

# Holter NH-301

## INSTRUCTIONS FOR USE



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# Chapter 1. General Information

## **Holter NH-301 analysis system.Instructions for Use**

**For software version: 4.0.0**

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## **Manufacturer Information**

Norav Medical GmbH

Christof-Ruthof-Weg 10

55252 Mainz-Kastel

Germany

Phone: +49 (0) 6134-567983-0

Fax: +49 (0) 6134-567983-14

E-Mail: [info@norav.com](mailto:info@norav.com)

## **Disclaimer**

This system is intended as a decision support system for persons who have received appropriate medical training, and should not be used as a sole basis for making clinical decisions pertaining to patient diagnosis, care, or management. Any application of medical information from the program, other than the original design or intended use thereof, is not advised and considered misuse of the software product.

## **Important Usage Notice**

**Like all Holter systems, noise and artifact may produce false positive ECG events. Therefore, patient data MUST be reviewed and edited by a qualified technician or physician. Norav Medical and its staff cannot be held liable for patient data edited by a nonqualified person or for data edited by a qualified person.**

## **Norav Medical Warranty Limitations**

Norav products are warranted to be free from manufacturing and material defects for a period of one (1) year from the date of shipment from Norav or the dealer to the original purchaser.

Excluded from this warranty are expendable supply items including, but not limited to, electrodes, lead wires, patient cables, and batteries. This warranty does not apply to any product that Norav determines to have been modified or damaged by the customer.

Except for the express warranties stated above, Norav disclaims all warranties including implied warranties of merchantability and fitness. The stated express warranties are in lieu of all obligations or liabilities on the part of Norav for damages, including but not limited to, special, indirect, or consequential, arising from or in connection with the use or performance of Norav products.

Any action for breach of warranty shall be commenced within one (1) year of said breach or be forever barred. Any repairs made to the product that are not covered by the warranty shall be billed to the customer.

For service or technical support, contact your local supplier or Norav Medical GmbH.

# Chapter 2. Introduction

These instructions for use explain in detail how to operate the Norav Medical NH-301 Holter analysis system and will guide you through the features of the software and their relevant controls.

## Document Conventions

Before working with the NH-301 Holter analysis system, review this section to familiarize yourself with the recommended standards, labels, and practices used throughout this manual. These conventions are designed to ensure clarity, accuracy, and safety for both medical personnel and patients

### Warning, Caution, and Note Labels in this Instruction

Pay particular attention to specific items in this instruction when you see one of the following labels:



#### **Warning:**

Warning labels highlight potential hazards that might cause damage or injury to individuals.



#### **CAUTION:**

Cautions indicate practices to prevent equipment damage or loss. Always follow these instructions closely.



#### **Note:**


Notes highlight key information for optimal software performance or important steps or procedures requiring careful attention.

## Abbreviations and Acronyms

Acronym	Description
AHA	American Heart Association
ECG	Electrocardiogram
EMC	Electro Magnetic Compatibility
HRV	Heart Rate Variability

Acronym	Description
<b>ID</b>	Patient Identifier
<b>IEC</b>	International Electrotechnical Commission
<b>MI</b>	Myocardial Infarction
<b>NH</b>	Norav Holter
<b>NR</b>	Norav Recorder
<b>Record</b>	ECG test
<b>ST</b>	ST segment: a time period from the end of the S wave and the start of the T wave on an ECG readout
<b>USB</b>	Universal Serial Bus

## Equipment Symbols

Symbol	Description
	Equipment labeled with this symbol is compliant with the European Union Medical Device Directive (EU MDD)

## Safety Measures

Before operating the NH-301 Holter analysis system, read key safety guidelines to ensure optimal device performance and the safety of both professionals and patients:

- The Instructions for Use are integral to the NH-301 Holter analysis system. Always keep them stored near the device for the reference.
- The NH-301 Holter analysis system is designed for use under clinical supervision. Only personnel with proper healthcare training should operate and interpret its results. This system isn't designed for critical-care applications, e.g. emergency units. Medical institutions using this system must ensure its use is restricted to qualified personnel and suitable patients. Patients should not access or handle the software, or any computer where it's installed.
- While this software is designed using advanced technology, errors are possible. Before prescribing therapeutic measures based on NH-301 or its modules' analysis results, consult an expert and verify with other diagnostic methods.

- Using non-approved third-party software with the NH-301 analysis system might result in conflicts. If such software doesn't state its compatibility with NH-301 beyond any doubt, consult the software manufacturer or a relevant expert.
- For patient safety, optimal equipment performance, maintenance, and interference immunity use only accessories and consumables recommended by Norav Medical.
- Prior to use, always check the equipment's functionality and condition.
- Devices emitting magnetic and electrical fields can affect instrument functionality. Ensure that all adjacent non-Norav Medical devices meet EMC standards (regulations for Electro Magnetic Compatibility). Notably, X-Ray and Tomographs, due to higher allowed electromagnetic emissions, may interfere with other equipment.

**CAUTION:**

Failing to follow the operation instructions in this manual may result in improper analysis of the data. The manufacturer accepts no liability for damages resulting from improper use.

## Intended Use

The NH-301 Holter analysis system is intended for patients requiring ambulatory Holter cardiac monitoring from 1 to 336 hours (14 days), which is most frequently used for the following indications:

- Evaluation of symptoms suggesting arrhythmia or myocardial ischemia.
- Evaluation of ECG documenting therapeutic interventions in individual patients or patient groups.
- Evaluation of patients for ST segment changes.
- Evaluation of a patient's response after resuming occupational or recreational activities, e.g., after a Myocardial Infarction (MI) or cardiac surgery.
- Clinical and epidemiological research studies.

**Note:**

The NH-301 Holter analysis system contains Heart Rate Variability (HRV) measurements. The clinical significance of HRV measurements should be determined by a physician.

## Evaluation of Patients with Pacemaker

The NH-301 Holter analysis system works in conjunction with a compatible ECG recorder to record and analyze pacemaker activities. Please refer to the "List of Supported Holter Recorders" section to obtain detailed information on which models of Holter Recorders are compatible with this analysis system.

## Contraindications for Use and Adverse Effects

There are no known contraindications or adverse effects associated with using Holter monitoring equipment.

## General Specifications and Sample Rates

The NH-301 Holter analysis system reads and analyses data recorded at sample rates of 128, 250, 500, and 1000 samples per second, with recording durations ranging from 1 hour to 336 hours (14 days).

Patient data, including raw ECG and other relevant information, are stored under identifiers such as Patient ID, Last Name, First Name, among others, for future review, editing, or reanalysis.

The system offers comprehensive arrhythmia detection based on high-precision beat analysis data. It also provides Pacemaker analysis, ST analysis, and HRV analysis. Standard event types extracted and reported by the system include:

Arrhythmia Event Types Notations
Pause
Bradycardia
Tachycardia
Minimum Heart Rate
Maximum Heart Rate
Minimum RR
Maximum RR
VPB (Ventricular Premature Beats or Premature Ventricular Contraction)
VPB Couplet (Ventricular Couplet)
VPB Triplet (Ventricular Triplet)
VPB Tachycardia (Ventricular Tachycardia)
VPB Flutter
VPB Bigeminy (Ventricular Bigeminy)
VPB Trigeminy (Ventricular Trigeminy)
SVE (Supraventricular Ectopic Beat)

<b>Arrhythmia Event Types Notations</b>
SVE Couplet (Supraventricular Couplet)
SVE Triplet (Supraventricular Triplet)
SVE Tachycardia (Supraventricular Tachycardia)
SVE Flutter
SVE Bigeminy (Supraventricular Bigeminy)
SVE Trigeminy (Supraventricular Trigeminy)
Atrial Fibrillation
Atrial Flutter
ST (ST Elevation or Depression)

<b>Pacemaker Event Types Notations</b>
Paced Beats (Total Paced Beats)
Atrial Paced (Atrial Paced Beats)
Ventricular Paced (Ventricular Paced Beats)
AV Paced (AV Paced Beats)
Capture Failures
Sense Failures
Inhibitions

<b>Respiration Event Types Notations</b>
Sleep Apnea

In addition to the standard list of Event Types that the NH-301 system can extract and analyze, there are also user-generated events:

- **Custom Events:** Users can add events of this type based on their specific needs.
- **Unconducted Pacemaker Event:** It's recommended to utilize this event type when pacemaker data in a record appears to be evidently incorrect.

It's crucial to emphasize that these specific events are not automatically detected and extracted by the system. Users must create them manually.

Another unique Event Type is Diary events. These can be entered by the patient directly into the Recorder, provided the recorder offers this function. In such instances, the analysis system will automatically detect them during the ECG analysis. If the events were tracked using an offline diary for the Holter monitoring, medical personnel would need to add Diary events manually.

## Supported Holter Recorders

The NH-301 Holter analysis system is compatible with the following Norav Medical Recorders:

Recorder Model
Norav <b>NR-302/NR-314/NR-1207/NR-1207-3/NR-314P</b> Holter Recorders
Norav <b>DL800</b> Holter Recorder
Norav <b>DL900</b> Holter Recorder
Norav <b>DL1200</b> Holter Recorder



# Chapter 3. Software Installation and Setup

This chapter provides an overview of the essential steps required to install and set up the Norav Medical NH-301 software. Additionally, you'll find valuable tips on device cleaning and maintaining both the software and data.



## CAUTION:

Before beginning the installation, carefully read the following instructions to prevent potential data loss or permanent damage to the computer and its peripherals.

## Recommended PC Specifications

To ensure optimal performance, the hardware on which NH-301 operates should meet or exceed the specifications listed below. Using hardware with characteristics lower than recommended specifications may compromise the software's efficiency, leading to slower operations or potential instability. Note that if a laptop meets the specifications listed below, it can also support the NH-301 software.

Component	Recommended Configuration	Minimum Configuration
Operating System	Windows® 10/11 Pro 64-bit	
CPU	Intel® Core™ i9	Intel® Core™ i5
RAM	2 x 16 GB 3200 MHz	1 x 16 GB
Data Storage	1 TB Secondary SSD	250 GB Secondary SSD
Graphics	Discrete video card GeForce 2600 or equivalent	-
Display Resolution	1920 x 1200, HD+ or higher	1600 x 900
USB Ports	4 x USB A slots for: <ul style="list-style-type: none"><li>• Software license key</li><li>• Memory card reader for downloading recorder data</li><li>• Preparing recorders for a new study</li><li>• Local printer to printout analysis results, reports, etc</li></ul>	

Component	Recommended Configuration	Minimum Configuration
<b>Memory Card Reader</b>	SD card reader for NR-series or DL900 Norav recorder; CF card reader for DL800 and DL1200 Norav recorders	
<b>Network Capability</b>	TCP/IP network interface	
<b>Printer</b>	A4 or Letter format standard color printer, Laser or InkJet	

## Installation Process

The installation process for the Norav Medical NH-301 software is designed to run automatically and doesn't require any specific skills to complete. Note that during the installation, certain third-party software, as listed below, will be installed on your PC to ensure the proper functioning of the Norav Medical NH-301.

To install the Norav Medical NH-301 analysis system software, it's advised to close all active applications and programs. This will prevent potential errors during the installation and setup. Follow these steps for a smooth installation:

1. Either click the provided link to download the NH-301 installation pack or insert a data storage device with the pack into an available USB slot on your computer.
2. If you're using a USB, the installation process should start automatically. If it doesn't, or you downloaded the installation package via the link, do the following:
  - a. Open a Windows Explorer window.
  - b. Navigate to the respective drive and directory (e.g. D:\, F:\) or access the location where the installation package (often in ZIP format) was downloaded.
  - c. (Optional) If you downloaded the installation package in a .zip file, double-click to access its contents. A new Windows Explorer window showcasing the archive's contents will appear.
  - d. Double click on the **NoravHolterSetup.exe** file within the Windows Explorer window to launch the installation process.
3. Choose the language when the installer prompts you. The language you select will be set as the default for the installed software.
4. Adhere to the on-screen instructions until the installation is complete and a success message appears.



### Note:

During the installation the following third-party software will be installed on your computer:

- Relevant version of Matlab Runtime, if not already on your PC.
- HASP security token driver to ensure the NH-301 analysis system's security.



- Required version of C++ Prerequisites.
- Relevant version of .NET, including support for legacy .NET versions.

5. The installation is complete, please restart your computer.

## Data Structure after Automatic Installation

### NH-301 Holter Software Path:

- Default Location: **C:\Program Files\Norav\Holter**

### NH-301 Holter Software Settings:

- Configurations such as layout, setup, and department name are stored by default in: **C:\Program Files\Norav\Holter**

### Raw Data and Analysis Results Storage Path:

- Default Location: **C:\Norav\Holter\Data**
- All ECG raw data files (\*.nrr) and analysis results (\*.hl5) are stored here by default.

## Setup Process after Installation

Once the installation is complete, you have the option to customize the NH-301 software settings according to your requirements.

To access the NH-301 software settings, follow these steps:

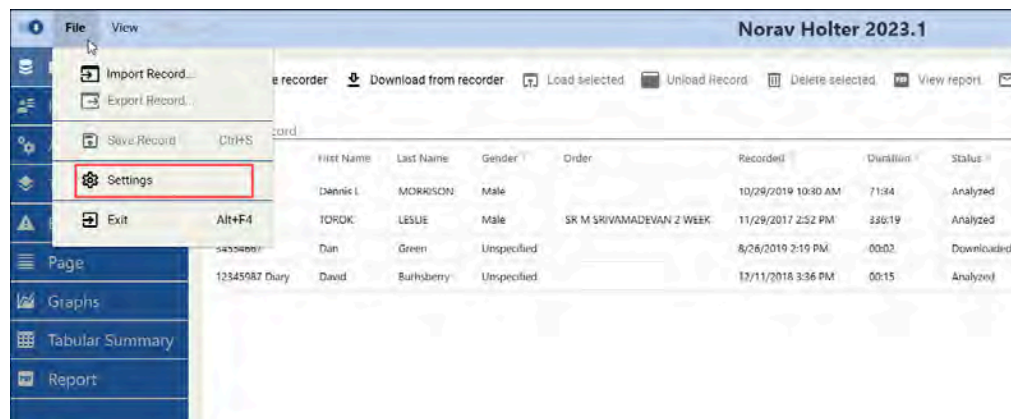
1. Double-click the **Norav Holter** icon on your desktop to launch the NH-301 analysis system.

Figure 1. Norav Holter Icon



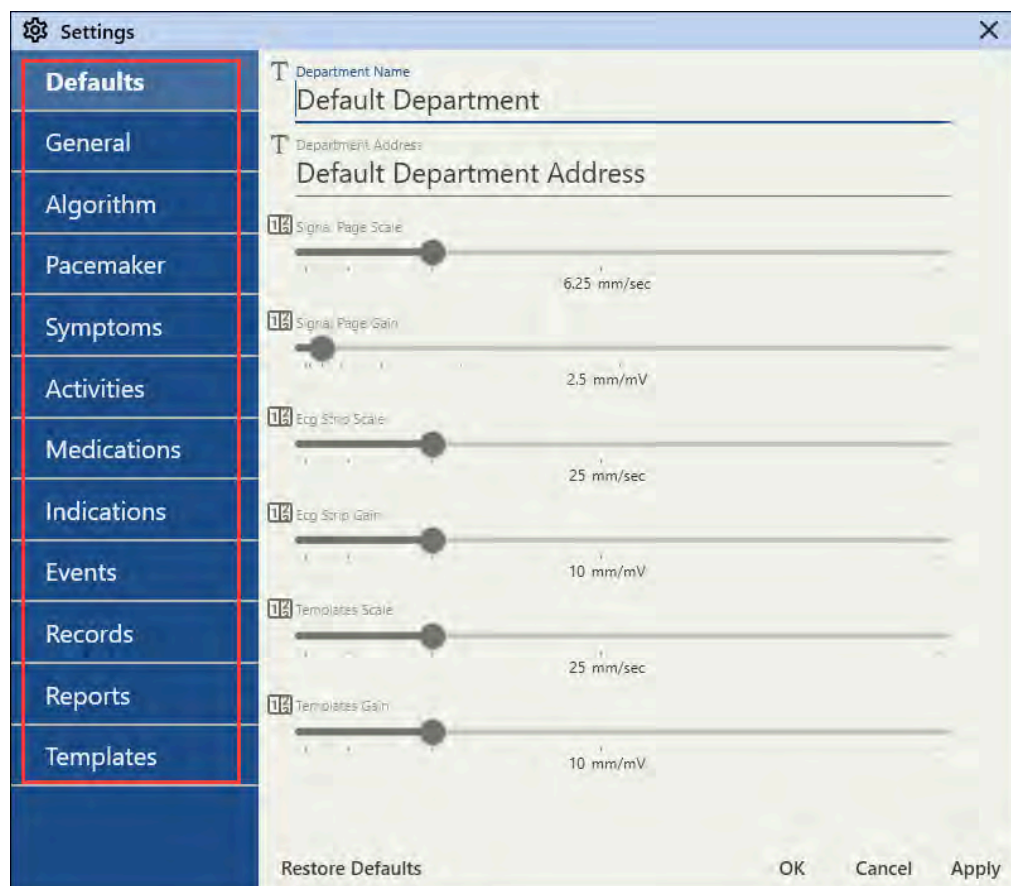
2. On the initial screen, navigate to the menu bar located at the top left, select **File**, and then choose **Settings** from the drop-down list.

Figure 2. Selecting Settings from the File menu



3. **Settings** dialog box will open.
4. Use the tabs in the left pane to access and either check or modify specific settings.

Figure 3. Settings Dialog Box - Defaults Tab



## Defaults Tab

The **Defaults Tab** contains a list of global default settings for tailoring various NH-301 analysis system Views to your preferences.

This tab presents two primary groups of settings:

### Department Settings

- **Department Name:** Enter your Department Name. This name will serve as a default parameter in relevant fields and forms across the analysis system, such as reports.
- **Department Address:** Enter your Department Address. This address will serve as a default parameter in relevant fields and forms across the analysis system, such as reports.

Figure 4. Defaults Tab - Settings Groups

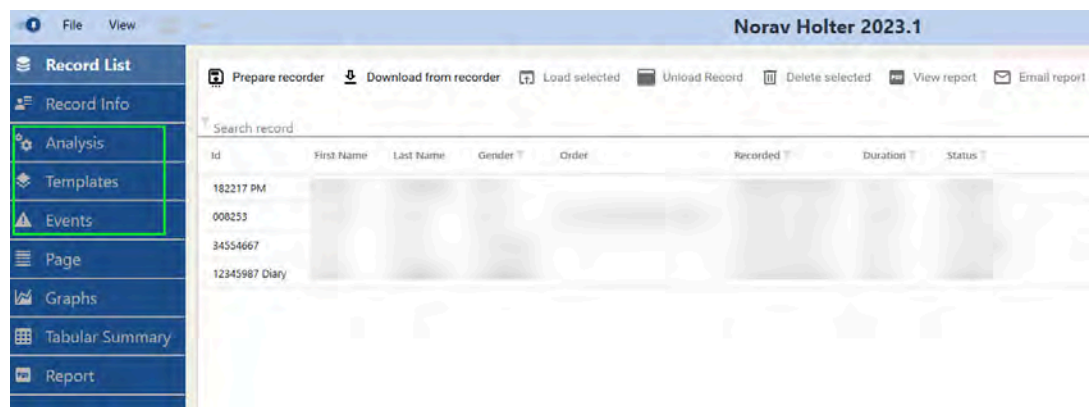
The screenshot shows the 'Defaults' tab in the NH-301 settings window. The sidebar on the left lists various settings categories, with 'Defaults' currently selected. The main panel is divided into two primary groups of settings, highlighted by a green border. The first group, 'Department Settings', includes 'Department Name' (set to 'Default Department') and 'Department Address' (set to 'Default Department Address'). The second group, 'Scale and Gain Settings', includes six sliders with their respective values: 'Signal Page Scale' (6.25 mm/sec), 'Signal Page Gain' (2.5 mm/mV), 'Ecg Strip Scale' (25 mm/sec), 'Ecg Strip Gain' (10 mm/mV), 'Templated Scale' (25 mm/sec), and 'Templated Gain' (10 mm/mV). At the bottom of the window, there are buttons for 'Restore Defaults', 'OK', 'Cancel', and 'Apply'.

### Scale and Gain Settings

- **Signal Page Scale:** Drag the slider to adjust the scale of the ECG waveform in the Signal Page.
- **Signal Page Gain:** Drag the slider to modify the gain of the ECG waveform in the Signal Page.
- **ECG Strip Scale:** Drag the slider to adjust the scale of the ECG Strip.
- **ECG Strip Gain:** Drag the slider to modify the gain of the ECG Strip.
- **Templates Scale:** Drag the slider to adjust the scale in the Templates View.
- **Templates Gain:** Drag the slider to modify the gain within the Templates View.

Scale and gain are two important settings that control the size and amplitude of the ECG waveform across diverse NH-301 analysis system **Views** and **View** components, including **Analysis**, **Templates**, and **Events Views**. Ensure you adjust the scale and gain settings appropriately to obtain an optimized ECG waveform display.

Figure 5. Analysis, Templates, Events Views



**Note:**

If the ECG waveform is too small, the scale can be increased. If the ECG waveform is too noisy, the gain can be decreased. The scale and gain settings should be adjusted carefully to ensure the ECG waveform is displayed accurately. Incorrect settings can make interpreting the ECG waveform and diagnosing heart conditions difficult.

## Saving or Discarding Settings Changes

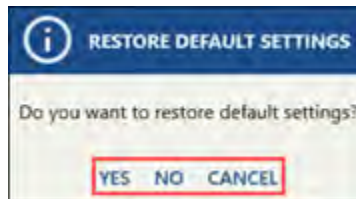
After making adjustments, you have several options located in the bottom part of the box:

Figure 6. Saving or Discarding Changes



- Click **Apply** to save the changes and continue working within the **Settings** dialog box (like navigating to other Tabs);
- Click **OK** to save and exit the **Settings** dialog box.
- Click **Cancel** to abort changes and exit the **Settings** dialog box.
- Click **Restore Defaults** to restore default settings. The **Restore Default Settings** dialog box will appear:
  - Click **Yes** to restore default settings and exit the **Settings** dialog box.
  - Click **No** to abort default settings restoration and return to the **Settings** dialog box.
  - Click **Cancel** to abort default settings restoration and exit the **Settings** dialog box.

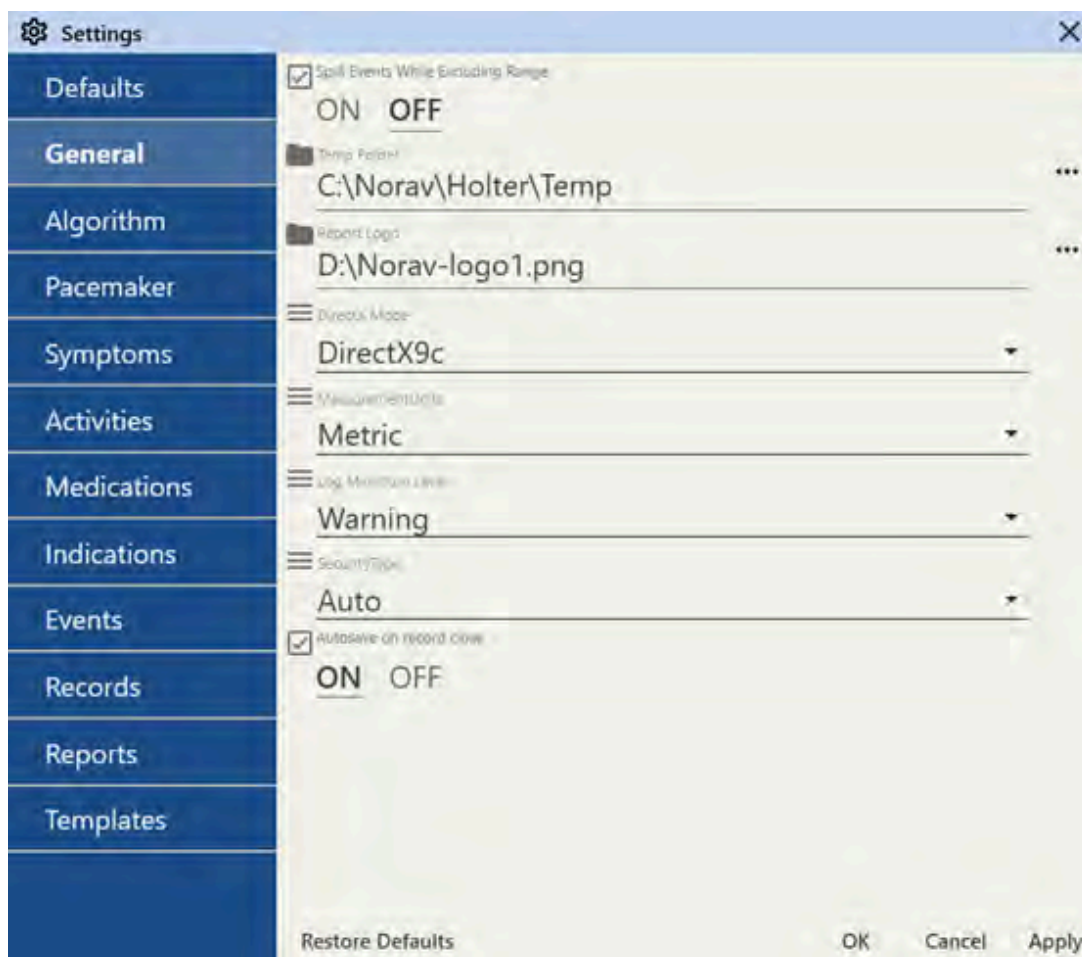
Figure 7. Restore Default Settings Box



## General Tab

**The General Tab** contains a list of general settings affecting NH-301 analysis system behavior and output parameters.

Figure 8. Settings Dialog Box - General Tab



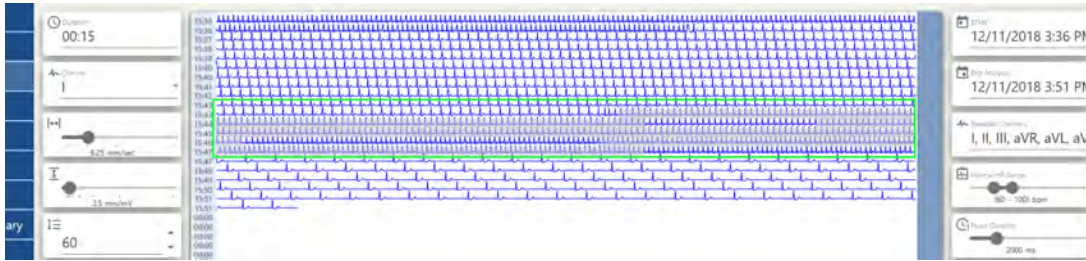
### Split Events While Excluding Range

Select **ON** to divide each continuous event that contains one or more "Exclude from analysis" areas into an equivalent number of separate events and standalone "Exclude from analysis" areas.

Select **OFF** to maintain each continuous event, even if it has one or more "Exclude from analysis" areas. Note that in this mode, event parameters such as duration, HRV, etc., will consider these "Exclude from analysis" areas. The event will not be fragmented into multiple events but will remain a single event.



Figure 9. General Tab - Split Events

**Note:**

This function applies to both existing events and new events you overlay on an "Exclude from analysis" area.

**Temp Folder**

Set the temporary folder for the NH-301 analysis system using one of two methods:

Figure 10. General Tab - Temp Folder Settings



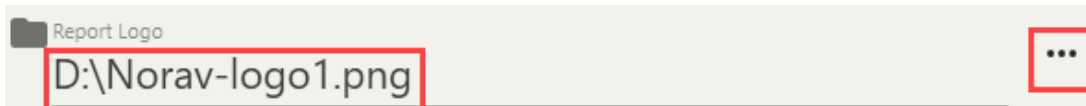
- Type in a new **Temp Folder** path in the text field.
- Click the ellipsis button on the right to open a Windows Explorer Window, and then:
  1. Navigate to the desired location on your PC.
  2. Select or double-click the folder you want to use as a temporary folder for the NH-301.
  3. Click the **Select Folder** button in the bottom right corner of the Windows Explorer Window.

Once done, you will see the new **Temp Folder** path displayed in this Tab.

**Report Logo**

Set the path for the **Report Logo** which will appear in the report output, using one of two methods:

Figure 11. General Tab - Report Logo Settings



- Type in a new path to the logo in the text field.
- Click the ellipsis button on the right to open a Windows Explorer Window, and then:

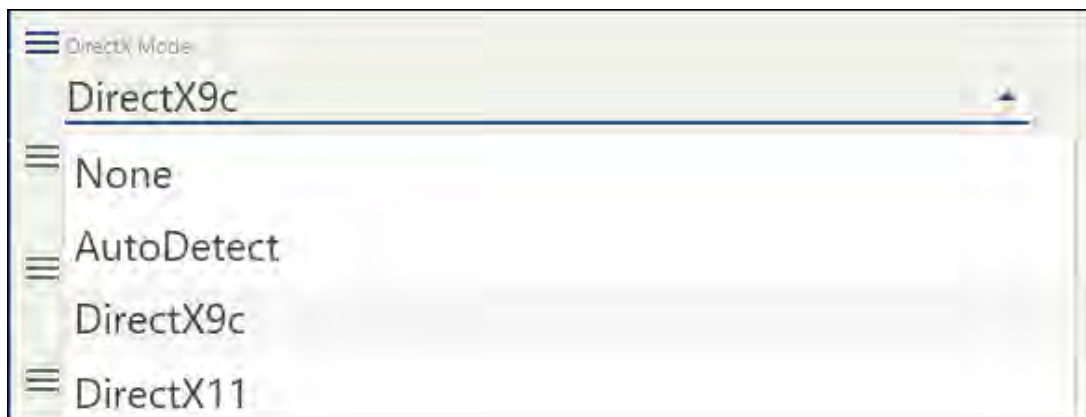
1. Navigate to the desired folder on your PC.
2. Select a .png file you want to use as a report logo.
3. Click the **Open** button in the bottom right corner of the Windows Explorer Window.

Once done, you will see the new **Report Logo** path displayed in this Tab.

### DirectX Mode

Select an appropriate mode from the drop-down list depending on your PC configuration:

Figure 12. General Tab - DirectX Mode Settings



- None
- AutoDetect - this option detects the suitable mode automatically.
- DirectX9c
- DirectX11c

### Measurement Units

Select your preferred measurement units from the drop-down list:

- Metric - for metric units.
- Imperial - for US units.

### Log Minimum Level

Select the **Log Minimum Level** from the drop-down list to set the log sensitivity grade:

- Verbose - all types of system notifications are logged.
- Debug - debug-level and all higher-level notifications are logged.
- Information - information-level and all higher-level notifications are logged.

- Warning - only warning notifications and errors are logged.
- Error - errors and fatal errors are logged.
- Fatal - only fatal system errors are logged.

### Security Type

Select the NH-301 analysis system **Security Type** from the drop-down list:

- Auto - autodetects the security type in use.
- Hasp - select this option if using a HASP security token.
- SecureX - select this option if using a SecureX security token.

### Autosave on Record Close

Select **ON** to save a patient record every time you close it.

Select **OFF** if you prefer to close patient records without saving them

## Saving or Discarding Settings Changes

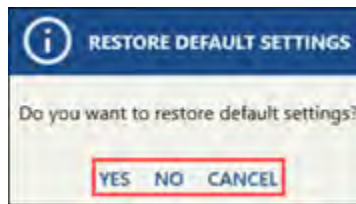
After making adjustments, you have several options located in the bottom part of the box:

Figure 13. Saving or Discarding Changes



- Click **Apply** to save the changes and continue working within the **Settings** dialog box (like navigating to other Tabs);
- Click **OK** to save and exit the **Settings** dialog box.
- Click **Cancel** to abort changes and exit the **Settings** dialog box.
- Click **Restore Defaults** to restore default settings. The **Restore Default Settings** dialog box will appear:
  - Click **Yes** to restore default settings and exit the **Settings** dialog box.
  - Click **No** to abort default settings restoration and return to the **Settings** dialog box.
  - Click **Cancel** to abort default settings restoration and exit the **Settings** dialog box.

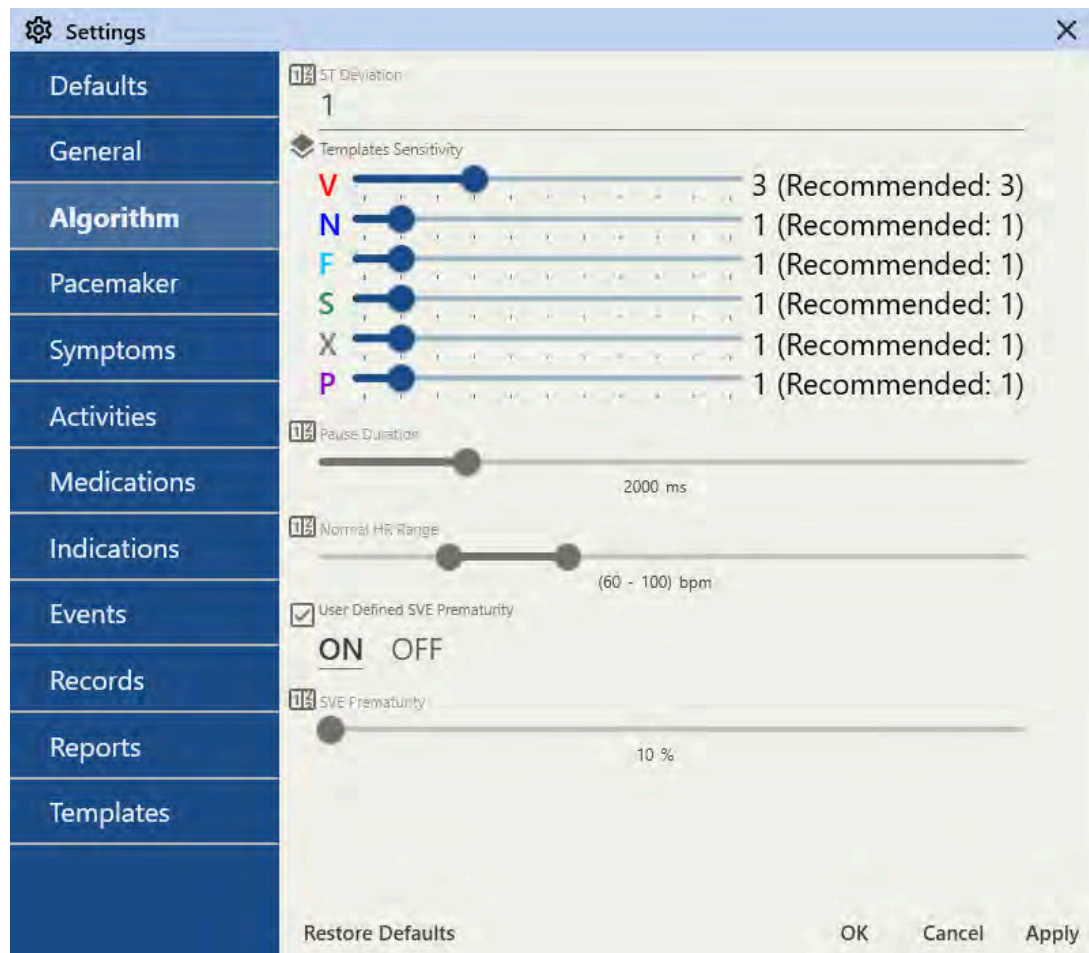
Figure 14. Restore Default Settings Box



## Algorithm Tab

The **Algorithm Tab** contains a list of algorithmic settings directly affecting the analysis process and outcomes of the patients' ECG records.

Figure 15. Settings Dialog Box - Algorithm Tab



### ST Deviation

Input the minimum deviation value for detecting ST events (either elevation or depression) during the analysis.

## Templates Sensitivity

Drag relevant sliders to set the analysis sensitivity level for each beat template type as recommended or set it to 0 to disable certain template types. Higher sensitivity levels will extract more distinct beat templates of the relevant type during analysis.



### Note:

By disabling certain template types you can speed up the Analysis step, weigh the importance of analysis accuracy against optimization.

## Pause Duration

Drag the slider to set the detection threshold for an ECG pause, ranging from 1000 ms to 6000 ms.

## Normal HR Range

Drag double slider controls to set the minimum and maximum heart rate values. Any significant deviations from this range will be classified as Tachycardia or Bradycardia.

## User Defined SVE Prematurity

Select **ON** to set new user conditions for detecting supraventricular premature beats. The **SVE Prematurity** value then serves as a deviation benchmark for comparing the current RR interval with the moving average of the three previous normal RR intervals.

Select **OFF** to use default settings for detecting supraventricular premature beats.

## SVE Prematurity

Drag a slider to set a new deviation value for detecting supraventricular premature beats, with options ranging from 10% to 40%.

If the deviation between current RR interval and the moving average of the three last normal RR intervals is smaller than the set value, the system will reclassify relevant events SVE event (S) as a Normal event (N).

For instance, if the SVE Prematurity is set to 20%, and the current RR interval deviation is 15%, the corresponding SVE event (S) will be reclassified as Normal (N).

## Saving or Discarding Settings Changes

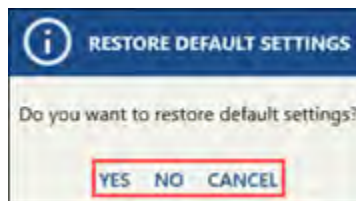
After making adjustments, you have several options located in the bottom part of the box:

Figure 16. Saving or Discarding Changes



- Click **Apply** to save the changes and continue working within the **Settings** dialog box (like navigating to other Tabs);
- Click **OK** to save and exit the **Settings** dialog box.
- Click **Cancel** to abort changes and exit the **Settings** dialog box.
- Click **Restore Defaults** to restore default settings. The **Restore Default Settings** dialog box will appear:
  - Click **Yes** to restore default settings and exit the **Settings** dialog box.
  - Click **No** to abort default settings restoration and return to the **Settings** dialog box.
  - Click **Cancel** to abort default settings restoration and exit the **Settings** dialog box.

Figure 17. Restore Default Settings Box



## Pacemaker Tab

The **Pacemaker Tab** contains a list of settings for configuring pacemaker beats analysis.

Figure 18. Settings Dialog Box - Pacemaker Tab

**Settings**

- Defaults
- General
- Algorithm
- Pacemaker**
- Symptoms
- Activities
- Medications
- Indications
- Events
- Records
- Reports
- Templates

Default Pacemaker Type: **DDD**

Pacemaker HR Range: **(50 - 120) bpm**

Maximum vent. spike to R interval: **90**

Maximum atrial spike to R interval: **260**

Pacemaker Sense time: **20**

Restore Defaults OK Cancel Apply

**Note:**

When pacemaker detection is activated by setting it to **ON** in the **Recorder** menu, these parameters become available both on the "Download from recorder" page and on the main page of the [Analysis View \(on page 97\)](#). On these pages, you can also adjust the pacemaker parameters to match the actual configuration of the patient's implanted device.



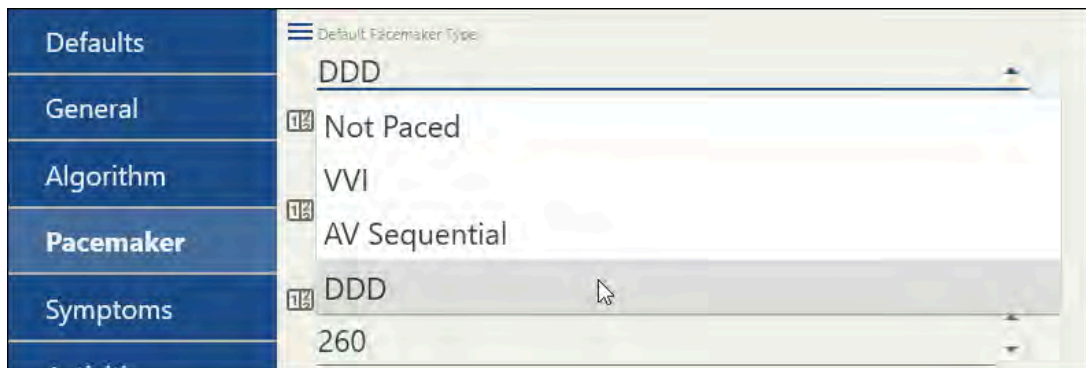
Figure 19. Recorder - Pacer Detector is ON



### Default Pacemaker Type

Select one of the available pacemaker types from the drop-down list to consider pacemaker beats during analysis:

Figure 20. Pacemaker Tab - Default Pacemaker Type Settings



- Not Paced
- VVI



- AV Sequential
- DDD

### Pacemaker HR Range

Drag double slider controls to set the minimum and maximum heart rate values initiated by the pacemaker.

### Maximum vent. spike to R interval

Set this parameter by using the picker arrows on the right. It represents the longest time a pacemaker can wait between delivering a ventricular pacing spike and the occurrence of the following R wave.

### Maximum atrial spike to R interval

Set this parameter by using the picker arrows on the right. It represents the longest time that a pacemaker can wait between delivering an atrial pacing spike and the following ventricular pacing spike.

### Pacemaker Sense Time

Set this parameter using the picker arrows on the right. It signifies the amount of time a pacemaker waits after detecting a heartbeat before administering another pacing stimulus.

## Saving or Discarding Settings Changes

After making adjustments, you have several options located in the bottom part of the box:

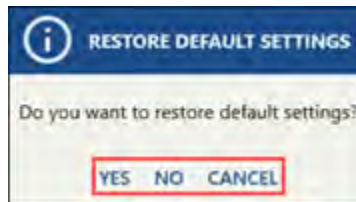
Figure 21. Saving or Discarding Changes



- Click **Apply** to save the changes and continue working within the **Settings** dialog box (like navigating to other Tabs);
- Click **OK** to save and exit the **Settings** dialog box.
- Click **Cancel** to abort changes and exit the **Settings** dialog box.
- Click **Restore Defaults** to restore default settings. The **Restore Default Settings** dialog box will appear:

- Click **Yes** to restore default settings and exit the **Settings** dialog box.
- Click **No** to abort default settings restoration and return to the **Settings** dialog box.
- Click **Cancel** to abort default settings restoration and exit the **Settings** dialog box.

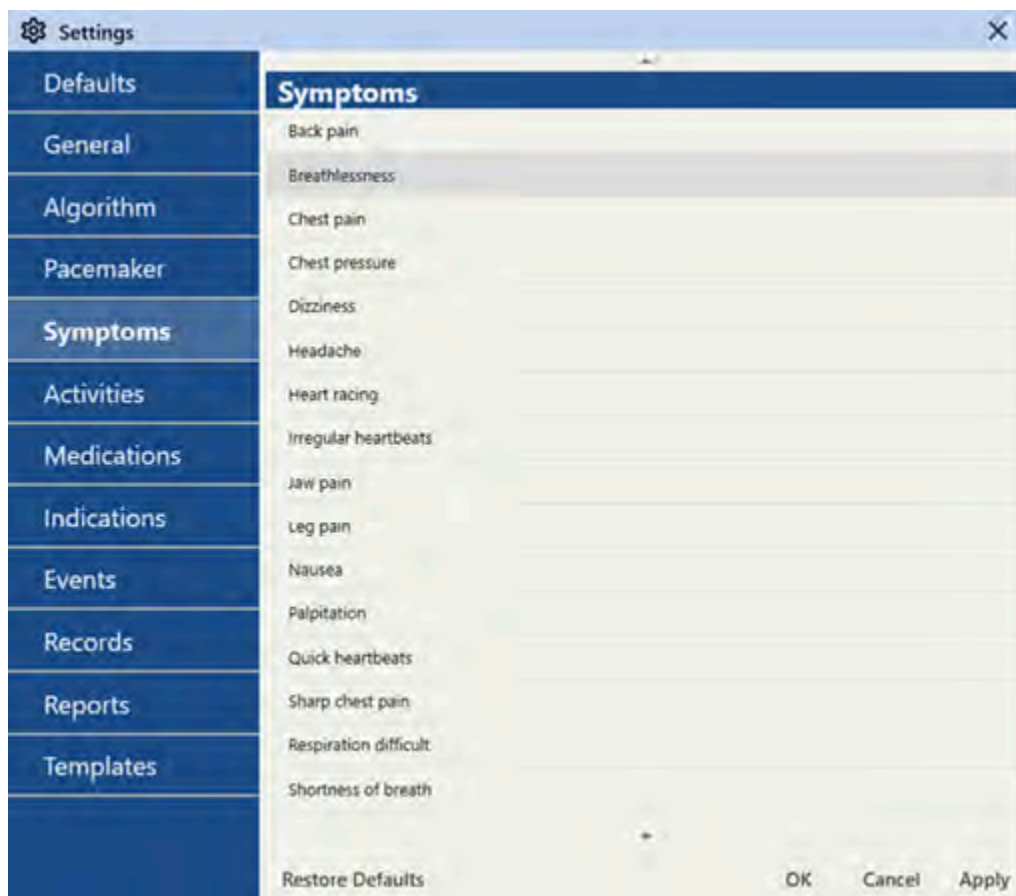
Figure 22. Restore Default Settings Box



## Symptoms Tab

The **Symptoms Tab** contains a list of predefined symptoms that can be used with the **Patient Diary** feature. You can modify or delete existing predefined items, or add new ones. If the full list of symptoms doesn't fit on your PC screen, use the scroll function to access the complete list.

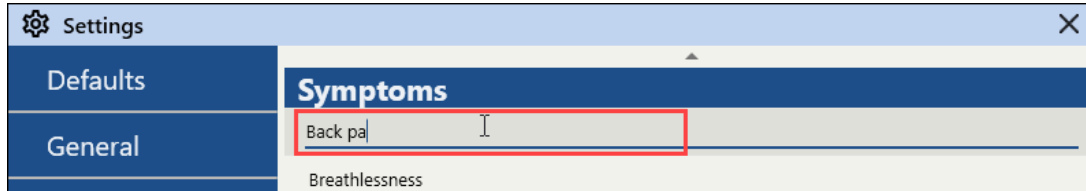
Figure 23. Settings Dialog Box - Symptoms Tab



## Editing Existing Symptoms Items

To modify an existing symptom entry in the **Symptoms Tab**, follow these steps:

Figure 24. Symptoms Tab - Editing Item



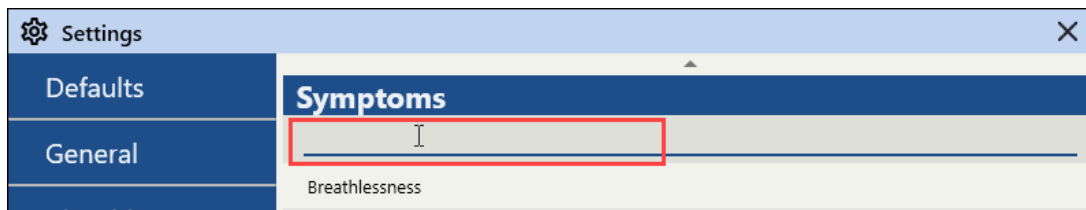
1. Click the line containing the symptom you want to edit.
2. Update the line's content as required.
3. Press Enter on your keyboard to confirm your changes.
4. Remember to save the changes in the **Symptoms Tab** after editing the necessary entries.

After you finish **Step 3**, you should see the updated name of the symptom that you just modified.

## Removing Existing Symptoms Items

To remove an existing symptom entry in the **Symptoms Tab**, follow these steps:

Figure 25. Symptoms Tab - Removing Item



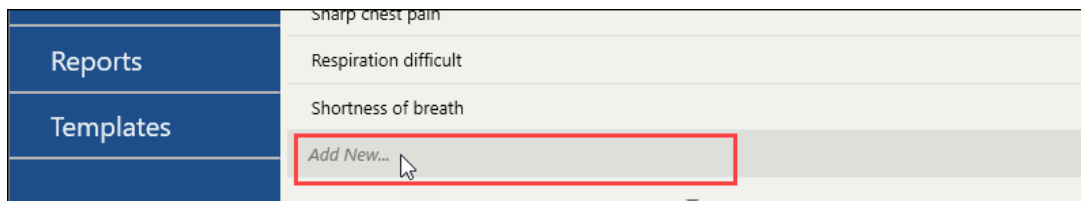
1. Click the line containing the symptom you want to remove.
2. Delete the line's content by selecting the text you want to remove and pressing Backspace or Delete on your keyboard.
3. Press Enter on your keyboard to confirm your changes.
4. Remember to save the changes in the **Symptoms Tab** after editing the necessary entries.

After you finish **Step 3**, you should see that the item is removed from the list.

## Adding New Symptoms Item

To add a new symptom entry in the **Symptoms Tab**, follow these steps:

Figure 26. Symptoms Tab - Adding Item



1. Scroll down to the very bottom of the symptoms list until you see the "Add New" line.
2. Click the "Add New" line.
3. Enter the new symptom you want to add to the symptoms list .
4. Press Enter on your keyboard to confirm your changes.
5. Remember to save the changes in the **Symptoms Tab** after editing the necessary entries.

After you finish **Step 4**, you should see a new line with the symptom you just typed in.

## Saving or Discarding Settings Changes

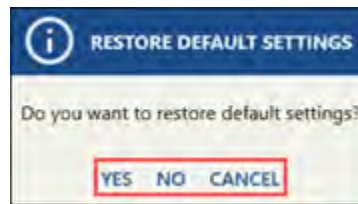
After making adjustments, you have several options located in the bottom part of the box:

Figure 27. Saving or Discarding Changes



- Click **Apply** to save the changes and continue working within the **Settings** dialog box (like navigating to other Tabs);
- Click **OK** to save and exit the **Settings** dialog box.
- Click **Cancel** to abort changes and exit the **Settings** dialog box.
- Click **Restore Defaults** to restore default settings. The **Restore Default Settings** dialog box will appear:
  - Click **Yes** to restore default settings and exit the **Settings** dialog box.
  - Click **No** to abort default settings restoration and return to the **Settings** dialog box.
  - Click **Cancel** to abort default settings restoration and exit the **Settings** dialog box.

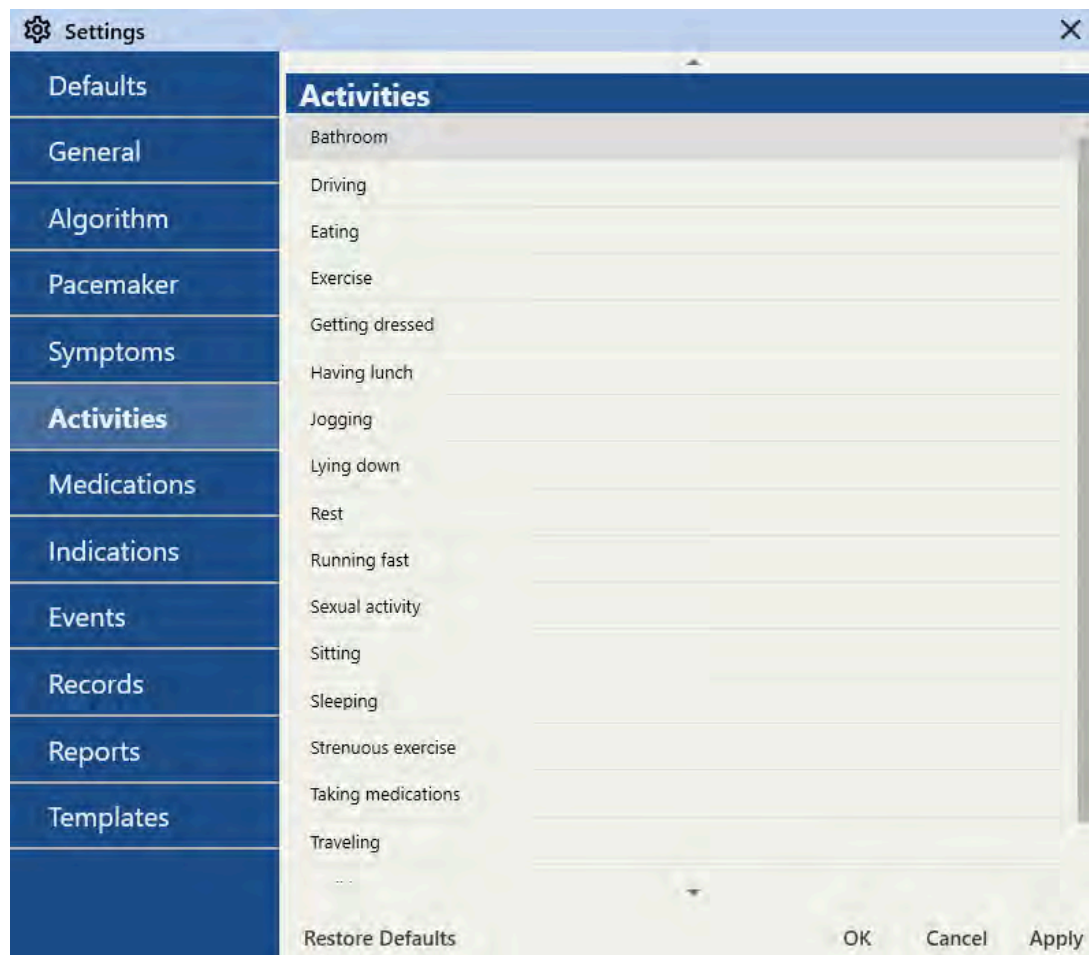
Figure 28. Restore Default Settings Box



## Activities Tab

The **Activities Tab** contains a list of predefined daily activities for patients for use with the **Patient Diary** feature. You can modify or delete existing predefined items, or add new ones. If the full list of activities doesn't fit on your PC screen, use the scroll function to access the complete list.

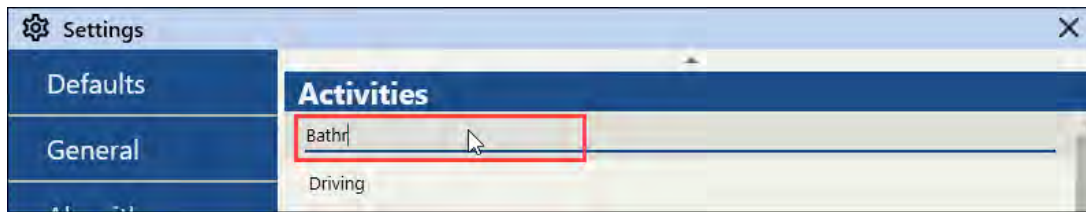
Figure 29. Settings Dialog Box - Activities Tab



### Editing Existing Activities Items

To modify an existing activity entry in the **Activities Tab**, follow these steps:

Figure 30. Activities Tab - Editing Item



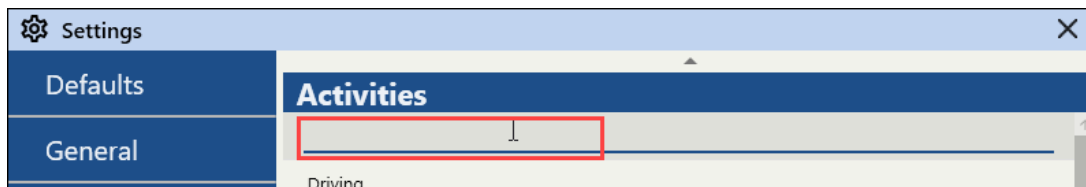
1. Click the line containing the activity you want to edit.
2. Update the line's content as required.
3. Press Enter on your keyboard to confirm your changes.
4. Remember to save the changes in the **Activities Tab** after editing the necessary entries.

After you finish **Step 3**, you should see the updated name of the activity that you just modified.

### Removing Existing Activities Items

To remove an existing activity entry in the **Activities Tab**, follow these steps:

Figure 31. Activities Tab - Removing Item



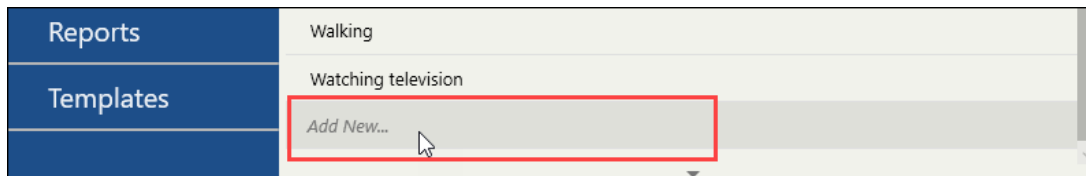
1. Click the line containing the activity you want to remove.
2. Delete the line's content by selecting the text you want to remove and pressing Backspace or Delete on your keyboard.
3. Press Enter on your keyboard to confirm your changes.
4. Remember to save the changes in the **Activities Tab** after editing the necessary entries.

After you finish **Step 3**, you should see that the item is removed from the list.

### Adding New Activities Item

To add a new activity entry in the **Activities Tab**, follow these steps:

Figure 32. Activities Tab - Adding Item



1. Scroll down to the very bottom of the activities list until you see the "Add New" line.
2. Click the "Add New" line.
3. Enter the new activity you want to add to the activities list .
4. Press Enter on your keyboard to confirm your changes.
5. Remember to save the changes in the **Activities Tab** after editing the necessary entries.

After you finish **Step 4**, you should see a new line with the activity you just typed in.

## Saving or Discarding Settings Changes

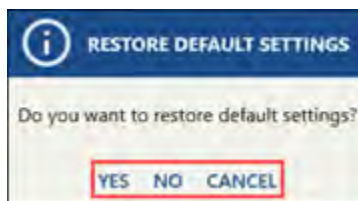
After making adjustments, you have several options located in the bottom part of the box:

Figure 33. Saving or Discarding Changes



- Click **Apply** to save the changes and continue working within the **Settings** dialog box (like navigating to other Tabs);
- Click **OK** to save and exit the **Settings** dialog box.
- Click **Cancel** to abort changes and exit the **Settings** dialog box.
- Click **Restore Defaults** to restore default settings. The **Restore Default Settings** dialog box will appear:
  - Click **Yes** to restore default settings and exit the **Settings** dialog box.
  - Click **No** to abort default settings restoration and return to the **Settings** dialog box.
  - Click **Cancel** to abort default settings restoration and exit the **Settings** dialog box.

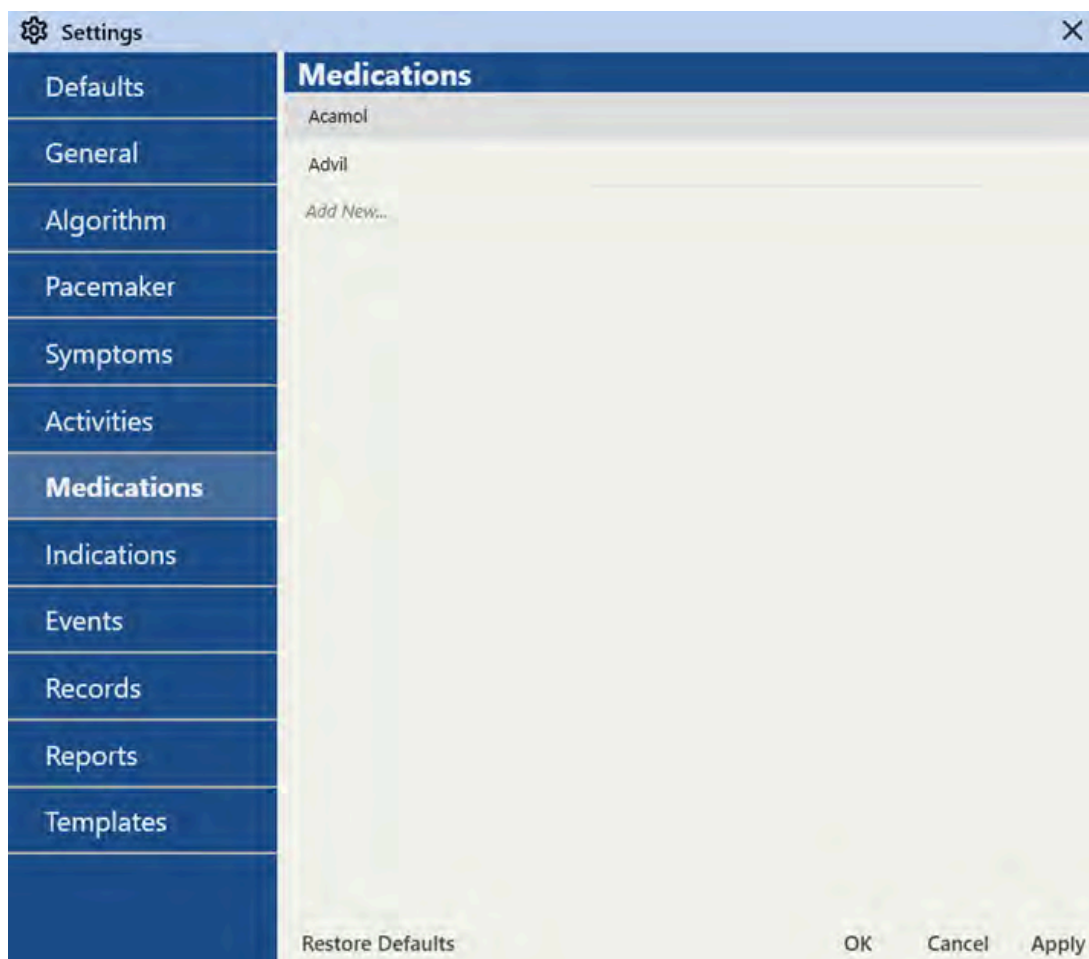
Figure 34. Restore Default Settings Box



## Medications Tab

The **Medications Tab** contains a list of medications taken by the patient on a regular basis. You can modify or delete existing predefined items, or add new ones. If the full list of medications doesn't fit on your PC screen, use the scroll function to access the complete list.

Figure 35. Settings Dialog Box - Medications Tab

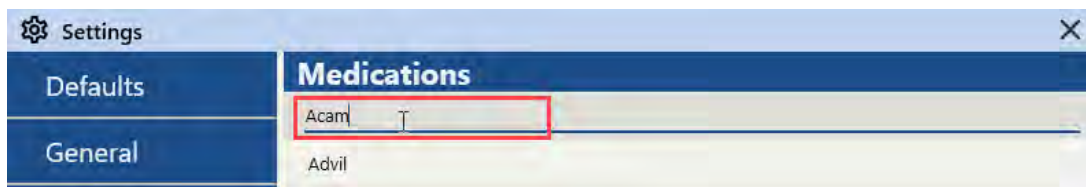


### Editing Existing Medications Items

To modify an existing medication entry in the **Medications Tab**, follow these steps:



Figure 36. Medications Tab - Editing Item



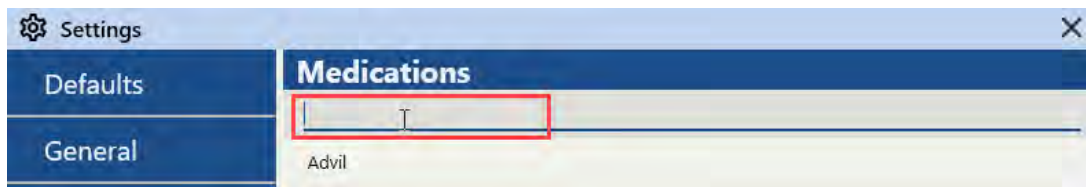
1. Click the line containing the medication you want to edit.
2. Update the line's content as required.
3. Press Enter on your keyboard to confirm your changes.
4. Remember to save the changes in the **Medications Tab** after editing the necessary entries.

After you finish **Step 3**, you should see the updated name of the medication that you just modified.

### Removing Existing Medications Items

To remove an existing medication entry in the **Medications Tab**, follow these steps:

Figure 37. Medications Tab - Removing Item



1. Click the line containing the medication you want to remove.
2. Delete the line's content by selecting the text you want to remove and pressing Backspace or Delete on your keyboard.
3. Press Enter on your keyboard to confirm your changes.
4. Remember to save the changes in the **Medications Tab** after editing the necessary entries.

After you finish **Step 3**, you should see that the item is removed from the list.

### Adding New Medications Item

To add a new medication entry in the **Medications Tab**, follow these steps:

Figure 38. Medications Tab - Adding Item



1. Scroll down to the very bottom of the medications list until you see the "Add New" line.
2. Click the "Add New" line.
3. Enter the new medication you want to add to the medications list .
4. Press Enter on your keyboard to confirm your changes.
5. Remember to save the changes in the **Medications Tab** after editing the necessary entries.

After you finish **Step 4**, you should see a new line with the medication you just typed in.

## Saving or Discarding Settings Changes

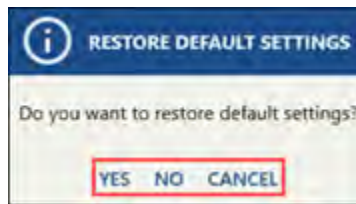
After making adjustments, you have several options located in the bottom part of the box:

Figure 39. Saving or Discarding Changes



- Click **Apply** to save the changes and continue working within the **Settings** dialog box (like navigating to other Tabs);
- Click **OK** to save and exit the **Settings** dialog box.
- Click **Cancel** to abort changes and exit the **Settings** dialog box.
- Click **Restore Defaults** to restore default settings. The **Restore Default Settings** dialog box will appear:
  - Click **Yes** to restore default settings and exit the **Settings** dialog box.
  - Click **No** to abort default settings restoration and return to the **Settings** dialog box.
  - Click **Cancel** to abort default settings restoration and exit the **Settings** dialog box.

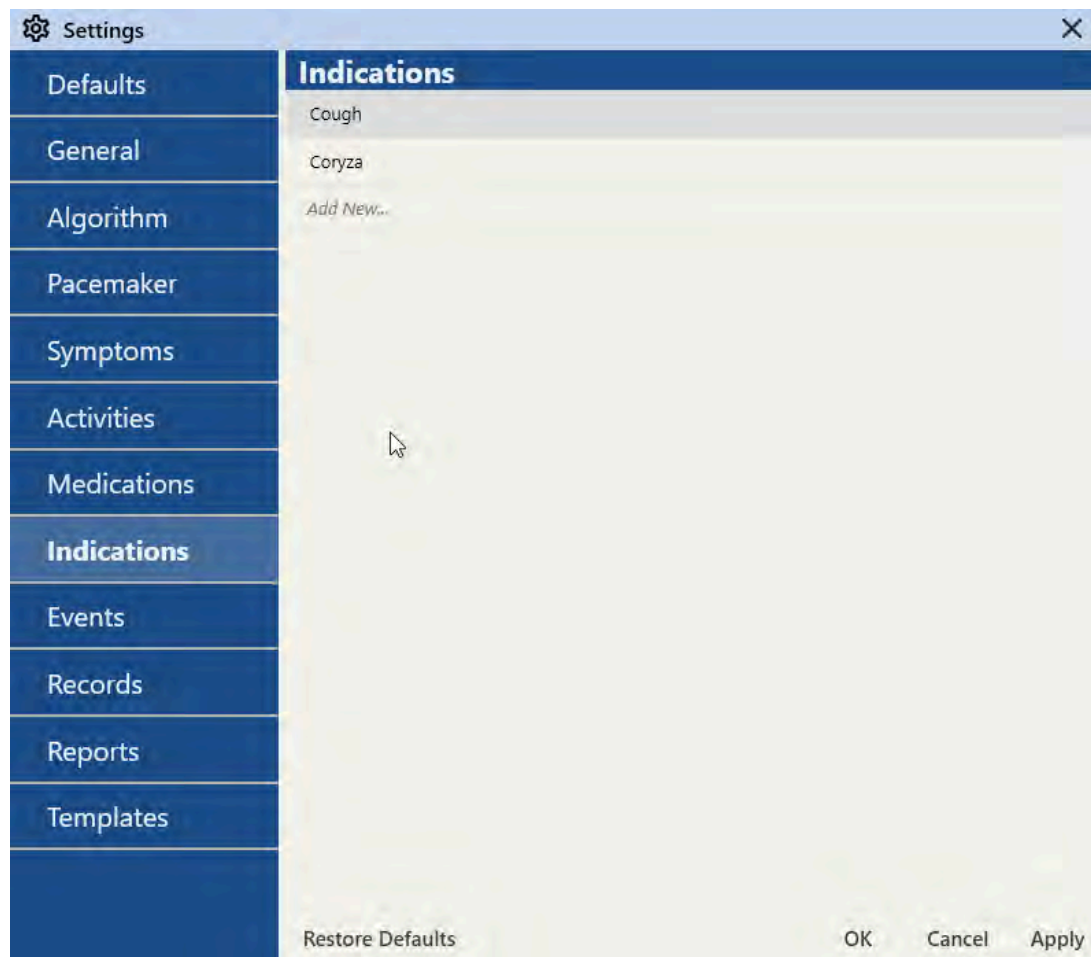
Figure 40. Restore Default Settings Box



## Indications Tab

The Indications Tab contains a list of predefined indications for patients. You can modify or delete existing predefined items, or add new ones. If the full list of indications doesn't fit on your PC screen, use the scroll function to access the complete list.

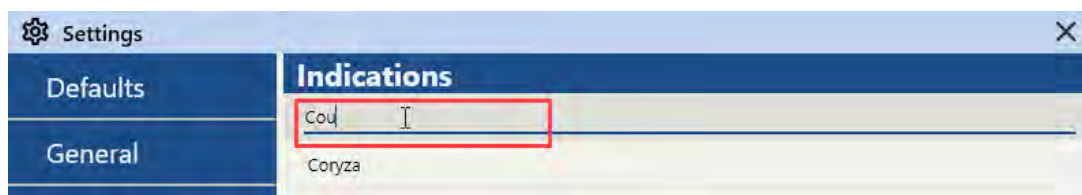
Figure 41. Settings Dialog Box - Indications Tab



### Editing Existing Indications Items

To modify an existing indication entry in the **Indications Tab**, follow these steps:

Figure 42. Indications Tab - Editing Item



1. Click the line containing the indication you want to edit.
2. Update the line's content as required.
3. Press Enter on your keyboard to confirm your changes.
4. Remember to save the changes in the **Indications Tab** after editing the necessary entries.

After you finish **Step 3**, you should see the updated name of the indication that you just modified.

### Removing Existing Indications Items

To remove an existing indication entry in the **Indications Tab**, follow these steps:

Figure 43. Indications Tab - Removing Item



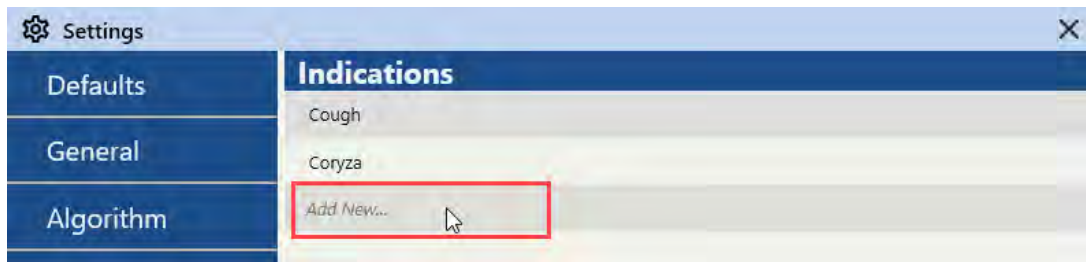
1. Click the line containing the indication you want to remove.
2. Delete the line's content by selecting the text you want to remove and pressing Backspace or Delete on your keyboard.
3. Press Enter on your keyboard to confirm your changes.
4. Remember to save the changes in the **Indications Tab** after editing the necessary entries.

After you finish **Step 3**, you should see that the item is removed from the list.

### Adding New Indications Item

To add a new indication entry in the **Indications Tab**, follow these steps:

Figure 44. Indications Tab - Adding Item



1. Scroll down to the very bottom of the indications list until you see the "Add New" line.
2. Click the "Add New" line.
3. Enter the new indication you want to add to the indications list.
4. Press Enter on your keyboard to confirm your changes.
5. Remember to save the changes in the **Indications Tab** after editing the necessary entries.

After you finish **Step 4**, you should see a new line with the indication you just typed in.

## Saving or Discarding Settings Changes

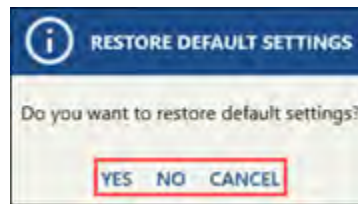
After making adjustments, you have several options located in the bottom part of the box:

Figure 45. Saving or Discarding Changes



- Click **Apply** to save the changes and continue working within the **Settings** dialog box (like navigating to other Tabs);
- Click **OK** to save and exit the **Settings** dialog box.
- Click **Cancel** to abort changes and exit the **Settings** dialog box.
- Click **Restore Defaults** to restore default settings. The **Restore Default Settings** dialog box will appear:
  - Click **Yes** to restore default settings and exit the **Settings** dialog box.
  - Click **No** to abort default settings restoration and return to the **Settings** dialog box.
  - Click **Cancel** to abort default settings restoration and exit the **Settings** dialog box.

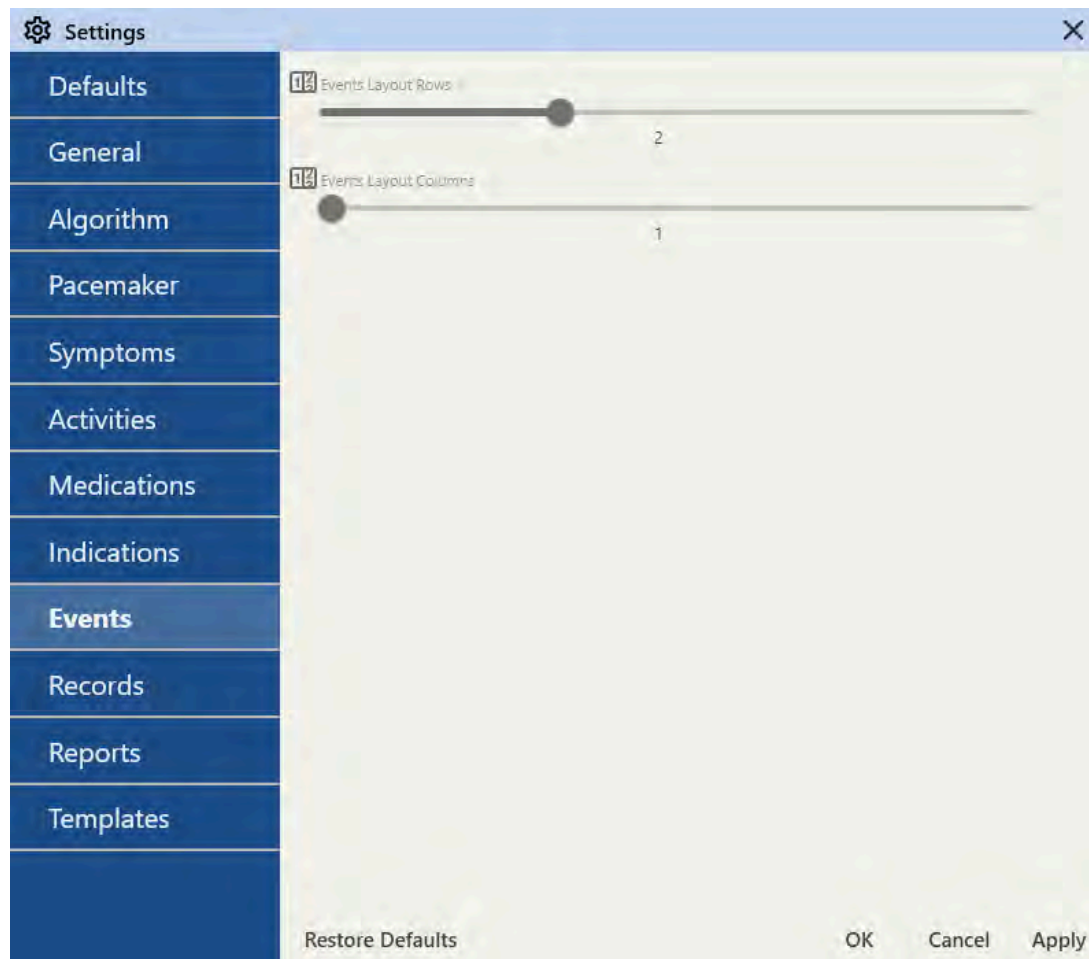
Figure 46. Restore Default Settings Box



## Events Tab

The **Events Tab** contains sliders to configure the layout of the **Events Panel** in the **Events View**. These controls allow you to adjust how the events blocks within the **Events Panel** are displayed.

Figure 47. Settings Dialog Box - Events Tab



### Events Layout Rows

Drag this slider to set the number of rows for the **Events Panel** layout, ranging from 1 to 4. This adjustment affects how many rows of events blocks are visible in the **Events Panel**.

## Events Layout Columns

Drag this slider to set the number of columns for the **Events Panel** layout, ranging from 1 to 10. This adjustment affects how many columns of events blocks are visible in the **Events Panel**.

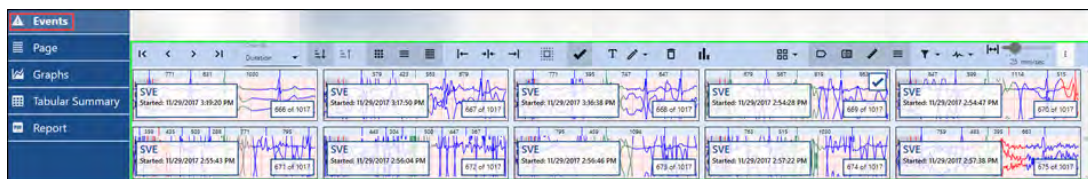


### Note:

The combination of these settings allows you to change the default layout, determining the total number of event blocks that you can see at the same time, ranging from 1 to 40. Customize this default setting to suit your preferences and viewing needs.

For example, if you set the **Events Layout Rows** value to 2 and the **Events Layout Columns** value to 5, you will see a total of 10 event blocks in the **Events Panel**.

Figure 48. Events View - Events Panel



## Saving or Discarding Settings Changes

After making adjustments, you have several options located in the bottom part of the box:

Figure 49. Saving or Discarding Changes



- Click **Apply** to save the changes and continue working within the **Settings** dialog box (like navigating to other Tabs);
- Click **OK** to save and exit the **Settings** dialog box.
- Click **Cancel** to abort changes and exit the **Settings** dialog box.
- Click **Restore Defaults** to restore default settings. The **Restore Default Settings** dialog box will appear:

- Click **Yes** to restore default settings and exit the **Settings** dialog box.
- Click **No** to abort default settings restoration and return to the **Settings** dialog box.
- Click **Cancel** to abort default settings restoration and exit the **Settings** dialog box.

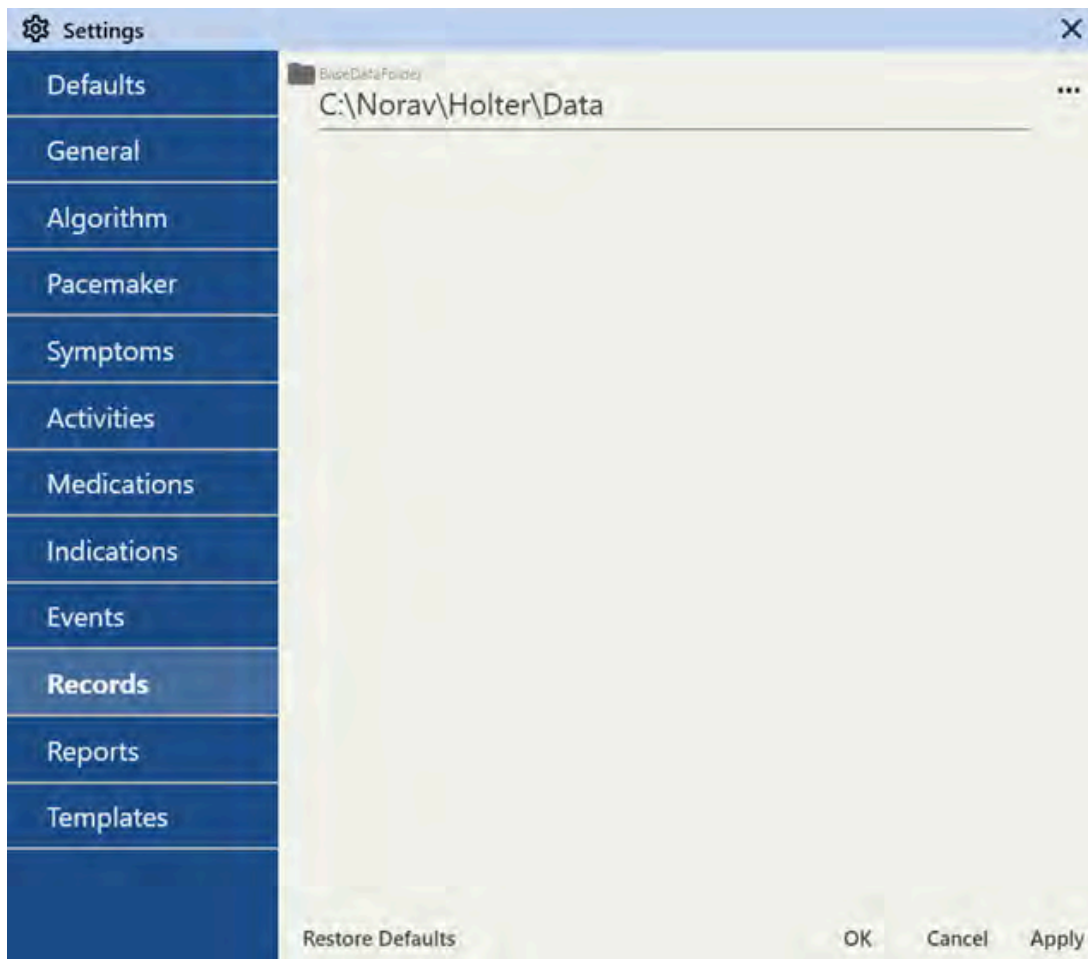
Figure 50. Restore Default Settings Box



## Records Tab

The **Records Tab** contains the **Base Data Folder** path, where the patients' records are stored on your PC. In this Tab, you have the option to modify the default path to a location of your choice.

Figure 51. Settings Dialog Box - Records Tab

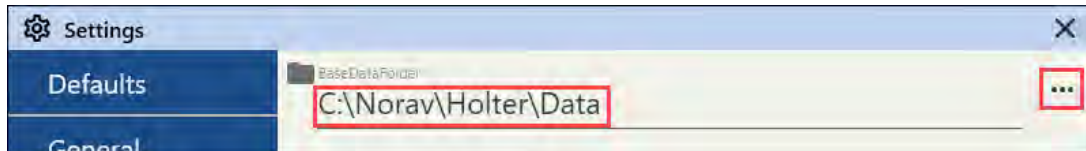




## Base Data Folder

To set the default **Base Data Folder** path, where the NH-301 analysis system will store patients' records on your PC, you can use one of two methods:

Figure 52. Records Tab - Base Data Folder Settings



- Type in a new **Base Data Folder** path in the text field.
- Click the ellipsis button on the right to open a Windows Explorer Window, and then:
  1. Navigate to the desired location on your PC.
  2. Select or double-click the folder you want to use as a **Base Data Folder** for the NH-301.
  3. Click the **Select Folder** button in the bottom right corner of the Windows Explorer Window.

Once done, you will see the new **Base Data Folder** path displayed in this Tab.

## Saving or Discarding Settings Changes

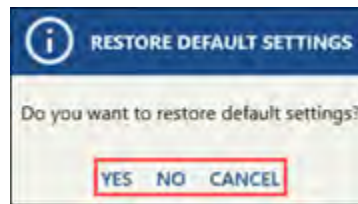
After making adjustments, you have several options located in the bottom part of the box:

Figure 53. Saving or Discarding Changes



- Click **Apply** to save the changes and continue working within the **Settings** dialog box (like navigating to other Tabs);
- Click **OK** to save and exit the **Settings** dialog box.
- Click **Cancel** to abort changes and exit the **Settings** dialog box.
- Click **Restore Defaults** to restore default settings. The **Restore Default Settings** dialog box will appear:
  - Click **Yes** to restore default settings and exit the **Settings** dialog box.
  - Click **No** to abort default settings restoration and return to the **Settings** dialog box.
  - Click **Cancel** to abort default settings restoration and exit the **Settings** dialog box.

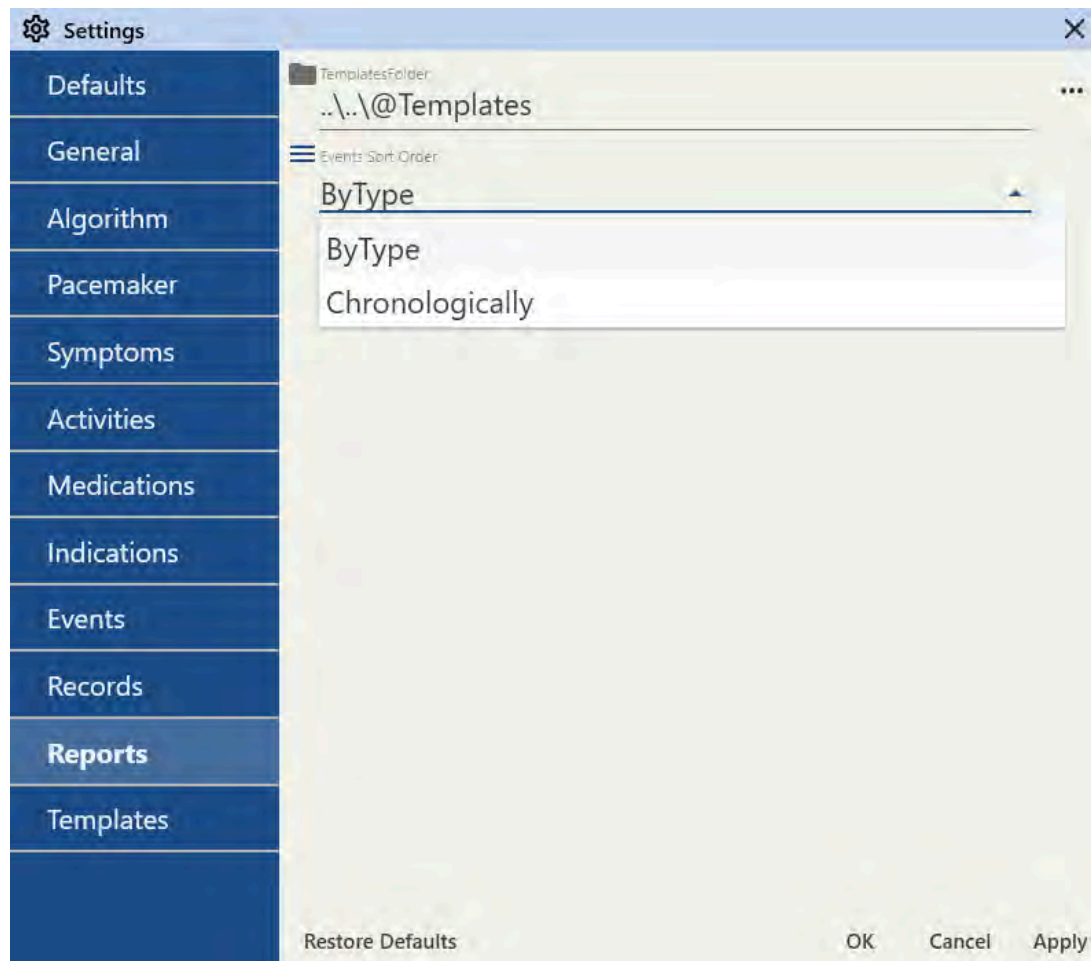
Figure 54. Restore Default Settings Box



## Reports Tab

The **Reports Tab** contains the default settings that influence the report output of the NH-301 analysis system.

Figure 55. Settings Dialog Box - Reports Tab



### Templates Folder

To set the default **Templates Folder** path, where the NH-301 analysis system will store reports templates on your PC, you can use one of two methods:

Figure 56. Report Tab - Templates Folder Settings



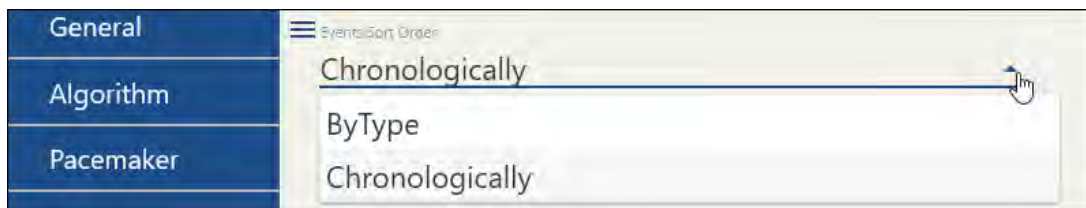
- Type in a new **Templates Folder** path in the text field.
- Click the ellipsis button on the right to open a Windows Explorer Window, and then:
  1. Navigate to the desired location on your PC.
  2. Select or double-click the folder you want to use as a **Templates Folder** for the NH-301.
  3. Click the **Select Folder** button in the bottom right corner of the Windows Explorer Window.

Once done, you will see the new **Templates Folder** path displayed in this Tab.

### Events Sort Order

Choose the default method by which the NH-301 analysis system will present events in the report output, using the drop-down list:

Figure 57. Report Tab - Events Sort Order Settings



- By Type
- Chronologically



#### Note:

You can also modify the **Events Sort Order** directly in the **Report View**, just before selecting the 'Generate Report' button.

### Saving or Discarding Settings Changes

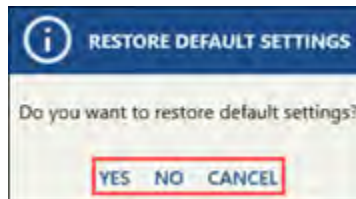
After making adjustments, you have several options located in the bottom part of the box:

Figure 58. Saving or Discarding Changes



- Click **Apply** to save the changes and continue working within the **Settings** dialog box (like navigating to other Tabs);
- Click **OK** to save and exit the **Settings** dialog box.
- Click **Cancel** to abort changes and exit the **Settings** dialog box.
- Click **Restore Defaults** to restore default settings. The **Restore Default Settings** dialog box will appear:
  - Click **Yes** to restore default settings and exit the **Settings** dialog box.
  - Click **No** to abort default settings restoration and return to the **Settings** dialog box.
  - Click **Cancel** to abort default settings restoration and exit the **Settings** dialog box.

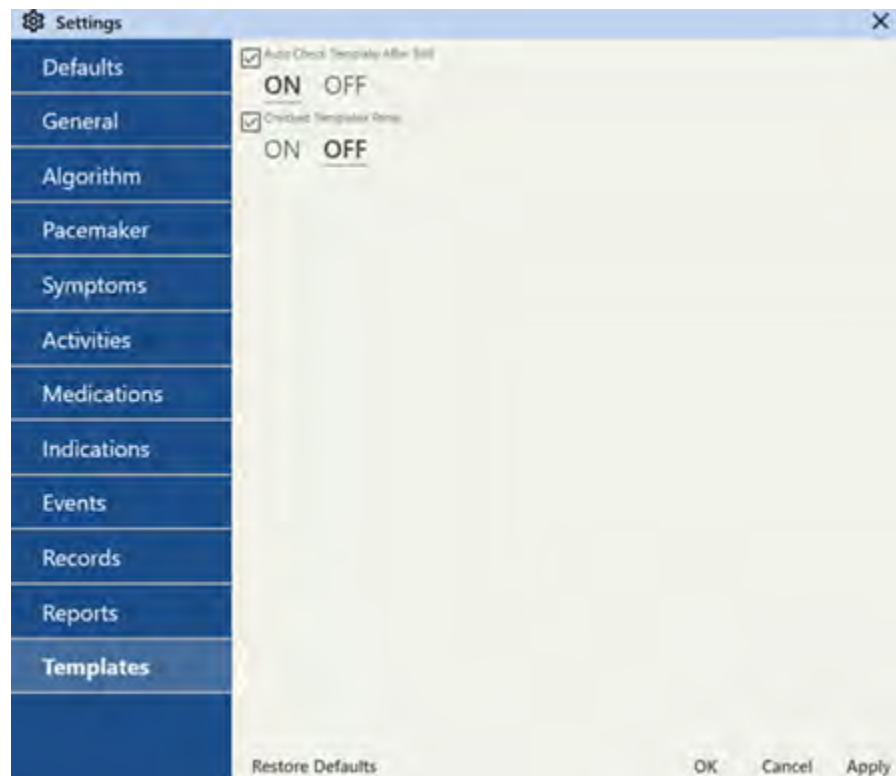
Figure 59. Restore Default Settings Box



## Templates Tab

The **Templates Tab** contains options to configure the process of how you work with beat templates in the **Templates View**.

Figure 60. Settings Dialog Box - Templates Tab



### Auto Check Template After Edit

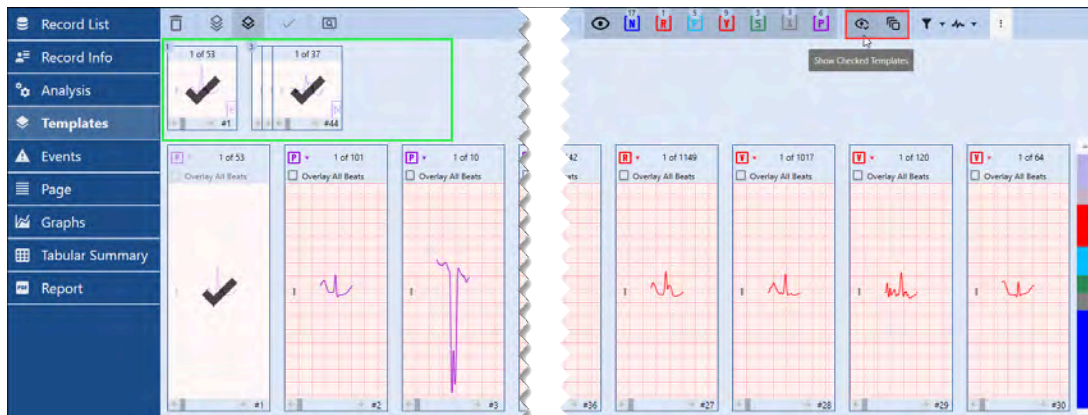
Select **ON** to automatically assign the "Checked" status to beat templates after you complete editing them. This option can help you speed up the templates review process.

Select **OFF** if you prefer to assign the "Checked" status to beat templates manually. In this case, after you complete editing a template, it won't be marked as a "Checked" one.

### Checked Templates Panel

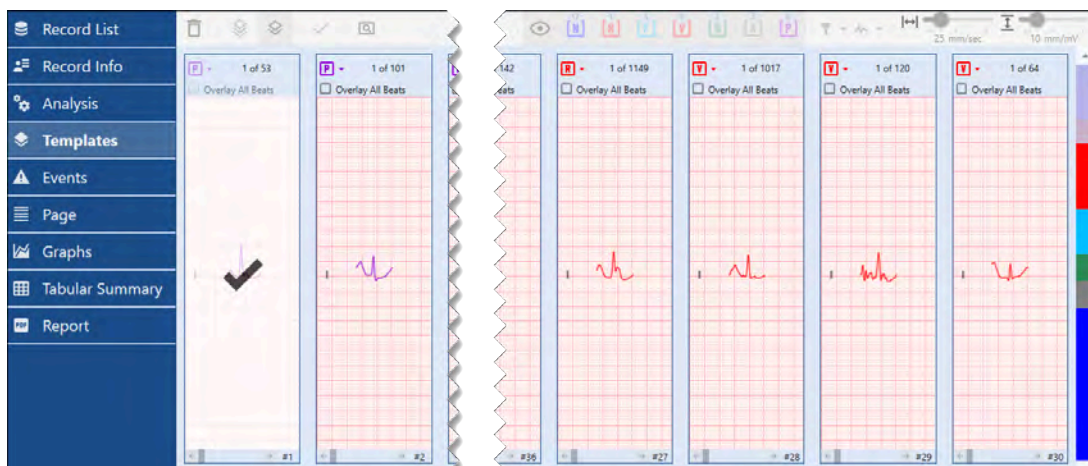
Select **ON** to enable a dedicated panel for checked templates in the top part of the **Templates View**. When it's set to **ON**, you will also see additional control buttons in the top action bar, as shown in the figure below. These buttons allow you to disable or enable the **Checked Templates Panel** itself and a display of the checked templates in the panel below the **Checked Templates Panel** (i.e., in the **Templates Panel**).

Figure 61. Templates View - Checked Templates Panel ON



Select **OFF** if you prefer to have this panel off the screen when you are in the **Templates View**.

Figure 62. Templates View - Checked Templates Panel OFF



## Saving or Discarding Settings Changes

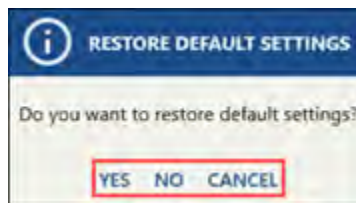
After making adjustments, you have several options located in the bottom part of the box:

Figure 63. Saving or Discarding Changes



- Click **Apply** to save the changes and continue working within the **Settings** dialog box (like navigating to other Tabs);
- Click **OK** to save and exit the **Settings** dialog box.
- Click **Cancel** to abort changes and exit the **Settings** dialog box.
- Click **Restore Defaults** to restore default settings. The **Restore Default Settings** dialog box will appear:
  - Click **Yes** to restore default settings and exit the **Settings** dialog box.
  - Click **No** to abort default settings restoration and return to the **Settings** dialog box.
  - Click **Cancel** to abort default settings restoration and exit the **Settings** dialog box.

Figure 64. Restore Default Settings Box





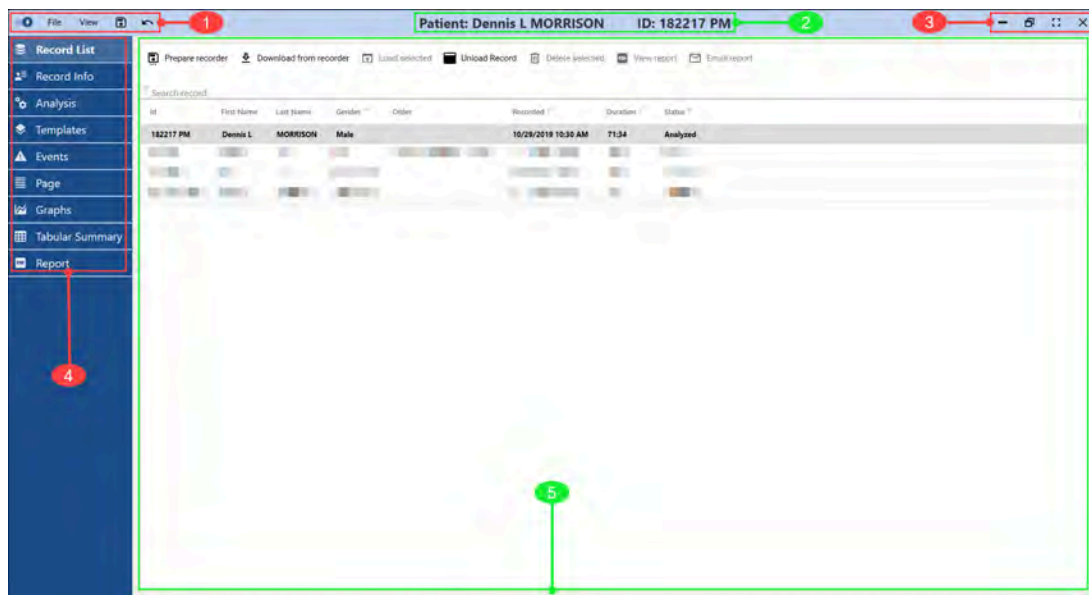
## Chapter 4. Interface Core Elements Overview

In this chapter, an overview of the basic interface elements of the Holter NH-301 analysis system is provided. You will learn about the functionality of the following user interface (UI) elements: the top menu bar, the top title bar, the window control buttons, and the left side bar with the **Views** menu (including Record List, Analysis, Graphs Views, etc.).

Here, a detailed description of the basic interface elements is provided, along with guidance on how to use them. To enhance clarity, the elements in the figures are distinguished by color:

- Actionable elements, such as buttons and menus, are marked in red.
- Non-actionable elements, including informative elements or specific screen areas, are marked in green.

Figure 65. User Interface Basic Elements



The elements depicted in the figure above are consistently available across all screens and views within the NH-301 analysis system:

1. **Menu Bar:** contains menus and buttons that control functions such as records import/export, saving, settings, views, etc.
2. **Title Bar Text:** includes the patient's name and patient ID for easy reference.
3. **Window Control Buttons:** features a standard set of controls for window states.



4. **Views Sidebar:** a designated sidebar that allows switching between different **Views** available within the system.
5. **View Area:** unlike other interface elements, which remain largely consistent across screens (except being active or inactive under certain circumstances), this area houses distinct content, data, and controls for each **View** and **View mode**.

Please refer to the relevant sections in this Chapter for detailed descriptions of each element.

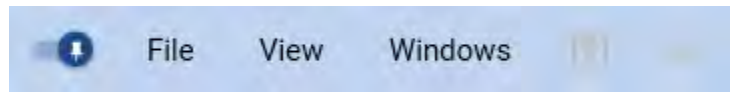
## Menu Bar

The **Menu Bar** contains menus and buttons that control various general functions of the NH-301 analysis system, such as importing/exporting records, saving, adjusting settings, switching views, etc. Please note that some buttons or menu items may be inactive until a patient's **Record** is loaded (e.g., the Save Record and Undo icons). A detailed description of the **Menu Bar** components can be found below.

The **Menu Bar** can be in one of three different states:

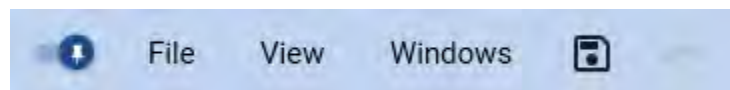
- **Default State (No Records Loaded):** When no patient records are loaded in the system, the Save Record, Undo, and Views switch functions and buttons are inactive.

Figure 66. Menu Bar - No Records Loaded



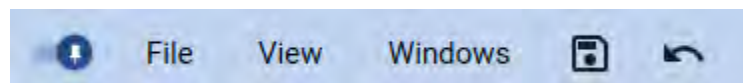
- **Record Loaded (No Actions Made):** When a patient record is loaded in the system but no actions have been made, only the Undo button and Export Record function are inactive.

Figure 67. Menu Bar - Record Loaded, No Actions



- **Record Loaded (Actions Made):** When a patient record is loaded in the system and actions have been taken (e.g., templates edited and checked), only the Export Record function is inactive.

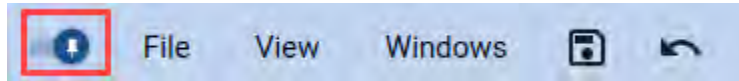
Figure 68. Menu Bar - Record Loaded, Undo Action Active



## Sidebar Control Button

The **Sidebar Control Button** allows you to toggle the **Views Sidebar** (Record List, Analysis, Events, Report, etc.), located in the left part of the screen:

Figure 69. Menu Bar - Sidebar Control Button

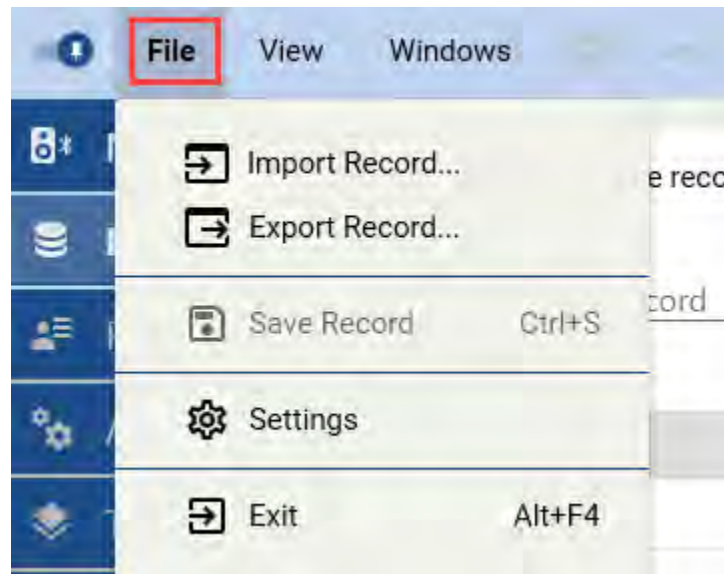


- **Collapse:** Click the **Sidebar Control Button** when the **Views Sidebar** is expanded to collapse it. This will automatically expand the **View Area**, providing more screen space.
- **Expand:** Click the **Sidebar Control Button** when the **Views Sidebar** is collapsed to expand it, revealing the available **Views**.

## File Menu

The **File** drop-down menu contains general menu items for importing, exporting, and saving patient records, accessing settings, and exiting the application.

Figure 70. Menu Bar - File Menu



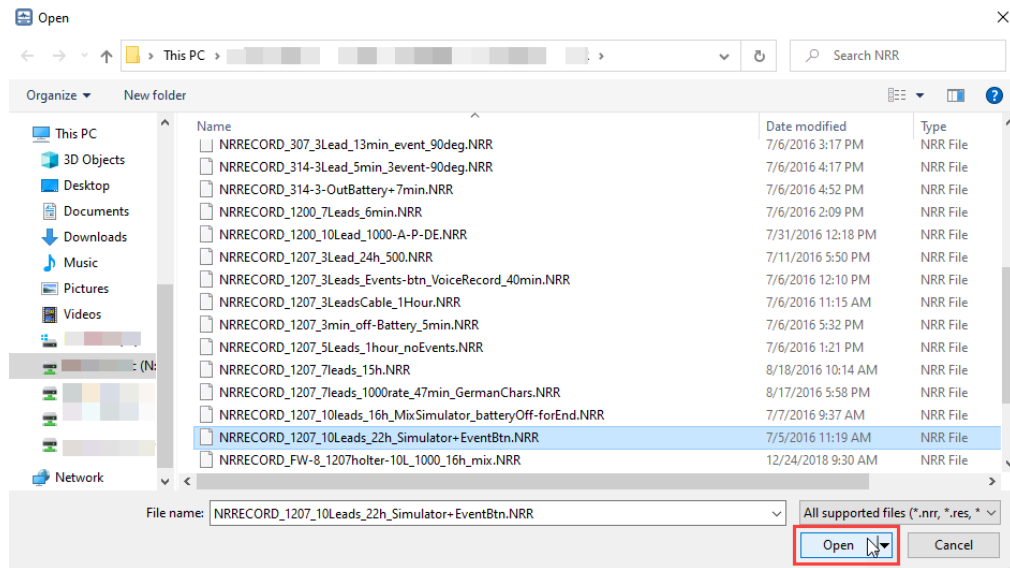
## Import Record

This option allows you to import a patient's record from a folder on your PC, local network, or USB drive.

To import a patient's record:

1. Click the **File** menu.
2. Click the **Import Record** option to open a Windows Explorer Window:
  - a. Navigate to the desired folder.
  - b. Select one .nrr, .res, or .hl5 file (only one file at a time).
  - c. Click the **Open** button in the bottom right corner.

Figure 71. Import Record - Open Record



A new window for entering the initial information for the patient's record will appear.

3. Fill in the patient's personal information, record information, medications and indications data, and set basic scanning criteria. To accomplish this, complete the following steps:

Figure 72. Import Record - Patient Information Window

The screenshot shows the 'Norav Holter 2023.1' patient information window. The window is divided into several sections: PERSONAL INFORMATION, RECORD INFORMATION, MEDICATIONS, INDICATIONS, and SCANNING CRITERIA. The 'Proceed' button in the bottom right corner is highlighted with a red box.

Section	Field	Value
PERSONAL INFORMATION	Order	35-35-35
	MRN	
	Referring Organization	
	Referring Physician	
	Birth date	
	Age	
	Gender	Male
	Weight	kg
	Height	cm
	Address Line 1	
RECORD INFORMATION	Clinic	
	Hookup Technician	
	Analyzing Technician	
	Reporting Physician	
MEDICATIONS	Medication	
	Address Line 2	
INDICATIONS	Indication	
	Address Line 2	
SCANNING CRITERIA	Heart Rate Range	60 - 100 bpm
	Heart Rate Threshold	30 - 120 bpm
	Heart Rate Threshold	90
	Heart Rate Threshold	260

- a. In the **Personal Information** section:

Figure 73. Import Record - Personal Information

- Click on each text field (**ID**, **First Name**, **Last Name**, **Age**, etc.) and type in the data according to your needs and workflows.
- Click on the **Birth Date** field and type in the date or use the ellipsis button on the right to select from a calendar.
- Select the patient's gender.

- b. In the **Medications** section:

Figure 74. Import Record - Medications

- Click "Add New Medication" to open a drop-down list with predefined medications.
- Click on an existing predefined medication, or type in a new medication and press **Enter** on your keyboard. Note that new entries made this way won't be stored in the list of predefined medications.
- To modify the list of predefined medications, click the **Edit List** icon located at the top right.

- c. In the **Indications** section:

Figure 75. Import Record - Indications

- i. Click "Add New Indication" to open a drop-down list with predefined predefined indications.
  - ii. Click on an existing predefined indication, or type in a new indication and press **Enter** on your keyboard. Note that new entries made this way won't be stored in the list of predefined indications.
  - iii. To modify the list of predefined indications, click the **Edit List** icon located at the top right.
- d. In the **Record Information** section:

Figure 76. Import Records - Record Information

- i. Click on each available text field (**Clinic**, **Hookup Technician**, etc.) and type in the the data according to your needs and workflows.
- ii. Click the **Recorded** field to enter the modified date and time when the record was launched. You can either type the date and time in the format DD/MM/YYYY HH:MM AM/PM or select a segment of the date and time string by clicking and holding the

left mouse button. Then, use the picker arrows located to the right of the field to adjust the day, month, year, hour, minute, and AM/PM values as needed.

- iii. Select the estimated duration of the **Record** from the drop-down list (24 to 336 hours).

Please note that the data in the **Recording Length**, **Recorder Model**, and **Serial Number** fields cannot be modified.

- e. In the **Scanning Criteria** section:

Figure 77. Import Records - Scanning Criteria

- i. Drag the sliders to define the **Normal HR Range** and normal **Pause Duration** for the scanning process.
  - ii. Drag the sliders to define the normal **Pacemaker HR Range**.
  - iii. Choose a **Pacemaker Type** from a drop-down list on the right.
  - iv. Set **Maximum vent. spike to R interval** and **Maximum atrial spike to R interval** by using the picker arrows on the right.
  - v. Set any additional parameters that may be available in this section, like **Accelerometer** and **Respiration** settings.
4. Click **Proceed** in the bottom right corner of the **View Area**.

Figure 78. Import Records - Click Proceed to Complete

Once completed, the new patient record will be displayed in the **Record List View**.

