User Manual

AT-PATCH ECG Analysis System

MODEL ATP-C130

ATsens Co.,Ltd.

※ **Revision History**

No	Version	Revision Date	Revision Details
1	0.0	2020.10.30	Initial release

Disposable Medical Device (Do Not Reuse) “This product is a medical device.”

The warranty period of this product is 12 months from the date of manufacture.

1. Product Introduction

It is a device that attaches electrodes to certain parts of the potential difference that occurs when myocardial activity is transmitted to the body surface, which detects signals and uses radio signals to display this ECG data. If you connect the App after turning on the power of the device, you can see the ECG signal through the App. While device is running for 14 days, ECG records are stored in the device. After the use of the device is completed for14 days, the record in the device is transmitted to the PC software through a dedicated cable, and the final report is documented and printed through the analysis program of the PC software.

1) Common Name: AT-Patch ECG Analysis System
2) Product Name (Model Name): AT-Patch ECG Analysis System (ATP-C130)
3) Manufacturer: ATsens Co.,Ltd.
4) Address: No.806, Point Town, 11 Gumi-ro, Bundang-gu, Seongnam-si, Gyeonggi-do, Korea
5) Contact: Tel. +82-70-5220-0738 / Fax. +82-70-8270-0738
6) U.S Representative
   A. Name: Mtech Group
   B. Address: 7707 Fannin St. Ste 200 Houston, TX 77054
   C. The person in charge: Dave Kim
   D. E-mail: davekim@mtech-inc.net

1.1 Intended Purpose

This device is intended to measure, analyze, and report continuous electrocardiogram (ECG) information for long-term monitoring (up to 14 days) by attaching to the skin surface. While continuously recording patient ECG, ECG records are saved in the device. It is indicated for use on patients 18 years or older who may be asymptomatic or who may suffer from transient symptoms such as palpitations, shortness of breath, dizziness, light-headedness, fatigue, or anxiety. The final report is offered to clinicians or doctors on an advisory basis only. Used by patients as prescribed by physician or medical personnel.

1.1.1 Target Treatment group

Patients 18 years or older who may be asymptomatic or who may suffer from transient symptoms such as palpitations, shortness of breath, dizziness, light-headedness, fatigue, or anxiety.

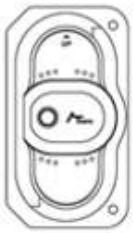
1.1.2 Target User

physician or qualified medical personnel (ex. a doctor, clinical pathologist, etc.)

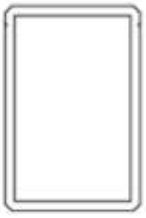
1.2 Packaging Information

1.2.1 Components (Device)

1) Basic


AT-Patch


Pad Paper


Sealing Bag


Quick Guide


Symptom Note


Gift Box

2) Accessories & PC S/W(ATR-C130)
Refer to User Manual 4.3.2

1.2.2 App

Android market: Google play (https://play.google.com/store)
iOS market: App Store(https://www.apple.com/ios/app-store)

1) Search for 'AT note, ATsens, ATreport' in the Google Play™ Store or App Store℠
2) Download app
3) Register before entering symptoms

* Supported on Android 5.0+ or iOS 12.0+
* See User manual 12 How to Install the App (ATN-C130) for details.

1.2.3 PC SW

Provide by USB memory: greater than or equal to 4GB & CE mark
Recommended System Requirements (PC)

Feature	Specification
Processor	Intel Core i7-9700K
RAM	16 gigabyte (GB)
Hard disk space	Main SSD: 512GB/Back-up HDD: 1TB
Graphics card	DirectX 9 or later with WDDM 1.0 driver
Display	1920 x 1080/24 inch Full-HD Monitor
OS	Windows 10 (64bit)

2. Caution ⚠

ATP-C130 is intended for direct use by the patient and the patiens is an intended operator.

2.1 Contraindications

1) If there are current symptoms or history of skin cancer, rash, skin disease, keloid, or injury, do not use our product.

2) Do not use our product for patients with symptomatic events where instance variations in cardiac performance could result in immediate danger to the patient.

3) Do not use our product in combination with cardiac defibrillators or high frequency surgical device near strong magnetic fields such as MRI.

4) Do not use our product on patients who do not have the competency to wear the device for the prescribed monitoring period.

2.2 Precautions

1) This device is a disposable product and cannot be reused. Reuse may lead to malfunctions or inaccurate results.

2) Do not attach this product to any place other than the body application area. ⃠

3) Only authorized technicians are allowed to repair or disassemble this product.

4) Learn how to use this product through sufficient training before using this product.

5) Avoid using in places where there may be a problem with the wireless communication connection (where there are many hardware and electronic devices).

6) Not available with defibrillator. ⃠

7) No exposure to strong electromagnetic fields. ⃠

8) Disposal ⚠

※ When disposing of this product and battery, the waste disposal regulations in each region should be followed. If the waste disposal regulations are not followed, it may cause environmental pollution. However, the data of the product must be disposed of after processing.

2.3 Device and App

2.3.1 Cautions ⚠

1) Incorrect application and use of the sensor may lead to incorrect measurement, so avoid the following:
   - Excessive patient movement
   - Applications other than suitable body parts
   - In order to prevent abnormalities in the signal according to the patient's skin condition, get sufficient usage notice from a specialist before use.

2) The following people should consult the doctor before using the device.
   - Sensitive or allergic skin patients
   - If there is a wound on the skin coming into contact with the device
   - Patients with cardiac pacemakers, cardiac defibrillators, or other implantable electrical devices.
   - Pregnant women, breastfeeding mothers, infants, or children.

3) Be careful not to let any liquid enter the device. (Rating for water and dust resistance: IP 57)

4) Do not come into contact with organic compounds such as thinner or benzene. ⃠

5) Beware of strong shocks and vibrations.

6) Once you have attached the device to your body, do not reattach it.

7) In event of an unexpected operation or event, please record it in AT-note or contact distributor.

8)Some people may experience itching symptoms due to product attachment.

9) Do not disassemble the product ⃠

10) If the patch appears to be floating or falling off, apply medical tape to prevent the patch from falling off.
11) When connecting multiple BLEs (more than 2), the App does not work properly. Please stop using BLE as much as possible while using the AT-note App.
12) When take a shower, be careful not to get soap, etc. on the patch as much as possible.
13) Federal (USA) law restricts the sale of this device to or on the order of a physician.
14) If you delete an app while using the device, you can reinstall the app, but the record for AT-note is deleted. It is recommended not to delete the app while in use, except for forgotten password.
15) Adhere extra patches on the top of the attached patch when the previous patch is about to fall off.

2.4 S/W ⚠

2.4.1This Product is an auxiliary device to assist in the diagnosis. It may only be used to the extent that it. This Product and installed equipment shall be capable of Bluetooth connection.
2.4.2 Cautions in Handling Patient Personal Information
2.4.3 It is very important to protect patient's personal information and comply with [Personal Information Protection Act].
2.4.4 The patient's personal information will not be used for purposes other than the analysis and monitoring of the patient's heart rhythm. If the purpose of use is changed, prior consent will be obtained.
1) The collected patient's personal information is stored and managed for up to 5 years.
2) When personal information becomes unnecessary due to the lapse of retention period or achievement of processing purposes, the personal information shall be destroyed without delay.
3) The following measures are taken to ensure information safety.
- Administrative measures: Training on Personal Information Protection Act every year
- Technical measures: Encrypting personal information, installing security program, managing access to personal information data and keeping access records for more than 6 months
- Physical measures: No access for unauthorized persons and the use of document encryption devices

2.5 Usage and Storage Conditions ⚠

2.5.1 Conditions of Use

1) Temperature range: 10-45℃
2) Range of relative humidity: 10-95%, non-condensing
3) Range of atmospheric pressure: 700-1060hPa
4) Rating for water and dust resistance: IP57

※ The IP 57 rating prevents dust-proof dust from entering the interior. Even a slight intrusion of dust does not impede normal operation. Protection against underwater immersion is not adversely affected by immersion in water under the specified pressure and time.

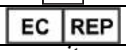
2.5.2 Storage Conditions

1) Temperature range: -20-55℃
2) Range of relative humidity: 10-95%, non-condensing
3) Range of atmospheric pressure: 700-1060hPa

2.6 Warning ⚠

1) Do not use ATP-C130 on patients with known allergic reaction to adhesives or hydrogels or with family history of adhesive skin allergies. Patient may experience skin irritation.
2) Do not reuse ATP-C130. This is a single use medical device. Reuse may cause incorrect patient data and patient may experience skin irritation.
3) Do not use ATP-C130 on patients residing in areas with limited to no smartphone reception.
4) If skin irritation such as severe itching or allergic symptoms develop, please remove the patch.

3. Symbol Guide

No.	Symbol	Descriptions
1		The serial number that identifies the object
2		Date of manufacture
3		For European Authorised Representative
4		Keep dry
5	IP57	Prevents dust-proof dust from entering the interior. Even a slight intrusion of dust does not impede normal operation. Protection against underwater immersion is not adversely affected by immersion in water under the specified pressure and time
6		Caution The equipment may be damaged if the instruction is not observed
7		Instruction for User manual
8		Do Not Reuse (Disposable medical devices)
9		Type of BF applied part
10		Manufacturer
11	Rx ONLY	Prescription Use only Not available without a doctor’s prescription
12		Warning
13		Prohibition Do not do anything marked with this symbol
14		Use by It can be used up to the date stated by the manufacturer.
15		Humidity Limitations It can be used in humidity conditions of 10 % or more and 95% or less.
16		Do not use if package is damaged
17		Temperature Limitation
18		On

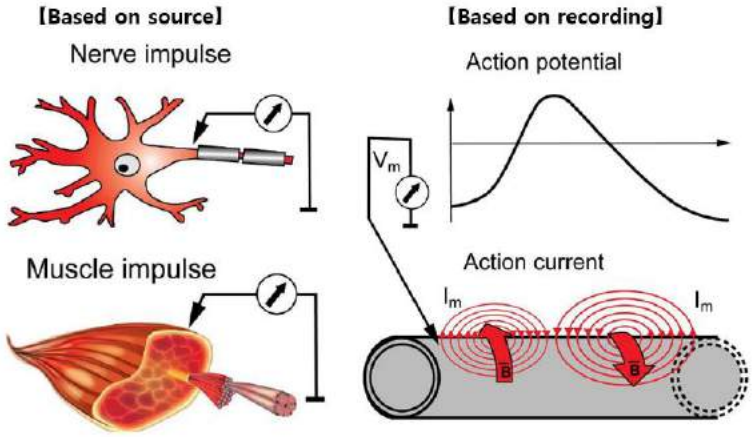
4. Device description

4.1 Operation principles

This device is a patch-type electrocardiogram device that senses a signal by attaching an electrode to a certain part of the potential difference generated when the action potentials generated when the myocardium is active is transferred to the surface of the body.

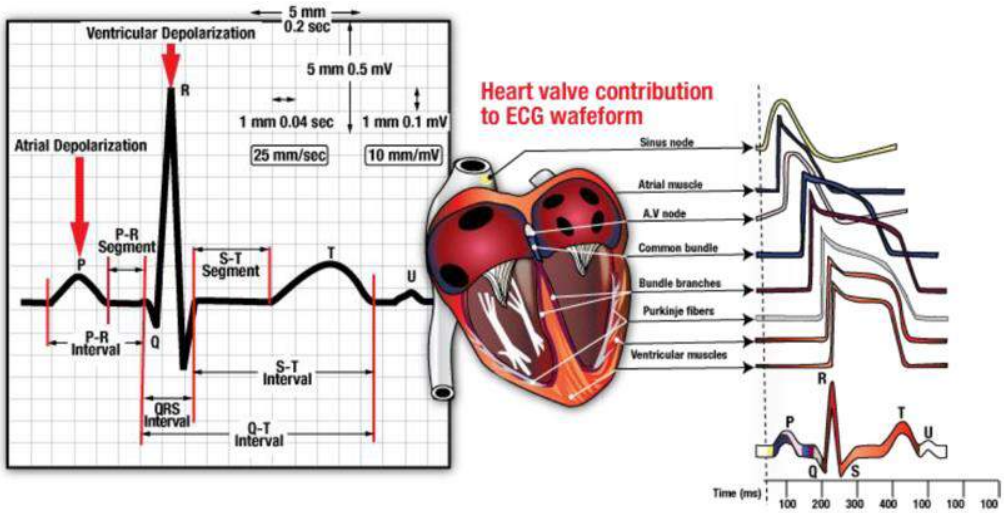
4.1.1 What is ECG?

Like the figure 3.1, when cells or muscles move, micro-currents are generated due to micro-resistance. At this time, each cell or muscle have action potential due to the micro-current generated by movement. The ECG waveform is the sum of the currents that the ECG electrode detects action potential caused by depolarization of the heart muscle and repolarization during the heartbeat. In other words, ECG is measure of the electrical activity of the heart.



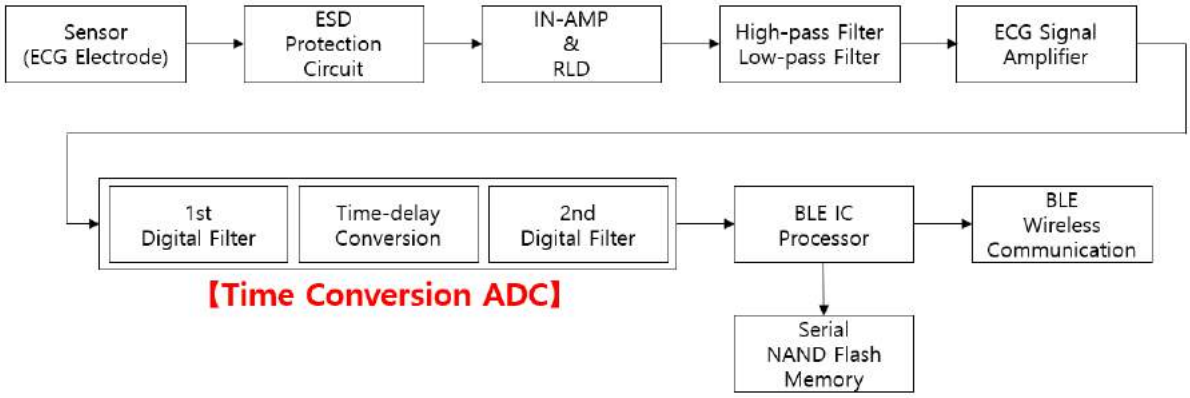
[Fig 4.1 Principle of micro-current generation]

As shown in Fig 3.2 below, the action potentials generated in the heart are gathered to view the ECG waveform.



[Fig 4.2 ECG waveform and action potential of the heart]

4.1.2 ATP-C130 ECG measurement process



[Fig 4.3 ATP-C130 system configuration]

1) Sensor: It detects the ECG signal and receives it in a stable form, reducing the fluidity of the ECG signal for the movement of the human body. However, offset voltage caused by electrodes occurs, and this part is removed from 3 IN-AMP & RLD(Amplifier).

2) ESD protection circuit: It acts as a protective circuit against signals input by ESD or external static electricity when attached to the human body.

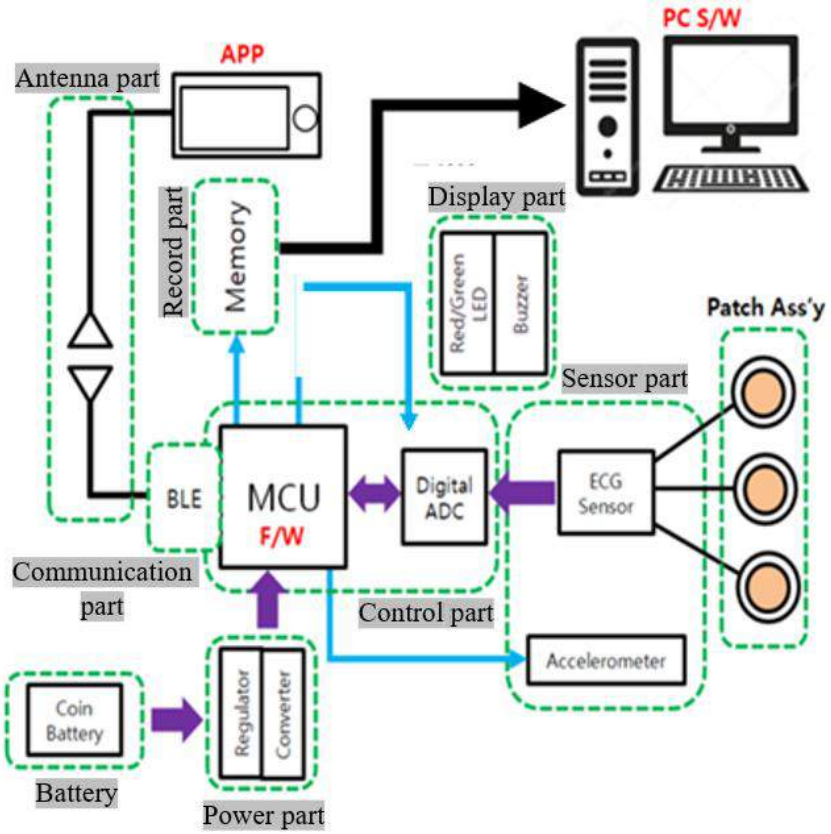
3) IN-AMP & RLD: It detects a signal using a precision instrument amplifier for electric signals (heart/EMG/movement) from the human body, and also uses feedback from the RLD circuit for the input of human body's common noise (50 Hz or 60 Hz). It plays a role in detecting a clear ECG signal by reducing the common-mode noise. Also remove the offset voltage generated by the sensor

4) High & Low-pass filter: The role of the filter is to remove the remaining signals except the information of the ECG signal output by the IN-AMP & RLD using a bandpass filter.

5) ECG signal amplifier: It amplifies the signal that has passed through the filter.

6)Time conversion ADC: Using the IC, It plays the role of converting analog signals into digital signals more accurately and precisely by using internal digital filters (primary / secondary) and algorithms for charging/discharging signals.
7) BLE IC Processor: It performs the final processing of the converted digital ECG signal using the above Time Conversion ADC and transmits it wirelessly in BLE or stores it in the Serial NAND Flash Memory included inside.
8) Serial NAND Flash Memory: It serves to store the digitally converted ECG signal in the internal memory.
9) BLE Wireless Communication: It plays the role of communication for wireless transmission.
10) After that, the ECG signal stored in the above process is stored in the device over 14 days, and then, the record can be transmitted from the device to PC software installed in the PC through a dedicated cable to the PC. The final report is documented and printed after analyzing the transmitted ECG records through software.

4.2 Operating system diagram

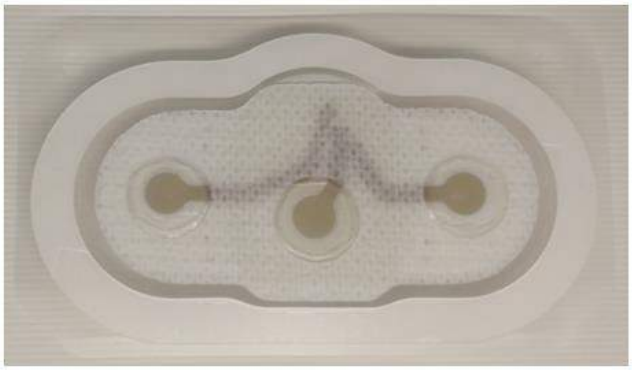


No.	Item	Description
1	Power part	The part that converts the power supplied by the battery into the proper power for the IC
2	Display part	The part that can be recognized externally according to

			the result processed by the controller
3	Sensor Part	Accelerometer	The part that senses the movement of the device
4		ECG Sensor	The part that senses electrocardiographic signal
5	Control Part	Digital ADC	The part that converts the input signal to a digital signal
6		MCU	The part that signal processing and various control
7	Communication Part	BLE	The part for BLE communication
8	Record part		The part that records the ECG signal
9	Antenna part		External input/output part to BLE wireless signal
10	Battery		The part that provides power to the device
11	Patch Ass'y		Patch part where ECG terminal is assembled
12	Software	F/W	S/W part that operates MCU and BLE
13		App	S/W part that processes the signal received from the device
14		PC/SW	The part that downloads S/W stored in memory and analyzes and reports on PC

4.3 Device and accessories

4.3.1 Device



4.3.2 Accessories

Component	Description	Picture
Dedicated Cable	After using the device (14 days), after installing the diagnostic S/W on the recommended PC, the device and PC only can get the ECG record of the device through this cable.	
BLE Dongle	It is a BLE dongle to communicate with the device from a PC that S/W installed	
USB Memory	Memory that S/W installer for analyzing ECG records is stored.	
Patch	Two extra patches are provided per product to maintain adhesion when the initial AT-patch is about to fall off.	

4.3.3 S/W

App (ATN-C130) Ver 1.3.0.0 / Android 5.x or iOS 12.x or later	PC S/W (ATR-C130) Ver 1.3.0.0 / Window10(64bit)
	

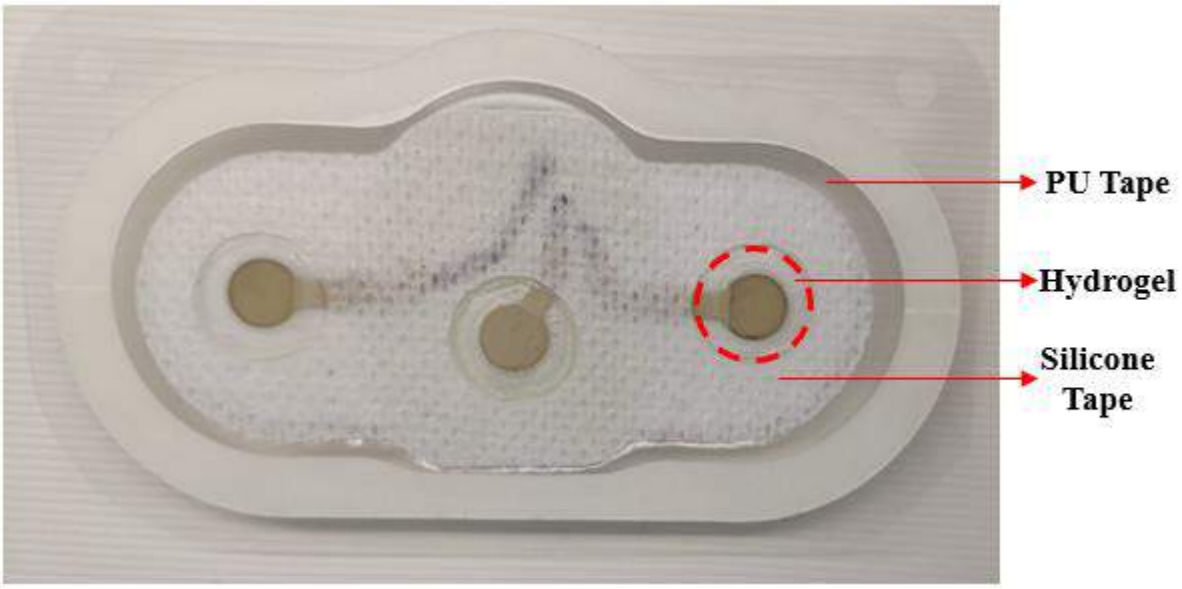
5. Critical Component List

Object / part No.	Manufacturer/ trademark	Type / model	Technical data	Standard	Mark(s) of conformity1)
PCB	ISUEXABOARD CO LTD, Elim electronics Ind.,LTD	MD1-A2-003	Flammability, V-0	IEC 60695-11-10 UL 94	UL ZPMV2. E252915
FPCB	Saemon Technology	MD1-PCB-002	FPCB Type Antenna CCL SV-SS1120SFQ1 Coverlay SV-SC015WFY1 Tape 3M 83710	-	Tested in equipment under condition of use in the ME EQUIPMENT
Case	SON TECHNOLOGY., LTD	MD1-A1-001 MD1-A2-001 MD1-A2-002	LG Chems SC1004A Flammability, HB	IEC 60695-11-10 UL94	UL QMFZ2. E67171
Patch	HANSUNG COLOR CO., LTD	MD1-A1-004	Medical Grade PU Tape 95 x 52.6 x 0.04mm Medical Grade Silicone Tape 72 x 36.4 x 0.25 mm Gel Type Medical Hydrogel CRRA240 Φ12 x 0.5mm	-	Test in equipment under condition of use in the ME EQUIPMENT
Battery	RENATA	CR2032	3.0V_235mAH 3.2mm H x 20mm D	IEC 60086-4	DK-74955-UL
	Panasonic	CR2032	3.0V_235mAH 3.2mm H x 20mm D	IEC 60086-4	UL1642

Object / part No.	Manufacturer/ trademark	Type / model	Technical data	Standard	Mark(s) of conformity1)
Supplementary information: 1) Indicates a mark which assures the agreed level of surveillance. See Licenses and Certificates of Conformity for verification.					

6. Patient Contact Part, Sterilization and Reusable

Part name	Patient Contact Part	Patient Contact Duration	Sterilization	Reusable
PU Tape	Skin	24h < D ≤ 30 days	X	Single-use
Hydrogel	Skin	24h < D ≤30 days	X	Single-use
Silicone Tape	Skin	24h < D ≤ 30 days	X	Single-use



The entire bottom part makes contact with the patient's skin.

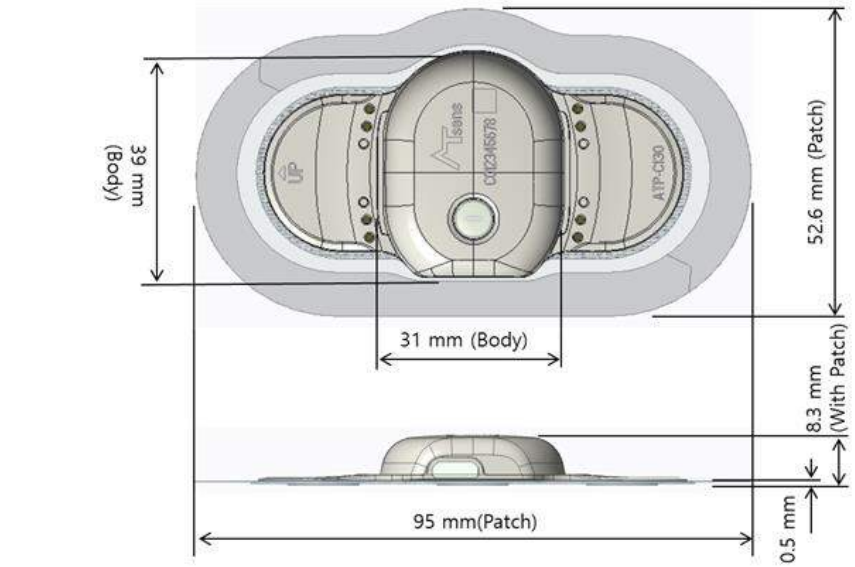
7. Photograph and/or Drawing of the Device

7.1 External Shape

1) Device (Model: ATP-C130)

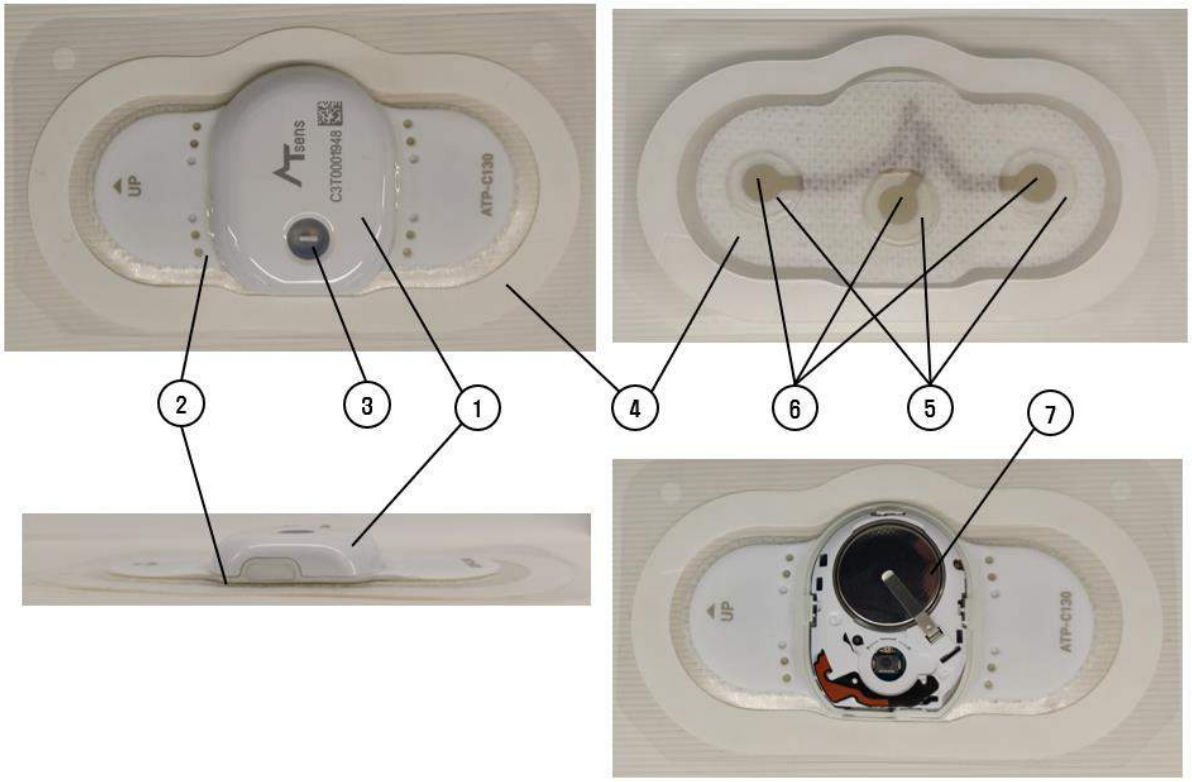
Body width(W)	Body length(L1)	Patch length(L2)	Patch Width(W2)	Patch thickness(T)	Total height(H)	Weight
39 mm	31 mm	95 mm	52.6 mm	0.5 mm	8.3 mm	12.6(g)

Front View	Rear View



2) Dedicated cable length: 1 (m)

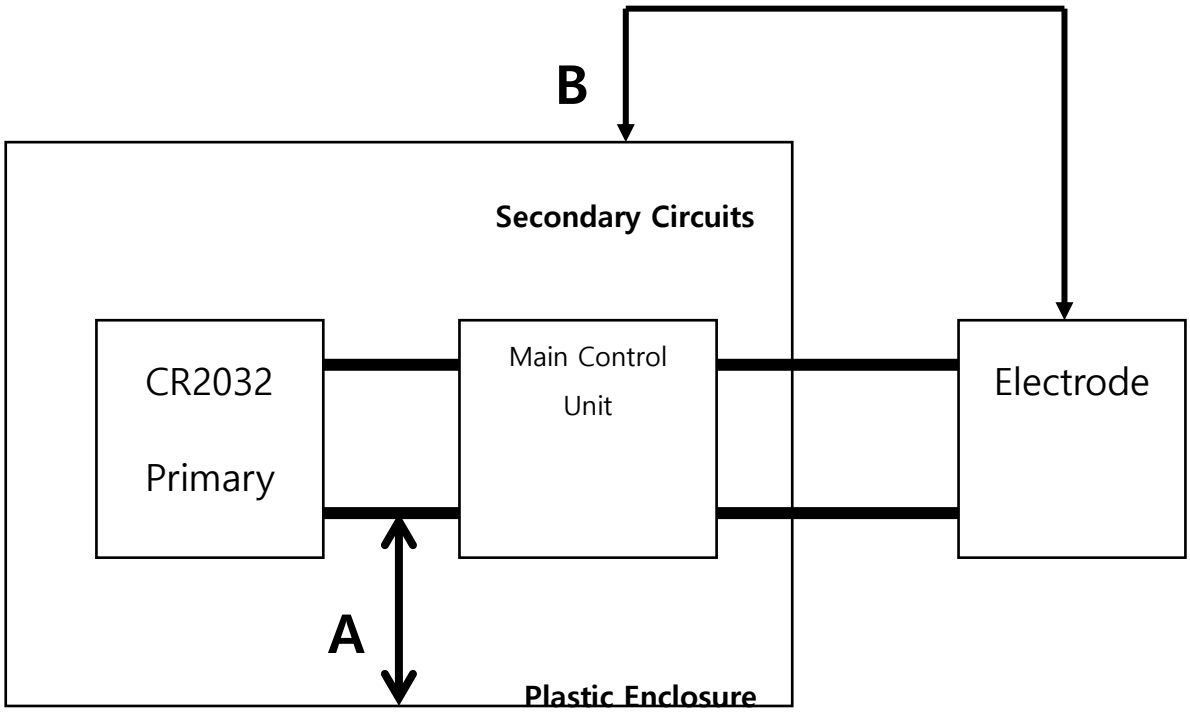
7.2 Interface Description



No.	Name	Description
①	Case Top	The power button is assembled, and the company logo and S/N of the device are printed on the surface.
②	Case BTM	It is made of PC and TPU double injection material and has an electrocardiogram electrode.
③	Power Button / LED	The power button turns on the power and you can check the power status through the LED.
④	Patch Ass'y	It uses medical grade tape and adheres to the skin surface.
⑤	Hydrogel	It is located between the ECG electrode and the skin, and it has a function that allows constant measurement of ECG signals.
⑥	Electrodes	ECG electrode
⑦	Battery	Coin Battery/CR2032

8. Insulation

Insulation is designed according to IEC 60601-1:



Entire enclosure of device is regarded as BF type applied part

IEC 60601-1			
Clause	Requirement + Test	Result - Remark	Verdict
TABLE: INSULATION DIAGRAM			P
Pollution degree ..... :	2		—
Overvoltage category ..... :	II		—
Altitude ..... :	≤ 2000		—
Additional details on parts considered as applied parts ..... :	(See Clause 4.6 for details)		—

Area	Number and type of Means of Protection: MOOP, MOPP	CTI	Working voltage		Required creepage (mm)	Required clearance (mm)	Measured creepage (mm)	Measured clearance (mm)	Remarks
			V_{rms}	V_{pk}					
A	2MOPP	IIIb	-	3	3.4	1.6	-1)	-1)	Live part – applied part
B	1MOPP	IIIb	250	-	4.0	2.5	-1)	-1)	ECG electode – applied part

Supplementary Information:
Note 1) Solid insulation provided. Compliance is checked by dielectric strength test according to clause 8.8.3.

