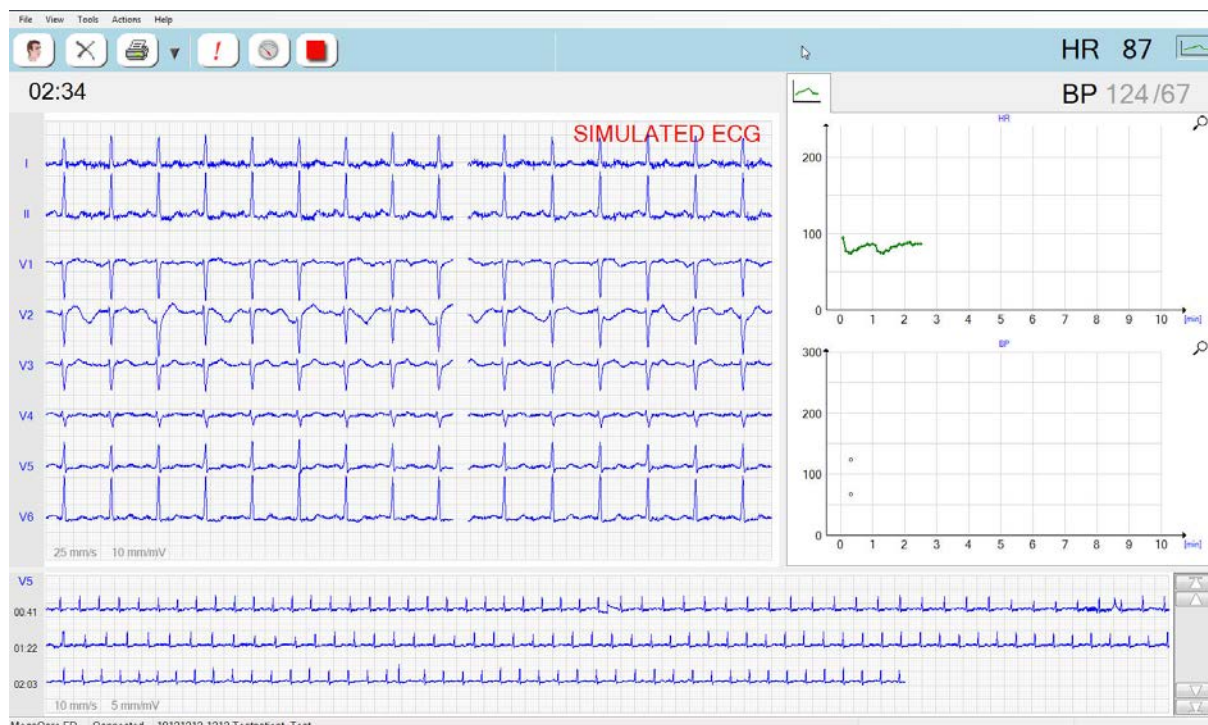


EC Sense

version 4.0



Long ECG Amendment to Operator's manual EC Sense 4.0

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1. INTRODUCTION	4
1.1 Intended use	4
1.2 Contraindication for use	4
1.2.1 Related services and products	4
1.3 Safety information	5
1.3.1 How to read this manual	5
1.3.2 Revision history	6
2 LONG ECG	7
2.1 Long ECG	7
2.1.1 The Long ECG option	7
2.1.2 Low hard disc space	7
2.2 Menus and basic functions	8
2.2.1 Menu bar	8
2.2.2 Icon bar	9
2.2.3 Examination windows	11
2.2.4 General functions	13
2.3 Quick start guide	15
2.4 How to record a Long ECG	16
2.4.1 Functions in real time mode	19
2.4.2 Functions in the trend display	26
2.5 Printouts	30
2.5.1 Manual printout on printer	30
2.5.2 Rhythm printout on printer	30
2.5.3 Status report printout	31
2.5.4 Event report printout	31
2.5.5 Print an ECG interval	31
2.6 Commands in Long ECG mode	32
3 LONG ECG REPORTS	33
3.1 Menus and functions	33
3.1.1 Menu bar	33
3.1.2 Icon bar	33
3.2 Editing and reviewing Long ECG	35
3.2.1 Rhythm tab	39
3.2.2 ECG tab	46
3.2.3 Trends tab	47
3.2.4 Report Preview tab	49
3.3 Report printout	51
3.3.1 Preview before printing out	51
3.3.2 Print out the final report	51
3.3.3 Temporary change of report content	51
3.3.4 Temporary change in a report printout	52

3.3.5 Print out a specific page in a report	53
3.3.6 Print a specific report	54
3.4 Save examinations	55
3.5 Opening a saved examination	56
3.5.1 Edit examinations saved on the local PC	57
3.6 Exit Report mode	57
3.7 Commands in Report mode	58
4 SEARCH INDEX	59

1. Introduction

1.1 Intended use

EC Sense together with the option *Long ECG* is intended to be used for recording of Long ECGs. *EC Sense* can be used for patients using an implanted pacemaker.

1.2 Contraindication for use

The application of ECG is widespread and a recognized form of examination. Users are required to have sufficient training and knowledge to decide whether the device can be used or not. There are no known medical impediments for using ECG.

1.2.1 Related services and products

The following services and products could be used together with *Long ECG*.

Product/Service	Description
<i>EC Sense</i>	<i>EC Sense</i> is intended to record Rest ECGs and Exercise ECGs. Depending on how <i>EC Sense</i> was ordered it can be delivered with different acquisition units and software options.
<i>EC Store</i>	Central storage system from Cardiolex that could be connected to <i>EC Sense</i> , used for Rest ECGs and Exercise ECGs.
<i>MegaCare</i>	Central storage system that could be connected to <i>EC Sense</i> , used to archive Rest ECGs, Exercise ECGs and Long ECGs. Reports sent for archiving can be edited in MegaCare. MegaCare is a product sold by Dräger AB.
<i>MegaCare FD</i>	Service from Cardiolex that could be connected to <i>EC Sense</i> , used for Rest ECGs, Exercise ECGs and Long ECGs. <i>MegaCare FD</i> is a combination of <i>EC Store</i> and <i>MegaCare</i> to offer <i>MegaCare</i> clients full disclosure Exercise ECGs.
<i>EC View</i>	Product from Cardiolex for viewing Rest ECGs and viewing/editing examinations stored in a central storage system. <i>EC View</i> is very similar to <i>EC Sense</i> except that it is not possible to record ECGs.

1.3 Safety information

This manual contains different types of safety messages written in italics on a grey background. These safety messages are placed where it is most likely that a potential danger may arise, or where the user needs additional information. The following types of messages appear:



Warning indicates a potential hazard which, if not avoided, may result in death or serious injury for the patient and/or the user.



Caution indicates a potential hazard which, if not avoided, may lead to personal injury or product damage.

NOTE

NOTE provides the user with information on how to use the device in the best way.



Read accompanying documents (Operator's manual).

1.3.1 How to read this manual

Please read all instructions and pay extra attention to safety information, warnings and cautions. Verify that the device has been properly installed in accordance with the instructions and that the users have sufficient knowledge about the requirements, including the safety instructions that have to be followed to protect the patient and yourself.



The user is advised to read the complete EC Sense Operator's manual.

Read this manual carefully and pay attention to all of the safety instructions before using Long ECG. If this is neglected the patient's and your own safety is at risk.

The safety information is presented where it seems most likely that a potential hazard could occur.

1.3.2 Revision history

Version number for corresponding *EC Sense* and date is printed on each page of the manual.

2 Long ECG

2.1 Long ECG

This section describes how to record a Long ECG in *EC Sense*. It is necessary for the user to read the Operator's manual and especially the chapter for Resting ECG since many references will be made to that chapter. The system offers several different ways of configuration which are described in the System manual. Different selections and functions will be described only once and in relation to where it is most likely that they are needed to be used.

2.1.1 The Long ECG option

The *Long ECG* is a software application that can be used if you have ordered and installed the *Long ECG* option key. The option key is a code that corresponds to the serial number of the acquisition unit.

NOTE

To use the Long ECG function as described in this section it is necessary to have the acquisition unit connected and that it has the correct serial number corresponding to the option key. To install the software see "Installation" in the System manual.

2.1.2 Low hard disc space

When acquiring ECG data *EC Sense* will store all information on the hard disc. If the hard disc space is too low the user will be warned.

- A message will be displayed if the space is less than 2 GB when the examination starts. The user can decide to ignore the message and click on *OK* to continue.
- A message will be displayed if the space is less than 1 GB when the examination starts. No examination can be started and nothing will happen if the user clicks on *OK*.



The examination requires at least 1 GB of hard disc space. When the 2 GB message is displayed the user should empty the hard disc of old data to ensure that future examinations can be stored properly.

2.2 Menus and basic functions

This section outlines general information about basic functions and menus that the user shall be familiar with before starting an examination. If you don't prefer, or can't use, the mouse most patient data can be entered from the keyboard with a few shortcut key commands using the function keys. When working with reports or settings it will be more or less necessary to use the mouse.

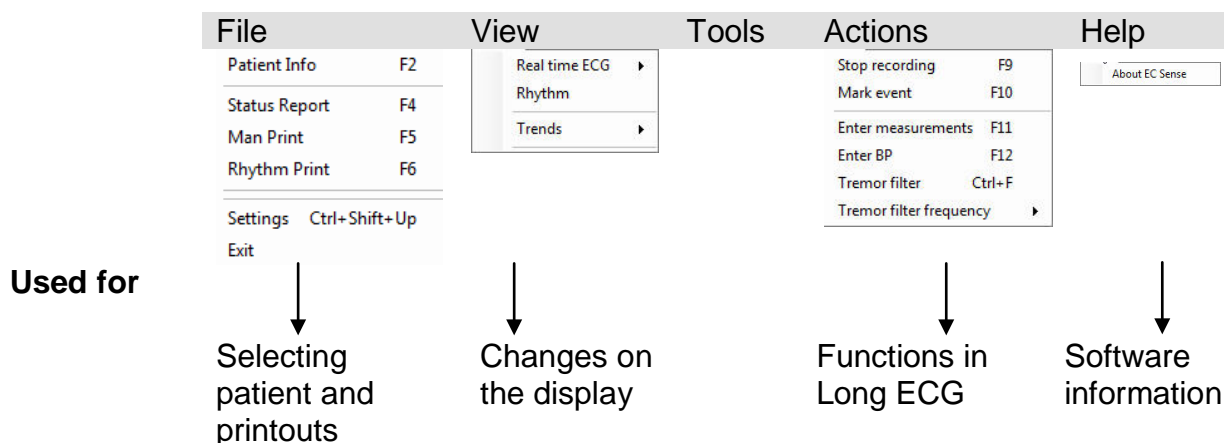
NOTE

Before the examination can start you must select a patient and enter patient data. See the section on "Resting ECG" in the Operator's manual.

Shortcut key commands have a different meaning depending on where in the program they are activated. Commands that are used during the examination do not have the same function as they have in Rest ECG or in the different report modes. The tables in each section show which shortcut key commands that can be used for each described mode.

2.2.1 Menu bar

The menu bar at the top of the recording screen has the following drop down menus.










