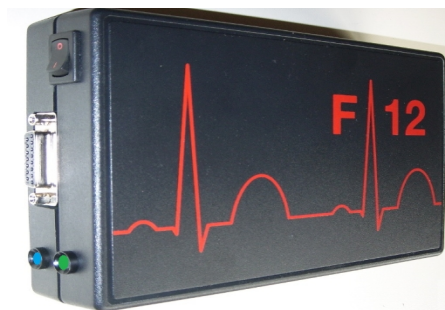
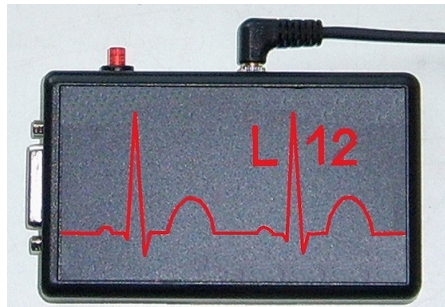


Android



ECG L12 and F12BT.



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Preface

Since we launched our first PC-based ecg apparatus, a quarter of a century is already passed.

Both the personal computer and our software changed a lot since then.

Recent years showed the coming of smart phones and tablets.

Android™ is now the tablet market leader.

We are glad to announce that our two ecg apparatus **L12 and F12 BT** are able to function with Android tablets and most phones **without any hardware modification**.

EcgL12 is connected and powered by micro USB port of Android device with OTG-host capability.

F12 BT bluetooth is connected to Android tablet or phone with Bluetooth.

More then ever your device is now portable.

New recordings are transferred easy to your Windows PC for integration in your patient database.

The technical specifications of the ecg apparatus are in the EcgL12En.pdf and EcgF12BT manuals.

Minimal configuration of Android device

Dual core processor, CPU 1 ghz or more.

Operating system **3.2** (Honeycomb) or higher

USB port with **OTG** (on the go) capability for **L12**

Bluetooth for **F12BT**

Minimal screen resolution of 600*800

Minimal dimension of the screen is only 4.5 inch.

Transfer of new recordings to your PC is possible by means of various ways

Home wifi network

Windows file explorer.

Connection to an USB stick

Bluetooth

Email

User requirements:

A minimal knowledge of the Ecg signal and Android is already a good starting point.

1 Installation

Software installation

The software is available as download in the Google Play Store.
Search “Apps” (applications) - Category “Medical” for “L12 ecg “
The recorded *.f12 ecg files are located in
Android/data/com.ganseman.ecg/files

In the same directory are also located the configuration file in ConfigEcg.xml and the configuration file for the automatic protocol in EcgProtocol.xml.

Upgrade from the playstore:

Your recordings will not be deleted. Only ecg.apk (+=.exe) will be replaced by a newer version.

Delete the software

By means of Apps-Uninstall it is possible to uninstall the software.
Attention: all recordings will also be deleted

Hardware installation of L12 with USB connection

= Connection to the micro USB port.

The ecg software has to be installed first!



It's not necessary to turn off Android.

Most tablets and phones are equipped with a micro USB female connector.

You need an **USB OTG cable**.

This is not the same as a connection cable between a micro usb connector and a classic usb A connector. An **OTG** cable has pin 4 and pin 5 connected together.

Plug the USB serial converter in a free USB port and wait a few moments.
Android will pop-up a message when the installation is ready.
Select OK.

2 Main menu

After launching of Ecg app, the following screen appears :

Ecg					
<< 1 >> Search 1 to 9 out of 15					
	Name	Firstname	Birth	ID	Files
A	Record				
B	View	Posterior infarctus	-	1938 11 07	M480 2003_04_03_16_18_41.f12
C	PQRST	RVH	RAH	1953 11 06	M18 2003_08_07_19_51_49.f12
D	Protocol	BFB	LAHB + RBBB	1937 04 12	M202 2005_02_01_17_15_40.f12
E	Setup	Posterior infarctus	-	1938 11 07	M480 2005_02_01_18_59_01.f12
F	Functions	Acut anterior infarctus	LAHB	1946 11 04	M04 2005_02_01_21_26_14.f12
G	Quit	AVNRT	-	1954 03 04	V800 2005_03_01_21_12_31.f12
		RBBB	-	1927 11 30	M400 2006_03_11_02_03_01.f12
		LBBB	-	1926 07 12	V405 2008_03_01_21_57_59.f12
		Acut inferior infarctus	-	1952 11 21	M072 2009_01_16_21_13_57.f12
		About	Info	Manual	Site

The list in the middle contains the recordings. After installation the list contains some examples. *The personal patient data were replaced by the name of a pathology. Wait until you performed some new recordings, to delete the examples with button F "Functions" - "Delete"*

Above on the grid from left to right you find:

Name

First name

Date of birth. In this order year(4 digits)-month(2 digits)-day(2digits)

ID number

Path name and ecg file name

At left are 7 control buttons.

A New record.

B View.

C PQRST

D Protocol

E Setup. **Do this once before first recording !**

F Functions: Delete, JPG, PNG and Share-export of selected file.

G Quit.

Sorting

Ascending and descending sorting of data in each column is possible by tapping on the corresponding header.

Example below shows data sorted by birthdate.

Record	Name	Firstname	Birth	ID	Files
View	Long	RAH+LAH	2000 02 28	M402	2022_05_23_18_10_42.f12
PQRST	WPW	I	1960 10 10	M38	2012_02_01_21_22_02.f12
Protocol	WPW	II	1956 07 21	V38	2010_12_01_11_08_47.f12
Setup	AVNRT	-	1954 03 04	V800	2005_03_01_21_12_31.f12
	RVH	RAH	1953 11 06	M18	2003_08_07_19_51_49.f12
	Acut inferior infarctus	-	1952 11 21	M072	2009_01_16_21_13_57.f12

Search a record.

A. Enter part of name, first name, birth date or ID to search a record.

Record	Name	Firstname	Birth	ID	Files
View	LBBB	-	1926 07 12	V405	2008_03_01_21_57_59.f12

B. Tap on the cross to show all recordings again!

The buttons below of the screen About-Info-Manual-Site

If you have an internet connection, "Manual" and "Website" allow direct contact to the online manual and our website.

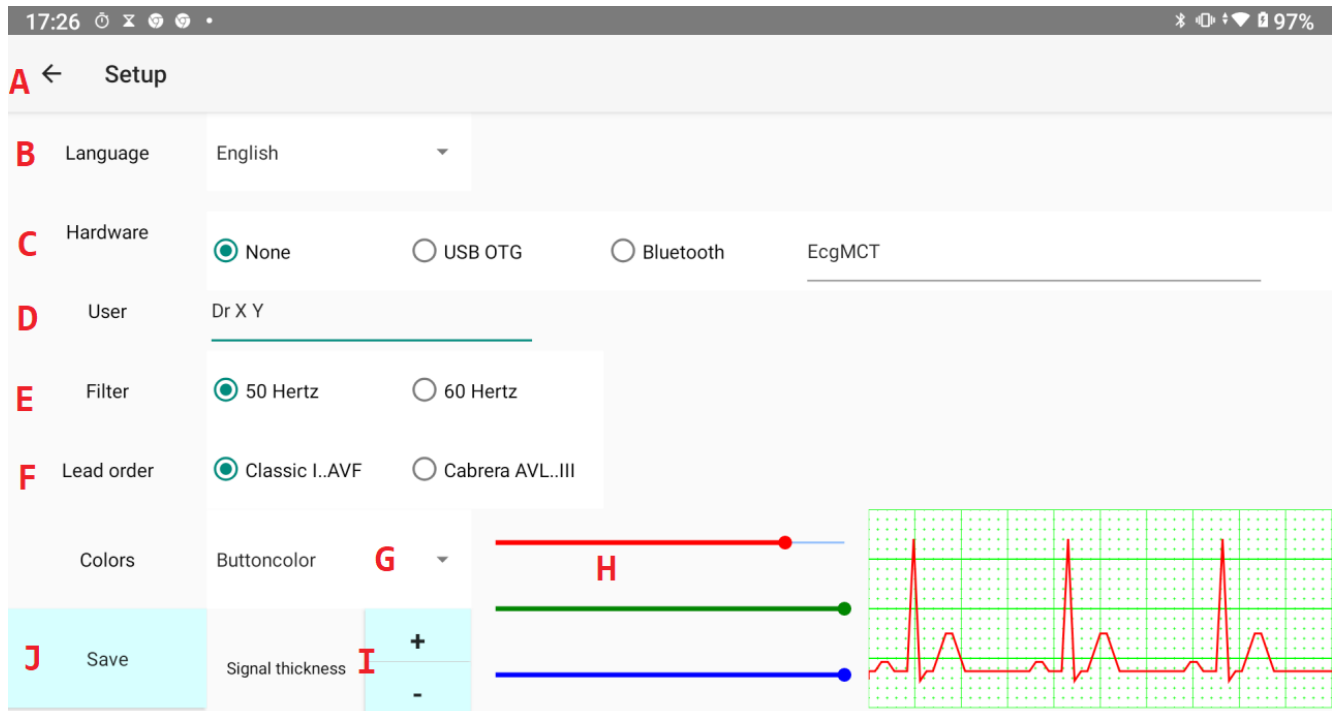
Select a patient and his recording.

Up and down scrolling in the list is easy.

Tap once on a record to select it.

It becomes light yellow coloured.

3 Setup



A Tap on the arrow to quit setup screen without saving changes.

B Select language

C Hardware.

None: if no ecg apparatus is connected.

If none is selected and you select “Record” in the main menu, the software executes a simulated recording of one of the examples. This simulated record will not be saved.

USB OTG:

When ecg apparatus is connected to USB port.

Bluetooth:

When Ecg apparatus is connected by means of Bluetooth and EcgMCT is paired with Android.

If recording seems not to work, verify that you made the correct choice !

D User

Enter your title and name. This is stored with the record. Do this now !

E 50 Hertz or 60 Hertz:

power line of your country.

This option has some importance for digital filtering of the signal.

F Lead order of the peripheral leads.

Al though it is less used in some countries, Cabrera lead order is more logical.

G Colours of the buttons, signal and grid.

All have three colour bars (**H**) for selection of the amount of red, green and blue.

I Signal thickness

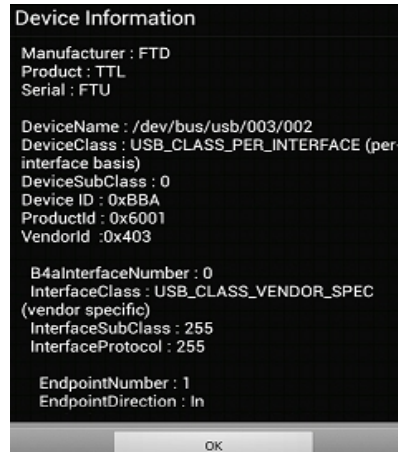
With the buttons + and – the signal thickness can be adjusted.

J Save button: saves changes and quits the setup screen.

4 Recording.

4.1 Apparatus L12 or F12 connected to micro USB port.

The first record on a new android device with usb will once pop up a message :



Click on 'OK' below.

4.2 Wireless Bluetooth recording with F12BT.

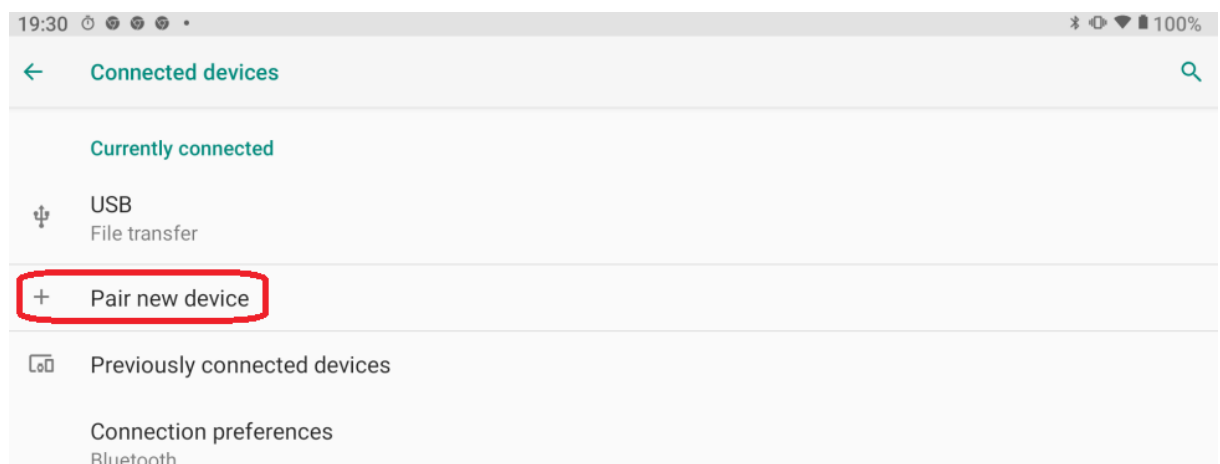
Verify in settings of Android that Bluetooth is turned on.

Before the first record, the ecg F12BT apparatus has to be paired with your Android device. Place F12BT next to tablet or phone and turn it on.

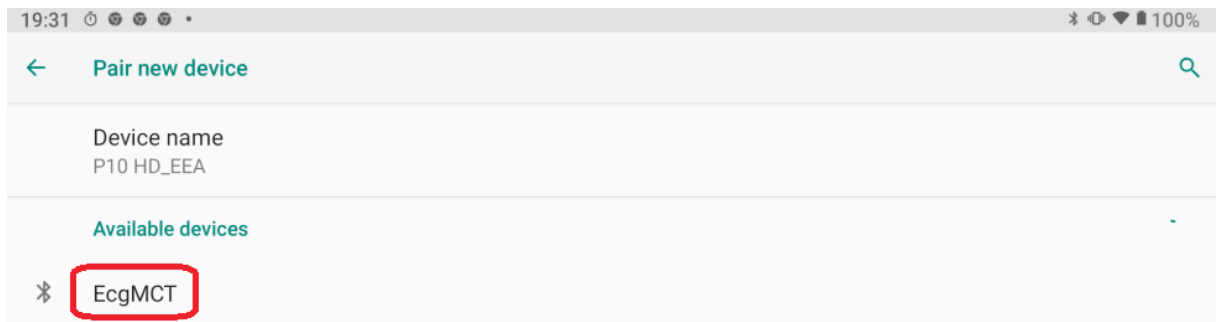
Pairing with EcgMCT in settings of Android

Bluetooth should be “ON” and Bluetooth Ecg ON.

Tap “Pair new device”



EcgMCT will be displayed. Tap on it to pair. Most often the pair code 1234 is not asked.



After a new installation, always test the apparatus first once without a patient !

Of course you see only disturbed signals. However if the “ecg” recording is finished in 10 seconds, it will be fine also with a patient.

For a real record, put the patient on a comfortable examination table. Apply gel or cream on the electrodes.

Turn the apparatus ON and tap on the main screen left above the button **“Record”**

Recording seems not possible:

Do not panic ! There are no mechanical parts inside the apparatus. A hardware failure is very unlikely.

Consider the following:

- Apparatus is not turned ON or battery is low (F12BT)

- Cables are not connected properly.

- Verify the correct choice – **bluetooth or usb in the setup !**

- When the F12BT apparatus is connected to tablet by means of the cable, wireless bluetooth recording is not possible!

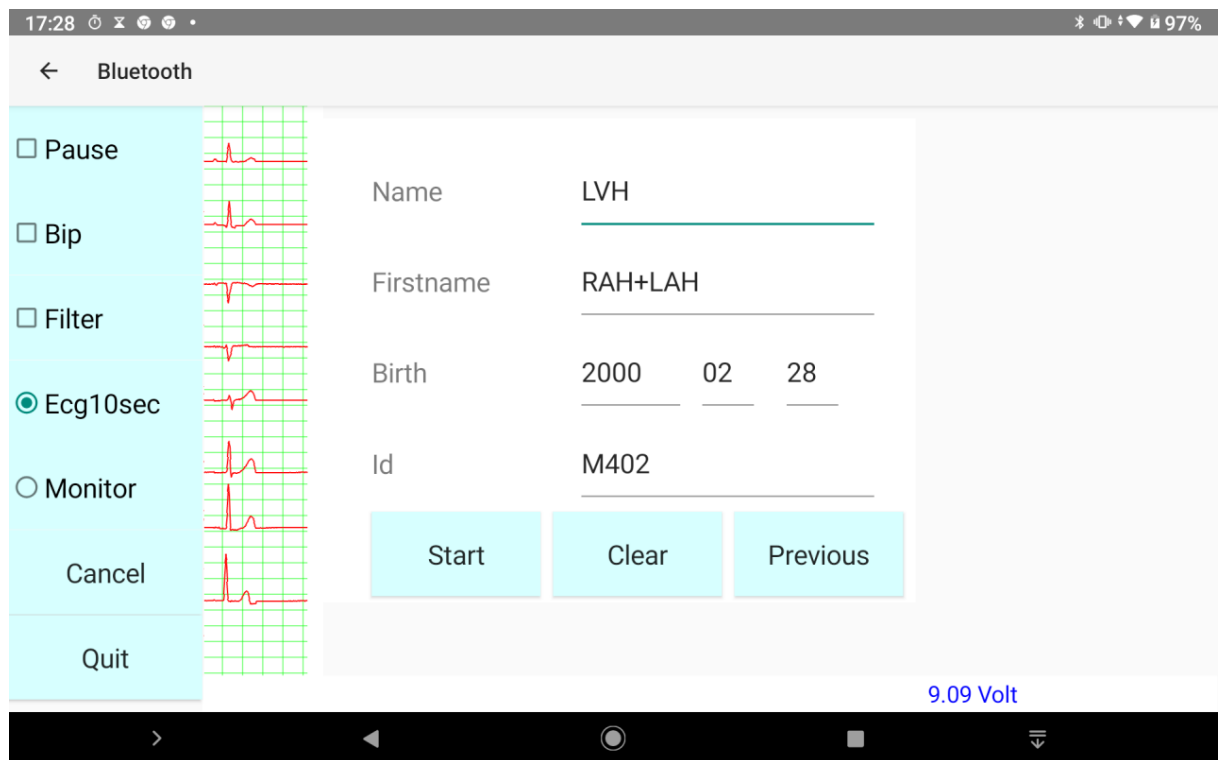
Press 'Cancel' on the recording screen and then again 'Record'.

If this should also fail, reset Bluetooth – pair – unpair - turn it on and off.

If all this fails, reset Android.

4.3 Start ecg 10 seconds recording

Wired or wireless recording shows the same screen.
On the left of the screen, a small part of the ECG is displayed.



If a lead is missing, attach the electrode again.

Before tapping “**Start**”, you have the possibility to **enter personal patient data**: name, first name, birth date format yyyy mm dd and Id number.

However, it's not always easy to enter the patient data with the Android keyboard. This depends of the CPU speed, the number of cores and dimensions of your Android tablet or phone.

Don't worry, there is still plenty of time to enter the patient data later in the protocol. If you don't like to use the Android keyboard, it's even not necessary to enter any data. After transfer of the recording(s) to Windows, you can enter them there: date and time are stamped into the *.f12 names.

If you did several recordings and did not enter any personal data, just note the time or order, when you did them.

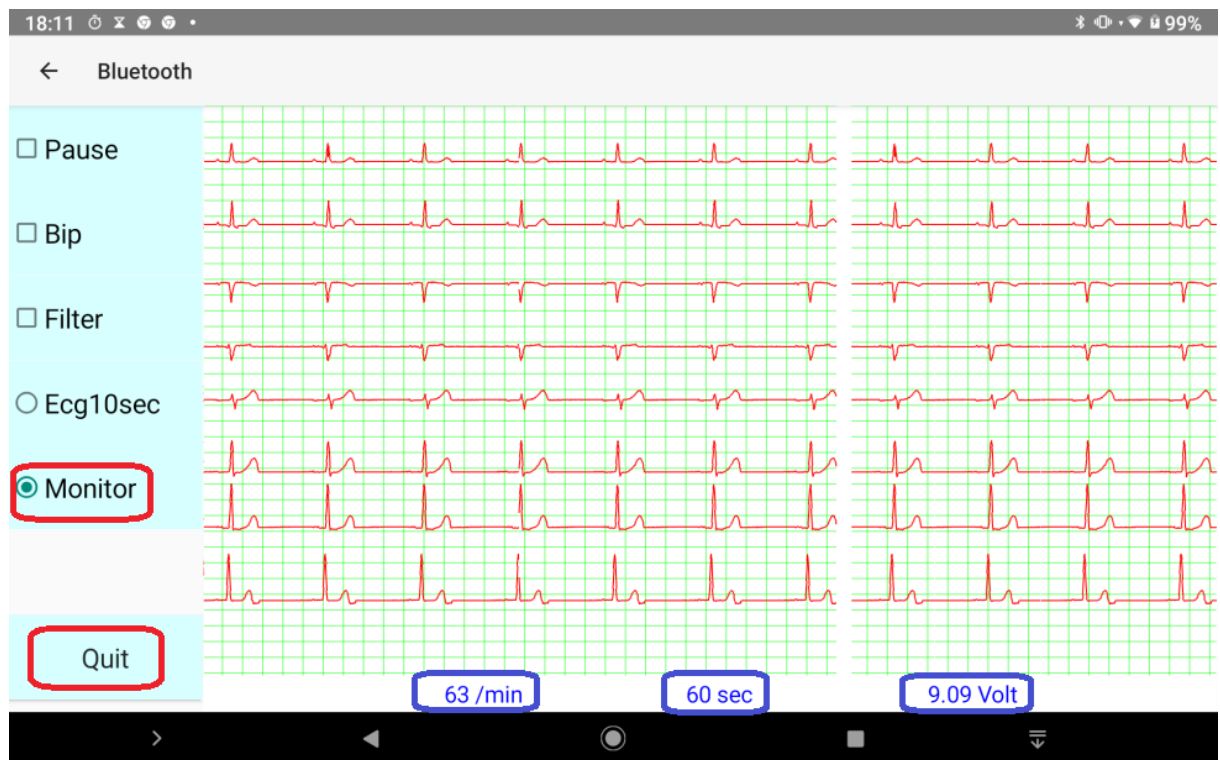
If you want a 10 sec ecg recording without entering any patient data, press button Start as soon as all leads are stable.

Button '**Clear**': data will be cleared.

Button '**Previous**'(9) If the previous recording was of the same patient.

4.4 Long time recording.

Other options on the recording screen are mostly important when you do a long time recording: select “**Monitor**”



Checkbox 'Pause' reattach a loosed electrode and uncheck pause to continue.

Checkbox 'Bip' probably, you will soon uncheck this annoying option..

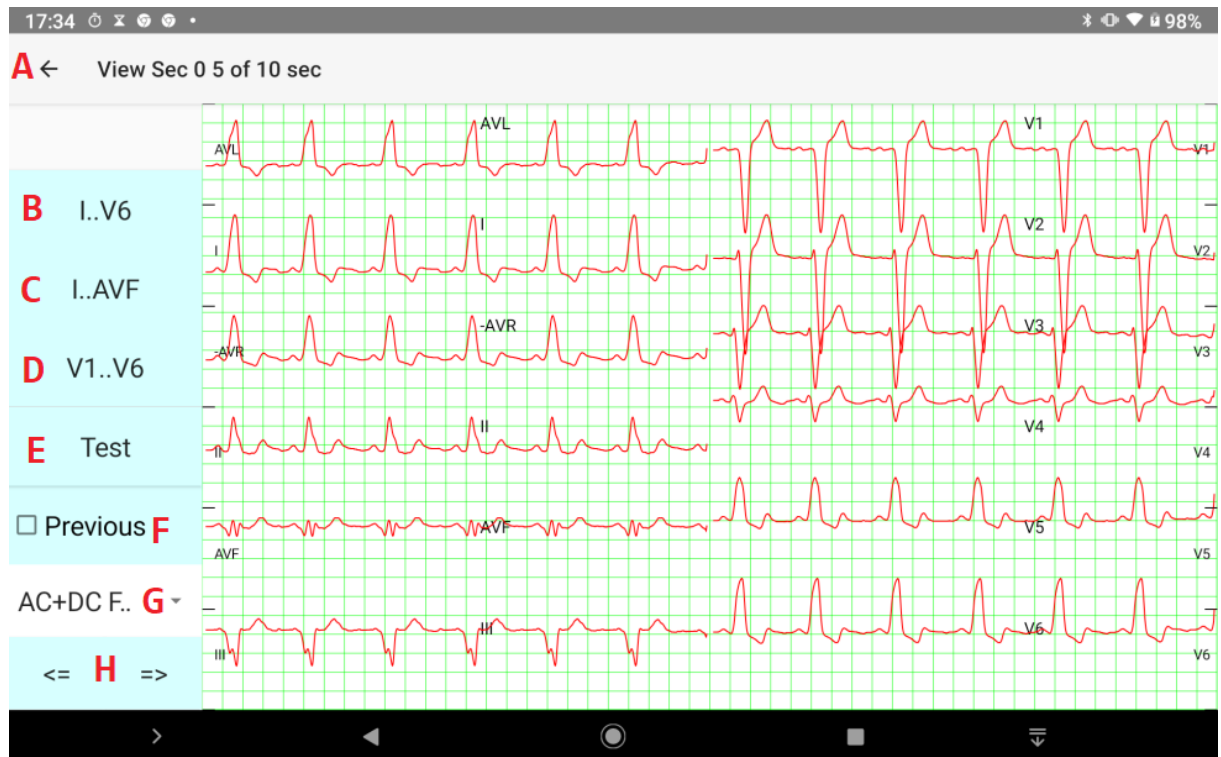
Checkbox 'Filter' turns the software filter during recording on or off

More explication about long time recording and exercise examination is located in the file \ Addenda_EN_Ecg.pdf These file is located on our site or on the CD-ROM in the directory \ Manuel\English Ecg.

Patient frequency, elapsed time in seconds and tension of battery (bluetooth) are displayed at the bottom of the recording screen.

Button '**Quit**' terminates the recording.

5 View of a 10 sec ecg recording (button B of the Main menu)



A Quit this screen

B View 5 sec of the 12 leads

C View 10 seconds of I..AVF in classic order or Cabrera lead order.

D View 10 seconds of V1..V6

E Test signal

F Compare with previous signal.

G Filter. Four possibilities: none, AC, DC and AC+DC

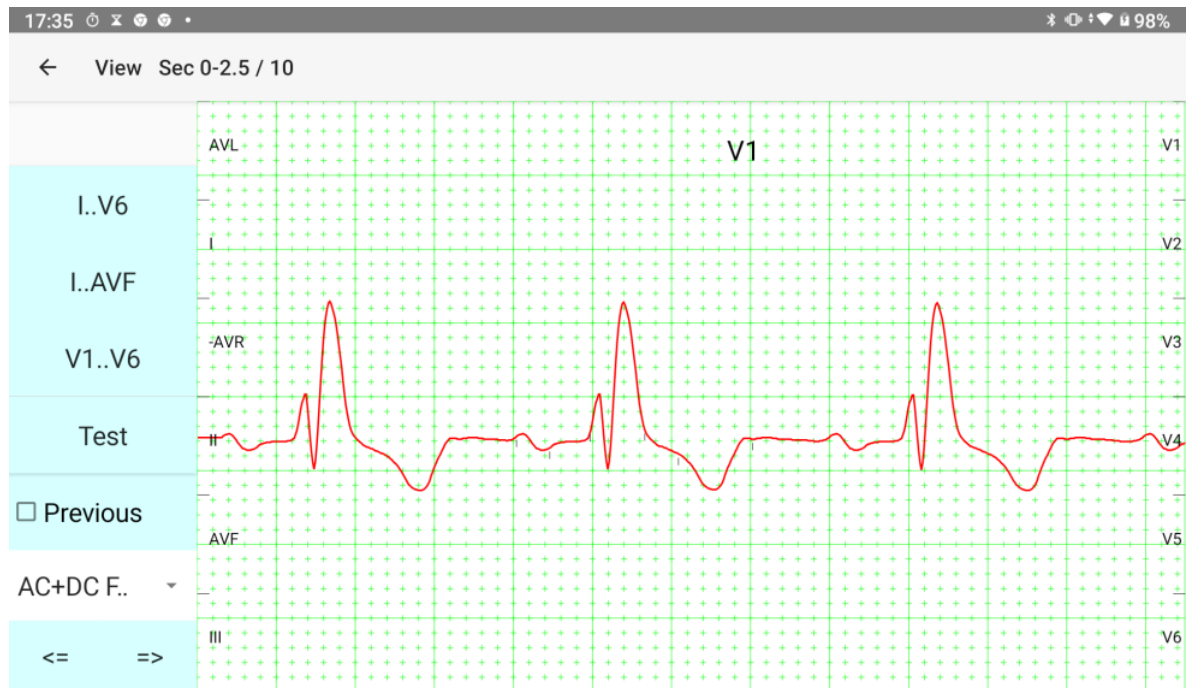
H Move 5 seconds at right or at left for button B

In the title above the position is displayed. Sec 0-5 / 10 means that the first 5 seconds of the 12 leads of a classic 10 seconds recording are displayed.

If the 12 leads are selected the view jumps by 5 seconds.

If a detailed view is selected then the view jumps by 2,5 seconds.

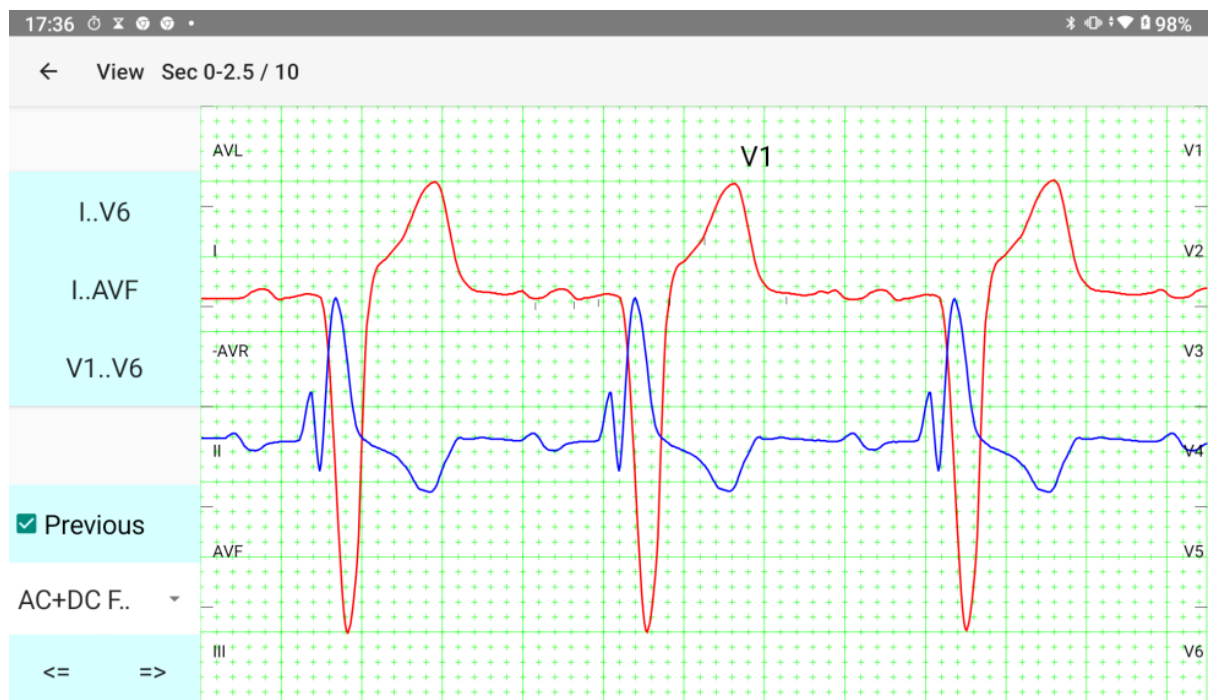
Tap on a particular lead in the screen to view a detail of it.



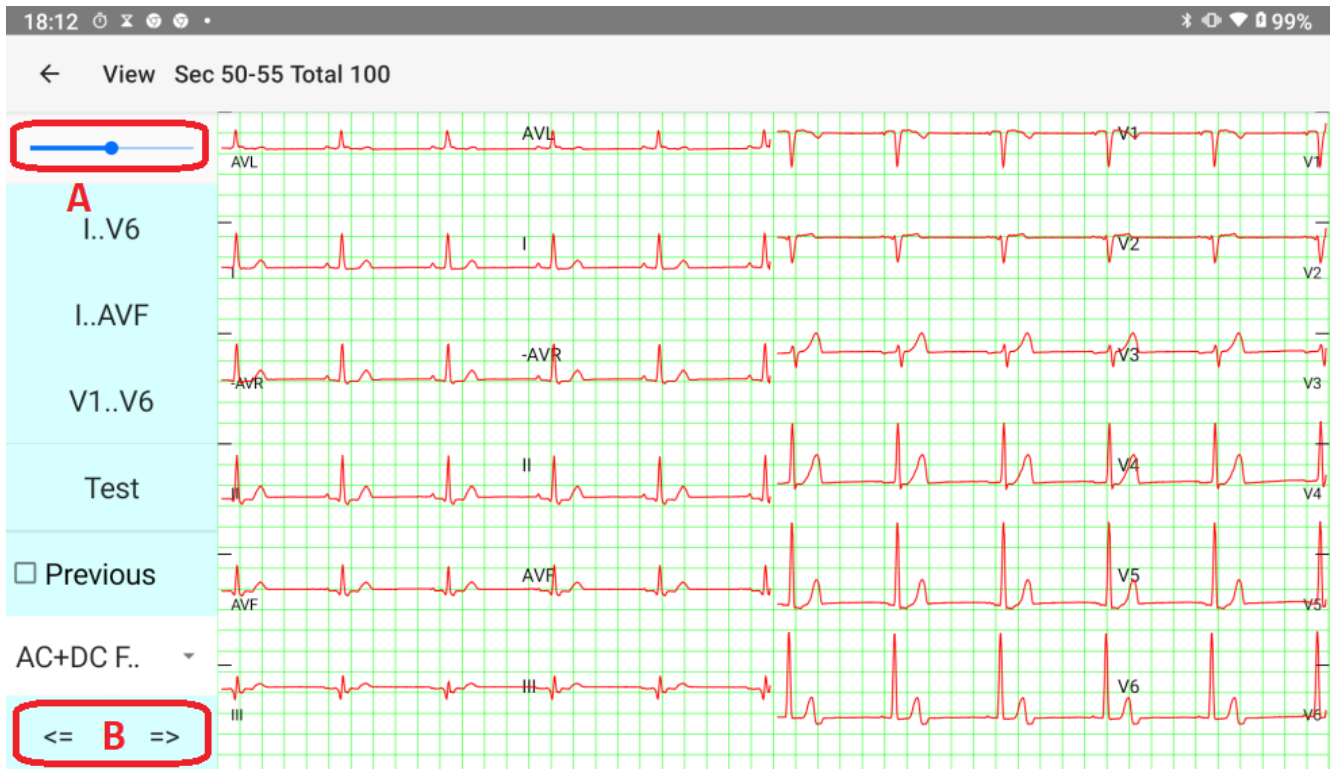
To view a detail of another lead, tap on its supposed position in the 12 leads screen. This position is indicated left and right with its name. Left I..AVF and right V1..V6.

Compare two ecg's

View the first recording. Quit the view screen. View another recording. Check "Previous" and select leads to compare. The first recording is coloured blue.



View of long time recording.



A This seekbar is only visible when a record is longer than 10 seconds.
It allows moving with steps of 10 seconds

B Move five seconds to right or left.

6 PQRST - Reference points button C of main menu.

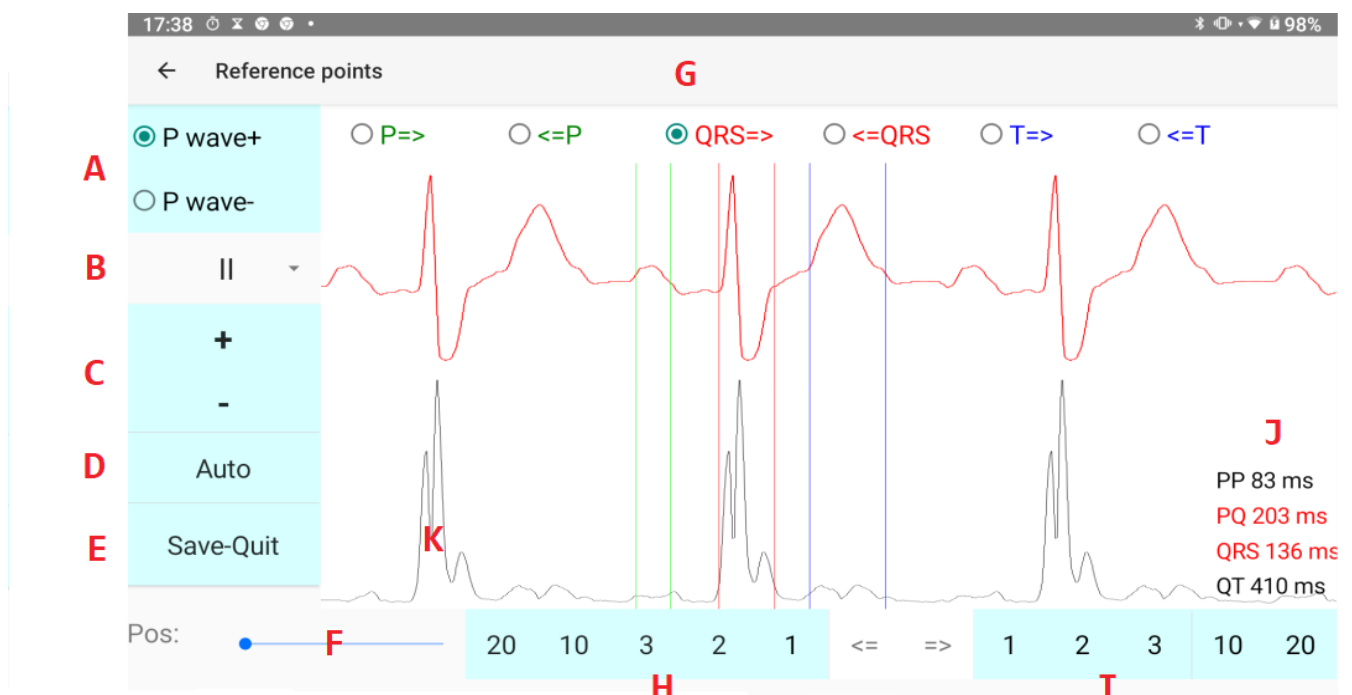
The reference points are begin and end of P wave (if present), QRS complex and T wave. The software tries to place those points correctly.

In about 90 percent of the cases the automatic placing is OK.

However, if the placing is not OK, failure of the automatic protocol is likely.

You can help the software to indicate e.g. the beginning of a low voltage P wave or a retrograde P wave.

The possibility for adjustment of the reference points enhances the automatic protocol very much.



A If recording has no P wave (eg auricular fibrillation), select “P wave -”

B Select lead for adjustment of reference points.

C Enlarge or diminish selected lead.

D Auto tries to place the reference points automatically.

E Save changes and quit.

F The screen displays 2.5 seconds of the selected lead.

Horizontal scrolling with steps of **2** seconds is possible.

G Select reference point to adjust. Start with begin of QRS complex.

H Tap 1..20 to move selected reference point at left.

I Tap 1..20 to move selected reference point at right.

J Newly calculated distances.

In the rare case of a retrograde P wave the PQ time will be calculated negative.

K This is a differential curb of all twelve leads.

The reference points are marked by vertical lines. The colour of the vertical lines is green for P wave (if present), red for QRS complex and blue for the T wave.

7 Protocol - Button D of main menu

17:57 99%

A ← Protocol

B Patient Name RBBB Firstname - Birth 1927 01 01 ID M400

C Data Fr 76 **P -35°** **QRS -36°** T 56° **PQ 203 ms** PP 83 ms **QRS136 ms** QT 410 ms **QTc 461 ms**

D Proposals Complete right bundle branch block AV Block I

Hints AV Block first order **E** => Right bundle branch block **G**

H Save V1 : R>S

I II III enlarged QRS

I AVR AVL AVF

V1 V2 V3

V4 V5 V6

J Motivation

Frontal vecto

P green QRS red T blue

A Press arrow to quit without saving changes.

B Personal data of patient. If you made a typing error, secondary changes are possible.

C Frequency (Fr). Axis of P,QRS and T wave. Distances.
The values outside the standard deviation are displayed in red.

D Proposals shows proposals of the software in **E**.

E Tap on a proposal.

F Move selection in **E** to your personal conclusion in **G**.
Without the use of the arrow your personal conclusion at right stays empty!

G Free edit is also possible. The personal conclusions are not located on the lower part of the screen: when the android keyboard pops up, the lowest part of the screen becomes temporary invisible.

H Save your conclusions.

I Select PQRST complex. The reference points are the green vertical lines.

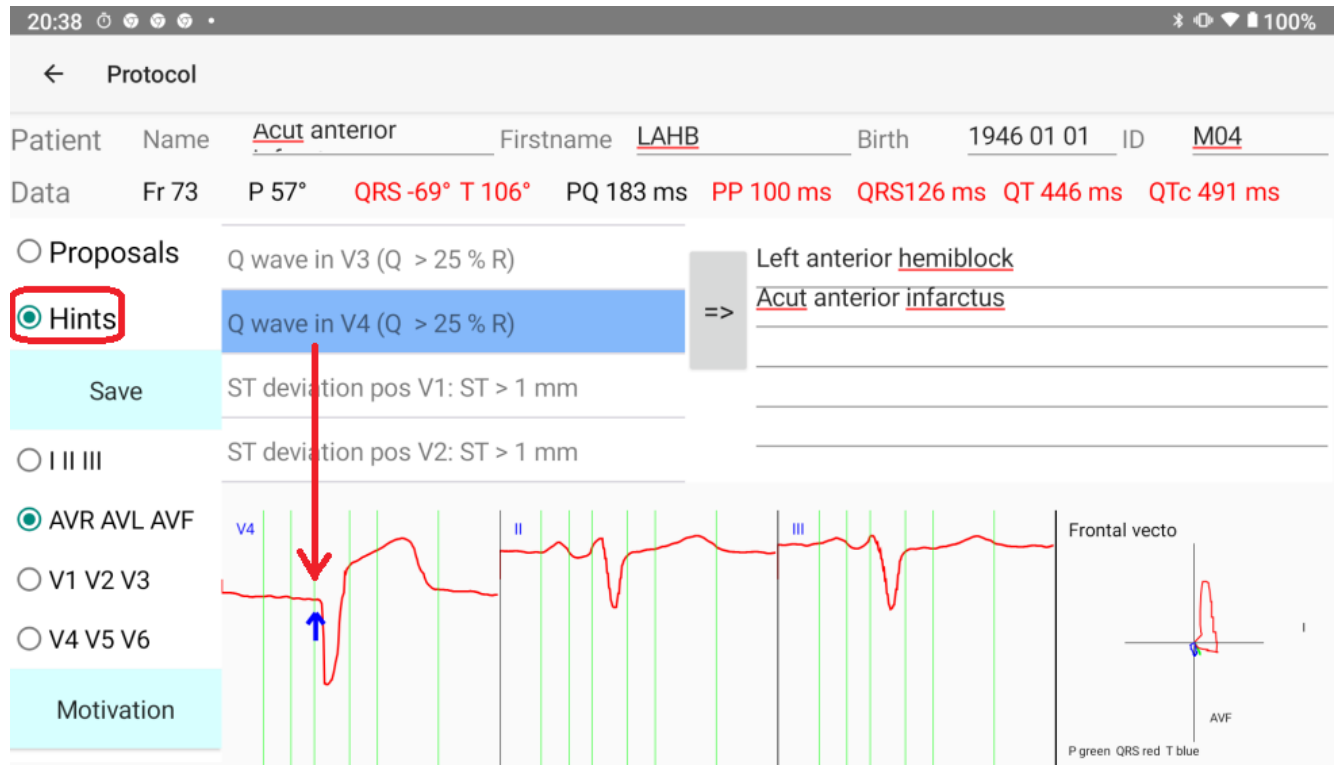
J Motivation. This important button will explain why or why not a particular conclusion is proposed.

D “Hint” is selected in the screen below.

Hints are suggestions of the software. Everything that is valuable to be mentioned.

By tapping on a hint, the corresponding signal is displayed on the left side below of the screen and marked with a blue arrow.

It is also possible to add a selected hint to your own personal conclusion by means of arrow (F)



8 Motivation of the software proposals.

Why of why not is a particular diagnosis proposed ?

On the protocol screen, tap on the button "Motivation"

Select a pathology	Min	Max	Pat	Result	
WPW type I	Frequency 50	150	76	OK	
WPW type II	P° -180	360	-35	OK	
Complete left bundle branch block	QRS° -180	360	-36	OK	
Complete right bundle branch block	56	-180	360	45°	OK
Incomplete right bundle branch block	PP msec 0	300	83	OK	
Left anterior hemiblock	PQ msec 110	300	203	OK	
Left posterior hemiblock	QRS msec 122	600	136	OK	
AV Block first order	QT msec 180	720	410	OK	
Left atrial hypertrophy	QTc msec 180	720	461	OK	
	Irregularity 0	99	7	OK	
	(R in V1-S in V1>0) AND			OK	
	(S in V6>15) AND			OK	
	(RSR in V1>0)			OK	

A Tap the pathology to examine, compare with the ecg in use

B Properties.

In the formula, below are **OR** conditions and **AND** conditions.

OR one condition is already OK.

AND all conditions must be true. (example above)

C lowest normal standard value.

D highest normal standard value.

E values of the actual ecg

F result of E compared with C and D green = OK. Red = not OK.

If all results are green, the selected diagnosis is applicable.

Often, even more important is to see why a particular diagnosis is not OK:.

Motivation another example.

The screenshot shows a mobile application interface with a title bar at the top displaying '18:00' and '99%' battery. Below the title bar is a navigation bar with a back arrow and the word 'Motivation'. The main content area is divided into two columns. The left column is titled 'Select a pathology' and lists various ECG conditions. The right column is a table with five columns: 'Min', 'Max', 'Pat', and 'Result'. The 'Result' column contains 'OK' in green text and 'NOT OK' in red text. The 'Left ventricular hypertrophy' row is highlighted in blue.

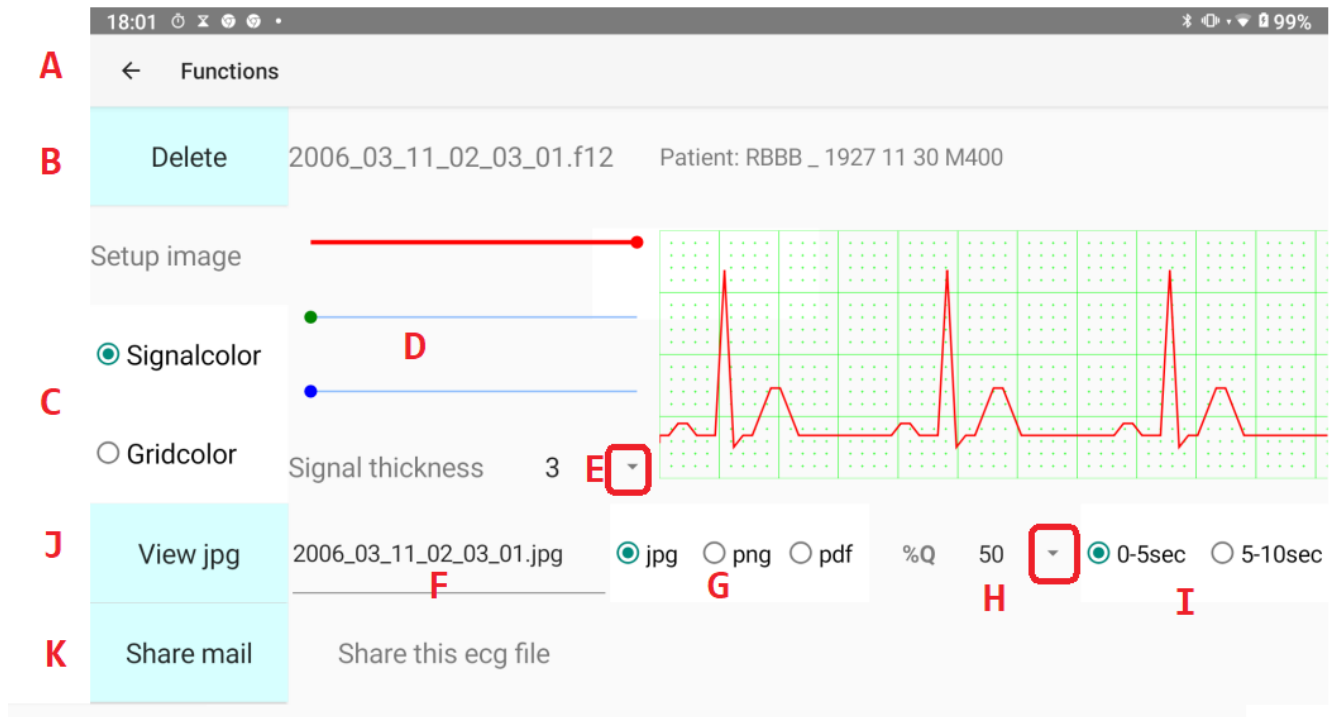
	Min	Max	Pat	Result	
incomplete right bundle branch block	Frequency	40	150	76	OK
Left anterior hemiblock	P°	-180	360	-35	OK
Left posterior hemiblock	QRS°	-180	360	-36	OK
AV Block first order	56	-180	360	45°	OK
Left atrial hypertrophy	PP msec	0	300	83	OK
Right atrial hypertrophie	PQ msec	0	300	203	OK
Left ventricular hypertrophy	QRS msec	0	125	136	NOT OK
Left ventricular hypertrophy	QT msec	180	720	410	OK
Left ventricular hypertrophy	QTc msec	180	720	461	OK
Right ventricular hypertrophy	Irregularity	0	99	7	OK
	(R in V4>270) OR				NOT OK
	(R in V5>270) OR				NOT OK
	(R in V6>270) OR				NOT OK
	(S in V1>300) OR				NOT OK
	(T in V6>11)				NOT OK

The formulas are located in a file EcgProtocol.xml

You find more explanation about the formulas in :

https://www.ganseman.com/Manuals/Addenda_EN_Ecg.pdf

9 Functions (button F of main menu)



A Quit

B Delete the recording in use. Attention: Deleted is deleted!

C Select “Signal” or “Grid” colours for output image.

These colours may differ from colours selected in the setup for output on screen.

D With the 3 scrollbars for red, green and blue, you can select any colour.

E Signal thickness.

F Name of the image file. Entering another name is possible.

G jpg, png or pdf output.

H Quality percent of output. The higher the percent, the larger the file.

However, even with 50% selected, the quality is often as good as with 100%.

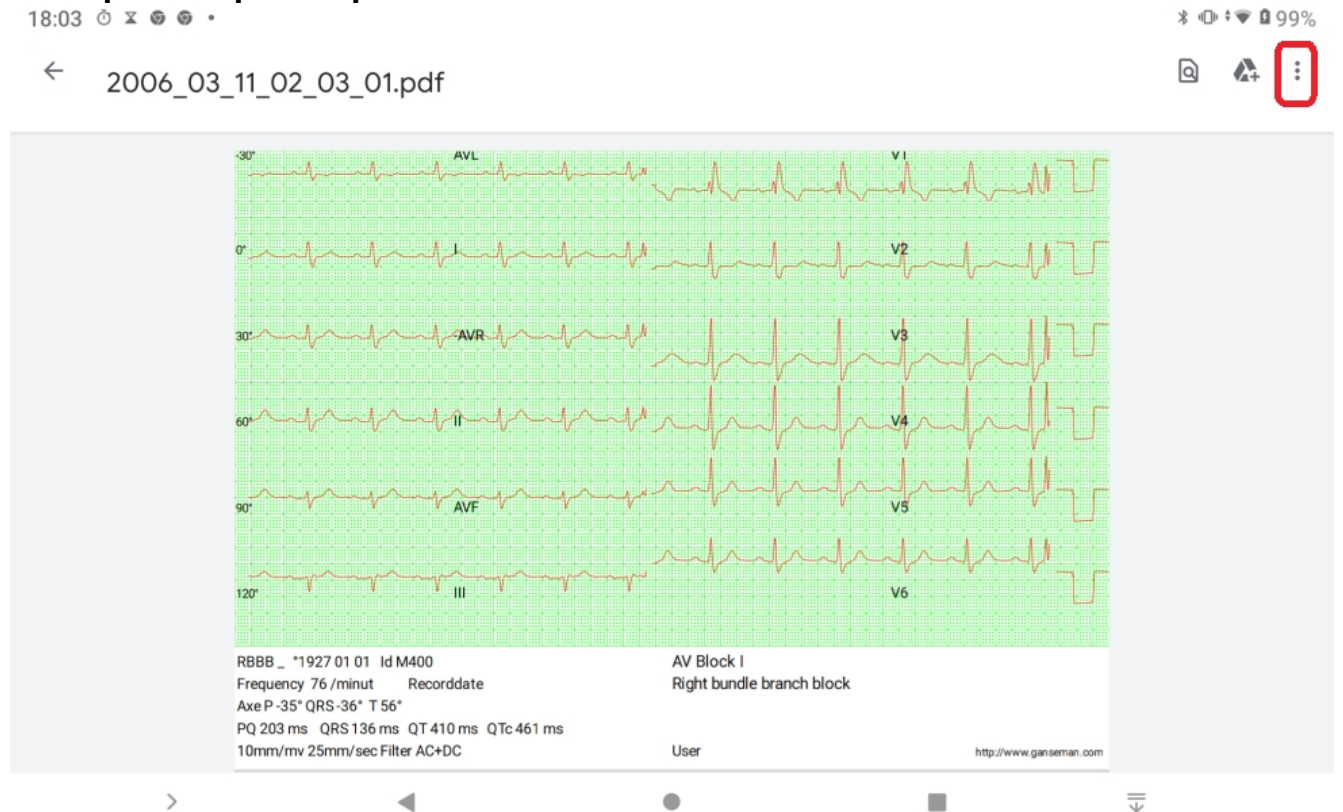
This depends of the image viewer of your Android device. You have to try it out.

I Select first or last 5 seconds for the output.

J View jpg, png or pdf generates the output file.

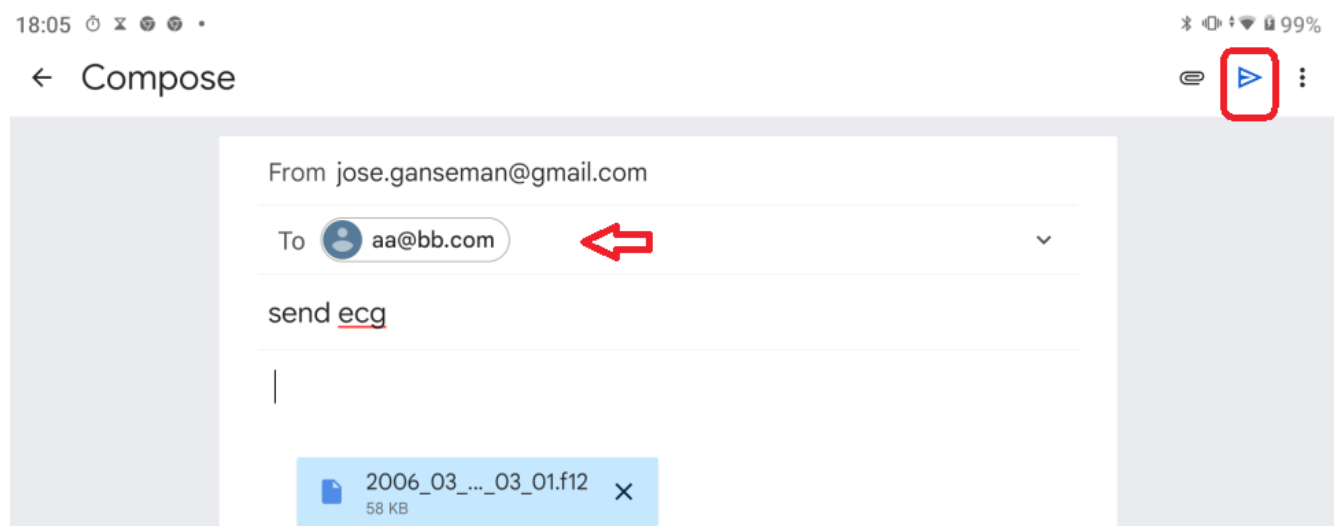
K Share mail. Send actual file as email attachment.

Example of a pdf output.



Most **image** viewers have a menu (often 3 vertical dots at right) with options for sharing and printing.

Email a recording:



Replace aa@bb.com by the email address before sending

If you share unencrypted, remove the personal data of the patient, name, firstname and birthdate

10 Transfer of multiple ecg files

Transfer of an ecg with Function – Share is OK for a few ecg's, but for transfer of a lot of ecg's other methods are available.

For transfer to a Windows PC connect the Android device to USB port by means of a USB cable.

Browse to directory Android – data – com.ganseman.ecg – files.

Select the ecg files for transfer and copy to the ecg Windows directory, default [C:\EcgF12](#).

Remember that the name of a file is the record date and time written as yyyy_mm_dd_hr_min_sec.f12