9. How to use (Device, App & PC S/W)

9.1 App (ATN-C130) Icon Screen and Initial Launch Screen

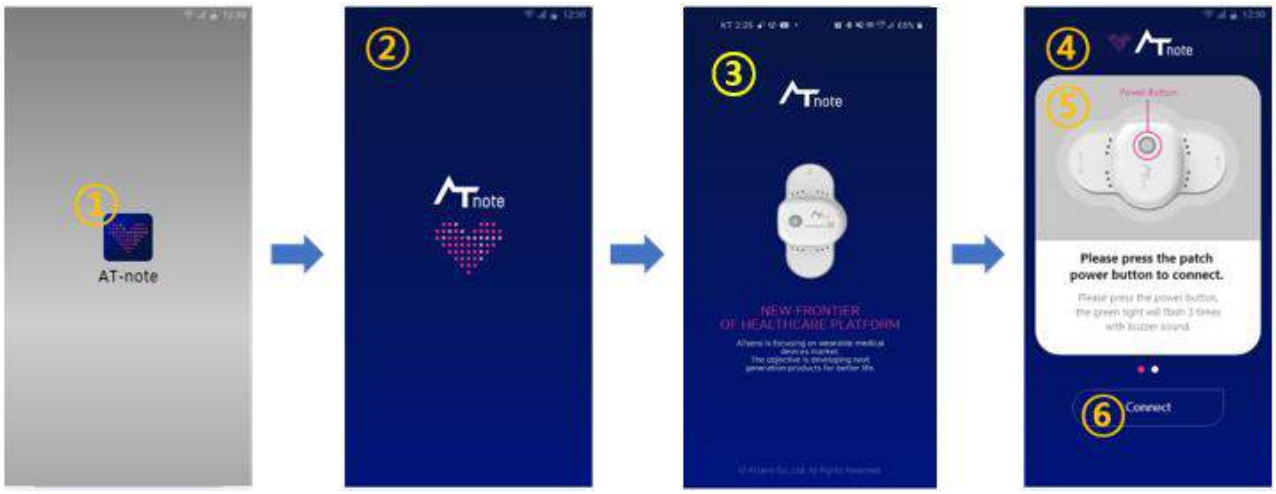


Figure 9.1 AT-note App Icon

Figure 9.2 Intro Screen 1

Figure 9.3 Intro Screen 2

Figure 9.4 Intro Screen 3

Table 9.1.

No	Item	Description
1	Run App (ATN-C130) Icon	Click the icon to run the App (ATN-C130)
2	Intro Screen 1	When running App (ATN-C130), the relevant intro screen is displayed for about 2 seconds and then the screen is switched to the next screen.
3	Intro Screen 2	After the intro screen is displayed for about 1 second, the screen changes to the next screen.
4	Intro Screen 3	Intro Screen
5	Contents of the Device Connection Guide	Contents of the guide for device connection
6	Screen for Device Connection navigation button	Screen call button for device connection

9.2 Device Connection Window

Figure 9.5 AT-patch Connecting Screen

Figure 9.6 AT-patch Connecting Screen

Figure 9.7 AT-patch PW input Screen

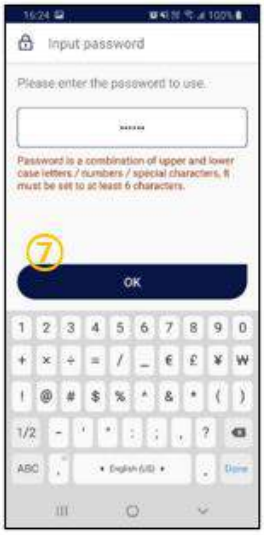


Figure 9.8 AT-patch PW input Screen2

Figure 9.9 AT-patch PW input Screen3

Figure 9.10 AT-patch PW input Screen4

Table 9.2

No	Item	Description
1	Button to cancel the device connection	Pressing the button cancels the device connection and switches to the [Figure 9.5] screen.
2	Input Device SN Information	Window to input Device SN information to connect
3	Button for Device Connection	Press the button to connect the device with the entered SN information.
4	Button for Scanning DataMatrix	Press the button to scan the DataMatrix.
5	Connection progress bar	Bar to show the progress of the device connection
6	Input PW	This is the field to input the PW to use the App.
7	Button to ok	When the PW satisfies the condition, it is activated.

9.3 Screen for 5 consecutive login failures

If 5 consecutive logins fail, a message appears on the screen like [Fig 9.11], and you cannot log in for 30 minutes.

Figure 9.11 Recorded ECG/3axis Data Viewer

9.4 Screen when running the app after a long period of inactivity or 5 consecutive login failure

If you run the app after 30 minutes after 5 consecutive login failures or run the app after not using it for a long time, the following [Fig 9.12] appears. Enter the PW you set for the first time and press OK to use the app again.

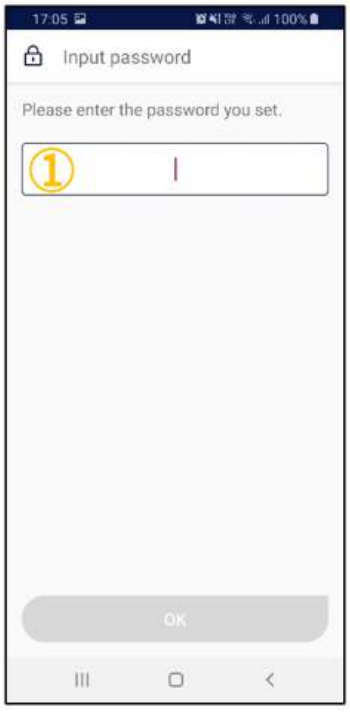


Figure 9.12 AT-patch PW input Screen1

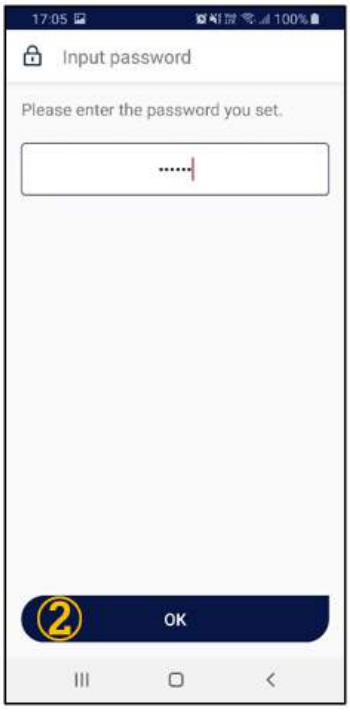


Figure 9.13 AT-patch PW input Screen2

Table 9.3

No	Item	Description
1	Input PW	This is the field to input the PW to use the App.
2	Button to ok	When the PW satisfies the condition, it is activated.

9.5 Main Screen

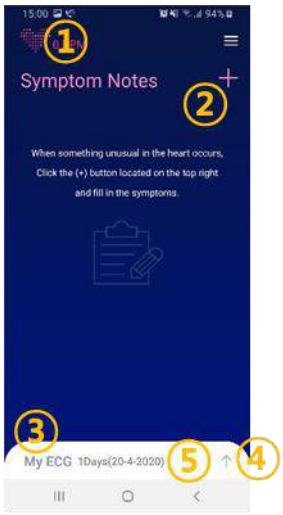


Figure 9.14 AT-note Main Screen

Table 9.4

No	Item	Description
1	Output area of heart rate data	Area where heart rate data is output (BPM)
2	Button to register symptom notes	Button to call up registration screen of symptom notes
3	Output area of days of use and current date of App (ATN-C130)	Area to display days of use and current date of App (ATN-C130)
4	Real-time output button of ECG and 3-axis data	Command button for real-time output of ECG and 3-axis data summed in graph
5	Output area of ECG and 3-axis data	Area for real-time output of ECG and 3-axis data summed in graph

9.6 LIVE Display Screen

Figure 9.15 Live ECG Screen

Figure 9.16 Live 3axis Zoom-in

Table 9.5

No	Item	Description
1	Button to stop real-time output of ECG and 3-axis data	Command button to stop outputting ECG and 3-axis data summed in graph in real time
2	Output area of ECG graph	Output area of real-time graph for ECG data
3	ECG graph	Real-time graph on ECG data
4	Zoom in button of the ECG graph	Zoom in button on the ECG graph being measured in real time
5	X-axis graph	Graph of X-axis measured value of 3-axis sensor currently being measured
6	Y-axis graph	Graph of Y-axis measured value of 3-axis sensor currently being measured
7	Z-axis graph	Graph of Z-axis measured value of 3-axis sensor currently being measured
8	Output area of 3-axis data	Output area of 3-axis data being measured in real time
9	Zoom in button of 3-axis data	Zoom in button for 3-axis data being measured in real time
10	Record button of real time data	Record command button of ECG and 3-axis data being measured in real time
11	Zoom out button on ECG graph	Zoom out button on the ECG graph being measured in real time
12	Output area of ECG graph	Output area of the graph on the enlarged screen of ECG data

13	ECG graph	Graph output from the enlarged screen of ECG data
14	Pause button on ECG graph	Pause button of ECG graph being measured in real time
15	Zoom out button on 3-axis data graph	Zoom out button of 3-axis data graph being measured in real time
16	X-axis graph	Graph of X-axis measured value of 3-axis sensor currently being measured
17	Y-axis graph	Graph of Y-axis measured value of 3-axis sensor currently being measured
18	Z-axis graph	Graph of Z-axis measured value of 3-axis sensor currently being measured
19	Output area of 3-axis data graph	Output area of graph in enlarged screen of 3-axis data
20	Pause button on 3-axis graph	Pause button of 3-axis graph being measured in real time

9.7 RECORD Screen

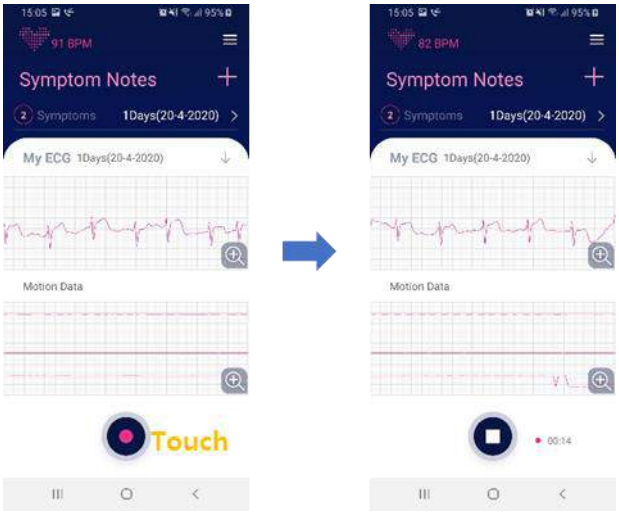


Figure 9.17 Recording Button Screen

If you touch the record button on the left screen of [Figure 9.17] above, it is converted to the stop button. Then recording starts with the recording time displayed to the right of the stop button.

9.8 Screens for Registering Symptom Notes

9.8.1 Registering Symptom Notes with the App (ATN-C130)

The order of the screens in [Figure 9.18] shows how to register symptom notes in order. If you touch the button in the lower right corner of the main screen (Leftmost first figure) to register symptom notes, switching to the initial screen for registering the notes takes place. The order of symptom note registration should be in the order of the date and time when the specific symptoms occurred, symptom type, activity status and other opinions. When registration of symptom notes is completed, a list of symptom notes registered on the main page appears.

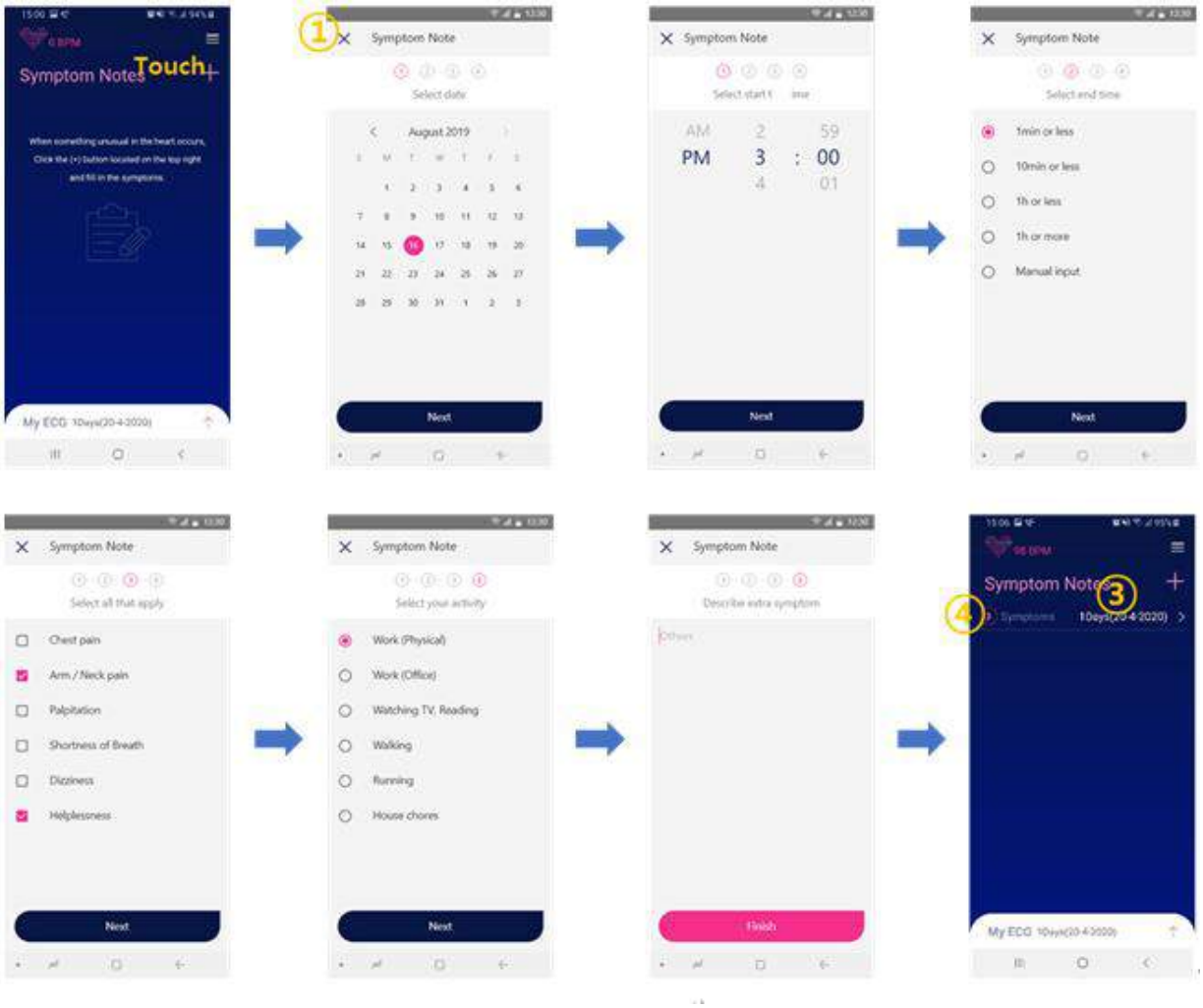


Figure 9.18 Symptom Note Procedure

Table 9.6

No	Item	Description
1	Button to end registration of symptom notes	Button to end registration of symptom notes
2	View details button for symptom notes	Detailed view button of registered symptom notes
3	Output of days used and current date of the App (ATN-C130)	Outputs the current date and days of use of the App (ATN-C130)
4	Number of symptom notes registered for days of use of the App (ATN-C130)	Number of symptom notes registered for days of use of the App (ATN-C130)

9.8.2 Registering Symptom Notes with the Device (ATP-C130)

[Figure 9.19] below is a screen for registering symptom notes through the device. If you press the power button on the device for about 0.2 seconds, the information is sent to the app by Bluetooth (BLE). Like the screen on the right, the app receives the event information from the device. Then a dialog box appears asking if you want to record the symptom immediately, as

shown by the red square area. If you touch the 'Later' button, the number of symptom notes registered on the main page will be increased but the screen will not switch. But if you touch 'Create Symptom', the screen will return to the initial screen of symptom note registration.

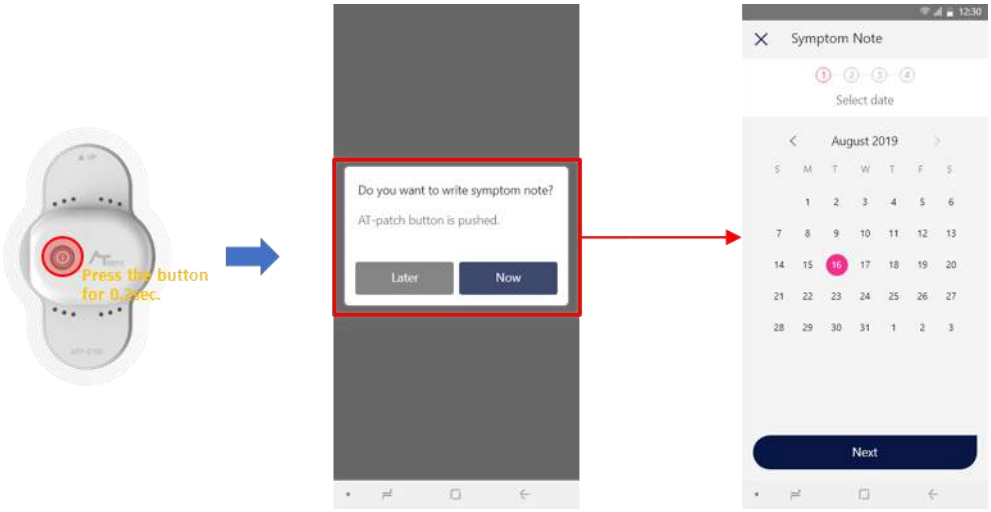


Figure 9.19 Symptom Note by AT-patch trigger buttion

9.9 Screens for Detailed View of Symptom Notes

9.9.1 View Details of Symptom Notes registered with the App (ATN-C130)

Touching the detail view button of the symptom notes registered in the main screen will switch to the registration list screen of symptom notes for the number of days of use as shown in [Figure 9.20]. The registration list of symptom notes for the number of days of use appears briefly, like a red square. Touch the red square to switch to the detailed view of one symptom note.

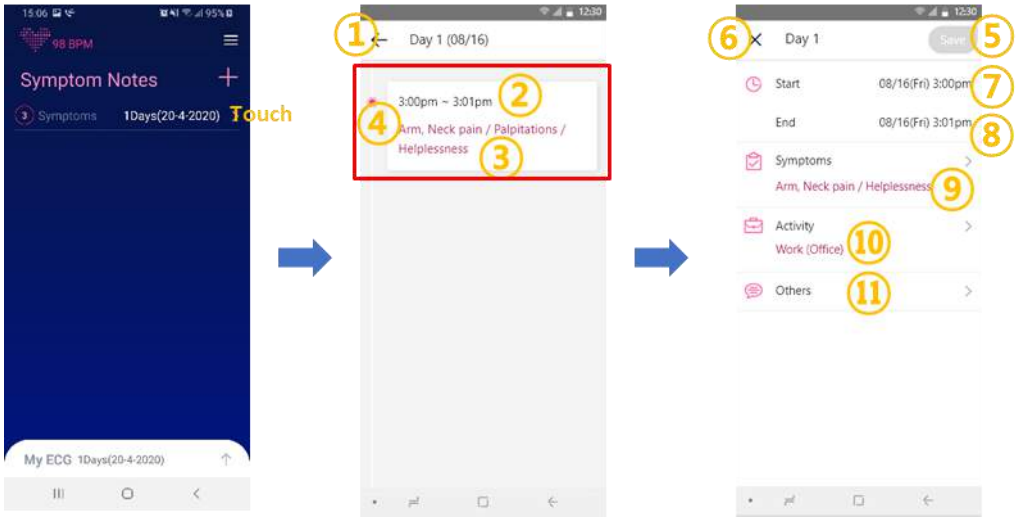


Figure 9.20 Registered Symptom Note

Table 9.7

No	Item	Description
1	Back button	Button to go back
2	Start and end times of symptom onset	Start and end times of symptom onset
3	Indication of symptom type	Indication of symptom type
4	Display of ECG recording data and whether registration of symptom notes has been completed	Display of ECG recording data and whether registration of symptom notes has been completed (Red when done, Black when not done, and Red when there is ECG recording data)
5	Save button for modifications in symptom notes	Command button to save modifications of symptom notes
6	Button to close the details view of symptom notes	Command button to close the details view of symptom notes
7	Start time of symptom onset	Start time of symptom onset
8	End time of symptom onset	End time of symptom onset
9	Indication of symptom type	Indication of symptom type
10	Indication of activity type	Indication of activity type
11	Button to add other descriptions	Button to add other descriptions

9.10 View Details of Symptom Notes registered with the Device (ATP-C130)

When the symptom note is registered with the device, the event time is displayed only as the start time of symptoms as shown in the red square of [Figure 9.21], and the other contents are not set. Since the registration of symptom notes is not completed, the indication of whether symptom notes registration is completed is shown in black. If you touch the red square area and register with the device on the detailed view screen for one symptom note, you can see that other parts except symptom's start time are not set.

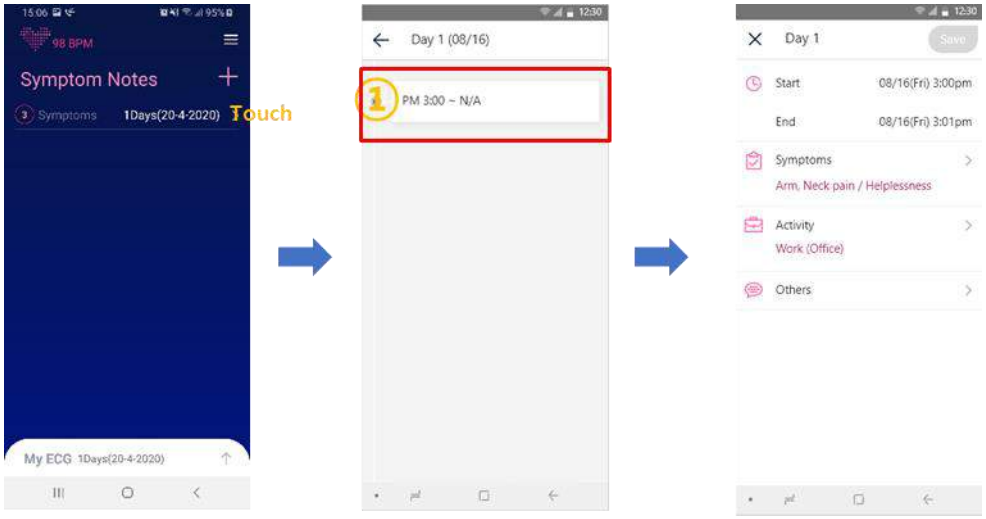


Figure 9.21 Registered Symptom Note from AT-patch

9.11 Screen to Correct Symptom Notes

The upper left screen of [Figure 9.21] below is the detailed view screen of one symptom note and shows the edit button or correct button area for each item. When touching each edit button or edit button area, the values of the selected items are displayed on the screen. Since the items whose symptom notes are registered with the device do not have values of each item except the start time of symptom occurrence, input must be made by touching the edit button or the edit button area.

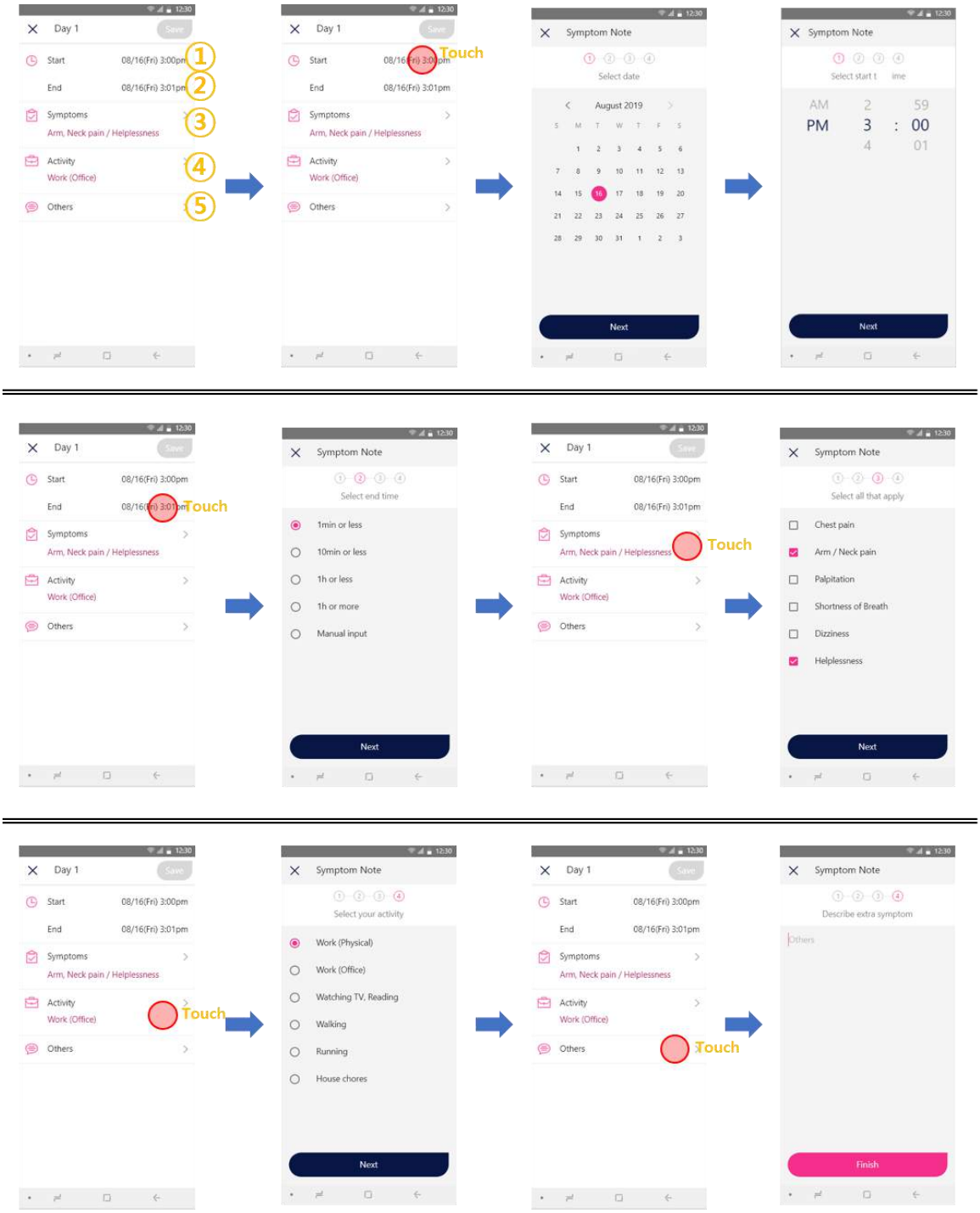


Figure 9.22 Modifing Registered Symptom Note

Table 9.8

No	Item	Description
1	Area of the Edit button of the start time of symptom occurrence	Command area of the button that edits the start time of symptom onset
2	Area of the Edit button of the end time of symptom occurrence	Command area of the button that edits the end time of symptom onset
3	Button to edit symptom type	Button to modify the symptom type
4	Button to edit activity type	Button to modify the activity type
5	Button to add other descriptions	Button to add other descriptions

9.12 Screen to Search Recorded Data

Recorded data can be checked on the list screen of symptom note registration for the number of days used, as in the red square area. ECG Record Data contains only ECG data and does not have symptom notes. Touch the red square area to switch to the screen for searching ECG recording data.

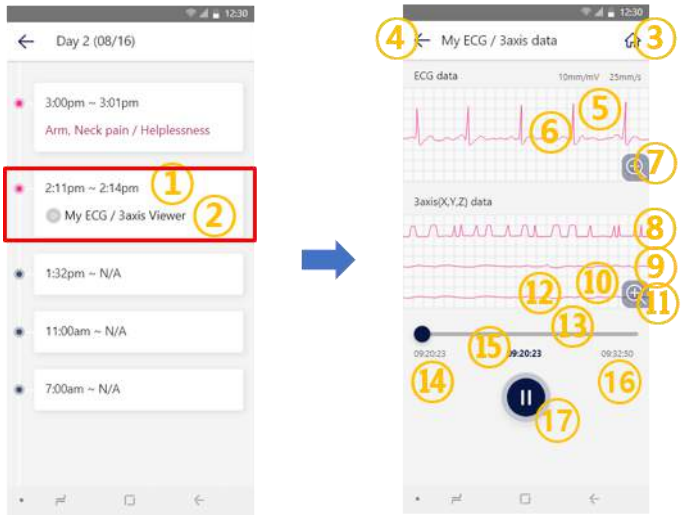


Figure 9.23 Recorded ECG/3axis Data Viewer

Table 9.9

No	Item	Description
1	Start and end times of ECG recording	Start and end times of ECG recording
2	Button to move to the screen to search ECG recording data	Command button to go to inquiry screen of ECG recording data
3	Go button on the main screen	Command button for going to the main screen of symptom notes
4	Back button	Button to go back
5	Output area of ECG graph	Output area of the graph for ECG Data
6	ECG graph	Graph of ECG Data

7	Zoom in button of ECG graph	Zoom in button of ECG graph
8	X-axis graph	Graph of X-axis measurement of recorded 3-axis sensor
9	Y-axis graph	Graph of Y-axis measurement of recorded 3-axis sensor
10	Output area of 3-axis data	Output area of 3-axis data being measured in real time
11	Zoom in button of 3-axis data	Zoom in button for 3-axis data being measured in real time
12	Z-axis graph	Graph of Z-axis measurement of recorded 3-axis sensor
13	Play position bar	Bar that shows the progress of the file being played
14	Start time of saving data	Displays the start time of data storage of the currently playing file
15	Play progress time	Displays the location time of the file currently playing
16	End time of saving data	Displays the end time of data storage of the currently playing file
17	PLAY / PAUSE	Start and pause command buttons for the file being played

10. How to Use S/W (ATR-C130 AT-Report PC S/W)

10.1 Overview of AT-Report S/W

1) AT-Report S/W (ATR-C130) is obtained from ATP-C130 device. The S/W is a program that can read ECG data file of device user saved by ATN-C130 (Android / IOS) App on PC of Microsoft© Windows based OS, show ECG rhythm waveform and analyze ECG Data.

2) AT-Report S/W performs the following functions:

① Opening ECG data file of own format saved by ATN-C130 App and reading data.

② Showing the read ECG Data in visual graph.

③ Analyzing each ECG data through its own analysis algorithm.

④ Searching the specific time and seeing the ECG data in the graph.

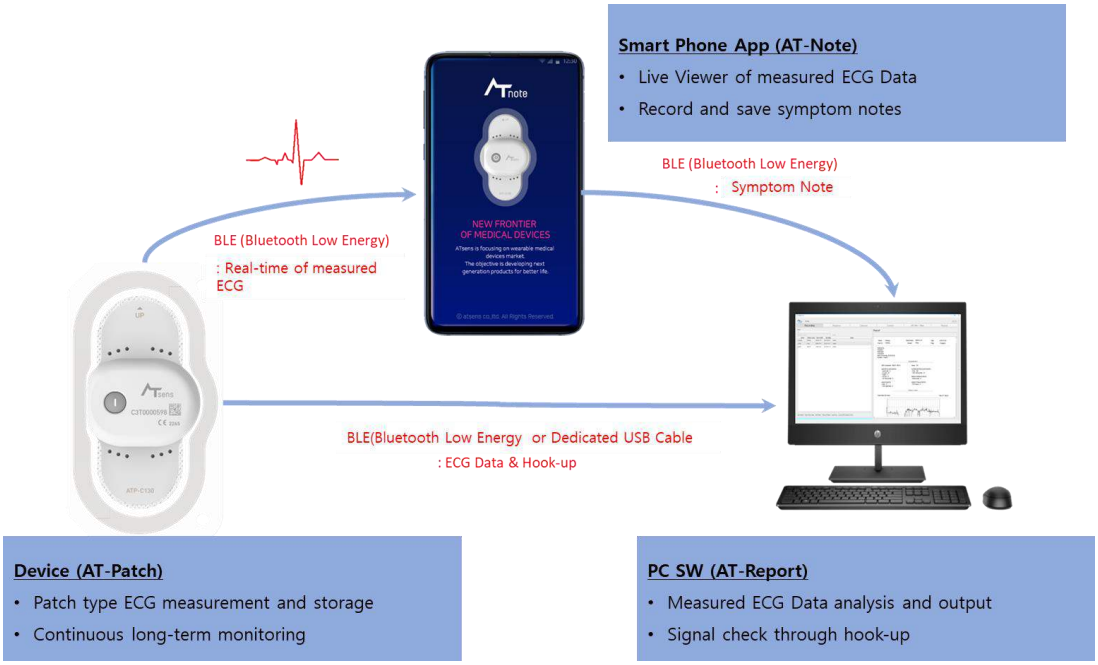


Figure 10.1 ECG Data Flowchart

3) AT-Report S/W does not change or remove the state of ECG Data file and does not change any attributes of the file.

4) AT-Report S/W stores abnormality determination result information or other data for the analyzed QRS signal type as a separate file. The imported ECG data value is not changed, and the QRS signal analyzed according to the algorithm is saved after the location or type is changed or newly added according to the user's command.

10.2 Installation of AT Report PC S/W (ATR-C130)

1) After connecting the provided USB memory stick to the PC, execute the ATR-C130 (AT-Report S/W) installation file saved as shown in [Figure 10.2]. (However, the file name can be changed.)

Figure 10.2 Icon and File Name of the ATR-C130 (AT-Report S/W) Installation File

2) When the installation file is executed, as shown in [Figure 10.3], a language selection dialog box is displayed. Select the language to be installed and click OK.