Apart from clicking on the options in the drop down menu it is possible to use the Alt key + the first letter in the menu to activate a function. For instance, opening the *File* menu can be done by:

- Pressing Alt + F simultaneously.

2.2.2 Icon bar

The icons below the menu bar display the different functions that can be activated during the examination. In addition, the function keys on the keyboard could also be used. An overview of all icons is shown below along with function keys and a brief explanation of the functions to be used during the examination.

Icon	Fn	Function
		Start recording – The recording starts and the functions below can be used. When the recording has started the circular icon changes to a square icon to be used to stop the recording.
	F2	Enter patient data – Patient data can only be changed before the examination starts. Examination data can on the other hand be changed during the examination and in the report mode.
		Stop recording – A message will be displayed, with the possibility to select Yes or No for final decision to stop. Selecting Yes means that all ECG data will be lost.
	F4 F5 F6 F4 Alt+F4	Printout – Print the ECG on the connected printer. The connected printer must be configured prior to use. See “Settings” in the System manual. Click on the printer icon for a default report or select a different printout option from the drop down menu when clicking on the arrow. - <i>Manual (MAN)</i> - <i>Rhythm (RHYT)</i> F6 - <i>Status Report</i> F4 - <i>Latest Arrhythmia/Event</i> (dimmed if no arrhythmia or event has occurred). A dimmed printer icon means that there is no printer set up in <i>EC Sense</i> .
	F10	Marking events – If activated a marker will be placed on the ECG. Symbols can be defined in “Settings” to be used for different events, or the user can enter a specific comment.
	F11	Measurements – Numeric data on blood pressure, chest pain, dizziness etc. can be entered any time by clicking on the measurement symbol. Enter numbers with the keyboard or

		select values by using the arrows. Depending on how it is preconfigured, different data will be presented. See “Settings” in the System manual.
	F9	Stop recording – By clicking on the red square icon the recording stops and the report mode opens. All recorded ECG data is saved.

The description above is not a complete explanation of the functions. Detailed information will follow in the next sections.

2.2.3 Examination windows

When the *Long ECG* function is activated the examination windows open with the patient's ECG together with available functions. Examination data is displayed in three different windows (if the trend window is selected):



Long ECG examination windows

1. Real time ECG display window
2. Rhythm ECG display window
3. Trend display window

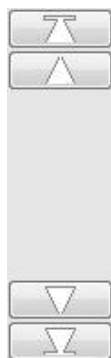
Real time ECG

The Real time display window shows the current ECG for the selected leads. For information on how to change settings in the Real time display window, please refer to 2.4.1.

Rhythm ECG

The Rhythm ECG display window shows one lead for the full length of the recording. ECG data will be saved from the start of the examination until it is stopped by the user. The Long ECG mode has no automatic arrhythmia detection. However, it is possible to save your own arrhythmia markers and events. For a description of the functions in Rhythm ECG window please refer to 2.4.1.

Use the arrows to the right to scroll forward or backward in the ECG for viewing or printing an interval. Depending on the selected speed, the pages will be displayed in different time intervals.



← Go to the beginning of the ECG

← Go back one step in the ECG

← Go forward one step in the ECG

← Go to the end of the ECG

Trend display

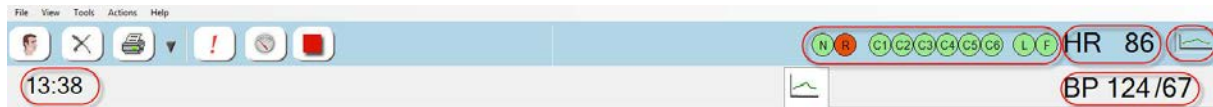
The trend display window includes the trend you select to display. The heart rate is acquired automatically but all other values in the trends are entered manually during the examination.

For description on how to select trends to be recorded, please refer to “Settings” in the System manual.

For functions that can be used in the trend display window see 2.4.2.

2.2.4 General functions

The examination windows have several functions that display values and information under the on-going examination.



Clock

21:33

The clock starts as soon as the recording starts and it displays the elapsed time of the recording.

Leadfail



The small circular electrode symbols will only be displayed if a signal problem occurs. On leadfail the corresponding electrode will be indicated with red. Electrodes where the signal quality is very weak or questionable, a yellow circle will be displayed. Red indicates that the traces are incorrect, since they are affected by the missing electrode. The corresponding ECG trace will be displayed with red instead of blue. Also see “Resting ECG” in the Operator’s manual. A faulty electrode could also be followed by a beep sound, if configured. See “Settings” in the System manual.

NOTE

If a leadfail is indicated, make sure to carefully check the connection of all electrodes before continuing.

Heart rate

HR 91

The current heart rate is displayed, which will be updated after every new heart beat.

Blood pressure

BP 124/67

The blood pressure values are entered manually during the examination, when you prefer yourself. If manual blood pressure has been selected, use a standard sphygmomanometer and enter the

values in the blood pressure window, at your own initiative. It is always the latest value that will be displayed on the screen.

The blood pressure value is displayed for one minute. After that it will be counted as non-representative and the value will be dimmed to indicate that it is old. To enter blood pressure values see 2.4 “How to record a Long ECG” and 2.4.1 “Enter blood pressure values”.

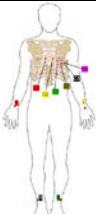

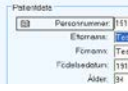
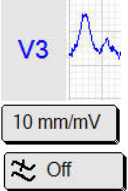







Trend display



Click on the symbol to show/hide the window with trends.

2.3 Quick start guide

This quick start guide gives a brief explanation on how to use *EC Sense* to record a Long ECG. The "quick start guide" is a summarised description on how to record a Long ECG, and it serves as an example.

Icon	Fn	Instruction
		1. Prepare the patient and connect all electrodes according to the desired lead electrode placement. Check that the patient cable is connected to the acquisition unit.
	F2	2. Click on the icon for entering patient data.
		3. Enter the patient information in the dialogue box. If the PC is connected to a central storage system the information may be filled in automatically.
		4. Select desired leads, gain and filter settings. Check the quality of the ECG signals.
	F9	5. Click on the start icon to start the ECG recording.
	F11	6. Enter blood pressure and other values, if desired.
	F10	7. Mark the events that should be included in the report.
	F9	8. Stop the recording by clicking on the red square icon. Disconnect the patient.
		9. In the report mode you can decide if you wish to add events and include them for printout before the report is printed and/or saved.
	F4	10. Click on the printer icon to printout the entire recording (or use <i>Print page</i> to print specific pages).
	F5	11. Save the recording on the local PC or in the central storage system.

2.4 How to record a Long ECG

The *Long ECG* mode is similar to the *Rest ECG* in real time mode, automatic sequence. A recorded ECG can be viewed, edited, printed, sent to and retrieved from a central storage system.

The step-by-step instructions below explain how *EC Sense* can be used to record a *Long ECG*.

1. Prepare the patient in the same way as for a *Rest ECG*, see the *EC Sense Operator's* manual for description. Inform the patient before the examination starts what will be expected of the patient and how long time it will take.




WARNING

For the patient's safety, ask the patient for the patient ID and verify that it corresponds to the information on the screen before starting the recording.

Before starting the recording it is necessary to first enter patient data. To select a patient:



2. Click on  or press F2.
3. Enter patient data in the window that opens (if not already filled in). If it is a new patient, enter the patient ID and other information relevant for the examination. Click with the mouse inside a white text box or move between the boxes by using the return key.


Patient data entry

If the patient has been previously registered on the local PC, click on *Patient ID* to do a search. It is also possible to search for patients externally by using a central storage system (search patient) when connected to such service. Information on how to enter patient data and selecting previous patients can be found in the section "About EC Sense" in the Operator's manual. Also refer to "Examination data base" for information on how to search patients locally or externally.

NOTE

If no patient is selected you will be asked if you wish to continue using a temporary patient ID.

4. Check the quality of the ECG signals. All leads will be acquired and can be reviewed after the recording. The patient must be relaxed and the ECG signals must be displayed with high quality.
5. Check the speed, gain and leads and make necessary adjustments, see 2.4.1. Refer to "Settings" in the System manual for configuration of predefined values.


6. Start the recording by clicking on .

7. The recording of the ECG can continue for as long as desired. During the recording a clock is displayed at the bottom to the left, showing the time as mm:ss.
8. To measure the blood pressure, click on **BP** and enter the values in the window that opens, or press F12. The time for the measurement will correspond to the time the window was opened. You can enter the numbers from the keyboard or click on the arrows. Click on **OK**.



Blood pressure window for manual measurements

You can click on **BP** or press F12 anytime to enter new values.


9. It is also possible to enter other values under the recording and to display them as trends. Click on , or press F11, to enter trend values. Here you can also enter the blood pressure.



Measurement window for entering trend data

10. The trend display shows the values for the trends that are selected in the menu View → Trends. The values to the right in the window are the previous values. If you click on these values they will be copied into the boxes.
11. Click on **OK** after entering all values to close the window.



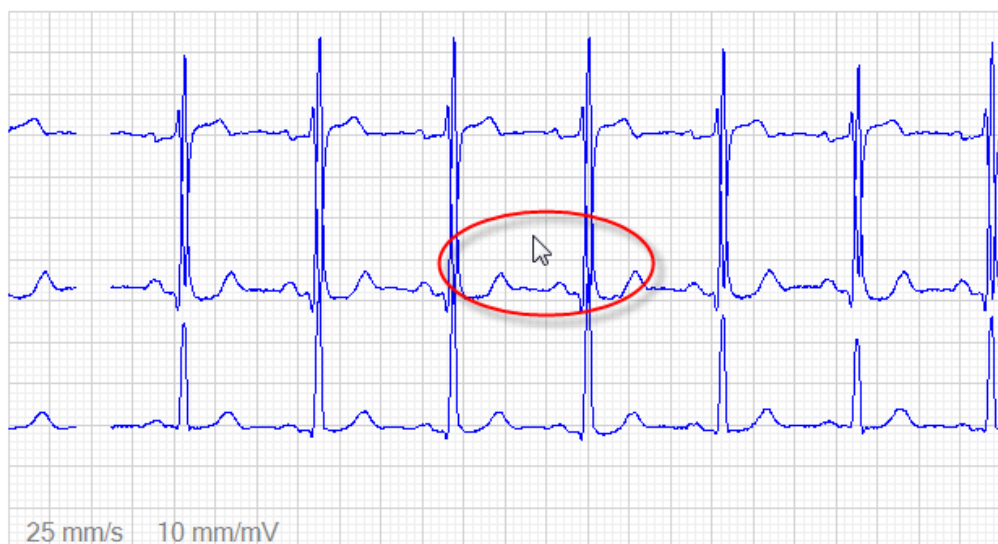
12. Click on  to end the recording. Please note that it is not possible to pause the recording to continue later. Each time the recording is started and stopped a new examination will be generated.
13. After the recording is stopped the report mode will open. It can take some time to compile the report depending on how long the recording is. In the report mode you can add and select events for printout and edit values for trends. See section 3 "Long ECG reports".
14. Disconnect the patient.

