VS-2020-034

Beat2Phone ECG Cloud Service User Manual

Professional user

Beat2Phone ECG

Powered by VitalSignum

Version 8.0

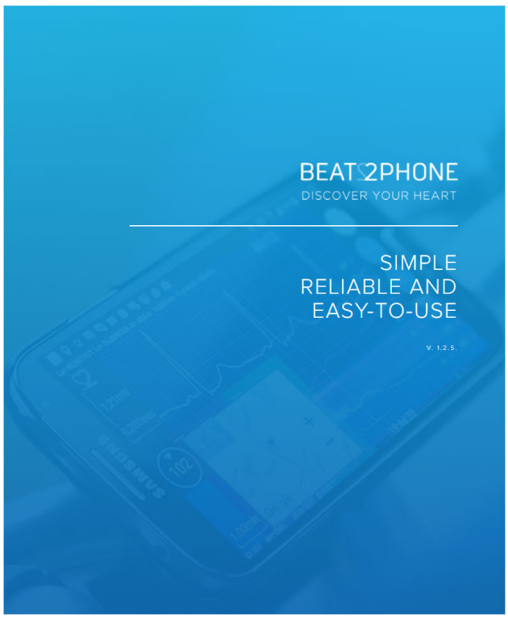
2.9.2021

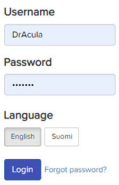
Logging in and account settings

You can find the Beat2Phone ECG Cloud Service at https://www.beat2phone.net

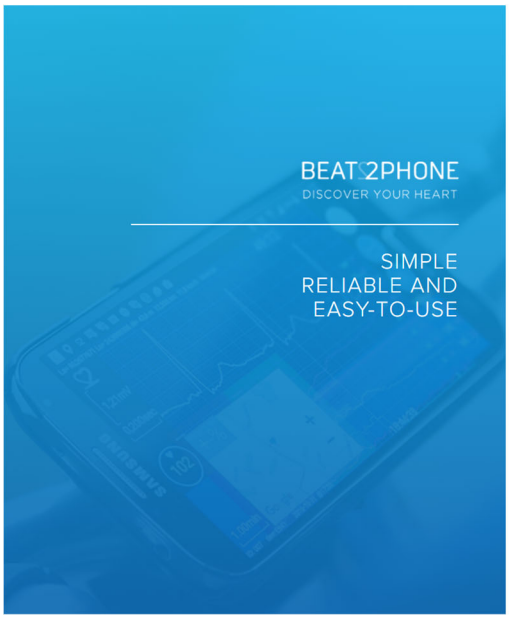
Select language between English and Suomi (Finnish) prior to login.

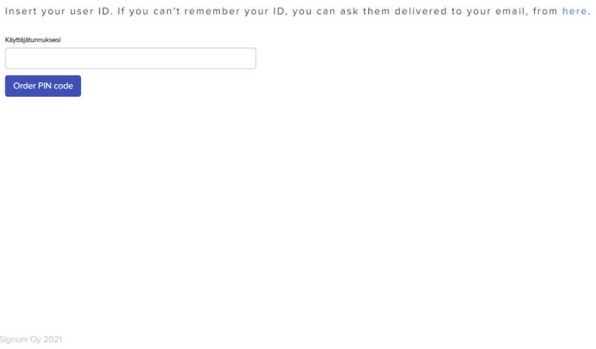
To log in to the cloud service, use the username and password that you have created in the Beat2Phone ECG mobile application, or that have been created for you by your organization admin. If you try to log in with a wrong password too many times in a row, your user account will be locked for security reasons. You cannot log in to the cloud service or the mobile application with a locked account, you must unlock the account first. The account can be unlocked be following the instruction below, that are also used to restore a forgotten password.





If you have forgotten your password or if your account is locked, choose “Forgot password?” next to the login button. By inserting your user id, the system will send you a PIN code to reset your password. The PIN code will be sent to the email that was used to create your user profile. Password must be at least 6 characters long, and special characters are allowed.





If you cannot remember your user ID, you can order a list of your usernames to your email by clicking the link that says “here”.

A form to input your email opens. By inputting the email that you used to create your profile, the system sends your username(s) to your email.

After successfully logging in, you can change your account settings from the “Account” button in the top right corner.

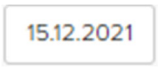
Currently a professional can only change email and password. Once you have made the changes you get the message from the service with re-login and user profile restoring.

After which you need to login again.

Patient and measurement list view

After logging in, you will see a list of patients belonging to your organization. Select active organization is visible only when you belong to several organizations.

You will see a list of patients. The uppermost patient is the patient with the most recent measurement. To open the ECG view of the most recent measurement of a patient, click on the button with the date and time of the measurement.



NOTE: Beat2Phone ECG sensor- CE_{0598} must be used for the patient ECG measurement to be listed.