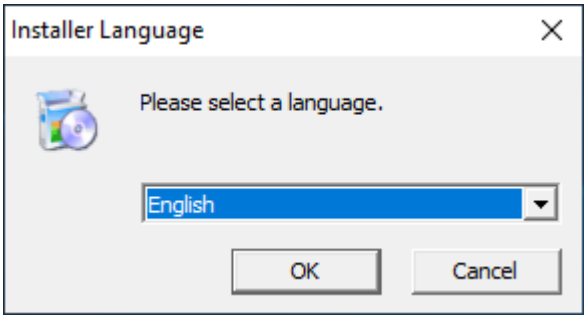


Figure 10.3 Language Selection Screen for Installation

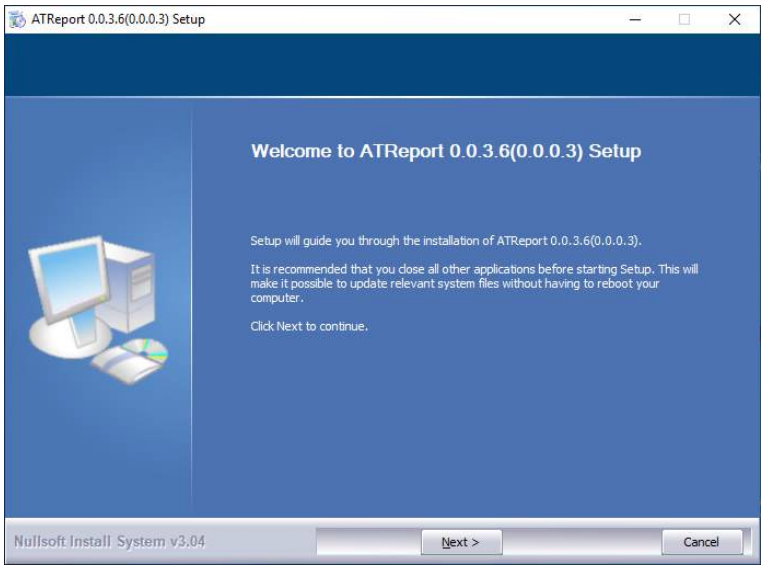


Figure 10.4 Initial Installation Screen of ATR-C130 (AT-Report S/W)

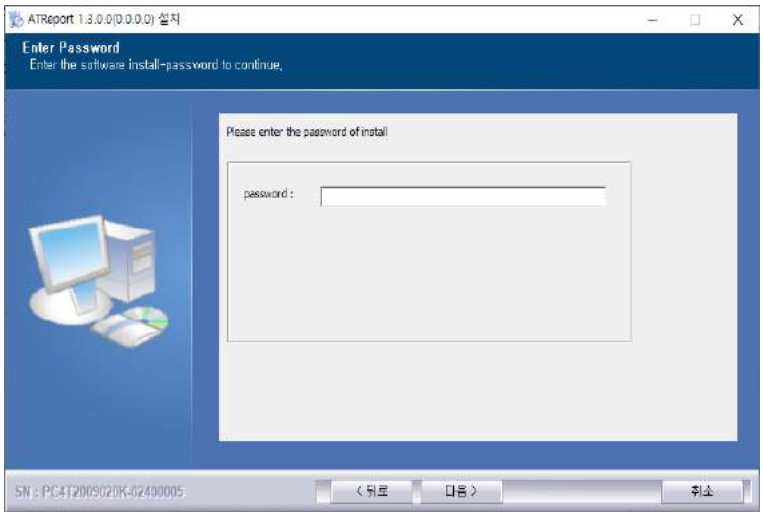


Figure 10.5 ATR-C130 (AT-Report S/W) installation password input screen

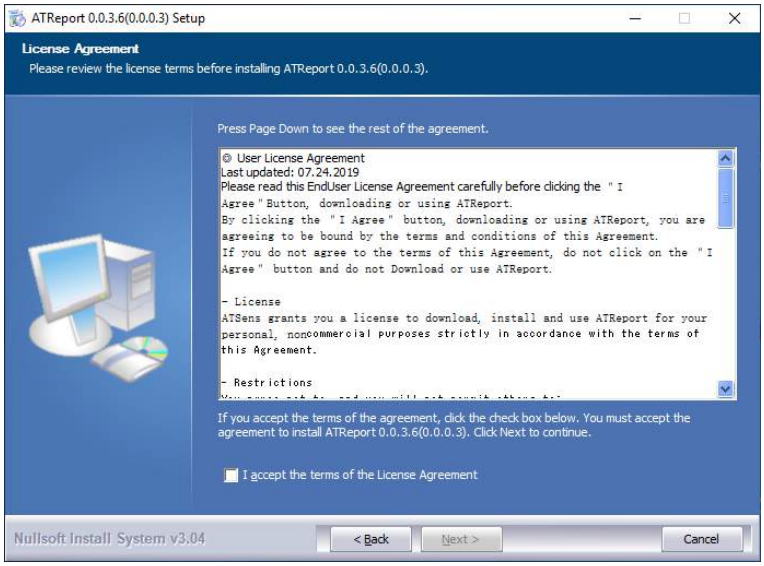


Figure 10.6 License Agreement Screen for ATR-C130 (AT-Report S/W)

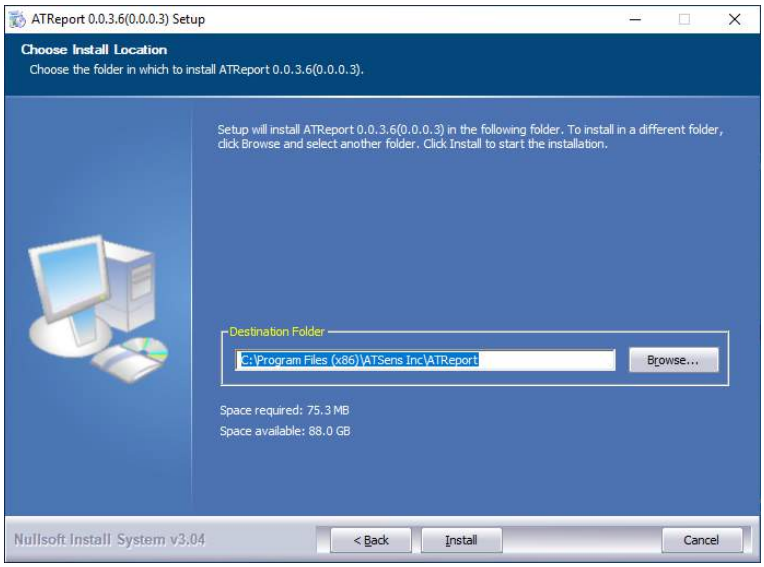


Figure 10.7 Screen for Selecting Installation Location of ATR-C130 (AT-Report S/W)

3) It converts to the installation location selection screen, and the default value can be changed by selecting "C:\Program Files\ATsens\ATReport" or the installation location.

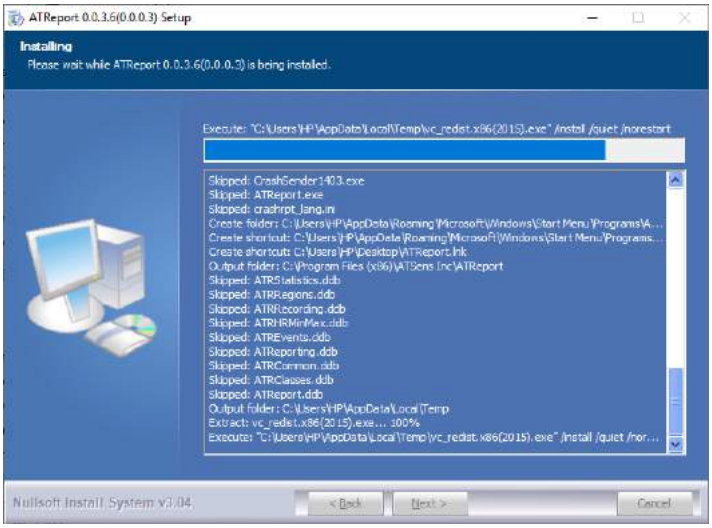


Figure 10.8 Installation Screen when installing ATR-C130 (AT-Report S/W) (Copying files)

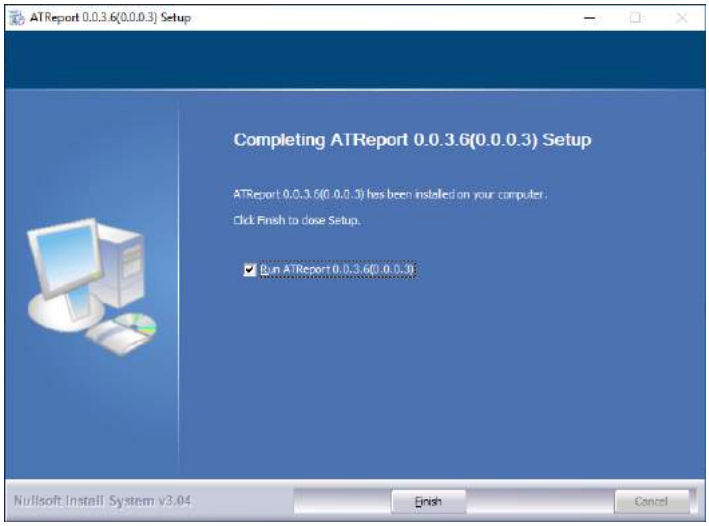


Figure 10.9 ATR-C130 (AT-Report S/W) Installation Completed

4) When the program installation is complete, ATsens folder is created in the start menu, and ATReport, ATReport Uninstall, and ATsens Homepage Icon are created in ATsens folder. "ATReport" Icon is created on the desktop.

10.3 Uninstalling AT-Report S/W ATR-C130

1) If you want to uninstall ATR-C130 (AT-Report S/W) from the PC where the program is installed, select the AT-Report Uninstall icon, a sub-item of "ATSens Inc" in the Start menu.

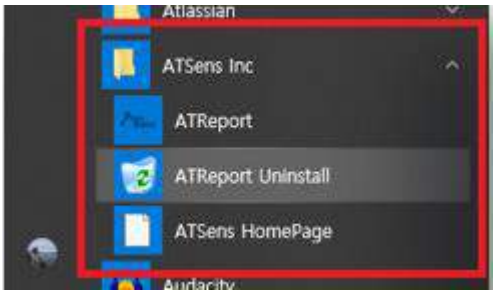


Figure 10.10 Uninstall icon under “ATSens” in Start menu

2) When confirming the program deletion, the language selection (Korean or English) and the removal guide window are displayed. If you select'Yes (Y)' and'OK' in the information window, ATR-C130 S/W is deleted.

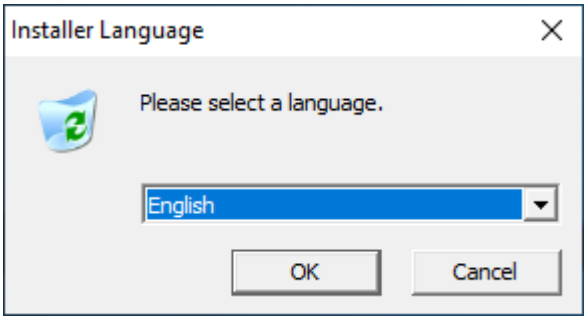
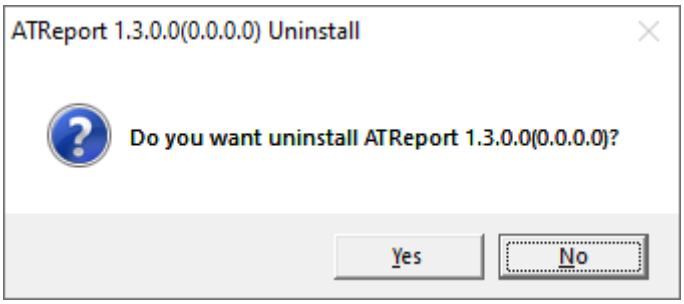


Figure 10.11 Language selection screen for installation files (when uninstalling)

※ Caution when uninstalling S/W

1) Even if the S/W is deleted, the DB File, Setting Value, and ECG Data Files registered in AT-Report are not deleted. However, if you select'Yes (Y)' in the information window asking if you want to remove all data after deleting the software, you can delete all remaining data at the same time. Deleted ECG data cannot be recovered again, so care must be taken when deleting.

2) The user can manually delete all DB data and set values. The path (C: \Users\[Windows user ID] \AppData\Local\ATsens) differs depending on the operating system installed on the PC.



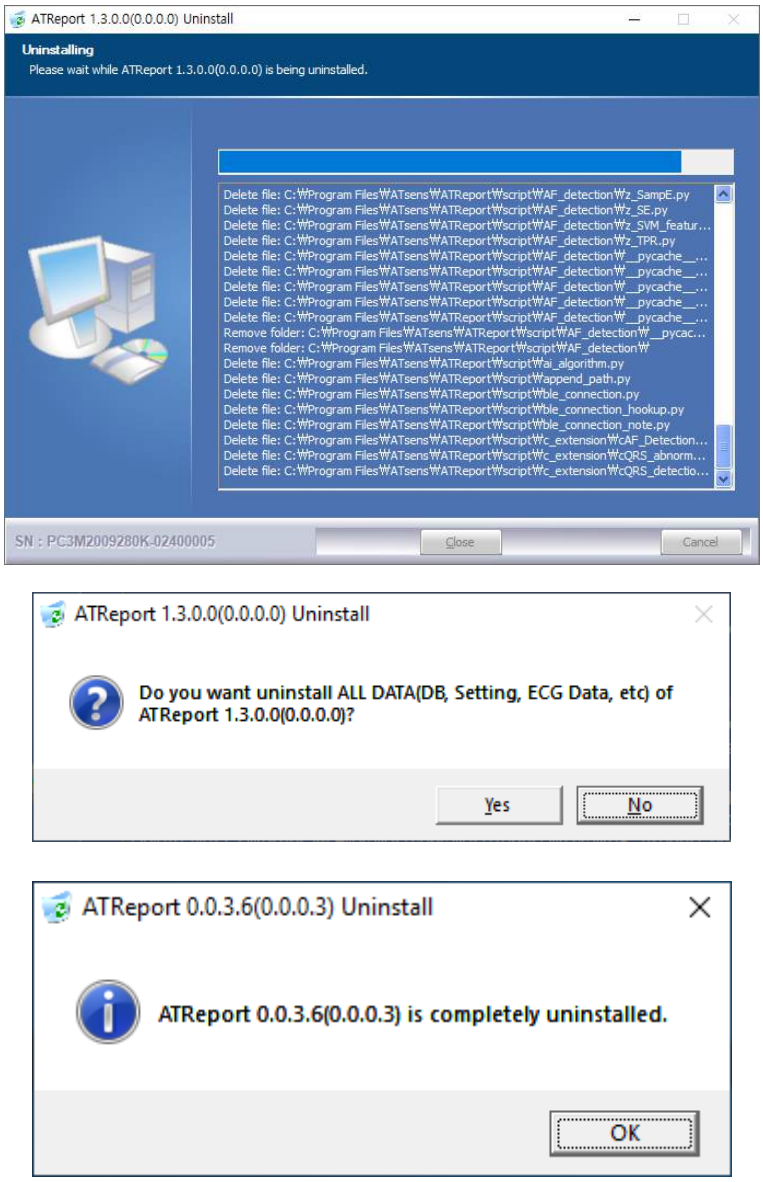


Figure 10.12 Confirmation message of ATR-C130 (AT-Report S/W) program removal

10.4 How to obtain S/W License

1) How to set a password for first access

①Upon initial login, a warning window as shown in [Fig. 10.13] appears, and the initial password must be reset.

Figure 10.13 ATR-C130(AT-Report S/W) initial password reset warning screen

② [Fig 10.14] Enter the initial password “0000” and the password to reset. Password must be at least 8 characters in combination of lowercase letters, uppercase letters, number and special characters.

Figure 10.14 ATR-C130 (AT-Report S/W) initial password reset screen

2) Log in by entering ID/PW

When AT-Report (ATR-C130) is executed, ID/Password input window and Authentication warning information window appear at the same time. Authentication warning If you press the OK button in the information window, ID and PW are automatically entered, and if you click the pink Login button after entering ID/Password, Login is executed. If you select the check box of Save ID/Password, the input ID and PW are saved. When the next S/W is executed, the saved ID/PW is automatically entered and the ID/Password input window does not appear.

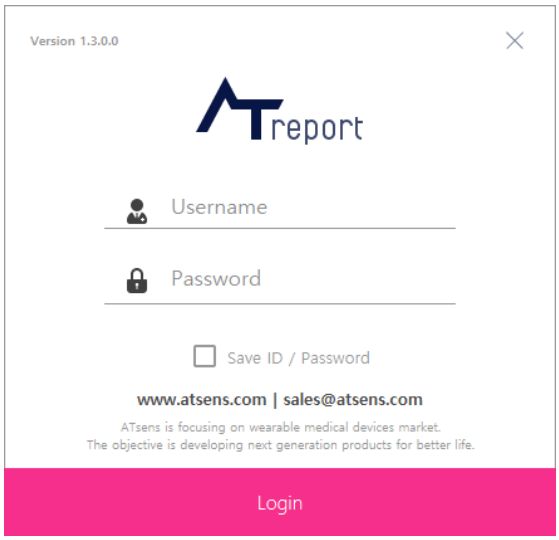


Figure 10.15 ATR-C130 (AT-Report S/W) login screen

3) When the initial program is executed, it is executed in the demo version, and in the demo version, only the recording and region tabs are displayed. [Fig 10.16] click the setup icon on the uuper right of the initial screen to display the setup dialog box.

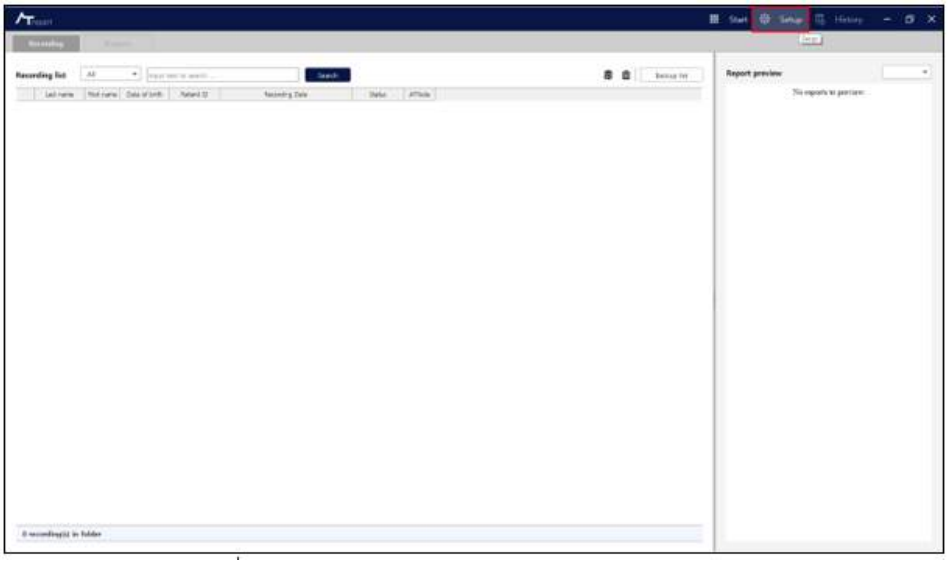


Figure 10.16ATR-C130 (AT-Report S/W) login screen

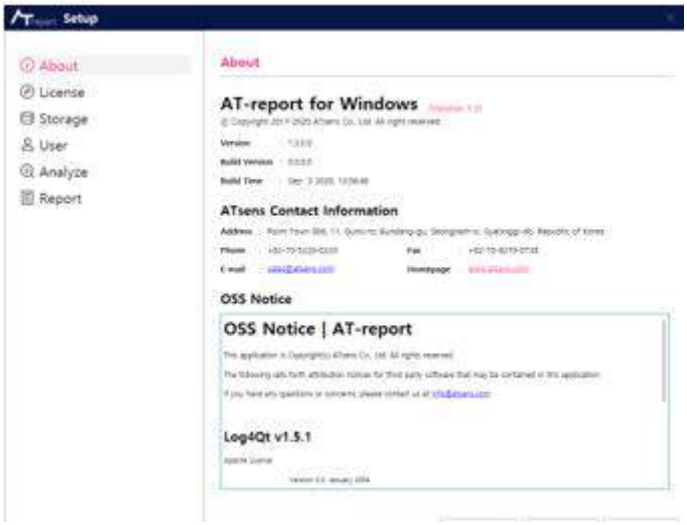


Figure 10.17 Setup dialog box

4) Copy the ID from the license item and inform the software manufacturer ATSense Co. [Figure 10.18]. As shown in ①, if you click theClipboard icon nex to the ID, the ID value is copied to the Clipboard.

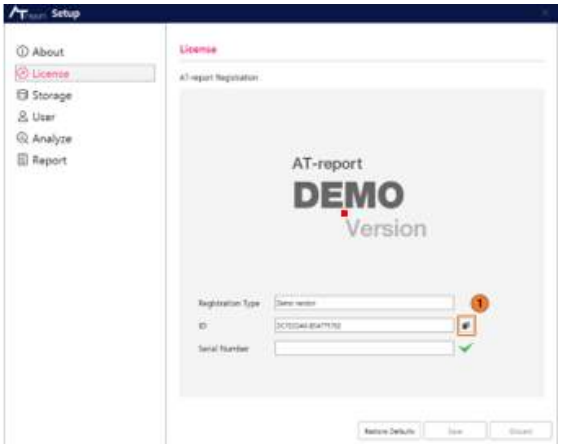


Figure 10.18 The clipboard icon to copy the registration screen and ID

5) When you receive the serial number corresponding to the ID as shown in [Figure 10.19], enter the serial number in the serial number input window at the bottom of the ID and click the confirmation icon. If the correct serial number is entered, different icons and messages are displayed according to the type of serial number.

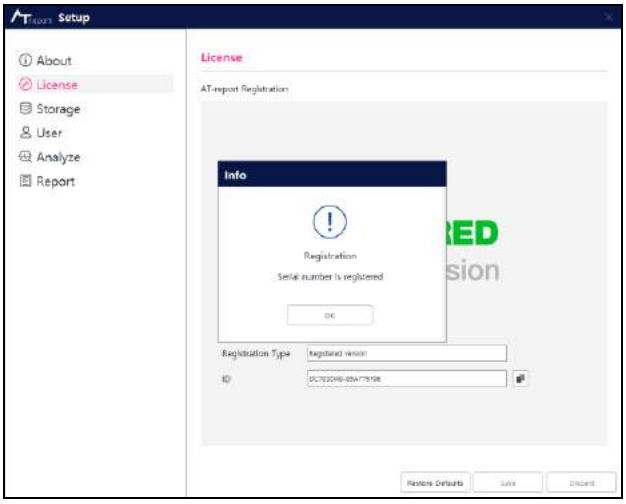


Figure 10.19 Registration version serial number input result screen

6) In the case of Registered Version, as shown in [Figure 10.20], all tabs are displayed.

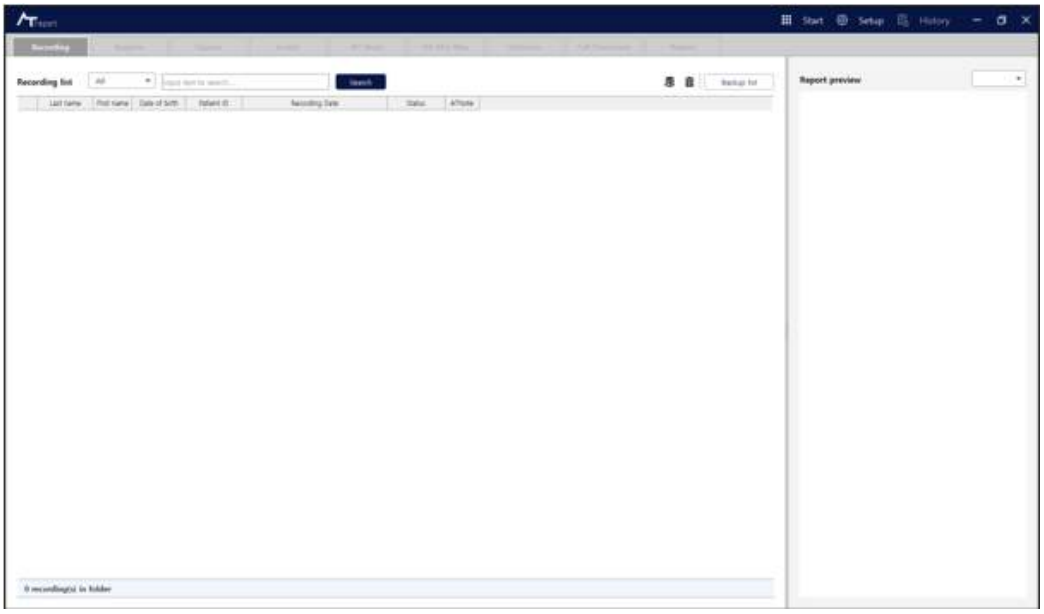


Figure 10.20 In case of Registered version, initial screen of ATR-C130 (AT-Report S/W)

7) License types are Demo/ Evaluation / Registered/ Illegal/ Clear version

Demo	Only limited use is possible.
Evaluation	Can only be used for a fixed period of time. The remaining usage period can be found by looking at the Registration section of the Information window. When the period expires, only limited use is possible, such as the demo version.
Registered	As a registered user, all functions can be used without restriction.
illegal	Illegal activity detected and registered as illegal version. Normal program operation is not possible.

8) License must be issued a serial number for each PC where ATR-C130 (AT-Report S/W) is installed, and if the license is previously installed on another PC, the serial number must be reissued.

10.5 AT-Report (ATR-C130) PC S/W Title Bar

10.5.1 Title Bar Menu

Figure 10.21 Title Bar Menu

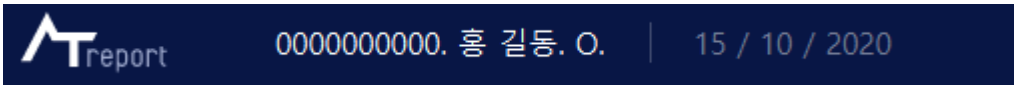


Figure 10.22 Display status of Title Bar with patient data loaded

10.5.2 Start {Fig10.21 Title Bar Menu ①}

10.5.2.1 New Patient data

1) This is a screen for registering patient and modifying information, and moves to the screen by pressing the [Start] button.

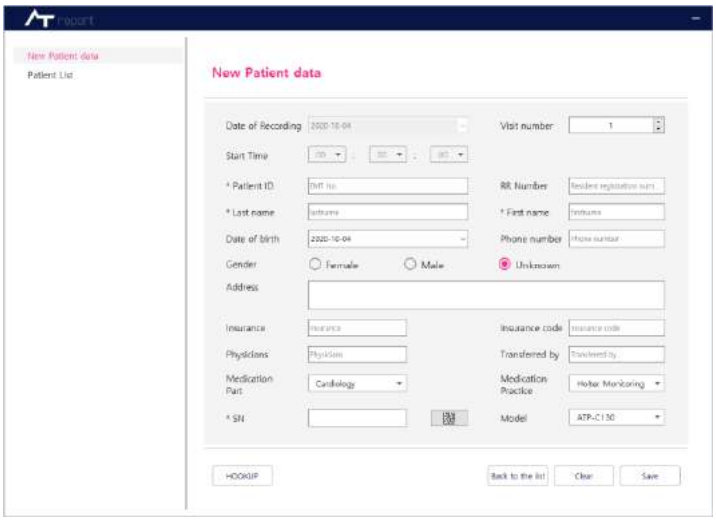


Figure 10.23 Start Screen

2) On the New Patient data screen, multiple patients can be registered and ECG data of multiple patients can be imported at the same time.

3) Among the input items, 'Product SN' is an AT-patch's unique device number and is a mandatory input item. If the SN is unknown or an error is entered, the patient's SN information window is automatically displayed. Record patient information and register by pressing the SAVE button.

4) Error message according to user actions when writing Patient Data

Error message	Detail
Input Patient ID (Chart no) Please input patient-ID	If Patient ID is not entered. Patient ID is required and must be entered.
Input Patient name Please input name of patient	When patient name is not entered. Patient name corresponds to required information and must be entered.
Patient ID (Chart no) is already exits. Please	When the same Patient ID and Patient name exist

check and input new Patient ID (Chart no)	
Please input correct PSN (PSN can only be input alphabet and numeric.	When SN (Serial Number) is not 10 digits when clicking Hookup. (SN is 10 letters and numbers.)
Drag error. The file with these file extensions cannot be processed	When importing by dragging a file that does not match the extension

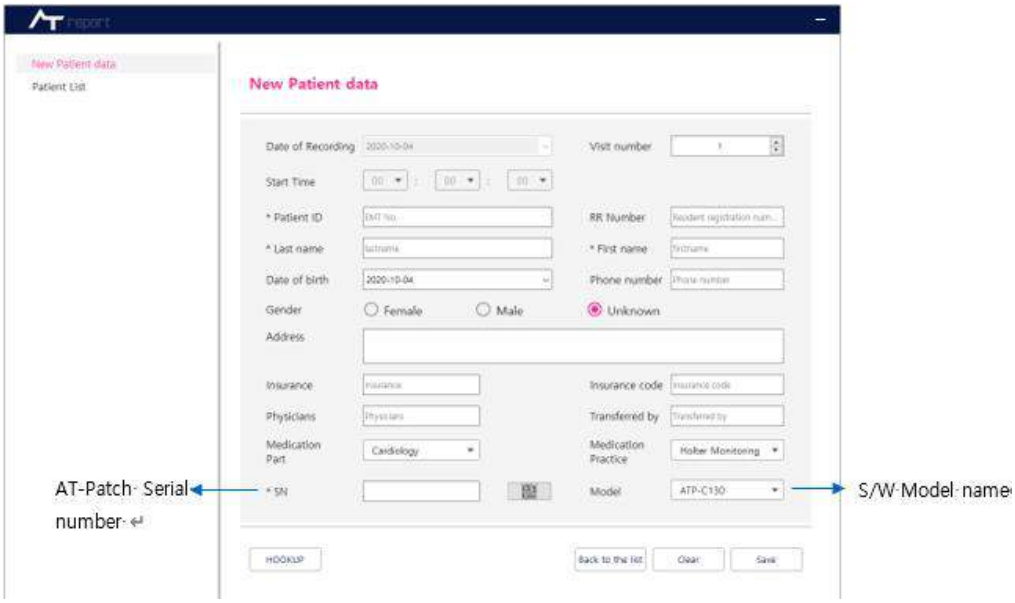


Figure 10.24 New patient data screen and input items

10.5.2.2 Patient List

1) In the Patient List, you can check the registered Patient list on the New Patient data screen. If the newly registered patient AT-Patch ECG data and note data recorded in the App are not imported, both AT-Patch and AT-Note data are in 'Empty'.

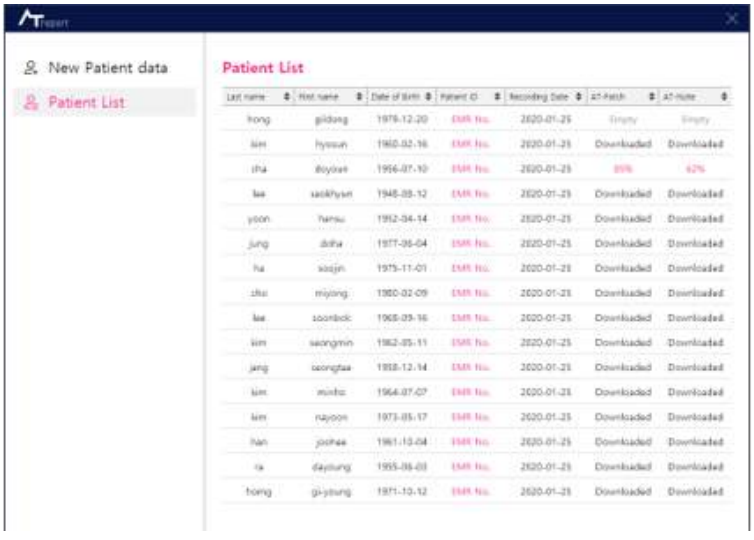


Figure 10.25 Patient List Screen

2) To import patient data, double-click the desired patient to convert to the Import screen.

10.5.2.3 Patient Data

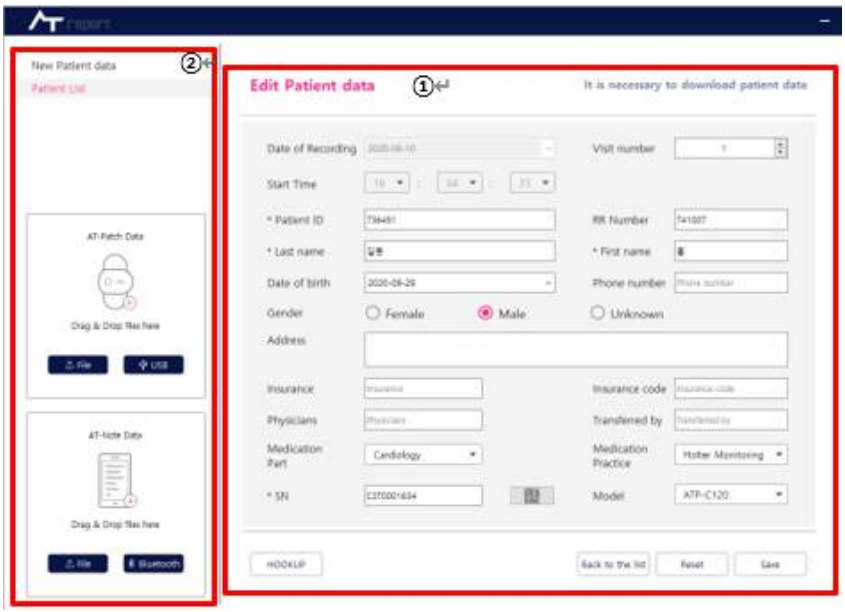


Figure 10.26 Patient Data Import Screen

1) You can change existing registered patient information in the Patient Data Box of the Patient List.
[Fig 10.26 - -①]

2) AT-Patch Data and AT-Note Data can be imported (imported) from the Patient List.
[Fig 10.26 - -②]

3) There are two ways to import AT-Patch: After turning on the power of AT-Patch, connecting it to a computer through a dedicated cable to load the data stored in the AT-patch and the data stored in the PC. Use the [File] button to load the ECG data stored in the PC, and the [USB] button to load the data stored in the AT-patch.

4) AT-Note Import is a function to import ECG data stored in Smartphone using USB Cable or Bluetooth in App

5) If the import takes a long time depending on the amount of data, it is also progressed in the background, so you can close the import screen without waiting or move to another screen by pressing the'Patient List' or'New Patient data' button.

6) Even if the start screen is closed, the data being imported operates as a background and the import operation continues. When the import of both AT-Patch and AT-Note data is completed, a balloon-type dialog box in [Start] of the Title Bar as shown in [Figure 10.27 AT-patch import process] indicates the completion of the import. When both ECG and Note data are imported, they disappear from the patient list and can be checked in the Recording Tab

Figure 10.27 AT-Patch Import Process

7) Error message according to user actions in ECG Data USB download and import

Error Message	Detail
USB download error Failed open a FT4222 device. please check USB cable connection.	When the dedicated cable connection is unstable during USB download
USB download error Not found a FT4222 device. please check whether USB cable is connected.	When the dedicated cable is not connected during USB download
USB download error Communication error has occurred. please retry again.	When communication fails for an unknown reason during USB download (reconnect AT-Patch, turn on the power, and try again.)
USB download error PSN is empty or invalid format. please enter PSN again.	When clicking USB download, when the SN (Serial Number) is empty or an invalid SN is entered.
USB download error This model does not support USB download.	When clicking on USB download When the device does not support USB download
USB download error File open error.	When the disk to be downloaded is insufficient for USB download
USB download error AT-Patch is powered off please turn on AT-Patch.	When AT-Patch is powered off during USB download
USB download error AT-Patch is not matched please check SN(serial number) of AT-Patch.	When the SN (Serial Number) entered during USB download and the SN of AT-Patch are different
USB download error AT-Patch USB download is failed	When it is not possible to get all the stored data of AT-Patch when downloading via USB

please reconnect the patch and retry again.	
USB download error The connection is disconnected during the download. please reconnect the patch and retry again.	When the AT-Patch and the dedicated cable are disconnected during USB download
ECG Import error	When ECG Data Import cannot be performed for an unknown reason (reconnect AT-Patch, turn on the power and try again.)

