NORAV medical
ECG Excellence

Holter NH-301

INSTRUCTIONS FOR USE



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1. General Information

NH-301. Instructions for Use.

For software version: 4.1.0.0 | Software release date: 18.01.2026

For device models: NR-302, NR-314, NR-1207, NR-1207-3, NR-314-P, DL800/900/1200

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Compliance Information

This product (software) complies with the applicable requirements of MDD 93/42/EEC.

CE
2797

This product (software) is intended for installation on equipment that meets the applicable edition of IEC 62368-1. Medical devices used in conjunction with this product must comply with the relevant IEC 60601 series standards, as appropriate. In addition, any electromagnetic interference generated by devices in this configuration must conform to Directive 2014/30/EU of the European Parliament and of the Council of 26 February 2014.

CAUTION: Federal Law restricts this device to sale by or on the order of a licensed physician or healthcare provider.

This product (software) complies with the recognized standards for the analysis of Ventricular Late Potentials using High-Resolution or Signal-Averaged Electrocardiography, as published in 1991 by the Task Force Committee of the European Society of Cardiology, the American Heart Association, and the American College of Cardiology, in accordance with their ongoing acceptance in current clinical practice.

Disclaimer

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

Important Usage Notice

Like in all medical (including but not limited to ECG) data processing systems, noise or artifacts may produce false-positive events. Therefore, patient data must be reviewed and edited only by a qualified technician or physician who has received appropriate training. Norav Medical and its staff shall not be held liable for patient data reviewed or edited by an unqualified person, or by a qualified person acting outside the scope of appropriate medical judgment.

Norav Medical Limited Warranty

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

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

Except for the express warranties stated above, Norav Medical 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 Medical for any damages, including but not limited to special, incidental, indirect, or consequential damages, arising out of or in connection with the use or performance of Norav Medical products.

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

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

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.

2.1. 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.

2.1.1. 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/system performance or important steps or procedures requiring careful attention.

2.1.2. Abbreviations and Acronyms

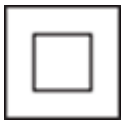
Acronym	Description
AHA	American Heart Association
ECG	Electrocardiogram
EMC	Electro Magnetic Compatibility
HRV	Heart Rate Variability
ID	Patient Identifier
IEC	International Electrotechnical Commission
MI	Myocardial Infarction
NH	Norav Holter
NR	Norav Recorder
Record	ECG test
ST	ST segment: a time period from the end of the S wave and the start of the T wave on an ECG readout
USB	Universal Serial Bus

2.1.3. Equipment Symbols Glossary

This section provides descriptions of the symbols and markings that may appear on devices and related accessories referenced in these Instructions for Use. Use this section as a reference to understand the symbols and markings, ensuring compliance with international standards and proper device usage.

Symbol	Title	Description
	Manufacturer	Indicates the medical device manufacturer, as defined in EU Directives 90/385/EEC, 93/42/EEC, 98/79/EC, and EU Regulation 2017/745.
	Reference number/ Catalogue number	Indicates the manufacturer's reference (catalogue) number so that the medical device can be identified.
	Serial number	Indicates the manufacturer's serial number so that a specific medical device can be identified.
	Batch code/Lot number	Indicates the manufacturer's batch code so that the batch or lot can be identified.
	Date of manufacture	Indicates the date when the medical device was manufactured.
	Global Trade Item Number	Indicates a number used to identify trade items at various packaging levels.
	Medical Device	Indicates that the item is a medical device.
	Unique Device Identifier	Indicates a carrier that contains unique device identifier information.
	Model Number	Indicates the model number or type number of a product.
	Contains/Contents	Indicates the components of a particular medical device.
	Contents quantity	Indicates that this package contains one single unit of the product.
	CE Marking	Indicates that the product is in compliance with European legislation for medical devices.
	CE Marking with Notified Body number	Indicates that the product is in compliance with European legislation for medical devices. The four-digit number (in this case, 2797) displayed next to the CE mark identifies the approved Notified Body (e.g., BSI) that conducted the conformity assessment.
	UKCA Marking	Indicates that the product is in compliance with UK legislation for medical devices. This mark is used for products placed on the market in Great Britain.
	UKCA Marking with Notified Body number	Indicates that the product is in compliance with UK legislation for medical devices. The four-digit number (in this case, 0086) displayed next to the UKCA mark identifies the UK Approved Body (e.g., BSI) that conducted the conformity assessment.
	Type BF applied part	To identify a type BF applied part complying with IEC 60601-1.

These tables provide descriptions of the symbols and markings that may appear on devices and related accessories referenced in these Instructions for Use.

Symbol	Title	Description
	Defibrillation-proof type BF applied part	To identify a defibrillation-proof type BF applied part complying with IEC 60601-1.
	Type CF applied part	To identify a type CF applied part complying with IEC 60601-1.
	Defibrillation-proof type CF applied part	To identify a defibrillation-proof type CF applied part complying with IEC 60601-1.
	Class II Equipment	To identify equipment meeting the safety requirements specified for Class II equipment according to IEC 61140.
	Consult instructions for use or electronic instructions for use	Indicates the need for the user to consult the instructions for use.
	Follow instructions for use or electronic instructions for use	Indicates that the instruction manual/booklet must be read.
	Caution	Indicates that caution is necessary when operating the device or control close to where the symbol is placed, or that the current situation needs operator awareness or operator action in order to avoid undesirable consequences.
	General warning / The accessory is part of a defibrillator-proof (DF) design	Indicates that caution is required, and users must consult accompanying documentation for critical safety-related information or specific instructions that cannot be fully conveyed on the device or accessory itself (ISO 15223-1:2021). **When placed specifically on patient cables or applied parts**, this symbol additionally indicates that these accessories have integrated defibrillation protection, as defined in IEC 60601-1. This marking emphasizes that the patient cable or accessory is defibrillation-proof and must be used to ensure the device's defibrillation protection during defibrillation events. Using cables without this marking could compromise patient safety, device integrity, and essential device performance during defibrillation
	For prescription use only	Caution: Federal law (USA) restricts this device to sale by or on the order of a licensed healthcare practitioner.
	Non-ionizing electromagnetic radiation	Indicates generally elevated, potentially hazardous, levels of nonionizing radiation, or equipment or systems (e.g., in the medical electrical area) that include RF (radio frequency) transmitters or that intentionally apply RF electromagnetic energy for diagnosis or treatment.
	Magnetic Resonance (MR) Unsafe	An item that poses unacceptable risks to the patient, medical staff, or other persons within the MR environment.
IPN$_1$N$_2$	Degree of Ingress Protection provided by enclosure	Manufacturer-determined degree of particle and water ingress protection, where: N1 = degree of protection from particulates (scale of 0-6); N2 = degree of protection from water (scale of 0-8).
IP22	Degree of Ingress Protection provided by enclosure	Protected against solid foreign objects of 12,5 mm and greater. Protection against vertically falling water drops when the enclosure is tilted up to 15°.

Symbol	Title	Description
IP64	Degree of Ingress Protection provided by enclosure	Protected from total dust ingress. Protected from water spray from any direction.
	Federal Communications Commission mark	FCC—Tested to Federal Communications Commission requirements.
FCC ID:	Federal Communication Commission Identifier (FCC ID: #)	A unique identifier assigned to a device registered with the United States Federal Communications Commission. Indicates that this device complies with United States Regulations for Radio Frequency Devices.
Contains FCC ID:	Federal Communication Commission Identifier (FCC ID: #)	A unique identifier assigned to a device module registered with the United States Federal Communications Commission. Indicates that this device contains a module that complies with United States Regulations for Radio Frequency Devices.
IC:	Innovation, Science and Economic Development (ISED) Canada Identifier (IC:#)	A unique identifier assigned to a device that complies with ISED Canada Radio Standards Specification.
	CSA—Canadian Standards Association mark of certification to applicable standards for electromedical equipment	Products bearing this mark have been tested and certified in accordance with applicable US and Canadian electrical safety and performance standards.
	Regulatory Compliance Mark	Indicates that the medical device complies with essential safety requirements for electrical equipment in Australia and New Zealand.
	Japanese Radio Technical Standards conformity mark	Indicates that the medical device complies with the requirements stated for Specified Radio Equipment in the Japanese Radio Law.
R	Japanese Radio Law certification mark	Indicates the certification by the Japanese Radio Law.
Bluetooth Bluetooth Bluetooth	Bluetooth® Wireless Technology Mark	This symbol indicates that the device incorporates Bluetooth wireless technology for data transmission or communication. Medical devices displaying the Bluetooth® mark can interface wirelessly with compatible systems via Bluetooth protocols.
NON STERILE	Non-sterile	Indicates a medical device that has not been subjected to a sterilization process.
	Temperature limit	Indicates the temperature limits to which the medical device can be safely exposed.
%	Humidity limitation	Indicates the range of humidity to which the medical device can be safely exposed.

Symbol	Title	Description
	Keep dry	Indicates a medical device that needs to be protected from moisture.
	Fragile, handle with care	Indicates a medical device that can be broken or damaged if not handled carefully.
	Not made with natural rubber latex	Indicates that the product was not made with natural rubber latex.
	Not made with PVC	Indicates that the product was not made with PVC.
	Not made with DEHP	Indicates that the product was not made with DEHP.
	Recycle: Electronic Equipment	Disposal of the device in accordance with the EU Directive 2002/96/EC (WEEE). Separate collection for electrical and electronic equipment. Donot dispose of this product in unsorted waste stream.
	Battery specification symbol / Battery compartment marking	Indicates that the device supports two AA cells of either alkaline or NiMH batteries. 2×1.5V Mignon AA: Requires two AA (also called “Mignon”) alkaline batteries, each rated 1.5V. 2×1.2V NiMH ACCU: Alternatively supports two AA NiMH (Nickel–Metal Hydride) rechargeable batteries, each rated 1.2V.
	Battery specification symbol / Battery compartment marking	Indicates that the device requires one AA-size (R6) battery, which can be between 1.2V (common in NiMH rechargeables) and 1.5V (common in alkaline or lithium primary cells).
	Battery specification symbol / Battery compartment marking	Indicates the proper orientation and size requirements of the battery to be installed. The battery must conform to IEC R6 standards, meaning a standard AA cylindrical cell.
	Device usage warning	The device (recorder) is not suitable for use on children weighing less than 10 kg due to the risk of loop formation in the patient cable.

2.2. Supported Holter Recorders

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

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

2.3. Intended Use

Overview

Electrocardiography is the creation of an electrogram, a recording of the electrical activity of the human heart. This is an electrocardiogram (ECG or EKG), in which the voltage of the heart's electrical activity, derived from electrodes attached to the patient's chest, is plotted against time.

These electrodes sense the small electrical changes that result from the depolarization of the heart muscle and subsequent repolarization during each cardiac cycle (heartbeat).

An electrocardiogram is carried out to check the heartbeat. It shows how fast or how slow the heart is beating. ECG test results can help the cardiologist to diagnose:

- Irregular heartbeats, also known as arrhythmias.
- A previous heart attack or myocardial infarction.
- The cause of chest pain. It may, for example, show signs of blocked or narrowed coronary arteries.

Intended Use of NH-301 Holter Analysis System

The NH-301 Holter analysis system is intended for patients requiring ambulatory Holter cardiac recording 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.

Intended use of NR Series Recorders

The NR Series recorder models, hereinafter referred to as "NR" or "NR recorders", are battery-powered digital recording devices that allow the continuous acquisition, digitization, and real-time storage of ECG waveforms from a patient's heart during normal daily activities via disposable ECG electrodes applied to the patient's chest. Different NR models support various types of signal processing for respective diagnostic examinations, such as resting ECG, cardiac stress testing, or ambulatory ECG monitoring (commonly known as Holter ECG). Some models can also be configured for more than one type of examination.

The NR device can detect pacemaker spikes and store the information alongside the ECG data. Additional signals, such as body movement (via acceleration sensors) or thoracic impedance respiration, can also be recorded as supplementary diagnostic data.

The NR device is part of a conventional ambulatory ECG system, in which data is recorded on an SD flash memory card that may be removed from the device once the recording is complete. The memory card is then inserted into a card reader connected to the computer analysis system. Optionally, the NR device can be connected directly to the computer analysis system via a dedicated USB cable; however, data transfer via USB is slower.

Following the instructions provided with the accompanying Norav Medical software, the recorded ECG data is downloaded onto the computer system and analyzed.

Patients may need an ECG examination if they experience:

- Chest pain (myocardial ischemia)
- Dizziness, lightheadedness, or confusion
- Pounding, skipping, or fluttering heartbeat
- Fast pulse
- Shortness of breath
- Weakness or fatigue
- Reduced ability to exercise
- A family history of heart disease (even if no symptoms are present)

Electrocardiograms are also frequently performed for the following reasons:

- ECG evaluation to document therapeutic interventions
- Evaluation of the patient's response after resuming occupational or recreational activities (e.g., following myocardial infarction or cardiac surgery)
- Evaluation of pacemaker performance or other heart disease treatments
- Analysis of ST segment changes in the ECG
- Time- and frequency-domain heart rate variability (HRV) analysis
- Analysis of late potentials in the ECG
- Analysis of QT interval parameters
- Clinical and epidemiological research studies

Intended Purpose of NR Series Models

The NR models are intended for patients who require:

- Ambulatory ECG Monitoring (Holter ECG):If symptoms tend to come and go, a regular ECG may not detect abnormalities in heart rhythm. In such cases, patients may be asked to wear an NR Series model for several days (up to 14) during normal daily activities.
- Cardiological diagnostics in a cardiologist's office by medical professionals:
    - 12-Lead Resting ECG
    - Cardiac Stress Test ECG
    - Telemetry ECG

Intended Patient Population

The NR models are intended for the following patient population:

- **Age:** 10 years and older — no upper limit
- **Weight:** Above 10 kg
- **Gender:** No restrictions
- **Patient is user:** No

Use Environment and Intended Users of NR Series Models

Use Environment

- All NR models are non-sterile devices.
- All NR models are reusable devices. Standard disposable ECG electrodes—purchased separately as consumables—are used with these devices.
- The NR models are also designed for use in the home environment to enable ambulatory ECG monitoring (Holter ECG).

Intended Users

- The use of an NR Series model should generally be prescribed and supervised by a qualified healthcare professional.
- NR devices are **not** intended for use by laypersons (i.e., patients).

Essential Performance

Within the intended use and environment, the performance elements critical to the NR Recorder ECG system remain the accurate, safe acquisition of ECG signals, as well as correct data processing and generation of the ECG report. These functionalities shall not be degraded or negatively impacted by electromagnetic or electrical interference, or environmental conditions that the system is designed to withstand.

Failures in these components or associated equipment do not result in the creation of an unacceptable level of risk, even in cases of early termination or an interruption of a test protocol, which does not necessarily preclude the patient from receiving additional therapy in a timely fashion and therefore does not negatively affect the essential performance of the ECG system.

Similarly, transmission of the ECG report or raw ECG data is not considered an essential performance element under environmental disturbances. The test procedure is observed by a qualified clinician as mandated by hospital protocols. Loss of data due to an interruption in the exam is covered by the previous statement dealing with early termination. A report for the test is generated and stored when the testing has been completed. Failure to transmit the data is a recoverable error, and delayed transmission of the data does not result in any additional unacceptable risk to the patient.

2.3.1. 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 Supported Holter Recorders *(on page 10)* section to obtain detailed information on which models of Holter Recorders are compatible with this analysis system.

2.4. Clinical Benefits for Patients

Clinical Benefit	Measurable outcome parameters	Benefits expected by Patient	Discussion
The device should accurately measure the Heart Rate	It should measure the heart rate between 60 and 100 beats per minute (bpm). However, it should also measure lower than 60 bpm (bradycardia i.e., ≤60 bpm) and it should also measure higher than 100 bpm (tachycardia - i.e., ≥100 bpm)	Assessing the heart rate is a quick and simple method of determining overall health. It can be used to track the general level of fitness and to identify potential heart conditions.	The study reveals that the median heart rate on Holter ECG monitoring was 95 bpm. Further the subject device too is a Holter ECG device. Therefore, this benefit is achieved with the subject device as well.
The device provides continuous ECG recording which is beneficial over intermittent recording	Continuous ECG recording should provide better (at least twice) atrial fibrillation (AF) detection as compared to intermittent recording	Continuous ECG recording is used to help diagnose intermittent and infrequent cardiac arrhythmias over a long period of time. It can be used for up to 14 days. It records the heart rhythm over longer periods of time to greatly increase the odds of capturing and recording this intermittent, but significant, arrhythmia, which can eventually help in providing adequate treatment to the patient.	The clinical literature shows that continuous event recording identified three times more AF than intermittent ECG. The subject device too measures continuous ECG, therefore this benefit is achieved with the subject device as well.
Holter devices are better than wrist band devices in Heart Rate Variability (HRV) measurement	More inter-beat interval (IBI) should be measured by holter device as compared to wrist band (at least 10 % more)	One way to determine the ANS's (autonomic nervous system) condition is by HRV. Low heart rate variability (HRV) has been linked to cardiovascular illnesses including hypertension, while high HRV is associated with greater cardiac fitness. One of the best ways to evaluate how different things, such as	The clinical study shows that far more IBIs were available from the Holter (M = 96,791.69, SD = 31,196.40) compared to the wrist band (M = 43,604.15, SD = 19,674.02). The subject device too is used in Holter recording, so this benefit is achieved with the subject device as well.
Clinical Benefit	**Measurable outcome parameters**	**Benefits expected by Patient**	**Discussion**

Clinical Benefit	Measurable outcome parameters	Benefits expected by Patient	Discussion
		the environment, emotion, thoughts, feeling, etc., affect the nervous system and how the nervous system responds appropriately is to be aware of HRV.	

2.5. Contraindications for Use and Adverse Effects

There is no risk of electric shock during an electrocardiogram. The disposable adhesive electrodes applied to the chest of a patient only sense the small electrical changes that result from the activity of the heart muscle during each cardiac cycle (heartbeat). No electrical energy is delivered to the patient.

There are no known contraindications or adverse effects for the application of NR devices for ambulatory ECG acquisition (Holter ECG).

Report any adverse events to the manufacturer.

2.6. Safety Measures: Warnings and Precautions

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 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.

Warning: Be sure to review the **Warnings** listed in this table.	• The NR devices are not intended for use on infants weighing less than 10 kilograms (22 pounds). • The NR devices are not directly applicable to the heart. • The NR devices (NR-302, NR-314, NR-1207) are not protected against high-energy shocks from cardiac defibrillators. Remove these NR devices from the patient before using a cardiac defibrillator. • Some NR devices (NR-314-P, NR-1207-E, NR-1207-3) are protected against high-energy shocks from cardiac defibrillators when a defibrillation-protected patient cable is used. To avoid the possibility of injury or hazardous situations when using a cardiac defibrillator, a defibrillation-protected patient cable must always be used. Do not touch the device or patient cable

a defibrillation-protected patient cable must always be used. Do not touch the device or patient cable while using a cardiac defibrillator. Proper placement of defibrillator paddles in relation to electrode placement is also required to minimize potential harm to the patient.

- The NR devices are not protected against high-frequency surgical equipment. Remove the NR device from the patient before using such equipment.
- The NR devices must not be used in areas where combustible or flammable gases or liquids, such as anesthetic gas, oxygen, or hydrogen, are present.
- The power supply of the NR devices (battery) and the patient circuit are not distinctly isolated. Only batteries specified for the operation of the device may be used. Under no circumstances should the device be operated with a mains adapter—this could endanger the life of the patient.
- Any attempt to operate NR devices in an area where an MRI is operating will result in mutual interference and negative effects.
- The NR devices should be safely stored away from children.
- Before each recording and before attaching sensors or electrodes to the patient, check the housing and ECG patient cable for damage that may have been caused, for example, by mechanical overload, a fall, or wear and tear (e.g., chafing on the cable). Do not use the device or cable if you notice any cracks, melted spots, or other signs of damage.
- Ensure that the connector (plug) of an electrode lead never comes into contact with live parts. Do not operate the recorder near exposed live parts.
- For your safety and best performance, only connect the NR device to specified equipment.
- False positive or false negative pacemaker spike detection events can occur in recordings from pacemaker patients.
- Use of this equipment adjacent to or stacked with other equipment should be avoided, as it could result in improper operation. If such use is necessary, both this equipment and the other equipment should be observed to verify that they are operating normally.
- Use of accessories, transducers, and cables other than those specified or provided by the manufacturer could result in increased electromagnetic emissions or decreased electromagnetic immunity, leading to improper operation.
- Portable RF communications equipment (including peripherals such as antenna cables and external antennas) should be used no closer than 30 cm (12 inches) to any part of the NR device, including cables specified by the manufacturer. Otherwise, performance degradation may occur.
- The NR device requires special precautions regarding EMC and must be installed and operated according to the specific instructions for maintaining basic safety and essential performance. Refer to the Electromagnetic Emissions and Immunity Information section of the NR

	essential performance. Refer to the Electromagnetic Emissions and Immunity Information section of the NR Series Instructions for Use.

CAUTION: Be sure to review the **Cautions** listed in this table.	• Store the NR devices in an area free from water or humidity. • Ensure to avoid areas with high humidity, poor ventilation, and direct sunlight. Store the NR devices in a place free from the harmful effects of ambient air containing dust, sodium, and sulfur. • Do not store the NR devices in an area where chemicals are kept or which is exposed to chemical fumes or vapors. • Never attempt to modify or disassemble the NR devices. • Do not open the NR device housing. The housing may only be opened by Norav service personnel. • Ensure that electrodes are correctly and safely applied to the patient. • Consult a qualified service technician for correct handling when using the NR device in combination with any other equipment. • When changing the batteries (except the NR-314-P), ensure that they are inserted with correct polarity. The polarity is indicated in the battery compartment. • Do not leave the batteries in the NR device (except the NR-314-P) when it is not in use. Corrosion or battery leakage can severely damage the NR device. • Although the NR devices are protected against the ingress of liquids (IP22), they should not be exposed to liquids during recording. The NR devices are not suitable for use in the bathtub or shower. • Ensure that during a recording the cable lead wires are not caught by the moving parts of a machine or sports equipment. This could lead to damage or injury (e.g., if loops are formed in the cable lead wires). • Take care to prevent chemicals or liquids from entering the connectors or internal parts of the NR device. • Any attempt to use a cleaner containing organic solvent, thinner, toluene, or benzene for cleaning the NR device will severely damage its housing. • To clean an NR device, wipe it with a damp cloth soaked with mild soap diluted with water. • Do not polish the housing with abrasive or chemical cleansers. • Under no circumstances insert objects into the connector for the patient input cable, SD flash memory card slot, or the battery compartment other than the specified NR device ECG cable connector, SD flash memory cards, or appropriate batteries. This may severely damage the NR device and pose a risk to the patient.

Note: Be sure to review the **Notes** listed in this table.	• Only use Norav Medical-certified SD flash memory cards for recording. • It is the responsibility of the user to properly configure the NR device with settings compatible with the relevant ECG analysis software. • False positive results can be caused by poor electrode connection to the patient or by strong electrical interference from nearby objects. Pacemakers set for bipolar pacing may produce false negative results due to a weak pacemaker pulse signal at the patient's skin. • NR devices are not designed for emergency purposes (intensive care or intermediate care).

Possible Hazards for Patient

This subsection outlines potential hazards that may affect the patient during the use of the product, despite all preventive measures taken through design, labeling, and user instructions. These risks are considered **residual risks**—they remain after risk mitigation and are deemed **acceptable** within the intended use and clinical context. Users must be aware of these risks and follow all operational guidelines to minimize their likelihood and impact.

Possible Hazard (acceptable Residual Risk)	Possibly caused by
--- Lack of Medical Data ---	
No output, irregular or incorrect output from chest module or wireless handheld device	Impaired equipment operation or equipment failure due to a design flaw.
Failure to detect Pacemaker Spikes	Noise level too high – above normal.
RF transmission failed	Insufficient wireless coexistence with: • Wi-Fi 802.11b Emitter: (PC) • Other BT Device • DECT cordless telephone • Cell Phone with BT enabled • Electromagnetic Interference
Lost study data	Database storage failed
Failure to record, interruption of data flow, partial/complete failure of update function	• Battery power low • Interruption of communication • Disconnection of Electrode(s) • Recording Trigger did not work

2.7. General Specifications and Sample Rates

The NH-301 Holter analysis system reads and analyzes data recorded at sample rates of 128, 250, 500, and 1000 (or 128, 256, 512 and 1024 for NR-314-P device) samples per second, with recording durations ranging from 1 hour to 336 hours (14 days).

Note: The NH-301 application is capable of supporting continuous ECG acquisition for up to 30 days using one lead.

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, Respiration, and Accelerometer 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)
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)

Pacemaker Event Types Notations
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

Respiration Event Types Notations
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 recording, medical personnel would need to add Diary events manually.

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 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.

3.1. 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: • Software license key • Memory card reader for downloading recorder data • Preparing recorders for a new study • Local printer to printout analysis results, reports, etc	
Memory Card Reader	SD card reader for NR-series devices (excluding the NR-314-P model) or DL900 Norav recorder; CF card reader for DL800 and DL1200 Norav recorders	
Network Capability	TCP/IP network interface	
Printer	A4 or Letter format standard color printer, Laser or InkJet	

3.2. Installation Process

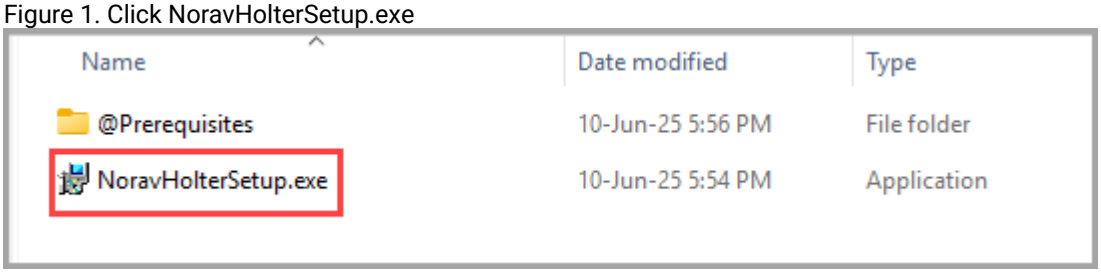
The installation process for the Norav Medical NH-301 software is designed to run automatically and doesn't require any specific skills to complete. Note that during the installation, certain third-party software, as listed below, will be installed on your PC to ensure the proper functioning of the Norav 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:
    1. Open a Windows Explorer window.
    2. 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.
    3. **(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.

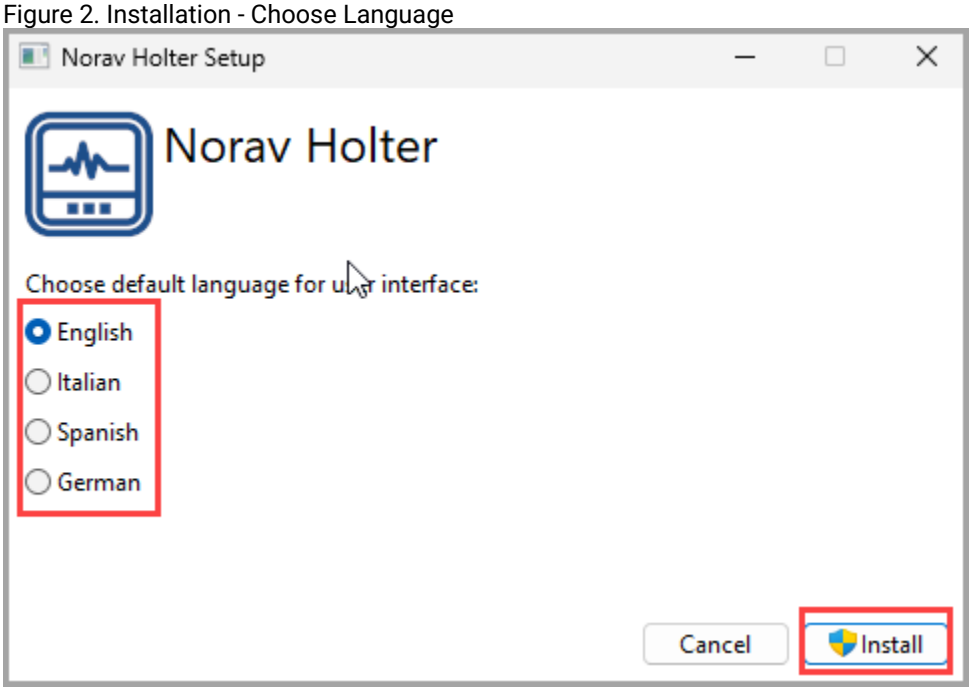
4. Double click on the **NoravHolterSetup.exe** file within the Windows Explorer window to launch the installation process.

Figure 1. Click NoravHolterSetup.exe



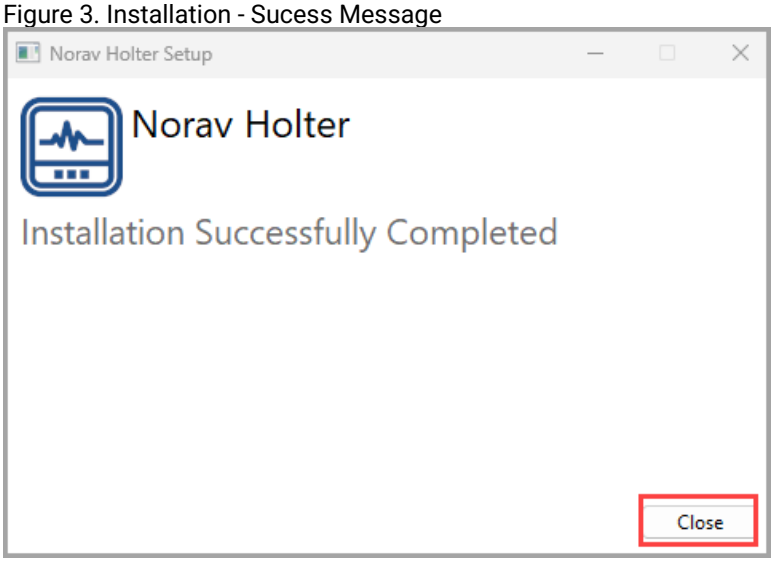
3. Choose the language when the installer prompts you and click **Install**. The language you select will be set as the default for the installed software.

Figure 2. Installation - Choose Language



4. Adhere to the on-screen instructions until the installation is complete and a success message appears. Then click **Close.**

Figure 3. Installation - Sucess Message



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.

3.3. 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.
- Temporary files folder default location: **C:\Norav\Holter\Temp**

Report Templates Storage Paths:

- Default Report Summary Templates folder: **C:\Norav\Holter\Templates\Summary**
- Default Report Conclusion Templates folder: **C:\Norav\Holter\Templates\Conclusion**

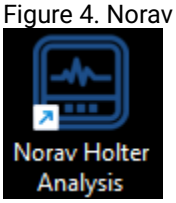
3.4. Setup Process after Installation

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:

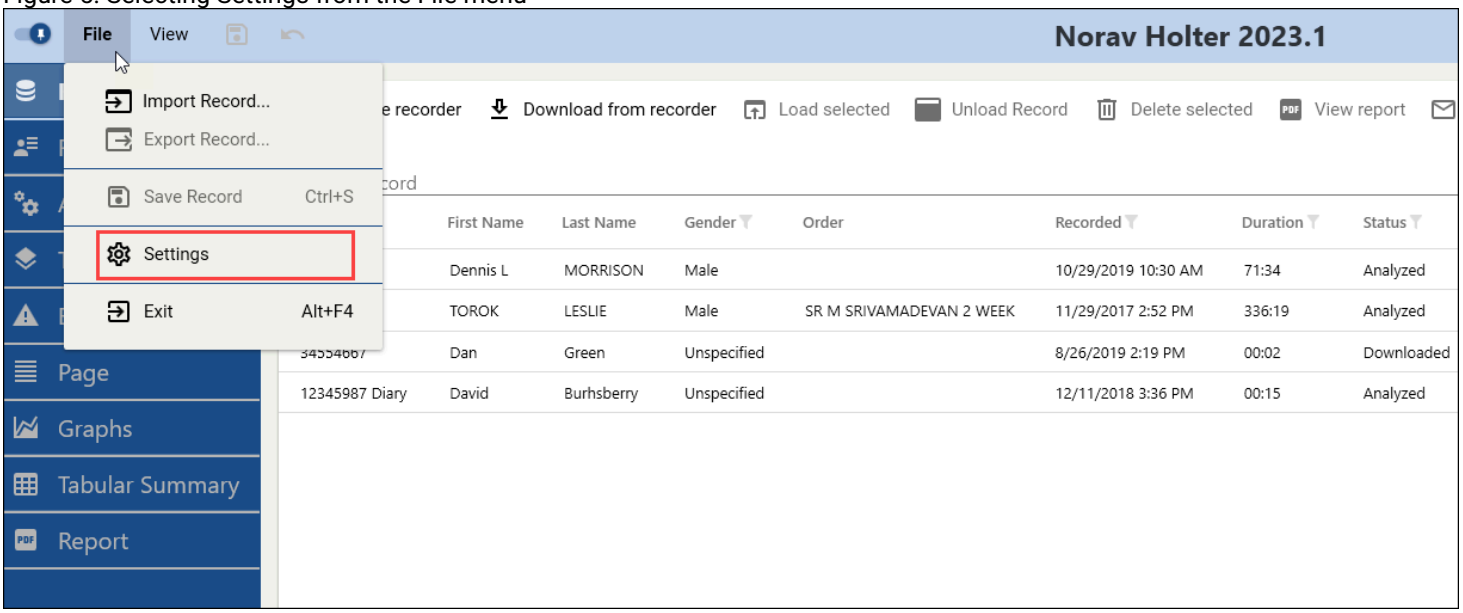
1. Double-click the **Norav Holter** icon on your desktop to launch the NH-301 analysis system.

   Figure 4. Norav Holter Icon

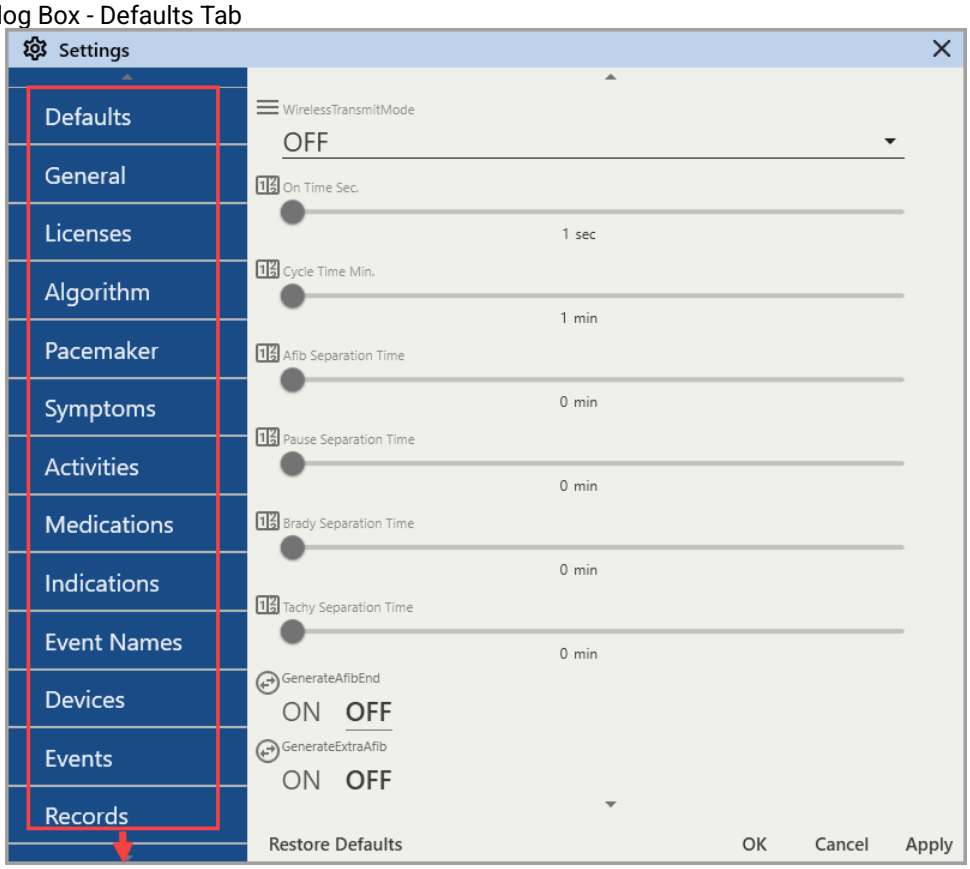
2. On the initial screen, navigate to the menu bar located at the top left, select **File**, and then choose **Settings** from the drop-down list.

Figure 5. Selecting Settings from the File menu



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

Figure 6. Settings Dialog Box - Defaults Tab



3.4.1. Defaults Tab

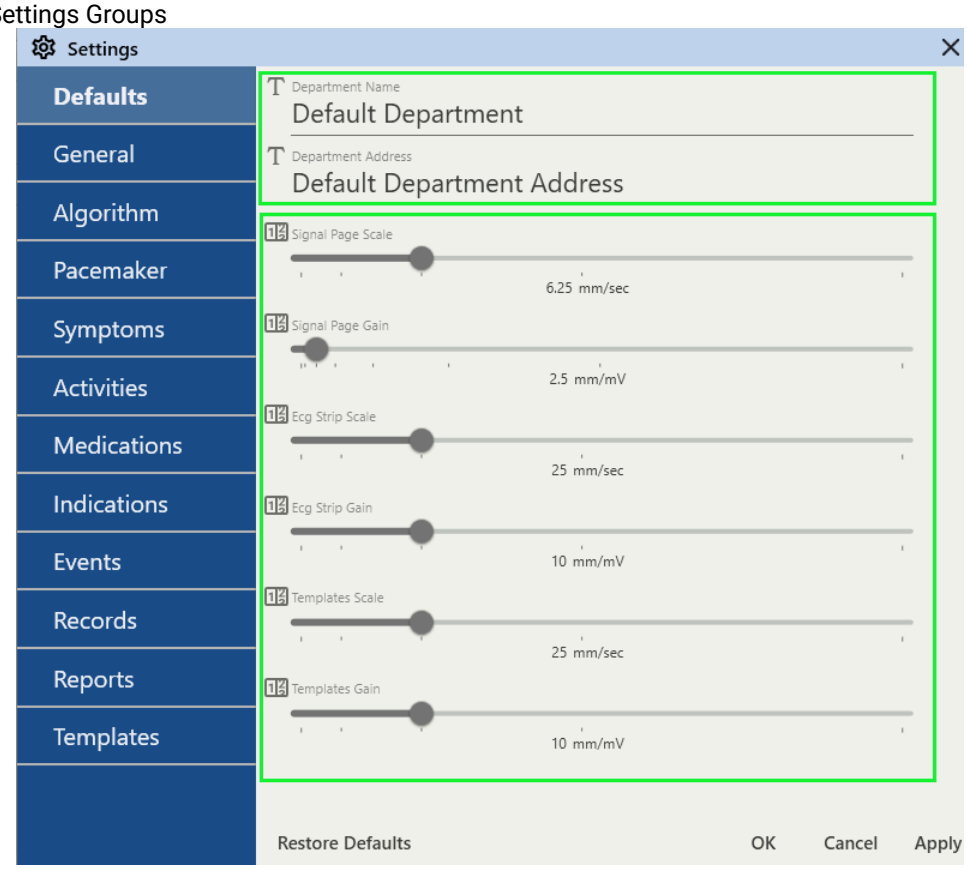
The Defaults Tab contains a list of global default settings for tailoring various NH-301 analysis system **Views** to your preferences.

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 7. Defaults Tab - Settings Groups

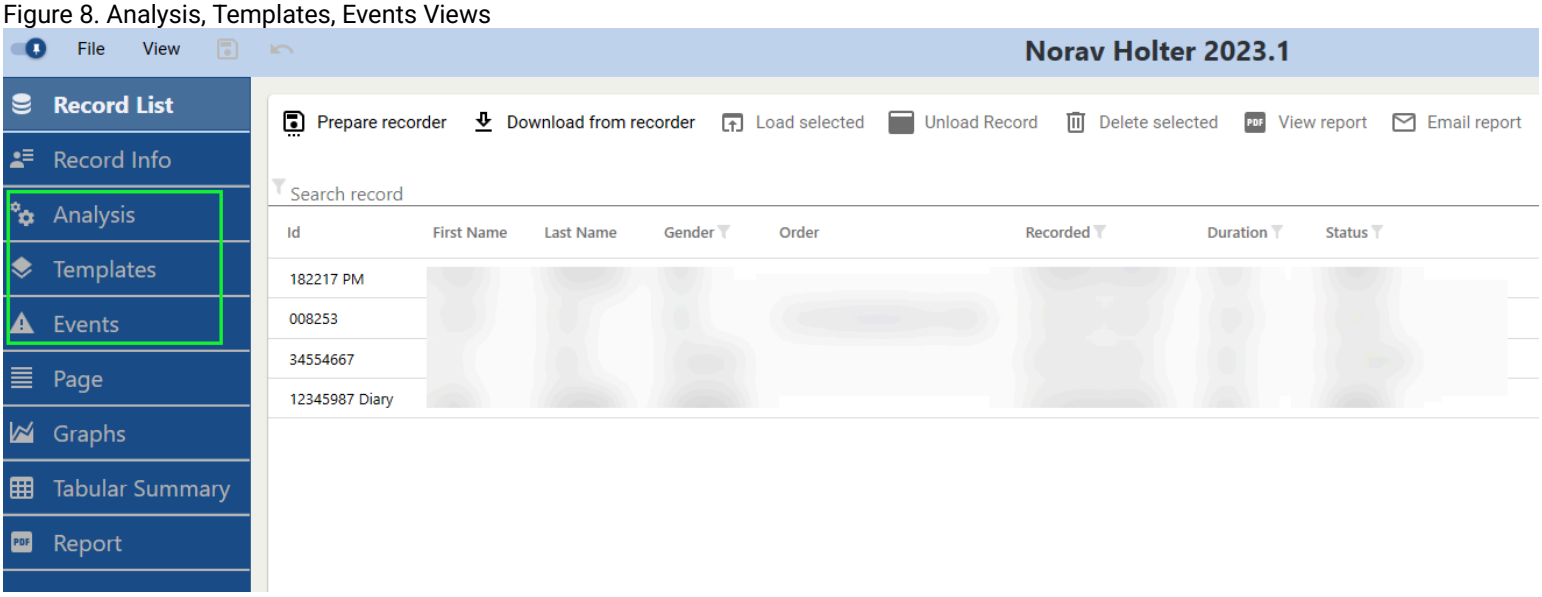


Scale and Gain Settings

- **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 8. Analysis, Templates, Events Views

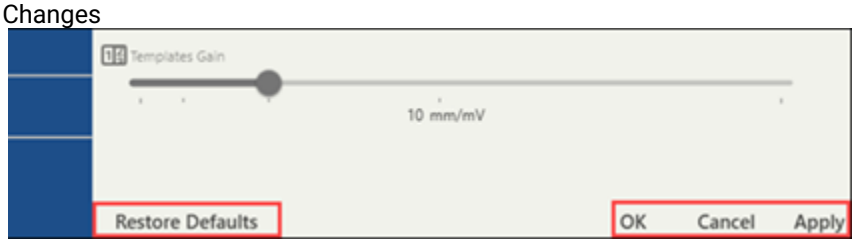


Note: If the ECG waveform is too small, the scale can be increased. If the ECG waveform is too noisy, the gain can be decreased. The scale and gain settings should be adjusted carefully to ensure the ECG waveform is displayed accurately. Incorrect settings can make interpreting the ECG waveform and diagnosing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

3.4.1.1. Saving or Discarding Settings Changes

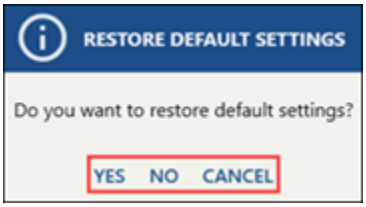
After making adjustments, you have several options located in the bottom part of the box:

Figure 9. 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.

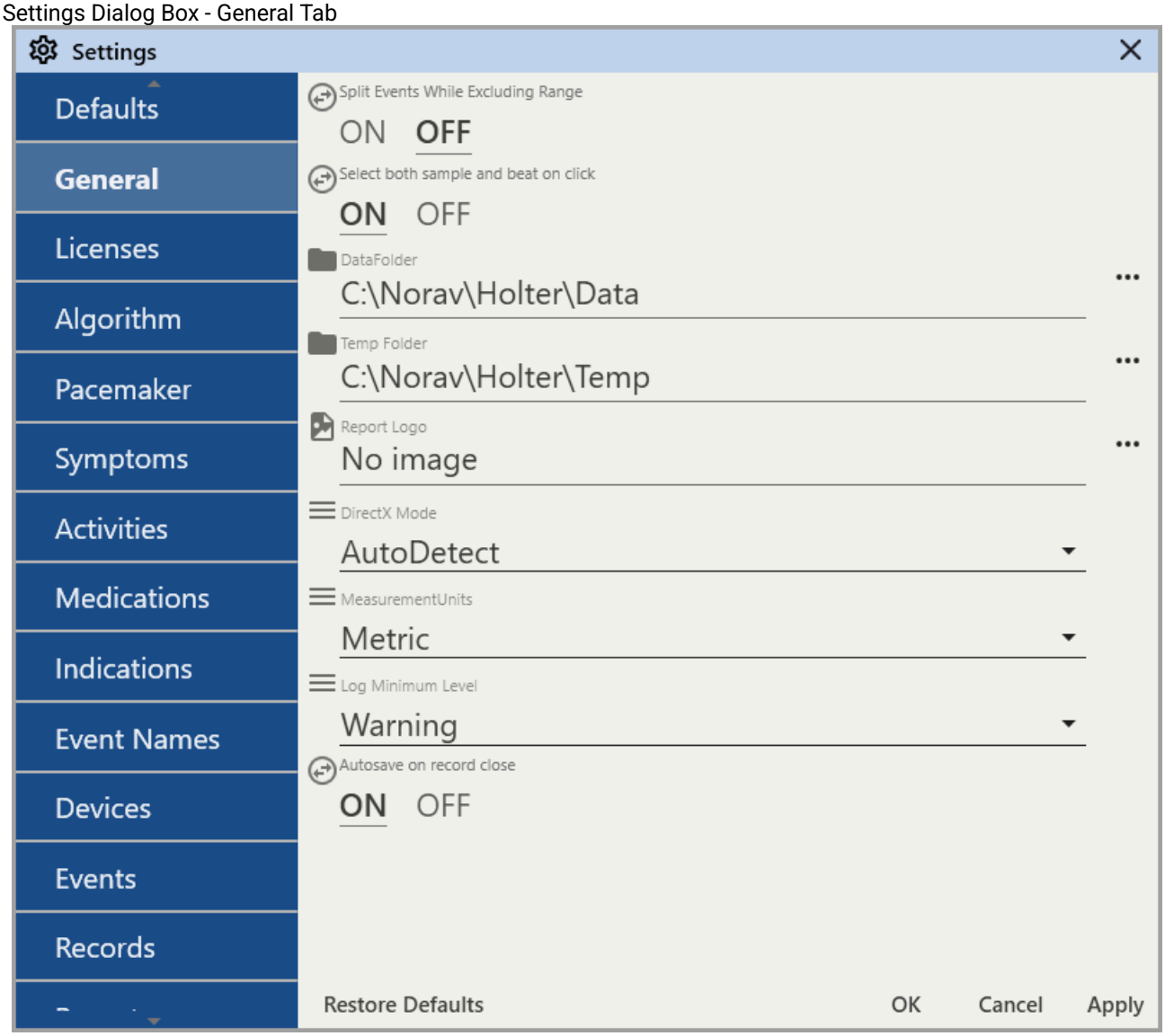
Figure 10. Restore Default Settings Box



3.4.2. General Tab

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

Figure 11. Settings Dialog Box - General Tab

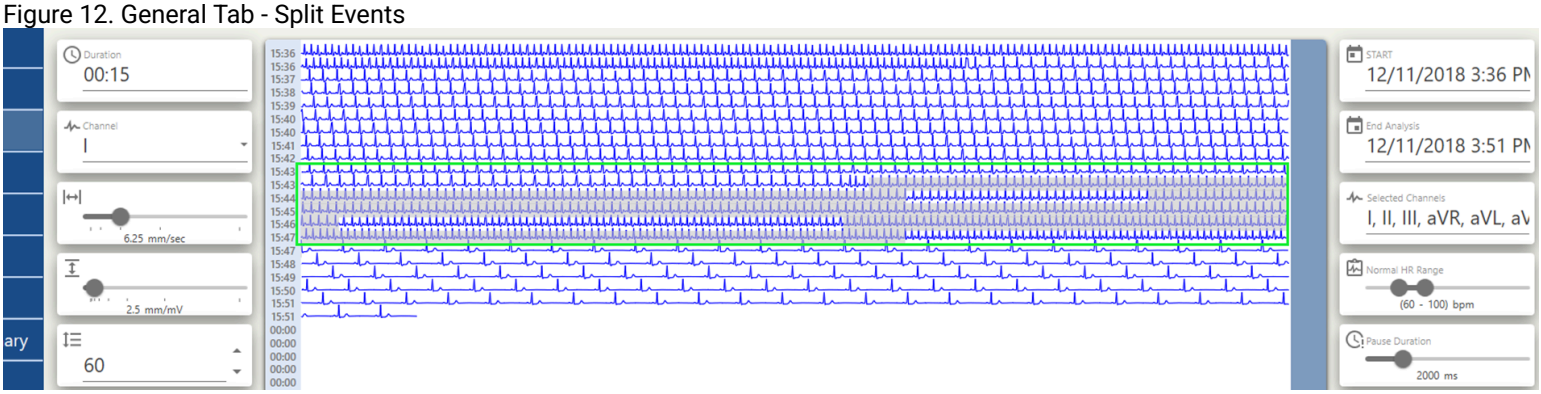


Split Events While Excluding Range

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 12. General Tab - Split Events



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

Select Both Sample and Beat on Click

This option modifies how beat insertion works in the system. Depending on whether it is set to **ON** or **OFF**, the behavior for inserting new beats will change.

Select **OFF** to use the standard method for inserting beats, as described in the **Context Menu Features** *(on page 164)* subsection in the **Templates** section.

Select **ON** to modify the insertion process. When this option is **ON**, right-clicking selects the beat, and a vertical dotted line appears, marking the desired position for inserting a beat. The context menu will then expand, displaying various options, including **Insert Beat**.

Figure 13. General Tab - Select Both Sample and Beat on Click



Data Folder

Set the folder for the **Record List** *(on page 85)* database of the NH-301 analysis system using one of two methods:

Figure 14. General Tab - Data Folder Settings



- Type in a new **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 the 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 **Data Folder** path displayed in this tab.

Temp Folder

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

Figure 15. 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 16. 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 17. 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.

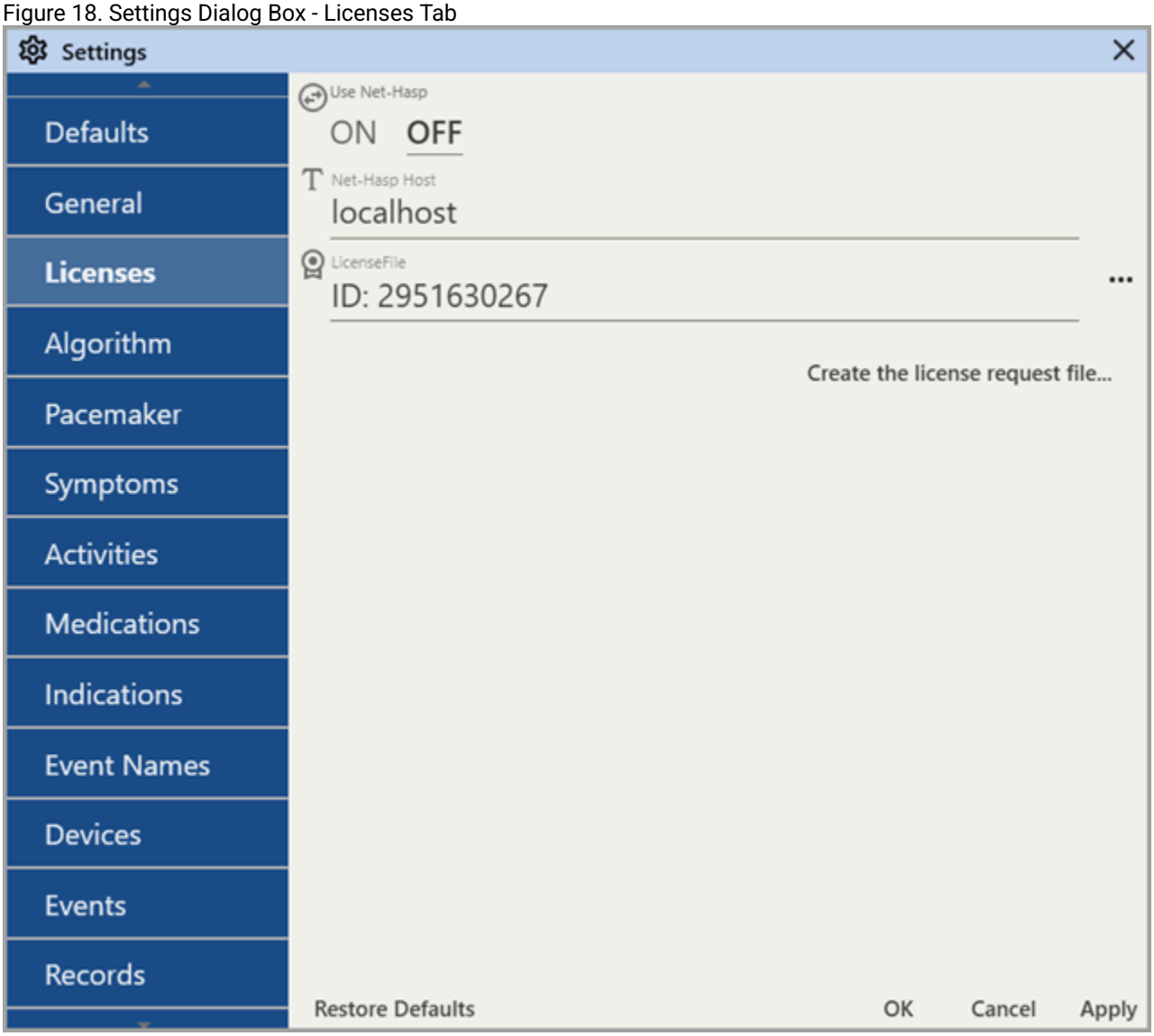
3.4.2.1. Saving or Discarding Settings Changes

For more details on saving or discarding changes, refer to the section **Saving or Discarding Settings Changes *(on page 25)***.

3.4.3. Licenses Tab

The **Licenses Tab** allows you to manage licensing options for the NH-301 analysis system.

Figure 18. Settings Dialog Box - Licenses Tab



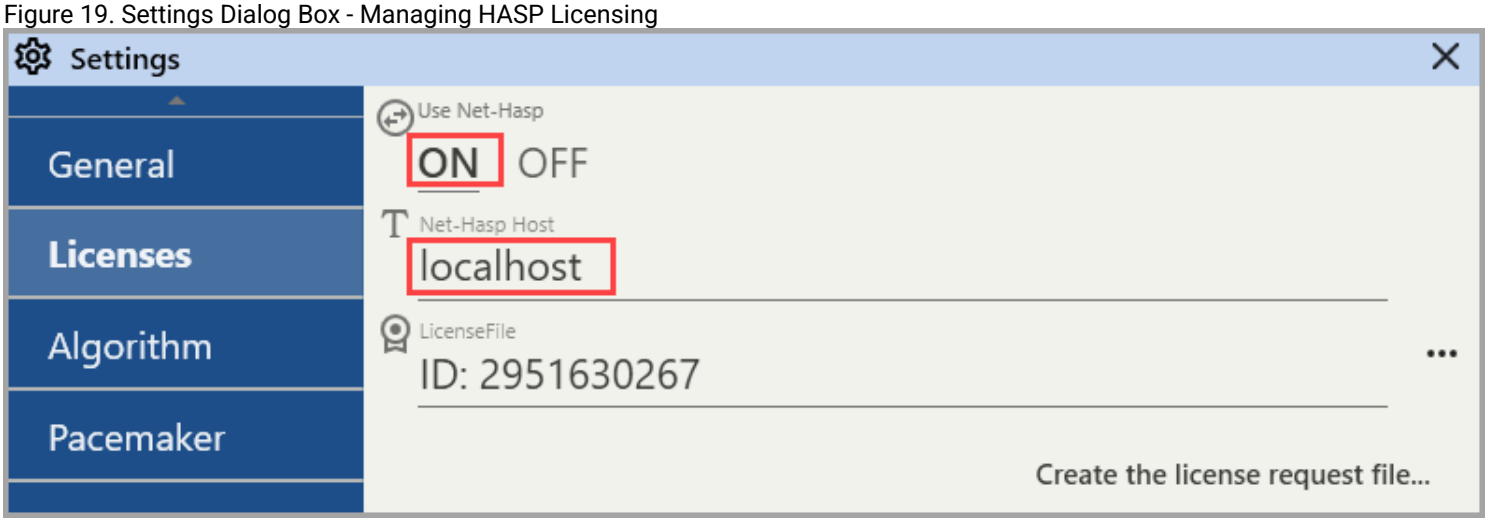
Available actions include:

- **Use Net-Hasp:** Toggle ON or OFF to enable or disable the Net HASP licensing.
- **Net-Hasp Host:** Specify the network address or hostname for the Net HASP server.
- **License File:** Shows the current license file ID and allows managing license files.

To manage HASP licensing:

1. Set **Use Net-Hasp** to **ON**.

Figure 19. Settings Dialog Box - Managing HASP Licensing

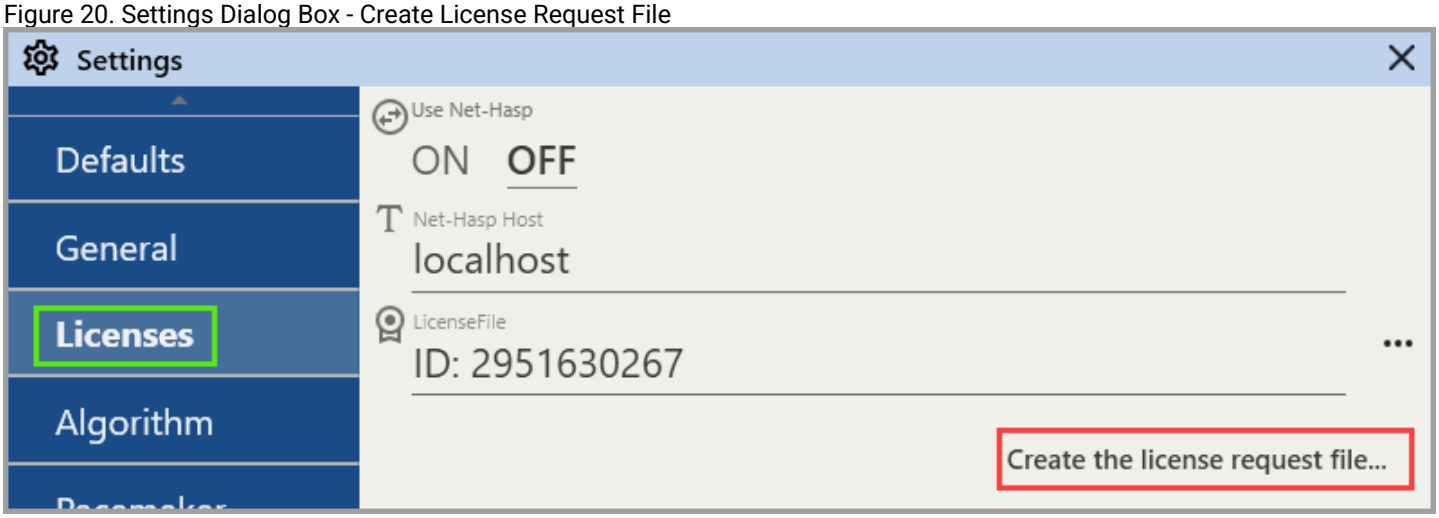


2. Enter the appropriate **Net-Hasp Host** address (e.g., localhost or another network address provided by your administrator).
3. Ensure the connection to the HASP server is correctly established for licensing validation.

To manage licenses using .lic files:

1. Navigate to **Settings > Licenses**.
2. To request a new license file:

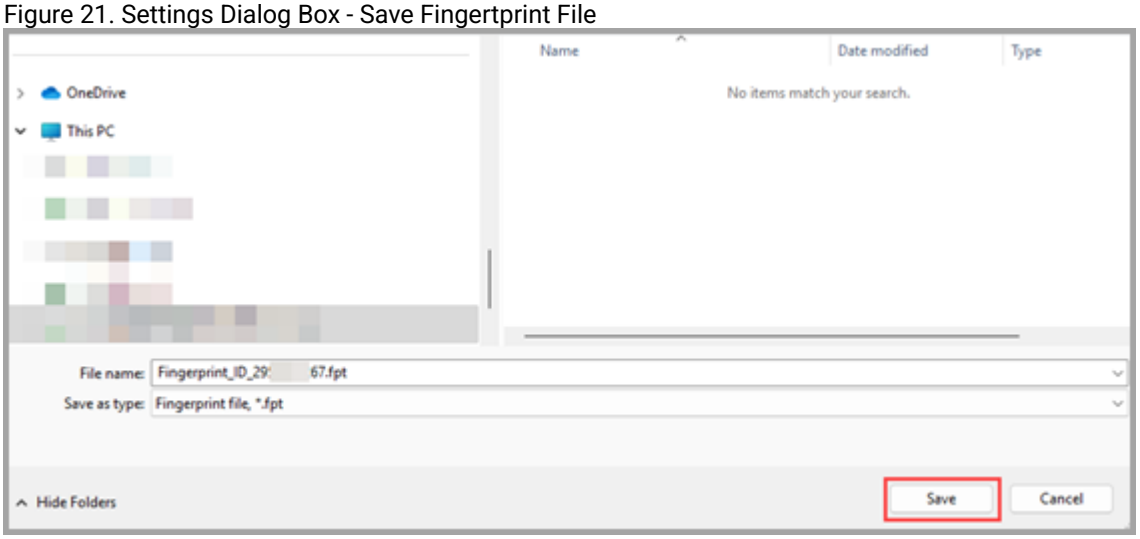
Figure 20. Settings Dialog Box - Create License Request File



2.1. Click **Create the license request file...**.

2.2. Choose a location to save the fingerprint file (`*.fpt`) and click **Save**.

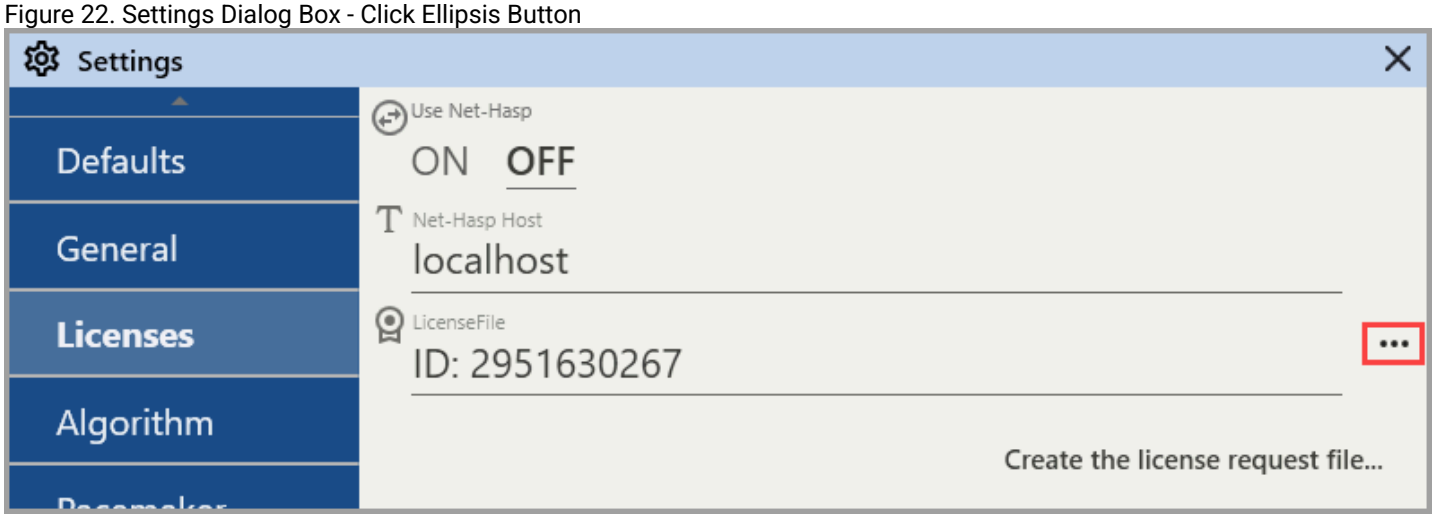
Figure 21. Settings Dialog Box - Save Fingertprint File



3. Send the generated fingerprint file (`*.fpt`) to Norav Medical.
4. Upon receiving the license file (`*.lic`) from Norav Medical:

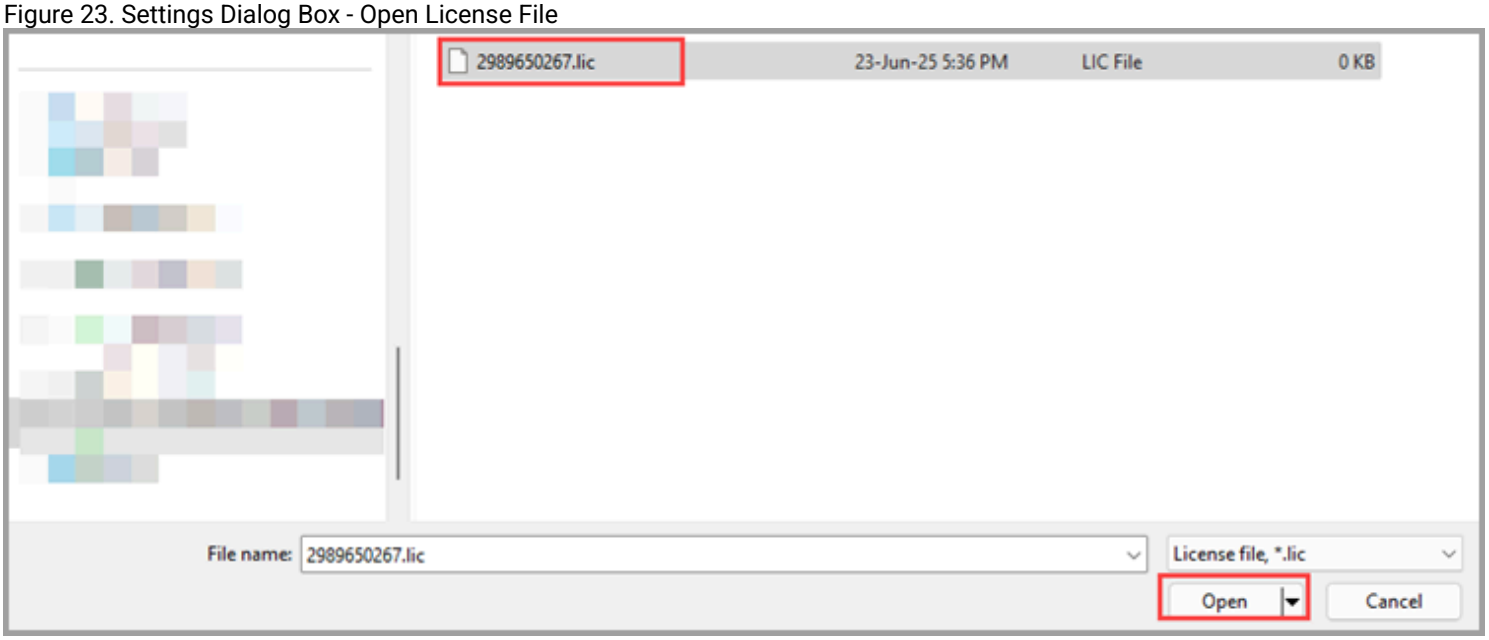
4.1. Click the ellipsis (...) button next to **License File**.

Figure 22. Settings Dialog Box - Click Ellipsis Button



4.2. Select the provided license file and click **Open** to upload and activate it.

Figure 23. Settings Dialog Box - Open License File



After completing any changes in the **Licenses Tab**, click **Apply** (to keep the dialog open) or **OK** (to save and close) so that your new licensing settings take effect.

Note: License files (*.lic) can be configured for time-based licensing upon request, depending on the user's needs and the terms provided by Norav Medical.

Always ensure proper management and secure storage of license files to maintain uninterrupted software functionality.

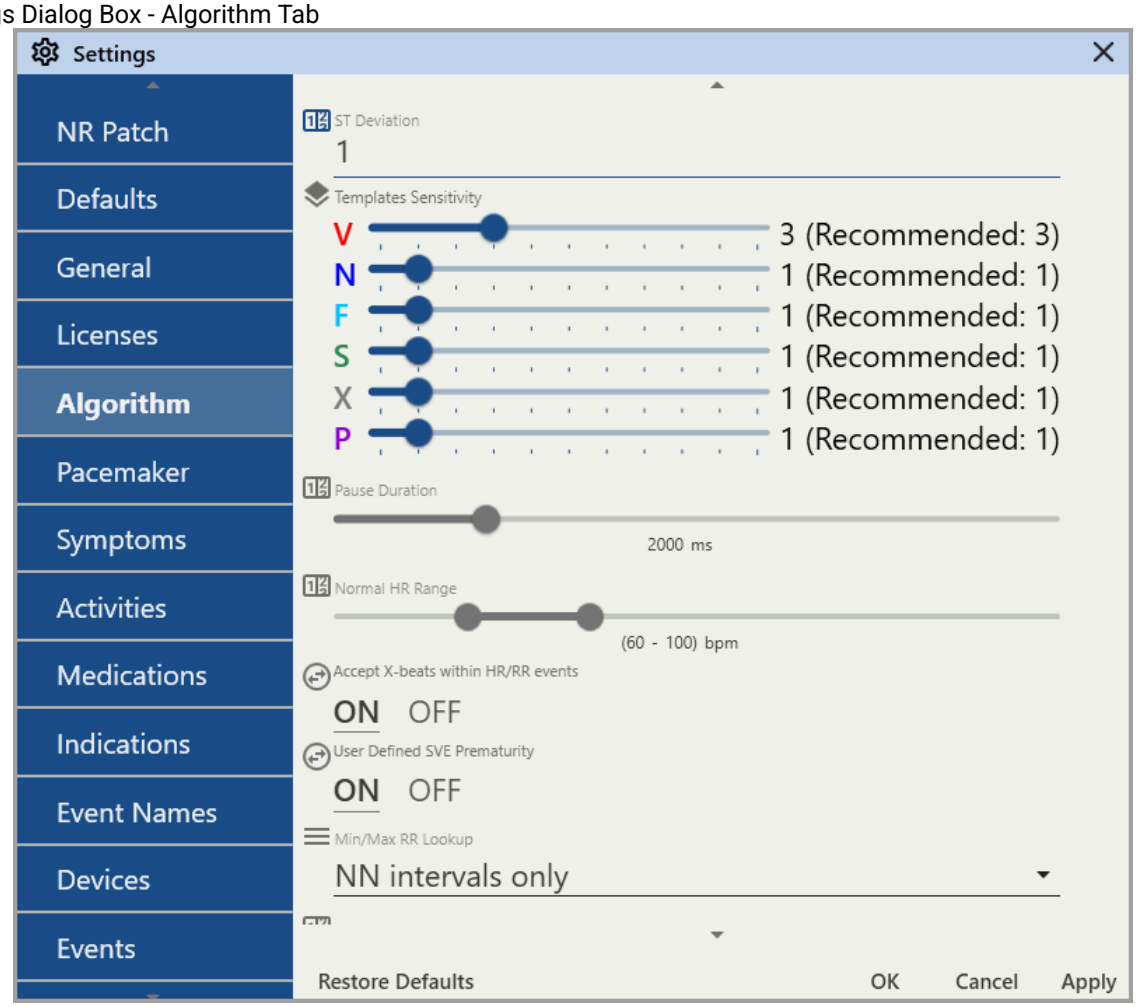
3.4.3.1. Saving or Discarding Settings Changes

For more details on saving or discarding changes, refer to the section **Saving or Discarding Settings Changes *(on page 25)***.

3.4.4. Algorithm Tab

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

Figure 24. 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.

Accept X-beats within HR/RR Events

Select this option to determine whether noise artifacts (“X” beats) are included when calculating and displaying data for **Pause, Bradycardia, Maximum RR, and Minimum HR events**.

- **Select ON** to include X-beats in these event calculations and displays.
- **Select OFF** to exclude X-beats from these events, removing noise artifacts and improving the accuracy of HR/RR-based results.

To adjust this setting:

1. Open the **Settings** dialog box.
2. Navigate to the **Algorithm Tab**.
3. Locate the **Accept X-beats within HR/RR Events** setting.
4. Select **ON** or **OFF** as desired.
5. Click **Apply** to confirm the change and keep the dialog open, or **OK** to save and close.

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.

Min/Max RR Lookup

Select the type of RR intervals to be used when calculating the minimum and maximum RR values for the patient's ECG record during analysis.

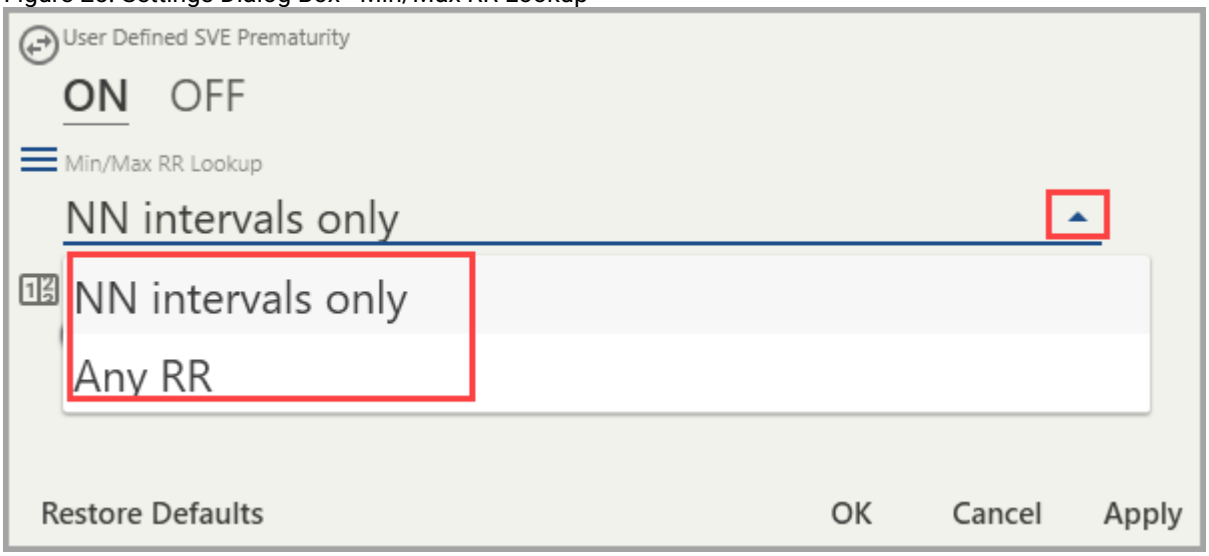
Select **NN intervals only** to include only normal-to-normal (NN) intervals—intervals between two consecutive sinus beats. This option excludes ectopic beats and artifacts, ensuring that the minimum and maximum RR values reflect true physiological variation. This setting supports more accurate HRV (Heart Rate Variability) analysis.

Select **Any RR** to include all detected RR intervals, regardless of beat classification or signal quality. This setting allows ectopic beats and artifacts to influence the minimum and maximum RR values and may be useful when the analysis focuses on extreme outlier intervals.

To configure the **Min/Max RR Lookup** setting:

1. Open the **Algorithm Tab** in the **Settings** dialog box.
2. Scroll to the **Min/Max RR Lookup** section.
3. Click and select either **NN intervals only** or **Any RR** from the drop-down list.

Figure 25. Settings Dialog Box - Min/Max RR Lookup



4. Click **Apply** to confirm your selection and keep the dialog open, or click **OK** to save and exit.

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).

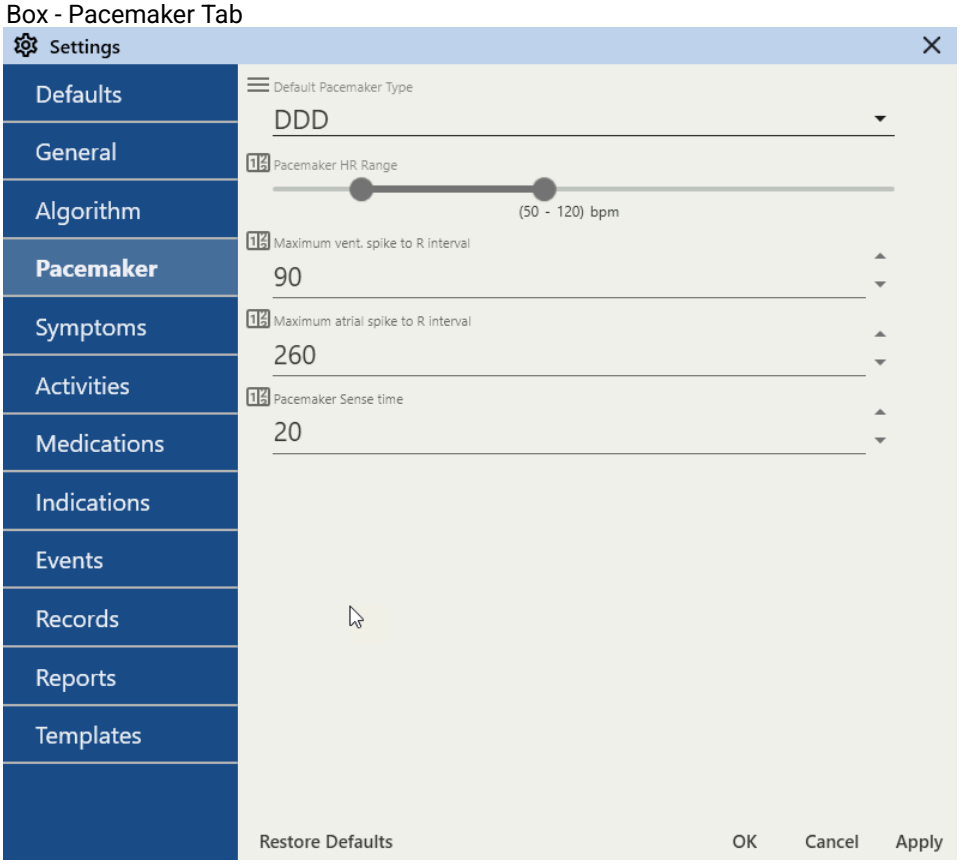
3.4.4.1. Saving or Discarding Settings Changes

For more details on saving or discarding changes, refer to the section **Saving or Discarding Settings Changes *(on page 25)***.

3.4.5. Pacemaker Tab

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

Figure 26. Settings Dialog Box - Pacemaker Tab



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.

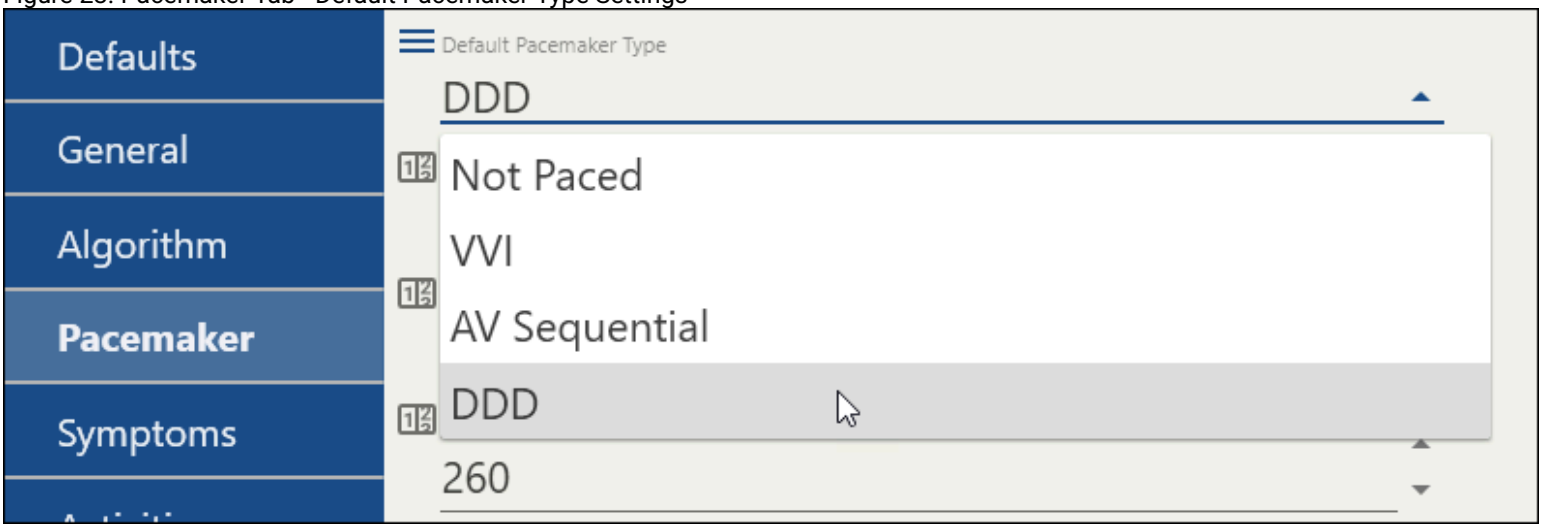
Figure 27. Recorder - Pacer Detector is ON



Default Pacemaker Type

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

Figure 28. 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.

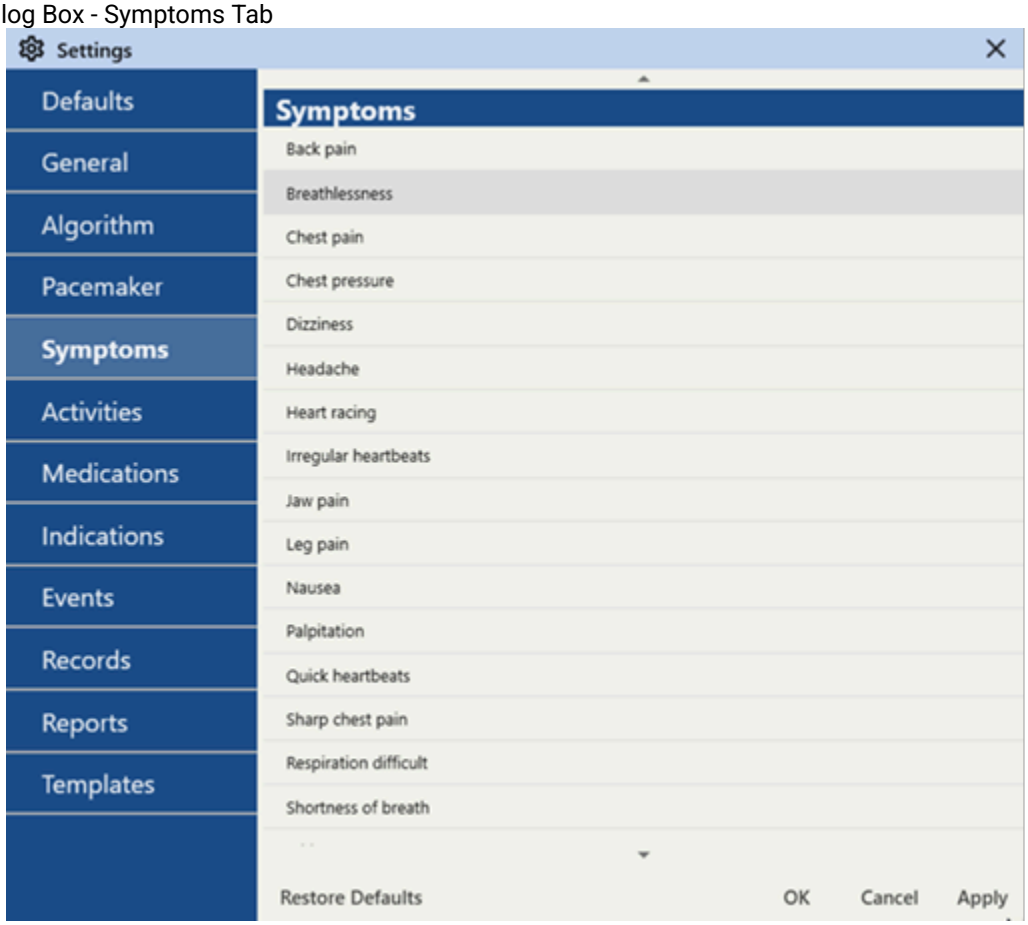
3.4.5.1. Saving or Discarding Settings Changes

For more details on saving or discarding changes, refer to the section **Saving or Discarding Settings Changes *(on page 25)***.

3.4.6. Symptoms Tab

The **Symptoms Tab** contains a list of predefined symptoms that can be used with the **Patient Diary** *(on page 342)* 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.

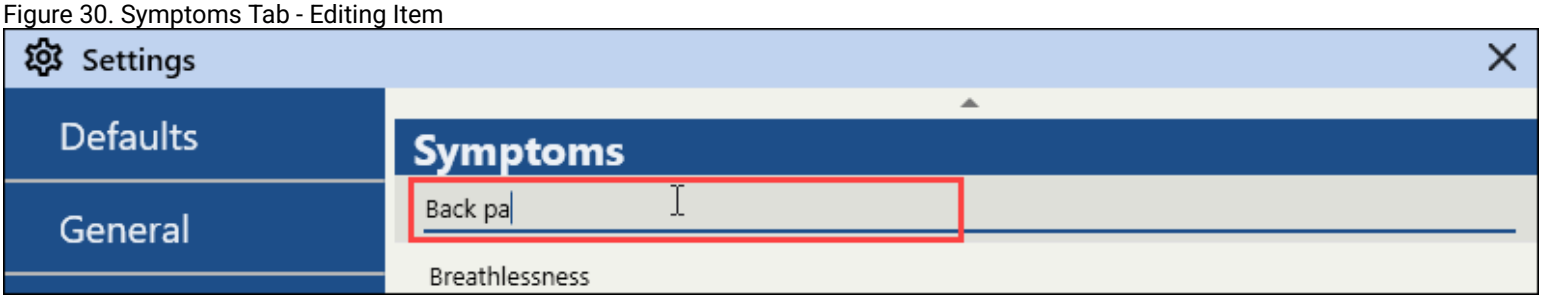
Figure 29. Settings Dialog Box - Symptoms Tab



Editing Existing Symptoms Items

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

Figure 30. Symptoms Tab - Editing Item



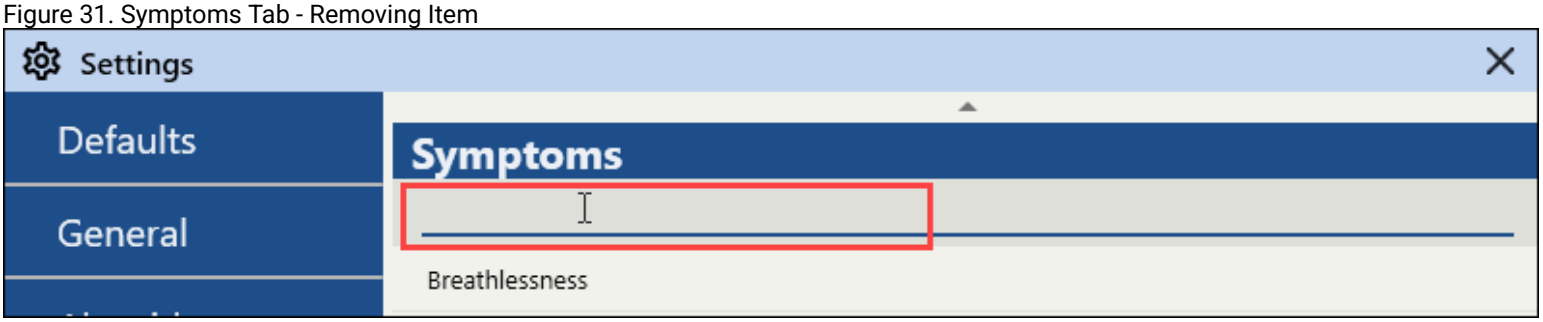
1. Click the line containing the symptom you want to edit.
2. Update the line's content as required.
3. Press Enter on your keyboard to confirm your changes.
4. Remember to save the changes in the **Symptoms Tab** after editing the necessary entries.

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 31. Symptoms Tab - Removing Item



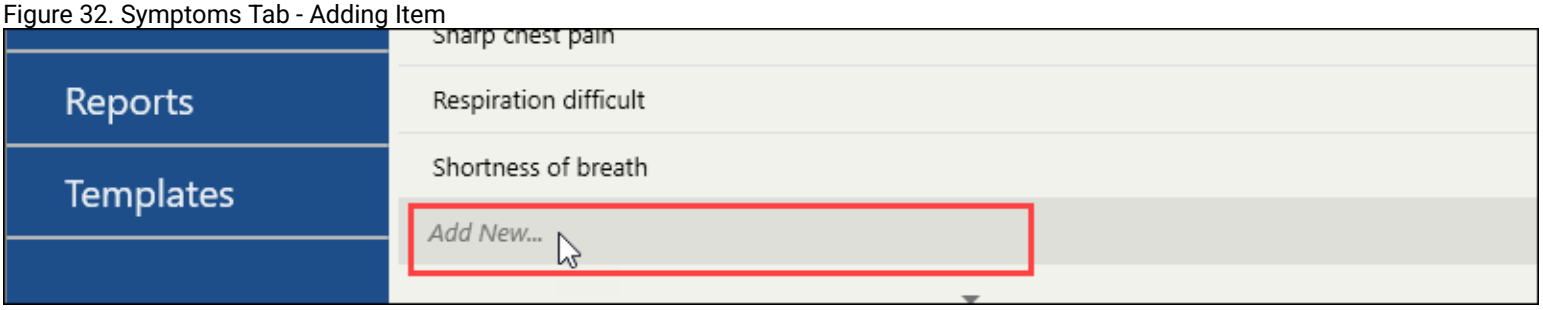
1. Click the line containing the symptom you want to remove.
2. Delete the line's content by selecting the text you want to remove and pressing Backspace or Delete on your keyboard.
3. Press Enter on your keyboard to confirm your changes.
4. Remember to save the changes in the **Symptoms Tab** after 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 32. 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.

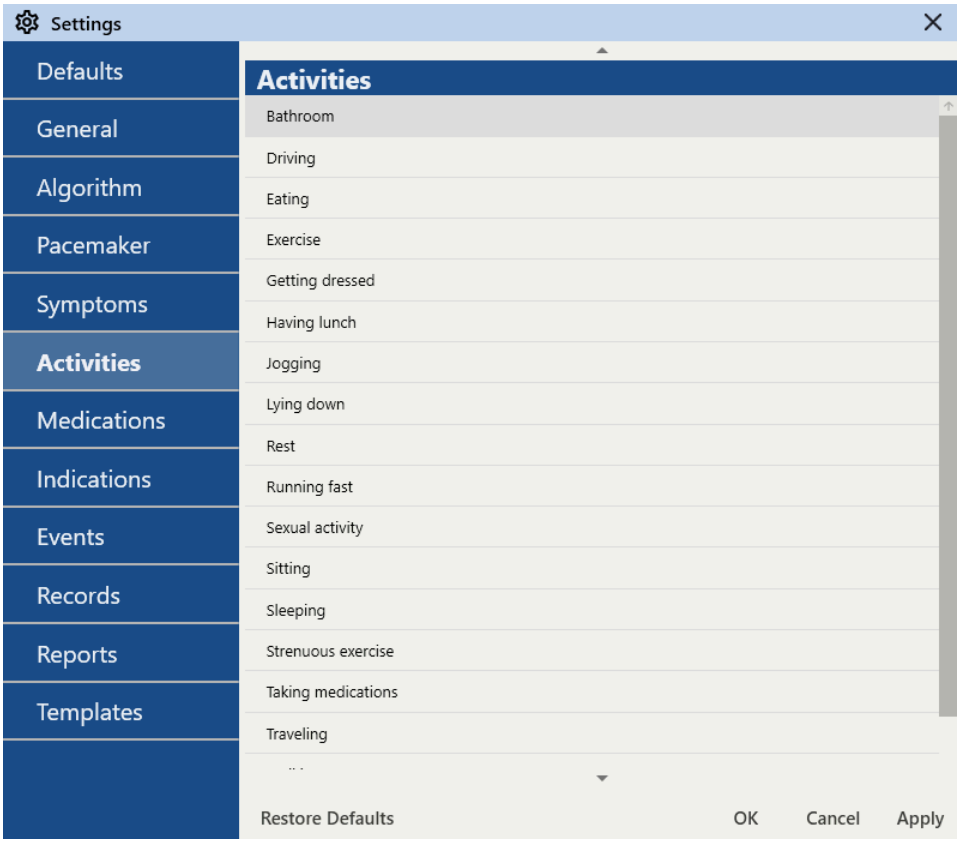
3.4.6.1. Saving or Discarding Settings Changes

For more details on saving or discarding changes, refer to the section **Saving or Discarding Settings Changes *(on page 25)***.

3.4.7. Activities Tab

The **Activities Tab** contains a list of predefined daily activities for patients for use with the **Patient Diary *(on page 342)*** 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.

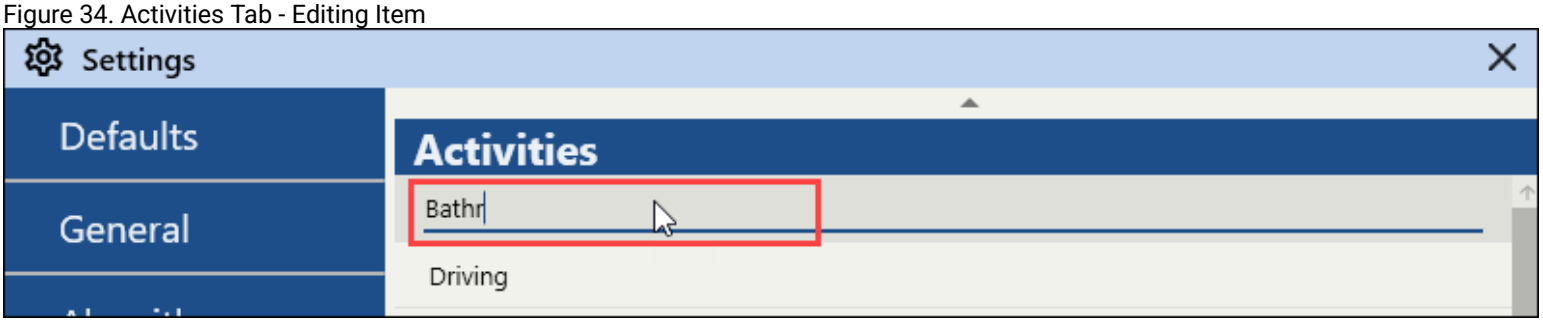
Figure 33. Settings Dialog Box - Activities Tab



Editing Existing Activities Items

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

Figure 34. Activities Tab - Editing Item



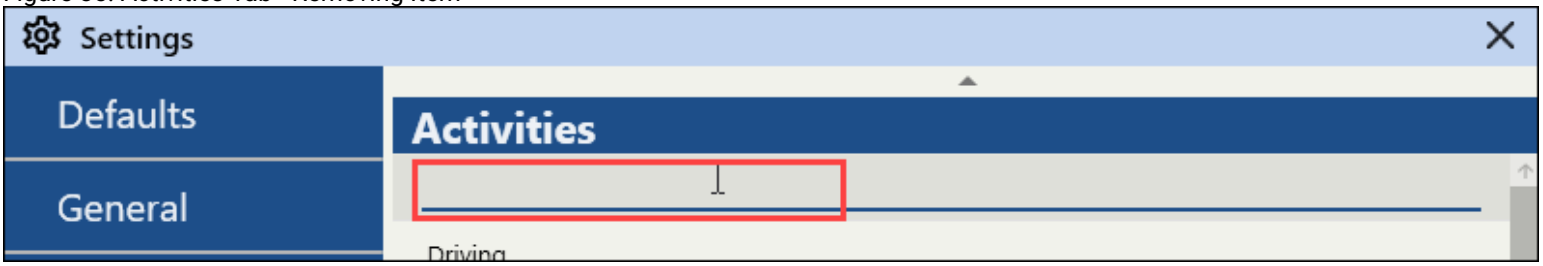
1. Click the line containing the activity you want to edit.
2. Update the line's content as required.
3. Press Enter on your keyboard to confirm your changes.
4. Remember to save the changes in the **Activities Tab** after editing the necessary entries.

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 35. Activities Tab - Removing Item



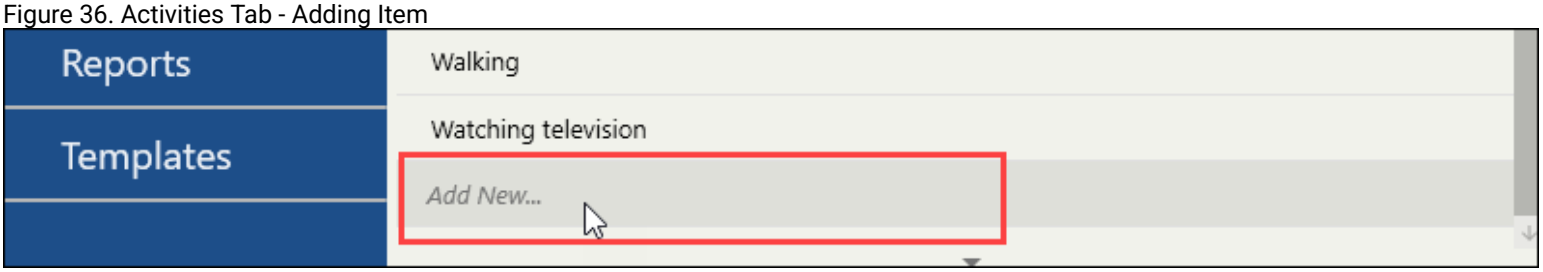
1. Click the line containing the activity you want to remove.
2. Delete the line's content by selecting the text you want to remove and pressing Backspace or Delete on your keyboard.
3. Press Enter on your keyboard to confirm your changes.
4. Remember to save the changes in the **Activities Tab** after 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 36. 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.

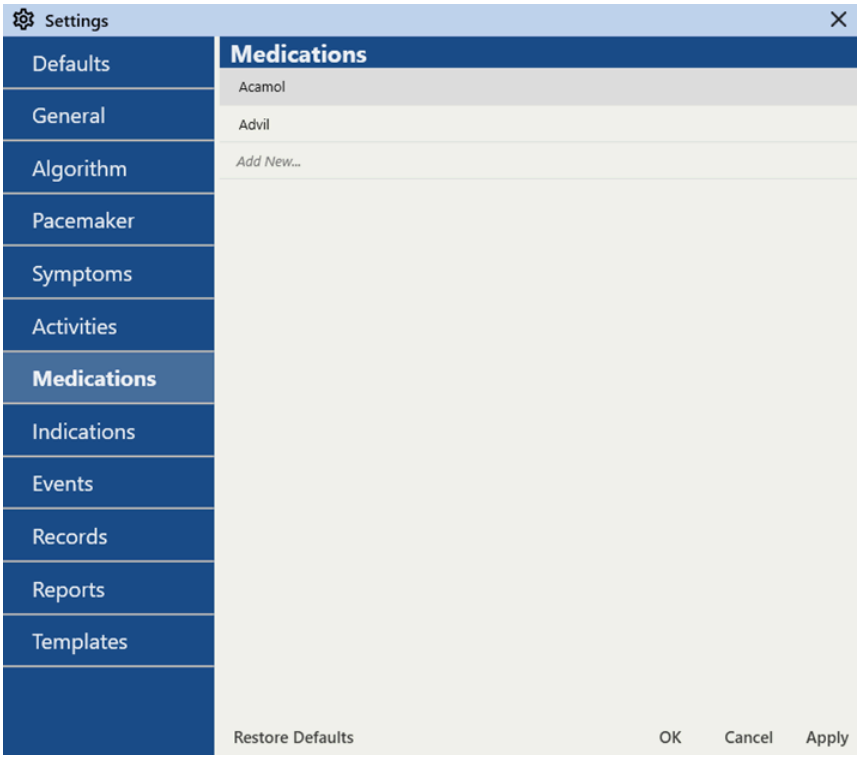
3.4.7.1. Saving or Discarding Settings Changes

For more details on saving or discarding changes, refer to the section **Saving or Discarding Settings Changes *(on page 25)***.

3.4.8. 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.

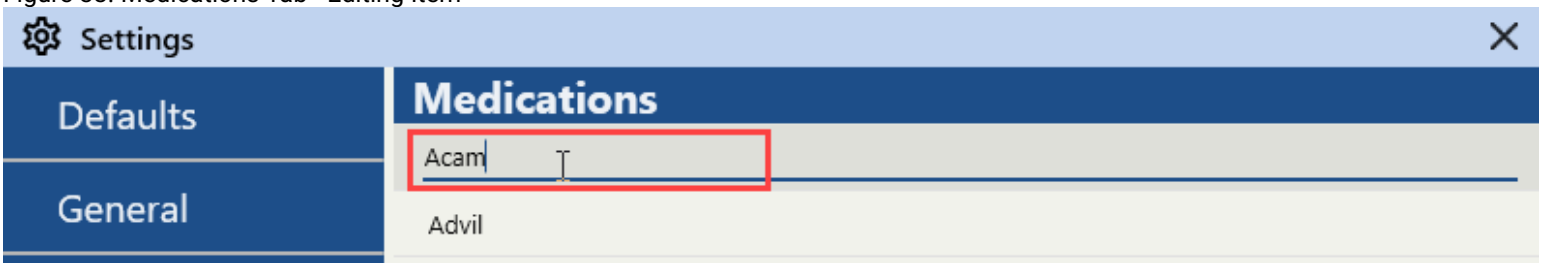
Figure 37. Settings Dialog Box - Medications Tab



Editing Existing Medications Items

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

Figure 38. Medications Tab - Editing Item



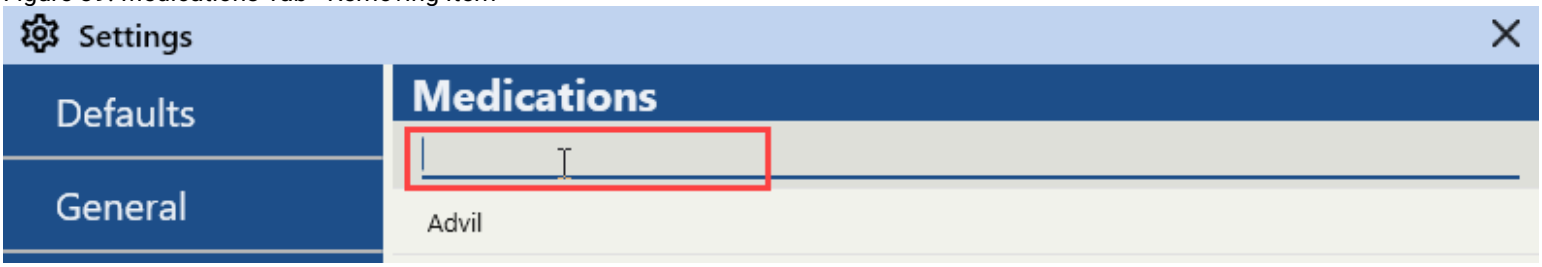
1. Click the line containing the medication you want to edit.
2. Update the line's content as required.
3. Press Enter on your keyboard to confirm your changes.
4. Remember to save the changes in the **Medications Tab** after editing the necessary entries.

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 39. 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 40. 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.

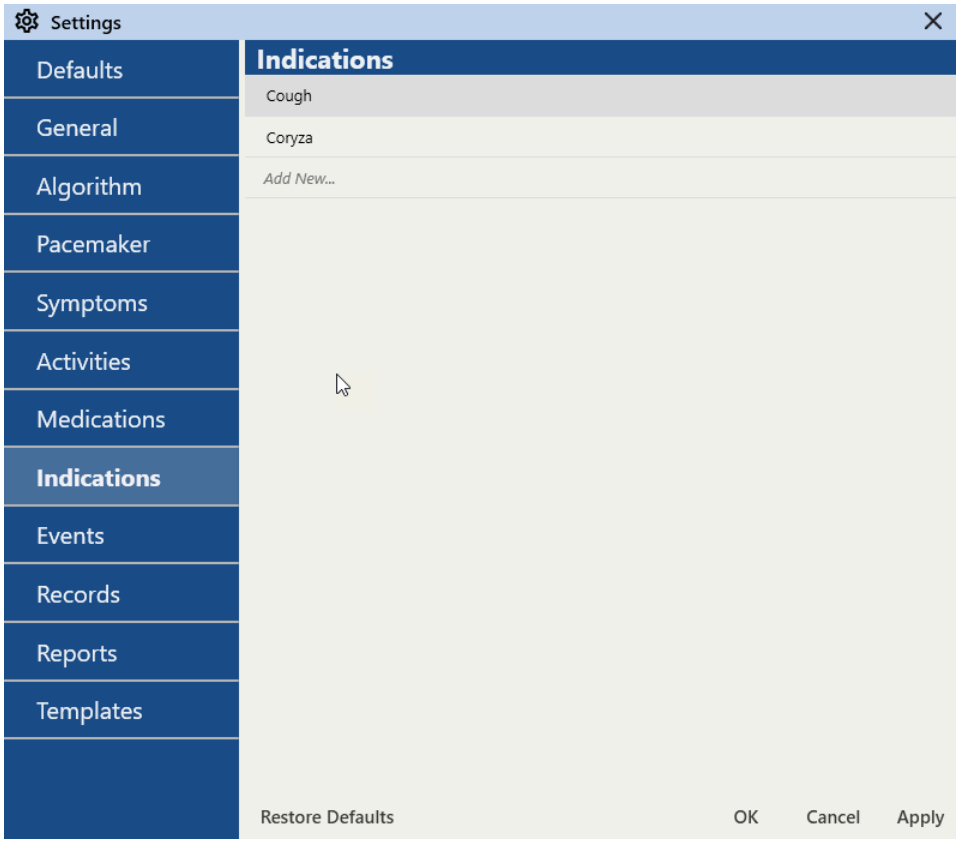
3.4.8.1. Saving or Discarding Settings Changes

For more details on saving or discarding changes, refer to the section **Saving or Discarding Settings Changes *(on page 25)***.

3.4.9. 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.

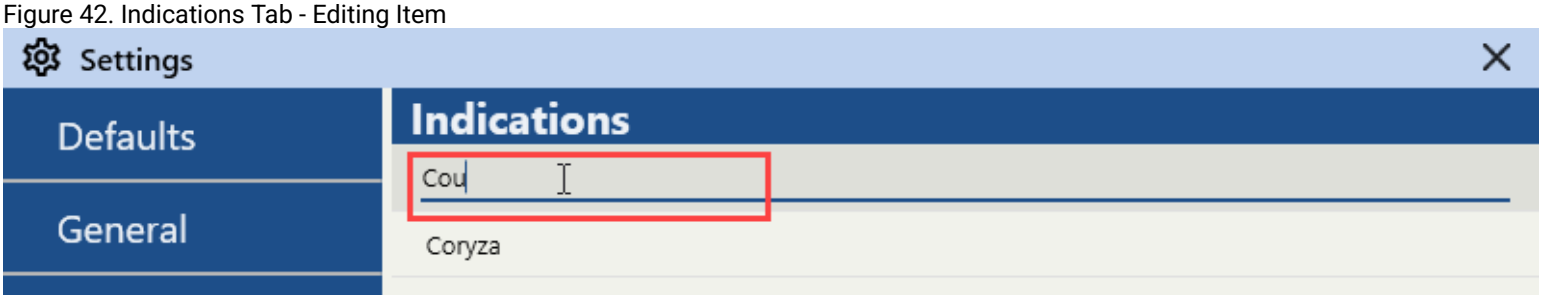
Figure 41. Settings Dialog Box - Indications Tab



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



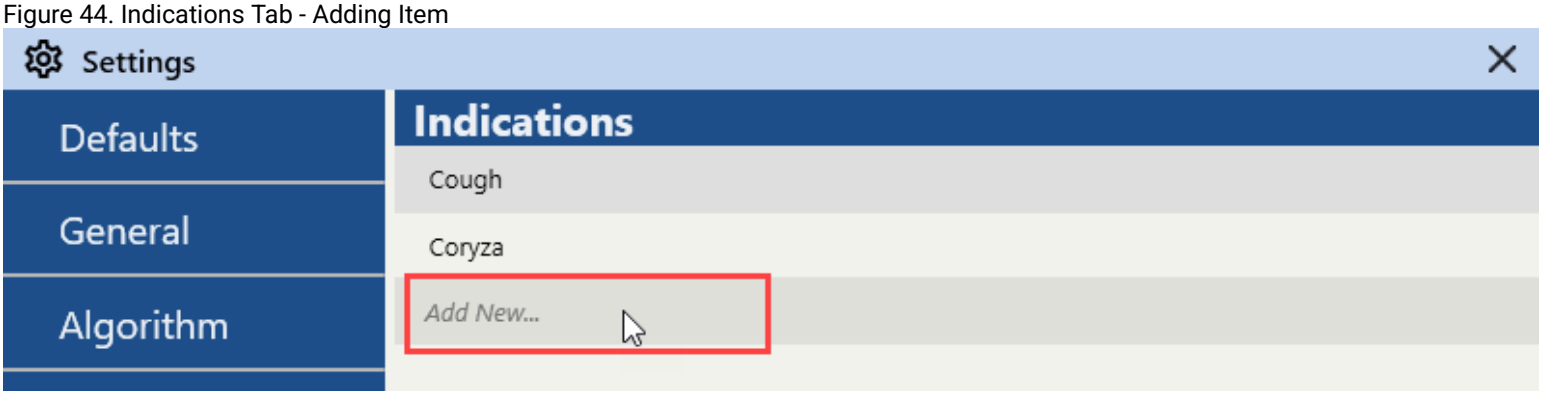
1. Click the line containing the indication you want to remove.
2. Delete the line's content by selecting the text you want to remove and pressing Backspace or Delete on your keyboard.
3. Press Enter on your keyboard to confirm your changes.
4. Remember to save the changes in the **Indications Tab**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

3.4.9.1. Saving or Discarding Settings Changes

For more details on saving or discarding changes, refer to the section **Saving or Discarding Settings Changes *(on page 25)***.

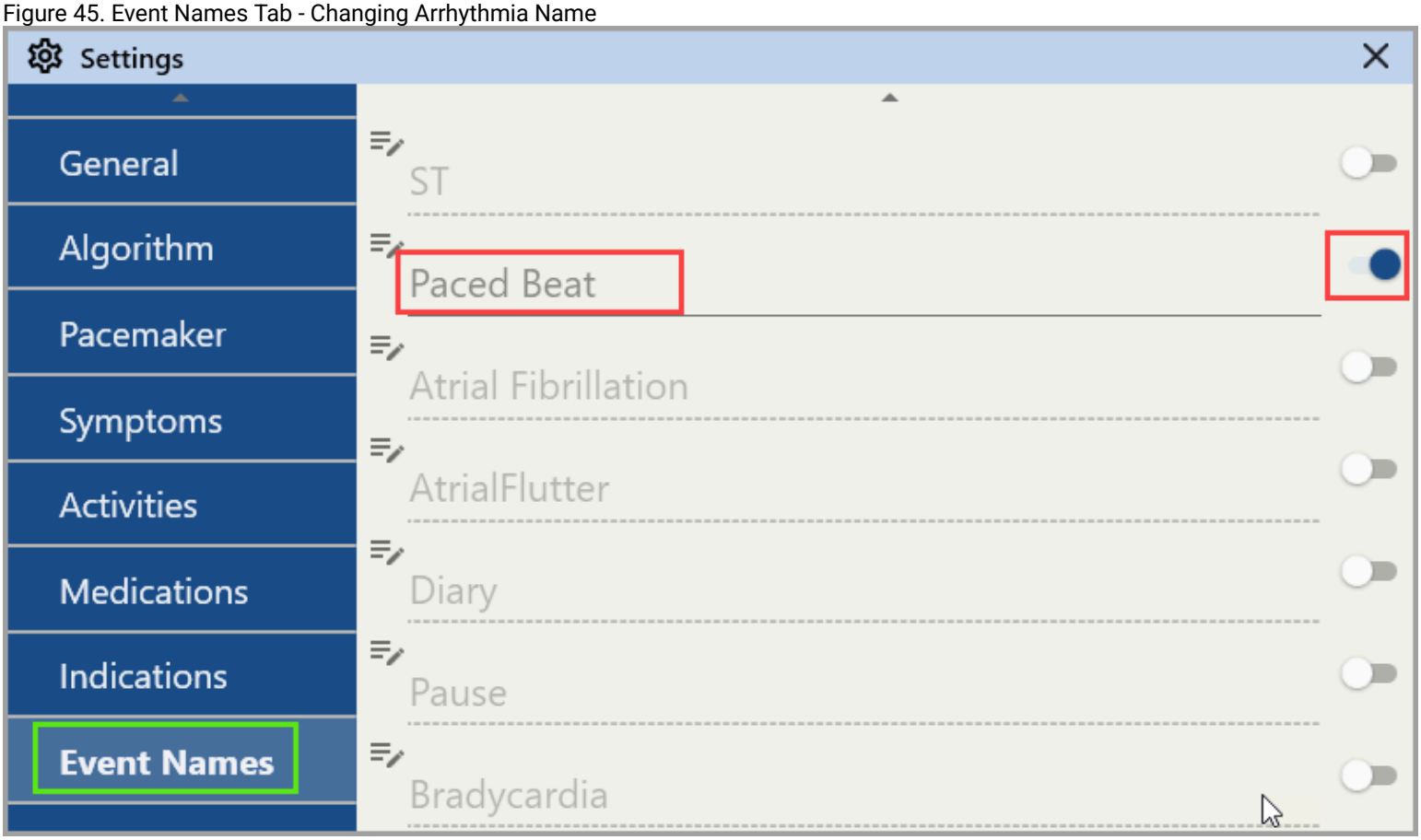
3.4.10. Event Names Tab

In this tab, you can edit the standard (default) arrhythmia names and change them according to your preference. This can be useful to accommodate different naming conventions in certain localities or for localization purposes.

To change the name of an arrhythmia type:

1. Click the toggle button (to turn it **ON**) near the desired arrhythmia type to unlock the relevant text field.
2. Enter the new name for this particular arrhythmia type in the unlocked text field.

Figure 45. Event Names Tab - Changing Arrhythmia Name



Once updated, the new name of the arrhythmia will be used throughout the app.

To revert the change:

1. Click the toggle button (to turn it **OFF**) near the desired arrhythmia type. The arrhythmia name will revert to the default. There is no need for manual editing to restore the original name.

3.4.10.1. Saving or Discarding Settings Changes

For more details on saving or discarding changes, refer to the section **Saving or Discarding Settings Changes *(on page 25)***.

3.4.11. Devices Tab

The **Devices Tab** enables the user to adjust the parameters of the application's **Device Manager** mode. In this mode, a user can only use two functions in the **Devices View**: **Prepare recorder** and **Download study**. This mode is available without an additional license and can be used, for example, by a technician.

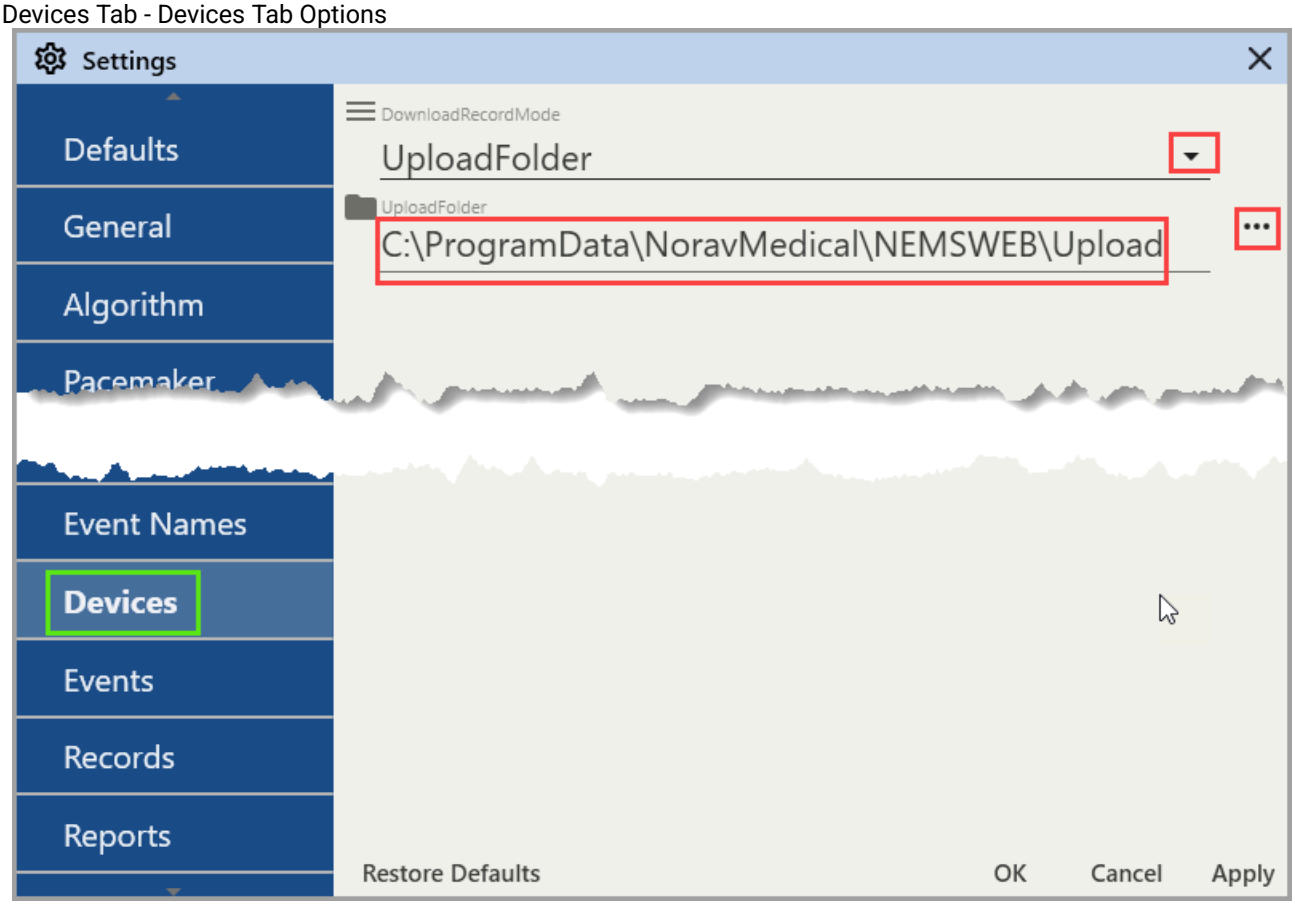
Test records can be downloaded either to the **Records List** within the app or to the external **Upload Folder**. Select an appropriate option from the **Download Record Mode** drop-down.

You can also adjust the **Upload Folder** path.

To adjust the Upload Folder path:

- Type in a new **Upload 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 the upload folder.
    3. Click the **Select Folder** button in the bottom right corner of the Windows Explorer window.

Figure 46. Devices Tab - Devices Tab Options



Once done, you will see the new **Upload Folder** path displayed in this tab.

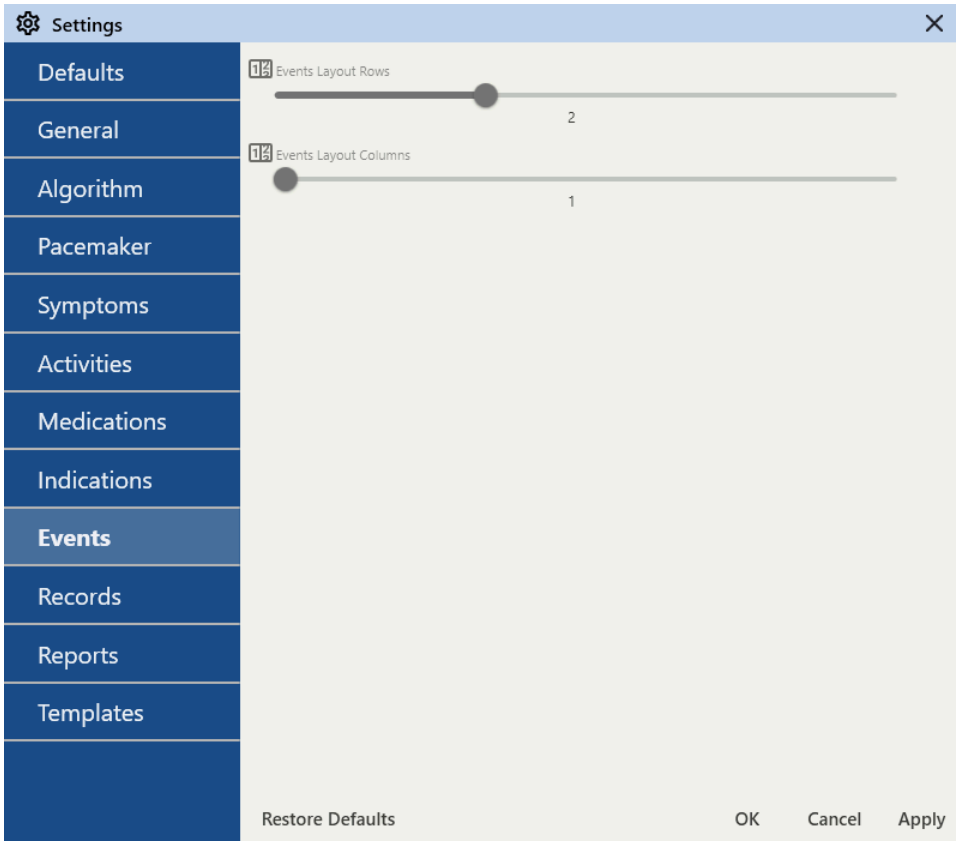
3.4.11.1. Saving or Discarding Settings Changes

For more details on saving or discarding changes, refer to the section **Saving or Discarding Settings Changes *(on page 25)***.

3.4.12. 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

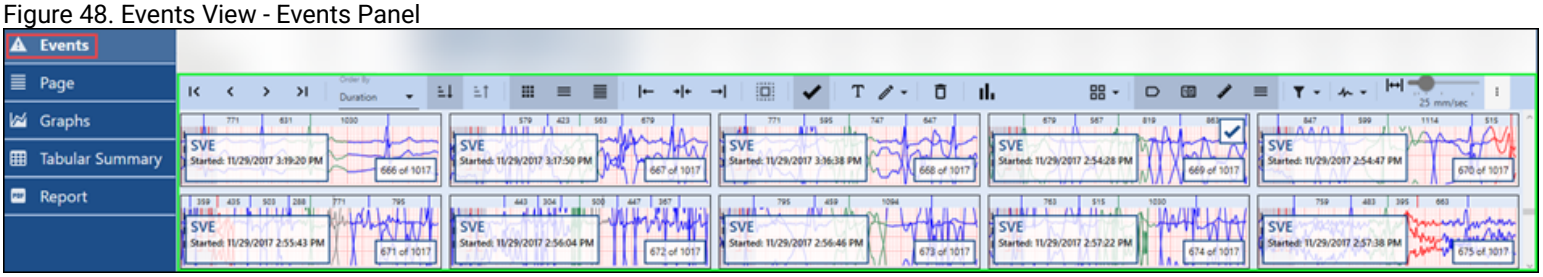
Drag this slider to set the number of columns for the **Events Panel** layout, ranging from 1 to 10. This adjustment affects how many columns of events blocks are visible in the **Events Panel**.

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



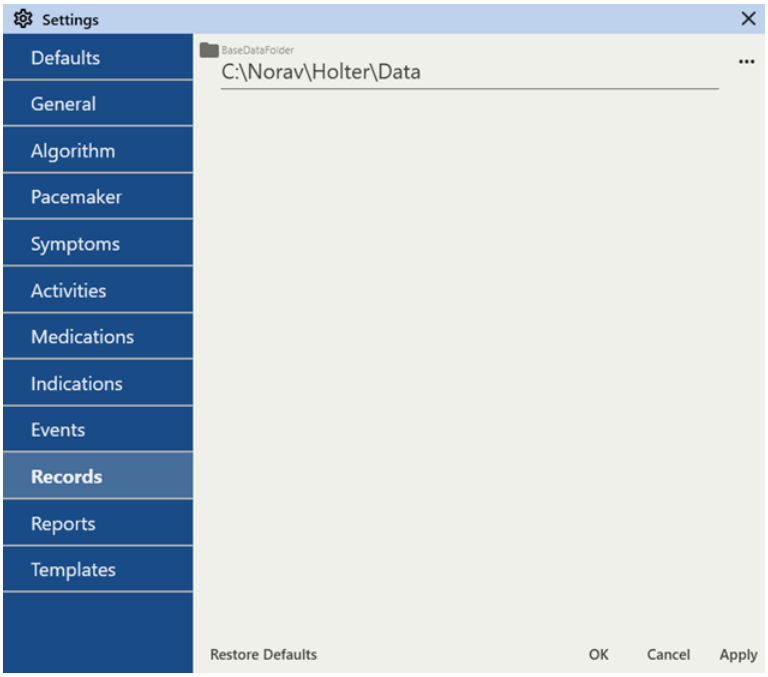
3.4.12.1. Saving or Discarding Settings Changes

For more details on saving or discarding changes, refer to the section **Saving or Discarding Settings Changes *(on page 25)***.

3.4.13. 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.

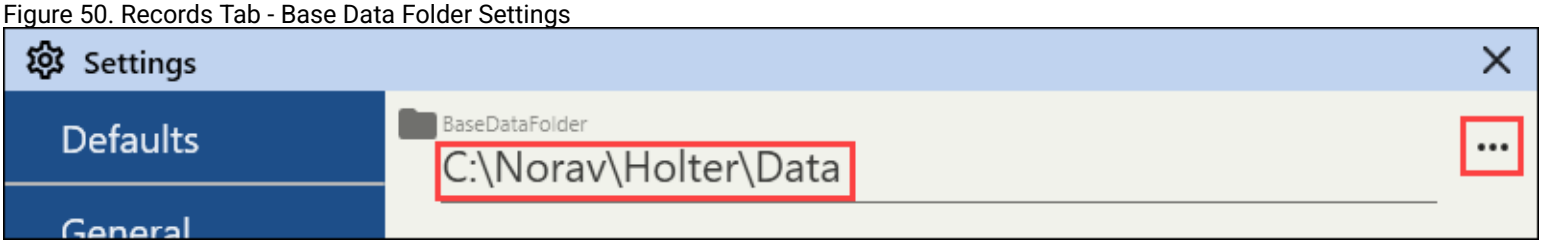
Figure 49. Settings Dialog Box - Records Tab



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 50. 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.

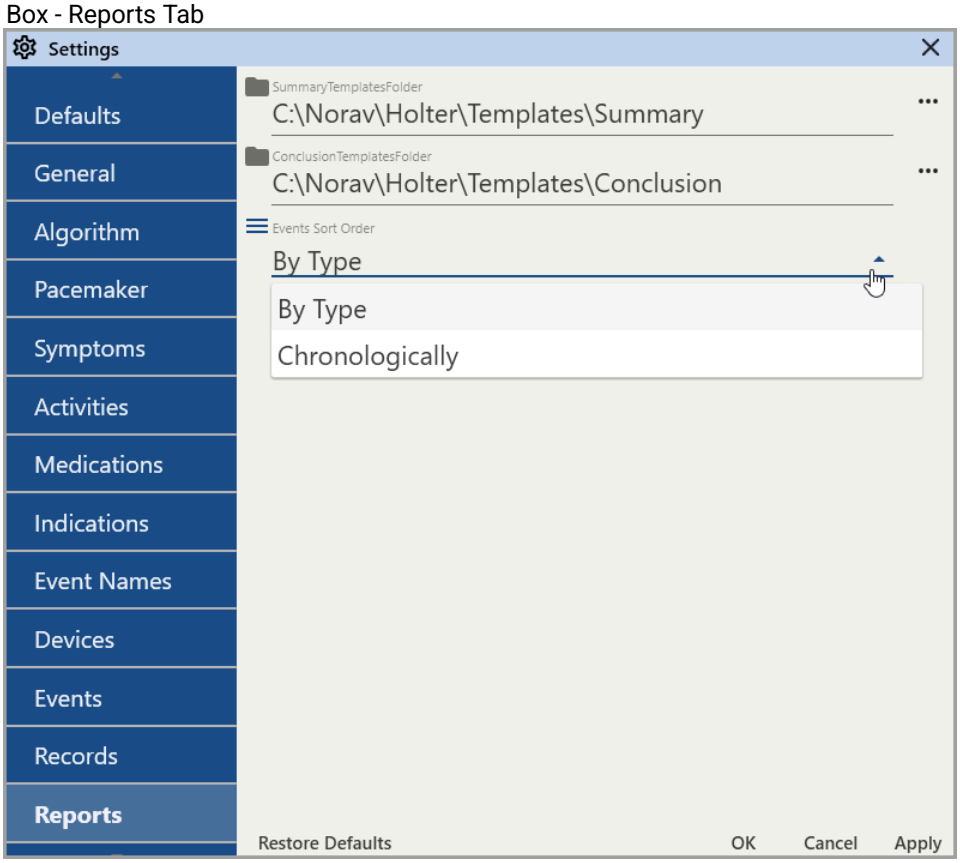
3.4.13.1. Saving or Discarding Settings Changes

For more details on saving or discarding changes, refer to the section **Saving or Discarding Settings Changes *(on page 25)***.

3.4.14. Reports Tab

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

Figure 51. Settings Dialog Box - Reports Tab

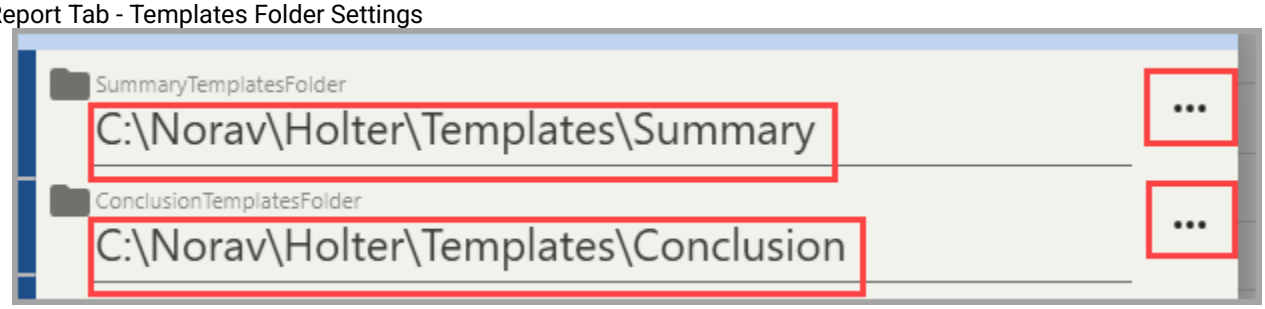


Summary and Conclusion Templates Folder

You can specify the folders used for storing **Summary** and **Conclusion** report templates.

To adjust the Summary or Conclusion Templates Folder path:

Figure 52. Report Tab - Templates Folder Settings



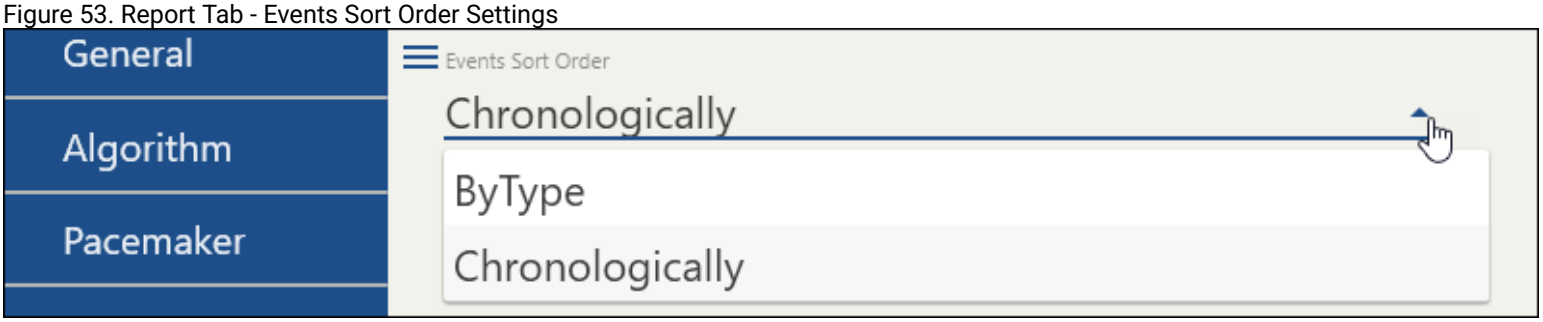
- Type in a new path for the **SummaryTemplatesFolder** or **ConclusionTemplatesFolder** in the corresponding text field.
- Click the ellipsis button on the right to open a Windows Explorer window, and then:
    1. Navigate to the desired location on your PC.
    2. Select or double-click the folder you want to use as the templates folder.
    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 53. Report Tab - Events Sort Order Settings



- **By Type**: Events will be sorted by their type.
- **Chronologically**: Events will be sorted by time.

Note: You can also modify the **Events Sort Order** directly in the **Report View** *(on page 270)*, just before selecting the **Generate Report** button.

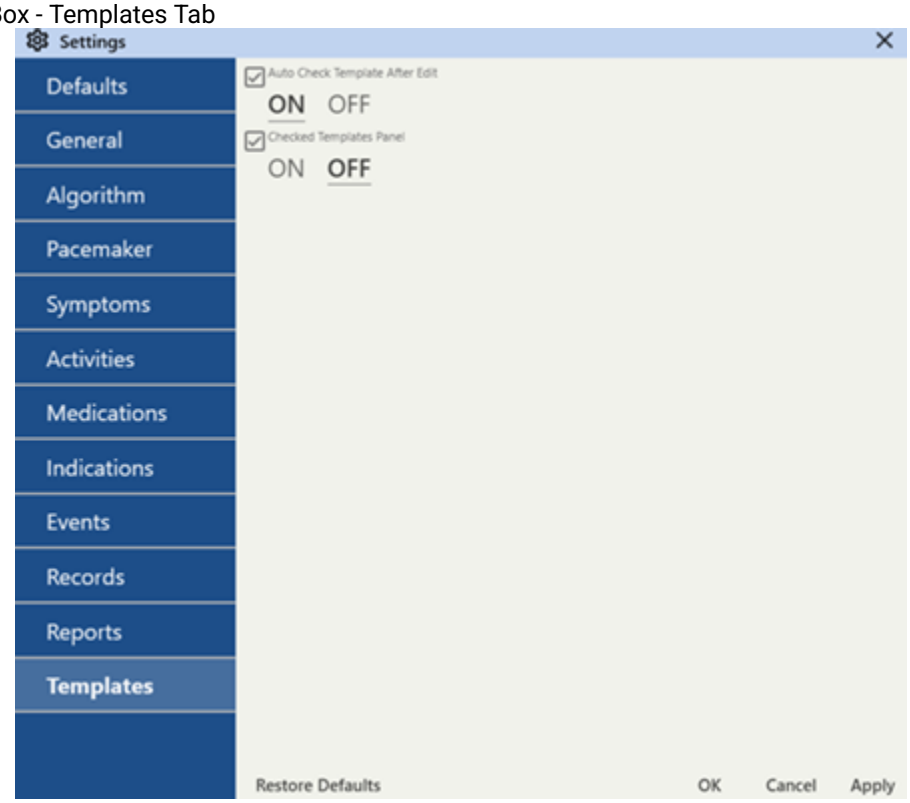
3.4.14.1. Saving or Discarding Settings Changes

For more details on saving or discarding changes, refer to the section **Saving or Discarding Settings Changes** *(on page 25)*.

3.4.15. Templates Tab

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

Figure 54. Settings Dialog Box - Templates Tab



Auto Check Template After Edit

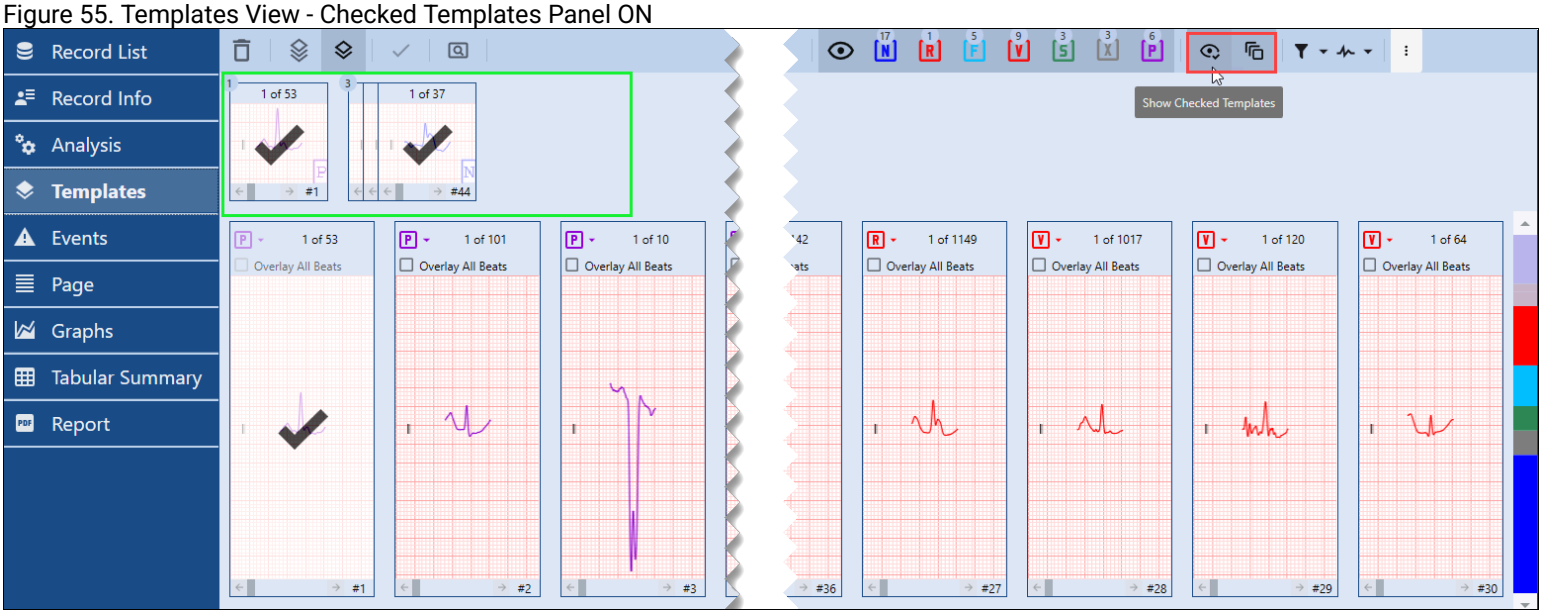
Select **ON** to automatically assign the "Checked" status to beat templates after you complete editing them. This option can help you speed up the templates review process.

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

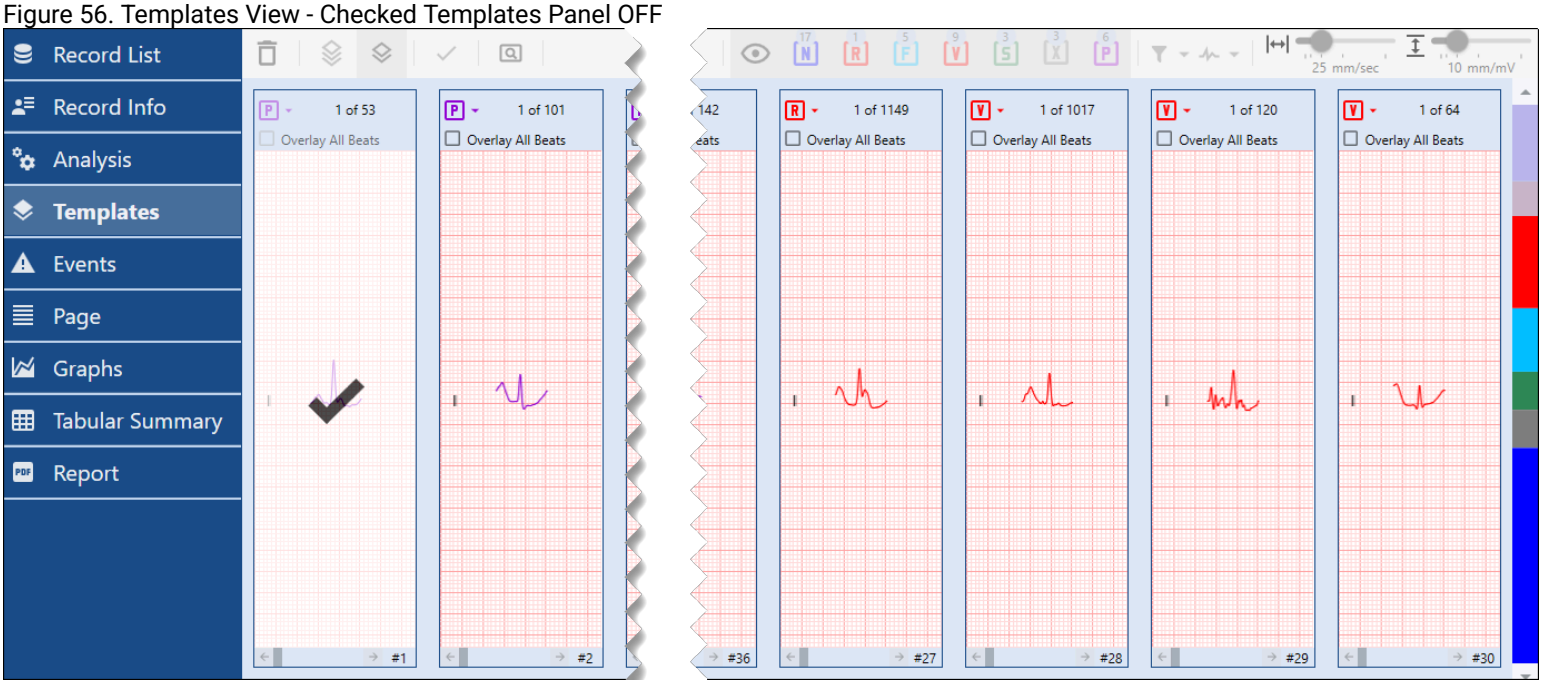
Select **ON** to enable a dedicated panel for checked templates in the top part of the **Templates View**. When it's set to ON, you will also see additional control buttons in the top action bar, allowing you to disable or enable the the **Checked Templates Panel** itself and a display of the checked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

Figure 55. 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 56. Templates View - Checked Templates Panel OFF



3.4.15.1. Saving or Discarding Settings Changes

For more details on saving or discarding changes, refer to the section **Saving or Discarding Settings Changes *(on page 25)***.

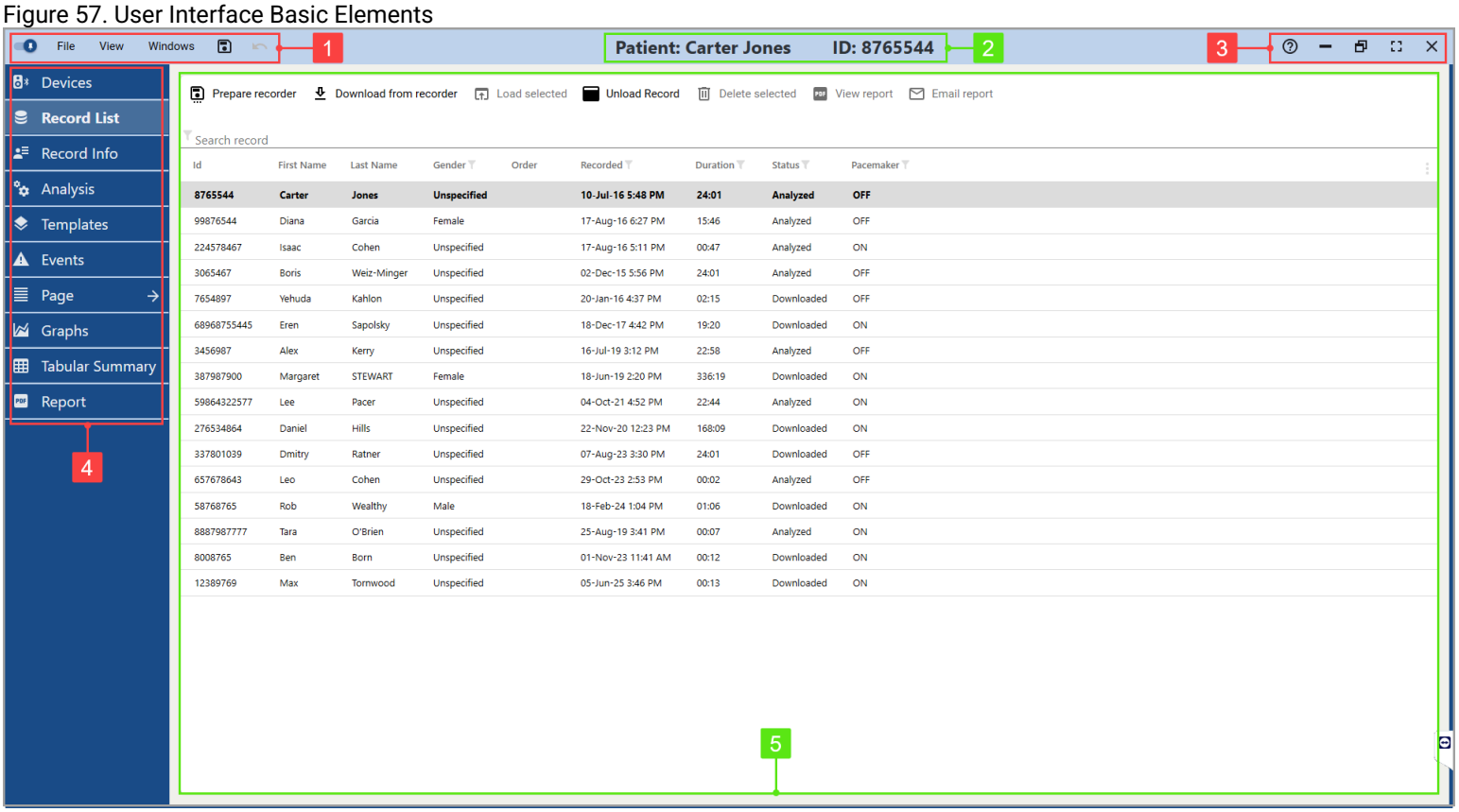
4. Interface Core Elements Overview

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 57. 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.

4.1. 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 58. Menu Bar - No Records Loaded



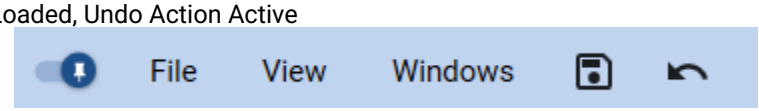
- **Record Loaded (No Actions Made):** When a patient record is loaded in the system but no actions have been made, only the Undo button and Export Record function are inactive.