Figure 79. Import Records - New Record Imported

Id	First Name	Last Name	Gender	Order	Recorded	Duration	Status
34554667	Dan	Green	Unspecified		8/26/2019 2:19 PM	00:02	Downloaded

## Export Record

This option allows you to export a patient's record to any folder on your PC, in your local network, or on a USB drive. Note that this option is available only when there is no patient's record loaded.

If this option is inactive, check the status of the record in the **Record List View** and unload a record if needed.

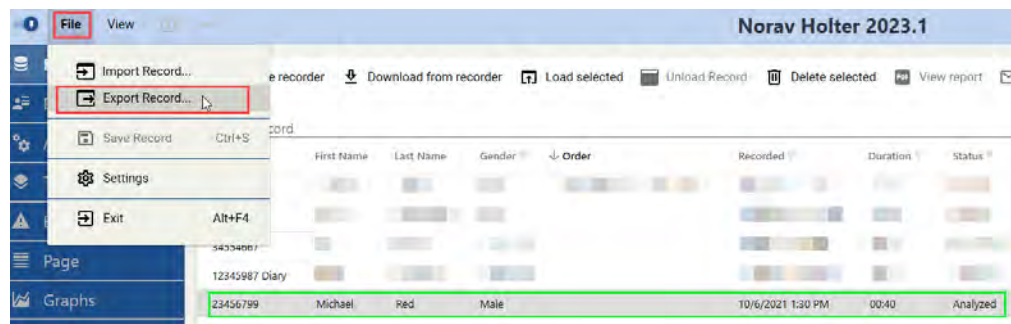
Figure 80. Export Record - Unload Record

Id	First Name	Last Name	Gender	Order	Recorded	Duration	Status
23456799	Michael	Red	Male		10/6/2021 1:30 PM	00:40	Analyzed

Follow these steps to export a patient's record. If there is no record loaded, disregard Step 1 and Step 2:

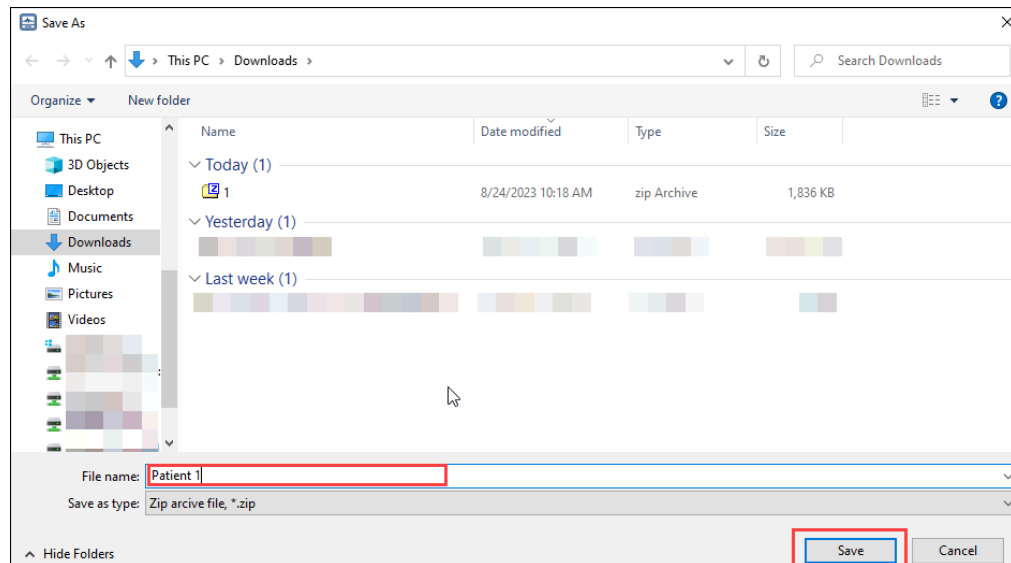
1. Click the **Record List View** in the **Views Sidebar** on the left. You will see a patients' record list in the **View Area**.
2. Click **Unload Record** in the top action bar. If the unload is successful, the font formatting of the target patient's record changes from bold to regular.
3. Select the record you want to export by clicking on it in the **Record List**.
4. Click the **File** drop-down menu in the top left corner.

Figure 81. Export Record - Exporting Record



5. Click **Export Record** to open the Windows Explorer Window.
6. Navigate to the desired folder.
7. Type in the desired name of the file archive in the **File name** text field.

Figure 82. Export Record - Saving Record



8. Click the **Save** button in the bottom right corner of the Windows Explorer Window.

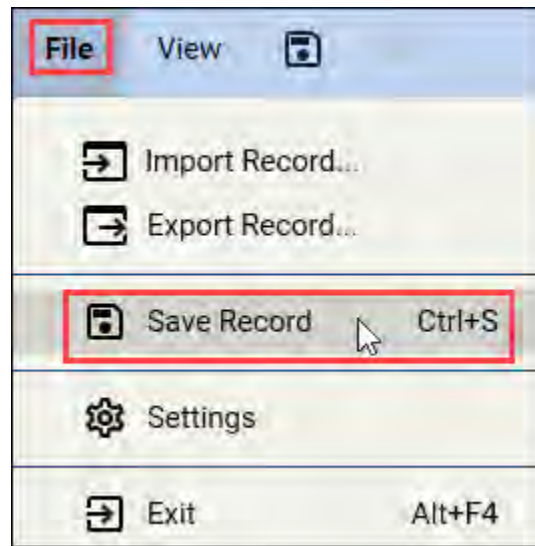
You will promptly see a progress bar marking the successful completion of the record export.

### Save Record

This option allows you to save any changes made to a loaded patient's record. To save a patient's record, follow these steps:



Figure 83. Save Record - Saving Record



1. Click the **File** drop-down menu in the top left corner.
2. Click **Save Record**.

Alternatively, you can press the **Ctrl + S** keys on your keyboard to save the current patient's record at any time.

### Settings

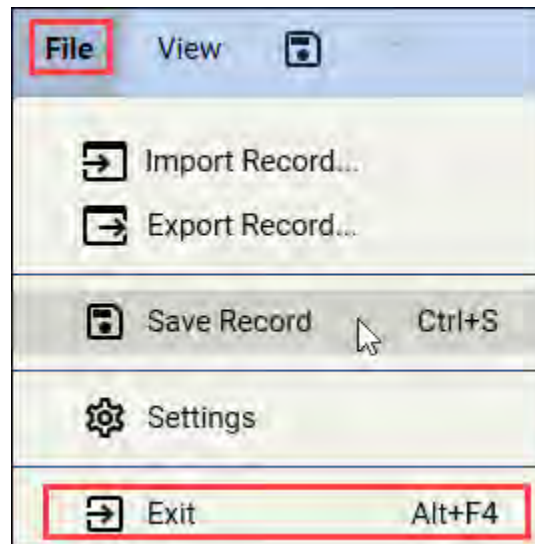
This option allows you to tailor the NH-301 software settings to meet your specific needs. For detailed instructions on how to modify these settings, please refer to the [Setup Process after Installation \(on page 15\)](#) section and follow the instruction, starting from the Step 2.

### Exit

This option allows you to exit the NH-301 analysis system and close the application.

To exit the program:

Figure 84. Exit - Exiting Program



1. Click the **File** drop-down menu in the top left corner.
2. Click the **Exit** option.

Alternatively, you can press the **Alt + F4** keys on your keyboard to exit the NH-301 analysis system.

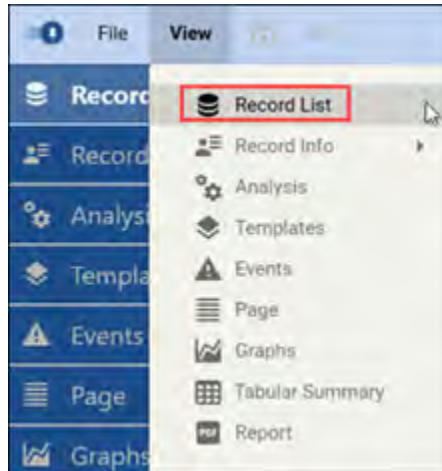
## View Menu

The **View** menu allows you to switch between different **Views** (such as Record List, Analysis, Templates, Graph, etc.), similar to the **Views Sidebar** functionality.

The **View Menu** can be in one of three different states:

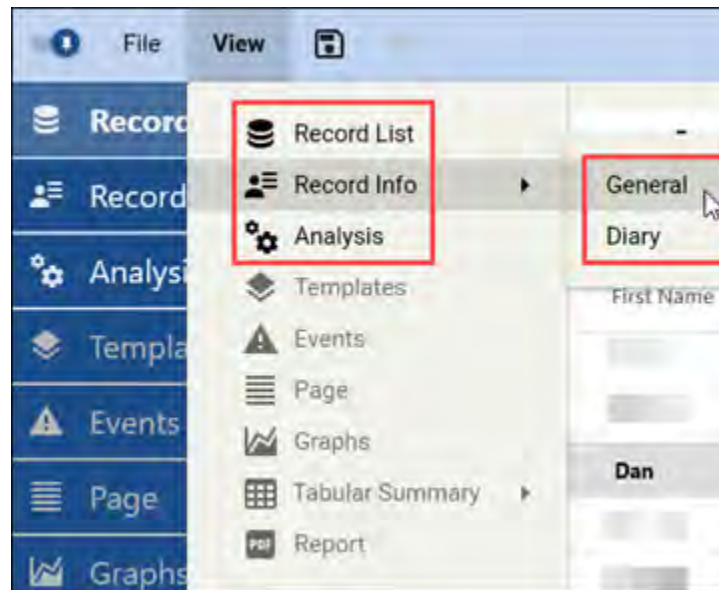
- **Default State (No Records Loaded):** When no patient records are loaded in the system, only the **Record List** option is accessible.

Figure 85. View Menu - No Records Loaded



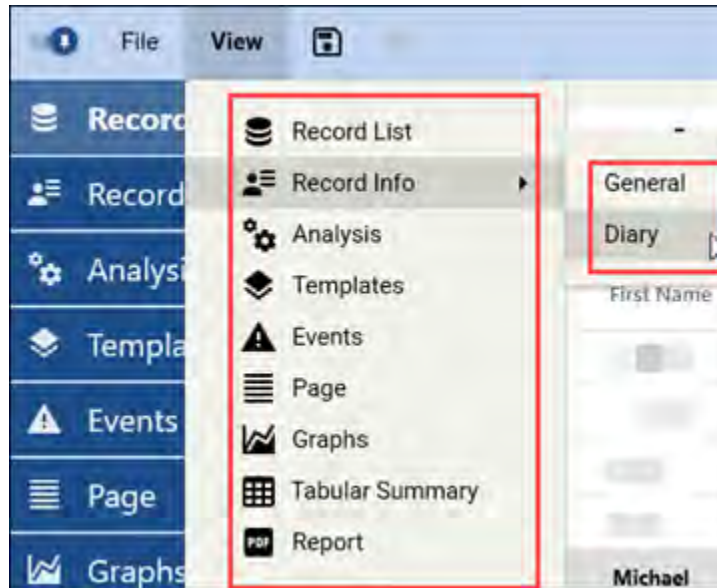
- **Record Loaded (Not Analyzed):** When a patient record is loaded into the system but it has never been analyzed within the application, only the **Record List** and **Record Info** (with General and Diary subitems) options are accessible.

Figure 86. View Menu - Record Loaded



- **Record Loaded (Analyzed):** When a patient record is loaded into the system and has been analyzed, all **View** items and their subitems in the menu are active and accessible. You can switch between them freely.

Figure 87. View Menu - Record Analyzed



## Windows Menu

Windows menu allows to activate **Secondary Screen Mode** facilitating more comfortable and efficient ECG analysis workflow. **Secondary Screen Mode** is a feature that allows for an additional display where you can place the **Page View**. This proves useful for quickly referring to the **Page View** while engaging with other **Views** on the main screen.

Figure 88. Page View - Secondary Screen Mode

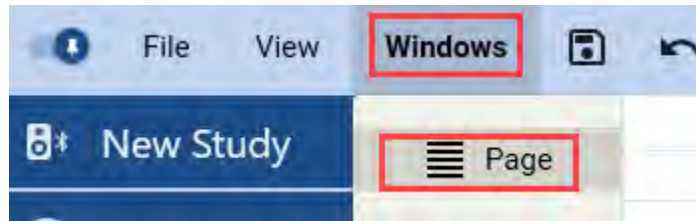


The **Page View** in **Secondary Screen Mode** replicates the functionality of the **Page View** strips in their respective **Views**.

**To activate Secondary Screen mode:**

1. Select the **Windows** menu in the Menu Bar.

Figure 89. Page View - Activating Secondary Screen Mode via Menu Bar



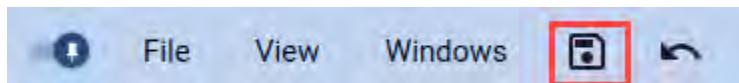
2. Choose the **Page** option from the menu. The **Page View** will open in a secondary window.
3. Adjust the secondary window settings as needed.

For further details, please, refer the [Secondary Screen Mode section \(on page 335\)](#).

## Save Record

The **Save Record** button allows you to save a patient's record. Click this button to save the loaded patient's record. If there is no loaded record, this button will be inactive and displayed in grayscale.

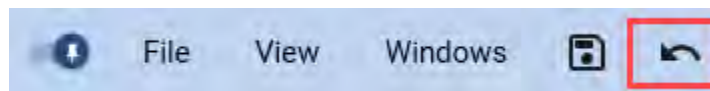
Figure 90. Menu Bar - Save Record Button



## Undo

The **Undo** button allows you to reverse the last action you took. Click the button to cancel the last action and return to the state before the action was taken. Alternatively, you can press the **Alt + Z** keys on your keyboard to undo the last action. If there is no loaded record or the record was loaded but no actions (like editing templates) have been taken, this button will be inactive and displayed in grayscale.

Figure 91. Menu Bar - Undo Button



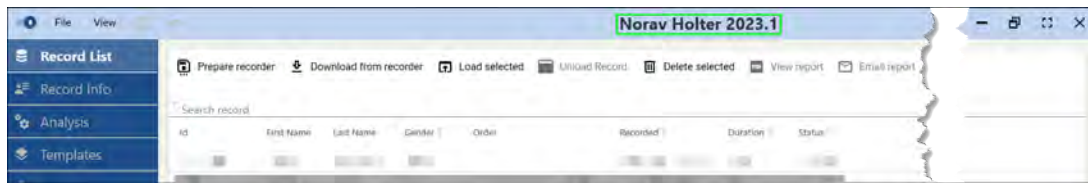
The **Undo** button can be used multiple times to undo a series of actions.

## Title Bar Text

The **Title Bar Text** contains either the name of the application or the patient's identification data.

If no patient record is loaded, the Title Bar Text shows the name and version of the program.

Figure 92. Title Bar Text - No Record Loaded



When a patient record is loaded, the Title Bar Text changes to display the patient's name and patient's ID.

Figure 93. Title Bar Text - Record Loaded



## Window Control Buttons

The **Window Control Buttons** element includes the window's **Minimize**, **Restore/Maximize**, **Enter Full Screen**, and **Close** buttons, and is located in the top right corner of the window. These buttons enable you to customize the analysis system window size according to your preferences, change the window mode, or close the program.

### Minimize

Click this button to reduce the window to an icon on the taskbar. The window is still running in the background, but it is not visible.

Figure 94. Window Control Buttons - Minimize Button



To restore the window, click on the program's icon on the Windows taskbar.

### Restore/Maximize

Click this button to toggle between the maximized and restored states of a window. The maximized state is the state when a window fills the entire screen, and it cannot be resized or moved, though you can still see a title bar of the current window.

Figure 95. Window Control Buttons - Restore/Maximize Button



The restored size of the window is the unique size you set by dragging the edges of the window with the mouse cursor. The restored state of the window is an in-between state, when the window is neither minimized, nor maximized. You can freely resize and move the window in a restored state.

### Enter Full Screen

Click this button to expand the window to the full screen. The **Enter Full Screen** button enables the window mode with the largest possible display space for the **View Area**.

Figure 96. Window Control Buttons - Enter Full Screen Button



As compared to the maximized state, you won't see a title bar in this mode, including the **Window Control Buttons** element. Moreover, the **Views Sidebar** element will be accessible only on hover.

To access the **Views Sidebar** items:

Figure 97. Enter Full Screen - Views Sidebar

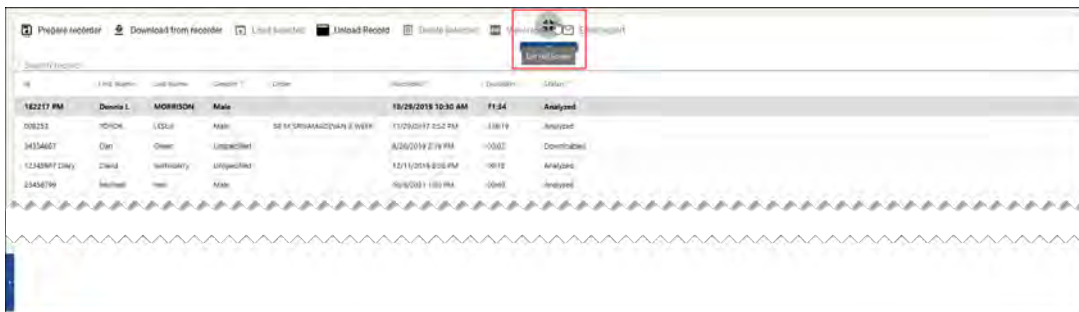


1. Hover over the handlebar on the left to expand the sidebar.
2. Click the **View** you want to switch to.

To exit the full screen mode:



Figure 98. Enter Full Screen - Exit Full Screen



1. Hover over the handlebar on top of the screen.
2. The handlebar will slide down and reveal the **Exit Full Screen** button.
3. Click the **Exit Full Screen** button.

The window should switch to the restored state.

## Close

Click this button to close the window and exit the NH-301 analysis system.

Figure 99. Window Control Buttons - Close Button



## View Area

### Views - Views Sidebar

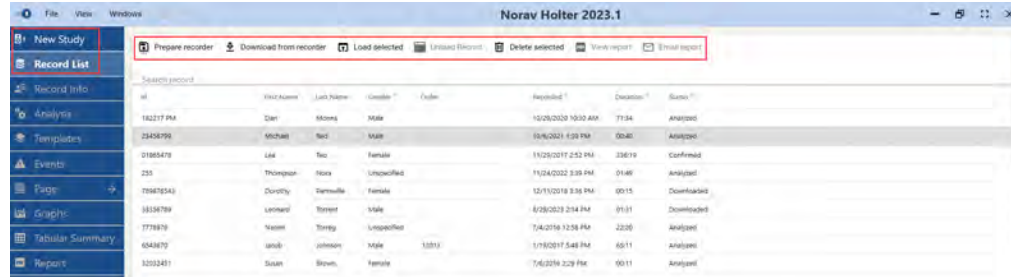
The **Views Sidebar** allows you to switch between different **Views** by selecting them and their subitems directly in a sidebar. Fast navigation allows you to perform efficiently various tasks, from preparing the **Recorder** before a Holter test to generating and submitting the post-analysis report.

The **Views Sidebar** can be in one of three operational states:



- **Default State (No Records Loaded):** When no patient records are loaded in the system, only **Record List** and **New Study** options are accessible for managing records.

Figure 100. Views Sidebar - No Record Loaded



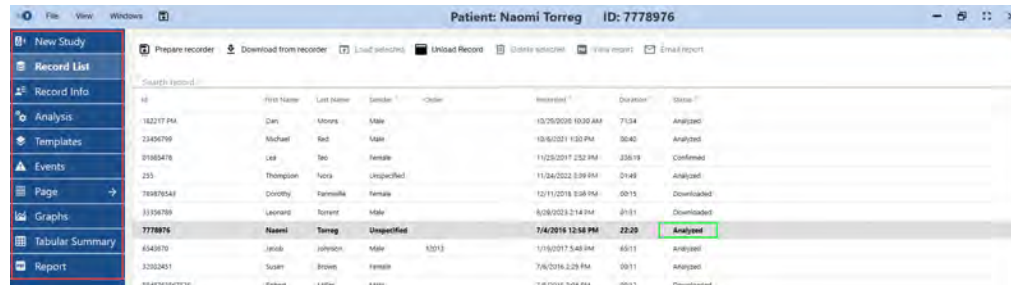
- **Record Loaded (Not Analyzed):** When a patient record is loaded into the system but it has never been analyzed within the application, only the **New Study**, **Record List** and **Record Info** (with General and Diary subitems) options are accessible.

Figure 101. Views Sidebar - Record Loaded



- **Record Loaded (Analyzed):** When a patient record is loaded into the system and has been analyzed, all **View** items and their subitems in the menu are active and accessible. You can switch between them freely.

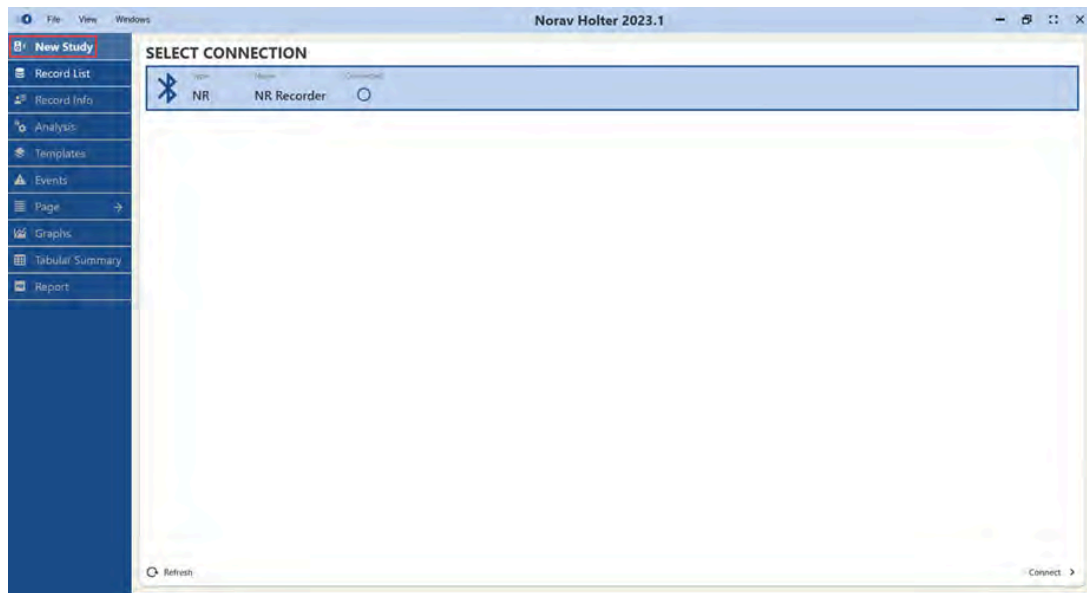
Figure 102. Views Sidebar - Record Loaded and Analysed



## New Study

The **New Study** is the **View** that allows you to choose a **Recorder** you want to connect to the system and prepare for the Holter recording. When you click the **Prepare Recorder** button in the **Record List View**, you are redirected to the **New Study View**. In other words, you can initiate a new study either through the **New Study** or **Record List View**

Figure 103. New Study View - New Study View



### Initiating New Study: General Workflow

To initiate a new study:

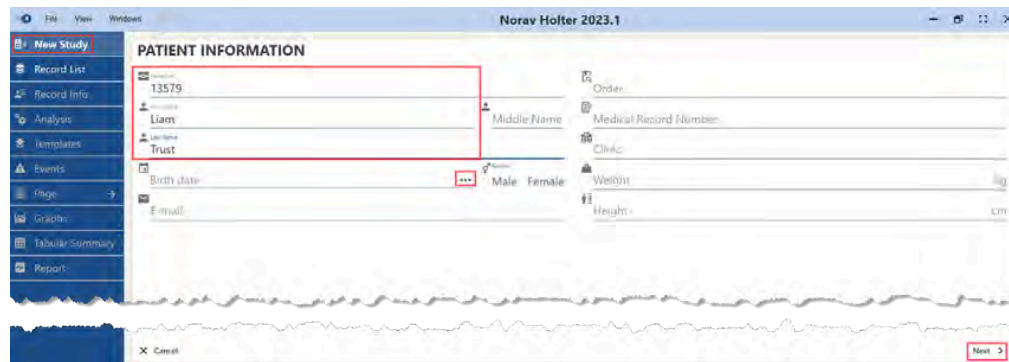
1. Click the **Prepare Recorder** button on the top toolbar of the **Record List View** or click the **New Study View** in the **Views Sidebar**. The **New Study View** is displayed, showcasing all available connections, including Memory Cards, USB and Bluetooth connections.
2. **(Optionally)** Click the **Refresh** button in the bottom-left corner to refresh the **Select Connection** list and discover new connections, if applicable.
3. Select a connection.

Figure 104. Preparing Recorder - New Study



4. Click **Connect** in the bottom-right corner. The **Patient Information** screen will appear.
5. Enter patient information. Click on each text field and type in the data as needed. To proceed, you must fill in at least one of the patient's identifiers: **Patient ID**, **First Name**, **Last Name**. Other text fields are not mandatory to proceed.

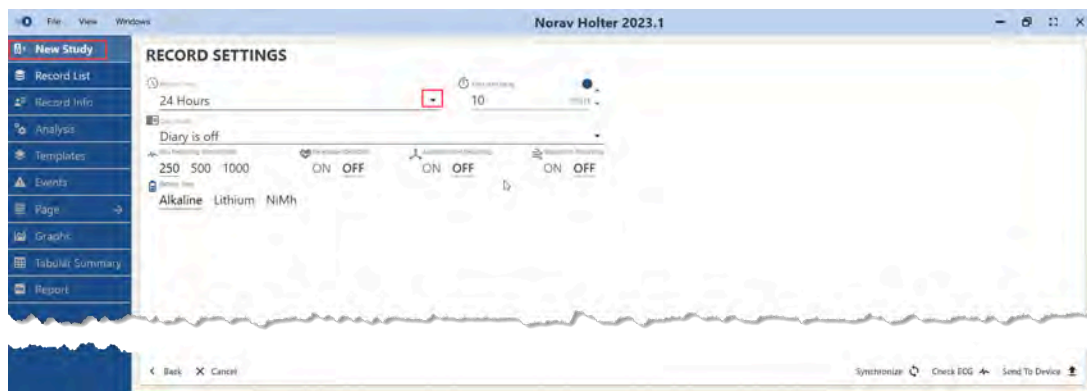
Figure 105. Entering Patient Information - Patient Information



6. **(Optional)** Click on the **Birth Date** field and type in the date or use the ellipsis button on the right to select from a calendar.
7. Click **Next** at the bottom right of the screen to proceed to the **Record Settings** screen.

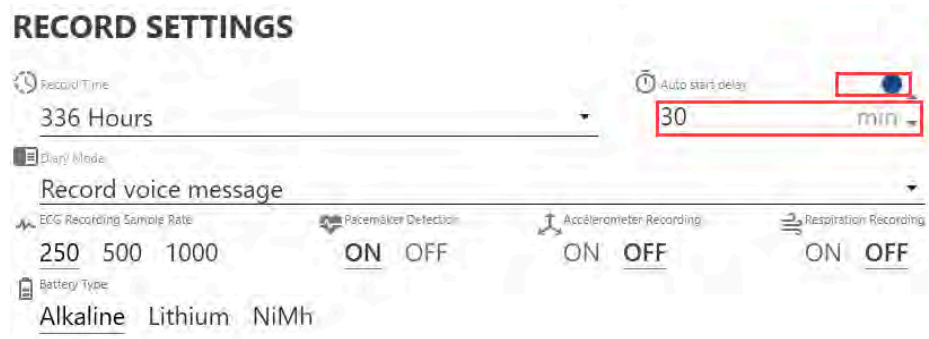
**To adjust the Record Settings, follow the steps listed below:**

Figure 106. Record Settings - Adjusting Record Settings



1. Select the **Record Time** from the drop-down list on the right, ranging from 24 to 336 hours, depending on the **Recorder** capabilities and requirements of the test.
2. **(Optional)** If the selected record time or **ECG Recording Sample Rate** are not compatible with a specific battery type, a warning will be displayed. Refer to the relevant **Recorder Manual** to check the **Record Time** parameters.
3. Set **Auto start delay**:
  - Toggle **Auto start delay** OFF to disable the auto start delay feature.
  - Toggle **Auto start delay** ON and set the delay in minutes using the picker arrows on the right. You can increase or decrease the delay time by 5 minutes with each click.

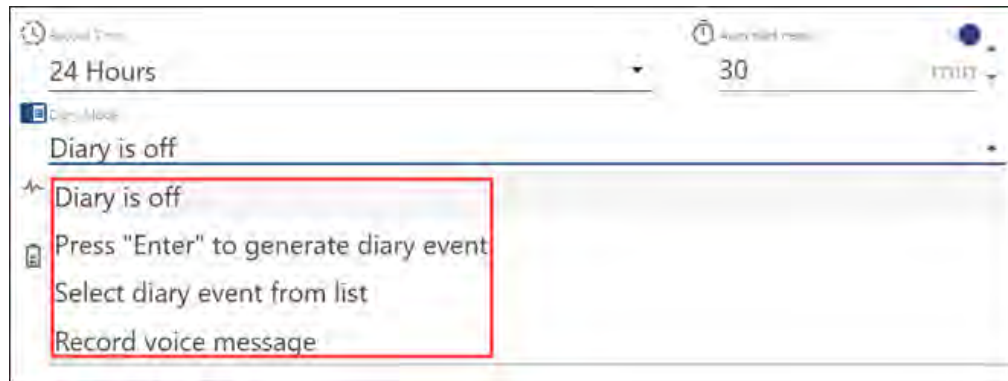
Figure 107. Record Settings - Auto start delay



4. Select how the patient inputs diary events (different types of **Recorders** support different types of input; refer to the relevant manual, if needed):
  - **Diary is off:** A patient won't be able to make inputs.
  - **Press "Enter" to generate diary event:** By pressing Enter on the **Recorder**, a patient will be able to register an **Event** without specifying its type.

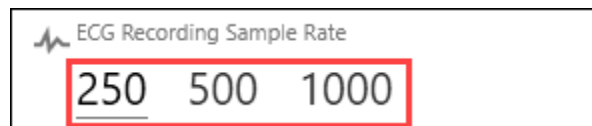
- **Select a diary event from the list:** By pressing Enter on the **Recorder**, a patient will be able to choose an **Event** from a predefined list.
- **Record voice message:** By pressing Enter on the **Recorder**, a patient will be able to register an **Event** and make a brief voice description.

Figure 108. Recorder Settings - Diary Mode



5. Click to select the **ECG Recording Sample Rate**: 250, 500 or 1000 Hz. The higher the sampling rate, the more detailed the ECG signal will be. However, a higher sampling rate also requires more memory and more battery capacity. If the selected ECG Recording sample rate is not compatible with a specific battery type, a warning will be displayed.

Figure 109. Recorder Settings - Sample Rate



6. Click to select **Pacemaker Detection**:

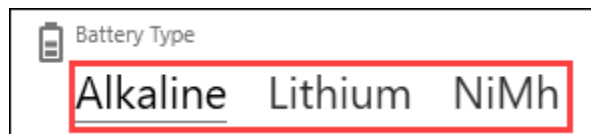
Figure 110. Recorder Settings - Pacemaker, Accelerometer, Respiration Options



- Select **ON** to detect a pacemaker during the test and analysis. This is important for the interpretation of the ECG recordings, as the presence of a pacemaker can affect the appearance of the ECG waves.
  - Select **OFF** if there is no need to detect a pacemaker for this patient.
7. Click to select **Accelerometer Recording**:

- Select **ON** to enable the **Accelerometer Recording** during the test. Accelerometer recording can help to identify movement artifacts and remove them from the ECG signal, which can improve the accuracy of the interpretation.
  - Select **OFF** if there is no need to enable it.
8. Click to select **Respiration Recording**:
- Select **ON** to enable the **Respiration Recording** during the test. Respiration recording can be used to assess the patient's respiratory rate and pattern. This information can be helpful in diagnosing certain heart conditions, such as sleep apnea.
  - Select **OFF** if there is no need to enable it.
9. Click to select the **Battery Type**: Alkaline, Lithium, NiMh. Choose the battery type considering the overall length of the Holter testing, quantity of leads, **Recorder** model, etc. Please, refer to the relevant **Recorder** manual if needed.

Figure 111. Recorder Settings - Battery Type



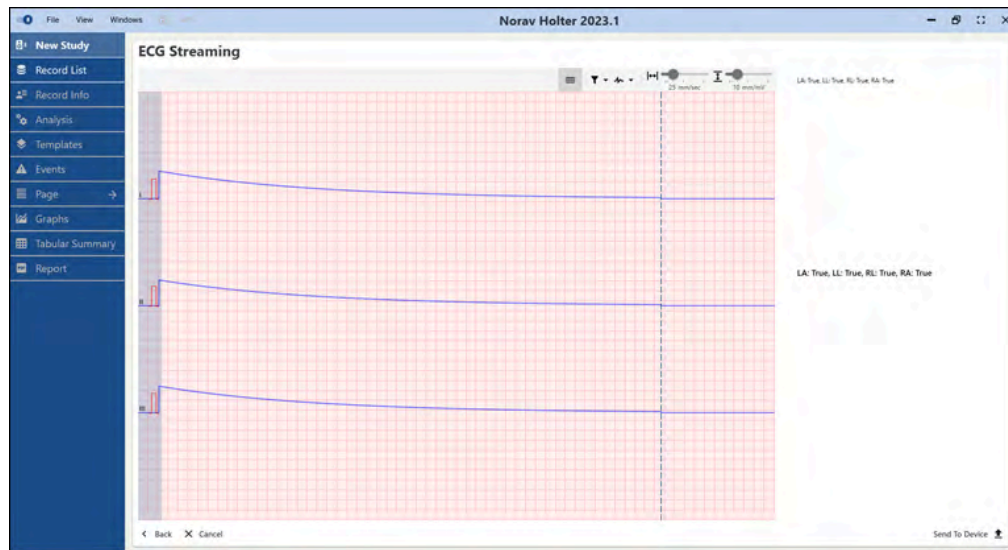
10. **(Optional)** If you're using a **Recorder** model equipped with Bluetooth, you may click the **Synchronize** button to synchronize device clock with your computer clock. It is recommended to synchronize device clock settings periodically. For the **NR-314P** model it is the easiest way for syncing as the device has no display and navigation buttons.

Figure 112. Record Settings - Synchronize



11. **(Optional)** If you're using a **Recorder** model equipped with Bluetooth, you may click the **Check ECG** button to verify that the electrodes are properly connected and that the ECG signal is being recorded correctly. This is important because if the electrodes are not properly connected, the ECG signal may be distorted or unreadable.

Figure 113. Record Settings - Check ECG



12. Click **Send To Device** in the bottom right corner to send the settings to the selected device. You will be briefly prompted by the **Uploading Configuration** progress bar. When it disappears, you will see a success message indicating that you have finished adjusting the **Record Settings**. If the **Send To Device** process fails, repeat the workflow from the start.

Figure 114. Record Settings - Send To Device

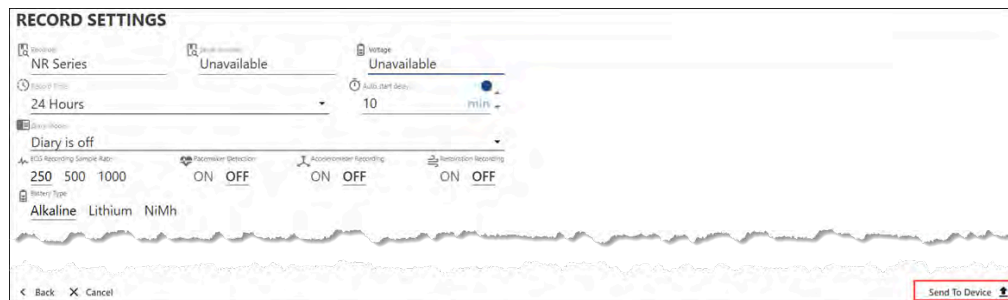
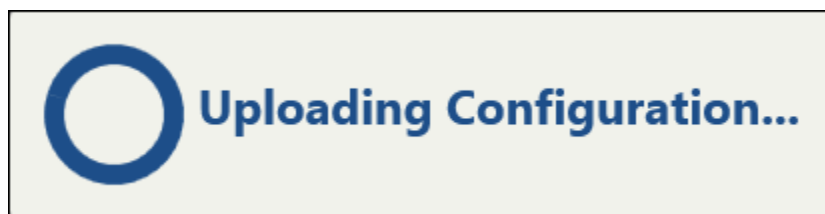


Figure 115. Record Settings - Uploading Configuration





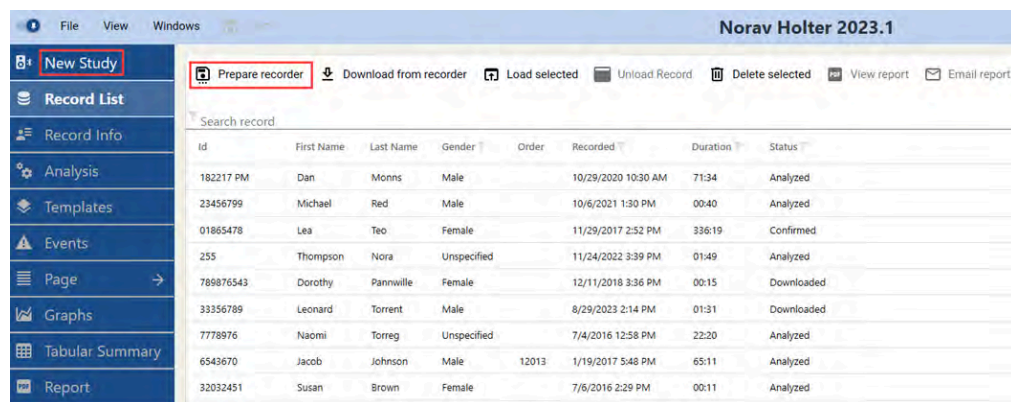
## Starting New Study: NR-314P Model Workflow

As the Norav Holter NR-314P is designed to be compact and lightweight for discreet and comfortable wear, it lacks a display, navigation buttons, has a rechargeable battery instead of a non-rechargeable one, and omits a memory card slot. These differences facilitate some distinctions in the initiating the new study and preparing the recorder workflows.

### To initiate a new study via Bluetooth:

1. Click the **Prepare Recorder** button on the top toolbar of the **Record List View**, or select the **New Study View** in the **Views Sidebar**. The **New Study View** is displayed, showing all available connections.

Figure 116. Preparing Recorder - New Study



2. (Optionally) Click the **Refresh** button in the bottom-left corner to update the Select Connection list and discover new connections, if applicable.
3. Select a connection.

Figure 117. Preparing Recorder - New Study



4. Click **Connect** in the bottom-right corner. The **Patient Information** screen will appear.
5. Enter patient information. Click on each text field and type in the data according to your needs and workflows. To proceed, you **must fill in at least one** of patient's identifiers: **Patient ID, First Name, Last Name**. Other text fields are not mandatory to proceed.



Figure 118. Entering Patient Information - Patient Information

6. **(Optional)** Click on the **Birth Date** field and type in the date or use the ellipsis button on the right to select from a calendar.
7. Click **Next** at the bottom right of the screen to proceed to the **Record Settings** screen.

To adjust the Record Settings, follow the steps listed below:

Figure 119. Record Settings - Adjusting Record Settings

1. Select the **Record Time** from the drop-down list on the right, ranging from 24 to 336 hours, depending on the **Recorder's** capabilities and the requirements of the test.
2. **(Optional)** If the selected **Record Time** or **ECG Recording** sample rate are not compatible with a specific battery type, a warning will be displayed. Refer to the relevant **Recorder Manual** to check the **Record Time** parameters..

Figure 120. Record Settings - Warning Example

**RECORD SETTINGS**

Record Time: 336 Hours

Auto start delay: 30 min

Record voice message

ECG Recording Sample Rate: 250 500 1000

Facemaker Detection: ON OFF

Accelerometer Recording: ON OFF

Respiration Recording: ON OFF

Battery Type: Alkaline Lithium NiMh

Selected record time with selected battery type unsupported. Please, try to decrease record time or (and) change battery type.

3. Set **Auto start delay** value:

- Toggle **Auto start delay** OFF to disable the auto start delay feature.
- Toggle **Auto start delay** ON and set the delay in minutes using the picker arrows on the right. You can increase or decrease the delay time by 5 minutes with each click.

Figure 121. Record Settings - Auto start delay

**RECORD SETTINGS**

Record Time: 24 Hours

Auto start delay: 10 min

Cable Type: ECG 4L Cable

Diary Mode: Diary is off

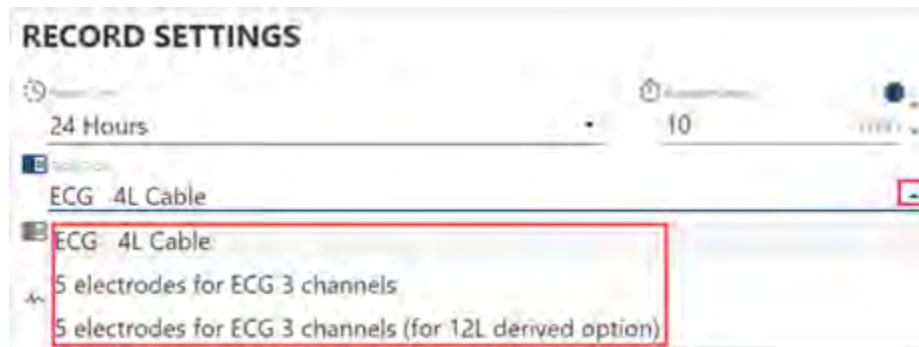
ECG Recording Sample Rate: 128 256 512 1024

Facemaker Detection: ON OFF

Accelerometer Recording: ON OFF

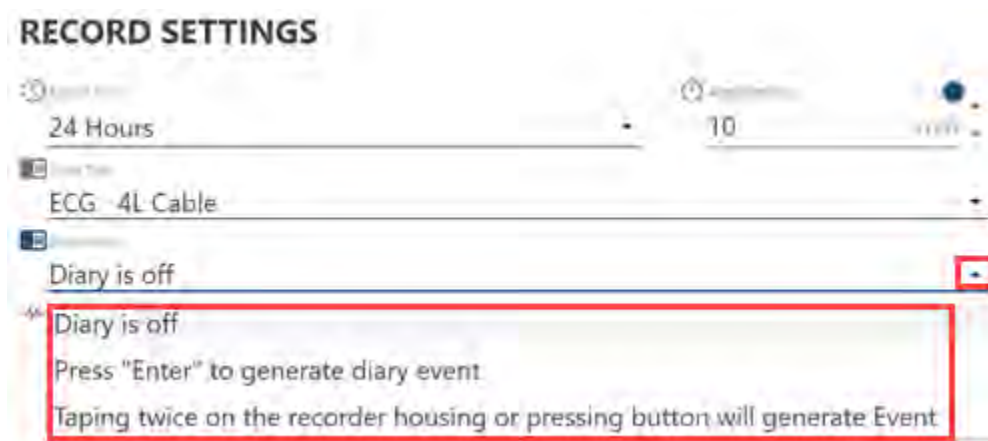
4. Select the cable type.

Figure 122. Record Settings - Selecting Cable



5. Select how the patient inputs diary events (different types of **Recorders** support different types of input, refer to the relevant manual, if needed):
- **Diary is off:** A patient won't be able to make inputs.
  - **Press "Enter" to generate diary event:** By pressing the sole button on the **Recorder**, a patient can register an **Event**.
  - **Tapping twice on the recorder housing or pressing button will generate Event:** In addition to the button press, a patient may double-tap the device case to register an **Event**.

Figure 123. Record Settings - Diary Mode



6. Click to select the **ECG Recording Sample Rate**: 128, 256, 512 or 1024 Hz. The higher the sampling rate, the more detailed the ECG signal will be. However, a higher sampling rate also requires more memory and more battery capacity. If the selected **ECG Recording Sample Rate** is not compatible with a specific battery type, a warning will be displayed.

Figure 124. Record Settings - Sample Rate



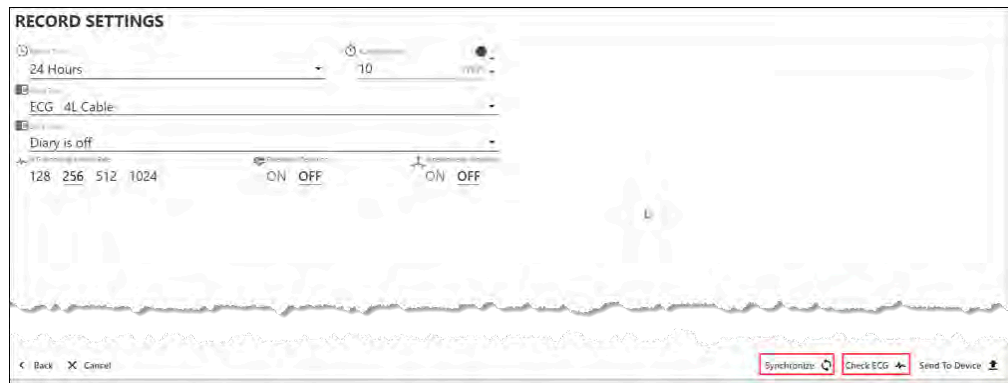
7. Click to select **Pacemaker Detection**:

Figure 125. Record Settings - Pacemaker and Accelerometer



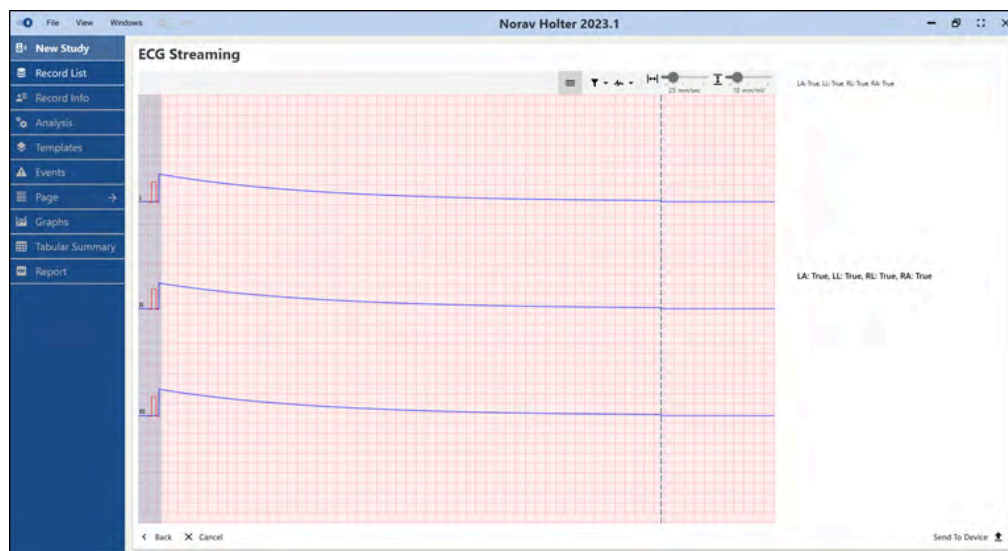
- Select **ON** to detect a pacemaker during the test and analysis. This is important for the interpretation of the ECG recordings, as the presence of a pacemaker can affect the appearance of the ECG waves.
  - Select **OFF** if there is no need to detect a pacemaker for this patient.
8. Click to select **Accelerometer Recording**:
- Select **ON** to enable the **Accelerometer Recording** during the test. Accelerometer recording can help to identify movement artifacts and remove them from the ECG signal, which can improve the accuracy of the interpretation.
  - Select **OFF** if there is no need to enable it.
9. **(Optional)** You may click the **Synchronize** button to synchronize the NR-314P clock with your computer clock. It is recommended to synchronize device clock settings periodically.

Figure 126. Record Settings - Synchronize



10. **(Optional)** You may click the **Check ECG** button to verify that the electrodes are properly connected and that the ECG signal is being recorded correctly. This step is crucial because if the electrodes are not properly connected, the ECG signal may be distorted or unreadable.

Figure 127. Record Settings - Check ECG



11. Click **Send To Device** in the bottom right corner to send the settings to the selected device. You will be briefly prompted by the **Uploading Configuration** progress bar. When it disappears, you will see a success message indicating that you have finished adjusting the **Record Settings**. If the **Send To Device** process fails, repeat the workflow from the start.

Figure 128. Record Settings - Send To Device

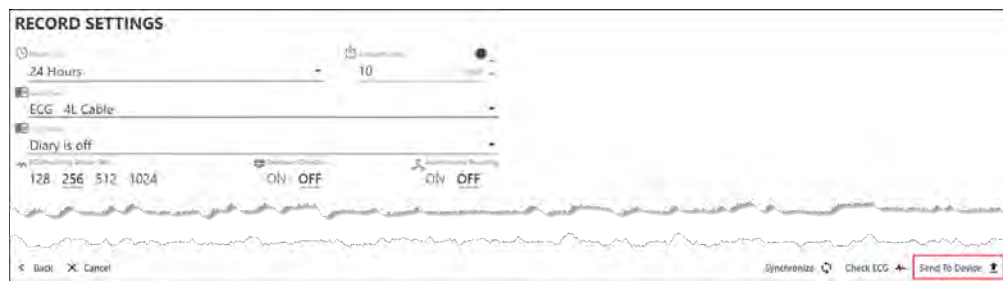
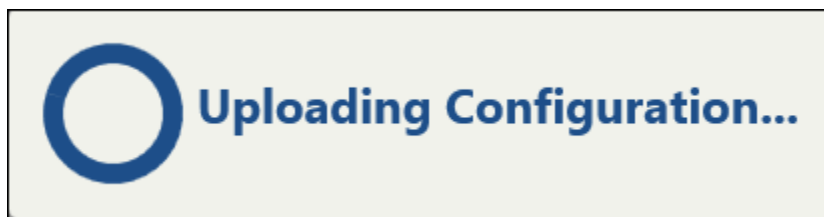


Figure 129. Record Settings - Uploading Configuration



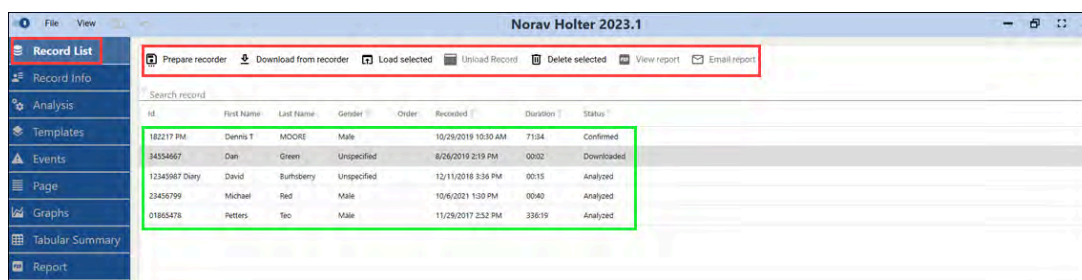
To initiate a new study via USB (docking station):

1. Follow **Steps 1-11** of the instructions about initiating a new study via **Bluetooth**. Keep in mind that **Step 10** will be unavailable due to the connection method (**USB**).

## Record List

The **Record List** is the initial **View** you see upon launching the NH-301 system. In this **View**, you can prepare the **Recorder** and manage patients' records imported and downloaded into the system.

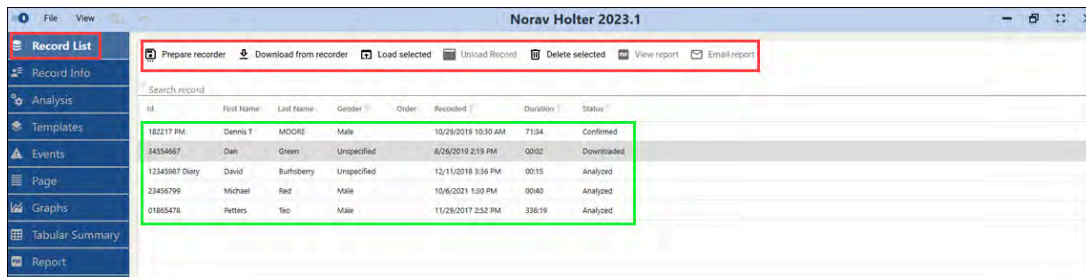
Figure 130. Record List View - Record List



## Using Top Toolbar

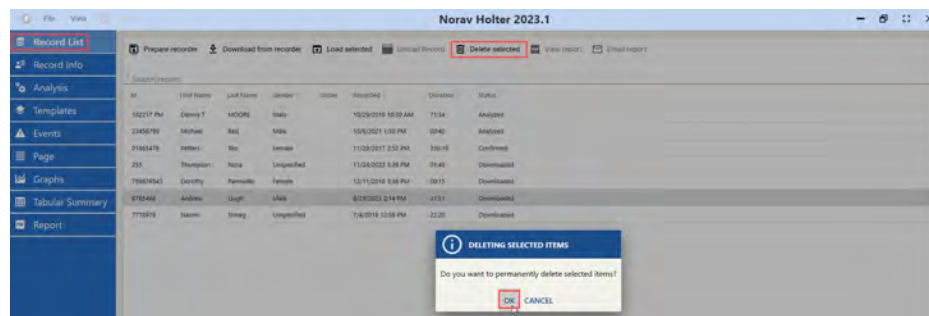
Using the top toolbar in this **View**, you can do the following:

Figure 131. Record List View - Top Toolbar



- **Prepare recorder:** Starts the recorder preparation procedure. More details in the [Preparing Recorder section \(on page 402\)](#).
- **Download from recorder:** Allows you to download a Holter recording into the system for the future analysis. You can download records from the **Memory Card** or directly from the **Recorder** via USB (if applicable). More details in the [Downloading Holter Recording Data section \(on page 436\)](#).
- **Load selected:** To load a **Record** you can double-click it in the list of records below the toolbar, or:
  1. Select a **Record** from the list. You can load **only one record** at a time.
  2. Click the **Load selected** button in the toolbar.
- **Unload Record:** Unloads a **Record**, so you could perform other actions or load the next **Record**.
- **Delete selected:** To permanently delete a **Record**:
  1. Select a **Record** from the list. You can also select multiple records using Ctrl+Click or Shift +Click keyboard shortcuts.
  2. Click the **Delete selected** button in the toolbar.

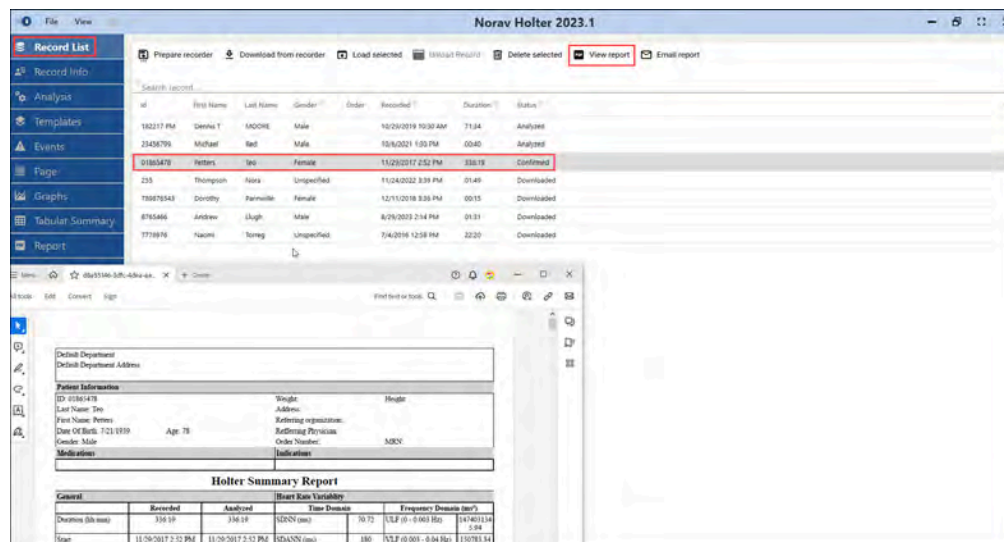
Figure 132. Record List View - Deleting Records



3. Click **OK** in the pop-up dialog box to confirm the action and permanently delete selected items. Click **Cancel** to discard the action.
- **View report:** Click the **View report** button to open an analysis report (in PDF, via the third-party viewer) associated with the selected **Record** in a separate window.



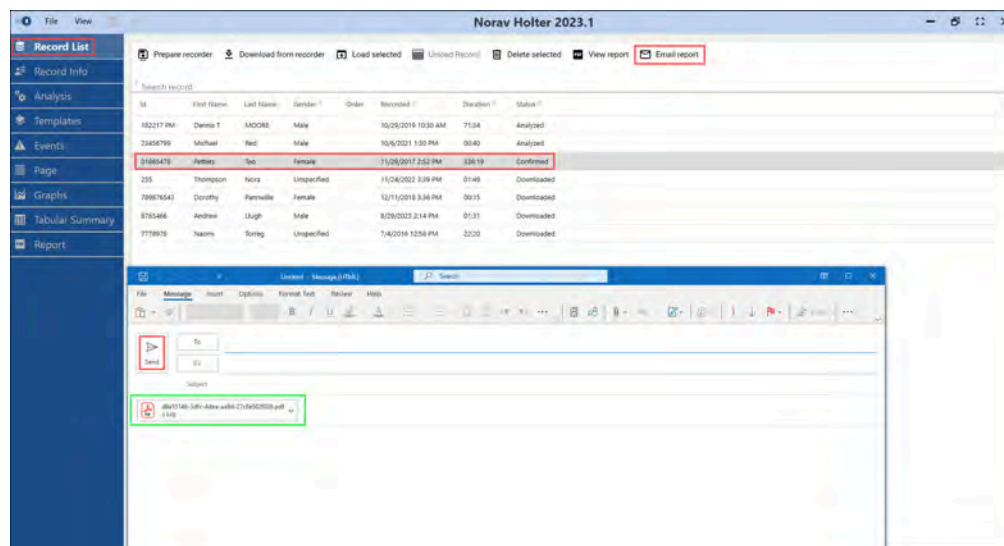
Figure 133. Record List View - Viewing Report



This button is active only for the records with the Confirmed status. A record obtains this status only when the analysis has been performed, and the report has been generated and confirmed.

- **Email report:** Click the **Email report** button to send an analysis report (in PDF) associated with the selected Record. You will see a window of your chosen email client with a new email containing this report.

Figure 134. Record List View - Emailing Report



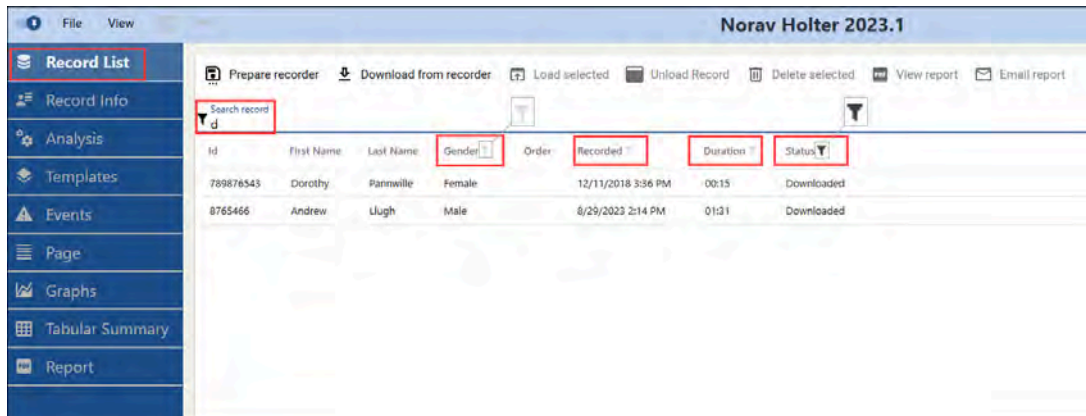
Fill in the required fields and click **Send** to send the report via email.



## Using Search

This **View** also provides the capability to search, sort, and filter records. Please note, "Filter" icons remain inactive (gray-colored) when their settings remain default. After you customize any of these settings, search or filtering conditions, "Filter" icons become active (colored in black).

Figure 135. Record List View - Search and Filtering

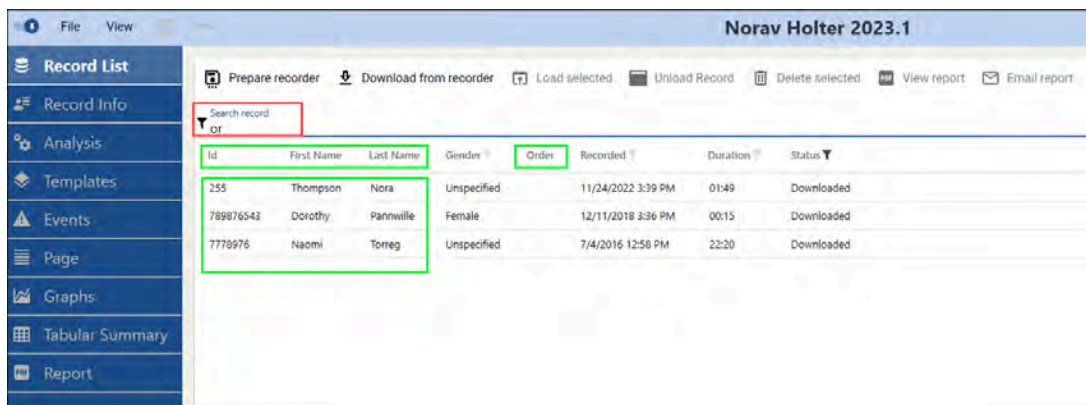


To find a **Record** in the **Record List**:

1. Click the **Search record** box.
2. Start typing.
3. Continue typing until you see the result(-s) you need. A real-time search engine will update the search results as you type, so you can see the results that match your query as you type it in.

By default search box runs search through **ID, First Name, Last Name, and Order** columns.

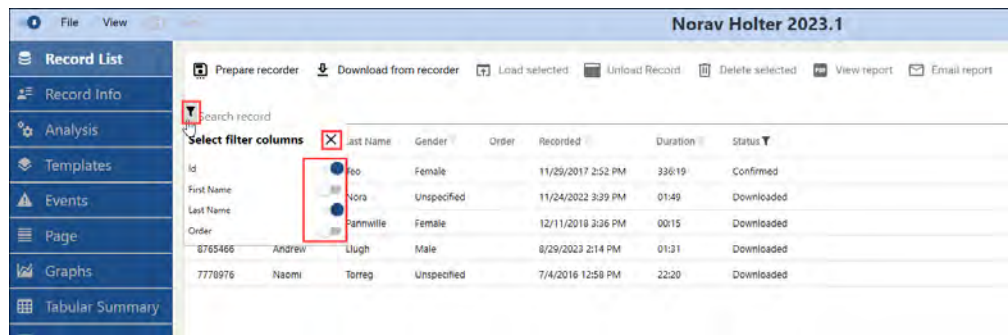
Figure 136. Record List View - Search



To change **Search record** settings:

1. Click a filter icon to the left of the **Search record** box.

Figure 137. Record List View - Search Settings



2. In the pop-up window, toggle **ON/OFF** default search parameters according to your needs.
3. Click the **Close** icon at the top right of the pop-up window or click anywhere else to close this window.

When you switch a toggle **OFF**, the **Search record** function excludes relevant column from the search.

## Using Column Sorting

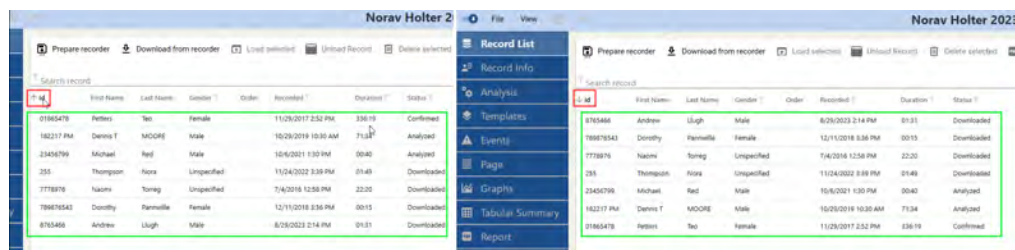
You can also sort records in the list using **Column Sorting**. **Column Sorting** toggles the sorting in a separate column between ascending and descending order. After switching the order in a separate column, all records in the list will be rearranged accordingly.

You can toggle column sorting order in each column you see under the **Search record** box.

To toggle column sorting order:

1. Hover your mouse cursor over the header of a column you want to use for sorting (the ID column, for example).

Figure 138. Record List View - Column Sorting



2. Click the column header to switch between the sorting orders - the records will be rearranged in the corresponding order. The arrow icon to the left of the column header will change accordingly.
3. **(Optional)** Click the column header again to reverse the sorting.

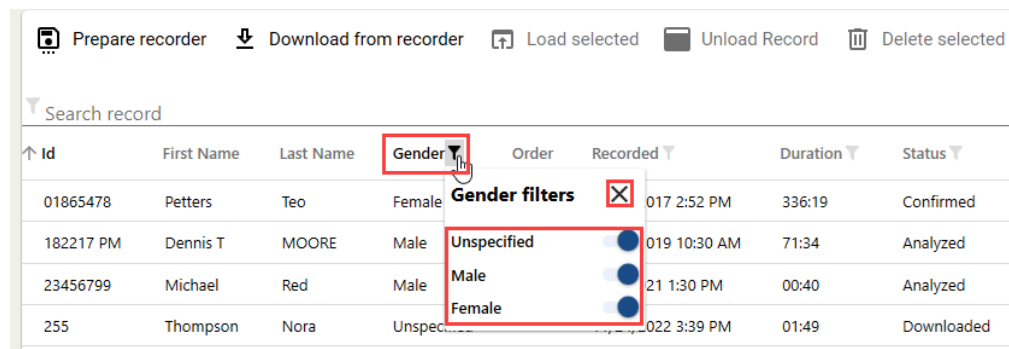
## Using Filters

You can set various filters for **Gender**, **Recorded**, **Duration**, and **Status** columns in the **Record List** to view only records that match your criteria.

To customize **Gender** column filter settings:

1. Click a filter icon to the right of the column header.
2. In the pop-up window toggle **ON/OFF** filtering parameters according to your needs. Records with the parameters you toggled **OFF** will be excluded from the list.

Figure 139. Record List View - Gender Filter



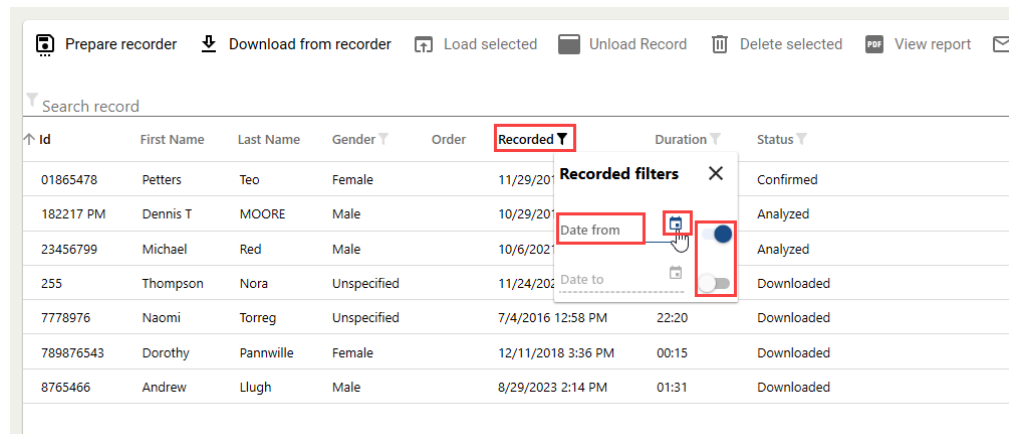
Id	First Name	Last Name	Gender	Order	Recorded	Duration	Status
01865478	Petters	Teo	Female		017 2:52 PM	336:19	Confirmed
182217 PM	Dennis T	MOORE	Male		019 10:30 AM	71:34	Analyzed
23456799	Michael	Red	Male		21 1:30 PM	00:40	Analyzed
255	Thompson	Nora	Unspecified		022 3:39 PM	01:49	Downloaded

3. Click the **Close** icon at the top right of the pop-up window or click anywhere else to close this window.
4. **(Optional)** To discard all changes and reset filter settings to default, hover over a filter icon and click the mouse wheel.

To customize **Recorded** column filter settings:

1. Click a filter icon to the right of the column header.
2. In the pop-up window toggle **ON/OFF** two parameters: **Date from** (Start Date) and **Date to** (End Date). These two parameters allow you to filter records by date range.

Figure 140. Record List View - Recorded Filter



Id	First Name	Last Name	Gender	Order	Recorded	Duration	Status
01865478	Petters	Teo	Female	11/29/201			Confirmed
182217 PM	Dennis T	MOORE	Male	10/29/201			Analyzed
23456799	Michael	Red	Male	10/6/2021			Analyzed
255	Thompson	Nora	Unspecified	11/24/202			Downloaded
7778976	Naomi	Torreg	Unspecified	7/4/2016 12:58 PM	22:20		Downloaded
789876543	Dorothy	Pannville	Female	12/11/2018 3:36 PM	00:15		Downloaded
8765466	Andrew	Llugh	Male	8/29/2023 2:14 PM	01:31		Downloaded

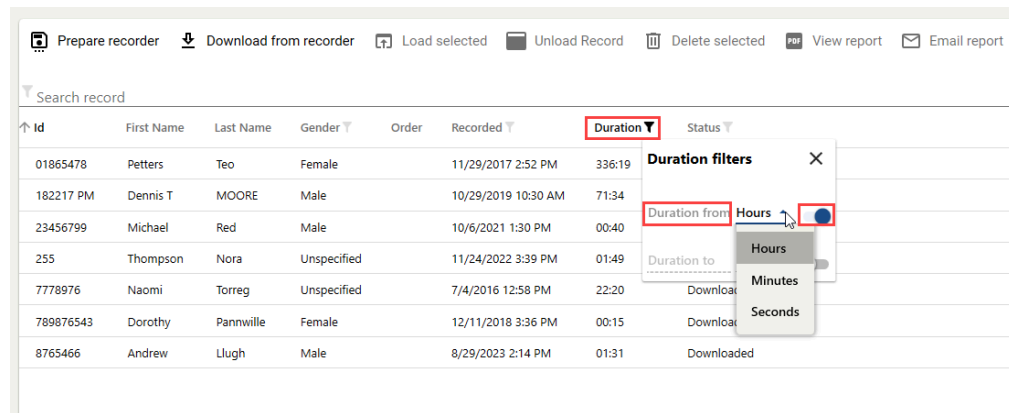
3. Click active date fields and fill the date manually, or click the Calendar icon on the right and choose the date you need.
4. Click the **Close** icon at the top right of the pop-up window or click anywhere else to close this window.
5. **(Optional)** To discard all changes and reset filter settings to default, hover over a filter icon and click the mouse wheel.

As soon as you set **Date from** and **Date to** parameter values, the contents of the **Record List** will change accordingly.

To customize **Duration** column filter settings:

1. Click a filter icon to the right of the column header.
2. In the pop-up window toggle **ON/OFF** two parameters: **Duration from** (Minimum Duration) and **Duration to** (Maximum Duration). These two parameters allow you to filter records by their duration.

Figure 141. Record List View - Duration Filter



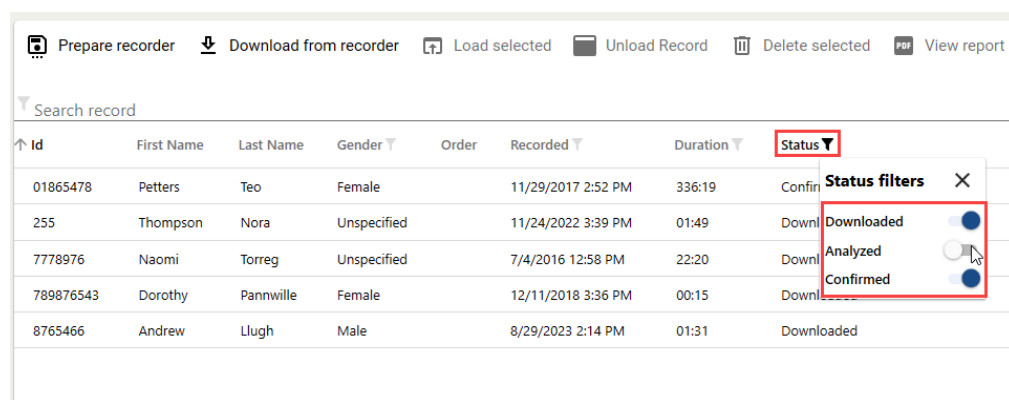
- First, choose units for parameters toggled **ON** from the drop-down list on the right: **Hours, Minutes, or Seconds**.
- Click active fields and fill the duration manually, using your keyboard.
- Click the **Close** icon at the top right of the pop-up window or click anywhere else to close this window.
- (Optional)** To discard all changes and reset filter settings to default, hover over a filter icon and click the mouse wheel.

As soon as you set **Duration from** and **Duration to** parameter values, the contents of the **Record List** will change accordingly.

To customize **Status** column filter settings:

- Click a filter icon to the right of the column header.
- In the pop-up window toggle **ON/OFF** filtering parameters according to your needs. Records with the parameters you toggled **OFF** will be excluded from the list.

Figure 142. Record List View - Status Filter



3. Click the **Close** icon at the top right of the pop-up window or click anywhere else to close this window.
4. **(Optional)** To discard all changes and reset filter settings to default, hover over a filter icon and click the mouse wheel.

## Record Info

The **Record Info View** enables you to edit the patient's data and the diary of the downloaded or imported **Record**.

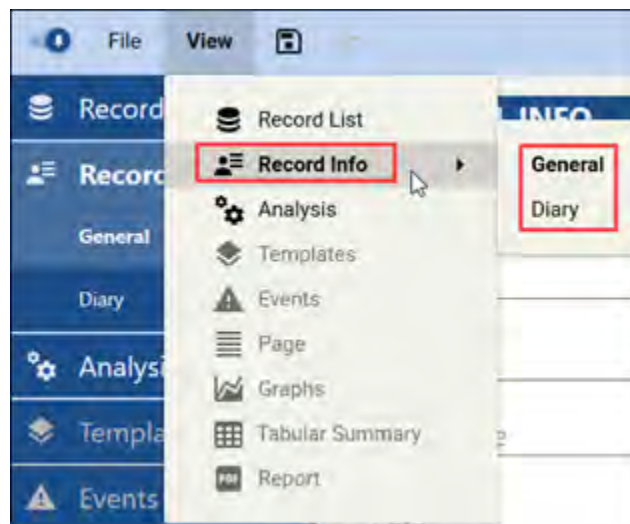
Figure 143. Record Info View - Record Info

The screenshot shows the 'Record Info View' for Patient Leonard Torrent (ID: 33356789). The interface includes a sidebar on the left with the following menu items: Record List, Record Info (selected), General, Diary, Analysis, Templates, Events, Page, Graphs, Tabular Summary, and Report. The main content area is divided into four sections:
 

- PERSONAL INFO:** Includes fields for ID (33356789), Last Name (Torrent), First Name (Leonard), Birth Date, Age, Gender (Male/Female), Weight (kg), and Height (m).
- RECORD INFO:** Includes fields for Clinic, Hookup Technician, Analyzing Technician, Reporting Physician, Date (8/29/2023 2:14 PM), Duration (72 Hours), and Time (01:31).
- MEDICATIONS:** A section with an 'Add New Medication...' button and an 'Edit List' link.
- INDICATIONS:** A section with an 'Add New Indication...' button and an 'Edit List' link.

You can navigate to the **Record Info View** using the **View Sidebar** on the left or the **View** menu in the **Menu bar**.

Figure 144. Record Info View - View Menu



Most often, you will be automatically redirected to the **Record Info View** when you load a **Record** from the **Record List**.

You will also be prompted with the **Patient Information View**, which looks and works almost exactly as the **Record Info View**, in the following cases:

- When you import a **Record**. More details in the [Import Record subsection \(on page 55\)](#).
- When you download a **Record** from the **Recorder**. More details in the [Downloading Holter Recording Data section \(on page 436\)](#)

## General View Mode

When you load a **Record** from the **Record List**, you are automatically redirected to the **General View Mode** of the **Record Info View**. Here you can review and edit the following sections of the patient information:










Figure 145. Record Info View - General View Mode

PERSONAL INFO		RECORD INFO	
ID	33356789	Clinic	
Last Name	Torrent	Hookup Technician	
First Name	Leonard	Analyzing Technician	
Birth Date		Reporting Physician	
Age		Date/Time	8/29/2023 2:14 PM
Gender	Male	Recording Duration	72 Hours
Weight	kg	Recording Start Time	01:31
Height	m	Recording Notes	NR1207 30004
MEDICATIONS		INDICATIONS	
Add New Medications		Add New Indications	

- **Personal info**, including ID, Last Name, First Name, Birth Date, etc.
- **Record info**, including Clinic, Hookup Technician, etc.
- **Medications** used by a patient.
- **Indications** for a patient.

To modify **Personal Info**:









Figure 146. Record Info View - Personal Info

RECORD INFO	
	Clinic
	Hookup Technician
	Analyzing Technician
	Reporting Physician
	Recorded 8/29/2023 2:14 PM
 Estimated Duration	 Recording Length
72 Hours	01:31
 Recorder Model	 Serial Number
NR1207	30004

1. Click on each text field and type in the data according to your needs and workflows. For example, fill in **ID, Last Name, First Name, Birth Date, Age, Weight** and **Height** values.
2. **(Optional)** Click on the **Birth Date** field and type in the date or use the ellipsis button on the right to select from a calendar.
3. Select patient's **Gender**.

To modify **Record Info**:

Figure 147. Record Info View - Record Info

RECORD INFO	
	Clinic
	Hookup Technician
	Analyzing Technician
	Reporting Physician
	Recorded 8/29/2023 2:14 PM
 Estimated Duration	 Recording Length
72 Hours	01:31
 Recorder Model	 Serial Number
NR1207	30004



1. Click on each text field and type in the data according to your needs and workflows. For example, fill in **Clinic**, **Hookup Technician** and other text fields.
2. (Optional) Click the **Recorded** field to enter the modified date and time when the record was launched. You can either type the date and time in the format DD/MM/YYYY HH:MM AM/PM or select a segment of the date and time string by clicking and holding the left mouse button. Then, use the picker arrows located to the right of the field to adjust the day, month, year, hour, minute, and AM/PM values as needed.
3. **(Optional)** If needed, select the estimated duration of the **Record** from the drop-down list (24 to 336 hours).

Please note that the data in the **Recording Length**, **Recorder Model**, and **Serial Number** fields cannot be modified.

To modify **Medications**:

Figure 148. Record Info View - Medications

1. Click "Add New Medication" to open a drop-down list with predefined medications.
2. Click on an existing predefined medication, or type in a new medication and press **Enter** on your keyboard. Note that new entries made this way won't be stored in the list of predefined medications.
3. To modify the list of predefined medications, click the **Edit List** icon located at the top right.

To modify **Indications**:

Figure 149. Record Info View - Indications

1. Click "Add New Indication" to open a drop-down list with predefined predefined indications.
2. Click on an existing predefined indication, or type in a new indication and press **Enter** on your keyboard. Note that new entries made this way won't be stored in the list of predefined indications.
3. To modify the list of predefined indications, click the **Edit List** icon located at the top right.

Figure 150. Record Info View - Proceeding to Diary

The screenshot shows the 'Record Info View' for Patient Leonard Torrent (ID: 33356789). The interface is divided into a sidebar and a main content area. The sidebar on the left has a 'View' menu at the top, and below it, a list of options: 'Record List', 'Record Info' (selected), 'General', 'Diary', 'Analysis', 'Templates', 'Events', 'Page', 'Graphs', 'Tabular Summary', and 'Report'. The main content area is titled 'Patient: Leonard Torrent ID: 33356789' and contains several sections: 'PERSONAL INFO' (with fields for ID, Name, Birth Date, Age, Sex, Weight, Height), 'RECORD INFO' (with fields for Clinic, Hookup Technician, Analyzing Technician, Reporting Physician, Date, Time, Duration, and Location), 'MEDICATIONS', and 'INDICATIONS'. At the bottom right of the main area, there is a 'Diary' button with a right-pointing arrow.

To proceed further within the **Record InfoView**, click **Diary** at the bottom right. Otherwise, click any **View** in the **Views Sidebar** or in the **View** menu.

## Diary View Mode

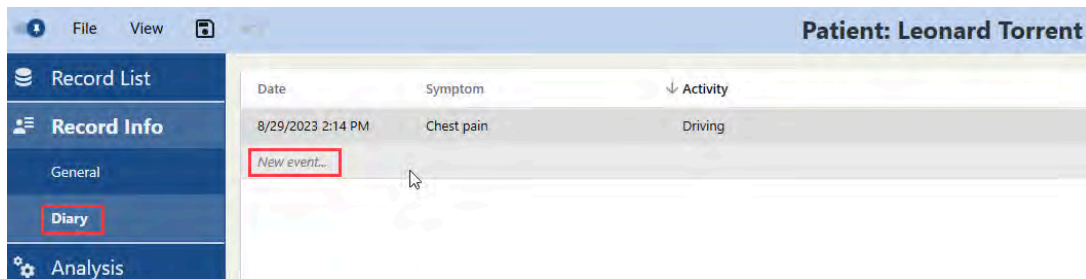
In the **Diary View Mode** you can add, review, modify, delete and sort **Diary Events** of a patient's **Record**.

Figure 151. Record Info View - Diary

The screenshot shows the 'Record Info View - Diary' mode for Patient Leonard Torrent. The sidebar on the left has 'Record Info' selected, and the 'Diary' option is highlighted. The main content area is titled 'Patient: Leonard Torrent' and displays a table of diary events. The table has three columns: 'Date', 'Symptom', and 'Activity'. The first row shows the date '8/29/2023 2:14 PM', the symptom 'Chest pain', and the activity 'Driving'. Below the table, there is a 'New event...' button with a right-pointing arrow.

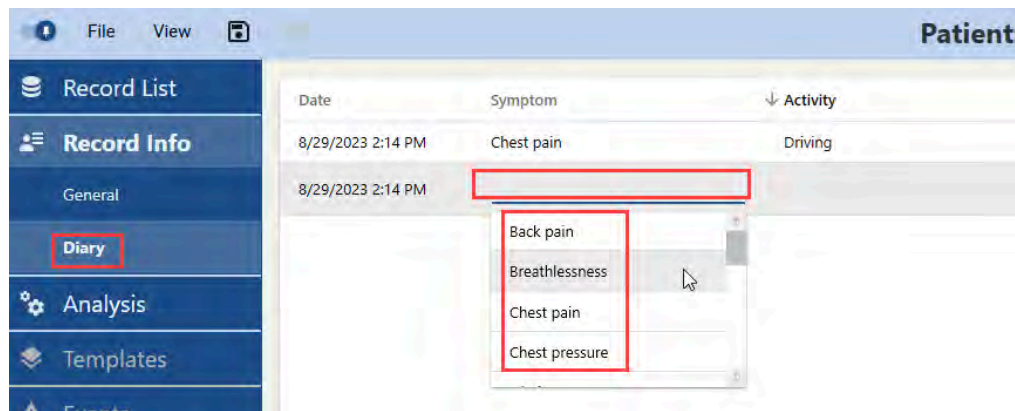
To add a **Diary Event**:

Figure 152. Record Info View - Adding Diary Event



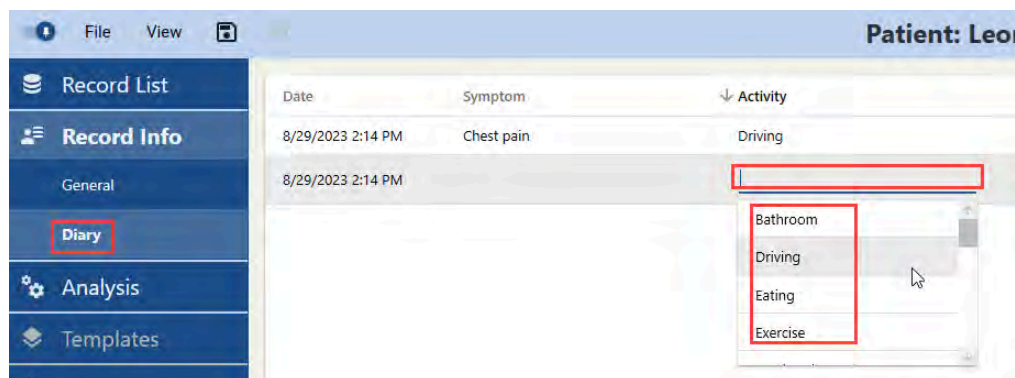
1. Click "New event". A new blank entry with a timestamp in the Date column will appear.
2. Click the blank text field in the **Symptom** column.

Figure 153. Record Info View - Adding Symptoms



3. Choose a **Symptom** from a drop-down list of predefined symptoms or type in a symptom missing in the list.
4. Click the blank text field in the **Activity** column.

Figure 154. Record Info View - Adding Activities

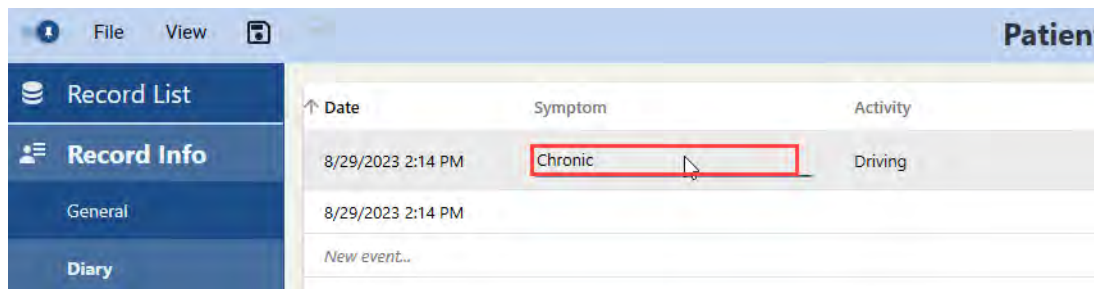


5. Choose an **Activity** from a drop-down list of predefined activities or type in an activity missing in the list.

For example, after you click "New event", you may choose "Shortness of breath" in Step 3 and "Exercise" in Step 4. This will mean that at a given moment a patient experienced a shortness of breath while exercising.

To modify an existing **Diary Event**:

Figure 155. Record Info View - Editing Diary Event



1. Click a text field in a respective column.
2. Use your keyboard to edit date and time in the **Date** column, or symptoms and activities in the **Symptom** or **Activity** columns respectively.

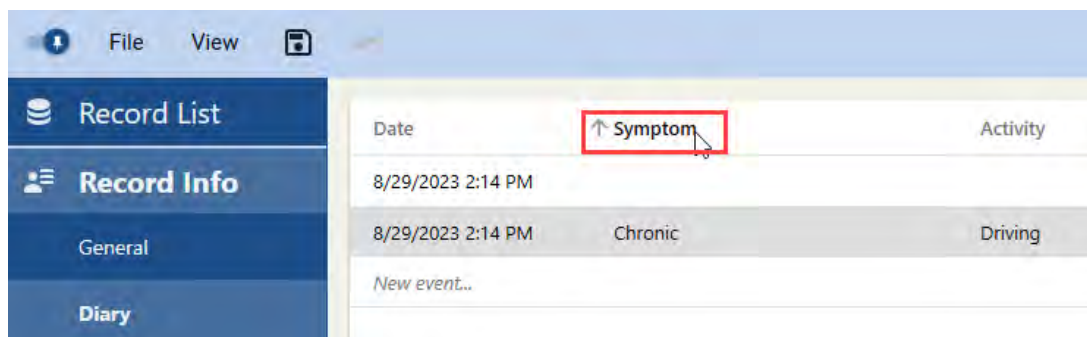
To delete a **Diary Event**:

1. Right-click the line with a Diary Event entry you want to delete and select the line. You can select multiple entries using Ctrl+Click or Shift+Click keyboard shortcuts.
2. Press **Delete** on you keyboard.

The entry will be deleted from the Diary.

To sort **Diary Events** by toggling between ascending and descending order:

Figure 156. Record Info View - Column Sorting

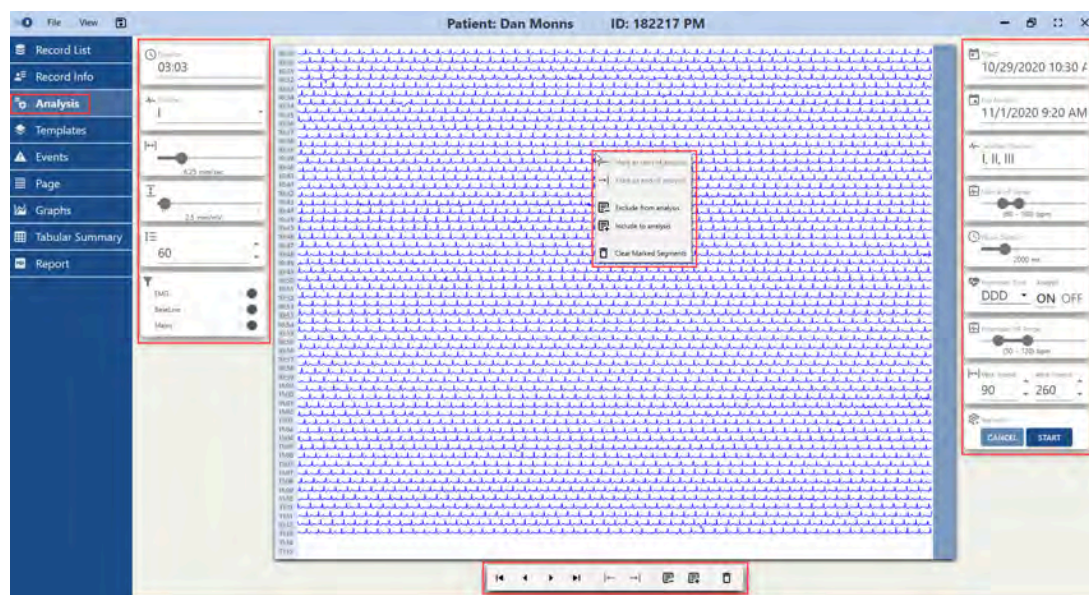


1. Hover your mouse cursor over the header of a column you want to use for sorting (the **Symptom** column, for example).
2. Click the column header to switch between the sorting orders - **Diary Event** entries will be rearranged in the corresponding order. The arrow icon to the left of the column header will change accordingly.
3. **(Optional)** Click the column header again to reverse the sorting.

## Analysis

Before analyzing a Holter recording, data must be uploaded either from the **Memory Card** or directly from the **Recorder**, if applicable. The NH-301 Holter analysis system scans and analyzes this data, offering a comprehensive toolkit for review, modification, and report generation. Within the **Analysis View**, users can define start and end points for analysis and opt to include or exclude specific (e.g., noisy) areas of the **Record**, as well as set analysis parameters.

Figure 157. Analysis View - Analysis View



## Signal Page Controls

The **Signal Page** displays a single page of data containing the electrical activity of the heart over a specific time frame. Signal timestamps are visible on the left, and a scrollbar is located on the right side of the **Signal Page**.

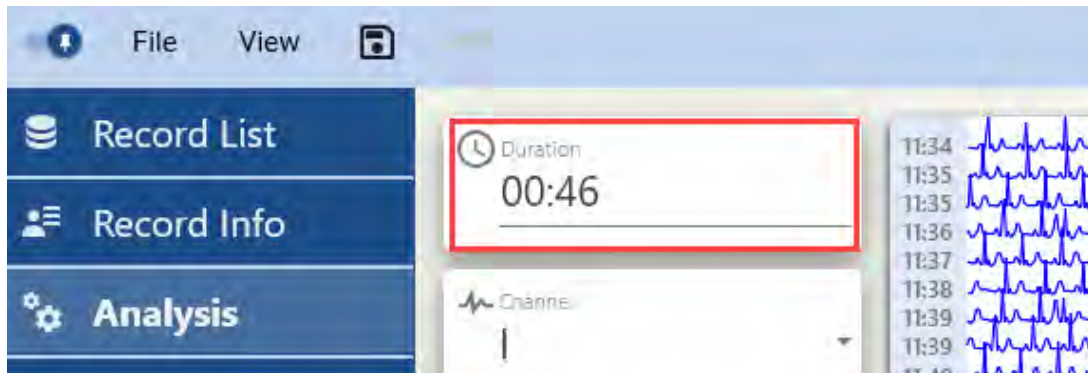
**Analysis View** enables adjustments to ECG signal visualization via control boxes situated on the left.

These controls affect **only** the visualization seen on the **Signal Page**, which is centrally displayed on the screen.



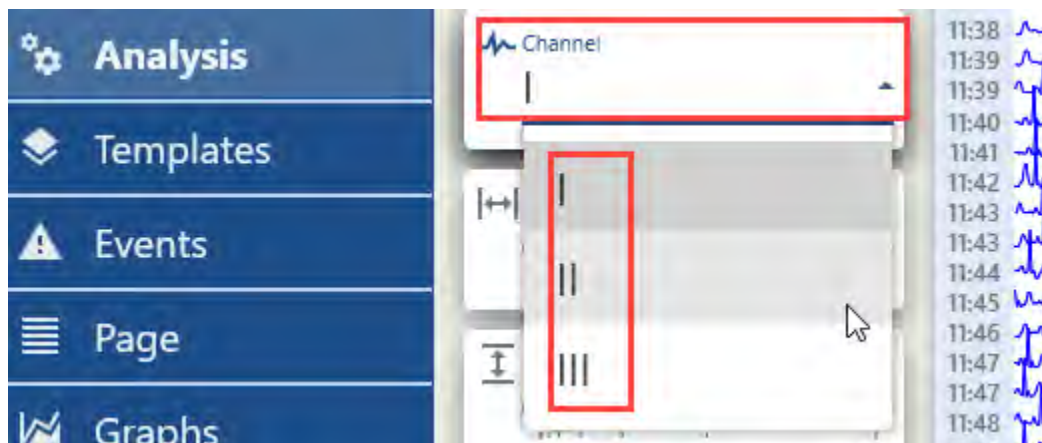
**Duration:** Displays the overall duration (in minutes) of the ECG Record fragment shown on the current **Signal Page**. This parameter is not directly adjustable and is influenced by the **Signal Page Gain** and **Signal Page Lines** parameters, as well as by window size. Alter these settings to see automatic changes to the **Duration** value.

Figure 158. Analysis View - Duration Box



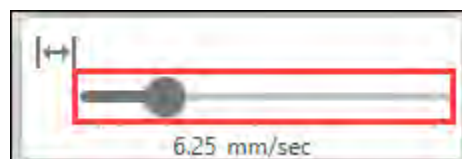
**Channel:** To select a channel you want to display on the **Signal Page**, choose it from a drop-down list on the right. The **Signal Page** updates accordingly.

Figure 159. Analysis View - Channel Box



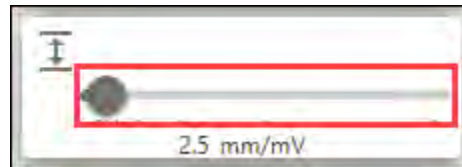
**Signal Page Scale:** Use the slider to adjust the ECG signal scale on the **Signal Page**. This action also affects the **Duration** value.

Figure 160. Analysis View - Signal Page Scale



**Signal Page Gain:** Use the slider to adjust the ECG signal gain on the **Signal Page**.

Figure 161. Analysis View - Signal Page Gain



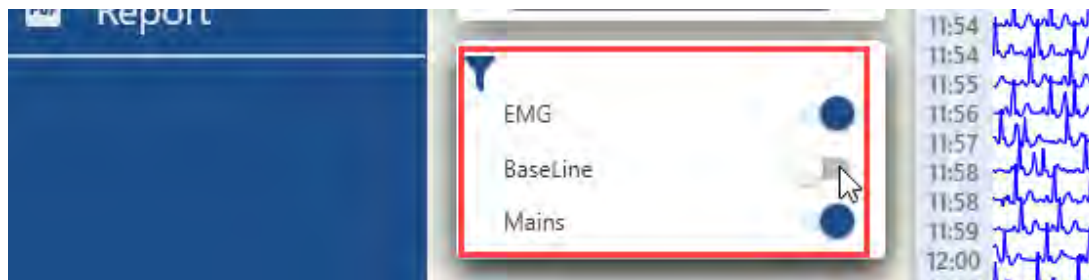
**Signal Page Lines:** Adjust the lines number using picker arrows on the right. This action changes the number of lines displayed on a **Signal Page** and consequently modifies the **Duration** value.

Figure 162. Analysis View - Signal Page Lines



**Filters:** Toggle **ON/OFF** three different filters designed to remove artifact components of various frequencies:

Figure 163. Analysis View - Filters Box



- **EMG filter:** Eliminates high-frequency ECG signal components.
- **Baseline filter:** Removes low-frequency ECG signal components.
- **Mains filter:** Eradicates 50 or 60 Hz power line interference. This interference can be caused by the electrical equipment in the environment.

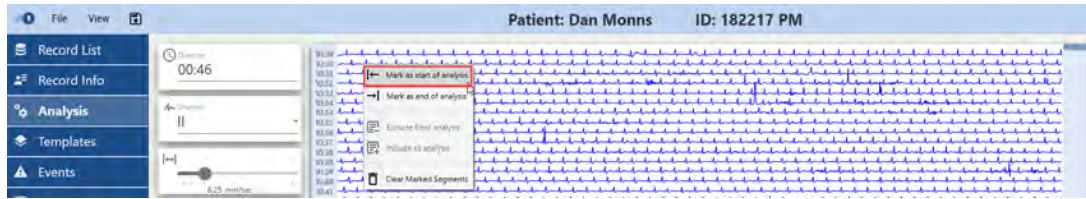
## Action Bar and Context Menu Controls

The right-click context menu of the **Signal Page** and **Action Bar** offer identical functionalities, including defining start and end points for analysis, as well as including or excluding noisy fragments of the **Record**. Additionally, the **Action Bar** located at the bottom enables **Signal Page** pagination and navigation.

### Context Menu

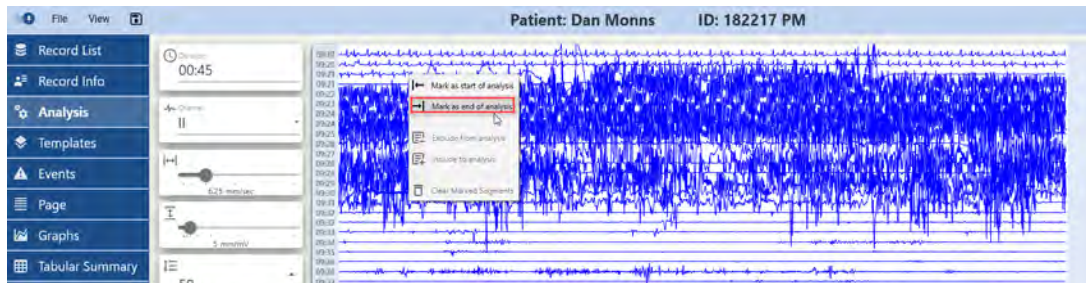
**Mark as start of analysis:** To set the analysis **Start**, hover over the desired point in the **Signal Page**, right-click, and select **Mark as start of analysis**.

Figure 164. Analysis View - Mark Start



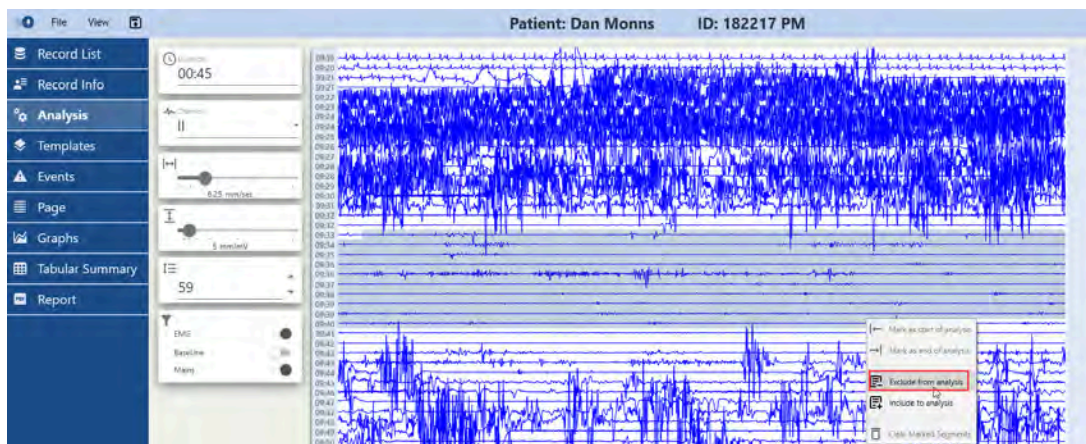
**Mark as end of analysis:** To set the analysis **End**, hover over the desired endpoint in the **Signal Page**, right-click, and select **Mark as end of analysis**.

Figure 165. Analysis View - Mark End



**Exclude from analysis:** Right-click at the point you want to designate as the starting point of the excluded noisy segment, and drag the cursor up to the desired end point. After selecting a continuous segment in this manner on the **Signal Page**, click **Exclude from analysis**.

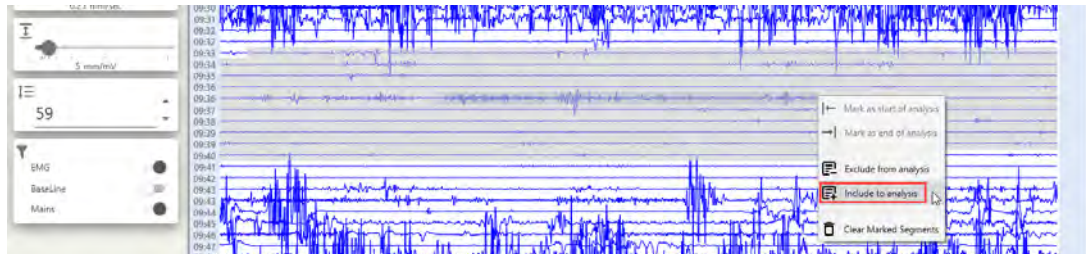
Figure 166. Analysis View - Exclude from Analysis





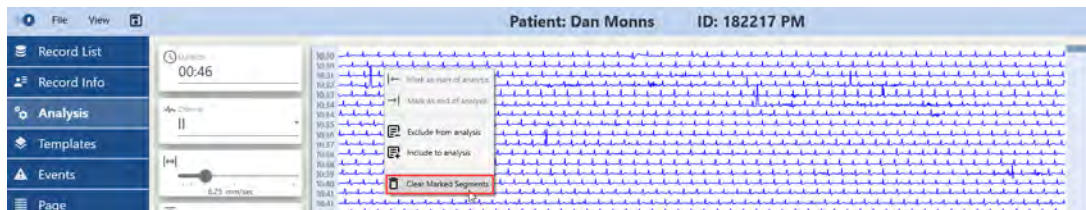
**Include to analysis:** Right-click at the desired starting point of the segment you wish to reinsert into the analysis, and drag the cursor up to the desired end point. After selecting a continuous segment within an excluded segment, click **Include to analysis**.

Figure 167. Analysis View - Include to Analysis



**Clear marked segments:** Select this option to clear all marked segments across the entire ECG Record in one click. It will clear marked **Start** and **End** points, excluded and included segments.

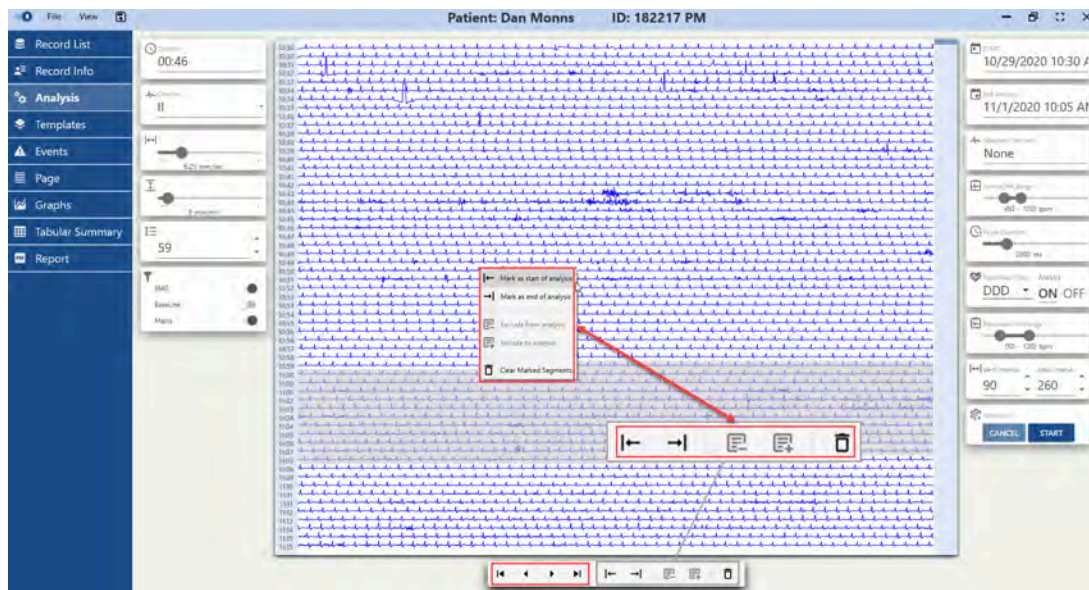
Figure 168. Analysis View - Clear Segments



## Action Bar

The **Action Bar** features the same [functionalities as the Context Menu \(on page 99\)](#), in addition to providing **Signal Page** navigation controls.

Figure 169. Analysis View - Action Bar



**First Page:** Displays the first page of the **Record**.

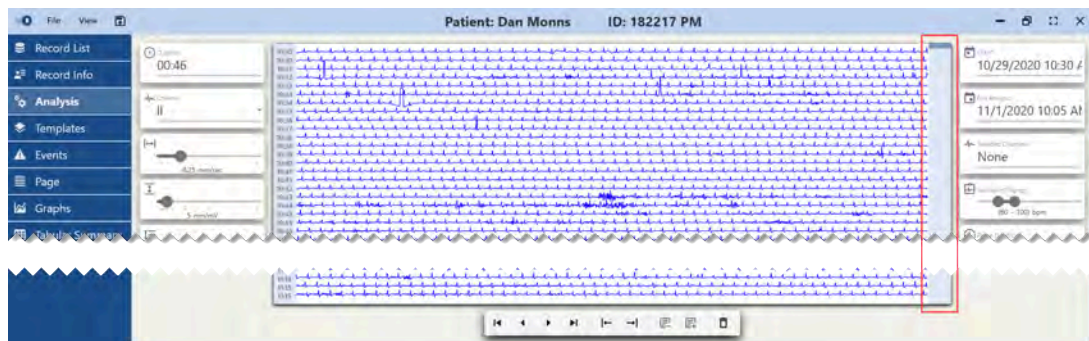
**Page Up:** Navigates one page backward.

**Page Down:** Navigates one page forward.

**Final Page:** Displays the last page of the **Record**.

For quick navigation and review of the **Record**, use your mouse wheel or the scrollbar situated to the right of the **Signal Page**.

Figure 170. Analysis View - Navigation and Scroll Bar



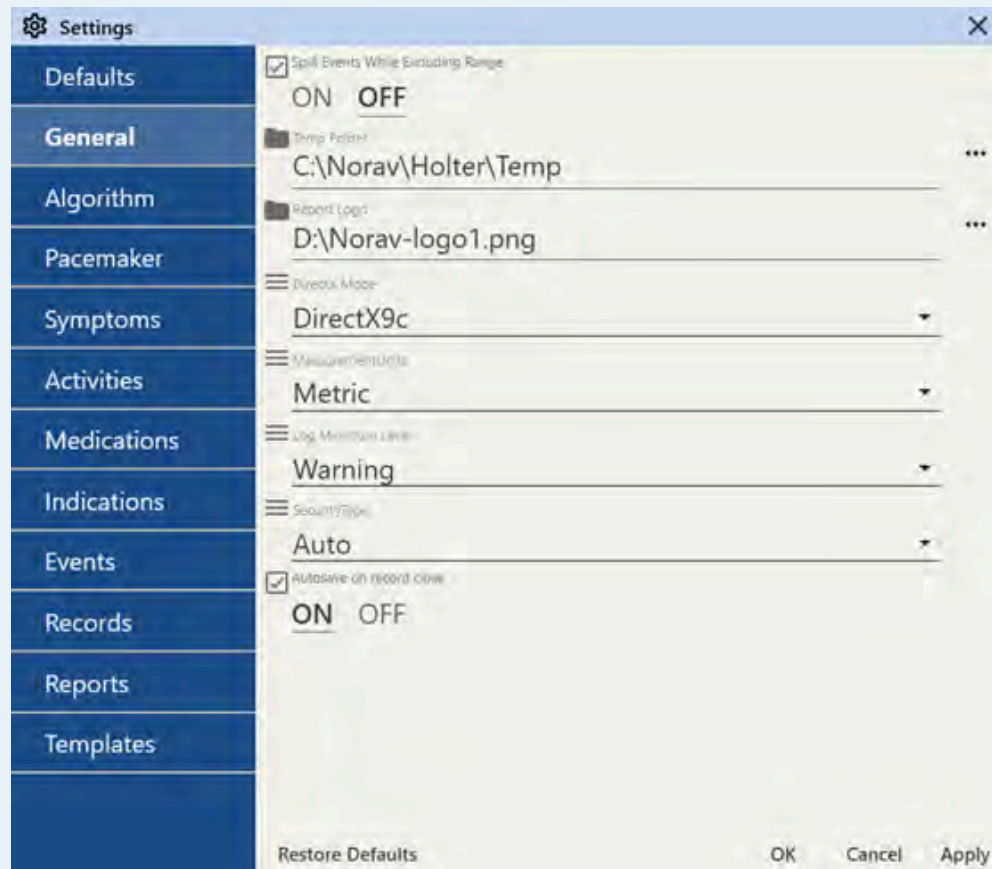
#### Note:

**Split Events While Excluding Range Settings**



The NH-301 analysis system settings contain a parameter that significantly influences the outcome of analyses involving excluded segments. This parameter dictates how algorithms will process events containing **Exclude from analysis** areas:

Figure 171. Settings Dialog Box - General Tab



- Select **ON** to split each continuous event containing one or more **Exclude from analysis** areas into an equivalent number of separate events and standalone **Exclude from analysis** areas.
- Select **OFF** to maintain each continuous event, even if it has one or more **Exclude from analysis** areas. Note that in this mode, event parameters such as duration, HRV, etc., will consider these **Exclude from analysis** areas. The event will not be fragmented into multiple events but will remain a single event.