10.5.2.4 Hookup function

1) The Hook-up function of the Patient data screen is a screen to check whether the ECG signal is normally recorded from the device attached to the patient's body, and the PSN of the attached device must be registered in Patient data.

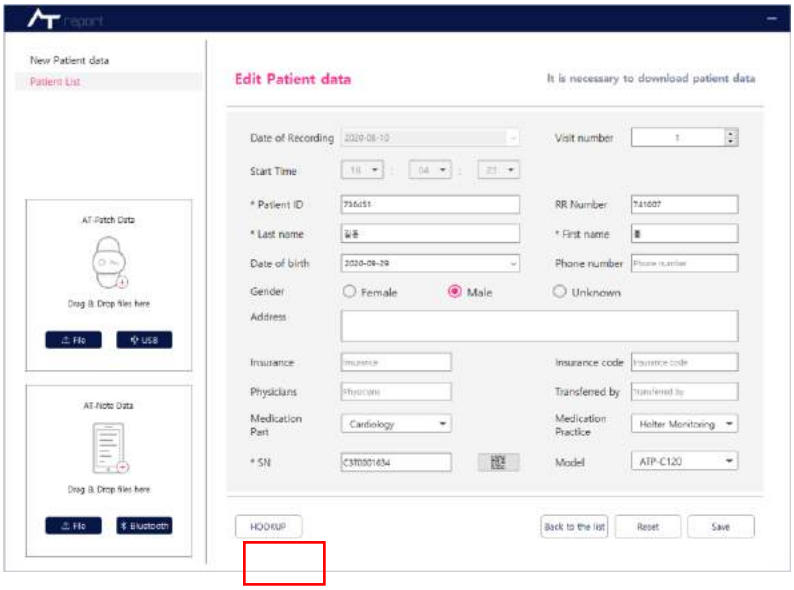


Figure 10.28 Hookup location

2) On the Hook-up screen, the current ECG signal can be viewed in real time by connecting AT-Patch corresponding to the input SN with BLE. At this time, if AT-Patch is already connected to App via BLE, PC and BLE are not connected. Depending on the strength or weakness of the signal, you can take measures such as removing the attached device and attaching a new device in the correct position.

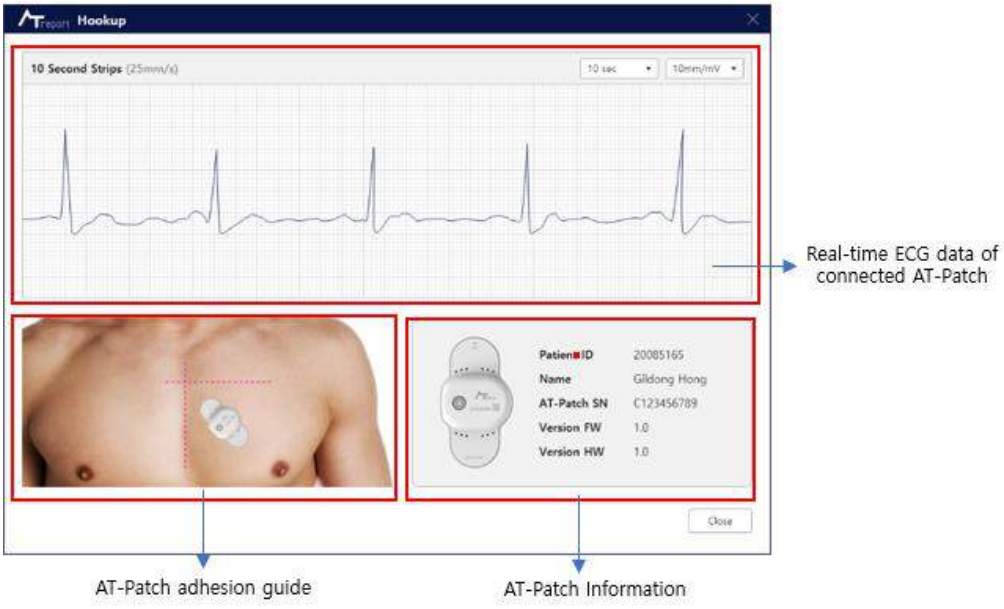


Figure 10.29 Hookup location

2) Error message according to user action in hook-up

Error message	Detail
Hookup connection error not found serial port. please check BLE dongle connection.	Error message according to user action in hook-up
Hookup connection error can not open serial port. please eject BLE dongle and re-insert	When a problem occurs in setting the BLE dongle during hookup, you must remove the BLE dongle and insert it again.
Hookup connection error connecting AT-Patch is fail. please retry after a few seconds.	When an unknown problem occurs in the BLE connection during hookup, you must try again after a certain period of time.
Hookup connection error not found AT-Patch to PSN. please check the PSN of AT-Patch again.	When the SN of AT-Patch and the SN information entered do not match during hookup
Hookup connection error disconnected from AT-Patch. please turn on AT-Patch again.	When the ECG signal is being received during hookup, but the reception of the ECG signal is cut off due to AT-Patch Power-off or other reasons.

10.5.3 Setup [Fig 10.21 Title Bar Menu ②]

10.5.3.1 Setup screen description

Item	Main function	Detail
About	Check information	SW, version, manufacturer, contact etc.
License	License setting	License check, ID copy etc.
Storage	Save setting	Storage location, type, capacity, etc.

User	User setting	User addition, removal, password change, etc.
Analyze	Analysis setting	Analysis, parameter setting etc.
Report	Report setting	Selection etc. including report
More	Etc. setting	Other options such as save/password

10.5.3.2 About screen

This is the screen for checking S/W information and setting the program of AT-Report (ATR-C130). Press the [Setup] button to move to the screen. On the About screen, you can check the S/W Version, company information, and copyright.

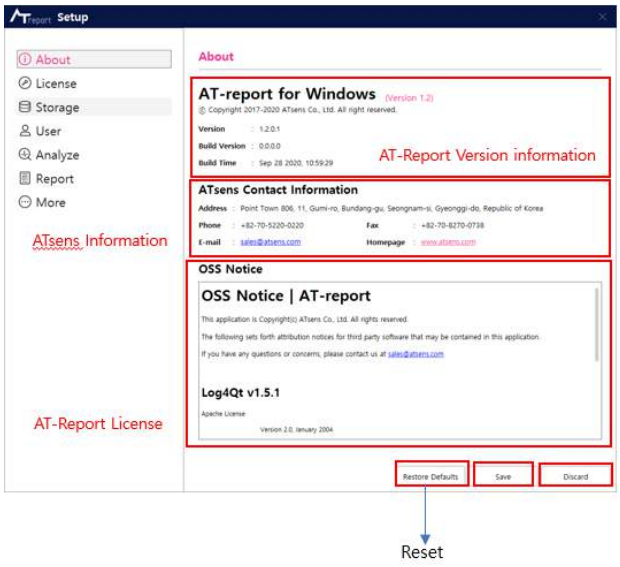


Figure 10.30 About screen

10.5.3.3 License screen

On the License screen, you can check the License Type and the ID of the S/W. According to the license type, there is a field for describing the Serial Number delivered by ATSense. For how to obtain license and registration, refer to [10.4 How to obtain SW license]

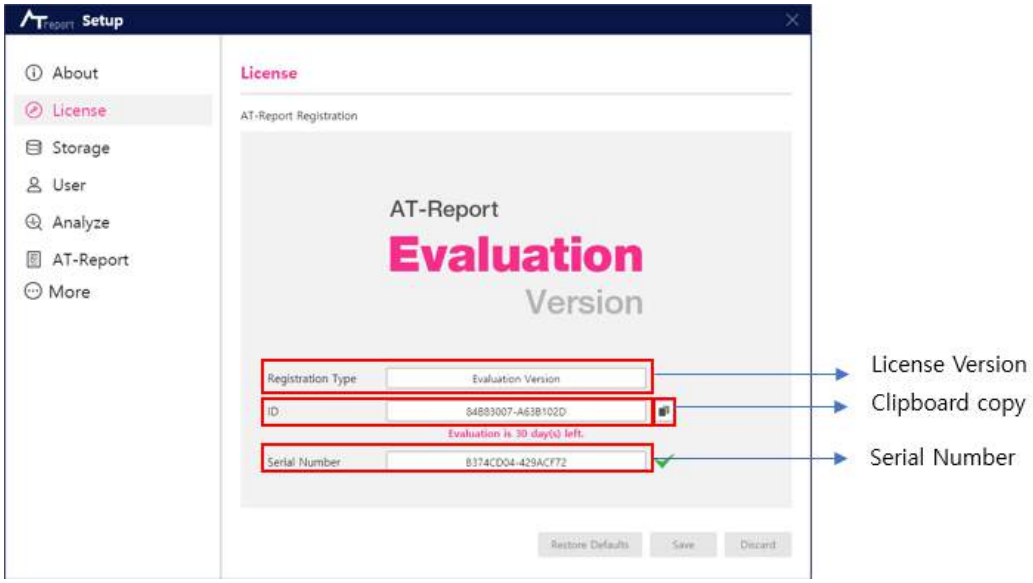


Figure 10.31 License screen

10.5.3.4 Storage screen

1) On the Storage screen, you can check and change the data storage location and check the folder storage capacity.

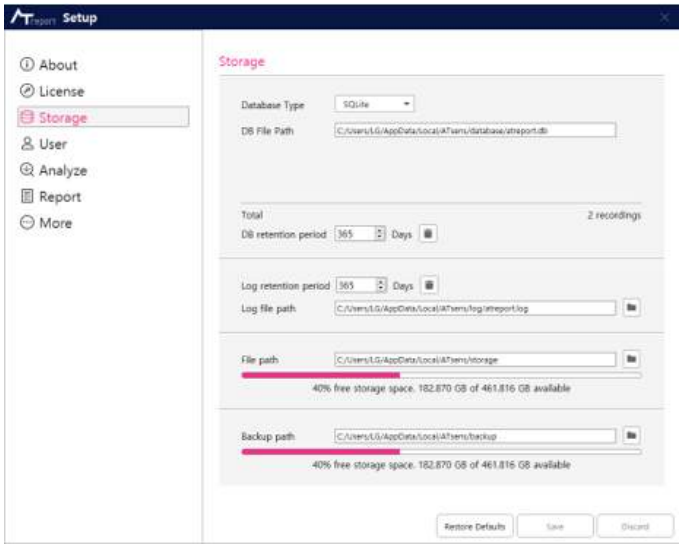


Figure 10.32 Storage screen

2) In the Database category, the Database Type can be selected from SQLite / PostgresSQL / ODBC, and the DB File Path shows the path where the Database file is saved.

3) In the DB retention period item, you can set the retention period of the logs stored in the DB, and you can delete the logs before the retention period.

4) Log retention period item allows you to set the retention period of log files, deletes log files before the retention period, and shows the path where the log files are saved.

5) The File Path item indicates the location where the analysis files of the imported ECG data are stored, and the size of the available space of the drive where the folder is located.

6) Back-up Path item indicates the location where back-up files are saved using the Back-up function, and shows the amount of available space on the drive where the folder is located.

10.5.3.5 User screen

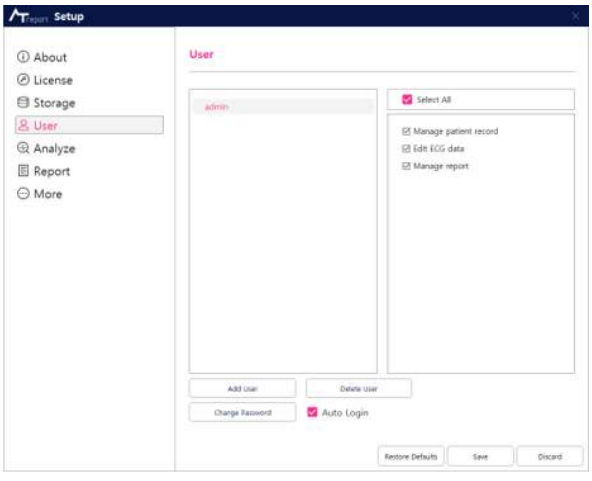


Figure 10.33 User screen

1) Add User – This is a menu to add a user to AT-Report. As shown in [Fig 10.34], you can add users by setting User Name/Password/Repeat Password.

Figure 10.34 Add New User screen

Only Admin account can add new user account. When re-login AT-Report SW as an added user, the user's screen displayed in Setup-User does not display the Admin account as shown in [Fig 10.35], but only the added user account. Only the Admin account can be used. 'Add User' and 'Delete User' buttons do not appear

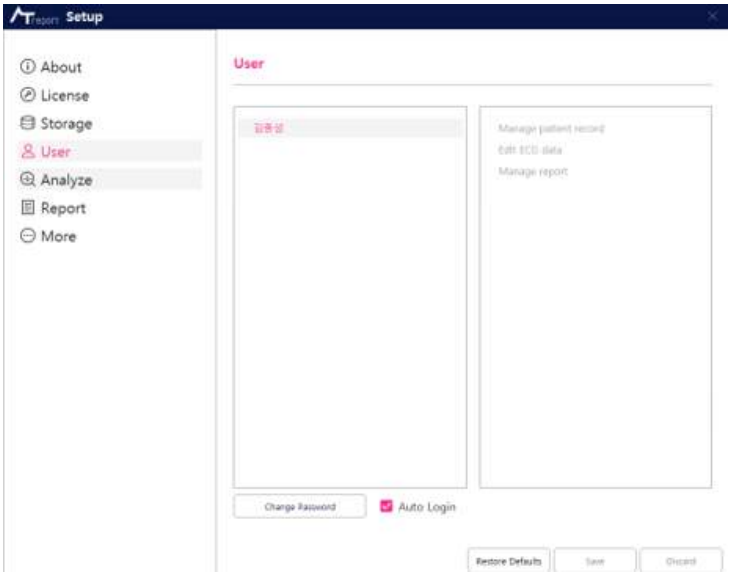


Figure 10.35 AT-Report SW User screen when logging in with the added user account

2) Delete User-Deletes the user account selected in the User screen. Only the Admin account can delete the selected user account.

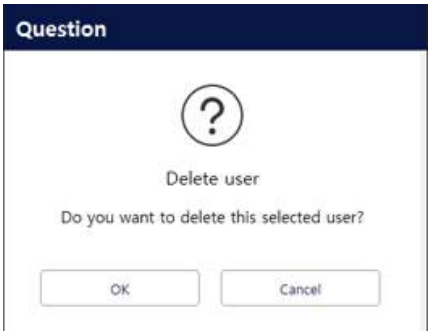


Figure 10.36 Delete user screen

3) Change Password-This is the function to change the password for the user selected in the User screen. Since the changed password is encrypted and stored, it cannot be restored, so be careful when entering the password. Only the Admin account can change the password of other accounts, and only the password of the own account can be changed for accounts other than Admin.

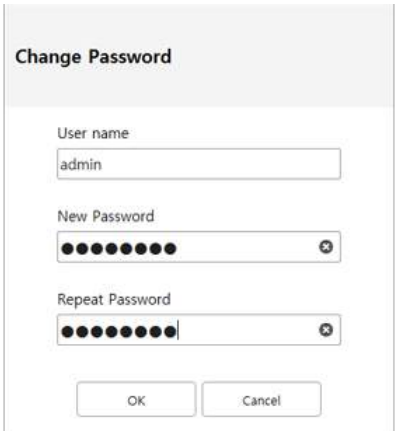


Figure 10.37 Change password screen

4) User Authority Option

- Management patient record

If you select the 'Manage patient record' option privilege when creating a user account, the created account can have the privilege to create/modify patient records.

- Edit ECG Data

If you select the "Edit ECG Data" option permission when creating a user account, the created account can have permission to edit/delete imported ECG data.

- Manage report

If you select the "Manage report" option permission when creating a user account, the created account can have permission to the Report Tab.

- Only Admin account can modify all privileges

10.5.3.6 Analyze screen

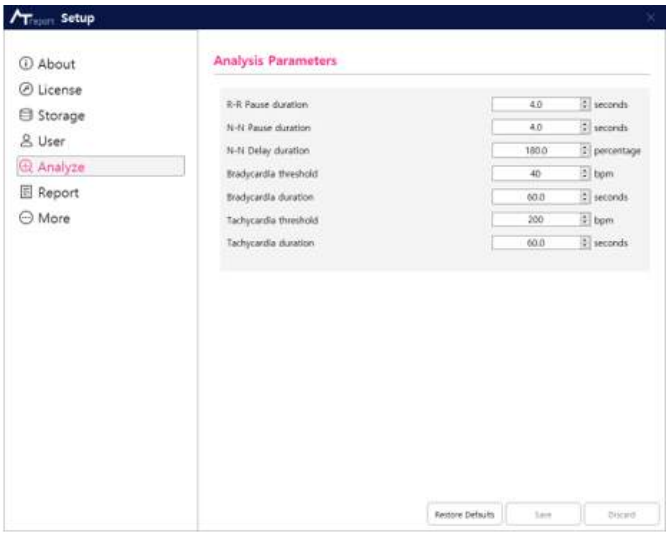


Figure 10.38 Analyze screen

The Analyze screen of [Figure 10.38] is a screen where you can configure each event used in the AT-Report Events Tab.

1) R-R Pause duration – This is a value that allows you to set 'R-R Pause' in the Events Tab.

2) N-N Pause duration – This is a value that allows you to set'N-N Pause' in the Events Tab.

3) N-N Delay duration – This is a value that allows you to set'N-N Delay' of the Events Tab.

4) Bradycadia threshold / Bradycardia duration – This is a number that allows you to set 'Bradycardia' in the Event Tab.

5) Tachycardia threshold / Tachycardia duration – This is a value that allows you to set 'Tachycardia' in the Events Tab.

10.5.3.7 Report screen

Checked Events are included in Report by default. (User can arbitrarily change whether to include report of each event.)

Events that are not checked are not included in the report by default. (User can arbitrarily change whether to include report of each event.)

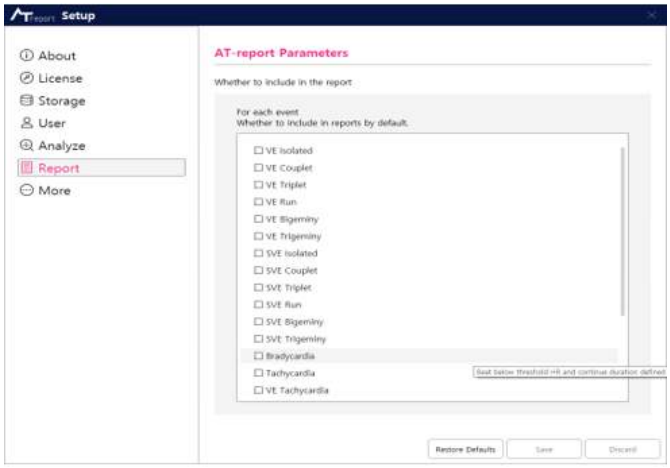


Figure 10.39 Report screen

10.5.3.8 More screen

In the 'More' option, you can set various functions used in AT-Report.

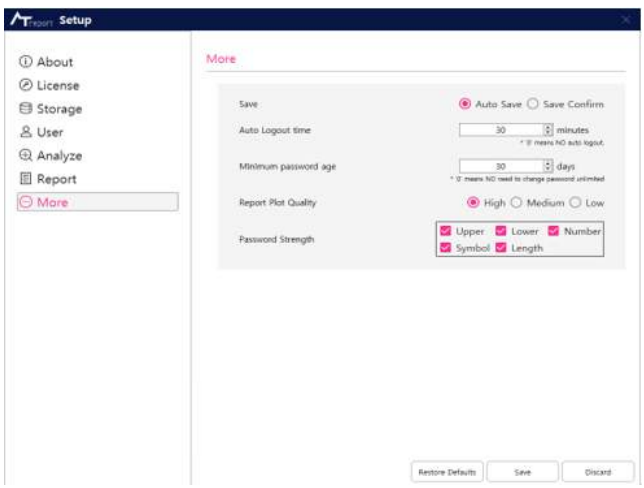


Figure 10.40 More option screen

1) Save

The 'Save' option is an option that allows the user to select a method to save the modified information when various modifications occur while using the AT-Report SW.

- Auto Save-When this option is selected, it is an option to automatically save the modified work while the user proceeds with the modification work using AT-Report SW.
- Save Confirm – When this option is selected, when the user proceeds with modification while using AT-Report SW, a dialog box for whether to save is displayed and the user confirms the saving.

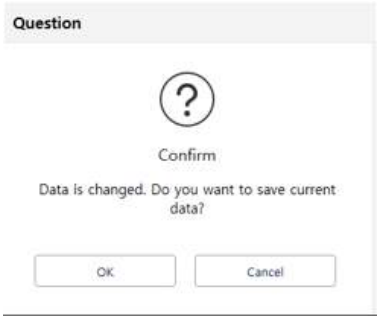


Figure 10.41 Dialog box asking whether to save or not

2) Auto logout time

The 'Auto Logout time' option is an option to adjust the user logout time when the user does not use AT-Report SW and there is no mouse/keyboard input. For example, when a value of '30' is set, if the user does not use AT-Report SW and there is no input for more than 30 minutes, the logout is performed.

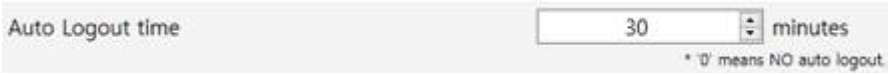


Figure 10.42 Setting screen of Auto logout time

3) Minimum password age

This option allows you to set the duration of the password for the account. If you do not change your password for a set period of time, you must change your password forcibly at login.

4) Report Plot quality

With this option, you can select the quality of the graph displayed in the Report Tab of AT-Report. If 'High' is selected, the graph output as a report is expressed in high quality, if it is 'Medium', it is expressed in medium quality, and if it is 'Low', it is expressed in low quality.

Figure 10.43 High Quality Plot and Low Quality Plot

5) Password Strength

When creating a password for a user account with this option, you can set the password strength.

- Upper-When selected, the password must contain at least one uppercase letter.
- Lower-When selected, the password must contain at least one lowercase letter.
- Number-When selected, the password must contain at least one number.
- Symbol-When selected, the password must contain at least one symbol.
- Length-When selected, the password must be at least 8 characters long.

10.5.4 History [Fig 10.21 Title Bar Menu ③]

10.5.4.1 History screen

Figure 10.44 History screen

1) Data Tab [Fig 10.44 History screen ①]

The Date Tab in the History Menu shows the date you are currently working on in the History Menu. To change the date the user wants, click the left mouse button or use the keyboard hotkey to change the date information.

The selected date has a red line below the date as shown in the picture above.

2) History List [Fig 10.44 History screen ②]

In the History List, a list of QRS Labels modified by the user in the Data Tab of the current working date is displayed.

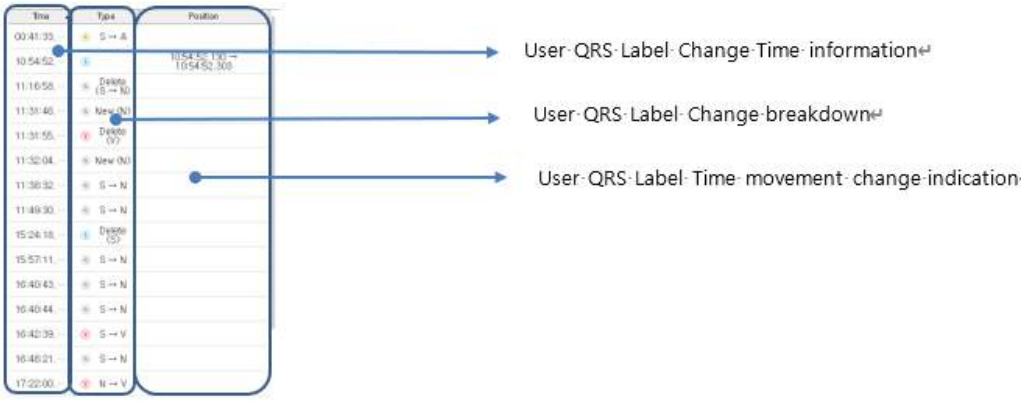


Figure 10.45 History List

- User QRS Label change time information-This is the part that displays information about the time when the user modified each QRS Label.
- User QRS Label Change History-This is the part that displays the change history of the user directly adding, deleting, modifying, moving, or deleting a QRS Label.
- User QRS Label time movement change indication – When the user moves the QRS Label, this part displays the movement time details.

3) Seconds strip Plot [Figure 10.44 History screen ③]

Refer to [10.6 Second Strip Plot]

4) History List Table [Figure 10.44 History screen ④]

QRS Label	New	Delete	Total
N	2	1	9 (S, V, A → N)
S	0	1	0 (N, V, A → S)
V	0	1	2 (N, S, A → V)
A	0	0	2 (N, S, V → A)

Figure 10.46 History List table

- QRS Label – Shows QRS Label before change in History Menu.
- New – Displays the number of QRS Labels newly created on the date set by the user as the Date Tab.
- Delete – Shows the number of QRS labels deleted on the date set by the user in the Date Tab.
- Total – Shows the total number of QRS Labels changed on the date set by the user with the Date Tab.

5) History Graph Plot [Figure 10.44 History screen ⑤]

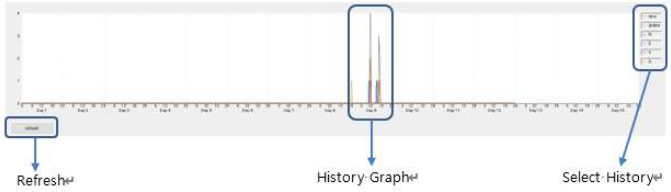


Figure 10.47 History Graph Plot

- Refresh – This is a button to refresh the details of the History Graph Plot.
- History Graph – History Graph shows the revision history of QRS Label by user's date as a graph.
- Select History-This is an option button to select the history you want to see in the current History Graph Plot. If you select each item with the mouse, you can see the graph of the revision history of the QRS label for the selected item, and if click again, cancel the selection and the graph is not visible. Also Toggle On/Off for selection can be done with the left mouse button.

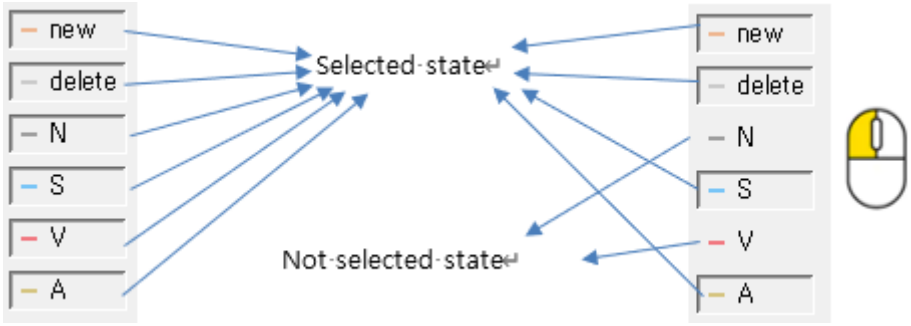


Figure 10.48 Select History

10.5.4 Title Bar display status text

As shown in [Figure 10.22 Display status of Title Bar with patient data loaded], the Title Bar displays patient information when the user edits patient data. The order of the displayed information is as [].

First Name	Last Name	Gender	Recording Date

Figure 10.49 Patient information display Status of Title bar

10.6 AT-Report (ATR-C130) Tab

10.6.1 Recording Tab

10.6.1.1 Recording Tab screen

Start → When the import of AT-patch data or AT-note data is completed in the Patient List, patient information and data information are displayed in the Recording List of the Recording Tab screen as shown in [Fig. 10.50 Recording Tab Screen].

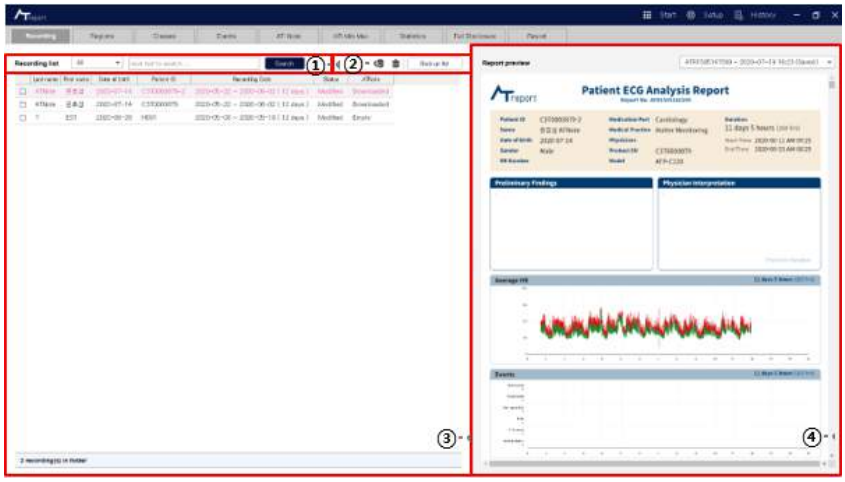


Figure 10.50 Recording Tab screen

10.6.1.2 List search [Figure 10.50 Recording Tab screen ①]

List Search is a function that allows users to search and select the data in the Recording List by the desired item. Click…" Input text to search. And press the "Search" button to search for the entered content and appear in the Recording List. The categories of searchable items are "All / Patient ID / Name / Physicians" as shown in [Figure 10.51 Search].

Figure 10.51 List search

10.6.1.3 Recording manage function [Figure 10.50 Recording Tab screen ②】

Recording Manager is a function used to back-up or delete the contents of the Recording List.

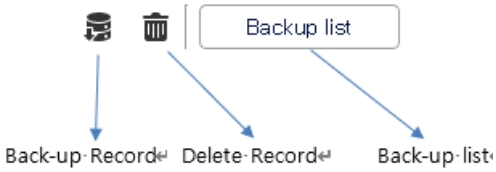


Figure 10.52 Recording Manage Function

1) Back-up Record-This is a function to back-up patient data in the Recording List. After selecting the patient data to be back-up from the Recording List with the mouse, press the back-up Record button ( ) to proceed with the back-up. If you perform back-up without selecting patient data, a warning window as shown below appears.

Figure 10.53 Warning window that appears when back-up is executed after selecting patient data

2) After selecting patient data in the Recording List, press the back-up Record button ( ) to perform back-up. [Figure 10.54 Window that appears when performing back-up after selecting patient data] appears, and click "OK" in the window. When selected, back-up is executed.

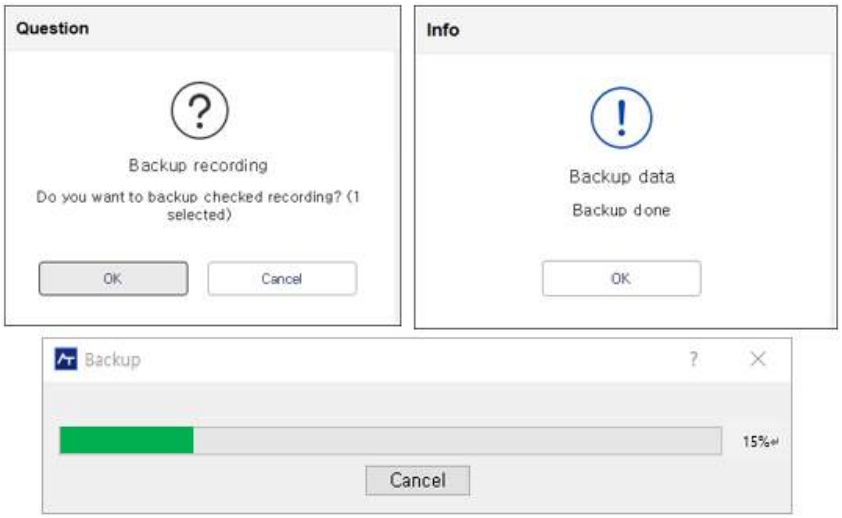


Figure 10.54 Window that appears when performing back-up after selecting patient data

3) Delete Record – This is a function to delete patient data in the Recording List. After selecting the patient data to be deleted from the Recording List with the mouse, press the Delete Recording button (🗑) to proceed with deletion.

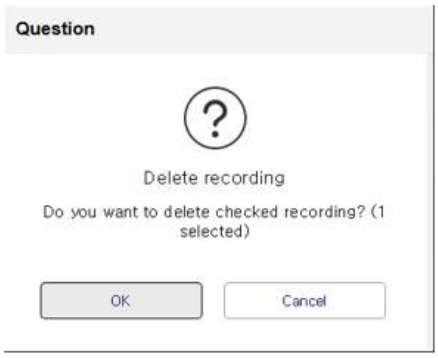


Figure 10.55 Delete Recording dialog box

4) Back-up list – This is a function that manages the patient data back-up from the Recording List.

Figure 10.56 Back-up list

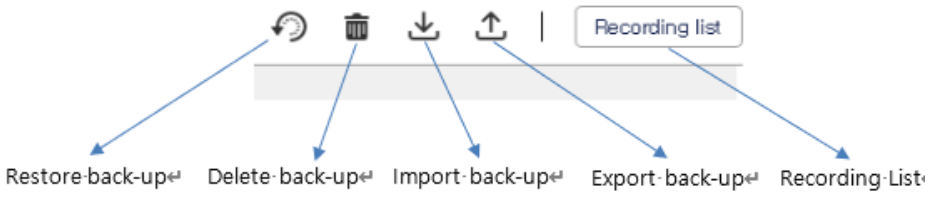


Figure 10.57 Back-up list function

5) Restore Back-up-This function restores the list in the Back-up List back to the Recording List. It is executed by clicking the Restore back-up button (⟲) with the left mouse button, and clicking the “OK” button in the dialog box as shown in [Figure 10.58 Restore Back-up] proceeds to the execution window and restore is completed.