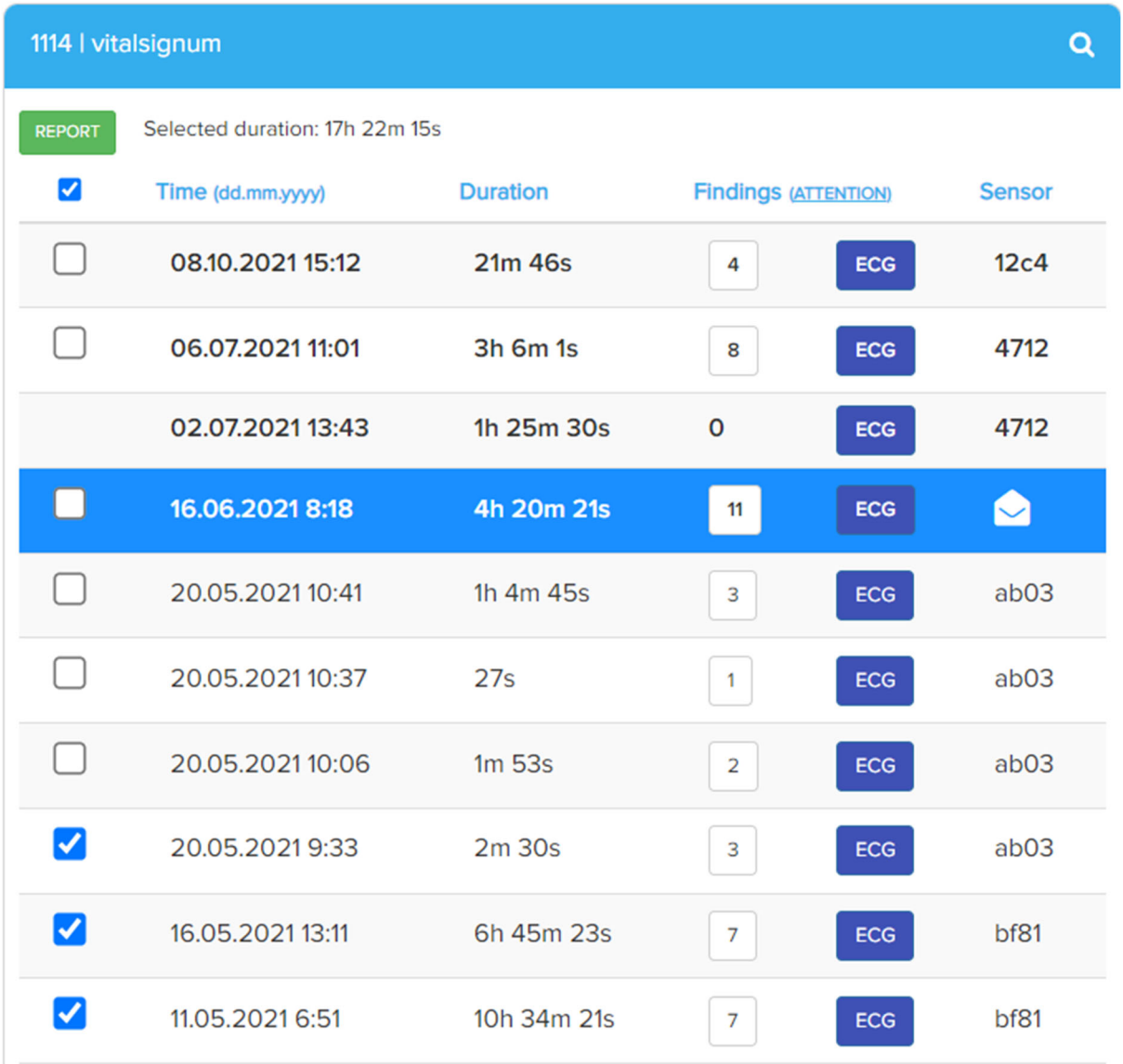
To add new patients to your organization, scroll down to the end of the patient list and select “Add patient”.

A form to input the patient ID opens.

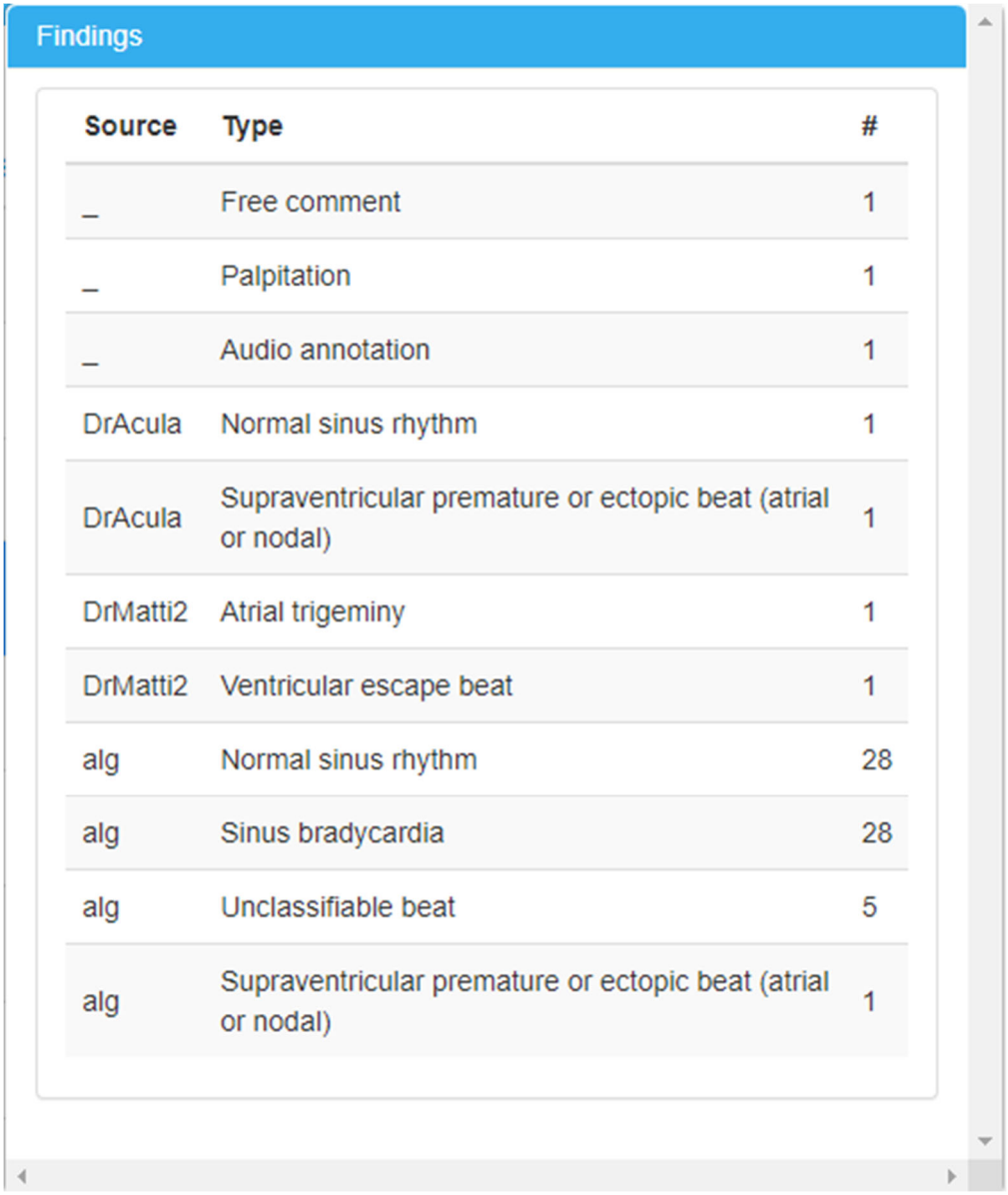
To choose a patient that you wish to examine more closely, click on the name of the patient.