## Analysis Controls

The core functionality of the **Analysis View** involves the setting of analysis parameters using control boxes located on the right.

If working with a **Record** that has already been analyzed (with **Analyzed** or **Confirmed** status), you will find that all **Analysis Controls** are inactive. A **Reanalysis** box will appear at the bottom right, containing two buttons: **PREPARE** and **START**. Click **PREPARE** to reactivate the **Analysis Controls**, particularly the **START** button, enabling re-analysis.

Figure 172. Analysis View - Analyse and Reanalyse



### General Controls

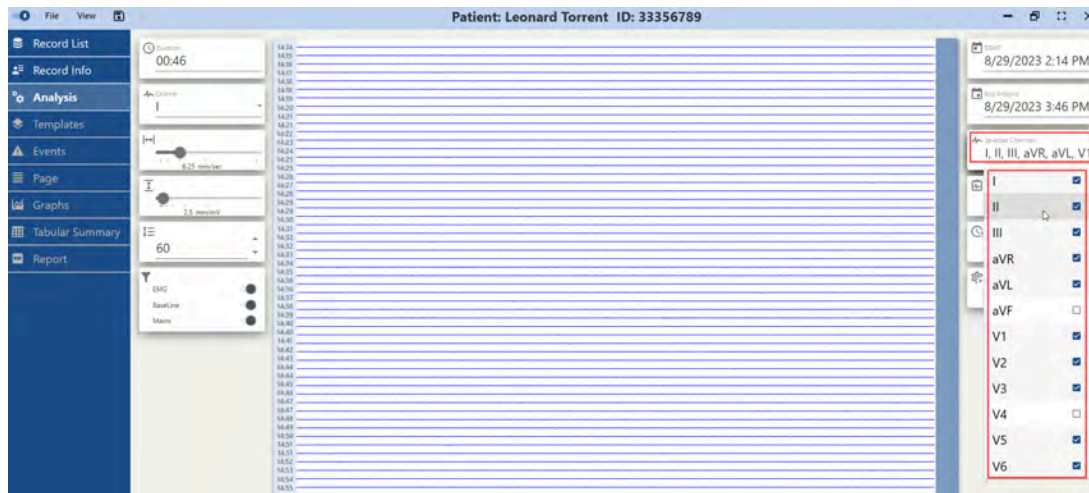
**START/End analysis:** These two boxes display the start and end date and time of the Holter **Record** to be analyzed. These parameters are not adjustable.

Figure 173. Analysis View - Start and End Analysis

The screenshot shows a section of the interface with a red border. It contains two entries, each with a calendar icon and a label. The first entry is labeled 'START' and shows the date and time '8/29/2023 2:14 PM'. The second entry is labeled 'End Analysis' and shows the date and time '8/29/2023 3:46 PM'.

**Selected Channels:** Click this box to select from a dropdown list which ECG channels should be included in the analysis. Check the checkboxes next to all the channels you want to include in the analysis. You must choose at least **one** channel.

Figure 174. Analysis View - Selected Channels



**Normal HR Range:** Use the double slider to define the minimum and maximum heart rate values. Any significant deviations from this range will be classified as Tachycardia or Bradycardia.

Figure 175. Analysis View - Normal HR Range



**Pause Duration:** Use this slider to set the maximum pause duration. Any significant deviations from this range will be classified as tachycardia.

Figure 176. Analysis View - Pause Duration



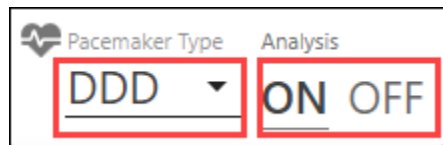
## Pacemaker Controls

These controls become accessible in the **Analysis View** only if pacemaker detection has been turned **ON**, during the **Recorder preparation procedure** (on page 421).

**Pacemaker Type:** Select a pacemaker type from the dropdown list (NONE, VVI, AV, DDD).



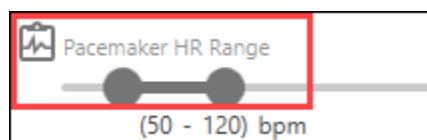
Figure 177. Analysis View - Pacemaker Type and Analysis



**Analysis:** Set pacemaker analysis to **ON** or **OFF** as needed.

**Pacemaker HR Range:** Use the double slider to set the minimum and maximum heart rate range initiated by a pacemaker.

Figure 178. Analysis View - Pacemaker HR Range



**Vent. interval:** Use the picker arrows on the right to set the time limit between the ventricular spike and the subsequent R-wave.



**Atrial interval:** Use the picker arrows on the right to set the time limit between the atrial spike and the subsequent R-wave.

**Analysis/Reanalysis:** Click **START** to initiate ECG Record analysis.

Figure 179. Analysis View - START and PREPARE Buttons



**Note:**

If the record you are working with hasn't been analyzed, you will see the **Analysis** box with only one button - **START**. If the **Record** has been previously analyzed, a **Reanalysis** box will appear with two buttons: **PREPARE** and **START**. Click **PREPARE** first to activate the control boxes, and then click **START** to initiate the **Analysis**.

After analysis completion, all **Views** in the **Views Sidebar** become accessible.

## Templates

The **Templates View** enables efficient inspection of beat analysis results: review, edit, reclassify, overlay, merge, check, and delete individual beats or entire templates. This section will first cover the editing tools located in the upper pane, followed by an explanation of features in the lower pane.

Figure 180. Templates View - Templates View



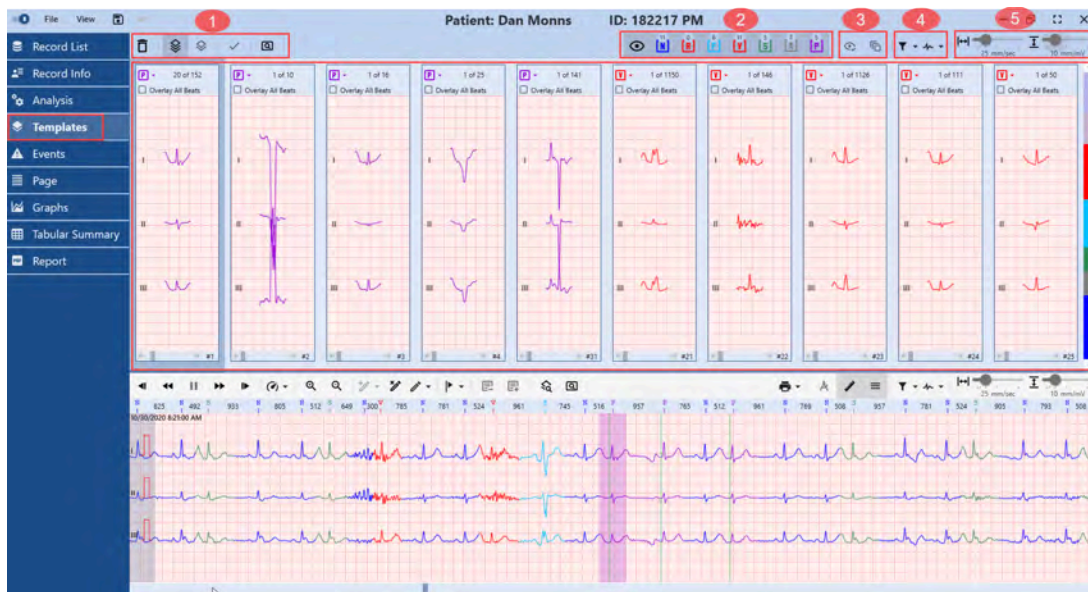
## Reviewing Beat Morphologies

In the top pane of the **Templates View**, you will find different beat morphologies identified during the beat analysis. These morphologies are organized into separate boxes. Each box constitutes a template that contains beats with similar morphology, enabling you to work with groups of beats simultaneously.

## Templates Pane Toolbar

Templates may be managed via the top toolbar, through drop-down menus, or by utilizing controls within each template box. Additionally, templates can be modified or removed through keyboard commands. In this section, we will concentrate on explaining the top toolbar controls. For ease of understanding, these controls are combined into separate groups of interface elements.

Figure 181. Templates View - Templates Pane Toolbar



1. General Controls.
2. Templates Controls.
3. Layout Controls.
4. Filters.
5. Scale and Gain Controls.

## General Controls

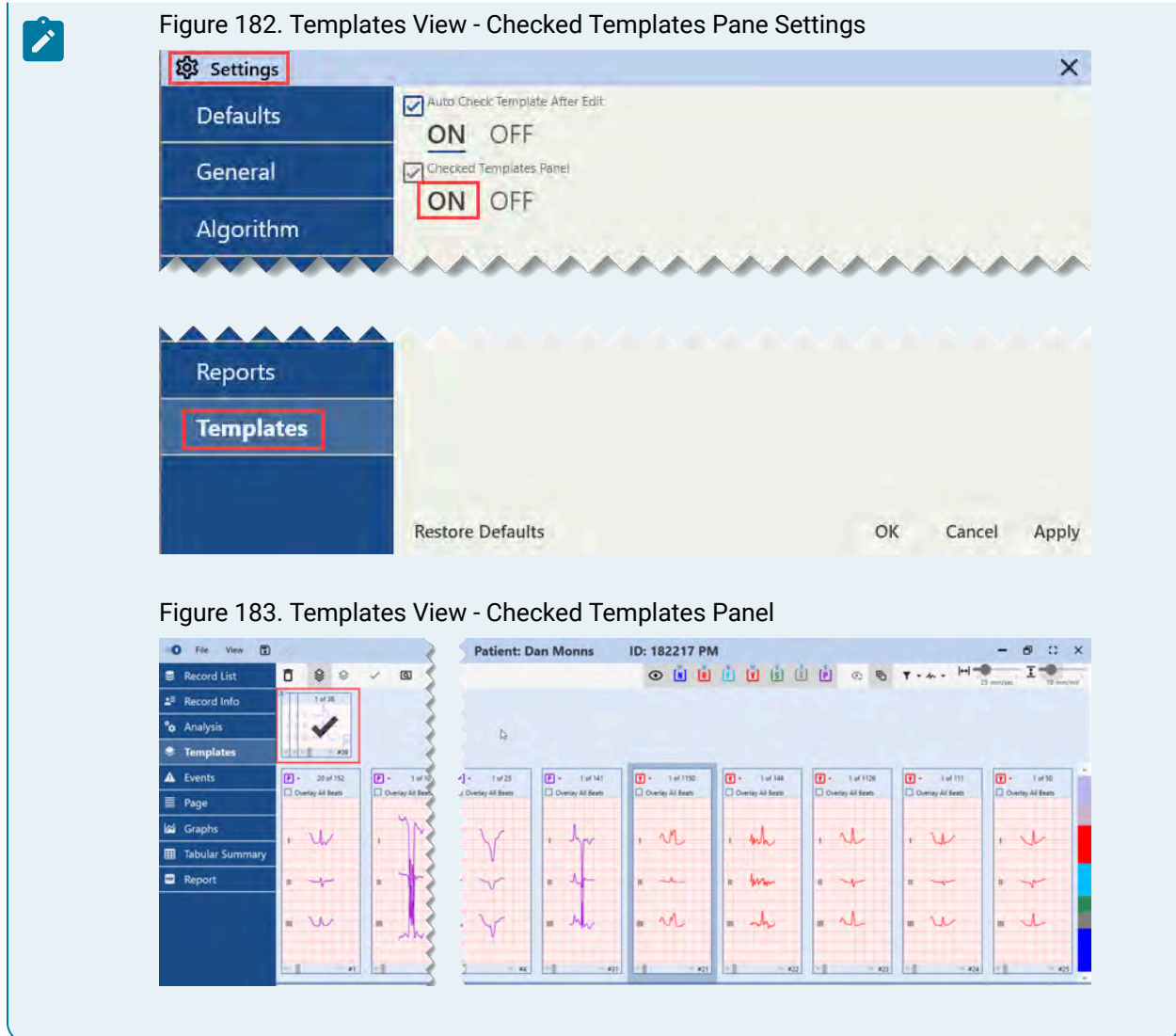
**General Controls** is a group of buttons representing different actions and modes for reviewing templates and beats.



### Note:

If you set the **Checked Templates Panel** option (*on page 49*) in **File > Settings > Templates** tab to **ON**, checked templates will be displayed in a separate pane at the top of the screen. Otherwise, they will reside in the standard **Templates Pane**, adjacent to unchecked templates.





Icon	Description
	<b>Delete:</b> Allows you to remove a single beat or <b>Template(s)</b> . To delete multiple <b>Templates</b> , select them using <b>Shift+Click</b> or <b>Ctrl+Click</b> keyboard shortcuts.
	<b>Template Mode:</b> Allows you to work with the entire <b>Template</b> . Specifically, pressing <b>Delete</b> will remove the selected <b>Template</b> . This mode is also applicable when changing annotations through key bindings.
	<b>Single Beat Mode:</b> Enables you to work with a selected, individual beat within a <b>Template</b> .
	<b>Check Templates:</b> Allows you to mark <b>Templates</b> as checked.


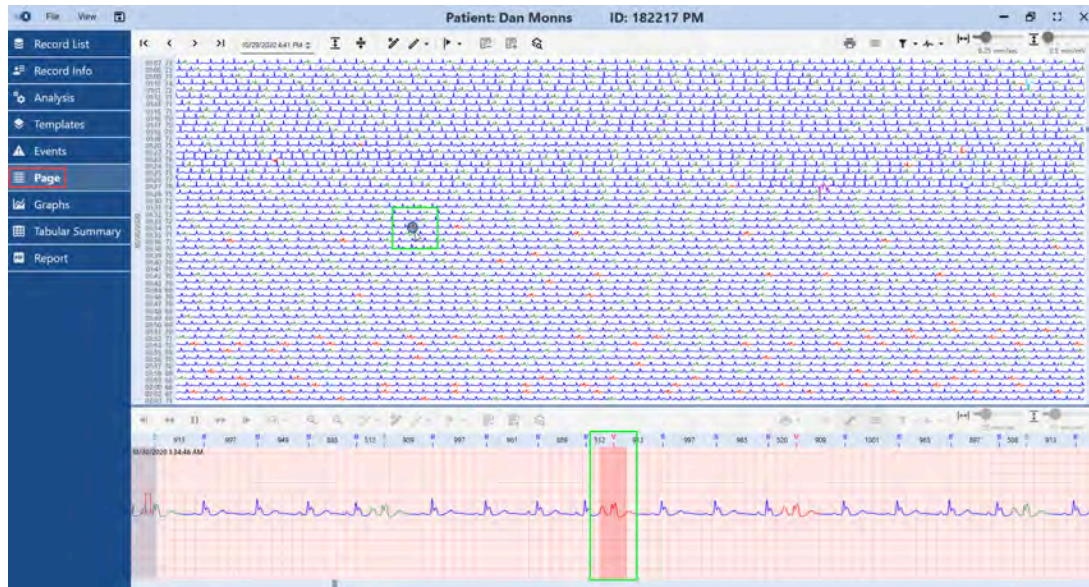


Icon	Description
	<b>Show in Page:</b> Facilitates an immediate switch to <b>Page View</b> , revealing the precise location of the chosen beat within this particular <b>Template</b> in both the <b>Signal Page</b> and the <b>ECG Strip</b> ..

Figure 184. Templates View - Show in Page Button



### Templates Controls

**Template Controls** is a group of buttons that directly control the visibility of all template types, either as separate entities or collectively.

Icon	Description
	<b>Show All:</b> Toggles the <b>Template Pane ON/OFF</b> .
	<b>Show Annotation Buttons:</b> Toggles <b>ON/OFF</b> the visualization of related types of templates. Numeric icons are displayed at the top of each <b>Show Annotation Button</b> . These icons indicate the number of distinct templates of a specific type that the <b>NH-301 analysis system</b> has extracted from this particular record.

### Layout Controls

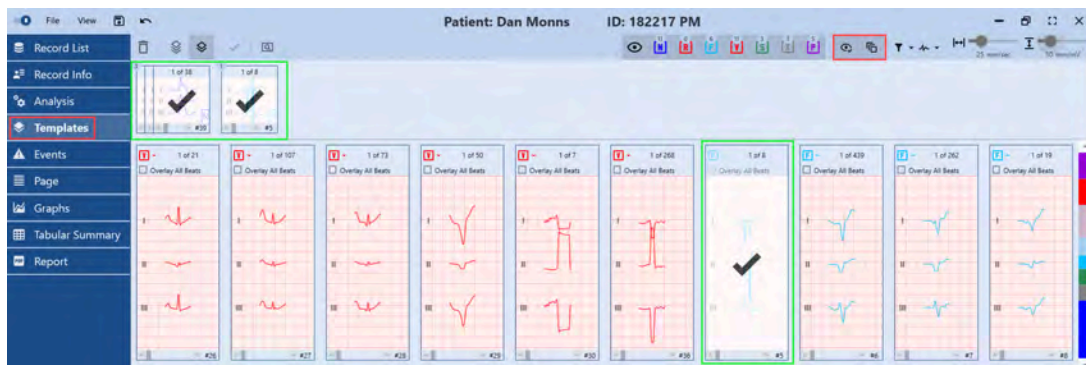
**Layout Controls** are a set of buttons designed to **modify** the layout of the **Templates Pane** by adding or removing specific interface elements, as needed.

Figure 185. Templates View - Layout Controls OFF



Icon	Description
	<b>Show Checked Templates:</b> Toggles <b>ON/OFF</b> checked templates visualization alongside unchecked <b>Templates</b> in the general <b>Templates Pane</b> .
	<b>Show Checked Templates Panel:</b> Toggles <b>ON/OFF</b> a dedicated panel above the general <b>Templates Pane</b> , housing only checked templates.

Figure 186. Templates View - Layout Controls ON

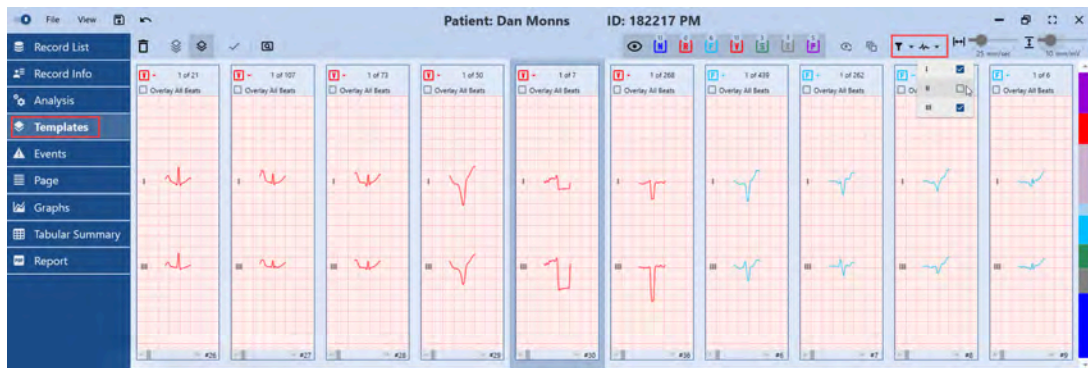




## Filters

**Filters** facilitate the toggling of filtering and **ECG Channel** visualization rules for template boxes.



Figure 187. Templates View - Filters

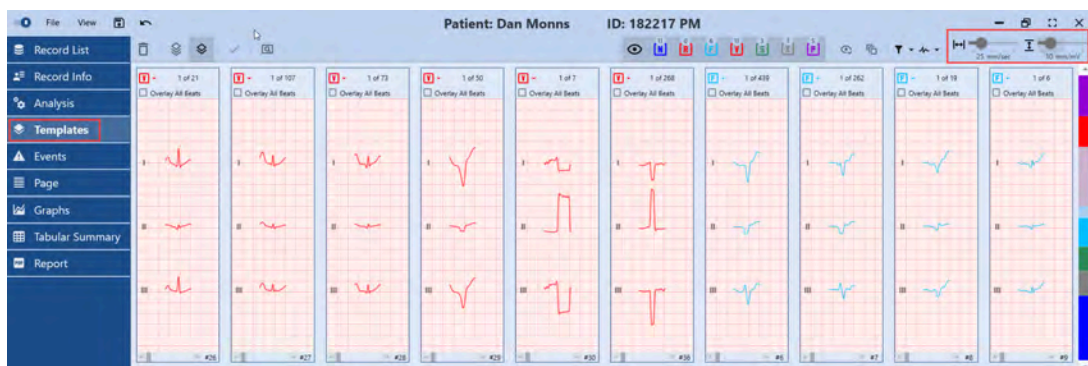


Icon	Description
	<b>Filter:</b> Enables toggling of visualization <b>ON/OFF</b> with the applied <b>EMG</b> , <b>Base Line</b> , and <b>Mains</b> filters. To accomplish this, check or uncheck any number of checkboxes in the drop-down list.
	<b>Channels:</b> Allows toggling of <b>ECG Record Channels</b> display in <b>Templates ON/OFF</b> . To execute this, check or uncheck any number of checkboxes in the drop-down list, depending on the number of channels in a record and the quantity you wish to display.

### Scale and Gain Controls

Drag **Scale and Gain Controls** sliders to set appropriate paper speed and amplitude for display in the template boxes.

Figure 188. Templates View - Scale and Gain Controls

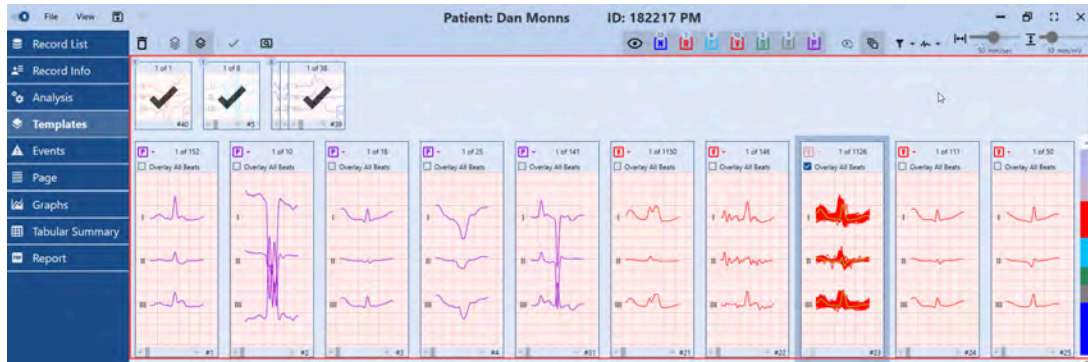


**Scale and Gain Controls** can help users identify and measure different ECG features more accurately, and analyze ECG data more efficiently by allowing them to quickly adjust the display of the template boxes to their needs.

## Templates Pane

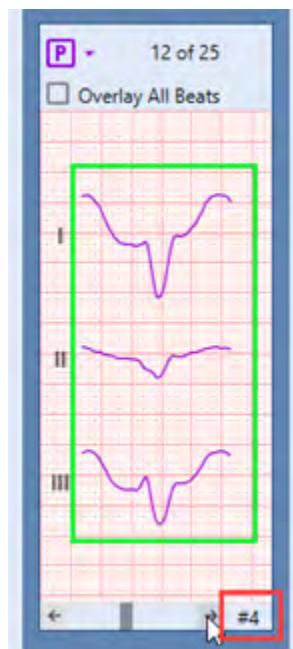
Reviewing numerous beats to ensure correct annotation and proper categorization into respective beat groups can be labor-intensive. The **NH-301 Holter** analysis system provides not only a highly accurate analysis algorithm but also extensive editing features, detailed below.

Figure 189. Templates View - Templates Pane



Each box functions as a template containing beats of similar morphology. Navigate through beats using either the arrow buttons inside the template box or your mouse scroll wheel.

Figure 190. Templates View - Templates Navigation

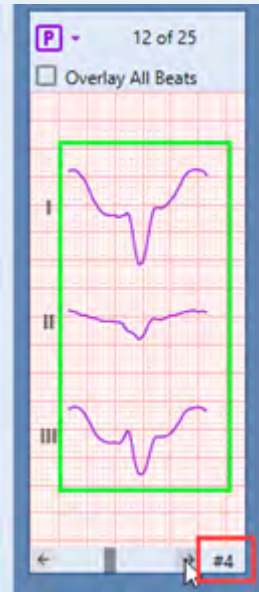


Pressing and holding the mouse button on an arrow enables quick cycling through all beats in that template. Alternatively, utilize a horizontal scrollbar at the lower section of the selected box by dragging the scroll thumb or clicking the scroll trough.

**Note:**

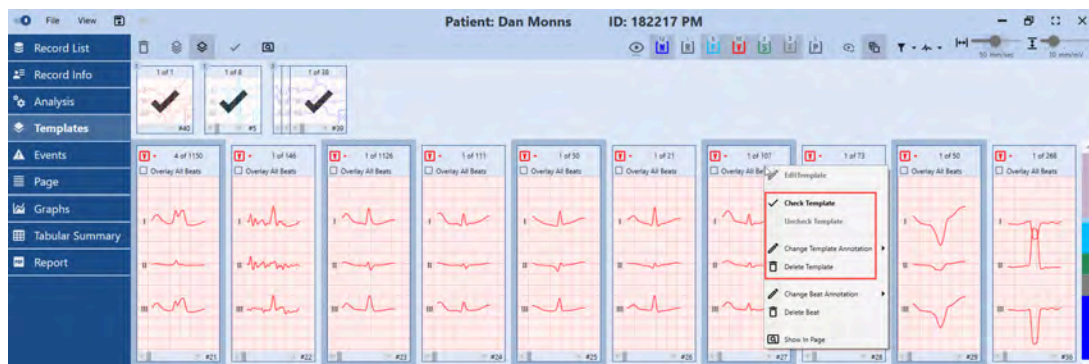
A number displayed in the bottom-right corner of each template indicates the template number, generated during both analysis and subsequent editing.

Figure 191. Templates View - Template Number



Utilizing the **Ctrl** or **Shift** key in combination with the mouse allows for the selection of multiple templates for batch processing:

Figure 192. Templates View - Batch Operations



1. To select individual templates for modification, click on a template. Then press and hold the **Ctrl** key while clicking on each additional template you wish to select.
2. To select a series of templates, click on the first template in the series. Press and hold the **Shift** key and click on the last template. All intervening templates will be automatically selected.
3. You can now quickly perform batch operations, such as changing the annotation for all selected templates, deleting them, or checking them.

## Overlay All Beats Feature

Swiftly assess all templates using the **Overlay All Beats** mode. This feature streamlines the review process and aids in the identification of outlier beats that deviate from the common pattern.

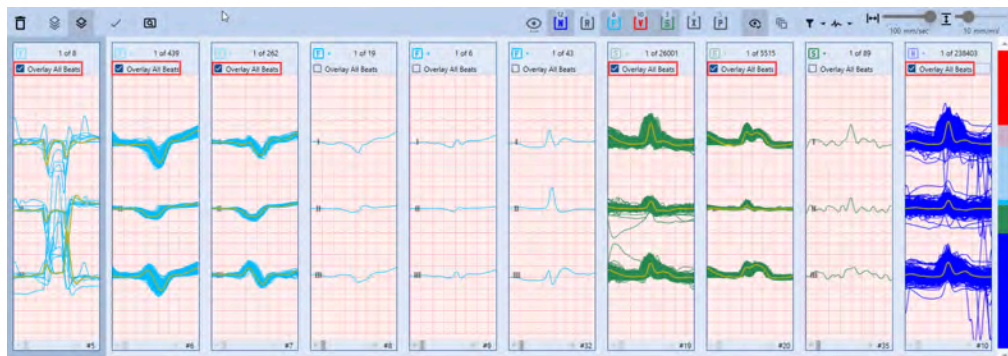
Figure 193. Templates View - Overlay All Beats



To activate this feature:

- Check the **Overlay All Beats** checkbox located at the top of the template box.

Figure 194. Templates View - Check Overlay All Beats



All beats within a given template are subsequently superimposed. The time required for this operation depends on the total number of beats in the template. Once superimposed, assess the alignment of the beats with the standard pattern displayed in the template box.

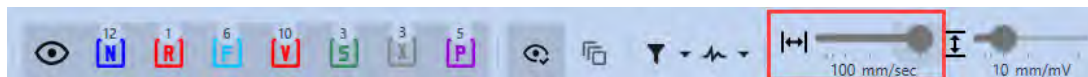
This example template box, depicted below, displays a range of beat shapes clustered together. Such inconsistencies may occur if beats have been manually renamed or templates merged.

Figure 195. Templates View - Inconsistent Template Example



For optimal inspection of beat patterns, it is recommended to set the paper speed for the template view to 100 mm/s. This adjustment enlarges the template view for easier inspection.

Figure 196. Templates View - Scale Control



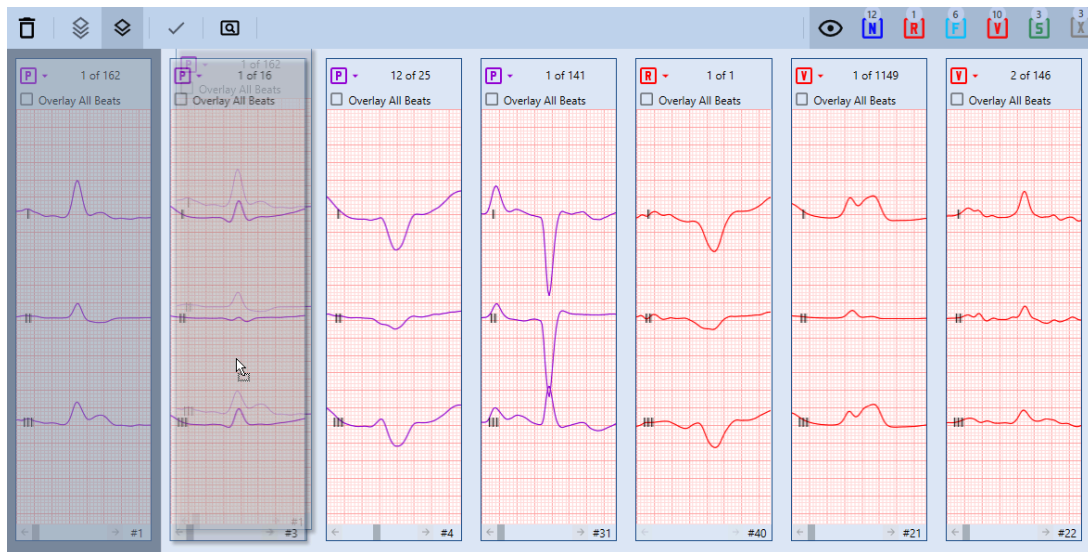
## Merge Templates Feature

If your **Record** contains multiple templates, the **Merge Templates** feature can simplify your reports by combining templates with similar morphologies. Although the **NH-301** software can handle a large number of templates, this feature offers an alternative for users who prefer streamlined reports.

**To merge templates:**



Figure 197. Templates View - Merge Templates



1. Choose two template boxes to merge.
2. Select the first template.
3. The first box will become transparent during the drag, facilitating visual confirmation that the beat shapes align.
4. Release the mouse button to finalize the merge.

**Note:**

The **Merge Templates** feature does not affect the outcomes of beat or arrhythmia analyses. Its primary function is to reduce template count for easier viewing.

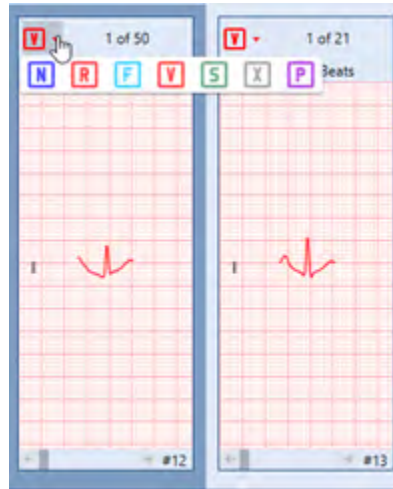
## Reclassifying Templates Feature

While reviewing templates, you may find it necessary to reclassify them for a more detailed and accurate **ECG** analysis.

The **Templates Pane** provides several methods for reclassification:

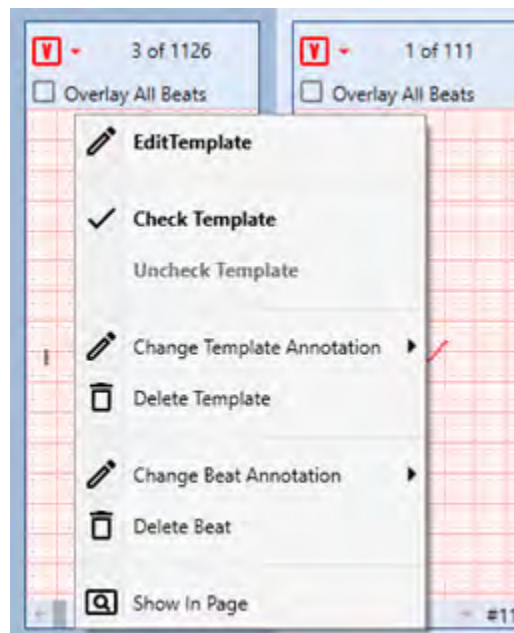
1. Drop-down menu at the top left corner of each template box.

Figure 198. Templates View - Template Box Drop-Down



2. Right-click context menu.

Figure 199. Template View - Context Menu



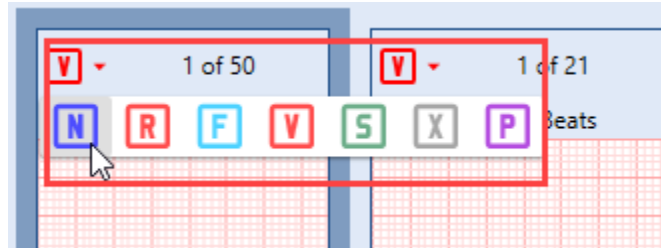
3. Keyboard shortcuts.

Further reclassification options are available in **Editing Templates** mode, which will be discussed in a subsequent section.

**To reclassify templates using the drop-down menu:**

1. Hover over the drop-down list icon at the top-left corner of the template box you wish to reclassify.  
A reclassification menu will appear.

Figure 200. Templates View - Reclassification Using Drop-Down



2. Select the arrhythmia type you wish to assign to the current template and click its button.
3. A "Processing" pop-up will briefly appear. Once it disappears, the template will be moved and grouped with templates of the same acquired type.

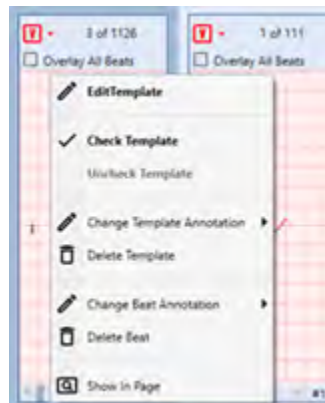
**Note:**

This method does not support bulk actions.

**To reclassify templates using the context menu:**

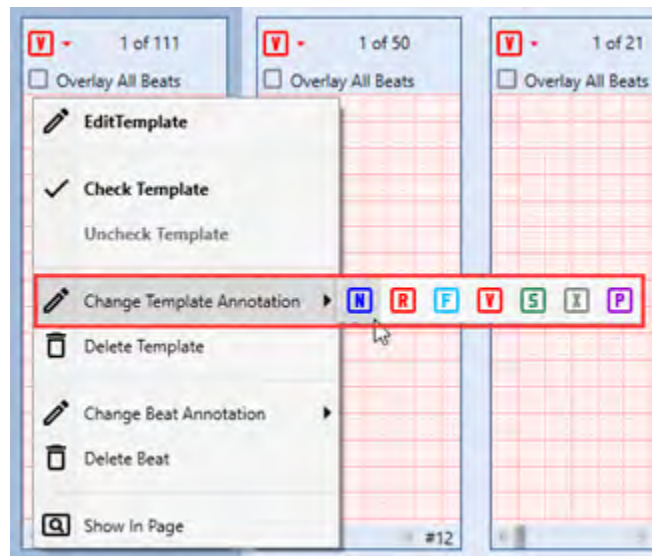
1. Hover over the template box you wish to reclassify.
2. Right-click to expand the context menu.

Figure 201. Template View - Expand Context Menu



3. Hover over the **Change Template Annotation** option to expand the reclassification panel.

Figure 202. Templates View - Change Template Annotation



4. Select the arrhythmia type you wish to assign to the current template and click its button.
5. A "Processing" pop-up will briefly appear. Once it disappears, the reclassification is complete, and the template will be moved and grouped accordingly.



**Note:**

This method allows bulk actions. Multiple templates can be selected using **Ctrl+Click** or **Shift+Click** shortcuts to reclassify them in one action.

**To reclassify templates using keyboard shortcuts:**









1. Select the template box you wish to reclassify.
2. Use a standard keyboard shortcut. For a list of default shortcuts, refer below.
3. A "Processing" pop-up will briefly appear. Once it disappears, the reclassification is complete, and the template will be moved and grouped accordingly.



**Note:**

This method also allows bulk actions using **Ctrl+Click** or **Shift+Click** shortcuts to reclassify them in one action.

**Table 1. Templates Reclassification Keyboard Shortcuts**

Action	But- ton	Keyboard Keys
Classify the template as <b>Normal</b>		Shift + N
Classify the template as <b>R on T</b>		Shift + R
Classify the template as <b>Fusion</b>		Shift + F
Classify the template as <b>VPB</b>		Shift + V
Classify the template as <b>SVE</b>		Shift + S
Classify template beats as <b>Questionable</b>		Shift + X
Classify template beats as <b>Paced</b>		Shift + P
<b>Delete</b> the template		Shift + Delete

**Example:** When you reclassify an **S**-annotated template to **N**-annotated, it will be moved and grouped with other **N**-templates in the **Templates Pane**.

## Edit Template Feature

The **Edit Template** feature enables the viewing of every single beat within a template, facilitating the most thorough inspection possible.

**To edit beats within a template, you have the following options:**

Figure 203. Templates View - Edit Template Option



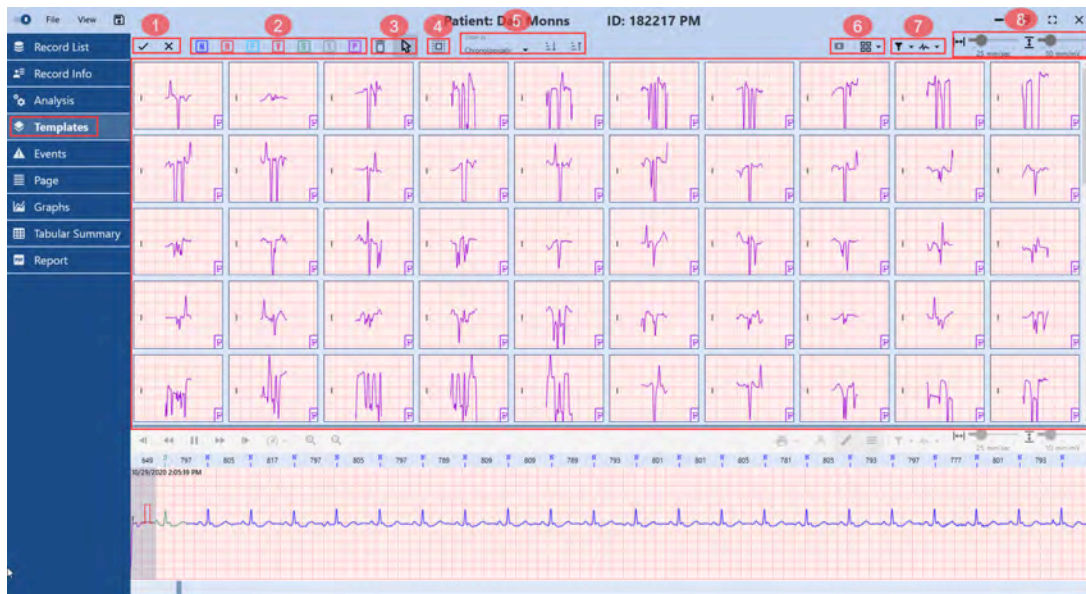
- Double-click the template box.
- Alternatively, you can:
  1. Hover over the template box you want to edit.
  2. Right-click the box to expand the context menu.
  3. Select the **Edit Template** option from the context menu.

The screen layout changes automatically, as shown below.

## Edit Template Mode

In the top pane of the **Edit Template** mode, you can view each beat of the template, facilitating the identification of beats that may be classified as noise or may be incorrectly labeled due to noise or artifacts. In the bottom pane, you can see the **Strip View**, identical to that in other views and modes, which will be explained later.

Figure 204. Templates View - Edit Template Mode





Beats within the template can be managed using the top toolbar or through keyboard controls. First, we will explain the top toolbar controls. To streamline the process, we will group them into categories of UI elements:

1. Save and Discard Changes Controls.
2. Reclassification Controls.
3. Mouse Function Controls.
4. Select All Control.
5. Sorting Controls.
6. Layout Controls.
7. Filters.
8. Scale and Gain Controls.

### Save and Discard Changes Controls

This group of controls enables exiting **Edit Template** mode, either saving or discarding all changes.

Icons	Description
	<b>Save:</b> Click to save all changes you've made in the <b>Edit Template</b> mode and return to the <b>Templates View</b> .
	<b>Cancel:</b> Click to discard all changes you've made in the <b>Edit Template</b> mode and return to the <b>Templates View</b> .



## Reclassification Controls

This group of controls allows you to reclassify beats individually or in bulk.

Figure 205. Template Edit - Reclassification Controls



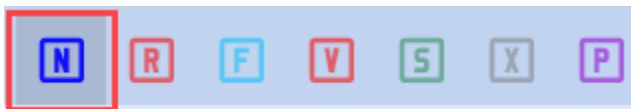
Click one of these buttons to reclassify beat(s) using one of the available methods. Alternatively, refer to the **Templates Reclassification Keyboard Shortcuts** table below to change beat types via keyboard shortcuts. To select multiple beats, utilize **Ctrl + Click** or **Shift + Click** shortcuts.

**You can either first click a reclassification button and then select beats to rename, or first select beats and then click the button:**

- **Option 1: To reclassify beats:**

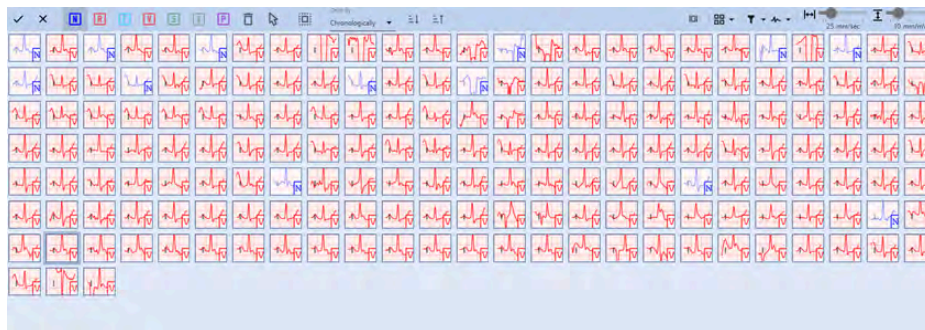
1. Click one of the **Reclassification Controls**. This will activate a reclassification action: beats you mark in the next step will be reclassified to the beat type of your choice.

Figure 206. Template Edit - Reclassification Button Activated



2. Right-click beats in the **Beats Pane** one by one. This changes their annotation type and color.

Figure 207. Template Edit - Beats Pane

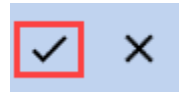


3. **(Optional)** Scroll to review all the beats in the current template. The **Beats Pane** can accommodate up to 250 beats, while a template may contain thousands.



- Click the **Save** button on the left of the top toolbar after completing reclassification.

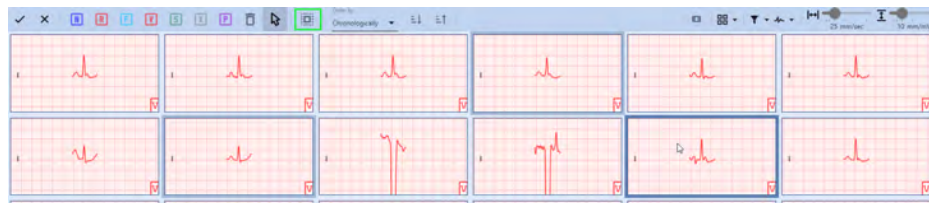
Figure 208. Template Edit - Save Button



• **Option 2: To reclassify beats:**

- Select beats you want to reclassify using **Ctrl + Click** or **Shift + Click**. You can also click the **Select All** button in the top toolbar to select all beats.

Figure 209. Template Edit - Selecting Beats



- (Optional)** Scroll to review all the beats in the current template. The **Beats Pane** can accommodate up to 250 beats, while a template may contain thousands.
- Click one of the **Reclassification Controls**. This immediately reclassifies all selected beats. Beat boxes will change their annotation type and color of the beat visualization.

Figure 210. Template Edit - Reclassification Button Activated

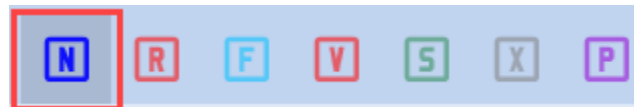
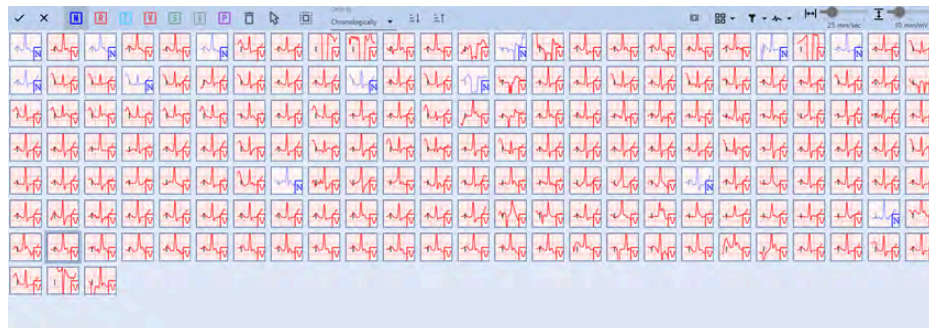
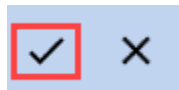


Figure 211. Template Edit - Beats Pane



4. Click the **Save** button on the left of the top toolbar after completing reclassification.

Figure 212. Template Edit - Save Button



**Example:** When you reclassify a **V**-type beat into an **N**-type beat, the icon at the bottom left of the beat box changes from **V** to **N**, and the color switches from red to blue. Similarly, the color of the beat changes from red to blue.

Figure 213. Template Edit - Reclassification Example

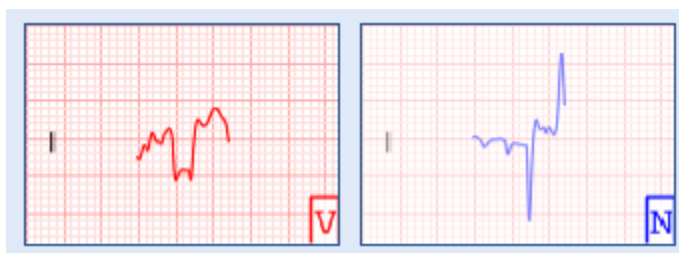



Table 2. Templates Reclassification Keyboard Shortcuts



Action	But-ton	Keyboard Keys
Classify the template as <b>Normal</b>		Shift + N
Classify the template as <b>R on T</b>		Shift + R
Classify the template as <b>Fusion</b>		Shift + F
Classify the template as <b>VPB</b>		Shift + V
Classify the template as <b>SVE</b>		Shift + S
Classify template beats as <b>Questionable</b>		Shift + X
Classify template beats as <b>Paced</b>		Shift + P

**Table 2. Templates Reclassification Keyboard Shortcuts**  
(continued)

Action	But- ton	Keyboard Keys
Delete the template		Shift + Delete

### Mouse Function Controls

This group of controls allows you to toggle between the **Free Cursor** mode and **Delete** mode. These modes affect your interaction with beats in the **Edit Template** mode.

Icons	Description
	<b>Switch to Free Cursor Button:</b> Allows you to switch from beats annotation function or <b>Delete</b> mode to <b>Free Cursor</b> mode. After you have changed annotations or <b>marked for deletion beats you wanted</b> , you can deactivate the annotation feature by clicking this button. This protects against unintended changes due to a misclick.
	<b>Switch to Delete Button:</b> Click to activate the <b>Delete</b> mode. Alternatively, use the <b>Shift + Delete</b> keyboard shortcut. The <b>Delete</b> mode operates as follows: <ul style="list-style-type: none"> <li>• Upon activation, it marks all selected beats for deletion. If no beats are selected, none will be marked for deletion.</li> <li>• After activation, right-click on additional beat boxes to mark them for deletion.</li> </ul>

You can either first click the **Switch to Delete** button and then select beats, or first select beats and then click the button (additional beats can still be added):

• **Option 1: To delete beats:**

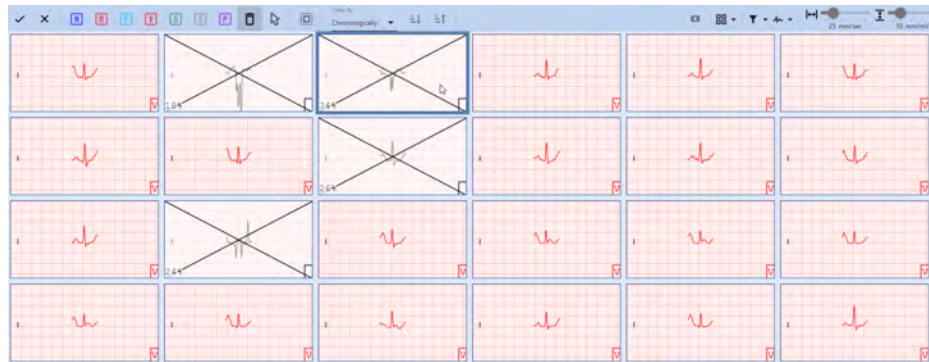
1. Click the **Switch to Delete** button. This activates **Delete** mode: subsequent beats you select will be marked for deletion.

Figure 214. Template Edit - Delete Button



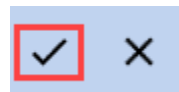
2. Right-click on beats in the **Beats Pane** individually. This marks them for deletion and changes their beat visualization.

Figure 215. Template Edit - Marking for Deletion



3. **(Optional)** Scroll to review and select all desired beats for deletion in the current template. The **Beats Pane** can accommodate up to 250 beats; templates may contain thousands.
4. Click the **Save** button on the left of the top toolbar after marking beats for deletion.

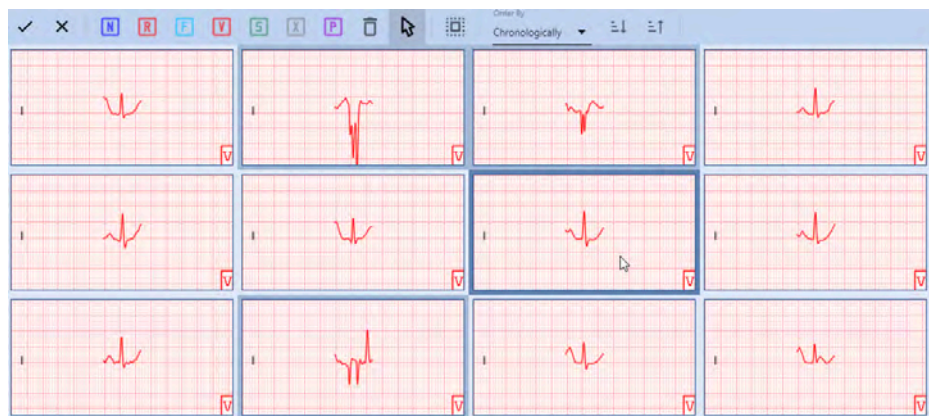
Figure 216. Template Edit - Save Button



• **Option 2: To delete beats:**

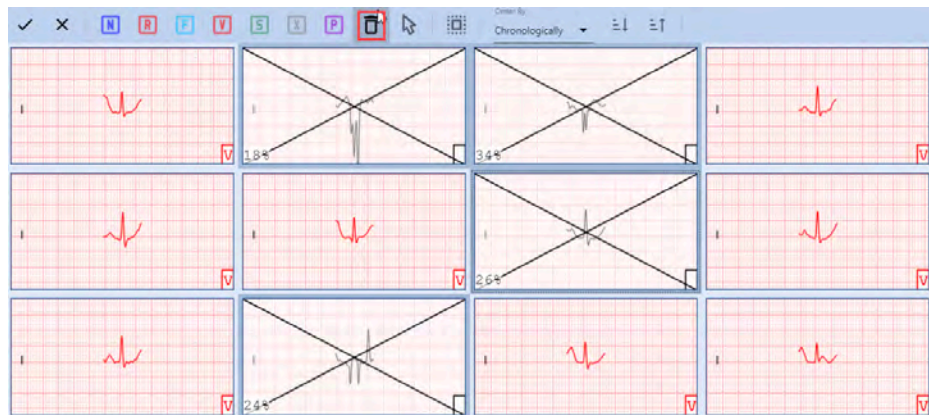
1. Select beats you want to delete, using **Ctrl + Click** or **Shift + Click**. Alternatively, click the **Select All** button in the top toolbar to select all beats.

Figure 217. Template Edit - Selecting Beats for Deletion



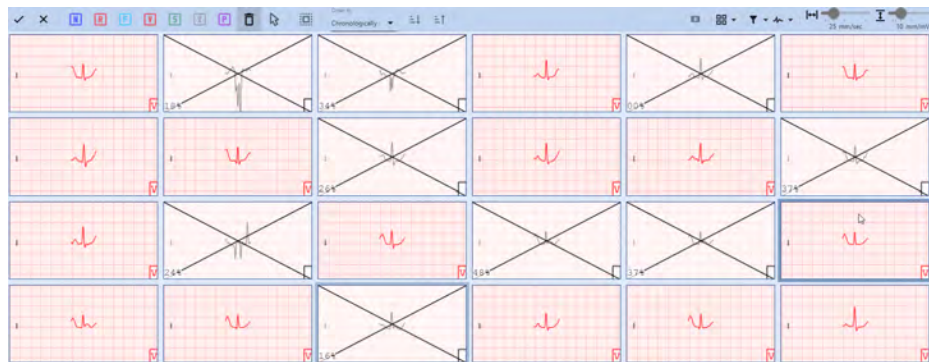
2. **(Optional)** Scroll down and up to review and select all the beats you want to delete in the current template. The **Beats Pane** can accommodate up to 250 beats; templates may contain thousands.
3. Click the **Switch to Delete** button. This activates **Delete** mode and marks all selected beats for deletion. Marked beat boxes will shift their visualization to grayscale.

Figure 218. Template Edit - Marking Beats for Deletion



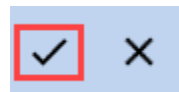
4. **(Optional)** Continue marking beats by right-clicking on them.

Figure 219. Template Edit - Right-click to Mark for Deletion



5. Click the **Save** button on the left of the top toolbar after marking beats for deletion.

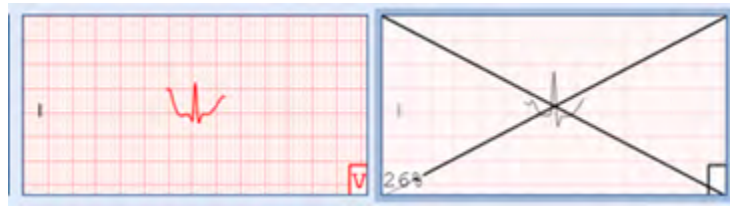
Figure 220. Template Edit - Save Button



**Example:**

When a beat is marked for deletion, the beat box turns grayed and crossed.

Figure 221. Template Edit - Marking for Deletion



### Select All Control

This control enables you to select all beats within the template for bulk action.

Figure 222. Template Edit - Select All Button



You may use the **Select All** button to reclassify or delete all beats at once within the template.

To reclassify beats:

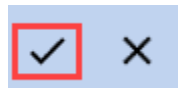
1. Click the **Select All** button to select all beats within the current template.
2. Click one of the **Reclassification Controls**. This immediately reclassifies all selected beats to the beat type of your choice. Beat boxes will change their annotation type and the color of the beat visualization.

Figure 223. Template Edit - Reclassification Button Activated



3. Click the **Save** button on the left side of the top toolbar after completing the reclassification of beats.

Figure 224. Template Edit - Save Button



To delete beats:

1. Click the **Select All** button to select all beats within the current template.
2. Click the **Switch to Delete** button. This activates **Delete** mode and immediately marks all selected beats for deletion. Marked beat boxes will shift their visualization to grayscale.

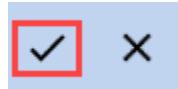


Figure 225. Template Edit - Delete Button



3. Click the **Save** button on the left side of the top toolbar after you have completed marking beats for deletion.

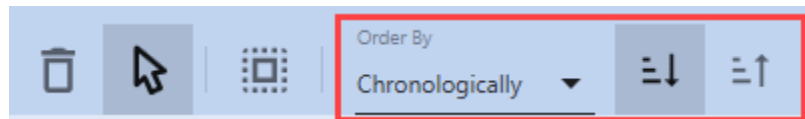
Figure 226. Template Edit - Save Button



### Sorting Controls

The first control in this group, the **Order by** drop-down list, allows you to toggle between viewing beats sorted in chronological order, based on their appearance in the ECG Record, by their RR interval duration, or by beat prematurity.

Figure 227. Template Edit - Sorting Controls

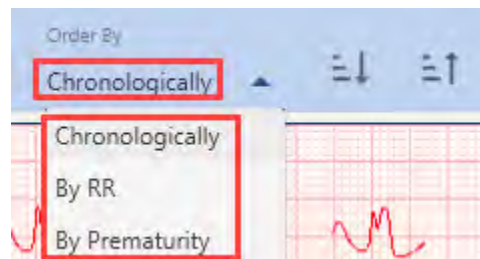


Two icons on the right enable ascending or descending sorting, respectively.

To sort beats with the **Order by** drop-down list:

1. Click the drop-down list.

Figure 228. Template Edit - Order by Sorting

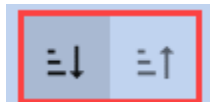


2. Select your desired sorting type. The order of the beats in the **Beats Pane** will change immediately.

To toggle a sorting order:

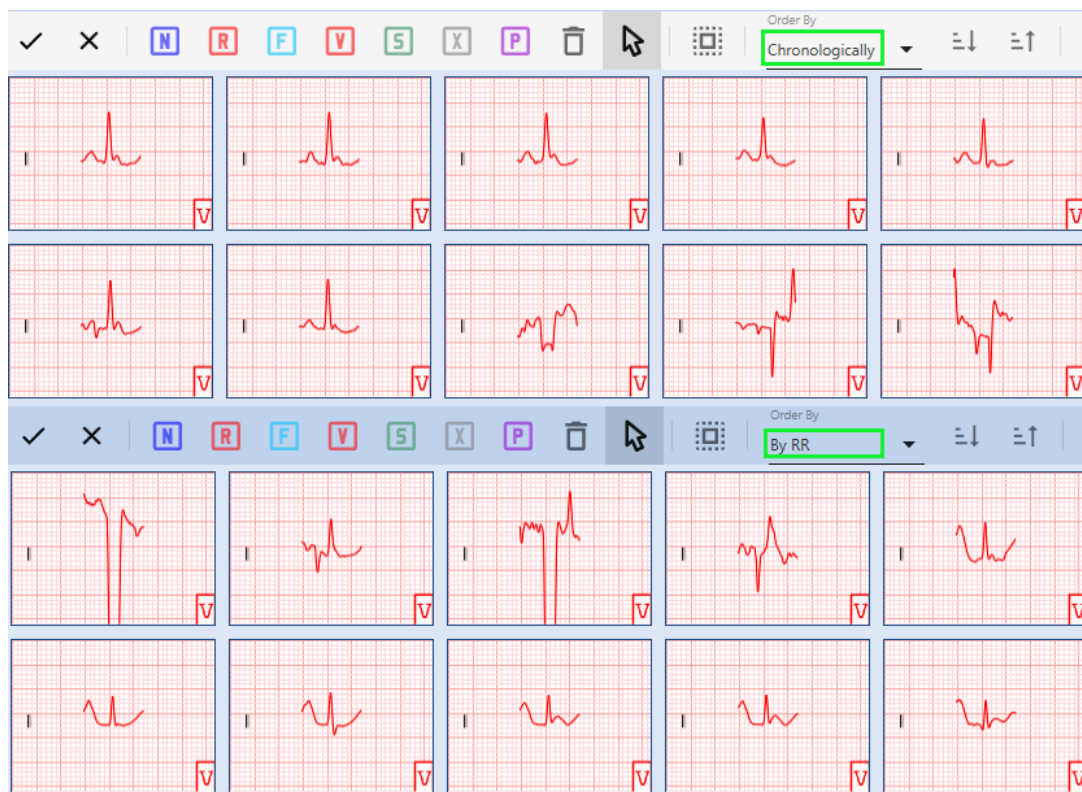
1. Click one of the buttons to switch sorting orders — all the beats will rearrange according to your choice.

Figure 229. Template Edit - Ascending and Descending Sorting




2. Click the second **Sorting Control** button to reverse the current sorting order.

Figure 230. Template Edit - Changing Sorting Order




### Layout Controls

This group of controls allows you to alter the layout of beat boxes and the **Beats Pane** to suit your reviewing needs and preferences.

Icons	Description
	<b>Show Single Beat</b> button: Enables the visualization of adjacent QRS fragments within beat boxes, facilitating the assessment of larger fragments in each beat box without switching <b>Views</b> or modes.



Icons	Description
	<b>Beats Pane Layout</b> button: Specifies the number of beat boxes displayed per row and the number of rows within the <b>Beats Pane</b> (ranging from 1 to 250 beat boxes).

To toggle adjacent QRS fragments ON/OFF:



1. Click the **Show Single Beat** button. The visualization in beat boxes will immediately change: an adjacent ECG fragment will appear in every single beat box.

To change the **Beats Pane** layout:

1. Hover over the **Beats Pane Layout** button to expand the Grid Control element. This element allows visual selection of the total number of beat boxes to display on one **Beats Pane** page.
2. Choose the exact number of rows and columns by hovering over the expanded Grid Control drop-down. Move your mouse cursor from left to right and from top to bottom to adjust the number of rows and columns.
3. Click the Grid Control element when you have chosen the desired row and column count. The **Beats Pane Layout** will change immediately.

## Filters

This group of controls allows you to apply various filters affecting beat visualization and enhancing the accuracy and reliability of ECG analysis.

Icons	Description
	<b>Filter:</b> This control enables you to toggle <b>ON/OFF</b> the visualization of beats with applied <b>EMG</b> , <b>Base Line</b> , and <b>Mains</b> filters. To activate or deactivate these filters, select or deselect any number of checkboxes from the drop-down list. These filters improve the accuracy and reliability of ECG analysis.
	<b>Channel Selection:</b> This control lets you select the channel(s) for display within the beat boxes, using the drop-down list (up to 12 channels, depending on the number of channels in the current <b>Record</b> ).

To toggle filters **ON/OFF**:

1. Hover over the **Filter** drop-down list to expand it.
2. Select the filter you wish to toggle. The visualization within some beat boxes will change immediately.

It is recommended to keep filters ON to provide accurate analysis:

- **EMG filter:** Eliminates high-frequency ECG signal components.
- **Baseline filter:** Removes low-frequency ECG signal components.
- **Mains filter:** Eradicates 50 or 60 Hz power line interference. This interference can be caused by the electrical equipment in the environment.

To toggle the visualization of channels within beat boxes:

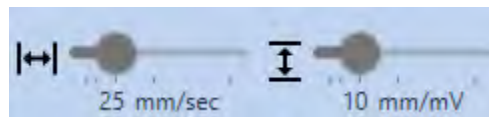
1. Hover over the **Channel Selection** drop-down list to expand it.
2. Select filters you wish to toggle. The visualization of beat boxes in the **Beats Pane** will change immediately.

Toggling **ON/OFF** ECG channels in beat templates enhances the accuracy and efficiency of ECG analysis. This feature allows you to focus on specific channels, compare them, filter out noise, and create custom beat template visualizations tailored to your particular needs.

### Scale and Gain Controls

This group of controls enables you to adjust the paper speed and amplitude, affecting beat visualization and enhancing the accuracy and reliability of ECG analysis.

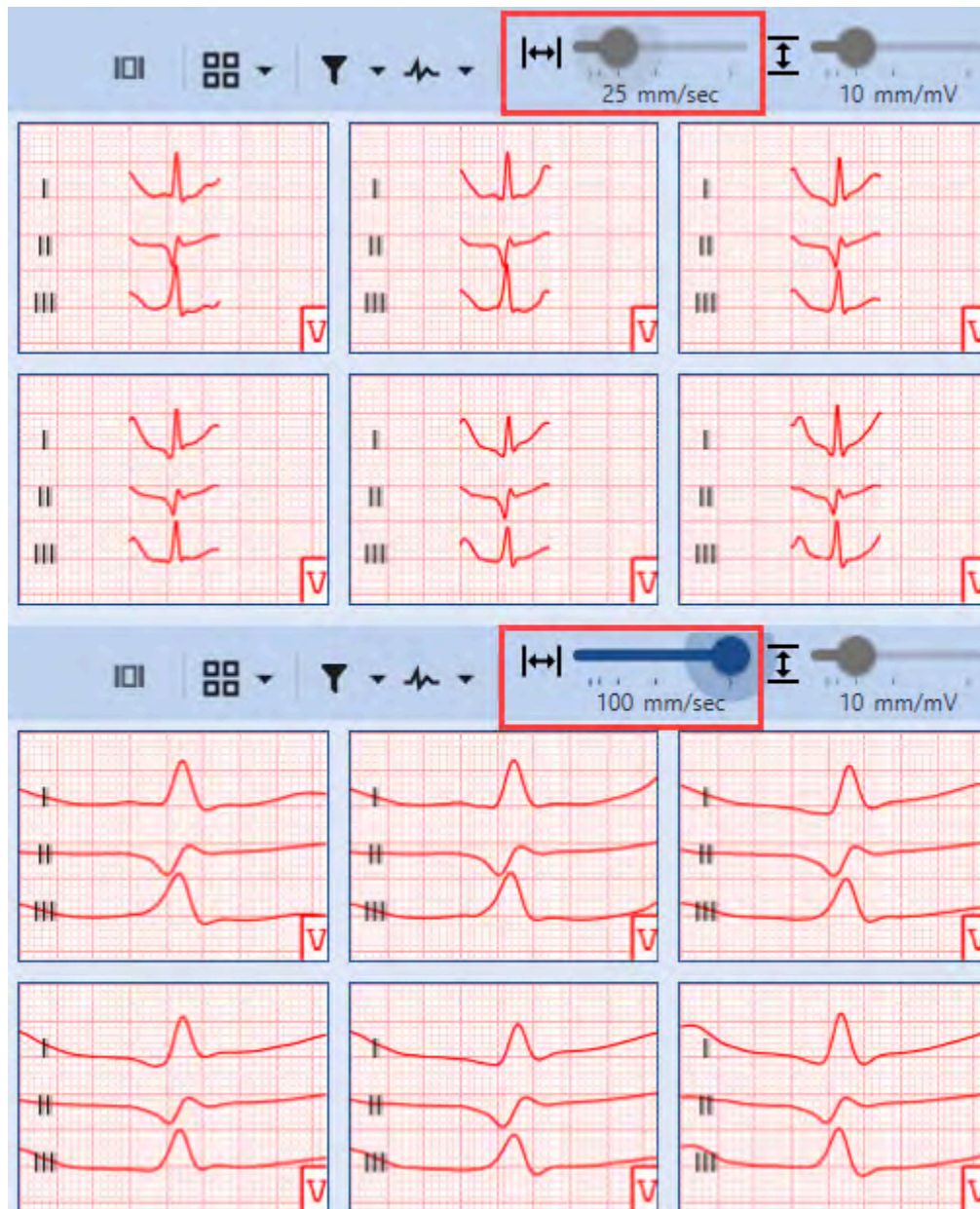
Figure 231. Template Edit - Scale and Gain Controls



To change the paper speed:

1. Drag the slider to your desired position, setting the paper speed within the range from 6.25 up to 100 mm/sec. The visualization within beat boxes will change immediately.

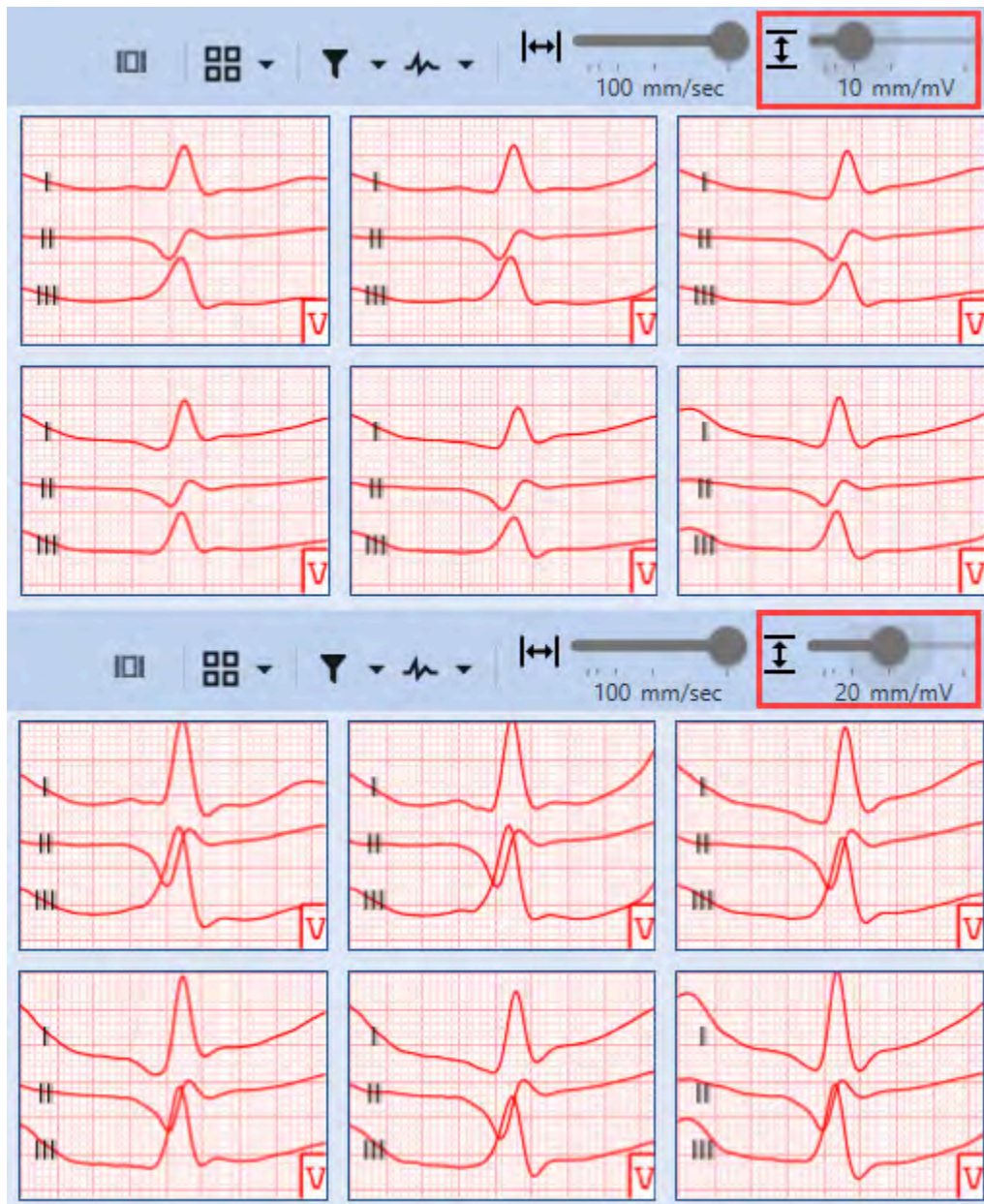
Figure 232. Template View - Setting Paper Speed



To change the amplitude:

1. Drag the slider to your desired position, setting the amplitude within the range from 2.5 up to 40 mm/mV. The visualization within beat boxes will change immediately.

Figure 233. Template View - Setting Amplitude



## Strip View

A generic view of the **NH-301 Holter** application **Strip View** is displayed in the bottom pane of the **Templates View**, as well as in the **Events** and **Page Views**. The **Strip View** in the **Edit Template** mode has somewhat limited functionality compared to the identical **Strip View** in the "parent" **Templates View**. In the **Edit Template** mode, the main focus is on editing beats; therefore, the Strip View presents primarily visual data aimed at assisting with beat analysis, comparison, and classification.

Consequently, the **Strip View** in **Edit Template** mode has no support for the following capabilities:



- Inserting, deleting, and reclassifying beats.
- Creating user events.
- Excluding or including fragments in analysis.
- **Show in Templates** function.
- **Show in Page** function.

Figure 234. Strip View - Generic Strip View

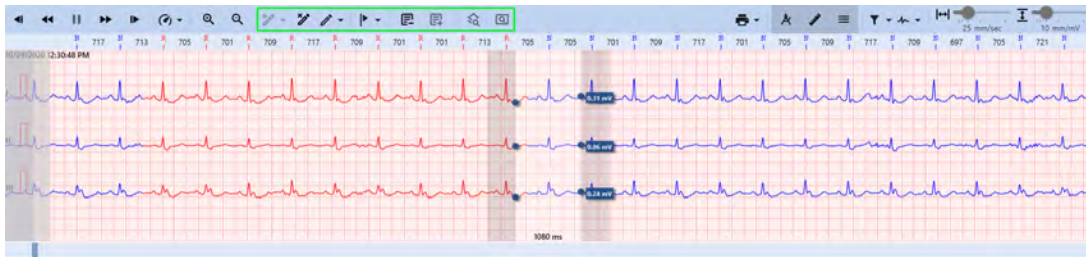


Figure 235. Strip View - Edit Template Mode Strip View

**Note:**

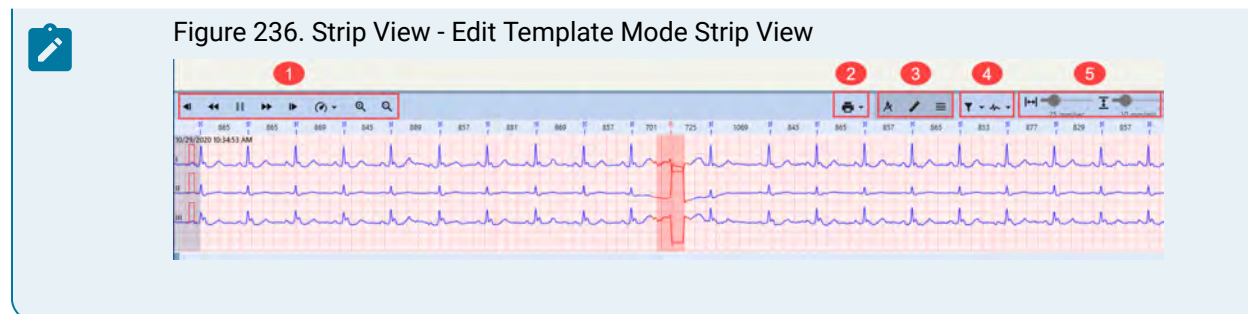
The ECG Strip grid is scaled accurately to millimeters, irrespective of the computer or monitor size in use. The **NH-301 Holter** analysis system automatically adjusts all application windows to align with the computer's graphical settings and monitor capabilities. This feature enables you to use any measuring tool, including specialized ECG rulers like the **Norav Medical ECG ruler**, to measure amplitude, cycles, frequency, and RR intervals.

## Strip View Toolbar

The toolbar at the top of the **Strip View** in the **Edit Template** mode contains various controls that facilitate the scanning and reviewing of the ECG signal within the **Strip View** itself. For clarity, these controls are organized into distinct groups of interface elements:

**Note:**

The **Strip View** in the **Edit Template** mode contains fewer controls in the toolbar than does a generic **Strip View** displayed in the **Page** and **Events Views**. Refer to the [dedicated Strip View section \(on page 163\)](#) for further details about generic ECG **Strip Views** in this application.





1. General Controls.
2. Printing Control.
3. Measuring Controls.
4. Filters.
5. Scale and Gain Controls.

### General Controls

General Controls is a group of buttons designed to facilitate efficient ECG Strip scanning and review within the **Strip View**.

Icon	Description
	<b>Step Backward button:</b> Click to move the ECG Strip one step backward for scanning and reviewing.
	<b>Scan Backward button:</b> Click to initiate continuous backward scanning of the ECG Strip.
	<b>Pause Scan button:</b> Click to halt continuous scanning of the ECG Strip. For example, if you have activated a <b>Scan Backward</b> or a <b>Scan Forward</b> button, halt scanning by clicking the <b>Pause Scan</b> button.
	<b>Scan Forward button:</b> Click to initiate continuous forward scanning of the ECG Strip.
	<b>Step Forward button:</b> Click to move the ECG Strip one step forward for scanning and reviewing.
	<b>Scan Speed button:</b> Allows you to control the scanning speed. To set the scanning speed: <ol style="list-style-type: none"> <li>1. Hover over the <b>Scan Speed</b> icon to expand the drop-down list.</li> <li>2. Click the desired scanning speed multiplier, ranging from <math>\times 1</math> to <math>\times 128</math>.</li> </ol>

Icon	Description
	<b>Zoom In button:</b> Click to adjust the scale of the waveform in the <b>Strip View</b> , focusing on specific areas or comparing different fragments of the ECG record.
	<b>Zoom Out button:</b> Click to adjust the scale of the waveform in the <b>Strip View</b> . Use this button to zoom out if you had zoomed in earlier, or to view adjacent beats and fragments of the ECG Records.

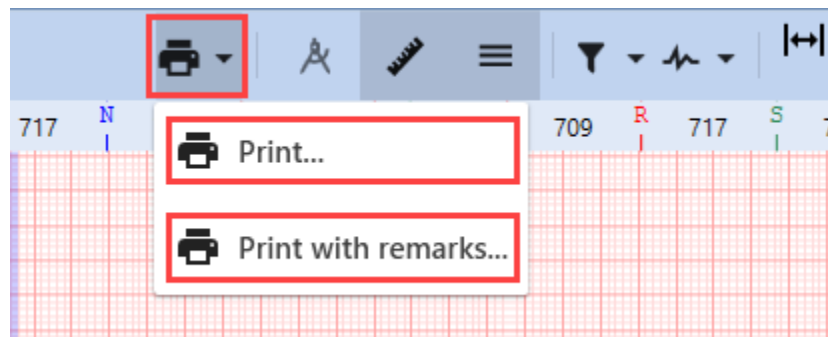
**Note:**

You can also click and hold the strip to drag it sideways, allowing you to view adjacent beats and ECG fragments.

### Printing Control

This button enables you to print a fragment of the ECG **Strip**. The printed copy will include a segment that fits the output format. The baseline of the printed version mirrors the center line of the Strip visible on your PC screen. The printed ECG Strip will accommodate as much ECG data as possible from the visible area around the center line.

Figure 237. Strip View - Printing Strip

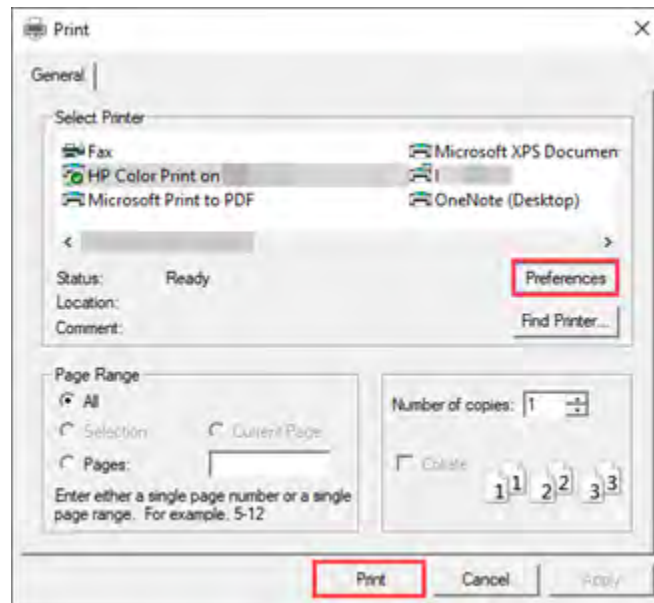


To print a fragment of the waveform in the **Strip View**:

1. Identify the area you want to print.
2. **(Optional)** [Scan the Strip View \(on page 138\)](#) to locate the desired area, if needed.
3. Hover over the **Printing Control** button to expand the drop-down list.
4. Click the **Print** option and navigate to the Print dialog box:

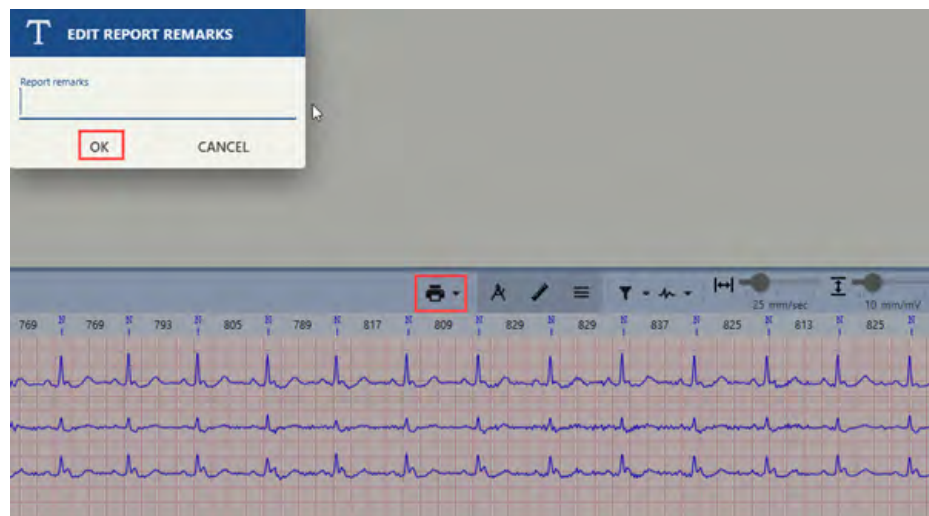


Figure 238. Strip View - Printing Dialog Box



- a. Choose a printer **available** in the **Select Printer** window.
  - b. Adjust other preferences according to your needs.
  - c. Click **Print** at the bottom of the dialog box to execute the printing of the waveform fragment.
5. **(Optional)** Click the **Print with remarks** option if you want to print a fragment of the waveform with your remarks:
- a. Complete the "Report remarks" field in the **Edit Report Remarks** pop-up.

Figure 239. Strip View - Printing with Remarks



- b. When you complete with filling in your remarks, click OK.
- c. **(Optional)** Click **Cancel** to abandon this action.

- d. Choose a printer available in the **Select Printer** window.
- e. Adjust other preferences according to your needs.
- f. Click **Print** at the bottom of the dialog box to execute the printing of the waveform fragment.

## Measuring Controls

**Measuring Controls** is a group of buttons designed to facilitate the indication and measurement of various waveform parameters within the **Strip View**. Namely, the most important tool in this group of controls is the **Caliper** tool. It allows you to measure different intervals and amplitudes on the ECG strip, which can be used to diagnose and assess a variety of heart conditions.




Icon	Description
	<b>Caliper toggle:</b> Click to toggle <b>ON/OFF</b> the <b>Caliper</b> tool. The <b>Caliper</b> tool assists with measuring intervals and amplitudes, such as the RR interval, T-wave, and QRS complex amplitudes. Refer to the <a href="#">Measuring ECG with Caliper (on page 193)</a> section for details.
	<b>ECG Ruler toggle:</b> Click to toggle <b>ON/OFF</b> the <b>ECG Ruler</b> , located right below the <b>Strip View Tool-bar</b> . The <b>ECG Ruler</b> indicates the duration of RR intervals for adjacent beats and their morphology classification (i.e., N, R, F, V, etc.).
	<b>Channel Numeration toggle:</b> Click to toggle <b>ON/OFF</b> the channel numeration on the left side of the ECG Strip.

Figure 240. Strip View - Caliper Tool

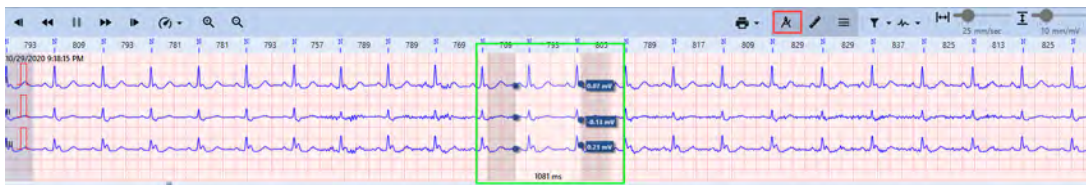


Figure 241. Strip View - ECG Ruler

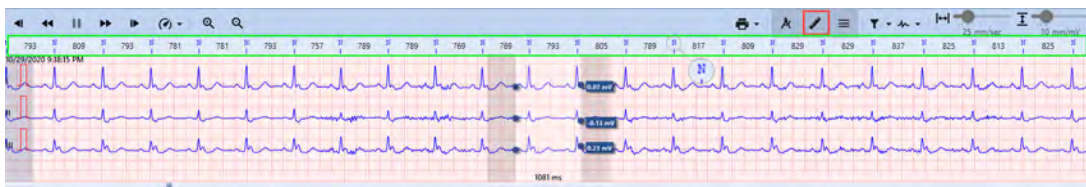
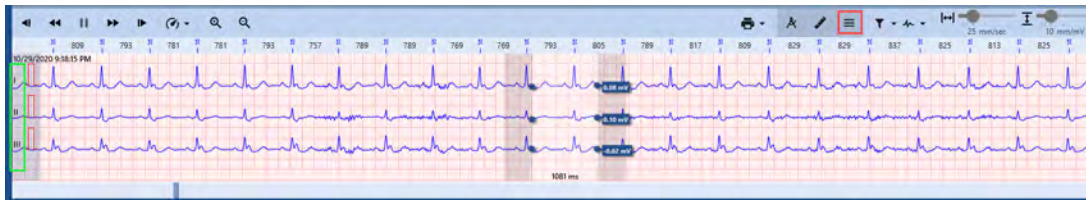




Figure 242. Strip View - Channel Numeration



## Filters

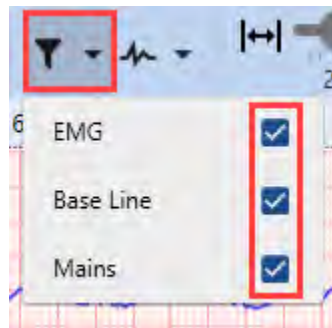
This group of controls allows you to apply various filters affecting beat visualization and enhancing the accuracy and reliability of ECG analysis.

Icons	Description
	<b>Filter:</b> This control enables you to toggle <b>ON/OFF</b> the visualization of the waveform with applied <b>EMG</b> , <b>Base Line</b> , and <b>Mains</b> filters. To activate or deactivate these filters, select or deselect any number of checkboxes from the drop-down list. These filters improve the accuracy and reliability of ECG analysis.
	<b>Channel Selection:</b> This control lets you select the channel(s) for display within the <b>Strip View</b> , using the drop-down list (up to 12 channels, depending on the number of channels in the current <b>Record</b> ).

To toggle filters **ON/OFF**:

1. Hover over the **Filter** drop-down list to expand it.

Figure 243. Strip View - Toggling Filters



2. Select the filter you wish to toggle. The visualization of the waveform will change immediately.

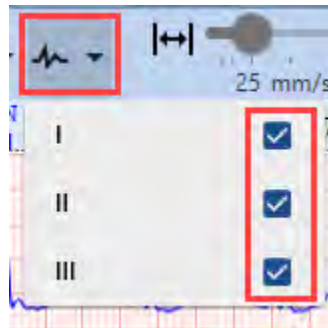
It is recommended to keep filters **ON** to provide accurate analysis:

- **EMG filter:** Eliminates high-frequency ECG signal components.
- **Baseline filter:** Removes low-frequency ECG signal components.
- **Mains filter:** Eradicates 50 or 60 Hz power line interference. This interference can be caused by the electrical equipment in the environment.

To toggle the visualization of channels within the Strip:

1. Hover over the **Channel Selection** drop-down list to expand it.

Figure 244. Strip View - Toggling Channels



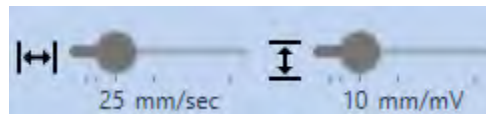
2. Select filters you wish to toggle. The visualization of the Strip will change immediately.

Toggling **ON/OFF** ECG channels enhances the accuracy and efficiency of ECG analysis. This feature allows you to focus on specific channels, compare them, filter out noise and more.

### Scale and Gain Controls

This group of controls enables you to adjust the paper speed and amplitude, affecting beat visualization and enhancing the accuracy and reliability of ECG analysis.

Figure 245. Template Edit - Scale and Gain Controls



### To change the paper speed:

1. Drag the slider to your desired position, setting the paper speed within the range from 6.25 up to 100 mm/sec. The visualization within the Strip will change immediately.

Figure 246. Strip View - Paper Speed



**To change the amplitude:**

1. Drag the slider to your desired position, setting the amplitude within the range from 2.5 up to 40 mm/mV. The visualization within the Strip will change immediately.



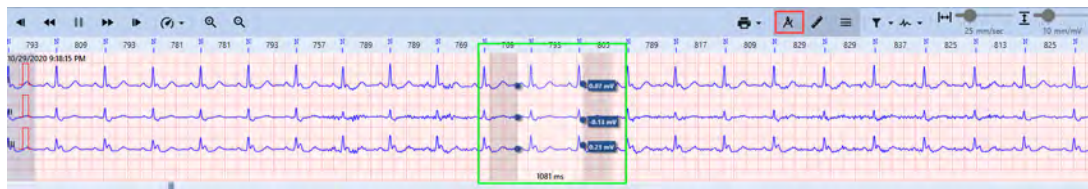
Figure 247. Strip View - Amplitude



## Measuring ECG with Caliper

You may use the **Caliper** function to measure the RR interval, QRS complex duration and amplitude, QT interval, and other ECG waveform parameters.

Figure 248. Strip View - Caliper Tool



### Caliper Design Overview

The **Caliper** tool in the **Strip View** displays two **measuring lines** (1) and a **measuring interval** (2) between them. To activate the **Caliper** tool, click the **Caliper** button in the **Strip View Toolbar**.

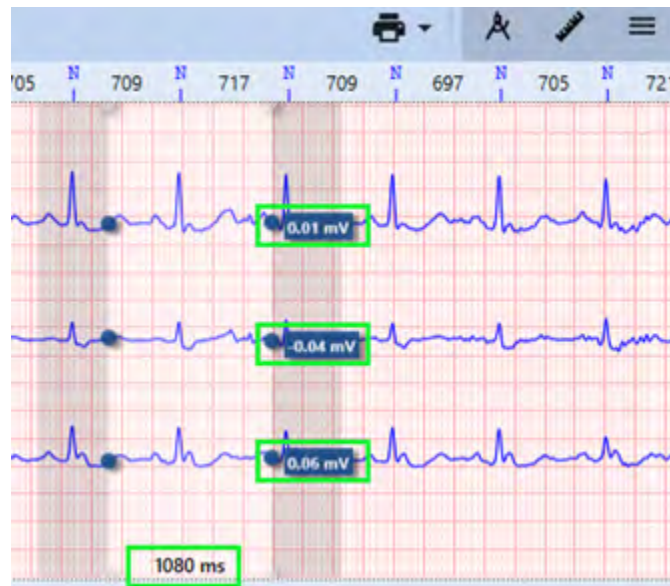
Figure 249. Strip View - Caliper Measurement Lines and Interval



Each ECG channel in the Strip has a small box adjacent to the point where the right measurement line intersects the channel signal line. The value in this box indicates the amplitude difference between the two points demarcated by the measurement lines.



Figure 250. Strip View - Interval Length and Amplitude Difference



The interval length in milliseconds is displayed at the bottom of the measuring interval.

### Moving Caliper Lines

You may move Caliper measurement lines either **simultaneously** or **independently**.

**To move both lines simultaneously:**

1. Position the cursor within the measuring interval. The cursor will change to a resize cursor.

Figure 251. Strip View - Moving Caliper Lines Simultaneously

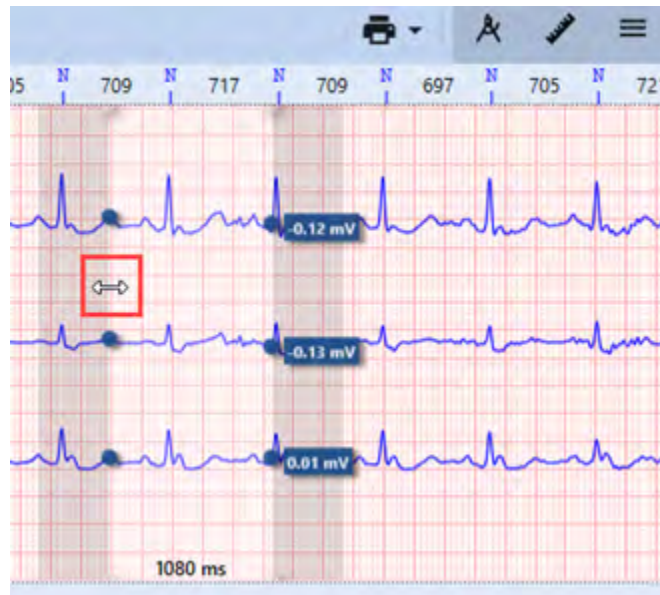


2. Drag and drop the **Caliper** to the desired location.
3. Optionally, use the Left and Right arrow keys to fine-tune the position.

#### To move lines independently:

1. Position the cursor near one of the measurement lines until it changes to a resize cursor.

Figure 252. Strip View - Moving Caliper Lines Independently

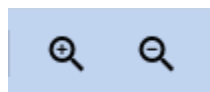


2. Click to select the measurement line.
3. Drag and drop it to the new location.

#### Zoom Feature

To adjust the display scale of the waveform in the Strip, utilize the **Zoom In/Zoom Out** options:

Figure 253. Strip View - Zooming Options



1. Click the corresponding button in the **Strip View Toolbar**.
2. Hold the **Ctrl** key while scrolling up (**Zoom In**) or down (**Zoom Out**) the mouse wheel.

#### Caliper Snapping Feature

The **Caliper Snapping** feature automatically aligns the **Caliper** measurement lines to the nearest R-peaks in the ECG signal. This functionality aids in the precise measurement of ECG wave duration and

amplitude. Manual alignment can be challenging, hence **Caliper Snapping** enhances the accuracy, efficiency, and reproducibility of ECG interpretation.

**To utilize the Caliper snapping feature:**

1. Click the **Caliper** button in the **Strip View Toolbar**.
2. **(Optional)** Use the Left and Right arrow keys to make slight adjustments to the Caliper measurement lines.
3. To snap a **Caliper** measurement line to an R-spike:

Figure 254. Strip View - Caliper Snapping



- To snap any line:
  - a. Hold down the **Alt** key.
  - b. Position the cursor near one of the measurement lines until the cursor icon changes to a resize cursor.
  - c. Click the measurement line to select it.
  - d. Drag and drop it to the desired location.
- To snap the right measurement line:
  - a. Hold down the **Right Alt** key.
  - b. Use the Left and Right arrow keys to move the **Caliper**; the right measurement line will automatically snap to the R-peaks as you move.
- To snap the left measurement line:

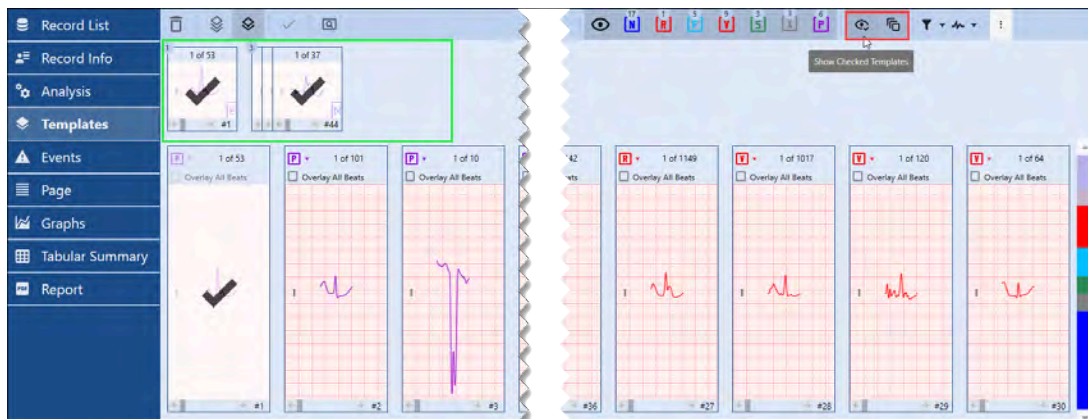
- a. Hold down the **Left Alt** key.
- b. Use the Left and Right Arrow keys to move the Caliper; the left measurement line will automatically snap to the R-peaks as you move.

The **Caliper Snapping** function is instrumental in enabling a quick and accurate evaluation of various ECG parameters.

## Marking Reviewed Templates

The reviewed templates can be marked to help you distinguish between them and the templates not yet reviewed.

Figure 255. Templates View - Checked Templates Panel ON

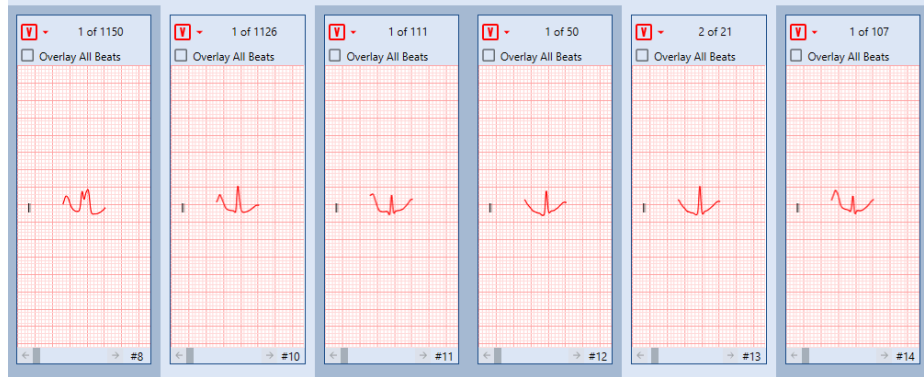


**To mark a template as reviewed:**

1. **Select a Template:** Click a template to select it.
2. **(Optional) Select Multiple Templates:**

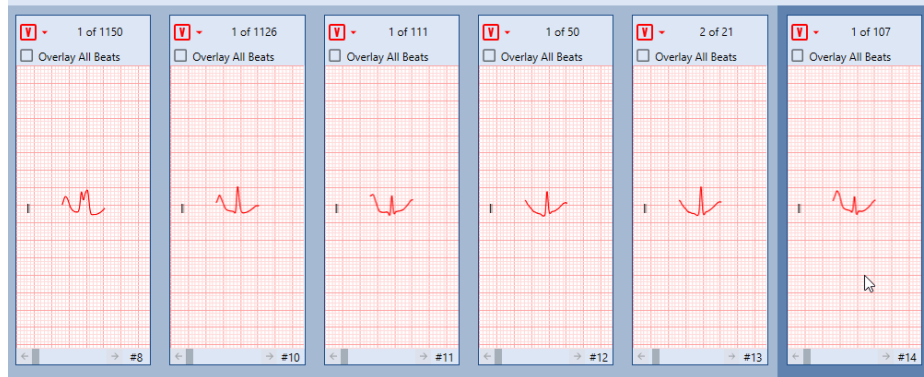
- **Select Individual Templates:** Hold down the **Ctrl** key while clicking on additional templates. The system will highlight them with a darker frame.

Figure 256. Templates View - Selecting Individual Templates



- **Select a Range of Templates:**

Figure 257. Templates View - Selecting Range of Templates



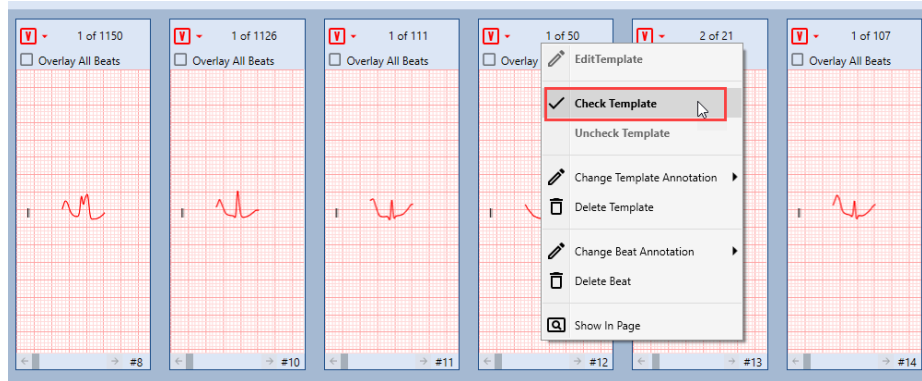
- Identify the initial template in the range you wish to select.
  - Hold down the **Shift** key.
  - Click the initial template.
  - Identify the final template in your desired range.
  - Click the final template to complete the range selection.
- **Select all templates:**
    - Use the **Ctrl+A** keyboard shortcut to select all templates displayed in the Templates Pane at once. Note: you can select only displayed templates. Note: You can only select displayed templates. Adjust the types of templates displayed using the [Templates Controls \(on page 110\)](#) in the **Templates Pane Toolbar**.

### 3. Mark as Reviewed:



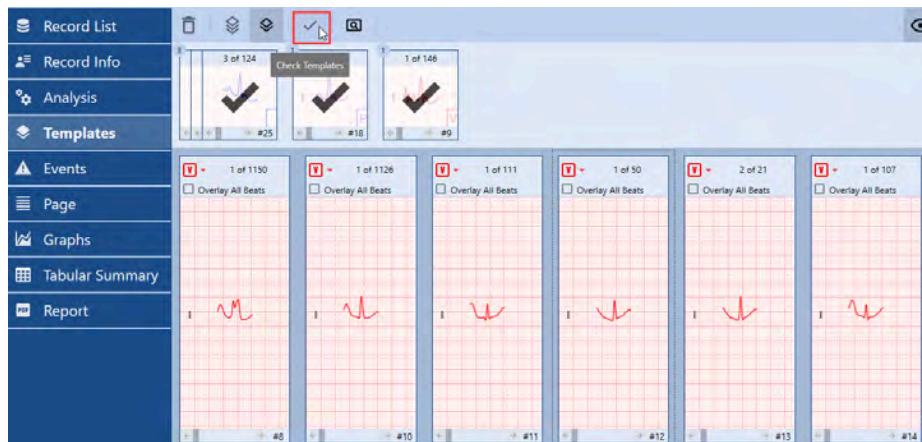
- Right-click on a selected template and choose **Check Template** from the context menu.

Figure 258. Templates View - Check Template



- Click the **Check Templates** button located in the **Templates Pane Toolbar** at the top of the **Templates View**.

Figure 259. Templates View - Check Templates



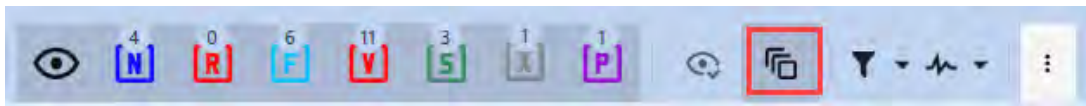
- **(Optional)** You can also mark individual templates as checked by selecting them and pressing the Space key on your keyboard.

Figure 260. Templates View - Check Individual Template



Upon completion, the system will mark all selected templates as reviewed. If you have enabled the **Checked Templates Panel** (on page 50) under **File > Settings > Templates**, and the **Show Checked Templates Panel** button is toggled **ON**, these marked templates will be displayed in the panel at the top of the screen.

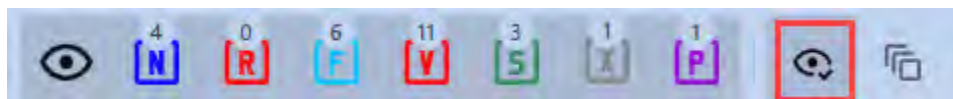
Figure 261. Templates View - Show Checked Templates Panel Button



**To unmark a template marked as reviewed:**

1. Hover over a template in the **Templates Pane** marked as checked. Verify that the **Show Checked Templates** button in the **Templates Pane Toolbar** is toggled ON. If it's not ON, checked templates will not be displayed in the **Templates Pane**.

Figure 262. Templates View - Show Checked Templates Button

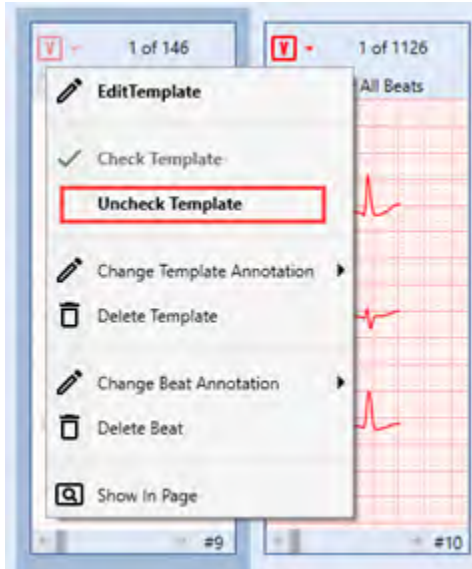


2. Right-click on the checked template to expand the context menu.



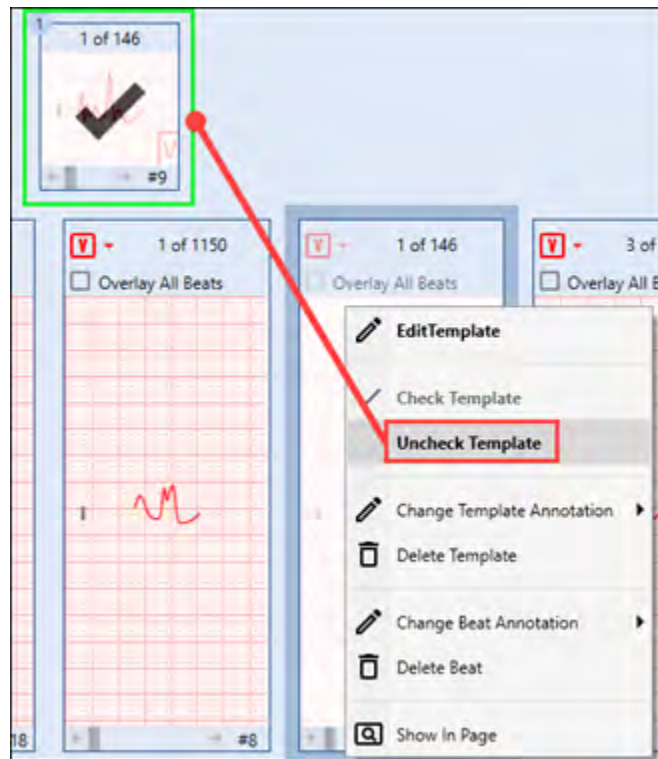
3. Click the **Uncheck Template** option. Alternatively, press the **Space** key on your keyboard. The checkmark will be removed, and the template will return to its default state.

Figure 263. Templates View - Uncheck Template Option



If the **Show Checked Templates Panel** button in the **Templates Pane Toolbar** is also toggled ON, the template will be removed from the **Checked Templates Panel** upon unchecking.

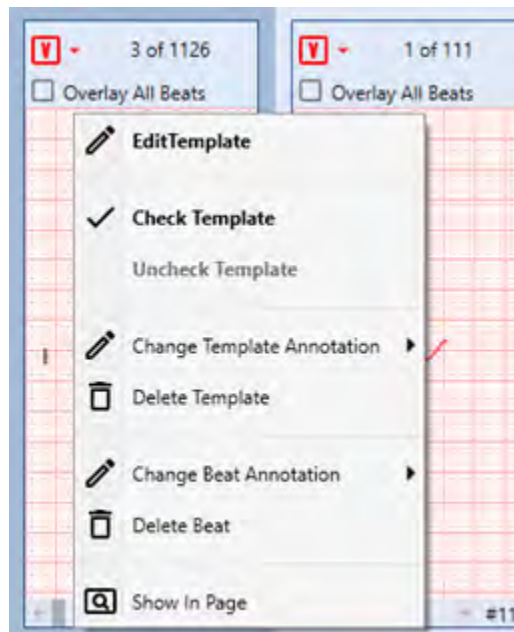
Figure 264. Templates View - Uncheck Template



## Context Menu Features

A context menu, accessible via right-click, enables you to quickly and easily access common actions, such as editing or deleting templates and beats, changing annotations, and marking templates as reviewed, etc.

Figure 265. Template View - Context Menu

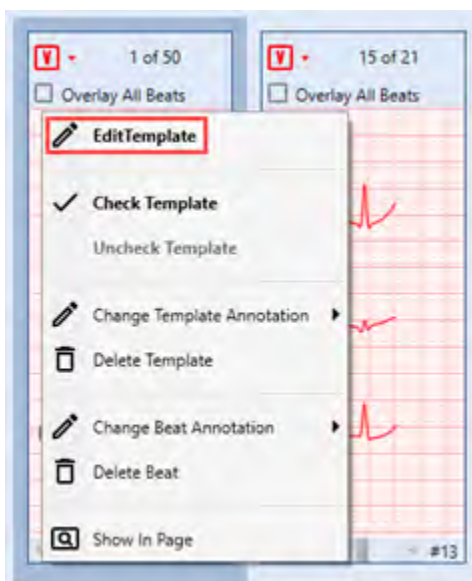


## Edit Template

Allows you to switch to the **Edit Template** mode:

1. Hover over the template box you want to edit.
2. Right-click the box to expand the context menu.
3. Select the **Edit Template** option.

Figure 266. Templates View - Edit Template Option

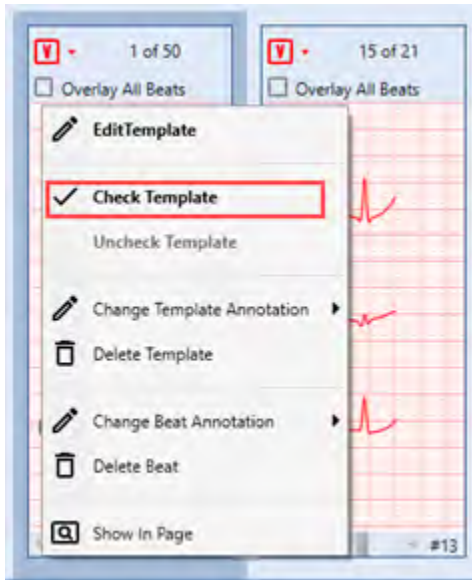


## Check Template

Enables you to mark templates as reviewed:

1. Hover over the template box you want to mark as reviewed.
2. Right-click the box to expand the context menu.
3. Select the **Check Template** option.