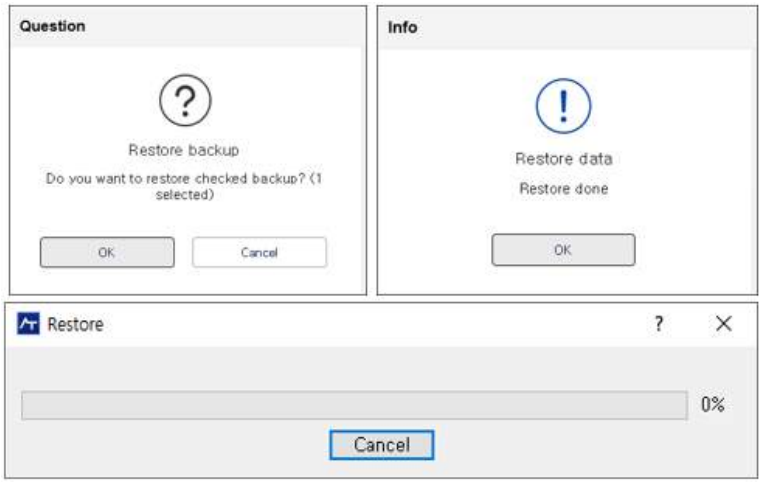


Figure 10.58 Restore Back-up

6) Delete Back-up-This function deletes the patient data in the back-up list. When the user selects the patient data ☐ check box in the Back-up List, it is changed to ☑ and when the user presses the Delete back-up button (🗑), a dialog box appears. When you select the “OK” button in the Delete dialog box, the deletion is completed.

Figure 10.59 Delete Back-up

7) Import Back-up-This is a function to import AT-report data in an external storage device with the Back-up List. If you execute the Import back-up button (⤓), a dialog box as shown in [Figure 10.60 Import Back-up] appears, and the user can search the desired folder and import the back-up AT-report patient data.

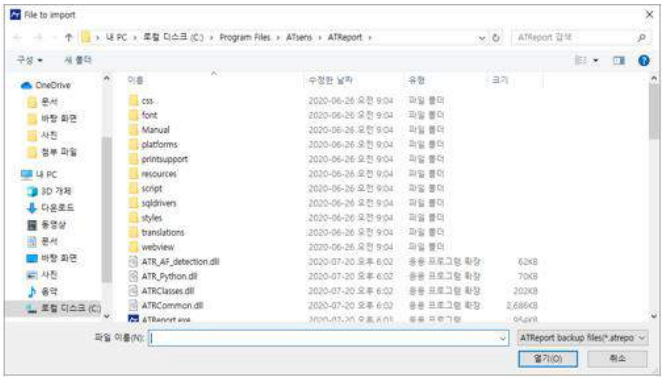


Figure 10.60 Import Back-up

8) Export back-up-This is a function to export patient data from the Back-up List to an external storage device. After selecting the data to be exported from the patient data in the back-up list, click the export back-up button (⬆) to execute the export.

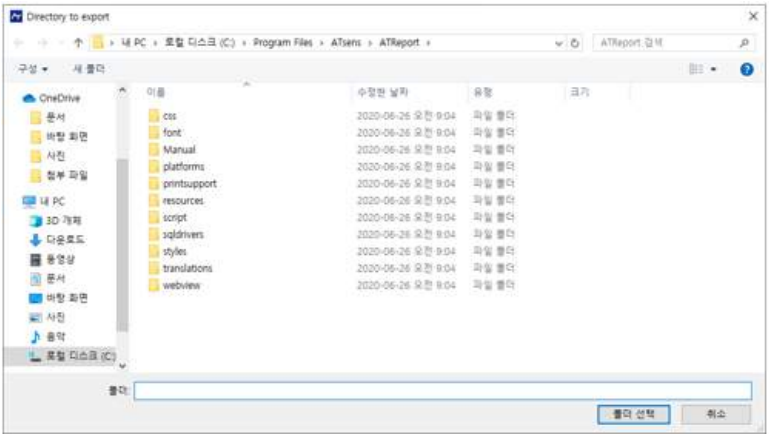


Figure 10.61 Export Back-up

9) Recording List – The Recording List button is to go back to the screen with the Recording List from the current Back-up List screen.

10.6.1.4 Recording List [Figure 10.50 Recording Tab screen ③]

When the user selects the contents of the List in the Recording List, it is displayed in red as in [Fig. 10.62 Recording List].

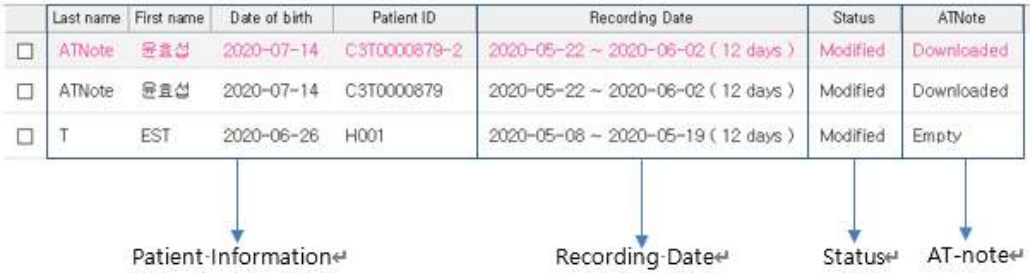


Figure 10.62 Recording List

1) Patient Information : This is the data created based on the patient information entered in Start → New Patient Data. In the Recoding List, information of Last Name / First Name / Date of birth / Patient ID is displayed.

2) Recording Date : It is the date when patient data was imported and recorded.

3) Status : Displays the status of imported patient data. Imported patient data is expressed in three states: “Downloaded”, “Modified” and “Report”. “Downloaded” is the status of the imported initial data without the user modifying the data, and “Modified” is the status of the data modified by the user as shown in [Figure 10.62 Recording List]. “Report” is the status of data displayed when a user creates a report.

4) AT-note : Start → If the download of “AT-note Data” is completed in Patient Data, it is expressed as “Downloaded”, and if “AT-note Data” is not downloaded, it is expressed as “Empty”.

5) Recording List Edit function

- Resize column width to contents

: This function arranges the contents of the initial Recording List according to each width. If you place the mouse arrow on the column of the Recording List and click the right button, a pop-up box appears as shown in [Figure

10.63 Resize Column width to contents before operation]. If you select and click the pop-up box, the Recording List automatically sorted according to each column appears.

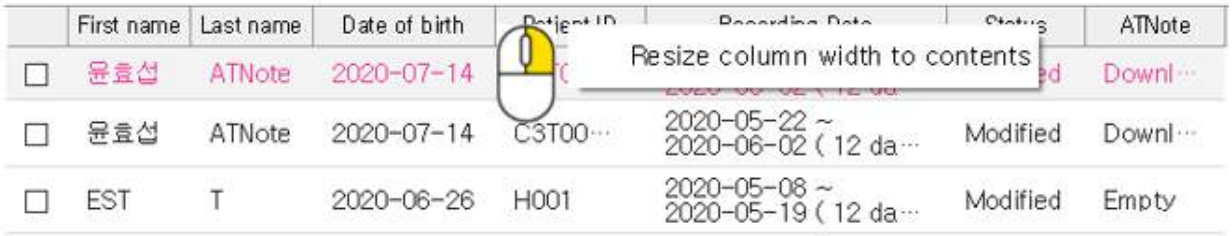


Figure 10.63 Resize column width to contents before operation

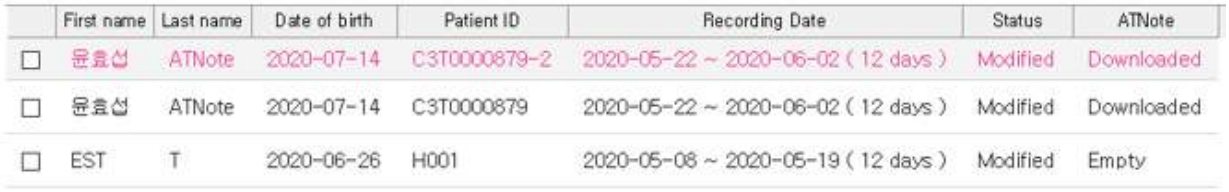


Figure 10.64 Resize column width to contents after operation

- Edit Patient Data & Reanalyze

: This function is for modifying patient information and patient data. If you move the mouse arrow over the Recording List and click the right button, a pop-up box with two functions appears as shown in [Figure 10.65 Edit patient data & Reanalyze]. It can be executed by clicking the desired function among “Edit patient data” and “Reanalyze”.

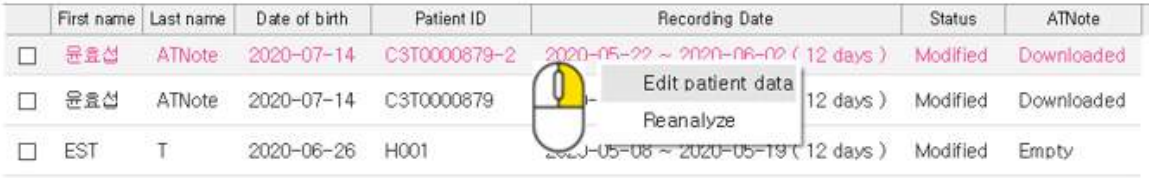


Figure 10.65 Edit patient data & reanalyze

- Edit patient data

: This is a function used by the user to modify Patient Data in the Recording List. When you select Edit patient data with the mouse, the Edit Patient data box appears, and the user can edit/change and save the necessary relevant information.

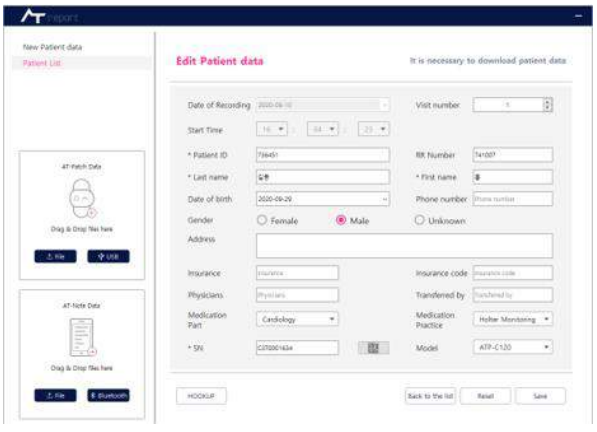


Figure 10.66 Edit patient data

- Reanalyze

: This function allows the user to revert the revised data in the Recording List to the initial patient data that was first imported. If you select Reanalyze, a pop-up box appears asking if you want to proceed as shown in the figure below. Reanalyze starts when you click the “OK” button in the pop-up box.

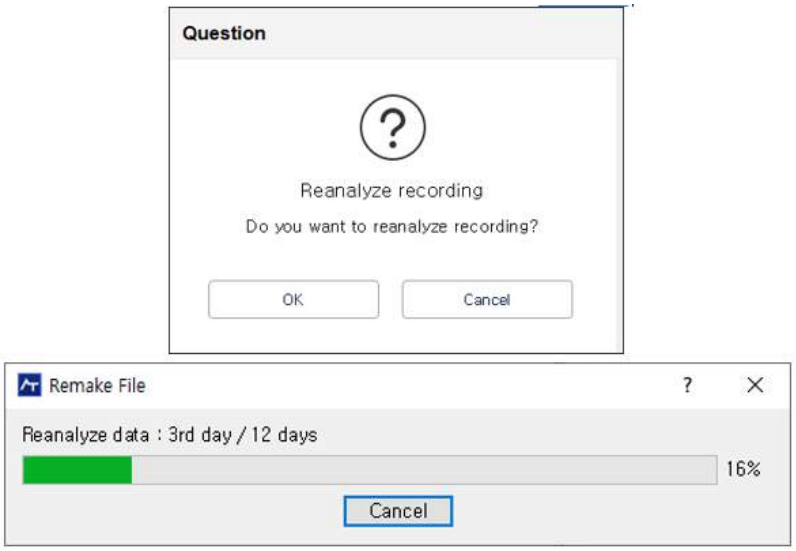


Figure 10.67 Reanalyze function

- List Number Information

: 【Figure 10.50 Recording Tab】-At the bottom of ③, the total number of patient data displayed in the current recording List is displayed.

10.6.1.5 Report Preview [Figure 10.50 Recording tab screen ④]

Report Preview function is a function to show the saved report in Preview form when the correction/analysis of the patient data selected in the current Recording List is in progress and “Export to PDF / Print / Save” in the Report Tab is completed.

Figure 10.68 Report preview

10.6.1.5 Error message according to user operation in recording tab

Error message	Detail
Loading error Cannot load ECG file	When the imported patient's ECG file cannot be loaded for an unknown reason
Saving error Cannot save ECG data	When the changed QRS label, class, event information, etc. cannot be saved for an unknown reason, or the imported patient's ECG data cannot be retrieved for an unknown reason.
Loading error Cannot load ECG data	When the imported patient's ECG data cannot be imported for an unknown reason
Data is empty Data is not imported, empty. first import data or select other work from list.	When trying to load ECG data that has not been imported
Remake analysis error	When the imported patient's CG data cannot be

Cannot load & remake analysis from ECG file	imported for an unknown reason during reanalyze
Cannot reanalyze ECG data	When there is already work in progress
Select patient first	When the wrong recording list is selected
Cannot load ECG Data Cannot load imported ECG data.	When the imported patient's CG data cannot be imported for an unknown reason
Back-up error Cannot back-up data	When imported data cannot be backed up for an unknown reason
Check recording first Check recording to back-up	When the backup icon is clicked, nothing is checked in the Recording list
Check recording first Check recording to delete	When clicking the delete icon, nothing is checked in the Recording list
Cannot export back-up	When the backed up item cannot be exported for an unknown reason
Select recording first Select recording to export	When clicking the restore export icon when nothing is checked in the back-up list
Restore error Cannot restore data	When the back-up data cannot be restored for an unknown reason
Check recording first Check recording to restore	When clicking the restore icon, nothing is checked in the back-up list
Check back-up recording first Check back-up recording to delete	When the backup delete icon is clicked, nothing is checked in the back-up list

10.6.2 Regions Tab

10.6.2.1 Regions Tab screen

Figure 10.69 Regions Tab screen

10.6.2.2 Date Tab [Figure 10.69 Regions tab screen ①]

In the Regions Tab, the Date Tab represents the date you are currently working on in the History Menu. To change the date the user wants, click the left mouse button or use the keyboard hotkey to change the date information.

The selected date has a red line below the date as shown in the picture above.

10.6.2.3 Average HR Plot [Figure 10.69 Regions tab screen ②]

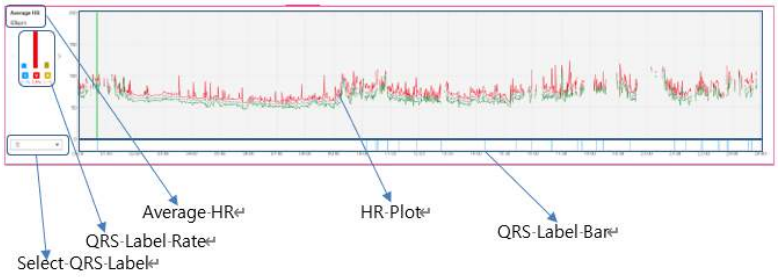


Figure 10.70 Average HR Plot

1) Average HR : Shows the Average HR (Heart Rate) of the part where the Indicator Line is located in the Average HR Plot.

QRS Label Rate : Shows the distribution ratio of QRS Label on the date selected in the Date Tab of the Regions Tab. This includes the% ratio of S(Supraventricular) / V(Ventricular) / A(Artifact). If you click >" or "<" using the left mouse button (), it moves toward the% ratio for the valid and noise areas. The ratio (%) of each QRS Label is calculated using the following formula.

QRS Label Rate = Total number of QRS labels/number of each QRS label (S/V/A)

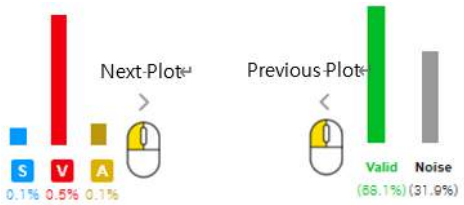


Figure 10.71 QRS Label Rate

2) Select QRS Label : This is a drop box that selects the type of QRS label displayed on the QRS Label bar of average HR Plot. Click (▼) in the select QRS Label drop box and select the QRS label you want to display.

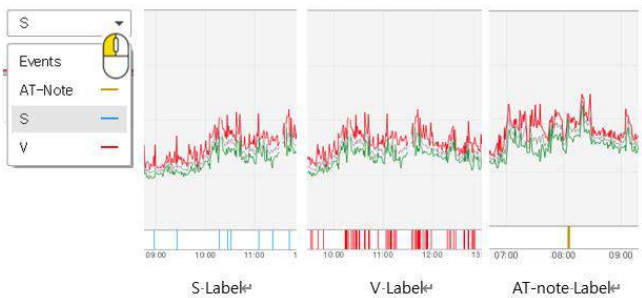


Figure 10.72 Select QRS Label

3) HR Plot: HR Plot shows the HR Plot for the entire date selected in the Regions Tab. In the HR Plot, information on the Maximum HR Plot / Average HR Plot / Minimum HR can be obtained, and if the user wants to check the noise event of the QRS Label Rate, the noise event can also be obtained.

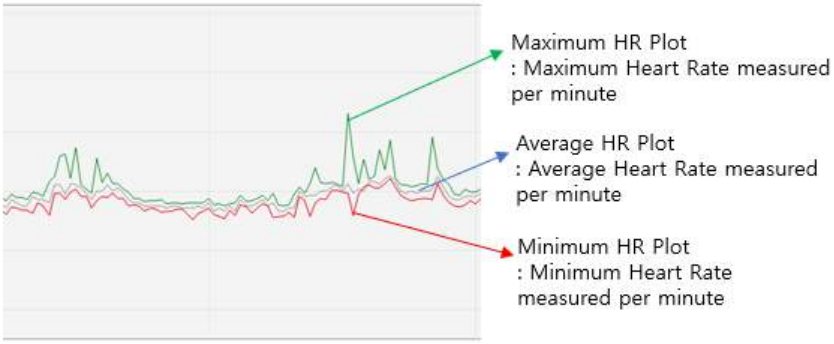


Figure 10.73 HR Plot in Regions Tab

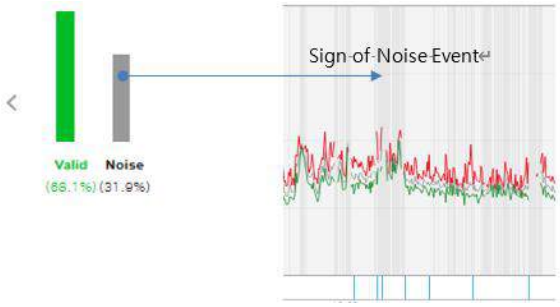


Figure 10.74 How to display Noise Event in HR Plot in Regions Tab

10.6.2.4 Strip Plot [Figure 10.69 Regions tab screen ③]

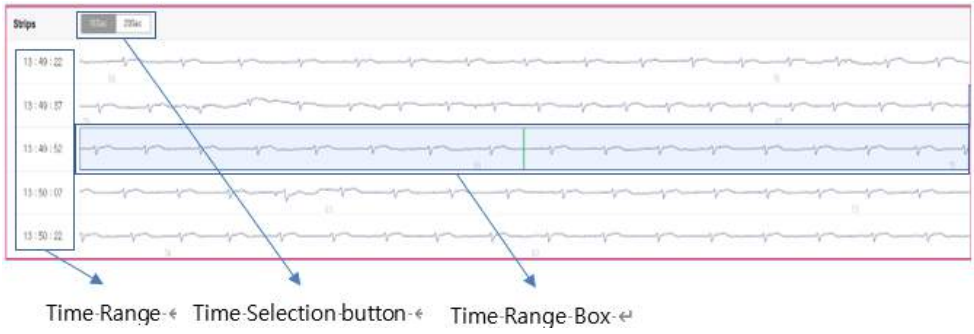


Figure 10.75 Strips Plot

1) Time Range: It shows the initial start time of ECG displayed in Strips Plot.

2) Time Selection button: This is a button to select the time range of the ECG displayed on the Strips Plot. In the case of 15sec, the ECG displayed on the Strips Plot appears in a time range of 15sec, and in the case of 20sec, the ECG displayed in the Strips Plot appears in the range of 20sec.

3) Time range box: Time Range Box displayed in Strips Plot is linked with Time Range Selection value of Seconds Strip Plot. That is, if the value of Time Range Selection of Seconds Strip Plot is 10sec, the Time Range Box is displayed as 10sec, and if it is 20sec, it is displayed as a box within the range of 20sec.

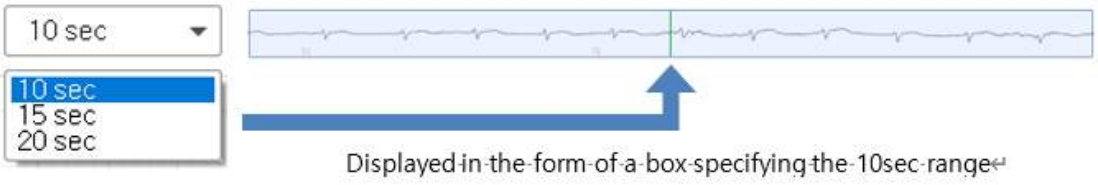


Figure 10.76 Time range box

4) HR number: The HR Number is displayed on the Strips Plot. This HR Number can be displayed by selecting the value of R-R Interval / HR / Average HR / max min HR using the right mouse button. For more information, refer to [10.6.3.5 Seconds Strip Plot ⑩– HR Number Change Function in Seconds Strip Plot].

10.6.2.5 Seconds Strip Plot [Figure 10.69 Regions tab screen ④]

Refer to [10.6.3.5 Seconds Strip Plot]

10.6.3 Class Tab

10.6.3.1 Class Tab screen

Figure 10.77 Class Tab screen

10.6.3.2 Group Class Label Tab - [Figure 10.77 Class Tab ①]

The Group Class Label Tab is a tab that categorizes and displays the imported patient's ECG data by group pattern (N/S/V/A). In this tab, the number next to each QRS Label means the total number of labels classified as Group Class.

10.6.3.3 Date Drop box - [Figure 10.77 Class Tab ②]

1) Save button

If there is changed labeling data in the Group Class Event Card, the “Save” button is activated, and the changed label is actually changed and applied by pressing the “Save” button. Depending on the option, changes are applied in a way that is saved the moment you leave the Class Tab.

Figure 10.78 Save function in Class tab

2) Date Drop box

3) The current working date information of the Class Tab is displayed in the Data Drop Box. Click (▼) in the Data drop box to select and change the date the user wants.

Hotkeys for date change are as follows

[Keyboard Hot key : - key – Before date, + key – Current date]

However, even if an arbitrary Group Class Label Tab is selected in the Class Tab when the date is changed, the Normal Class Label Tab is always selected and displayed after the change.

10.6.3.4 Group Class Card - [Figure 10.77 Class Tab ③]

It is a card with QRS label of each group. The number of labels belonging to each Group Class is arranged in the order of the greatest number. At the top of each Group Class Card, the type of QRS label and the percentage of that type (%, the ratio of the number of each group class to the total number of heartbeats per day) are displayed, and at the bottom, the serial number of the group class card and this class label The number of QRS labels that belong to is displayed.

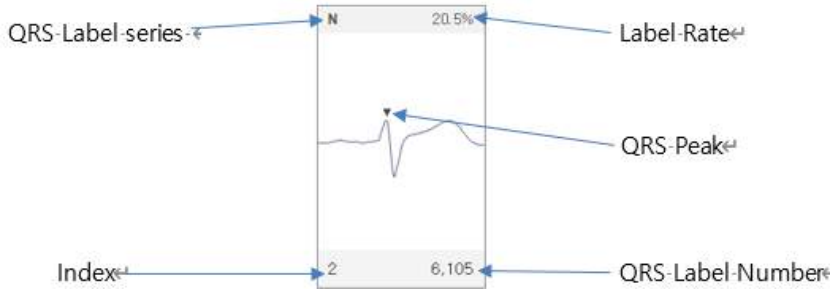


Figure 10.79 Group Class Label Card

1) QRS label type: Group Class Label Shows which group the QRS Label of the card belongs to.

2) Index: This is the order in which the Group Class Label Card is displayed while grouping the QRS Label pattern in the Class Tab

3) QRS Label Number: This indicates the number of ECG patterns in the Group Class Label Card.

4) Label rate: It represents the ratio (%) of the number of QRS labels in each N/S / V/A group to the total QRS labels during the day.

5) QRS Peak: This indicates the location of the QRS peak of the ECG pattern currently being viewed by the user.

6) Group Class event card sorting method: First, sorting the QRS label according to the shape of the ECG, and then setting the order of the index, sorting and displaying all class events in the order of the ratio with the event number and event rate large.

7) Group Class Label Marker Change function: Clicking the right mouse button on the Group Class label card opens the pop-up window, and selecting the label type displayed in the pop-up window changes the type of all QRS labels belonging to the class.

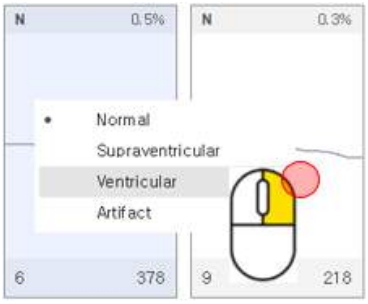


Figure 10.80 Group Class Label Card

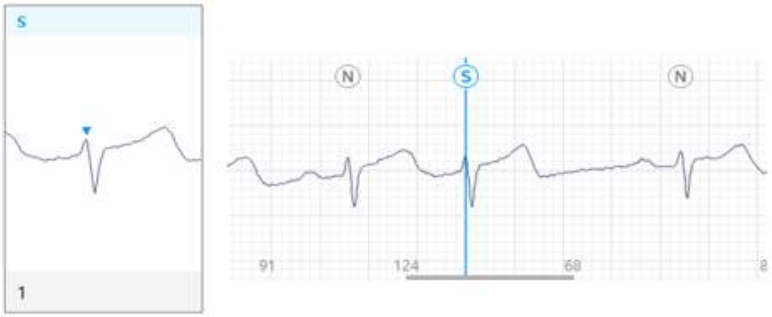
8) Operation in case select Group Class Label Card

When selecting the Group Class Label Card item, the first label among the QRS labels corresponding to the selected Class label card is selected. In the Second Strip Plot, time information at the time when the selected QRS label is located is displayed, and the corresponding QRS label is displayed in the center along with the indicator line as shown in [Fig. 10.10.1.1 ④].

9) Type of QRS Label

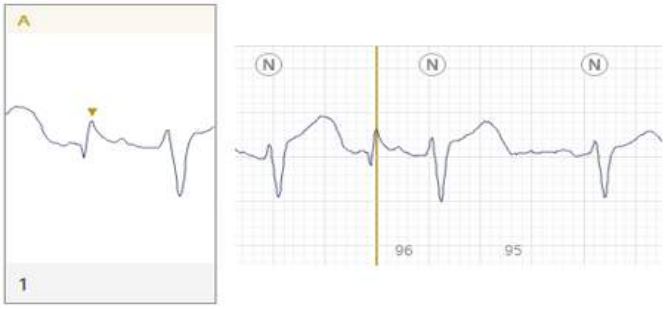
■ Group Normal QRS Label - Based on the QRS wave of the ECG, ECG data within the normal range is defined as a Normal QRS label.

■ Group Supraventricular QRS Label - This is a normal QRS wave pattern that is faster than the normal defined QRS label pattern based on the QRS wave of the ECG.



■ Group Ventricular QRS Label - Defined as a non-normal QRS wave pattern based on the QRS wave of ECG

■ Group Artifact QRS Label – This is an abnormal wave pattern that cannot be classified as a group of N/S/V.



10.6.3.5 Seconds Strip Plot – [Figure 10.6.3.1 Class Tab screen ④]

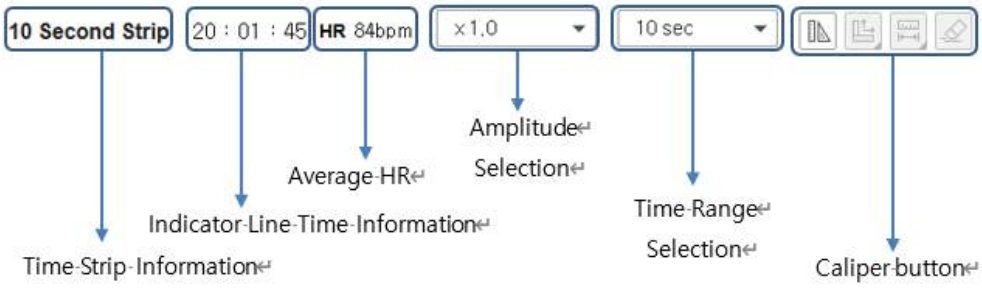


Figure 10.81 Seconds Strip Plot - 1

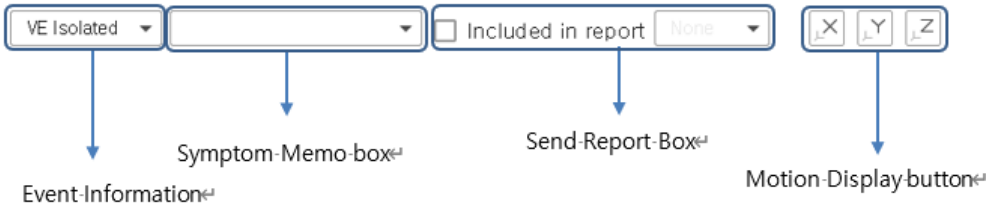


Figure 10.82 Seconds Strip Plot - 2

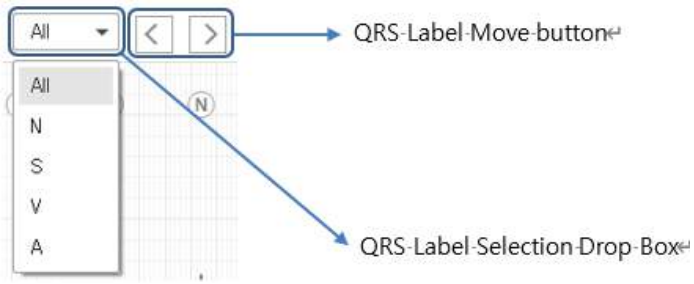


Figure 10.83 Seconds Strip Plot - 3

1) Time range information sign of Time Strip information

If you select “10 sec” in the Range Drop Box as shown in [Figure 10.84 Time information sign of seconds Strip Plot], time information is displayed based on the time selection and the time is displayed in the range of “10 Seconds”.

Figure 10.84 Time information sign of Seconds Strip Plot

2) Indicator Line Time Information

For each QRS Peak, a QRS label is displayed and the currently selected time is displayed in the center. This time information represents time information of a point where the indicator line is located in the Seconds Strip Plot. If the Indicator Line is not visible on the Seconds Strip Plot, you can make the Indicator Line appear again by pressing the + Space Key.

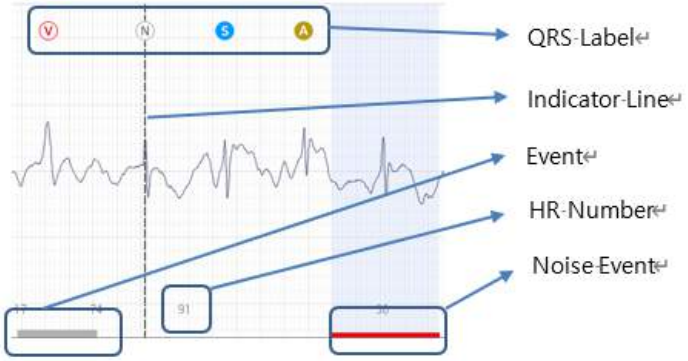


Figure 10.85 Seconds Strip Plot - 4

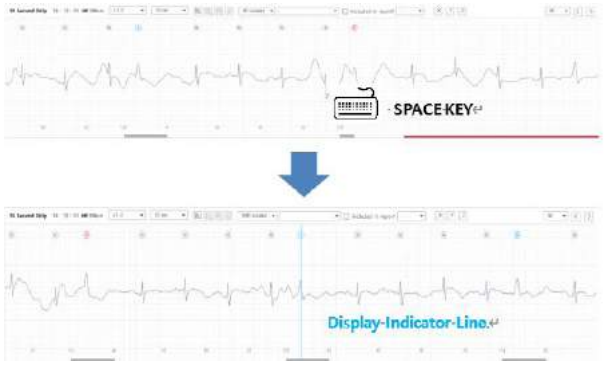


Figure 10.86 Center location operation in Indicator Line

3) Average HR

The average ‘average HR (Heart Rate)’ during the Time Range displayed in Time Strip Information is displayed as a number.

Heart Rate is measured through the R-R interval. R-R is measured as the time between beats. The normal range is 0.6 ~ 1.0 seconds, and the normal range of heart rate is 60 ~ 100 bpm. The RR interval is the time between QRS, and the instantaneous heart rate can be calculated from the time between QRS.

The calculation method is as follows.

[Distance (mm/beat) × Time (sec/square) = RR interval (sec/beat)]

1 beat is a value calculated by 1 second (1 second/beat), and the number of beats per second must be calculated to calculate the heart rate, and to do so, the RR value is 1/RR value.

It uses a conversion factor and converts it to a general unit of minutes (beat/min).

[1 beat/sec x 60 sec/min = 60 beats/min.]

Pause is recognized as pause when no QSR bit for more than 4 seconds occurs.

If the QRS label does not occur in the detail plot and the graph continues flat for 4 seconds, it is recognized as a pause.

4) Amplitude selection drop box

This is a function to select the voltage of the ECG displayed on the Seconds Strip Plot. The initial Amplitude setting value is “x1.0” and the user can select and use the desired value among the values presented in the drop box.

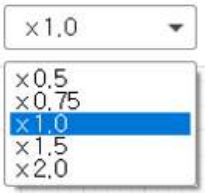


Figure 10.87 Amplitude Selection Drop Box

5) Time Range Selection Drop Box

It is a part that selects the range of the ECG time domain displayed on the Seconds Strip Plot. As shown in [Figure 10.88 Time Range Selection Drop Box], there are 10 sec, 15 sec, and 20 sec values to select the time range.

Figure 10.88 Time Range Selection Drop Box

6) Caliper Button

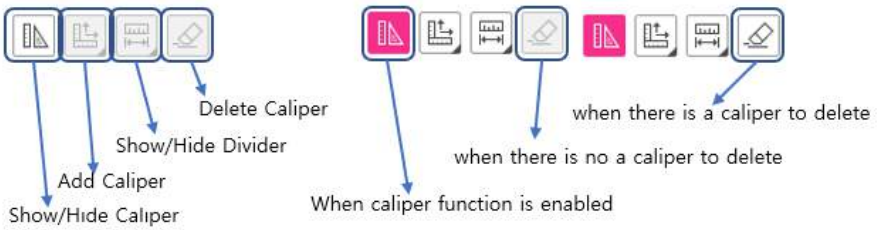


Figure 10.89 Caliper button

■ Show/Hide Caliper: Show/Hide Caliper button is a button to enable/disable the Caliper function. As shown in the picture above, when enabled, the button color changes to pink, and when disabled, the button color appears in white.