NOTE: in case a Beat2Phone ECG user has shared her results with the professional, this user ID will appear on the patient list and this user’s recording are available to view. See ‘Access to private customer shared recordings’.

A list of measurements for the selected patient opens. The uppermost measurement is the most recent one. The duration of the measurement is shown in the duration field.



The findings field displays the number of different annotations made by the patient or by a professional and gives detailed information when hovered over.



Findings

Source	Type	#
_	Free comment	1
_	Palpitation	1
_	Audio annotation	1
DrAcula	Normal sinus rhythm	1
DrAcula	Supraventricular premature or ectopic beat (atrial or nodal)	1
DrMatti2	Atrial trigeminy	1
DrMatti2	Ventricular escape beat	1
alg	Normal sinus rhythm	28
alg	Sinus bradycardia	28
alg	Unclassifiable beat	5
alg	Supraventricular premature or ectopic beat (atrial or nodal)	1

If your organization has bought the Beat2Phone ECG analytics service[1], the findings field will also display those annotations. Hovering over the findings button opens a list of unique annotations. The list includes the source and type of an annotation, and the number of those annotations in the recording. The source of an annotation can be '-', meaning the patient, 'alg', meaning algorithm, or the user ID of a professional user.

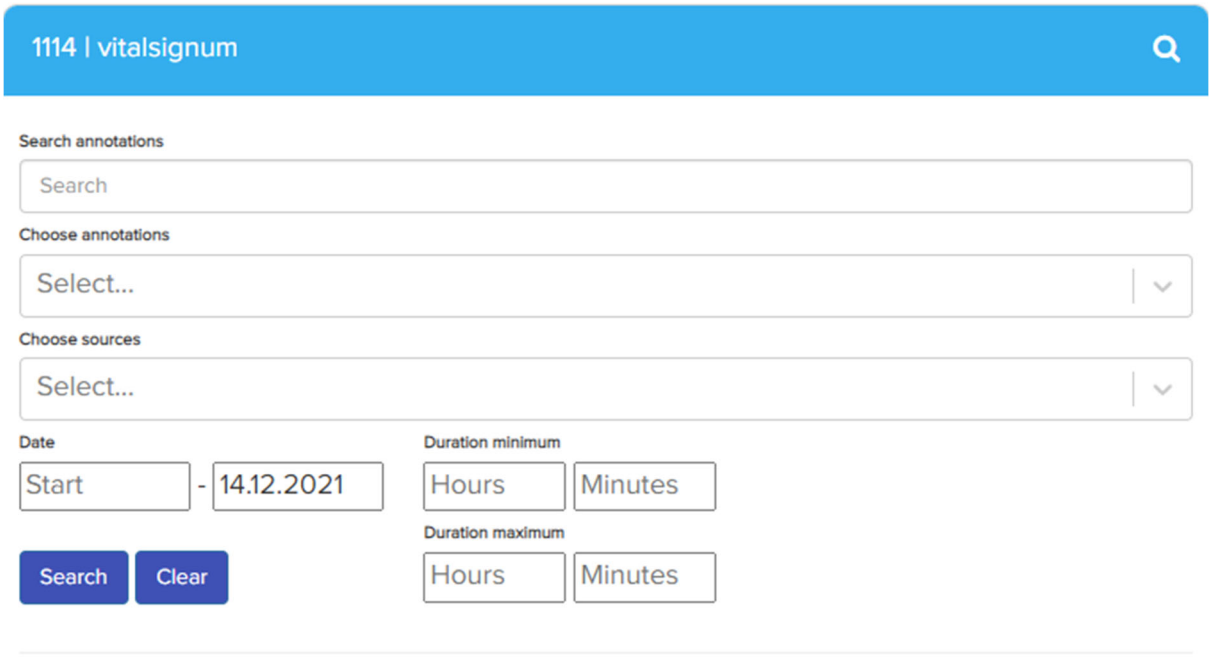
Measurements that have not been opened by a professional are marked with bold text. Once the ECG is opened, the bolding is removed. Just viewing the findings will only temporarily remove the bolding. You can also mark the measurement read or unread by hovering over the line and clicking the envelope symbol at the sensor column.

[1] Analytics service is provided by Cardiolyse CE_{0197}-marked software algorithm

ATTENTION: Algorithm (alg) annotations are not intended to be the sole means of diagnosis for any abnormal ECG. They are offered to physicians on an advisory basis only, in conjunction with the physician's knowledge of ECG.