  Figure 59. 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.

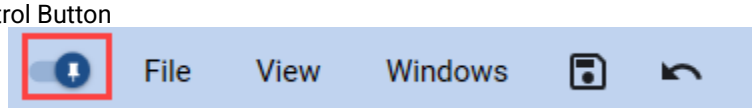
  Figure 60. Menu Bar - Record Loaded, Undo Action Active



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 61. Menu Bar - Sidebar Control Button

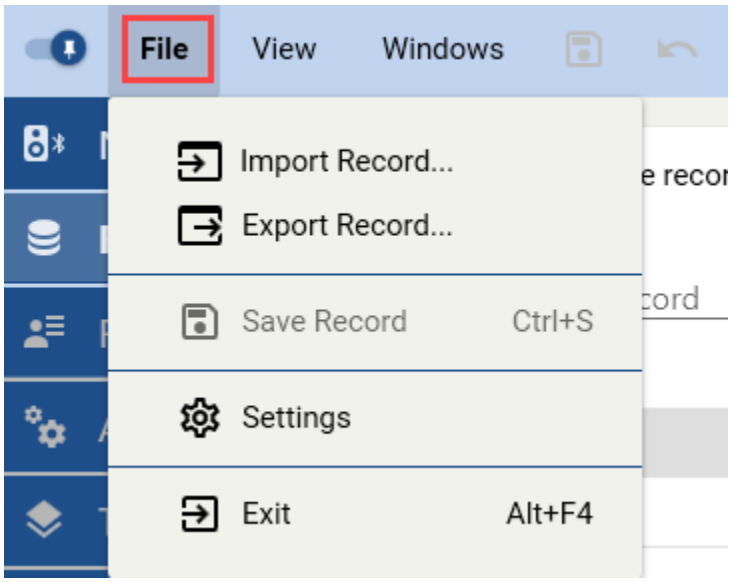


- **Collapse**: Click the **Sidebar Control Button** when the **Views Sidebar** is expanded to collapse it. This will automatically expand the **View Area**, providing more screen space.
- **Expand**: Click the **Sidebar Control Button** when the **Views Sidebar** is collapsed to expand it, revealing 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 62. Menu Bar - File Menu



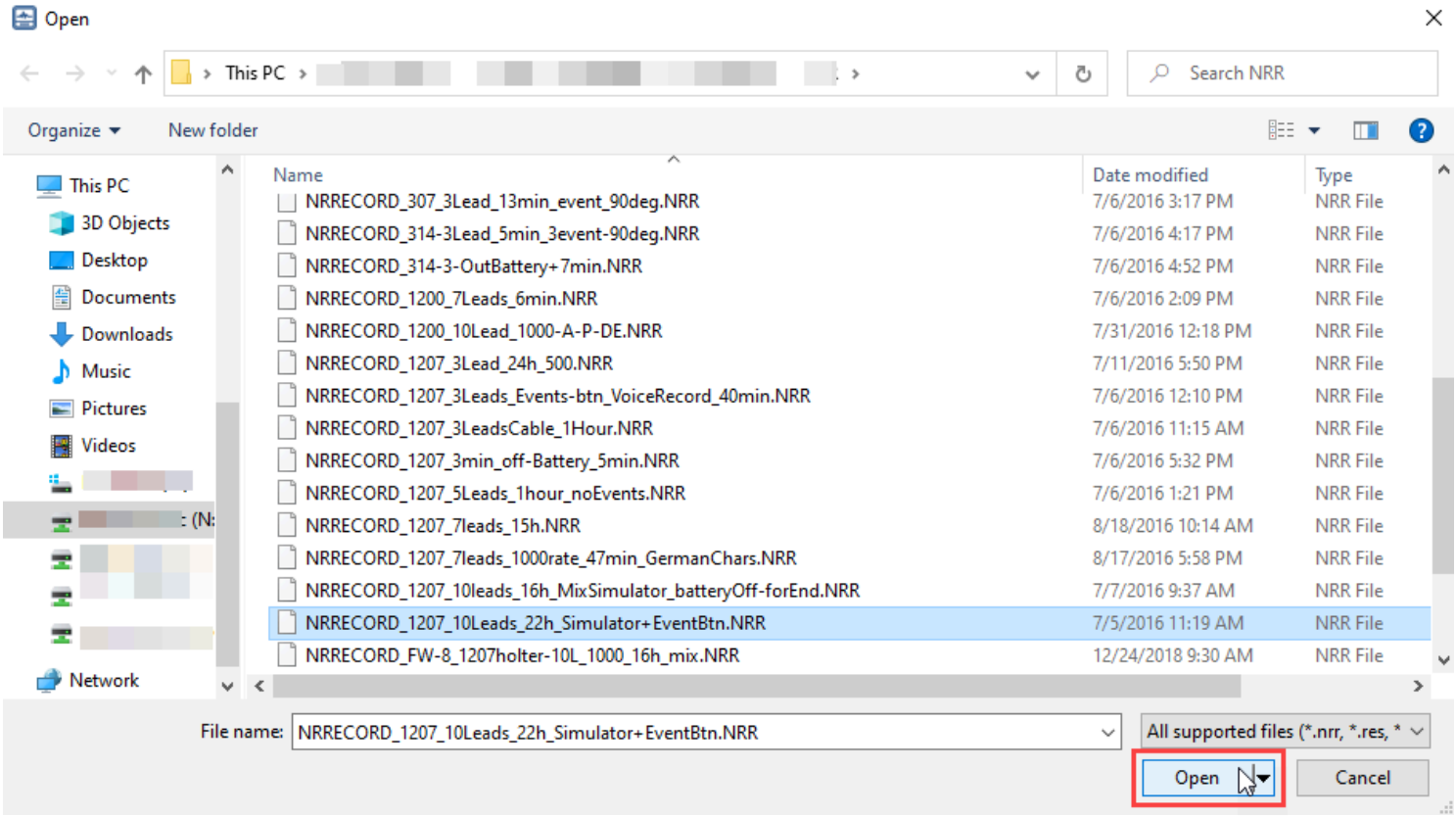
Import Record

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:

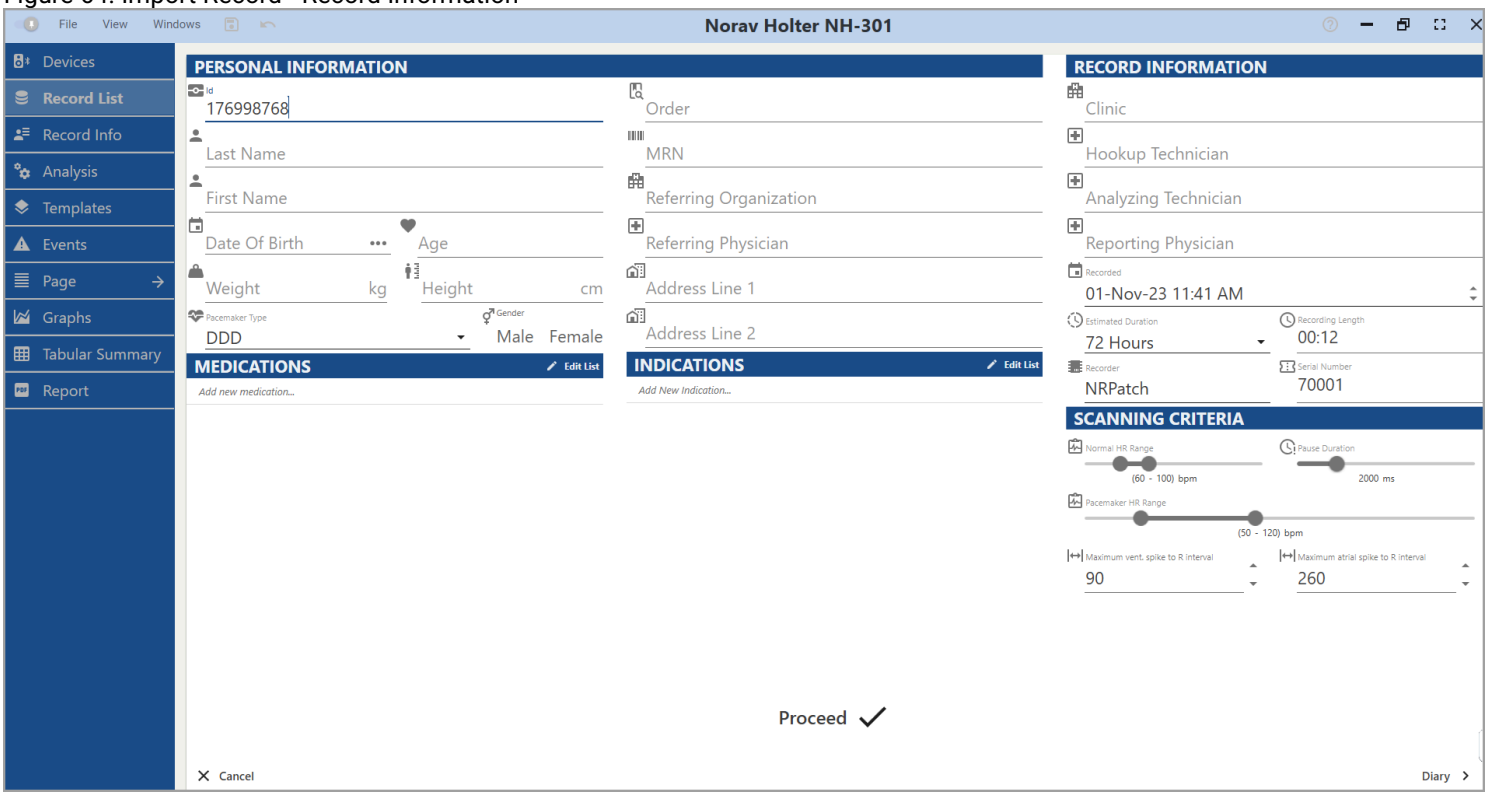
1. Click the **File** menu.
2. Click the **Import Record** option to open a Windows Explorer Window:
    2.1. Navigate to the desired folder.
    2.2. Select one .nrr, .res, or .hl5 file (only one file at a time).
    2.3. Click the **Open** button in the bottom right corner.

Figure 63. Import Record - Open Record



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

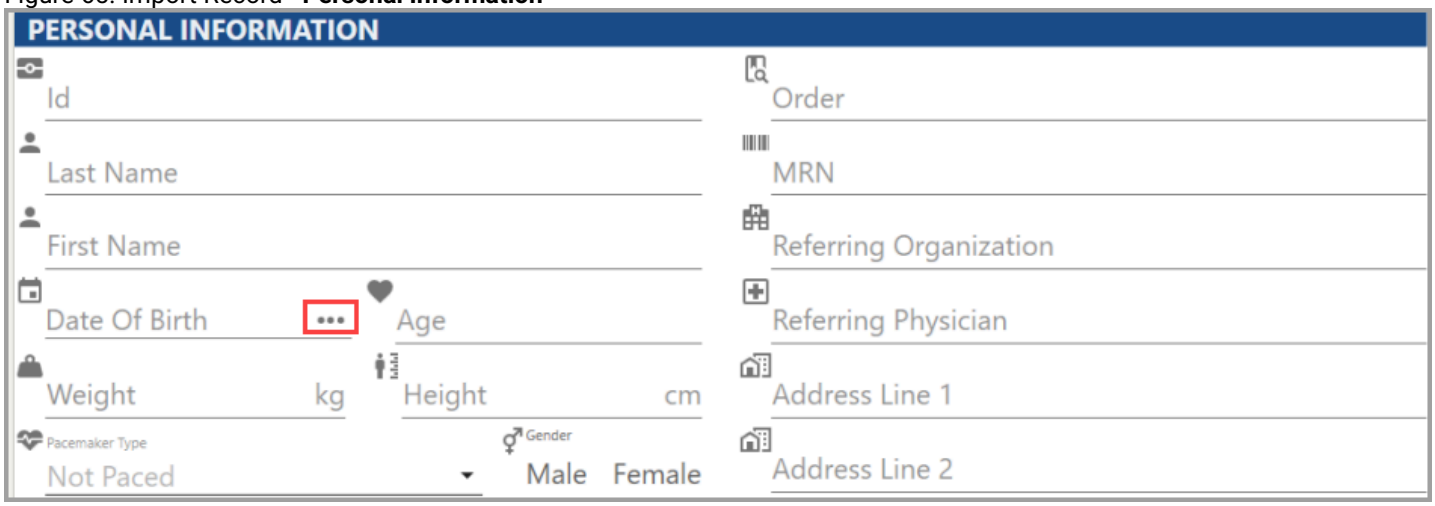
Figure 64. Import Record - Record Information



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:

3.1. In the **Personal Information** section:

Figure 65. Import Record - **Personal Information**



3.1.1. Click on each text field (**ID**,**First Name**,**Last Name**, **Age**, etc.) and type in the data according to your needs and workflows.

3.1.2. Click on the **Date Of Birth** field and type in the date or use the ellipsis button on the right to select from a calendar.

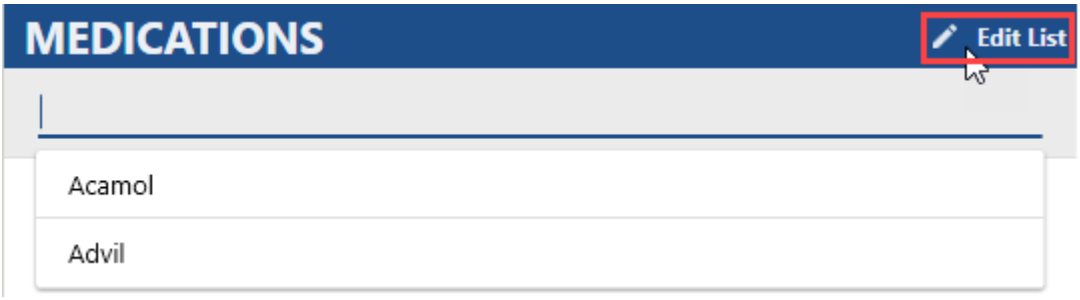
3.1.3. Select the pacemaker from the **Pacemaker Type**, if needed. When performing the import, you can specify the type of the patient's pacemaker if it wasn't specified earlier.

3.1.4. Select the patient's gender.

3.1.5. Fill in **Order**, **MRN**, etc., if needed.

3.2. In the **Medications** section:

Figure 66. Import Record - **Medications**



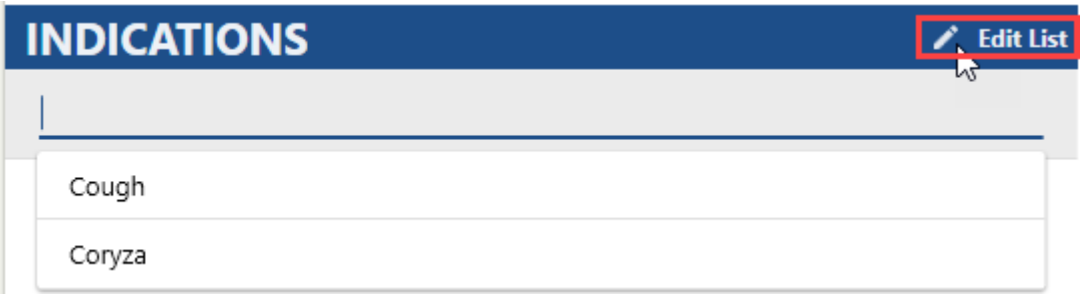
3.2.1. Click "Add New Medication" to open a drop-down list with predefined medications.

3.2.2. 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.

3.2.3. To modify the list of predefined medications, click the **Edit List** icon located at the top right.

3.3. In the **Indications** section:

Figure 67. Import Record - **Indications**



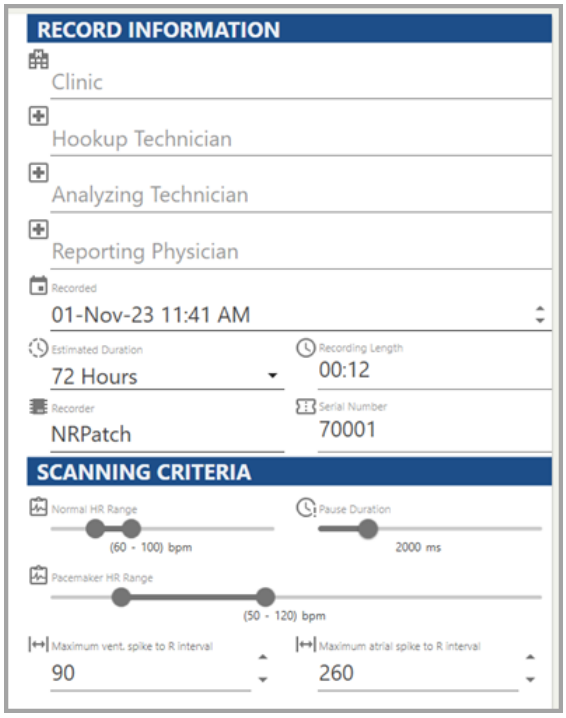
3.3.1. Click "Add New Indication" to open a drop-down list with predefined indications.

3.3.2. 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.

3.3.3. To modify the list of predefined indications, click the **Edit List** icon located at the top right.

3.4. In the **Record Information** section:

Figure 68. Import Record - Record Information Section



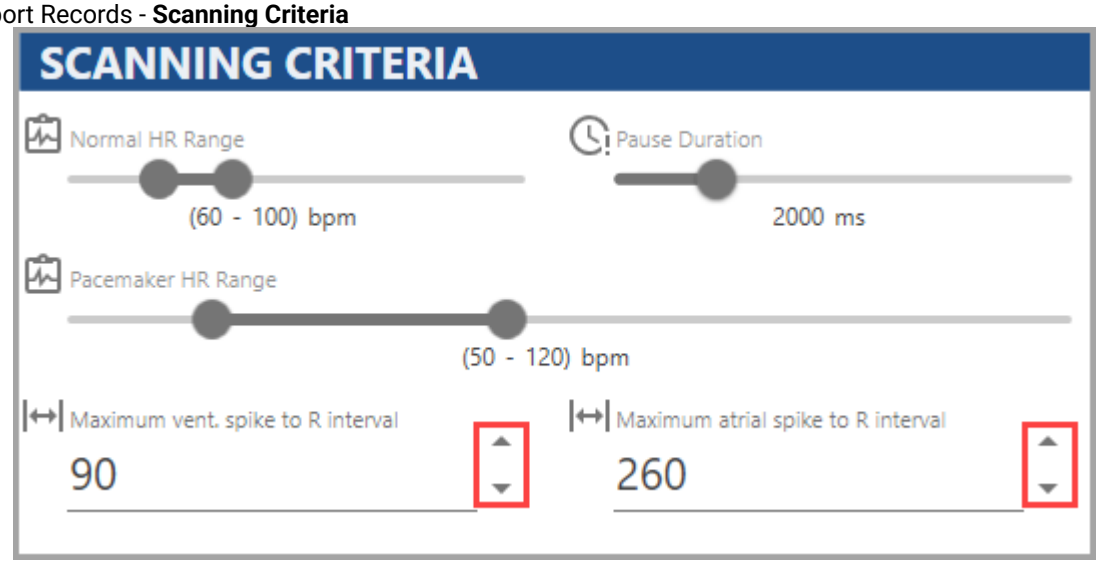
3.4.1. Click on each available text field (**Clinic**, **Hookup Technician**, etc.) and type in the data according to your needs and workflows.

3.4.2. Select the **Estimated Duration** value for the record from the drop-down list (24 to 336 hours). The default value is set to 24 hours.

Please note that the data in other fields of this section cannot be modified.

3.5. In the **Scanning Criteria** section:

Figure 69. Import Records - **Scanning Criteria**



3.5.1. Drag the sliders to define the **Normal HR Range** and normal **Pause Duration** for the scanning process.

3.5.2. Drag the sliders to define the normal **Pacemaker HR Range**.

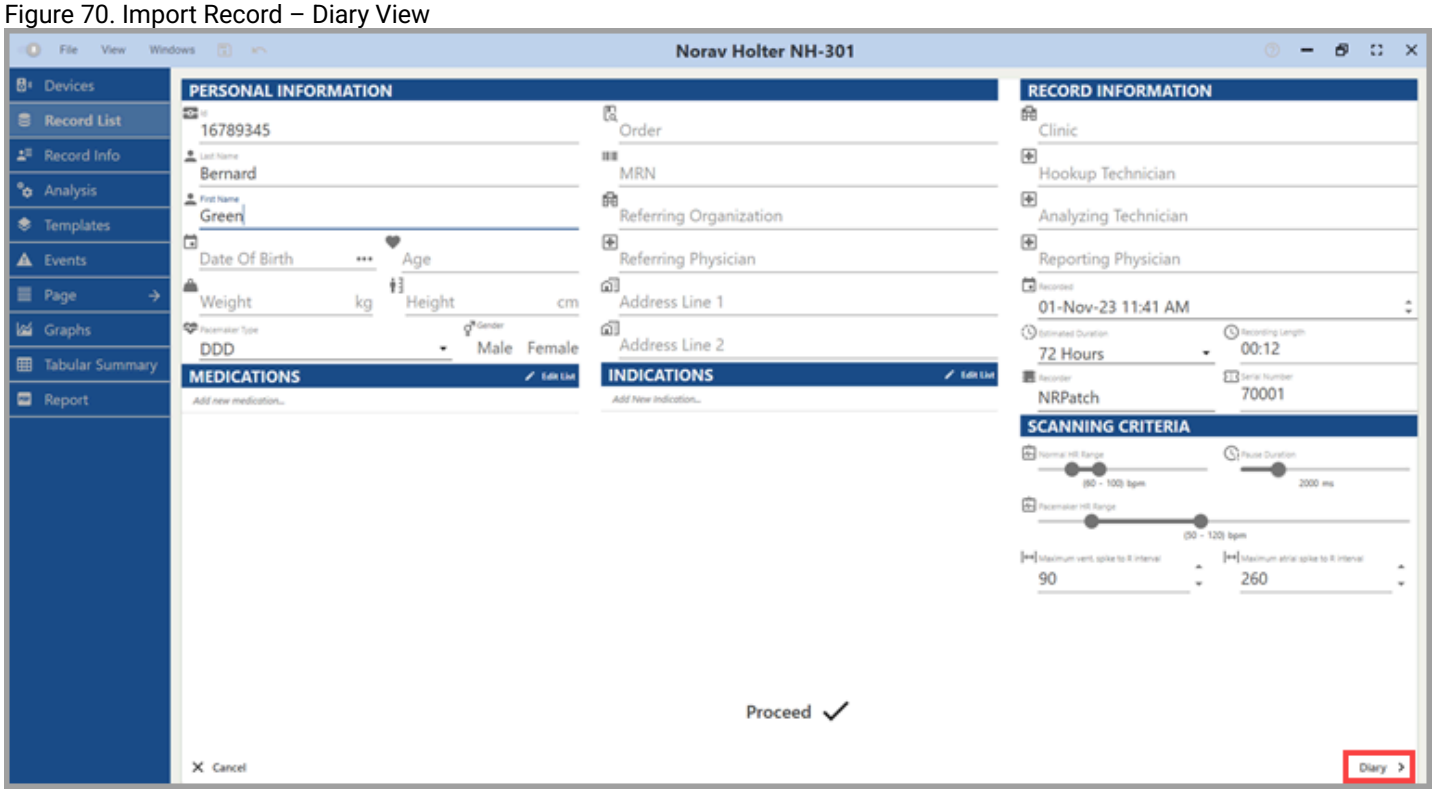
3.5.3. Set **Maximum vent. spike to R interval** and **Maximum atrial spike to R interval** by using the picker arrows on the right.

3.5.4. Set any additional parameters that may be available in this section.

4. **(Optional)** Review the patient's **Diary**. To review the **Diary**:

4.1. Click the **Diary** button in the bottom-right corner to switch to the **Diary View**.

Figure 70. Import Record – Diary View

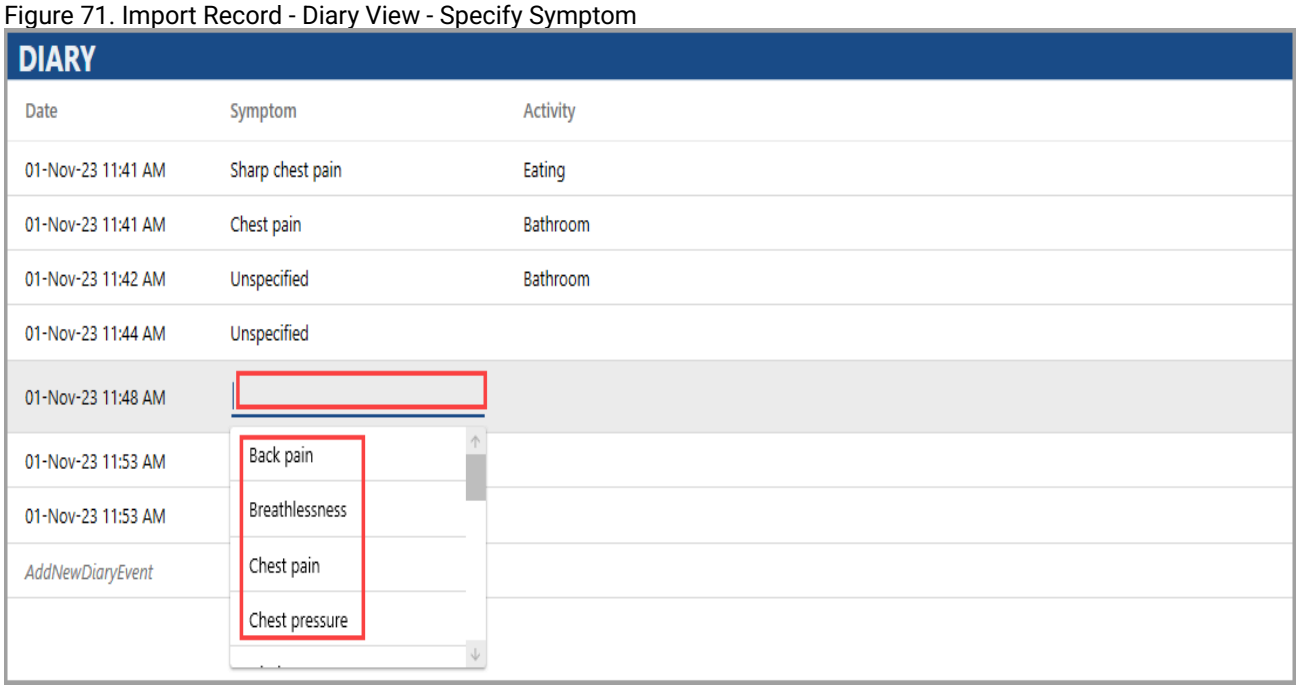


4.1.1. In the **Diary View**, review the list of diary events. Each row includes the event's **Date and Time**, **Symptom**, and **Activity**.

4.1.2. To specify a symptom or activity for an event marked as *Unspecified*, click the respective text field:

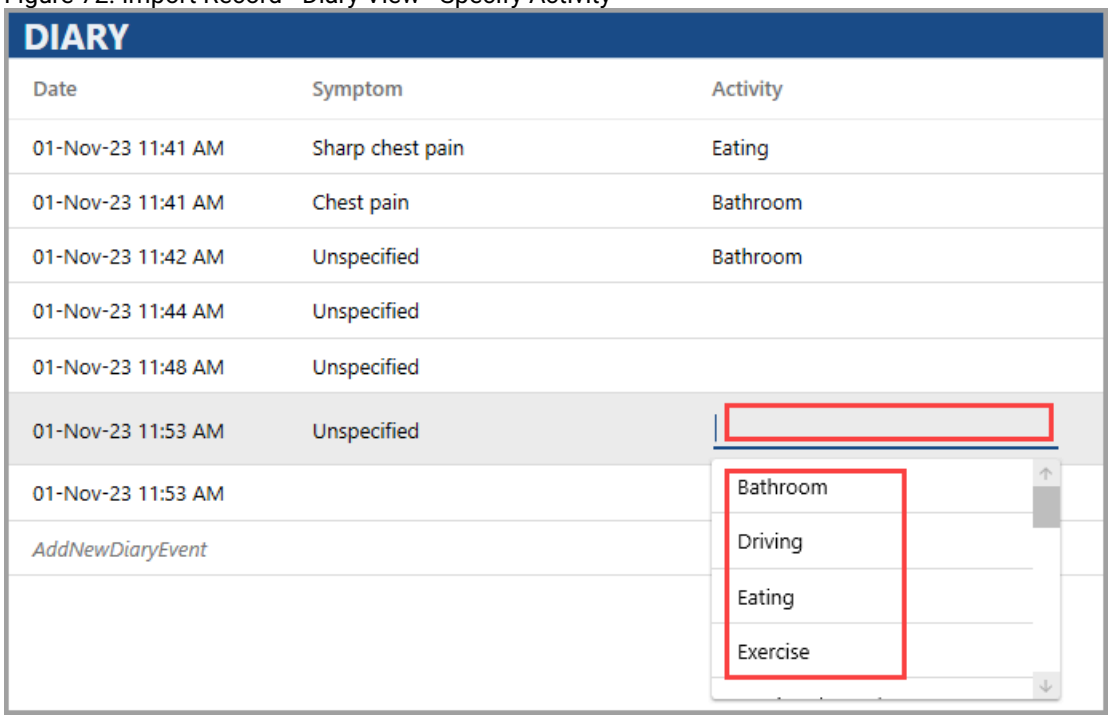
- For **Symptom**, delete the word *Unspecified* to open a drop-down list, then select an item or type in a custom symptom.

Figure 71. Import Record - Diary View - Specify Symptom



- For **Activity**, click the field to open a drop-down list, then select or enter the desired activity.

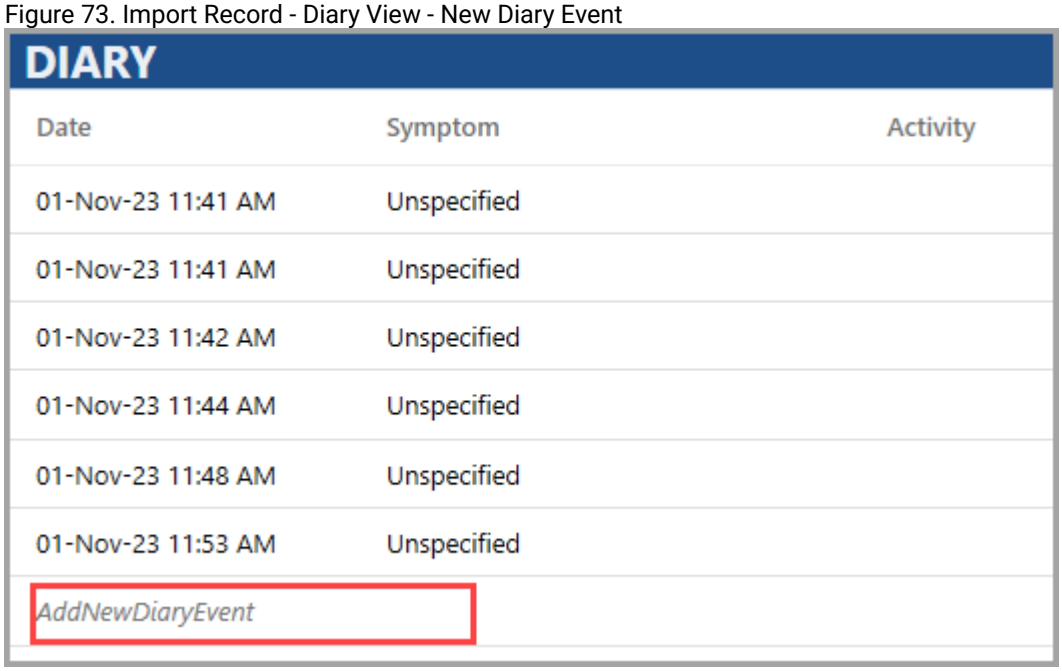
Figure 72. Import Record - Diary View - Specify Activity



4.1.3. To add a new diary event:

4.1.3.1. Click **AddNewDiaryEvent** below the last event.

Figure 73. Import Record - Diary View - New Diary Event



4.1.3.2. A new row will appear with blank **Symptom** and **Activity**fields.

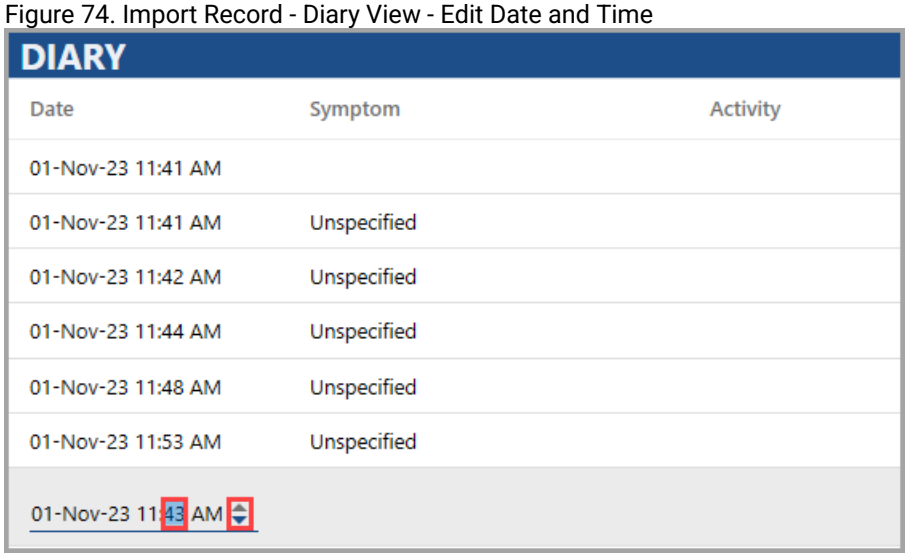
4.1.3.3. The time of the new event will match the time of the preceding one. Modify it if needed using the method described in the step below.

4.1.4. To edit the **Date and Time** of a **new** diary event:

4.1.4.1. Click on the relevant field (day, month, year, hour, or minute).

4.1.4.2. Use the up/down arrows to adjust the value, or type it in manually.

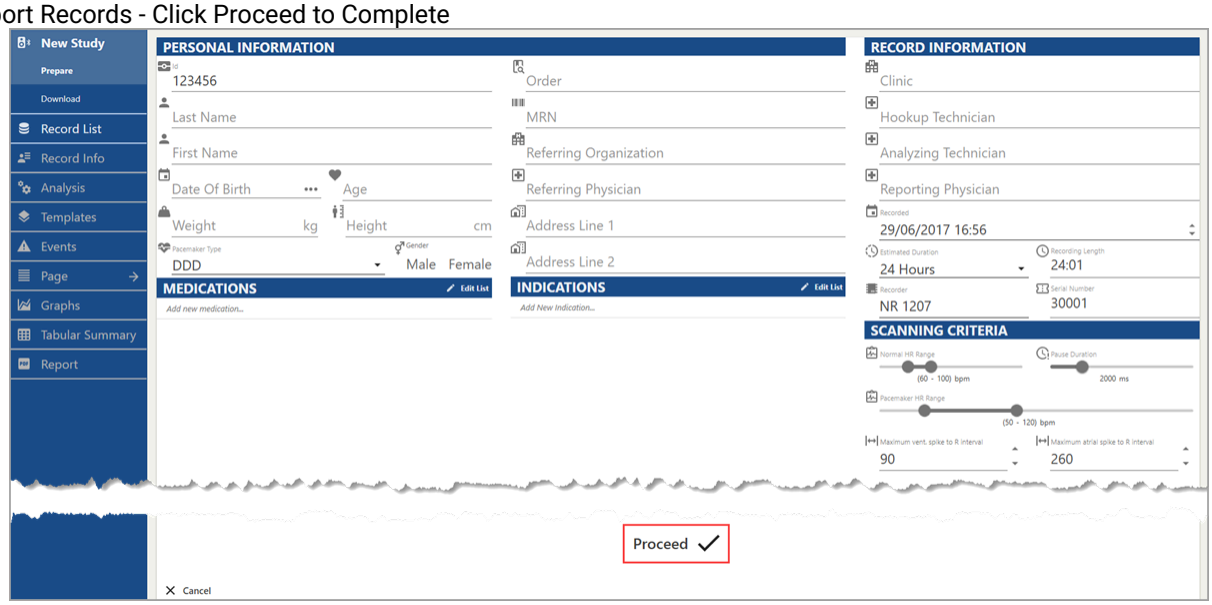
Figure 74. Import Record - Diary View - Edit Date and Time



Note: You can only edit the **Date and Time** of diary events that you have added. Editing the **Date and Time** of events that already existed in the record is not allowed. The allowed time range is limited to the start and end times of the record.

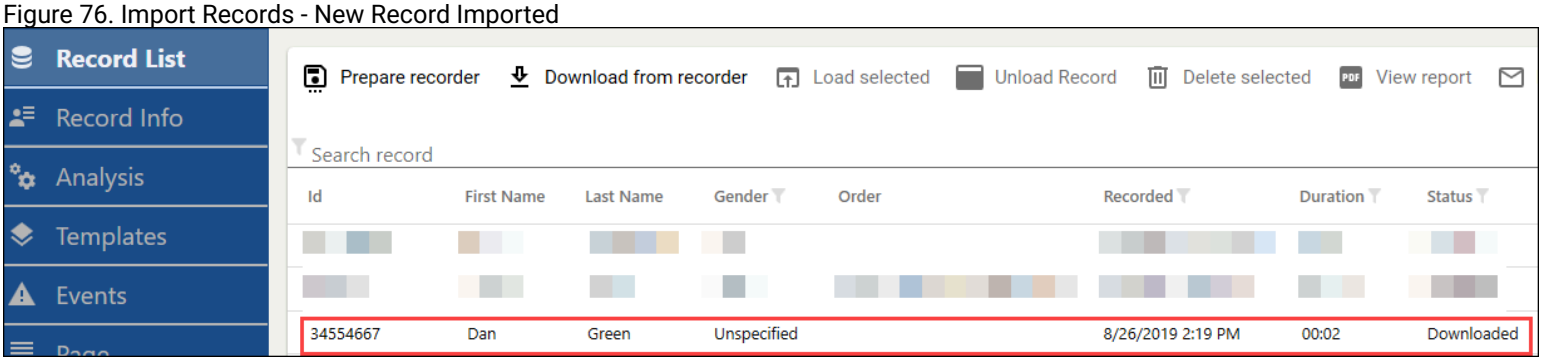
5. Click **Proceed** in the bottom part of the **View Area**.

Figure 75. Import Records - Click Proceed to Complete



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

Figure 76. Import Records - New Record Imported

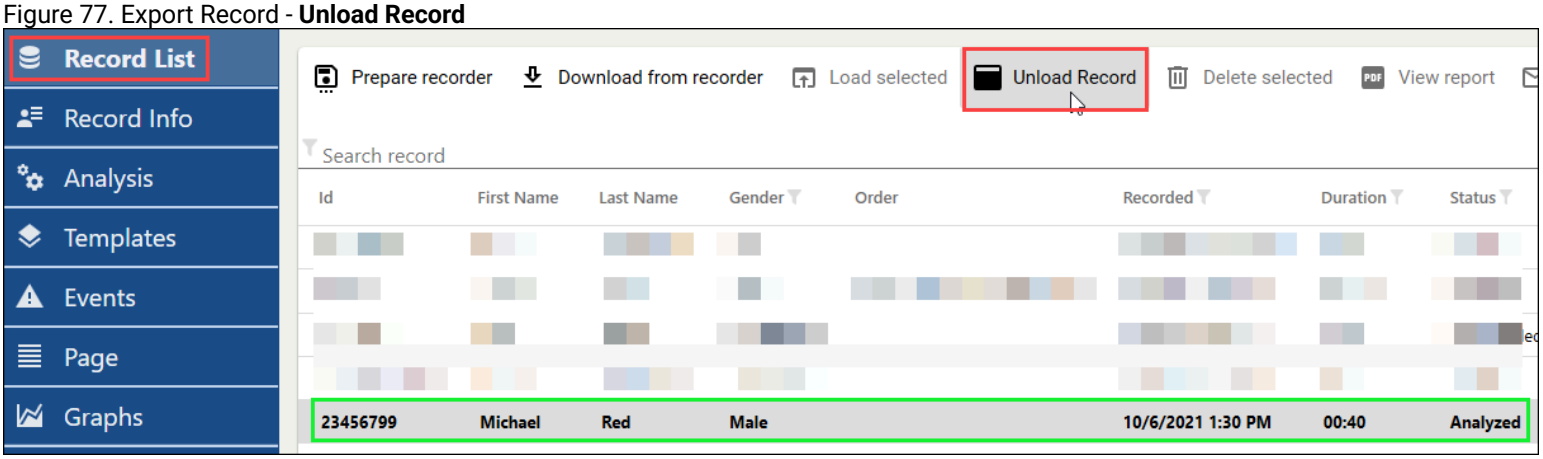


Export Record

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.

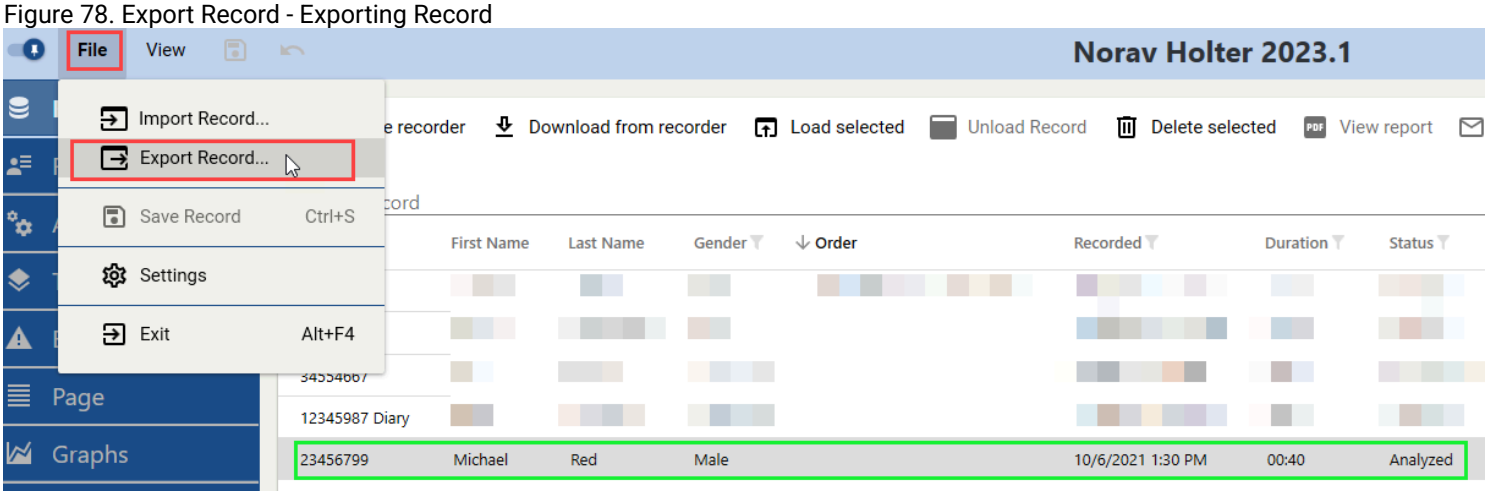
Figure 77. Export Record - **Unload Record**



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 78. Export Record - Exporting Record

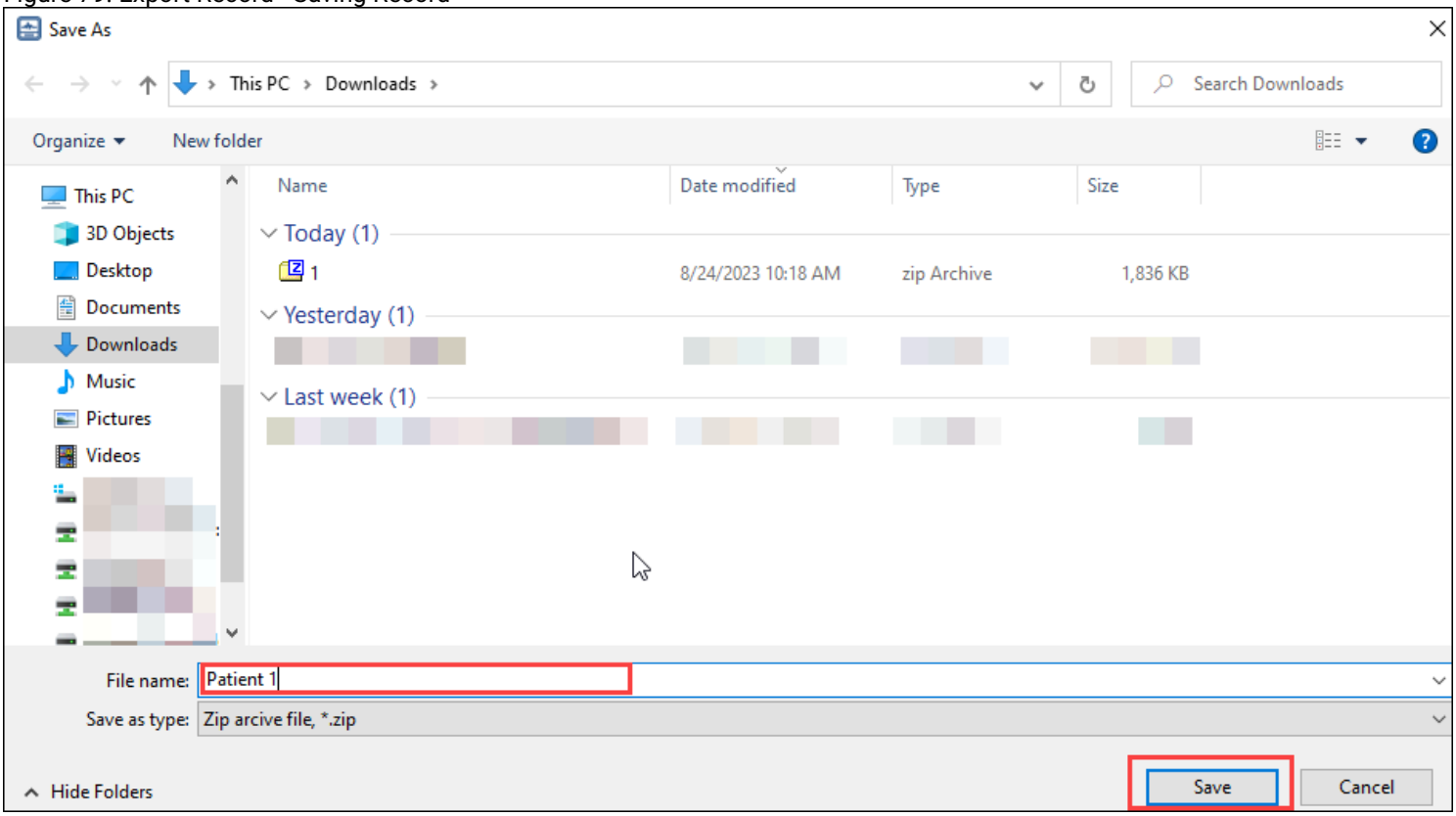


5. Click **Export Record** to open the Windows Explorer Window.

6. Navigate to the desired folder.

7. Type in the desired name of the file archive in the **File name** text field.

Figure 79. Export Record - Saving Record



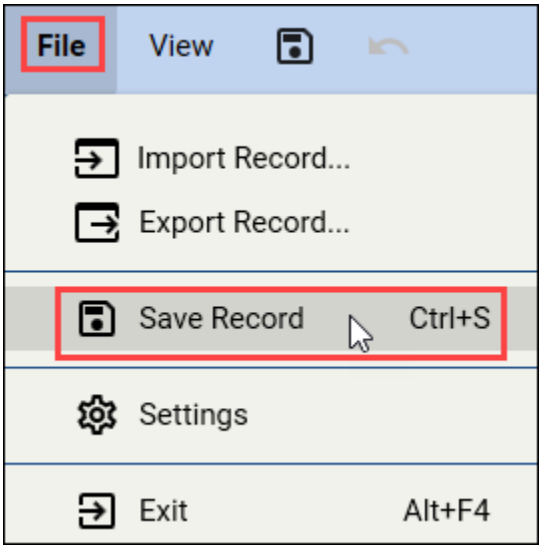
8. Click the **Save** button in the bottom right corner of the Windows Explorer Window.

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 80. 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

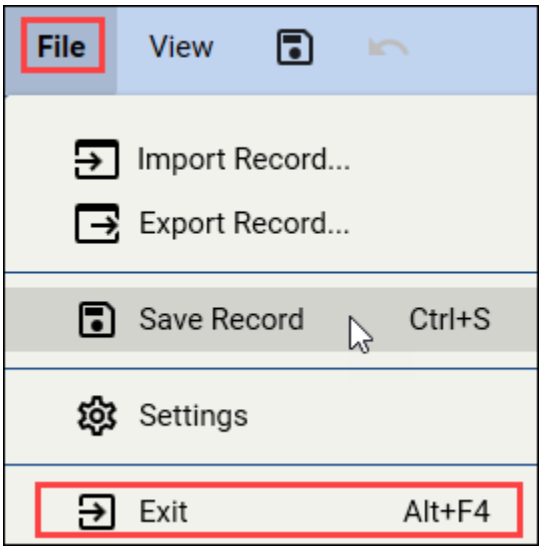
This option allows you to tailor the NH-301 software settings to meet your specific needs. For detailed instructions on how to modify these settings, please refer to the **Setup Process after Installation** ***(on page 22)*** section and follow the instruction, starting from the **Step 2**.

Exit

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

To exit the program:

Figure 81. 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.

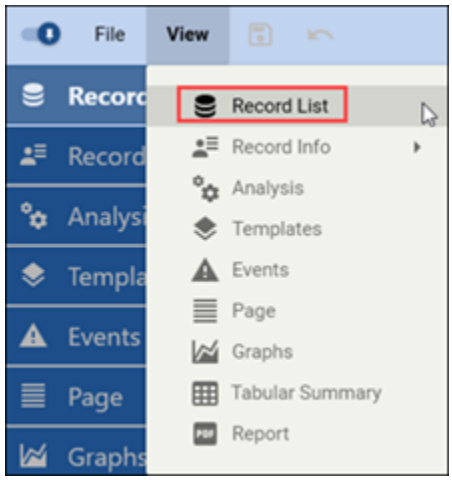
View Menu

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

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

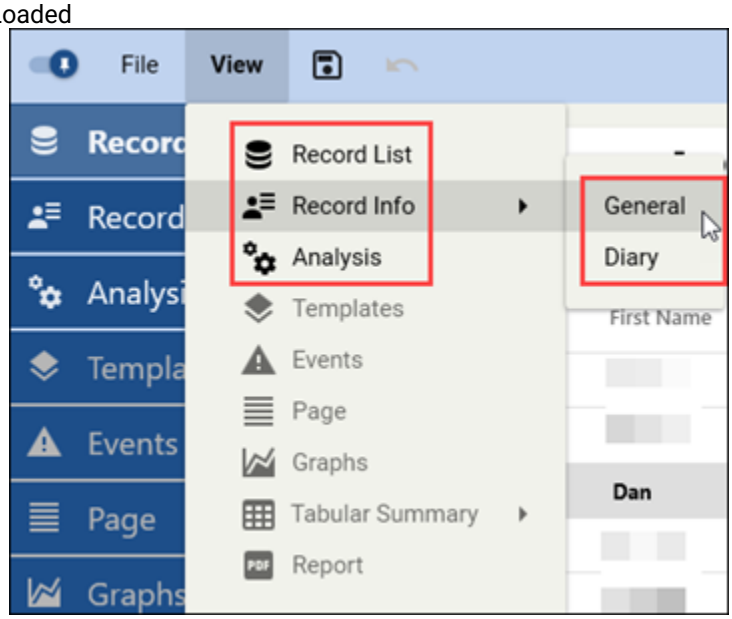
- **Default State (No Records Loaded):** When no patient records are loaded in the system, only the **Record List** option is accessible.

Figure 82. View Menu - No Records Loaded



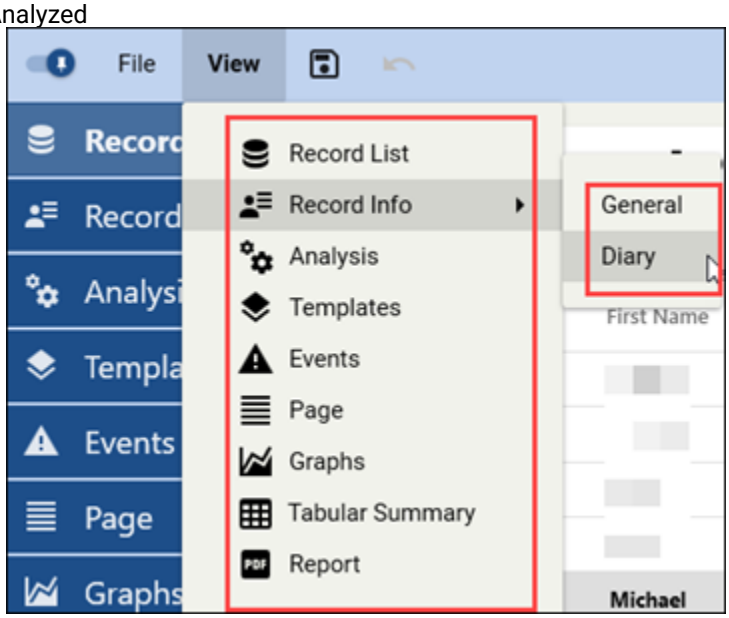
- **Record Loaded (Not Analyzed):** When a patient record is loaded into the system but it has never been analyzed within the application, only the **Record List** and **Record List** (with **General** and **Diary** subitems) options are accessible.

Figure 83. 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.

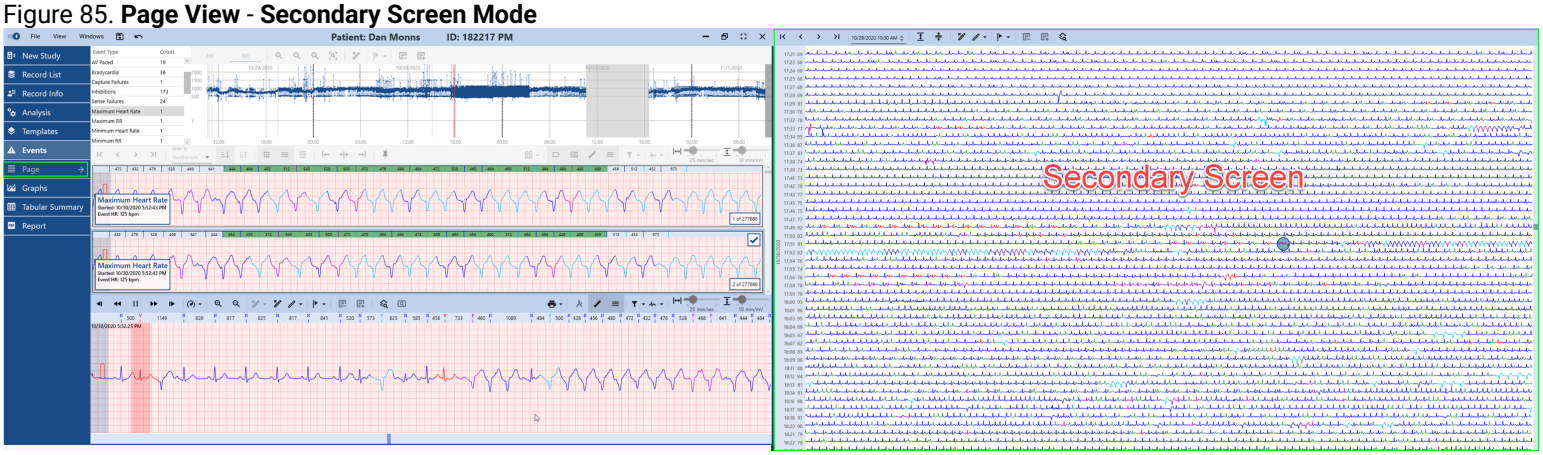
Figure 84. View Menu - Record Analyzed



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 85. **Page View** - **Secondary Screen Mode**

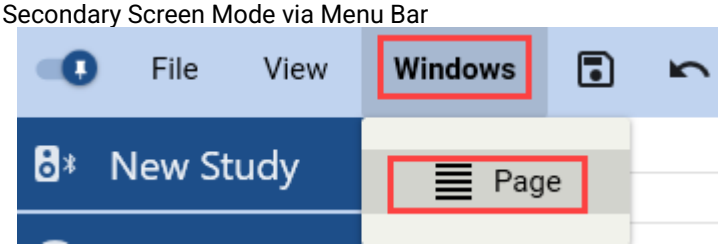


The **Page View** in **Secondary Screen Mode** replicates the functionality of the **Page View** strips in their respective **Views**.

To activate Secondary Screen Mode:

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

Figure 86. **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 260)*.

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.

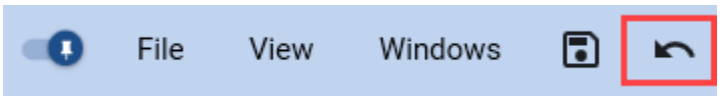
Figure 87. Menu Bar - Save Record Button



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 **Ctrl + 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 88. Menu Bar - Undo Button



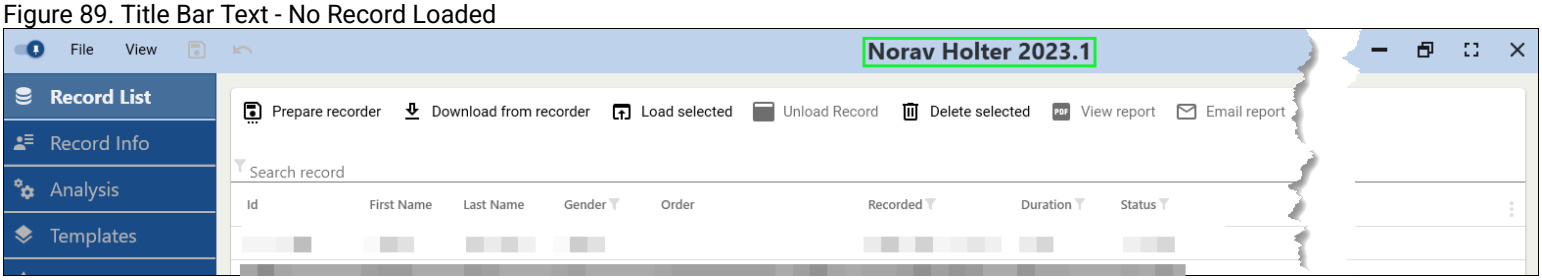
The **Undo** button can be used multiple times to undo a series of actions.

4.2. 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 89. 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 90. Title Bar Text - Record Loaded



4.3. 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 91. 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 92. 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**.

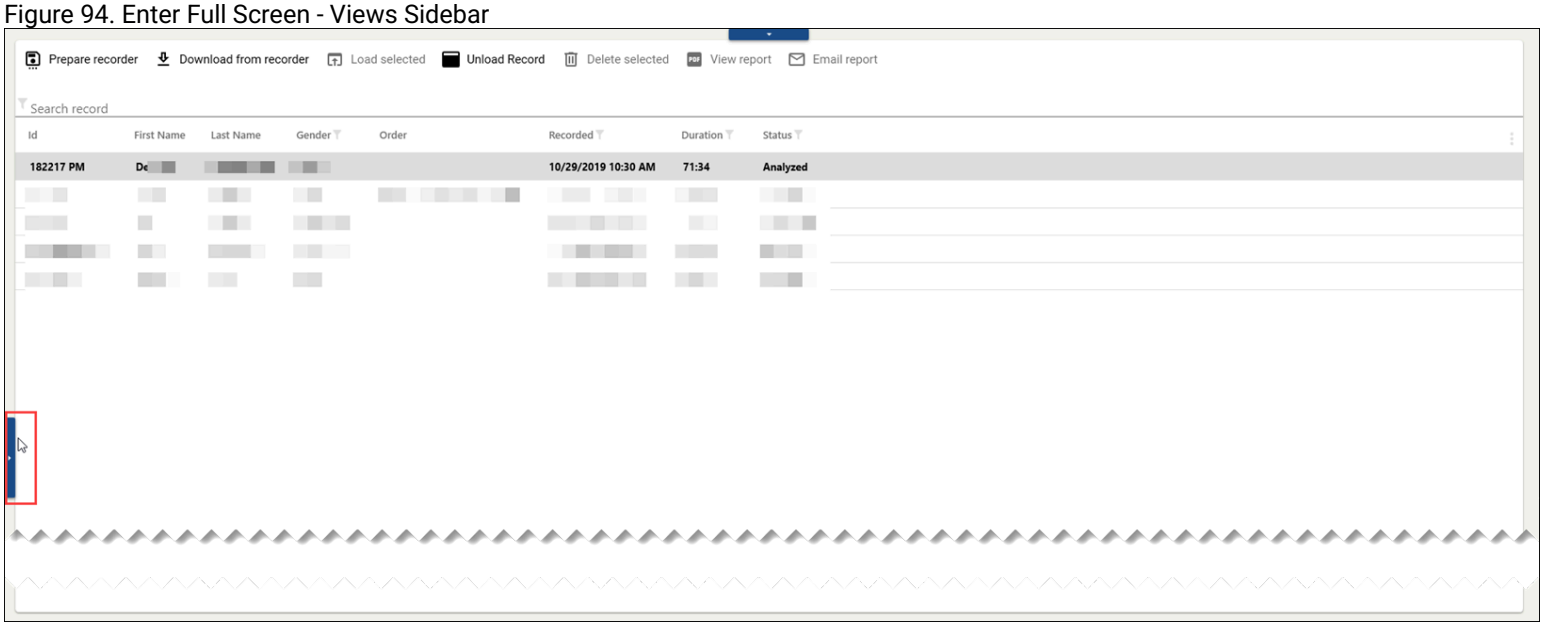
Figure 93. WIndow Control Buttons - Enter Full Screen Button



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:

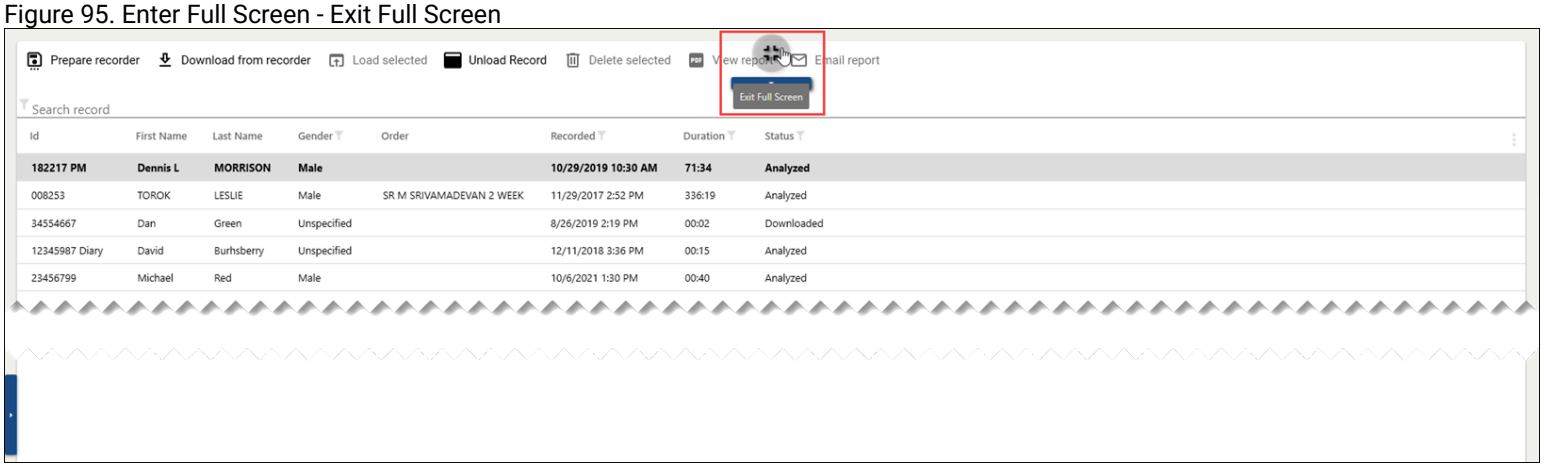
Figure 94. Enter Full Screen - Views Sidebar



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 95. 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 96. WIndow Control Buttons - Close Button



4.4. About

The **About** window provides essential information about the installed version of the NH-301 software, license type, and activated features.

Accessing the About Window

To open the **About**window:

1. Click the **About** button in the upper-right corner of the main window.

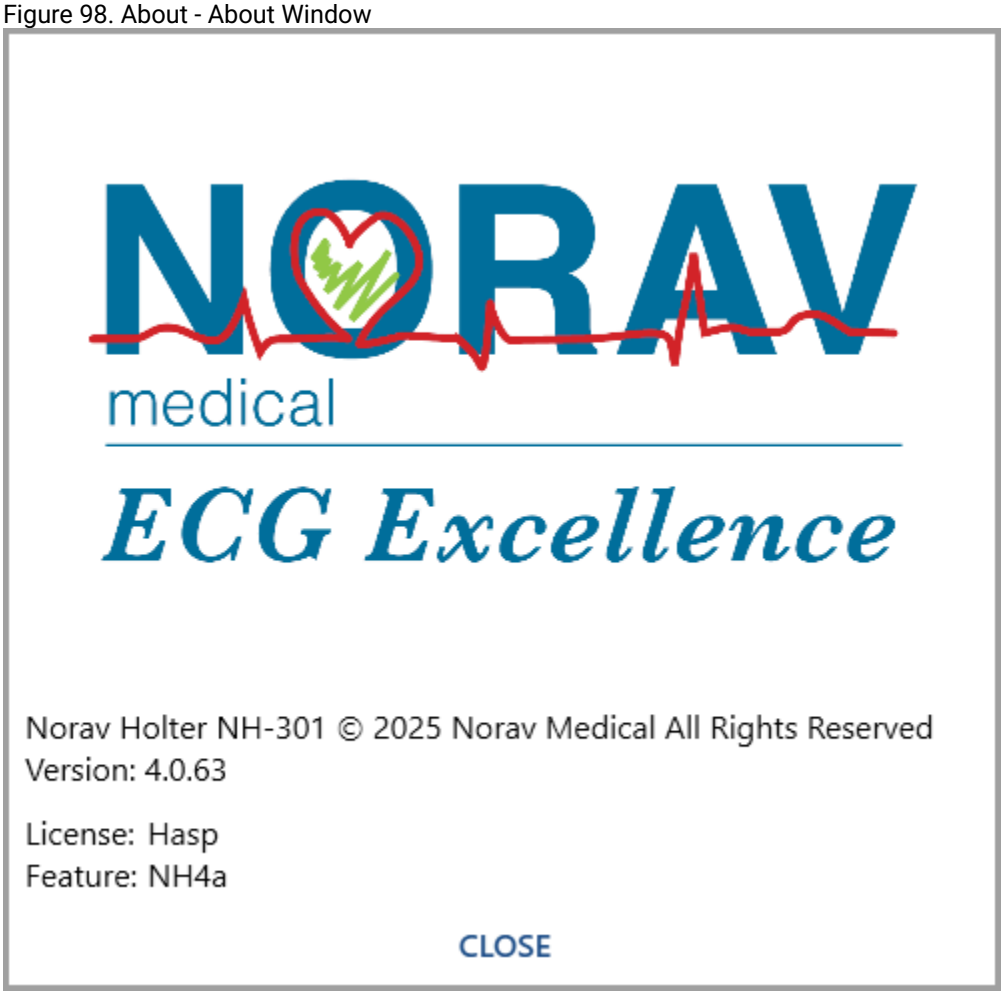
Figure 97. About - About Button



2. The **About** window will appear.

The About window displays the following information:

Figure 98. About - About Window



- **Software Name and Version** – Displays the product name (e.g., Norav Holter NH-301) and the installed version number.
- **Copyright** – Confirms the current copyright holder and year.
- **License Type** – Indicates the type of license in use (e.g., Hasp).
- **Feature** – Shows the active software feature set (e.g., NH4a).

Click the **Close** button at the bottom of the window to exit the About screen.

4.5. View Area

Unlike other interface elements, which remain largely consistent across screens (except being active or inactive under certain circumstances), **View Area** houses distinct content, data, and controls for each **View** and **View mode**.

Figure 99. View Area - Analysis View

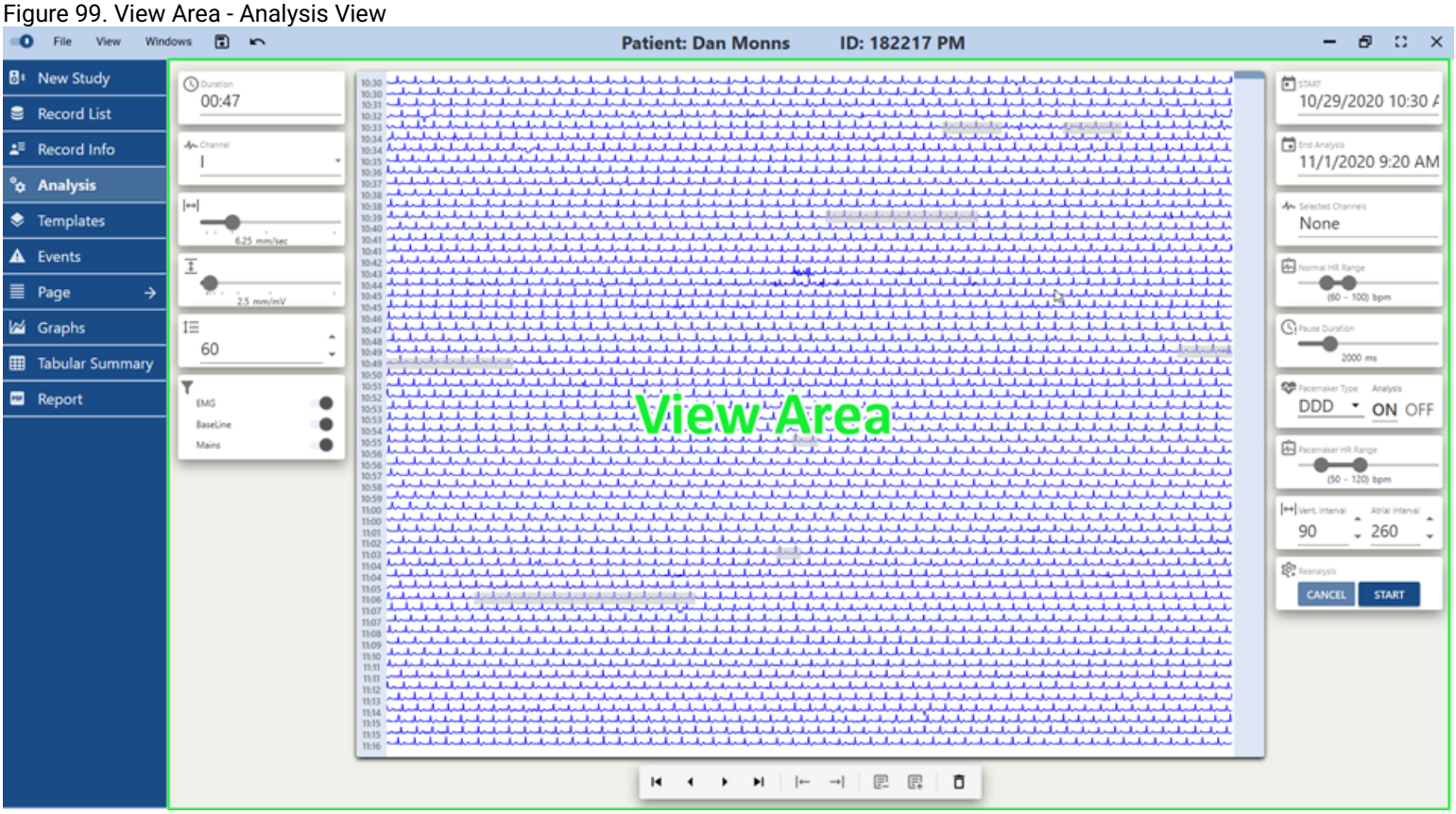
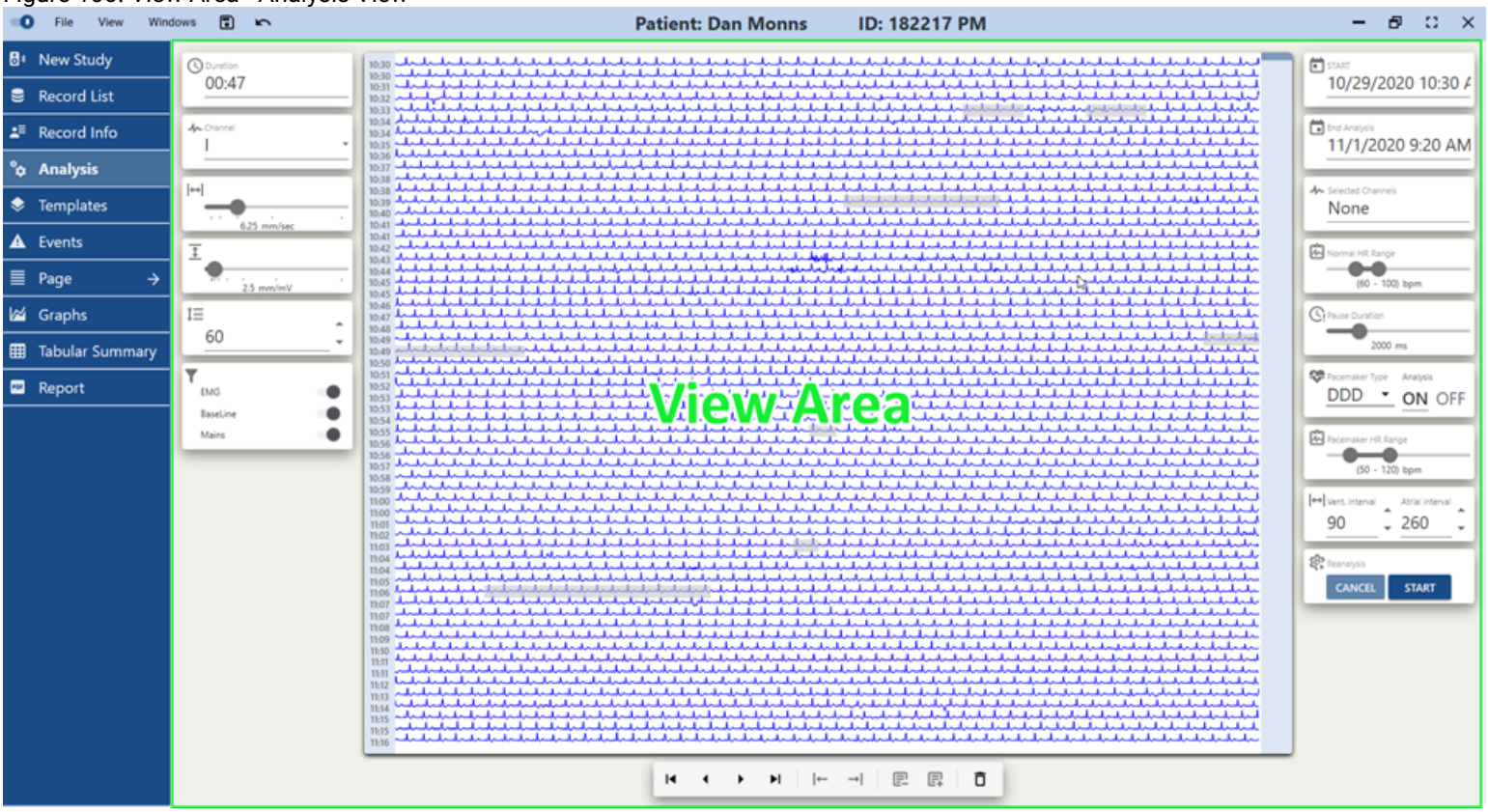


Figure 100. View Area - Analysis View



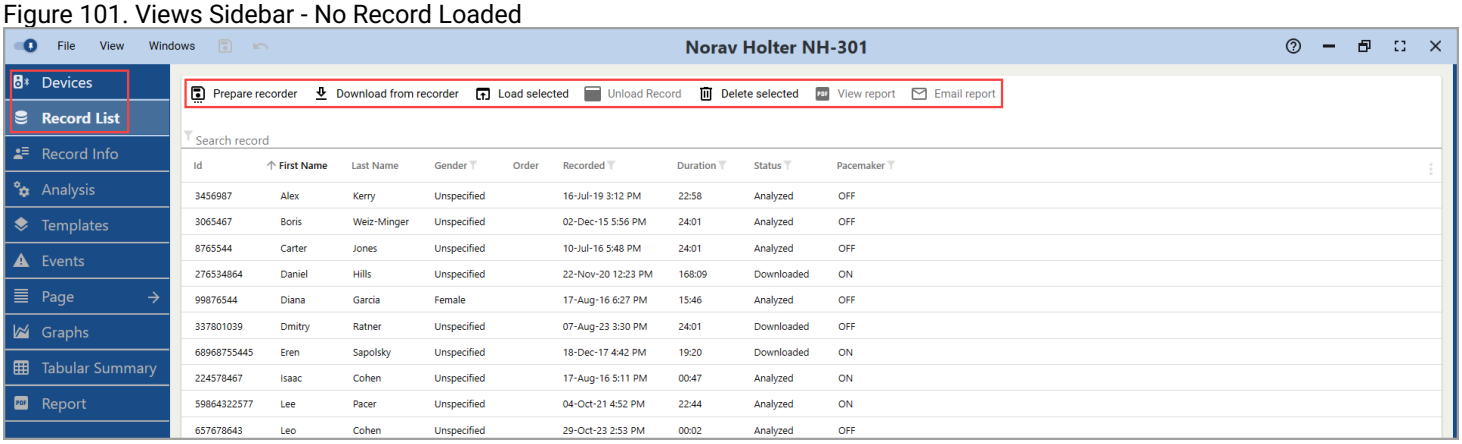
4.6. Views - Views Sidebar

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:

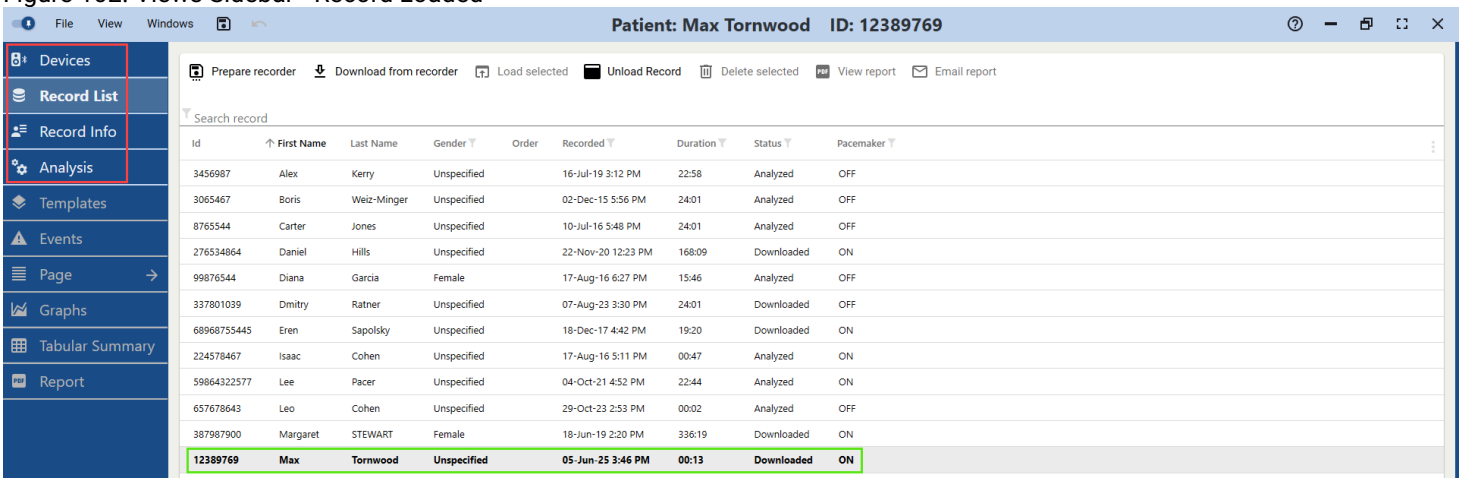
- **Default State (No Records Loaded):** When no patient records are loaded in the system, only **Record List** and **Devices** options are accessible for managing records.

Figure 101. Views Sidebar - No Record Loaded



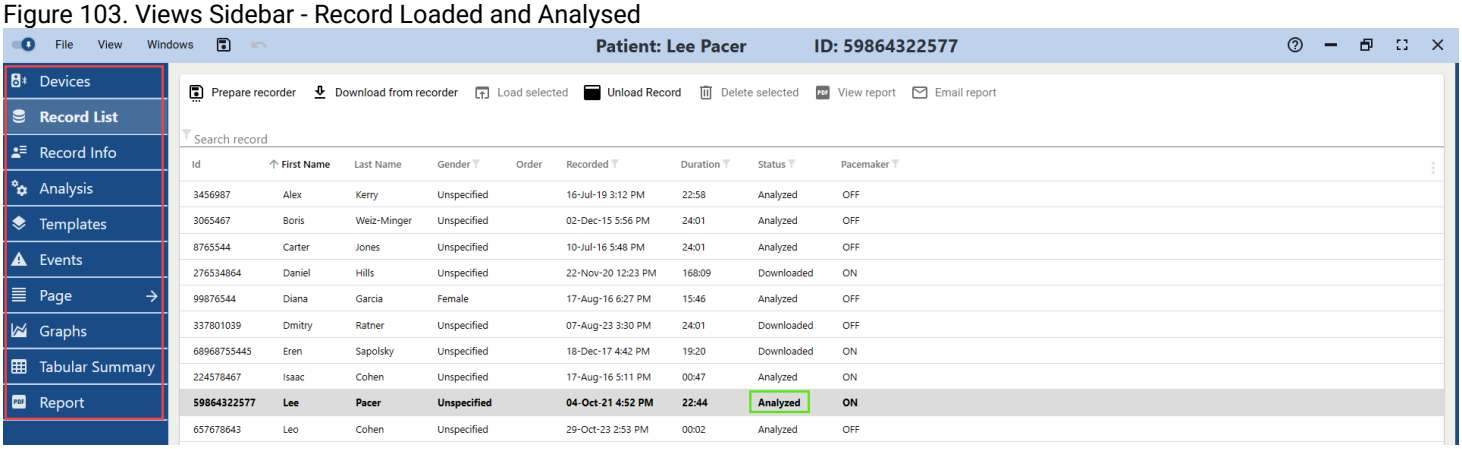
- **Record Loaded (Not Analyzed):** When a patient record is loaded into the system but it has never been analyzed within the application, only the **Devices**, **Record List** and **Record Info** (with General and Diary subitems) options are accessible.

Figure 102. 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.

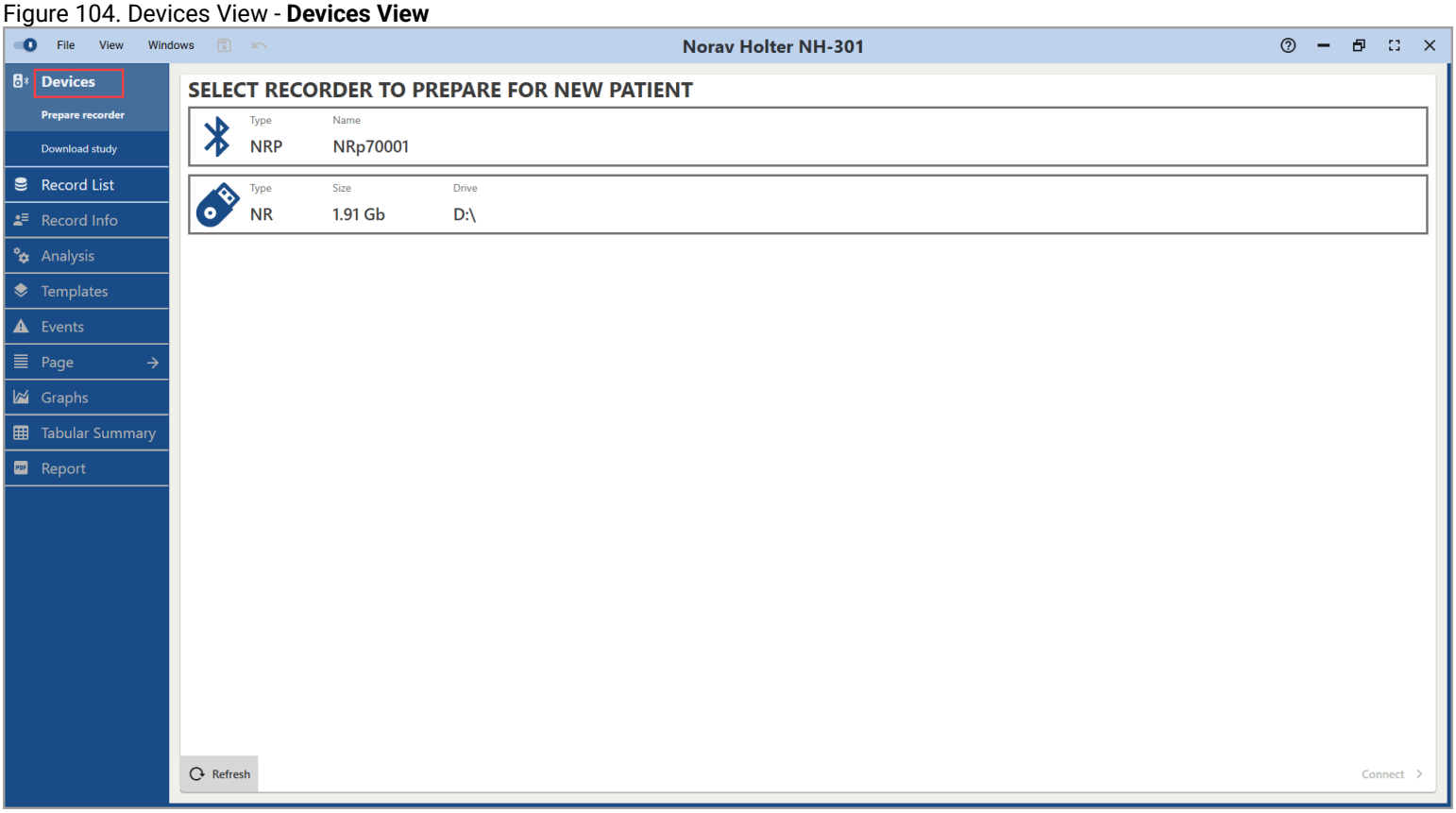
Figure 103. Views Sidebar - Record Loaded and Analysed



4.6.1. Devices

The **Devices** 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 **Devices View**. In other words, you can initiate a new study either through the **Devices** or **Record List View**.

Figure 104. Devices View - **Devices View**



Prepare Recorder: General Workflow

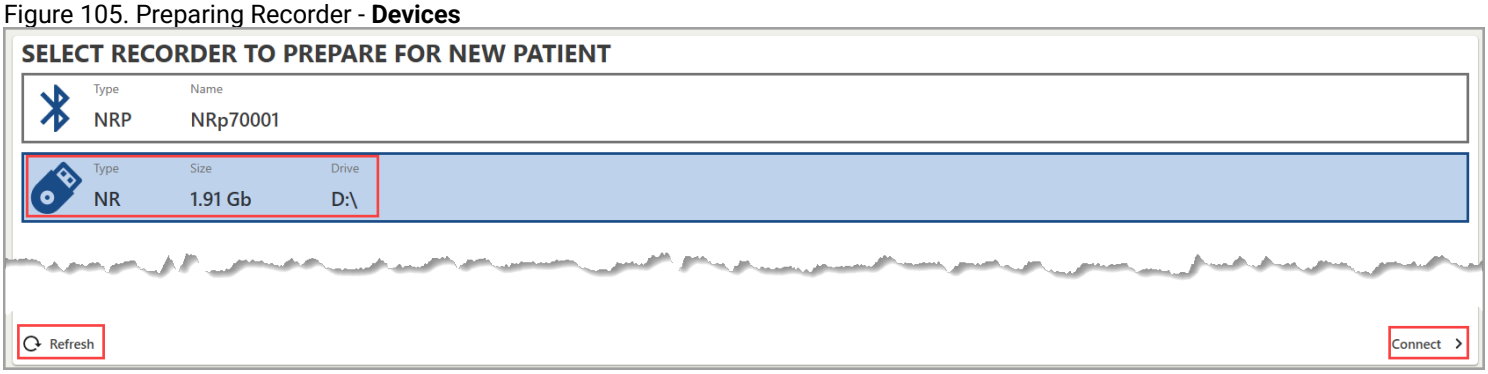
To prepare a recorder:

1. Click the **Prepare Recorder** button on the top toolbar of the **Record List** or click the **Devices View** in the **Views Sidebar**. The **Devices View** is displayed, showcasing all available connections, including Memory Card, USB and Bluetooth connections.

2. **(Optional)** 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.

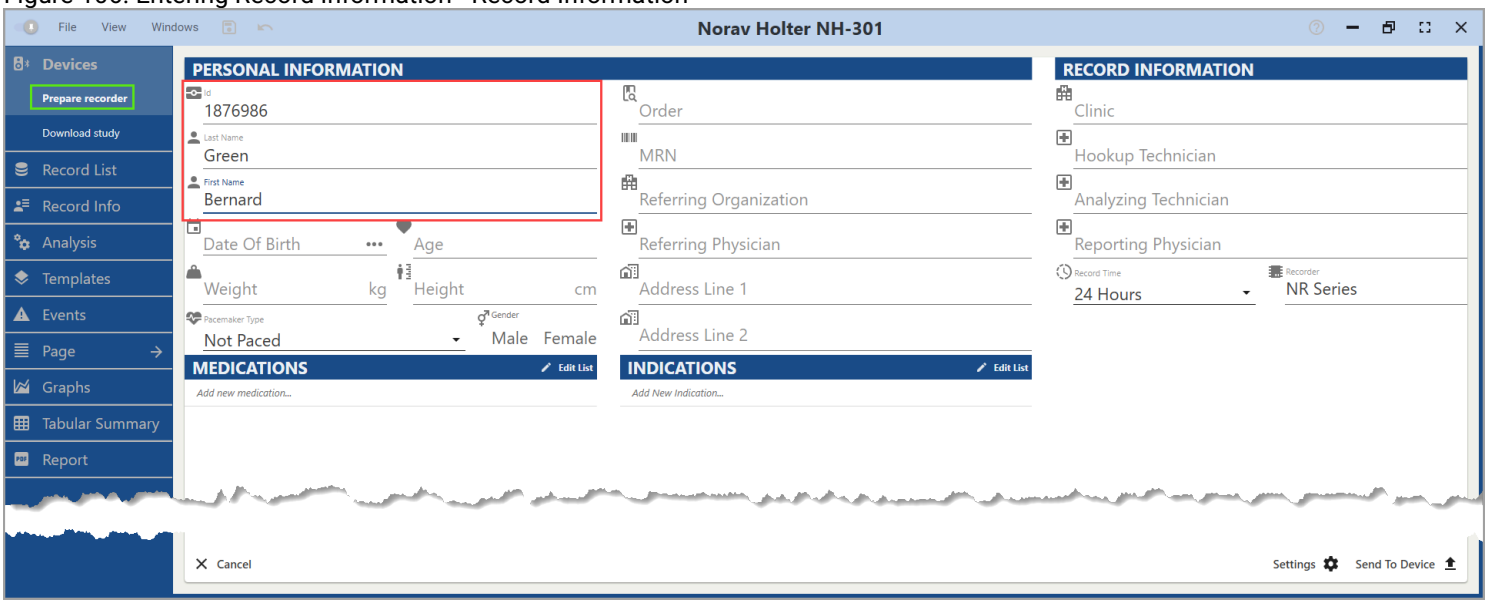
Figure 105. Preparing Recorder - **Devices**



4. Click **Connect** in the bottom-right corner. The **Record Information** screen will appear.

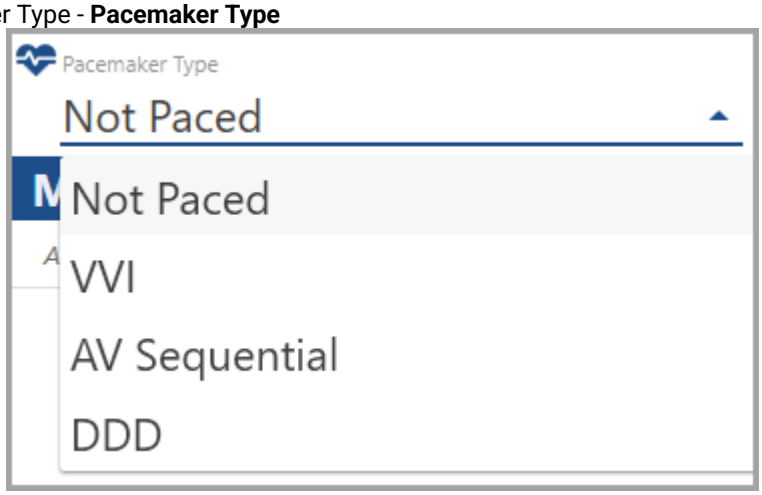
5. Enter personal information. Click on each text field and type in the data as needed. To proceed, you must fill in at least one of the patient's identifiers: **Patient ID**, **First Name**, **Last Name**. Other fields are not mandatory to proceed.

Figure 106. Entering Record Information - Record Information



Note: Even if a patient has a pacemaker, selecting a **Pacemaker Type** from the drop-down menu during recorder setup is not mandatory. The device will capture the pacemaker signal regardless. This functionality ensures that the pacemaker signal is captured, even if the **Pacemaker Type** is not specified initially. Users have the flexibility to specify the pacemaker type at a later stage, such as during the download of the record or before analyzing it. While the ideal workflow involves specifying the **Pacemaker Type** at the setup stage, omitting this step will not compromise the quality of the ECG analysis.

Figure 107. Selecting Pacemaker Type - **Pacemaker Type**



6. **(Optional)** Click on the **Date Of Birth** field and type in the date or use the ellipsis button on the right to select from a calendar.

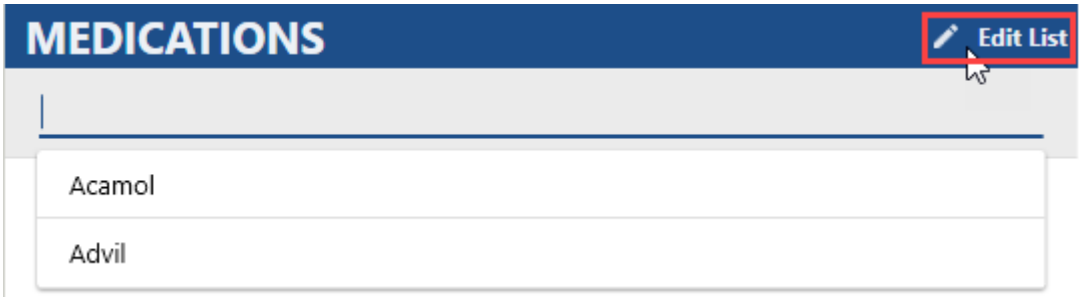
7. **(Optional)** To add **Medications**:

   7.1. Click "Add New Medication" to open a drop-down list with predefined medications.

   7.2. 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.

   7.3. To modify the list of predefined medications, click the **Edit List** icon located at the top right.

Figure 108. Import Record - **Medications**



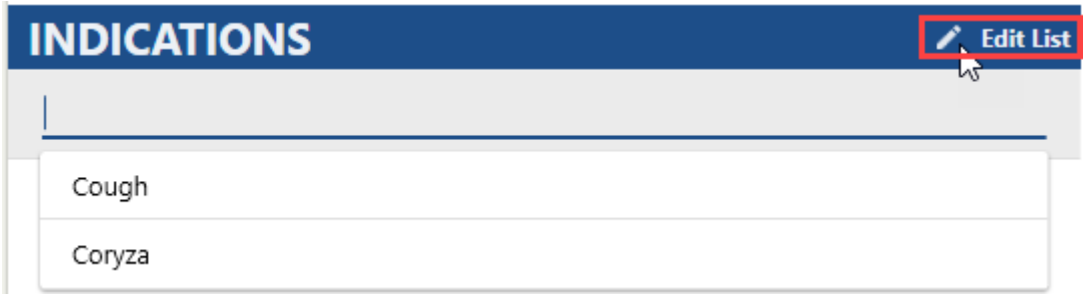
8. **(Optional)** To add **Indications**:

   8.1. Click "Add New Indication" to open a drop-down list with predefined indications.

   8.2. 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.

   8.3. To modify the list of predefined indications, click the **Edit List** icon located at the top right.

Figure 109. Import Record - **Indications**

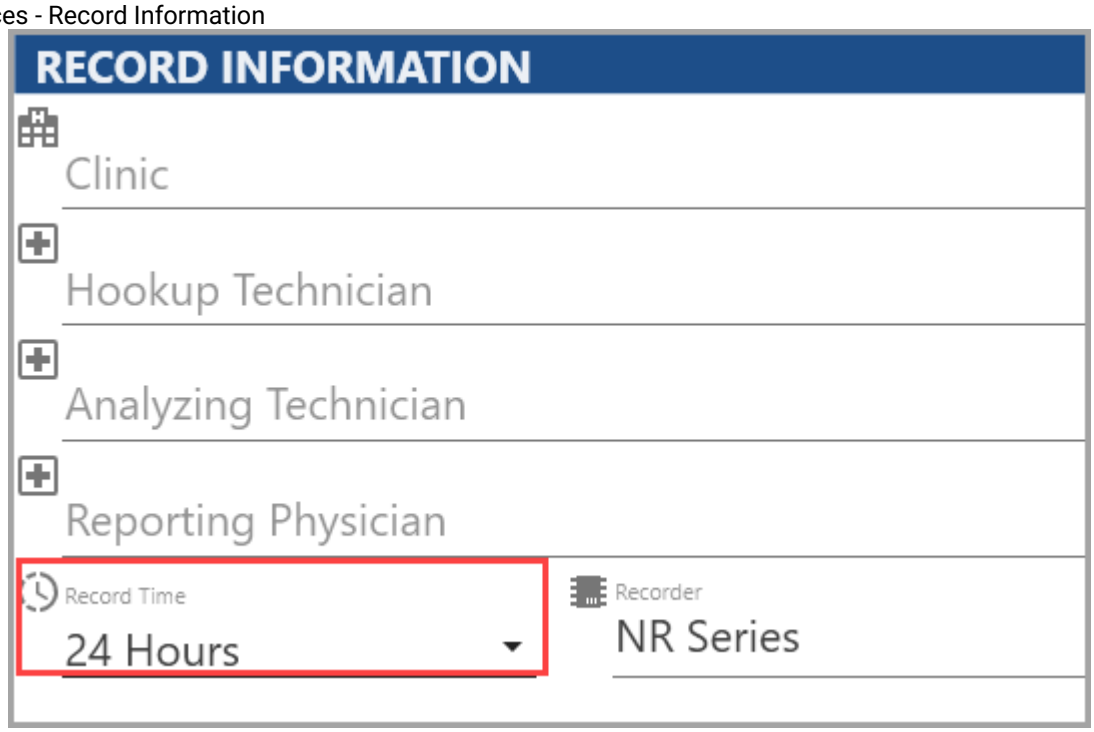


9. **(Optional)** In the **Record Information** section:

   9.1. Click on each available text field (**Clinic**, **Hookup Technician**, etc.) and type in the data according to your needs and workflows.

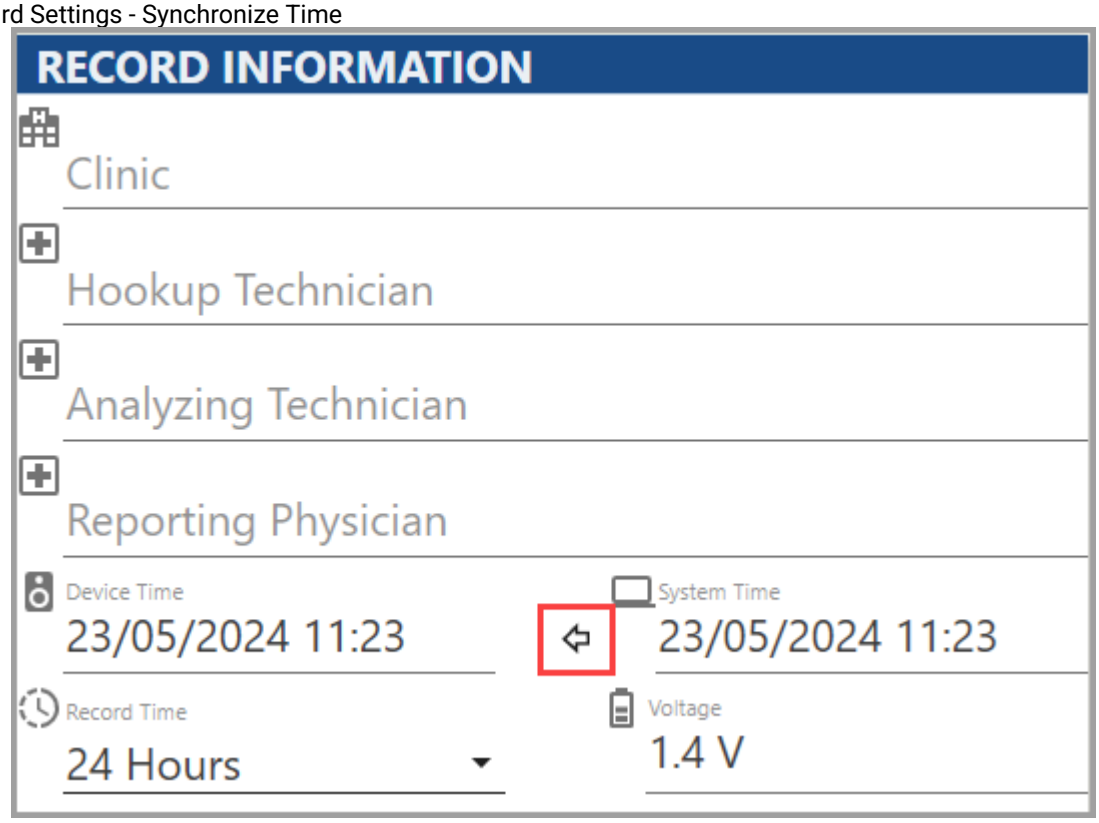
   9.2. Select the **Estimated Duration** value for the record from the drop-down list (24 to 336 hours). The default value is set to 24 hours.

Figure 110. Devices - Record Information



10. **(Optional) For Bluetooth connection:** If you're using a **Recorder** model equipped with Bluetooth, you may click the **Synchronize** arrow button to synchronize the device time with your system time. It is recommended to synchronize the device time settings periodically.

Figure 111. Record Settings - Synchronize Time



11. **(Optional) For Bluetooth connection:** If you're using a **Recorder** model equipped with Bluetooth, you may click the **Check ECG** button in the bottom-right corner of the screen to verify that the electrodes are properly connected and that the ECG signal will be recorded correctly. This is important because if the electrodes are not properly connected, the ECG signal may be distorted or unreadable.

Figure 112. Record Settings - Check ECG

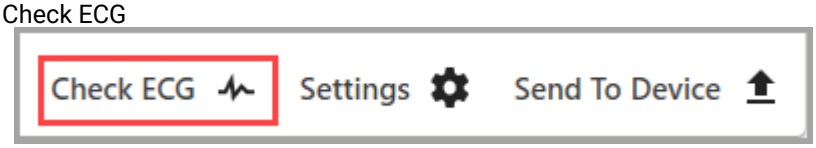
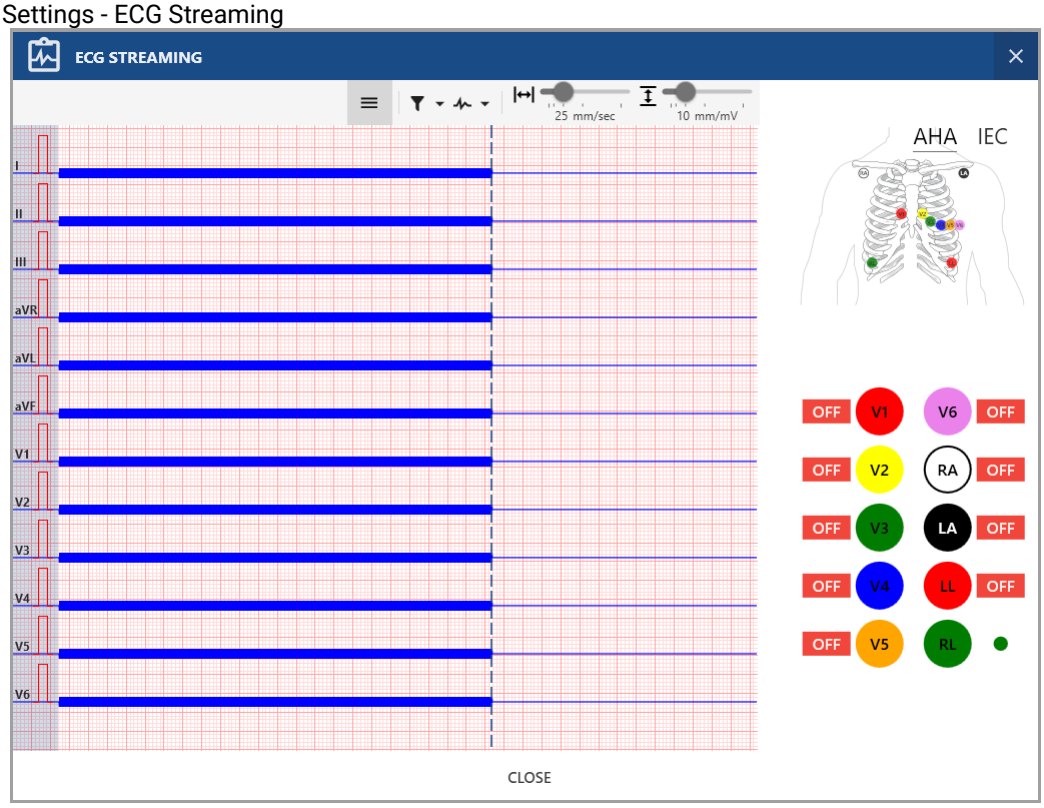


Figure 113. Record Settings - ECG Streaming



12. **(Optional)** If needed, click the **Settings** button located in the lower-right corner of the screen to modify the default settings of the ECG record before transmitting them to the **Recorder**. Additional information on adjusting the record settings is provided below.

13. 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

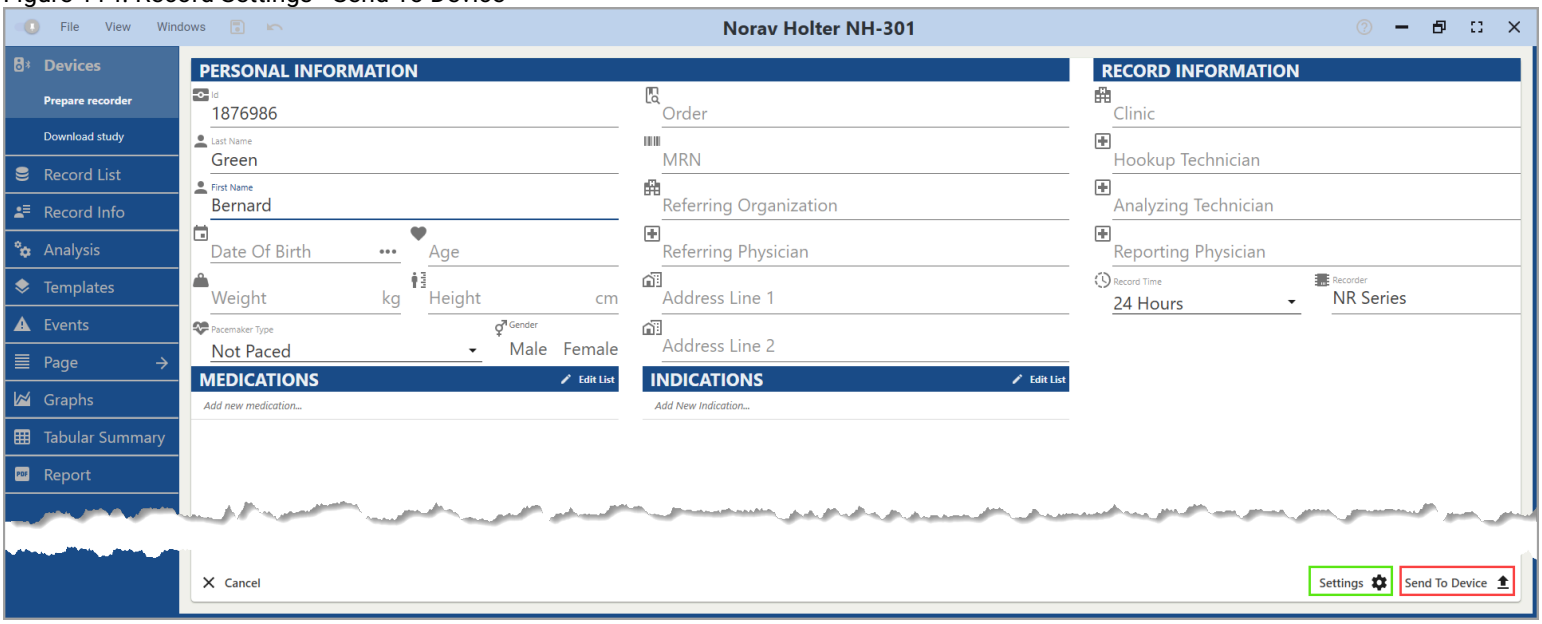
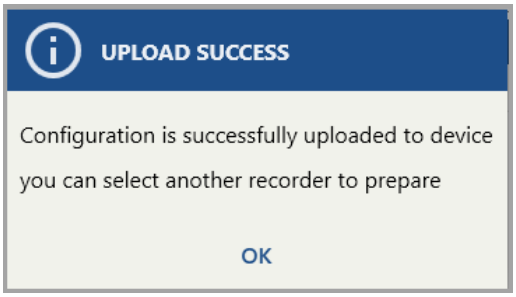


Figure 115. Devices - Upload Success

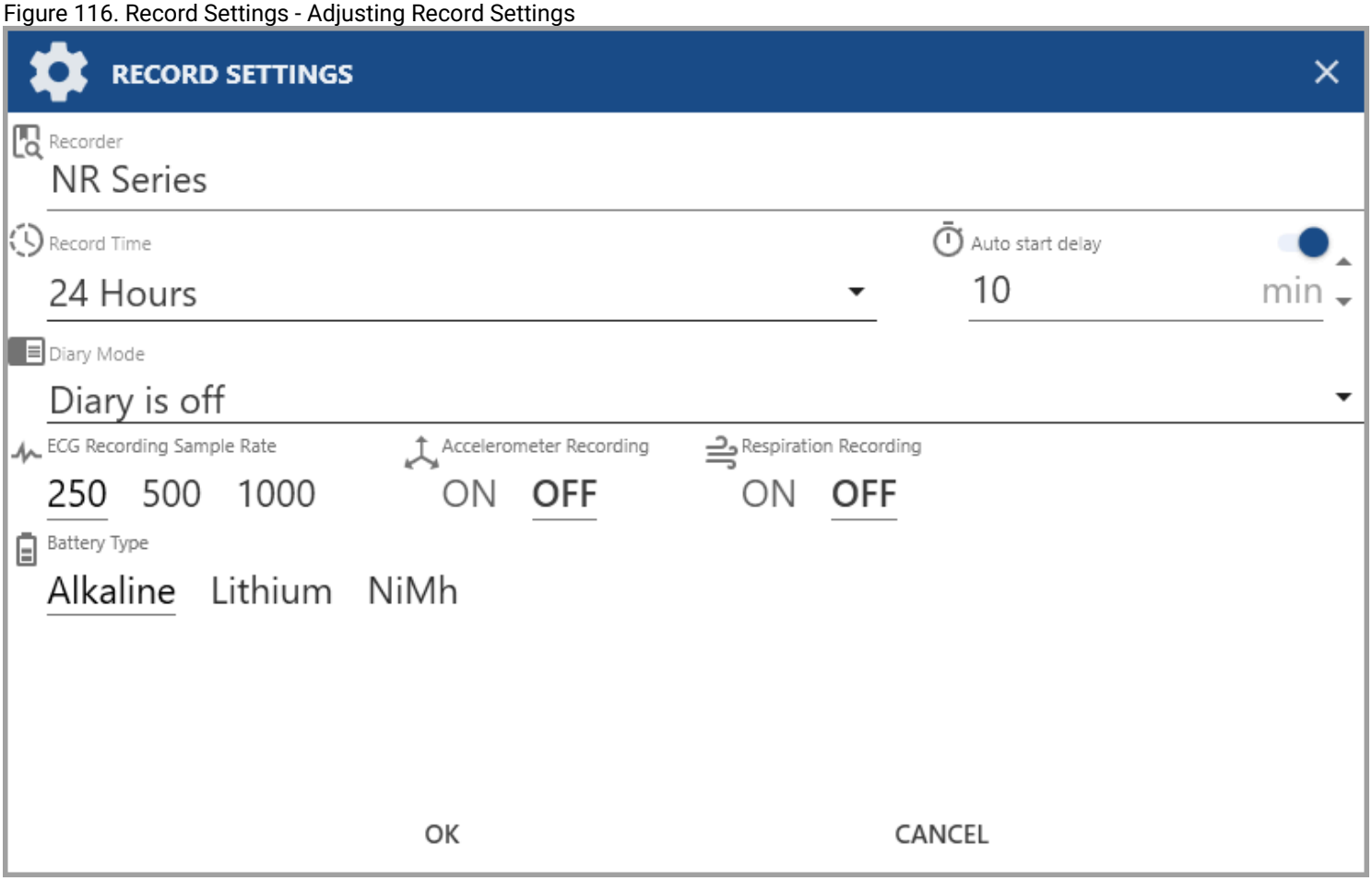


Adjusting Record Settings

To adjust the record settings, follow the steps listed below:

1. Click the **Settings** button located in the lower-right corner of the **Record Information** screen to modify the default settings of the ECG record. The **Record Settings** dialog box will appear.

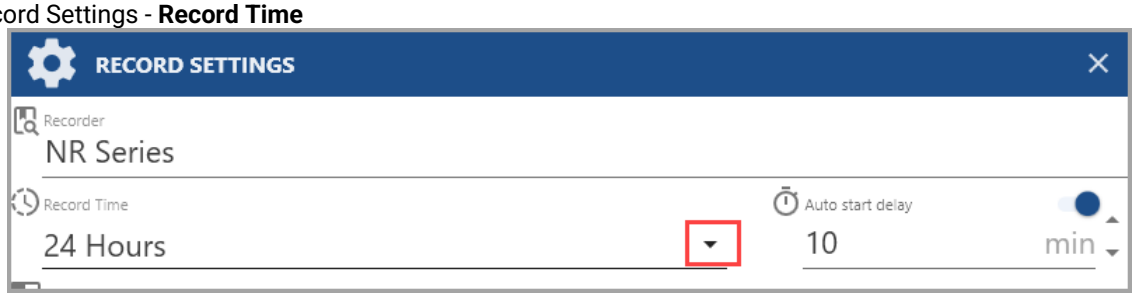
Figure 116. Record Settings - Adjusting Record Settings



Note: You may notice that the **Record Information** screen and **Record Settings** dialog box layout for the Bluetooth and USB connection of the same recorder model differ. This difference mainly focuses on providing additional data but doesn't affect the core of the workflow.

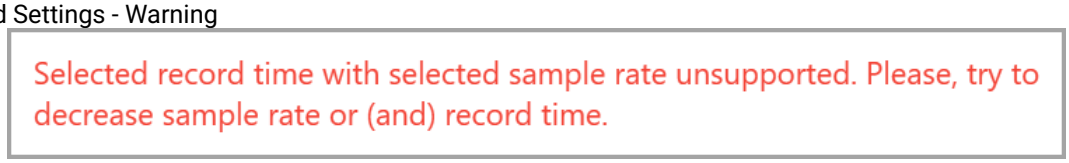
2. Select the **Record Time** value from the drop-down list, ranging from 24 to 336 hours, depending on the **Recorder** capabilities and requirements of the test.

Figure 117. Record Settings - **Record Time**



3. **(Optional)** If the selected **Record Time** or **ECG Recording Sample Rate** is not compatible with a specific battery type, a warning will be displayed. Select another time range or refer to the relevant **Recorder Manual** to check the **Record Time** parameters.

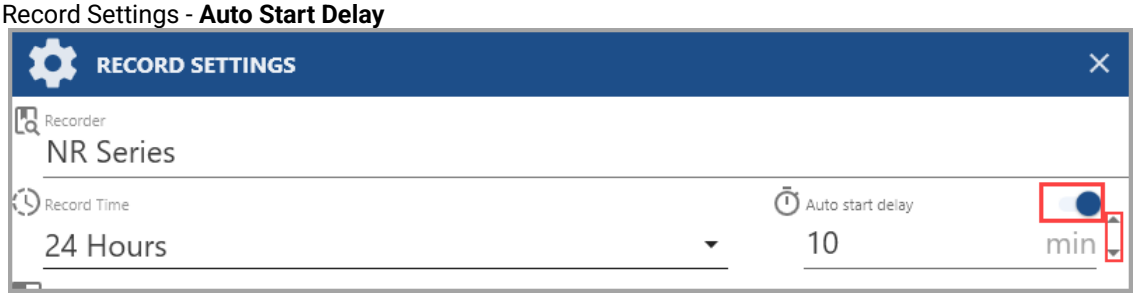
Figure 118. Record Settings - Warning



4. Set **Auto Start Delay** to determine the timing for initiating the ECG recording:

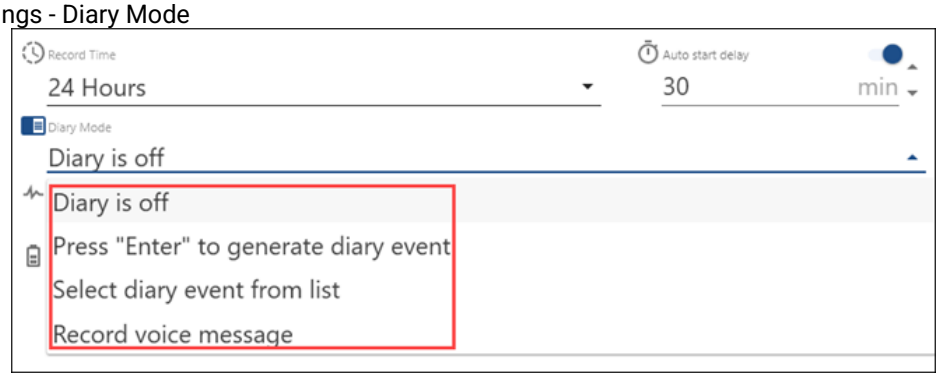
- Toggle **Auto Start Delay** OFF to disable the auto start delay feature.
- Toggle **Auto Start Delay** ON and set the delay in minutes using the picker arrows on the right. You can increase or decrease the delay time by 5 minutes with each click.

Figure 119. Record Settings - **Auto Start Delay**



5. Select how the patient inputs diary events (different types of **Recorder** support different types of input; refer to the relevant manual, if needed):

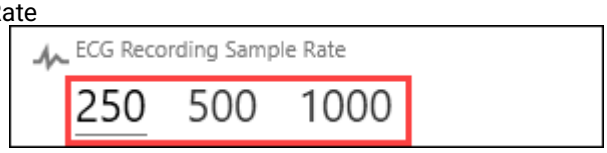
Figure 120. Record Settings - Diary Mode



- **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.

6. 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 121. Record Settings - Sample Rate



7. Click to set up **Accelerometer Recording**:

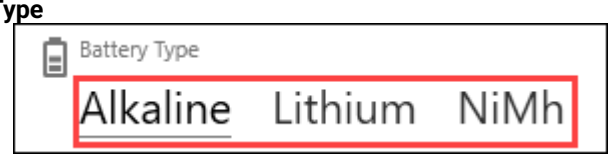
   - Select **ON** to enable the **Accelerometer Recording** during the test. Accelerometer recording can help to identify movement artifacts and remove them from the ECG signal, which can improve the accuracy of the interpretation.
   - Select **OFF** if there is no need to enable it.

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 122. Record Settings - **Battery Type**

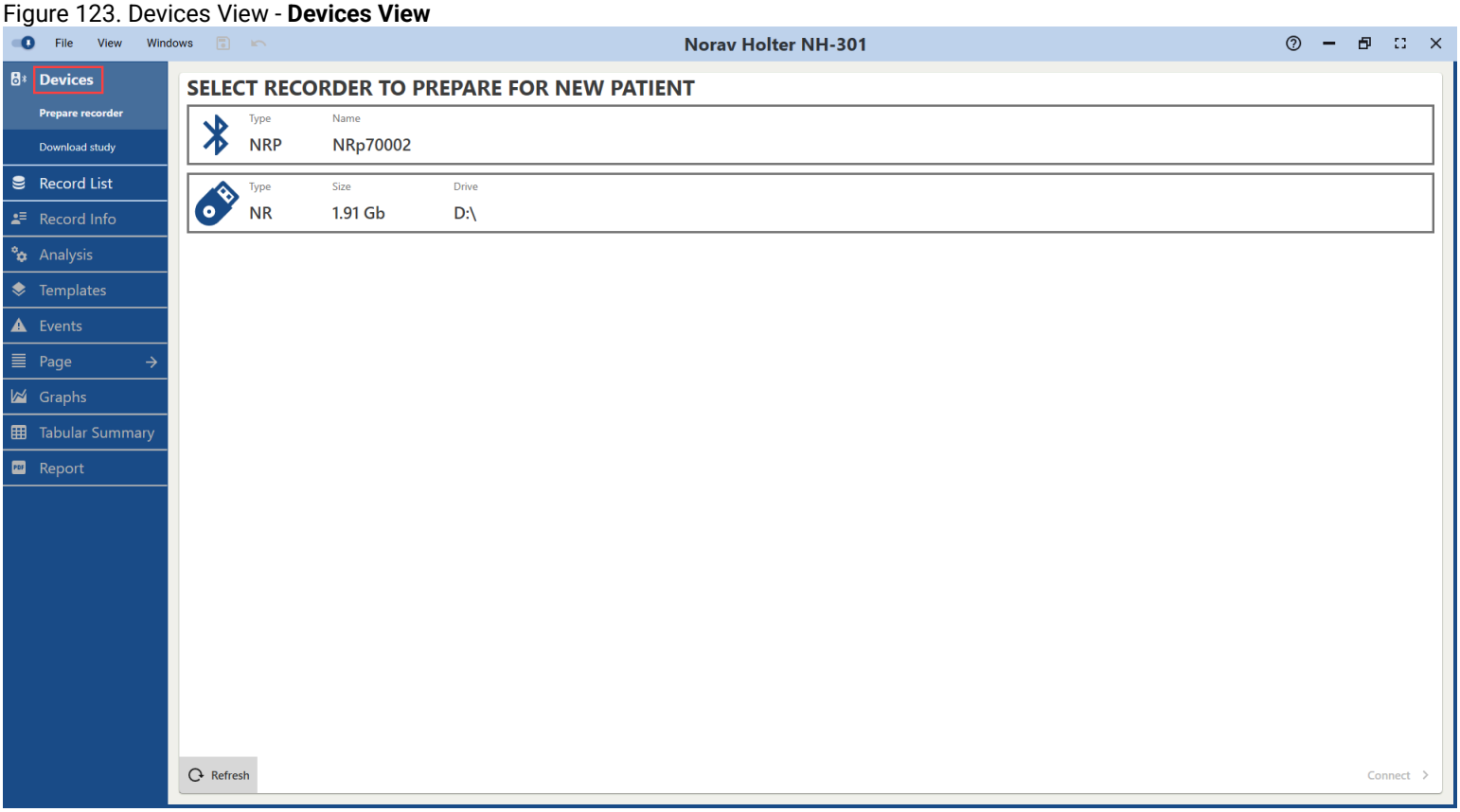


10. Click **OK** to save and apply changes to the record settings.

4.6.2. Devices: NR-314-P Workflow

The **Devices** 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 **Devices View**. In other words, you can initiate a new study either through the **Devices** or **Record List View**.

Figure 123. Devices View - **Devices View**



Prepare Recorder: NR-314-P Workflow

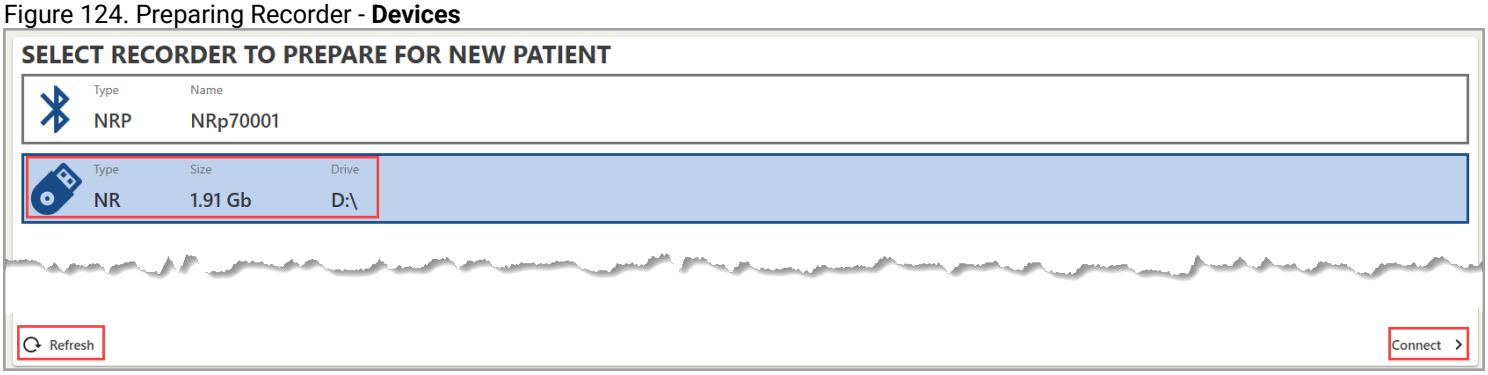
To prepare a recorder:

1. Click the **Prepare Recorder** button on the top toolbar of the **Record List** or click the **Devices View** in the **Views Sidebar**. The **Devices View** is displayed, showcasing all available connections, including Memory Card, USB and Bluetooth connections.

2. **(Optional)** 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.

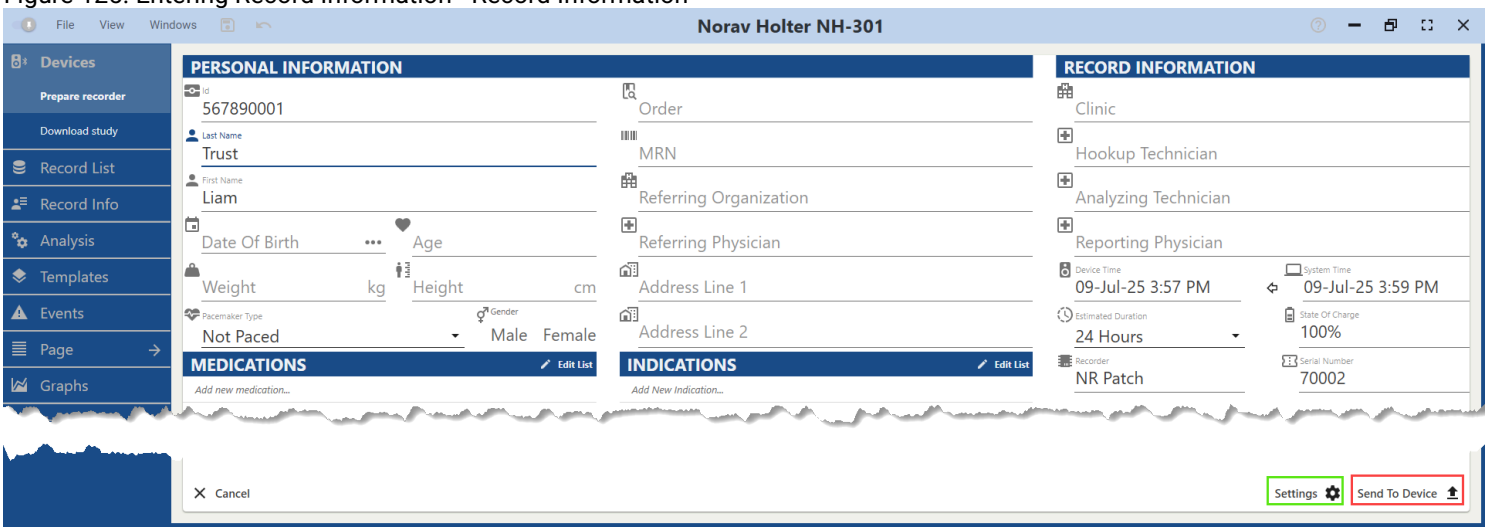
Figure 124. Preparing Recorder - **Devices**



4. Click **Connect** in the bottom-right corner. The **Record Information** screen will appear.

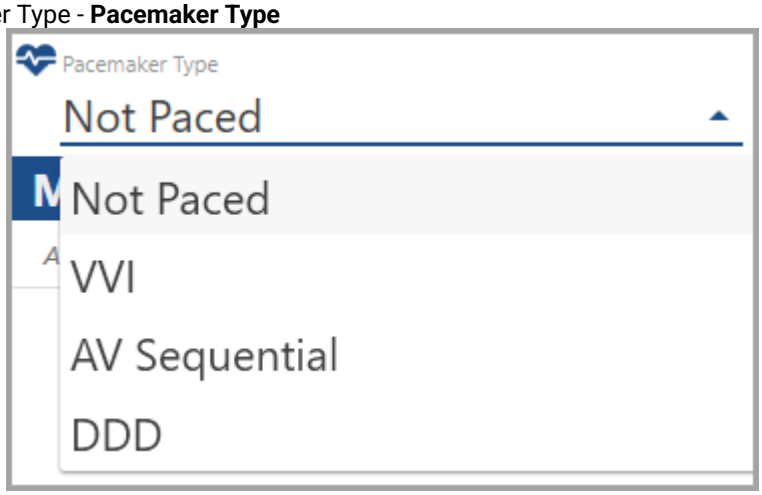
5. Enter personal information. Click on each text field and type in the data as needed. To proceed, you must fill in at least one of the patient's identifiers: **Patient ID**, **First Name**, **Last Name**. Other fields are not mandatory to proceed.

Figure 125. Entering Record Information - Record Information



Note: Even if a patient has a pacemaker, selecting a **Pacemaker Type** from the drop-down menu during recorder setup is not mandatory. The device will capture the pacemaker signal regardless. This functionality ensures that the pacemaker signal is captured, even if the **Pacemaker Type** is not specified initially. Users have the flexibility to specify the pacemaker type at a later stage, such as during the download of the record or before analyzing it. While the ideal workflow involves specifying the **Pacemaker Type** at the setup stage, omitting this step will not compromise the quality of the ECG analysis.

Figure 126. Selecting Pacemaker Type - **Pacemaker Type**



6. **(Optional)** Click on the **Date Of Birth** field and type in the date or use the ellipsis button on the right to select from a calendar.

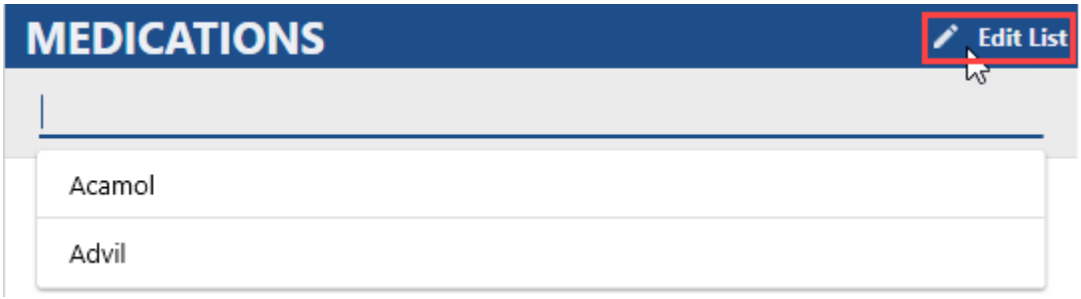
7. **(Optional)** To modify **Medications**:

   7.1. Click "Add New Medication" to open a drop-down list with predefined medications.

   7.2. 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.

   7.3. To modify the list of predefined medications, click the **Edit List** icon located at the top right.

Figure 127. Import Record - **Medications**



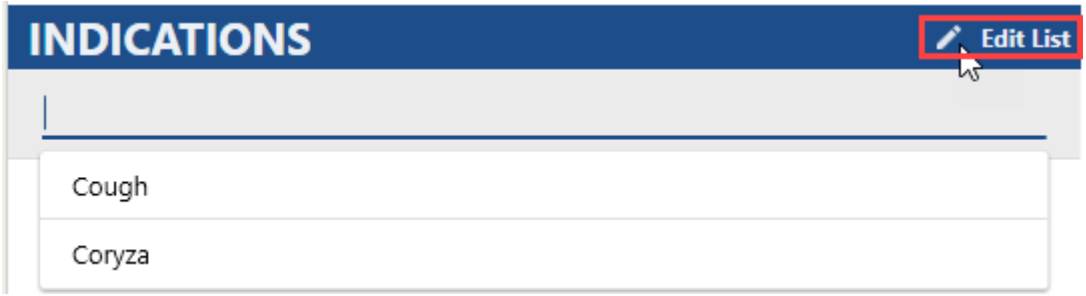
8. **(Optional)** To modify **Indications**:

8.1. Click "Add New Indication" to open a drop-down list with predefined indications.

8.2. 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.

8.3. To modify the list of predefined indications, click the **Edit List** icon located at the top right.

Figure 128. Import Record - **Indications**

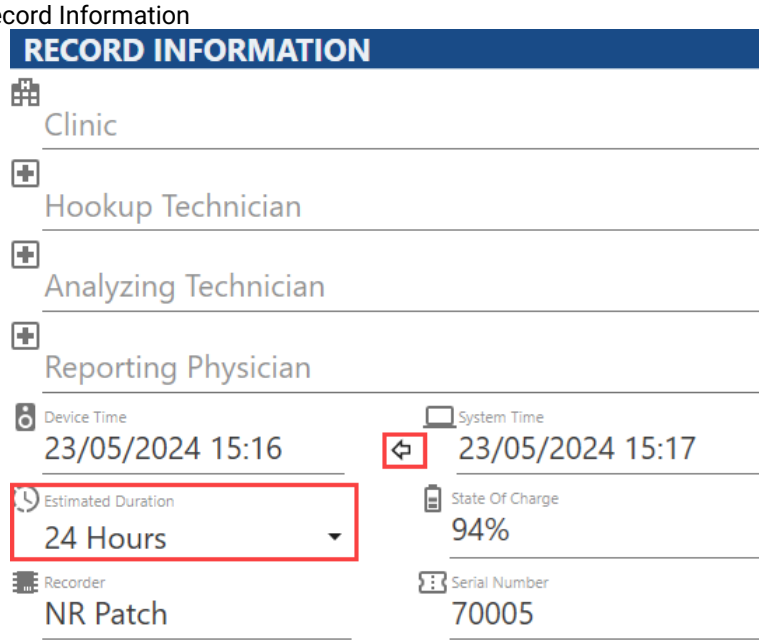


9. **(Optional)** In the **Record Information** section:

9.1. Click on each available text field (**Clinic**, **Hookup Technician**, etc.) and type in the data according to your needs and workflows.

9.2. Select the **Estimated Duration** value for the record from the drop-down list (24 to 336 hours). The default value is set to 24 hours.

Figure 129. Record Settings - Record Information



10. **(Optional) For Bluetooth connection:** If you have connected the **Recorder** to your PC via Bluetooth, you may click the **Check ECG** button in the bottom-right corner of the screen to verify that the electrodes are properly connected and that the ECG signal will be recorded correctly. This is important because if the electrodes are not properly connected, the ECG signal may be distorted or unreadable.

Figure 130. Record Settings - Check ECG

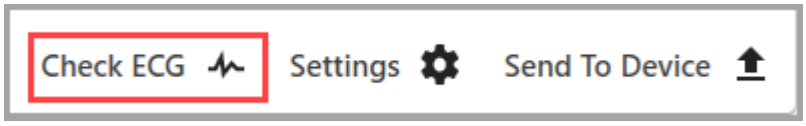
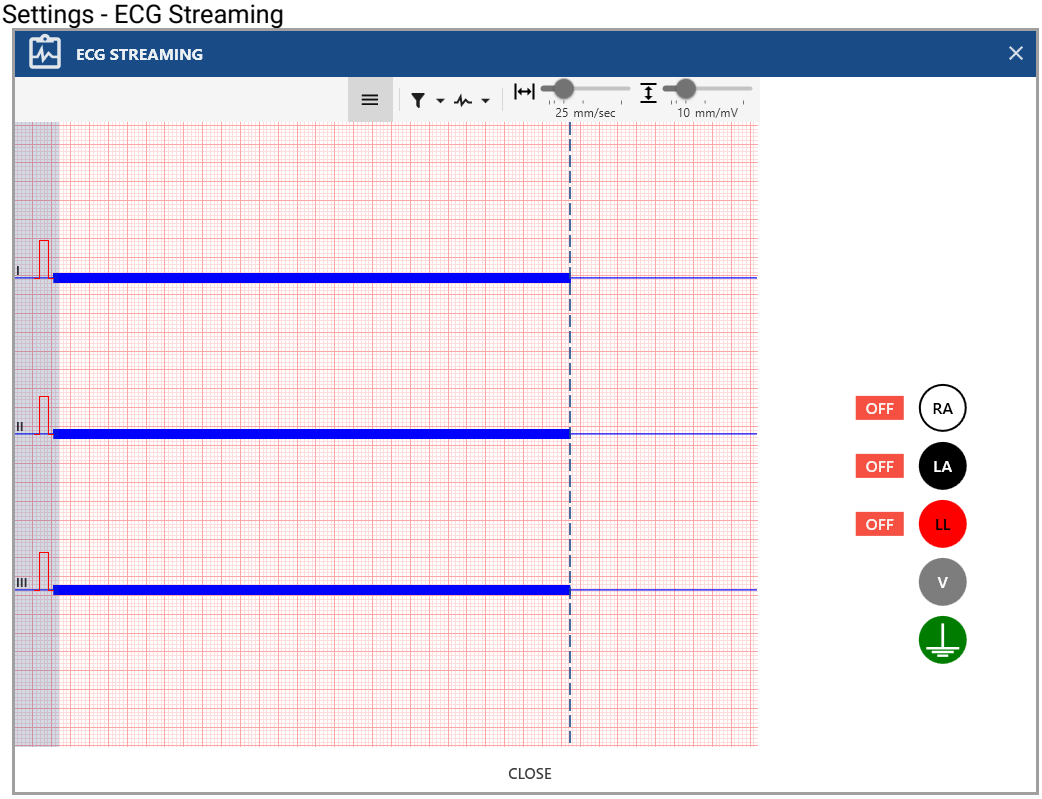


Figure 131. Record Settings - ECG Streaming



11. **(Optional)** If needed, click the **Settings** button located in the lower-right corner of the screen to modify the default settings of the ECG record before transmitting them to the **Recorder**. Additional information on adjusting the record settings is provided below.

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 132. Record Settings - **Send To Device**

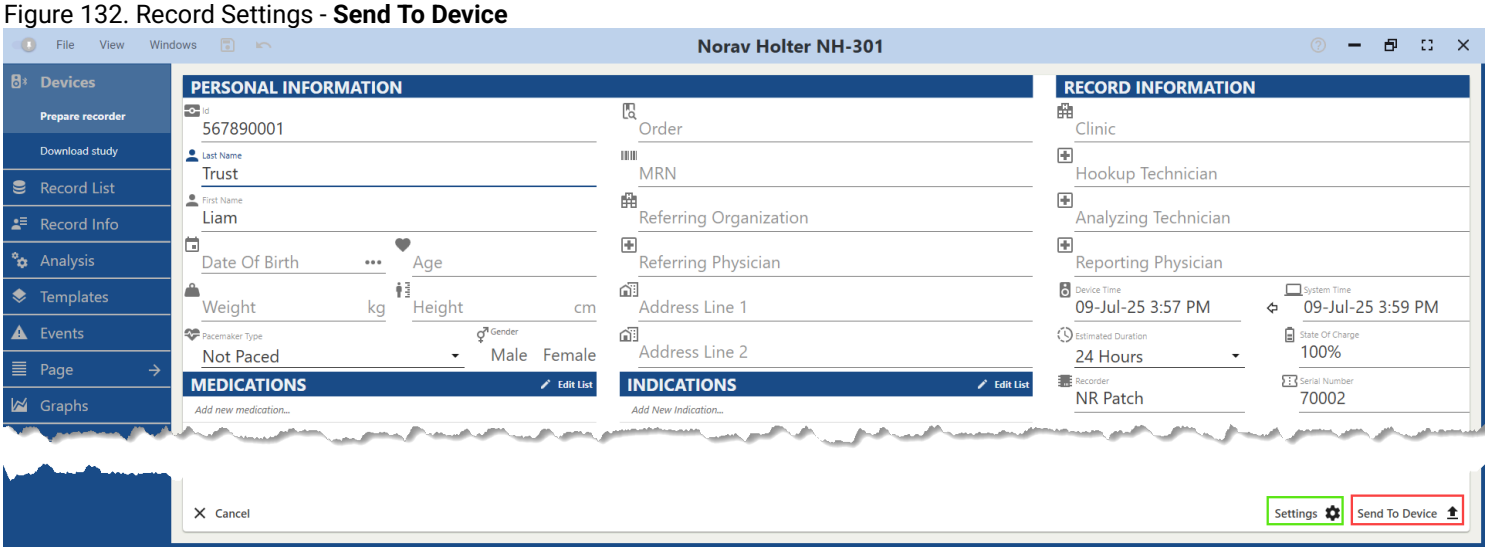
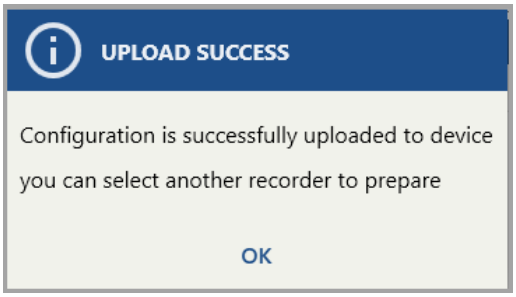


Figure 133. Devices - Upload Success

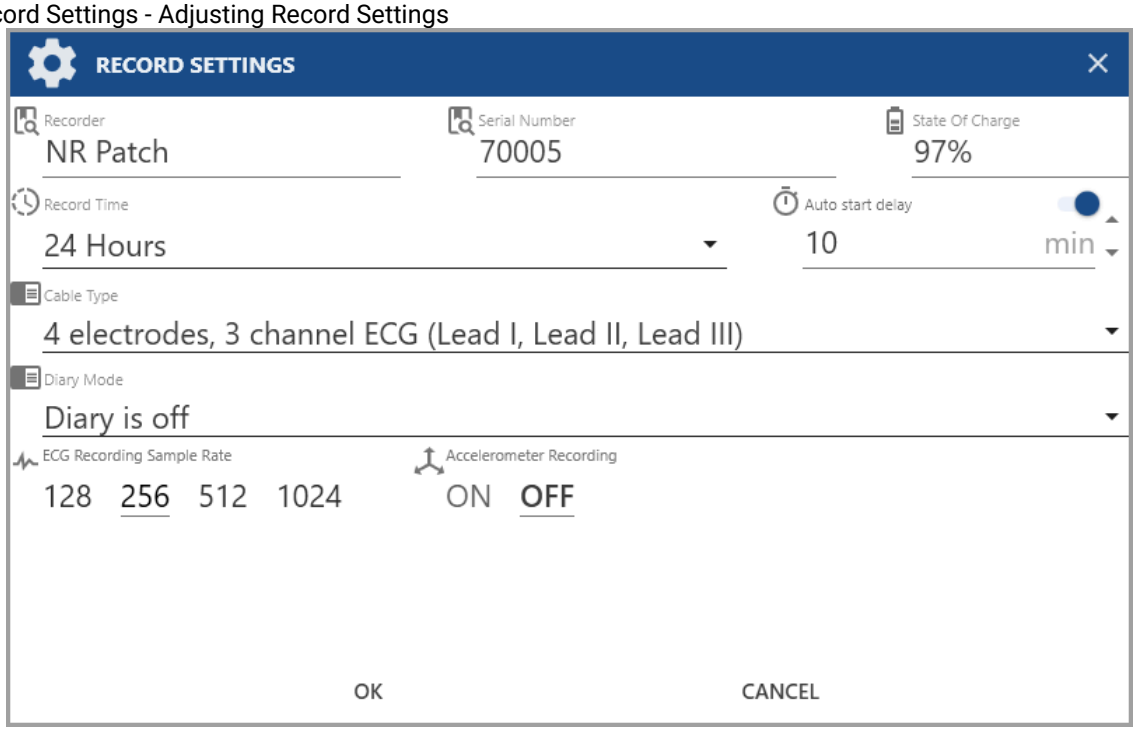


Adjusting Record Settings

To adjust the record settings, follow the steps listed below:

1. Click the **Settings** button located in the lower-right corner of the **Record Information** screen to modify the default settings of the ECG record. The **Record Settings** dialog box will appear.

Figure 134. Record Settings - Adjusting Record Settings



Note: You may notice that the **Record Information** screen and **Record Settings** dialog box layout for the Bluetooth and USB connection of the same recorder model differ. This difference mainly focuses on providing additional data but doesn't affect the core of the workflow.

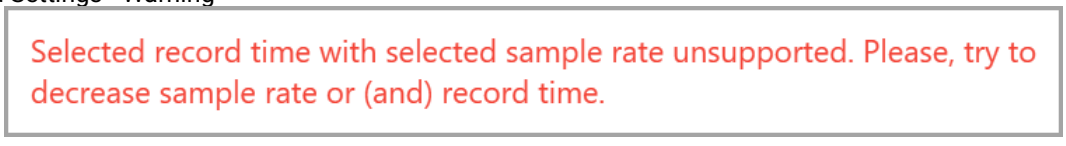
2. Select the **Record Time** value from the drop-down list, ranging from 24 to 336 hours, depending on the **Recorder** capabilities and requirements of the test.

Figure 135. Record Settings - **Record Time**



3. **(Optional)** If the selected **Record Time** or **ECG Recording Sample Rate** is not compatible with a specific battery type, a warning will be displayed. Select another time range or refer to the relevant **Recorder Manual** to check the **Record Time** parameters.