■ Add Caliper: If you click the Add Caliper button, the Drop-down Menu of Add Horizontal Caliper / Add Vertical Caliper / Add Horizontal / Vertical Caliper appears.

Figure 10.90 Add Caliper

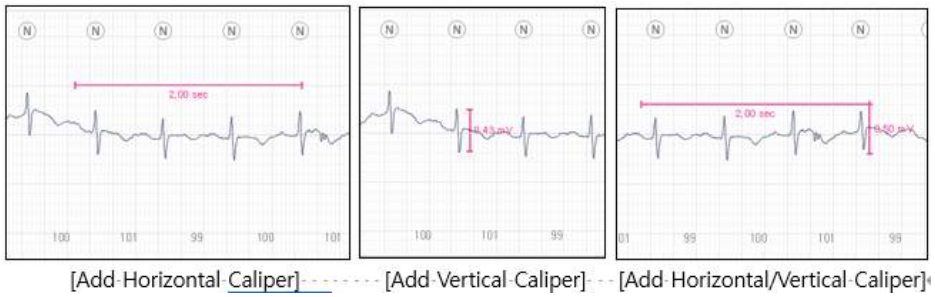


Figure 10.91 Operation status of Add Caliper

When a Caliper is added by clicking the Add Caliper button, the Caliper appears centering on the Indicator Line of the current Seconds Strip Plot. Caliper is created as many times as the Add Caliper button is pressed, and if the Add Caliper button is repeatedly pressed without moving the Caliper, the Caliper appears superimposed on the existing Caliper.

■ Show/hide Divider: If you click the Show/Hide Divider button with a mouse, the Drop-down Menu of Show Right Divider / Show Left Divider appears.

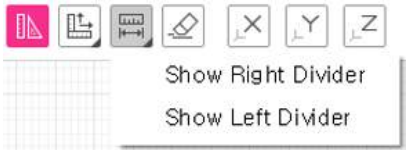


Figure 10.92 Show/Hide Divider

Figure 10.93 Show Right Divider

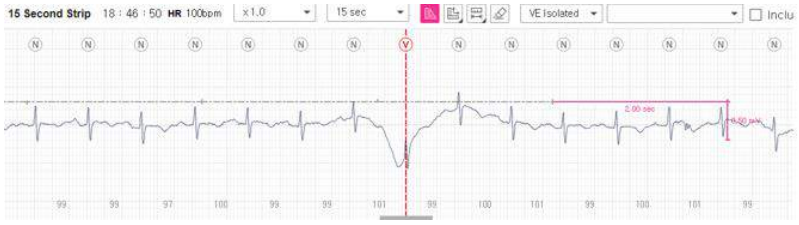


Figure 10.94 Show Left Divider

If you use the Show divider function as shown in [Figure 10.93 Show Right Divider] and, [Figure 10.94 Show Left Divider] a dotted line that is expanded by a multiple of Caliper set to the left and right of the graph area indicated by the ECG of Seconds Strip Plot appears. The line extending in Caliper units currently displayed in the Seconds Strip Plot is displayed in a uniform Caliper Time Domain period to the left and right.

■ Delete Caliper

The Delete Caliper button is a function to delete the Caliper displayed on the Seconds Strip Plot. After selecting the Caliper to be deleted with the left mouse button, if the Caliper is changed to dark color, you can delete the Caliper by pressing the Delete Caliper button

Figure 10.95 Delete Caliper

■ Edit Caliper function

If you click and move the Caliper displayed on the Seconds Strip Plot with the left mouse button, the user can modify it as desired. You can increase or decrease the range of the calipers up, down, left and right, or you can move the caliper line to the desired position by clicking and dragging the caliper line with the left mouse button.

Figure 10.96 Edit Caliper function

7) Second Report Box

Send Report Box is a function that includes the event desired by the user in the report from the ECG graph of the Seconds Strip Plot.

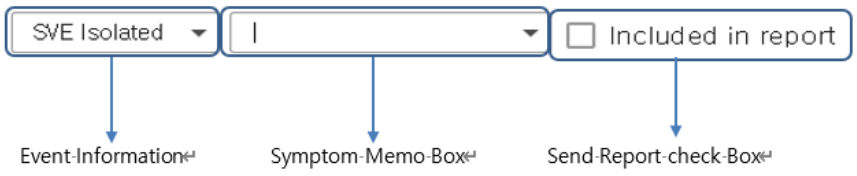


Figure 10.97 Second Report Box

■ Event Information

In the Events Drop Box, the events specified or specified in the xx Second Strip area are displayed. Events appearing in this section are events included in the Events Graph Plot of the Events Tab.

■ Symptom Memo Box

Events	Description
User Input	Users can directly enter events or text
Palpitation	It is a symptom of a palpitation or discomfort due to an irregular or rapid heartbeat.
Dyspnea	Difficulty or painful condition to breathe. In most cases, rapid or deep breathing occurs.
Chest Pain	It is called chest pain, and it appears as a symptom of chest pain or shortness of breath.
Dizziness	It often means dizziness, and it moves even though you or the objects around you are stationary. It is a collective term for all symptoms that feel like this.
Syncope	It refers to a symptom of instantaneous loss of consciousness due to a decrease in blood flow to the brain, and most of the causes of fainting are related to bradycardia.
Patient Symptom Event	After attaching AT-patch, it is a record that the patient himself saved as symptom event by pressing the power key of AT-patch when symptoms occur..

Table 10.6.3.5.1 Symptom List

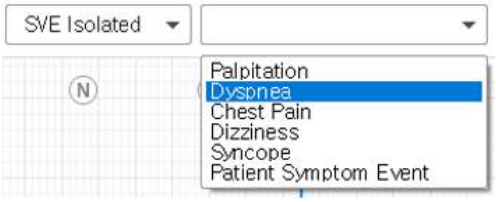


Figure 10.98 Symptom List

■ Send Report Check Box

By selecting the check box to the left of “Included in Report”, the user can include those events in the report.

8) Motion Display Button

Motion Display is a function that displays Motion Data according to the movement of the patient attaching the AT-patch to the Seconds Strip Plot. Here, “X” indicates x-axis data among Motion Data, “Y” indicates y-axis data among Motion Data, and “Z” indicates z-axis data among Motion Data.

Figure 10.99 Motion Display Button

9) QRS Label Move button

The QRS Label Move button is a function that allows you to change the position of the QRS label of the Seconds Strip Plot. Based on the selected QRS Label, you can move left or right by pressing the PREV Label / NEXT Label button.

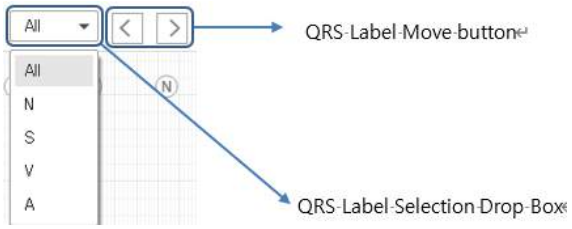


Figure 10.100 QRS Label Move

■ QRS Label Selection Drop box

When the user selects the required label from the QRS Label Selection Drop Box, only the selected label is reflected in the Seconds Strip Plot and appears.

All: All QRS labels classified as N/S/V/A are displayed. Clicking the QRS Label Move button moves one left and one right.

N: Only the QRS label classified as N appears in the Seconds Strip Plot, and if you click the QRS Label Move button, you can only move to the left or right of the label corresponding to N.

S: Only the QRS label classified as S appears in the Seconds Strip Plot, and if you click the QRS Label Move button, you can only move to the left or right of the label corresponding to S.

V: Only QRS labels classified as V appear in the Seconds Strip Plot, and if you click the QRS Label Move button, you can only move to the left or right of the label corresponding to V.

A: Only the QRS label classified as A appears in the Seconds Strip Plot, and if you click the QRS Label Move button, you can only move to the left or right of the label corresponding to A.

■ QRS Label Move Button

The QRS Label Move button is a function that moves one by one to the previous label or next label according to the QRS label selected in the QRS Label Selection Drop Box.

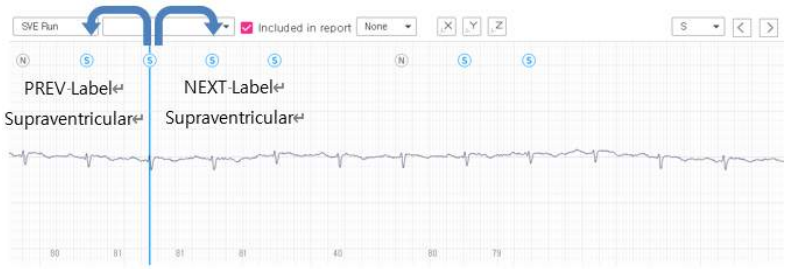


Figure 10.101 QRS Label Move button

10) HR Number change function in Seconds Strip Plot

In the Seconds Strip Plot, the HR (Heart Rate) displayed between each QRS Label can be changed to the type desired by the user (R-R Interval / HR / Average HR / max min HR).

Figure 10.102 HR/RR interval/Average HR/max-in HR sign

10.6.4 Sub Class Tab

10.6.4.1 Sub class tab screen

Figure 10.103 Sub class Tab screen

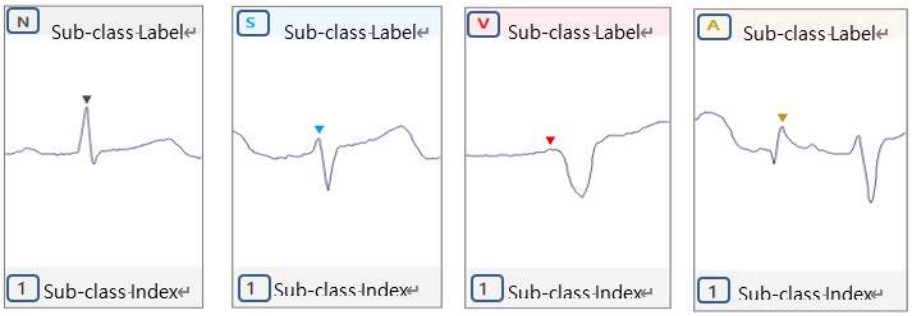


Figure 10.104 Sub class QRS label Card

In [Figure 10.104 Sub-class QRS Label Card], Sub-class QRS Label represents the type of QRS Label of each sub-class, and Sub-class Index is the total number of QRS labels belonging to each Sub-class Event Card. Represents.

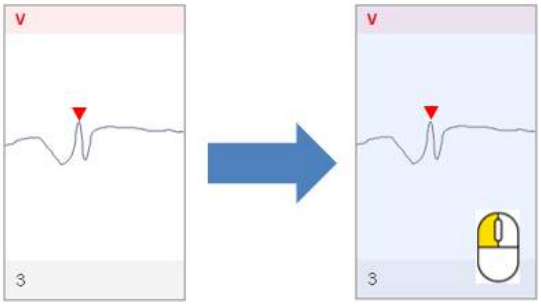


Figure 10.105 Selection Sub class QRS label Card

[Figure 10.105 Selection Sub-class QRS Label Card] shows how to select Sub-class QRS Label Card. If you select the Sub-class QRS Label Card with the left mouse button, the selected Sub-Class QRS Label Card is changed to gray.

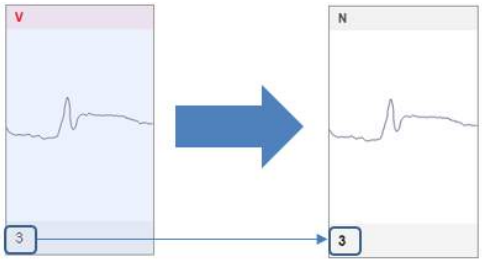


Figure 10.106 When Sub-class QRS Label is changed, Index change (Bold font) is displayed

10.6.4.2 Multi Selection Sub-class QRS Label Card

1) 1st selection guide

As you can see in [Figure 10.107 Multi-Selection Sub-class QRS Label Card-1st], you can select multiple sub-class QRS Label Cards by clicking & dragging the lower left or upper right using the left mouse button.

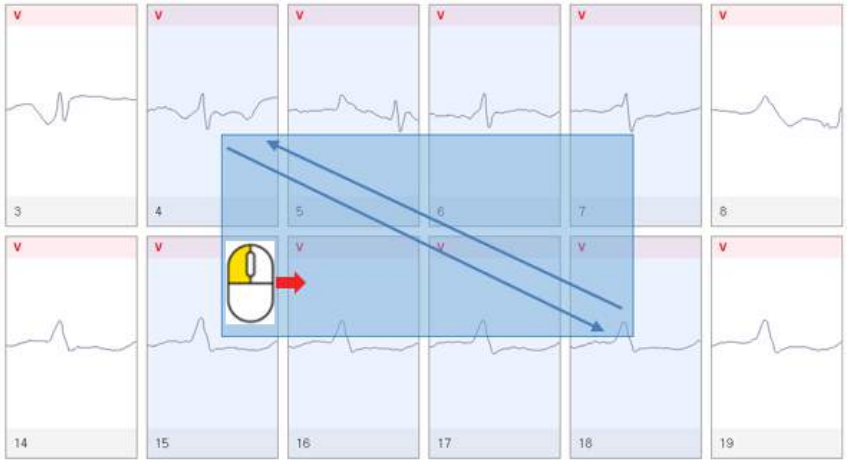


Figure 10.107 Multi-Selection Sub-class QRS Label Card-1st

2) 2nd selection guide

As in [Figure 10.108 Multi-Selection Sub-class Event Card - 2nd], you can select only the Sub-class Event Card you want to select (①→②→③→④) by using the ctrl(Ctrl) key on the keyboard and the left mouse button together. In the selected state, click the selected sub-class event card in the same way as above to cancel the selected state.

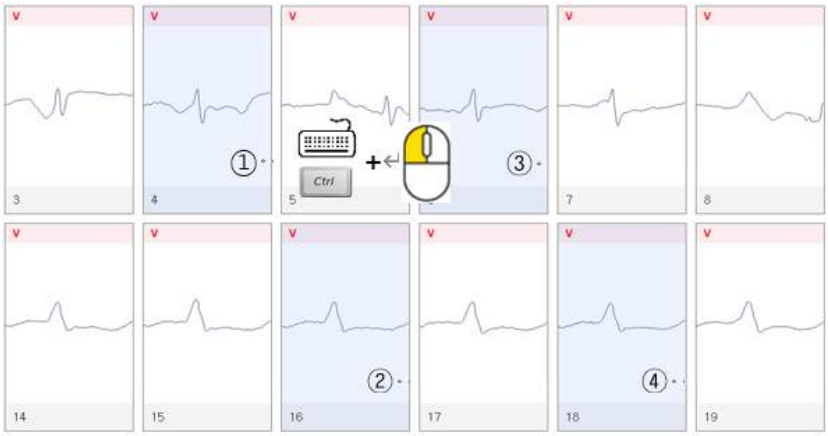


Figure 10.108 Multi-Selection Sub-class QRS Label Card-2nd

3) 3rd selection guide

If you select (①→②) by using the shift (Shift) key on the keyboard and the left mouse button together as in [Figure 10.109 Multi-Selection Sub-class Event Card-3rd], click the second on the sub-class QRS Label card you clicked first. All up to one sub-class card can be selected.

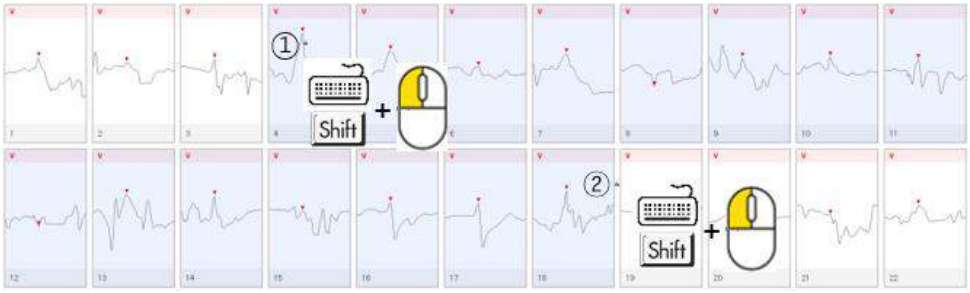


Figure 10.109 Multi-Selection Sub-class QRS Label Card-3rd

10.6.4.3 Generation of Sub-Class QRS Label Tab

[Figure 10.110 Creation of Sub-class QRS Label Tab] shows the screen where Sub-class QRS Label Tab is created. Up to 3 sub-class tabs are created, and the most recently selected one in the class tab is displayed as a sub-class tab.

Figure 10.110 Generation of Sub-Class QRS Label Tab

10.6.4.4 How to move between Sub-class QRS Label

[Figure 10.111 How to Move from Sub-class QRS Label Card] shows how to move from Sub-class QRS Label Card to Card. You can move to the desired card of the sub-class QRS Label Card by using the up, down, left, and right (↑ ↓ →←) keys on the keyboard.

Figure 10.111 How to move between Sub-class QRS Label

10.6.4.5 Change Label List – [Figure 10.103 Sub class Tab screen - ①]

"Total Sub-class Number" means the number of all labels existing in the created Sub-class QRS Label Tab. Like the initial patient data, if the user has never changed the label in the Sub-class QRS Label Tab, all numbers corresponding to "Sub-class Number list to be changed" are displayed as "0", and then the user When changing - class QRS Label Card, the number of changes is continuously accumulated and recorded.

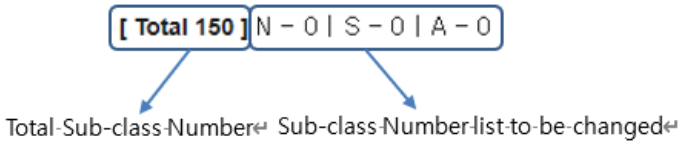


Figure 10.112 Change Label List

10.6.4.6 Save/Date function – [Figure Sub-class Tab screen - ②]

Figure 10.113 Save/Date function

1) Save button

If there is a changed QRS label in the sub-class QRS label card, the "Save" button on the upper right is activated, and you can save the changed QRS label by pressing the "Save" button. Depending on the option, it may be applied in a way that is saved the moment it leaves the class tab.

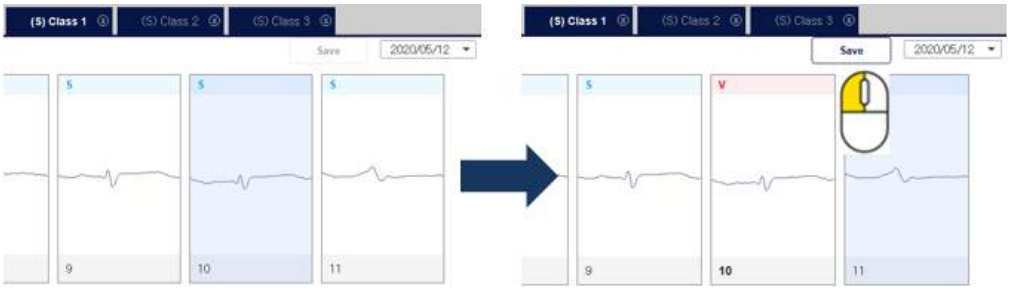


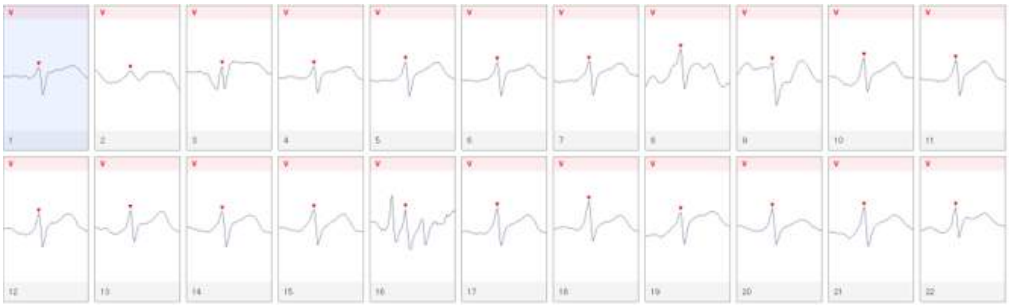
Figure 10.114 Save button in Sub-class QRS Label Card

2) Date Drop box

The Date Drop Box in the Sub-class QRS Label Tab indicates the date of the Sub-class QRS Label Tab currently being worked on.

10.6.4.7 Sub-class Event Card – [Figure 10.103 Sub-class Tab screen - ③]

In this area, all of the sub-class QRS Label Cards currently in the Sub-class QRS Label Tab are displayed, and you can edit and save the Sub-class QRS Label. For how to modify the sub-class QRS Label, refer to [10.7.6.1 Sub-class QRS Label Card change method].



10.6.4.8 Seconds Strip Plot – [Figure 10.103 Sub-class Tab screen - ④]

Refer to [10.6.3.5 Seconds Strip Plot]

10.6.5 Events Tab

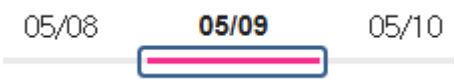
10.6.5.1 Events Tab screen

Figure 10.115 Events Tab screen

10.6.5.2 Date Tab – [Figure 10.115 Events Tab screen - ①]

The Date Tab of the Events Tab shows the date you are currently working on in the History Menu. To change the date the user wants, click the left mouse button or use the keyboard hotkey to change the date information.

[Keyboard Hot key : - key – Before date, + key – Current date]



The selected date has a red line below the date as shown in the picture above.

10.6.5.3 Average HR Plot – [Figure 10.115 Events Tab screen - ②]

Figure 10.116 Average HR Plot

1) Average HR: Average HR represents the heart rate per minute where the indicator line is located.

2) Average HR Plot: This is the average HR graph for the day of the date selected in the Date Tab. In Average HR Plot, Maximum HR Graph / Average HR Graph / Minimum HR Graph are also displayed.

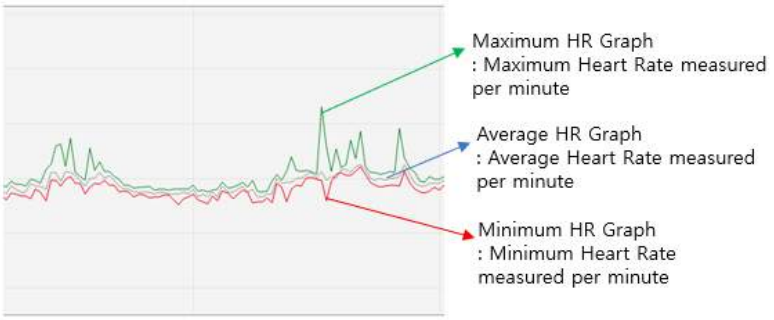


Figure 10.117 Description of Average HR Graph

10.6.5.4 Events Graph Plot – [Figure 10.115 Events Tab screen - ③]

1) Events Description

NO	Events	Description
1	VE Isolated	Determines whether an event label will be displayed for isolated VE beats.
2	VE Couplet	Determines whether an event label will be displayed for two consecutive VE beats.
3	VE Triplet	Determines whether an event label will be displayed for three consecutive VE beats.
4	VE Run	Determines whether an event label will be displayed for three or more consecutive VE beats.
5	VE Bigeminy	Determines whether an event label will be displayed when a VE occurs every other beat.
6	VE Trigeminy	Determines whether an event label will be displayed when a VE occurs every third beat.
7	VE Escape	A ventricular rhythm with a rate of 20-40 bpm. QRS complexes are broad (≥ 120 msec) and may have a LBBB or RBBB morphology.
8	VE Tachycardia	Defined as 3 or more VE in a row, at a rate of more than 100 beats a minute
9	SVE Isolated	Determines whether an event label will be displayed for isolated SVE beats.
10	SVE Couplet	Determines whether an event label will be displayed for two consecutive SVE beats.
11	SVE Triplet	Determines whether an event label will be displayed for three consecutive SVE beats.
12	SVE Run	Determines whether an event label will be displayed for three or more consecutive SVE beats.

13	SVE Bigeminy	Determines whether an event label will be displayed when an SVE occurs every other beat.
14	SVE Trigeminy	Determines whether an event label will be displayed when an SVE occurs every third beat.
15	Bradycardia	Bradycardia is a slower than normal heart rate. The hearts of adults at rest usually beat between 60 and 100 times a minute.
16	Tachycardia	Tachycardia, also called tachyarrhythmia, is a heart rate that exceeds the normal resting rate. In general, a resting heart rate over 100 beats per minute is accepted as tachycardia in adults.
17	R-R Pause	Sets the maximum duration, in milliseconds (msec), between two R waves that will be considered normal. Any duration above that limit will be labeled a significant R-R Pause
18	N-N Delay	Sets the maximum percentage of the average duration between two normal beats. Any duration above that percentage will be labeled an N-N Delay.
19	N-N Pause	Sets the maximum duration, in milliseconds (msec), between two normal beats that will be considered normal. Any duration above that limit will be labeled a significant N-N Pause.
20	Atrial Fibrillation	Commonly called A-fib or AF, this irregular heartbeat causes the atria to quiver and prevents them from effectively moving blood into the ventricles. It can lead to stroke or other heart-related complications.
21	Note	This is the record that the user who attached the AT-patch directly saved to the AT-patch when symptoms occurred. When symptoms are manifested, pressing the power key of AT-patch is saved as a symptom event, and the saved data can be loaded as AT-report through AT-patch and AT-note App.
22	Noise	Noise caused by various causes such as noise due to muscle movement, noise due to movement, noise due to breathing, noise due to AT-patch contact, etc.
23	User Appended	Indicates the event area designated by the user using AT-report in the xx Second Strip Plot. Refer to [xx Second Strip Plot] → [Send Report Box].

2) Move function in Event Graph Plot

Event Graph Plot shows all events included in the date selected in the Date Tab.

Figure 10.118 Events Graph Plot

Click the pentagonal area to move right/left in the current event

3) Add Report/Remove Report function in Event Graph Plot

This function is a function that the user can add or delete to the report for each event in the Event Graph Plot.

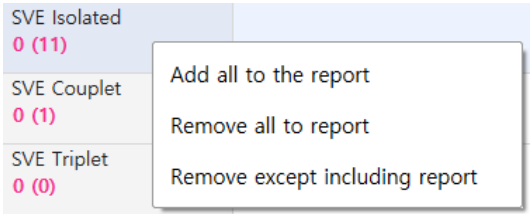


Figure 10.119 Add Report/Remove Report function

In [Figure 10.119 Add Report / Remove Report Function], in “XX(YYY)” displayed under each event, the preceding “XX” means the number of events added to the report, and “(YYY)” is the current Event Graph Plot. It means the total number of each Event in.

■ Add all to the report – If you select this function, all events included in the Event Graph plot are added to the report.

■ Remove all to report – If this function is selected, all events included in the Event Graph plot can be deleted from the Report.

■ Remove except including report-If you select this function, all events except those included in the report are deleted from the report.

10.6.5.5 Seconds Strip Plot – [Figure 10.113 Events Tab screen - ④]

Refer to [10.6.3.5 seconds Strip Plot]

10.6.6 AT-Note Tab

10.6.6.1 AT-Note Tab screen

Figure 10.120 AT-Note Tab screen

1) Date Tab – [Figure 10.120 AT-Note Tab screen - ①]

In AT-note Tab, Date Tab indicates the date you are currently working in History Menu. To change the date the user wants, the date information can be changed by clicking the left mouse button or using the keyboard hotkey. The selected date has a red line below the date as shown in the picture above.

2) AT-note Edit button – [Figure 10.120 AT-Note Tab screen - ②]

It is a function to create or delete the contents of the symptom note list in AT-note Tab.

Figure 10.121 AT-Note Edit button

■ Create button

User symptom notes can be added to the AT-note List of the current AT-note Tab by using the Create function. When you click the Create button, a window as shown in [Fig. 10.122 Create button] appears, and you can enter the Start/End time of the date you want and select Symptoms and Activity. In addition, the user can directly input the content that the user wants to input in the Comment field. If you want to include the entered symptoms note in the report, you can select the "Add to report" check box.

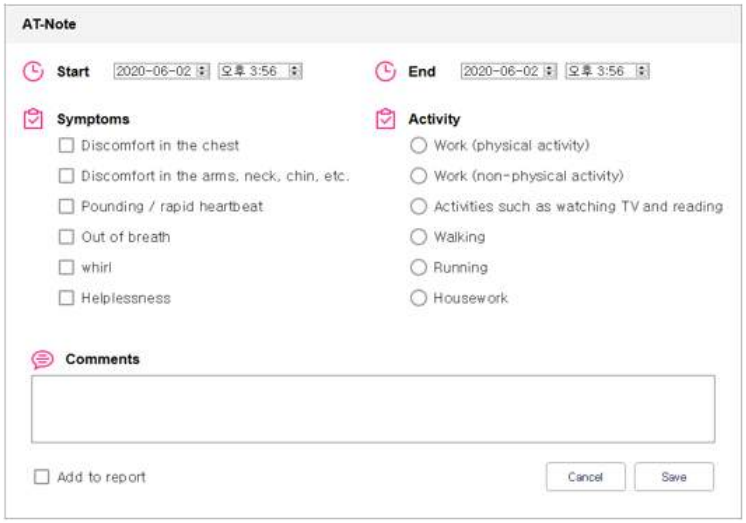


Figure 10.122 Create button

■ Delete button

Figure 10.123 AT-note delete function

You can delete the symptom stored in the AT-note List by using the Delete function. If you select the Select Check Box button of the list you want to delete and click the Delete button, the symptom item in the AT-note List is deleted.

3) AT-Note List – [Figure 10.120 AT-Note Tab screen - ③]

AT-note List is a part that displays symptom note data received from AT-patch and symptom note data downloaded from smartphone. This function can be viewed as a function that shows the contents written by AT-patch users while using AT-patch.

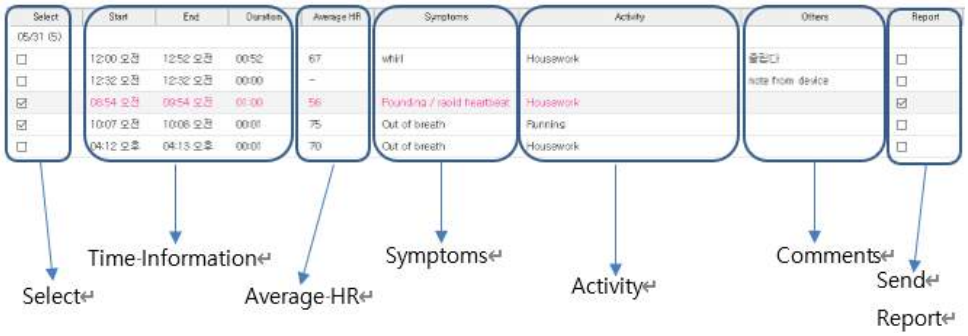


Figure 10.124 AT-Note List

■ Select: This is a check box used to select the list to be deleted from the AT-note List.

■ Time Information: Displays AT-note time information. Start represents the start time of writing the symptom note, and End represents the time at which the symptom note was completed. Duration means the time interval between Start and End.

■ Average HR: If a symptom note is written, it shows the average HR during the written time.

■ Symptoms: Symptoms that can be expressed using the Create function of a smartphone and AT-report are the following 6 items.

Figure 10.125 Symptom list for writing symptoms

■ Activity: The activity area that can be expressed using the Create function of a smartphone and AT-report is the following 6 items.

■ Comments: This is a data item that can be directly entered by the user or patient as desired..

■ Send Report Check Box: If the user wants to include symptoms in the current AT-Note List in the Report Tab, selecting this Check Box will add it to the final report of the report.

4) Seconds Strip operation when selecting an item in the AT-Note List

As in [Figure 10.126 Seconds Strip Plot operation when selecting AT-Note item], when the user selects the desired AT-note List data using the left mouse button, the selected data turns red and the selected symptom note data is displayed. The Indicator Line of the Seconds Strip Plot is located in the center.

Figure 10.126 Seconds Strip operation when selecting an item in the AT-Note List

5) Seconds Strip Plot – [Figure 10.120 AT-Note Tab screen - ④]

Refer to [10.6.3.5 Seconds Strip Plot]

6) Error message according to user action in AT-Note Tab

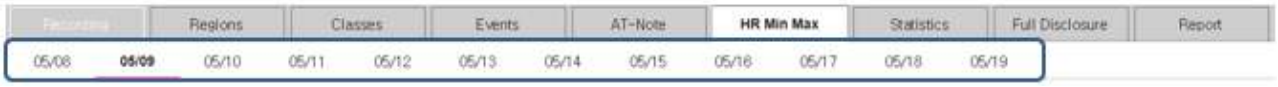
Error message	Detail
Select notes first Select notes to delete	When clicking the Delete Note button without selecting any data
Time is not valid Please enter the start time	When you enter an invalid start time when adding a note
Time is not valid Please enter the end time	When you enter an invalid end time when adding a note
Error occurred The note cannot be added Please try again	When you cannot add a note for an unknown reason

10.6.7 HR MIN/MAX Tab

10.6.6.1 HR MIN/MAX Tab screen

Figure 10.127 HR MIN/MAX Tab screen

10.6.6.2 Date Tab – [Figure 10.127 HR MIN/MAX Tab screen - ①]



In HR MIN/MAX Tab, Date Tab indicates the date you are currently working on in the History Menu. To change the date the user wants, click the left mouse button or use the keyboard hotkey to change the date information.

The selected date has a red line below the date as shown in the picture above.

10.6.6.3 Average HR Plot – [Figure 10.127 HR MIN/MAX Tab screen - ②]

1) Average HR: Average HR represents the heart rate per minute in the area where the indicator line is located.

Figure 10.128 Average HR Graph

2) Average HR Plot: Displays the average HR graph of the day for the date selected in the Date Tab, and includes the Maximum HR Graph / Average HR Graph / Minimum HR Graph.

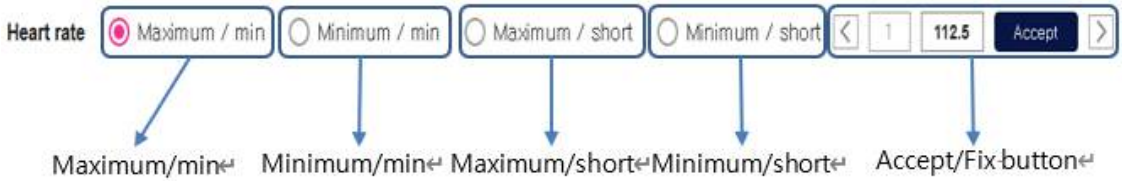


Figure 10.129 Average HR Plot

Figure 10.130 Search HR Function in HR MIN/MAX

3) Maximum/Min: This is a function that finds the highest heart rate per minute shown in Average HR Plot. The point with the highest heart rate in the signal analyzed by AT-report becomes Index 1, and the heart rate decreases sequentially, and the index increases.