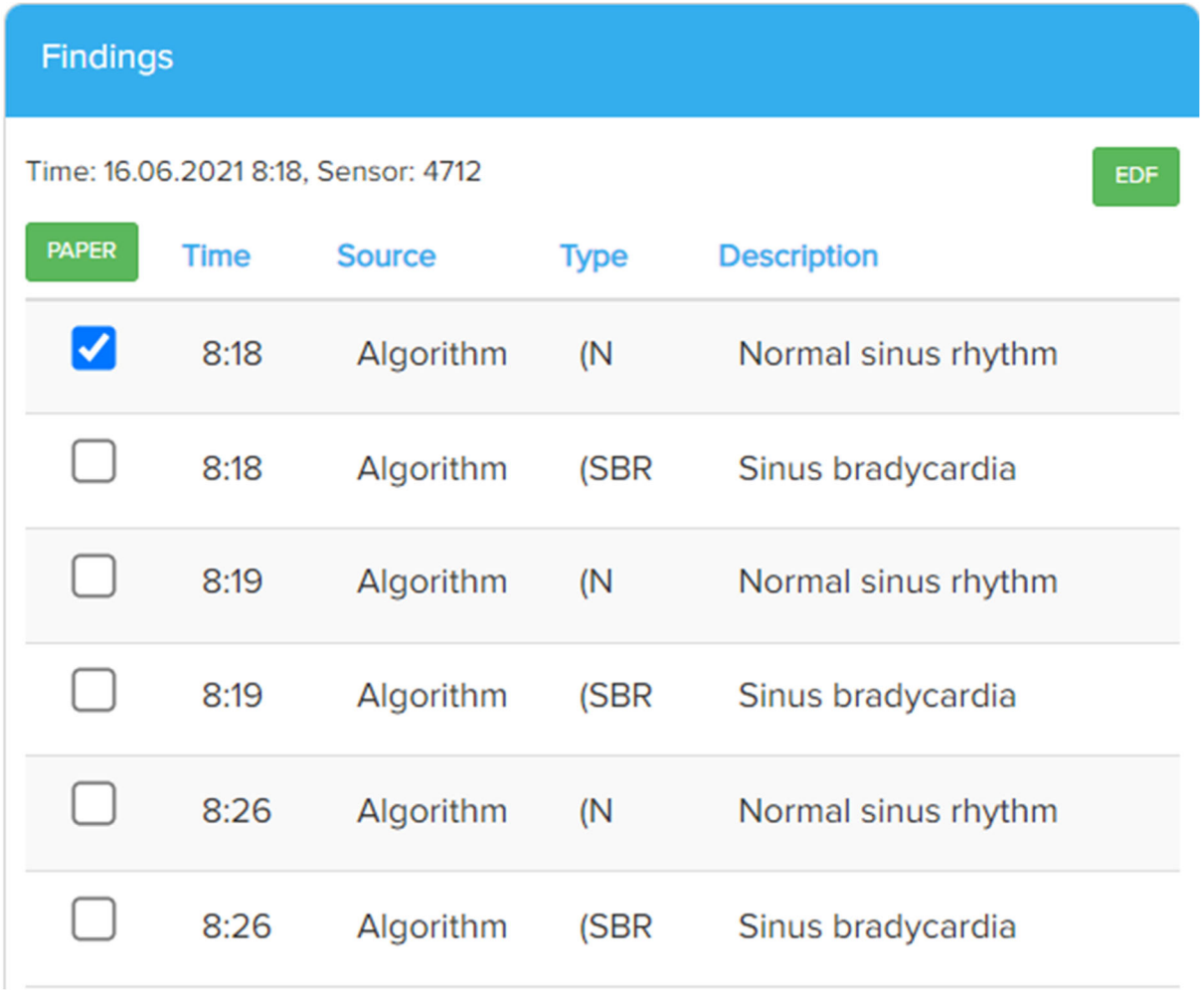
The ECG button opens the ECG chart view.

The measurement list also includes search functions behind the magnifying class symbol that can be used to filter the list of measurements with several different criteria, for example measurement duration and types of annotations.



Choose a recording you wish to examine by clicking the name of the recording.

Details about the measurement open to the right in a Findings column.



In this list, each annotation made by the patient, a professional, or the Beat2Phone ECG analytics service algorithm is displayed along with its time, type and description. By choosing an annotation from the list, the ECG graph view opens, and the ECG graph will be centered around the chosen annotation.

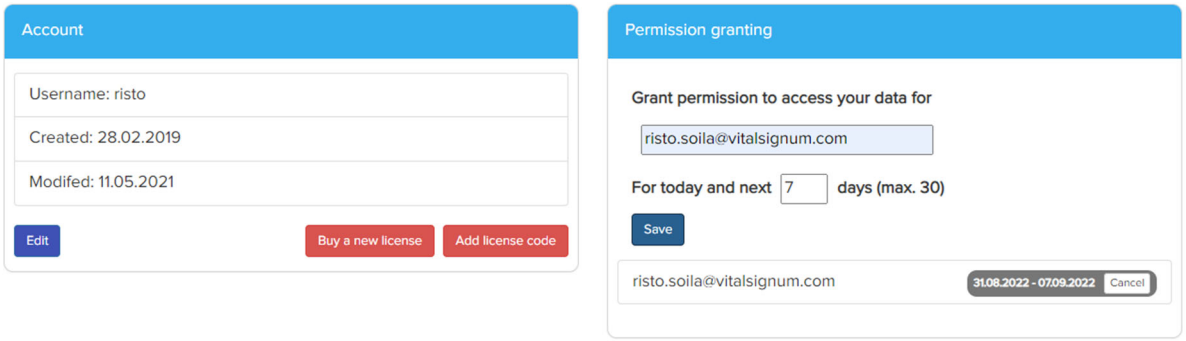
ATTENTION: Algorithm (alg) annotations are not intended to be the sole means of diagnosis for any abnormal ECG. They are offered to physicians on an advisory basis only, in conjunction with the physician's knowledge of ECG.

NOTE: The algorithm (alg) adds N marking of normal beat for first normal beat detected at the beginning of the recording and after each abnormal beat. Algorithm also adds (N marking of normal sinus rhythm detected at the beginning of the recording and after each abnormal rhythm.

You can create a millimeter paper report from the chosen annotations from the PAPER button. From the EDF button, you can download the ECG recording as an EDF file.

Access to private customer shared recordings

Private customers can share their recordings with a professional user through their account management. They need the professional user email address to initiate sharing their recordings for a selected period of time.

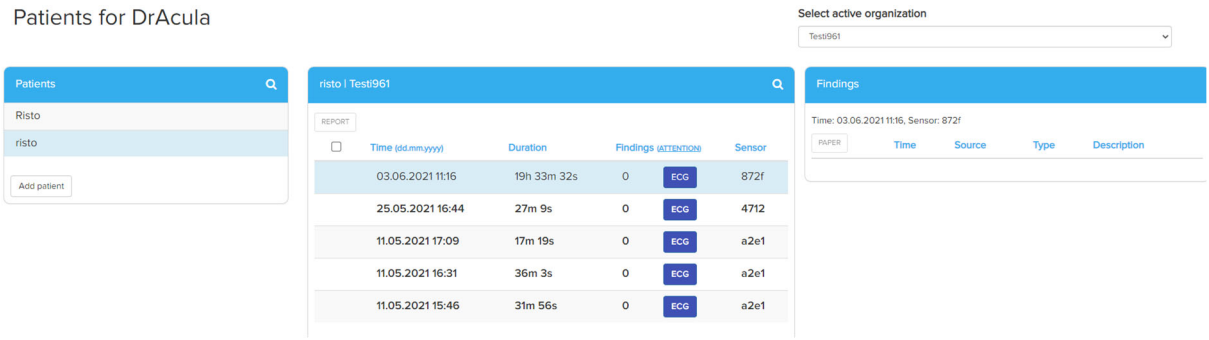


The professional having an existing Beat2Phone ECG account and organization (Testi961 in the example) receives an email notification about the shared access to private user recording:

”Sinulle on jaettu pääsy käyttäjän Risto Soila Beat2Phone EKG-mittauksiin. Näet ne kirjautumalla osoitteessa https://beat2phone.net/ tunnuksella DrAcula organisaatiossa Testi961. Mittaukset löydät merkittynä potilaalle, jonka tunnus on risto. Jako on voimassa 6.9.2022 asti. - You have been shared access to the Beat2Phone ECG measurements of Risto Soila. You can see the measurements by logging in to https://beat2phone.net/ with the userid DrAcula in Testi961. You can find the measurements with the patient id risto. The share can be accessed until 6.9.2022.“

The professional without an existing Beat2Phone ECG account will be created one with the professional email address as the user ID and automatically generated password to login to the service.