Figure 267. Templates View - Check Template Option



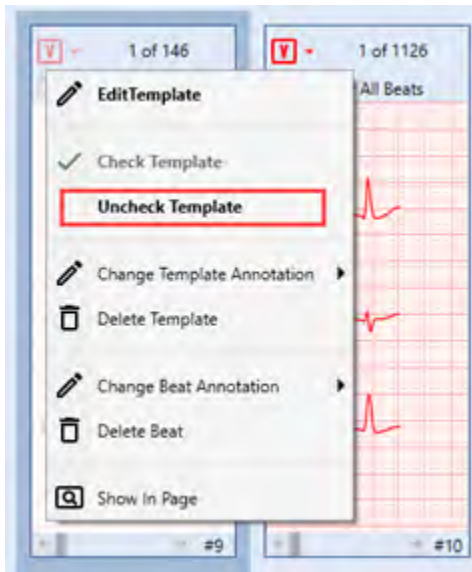
## Uncheck Template

Allows you to unmark templates previously marked as reviewed:

1. Hover over the template box you want to unmark.
2. Right-click the box to expand the context menu.

3. Select the **Uncheck Template** option.

Figure 268. Templates View - Uncheck Template Option

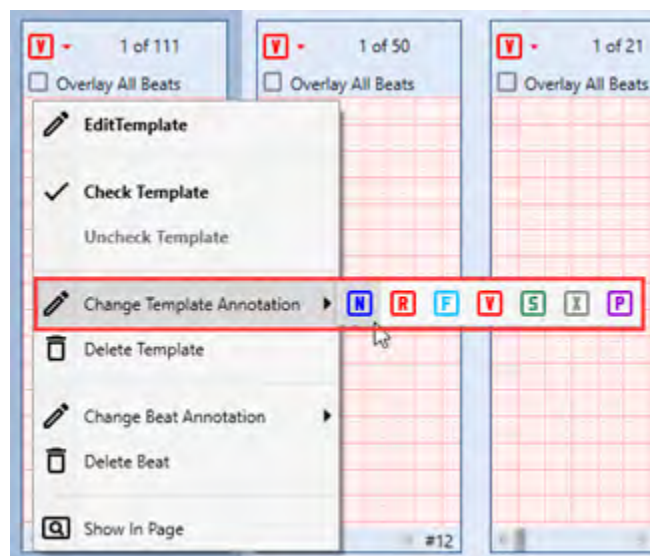


### Change Template Annotation

Allows you to reclassify templates:

1. Hover over the template box you wish to reclassify.
2. Right-click the box to expand the context menu.
3. Hover over the **Change Template Annotation** option to expand the reclassification panel.

Figure 269. Templates View - Change Template Annotation Option



4. Select the arrhythmia type you wish to assign to the current template and click its button.
5. A "Processing" pop-up will briefly appear. Once it disappears, the reclassification is complete, and the template will be moved and grouped accordingly.

**Note:**

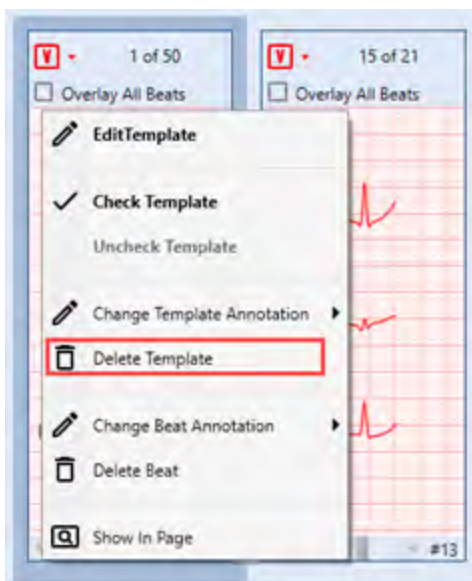
This method allows bulk actions. Multiple templates can be selected using **Ctrl+Click** or **Shift+Click** shortcuts to reclassify them in one action.

## Delete Template

Allows you to delete templates:

1. Select the template box you wish to delete.
2. **(Optional)** Select additional templates using **Ctrl+Click** or **Shift+Click** keyboard shortcuts, if needed.
3. Right-click selected box to expand the context menu.
4. Click the **Delete Template** option.

Figure 270. Templates View - Delete Template Option



5. A "Processing" pop-up will briefly appear. Once it disappears, the deletion is complete, and the template(s) will be removed from the **Templates Pane**.

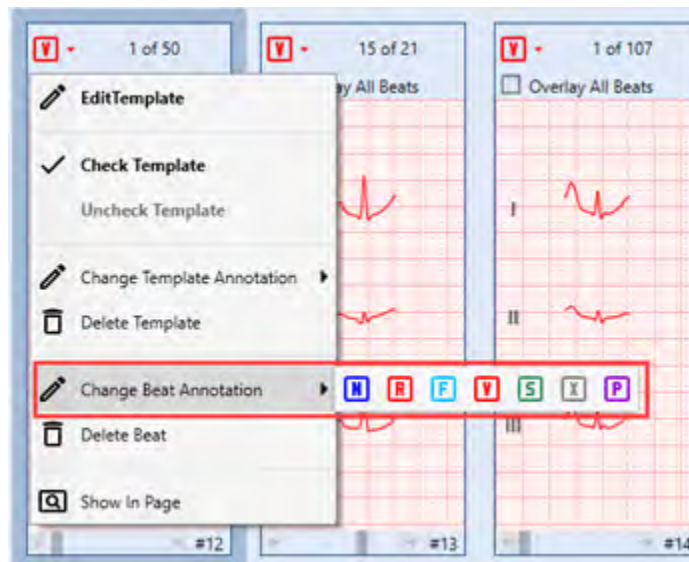
## Change Beat Annotation

Allows you to reclassify individual beats within a selected template box:



1. Click a template box.
2. Choose a beat you want to reclassify. Navigate through beats using one of the following methods:
  - Use the arrow buttons inside the template box. Pressing and holding the mouse button on an arrow facilitates rapid cycling through all beats within that template.
  - Utilize a scroll wheel.
  - Drag the scroll thumb on the horizontal scrollbar located at the lower section of the selected box.
  - Click the scroll trough in the horizontal scrollbar at the lower section of the template box.
3. Right-click the box to expand the context menu.
4. Hover over the **Change Beat Annotation** option to expand the reclassification panel.

Figure 271. Templates View - Change Beat Annotation Option



5. Select the arrhythmia type you wish to assign to the current beat and click its button.
6. A "Processing" pop-up will briefly appear. Once it disappears, the reclassification is complete, and the beat will be moved and grouped accordingly.



**Note:**

This method doesn't allow bulk actions.

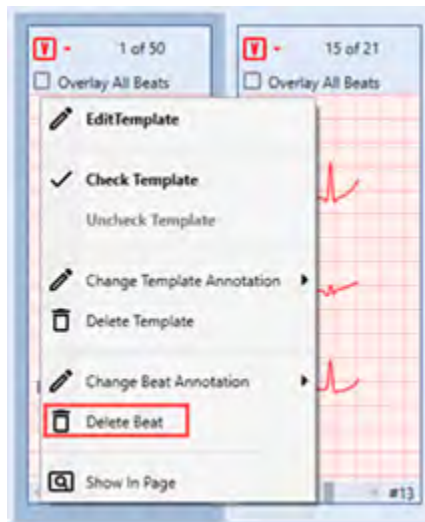
## Delete Beat

Allows you to delete an individual beat:

1. Click a template box.
2. Choose a beat you want to delete. Navigate through beats using one of the following methods:

- Use the arrow buttons inside the template box. Pressing and holding the mouse button on an arrow facilitates rapid cycling through all beats within that template.
  - Utilize a scroll wheel.
  - Drag the scroll thumb on the horizontal scrollbar located at the lower section of the selected box.
  - Click the scroll trough in the horizontal scrollbar at the lower section of the template box.
3. Right-click the box to expand the context menu.
  4. Click the **Delete Beat** option.

Figure 272. Templates View - Delete Beat Option



5. A "Processing" pop-up will briefly appear. Once it disappears, the deletion is complete, and the beat will be removed from the template.

**Note:**

This method doesn't allow bulk actions.

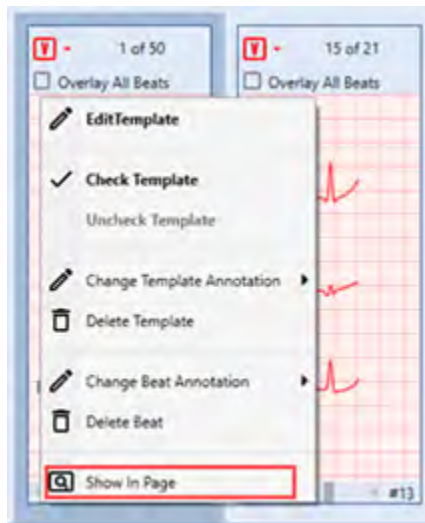
**Show In Page**

Shifts focus to the selected ECG Data Segment in the **Page View**, enabling a transition from examining individual beats or templates to a broader, **Full Disclosure View** for comprehensive analysis:

1. Click a template box.
2. Choose a beat you want to focus on. Navigate through beats using one of the following methods:
  - Use the arrow buttons inside the template box. Pressing and holding the mouse button on an arrow facilitates rapid cycling through all beats within that template.
  - Utilize a scroll wheel.

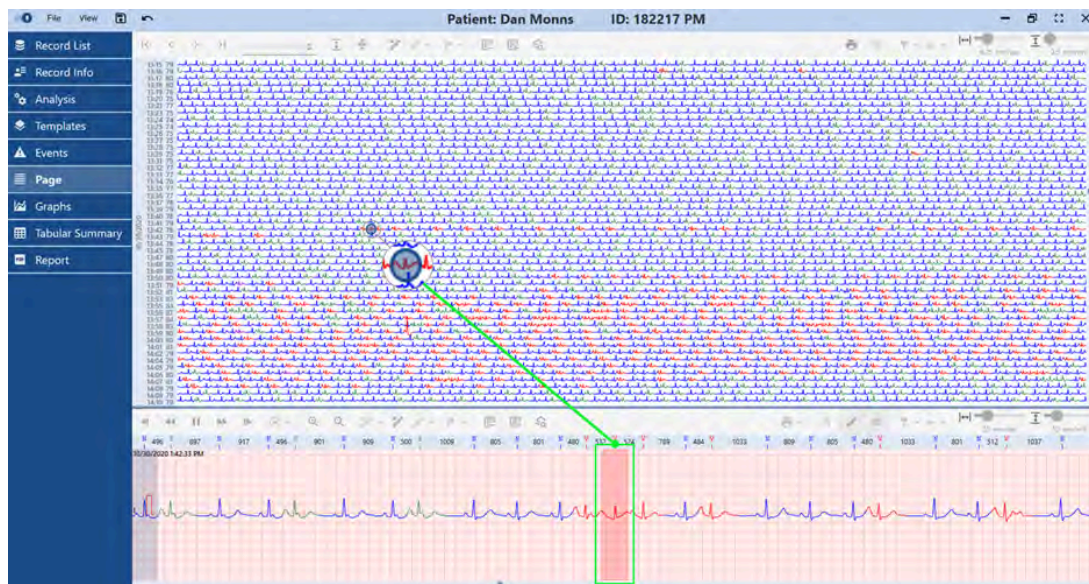
- Drag the scroll thumb on the horizontal scrollbar located at the lower section of the selected box.
  - Click the scroll trough in the horizontal scrollbar at the lower section of the template box.
3. Right-click the box to expand the context menu.
  4. Click the **Show in Page** option.

Figure 273. Templates View - Show In Page Option



5. You will be redirected to the **Page View**. The beat you selected in **Step 2** will be marked with a circle in a **Full Disclosure Page** and selected in the **Strip View** below the **Full Disclosure Page**.

Figure 274. Templates View - Page View



## Strip View

The ECG **Strip View** is displayed in the bottom pane of the **Templates View** and in the **Edit Templates Mode**. It is also displayed in the **Events**, **Page**, and **Graphs Views**. The **Strip View** presents detailed data for the currently selected beat, as well as the adjacent ECG signal. Typically, the strip displays 12 to 16 seconds of ECG signal, depending on the monitor characteristics and ECG paper speed settings. You can utilize the **Strip View** for detailed analysis, measurements, beat reclassification, user event creation, and more.

Figure 275. Strip View - Strip View



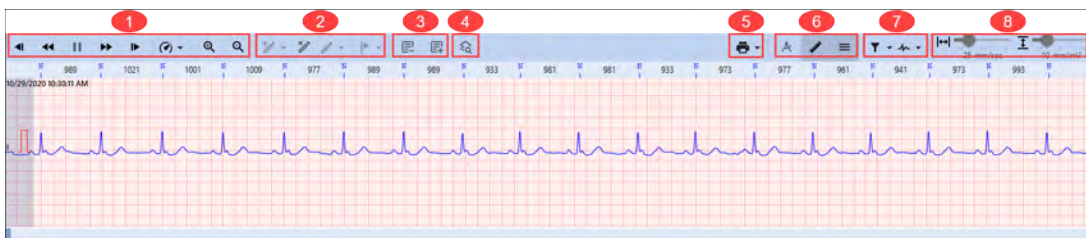
### Note:

The ECG Strip grid is scaled accurately to millimeters, irrespective of the computer or monitor size in use. The **NH-301 Holter** analysis system automatically adjusts all application windows to align with the computer's graphical settings and monitor capabilities. This feature enables you to use any measuring tool, including specialized ECG rulers like the **Norav Medical ECG ruler**, to measure amplitude, cycles, frequency, and RR intervals.

## Strip View Toolbar

The toolbar at the top of the **Strip View** contains various controls that facilitate the scanning and reviewing of the ECG signal within the **Strip View** itself. For ease of understanding, these controls are organized into distinct groups of interface elements:









Figure 276. Page View - Strip View Toolbar



1. General Controls.
2. Beats and Events Controls.
3. Analysis Controls.
4. Views Switching Controls.
5. Printing Control.
6. Measuring Controls.
7. Filters.
8. Scale and Gain Controls.

### General Controls

**General Controls** is a group of buttons designed to facilitate efficient ECG Strip scanning and review within the **Strip View**.

Icon	Description
	<b>Step Backward button:</b> Click to move the ECG Strip one step backward for scanning and reviewing.
	<b>Scan Backward button:</b> Click to initiate continuous backward scanning of the ECG Strip.
	<b>Pause Scan button:</b> Click to halt continuous scanning of the ECG Strip. For example, if you have activated a <b>Scan Backward</b> or a <b>Scan Forward</b> button, halt scanning by clicking the <b>Pause Scan</b> button.
	<b>Scan Forward button:</b> Click to initiate continuous forward scanning of the ECG Strip.
	<b>Step Forward button:</b> Click to move the ECG Strip one step forward for scanning and reviewing.
	<b>Scan Speed button:</b> Allows you to control the scanning speed. To set the scanning speed: <ol style="list-style-type: none"> <li>1. Hover over the <b>Scan Speed</b> icon to expand the drop-down list.</li> <li>2. Click the desired scanning speed multiplier, ranging from <math>\times 1</math> to <math>\times 128</math>.</li> </ol>
	<b>Zoom In button:</b> Click to adjust the scale of the waveform in the <b>Strip View</b> , focusing on specific areas or comparing different fragments of the ECG record.
	<b>Zoom Out button:</b> Click to adjust the scale of the waveform in the <b>Strip View</b> . Use this button to zoom out if you had zoomed in earlier, or to view adjacent beats and fragments of the ECG Records.

**Note:**

You can also click and hold the strip to drag it sideways, allowing you to view adjacent beats and ECG fragments.

## Beats and Events Controls

**Beats and Events Controls** is a group of buttons that facilitate beats and events management in the **Strip View**.

Icon	Description
	<b>Insert Beat button:</b> Allows you to insert new beats between existing ones. Further instructions are presented below.
	<b>Delete Beats button:</b> Click to delete a selected beat.
	<b>Change Beats Annotation button:</b> Enables you to modify the annotation of selected beats.
	<b>Create User Event button:</b> Allows you to create a new user event, located at the selected beat or ECG fragment. After adding a user event, the corresponding fragment of the ECG waveform will be recalculated, and some beats may shift between templates. Further instructions are presented below.

By default, when you click the **Strip View**, you select an entire beat. Inserting a beat is not equivalent to beat reclassification, so it requires an alternative method for selecting a position in the **Strip View**.

### To insert a beat:

- Select a position in the **Strip View** using one of these methods:
  - Press Alt+Click in the **Strip View**: A vertical dotted line will, marking the desired position.
  - Press your mouse wheel in the **Strip View**: A vertical dotted line will appear, marking the desired position.
  - Press Alt+Right Click in the **Strip View**: A vertical dotted line will appear to mark the desired position. Alongside the dotted line, a context menu will also expand, simplifying access to the **Insert Beat** option. **Note:** this key combination expands the context menu with only one option available — **Insert Beat**.
- Hover over the **Insert Beat** button in the **Strip View Toolbar** to expand the drop-down list.



Figure 277. Strip View - Inserting Beats



3. Click the appropriate type of morphology for the insertion. The NH-301 software will automatically determine which fragment of the waveform to use for this purpose. A specific segment of the ECG waveform in the **Strip View** will immediately change color.

#### To delete beats:

1. Select a fragment of the ECG, which you wish to delete, using one of the following methods:
  - Click an individual beat to select it.
  - Select a fragment of the waveform using one of these methods:
    - **Using Shift + Click:**
      - a. Identify the initial point in the range you wish to select.
      - b. Click the initial point.
      - c. Hold down the **Shift** key.
      - d. Identify the final point in the range.
      - e. **(Optional)** [Scan the Strip View \(on page 164\)](#) to locate the points of interest, if necessary.
      - f. Click the final point to complete the range selection.
    - **Using Ctrl +Click:**
      - a. Identify the initial point in the range you wish to select.
      - b. Hold down the **Ctrl** key.
      - c. Click the initial point.
      - d. Identify the final point in your desired range.

- e. **(Optional)** [Scan the Strip View \(on page 164\)](#) to locate the points of interest, if necessary.
  - f. Drag the cursor to the final point and release the mouse button to complete the selection.
- **Using the right mouse button:**
- a. Click the **Strip View** and hold the right mouse button to designate the initial point in the range you wish to select.
  - b. Drag the cursor to set the final point.
  - c. **(Optional)** [Scan the Strip View \(on page 164\)](#) to locate the points of interest, if necessary.
  - d. Release the right mouse button to complete the range selection. A context menu will appear.

Figure 278. Strip View - Deleting Beats



2. Click the **Delete Beats** button.

#### To change beat annotation:

1. Select a fragment of the ECG, which you wish to reclassify, using one of the following methods:
  - Click an individual beat to select it.
  - Select a fragment of the waveform using one of these methods:

▪ **Using Shift + Click:**

- a. Identify the initial point in the range you wish to select.
- b. Click the initial point.
- c. Hold down the **Shift** key.
- d. Identify the final point in the range.
- e. **(Optional)** [Scan the Strip View \(on page 164\)](#) to locate the points of interest, if necessary.
- f. Click the final point to complete the range selection.

▪ **Using Ctrl +Click:**

- a. Identify the initial point in the range you wish to select.
- b. Hold down the **Ctrl** key.
- c. Click the initial point.
- d. Identify the final point in your desired range.
- e. **(Optional)** [Scan the Strip View \(on page 164\)](#) to locate the points of interest, if necessary.
- f. Drag the cursor to the final point and release the mouse button to complete the selection.

▪ **Using the right mouse button:**






- a. Click the **Strip View** and hold the right mouse button to designate the initial point in the range you wish to select.
- b. Drag the cursor to set the final point.
- c. **(Optional)** [Scan the Strip View \(on page 164\)](#) to locate the points of interest, if necessary.
- d. Release the right mouse button to complete the range selection. A context menu will appear.

Figure 279. Changing Beats Annotation





2. Hover over the **Change Beats Annotation** button in the **Strip View Toolbar** to expand the drop-down list.
3. Click the appropriate type of morphology for the beat you wish to reclassify. Alternatively, you may utilize keyboard shortcuts as outlined in the table below. The selected beat in the **Strip View** will immediately change color.

**Table 3. Beats Reclassification Keyboard****Shortcuts for Strip View**

Action	But- ton	Keyboard Keys
Classify as <b>Normal</b>		N
Classify as <b>R on T</b>		R
Classify as <b>Fusion</b>		F
Classify as <b>VPB</b>		V
Classify as <b>SVE</b>		S

**Table 3. Beats Reclassification Keyboard****Shortcuts for Strip View (continued)**

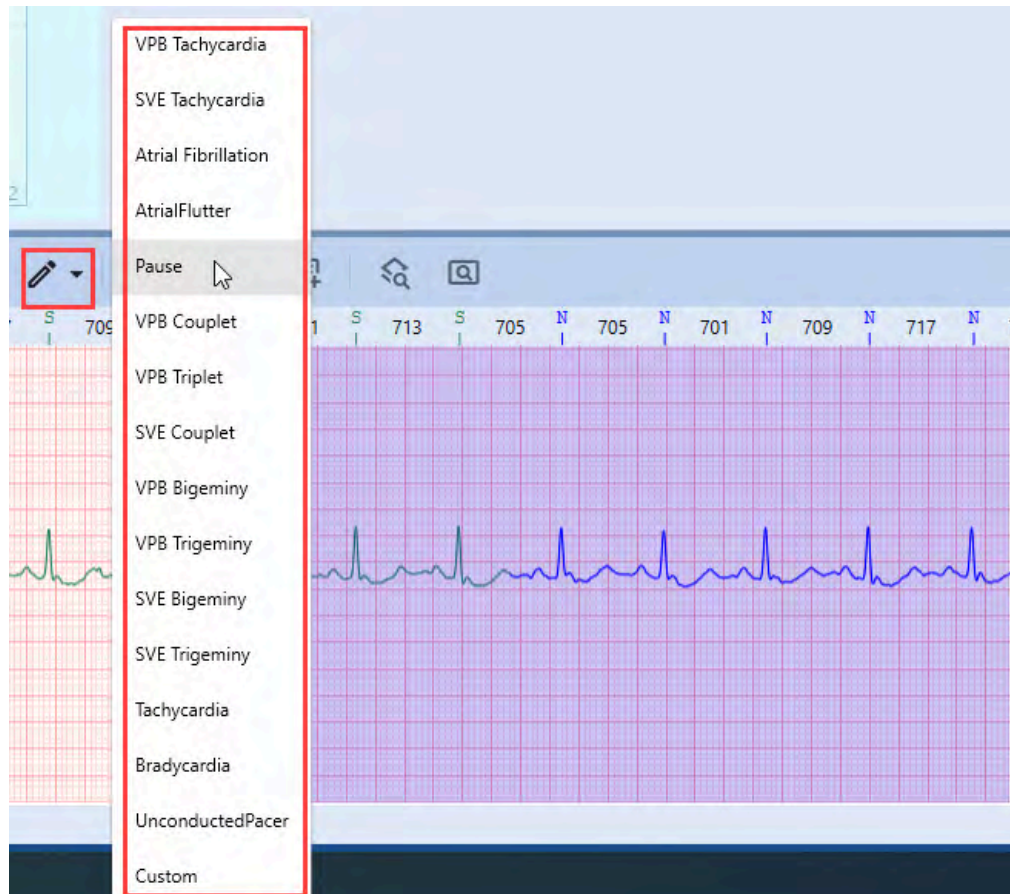
Action	But- ton	Keyboard Keys
Classify as <b>Questionable</b>		<b>X</b>
Classify <b>Paced</b>		<b>P</b>

**To create a user event:**

- Select a fragment of the ECG, which you wish to reclassify as a continuous event, using one of the following methods:
  - Click an individual beat to select it.
  - Select a fragment of the waveform:
    - **Using Shift + Click:**
      - Identify the initial point in the range you wish to select.
      - Click the initial point.
      - Hold down the **Shift** key.
      - Identify the final point in the range.
      - (Optional) [Scan the Strip View \(on page 164\)](#) to locate the points of interest, if necessary.
      - Click the final point to complete the range selection.
    - **Using Ctrl +Click:**
      - Identify the initial point in the range you wish to select.
      - Hold down the **Ctrl** key.
      - Click the initial point.
      - Identify the final point in your desired range.
      - (Optional) [Scan the Strip View \(on page 164\)](#) to locate the points of interest, if necessary.
      - Drag the cursor to the final point and release the mouse button to complete the selection.
    - **Using the right mouse button:**
      - Click the **Strip View** and hold the right mouse button to designate the initial point in the range you wish to select.
      - Drag the cursor to set the final point.

- c. **(Optional)** Scan the Strip View (on page 164) to locate the points of interest, if necessary.
- d. Release the right mouse button to complete the range selection. A context menu will appear.


Figure 280. Strip View - Creating User Event




2. Hover over the **Create User Event** button or menu option to expand the drop-down list.
3. Click the relevant type of **Event** you wish to create in the selected area.

### Analysis Controls

Analysis Controls is a group of buttons that enable you to exclude or re-include specific fragments of the ECG recording within the Strip View.

Icon	Description
	<b>Exclude from analysis button:</b> Enables the exclusion of a selected fragment of an ECG record from analysis.



Icon	Description
	<b>Include to analysis button:</b> Enables the re-inclusion of previously excluded fragments of an ECG record.

### To exclude an ECG segment from analysis:

1. Select the ECG fragment you wish to exclude from analysis using one of the following methods:
  - **Using Shift + Click:**
    - a. Identify the initial point in the range you wish to select.
    - b. Click the initial point.
    - c. Hold down the **Shift** key.
    - d. Identify the final point in the range.
    - e. **(Optional)** [Scan the Strip View \(on page 164\)](#) to locate the points of interest, if necessary.
    - f. Click the final point to complete the range selection.
  - **Using Ctrl +Click:**
    - a. Identify the initial point in the range you wish to select.
    - b. Hold down the **Ctrl** key.
    - c. Click the initial point.
    - d. Identify the final point in your desired range.
    - e. **(Optional)** [Scan the Strip View \(on page 164\)](#) to locate the points of interest, if necessary.
    - f. Drag the cursor to the final point and release the mouse button to complete the selection.
  - **Using the right mouse button:**
    - a. Click the **Strip View** and hold the right mouse button to designate the initial point in the range you wish to select.
    - b. Drag the cursor to set the final point.
    - c. **(Optional)** [Scan the Strip View \(on page 164\)](#) to locate the points of interest, if necessary.
    - d. Release the right mouse button to complete the range selection. A context menu will appear.

Figure 281. Strip View - Excluding from analysis



2. Click the **Exclude from Analysis** button or select the same option from the context menu.

#### To re-include an ECG segment into analysis:



#### Note:

The range you wish to re-include should fully overlap a previously excluded fragment. If it does not overlap an excluded area, the **Include to analysis** button and option remain inactive.

Figure 282. Page View - Include to analysis Overlap Condition



1. Select a fragment of the ECG, you want to re-include to analysis, using one of the following methods:
  - **Using Shift + Click:**
    - a. Identify the initial point in the range you wish to select.
    - b. Click the initial point.

- c. Hold down the **Shift** key.
  - d. Identify the final point in your desired range.
  - e. **(Optional)** [Scan the Strip View \(on page 164\)](#) to locate the points of interest, if necessary.
  - f. Click the final point to complete the range selection.
- **Using Ctrl +Click:**
    - a. Identify the initial point in the range you wish to select.
    - b. Hold down the **Ctrl** key.
    - c. Click the initial point.
    - d. Identify the final point in your desired range.
    - e. **(Optional)** [Scan the Strip View \(on page 164\)](#) to locate the points of interest, if necessary.
    - f. Drag the cursor to the final point and release the mouse button to complete the selection.
  - **Using the right mouse button:**
    - a. Click the **Strip View** and hold the right mouse button to designate the initial point in the range you wish to select.
    - b. Drag the cursor to set the final point.
    - c. **(Optional)** [Scan the Strip View \(on page 164\)](#) to locate the points of interest, if necessary.
    - d. Release the right mouse button to complete the range selection. A context menu will appear.

Figure 283. Strip View - Including to analysis



2. Click the **Include to analysis** button or select the option from the context menu.

## Views Switching Controls

**Views Switching Controls** is a group of buttons that allows you to focus on a single beat you have selected in the **Strip View**, in the **Templates View** and **Page View**. This functionality enhances analysis quality and efficiency.



Icon	Description
	<b>Show In Templates button:</b> Click this button to display the beat you have selected in the <b>Strip View</b> ; it will be highlighted in the relevant template within the <b>Templates Pane</b> .
	<b>Show in Page:</b> Facilitates an immediate switch to <b>Page View</b> , revealing the precise location of the chosen beat within this particular <b>Template</b> in both the <b>Signal Page</b> and the <b>ECG Strip</b> .

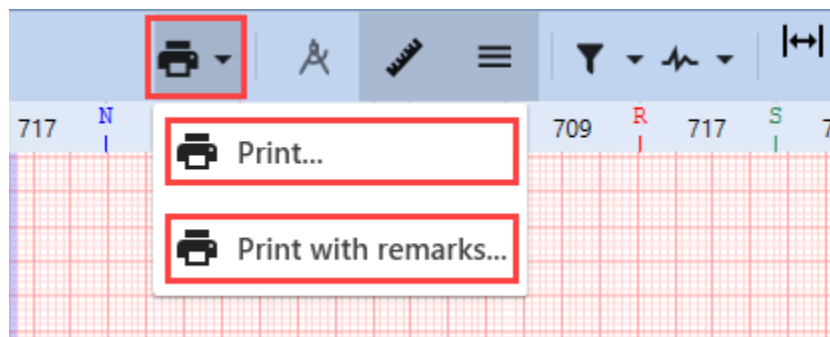
Figure 284. Strip View - Show In Templates



## Printing Control

This button enables you to print a fragment of the ECG **Strip**. The printed copy will include a segment that fits the output format. The baseline of the printed version mirrors the center line of the Strip visible on your PC screen. The printed ECG Strip will accommodate as much ECG data as possible from the visible area around the center line.

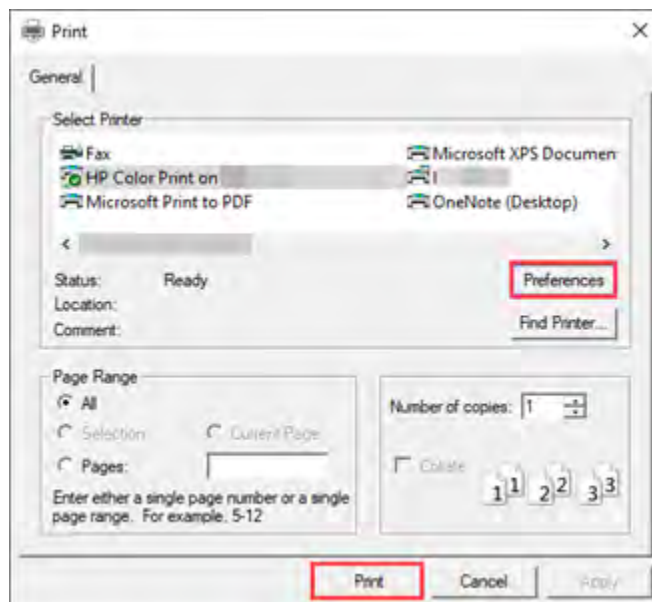
Figure 285. Strip View - Printing Strip



To print a fragment of the waveform in the **Strip View**:

1. Identify the area you want to print.
2. **(Optional)** [Scan the Strip View \(on page 164\)](#) to locate the desired area, if needed.
3. Hover over the **Printing Control** button to expand the drop-down list.
4. Click the **Print** option and navigate to the Print dialog box:

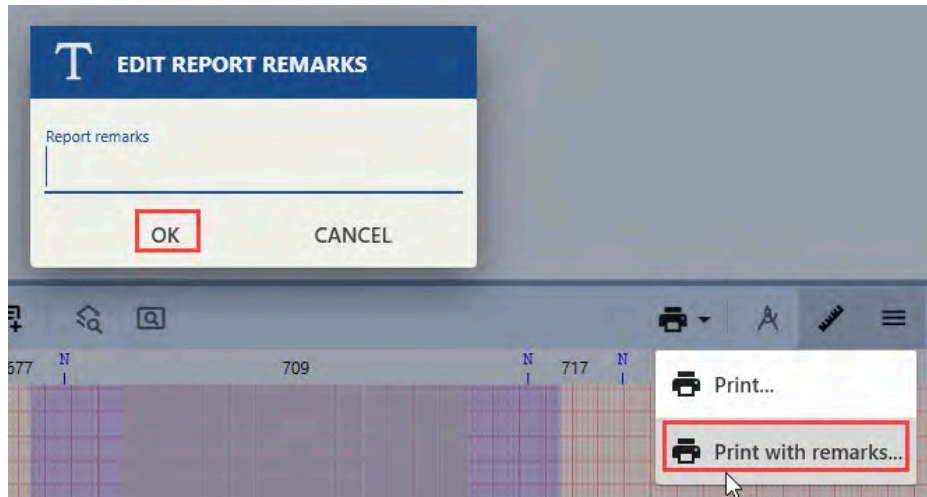
Figure 286. Strip View - Printing Dialog Box



- a. Choose a printer **available** in the **Select Printer** window.
- b. Adjust other preferences according to your needs.
- c. Click **Print** at the bottom of the dialog box to execute the printing of the waveform fragment.
5. **(Optional)** Click the **Print with remarks** option if you want to print a fragment of the waveform with your remarks:

- a. Complete the "Report remarks" field in the **Edit Report Remarks** pop-up.



Figure 287. Strip View - Printing with Remarks



- b. When you complete with filling in you remarks, click OK.  
 c. **(Optional)**Click **Cancel** to abandon this action.  
 d. Choose a printer available in the **Select Printer** window.  
 e. Adjust other preferences according to your needs.  
 f. Click **Print** at the bottom of the dialog box to execute the printing of the waveform fragment.

## Measuring Controls

**Measuring Controls** is a group of buttons designed to facilitate the indication and measurement of various waveform parameters within the **Strip View**. Namely, the most important tool in this group of controls is the **Caliper** tool. It allows you to measure different intervals and amplitudes on the ECG strip, which can be used to diagnose and assess a variety of heart conditions. We will explain [how to use the Caliper for ECG measurments \(on page 193\)](#) in the following sections.

Icon	Description
	<b>Caliper toggle:</b> Click to toggle <b>ON/OFF</b> the <b>Caliper</b> tool. The <b>Caliper</b> tool assists with measuring intervals and amplitudes, such as the RR interval, T-wave, and QRS complex amplitudes. Refer to the <a href="#">Measuring ECG with Caliper (on page 193)</a> section for details.
	<b>ECG Ruler toggle:</b> Click to toggle <b>ON/OFF</b> the <b>ECG Ruler</b> , located right below the <b>Strip View Tool-bar</b> . The <b>ECG Ruler</b> indicates the duration of RR intervals for adjacent beats and their morphology classification (i.e., N, R, F, V, etc.).




Icon	Description
	<b>Channel Numeration toggle:</b> Click to toggle <b>ON/OFF</b> the channel numeration on the left side of the ECG Strip.

Figure 288. Strip View - Caliper Tool



Figure 289. Strip View - ECG Ruler





Figure 290. Strip View - Channel Numeration



## Filters

This group of controls allows you to apply various filters affecting beat visualization and enhancing the accuracy and reliability of ECG analysis.

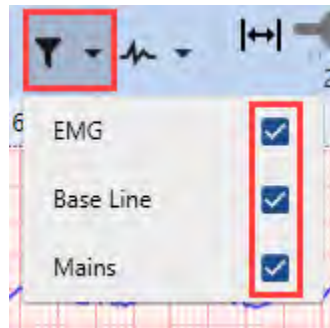
Icons	Description
	<b>Filter:</b> This control enables you to toggle <b>ON/OFF</b> the visualization of the waveform with applied <b>EMG</b> , <b>Base Line</b> , and <b>Mains</b> filters. To activate or deactivate these filters, select or deselect any number of checkboxes from the drop-down list. These filters improve the accuracy and reliability of ECG analysis.

Icons	Description
	<b>Channel Selection:</b> This control lets you select the channel(s) for display within the <b>Strip View</b> , using the drop-down list (up to 12 channels, depending on the number of channels in the current <b>Record</b> ).

To toggle filters **ON/OFF**:

1. Hover over the **Filter** drop-down list to expand it.

Figure 291. Strip View - Toggling Filters



2. Select the filter you wish to toggle. The visualization of the waveform will change immediately.

It is recommended to keep filters **ON** to provide accurate analysis:

- **EMG filter:** Eliminates high-frequency ECG signal components.
- **Baseline filter:** Removes low-frequency ECG signal components.
- **Mains filter:** Eradicates 50 or 60 Hz power line interference. This interference can be caused by the electrical equipment in the environment.

To toggle the visualization of channels within the Strip:

1. Hover over the **Channel Selection** drop-down list to expand it.

Figure 292. Strip View - Toggling Channels



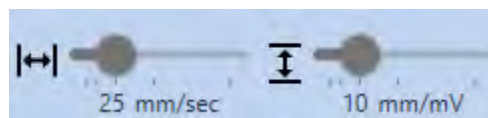
2. Select filters you wish to toggle. The visualization of the Strip will change immediately.

Toggling **ON/OFF** ECG channels enhances the accuracy and efficiency of ECG analysis. This feature allows you to focus on specific channels, compare them, filter out noise and more.

### Scale and Gain Controls

This group of controls enables you to adjust the paper speed and amplitude, affecting beat visualization and enhancing the accuracy and reliability of ECG analysis.

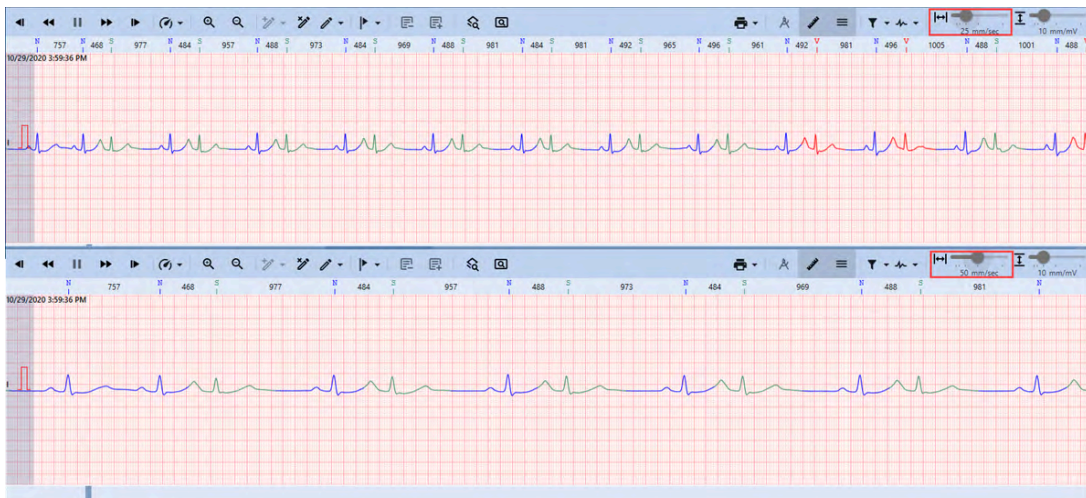
Figure 293. Template Edit - Scale and Gain Controls



### To change the paper speed:

1. Drag the slider to your desired position, setting the paper speed within the range from 6.25 up to 100 mm/sec. The visualization within the Strip will change immediately.

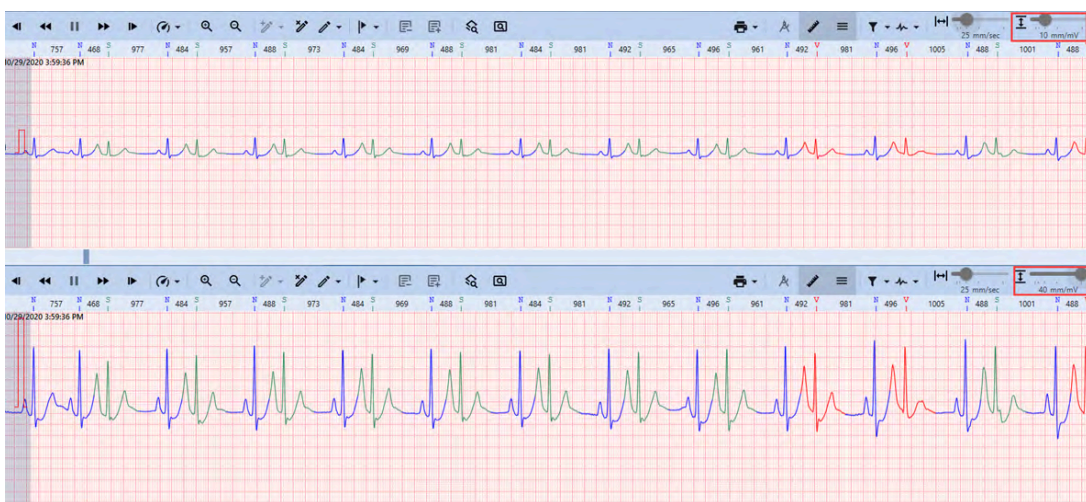
Figure 294. Strip View - Setting Paper Speed



### To change the amplitude:

1. Drag the slider to your desired position, setting the amplitude within the range from 2.5 up to 40 mm/mV. The visualization within the Strip will change immediately.

Figure 295. Strip View - Setting Amplitude

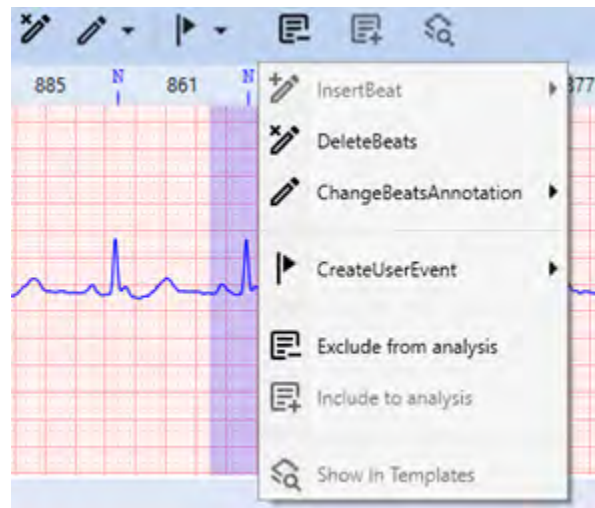


## Context Menu Features

A **Context Menu**, accessible via right-click, enables you to quickly and easily access common actions, such as inserting or deleting beats, changing annotations, creating user events, etc.



Figure 296. Strip View - Context Menu



### Insert Beat

Allows you to insert new beats between existing ones:

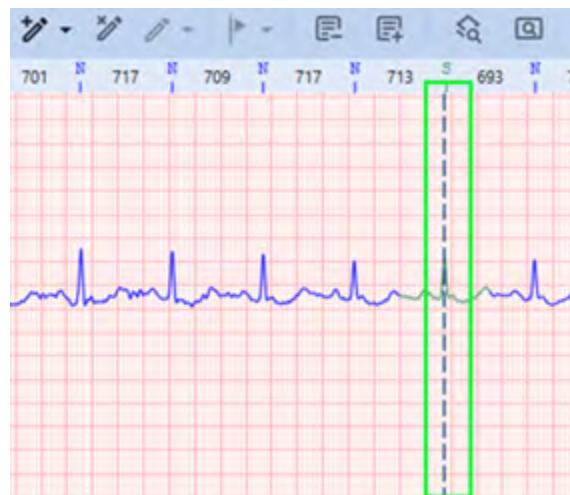


#### Note:

By default, when you click the **Strip View**, you select an entire beat. Inserting a beat is not equivalent to beat reclassification, so it requires an alternative method for selecting a position in the **Strip View**.

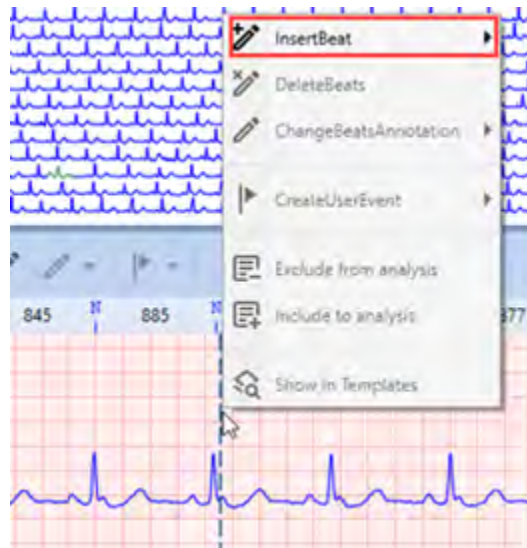
1. Select a position in the **Strip View** using one of these methods:

Figure 297. Strip View - Positioning Beat



- Hold Alt and click in the **Strip View**: A vertical dotted line will, marking the desired position. While holding Alt, click the right mouse button to expand the context menu.
  - Press your mouse wheel in the **Strip View**: A vertical dotted line will appear, marking the desired position. Click again and hold the mouse wheel, and then press the right mouse button to expand the context menu.
  - Press Alt+Right Click in the **Strip View**: A vertical dotted line will appear to mark the desired position. Alongside the dotted line, a context menu will expand, simplifying access to the **Insert Beat** option.
2. Hover over the **Insert Beat** option in the **Context Menu** to expand the drop-down list.

Figure 298. Strip View - Insert Beat



3. Click the appropriate type of morphology for the insertion. The NH-301 software will automatically determine which fragment of the waveform to use for this purpose. A specific segment of the ECG waveform in the **Strip View** will immediately change color.

### Delete Beats

Allows you to delete a selected beat or a fragment of a waveform:

1. Select a fragment of the ECG, which you wish to delete, using one of the following methods:
  - Click an individual beat to select it. Right-click the selected fragment to expand the context menu.
  - Select a fragment of the waveform using one of these methods:



▪ **Using Shift + Click:**

- a. Identify the initial point in the range you wish to select.
- b. Click the initial point.
- c. Hold down the **Shift** key.
- d. Identify the final point in the range.
- e. **(Optional)** [Scan the Strip View \(on page 164\)](#) to locate the points of interest, if necessary.
- f. Click the final point to complete the range selection.
- g. Right-click the selected fragment to expand the context menu.

▪ **Using Ctrl +Click:**

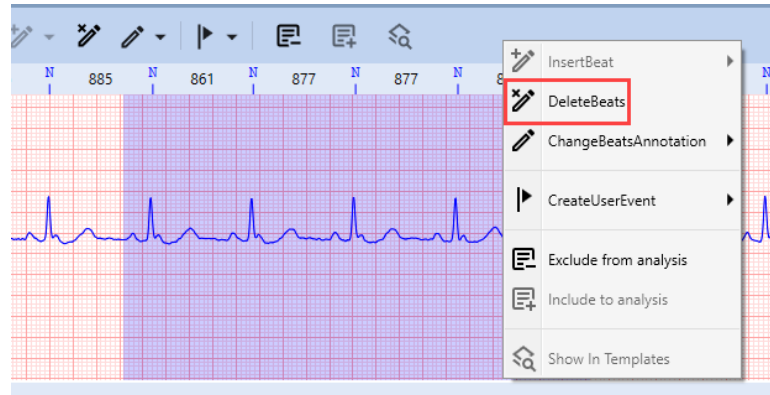
- a. Identify the initial point in the range you wish to select.
- b. Hold down the **Ctrl** key.
- c. Click the initial point.
- d. Identify the final point in your desired range.
- e. **(Optional)** [Scan the Strip View \(on page 164\)](#) to locate the points of interest, if necessary.
- f. Drag the cursor to the final point and release the mouse button to complete the selection.
- g. Right-click the selected fragment to expand the context menu.

▪ **Using the right mouse button:**

- a. Click the **Strip View** and hold the right mouse button to designate the initial point in the range you wish to select.
- b. Drag the cursor to set the final point.
- c. **(Optional)** [Scan the Strip View \(on page 164\)](#) to locate the points of interest, if necessary.

- d. Release the right mouse button to complete the range selection. A context menu will appear.

Figure 299. Strip View - Delete Beats



2. Click the **Delete Beats** option in the context menu. The system will automatically recalculate events and templates following the deletion.

### Change Beats Annotation

Enables you to modify the annotation of the selected beat:

1. Select a fragment of the ECG, which you wish to delete, using one of the following methods:
  - Click an individual beat to select it. Right-click the selected fragment to expand the context menu.
  - Select a fragment of the waveform using one of these methods:
    - **Using Shift + Click:**
      - a. Identify the initial point in the range you wish to select.
      - b. Click the initial point.
      - c. Hold down the **Shift** key.
      - d. Identify the final point in the range.
      - e. **(Optional)** [Scan the Strip View \(on page 164\)](#) to locate the points of interest, if necessary.
      - f. Click the final point to complete the range selection.
      - g. Right-click the selected fragment to expand the context menu.
    - **Using Ctrl +Click:**
      - a. Identify the initial point in the range you wish to select.
      - b. Hold down the **Ctrl** key.
      - c. Click the initial point.
      - d. Identify the final point in your desired range.

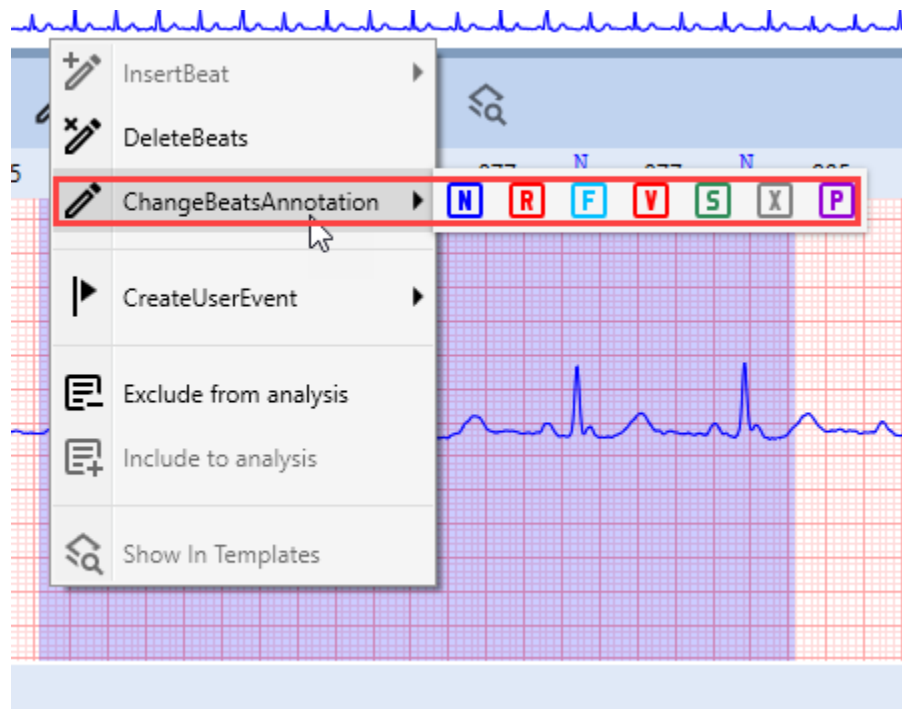
- e. **(Optional)** [Scan the Strip View \(on page 164\)](#) to locate the points of interest, if necessary.
- f. Drag the cursor to the final point and release the mouse button to complete the selection.
- g. Right-click the selected fragment to expand the context menu.

• **Using the right mouse button:**

- a. Click the **Strip View** and hold the right mouse button to designate the initial point in the range you wish to select.
- b. Drag the cursor to set the final point.
- c. **(Optional)** [Scan the Strip View \(on page 164\)](#) to locate the points of interest, if necessary.
- d. Release the right mouse button to complete the range selection. A context menu will appear.








2. Hover over the **Change Beats Annotation** option in the context menu to expand the drop-down list.

Figure 300. Strip View - Change Beats Annotation



3. Click the appropriate type of morphology for the beats you wish to reclassify. Alternatively, you may utilize keyboard shortcuts as outlined in the table below. Reclassified beats in the **Strip View** will immediately change color.

**Table 4. Beats Reclassification Keyboard****Shortcuts for Strip View**

Action	But- ton	Keyboard Keys
Classify as <b>Normal</b>		<b>N</b>
Classify as <b>R on T</b>		<b>R</b>
Classify as <b>Fusion</b>		<b>F</b>
Classify as <b>VPB</b>		<b>V</b>
Classify as <b>SVE</b>		<b>S</b>
Classify as <b>Questionable</b>		<b>X</b>
Classify <b>Paced</b>		<b>P</b>

**Create User Event**

Allows you to create a new user event, located at the selected beat or ECG fragment. After adding a user event, the corresponding fragment of the ECG waveform will be recalculated, and some beats may shift between templates.

1. Select a fragment of the ECG, which you wish to reclassify as a continuous event, using one of the following methods:
  - Click an individual beat to select it. Right-click the selected fragment to expand the context menu.
  - Select a fragment of the waveform using one of these methods:
    - **Using Shift + Click:**
      - a. Identify the initial point in the range you wish to select.
      - b. Click the initial point.
      - c. Hold down the **Shift** key.
      - d. Identify the final point in the range.
      - e. **(Optional)** [Scan the Strip View \(on page 164\)](#) to locate the points of interest, if necessary.

- f. Click the final point to complete the range selection.
- g. Right-click the selected fragment to expand the context menu.

▪ **Using Ctrl +Click:**

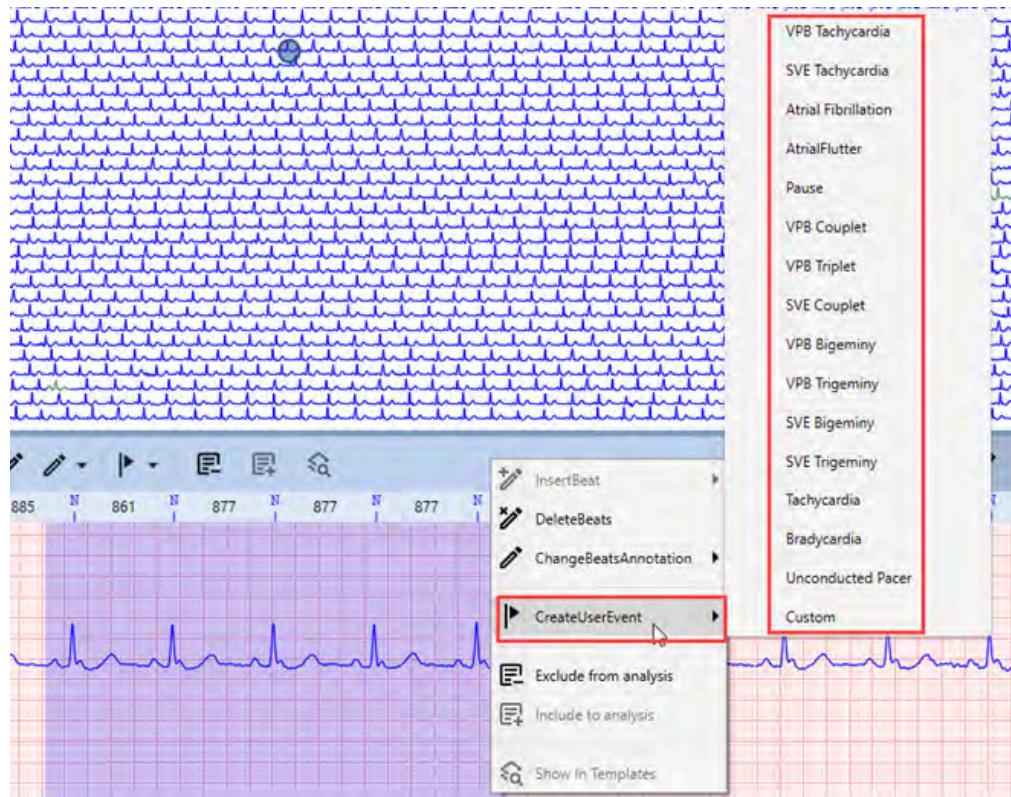
- a. Identify the initial point in the range you wish to select.
- b. Hold down the **Ctrl** key.
- c. Click the initial point.
- d. Identify the final point in your desired range.
- e. **(Optional)** [Scan the Strip View \(on page 164\)](#) to locate the points of interest, if necessary.
- f. Drag the cursor to the final point and release the mouse button to complete the selection.
- g. Right-click the selected fragment to expand the context menu.

▪ **Using the right mouse button:**

- a. Click the **Strip View** and hold the right mouse button to designate the initial point in the range you wish to select.
- b. Drag the cursor to set the final point.
- c. **(Optional)** [Scan the Strip View \(on page 164\)](#) to locate the points of interest, if necessary.
- d. Release the right mouse button to complete the range selection. A context menu will appear.

- 2. Hover over the **Create User Event** option to expand the drop-down list.

Figure 301. Strip View - Create User Event



3. Click the relevant type of **Event** you wish to create in the selected area.

### Exclude from analysis

Enables the exclusion of a selected fragment of an ECG record from analysis:

1. Select the ECG fragment you wish to exclude from analysis using one of the following methods:

- **Using Shift + Click:**

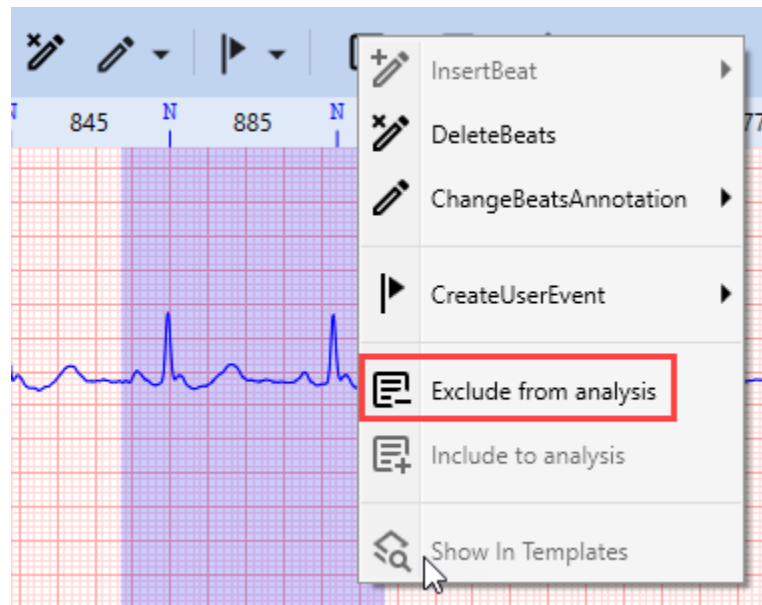
- a. Identify the initial point in the range you wish to select.
- b. Click the initial point.
- c. Hold down the **Shift** key.
- d. Identify the final point in the range.
- e. **(Optional)** [Scan the Strip View \(on page 164\)](#) to locate the points of interest, if necessary.
- f. Click the final point to complete the range selection.
- g. Right-click the selected fragment to expand the context menu.

- **Using Ctrl +Click:**



- a. Identify the initial point in the range you wish to select.
  - b. Hold down the **Ctrl** key.
  - c. Click the initial point.
  - d. Identify the final point in your desired range.
  - e. **(Optional)** [Scan the Strip View \(on page 164\)](#) to locate the points of interest, if necessary.
  - f. Drag the cursor to the final point and release the mouse button to complete the selection.
  - g. Right-click the selected fragment to expand the context menu.
- **Using the right mouse button:**
    - a. Click the **Strip View** and hold the right mouse button to designate the initial point in the range you wish to select.
    - b. Drag the cursor to set the final point.
    - c. **(Optional)** [Scan the Strip View \(on page 164\)](#) to locate the points of interest, if necessary.
    - d. Release the right mouse button to complete the range selection. A context menu will appear.

Figure 302. Strip View - Exclude from analysis



2. Click the **Exclude from Analysis** option in the context menu.

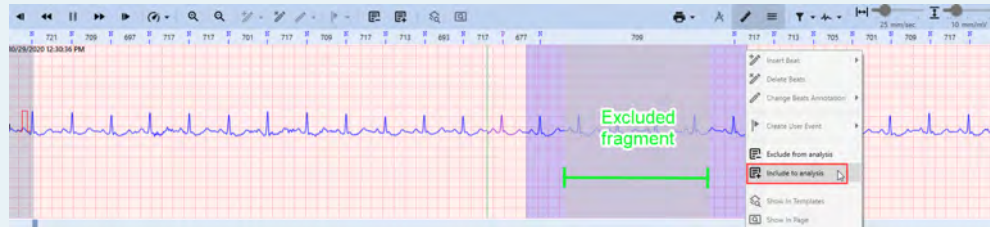
### Include to analysis

Enables the re-inclusion of previously excluded fragments of an ECG record:

**Note:**

The range you wish to re-include should fully overlap a previously excluded fragment. If it does not overlap an excluded area, the **Include to analysis** button and option remain inactive.

Figure 303. Strip View - Include to analysis



1. Select a fragment of the ECG, you want to re-include to analysis, using one of the following methods:

- **Using Shift + Click:**

- a. Identify the initial point in the range you wish to select.
- b. Click the initial point.
- c. Hold down the **Shift** key.
- d. Identify the final point in the range.
- e. **(Optional)** [Scan the Strip View \(on page 164\)](#) to locate the points of interest, if necessary.
- f. Click the final point to complete the range selection.
- g. Right-click the selected fragment to expand the context menu.

- **Using Ctrl +Click:**

- a. Identify the initial point in the range you wish to select.
- b. Hold down the **Ctrl** key.
- c. Click the initial point.
- d. Identify the final point in your desired range.
- e. **(Optional)** [Scan the Strip View \(on page 164\)](#) to locate the points of interest, if necessary.
- f. Drag the cursor to the final point and release the mouse button to complete the selection.
- g. Right-click the selected fragment to expand the context menu.

- **Using the right mouse button:**

- a. Click the **Strip View** and hold the right mouse button to designate the initial point in the range you wish to select.
- b. Drag the cursor to set the final point.

- c. **(Optional)** Scan the [Strip View](#) (on page 164) to locate the points of interest, if necessary.
- d. Release the right mouse button to complete the range selection. A context menu will appear.

Figure 304. Strip View - Include to analysis



2. Click the **Include to analysis** option in the context menu.

### Show In Templates

Select this option from the context menu to display the beat you have selected in the **Strip View**; it will be highlighted in the relevant template within the **Templates Pane**.

Figure 305. Strip View - Show In Templates



## Measuring ECG with Caliper

You may use the **Caliper** function to measure the RR interval, QRS complex duration and amplitude, QT interval, and other ECG waveform parameters. The **Caliper** also allows for editing the ECG record via the **Strip View**.

Figure 306. Strip View - Caliper Tool



## Caliper Design Overview

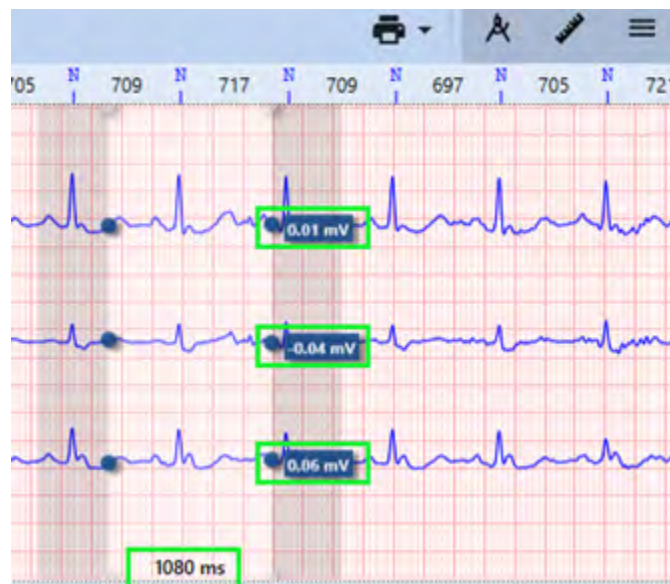
The **Caliper** tool in the **Strip View** displays two **measuring lines** (1) and a **measuring interval** (2) between them. To activate the **Caliper** tool, click the **Caliper** button in the **Strip View Toolbar**.

Figure 307. Strip View - Caliper Measurement Lines and Interval



Each ECG channel in the Strip has a small box adjacent to the point where the right measurement line intersects the channel signal line. The value in this box indicates the amplitude difference between the two points demarcated by the measurement lines.

Figure 308. Strip View - Interval Length and Amplitude Difference





The interval length in milliseconds is displayed at the bottom of the measuring interval.

### Moving Caliper Lines

You may move Caliper measurement lines either **simultaneously** or **independently**.

#### To move both lines simultaneously:

1. Position the cursor within the measuring interval. The cursor will change to a resize cursor.

Figure 309. Strip View - Moving Caliper Lines Simultaneously



2. Drag and drop the **Caliper** to the desired location.
3. Optionally, use the Left and Right arrow keys to fine-tune the position.

#### To move lines independently:



1. Position the cursor near one of the measurement lines until it changes to a resize cursor.

Figure 310. Strip View - Moving Caliper Lines Independently

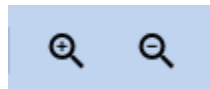


2. Click to select the measurement line.
3. Drag and drop it to the new location.

## Zoom Feature

To adjust the display scale of the waveform in the Strip, utilize the **Zoom In/Zoom Out** options:

Figure 311. Strip View - Zooming Options



1. Click the corresponding button in the **Strip View Toolbar**.
2. Hold the **Ctrl** key while scrolling up (**Zoom In**) or down (**Zoom Out**) the mouse wheel.

## Caliper Snapping Feature

The **Caliper Snapping** feature automatically aligns the **Caliper** measurement lines to the nearest R-peaks in the ECG signal. This functionality aids in the precise measurement of ECG wave duration and amplitude. Manual alignment can be challenging, hence **Caliper Snapping** enhances the accuracy, efficiency, and reproducibility of ECG interpretation.

**To utilize the Caliper snapping feature:**

1. Click the **Caliper** button in the **Strip View Toolbar**.
2. **(Optional)** Use the Left and Right arrow keys to make slight adjustments to the Caliper measurement lines.
3. To snap a **Caliper** measurement line to an R-spike:

Figure 312. Strip View - Caliper Snapping



- To snap any line:
  - a. Hold down the **Alt** key.
  - b. Position the cursor near one of the measurement lines until the cursor icon changes to a resize cursor.
  - c. Click the measurement line to select it.
  - d. Drag and drop it to the desired location.
- To snap the right measurement line:
  - a. Hold down the **Right Alt** key.
  - b. Use the Left and Right arrow keys to move the **Caliper**; the right measurement line will automatically snap to the R-peaks as you move.
- To snap the left measurement line:
  - a. Hold down the **Left Alt** key.
  - b. Use the Left and Right Arrow keys to move the Caliper; the left measurement line will automatically snap to the R-peaks as you move.

The **Caliper Snapping** function is instrumental in enabling a quick and accurate evaluation of various ECG parameters.

## Editing Beats and Events Using Caliper

The **Caliper** tool enables you to edit specific fragments of the ECG waveform contained within the measurement lines of the **Caliper**. When you opt to delete or reclassify beats, or exclude a waveform fragment from analysis, the changes will be confined to the selected fragment, which may contain multiple beats. In essence, the **Caliper** allows you to edit a continuous section of an ECG record, demarcated by the measurement lines, in a single action.

Figure 313. Strip View - Editing Beats and Events Using Caliper



### To edit a fragment of an ECG using the Caliper:

1. Position the **Caliper** and adjust its measurement lines as needed. For guidance, refer to the [Caliper Design Overview \(on page 196\)](#) section.
2. Right-click in the **Strip View** area to expand the context menu.
3. The **Caliper** tool's context menu offers several options within the **Strip View**:

- **Delete Beats:** Click this option to remove all beats within the boundaries of the **Caliper's** measurement lines. This action will result in minor recalculations.

**Note:**

Deleting beats may trigger the generation of **Pause** events. To annotate and exclude noisy segments, the **Exclude from analysis** option is preferable to **Delete Beats**.

- **Change Beats Annotation:** Hover over this option to display a drop-down list, then click the morphology type you wish to assign to the beats. The reclassified beats will instantly change color in the **Strip View**.
- **Create User Event:** Hover over this option to expand a drop-down list, and click the event type you wish to create in the selected area.
- **Exclude from analysis:** Click to exclude a noisy ECG segment within the **Caliper's** measurement lines from the analysis, without affecting other analytical outcomes.
- **Include to analysis:** Click to include previously excluded ECG fragments back into the analysis.

**Note:**

The **Include in Analysis** option becomes active in the **Caliper** context menu only when the current **Caliper** measurement interval overlaps with a segment that was excluded earlier.

## Events

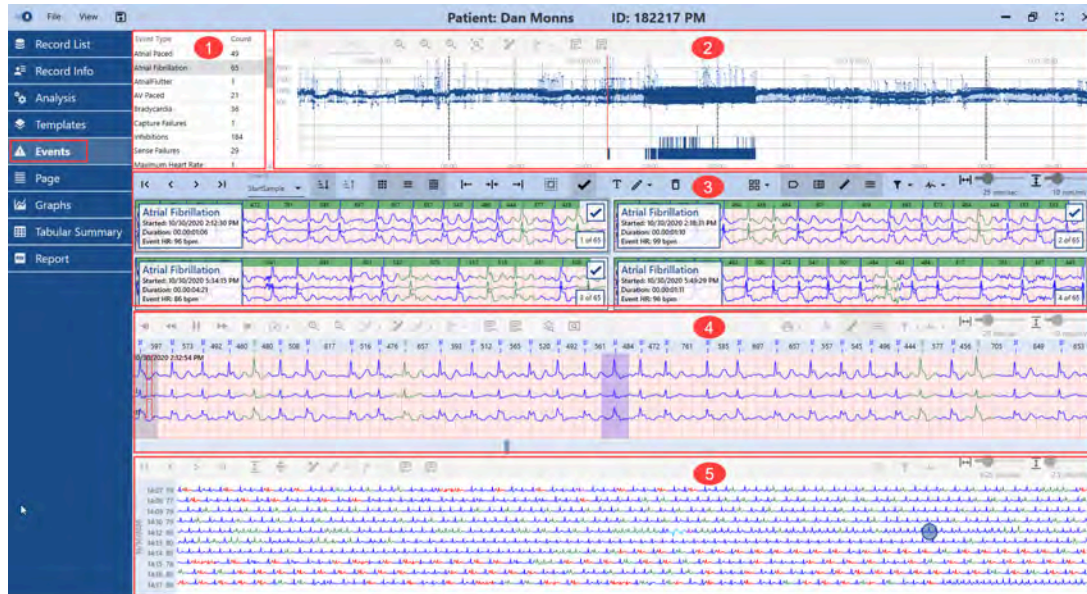
The **Events View** facilitates the assessment of detected arrhythmias by offering quick navigation through example strips and trend overviews. To switch between different types of arrhythmias, click on various events in the **Events List**. Utilize the **Events Overview Panel** to assess, modify, and delete these events. For rapid identification of **HR/RR Trends**, refer to the designated section. Additionally, obtain more in-depth information via the **Strip View** and **Page View**, integrated within the Events View screen.

In this section, we will focus on explaining different areas of the **Events View** screen, including:

1. Events List.
2. HR/RR Trends View.
3. Events Overview Panel.

4. Strip View.
5. Page View.

Figure 314. Events View - Events View

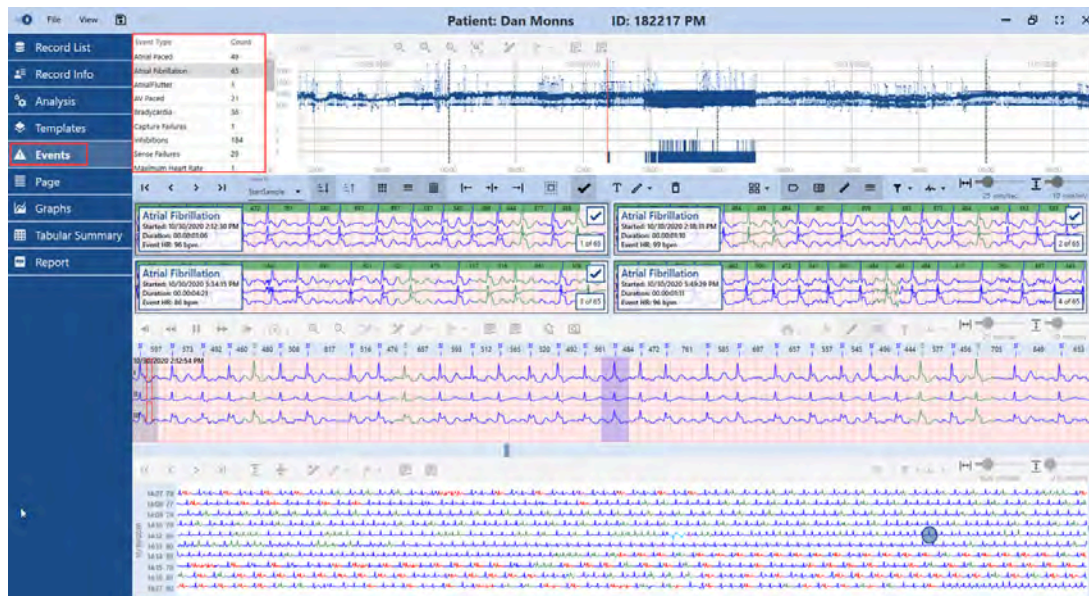


## Events List

The **Events List** displays various arrhythmia events identified during the analysis of the **Recording**. By clicking on different arrhythmia types in the **Events List**, users can toggle between comprehensive overviews for each event type. These overviews populate the **HR/RR Trends View**, **Events Overview Panel**, **Strip View**, and **Page View** with data specific to the selected arrhythmia.

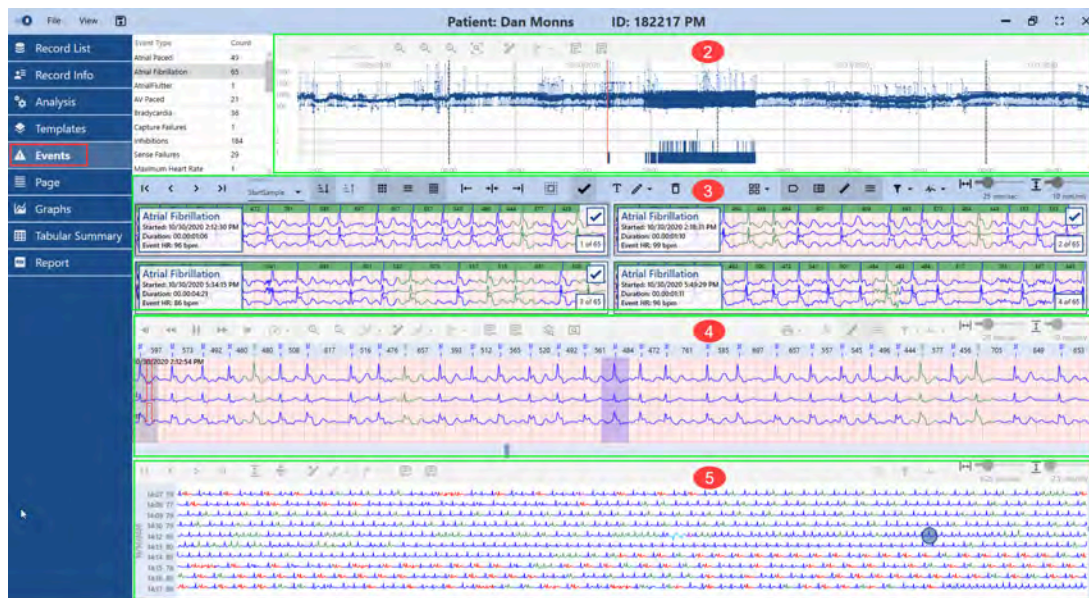


Figure 315. Events View - Events List



The **Events List** primarily serves to enable switching between arrhythmia types for further evaluation. This assessment utilizes the **HR/RR Trends View**, **Events Overview Panel**, **Strip View**, and **Page View** tools and capabilities.

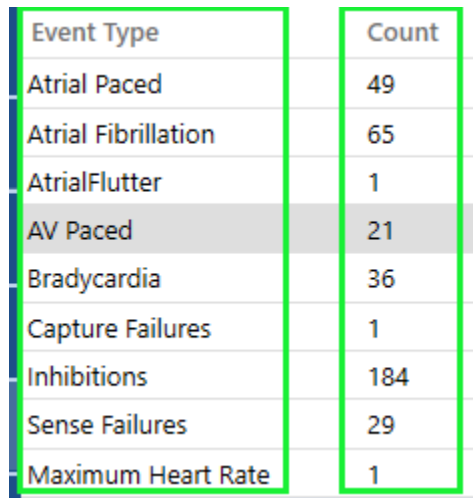
Figure 316. Events View - Assessment Tools



The **Events List** is organized into a table with two columns:



Figure 317. Events View - Events List Columns



Event Type	Count
Atrial Paced	49
Atrial Fibrillation	65
AtrialFlutter	1
AV Paced	21
Bradycardia	36
Capture Failures	1
Inhibitions	184
Sense Failures	29
Maximum Heart Rate	1

1. **Event Type:** The right column contains clickable names of different arrhythmia types.
2. **Count:** The left column shows the number of occurrences for each corresponding arrhythmia type in the **Recording**.

**To switch between Event types:**

1. Click on a relevant event type in the **Events List**. All related views and panels will adjust accordingly.

Upon clicking a specific arrhythmia type, the first occurrence of this event is automatically highlighted in the **HR/RR Trends View**, **Events Overview Panel**, **Strip View**, and **Page View**.

Figure 318. Events View - Event Highlighting



After selecting a particular arrhythmia type, to continue with the review of further occurrences:

Figure 319. Events View - Reviewing Event Occurrences

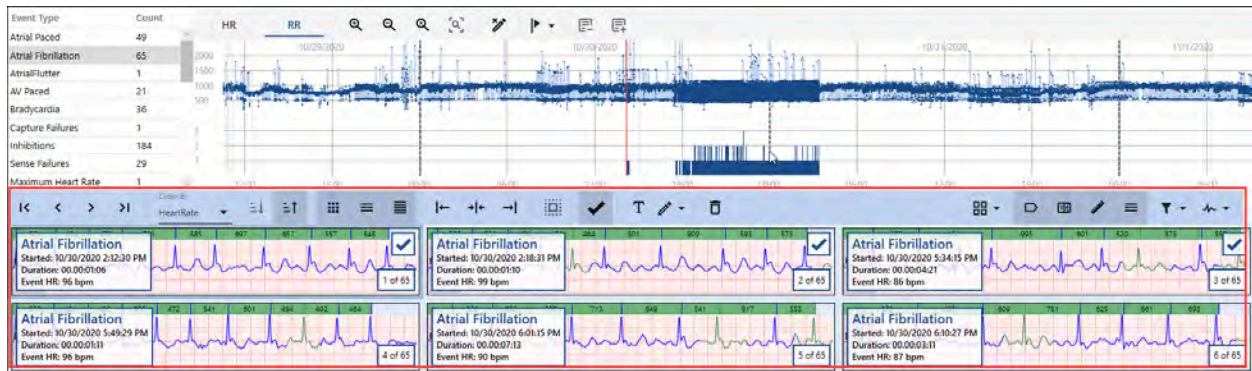


1. Click on any unselected **Example Strip** in the **Events Overview Panel** to switch to another event. All related views and panels will update accordingly.

For more details on the functionality of the [Events Overview Panel \(on page 204\)](#), please refer to its respective section..

## Events Overview Panel

The **Events Overview Panel** serves as the primary workspace within the **Events View**, supplemented by **HR/RR Trends View**, **Strip View**, and **Page View** for a more detailed ECG analysis. It provides a wide array of capabilities such as reviewing, reclassifying, deleting, identifying, and marking specific events for the final report.



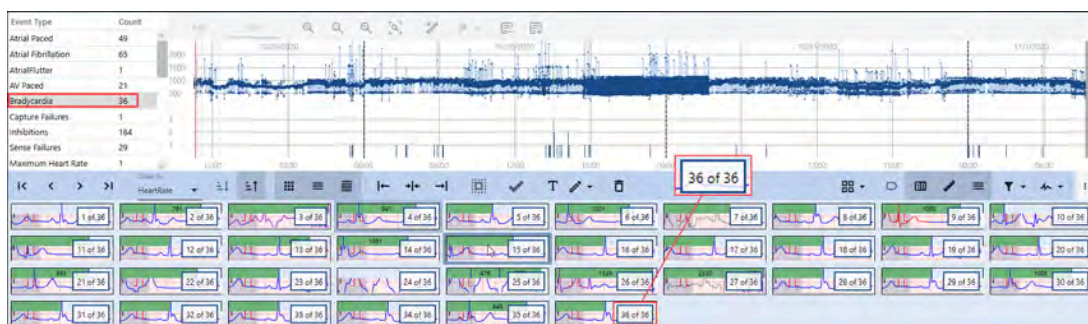
When clicking on any event type in the **Events List**, the **Events Overview Panel** populates with **Example Strips** corresponding to the selected arrhythmia type. Concurrently, **HR/RR Trends View**, **Strip View**, and **Page View** adjust their displays. By default, the system will automatically highlight the first sample of the chosen event type.

Users can interact with these **Example Strips** using the **Events Overview Panel**, context menus, and other available tools within the **Events View**.

The **Count** column in the **Events List** displays the total number of **Example Strips** for the selected event type, excluding Maximum and Minimum HR/RR events.

**Example:** If the **Events Overview Panel** displays 36 **Example Strips**, that number will also appear in the **Events List** under the relevant arrhythmia type..

Figure 320. Events View - Example Strips in the Panel

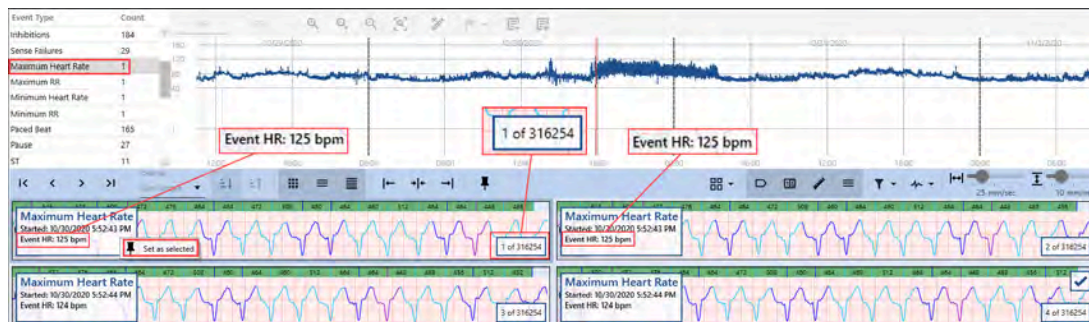


**Note:**

When selecting Maximum or Minimum HR/RR events from the **Events List**, you may observe that the **Count** value for these types is '1', yet the **Events Overview Panel** is filled with multiple **Example Strips**. As the Holter NH-301 analysis system captures numerous instances of these **Events**, often with identical or similar numerical values for Heart Rate and RR length, only one **Example Event** needs to be selected for the report as an indicative parameter.

To maintain analysis quality, the Holter NH-301 software allows users to evaluate these Maximum and Minimum HR/RR samples and select **one** most appropriate sample for the final **Report**.

Figure 321. Events View - Setting as Selected



**Example:** When dealing with **Maximum** and **Minimum** HR/RR strips, you should choose **only a single strip** to include in the **Report**.

In the accompanying image, the total number of **Example Strips** for Maximum HR is indicated as 316,254. Notably, there are at least two strips displaying a Heart Rate of 125 bpm, among others with Maximum HR values of 124 bpm.

Professionals are not required to scrutinize all the available **Example Strips**. The workflow specifies that only one **Event** example needs to be set as selected. Utilizing the quick check feature for **Maximum Heart Rate**, **Minimum Heart Rate**, **Maximum RR**, and **Minimum RR** events, the NH-301 software facilitates the identification of the most suitable **Event** sample for the report.

## Events Overview Toolbar

The toolbar at the top of the **Events Overview Panel** in the **Strip View** contains various controls for facilitating the review and modification of different event types. For ease of understanding, these controls are organized into distinct groups of interface elements. The **Events Overview Toolbar** features three



unique states, each designed to support specific analysis workflow requirements for different event types. This section will describe all three toolbar states, starting with the "default" state.

Figure 322. Events View - Events Overview Toolbar

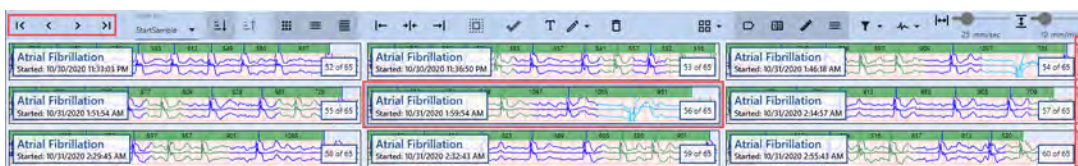


1. General Controls.
2. Sorting Controls.
3. Events View Layout Controls.
4. Example Strip Navigation Controls.
5. Events Editing Controls.
6. Example Strips Layout Controls.
7. Filters.
8. Scale and Gain Controls.

### General Controls

General Controls is a group of buttons designed to facilitate navigation between **Example Strips** within the **Events Overview Panel**. When switching between **Example Strips**, the **HR/RR Trends View**, **Strip View**, and **Page View** adjust automatically.




Figure 323. Events View - Navigation within Events Overview Panel



#### Note:

To navigate between **Example Strips** within the **Events Overview Panel**, one can also use the built-in scrollbar on the right side and select **Example Strips** by clicking on them.

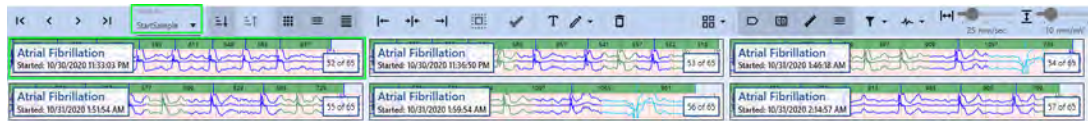
Icon	Description
	<b>First Event button:</b> Click to jump to the first <b>Example Strip</b> of the selected <b>Event type</b> within the <b>Events Overview Panel</b> .

Icon	Description
	<b>Previous Event button:</b> Click to navigate to the previous <b>Example Strip</b> of the selected <b>Event</b> type.
	<b>Next Event button:</b> Click to navigate to the next <b>Example Strip</b> of the selected <b>Event</b> type.
	<b>Last Event button:</b> Click to jump to the last <b>Example Strip</b> of the selected <b>Event Type</b> within the <b>Events Panel Overview</b> .

**Note:**

By default, the software system will automatically select the first sample of the specific **Event** type according to either default or user-modified sorting rules.

Figure 324. Events View - Default Selection

**Sorting Controls**

The first control in this group, the **Order by** drop-down list, enables toggling between **Example Strips** sorted by chronological order, **Event** duration, or **Heart Rate** value. Two icons on the right allow for ascending or descending sorting, respectively.

Figure 325. Events View - Sorting Controls

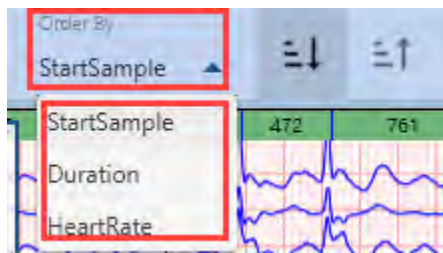


**To adjust the sorting:**



1. Click the **Order by** drop-down list.

Figure 326. Events View - Order by Sorting

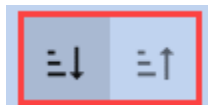


2. Select your preferred sorting type. The order of the **Example Strips** in the **Events Overview Panel** will update immediately.

#### To toggle a sorting order:

1. Click one of the buttons to switch sorting orders. The **Example Strips** will rearrange according to your choice.

Figure 327. Template Edit - Ascending and Descending Sorting

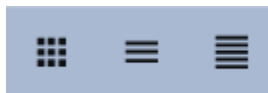


2. Click the second **Sorting Control** button to reverse the current sorting order.

#### Events View Layout Controls

This group of controls allows you to modify the **Events View** layout by toggling the **Events Overview Panel**, **Strip View**, and **Page View** located on the same **Events View** screen. The layout can be customized according to your ongoing needs: either expand or disable specific views as your review progresses.

Figure 328. Events View - Events View Layout Controls



#### Note:

You can deactivate up to two of the three toggles at once. Simply choose any toggle you wish to remain activated, and disable the one or two others. All three toggles cannot be turned **OFF** simultaneously.

Icons	Description
	<b>Events Overview Panel toggle:</b> Click to turn <b>ON/OFF</b> the <b>Events Overview Panel</b> within the <b>Events View</b> . Both <b>Strip View</b> and <b>Page View</b> will resize automatically.
	<b>Strip View toggle:</b> Click to turn <b>ON/OFF</b> the <b>Strip View</b> . Both <b>Events Overview Panel</b> and <b>Page View</b> will adjust automatically.
	<b>Page View toggle:</b> Click to turn <b>ON/OFF</b> the <b>Page View</b> . Both <b>Strip View</b> and <b>Events Overview Panel</b> will adjust automatically.

Figure 329. Events View - Events Overview Panel ON



Figure 330. Events View - Page View OFF



Figure 331. Events View - Events Overview Panel OFF



### Example Strip Navigation Controls

**Example Strip Navigation Controls** comprise a set of buttons that enable centering, left-aligning, or right-aligning the **Example Strip(s)** within their designated window(s). These controls facilitate a comprehensive review of the **Example Strip**, which typically does not entirely fit into the **Example Strip** box.




#### Note:

You may also drag the strip left or right within this window to shift its position.

Figure 332. Events View - Dragging Example Strip



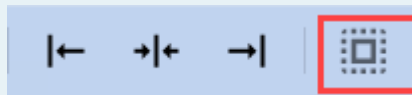
Icon	Description
	<b>Align Event Left button:</b> Click to align the selected <b>Example Strip(s)</b> to the left.
	<b>Center Event button:</b> Click to center the selected <b>Example Strip(s)</b> .

Icon	Description
	<b>Align Event Right button:</b> Click to align the selected <b>Example Strip(s)</b> to the right.

**Note:**

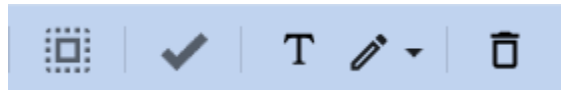
Bulk operations on **Example Strips** can be executed by either selecting them via the **Select All Button**, or by selection through **Ctrl+Click** or **Shift+Click** actions.



Figure 333. Events View - Selecting All Strips

**Events Editing Controls**





**Events Editing Controls** consist of buttons designed to modify **Events**, mark them for inclusion in the **Report**, delete **Events**, or add notes. This group of controls houses main events modification features within the **Events Overview Toolbar**.

Figure 334. Events View - Events Editing Controls



Icon	Description
	<p><b>Select All button:</b> Click to select all <b>Example Strips</b> currently displayed within the <b>Events Overview Panel</b>. Click again to deselect all <b>Example Strips</b>. Alternatively, you can use the Ctrl + A keyboard shortcut.</p> <p>The <b>Select All</b> button enables bulk operations with <b>Example Strips</b> of the selected <b>Event</b> type. Features such as <b>Set as Marked</b>, <b>Modify Events</b>, <b>Edit Label</b>, <b>Delete Selected Events</b>, and <a href="#">Align Events (on page 210)</a> can be applied to all strips of the selected <b>Event</b> type in one action.</p>
	<p><b>Set as marked button:</b> Click to mark <b>Example Strip(s)</b> you wish to include in the final <b>Report</b> (excluding <b>Maximum/Minimum HR</b> and <b>Maximum/Minimum RR</b> events).</p> <p>By default, if you don't mark any strips manually, for all <b>Event</b> types, excluding <b>Maximum/Minimum HR</b> and <b>Maximum/Minimum RR</b>, the first three <b>Example Strips</b> will be included in the <b>Report</b></p>



Icon	Description
	<p><b>Set as selected button:</b> Click to select <b>one Maximum/Minimum HR</b> and <b>one Maximum/Minimum RR event Example Strip</b> for inclusion in the final <b>Report</b>.</p> <p>For these types of events, the <b>Set as Marked</b> button is replaced by the <b>Set as Selected</b> button. This change indicates that you can only select a single event of these types for the <b>Report</b>.</p> <p>For <b>Maximum/Minimum HR</b> and <b>Maximum/Minimum RR</b> events, the software automatically selects only one <b>Example Strip</b>. Use this button to select a different <b>Example Strip</b>, if required.</p>
	<p><b>Edit Label button:</b> Click to add or edit a note associated with the selected <b>Example Strip(s)</b>. Notes may be used for various purposes, such as documenting clinical context, identifying specific findings, and communicating these to other clinicians.</p> <p>Keep in mind that note length is constrained by the <b>Example Strips</b> visualization parameters in the final <b>Report</b>. Refer to the <a href="#">example below (on page 213)</a> to find more details.</p>
	<p><b>Modify Event button:</b> Click to reclassify (change the annotation) of the selected <b>Example Strip(s)</b>. Changes will be reflected in the <b>Count</b> column of the <b>Events List</b> for affected <b>Event types</b>.</p> <p>Keep in mind that the contents of the <b>Modify Event</b> drop-down list vary depending on the types of <b>Events</b> you select in the <b>Events List</b>.</p>
	<p><b>Delete Selected Events:</b> Click to delete selected <b>Example Strips</b> of the chosen <b>Event</b> type from the <b>Events List</b>. Changes will be reflected in the <b>Count</b> column of the <b>Events List</b> for the affected <b>Event</b> type.</p>

#### To set Example Strips as marked:

1. Select **Example Strip(s)** of the chosen **Event** type you wish to include in the **Report**:
  - Click on an **Example Strip** to select it.
  - Utilize Ctrl + Click or Shift + Click to select multiple **Example Strips**. Alternatively, use the **Select All** button in the top toolbar or employ the Ctrl + A keyboard shortcut to select all strips.
2. **(Optional)** Scroll to review the strips you aim to mark. The **Events Overview Panel** can display multiple events of the same type, accommodating even thousands.
3. Click the **Set as Marked** button. A checked box icon will appear in the upper-right corner of each selected **Example Strip**.

#### To set an Example Strip as selected:

1. Navigate through the **Events Overview Panel** to locate the strip you intend to include in the report. The **Events Overview Panel** can display multiple events of the same type, accommodating even thousands.
2. Click on an **Example Strip** to select it.
3. Click the **Set as selected** button. A pin icon will appear in the upper-right corner of the chosen **Example Strip**.

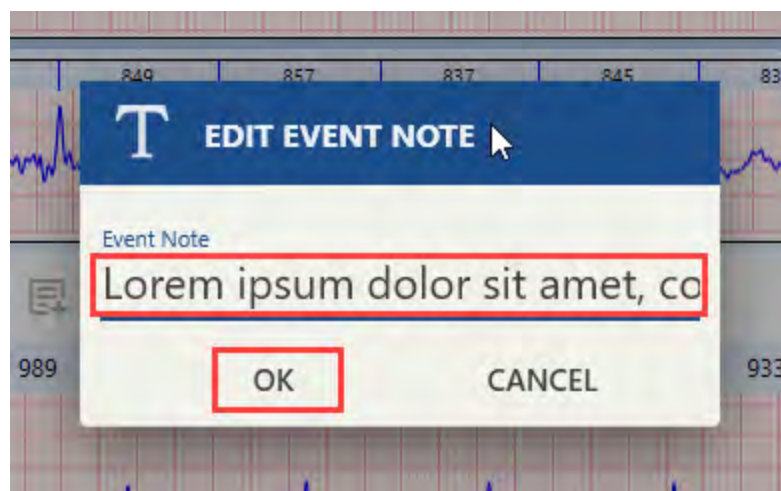
**Note:**

It is recommended to choose the maximum and minimum values as the final step of the review procedure. If subsequent changes are made, such as adding or deleting beats, these values might be automatically recalculated in the background. Consequently, you may need to reassess the maximum and minimum values.

**To add or edit a note:**

1. Select **Example Strip(s)** of the chosen **Event** type you wish to include in the **Report**:
  - Click on an **Example Strip** to select it.
  - Utilize Ctrl + Click or Shift + Click to select multiple **Example Strips**. Alternatively, use the **Select All** button in the top toolbar or employ the Ctrl + A keyboard shortcut to select all strips.
2. **(Optional)** Scroll to review the strips. The **Events Overview Panel** can display multiple events of the same type, accommodating even thousands.
3. Click the **Edit Label** button to open the **EDIT EVENT NOTE** dialog box. Alternatively, double-click on a single **Example Strip** to open a dialog box.

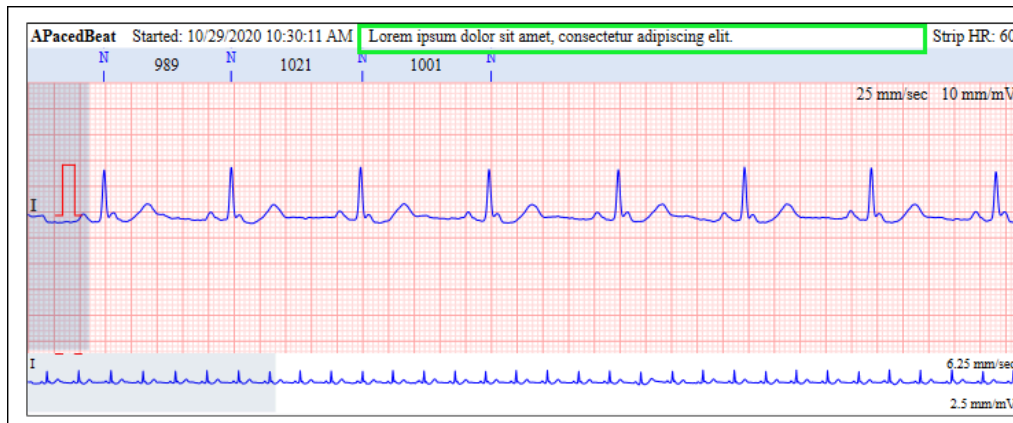
Figure 335. Events View - Edit Event Note Dialog Box





4. Enter or modify the note in the **Event Note** text field. Note that the length of the note is subject to a soft limit, governed by the **Example Strips**' visualization parameters in the final report. You may type in a substantial note, but be aware that it may not display correctly in the final report. Refer to the figure below for details on the note length soft cap.

Figure 336. Events View - Example Strip Note Limitations



5. Click **OK** to save the note or **Cancel** to discard it.

#### To modify Event(s):

1. Select **Example Strip(s)** of the chosen **Event type** you want to modify:
  - Click on an **Example Strip** to select it.
  - Utilize Ctrl + Click or Shift + Click to select multiple **Example Strips**. Alternatively, use the **Select All** button in the top toolbar or employ the Ctrl + A keyboard shortcut to select all strips.
2. **(Optional)** Scroll to review and select all the strips you want to modify. The **Events Overview Panel** can display multiple events of the same type, accommodating even thousands.
3. Hover over the **Modify Event** button to expand a drop-down menu.
4. Choose a new **Event type** for the selected **Example Strips**. The values in the Count column of the **Events List** will change accordingly for the **Event types** affected by the action.



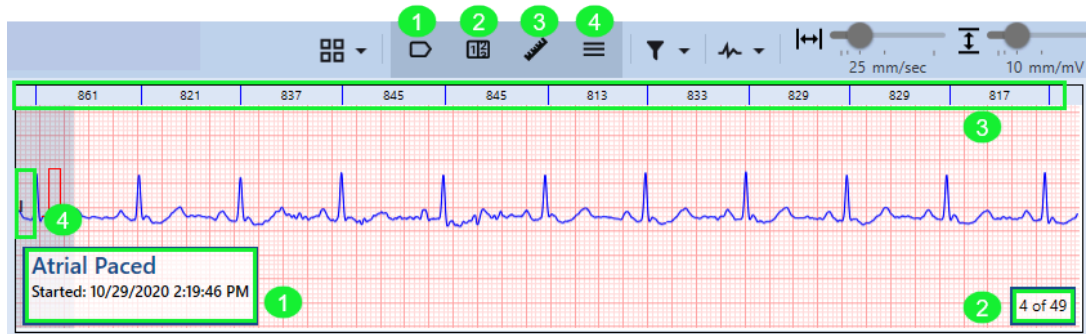
#### Note:






Be aware that the contents of the **Modify Event** drop-down list will differ based on the types of **Events** chosen in the **Events List**. Each specific **Event type** has a distinct set of available modifications.

#### Example Strips Layout Controls

The **Example Strips** Layout Controls comprise a set of buttons that manage the layout of **Example Strips** within the **Events Overview Panel**.

Figure 337. Events View - Example Strips Layout Controls Scheme



Icon	Description
	<b>Example Strips Layout button:</b> Determines the number of <b>Example Strips</b> displayed per row and the number of rows within the <b>Events Overview Panel</b> , with options ranging from 1 to 40 strips.
	<p><b>Example Strips Text Box toggle:</b> Click to toggle <b>ON/OFF</b> a text box in the bottom left corner of the <b>Example Strip</b>. This box contains <b>Event</b> type, <b>Event</b> time stamp, and other basic data about each <b>Event</b> occurrence.</p> <p>When <a href="#">adding a note (on page 213)</a> to an <b>Example Strip</b> via the <b>Edit Label</b> button, the note appears at the bottom of this text box..</p>
	<b>Example Strips Numerating Box toggle:</b> Click to toggle <b>ON/OFF</b> a text box located in the bottom right corner of the <b>Example Strip</b> . This box displays a sequential count of the <b>Example Strip</b> as it was chronologically identified by the software and the total number of <b>Events</b> of the same type.
	<b>ECG Ruler toggle:</b> Click to toggle <b>ON/OFF</b> the <b>ECG Ruler</b> at the top of each <b>Example Strip</b> , which shows the duration of RR intervals for adjacent beats within the <b>Event</b> .
	<b>Channel Numeration toggle:</b> Click to toggle <b>ON/OFF</b> channel numeration on the left side of the <b>Example Strip</b> .

To change the **Example Strips** layout:

1. Hover over the **Example Strips Layout** button to expand the drop-down menu.
2. Navigate through the dropdown to select the desired total number of **Example Strips** to display within the **Events Overview Panel**. Adjust the number of rows and columns by moving the cursor diagonally from the top left to the bottom right.

Figure 338. Events View - Changing Events Overview Panel Layout



- Click on the preferred cell icon in the dropdown menu to apply the layout changes.

**Note:**

If you wish to display numerous **Example Strips** within the **Events Overview Panel**, consider [toggling OFF Strip View and Page View \(on page 208\)](#) to preserve the readability of UI elements within the **Example Strips**.


**Filters**

**Filters** facilitate the toggling of filtering and **ECG Channel** visualization rules for **Example Strips**.

Figure 339. Events View - Filters



Icon	Description
	<b>Filter:</b> Enables toggling of visualization <b>ON/OFF</b> with the applied <b>EMG</b> , <b>Base Line</b> , and <b>Mains</b> filters. To accomplish this, check or uncheck any number of checkboxes in the drop-down list.

Icon	Description
	<b>Channels:</b> Allows toggling of <b>ECG Record Channels</b> display in <b>Example Strips ON/OFF</b> . To execute this, check or uncheck any number of checkboxes in the drop-down list, depending on the number of channels in a record and the quantity you wish to display.

### Scale and Gain Controls

Drag **Scale and Gain Controls** sliders to set appropriate paper speed and amplitude for display in the Example Strips.

Figure 340. Events View - Scale and Gain Controls



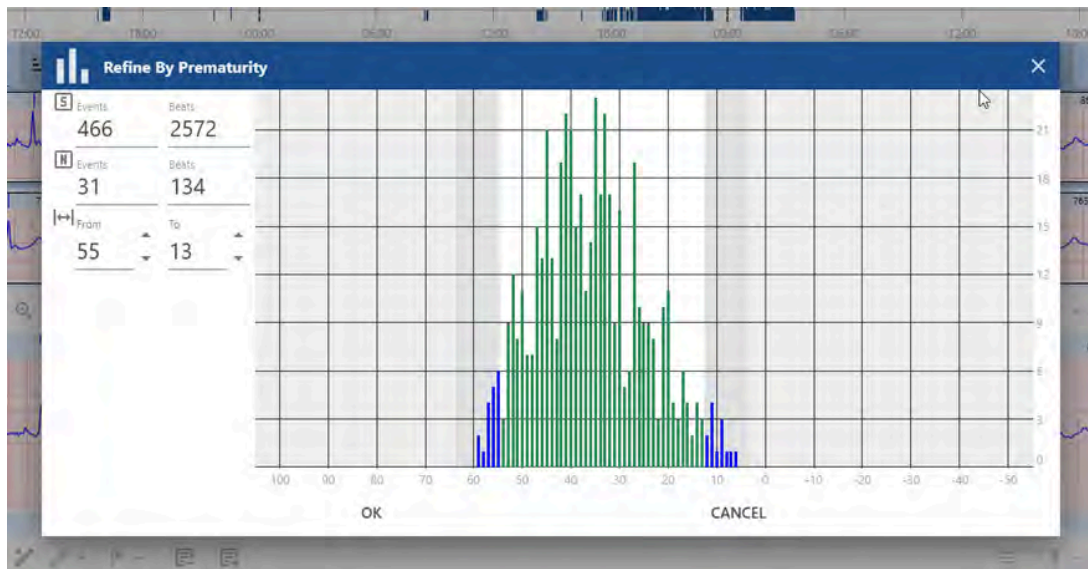
**Scale and Gain Controls** can help users identify and measure different ECG features more accurately, and analyze ECG data more efficiently by allowing them to quickly adjust the display of the template boxes to their needs.

### Events Overview Toolbar for SVE Type Events

For the purpose of prematurity refinement, when you select any **SVE** type events like **SVE**, **SVE Bigeminy**, **SVE Couplet**, **SVE Tachycardia**, **SVE Trigeminy**, an additional **Refine Prematurity** button in the **Events Overview Toolbar** appears. Prematurity refinement is a feature of the **NH-301 Holter** software that can be used to improve the accuracy of **SVE** events classification. Prematurity refinement works by reclassifying events that are not very premature (do not occur very early in the cardiac cycle) as normal. This can reduce the number of false-positive classifications.



Figure 341. Events View - Refine by Prematurity Dialog Box



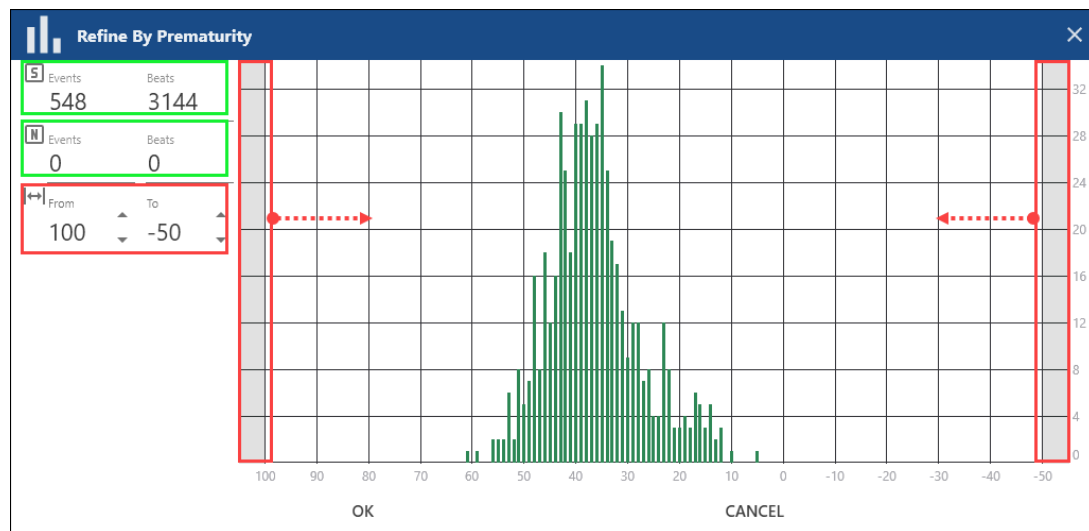
When you click the **Refine Prematurity**, the **Refine By Prematurity** dialog box pops up. The dialog box contains an event type distribution graph with the adjustable refinement sliders on the left and right margins of the grid.

Figure 342. Events View - Refine Prematurity Button



The prematurity is defined by the time difference between the premature beat and previous normal beats. A premature beat occurs sooner than the expected time of the next normal beat. The X axis represents the "percentage of prematurity" of the premature beats comprising the event, in comparison to normal beats.

Figure 343. Events View - Refine by Prematurity Dialog Box Elements



In the top left corner, you can see how many **Events** of the selected type were identified by the **NH-301 Holter** software and how many **Beats** comprise these events.

Below that you can see how many **Events** will be reclassified as Normal and how many **Beats** will be affected after you set up and confirm bulk reclassification via this feature.

Finally, **From** and **To** parameters represent the position of the refinement sliders on the X-axis. Default values: From = 100 which equals to the left margin of the graph; To = -50 which equals the right margin of the graph. You can move the sliders by clicking spinner arrows in order to change the default values.

#### To refine selected SVE type events:

1. Click the **Refine Prematurity** button in the **Events Overview Toolbar**. The **Refine By Prematurity** dialog box will pop up.