4) Minimum/Min: This is a function that finds the lowest Heart Rate per minute value shown in Average HR Plot. In the signal analyzed by AT-report, the point with the lowest heart rate becomes Index 1, and the heart rate increases sequentially, and the index increases.

5) Maximum/Short: This function finds the point where the interval between instantaneous QRS peaks seen in Average HR Plot is the shortest. . In the signal analyzed by AT-report, the point with the shortest interval between QRS peaks becomes Index 1, and the index increases as the interval between QRS peaks increases sequentially.

6) Minimum/Short: This is a function to find the point with the longest interval between instantaneous QRS peaks seen in Average HR Plot. In the signal analyzed by AT-report, the point where the interval between QRS peaks is the longest becomes Index 1, and the index increases as the interval between QRS peaks decreases sequentially.

Figure 10.131 Accept/Fix function in HR MIN/MAX

7) Accept/Fix button: In HR MIN/MAX Tab, this is a function that allows the user to select 4 items of Heart Rate “Maximum/min”, “Minimum/min”, “Maximum/short”, and “Minimum/short”. By using the left and right arrow buttons, you can check the location of the time point where the heart rate is reflected in the order of the largest (or smallest) value of the selected item. ECG can be checked. When the user makes a decision by pressing the “Accept” button at the location where the correct value is judged to be reflected, the location is saved as a Min/Max value. For items that have already been “fixed”, the “Accept” button is deactivated and the indicator line appears on the graph.

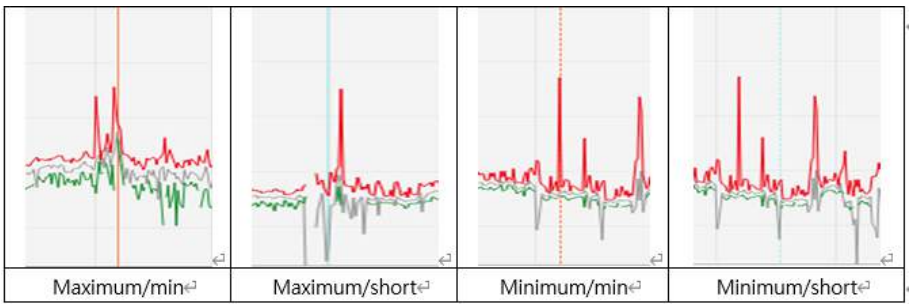


Figure 10.132 Indicator Line in HR MIN/MAX

When changing an item that has already been fixed, click the left and right arrows and cancel the decision by selecting the “OK” button in the Question message of [Fig. 10.133 Cancellation confirmation warning message].

Figure 10.133 Cancellation confirmation warning message

10.6.6.4 Seconds Strip Plot – [Figure 10.127 HR MIN/MAX Tab screen - ③]

Refer to [10.6.3.5 Seconds Strip Plot]

10.6.7 Statistics Tab

10.6.7.1 Statistics Tab screen

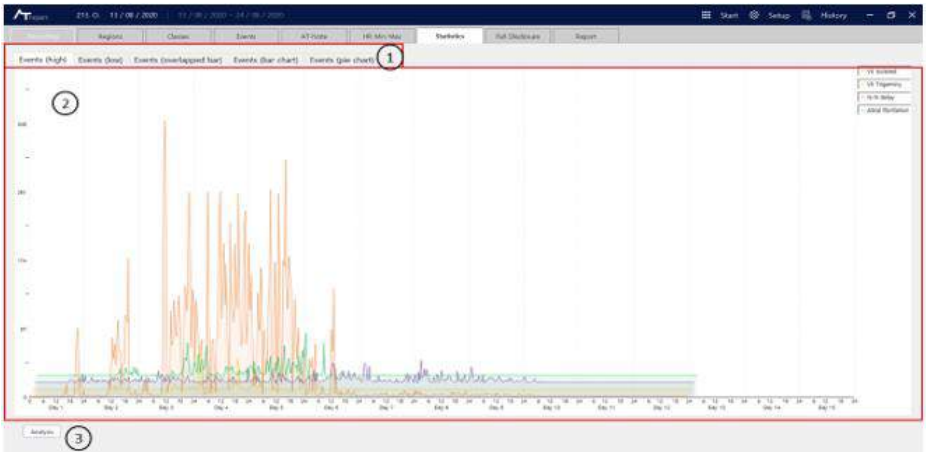


Figure 10.134 Statistics Tab screen

10.6.7.2 Plot Events Tab – [Figure 10.134 Statistics Tab screen - ①]

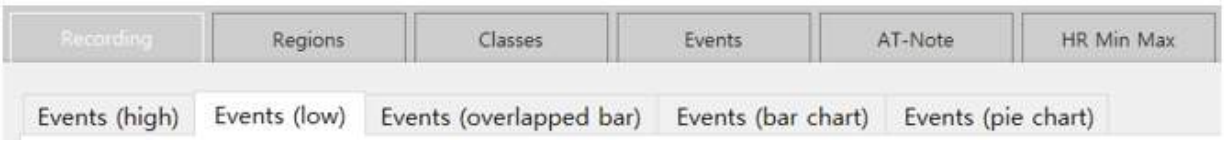


Figure 10.135 Plot events area in Statistics Tab

In the Plot Events area, you can check the QRS label and statistical graph based on each event in the Statistics Tab. You can select graphs and data for each event and chart in ① item. After selecting the item, click the Analysis icon in ③, and the graph will appear on the screen as shown in ②.

10.6.7.3 Graph area – [Figure 10.134 Statistics Tab screen - ②]

Figure 10.136 Overlapped Bar/Bar Chart/Pie Chart Graph

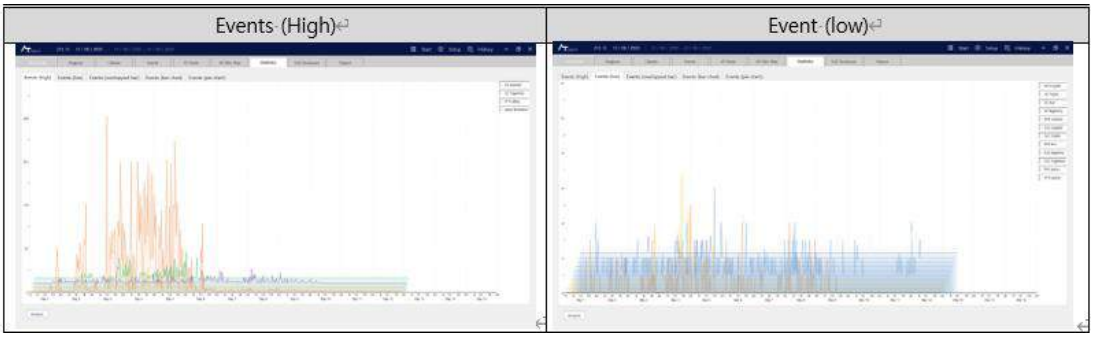


Figure 10.136 High/Low Graph

10.6.7.4 Analysis – [Figure 10.134 Statistics Tab screen - ③]

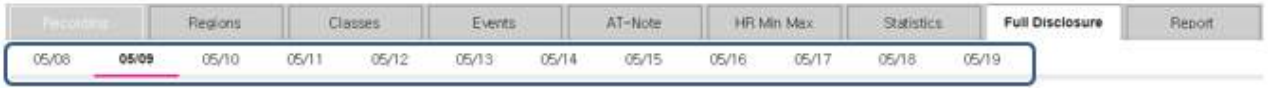
To view the statistical graph and data for the ECG data in the selected Plot Events, statistical analysis of the ECG data is required, and the Analysis button is to execute it. If you click this button and run it, the graph appears in the graph area.

10.6.8 Full Disclosure Tab

10.6.8.1 Full Disclosure Tab screen

Figure 10.137 Full Disclosure Tab screen

10.6.8.2 Date Tab – [Figure 10.137 Full Disclosure Tab screen - ①]



In the Full Disclosure Tab, the Date Tab indicates the date you are currently working on in the History Menu. To change the date the user wants, click the left mouse button or use the keyboard hotkey to change the date information.

The selected date has a red line below the date as shown in the picture above.

10.6.8.3 Strip item – [Figure10.137 Full Disclosure Tab screen - ②]

Figure 10.138 Selection option box in Full Disclosure Tab

1) Amplitude Selection Box: This is a drop box that controls the amplitude of Signal Plot of Full Disclosure. Amplitude can be adjusted by selecting a value between “x0.5 ~ x2.0”.

Figure 10.139 Signal Plot at Amplitude x 0.5

Figure 10.140 Signal Plot at Amplitude x 2.0

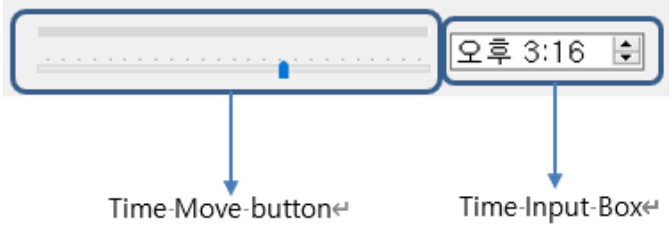
2) Time Range Selection Box: This is a Drop Box that controls the Time Range of Signal Plot of Full Disclosure. Time can be adjusted with a value between “x10sec ~ x180sec”

Figure 10.141 Signal Plot when Time Range is x 10sec

Figure 10.142 Signal Plot when Time Range is x 180sec

3) Time Control Box

Time Control Box is a function to designate the area the user wants to move in the Full Disclosure Tab and make it move as it is.



■ Time Move button: This is a function that allows the user to directly move the Time Control Bar with the mouse to see the desired time point.

■ Time Input Box: This is a function that allows the user to directly input the desired time in text format and move it to the desired time point.

10.6.8.4 Signal Display option – [Figure 10.137 Full Disclosure Tab screen - ③]

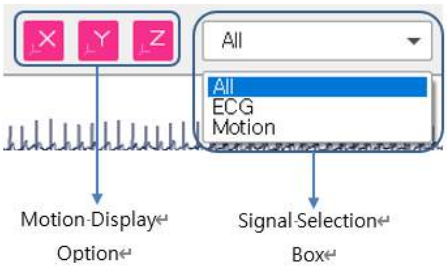


Figure 10.143 Signal Display option

1) Motion Display Option: This is a button to select X-axis data, Y-axis data, and Z-axis data of Motion Plot data displayed in Signal Plot. When the user selects the axis he wants to see from the 3 axis data he wants to see, it appears in the signal plot.

2) Signal Selection Box-This is a button to select the type of signal expressed in the Signal Plot. There are three options: All/ECG/Motion.

■ All: It expresses both ECG and Motion Signal.

■ ECG: Only the ECG signal is expressed in the Signal Plot.

■ Motion: Only motion signals are expressed in Signal Plot.

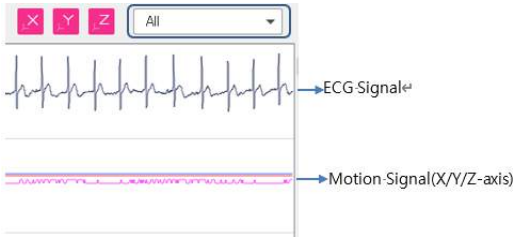


Figure 10.144 In case of signal selection box is 'all'

Figure 10.145 In case of signal selection box is 'ECG'

Figure 10.146 In case of signal selection box is 'Motion'

10.6.8.5 Signal Plot – [Figure 10.137 Full Disclosure Tab screen - ④]

Signal Plot is an area that expresses the signal selected by the user in the Full Disclosure Tab. In this area, the ECG can be checked in a full screen that is wider and longer than the time range of the existing signal, so it can be useful when viewing the overall signal flow.

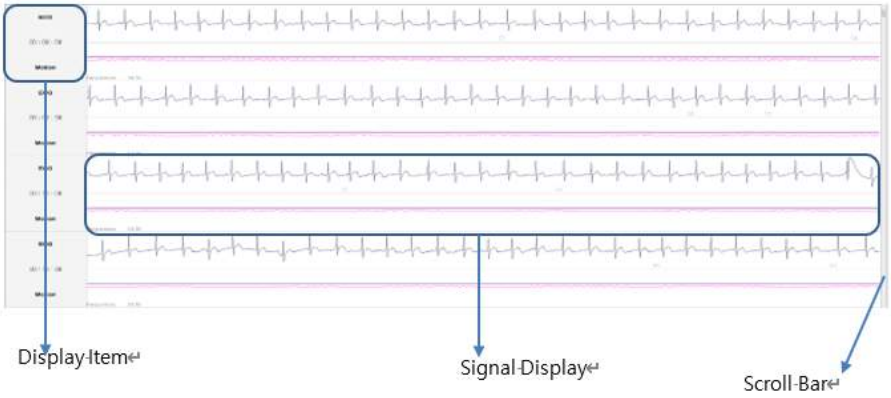


Figure 10.147 Signal Plot'

1) Display item: This area displays the type of signal and time information displayed in the Signal Display area, and can be viewed including ECG / Motion / time information.

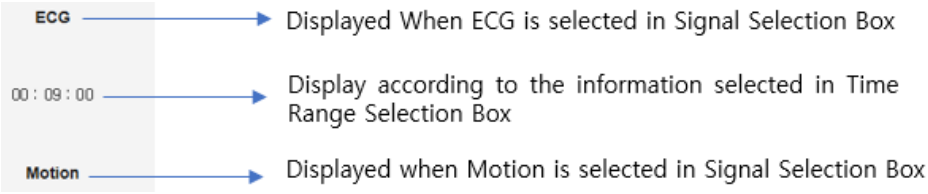


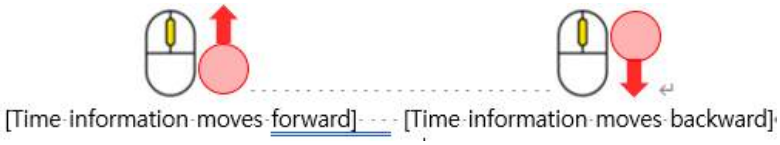
Figure 10.148 Description of Display item'

2) Signal Display

As shown in [Fig. 10.149 Description of Signal Display], the Signal Selection Box displays the selected information and additional device temperature information. Device information is displayed as "Temperature: xx.xx" in the Signal Display area, and a number indicating HR (heart rate) is displayed between graphs of each signal. You can use the scroll bar to move up and down the Signal Display.

Figure 10.149 Description of Signal Display

10.6.8.6 How to move the time range using the mouse in the signal display area



Move the mouse wheel up/down to move the time information forward or backward.

10.6.8.7 How to specify noise in the signal display area

In the Full Disclosure Tab, the user can designate an area and set it as a noise section.

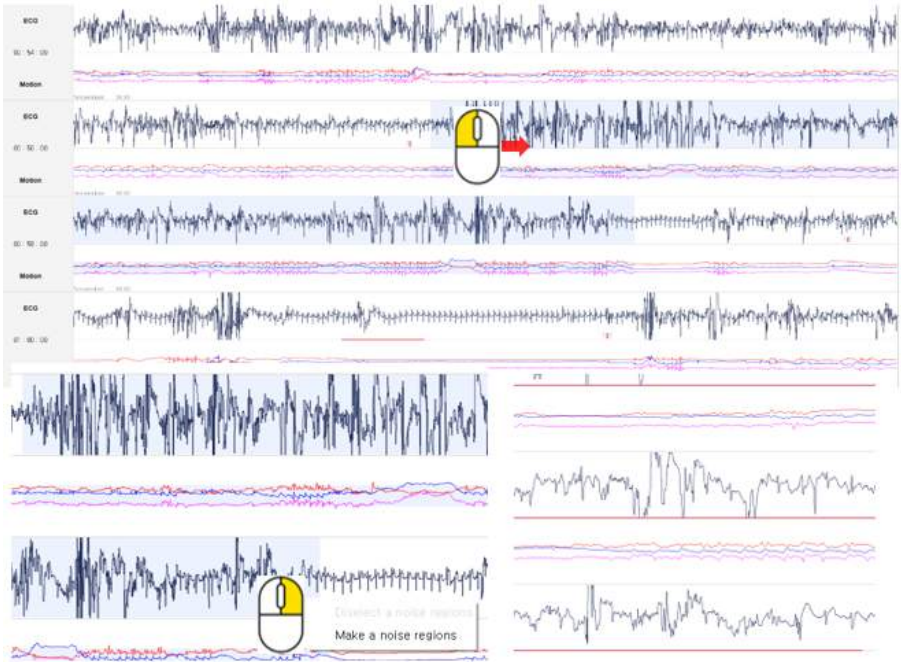


Figure 10.150 Noise area designation function

As shown in the figure at the top of [Fig. 10.150 Noise area designation function], select the desired area with Click & Drag using the left button of the mouse in the Signal Display area and click the right mouse button. A pop-up box appears as shown in the picture in

There are two items in the pop-up box, “Make a noise Regions” and “Deselect a noise Regions”. When the user selects “Make a noise Regions”, the figure at the bottom left of [Fig. 10.150 Noise area designation function] As shown, a red line appears at the bottom of the selection area and is set as the noise area.

To cancel the set noise area, right-click on the set noise area (the area where the red line exists) and select “Deselect a noise Regions”.

10.6.9 Report Tab

10.6.9.1 Report Tab screen

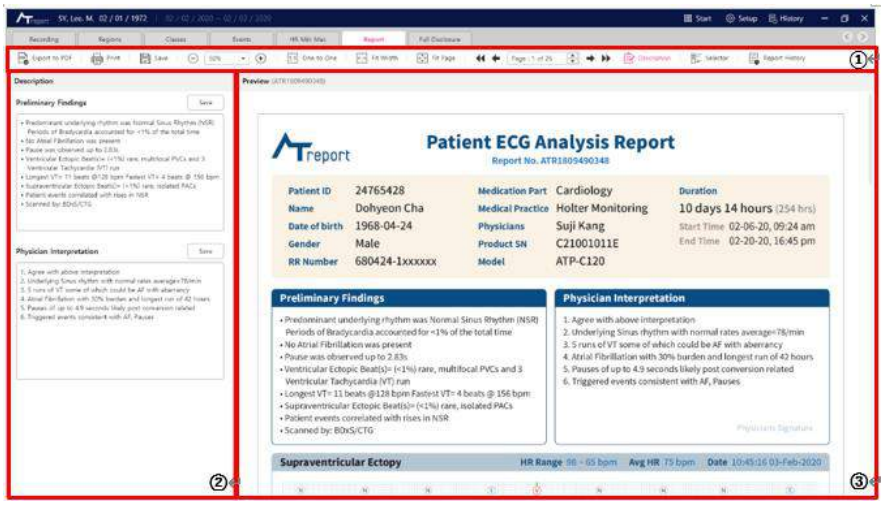
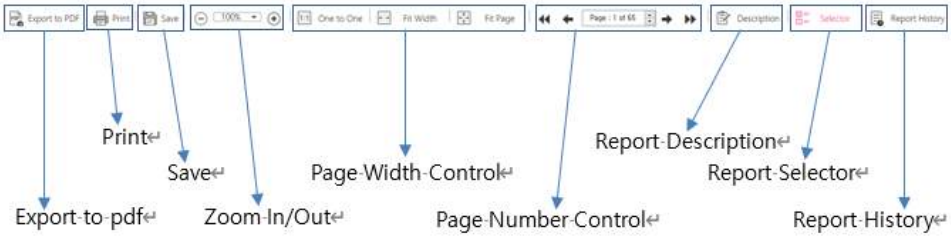


Figure 10.151 Report Tab screen

10.6.9.2 Control button box – [Figure 10.151 Report Tab screen - ①]



1) Export to pdf: This is a button that makes the final report out as a report into pdf. After pressing this button, you can save the folder under the desired name.

2) Print: Used to print the final report out of Report.

3) Save: It is used to save the final report from Report.

4) Zoom In/Out: Used for Zoom In/Out of the final report that came out as a report.

5) Page Width Control

1:1 (one to one) is the size of the report when the value of the zoom setting box is 100%, and is displayed on the screen. Fit Width is a function that adjusts the size of the report to fit the width of the page currently being viewed by the user, and Fit Page is a function that adjusts the size of the report to fit 1 page within the screen currently being viewed by the user.

6) Page Number Control:

The total number of pages of the final report that came out as a report is displayed, and the user can move to the desired page. “Go to first page” moves to the first page of the report final report, “go to previous page” moves to 1 page before the current page, and “go to next page” moves to 1 page after the current page. And “go to last page” moves to the last page of the final report.

7) Report Description:

Report Description is a button to select the option to insert “Preliminary Finding” and “Physician Interpretation” into the final report of the report.

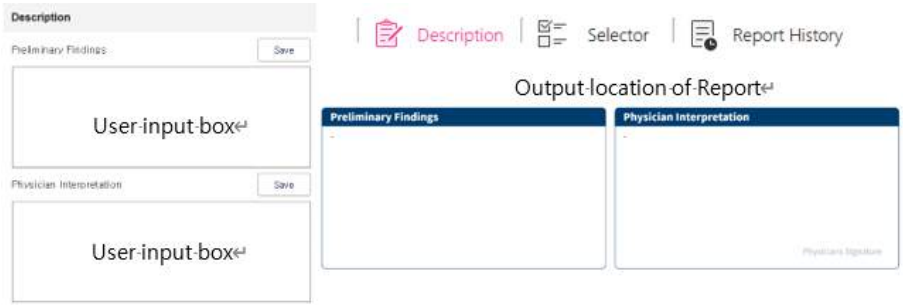


Figure 10.152 Report description

8) Report Selector:

Report Shows the user's choice for the contents of the report displayed in the final report.

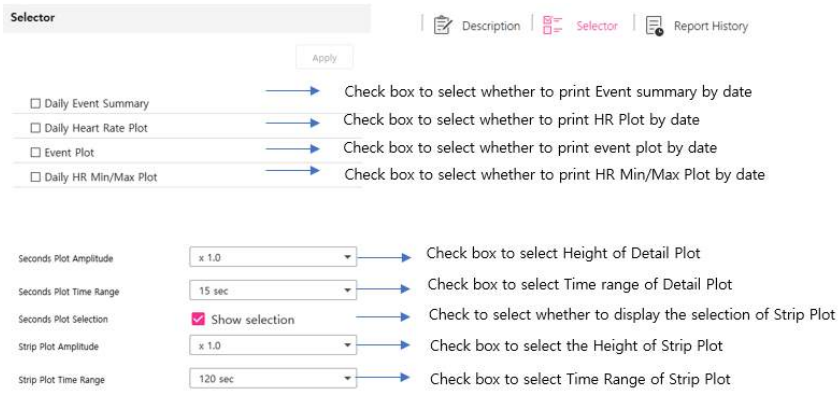


Figure 10.153 Report Selector

■ Day Events Summary: Report This is a check box that displays the summary of ECG Events by date when outputting the contents of each ECG event in the final report.

■ Day HR Plot: When outputting the HR Plot included in the Report Final Report, the HR Plot for each day and the corresponding 6 Events (Tachycardia/Bradycardia/User Appended/Note/RR Pause/Atrial Fibrillation) are displayed including the time of occurrence. do.

■ Detail Events: Report Displays detailed ECG events included in the final report.

■ Detail Plot Height: This is a drop box that selects the height of the detail plot added to the final report.

■ Detail Plot Length: Report This is a drop box that selects the time range of the detail plot added to the final report.

■ Strip Plot Height: This is a drop box that selects the height of the strip plot added to the final report.

■ Strip Plot Length: This is a drop box that selects the time range of the strip plot added to the report final report.

9) Report History:

Report History is a function that saves the history of the final report operation in the Report Tab.

Figure 10.154 Report History

If you look at the Report History in [Figure 10.154 Report History], there are History corresponding to “Saved”, “PDF” and “Printed”. The first item corresponding to “Save” is to save the final report like the above History, and the second “PDF” is to save the report final report as a PDF file. The third “Printed” is to save the history of the print operation after printing the final report.

In addition, the report history list selected by the user is changed to red as shown in [Figure 10.154 Report History], and the user can use the right mouse button to delete the list of the list saved in Report History. Select an item to be deleted from the list and click the right mouse button to display the “Delete selected report” pop-up box. Click the box to delete the selected Report History list.

10.6.9.3 Error message according to user operation in Report tab

Error message	Detail
Failed to save report	When a report cannot be saved for an unknown reason
Failed to export pdf	When a report cannot be saved as a PDF for an unknown reason
Loading report error Cannot load saved report	When the saved report cannot be loaded for an unknown reason

10.7 Explanation of various operations of AT-Report

10.7.1 AT-report area selection function

To select an area in AT-report, click the left mouse button as shown below.

Figure 10.155 AT-Report area selection function

10.7.2 Modification function of Seconds Strip Plot

10.7.2.1 Function to change time in Seconds Strip Plot

If you click the left mouse button ( ) while holding down the Shift ( ) key in the Seconds Strip Plot, an indicator line is created in the clicked part, and the time changes. The color of the indicator varies depending on whether the QRS label is selected.

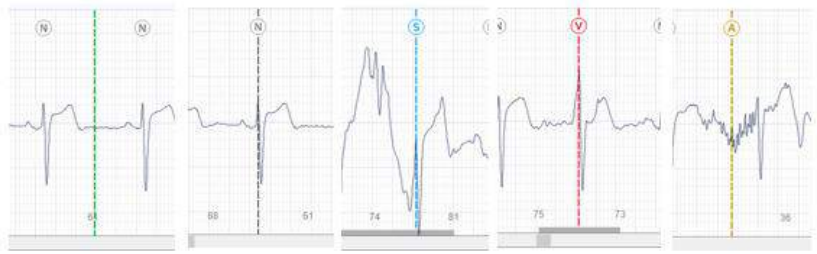


Figure 10.156 Indicator color according to None/Normal/Supraventricular/Ventricular/Artifact

10.7.2.2 Function to locate the indicator line in the center

When changing the current time in another plot or setting the selected time to the current time by pressing the space key( ), the indicator changes to a solid line while moving to the center.

Figure 10.157 Indicator color according to whether the selected time matches the current time

10.7.2.3 Editing function of QRS Label in Indicator Line

1) Change QRS Label

If the QRS Label is selected at the selected time, you can change the QRS Label with a shortcut such as N/S/A/V. You can also change it from the right-click pop-up menu.

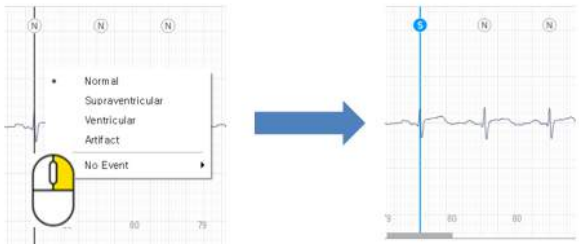


Figure 10.158 Right mouse button popup menu

2) Use of N/S/A/V shortcut keys in Class Tab/Sub-class Tab

The QRS Label of the selected Group Class QRS Label Card is changed.

3) Add QRS Label

To add a QRS Label in the Seconds Strip Plot, press the Shift ( ) key on the keyboard and click the left mouse button ( ) to select an arbitrary area first. When the indicator line is created after selecting an arbitrary area, click

the right mouse button. You can add a QRS Label to an arbitrary area by selecting QRS Label from the pop-up menu that appears with a right-click.

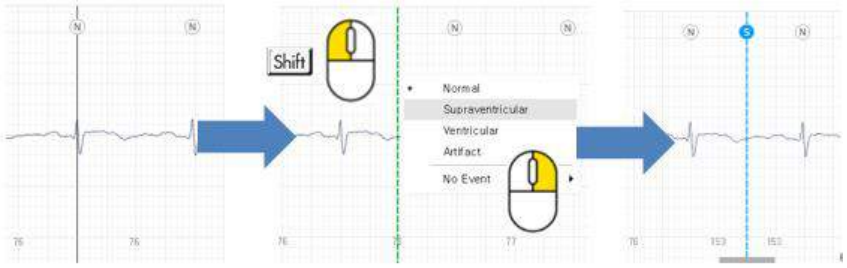


Figure 10.159 Add QRS Label function

4) Move Indicator Line

If QRS Label is selected at the selected time, the position can be adjusted using the Shift + mouse wheel.

5) The QRS Label icon is changed for the changed QRS Label.

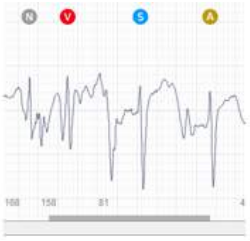


Figure 10.160 Changed QRS Label

6) If the selected time is in the event section, the name of the event is displayed, and you can enter a comment or decide whether to add it to the report. To add an event to the report, select (☑) the check box of ☐Included in report.

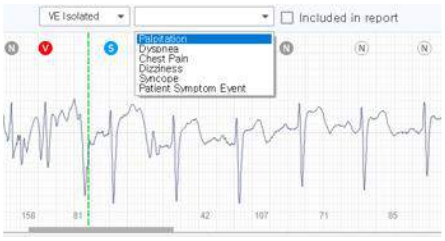


Figure 10.161 Comment input of event/Whether to add a report

7) Add Event symptom in Seconds Strip Plot

As shown in [Figure 10.162 Add Event Symptom], to add an event symptom in the ECG graph of the Seconds Strip Plot, the user can use Click & Drag of the left mouse button. After designating the time range of a certain area by using the left mouse button, and clicking the right mouse button, a box for selecting an event symptom appears. Event symptom is added by selecting the desired Event from the box.

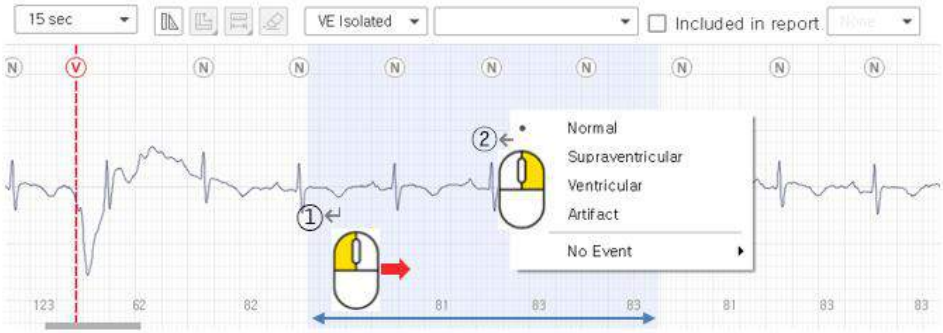


Figure 10.162 Add Event Symptom

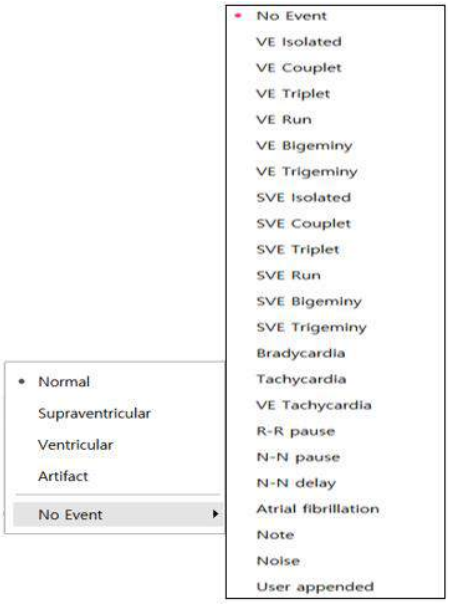


Figure 10.163 Event Symptom List

10.7.3 Hotkey in Move Seconds Strip Plot

The following two methods can be used to move the ECG graph of the Seconds Strip Plot left and right in the Time Domain.

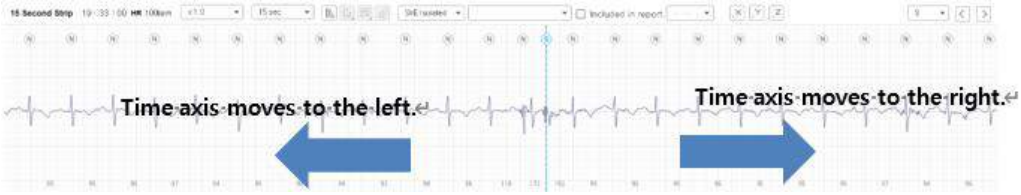
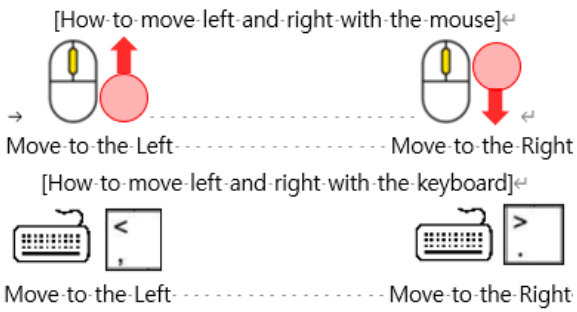


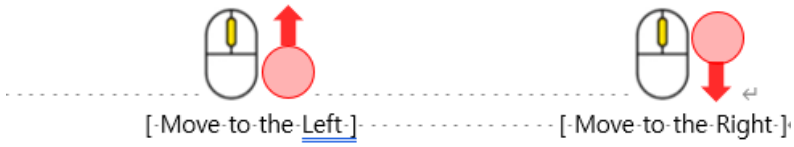
Figure 10.164 Time axis movement method in Seconds Strip Plot



10.7.4 Moving function of Indicator Line in Average HR Plot of Regions Tab.

Figure 10.165 Movement function of Indicator Line

In [Figure 10.165 Movement Function of Indicator Line], when the mouse wheel is moved up and down in Average HR Plot, the indicator line moves left and right.



10.7.5 Zoom In/Out function of Average HR Plot

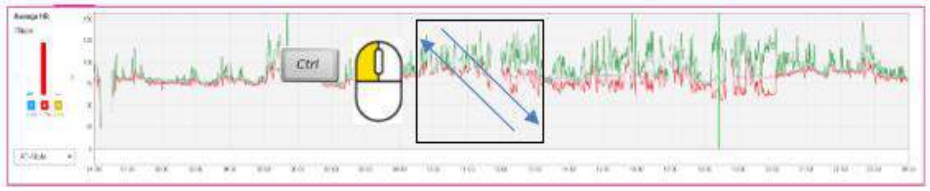


Figure 10.166 Zoom In/Out function of Average HR Plot

When clicking & dragging in the diagonal direction using 'ctrl' + the left mouse button, an expanded square is generated and zoomed in according to the shape.

When you click in the order of Zoom In using 'ctrl' + the right button of the mouse, the zoom out one by one in the click order.

When Click 'ctrl' + the mouse wheel to become Zoom Fit.