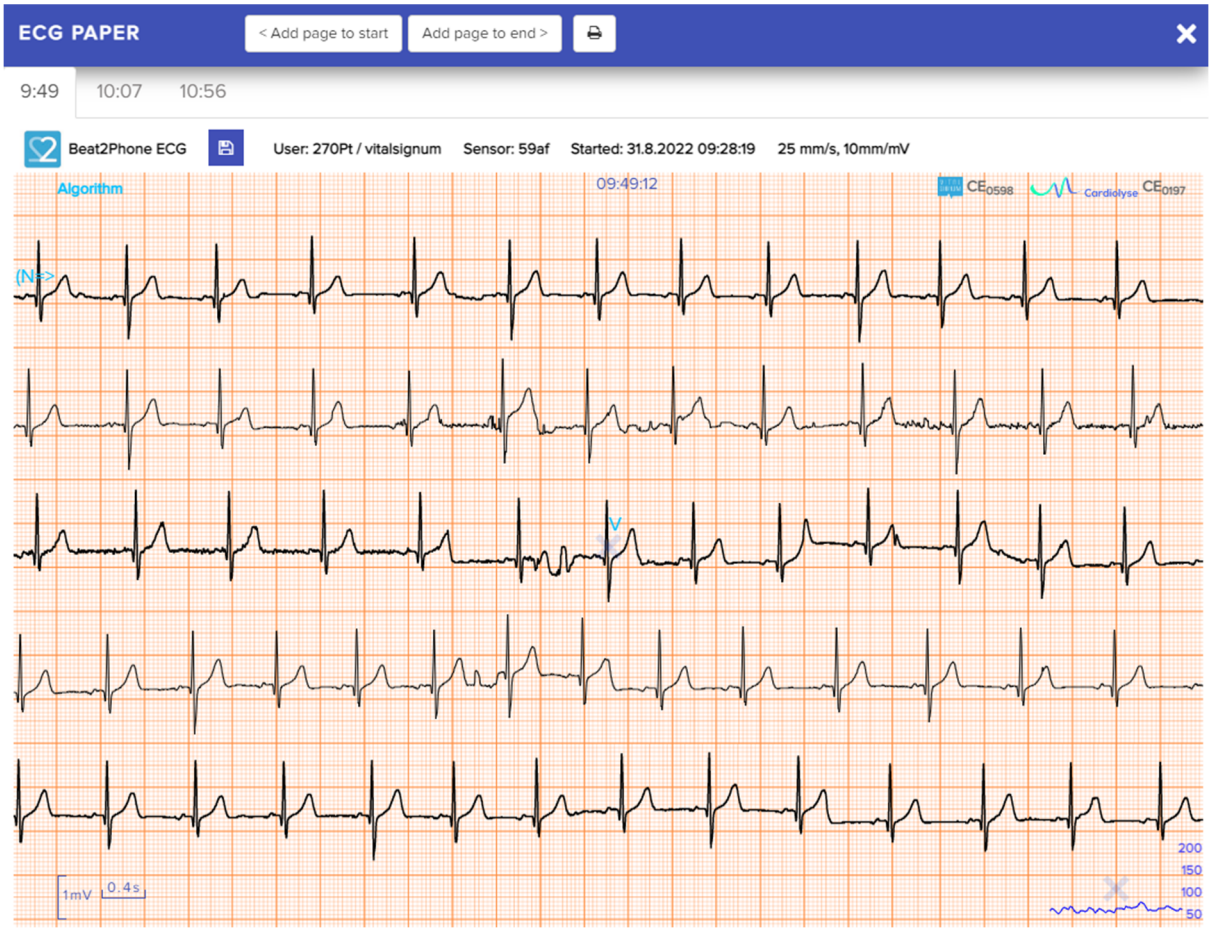
The private user ID is shown on the professional list of patients and recordings can be viewed as for any patient.



After the sharing expires access to the private user ID recordings will be removed from the professional’s list of patients.

Millimeter paper report from annotations

You can create a millimeter paper report from chosen annotations from the annotation list view. First, choose the annotations you want to include by using the check box. Then, click the PAPER button. After clicking the PAPER -button, the report from the chosen annotations opens.



You can move between annotations by clicking the numbered tabs. “Add page to start” and “Add page to end” buttons are used to add ECG signal around the chosen annotation, either before the annotation or after the annotation. The print button (printer) is used for printing the ECG signal to either paper or pdf, and the save button (disk) is used for saving the ECG signal as png image. The prevalent rhythm algorithm marking is shown at the first beat of the ECG mm-paper sample. The scales of the mm-paper sample are at the bottom left corner.

ECG graph view

The ECG graph view opens from the start of the measurement by default. If you opened it by choosing an annotation from the list view, the graph will be centered around the chosen annotation.

The white graph in the middle is the ECG graph, the yellow one below is the HR graph, and the red one is the HRV graph displaying the changes in the heart rate and heart rate variation.

The horizontal bars between the ECG and HR/HRV graphs highlight the detected rhythm periods – sinus bradycardia in this example – however an AF rhythm period would be similarly highlighted from the beginning of the rhythm to the end of it.

ATTENTION: Sometimes annotations made by the algorithm (alg) might be slightly off, e.g. off by one R peak (beat) on the ECG.

An annotation by the algorithm can be approved, questioned, or deleted by the professional.

Click the green check mark to agree, question mark to suspect and trash mark to remove the marking.

On the left of the screen, you can see the scale of the measurement view ECG. Two squares vertically are 1.00 millivolts, and two squares horizontally are 0.200 seconds. The horizontal ECG and HR scale can be zoomed in and out with the mouse scroll wheel. You can reset the scale by clicking the Beat2Phone logo on the left. In addition, the heart rate is (HR) and the heart rate variation (HRV) and their time scale displayed on the left.