2.4.1 Functions in real time mode

Several functions and settings could be activated in this mode.

To change speed, gain or leads:

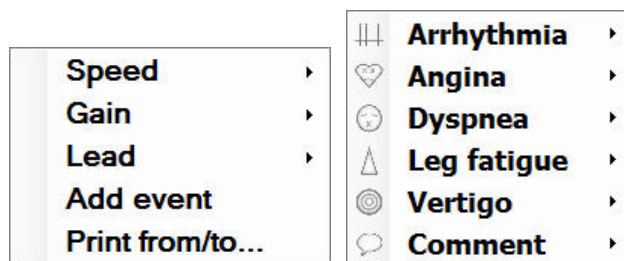
- Right click with the mouse somewhere in the Real time ECG window or on the Rhythm ECG. The menu for changing *Speed*, *Gain* or *Leads* opens. The Rhythm ECG window also has functions for adding events and making printouts. The time for the event will be saved at the time where the mouse was clicked.



Real time ECG window

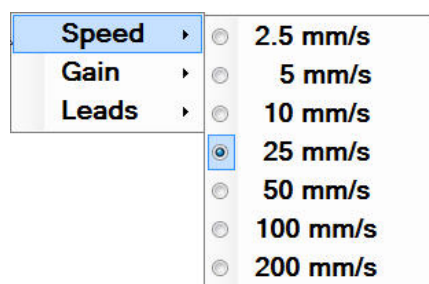
Add events

- Right click with the mouse inside the Rhythm ECG window and select *Add event*. A pop-up menu shows the types of events that can be selected with a mouse click.



Change speed

- Right click with the mouse in the window and select an option from the drop down list.

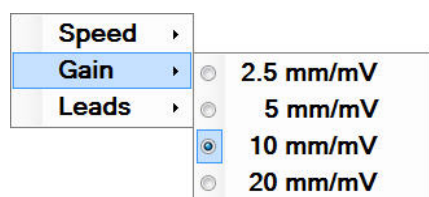


or

- Select speed from the list in the menu *View* → *Real time ECG* → *Speed*.

Change gain

- Right click with the mouse in the window and select an option from the drop down list.

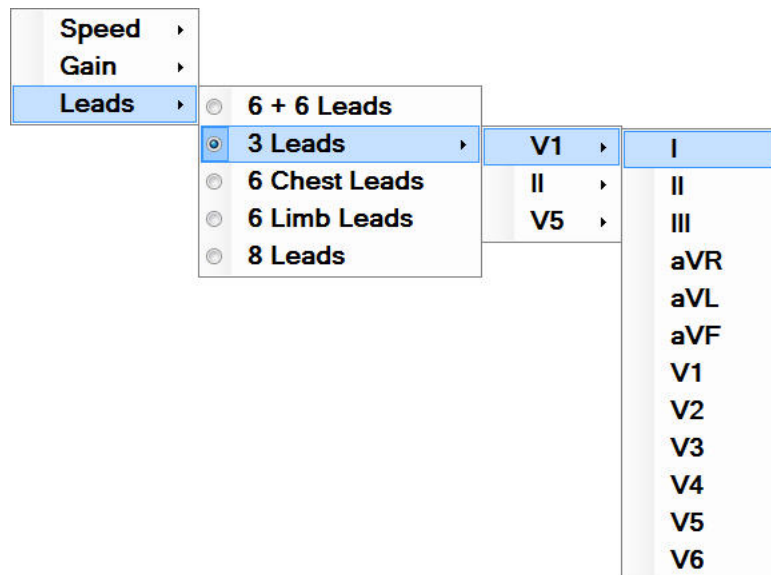


or

- Select gain from the list in the menu *View* → *Real time ECG* → *Gain*.

Change leads

- Right click with the mouse in the window and select an option from the drop down list.



or

- Select lead combination from the list in the menu *View → Real time ECG → Leads*.

The default lead combination depends on how it has been configured in *Settings*.

NOTE


The option with 3 leads has different display options since it is possible to select different combinations of the 3 leads. The individual lead to be displayed for each of the 3 leads can be selected after the arrow.

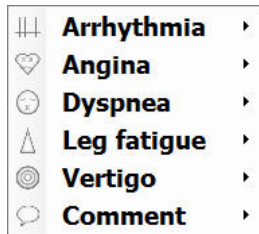
Add events

Events markers could be added anywhere during the ECG. The function is useful if the condition of the patient changes or if you for any other reason would like to make a note or point out an interesting occurrence.

To add and mark events:



1. Click on  or press F10. It is also possible to click somewhere inside the Rhythm ECG window to open the menu with event markers. The window opens:



The menu for adding events

2. Select an event from the list by clicking on a symbol. Move the pointer to the left, click inside the text box and enter a comment about the event and then press return. The types of events that can be selected from a list can be configured in *Settings*.
3. If you prefer only to add a comment, just click on *Comment* and type in your text (may depend on *Settings*).

The event will be saved on the ECG at the same time as when you first clicked.

NOTE

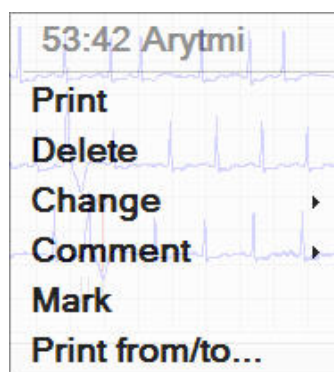
You can edit your own types of events in Settings under Long ECG → General → Events. See the System manual.

Edit and print out events and arrhythmias

All events and arrhythmias that have been marked from the very beginning of the examination will be stored. Events can be added, printed, deleted or changed anytime in the examination.

To edit/print an event:

1. Scroll through the Rhythm ECG to find the event.
2. Place the mouse pointer over the event symbol and right click.
3. The menu for editing/printing events opens. Select one of the following options:



The menu for editing events

- Print the interval with the event
- Remove the marked event
- Change the type of event or arrhythmia
- Add your own comment
- Mark that the event shall be included in the report
- Print out an ECG interval, see below

NOTE

It is important to hold the mouse pointer precisely over the symbol. The time when the event occurred and the name of the symbol will be displayed in a small grey box when pointing with the mouse on the event.

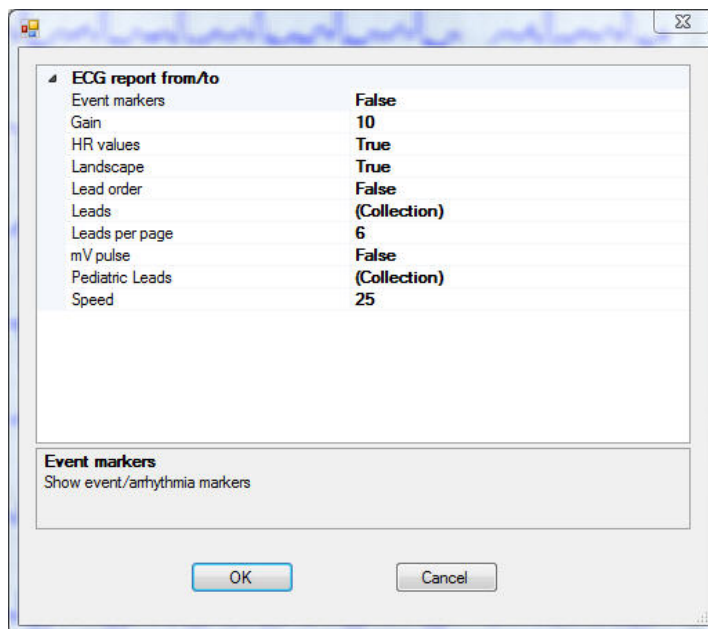
To print a report with a desired ECG interval:

1. Mark the starting point on the Rhythm ECG by clicking with the left mouse button and then move the mouse to the stopping point.

NOTE

The Rhythm ECG will be printed out from the very beginning of the ECG if no starting point has been marked (this could result in several pages of ECG).

2. Hold the mouse pointer over the stopping time and right click.
3. Select *Print from/to...*




Temporary change

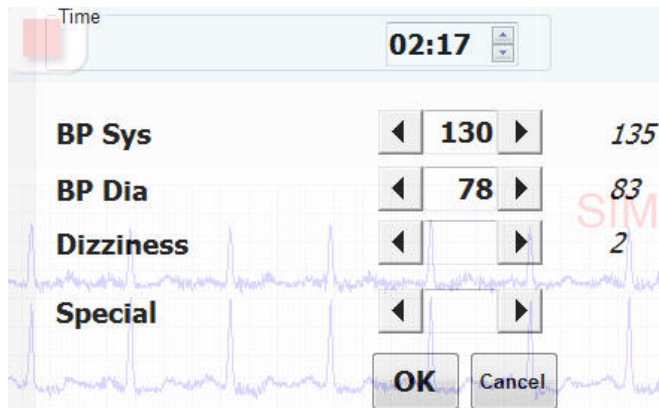
4. The window opens for temporary change of predefined report options.
5. Change a setting or click on *OK*.

The report options will reset to default configuration when a new examination starts.

Enter measurements

To enter other measurement values (this can be done any time during the examination):

1. Click on  or, press F11, or select *Actions* → *Enter measurements* from the menu.



The window for entering measurements

2. Select a value with the arrows or with the numeric keys. The value to the right is the previous value. You can copy the previous value by clicking on it.

All entered values will be saved and included in the trends. (The parameters in the window above depend on how the system has been configured, see “Settings” in the System manual).

Enter blood pressure

Blood pressure values could be entered at any time in real time mode but also be added later in the report mode. Enter as many blood pressure values as desired during the examination or add the values later.

To enter BP values:

1. Click on **BP** to open the window for entering blood pressure values, or press F12.



Blood pressure window

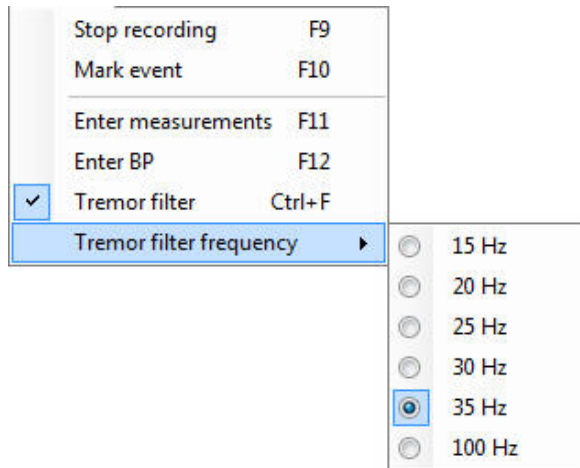
2. Enter the blood pressure values with the numeric keys or use the arrows, then click on **OK**. (You can copy the previous value into the box by clicking on the value to right).
3. The blood pressure will be displayed for 1 minute before it will be dimmed.

Tremor filter

The tremor filter can be configured under *Settings*. Often it is set to 35 Hz, which is a standard frequency for filtering out unwanted interference from muscles. The tremor filter can be selected/deselected and the frequency of the filter can be changed from 15 to 100 Hz during the on-going examination.