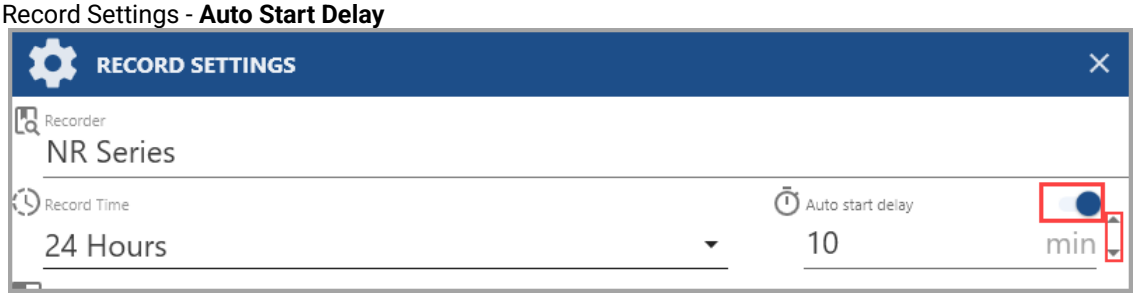
Figure 136. Record Settings - Warning



4. Set **Auto Start Delay** to determine the timing for initiating the ECG recording:

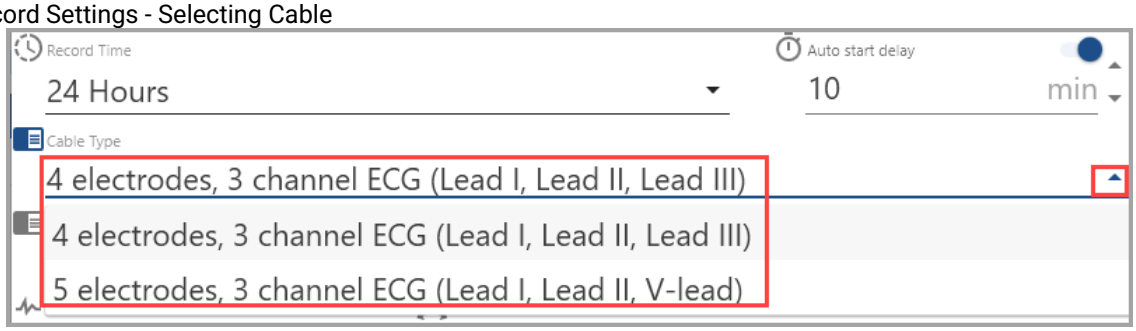
- Toggle **Auto Start Delay** OFF to disable the auto start delay feature.
- Toggle **Auto Start Delay** ON and set the delay in minutes using the picker arrows on the right. You can increase or decrease the delay time by 5 minutes with each click.

Figure 137. Record Settings - **Auto Start Delay**



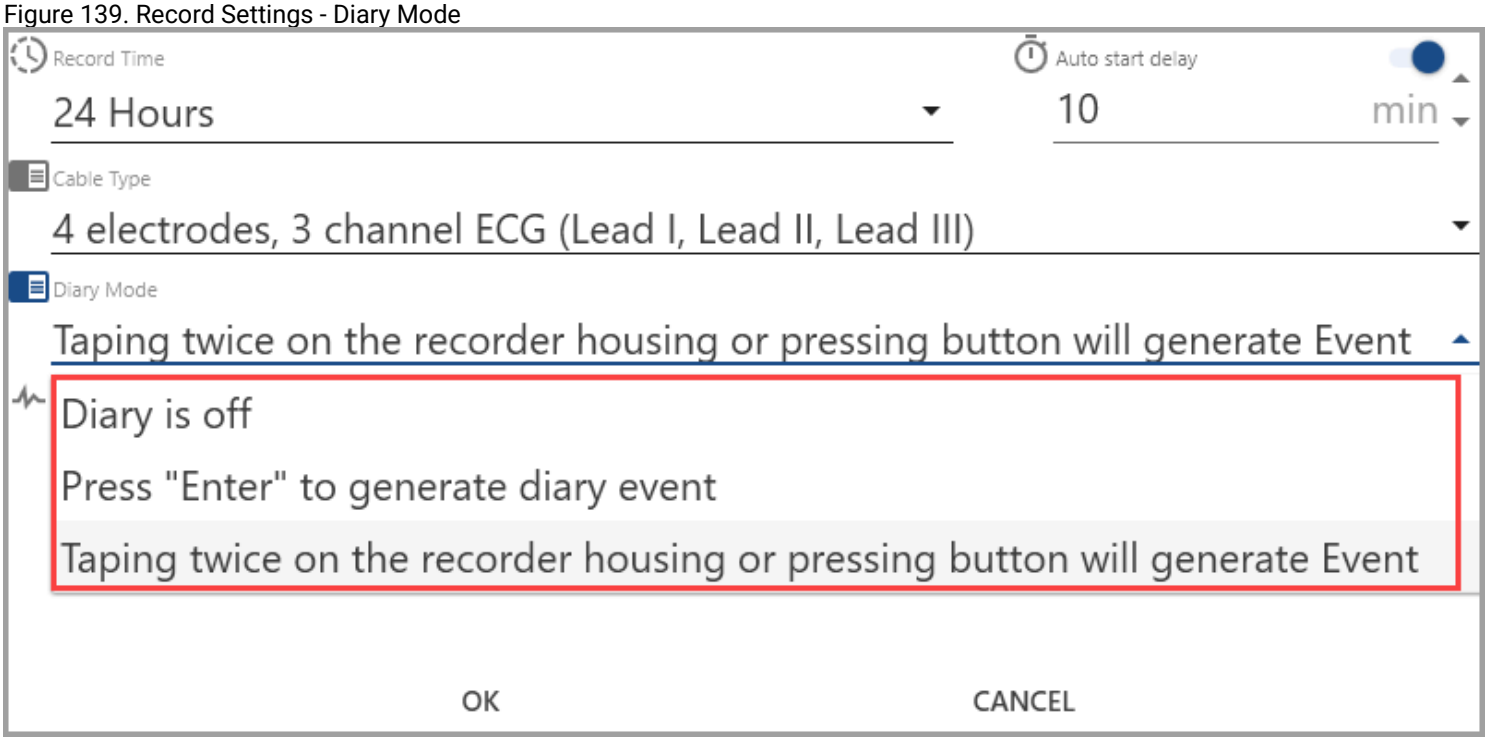
5. Select the cable type from the **Cable Type** drop-down list:

Figure 138. Record Settings - Selecting Cable



6. Select how the patient inputs diary events (different types of **Recorder** devices support different types of input; refer to the relevant manual, if needed):

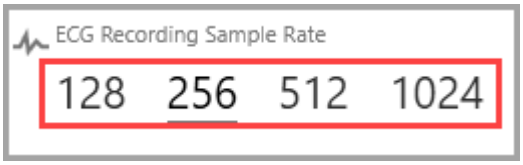
Figure 139. Record Settings - Diary Mode



- **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.
- **Tapping twice on the recorder housing or pressig button will generate Event:** By pressing Enter on the **Recorder**, or tapping the **Recorder** case twice, a patient will be able to register an **Event**.

7. 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 140. Record Settings - Sample Rate

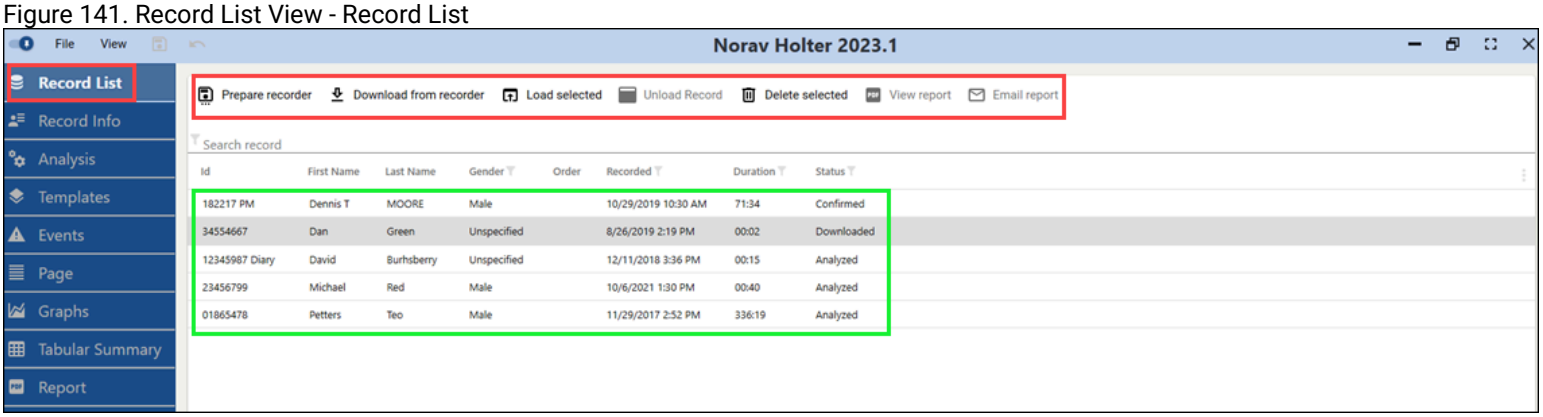


8. Click to set up **Accelerometer Recording**:
   - Select **ON** to enable the **Accelerometer Recording** during the test. Accelerometer recording can help to identify movement artifacts and remove them from the ECG signal, which can improve the accuracy of the interpretation.
   - Select **OFF** if there is no need to enable it.
9. Click **OK** to save and apply changes to the record settings.

4.6.3. Record List

The **Record List** is the **View** where you can prepare the **Recorder** and manage patients' records imported and downloaded into the system.

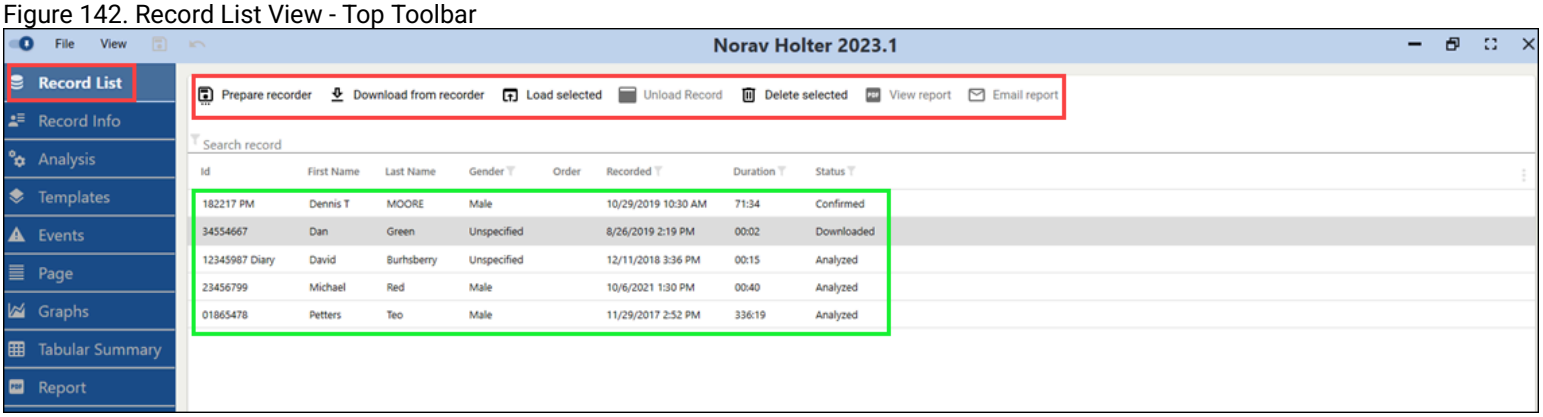
Figure 141. Record List View - Record List



4.6.3.1. Using Top Toolbar

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

Figure 142. Record List View - Top Toolbar



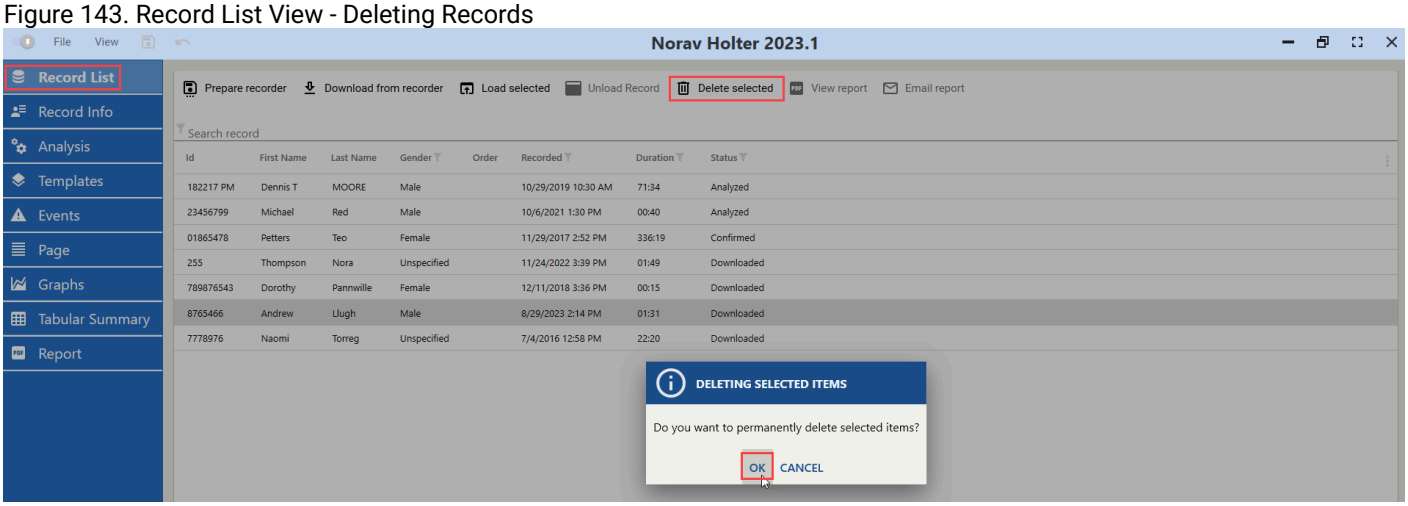
- **Prepare recorder:** Starts the recorder preparation procedure. More details in the Preparing Recoder section *(on page 290)*.
- **Download from recorder:** Allows you to download a Holter recording into the system for the future analysis. You can download records from the **Memory Card** or directly from the **Recorder** via USB (if applicable). More details in the Downloading Holter Recording Data section *(on page 317)*.
- **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.

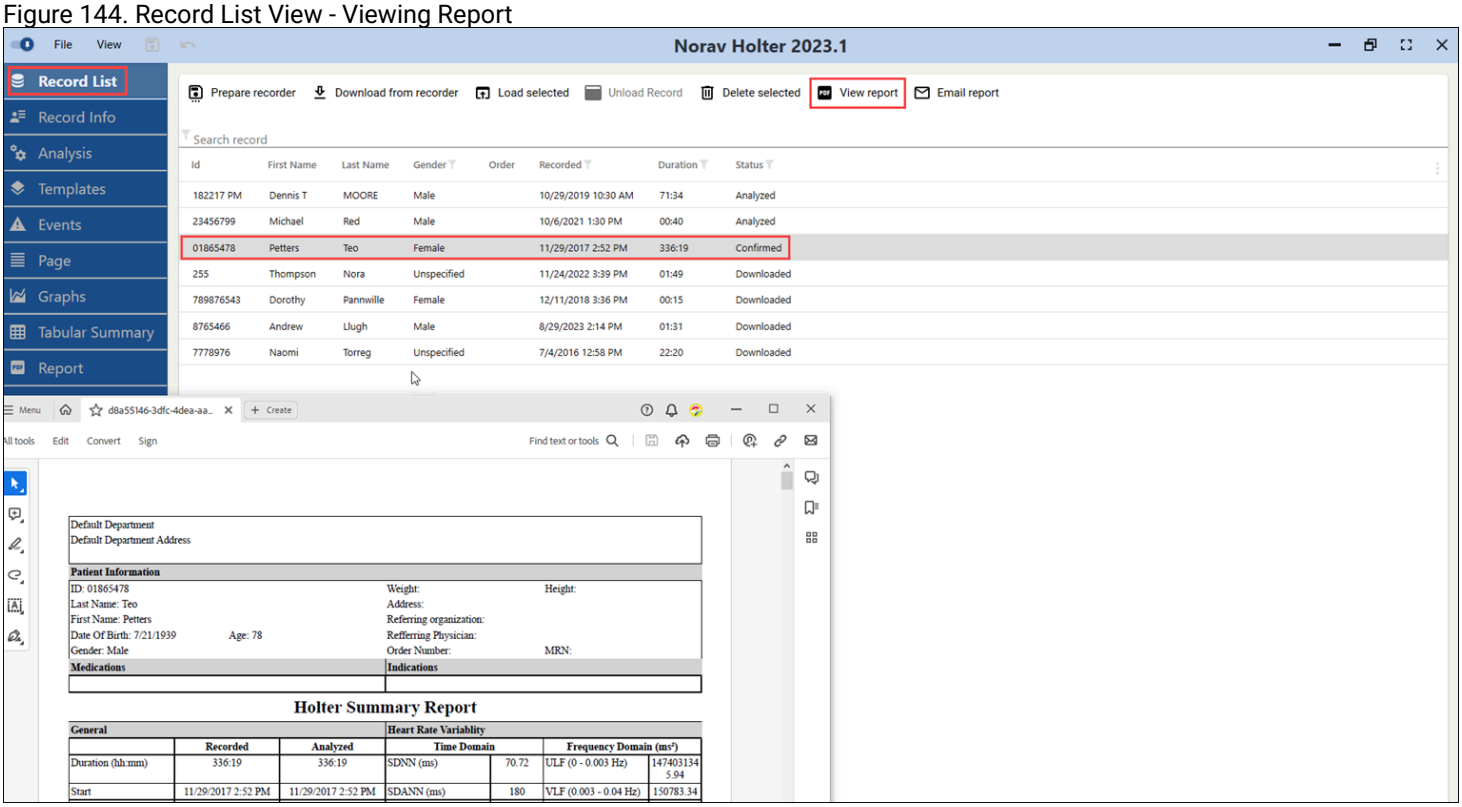
Figure 143. Record List View - Deleting Records



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.

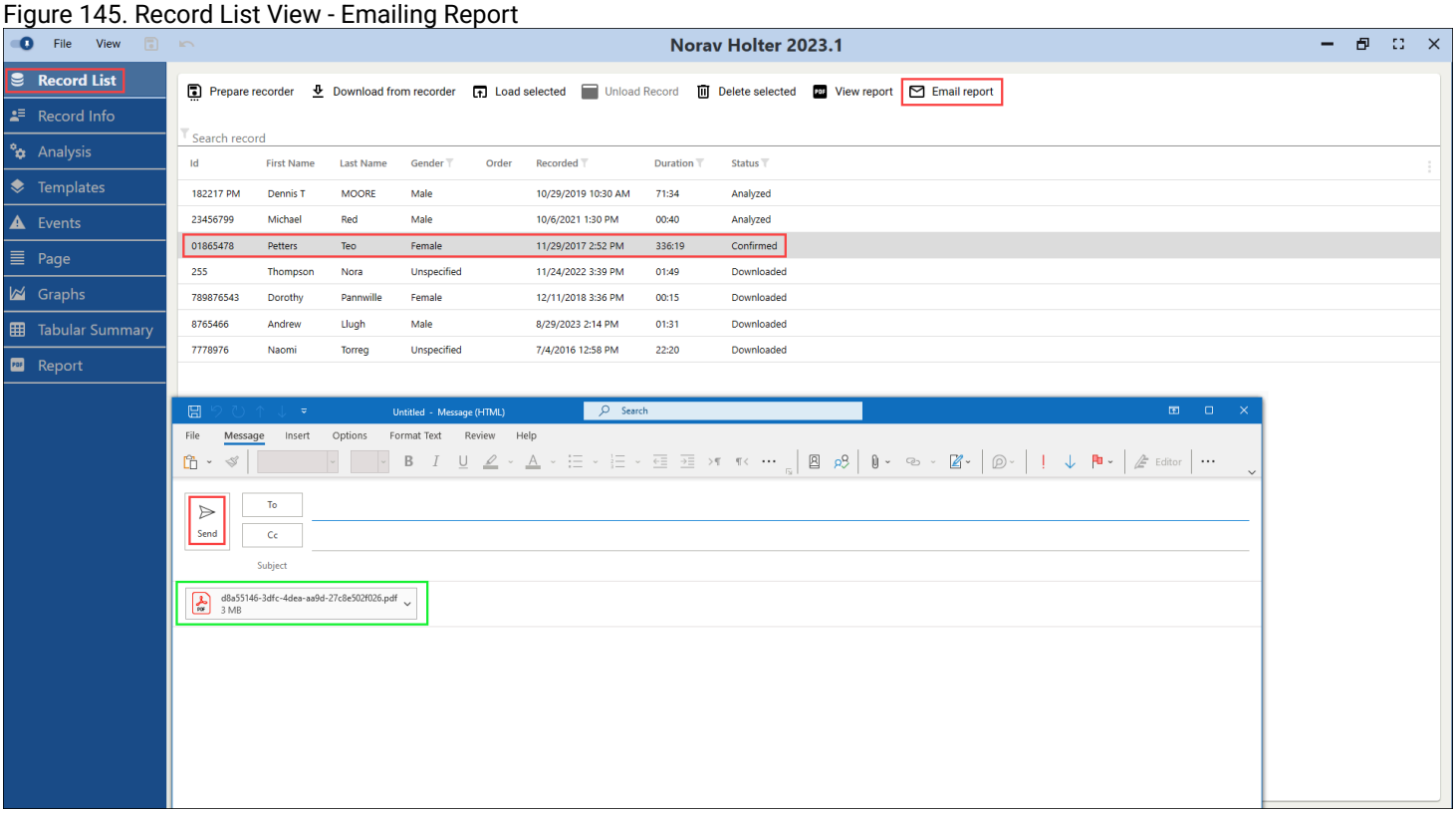
Figure 144. Record List View - Viewing Report



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 145. Record List View - Emailing Report

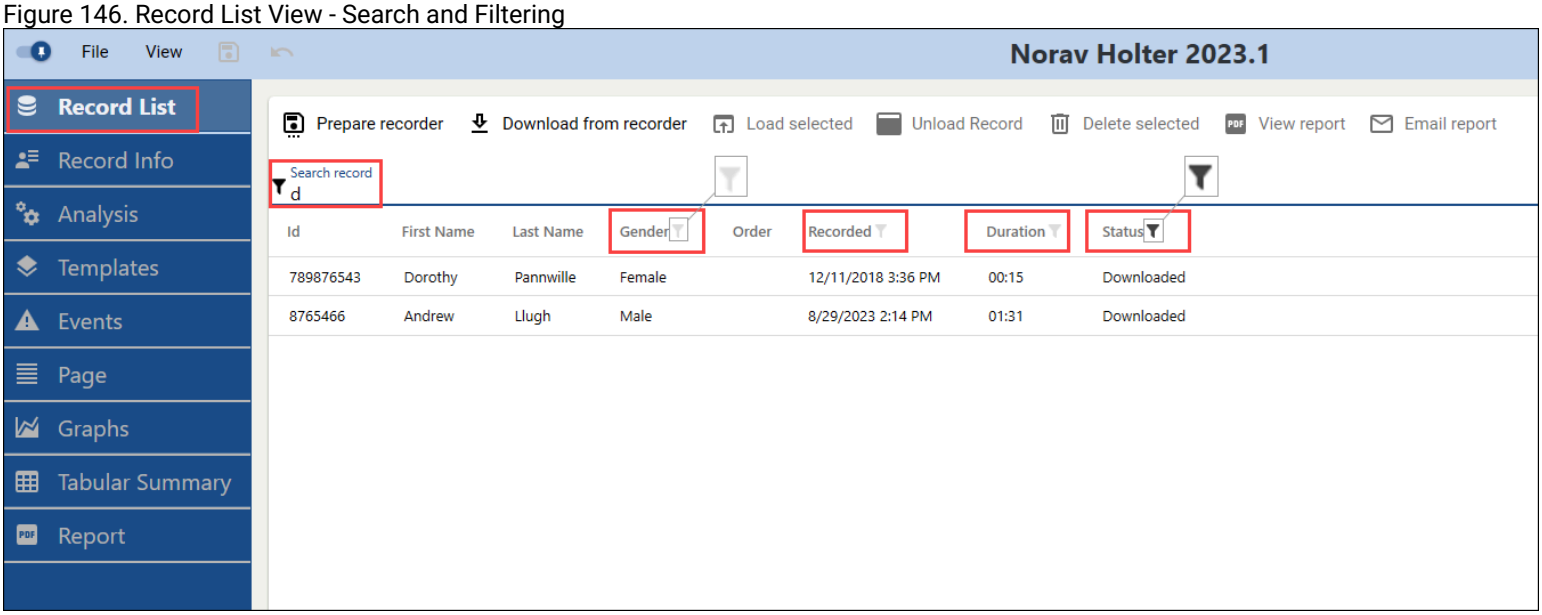


Fill in the required fields and click **Send** to send the report via email.

4.6.3.2. 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 146. Record List View - Search and Filtering

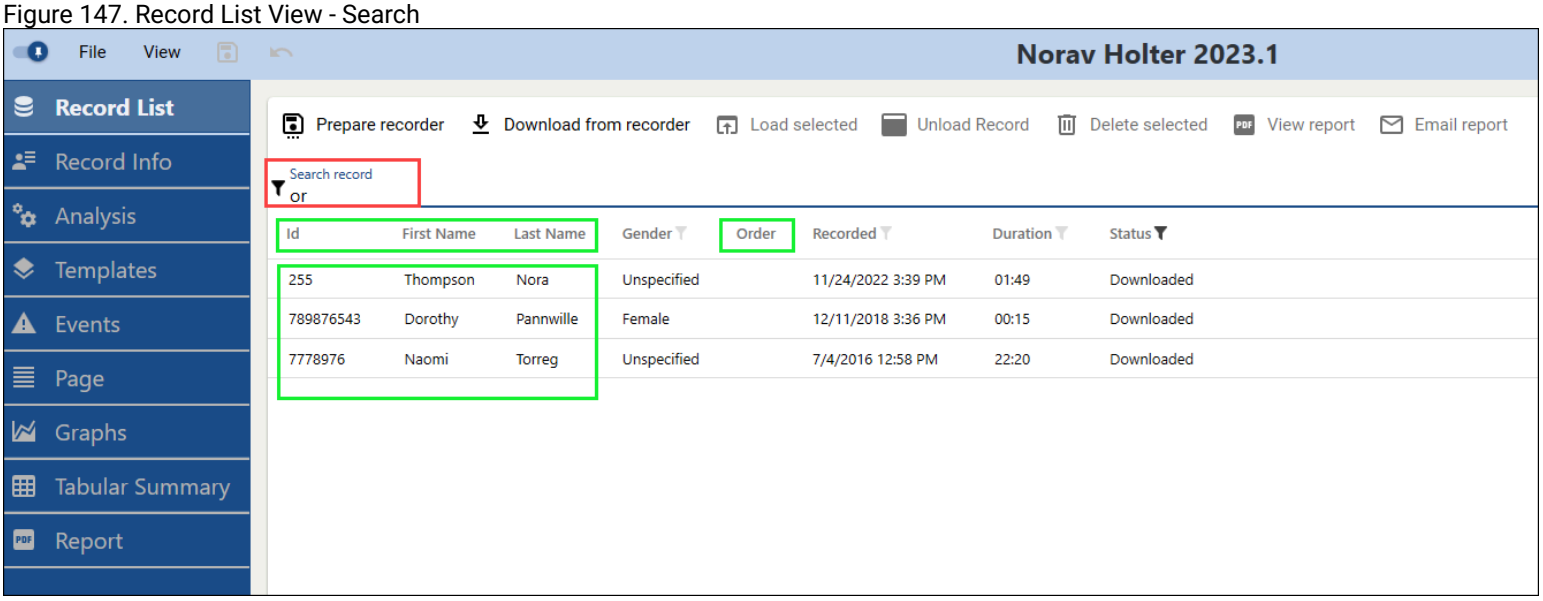


To find a **Record** in the **Record List**:

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.

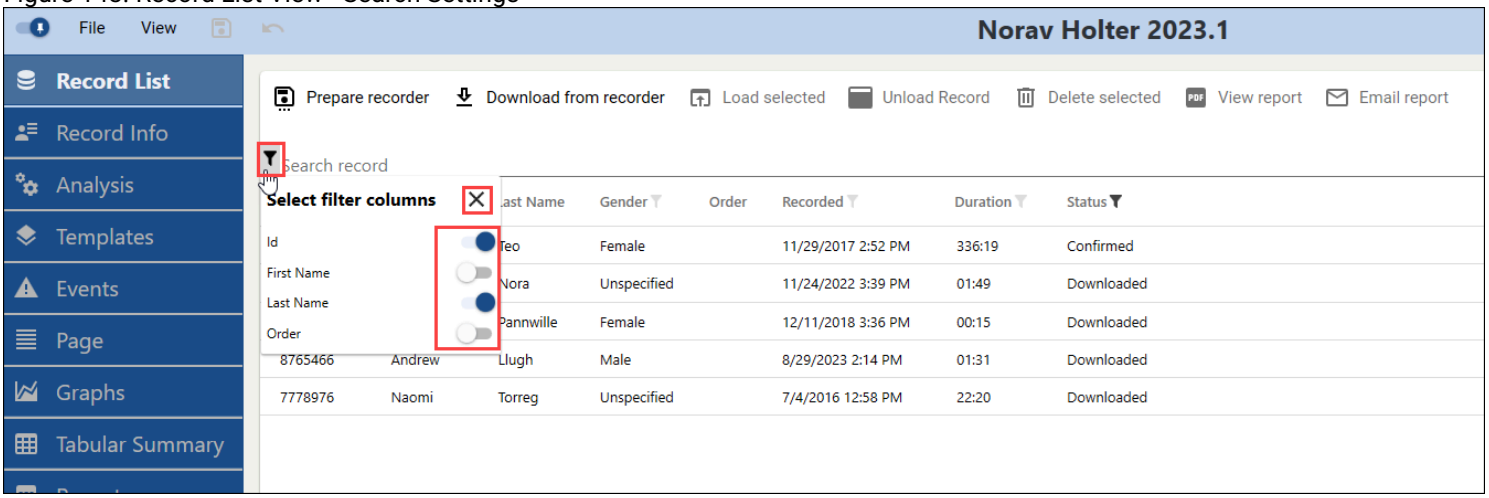
Figure 147. Record List View - Search



To change **Search record** settings:

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

Figure 148. 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.

4.6.3.3. Using Column Sorting

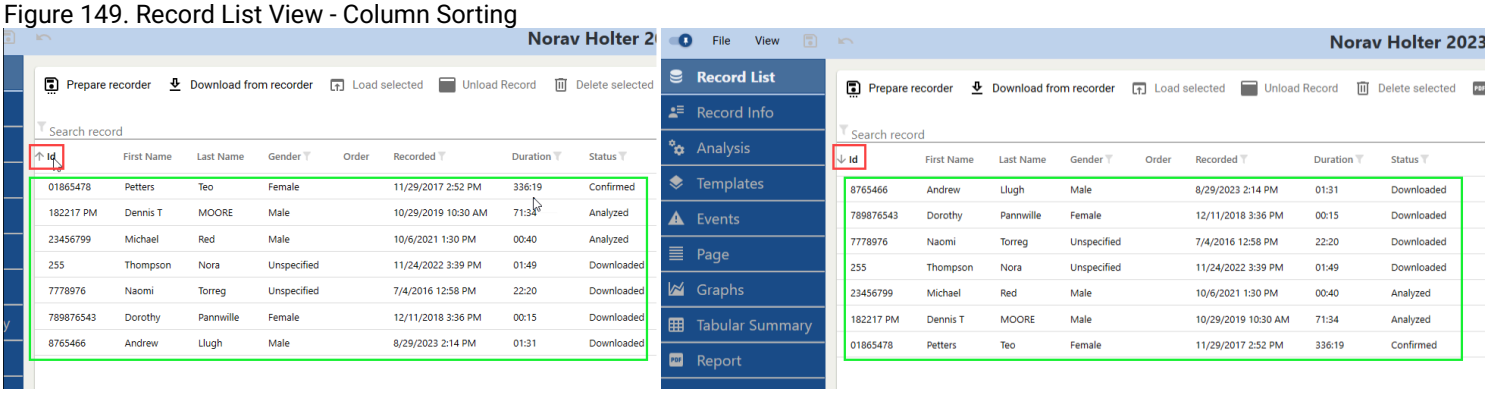
You can also sort records in the list using **Column Sorting**. **Column Sorting** toggles the sorting in a separate column between ascending and descending order. After switching the order in a separate column, all records in the list will be rearranged accordingly.

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 149. 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.

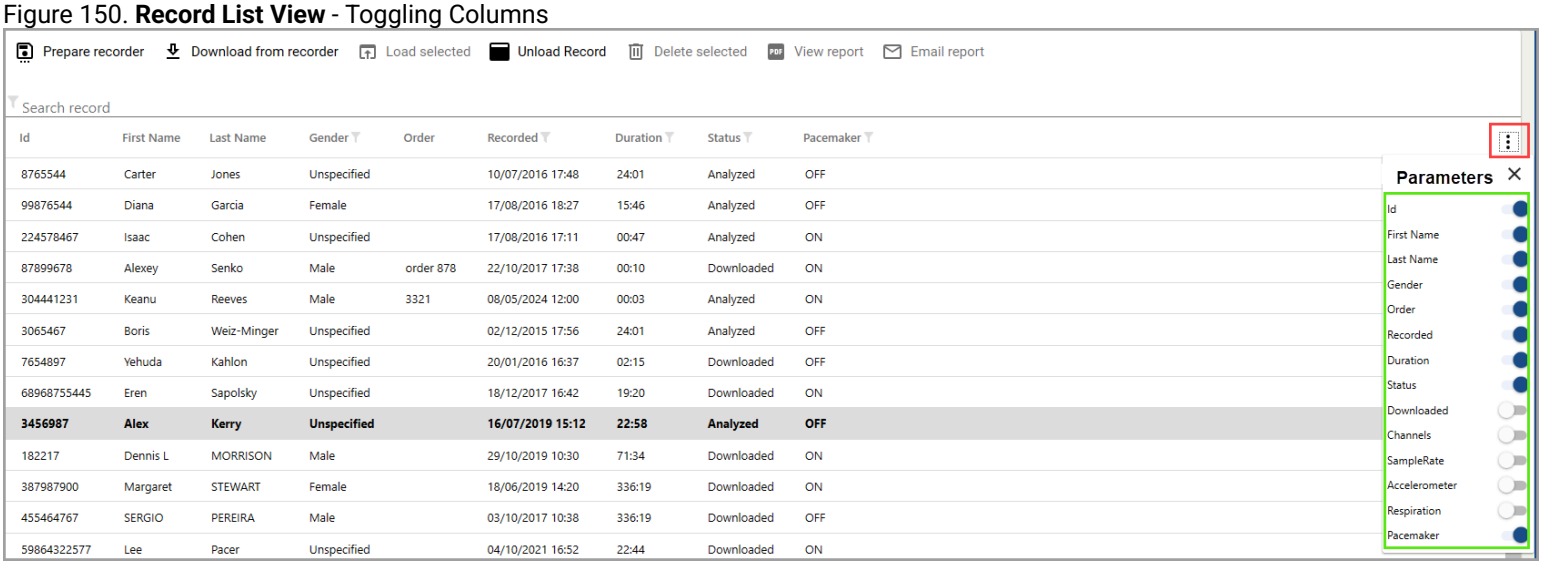
To turn on additional columns or adjust the visibility of the displayed columns, if needed:

1. Click the vertical ellipsis menu on the right to access the **Parameters** drop-down menu.

2. Click on the relevant available toggles to turn them ON or OFF.

3. The **Record List** will be adjusted accordingly.

Figure 150. **Record List View** - Toggling Columns



4.6.3.4. Using Filters

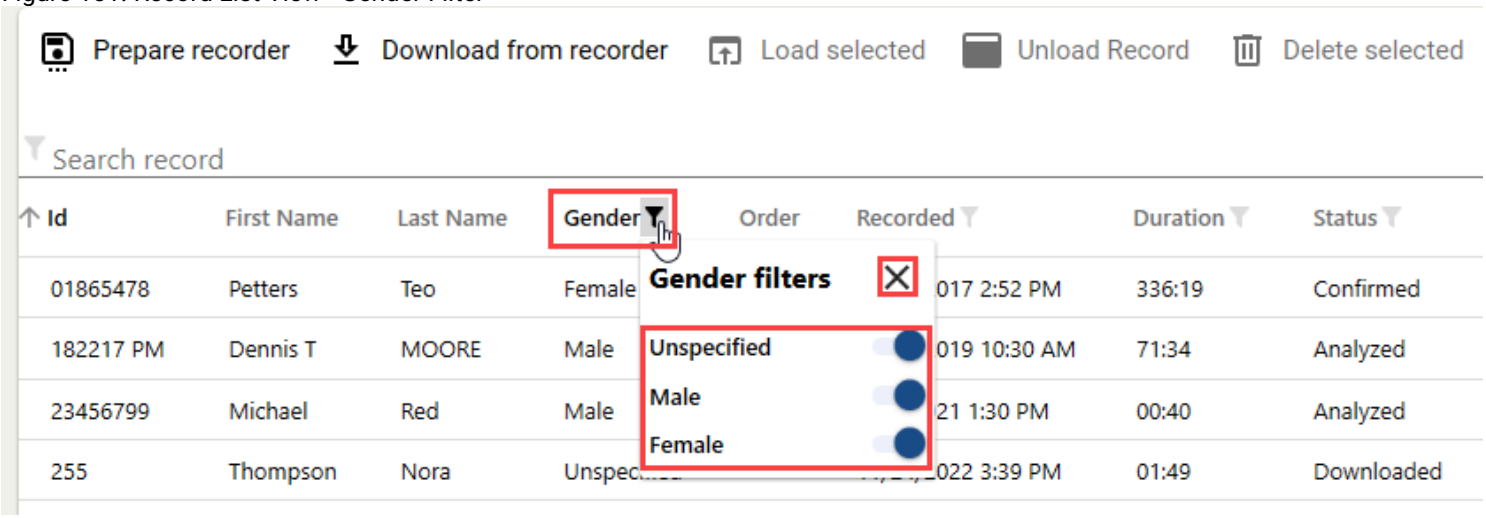
You can set various filters for **Gender**, **Recorded**, **Duration**, and **Status** columns in the **Record List** to view only records that match your criteria.

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 151. Record List View - Gender Filter



3. Click the **Close** icon at the top right of the pop-up window or click anywhere else to close this window.

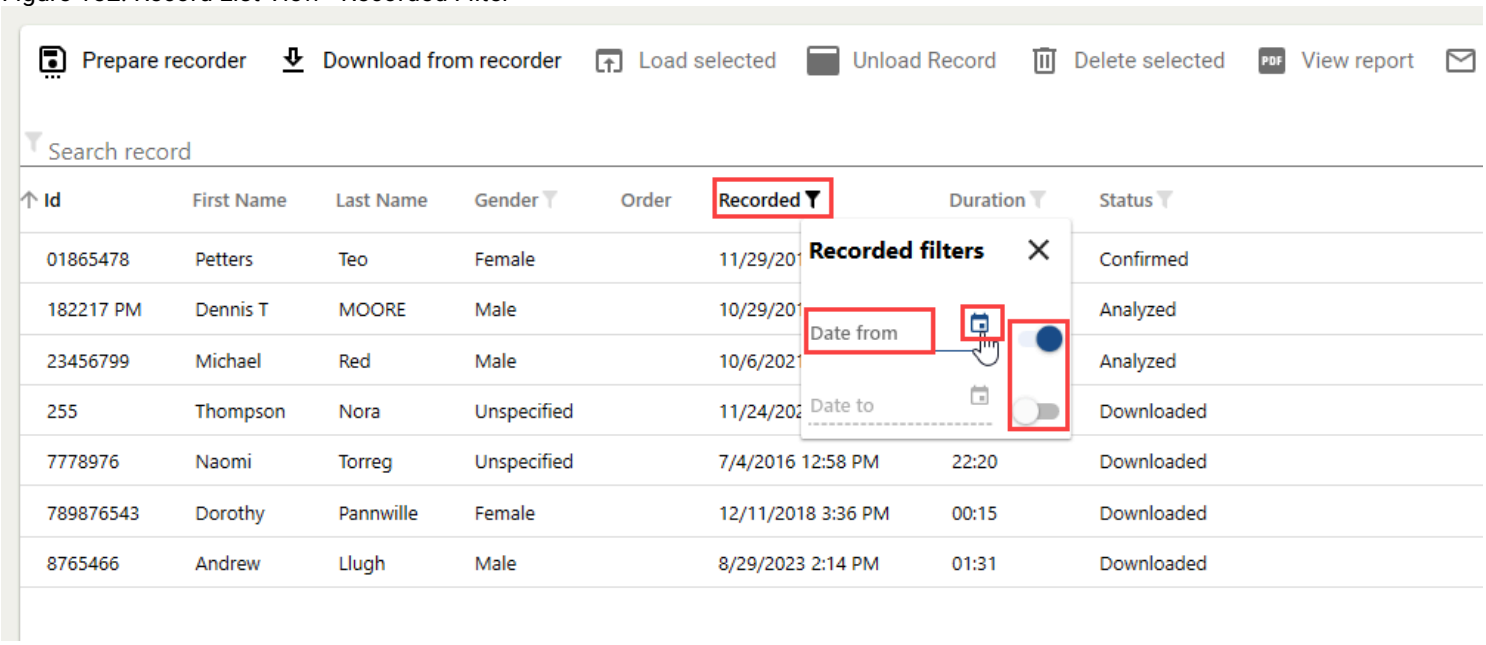
4. **(Optional)** To discard all changes and reset filter settings to default, hover over a filter icon and click the mouse wheel.

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 152. Record List View - Recorded Filter



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.

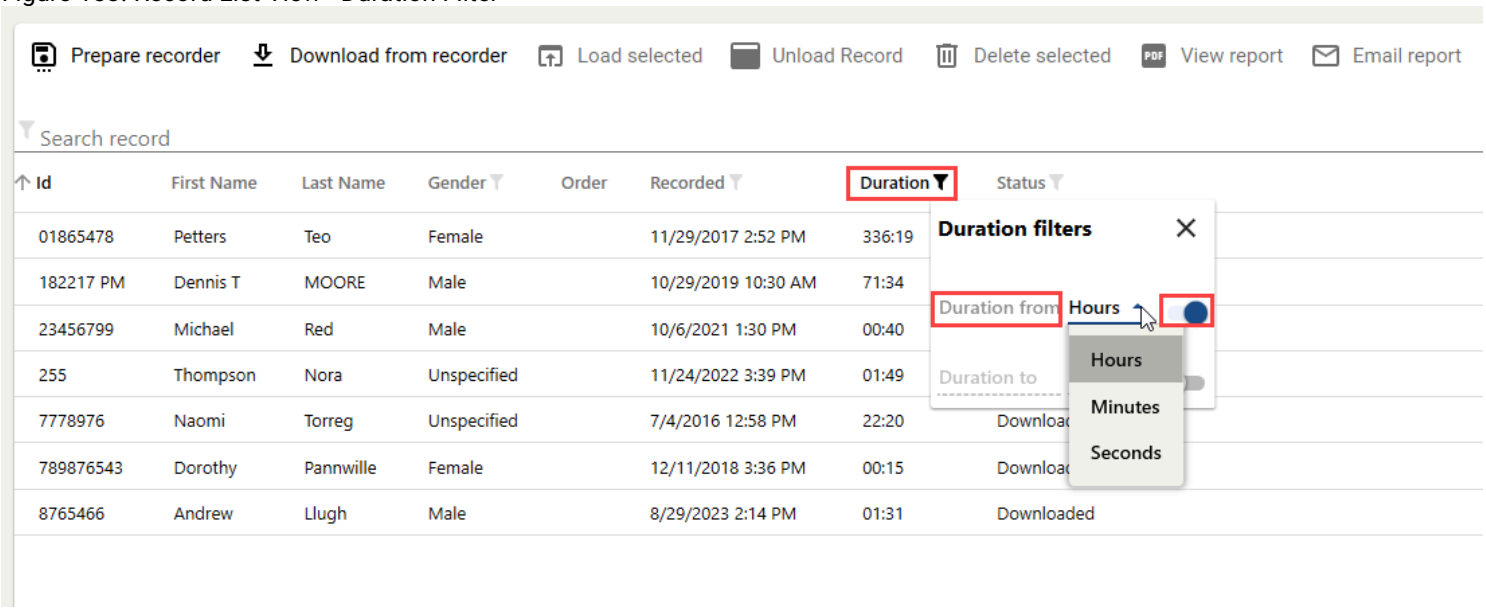
As soon as you set **Date from** and **Date to** parameter values, the contents of the **Record List** will change accordingly.

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 153. Record List View - Duration Filter



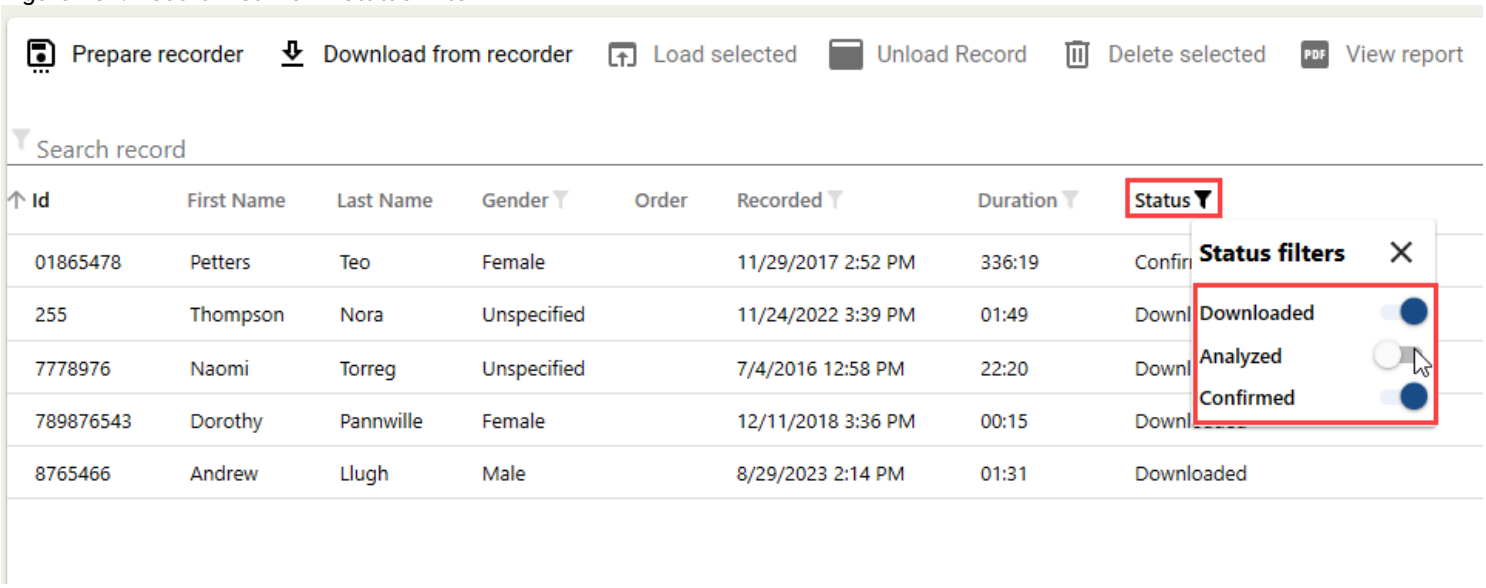
3. First, choose units for parameters toggled **ON** from the drop-down list on the right: **Hours, Minutes,** or **Seconds**.
4. Click active fields and fill the duration manually, using your keyboard.
5. Click the **Close** icon at the top right of the pop-up window or click anywhere else to close this window.
6. **(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:

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 154. Record List View - Status Filter

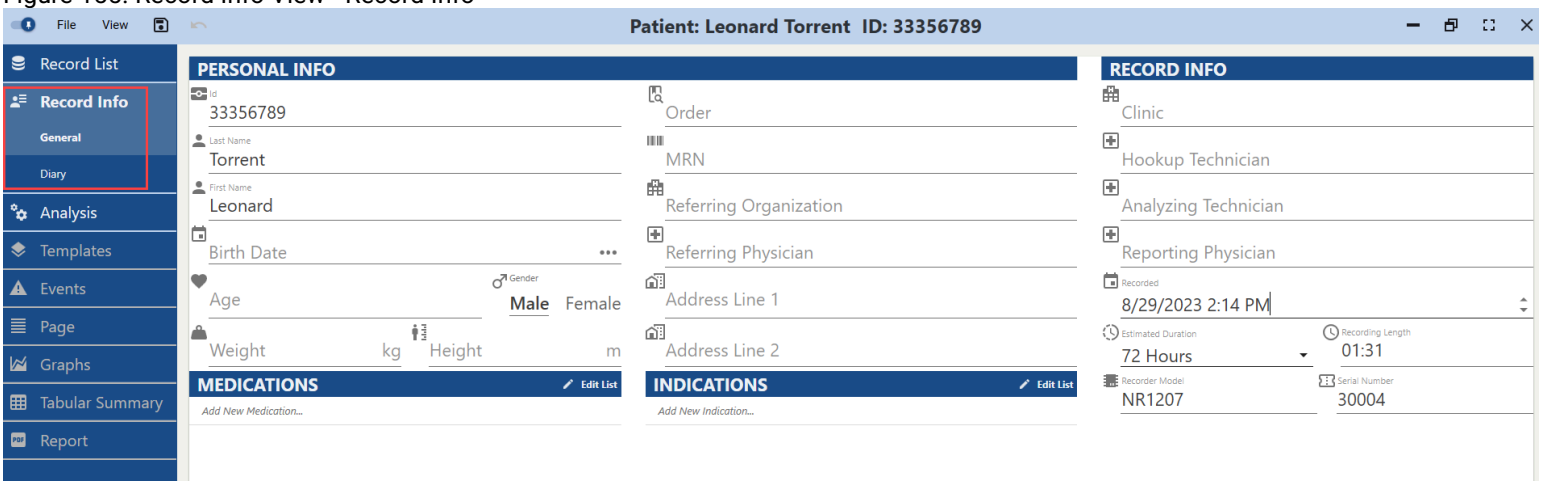


3. Click the **Close** icon at the top right of the pop-up window or click anywhere else to close this window.
4. **(Optional)** To discard all changes and reset filter settings to default, hover over a filter icon and click the mouse wheel.

4.6.4. Record Info

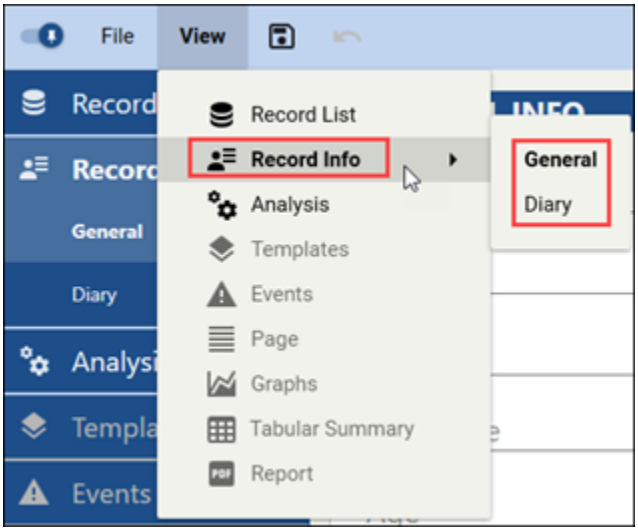
The **Record Info View** enables you to edit the patient's data and the diary of the downloaded or imported **Record**.

Figure 155. Record Info View - Record Info



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

Figure 156. 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**.

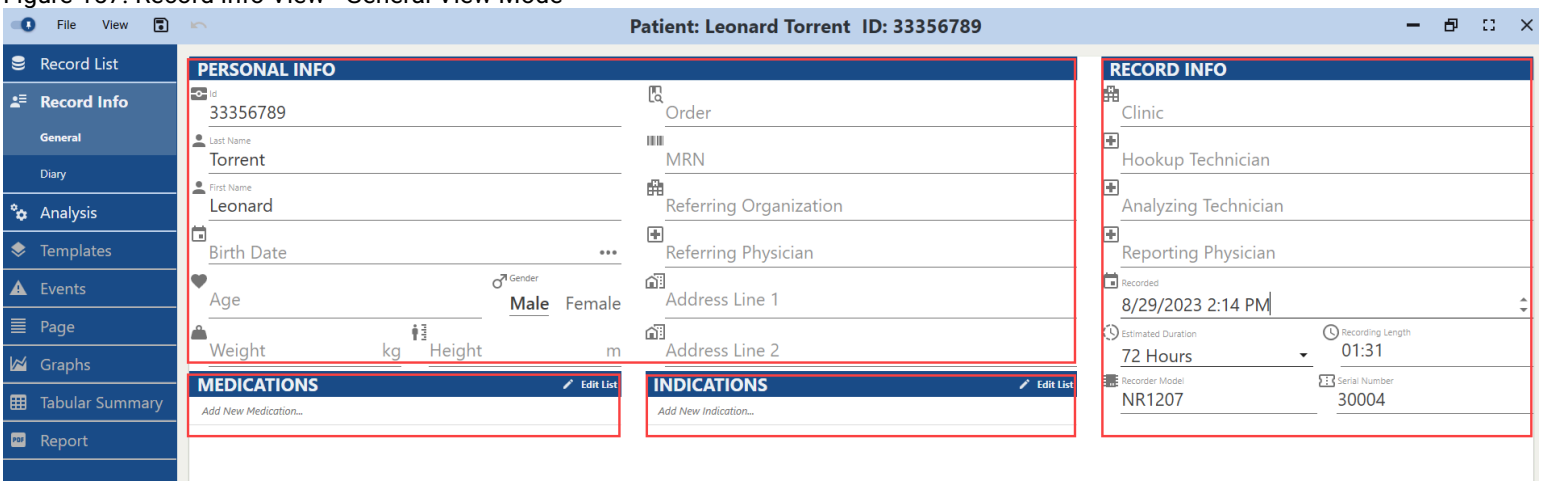
You will also be prompted with the **Patient Information View**, which looks and works almost exactly as the **Record Info View**, in the following cases:

- When you import a **Record**. More details in the Import Record subsection *(on page 54)*.
- When you download a **Record** from the **Recorder**. More details in the Downloading Holter Recording Data section *(on page 317)*.

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:

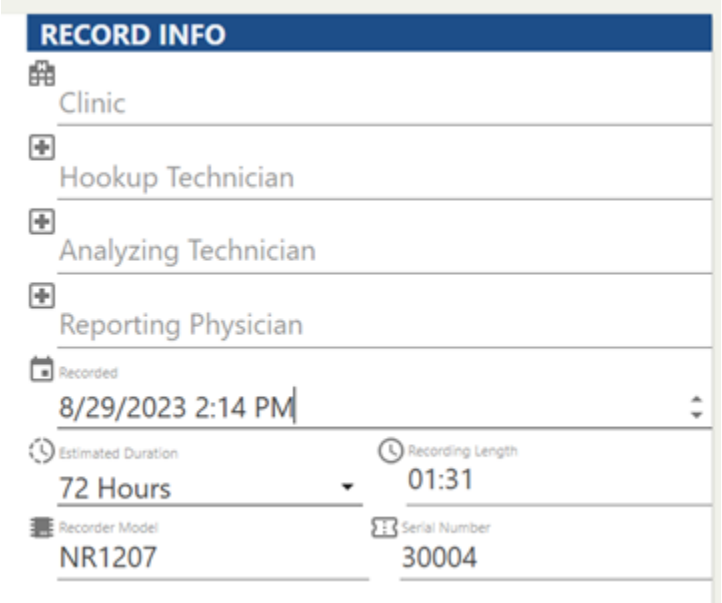
Figure 157. Record Info View - General View Mode



- **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**:

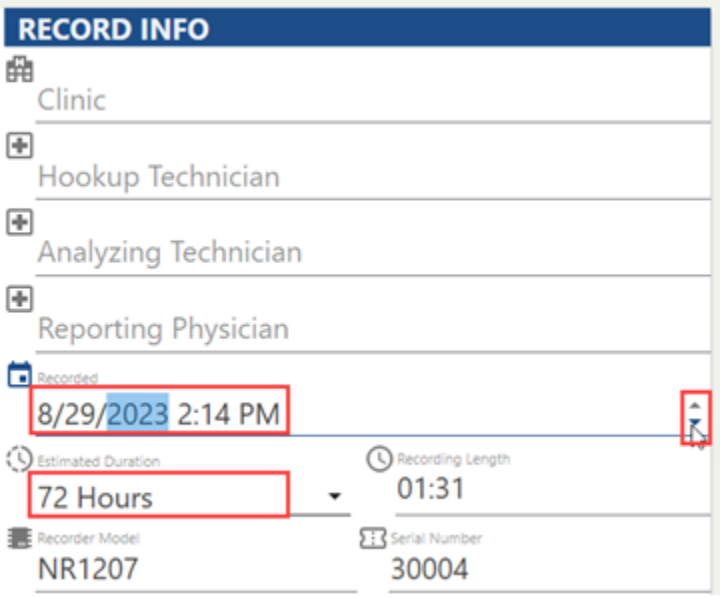
Figure 158. Record Info View - Personal Info



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 159. Record Info View - Record Info



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.

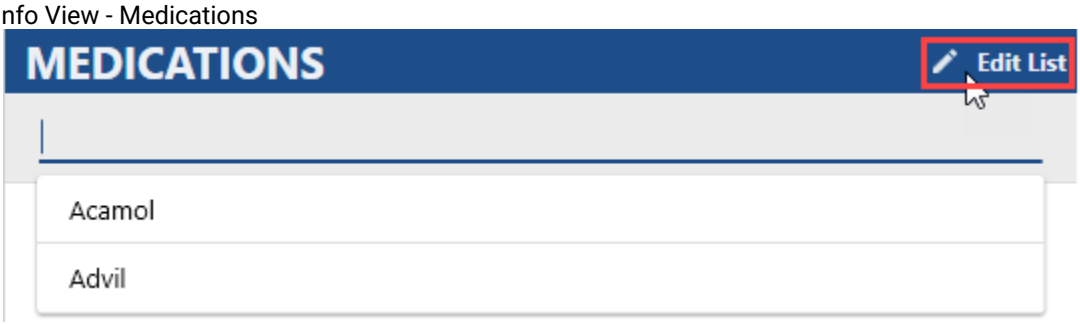
2. **(Optional)** Click the **Recorded** field to enter the modified date and time when the record was launched. You can either type the date and time in the format DD/MM/YYYY HH:MM AM/PM or select a segment of the date and time string by clicking and holding the left mouse button. Then, use the picker 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 160. Record Info View - Medications



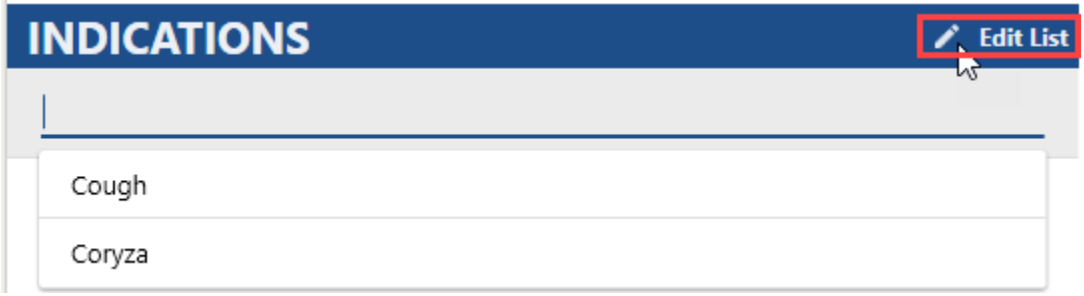
1. Click "Add New Medication" to open a drop-down list with predefined medications.

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 161. Record Info View - Indications

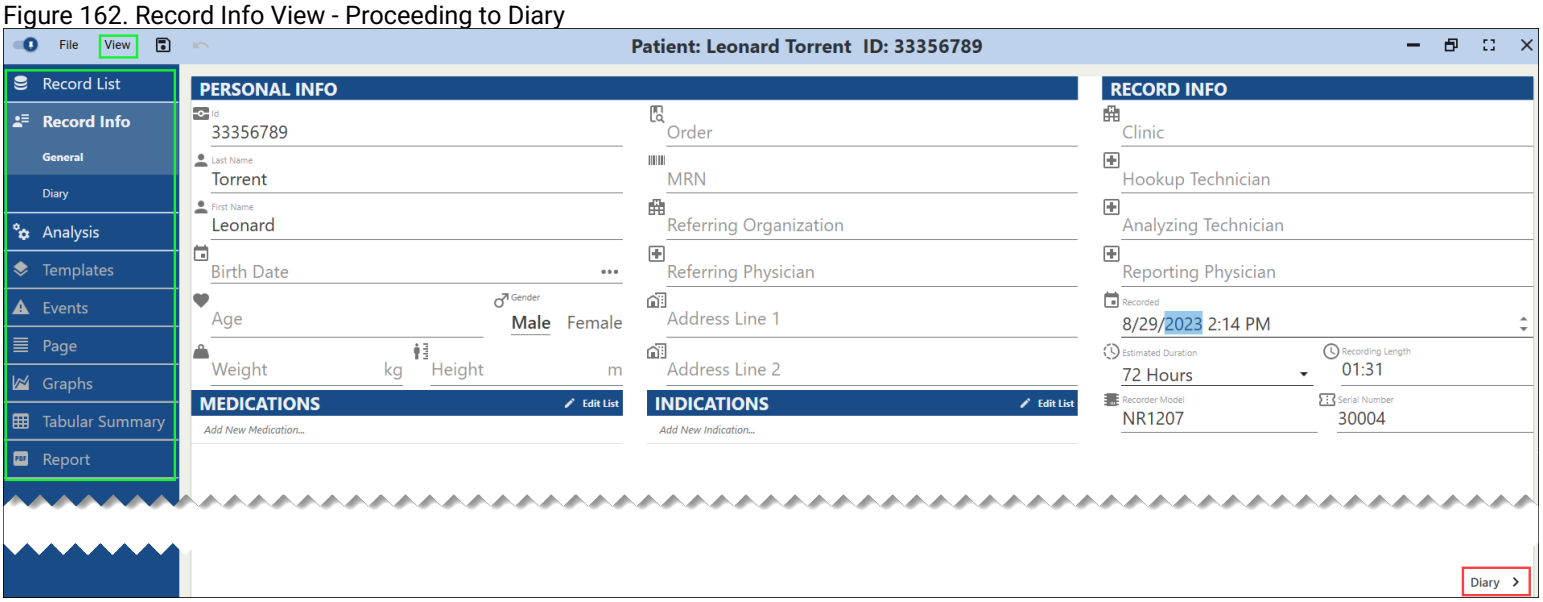


1. Click "Add New Indication" to open a drop-down list with predefined indications.

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 162. Record Info View - Proceeding to Diary

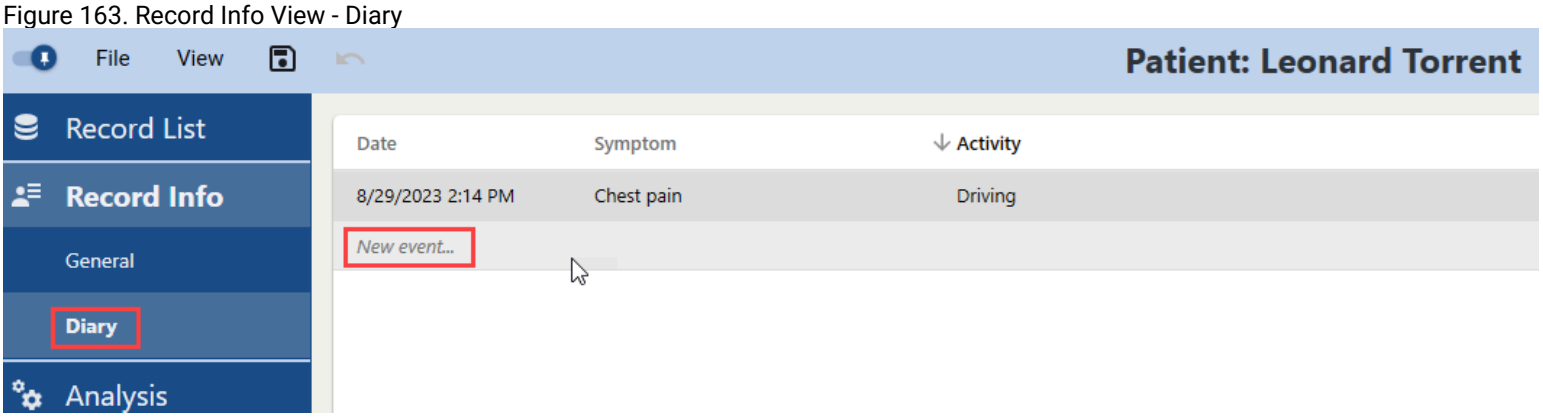


To proceed further within the **Record Info View**, click **Diary** at the bottom right. Otherwise, click any **View** in the **Views Sidebar** or in the **View** menu.

Diary View Mode

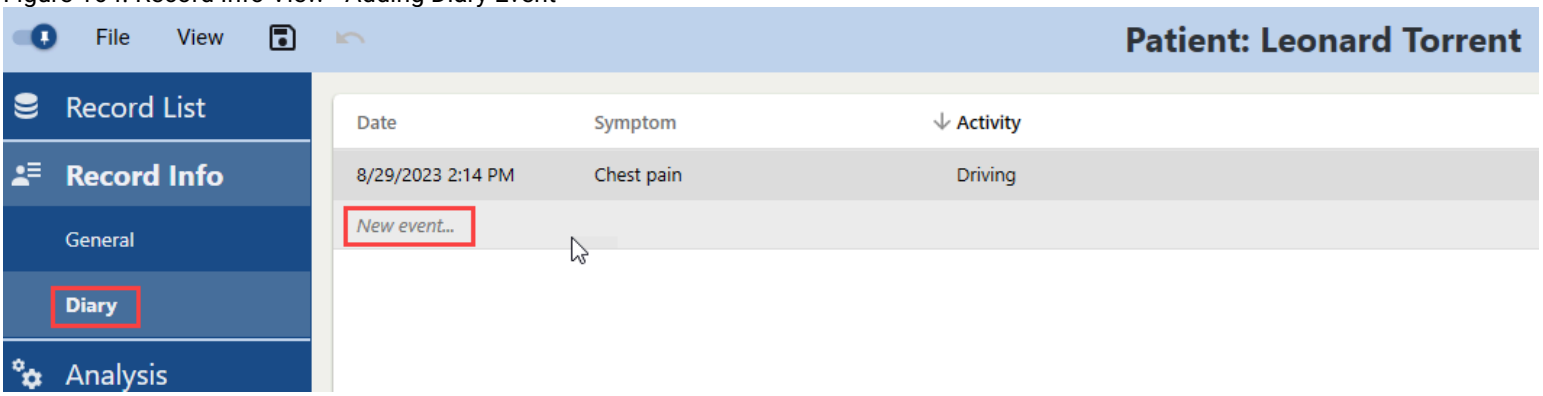
In the **Diary View Mode** you can add, review, modify, delete and sort **Diary Events** of a patient's **Record**.

Figure 163. Record Info View - Diary



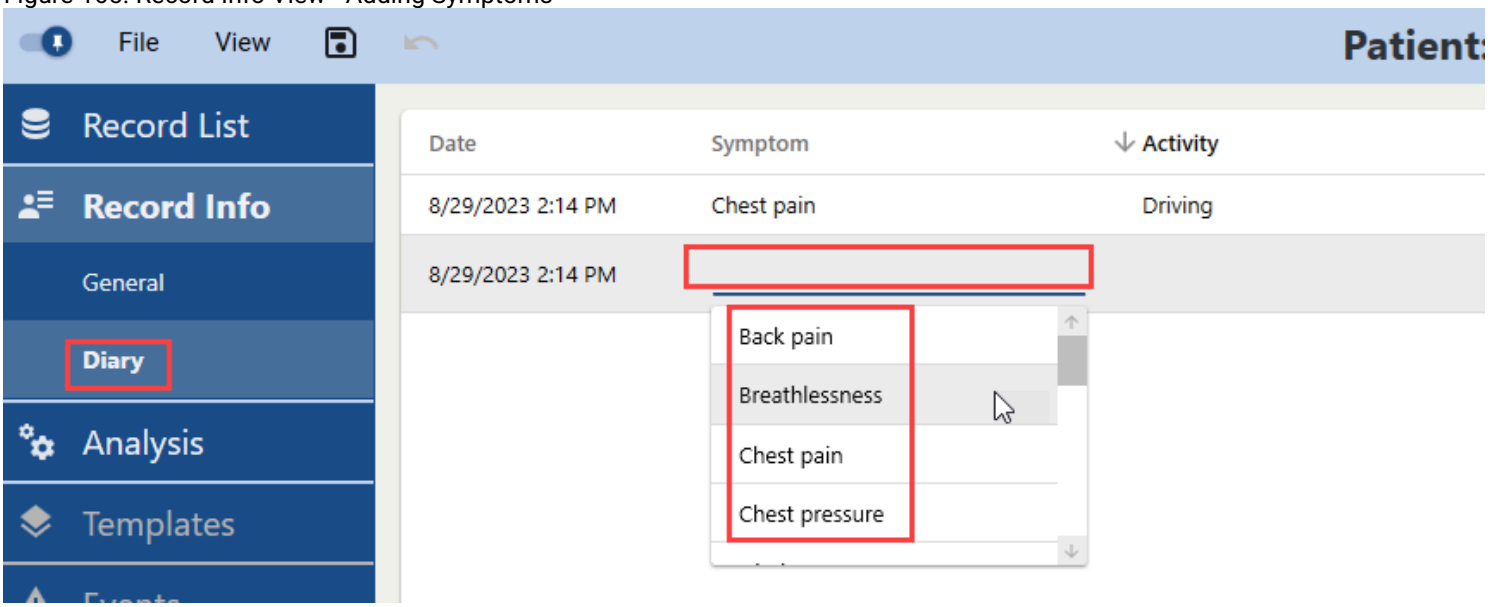
To add a **Diary Event**:

Figure 164. Record Info View - Adding Diary Event



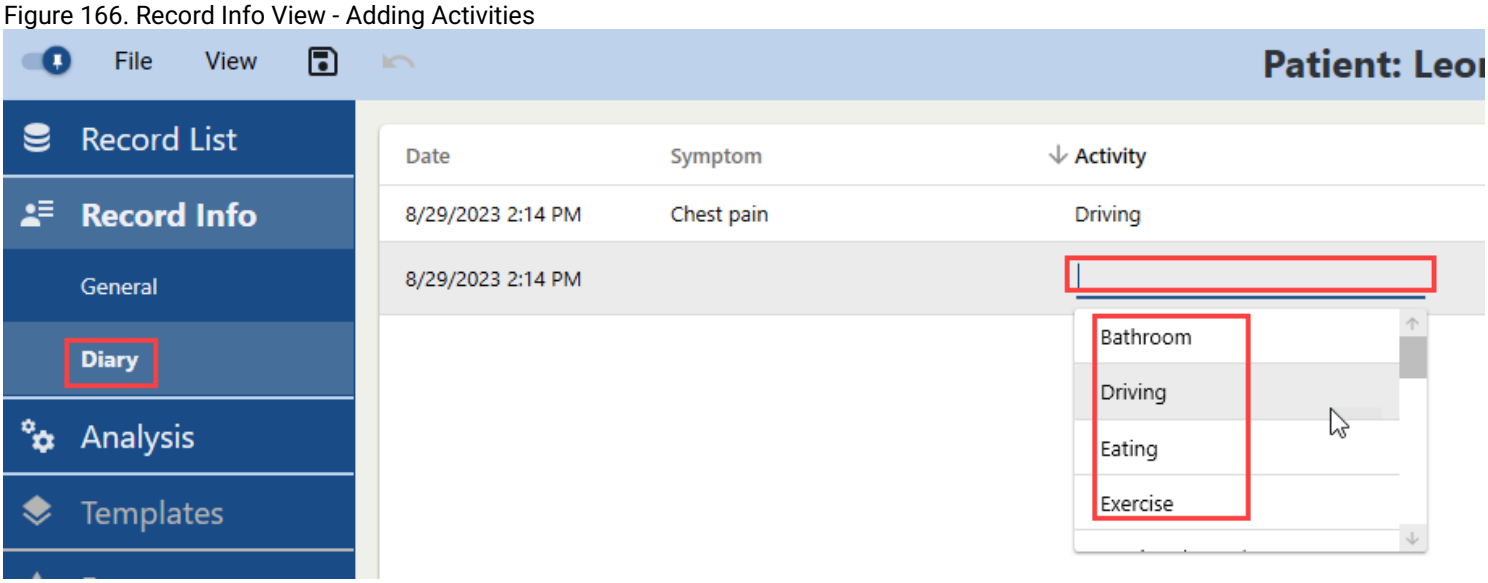
1. Click "New event". A new blank entry with a timestamp in the Date column will appear.
2. Click the blank text field in the **Symptom** column.

Figure 165. 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 166. Record Info View - Adding Activities

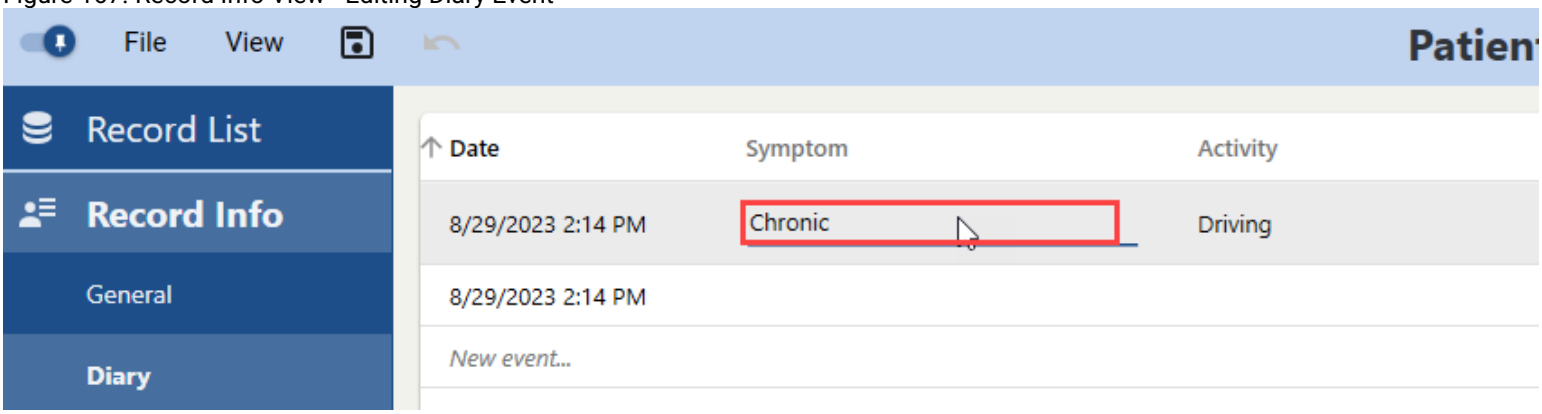


5. Choose an **Activity** from a drop-down list of predefined activities or type in an activity missing in the list.

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 167. 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.

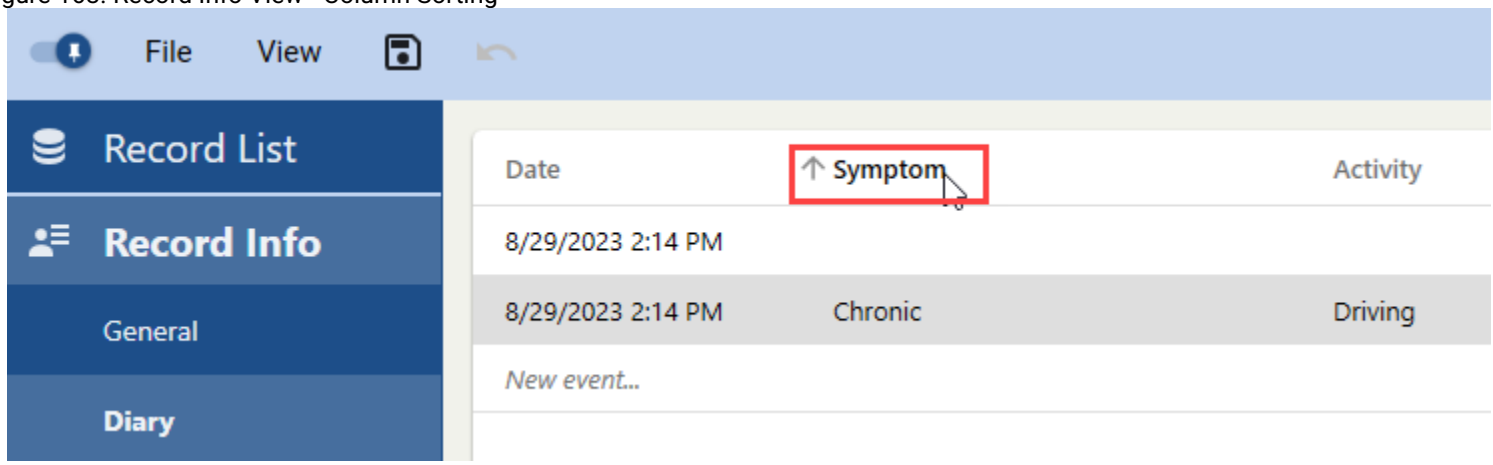
To delete a **Diary Event:**

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 your keyboard.

The entry will be deleted from the Diary.

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

Figure 168. Record Info View - Column Sorting

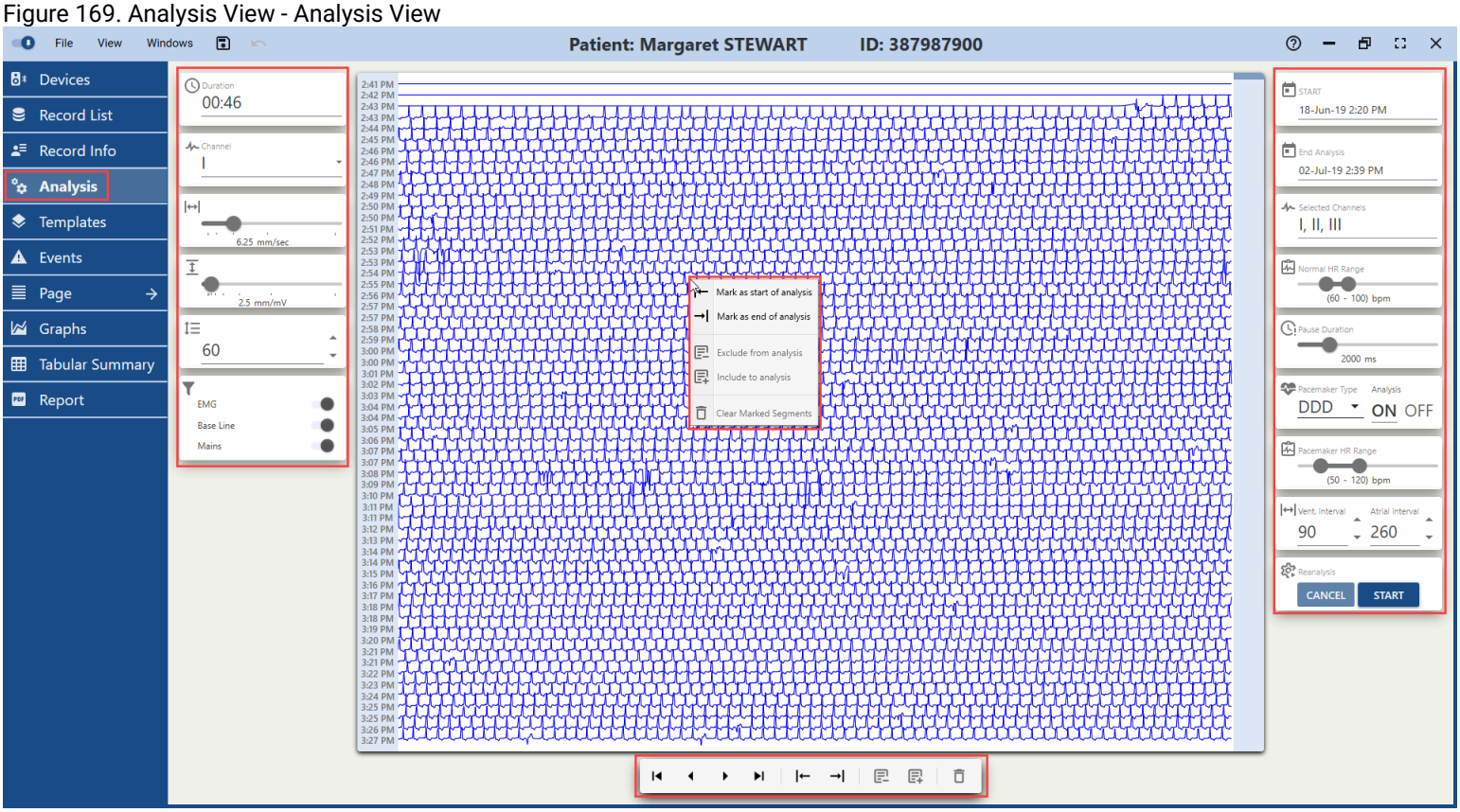


1. Hover your mouse cursor over the header of a column you want to use for sorting (the **Symptom** column, for example).
2. Click the column header to switch between the sorting orders - **Diary Event** entries will be rearranged in the corresponding order. The arrow icon to the left of the column header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

4.6.5. 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 169. Analysis View - Analysis View



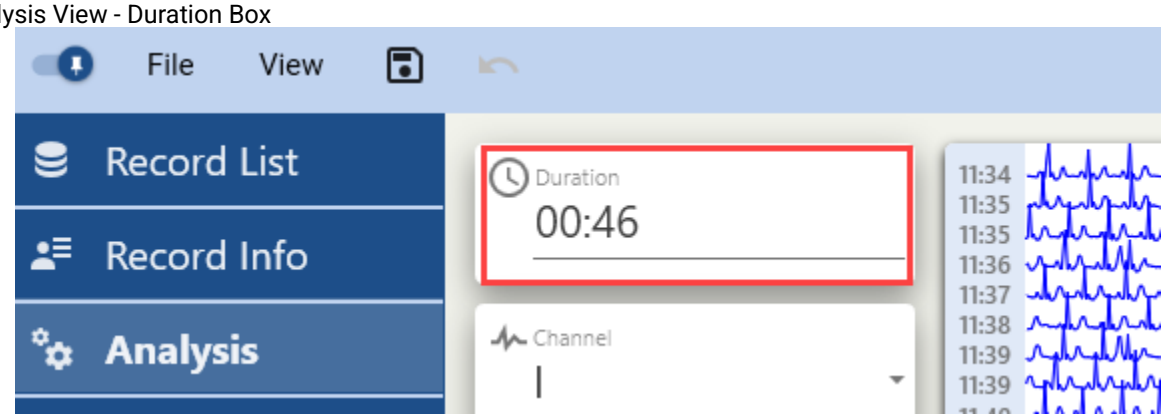
Signal Page Controls

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.

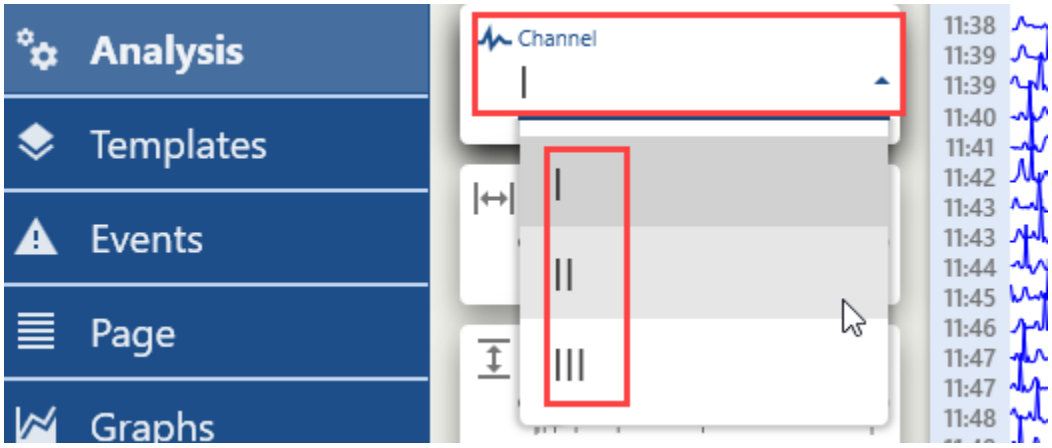
Duration: Displays the overall duration (in minutes) of the ECG Record fragment shown on the current **Signal Page**. This parameter is not directly adjustable and is influenced by the **Signal Page Gain** and **Signal Page Lines** parameters, as well as by window size. Alter these settings to see automatic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

Figure 170. Analysis View - Duration Box



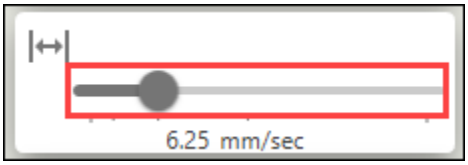
Channel: To select a channel you want to display on the **Signal Page**, choose it from a drop-down list on the right. The **Signal Page** updates accordingly.

Figure 171. Analysis View - Channel Box



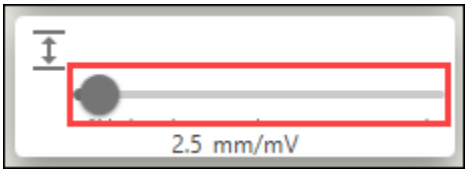
Signal Page Scale: Use the slider to adjust the ECG signal scale on the **Signal Page**. This action also affects the **Duration** value.

Figure 172. Analysis View - Signal Page Scale



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

Figure 173. Analysis View - Signal Page Gain



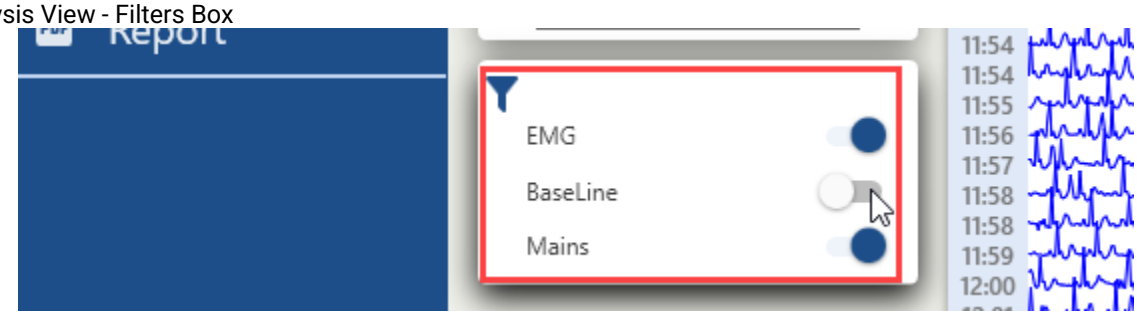
Signal Page Lines: Adjust the lines number using picker arrows on the right. This action changes the number of lines displayed on a **Signal Page** and consequently modifies the **Duration** value.

Figure 174. Analysis View - Signal Page Lines



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

Figure 175. 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.

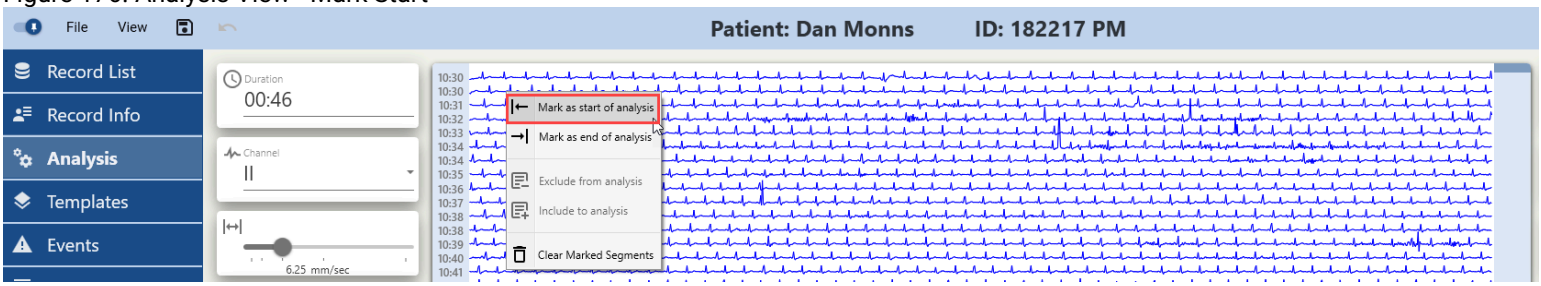
Action Bar and Context Menu Controls

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

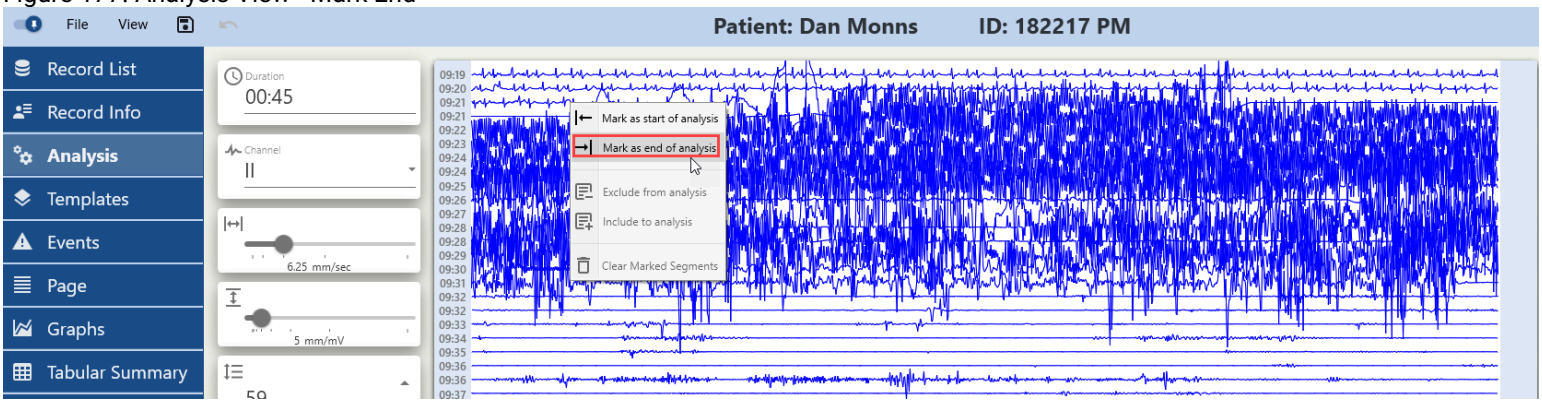
Mark as start of analysis: To set the analysis **Start**, hover over the desired point in the **Signal Page**, right-click, and select **Mark as start of analysis**.

Figure 176. Analysis View - Mark Start



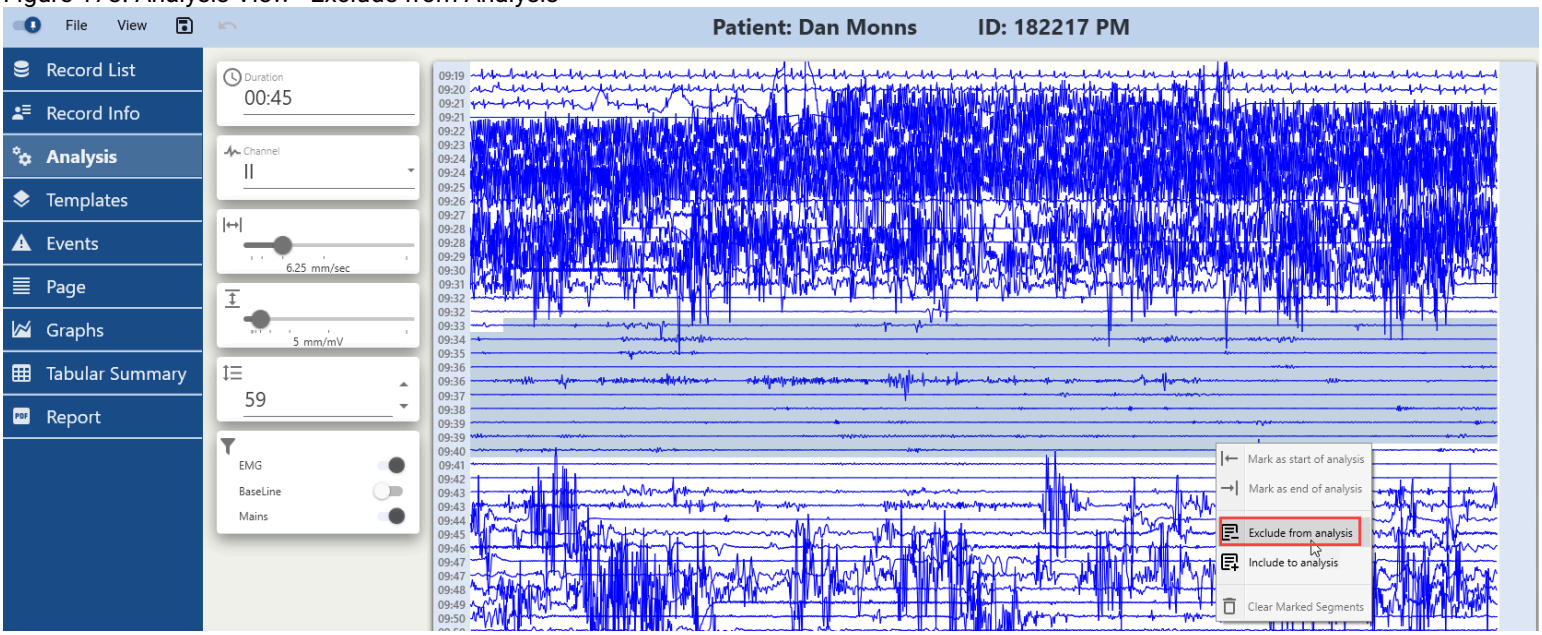
Mark as end of analysis: To set the analysis **End**, hover over the desired endpoint in the **Signal Page**, right-click, and select **Mark as end of analysis**.

Figure 177. 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**.

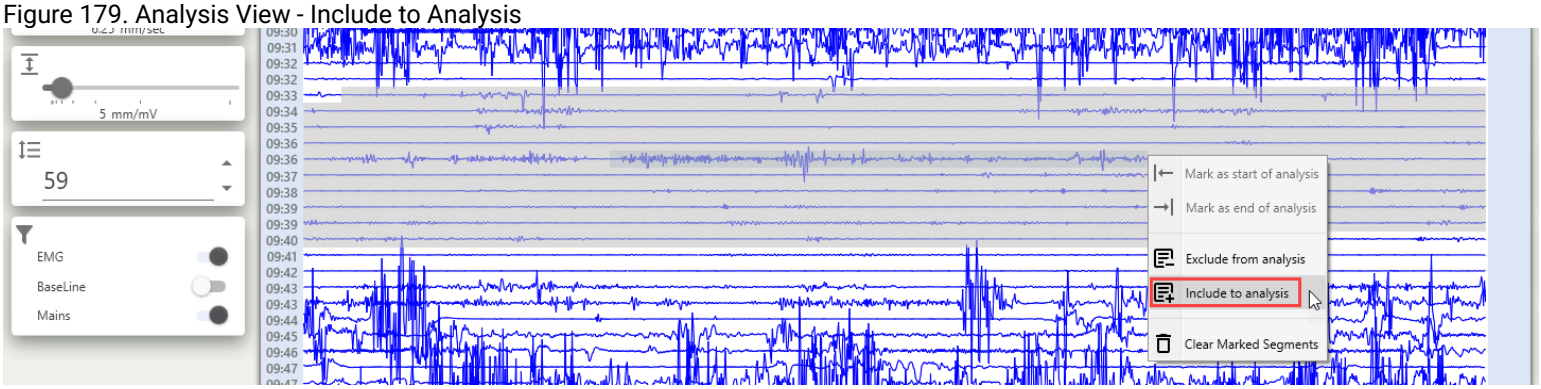
Figure 178. Analysis View - Exclude from Analysis



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**.

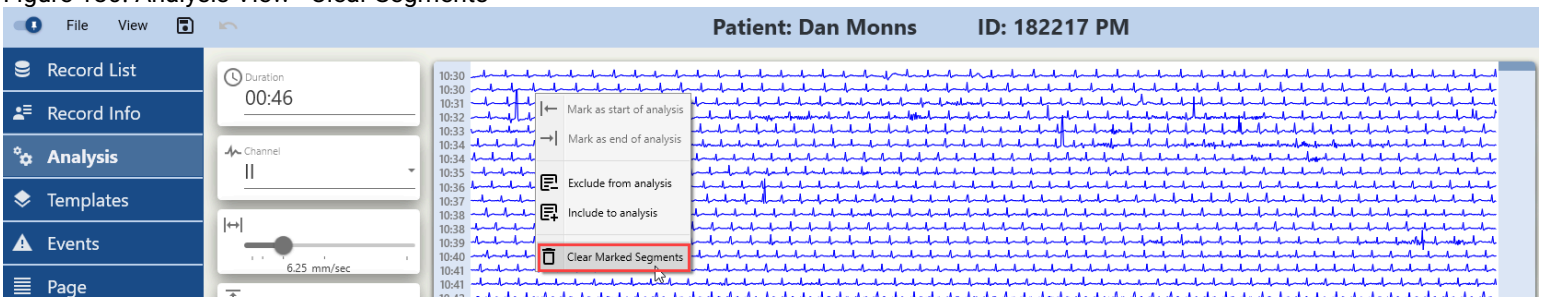
Note: The range you wish to re-include should fully overlap a previously excluded fragment. If it does not overlap an excluded area, the **Include to analysis** button and option remain inactive.

Figure 179. 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, exluded and included segments.

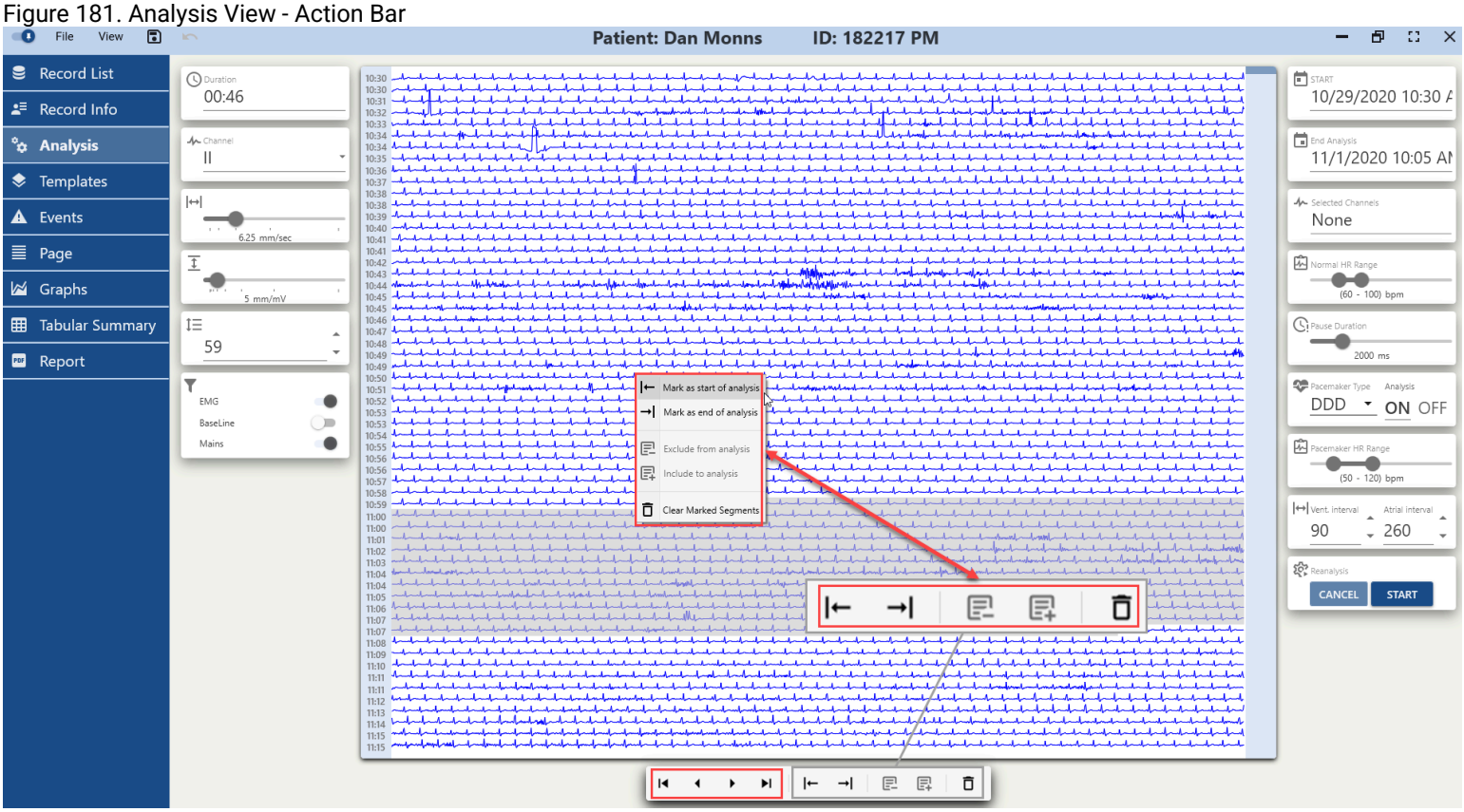
Figure 180. Analysis View - Clear Segments



Action Bar

The **Action Bar** features the same functionalities as the Context Menu *(on page 100)*, in addition to providing **Signal Page** navigation controls.

Figure 181. Analysis View - Action Bar



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

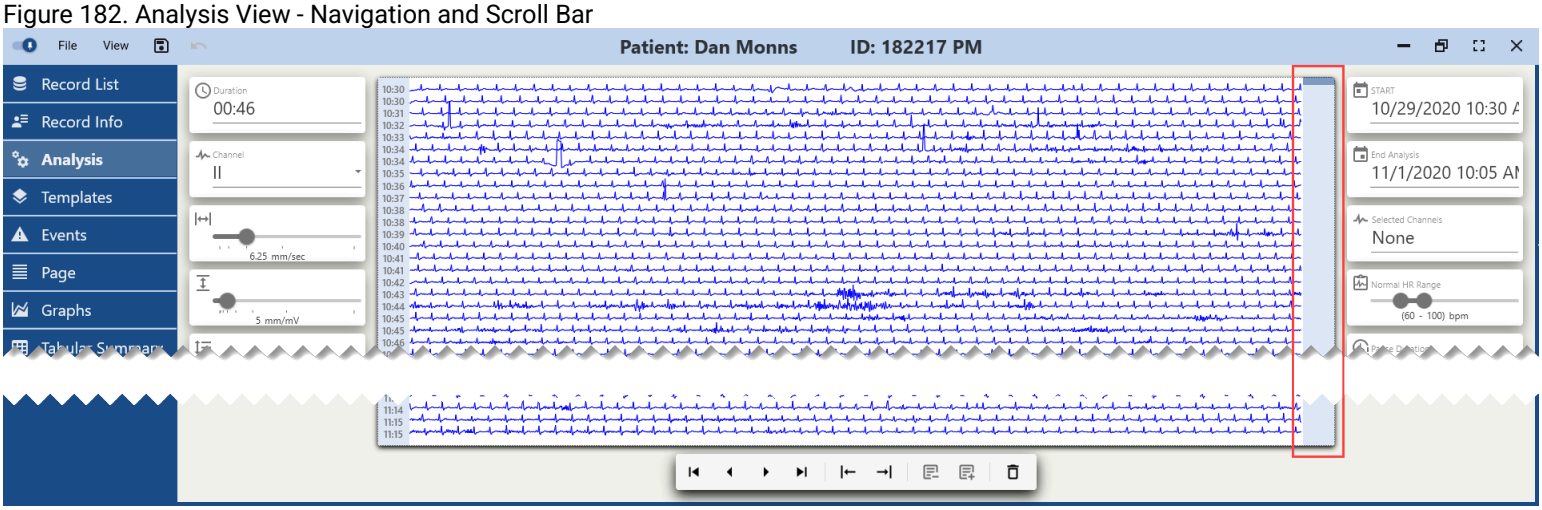
Page Up: Navigates one page backward.

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 182. Analysis View - Navigation and Scroll Bar

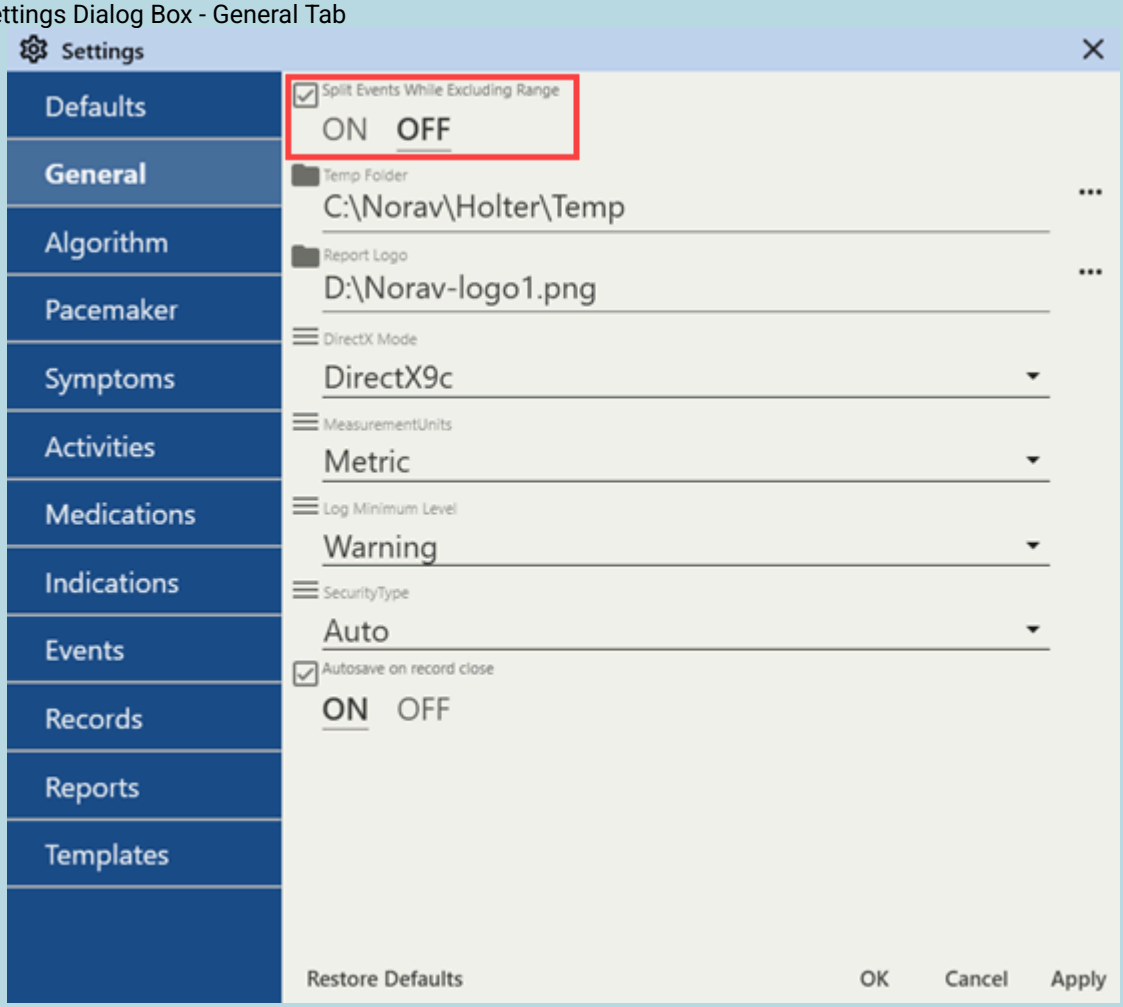


Note:

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 *(on page 26)*. This parameter dictates how algorithms will process events containing **Exclude from analysis** areas:

Figure 183. 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.

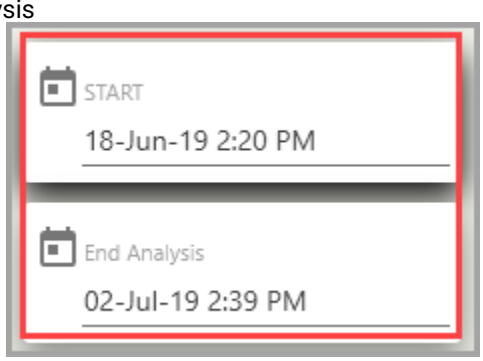
Analysis Controls

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

General Controls

START/END Analysis: These fields display the start and end date and time for the Holter **Record** to be analyzed. Adjust the START and END Analysis values using the date-time picker.

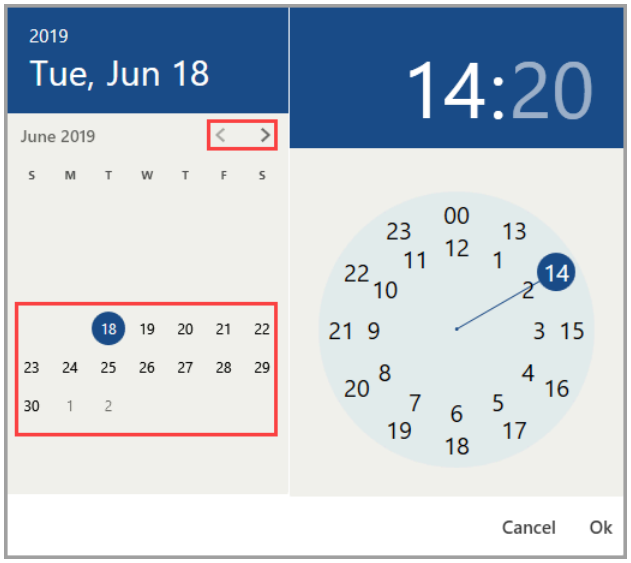
Figure 184. Analysis View - Start and End Analysis



To set start or end of record analysis using the date-time picker:

1. Click the **START** or **End Analysis** field to open the picker.
2. Select the date:

Figure 185. Analysis View - Date-Time Picker - Select Date



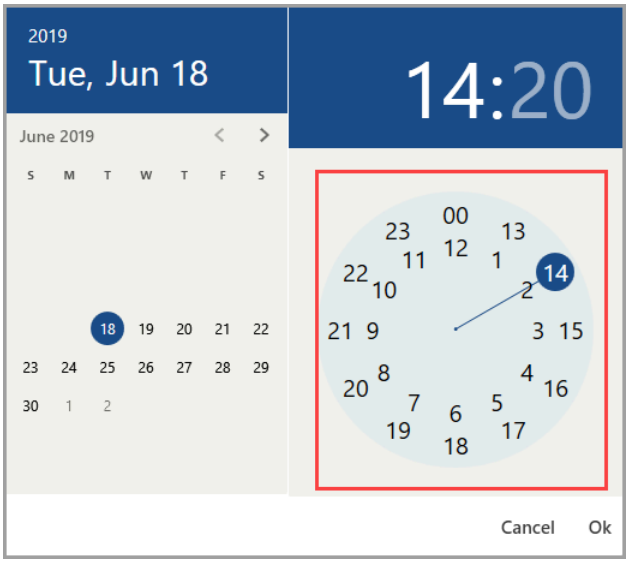
2.1. In the calendar pane, use the left or right arrows to change the month (if applicable).

2.2. Click the required day.

3. Select the time:

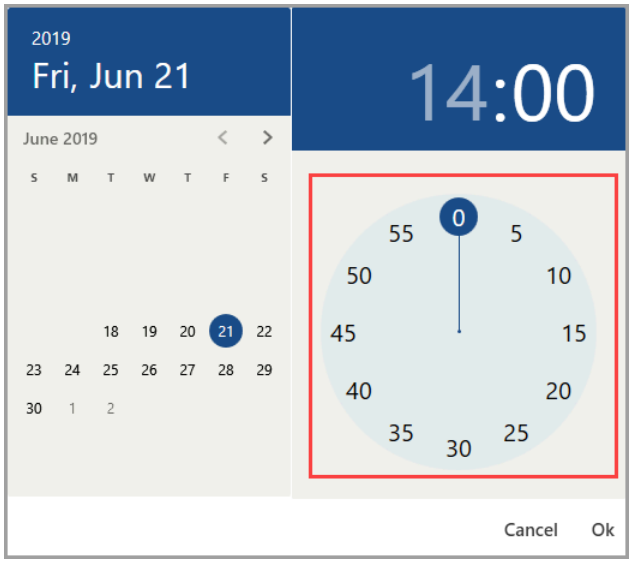
3.1. In the clock pane, click or drag the hour on the dial.

Figure 186. Analysis View - Date-Time Picker - Select Hour



3.2. The picker switches to the minutes dial. Click or drag the minute on the dial.

Figure 187. Analysis View - Date-Time Picker - Select Minute



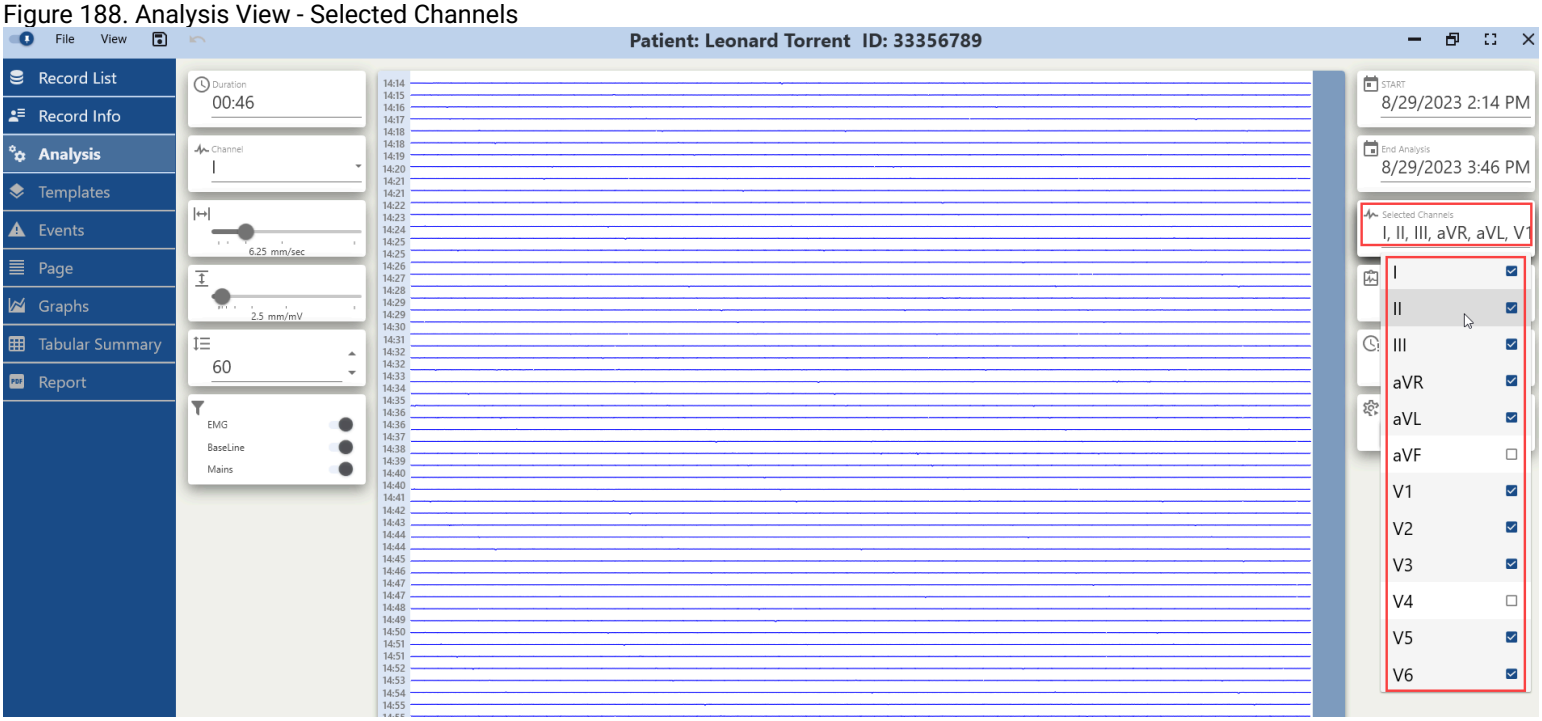
3.3. Verify the time in the top display. To switch between the hour and minute dials, click the hour or minute in the top display.

4. Click **OK** to apply, or **Cancel** to close without changes.

The allowed range is limited to the recording interval. **START must be earlier than End Analysis**.

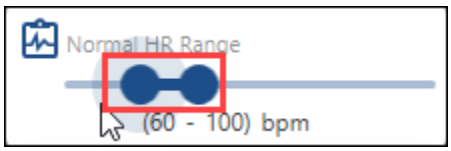
Selected Channels: Click this box to select from a dropdown list which ECG channels should be included in the analysis. Check the checkboxes next to all the channels you want to include in the analysis. You must choose at least **one** channel.

Figure 188. Analysis View - Selected Channels



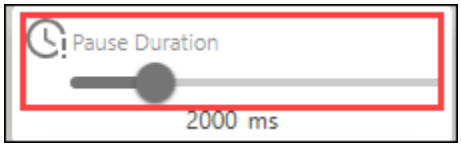
Normal HR Range: Use the double slider to define the minimum and maximum heart rate values. Any significant deviations from this range will be classified as Tachycardia or Bradycardia.

Figure 189. 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.

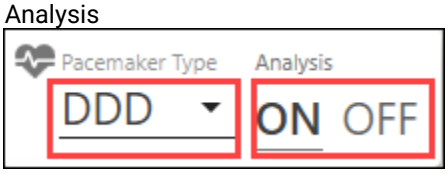
Figure 190. Analysis View - Pause Duration



Pacemaker Controls

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

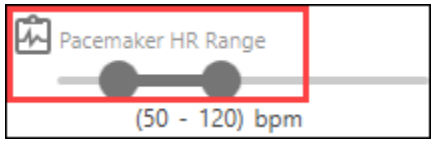
Figure 191. Analysis View - Pacemaker Type and Analysis



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 192. 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 193. Analysis View - START and PREPARE Buttons



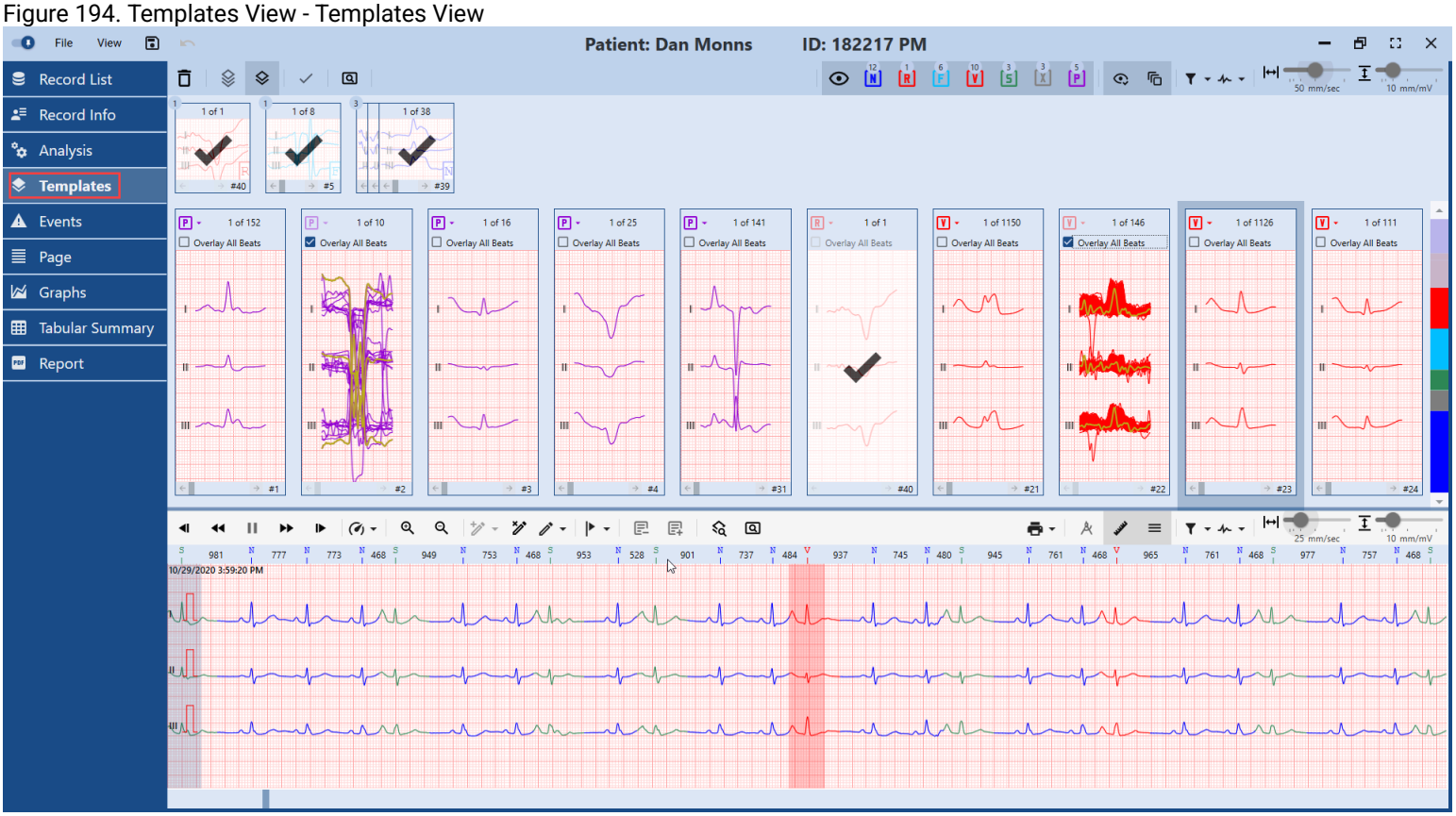
Note: If the record you are working with hasn't been analyzed, you will see the **Analysis** box with only one button - **START**. If the **Record** has been previously analyzed, a **Reanalysis** box will appear with two buttons: **PREPARE** and **START**. Click **PREPARE** first to activate the control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

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

4.6.6. 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 194. Templates View - Templates View



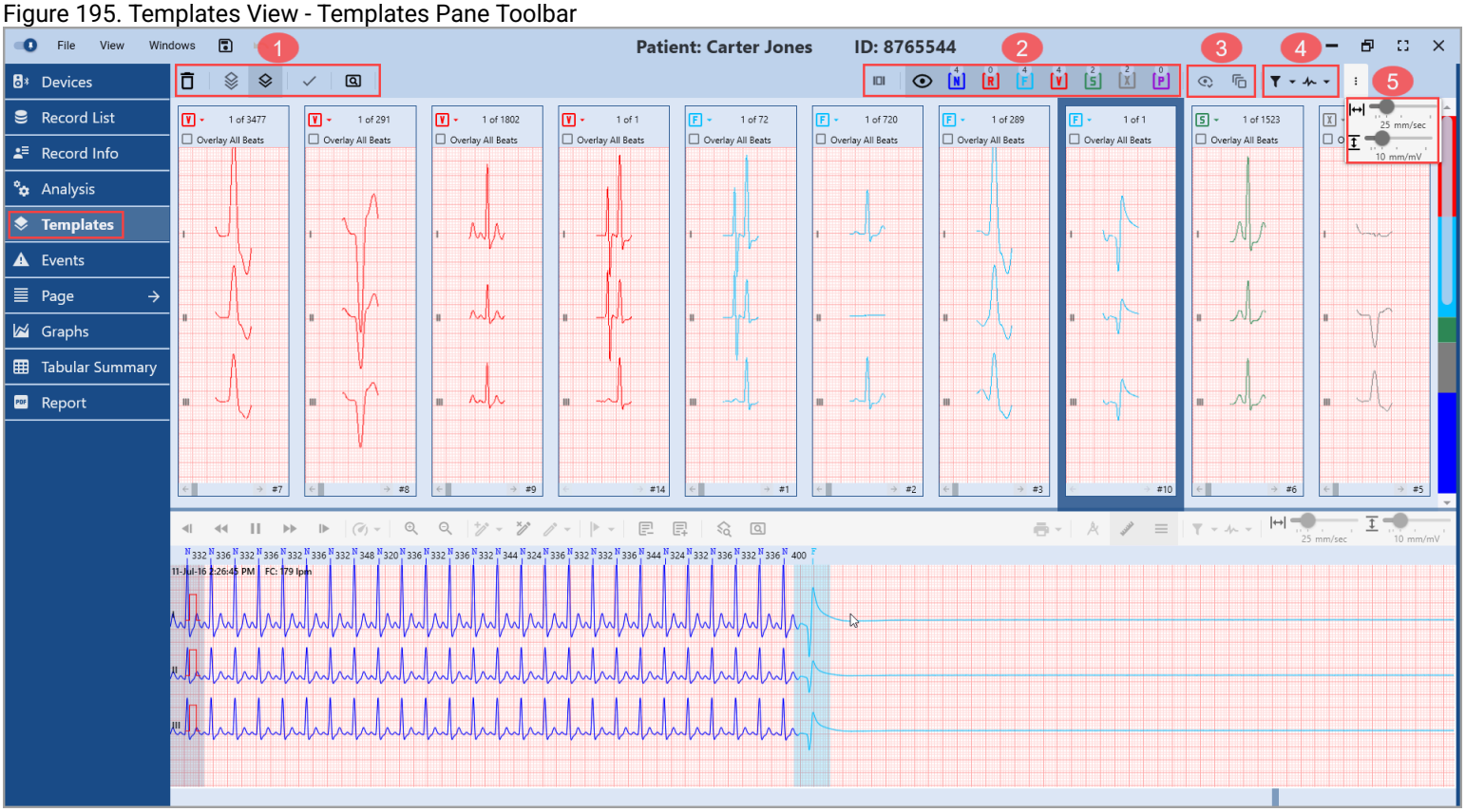
Reviewing Beat Morphologies

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.

4.6.6.1. 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, controls are combined into separate groups of interface elements.

Figure 195. 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 50)* 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.

Figure 196. Templates View - Checked Templates Pane Settings

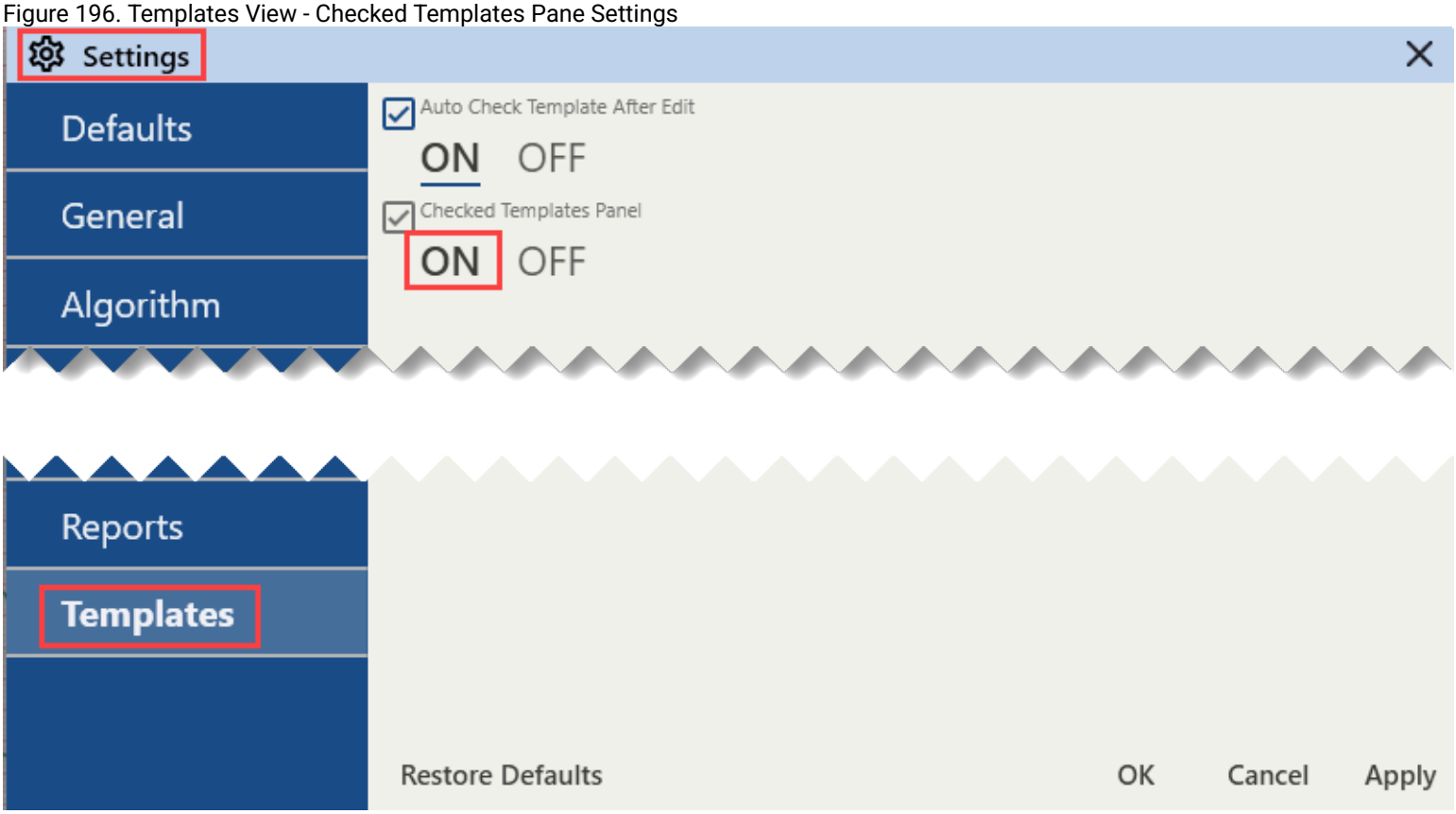
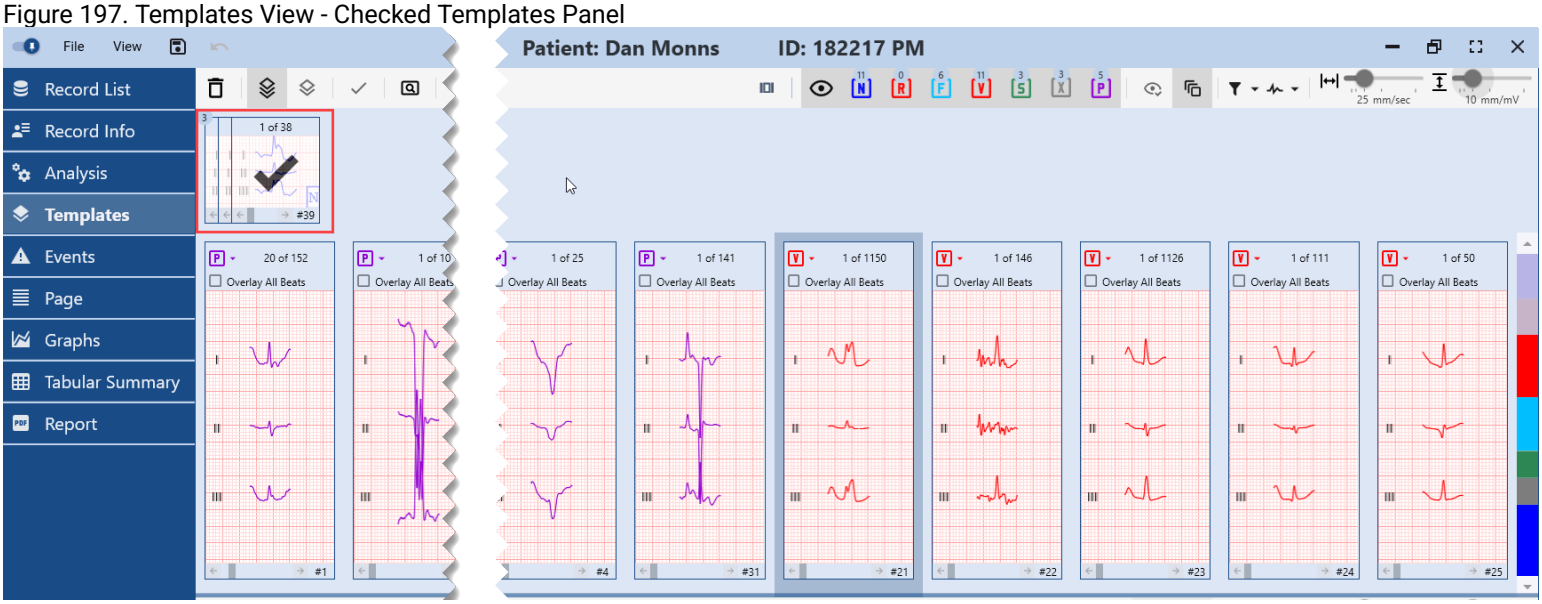
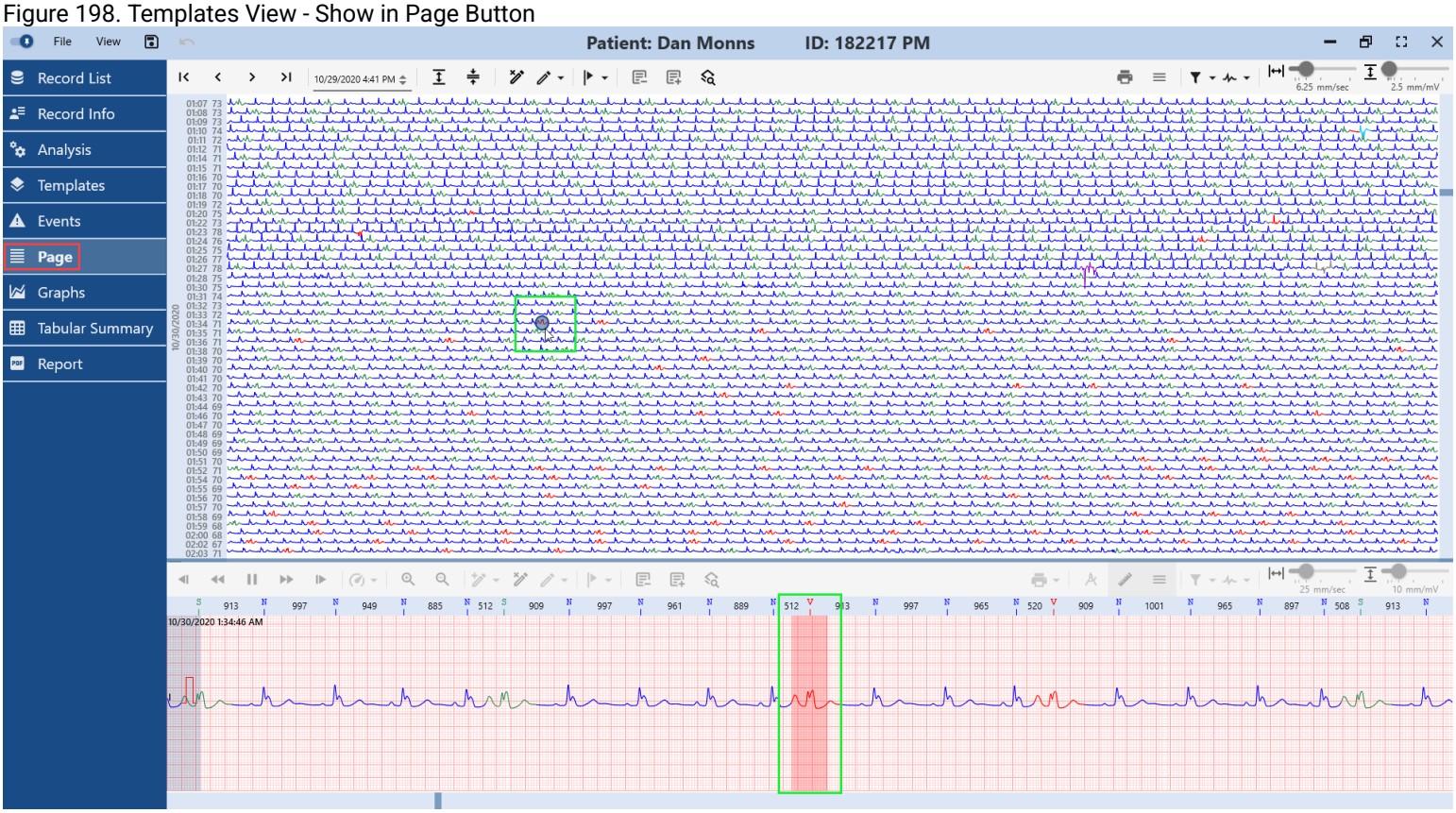


Figure 197. Templates View - Checked Templates Panel



Icon	Description
	Delete: Allows you to remove a single beat or **Template(s)**. To delete multiple **Templates**, select them using **Shift+Click** or **Ctrl+Click** keyboard shortcuts.
	Template Mode: Allows you to work with the entire **Template**. Specifically, pressing **Delete** will remove the selected **Template**. This mode is also applicable when changing annotations through key bindings.
	Single Beat Mode: Enables you to work with a selected, individual beat within a **Template**.
	Check Templates: Allows you to mark **Templates** as checked.
	Show in Page: Facilitates an immediate switch to **Page View**, revealing the precise location of the chosen beat within this particular **Template** in both the **Signal Page** and the **ECG Strip**.

Figure 198. Templates View - Show in Page Button



Templates Controls

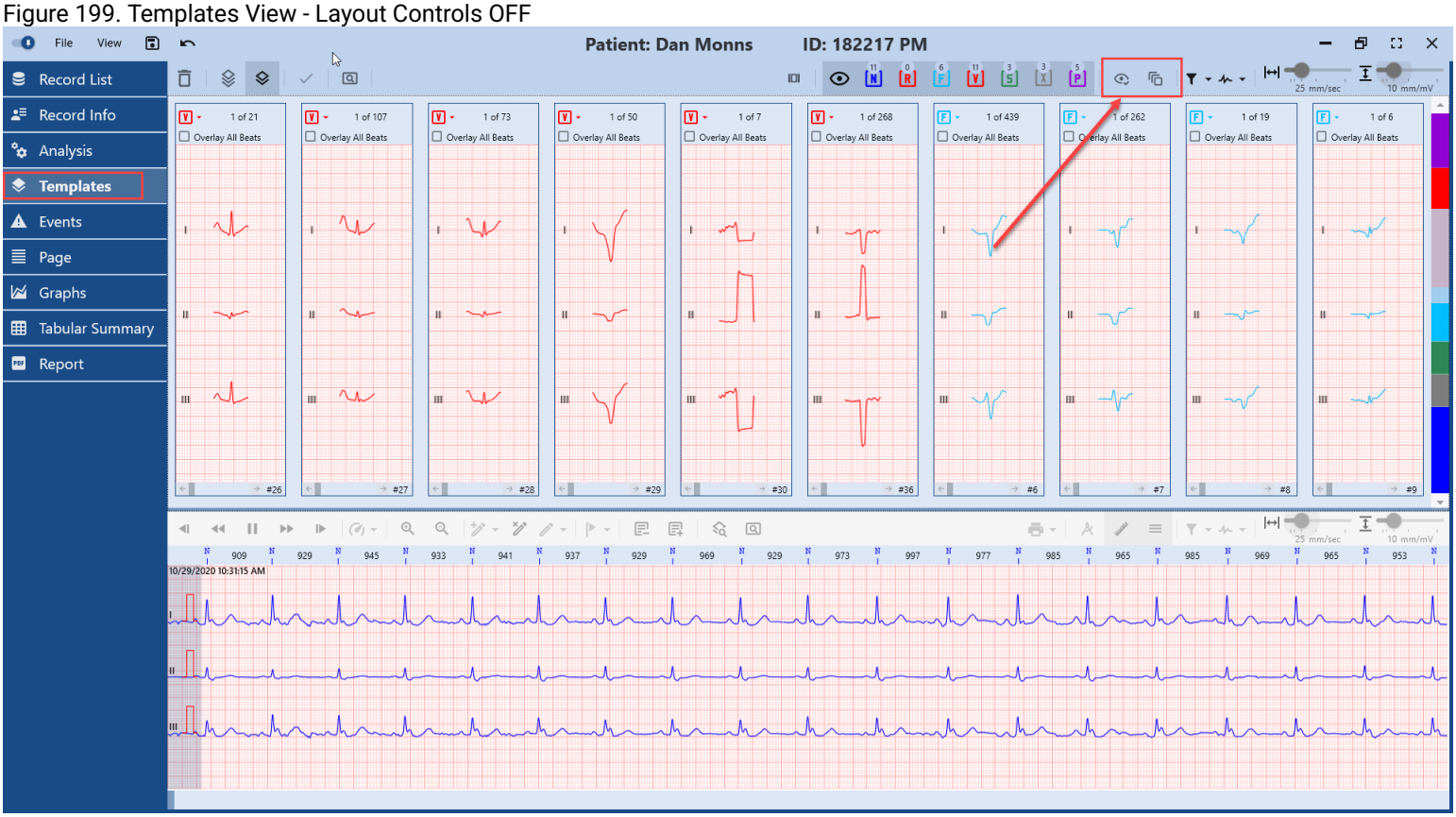
Template Controls is a group of buttons that directly control the visibility of all template types, either as separate entities or collectively.

Icon	Description
	**Show Single Beat button:** Enables the visualization of adjacent QRS fragments within beat boxes, facilitating the assessment of larger fragments in each beat box without switching **Views** or modes.
	**Show All**: Toggles the **Template Pane ON/OFF**.
	**Show Annotation Buttons**: Toggles **ON/OFF** the visualization of related types of templates. Numeric icons are displayed at the top of each **Show Annotation Button**. These icons indicate the number of distinct templates of a specific type that the **NH-301 analysis system** has extracted from this particular record.

Layout Controls

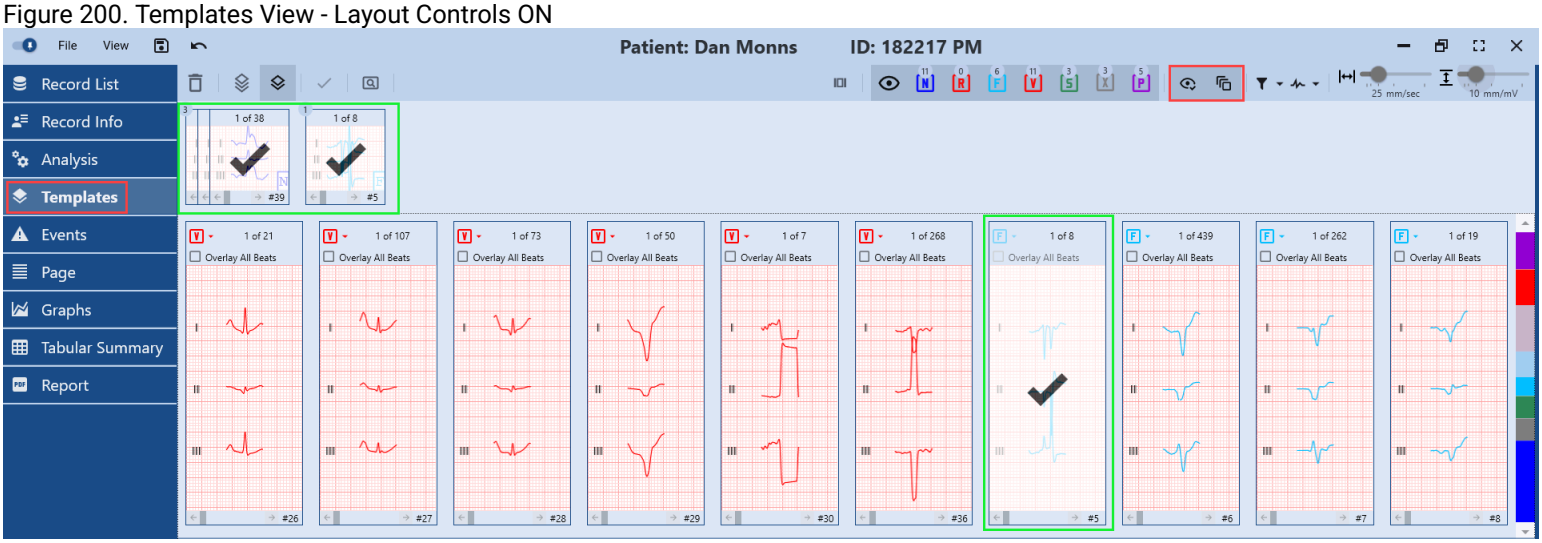
Layout Controls are a set of buttons designed to **modify** the layout of the **Templates Pane** by adding or removing specific interface elements, as needed.

Figure 199. Templates View - Layout Controls OFF



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

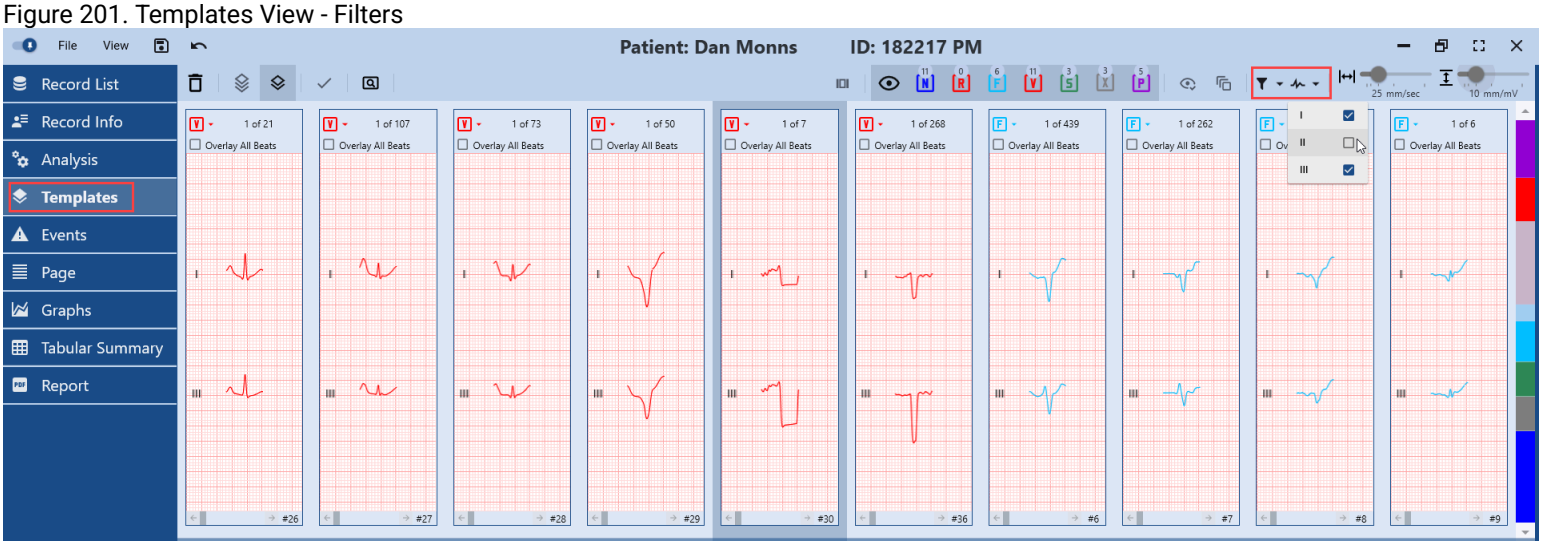
Figure 200. Templates View - Layout Controls ON



Filters

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

Figure 201. Templates View - Filters

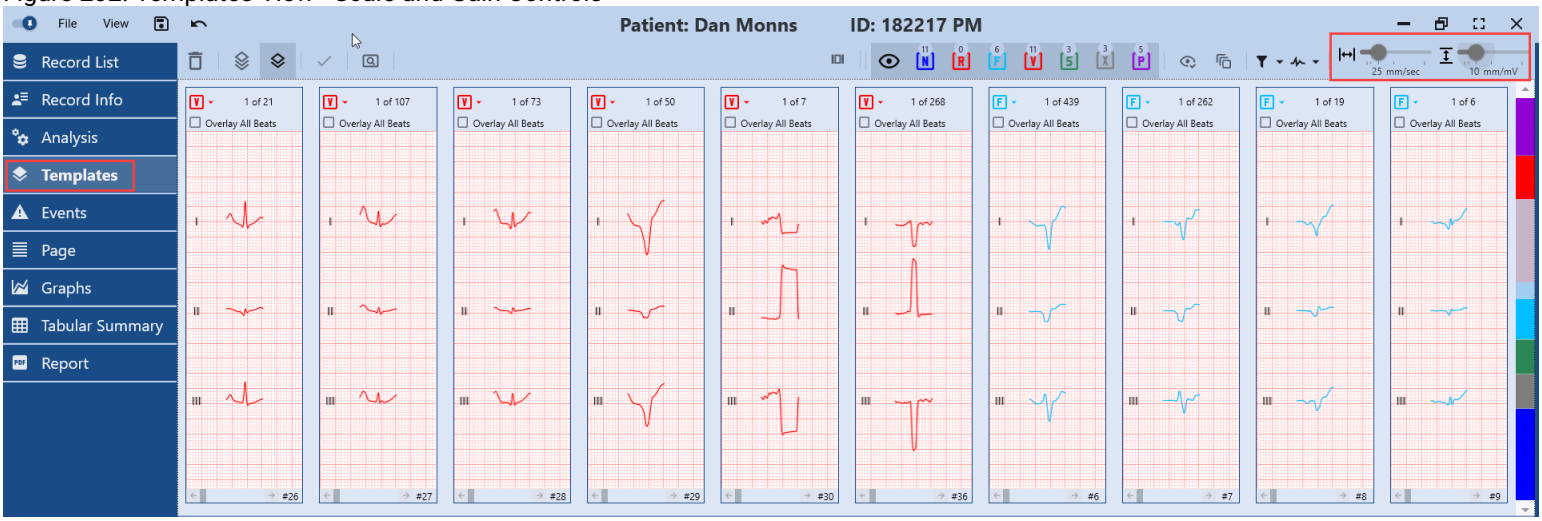


Icon	Description
	**Filter**: Enables toggling of visualization **ON/OFF** with the applied **EMG**, **Base Line**, and **Mains** *(on page 99)* filters. To accomplish this, check or uncheck any number of checkboxes in the drop-down list.
	**Channels**: Allows toggling of **ECG Record Channels** display in **Templates ON/OFF**. 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 202. Templates View - Scale and Gain Controls

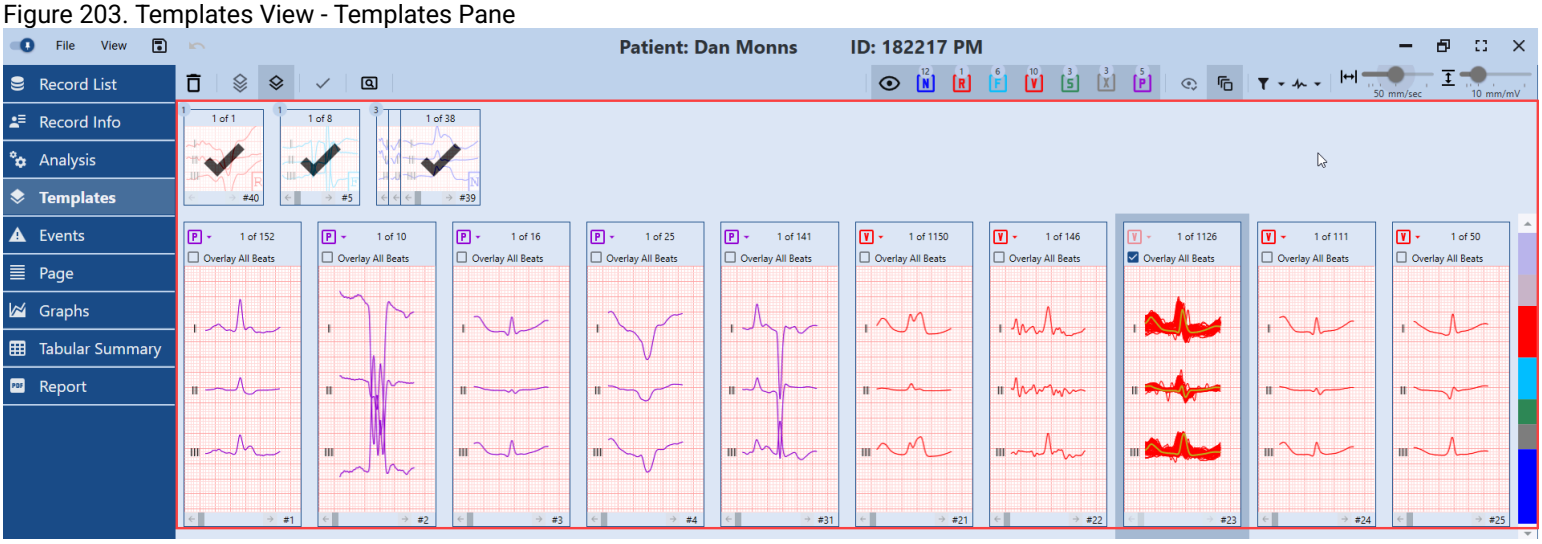


Scale and Gain Controls can help users identify and measure different ECG features more accurately, and analyze ECG data more efficiently by allowing them to quickly adjust the display of the template boxes to their needs.

4.6.6.2. Templates Pane

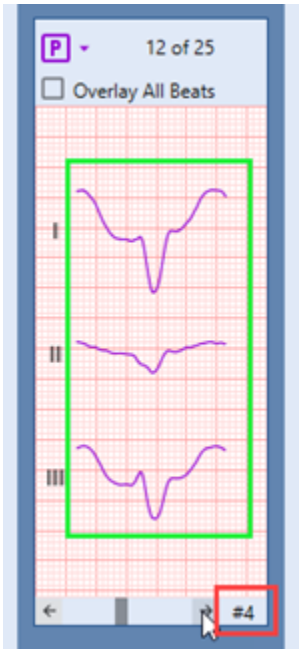
Reviewing numerous beats to ensure correct annotation and proper categorization into respective beat groups can be labor-intensive. The **NH-301 Holter** analysis system provides not only a highly accurate analysis algorithm but also extensive editing features, detailed below.

Figure 203. 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 204. Templates View - Templates Navigation

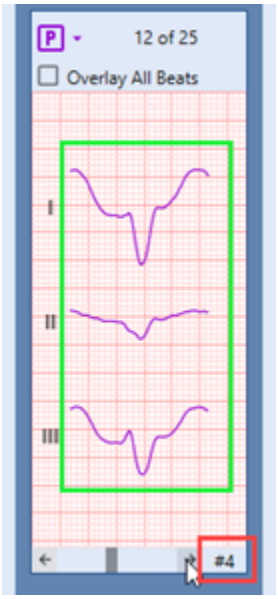


Pressing and holding the mouse button on an arrow enables quick cycling through all beats in that template. Alternatively, utilize a horizontal scrollbar at the lower section of the selected box by dragging the scroll thumb or clicking the scroll trough.

Note:

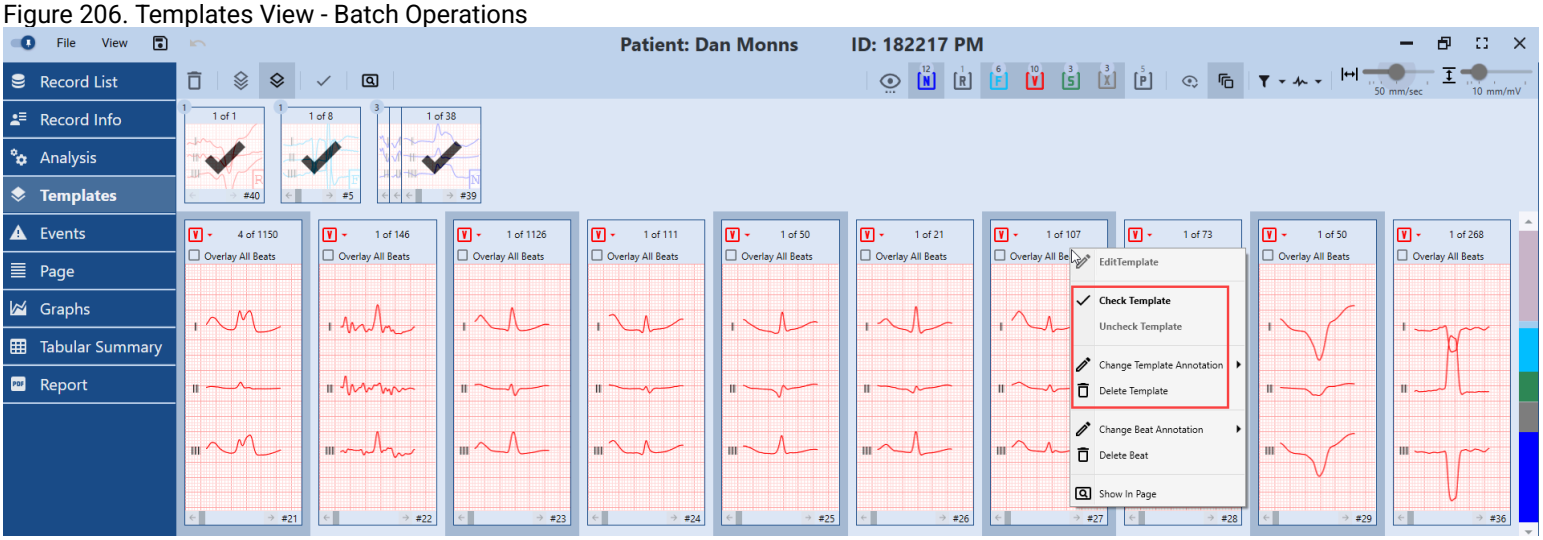
A number displayed in the bottom-right corner of each template indicates the template number, generated during both analysis and subsequent editing.

Figure 205. 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 206. 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.

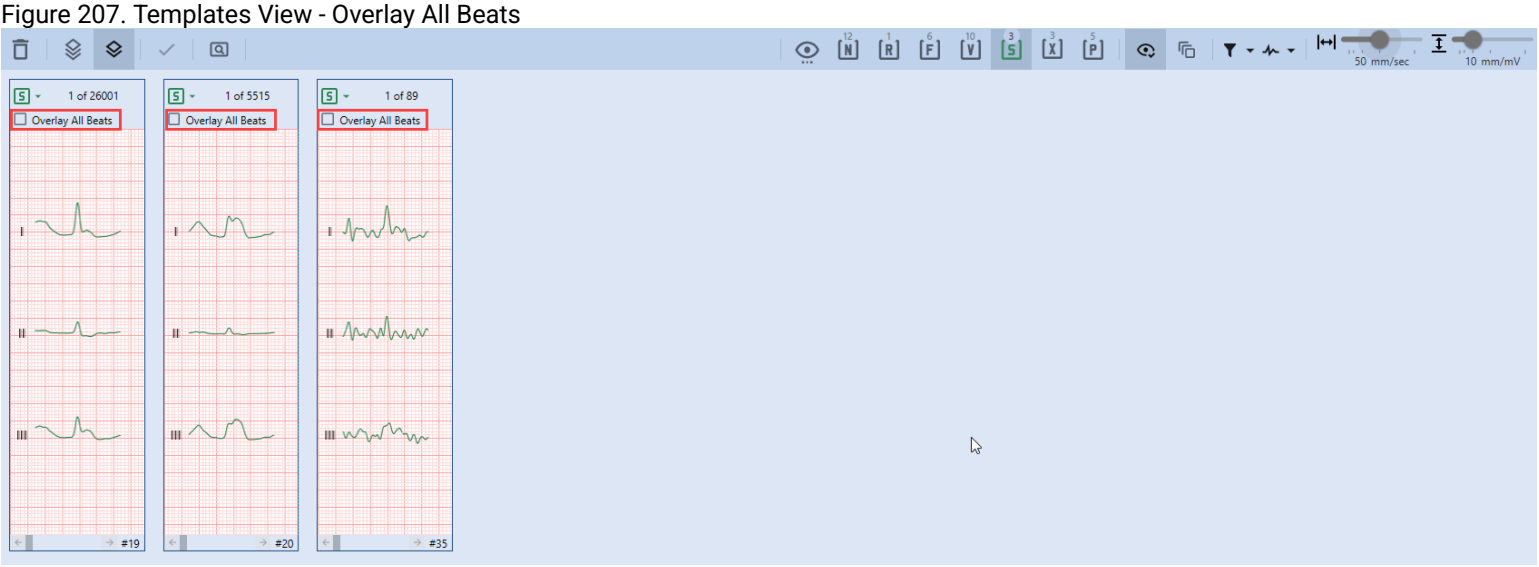
2. To select a series of templates, click on the first template in the series. Press and hold the **Shift** key and click on the last template. All intervening templates will be automatically selected.

3. You can now quickly perform batch operations, such as changing the annotation for all selected templates, deleting them, or checking them.

4.6.6.2.1. 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.

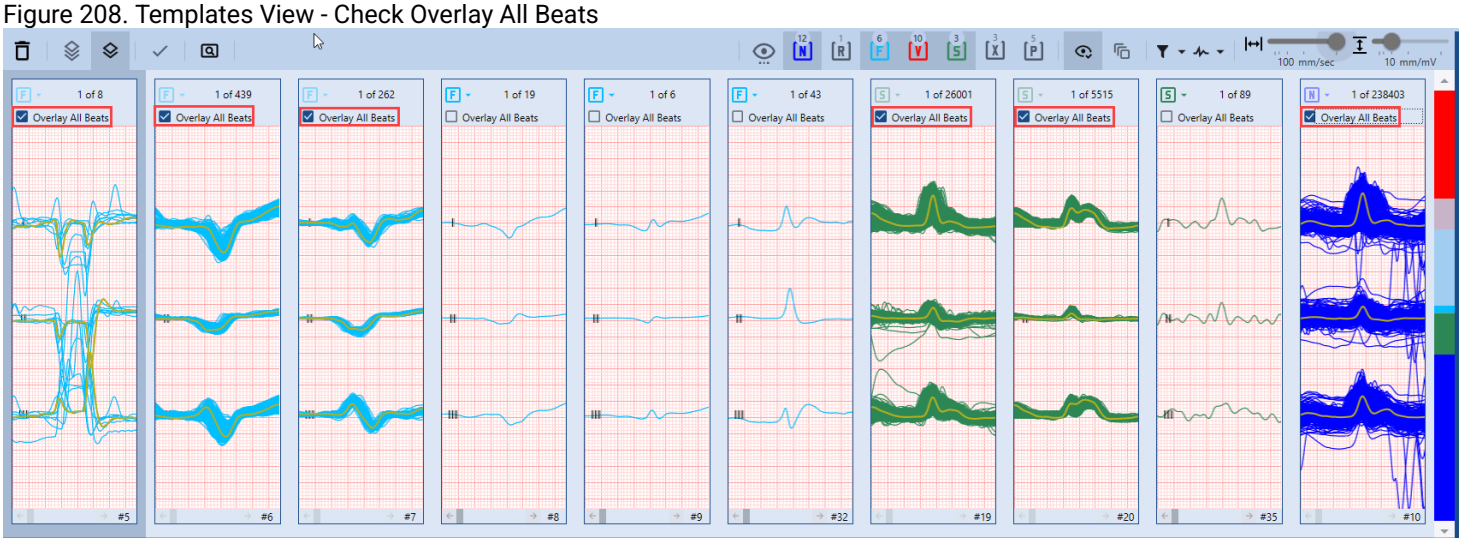
Figure 207. Templates View - Overlay All Beats



To activate this feature:

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

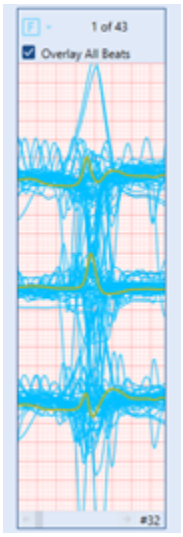
Figure 208. Templates View - Check Overlay All Beats



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.

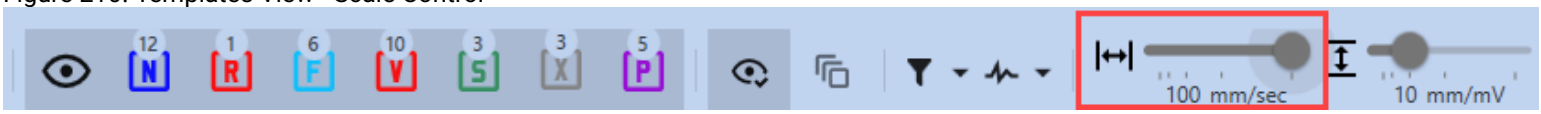
This example template box, depicted below, displays a range of beat shapes clustered together. Such inconsistencies may occur if beats have been manually renamed or templates merged.

Figure 209. 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 210. Templates View - Scale Control

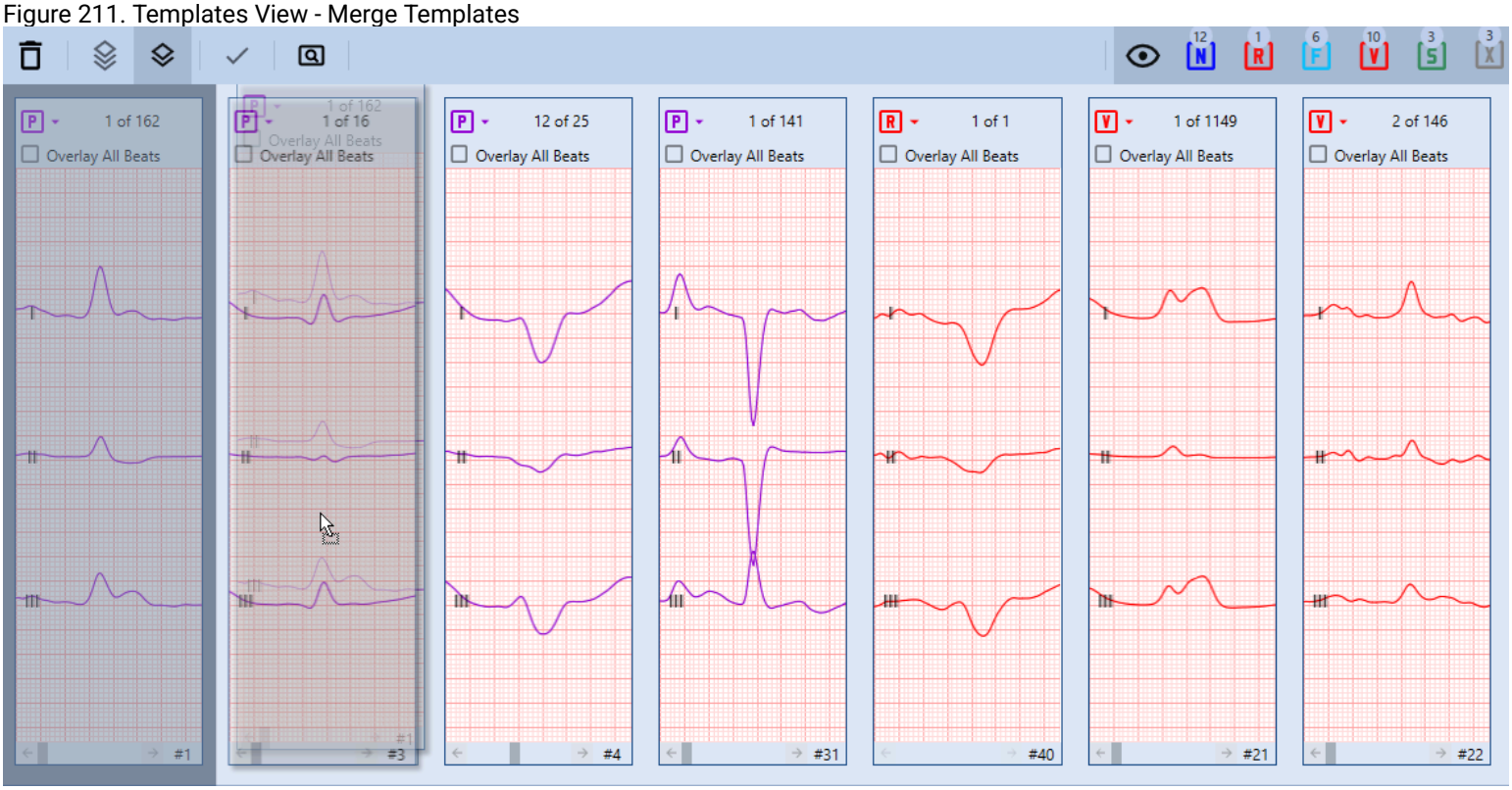


4.6.6.2.2. Merge Templates Feature

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 211. Templates View - Merge Templates



1. Choose two template boxes to merge.
2. Select the first template.

3. Start dragging the first template box onto the second one you have chosen in **Step 1**. 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 analysis. Its primary function is to reduce template count for easier viewing.

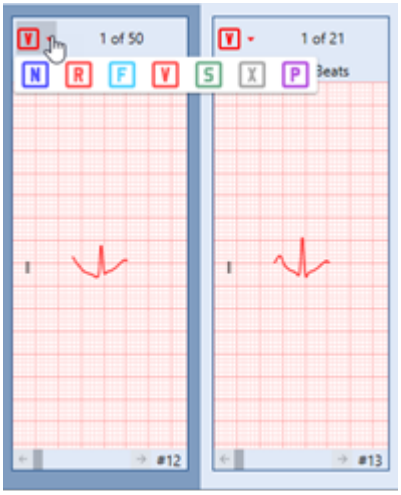
4.6.6.2.3. Reclassifying Templates Feature

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:

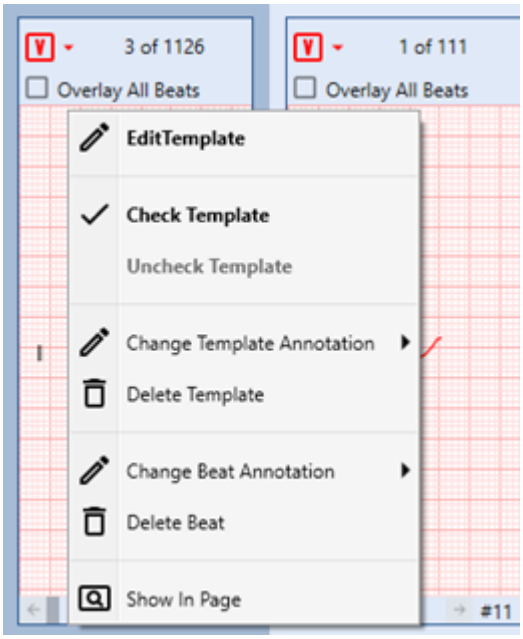
1. Drop-down menu at the top left corner of each template box.

Figure 212. Templates View - Template Box Drop-Down



2. Right-click context menu.

Figure 213. Template View - Context Menu



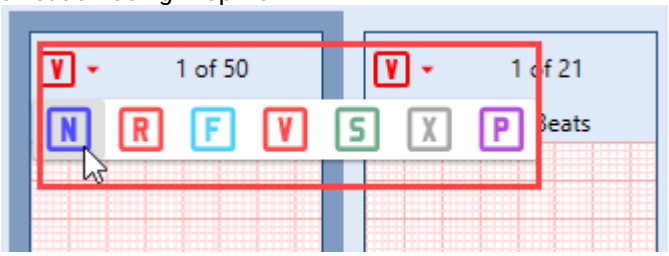
3. Keyboard shortcuts.

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 214. 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.

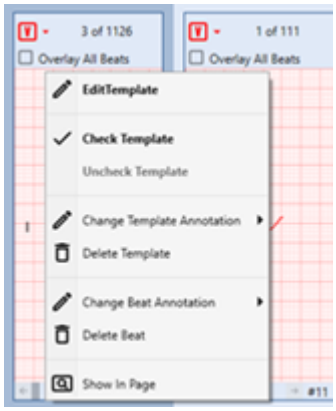
Note: This method does not support bulk actions.

To reclassify templates using the context menu:

1. Hover over the template box you wish to reclassify.

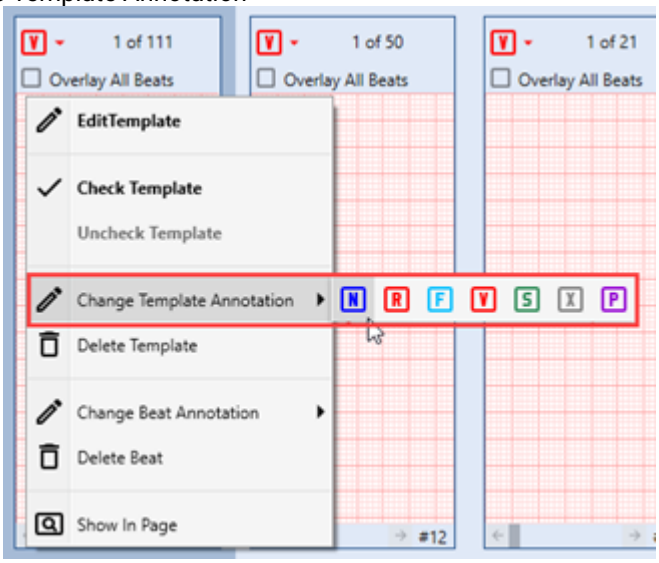
2. Right-click to expand the context menu.

Figure 215. Template View - Expand Context Menu



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

Figure 216. 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	Button	Keyboard Keys
Classify the template as **Normal**		**Shift + N**
Classify the template as **R** on **T**		**Shift + R**
Classify the template as **Fusion**		**Shift + F**
Classify the template as **VPB**		**Shift + V**
Classify the template as **SVE**		**Shift + S**
Classify template beats as **Questionable**		**Shift + X**
Classify template beats as **Paced**		**Shift + P**
Delete the template		**Shift + Delete**

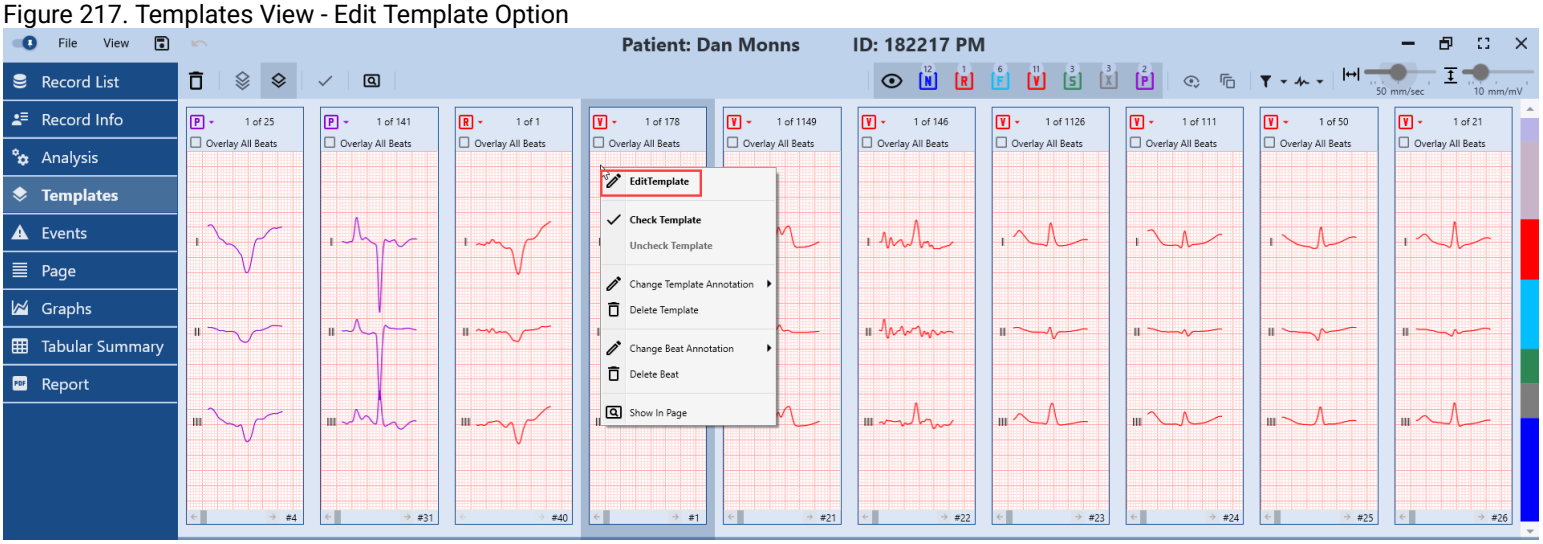
Example: When you reclassify an **S**-annotated template to **N**-annotated, it will be moved and grouped with other **N**-templates in the **Templates Pane**.

4.6.6.2.4. 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 217. Templates View - Edit Template Option



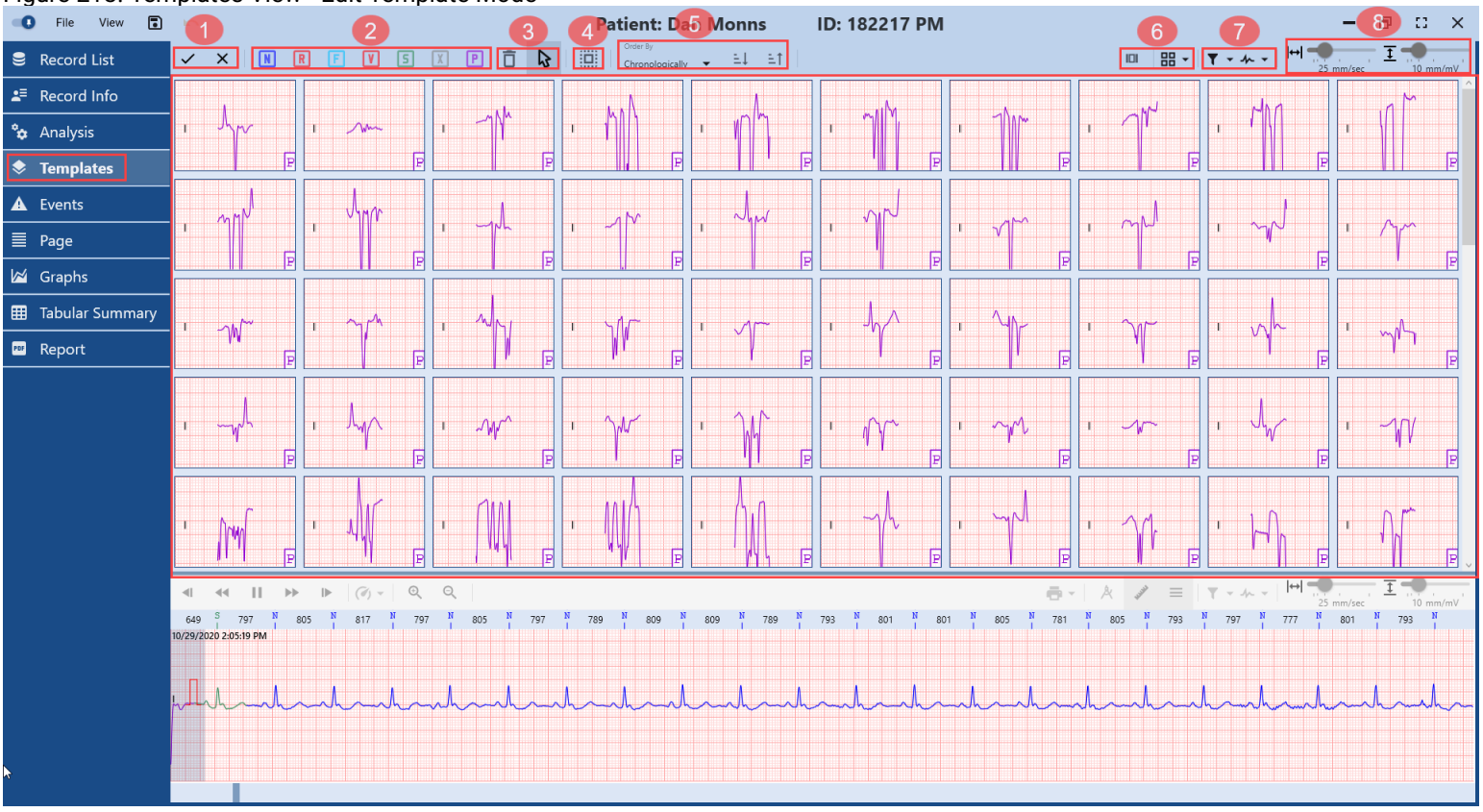
- Double-click the template box.
- Alternatively, you can:
    1. Hover over the template box you want to edit.
    2. Right-click the box to expand the context menu.
    3. Select the **Edit Template** option from the context menu.

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 218. 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
✓	**Save**: Click to save all changes you've made in the **Edit Template** mode and return to the **Templates View**.
✕	**Cancel**: Click to discard all changes you've made in the **Edit Template** mode and return to the **Templates View**.

Reclassification Controls

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

Figure 219. 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:**

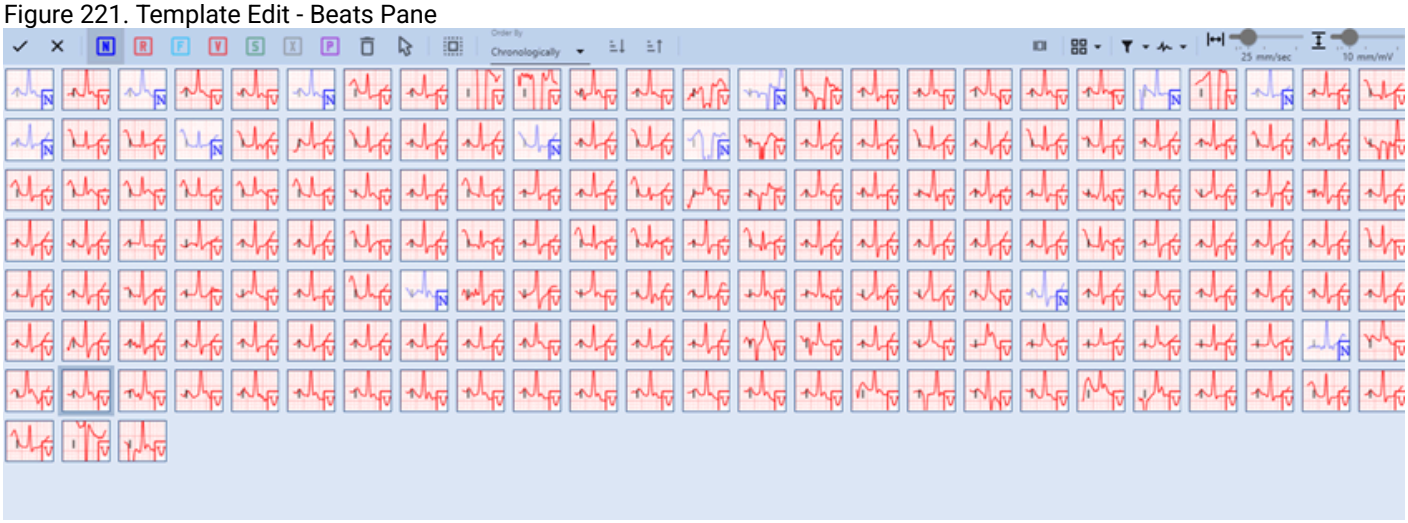
  1. Click one of the **Reclassification Controls**. This will activate a reclassification action: beats you mark in the next step will be reclassified to the beat type of your choice.

     Figure 220. Template Edit - Reclassification Button Activated

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

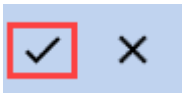
Figure 221. Template Edit - Beats Pane



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.

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

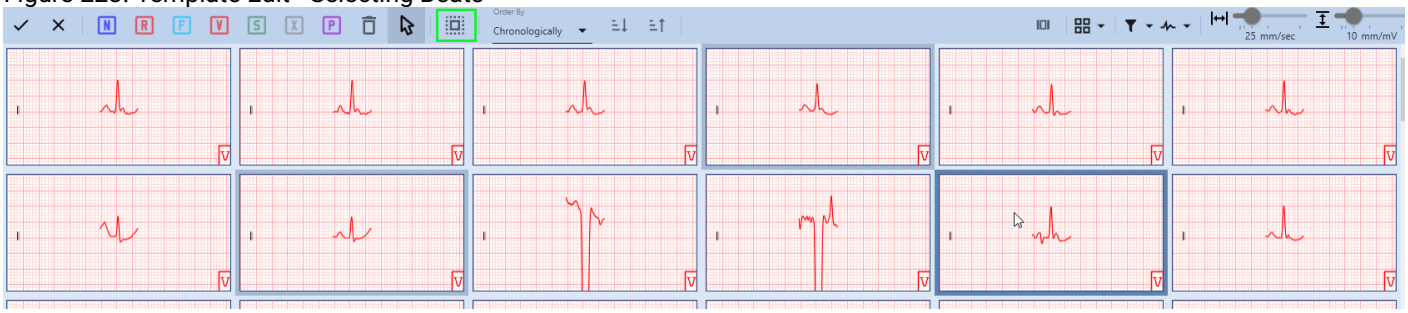
Figure 222. Template Edit - Save Button



- **Option 2: To reclassify beats:**

1. 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 223. Template Edit - Selecting Beats



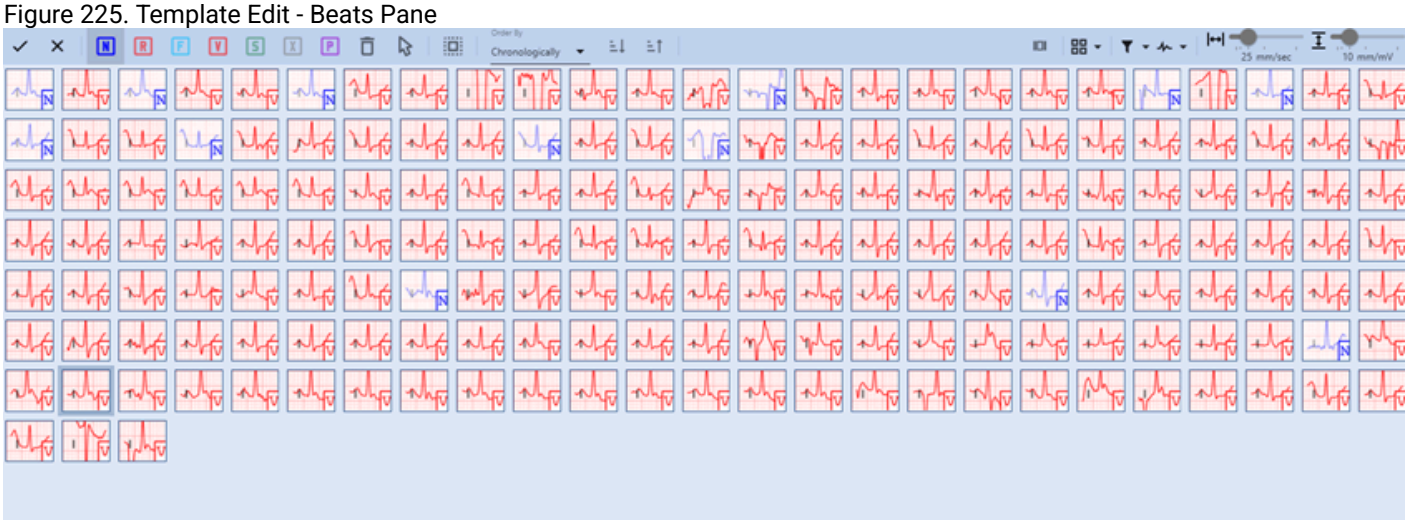
2. **(Optional)** Scroll to review all the beats in the current template. The **Beats Pane** can accommodate up to 250 beats, while a template may contain thousands.

3. 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 224. Template Edit - Reclassification Button Activated

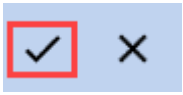


Figure 225. Template Edit - Beats Pane



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

Figure 226. 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 227. Template Edit - Reclassification Example

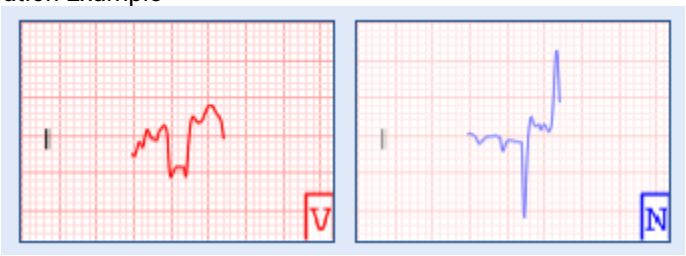


Table 2. Templates Reclassification Keyboard Shortcuts

Action	Button	Keyboard Keys
Classify the template as **Normal**	N	**Shift + N**
Classify the template as **R** on **T**	R	**Shift + R**
Classify the template as **Fusion**	F	**Shift + F**
Classify the template as **VPB**	V	**Shift + V**
Classify the template as **SVE**	S	**Shift + S**
Classify template beats as **Questionable**	X	**Shift + X**
Classify template beats as **Paced**	P	**Shift + P**
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
	**Switch to Free Cursor button**: Allows you to switch from beats annotation function or **Delete** mode to **Free Cursor** mode. After you have changed annotations or **marked for deletion beats you wanted**, you can deactivate the annotation feature by clicking this button. This protects against unintended changes due to a misclick.
	**Switch to Delete button**: Click to activate the **Delete** mode. Alternatively, use the **Shift + Delete** keyboard shortcut. The **Delete** mode operates as follows: • Upon activation, it marks all previously selected beats for deletion. If no beats are selected, none will be marked for deletion. • After activation, right-click on additional beat boxes to mark them for deletion.

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:**

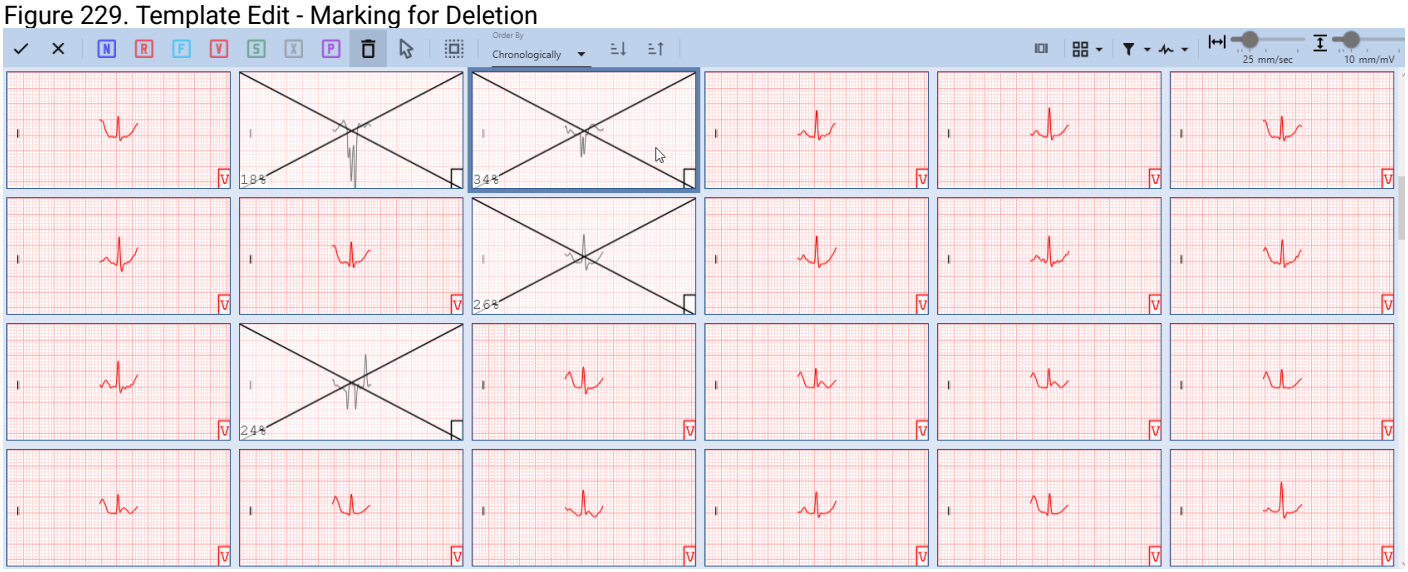
  1. Click the **Switch to Delete** button. This activates **Delete** mode: subsequent beats you select will be marked for deletion.

  Figure 228. Template Edit - Delete Button

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

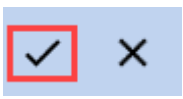
  Figure 229. Template Edit - Marking for Deletion

  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.

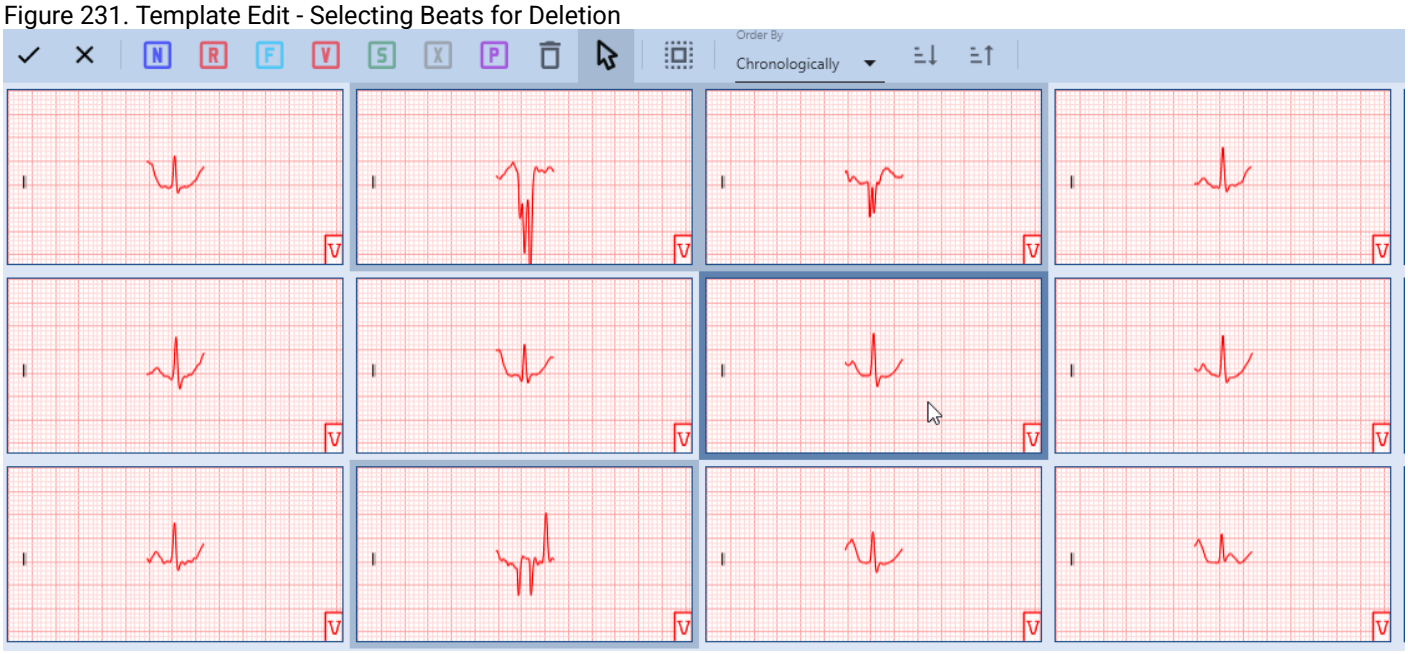
  Figure 230. Template Edit - Save Button

- **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.

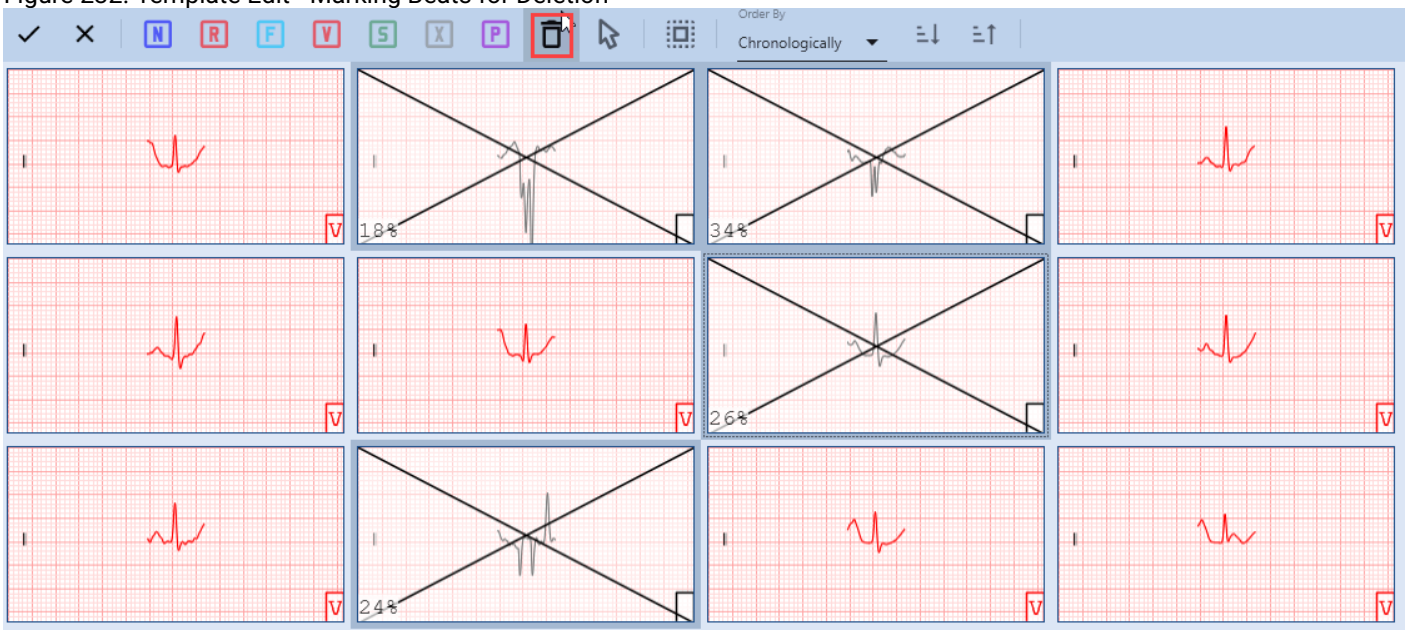
Figure 231. Template Edit - Selecting Beats for Deletion



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.

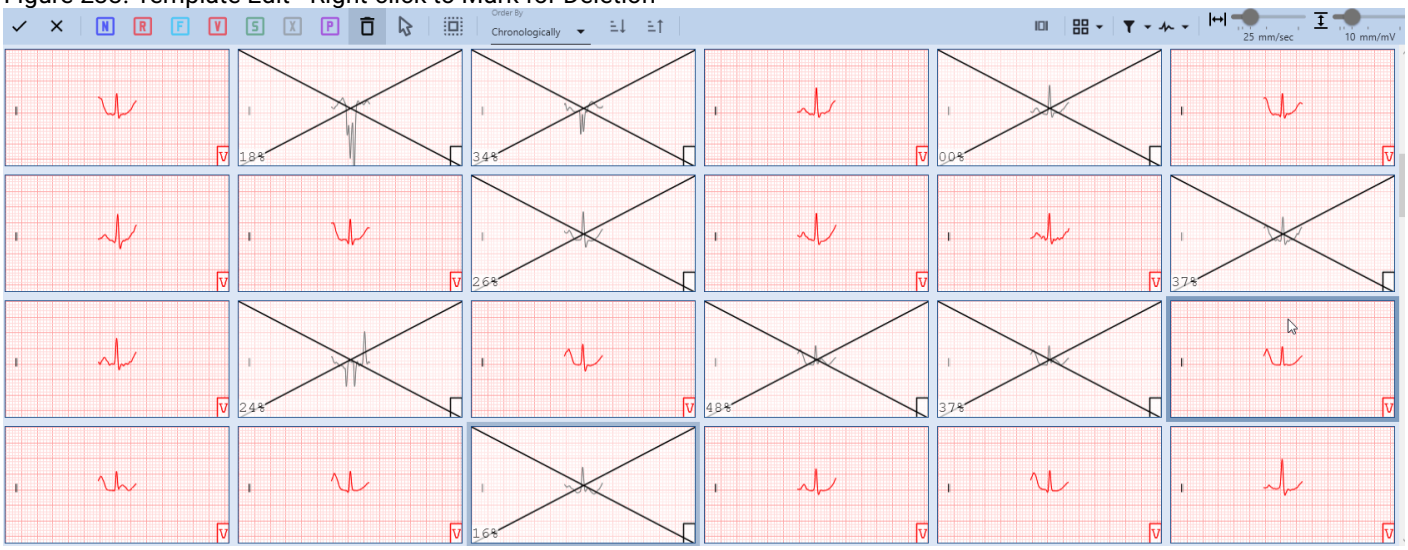
3. Click the **Switch to Delete** button. This activates **Delete** mode and marks all selected beats for deletion. Marked beat boxes will shift their visualization to grayscaled.

Figure 232. Template Edit - Marking Beats for Deletion



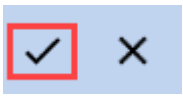
4. **(Optional)** Continue marking beats by right-clicking on them.

Figure 233. 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.

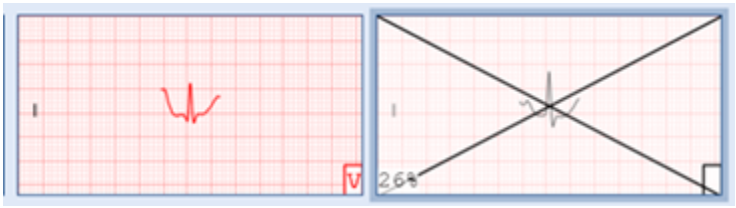
Figure 234. Template Edit - Save Button



Example:

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

Figure 235. Template Edit - Marking for Deletion



Select All Control

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

Figure 236. 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.

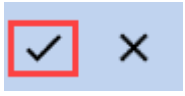
2. Click one of the **Reclassification Controls**. This immediately reclassifies all selected beats to the beat type of your choice. Beat boxes will change their annotation type and the color of the beat visualization.

Figure 237. 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 238. Template Edit - Save Button



To delete beats:

1. Click the **Select All** button to select all beats within the current template.

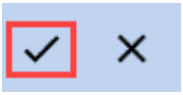
2. Click the **Switch to Delete** button. This activates **Delete** mode and immediately marks all selected beats for deletion. Marked beat boxes will shift their visualization to grayscaled.

Figure 239. 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.

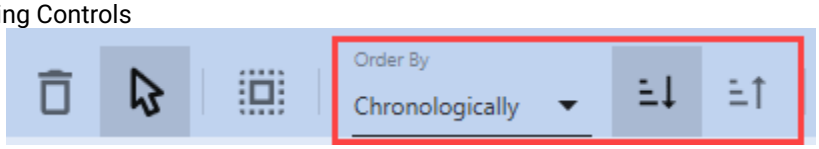
Figure 240. Template Edit - Save Button



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 241. Template Edit - Sorting Controls

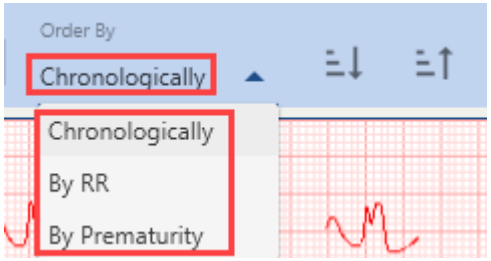


Two icons on the right enable ascending or descending sorting, respectively.

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

1. Click the drop-down list.

Figure 242. Template Edit - Order by Sorting

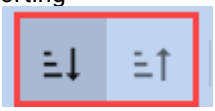


2. Select your desired sorting type. The order of the beats in the **Beats Pane** will change immediately.

To toggle a sorting order:

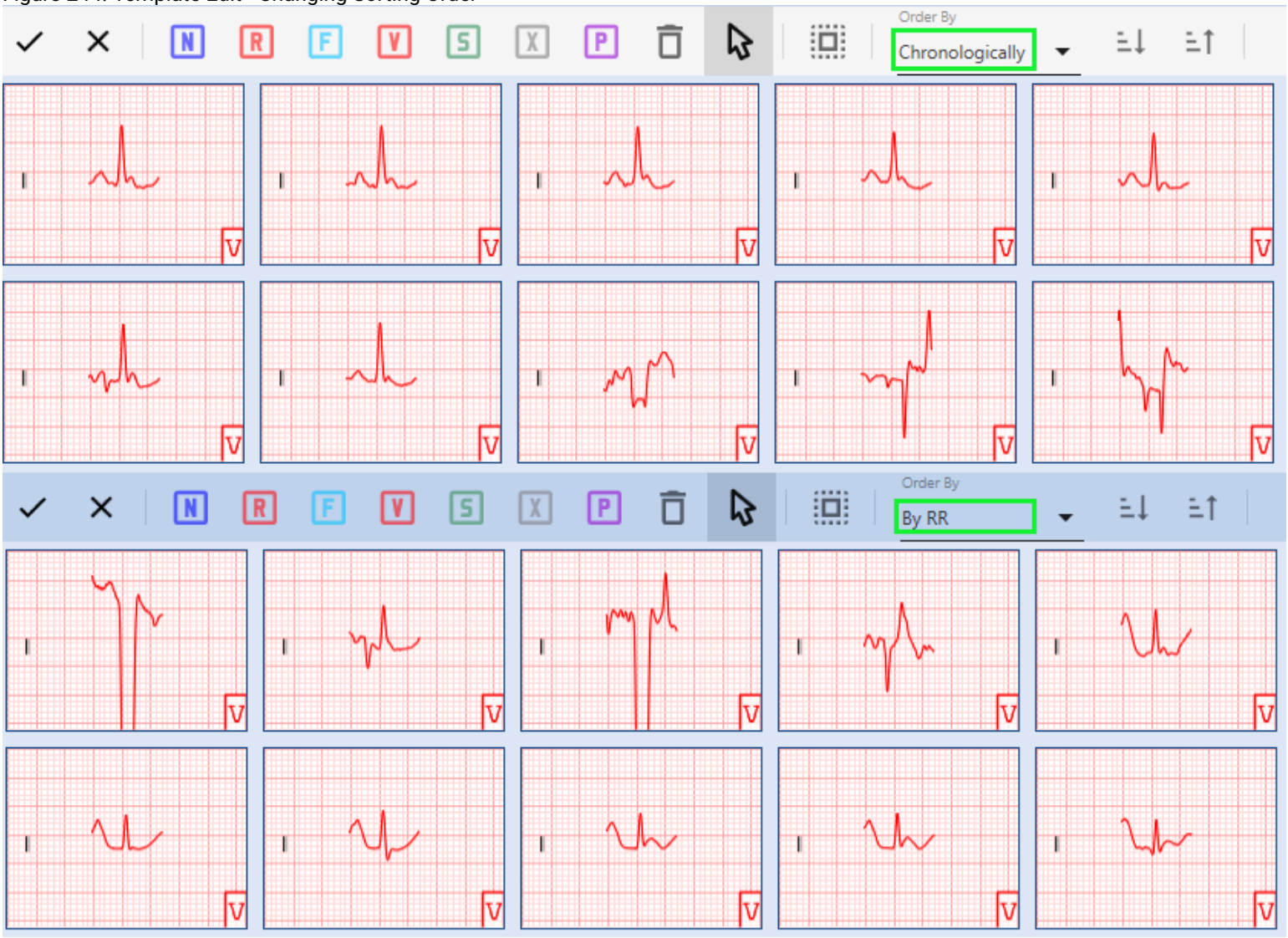
1. Click one of the buttons to switch sorting orders — all the beats will rearrange according to your choice.

Figure 243. Template Edit - Ascending and Descending Sorting



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

Figure 244. 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
	Show Single Beat button: Enables the visualization of adjacent QRS fragments within beat boxes, facilitating the assessment of larger fragments in each beat box without switching **Views** or modes.
	Beats Pane Layout button: Specifies the number of beat boxes displayed per row and the number of rows within the **Beats Pane** (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
	**Filter**: This control enables you to toggle **ON/OFF** the visualization of beats with applied **EMG, Base Line**, and **Mains** 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.
	**Channel Selection:** 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 **Record**).

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:

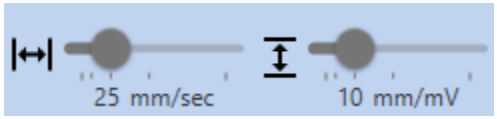
1. Hover over the **Channel Selection** drop-down list to expand it.
2. Select filters you wish to toggle. The visualization of beat boxes in the **Beats Pane** will change immediately.

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.

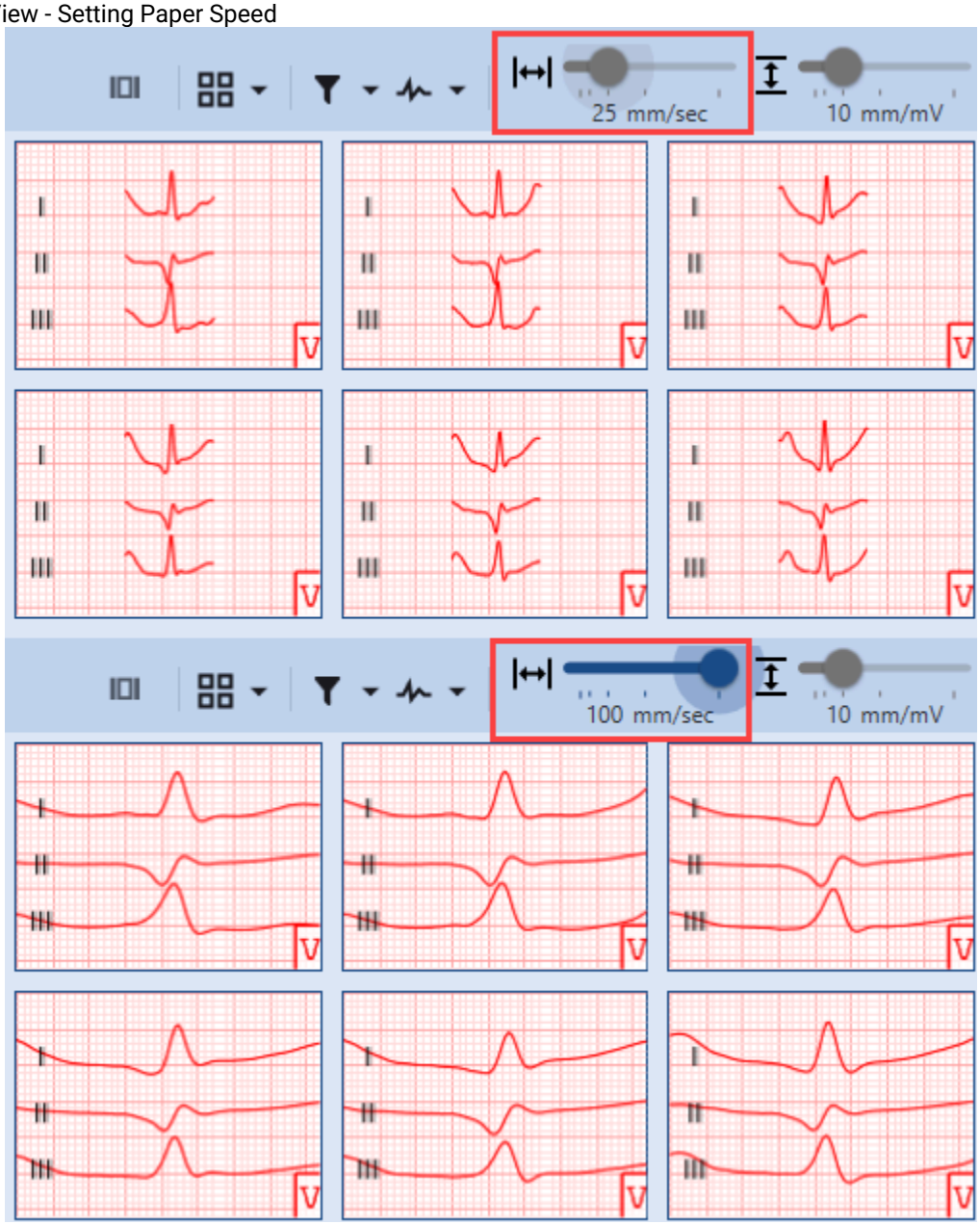
Figure 245. Template Edit - Scale and Gain Controls



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 beat boxes will change immediately.

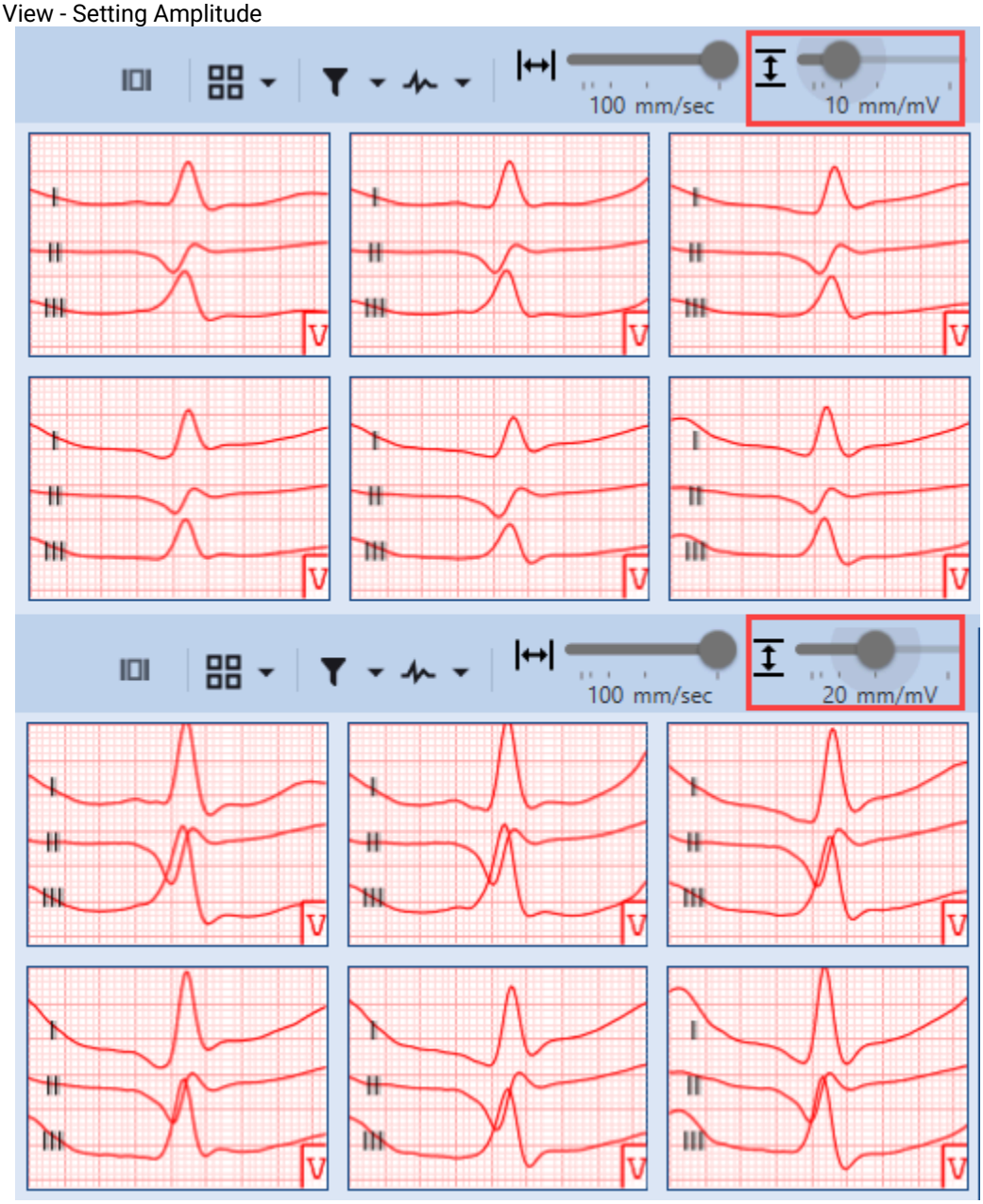
Figure 246. Template View - Setting Paper Speed



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 247. Template View - Setting Amplitude



4.6.6.2.4.1. 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**. Its settings also determine how **Strip View** fragments are presented in the generated **Report**. 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. The **Strip View** in the **Edit Template** mode has somewhat limited functionality compared to the identical **Strip View** in the "parent" **Templates View** *(on page 151)*. 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 248. Strip View - Generic Strip View

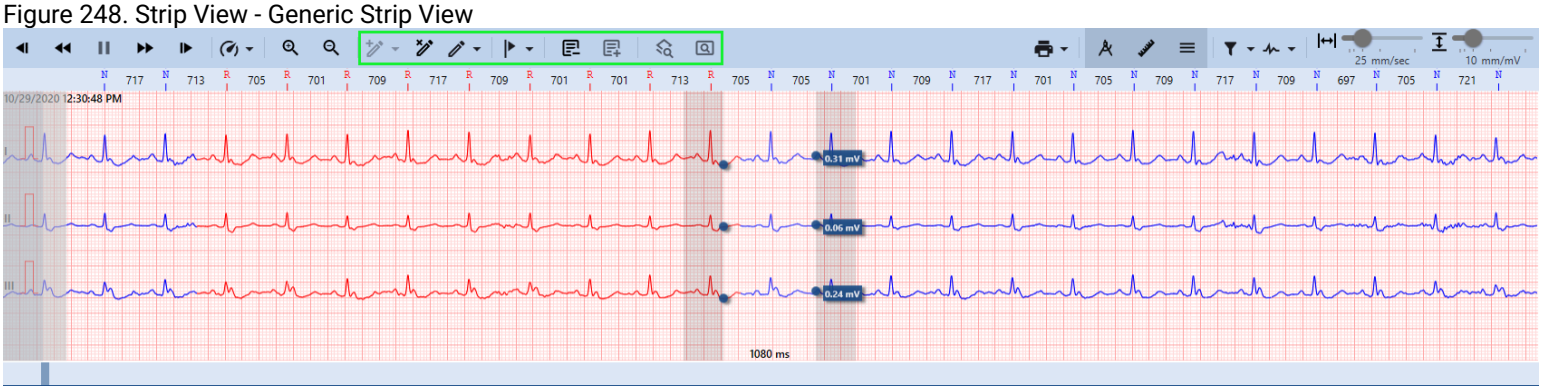
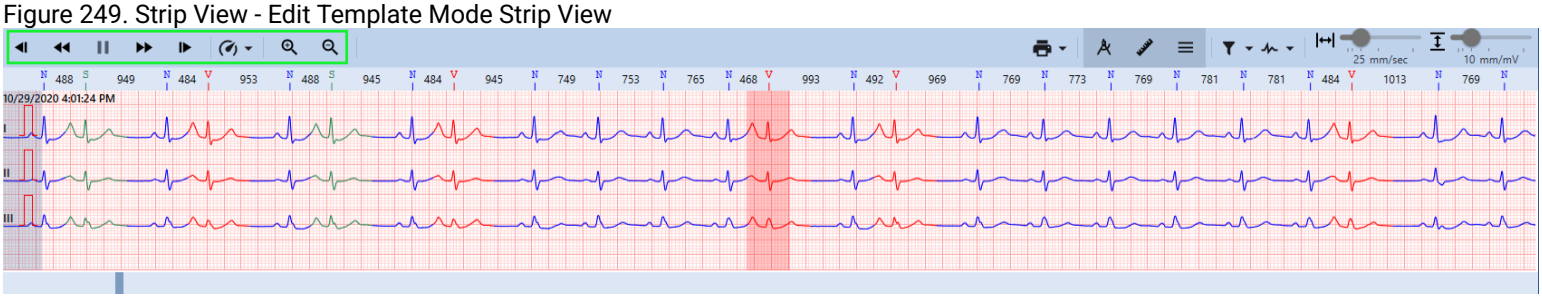


Figure 249. Strip View - Edit Template Mode Strip View



Note:

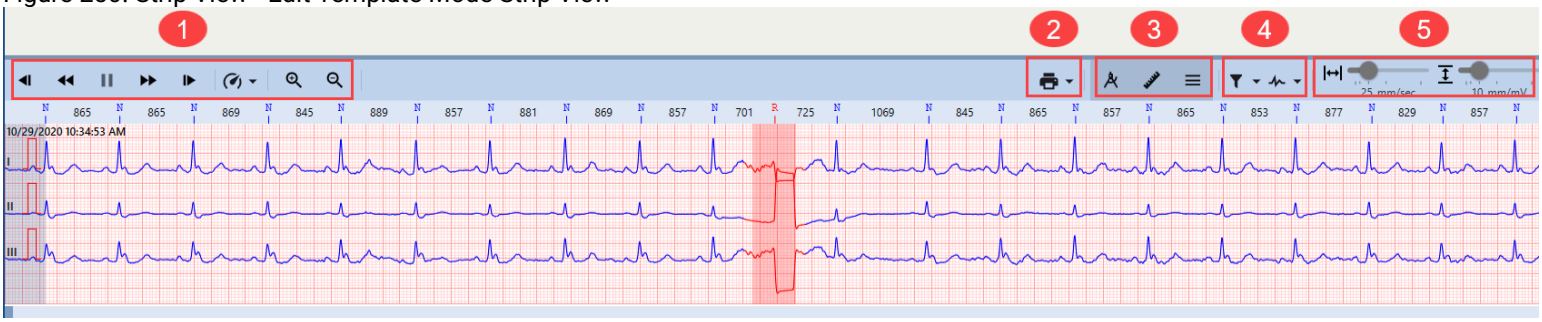
The ECG Strip grid is scaled accurately to millimeters, irrespective of the computer or monitor size in use. The **NH-301 Holter** analysis system automatically adjusts all application windows to align with the computer's graphical settings and monitor capabilities. This feature enables you to use any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

4.6.6.2.4.1.1. 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 151)* for further details about generic ECG **Strip Views** in this application.

Figure 250. Strip View - Edit Template Mode Strip View



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**.

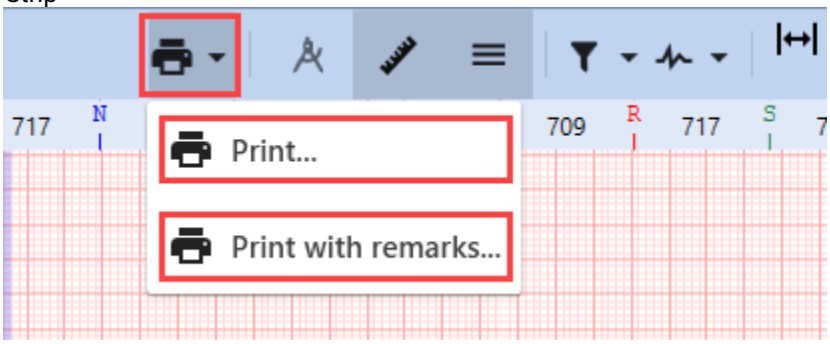
Icon	Description
	Step Backward button: Click to move the ECG Strip one step backward for scanning and reviewing.
	Scan Backward button: Click to initiate continuous backward scanning of the ECG Strip.
	Pause Scan button: Click to halt continuous scanning of the ECG Strip. For example, if you have activated a **Scan Backward** or a **Scan Forward** button, halt scanning by clicking the **Pause Scan** button.
	Scan Forward button: Click to initiate continuous forward scanning of the ECG Strip.
	Step Forward button: Click to move the ECG Strip one step forward for scanning and reviewing.
	Scan Speed button: Allows you to control the scanning speed. To set the scanning speed: 1. Hover over the **Scan Speed** icon to expand the drop-down list. 2. Click the desired scanning speed multiplier, ranging from ×1 to ×128.
	Zoom In button: Click to adjust the scale of the waveform in the **Strip View**, focusing on specific areas or comparing different fragments of the ECG record.
	Zoom Out button: Click to adjust the scale of the waveform in the **Strip View**. 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.

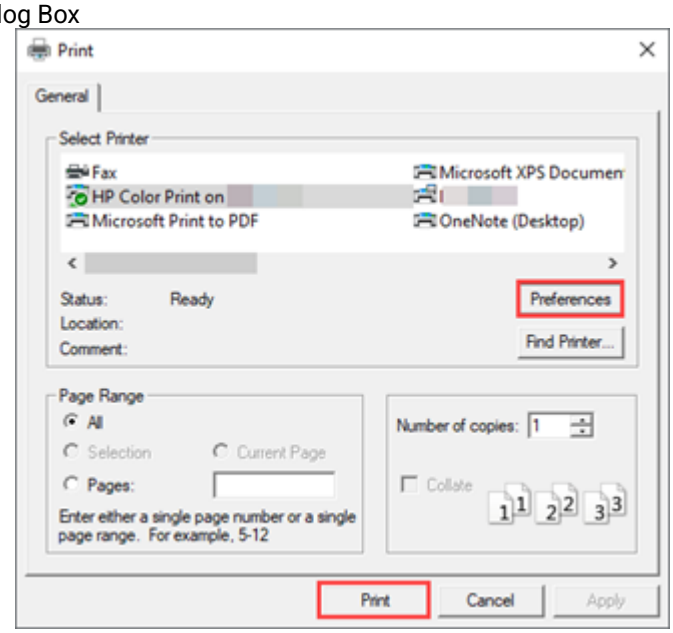
Figure 251. Strip View - Printing Strip



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 133)* 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 252. Strip View - Printing Dialog Box



4.1. Choose a printer **available** in the **Select Printer** window.

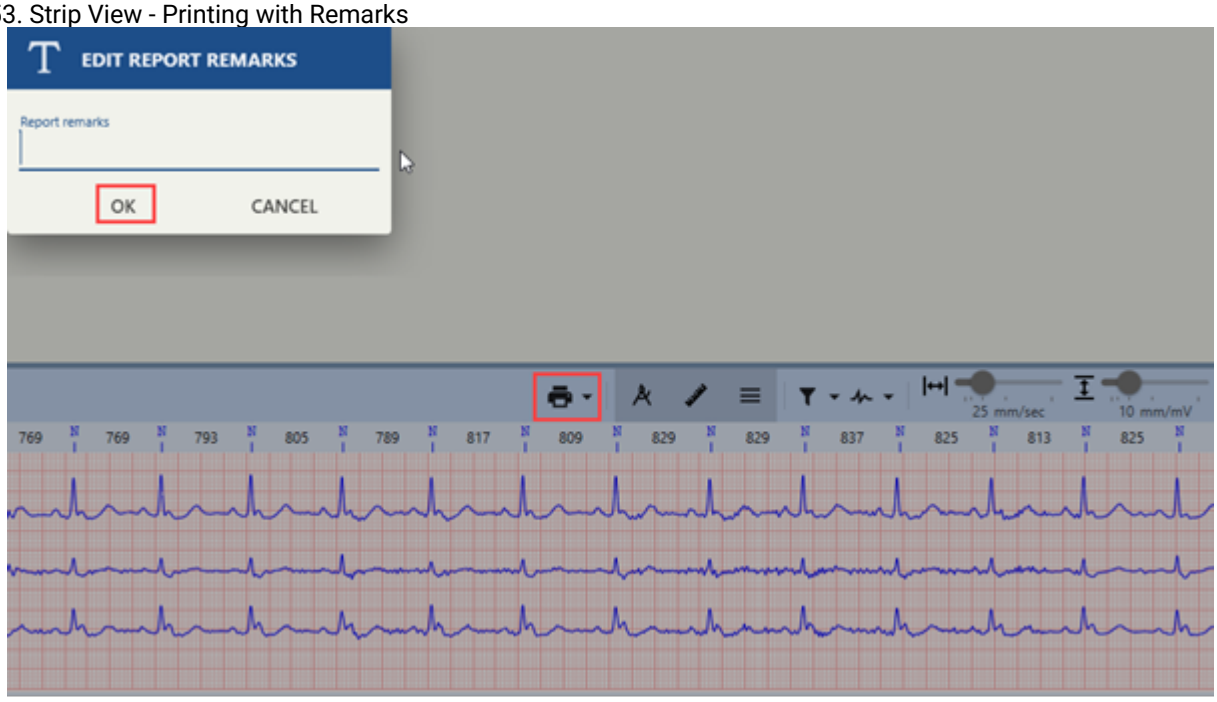
4.2. Adjust other preferences according to your needs.

4.3. 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:

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

Figure 253. Strip View - Printing with Remarks



5.2. When you are complete with filling in you remarks, click OK.

5.3. **(Optional)** Click **Cancel** to abandon this action.

5.4. Choose a printer available in the **Select Printer** window.

5.5. Adjust other preferences according to your needs.

5.6. 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
	**Caliper toggle**: Click to toggle **ON/OFF** the **Caliper** tool. The **Caliper** tool assists with measuring intervals and amplitudes, such as the RR interval, T-wave, and QRS complex amplitudes. Refer to the Measuring ECG with Caliper *(on page 173)* section for details.
	**ECG Ruler toggle**: Click to toggle **ON/OFF** the **ECG Ruler**, located right below the **Strip View Toolbar**. The **ECG Ruler** indicates the duration of RR intervals for adjacent beats and their morphology classification (i.e., N, R, F, V, etc.).
	**Channel Numeration toggle:** Click to toggle **ON/OFF** the channel numeration on the left side of the ECG Strip.

Figure 254. Strip View - Caliper Tool

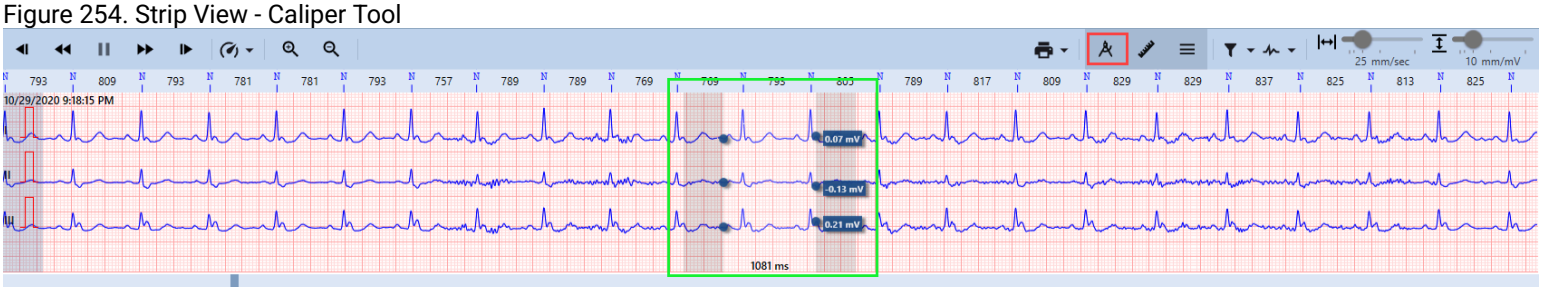


Figure 255. Strip View - ECG Ruler

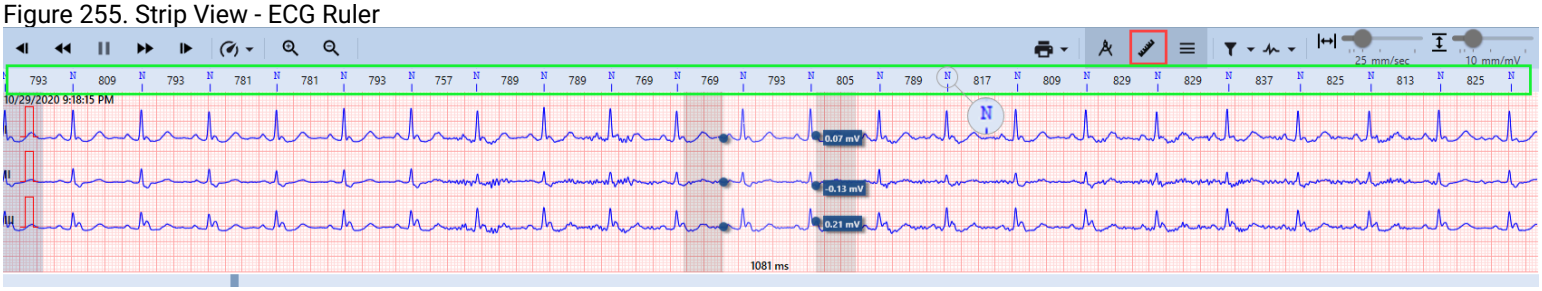
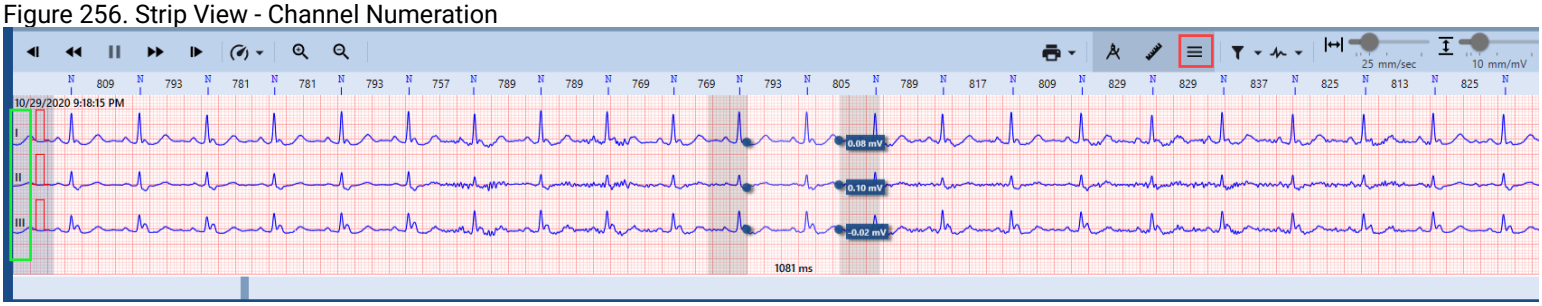


Figure 256. Strip View - Channel Numeration



Filters

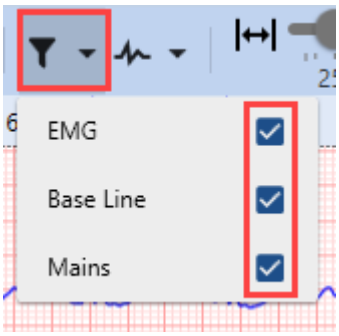
This group of controls allows you to apply various filters affecting beat visualization and enhancing the accuracy and reliability of ECG analysis.

Icons	Description
	**Filter**: This control enables you to toggle **ON/OFF** the visualization of the waveform with applied **EMG, Base Line**, and **Mains** 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.
	**Channel Selection:** This control lets you select the channel(s) for display within the **Strip View**, using the drop-down list (up to 12 channels, depending on the number of channels in the current **Record**).

To toggle filters **ON/OFF**:

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

Figure 257. Strip View - Toggling Filters



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

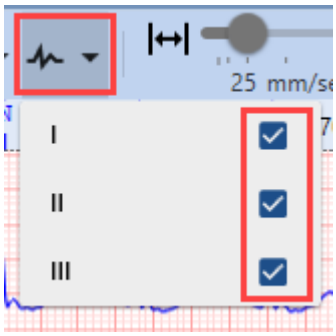
It is recommended to keep filters **ON** to provide accurate analysis:

- **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 258. Strip View - Toggling Channels



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

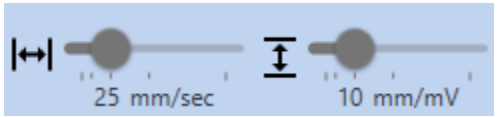
Toggling **ON/OFF** ECG channels enhances the accuracy and efficiency of ECG analysis. This feature allows you to focus on specific channels, compare them, filter out noise and more.

Note: The **Channel Selection** settings are synchronized across all **Views** that include the **Strip View**

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 259. 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 260. 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.

Note: The amplitude settings are synchronized across all **Views** that include the **Strip View**

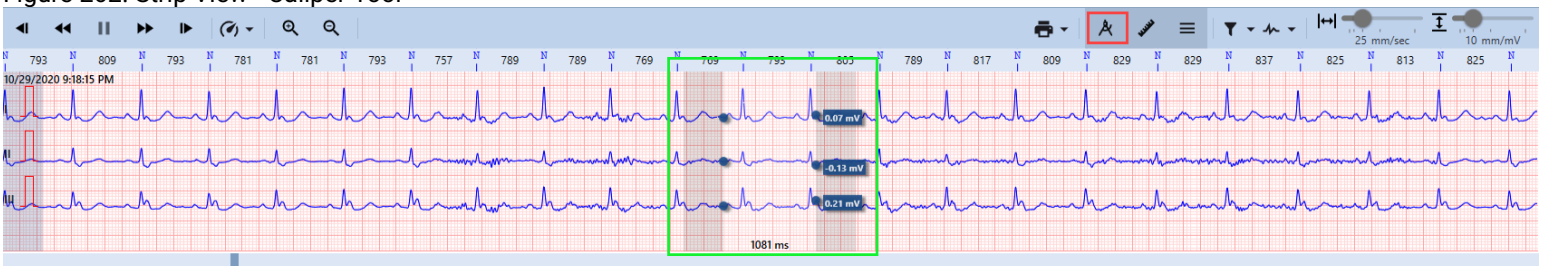
Figure 261. Strip View - Amplitude



4.6.6.2.4.1.2. 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 262. 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 263. 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 264. Strip View - Interval Length and Amplitude Difference



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

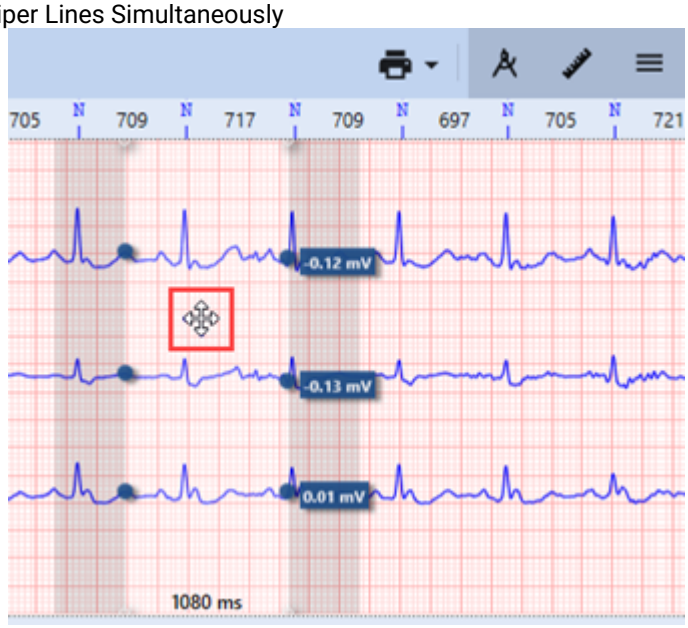
Moving Caliper Lines

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 265. Strip View - Moving Caliper Lines Simultaneously



2. Drag and drop the **Caliper** to the desired location.
3. **(Optional)** 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 266. Strip View - Moving Caliper Lines Independently

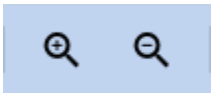


2. Click to select the measurement line.
3. Drag and drop it to the new location.

Zoom Feature

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

Figure 267. Strip View - Zooming Options



- Click the corresponding button in the **Strip View Toolbar**.
- 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 268. Strip View - Caliper Snapping



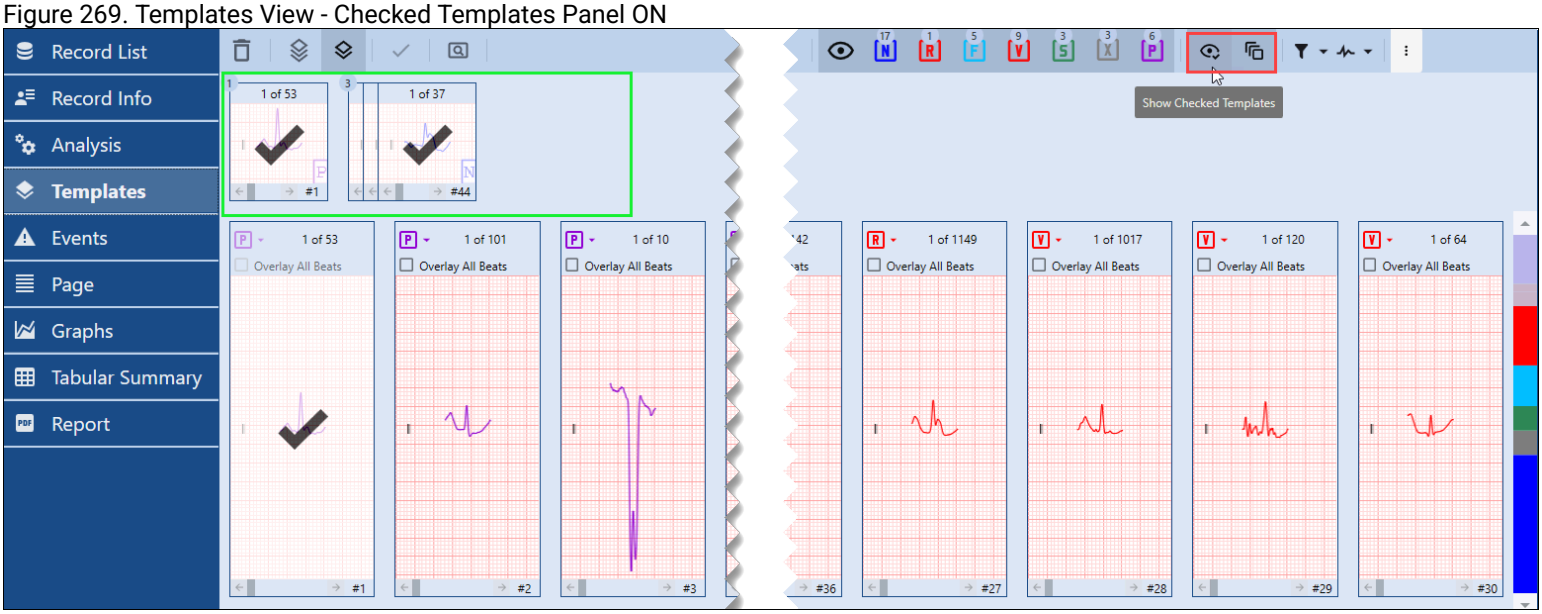
   - To snap any line:
     3.1. Hold down the **Alt** key.
     3.2. Position the cursor near one of the measurement lines until the cursor icon changes to a resize cursor.
     3.3. Click the measurement line to select it.
     3.4. Drag and drop it to the desired location.
   - To snap the right measurement line:
     3.1. Hold down the **Right Alt** key.
     3.2. 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:
     3.1. Hold down the **Left Alt** key.
     3.2. 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.

4.6.6.2.5. Marking Reviewed Templates

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

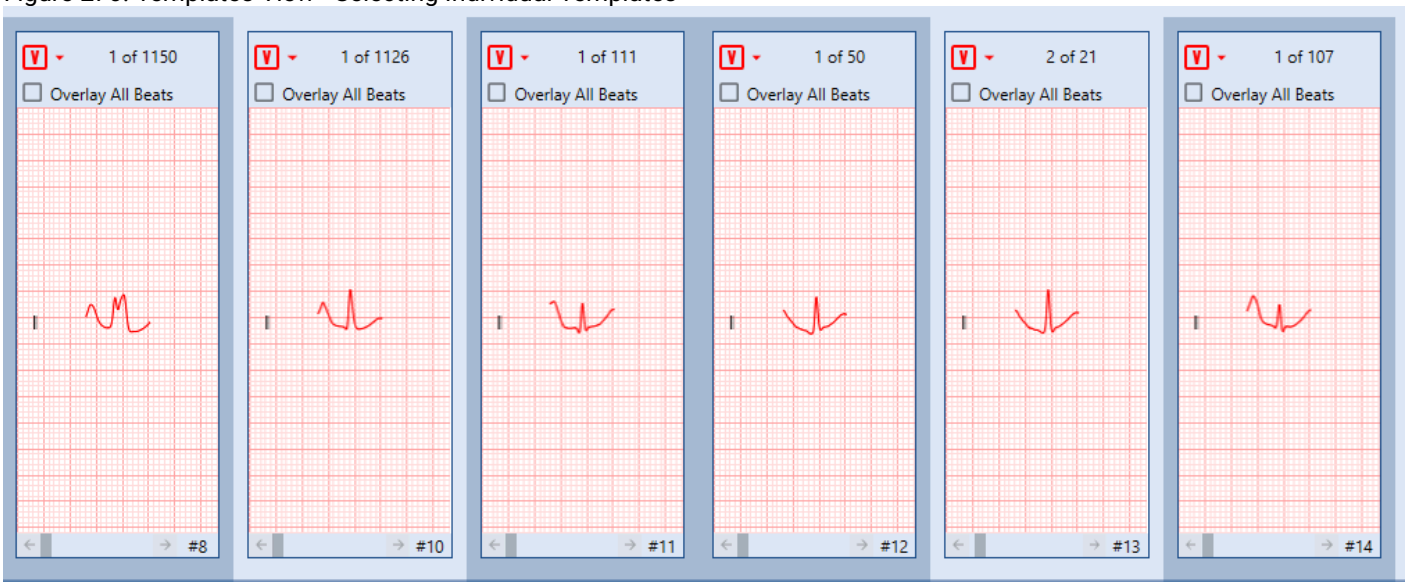
Figure 269. Templates View - Checked Templates Panel ON



To mark a template as reviewed:

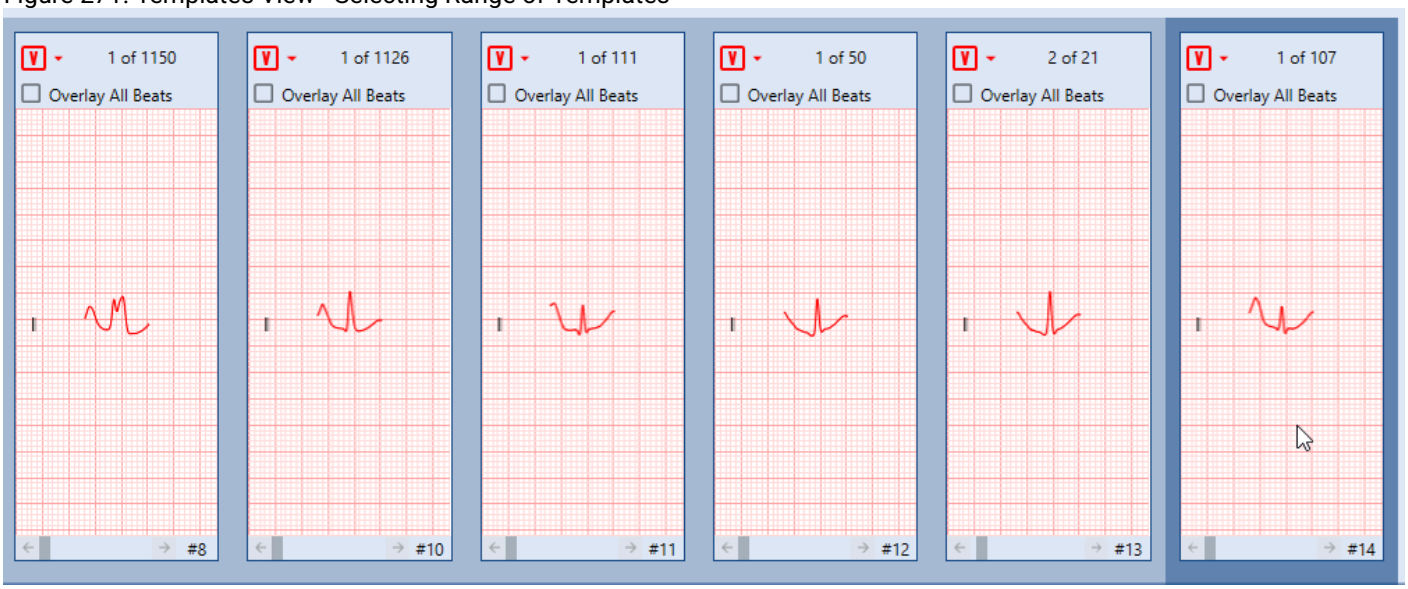
1. **Select a Template**: Click a template to select it.
2. **(Optional) Select Multiple Templates**:
   - **Select Individual Templates**: Hold down the **Ctrl** key while clicking on additional templates. The system will highlight them with a darker frame.

     Figure 270. Templates View - Selecting Individual Templates

   - **Select a Range of Templates**:

Figure 271. Templates View - Selecting Range of Templates



2.1. Identify the initial template in the range you wish to select.

2.2. Hold down the **Shift** key.

2.3. Click the initial template.

2.4. Identify the final template in your desired range.

2.5. Click the final template to complete the range selection.

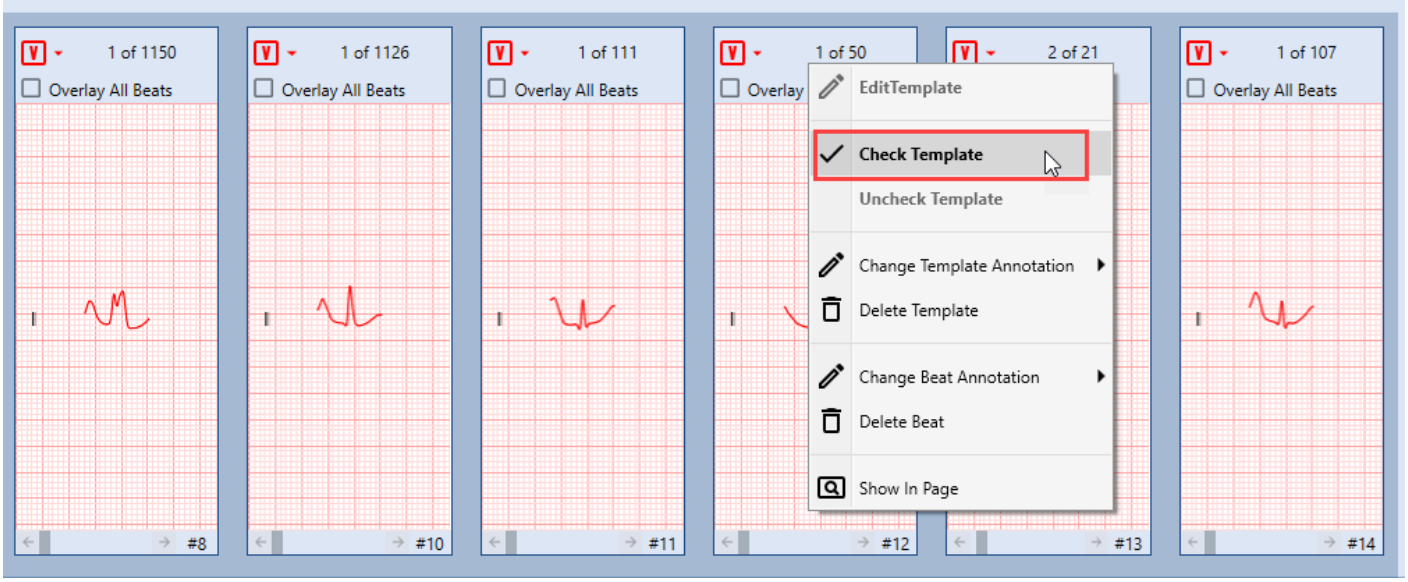
- **Select all templates:**

  2.1. Use the **Ctrl+A** keyboard shortcut to select all templates displayed in the Templates Pane at once. 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**:

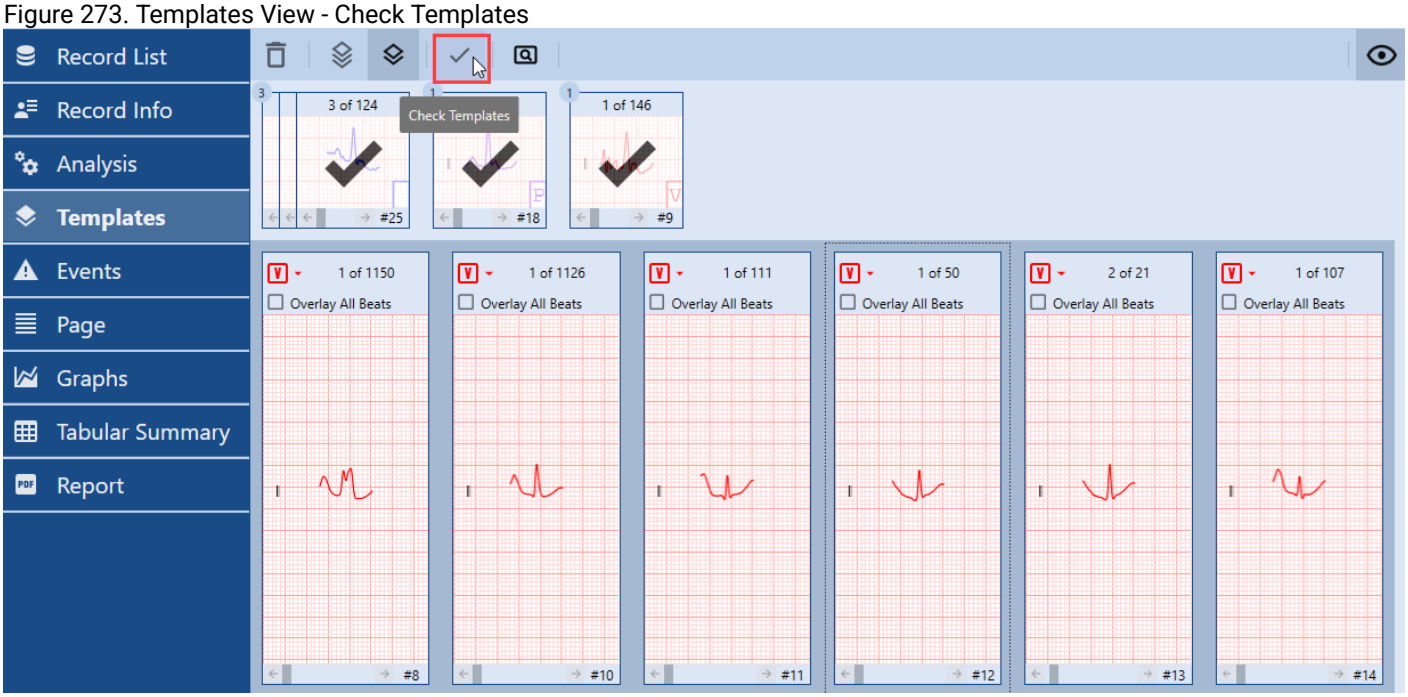
- Right-click on a selected template and choose **Check Template** from the context menu.

Figure 272. Templates View - Check Template



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

Figure 273. Templates View - Check Templates



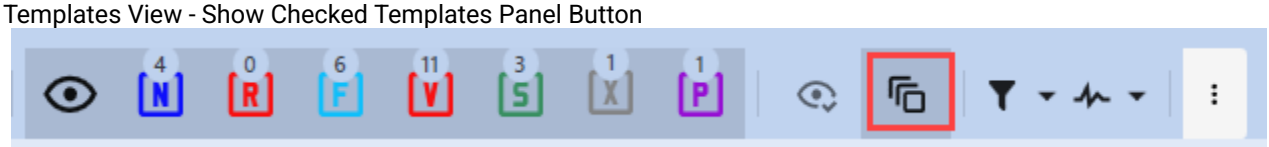
- **(Optional)** You can also mark individual templates as checked by selecting them and pressing the Space key on your keyboard.

Figure 274. 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 51)* 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 275. 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**.

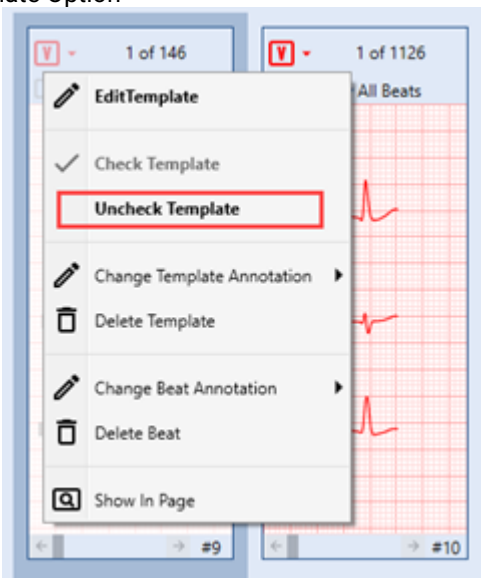
Figure 276. Templates View - Show Checked Templates Button



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

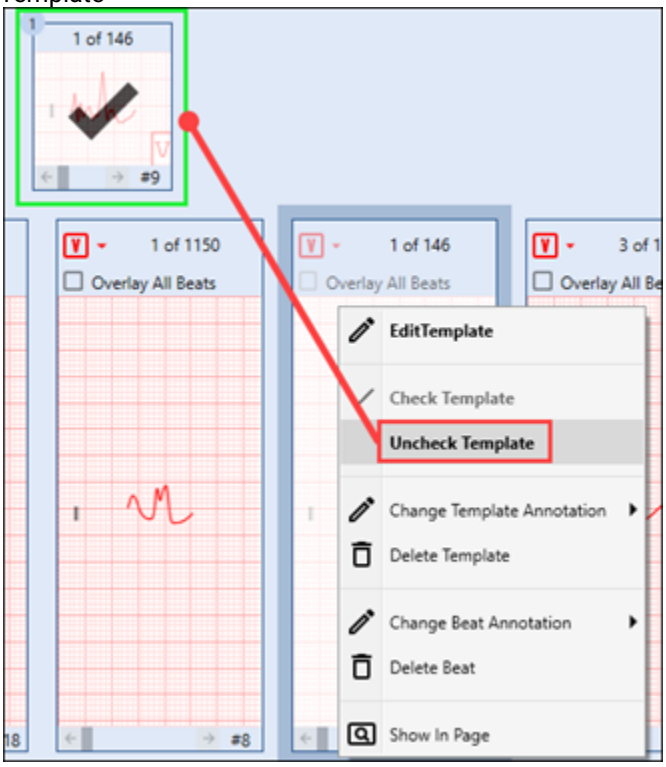
3. Click the **Uncheck Template** option. Alternatively, press the **Space** key on your keyboard. The checkmark will be removed, and the template will return to its default state.

Figure 277. 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.

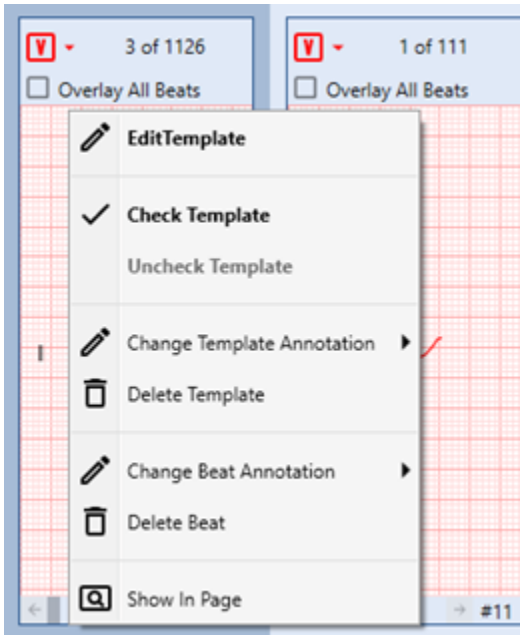
Figure 278. Templates View - Uncheck Template



4.6.6.2.6. 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 279. Template View - Context Menu

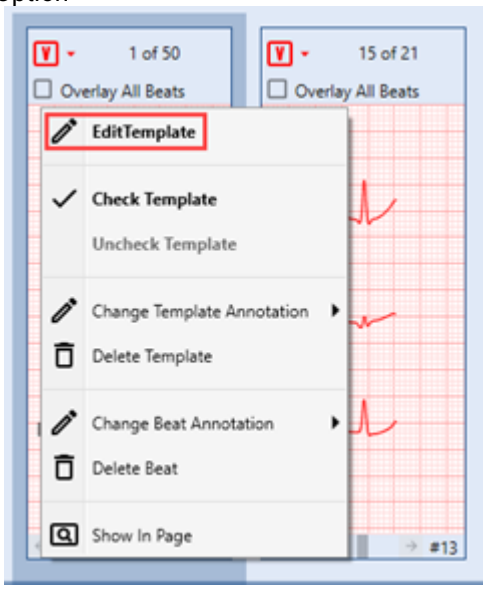


Edit Template

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 280. Templates View - Edit Template Option



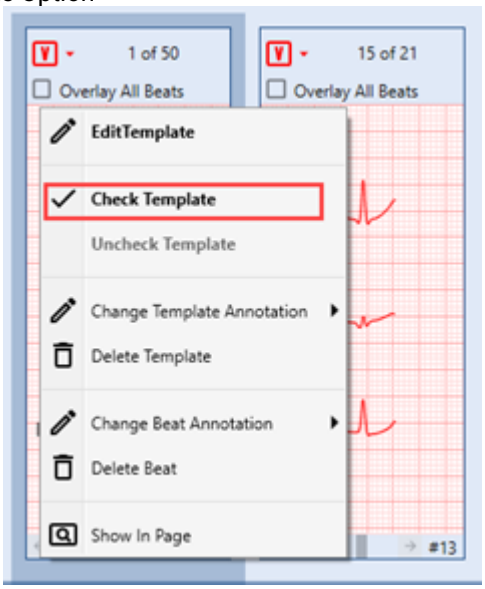
Check Template

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 281. Templates View - Check Template Option

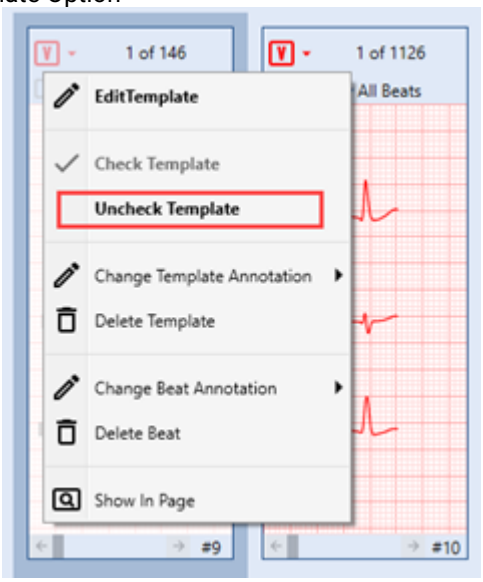


Uncheck Template

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 282. Templates View - Uncheck Template Option

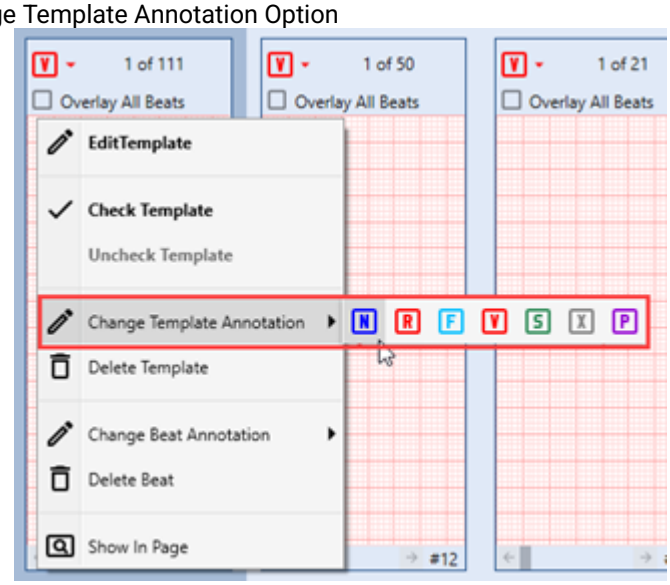


Change Template Annotation

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 283. 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.

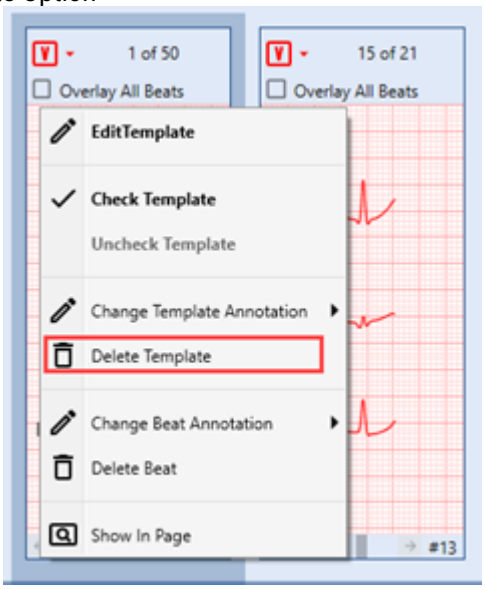
Note: This method allows bulk actions. Multiple templates can be selected using **Ctrl+Click** or **Shift+Click** shortcuts to reclassify them in one action.

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 284. Templates View - Delete Template Option



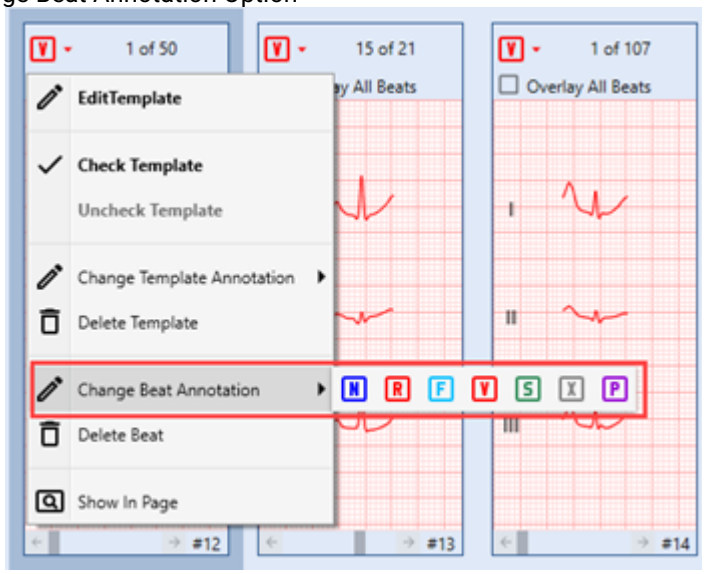
5. A "Processing" pop-up will briefly appear. Once it disappears, the deletion is complete, and the template(s) will be removed from the **Templates Pane**.

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 285. 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.

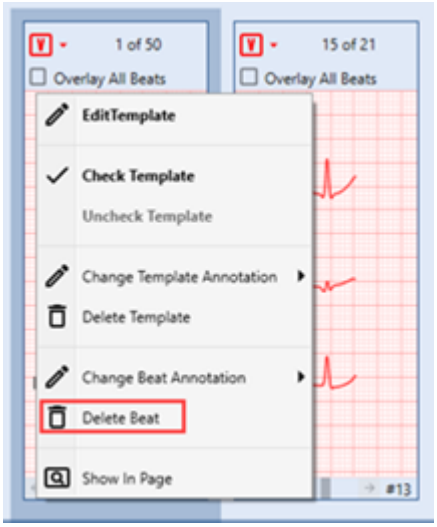
Note: This method doesn't allow bulk actions.

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 286. 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.

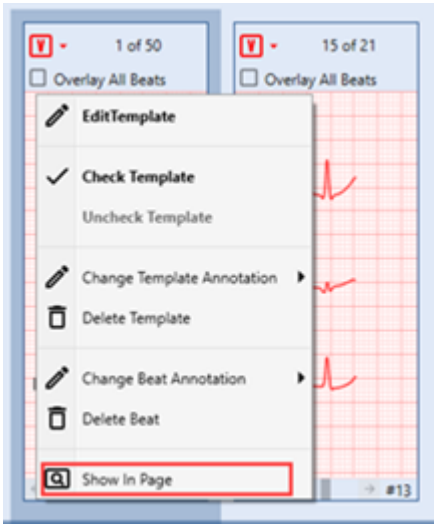
Note: This method doesn't allow bulk actions.

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:

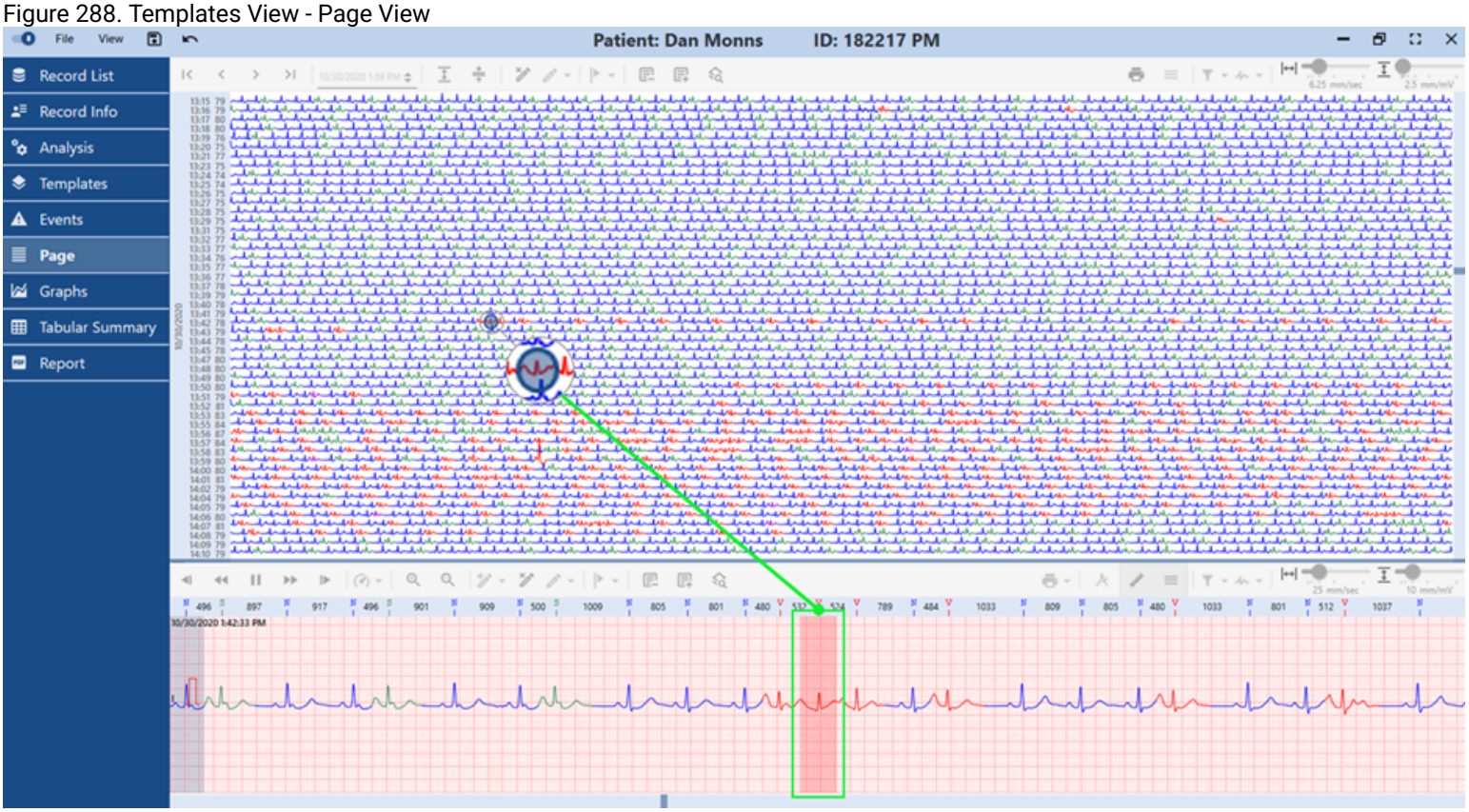
1. Click a template box.
2. Choose a beat you want to focus on. Navigate through beats using one of the following methods:
   - Use the arrow buttons inside the template box. Pressing and holding the mouse button on an arrow facilitates rapid cycling through all beats within that template.
   - Utilize 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 287. 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 288. Templates View - Page View



4.6.6.3. 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**. Its settings also determine how **Strip View** fragments are presented in the generated **Report**. 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 289. Strip View - Strip View



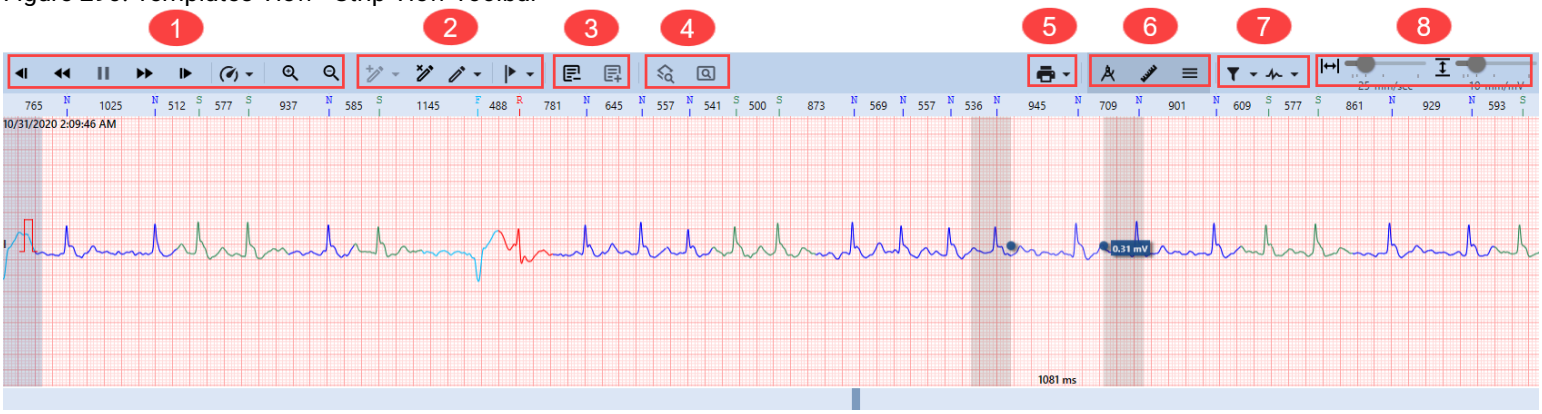
Note:

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.

4.6.6.3.1. 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 290. Templates 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
	Step Backward button: Click to move the ECG Strip one step backward for scanning and reviewing.
	Scan Backward button: Click to initiate continuous backward scanning of the ECG Strip.
	Pause Scan button: Click to halt continuous scanning of the ECG Strip. For example, if you have activated a **Scan Backward** or a **Scan Forward** button, halt scanning by clicking the **Pause Scan** button.
	Scan Forward button: Click to initiate continuous forward scanning of the ECG Strip.
	Step Forward button: Click to move the ECG Strip one step forward for scanning and reviewing.
	Scan Speed button: Allows you to control the scanning speed. To set the scanning speed: 1. Hover over the **Scan Speed** icon to expand the drop-down list. 2. Click the desired scanning speed multiplier, ranging from ×1 to ×128.
	Zoom In button: Click to adjust the scale of the waveform in the **Strip View**, focusing on specific areas or comparing different fragments of the ECG record.
	Zoom Out button: Click to adjust the scale of the waveform in the **Strip View**. 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 are a group of buttons that facilitate beats and events management in the **Strip View**.

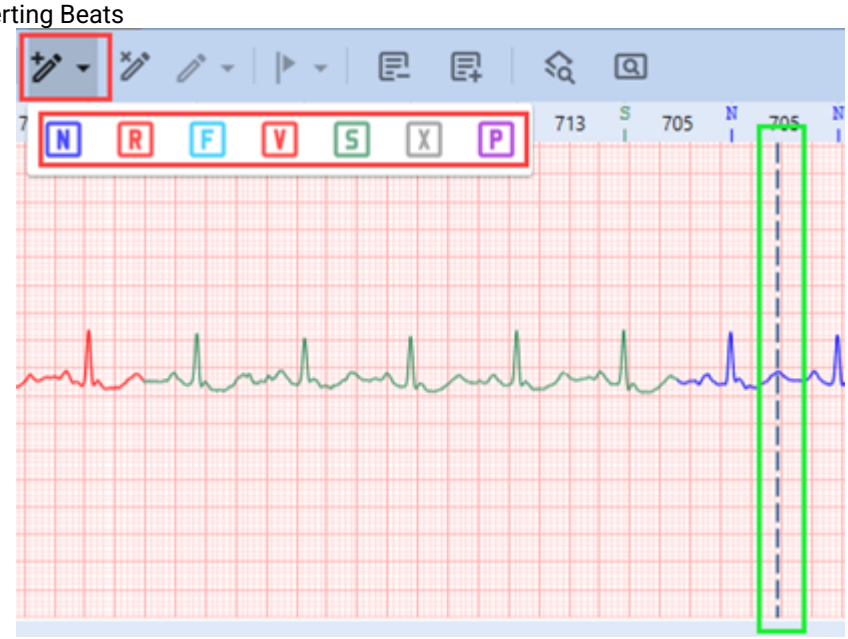
Icon	Description
	Insert Beat button: Allows you to insert new beats between existing ones. Further instructions are presented below.
	Delete Beats button: Click to delete a selected beat.
	Change Beats Annotation button: Enables you to modify the annotation of selected beats.
	Create User Event button: 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 appear, 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 291. 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:** Click the first point, then hold **Shift** and click the end point. Scan the Strip View *(on page 152)* to locate the points of interest, if necessary.
- **Using Ctrl + Click:** Hold **Ctrl**, click the start point, drag to the endpoint, and release. Scan the Strip View *(on page 152)* to locate the points of interest, if necessary.
- **Using the right mouse button:** Right-click and drag to highlight the desired segment. Scan the Strip View *(on page 152)* to locate the points of interest, if necessary.

Figure 292. Strip View - Deleting Beats

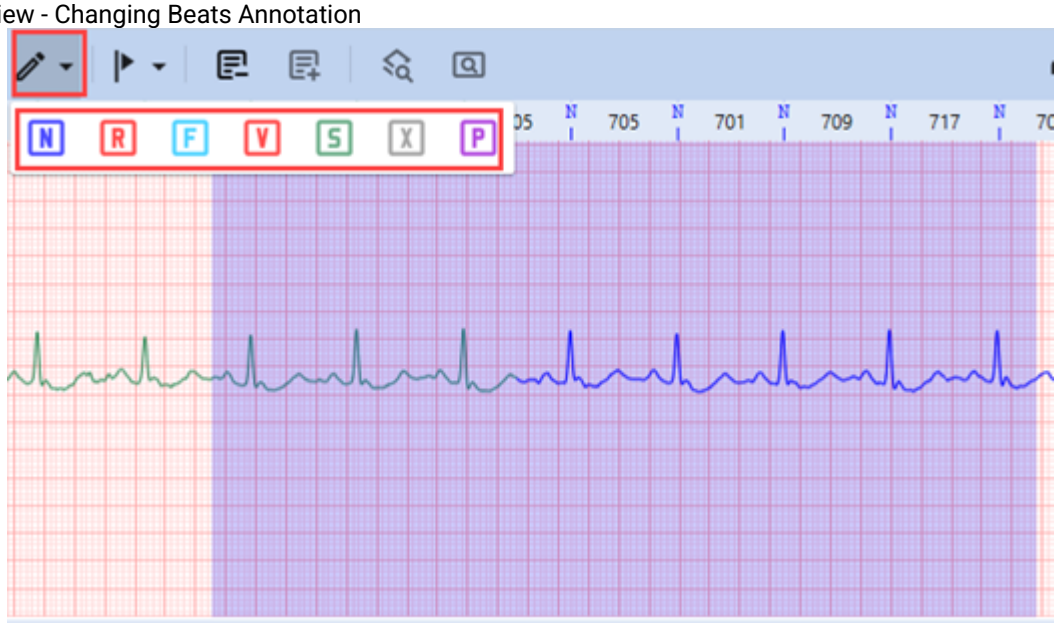


2. Click the **Delete Beats** button.

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:** Click the first point, then hold **Shift** and click the end point. Scan the Strip View *(on page 152)* to locate the points of interest, if necessary.
     - **Using Ctrl + Click:** Hold **Ctrl**, click the start point, drag to the endpoint, and release. Scan the Strip View *(on page 152)* to locate the points of interest, if necessary.
     - **Using the right mouse button:** Right-click and drag to highlight the desired segment. Scan the Strip View *(on page 152)* to locate the points of interest, if necessary.

Figure 293. Strip View - 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.

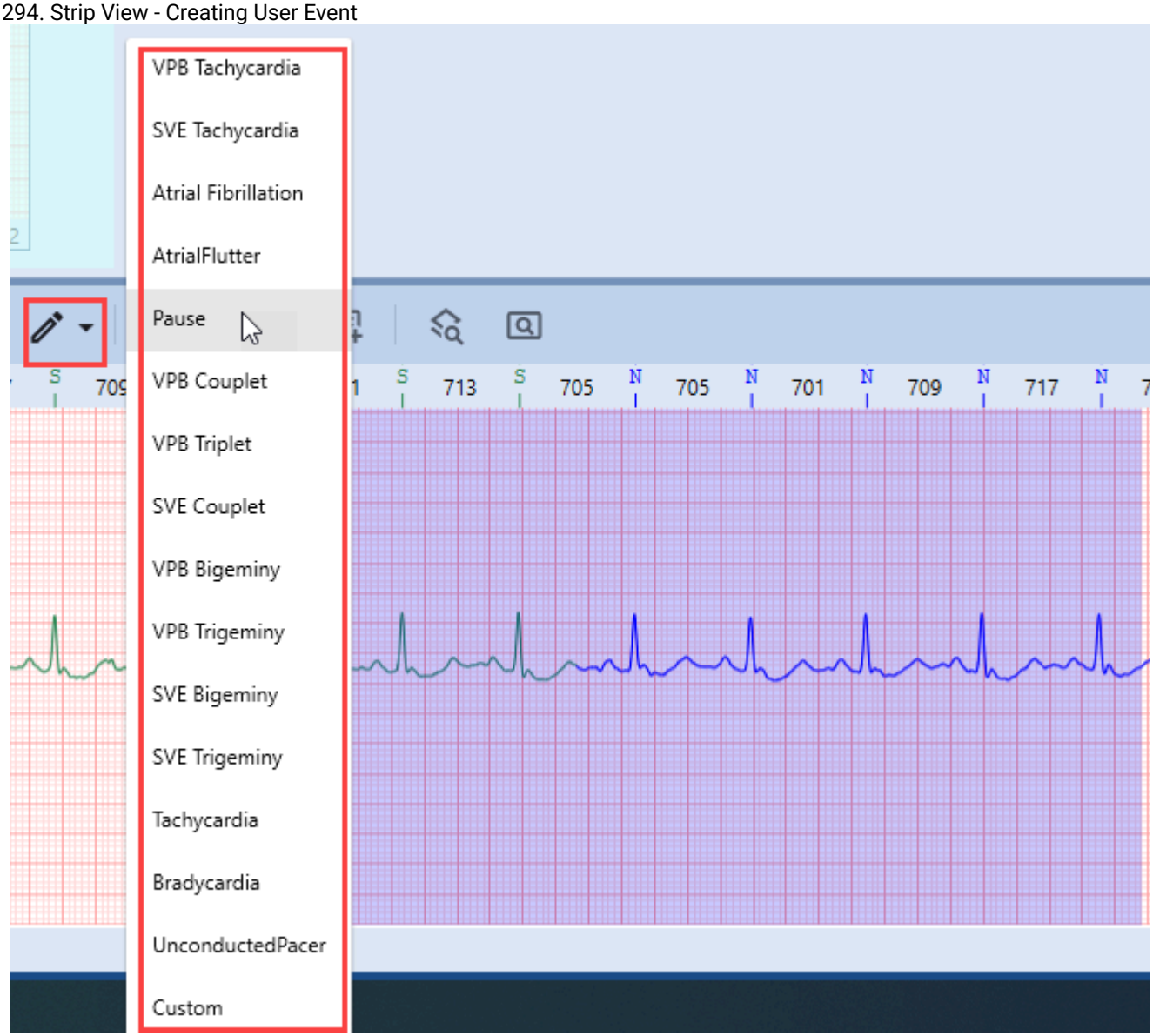
Table 3. Beats Reclassification Keyboard Shortcuts for Strip View

Action	Button	Keyboard Keys
Classify as **Normal**	N	**N**
Classify as **R** on **T**	R	**R**
Classify as **Fusion**	F	**F**
Classify as **VPB**	V	**V**
Classify as **SVE**	S	**S**
Classify as **Questionable**	X	**X**
Classify **Paced**	P	**P**

To create a user event:

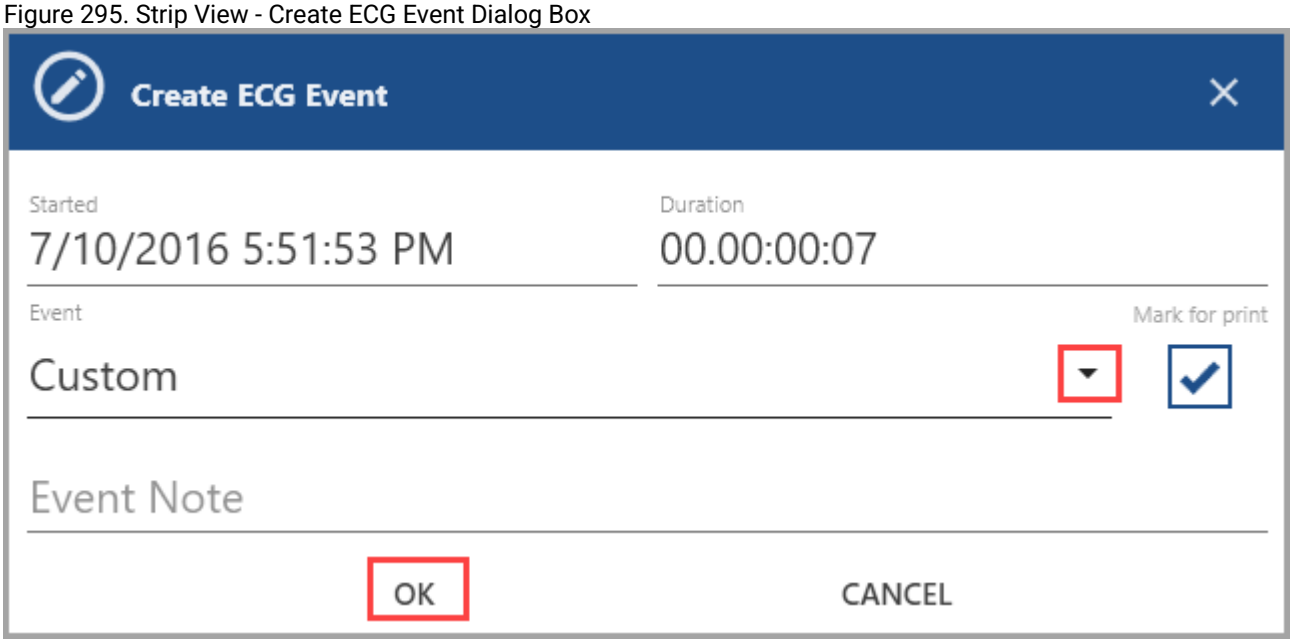
1. Select a fragment of the ECG, which you wish to reclassify as a continuous event, using one of the following methods:
   - Click an individual beat to select it.
   - Select a fragment of the waveform:
     - **Using Shift + Click:** Click the first point, then hold **Shift** and click the end point. Scan the Strip View *(on page 152)* to locate the points of interest, if necessary.
     - **Using Ctrl + Click:** Hold **Ctrl**, click the start point, drag to the endpoint, and release. Scan the Strip View *(on page 152)* to locate the points of interest, if necessary.
     - **Using the right mouse button:** Right-click and drag to highlight the desired segment. Scan the Strip View *(on page 152)* to locate the points of interest, if necessary.

Figure 294. 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.
4. Review the event details in the **Create ECG Event** dialog box:
    - Re-select or confirm the event type using the drop-down menu.
    - **(Optional)** Check or uncheck the **Mark for print** checkbox.
    - **(Optional)** Enter a custom event note in the **Event Note** field.

Figure 295. Strip View - Create ECG Event Dialog Box



5. Click **OK** to confirm or **Cancel** to discard changes.

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.

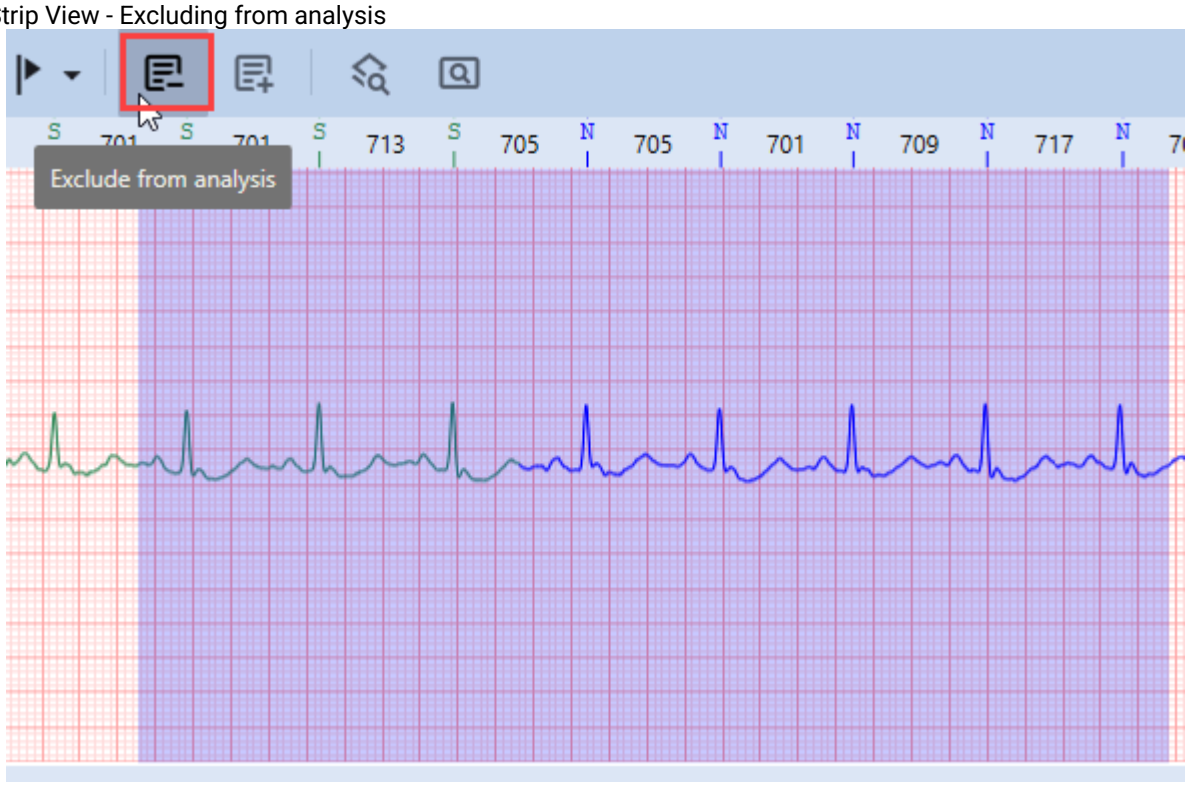
Icon	Description
	Exclude from analysis button: Enables the exclusion of a selected fragment of an ECG record from analysis.
	Include to analysis button: Enables the re-inclusion of previously excluded fragments of an ECG record.

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:** Click the first point, then hold **Shift** and click the end point. Scan the Strip View *(on page 152)* to locate the points of interest, if necessary.
   - **Using Ctrl + Click:** Hold **Ctrl**, click the start point, drag to the endpoint, and release. Scan the Strip View *(on page 152)* to locate the points of interest, if necessary.
   - **Using the right mouse button:** Right-click and drag to highlight the desired segment. Scan the Strip View *(on page 152)* to locate the points of interest, if necessary.

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

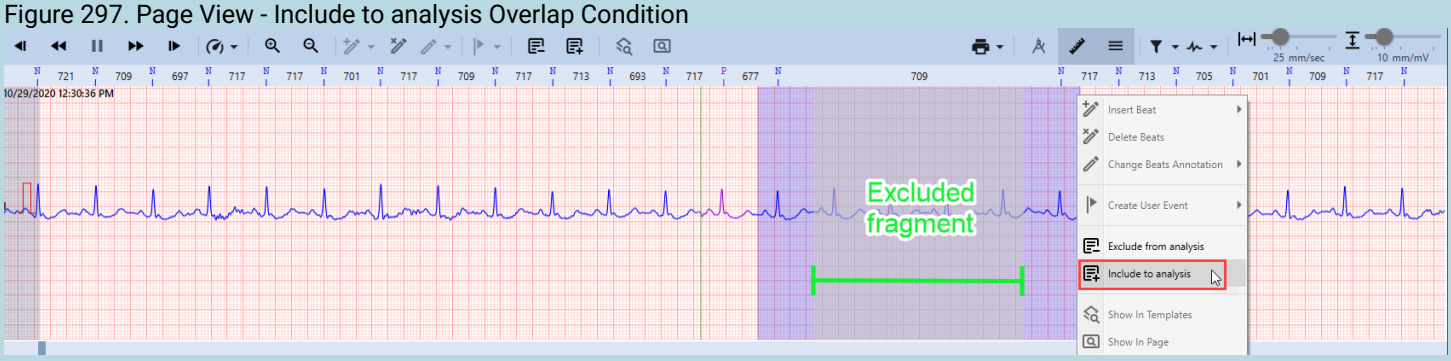
Figure 296. Strip View - Excluding from analysis



To re-include an ECG segment into analysis:

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

Figure 297. 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:** Click the first point, then hold **Shift** and click the end point. Scan the Strip View *(on page 152)* to locate the points of interest, if necessary.
   - **Using Ctrl + Click:** Hold **Ctrl**, click the start point, drag to the endpoint, and release. Scan the Strip View *(on page 152)* to locate the points of interest, if necessary.
   - **Using the right mouse button:** Right-click and drag to highlight the desired segment. Scan the Strip View *(on page 152)* to locate the points of interest, if necessary.

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

Figure 298. Strip View - Including to analysis

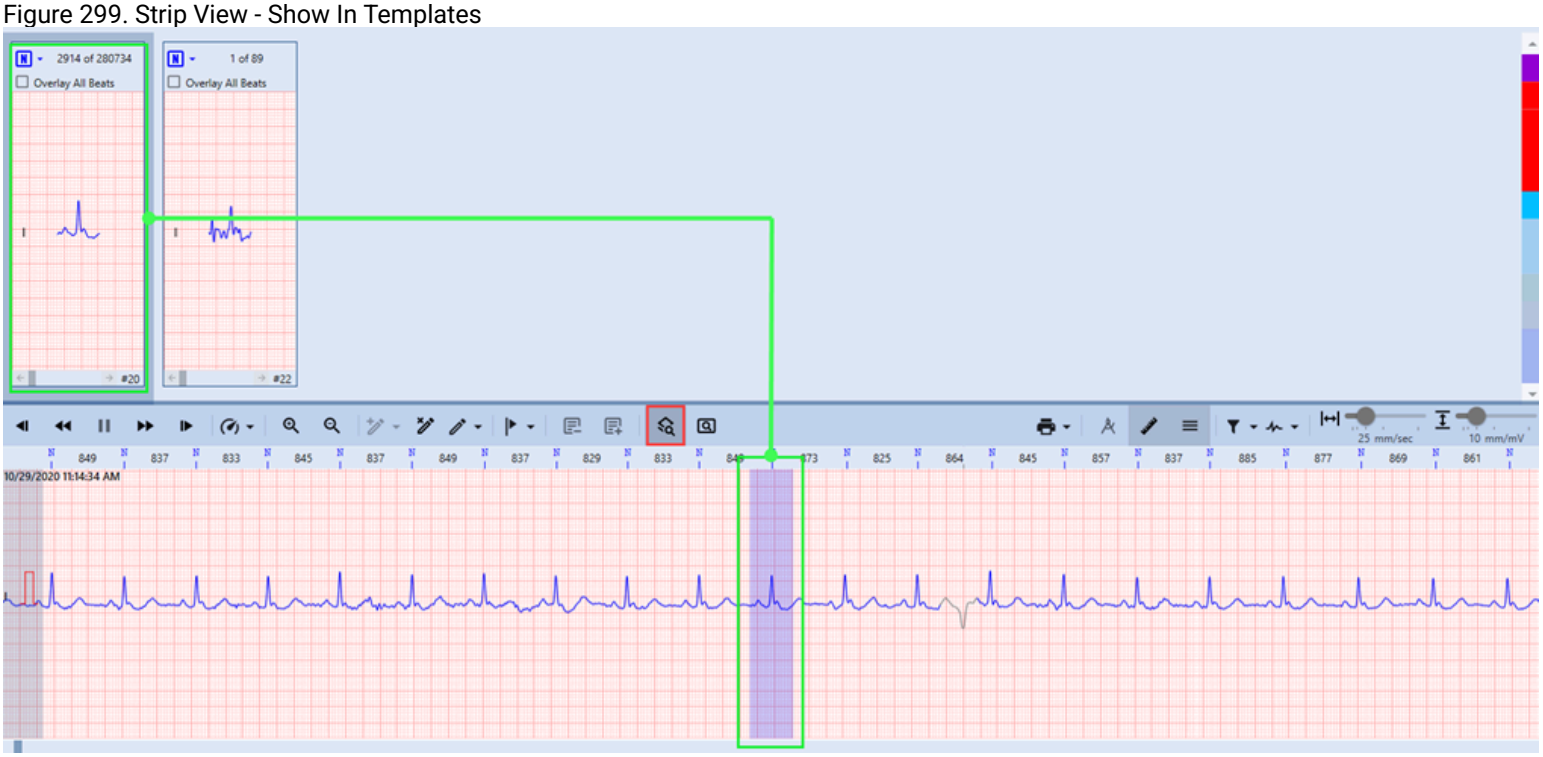


Views Switching Controls

Views Switching Controls are a group of buttons that allow 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
	**Show In Templates button:** Click this button to display the beat you have selected in the **Strip View**; it will be highlighted in the relevant template within the **Templates Pane**.
	**Show in Page**: Facilitates an immediate switch to **Page View**, revealing the precise location of the chosen beat within this particular **Template** in both the **Signal Page** and the **ECG Strip**.

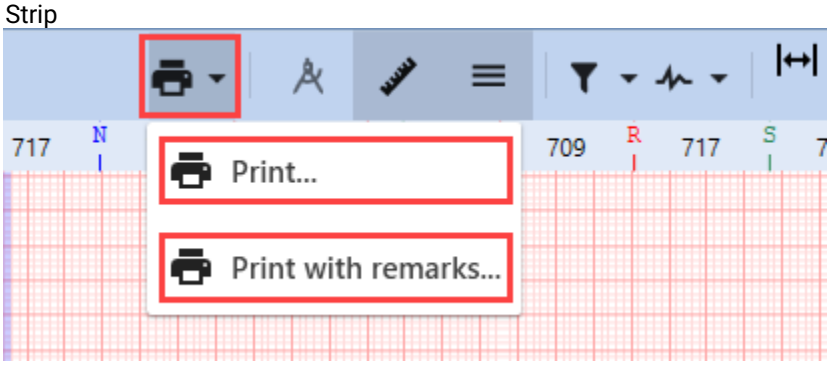
Figure 299. Strip View - Show In Templates



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.

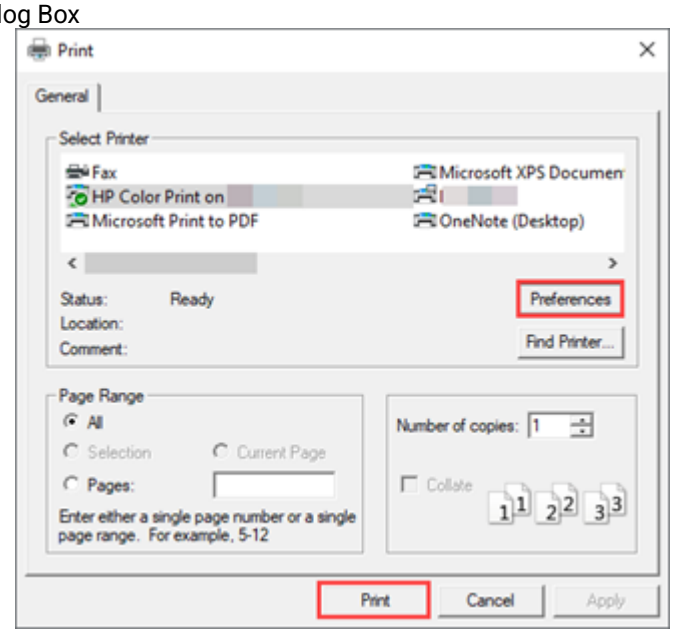
Figure 300. Strip View - Printing Strip



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 152)* 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 301. Strip View - Printing Dialog Box



   4.1. Choose a printer **available** in the **Select Printer** window.

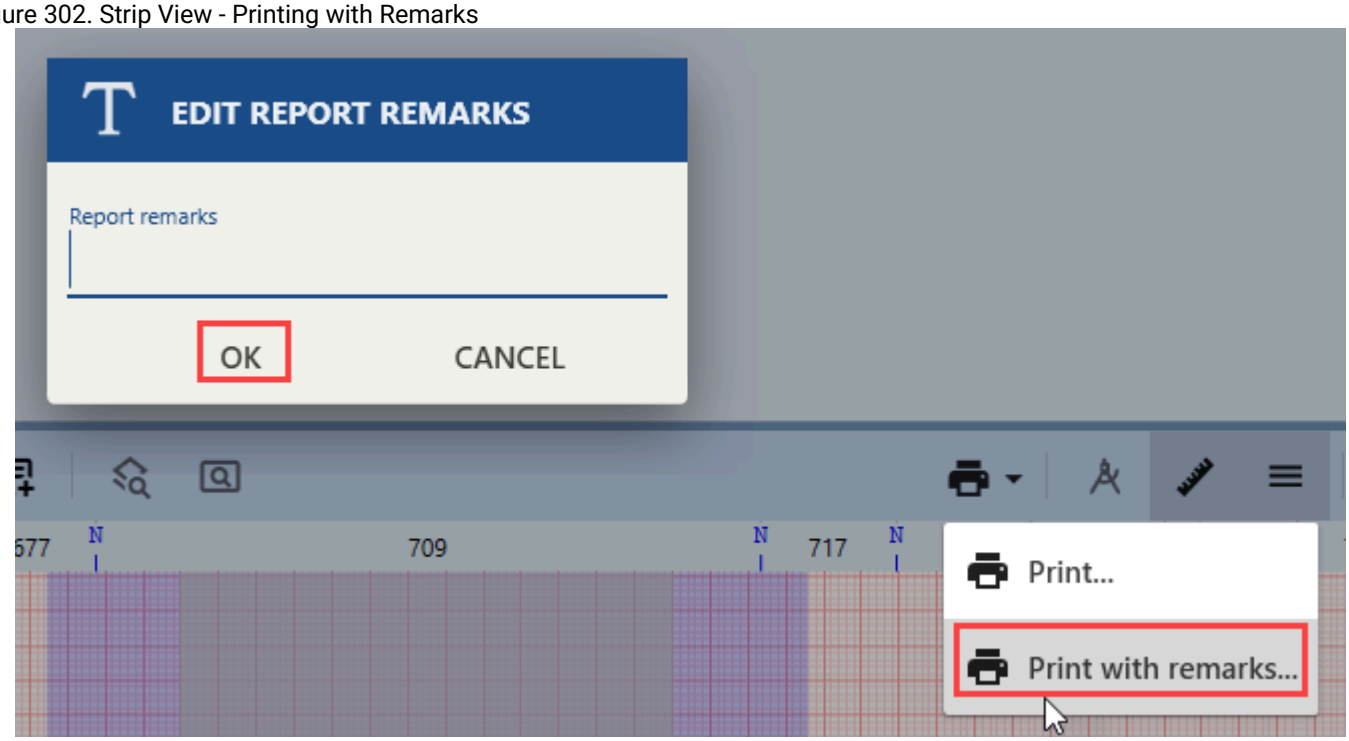
   4.2. Adjust other preferences according to your needs.

   4.3. 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:

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

Figure 302. Strip View - Printing with Remarks



5.2. When you are complete with filling in you remarks, click OK.

5.3. **(Optional)** Click **Cancel** to abandon this action.

5.4. Choose a printer available in the **Select Printer** window.

5.5. Adjust other preferences according to your needs.

5.6. Click **Print** at the bottom of the dialog box to execute the printing of the waveform fragment.

Measuring Controls

Measuring Controlsare 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 173)* in the following sections.

Icon	Description
	Caliper toggle: Click to toggle **ON/OFF** the **Caliper** tool. The **Caliper** tool assists with measuring intervals and amplitudes, such as the RR interval, T-wave, and QRS complex amplitudes. Refer to the Measuring ECG with Caliper *(on page 173)* section for details.
	ECG Ruler toggle: Click to toggle **ON/OFF** the **ECG Ruler**, located right below the **Strip View Toolbar**. The **ECG Ruler** indicates the duration of RR intervals for adjacent beats and their morphology classification (i.e., N, R, F, V, etc.).
	Channel Numeration toggle: Click to toggle **ON/OFF** the channel numeration on the left side of the ECG Strip.

Figure 303. Strip View - Caliper Tool

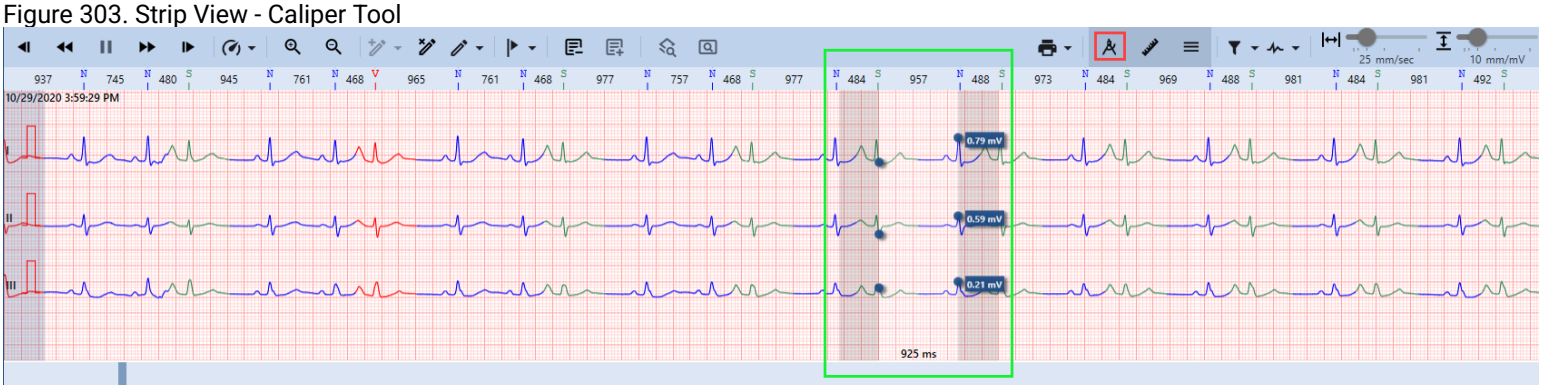
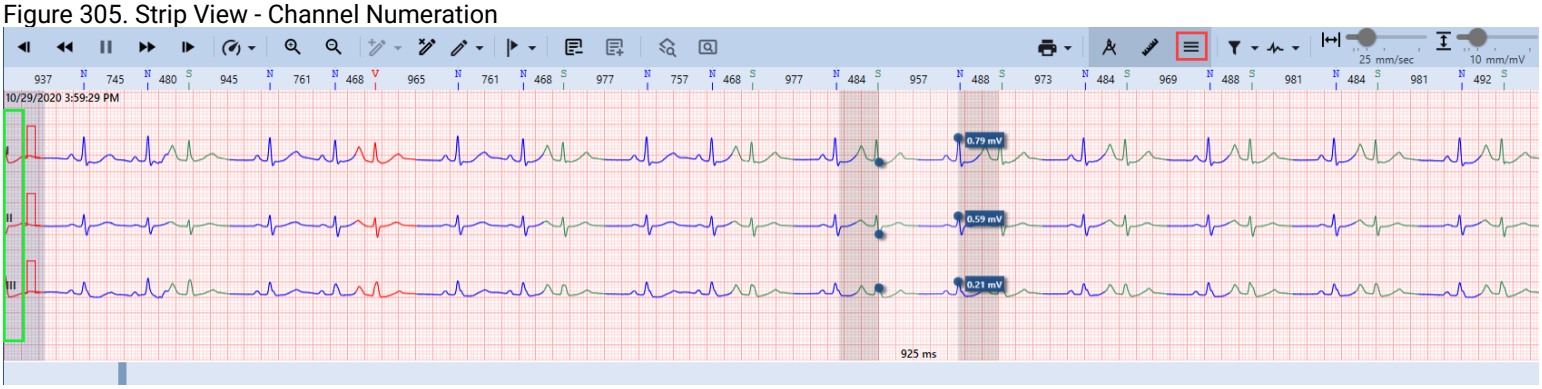


Figure 304. Strip View - ECG Ruler



Figure 305. Strip View - Channel Numeration



Filters

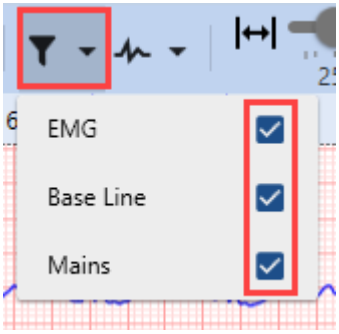
This group of controls allows you to apply various filters affecting beat visualization and enhancing the accuracy and reliability of ECG analysis.

Icons	Description
	**Filter**: This control enables you to toggle **ON/OFF** the visualization of the waveform with applied **EMG, Base Line**, and **Mains** 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.
	**Channel Selection:** This control lets you select the channel(s) for display within the **Strip View**, using the drop-down list (up to 12 channels, depending on the number of channels in the current **Record**).

To toggle filters **ON/OFF**:

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

Figure 306. Strip View - Toggling Filters



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

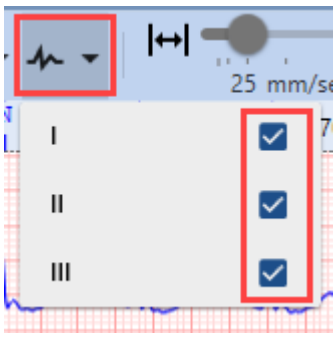
It is recommended to keep filters **ON** to provide accurate analysis:

- **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 307. Strip View - Toggling Channels



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

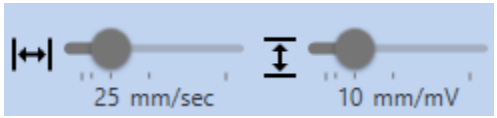
Toggling **ON/OFF** ECG channels enhances the accuracy and efficiency of ECG analysis. This feature allows you to focus on specific channels, compare them, filter out noise and more.

Note: The **Channel Selection** settings are synchronized across all **Views** that include the **Strip View**

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.

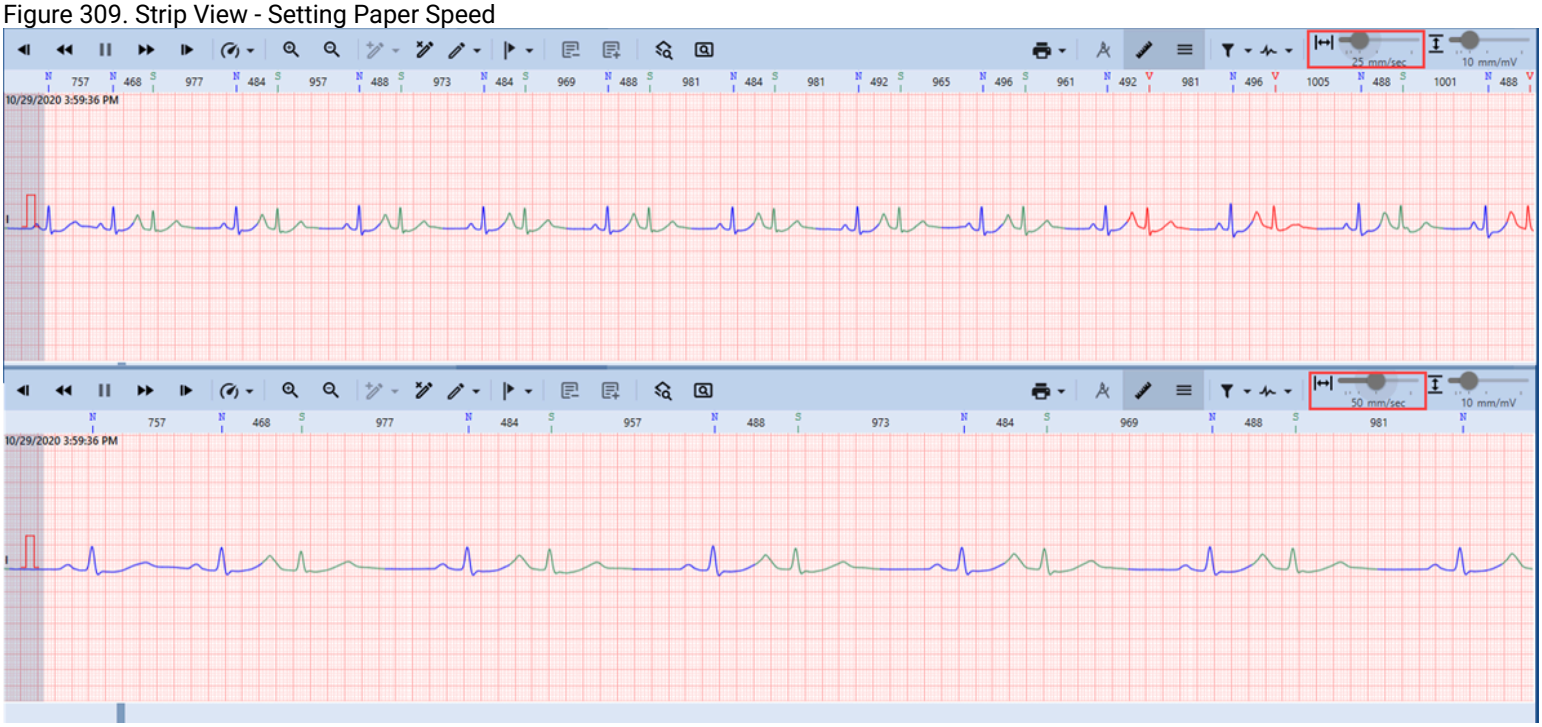
Figure 308. Strip View - Scale and Gain Controls



To change the paper speed:

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

Figure 309. 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.

Note: The amplitude settings are synchronized across all **Views** that include the **Strip View**

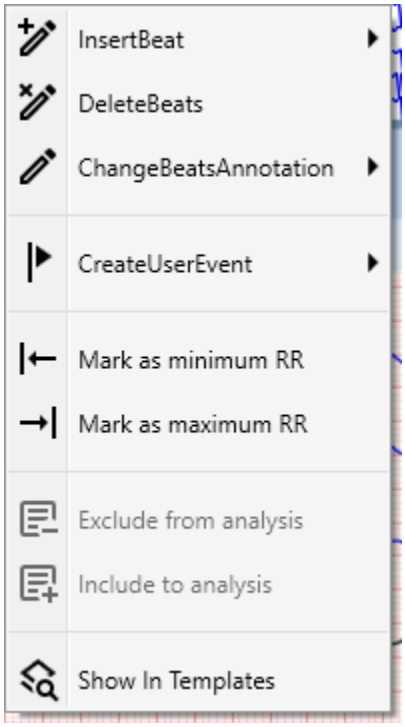
Figure 310. Strip View - Setting Amplitude



4.6.6.3.2. 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 311. 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 within the **Strip View**.

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

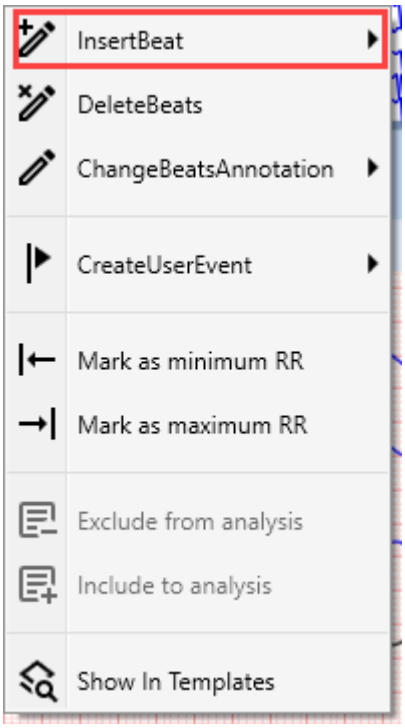
Figure 312. Strip View - Positioning Beat



- Hold Alt and click in the **Strip View**: A vertical dotted line will appear, 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 313. 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.

Note: You can modify how beat insertion works by turning ON the **Select Both Sample and Beat on Click** *(on page 26)* option in the **File > Settings** menu.

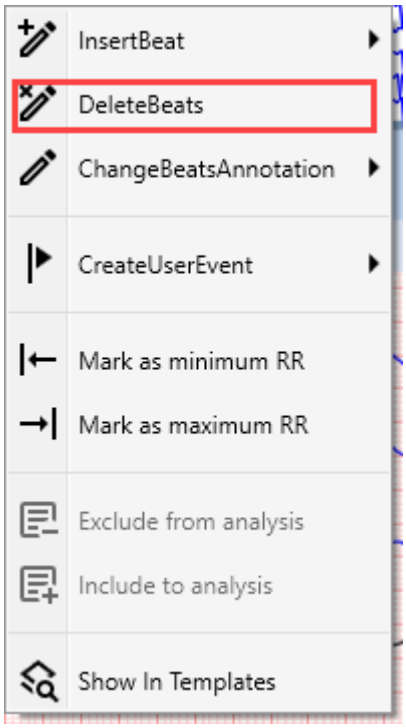
Delete Beats

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:**
            1.1. Identify the initial point in the range you wish to select.
            1.2. Click the initial point.
            1.3. Hold down the **Shift** key.
            1.4. Identify the final point in the range.
            1.5. **(Optional)** Scan the Strip View *(on page 152)* to locate the points of interest, if necessary.
            1.6. Click the final point to complete the range selection.
            1.7. Right-click the selected fragment to expand the context menu.
        - **Using Ctrl + Click:**
            1.1. Identify the initial point in the range you wish to select.
            1.2. Hold down the **Ctrl** key.
            1.3. Click the initial point.
            1.4. Identify the final point in your desired range.
            1.5. **(Optional)** Scan the Strip View *(on page 152)* to locate the points of interest, if necessary.
            1.6. Drag the cursor to the final point and release the mouse button to complete the selection.
            1.7. Right-click the selected fragment to expand the context menu.
        - **Using the right mouse button:**
            1.1. Click the **Strip View** and hold the right mouse button to designate the initial point in the range you wish to select.
            1.2. Drag the cursor to set the final point.
            1.3. **(Optional)** Scan the Strip View *(on page 152)* to locate the points of interest, if necessary.

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

Figure 314. Strip View - Delete Beats



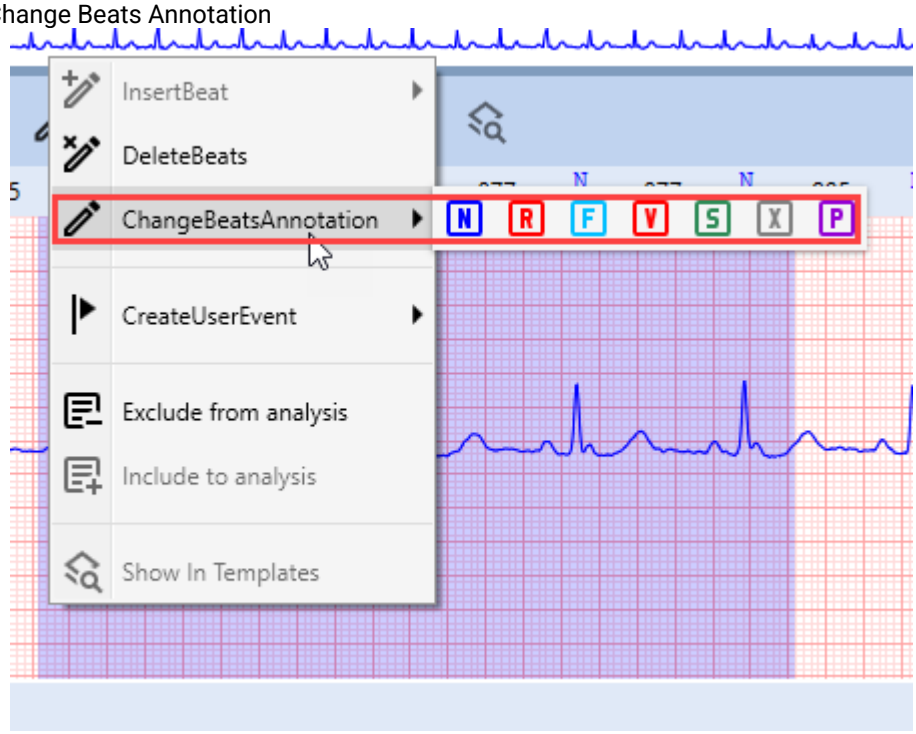
2. Click the **Delete Beats** option in the context menu. The system will automatically recalculate events and templates following the deletion.

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:** Click the first point, then hold **Shift** and click the end point. Scan the Strip View *(on page 152)* to locate the points of interest, if necessary.
        - **Using Ctrl + Click:** Hold **Ctrl**, click the start point, drag to the endpoint, and release. Scan the Strip View *(on page 152)* to locate the points of interest, if necessary.
        - **Using the right mouse button:** Right-click and drag to highlight the desired segment. Scan the Strip View *(on page 152)* to locate the points of interest, if necessary.
2. Hover over the **Change Beats Annotation** option in the context menu to expand the drop-down list.

Figure 315. 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	Button	Keyboard Keys
Classify as **Normal**	N	**N**
Classify as **R** on **T**	R	**R**
Classify as **Fusion**	F	**F**
Classify as **VPB**	V	**V**
Classify as **SVE**	S	**S**
Classify as **Questionable**	X	**X**
Classify **Paced**	P	**P**

Create User Event

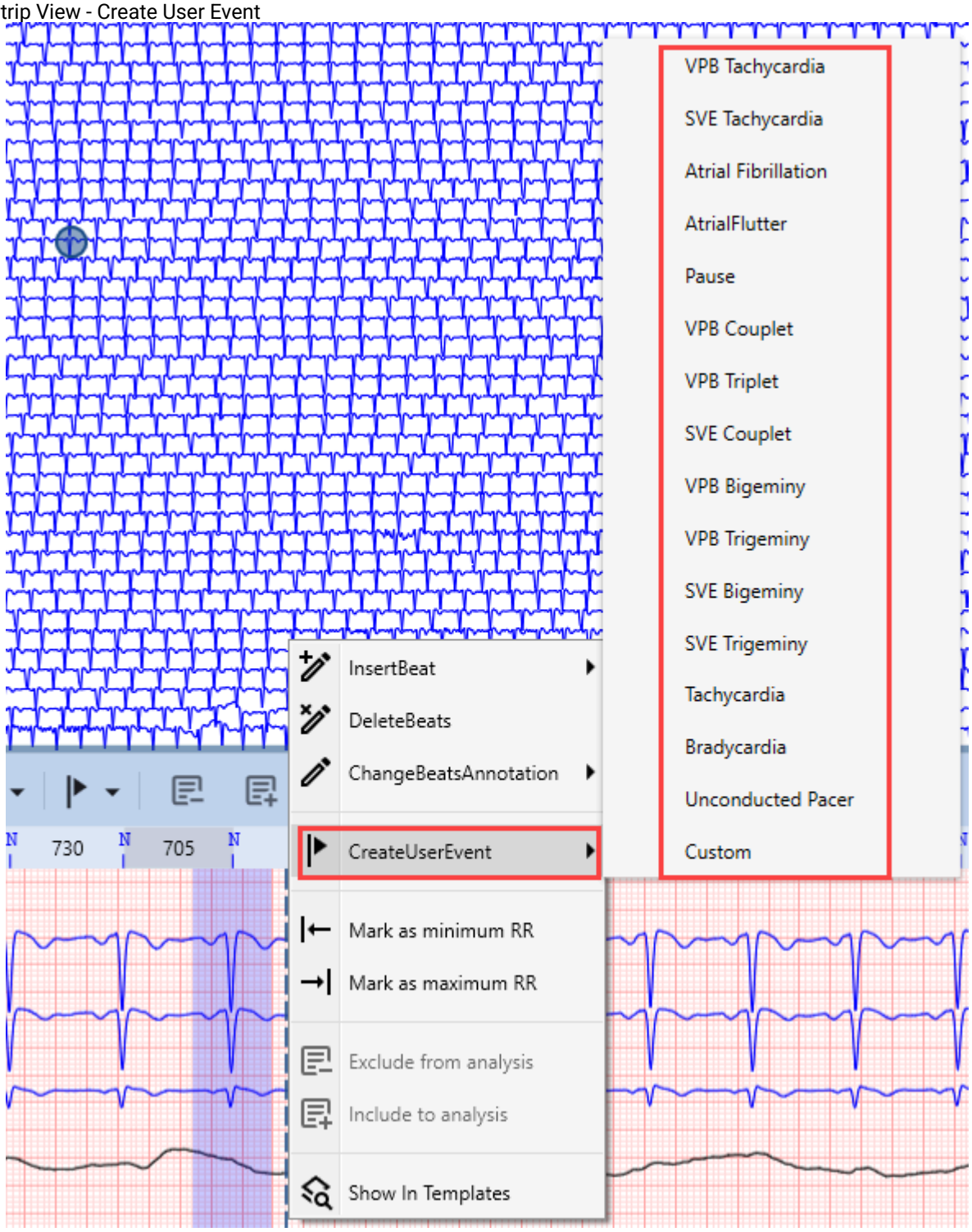
Allows you to create a new user event at the selected beat or ECG fragment. After adding a user event, the corresponding fragment of the ECG waveform will be recalculated, and some beats may shift between templates.

1. Select a fragment of the ECG that 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 waveform fragment using one of these methods:

- **Using Shift + Click:** Click the first point, then hold **Shift** and click the end point. Scan the Strip View *(on page 152)* to locate the points of interest, if necessary.
- **Using Ctrl + Click:** Hold **Ctrl**, click the start point, drag to the endpoint, and release. Scan the Strip View *(on page 152)* to locate the points of interest, if necessary.
- **Using the right mouse button:** Right-click and drag to highlight the desired segment. Scan the Strip View *(on page 152)* to locate the points of interest, if necessary.

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

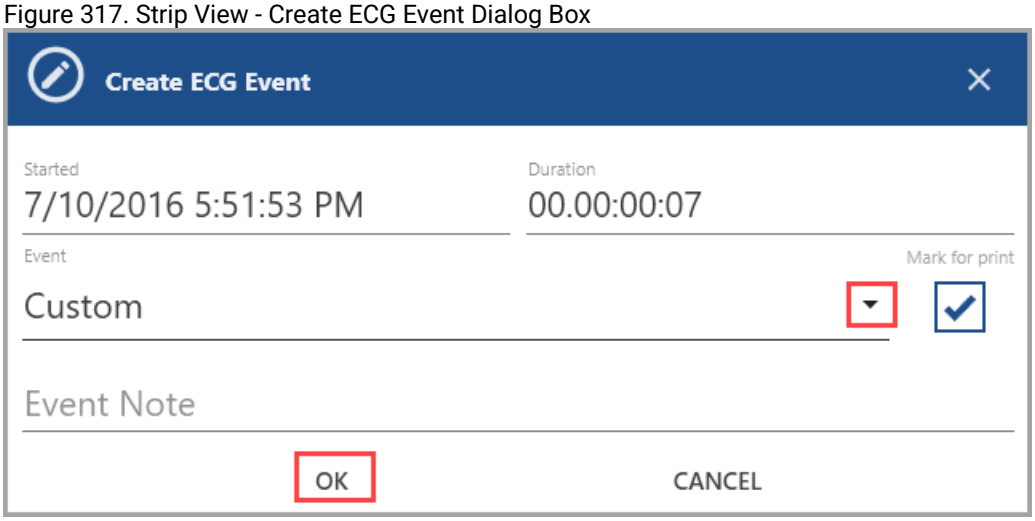
Figure 316. Strip View - Create User Event



3. Click the relevant type of **Event** you wish to assign to the selected ECG fragment.
4. Review the event details in the **Create ECG Event** dialog box:

- Re-select or confirm the event type using the drop-down menu.
- **(Optional)** Check or uncheck the **Mark for print** checkbox.
- **(Optional)** Enter a custom event note in the **Event Note** field.

Figure 317. Strip View - Create ECG Event Dialog Box



5. Click **OK** to confirm or **Cancel** to discard changes.

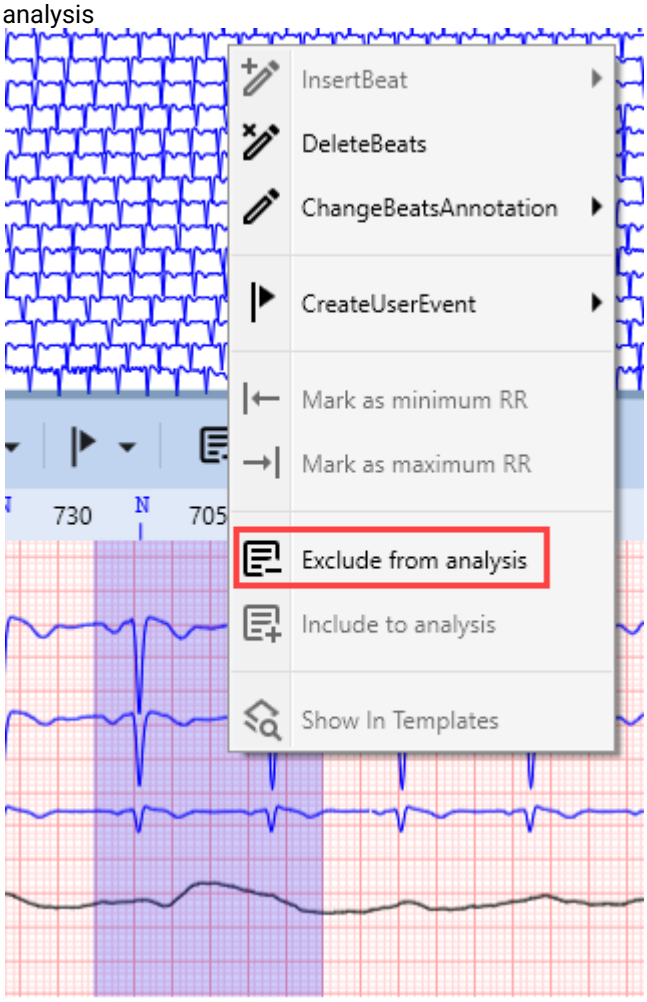
Exclude from analysis

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:** Click the first point, then hold **Shift** and click the end point. Scan the Strip View *(on page 152)* to locate the points of interest, if necessary.
   - **Using Ctrl + Click:** Hold **Ctrl**, click the start point, drag to the endpoint, and release. Scan the Strip View *(on page 152)* to locate the points of interest, if necessary.
   - **Using the right mouse button:** Right-click and drag to highlight the desired segment. Scan the Strip View *(on page 152)* to locate the points of interest, if necessary.

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

Figure 318. Strip View - Exclude from analysis

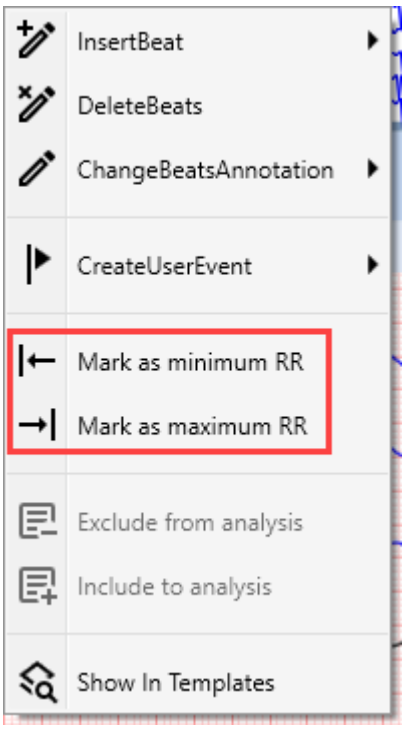


Mark as minimum/maximum RR

To mark as minimum RR or maximum RR:

1. Right-click at the desired point in the **Strip View** to open the **Context Menu**.
2. Click the corresponding **Mark as minimum RR** or **Mark as maximum RR** option.

Figure 319. Mark as minimum/maximum RR



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 320. Strip View - Include to analysis Overlap Condition

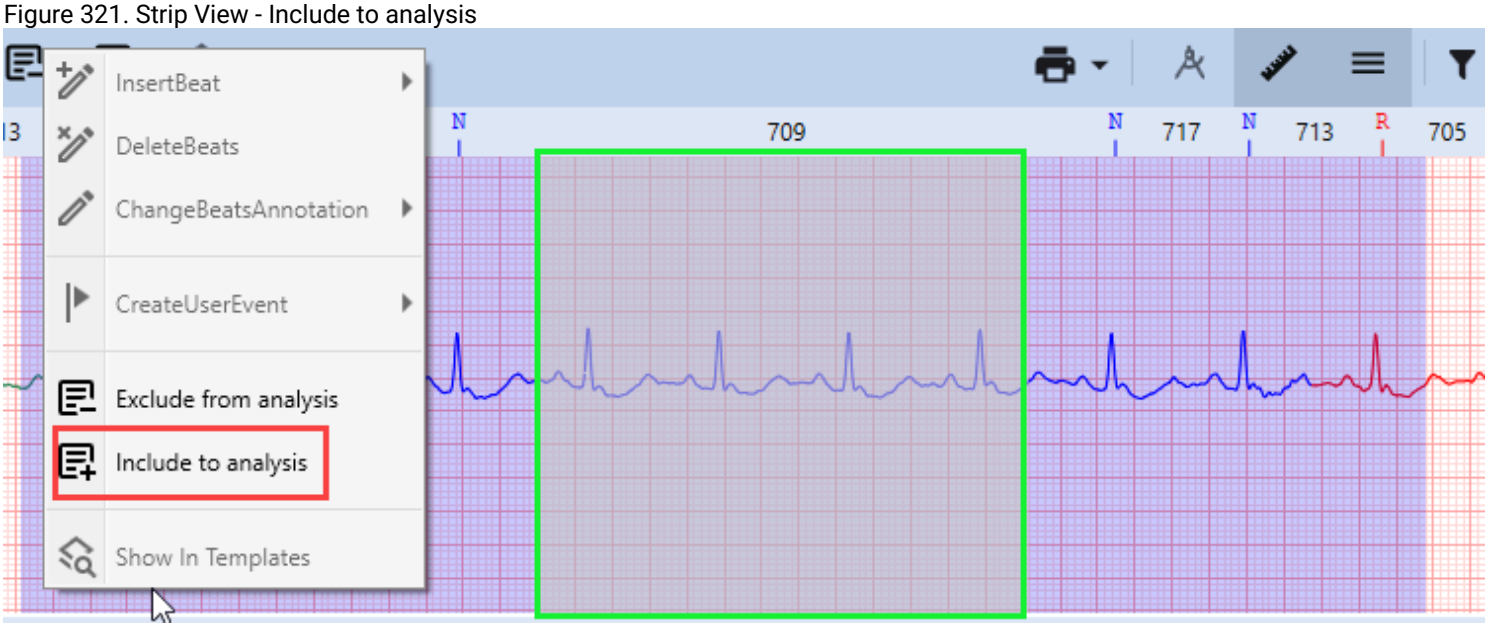


2.1. Select a fragment of the ECG you want to re-include in analysis, using one of the following methods:

- **Using Shift + Click:**
- **Using Shift + Click:** Click the first point, then hold **Shift** and click the end point. Scan the Strip View *(on page 152)* to locate the points of interest, if necessary.
- **Using Ctrl + Click:** Hold **Ctrl**, click the start point, drag to the endpoint, and release. Scan the Strip View *(on page 152)* to locate the points of interest, if necessary.
- **Using the right mouse button:** Right-click and drag to highlight the desired segment. Scan the Strip View *(on page 152)* to locate the points of interest, if necessary.

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

Figure 321. Strip View - Include to analysis



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**.

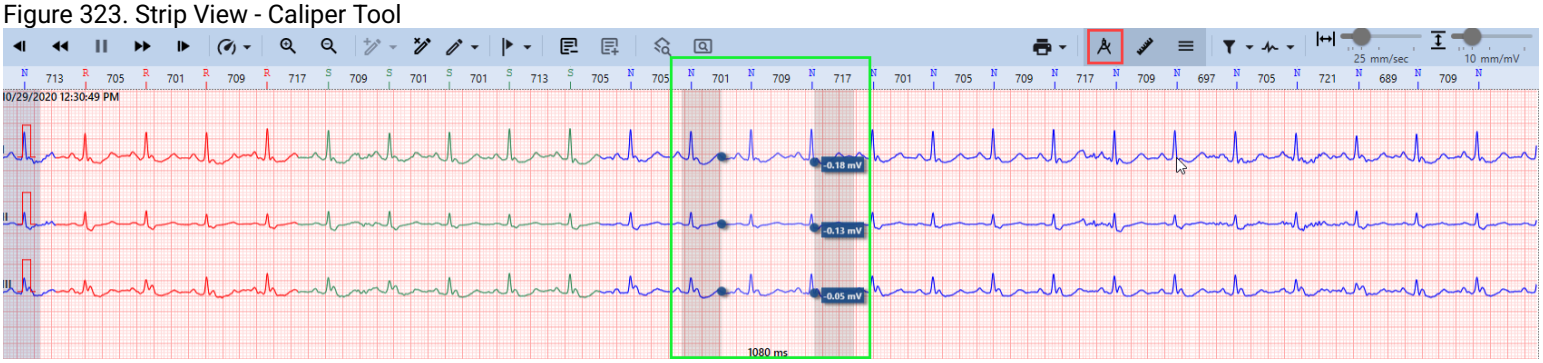
Figure 322. Strip View - Show In Templates



4.6.6.3.3. 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 323. Strip View - Caliper Tool



Caliper Design Overview

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

Figure 324. 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 325. Strip View - Interval Length and Amplitude Difference



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

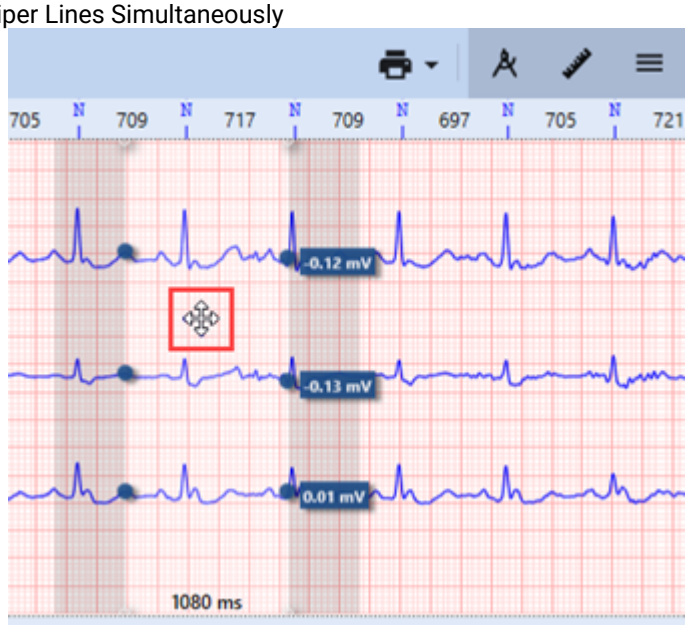
Moving Caliper Lines

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 326. 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 327. Strip View - Moving Caliper Lines Independently

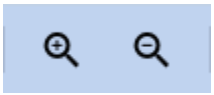


2. Click to select the measurement line.
3. Drag and drop it to the new location.

Zoom Feature

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

Figure 328. Strip View - Zooming Options



- Click the corresponding button in the **Strip View Toolbar**.
- 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 329. Strip View - Caliper Snapping



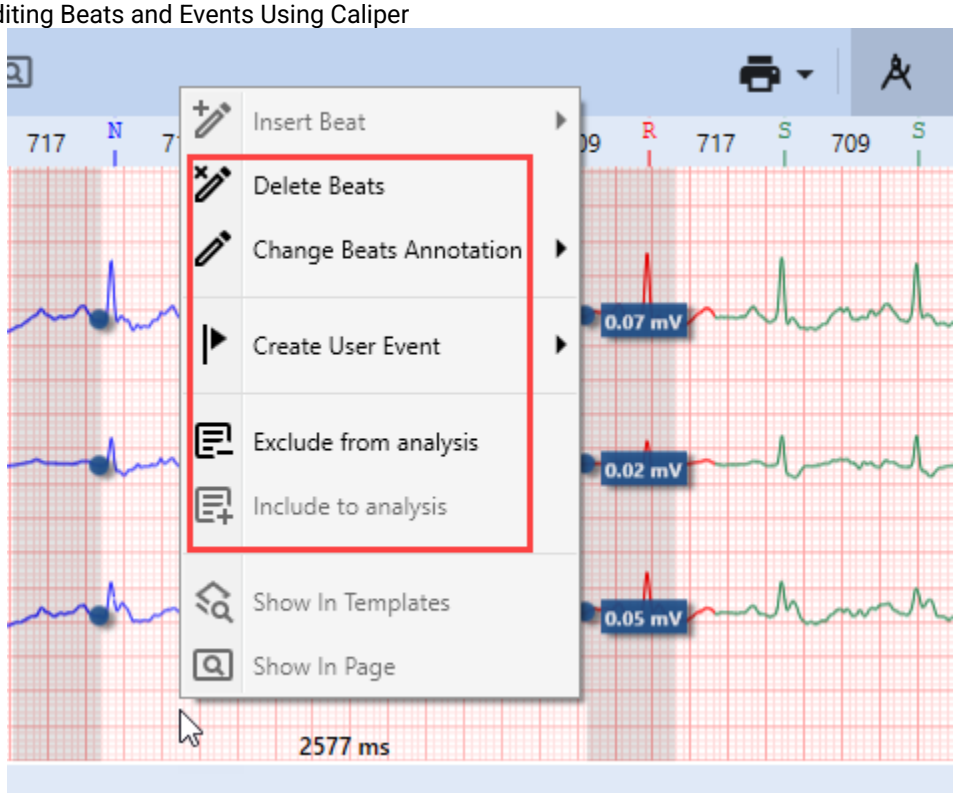
- To snap any line:
  - 3.1. Hold down the **Alt** key.
  - 3.2. Position the cursor near one of the measurement lines until the cursor icon changes to a resize cursor.
  - 3.3. Click the measurement line to select it.
  - 3.4. Drag and drop it to the desired location.
- To snap the right measurement line:
  - 3.1. Hold down the **Right Alt** key.
  - 3.2. 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:
  - 3.1. Hold down the **Left Alt** key.
  - 3.2. 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 330. 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 176)* 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.

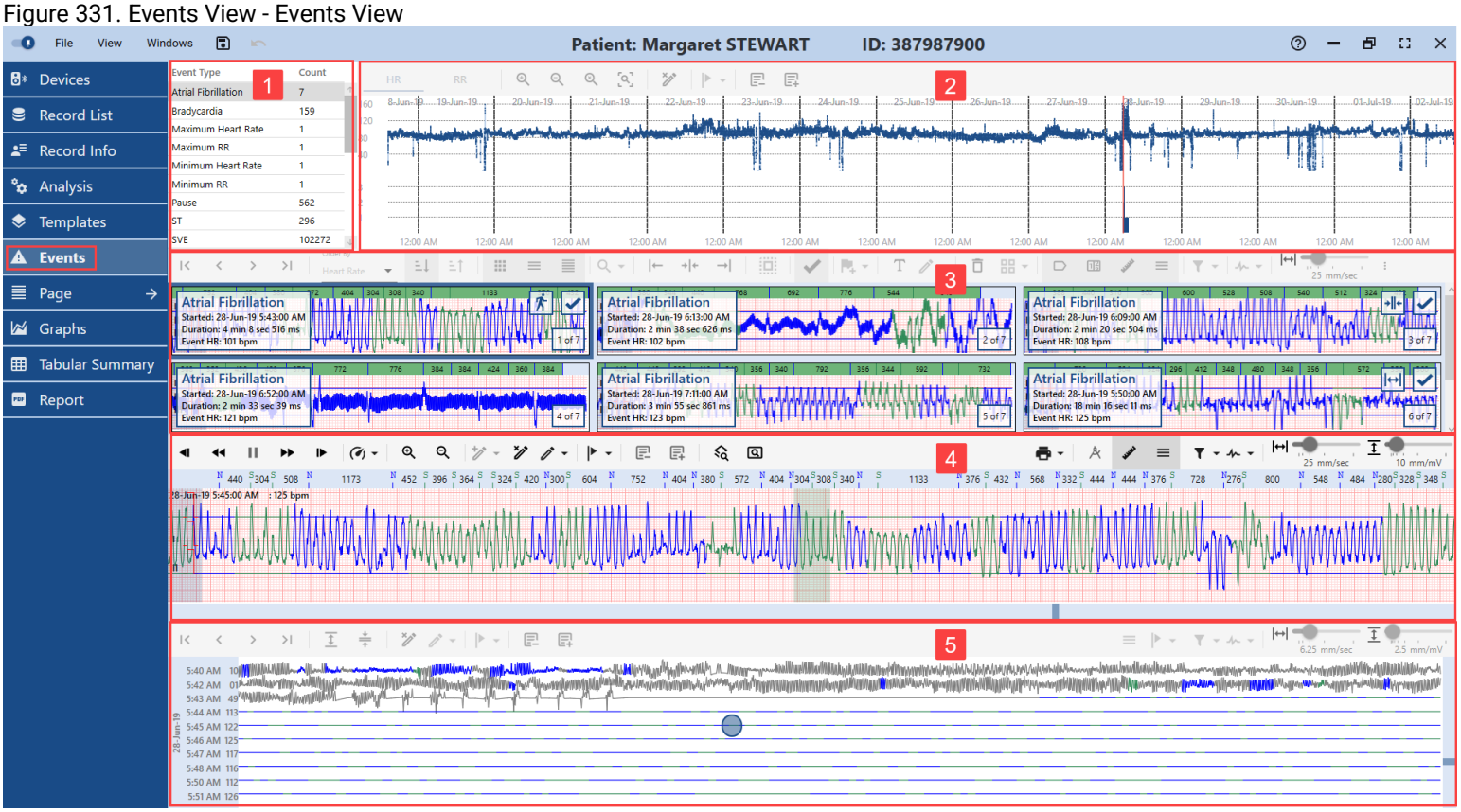
4.6.7. Events

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**. Use the **Events Overview Panel** to assess, modify, and delete these events. For rapid identification of **HR/RR Trends**, refer to the designated section. Additionally, you can obtain more in-depth information via the **Strip View** and **Page View**, which are 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 331. Events View - Events View



4.6.7.1. Events List

The **Events List** displays various arrhythmia events identified during the analysis of the **Recording**. By clicking 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 332. 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 (2)**, **Events Overview Panel (3)**, **Strip View (4)**, and **Page View (5)** tools and capabilities.

Figure 333. Events View - Assessment Tools



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

Figure 334. 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 left column contains clickable names of different arrhythmia types.
2. **Count:** The right 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.

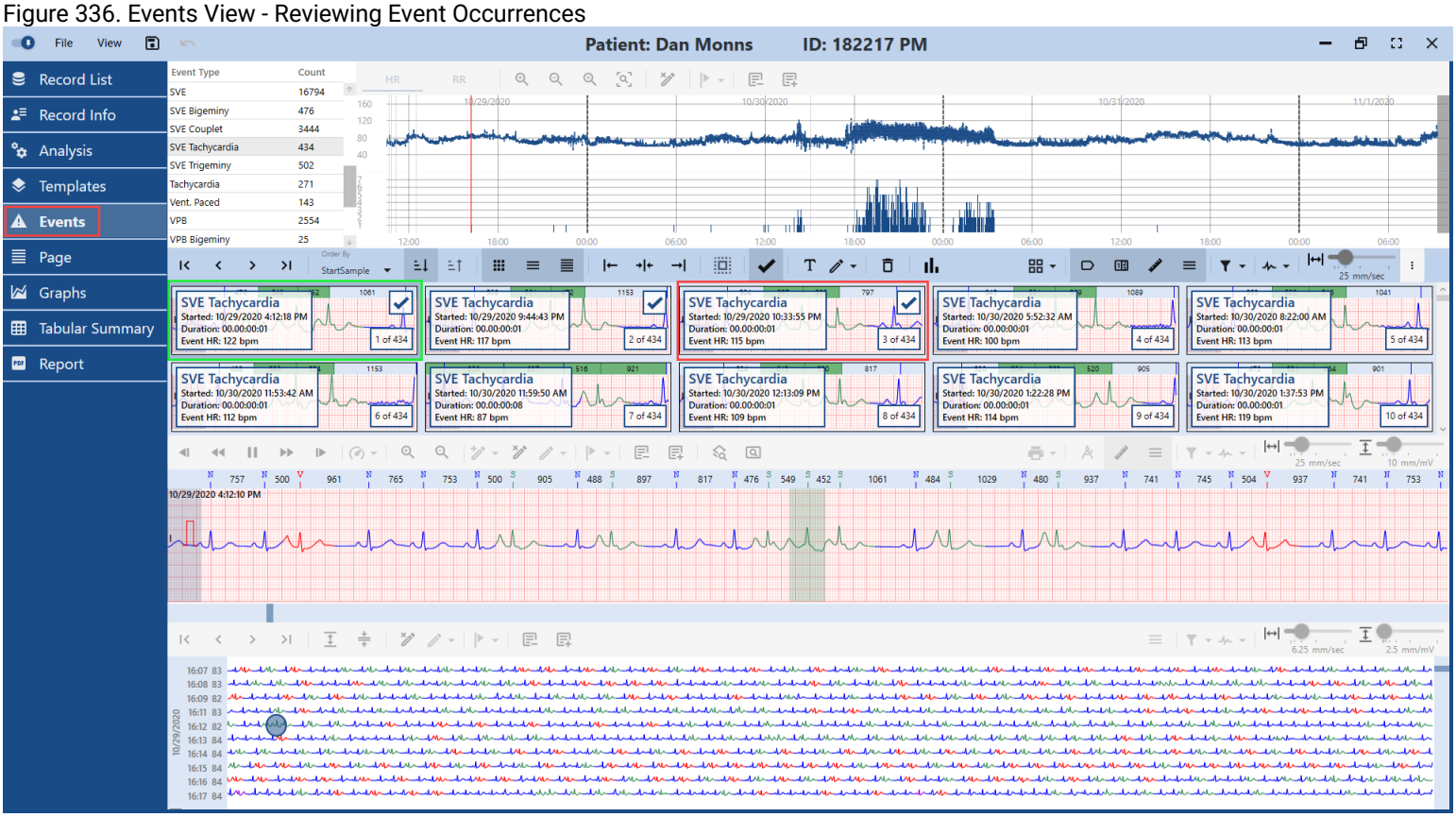
Upon clicking a specific arrhythmia type, the first occurrence of this event is automatically highlighted in the **HR/RR Trends View**, **Events Overview Panel**, **Strip View**, and **Page View**.

Figure 335. Events View - Event Highlighting



After selecting a particular arrhythmia type, to review additional occurrences:

Figure 336. 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 185)*, please refer to its respective section.

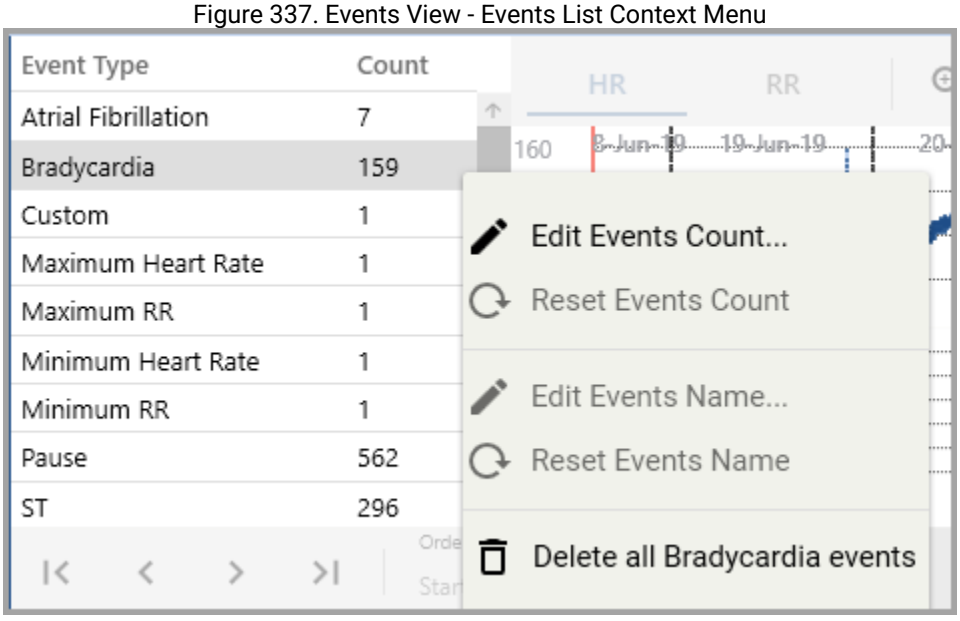
Adjusting Events Count and Events Name

You can manually adjust the count for any event type in the **Events List** by accessing the context menu. This feature allows you to correct or override the automatically detected event count for your specific needs.

To open the context menu:

1. Right-click on any row in the **Events List**.
2. A pop-up menu will appear.

Figure 337. Events View - Events List Context Menu



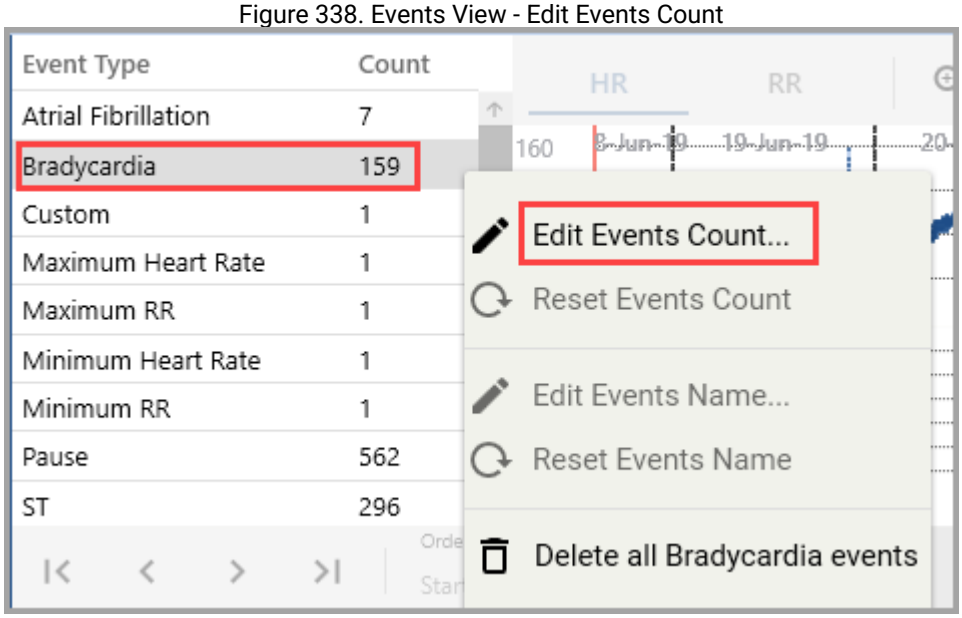
The menu includes the following options:

- **Edit Events Count** – Opens a dialog box where you can manually modify the number of occurrences for the selected event type.
- **Reset Events Count** – Restores the original count detected during automatic analysis.
- **Edit Events Name** - Opens a dialog box allowing you to rename a selected **Custom** event type. This option is only available for **Custom** events.
- **Reset Events Name** - Reverts the name of a **Custom** event to its original label.
- **Delete all [Event Type] events** – Deletes all occurrences of the selected event type from the **Events List**.

To change the event count:

1. Right-click on a row in the **Events List** to open the context menu.
2. Click the **Edit Events Count** option. The **Edit Events Count** window will appear.

Figure 338. Events View - Edit Events Count



3. In the **Events Count** field:
   - Use the up/down arrow buttons on the right to increase or decrease the count.
   - Alternatively, use the **arrow keys** on your keyboard.

Figure 339. Events View - Edit Events Count Window



4. Click **OK** to apply the changes. The modified count will be reflected in the **Count** column of the **Events List** and in the automatically generated conclusion of the **Report**.

Note: When the count for an event type is modified manually, its row in the **Events List** is recolored and displayed in ***bold italics*** for clear identification.

Figure 340. Events View - Edited Events

Event Type	Count
ST1	4
SVE	46
SVE Couplet	7
SVE Trigeminy	1
Tachycardia	34
VPB	***24***
Total	**316**
Checked	**28**

Note: The **Total** and **Checked** counters at the bottom of the **Events List** are not affected by manual changes to event counts.

Note: Manually modified **Events Count** affects only the **Events List** and the automatically generated conclusion of the **Report**. It changes the count of relevant events in both cases, but does not impact other elements of the analysis.

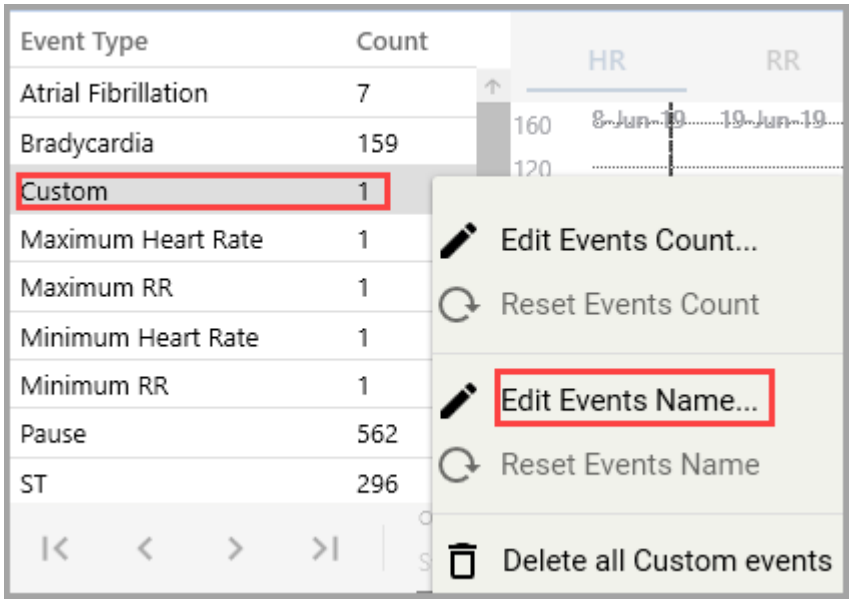
To change the **Custom** event name:

4.1. Locate the **Custom** event in the **Events List**.

4.2. Right-click the row labeled **Custom** to open the context menu.

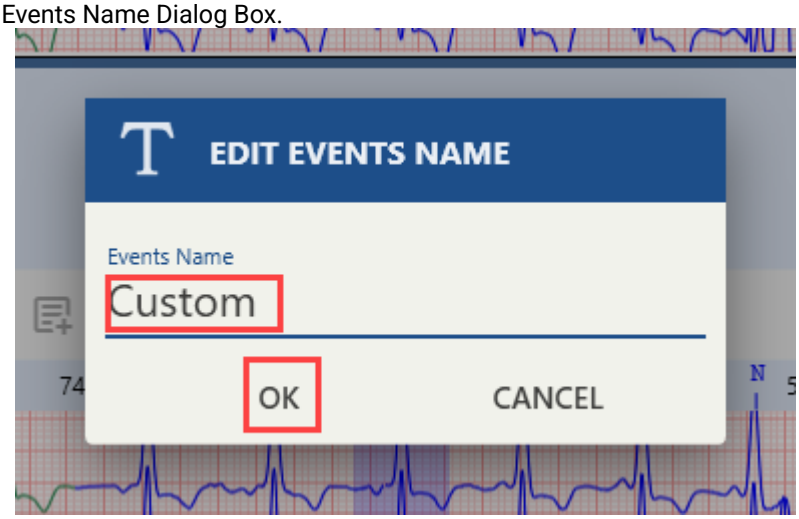
4.3. Click **Edit Events Name**.

Figure 341. Events View - Edit Events Name



4.4. In the **Edit Events Name** dialog box, type the new name in the **Events Name** field.

Figure 342. Events View - Edit Events Name Dialog Box.

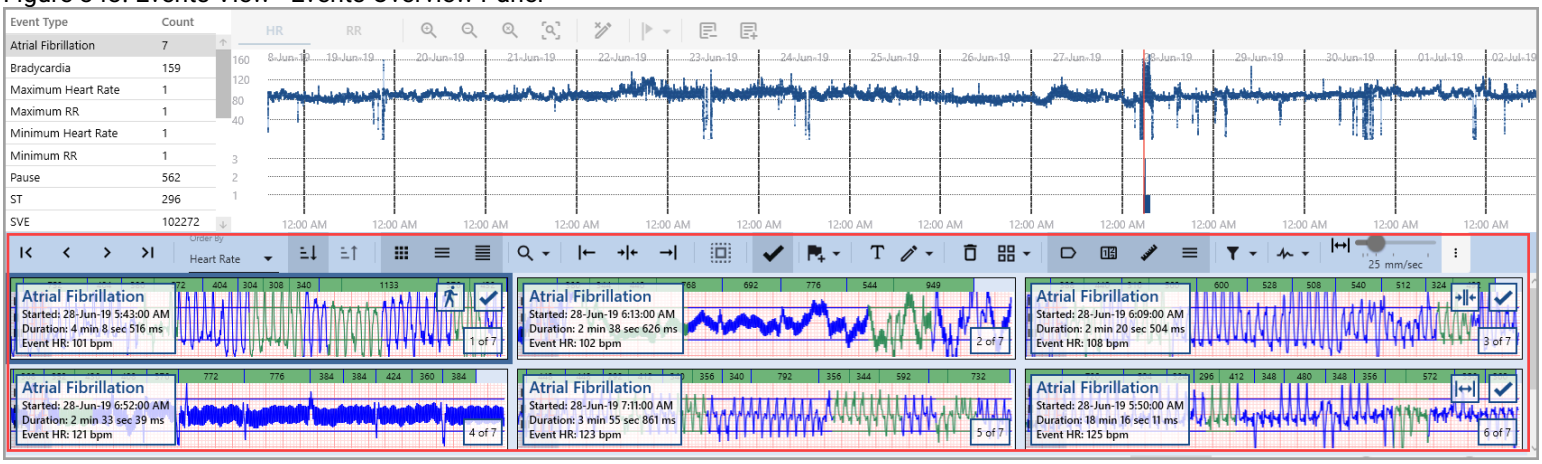


4.5. Click **OK** to apply the new name. Click **Cancel** to discard changes.

4.6.7.2. Events Overview Panel

The **Events Overview Panel** serves as the primary workspace within the **Events View**, supplemented by the **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, searching, deleting, identifying, and marking specific events for the final report.

Figure 343. Events View - Events Overview Panel



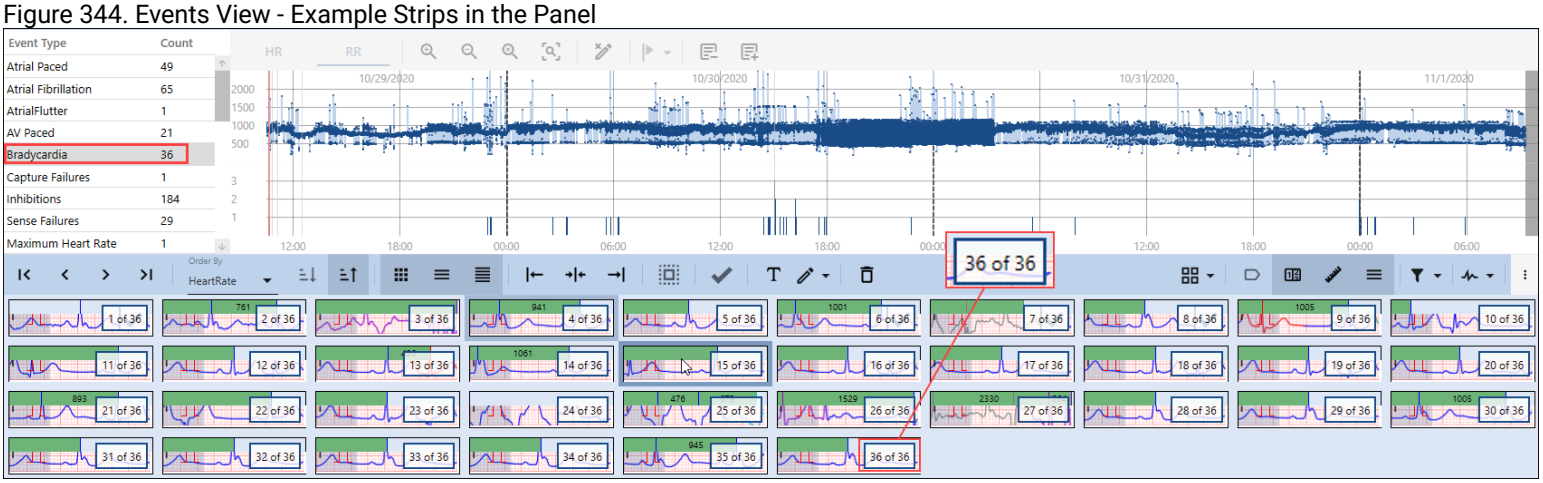
When clicking on any event type in the **Events List**, the **Events Overview Panel** populates with **Example Strips** corresponding to the selected arrhythmia type. Concurrently, the **HR/RR Trends View**, **Strip View**, and **Page View** adjust their displays. By default, the system will automatically 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 344. 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 345. 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**.

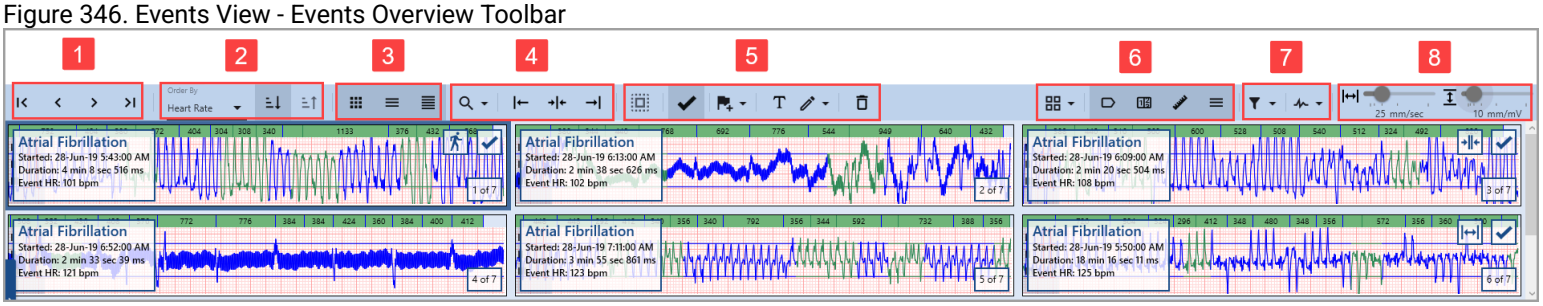
In the accompanying image, the total number of **Example Strips** for Maximum HR is indicated as 316,254. Notably, there are at least two strips displaying a Heart Rate of 125 bpm, among others with Maximum HR values of 124 bpm.

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.

4.6.7.2.1. Events Overview Toolbar

The toolbar at the top of the **Events Overview Panel** contains various controls that facilitate 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 346. 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 are 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 347. Events View - Navigation within Events Overview Panel

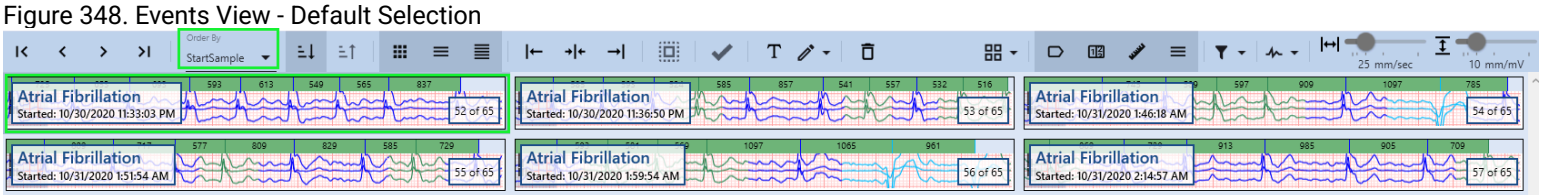


Note: To navigate between **Example Strips** within the **Events Overview Panel**, you can also use the built-in scrollbar on the right side and select **Example Strips** by clicking on them.

Icon	Description
	**First Event button:** Click to jump to the first **Example Strip** of the selected **Event** type within the **Events Overview Panel**.
	**Previous Event button:** Click to navigate to the previous **Example Strip** of the selected **Event** type.
	**Next Event button:** Click to navigate to the next **Example Strip** of the selected **Event** type.
	**Last Event button:** Click to jump to the last **Example Strip** of the selected **Event Type** within the **Events Overview Panel**.

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 348. 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 349. Events View - Sorting Controls



To adjust the sorting:

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

Figure 350. Events View - Order by Sorting

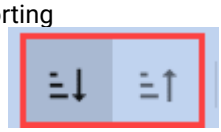


2. Select your preferred sorting type. The order of the **Example Strips** in the **Events Overview Panel** will update immediately.

To toggle the sorting order:

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

Figure 351. Events View - 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 352. 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
	**Events Overview Panel toggle:** Click to turn **ON/OFF** the **Events Overview Panel** within the **Events View**. Both **Strip View** and **Page View** will resize automatically.
	**Strip View toggle:** Click to turn **ON/OFF** the **Strip View**. Both **Events Overview Panel** and **Page View** will adjust automatically.
	**Page View toggle:** Click to turn **ON/OFF** the **Page View**. Both **Strip View** and **Events Overview Panel** will adjust automatically.

Figure 353. Events View - Events Overview Panel ON



Figure 354. Events View - Page View OFF



Figure 355. Events View - Events Overview Panel OFF



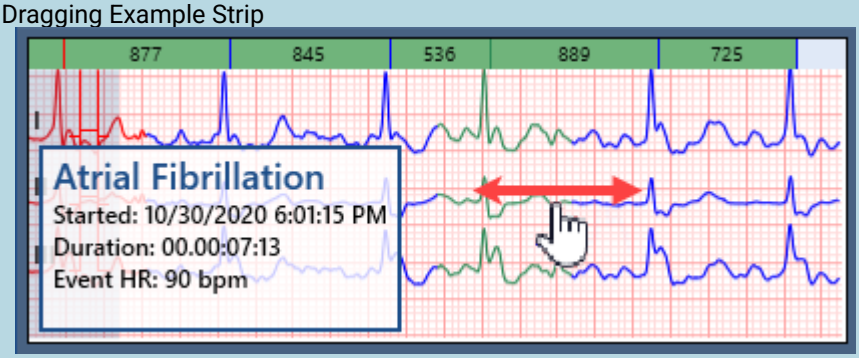
Example Strip Navigation Controls

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. In addition, the Find button allows you to locate **Example Strips** that are marked as **Checked** or flagged as **Fastest**, **Slowest**, **Shortest**, or **Longest**.

Icon	Description
	Find button: Click to open the **Find** list, then select **Checked**, **Fastest**, **Slowest**, **Shortest**, or **Longest** to locate the corresponding **Example Strip**.
	Align Event Left button: Click to align the selected **Example Strip(s)** to the left.
	Center Event button: Click to center the selected **Example Strip(s**).
	Align Event Right button: Click to align the selected **Example Strip(s)** to the right.

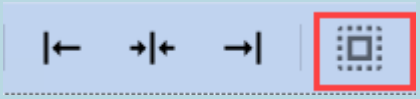
Note:
You may also drag the strip left or right within this window to shift its position.

Figure 356. Events View - Dragging Example Strip



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.

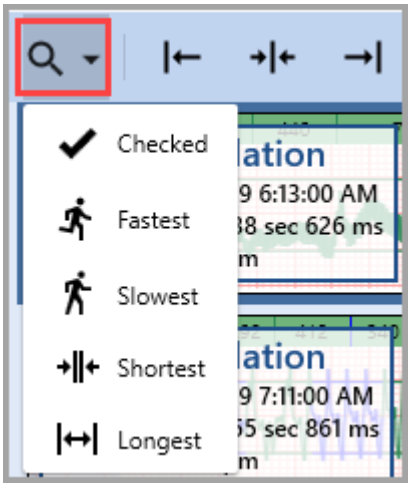
Figure 357. Events View - Selecting All Strips



To find a marked Example Strip:

1. Click the **Find** button drop-down.

Figure 358. Events View - Find Button



2. Select **Checked**, **Fastest**, **Slowest**, **Shortest**, or **Longest**.
3. The application locates the corresponding **Example Strip** and updates the related views.

Note: If you click the **Checked** option in the **Find** drop-down list multiple times, the software advances to the next checked **Example Strip** each time you click it.

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 provides the main event modification features within the **Events Overview Toolbar**.

Figure 359. Events View - Events Editing Controls



Icon	Description
	Select All button: Click to select all **Example Strips** currently displayed within the **Events Overview Panel**. Click again to deselect all **Example Strips**. Alternatively, you can use the Ctrl + A keyboard shortcut. The **Select All** button enables bulk operations with **Example Strips** of the selected **Event** type. Features such as **Set as Checked**, **Modify Event**, **Edit Label**, **Delete Selected Events**, and **Align Events** *(on page 190)* can be applied to all strips of the selected **Event** type in one action.
	Set as checked button: Click to mark **Example Strip(s)** that you want to include in the final **Report** (**excluding Maximum/Minimum HR and Maximum/Minimum RR events**). By default, if you don't mark any strips manually, the first three **Example Strips** will be included in the **Report** for all **Event** types, excluding **Maximum/Minimum HR** and **Maximum/Minimum RR** events.
	Set Extreme Event button: Hover over it to open the pop-up menu and mark the selected **Example Strip** as **Fastest**, **Slowest**, **Shortest**, or **Longest**. Note that only certain types of events can be marked as **Fastest**, **Slowest**, **Shortest**, or **Longest**.
	Set as selected button: Click to select **one Maximum/Minimum HR** event and **one Maximum/Minimum RR** event **Example Strip** for inclusion in the final **Report**.
Icon	**Description**
	For these types of events, the **Set as checked** button is replaced by the **Set as Selected** button. This change indicates that you can only select a single event of these types for the **Report**.

Icon	Description
	For these types of events, the **Set as checked** button is replaced by the **Set as Selected** button. This change indicates that you can only select a single event of these types for the **Report**. For **Maximum/Minimum HR** and **Maximum/Minimum RR** events, the software automatically selects only one **Example Strip**. Use this button to select a different **Example Strip** if required.
	**Edit Label button:** Click to add or edit a note associated with the selected **Example Strip(s)**. Notes may be used for various purposes, such as documenting clinical context, identifying specific findings, and communicating these to other clinicians. Keep in mind that the note length is constrained by the **Example Strips** visualization parameters in the final **Report**. Refer to the example below *(on page 194)* for more details.
	**Modify Event button:** Hover over it to reclassify (change the annotation) the selected **Example Strip(s)**. Changes will be reflected in the **Count** column of the **Events List** for affected **Event types**. Keep in mind that the contents of the **Modify Event** drop-down list vary depending on the types of **Events** you select in the **Events List**.
	**Delete Selected Events button:** Click to delete selected **Example Strips** of the chosen **Event** type from the **Events List**. Changes will be reflected in the Count column of the **Events List** for the affected **Event** type.

To set Example Strips as checked:

1. Select the **Example Strip(s)** of the chosen **Event** type that you want 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 use the Ctrl + A keyboard shortcut to select all strips.
2. **(Optional)** Scroll to review the strips you want to mark. The **Events Overview Panel** can display multiple events of the same type, including thousands.
3. Click the **Set as checked** button. A check 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, including 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 mark an Example Strip as an Extreme Event:

1. Click the **Example Strip** you want to mark.
2. Hover over the **Set Extreme Event** button to open the pop-up menu.

Figure 360. Events View - Set Extreme Event Menu



3. Click the required option: **Fastest**, **Slowest**, **Shortest**, or **Longest**. A corresponding icon will appear in the upper-right corner of the selected **Example Strip**.

Note: Only certain event types can be marked as **Fastest**, **Slowest**, **Shortest**, or **Longest**.

Event Type	Fastest	Slowest	Longest	Shortest
Atrial Fibrillation	+	+	+	+
Bradycardia		+	+	
Custom User Event	+	+	+	+
Pause			+	
ST			+	
SVE Bigeminy			+	
SVE Tachycardia	+		+	
SVE Trigeminy			+	
Tachycardia	+		+	
VPB Bigeminy			+	
VPB Fibrillation	+		+	
VPB Flutter	+		+	
VPB Tachycardia	+		+	
VPB Trigeminy			+	

To add or edit a note:

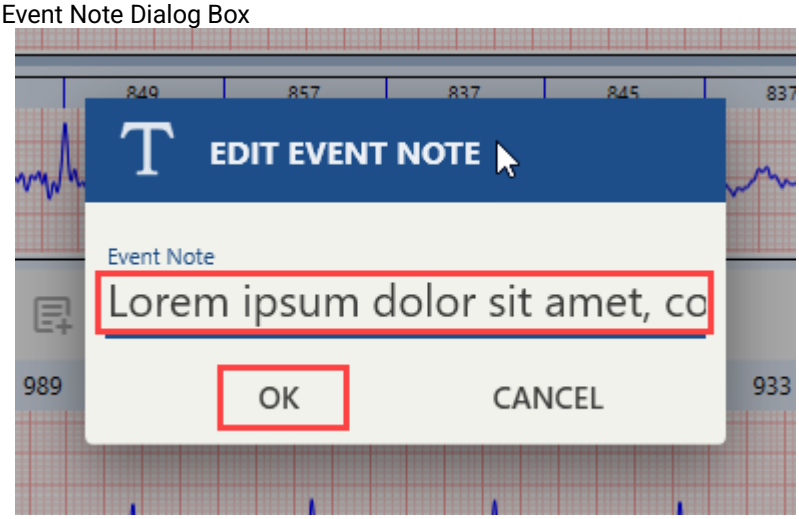
3.1. Select the **Example Strip(s)** of the chosen **Event** type that you want to include in the **Report**:

- 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 use the Ctrl + A keyboard shortcut to select all strips.

3.2. **(Optional)** Scroll to review the strips. The **Events Overview Panel** can display multiple events of the same type, including thousands.

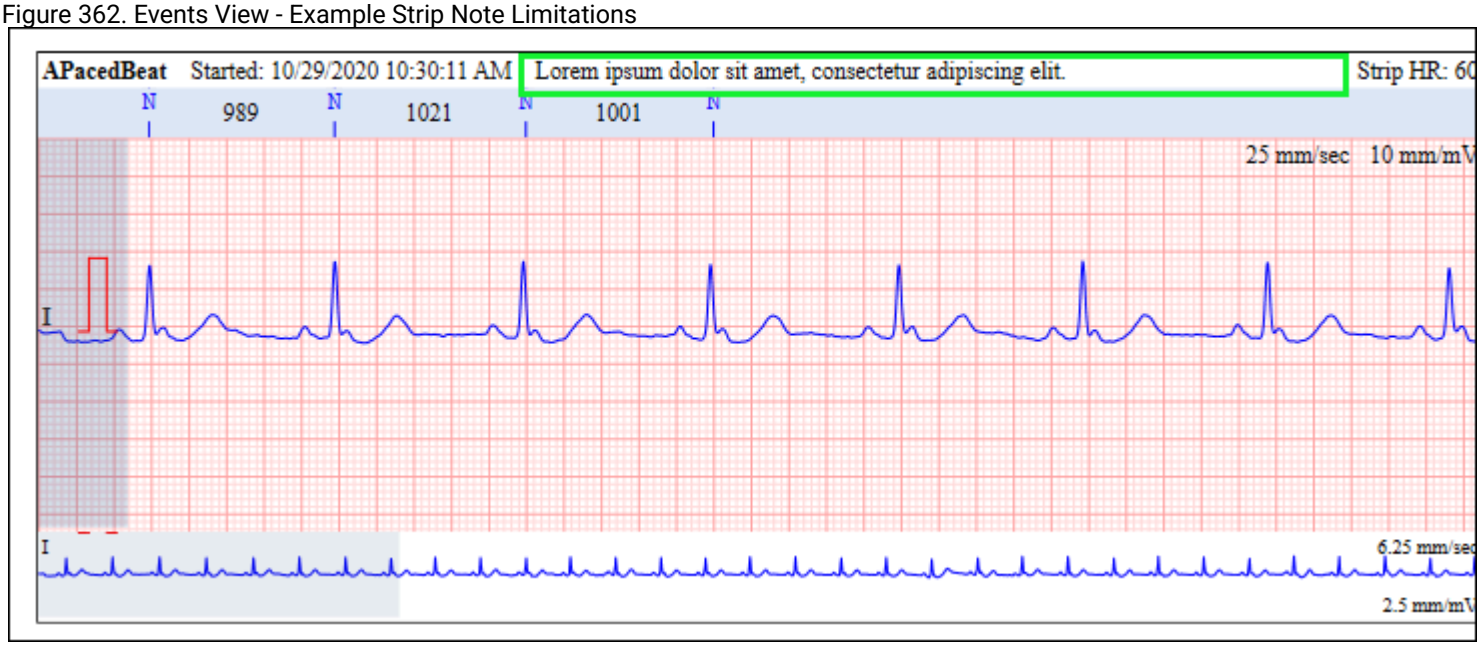
3.3. Click the **Edit Label** button to open the **EDIT EVENT NOTE** dialog box. Alternatively, double-click on a single **Example Strip** to open the dialog box.

Figure 361. Events View - Edit Event Note Dialog Box



3.4. 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 a longer 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 362. Events View - Example Strip Note Limitations



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

To modify Event(s):

3.1. Select the **Example Strip(s)** of the chosen **Event type** that 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 use the Ctrl + A keyboard shortcut to select all strips.

3.2. **(Optional)** Scroll to review and select all the strips that you want to modify. The **Events Overview Panel** can display multiple events of the same type, including thousands.

3.3. Hover over the **Modify Event** button to expand the drop-down menu.

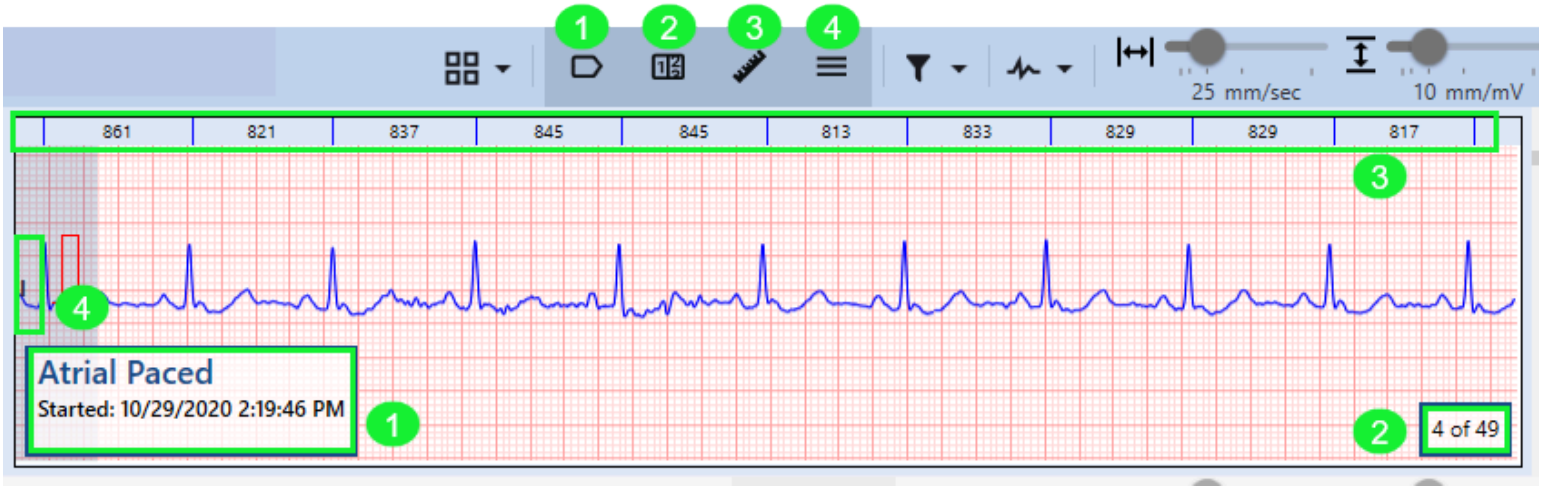
3.4. Choose a new **Event** type for the selected **Example Strips**. The values in the **Count** column of the **Events List** will change accordingly for the **Event** types affected by the action.

Note: 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 363. Events View - Example Strips Layout Controls Scheme



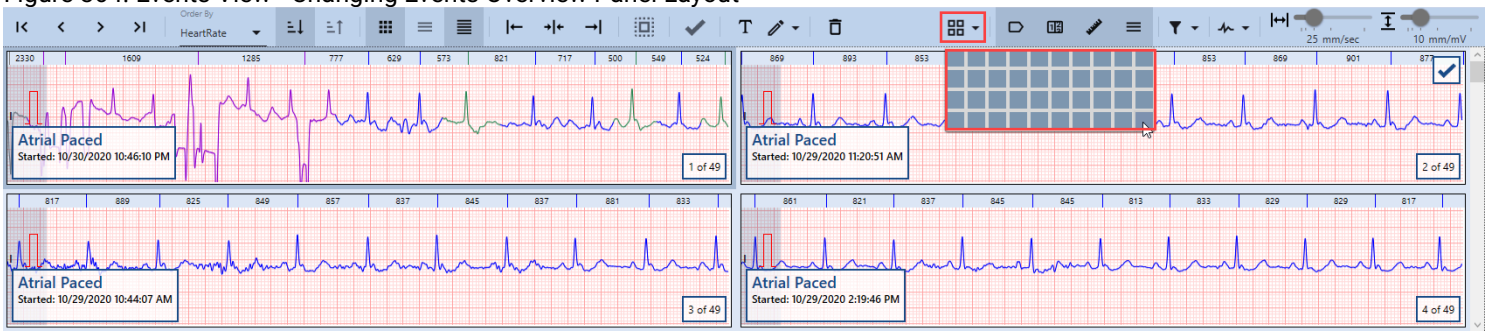
Icon	Description
	Example Strips Layout button: Determines the number of **Example Strips** displayed per row and the number of rows within the **Events Overview Panel**, with options ranging from 1 to 40 strips.
	Example Strips Text Box toggle: Click to toggle **ON/OFF** a text box in the bottom left corner of the **Example Strip**. This box contains **Event** type, **Event** time stamp, and other basic data about each **Event** occurrence. When adding a note *(on page 194)* to an **Example Strip** via the **Edit Label** button, the note appears at the bottom of this text box.
	Example Strips Numerating Box toggle: Click to toggle **ON/OFF** a text box located in the bottom right corner of the **Example Strip**. This box displays a sequential count of the **Example Strip** as it was chronologically identified by the software and the total number of **Events** of the same type.
	ECG Ruler toggle: Click to toggle **ON/OFF** the **ECG Ruler** at the top of each **Example Strip**, which shows the duration of RR intervals for adjacent beats within the **Event**.
	Channel Numeration toggle: Click to toggle **ON/OFF** channel numeration on the left side of the **Example Strip**.

To change the Example Strips layout:

3.1. Hover over the **Example Strips Layout** button to expand the drop-down menu.

3.2. 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 364. Events View - Changing Events Overview Panel Layout



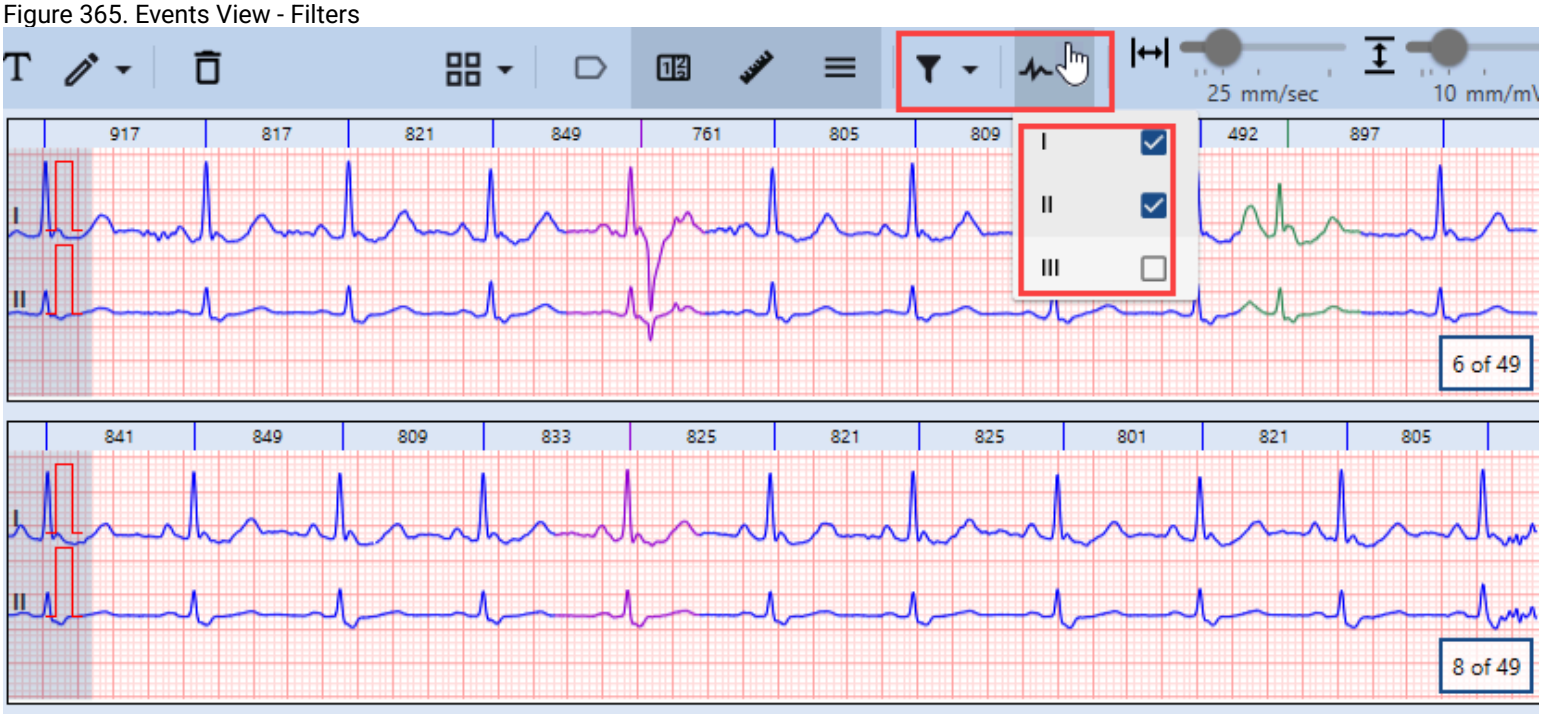
3.3. Click on the preferred cell icon in the dropdown menu to apply the layout changes.

Note: If you wish to display numerous **Example Strips** within the **Events Overview Panel**, consider toggling OFF Strip View and Page View *(on page 188)* 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 365. Events View - Filters



Icon	Description
	**Filter**: Enables toggling of visualization **ON/OFF** with the applied **EMG**, **Base Line**, and **Mains** filters. To accomplish this, check or uncheck any number of checkboxes in the drop-down list.
	**Channels**: Allows toggling of **ECG Record Channels** display in **Example Strips ON/OFF**. 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 366. 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.

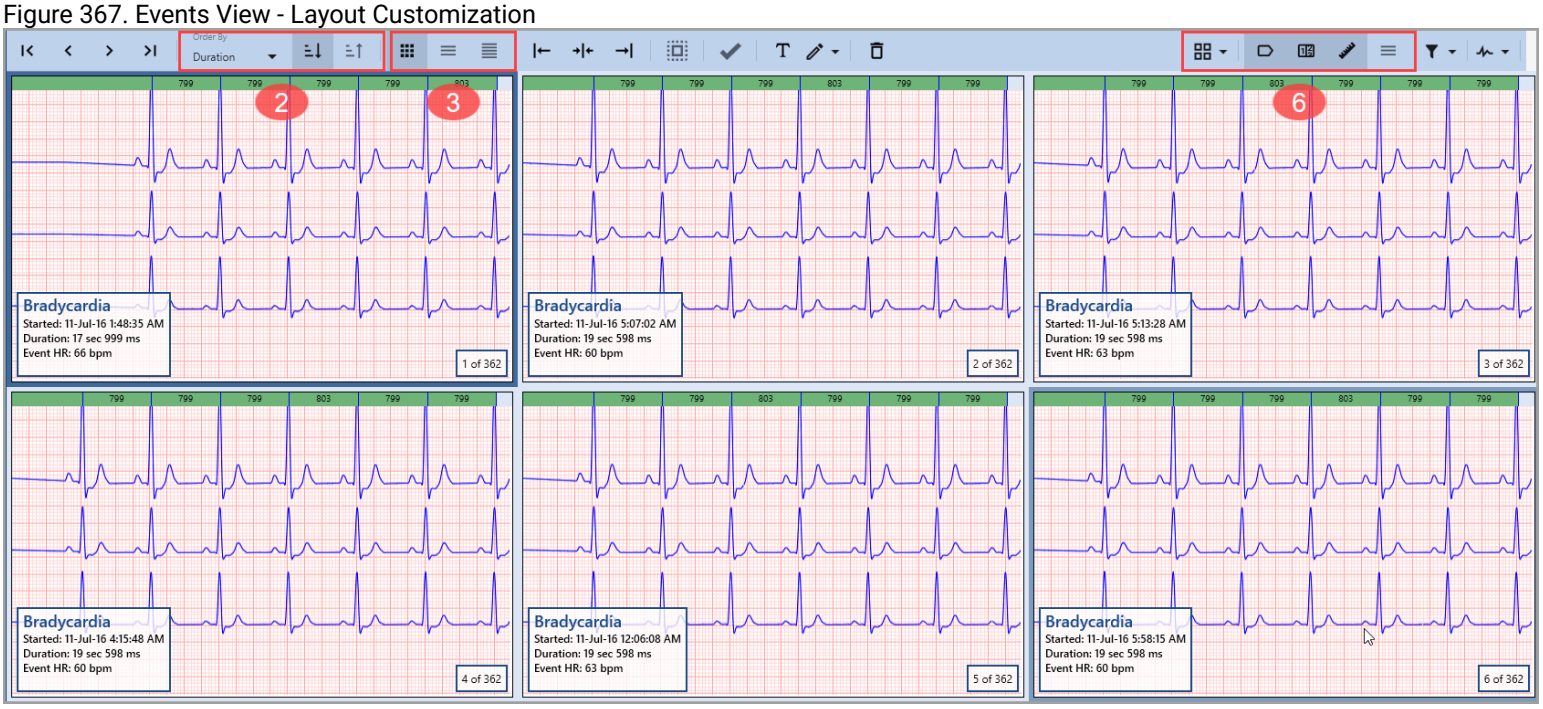
Events View Layout Customization

You can save the **Events View** layout settings for each event type in the NH-301 analysis system. This means that any layout customizations you make for a specific event type using the **Events Overview Toolbar** elements will be automatically applied across all records, not limited to a specific patient's record.

Use the following groups of elements from the **Events Overview Toolbar** to customize the **Events View** layout:

- **Sorting Controls (2)**: Specify the order in which events are displayed.
- **Events View Layout Controls (3)**: Manage the visibility of panels such as the **Events Overview Panel**, **Strip View**, and **Page View**.
- **Example Strip Layout Controls (6)**: Define the configuration of example strips, including the number of strips, their layout, and additional details such as text or numbering.

Figure 367. Events View - Layout Customization



Example

Suppose you are customizing the layout for **Bradycardia** events in **Patient A's** record. You may set the following parameters:

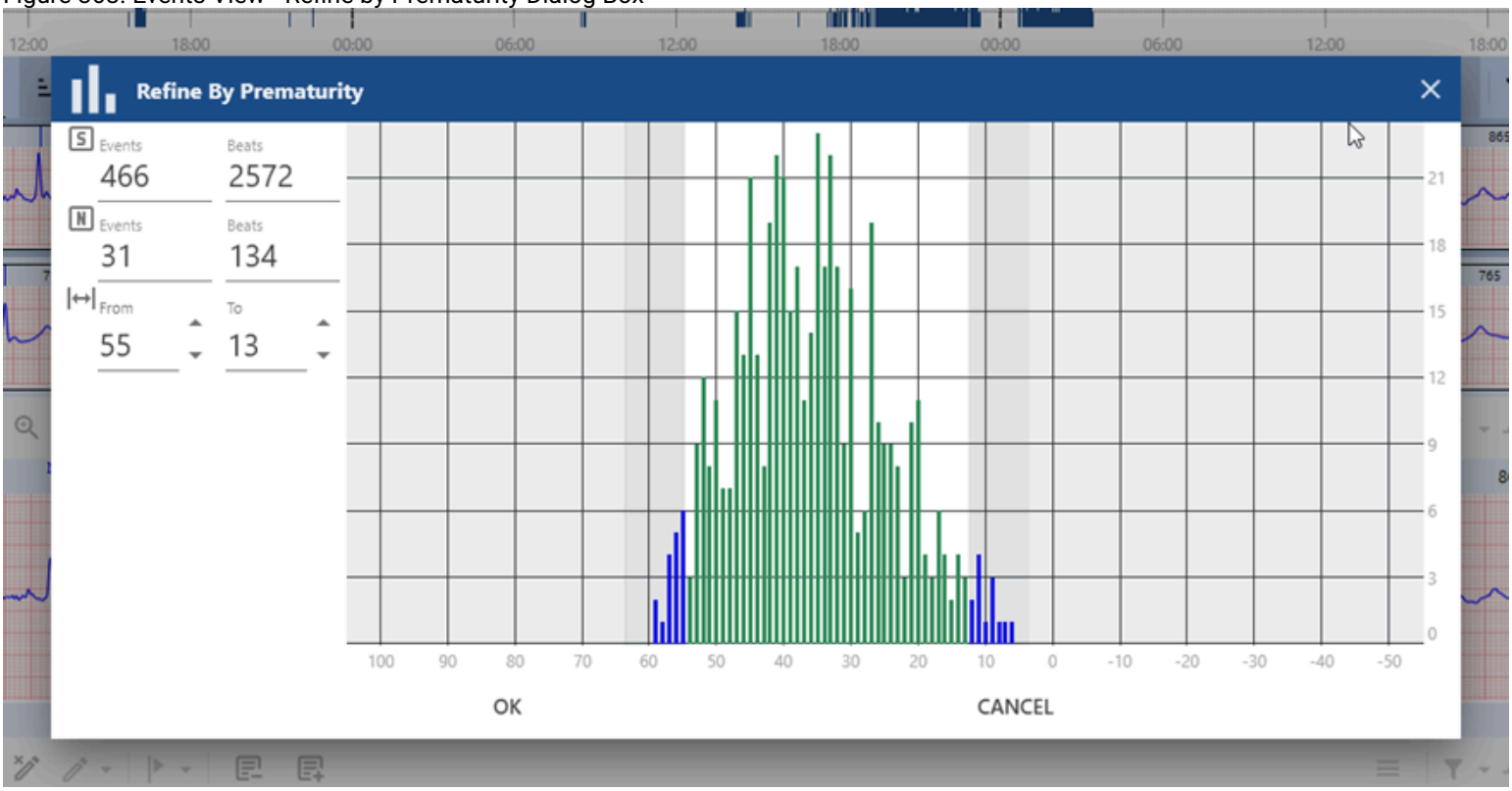
- **Order by**: Duration
- **Sorting**: Ascending
- **Events Overview Panel**: ON
- **Strip View**: OFF
- **Page View**: OFF
- **Example Strips Layout**: 2x3 strips (6 strips in total)
- **Example Strips Text Box**: ON
- **Example Strips Numerating Box**: ON
- **ECG Ruler**: ON
- **Channel Numeration**: OFF

These settings will be saved and applied to the **Bradycardia** event type across all patient records within the application. For example, when you open records for **Patient B**, **Patient C**, or **Patient N** and switch to the **Events Tab**, the layout will match the one configured for **Patient A**.

4.6.7.2.1.1. Events Overview Toolbar for SVE Type Events

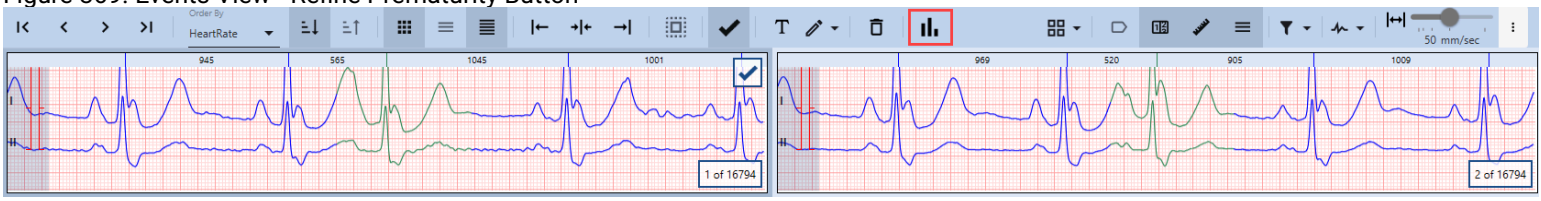
For the purpose of prematurity refinement, when you select any **SVE** type events like **SVE**, **SVE Bigeminy**, **SVE Couplet**, **SVE Tachycardia**, **SVE Trigeminy**, an additional **Refine Prematurity** button in the **Events Overview Toolbar** appears. Prematurity refinement is a feature of the **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 368. Events View - Refine by Prematurity Dialog Box



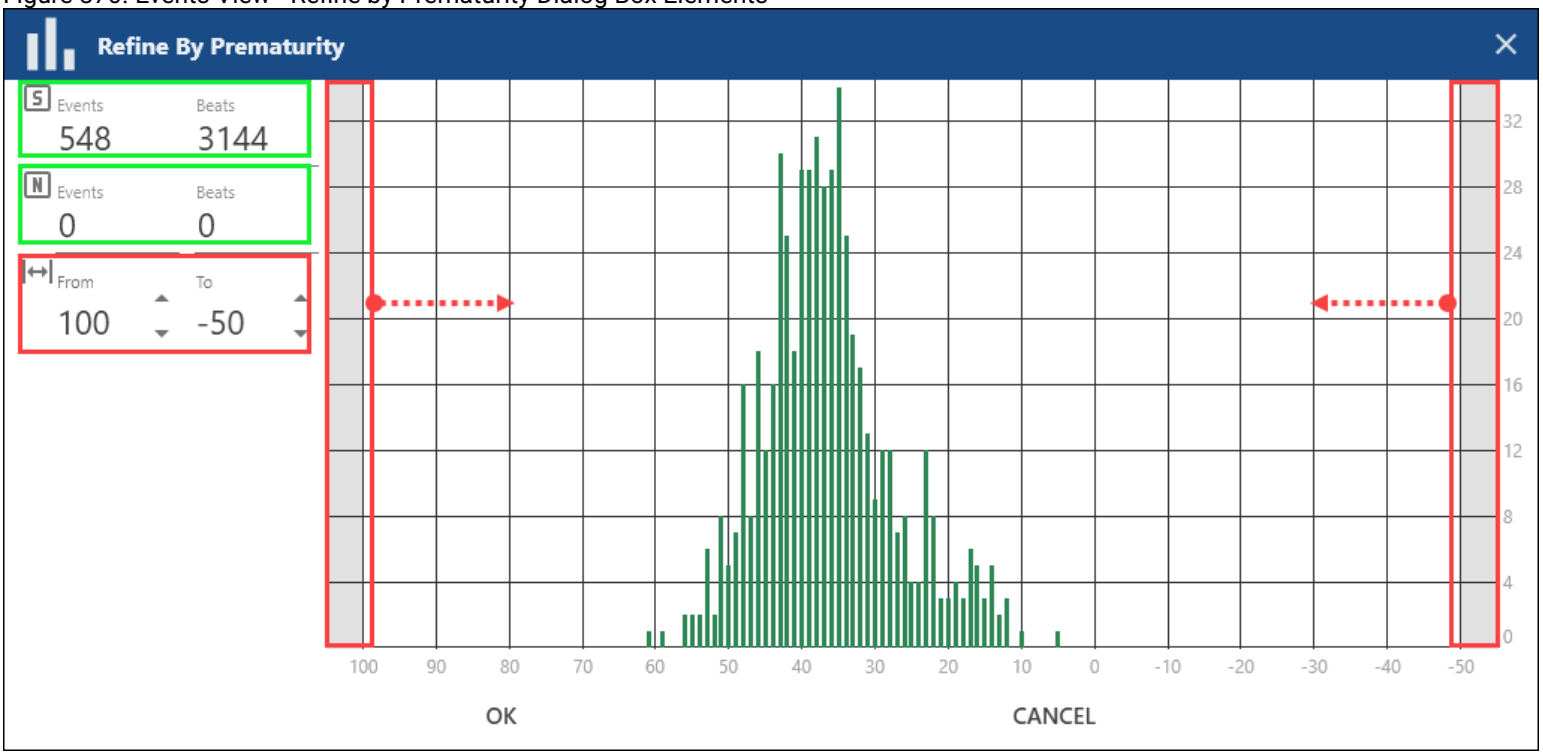
When you click the **Refine Prematurity** button, the **Refine By Prematurity** dialog box pops up. The dialog box contains an event type distribution graph with the adjustable refinement sliders on the left and right margins of the grid.

Figure 369. 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 370. 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.

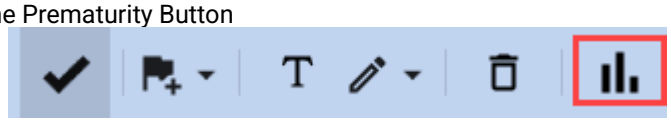
Below that, you can see how many **Events** will be reclassified as Normal and how many **Beats** will be affected after you set up and confirm bulk reclassification via this feature.

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 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.

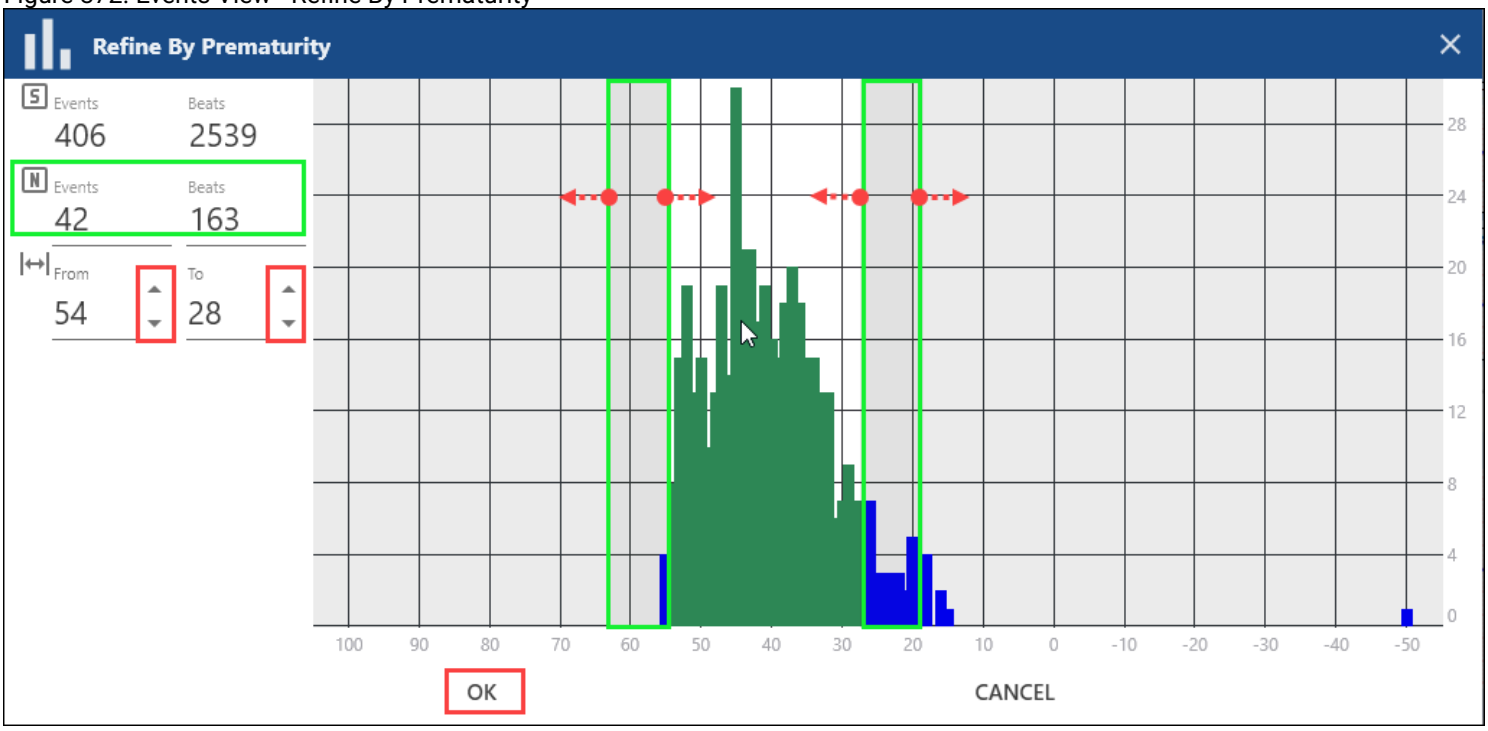
Figure 371. Events View - Click Refine Prematurity Button



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 372. Events View - Refine By Prematurity



3. Click the **OK** button to confirm the refinement after you have positioned the 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**.

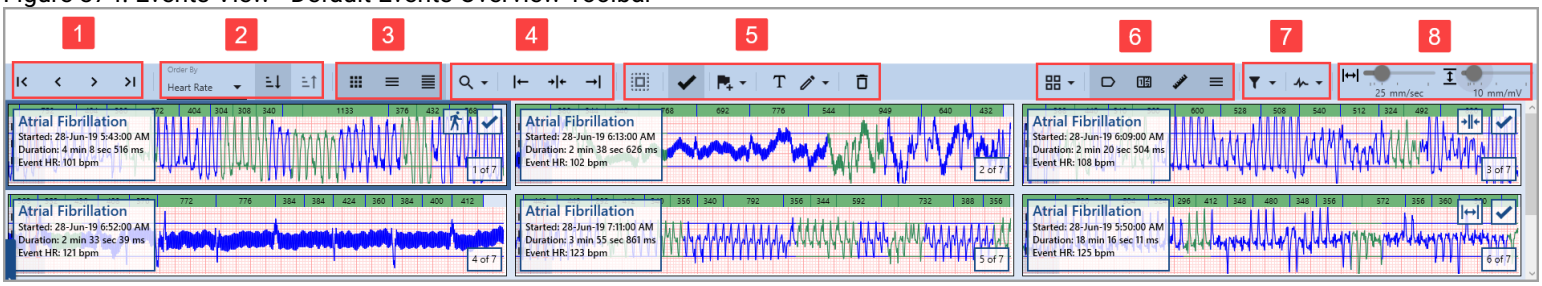
Figure 373. Events View - Events List Count Change

Event Type	Count
Pause	27
ST	11
SVE	16786
SVE Bigeminy	475
SVE Couplet	3437
SVE Tachycardia	411
SVE Trigeminy	502
Tachycardia	271
Vent. Paced	143

4.6.7.2.1.2. Events Overview Toolbar for Min/Max HR/RR Events

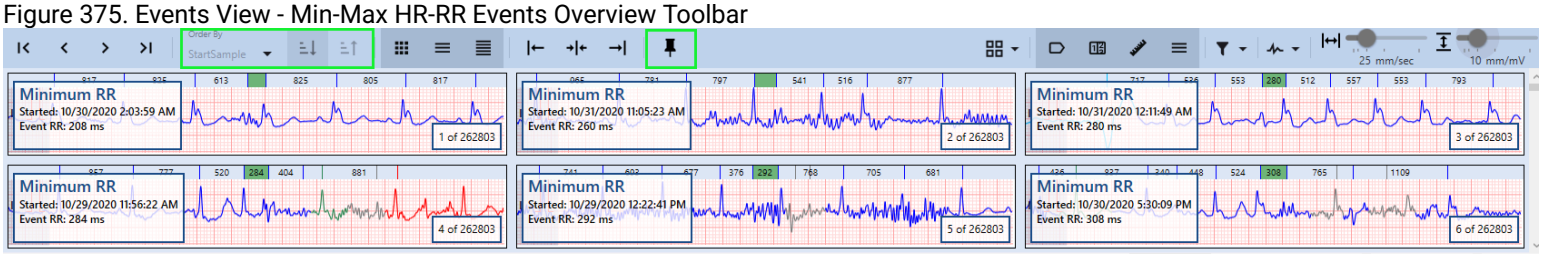
For **Maximum/Minimum Heart Rate** and **Maximum/Minimum RR** events, you need to choose only one **Example Strip** for inclusion in the final Report. Users are not supposed to modify, delete, or add notes to these specific types of **Events** due to their special role in ECG Recording analysis. In line with this workflow logic, the **Events Overview Toolbar** for **Maximum/Minimum Heart Rate** and **Maximum/Minimum RR** events has inactive **Sorting Controls,** while the **Events Editing Controls** are simplified to one **Set as Selected** button, as opposed to the five buttons on the default Toolbar.

Figure 374. 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.

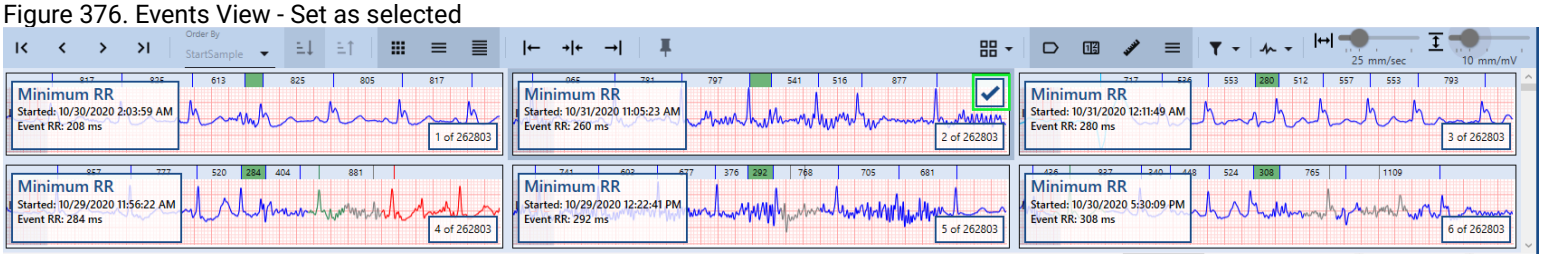
Figure 375. Events View - Min-Max HR-RR Events Overview Toolbar



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 376. Events View - Set as selected



Note:
A context menu for these types of **Events** also contains only the **Set as selected** option.

Figure 377. Events View - Set as selected Context Menu Option

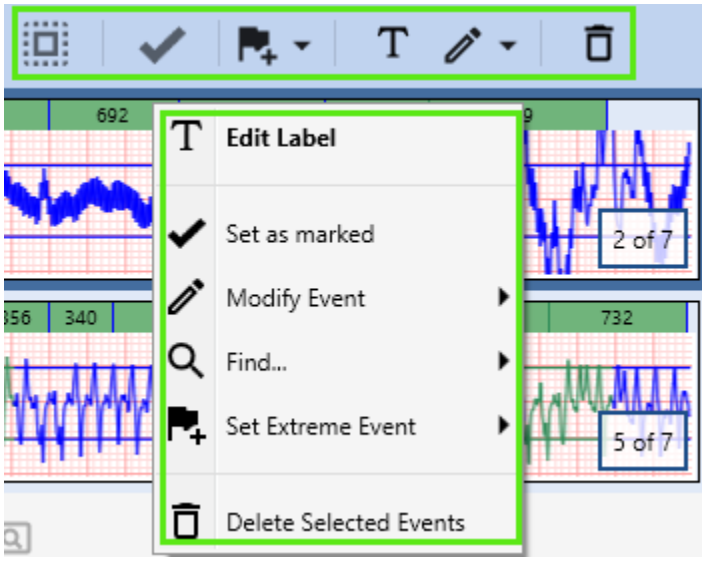


4.6.7.2.2. Context Menu Features

The **Context Menu**, accessible by right-clicking an **Example Strip** in the **Events Overview Panel**, provides quick access to common actions..

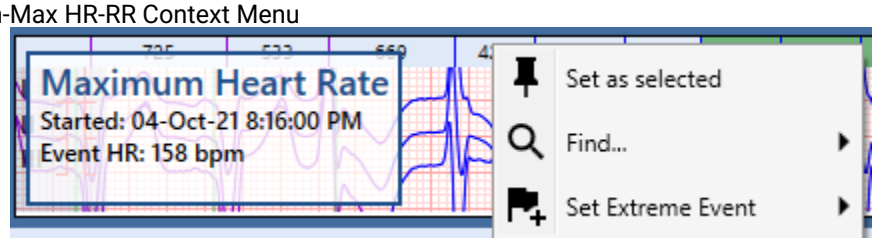
Depending on the selected event type, the **Context Menu** includes options to edit a note (**Edit Label**), set an **Example Strip** as marked (**Set as marked**), modify the event classification (**Modify Event**), find marked or flagged **Example Strips** (**Find**), mark an **Example Strip** as an Extreme Event (**Set Extreme Event**), and delete selected events (**Delete Selected Events**).

Figure 378. 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**, **Find**, and **Set Extreme Event** options. The **Set Extreme Event** option is not available for **Maximum/Minimum HR** and **Maximum/Minimum RR** events.

Figure 379. Events View - Min-Max HR-RR Context Menu

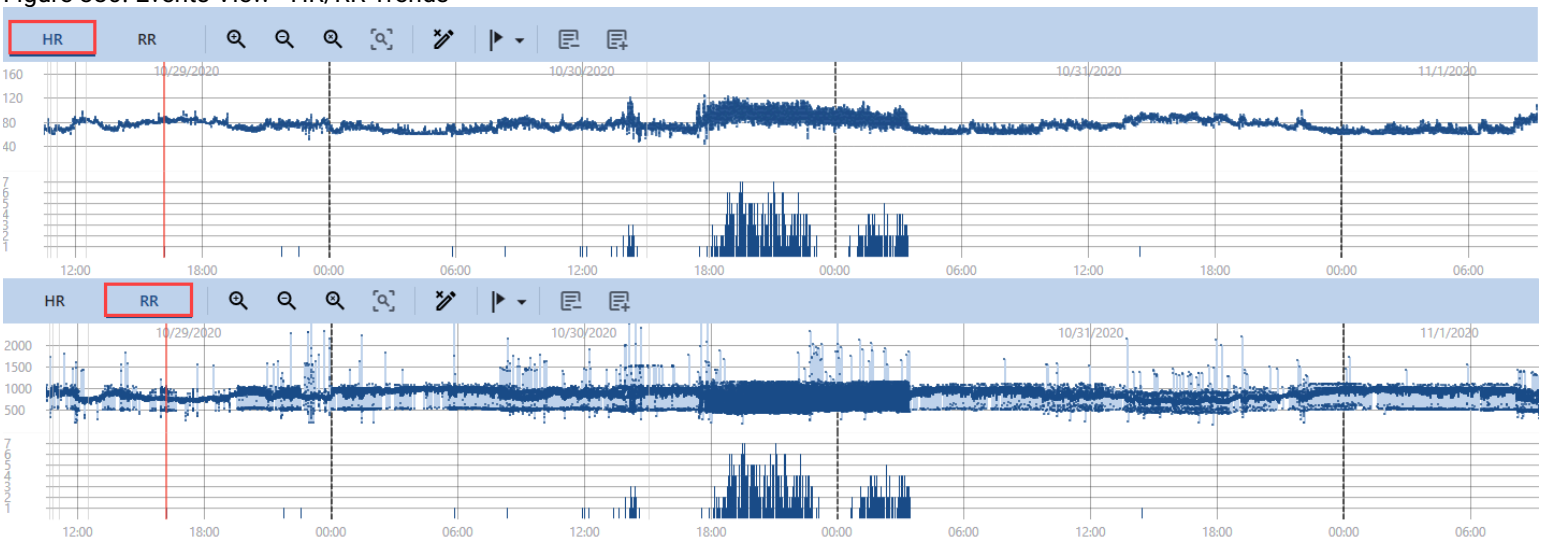


To open the context menu, right-click within the **Example Strip** box of your choice.

4.6.7.3. HR/RR Trends View

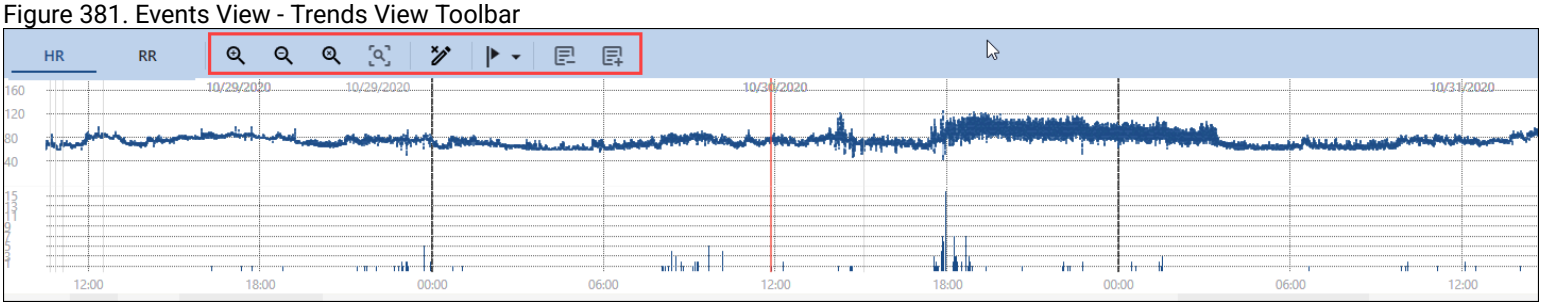
The **HR/RR Trends View** displays two graphs that show the heart rate and RR interval changes over time, respectively. This feature is instrumental for visualizing heart rate trends. The **RR Trend View** is more specific, as it distinguishes between different types of heart rhythms. The **HR Trend 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 380. Events View - HR/RR Trends



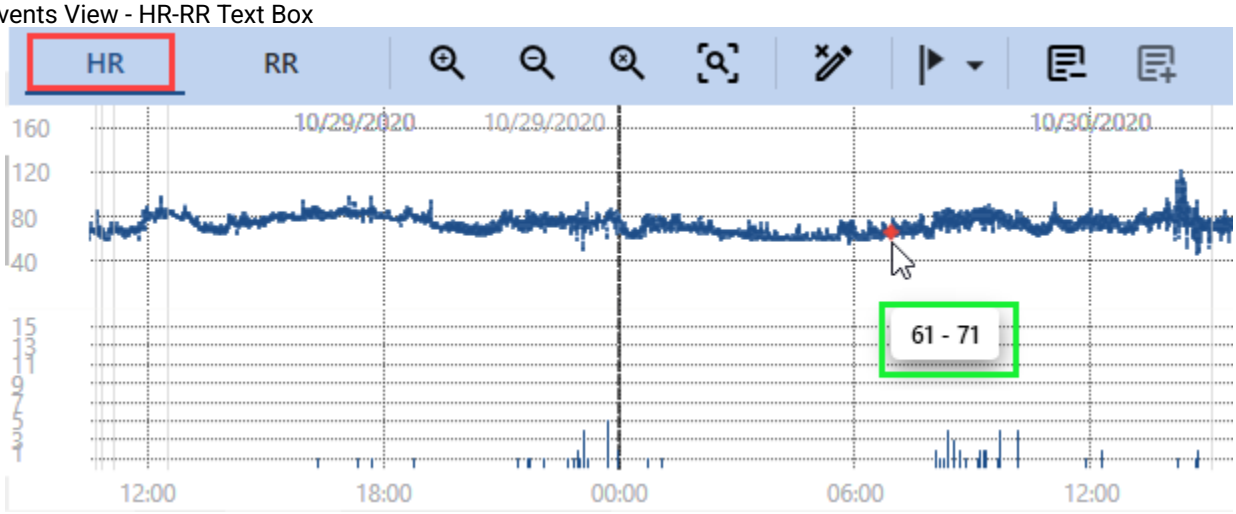
The **HR/RR Trends View** is a tool that aids in assessing and obtaining additional data about arrhythmia events by presenting heart rate and RR interval changes over time.

Figure 381. 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 382. 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 visualization will change accordingly.

Icon	Description
	Zoom In button: Click to adjust the scale of the HR or RR graph in the **HR/RR Trends View**, focusing on specific areas of the graph. You can click this button multiple times.
	Zoom Out button: Click to adjust the scale of the HR or RR graph in the **HR/RR Trends View**. 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.
	Full Extent button: Click to zoom out instantly and see the entire HR/RR Trends graph.
	Zoom to Extent button: Click to zoom in instantly to the selected area of the graph. The area will be displayed at the maximum available zoom.
	Delete Beats button: Click to delete beats within the selected area.
	Create User Event button: 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.
	Exclude from analysis button: Enables the exclusion of a selected fragment of an ECG record from analysis.
	Include to analysis button: 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:

1. Select the fragment you wish to exclude from analysis using one of the following methods:
    - **Using Ctrl + Click:**
        1.1. Identify the initial point in the range you wish to select.
        1.2. Hold down the **Ctrl** key.

1.3. Click the initial point.

1.4. Identify the final point in your desired range.

1.5. **(Optional)** If you are zoomed in, you can move the graph strip by clicking and dragging it.

1.6. Drag the cursor to the final point and release the mouse button to complete the selection.

- **Using the right mouse button:**

1.1. Click the **Trend View** graph and hold the right mouse button to designate the initial point in the range you wish to select.

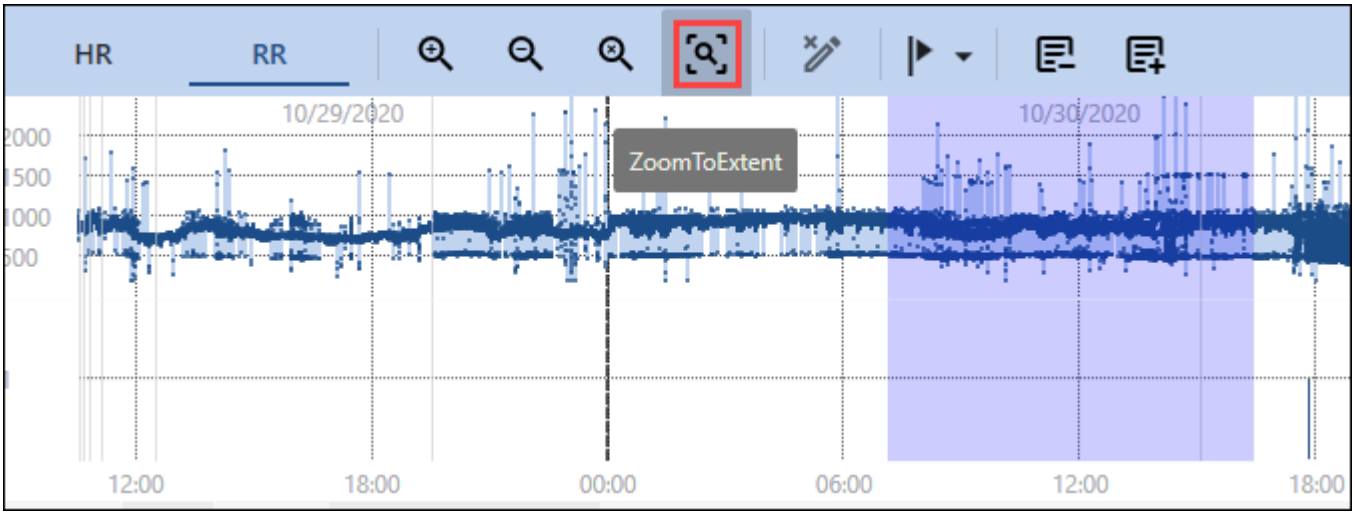
1.2. Drag the cursor to set the final point.

1.3. **(Optional)** If you are zoomed in, you can move the graph strip by clicking and dragging it.

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

2. Click the **Zoom To Extent** button. The selected fragment of graph will be instantly displayed with the maximum zoom.

Figure 383. Events View - Zoom To Extent Button



3. **(Optional)** To revert the zoom, you may click the **Zoom Out** or the **Full Extent** buttons.

To delete beats:

1. Select a fragment 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:**

1.1. Identify the initial point in the range you wish to select.

1.2. Hold down the **Ctrl** key.

1.3. Click the initial point.

1.4. Identify the final point in your desired range.

1.5. **(Optional)** If you are zoomed in, you can move the graph strip by clicking and dragging it.

1.6. Drag the cursor to the final point and release the mouse button to complete the selection.

  - **Using the right mouse button:**

1.1. Click the **Trend View** graph and hold the right mouse button to designate the initial point in the range you wish to select.

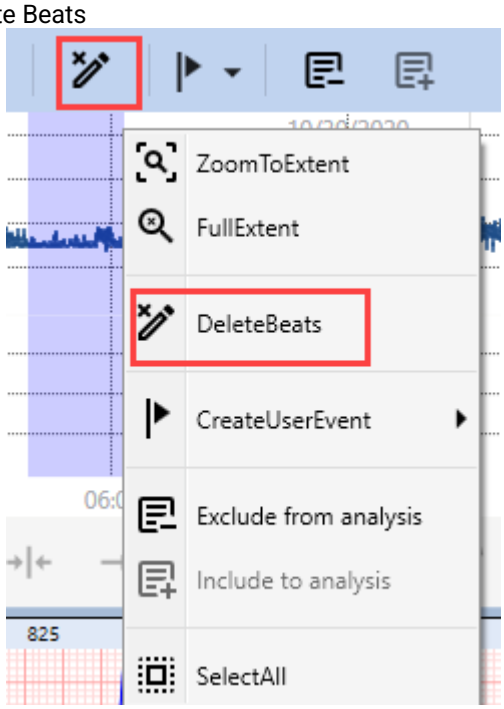
1.2. Drag the cursor to set the final point.

1.3. **(Optional)** If you are zoomed in, you can move the graph strip by clicking and dragging it.

1.4. 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.

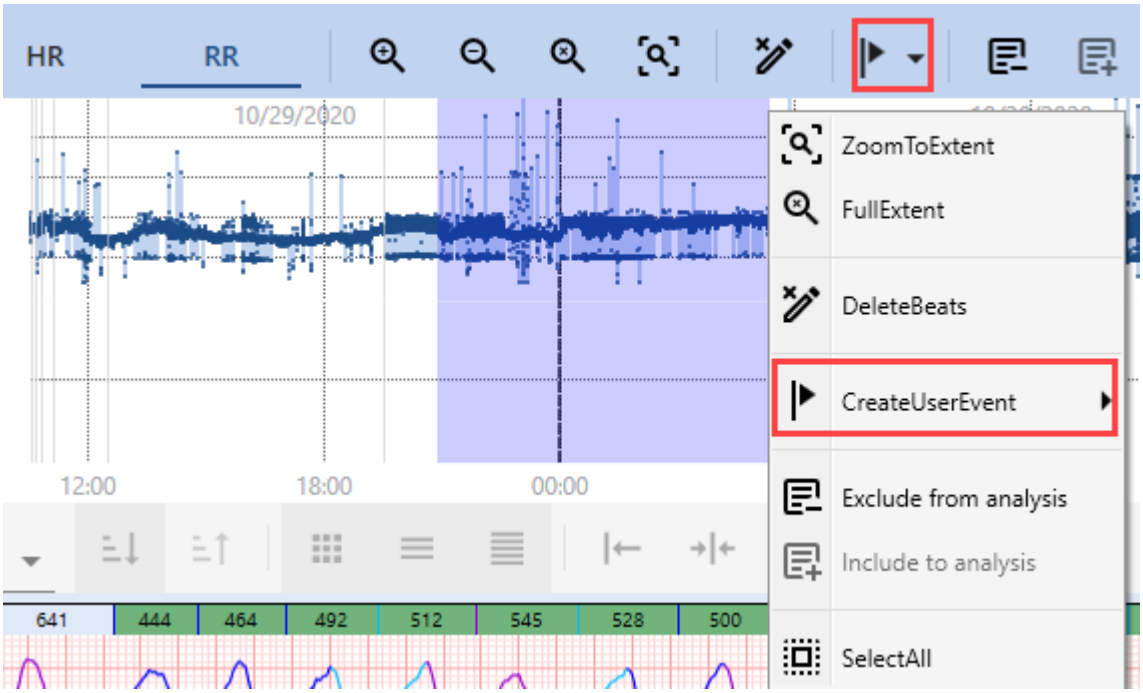
Figure 384. Events View - Trends View Delete Beats



To create a user event:

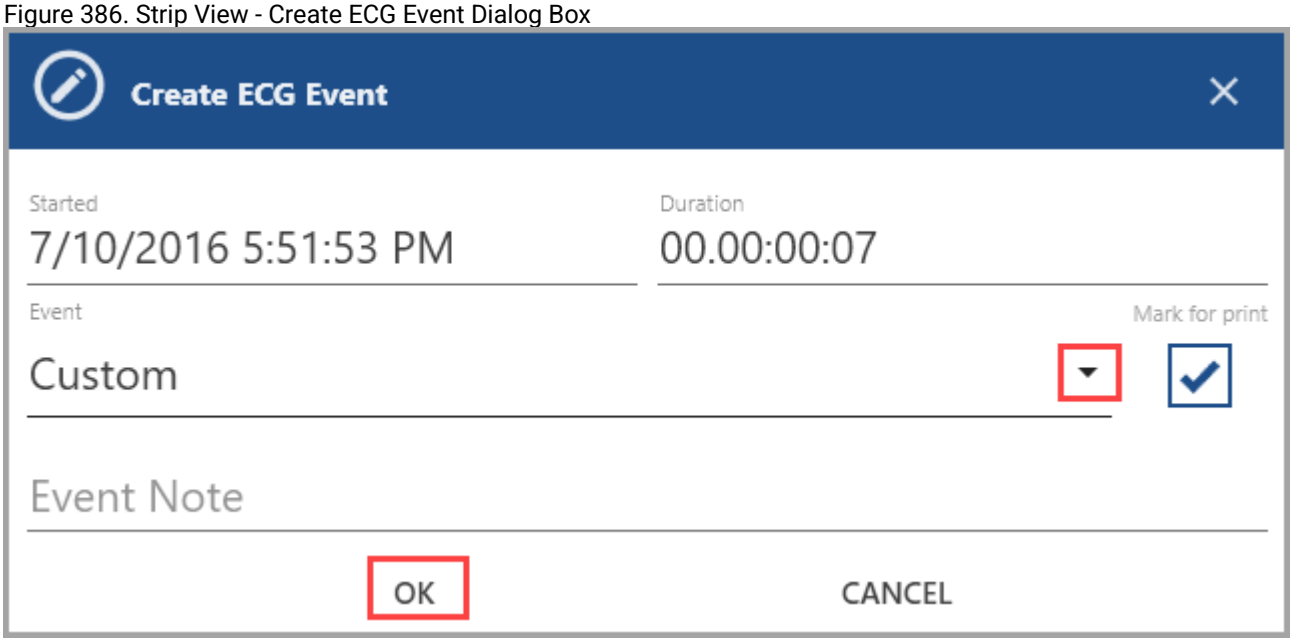
1. Select a fragment of the graph, which you wish to reclassify as a continuous event, using one of the following methods:
    - Click an individual beat to select it.
    - Select a fragment of the graph using one of these methods:
        - **Using Ctrl + Click:**
            1.1. Identify the initial point in the range you wish to select.
            1.2. Hold down the **Ctrl** key.
            1.3. Click the initial point.
            1.4. Identify the final point in your desired range.
            1.5. **(Optional)** If you are zoomed in, you can move the graph strip by clicking and dragging it.
            1.6. Drag the cursor to the final point and release the mouse button to complete the selection.
        - **Using the right mouse button:**
            1.1. Click the **Trend View** graph and hold the right mouse button to designate the initial point in the range you wish to select.
            1.2. Drag the cursor to set the final point.
            1.3. **(Optional)** If you are zoomed in, you can move the graph strip by clicking and dragging it.
            1.4. 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 385. Events View - Trends View Create User Event



3. Click the relevant type of **Event** you wish to create in the selected area.
4. Review the event details in the **Create ECG Event** dialog box:
    - Re-select or confirm the event type using the drop-down menu.
    - **(Optional)** Check or uncheck the **Mark for print** checkbox.
    - **(Optional)** Enter a custom event note in the **Event Note** field.

Figure 386. Strip View - Create ECG Event Dialog Box



5. Click **OK** to confirm or **Cancel** to discard changes.

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:**
        1.1. Identify the initial point in the range you wish to select.
        1.2. Hold down the **Ctrl** key.

1.3. Click the initial point.

1.4. Identify the final point in your desired range.

1.5. **(Optional)** If you are zoomed in, you can move the graph strip by clicking and dragging it.

1.6. Drag the cursor to the final point and release the mouse button to complete the selection.

- **Using the right mouse button:**

1.1. Click the **Trend View** graph and hold the right mouse button to designate the initial point in the range you wish to select.

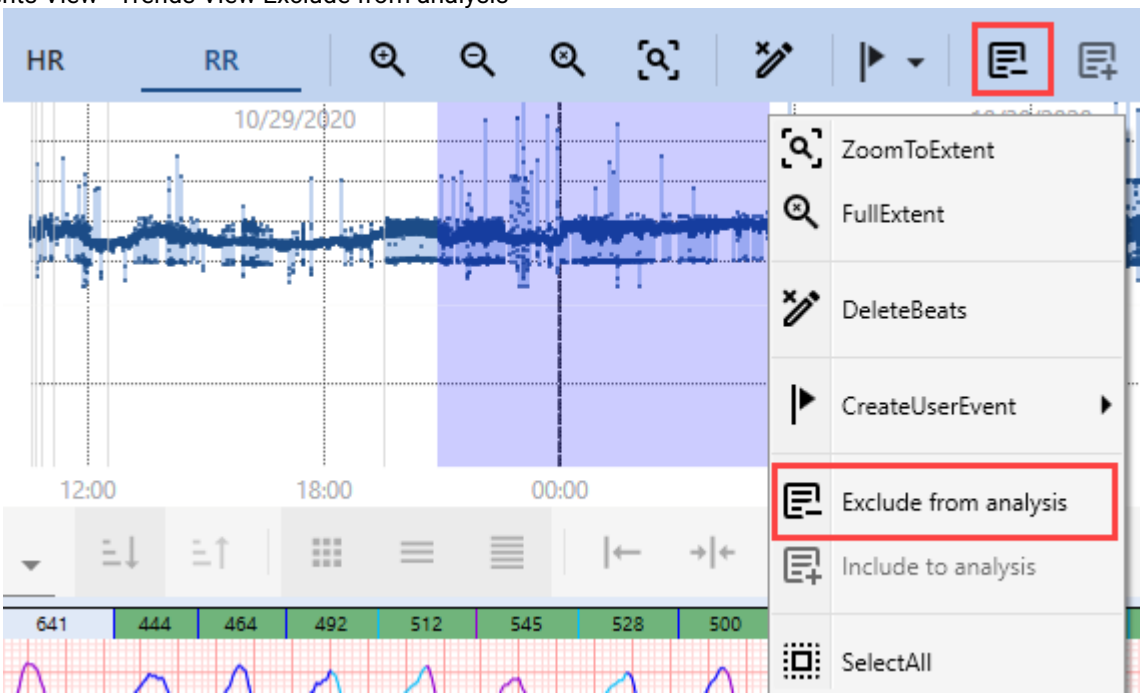
1.2. Drag the cursor to set the final point.

1.3. **(Optional)** If you are zoomed in, you can move the graph strip by clicking and dragging it.

1.4. 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.

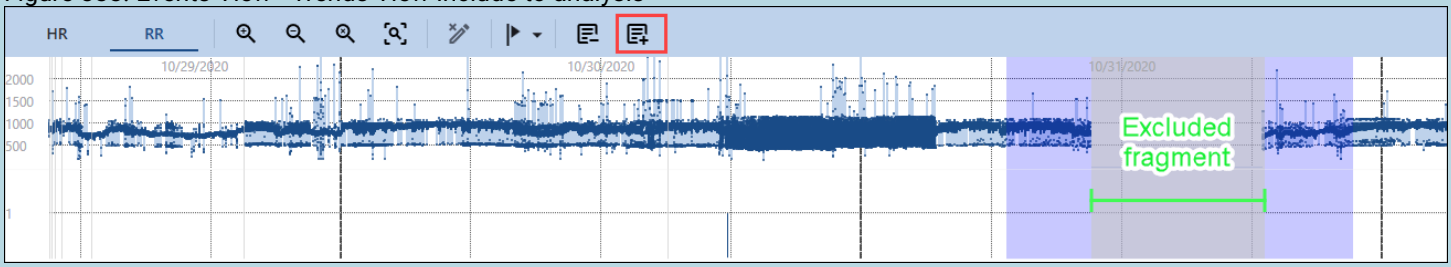
Figure 387. Events View - Trends View Exclude from analysis



To re-include an ECG segment into analysis:

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

Figure 388. 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:**
        1.1. Identify the initial point in the range you wish to select.
        1.2. Hold down the **Ctrl** key.
        1.3. Click the initial point.
        1.4. Identify the final point in your desired range.
        1.5. **(Optional)** If you are zoomed in, you can move the graph strip by clicking and dragging it.
        1.6. Drag the cursor to the final point and release the mouse button to complete the selection.
    - **Using the right mouse button:**
        1.1. Click the **Trend View** graph and hold the right mouse button to designate the initial point in the range you wish to select.
        1.2. Drag the cursor to set the final point.
        1.3. **(Optional)** If you are zoomed in, you can move the graph strip by clicking and dragging it.
        1.4. 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.

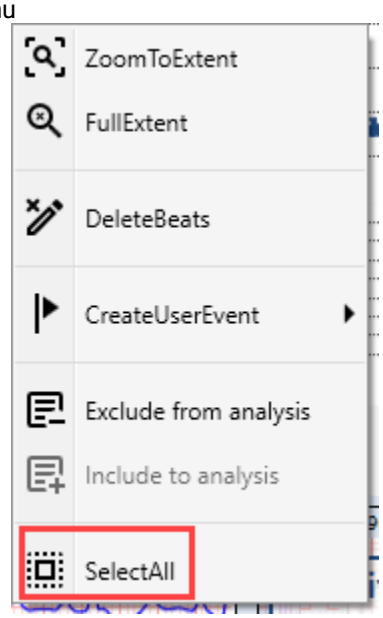
Context Menu Features

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.

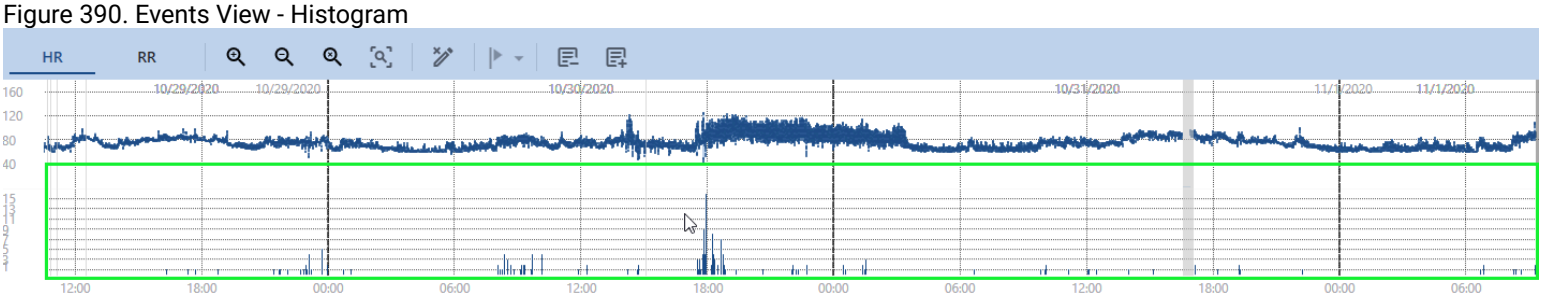
Figure 389. Events View - Trends View Context Menu



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 *(on page 334)*, enhancing the ECG analysis process.

Figure 390. Events View - Histogram



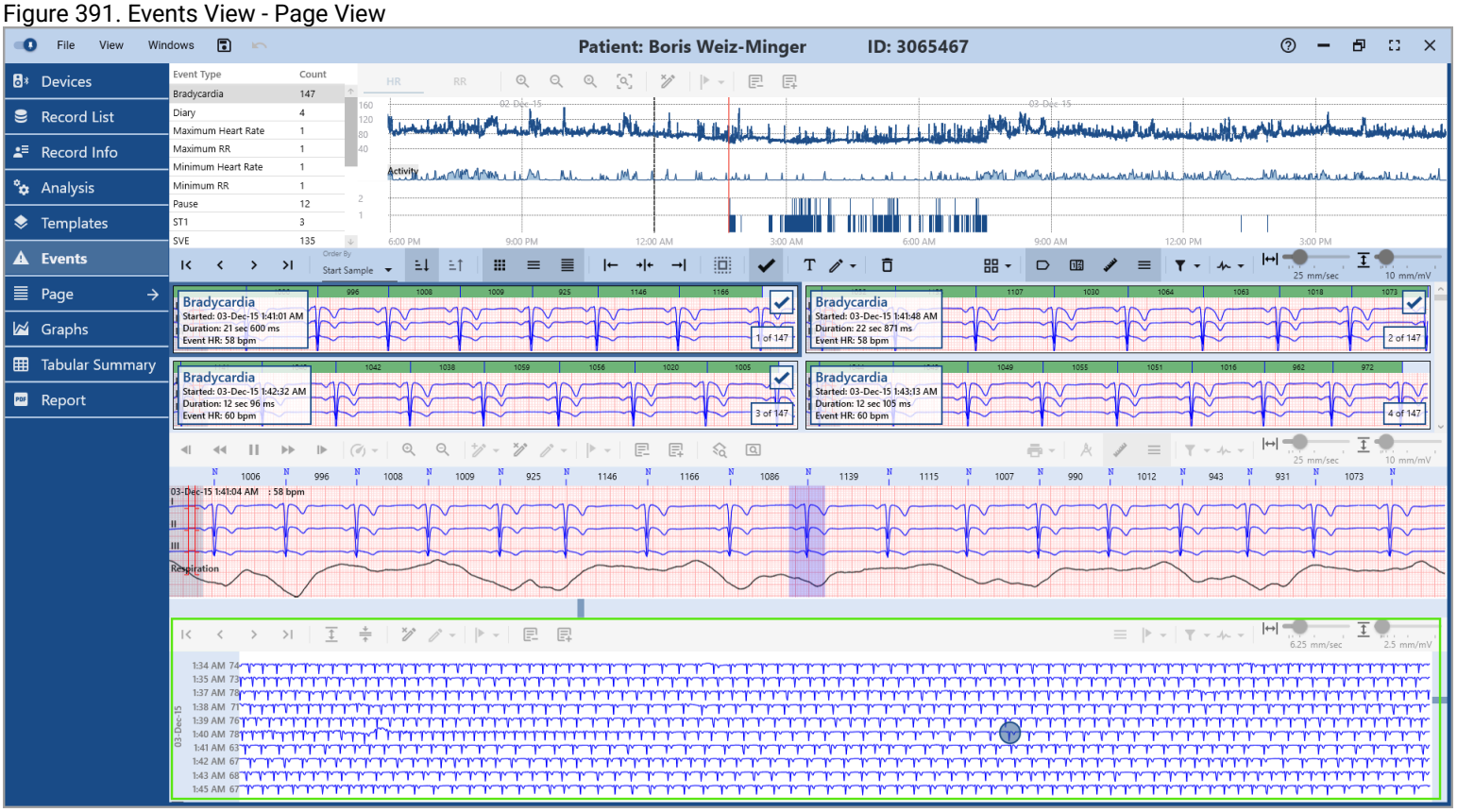
4.6.7.4. Strip View

The **Strip View** displays the currently selected beat along with adjacent ECG signal, typically covering 12 to 16 seconds depending on monitor resolution and ECG paper speed settings. It supports detailed analysis, measurements, beat reclassification, and user event creation. For a comprehensive overview of the **Strip View**, including its configuration options and usage across different views and workflows, see the **Strip View** section and its subsections *(on page 151)*.

4.6.7.5. 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 179)***, **Events Overview Panel *(on page 185)***, **HR/RR Trends View *(on page 202)***, and **Strip View *(on page 151)***, it supports a thorough review and analysis of events detected in the ECG Record.

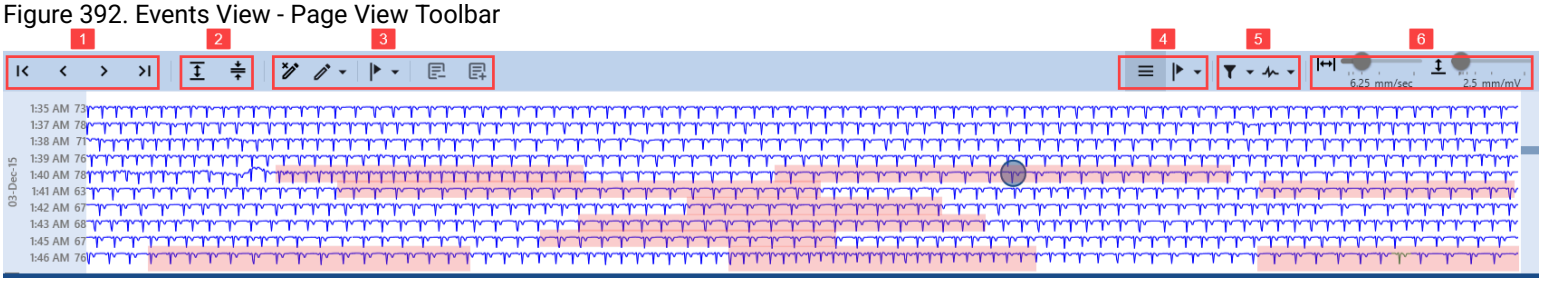
Figure 391. Events View - Page View



4.6.7.5.1. 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 392. Events View - Page View Toolbar

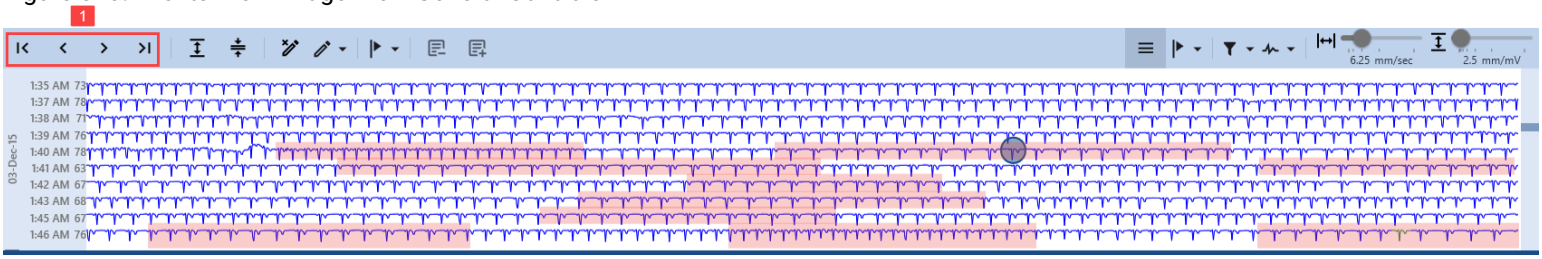


1. General Controls.
2. Page View Layout Controls.
3. Editing Controls.
4. Events Highlighting Controls.
5. Filters.
6. Scale and Gain Controls.

General Controls

General Controls comprise a group of buttons designed to facilitate navigation within the **Page View** on the **Events View** screen.

Figure 393. 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.

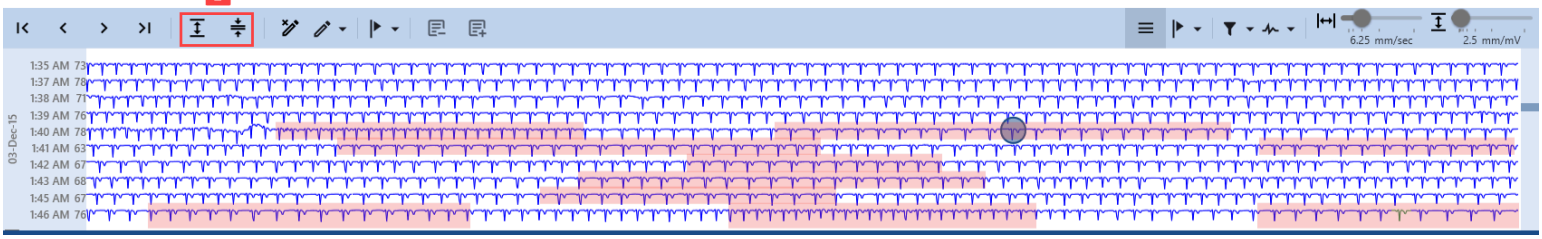
Note: If a user selects **Min RR/HR** or **Max RR/HR** in the **Events List** of the **Events View**, then clicks on the **Page View**, all related views and panels will adjust accordingly (including the **Strip View** and **HR/RR Trends View**).

Icon	Description
	First Page: Click to display the first page of the **Record**.
	Page Up: Click to navigate to the previous page of the **Record**.
	Page Down: Click to navigate to the next page of the **Record**.
	Final Page: Click to display the last page of the **Record**, 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 394. Events View - Page View Layout Controls

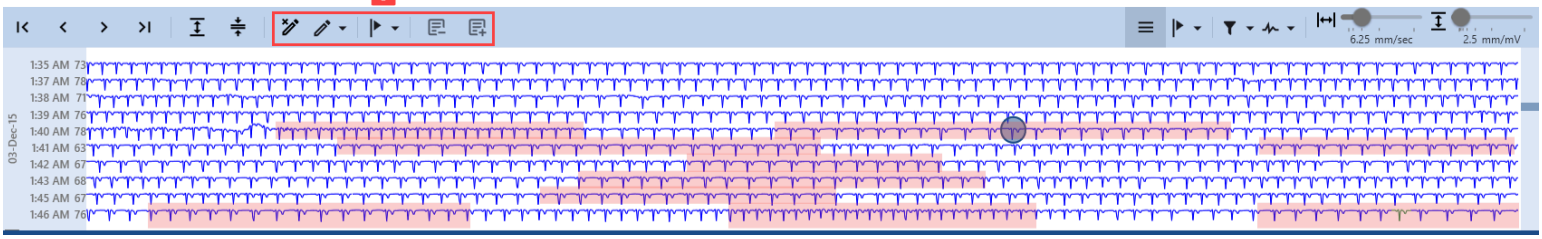


Icon	Description
	Decrease Lines Per Page button: Click to reduce the number of lines per Page, enhancing focus on specific ECG lines. This feature allows for adjusting the density of lines within the **Page View**. Repeated clicks reduce lines to a minimum of one per Page.
	Increase Lines Per Page button: 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 **Page View** as needed. However, an overpopulated **Page View** 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 395. Page View - Page View Editing Controls



Icon	Description
	Delete Beats button: Click to delete beats within the selected area.
	Change Beats Annotation button: Enables you to modify the annotation of selected beats.
	Create User Event button: 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.
	Exclude from analysis button: Enables the exclusion of a selected fragment of an ECG record from analysis.
	Include to analysis button: 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 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:**
            1.1. Identify the initial point in the range you wish to select.
            1.2. Click the initial point.

1.3. Hold down the **Shift** key.

1.4. Identify the final point in the range.

1.5. **(Optional)** Scan the Page View *(on page 210)* to locate the points of interest, if necessary.

1.6. Click the final point to complete the range selection.

- **Using Ctrl + Click:**

  1.1. Identify the initial point in the range you wish to select.

  1.2. Hold down the **Ctrl** key.

  1.3. Click the initial point.

  1.4. Identify the final point in your desired range.

  1.5. **(Optional)** Scan the Page View *(on page 210)* to locate the points of interest, if necessary.

  1.6. Drag the cursor to the final point and release the mouse button to complete the selection.

- **Using the right mouse button:**

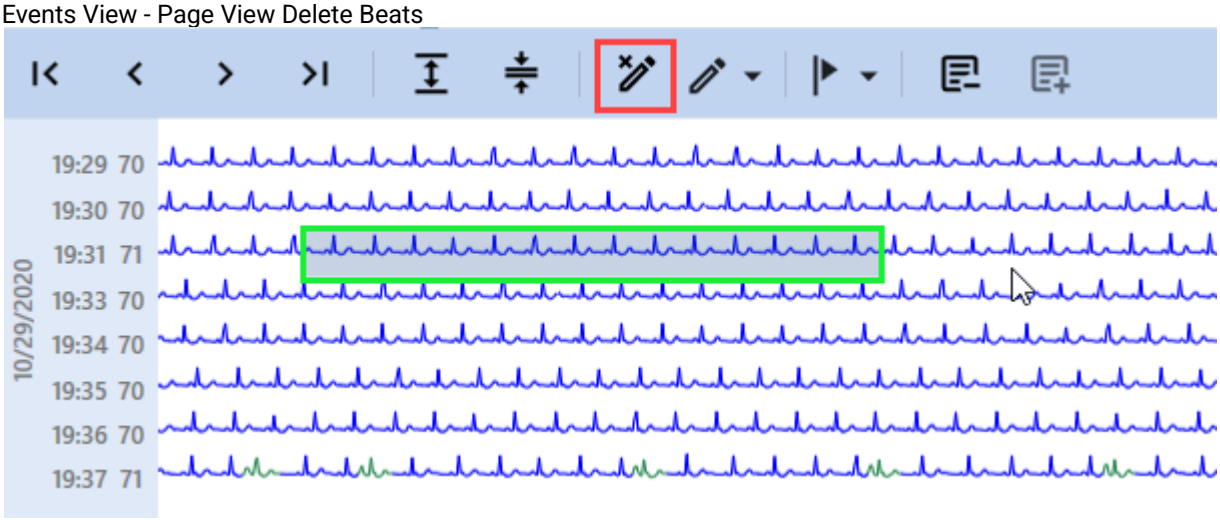
  1.1. Click the **Page View** and hold the right mouse button to designate the initial point in the range you wish to select.

  1.2. Drag the cursor to set the final point.

  1.3. **(Optional)** Scan the Page View *(on page 210)* to locate the points of interest, if necessary.

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

Figure 396. Events View - Page View Delete Beats



2. Click the **Delete Beats** button or the same option in the context menu.

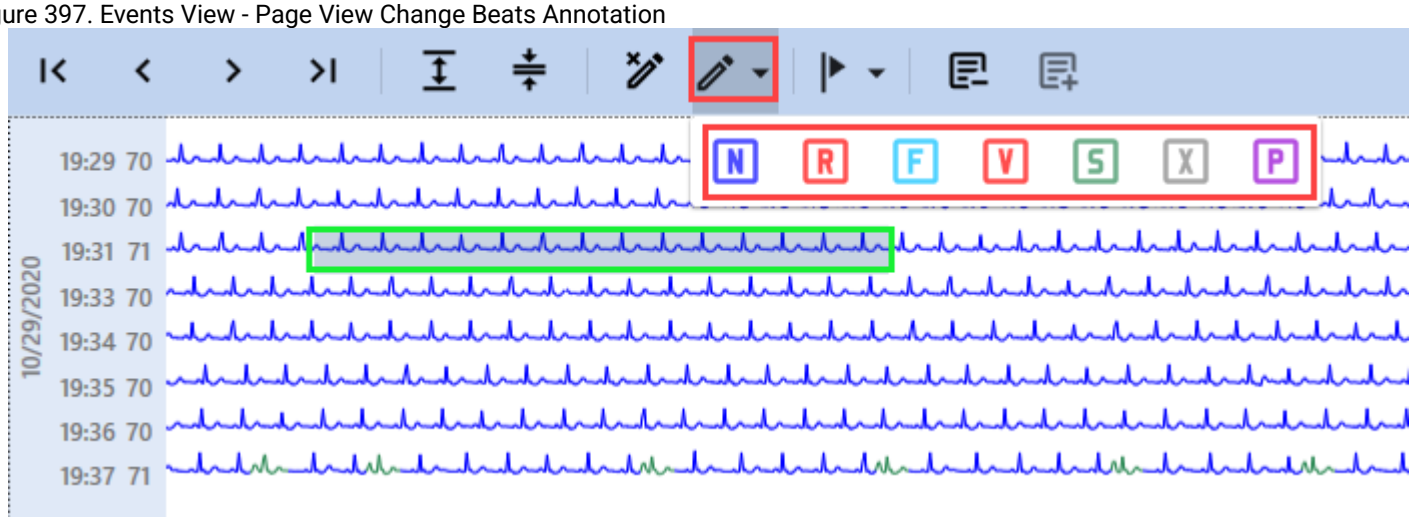
To change beats annotation:

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:** Click the first point, then hold **Shift** and click the end point. Scan the Page View *(on page 210)* to locate the points of interest, if necessary.
     - **Using Ctrl + Click:** Hold **Ctrl**, click the start point, drag to the endpoint, and release. Scan the Page View *(on page 210)* to locate the points of interest, if necessary.
     - **Using the right mouse button:** Right-click and drag to highlight the desired segment. Scan the Page View *(on page 210)* to locate the points of interest, if necessary.

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 397. 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 5. Beats Reclassification Keyboard Shortcuts for Page View

Action	Button	Keyboard Keys
Classify as **Normal**	N	**N**
Classify as **R** on **T**	R	**R**
Classify as **Fusion**	F	**F**
Classify as **VPB**	V	**V**
Classify as **SVE**	S	**S**
Classify as **Questionable**	X	**X**
Classify **Paced**	P	**P**

To create a user event:

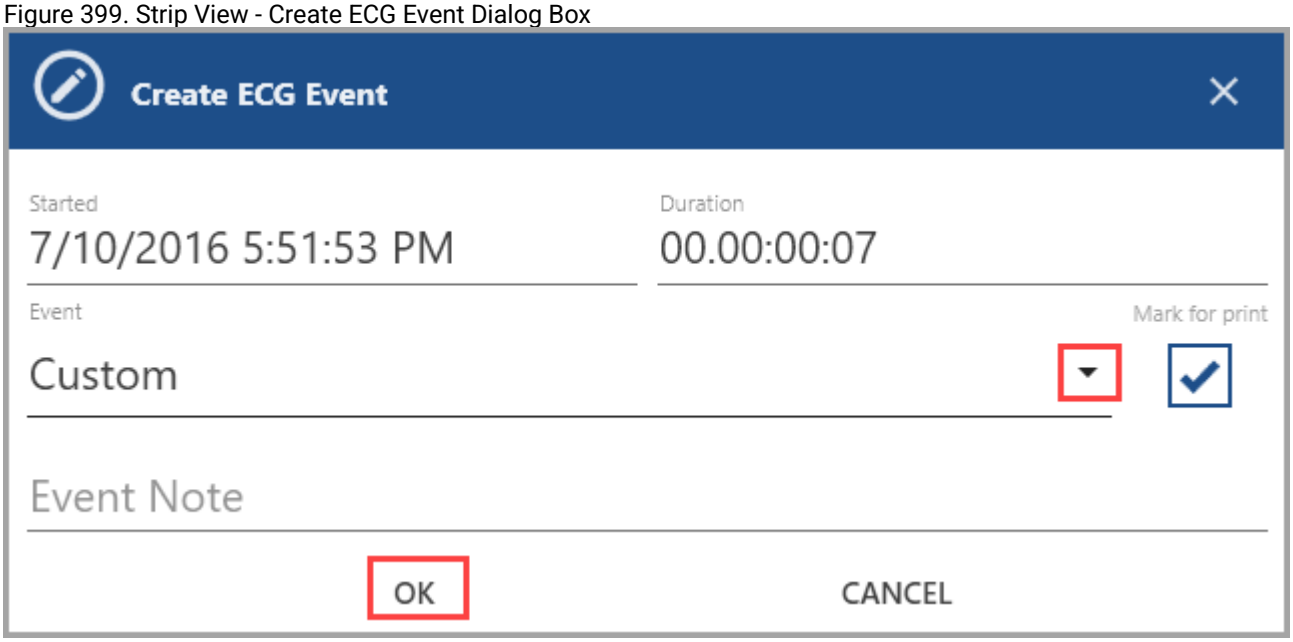
1. Select a fragment of the ECG, which you wish to reclassify as a continuous event, using one of the following methods:
   - Click an individual beat to select it.
   - Select a fragment of the waveform using one of these methods:
     - **Using Shift + Click:** Click the first point, then hold **Shift** and click the end point. Scan the Page View *(on page 210)* to locate the points of interest, if necessary.
     - **Using Ctrl + Click:** Hold **Ctrl**, click the start point, drag to the endpoint, and release. Scan the Page View *(on page 210)* to locate the points of interest, if necessary.
     - **Using the right mouse button:** Right-click and drag to highlight the desired segment. Scan the Page View *(on page 210)* to locate the points of interest, if necessary.
2. Hover over the **Create User Event** button or menu option to expand the drop-down list.

Figure 398. Events View - Page View Create User Event



3. Click the relevant type of **Event** you wish to create in the selected area.
4. Review the event details in the **Create ECG Event** dialog box:
    - Re-select or confirm the event type using the drop-down menu.
    - **(Optional)** Check or uncheck the **Mark for print** checkbox.
    - **(Optional)** Enter a custom event note in the **Event Note** field.

Figure 399. Strip View - Create ECG Event Dialog Box

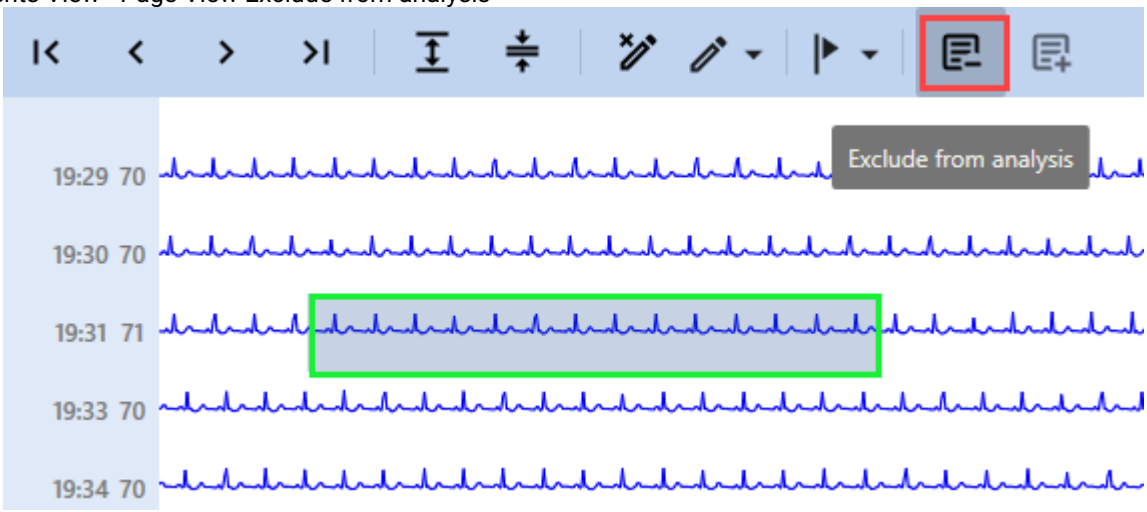


5. Click **OK** to confirm or **Cancel** to discard changes.

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:** Click the first point, then hold **Shift** and click the end point. Scan the Page View *(on page 210)* to locate the points of interest, if necessary.
        - **Using Ctrl + Click:** Hold **Ctrl**, click the start point, drag to the endpoint, and release. Scan the Page View *(on page 210)* to locate the points of interest, if necessary.
        - **Using the right mouse button:** Right-click and drag to highlight the desired segment. Scan the Page View *(on page 210)* to locate the points of interest, if necessary.
2. Click the **Exclude from Analysis** button or select the same option from the context menu.

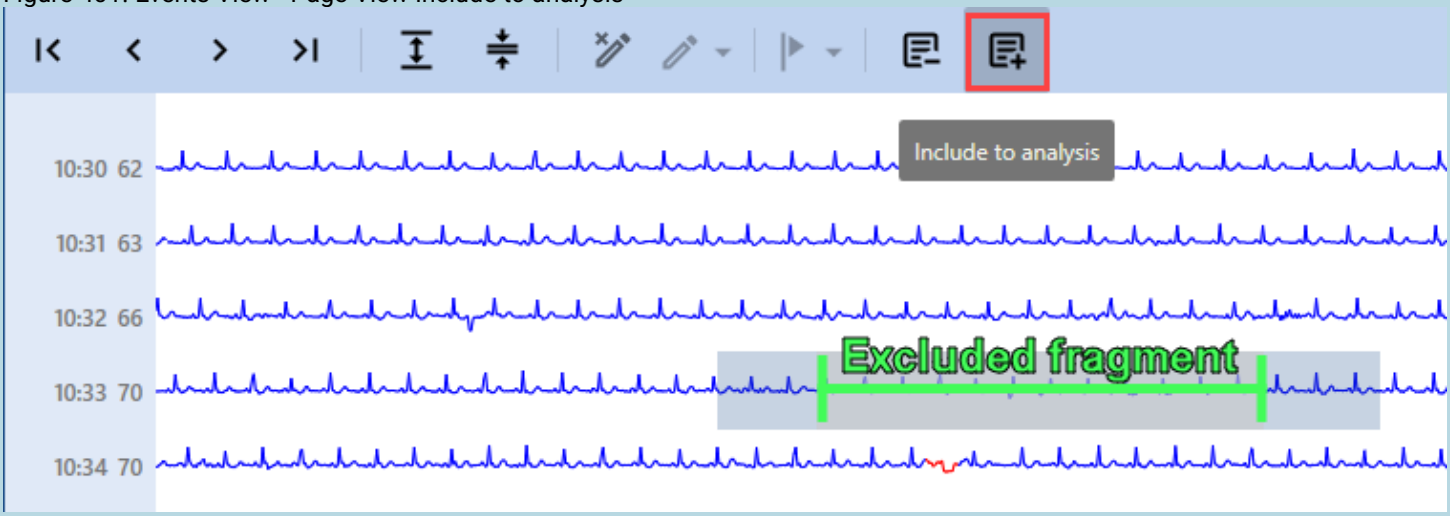
Figure 400. Events View - Page View Exclude from analysis



To re-include an ECG segment into analysis:

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

Figure 401. Events View - Page View Include to analysis



1. Select a fragment of the ECG you want to re-include in 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:** Click the first point, then hold **Shift** and click the end point. Scan the Page View *(on page 210)* to locate the points of interest, if necessary.
- **Using Ctrl + Click:** Hold **Ctrl**, click the start point, drag to the endpoint, and release. Scan the Page View *(on page 210)* to locate the points of interest, if necessary.
- **Using the right mouse button:** Right-click and drag to highlight the desired segment. Scan the Page View *(on page 210)* to locate the points of interest, if necessary.

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

Events Highlighting Controls

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 402. Events View - Page View Highlight Events Button OFF

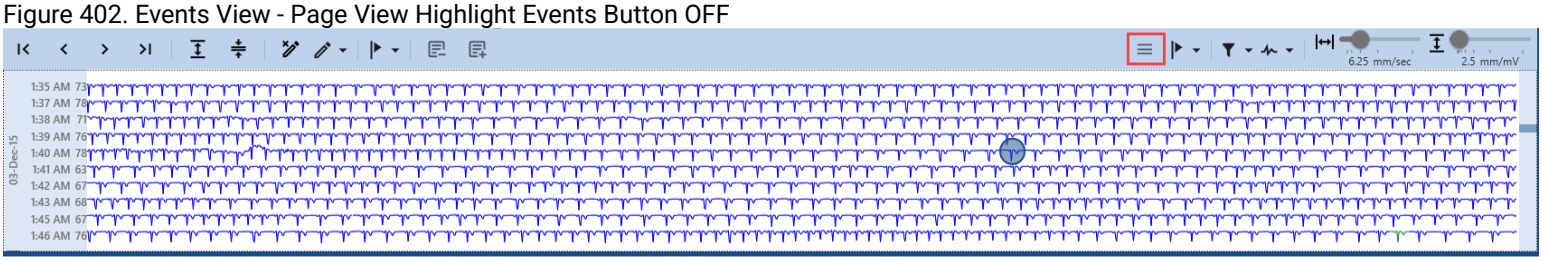
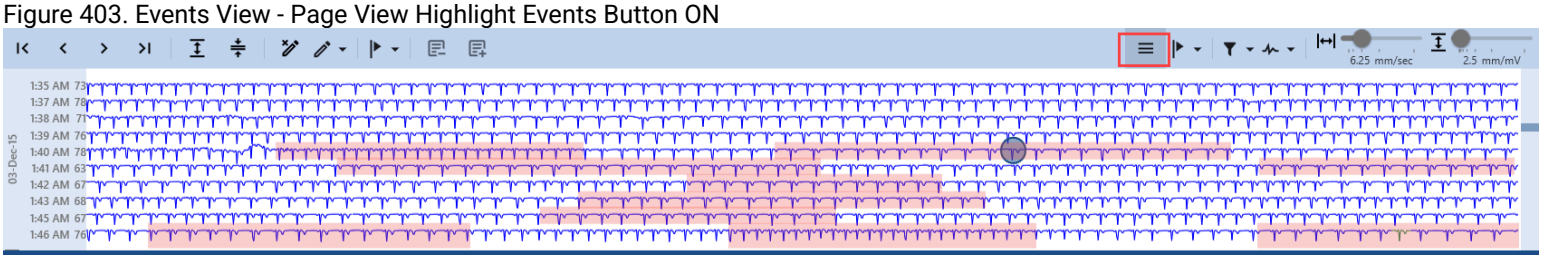


Figure 403. Events View - Page View Highlight Events Button ON



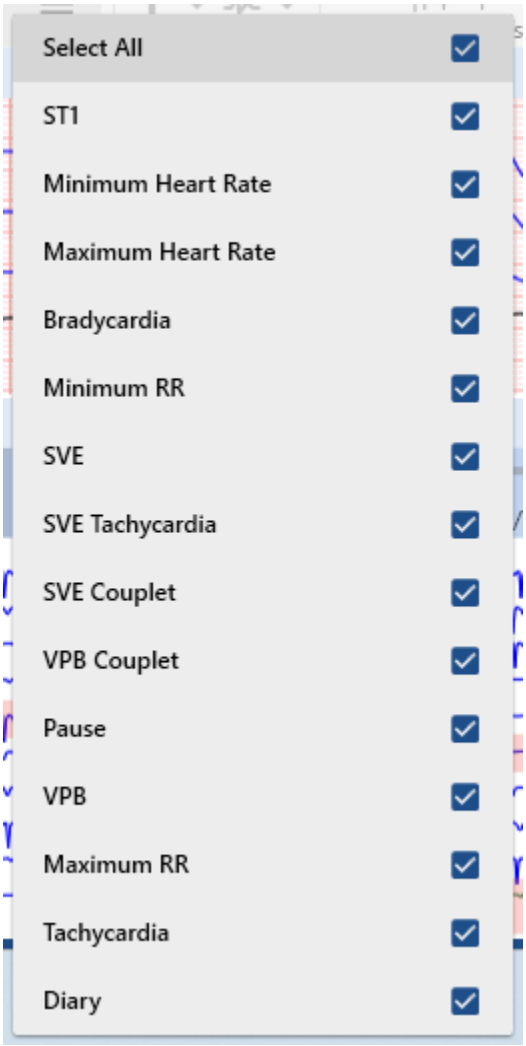
Hover over the **Events Selection** combo box button to view a list of event types available for highlighting in the **Page View**:

Figure 404. Events View - Events Selection



- **To select or unselect all events:** Check or uncheck the **Select All** checkbox.
- **To select or unselect individual event types:** Click the checkbox next to the desired event name. Selected event types will be highlighted in the **Page View**.

Figure 405. Events View - Events Selection Combo Box



Filters

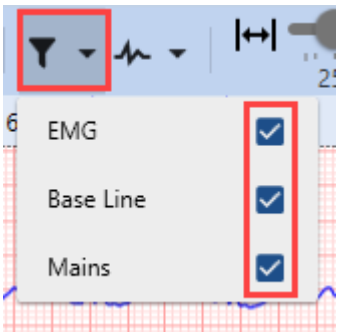
This group of controls allows you to apply various filters affecting waveform visualization and enhancing the accuracy and reliability of ECG analysis.

Icons	Description
	Filter: This control enables you to toggle **ON/OFF** the visualization of the waveform with applied **EMG, Base Line**, and **Mains** 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.
	Channel Selection: This control lets you select the channel(s) for display within the **Page View**, using the drop-down list (up to 12 channels, depending on the number of channels in the current **Record**.

To toggle filters ON/OFF:

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

Figure 406. Events View - Toggling Filters



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

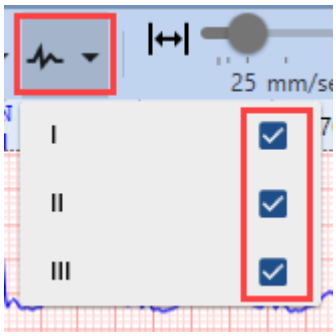
It is recommended to keep filters **ON** to provide accurate analysis:

- **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 407. Events View - Toggling Channels



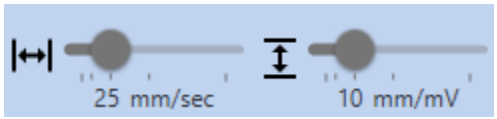
2. Select channels you wish to toggle. The visualization within the **Page View** will change immediately.

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.

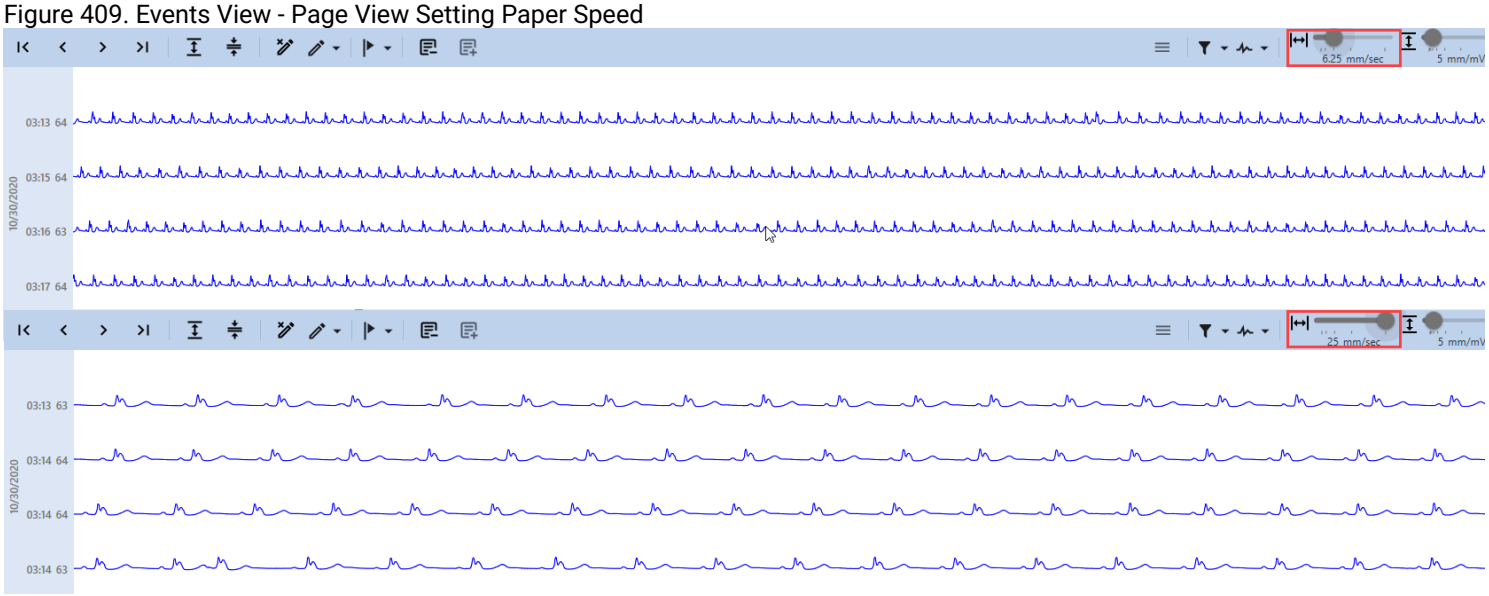
Figure 408. Events View - Scale and Gain Controls



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.

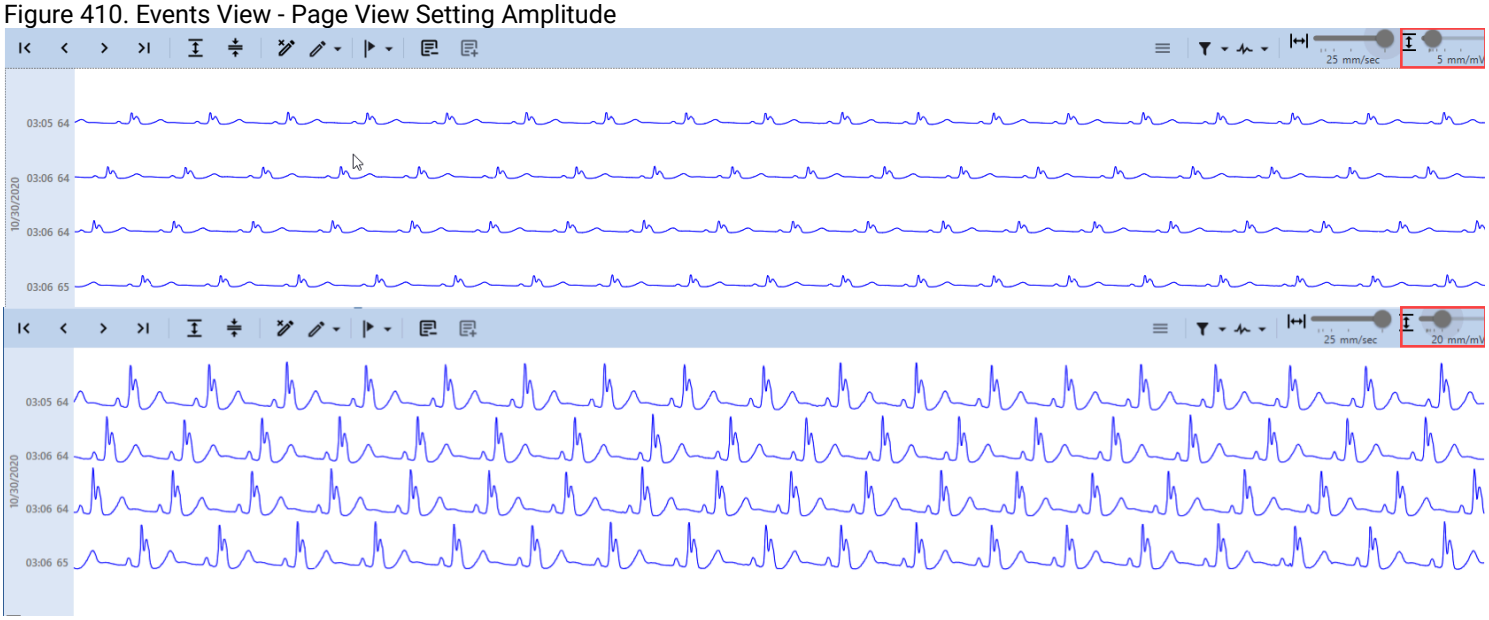
Figure 409. Events View - Page View Setting Paper Speed



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 410. Events View - Page View Setting Amplitude

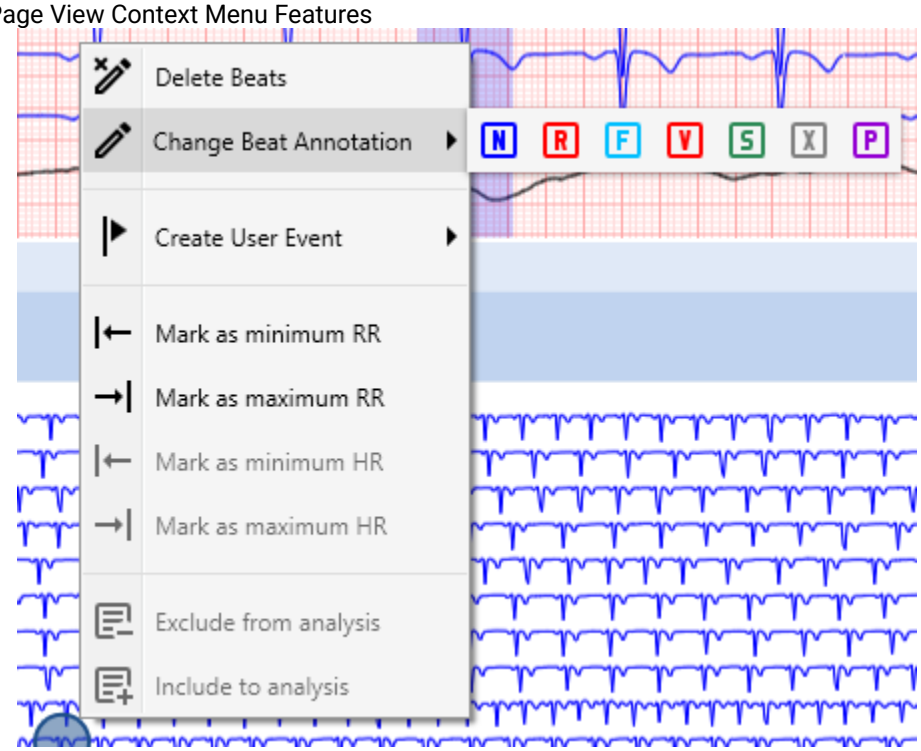


4.6.7.5.2. Context Menu Features

The **Context Menu**, accessible via right-click in the **Page View**, enables quick access to commonly used actions. It contains all functions of the **Editing Controls** available in the **Page View Toolbar** and includes additional options for marking specific points or ranges in the ECG as minimum or maximum RR or HR.

The **Context Menu** mirrors the **Page View Toolbar**, with menu options carrying the same annotations and capabilities as the corresponding buttons on the Toolbar *(on page 209)*, plus the extended **Mark as...** features.

Figure 411. Events View - Page View Context Menu Features



To mark as minimum RR or maximum RR:

1. Right-click at the desired point in the **Page View** to open the **Context Menu**.
2. Click the corresponding **Mark as minimum RR** or **Mark as maximum RR** option.

To mark as minimum HR or maximum HR:

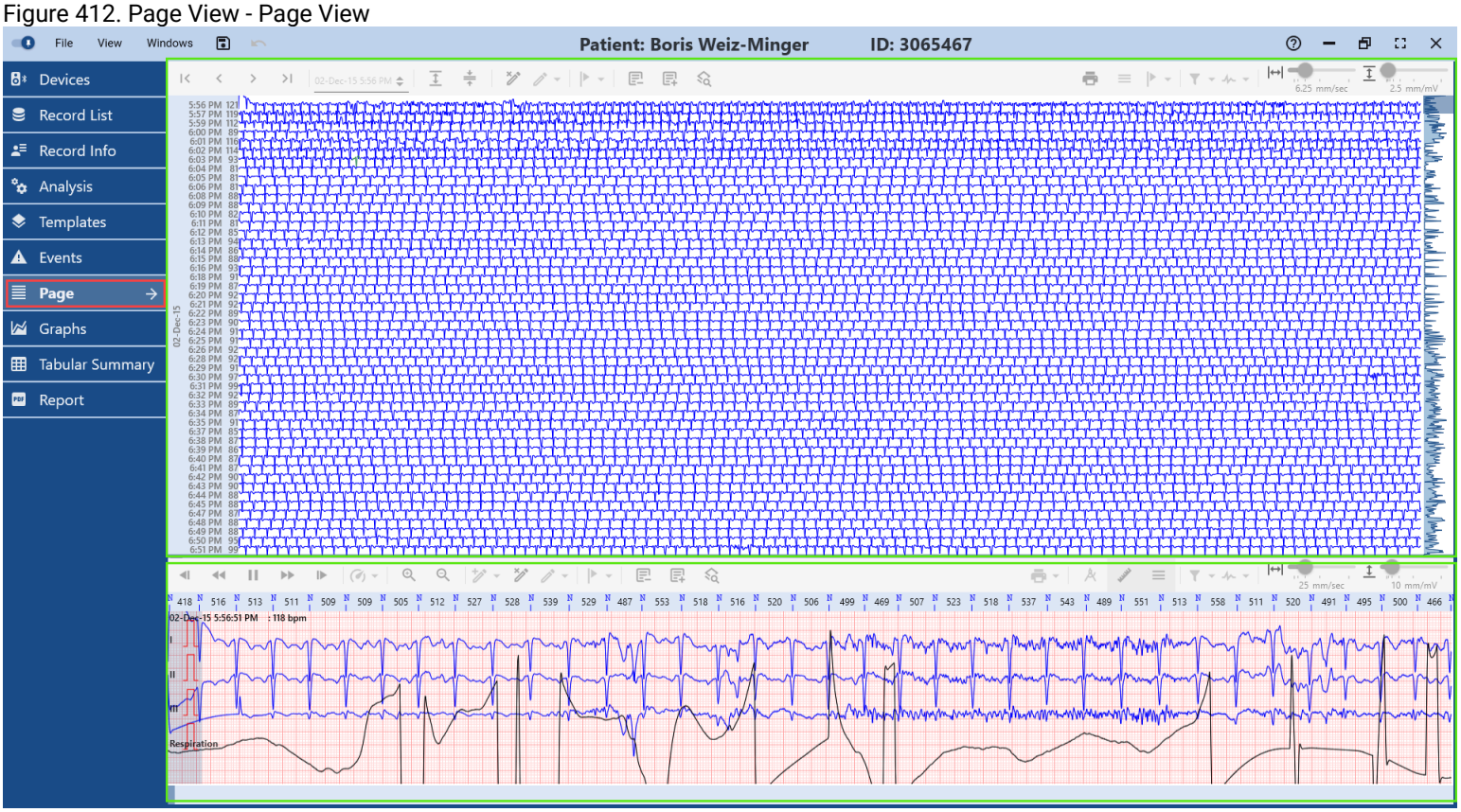
1. Right-click at the starting point in the **Page View**.
2. Hold the right mouse button and drag to the end point.
3. Release the mouse button to display the **Context Menu**.
4. Click the corresponding **Mark as minimum HR** or **Mark as maximum HR** option.

4.6.8. Page

The **Page View** displays the entire ECG data as **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 supports Secondary Screen Mode *(on page 260)* (or Dual Screen Mode), adding additional level of comfort for reviewing and editing the Recording in the **Page View**.

The **Page View** screen houses 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 412. Page View - Page View

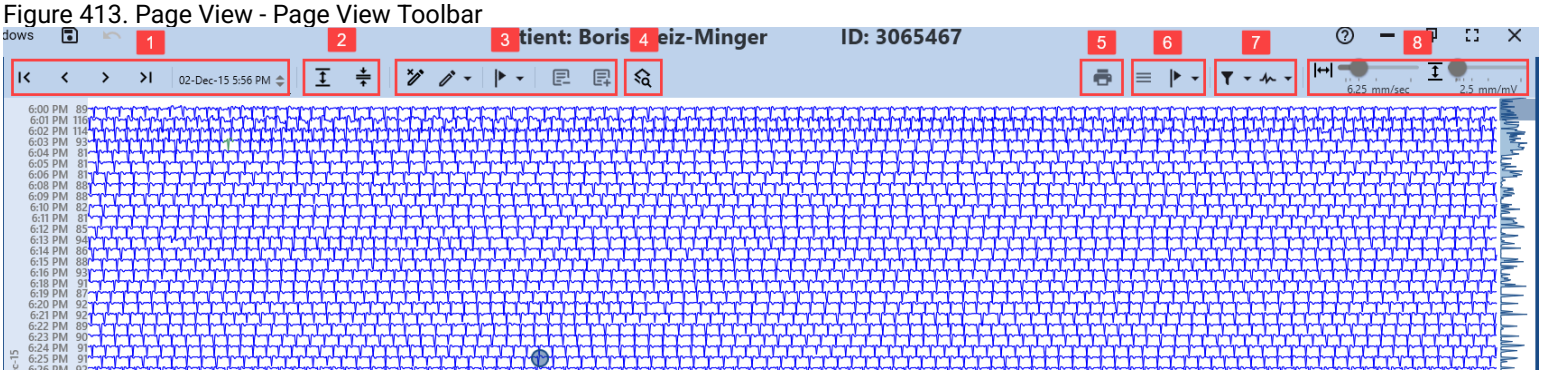


A green circle on the **Page** indicates current position in the **ECG Record**, shown in the **Strip View** below the Page.

4.6.8.1. 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 413. Page View - Page View Toolbar

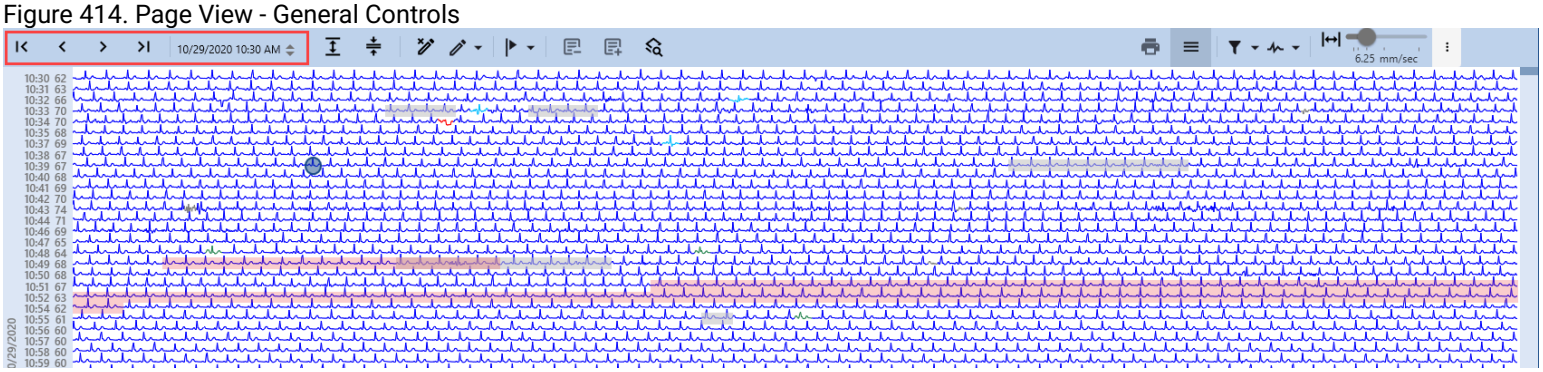


1. General Controls.
2. Page View Layout Controls.
3. Editing Controls.
4. Show in Templates Control.
5. Printing Control.
6. Events Highlighting Controls.
7. Filters.
8. Scale and Gain Controls.

General Controls

General Controls is a group of buttons designed to facilitate navigation within the **Page View**.

Figure 414. Page View - General Controls



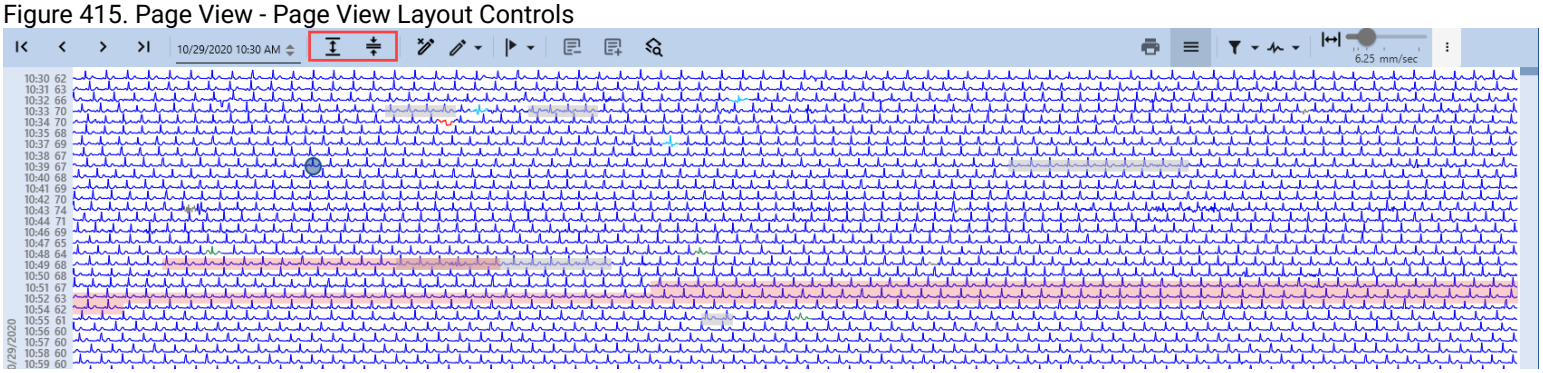
Note: To navigate within the **Page View**, you can also use the built-in scrollbar on the right.

Icon	Description
	First Page: Click to display the first page of the **Record**.
	Page Up: Click to navigate to the previous page of the **Record**.
	Page Down: Click to navigate to the next page of the **Record**.
	Final Page: Click to display the last page of the **Record**. Last pages of a Record tend to have noisy segments.
	Time Navigation Control: 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 415. Page View - Page View Layout Controls

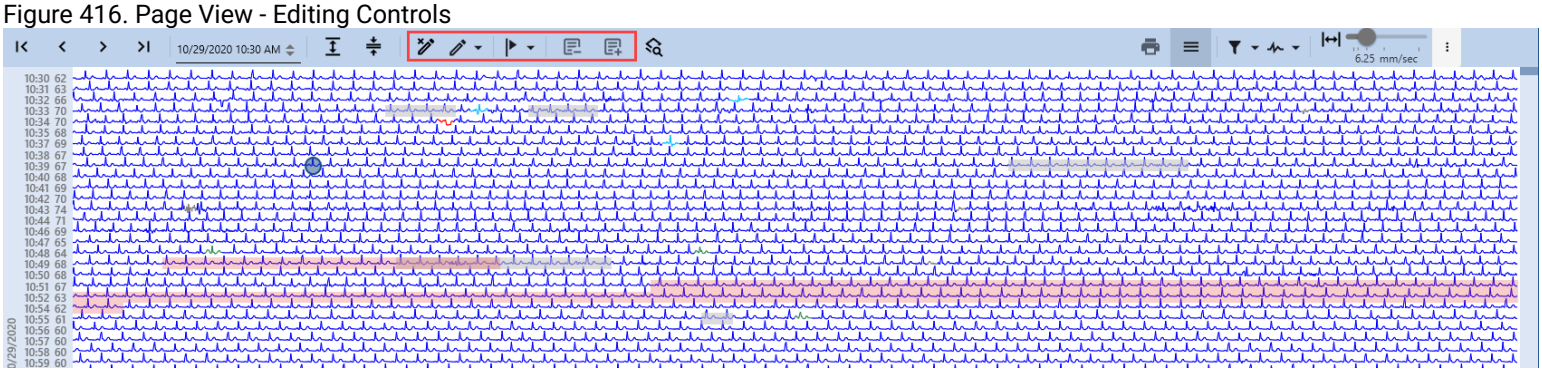


Icon	Description
	Decrease Lines Per Page button: Click to reduce the number of lines per Page, enhancing focus on specific ECG lines. This feature allows for adjusting the density of lines within the **Page View**. Repeated clicks reduce lines to a minimum of one per Page.
	Increase Lines Per Page button: 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 **Page View** as needed. However, an overpopulated **Page View** 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 416. Page View - Editing Controls



Icon	Description
	Delete Beats button: Click to delete beats within the selected area.
	Change Beats Annotation button: Enables you to modify the annotation of selected beats.
	Create User Event button: 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.
	Exclude from analysis button: Enables the exclusion of a selected fragment of an ECG record from analysis.
	Include to analysis button: 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.

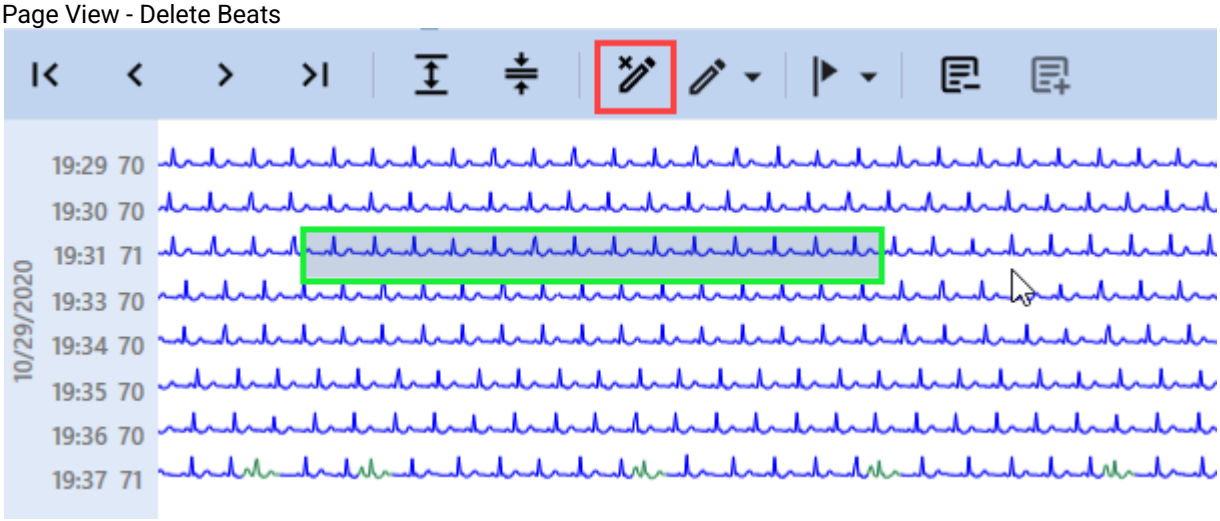
To delete a beat:

1. Select a fragment of the ECG 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:**
            1.1. Identify the initial point in the range you wish to select.
            1.2. Click the initial point.
            1.3. Hold down the **Shift** key.
            1.4. Identify the final point in the range.
            1.5. **(Optional)** Scan the Page View *(on page 210)* to locate the points of interest, if necessary.
            1.6. Click the final point to complete the range selection.
        - **Using Ctrl + Click:**
            1.1. Identify the initial point in the range you wish to select.
            1.2. Hold down the **Ctrl** key.
            1.3. Click the initial point.
            1.4. Identify the final point in your desired range.
            1.5. **(Optional)** Scan the Page View *(on page 210)* to locate the points of interest, if necessary.
            1.6. Drag the cursor to the final point and release the mouse button to complete the selection.
        - **Using the right mouse button:**
            1.1. Click the **Page View** and hold the right mouse button to designate the initial point in the range you wish to select.
            1.2. Drag the cursor to set the final point.

1.3. **(Optional)** Scan the Page View *(on page 210)* to locate the points of interest, if necessary.

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

Figure 417. Page View - Delete Beats



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

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:** Click the first point, then hold **Shift** and click the end point. Scan the Page View *(on page 210)* to locate the points of interest, if necessary.
     - **Using Ctrl + Click:** Hold **Ctrl**, click the start point, drag to the endpoint, and release. Scan the Page View *(on page 210)* to locate the points of interest, if necessary.
     - **Using the right mouse button:** Right-click and drag to highlight the desired segment. Scan the Page View *(on page 210)* to locate the points of interest, if necessary.
2. Hover over the **Change Beats Annotation** button in the **Page View Toolbar** to expand the drop-down list.

Figure 418. 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 6. Beats Reclassification Keyboard Shortcuts for Page View

Action	Button	Keyboard Keys
Classify as **Normal**		**N**
Classify as **R** on **T**		**R**
Classify as **Fusion**		**F**
Classify as **VPB**		**V**
Classify as **SVE**		**S**
Classify as **Questionable**		**X**
Classify **Paced**		**P**

To create a user event:

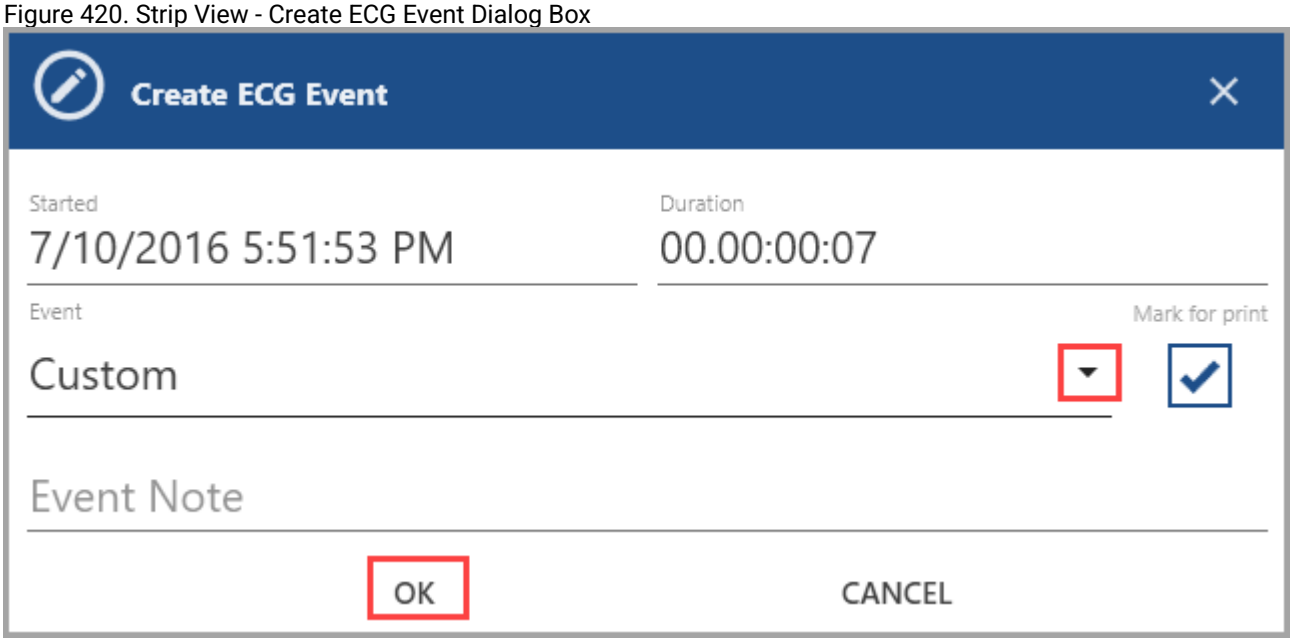
1. Select a fragment of the ECG, which you wish to reclassify as a continuous event, using one of the following methods:
    - Click an individual beat to select it.
    - Select a fragment of the waveform using one of these methods:
        - **Using Shift + Click:** Click the first point, then hold **Shift** and click the end point. Scan the Page View *(on page 210)* to locate the points of interest, if necessary.
        - **Using Ctrl + Click:** Hold **Ctrl**, click the start point, drag to the endpoint, and release. Scan the Page View *(on page 210)* to locate the points of interest, if necessary.
        - **Using the right mouse button:** Right-click and drag to highlight the desired segment. Scan the Page View *(on page 210)* to locate the points of interest, if necessary.
2. Hover over the **Create User Event** button or menu option to expand the drop-down list.

Figure 419. Page View - Create User Event



3. Click the relevant type of **Event** you wish to create in the selected area.
4. Review the event details in the **Create ECG Event** dialog box:
    - Re-select or confirm the event type using the drop-down menu.
    - **(Optional)** Check or uncheck the **Mark for print** checkbox.
    - **(Optional)** Enter a custom event note in the **Event Note** field.

Figure 420. Strip View - Create ECG Event Dialog Box

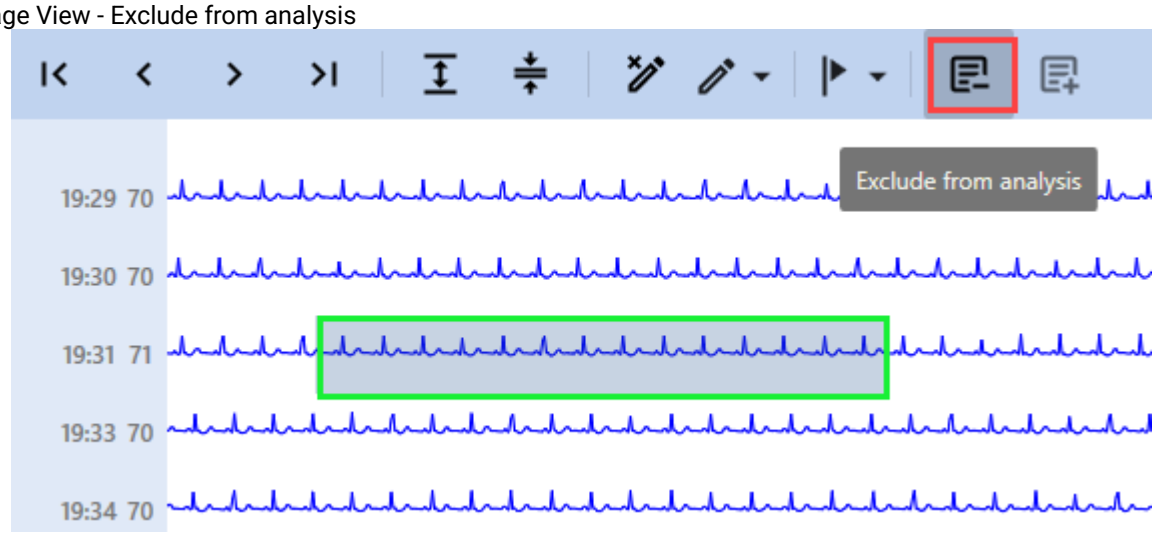


5. Click **OK** to confirm or **Cancel** to discard changes.

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:** Click the first point, then hold **Shift** and click the end point. Scan the Page View *(on page 210)* to locate the points of interest, if necessary.
        - **Using Ctrl + Click:** Hold **Ctrl**, click the start point, drag to the endpoint, and release. Scan the Page View *(on page 210)* to locate the points of interest, if necessary.
        - **Using the right mouse button:** Right-click and drag to highlight the desired segment. Scan the Page View *(on page 210)* to locate the points of interest, if necessary.
2. Click the **Exclude from Analysis** button or select the same option from the context menu.

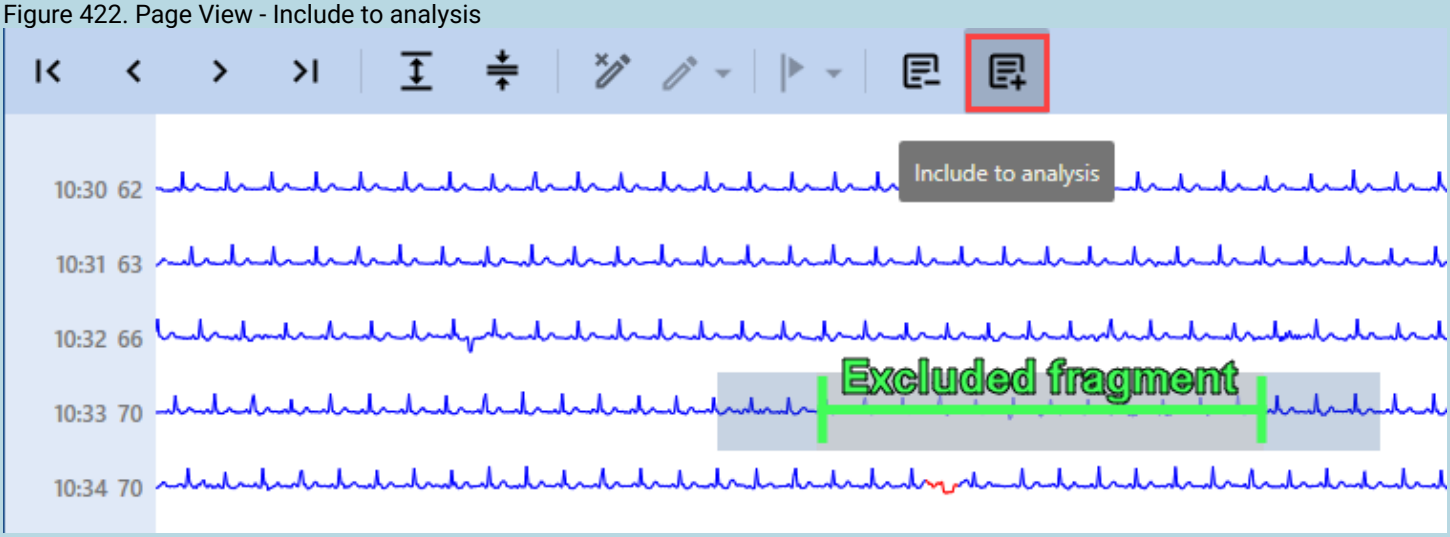
Figure 421. Page View - Exclude from analysis



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 422. Page View - Include to analysis



1. Select a fragment of the ECG, you want to re-include in 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:** Click the first point, then hold **Shift** and click the end point. Scan the Page View *(on page 210)* to locate the points of interest, if necessary.
- **Using Ctrl + Click:** Hold **Ctrl**, click the start point, drag to the endpoint, and release. Scan the Page View *(on page 210)* to locate the points of interest, if necessary.
- **Using the right mouse button:** Right-click and drag to highlight the desired segment. Scan the Page View *(on page 210)* to locate the points of interest, if necessary.

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
	**Show In Templates button:** Click this button to display the beat you have selected in the **Page View**; it will be highlighted in the relevant template within the **Templates Pane *(on page 112)***.

Events Highlighting Controls

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 423. Events View - Page View Highlight Events Button OFF

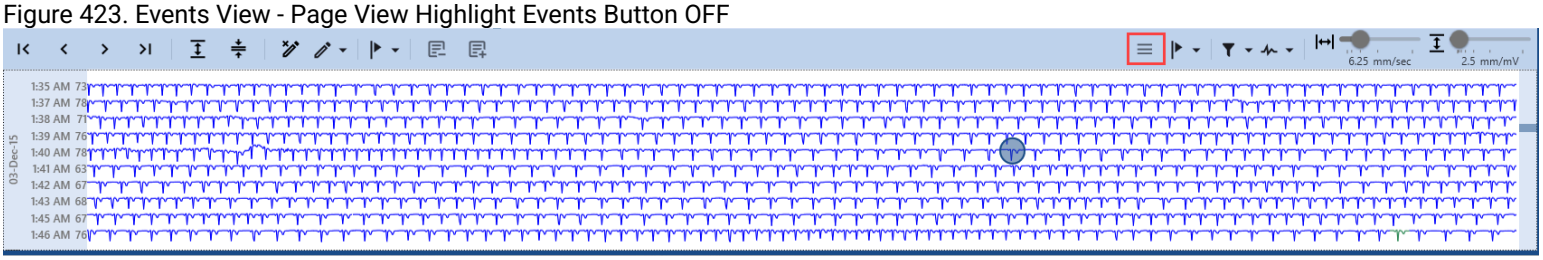
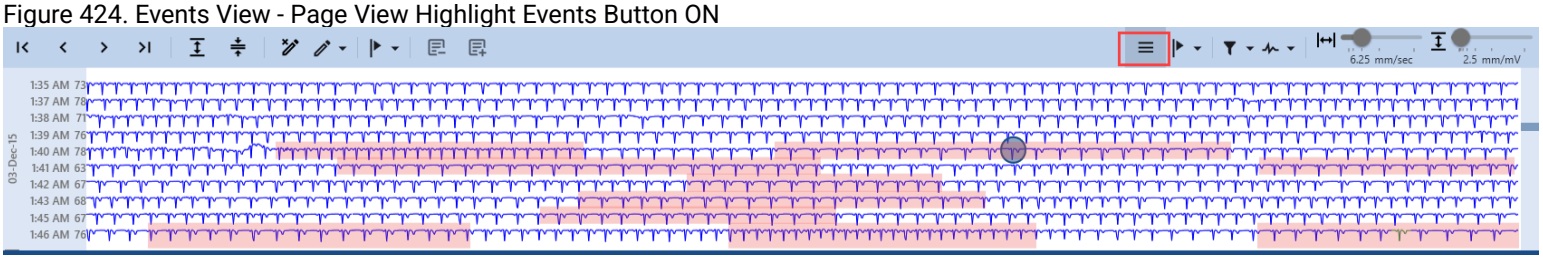
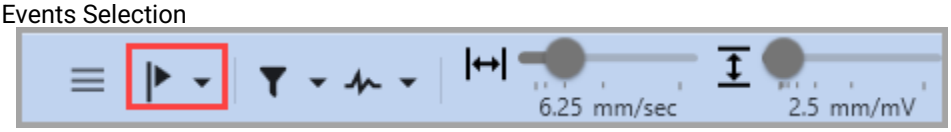


Figure 424. Events View - Page View Highlight Events Button ON



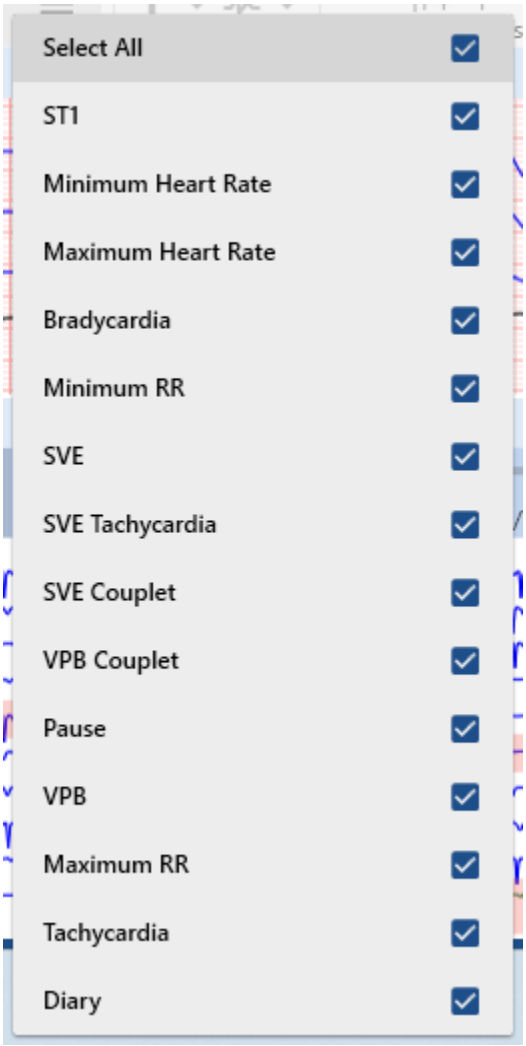
Hover over the **Events Selection** combo box button to view a list of event types available for highlighting in the **Page View**:

Figure 425. Events View - Events Selection



- **To select or unselect all events:** Check or uncheck the **Select All** checkbox.
- **To select or unselect individual event types:** Click the checkbox next to the desired event name. Selected event types will be highlighted in the **Page View**.

Figure 426. Events View - Events Selection Combo Box



Filters

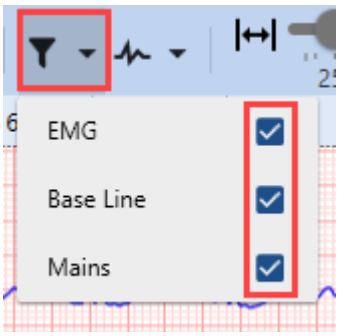
This group of controls allows you to apply various filters affecting waveform visualization and enhancing the accuracy and reliability of ECG analysis.

Icons	Description
	Filter: This control enables you to toggle **ON/OFF** the visualization of the waveform with applied **EMG, Base Line**, and **Mains** 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.
	Channel Selection: This control lets you select the channel(s) for display within the **Page View**, using the drop-down list (up to 12 channels, depending on the number of channels in the current **Record**.

To toggle filters ON/OFF:

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

Figure 427. Page View - Toggling Filters



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

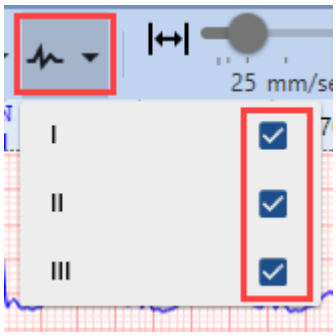
It is recommended to keep filters **ON** to provide accurate analysis:

- **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 428. Page View - Toggling Channels



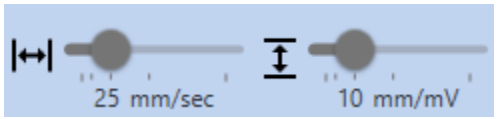
2. Select channels you wish to toggle. The visualization within the **Page View** will change immediately.

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.

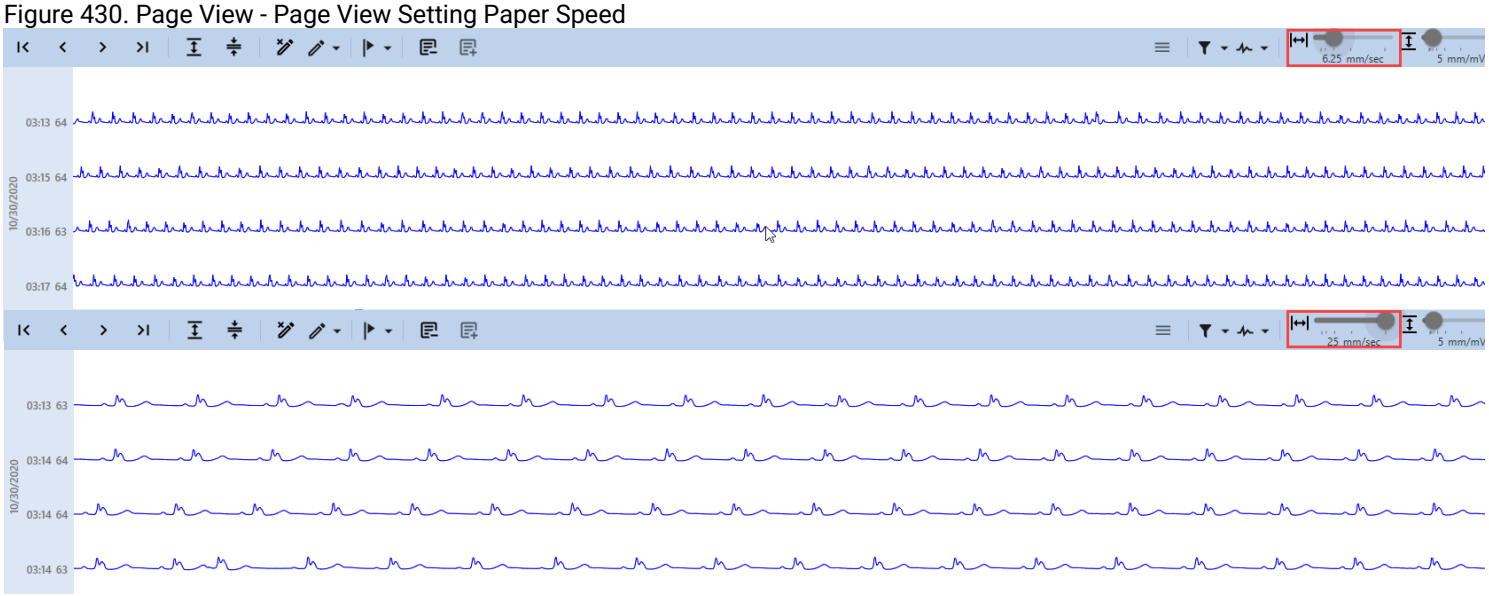
Figure 429. Page View - Scale and Gain Controls



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.

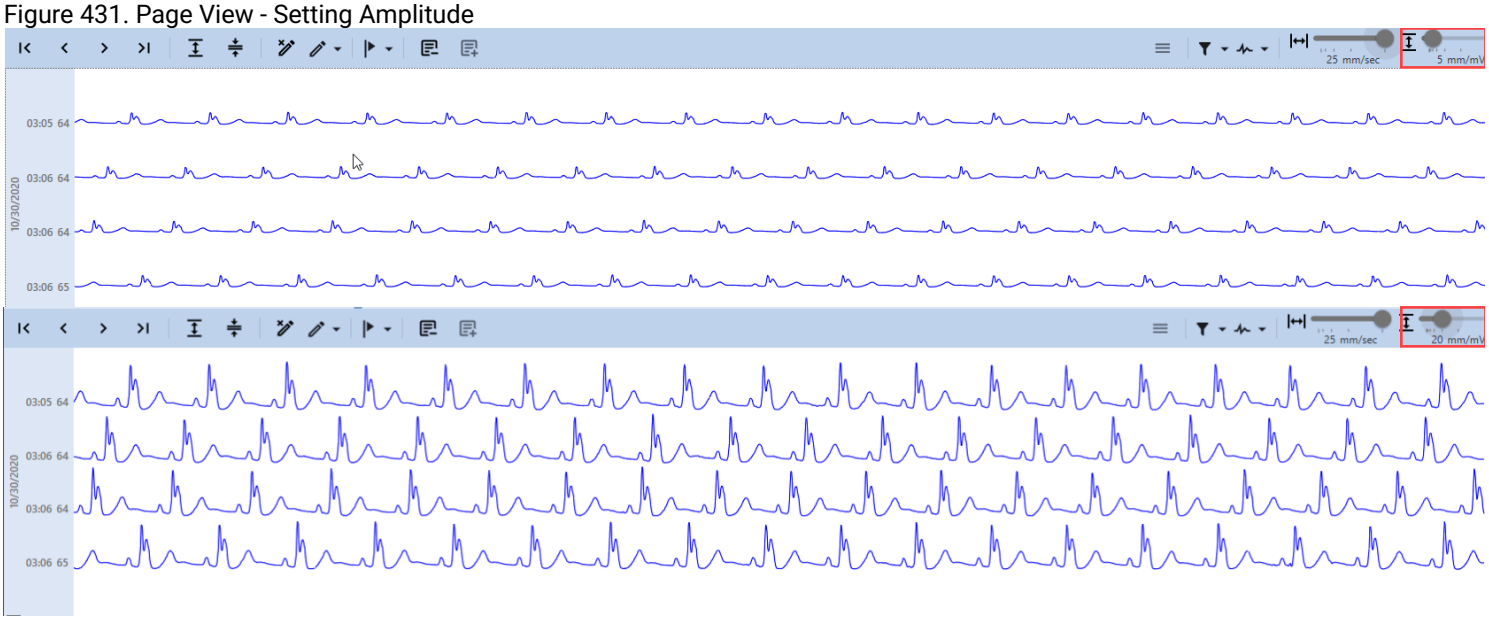
Figure 430. Page View - Page View Setting Paper Speed



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.

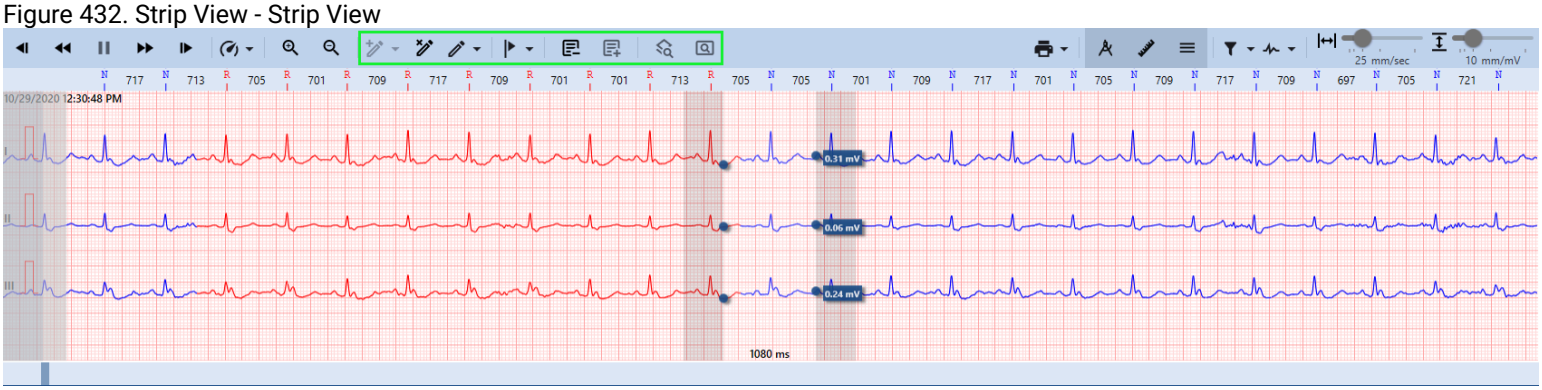
Figure 431. Page View - Setting Amplitude



4.6.8.2. 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**. Its settings also determine how **Strip View** fragments are presented in the generated **Report**. 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 432. Strip View - Strip View



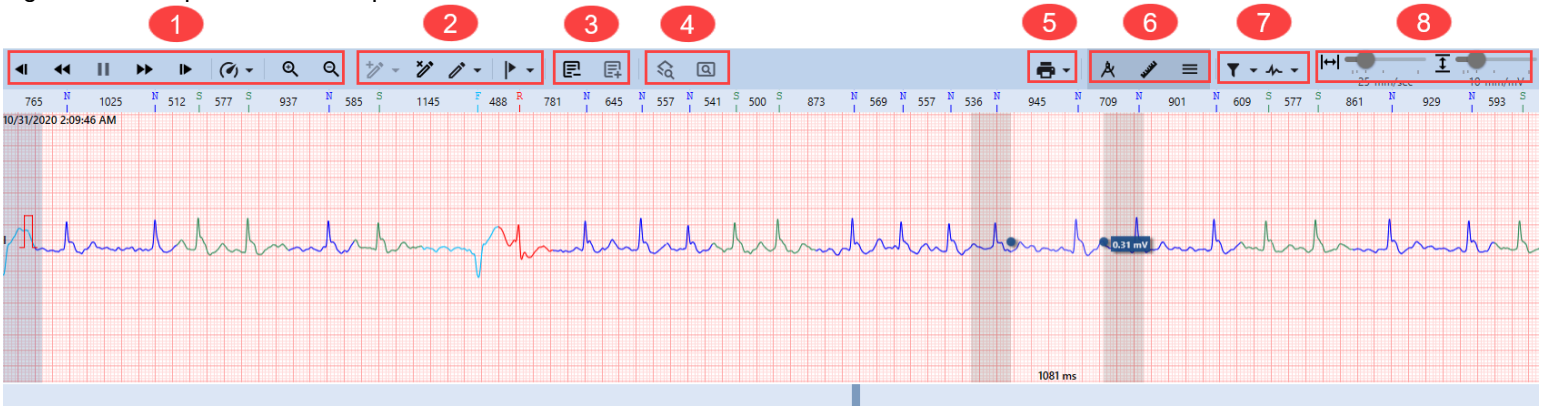
Note:

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.

4.6.8.2.1. 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 433. Templates 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
	**Step Backward button:** Click to move the ECG Strip one step backward for scanning and reviewing.
	**Scan Backward button:** Click to initiate continuous backward scanning of the ECG Strip.
Icon	**Description**
	**Pause Scan button:** Click to halt continuous scanning of the ECG Strip. For example, if you have activated a **Scan**

Icon	Description
	Pause Scan button: Click to halt continuous scanning of the ECG Strip. For example, if you have activated a **Scan Backward** or a **Scan Forward** button, halt scanning by clicking the **Pause Scan** button.
	Scan Forward button: Click to initiate continuous forward scanning of the ECG Strip.
	Step Forward button: Click to move the ECG Strip one step forward for scanning and reviewing.
	Scan Speed button: Allows you to control the scanning speed. To set the scanning speed: 1. Hover over the **Scan Speed** icon to expand the drop-down list. 2. Click the desired scanning speed multiplier, ranging from ×1 to ×128.
	Zoom In button: Click to adjust the scale of the waveform in the **Strip View**, focusing on specific areas or comparing different fragments of the ECG record.
	Zoom Out button: Click to adjust the scale of the waveform in the **Strip View**. 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 are a group of buttons that facilitate beats and events management in the **Strip View**.

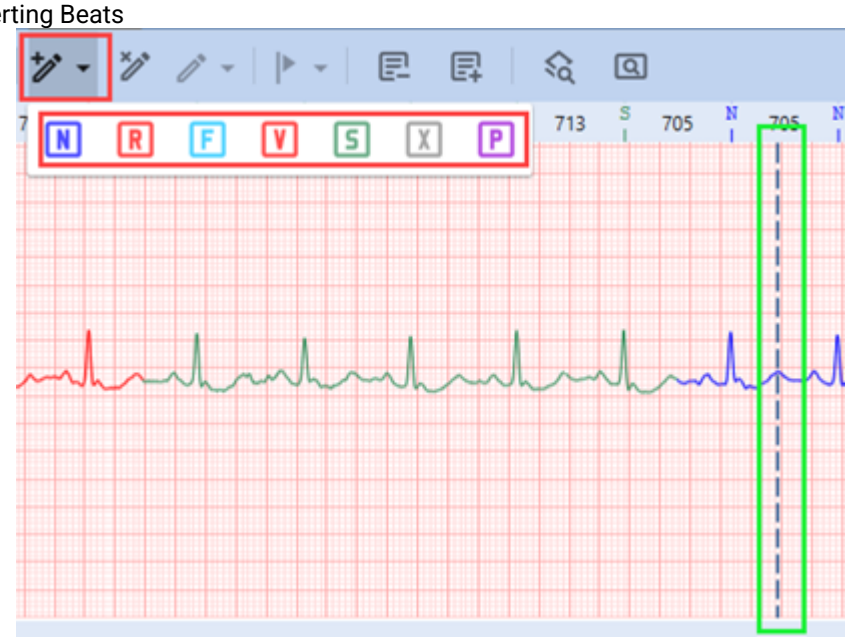
Icon	Description
	Insert Beat button: Allows you to insert new beats between existing ones. Further instructions are presented below.
	Delete Beats button: Click to delete a selected beat.
	Change Beats Annotation button: Enables you to modify the annotation of selected beats.
	Create User Event button: 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 appear, 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 434. 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:** Click the first point, then hold **Shift** and click the end point. Scan the Strip View *(on page 232)* to locate the points of interest, if necessary.
     - **Using Ctrl + Click:** Hold **Ctrl**, click the start point, drag to the endpoint, and release. Scan the Strip View *(on page 232)* to locate the points of interest, if necessary.
     - **Using the right mouse button:** Right-click and drag to highlight the desired segment. Scan the Strip View *(on page 232)* to locate the points of interest, if necessary.

Figure 435. Strip View - Deleting Beats

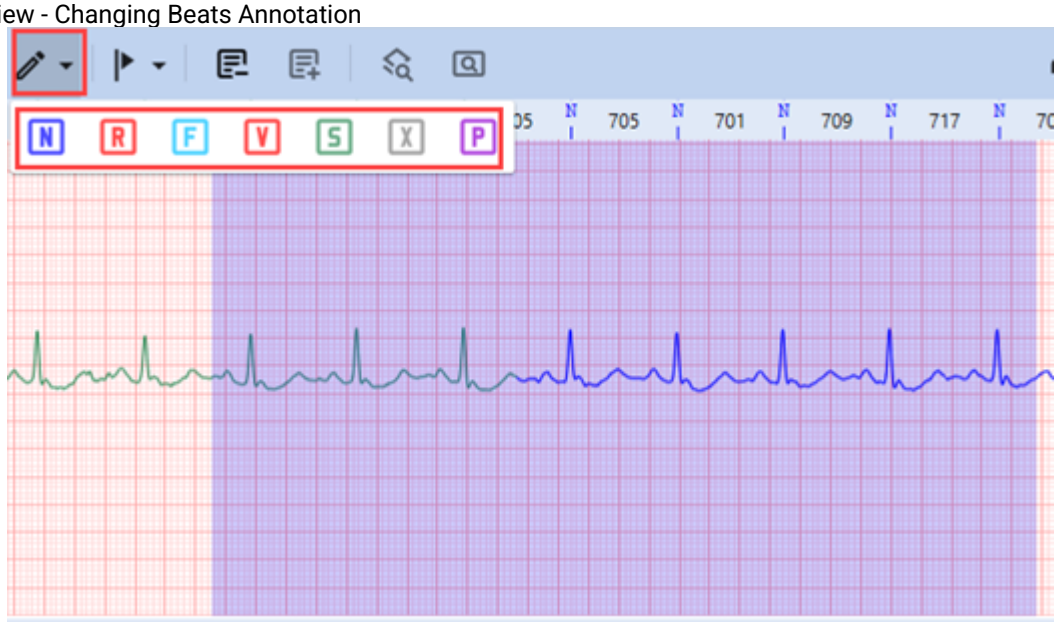


2. Click the **Delete Beats** button.

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:** Click the first point, then hold **Shift** and click the end point. Scan the Strip View *(on page 232)* to locate the points of interest, if necessary.
     - **Using Ctrl + Click:** Hold **Ctrl**, click the start point, drag to the endpoint, and release. Scan the Strip View *(on page 232)* to locate the points of interest, if necessary.
     - **Using the right mouse button:** Right-click and drag to highlight the desired segment. Scan the Strip View *(on page 232)* to locate the points of interest, if necessary.

Figure 436. Strip View - 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.

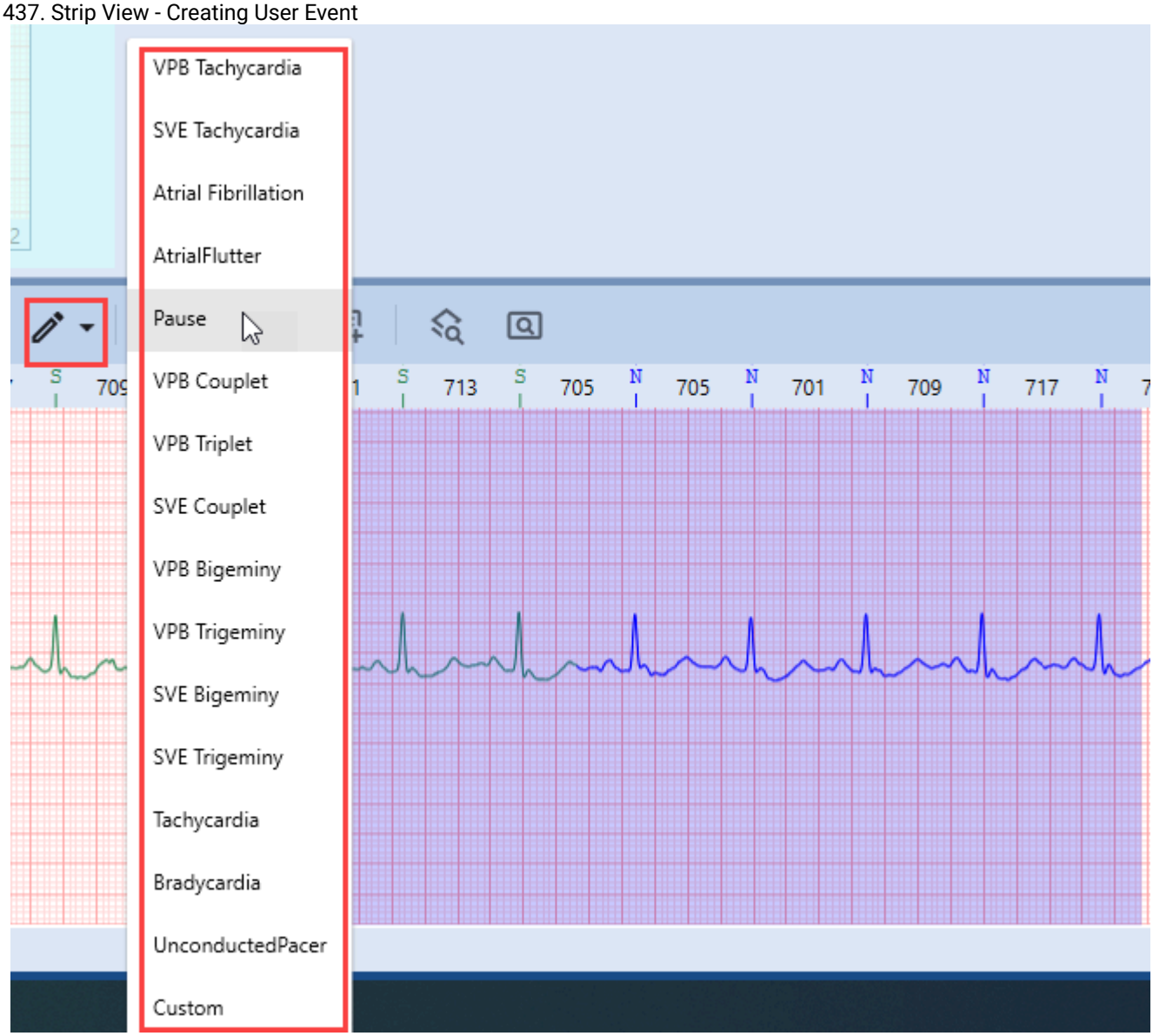
Table 7. Beats Reclassification Keyboard Shortcuts for Strip View

Action	Button	Keyboard Keys
Classify as **Normal**		**N**
Classify as **R** on **T**		**R**
Classify as **Fusion**		**F**
Classify as **VPB**		**V**
Classify as **SVE**		**S**
Classify as **Questionable**		**X**
Classify **Paced**		**P**

To create a user event:

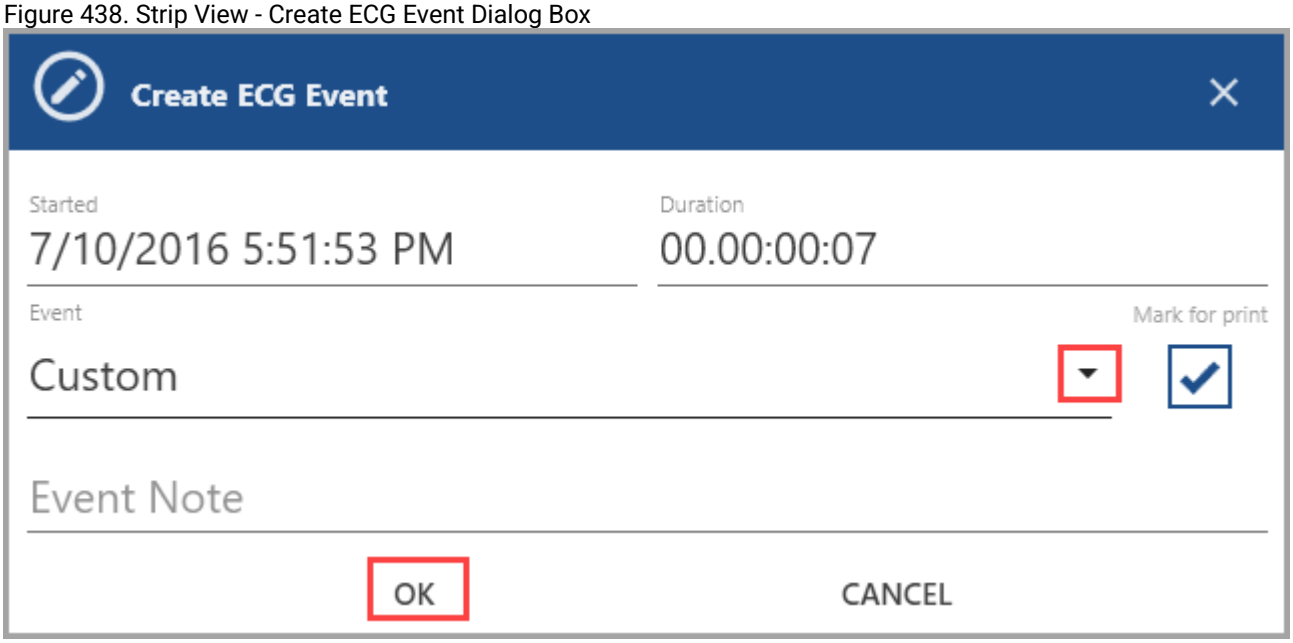
1. Select a fragment of the ECG, which you wish to reclassify as a continuous event, using one of the following methods:
    - Click an individual beat to select it.
    - Select a fragment of the waveform:
        - **Using Shift + Click:** Click the first point, then hold **Shift** and click the end point. Scan the Strip View *(on page 232)* to locate the points of interest, if necessary.
        - **Using Ctrl + Click:** Hold **Ctrl**, click the start point, drag to the endpoint, and release. Scan the Strip View *(on page 232)* to locate the points of interest, if necessary.
        - **Using the right mouse button:** Right-click and drag to highlight the desired segment. Scan the Strip View *(on page 232)* to locate the points of interest, if necessary.

Figure 437. 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.
4. Review the event details in the **Create ECG Event** dialog box:
    - Re-select or confirm the event type using the drop-down menu.
    - **(Optional)** Check or uncheck the **Mark for print** checkbox.
    - **(Optional)** Enter a custom event note in the **Event Note** field.

Figure 438. Strip View - Create ECG Event Dialog Box



5. Click **OK** to confirm or **Cancel** to discard changes.

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.

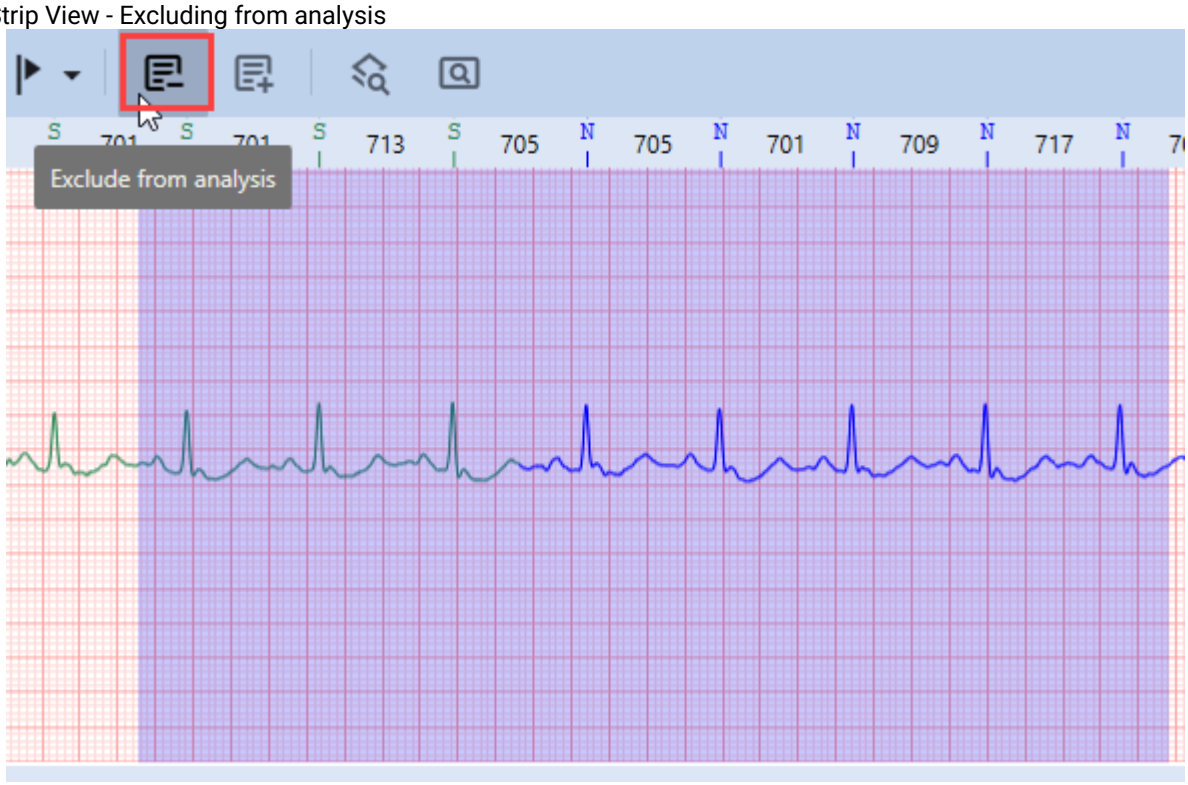
Icon	Description
	Exclude from analysis button: Enables the exclusion of a selected fragment of an ECG record from analysis.
	Include to analysis button: Enables the re-inclusion of previously excluded fragments of an ECG record.

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:** Click the first point, then hold **Shift** and click the end point. Scan the Strip View *(on page 232)* to locate the points of interest, if necessary.
   - **Using Ctrl + Click:** Hold **Ctrl**, click the start point, drag to the endpoint, and release. Scan the Strip View *(on page 232)* to locate the points of interest, if necessary.
   - **Using the right mouse button:** Right-click and drag to highlight the desired segment. Scan the Strip View *(on page 232)* to locate the points of interest, if necessary.

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

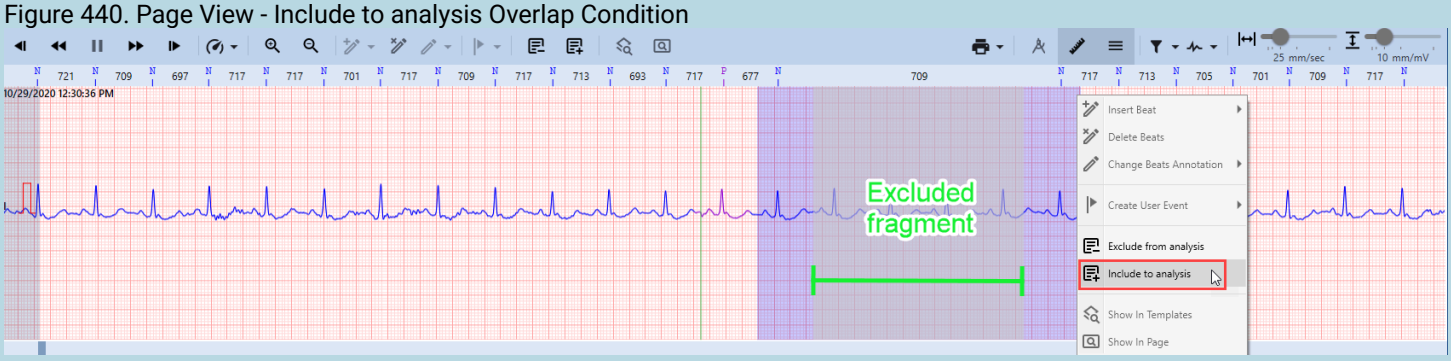
Figure 439. Strip View - Excluding from analysis



To re-include an ECG segment into analysis:

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

Figure 440. 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:** Click the first point, then hold **Shift** and click the end point. Scan the Strip View *(on page 232)* to locate the points of interest, if necessary.
   - **Using Ctrl + Click:** Hold **Ctrl**, click the start point, drag to the endpoint, and release. Scan the Strip View *(on page 232)* to locate the points of interest, if necessary.
   - **Using the right mouse button:** Right-click and drag to highlight the desired segment. Scan the Strip View *(on page 232)* to locate the points of interest, if necessary.

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

Figure 441. Strip View - Including to analysis

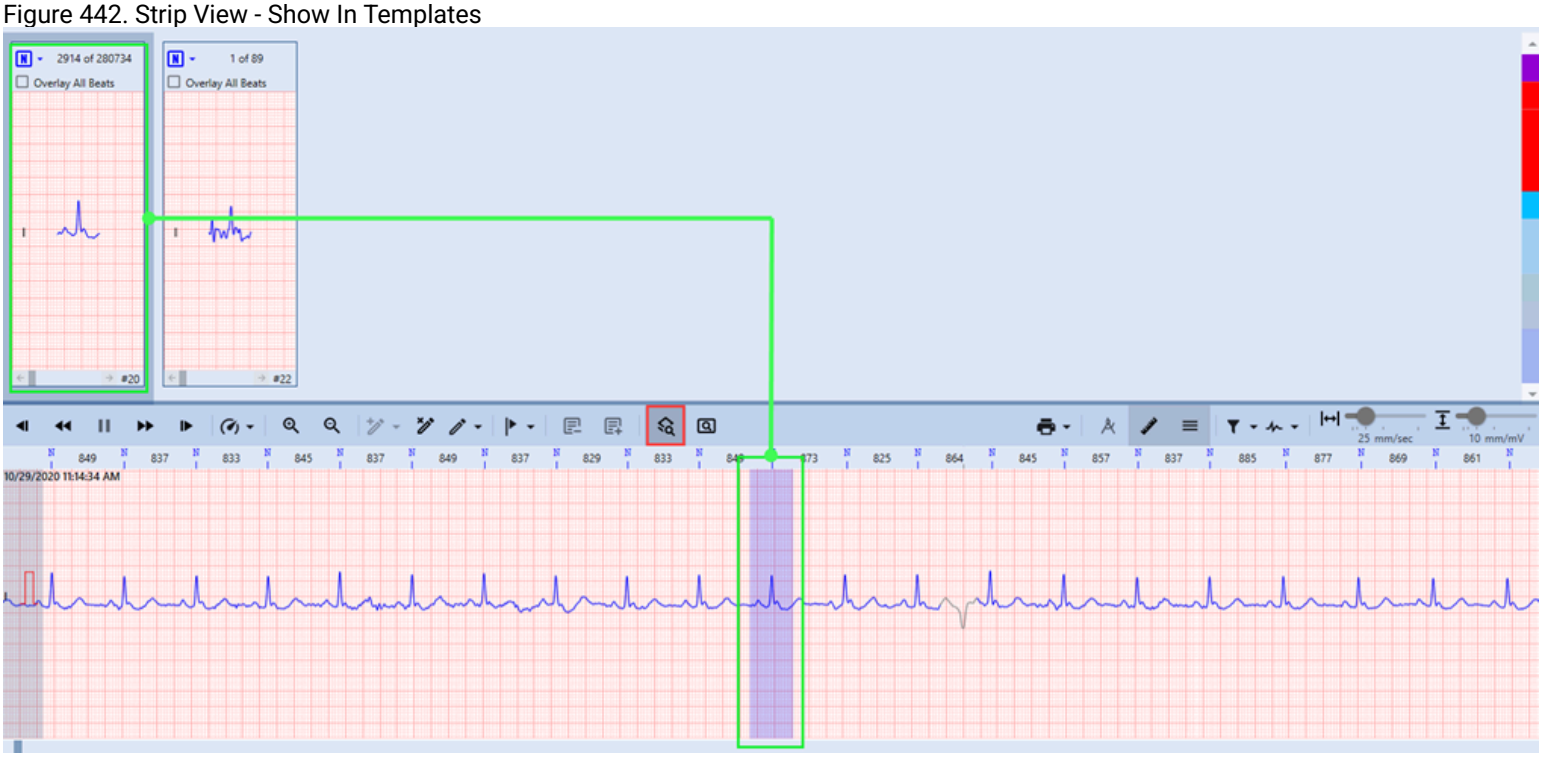


Views Switching Controls

Views Switching Controls are a group of buttons that allow 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
	Show In Templates button: Click this button to display the beat you have selected in the **Strip View**; it will be highlighted in the relevant template within the **Templates Pane**.
	Show in Page: Facilitates an immediate switch to **Page View**, revealing the precise location of the chosen beat within this particular **Template** in both the **Signal Page** and the **ECG Strip**.

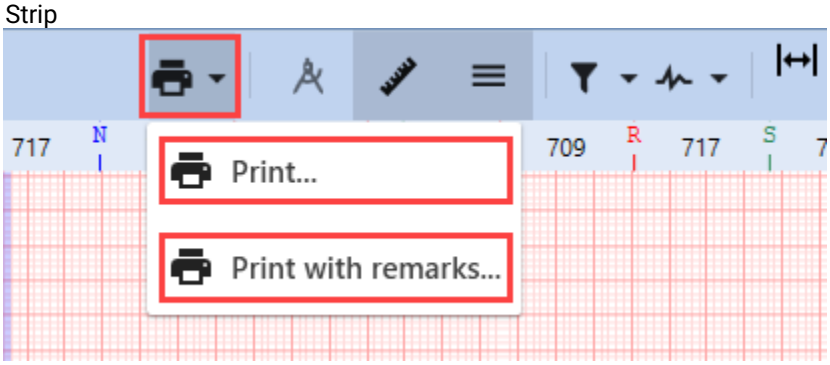
Figure 442. Strip View - Show In Templates



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.

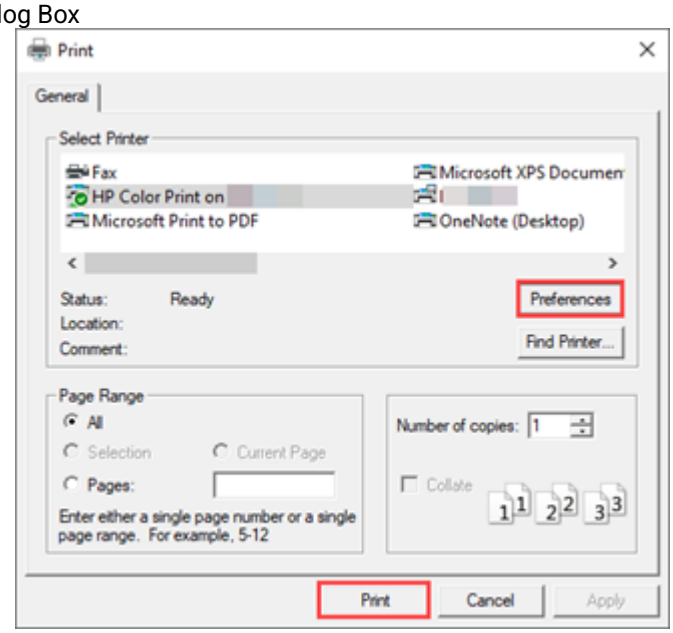
Figure 443. Strip View - Printing Strip



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 232)* 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 444. Strip View - Printing Dialog Box



   4.1. Choose a printer **available** in the **Select Printer** window.

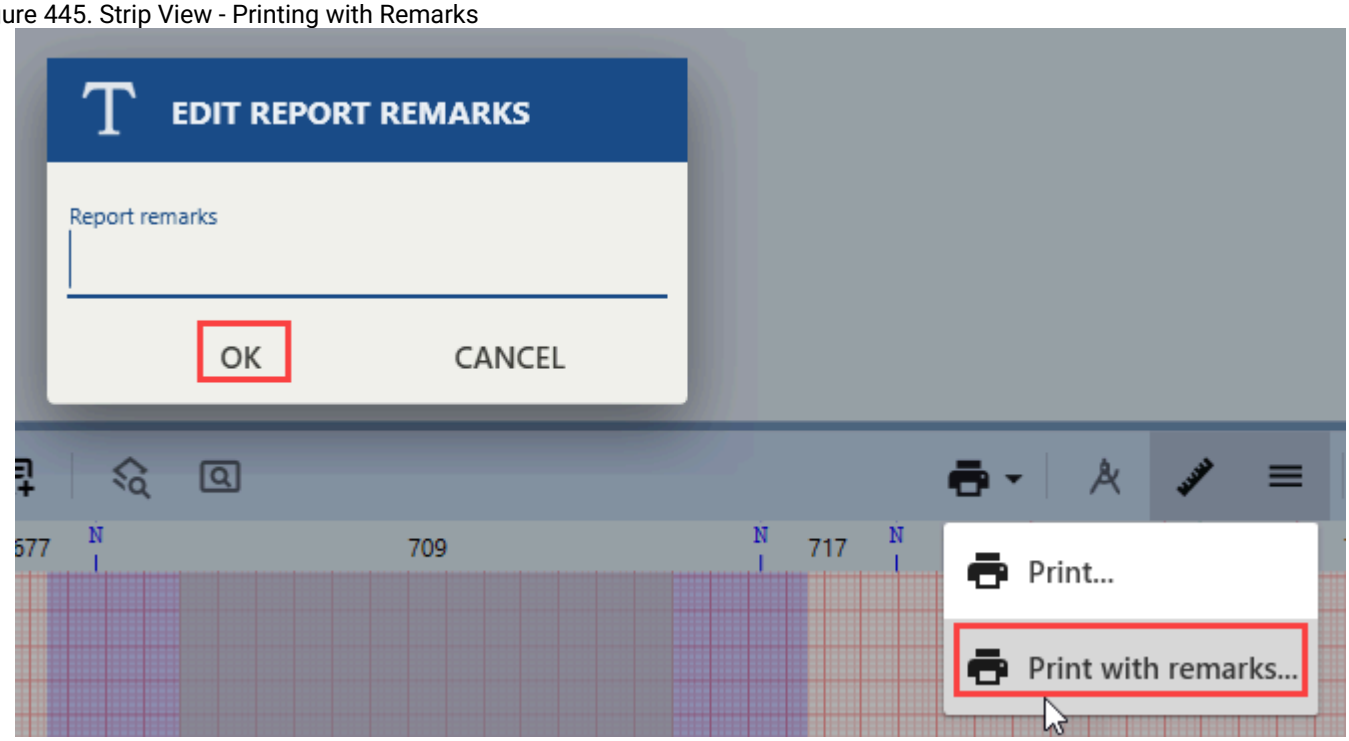
   4.2. Adjust other preferences according to your needs.

   4.3. 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:

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

Figure 445. Strip View - Printing with Remarks



5.2. When you are complete with filling in you remarks, click OK.

5.3. **(Optional)** Click **Cancel** to abandon this action.

5.4. Choose a printer available in the **Select Printer** window.

5.5. Adjust other preferences according to your needs.

5.6. Click **Print** at the bottom of the dialog box to execute the printing of the waveform fragment.

Measuring Controls

Measuring Controlsare 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 173)* in the following sections.

Icon	Description
	Caliper toggle: Click to toggle **ON/OFF** the **Caliper** tool. The **Caliper** tool assists with measuring intervals and amplitudes, such as the RR interval, T-wave, and QRS complex amplitudes. Refer to the Measuring ECG with Caliper *(on page 173)* section for details.
	ECG Ruler toggle: Click to toggle **ON/OFF** the **ECG Ruler**, located right below the **Strip View Toolbar**. The **ECG Ruler** indicates the duration of RR intervals for adjacent beats and their morphology classification (i.e., N, R, F, V, etc.).
	Channel Numeration toggle: Click to toggle **ON/OFF** the channel numeration on the left side of the ECG Strip.

Figure 446. Strip View - Caliper Tool

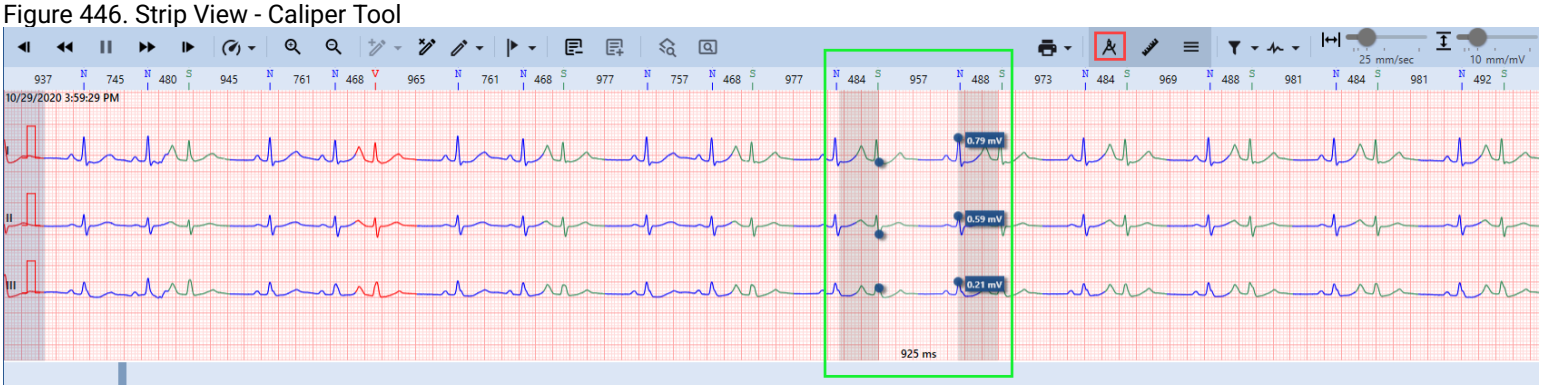
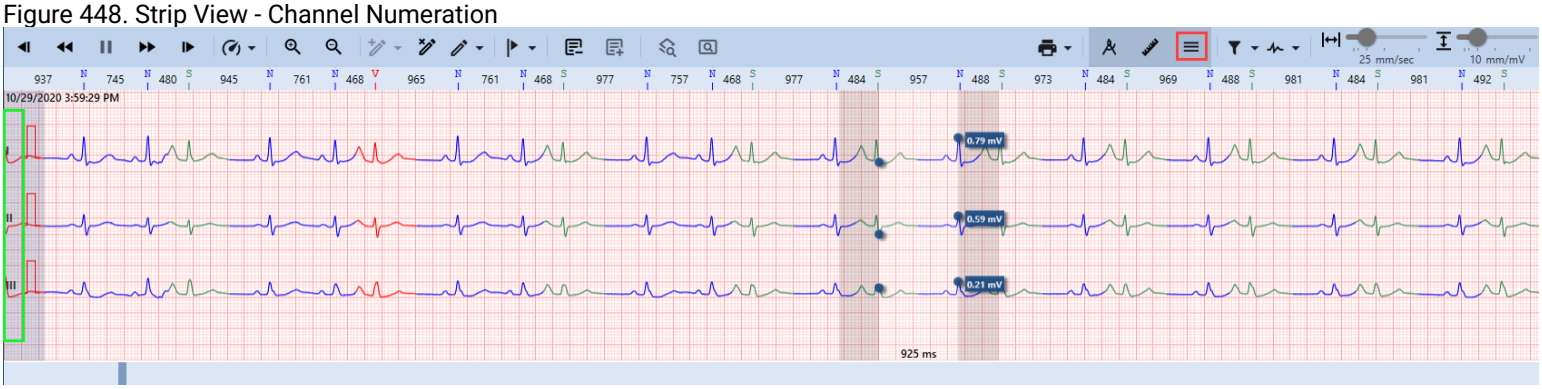


Figure 447. Strip View - ECG Ruler



Figure 448. Strip View - Channel Numeration



Filters

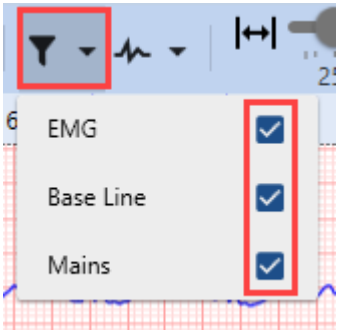
This group of controls allows you to apply various filters affecting beat visualization and enhancing the accuracy and reliability of ECG analysis.

Icons	Description
	**Filter**: This control enables you to toggle **ON/OFF** the visualization of the waveform with applied **EMG, Base Line**, and **Mains** 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.
	**Channel Selection:** This control lets you select the channel(s) for display within the **Strip View**, using the drop-down list (up to 12 channels, depending on the number of channels in the current **Record**).

To toggle filters **ON/OFF**:

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

Figure 449. Strip View - Toggling Filters



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

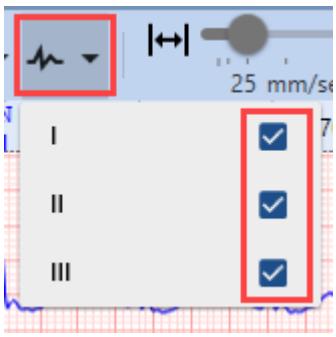
It is recommended to keep filters **ON** to provide accurate analysis:

- **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 450. Strip View - Toggling Channels



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

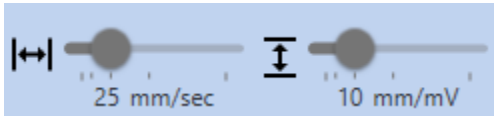
Toggling **ON/OFF** ECG channels enhances the accuracy and efficiency of ECG analysis. This feature allows you to focus on specific channels, compare them, filter out noise and more.

Note: The **Channel Selection** settings are synchronized across all **Views** that include the **Strip View**

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.

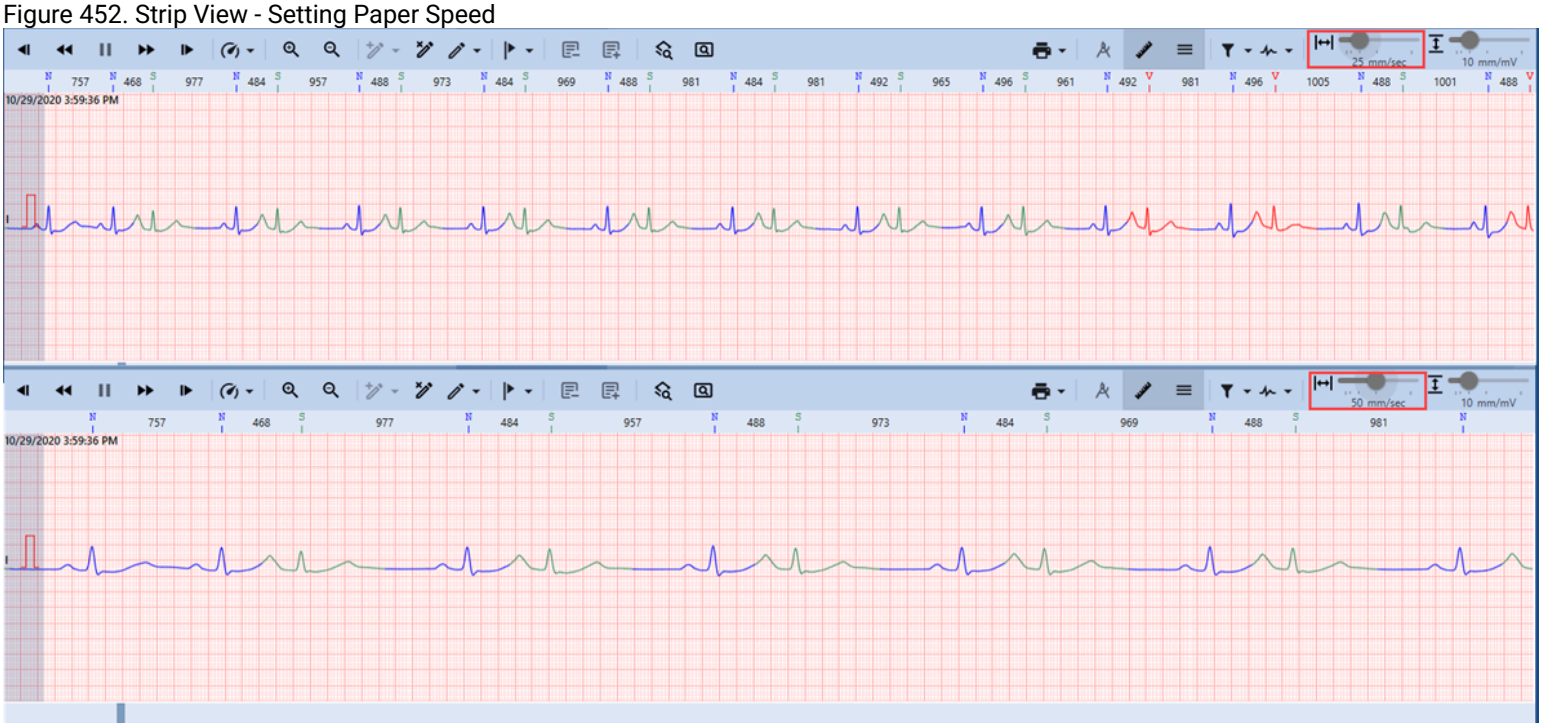
Figure 451. Strip View - Scale and Gain Controls



To change the paper speed:

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

Figure 452. 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.

Note: The amplitude settings are synchronized across all **Views** that include the **Strip View**

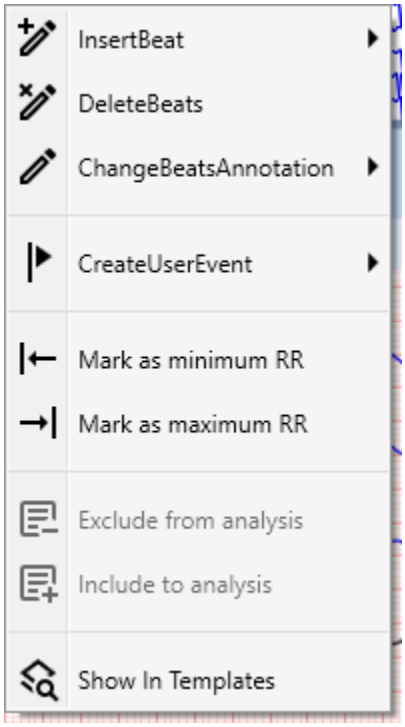
Figure 453. Strip View - Setting Amplitude



4.6.8.2.2. 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 454. 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 within the **Strip View**.

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

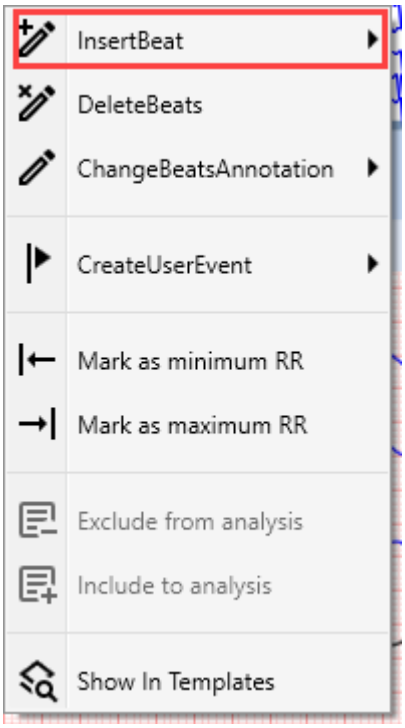
Figure 455. Strip View - Positioning Beat



- Hold Alt and click in the **Strip View**: A vertical dotted line will appear, 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 456. 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.

Note: You can modify how beat insertion works by turning ON the **Select Both Sample and Beat on Click** *(on page 26)* option in the **File > Settings** menu.

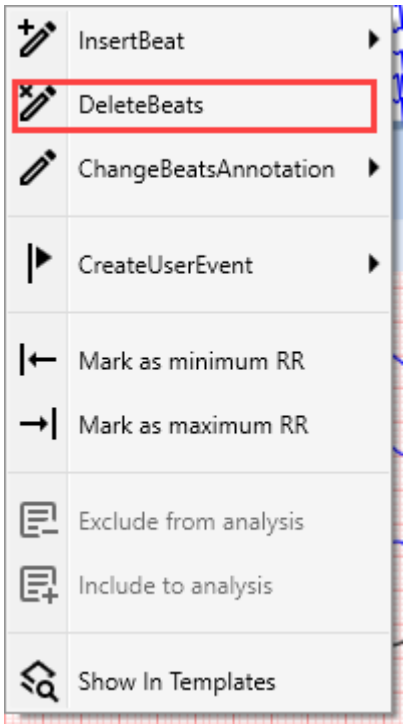
Delete Beats

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:**
            1.1. Identify the initial point in the range you wish to select.
            1.2. Click the initial point.
            1.3. Hold down the **Shift** key.
            1.4. Identify the final point in the range.
            1.5. **(Optional)** Scan the Strip View *(on page 152)* to locate the points of interest, if necessary.
            1.6. Click the final point to complete the range selection.
            1.7. Right-click the selected fragment to expand the context menu.
        - **Using Ctrl + Click:**
            1.1. Identify the initial point in the range you wish to select.
            1.2. Hold down the **Ctrl** key.
            1.3. Click the initial point.
            1.4. Identify the final point in your desired range.
            1.5. **(Optional)** Scan the Strip View *(on page 152)* to locate the points of interest, if necessary.
            1.6. Drag the cursor to the final point and release the mouse button to complete the selection.
            1.7. Right-click the selected fragment to expand the context menu.
        - **Using the right mouse button:**
            1.1. Click the **Strip View** and hold the right mouse button to designate the initial point in the range you wish to select.
            1.2. Drag the cursor to set the final point.
            1.3. **(Optional)** Scan the Strip View *(on page 152)* to locate the points of interest, if necessary.

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

Figure 457. Strip View - Delete Beats



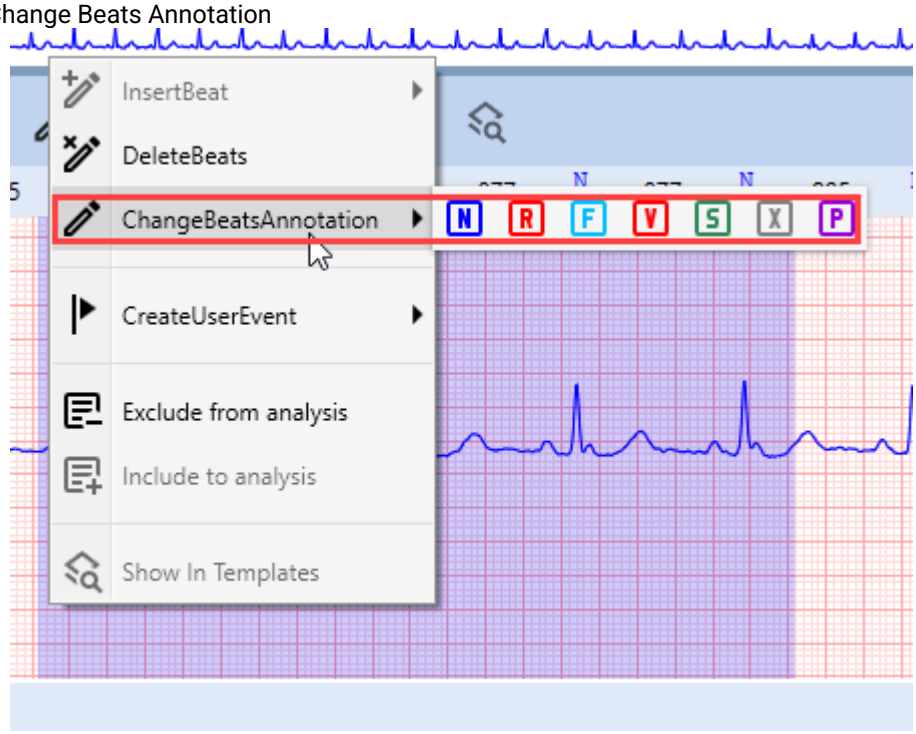
2. Click the **Delete Beats** option in the context menu. The system will automatically recalculate events and templates following the deletion.

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:** Click the first point, then hold **Shift** and click the end point. Scan the Strip View *(on page 152)* to locate the points of interest, if necessary.
        - **Using Ctrl + Click:** Hold **Ctrl**, click the start point, drag to the endpoint, and release. Scan the Strip View *(on page 152)* to locate the points of interest, if necessary.
        - **Using the right mouse button:** Right-click and drag to highlight the desired segment. Scan the Strip View *(on page 152)* to locate the points of interest, if necessary.
2. Hover over the **Change Beats Annotation** option in the context menu to expand the drop-down list.

Figure 458. 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 8. Beats Reclassification Keyboard Shortcuts for Strip View

Action	Button	Keyboard Keys
Classify as **Normal**	N	**N**
Classify as **R** on **T**	R	**R**
Classify as **Fusion**	F	**F**
Classify as **VPB**	V	**V**
Classify as **SVE**	S	**S**
Classify as **Questionable**	X	**X**
Classify **Paced**	P	**P**

Create User Event

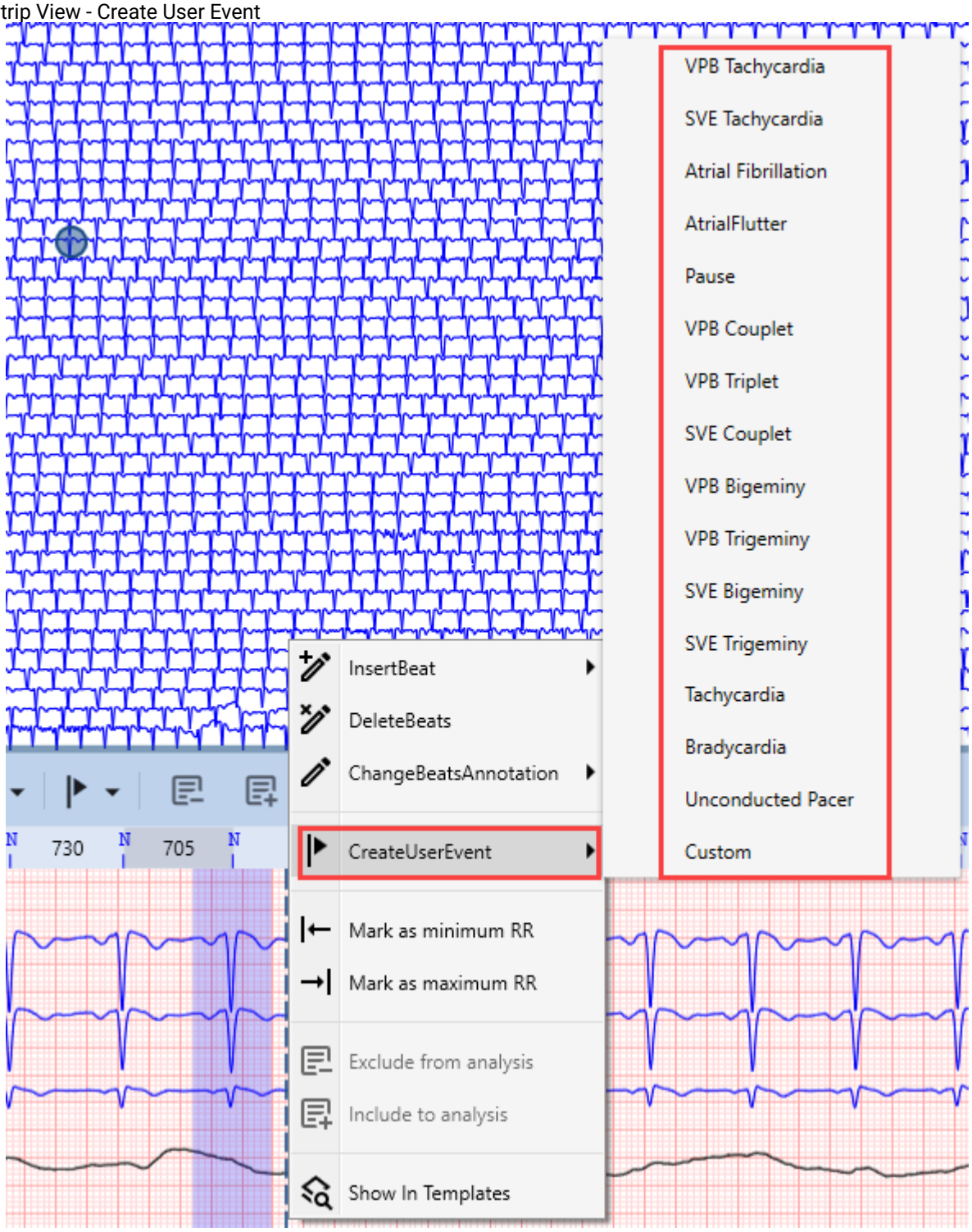
Allows you to create a new user event at the selected beat or ECG fragment. After adding a user event, the corresponding fragment of the ECG waveform will be recalculated, and some beats may shift between templates.

1. Select a fragment of the ECG that 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 waveform fragment using one of these methods:

- **Using Shift + Click:** Click the first point, then hold **Shift** and click the end point. Scan the Strip View *(on page 152)* to locate the points of interest, if necessary.
- **Using Ctrl + Click:** Hold **Ctrl**, click the start point, drag to the endpoint, and release. Scan the Strip View *(on page 152)* to locate the points of interest, if necessary.
- **Using the right mouse button:** Right-click and drag to highlight the desired segment. Scan the Strip View *(on page 152)* to locate the points of interest, if necessary.

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

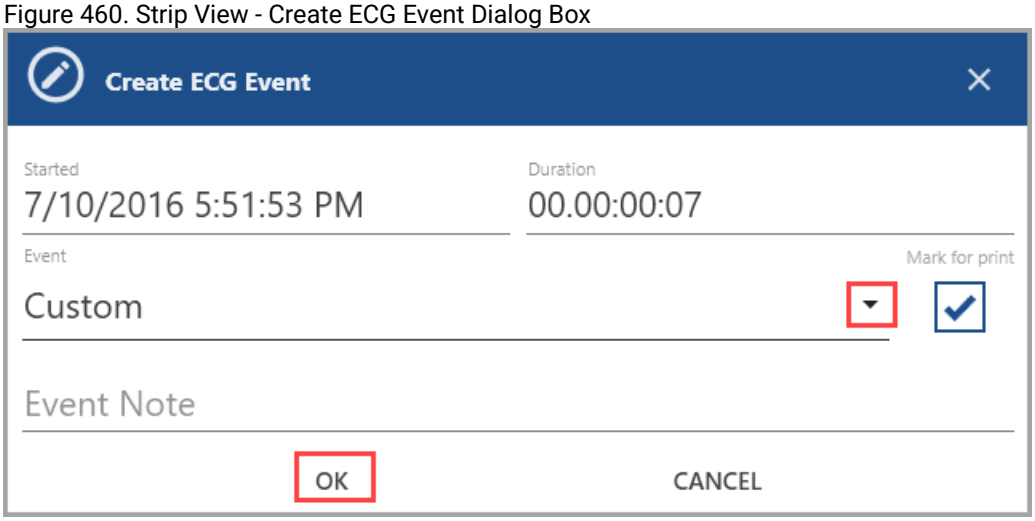
Figure 459. Strip View - Create User Event



3. Click the relevant type of **Event** you wish to assign to the selected ECG fragment.
4. Review the event details in the **Create ECG Event** dialog box:

- Re-select or confirm the event type using the drop-down menu.
- **(Optional)** Check or uncheck the **Mark for print** checkbox.
- **(Optional)** Enter a custom event note in the **Event Note** field.

Figure 460. Strip View - Create ECG Event Dialog Box



5. Click **OK** to confirm or **Cancel** to discard changes.

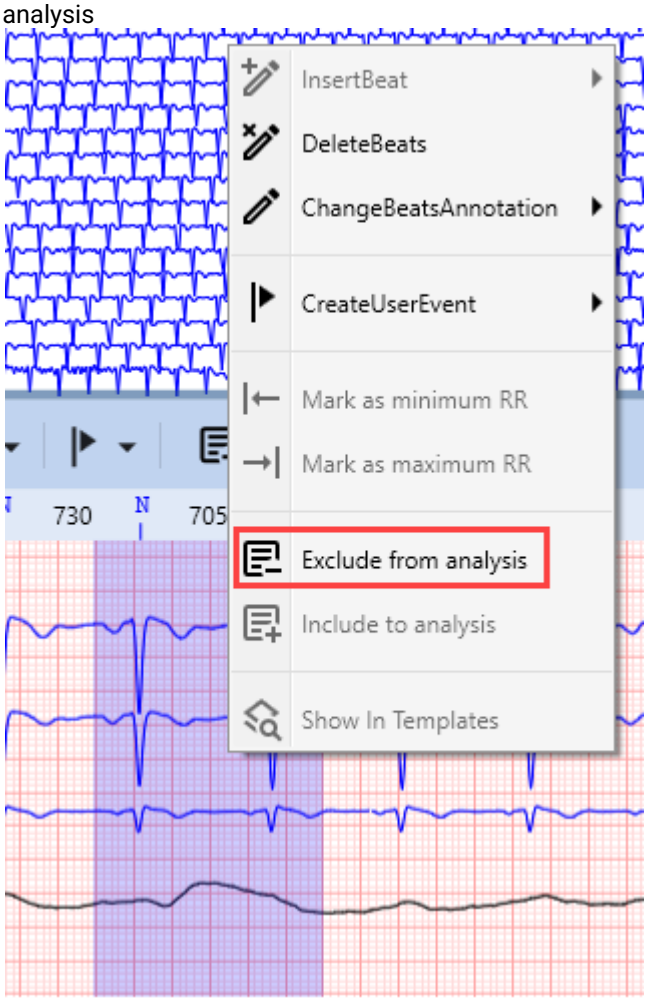
Exclude from analysis

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:** Click the first point, then hold **Shift** and click the end point. Scan the Strip View *(on page 152)* to locate the points of interest, if necessary.
   - **Using Ctrl + Click:** Hold **Ctrl**, click the start point, drag to the endpoint, and release. Scan the Strip View *(on page 152)* to locate the points of interest, if necessary.
   - **Using the right mouse button:** Right-click and drag to highlight the desired segment. Scan the Strip View *(on page 152)* to locate the points of interest, if necessary.

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

Figure 461. Strip View - Exclude from analysis

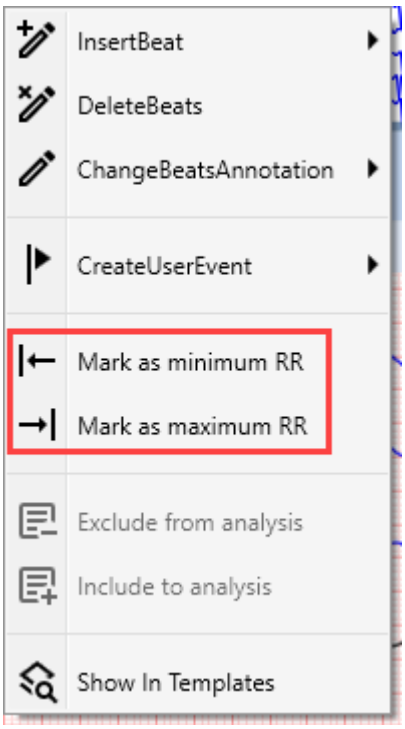


Mark as minimum/maximum RR

To mark as minimum RR or maximum RR:

1. Right-click at the desired point in the **Strip View** to open the **Context Menu**.
2. Click the corresponding **Mark as minimum RR** or **Mark as maximum RR** option.

Figure 462. Mark as minimum/maximum RR



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 463. Strip View - Include to analysis Overlap Condition

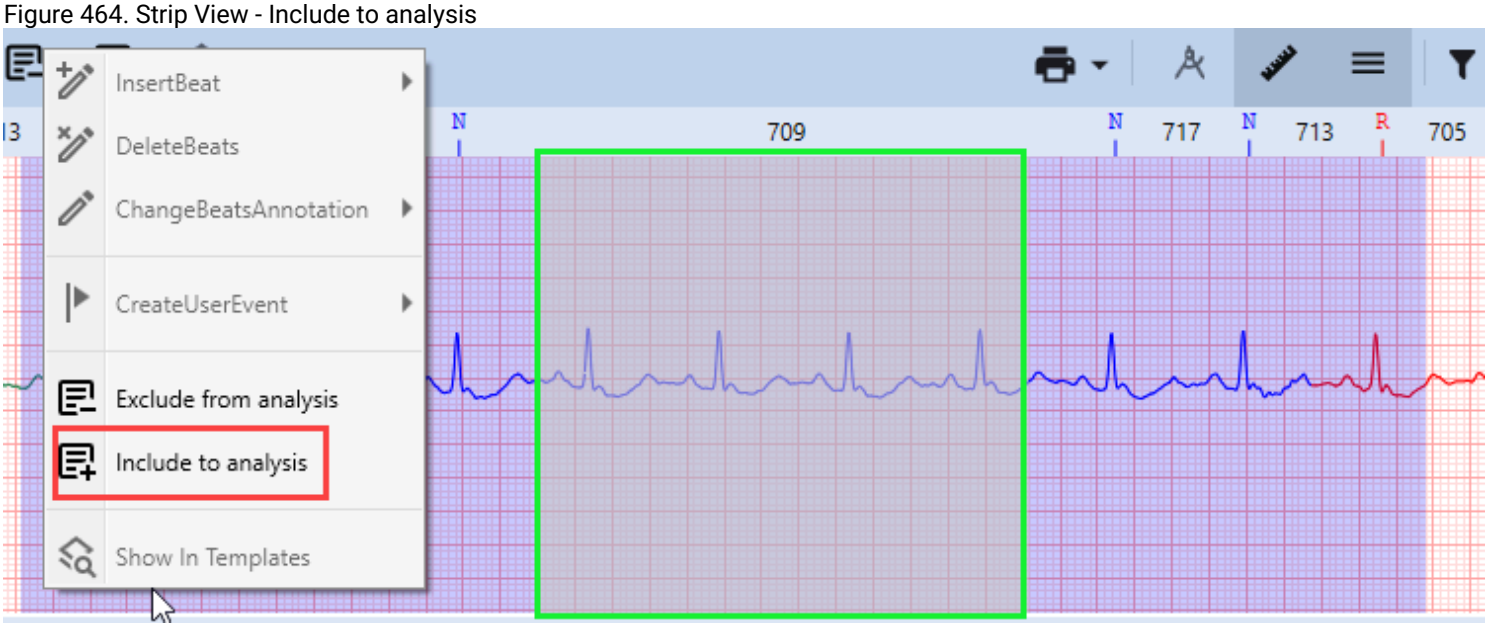


2.1. Select a fragment of the ECG you want to re-include in analysis, using one of the following methods:

- **Using Shift + Click:**
- **Using Shift + Click:** Click the first point, then hold **Shift** and click the end point. Scan the Strip View *(on page 152)* to locate the points of interest, if necessary.
- **Using Ctrl + Click:** Hold **Ctrl**, click the start point, drag to the endpoint, and release. Scan the Strip View *(on page 152)* to locate the points of interest, if necessary.
- **Using the right mouse button:** Right-click and drag to highlight the desired segment. Scan the Strip View *(on page 152)* to locate the points of interest, if necessary.

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

Figure 464. Strip View - Include to analysis



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**.

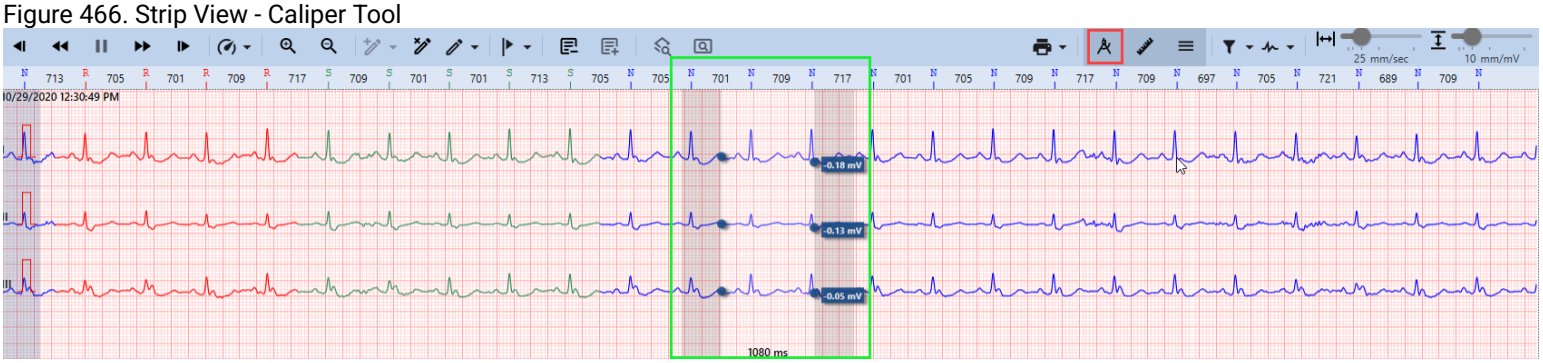
Figure 465. Strip View - Show In Templates



4.6.8.2.3. 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 466. Strip View - Caliper Tool



Caliper Design Overview

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

Figure 467. 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 468. Strip View - Interval Length and Amplitude Difference



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

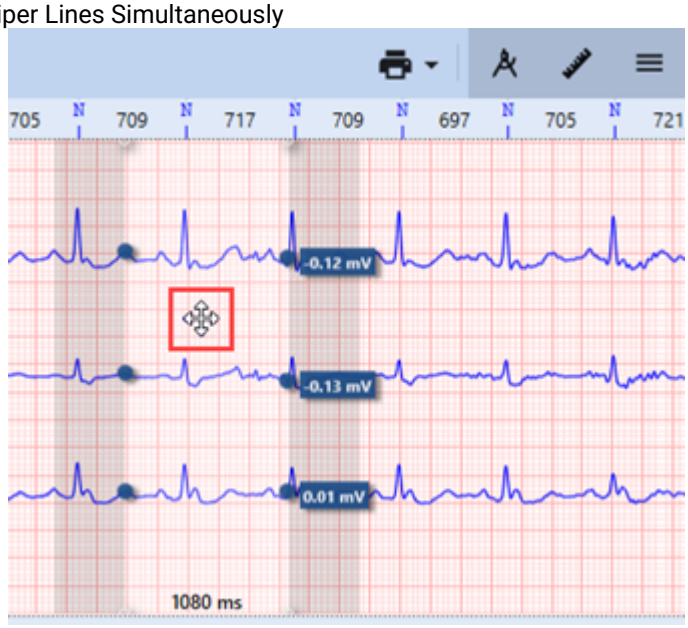
Moving Caliper Lines

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 469. 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 470. Strip View - Moving Caliper Lines Independently

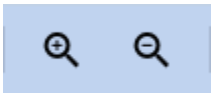


2. Click to select the measurement line.
3. Drag and drop it to the new location.

Zoom Feature

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

Figure 471. Strip View - Zooming Options



- Click the corresponding button in the **Strip View Toolbar**.
- 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 472. Strip View - Caliper Snapping



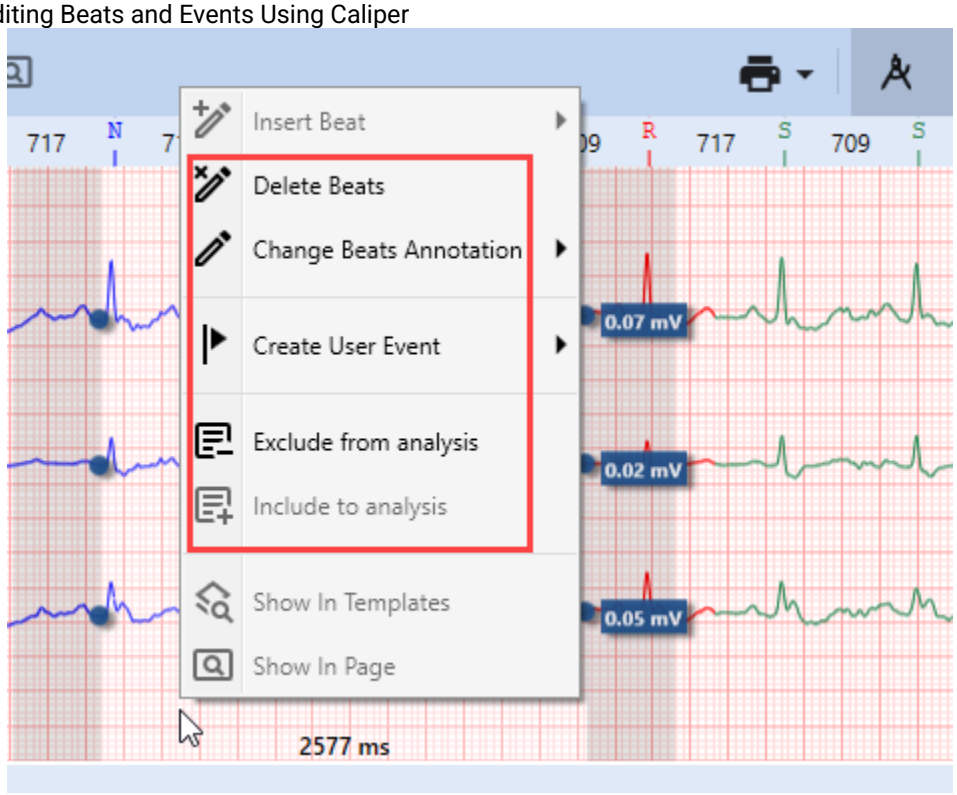
- To snap any line:
  3.1. Hold down the **Alt** key.
  3.2. Position the cursor near one of the measurement lines until the cursor icon changes to a resize cursor.
  3.3. Click the measurement line to select it.
  3.4. Drag and drop it to the desired location.
- To snap the right measurement line:
  3.1. Hold down the **Right Alt** key.
  3.2. 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:
  3.1. Hold down the **Left Alt** key.
  3.2. 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 473. 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 257)* 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.

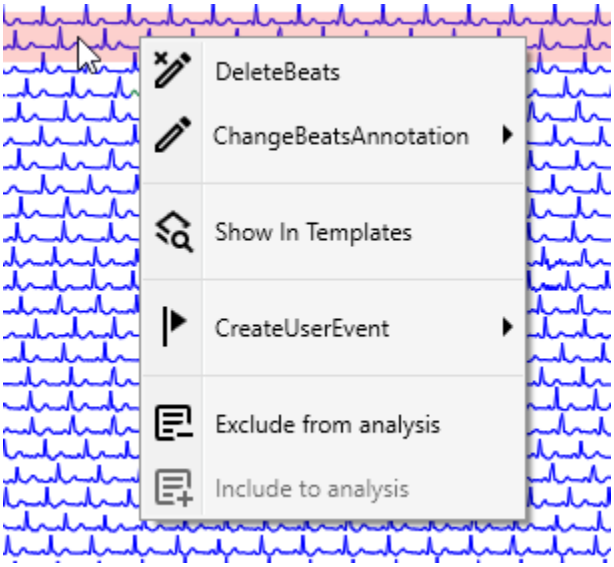
     Note: The **Include in Analysis** option becomes active in the **Caliper** context menu only when the current **Caliper** measurement interval overlaps with a segment that was excluded earlier.

4.6.8.3. 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 221)*.

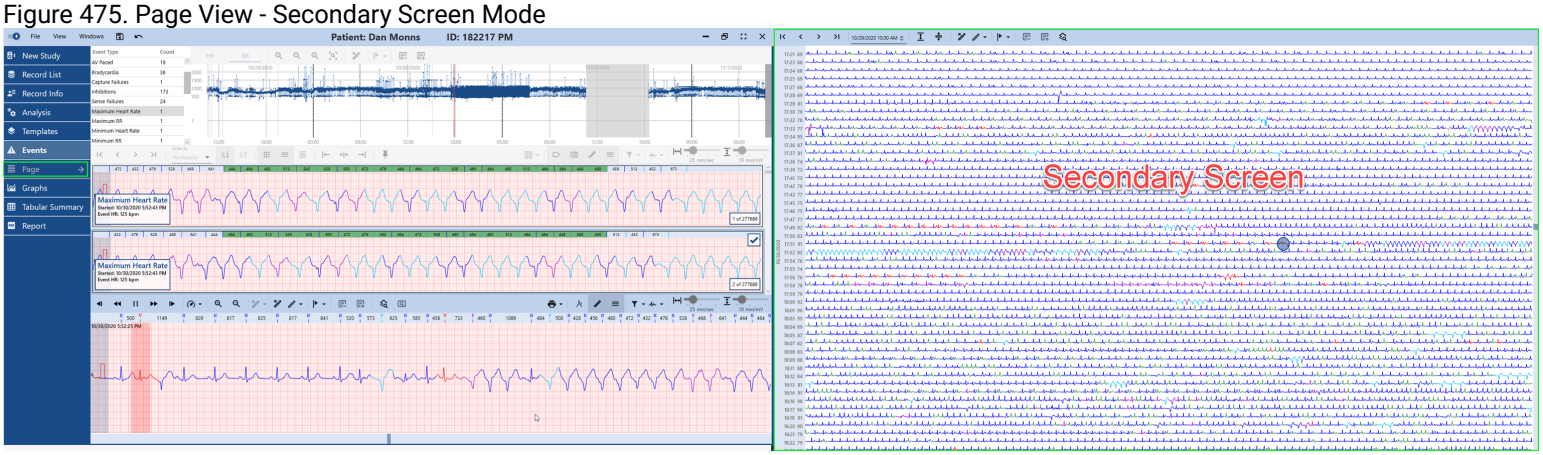
Figure 474. Page View - Context Menu



4.6.8.4. 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 475. 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
Analysis	Combines **Page View** and **Strip View** functionalities.
Templates	Retains common **Page View** functionalities.
Events	Retains common **Page View** functionalities.
Graphs (ST tab)	Retains common **Page View** functionalities. Click **HR**, **RR** graphs, or the **Strip View** to navigate to the corresponding beat in the **Page View**.
Tabular Summary	Combines **Page View** and **Strip View** functionalities. Clicking any line in the **Tabular** report navigates to the relevant beat in the **Page View** and **Strip View** in the secondary window.

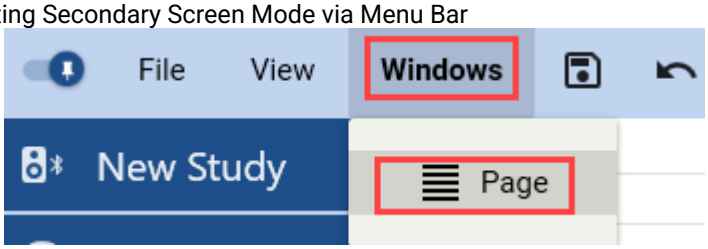
Activating Secondary Screen Mode

To activate Secondary Screen mode:

- Using the Menu Bar:

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

  Figure 476. Page View - Activating Secondary Screen Mode via Menu Bar



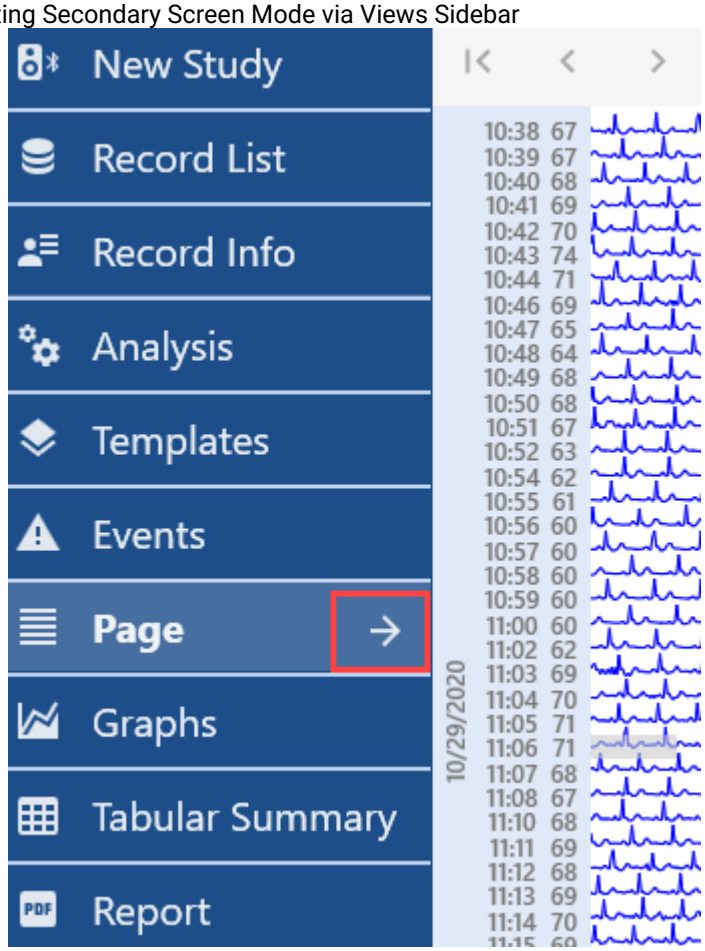
  2. Choose the **Page** option from the menu. The **Page View** will open in a secondary window.

  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 477. Page View - Activating Secondary Screen Mode via Views Sidebar

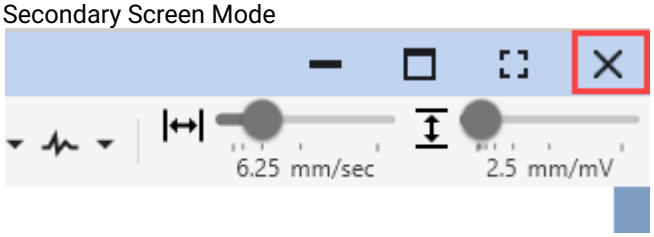


  2. Adjust the secondary window settings as needed.

To deactivate Secondary Screen Mode:

1. Click the **X** (Close) icon in the top-right corner of the secondary window.

Figure 478. Page View - Deactivating Secondary Screen Mode

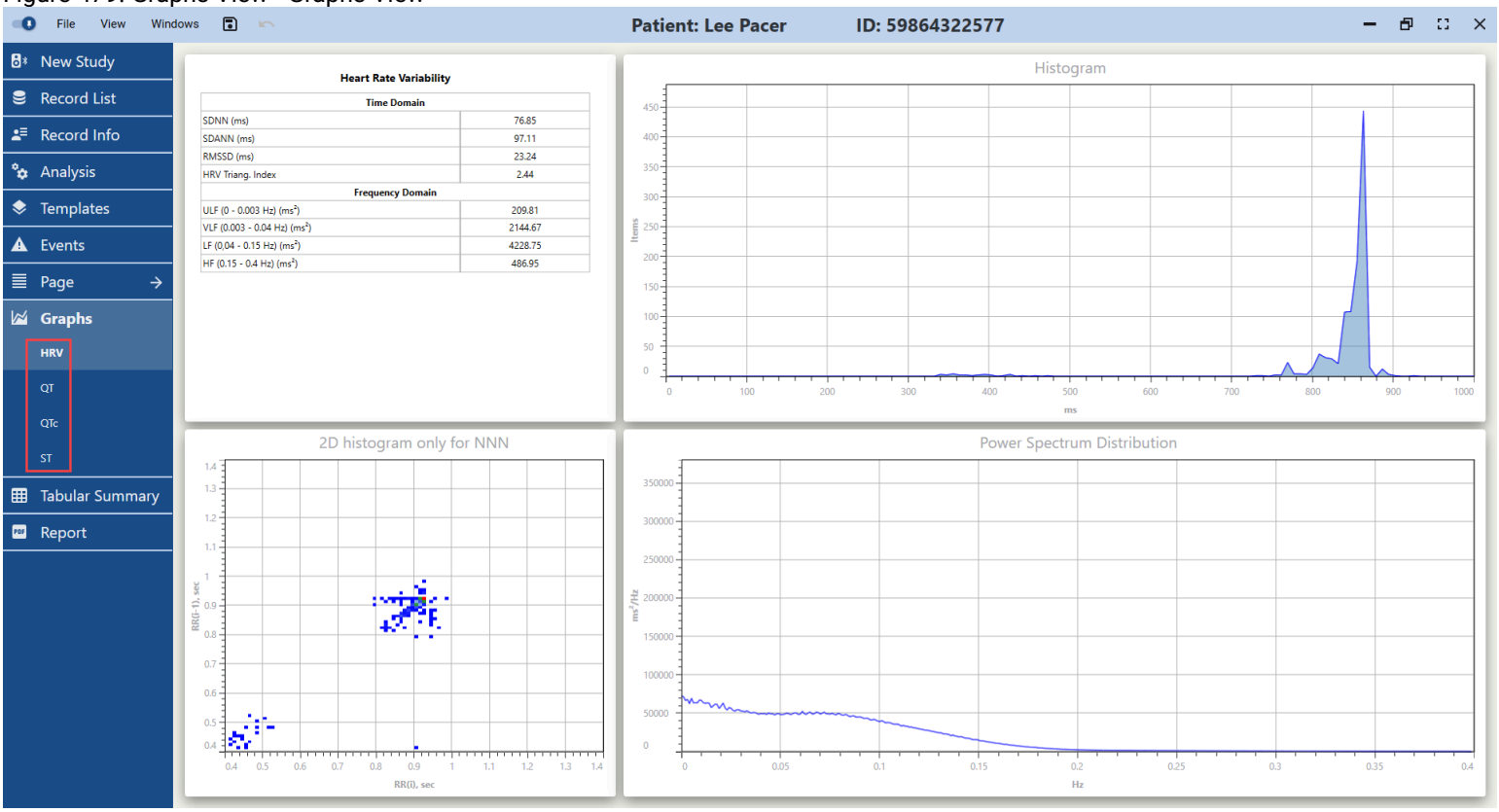


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4.6.9. Graphs

The **Graphs View** facilitates the examination of **HRV** analysis results and the preview of **ST** trends, as well as **QT** and **QTc** analysis. **HRV** graphs illustrate both the time domain analysis outcomes and the frequency domain spectrum.

Figure 479. Graphs View - Graphs View

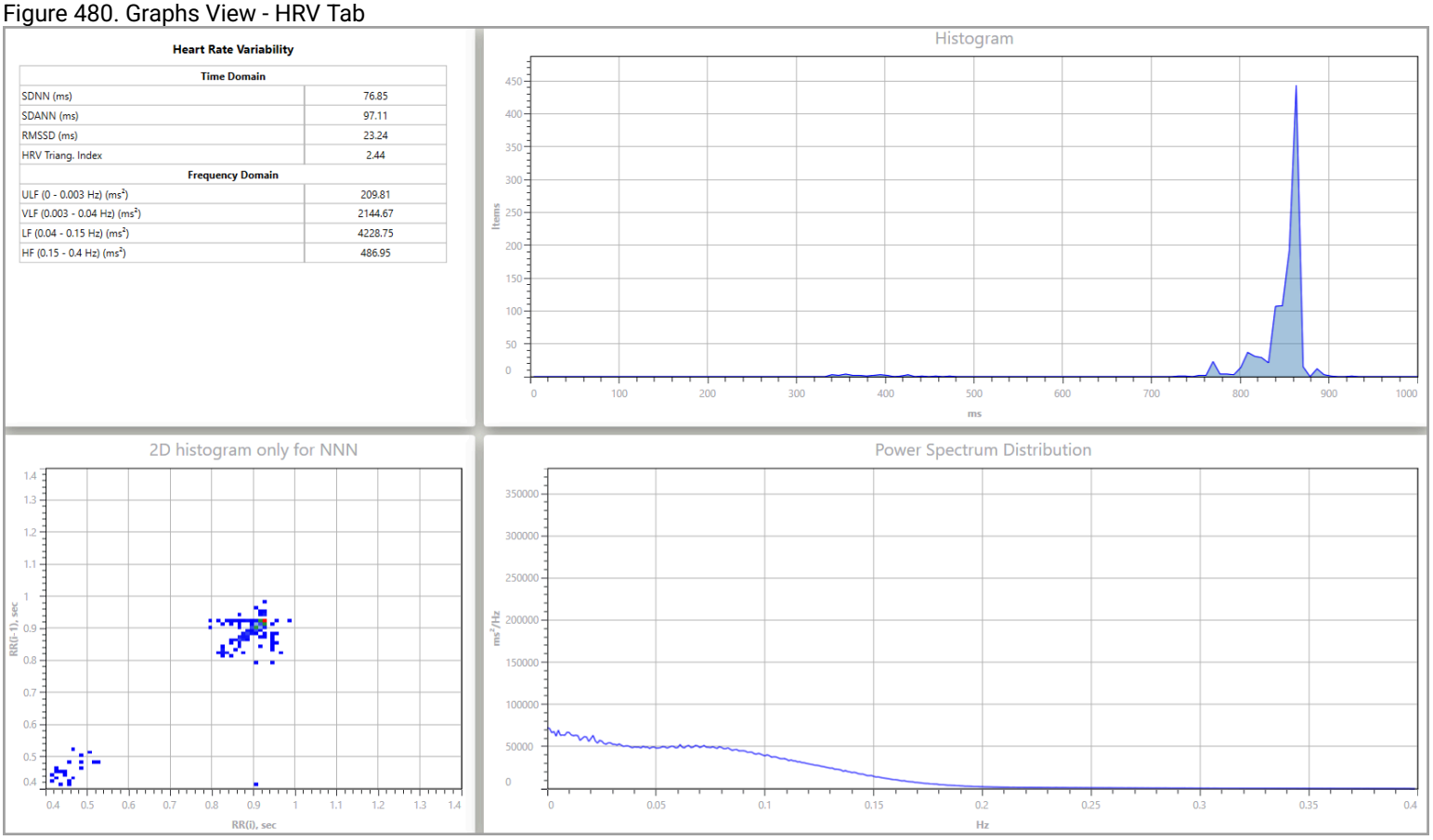


The **HRV**, **ST**, **QT**, and **QTc** tabs under the **Graphs View** enable the selection of the page displaying **HRV**, **QT**, and **QTc** analysis or the visualization of **ST** trends.

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 480. 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.

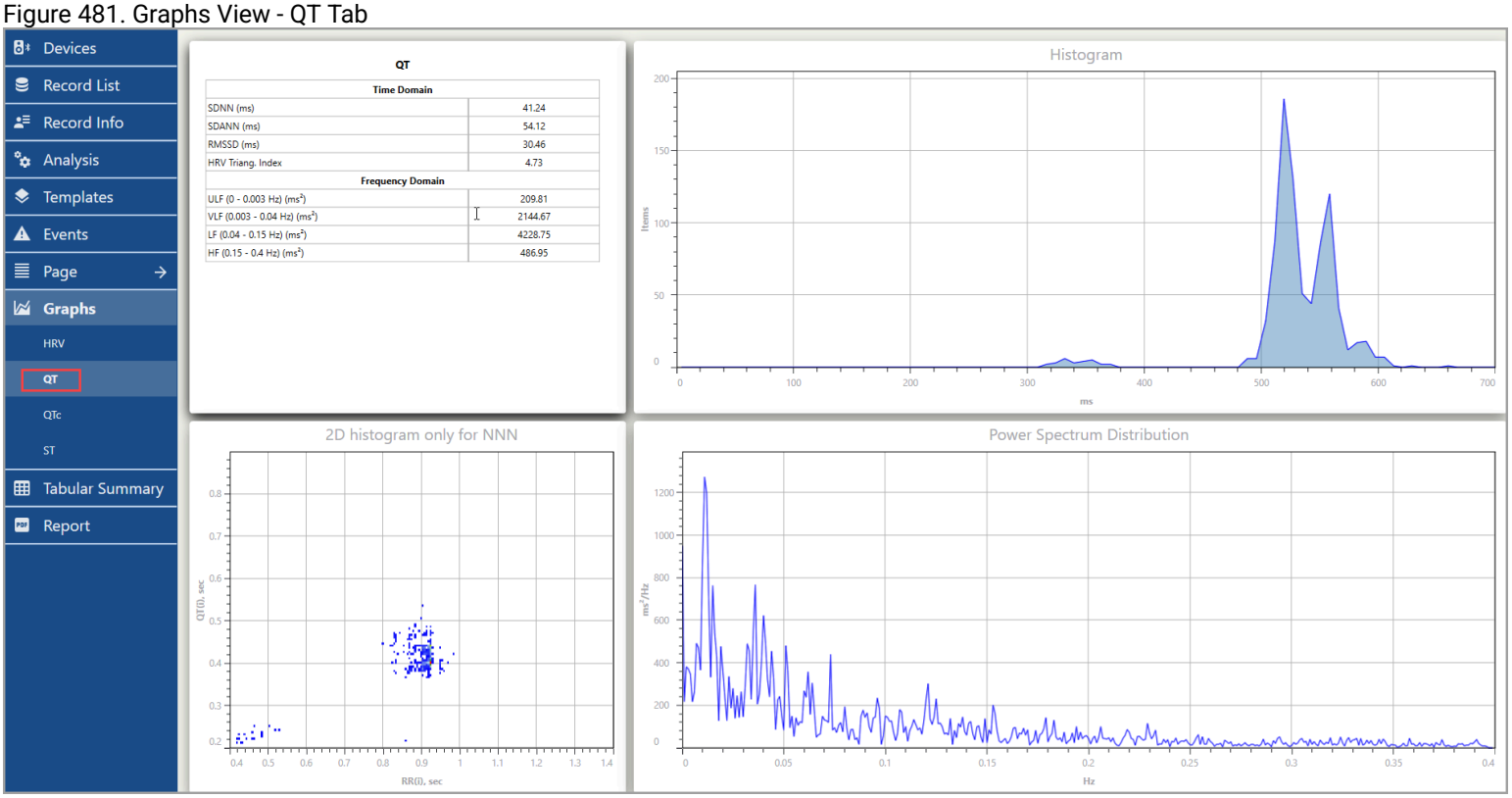
The **Lorenz Plot** or **Scatter Diagram** (bottom left), based on the RR Intervals of consecutive **N**-annotated beats (with neither S nor V preceding or following the actual beat), presents a graphical representation of the variability. The X-axis denotes Interval (i), while the Y-axis corresponds 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.

QT

The QT analysis offers insights into ventricular repolarization and can assist in identifying potential abnormalities linked to conditions such as Long QT Syndrome.

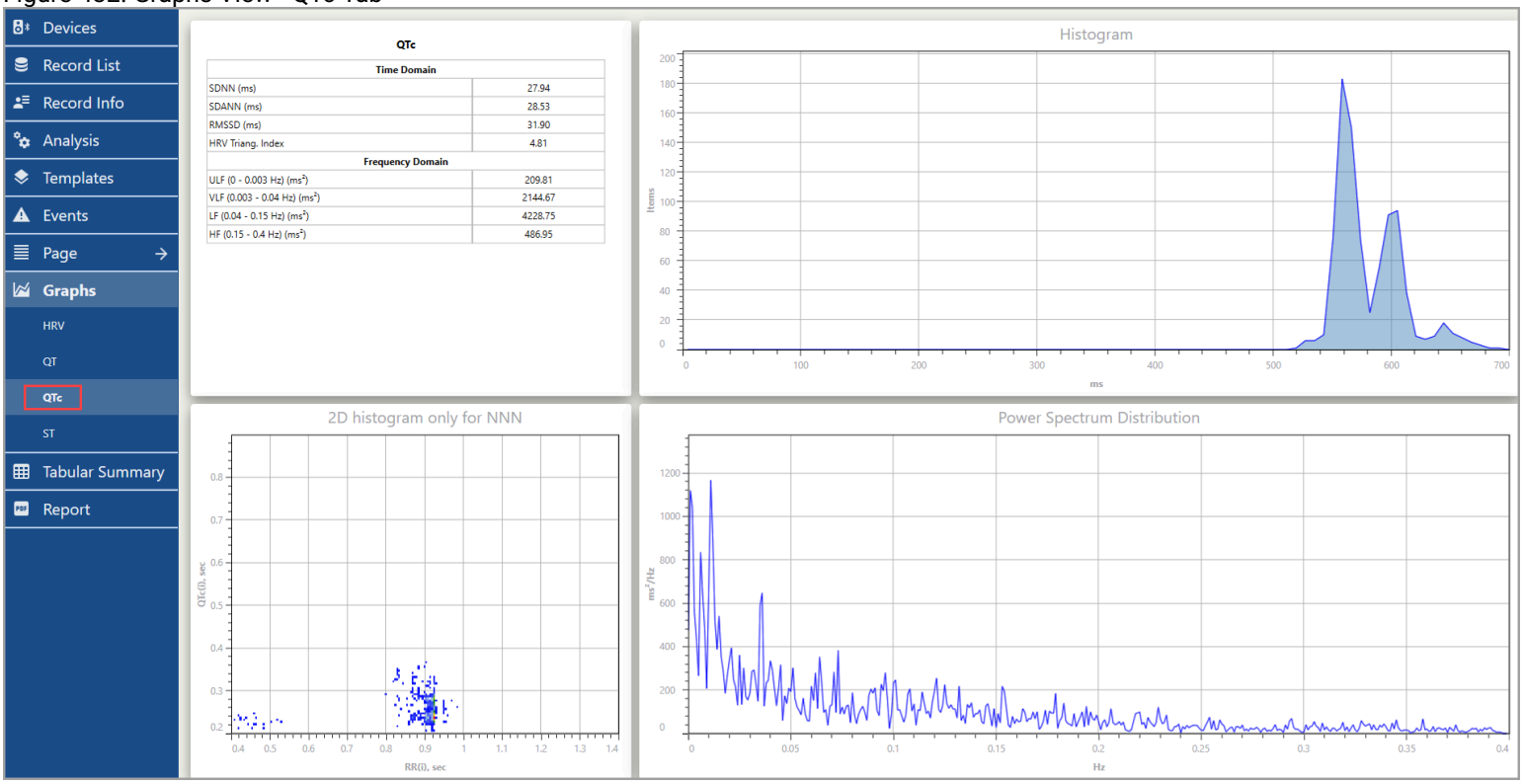
Figure 481. Graphs View - QT Tab



QTc

The **QTc** analysis provides insights into ventricular repolarization and can help identify potential abnormalities that might be associated with conditions like Long QT Syndrome. The QTc interval is a corrected version of the QT interval. By comparing the calculated QTc interval to the reference ranges, healthcare professionals can assess if it falls within the expected range, potentially indicating a normal or abnormal repolarization process.

Figure 482. Graphs View - QTc Tab



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 483. 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
	Zoom In button: Click to adjust the scale of the HR or RR graph in the **HR/RR Trends View**, focusing on specific areas of the graph. You can click this button multiple times.
	Zoom Out button: Click to adjust the scale of the HR or RR graph in the **HR/RR Trends View**. 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.
	Full Extent button: Click to zoom out instantly and see the entire HR/RR Trends graph.
	Zoom to Extent button: Click to zoom in instantly to the selected area of the graph. The area will be displayed at the maximum available zoom.

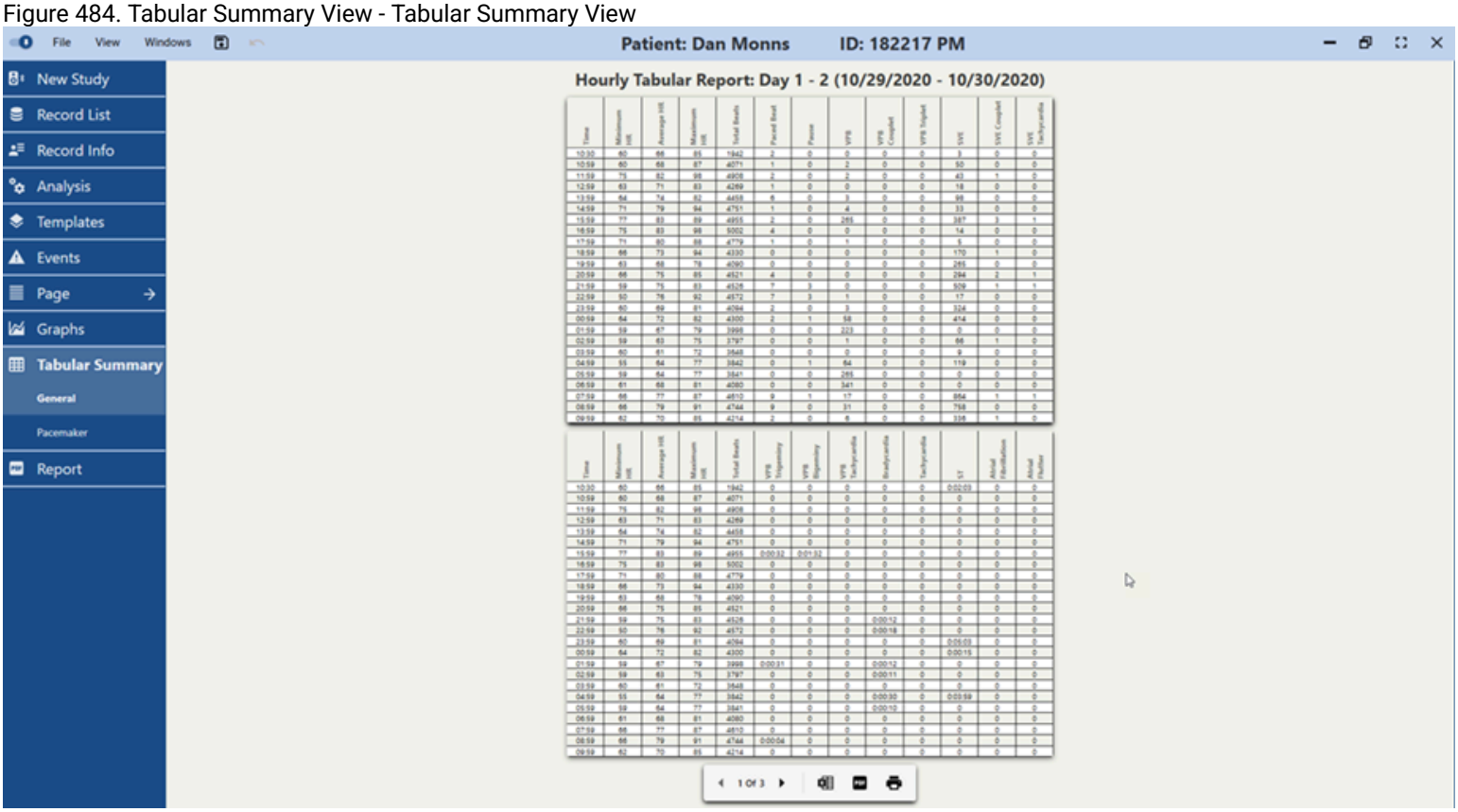
4.6.9.1. Strip View

The **Strip View** displays the currently selected beat along with adjacent ECG signal, typically covering 12 to 16 seconds depending on monitor resolution and ECG paper speed settings. It supports detailed analysis, measurements, beat reclassification, and user event creation. For a comprehensive overview of the **Strip View**, including its configuration options and usage across different views and workflows, see the **Strip View** section and its subsections *(on page 151)*.

4.6.10. 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).

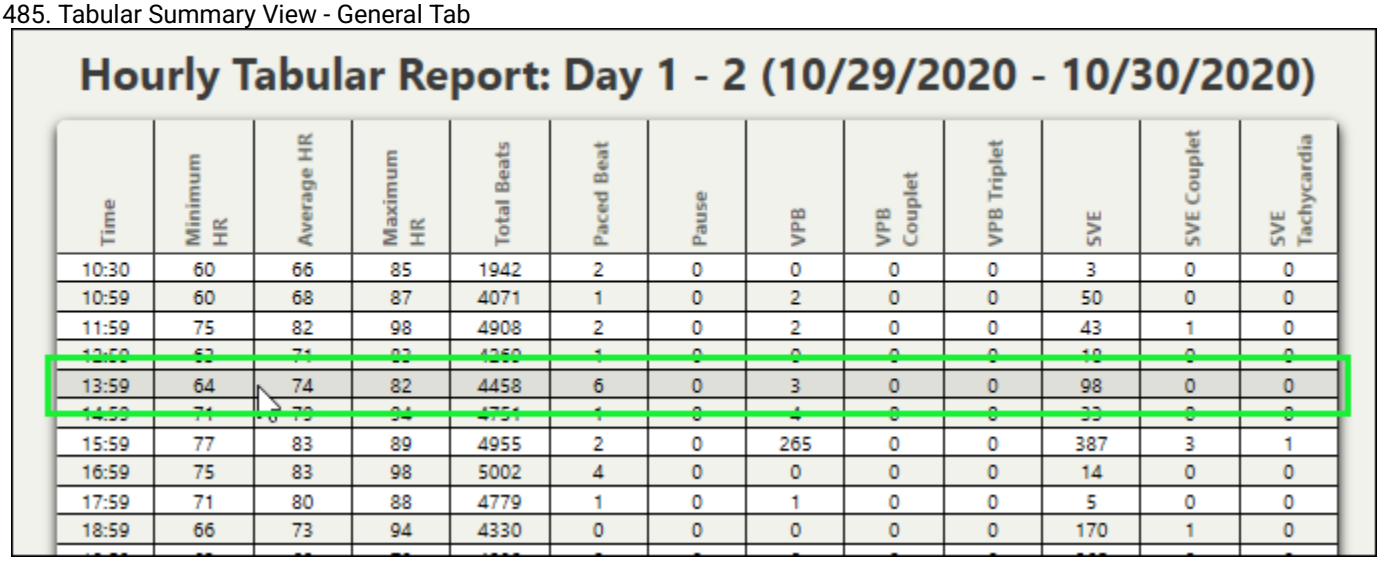
Figure 484. Tabular Summary View - Tabular Summary View



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 485. Tabular Summary View - General Tab



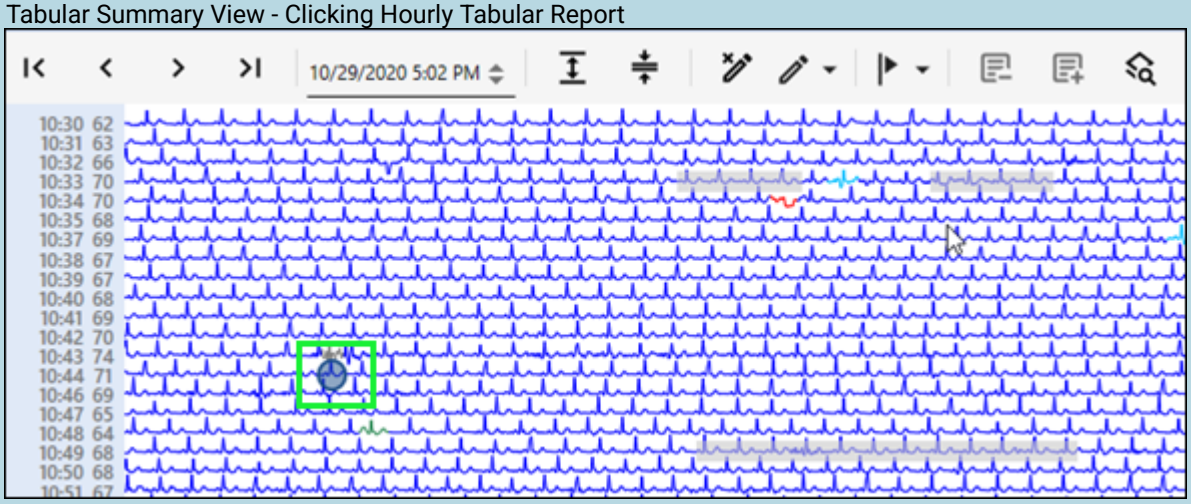
Hourly Tabular Report: Day 1 - 2 (10/29/2020 - 10/30/2020)

Time	Minimum HR	Average HR	Maximum HR	Total Beats	Paced Beat	Pause	VPB	VPB Couplet	VPB 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
13:59	64	74	82	4458	6	0	3	0	0	98	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 486. Tabular Summary View - Clicking Hourly Tabular Report



You can also perform the following actions in this **View**:

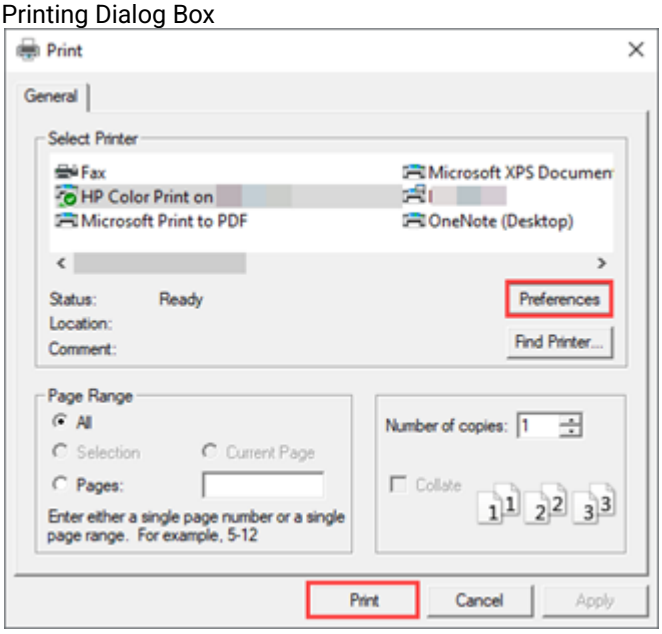
Icon	Description
	**Navigation Controls**: Click arrows to switch between pages.
	**Export To Excel button**: Click to export the table to Excel.
	**Export To PDF button**: Click to export the table to PDF.
	**Print Table button**: Click to print the table.

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.

4. Click **Print** at the bottom of the dialog box to execute the printing of the waveform fragment.

Figure 487. 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 488. Tabular Summary View - Pacemaker Tab

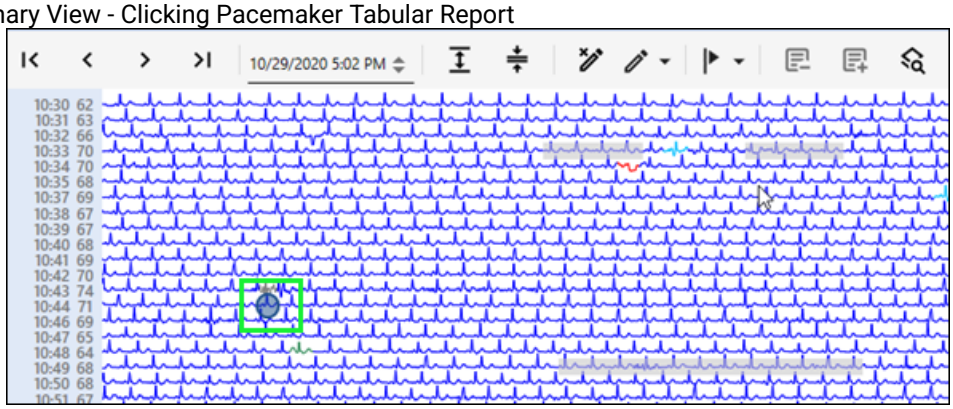
Patient: Dan Monns ID: 182217 PM

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 489. Tabular Summary View - Clicking Pacemaker Tabular Report



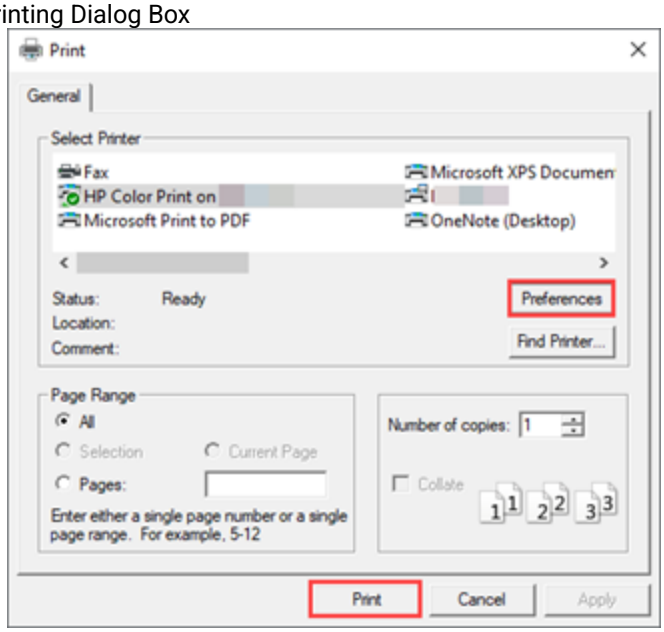
You can also perform the following actions in this **View**:

Icon	Description
	**Navigation Controls**: Click arrows to switch between pages.
	**Export To Excel button**: Click to export the table to Excel.
	**Export To PDF button**: Click to export the table to PDF.
	**Print Table button**: 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.
4. Click **Print** at the bottom of the dialog box to execute the printing of the waveform fragment.

Figure 490. Tabular Summary View - Printing Dialog Box

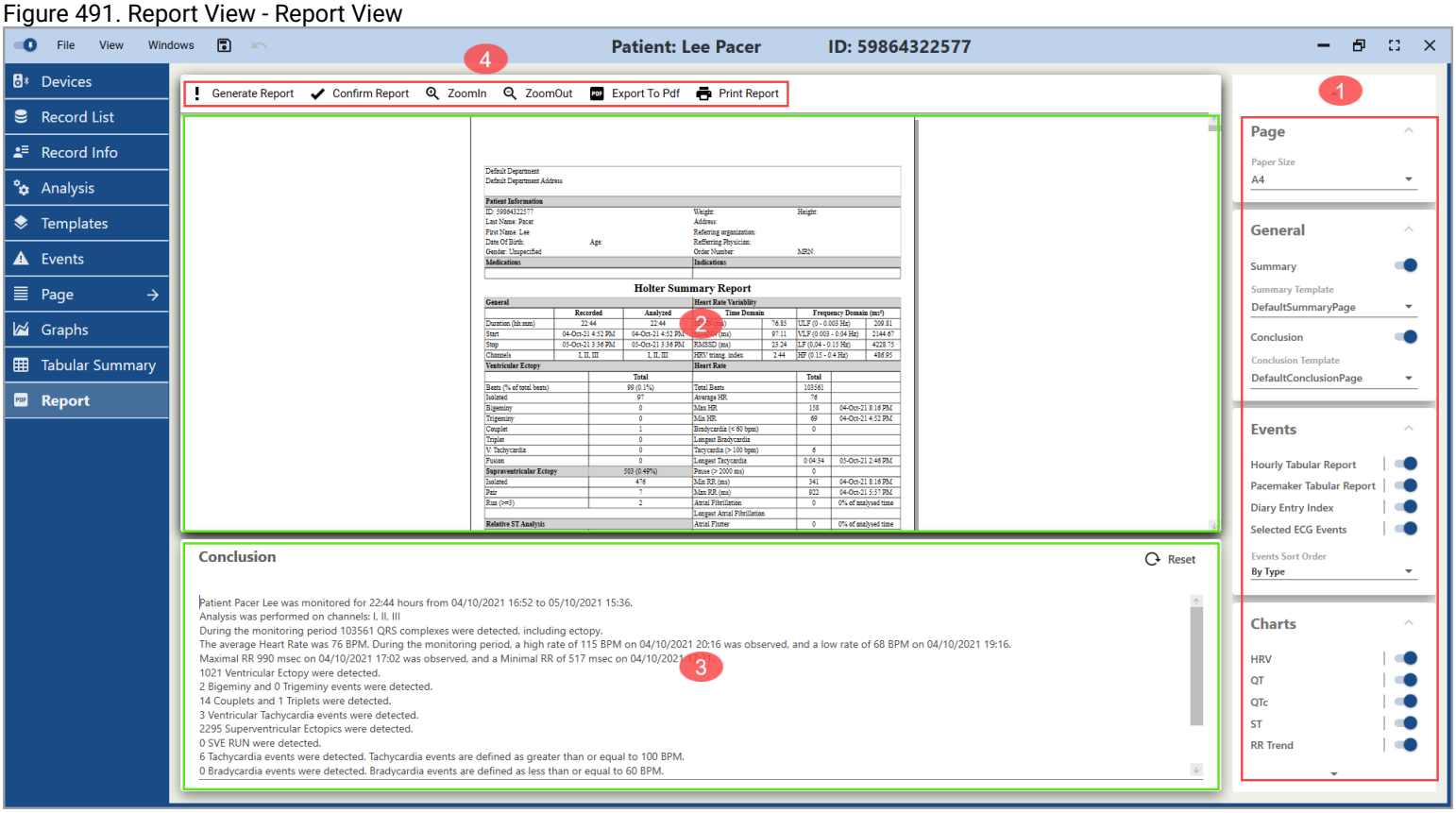


4.6.11. Report

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**, **QT**, **QTc**, **ST**, **HR Trend**, 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 491. Report View - Report View



1. **Report Customization Boxes.**
2. **Summary Area**
3. **Conclusion Area**
4. **Report View Toolbar**

Note: You can customize the **Report** with your institution's department name and address. To do that, please refer to the Setup Process after Installation *(on page 24)* 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 the available options.

Figure 492. **Report View** - **Page**



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, including extreme events data.

Figure 493. **Report View** - **Summary**

Default Department
Default Department Address

Patient Information			
ID: 3456987		Weight:	Height:
Last Name: Kerry		Address:	
First Name: Alex		Referring Organization:	
Date Of Birth: 30-Mar-58	Age: 61	Referring Physician:	
Gender: Unspecified		Order Number:	MRN:
Medications		**Indications**	

Holter Summary Report

General			**Heart Rate Variablity**			
	Recorded	**Analyzed**	**Time Domain**		**Frequency Domain (ms²)**	
Duration (hh:mm)	22:58	22:58	SDNN (ms)	128.33	ULF (0 - 0.003 Hz)	12852.97
Start	16-Jul-19 3:12 PM	16-Jul-19 3:12 PM	SDANN (ms)	110.74	VLF (0.003 - 0.04 Hz)	1887.82
Stop	17-Jul-19 2:10 PM	17-Jul-19 2:10 PM	RMSSD (ms)	22.57	LF (0,04 - 0.15 Hz)	643.58
Channels	I, II, III	I, II, III	HRV triang. index	42.4	HF (0.15 - 0.4 Hz)	129.36

Ventricular Ectopy		**Heart Rate**		
Beats (% of total beats)	23 (0.02%)	Total Beats	96595	
Isolated	23	Average HR	72	
VPB Bigeminy	0	Max HR	143	17-Jul-19 7:40 AM
VPB Trigeminy	0	Min HR	51	17-Jul-19 1:47 PM
VPB Couplet	0	Bradycardia *[longest]*	195	*[0:25:43]* 17-Jul-19 12:07 PM
VPB Triplet	0	Tachycardia *[longest]*	32	*[0:02:58]* 16-Jul-19 4:50 PM
VPB Tachycardia	0	Pause (RR>2000 ms)	0	
Fusion	2	Min RR (ms)	395	16-Jul-19 4:51 PM
Supraventricular Ectopy	61 (0.06%)	Max RR (ms)	1422	16-Jul-19 7:40 PM
Isolated	44	**Atrial Fibrillation**	0	0% of analysed time
Pair	7	Mean HR during AF		
Run (>=3)	0	Longest AF		
SVE Bigeminy	0	Fastest AF		
SVE Trigeminy	1	**Recorder** NR1207, sn 30041		
Relative ST Analysis. Channels I 0.46 mm | II 0.41 mm | III - 0.06 mm		Pacemaker Detection	Off	
Max Elevation (> 1.00 mm)	0	Motion Sensor	On	
Max Depression (> 1.00 mm)	1.07	Respiration Sensor	On	

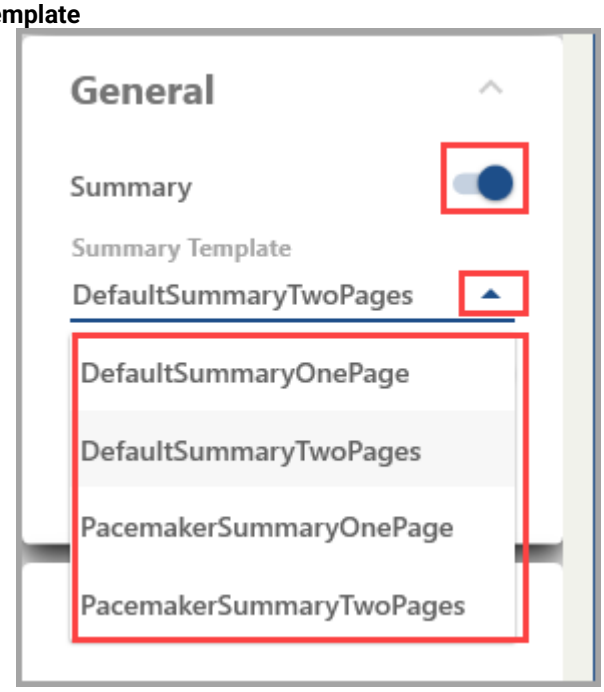
Click the **Summary Template** drop-down list to choose how the summary appears in the final report - either as a default or pacemaker-specific version, and whether it starts on the first or second page.

To select a summary template:

1.

Click the drop-down arrow next to **Summary Template** and choose one of the following:

Figure 494. **Report View** - **Summary Template**



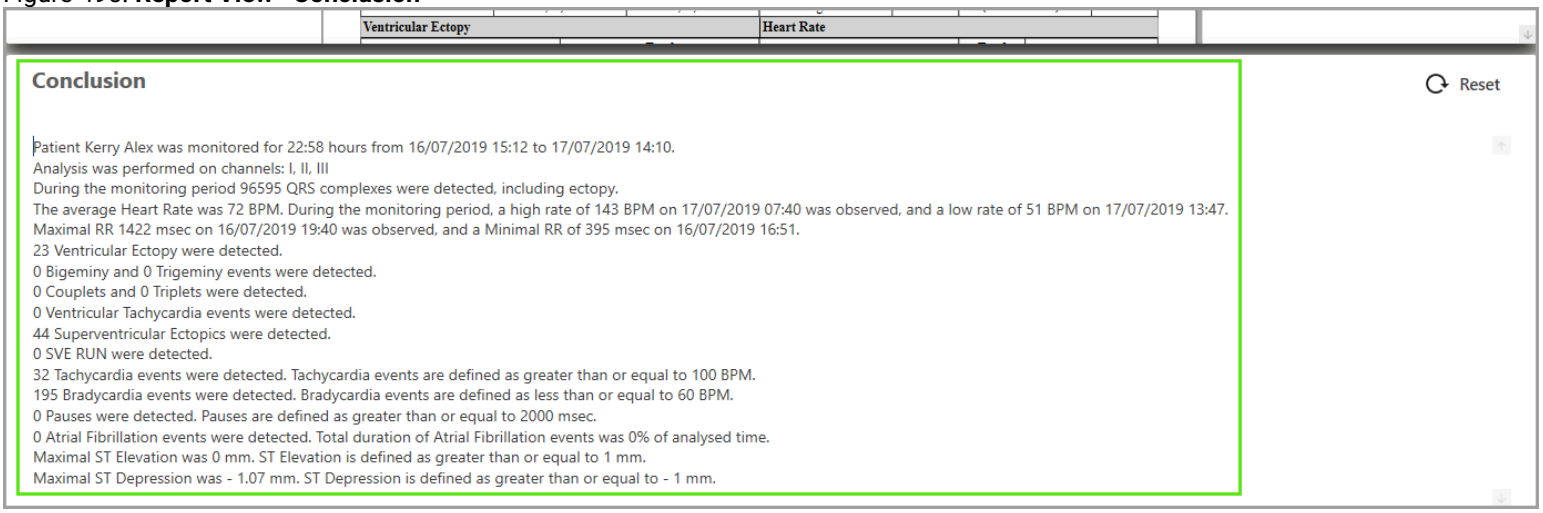
- **DefaultSummaryOnePage** – Default summary starting on the first page.
- **DefaultSummaryTwoPages** – Default summary starting on the second page.
- **PacemakerSummaryOnePage** – Pacemaker-specific summary starting on the first page.
- **PacemakerSummaryTwoPages** – Pacemaker-specific summary starting on the second page.

2. The selected template will be applied when the report is generated .

Note: Custom Conclusion Templates are also supported and can be made available upon request.

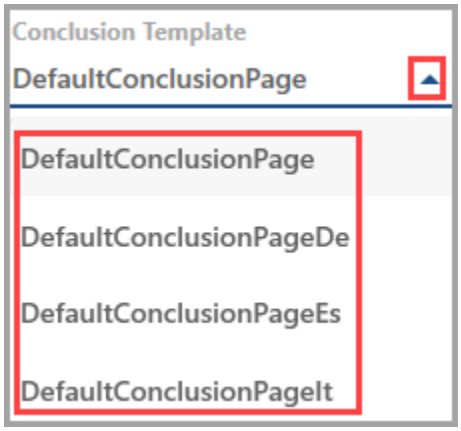
Click the **Conclusion** toggle to turn the section ON/OFF. This is the section of the **Report** (if the section is ON), which provides a default conclusion based on key ECG analysis data.

Figure 495. **Report View** - **Conclusion**



Click the **Conclusion Template** drop-down list to choose a conclusion template option from the available language options.

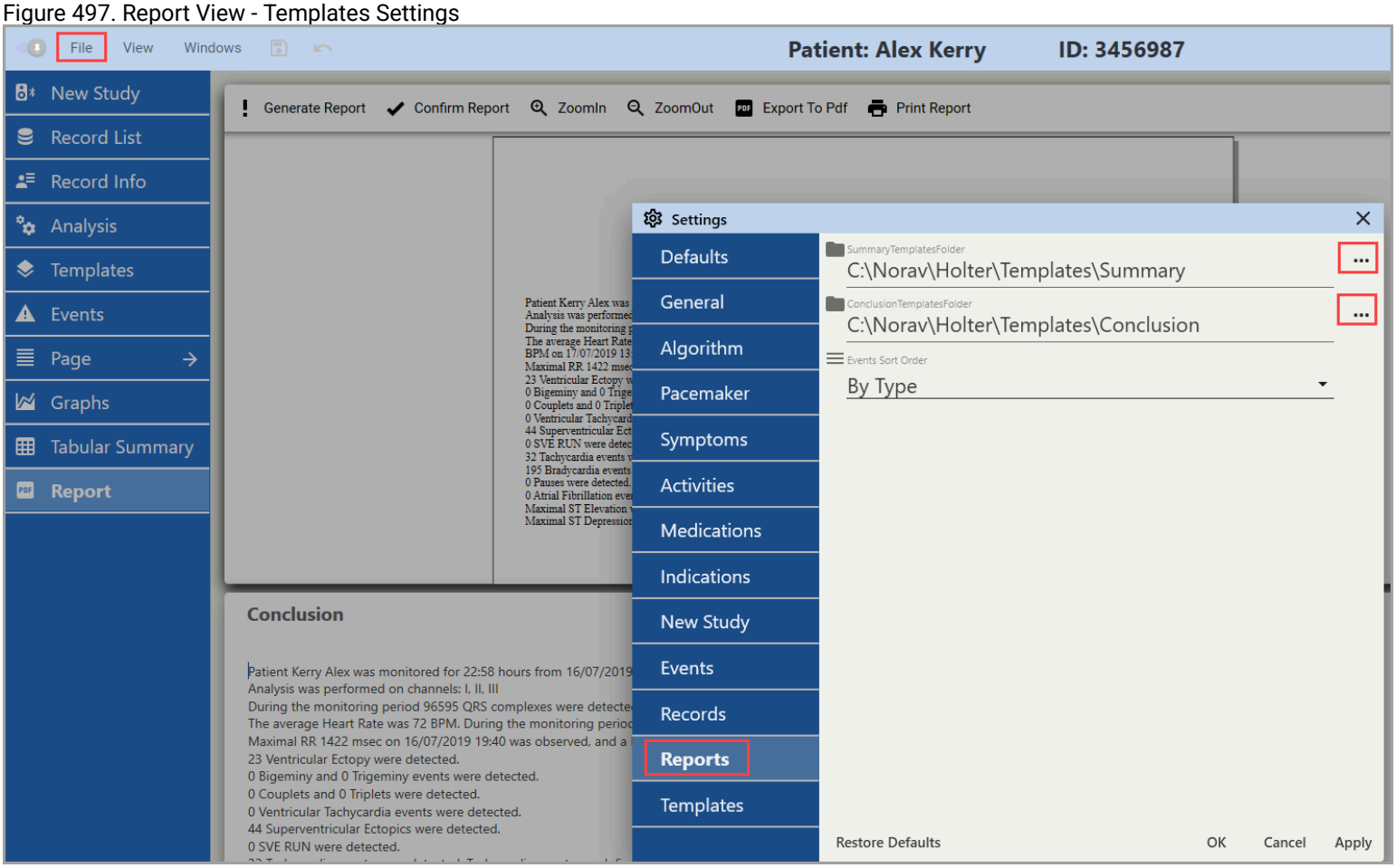
Figure 496. **Report View - Conclusion Template**



Note: If you turn OFF the **Summary**, when you generate a report, the **Conclusion** section will be displayed in the top part of the screen, in the **Summary** area.

Additional templates can be added to the relevant summary templates folder or conclusion templates folder. The path to this folder can be adjusted via the **File** drop-down menu, at **File>Settings>Reports**. You can contact our Support Team to obtain your own custom templates.

Figure 497. Report View - Templates Settings

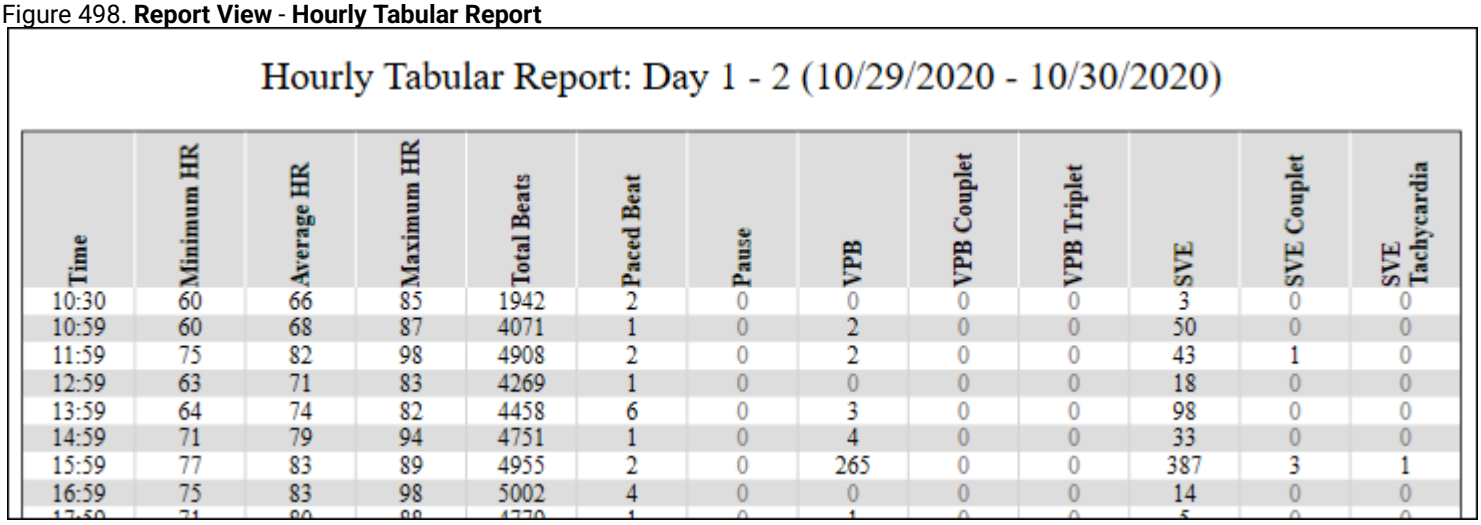


Events

Click relevant toggles ON/OFF to include or exclude the following subsections:

2.1. **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 498. **Report View** - **Hourly Tabular Report**

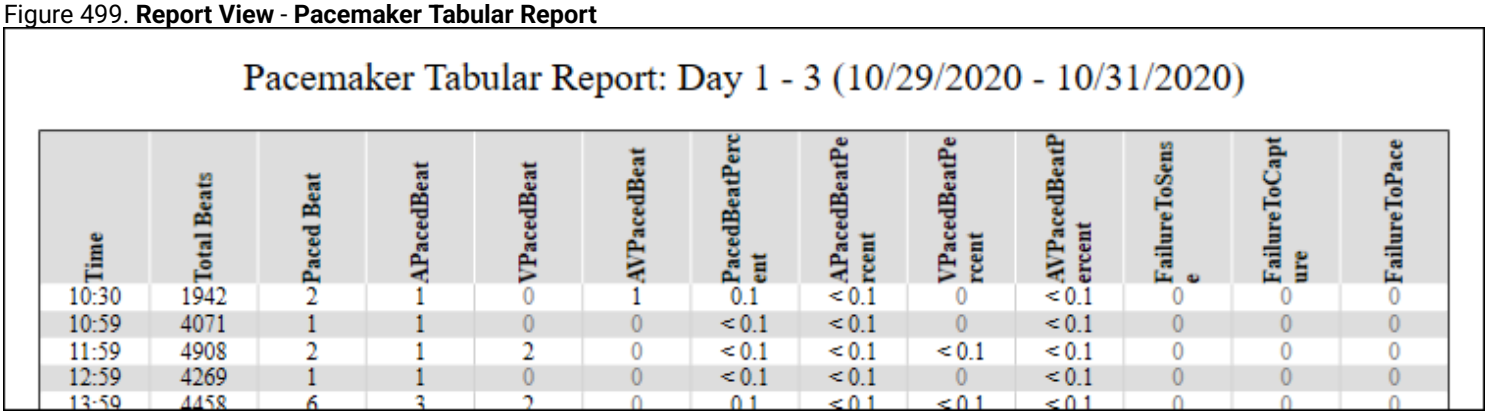


Hourly Tabular Report: Day 1 - 2 (10/29/2020 - 10/30/2020)

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	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	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

2.2. **Pacemaker Tabular Report**: This section presents a formatted table of pacemaker events detected during analysis, similarly detailing event occurrences. Like in the **Hourly Tabular Report**, entries here are not interactive.

Figure 499. **Report View** - **Pacemaker Tabular Report**

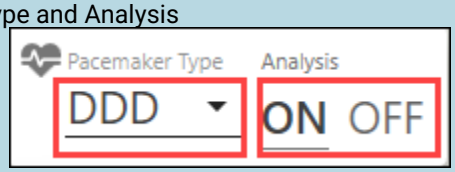


Pacemaker Tabular Report: Day 1 - 3 (10/29/2020 - 10/31/2020)

Time	Total Beats	Paced Beat	APacedBeat	VPacedBeat	AVPacedBeat	PacedBeatPercent	APacedBeatPercent	VPacedBeatPercent	AVPacedBeatPercent	FailureToSense	FailureToCapture	FailureToPace
10:30	1942	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

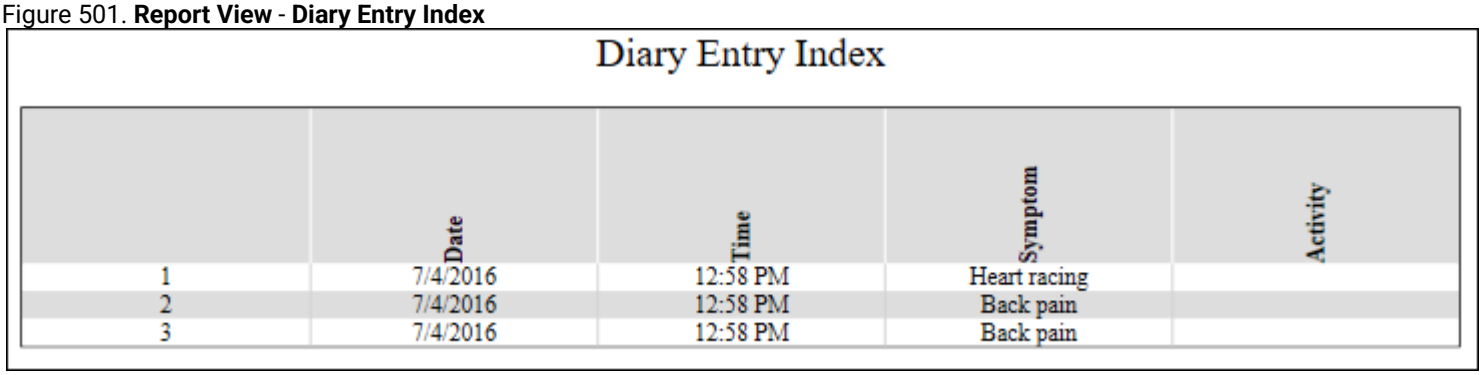
Note:
The **Pacemaker Tabular Report** toggle becomes available in the **Report View** only if, on the **Analysis** step, you have turned ON the pacemaker **Analysis** option in the **Pacemaker Controls** box and chosen the **Pacemaker Type**. Refer to the**Analysis View** section for more details.

Figure 500. Analysis View - Pacemaker Type and Analysis



2.3. **Diary Entry Index**: Lists all diary entries made during the ECG recording.

Figure 501. **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	

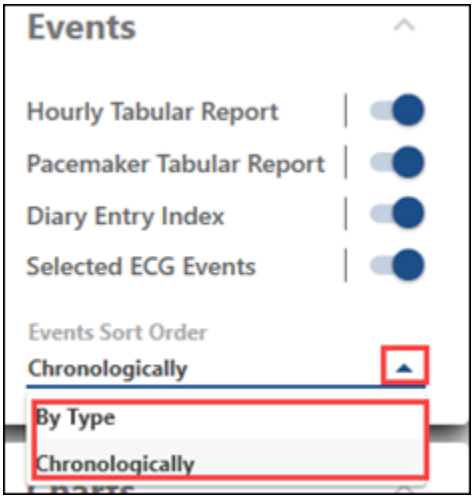
2.4. **Selected ECG Events** Displays events marked (selected) for inclusion in the final **Report** while reviewing Events in the Events View *(on page 191)*.

Figure 502. **Report View** - **Selected ECG Events**



Click the **Events Sort Order** drop-down list to choose a sorting option from available options.

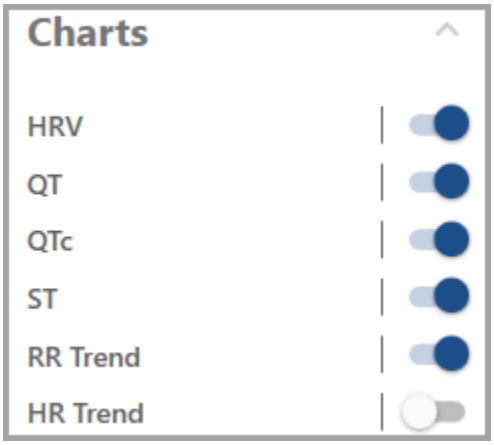
Figure 503. **Report View** - **Events Sort Order**



Charts

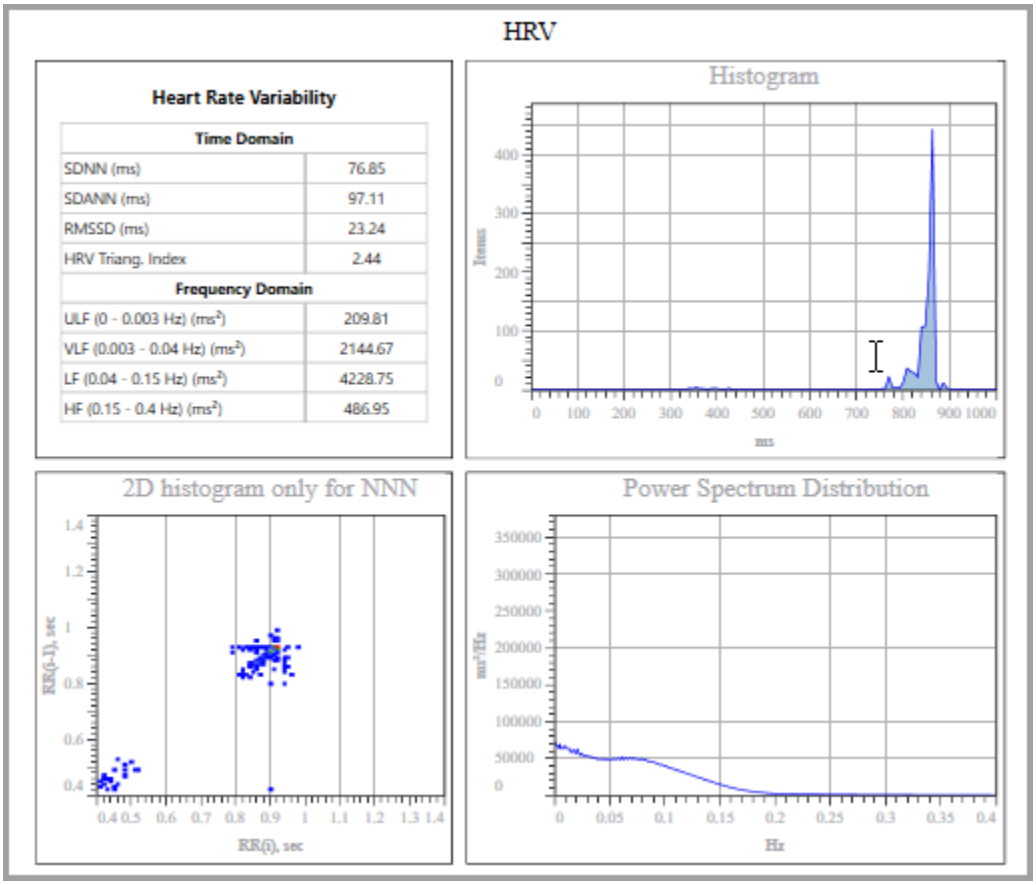
The **Charts** box allows the inclusion of **HRV** and **ST**, **QT** and **QTc**, and either the **RR Trend** or **HR Trend** graphs in the **Report**.

Figure 504. **Report View Charts Box**



Note: Only one Trend (HR or RR) can be included at a time; selecting one will automatically deselect the other.

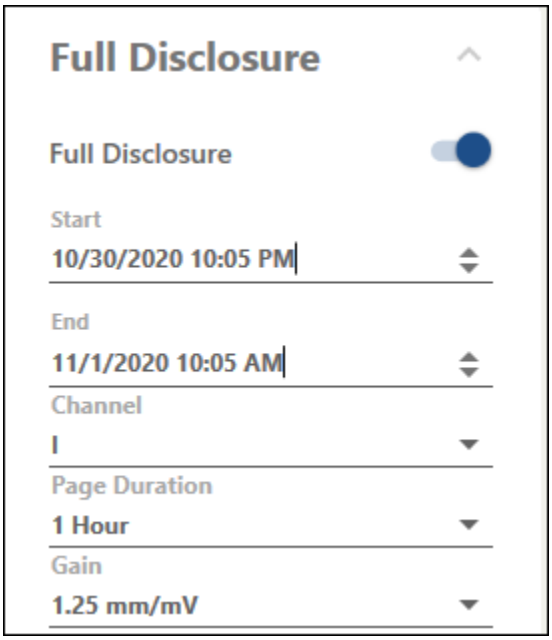
Figure 505. Report View - Charts



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.

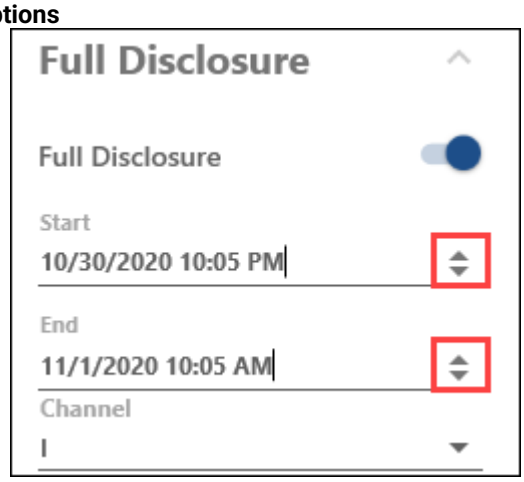
Figure 506. **Report View** - **Full Disclosure**



To adjust the **Full Disclosure** section configuration for the final Report:

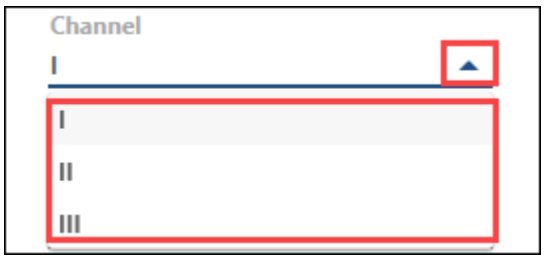
2.1. **Start and End options**: Click the picker arrows on the right to adjust the timing and length of the **Full Disclosure** segment to include in the **Report**.

Figure 507. **Report View** - **Start and End options**



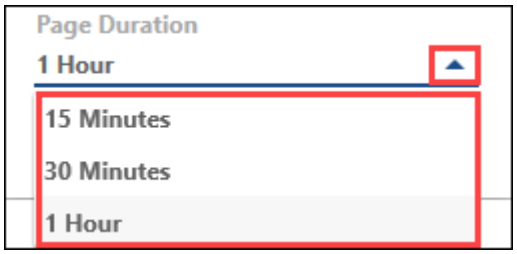
2.2. **Channel** Click the **Channel** drop-down list to choose which channel to display, with only one channel shown at a time in the **Full Disclosure** section.

Figure 508. **Report View** - **Channel**



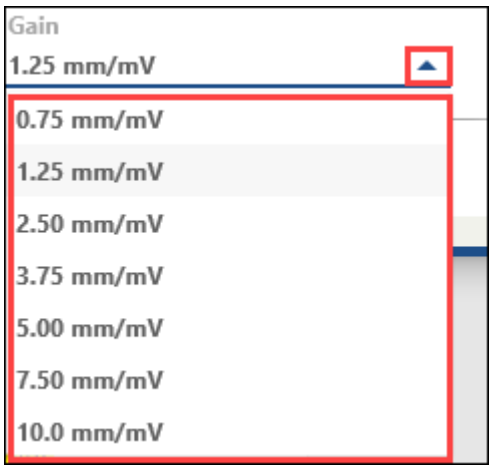
2.3. **Page Duration** Click the **Page Duration** drop-down list to select one of the available options. This parameter will define the length of the **Full Disclosure** fragment to include in the **Report**.

Figure 509. **Report View** - **Page Duration**



2.4. **Gain** Click the **Gain** drop-down list to select the gain scale for the **Full Disclosure** from the available options.

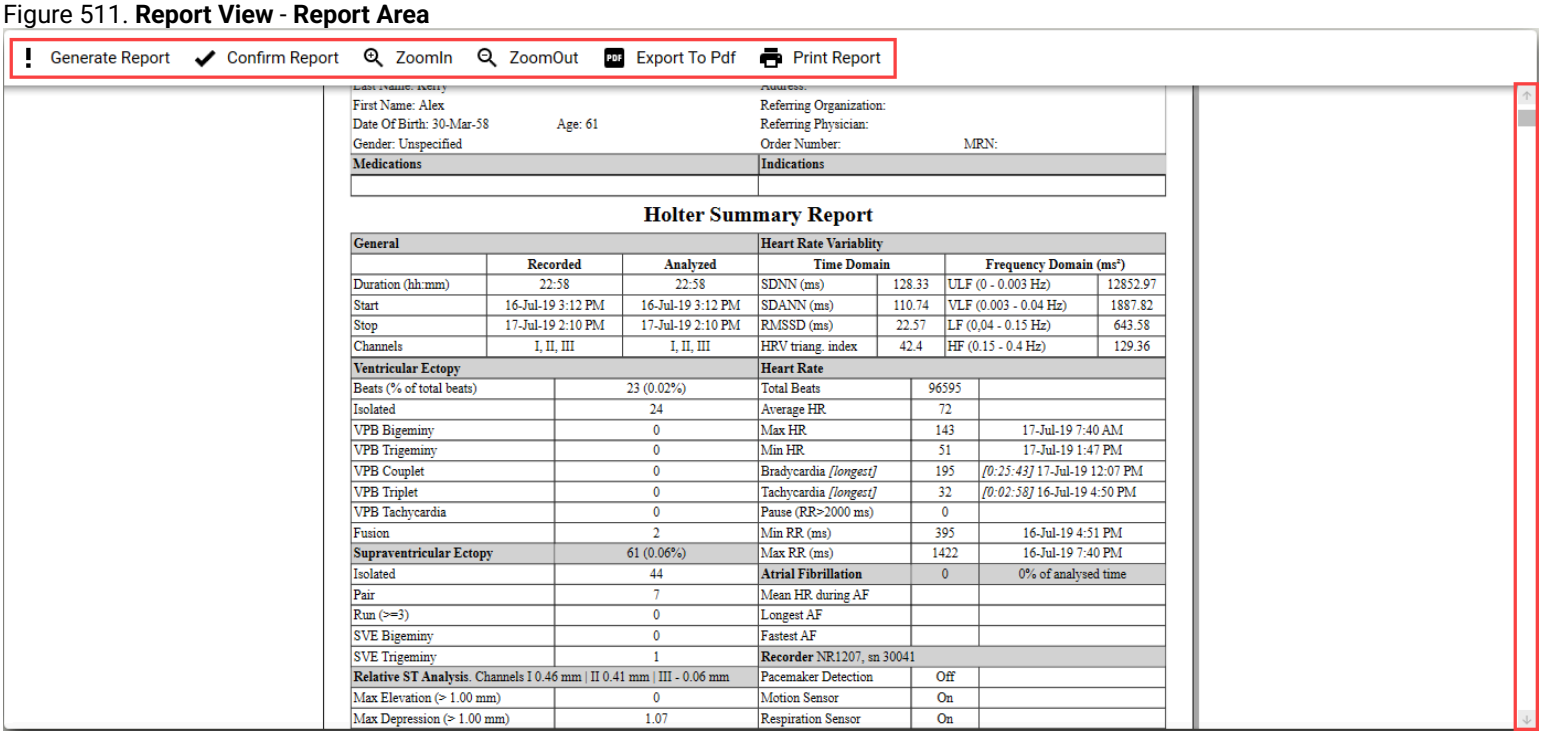
Figure 510. **Report View** - **Gain**



Summary Area

Review the generated **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 511. **Report View** - **Report Area**



First Name: Alex
Date Of Birth: 30-Mar-58 Age: 61
Gender: Unspecified
Referring Organization:
Referring Physician:
Order Number: MRN:

Medications	Indications

Holter Summary Report

General	Recorded	Analyzed
Duration (hh:mm)	22:58	22:58
Start	16-Jul-19 3:12 PM	16-Jul-19 3:12 PM
Stop	17-Jul-19 2:10 PM	17-Jul-19 2:10 PM
Channels	I, II, III	I, II, III

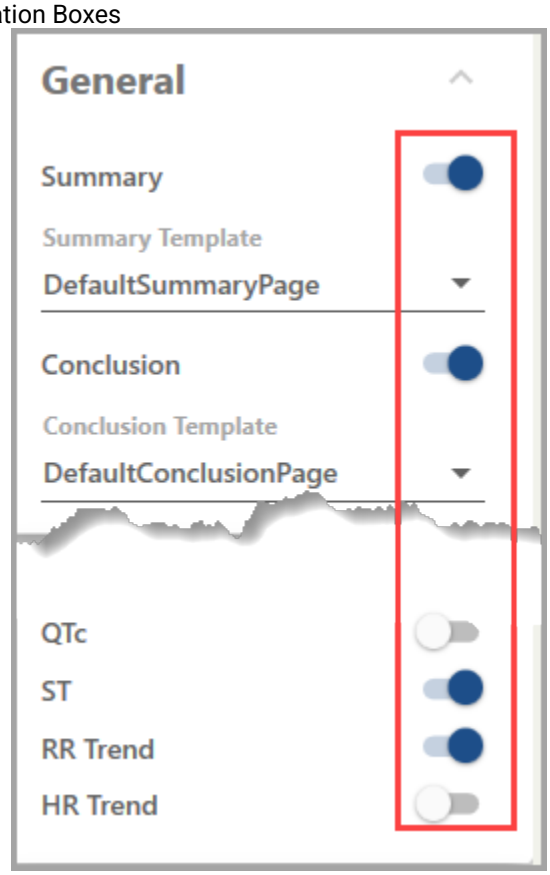
Heart Rate Variablity		Frequency Domain (ms^2)	
Time Domain			
SDNN (ms)	128.33	ULF (0 - 0.003 Hz)	12852.97
SDANN (ms)	110.74	VLF (0.003 - 0.04 Hz)	1887.82
RMSSD (ms)	22.57	LF (0,04 - 0.15 Hz)	643.58
HRV triang. index	42.4	HF (0.15 - 0.4 Hz)	129.36

Ventricular Ectopy	
Beats (% of total beats)	23 (0.02%)
Isolated	24
VPB Bigeminy	0
VPB Trigeminy	0
VPB Couplet	0
VPB Triplet	0
VPB Tachycardia	0
Fusion	2
Supraventricular Ectopy	61 (0.06%)
Isolated	44
Pair	7
Run (>=3)	0
SVE Bigeminy	0
SVE Trigeminy	1
Relative ST Analysis. Channels I 0.46 mm | II 0.41 mm | III - 0.06 mm	
Max Elevation (> 1.00 mm)	0
Max Depression (> 1.00 mm)	1.07

Heart Rate		
Total Beats	96595	
Average HR	72	
Max HR	143	17-Jul-19 7:40 AM
Min HR	51	17-Jul-19 1:47 PM
Bradycardia *[longest]*	195	*[0:25:43]* 17-Jul-19 12:07 PM
Tachycardia *[longest]*	32	*[0:02:58]* 16-Jul-19 4:50 PM
Pause (RR>2000 ms)	0	
Min RR (ms)	395	16-Jul-19 4:51 PM
Max RR (ms)	1422	16-Jul-19 7:40 PM
Atrial Fibrillation	0	0% of analysed time
Mean HR during AF		
Longest AF		
Fastest AF		
Recorder NR1207, sn 30041		
Pacemaker Detection	Off	
Motion Sensor	On	
Respiration Sensor	On	

Summary Area displays a detailed **Holter Summary Report** once it's generated. The report in the **Summary Area** includes all the essential data obtained from the ECG record during the **Analysis**, including sections turned ON using **Report Customization Boxes** *(on page 270)*.

Figure 512. **Report View** - Report Customization Boxes

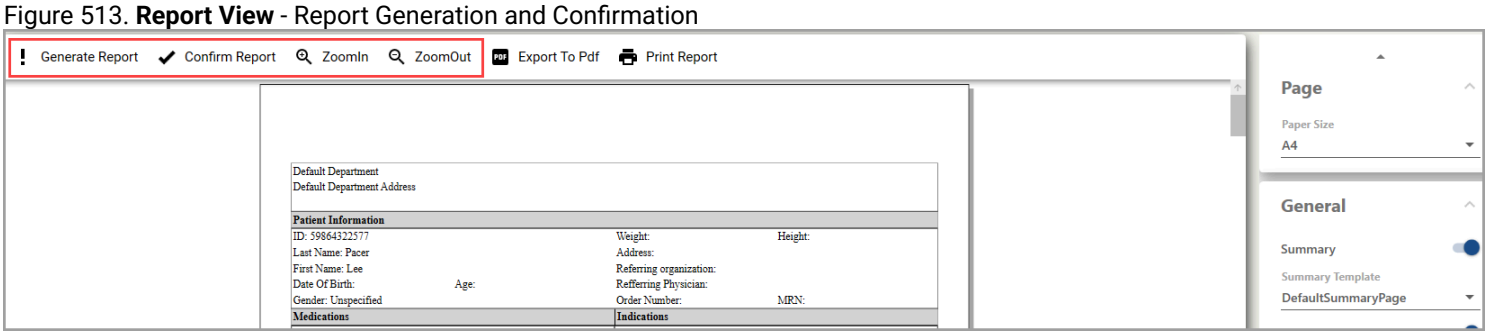


To review and confirm the **Report** using **Summary Area**:

1. Customize the report layout using the **Report Customization Boxes** *(on page 270)*. Switch relevant toggles and adjust other parameters according to your needs.

2. Click on the **Generate Report** button. Wait until the report is generated and appears on the screen.

Figure 513. **Report View** - Report Generation and Confirmation



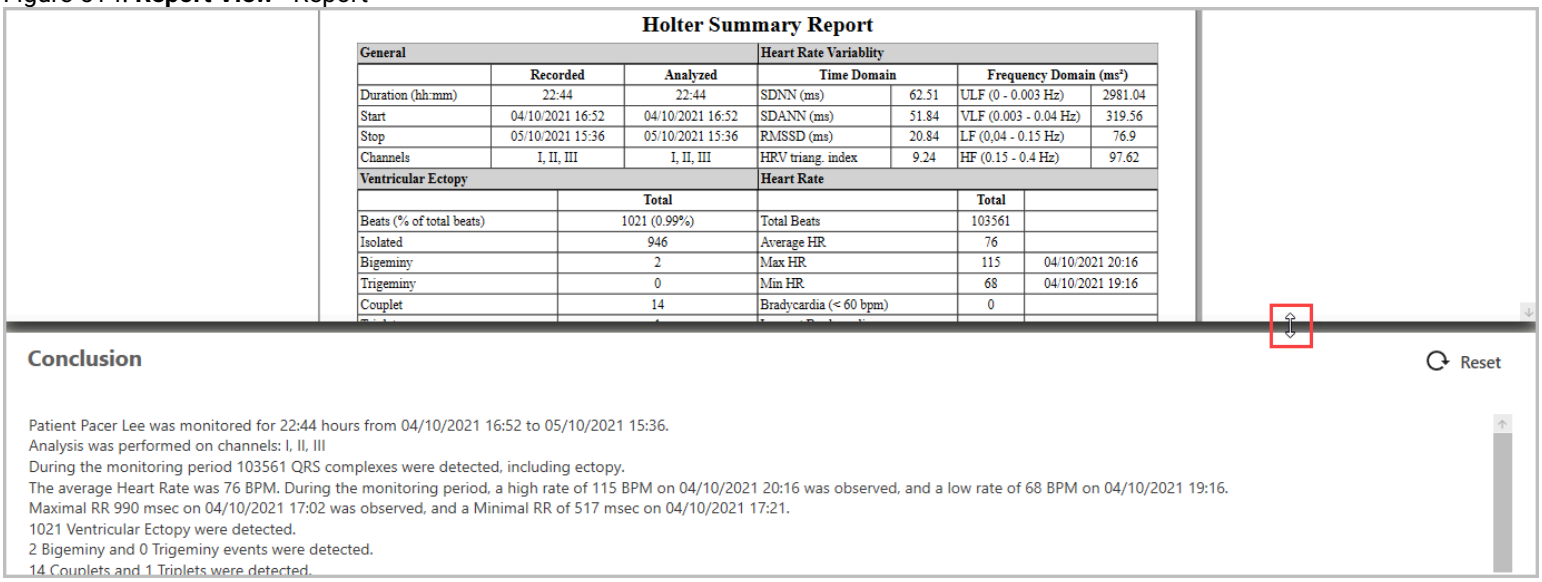
3. Review the generated **Report** using the scroll function or scroll bar, and**Zoom In**/**Zoom Out** buttons in the **Report View Toolbar** as needed.

4. If you have no more changes to make to the report after the review, click **Confirm Report** in the **Report View Toolbar**.

Note:
You can adjust the **Summary** and **Conclusion** sections size proportionally by dragging and dropping the splitter bar between them:

1. To resize the section, move the cursor over the splitter bar until it changes to a vertical resize cursor.
2. Click the splitter bar and drag-and-drop it to the desired position. You can readjust the position at any moment.

Figure 514. **Report View** - Report



Conclusion Area

The **Conclusion Area** is designed to reflect the key findings of an ECG test. The **Conclusion** is an automatically generated list of key observations extracted from the ECG analysis and displayed in this area. It is typically reviewed and augmented by a qualified healthcare professional. It encapsulates the ECG test data, including patient history, test indications, results, and any diagnoses or recommendations. You may confirm the **Report** once you finish reviewing the **Conclusion**.

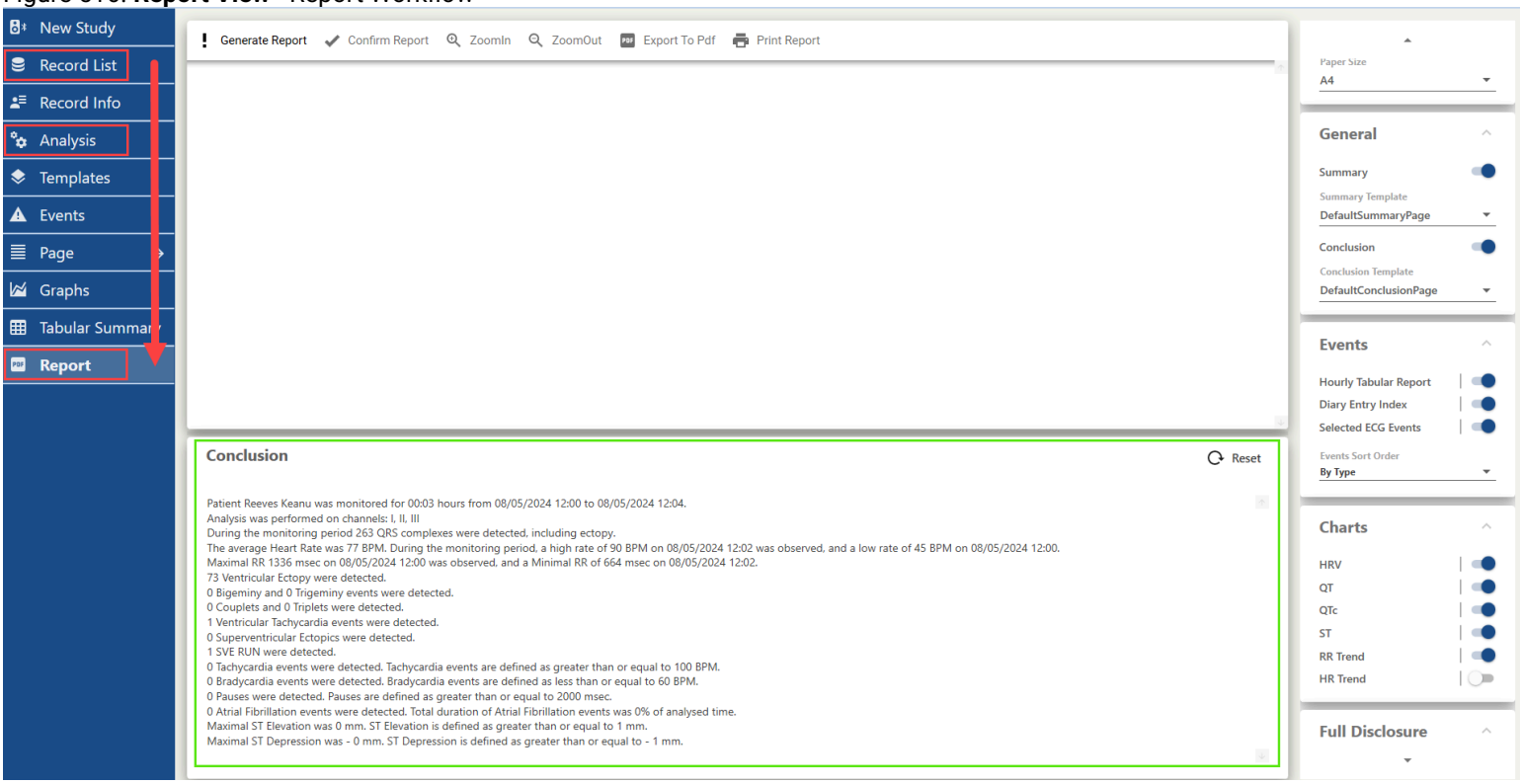
Figure 515. **Report View** - **Conclusion**



The **Conclusion** is autogenerated along the standard ECG analysis workflow supported by the NH-301 software:

1. **Load a Record**: Import or load the ECG record into the system via **Record List View** *(on page 85)*.
2. **Analyze**: Perform the analysis on the loaded record using the **Analysis View** *(on page 97)*.
3. **Go to the Report View**: Navigate to the **Report View**. When you click on the **Report** on the left, the **Conclusion** using the ECG parameters acquired during the analysis is automatically generated and displayed in the **Conclusion Area**.

Figure 516. **Report View** - Report Workflow

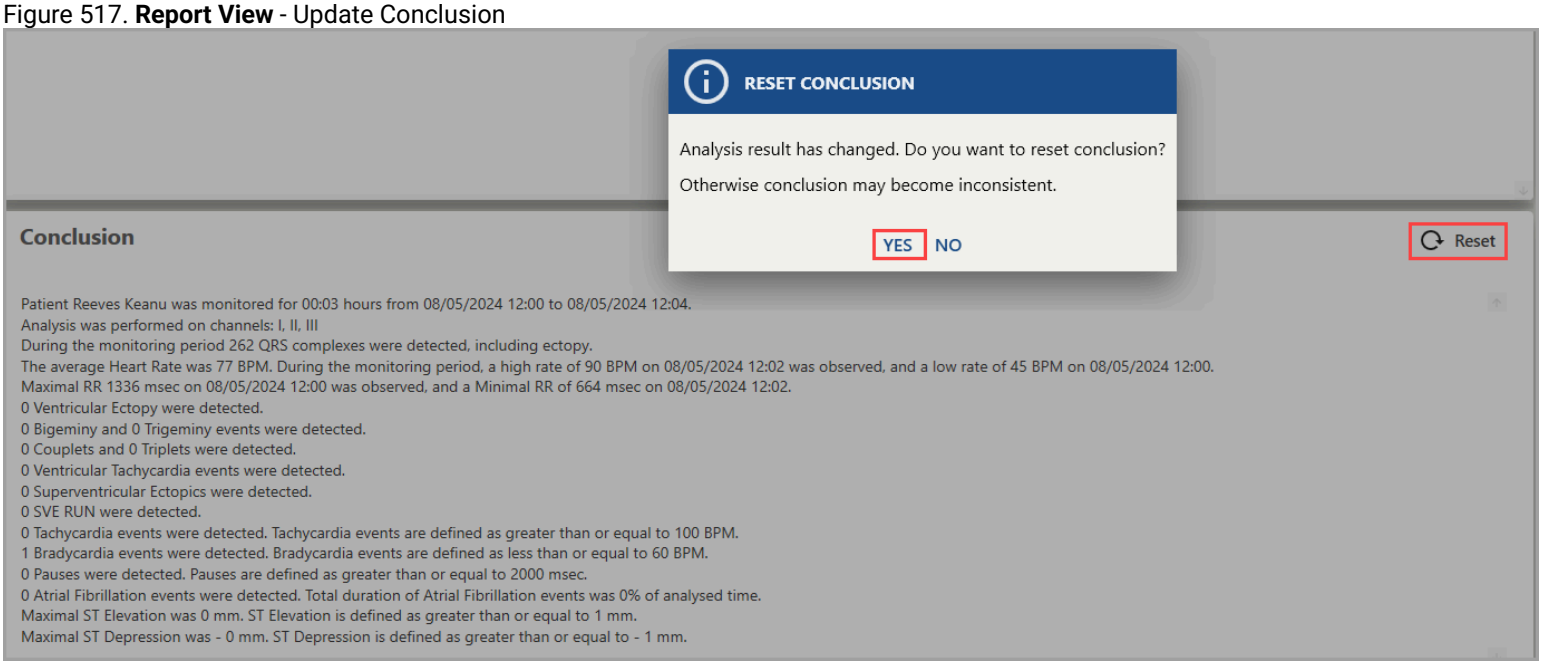


If you have saved the generated **Conclusion** and then navigate to the **Templates View** or **Events View** to make changes (like editing templates or adding events), you will see a pop-up when you return to the Report View. This pop-up will prompt you to decide whether to save or discard the changes made to the **Conclusion**, which has been recalculated because of the modifications in**Templates** and **Events**.

Here you can do the following:

- **Save Changes**: Click **Yes** to save the changes after the **Conclusion** was recalculated.
- **Discard Changes**: Click **No** to discard the changes.

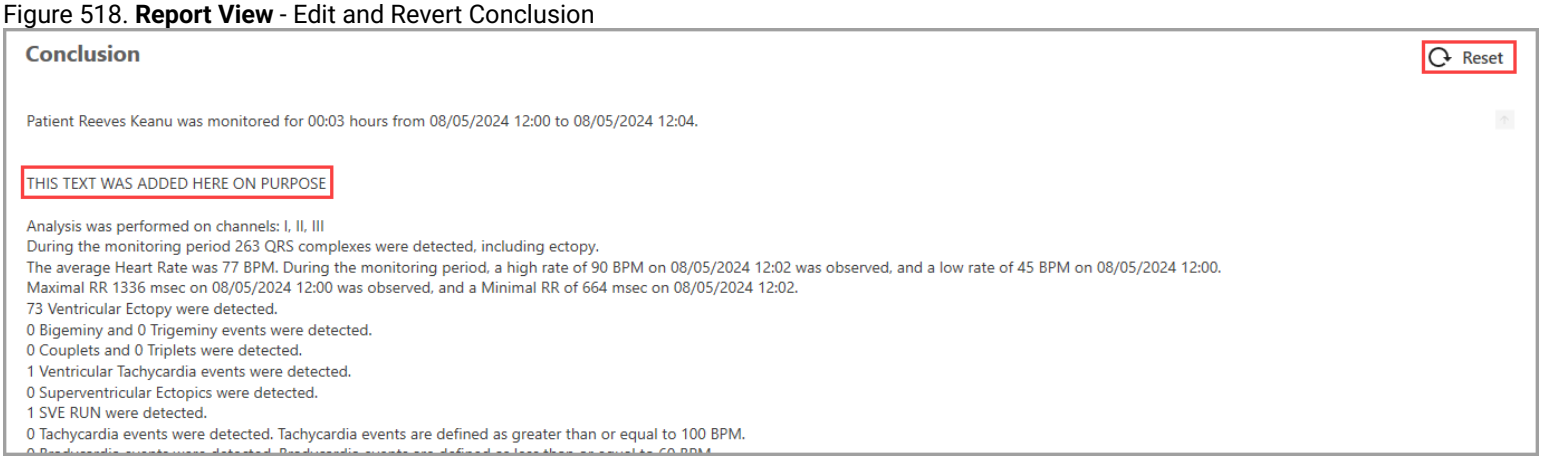
Figure 517. **Report View** - Update Conclusion



You can also modify the **Conclusion** text manually by following these steps:

1. Click at any desired point within the **Conclusion Area** to place a cursor.
2. Type in the text you need.
3. **(Optional)** Save the **Record** by clicking the **Save** icon in the **Top Toolbar**.

Figure 518. **Report View** - Edit and Revert Conclusion



To undo (discard) the manual alterations made in the **Conclusion Area**:

1. Click the **Reset** button in the upper-right corner of the **Conclusion Area**. The contents of the **Conclusion** will revert to the last saved state where the **Conclusion** was recalculated.

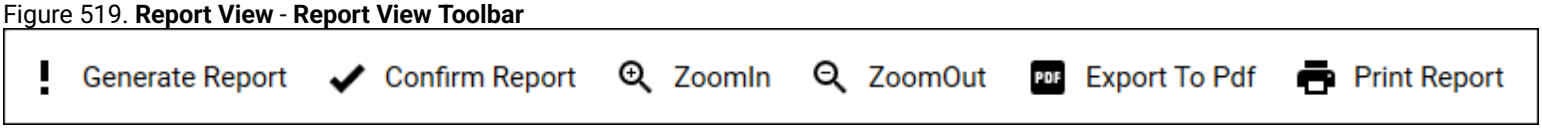
Note: Changes in content resulting from recalculating the **Conclusion** due to modifications in **Templates** and **Events** cannot be undone using this feature. This feature only affects the information you have personally entered into the **Conclusion**, such as additional notes or observations that were typed in.

Note: Both functions—conclusion recalculation due to changes in analysis outcomes (such as editing templates or events) and manual changes reset—are "saving insensitive." You can edit templates or change the text of the **Conclusion**, then save the record, unload it, load it again, return to the **Report View**, and discard the changes you made before the last record saving.

Report View Toolbar

The **Report View Toolbar** facilitates report generation, confirmation, zooming, exporting to PDF, and printing.

Figure 519. **Report View** - **Report View Toolbar**



Icon	Description
Generate Report	**Generate Report button:** Click to start the report generation process. The report will include all sections toggled ON in the **Report Customization Boxes**. Once the generation is complete, you'll receive a preview of the **Report** to review before finalizing your conclusion.
Confirm Report	**Confirm Report button:** Click this to confirm and save the **Report**. It's advisable to do this only after reviewing the generated **Report** and submitting your conclusion.
ZoomIn	**Zoom In button:** Click to zoom in on specific parts of the **Report** in the **Report Area**.
ZoomOut	**Zoom Out button:** Click to zoom out in the **Report Area**. Use this button to zoom out if you had zoomed in earlier.
Export To Pdf	**Export To PDF button**: This allows you to export and save the **Report** as a PDF. In the dialog box, click **Save** in the bottom-right corner to start the export. An 'Exporting' progress bar will indicate the process and disappear once the export is complete.
Print Report	**Print Report button**: Click to open the Print dialog box for printing the **Report**. Within the Print dialog box: 1. Choose a printer **available** in the **Select Printer** window. 2. Adjust other preferences according to your needs. 3. Click **Print** at the bottom of the dialog box to print the **Report**.

4.6.11.1. 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 the report generation is complete, a report preview is provided.
3. Review the generated report using 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.

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.

5.1. 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.

5.1.1. 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 284)* 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.

5.1.2. 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 313)* 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 these verification capabilities as diagnostic tools.

General instructions:

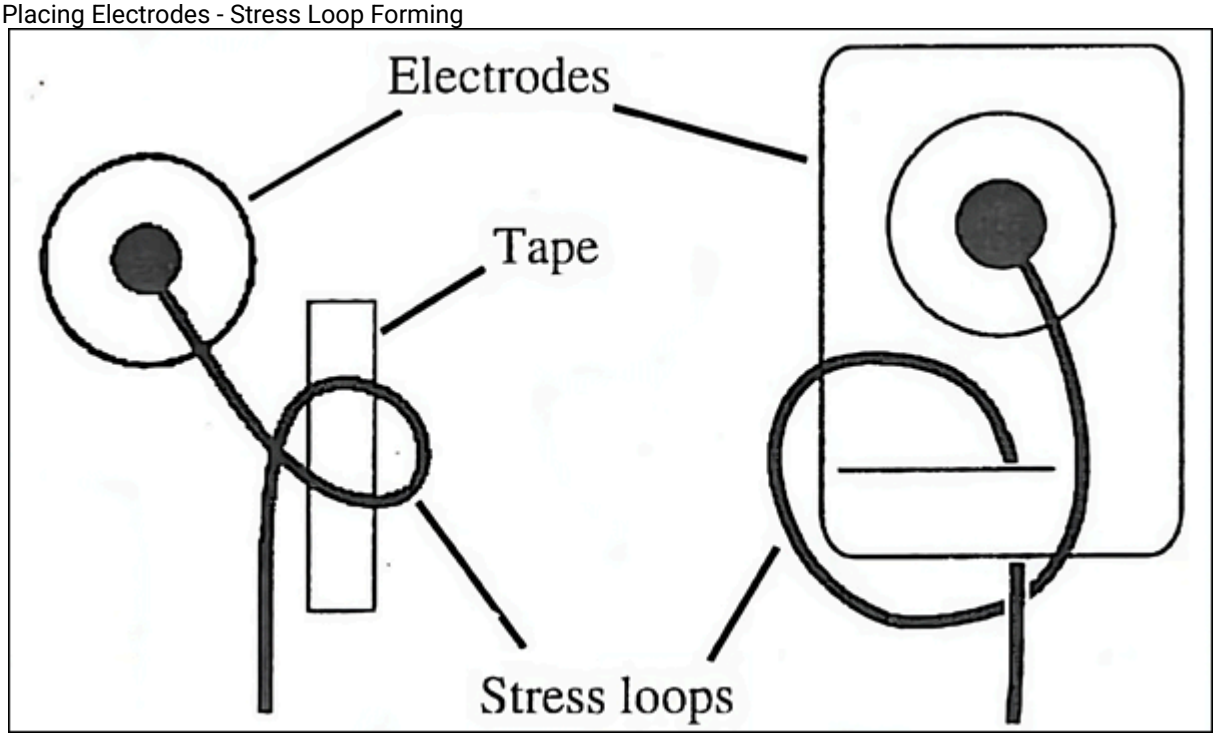
1. Use only high-quality disposable electrodes, designed for use with **Holter Recorders**. Wet gel electrodes are recommended. Refer to the **ANSI/AAMI EC12:2000 Standard** for safety, performance, and labeling requirements for the disposable electrodes, and guidelines for reliable patient connections.

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 520. Placing Electrodes - Stress Loop Forming

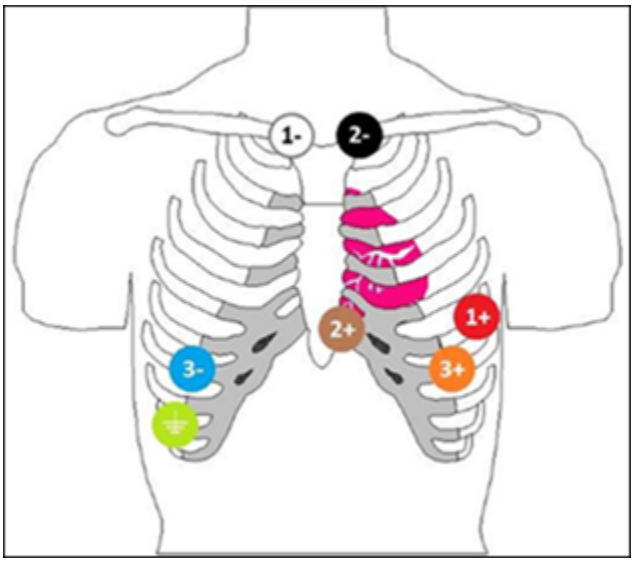


Note:

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.

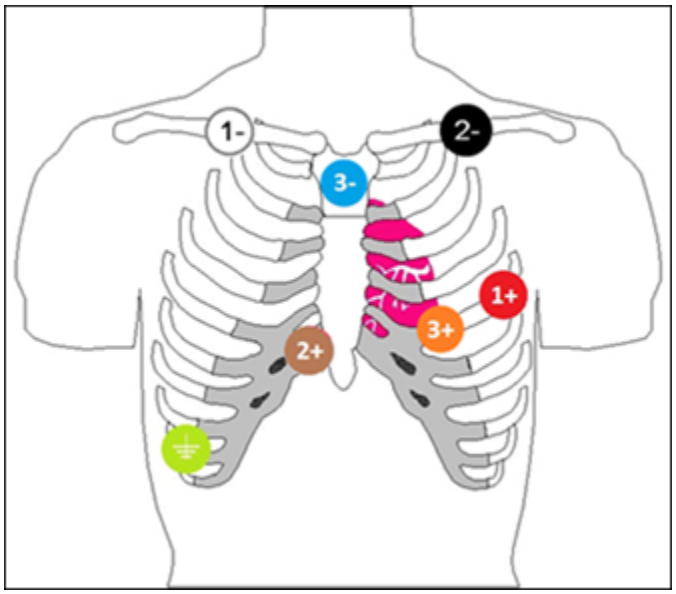
5.1.2.1. Recommended Electrode Placement: 3 Channels, 7-Lead ECG Cable

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
Ch 3 +	Orange	Left midclavicular line on the 7th costal arch
GND	Green	Lower right costal arch



5.1.2.2. Alternative Electrode Placement: 3 Channels, 7-Lead ECG Cable

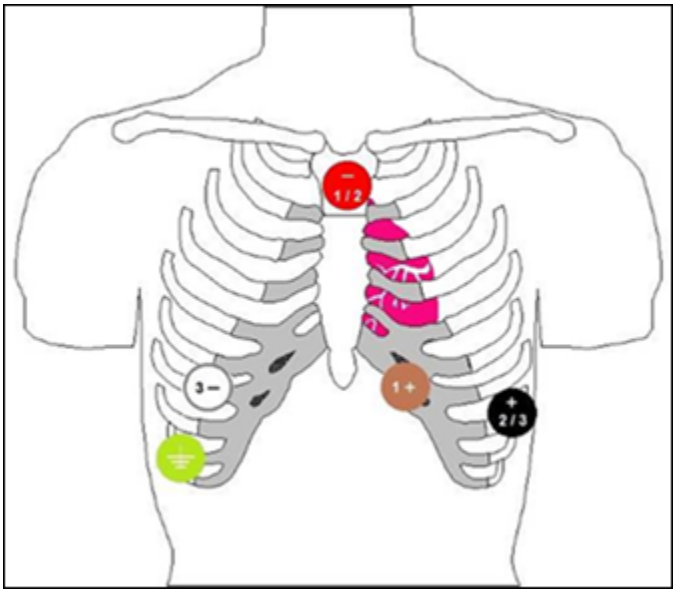
Channel	Color	Placement
Ch 1 –	White	Right midclavicular
Ch 1 +	Red	Left anterior axillary line on the 5th costal arch
Ch 2 –	Black	Left midclavicular
Ch 2 +	Brown	Approximately 1 inch right of the xiphoid process
Ch 3 –	Blue	Center of manubrium of the sternum
Ch 3 +	Orange	Left midclavicular line on 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

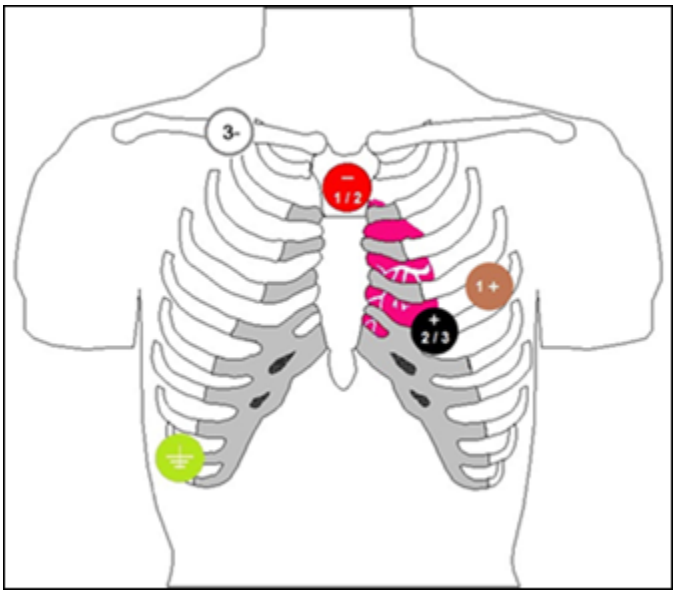
5.1.2.3. Recommended Electrode Placement: 3 Channels, 5-Lead ECG Cable

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



5.1.2.4. Alternative Electrode Placement: 3 Channels, 5-Lead ECG Cable

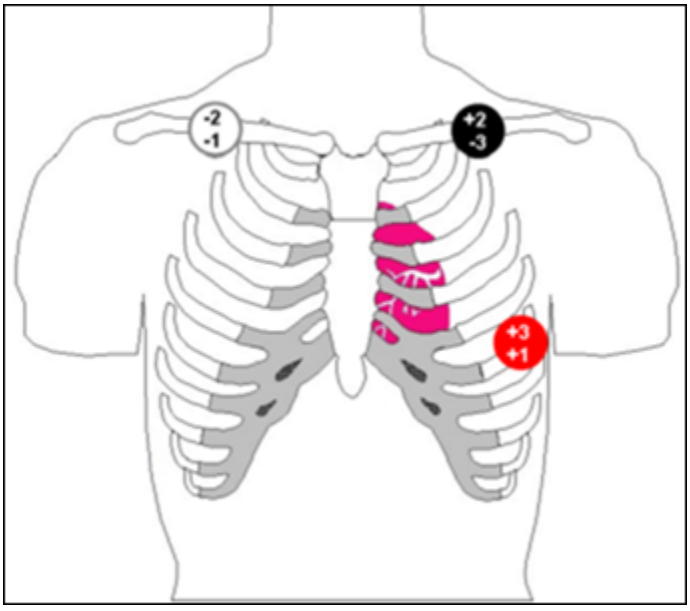
Channel	Color	Placement
Ch 1 – Ch 2 –	Red	Center of manubrium of the sternum
Ch 1 +	Brown	Left anterior axillary line on the 5th costal arch
Ch 2 + Ch 3 +	Black	Left midclavicular line on the 5th costal arch
Ch 3 –	White	Right midclavicular
GND	Green	Lower right costal arch



Channel	Electrode Colors	Standard 12-Lead Equivalent
Ch 1	Red–Brown	CM5
Ch 2	Red–Black	aFV
Ch 3	White–Black	Lead III

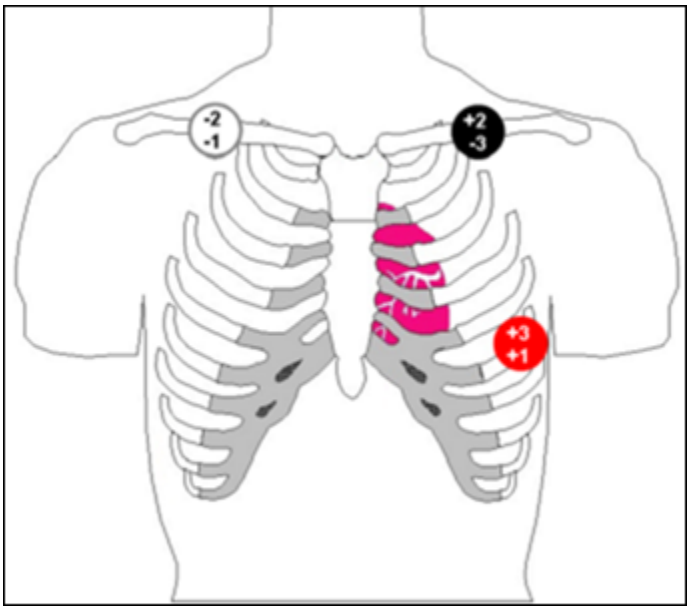
5.1.2.5. Recommended Electrode Placement: 3 Channels, 3-Lead ECG Cable

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



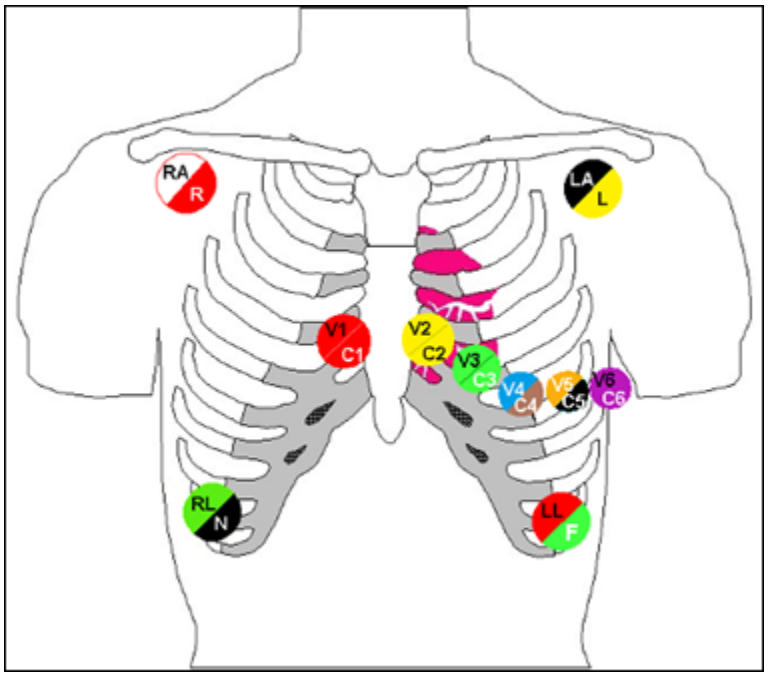
5.1.2.6. Alternative Electrode Placement: 3 Channels, 3-Lead ECG Cable

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



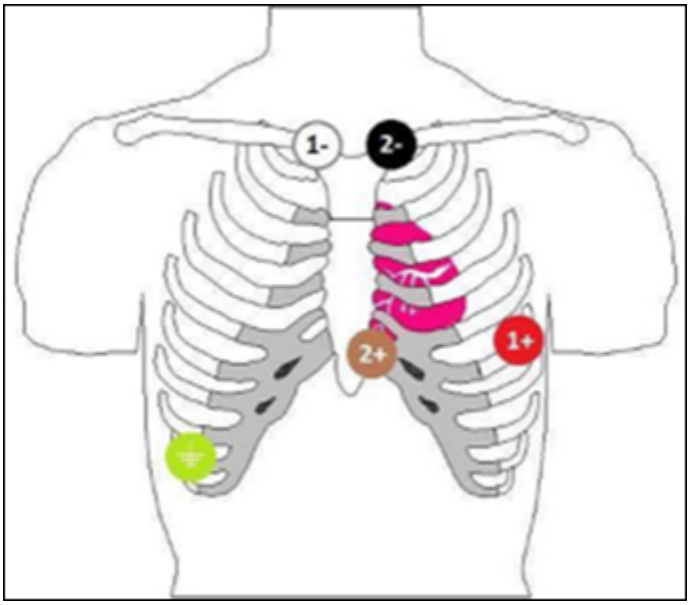
5.1.2.7. Recommended Electrode Placement: 12 Channels, 10-Lead ECG Cable

#	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



5.1.2.8. 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



5.2. 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:

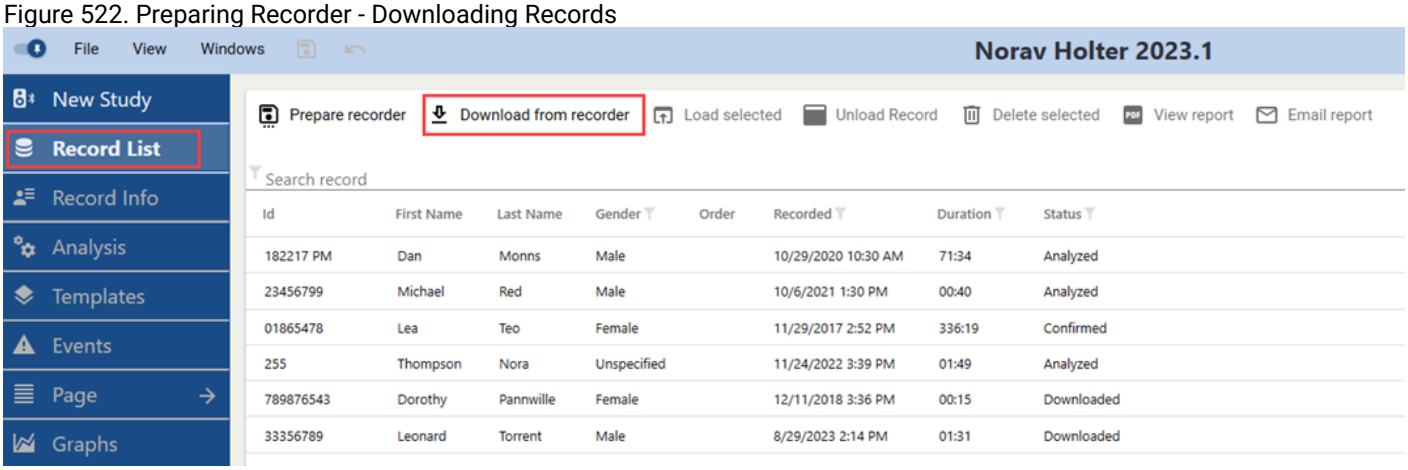
1. **Connecting the Recorder**: Connect the **Recorder** to the computer where the NH-301 analysis system is installed. You have three options:
    1. **Connection via USB**:
        1.1. Confirm that a **Memory Card** is installed in the recorder.
        1.2. Disconnect the ECG cable from the **Recorder** and connect a USB cable instead.
        1.3. Plug the USB cable into a USB port on the computer.
    2. **Connection via Memory Card Reader**:
        2.1. Eject the **Memory Card** from the **Recorder**.
        2.2. Place the **Memory Card** into the **Card Reader**.
        2.3. Connect the **Card Reader** to a USB port on the computer.
    3. **Connection via Bluetooth**:
        3.1. To connect a **Recorder** using Bluetooth pairing, please refer to the Pairing Norav Devices via Bluetooth *(on page 293)* 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:
    1. Open Windows Explorer by clicking its icon on the Windows Taskbar.

Figure 521. Verifying Memory - Opening Windows Explorer



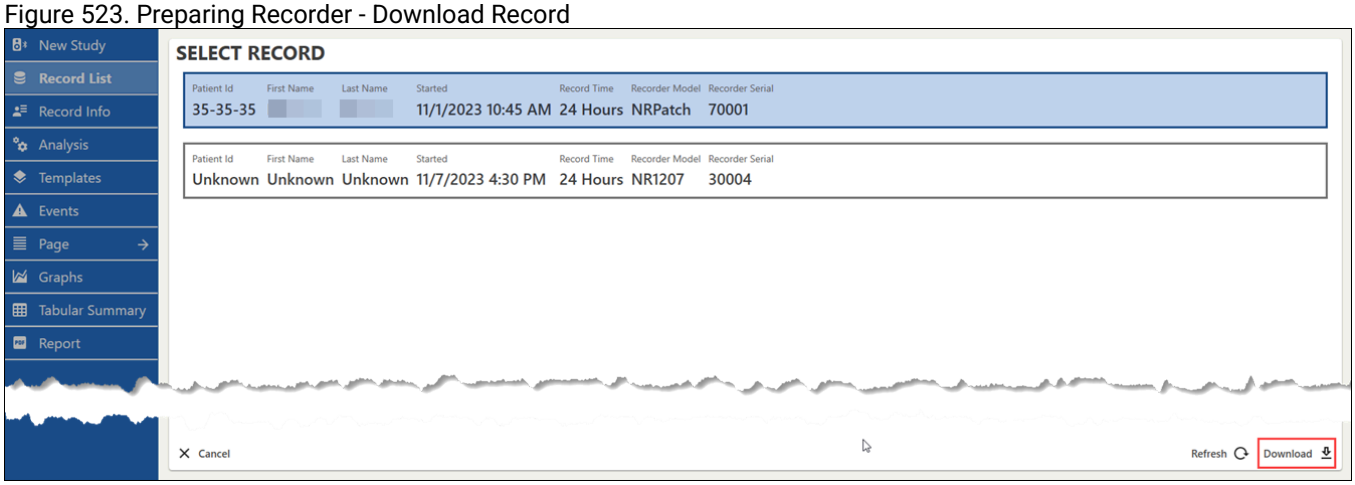
    2. Click on the relevant drive that represents your **Recorder** memory.
    3. Check for .nrr or .res files. If these files exist, proceed to **Step 3** below to download and clear them; otherwise proceed to the next section *(on page 302)*.
3. **(Optional) Downloading and Clearing Previous Records:**
    1. Download the record:

Figure 522. Preparing Recorder - Downloading Records



    1.1. Click the **Record List View** in the **Views Sidebar** on the left.
    1.2. Click the **Download from recorder** button on the top toolbar. A pop-up window will appear.
    1.3. 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 523. Preparing Recorder - Download Record

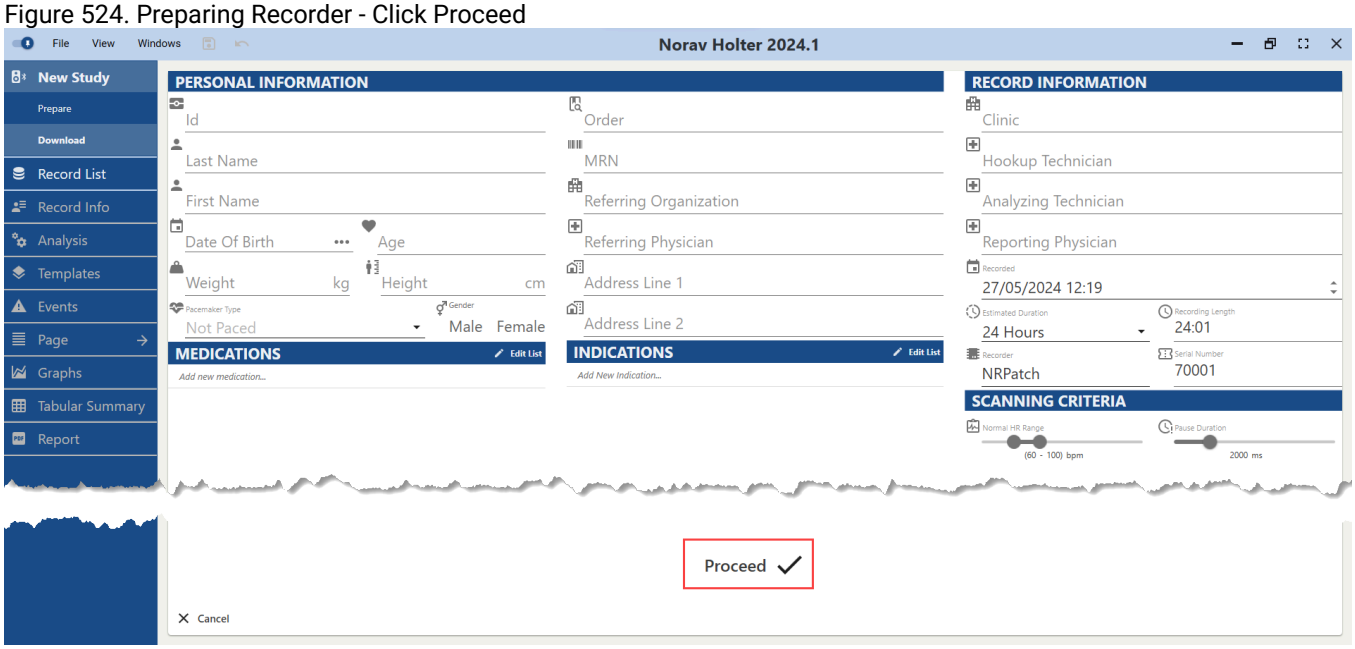


If you have connected additional **Recorders** or disconnected some of those previously plugged in, click **Refresh** in the bottom right corner to update the accessible records list.

1.4. The **Record Information**window will appear. Validate and modify the patient's information if needed; refer to Step 3 in the Menu Bar section *(on page)* on how to modify the patient's data.

1.5. Click **Proceed** to finish downloading the record. A "Downloading..." progress bar will appear. If only one record was recognized, the download is finished and the **Record List** will be displayed.

Figure 524. 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 **Record List View** to navigate back to the **Select Record**screen.

1.6. **(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.

2. Clear the **Recorder** memory:

2.1. Open Windows Explorer by clicking its icon on the Windows Taskbar.

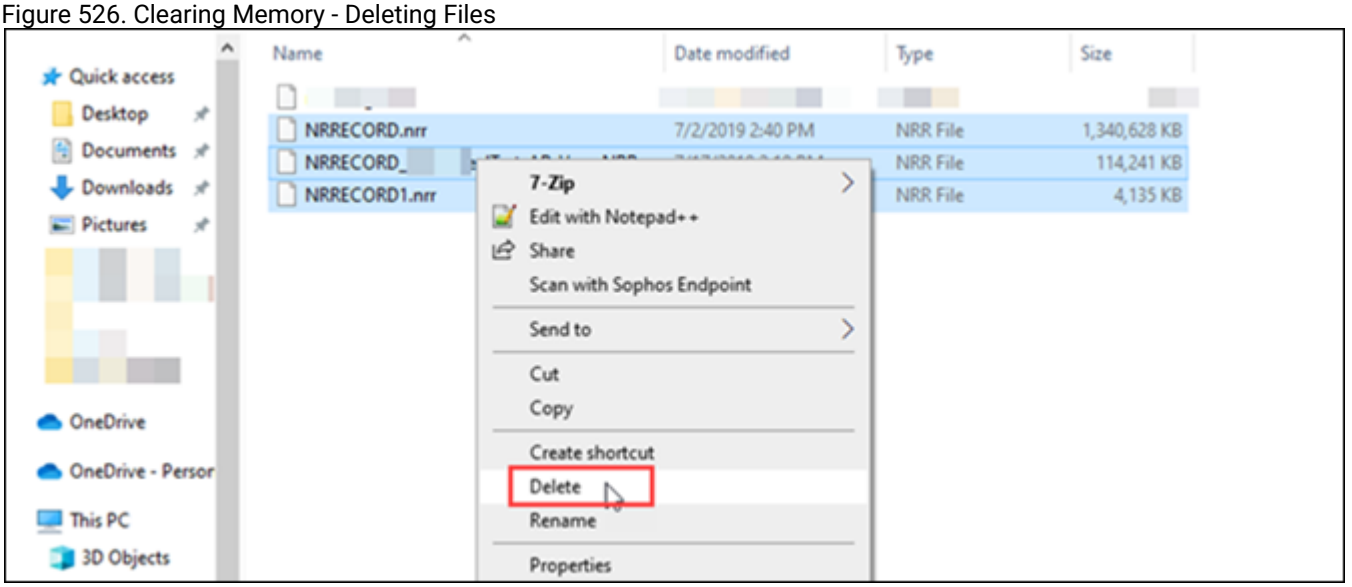
Figure 525. Clearing Memory - Opening Windows Explorer



2.2. Click on the relevant drive that represents your **Recorder** memory.

2.3. 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 526. Clearing Memory - Deleting Files



2.4. Right-click 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**, particularly 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 record information, adjust record settings, and more *(on page 302)*.

5.2.1. Pairing Norav Devices via Bluetooth

Before starting the Preparing Recorder *(on page 290)* procedure, you may opt to connect a **Recorder** to your computer via Bluetooth pairing. This section will guide you through the pairing process of various NR device models with your computer.

Depending on the default pairing method of the specific NR **Recorder**, you may need to follow one of the sequences described below.

5.2.1.1. Pairing NR-314-P Recorder Model

The NR-314-P model, due to its compact size and design, has no Memory Card slot, unlike most other **NR Recorder** models. The NR-314-P model features USB and Bluetooth connection methods.

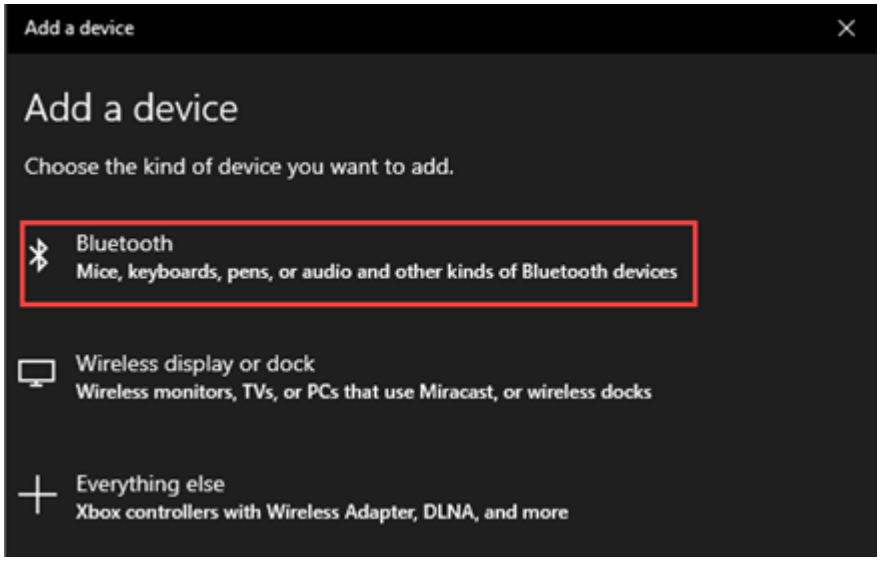
Note: The NR-314-P device model is compatible **only with Bluetooth Low Energy (BLE) dongles**. Other device models may support both standard and low-energy dongles.

Note: To connect the NR-314-P recorder to the computer via Bluetooth, make sure the device is undocked from its docking station.

To connect the NR-314-P Recorder via Bluetooth:

1. Press the NR-314-P button to turn the device ON, then wait until initialization is complete (the LED indicator turns solid green).
2. On your computer, go to **Settings > Bluetooth & devices**.
3. Click **Add device**.
4. Select **Bluetooth**, then click **Show all devices** (if available).

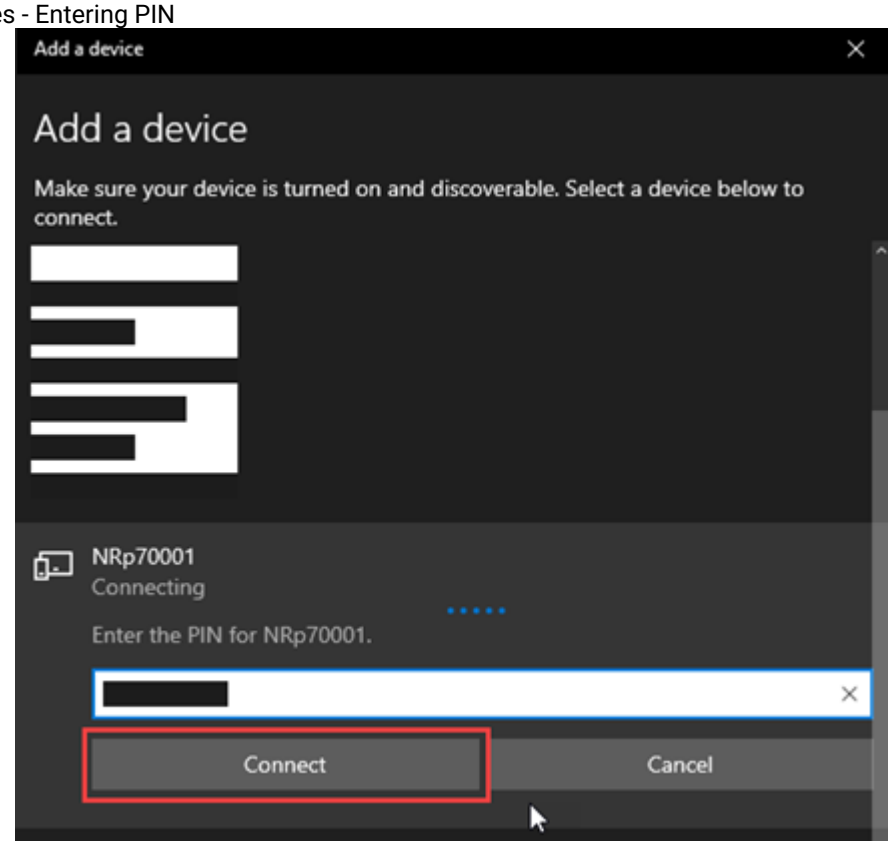
Figure 527. Pairing Devices - Add a device



5. In the **Add a device** list, click the **NRpXXXXX** entry (or a similar name). When prompted, enter the PIN code.

6. Enter the following PIN code: **120474**.

Figure 528. Pairing Devices - Entering PIN



7. Click **Connect** to initiate pairing. If this PIN code is not accepted, contact the Support Team.

8. When the **Connected** message appears on your computer, the pairing is complete and you can click **Done**. If the device does not connect, repeat from **Step 1** or consult the device manual.

Note:

You may encounter a device selection and connection issue when attempting to select the NR-314-P in the **Select Connection** list of the **Devices View**. Generally, the procedure follows these steps:

1. Turn the device ON. The green indicator light should start blinking.
2. **Wait until the green light stops blinking.**
3. Select the NR-314-P 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 might lose connection with the device, and the device name 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 & 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.

The NR-314-P recorder's LED indicator functions as detailed in the table below. Refer to this table for accurate interpretation of the NR-314-P recorder's LED indicator behaviors.

Action/Indication	Description	LED Indicator Behavior
Switch ON (NR-314-P disconnected from the docking station and **with no existing recordings**)	Press the button **firmly**, then release it.	**Green LED blinks slowly** during initialization. **Solid green** after initialization is complete.
Switch OFF (before starting a new recording or uploading a record configuration file)	Press and hold the button for approximately 15 seconds until the indicator turns OFF, then release.	The LED **blinks green** and then turns OFF when the device is shut down.
Start a new recording	After you have turned the NR-314-P recorder ON and initialization is complete, press and hold the button for 3 seconds, then release.	The LED **blinks green slowly**. The recording starts in 30 seconds. After 60 more seconds, the **green LED briefly flashes at longer intervals**, indicating that the recording is in progress. **Note:** If **Auto Start Delay** is configured (10 minutes by default), turning the recorder ON will start recording automatically after the set delay, even if no further action is taken.
Record User Event	While recording is in progress, press the button until the device beeps, then release.	The LED indicator turns **solid blue**, and after approximately 30 seconds, turns OFF.
Stop recording	Press and hold the button for 15 seconds until the LED indicator turns OFF, then release.	The LED indicator turns **solid blue**, then turns OFF when recording stops.
Record session is finished	-	The LED indicator **slowly blinks red-to-green**, then turns OFF after 5 minutes. Connect the device to a PC via USB to download the recording.
Data download	Connect the NR-314-P recorder to the docking station (USB connection).	When you connect the NR-314-P recorder to the docking station, the LED indicator starts **flashing green**; within a few seconds, it turns **blue**. You can then download the data from the recorder.
Action/Indication	**Description**	**LED Indicator Behavior**
Switch ON (NR-314-P	Press the button **firmly**, then release it.	**Green LED blinks** during initialization, then turns **solid**

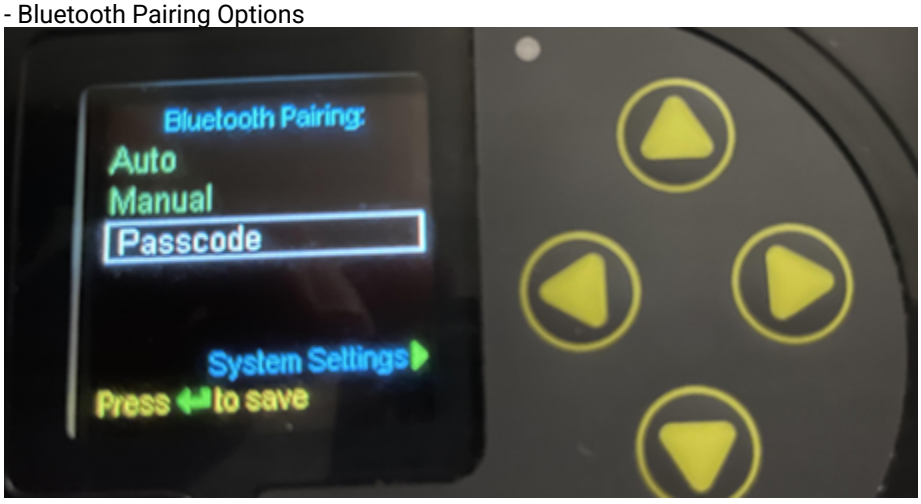
Action/Indication	Description	LED Indicator Behavior
Switch ON (NR-314-P disconnected from the docking station and has a recording)	Press the button **firmly**, then release it.	**Green LED blinks** during initialization, then turns **solid green** when initialization is complete. If a recording is present, the LED then blinks **green-to-red** and turns OFF after a short period. **Note:** Download or delete the existing recording to turn the NR-314-P ON.
Battery is fully charged when connected via USB	The NR-314-P recorder is docked to the docking station (USB connection).	The LED indicator displays **solid blue** light.
Battery is charging when connected via USB	The NR-314-P recorder is docked to the docking station (USB connection).	The LED indicator displays **blinking blue** light.
Battery low	-	The LED indicator displays **solid red** light. Connect the device to the docking station.
Hardware issue - non-critical	-	The LED indicator displays **blinking red** light and turns OFF after 2 minutes. Please contact the Support Team.
Hardware issue - critical	-	The LED indicator displays **blinking red** light and turns OFF after 5 seconds. Disconnect the device from the charging station and contact the Support Team.
Device is undocked and connected via Bluetooth	The NR-314-P recorder is connected via Bluetooth.	The LED indicator displays **solid blue** light.
Data transmission (ECG Streaming) via Bluetooth	The NR-314-P recorder is connected via Bluetooth.	The LED indicator displays **blinking blue** light.

5.2.1.2. Pairing Norav Recorders Using Various Pairing Options

Some **NR Recorder** models provide three device-computer pairing options:

- **Auto**
- **Manual**
- **Passcode**

Figure 529. Pairing Devices - Bluetooth Pairing Options



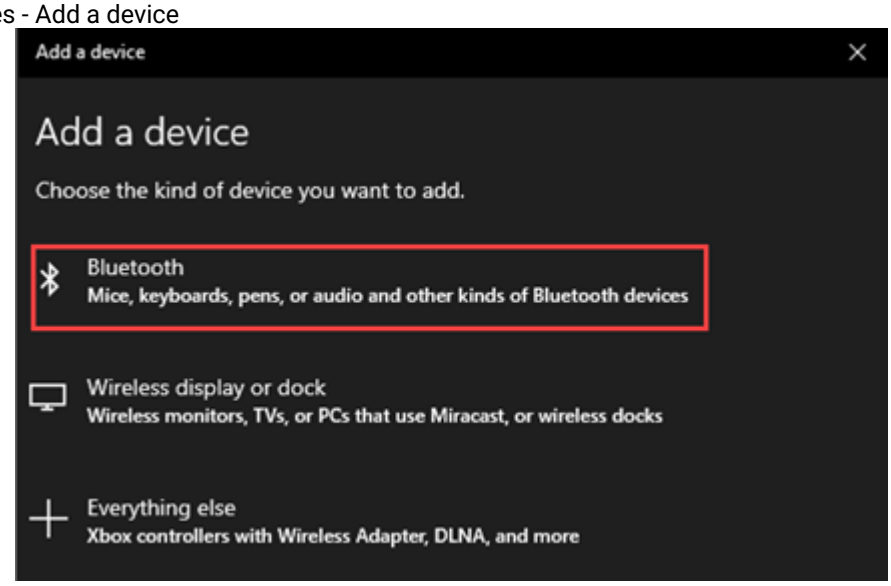
Devices that support these three pairing options include a dedicated **Pairing** item in the **Settings** menu (for Manual and Passcode modes) and a separate **Bluetooth** item in the **System Settings** menu, allowing you to switch between these pairing methods.

Pairing in Auto mode:

1. Press the **Enter** button on the Recorder to turn the device ON.
2. On your computer, go to **Settings > Bluetooth & devices**.
3. Click **Add device**.

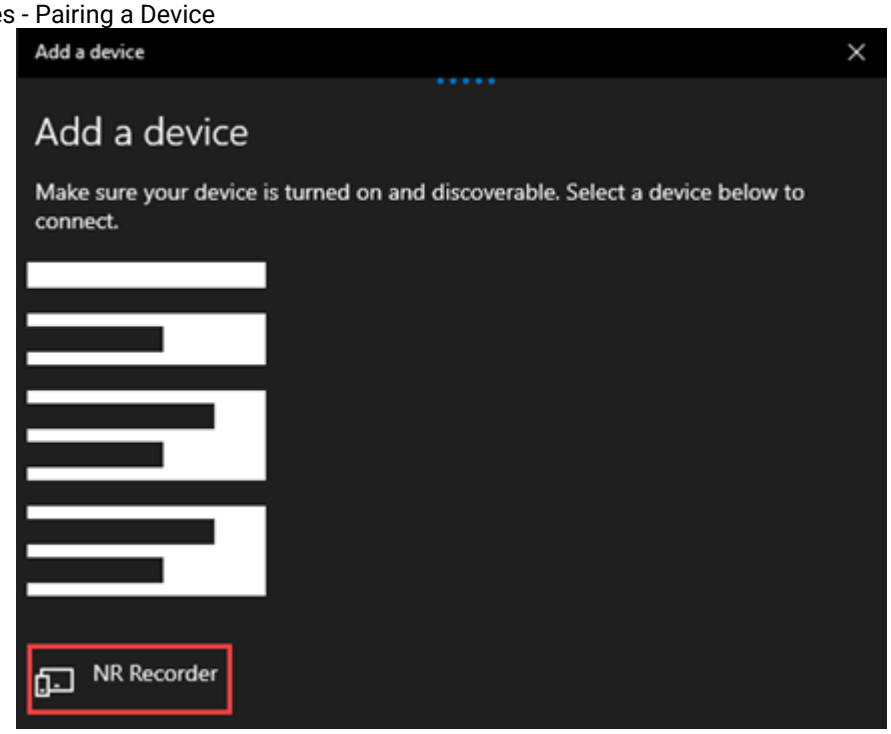
4. Select **Bluetooth**, then click **Show all devices** (if available).

Figure 530. Pairing Devices - Add a device



5. In the **Add a device** list, click the **NR Recorder** entry (or a similar name).

Figure 531. Pairing Devices - Pairing a Device

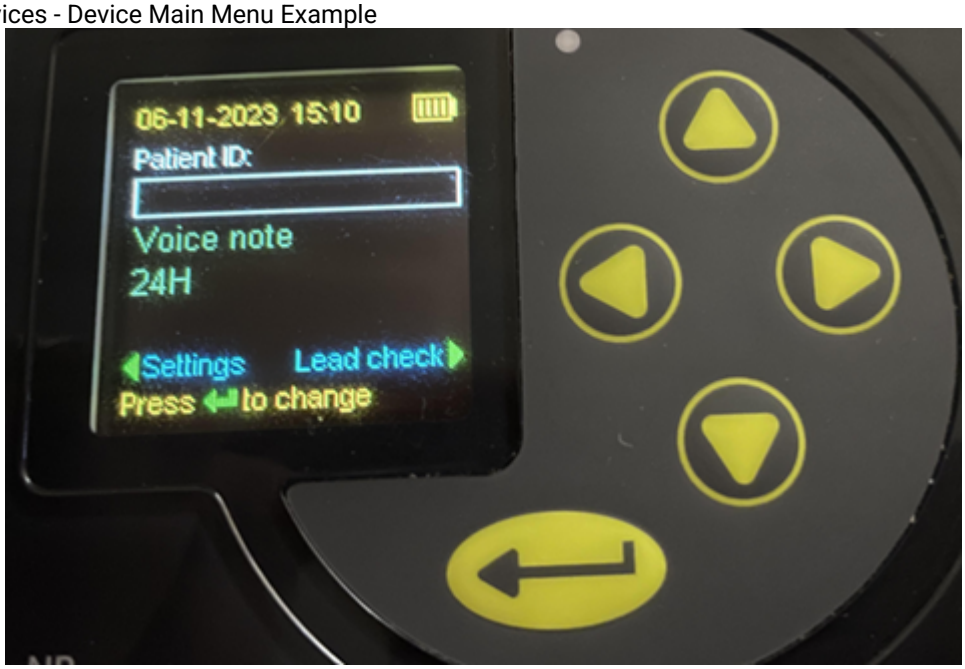


6. When the **Connected** message appears on your computer, the pairing is complete and you can click **Done**. If the device does not connect, repeat from **Step 1** or consult the device manual.

Pairing in Manual mode:

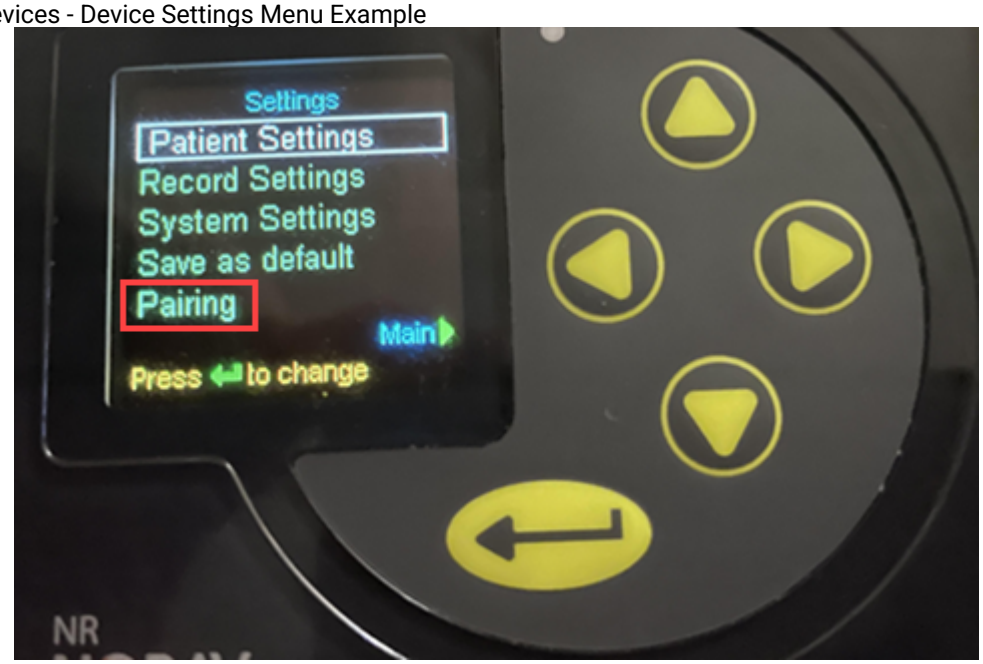
1. Press the **Enter** button on the Recorder to turn the device ON.
2. On the Recorder, go to the **Settings** menu.

Figure 532. Pairing Devices - Device Main Menu Example



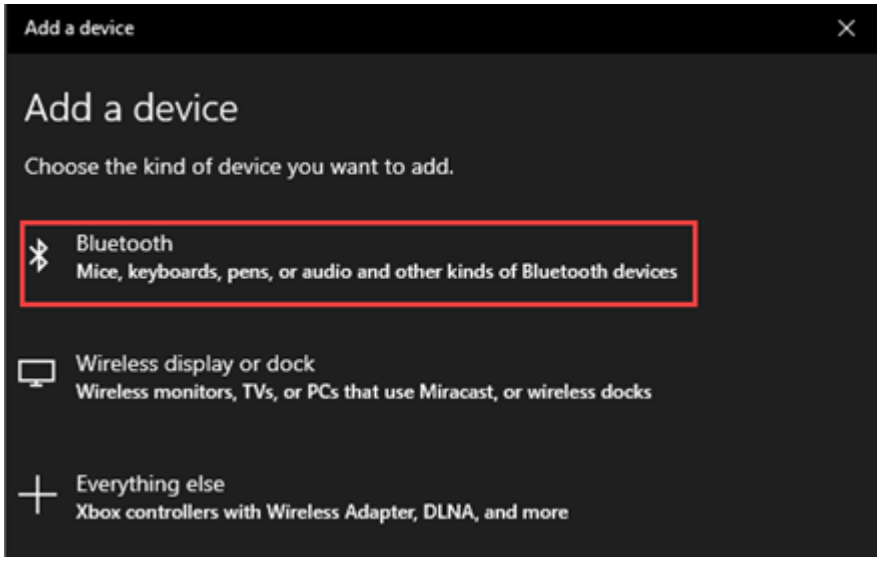
3. Select **Pairing**. The **"Wait for pairing"** message appears on the Recorder's Bluetooth Pairing screen..

Figure 533. Pairing Devices - Device Settings Menu Example



4. On your computer, go to **Settings > Bluetooth & devices**.
5. Click **Add device**.
6. Select **Bluetooth**, then click **Show all devices** (if available)

Figure 534. Pairing Devices - Add a device



7. In the **Add a device** list, click the **NR Recorder** entry (or a similar name).

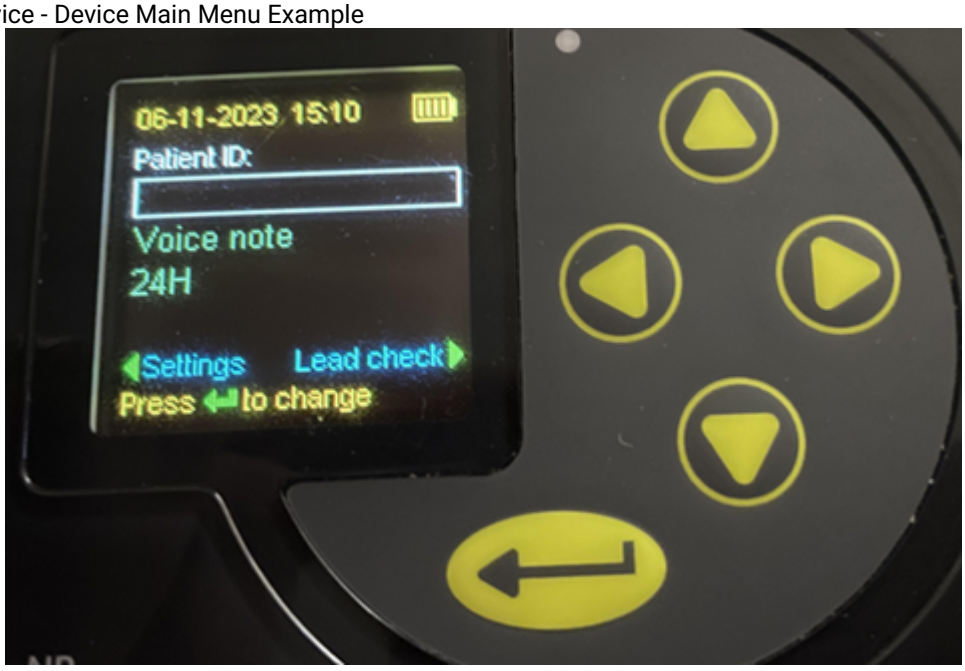
8. When the **PAIRED** message appears on the Recorder's screen and the **Connected** message appears on your computer, the pairing is complete. On your computer, click **Done**. If the device does not connect, repeat from **Step 1** or consult the device manual.

Pairing in Passcode mode:

1. Press the **Enter** button on the Recorder to turn the device ON.

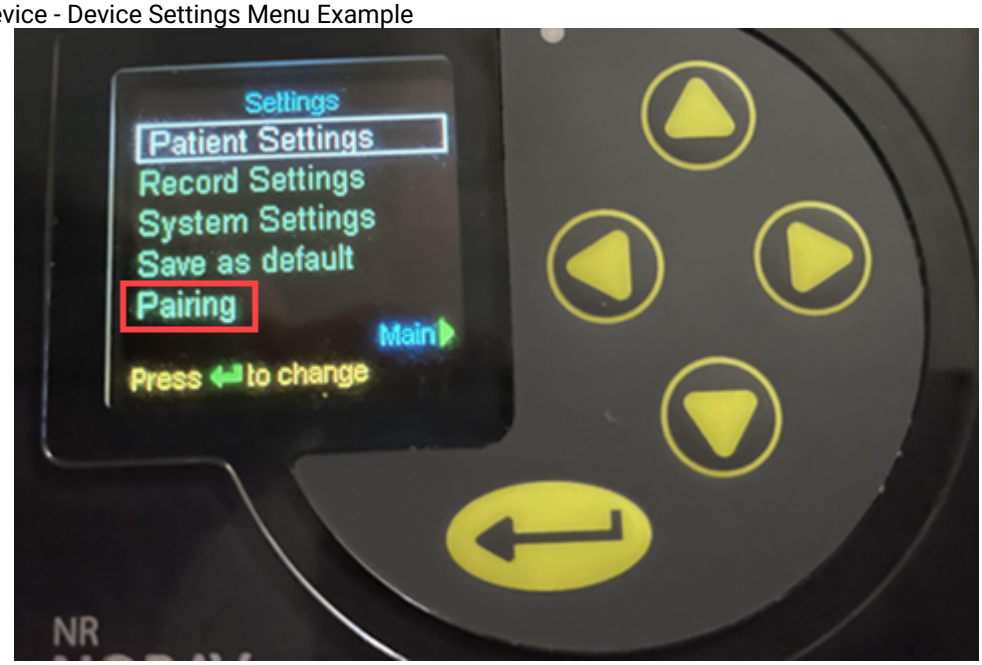
2. On the Recorder, go to the **Settings** menu.

Figure 535. Pairing Device - Device Main Menu Example



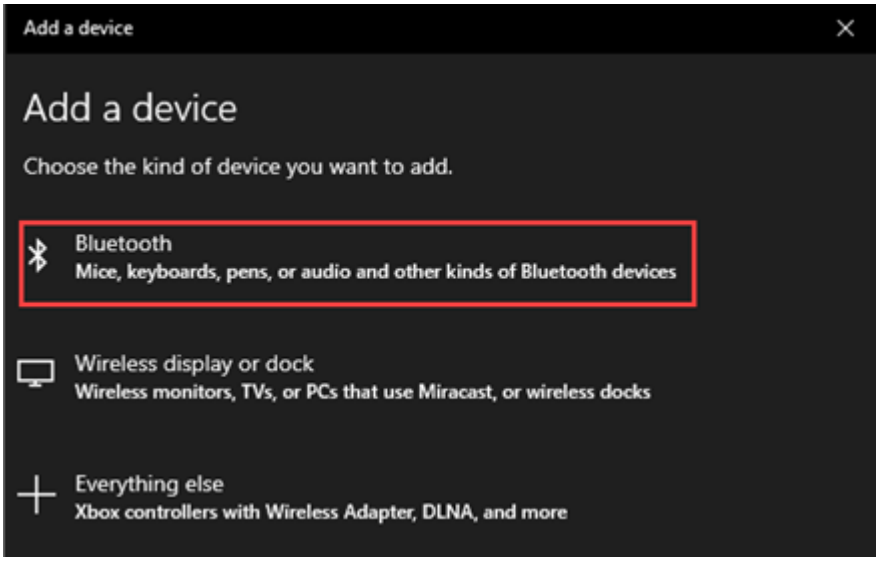
3. Select **Pairing**. The **"Waiting for passcode"** message appears on the Recorder's Bluetooth Pairing screen.

Figure 536. Pairing Device - Device Settings Menu Example



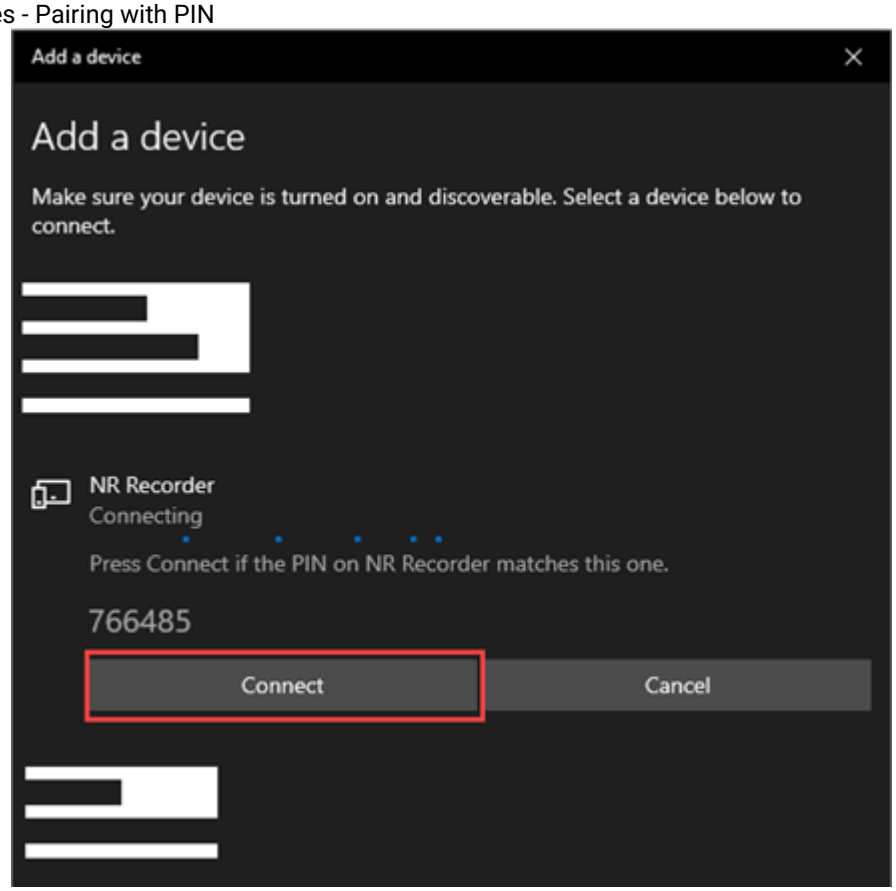
4. On your computer, go to **Settings > Bluetooth & devices**.
5. Click **Add device**.
6. Select **Bluetooth**, then click **Show all devices** (if available).

Figure 537. Pairing Devices - Add a device



7. In the **Add a device** list, click the **NR Recorder** entry (or a similar name).
8. Follow the on-screen instructions on your computer.
9. Press the **Enter** button on the Recorder and click **Connect** in the **Add a device** window on your computer to confirm the connection. You may perform these actions in any order.

Figure 538. Pairing Devices - Pairing with PIN



10. When the **PAIRED** message appears on the Recorder's screen and the **Connected** message appears on your computer, the pairing is complete. On your computer, click **Done**. If the device does not connect, repeat from **Step 1** or consult the device manual.

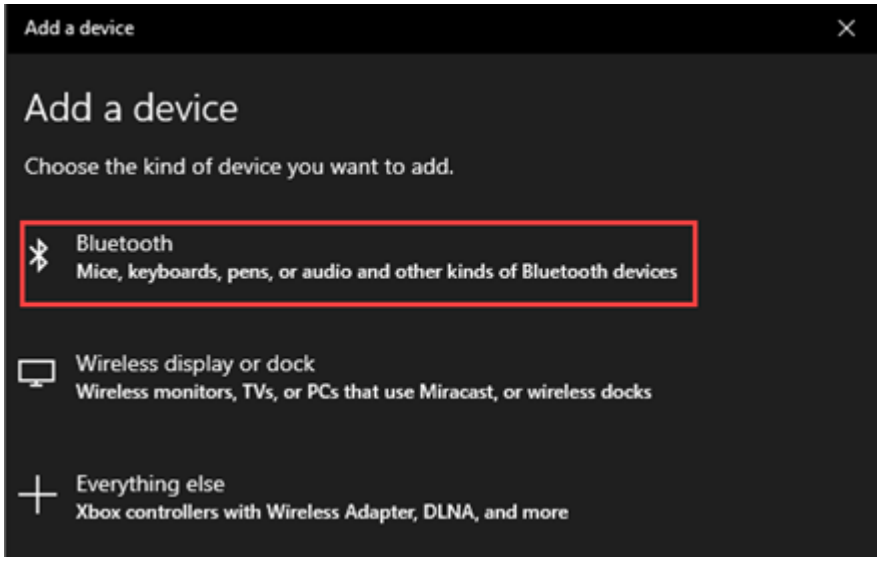
5.2.1.3. Pairing Norav Recorder via PIN-Based Connection

Some NR Recorder models support pairing with the computer by entering a PIN code on the computer. Unlike models that offer three pairing options (refer to the section above for more details *(on page 296)*), these devices do not have a **Pairing** item in the **Settings** menu and do not have a **Bluetooth** item in the **System Settings** menu.

To pair the Recorder with your computer:

1. Press the **Enter** button to turn the device ON.
2. On your computer, go to **Settings > Bluetooth & devices**.
3. Click **Add device**.
4. Select **Bluetooth**, then click **Show all devices** (if available).

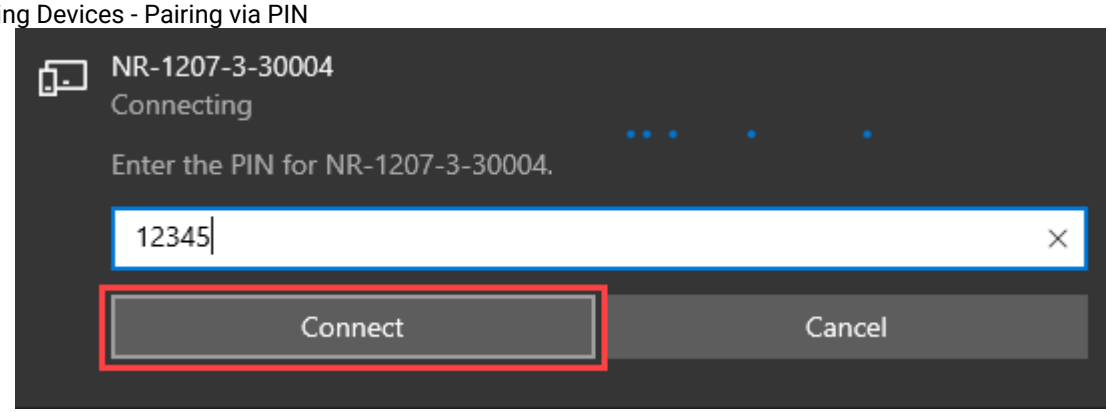
Figure 539. Pairing Devices - Add a device



5. In the **Add a device** list, click the **NR-XXXX-XXXX** entry (or a similar name). When prompted, enter the PIN code.

6. Enter the following PIN code: **12345**.

Figure 540. Pairing Devices - Pairing via PIN



7. Click **Connect** to initiate pairing. If this PIN code is not accepted, contact the Support Team

8. When the **Connected** message appears on your computer, the pairing is complete and you can click **Done**. If the device does not connect, repeat from **Step 1** or consult the device manual.

5.3. 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:

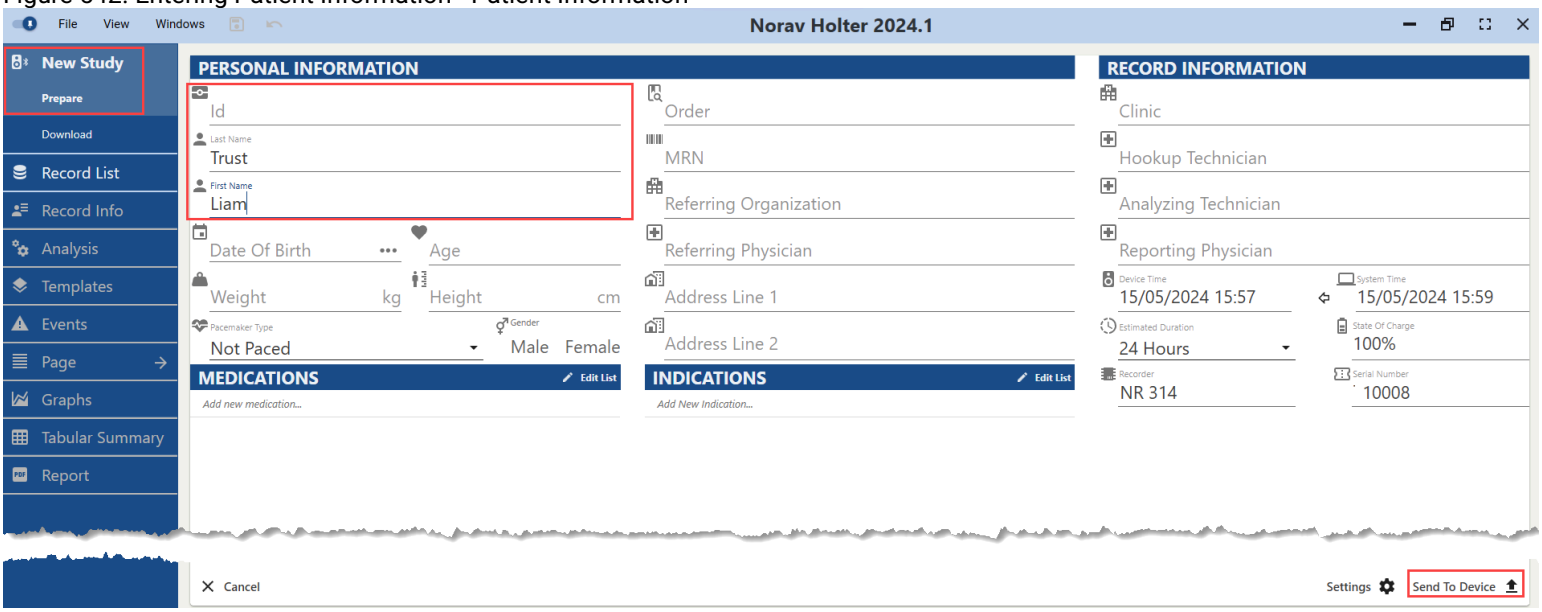
1. Click the **Prepare Recorder** button on the top toolbar of the **Record List View**. The **Patient Information** window is displayed.

Figure 541. 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 the patient's identifiers: **Patient ID**, **First Name**, **Last Name**. Other text fields are not mandatory to proceed.

Figure 542. 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.

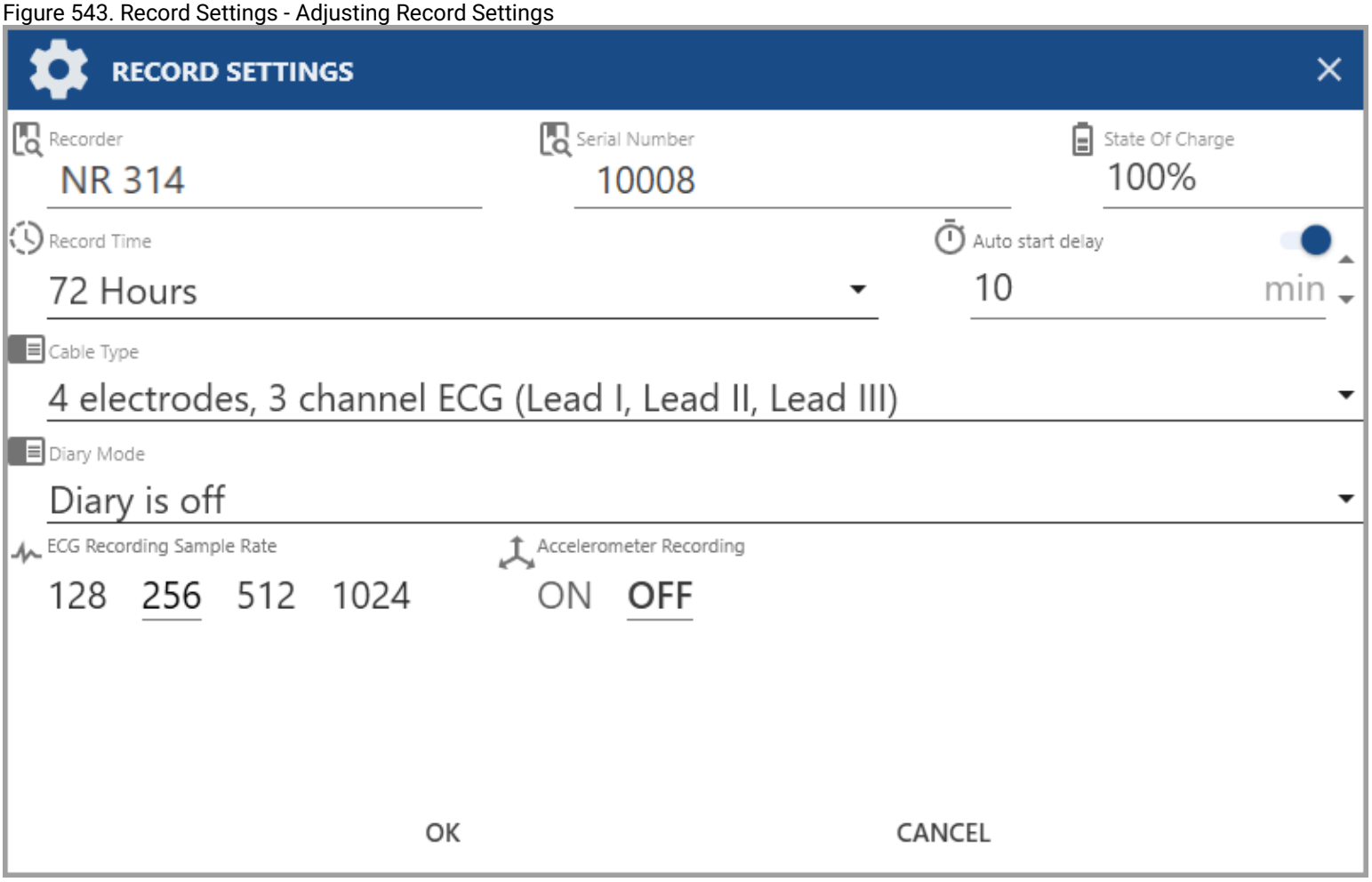
After completing the steps above, you can begin Adjusting Record Settings *(on page 303)*.

5.4. 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.

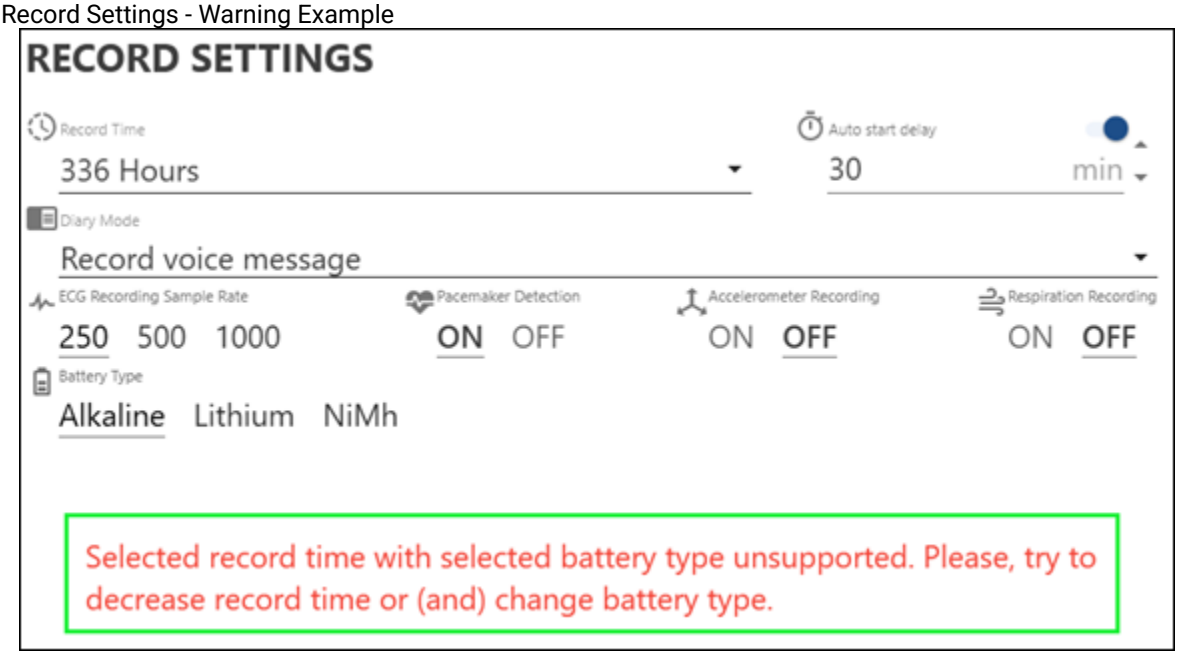
To adjust the Record Settings, follow the steps listed below:

Figure 543. 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** is not compatible with a specific battery type, a warning will be displayed. Refer to the relevant **Recorder Manual** to check the **Record Time** parameters.

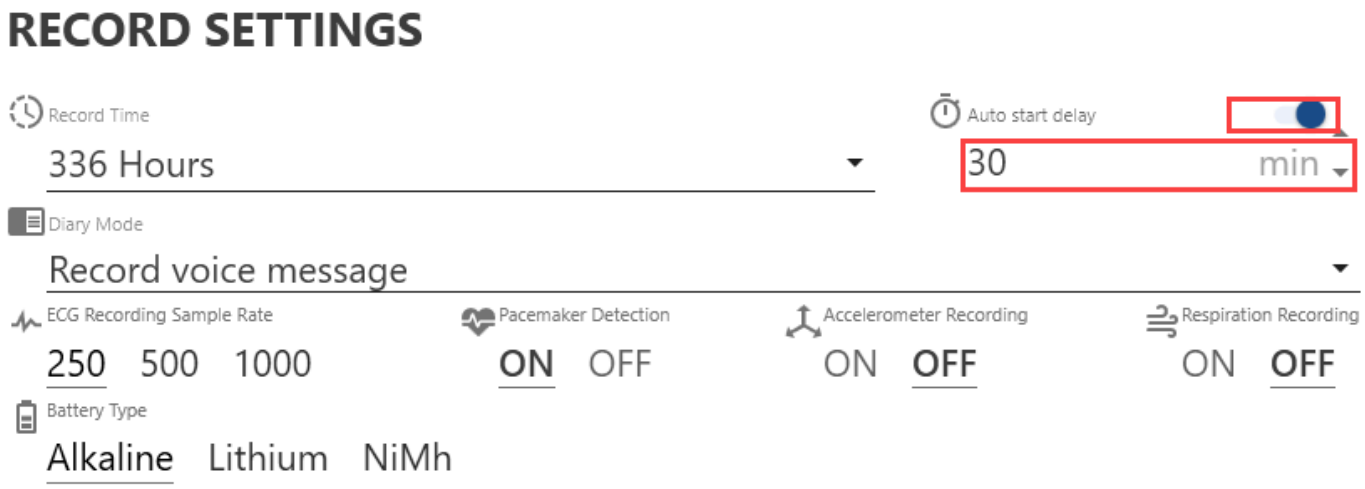
   Figure 544. Record Settings - Warning Example



3. Set **Auto start delay**:

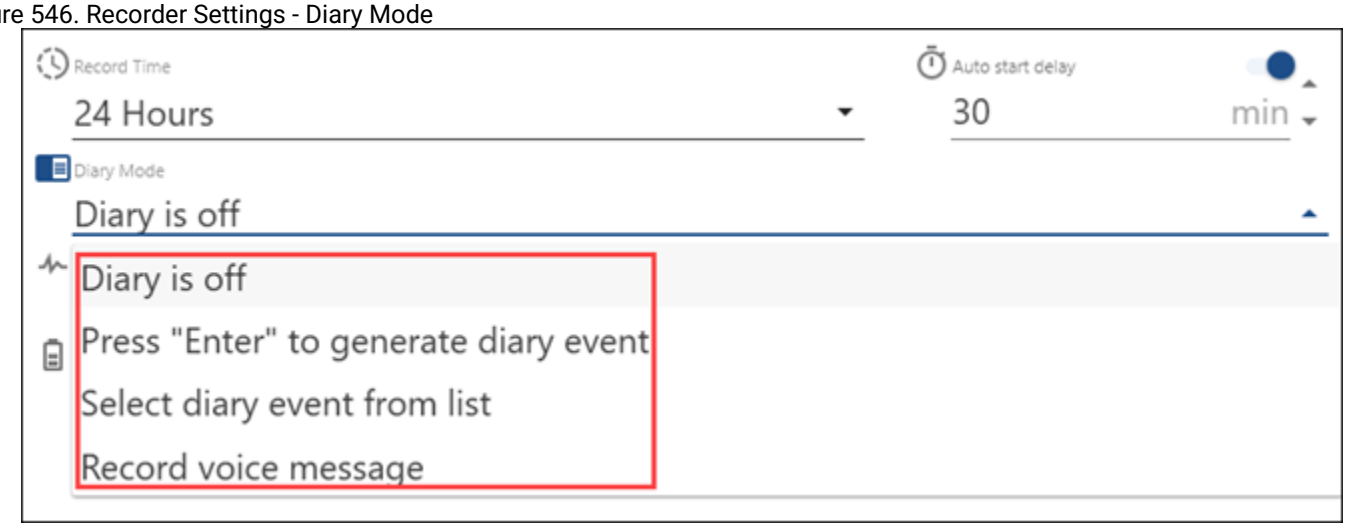
- Toggle **Auto start delay** OFF to disable the auto start delay feature.
- Toggle **Auto start delay** ON and set the delay in minutes using the picker arrows on the right. You can increase or decrease the delay time by 5 minutes with each click.

Figure 545. Record Settings - Auto start delay



4. Select how the patient inputs diary events:

Figure 546. 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.

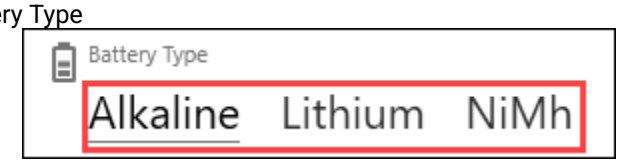
5. Click to select the **ECG Recording Sample Rate**: 250, 500 or 1000 Hz. The higher the sampling rate, the more detailed the ECG signal will be. However, a higher sampling rate also requires more memory and more battery capacity. If the selected ECG Recording sample rate is not compatible with a specific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

Figure 547. Recorder Settings - Sample Rate



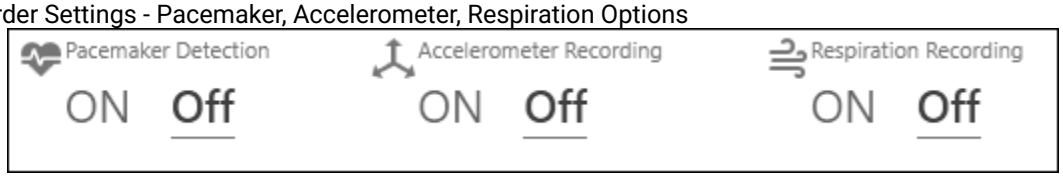
6. Click to select the **Battery Type**: Alkaline, Lithium, NiMh. Choose the battery type considering the overall length of the Holter testing, quantity of leads, **Recorder** model, etc. Please, refer to the relevant **Recorder** manual if needed.

   Figure 548. Recorder Settings - Battery Type



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

   Figure 549. 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.

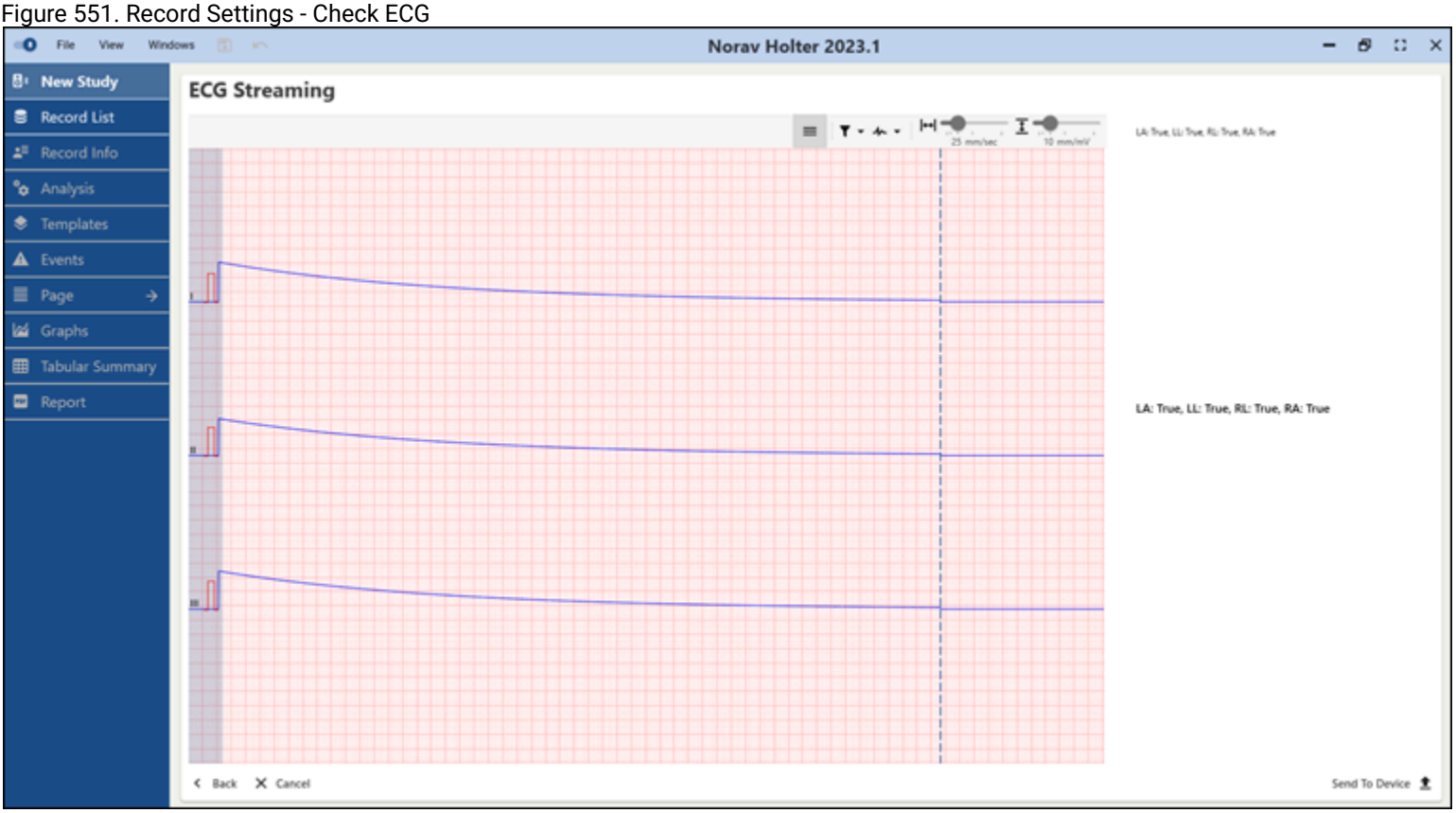
10. **(Optional)** If you're using a **Recorder** model equipped with Bluetooth, you may click the **Synchronize** button to synchronize device clock with your computer clock. It is recommended to synchronize the device clock settings periodically. For the **NR-314-P** model, it is the easiest way of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

    Figure 550. 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 551. 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 552. Record Settings - Send To Device

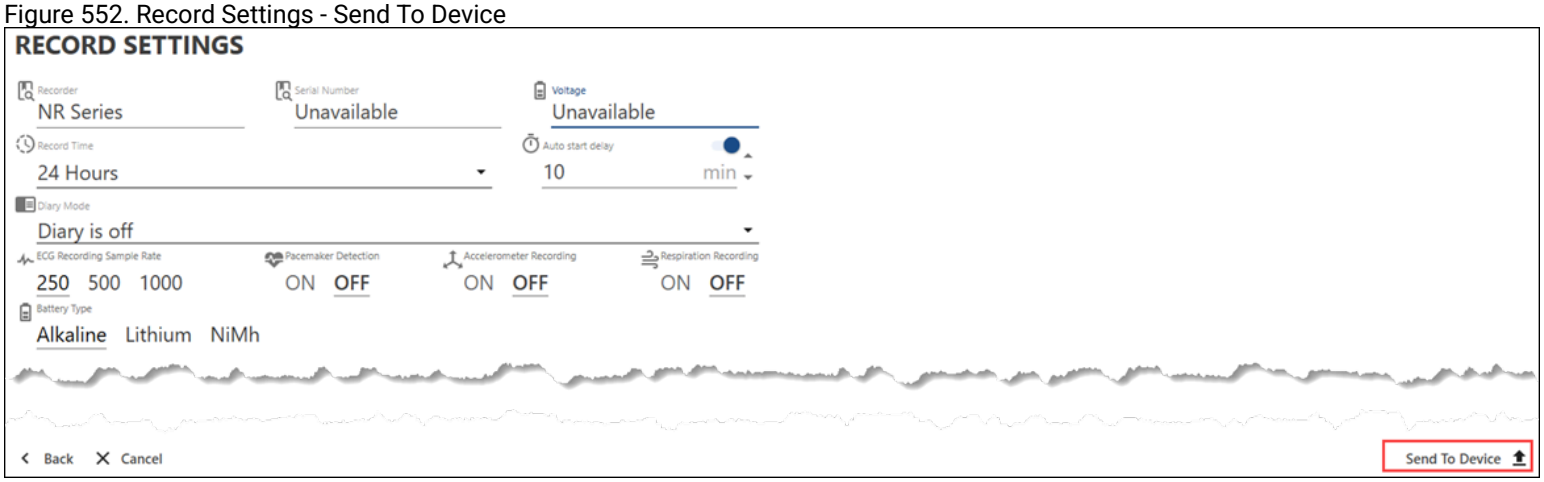
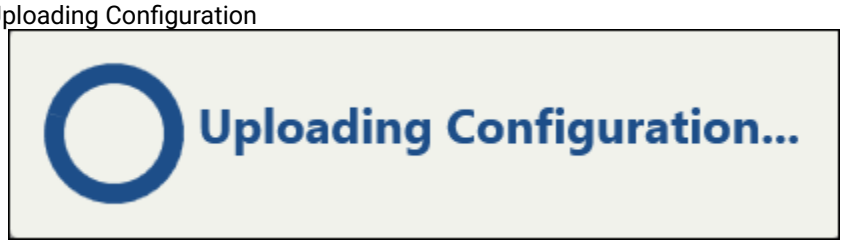


Figure 553. Record Settings - Uploading Configuration



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 begin Initiating Recording.

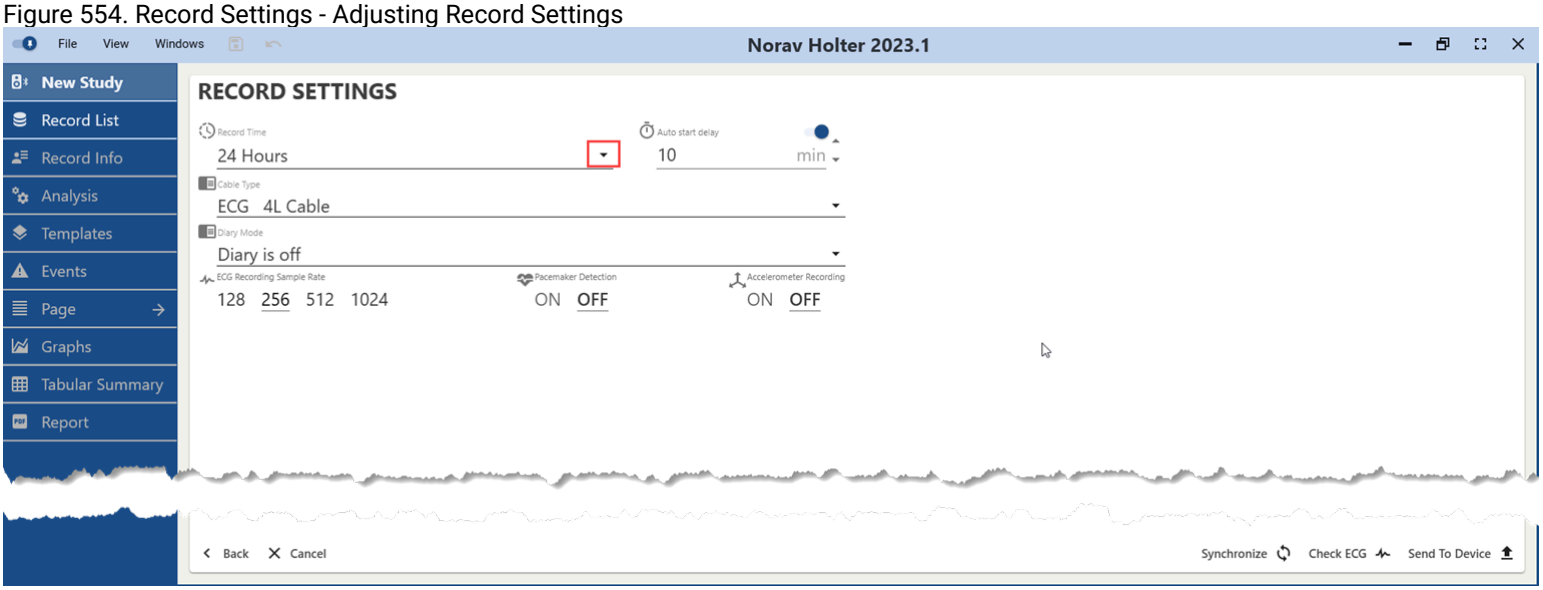
5.5. Adjusting Record Settings: NR-314-P Model Workflow

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.

As the Norav Holter NR-314-P 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:

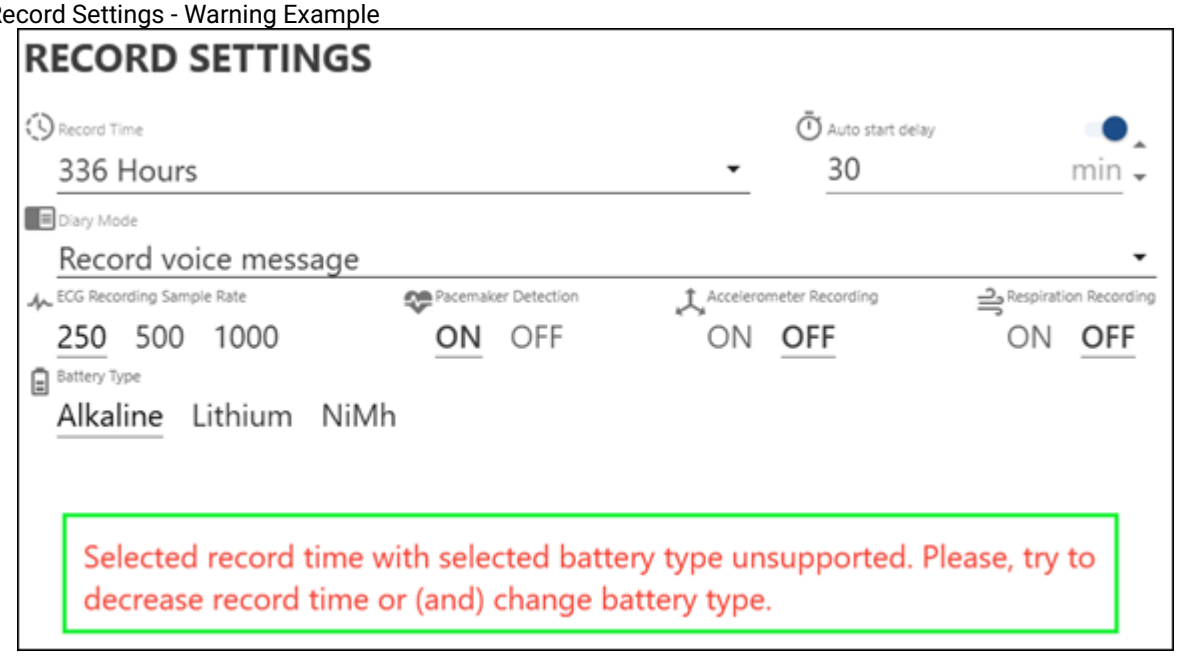
Figure 554. Record Settings - Adjusting Record Settings



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 is not compatible with a specific battery type, a warning will be displayed. Refer to the relevant **Recorder Manual** to check the **Record Time** parameters.

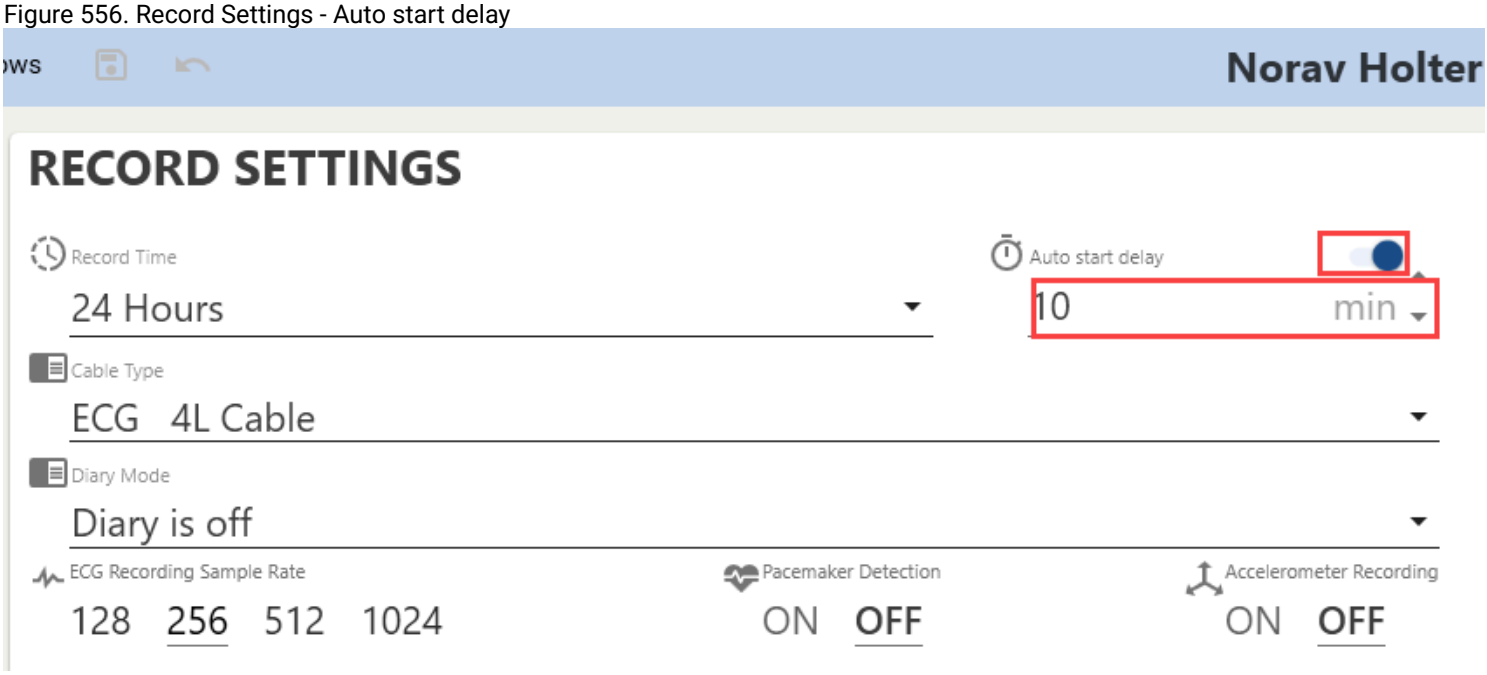
Figure 555. Record Settings - Warning Example



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

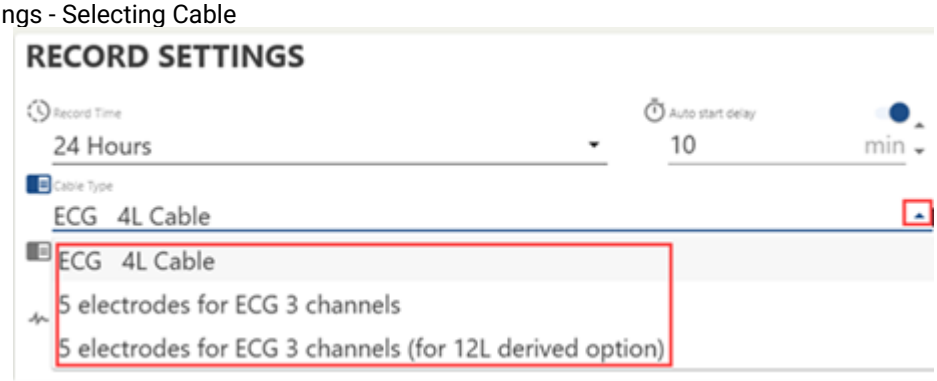
   - Toggle **Auto start delay** OFF to disable the auto start delay feature.
   - Toggle **Auto start delay** ON and set the delay in minutes using the picker arrows on the right. You can increase or decrease the delay time by 5 minutes with each click.

Figure 556. Record Settings - Auto start delay



4. Select the cable type.

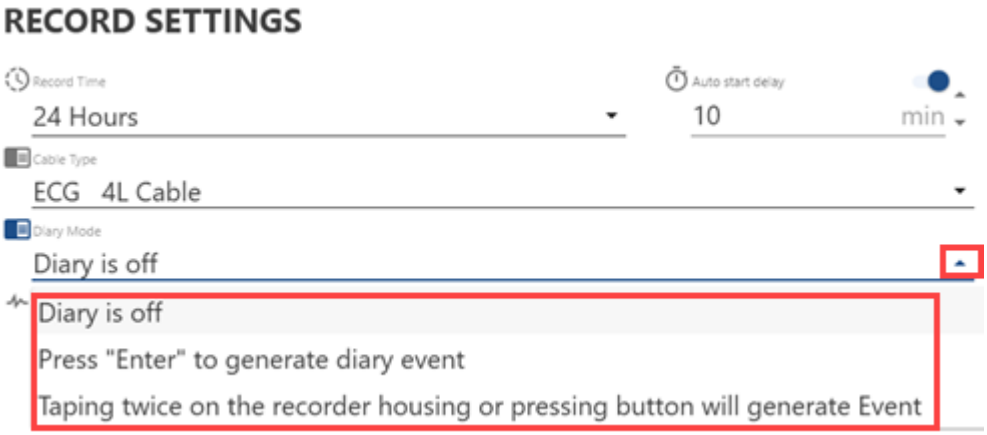
Figure 557. Record Settings - Selecting Cable



5. Select how the patient inputs diary events (different types of **Recorders** support different types of input, refer to the relevant manual, if needed):

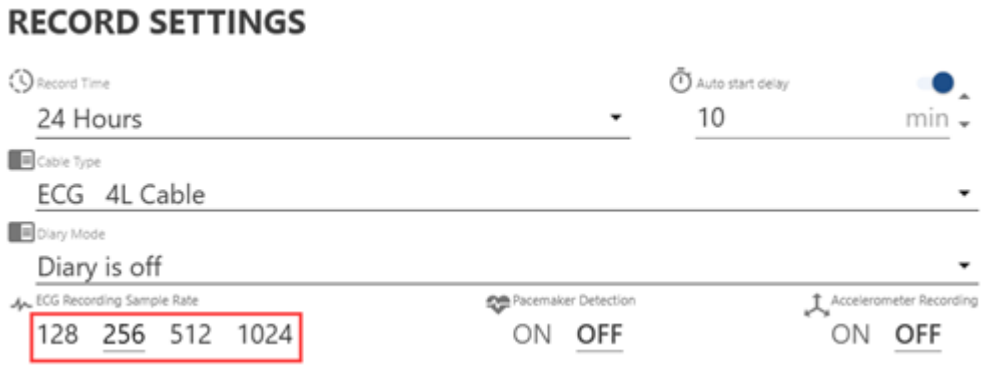
- **Diary is off:** A patient won't be able to make inputs.
- **Press "Enter" to generate diary event:** By pressing the sole button on the **Recorder**, a patient can register an **Event**.
- **Tapping twice on the recorder housing or pressing button will generate Event:** In addition to the button press, a patient may double-tap the device case to register an **Event**.

Figure 558. 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 559. Record Settings - Sample Rate



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

Figure 560. Record Settings - Pacemaker and Accelerometer



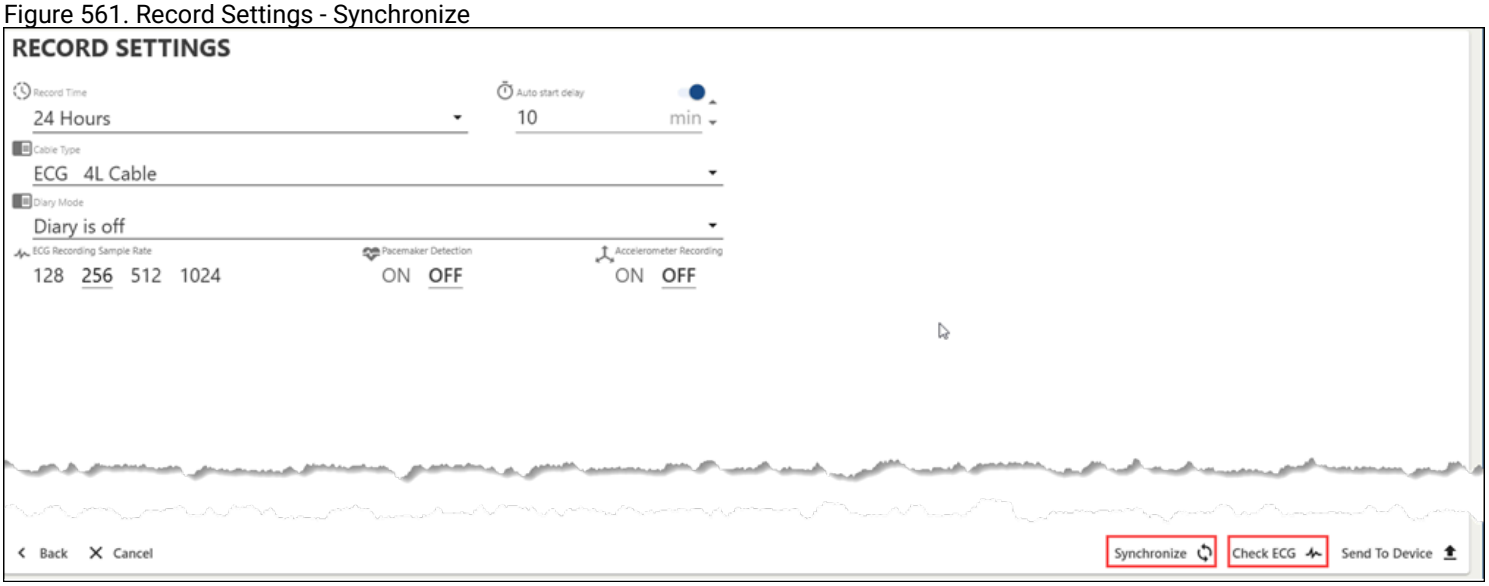
- Select **ON** to detect a pacemaker during the test and analysis. This is important for the interpretation of the ECG recordings, as the presence of a pacemaker can affect the appearance of the ECG waves.
- Select **OFF** if there is no need to detect a pacemaker for this patient.

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.

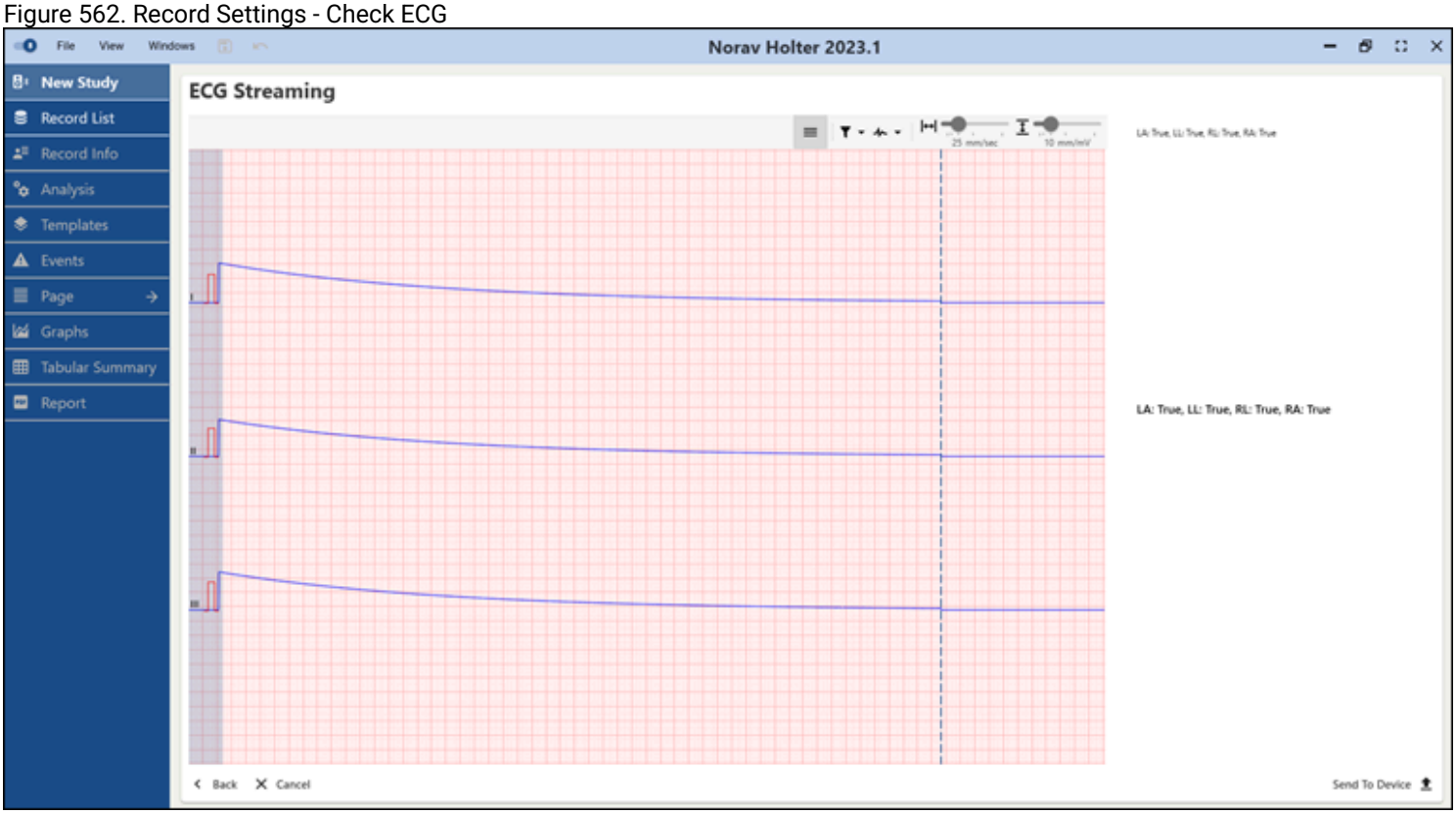
9. **(Optional)** You may click the **Synchronize** button to synchronize the NR-314-P clock with your computer clock. It is recommended to synchronize device clock settings periodically.

Figure 561. 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 562. 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 563. Record Settings - Send To Device

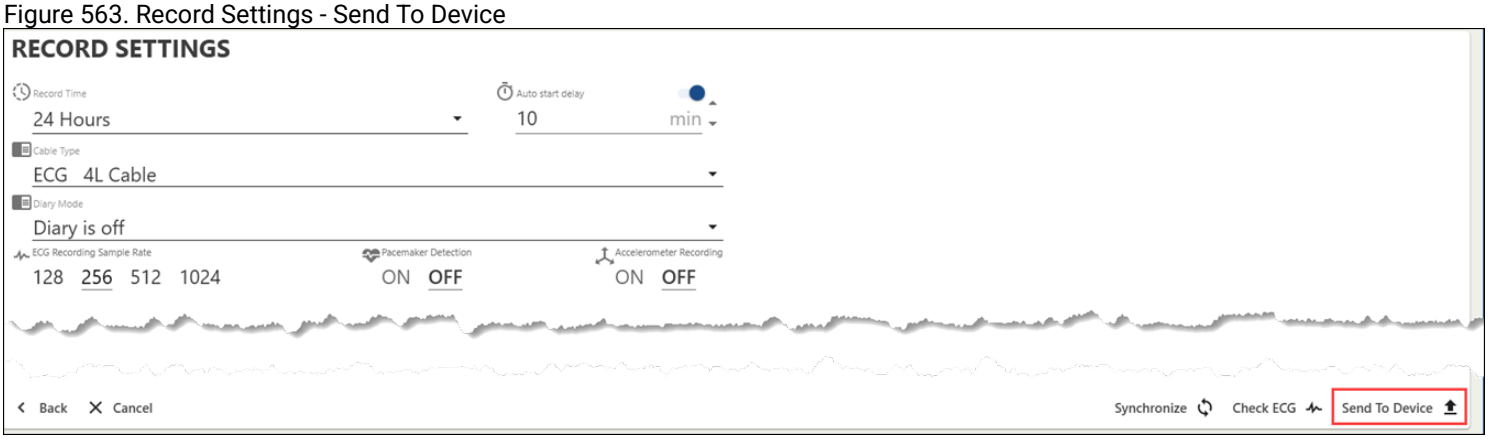


Figure 564. Record Settings - Uploading Configuration



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 begin Initiating Recording.

5.6. 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.

Note: If you didn't turn OFF the Auto start delay feature on the Adjusting Record Settings *(on page 305)* step, you may just use this feature to initiate recording automatically.

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 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 565. Initiating Recording - Verifying Recorder



Note: You can see an example of a live screen from a Norav NR-1207-3 Recorder in the figure above. 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 are using the **NR-314-P 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 313)*.

5.7. 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 302)* and Adjusting Recorder Settings *(on page 303)* sections to understand which parameters you have set up and uploaded to the Recorder, if needed.
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 left 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 (shown in the right part of the example figure below), inspect the lead connection and resolve any issues.

   Figure 566. 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 567. Verifying Recorder Data - Verifying ECG Signal



After completing the steps above, you are ready to proceed to Starting Recording *(on page 315)*.

5.8. Verifying Recorder Data: NR-314-P

After initiating the recording, you need to **Verify Recorder Data**. You should confirm whether the electrode connections and acquired ECG signal are accurate. For a comprehensive description of how to set up and operate a specific **Recorder** model, refer to the appropriate recorder manual.

To verify the connection and ECG signal accuracy:

1. **For Bluetooth connection:** If you have connected the **Recorder** to your PC via Bluetooth, you may click the **Check ECG** button in the bottom-right corner of the screen to verify that the electrodes are properly connected and that the ECG signal will be recorded correctly.

   Figure 568. Record Settings - Check ECG

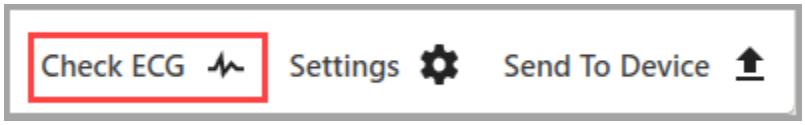
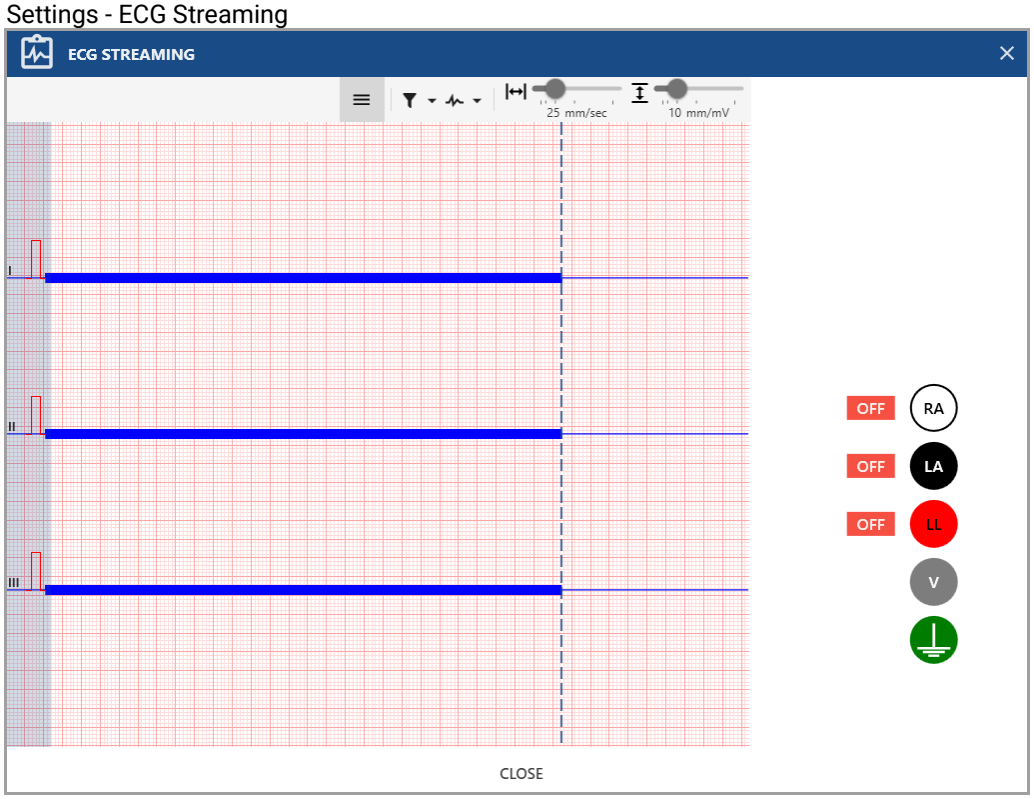
   

Figure 569. Record Settings - ECG Streaming



2. Assess the quality of the ECG traces displayed on the PC screen. The waveform on the recorder screen should exhibit appropriate morphology. 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.

After completing the steps above, you are ready to proceed to Starting Recording *(on page 315)*.

5.9. 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 570. Start Recording - "Enter" Button (example)



Note: Norav Recorder devices offer an **Auto Start Delay** *(on page 305)* function. If you forget to start the recording, it will start automatically within a set period of time if you have completed all the previous steps. For more details specific to a particular **Recorder** model, refer to the relevant recorder manual.

If you are using the **NR-314-P 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.

After you have started the recording, instruct the patient *(on page 343)* 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.

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.

Note: The **NR-314-P** 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.

When a patient returns to the physician's office after a set period of time (24-366 hours) when the Holter recording 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: 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.

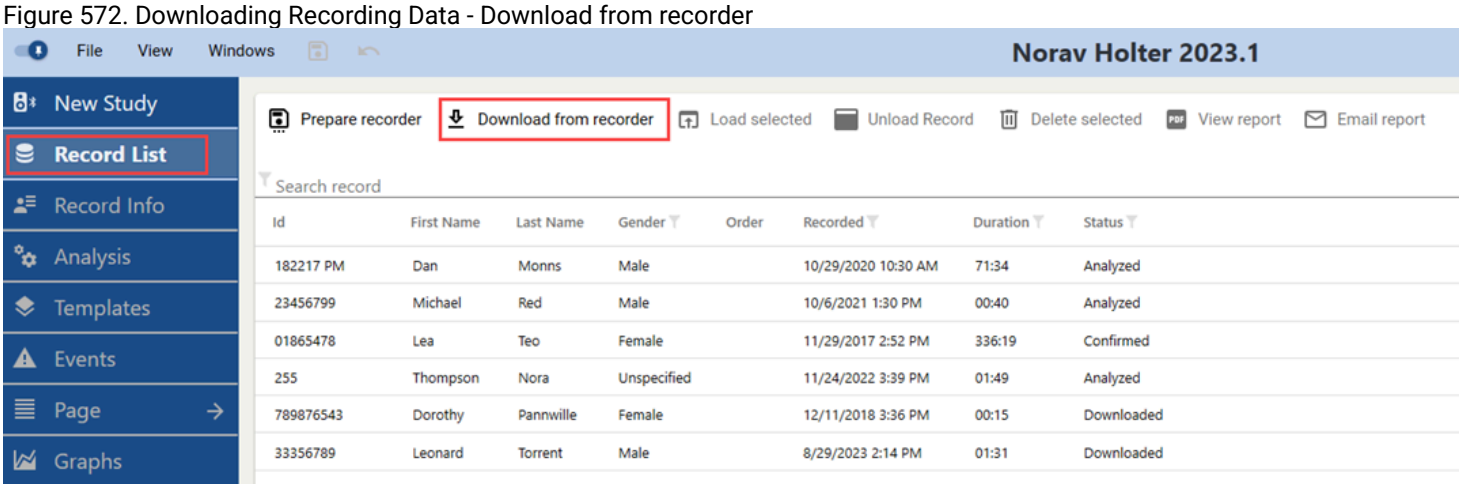
   Figure 571. Norav Holter Icon

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 54)* for more details. To **download** a record, proceed to the next Step.

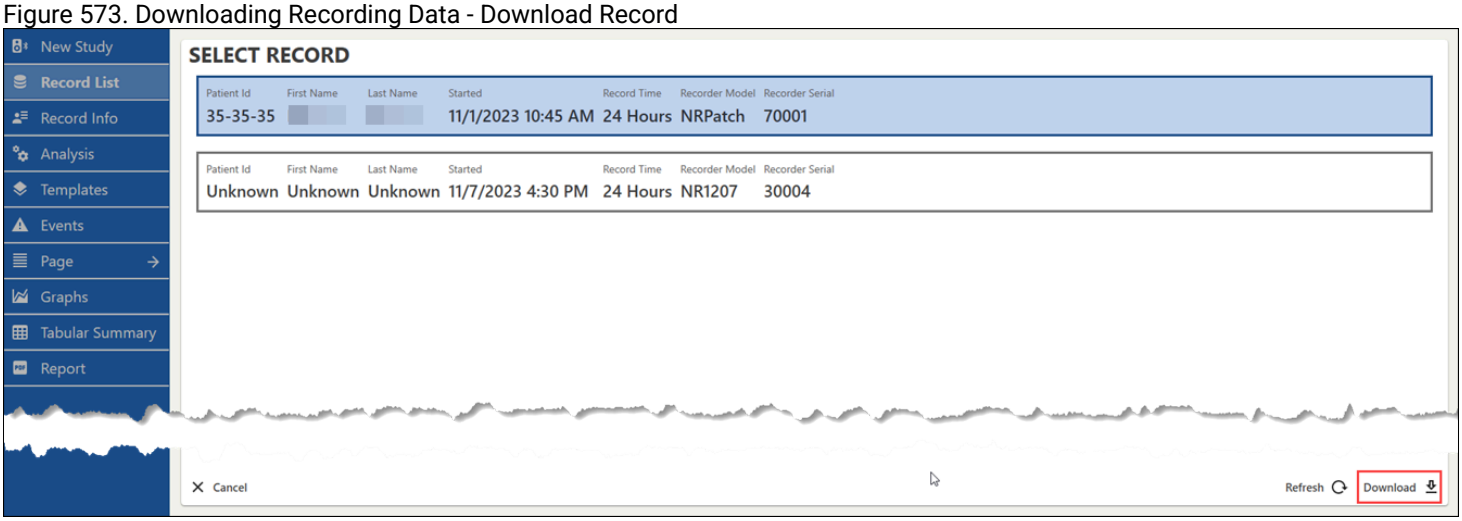
3. Click the **Download from recorder** button on the top toolbar. The **Select Record** window will appear.

   Figure 572. 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 573. Downloading Recording Data - Download Record



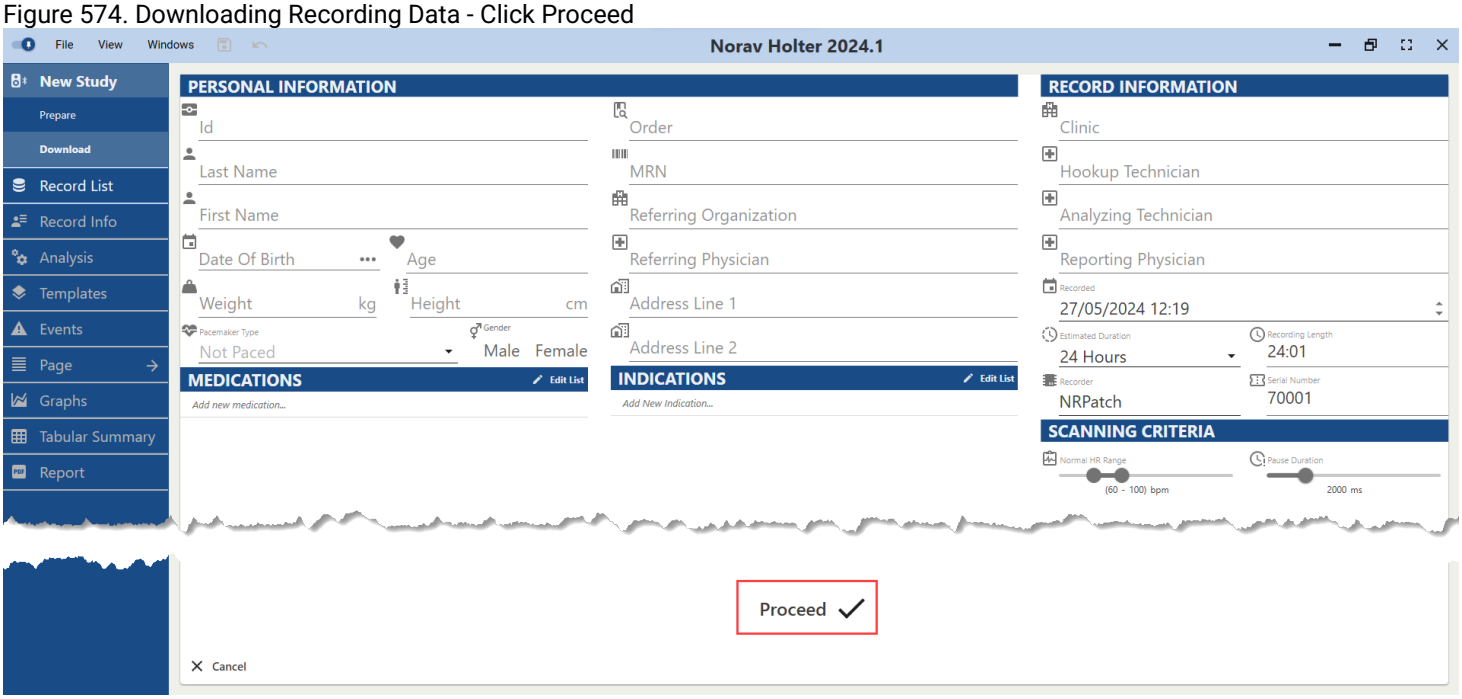
If you have connected additional **Recorders** or disconnected some of those previously plugged in, click **Refresh** in the bottom right corner to update the accessible records list.

5. The **Patient Information** window will appear. Validate and modify the patient's information if needed; refer to the Menu Bar section *(on page 52)* for instructions on modifying 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.

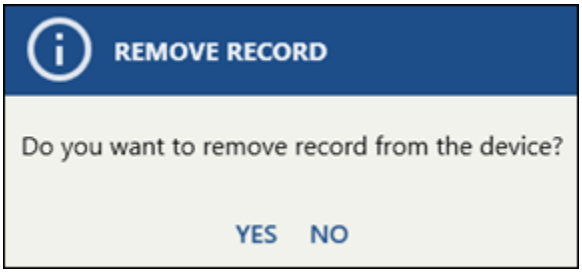
6. Click **Proceed** in the bottom right corner to finish downloading the record. A "Downloading..." progress bar will appear. If only one record was recognized, the download is complete and the **Records List View** will be displayed. Otherwise, a list of records will be displayed for selection once more.

Figure 574. Downloading Recording Data - Click Proceed



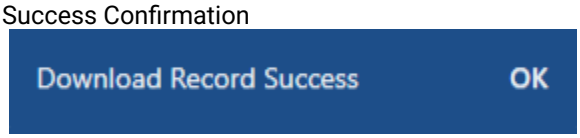
7. You will be prompted with the **Remove Record** dialog box. If you wish to remove the downloaded **Record** from the device (memory card), click **Yes**. Otherwise, click **No**.

Figure 575. 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 576. Downloading Recording Data - Success Confirmation

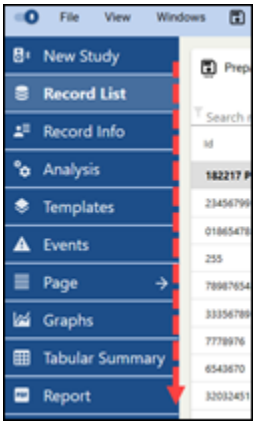


7. Recommended Workflow Options

The previous chapters have detailed the analysis process and features, and how you can tailor the software system and the analysis workflows to your requirements. In this **Chapter**, we will overview various options for editing analysis results, concluding with steps to generate a report that incorporates your personal findings.

7.1. Standard Workflow Overview

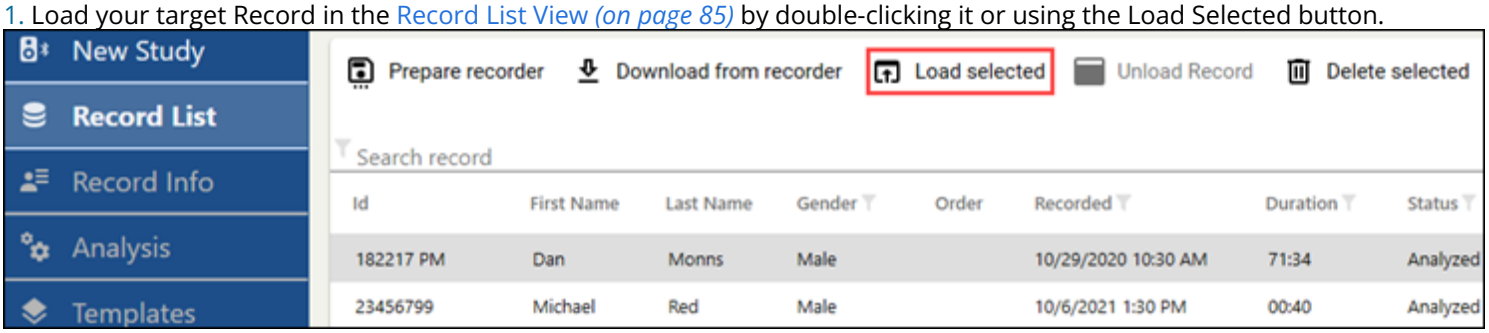
Here, we will cover the procedure for conducting the analysis, reviewing beat Templates and Events, and setting up and generating the final Report. The Norav NH-301 Holter analysis system offers a simple and streamlined workflow. To commence the Analysis and deliver a comprehensive report, follow the general top-down logic of the Views Sidebar on the left side of the screen. For more details on completing each step, please refer to the Views section *(on page 69)* and its respective subsections.



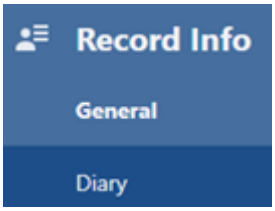
Step 1: Launching Analysis

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 85)* by double-clicking it or using the Load Selected button.



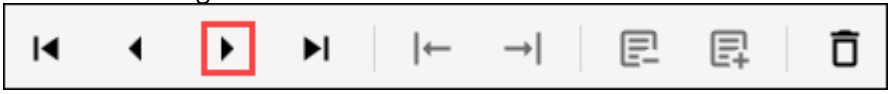
2. If needed, update patient data in the Record Info View.



3. Access the Analysis View *(on page 97)*.

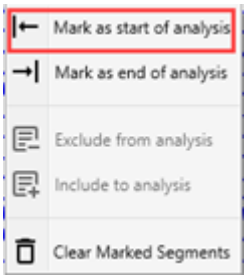


4. Assess the ECG signal on the first page. If it's abnormal, use the "Page Down" button in the Action Bar at the bottom and switch between Channels to find a clear signal.

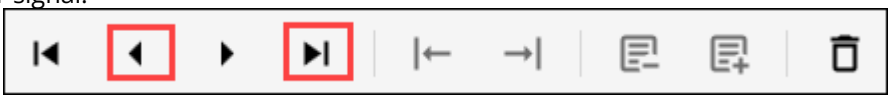




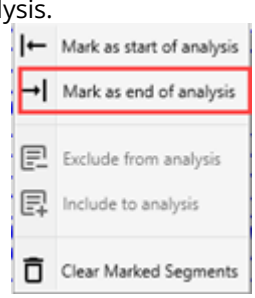
5. Right-click to access the context menu and select "Mark as start of analysis," or use the corresponding button in the Action Bar to mark the Start of Analysis.



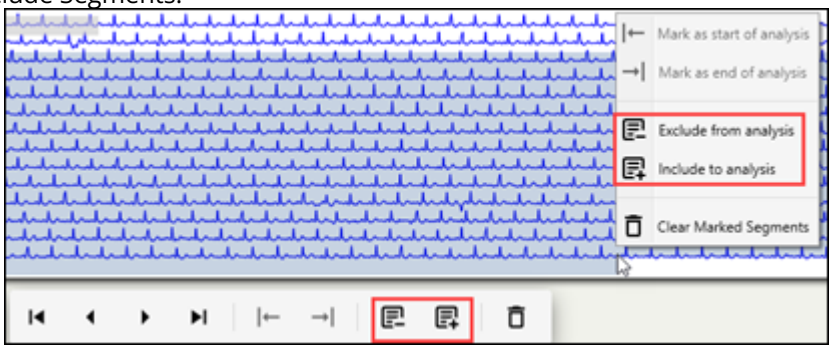
6. Navigate to the Final Page using the "Final Page" button in the Action Bar. If noise is present, use "Page Up" and alternate Channels to locate a clear signal.



7. Mark the clear signal as the end point for the analysis.

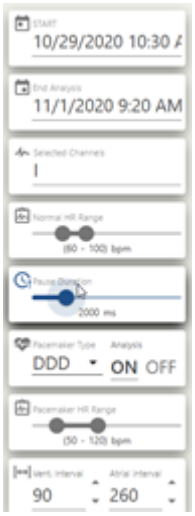


8. **(Optional)** Include or Exclude Segments:

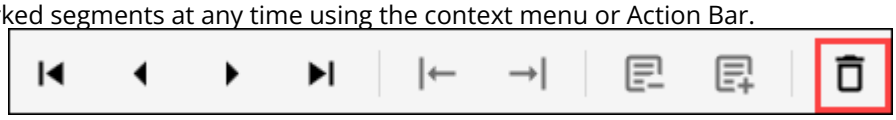


- To exclude, right-click and drag over the interval, selecting "Exclude from analysis" from the context menu or Action Bar.
- To re-include a segment, right-click within the excluded area, drag to the required position, and select "Include to analysis."

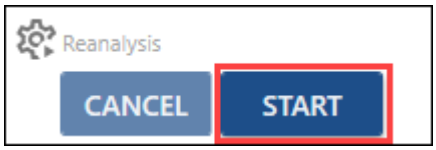
9. Adjust Channels, Heart Rate Range, Pause Duration, Pacemaker settings, and other parameters in the right control boxes if necessary.



10. **(Optional)** Clear marked segments at any time using the context menu or Action Bar.



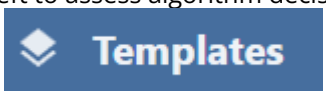
11. Click START to begin the analysis.



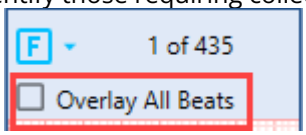
Step 2: Editing Templates

After the analysis, proceed to edit beat Templates:

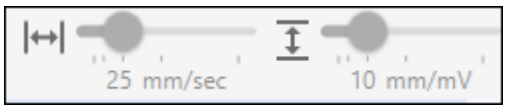
1. Click the Templates View *(on page 106)* on the left to assess algorithm decisions on heartbeat shapes.



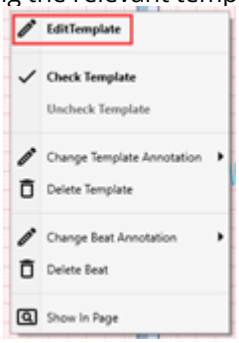
2. Select Overlay All Beats for each template to identify those requiring collective or individual edits.



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.

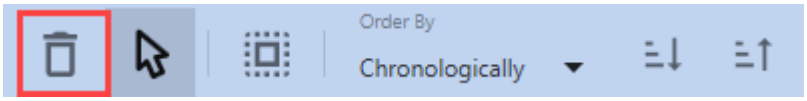


4. Enter template beat editing mode by double-clicking the relevant template box or right-clicking and choosing Edit Template.



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.



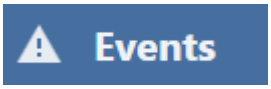
6. Click Apply in the top left corner to save changes.



Step 3. Reviewing Events

After editing Templates, proceed to review Events.

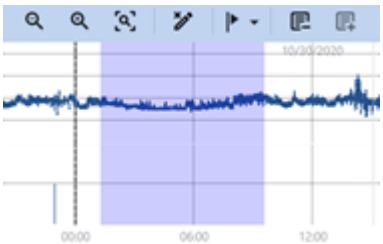
1. Click the Events View *(on page 178)* on the left.



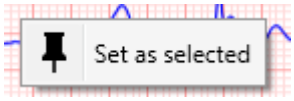
2. Select the Maximum RR event from the Event Type List. The first occurrence will be displayed in the RR-trend, ECG Strip, and Page pane at the bottom (depending on the View layout).



3. Drag and drop 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.

Event Type	Count
Atrial Paced	42
Atrial Fibrillation	65

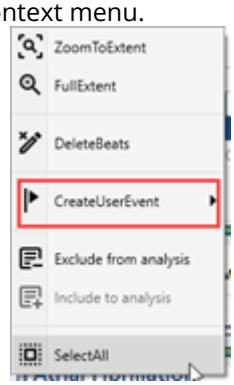
6. Review and delete any incorrect Atrial Fibrillation events.

7. If remaining, navigate through these events in the middle pane:

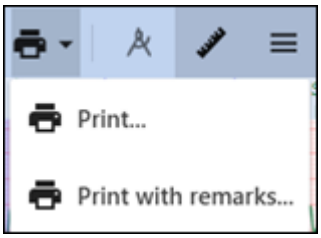
- Right-click on the corresponding ECG Strip or Page segment to open the context menu.
- Choose Change Beats Annotation to access the annotation pane.
- Reclassify using N annotation.



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.

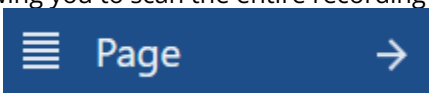


9. **(Optional)** To print an ECG segment if needed:
   - Click the start point.
   - Press and hold Shift.
   - Scroll to the desired endpoint using control buttons in the toolbar on top or a scrollbar at the bottom.
   - Click the desired endpoint.
   - Click the Print icon.

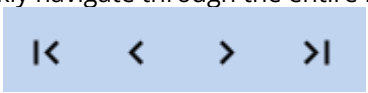


Step 4. Scanning ECG Page Data

Before generating the final Report, you may review the results in other Views: Page, Graphs, or Tabular Summary. The Page View *(on page 220)* 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

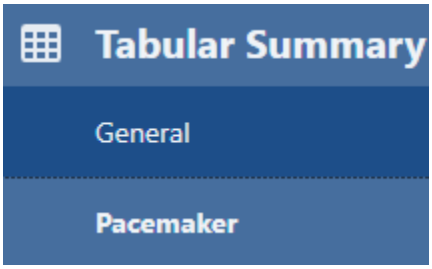
Graphs View *(on page 262)*: Allows you to examine HRV analysis results and preview ST trends.



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 265)*: Displays an Hourly Tabular Report of all detected arrhythmias, useful for contextualizing specific conditions for their appearance.



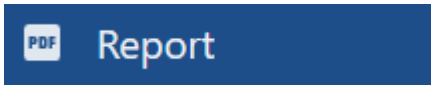
The Summary may include a Pacemaker Report. You can export it to PDF or Excel.



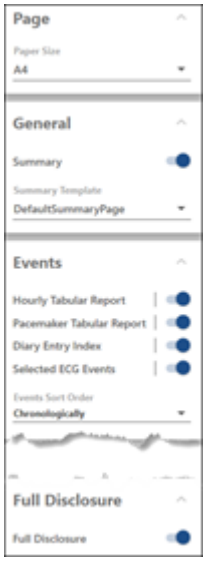
Step 7. Generating and Confirming Report

After completing all necessary steps, generate, review, and confirm your Report.

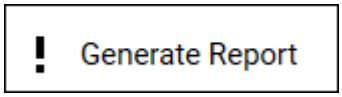
1. Click the Report View *(on page 269)*.



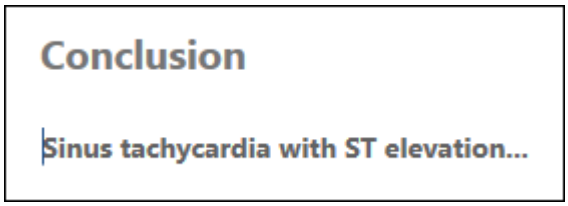
2. Toggle ON/OFF the desired report sections using control boxes on the right. Manage sections such as Summary and Conclusion; Events; Charts; Full Disclosure, and more.



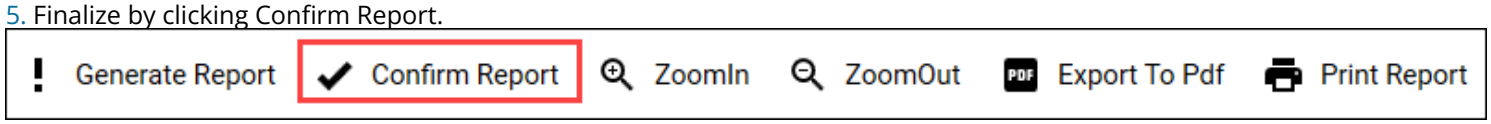
3. Click Generate Report *(on page 282)*.



4. Once the Report is generated, review it and fill in the Conclusion.

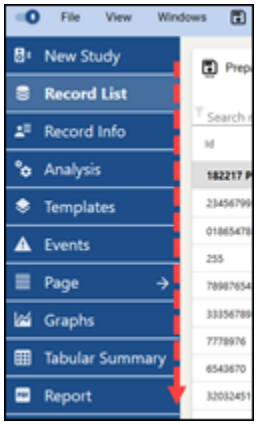


5. Finalize by clicking Confirm Report.



7.2. Perfectionist Workflow Overview

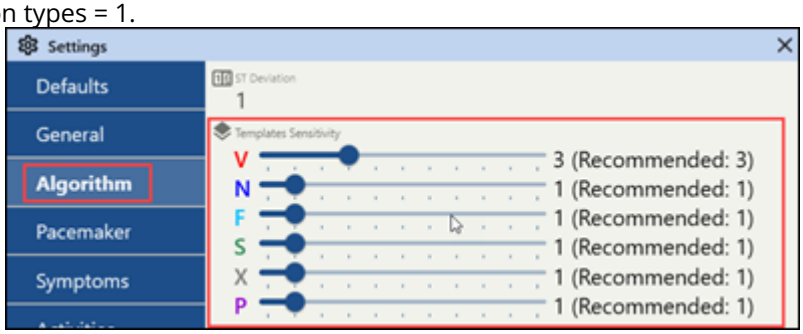
Here, we will cover the procedure for conducting the analysis, reviewing beat Templates and Events, and how to set up and generate the final Report. The Norav NH-301 Holter analysis system offers a simple and streamlined workflow. To commence the Analysis and deliver a comprehensive report, follow the 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 69)* and its respective subsections.



Step 1. Configuring Algorithm Settings

Before initiating analysis, you need to configure the algorithm sensitivity:

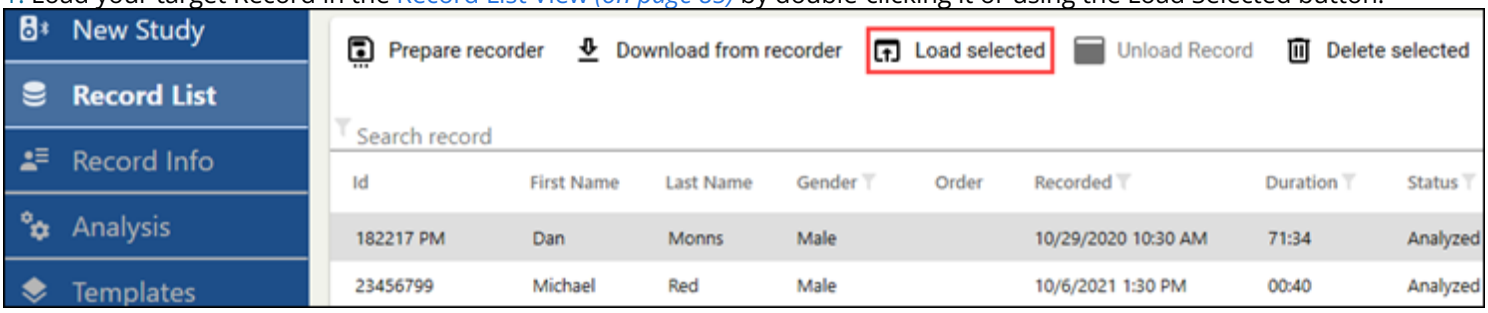
1. Navigate to File Menu > Settings > Algorithm *(on page 32)*.
2. Set the Templates Sensitivity parameters:
    2.1. For V-type annotations = 3.
    2.2. For all other annotation types = 1.



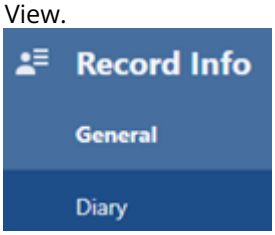
Step 2. Launching Analysis

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 85)* by double-clicking it or using the Load Selected button.



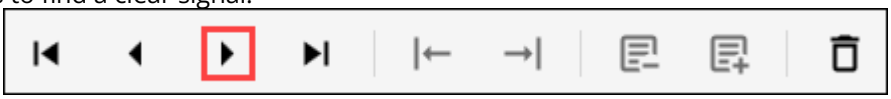
2. If needed, update patient data in the Record Info View.



3. Access the Analysis View *(on page 97)*.

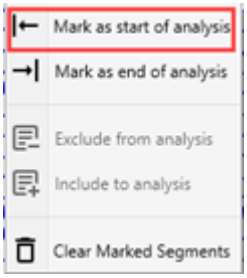


4. Assess the ECG signal on the first page. If it's abnormal, use the "Page Down" button in the Action Bar at the bottom and switch between Channels to find a clear signal.

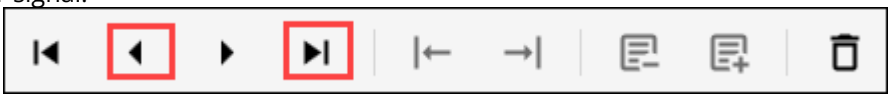




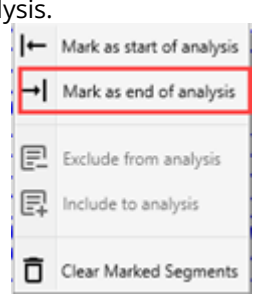
5. Right-click to access the context menu and select "Mark as start of analysis," or use the corresponding button in the Action Bar to mark the Start of Analysis.



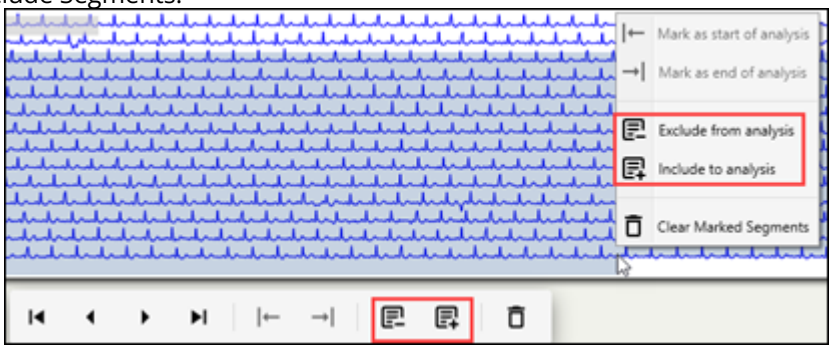
6. Navigate to the Final Page using the "Final Page" button in the Action Bar. If noise is present, use "Page Up" and alternate Channels to locate a clear signal.



7. Mark the clear signal as the end point for the analysis.



8. **(Optional)** Include or Exclude Segments:

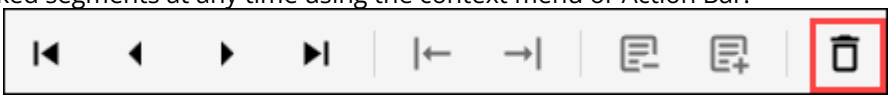


- To exclude, right-click and drag over the interval, selecting "Exclude from analysis" from the context menu or Action Bar.
- To re-include a segment, right-click within the excluded area, drag to the required position, and select "Include to analysis."

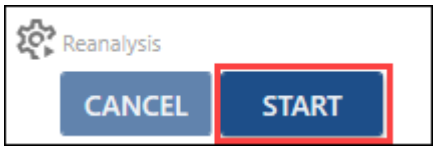
9. Adjust Channels, Heart Rate Range, Pause Duration, Pacemaker settings, and other parameters in the right control boxes if necessary.



10. **(Optional)** Clear marked segments at any time using the context menu or Action Bar.



11. Click START to begin the analysis.

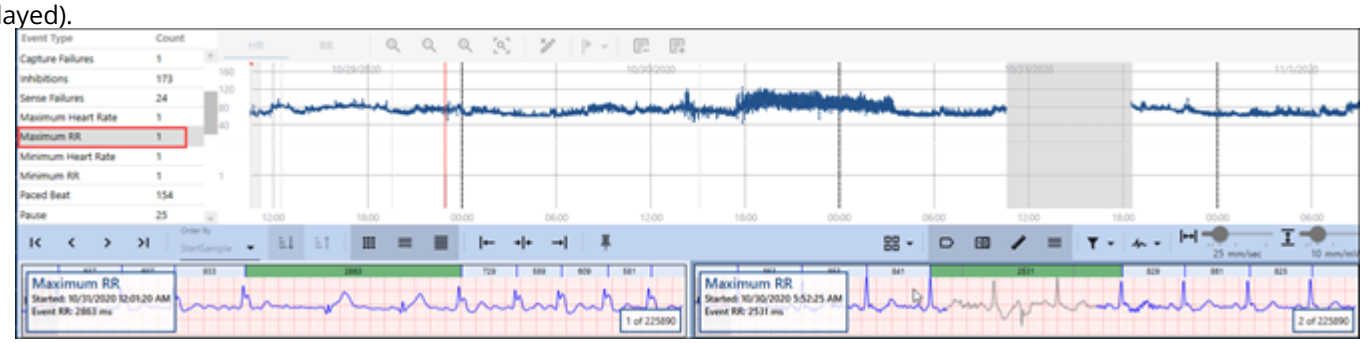


Step 2. Editing RR-type Events

Upon completion of the analysis, click the Events View *(on page 178)*.



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).

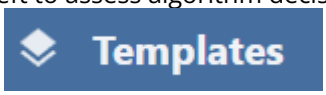


2. Using the RR-trend and the ECG strip, select regions to be excluded from analysis

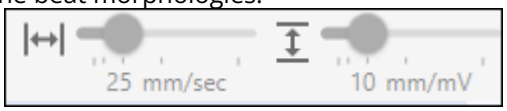
Step 3. Editing Templates

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).

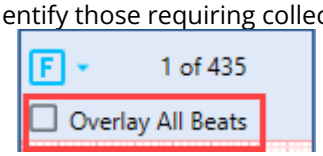
1. Click the Templates View *(on page 106)* on the left to assess algorithm decisions on heartbeat shapes.



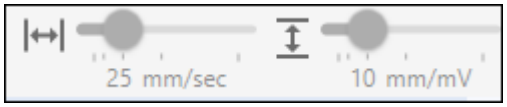
2. Use the Scale slider at the top right of the page to set the paper speed for the template boxes to 100 mm/s, since this setting allows displaying more details of the beat morphologies.



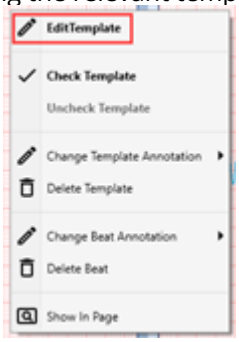
3. Select Overlay All Beats for each template to identify those requiring collective or individual edits.



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.

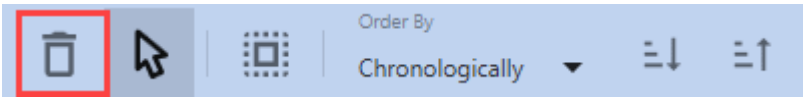


5. Enter template beat editing mode by double-clicking the relevant template box or right-clicking and choosing Edit Template.



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.



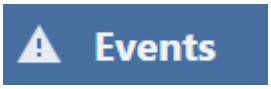
7. Click Apply in the top left corner to save changes.



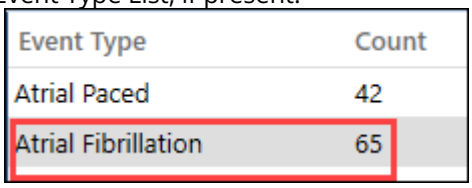
Step 4. Reviewing Events

After editing Templates, proceed to review Events.

1. Click the Events View *(on page 178)* on the left.



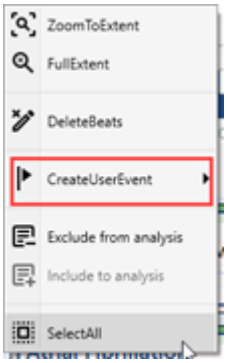
2. Select Atrial Fibrillation events from the Event Type List, if present.



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.



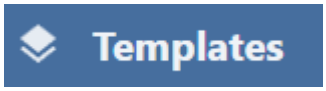
5. **(Optional)** To add Atrial Fibrillation events if necessary: Use Trends, ECG Strip, or Page pane - right-click, drag, and select Create User Event, then Atrial Fibrillation from the context menu.



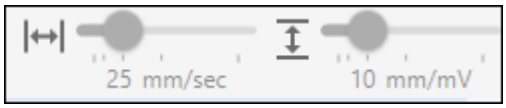
Step 5. Reviewing Prematurity Templates

Click the Templates View to review the algorithm's decisions about the prematurity of the heartbeats.

1. Click the Templates View *(on page 106)* on the left.

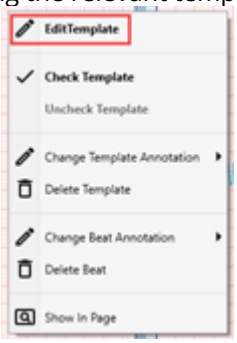


2. Use the Scale slider at the top right of the page to set the paper speed for the template boxes to 100 mm/s, since this setting allows displaying more details of the beat morphologies

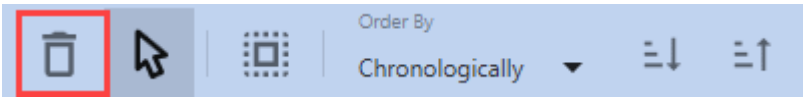


.

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



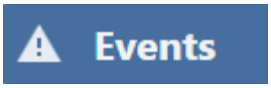
5. Click Apply in the top left corner to save changes.



Step 6. Editing Events

After reviewing Templates, proceed to Events.

1. Click the Events View *(on page 178)* on the left.



2. Examine Example Strips for various arrhythmia types.

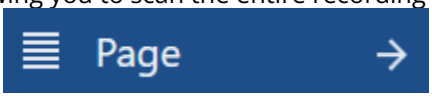


3. Review and delete incorrect Events.
4. If needed, mark (select) Example Strips of various arrhythmia types to include in the Report.

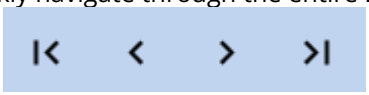


Step 7. Scanning ECG Page Data

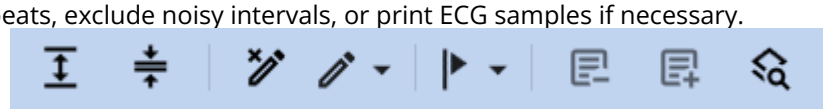
Before generating the final Report, you may review the results in other Views: Page, Graphs, or Tabular Summary. The Page View *(on page 220)* displays complete ECG data, allowing you to scan the entire recording and add user Events if needed.



1. Use navigation buttons at the top left to quickly navigate through the entire ECG recording for review.

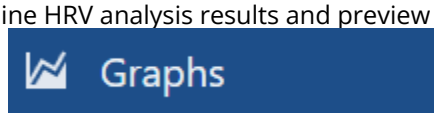


2. Click to select a beat or right-click and drag to select a segment of the ECG recording.
3. Add user Events, delete beats, exclude noisy intervals, or print ECG samples if necessary.



Step 8. Reviewing Graphs

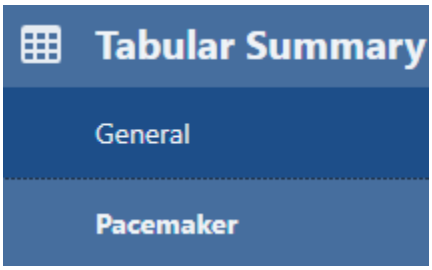
Graphs View *(on page 262)*: Allows you to examine HRV analysis results and preview ST trends.



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 265)*: Displays an Hourly Tabular Report of all detected arrhythmias, useful for contextualizing specific conditions for their appearance.

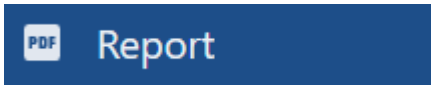


The Summary may include a Pacemaker Report. You can export it to PDF or Excel.

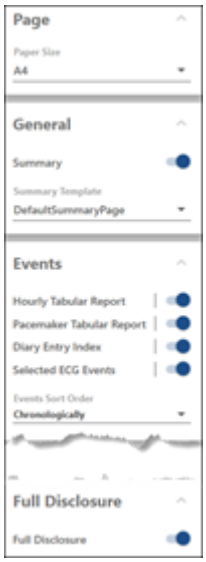
Step 10. Generating and Confirming Report

After completing all necessary steps, generate, review, and confirm your Report.

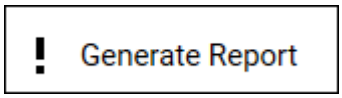
1. Click the Report View *(on page 269)*.



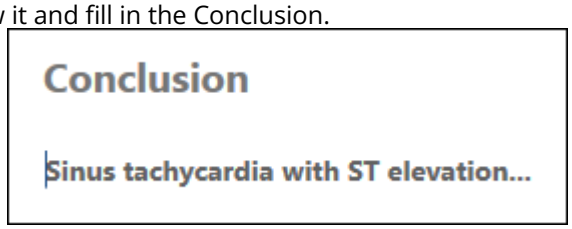
2. Toggle ON/OFF the desired report sections using control boxes on the right. Manage sections such as Summary and Conclusion; Events; Charts; Full Disclosure, and more.



3. Click Generate Report *(on page 283)*.



4. Once the report is generated, review it and fill in the Conclusion.



5. Finalize by clicking Confirm Report.



7.3. Workflow Clarifications and Explanations

In both workflows, channels are not selected for analysis. This occurs because the algorithm evaluates each channel's usefulness at a given time and responds accordingly. In most cases, this results in an additional channel being advantageous for analysis, even if its signal is of low quality.

In the Standard workflow within the Analysis View, all regions are included, and the start and end points of the analysis are not set. This approach is adopted because it is faster and easier to exclude regions from the analysis after its completion (RR-trend), and there is no benefit to doing so beforehand.

Conversely, in the Perfectionist workflow, the endpoint of the analysis is selected. This selection is made due to the algorithm slowing down as a result of combining both templates, which are enabled for annotations of type N, X, or P, along with extended periods where no channels exhibit ECG signals (due to detached electrodes).

When both these 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 channels lack ECG do not pose this issue. Similarly, if at least one channel has an ECG, the problem does not arise. Extended periods without ECG on any channel only occur at the end of a record. Therefore, if template sensitivity for annotations of types N, X, or P is enabled, the record's end should be examined to determine the analysis endpoint.

When SVEs are excluded from Atrial Fibrillation events, either manually or automatically, all beats previously marked as S are grouped into the same template, and information on shape similarity is lost.

Consequently, reviewing heartbeat shapes should occur before excluding any SVEs from Atrial Fibrillation, but after removing bad ECG regions from the analysis.

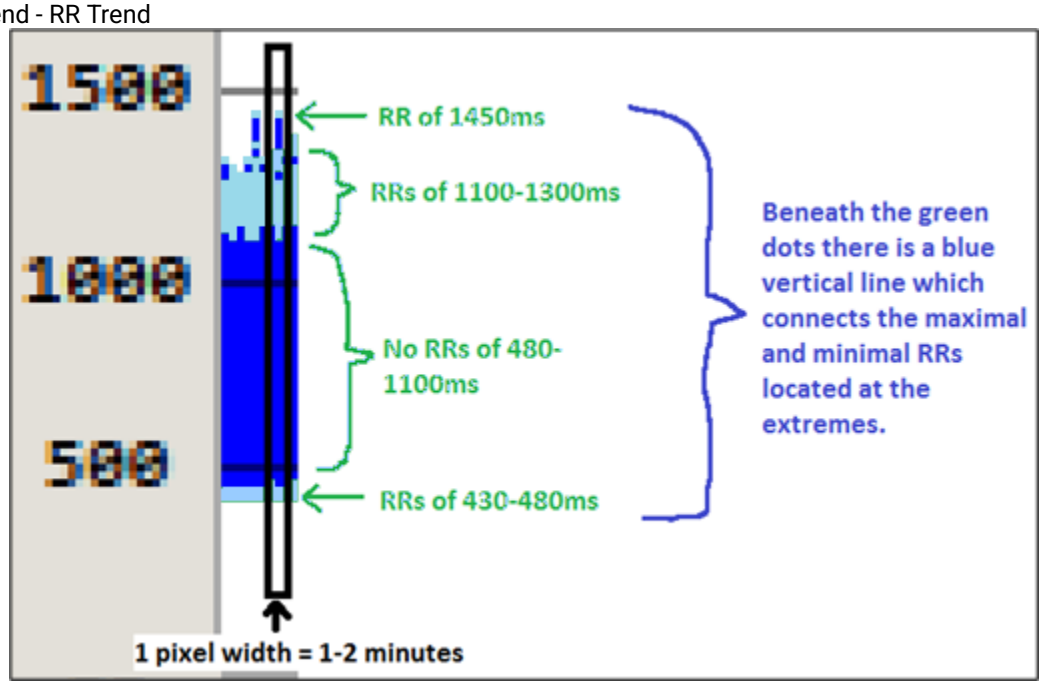
However, assessing heartbeat prematurity should take place after SVEs are excluded from Atrial Fibrillation. This necessity leads to multiple switches between the Events and Templates Views in the Perfectionist Workflow.

8. Appendix A: Overview and Utilization of RR Trend Visualizations

The RR trend comprises blue vertical lines with light-blue dots on top. Each vertical line of pixels displays information for 1 to 2 minutes of the record:

- The blue lines signify the range between the maximum and minimum RR intervals within the 1 to 2-minute intervals.
- For each RR interval within a 1-2 minute period, a light-blue dot is positioned at a specific point on the vertical axis to represent the interval's duration. Often, numerous RR intervals have similar values, leading to multiple light-blue dots converging into a single pixel (meaning a single light-blue pixel may signify several RR intervals).

Figure 577. RR Trend - RR Trend



The RR trend also comprises three additional vertical lines:

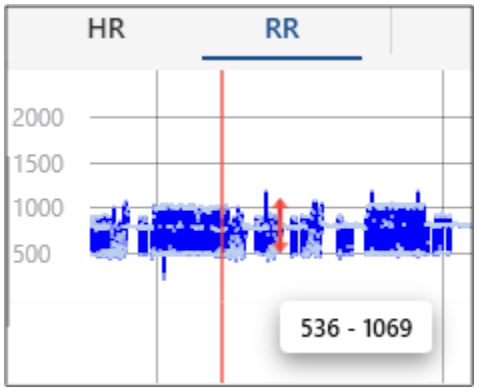
- A green thick line marks the maximum RR event.
- A red thick line marks the minimum RR event.
- A red thin line represents the current ECG marker.

Figure 578. RR Trend - ECG Markers



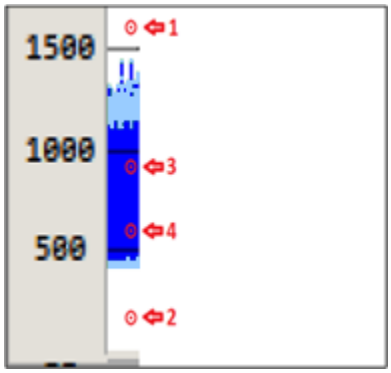
Hovering over the RR trend displays a vertical red line with arrow pointers at each end, following the mouse cursor. This line marks the 1-2 minute interval under the cursor, with the arrow pointers highlighting the minimum and maximum RR intervals of that period. The precise values of these RRs are shown in milliseconds below.

Figure 579. Trend - RR Values



Clicking on the RR trend navigates the ECG Strip in the Event View to a specific point within the 1-2 minute interval aligned with the click location. The vertical position of the click determines the exact RR interval shown—above the blue line for the maximum RR and below for the minimum RR of that 1-2 minute period:

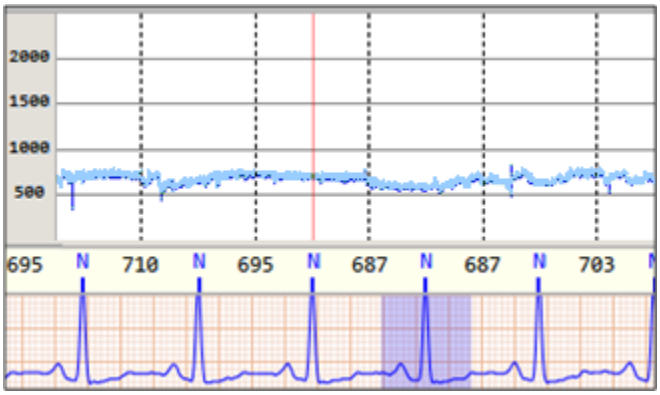
Figure 580. RR Trend - Min and Max RR



1. Displays the maximum RR within the 1-2 minute period (1450 ms)
2. Displays the minimum RR within the 1-2 minute period (420 ms)
3. Shows an RR of 1120 ms, the shortest RR among those longer than 1000 ms. This occurs when the mouse is clicked on a blue pixel (indicating an area without RRs) instead of a light-blue one, which leads to the display of either the longest RR below the click position (450 ms) or the shortest RR above it (1120 ms). As the click is nearer to the latter, the 1120 ms RR is displayed.
4. Shows an RR of 450 ms, the longest RR among those shorter than 500 ms. This happens when the mouse is clicked on a blue pixel (indicating an area without RRs) instead of a light-blue one, which leads to the display of either the longest RR below the click (450 ms) or the shortest RR above it (1120 ms). As the click is nearer to the former, the 450 ms RR is displayed.

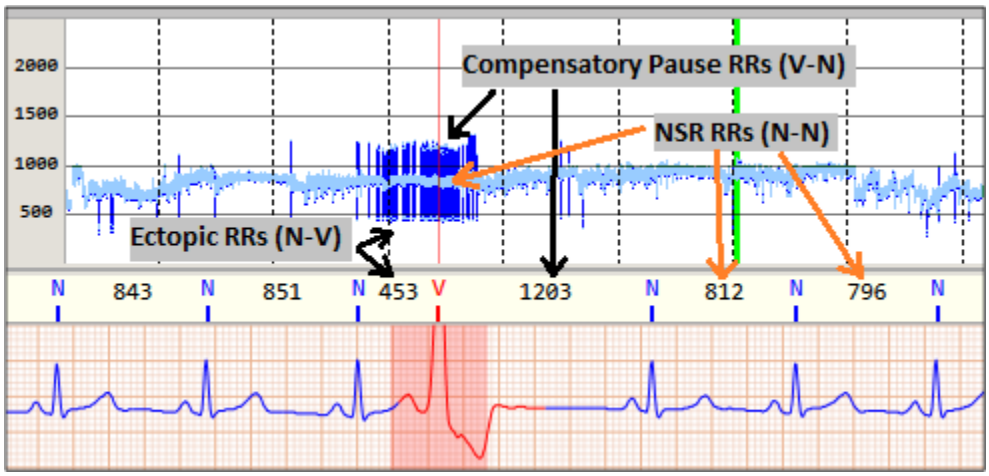
8.1. RR Trend Examples

8.1.1. Normal Sinus Rhythm (NSR)



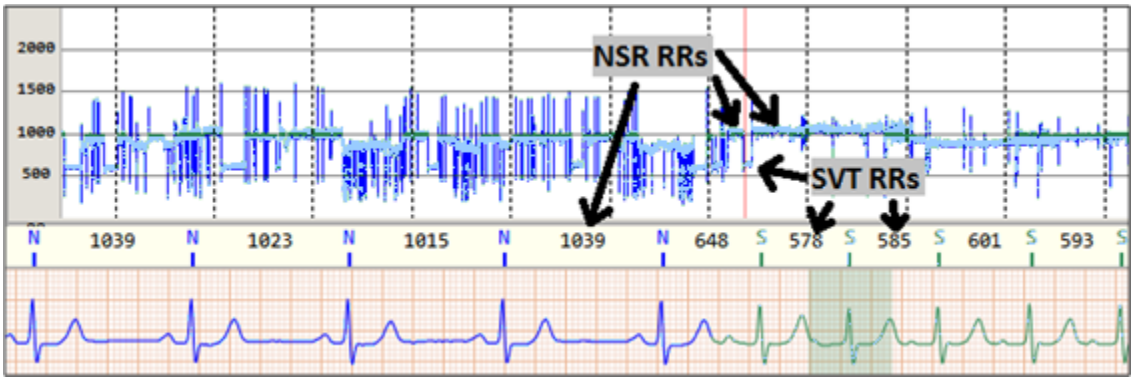
8.1.2. NSR with VPBs

1. Lower Line – Ectopic RRs (**N**–**V**)
2. Upper Line – Compensatory Pause RRs (**V**–**N**)
3. Middle Line – NSR RRs (**N**–**N**)



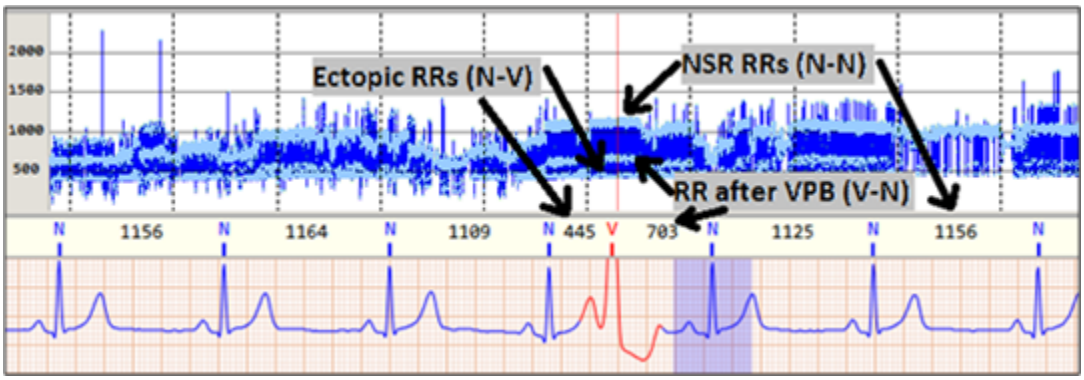
8.1.3. Sustained Supraventricular Tachycardia (SVT)

1. Upper light-blue line – NSR RRs
2. Depressed light-blue line – SVT RRs



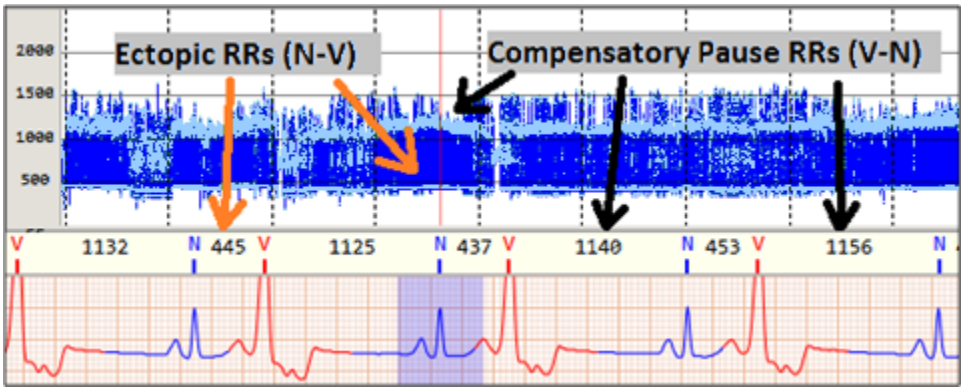
8.1.4. NSR with VPBs without Compensatory Pause

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**)



8.1.5. Ventricular Bigeminy

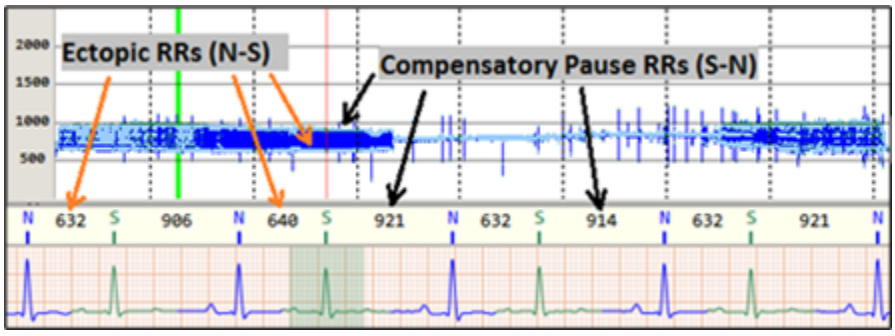
1. Lower light-blue line – Ectopic RRs (**N**–**V**)
2. Upper light-blue line – Compensatory Pause RRs (**V**–**N**)



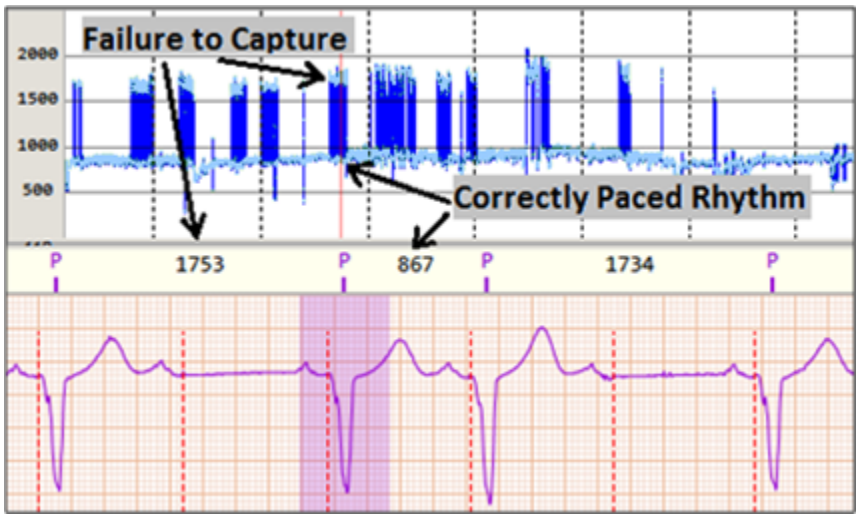
When you click on	Display
The white area below the lower light-blue line	Shortest Ectopic RR (**N**–**V**)
The lower part of the blue area	Longest Ectopic RR (**N**–**V**)
The white area above the upper light-blue line	Longest Compensatory Pause (**V**–**N**)
The upper part of the blue area	Shortest Compensatory Pause (**V**–**N**)

8.1.6. Supraventricular Bigeminy

- Lower light-blue line – Ectopic RRs (**N**–**S**)
- Upper light-blue line – Compensatory Pause RRs (**S**–**N**)

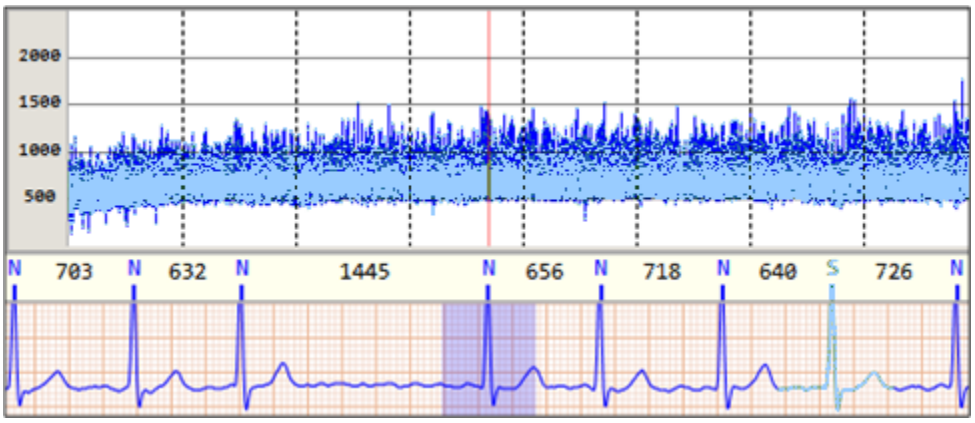


8.1.7. Pacemaker Failure to Capture



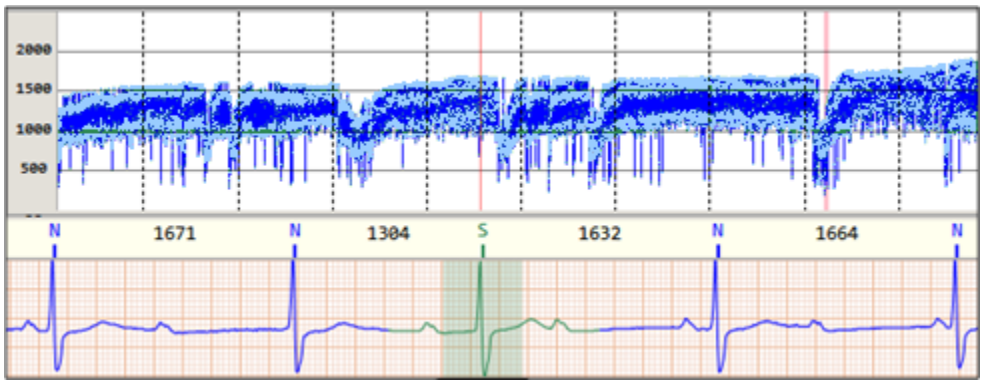
8.1.8. Atrial Fibrillation

Observe the wide light-blue ribbon indicating atrial activity.



8.1.9. Wenkebach (Mobitz I)

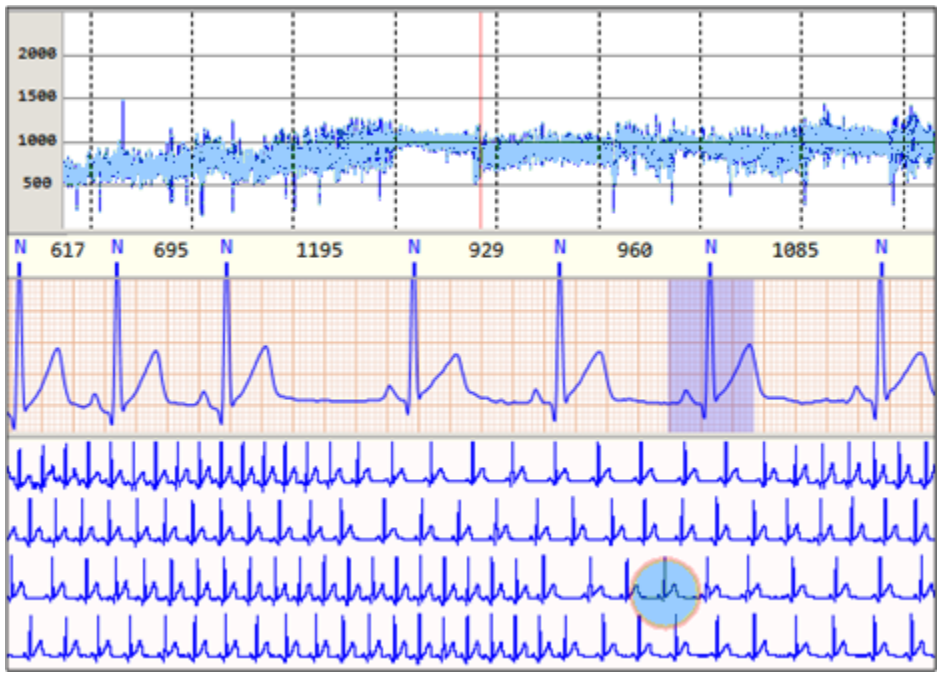
Therefore, when the RR trend appears as a wide light-blue ribbon, it is advisable to consult both the Strip View and Page View, located below the Trends View, to distinguish between the various possibilities.





8.1.10. Sick Sinus Syndrome

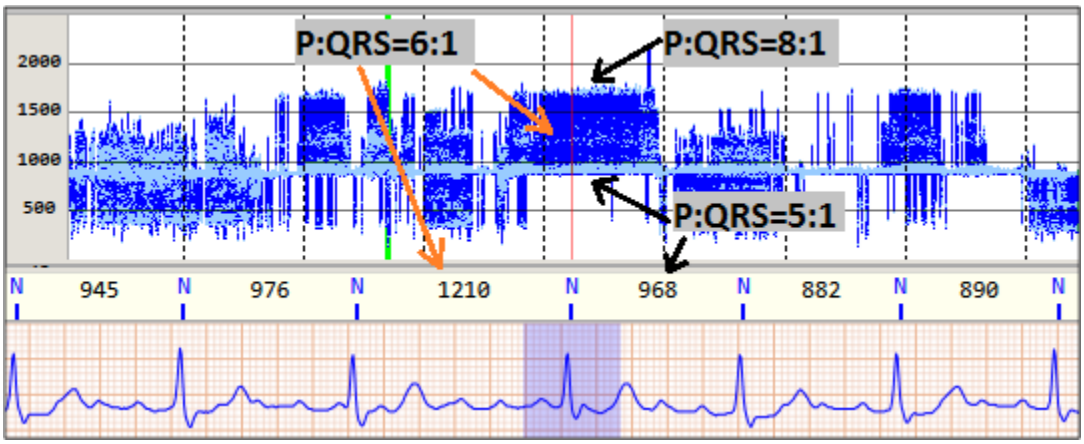
When the RR trend appears as a wide light-blue ribbon and looks similar to Atrial Fibrillation or other event types, it is advisable to consult both the Strip View and Page View, located below the Trends View, to distinguish between the various possibilities.



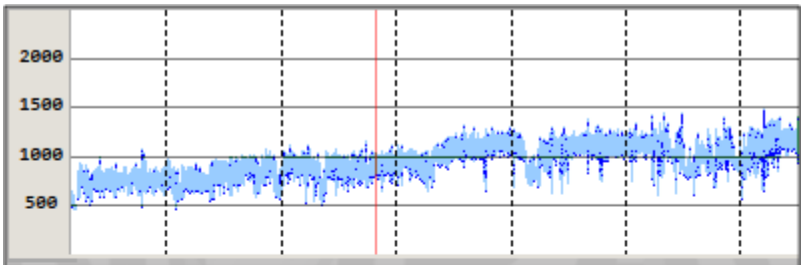


8.1.11. Atrial Flutter

Horizontal light-blue lines of varying positions represent different P:R ratios.

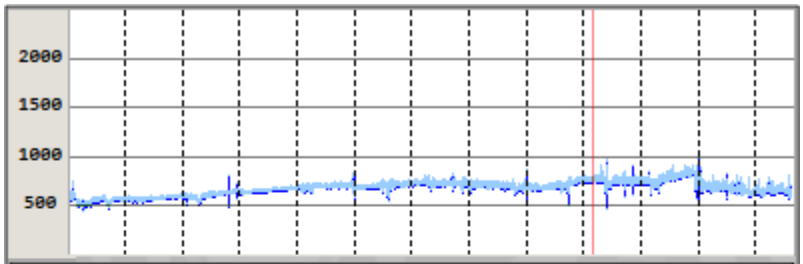


8.1.12. NSR with High HRV



HRV	
Time Domain	
SDNN (ms)	214.3904
SDANN (ms)	200.843
RMSSD (ms)	35.87594
HRV triang.index	56.24861
Frequency Domain	
ULF[0-0.003Hz](ms²)	41770.3
VLF[0.003-0.04Hz] (ms²)	3688.52
LF[0.04-0.15Hz] (ms²)	1846.854
HF[0.15-0.4Hz] (ms²)	481.4632

8.1.13. NSR with Low HRV



HRV	
Time Domain	
SDNN (ms)	63.19224
SDANN (ms)	60.1311
RMSSD (ms)	7.513971
HRV triang.index	18.13672
Frequency Domain	
ULF[0-0.003Hz](ms²)	3704.025
VLF[0.003-0.04Hz] (ms²)	189.9941
LF[0.04-0.15Hz] (ms²)	70.07948
HF[0.15-0.4Hz] (ms²)	20.47246

9. Appendix B: Holter ECG Acquisition Patient Diary Form

This is a recommended Holter Patient Diary Form for use during the Holter recording procedure.

Institution:						
Referring Physician:						
Patient Name:						
Date of Birth:		**Gender:**		**MRN:**		
Recording Period:		**Hours**	**from:**		**to:**	
Recorder:			**Connected by:**			

Dear patient,

While undergoing Holter ECG acquisition, it's important to keep a detailed diary of your activities and any symptoms you experience. Please record the time any symptoms begin, such as chest pain, shortness of breath, irregular heartbeats, or dizziness, and note you were doing at that moment. Your diary will help correlate your daily activities with the ECG data recorded by the Holter monitor.

Remember that your physician needs a complete picture of your activities. If you're unsure whether to include something, it's better to write it down.

Please use this diary form to note all your daily activities:

- Time of day – Write the time for every activity or symptom that you note in the diary.
- Your symptoms – Record any symptoms like chest pain, back pain, dizziness, or nausea, even if they seem minor.
- Your activities –Write down all your activities, including sitting, walking, exercising, eating, sexual activity, taking medications, and so on.

Date	Time	Symptoms	Activity

10. Appendix C: Patient-Related Instructions

Note: It's the physician's responsibility to inform the patient of the necessary steps for a safe and effective ECG recording.

Patient Safety Cautions

CAUTION:

- If you experience skin problems, inform your physician immediately. In rare cases, even when using biocompatible electrodes, allergic reactions may occur.
- Avoid exposing the recorder to water. This includes adverse weather conditions and bathing.
- In humid or bad weather, store the recorder in its pouch and wear it under a coat to avoid damage.
- Do not expose the recorder to extreme temperatures. Stay in air-conditioned places in hot weather, and keep the recorder under your clothes in cold weather.
- Handle the ECG cable with care. Bending or wrapping it tightly around the recorder can damage it.
- Keep away from electrical devices to ensure safety.
- Avoid using electric blankets while you have the recorder on.

Patient Diary

Depending on the physician's recommendation, patients can use a Holter Monitor Patient Diary Form to log activities, symptoms, and their times during ECG recording. The diary options include (based on recorder settings):

- Pressing the recorder's Event button to mark the time, then recording symptoms/activities separately.
- Pressing the Event button to choose an event from a preset list.
- Recording a voice message about the event using the Event button.

Submitting Patient Event

As per the physician's instructions, patients can use the Event button on the recorder to mark times when they experience symptoms or engage in specific activities. Options for logging these events, based on the recorder's settings, include selecting an activity from a list or recording a voice message. To record an event, press and hold the Event button for 2-3 seconds until the recorder beeps.

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

To clean the license key, use a cleaning kit or a soft cotton cloth.

Do not use solvents or cleaning agents to clean the license key

Disposal of License Physical Key

Dispose of the license key according to local regulations. The key contains metal, plastic, and electronic components.