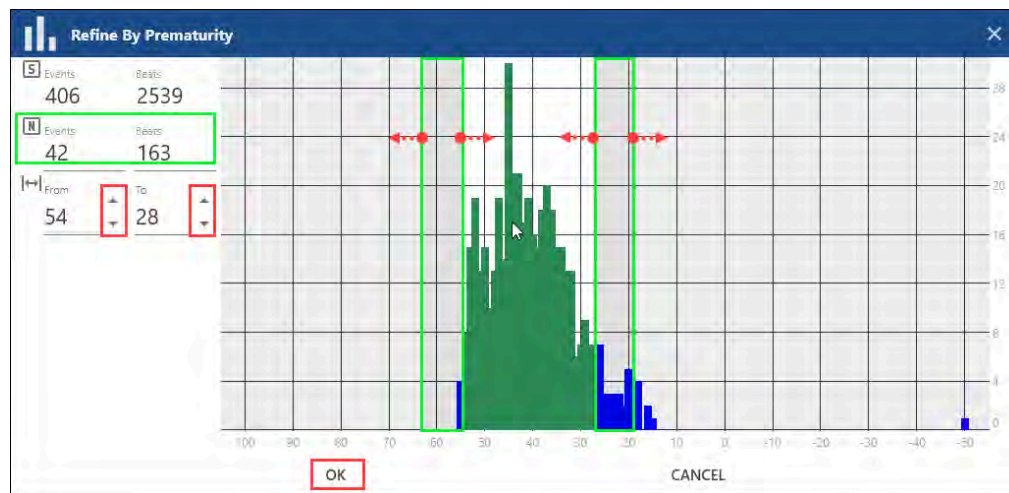
Figure 344. Events View - Click Refine Prematurity Button



2. Move refinement sliders on the left and right in relevant directions to refine detected **Events** by prematurity. This will decrease the number of S-events and S-beats in the top left corner and increase the number of N-events and N-beats. Graph bars affected by refinement sliders will also change their color from green to blue. To move the sliders to the desired position:
  - Click spinner arrows near to the **From** and **To** elements.
  - Click and drag refinement sliders with your mouse cursor.



Figure 345. Events View - Refine By Prematurity



- Click the **OK** button to confirm the refinement after you positioned sliders as required. The value in the **Count** column of the **Events List** for the selected **Events** type will change accordingly. To discard refinement, click **Cancel**.

Figure 346. Events View - Events List Count Change

Event Type	Count
Pause	27
ST	11
SVE	16786
SVE Bigeminy	475
SVE Couplet	3437
<b>SVE Tachycardia</b>	<b>411</b>
SVE Trigeminy	502
Tachycardia	271
Vent. Paced	143

## Events Overview Toolbar for Min/Max HR/RR Events

For **Maximum/Minimum Heart Rate** and **Maximum/Minimum RR** events, you need to choose only one **Example Strip** for inclusion in the final Report. Users are not supposed to modify, delete, or add notes to these specific types of **Events** due to their special role in ECG Recording analysis. In line with this workflow logic, the **Events Overview Toolbar** for **Maximum/Minimum Heart Rate** and **Maximum/Minimum RR** events has inactive **Sorting Controls** and the **Events Editing Controls** are simplified to one **Set as Selected** button, as opposed to the five buttons on the default Toolbar.

Figure 347. Events View - Default Events Overview Toolbar



For **Maximum/Minimum HR** and **Maximum/Minimum RR** events, the software automatically selects only one **Example Strip**. Use the **Set as Selected** button to choose a different **Example Strip**, if required.

Figure 348. Events View - Min-Max HR-RR Events Overview Toolbar



To set an Example Strip as selected:

1. Navigate through the **Events Overview Panel** to locate the strip you intend to include in the report. The **Events Overview Panel** can display multiple events of the same type, accommodating even thousands.
2. Click on an **Example Strip** to select it.
3. Click the **Set as selected** button. A pin icon will appear in the upper-right corner of the chosen **Example Strip**.

Figure 349. Events View - Set as selected



**Note:**

A context menu for these types of **Events** also contains only the **Set as selected** option.

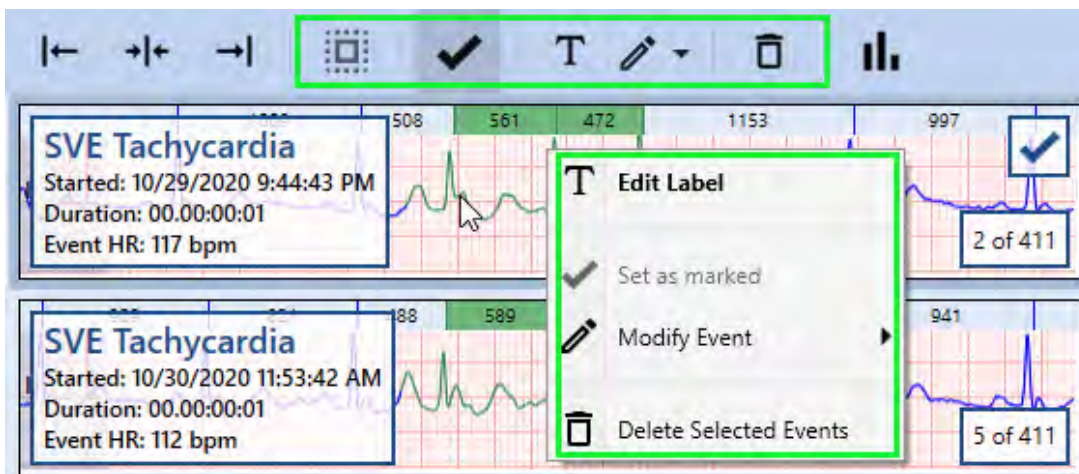


## Context Menu Features

A **Context Menu**, accessible via right-click, enables you to quickly and easily access common actions available on the **Events Overview Panel**.

For all event types, excluding **Maximum Heart Rate**, **Minimum Heart Rate**, **Maximum RR**, and **Minimum RR** events, the context menu allows for adding notes, setting **Example Strips** as marked, and modifying or deleting events.

Figure 351. Events View - Default Context Menu



The context menu for **Maximum Heart Rate**, **Minimum Heart Rate**, **Maximum RR**, and **Minimum RR** events contains only the **Set as selected** option.

Figure 352. Events View - Min-Max HR-RR Context Menu

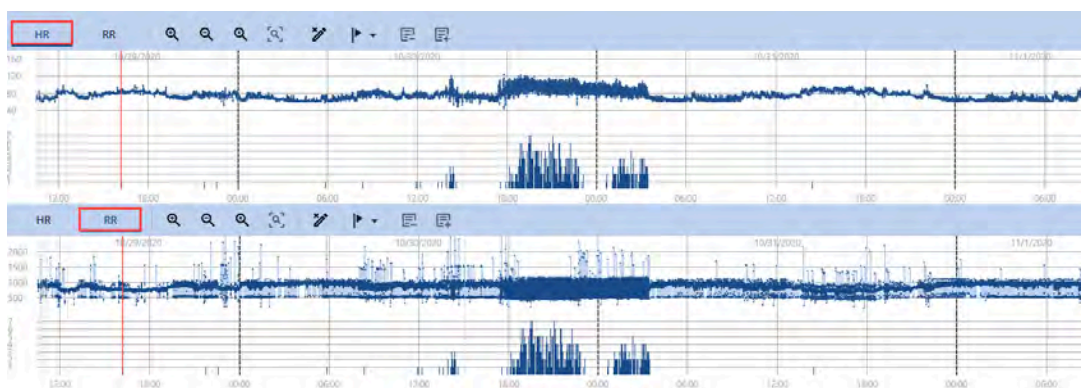


To unveil the context menu, right-click within the **Example Strip** box of your choice.

## HR/RR Trends View

The **HR/RR Trends View** displays two graphs that show the heart rate and RR interval changes over time, respectively. This feature is instrumental for visualizing heart rate trends. The **RR Trend View** is more specific, as it distinguishes between different types of heart rhythms. The **HR Trend View** is more general, but it can be used to track changes in heart rate over a longer period of time. Underneath the **Trends View**, a histogram illustrates the frequency of selected arrhythmia type occurrences.

Figure 353. Events View - HR/RR Trends



The **HR/RR Trends View** is a tool that aids in assessing and obtaining additional data about arrhythmia events by presenting heart rate and RR interval changes over time.

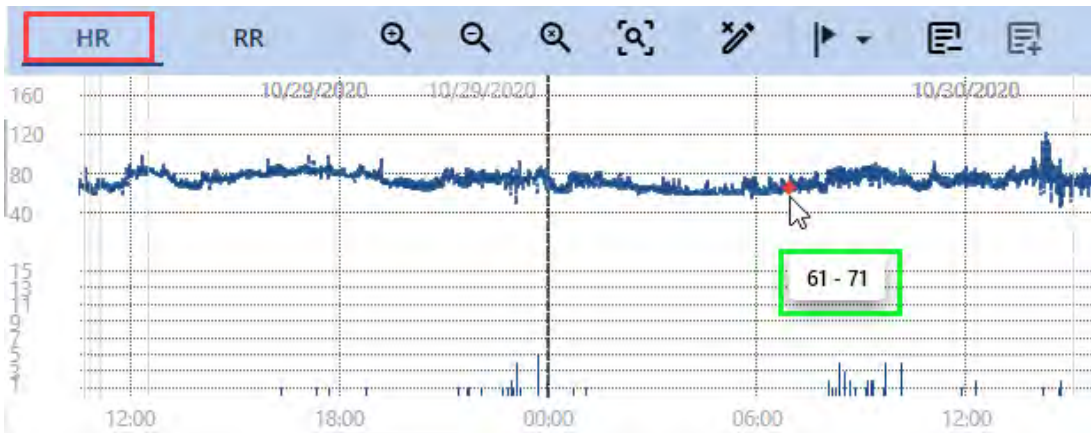


Figure 354. Events View - Trends View Toolbar







When hovering over any point on the graph within the **HR/RR Trends View**, a tooltip displays the heart rate or RR interval values.





Figure 355. Events View - HR-RR Text Box



**To toggle between HR and RR views in the Trends View:**

1. Click either the **HR** or **RR** button in the upper-left corner of the **Trends View**. The graph visualisation will change accordingly.

Icon	Description
	<b>Zoom In button:</b> Click to adjust the scale of the HR or RR graph in the <b>HR/RR Trends View</b> , focusing on specific areas of the graph. You can click this button multiple times.
	<b>Zoom Out button:</b> Click to adjust the scale of the HR or RR graph in the <b>HR/RR Trends View</b> . Use this button to zoom out if you have zoomed in previously, or to view adjacent areas of the graph. You can click this button multiple times.
	<b>Full Extent button:</b> Click to zoom out instantly and see the entire HR/RR Trends graph.
	<b>Zoom to Extent button:</b> Click to zoom in instantly to the selected area of the graph. The area will be displayed at the maximum available zoom.

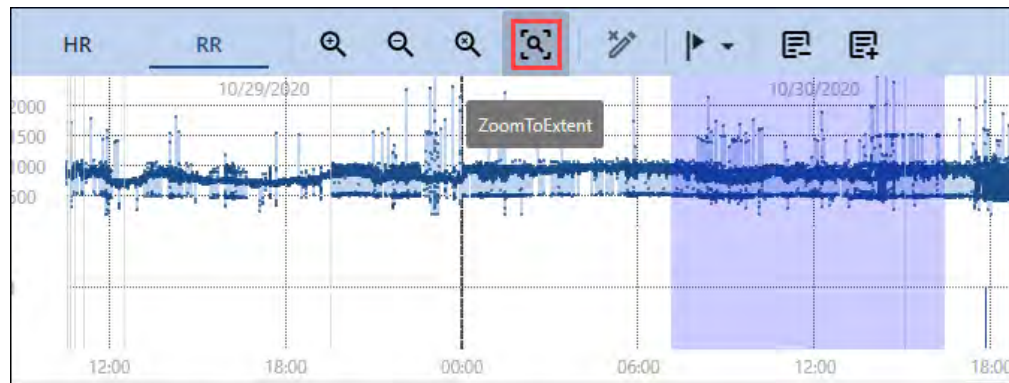
Icon	Description
	<b>Delete Beats button:</b> Click to delete beats within the selected area.
	<b>Create User Event button:</b> Allows you to create a new user event, located within the selected area. After adding a user event, the corresponding fragment of the ECG waveform will be recalculated, and some beats may change their annotations.
	<b>Exclude from analysis button:</b> Enables the exclusion of a selected fragment of an ECG record from analysis.
	<b>Include to analysis button:</b> Enables the re-inclusion of previously excluded fragments of an ECG record.

**To zoom into the selected area of the graph to its full extent:**

- Select the fragment you wish to exclude from analysis using one of the following methods:
  - **Using Ctrl +Click:**
    - Identify the initial point in the range you wish to select.
    - Hold down the **Ctrl** key.
    - Click the initial point.
    - Identify the final point in your desired range.
    - (Optional)** If you are zoomed in, you can move the graph strip by clicking and dragging it.
    - Drag the cursor to the final point and release the mouse button to complete the selection.
  - **Using the right mouse button:**
    - Click the **Trend View** graph and hold the right mouse button to designate the initial point in the range you wish to select.
    - Drag the cursor to set the final point.
    - (Optional)** If you are zoomed in, you can move the graph strip by clicking and dragging it.
    - Release the right mouse button to complete the range selection. A context menu will appear.
- Click the **Zoom To Extent** button. The selected fragment of graph will be instantly displayed with the maximum zoom.



Figure 356. Events View - Zoom To Extent Button



3. (Optionally) To revert the zoom, you may click the **Zoom Out** or the **Full Extent** buttons.

#### To delete beats:

1. Select a fragment, which you wish to delete, using one of the following methods:
  - Click an individual beat to select it.
  - Select a fragment of the graph using one of these methods:
    - **Using Ctrl +Click:**
      - a. Identify the initial point in the range you wish to select.
      - b. Hold down the **Ctrl** key.
      - c. Click the initial point.
      - d. Identify the final point in your desired range.
      - e. **(Optional)** If you are zoomed in, you can move the graph strip by clicking and dragging it.
      - f. Drag the cursor to the final point and release the mouse button to complete the selection.
    - **Using the right mouse button:**
      - a. Click the **Trend View** graph and hold the right mouse button to designate the initial point in the range you wish to select.
      - b. Drag the cursor to set the final point.
      - c. **(Optional)** If you are zoomed in, you can move the graph strip by clicking and dragging it.
      - d. Release the right mouse button to complete the range selection. A context menu will appear.

2. Click the **Delete Beats** button or select the option from the context menu.

Figure 357. Events View - Trends View Delete Beats

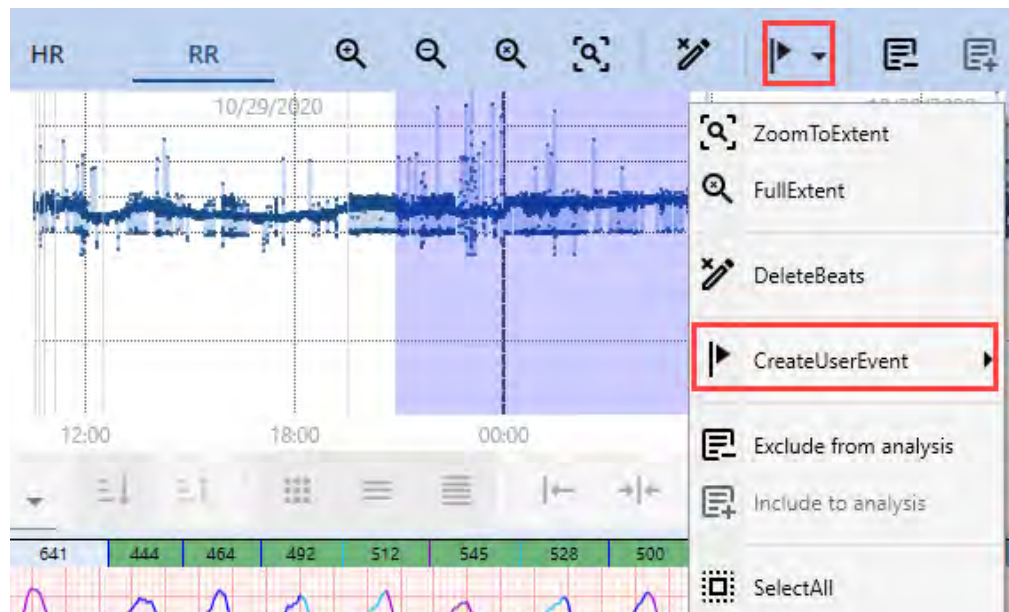


**To create a user event:**

1. Select a fragment of the graph, which you wish to reclassify as a continuous event, using one of the following methods:
  - Click an individual beat to select it.
  - Select a fragment of the graph using one of these methods:
    - **Using Ctrl +Click:**
      - a. Identify the initial point in the range you wish to select.
      - b. Hold down the **Ctrl** key.
      - c. Click the initial point.
      - d. Identify the final point in your desired range.
      - e. **(Optional)** If you are zoomed in, you can move the graph strip by clicking and dragging it.
      - f. Drag the cursor to the final point and release the mouse button to complete the selection.
    - **Using the right mouse button:**
      - a. Click the **Trend View** graph and hold the right mouse button to designate the initial point in the range you wish to select.
      - b. Drag the cursor to set the final point.

- c. **(Optional)** If you are zoomed in, you can move the graph strip by clicking and dragging it.
  - d. Release the right mouse button to complete the range selection. A context menu will appear.
2. Hover over the **Create User Event** button or menu option to expand the drop-down list.

Figure 358. Events View - Trends View Create User Event



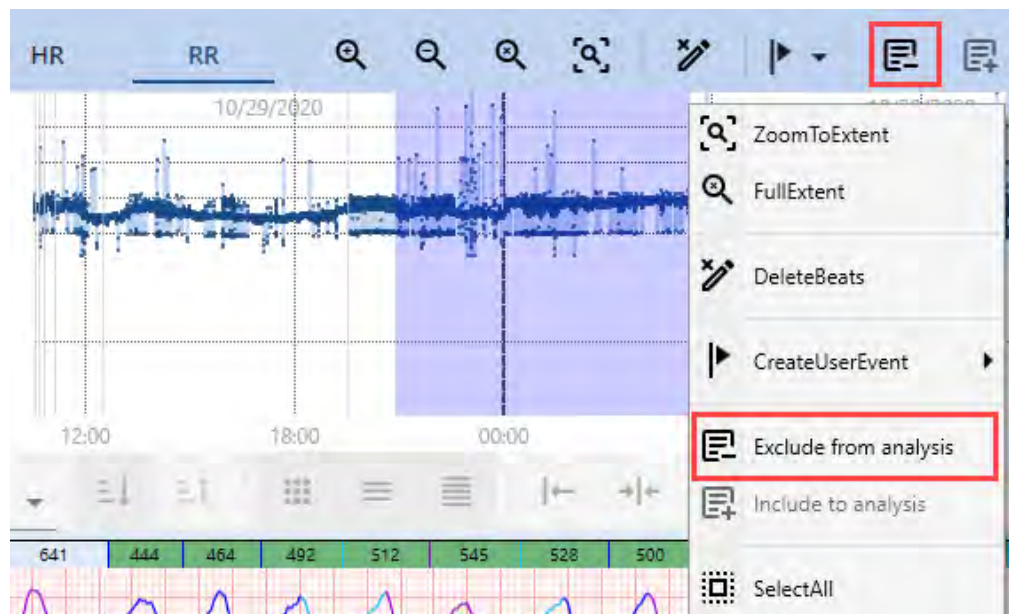
3. Click the relevant type of **Event** you wish to create in the selected area.

#### To exclude an ECG segment from analysis:

1. Select the fragment you wish to exclude from analysis using one of the following methods:
  - **Using Ctrl +Click:**
    - a. Identify the initial point in the range you wish to select.
    - b. Hold down the **Ctrl** key.
    - c. Click the initial point.
    - d. Identify the final point in your desired range.
    - e. **(Optional)** If you are zoomed in, you can move the graph strip by clicking and dragging it.
    - f. Drag the cursor to the final point and release the mouse button to complete the selection.
  - **Using the right mouse button:**

- a. Click the **Trend View** graph and hold the right mouse button to designate the initial point in the range you wish to select.
  - b. Drag the cursor to set the final point.
  - c. **(Optional)** If you are zoomed in, you can move the graph strip by clicking and dragging it.
  - d. Release the right mouse button to complete the range selection. A context menu will appear.
2. Click the **Exclude from Analysis** button or select the same option from the context menu.

Figure 359. Events View - Trends View Exclude from analysis



To re-include an ECG segment into analysis:



**Note:**

The range you wish to re-include should fully overlap a previously excluded fragment. If it does not overlap an excluded area, the **Include to analysis** button and option remain inactive.

Figure 360. Events View - Trends View Include to analysis



1. Select the fragment you wish to re-include using one of the following methods:
  - **Using Ctrl +Click:**
    - a. Identify the initial point in the range you wish to select.
    - b. Hold down the **Ctrl** key.
    - c. Click the initial point.
    - d. Identify the final point in your desired range.
    - e. **(Optional)** If you are zoomed in, you can move the graph strip by clicking and dragging it.
    - f. Drag the cursor to the final point and release the mouse button to complete the selection.
  - **Using the right mouse button:**
    - a. Click the **Trend View** graph and hold the right mouse button to designate the initial point in the range you wish to select.
    - b. Drag the cursor to set the final point.
    - c. **(Optional)** If you are zoomed in, you can move the graph strip by clicking and dragging it.
    - d. Release the right mouse button to complete the range selection. A context menu will appear.
2. Click the **Include to analysis** button or select the option from the context menu.

## Context Menu Features

The **Context Menu**, accessible via right-click, enables quick and easy access to common actions found on the **HR/RR Trends View Toolbar**.

The **Context Menu** contains identical features to the **HR/RR Trends View Toolbar**.

The sole distinction between the **Context Menu** and the **HR/RR Trends View Toolbar** is the presence of the **Select All** feature. Utilize this option in the menu to select the entire graph.

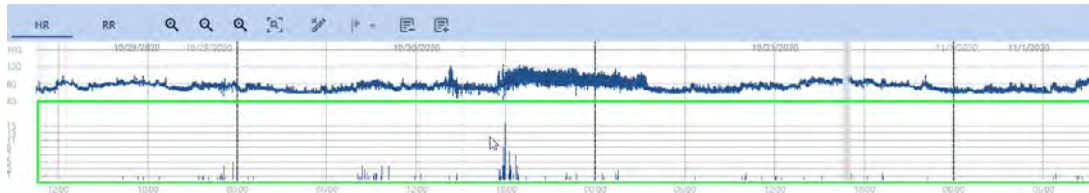
Figure 361. Events View - Trends View Context Menu



## Histogram

Below the **Trend View**, you can see the **Histogram Panel**, showcasing the number of occurrences of the selected arrhythmia type. The **Histogram Panel** adds an additional visual dimension, enhancing the ECG analysis process.

Figure 362. Events View - Histogram



## Strip View

The ECG **Strip View** is displayed in the bottom pane of the **Templates View** and in the **Edit Templates Mode**. It is also displayed in the **Events, Page, and Graphs Views**. The **Strip View** presents detailed data for the currently selected beat, as well as the adjacent ECG signal. Typically, the strip displays 12 to 16 seconds of ECG signal, depending on the monitor characteristics and ECG paper speed settings. You can utilize the **Strip View** for detailed analysis, measurements, beat reclassification, user event creation, and more.



Figure 363. Strip View - Strip View

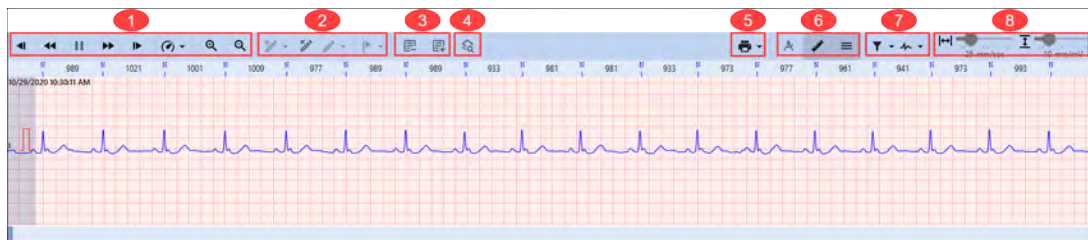
**Note:**

The ECG Strip grid is scaled accurately to millimeters, irrespective of the computer or monitor size in use. The **NH-301 Holter** analysis system automatically adjusts all application windows to align with the computer's graphical settings and monitor capabilities. This feature enables you to use any measuring tool, including specialized ECG rulers like the **Norav Medical ECG ruler**, to measure amplitude, cycles, frequency, and RR intervals.

## Strip View Toolbar

The toolbar at the top of the **Strip View** contains various controls that facilitate the scanning and reviewing of the ECG signal within the **Strip View** itself. For ease of understanding, these controls are organized into distinct groups of interface elements:

Figure 364. Page View - Strip View Toolbar



1. General Controls.
2. Beats and Events Controls.
3. Analysis Controls.
4. Views Switching Controls.
5. Printing Control.
6. Measuring Controls.
7. Filters.
8. Scale and Gain Controls.

## General Controls

**General Controls** is a group of buttons designed to facilitate efficient ECG Strip scanning and review within the **Strip View**.

Icon	Description
	<b>Step Backward button:</b> Click to move the ECG Strip one step backward for scanning and reviewing.
	<b>Scan Backward button:</b> Click to initiate continuous backward scanning of the ECG Strip.
	<b>Pause Scan button:</b> Click to halt continuous scanning of the ECG Strip. For example, if you have activated a <b>Scan Backward</b> or a <b>Scan Forward</b> button, halt scanning by clicking the <b>Pause Scan</b> button.
	<b>Scan Forward button:</b> Click to initiate continuous forward scanning of the ECG Strip.
	<b>Step Forward button:</b> Click to move the ECG Strip one step forward for scanning and reviewing.
	<b>Scan Speed button:</b> Allows you to control the scanning speed. To set the scanning speed: <ol style="list-style-type: none"> <li>1. Hover over the <b>Scan Speed</b> icon to expand the drop-down list.</li> <li>2. Click the desired scanning speed multiplier, ranging from <math>\times 1</math> to <math>\times 128</math>.</li> </ol>
	<b>Zoom In button:</b> Click to adjust the scale of the waveform in the <b>Strip View</b> , focusing on specific areas or comparing different fragments of the ECG record.
	<b>Zoom Out button:</b> Click to adjust the scale of the waveform in the <b>Strip View</b> . Use this button to zoom out if you had zoomed in earlier, or to view adjacent beats and fragments of the ECG Records.







### Note:

You can also click and hold the strip to drag it sideways, allowing you to view adjacent beats and ECG fragments.

## Beats and Events Controls

**Beats and Events Controls** is a group of buttons that facilitate beats and events management in the **Strip View**.

Icon	Description
	<b>Insert Beat button:</b> Allows you to insert new beats between existing ones. Further instructions are presented below.
	<b>Delete Beats button:</b> Click to delete a selected beat.
	<b>Change Beats Annotation button:</b> Enables you to modify the annotation of selected beats.
	<b>Create User Event button:</b> Allows you to create a new user event, located at the selected beat or ECG fragment. After adding a user event, the corresponding fragment of the ECG waveform will be recalculated, and some beats may shift between templates. Further instructions are presented below.

By default, when you click the **Strip View**, you select an entire beat. Inserting a beat is not equivalent to beat reclassification, so it requires an alternative method for selecting a position in the **Strip View**.

#### To insert a beat:

1. Select a position in the **Strip View** using one of these methods:
  - Press Alt+Click in the **Strip View**: A vertical dotted line will, marking the desired position.
  - Press your mouse wheel in the **Strip View**: A vertical dotted line will appear, marking the desired position.
  - Press Alt+Right Click in the **Strip View**: A vertical dotted line will appear to mark the desired position. Alongside the dotted line, a context menu will also expand, simplifying access to the **Insert Beat** option. **Note:** this key combination expands the context menu with only one option available — **Insert Beat**.
2. Hover over the **Insert Beat** button in the **Strip View Toolbar** to expand the drop-down list.

Figure 365. Strip View - Inserting Beats



3. Click the appropriate type of morphology for the insertion. The NH-301 software will automatically determine which fragment of the waveform to use for this purpose. A specific segment of the ECG waveform in the **Strip View** will immediately change color.

#### To delete beats:

1. Select a fragment of the ECG, which you wish to delete, using one of the following methods:
  - Click an individual beat to select it.
  - Select a fragment of the waveform using one of these methods:
    - **Using Shift + Click:**
      - a. Identify the initial point in the range you wish to select.
      - b. Click the initial point.
      - c. Hold down the **Shift** key.
      - d. Identify the final point in the range.
      - e. **(Optional)** [Scan the Strip View \(on page 233\)](#) to locate the points of interest, if necessary.
      - f. Click the final point to complete the range selection.
    - **Using Ctrl +Click:**
      - a. Identify the initial point in the range you wish to select.
      - b. Hold down the **Ctrl** key.
      - c. Click the initial point.
      - d. Identify the final point in your desired range.

- e. **(Optional)** [Scan the Strip View \(on page 233\)](#) to locate the points of interest, if necessary.
  - f. Drag the cursor to the final point and release the mouse button to complete the selection.
- **Using the right mouse button:**
- a. Click the **Strip View** and hold the right mouse button to designate the initial point in the range you wish to select.
  - b. Drag the cursor to set the final point.
  - c. **(Optional)** [Scan the Strip View \(on page 233\)](#) to locate the points of interest, if necessary.
  - d. Release the right mouse button to complete the range selection. A context menu will appear.

Figure 366. Strip View - Deleting Beats



2. Click the **Delete Beats** button.

**To change beat annotation:**

1. Select a fragment of the ECG, which you wish to reclassify, using one of the following methods:
  - Click an individual beat to select it.
  - Select a fragment of the waveform using one of these methods:

▪ **Using Shift + Click:**

- a. Identify the initial point in the range you wish to select.
- b. Click the initial point.
- c. Hold down the **Shift** key.
- d. Identify the final point in the range.
- e. **(Optional)** [Scan the Strip View \(on page 233\)](#) to locate the points of interest, if necessary.
- f. Click the final point to complete the range selection.

▪ **Using Ctrl +Click:**

- a. Identify the initial point in the range you wish to select.
- b. Hold down the **Ctrl** key.
- c. Click the initial point.
- d. Identify the final point in your desired range.
- e. **(Optional)** [Scan the Strip View \(on page 233\)](#) to locate the points of interest, if necessary.
- f. Drag the cursor to the final point and release the mouse button to complete the selection.

▪ **Using the right mouse button:**

- a. Click the **Strip View** and hold the right mouse button to designate the initial point in the range you wish to select.
- b. Drag the cursor to set the final point.
- c. **(Optional)** [Scan the Strip View \(on page 233\)](#) to locate the points of interest, if necessary.
- d. Release the right mouse button to complete the range selection. A context menu will appear.








Figure 367. Changing Beats Annotation





2. Hover over the **Change Beats Annotation** button in the **Strip View Toolbar** to expand the drop-down list.
3. Click the appropriate type of morphology for the beat you wish to reclassify. Alternatively, you may utilize keyboard shortcuts as outlined in the table below. The selected beat in the **Strip View** will immediately change color.

**Table 5. Beats Reclassification Keyboard****Shortcuts for Strip View**

Action	But-ton	Keyboard Keys
Classify as <b>Normal</b>		N
Classify as <b>R on T</b>		R
Classify as <b>Fusion</b>		F
Classify as <b>VPB</b>		V
Classify as <b>SVE</b>		S

**Table 5. Beats Reclassification Keyboard****Shortcuts for Strip View (continued)**

Action	But- ton	Keyboard Keys
Classify as <b>Questionable</b>		<b>X</b>
Classify <b>Paced</b>		<b>P</b>

**To create a user event:**

1. Select a fragment of the ECG, which you wish to reclassify as a continuous event, using one of the following methods:

- Click an individual beat to select it.
- Select a fragment of the waveform:

- **Using Shift + Click:**

- a. Identify the initial point in the range you wish to select.
- b. Click the initial point.
- c. Hold down the **Shift** key.
- d. Identify the final point in the range.
- e. **(Optional)** [Scan the Strip View \(on page 233\)](#) to locate the points of interest, if necessary.
- f. Click the final point to complete the range selection.

- **Using Ctrl +Click:**

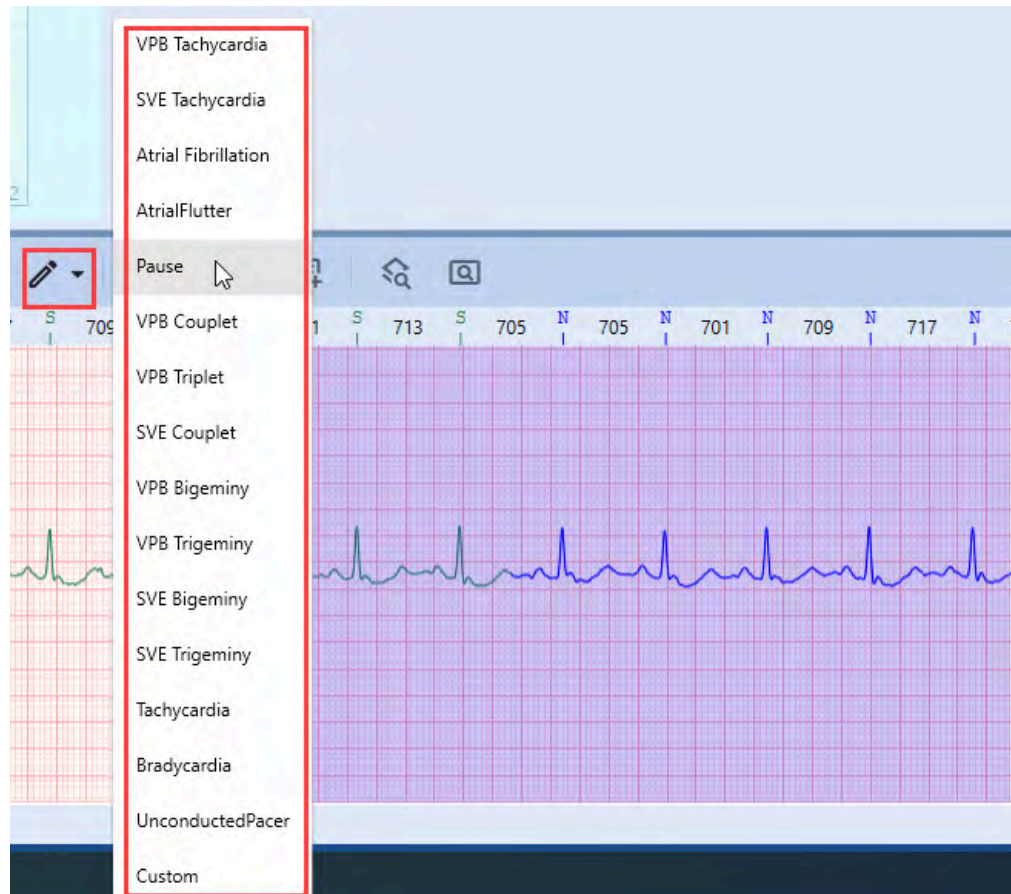
- a. Identify the initial point in the range you wish to select.
- b. Hold down the **Ctrl** key.
- c. Click the initial point.
- d. Identify the final point in your desired range.
- e. **(Optional)** [Scan the Strip View \(on page 233\)](#) to locate the points of interest, if necessary.
- f. Drag the cursor to the final point and release the mouse button to complete the selection.

- **Using the right mouse button:**

- a. Click the **Strip View** and hold the right mouse button to designate the initial point in the range you wish to select.
- b. Drag the cursor to set the final point.

- c. **(Optional)** [Scan the Strip View \(on page 233\)](#) to locate the points of interest, if necessary.
- d. Release the right mouse button to complete the range selection. A context menu will appear.

Figure 368. Strip View - Creating User Event




2. Hover over the **Create User Event** button or menu option to expand the drop-down list.
3. Click the relevant type of **Event** you wish to create in the selected area.

### Analysis Controls

Analysis Controls is a group of buttons that enable you to exclude or re-include specific fragments of the ECG recording within the Strip View.

Icon	Description
	<b>Exclude from analysis button:</b> Enables the exclusion of a selected fragment of an ECG record from analysis.

Icon	Description
	<b>Include to analysis button:</b> Enables the re-inclusion of previously excluded fragments of an ECG record.

**To exclude an ECG segment from analysis:**

1. Select the ECG fragment you wish to exclude from analysis using one of the following methods:

- **Using Shift + Click:**

- a. Identify the initial point in the range you wish to select.
- b. Click the initial point.
- c. Hold down the **Shift** key.
- d. Identify the final point in the range.
- e. **(Optional)** [Scan the Strip View \(on page 233\)](#) to locate the points of interest, if necessary.
- f. Click the final point to complete the range selection.

- **Using Ctrl +Click:**

- a. Identify the initial point in the range you wish to select.
- b. Hold down the **Ctrl** key.
- c. Click the initial point.
- d. Identify the final point in your desired range.
- e. **(Optional)** [Scan the Strip View \(on page 233\)](#) to locate the points of interest, if necessary.
- f. Drag the cursor to the final point and release the mouse button to complete the selection.

- **Using the right mouse button:**

- a. Click the **Strip View** and hold the right mouse button to designate the initial point in the range you wish to select.
- b. Drag the cursor to set the final point.
- c. **(Optional)** [Scan the Strip View \(on page 233\)](#) to locate the points of interest, if necessary.
- d. Release the right mouse button to complete the range selection. A context menu will appear.

Figure 369. Strip View - Excluding from analysis



2. Click the **Exclude from Analysis** button or select the same option from the context menu.

#### To re-include an ECG segment into analysis:



#### Note:

The range you wish to re-include should fully overlap a previously excluded fragment. If it does not overlap an excluded area, the **Include to analysis** button and option remain inactive.

Figure 370. Page View - Include to analysis Overlap Condition



1. Select a fragment of the ECG, you want to re-include to analysis, using one of the following methods:

- **Using Shift + Click:**

- a. Identify the initial point in the range you wish to select.
- b. Click the initial point.

- c. Hold down the **Shift** key.
- d. Identify the final point in your desired range.
- e. **(Optional)** [Scan the Strip View \(on page 233\)](#) to locate the points of interest, if necessary.
- f. Click the final point to complete the range selection.
- **Using Ctrl +Click:**
  - a. Identify the initial point in the range you wish to select.
  - b. Hold down the **Ctrl** key.
  - c. Click the initial point.
  - d. Identify the final point in your desired range.
  - e. **(Optional)** [Scan the Strip View \(on page 233\)](#) to locate the points of interest, if necessary.
  - f. Drag the cursor to the final point and release the mouse button to complete the selection.
- **Using the right mouse button:**
  - a. Click the **Strip View** and hold the right mouse button to designate the initial point in the range you wish to select.
  - b. Drag the cursor to set the final point.
  - c. **(Optional)** [Scan the Strip View \(on page 233\)](#) to locate the points of interest, if necessary.
  - d. Release the right mouse button to complete the range selection. A context menu will appear.

Figure 371. Strip View - Including to analysis



2. Click the **Include to analysis** button or select the option from the context menu.



## Views Switching Controls

**Views Switching Controls** is a group of buttons that allows you to focus on a single beat you have selected in the **Strip View**, in the **Templates View** and **Page View**. This functionality enhances analysis quality and efficiency.



Icon	Description
	<b>Show In Templates button:</b> Click this button to display the beat you have selected in the <b>Strip View</b> ; it will be highlighted in the relevant template within the <b>Templates Pane</b> .
	<b>Show in Page:</b> Facilitates an immediate switch to <b>Page View</b> , revealing the precise location of the chosen beat within this particular <b>Template</b> in both the <b>Signal Page</b> and the <b>ECG Strip</b> .

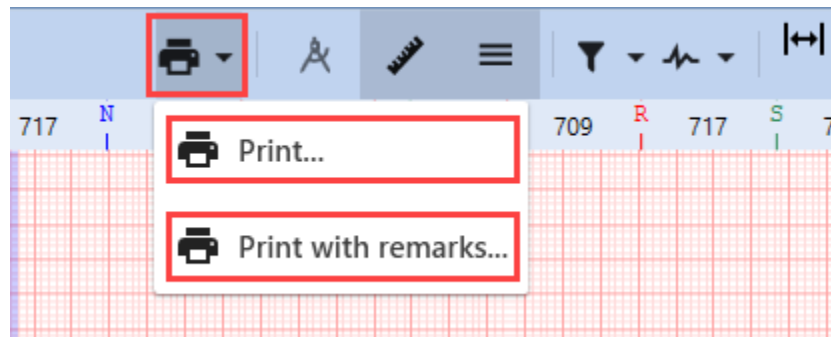
Figure 372. Strip View - Show In Templates



## Printing Control

This button enables you to print a fragment of the ECG **Strip**. The printed copy will include a segment that fits the output format. The baseline of the printed version mirrors the center line of the Strip visible on your PC screen. The printed ECG Strip will accommodate as much ECG data as possible from the visible area around the center line.

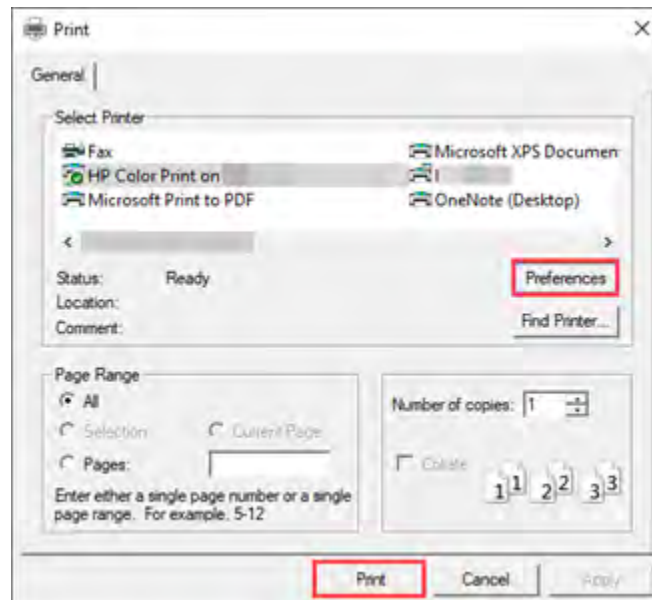
Figure 373. Strip View - Printing Strip



To print a fragment of the waveform in the **Strip View**:

1. Identify the area you want to print.
2. **(Optional)** [Scan the Strip View \(on page 233\)](#) to locate the desired area, if needed.
3. Hover over the **Printing Control** button to expand the drop-down list.
4. Click the **Print** option and navigate to the Print dialog box:

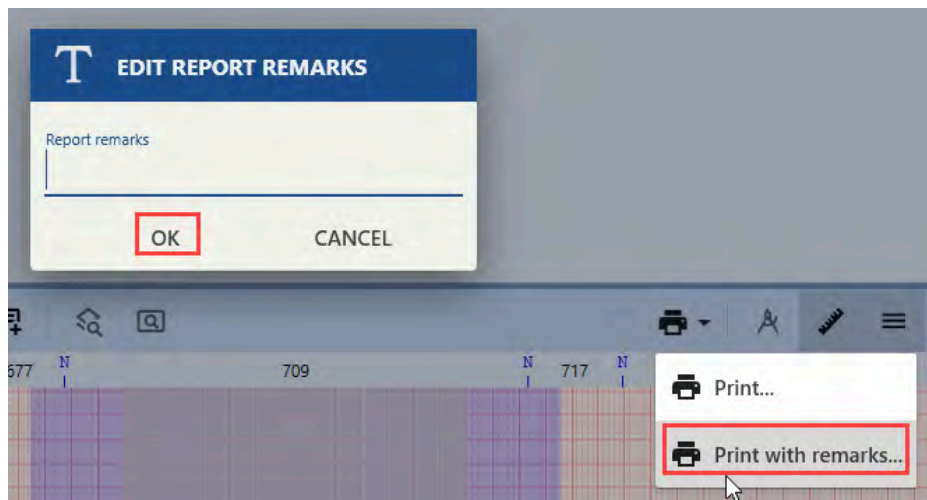
Figure 374. Strip View - Printing Dialog Box



- a. Choose a printer **available** in the **Select Printer** window.
- b. Adjust other preferences according to your needs.
- c. Click **Print** at the bottom of the dialog box to execute the printing of the waveform fragment.
5. **(Optional)** Click the **Print with remarks** option if you want to print a fragment of the waveform with your remarks:

- a. Complete the "Report remarks" field in the **Edit Report Remarks** pop-up.



Figure 375. Strip View - Printing with Remarks



- b. When you complete with filling in you remarks, click OK.  
 c. **(Optional)**Click **Cancel** to abandon this action.  
 d. Choose a printer available in the **Select Printer** window.  
 e. Adjust other preferences according to your needs.  
 f. Click **Print** at the bottom of the dialog box to execute the printing of the waveform fragment.

## Measuring Controls

**Measuring Controls** is a group of buttons designed to facilitate the indication and measurement of various waveform parameters within the **Strip View**. Namely, the most important tool in this group of controls is the **Caliper** tool. It allows you to measure different intervals and amplitudes on the ECG strip, which can be used to diagnose and assess a variety of heart conditions. We will explain [how to use the Caliper for ECG measurments \(on page 193\)](#) in the following sections.

Icon	Description
	<b>Caliper toggle:</b> Click to toggle <b>ON/OFF</b> the <b>Caliper</b> tool. The <b>Caliper</b> tool assists with measuring intervals and amplitudes, such as the RR interval, T-wave, and QRS complex amplitudes. Refer to the <a href="#">Measuring ECG with Caliper (on page 193)</a> section for details.
	<b>ECG Ruler toggle:</b> Click to toggle <b>ON/OFF</b> the <b>ECG Ruler</b> , located right below the <b>Strip View Tool-bar</b> . The <b>ECG Ruler</b> indicates the duration of RR intervals for adjacent beats and their morphology classification (i.e., N, R, F, V, etc.).


Icon	Description
	<b>Channel Numeration toggle:</b> Click to toggle <b>ON/OFF</b> the channel numeration on the left side of the ECG Strip.

Figure 376. Strip View - Caliper Tool



Figure 377. Strip View - ECG Ruler





Figure 378. Strip View - Channel Numeration



## Filters

This group of controls allows you to apply various filters affecting beat visualization and enhancing the accuracy and reliability of ECG analysis.

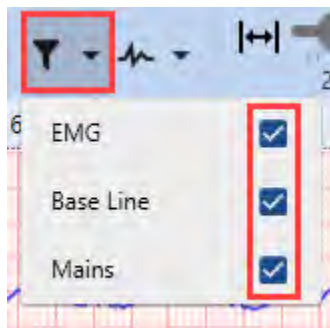
Icons	Description
	<b>Filter:</b> This control enables you to toggle <b>ON/OFF</b> the visualization of the waveform with applied <b>EMG</b> , <b>Base Line</b> , and <b>Mains</b> filters. To activate or deactivate these filters, select or deselect any number of checkboxes from the drop-down list. These filters improve the accuracy and reliability of ECG analysis.

Icons	Description
	<b>Channel Selection:</b> This control lets you select the channel(s) for display within the <b>Strip View</b> , using the drop-down list (up to 12 channels, depending on the number of channels in the current <b>Record</b> ).

To toggle filters **ON/OFF**:

1. Hover over the **Filter** drop-down list to expand it.

Figure 379. Strip View - Toggling Filters



2. Select the filter you wish to toggle. The visualization of the waveform will change immediately.

It is recommended to keep filters **ON** to provide accurate analysis:

- **EMG filter:** Eliminates high-frequency ECG signal components.
- **Baseline filter:** Removes low-frequency ECG signal components.
- **Mains filter:** Eradicates 50 or 60 Hz power line interference. This interference can be caused by the electrical equipment in the environment.

To toggle the visualization of channels within the Strip:

1. Hover over the **Channel Selection** drop-down list to expand it.

Figure 380. Strip View - Toggling Channels



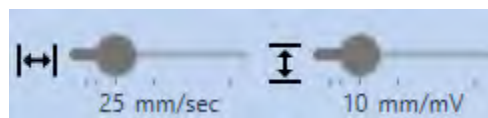
2. Select filters you wish to toggle. The visualization of the Strip will change immediately.

Toggling **ON/OFF** ECG channels enhances the accuracy and efficiency of ECG analysis. This feature allows you to focus on specific channels, compare them, filter out noise and more.

### Scale and Gain Controls

This group of controls enables you to adjust the paper speed and amplitude, affecting beat visualization and enhancing the accuracy and reliability of ECG analysis.

Figure 381. Template Edit - Scale and Gain Controls



### To change the paper speed:

1. Drag the slider to your desired position, setting the paper speed within the range from 6.25 up to 100 mm/sec. The visualization within the Strip will change immediately.



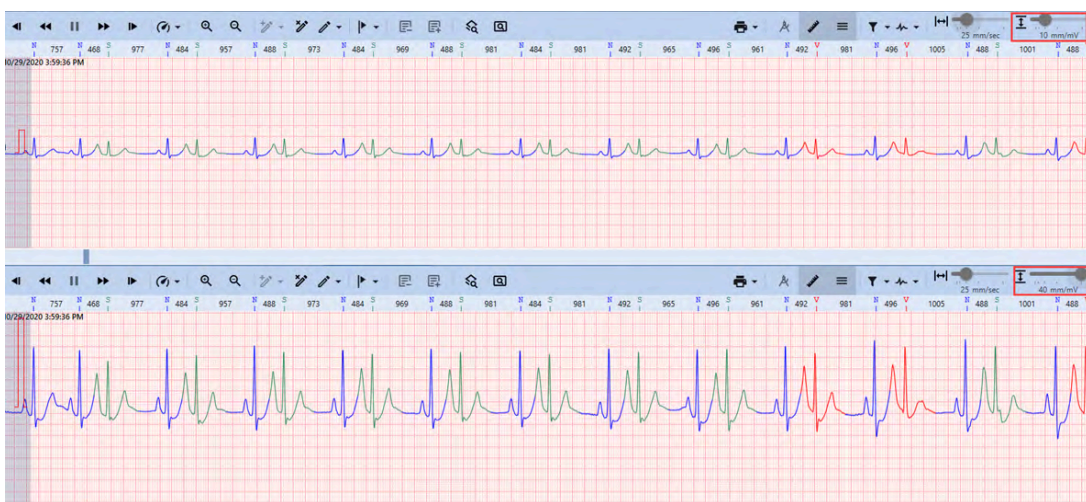
Figure 382. Strip View - Setting Paper Speed



### To change the amplitude:

1. Drag the slider to your desired position, setting the amplitude within the range from 2.5 up to 40 mm/mV. The visualization within the Strip will change immediately.

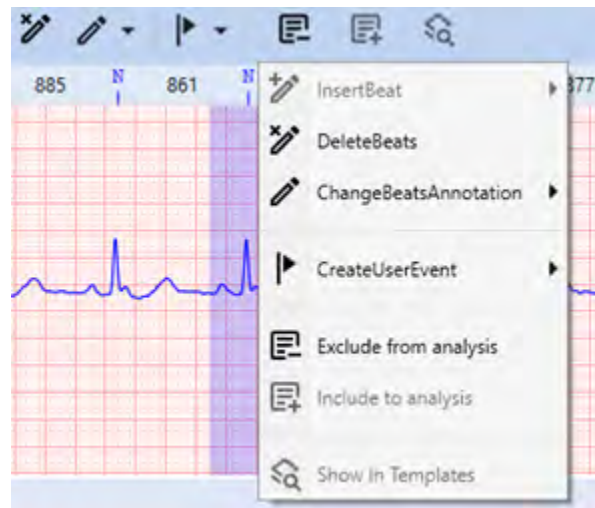
Figure 383. Strip View - Setting Amplitude



## Context Menu Features

A **Context Menu**, accessible via right-click, enables you to quickly and easily access common actions, such as inserting or deleting beats, changing annotations, creating user events, etc.

Figure 384. Strip View - Context Menu



### Insert Beat

Allows you to insert new beats between existing ones:

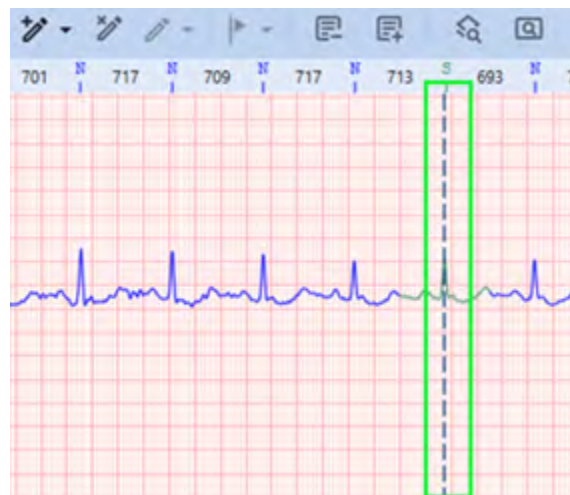


#### Note:

By default, when you click the **Strip View**, you select an entire beat. Inserting a beat is not equivalent to beat reclassification, so it requires an alternative method for selecting a position in the **Strip View**.

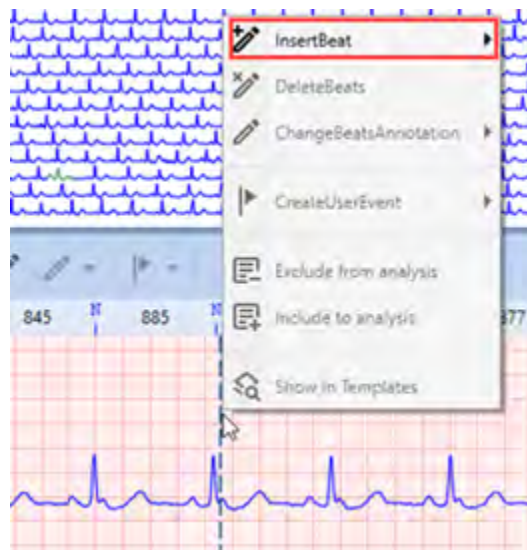
1. Select a position in the **Strip View** using one of these methods:

Figure 385. Strip View - Positioning Beat



- Hold Alt and click in the **Strip View**: A vertical dotted line will, marking the desired position. While holding Alt, click the right mouse button to expand the context menu.
  - Press your mouse wheel in the **Strip View**: A vertical dotted line will appear, marking the desired position. Click again and hold the mouse wheel, and then press the right mouse button to expand the context menu.
  - Press Alt+Right Click in the **Strip View**: A vertical dotted line will appear to mark the desired position. Alongside the dotted line, a context menu will expand, simplifying access to the **Insert Beat** option.
2. Hover over the **Insert Beat** option in the **Context Menu** to expand the drop-down list.

Figure 386. Strip View - Insert Beat



3. Click the appropriate type of morphology for the insertion. The NH-301 software will automatically determine which fragment of the waveform to use for this purpose. A specific segment of the ECG waveform in the **Strip View** will immediately change color.

### Delete Beats

Allows you to delete a selected beat or a fragment of a waveform:

1. Select a fragment of the ECG, which you wish to delete, using one of the following methods:
  - Click an individual beat to select it. Right-click the selected fragment to expand the context menu.
  - Select a fragment of the waveform using one of these methods:

▪ **Using Shift + Click:**

- a. Identify the initial point in the range you wish to select.
- b. Click the initial point.
- c. Hold down the **Shift** key.
- d. Identify the final point in the range.
- e. **(Optional)** [Scan the Strip View \(on page 164\)](#) to locate the points of interest, if necessary.
- f. Click the final point to complete the range selection.
- g. Right-click the selected fragment to expand the context menu.

▪ **Using Ctrl +Click:**

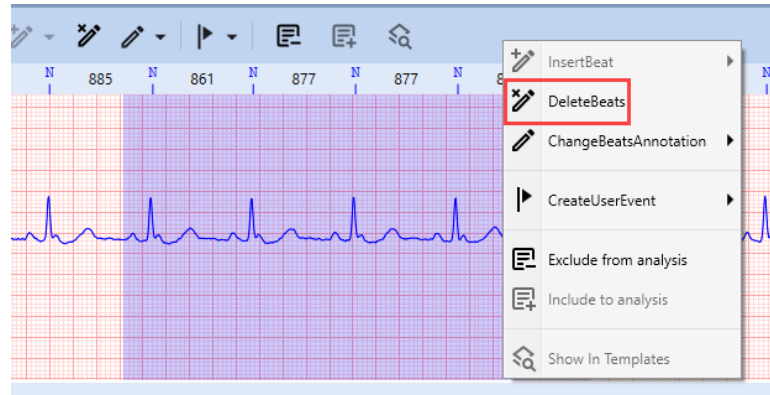
- a. Identify the initial point in the range you wish to select.
- b. Hold down the **Ctrl** key.
- c. Click the initial point.
- d. Identify the final point in your desired range.
- e. **(Optional)** [Scan the Strip View \(on page 164\)](#) to locate the points of interest, if necessary.
- f. Drag the cursor to the final point and release the mouse button to complete the selection.
- g. Right-click the selected fragment to expand the context menu.

▪ **Using the right mouse button:**

- a. Click the **Strip View** and hold the right mouse button to designate the initial point in the range you wish to select.
- b. Drag the cursor to set the final point.
- c. **(Optional)** [Scan the Strip View \(on page 164\)](#) to locate the points of interest, if necessary.

- d. Release the right mouse button to complete the range selection. A context menu will appear.

Figure 387. Strip View - Delete Beats



2. Click the **Delete Beats** option in the context menu. The system will automatically recalculate events and templates following the deletion.

### Change Beats Annotation

Enables you to modify the annotation of the selected beat:

1. Select a fragment of the ECG, which you wish to delete, using one of the following methods:
  - Click an individual beat to select it. Right-click the selected fragment to expand the context menu.
  - Select a fragment of the waveform using one of these methods:
    - **Using Shift + Click:**
      - a. Identify the initial point in the range you wish to select.
      - b. Click the initial point.
      - c. Hold down the **Shift** key.
      - d. Identify the final point in the range.
      - e. **(Optional)** [Scan the Strip View \(on page 164\)](#) to locate the points of interest, if necessary.
      - f. Click the final point to complete the range selection.
      - g. Right-click the selected fragment to expand the context menu.
    - **Using Ctrl +Click:**
      - a. Identify the initial point in the range you wish to select.
      - b. Hold down the **Ctrl** key.
      - c. Click the initial point.
      - d. Identify the final point in your desired range.

e. **(Optional)** [Scan the Strip View \(on page 164\)](#) to locate the points of interest, if necessary.

f. Drag the cursor to the final point and release the mouse button to complete the selection.

g. Right-click the selected fragment to expand the context menu.

• **Using the right mouse button:**

a. Click the **Strip View** and hold the right mouse button to designate the initial point in the range you wish to select.

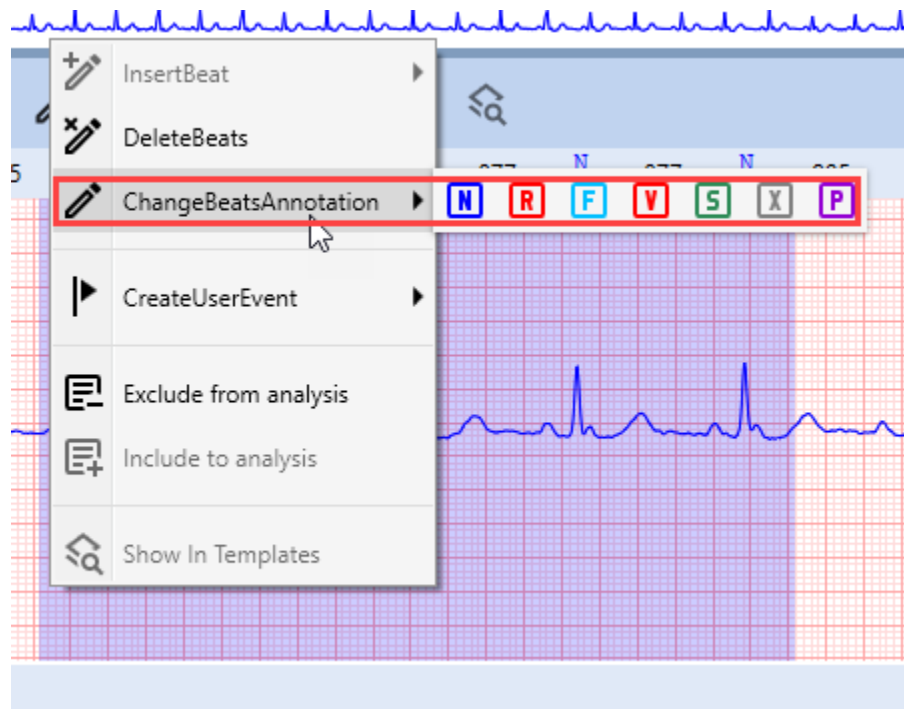
b. Drag the cursor to set the final point.

c. **(Optional)** [Scan the Strip View \(on page 164\)](#) to locate the points of interest, if necessary.

d. Release the right mouse button to complete the range selection. A context menu will appear.

2. Hover over the **Change Beats Annotation** option in the context menu to expand the drop-down list.








Figure 388. Strip View - Change Beats Annotation



3. Click the appropriate type of morphology for the beats you wish to reclassify. Alternatively, you may utilize keyboard shortcuts as outlined in the table below. Reclassified beats in the **Strip View** will immediately change color.



**Table 6. Beats Reclassification Keyboard****Shortcuts for Strip View**

Action	But- ton	Keyboard Keys
Classify as <b>Normal</b>		<b>N</b>
Classify as <b>R on T</b>		<b>R</b>
Classify as <b>Fusion</b>		<b>F</b>
Classify as <b>VPB</b>		<b>V</b>
Classify as <b>SVE</b>		<b>S</b>
Classify as <b>Questionable</b>		<b>X</b>
Classify <b>Paced</b>		<b>P</b>

**Create User Event**

Allows you to create a new user event, located at the selected beat or ECG fragment. After adding a user event, the corresponding fragment of the ECG waveform will be recalculated, and some beats may shift between templates.

1. Select a fragment of the ECG, which you wish to reclassify as a continuous event, using one of the following methods:
  - Click an individual beat to select it. Right-click the selected fragment to expand the context menu.
  - Select a fragment of the waveform using one of these methods:
    - **Using Shift + Click:**
      - a. Identify the initial point in the range you wish to select.
      - b. Click the initial point.
      - c. Hold down the **Shift** key.
      - d. Identify the final point in the range.
      - e. **(Optional)** [Scan the Strip View \(on page 164\)](#) to locate the points of interest, if necessary.

- f. Click the final point to complete the range selection.
- g. Right-click the selected fragment to expand the context menu.

▪ **Using Ctrl +Click:**

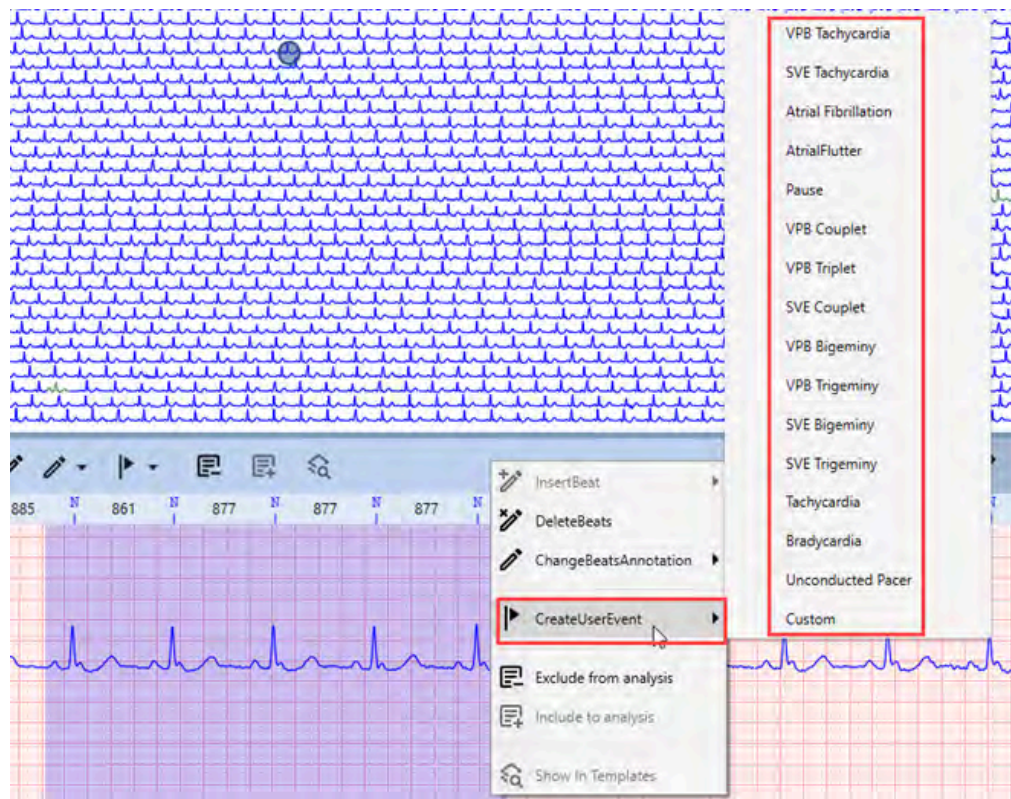
- a. Identify the initial point in the range you wish to select.
- b. Hold down the **Ctrl** key.
- c. Click the initial point.
- d. Identify the final point in your desired range.
- e. **(Optional)** [Scan the Strip View \(on page 164\)](#) to locate the points of interest, if necessary.
- f. Drag the cursor to the final point and release the mouse button to complete the selection.
- g. Right-click the selected fragment to expand the context menu.

▪ **Using the right mouse button:**

- a. Click the **Strip View** and hold the right mouse button to designate the initial point in the range you wish to select.
- b. Drag the cursor to set the final point.
- c. **(Optional)** [Scan the Strip View \(on page 164\)](#) to locate the points of interest, if necessary.
- d. Release the right mouse button to complete the range selection. A context menu will appear.

2. Hover over the **Create User Event** option to expand the drop-down list.

Figure 389. Strip View - Create User Event



3. Click the relevant type of **Event** you wish to create in the selected area.

### Exclude from analysis

Enables the exclusion of a selected fragment of an ECG record from analysis:

1. Select the ECG fragment you wish to exclude from analysis using one of the following methods:

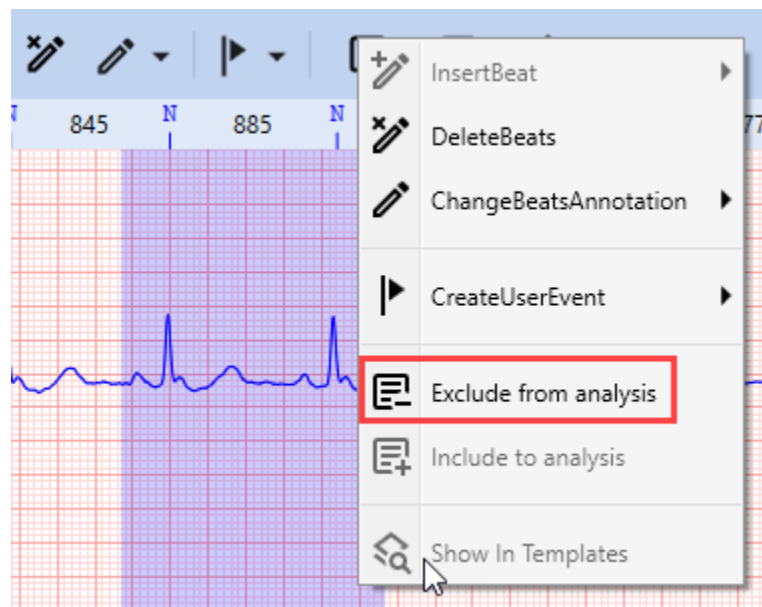
- **Using Shift + Click:**

- a. Identify the initial point in the range you wish to select.
- b. Click the initial point.
- c. Hold down the **Shift** key.
- d. Identify the final point in the range.
- e. **(Optional)** [Scan the Strip View \(on page 164\)](#) to locate the points of interest, if necessary.
- f. Click the final point to complete the range selection.
- g. Right-click the selected fragment to expand the context menu.

- **Using Ctrl +Click:**

- a. Identify the initial point in the range you wish to select.
  - b. Hold down the **Ctrl** key.
  - c. Click the initial point.
  - d. Identify the final point in your desired range.
  - e. **(Optional)** [Scan the Strip View \(on page 164\)](#) to locate the points of interest, if necessary.
  - f. Drag the cursor to the final point and release the mouse button to complete the selection.
  - g. Right-click the selected fragment to expand the context menu.
- **Using the right mouse button:**
- a. Click the **Strip View** and hold the right mouse button to designate the initial point in the range you wish to select.
  - b. Drag the cursor to set the final point.
  - c. **(Optional)** [Scan the Strip View \(on page 164\)](#) to locate the points of interest, if necessary.
  - d. Release the right mouse button to complete the range selection. A context menu will appear.

Figure 390. Strip View - Exclude from analysis



2. Click the **Exclude from Analysis** option in the context menu.

### Include to analysis

Enables the re-inclusion of previously excluded fragments of an ECG record:

**Note:**

The range you wish to re-include should fully overlap a previously excluded fragment. If it does not overlap an excluded area, the **Include to analysis** button and option remain inactive.

Figure 391. Strip View - Include to analysis



1. Select a fragment of the ECG, you want to re-include to analysis, using one of the following methods:

- **Using Shift + Click:**

- a. Identify the initial point in the range you wish to select.
- b. Click the initial point.
- c. Hold down the **Shift** key.
- d. Identify the final point in the range.
- e. **(Optional)** [Scan the Strip View \(on page 164\)](#) to locate the points of interest, if necessary.
- f. Click the final point to complete the range selection.
- g. Right-click the selected fragment to expand the context menu.

- **Using Ctrl +Click:**

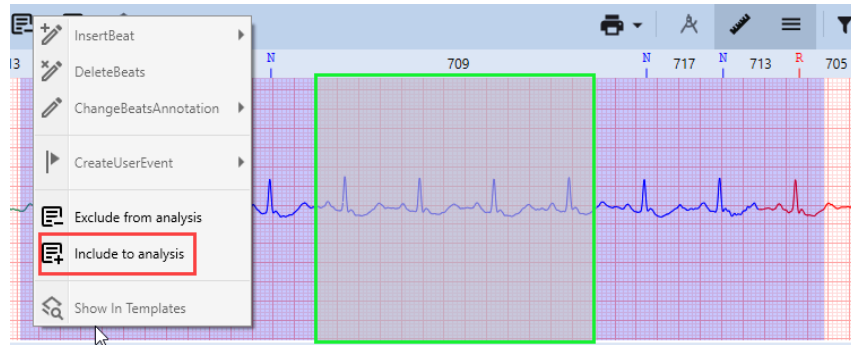
- a. Identify the initial point in the range you wish to select.
- b. Hold down the **Ctrl** key.
- c. Click the initial point.
- d. Identify the final point in your desired range.
- e. **(Optional)** [Scan the Strip View \(on page 164\)](#) to locate the points of interest, if necessary.
- f. Drag the cursor to the final point and release the mouse button to complete the selection.
- g. Right-click the selected fragment to expand the context menu.

- **Using the right mouse button:**

- a. Click the **Strip View** and hold the right mouse button to designate the initial point in the range you wish to select.
- b. Drag the cursor to set the final point.

- c. **(Optional)** Scan the [Strip View](#) (on page 164) to locate the points of interest, if necessary.
- d. Release the right mouse button to complete the range selection. A context menu will appear.

Figure 392. Strip View - Include to analysis



- 2. Click the **Include to analysis** option in the context menu.

### Show In Templates

Select this option from the context menu to display the beat you have selected in the **Strip View**; it will be highlighted in the relevant template within the **Templates Pane**.



Figure 393. Strip View - Show In Templates



## Measuring ECG with Caliper

You may use the **Caliper** function to measure the RR interval, QRS complex duration and amplitude, QT interval, and other ECG waveform parameters. The **Caliper** also allows for editing the ECG record via the **Strip View**.

Figure 394. Strip View - Caliper Tool



## Caliper Design Overview

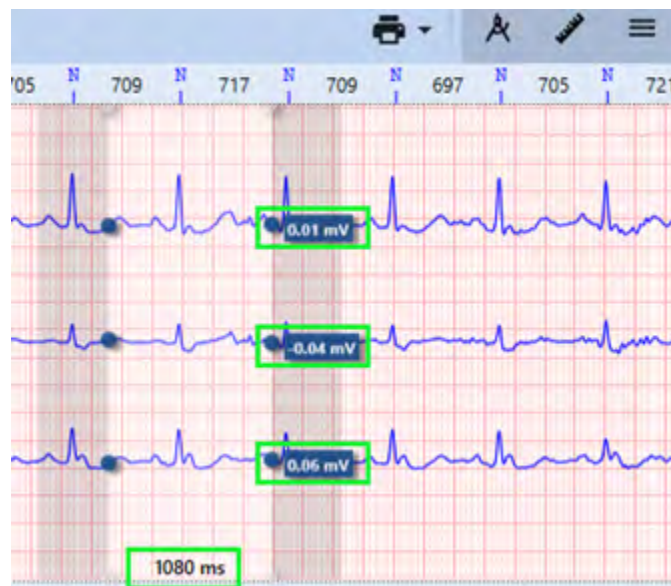
The **Caliper** tool in the **Strip View** displays two **measuring lines** (1) and a **measuring interval** (2) between them. To activate the **Caliper** tool, click the **Caliper** button in the **Strip View Toolbar**.

Figure 395. Strip View - Caliper Measurement Lines and Interval



Each ECG channel in the Strip has a small box adjacent to the point where the right measurement line intersects the channel signal line. The value in this box indicates the amplitude difference between the two points demarcated by the measurement lines.

Figure 396. Strip View - Interval Length and Amplitude Difference



The interval length in milliseconds is displayed at the bottom of the measuring interval.

### Moving Caliper Lines

You may move Caliper measurement lines either **simultaneously** or **independently**.

#### To move both lines simultaneously:

1. Position the cursor within the measuring interval. The cursor will change to a resize cursor.

Figure 397. Strip View - Moving Caliper Lines Simultaneously



2. Drag and drop the **Caliper** to the desired location.
3. Optionally, use the Left and Right arrow keys to fine-tune the position.

#### To move lines independently:

1. Position the cursor near one of the measurement lines until it changes to a resize cursor.

Figure 398. Strip View - Moving Caliper Lines Independently



2. Click to select the measurement line.
3. Drag and drop it to the new location.

### Zoom Feature

To adjust the display scale of the waveform in the Strip, utilize the **Zoom In/Zoom Out** options:

Figure 399. Strip View - Zooming Options



1. Click the corresponding button in the **Strip View Toolbar**.
2. Hold the **Ctrl** key while scrolling up (**Zoom In**) or down (**Zoom Out**) the mouse wheel.

### Caliper Snapping Feature

The **Caliper Snapping** feature automatically aligns the **Caliper** measurement lines to the nearest R-peaks in the ECG signal. This functionality aids in the precise measurement of ECG wave duration and amplitude. Manual alignment can be challenging, hence **Caliper Snapping** enhances the accuracy, efficiency, and reproducibility of ECG interpretation.

**To utilize the Caliper snapping feature:**



1. Click the **Caliper** button in the **Strip View Toolbar**.
2. **(Optional)** Use the Left and Right arrow keys to make slight adjustments to the Caliper measurement lines.
3. To snap a **Caliper** measurement line to an R-spike:

Figure 400. Strip View - Caliper Snapping



- To snap any line:
  - a. Hold down the **Alt** key.
  - b. Position the cursor near one of the measurement lines until the cursor icon changes to a resize cursor.
  - c. Click the measurement line to select it.
  - d. Drag and drop it to the desired location.
- To snap the right measurement line:
  - a. Hold down the **Right Alt** key.
  - b. Use the Left and Right arrow keys to move the **Caliper**; the right measurement line will automatically snap to the R-peaks as you move.
- To snap the left measurement line:
  - a. Hold down the **Left Alt** key.
  - b. Use the Left and Right Arrow keys to move the Caliper; the left measurement line will automatically snap to the R-peaks as you move.

The **Caliper Snapping** function is instrumental in enabling a quick and accurate evaluation of various ECG parameters.

## Editing Beats and Events Using Caliper

The **Caliper** tool enables you to edit specific fragments of the ECG waveform contained within the measurement lines of the **Caliper**. When you opt to delete or reclassify beats, or exclude a waveform fragment from analysis, the changes will be confined to the selected fragment, which may contain multiple beats. In essence, the **Caliper** allows you to edit a continuous section of an ECG record, demarcated by the measurement lines, in a single action.

Figure 401. Strip View - Editing Beats and Events Using Caliper



**To edit a fragment of an ECG using the Caliper:**

1. Position the **Caliper** and adjust its measurement lines as needed. For guidance, refer to the [Caliper Design Overview \(on page 265\)](#) section.
2. Right-click in the **Strip View** area to expand the context menu.
3. The **Caliper** tool's context menu offers several options within the **Strip View**:



- **Delete Beats:** Click this option to remove all beats within the boundaries of the **Caliper's** measurement lines. This action will result in minor recalculations.



**Note:**

Deleting beats may trigger the generation of **Pause** events. To annotate and exclude noisy segments, the **Exclude from analysis** option is preferable to **Delete Beats**.

- **Change Beats Annotation:** Hover over this option to display a drop-down list, then click the morphology type you wish to assign to the beats. The reclassified beats will instantly change color in the **Strip View**.
- **Create User Event:** Hover over this option to expand a drop-down list, and click the event type you wish to create in the selected area.
- **Exclude from analysis:** Click to exclude a noisy ECG segment within the **Caliper's** measurement lines from the analysis, without affecting other analytical outcomes.
- **Include to analysis:** Click to include previously excluded ECG fragments back into the analysis.



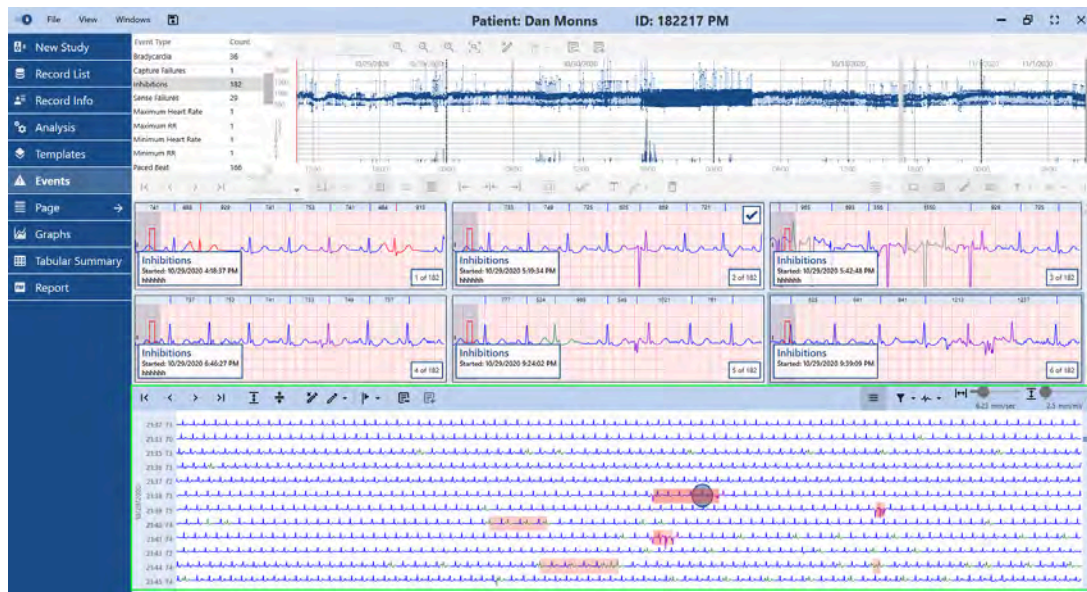
**Note:**

The **Include in Analysis** option becomes active in the **Caliper** context menu only when the current **Caliper** measurement interval overlaps with a segment that was excluded earlier.

## Page View

The **Page View Strip** allows for previewing and scanning the ECG Recording as **Full Disclosure** within the **Events View**. It enables the highlighting of elements in **Full Disclosure**, creation of user events, reclassification or deletion of beats, and exclusion of noisy segments. In conjunction with other components of the **Events View** — including the [Events List \(on page 200\)](#), [Events Overview Panel \(on page 204\)](#), [HR/RR Trends View \(on page 223\)](#), and [Strip View \(on page 163\)](#), it supports a thorough review and analysis of events detected in the ECG Record.

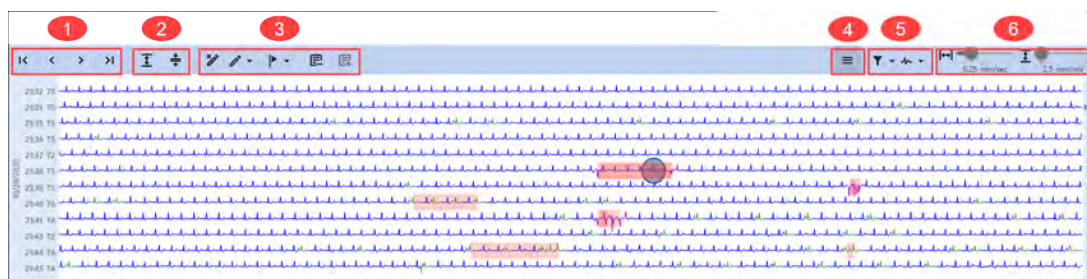
Figure 402. Events View - Page View



## Page View Toolbar

The **Page View Toolbar** at the top of the **Page View** in the **Events View** contains various controls for facilitating the scanning and review of the ECG Recording, including beat deletion and reclassification, adding user events, excluding noise segments, and more. For ease of understanding, these controls are organized into distinct groups of interface elements.

Figure 403. Events View - Page View Toolbar

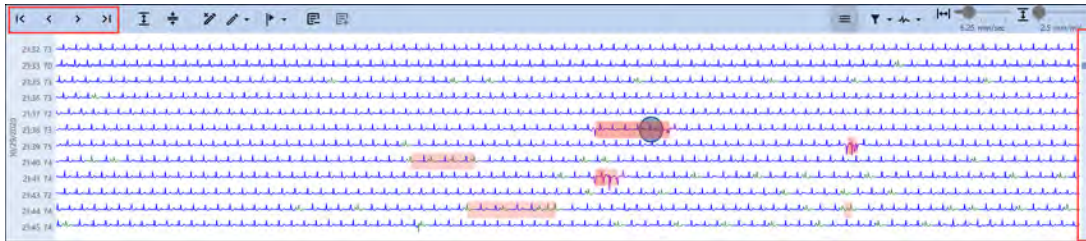


1. General Controls.
2. Page View Layout Controls.
3. Editing Controls.
4. Events Highlighting Control.
5. Filters.
6. Scale and Gain Controls.

## General Controls





**General Controls** comprise a group of buttons designed to facilitate navigation within the **Page View** on the **Events View** screen.

Figure 404. Events View - Page View General Controls



**Note:**

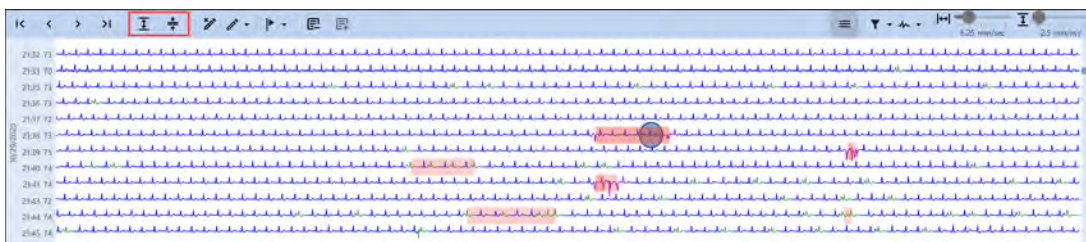
For navigation within the **Page View**, the scroll function of your mouse or the built-in scrollbar to the right can be used.



Icon	Description
	<b>First Page:</b> Click to display the first page of the <b>Record</b> .
	<b>Page Up:</b> Click to navigate to the previous page of the <b>Record</b> .
	<b>Page Down:</b> Click to navigate to the next page of the <b>Record</b> .
	<b>Final Page:</b> Click to display the last page of the <b>Record</b> , which may contain noisy segments.

### Page View Layout Controls

**Page View Layout Controls** comprise a group of buttons designed to alter the number of waveform lines displayed in the **Page View** on the **Events View** screen.

Figure 405. Events View - Page View Layout Controls

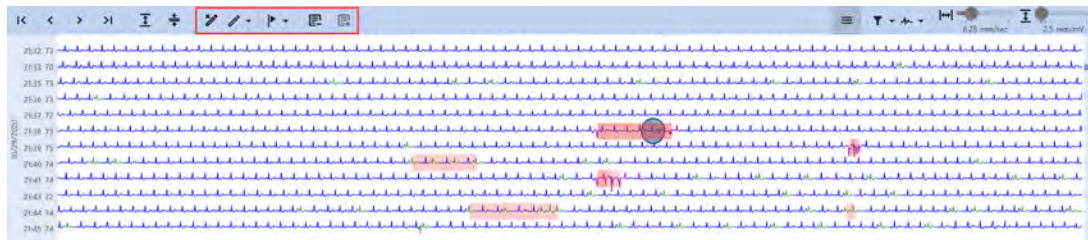







Icon	Description
	<b>Decrease Lines Per Page button:</b> Click to reduce the number of lines per Page, enhancing focus on specific ECG lines. This feature allows for adjusting the density of lines within the <b>Page View</b> . Repeated clicks reduce lines to a minimum of one per Page.
	<b>Increase Lines Per Page button:</b> Click to add more lines per Page, enabling a broader segment of the ECG Record to be reviewed. Adjust the density of lines within the <b>Page View</b> as needed. However, an overpopulated <b>Page View</b> may hinder waveform analysis due to a visual overload.

### Editing Controls

**Editing Controls** is a group of buttons allowing you to reclassify and delete beats, create user events, and exclude noisy segments from the Record.

Figure 406. Page View Editing Controls



Icon	Description
	<b>Delete Beats button:</b> Click to delete beats within the selected area.
	<b>Change Beats Annotation button:</b> Enables you to modify the annotation of selected beats.
	<b>Create User Event button:</b> Allows you to create a new user event, located within the selected area. After adding a user event, the corresponding fragment of the ECG waveform will be recalculated, and some beats may change their annotations.
	<b>Exclude from analysis button:</b> Enables the exclusion of a selected fragment of an ECG record from analysis.
	<b>Include to analysis button:</b> Enables the re-inclusion of previously excluded fragments of an ECG record.

By default, when you click on any **Example Strip** within the **Events Overview Panel**, **HR/RR Trends** graph, or select a beat in the **Strip View**, the corresponding area of the ECG Record is highlighted with a circle in

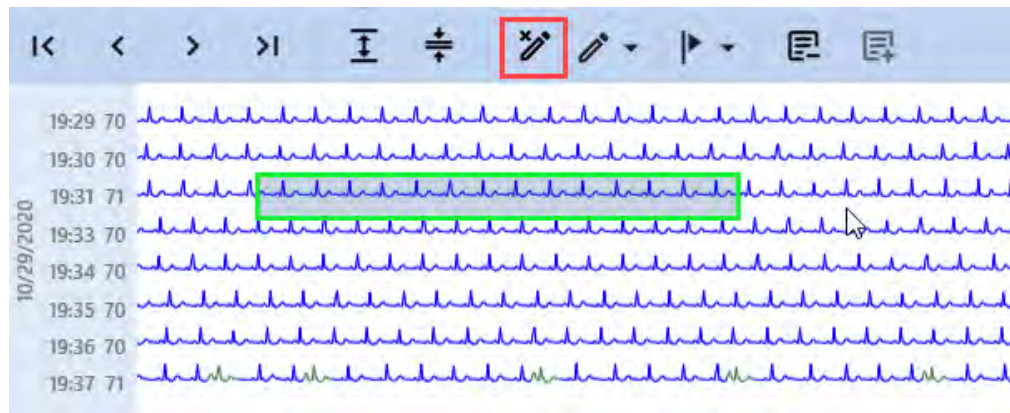
the **Page View**. Similarly, clicking on the **Page View** causes the **Strip View** and **HR/RR Trends** graphs to adjust correspondingly. The **Events Overview Panel** remains unaffected by this action.

**To delete a beat:**

1. Select a fragment of the ECG, which you wish to delete, using one of the following methods:
  - Click an individual beat to select it.
  - Select a fragment of the waveform using one of these methods:
    - **Using Shift + Click:**
      - a. Identify the initial point in the range you wish to select.
      - b. Click the initial point.
      - c. Hold down the **Shift** key.
      - d. Identify the final point in the range.
      - e. **(Optional)** [Scan the Page View \(on page 270\)](#) to locate the points of interest, if necessary.
      - f. Click the final point to complete the range selection.
    - **Using Ctrl +Click:**
      - a. Identify the initial point in the range you wish to select.
      - b. Hold down the **Ctrl** key.
      - c. Click the initial point.
      - d. Identify the final point in your desired range.
      - e. **(Optional)** [Scan the Page View \(on page 270\)](#) to locate the points of interest, if necessary.
      - f. Drag the cursor to the final point and release the mouse button to complete the selection.
    - **Using the right mouse button:**
      - a. Click the **Page View** and hold the right mouse button to designate the initial point in the range you wish to select.
      - b. Drag the cursor to set the final point.
      - c. **(Optional)** [Scan the Page View \(on page 270\)](#) to locate the points of interest, if necessary.
      - d. Release the right mouse button to complete the range selection. A context menu will appear.



Figure 407. Events View - Page View Delete Beats



2. Click the **Delete Beats** button or the same option in the context menu.

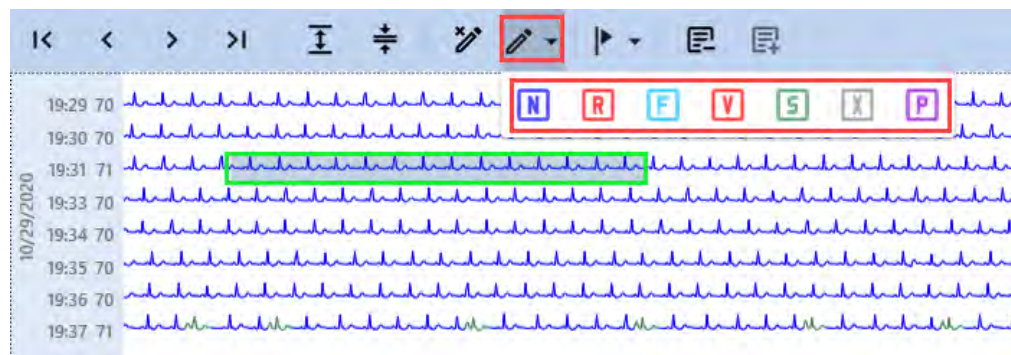
#### To change beats annotation:

1. Select a fragment of the ECG using one of the following methods:
  - Click an individual beat to select it.
  - Select a fragment of the waveform using one of these methods:
    - **Using Shift + Click:**
      - a. Identify the initial point in the range you wish to select.
      - b. Click the initial point.
      - c. Hold down the **Shift** key.
      - d. Identify the final point in the range.
      - e. **(Optional)** [Scan the Page View \(on page 270\)](#) to locate the points of interest, if necessary.
      - f. Click the final point to complete the range selection.
    - **Using Ctrl +Click:**
      - a. Identify the initial point in the range you wish to select.
      - b. Hold down the **Ctrl** key.
      - c. Click the initial point.
      - d. Identify the final point in your desired range.
      - e. **(Optional)** [Scan the Page View \(on page 270\)](#) to locate the points of interest, if necessary.
      - f. Drag the cursor to the final point and release the mouse button to complete the selection.
    - **Using the right mouse button:**



- a. Click the **Page View** and hold the right mouse button to designate the initial point in the range you wish to select.
  - b. Drag the cursor to set the final point.
  - c. **(Optional)** [Scan the Page View \(on page 270\)](#) to locate the points of interest, if necessary.
  - d. Release the right mouse button to complete the range selection. A context menu will appear.
2. Hover over the **Change Beats Annotation** button in the **Page View Toolbar** or the same option in the context menu to expand the drop-down list.





Figure 408. Events View - Page View Change Beats Annotation






3. Click the appropriate type of morphology for the beats you wish to reclassify. Alternatively, you may utilize keyboard shortcuts as outlined in the table below. Selected beats will immediately change color.

Table 7. Beats Reclassification Keyboard

## Shortcuts for Page View

Action	But-ton	Keyboard Keys
Classify as <b>Normal</b>		<b>N</b>
Classify as <b>R on T</b>		<b>R</b>
Classify as <b>Fusion</b>		<b>F</b>
Classify as <b>VPB</b>		<b>V</b>

**Table 7. Beats Reclassification Keyboard****Shortcuts for Page View (continued)**

Action	But- ton	Keyboard Keys
Classify as <b>SVE</b>		<b>S</b>
Classify as <b>Questionable</b>		<b>X</b>
Classify <b>Paced</b>		<b>P</b>

**To create a user event:**

1. Select a fragment of the ECG, which you wish to reclassify as a continuous event, using one of the following methods:

- Click an individual beat to select it.
- Select a fragment of the waveform using one of these methods:

- **Using Shift + Click:**

- a. Identify the initial point in the range you wish to select.
- b. Click the initial point.
- c. Hold down the **Shift** key.
- d. Identify the final point in the range.
- e. **(Optional)** [Scan the Page View \(on page 270\)](#) to locate the points of interest, if necessary.
- f. Click the final point to complete the range selection.

- **Using Ctrl +Click:**

- a. Identify the initial point in the range you wish to select.
- b. Hold down the **Ctrl** key.
- c. Click the initial point.
- d. Identify the final point in your desired range.
- e. **(Optional)** [Scan the Page View \(on page 270\)](#) to locate the points of interest, if necessary.
- f. Drag the cursor to the final point and release the mouse button to complete the selection.

- **Using the right mouse button:**

- a. Click the **Page View** and hold the right mouse button to designate the initial point in the range you wish to select.
  - b. Drag the cursor to set the final point.
  - c. **(Optional)** [Scan the Page View \(on page 270\)](#) to locate the points of interest, if necessary.
  - d. Release the right mouse button to complete the range selection. A context menu will appear.
2. Hover over the **Create User Event** button or menu option to expand the drop-down list.

Figure 409. Events View - Page View Create User Event



3. Click the relevant type of **Event** you wish to create in the selected area.

#### To exclude an ECG segment from analysis:

1. Select the ECG fragment you wish to exclude from analysis using one of the following methods:
  - Click an individual beat to select it.
  - Select a fragment of the waveform using one of these methods:
    - **Using Shift + Click:**
      - a. Identify the initial point in the range you wish to select.
      - b. Click the initial point.

- c. Hold down the **Shift** key.
- d. Identify the final point in the range.
- e. **(Optional)** [Scan the Page View \(on page 270\)](#) to locate the points of interest, if necessary.
- f. Click the final point to complete the range selection.

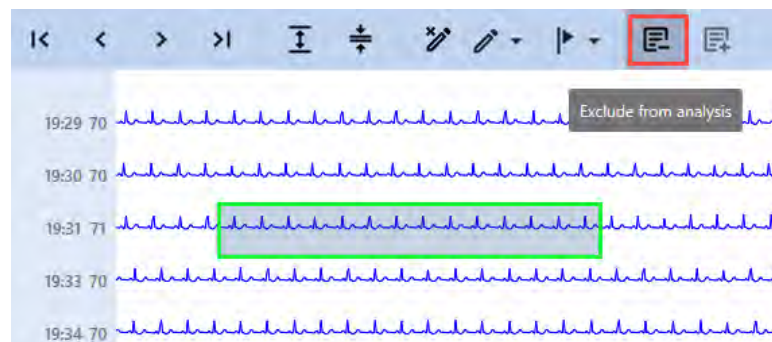
▪ **Using Ctrl +Click:**

- a. Identify the initial point in the range you wish to select.
- b. Hold down the **Ctrl** key.
- c. Click the initial point.
- d. Identify the final point in your desired range.
- e. **(Optional)** [Scan the Page View \(on page 270\)](#) to locate the points of interest, if necessary.
- f. Drag the cursor to the final point and release the mouse button to complete the selection.

▪ **Using the right mouse button:**

- a. Click the **Page View** and hold the right mouse button to designate the initial point in the range you wish to select.
- b. Drag the cursor to set the final point.
- c. **(Optional)** [Scan the Page View \(on page 270\)](#) to locate the points of interest, if necessary.
- d. Release the right mouse button to complete the range selection. A context menu will appear.

Figure 410. Events View - Page View Exclude from analysis



2. Click the **Exclude from Analysis** button or select the same option from the context menu.

**To re-include an ECG segment into analysis:**

**Note:**

The range you wish to re-include should fully overlap a previously excluded fragment. If it does not overlap an excluded area, the **Include to analysis** button and option remain inactive.

Figure 411. Events View - Page View Include to analysis



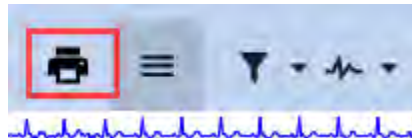
1. Select a fragment of the ECG, you want to re-include to analysis, using one of the following methods:
  - Click an individual beat to select it.
  - Select a fragment of the waveform using one of these methods:
    - **Using Shift + Click:**
      - a. Identify the initial point in the range you wish to select.
      - b. Click the initial point.
      - c. Hold down the **Shift** key.
      - d. Identify the final point in the range.
      - e. **(Optional)** [Scan the Page View \(on page 270\)](#) to locate the points of interest, if necessary.
      - f. Click the final point to complete the range selection.
    - **Using Ctrl +Click:**
      - a. Identify the initial point in the range you wish to select.
      - b. Hold down the **Ctrl** key.
      - c. Click the initial point.
      - d. Identify the final point in your desired range.
      - e. **(Optional)** [Scan the Page View \(on page 270\)](#) to locate the points of interest, if necessary.
      - f. Drag the cursor to the final point and release the mouse button to complete the selection.
    - **Using the right mouse button:**

- a. Click the **Page View** and hold the right mouse button to designate the initial point in the range you wish to select.
  - b. Drag the cursor to set the final point.
  - c. **(Optional)** [Scan the Page View \(on page 270\)](#) to locate the points of interest, if necessary.
  - d. Release the right mouse button to complete the range selection. A context menu will appear.
2. Click the **Include to analysis** button or select the same option from the context menu.

## Printing Control

This button enables you to print a selected fragment of the ECG Record.

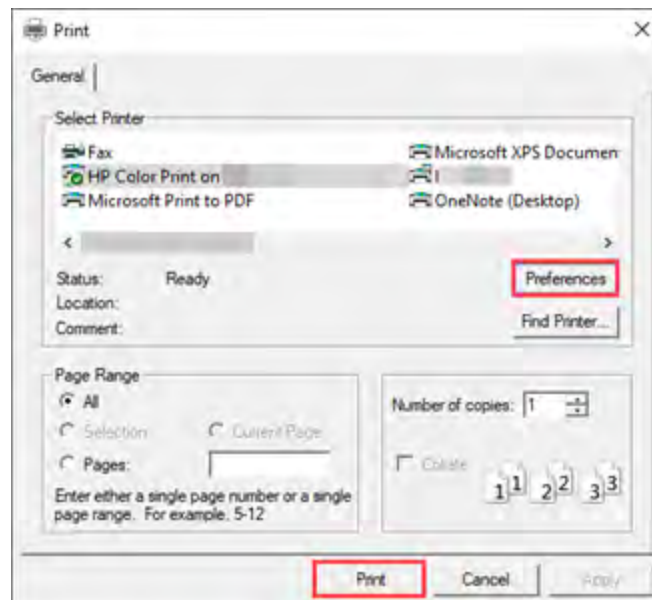
Figure 412. Page View - Printing Control



To print a fragment of the waveform in the **Page View**:

1. Identify the area you want to print.
2. **(Optional)** [Scan the Page View \(on page 285\)](#) to locate the desired area, if needed.
3. Click the **Printing Control** and navigate to the Print dialog box:

Figure 413. Strip View - Printing Dialog Box





- Choose a printer **available** in the **Select Printer** window.
- Adjust other preferences according to your needs.
- Click **Print** at the bottom of the dialog box to execute the printing of the waveform fragment.

### Events Highlighting Control

Toggle this button **ON** to highlight **Events** occurrences within the **Page View**. Toggle **OFF** to stop highlighting **Events**. Please keep in mind that in some cases different **Events** may overlap in the **ECG Recording**.

Figure 414. Events View - Page View Highlight Events Button OFF

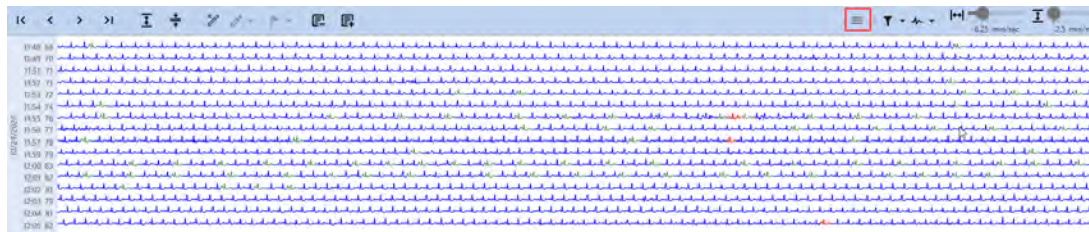
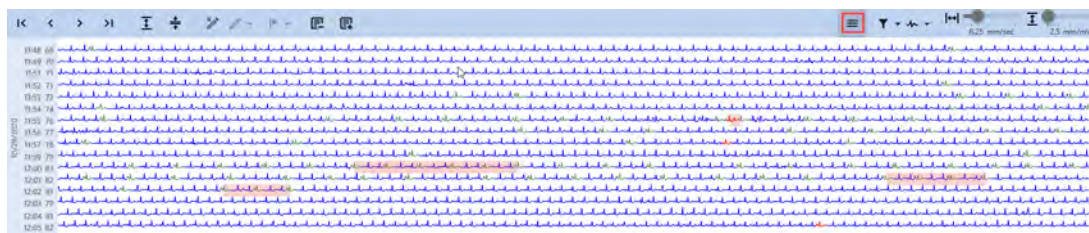


Figure 415. Events View - Page View Highlight Events Button ON



### Filters

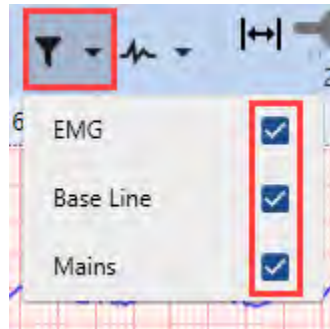
This group of controls allows you to apply various filters affecting waveform visualization and enhancing the accuracy and reliability of ECG analysis.

Icons	Description
	<b>Filter:</b> This control enables you to toggle <b>ON/OFF</b> the visualization of the waveform with applied <b>EMG, Base Line, and Mains</b> filters. To activate or deactivate these filters, select or deselect any number of checkboxes from the drop-down list. These filters improve the accuracy and reliability of ECG analysis.
	<b>Channel Selection:</b> This control lets you select the channel(s) for display within the <b>Page View</b> , using the drop-down list (up to 12 channels, depending on the number of channels in the current <b>Record</b> ).

**To toggle filters ON/OFF:**

1. Hover over the **Filter** drop-down list to expand it.

Figure 416. Events View - Toggling Filters



2. Select the filter you wish to toggle. The visualization of the waveform will change immediately.

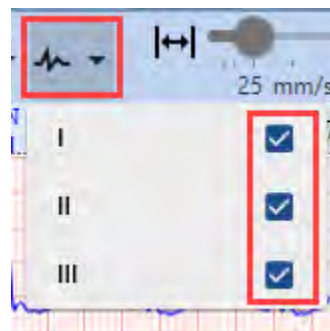
It is recommended to keep filters **ON** to provide accurate analysis:

- **EMG filter:** Eliminates high-frequency ECG signal components.
- **Baseline filter:** Removes low-frequency ECG signal components.
- **Mains filter:** Eradicates 50 or 60 Hz power line interference. This interference can be caused by the electrical equipment in the environment.

**To toggle the visualization of channels within the Page View:**

1. Hover over the **Channel Selection** drop-down list to expand it.

Figure 417. Events View - Toggling Channels



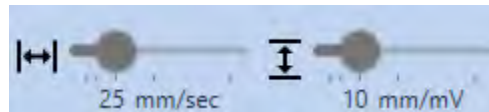
2. Select channels you wish to toggle. The visualization within the **Page View** will change immediately.

Toggling **ON/OFF** ECG channels enhances the accuracy and efficiency of ECG analysis. This feature allows you to focus on specific channels, compare them, filter out noise and more.

### Scale and Gain Controls

This group of controls enables you to adjust the paper speed and amplitude, affecting waveform visualization and enhancing the accuracy and reliability of ECG analysis.

Figure 418. Events View - Scale and Gain Controls



### To change the paper speed:

1. Drag the slider to your desired position, setting the paper speed within the range from 1.56 up to 25 mm/sec. The visualization within the **Page View** will change immediately.

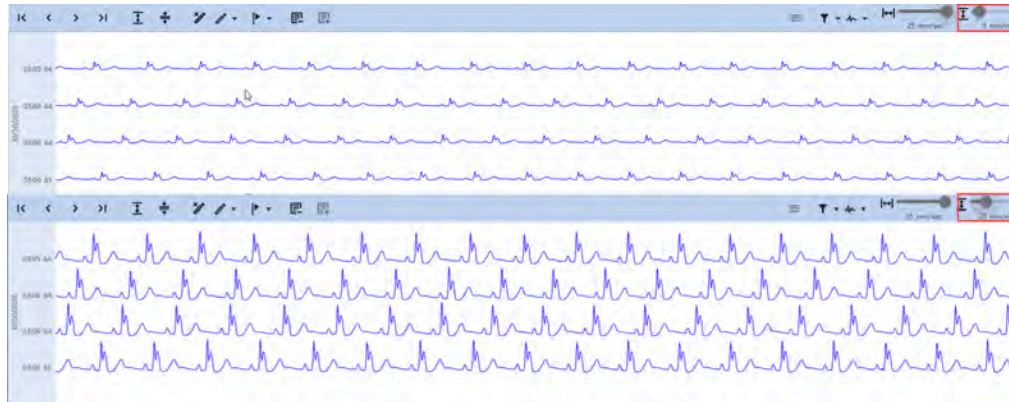
Figure 419. Events View - Page View Setting Paper Speed



### To change the amplitude:

1. Drag the slider to your desired position, setting the amplitude within the range from 0.5 up to 80 mm/mV. The visualization within the **Page View** will change immediately.

Figure 420. Events View - Page View Setting Amplitude



## Context Menu Features

The **Context Menu**, accessible via right-click, enables you to quickly and easily access common actions, available on the **Page View Toolbar**.

The **Context Menu** mirrors the **Page View Toolbar**, with menu options carrying the same annotations and capabilities as [buttons on the Toolbar \(on page 269\)](#).

Figure 421. Events View - Page View Context Menu Features



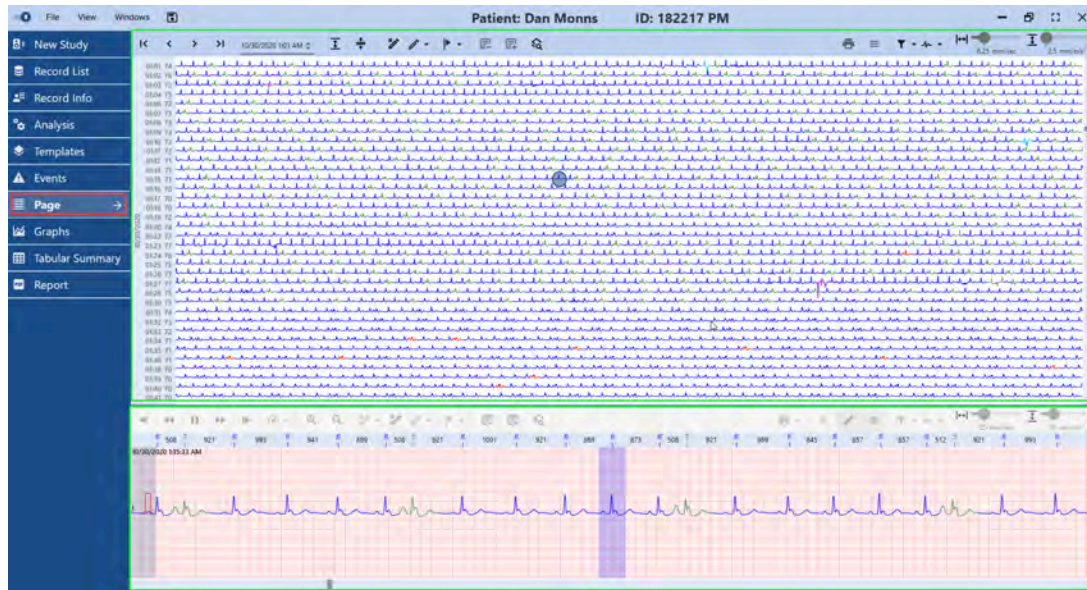
## Page

The **Page View** displays the entire ECG data as a **Full Disclosure**, enabling back-and-forth navigation for the complete Recording review. ECG sections in the **Page View** are viewable one channel at a time. The **Page View** also support Dual Screen Mode, adding additional level of comfort for reviewing and editing the Recording in the **Page View**.



The **Page View** screen is housing two main elements: the **Signal Page** in the top part, and the **Strip View** in the lower part. In the top area of the **Signal Page** you can see the **Signal Page Toolbar** - a collection of controls allowing you to scan and review the entire **ECG Recording**.

Figure 422. Page View - Page View

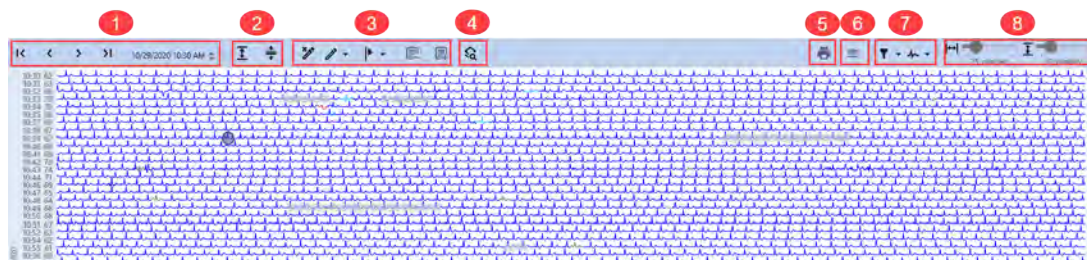


A green circle on the **Page** indicates current position in the **ECG Record**, shown in the **Strip View** below the Page.

## Page View Toolbar

The **Page View Toolbar** contains controls for facilitating the scanning and review of large ECG Recording fragments, beats deletion and reclassification, adding user events, excluding noise segments and more. For ease of understanding, these controls are organized into distinct groups of interface elements.