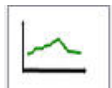
To activate the tremor filter:

1. Select *Actions* → *Tremor filter* from the menu, or click on Ctrl + F.
2. The activated filter will be indicated in the Real time and Rhythm ECG windows.
3. To deselect the tremor filter, the procedure is repeated.
4. Select *Actions* → *Tremor filter frequency* from the menu to change frequency.
5. Select a frequency from the drop down list.



The tremor filter is added to the ECG signal after the acquisition, which means that ECG raw data is not affected. In the report mode the signal could be displayed as unfiltered or with different frequencies.

2.4.2 Functions in the trend display



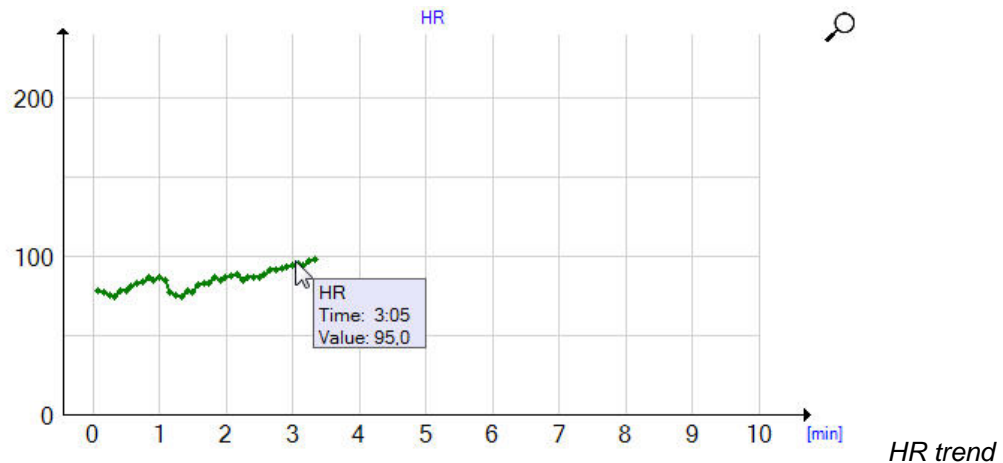
The Trend display window shows all data and events that have been saved during the examination. The user can decide which trends to display. It is also possible to edit acquired data later on. The acquisition of automatic trend data begins when the examination starts and continues until it is stopped. Trend data is normally showed in 10 minutes intervals. After 10 minutes the interval gets incremented with 10 more minutes after every started 10 minute interval as long as the examination lasts.



Show measurement value

To show the measurement value in a trend:

1. Point with the mouse on the target line to show the value.



Change trends

To select a different parameter on the Trend display:

1. Point with the mouse on the trend to be replaced.
2. Right click and select a new trend from the drop down list.



Change scale

To change the scale in a trend:

1. Right click and select the *Range* from the menu.
2. Select a different scale or *Adjusted*.

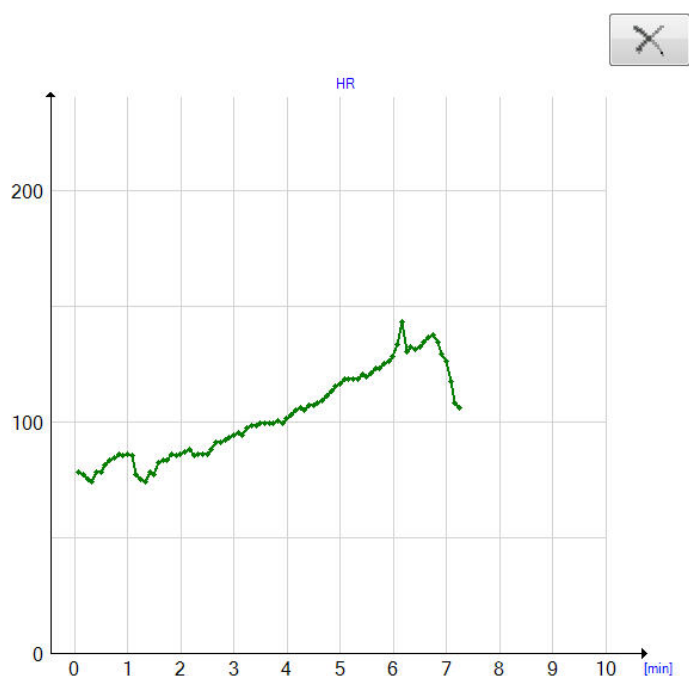
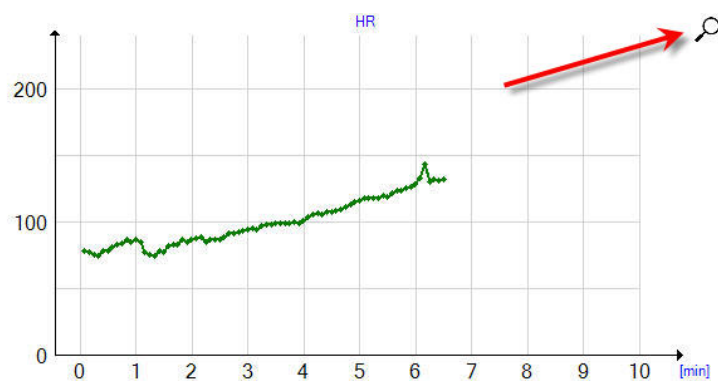
When the option *Adjusted* is selected the scale will be adjusted to fit the range of measurement values.

Enlarge trend

Each trend could be displayed individually and enlarged.

To show a single trend:

1. Click on the magnifying glass to the right.



Enlarged trend

The trend is displayed as enlarged.

1. To change trend, right click and select a different trend from the drop down list.


2. Click on  to return.

Edit trend

It is sometimes useful to be able to change the data in a trend e.g. correcting a blood pressure value or adding other measurements. Values that have been entered in the trend by the user can be edited any time.

To change/add values:

1. Click on a position in the trend where a value should be changed or added.

2. Adjust the time by using the arrows.
3. Enter the new value.
4. Click on  to accept the new values.
5. The time corresponds to where the pointer is positioned when you clicked in the trend.

2.5 Printouts

The printing function can be activated any time during the examination, provided that a printer has been connected and configured. The various types of printouts can be selected from the drop down menu next to



NOTE

A dimmed (grey) button indicates that there is no printer connected. Default printer and Real time printer must to be configured. See "Settings" in the System manual.




WARNING

PDF printouts and some printers sometimes have a function called "Fit to page". It advisable NOT to choose this alternative without checking that the scale is set to 100%, or measurements will be inaccurate. Otherwise measurements must be carried out in reference to the scale of the grid.


2.5.1 Manual printout on printer

To print out a continuous printout of the Real Time ECG:



1. Click on  → *Manual* or press F5.
2. The ECG will be printed out in real time with the same lead combination as displayed in the Real time ECG window (a minor delay is normal) and continue until stopped by the user. At the bottom of the screen you will see the message "Printing in progress" and current page number.




3. Click on  to quit printing, or press F5.

See the section on "Printouts" under Resting ECG in the Operator's manual for further information.

2.5.2 Rhythm printout on printer

To print out Rhythm ECG:




1. Click on  → *Rhythm* or press F6.
2. The ECG will be printed out according to the configuration in *Settings*.

See the section on "Printouts" under Resting ECG in the Operator's manual for further information.

2.5.3 Status report printout

To print out a Status Report:




1. Click on  → *Status Report* or press F4.
2. The Status report consists of one page with the current real time ECG.

2.5.4 Event report printout

To print an Event Report (provided that events have occurred):



1. Click on  → *Latest Arrhythmia/Event* or press Alt + F4 (a message is displayed if events or arrhythmias are missing).
2. A page with the latest event or arrhythmia is printed out.

2.5.5 Print an ECG interval

To print a desired ECG interval:



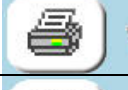
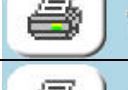

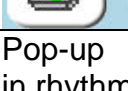




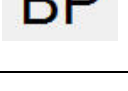

1. Search the Rhythm ECG for an area of interest.
2. Set the starting point by clicking with the mouse before the event.
3. Right click and select *Print from/to...*
4. Click on *OK* in the window for temporary change.
5. The interval will be printed out on the Real Time printer.

NOTE

The Rhythm ECG will be printed out from the very beginning of the ECG if no starting point has been marked (this could result in several pages of ECG).

2.6 Commands in Long ECG mode

The summary below shows the available functions in the *Long ECG* mode.

Function	Icon	Menu selection	Fn key	Comment
Patient Entry		File → Patient Info	F2	
Stop examination		File → Exit		No ECG data will be saved
Real Time ECG on printer		File → Man Print	F5	
Rhythm ECG on printer		File → Rhythm Print	F6	
Print a Status Report		File → Status Report	F4	
Print Latest Event/Arrhythmia			Alt+F4	Event/Arrhythmia must first be added
Print a ECG interval	Pop-up in rhythm	Print from/to...		Print from time lock to clicking point
Start recording		File → Long ECG	F9	Alter between Start/Stop
Stop recording			F9	ECG is saved and reports are opened
Mark an event on ECG		Actions → Mark event	F10	
Enter trend data		Actions → Enter measurements	F11	
Take the blood pressure and enter the BP values		Actions → Enter BP	F12	
Select or deselect tremor filter		Actions → Tremor filter	Ctrl + F	
Change frequency of tremor filter		Actions → Tremor filter frequency		Select frequency from drop down list
Close pop-up window			ESC	
Change settings in Real Time ECG	Pop-up real time	View → Real Time ECG		Select settings in drop down list
Change settings in Rhythm ECG	Pop-up in rhythm	View → Rhythm ECG		Select settings in drop down list
Change trends in trend display	Pop-up in trends	View → Trends		Select trends in drop down list
Show/hide trend information				Displayed trends depend on <i>Settings</i>

3 Long ECG reports

3.1 Menus and functions

The Report mode that automatically opens after the examination has many functions. Different types of information can be reviewed, edited and printed out by selecting any of the tabs under the menu bar. It is also possible to select the parameters to be included in the report. See “Settings” in the System manual.



3.1.1 Menu bar




The menu bar at the top of the Report mode page has the following drop down menus.