Reset the scale

Vertical scale

Horizontal scale

HR

Time scale

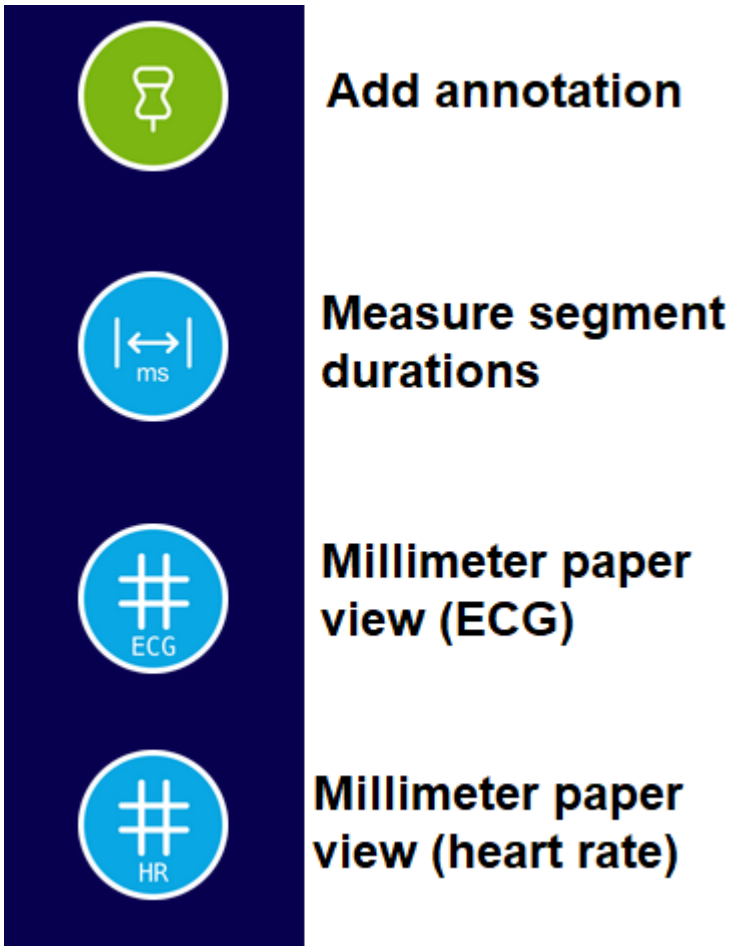
HR Variation

On the top of the screen, there are controls for moving between annotations and automatically playing the ECG graph. From 'Annotations', you can filter the annotations by type and source and use the arrows to move between annotations. From 'Play/Pause' you can choose whether to play the ECG graph or the HR graph. After that, the arrow keys are used to control whether the playback is forwards or backwards. From 'Speed Control' you can adjust the playback speed. With the Start and End -buttons you can quickly move to the beginning and the end of the ECG view.

Annotation source | Annotation type | Move between annotations | Choose ECG/HR | Goto start | Play back | Play fwrd | Goto end | Playback speed

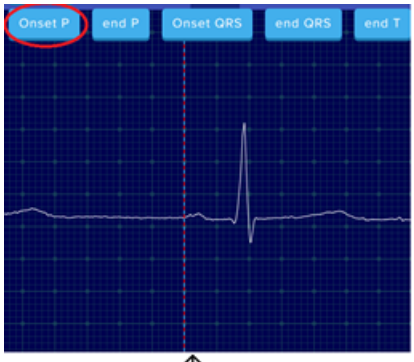
On the right, there are various buttons. From the 'Add annotation' button, predefined annotations and 'free comment' to add text can be selected from the list and added to the registration. From the next button (ms), you can open a tool for measuring the duration of different segments in the ECG. From the

third button (ECG), you can open a millimeter paper view of the ECG. The last button (HR) opens a millimeter paper view of the heart rate graph.



Segment duration measurement tool

The segment duration measurement tool can be used to estimate the duration of different waves and segments. You use the tool by first dragging the vertical dotted line to the correct spot, for example to the onset of the P wave, and then clicking the corresponding button from the top. By repeating this step for all points, the tool calculates the durations.



Drag the dotted line to the onset of the P wave and choose 'Onset P'

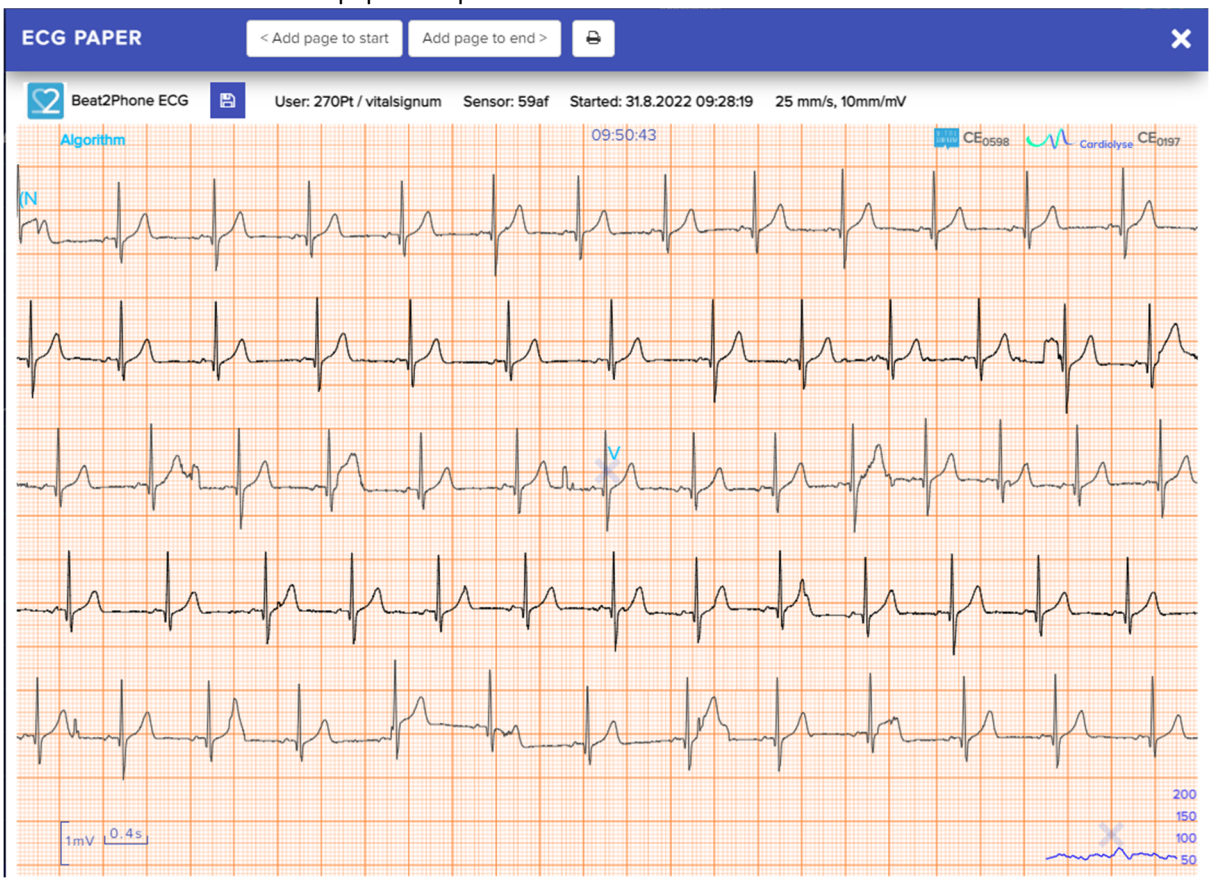
Drag the dotted line to the end of the P wave and choose 'end P'