Figure 423. Page View - Page View Toolbar



1. General Controls.
2. Page View Layout Controls.
3. Editing Controls.

4. Show in Templates Control.
5. Printing Control.
6. Events Highlighting Control.
7. Filters.
8. Scale and Gain Controls.

## General Controls

**General Controls** is a group of buttons designed to facilitate navigation within the **Page View**.

Figure 424. Page View - General Controls



### Note:

To navigate within the **Page View**, you can also use the built-in scrollbar on the right.

Icon	Description
	<b>First Page:</b> Click to display the first page of the <b>Record</b> .
	<b>Page Up:</b> Click to navigate to the previous page of the <b>Record</b> .
	<b>Page Down:</b> Click to navigate to the next page of the <b>Record</b> .
	<b>Final Page:</b> Click to display the last page of the <b>Record</b> . Last pages of a Record tend to have noisy segments.
	<b>Time Navigation Control:</b> Click arrows on the right to navigate the ECG Record by switching between its time stamps.

## Page View Layout Controls

**Page View Layout Controls** comprise a group of buttons designed to alter the number of waveform lines displayed in the **Page View**.



Figure 425. Page View - Page View Layout Controls

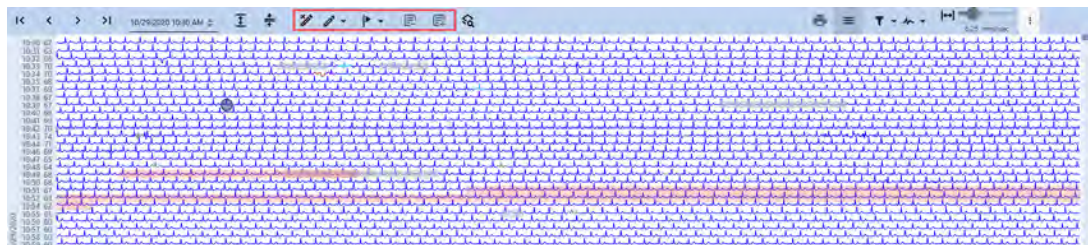


Icon	Description
	<b>Decrease Lines Per Page button:</b> Click to reduce the number of lines per Page, enhancing focus on specific ECG lines. This feature allows for adjusting the density of lines within the <b>Page View</b> . Repeated clicks reduce lines to a minimum of one per Page.
	<b>Increase Lines Per Page button:</b> Click to add more lines per Page, enabling a broader segment of the ECG Record to be reviewed. Adjust the density of lines within the <b>Page View</b> as needed. However, an overpopulated <b>Page View</b> may hinder waveform analysis due to a visual overload.



### Editing Controls

**Editing Controls** is a group of buttons allowing you to reclassify and delete beats, create user events, and exclude noisy segments from the Record.

Figure 426. Page View - Editing Controls



Icon	Description
	<b>Delete Beats button:</b> Click to delete beats within the selected area.
	<b>Change Beats Annotation button:</b> Enables you to modify the annotation of selected beats.
	<b>Create User Event button:</b> Allows you to create a new user event, located within the selected area. After adding a user event, the corresponding fragment of the ECG waveform will be recalculated, and some beats may change their annotations.

Icon	Description
	<b>Exclude from analysis button:</b> Enables the exclusion of a selected fragment of an ECG record from analysis.
	<b>Include to analysis button:</b> Enables the re-inclusion of previously excluded fragments of an ECG record.

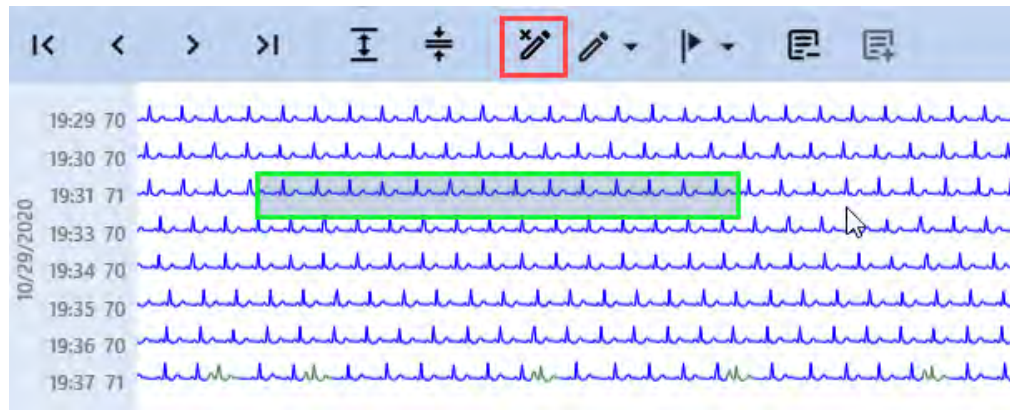
By default, when you click on a Record waveform within the **Page View** the corresponding area of the **Strip View** is highlighted

#### To delete a beat:

- Select a fragment of the ECG, which you wish to delete, using one of the following methods:
  - Click an individual beat to select it.
  - Select a fragment of the waveform using one of these methods:
    - **Using Shift + Click:**
      - Identify the initial point in the range you wish to select.
      - Click the initial point.
      - Hold down the **Shift** key.
      - Identify the final point in the range.
      - (Optional) [Scan the Page View \(on page 270\)](#) to locate the points of interest, if necessary.
      - Click the final point to complete the range selection.
    - **Using Ctrl +Click:**
      - Identify the initial point in the range you wish to select.
      - Hold down the **Ctrl** key.
      - Click the initial point.
      - Identify the final point in your desired range.
      - (Optional) [Scan the Page View \(on page 270\)](#) to locate the points of interest, if necessary.
      - Drag the cursor to the final point and release the mouse button to complete the selection.
    - **Using the right mouse button:**
      - Click the **Page View** and hold the right mouse button to designate the initial point in the range you wish to select.
      - Drag the cursor to set the final point.

- c. **(Optional)** [Scan the Page View \(on page 270\)](#) to locate the points of interest, if necessary.
- d. Release the right mouse button to complete the range selection. A context menu will appear.

Figure 427. Page View - Delete Beats



2. Click the **Delete Beats** button.

#### To change beats annotation:

1. Select a fragment of the ECG, which you wish to delete, using one of the following methods:
  - Click an individual beat to select it.
  - Select a fragment of the waveform using one of these methods:
    - **Using Shift + Click:**
      - a. Identify the initial point in the range you wish to select.
      - b. Click the initial point.
      - c. Hold down the **Shift** key.
      - d. Identify the final point in the range.
      - e. **(Optional)** [Scan the Page View \(on page 270\)](#) to locate the points of interest, if necessary.
      - f. Click the final point to complete the range selection.
    - **Using Ctrl +Click:**
      - a. Identify the initial point in the range you wish to select.
      - b. Hold down the **Ctrl** key.
      - c. Click the initial point.
      - d. Identify the final point in your desired range.

e. **(Optional)** [Scan the Page View \(on page 270\)](#) to locate the points of interest, if necessary.

f. Drag the cursor to the final point and release the mouse button to complete the selection.

▪ **Using the right mouse button:**

a. Click the **Page View** and hold the right mouse button to designate the initial point in the range you wish to select.

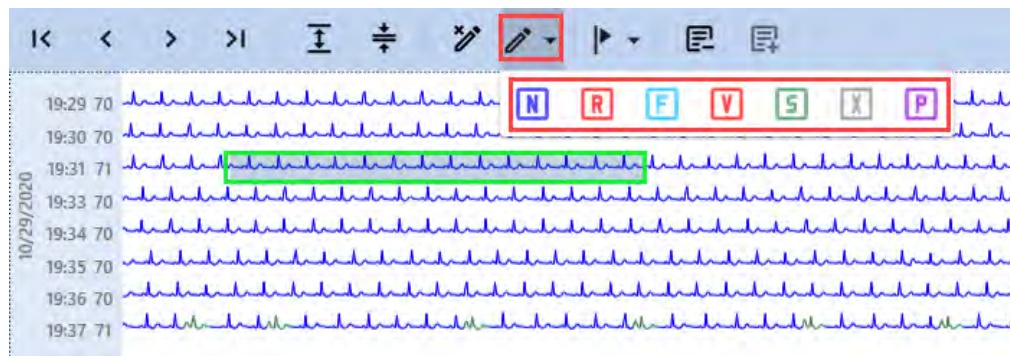
b. Drag the cursor to set the final point.

c. **(Optional)** [Scan the Page View \(on page 270\)](#) to locate the points of interest, if necessary.

d. Release the right mouse button to complete the range selection. A context menu will appear.

2. Hover over the **Change Beats Annotation** button in the **Page View Toolbar** to expand the drop-down list.



Figure 428. Page View - Change Beats Annotation








3. Click the appropriate type of morphology for the beats you wish to reclassify. Alternatively, you may utilize keyboard shortcuts as outlined in the table below. Selected beats will immediately change color.

**Table 8. Beats Reclassification Keyboard**

**Shortcuts for Page View**

Action	But-ton	Keyboard Keys
Classify as <b>Normal</b>		<b>N</b>
Classify as <b>R on T</b>		<b>R</b>

**Table 8. Beats Reclassification Keyboard****Shortcuts for Page View (continued)**

Action	But- ton	Keyboard Keys
Classify as <b>Fusion</b>		<b>F</b>
Classify as <b>VPB</b>		<b>V</b>
Classify as <b>SVE</b>		<b>S</b>
Classify as <b>Questionable</b>		<b>X</b>
Classify <b>Paced</b>		<b>P</b>

**To create a user event:**

1. Select a fragment of the ECG, which you wish to reclassify as a continuous event, using one of the following methods:
  - Click an individual beat to select it.
  - Select a fragment of the waveform using one of these methods:
    - **Using Shift + Click:**
      - a. Identify the initial point in the range you wish to select.
      - b. Click the initial point.
      - c. Hold down the **Shift** key.
      - d. Identify the final point in the range.
      - e. **(Optional)** [Scan the Page View \(on page 270\)](#) to locate the points of interest, if necessary.
      - f. Click the final point to complete the range selection.
    - **Using Ctrl +Click:**
      - a. Identify the initial point in the range you wish to select.
      - b. Hold down the **Ctrl** key.
      - c. Click the initial point.
      - d. Identify the final point in your desired range.

e. **(Optional)** [Scan the Page View \(on page 270\)](#) to locate the points of interest, if necessary.

f. Drag the cursor to the final point and release the mouse button to complete the selection.

▪ **Using the right mouse button:**

a. Click the **Page View** and hold the right mouse button to designate the initial point in the range you wish to select.

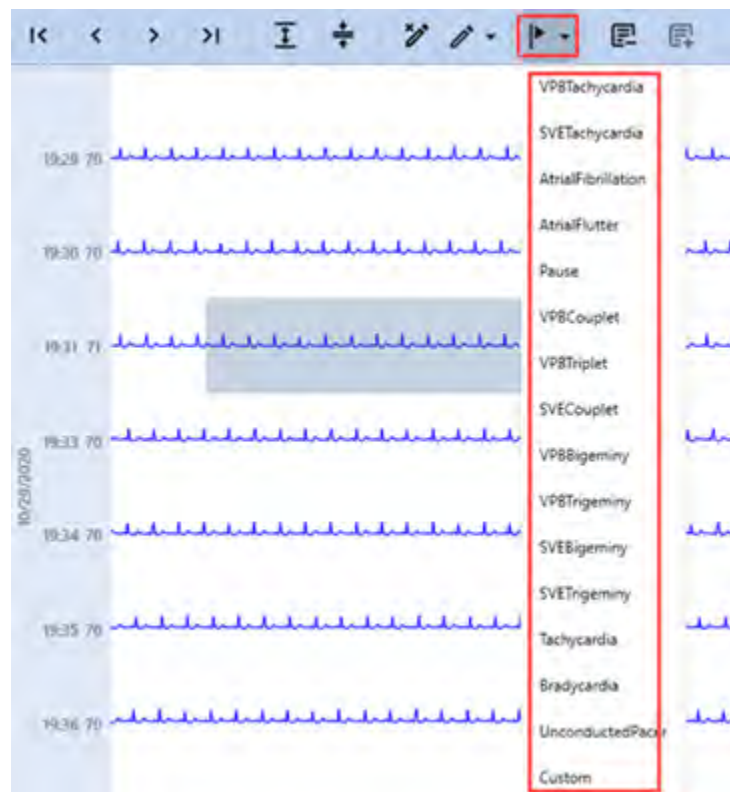
b. Drag the cursor to set the final point.

c. **(Optional)** [Scan the Page View \(on page 270\)](#) to locate the points of interest, if necessary.

d. Release the right mouse button to complete the range selection. A context menu will appear.

2. Hover over the **Create User Event** button or menu option to expand the drop-down list.

Figure 429. Page View - Create User Event



3. Click the relevant type of **Event** you wish to create in the selected area.

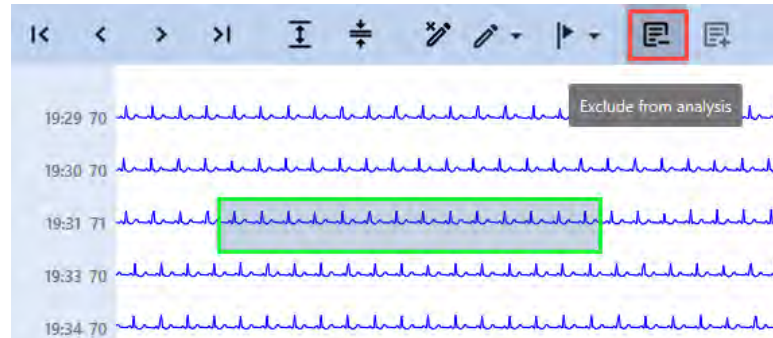
**To exclude an ECG segment from analysis:**



1. Select the ECG fragment you wish to exclude from analysis using one of the following methods:
  - Click an individual beat to select it.
  - Select a fragment of the waveform using one of these methods:
    - **Using Shift + Click:**
      - a. Identify the initial point in the range you wish to select.
      - b. Click the initial point.
      - c. Hold down the **Shift** key.
      - d. Identify the final point in the range.
      - e. **(Optional)** [Scan the Page View \(on page 270\)](#) to locate the points of interest, if necessary.
      - f. Click the final point to complete the range selection.
    - **Using Ctrl +Click:**
      - a. Identify the initial point in the range you wish to select.
      - b. Hold down the **Ctrl** key.
      - c. Click the initial point.
      - d. Identify the final point in your desired range.
      - e. **(Optional)** [Scan the Page View \(on page 270\)](#) to locate the points of interest, if necessary.
      - f. Drag the cursor to the final point and release the mouse button to complete the selection.
    - **Using the right mouse button:**
      - a. Click the **Page View** and hold the right mouse button to designate the initial point in the range you wish to select.
      - b. Drag the cursor to set the final point.
      - c. **(Optional)** [Scan the Page View \(on page 270\)](#) to locate the points of interest, if necessary.

- d. Release the right mouse button to complete the range selection. A context menu will appear.

Figure 430. Page View - Exclude from analysis



2. Click the **Exclude from Analysis** button or select the same option from the context menu.

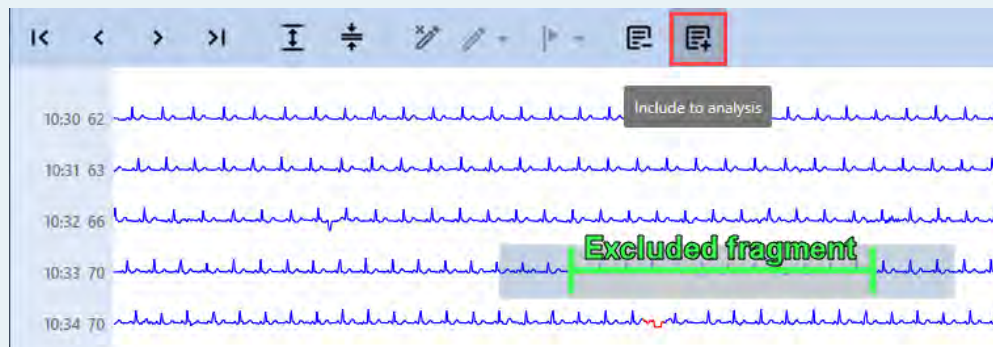
#### To re-include an ECG segment into analysis:



#### Note:

The range you wish to re-include should fully overlap a previously excluded fragment. If it does not overlap an excluded area, the **Include to analysis** button and option remain inactive.

Figure 431. Page View - Include to analysis



1. Select a fragment of the ECG, you want to re-include to analysis, using one of the following methods:
  - Click an individual beat to select it.
  - Select a fragment of the waveform using one of these methods:
    - **Using Shift + Click:**
      - a. Identify the initial point in the range you wish to select.
      - b. Click the initial point.

- c. Hold down the **Shift** key.
- d. Identify the final point in the range.
- e. **(Optional)** [Scan the Page View \(on page 270\)](#) to locate the points of interest, if necessary.
- f. Click the final point to complete the range selection.

▪ **Using Ctrl +Click:**

- a. Identify the initial point in the range you wish to select.
- b. Hold down the **Ctrl** key.
- c. Click the initial point.
- d. Identify the final point in your desired range.
- e. **(Optional)** [Scan the Page View \(on page 270\)](#) to locate the points of interest, if necessary.
- f. Drag the cursor to the final point and release the mouse button to complete the selection.


▪ **Using the right mouse button:**

- a. Click the **Page View** and hold the right mouse button to designate the initial point in the range you wish to select.
- b. Drag the cursor to set the final point.
- c. **(Optional)** [Scan the Page View \(on page 270\)](#) to locate the points of interest, if necessary.
- d. Release the right mouse button to complete the range selection. A context menu will appear.

2. Click the **Include to analysis** button or select the option from the context menu.

### Show in Templates Control

This control allows you to focus on a single beat you have selected in the **Page View**, in the **Templates View**.

Icon	Description
	<b>Show In Templates button:</b> Click this button to display the beat you have selected in the <b>Page View</b> ; it will be highlighted in the relevant template within the <a href="#">Templates Pane (on page 113)</a> .

### Events Highlighting Control

Toggle this button **ON** to highlight **Events** occurrences within the **Page View**. Toggle **OFF** to stop highlighting **Events**. Please keep in mind that in some cases different **Events** may overlap in the **ECG Recording**.

Figure 432. Page View - Highlight Events Button OFF

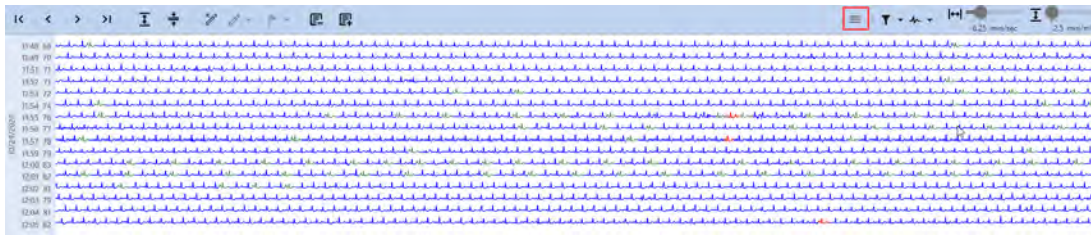


Figure 433. Page View - Highlight Events Button ON



## Filters

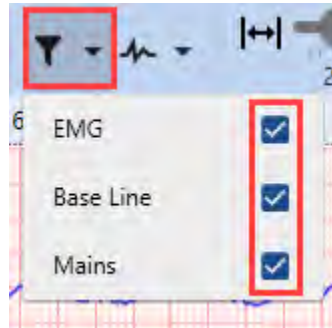
This group of controls allows you to apply various filters affecting waveform visualization and enhancing the accuracy and reliability of ECG analysis.

Icons	Description
	<b>Filter:</b> This control enables you to toggle <b>ON/OFF</b> the visualization of the waveform with applied <b>EMG, Base Line, and Mains</b> filters. To activate or deactivate these filters, select or deselect any number of checkboxes from the drop-down list. These filters improve the accuracy and reliability of ECG analysis.
	<b>Channel Selection:</b> This control lets you select the channel(s) for display within the <b>Page View</b> , using the drop-down list (up to 12 channels, depending on the number of channels in the current <b>Record</b> ).

**To toggle filters ON/OFF:**

1. Hover over the **Filter** drop-down list to expand it.

Figure 434. Page View - Toggling Filters



2. Select the filter you wish to toggle. The visualization of the waveform will change immediately.

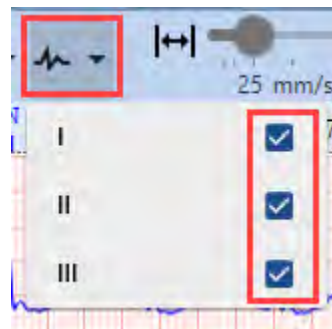
It is recommended to keep filters **ON** to provide accurate analysis:

- **EMG filter:** Eliminates high-frequency ECG signal components.
- **Baseline filter:** Removes low-frequency ECG signal components.
- **Mains filter:** Eradicates 50 or 60 Hz power line interference. This interference can be caused by the electrical equipment in the environment.

**To toggle the visualization of channels within the Page View:**

1. Hover over the **Channel Selection** drop-down list to expand it.

Figure 435. Page View - Toggling Channels



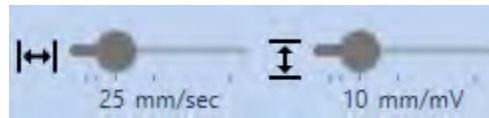
2. Select channels you wish to toggle. The visualization within the **Page View** will change immediately.

Toggling **ON/OFF** ECG channels enhances the accuracy and efficiency of ECG analysis. This feature allows you to focus on specific channels, compare them, filter out noise and more.

## Scale and Gain Controls

This group of controls enables you to adjust the paper speed and amplitude, affecting waveform visualization and enhancing the accuracy and reliability of ECG analysis.

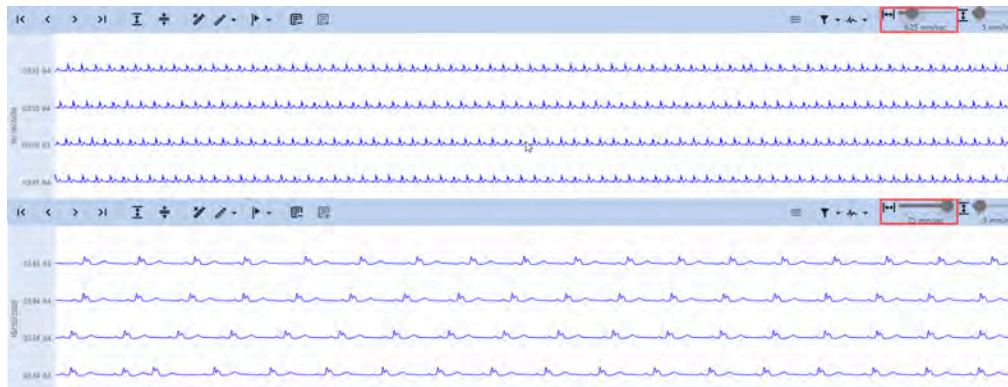
Figure 436. Page View - Scale and Gain Controls



### To change the paper speed:

1. Drag the slider to your desired position, setting the paper speed within the range from 1.56 up to 25 mm/sec. The visualization within the **Page View** will change immediately.

Figure 437. Page View - Page View Setting Paper Speed

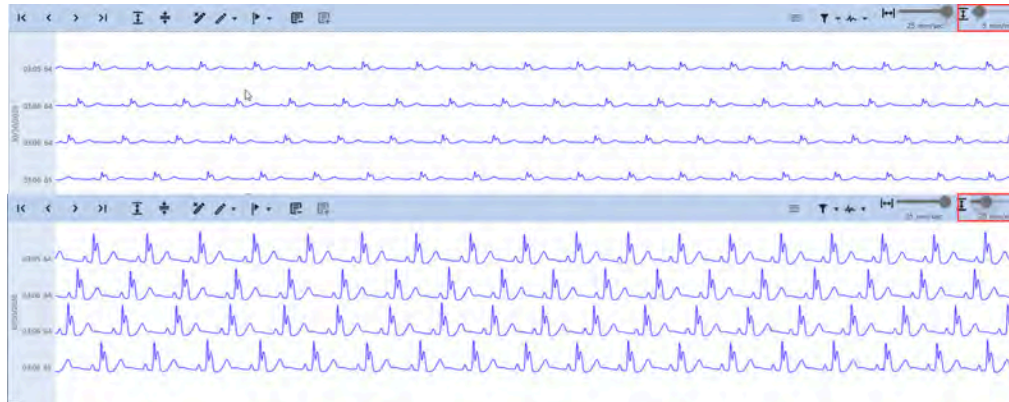


### To change the amplitude:



1. Drag the slider to your desired position, setting the amplitude within the range from 0.5 up to 80 mm/mV. The visualization within the **Page View** will change immediately.

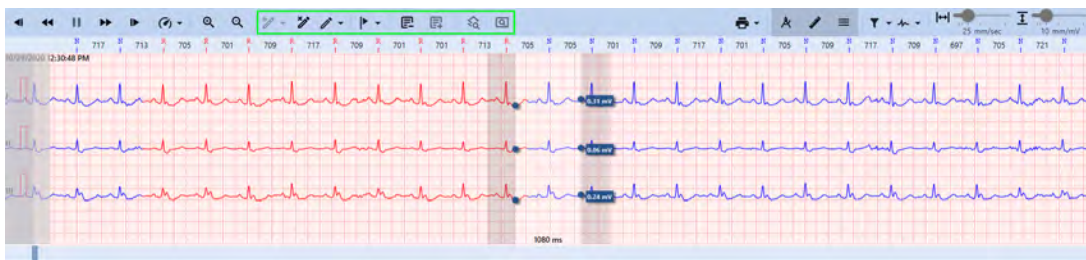
Figure 438. Page View - Setting Amplitude



## Strip View

The ECG **Strip View** is displayed in the bottom pane of the **Templates View** and in the **Edit Templates Mode**. It is also displayed in the **Events** and **Page Views**. The **Strip View** presents detailed data for the currently selected beat, as well as the adjacent ECG signal. Typically, the strip displays 12 to 16 seconds of ECG signal, depending on the monitor characteristics and ECG paper speed settings. You can utilize the **Strip View** for detailed analysis, measurements, beat reclassification, user event creation, and more.

Figure 439. Strip View - Strip View



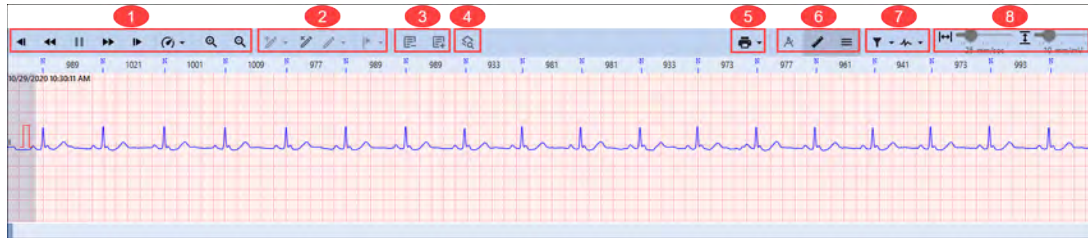
### Note:

The ECG Strip grid is scaled accurately to millimeters, irrespective of the computer or monitor size in use. The **NH-301 Holter** analysis system automatically adjusts all application windows to align with the computer's graphical settings and monitor capabilities. This feature enables you to use any measuring tool, including specialized ECG rulers like the **Norav Medical ECG ruler**, to measure amplitude, cycles, frequency, and RR intervals.

## Strip View Toolbar

The toolbar at the top of the **Strip View** contains various controls that facilitate the scanning and reviewing of the ECG signal within the **Strip View** itself. For ease of understanding, these controls are organized into distinct groups of interface elements:

Figure 440. Page View - Strip View Toolbar







1. General Controls.
2. Beats and Events Controls.
3. Analysis Controls.
4. Views Switching Controls.
5. Printing Control.
6. Measuring Controls.
7. Filters.
8. Scale and Gain Controls.

### General Controls

**General Controls** is a group of buttons designed to facilitate efficient ECG Strip scanning and review within the **Strip View**.

Icon	Description
	<b>Step Backward button:</b> Click to move the ECG Strip one step backward for scanning and reviewing.
	<b>Scan Backward button:</b> Click to initiate continuous backward scanning of the ECG Strip.
	<b>Pause Scan button:</b> Click to halt continuous scanning of the ECG Strip. For example, if you have activated a <b>Scan Backward</b> or a <b>Scan Forward</b> button, halt scanning by clicking the <b>Pause Scan</b> button.
	<b>Scan Forward button:</b> Click to initiate continuous forward scanning of the ECG Strip.





Icon	Description
	<b>Step Forward button:</b> Click to move the ECG Strip one step forward for scanning and reviewing.
	<b>Scan Speed button:</b> Allows you to control the scanning speed. To set the scanning speed: <ol style="list-style-type: none"> <li>1. Hover over the <b>Scan Speed</b> icon to expand the drop-down list.</li> <li>2. Click the desired scanning speed multiplier, ranging from <math>\times 1</math> to <math>\times 128</math>.</li> </ol>
	<b>Zoom In button:</b> Click to adjust the scale of the waveform in the <b>Strip View</b> , focusing on specific areas or comparing different fragments of the ECG record.
	<b>Zoom Out button:</b> Click to adjust the scale of the waveform in the <b>Strip View</b> . Use this button to zoom out if you had zoomed in earlier, or to view adjacent beats and fragments of the ECG Records.

**Note:**

You can also click and hold the strip to drag it sideways, allowing you to view adjacent beats and ECG fragments.

## Beats and Events Controls

**Beats and Events Controls** is a group of buttons that facilitate beats and events management in the **Strip View**.

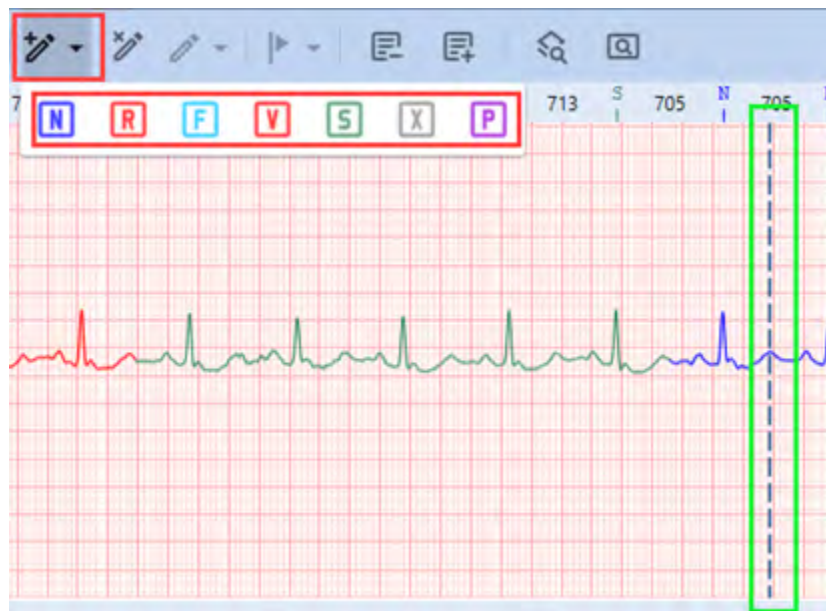
Icon	Description
	<b>Insert Beat button:</b> Allows you to insert new beats between existing ones. Further instructions are presented below.
	<b>Delete Beats button:</b> Click to delete a selected beat.
	<b>Change Beats Annotation button:</b> Enables you to modify the annotation of selected beats.
	<b>Create User Event button:</b> Allows you to create a new user event, located at the selected beat or ECG fragment. After adding a user event, the corresponding fragment of the ECG waveform will be recalculated, and some beats may shift between templates. Further instructions are presented below.

By default, when you click the **Strip View**, you select an entire beat. Inserting a beat is not equivalent to beat reclassification, so it requires an alternative method for selecting a position in the **Strip View**.

**To insert a beat:**

1. Select a position in the **Strip View** using one of these methods:
  - Press Alt+Click in the **Strip View**: A vertical dotted line will, marking the desired position.
  - Press your mouse wheel in the **Strip View**:. A vertical dotted line will appear, marking the desired position.
  - Press Alt+Right Click in the **Strip View**: A vertical dotted line will appear to mark the desired position. Alongside the dotted line, a context menu will also expand, simplifying access to the **Insert Beat** option. **Note:** this key combination expands the context menu with only one option available – **Insert Beat**.
2. Hover over the **Insert Beat** button in the **Strip View Toolbar** to expand the drop-down list.

Figure 441. Strip View - Inserting Beats



3. Click the appropriate type of morphology for the insertion. The NH-301 software will automatically determine which fragment of the waveform to use for this purpose. A specific segment of the ECG waveform in the **Strip View** will immediately change color.

**To delete beats:**

1. Select a fragment of the ECG, which you wish to delete, using one of the following methods:
  - Click an individual beat to select it.
  - Select a fragment of the waveform using one of these methods:

▪ **Using Shift + Click:**

- a. Identify the initial point in the range you wish to select.
- b. Click the initial point.
- c. Hold down the **Shift** key.
- d. Identify the final point in the range.
- e. **(Optional)** [Scan the Strip View \(on page 299\)](#) to locate the points of interest, if necessary.
- f. Click the final point to complete the range selection.

▪ **Using Ctrl +Click:**

- a. Identify the initial point in the range you wish to select.
- b. Hold down the **Ctrl** key.
- c. Click the initial point.
- d. Identify the final point in your desired range.
- e. **(Optional)** [Scan the Strip View \(on page 299\)](#) to locate the points of interest, if necessary.
- f. Drag the cursor to the final point and release the mouse button to complete the selection.

▪ **Using the right mouse button:**

- a. Click the **Strip View** and hold the right mouse button to designate the initial point in the range you wish to select.
- b. Drag the cursor to set the final point.
- c. **(Optional)** [Scan the Strip View \(on page 299\)](#) to locate the points of interest, if necessary.
- d. Release the right mouse button to complete the range selection. A context menu will appear.

Figure 442. Strip View - Deleting Beats



2. Click the **Delete Beats** button.

#### To change beat annotation:

1. Select a fragment of the ECG, which you wish to reclassify, using one of the following methods:
  - Click an individual beat to select it.
  - Select a fragment of the waveform using one of these methods:
    - **Using Shift + Click:**
      - a. Identify the initial point in the range you wish to select.
      - b. Click the initial point.
      - c. Hold down the **Shift** key.
      - d. Identify the final point in the range.
      - e. **(Optional)** [Scan the Strip View \(on page 299\)](#) to locate the points of interest, if necessary.
      - f. Click the final point to complete the range selection.
    - **Using Ctrl +Click:**
      - a. Identify the initial point in the range you wish to select.
      - b. Hold down the **Ctrl** key.
      - c. Click the initial point.



- d. Identify the final point in your desired range.
- e. **(Optional)** [Scan the Strip View \(on page 299\)](#) to locate the points of interest, if necessary.
- f. Drag the cursor to the final point and release the mouse button to complete the selection.

• **Using the right mouse button:**








- a. Click the **Strip View** and hold the right mouse button to designate the initial point in the range you wish to select.
- b. Drag the cursor to set the final point.
- c. **(Optional)** [Scan the Strip View \(on page 299\)](#) to locate the points of interest, if necessary.
- d. Release the right mouse button to complete the range selection. A context menu will appear.

Figure 443. Changing Beats Annotation



2. Hover over the **Change Beats Annotation** button in the **Strip View Toolbar** to expand the drop-down list.
3. Click the appropriate type of morphology for the beat you wish to reclassify. Alternatively, you may utilize keyboard shortcuts as outlined in the table below. The selected beat in the **Strip View** will immediately change color.

**Table 9. Beats Reclassification Keyboard****Shortcuts for Strip View**

Action	But- ton	Keyboard Keys
Classify as <b>Normal</b>		<b>N</b>
Classify as <b>R on T</b>		<b>R</b>
Classify as <b>Fusion</b>		<b>F</b>
Classify as <b>VPB</b>		<b>V</b>
Classify as <b>SVE</b>		<b>S</b>
Classify as <b>Questionable</b>		<b>X</b>
Classify <b>Paced</b>		<b>P</b>

**To create a user event:**

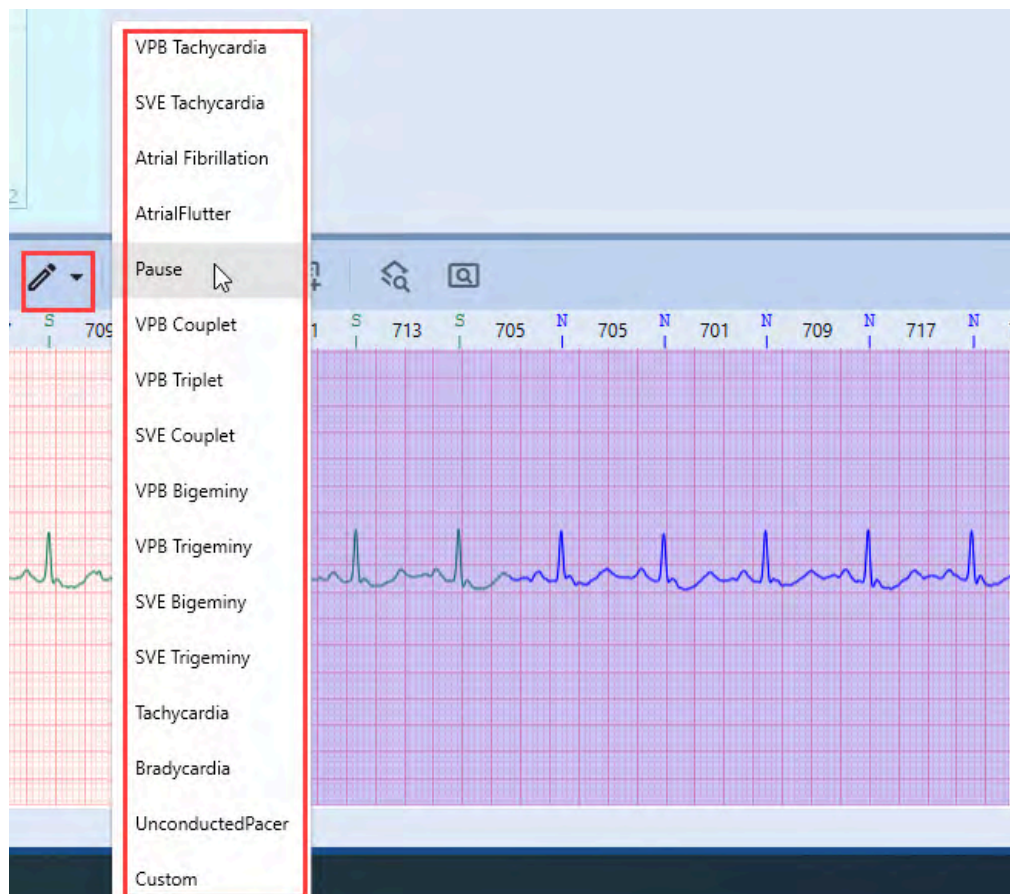
- Select a fragment of the ECG, which you wish to reclassify as a continuous event, using one of the following methods:
  - Click an individual beat to select it.
  - Select a fragment of the waveform:
    - **Using Shift + Click:**
      - Identify the initial point in the range you wish to select.
      - Click the initial point.
      - Hold down the **Shift** key.
      - Identify the final point in the range.
      - (Optional) [Scan the Strip View \(on page 299\)](#) to locate the points of interest, if necessary.
      - Click the final point to complete the range selection.
    - **Using Ctrl +Click:**
      - Identify the initial point in the range you wish to select.
      - Hold down the **Ctrl** key.
      - Click the initial point.

- d. Identify the final point in your desired range.
- e. **(Optional)** [Scan the Strip View \(on page 299\)](#) to locate the points of interest, if necessary.
- f. Drag the cursor to the final point and release the mouse button to complete the selection.

• **Using the right mouse button:**

- a. Click the **Strip View** and hold the right mouse button to designate the initial point in the range you wish to select.
- b. Drag the cursor to set the final point.
- c. **(Optional)** [Scan the Strip View \(on page 299\)](#) to locate the points of interest, if necessary.
- d. Release the right mouse button to complete the range selection. A context menu will appear.



Figure 444. Strip View - Creating User Event



2. Hover over the **Create User Event** button or menu option to expand the drop-down list.
3. Click the relevant type of **Event** you wish to create in the selected area.

## Analysis Controls

Analysis Controls is a group of buttons that enable you to exclude or re-include specific fragments of the ECG recording within the Strip View.

Icon	Description
	<b>Exclude from analysis button:</b> Enables the exclusion of a selected fragment of an ECG record from analysis.
	<b>Include to analysis button:</b> Enables the re-inclusion of previously excluded fragments of an ECG record.

### To exclude an ECG segment from analysis:

1. Select the ECG fragment you wish to exclude from analysis using one of the following methods:

- **Using Shift + Click:**

- a. Identify the initial point in the range you wish to select.
- b. Click the initial point.
- c. Hold down the **Shift** key.
- d. Identify the final point in the range.
- e. **(Optional)** [Scan the Strip View \(on page 299\)](#) to locate the points of interest, if necessary.
- f. Click the final point to complete the range selection.

- **Using Ctrl +Click:**

- a. Identify the initial point in the range you wish to select.
- b. Hold down the **Ctrl** key.
- c. Click the initial point.
- d. Identify the final point in your desired range.
- e. **(Optional)** [Scan the Strip View \(on page 299\)](#) to locate the points of interest, if necessary.
- f. Drag the cursor to the final point and release the mouse button to complete the selection.

- **Using the right mouse button:**

- a. Click the **Strip View** and hold the right mouse button to designate the initial point in the range you wish to select.
- b. Drag the cursor to set the final point.

- c. **(Optional)** Scan the [Strip View](#) (on page 299) to locate the points of interest, if necessary.
- d. Release the right mouse button to complete the range selection. A context menu will appear.

Figure 445. Strip View - Excluding from analysis



2. Click the **Exclude from Analysis** button or select the same option from the context menu.

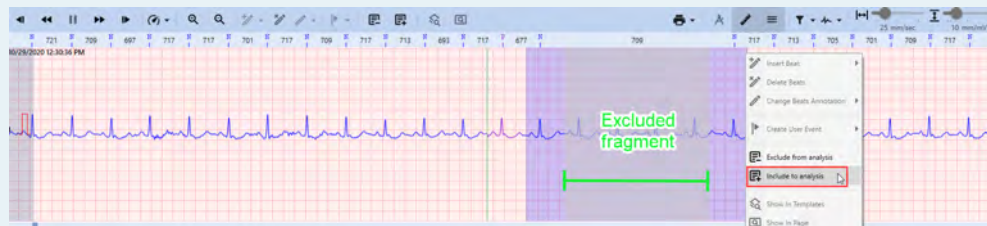
**To re-include an ECG segment into analysis:**



**Note:**

The range you wish to re-include should fully overlap a previously excluded fragment. If it does not overlap an excluded area, the **Include to analysis** button and option remain inactive.

Figure 446. Page View - Include to analysis Overlap Condition



1. Select a fragment of the ECG, you want to re-include to analysis, using one of the following methods:

- **Using Shift + Click:**

- a. Identify the initial point in the range you wish to select.
- b. Click the initial point.
- c. Hold down the **Shift** key.
- d. Identify the final point in your desired range.
- e. **(Optional)** [Scan the Strip View \(on page 299\)](#) to locate the points of interest, if necessary.
- f. Click the final point to complete the range selection.

- **Using Ctrl +Click:**

- a. Identify the initial point in the range you wish to select.
- b. Hold down the **Ctrl** key.
- c. Click the initial point.
- d. Identify the final point in your desired range.
- e. **(Optional)** [Scan the Strip View \(on page 299\)](#) to locate the points of interest, if necessary.
- f. Drag the cursor to the final point and release the mouse button to complete the selection.

- **Using the right mouse button:**

- a. Click the **Strip View** and hold the right mouse button to designate the initial point in the range you wish to select.
- b. Drag the cursor to set the final point.
- c. **(Optional)** [Scan the Strip View \(on page 299\)](#) to locate the points of interest, if necessary.
- d. Release the right mouse button to complete the range selection. A context menu will appear.



Figure 447. Strip View - Including to analysis



2. Click the **Include to analysis** button or select the option from the context menu.

### Views Switching Controls

**Views Switching Controls** is a group of buttons that allows you to focus on a single beat you have selected in the **Strip View**, in the **Templates View** and **Page View**. This functionality enhances analysis quality and efficiency.



Icon	Description
	<b>Show In Templates button:</b> Click this button to display the beat you have selected in the <b>Strip View</b> ; it will be highlighted in the relevant template within the <b>Templates Pane</b> .
	<b>Show in Page:</b> Facilitates an immediate switch to <b>Page View</b> , revealing the precise location of the chosen beat within this particular <b>Template</b> in both the <b>Signal Page</b> and the <b>ECG Strip</b> .

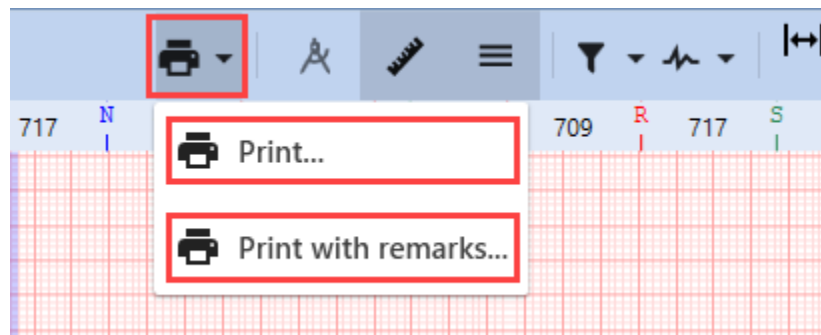
Figure 448. Strip View - Show In Templates



### Printing Control

This button enables you to print a fragment of the ECG **Strip**. The printed copy will include a segment that fits the output format. The baseline of the printed version mirrors the center line of the Strip visible on your PC screen. The printed ECG Strip will accommodate as much ECG data as possible from the visible area around the center line.

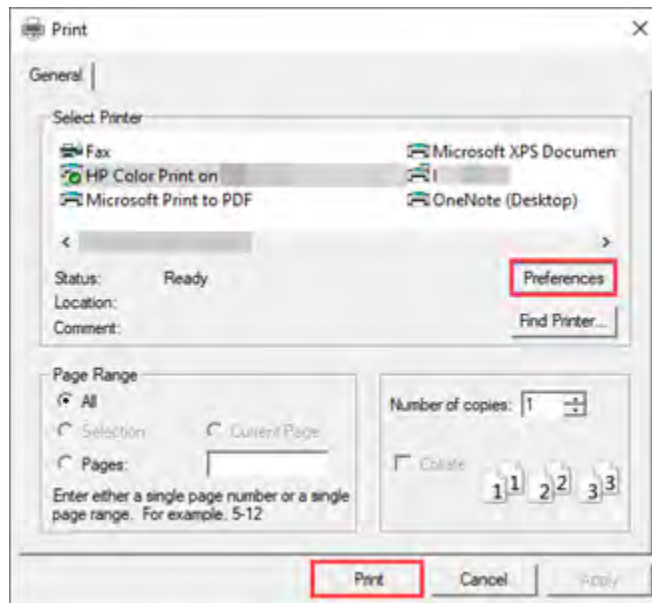
Figure 449. Strip View - Printing Strip



To print a fragment of the waveform in the **Strip View**:

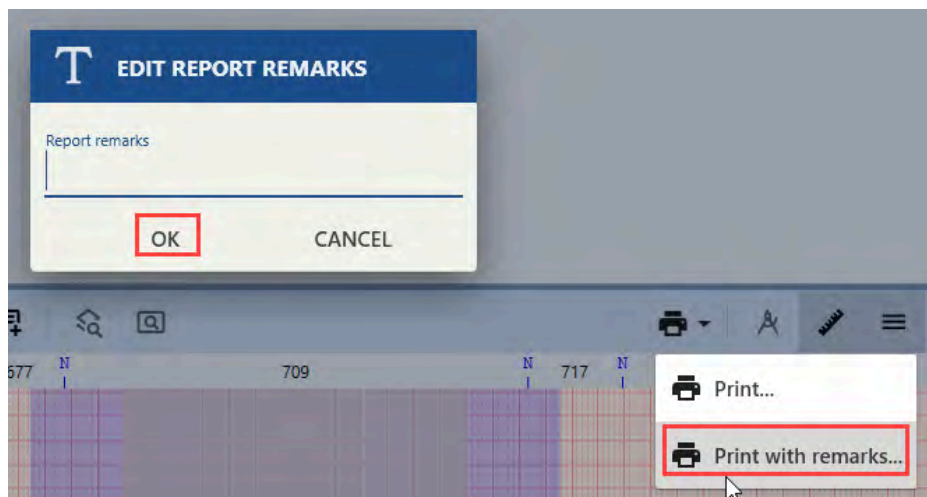
1. Identify the area you want to print.
2. **(Optional)** [Scan the Strip View \(on page 299\)](#) to locate the desired area, if needed.
3. Hover over the **Printing Control** button to expand the drop-down list.
4. Click the **Print** option and navigate to the Print dialog box:

Figure 450. Strip View - Printing Dialog Box



- a. Choose a printer **available** in the **Select Printer** window.
  - b. Adjust other preferences according to your needs.
  - c. Click **Print** at the bottom of the dialog box to execute the printing of the waveform fragment.
5. **(Optional)** Click the **Print with remarks** option if you want to print a fragment of the waveform with your remarks:
- a. Complete the "Report remarks" field in the **Edit Report Remarks** pop-up.

Figure 451. Strip View - Printing with Remarks



- b. When you complete with filling in you remarks, click OK.
- c. **(Optional)**Click **Cancel** to abandon this action.

- d. Choose a printer available in the **Select Printer** window.
- e. Adjust other preferences according to your needs.
- f. Click **Print** at the bottom of the dialog box to execute the printing of the waveform fragment.

## Measuring Controls

**Measuring Controls** is a group of buttons designed to facilitate the indication and measurement of various waveform parameters within the **Strip View**. Namely, the most important tool in this group of controls is the **Caliper** tool. It allows you to measure different intervals and amplitudes on the ECG strip, which can be used to diagnose and assess a variety of heart conditions. We will explain [how to use the Caliper for ECG measurements \(on page 193\)](#) in the following sections.




Icon	Description
	<b>Caliper toggle:</b> Click to toggle <b>ON/OFF</b> the <b>Caliper</b> tool. The <b>Caliper</b> tool assists with measuring intervals and amplitudes, such as the RR interval, T-wave, and QRS complex amplitudes. Refer to the <a href="#">Measuring ECG with Caliper (on page 193)</a> section for details.
	<b>ECG Ruler toggle:</b> Click to toggle <b>ON/OFF</b> the <b>ECG Ruler</b> , located right below the <b>Strip View Tool-bar</b> . The <b>ECG Ruler</b> indicates the duration of RR intervals for adjacent beats and their morphology classification (i.e., N, R, F, V, etc.).
	<b>Channel Numeration toggle:</b> Click to toggle <b>ON/OFF</b> the channel numeration on the left side of the ECG Strip.

Figure 452. Strip View - Caliper Tool



Figure 453. Strip View - ECG Ruler





Figure 454. Strip View - Channel Numeration



## Filters

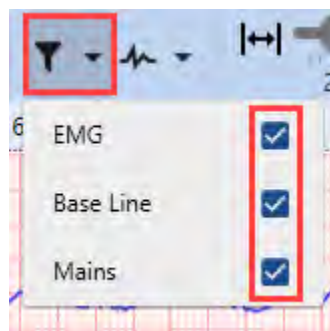
This group of controls allows you to apply various filters affecting beat visualization and enhancing the accuracy and reliability of ECG analysis.

Icons	Description
	<b>Filter:</b> This control enables you to toggle <b>ON/OFF</b> the visualization of the waveform with applied <b>EMG</b> , <b>Base Line</b> , and <b>Mains</b> filters. To activate or deactivate these filters, select or deselect any number of checkboxes from the drop-down list. These filters improve the accuracy and reliability of ECG analysis.
	<b>Channel Selection:</b> This control lets you select the channel(s) for display within the <b>Strip View</b> , using the drop-down list (up to 12 channels, depending on the number of channels in the current <b>Record</b> ).

To toggle filters **ON/OFF**:

1. Hover over the **Filter** drop-down list to expand it.

Figure 455. Strip View - Toggling Filters



2. Select the filter you wish to toggle. The visualization of the waveform will change immediately.

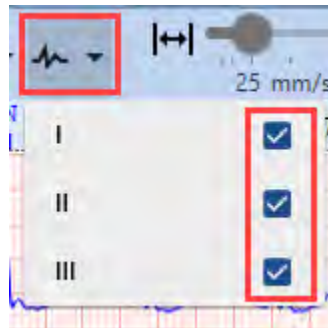
It is recommended to keep filters **ON** to provide accurate analysis:

- **EMG filter:** Eliminates high-frequency ECG signal components.
- **Baseline filter:** Removes low-frequency ECG signal components.
- **Mains filter:** Eradicates 50 or 60 Hz power line interference. This interference can be caused by the electrical equipment in the environment.

To toggle the visualization of channels within the Strip:

1. Hover over the **Channel Selection** drop-down list to expand it.

Figure 456. Strip View - Toggling Channels



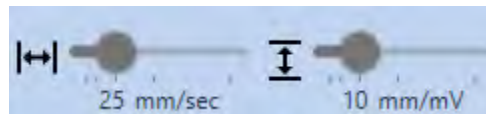
2. Select filters you wish to toggle. The visualization of the Strip will change immediately.

Toggling **ON/OFF** ECG channels enhances the accuracy and efficiency of ECG analysis. This feature allows you to focus on specific channels, compare them, filter out noise and more.

### Scale and Gain Controls

This group of controls enables you to adjust the paper speed and amplitude, affecting beat visualization and enhancing the accuracy and reliability of ECG analysis.

Figure 457. Template Edit - Scale and Gain Controls



### To change the paper speed:

1. Drag the slider to your desired position, setting the paper speed within the range from 6.25 up to 100 mm/sec. The visualization within the Strip will change immediately.



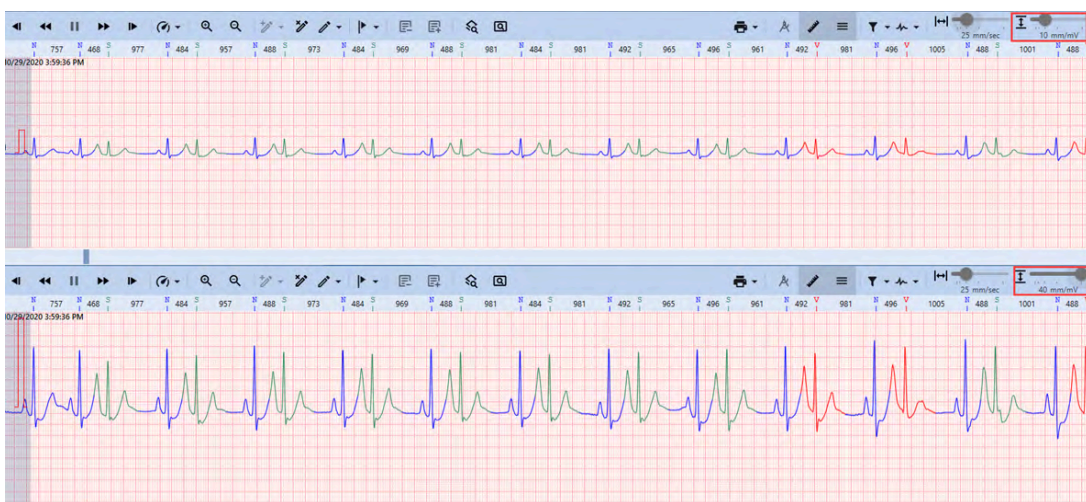
Figure 458. Strip View - Setting Paper Speed



### To change the amplitude:

1. Drag the slider to your desired position, setting the amplitude within the range from 2.5 up to 40 mm/mV. The visualization within the Strip will change immediately.

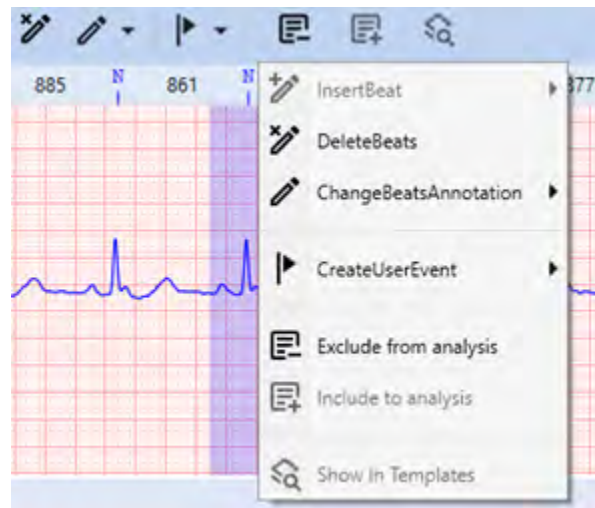
Figure 459. Strip View - Setting Amplitude



## Context Menu Features

A **Context Menu**, accessible via right-click, enables you to quickly and easily access common actions, such as inserting or deleting beats, changing annotations, creating user events, etc.

Figure 460. Strip View - Context Menu



### Insert Beat

Allows you to insert new beats between existing ones:

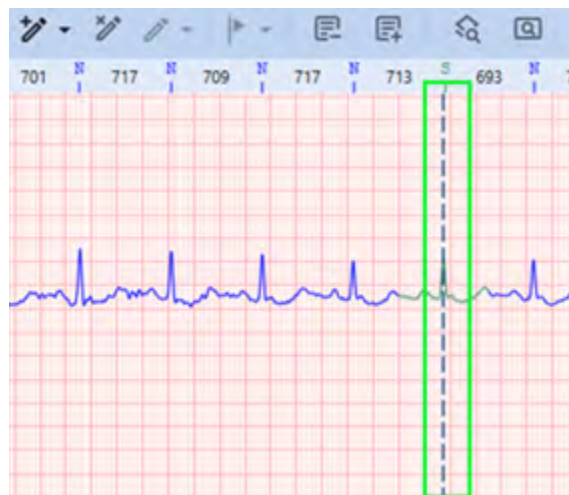


#### Note:

By default, when you click the **Strip View**, you select an entire beat. Inserting a beat is not equivalent to beat reclassification, so it requires an alternative method for selecting a position in the **Strip View**.

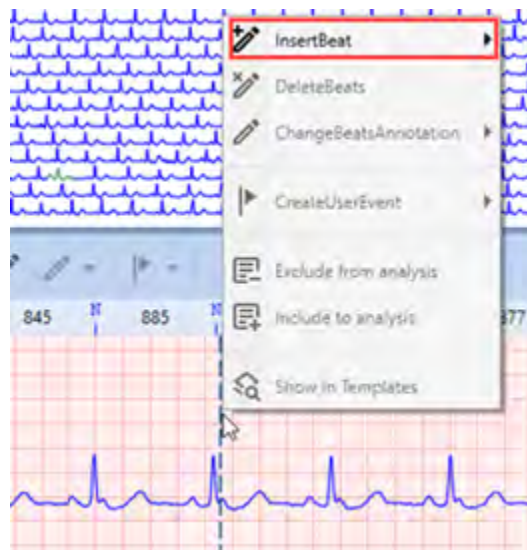
1. Select a position in the **Strip View** using one of these methods:

Figure 461. Strip View - Positioning Beat



- Hold Alt and click in the **Strip View**: A vertical dotted line will, marking the desired position. While holding Alt, click the right mouse button to expand the context menu.
  - Press your mouse wheel in the **Strip View**: A vertical dotted line will appear, marking the desired position. Click again and hold the mouse wheel, and then press the right mouse button to expand the context menu.
  - Press Alt+Right Click in the **Strip View**: A vertical dotted line will appear to mark the desired position. Alongside the dotted line, a context menu will expand, simplifying access to the **Insert Beat** option.
2. Hover over the **Insert Beat** option in the **Context Menu** to expand the drop-down list.

Figure 462. Strip View - Insert Beat



3. Click the appropriate type of morphology for the insertion. The NH-301 software will automatically determine which fragment of the waveform to use for this purpose. A specific segment of the ECG waveform in the **Strip View** will immediately change color.

### Delete Beats

Allows you to delete a selected beat or a fragment of a waveform:

1. Select a fragment of the ECG, which you wish to delete, using one of the following methods:
  - Click an individual beat to select it. Right-click the selected fragment to expand the context menu.
  - Select a fragment of the waveform using one of these methods:

**▪ Using Shift + Click:**

- a. Identify the initial point in the range you wish to select.
- b. Click the initial point.
- c. Hold down the **Shift** key.
- d. Identify the final point in the range.
- e. **(Optional)** [Scan the Strip View \(on page 164\)](#) to locate the points of interest, if necessary.
- f. Click the final point to complete the range selection.
- g. Right-click the selected fragment to expand the context menu.

**▪ Using Ctrl +Click:**

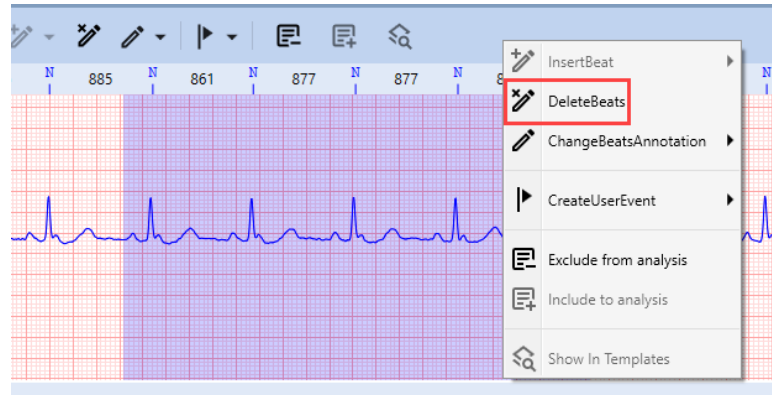
- a. Identify the initial point in the range you wish to select.
- b. Hold down the **Ctrl** key.
- c. Click the initial point.
- d. Identify the final point in your desired range.
- e. **(Optional)** [Scan the Strip View \(on page 164\)](#) to locate the points of interest, if necessary.
- f. Drag the cursor to the final point and release the mouse button to complete the selection.
- g. Right-click the selected fragment to expand the context menu.

**▪ Using the right mouse button:**

- a. Click the **Strip View** and hold the right mouse button to designate the initial point in the range you wish to select.
- b. Drag the cursor to set the final point.
- c. **(Optional)** [Scan the Strip View \(on page 164\)](#) to locate the points of interest, if necessary.

- d. Release the right mouse button to complete the range selection. A context menu will appear.

Figure 463. Strip View - Delete Beats



2. Click the **Delete Beats** option in the context menu. The system will automatically recalculate events and templates following the deletion.

### Change Beats Annotation

Enables you to modify the annotation of the selected beat:

1. Select a fragment of the ECG, which you wish to delete, using one of the following methods:
  - Click an individual beat to select it. Right-click the selected fragment to expand the context menu.
  - Select a fragment of the waveform using one of these methods:
    - **Using Shift + Click:**
      - a. Identify the initial point in the range you wish to select.
      - b. Click the initial point.
      - c. Hold down the **Shift** key.
      - d. Identify the final point in the range.
      - e. **(Optional)** [Scan the Strip View \(on page 164\)](#) to locate the points of interest, if necessary.
      - f. Click the final point to complete the range selection.
      - g. Right-click the selected fragment to expand the context menu.
    - **Using Ctrl +Click:**
      - a. Identify the initial point in the range you wish to select.
      - b. Hold down the **Ctrl** key.
      - c. Click the initial point.
      - d. Identify the final point in your desired range.

e. **(Optional)** [Scan the Strip View \(on page 164\)](#) to locate the points of interest, if necessary.

f. Drag the cursor to the final point and release the mouse button to complete the selection.

g. Right-click the selected fragment to expand the context menu.

• **Using the right mouse button:**

a. Click the **Strip View** and hold the right mouse button to designate the initial point in the range you wish to select.

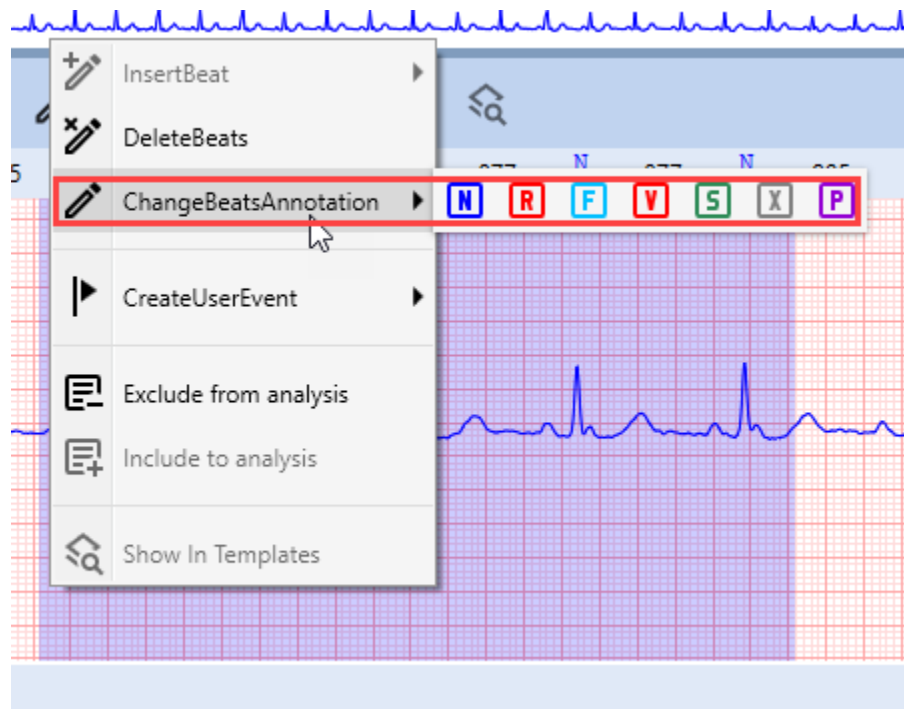
b. Drag the cursor to set the final point.

c. **(Optional)** [Scan the Strip View \(on page 164\)](#) to locate the points of interest, if necessary.

d. Release the right mouse button to complete the range selection. A context menu will appear.

2. Hover over the **Change Beats Annotation** option in the context menu to expand the drop-down list.








Figure 464. Strip View - Change Beats Annotation



3. Click the appropriate type of morphology for the beats you wish to reclassify. Alternatively, you may utilize keyboard shortcuts as outlined in the table below. Reclassified beats in the **Strip View** will immediately change color.



**Table 10. Beats Reclassification Keyboard****Shortcuts for Strip View**

Action	But- ton	Keyboard Keys
Classify as <b>Normal</b>		<b>N</b>
Classify as <b>R on T</b>		<b>R</b>
Classify as <b>Fusion</b>		<b>F</b>
Classify as <b>VPB</b>		<b>V</b>
Classify as <b>SVE</b>		<b>S</b>
Classify as <b>Questionable</b>		<b>X</b>
Classify <b>Paced</b>		<b>P</b>

**Create User Event**

Allows you to create a new user event, located at the selected beat or ECG fragment. After adding a user event, the corresponding fragment of the ECG waveform will be recalculated, and some beats may shift between templates.

1. Select a fragment of the ECG, which you wish to reclassify as a continuous event, using one of the following methods:
  - Click an individual beat to select it. Right-click the selected fragment to expand the context menu.
  - Select a fragment of the waveform using one of these methods:
    - **Using Shift + Click:**
      - a. Identify the initial point in the range you wish to select.
      - b. Click the initial point.
      - c. Hold down the **Shift** key.
      - d. Identify the final point in the range.
      - e. **(Optional)** [Scan the Strip View \(on page 164\)](#) to locate the points of interest, if necessary.

- f. Click the final point to complete the range selection.
- g. Right-click the selected fragment to expand the context menu.

▪ **Using Ctrl +Click:**

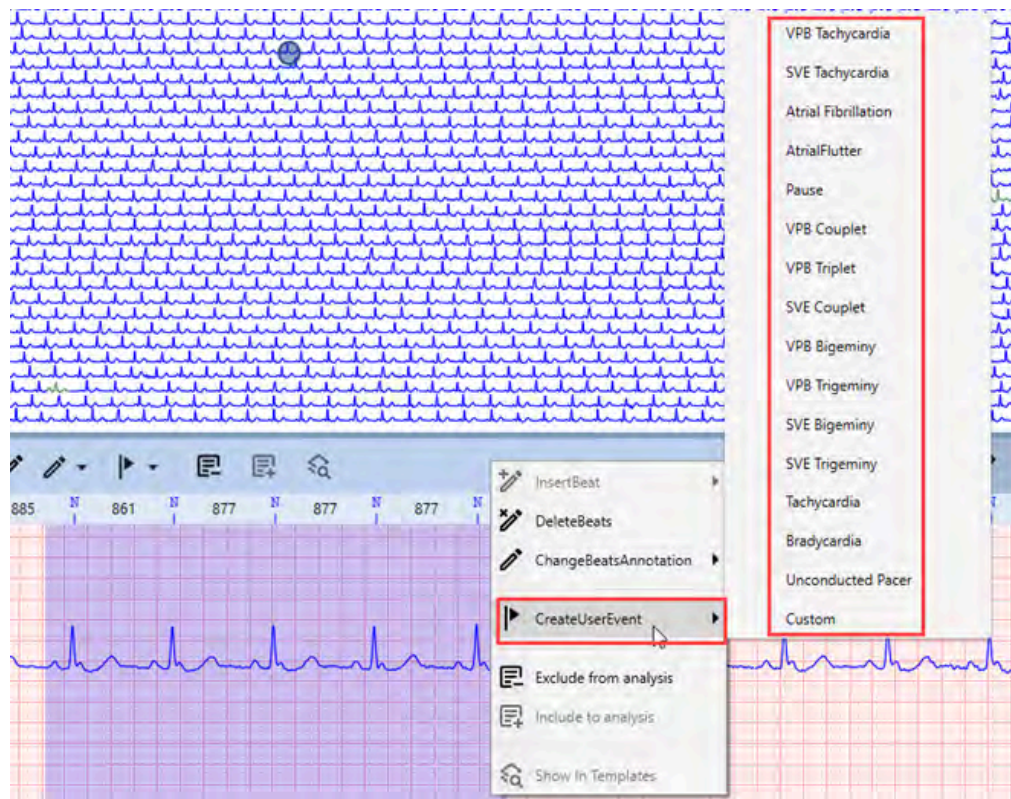
- a. Identify the initial point in the range you wish to select.
- b. Hold down the **Ctrl** key.
- c. Click the initial point.
- d. Identify the final point in your desired range.
- e. **(Optional)** [Scan the Strip View \(on page 164\)](#) to locate the points of interest, if necessary.
- f. Drag the cursor to the final point and release the mouse button to complete the selection.
- g. Right-click the selected fragment to expand the context menu.

▪ **Using the right mouse button:**

- a. Click the **Strip View** and hold the right mouse button to designate the initial point in the range you wish to select.
- b. Drag the cursor to set the final point.
- c. **(Optional)** [Scan the Strip View \(on page 164\)](#) to locate the points of interest, if necessary.
- d. Release the right mouse button to complete the range selection. A context menu will appear.

2. Hover over the **Create User Event** option to expand the drop-down list.

Figure 465. Strip View - Create User Event



3. Click the relevant type of **Event** you wish to create in the selected area.

### Exclude from analysis

Enables the exclusion of a selected fragment of an ECG record from analysis:

1. Select the ECG fragment you wish to exclude from analysis using one of the following methods:

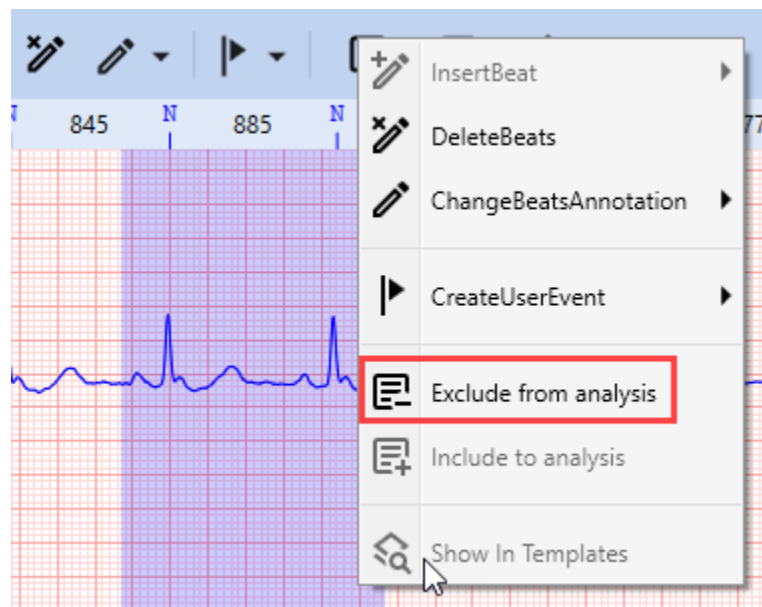
- **Using Shift + Click:**

- a. Identify the initial point in the range you wish to select.
- b. Click the initial point.
- c. Hold down the **Shift** key.
- d. Identify the final point in the range.
- e. **(Optional)** [Scan the Strip View \(on page 164\)](#) to locate the points of interest, if necessary.
- f. Click the final point to complete the range selection.
- g. Right-click the selected fragment to expand the context menu.

- **Using Ctrl +Click:**

- a. Identify the initial point in the range you wish to select.
  - b. Hold down the **Ctrl** key.
  - c. Click the initial point.
  - d. Identify the final point in your desired range.
  - e. **(Optional)** [Scan the Strip View \(on page 164\)](#) to locate the points of interest, if necessary.
  - f. Drag the cursor to the final point and release the mouse button to complete the selection.
  - g. Right-click the selected fragment to expand the context menu.
- **Using the right mouse button:**
- a. Click the **Strip View** and hold the right mouse button to designate the initial point in the range you wish to select.
  - b. Drag the cursor to set the final point.
  - c. **(Optional)** [Scan the Strip View \(on page 164\)](#) to locate the points of interest, if necessary.
  - d. Release the right mouse button to complete the range selection. A context menu will appear.

Figure 466. Strip View - Exclude from analysis



2. Click the **Exclude from Analysis** option in the context menu.

### Include to analysis

Enables the re-inclusion of previously excluded fragments of an ECG record:

**Note:**

The range you wish to re-include should fully overlap a previously excluded fragment. If it does not overlap an excluded area, the **Include to analysis** button and option remain inactive.

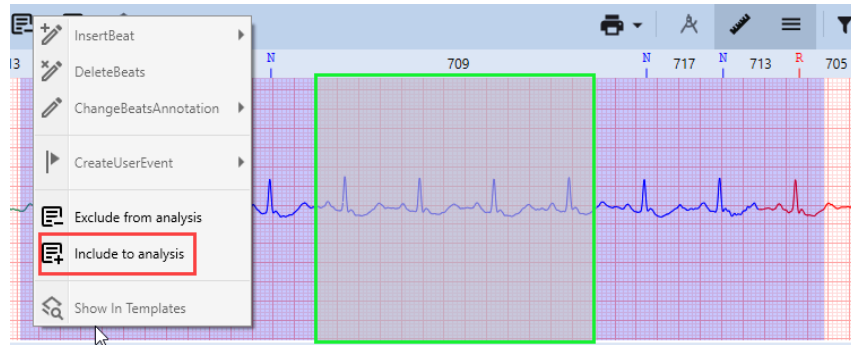
Figure 467. Strip View - Include to analysis



1. Select a fragment of the ECG, you want to re-include to analysis, using one of the following methods:
  - **Using Shift + Click:**
    - a. Identify the initial point in the range you wish to select.
    - b. Click the initial point.
    - c. Hold down the **Shift** key.
    - d. Identify the final point in the range.
    - e. **(Optional)** [Scan the Strip View \(on page 164\)](#) to locate the points of interest, if necessary.
    - f. Click the final point to complete the range selection.
    - g. Right-click the selected fragment to expand the context menu.
  - **Using Ctrl +Click:**
    - a. Identify the initial point in the range you wish to select.
    - b. Hold down the **Ctrl** key.
    - c. Click the initial point.
    - d. Identify the final point in your desired range.
    - e. **(Optional)** [Scan the Strip View \(on page 164\)](#) to locate the points of interest, if necessary.
    - f. Drag the cursor to the final point and release the mouse button to complete the selection.
    - g. Right-click the selected fragment to expand the context menu.
  - **Using the right mouse button:**
    - a. Click the **Strip View** and hold the right mouse button to designate the initial point in the range you wish to select.
    - b. Drag the cursor to set the final point.

- c. **(Optional)** Scan the [Strip View](#) (on page 164) to locate the points of interest, if necessary.
- d. Release the right mouse button to complete the range selection. A context menu will appear.

Figure 468. Strip View - Include to analysis



- 2. Click the **Include to analysis** option in the context menu.

### Show In Templates

Select this option from the context menu to display the beat you have selected in the **Strip View**; it will be highlighted in the relevant template within the **Templates Pane**.



Figure 469. Strip View - Show In Templates



## Measuring ECG with Caliper

You may use the **Caliper** function to measure the RR interval, QRS complex duration and amplitude, QT interval, and other ECG waveform parameters. The **Caliper** also allows for editing the ECG record via the **Strip View**.

Figure 470. Strip View - Caliper Tool



## Caliper Design Overview

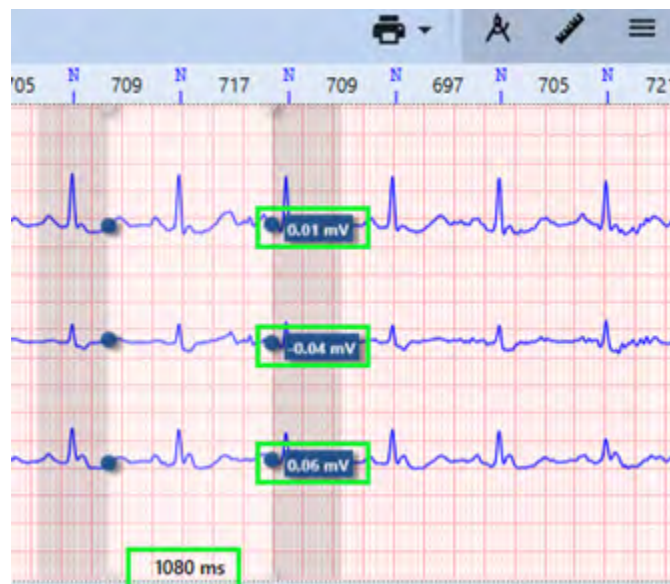
The **Caliper** tool in the **Strip View** displays two **measuring lines** (1) and a **measuring interval** (2) between them. To activate the **Caliper** tool, click the **Caliper** button in the **Strip View Toolbar**.

Figure 471. Strip View - Caliper Measurement Lines and Interval



Each ECG channel in the Strip has a small box adjacent to the point where the right measurement line intersects the channel signal line. The value in this box indicates the amplitude difference between the two points demarcated by the measurement lines.

Figure 472. Strip View - Interval Length and Amplitude Difference



The interval length in milliseconds is displayed at the bottom of the measuring interval.

### Moving Caliper Lines

You may move Caliper measurement lines either **simultaneously** or **independently**.

#### To move both lines simultaneously:

1. Position the cursor within the measuring interval. The cursor will change to a resize cursor.

Figure 473. Strip View - Moving Caliper Lines Simultaneously



2. Drag and drop the **Caliper** to the desired location.
3. Optionally, use the Left and Right arrow keys to fine-tune the position.

#### To move lines independently:

1. Position the cursor near one of the measurement lines until it changes to a resize cursor.

Figure 474. Strip View - Moving Caliper Lines Independently



2. Click to select the measurement line.
3. Drag and drop it to the new location.

### Zoom Feature

To adjust the display scale of the waveform in the Strip, utilize the **Zoom In/Zoom Out** options:

Figure 475. Strip View - Zooming Options



1. Click the corresponding button in the **Strip View Toolbar**.
2. Hold the **Ctrl** key while scrolling up (**Zoom In**) or down (**Zoom Out**) the mouse wheel.

### Caliper Snapping Feature

The **Caliper Snapping** feature automatically aligns the **Caliper** measurement lines to the nearest R-peaks in the ECG signal. This functionality aids in the precise measurement of ECG wave duration and amplitude. Manual alignment can be challenging, hence **Caliper Snapping** enhances the accuracy, efficiency, and reproducibility of ECG interpretation.

**To utilize the Caliper snapping feature:**



1. Click the **Caliper** button in the **Strip View Toolbar**.
2. **(Optional)** Use the Left and Right arrow keys to make slight adjustments to the Caliper measurement lines.
3. To snap a **Caliper** measurement line to an R-spike:

Figure 476. Strip View - Caliper Snapping



- To snap any line:
  - a. Hold down the **Alt** key.
  - b. Position the cursor near one of the measurement lines until the cursor icon changes to a resize cursor.
  - c. Click the measurement line to select it.
  - d. Drag and drop it to the desired location.
- To snap the right measurement line:
  - a. Hold down the **Right Alt** key.
  - b. Use the Left and Right arrow keys to move the **Caliper**; the right measurement line will automatically snap to the R-peaks as you move.
- To snap the left measurement line:
  - a. Hold down the **Left Alt** key.
  - b. Use the Left and Right Arrow keys to move the Caliper; the left measurement line will automatically snap to the R-peaks as you move.

The **Caliper Snapping** function is instrumental in enabling a quick and accurate evaluation of various ECG parameters.

## Editing Beats and Events Using Caliper

The **Caliper** tool enables you to edit specific fragments of the ECG waveform contained within the measurement lines of the **Caliper**. When you opt to delete or reclassify beats, or exclude a waveform fragment from analysis, the changes will be confined to the selected fragment, which may contain multiple beats. In essence, the **Caliper** allows you to edit a continuous section of an ECG record, demarcated by the measurement lines, in a single action.

Figure 477. Strip View - Editing Beats and Events Using Caliper



**To edit a fragment of an ECG using the Caliper:**

1. Position the **Caliper** and adjust its measurement lines as needed. For guidance, refer to the [Caliper Design Overview \(on page 331\)](#) section.
2. Right-click in the **Strip View** area to expand the context menu.
3. The **Caliper** tool's context menu offers several options within the **Strip View**:



- **Delete Beats:** Click this option to remove all beats within the boundaries of the **Caliper's** measurement lines. This action will result in minor recalculations.



**Note:**

Deleting beats may trigger the generation of **Pause** events. To annotate and exclude noisy segments, the **Exclude from analysis** option is preferable to **Delete Beats**.

- **Change Beats Annotation:** Hover over this option to display a drop-down list, then click the morphology type you wish to assign to the beats. The reclassified beats will instantly change color in the **Strip View**.
- **Create User Event:** Hover over this option to expand a drop-down list, and click the event type you wish to create in the selected area.
- **Exclude from analysis:** Click to exclude a noisy ECG segment within the **Caliper's** measurement lines from the analysis, without affecting other analytical outcomes.
- **Include to analysis:** Click to include previously excluded ECG fragments back into the analysis.



**Note:**

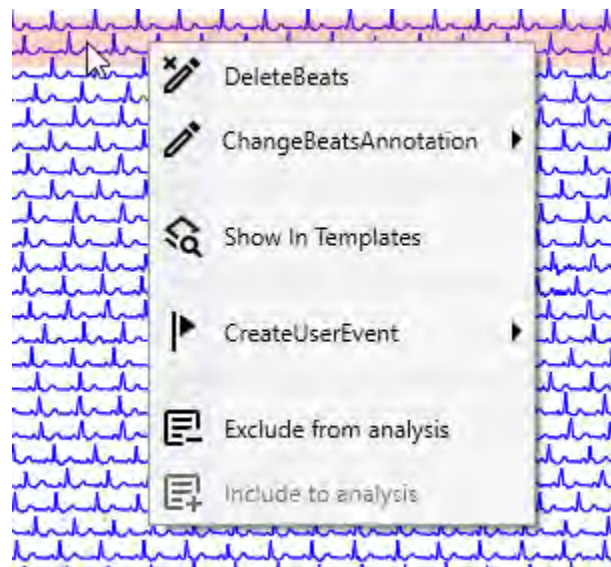
The **Include in Analysis** option becomes active in the **Caliper** context menu only when the current **Caliper** measurement interval overlaps with a segment that was excluded earlier.

## Context Menu Features

The **Context Menu**, accessible via right-click, enables you to quickly and easily access common actions, available on the **Page View Toolbar**.

The **Context Menu** mirrors the **Page View Toolbar**, with menu options carrying the same annotations and capabilities as [buttons on the Toolbar \(on page 284\)](#).

Figure 478. Page View - Context Menu



## Secondary Screen Mode

The **NH-301 Holter** software supports **Secondary Screen Mode** to facilitate a more comfortable and efficient ECG analysis workflow. **Secondary Screen Mode** is a feature that allows for an additional display where you can place the **Page View**. This proves useful for quickly referring to the **Page View** while engaging with other **Views** on the main screen. The **Page View** in **Secondary Screen Mode** replicates the functionality of the **Page View** strips in their respective **Views**.

Figure 479. Page View - Secondary Screen Mode



## Views Interaction

The **Page View** in **Secondary Screen Mode** mirrors the functionalities of **Page View** elements in their respective **Views**. It offers similar interactions with other components of the specific **View**. Activating the **Secondary Screen Mode** renders the **Page View** in the **Views Sidebar** inactive.

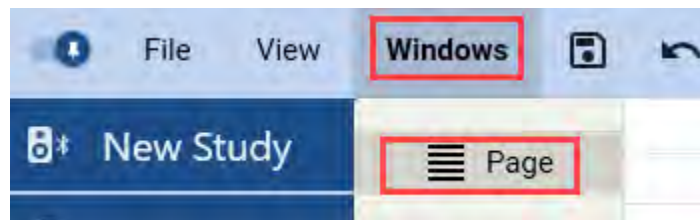
View	Description
<b>Analysis</b>	Combines <b>Page View</b> and <b>Strip View</b> functionalities.
<b>Templates</b>	Retains common <b>Page View</b> functionalities.
<b>Events</b>	Retains common <b>Page View</b> functionalities.
<b>Graphs (ST tab)</b>	Retains common <b>Page View</b> functionalities. Click <b>HR</b> , <b>RR</b> graphs, or the <b>Strip View</b> to navigate to the corresponding beat in the <b>Page View</b> .
<b>Tabular Summary</b>	Combines <b>Page View</b> and <b>Strip View</b> functionalities. Clicking any line in the <b>Tabular</b> report navigates to the relevant beat in the <b>Page View</b> and <b>Strip View</b> in the secondary window.

## Activating Secondary Screen Mode

To activate **Secondary Screen mode**:

- Using the Menu Bar:
  1. Select the **Windows** menu in the Menu Bar.

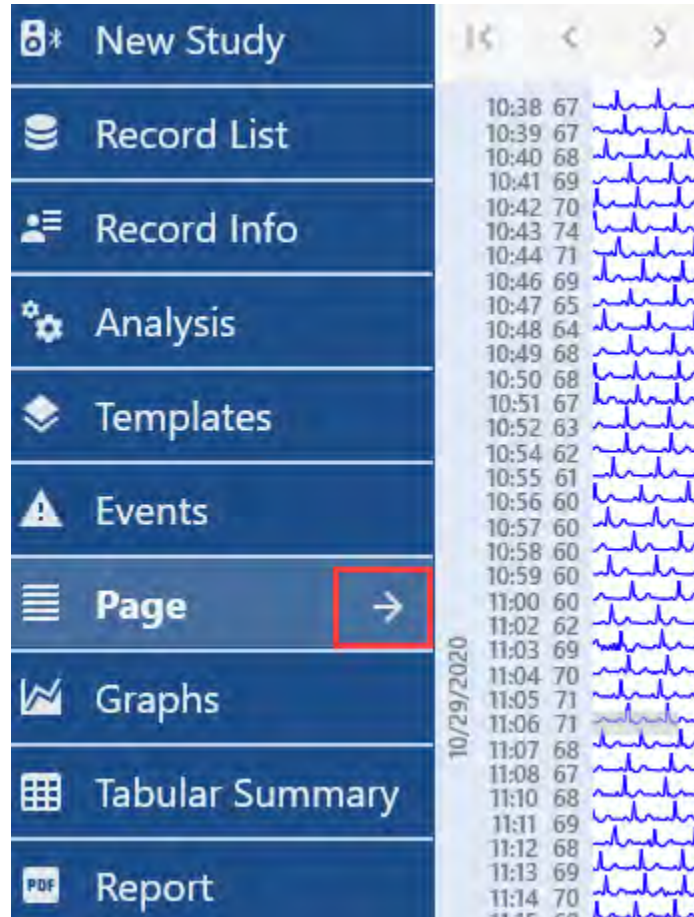
Figure 480. Page View - Activating Secondary Screen Mode via Menu Bar



2. Choose the **Page** option from the menu. The **Page View** will open in a secondary window.
  3. Adjust the secondary window settings as needed.
- Using Views Sidebar:

1. Click the arrow icon next to the **Page View** option in the **Views Sidebar**. The **Page View** will appear in a secondary window.

Figure 481. Page View - Activating Secondary Screen Mode via Views Sidebar

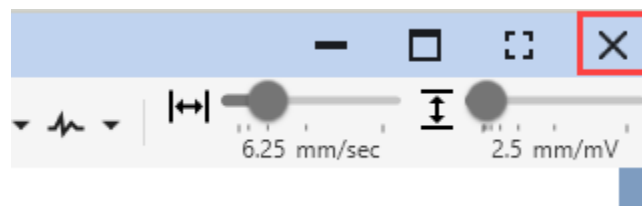


2. Adjust the secondary window settings as needed.

**To deactivate Secondary Screen Mode:**

1. Click the **X** (Close) icon in the top-right corner of the secondary window.

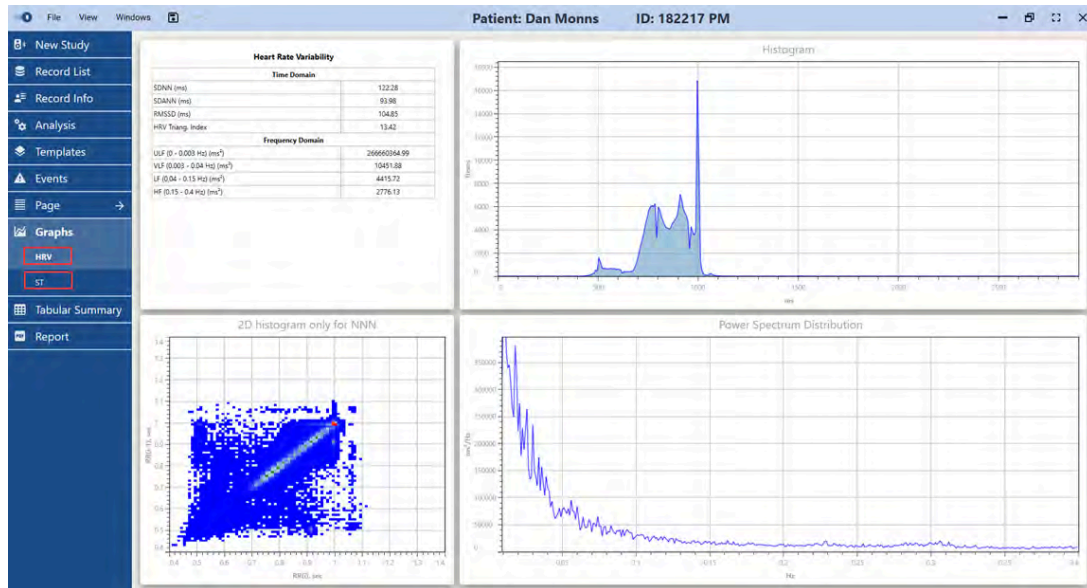
Figure 482. Page View - Deactivating Secondary Screen Mode



## Graphs

The **Graphs View** facilitates the examination of **HRV** analysis results and the preview of **ST** trends. **HRV** graphs illustrate both the time domain analysis outcomes and the frequency domain spectrum.

Figure 483. Graphs View - Graphs View

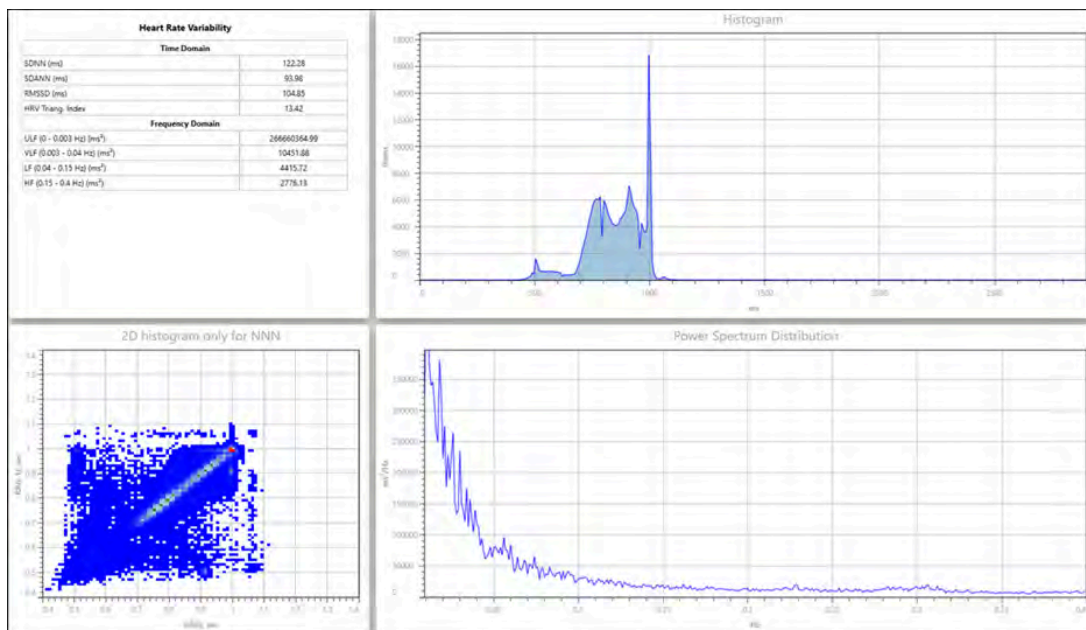


The **HTV** and **ST** tabs under the **Graphs View** enable the selection of the page displaying **HRV** analysis or the visualization of **ST** trends.

### HRV Analysis

The **Heart Rate Variability** table lists standard HRV Time Domain and Frequency Domain analysis metrics, such as SDNN, SDANN, RMSSD, and more.

Figure 484. Graphs View - HRV Tab



The **Histogram** illustrates the distribution of RR Intervals with identical durations. The graph's shape offers immediate insight into the variability.

The **Lorenz Plot** or **Scatter Diagram** (bottom left), is based on the RR Intervals of consecutive **N**-annotated beats (with neither S nor V preceding or following the actual beat), presents a graphical representation of the variability. The X-axis denotes Interval (i), while the Y-axis corresponds to Interval (i-1). This plot provides a swift assessment of variability; a smaller diagonal line suggests lower variability. Outlier dots indicate extreme variations, such as SVTs or Pauses.

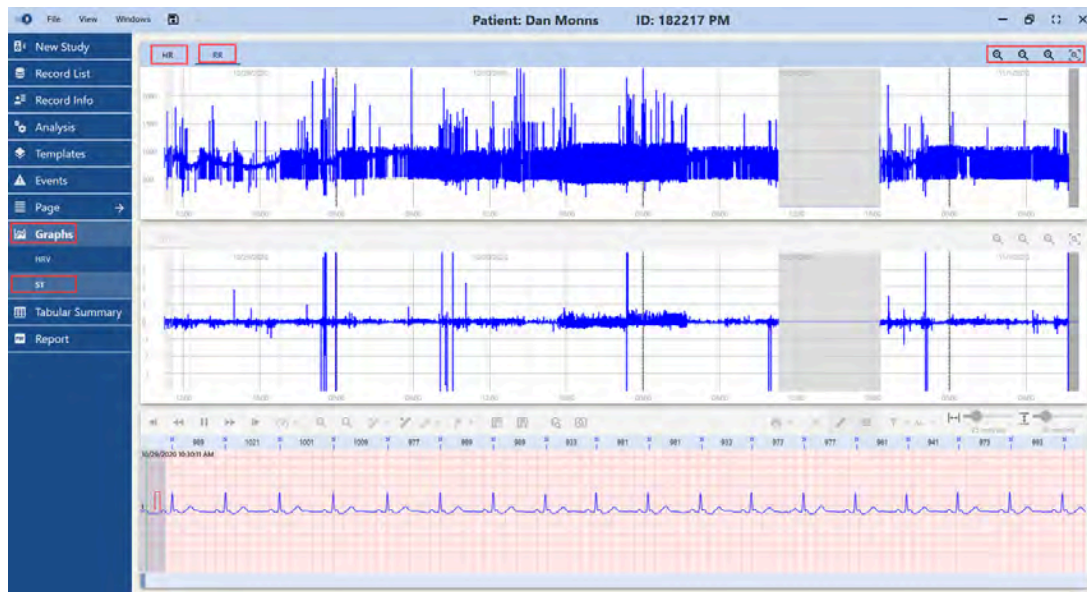
The **Power Spectrum Distribution** graph depicts the frequency domain analysis.

## ST

This page represents the **ST** calculations for each ECG channel. The top trend on the page displays the **HR** or **RR** intervals. To switch between trends, click on RR/HR buttons in the upper-right corner.



Figure 485. Graphs View - ST Tab



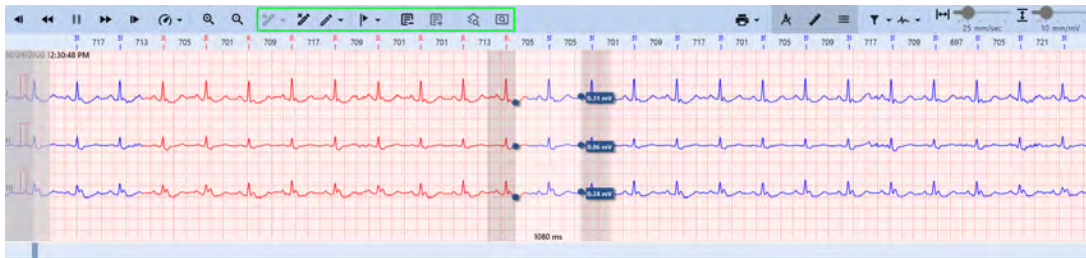
You can conduct a more thorough review of the graphs using the scaling buttons located in the top-right corner.

Icon	Description
	<b>Zoom In button:</b> Click to adjust the scale of the HR or RR graph in the <b>HR/RR Trends View</b> , focusing on specific areas of the graph. You can click this button multiple times.
	<b>Zoom Out button:</b> Click to adjust the scale of the HR or RR graph in the <b>HR/RR Trends View</b> . Use this button to zoom out if you have zoomed in previously, or to view adjacent areas of the graph. You can click this button multiple times.
	<b>Full Extent button:</b> Click to zoom out instantly and see the entire HR/RR Trends graph.
	<b>Zoom to Extent button:</b> Click to zoom in instantly to the selected area of the graph. The area will be displayed at the maximum available zoom.

## Strip View

The ECG **Strip View** is displayed in the bottom pane of the **Templates View** and in the **Edit Templates Mode**. It is also displayed in the **Events**, **Page**, and **Graphs Views**. The **Strip View** presents detailed data for the currently selected beat, as well as the adjacent ECG signal. Typically, the strip displays 12 to 16 seconds of ECG signal, depending on the monitor characteristics and ECG paper speed settings. You can utilize the **Strip View** for detailed analysis, measurements, beat reclassification, user event creation, and more.

Figure 486. Strip View - Strip View

**Note:**

The ECG Strip grid is scaled accurately to millimeters, irrespective of the computer or monitor size in use. The **NH-301 Holter** analysis system automatically adjusts all application windows to align with the computer's graphical settings and monitor capabilities. This feature enables you to use any measuring tool, including specialized ECG rulers like the **Norav Medical ECG ruler**, to measure amplitude, cycles, frequency, and RR intervals.

## Strip View Toolbar

The toolbar at the top of the **Strip View** contains various controls that facilitate the scanning and reviewing of the ECG signal within the **Strip View** itself. For ease of understanding, these controls are organized into distinct groups of interface elements:

Figure 487. Page View - Strip View Toolbar



1. General Controls.
2. Beats and Events Controls.
3. Analysis Controls.
4. Views Switching Controls.
5. Printing Control.
6. Measuring Controls.
7. Filters.
8. Scale and Gain Controls.

## General Controls

**General Controls** is a group of buttons designed to facilitate efficient ECG Strip scanning and review within the **Strip View**.

Icon	Description
	<b>Step Backward button:</b> Click to move the ECG Strip one step backward for scanning and reviewing.
	<b>Scan Backward button:</b> Click to initiate continuous backward scanning of the ECG Strip.
	<b>Pause Scan button:</b> Click to halt continuous scanning of the ECG Strip. For example, if you have activated a <b>Scan Backward</b> or a <b>Scan Forward</b> button, halt scanning by clicking the <b>Pause Scan</b> button.
	<b>Scan Forward button:</b> Click to initiate continuous forward scanning of the ECG Strip.
	<b>Step Forward button:</b> Click to move the ECG Strip one step forward for scanning and reviewing.
	<b>Scan Speed button:</b> Allows you to control the scanning speed. To set the scanning speed: <ol style="list-style-type: none"> <li>1. Hover over the <b>Scan Speed</b> icon to expand the drop-down list.</li> <li>2. Click the desired scanning speed multiplier, ranging from <math>\times 1</math> to <math>\times 128</math>.</li> </ol>
	<b>Zoom In button:</b> Click to adjust the scale of the waveform in the <b>Strip View</b> , focusing on specific areas or comparing different fragments of the ECG record.
	<b>Zoom Out button:</b> Click to adjust the scale of the waveform in the <b>Strip View</b> . Use this button to zoom out if you had zoomed in earlier, or to view adjacent beats and fragments of the ECG Records.







### Note:

You can also click and hold the strip to drag it sideways, allowing you to view adjacent beats and ECG fragments.

## Beats and Events Controls

**Beats and Events Controls** is a group of buttons that facilitate beats and events management in the **Strip View**.

Icon	Description
	<b>Insert Beat button:</b> Allows you to insert new beats between existing ones. Further instructions are presented below.
	<b>Delete Beats button:</b> Click to delete a selected beat.
	<b>Change Beats Annotation button:</b> Enables you to modify the annotation of selected beats.
	<b>Create User Event button:</b> Allows you to create a new user event, located at the selected beat or ECG fragment. After adding a user event, the corresponding fragment of the ECG waveform will be recalculated, and some beats may shift between templates. Further instructions are presented below.

By default, when you click the **Strip View**, you select an entire beat. Inserting a beat is not equivalent to beat reclassification, so it requires an alternative method for selecting a position in the **Strip View**.

#### To insert a beat:

1. Select a position in the **Strip View** using one of these methods:
  - Press Alt+Click in the **Strip View**: A vertical dotted line will, marking the desired position.
  - Press your mouse wheel in the **Strip View**: A vertical dotted line will appear, marking the desired position.
  - Press Alt+Right Click in the **Strip View**: A vertical dotted line will appear to mark the desired position. Alongside the dotted line, a context menu will also expand, simplifying access to the **Insert Beat** option. **Note:** this key combination expands the context menu with only one option available — **Insert Beat**.
2. Hover over the **Insert Beat** button in the **Strip View Toolbar** to expand the drop-down list.

Figure 488. Strip View - Inserting Beats



3. Click the appropriate type of morphology for the insertion. The NH-301 software will automatically determine which fragment of the waveform to use for this purpose. A specific segment of the ECG waveform in the **Strip View** will immediately change color.

#### To delete beats:

1. Select a fragment of the ECG, which you wish to delete, using one of the following methods:
  - Click an individual beat to select it.
  - Select a fragment of the waveform using one of these methods:
    - **Using Shift + Click:**
      - a. Identify the initial point in the range you wish to select.
      - b. Click the initial point.
      - c. Hold down the **Shift** key.
      - d. Identify the final point in the range.
      - e. **(Optional)** [Scan the Strip View \(on page 342\)](#) to locate the points of interest, if necessary.
      - f. Click the final point to complete the range selection.
    - **Using Ctrl +Click:**
      - a. Identify the initial point in the range you wish to select.
      - b. Hold down the **Ctrl** key.
      - c. Click the initial point.
      - d. Identify the final point in your desired range.

- e. **(Optional)** [Scan the Strip View \(on page 342\)](#) to locate the points of interest, if necessary.
  - f. Drag the cursor to the final point and release the mouse button to complete the selection.
- **Using the right mouse button:**
- a. Click the **Strip View** and hold the right mouse button to designate the initial point in the range you wish to select.
  - b. Drag the cursor to set the final point.
  - c. **(Optional)** [Scan the Strip View \(on page 342\)](#) to locate the points of interest, if necessary.
  - d. Release the right mouse button to complete the range selection. A context menu will appear.

Figure 489. Strip View - Deleting Beats



2. Click the **Delete Beats** button.

#### To change beat annotation:

1. Select a fragment of the ECG, which you wish to reclassify, using one of the following methods:
  - Click an individual beat to select it.
  - Select a fragment of the waveform using one of these methods:



▪ **Using Shift + Click:**

- a. Identify the initial point in the range you wish to select.
- b. Click the initial point.
- c. Hold down the **Shift** key.
- d. Identify the final point in the range.
- e. **(Optional)** [Scan the Strip View \(on page 342\)](#) to locate the points of interest, if necessary.
- f. Click the final point to complete the range selection.

▪ **Using Ctrl +Click:**

- a. Identify the initial point in the range you wish to select.
- b. Hold down the **Ctrl** key.
- c. Click the initial point.
- d. Identify the final point in your desired range.
- e. **(Optional)** [Scan the Strip View \(on page 342\)](#) to locate the points of interest, if necessary.
- f. Drag the cursor to the final point and release the mouse button to complete the selection.

▪ **Using the right mouse button:**






- a. Click the **Strip View** and hold the right mouse button to designate the initial point in the range you wish to select.
- b. Drag the cursor to set the final point.
- c. **(Optional)** [Scan the Strip View \(on page 342\)](#) to locate the points of interest, if necessary.
- d. Release the right mouse button to complete the range selection. A context menu will appear.

Figure 490. Changing Beats Annotation





2. Hover over the **Change Beats Annotation** button in the **Strip View Toolbar** to expand the drop-down list.
3. Click the appropriate type of morphology for the beat you wish to reclassify. Alternatively, you may utilize keyboard shortcuts as outlined in the table below. The selected beat in the **Strip View** will immediately change color.

**Table 11. Beats Reclassification Keyboard****Shortcuts for Strip View**

Action	But- ton	Keyboard Keys
Classify as <b>Normal</b>		N
Classify as <b>R on T</b>		R
Classify as <b>Fusion</b>		F
Classify as <b>VPB</b>		V
Classify as <b>SVE</b>		S

**Table 11. Beats Reclassification Keyboard****Shortcuts for Strip View (continued)**

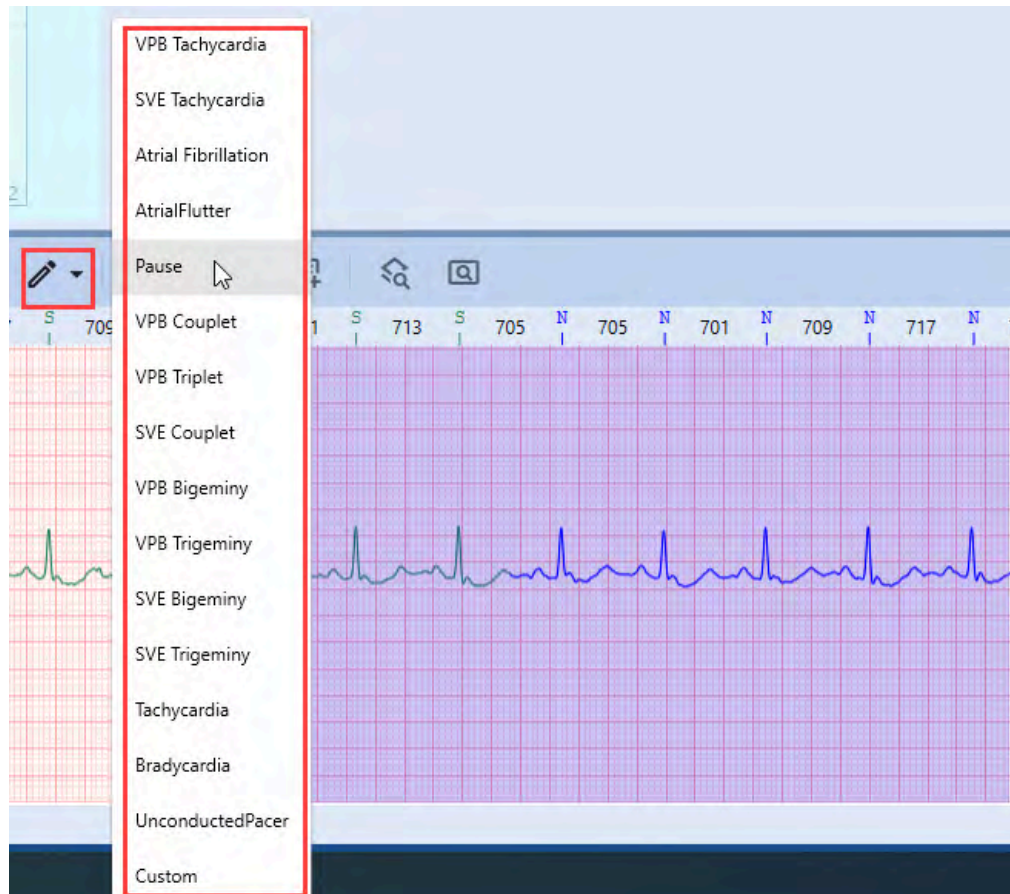
Action	But- ton	Keyboard Keys
Classify as <b>Questionable</b>		<b>X</b>
Classify <b>Paced</b>		<b>P</b>

**To create a user event:**

- Select a fragment of the ECG, which you wish to reclassify as a continuous event, using one of the following methods:
  - Click an individual beat to select it.
  - Select a fragment of the waveform:
    - **Using Shift + Click:**
      - Identify the initial point in the range you wish to select.
      - Click the initial point.
      - Hold down the **Shift** key.
      - Identify the final point in the range.
      - (Optional) [Scan the Strip View \(on page 342\)](#) to locate the points of interest, if necessary.
      - Click the final point to complete the range selection.
    - **Using Ctrl +Click:**
      - Identify the initial point in the range you wish to select.
      - Hold down the **Ctrl** key.
      - Click the initial point.
      - Identify the final point in your desired range.
      - (Optional) [Scan the Strip View \(on page 342\)](#) to locate the points of interest, if necessary.
      - Drag the cursor to the final point and release the mouse button to complete the selection.
    - **Using the right mouse button:**
      - Click the **Strip View** and hold the right mouse button to designate the initial point in the range you wish to select.
      - Drag the cursor to set the final point.

- c. **(Optional)** Scan the Strip View (on page 342) to locate the points of interest, if necessary.
- d. Release the right mouse button to complete the range selection. A context menu will appear.

Figure 491. Strip View - Creating User Event




2. Hover over the **Create User Event** button or menu option to expand the drop-down list.
3. Click the relevant type of **Event** you wish to create in the selected area.

### Analysis Controls

Analysis Controls is a group of buttons that enable you to exclude or re-include specific fragments of the ECG recording within the Strip View.

Icon	Description
	<b>Exclude from analysis button:</b> Enables the exclusion of a selected fragment of an ECG record from analysis.

Icon	Description
	<b>Include to analysis button:</b> Enables the re-inclusion of previously excluded fragments of an ECG record.

### To exclude an ECG segment from analysis:

1. Select the ECG fragment you wish to exclude from analysis using one of the following methods:
  - **Using Shift + Click:**
    - a. Identify the initial point in the range you wish to select.
    - b. Click the initial point.
    - c. Hold down the **Shift** key.
    - d. Identify the final point in the range.
    - e. **(Optional)** [Scan the Strip View \(on page 342\)](#) to locate the points of interest, if necessary.
    - f. Click the final point to complete the range selection.
  - **Using Ctrl +Click:**
    - a. Identify the initial point in the range you wish to select.
    - b. Hold down the **Ctrl** key.
    - c. Click the initial point.
    - d. Identify the final point in your desired range.
    - e. **(Optional)** [Scan the Strip View \(on page 342\)](#) to locate the points of interest, if necessary.
    - f. Drag the cursor to the final point and release the mouse button to complete the selection.
  - **Using the right mouse button:**
    - a. Click the **Strip View** and hold the right mouse button to designate the initial point in the range you wish to select.
    - b. Drag the cursor to set the final point.
    - c. **(Optional)** [Scan the Strip View \(on page 342\)](#) to locate the points of interest, if necessary.
    - d. Release the right mouse button to complete the range selection. A context menu will appear.

Figure 492. Strip View - Excluding from analysis



2. Click the **Exclude from Analysis** button or select the same option from the context menu.

#### To re-include an ECG segment into analysis:



#### Note:

The range you wish to re-include should fully overlap a previously excluded fragment. If it does not overlap an excluded area, the **Include to analysis** button and option remain inactive.

Figure 493. Page View - Include to analysis Overlap Condition



1. Select a fragment of the ECG, you want to re-include to analysis, using one of the following methods:
  - **Using Shift + Click:**
    - a. Identify the initial point in the range you wish to select.
    - b. Click the initial point.



- c. Hold down the **Shift** key.
- d. Identify the final point in your desired range.
- e. **(Optional)** [Scan the Strip View \(on page 342\)](#) to locate the points of interest, if necessary.
- f. Click the final point to complete the range selection.
- **Using Ctrl +Click:**
  - a. Identify the initial point in the range you wish to select.
  - b. Hold down the **Ctrl** key.
  - c. Click the initial point.
  - d. Identify the final point in your desired range.
  - e. **(Optional)** [Scan the Strip View \(on page 342\)](#) to locate the points of interest, if necessary.
  - f. Drag the cursor to the final point and release the mouse button to complete the selection.
- **Using the right mouse button:**
  - a. Click the **Strip View** and hold the right mouse button to designate the initial point in the range you wish to select.
  - b. Drag the cursor to set the final point.
  - c. **(Optional)** [Scan the Strip View \(on page 342\)](#) to locate the points of interest, if necessary.
  - d. Release the right mouse button to complete the range selection. A context menu will appear.

Figure 494. Strip View - Including to analysis



2. Click the **Include to analysis** button or select the option from the context menu.

## Views Switching Controls

**Views Switching Controls** is a group of buttons that allows you to focus on a single beat you have selected in the **Strip View**, in the **Templates View** and **Page View**. This functionality enhances analysis quality and efficiency.



Icon	Description
	<b>Show In Templates button:</b> Click this button to display the beat you have selected in the <b>Strip View</b> ; it will be highlighted in the relevant template within the <b>Templates Pane</b> .
	<b>Show in Page:</b> Facilitates an immediate switch to <b>Page View</b> , revealing the precise location of the chosen beat within this particular <b>Template</b> in both the <b>Signal Page</b> and the <b>ECG Strip</b> .

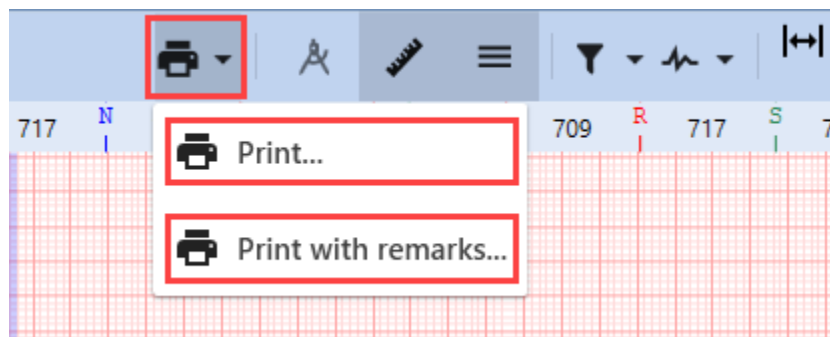
Figure 495. Strip View - Show In Templates



## Printing Control

This button enables you to print a fragment of the ECG **Strip**. The printed copy will include a segment that fits the output format. The baseline of the printed version mirrors the center line of the Strip visible on your PC screen. The printed ECG Strip will accommodate as much ECG data as possible from the visible area around the center line.

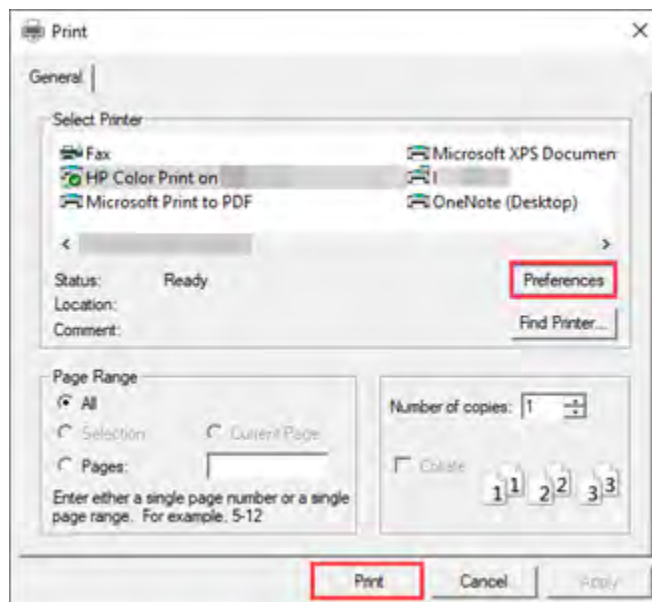
Figure 496. Strip View - Printing Strip



To print a fragment of the waveform in the **Strip View**:

1. Identify the area you want to print.
2. **(Optional)** [Scan the Strip View \(on page 342\)](#) to locate the desired area, if needed.
3. Hover over the **Printing Control** button to expand the drop-down list.
4. Click the **Print** option and navigate to the Print dialog box:

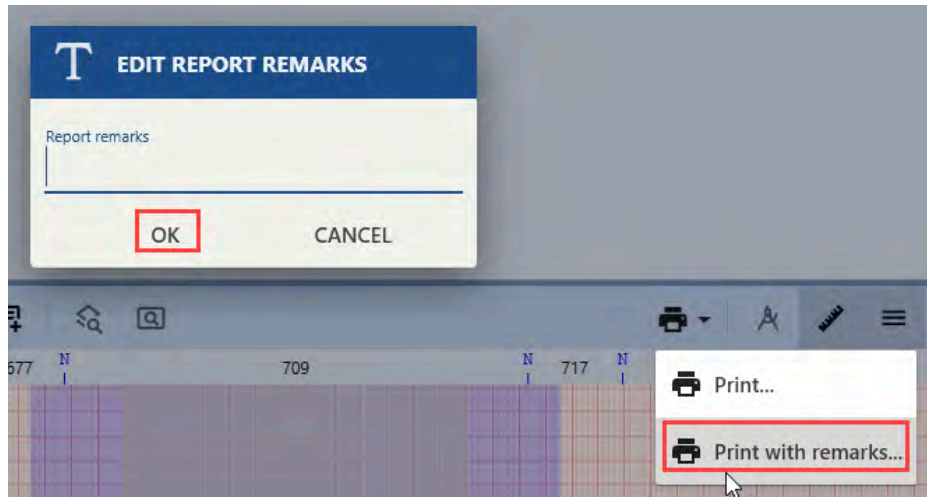
Figure 497. Strip View - Printing Dialog Box



- a. Choose a printer **available** in the **Select Printer** window.
- b. Adjust other preferences according to your needs.
- c. Click **Print** at the bottom of the dialog box to execute the printing of the waveform fragment.
5. **(Optional)** Click the **Print with remarks** option if you want to print a fragment of the waveform with your remarks:

- a. Complete the "Report remarks" field in the **Edit Report Remarks** pop-up.



Figure 498. Strip View - Printing with Remarks



- b. When you complete with filling in you remarks, click OK.  
 c. **(Optional)**Click **Cancel** to abandon this action.  
 d. Choose a printer available in the **Select Printer** window.  
 e. Adjust other preferences according to your needs.  
 f. Click **Print** at the bottom of the dialog box to execute the printing of the waveform fragment.

## Measuring Controls

**Measuring Controls** is a group of buttons designed to facilitate the indication and measurement of various waveform parameters within the **Strip View**. Namely, the most important tool in this group of controls is the **Caliper** tool. It allows you to measure different intervals and amplitudes on the ECG strip, which can be used to diagnose and assess a variety of heart conditions. We will explain [how to use the Caliper for ECG measurments \(on page 193\)](#) in the following sections.

Icon	Description
	<b>Caliper toggle:</b> Click to toggle <b>ON/OFF</b> the <b>Caliper</b> tool. The <b>Caliper</b> tool assists with measuring intervals and amplitudes, such as the RR interval, T-wave, and QRS complex amplitudes. Refer to the <a href="#">Measuring ECG with Caliper (on page 193)</a> section for details.
	<b>ECG Ruler toggle:</b> Click to toggle <b>ON/OFF</b> the <b>ECG Ruler</b> , located right below the <b>Strip View Tool-bar</b> . The <b>ECG Ruler</b> indicates the duration of RR intervals for adjacent beats and their morphology classification (i.e., N, R, F, V, etc.).

Icon	Description
	<b>Channel Numeration toggle:</b> Click to toggle <b>ON/OFF</b> the channel numeration on the left side of the ECG Strip.

Figure 499. Strip View - Caliper Tool



Figure 500. Strip View - ECG Ruler




Figure 501. Strip View - Channel Numeration



## Filters

This group of controls allows you to apply various filters affecting beat visualization and enhancing the accuracy and reliability of ECG analysis.

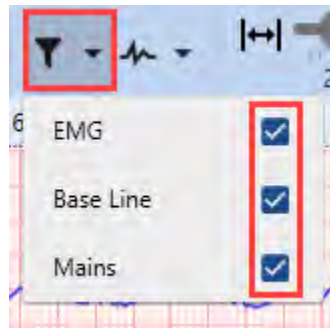
Icons	Description
	<b>Filter:</b> This control enables you to toggle <b>ON/OFF</b> the visualization of the waveform with applied <b>EMG</b> , <b>Base Line</b> , and <b>Mains</b> filters. To activate or deactivate these filters, select or deselect any number of checkboxes from the drop-down list. These filters improve the accuracy and reliability of ECG analysis.

Icons	Description
	<b>Channel Selection:</b> This control lets you select the channel(s) for display within the <b>Strip View</b> , using the drop-down list (up to 12 channels, depending on the number of channels in the current <b>Record</b> ).

To toggle filters **ON/OFF**:

1. Hover over the **Filter** drop-down list to expand it.

Figure 502. Strip View - Toggling Filters



2. Select the filter you wish to toggle. The visualization of the waveform will change immediately.

It is recommended to keep filters **ON** to provide accurate analysis:

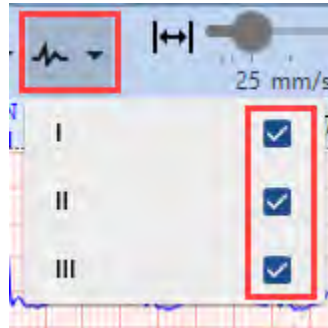
- **EMG filter:** Eliminates high-frequency ECG signal components.
- **Baseline filter:** Removes low-frequency ECG signal components.
- **Mains filter:** Eradicates 50 or 60 Hz power line interference. This interference can be caused by the electrical equipment in the environment.

To toggle the visualization of channels within the Strip:



1. Hover over the **Channel Selection** drop-down list to expand it.

Figure 503. Strip View - Toggling Channels



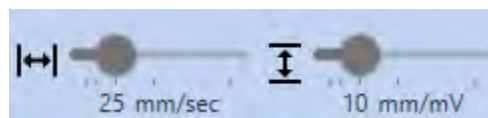
2. Select filters you wish to toggle. The visualization of the Strip will change immediately.

Toggling **ON/OFF** ECG channels enhances the accuracy and efficiency of ECG analysis. This feature allows you to focus on specific channels, compare them, filter out noise and more.

### Scale and Gain Controls

This group of controls enables you to adjust the paper speed and amplitude, affecting beat visualization and enhancing the accuracy and reliability of ECG analysis.

Figure 504. Template Edit - Scale and Gain Controls



### To change the paper speed:

1. Drag the slider to your desired position, setting the paper speed within the range from 6.25 up to 100 mm/sec. The visualization within the Strip will change immediately.

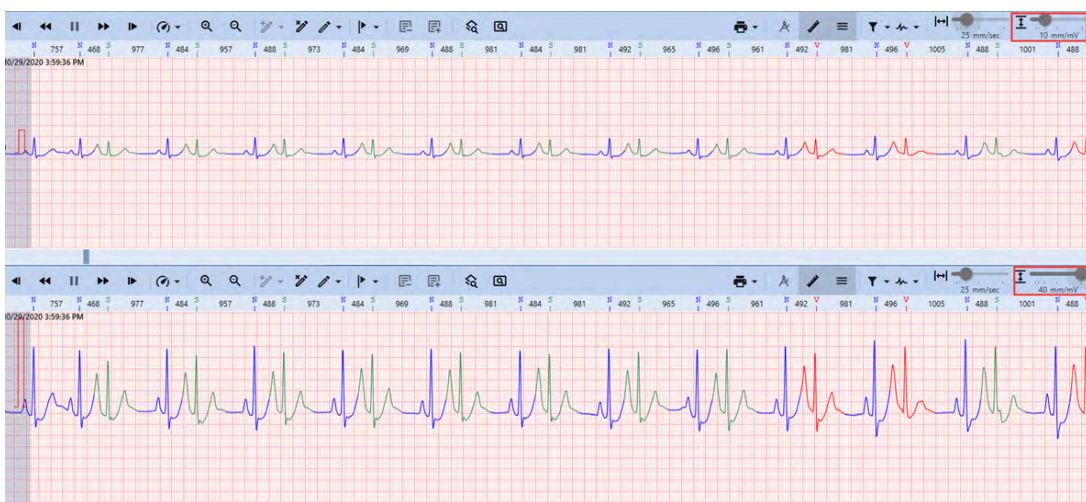
Figure 505. Strip View - Setting Paper Speed



### To change the amplitude:

1. Drag the slider to your desired position, setting the amplitude within the range from 2.5 up to 40 mm/mV. The visualization within the Strip will change immediately.

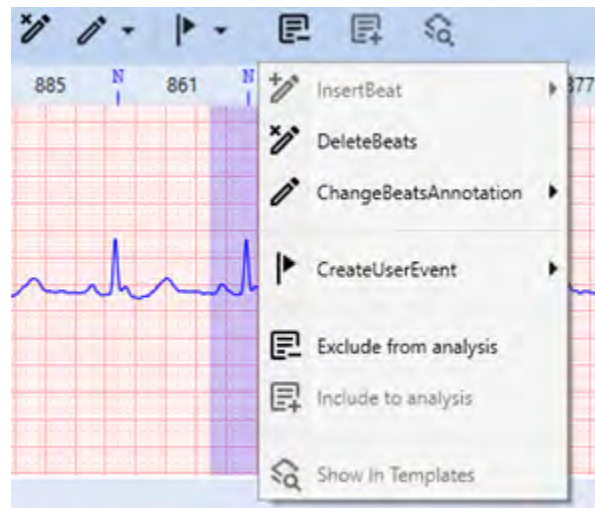
Figure 506. Strip View - Setting Amplitude



## Context Menu Features

A **Context Menu**, accessible via right-click, enables you to quickly and easily access common actions, such as inserting or deleting beats, changing annotations, creating user events, etc.

Figure 507. Strip View - Context Menu



### Insert Beat

Allows you to insert new beats between existing ones:

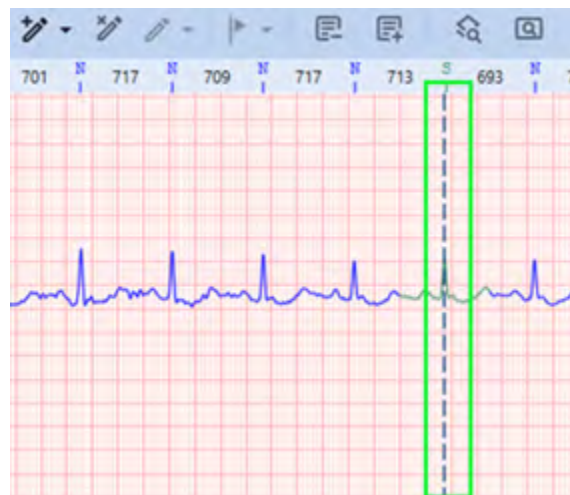


#### Note:

By default, when you click the **Strip View**, you select an entire beat. Inserting a beat is not equivalent to beat reclassification, so it requires an alternative method for selecting a position in the **Strip View**.

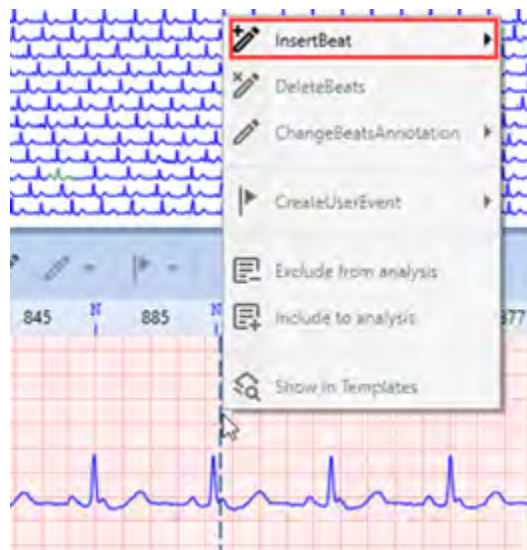
1. Select a position in the **Strip View** using one of these methods:

Figure 508. Strip View - Positioning Beat



- Hold Alt and click in the **Strip View**: A vertical dotted line will, marking the desired position. While holding Alt, click the right mouse button to expand the context menu.
  - Press your mouse wheel in the **Strip View**: A vertical dotted line will appear, marking the desired position. Click again and hold the mouse wheel, and then press the right mouse button to expand the context menu.
  - Press Alt+Right Click in the **Strip View**: A vertical dotted line will appear to mark the desired position. Alongside the dotted line, a context menu will expand, simplifying access to the **Insert Beat** option.
2. Hover over the **Insert Beat** option in the **Context Menu** to expand the drop-down list.

Figure 509. Strip View - Insert Beat



3. Click the appropriate type of morphology for the insertion. The NH-301 software will automatically determine which fragment of the waveform to use for this purpose. A specific segment of the ECG waveform in the **Strip View** will immediately change color.

### Delete Beats

Allows you to delete a selected beat or a fragment of a waveform:

1. Select a fragment of the ECG, which you wish to delete, using one of the following methods:
  - Click an individual beat to select it. Right-click the selected fragment to expand the context menu.
  - Select a fragment of the waveform using one of these methods:

▪ **Using Shift + Click:**

- a. Identify the initial point in the range you wish to select.
- b. Click the initial point.
- c. Hold down the **Shift** key.
- d. Identify the final point in the range.
- e. **(Optional)** [Scan the Strip View \(on page 164\)](#) to locate the points of interest, if necessary.
- f. Click the final point to complete the range selection.
- g. Right-click the selected fragment to expand the context menu.

▪ **Using Ctrl +Click:**

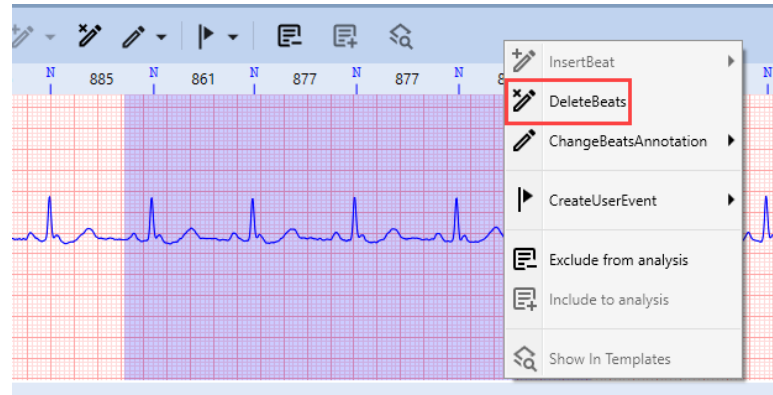
- a. Identify the initial point in the range you wish to select.
- b. Hold down the **Ctrl** key.
- c. Click the initial point.
- d. Identify the final point in your desired range.
- e. **(Optional)** [Scan the Strip View \(on page 164\)](#) to locate the points of interest, if necessary.
- f. Drag the cursor to the final point and release the mouse button to complete the selection.
- g. Right-click the selected fragment to expand the context menu.

▪ **Using the right mouse button:**

- a. Click the **Strip View** and hold the right mouse button to designate the initial point in the range you wish to select.
- b. Drag the cursor to set the final point.
- c. **(Optional)** [Scan the Strip View \(on page 164\)](#) to locate the points of interest, if necessary.

- d. Release the right mouse button to complete the range selection. A context menu will appear.

Figure 510. Strip View - Delete Beats



2. Click the **Delete Beats** option in the context menu. The system will automatically recalculate events and templates following the deletion.

### Change Beats Annotation

Enables you to modify the annotation of the selected beat:

1. Select a fragment of the ECG, which you wish to delete, using one of the following methods:
  - Click an individual beat to select it. Right-click the selected fragment to expand the context menu.
  - Select a fragment of the waveform using one of these methods:
    - **Using Shift + Click:**
      - a. Identify the initial point in the range you wish to select.
      - b. Click the initial point.
      - c. Hold down the **Shift** key.
      - d. Identify the final point in the range.
      - e. **(Optional)** [Scan the Strip View \(on page 164\)](#) to locate the points of interest, if necessary.
      - f. Click the final point to complete the range selection.
      - g. Right-click the selected fragment to expand the context menu.
    - **Using Ctrl +Click:**
      - a. Identify the initial point in the range you wish to select.
      - b. Hold down the **Ctrl** key.
      - c. Click the initial point.
      - d. Identify the final point in your desired range.



e. **(Optional)** [Scan the Strip View \(on page 164\)](#) to locate the points of interest, if necessary.

f. Drag the cursor to the final point and release the mouse button to complete the selection.

g. Right-click the selected fragment to expand the context menu.

• **Using the right mouse button:**

a. Click the **Strip View** and hold the right mouse button to designate the initial point in the range you wish to select.

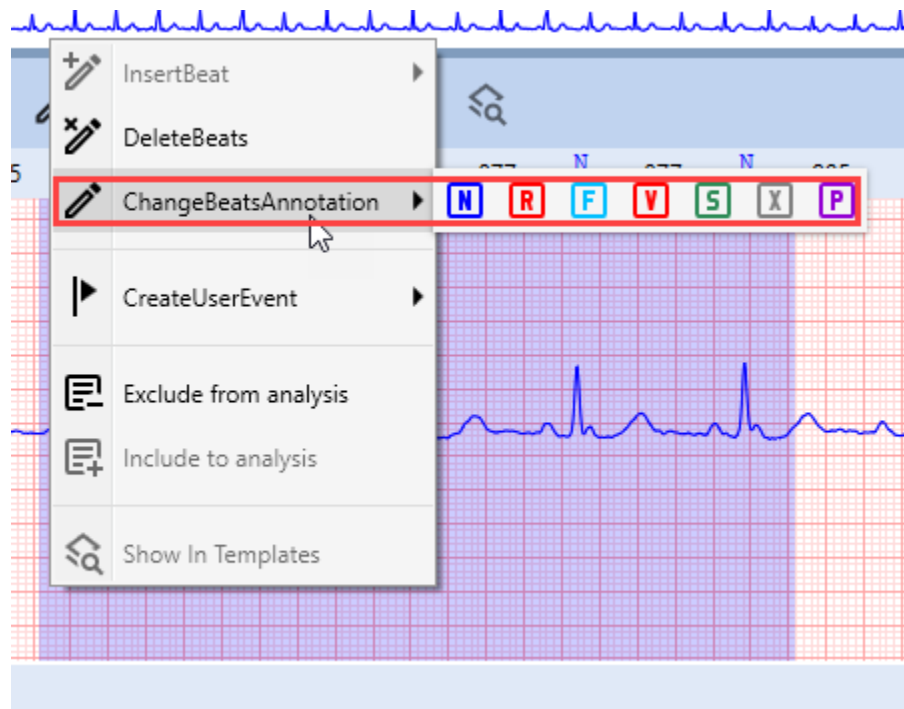
b. Drag the cursor to set the final point.

c. **(Optional)** [Scan the Strip View \(on page 164\)](#) to locate the points of interest, if necessary.

d. Release the right mouse button to complete the range selection. A context menu will appear.








2. Hover over the **Change Beats Annotation** option in the context menu to expand the drop-down list.

Figure 511. Strip View - Change Beats Annotation



3. Click the appropriate type of morphology for the beats you wish to reclassify. Alternatively, you may utilize keyboard shortcuts as outlined in the table below. Reclassified beats in the **Strip View** will immediately change color.

**Table 12. Beats Reclassification Keyboard****Shortcuts for Strip View**

Action	But- ton	Keyboard Keys
Classify as <b>Normal</b>		<b>N</b>
Classify as <b>R on T</b>		<b>R</b>
Classify as <b>Fusion</b>		<b>F</b>
Classify as <b>VPB</b>		<b>V</b>
Classify as <b>SVE</b>		<b>S</b>
Classify as <b>Questionable</b>		<b>X</b>
Classify <b>Paced</b>		<b>P</b>

**Create User Event**

Allows you to create a new user event, located at the selected beat or ECG fragment. After adding a user event, the corresponding fragment of the ECG waveform will be recalculated, and some beats may shift between templates.

1. Select a fragment of the ECG, which you wish to reclassify as a continuous event, using one of the following methods:
  - Click an individual beat to select it. Right-click the selected fragment to expand the context menu.
  - Select a fragment of the waveform using one of these methods:
    - **Using Shift + Click:**
      - a. Identify the initial point in the range you wish to select.
      - b. Click the initial point.
      - c. Hold down the **Shift** key.
      - d. Identify the final point in the range.
      - e. **(Optional)** [Scan the Strip View \(on page 164\)](#) to locate the points of interest, if necessary.

- f. Click the final point to complete the range selection.
- g. Right-click the selected fragment to expand the context menu.

▪ **Using Ctrl +Click:**

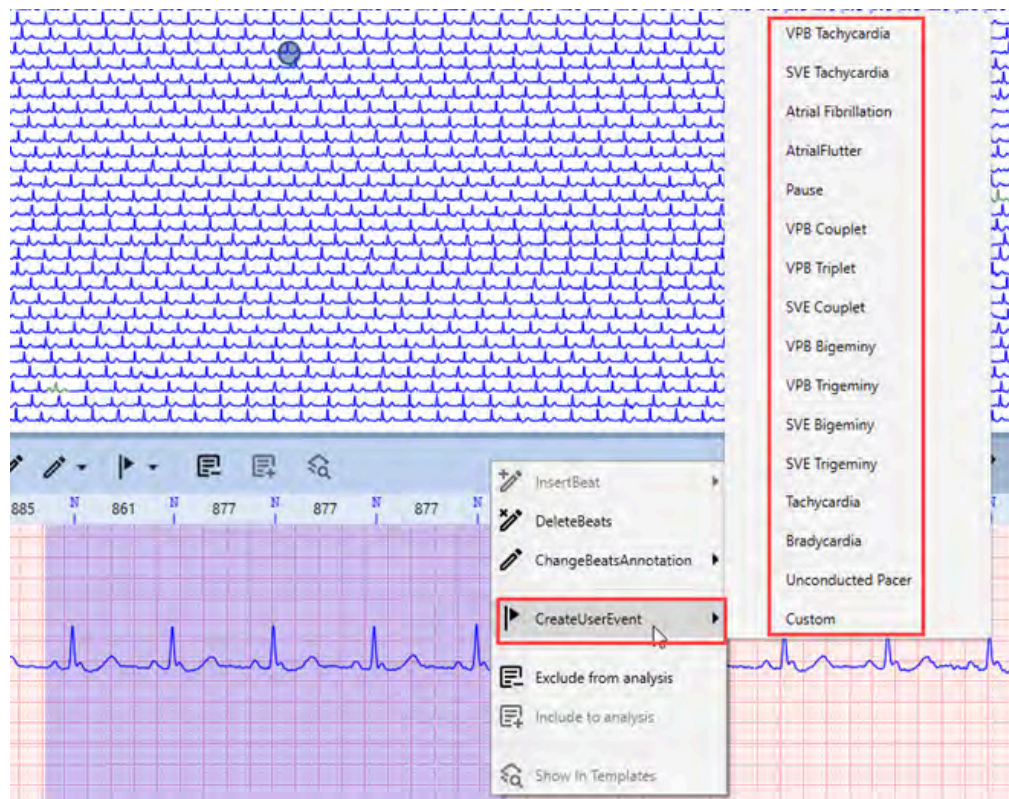
- a. Identify the initial point in the range you wish to select.
- b. Hold down the **Ctrl** key.
- c. Click the initial point.
- d. Identify the final point in your desired range.
- e. **(Optional)** [Scan the Strip View \(on page 164\)](#) to locate the points of interest, if necessary.
- f. Drag the cursor to the final point and release the mouse button to complete the selection.
- g. Right-click the selected fragment to expand the context menu.

▪ **Using the right mouse button:**

- a. Click the **Strip View** and hold the right mouse button to designate the initial point in the range you wish to select.
- b. Drag the cursor to set the final point.
- c. **(Optional)** [Scan the Strip View \(on page 164\)](#) to locate the points of interest, if necessary.
- d. Release the right mouse button to complete the range selection. A context menu will appear.

2. Hover over the **Create User Event** option to expand the drop-down list.

Figure 512. Strip View - Create User Event



3. Click the relevant type of **Event** you wish to create in the selected area.

### Exclude from analysis

Enables the exclusion of a selected fragment of an ECG record from analysis:

1. Select the ECG fragment you wish to exclude from analysis using one of the following methods:

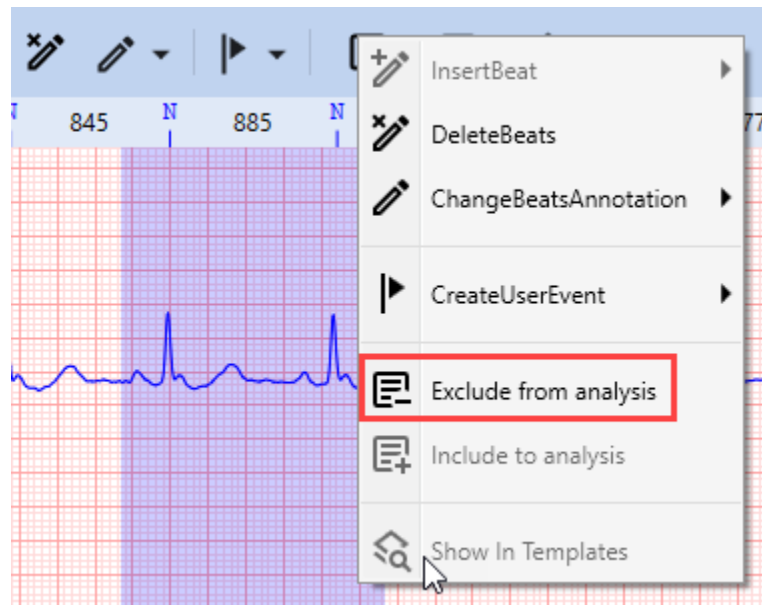
- **Using Shift + Click:**

- a. Identify the initial point in the range you wish to select.
- b. Click the initial point.
- c. Hold down the **Shift** key.
- d. Identify the final point in the range.
- e. **(Optional)** [Scan the Strip View \(on page 164\)](#) to locate the points of interest, if necessary.
- f. Click the final point to complete the range selection.
- g. Right-click the selected fragment to expand the context menu.

- **Using Ctrl +Click:**

- a. Identify the initial point in the range you wish to select.
  - b. Hold down the **Ctrl** key.
  - c. Click the initial point.
  - d. Identify the final point in your desired range.
  - e. **(Optional)** [Scan the Strip View \(on page 164\)](#) to locate the points of interest, if necessary.
  - f. Drag the cursor to the final point and release the mouse button to complete the selection.
  - g. Right-click the selected fragment to expand the context menu.
- **Using the right mouse button:**
    - a. Click the **Strip View** and hold the right mouse button to designate the initial point in the range you wish to select.
    - b. Drag the cursor to set the final point.
    - c. **(Optional)** [Scan the Strip View \(on page 164\)](#) to locate the points of interest, if necessary.
    - d. Release the right mouse button to complete the range selection. A context menu will appear.

Figure 513. Strip View - Exclude from analysis



2. Click the **Exclude from Analysis** option in the context menu.

### Include to analysis

Enables the re-inclusion of previously excluded fragments of an ECG record:

**Note:**

The range you wish to re-include should fully overlap a previously excluded fragment. If it does not overlap an excluded area, the **Include to analysis** button and option remain inactive.

Figure 514. Strip View - Include to analysis



1. Select a fragment of the ECG, you want to re-include to analysis, using one of the following methods:

- **Using Shift + Click:**

- a. Identify the initial point in the range you wish to select.
- b. Click the initial point.
- c. Hold down the **Shift** key.
- d. Identify the final point in the range.
- e. **(Optional)** [Scan the Strip View \(on page 164\)](#) to locate the points of interest, if necessary.
- f. Click the final point to complete the range selection.
- g. Right-click the selected fragment to expand the context menu.

- **Using Ctrl +Click:**

- a. Identify the initial point in the range you wish to select.
- b. Hold down the **Ctrl** key.
- c. Click the initial point.
- d. Identify the final point in your desired range.
- e. **(Optional)** [Scan the Strip View \(on page 164\)](#) to locate the points of interest, if necessary.
- f. Drag the cursor to the final point and release the mouse button to complete the selection.
- g. Right-click the selected fragment to expand the context menu.

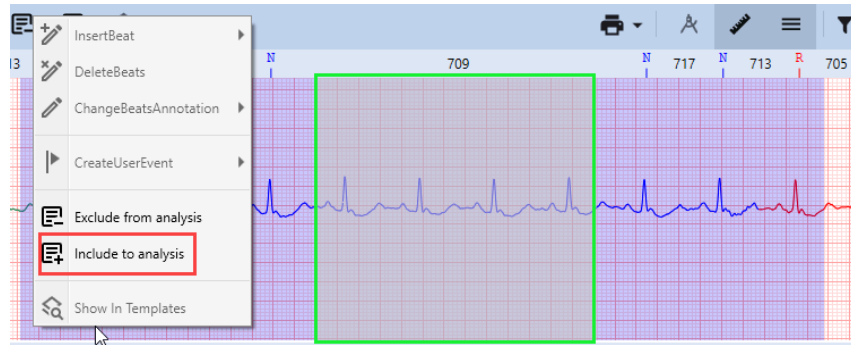
- **Using the right mouse button:**

- a. Click the **Strip View** and hold the right mouse button to designate the initial point in the range you wish to select.
- b. Drag the cursor to set the final point.



- c. **(Optional)** Scan the [Strip View \(on page 164\)](#) to locate the points of interest, if necessary.
- d. Release the right mouse button to complete the range selection. A context menu will appear.

Figure 515. Strip View - Include to analysis



- 2. Click the **Include to analysis** option in the context menu.

### Show In Templates

Select this option from the context menu to display the beat you have selected in the **Strip View**; it will be highlighted in the relevant template within the **Templates Pane**.

Figure 516. Strip View - Show In Templates



## Measuring ECG with Caliper

You may use the **Caliper** function to measure the RR interval, QRS complex duration and amplitude, QT interval, and other ECG waveform parameters. The **Caliper** also allows for editing the ECG record via the **Strip View**.

Figure 517. Strip View - Caliper Tool



## Caliper Design Overview

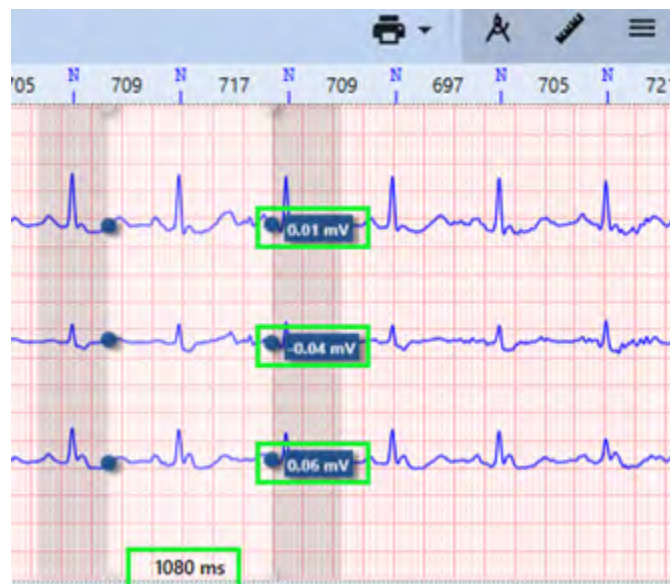
The **Caliper** tool in the **Strip View** displays two **measuring lines** (1) and a **measuring interval** (2) between them. To activate the **Caliper** tool, click the **Caliper** button in the **Strip View Toolbar**.

Figure 518. Strip View - Caliper Measurement Lines and Interval



Each ECG channel in the Strip has a small box adjacent to the point where the right measurement line intersects the channel signal line. The value in this box indicates the amplitude difference between the two points demarcated by the measurement lines.

Figure 519. Strip View - Interval Length and Amplitude Difference



The interval length in milliseconds is displayed at the bottom of the measuring interval.

### Moving Caliper Lines

You may move Caliper measurement lines either **simultaneously** or **independently**.

#### To move both lines simultaneously:

1. Position the cursor within the measuring interval. The cursor will change to a resize cursor.

Figure 520. Strip View - Moving Caliper Lines Simultaneously



2. Drag and drop the **Caliper** to the desired location.
3. Optionally, use the Left and Right arrow keys to fine-tune the position.

#### To move lines independently:

1. Position the cursor near one of the measurement lines until it changes to a resize cursor.

Figure 521. Strip View - Moving Caliper Lines Independently

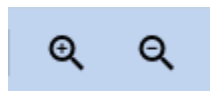


2. Click to select the measurement line.
3. Drag and drop it to the new location.

## Zoom Feature

To adjust the display scale of the waveform in the Strip, utilize the **Zoom In/Zoom Out** options:

Figure 522. Strip View - Zooming Options



1. Click the corresponding button in the **Strip View Toolbar**.
2. Hold the **Ctrl** key while scrolling up (**Zoom In**) or down (**Zoom Out**) the mouse wheel.

## Caliper Snapping Feature

The **Caliper Snapping** feature automatically aligns the **Caliper** measurement lines to the nearest R-peaks in the ECG signal. This functionality aids in the precise measurement of ECG wave duration and amplitude. Manual alignment can be challenging, hence **Caliper Snapping** enhances the accuracy, efficiency, and reproducibility of ECG interpretation.

**To utilize the Caliper snapping feature:**



1. Click the **Caliper** button in the **Strip View Toolbar**.
2. **(Optional)** Use the Left and Right arrow keys to make slight adjustments to the Caliper measurement lines.
3. To snap a **Caliper** measurement line to an R-spike:

Figure 523. Strip View - Caliper Snapping



- To snap any line:
  - a. Hold down the **Alt** key.
  - b. Position the cursor near one of the measurement lines until the cursor icon changes to a resize cursor.
  - c. Click the measurement line to select it.
  - d. Drag and drop it to the desired location.
- To snap the right measurement line:
  - a. Hold down the **Right Alt** key.
  - b. Use the Left and Right arrow keys to move the **Caliper**; the right measurement line will automatically snap to the R-peaks as you move.
- To snap the left measurement line:
  - a. Hold down the **Left Alt** key.
  - b. Use the Left and Right Arrow keys to move the Caliper; the left measurement line will automatically snap to the R-peaks as you move.

The **Caliper Snapping** function is instrumental in enabling a quick and accurate evaluation of various ECG parameters.



## Editing Beats and Events Using Caliper

The **Caliper** tool enables you to edit specific fragments of the ECG waveform contained within the measurement lines of the **Caliper**. When you opt to delete or reclassify beats, or exclude a waveform fragment from analysis, the changes will be confined to the selected fragment, which may contain multiple beats. In essence, the **Caliper** allows you to edit a continuous section of an ECG record, demarcated by the measurement lines, in a single action.

Figure 524. Strip View - Editing Beats and Events Using Caliper



### To edit a fragment of an ECG using the Caliper:

1. Position the **Caliper** and adjust its measurement lines as needed. For guidance, refer to the [Caliper Design Overview \(on page 374\)](#) section.
2. Right-click in the **Strip View** area to expand the context menu.
3. The **Caliper** tool's context menu offers several options within the **Strip View**:

- **Delete Beats:** Click this option to remove all beats within the boundaries of the **Caliper's** measurement lines. This action will result in minor recalculations.

**Note:**

Deleting beats may trigger the generation of **Pause** events. To annotate and exclude noisy segments, the **Exclude from analysis** option is preferable to **Delete Beats**.

- **Change Beats Annotation:** Hover over this option to display a drop-down list, then click the morphology type you wish to assign to the beats. The reclassified beats will instantly change color in the **Strip View**.
- **Create User Event:** Hover over this option to expand a drop-down list, and click the event type you wish to create in the selected area.
- **Exclude from analysis:** Click to exclude a noisy ECG segment within the **Caliper's** measurement lines from the analysis, without affecting other analytical outcomes.
- **Include to analysis:** Click to include previously excluded ECG fragments back into the analysis.

**Note:**

The **Include in Analysis** option becomes active in the **Caliper** context menu only when the current **Caliper** measurement interval overlaps with a segment that was excluded earlier.

## Tabular Summary

The **Tabular Summary View** displays the **Hourly Tabular Report** table with all arrhythmias detected by the software during the analysis. This table is useful for predicting whether certain arrhythmias appeared only under certain circumstances. It also features the **Pacemaker Tabular Report**, representing the pacemaker-analysis hourly statistics (available only if pacemaker detection has been enabled in the recorder).

Figure 525. Tabular Summary View - Tabular Summary View

Patient: Dan Monns ID: 182217 PM

Hourly Tabular Report: Day 1 - 2 (10/29/2020 - 10/30/2020)

Time	Minimum HR	Average HR	Maximum HR	Total Beats	Paced Beat	Pause	VFB	VFB Couplet	VFB Triplet	SVE	SVE Couplet	SVE Tachycardia
10:30	60	66	85	1942	2	0	0	0	0	3	0	0
10:59	60	68	87	4071	1	0	2	0	0	50	0	0
11:59	75	82	98	4908	2	0	2	0	0	43	1	0
12:59	63	71	93	1260	1	0	0	0	0	10	0	0
13:59	64	74	82	4458	6	0	3	0	0	98	0	0
14:59	74	79	94	4751	1	0	4	0	0	33	0	0
15:59	77	83	89	4955	2	0	265	0	0	387	3	1
16:59	75	83	98	5002	4	0	0	0	0	14	0	0
17:59	71	80	88	4779	1	0	1	0	0	5	0	0
18:59	66	73	94	4330	0	0	0	0	0	170	1	0

## General Tab

The **General Tab** of the **Tabular Summary View** houses the **Hourly Tabular Report** table with all arrhythmias detected by the software during the analysis.

Figure 526. Tabular Summary View - General Tab

Hourly Tabular Report: Day 1 - 2 (10/29/2020 - 10/30/2020)

Time	Minimum HR	Average HR	Maximum HR	Total Beats	Paced Beat	Pause	VFB	VFB Couplet	VFB Triplet	SVE	SVE Couplet	SVE Tachycardia
10:30	60	66	85	1942	2	0	0	0	0	3	0	0
10:59	60	68	87	4071	1	0	2	0	0	50	0	0
11:59	75	82	98	4908	2	0	2	0	0	43	1	0
12:59	63	71	93	1260	1	0	0	0	0	10	0	0
13:59	64	74	82	4458	6	0	3	0	0	98	0	0
14:59	74	79	94	4751	1	0	4	0	0	33	0	0
15:59	77	83	89	4955	2	0	265	0	0	387	3	1
16:59	75	83	98	5002	4	0	0	0	0	14	0	0
17:59	71	80	88	4779	1	0	1	0	0	5	0	0
18:59	66	73	94	4330	0	0	0	0	0	170	1	0

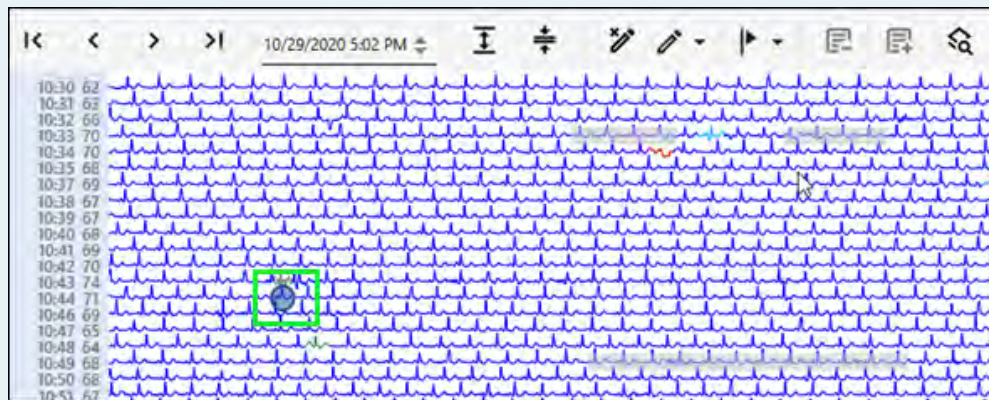


### Note:

Click any line in the **Hourly Tabular Report**. You will be redirected to the **Page View** to the position of the event you have clicked on in the **Hourly Tabular Report**.



Figure 527. Tabular Summary View - Clicking Hourly Tabular Report



You can also perform the following actions in this **View**:

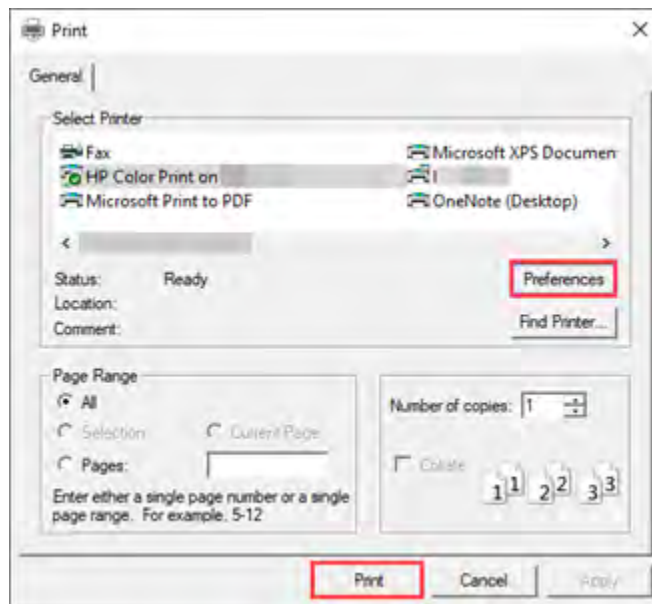
Icon	Description
	<b>Navigation Controls:</b> Click arrows to switch between pages.
	<b>Export To Excel button:</b> Click to export the table to Excel.
	<b>Export To PDF button:</b> Click to export the table to PDF.
	<b>Print Table button:</b> Click to print the table.

To print the **Hourly Tabular Report**:

1. Click the **Print Table** button and navigate to the Print dialog box.
2. Choose a printer **available** in the **Select Printer** window.
3. Adjust other preferences according to your needs.

- Click **Print** at the bottom of the dialog box to execute the printing of the waveform fragment.

Figure 528. Tabular Summary View - Printing Dialog Box



## Pacemaker Tab

The **Pacemaker Tabular Report** displays the pacemaker-analysis hourly statistics. This report becomes available only if the pacemaker detection has been enabled in the recorder.

Figure 529. Tabular Summary View - Pacemaker Tab

Patient: Dan Monns

ID: 182217 PM

Pacemaker Tabular Report: Day 1 - 3 (10/29/2020 - 10/31/2020)

Time	Total Beats	Paced Beat	Atrial Paced	Vent. Paced	AV Paced	% Paced	% Atrial Paced	% Vent. Paced	% AV Paced	Sense Failure	Capture Failure	Inhibitions
10:30	1942	2	1	0	1	0.1	< 0.1	0	< 0.1	0	0	0
10:59	4071	1	1	0	0	< 0.1	< 0.1	0	< 0.1	0	0	0
11:59	4908	2	1	2	0	< 0.1	< 0.1	< 0.1	< 0.1	0	0	0
12:59	4269	1	1	0	0	< 0.1	< 0.1	0	< 0.1	0	0	0
13:59	4458	6	3	2	0	0.1	< 0.1	< 0.1	< 0.1	0	0	0
14:59	4751	1	2	1	1	< 0.1	< 0.1	< 0.1	< 0.1	3	0	0
15:59	4955	2	0	2	0	< 0.1	0	< 0.1	0	0	0	1
16:59	5002	4	1	4	2	< 0.1	< 0.1	< 0.1	< 0.1	2	0	2



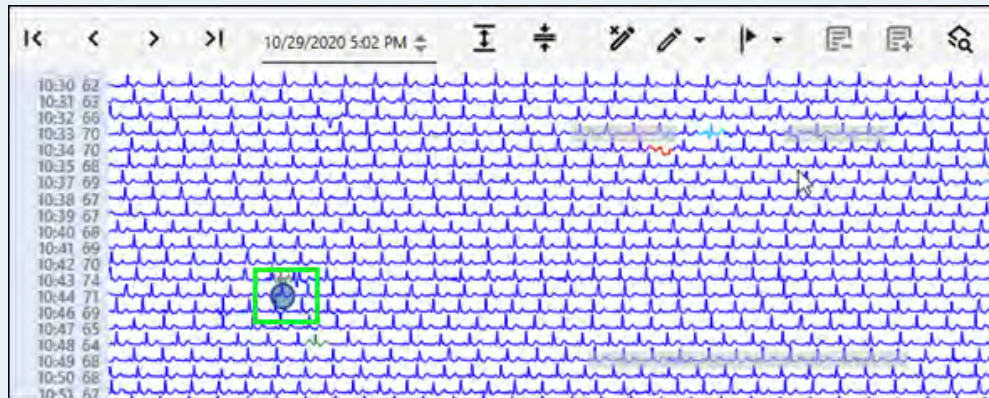
### Note:

Click any line in the **Pacemaker Tabular Report**. You will be redirected to the **Page View** to the position of the event you have clicked on in the **Pacemaker Tabular Report**.





Figure 530. Tabular Summary View - Clicking Pacemaker Tabular Report



You can also perform the following actions in this View:

Icon	Description
	<b>Navigation Controls:</b> Click arrows to switch between pages.
	<b>Export To Excel button:</b> Click to export the table to Excel.
	<b>Export To PDF button:</b> Click to export the table to PDF.
	<b>Print Table button:</b> Click to print the table.

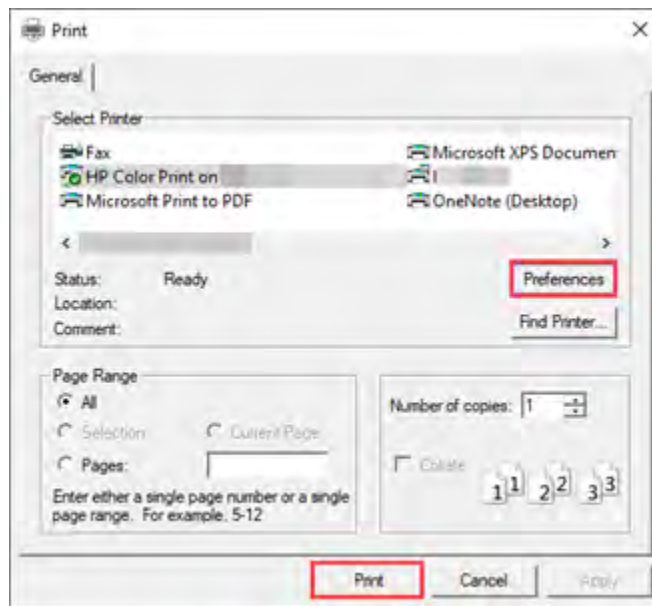
To print the **Pacemaker Tabular Report**:

1. Click the **Print Table** button and navigate to the Print dialog box.
2. Choose a printer **available** in the **Select Printer** window.
3. Adjust other preferences according to your needs.



- Click **Print** at the bottom of the dialog box to execute the printing of the waveform fragment.

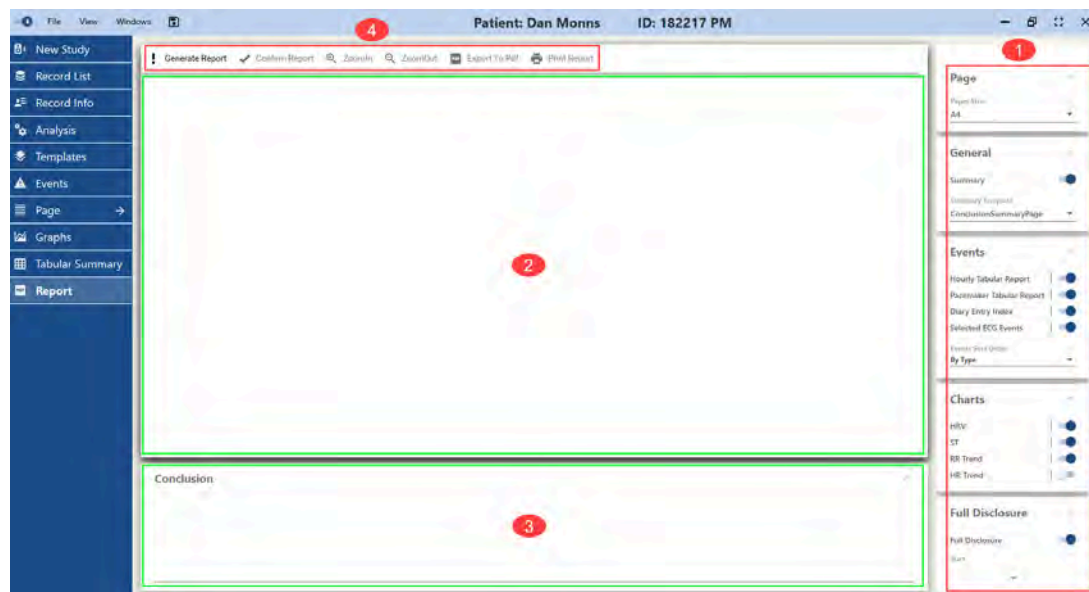
Figure 531. Tabular Summary View - Printing Dialog Box



## Report

The **Report** represents the final stage of the ECG analysis process. The NH-301 Holter software offers a full range of customization features that are both comprehensive and user-friendly, enabling users to tailor the **Report** to their individual requirements and preferences. Within the **Report View**, the final document can be personalized by toggling sections such as: **Summary and Conclusion**; **Events** while setting their order; **HRV, ST, HR or RR Trend** charts; it's also possible to include **Full Disclosure**, specifying start and end periods, selecting channels, and more. For clarity, the interface elements of this view are categorized into distinct groups.

Figure 532. Report View - Report View



1. Report Customization Boxes.
2. Report Area.
3. Conclusion Area.
4. Report View Toolbar.

**Note:**

You can customize the Report with you institution department name and address. To do that, please refer to the [Setup Process after Installation \(on page 17\)](#) section.

## Report Customization Boxes

The **Report Customization Boxes** enable toggling ON or OFF entire sections of the **Report** in its final form.

To include a section in the **Report**, activate the toggle adjacent to the respective section. Sections can be included or excluded at any time. After modifying customization settings, a new **Report** generation is required to reflect the changes.

You can customize your **Report** through settings in the following boxes::

1. Page
2. General
3. Events

4. Charts
5. Full Disclosure.

## Page

Click the **Paper Size** drop-down list to select the **Report** format from available options.

Figure 533. Report View - Page Box



## General

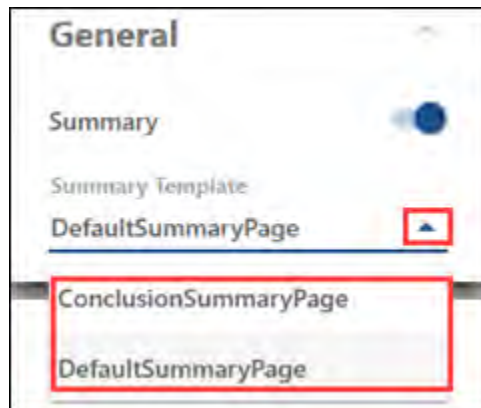
Click the **Summary** toggle to turn the section ON/OFF. This is the first section of the Report (if the section is ON), which provides a formatted table with key ECG analysis data.

Figure 534. Report View - Summary

<div> <div>! Generate Report</div> <div>✓ Confirm Report</div> <div>🔍 ZoomOut</div> <div>🔍 ZoomIn</div> <div>📄 Export To Pdf</div> <div>🖨️ Print Report</div> </div>			
<div> <div>Central Hospital Cardiology</div> <div>Holter</div> </div>			
<b>Patient Information</b>			
ID: 183217 PM		Weight:	Height:
Last Name: Mavris		Address:	
First Name: Dan		Referring organization:	
Date Of Birth: 7/12/1943		Referring Physician:	
Gender: Male		Age: 73	Order Number: 530N
<b>Medications</b>		<b>Indications</b>	
Adriol		Cough	
<b>Holter Summary Report</b>			
<b>General</b>			
	<b>Recorded</b>	<b>Analyzed</b>	<b>Time Domain</b>
Duration (hh:mm)	71:34	62:52	SDNN (ms) 122.28
			ULF (0 - 0.003 Hz) 26664603.6499
Start	10/29/2020 10:30 AM	10/29/2020 10:30 AM	SDANN (ms) 93.96
Stop	11/1/2020 10:05 AM	11/1/2020 9:20 AM	RMSSD (ms) 104.85
Channels	I, II, III	I	LF (0.04 - 0.15 Hz) 4415.72
			HF (0.15 - 0.4 Hz) 2776.13
<b>Ventricular Ectopy</b>		<b>Heart Rate</b>	
	<b>Total</b>	<b>Total</b>	<b>Total</b>
Beats (% of total beats)	2634 (0.95%)	Total Beats	277686
Isolated	2537	Average HR:	76
Bigeminy	25	Max HR:	132
Trigeminy	59	Min HR:	55
Couplet	30	Bradycardia (< 60 bpm)	36
Triplet	6	Longest Bradycardia	0:00:44
V. Tachycardia	2	Tachycardia (> 100 bpm)	0:01:21
Fusion	727	Longest Tachycardia	0:03:45
<b>Supraventricular Ectopy</b>	25111 (0.04%)	Pause (> 2000 ms)	25
Isolated	15999	Min RR (ms)	260
Pair	3437	Max RR (ms)	2306
Run (>=3)	410	Atrial Fibrillation	65
			11.65% of analysed time

Click the **Summary Template** drop-down list to choose a summary template option from available options.

Figure 535. Report View - Summary Template



## Events

Click relevant toggles ON/OFF to include or exclude the following subsections:

1. **Hourly Tabular Report:** This formatted table includes arrhythmia events identified during analysis, detailing a range of parameters related to event occurrences. This section is similar to the **Tabular Summary View** but with non-interactive table entries.

Figure 536. Report View - Hourly Tabular Report

Time	Minimum HR	Average HR	Maximum HR	Total Beats	Paced Beat	Pause	VPB	VPB Couplet	VPB Triplet	SVE	SVE Couplet	SVE Tachycardia
10:30	60	66	85	1942	1	0	0	0	0	30	0	0
10:59	60	68	87	4071	1	0	2	0	0	18	0	0
11:59	75	82	98	4908	2	0	2	0	0	43	1	0
12:59	63	71	83	4269	1	0	0	0	0	18	0	0
13:59	64	74	82	4458	6	0	3	0	0	98	0	0
14:59	71	79	94	4751	1	0	4	0	0	33	0	0
15:59	77	83	89	4955	2	0	265	0	0	387	3	1
16:59	75	83	98	5002	4	0	0	0	0	14	0	0
17:59	71	80	88	4720	1	0	1	0	0	5	0	0

2. **Pacemaker Tabular Report:** This section presents a formatted table of pacemaker events detected during analysis, similarly detailing event occurrences. Like the **Hourly Tabular Report**, entries here are not interactive.

Figure 537. Report View - Pacemaker Tabular Report

Pacemaker Tabular Report: Day 1 - 3 (10/29/2020 - 10/31/2020)												
Time	Total Beats	Paced Beat	APacedBeat	VPacedBeat	AVPacedBeat	PacedBeatPercent	APacedBeatPercent	VPacedBeatPercent	AVPacedBeatPercent	FailureToSense	FailureToCapture	FailureToPace
10:30	1942	1	1	0	1	0.1	0.1	0	0.1	0	0	0
10:59	4071	1	1	0	0	< 0.1	< 0.1	0	< 0.1	0	0	0
11:59	4908	2	1	2	0	< 0.1	< 0.1	< 0.1	< 0.1	0	0	0
12:59	4269	1	1	0	0	< 0.1	< 0.1	0	< 0.1	0	0	0
13:59	4458	6	3	2	0	0.1	0.1	< 0.1	< 0.1	0	0	0

3. **Diary Entry Index:** Lists all diary entries made during the ECG recording.

Figure 538. Report View - Diary Entry Index

Diary Entry Index				
	Date	Time	Symptom	Activity
1	7/4/2016	12:58 PM	Heart racing	
2	7/4/2016	12:58 PM	Back pain	
3	7/4/2016	12:58 PM	Back pain	

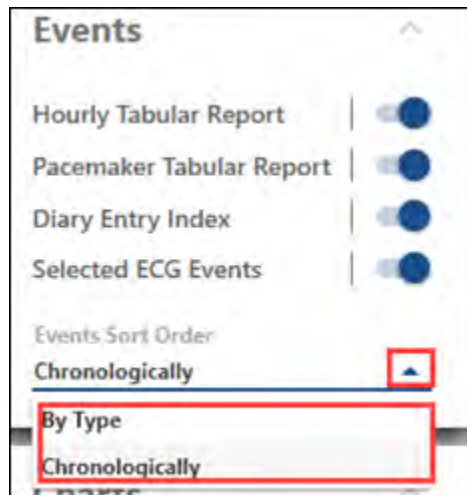
4. **Selected ECG Events:** Displays events marked (selected) for inclusion in the final **Report** while reviewing Events in the Events View (on page 211).

Figure 539. Report View - Selected Events



Click the **Events Sort Order** drop-down list to choose a sorting option from available options.

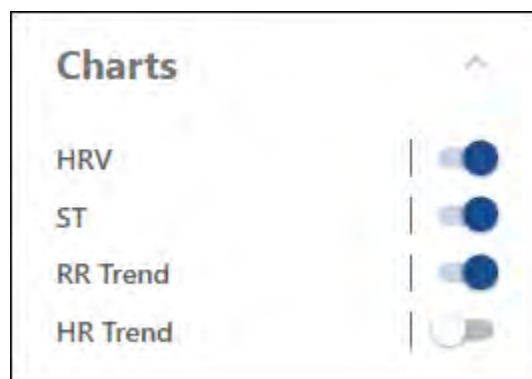
Figure 540. Report View - Events Sort Order



## Charts

The **Charts** box allows including **HRV** and **ST** trend graphs, and either the **RR Trend** or **HR Trend** graph in the **Report**.

Figure 541. Report View - Charts Box

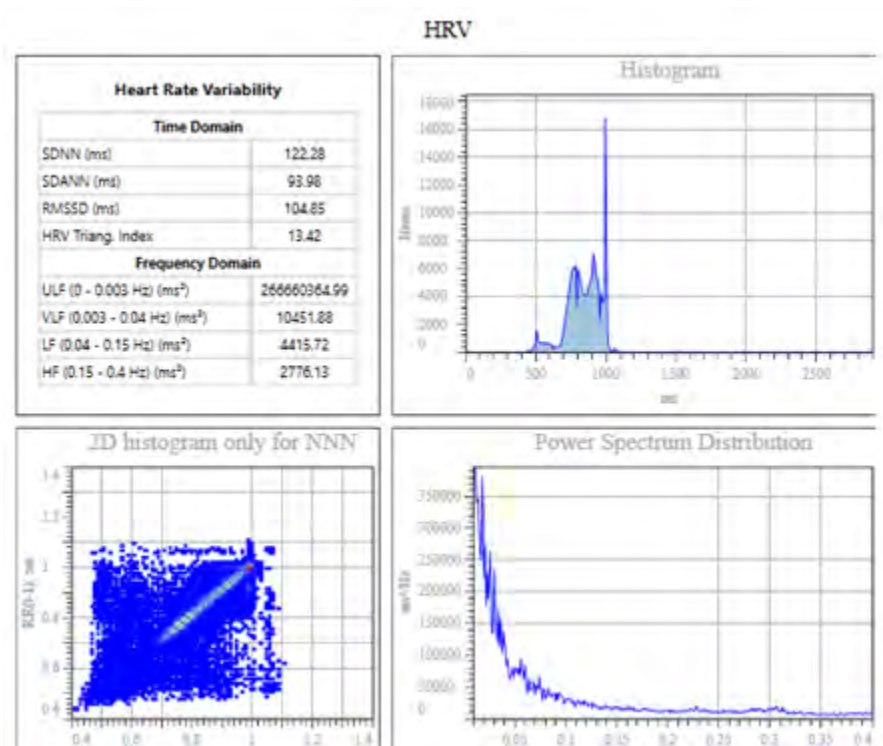


### Note:

Only one trend can be included at a time: selecting one will automatically deselect the other.



Figure 542. Report View - Charts



**Full Disclosure**

Click the Full Disclosure toggle to turn the **Full Disclosure** section ON/OFF. The **Full Disclosure** box also allows you to fine-tune its parameters for the Report.

Figure 543. Report View - Full Disclosure

### Full Disclosure

Full Disclosure

Start

10/30/2020 10:05 PM

End

11/1/2020 10:05 AM

Channel

I

Page Duration

1 Hour

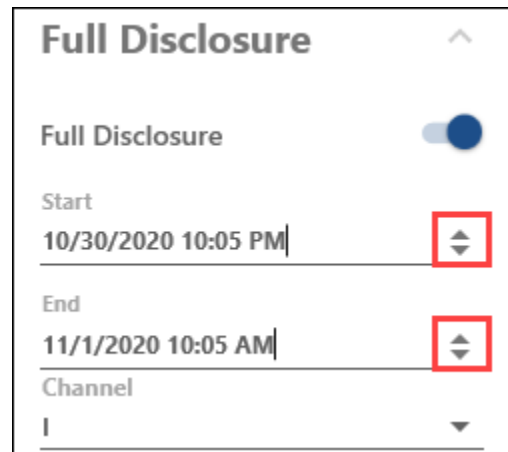
Gain

1.25 mm/mV

To adjust the **Full Disclosure** section configuration for the final Report:

1. **Start and End options:** Click the picker arrows on the right to adjust the timing and length of the **Full Disclosure** segment to include in the **Report**.

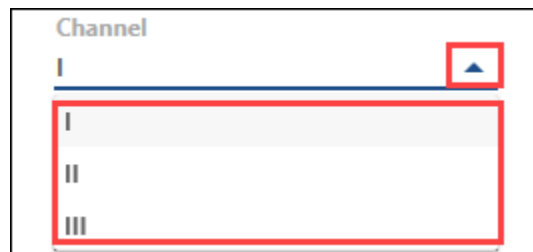
Figure 544. Report View - Start and End options



The screenshot shows a configuration panel titled "Full Disclosure". It includes a toggle switch for "Full Disclosure" which is turned on. Below the toggle, there are two date and time pickers. The "Start" picker is set to "10/30/2020 10:05 PM" and the "End" picker is set to "11/1/2020 10:05 AM". Both pickers have a red box highlighting the up/down arrow controls on their right side. Below the pickers is a "Channel" dropdown menu with a red box highlighting the dropdown arrow.

2. **Channel:** Click the Channel drop-down list to choose which channel to display, with only one channel shown at a time in the **Full Disclosure** section.

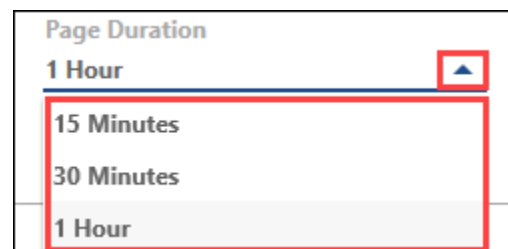
Figure 545. Report View - Channel



The screenshot shows a "Channel" drop-down menu. The current selection is "I". A red box highlights the dropdown arrow on the right. Below the menu, a list of options is shown: "I", "II", and "III". The option "I" is highlighted with a red box.

3. **Page Duration:** Click the **Page Duration** drop-down list to select one of the available options. This parameter will define the length of the **Full Disclosure** fragment to include in the **Report**.

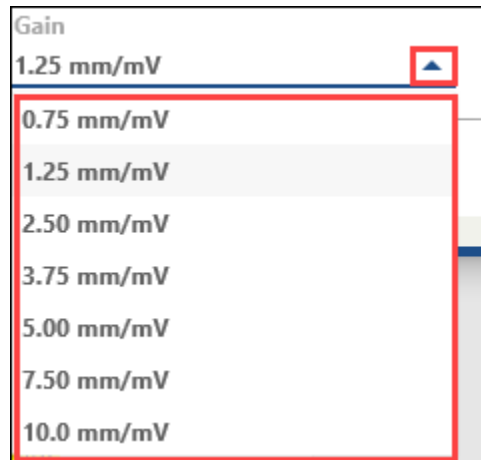
Figure 546. Report View - Page Duration



The screenshot shows a "Page Duration" drop-down menu. The current selection is "1 Hour". A red box highlights the dropdown arrow on the right. Below the menu, a list of options is shown: "15 Minutes", "30 Minutes", and "1 Hour". The option "1 Hour" is highlighted with a red box.

4. **Gain:** Click the **Gain** drop-down list to select the gain scale for the **Full Disclosure** from the available options.

Figure 547. Report View - Gain



## Report Area

Review the **Report** using the scroll function or scroll bar, and zoom in/out as needed. The **Report View Toolbar** provides tools for report review and confirmation.

Figure 548. Report View - Report Area

! Generate Report ✓ Confirm Report 🔍 ZoomIn 🔍 ZoomOut 📄 Export To Pdf 🖨 Print Report

AdvilCough

Holter Summary Report

General			Heart Rate Variability			
	Recorded	Analyzed	Time Domain		Frequency Domain (ms <sup>2</sup> )	
Duration (hh:mm)	71:34	62:52	SDNN (ms)	122.28	ULF (0 - 0.003 Hz)	266660364.99
Start	10/29/2020 10:30 AM	10/29/2020 10:30 AM	SDANN (ms)	93.98	VLF (0.003 - 0.04 Hz)	10451.88
Stop	11/1/2020 10:05 AM	11/1/2020 9:20 AM	RMSSD (ms)	104.85	LF (0.04 - 0.15 Hz)	4415.72
Channels	I, II, III	I	HRV triang. index	13.42	HF (0.15 - 0.4 Hz)	2776.13
Ventricular Ectopy			Heart Rate			
	Total		Total		Total	
Beats (% of total beats)	2634 (0.95%)		Total Beats		277686	
Isolated	2537		Average HR		76	
Bigeminy	25		Max HR		125	
Trigeminy	59		Min HR		55	
Couplet	30		Bradycardia (< 60 bpm)		36	
Triplet	6		Longest Bradycardia		0:00:44	
V. Tachycardia	2		Tachycardia (> 100 bpm)		271	
Fusion	727		Longest Tachycardia		0:03:45	
Supraventricular Ectopy	25111 (9.04%)		Pause (> 2000 ms)		25	
Isolated	15999		Min RR (ms)		260	
Pair	3437		Max RR (ms)		2306	
Run (>=3)	410		Atrial Fibrillation		65	
					11.65% of analysed time	

## Conclusion Area

The **Conclusion Area** is designed to contain a summary of the findings of an ECG test. It is typically written by a qualified healthcare professional. Summarize the ECG test findings, including patient history,

test indications, results, and any diagnoses or recommendations. You may **Confirm** the **Report** after completing the **Conclusion**.

Figure 549. Report View - Conclusion









## Report View Toolbar

The **Report View Toolbar** facilitates report generation, confirmation, zooming, exporting to PDF, and printing.

Figure 550. Report View - Report View Toolbar



Icon	Description
	<b>Generate Report button:</b> Click to start the report generation process. The report will include all sections toggled ON in the <b>Report Customization Boxes</b> . Once the generation is complete, you'll receive a preview of the <b>Report</b> to review before finalizing your conclusion.
	<b>Confirm Report button:</b> Click this to confirm and save the <b>Report</b> . It's advisable to do this only after reviewing the generated <b>Report</b> and submitting your conclusion.
	<b>Zoom In button:</b> Click to zoom in on specific parts of the <b>Report</b> in the <b>Report Area</b> .
	<b>Zoom Out button:</b> Click to zoom out in the <b>Report Area</b> . Use this button to zoom out if you had zoomed in earlier.
	<b>Export to PDF button:</b> This allows you to export and save the <b>Report</b> as a PDF. In the dialog box, click <b>Save</b> in the bottom-right corner to start the export. A 'Exporting' progress bar will indicate the process and disappear once the export is complete.
	<b>Print Report button:</b> Click to open the Print dialog box for printing the <b>Report</b> .  Within the Print dialog box:

Icon	Description
	<ol style="list-style-type: none"><li>1. Choose a printer <b>available</b> in the <b>Select Printer</b> window.</li><li>2. Adjust other preferences according to your needs.</li><li>3. Click <b>Print</b> at the bottom of the dialog box to print the <b>Report</b>.</li></ol>

## Report Confirmation Workflow

Confirmation is the final step in the ECG analysis process. All prior steps must be completed before confirming the **Report**.

### To confirm the report:

1. Customize the report using the **Report Customization Boxes** in the **Report View**.
2. Click the **Generate Report** button. Once report generation is complete, a report preview is provided.
3. Review the generated report utilizing the **Report View Toolbar** and **Report Area** capabilities.
4. If necessary, fill in the **Conclusion** section.
5. Click the **Confirm Report** button to finalize the report.

Once the report is confirmed, its status in the **Record List View** changes to 'Confirmed', and you can view or email the PDF directly from this view.

# Chapter 5. Preparing for Holter Recording

In this chapter, you'll find an overview of how to prepare and perform a **Holter Recording** after you have completed initial software installation and setup. For more detailed information about the setup and operation of the particular **Recorder** model, refer to the relevant operating manual.

To set up a **Holter Recording** process, follow the appropriate steps listed below. The exact order of the steps may vary depending on the **Holter Recorder** model and the type of connection to the computer where the NH-301 analysis system is installed:

1. Prepare the patient.
2. Connect the **Recorder** or the recorder memory card to the computer where the NH-301 analysis system is installed.
3. Enter the patient data.
4. Adjust the recording duration limit and other parameters.
5. Upload the patient data and the recording parameters to the **Recorder**.
6. Initiate the **Recorder**.
7. Verify or modify the data in the **Recorder**.
8. Start recording.

## Preparing Patient

The signal quality of a Holter recording depends on the quality of electrodes in use and on the quality of skin preparation procedures. Ensure that the electrodes you use did not exceed their shelf life. Quality issues with patient's skin preparation and electrode condition, as well as incorrect electrode positioning may cause extra ECG artifacts and noise.

## Preparing Skin

Follow these basic instructions to ensure correct electrode placement and high quality recording outcomes:



### Warning:

Do not clean the skin with an electrode spray, which is commonly used for exercise tests. Sprays of this type are not suitable for disposable electrodes.



1. Locate the correct electrode locations according to the illustrations in the [Placing Electrodes \(on page 394\)](#) section or as described in the relevant Recorder operating manual.
2. If necessary, clip hair at the electrode sites (or shave sites, if needed).
3. Thoroughly scrub each electrode area to remove dead skin, oil, and dirt. For proper cleaning, use an abrasive skin cleaner paste consisting of soap and pumice.
4. Cleanse the scrubbed area with physician-approved alcohol.
5. Dry the electrode placement sites.

## Placing Electrodes

Incorrect electrode positioning may cause extra ECG artifacts and noise, potentially affecting analysis workflows and outcomes. All electrodes should be of the same brand and type, to minimize noise. Suggested electrode placement schemes are displayed in the following subsections. However, making the final placement decisions is up to the physician in charge.



### Note:

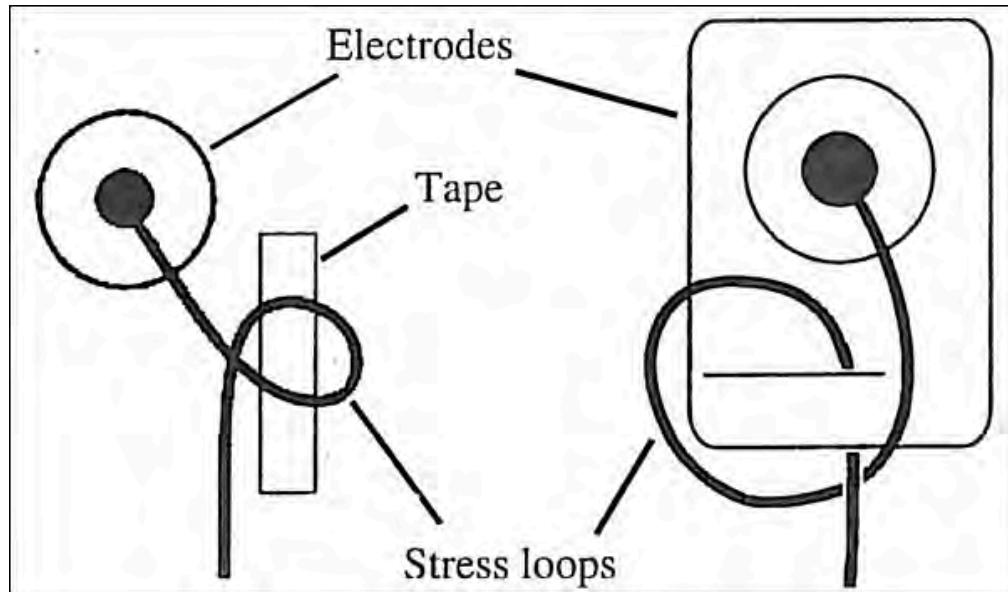
You can use [NR devices ECG display screen \(on page 434\)](#) or [NH-301 Holter software system capabilities \(on page 75\)](#) related to device models equipped with Bluetooth to verify a proper patient hookup. At the same time, do not use this verification capabilities as diagnostic tools.

### General instructions:

1. Use only high-quality disposable electrodes, designed for use with **Holter Recorders**. Wet gel electrodes are recommended. Refer to the **ANSI/AAMI EC12:2000 Standard** for safety, performance, and labeling requirements for the disposable electrodes, and guidelines for reliable patient connections.
2. Connect the **Recorder** input lead snap-on contacts with the electrode press-on studs. When you first place the electrode on the patient's chest, the electrode gel may be squeezed out, which can lead to poor electrode impedance.
3. Place the electrodes on the correct and properly cleansed positions.

4. If you use lead lock or clip lock electrodes, be sure to use the lock or clip to relieve stress on each lead wire. Otherwise, tape each lead wire into a stress loop to help prevent movement of the electrode. This ensures that body movements do not cause additional artifacts..

Figure 551. Placing Electrodes - Stress Loop Forming



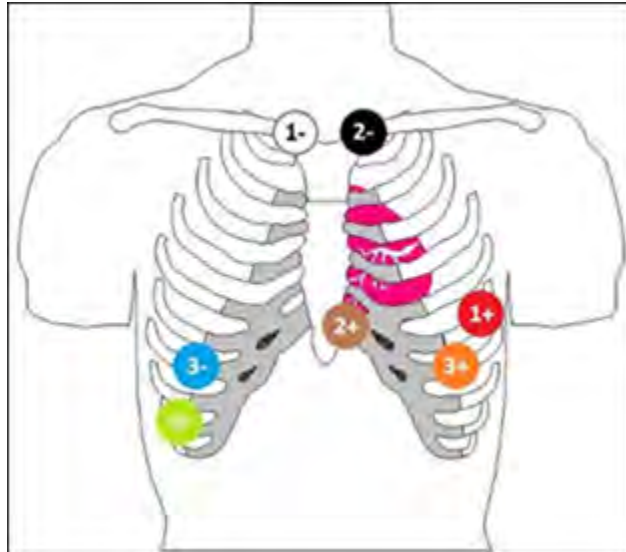
**Note:**

The **Norav Holter Recorders** are compatible with ECG cables of varying lead counts. The NH-301 Holter analysis system is designed to automatically recognize the number of channels being recorded.

### Recommended Electrode Placement: 3 Channels, 7-Lead ECG Cable

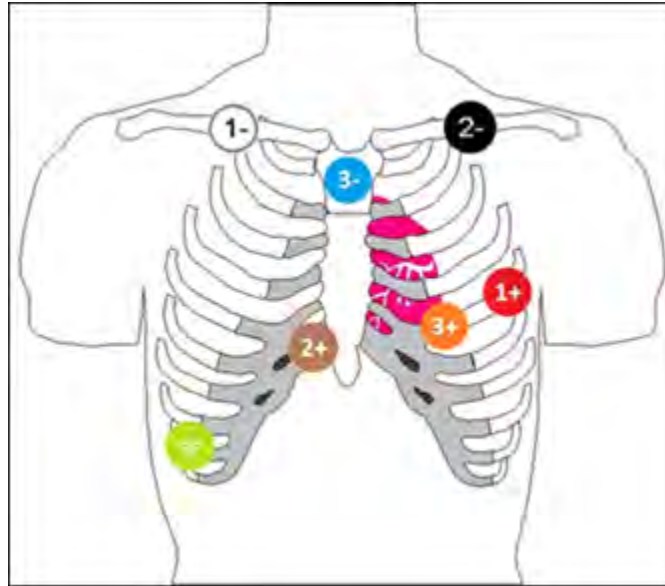
Channel	Color	Placement
Ch 1 –	White	Right border of manubrium of the sternum
Ch 1 +	Red	Left anterior axillary line on the 6th costal arch
Ch 2 –	Black	Left border of manubrium of the sternum
Ch 2 +	Brown	Approximately 1 inch left of the xiphoid process
Ch 3 –	Blue	Right midclavicular line on the 7th costal arch

Channel	Color	Placement
Ch 3 +	Orange	Left midclavicular line on the 7th costal arch
GND	Green	Lower right costal arch



### Alternative Electrode Placement: 3 Channels, 7-Lead ECG Cable

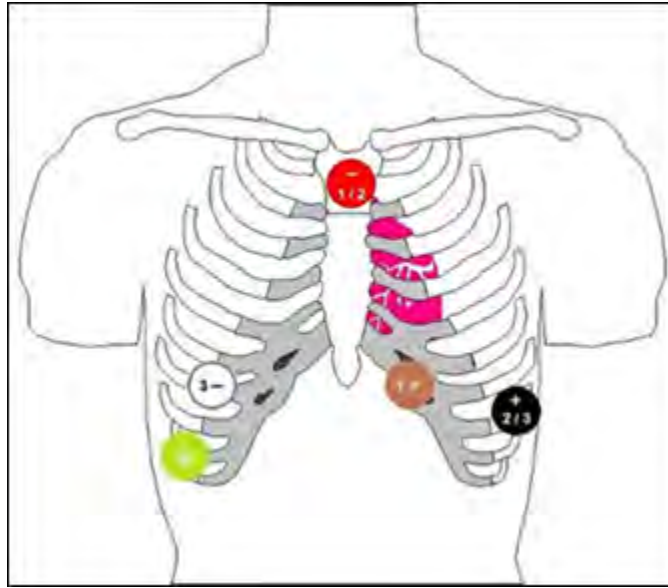
Channel	Color	Placement
Ch 1 –	White	Right midclavicular
Ch 1 +	Red	Left anterior axillary line on the 5th costal arch
Ch 2 –	Black	Left midclavicular
Ch 2 +	Brown	Approximately 1 inch right of the xiphoid process
Ch 3 –	Blue	Center of manubrium of the sternum
Ch 3 +	Orange	Left midclavicular line on the 5th costal arch
GND	Green	Lower right costal arch



Channel	Electrode Colors	Standard 12-Lead Equivalent
Ch 1	White–Red	Modified V5
Ch 2	Black–Brown	Modified V1
Ch 3	Blue–Orange	Lead III

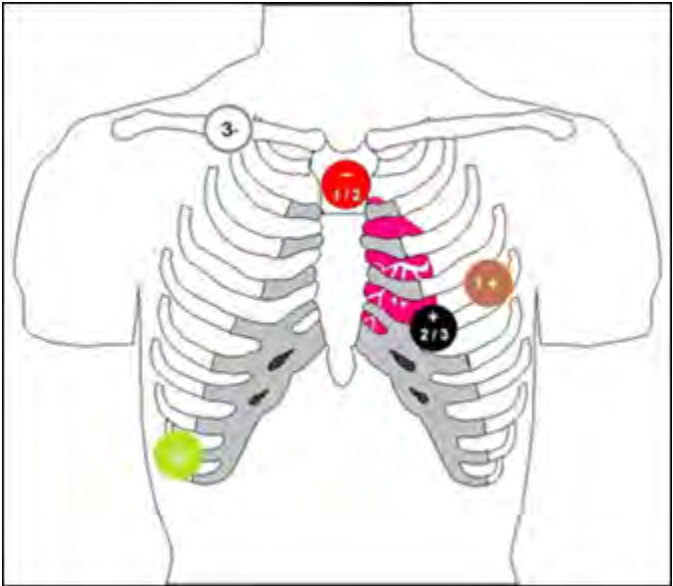
### Recommended Electrode Placement: 3 Channels, 5-Lead ECG Cable

Channel	Color	Placement
Ch 1 – Ch 2 –	Red	Center of manubrium of the sternum
Ch 1 +	Brown	Approximately 2 inches left of the xiphoid process
Ch 2 + Ch 3 +	Black	Left anterior axillary line on the 8th costal arch
Ch 3 –	White	Right midclavicular line on the 7th costal arch
GND	Green	Lower right costal arch



### Alternative Electrode Placement: 3 Channels, 5-Lead ECG Cable

Channel	Color	Placement
Ch 1 – Ch 2 –	Red	Center of manubrium of the sternum
Ch 1 +	Brown	Left anterior axillary line on the 5th costal arch
Ch 2 + Ch 3 +	Black	Left midclavicular line on the 5th costal arch
Ch 3 –	White	Right midclavicular
GND	Green	Lower right costal arch

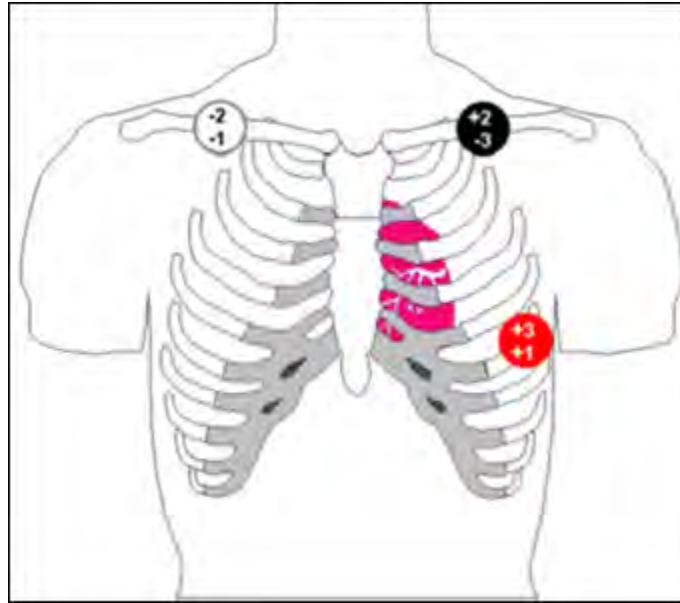


Channel	Electrode Col- ors	Standard 12-Lead Equiva- lent
Ch 1	Red–Brown	CM5
Ch 2	Red–Black	aFV
Ch 3	White–Black	Lead III

Recommended Electrode Placement: 3 Channels, 3-Lead ECG Cable

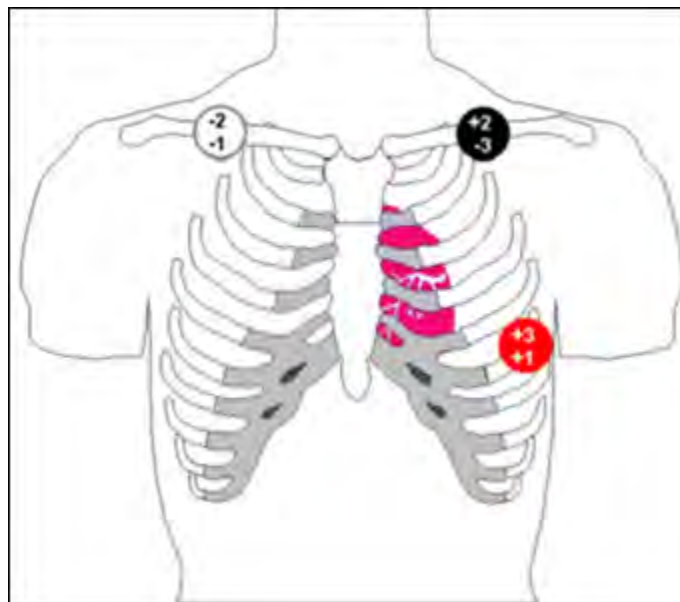
Channel	Color	Placement
Ch 1 – Ch 2 –	White	Right midclavicular
Ch 1 + Ch 3 +	Red	Left anterior axillary line on the 6th costal arch
Ch 2 + Ch 3 –	Black	Left midclavicular





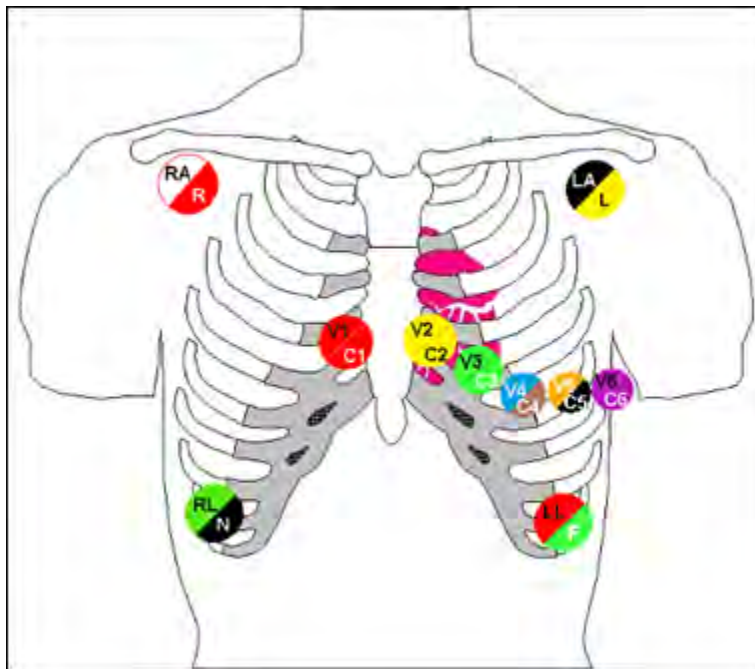
### Alternative Electrode Placement: 3 Channels, 3-Lead ECG Cable

Channel	Electrode Colors	Standard 12-Lead Equivalent
Ch 1	White-Red	Lead II
Ch 2	Red-Black	Lead I
Ch 3	White-Black	Lead III



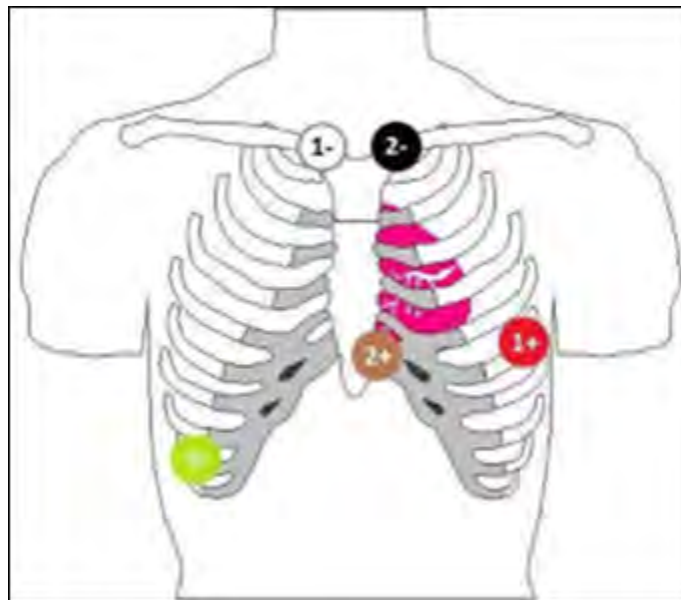
## Recommended Electrode Placement: 12 Channels, 10-Lead ECG Cable

#	AHA Color	AHA Lead	IEC Color	IEC Lead	Placement
1	Red	V1	Red	C1	Fourth intercostal space at the right border of the sternum
2	Yellow	V2	Yellow	C2	Fourth intercostal space at the left border of the sternum
3	Green	V3	Green	C3	Midway between location V2 and V4
4	Blue	V4	Brown	C4	At the midclavicular line in the fifth intercostal space
5	Orange	V5	Black	C5	At the anterior axillary line on the same horizontal level as V4
6	Violet	V6	Violet	C6	At the midaxillary line on the same horizontal level as V4 and V5
7	Black	LA	Yellow	L	Left shoulder
8	Red	LL	Green	F	Lower edge of the rib cage, or at the level of the umbilicus at the midclavicular line
9	Green	RL	Black	N	Lower edge of the rib cage, or at the level of the umbilicus at the midclavicular line
10	White	RA	Red	R	Right shoulder



## Recommended Electrode Placement: 2 Channels, 5-Lead ECG Cable

Channel	Color	Placement
Ch 1 –	White	Right border of manubrium of the sternum
Ch 1 +	Red	Left anterior axillary line on the 6th costal arch
Ch 2 –	Black	Left border of manubrium of the sternum
Ch 2 +	Brown	Approximately 1 inch left of the xiphoid process
GND	Green	Lower right costal arch



## Preparing Recorder

After you have finished preparing the patient, it's time to set up your **Recorder** device for a new Holter recording.

To prepare a **Recorder** for a new **Holter Recording**, follow these steps:

1. **Connecting the Recorder:** Connect the **Recorder** to the computer where the NH-301 analysis system is installed. You have three options:

a. **Connection via USB:**

- i. Confirm that a **Memory Card** is installed in the recorder.
- ii. Disconnect the ECG cable from the **Recorder** and connect a USB cable instead.
- iii. Plug the USB cable into a USB port on the computer.

b. **Connection via Memory Card Reader:**

- i. Eject the **Memory Card** from the **Recorder**.
- ii. Place the **Memory Card** into the **Card Reader**.
- iii. Connect the **Card Reader** to a USB port on the computer.

c. **Connection via Bluetooth:**

- i. To connect a **Recorder** using Bluetooth pairing, please refer to the [Pairing Norav Devices via Bluetooth \(on page 406\)](#) section for detailed instructions, depending on the device model.

2. **Verifying Recorder Memory:** Before initiating a new recording, ensure the **Recorder** memory does not contain a previous recording. If it does, you'll need to download all records and clear the memory:

- a. Open Windows Explorer by clicking its icon on the Windows Taskbar.

Figure 552. Verifying Memory - Opening Windows Explorer



- b. Click on the relevant drive that represents your **Recorder** memory.
- c. Check for .nrr, or .res files. If these files exist, proceed to **Step 3** below to download and clear them; otherwise [proceed to the next section \(on page 420\)](#).

3. (Optional) **Downloading and Clearing Previous Records:**

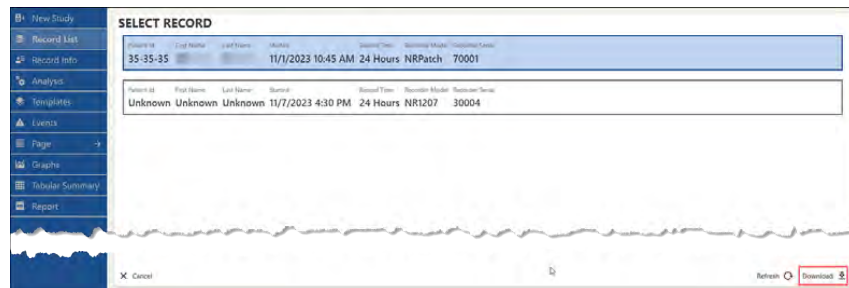
- a. Download the record:

Figure 553. Preparing Recorder - Downloading Records

Id	First Name	Last Name	Gender	Order	Recorded	Duration	Status
182217 PM	Dan	Morris	Male		10/29/2020 10:30 AM	71:34	Analyzed
23456799	Michael	Red	Male		10/6/2021 1:30 PM	00:40	Analyzed
01865478	Lee	Teo	Female		11/29/2017 2:52 PM	336:19	Confirmed
255	Thompson	Nora	Unspecified		11/24/2022 3:39 PM	01:49	Analyzed
789876543	Dorothy	Pannville	Female		12/11/2018 3:36 PM	00:15	Downloaded
33356789	Leonard	Torrent	Male		8/29/2023 2:14 PM	01:31	Downloaded

- i. Click the **Record List View** in the **Views Sidebar** on the left.
- ii. Click the **Download from recorder** button on the top toolbar. A pop-up window will appear.
- iii. Select and double-click **one** record to download. Alternatively, click the **Download** button in the bottom right corner. If multiple records are recognized (as multiple recorders can be connected to a PC), a list of records will be displayed for selection. Note that you can select **only one record** at a time.

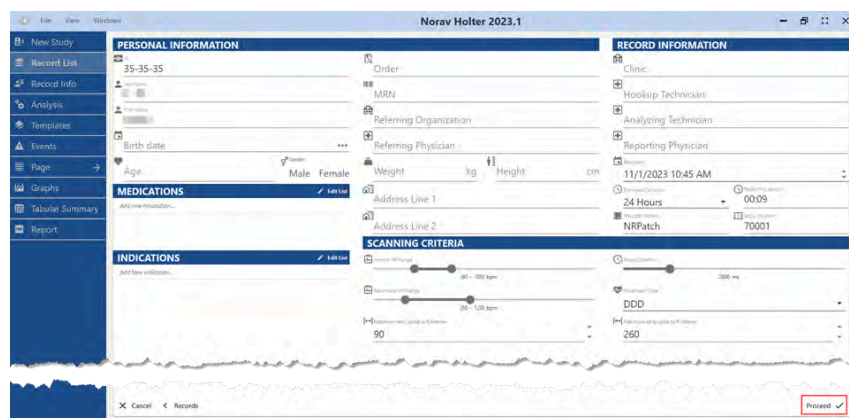
Figure 554. Preparing Recorder - Download Record



If you have connected additional **Recorders** or disconnected some of those previously plugged in, click **Refresh** in the bottom right corner to update the accessible records list.

- iv. The **Patient Information** window will appear. Validate and modify the patient's information if needed; refer to [Step 3 in the Menu Bar section \(on page 55\)](#) on how to modify the patient's data.
- v. Click **Proceed** in the bottom right corner to finish downloading the record. A "Downloading..." progress bar will appear. If only one record was recognized, the download is finished and the **Records List View** will be displayed.

Figure 555. Preparing Recorder - Click Proceed



You can also:

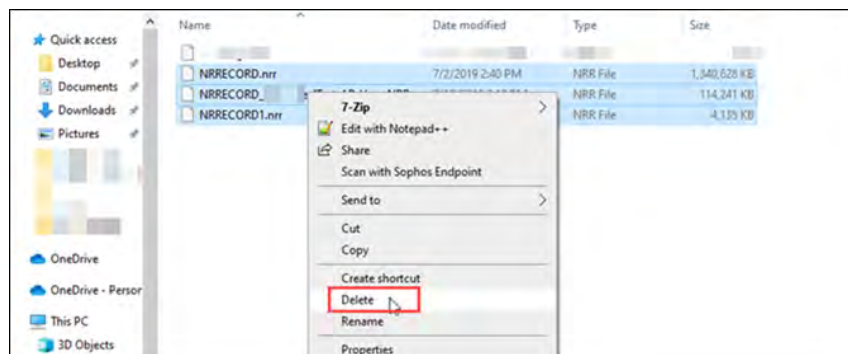
- Click **Cancel** in the bottom left corner to skip all changes and get back to the **Record List View** immediately.
  - Click **Records** to navigate back to the **Select Record** screen.
- vi. (Optional) If multiple records were recognized in **Substep III**, a list of records will be displayed again for selection. You can choose another record from the list if needed, and repeat the procedure starting from the **Substep III** here.
- b. Clear the **Recorder** memory:
- i. Open Windows Explorer by clicking its icon on the Windows Taskbar.

Figure 556. Clearing Memory - Opening Windows Explorer



- ii. Click on the relevant drive that represents your **Recorder** memory.
- iii. Select any .nrr, or .res files to delete them. If there are more than one file, use Ctrl + Click or Shift + Click to select all relevant files.

Figure 557. Clearing Memory - Deleting Files



- iv. Click the right mouse button and select Delete from the context menu or press Delete on your keyboard to clear the **Recorder** memory. All the selected files will be moved to the **Recycle Bin**.



**Note:**

Regularly inspect the **Holter Recorder**, especially the ECG cable leads, for signs of wear or damage to prevent issues during patient hook-up.

After completing these steps, [proceed to the NH-301 analysis system to enter patient information, adjust recorder settings, and more \(on page 420\)](#).



## Pairing Norav Devices via Bluetooth

Before beginning the [Preparing Recorder \(on page 402\)](#) procedure, you may choose to connect an NR family device to your computer via Bluetooth pairing. This section will guide you through the pairing process of different NR device models with your computer.

Depending on the specific NR device's default pairing method, you may need to follow one of the following sequences.

### Pairing NR-314P Device Model

The NR-314P model, due to its compact size and design, has no Memory Card slot, unlike most other NR models. The NR-314P model features USB and Bluetooth connection methods.

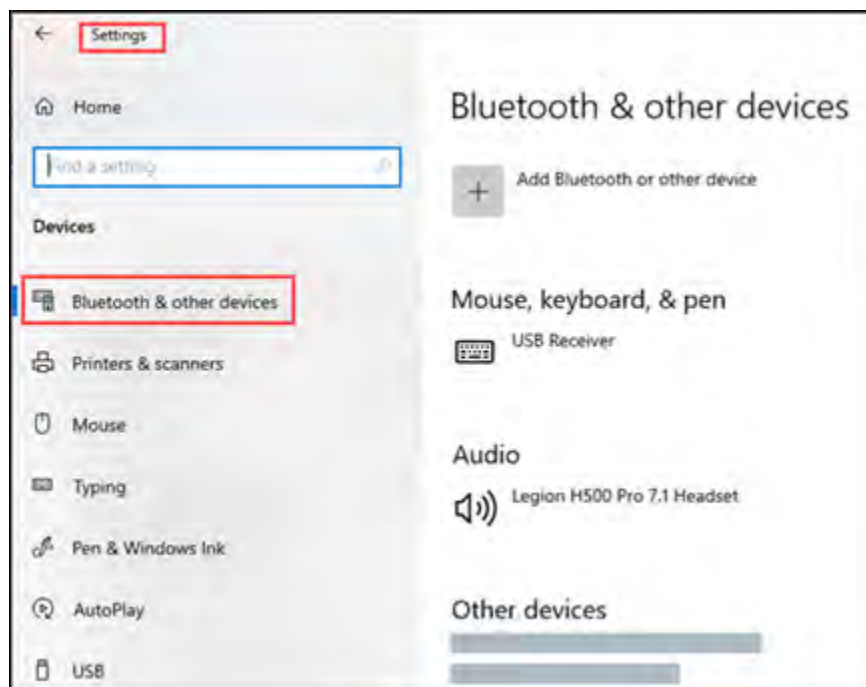
**Note:**

The NR-314P device model is compatible with **Bluetooth Low Energy (BLE) dongles only**. Other device models may employ both standard and low energy dongles.

**To connect an NR-314P device via Bluetooth:**

1. Turn the device ON.
2. On your computer navigate to **Settings>Devices>Bluetooth & other devices**.

Figure 558. Pairing Devices - Bluetooth and other devices Screen



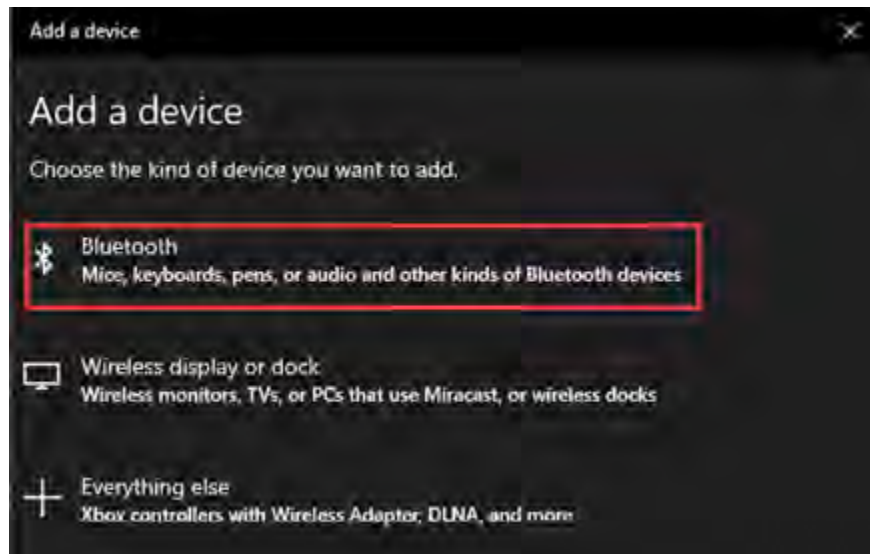
3. Click **Add Bluetooth or other device**.

Figure 559. Pairing Devices - Add Bluetooth Device



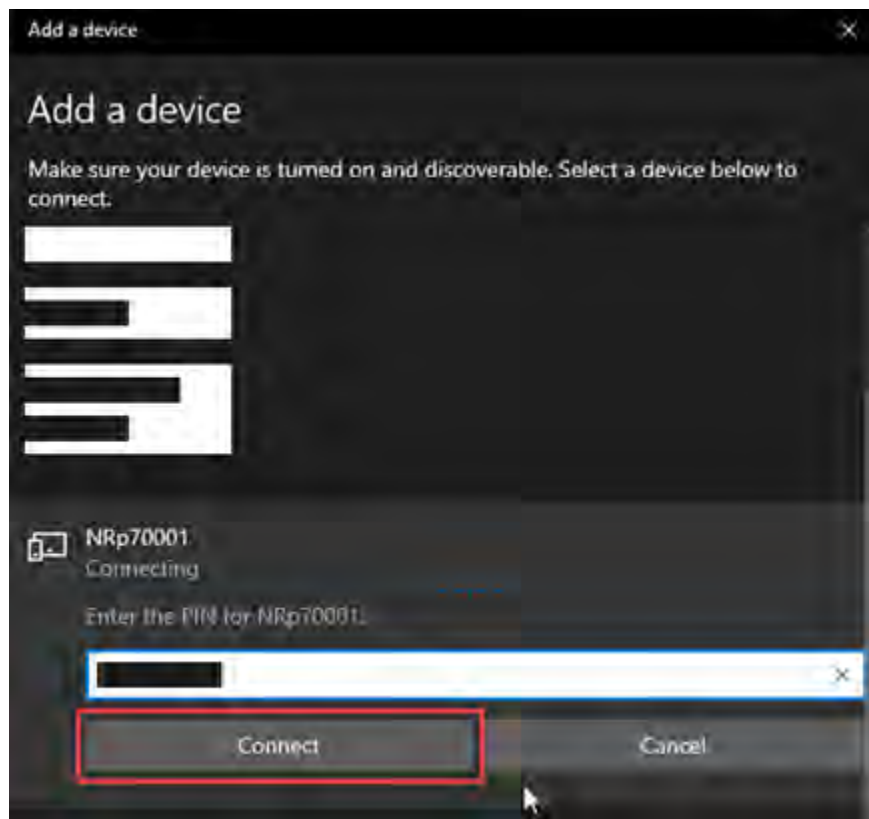
4. Select the **Bluetooth** option.

Figure 560. Pairing Devices - Add a device



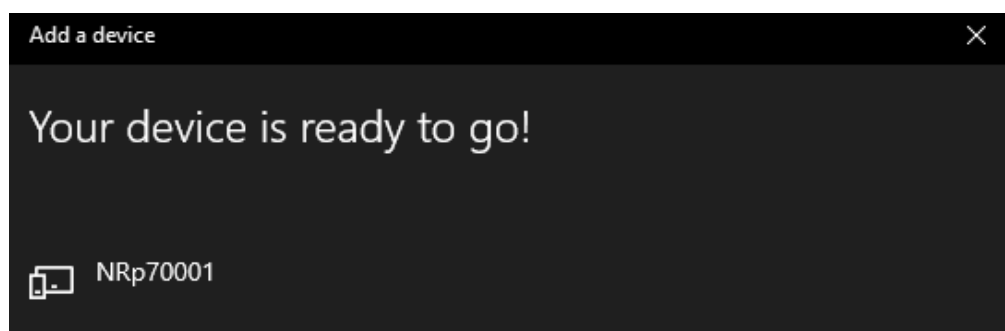
5. Click an **NRpXXXXX** option (or a similar entry) in the **Add a device** list. You will be prompted to enter the PIN code.
6. Enter the following PIN: **120474**. If this PIN doesn't work, please contact the Support Team.

Figure 561. Pairing Devices - Entering PIN



7. Click **Connect** to initiate pairing.
8. If you see the 'Paired' message on your computer, the process is complete. Otherwise, repeat from **Step 1** or consult the device manual.

Figure 562. Pairing Devices - Success



**Note:**

You may encounter a device selection and connection issue when attempting to select the NR-314P in the **Select Connection** list of the **New Study View**. Generally, the procedure follows these steps:

1. Turn the device ON. The green indicator light should begin to blink.
2. **Wait until the green light ceases to blink.**
3. Select the NR-314P device from the **Select Connection** list.

If you proceed to **Step 3** before meeting the condition of **Step 2**, you may encounter a Bluetooth connection issue: the application may lose connection with the device, and the name of the device in the Windows Bluetooth and other devices list may change.

To resolve the connection issue, disable and then re-enable Bluetooth in Windows:

1. Select the **Start** button, then select **Settings > Devices > Bluetooth & other devices**.
2. Select the Bluetooth toggle and turn it OFF.
3. Turn the Bluetooth toggle ON.

Alternatively, to resolve the connection issue, disconnect and then reconnect the device dongle:

1. Remove the dongle.
2. Wait 5 seconds before reconnecting the dongle to your computer.

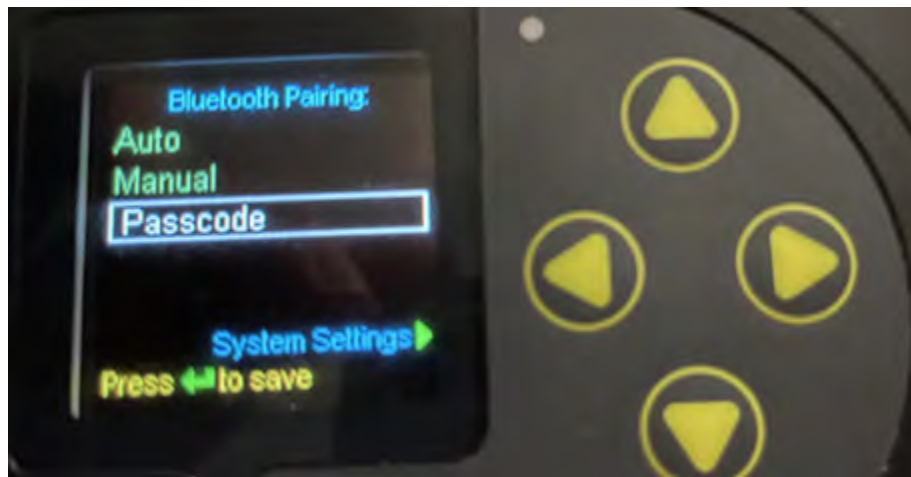
After resolving the Bluetooth pairing issue, adhere to the general procedure described above, ensuring compliance with the **Step 2** condition.

## Pairing NR Devices Offering Various Pairing Options

Some NR device models (excluding the NR-314P model) provide three device-computer pairing options to suit your preference:

- Auto
- Manual
- Passcode

Figure 563. Pairing Devices - Bluetooth Pairing Options

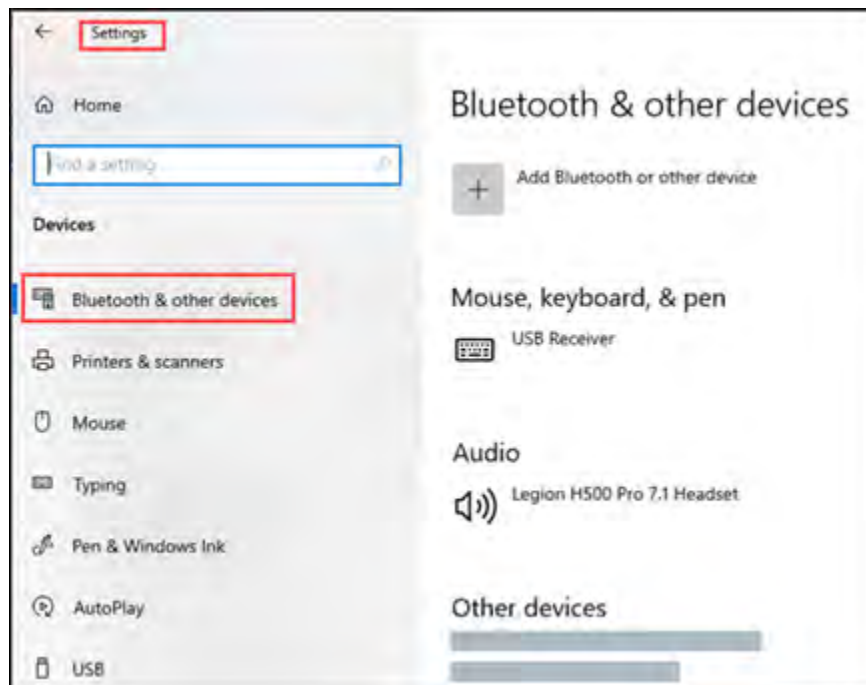


Devices with these three pairing options feature a dedicated **Pairing** option in their **Settings Menu** and a separate **Bluetooth** option in the **System Settings** menu, allowing you to switch among the aforementioned pairing methods.

**Pairing with an Auto option:**

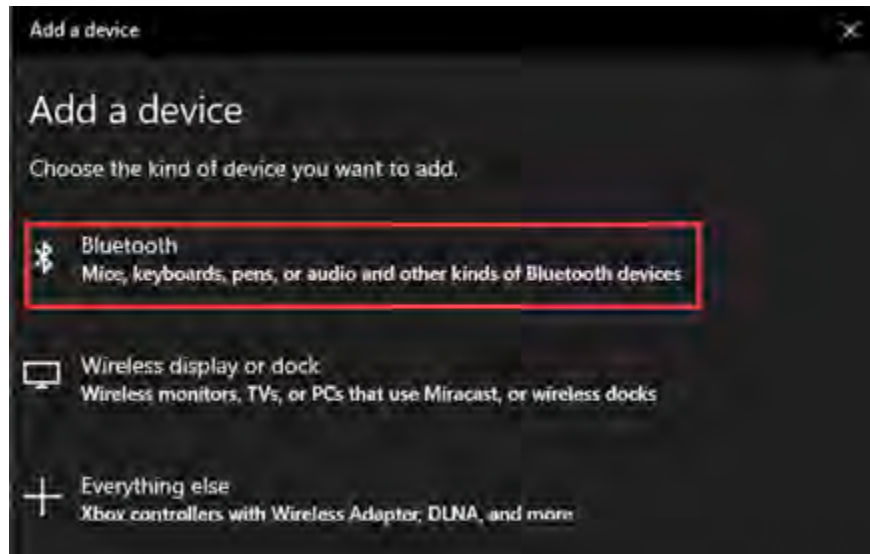
1. Turn the device ON.
2. On your computer navigate to **Settings>Devices>Bluetooth & other devices**.

Figure 564. Pairing Devices - Bluetooth and other devices Screen



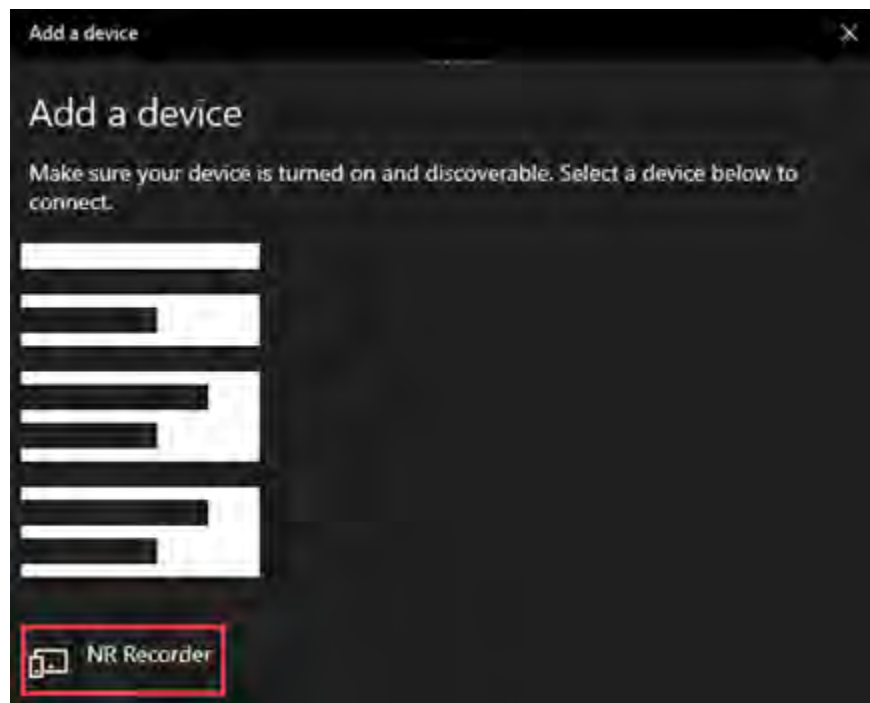
3. Click **Add Bluetooth or other device**.
4. Select the **Bluetooth** option.

Figure 565. Pairing Devices - Add a device



5. Click an **NR Recorder** option (or a similar entry) in the **Add a device** list.

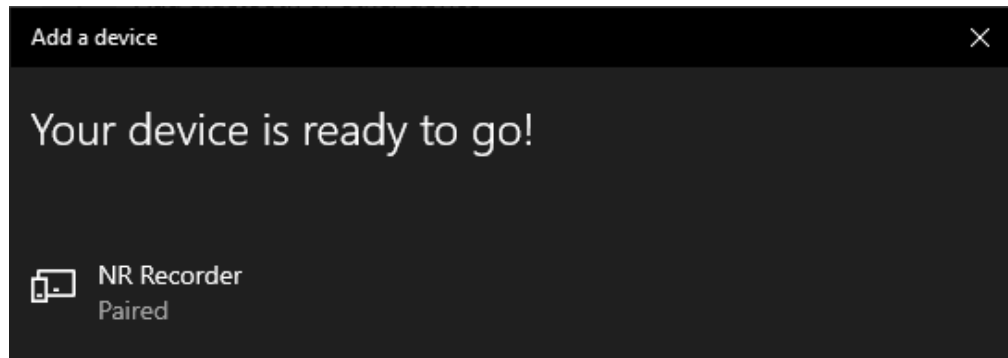
Figure 566. Pairing Devices - Pairing a Device





6. If you see the 'Paired' message on your computer, the process is complete. Otherwise, repeat from **Step 1** or consult the device manual.

Figure 567. Pairing Devices - Success



**Pairing with a Manual option:**

1. Turn the device ON.
2. Access the device's main menu.

Figure 568. Pairing Devices - Device Main Menu Example



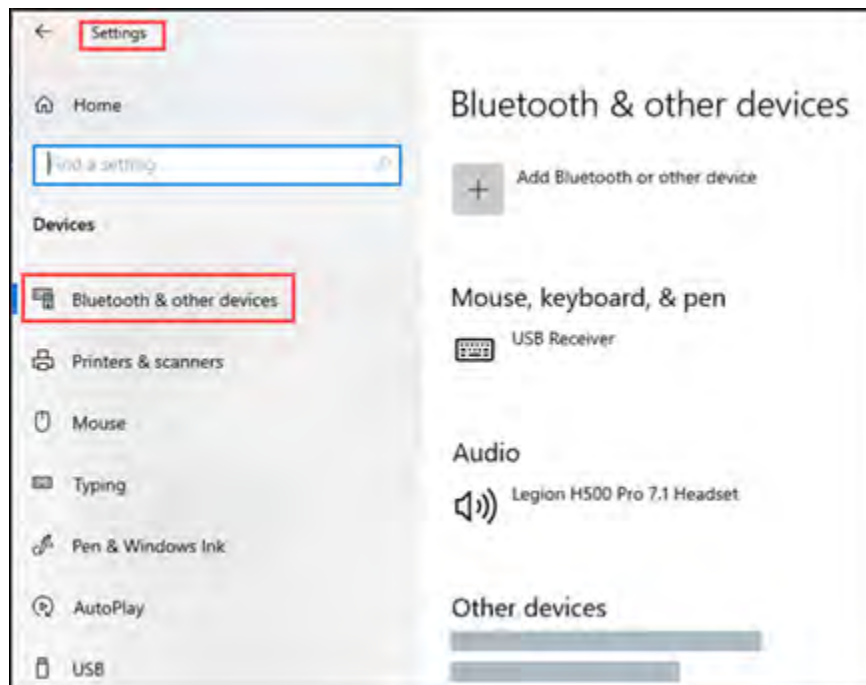
3. Go to Settings.

Figure 569. Pairing Devices - Device Settings Menu Example



4. Select Pairing to see the Bluetooth Pairing screen on your device.
5. On your computer navigate to **Settings>Devices>Bluetooth & other devices**.

Figure 570. Pairing Devices - Bluetooth and other devices Screen



6. Click **Add Bluetooth or other device**.

7. Select the **Bluetooth** option.

Figure 571. Pairing Devices - Add a device



8. Click an **NR Recorder** option (or a similar entry) in the **Add a device** list.
9. If you see the 'Paired' message on your computer, the process is complete. Otherwise, repeat from **Step 1** or consult the device manual.

**Pairing with a Passcode option:**

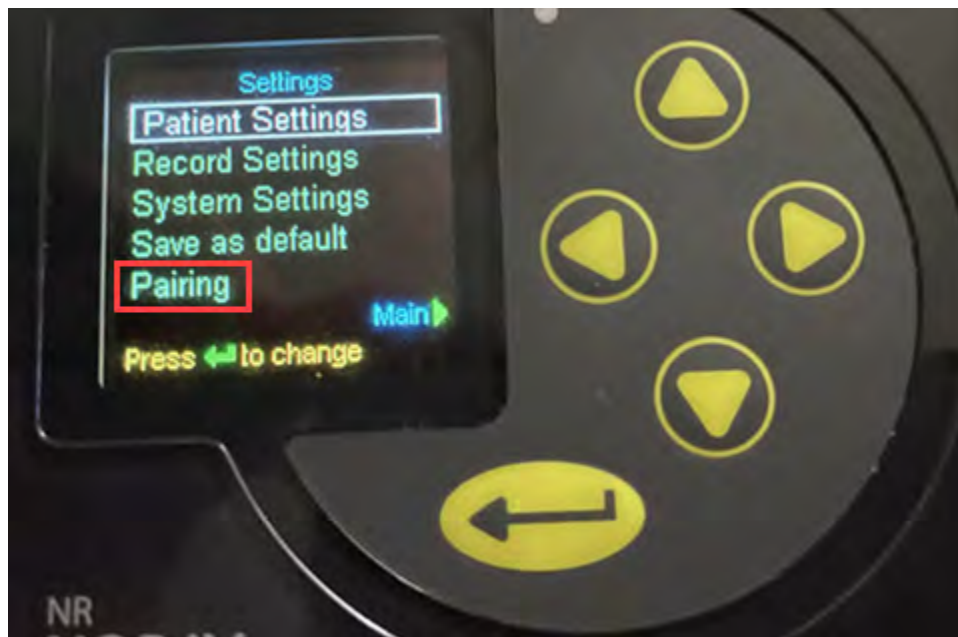
1. Turn the device ON.
2. Access the device's main menu.

Figure 572. Pairing Device - Device Main Menu Example



3. Go to Settings.

Figure 573. Pairing Device - Device Settings Menu Example



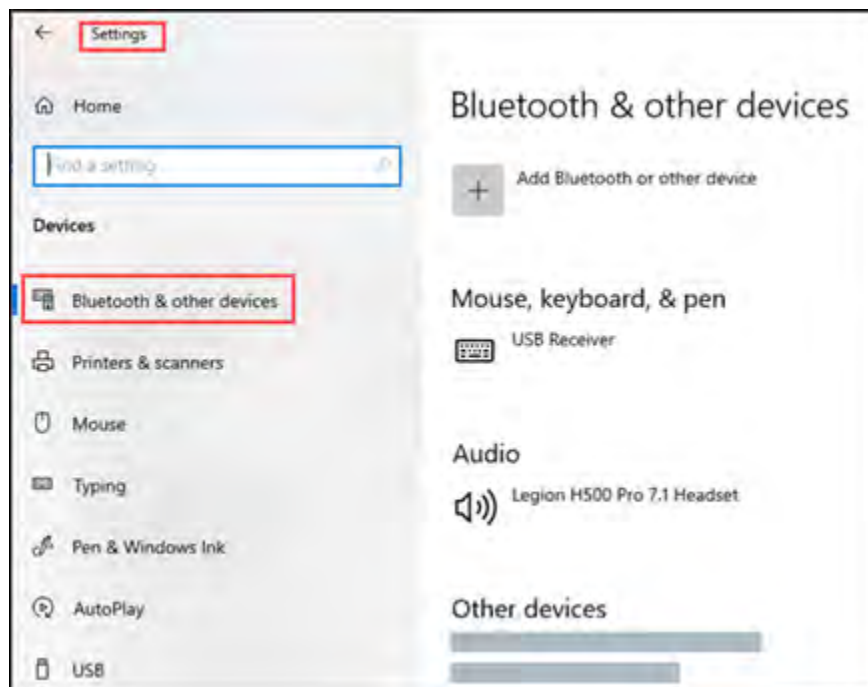
4. Select Pairing to see the Bluetooth Pairing screen on your device.

Figure 574. Pairing Devices - Pairing via PIN Code



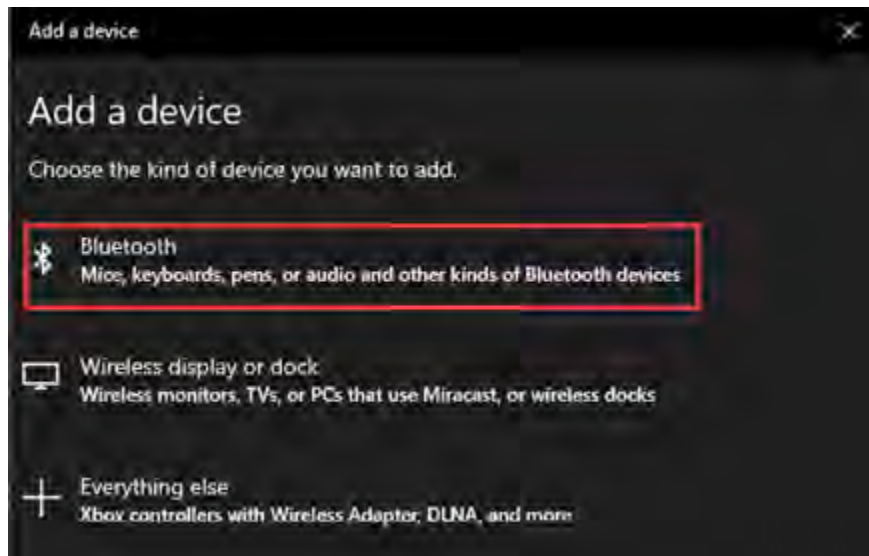
5. On your computer navigate to **Settings>Devices>Bluetooth & other devices**.

Figure 575. Pairing Devices - Bluetooth and other devices Screen



6. Click **Add Bluetooth or other device**.
7. Select the **Bluetooth** option.

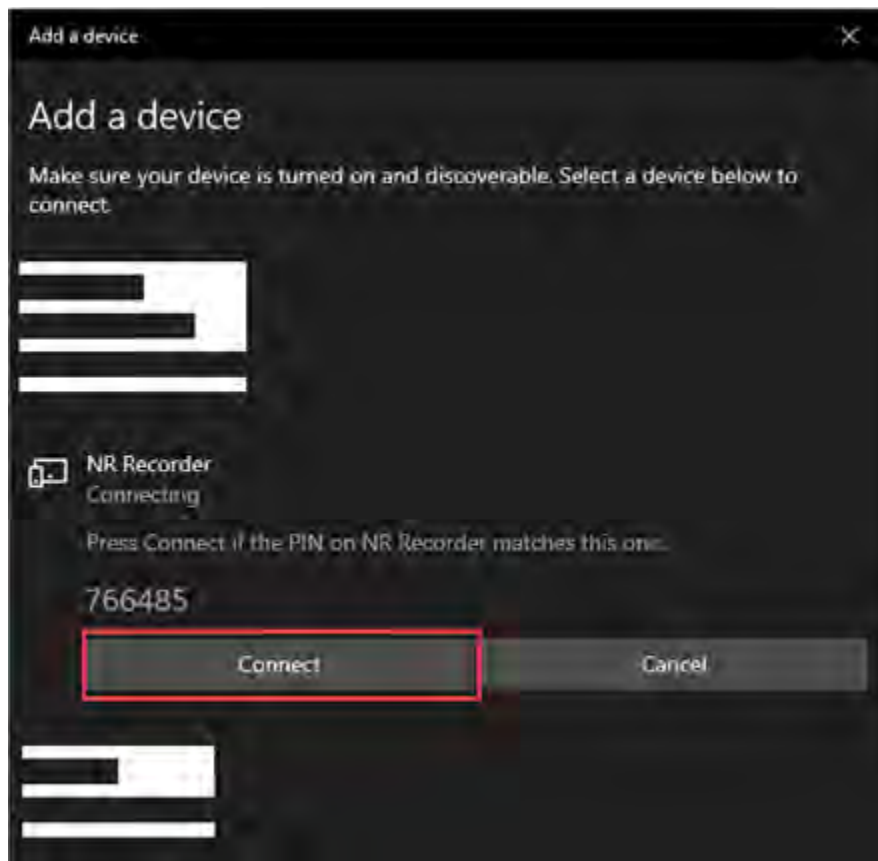
Figure 576. Pairing Devices - Add a device



8. Click an **NR Recorder** option (or a similar entry) in the **Add a device** list.
9. Follow the on-screen instructions on your computer to input a PIN code.
10. Press the **Enter** button on your device to confirm connection. Click **Connect** in the **Add a device** window of your computer. You may perform these actions in any order.



Figure 577. Pairing Devices - Pairing with PIN



11. If you see the 'Paired' message on your computer, the process is complete. Otherwise, repeat from **Step 1** or consult the device manual.

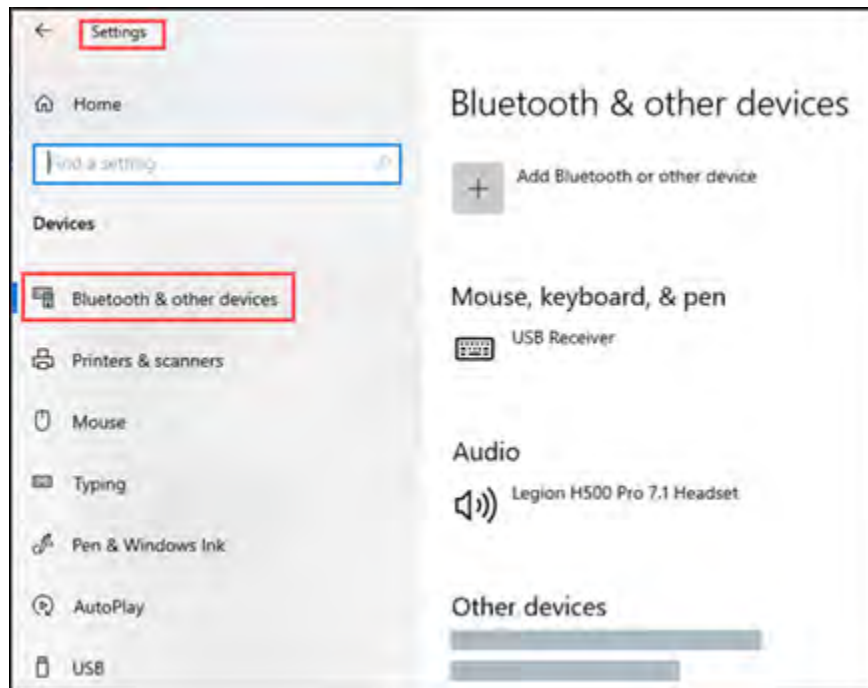
### Pairing NR Devices via PIN-Based Connection

Some NR device models (excluding the NR-314P model) offer a device-computer pairing by entering a PIN code on your computer. These models, unlike those offering three different pairing options ([refer to the section above for more details \(on page 410\)](#)), have no **Pairing** option in their Settings Menu, and no **Bluetooth** option in the System Settings menu.

#### To pair your device with your computer:

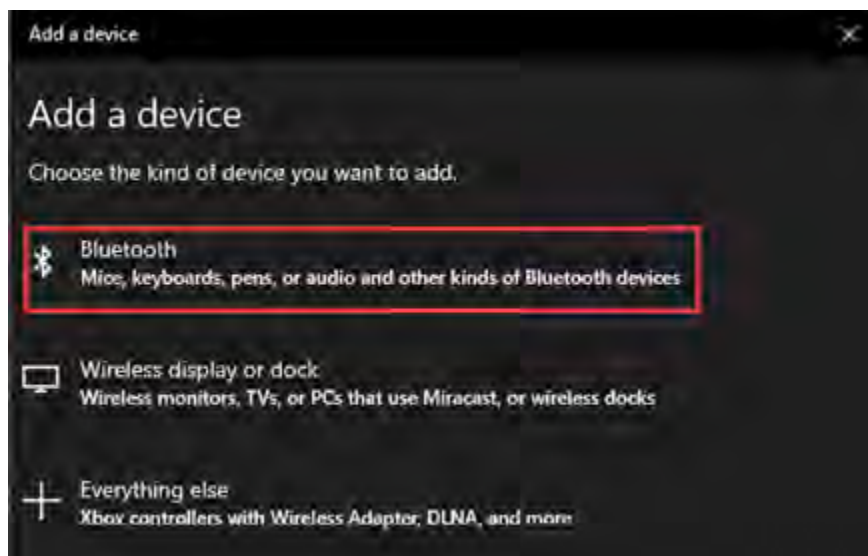
1. Turn the device ON.
2. On your computer navigate to **Settings>Devices>Bluetooth & other devices**.

Figure 578. Pairing Devices - Bluetooth and other devices Screen



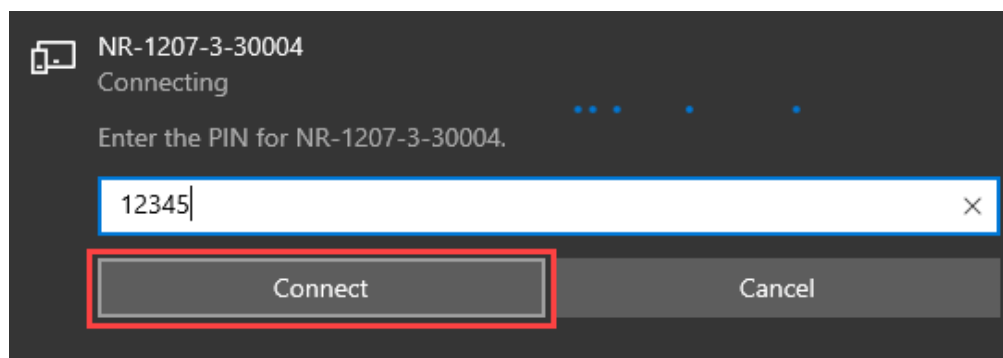
3. Click **Add Bluetooth or other device**.
4. Select the **Bluetooth** option.

Figure 579. Pairing Devices - Add a device



5. Click an **NR-XXXX-X-XXXXXX** option (or a similar entry) in the **Add a device** list. You will be prompted to enter the PIN code.
6. Enter the following PIN: **12345**. If this PIN doesn't work, please contact the Support Team.

Figure 580. Pairing Devices - Pairing via PIN



7. Click **Connect** to initiate pairing.
8. If you see the 'Paired' message on your computer, the process is complete. Otherwise, repeat from **Step 1** or consult the device manual.

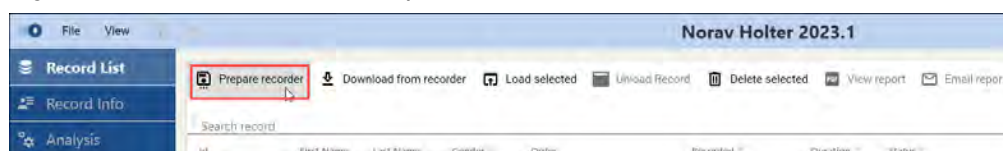
## Entering Patient Information

After you have finished preparing the patient and your **Recorder**, you need to enter patient information.

To enter **Patient Information**, follow these steps:

1. Click the **Prepare Recorder** button on the top toolbar of the **Record List View**. The **Patient Information** window is displayed.

Figure 581. Record List View - Prepare Recorder



2. Enter patient information. Click on each text field and type in the data according to your needs and workflows. To proceed, you **must fill in at least one** of patient's identifiers: **Patient ID, First Name, Last Name**. Other text fields are not mandatory to proceed.

Figure 582. Entering Patient Information - Patient Information

3. **(Optional)** Click on the **Birth Date** field and type in the date or use the ellipsis button on the right to select from a calendar.
4. Click **Next** at the bottom right of the screen.

After completing the steps above, you will see the Recorder Settings screen and may start [Adjusting Recorder Settings \(on page 421\)](#).

## Adjusting Record Settings

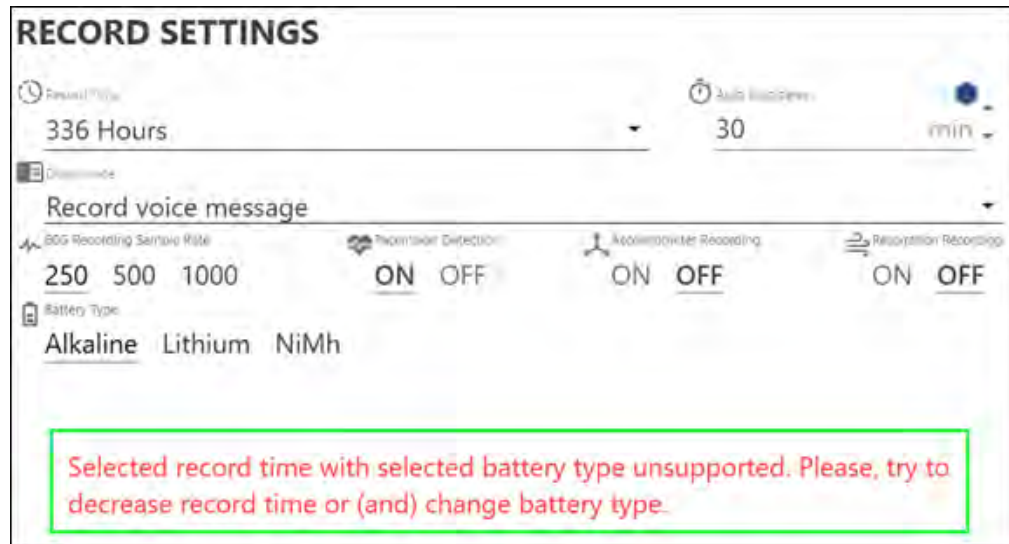
After you have entered the patient information, you need to adjust the **Record Settings**. Please note, that all underlined values (like ON/OFF) in this **View** are default values.

**To adjust the Record Settings (for all models excluding NR-314P), follow the steps listed below:**

Figure 583. Record Settings - Adjusting Record Settings

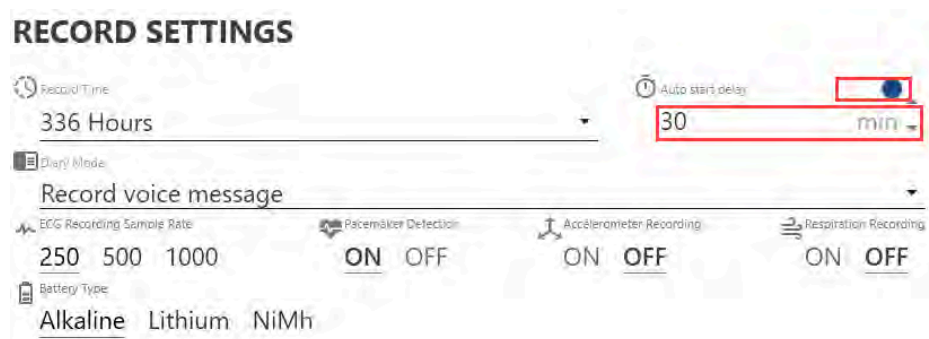
1. Select the **Record Time** from the drop-down list on the right, ranging from 24 to 336 hours, depending on the **Recorder** capabilities and requirements of the test. Refer to the relevant **Recorder** manual to check the longest possible **Record Time**.
2. **(Optional)** If the selected record time or **ECG Recording Sample Rate** are not compatible with a specific battery type, a warning will be displayed. Refer to the relevant **Recorder Manual** to check the **Record Time** parameters.

Figure 584. Record Settings - Warning Example



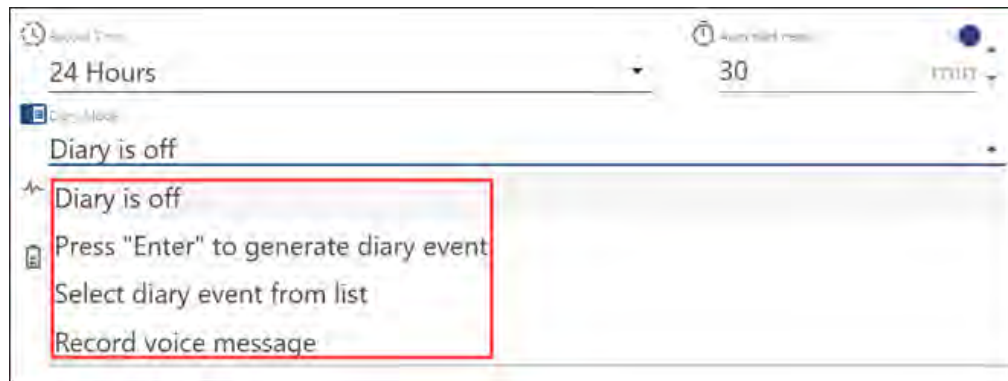
3. Set **Auto start delay**:
  - Toggle **Auto start delay** OFF to disable the auto start delay feature.
  - Toggle **Auto start delay** ON and set the delay in minutes using the picker arrows on the right. You can increase or decrease the delay time by 5 minutes with each click.

Figure 585. Record Settings - Auto start delay



4. Select how the patient inputs diary events:

Figure 586. Recorder Settings - Diary Mode

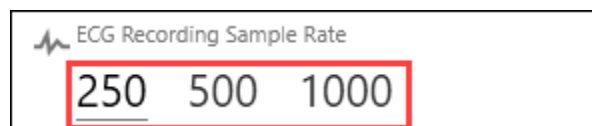


- **Diary is off:** A patient won't be able to make inputs.
- **Press "Enter" to generate diary event:** By pressing Enter on the **Recorder**, a patient will be able to register an **Event** without specifying its type.
- **Select a diary event from the list:** By pressing Enter on the **Recorder**, a patient will be able to choose an **Event** from a predefined list.
- **Record voice message:** By pressing Enter on the **Recorder**, a patient will be able to register an **Event** and make a brief voice description.

Note that different types of **Recorders** support different types of input for diary events. Please, refer to the relevant **Recorder** manual if needed.

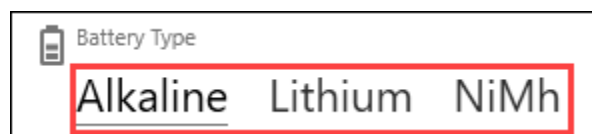
- Click to select the **ECG Recording Sample Rate**: 250, 500 or 1000 Hz. The higher the sampling rate, the more detailed the ECG signal will be. However, a higher sampling rate also requires more memory and more battery capacity. If the selected ECG Recording sample rate is not compatible with a specific battery type, a warning will be displayed.

Figure 587. Recorder Settings - Sample Rate



- Click to select the **Battery Type**: Alkaline, Lithium, NiMh. Choose the battery type considering the overall length of the Holter testing, quantity of leads, **Recorder** model, etc. Please, refer to the relevant **Recorder** manual if needed.

Figure 588. Recorder Settings - Battery Type





7. Click to select **Pacemaker Detection**:

Figure 589. Recorder Settings - Pacemaker, Accelerometer, Respiration Options



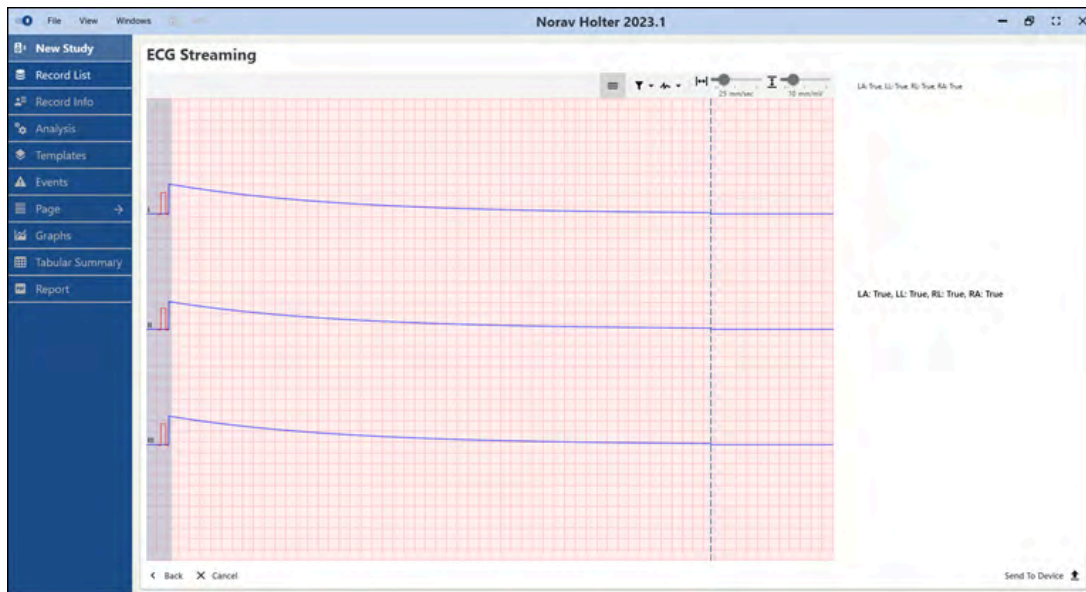
- Select **ON** to detect a pacemaker during the test and analysis. This is important for the interpretation of the ECG recordings, as the presence of a pacemaker can affect the appearance of the ECG waves.
  - Select **OFF** if there is no need to detect a pacemaker for this patient.
8. Click to select **Accelerometer Recording**:
- Select **ON** to enable the **Accelerometer Recording** during the test. Accelerometer recording can help to identify movement artifacts and remove them from the ECG signal, which can improve the accuracy of the interpretation.
  - Select **OFF** if there is no need to enable it.
9. Click to select **Respiration Recording**:
- Select **ON** to enable the **Respiration Recording** during the test. Respiration recording can be used to assess the patient's respiratory rate and pattern. This information can be helpful in diagnosing certain heart conditions, such as sleep apnea.
  - Select **OFF** if there is no need to enable it.
10. **(Optional)** If you're using a **Recorder** model equipped with Bluetooth, you may click the **Synchronize** button to synchronize device clock with your computer clock. It is recommended to synchronize device clock settings periodically. For the **NR-314P** model it is the easiest way for syncing as the device has no display and navigation buttons.

Figure 590. Record Settings - Synchronize



11. **(Optional)** If you're using a **Recorder** model equipped with Bluetooth, you may click the **Check ECG** button to verify that the electrodes are properly connected and that the ECG signal is being recorded correctly. This is important because if the electrodes are not properly connected, the ECG signal may be distorted or unreadable.

Figure 591. Record Settings - Check ECG

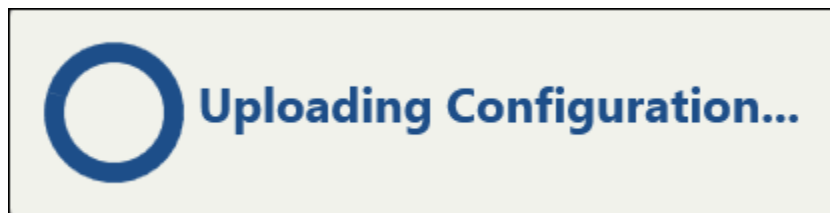


12. Click **Send To Device** in the bottom right corner to send the settings to the selected device. You will be briefly prompted by the **Uploading Configuration** progress bar. When it disappears, you will see a success message indicating that you have finished adjusting the **Record Settings**. If the **Send To Device** process fails, repeat the workflow from the start.

Figure 592. Record Settings - Send To Device



Figure 593. Record Settings - Uploading Configuration



You can also use the following buttons at every step:

- Click **Cancel** in the bottom left corner to skip all changes.
- Click **Back** to navigate back to the previous screen.

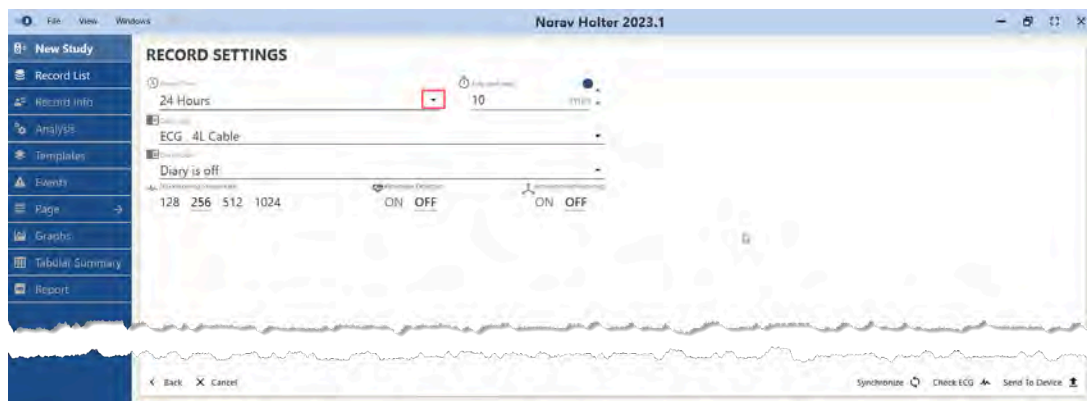
After completing the steps above, you may start [Initiating Recording \(on page 431\)](#).

## Adjusting Record Settings: NR-314P Model Workflow

As the Norav Holter NR-314P is designed to be compact and lightweight for discreet and comfortable wear, it has some distinctions in adjusting the **Record Settings** workflow.

**To adjust the Record Settings, follow the steps listed below:**

Figure 594. Record Settings - Adjusting Record Settings



1. Select the **Record Time** from the drop-down list on the right, ranging from 24 to 336 hours, depending on the **Recorder's** capabilities and the requirements of the test.
2. **(Optional)** If the selected **Record Time** or **ECG Recording** sample rate are not compatible with a specific battery type, a warning will be displayed. Refer to the relevant **Recorder Manual** to check the **Record Time** parameters..

Figure 595. Record Settings - Warning Example

**RECORD SETTINGS**

Record Time: 336 Hours

Auto start delay: 30 min

Record voice message

ECG Recording Sample Rate: 250 500 1000

Facemaker Detection: ON OFF

Accelerometer Recording: ON OFF

Respiration Recording: ON OFF

Battery Type: Alkaline Lithium NiMh

Selected record time with selected battery type unsupported. Please, try to decrease record time or (and) change battery type.

3. Set **Auto start delay** value:

- Toggle **Auto start delay** OFF to disable the auto start delay feature.
- Toggle **Auto start delay** ON and set the delay in minutes using the picker arrows on the right. You can increase or decrease the delay time by 5 minutes with each click.

Figure 596. Record Settings - Auto start delay

**RECORD SETTINGS**

Record Time: 24 Hours

Auto start delay: 10 min

Cable Type: ECG 4L Cable

Diary Mode: Diary is off

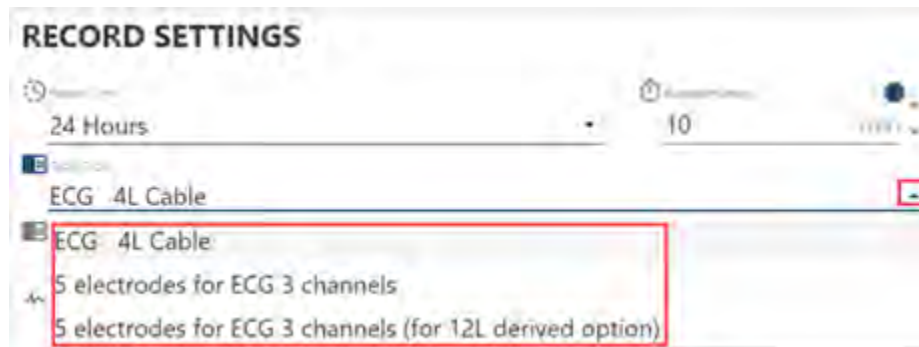
ECG Recording Sample Rate: 128 256 512 1024

Facemaker Detection: ON OFF

Accelerometer Recording: ON OFF

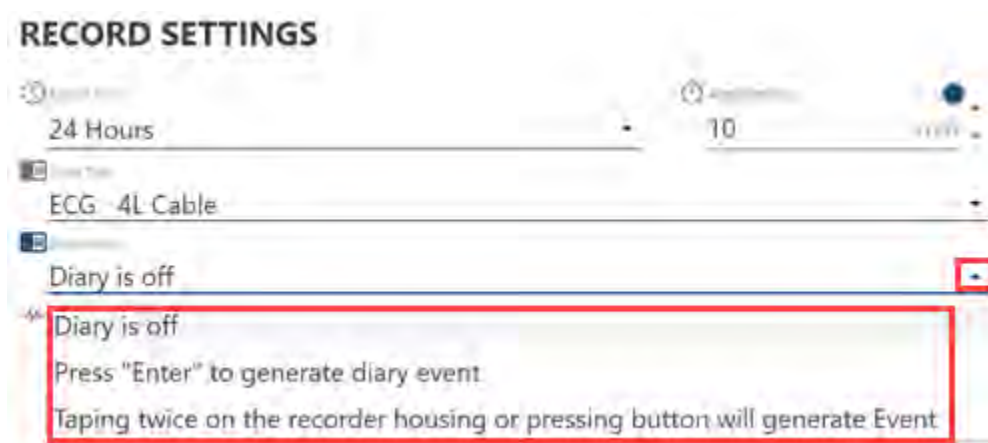
4. Select the cable type.

Figure 597. Record Settings - Selecting Cable



5. Select how the patient inputs diary events (different types of **Recorders** support different types of input, refer to the relevant manual, if needed):
  - **Diary is off:** A patient won't be able to make inputs.
  - **Press "Enter" to generate diary event:** By pressing the sole button on the **Recorder**, a patient can register an **Event**.
  - **Tapping twice on the recorder housing or pressing button will generate Event:** In addition to the button press, a patient may double-tap the device case to register an **Event**.

Figure 598. Record Settings - Diary Mode



6. Click to select the **ECG Recording Sample Rate:** 128, 256, 512 or 1024 Hz. The higher the sampling rate, the more detailed the ECG signal will be. However, a higher sampling rate also requires more memory and more battery capacity. If the selected **ECG Recording Sample Rate** is not compatible with a specific battery type, a warning will be displayed.

Figure 599. Record Settings - Sample Rate



7. Click to select **Pacemaker Detection**:

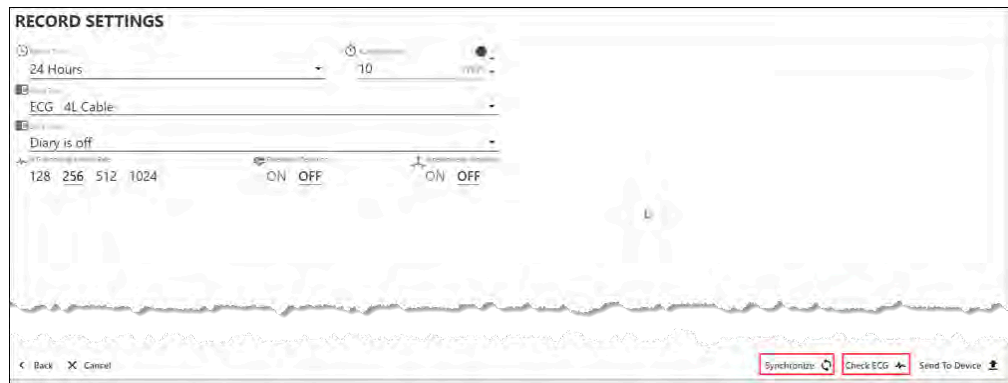
Figure 600. Record Settings - Pacemaker and Accelerometer



- Select **ON** to detect a pacemaker during the test and analysis. This is important for the interpretation of the ECG recordings, as the presence of a pacemaker can affect the appearance of the ECG waves.
  - Select **OFF** if there is no need to detect a pacemaker for this patient.
8. Click to select **Accelerometer Recording**:
- Select **ON** to enable the **Accelerometer Recording** during the test. Accelerometer recording can help to identify movement artifacts and remove them from the ECG signal, which can improve the accuracy of the interpretation.
  - Select **OFF** if there is no need to enable it.
9. **(Optional)** You may click the **Synchronize** button to synchronize the NR-314P clock with your computer clock. It is recommended to synchronize device clock settings periodically.

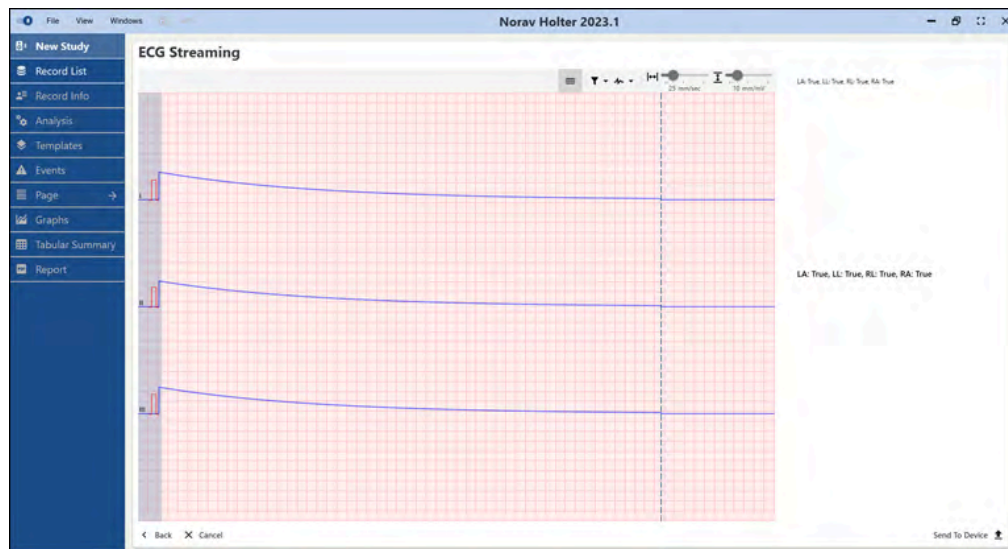


Figure 601. Record Settings - Synchronize



10. **(Optional)** You may click the **Check ECG** button to verify that the electrodes are properly connected and that the ECG signal is being recorded correctly. This step is crucial because if the electrodes are not properly connected, the ECG signal may be distorted or unreadable.

Figure 602. Record Settings - Check ECG



11. Click **Send To Device** in the bottom right corner to send the settings to the selected device. You will be briefly prompted by the **Uploading Configuration** progress bar. When it disappears, you will see a success message indicating that you have finished adjusting the **Record Settings**. If the **Send To Device** process fails, repeat the workflow from the start.

Figure 603. Record Settings - Send To Device

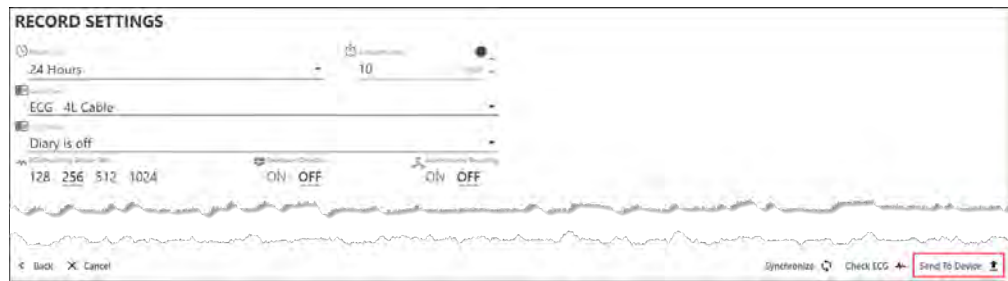
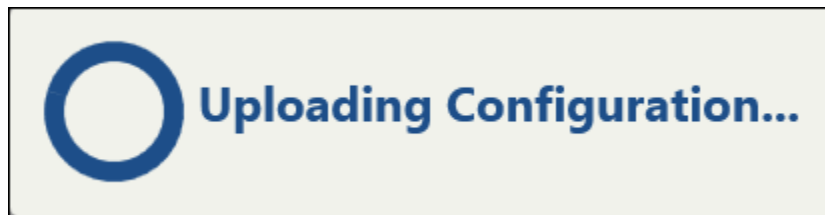


Figure 604. Record Settings - Uploading Configuration



You can also use the following buttons at every step:

- Click **Cancel** in the bottom left corner to skip all changes.
- Click **Back** to navigate back to the previous screen.

After completing the steps above, you may start [Initiating Recording \(on page 431\)](#).

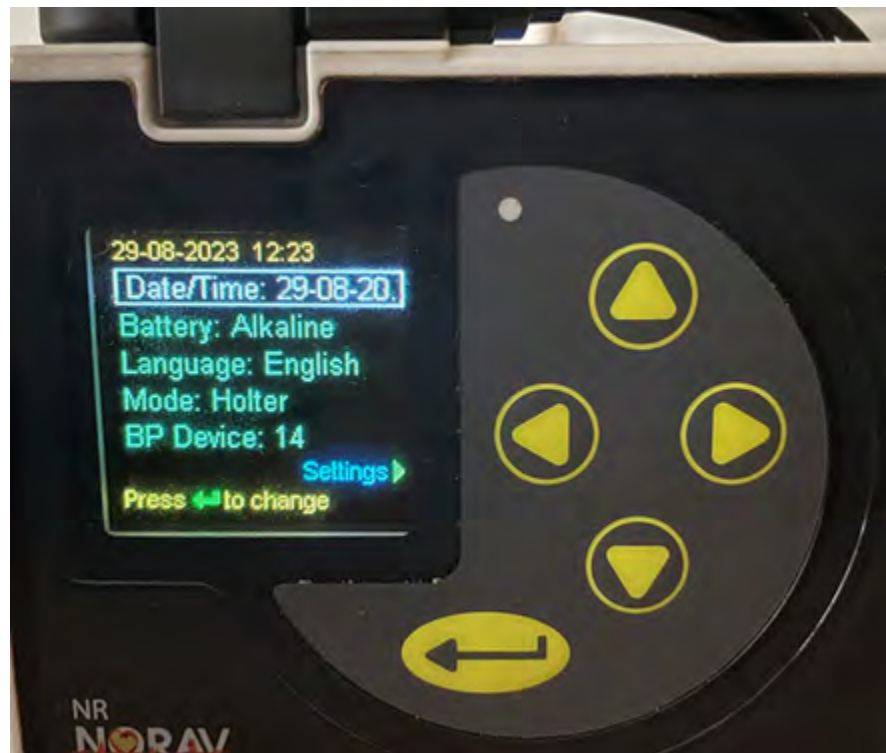
## Initiating Recording

After you have prepared the **Recorder**, entered the patient information, adjusted the recorder settings, and uploaded them to the **Recorder**, you are now ready to initiate the recording.

To initiate the recording, follow the steps below, depending on the method (connection type) you have used to prepare the **Recorder**:

- If you have prepared your **Recorder** using USB:
  1. Disconnect the **Recorder** from the USB port of the computer.
  2. Detach the USB cable from the **Recorder**.
  3. Connect the ECG cable of the previously prepared patient to the **Recorder**.
  4. Insert a **new** battery into the **Recorder**, and turn it **ON**. We recommend using new batteries of the appropriate type for every Holter test.
  5. Make sure the **Recorder** screen is turned **ON**: the screen should activate.

Figure 605. Initiating Recording - Verifying Recorder



**Note:**

In the figure above you can see an example of a live screen on a Norav NR-1207-3 Recorder. It may look different for other models.

- If you have prepared your **Recorder** using a **Memory Card Reader**:
  1. Remove the **Memory Card** from the card reader.
  2. Insert the **Memory Card** into the recorder of the prepared patient.
  3. Insert a **new** battery into the **Recorder**, and turn it **ON**. We recommend using new batteries of the appropriate type for every Holter test.
  4. Make sure the **Recorder** screen is turned **ON**: the screen should activate.
- If you have prepared your **Recorder** using a **Bluetooth** connection, you may use the **Auto start delay** feature.
- If you are using the **NR-314P Recorder**, use the **Auto start delay** feature, or:
  1. **(Optional)** Detach the device from the docking station, if applicable.

After completing the steps above, you are ready to proceed to [Verifying Recorder Data \(on page 433\)](#).

## Verifying Recorder Data

After you have initiated the recording, you need to **Verify Recorder Data**. Generally, you should confirm whether the patient data and settings uploaded to the **Recorder** are accurate. For a comprehensive description of how to set up and operate a certain **Recorder** model, refer to the appropriate recorder manual. In this section, you will find the essence of this step on how to prepare for Holter recording.

To verify the recorder data, follow the steps below:

1. Confirm whether the data displayed on the recorder screen is correct, and modify it if necessary. Review the data uploaded to the **Recorder**, such as patient information, recording duration limit, internal clock settings, and pacemaker detection, among others. Refer to the [Entering Patient Information \(on page 420\)](#) and [Adjusting Recorder Settings \(on page 421\)](#) sections to understand which parameters you have set up and uploaded to the Recorder, if needed.

Figure 606. Verifying Recorder Data - Verifying Data and Settings



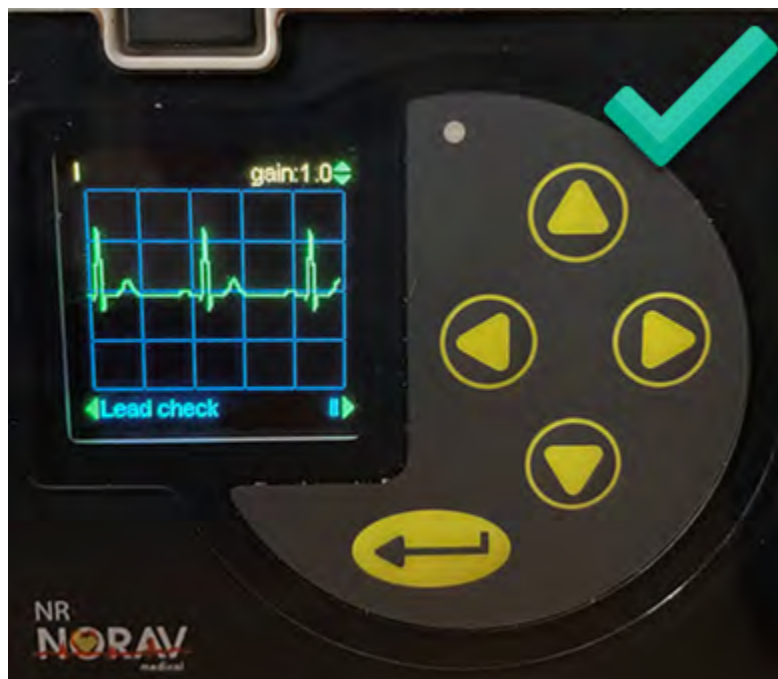
2. Validate the quality of lead connections displayed on the recorder screen. If you see green dots near the lead pictograms on the recorder screen (as shown in the right part of the example figure below), the lead connections are active and functional. If you see a message labeled **OFF** near a lead pictogram on the recorder screen (also shown in the right part of the example figure below), inspect the lead connection and resolve any issues.

Figure 607. Verifying Recorder Data - Verifying Leads Connection



3. Assess the quality of the ECG traces displayed on the recorder screen. The waveform on the recorder screen should exhibit appropriate morphology (as shown in the example figure below). If you see a blank or wavy line on the screen, or unusual distortion, you may need to adjust the electrodes, reposition the recorder, or take other corrective actions to improve the signal quality.

Figure 608. Verifying Recorder Data - Verifying ECG Signal



After completing the steps above, you are ready to proceed to [Starting Recording \(on page 435\)](#).

## Starting Recording

Before this step of **Preparing for Holter Recording**, you must complete all the previous steps: prepare the **Recorder**, enter the patient information, adjust the recorder settings, upload them to the **Recorder**, initiate the recording, and verify the recorder data. Now, you are ready to start the Holter recording.

**To start the Holter recording, use the Auto start delay feature, or:**

1. Press the **Enter** button on the **Recorder** device. For more details specific to a particular **Recorder** model, refer to the relevant recorder manual.

Figure 609. Start Recording - "Enter" Button (example)



If you are using the **NR-314P Recorder**, use the **Auto start delay** feature, or:

1. **(Optional)** Detach the device from the docking station, if applicable.
2. Press the sole **Enter** button for 3 seconds, until the **LED** indicator starts flashing slowly. Release the button.
3. Recording will start after 30 seconds, and the **LED** indicator will turn **OFF** after 60 seconds.



### Note:

Norav Recorder devices also offer an **Autostart Recording (on page 422)** function. If you forget to start the recording, it will start automatically within a set period of time (approximately several minutes) if you have completed all the previous steps. For more details specific to a particular **Recorder** model, refer to the relevant recorder manual.

After you have started the recording, instruct the patient on how to follow the test procedure and answer any questions they may have. You may then discharge the patient. Remind the patient to return the recorder to the clinic or hospital on time. By following these instructions, you help ensure the accuracy of the Holter recording and the best possible care for the patient.



## Chapter 6. Downloading Holter Recording Data

Before a Holter recording can be analyzed, the recorded data must be downloaded from the **Memory Card** or directly from the **Recorder** via USB. The **Record** cannot be downloaded via Bluetooth. Once the data has been downloaded, the **Memory Card** can be reused for the next recording.

When a patient returns to the physician's office after a set period of time (24-366 hours) when the Holter monitoring procedure is supposed to be finished, check if the recorder has been turned off automatically. If not, follow the procedure in the specific **Recorder** operating manual to terminate the recording and to prevent the recording of artifacts.



### Note:

The **NR-314P** device model supports recording downloads only via **USB** connection due to the large file sizes of **Holter Record** files. You need to connect the device to the docking station. Once connected, follow the general download workflow explained further to complete the **Record** file download.



### Note:

You need to terminate the recording before downloading the data to prevent potential data loss or distortion.

To download the Holter recording data, follow these steps:

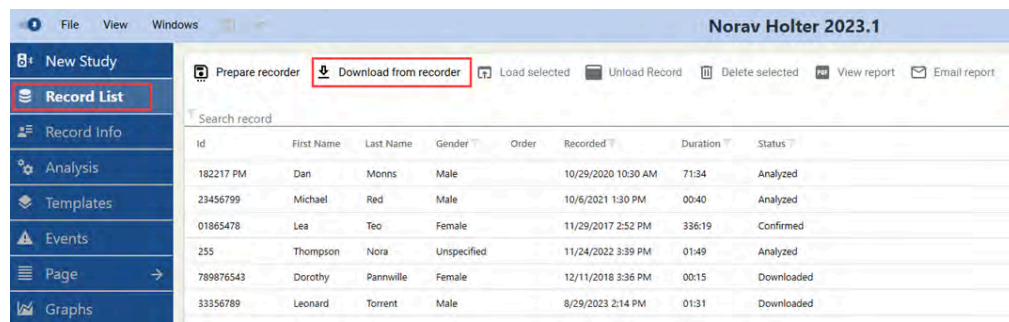
1. Double-click the **Norav Holter** icon on your desktop to launch the NH-301 analysis system.

Figure 610. Norav Holter Icon



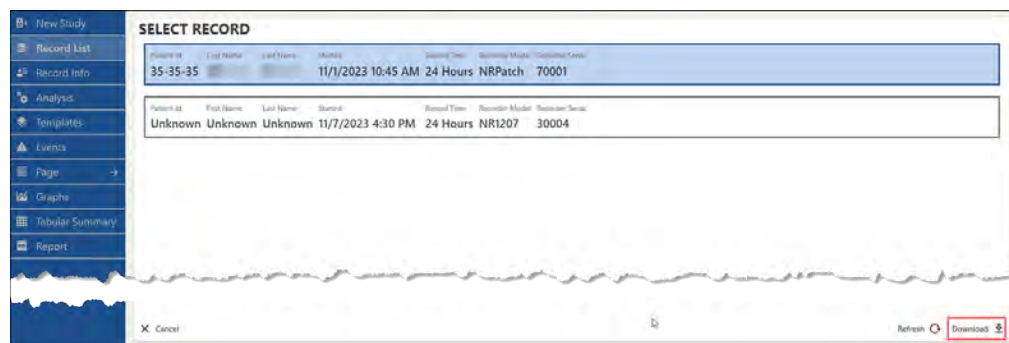
2. You will see the **Record List View**. It allows you either to **import** an existing recording from the hard drive of your computer or your local network, or **download** a record from a Recorder using Memory Card or USB connection. If you need to **import** a record, refer to the [Menu Bar section \(on page 55\)](#) for more details. To **download** a record, proceed to the next Step.
3. Click the **Download from recorder** button on the top toolbar. The **Select Record** window will appear.

Figure 611. Downloading Recording Data - Download from recorder



4. Select and double-click **one** record to download. Alternatively, click the **Download** button in the bottom right corner. Note that you can select **only one record** at a time.

Figure 612. Downloading Recording Data - Download Record



If you have connected additional **Recorders** or disconnected some of those previously plugged in, click **Refresh** in the bottom right corner to update the accessible records list.

5. The **Patient Information** window will appear. Validate and modify the patient's information if needed; refer to [Step 3 in the Menu Bar section \(on page 55\)](#) for instructions on how to modify the patient's data.

**Note:**

To ensure accurate software analysis of the pacemaker's performance, it's crucial to configure the pacemaker parameters to match the specific settings of the patient's implanted device.

6. Click **Proceed** in the bottom right corner to finish downloading the record. A "Downloading..." progress bar will appear. If only one record was recognized, the download is complete and the **Records List View** will be displayed. Otherwise, a list of records will be displayed for selection once more.

Figure 613. Downloading Recording Data - Click Proceed

The screenshot shows the 'Norav Holter 2023.1' software interface. On the left is a sidebar with navigation options: New Study, Record List, Record Info, Analysis, Templates, Events, Page, Graphs, Tabular Summary, and Report. The main area is divided into several sections: PERSONAL INFORMATION (Age: 35-35-35, Gender: Male, Birth date, etc.), RECORD INFORMATION (Clinic, Hookup Technician, etc.), MEDICATIONS, INDICATIONS, and SCANNING CRITERIA (Recording Rate: 100 bpm, Recording Interval: 300 ms). At the bottom, there is a 'Download Record' button highlighted with a red box, and a 'Proceed' button with a checkmark.

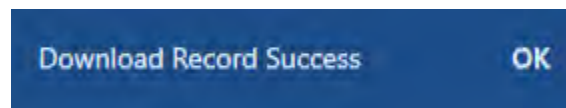
7. You will be prompted with the **Remove Record** dialog box. If you wish to remove the downloaded **Record** from the device (memory card), click **Yes**. Otherwise, click **No**.

Figure 614. Downloading Recorder Data - Remove Record



If the **Record** was downloaded successfully you will see a confirmation message as shown below. After that you may start [analyzing the ECG Data \(on page 97\)](#).

Figure 615. Downloading Recording Data - Success Confirmation



# Chapter 7. Recommended Workflow Options

The previous chapters have detailed the analysis process and features and how you can tailor it to your requirements. In this **Chapter** we will overview of the various options for editing analysis results, concluding with steps to generate a printed report that incorporates your personal findings.

## Standard Workflow Overview

Here, we will cover the procedure for conducting the analysis, reviewing beat Templates and Events, and how to set up and generate the final Report. The Norav NH-301 Holter analysis system offers a simple and streamlined workflow. To commence the Analysis and deliver a comprehensive report, follow the general top-down logic of the Views Sidebar on the left side of the screen. For more details on how to complete each step, please refer to the [Views section \(on page 68\)](#) and its respective subsections.

### Step 1. Launching Analysis

Before initiating analysis, ensure a Record is loaded, define the start and end points, and adjust the necessary parameters:

1. Load your target Record in the [Record List View \(on page 82\)](#) by double-clicking it or using the Load Selected button.
2. If needed, update patient data in the Record Info View.
3. Access the [Analysis View \(on page 97\)](#).
4. Assess the ECG signal on the first page. If it's abnormal, use the "Page Down" button in the Action Bar at the bottom and switch between Channels to find a clear signal.
5. Right-click to access the context menu and select "Mark as start of analysis," or use the corresponding button in the Action Bar to mark the Start of Analysis.
6. Navigate to the Final Page using the "Final Page" button in the Action Bar. If noise is present, use "Page Up" and alternate Channels to locate a clear signal.
7. Mark the clear signal as the end point for the analysis.
8. **(Optional)** Include or Exclude Segments:
  - To exclude, right-click and drag over the interval, selecting "Exclude from analysis" from the context menu or Action Bar.
  - To re-include a segment, right-click within the excluded area, drag to the required position, and select "Include to analysis."
9. Adjust Channels, Heart Rate Range, Pause Duration, Pacemaker settings, and other parameters in the right control boxes if necessary.

10. **(Optional)** Clear marked segments at any time using the context menu or Action Bar.
11. Click START to begin the analysis.

## Step 2. Editing Templates

Post-analysis, proceed to edit beat Templates:

1. Click the [Templates View \(on page 107\)](#) on the left to assess algorithm decisions on heartbeat shapes.
2. Select Overlay All Beats for each template to identify those requiring collective or individual edits.
3. Check annotations of the templates that can be handled as a whole and reclassify them if necessary. It's recommended to begin with V templates, proceed with F, and then S. Use the Scale and Gain sliders located at the top right to display more details of the beat morphologies
4. Enter template beat editing mode by double-clicking the relevant template box or right-clicking and choosing Edit Template.
5. To delete beats:
  - Click the Delete button in the top toolbar and right-click the beats you want to delete.
  - Alternatively, use the Select All button, Ctrl+Click, or Shift+Click to select beats first, then click Delete to mark them as deleted
6. Click Apply in the top left corner to save changes.

## Step 3. Reviewing Events

After editing Templates, proceed to review Events.

1. Click the [Events View \(on page 199\)](#) on the left.
2. Select the Maximum RR event from the Event Type List. The first occurrence will be displayed in the RR-trend, ECG Strip, and Page pane at the bottom (depending on the View layout).
3. Drag to select and exclude incorrect segments with an Event that appears incorrect in the RR-trend, ECG Strip, or Page pane.
4. After deleting all incorrect Events, right-click the desired event in the middle pane and select Set as Selected to include it in the final Report.
5. Select Atrial Fibrillation events from the Event Type List, if present.
6. Review and delete any incorrect Atrial Fibrillation events.
7. If remaining, navigate through these events in the middle pane:

- Right-click on the corresponding ECG Strip or Page segment to open the context menu.
  - Choose Change Beats Annotation to access the annotation pane.
  - Reclassify using N annotation.
8. **(Optional)** To add Atrial Fibrillation events if necessary: Use Trends, ECG Strip, or Page pane - right-click, drag, and select Create User Event, then Atrial Fibrillation from the context menu.
9. **(Optional)** To print an ECG segment if needed:
- Click the start point.
  - Press and hold Shift.
  - Scroll to the desired endpoint using control buttons in the toolbar on top or a scrollbar at the bottom.
  - Click the desired endpoint.
  - Click the Print icon.

#### Step 4. Scanning ECG Page Data

Before generating the final report, you may review the results in other Views: Page, Graphs, or Tabular Summary. The [Page View \(on page 283\)](#) displays complete ECG data, allowing you to scan the entire recording and add user Events if needed.

1. Use navigation buttons at the top left to quickly navigate through the entire ECG recording for review.
2. Click to select a beat or right-click and drag to select a segment of the ECG recording.
3. Add user Events, delete beats, exclude noisy intervals, or print ECG samples if necessary.

#### Step 5. Reviewing Graphs

[Graphs View \(on page 338\)](#): Allows you to examine HRV analysis results and preview ST trends. The lower panel displays a detailed ECG Strip for previewing and scanning ECG traces, event creation, beat management, and printing.

#### Step 6. Reviewing Tabular Summary

[Tabular Summary \(on page 377\)](#): Displays an Hourly Tabular Report of all detected arrhythmias, useful for contextualizing specific conditions for their appearance. The Summary may include a Pacemaker Report. You can export it to PDF or Excel.



## Step 7. Generating and Confirming Report

After completing all necessary steps, generate, review, and confirm your Report.

1. Click the [Report View \(on page 382\)](#).
2. Toggle ON/OFF the desired report sections using control boxes on the right. Manage sections such as Summary and Conclusion; Events; Charts; Full Disclosure, and more.
3. Click [Generate Report \(on page 391\)](#).
4. Once the report is generated, review it and fill in the Conclusion.
5. Finalize by clicking Confirm Report.

## Perfectionist Workflow Overview

Here, we will cover the procedure for conducting the analysis, reviewing beat Templates and Events, and how to set up and generate the final Report. The Norav NH-301 Holter analysis system offers a simple and streamlined workflow. To commence the Analysis and deliver a comprehensive report, follow the general top-down logic of the Views Sidebar on the left side of the screen. For more details on how to complete each step, please refer to the [Views section \(on page 68\)](#) and its respective subsections.

### Step 1. Configuring Algorithm Settings

Before initiating analysis, you need to configure the algorithm sensitivity:

1. Navigate to [File Menu > Settings > Algorithm \(on page 24\)](#).
2. Set the Templates Sensitivity parameters:
  - a. For V-type annotations = 3.
  - b. For all other annotation types = 1.

### Step 2. Launching Analysis

Before initiating analysis, ensure a Record is loaded, define the start and end points, and adjust the necessary parameters:

1. Load your target Record in the [Record List View \(on page 82\)](#) by double-clicking it or using the Load Selected button.
2. If needed, update patient data in the Record Info View.
3. Access the [Analysis View \(on page 97\)](#).
4. Assess the ECG signal on the first page. If it's abnormal, use the "Page Down" button in the Action Bar at the bottom and switch between Channels to find a clear signal.

5. Right-click to access the context menu and select "Mark as start of analysis," or use the corresponding button in the Action Bar to mark the Start of Analysis.
6. Navigate to the Final Page using the "Final Page" button in the Action Bar. If noise is present, use "Page Up" and alternate Channels to locate a clear signal.
7. Mark the clear signal as the end point for the analysis.
8. **(Optional)** Include or Exclude Segments:
  - To exclude, right-click and drag over the interval, selecting "Exclude from analysis" from the context menu or Action Bar.
  - To re-include a segment, right-click within the excluded area, drag to the required position, and select "Include to analysis."
9. Adjust Channels, Heart Rate Range, Pause Duration, Pacemaker settings, and other parameters in the right control boxes if necessary.
10. **(Optional)** Clear marked segments at any time using the context menu or Action Bar.
11. Click START to begin the analysis.

## Step 2. Editing RR-type Events

Upon completion of the analysis, click the [Events View \(on page 199\)](#).

1. Select Maximum RR from the Event Type list (or use any other means to ensure the RR-trend and the ECG strip are displayed).
2. Using the RR-trend and the ECG strip, select regions to be excluded from analysis

## Step 3. Editing Templates

Proceed to the Templates View to review the algorithm's decisions about the heartbeats' shapes but not the decisions about their prematurity i.e., reviewing whether heartbeats annotated as N and S really have normal shapes and whether heartbeats annotated as V and F really have abnormal shapes. At this stage, there is no need to review whether heartbeats annotated as S are really premature, which is done later (after AFib events are reviewed).

1. Click the [Templates View \(on page 107\)](#) on the left to assess algorithm decisions on heartbeat shapes.
2. Use the Scale slider at the top right of the page to set the paper speed for the template boxes to 100 mm/s, since this setting allows displaying more details of the beat morphologies.
3. Select Overlay All Beats for each template to identify those requiring collective or individual edits.
4. Check annotations of the templates that can be handled as a whole and reclassify them if necessary. It's recommended to begin with V templates, proceed with F, and then S. Use the Scale and Gain sliders located at the top right to display more details of the beat morphologies

5. Enter template beat editing mode by double-clicking the relevant template box or right-clicking and choosing Edit Template.
6. To delete beats:
  - Click the Delete button in the top toolbar and right-click the beats you want to delete.
  - Alternatively, use the Select All button, Ctrl+Click, or Shift+Click to select beats first, then click Delete to mark them as deleted
7. Click Apply in the top left corner to save changes.

## Step 4. Reviewing Events

After editing Templates, proceed to review Events.

1. Click the [Events View \(on page 199\)](#) on the left.
2. Select Atrial Fibrillation events from the Event Type List, if present.
3. Review and delete any incorrect Atrial Fibrillation events.
4. If remaining, navigate through these events in the middle pane:
  - Right-click on the corresponding ECG Strip or Page segment to open the context menu.
  - Choose Change Beats Annotation to access the annotation pane.
  - Reclassify using N annotation.
5. **(Optional)** To add Atrial Fibrillation events if necessary: Use Trends, ECG Strip, or Page pane - right-click, drag, and select Create User Event, then Atrial Fibrillation from the context menu.

## Step 5. Reviewing Prematurity Templates

Click the Templates View to review the algorithm's decisions about the prematurity of the heartbeats.

1. Click the [Templates View \(on page 107\)](#) on the left to assess the algorithm's decisions about the prematurity of the heartbeats.
2. Use the Scale slider at the top right of the page to set the paper speed for the template boxes to 100 mm/s, since this setting allows displaying more details of the beat morphologies.
3. Enter template beat editing mode by double-clicking the relevant template box or right-clicking and choosing Edit Template.
4. To delete beats:

- Click the Delete button in the top toolbar and right-click the beats you want to delete.
  - Alternatively, use the Select All button, Ctrl+Click, or Shift+Click to select beats first, then click Delete to mark them as deleted
5. Click Apply in the top left corner to save changes.

## Step 6. Editing Events

After reviewing Templates, proceed to Events.

1. Click the [Events View \(on page 199\)](#) on the left.
2. Examine Example Strips for various arrhythmia types.
3. Review and delete incorrect Events.
4. If needed, mark (select) Example Strips of various arrhythmia types to include in the Report.

## Step 7. Scanning ECG Page Data

Before generating the final report, you may review the results in other Views: Page, Graphs, or Tabular Summary. The [Page View \(on page 283\)](#) displays complete ECG data, allowing you to scan the entire recording and add user Events if needed.

1. Use navigation buttons at the top left to quickly navigate through the entire ECG recording for review.
2. Click to select a beat or right-click and drag to select a segment of the ECG recording.
3. Add user Events, delete beats, exclude noisy intervals, or print ECG samples if necessary.

## Step 8. Reviewing Graphs

[Graphs View \(on page 338\)](#): Allows you to examine HRV analysis results and preview ST trends. The lower panel displays a detailed ECG Strip for previewing and scanning ECG traces, event creation, beat management, and printing.

## Step 9. Reviewing Tabular Summary

[Tabular Summary \(on page 377\)](#): Displays an Hourly Tabular Report of all detected arrhythmias, useful for contextualizing specific conditions for their appearance. The Summary may include a Pacemaker Report. You can export it to PDF or Excel.

## Step 10. Generating and Confirming Report

After completing all necessary steps, generate, review, and confirm your Report.

1. Click the [Report View \(on page 382\)](#).
2. Toggle ON/OFF the desired report sections using control boxes on the right. Manage sections such as Summary and Conclusion; Events; Charts; Full Disclosure, and more.
3. Click [Generate Report \(on page 391\)](#).
4. Once the report is generated, review it and fill in the Conclusion.
5. Finalize by clicking Confirm Report.

## Workflow Clarifications and Explanations

In both workflows, no selection of channels for analysis is done. This is because the algorithm estimates the usefulness of each channel at a specific time and acts accordingly. In the absolute majority of records, this leads to an additional channel being beneficial for the analysis even if it has a low-quality signal.

In the Standard workflow in the Analysis View, all regions are included in the analysis and the start and end of analysis are not selected. This is because excluding regions from the analysis after the analysis is completed (RR-trend) is faster and easier, and there is no advantage in doing so before the analysis.

Unlike in the Standard workflow, in the Perfectionist workflow, the endpoint for analysis is selected. This is because the algorithm slows as the result of the combination of both templates being enabled for annotations of type N, X, or P, and many hours with no channels having any ECG (detached electrodes).

When both conditions occur, the algorithm attempts to find similar shapes where no such similarities can be found. Relatively short periods (up to tens of minutes) where no channels have ECG, do not create such a problem, and if at least one of the channels has ECG, the problem does not exist either. Such a long period without ECG on any of the channels can exist only at the end of a record. Thus, if template sensitivity is enabled for annotations of any of the types N, X, or P, the end of the record should be examined, and the end of the analysis should be selected.

When SVEs are excluded from Atrial Fibrillation events either manually or automatically, all the beats previously annotated as S are placed in the same template, and shape-similarity information is not retained.

Thus, the review of the heartbeat shapes should be done before any SVEs are excluded from Atrial Fibrillation (but after bad ECG regions were excluded from the analysis).

However, the review of heartbeats prematurity should be performed after SVEs are excluded from Atrial Fibrillation. This is why the perfectionist workflow has multiple switches between the Events and the Templates Views.

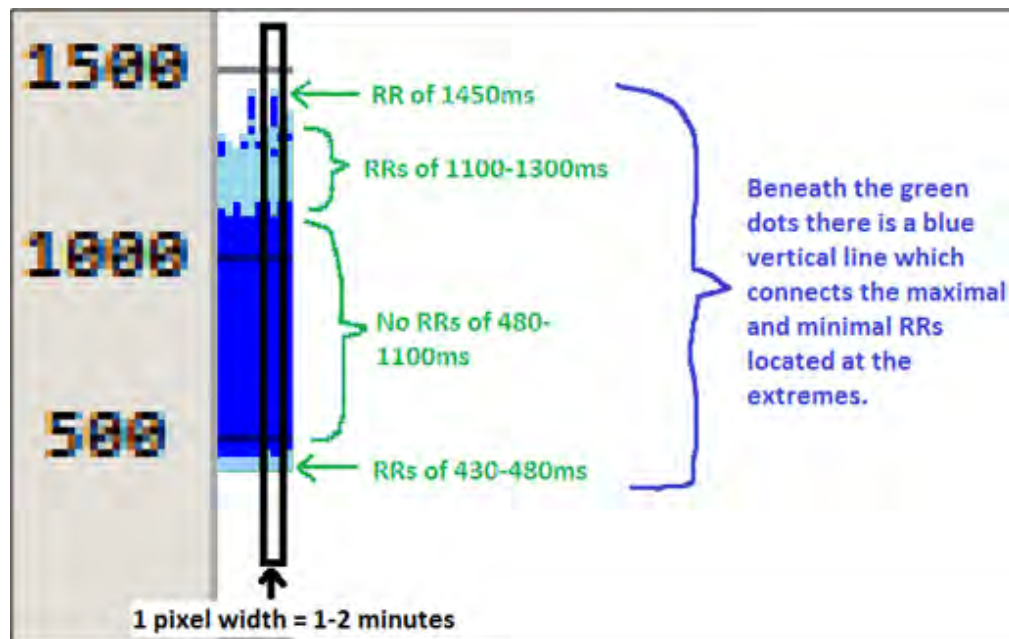


## Chapter 8. Appendix A: Overview and Utilization of RR Trend Visualizations

The RR trend consists of blue vertical lines with light-blue dots on top of them. Each vertical line of pixels shows information regarding 1 to 2 minutes of the record:

- The blue lines represent the connection between the maximal and minimal RRs within the 1 to 2-minute intervals.
- For each RR interval within 1-2 minutes, there is a light-blue dot at the height representing the interval duration. Frequently, there are various RR intervals with close values, resulting in many light-blue dots included in the same pixel (i.e., one light-blue pixel can represent multiple RR intervals).

Figure 616. RR Trend - RR Trend



The RR trend also includes three additional vertical lines.

- Green thick line – maximum RR event
- Red thick line – minimum RR event
- Red thin line – current ECG marker

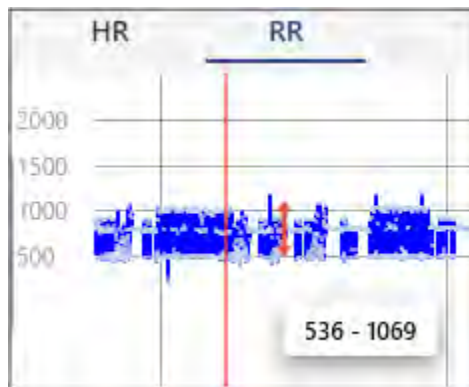
Figure 617. RR Trend - ECG Markers



While hovering over the RR trend, the mouse pointer is accompanied by a vertical red line with red circles at its ends. This line highlights the 1-2 minute period where the mouse pointer is, and the circles denote the minimal and maximal RR in this period.

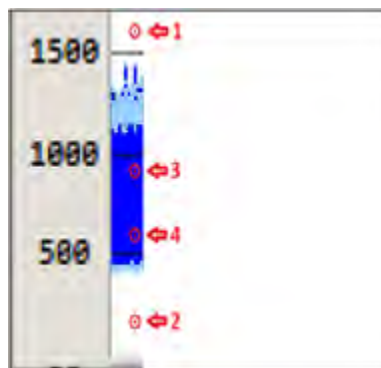
Moreover, the actual values of minimal and maximal RRs are shown below in milliseconds.

Figure 618. Trend - RR Values



Clicking the mouse on the RR trend moves the current ECG of the Event Tab to show a location inside the 1-2 minute period corresponding to the column where the mouse was clicked. The height at which the mouse is clicked is significant since it determines the specific location inside that 1-2 minute period displayed. The shown location is the RR location closest to the height at which the mouse was clicked. When clicked above the blue line, the maximal RR is displayed and if clicked below the blue line the minimal RR is displayed during the 1-2 minute period.

Figure 619. RR Trend - Min and Max RR

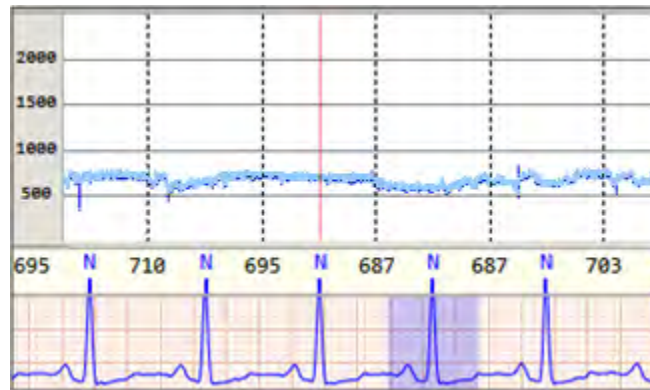


1. Shows maximal RR within the 1-2 minute period (1450 ms)
2. Shows minimal RR within the 1-2 minute period (420 ms)
3. Shows RR of 1120 ms, which is the shortest RR among RRs longer than 1000 ms. Explanation: The mouse was clicked in an area without RRs (blue pixel, not light-blue), so the RR displayed is either the longest RR below the height of mouse click (450 ms) or the shortest RR above the mouse click (1120 ms). Since the mouse click is closer to the latter than the former, the RR of 1120 ms is displayed.
4. Shows RR of 450 ms, which is the longest RR among RRs shorter than 500 ms. Explanation: The mouse was clicked in an area without RRs (blue pixel, not light-blue), so the RR displayed is either

the longest RR below the height of mouse click (450 ms) or the shortest RR above the mouse click (1120 ms). Since the mouse click is closer to the former than the latter, the RR of 450 ms is displayed.

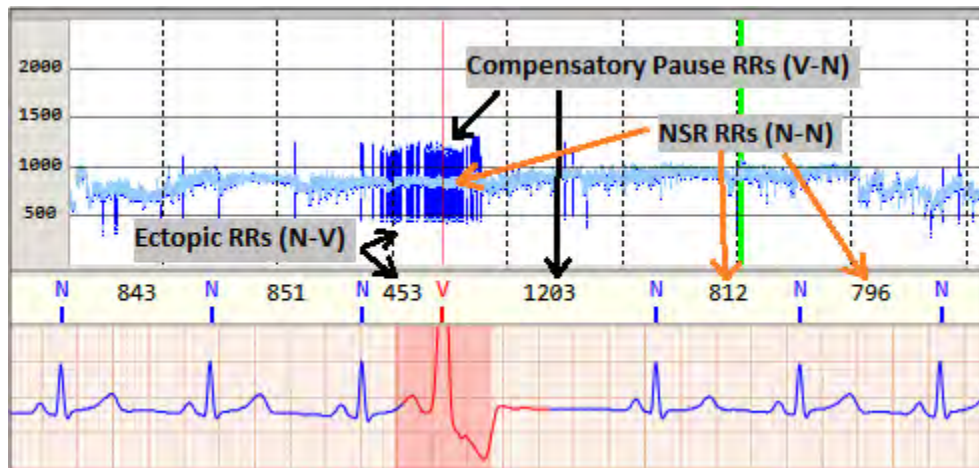
## RR Trend Examples

### Normal Sinus Rhythm (NSR)



### NSR with VPBs

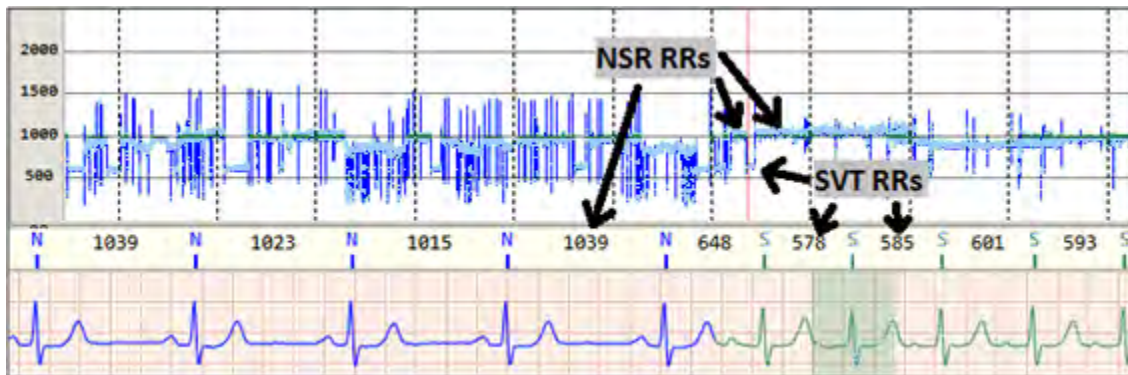
1. Lower Line – Ectopic RR (N-V)
2. Upper Line – Compensatory Pause RR (V-N)
3. Middle Line – NSR RR (N-N)



### Sustained Supraventricular Tachycardia (SVT)

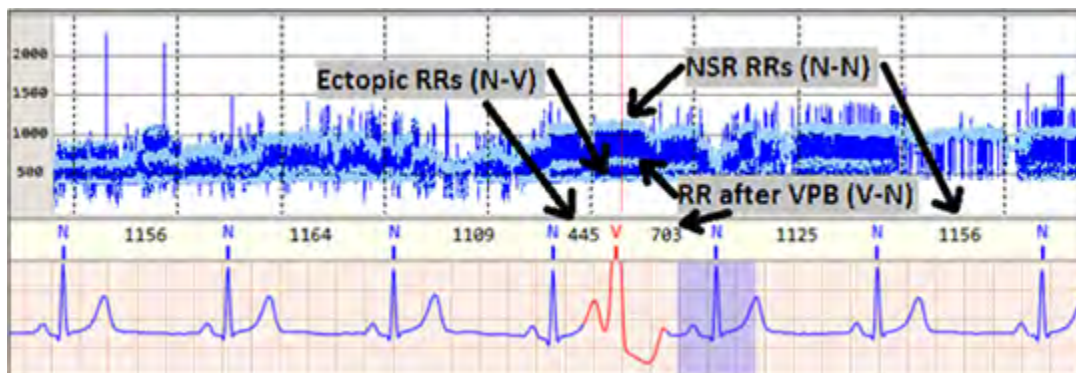


1. Upper light-blue line – NSR RRs
2. Depressed light-blue line – SVT RRs



### NSR with VPBs without Compensatory Pause

1. Upper light-blue line – NSR (N-N)
2. Lower light-blue line – Ectopic RRs (N-V)
3. Middle light-blue line – RR after VPB (V-N)



### Ventricular Bigeminy

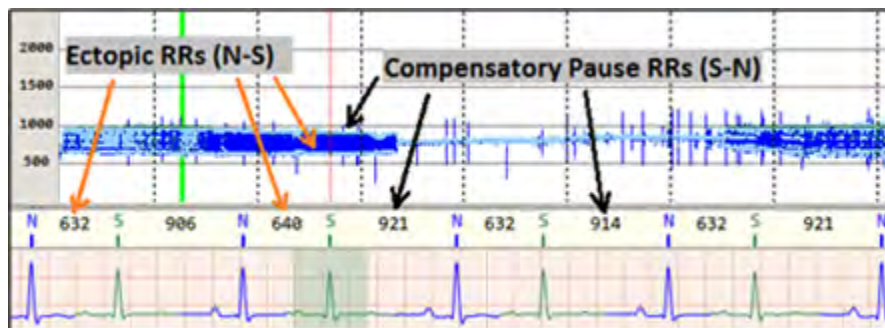
1. Lower light-blue line – Ectopic RRs (N-V)
2. Upper light-blue line – Compensatory Pause RRs (V-N)



Mouse Click On	Display
White area below lower light-blue line	Shortest Ectopic RR (N-V)
Lower part of blue area	Longest Ectopic RR (N-V)
White area above upper light-blue line	Longest Compensatory Pause (V-N)
Upper part of blue area	Shortest Compensatory Pause (V-N)

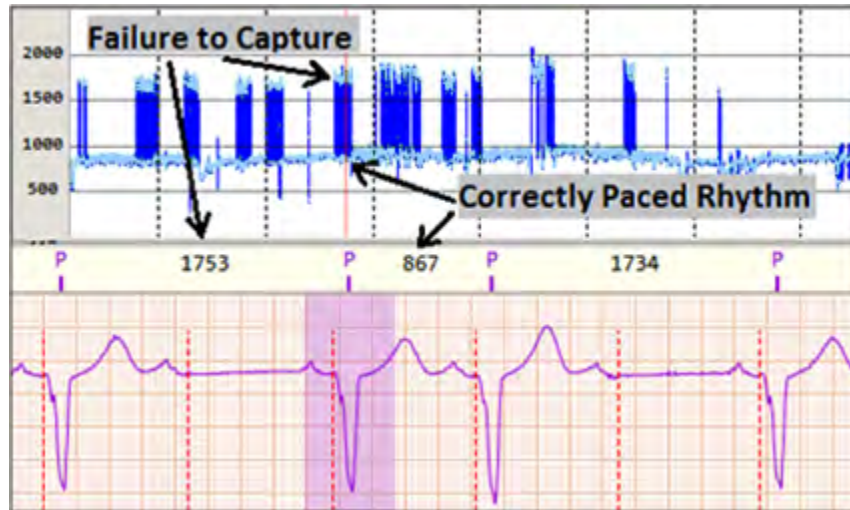
## Supraventricular Bigeminy

- Lower light-blue line – Ectopic RRs (N-S)
- Upper light-blue line – Compensatory Pause RRs (S-N)



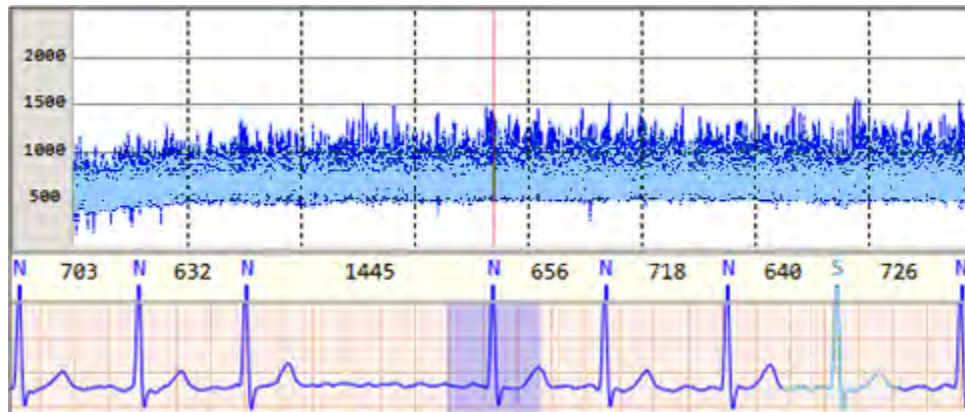
## Pacemaker Failure to Capture





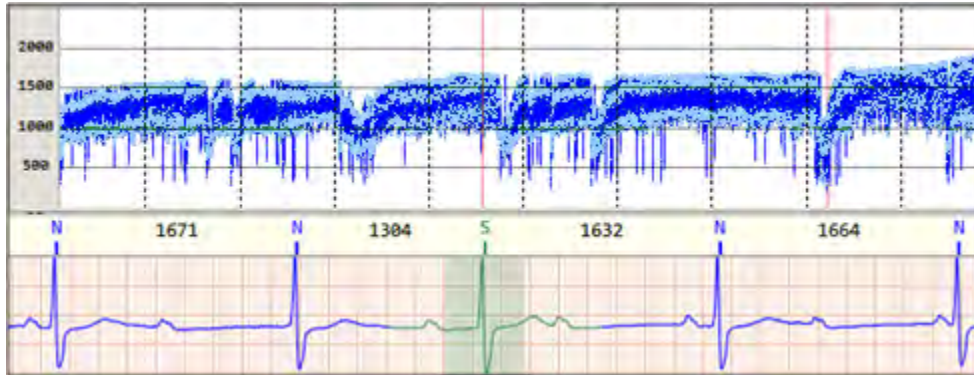
## Atrial Fibrillation

See wide light-blue ribbon.



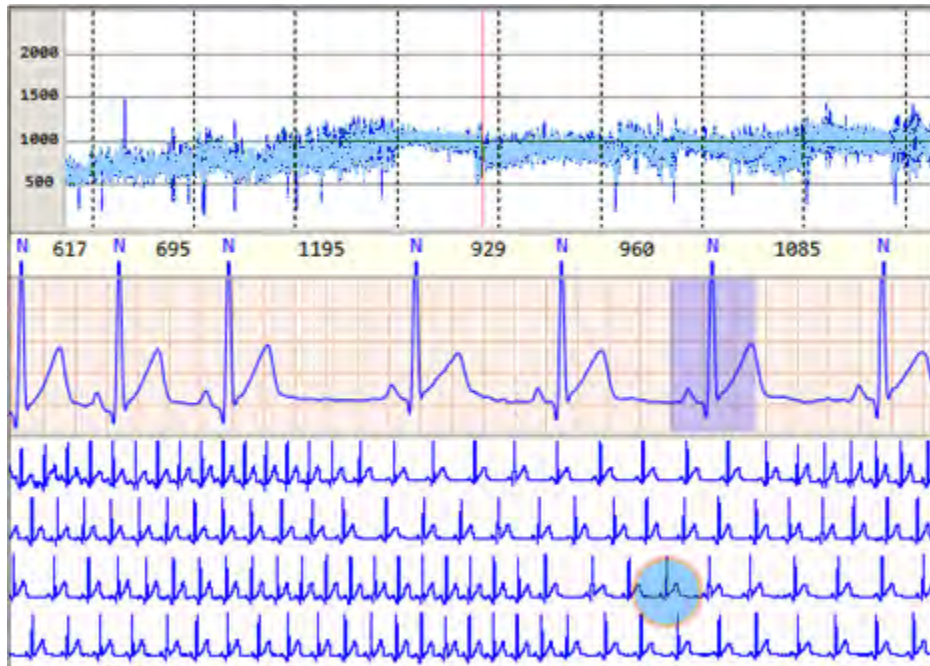
## Wenkebach (Mobitz I)

In figure below at the immediate vicinity of the red thin line, the RR-trend looks very similar to Atrial Fibrillation and other events, thus when the RR trend appears like a wide light-blue ribbon, the strip and page should be also consulted to differentiate between the different possibilities.



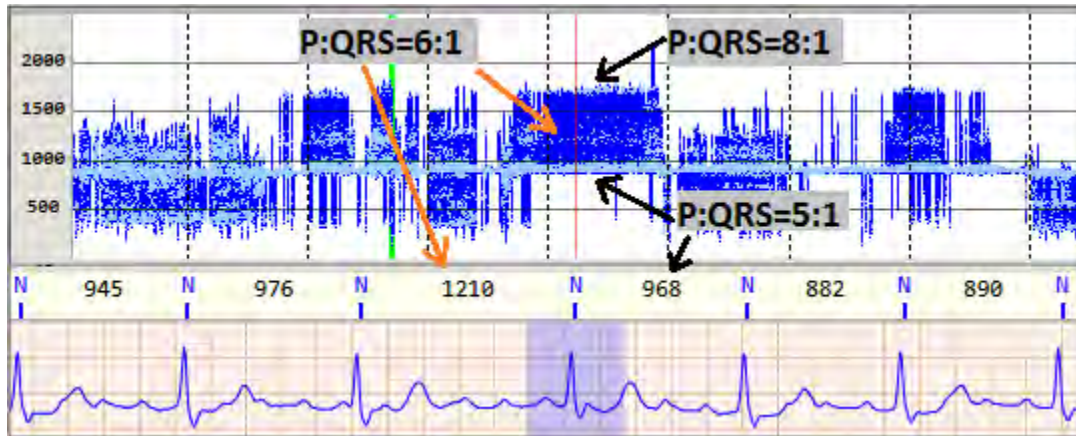
## Sick Sinus Syndrome

Wide light-blue ribbon – the RR trend may look similar to that of Atrial Fibrillation and other events, thus when the RR trend appears like a wide light-blue ribbon, the strip and page should also be consulted.

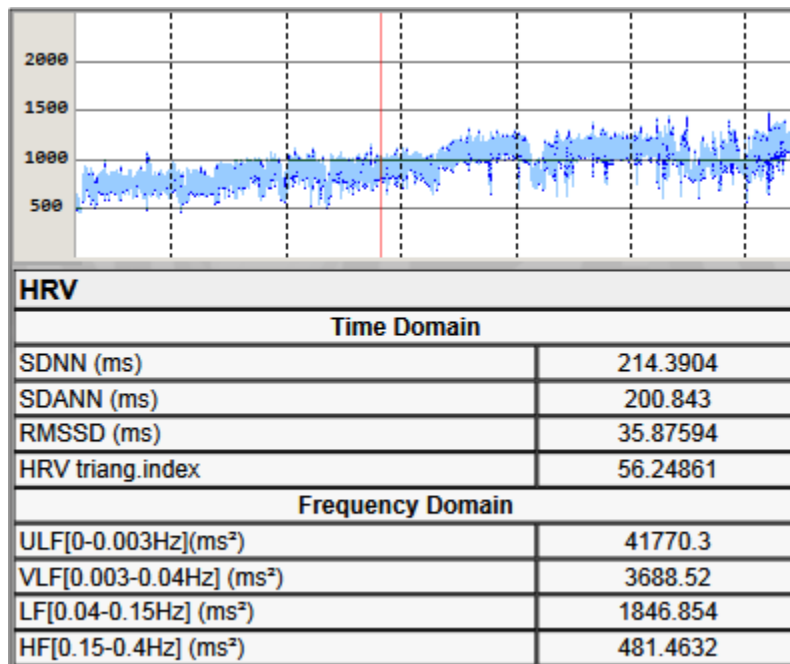


## Atrial Flutter

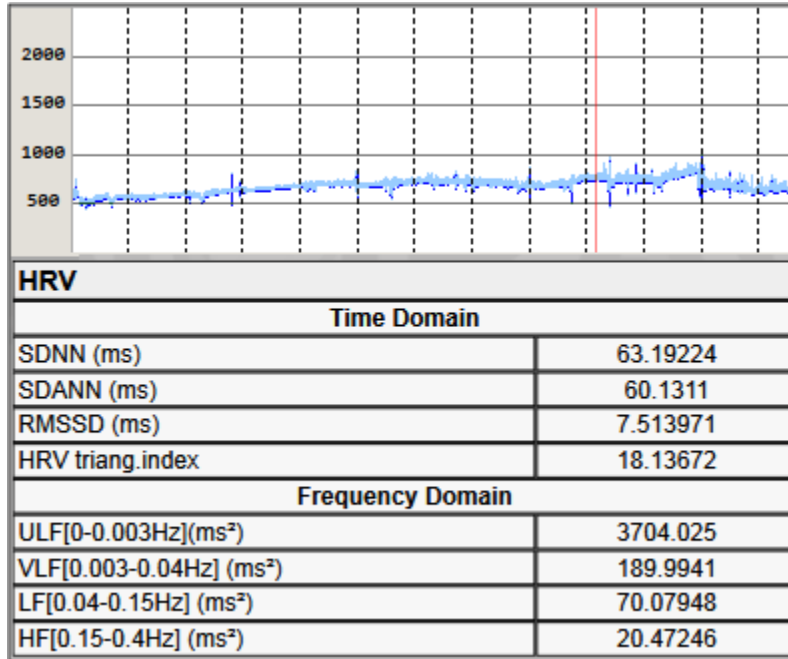
Different horizontal light-blue lines correspond to different P:R ratios.



NSR with High HRV



NSR with Low HRV



## Chapter 9. Appendix B: Holter Monitoring Patient Diary Form

This is one of the recommended Holter Monitor Patient Diary Forms you may use for Holter monitoring.

<b>Institution:</b>					
<b>Referring Physician:</b>					
<b>Patient Name:</b>					
<b>Date of Birth:</b>		<b>Gender:</b>		<b>MRN:</b>	
<b>Recording Period:</b>		<b>Hours</b>	<b>from:</b>		<b>to:</b>
<b>Recorder:</b>				<b>Connected by:</b>	

Dear patient,

While you are being monitored by a Holter monitor, it is essential to keep an accurate diary of your activities and symptoms during the test. Note in your diary the time of day any symptoms such as chest pain, shortness of breath, uneven heartbeats, or dizziness began, and what you were doing. Your diary will be compared to the changes in your ECG recorded by the Holter monitor.

Remember that your physician needs a complete picture of your activities. If in doubt, write it down.

Use the following diary to record all of your daily activities:

- Time of day – Write the time for every activity or symptom that you note in the diary.
- Your symptoms – Include any chest pain, back pain, dizziness, nausea, etc., whether or not you feel they are significant.
- Your activities – Document activities such as sitting, walking, strenuous exercise, eating, sexual activity, taking medications, etc.

Date	Time	Symptoms	Activity
			I



# Chapter 10. Appendix C: Patients-Related Instructions

**Note:**

The physician is responsible for providing the patient with the following information required for a safe and effective ECG recording.

## Patient Safety Cautions

**CAUTION:**

- Notify the physician if skin problems develop. In rare cases, even when using biocompatible electrodes, allergic reactions may occur.
- Do not expose the recorder to water in adverse weather or by taking a bath.
- Keep the recorder inside its pouch and wear it under a coat in adverse weather. Excessive humidity can damage parts of the recorder.
- Do not expose the recorder to extreme temperatures. In hot climates, stay in temperature-controlled environments as much as possible. In cold climates, wear the recorder under outer garments.
- Do not excessively bend or wrap the ECG cable around the recorder. The ECG cable can be damaged this way.
- Keep a distance from electrical equipment.
- Do not use an electric blanket when wearing the recorder.

## Patient Diary

According to the physician's choice, the patient can maintain a Holter Monitor Patient Diary Form to record activities, symptoms, and the corresponding times during the ECG recording. There are a few options for the diary (depending on the recorder settings):

- Click the recorder Event button to note the time, and write symptoms/activities separately.
- Click the recorder Event button and select a reason from the predefined list.
- Click the recorder Event button and record a voice message about the event.

## **Submitting Patient Event**

According to the physician's choice, the patient can use the recorder Event button to mark the times when feeling symptoms or performing particular activities and select the activity from the list or use the voice message option (depending on the recorder settings). To mark an event, the patient should press the Event button for 2-3 seconds until the recorder beeps.

# Chapter 11. Storage, Cleaning and Disposal of License Physical Key

## Operation, Storage, and Transportation Conditions

Parameter	Value
Operating temperature	10 °C to 45 °C
Storage and transportation temperature	-20 °C to 60 °C
Operating atmospheric pressure	68 kPa to 106 kPa (680 mb to 1060 mb)
Atmospheric pressure for storage and transportation	
Operating humidity	10% RH to 95% RH non-condensing
Humidity for storage and transportation	

During storage, avoid exposure to extreme temperatures, humidity, dust, or vibrations.

Do not expose the software license key to direct sunlight or any other UVA/UVB radiation.

## Cleaning of License Physical Key

Clean the license key using a cleaning kit or a generic cleaning cotton cloth.

Do not use solvents or cleaning agents to clean the license key

## Disposal of License Physical Key

Dispose the license key in accordance with your local regulations. The item contains metal, plastics, and electronics.