File	View	Tools	Actions	Help
Patient Info F2 Print F4 Print ... Print Preview Ctrl+W Save F5 Real time F6 Examinations F7 Settings Ctrl+Shift+Up Exit Select patient and printouts		Patients Select/change examination to view	<input checked="" type="checkbox"/> Tremor filter Ctrl+F Tremor filter frequency ▶ Select/Change filter	About EC Sense Information about software

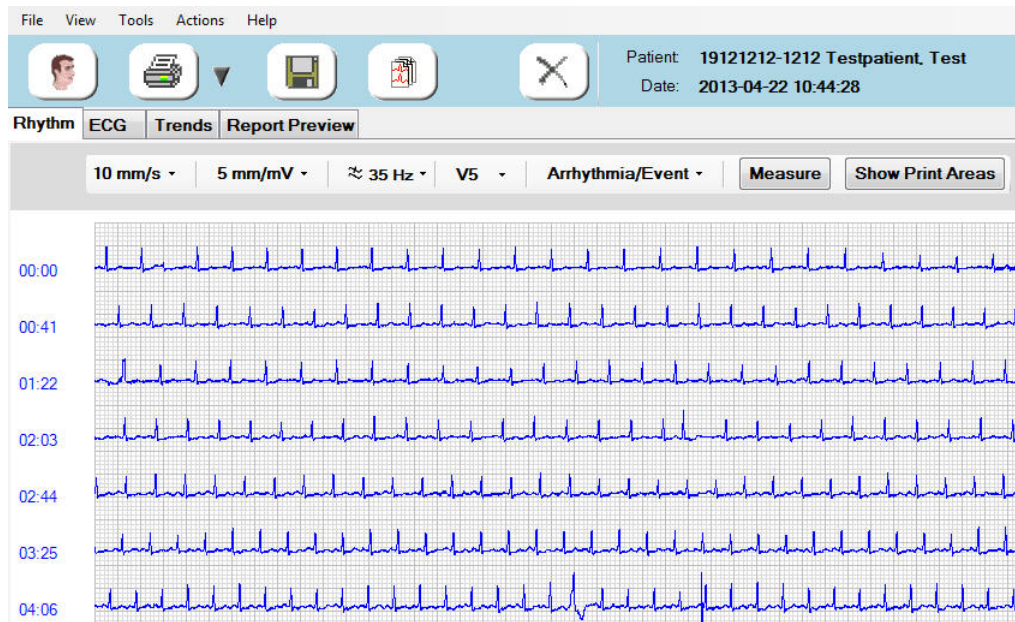
3.1.2 Icon bar

The icons to be used in the Report mode are placed under the menu bar. The overview below gives a brief explanation of the functionality.

Icon	Key	Function
	F2	Edit patient information – Change examination data for the patient. Some patient data, such as ID and name, cannot be changed since this information is linked to the examination.
	F4	Printout – Print the final report on the default printer. (See “Settings” in the System manual.) Two other types of printouts are available: <i>Print page</i> – Print the page that is currently displayed <i>Print sub report</i> – Print the report that is currently displayed

	F5	Save examination – Save the examination on the PC or in the central storage system.
	F7	Open examination – Retrieve an examination from the local database or the central storage system.
	F6	Enter Realtime Mode – Exit from the report mode and return to real time display. If you exit without saving, a message whether to save or not will be displayed. If you select <i>No</i> , all data will be lost.

3.2 Editing and reviewing Long ECG

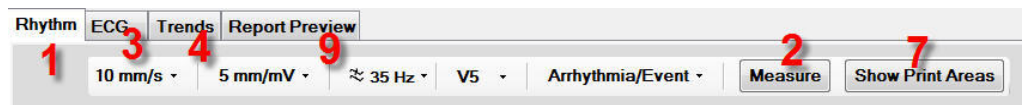


Review window

The report mode has several tabs and windows for reviewing and editing the examination before it is printed out and stored.

Workflow

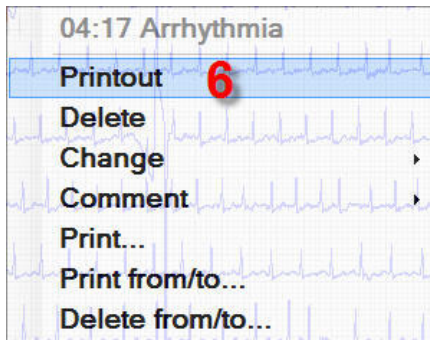
How to best work with reports is a matter of taste and the user can review the tabs and data in any order. Below is an example:



1. Review the full ECG under *Rhythm*.
2. Make any measurements with *Measure*.
3. Set the time reference at an interesting point and review under *ECG*. Make measurements, if desired.
4. Review and edit trend data under *Trends*.
5. Go back to *Rhythm* and select *Add events* from the pop-up menu.



- Click on each event and select *Printout* from the pop-up menu.



- Review the areas to be printed by clicking on *Show Print Areas*.
- Delete, if desired, the sections in the ECG that are insignificant by clicking on *Delete from/to...*

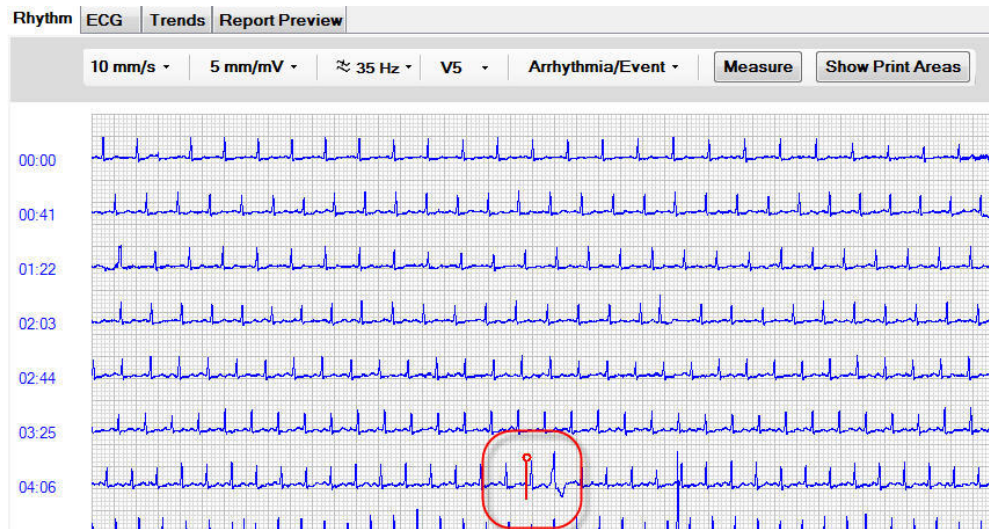


- Go to *Report Preview* and review the Event report.
- Print the Event report.

The time reference

The time reference works as a reference marker and is a useful tool for searching and reviewing events on the different pages. By setting the time reference in one location in the ECG it is possible to review other parameters or leads for the same interval of time. The following example shows a typical review procedure:

- Click on the *Rhythm* tab.
- The time reference is placed on the time you selected.



Rhythm window

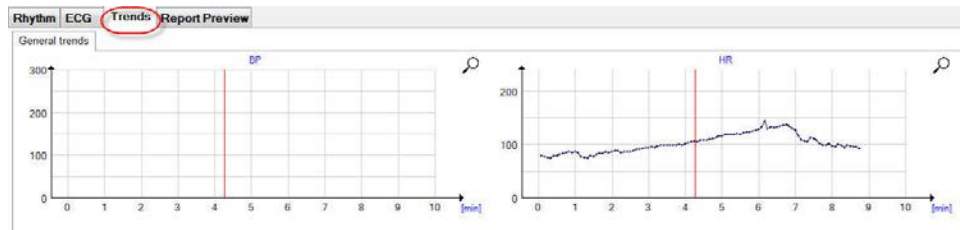
3. Then click on **OK**.



ECG window

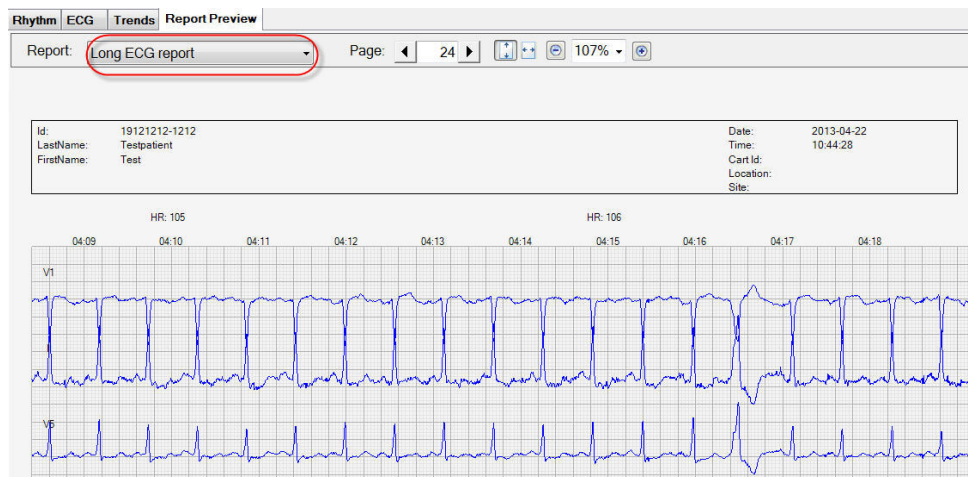
4. The time reference is placed at the same time and is displayed as a red vertical marker. (The time reference can be set in *Rhythm*, *ECG* and *Trends*.)

5. Click on the *Trends* tab.



Trends window

6. The time reference will be synchronised for the same time on all trends.
7. The time reference also displays the ECG for the same time in *Report Preview* → *Long ECG report*.



8. Left click on a different place in the ECG and the time reference will move to that time.

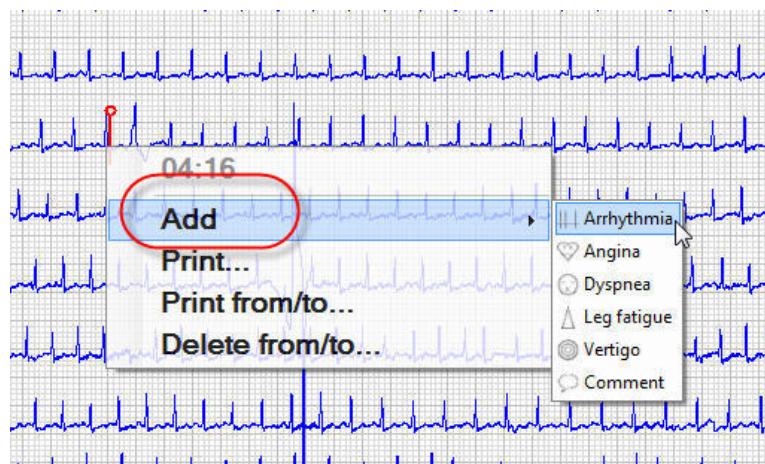
3.2.1 Rhythm tab

The *Rhythm* page shows the ECG for one lead at a time for the entire examination. When reviewing a Long ECG you may need to alter between the *Rhythm* and *ECG* tab. Most functions works in a similar way. Functions for *Rhythm* and *ECG*, having the same functionality, are described in this section.

Add events

To printout interesting areas in the *Event report* you must first add the events and thereafter select them for printout. To add events follow these steps:

1. Position the mouse pointer on a desired location in the ECG and right click.



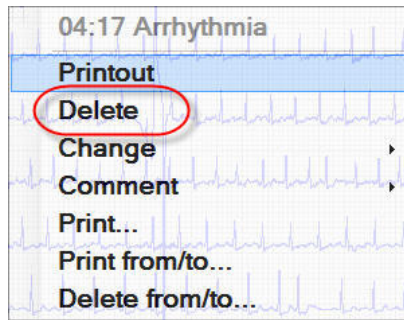
2. Click on *Add* and select the type of event from the list. Add any other events in the same way.

NOTE

If no or events have been selected for printout the report page for events will be blank.

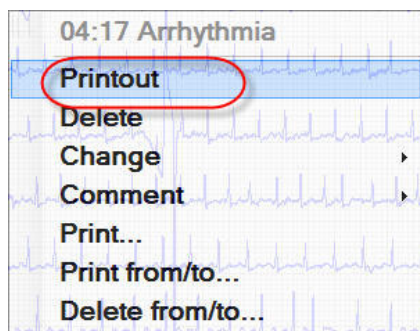
Delete events

To delete an event, right click on the event and select *Delete* from the pop-up menu.



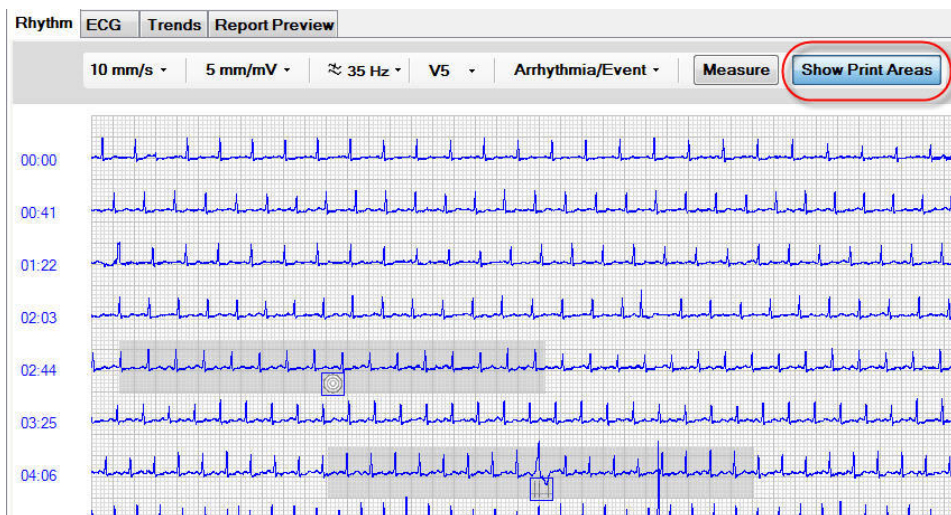
Select for Printout

To select events to be printed, right click on the event and select *Printout* in the pop-up menu.



Show area for printout

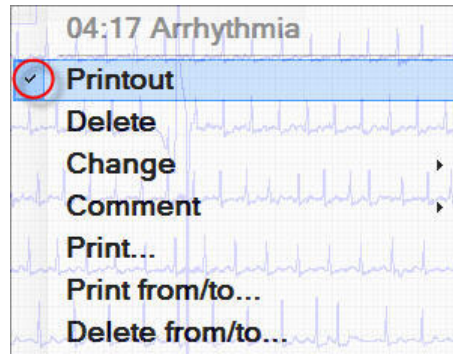
Click on *Show Print Areas* to show the segment of the ECG before and after the event that will be printed.



The ECG areas that will be printed in the report are highlighted in grey.

Delete printout

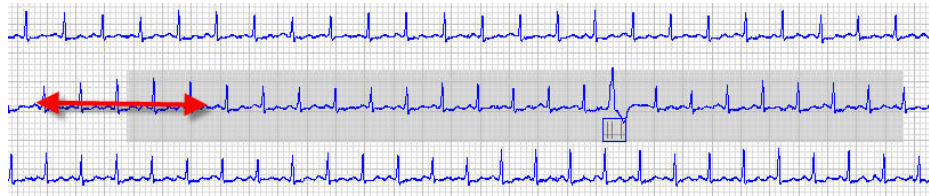
Open the pop-up menu by right clicking on the event.
Deselect *Printout* by clicking on the check mark.



The printout area will be removed from the report, but the event itself will remain. Click on *Delete* if you also wish to remove the event. Then both the event and printout will be deleted.

Change size of print area

The print area can be expanded or minimised if you place the mouse at the end of the area and then left click and drag with the mouse to expand/minimise.

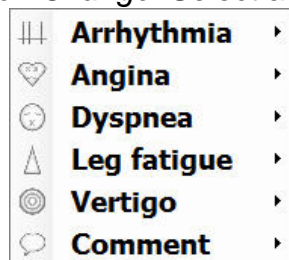


NOTE

To show areas for printout it is necessary to first select events for printout.

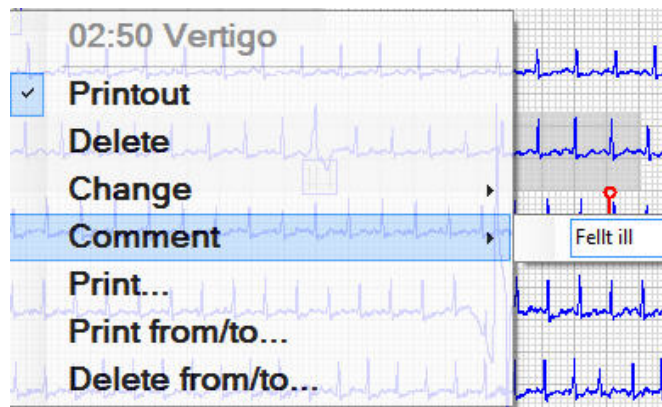
Change events

To change the type of an event, position the mouse over the event and right click on *Change*. Select a type from the drop down list.



Comment

To add a comment, position the mouse on the event and right click. Move the mouse to the blank space that opens next to *Comment* and type your comment. Press Return.



Print an event

If you wish to print a page with the current event select *Print...* Please note that the event must first have been added before it can be printed.

Print an interval

To print an ECG interval, set the time reference on a desired location then move the mouse and right click on *Print from/to...* The interval between the time reference and the current position will be printed as an ECG report.

Remove ECG data

ECG data can be removed by placing the time reference on a location and then moving the mouse and clicking on *Delete from/to...* The ECG data for the selected interval will be removed. It is possible to cancel the action by selecting *Cancel Delete from/to...* as long as the ECG has not been sent to a central storage system.

Cancel delete

To cancel a deleted ECG interval, click on the deleted area and select *Cancel Delete from/to...* This is possible as long as the ECG is saved on the local PC.

Change speed

Click on **50 mm/s** in the menu bar and select the speed to 2.5, 5, 10, 25, 50 or 100 mm/s.

Change gain

Click on **10mm/mV** in the menu bar and select the gain to 2.5, 5, 10, 20 or 40 mm/mV.

Change lead

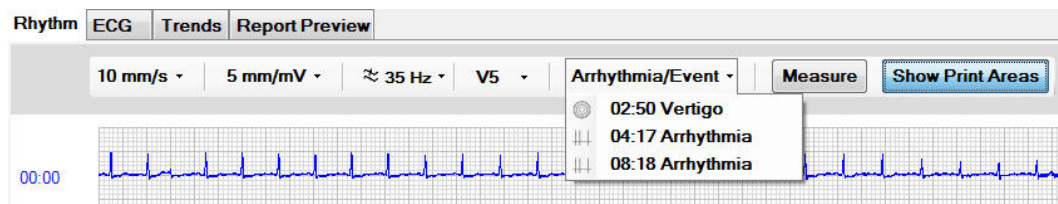
Click on the lead in the menu bar and select a new lead from the drop down list. Only one lead can be displayed at a time. The first lead to be displayed as default could be configured in *Settings*.

Review events

Arrhythmia/Event ▾

All arrhythmias and events are collected under *Arrhythmia/Events*.

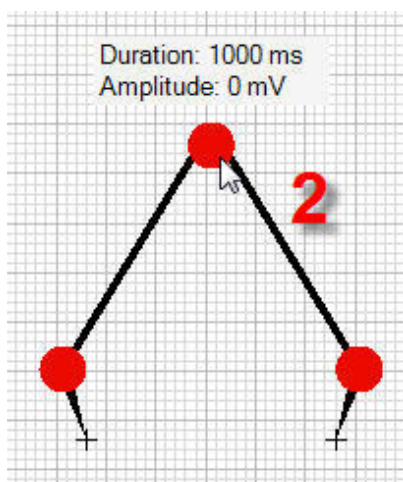
Click on **Arrhythmia/Event** ▾ to display a drop down list of all events that have been selected. The time reference will be placed on the event that is selected from the list.



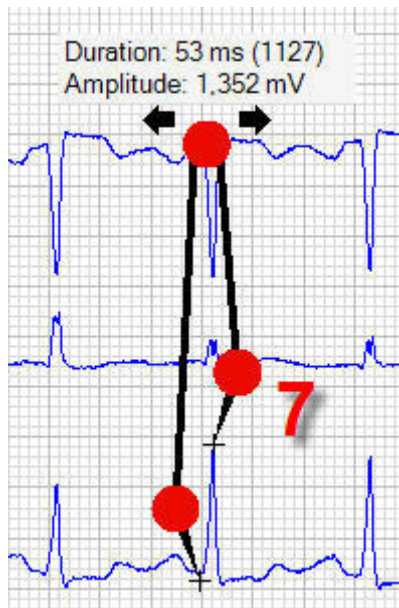
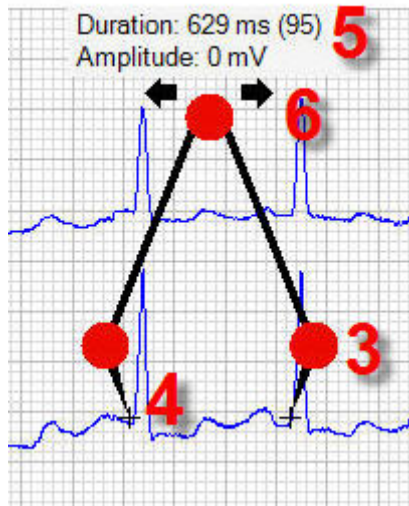
Measure duration/amplitude

To the right in the menu bar there is a box for activating a measurement tool for measuring duration and amplitude on the ECG.

1. Click on **Measure**. A pair of compasses is presented which functions as drag-and-drop.



2. Move the pair of compasses to the desired position by clicking on the left mouse button while pointing on the upper red dot and drag the pair of compasses over the screen.



3. Measure the duration by dragging the lower red dots sideways.
4. The measurement values at the top are calculated from the small cross-hairs, and correspond to the scale on the screen.
5. The duration is in milliseconds. The heart rate is within brackets (as 1/ms) when measuring an RR interval.
6. Move the pair of compasses to the next interval by clicking on ◀ or ▶ on the screen. It is also possible to press Ctrl + left/right arrow on the keyboard.
7. Measure the amplitude by dragging the lower red dots up or down. The amplitude is presented in mV at the top.

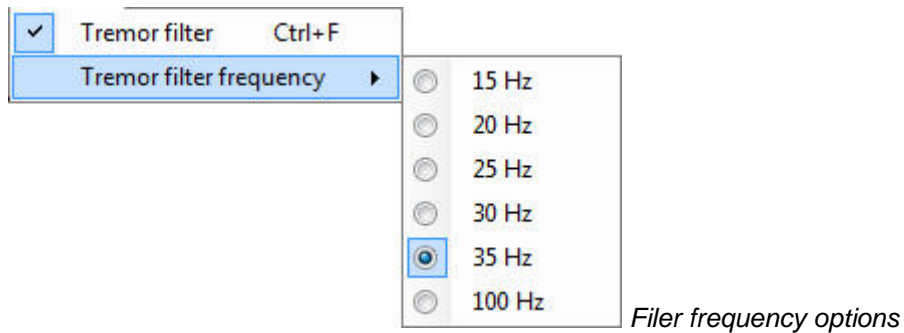
NOTE

The measurement function can also be used in ECG.

Change filter

In the report mode it is possible to select a Tremor filter or change the filter frequency. All ECG data is acquired and stored in the central storage system without filtering. The filter can be changed from the menu bar and can be used in all reports.

To select/change filter frequency:
Select *Actions* → *Tremor filter*



The window opens. Choose a new frequency by clicking on an option in the drop down list.

NOTE

When retrieving ECGs from other systems than EC Store, it may not always be possible to change filter or select/deselect a tremor filter since those ECGs may have been saved as filtered.

3.2.2 ECG tab

From the ECG tab it is possible to search and review several leads of the ECG. Functions are described in the section 3.2.1. The functions that differ from those described under *Rhythm* are explained below.

Change speed

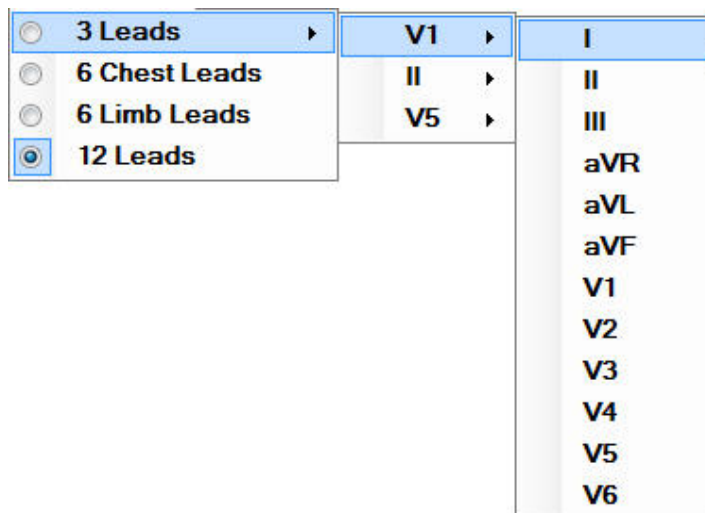
Click on **50 mm/s** in the menu bar and select the speed to 10, 25, 50 or 200 mm/s.

Change gain

Click on **10mm/mV** in the menu bar and select the gain to 5, 10, 20 or 40 mm/mV. Use the scroll bar to the right to view all leads.

Change lead

Click on **Leads** in the menu bar and select 3 leads, 6 chest leads, 6 limb leads or 12 leads from the drop down list. If the option of 3 leads is selected it is possible to choose which 3 leads to be displayed.



Scroll forward/backward

Click on **◀** or **▶** to go to the previous or next event.

Click on **◀◀** or **▶▶** to go to the previous or next event outside the page.

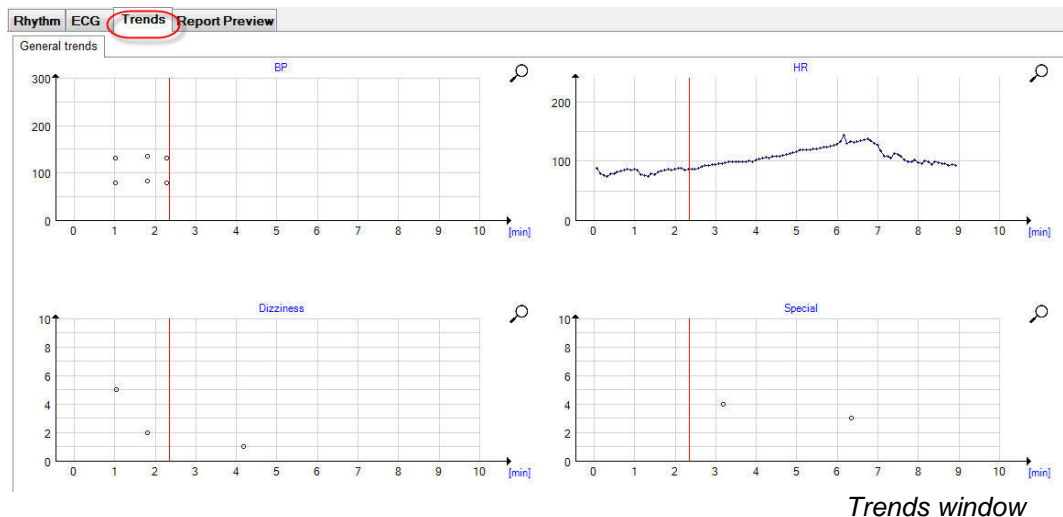
Click on **◀◀◀** or **▶▶▶** to go to the first or last event.

3.2.3 Trends tab

Comparative analysis of the collected trend data can be made from the trends page.

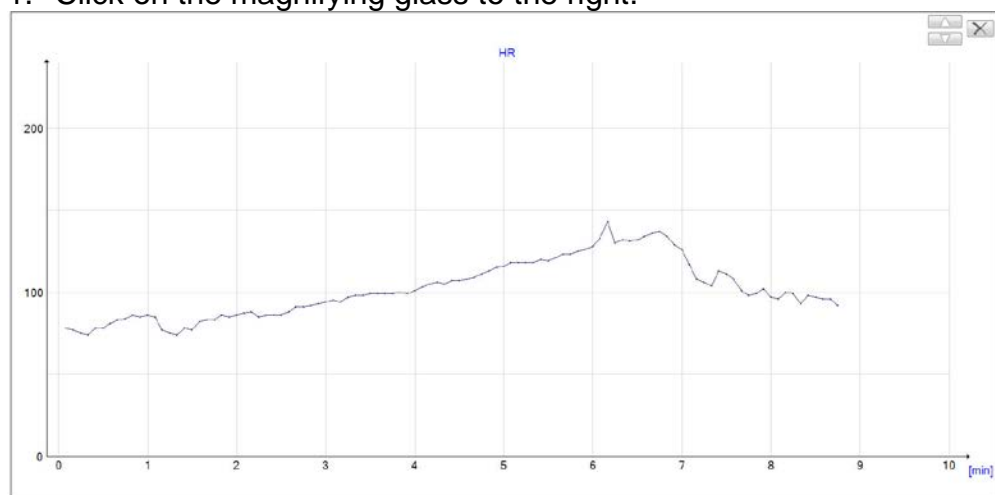
Trends

The trend page displays data for those trends that have been configured in *Settings*. This example below shows *Heart rate*, *Blood Pressure*, *Dizziness* and *Special*.



Each trend can be displayed individually and enlarged. To enlarge a single trend:



1. Click on the magnifying glass to the right.



Enlarged HR trend

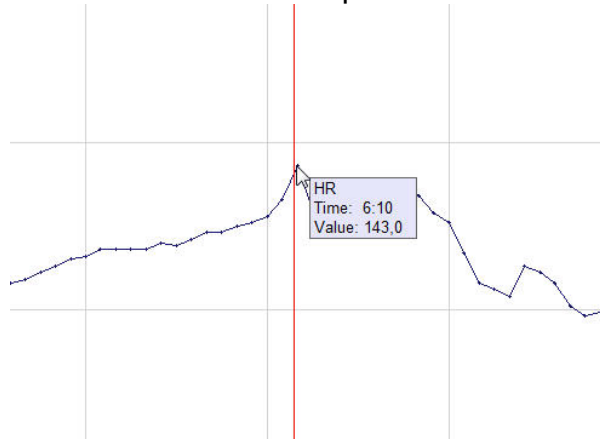
To change trend to be displayed:



1. Click on  to change trend.
2. Click on  to return to the group of trends.

To display trend data:

1. Place the mouse on a point in the trend to display a value.



Enlarged HR trend

2. The measurement values can be seen inside the small grey box when pointing with the mouse on the trend.

Edit trends


All trends where the user can enter values under the examination can be edited. Typical trends that can be edited:

- Blood pressure
- Other trends configured by the user

To edit values in a trend:

1. Click on a position in a trend (here the blood pressure).

Blood pressure window

2. Enter the blood pressure. The new values will be added in the trend.
3. To delete blood pressure values, click on the marked BP in the trend and then on .

NOTE

No trend data that has been generated by the system can be edited, such as heart rate.

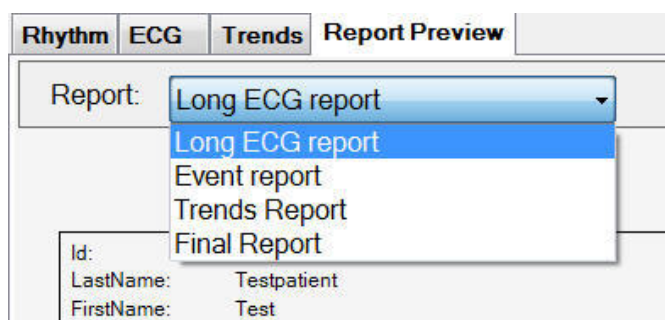
3.2.4 Report Preview tab

The *Report Preview* tab is used once the review task is completed, or if it is required to preview the report before it is printed out. From this page it is possible to look at summarised data and preview the report format for all type of reports before printing and storing. The function can only be used to display information.

Report type

The reports types that are available can be printed and previewed. To select a report type:

1. Click on the arrow next to *Report* for a drop down list. The following report types will be displayed:



The screenshot shows the 'Report Preview' tab selected in a software interface. Below the tab, there is a 'Report:' label followed by a dropdown menu. The dropdown menu is open, showing four options: 'Long ECG report' (highlighted), 'Event report', 'Trends Report', and 'Final Report'. Below the dropdown, there are fields for 'Id:', 'LastName:', 'FirstName:', 'Testpatient', and 'Test'.

2. Select a report by clicking on it. Use the functions described below to look through the different reports that are of interest.

Long ECG report

Select this report type to print out the entire ECG. It will most likely be an extensive report with several pages.

Event Report

Select to print a report only for events that have been selected for printout.

Trends report

Print a report with the trends that have been configured in *Settings*.

Final report

The final report can include several reports that have been combined. The included reports are configured in *Settings*.

NOTE

The content in each report may vary and depend on how the reports have been configured. See "Settings" in the System manual.


Next page

To go to the next page:

1. Click on the arrows next to  in the menu bar.

Change height

To increase or decrease the height in a report:

1. Click on .

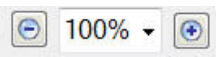
Change width

To increase or decrease the width in a report:

1. Click on .

Zoom in/ Zoom out

To zoom in or out in a report:

1. Click on the + or – signs at .
- The size is displayed as a percentage.

It is also possible to click on the arrow to select a size from the drop down list.

NOTE

The options selected in the report will be included in the report printouts. However, size and different ways to preview the reports do not affect the printouts.

3.3 Report printout

After reviewing and editing, the selected reports can be printed out on the connected printer. There are several different options for printing out reports.



PDF printouts and some printers sometimes have a function called "Fit to page". It is advisable NOT to choose this alternative without checking that the scale is set to 100%, or measurements will be inaccurate. Otherwise measurements must be carried out in reference to the scale of the grid.


3.3.1 Preview before printing out

It is useful to preview the printout before it is sent to the printer.

1. Select *File* → *Print Preview* or *Ctrl + W* to open the window for preview.
2. Enlarge the window by clicking on the magnifying glass to zoom in/out a page. Click on the icons next to the magnifying glass to select how many pages that shall be displayed together.
3. Scroll through the pages in the report by using the arrows to the right.
4. Click on the *Print* icon to start printing or *Close* to return.

3.3.2 Print out the final report



1. To print out the final report click on  or F4.
2. The report will be printed out on the default printer.

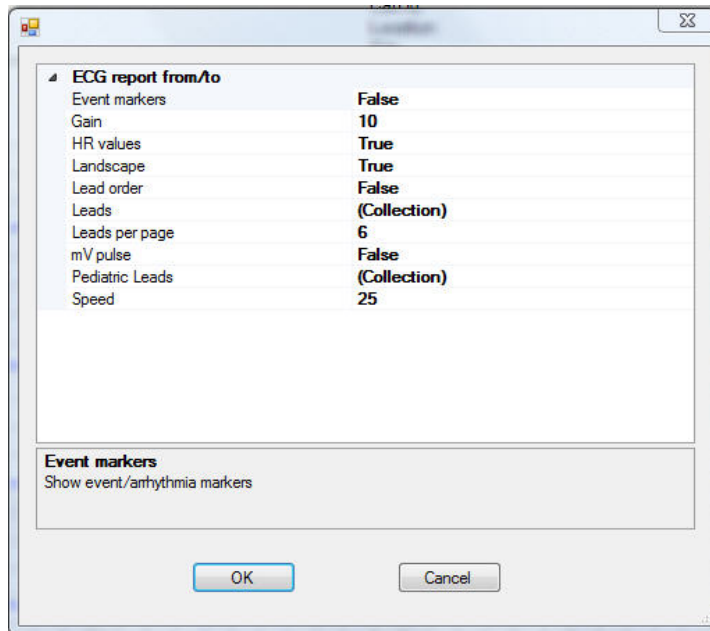
3.3.3 Temporary change of report content

Each report type is predefined. The content and layout of the report can be configured in *Settings*. If required, a temporary change can be made for the current examination.

To change the content in the report for the current examination follow these steps:

1. Go to the *Report* page.

2. Select a report from the drop down list.
3. Right click with the mouse somewhere inside the report window.
4. A pop-up menu for the selected report opens. See the example below.



Report content pop-up

5. Click to the right of the parameter that shall be changed and select an option from the list with the arrow. The change is only temporary and as soon as a new examination is opened it will reset to default configuration.

Information about how each parameter affects the examination can be found under "Settings" in the System manual.

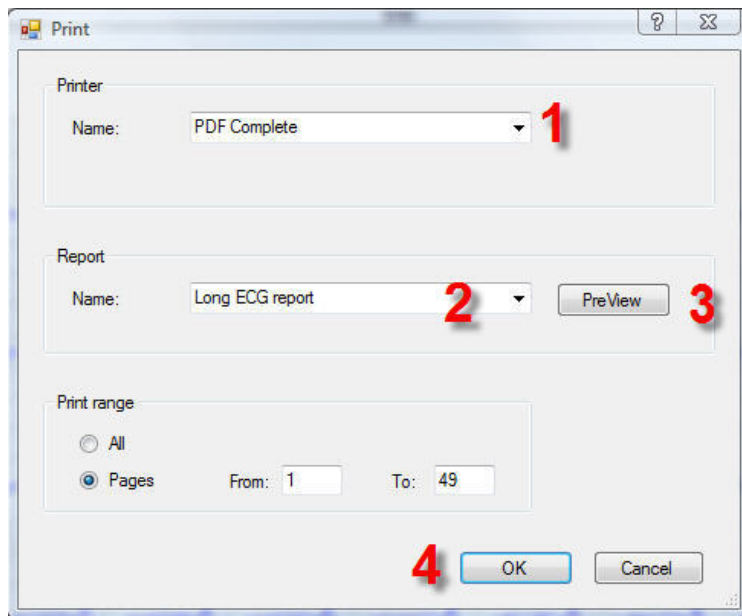
3.3.4 Temporary change in a report printout

If required, the report format can be changed temporarily.

To preview, change printer, select report and/or to print out other pages in the report:

Select *File* → *Print...*

The *Print* window opens:




Print window

1. Select a different printer from the drop down list.
2. Select a different type of report to print out.
3. Click on *PreView* to see how the report will be printed out.
4. Click on *OK* to start the printout.

3.3.5 Print out a specific page in a report

To print out a specific page in a report:

1. Click on the *Report Preview* tab and select a report from the drop down list.
2. Scroll to the desired page in the report.
3. Click on  *Print page*.
4. The report page will be printed out on the connected printer.

NOTE

The Print page option can only be selected from the Report Preview tab.

3.3.6 *Print a specific report*

To print out a specific report:

1. Click on a tab in the menu bar or select a report from the drop down list under *Report Preview*.



2. Click on *Print sub report*.


3. A pop-up menu opens where a temporary change can be made, if desired.

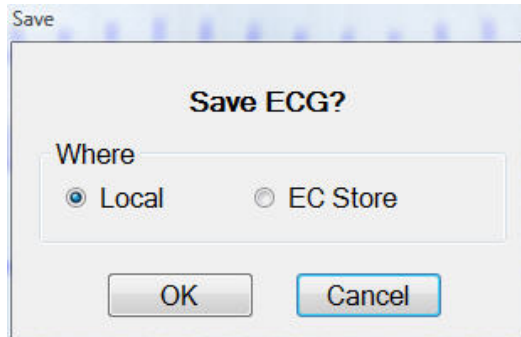
4. Click on *OK* to start the printout.

3.4 Save examinations

All examinations can be saved on the local PC or in the central storage system. To save an examination:



1. Click on  (or select *File* → *Save F5*).
2. The window for saving ECG opens.



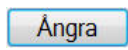
Saving ECG

3. Select where to save the examination.

Save	What is saved?
Local	All of the ECG, including raw data and marked areas for printout, will be saved locally on the PC. You can retrieve, review, edit and print out the report and then save again. The saved ECGs can be sent to a central storage system at a later time.
Central	All of the ECG can be sent to and stored in a central storage system in the same manner as when saving it locally. (Depending on the type of central storage system that is connected, the name of the system will be displayed in the window, e.g. EC Store as above.) ECGs can be retrieved for printout, review and edit. <i>EC Store</i> saves the full examination.

4. Click on  to save the ECG and the report.

or

5. Click on  to return to the report mode without saving.

NOTE

The examination and the report will be saved with the same name as the report date, patient ID and report type.


If EC Sense is not connected to a central storage system this option will not be displayed in the message. Saving is only possible on the local PC. To connect to a central storage system see "Examination data base" in the EC Sense Operator's manual.

EC Store is the only central storage system where Long ECGs can be archived.

3.5 Opening a saved examination

All examinations that are saved on the local PC can be reviewed and printed out at any time. (Please observe that examinations that have been retrieved from a central storage system can't be edited and saved locally.) To open the menu with stored examinations:



1. Click on  (or select *File → Examinations F7*).
2. The examination list is displayed.

The 'Examinations' dialog box is shown with the 'Local' tab selected. It contains a table with the following data:

Date	Type	PatientId	LastName	FirstName
2013-04-22 10:44:28	Long ECG	19121212-1212	Testpatient	Test
2013-04-08 15:46:53	Exercise ECG	1213456789		
2013-04-04 09:55:48	Exercise ECG	19121212-1212	Testpatient	Test
2013-04-04 09:53:37	Exercise ECG	19121212-1212	Testpatient	Test
2013-03-21 10:09:06	Exercise ECG	19121212-1212	Testpatient	Test
2012-09-04 17:05:00	Exercise ECG	12051109-2359		
2012-09-04 16:32:32	Exercise ECG	12070210-0220		
2012-09-04 13:39:47	Exercise ECG	12070210-0220		
2012-07-02 12:13:11	Exercise ECG	12051109-2359		
2012-07-02 11:25:36	Exercise ECG	MWA484763	Mozart	Wolfgang Amadeu
2012-07-02 10:57:39	Exercise ECG	12051109-2359		
2012-07-02 10:22:05	Exercise ECG	HF	Haydn	Franz Joseph

Below the table, there are fields for 'Diagnosis:' and 'Summary:'. At the bottom, there are buttons for 'Open', 'Send', 'Delete', and 'Cancel'.



Examination list

3. Click on an examination in the list to open it.

The *send* button is only displayed when connected to a central storage system. Refer to the chapter "Examination data base" in the Operator's manual for information about how to use the examination list.


3.5.1 Edit examinations saved on the local PC

Examinations that have been saved on the local PC can be edited again. Any changes that are made in the examination will be saved, and the old information is replaced.








1. Open an examination by clicking on  in the real time mode.
2. Make the required changes.
3. Save the changes by clicking on .

3.6 Exit Report mode

You can exit from the report mode any time.

1. Click on  to return to real time ECG.
2. If the examination has not been saved you will be asked whether to save the report or not.

3.7 Commands in Report mode

Function	Icon	Menu	Fn	Comment
Change examination data		File → Patient Info	F2	Not possible to change patient data
Print full report		File → Print	F4	
Preview, change printer, report, pages		File → Print...		Temporary change in settings
Preview the report to be printed out		File → Print Preview	Ctrl+W	
Print a page of the currently displayed report		Print page		The <i>Report</i> tab must be selected
Print the full currently displayed report		Print sub report		
Print an interval in Rhythm ECG	Pop-up in rhythm	Print from/to...		Print from time lock to clicking point
Print an interval in ECG	Pop-up in ECG	Print from/to...		Print from time lock to clicking point
Change final report	Pop-up in report			Temporary change of report content
Save examination		File → Save	F5	
Open examination		File → Examinations	F7	
Exit and return to real time mode		File → Real time	F6	
Exit this program		File → Exit		

4 Search index

- Blood pressure, 13
 - Enter values, 24
- Commands Report mode, 58
- Edit saved examinations, 57
- Examination clock, 13
- Exit Report mode, 57
- Intended use, 4
- Long ECG commands, 32
- Long ECG reports, 33
- Measurement function, 43
- Open saved examination, 56
- Printouts, 30
 - Event report printout, 31
 - Manual printout, 30
 - Print ECG interval, 31
 - Print specific page, 53
 - Print specific report, 54
 - Report printout, 51
 - Rhythm printout, 30
 - Status report printout, 31
 - Temporary change, 51
- Quick start guide, 15
- Real time ECG display, 11
- Record Long ECG, 16
- Report Preview, 49
- Reviewing Long ECG, 35
- Revision history, 6
- Safety information, 5
- Save examinations, 55
- Search patient, 17
- Time reference, 36
- Tremor filter
 - Real time, 25
 - Reports, 45
- Trends
 - Real time, 26
 - Reports, 47