The tool displays the duration of the P wave in milliseconds

Millimeter paper view

The millimeter paper view shows 30 seconds of ECG from the selected spot on the ECG view, 15 seconds backwards and 15 seconds forwards from the spot. A cross X is visible on the millimeter paper to indicate the selected spot. The time for the selected spot is shown on the top of the mm-paper. The HR graph from the whole recording is displayed on the bottom right corner of the millimeter paper. The HR graph also includes the cross X that indicates the selected spot.

Annotations are also available on the millimeter paper. Annotation source is show in distinct colors explained at top left on the mm-paper. Annotation short form notations are visible see Used annotation markings. Algorithm (Cardiolyse) analysis annotations are visible on the mm-paper view provided that the organization has purchased the analysis service. The prevalent rhythm algorithm marking is shown at the first beat of the ECG mm-paper sample.



The scales of the mm-paper sample are at the bottom left corner. The millimeter paper can be saved as an image by selecting the save button (floppy disk).

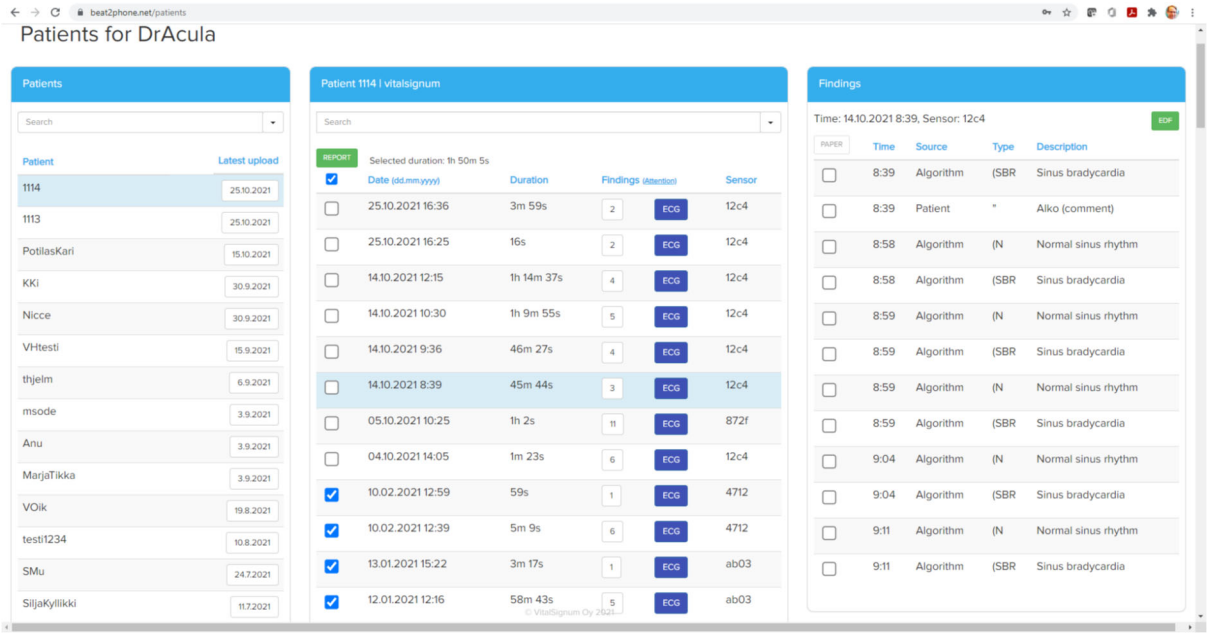
file name PatientID-RecordingID.png is suggested – for example **1118-20201028T111715+0200__872f.png** where 1118 is the Patient ID, 20201028T111715+0200 the recording start time, and 872f is the used sensor ID (MAC-address last four hexa numbers).

The millimeter paper can be printed or saved as pdf by right clicking the millimeter paper and selecting Print… or by using the shortcut ctrl+P.

To exit the millimeter paper view back to ECG view click the cross on top right corner of the mm-paper window or the ECG view on the background. Using the back button of the browser returns you to the recordings list.

EGG Analysis

Professional organization may purchase ECG analysis by Cardiolyse (CE_{0197}) algorithm. In this case the ECG recording is passed to the algorithm and the analysis results are displayed at the browser GUI measurement list, findings list, and the ECG graph view.



NOTE: The algorithm (alg) adds N marking of normal beat for first normal beat detected at the beginning of the recording and after each abnormal beat. Algorithm also adds (N marking of normal sinus rhythm detected at the beginning of the recording and after each abnormal rhythm.

ECG Analysis Report

Each recording is provided with an ECG Analysis report provided that the reporting service is purchased. The report can be opened from the patient recordings list by selecting recording and clicking the REPORT -button.

The opening report -pdf can be saved. The default name of the file is PatientID-recordingID.pdf – for example 1118-20201028T110054+0200__872f-report.pdf

ECG Period Analysis Report

A combination report can be generated provided that this service is purchased. The combination report is generated by selecting more than one recording from the patient recording view and clicking the CREATE -button. When the report is available the REPORT -button is shown for the selection. It takes some time to generate the report during which the WAIT -button is shown. The generation is done in the cloud, so there is no need to wait for it to complete. The ready reports for the selections are stored in the cloud and appear available when the same selection is made again. The most recent report recording selection is shown when the patient recording list is re-opened from the patient list.

The opening report -pdf can be saved. The default name of the file is PatientID-reportID.pdf – for example 1118-1603872252169_0-report. The report provides a list of recordings included.

ECG report details

The ECG report consists of several pages with information about the recording or recordings.

Used annotation abbreviations

The Beat2Phone ECG analytics service uses abbreviations for annotations in the millimeter paper view and in some lists. The full list of annotation abbreviations is as follows:

'F1': 'Irregular rhythm',

'F2': 'Extra beat',

'F3': 'Palpitation',

'F4': 'Chest pain',

'N': 'Normal beat',

'L': 'Left bundle branch block beat',

'R': 'Right bundle branch block beat',

'B': 'Bundle branch block beat (unspecified)',

'A': 'Atrial premature beat',

'a': 'Aberrated atrial premature beat',

'J': 'Nodal (junctional) premature beat',

'S': 'Supraventricular premature or ectopic beat (atrial or nodal)',

'V': 'Premature ventricular contraction',

'r': 'R-on-T premature ventricular contraction',

'F': 'Fusion of ventricular and normal beat',

'e': 'Atrial escape beat',

'j': 'Nodal (junctional) escape beat',

'n': 'Supraventricular escape beat (atrial or nodal)',

'E': 'Ventricular escape beat',

'/': 'Paced beat',

'f': 'Fusion of paced and normal beat',

'Q': 'Unclassifiable beat',

'?': 'Beat not classified during learning',

'(AB': 'Atrial bigeminy',

'(AFIB': 'Atrial fibrillation',

‘(AFL’: ‘Atrial flutter’,

‘(B’: ‘Ventricular bigeminy’,

‘(BII’: ‘2° heart block’,

‘(IVR’: ‘Idioventricular rhythm’,

‘(N’: ‘Normal sinus rhythm’,

‘(NOD’: ‘Nodal (A-V junctional) rhythm’,

‘(P’: ‘Paced rhythm’,

‘(PREX’: ‘Pre-excitation (WPW)‘,

‘(SA’: ‘Sinus arrhythmia,

‘(SI’: Sinus arrhythmia,

‘(SBR’: ‘Sinus bradycardia’,

‘(STH’: ‘Sinus tachycardia’,

‘(SVTA’: ‘Supraventricular tachyarrhythmia’,

‘(T’: ‘Ventricular trigeminy’,

‘(VFL’: ‘Ventricular flutter’,

‘(VT’: ‘Ventricular tachycardia’,

‘[’: ‘Start of ventricular flutter/fibrillation’,

‘!’: ‘Ventricular flutter wave’,

‘]’: ‘End of ventricular flutter/fibrillation’,

‘x’: ‘Non-conducted P-wave (blocked APC)‘,

‘(’: ‘Waveform onset’,

‘)’: ‘Waveform end’,

‘p’: ‘Peak of P-wave’,

‘t’: ‘Peak of T-wave’,

‘u’: ‘Peak of U-wave’,

‘`’: ‘PQ junction’,

‘\’’: ‘J-point’,

‘^’: ‘(Non-captured) pacemaker artifact’,

‘|': ‘Isolated QRS-like artifact’,

‘~’: ‘Change in signal quality’,

‘+’: ‘Rhythm change’,

‘s’: ‘ST segment change’,

‘T’: ‘T-wave change’,

‘*’: ‘Systole’,

‘D’: ‘Diastole’,

‘=’: ‘Measurement annotation’,

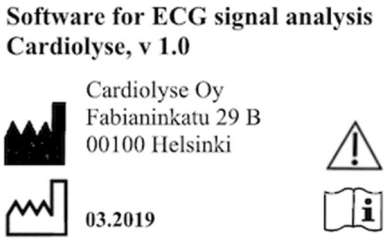
‘DEV’:‘Deviation from normal’,

’ ” ’: ‘Comment annotation’

‘audio’: ‘Audio annotation’

The analytics service algorithm sometimes fails to classify beats due to signal artefacts. The algorithm annotation ‘Unclassified beat’ is filtered out from the GUI for the sake of clarity.

Cardiolyse information



CE 0197

Cardiolyse CE_{0197} Standalone software for ECG signal analysis – HD 60145512 0001

Cardiolyse instructions for use:
https://docs.google.com/document/d/1SwFXwcrBjzvh3ElFcNKHz3f5OzTWID-x4qCy3qnM7dw

CONTACT INFORMATION

CARDIOLYSE OY,

GE Health Innovation Village, 2 Kuortaneenkatu, Helsinki, 00510.

https://cardiolyse.com

Contact: info@cardiolyse.com

INTENDED USE

The Cardiolyse is intended to record, store, analyze, display and transfer up to twelve (12) leads electrocardiogram (ECG).

The Cardiolyse software performs QRS, Ventricular Ectopic Beats, Supraventricular ectopic beats detection, QRS feature extraction, interval measurement, heart rate measurement, rhythm analysis and abnormal ST-T changes for up to 12 leads ECG.

Cardiolyse software also performs automatic ECG interpretation of common abnormalities, including ventricular hypertrophy and myocardial infarction for 12 leads ECG.

The Cardiolyse interpretation results are not intended to be the sole means of diagnosis for any abnormal ECG. They are offered to physicians on an advisory basis only in conjunction with the physician's knowledge of ECG.

The device has not been tested and it is not intended for pediatric use.

CONTRAINDICATIONS

People below 18 years old

SAFETY AND PERFORMANCE

Cardiolyse.me software as a medical device safety and performance was validated based on device's equivalence and clinical evaluation data.

ECG algorithms were validated on widely acceptable databases MIT-BIH, NST, CU, ESC as well as CSE.

Algorithm's sensitivity and specificity is highly dependent on signal quality provided by device.

VitalSignum Information

Beat2Phone ECG Service

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