10.7.6 Modification function in Sub-class QRS Label Card

10.7.6.1 Sub-class QRS Label Card Change method

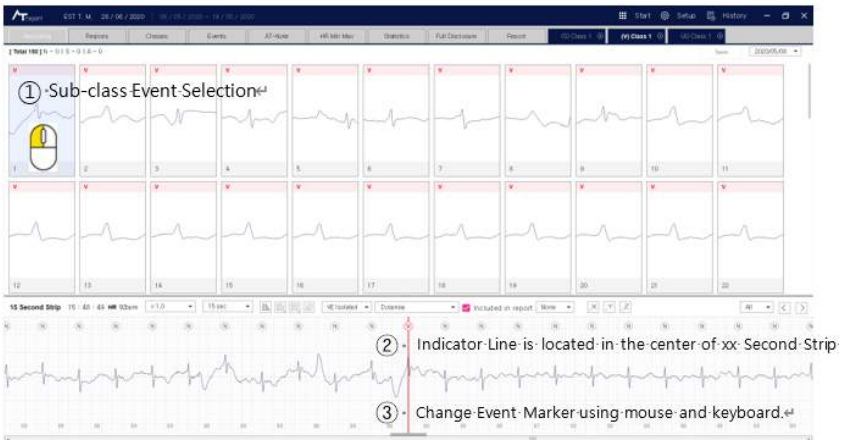


Figure 10.167 Sub-class QRS Label Card change method

In order to change the sub-class QRS label card with the indicator line in the center as ② of [Fig. 10.167 Sub-class QRS Label Card Change Method], [10.7.2.3] of [10.7.2 Seconds Strip Plot Modification]. ① Change QRS Label] function can be referred.

After that, when the sub-class QRS Label is changed, it automatically moves to the next Index (Index 1 → Index 2 → Index 3). This operation can be done continuously and repeatedly, and finally, when the user modifies the last sub-class QRS label (modify the QRS label using the keyboard or the right mouse button), press the Enter key on the keyboard to the next sub-class tab. You can move to.

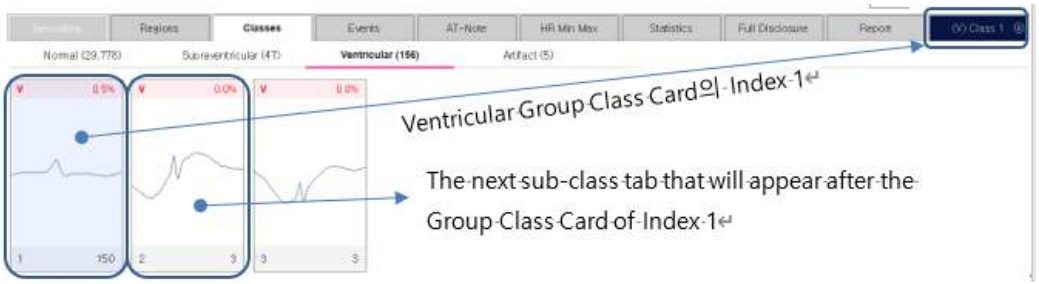


Figure 10.168 Creation Index of Sub-class Tab in Group Class QRS Label Card

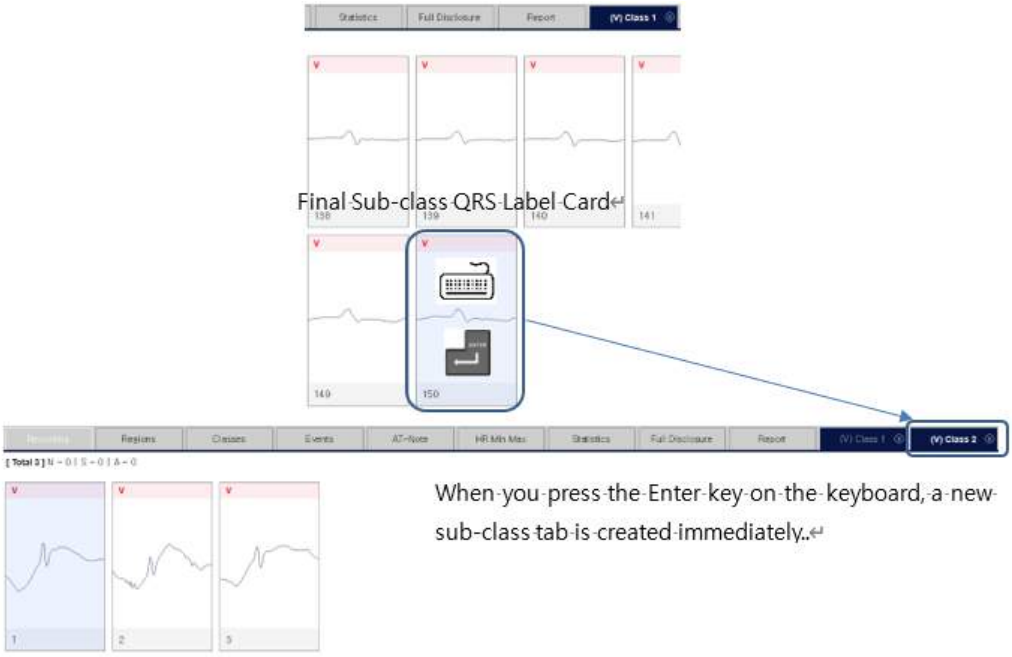


Figure 10.169 Additional generation method of newly created sub-class tab

10.7.7 Time Sync function of Indicator Line

When the user selects a specific area (Plot / Class or Sub-class Card / List Data) that the indicator line used in the AT-report is the indicator line in the plots used in each tab, Time information is also arranged in the center.

In Average HR Plot of [Figure 10.170 Time Sync Function of Indicator Line], if you click the left mouse button as in ① to create an Indicator Line, the Indicator Lin is located in the center of the entire Time Range of the Strips Plot and Seconds Strip Plot.

As in ②, if you click the left mouse button on the Strips Plot and move the Indicator Line, the Indicator Line of the Strips Plot moves to the location you want. The Indicator Line of the Average HR Plot is the time specified in the Strips Plot, and the Indicator Line of the Seconds Strips Plot Moves to the center

Figure 10.170 Time Sync Function of Indicator Line

10.8 AT-Report Hotkey

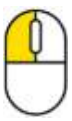
Division	Action	Description
AT-Report	1 key (1)	Move to Regions Tab
	2 key (2)	Move to Classes Tab
	3 key (3)	Move to Events Tab
	4 key (4)	Move to AT-Note Tab
	5 key (5)	Move to HR Min Max Tab
	6 key (6)	Move to Statistics Tab
	7 key (7)	Move to Full Disclosure Tab
	8 key (8)	Move to Report Tab
	9 key (9)	Move to left Subclass
	0 key (0)	Move to right Subclass
Second Strip Plot	N / S / V / A key (N S V A)	QRS label modification (except for Classes, Sub-class Tab: click the mouse right to edit)
	Delete key (Delete)	Delete QRS label (except for Sub-class Tab: Selected sub-class card is deleted)
	Space key (Space)	Arrange the graph so that the selected timeline is centered
	[key ([ )	Move to previous QRS label
	] key ( ])	Move to next QRS label

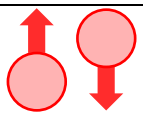
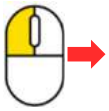
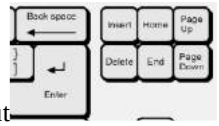
	, key (,)	Move to graph left
	. key (.)	Move to graph right
	Wheel	Move according to graph wheel motion
	SHIFT + , key (↑ Shift + ,)	Move to the left of the selected QRS label or Indicator Line
	SHIFT + . key (↑ Shift + .)	Move to the right of the selected QRS label or Indicator Line
	SHIFT + Wheel (↑ Shift + )	Move according to selected QRS label or Indicator Line wheel motion
	CTRL + Left drag & Drop (Ctrl + )	1-step Zoom-in
	CTRL + Right Click (Ctrl + )	1-step Zoom-out
	CTRL + Wheel click (Ctrl + )	Zoom-Fit
Regions Tab	− key	Move to previous date
	= / + key	Move to next date
Classes Tab	N / S / V / A key (N S V A)	Modify the QRS label for all selected class cards
	↑ / ↓ / ← / → key	Move in Class card
	Home / End key (Home / End)	Move to the first and last class card
	PgUp/PgDn Key (Page Up / Page Down)	Same as ↑/↓ motion
	− key	Move to previous date
	= / + key	Move to next date
	F5 / CTRL + s key (F5 / Ctrl + S)	Save
Subclass Tab	N / S / V / A key (N S V A)	Modify the QRS label of the selected subclass card
	↑ / ↓ / ← / → key	Move in Sub-class card
	Home / End key	Move to the first and last class card

	(Home / End)	
	PgUp / PgDn Key (Page Up / Page Down)	Same as ↑/↓ motion
	Enter key (Enter)	When it is the last subclass card, it moves to the next subclass
	F5 / CTRL + s key (F5 / Ctrl + S)	Save
	Delete key	Delete QRS label of selected subclass card
Events Tab	↑ / ↓ key	Move up or down to an existing event
	← / → key	Move to previous, next event
	− key	Move to previous date
	= / + key	Move to next date
HR Min/Max Tab	− key	Move to previous date
	= / + key	Move to next date
Full Disclosure Tab	Page Up(Page Up) Key	Move to up
	Page Down(Page Down) Key	Move to down
	− key	Move to previous date
	= / + key	Move to next date
Average HR Plot	CTRL + Left drag & Drop (Ctrl + 🖱)	1-step Zoom-in
	CTRL + Right Click (Ctrl + 🖱)	1-step Zoom-out
	CTRL + Wheel click (Ctrl + 🖱)	Zoom-Fit

10.9 Explanation of mouse operation in AT-report program

The operation of Mouse and Keyboard in AT-report Program is described in detail in the table below.

Interaction	Mouse Action	Symbol	Description	Use cases
Left Click			Short press and release button/screen (Execute immediately when pressing)	- Button execution - Menu and list selection - Keypad input

Right Click			Short press and release button/screen (Execute immediately when pressing)	- Button execution - Menu and list selection - Keypad input
Scroll			Screen move through scroll	Scroll Bar
Click & Drag			Move the position value through drag after clicking	Drag and Drop
Press			Short press and release button/screen (Execute immediately when pressing)	Keyboard input 
Scroll Click			Clicking the Mouse Scroll button	Scroll button Click

10.10 Displayed error message in AT-Report ATR-C130

In AT-Report S/W (ATR-C130), the following error message may be displayed depending on the user's actions.

10.10.1 When running the program

Error message	Detail
Hashcode does not match. Exits the program. Please contact us. - Phone: +82-70-5220-0220 - E-mail: sales@atsens.com	When program integrity check fails

10.10.2 When log-in

Error message	Detail
You cannot run the program unless you change the password to a valid password.	When you close the password reset window when connecting for the first time
It's been too long since you haven't changed your password. Please change your password.	When the password has been changed for a long time, the password must be reset after 30 days
You cannot run the program unless you change the password.	When the password has been changed for a long time or when the password reset window that appears after the warning window is closed

10.10.3 Related to License

Error message	Detail	Function
AT-report has no license to use caliper. Please change the AT-report to a registered version	When trying to use caliper without license authorization	Detail Plot
AT-report has no license to manage the report. Please change the AT-report to a registered version	When trying to modify a report without license authority	Report Tab

10.10.4 When there is no authorization

Error message	Detail	Function
You can only add users with authority. Please log in as authority and try again	Add user	Setup
Cannot change user's password or authentication You can only change YOUR account or with authority.	Change user password	Setup
You can only delete users with authority. Please log in as authority and try again	Delete user	Setup
You can only save patient data with authority. Please log in as authority and try again	Patient data save authorization	Importer
You can only import ECG data with authority. Please log in as authority and try again	ECG data import authorization	Importer
You can only import note data with authority. Please log in as authority and try again	Note data import authorization	Importer
You can only delete patient data with authority.	Authorization that delete patient	Importer
You can only manage patients with authority. Please log in as authority and try again	Authorization that manage patient	Recording Tab
You can only manage back-up data with authority. Please log in as authority and try again	Authorization that manage back-up data	Recording Tab
You can only back-up data with authority. Please log in as authority and try again	Back-up data authorization	Recording Tab
You can only change class operation with authority. Please log in as authority and try again	Class change operation authorization	Class Tab
You can only change type operation with authority. Please log in as authority and try again	Authorization to change event type	Sub Class Tab
You can only open report history with authority. Please log in as authority and try again	Authorization to open report history	Report tab
You can only save report with authority. Please log in as authority and try again	Authorization to save Report	Report tab
You can only print report with authority. Please log in as authority and try again	Authorization to output Report	Report tab

You can only export PDF with authority. Please log in as authority and try again	Authorization to save report as PDF	Report tab

11. How to Use the Device (ATP-C130)

11.1 How to Use and Attach the Device (ATP-C130)

11.1.1 How to use Device (ATP-C130)

1) Initial devices (Device, ATP-C130) are packaged in “Sleep Mode” and delivered to customers. For patients who want to attach the device, press the button in device for more than 3 seconds. After this, the green LED blinks twice, and after the sound “beep” is generated once, the device is normally changed to “Active Mode”.

2) After attaching the device (Device, ATP-C130) and initially connecting to the App (ATN-C130), the device operates in the normal “Active Mode”, and the device is “Sleep Mode ”, it operates in“ Active Mode ”, and after the device is operated for the duration of use, it automatically enters“ Sleep Mode ”, the red LED flashes once, and the sound“ "beeps" (beep--- beep beep---) “It occurs 3 times.

3) The device (Device, ATP-C130) and AT-Report (PC SW) Hook-up or App connection must be connected only once for the first time, otherwise the connection is terminated as shown in 2). The device does not work properly. After the initial connection, even if AT-Report (PC SW) Hook-up or App Bluetooth is terminated due to reasons, ECG measurement is performed normally.

※ You cannot use the device in case of a PC or mobile phone that does not support the Bluetooth function.

4) Whether the device (Device, ATP-C130) is operating normally can be checked only through real-time live monitoring of the App or AT-Report (PC SW) Hook-up.

5) AT-Patch is not terminated for the period of use (14 days) when the connection is confirmed after the first connection (Connecting).

※ Physical Power-Off is not possible, and it is automatically powered off when the use period (14 days) ends.

※ If you cannot check the buzzer sound and Red LED after the use period of AT-Patch is over, you can check it only with App and AT-Report (PC SW) Hook-up

11.1.2 How to Attach the Device (ATP-C130) to the Human Body

1) Skin Condition before Attaching to the Human Body

The skin care area of the patient should be larger than the area where the Device (ATP-C130) is attached.

If there is a lot of hair in the attachment area, shaving is necessary. However, if there is a wound or bleeding during hair removal, it should be attached after the bleeding has stopped.

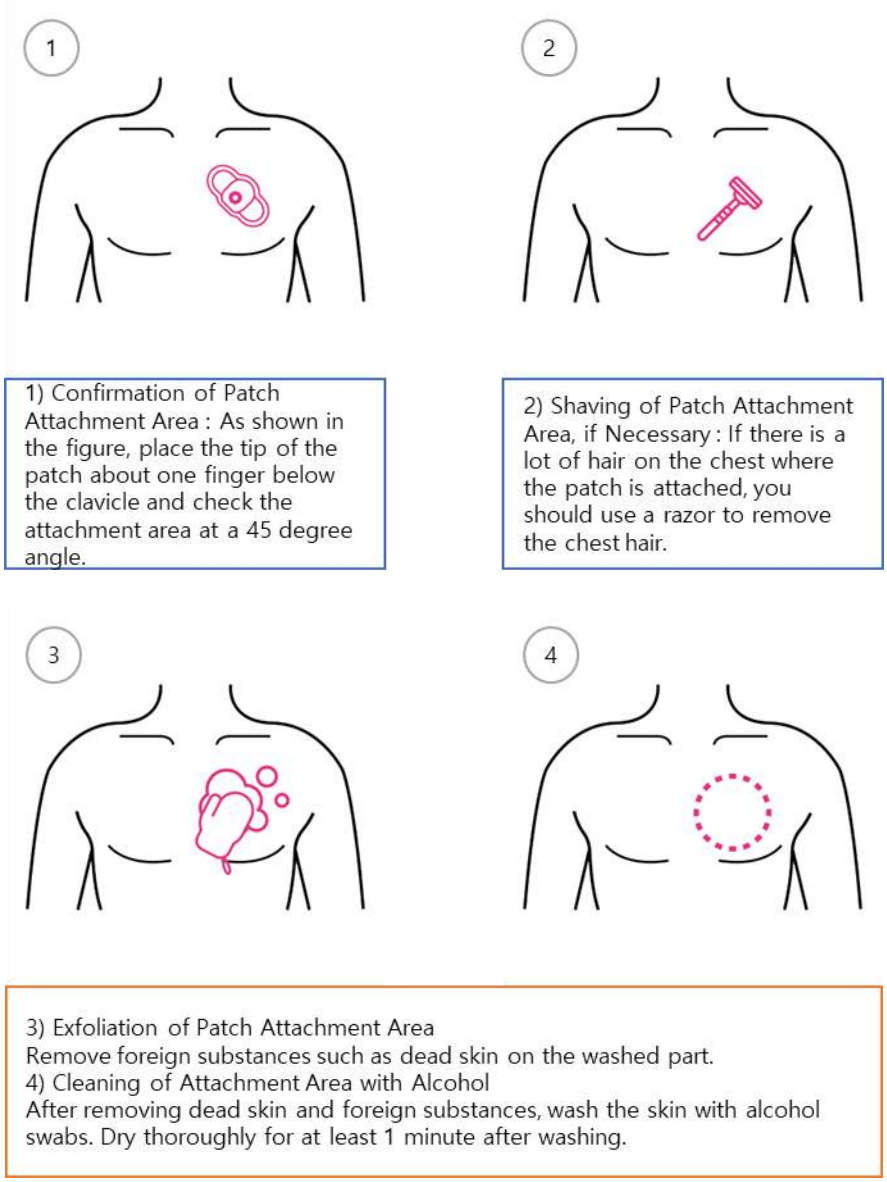


Figure 11.1 Attachment Preparation Step

In order to output the correct ECG signal, slough off foreign substances such as dead skin cells on the attachment area (ex. Exfoliating products for the human body). First, you should remove dead skin cells and foreign substances and clean the attachment area with alcohol swaps. Then you should dry the skin for at least 1 minute to attach the Device (ATP-C130).

Figure 11.2. How to attach ATP-C130

2) How to Attach to the Human Body

After pressing the power button of the device to operate normally, remove the tape to protect the patch as shown in ① of [Figure 11.2]. After attaching the tape removed device to the human body [Figure 11.2] ② As shown in the figure, attach the center part of the clavicle to the body in an inclined direction toward the nipple of the left chest. However, if the chest is large or it is difficult to attach it in an oblique direction, the part facing the nipple must be slightly raised to attach it.

[Figure11.2] ③ Start ECG measurement as shown in the figure. When the device is attached to the human body, press the entire patch so that there is no gap.

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12. How to Install the App (ATN-C130)

12.1 Users of Android

App (ATN-C130) can be downloaded from Android market: Google play (https://play.google.com/store). If it is as shown in [Figure 12.1], it is normally installed.

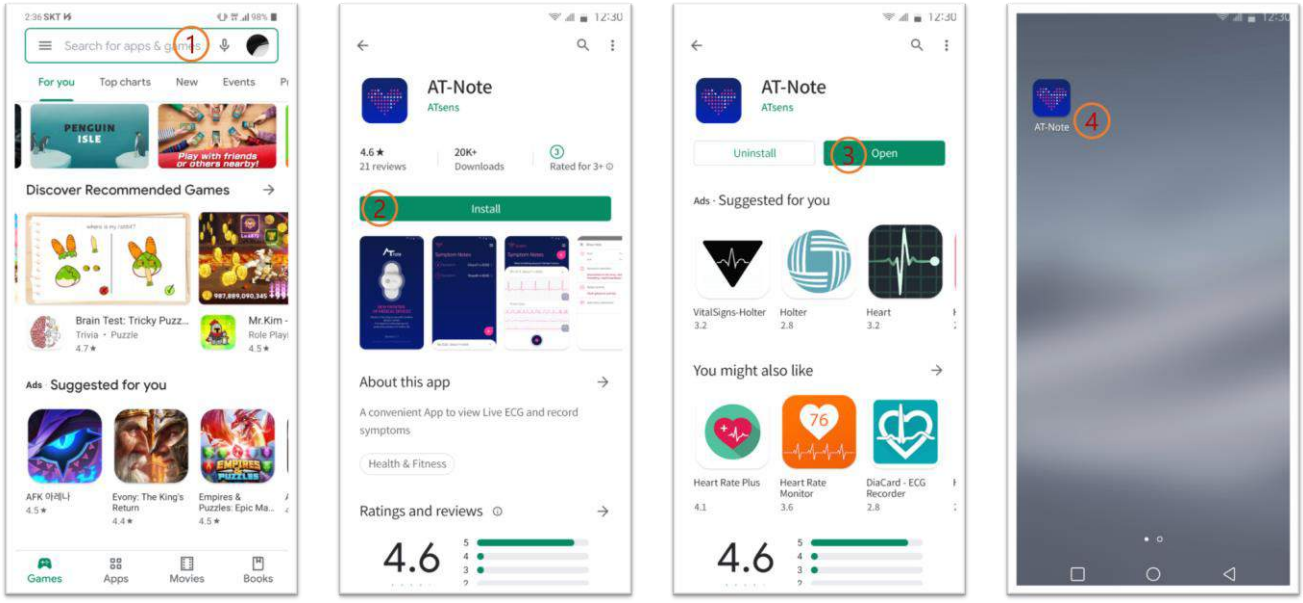

Figure 12.1 How to install App (ATP-C130)

1) In the search window of Android ™ market Google play ™ (https://play.google.com/store) as shown in the picture ① in [Figure 12.1], “ATnote, ATsens, ATpatch”.

2) If [AT-Note] is searched as shown in ② in [Figure 12.1], click [Install] to download and install the app.

3) If the installation is completed as shown in ③ in [Figure 12.1], click [Open] to run the app.

4) If the [AT-Note] icon is normally displayed on the screen of the smartphone as shown in ④ in [Figure 12.1], the installation is completed successfully.

12.2 User of IPhone

App can download the App (ATN-C130) through the IOS Store: App Store^{SM} (https://www.apple.com/ios/app-store/). If it is as shown in [Figure 12.2], it is installed normally

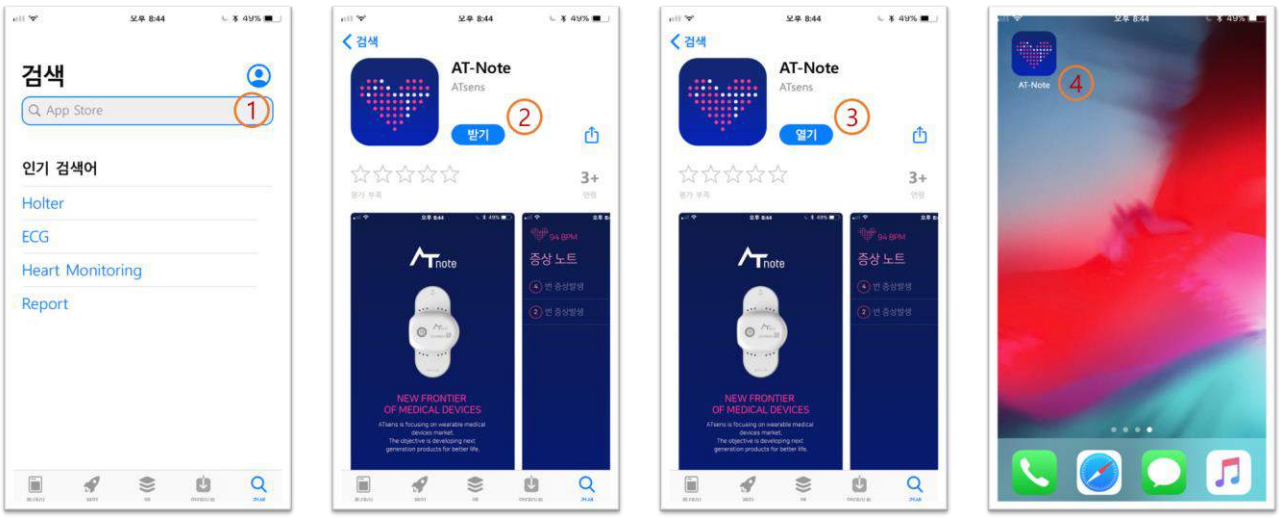

Figure 12.2 How to install App (APK)_iOS

1) In the search term window of IOS Store App Store[SM] (https://www.apple.com/ios/app-store/), as shown in ① in [Figure 12.2], “ATnote, ATsens, ATpatch”.

2) As shown in ② in [Figure 12.2], if [AT-Note] is searched, click [Install] to download and install the app.

3) If the installation is completed as shown in ③ in [Figure 12.2], click [Open] to run the app.

4) If the [AT-Note] icon is normally displayed on the screen of the smartphone as shown in ④ in [Figure 12.2], the installation is completed successfully.

13. Specifications

13.1 ATP-C130 Specifications

ATP-C130		
	Item	**Description**
ECG	Type	BF type
	Sampling Rate	250sample/sec
	Input Offset Dynamic Range	±300mV
	Channel	1 channel
	ADC Resolution	10 bits
	Input Impedance	≥10MΩ
	Frequency Response	0.05Hz to 40Hz
Electrode	AC impedance	Less than 3KΩ(10Hz)
RF	RF communication	2.4GHz BLE 4.2
	Effective Radiated Power	<1mW
	RF Frequency Band of TX	2.4GHz
	Bandwidth of the Receiver	2400 ~ 2480MHz
SW	CPU	ARM Cortex-M4
	Supported App	Android 5.x or iOS 12.x
	Supported PC S/W Version	Window 10
Power Requirement	Power Supply	DC 3V, Coin Battery (CR2032)
	Intended use period	Up to 14 days
Physical Characteristics	Patch Size (L x W x H: mm)	95 x 52.6 x 0.5
	Body Size (L x W x H: mm)	31 x 39 x 7.8
	Weight(g)	Below 13g
	Lifetime	12 months

14. Usage and Storage condition

14.1 Conditions of use

1) Temperature range: 10 ~ 45℃

2) Range of relative humidity: 10 ~ 95%, non-condensing

3) Range of atmospheric pressure: 700 ~ 1060hPa

4) Rating for water and dust resistance: IP57

14.2 Storage conditions

1) Temperature range: -20 ~ 55℃

2) Range of relative humidity: 0 ~ 95%, non-condensing

3) Range of atmospheric pressure: 700 ~ 1060hPa

15. Disposal

This product is a disposable medical device and cannot be reused.

Disposal of this product and batteries must be in accordance with local waste disposal regulations. If the waste disposal regulations are not followed, it may cause environmental pollution.

16. Maintenance

16.1 Replacement of dedicated cable

If data is not transmitted from the equipment to PC S/W using the dedicated cable, contact our company or the agency to replace the cable.

17. Lifetime of the product

12 months from the manufacturing date

18. Label

(01) 08800069700017
(11) 200320
(10) C2203003
(21) C3T0000598

Product Name : AT-Patch ECG Analysis system
Model Name : ATP-C130
Supply Voltage : 3V(Lithium Coin Battery)
Dimension : 39 x 31 x 8.3 (unit : mm) **FCC ID : 2AWWS-ATPC130**

SN	C3T0000598	**Date of Manufacture**	2020.03.20

CAUTION – Electric shock
" To avoid electric shock, do not disassemble the device"

Please read the User's manual carefully before use

IP57 Rx ONLY

Do not Reuse

Manufacturer : Atsens Co.,Ltd.
Address : Point Town 806, 11, Gumi-ro, Bundang-gu, Seongnam-si, Gyeonggi-do, Republic of Korea
Tel) +82-70-5220-0220 Fax) +82-70-8270-0738
Homepage : www.atsens.com

Medical Device **Made in Korea**

19. ANNEX 1 –EMC (Electromagnetic Compatibility) Information

Applicable Standards and Test Methods

5.2.1.1 a)

The EUT uses RF energy only for its internal function. Therefore, its RF emissions are very low and are not likely to cause any interference in nearby electronic equipment

5.2.1.1 b)

The EUT is suitable for use in ail establishments, including domestic establishments and those directly connected to the public low-voltage power supply network that supplies buildings used for domestic purposes

5.2.1.1 c)

WARNING : Use of this equipment adjacent to or stacked with other equipment should be avoided because it could result in improper operation. If such use is necessary, this equipment and the other equipment should be observed to verify that they are operating normally.

5.2.1.1 d) e)

Not applicable

5.2.1.1 f)

WARNING : Portable RF communications equipment (including peripherals such as antenna cables and external antennas) should be used no closer than 30cm (12inches) to any part of the [ME EQUIPMENT or ME SYSTEM], including cables specified by the manufacturer. Otherwise, degradation of the performance of this equipment could result.

5.2.1.2

Not applicable(CLASS B)

5.2.2.1 a) ~ c)

Phenomenon	**Basic EMC standard or test method**	**Operating mode**	**Port tested**	**Test Voltage**	**Test level/requirement**
Mains terminal disturbance voltage	CISPR 11:2015	N/A	N/A	N/A	N/A
Radiated disturbance	CISPR 11:2015	Continuous	Enclosure	Battery	Group 1,

		operation mode			Class A
Harmonic Current Emission	EN 61000-3-2:2014 IEC 61000-3-2:2014	N/A	N/A	N/A	N/A
Voltage change, Voltage fluctuations and Flicker Emission	EN 61000-3-3:2013 IEC 61000-3-3:2013	N/A	N/A	N/A	N/A
Electrostatic Discharge Immunity	EN 61000-4-2:2009 IEC 61000-4-2:2008	Continuous operation mode	Enclosure	Battery	± 8 kV/Contact ± 2, ± 4, ± 8, ± 15 kV/Air
Radiated RF Electromagnetic Field Immunity	EN 61000-4-3:2006+A2:2010 IEC 61000-4-3:2010	Continuous operation mode	Enclosure	Battery	3 V/m 80 MHz-2.7 GHz 80% AM at 1 kHz
Immunity to Proximity Fields from RF wireless Communications Equipment	EN 61000-4-3:2006+A2:2010 IEC 61000-4-3:2010	N/A	N/A	N/A	N/A
Electrical Fast Transient/Burst Immunity	EN 61000-4-4:2012 IEC 61000-4-4:2012	N/A	N/A	N/A	N/A
Surge Immunity	EN 61000-4-5:2014 IEC 61000-4-5:2014	N/A	N/A	N/A	N/A
Immunity to Conducted Disturbances Induced by RF fields	EN 61000-4-6:2014 IEC 61000-4-6:2013	N/A	N/A	N/A	N/A
Power Frequency Magnetic Field Immunity	EN 61000-4-8:2010 IEC 61000-4-8:2009	Continuous operation mode	Enclosure	Battery	30 A/m 50 Hz & 60 Hz
Voltage dips	EN 61000-4-11:2004 IEC 61000-4-11:2004	N/A	N/A	N/A	N/A N/A
Voltage interruptions	EN 61000-4-11:2004 IEC 61000-4-11:2004	N/A	N/A	N/A	N/A

5.2.2.2 a) ~ d)

Not applicable

5.2.2.3 / 5.2.2.4

Frequency range: 2 42 MHz ~ 2 480 MHz(LE)

Number of channels: 40 ch

20. FAQs

No.	Question	Answer
1	This device has FCC certification?	This device complies with part 15 of the FCC Rules. We have FCC certification.
2	Can you use it an area where there is no BLE or internet signal?	This device communicates with the App through BLE, and the communicated data is stored in the device. If the internet is not connected, the App and the device do not communicate because the App cannot be accessed, and the device stops working. However, after connecting the App and communicating with the device, only AT-notes that can be recorded in the App cannot be used, but ECG data is still stored in the memory chip in the device. And recorded data can be analyzed in PC S/W.
3	How should I respond when cybersecurity arises?	Please contact us. Our Telephone or email address is in User Manual last page ‘Contact US’.
4	App downloaded from the Google Store or App Store are not installed.	Please check your phone version. You can download and use the App only on phones with the operating environment mentioned in the user manual.
5	The ECG signal is not output from the App.	Please check AT-patch adhesion status. If the patch does not adhere to the skin and is floating, press down so that the patch adheres to the skin.
6	When the power is turned on, the buzzer does not sound, or the green LED signal does not appear.	It is highly likely due to shock or defective circuit contact during distribution or adhesion. It must be replaced.
7	What should I do If you forgot my password?	In case PC S/W(ATR-C130), there are 2 cases. 1. If a user other than the administrator forgets, the administrator can change the user’s password. 2. If the administrator has forgotten it, the password will be reset when official authentication is re-entered. To get official authentication, please contact us. In case App(ATN-C130), just delete the App and install it again. The password will be reset.
8	The ECG and motion data graphs are displayed abnormally in the App.	If BLE communication is poor, the measured ECG waveform may not appear properly. First, Turn off the App. Second, Turn off BLE communication with other devices. After then, run the App again. A normal signal will appear.

		If the same phenomenon is repeated even after running it again, please contact distributor or us.
9	The device does not work during use.	1. The battery is discharged. 2. Discharge due to short circuit due to immersion 3. Discharge due to other circuit damage This is due to the above causes, so stop using the patch and visit a hospital for replacement after detachment.
10	What should I do if very severe itching occurs during operation?	Follow your doctor's judgement after visiting the hospital where you prescribed it or remove the patch.
11	How long am I supposed to adhere the patch?	Device intended to be attached for up to 14 days, However, depending on the individual's skin condition, the attachment period may be shorter than the intended period.
12	Is it normal to experience skin irritation or itchiness in the area of the Patch?	Depending on the patient's skin condition, mild itching may occur. But if sever itching occurs, follow your doctor's judgement after visiting the hospital where you prescribed it or remove the patch.
13	What should I do if the patch falls off?	Follow your doctor's judgement after visiting the hospital
14	What activities should I avoid?	We recommended to refrain from rubbing the patched area with soapy water or a body washer and vigorous sweating.
15	Can I take a shower?	Yes. You can take a shower. This device has IP 57 grade.

CONTACT US

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www.atsens.com

Authorized Representative: Dave Kim
Name: Mtech Group
Address: 7707 Fannin St. Ste 200 Houston, TX 77054
Email: davekim@mtech-inc.net

FCC REQUIREMENTS PART 15

Caution: Any changes or modifications in construction of this device which are not expressly approved by the responsible for compliance could void the user's authority to operate the

FCC Compliance Statement

This device complies with part 15 of the FCC rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

This equipment has been tested and found to comply with the limits for a Class B Digital Device, pursuant to Part 15 of the FCC Rules. These limits are designed to this equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications.
However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the radio or television off and on, the user is encouraged to try to correct interference by one or more of the following measures.

1. Reorient or relocate the receiving antenna.
2. Increase the separation between the equipment and receiver.
3. Connect the equipment into an outlet on another circuit.
4. Consult the dealer or an experienced radio/TV technician for help.

FCC Caution

Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment.