BM3VET Touch
Operation Manual

Veterinary Patient Monitor

For Veterinary Use Only

Ver. 1.3

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Bionet

www.ebionet.com

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1.1 CE Standard Information

Electromechanical safety standards met:

Information supplied by the manufacturer of medical devices

1. **EN 60601-1(2006)**
   Medical electrical equipment Part1: General requirements for safety
2. **EN 60601-1-2 (2007) (IEC 60601-1-2)**
   Electromagnetic Compatibility Requirement and tests
3. **EN 55011:2007+A2:2007 Group 1 Class B(CISPR11) (EN 55011:2009/A1:2010)**
   Limits and methods of measurement of radio disturbance characteristics of industrial, scientific and medical (ISM) radio-frequency equipment
4. **IEC 60601-1-4:1996+A1:1999 (EN 60601-1:2006**)
   Part 1-4 General requirements for safety Collateral standard: Programmable electrical medical system
5. **IEC 60601-1-6:2010**
   Part 1-6 General requirements for safety Collateral standard: Usability
6. **IEC 60601-1-8:2006 (EN 60601-1-8:2007)**
   Part 1-8 General requirements for safety Collateral standard: General requirements, tests and guidance for alarm systems in medical electrical equipment and medical electrical systems
7. **EN 60601-2-30:2000 (IEC 80601-2-30:2013)**
   Part 2: Particular requirements for the safety, including essential performance of automatic cycling non-invasive blood pressure monitoring equipment
8. **EN 60601-2-49:2001 (IEC 60601-2-49:2001)**
   Part 2: Particular requirements for the safety of multifunction patient monitoring equipment
9. **EN 12470-4:2000+A1:2009**
   Performance test for Temperature Clinical thermometers - Part 4: Performance of electrical thermometers for continuous measurement
10. **EN 1060-1:1995+A2:2009, EN 1060-3:1995+A2:2009**: **(EN ISO 81060-1:2012)**
    Performance test for NIBP Non-invasive sphygmomanometers- Part 1: General requirements, Part 3: Supplementary requirements for electro-mechanical blood pressure measuring systems
11. **EN ISO 14971:2012**
    Medical devices - Application of risk management to medical devices
12. **EN ISO 9919:2009 (ISO 80601-2-61:2011)**
    Particular requirements for the basic safety and essential performance of pulse oximeter equipments for medical use.

13. **EN ISO 21647:2009 (**ISO 80601-2-55:2011**)**
    Medical electrical equipment -- Particular requirements for the basic safety and essential performance of respiratory gas monitors
14. **EN 980:2008 (EN ISO 15223-1:2012)**
    Symbols for use in the labeling of medical devices (Medical devices -- Symbols to be used with medical device labels, labeling and information to be supplied -- Part 1: General requirements)
15. **EN 1041:2008**
    Information supplied by the manufacturer of medical devices
16. **IEC 60601-2-27:2006** : ECG Test
    Medical electrical equipment - Part 2-27: Particular requirements for the safety including essential performance, of electrocardiographic monitoring equipment
17. **EN ISO 9919:2005**
    Medical electrical equipment -- Particular requirements for the basic safety and essential performance of pulse oximeter equipment for medical use
18. **EN 60601-2-34:2000** : IBP test
    Medical electrical equipment – Part2: Particular requirements for the safety, including essential performance, of invasive blood pressure monitoring equipment.

1.2 Read before Use

BIONET services are always available to you.
The following are address and phone numbers for contacting information, services, and product supplies.

How to Contact Us

Product Supply Information	**Bionet Co.,Ltd.** 5F, Shinsegae I&C Digital Center 61 Digital-ro 31 gil, Guro-gu, SEOUL 08375, REPUBLIC OF KOREA Tel: +82-2-6300-6410 Fax: +82-2-6499-7789 E-mail: Sales@ebionet.com Service@ebionet.com URL: http://www.ebionet.com
US Distributor	**Bionet America, Inc.** 2691 Dow Ave. Ste B Tustin, CA 92780, USA Toll Fee: 1-877-924-6638 Tel:1- 714-734-1760 Fax: 1-714-734-1761 www.bionetus.com sales@bionetus.com support@bionetus.com

※ In the event of malfunction or failure, contact us along with the model name, serial number, and product name of the equipment.

※ If you need the supply circuit diagram, component list, description and calibration instruction etc. you can contact us we will provide you with it.

Warranty Period

- This product is manufactured and passed through strict quality control and through inspection.
- Compensation standard concerning repair, replacement, refund of the product complies with “Consumer’s protection law” noticed by Korea Fair Trade Commission.
- Warranty period is 4 years.(Four years in USA).
- We will repair or replace any part of the BM3VET Touch found to be defective in usual operating circumstance for free to you.
- This warranty does not apply to any defects caused by improper use, misuse or abuse

Warning, Caution, Note

For special emphasis on agreement, terms are defined as listed below in user’s manual. Users should operate the equipment according to all the warnings and cautions.
Indicated in this manual In order to improve the product specifications and features are subject to change without notice.

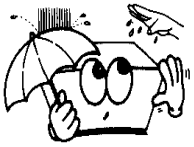
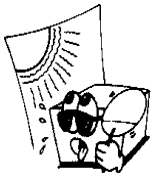
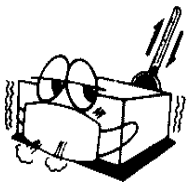
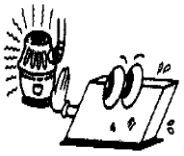
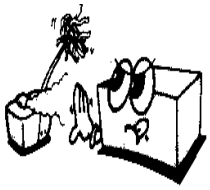
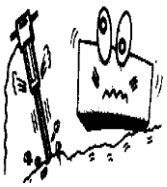
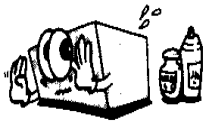
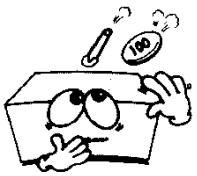
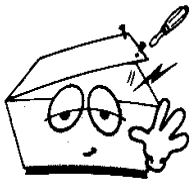
Warning
To inform that it may cause serious injury or death to the patient, property damage, or material losses

Caution
To inform that it may cause no loss in life but lead to injury

Note
To inform that it is not dangerous but important “note” sign for proper installation, operation, and maintenance of the equipment.

General Precaution on Environment

- Do not keep or operate the equipment in the environment listed below.

	Avoid placing in an area exposed to moisture. Do not touch the equipment with wet hands.		Avoid exposure to direct sunlight
	Avoid placing in an area where there is a high variation of temperature. Operating temperature ranges from 10(C to 40(C. Operating humidity ranges from 30% to 85%.		Avoid placing in the vicinity of Electric heater
	Avoid placing in an area where there is an excessive humidity rise or ventilation problem.		Avoid placing in an area where there is an excessive shock or vibration.
	Avoid placing in an area where chemicals are stored or where there is danger of gas leakage.		Avoid inserting dust or especially metal material into the equipment
	Do not disjoint or disassemble the equipment. This will void your warranty..		Power off when the equipment is not fully installed. Otherwise, equipment could be damaged.

CAUTIONS

Before Installation

Compatibility is critical to safe and effective use of this device. Please contact your local sales or service representative prior to installation to verify equipment compatibility.

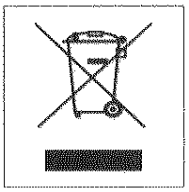
Defibrillator Precaution

Patient signal inputs labeled with the CF and BF symbols with paddles are protected against damage resulting from defibrillation voltages. To ensure proper defibrillator protection, use only the recommended cables and lead wires.
Proper placement of defibrillator paddles in relation to the electrodes is required to ensure successful defibrillation.

Disposables

Disposable devices are intended for single use only. They should not be reused as performance could degrade or contamination could occur.

Disposal of your old appliance



1. When this crossed out wheeled bin symbol is attached to a product it means the product is covered by the European Directive 2002/96/EC.
2. All electrical and electronic products should be disposed of separately from the municipal waste stream via designated collection facilities appointed by the government or the local authorities.
3. The correct disposal of your old appliance will help prevent potential negative consequences for the environment and human health.
4. For more detailed information about disposal of your old appliance, please contact your city office, waste disposal service or the shop where you purchased the product.

WARNING
This product contains a chemical known to the State of California to cause cancer, birth defects, or other reproductive harm.

Electrocute Precautions

To prevent skin burns, apply electrocute electrodes as far as possible from all other electrodes, a distance of at 15 cm/6 in. is recommended.

EMC

Magnetic and electrical fields are capable of interfering with the proper performance of the device. For this reason make sure that all external devices operated in the vicinity of the monitor comply with the relevant EMC requirements. X-ray equipment or MRI devices are possible sources of interference as they may emit higher levels of electromagnetic radiation.
Also, keep cellular phones and other telecommunication equipment away from the monitor.

CAUTIONS

Intended Use
This device is designed to be used for monitoring the biological vital signs of Canine and Feline and horses. Main functions of the product include displaying information such as ECG, respiration, SpO_2, NIBP, carbon dioxide (CO_2) and temperature on its LCD screen and monitoring parameter, and alarming. It also prints out waves and parameters via a printer.

Application Environment
This device is for use by trained veterinary personnel in veterinary centers. The device is restricted to be used on one patient at a time.

Operator Requirement
Only veterinary personnel who have read the Operator's Manual should use this monitor

Instruction for Use
For continued safe use of this equipment, it is necessary that the instructions are followed. However, instructions listed in this manual in no way supersede established medical practices concerning patient care.

Loss of Data
Should the monitor at any time temporarily lose patient data, the potential exists that active monitoring is not being done. Close Animal observation or alternate monitoring devices should be used until monitor function is restored.
If the monitor does not automatically resume operation within 60 seconds, power cycle the monitor using the power on/off switch. Once monitoring is restored, you should verify correct monitoring state and alarm function.

Maintenance
Regular preventive maintenance should be carried out annually (Technical inspections). You are responsible for any requirements specific to your country and locality.

MPSO
The use of a multiple portable socket outlet (MPSO) for a system will result in an enclosure leakage current equal to the sum of all individual earth leakage currents of the system if there is an interruption of the MPSO protective earth conductor. Do not use an additional extension cable with the MPSO as it will increase the chance of the single protective earth conductor interruption.

Negligence
BIONET does not assume responsibility for damage to the equipment caused by improperly vented cabinets, improper or faulty power, or insufficient wall strength to support equipment mounted on such walls.

NOTES

Power Requirements

Before connecting the device to the power line, check that the voltage and frequency ratings of the power line are the same as those indicated on the unit's label. If this is not the case, do not connect the system to the power line until you adjust the unit to match the power source. In U.S.A, if the installation of this equipment will use 240V rather than 120V, the source must be a center-tapped, 240V, single-phase circuit.

Restricted Sale

U.S.A federal law restricts this device to sale by or on the order of a licensed veterinarian..

Supervised Use

This equipment is intended for use under the direct supervision of trained veterinary personnel in veterinary centers. The device is restricted to be used on one patient at a time.

Ventilation Requirements

Set up the device in a location which affords sufficient ventilation. The ventilation openings of the device must not be obstructed. The ambient conditions specified in the technical specifications must be ensured at all times.

·Put the monitor in a location where you can easily see the screen and access the operating controls.

·This product is protected against the effects of cardiac defibrillator discharges to ensure proper recovery, as required by test standards. (the screen may blank during a defibrillator discharge but recovers within second as required by test standards.)

Reference Literature

Medical Device Directive 93/42/EEC
EN 60601-1/1990 +A1: 1993 +A2 : 1995 : Medical electrical equipment.
General requirements for safety
EN 60601-1-1/9. 1994 +A1 12.95: General requirements for safety.

General Precaution on Electric Safety

Warning
Check the items listed below before operating the equipment.

1. Be sure that AC power supply line is appropriate to use. (AC100 - 240V)
2. Be sure that the power source is the one supplied from Bionet. (DC18V,2.8A, BPM050S18F02 Made in BridgePower Co., Ltd.)
3. Be sure that the entire connection cable of the system is properly and firmly fixed.
4. Be sure that the equipment is completely grounded. (If not, there might be problems in the product.)
5. The equipment should not be placed in the vicinity of electric generators, X-ray, broadcasting apparatus to eliminate electrical noise during operation. Otherwise, it may cause incorrect results.

Note
The Equipment should be placed far from generators, X-ray equipment, broadcasting equipment or transmitting wires, so as to prevent electrical noise from being generated during operation, When these devices are near the Equipment, it can produce inaccurate measurements. For BM3VET TOUCH both independent circuit and stable grounding are essentially required. In the event that the same power source is shared with other electronic equipment, it can also produce inaccurate output.

Warning
Do not make contact with the Animal while operating the machine It may cause serious danger to the users. Use only the provided cables. A warning that other cables and accessories may negatively affect EMC performance

Warning
In case the Equipment does not operate as usual or damaged, do not use on Animal, and contact to the medical equipment technician of the hospital or the equipment supply division.

Note
BM3VET TOUCH is classified as follows: - BM3VET TOUCH classifies as Class **I,** BF **&** CF concerning electric shock. It is not proper to operate this Equipment around combustible anesthetic or dissolvent. - Noise level is B class regarding IEC/EN 60601-1 and the subject of Nose is B level concerning IEC/EN60601-1-2.

Equipment Connection

For measurements in or near the heart we recommend connecting the monitor to the potential equalization system. Use the green and yellow potential equalization cable and connect it to the pin labeled with the symbol  .

Manufacturer's declaration - electromagnetic emission

The BM3VET TOUCH system is intended for use in the electromagnetic environment specified below. The customer or the user of BM3VET TOUCH system should ensure that it is used in such an environment		
Emission test	Compliance	Electromagnetic environment - guidance
RF emissions CISPR 11	Group 1	The BM3VET TOUCH system 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
RF emissions CISPR 11	Class B	The BM3VET TOUCH system is suitable for use in all establishments other than domestic and those directly connected to the public low-voltage power supplies buildings used for domestic purposes.
Harmonics emission IEC 61000-3-2	A	
Voltage fluctuation IEC 61000-3-3	Complies	

Manufacturer's declaration - electromagnetic immunity

The **BM3VET TOUCH** system is intended for use in the electromagnetic environment specified below.
The customer or the user of the **BM3VET TOUCH** system should ensure that it is used in such an environment

Immunity test	**IEC 60601 Test level**	**Compliance level**	**Electromagnetic Environment -guidance**
Electrostatic discharge (ESD) IEC 61000-4-2	6 kV Contact 8 kV Air	6 kV Contact 8 kV Air	Floors should be wood, concrete or ceramic tile. If floors are covered with synthetic material, the relative humidity should be at least 30 %
Electrical fast Transient / burst IEC 61000-4-4	2kV for power supply lines 1kV for input/output lines	2kV for power supply lines 1kV for input/output lines	Mains power quality should be that of a typical commercial or hospital environment.
Surge IEC 61000-4-5	1 kV differential mode 2 kV common mode	1 kV differential mode 2 kV common mode	Mains power quality should be that of a typical commercial or hospital environment.
Power frequency (50/60Hz) Magnetic field IEC 61000-4-8	3.0 A/m	3.0 A/m	Power frequency magnetic fields should be at levels characteristic of a typical location in a typical commercial or hospital environment.
Voltage dips, short Interruptions and Voltage variations on power supply input lines IEC 61000-4-11	<5% U_T (>95% dip in U_T) for 0.5cycle 40% U_T (60% dip in U_T) for 5 cycle 70% U_T (30% dip in U_T) for 25 cycle <5% U_T (<95% dip in U_T) for 5 s	<5% U_T (>95% dip in U_T) for 0.5cycle 40% U_T (60% dip in U_T) for 5 cycle 70% U_T (30% dip in U_T) for 25 cycle <5% U_T (<95% dip in U_T) for 5 s	Mains power quality should be that of a typical commercial or hospital environment. If the user of the **BM3VET TOUCH** system requires continued operation during power mains interruptions, it is recommended that the BM3VET TOUCH system be powered from an uninterruptible power supply or a battery
Note: U_T is the a.c. mains voltage prior to application of the test level.			

The **BM3VET TOUCH** system is intended for use in the electromagnetic environment specified below.
The customer or the user of the **BM3VET TOUCH** system should ensure that it is used in such an environment

Immunity test	**IEC 60601 Test level**	**Compliance level**	**Electromagnetic environment -guidance**

Conducted RF IEC 61000-4-6	3 Vrms 150 kHz to 80 MHz	3 Vrms 150 kHz to 80 MHz	Portable and mobile RF communications equipment should be used no closer to any part of the BM3VET TOUCH system, including cables, than the recommended separation distance calculated from the equation applicable to the frequency of the transmitter. **Recommended separation distance** $d = [\frac{3,5}{V_1}]\sqrt{P}$
Radiated RF IEC 61000-4-3	3 V/m 80.0 MHz to 2.5 GHz	3 V/m 80.0 MHz to 2.5 GHz	**Recommended separation distance** $d = [\frac{3,5}{E_1}]\sqrt{P}$ 80 MHz to 800 MHz $d = [\frac{7}{E_1}]\sqrt{P}$ 800 MHz to 2,5 GHz Where *P* is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer and *d* is the recommended separation distance in meters (m). Field strengths from fixed RF transmitters, as deter-mined by an electromagnetic site survey, (a) Should be less than the compliance level in each frequency range (b). Interference may occur in the vicinity of equipment marked with the following symbol: 

Note 1) U_T is the A.C. mains voltage prior to application of the test level.

Note 2) At 80 MHz and 800 MHz, the higher frequency range applies.

Note 3) These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.

a Field strengths from fixed transmitters, such as base stations for radio (cellular/cordless) telephones and land mobile radios, amateur radio, AM and FM radio broadcast and TV broadcast cannot be predicted theoretically with accuracy. To assess the electromagnetic environment due to fixed RF transmitters, an electromagnetic site survey should be considered. If the measured field strength in the location in which the EUT is used exceeds the applicable RF compliance level above, the EUT should be observed to verify normal operation. If abnormal performance is observed, additional measures may be necessary, such as re-orienting or relocating the EUT.

b Over the frequency range 150 kHz to 80 MHz, field strengths should be less than [V1] V / m.

Recommended Separation Distances Between Portable and Mobile RF Communications Equipment and the **BM3VET Touch** system.

The **BM3VET TOUCH** system is intended for use in an electromagnetic environment in which radiated RF disturbances are controlled. The user of the **BM3VET Touch** system can help prevent electromagnetic interference by maintaining a minimum distance between portable and mobile RF communications equipment (transmitters) and the BM3VET TOUCH system as recommended below, according to the maximum output power of the communications equipment.

Rated maximum output power (W) of transmitter	Separation distance (m) according to frequency of transmitter		
	150 kHz to 80 MHz	80 MHz to 800 MHz	800 MHz to 2.5 GHz
0.01	0.12	0.12	0.23
0.1	0.37	0.37	0.74
1	1.17	1.17	2.33
10	3.70	3.70	7.37
100	11.70	11.70	23.30

For transmitters rated at a maximum output power not listed above, the recommended separation dist ance (d) in meters (m) can be estimated using the equation applicable to the frequency of the transm itter, where P is the maximum output power rating of the transmitter in watts (W) according to the tra nsmitter manufacturer.

Note 1: At 80 MHz and 800 MHz, the separation distance for the higher frequency range applies

Note 2: These guidelines may not apply in all situations. Electromagnetic propagation is affected by a bsorption and reflection from structures, objects, and people.

Immunity and Compliance Level			
Immunity test	IEC 60601 Test Level	Actual Immunity Level	Compliance Level
Conducted RF IEC 61000-4-6	3 Vrms, 150 kHz to 80 MHz	3 Vrms, 150 kHz to 80 MHz	3 Vrms, 150 kHz to 80 MHz
Radiated RF IEC 61000-4-3	3 V/m, 80 MHz to 2.5 GHz	3 V/m, 80 MHz to 2.5 GHz	3 V/m, 80 MHz to 2.5 GHz

Guidance and manufacturer's declaration - electromagnetic immunity

The **BM3VET TOUCH** system is intended for use in the electromagnetic environment specified below. The customer or the user of the **BM3VET TOUCH** system should ensure that it is used in such an environment			
Immunity test	IEC 60601 Test level	Compliance level	Electromagnetic environment -guidance
Conducted RF IEC 61000-4-6	3 Vrms 150 kHz to 80MHz	3 Vrms 150 kHz to 80 MHz	**BM3VET TOUCH** system must be used only in a shielded location with a minimum RF shielding effectiveness and, for each cable that enters the shielded location with a minimum RF shielding effectiveness and, for each cable that enters the shielded location
Radiated RF IEC 61000-4-3	3 V/m 80.0 MHz to 2.5 GHz	3 V/m 80.0 MHz to 2.5 GHz	Field strengths outside the shielded location from fixed RF transmitters, as determined by an electromagnetic site survey, should be less than 3V/m.**a** Interference may occur in the vicinity of equipment marked with the following symbol: 
Note 1) These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people. **Note 2)** It is essential that the actual shielding effectiveness and filter attenuation of the shielded location be verified to assure that they meet the minimum specification.			
a- Field strengths from fixed transmitters, such as base stations for radio (cellular/cordless) telephones and land mobile radios, amateur radio, AM and FM radio broadcast and TV broadcast cannot be predicted theoretically with accuracy. To assess the electromagnetic environment due to fixed RF transmitters, an electromagnetic site survey should be considered. If the measured field strength outside the shielded location in which the EUT is used exceeds 3V/m, the EUT should be observed to verify normal operation. If abnormal performance is observed, additional measures may be necessary, such as relocating the EUT or using a shielded location with a higher RF shielding effectiveness and filter attenuation.			

Note
For Type A Professional ME Equipment intended for use in domestic establishment instructions for use includes a warning: This ME equipment is intended for use by professional healthcare personnel only.

Caution
In the hospital, doctors and Animals are exposed to dangerous, uncontrollable compensating currents. These currents are due to the potential differences between connected equipment. The safety solution to the problem is accomplished with EN60601-1;1996.

Biocompatibility
When used as intended, the parts of the product described in this operator manual, including accessories that come in contact with the Animal during the intended use, fulfill the biocompatibility requirements of the applicable standards. If you have questions about this matter, please contact BIONET or its representatives.

Maintenance and Washing Equipment Connections

Various methods can be used to clean the BM3VET TOUCH and its accessories. Please follow the methods mentioned below to avoid unnecessary damage or contamination to the Equipment.

We do not repair free of charge regardless of warranty period if it is contaminated or damaged by using dangerous material not designated for washing.

Cleaning Applied Parts

Do not permit any liquid to enter the monitor case and avoid pouring it on the monitor while cleaning.
Do not allow water or cleaning solution to enter the connectors of jack cover.
Recommended cleaning agents:
Alcohol (Ethanol 70%, Iosopropanol 70%, Window cleaner)
Ammonias (Dilution of ammonia <3%, Window cleaner)
Tensides (dishwasher detergents) (Edisonite schnellreiniger®, Alconox®)

Cables and Leadwires

CAUTION
Do not use acetone or keytone solvents for cleaning; do not use an autoclave or steam cleaner.

Cables and leadwires can be cleaned with a warm, damp cloth and mild soap, or isopropyl alcohol wipes. For more intensive disinfecting (near sterile) Ethylene Oxide (ETO) is acceptable but will reduce the useful lifetime of the cable or leadwire.

CAUTION
The decision to sterilize must be made per your institution's requirements with an awareness of the effect on the integrity of the cable or leadwire.

Note
The Equipment needs a safety inspection once a year. Please refer to user's guide or service manual for the procedure.

Please check carefully both frame and sensor, after cleaning the Equipment, Do not use equipment that is worn out or damaged.
At least once a month, clean and wipe off the frame by using a soft cloth after wetting it with water and alcohol. Do not use lacquer, thinner, ethylene, or oxidizer which may lead to damage to the equipment.
Make sure both cables and accessories are free of dust or contaminants, and wipe them off with soft cloth wetted with warm water (40°), and at least once a week, clean them by using clinical alcohol.
Do not submerge the accessories under any liquid or detergent. Also, make sure liquids do not penetrate into the Equipment or probe.

Disinfecting

Do not mix disinfecting solutions (such as bleach and ammonia) as hazardous gases may result.
Clean equipment before disinfecting.
Recommended disinfecting agents:
Aldehyde based (Cidex® activated dialdehyde solution, Gigasept)
Alcohol base (Ethanol 70%, Isopropanol 70%, Spitacid®, Streilium fluid®, Cutasept®, Hospisept®, Tinktur forte, Sagrosept®, Kodan®

Caution
Always follow all local laws and recommendations for disposal of single use and/or contaminated items.

Caution
There is back-up battery inside system. When users dispose of this battery, please follow all local laws and recommendations. .

Warning
Check the electrodes of batteries before changing them.

· Operate BM3VET TOUCH with internal electric power supply when unsure of external ground connection.
· Remove the 1st Battery when not using equipment for an extended period of time to avoid any damage.

For other applied parts such as temperature sensors, pulse oximetry probes, and NBP cuffs, you must consult the manufacturer for cleaning, sterilization, or disinfecting methods.

1.3 Product Components

Product Outline

BM3VET TOUCH monitor is a product used for monitoring biological information of Canine and Feline. Main functions of the product include displaying information such as ECG, respiration, SpO2, NIBP, EtCO2 and temperature on its LCD screen and monitoring parameters, and alarming. It also prints out waves and parameters via a printer.

Principal features of Product

BM3VET TOUCH is a small-size multifunctional monitoring unit for an Animal designed for easy usage during movement. It features a DC power supply (Bridgepower, BPM050S18F02, DC 18V, 2.8A). The equipment also measures major parameters such as ECG, respiration rate, SpO2, pulse rate, NIBP, EtCO2, and temperature, displaying them on an 8-inch color LCD screen. It also enables users to check waves and parameters and other vital signs of an Animal via the 58mm thermal printer and monitor the Animal using the alarm system. With B-Link software, up to 128 hours of saved parameter data can be transferred to a Windows based computer through an Ethernet network.

Warning
Use only the accessories provided by us. Otherwise, Animal and user may be exposed to danger.

Warning
BEFORE USE — Before putting the system into operation visually inspect all connecting cables for signs of damage. Damaged cables and connectors must be replaced immediately. Before using the system, the operator must verify that it is in correct working order and operating condition. Periodically, and whenever the integrity of the product is in doubt, test all functions.

Product Configuration

1. Main body of BM3VET Touch Monitor	1 EA
2. 3-Lead vet ECG Cable (3CBL-400, 3WIRE-430)	1 EA
3. 3-Lead vet Extension Cable	1 EA
4. NIBP extension tube (NBPCBL-400)	1 EA
5. NIBP vet cuff infant reusable	1 EA
6. SpO_2 sensor extension cable (SPCBL-400)	1 EA
7. Reusable multisite SpO_2 probe	1 EA
8. DC Adaptor (BPM050S18F02 made in Bridgepower Co., Ltd.)	1 EA
9. Operator`s Manual	1 EA
10. Chart Paper (PAPER-400)	2Roll
11. Temperature probe	1 EA
12. Printer(Built in)	1 EA
13.Esophageal ECG/temperature probe	1 EA
14. Transflectance SpO2 sensor	1 EA

Option Product

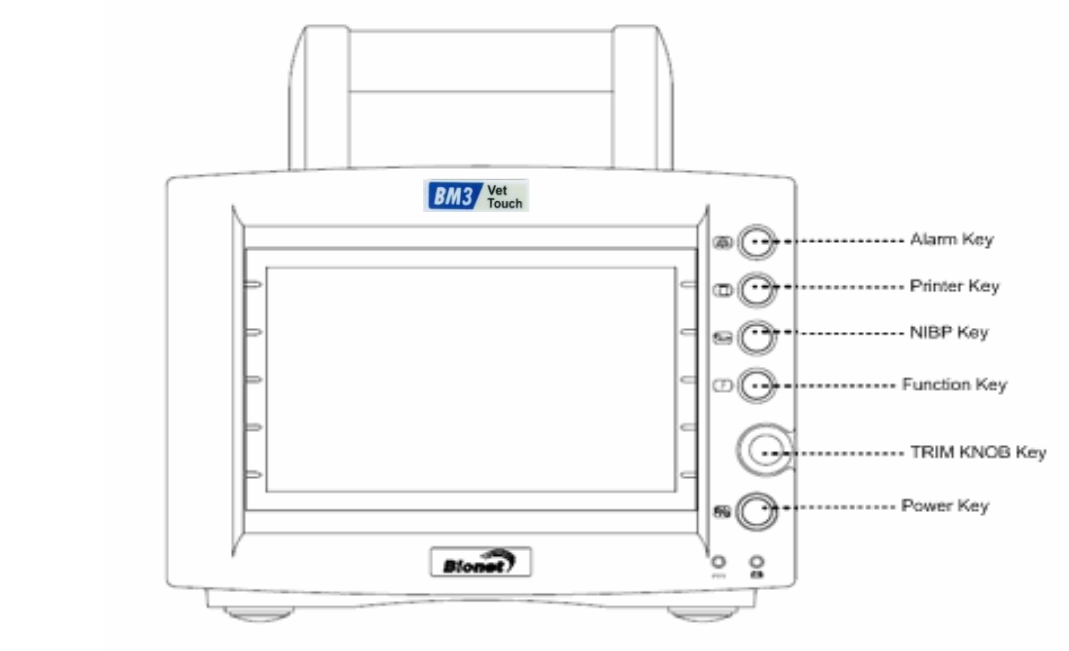
1. 5-Lead Animal Cable (MECA5(AHA),MECE5(IEC))
2. EtCO2 Module
3. Li-ion Battery (2150mAh, 10.8V)
4. Sidestream EtCO2 Module (Respironics)
5. Mainstream EtCO2 Module (Respironics)
6. Sidestream EtCO2 airway adapter sampling kit
7. Mainstream EtCO2 airway adapter

Warning
In order to avoid electrical shock, do not open the cover. Disassembling of the equipment should be done only by service personnel authorized by BIONET

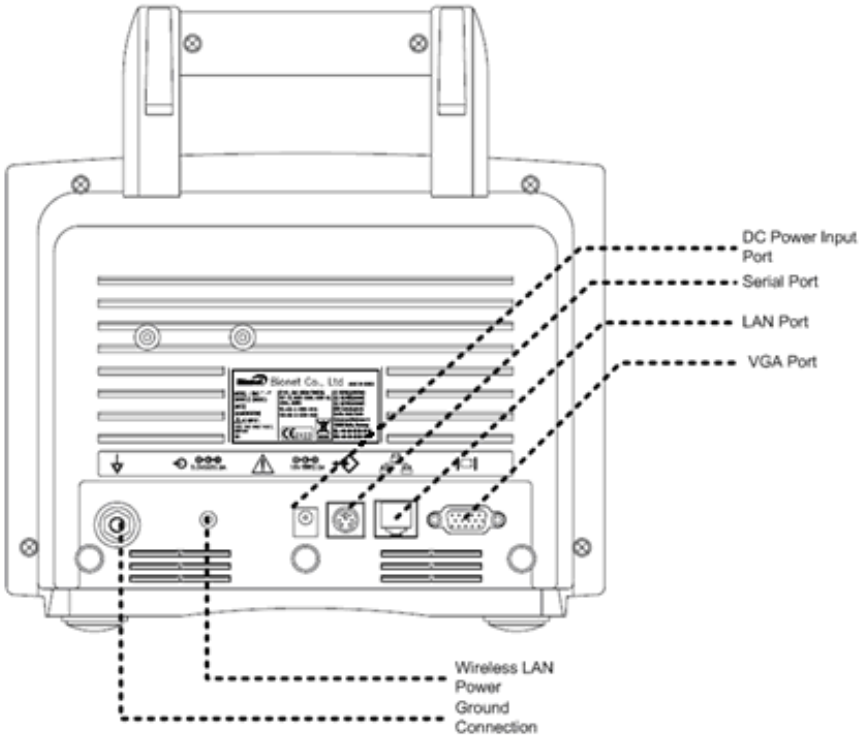
Warning
Users must pay attention on connection of any auxiliary device via LAN port or nurse calling. Always consider about summation of leakage current, please check if the auxiliary device is qualified by IEC 60601-1, or consult your hospital biomedical engineer.

Features of Main Body

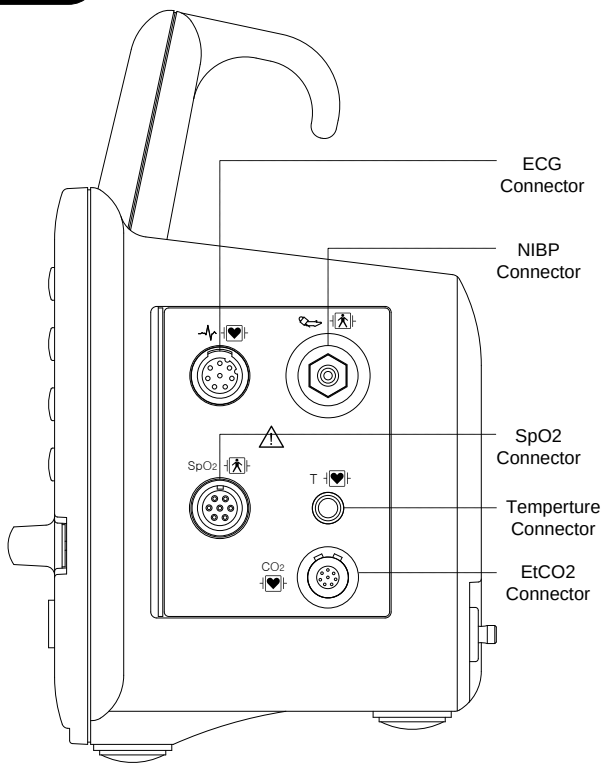
FRONT



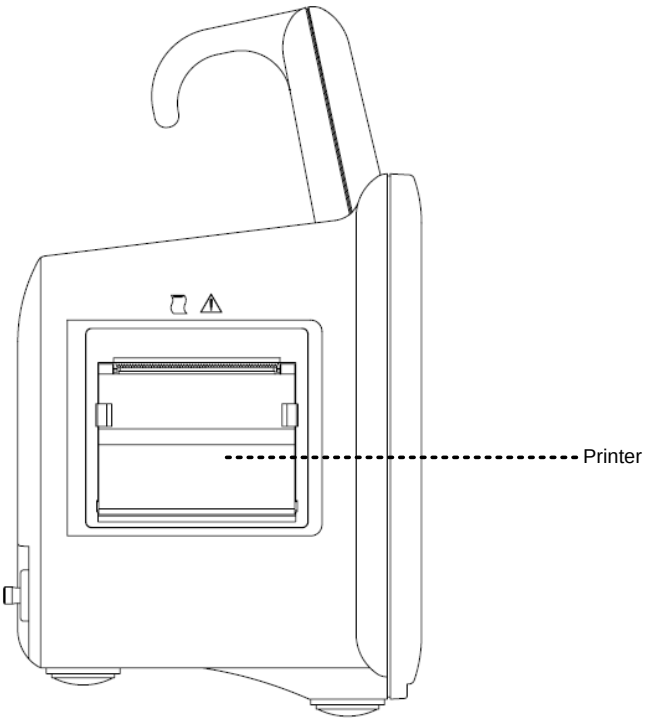
BACK



Right Side



Left Side

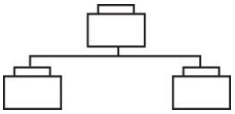
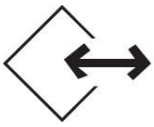
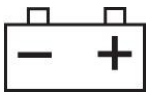
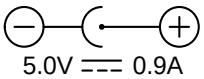
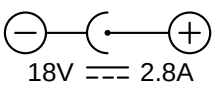


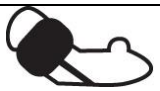
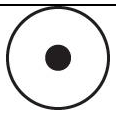
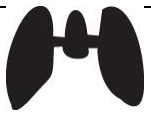
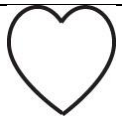
Accessories

	3-Lead ECG Extension Cable
	5-Lead ECG Extension Cable
	3-Lead vet ECG Cable
	5-Lead vet ECG Cable
	Reusable multisite SpO2 Probe
	SPO2 extension cable (2m)
	NIBP Extension Tube (3m)
	Reusable NIBP Infant Cuff Cuff Size : 210 * 60 Range : 8 to 13 cm
	Temperature Probe (Surface/Skin)
	Temperature Probe (Rectal/Esophageal)

Equipment Sign

	ATTENTION : Consult accompanying documents
	TYPE CF APPLIED PART : Insulated (floating) applied part suitable for intentional external and internal application to the Animal including direct cardiac application. "Paddles" outside the box indicate the applied part is defibrillator proof. Medical Standard Definition : F-type applied part(floating/insulated) complying with the specified requirements of IEC 60601-1/UL 2601-1/CSA 601.1 Medical Standards to provide a higher degree of protection against electric shock tan that provided by type CF applied parts.
	TYPE BF APPLIED PART : Insulated (floating) applied part suitable for intentional external and internal application to the Animal excluding direct cardiac application. "Paddles" outside the box indicate the applied part is defibrillator proof. Medical Standard Definition : F-type applied part (floating/insulated) complying with the specified requirements of IEC 60601-1/UL 2601-1/CSA 601.1 Medical Standards to provide a higher degree of protection against electric shock than that provided by type BF applied parts.

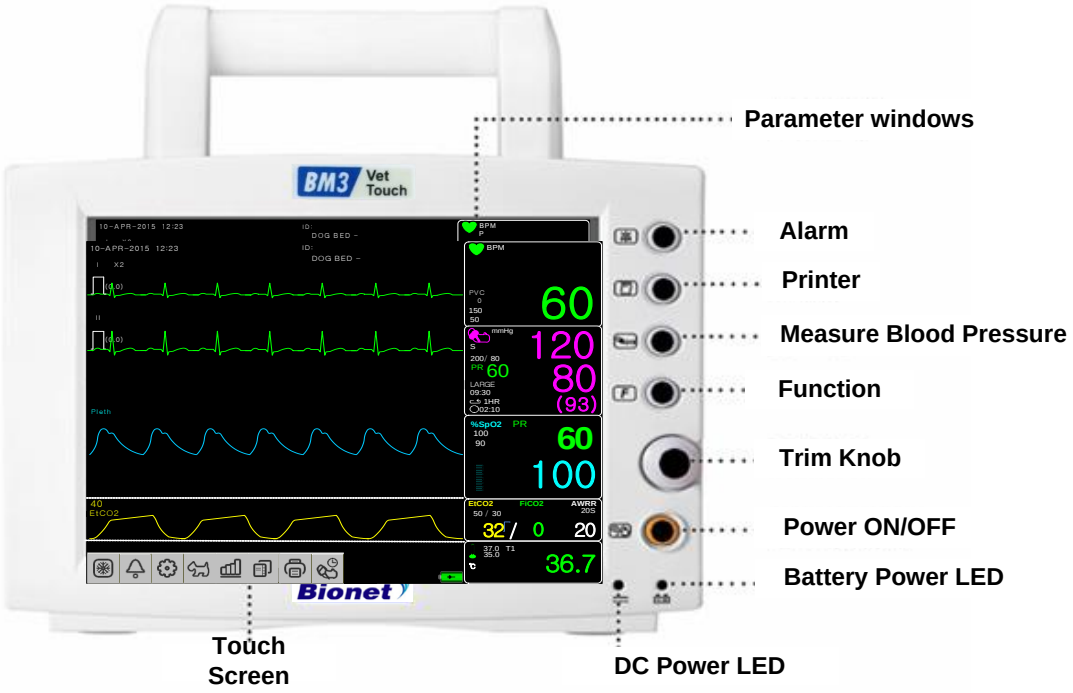
	**Ground**
	**Printer**
	**Serial Port**
	**LAN Port**
	**AUX Connector Port**
	**DC Input Indicator**
	**DSUB 15pin external VGA port**
	**Battery Operation Indicator**
	**WIRELESS LAN power output Port**
	**DC Input Connector**

	**TOUCH SCREEN LOCK**
	**NIBP**
	**Temperature**
	**Function**
	**Power on**
	**Power off**
	**Respiration**
	**ECG**
	**Heart Pulse**

1.4 Function and Key

External Function

The front panel of this product consists of an LCD screen and five function keys and one trim knob.



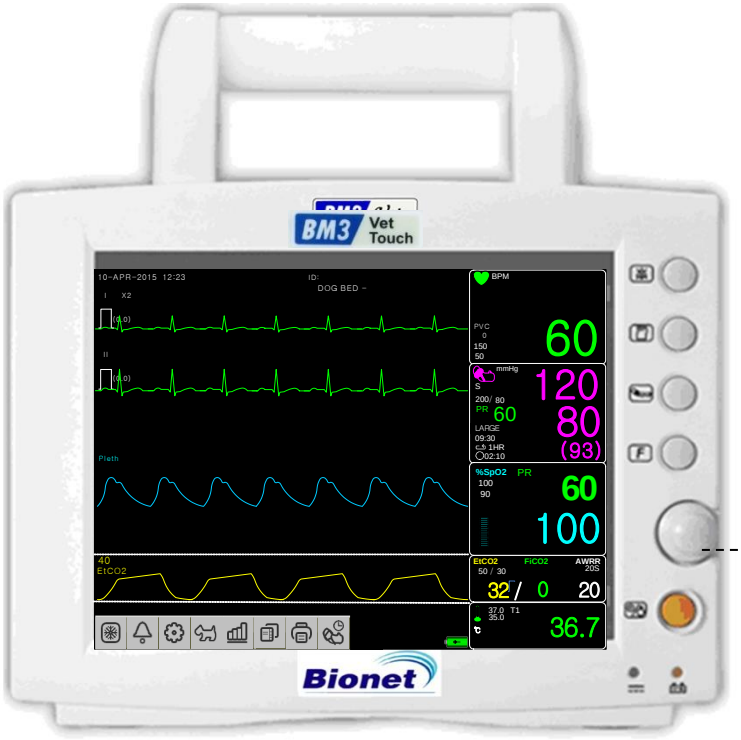
Operation Key

1. Power : Switches on and off the Power.
2. Function Key – Alternates between display modes.
3. Blood Pressure：Manually completes measuring blood pressure.
4. Printer：Prints out the waves selected from the menu until the key is pressed to stop.
5. Alarm： Stop alarm sound.
   First press stops the current alarm for one minute
   Second press stops the all alarm for five minutes.
   Third press will stops the all alarms.
   Forth press resets alarms back to the original setting.
6. Trim Knob：This key is used to select menu by turning it clock or anticlockwise to move cursors.
7. Alarm + Function: Touchscreen, key, rotary wheel lock function on and off.

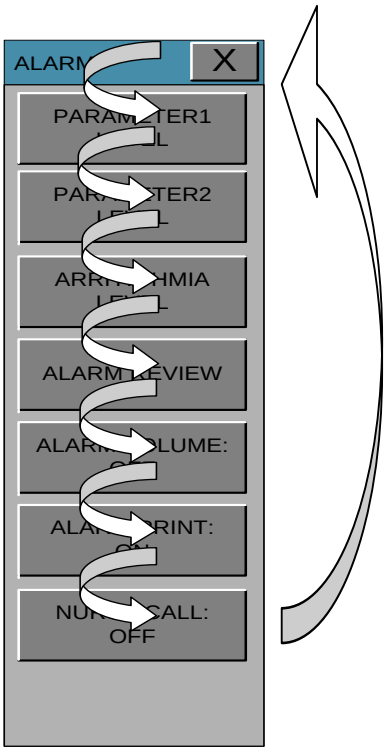
Lock : Press the alarm and function key at the same time until lock icon is displayed.
Unlock : Press the alarm and function key at the same time until Unlock icon is displayed.

lock icon

unlock icon



Use knob or touch screen to select menu



1.5 Standard Power Supply Application

DC Power

- Product information
- Manufacture: Bridgpower corp.
- Model name: BPM050S18F02
- Input power:

  Rated Voltage 100 – 240V

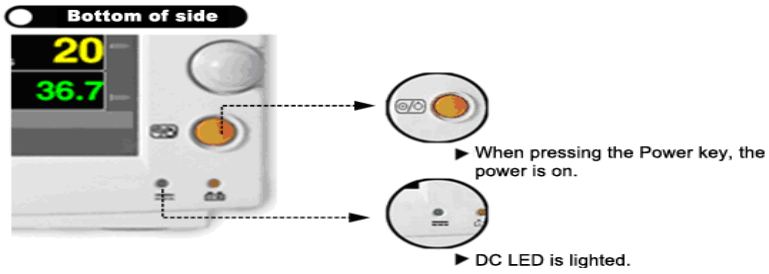
  Rated Line Frequency 50 – 60 Hz

  Current 1.5A Max at 100 VAC input
  Protection Internal primary current Fuse (2.0A)
- Output power:

  Capable of supplying +18VDC at 2.8A

  Voltage +18VDC +/- 5%
  Over current Protection 3.36 – 5.6A

DC Power LED is lighted on when the DC Power is plugged into the inlet on the back of the product. A press of power key makes the machine ready for use.



Warning
This equipment must only be connected to a supply mains with ground. Noise or distortion of signals using non-off-the-shelf products rather than adapters supplied by our company may be caused.

1.6 Battery Power Supply Application

Battery power can be supplied for enabling portable use or for use during DC power failure.

Operation

1. Battery Power LED is lighted on when the machine is in use.

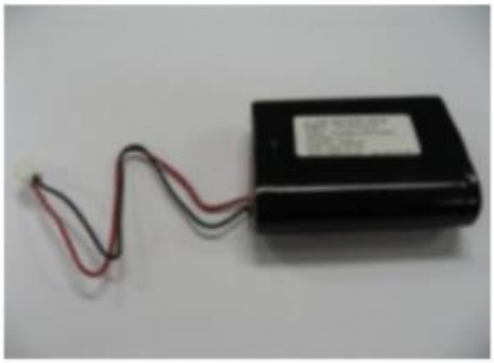
2. The DC/battery power is only sustainable for 1 and a half hours.

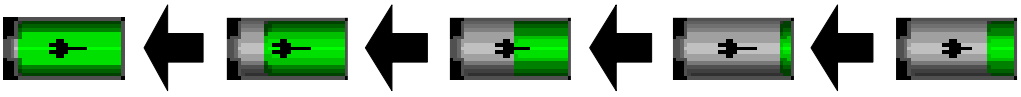
3. Battery is automatically charged when the machine is connected to DC Power Supply. Battery LED is lighted on after blinking.

4. The charging status of the batteries is displayed with 5 green boxes, ea charging. (0% -> 25% -> 50% -> 75% -> 100%)

- Battery: 031PpTC(3ICR19/65)(10.8V, 2150mAh/23.22Wh)

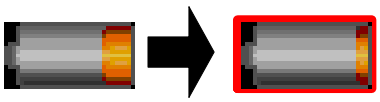
The Lithium-Ion battery is a rechargeable battery containing Lithium-Ion cells. Each battery contains an integrated electronic fuel gauge and a safety protection circuit.





5. The discharge condition of battery is indicated with on of 5 yellow boxes, each box showing a different level of charge available.
(100% -> 75% -> 50% -> 25%)

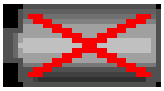
When remaining battery is less than 25%, the battery icon box is turned to blinking red. The device will be turned off automatically after 5 minutes from that warning sign. In case of that warning sign with blinking red icon, charge the device immediately with DC power adaptor which is provided from BIONET.



- Battery charging time: More than 6 hours
- Continuous battery use time: Lowest 1 hour to highest 2 hours continuous use (buffering)

Warning
Check the electrodes of batteries before charging them.

6. Battery status indication: When battery is disconnected from equipment or out of order, it is shown by a red `X' as shown below.



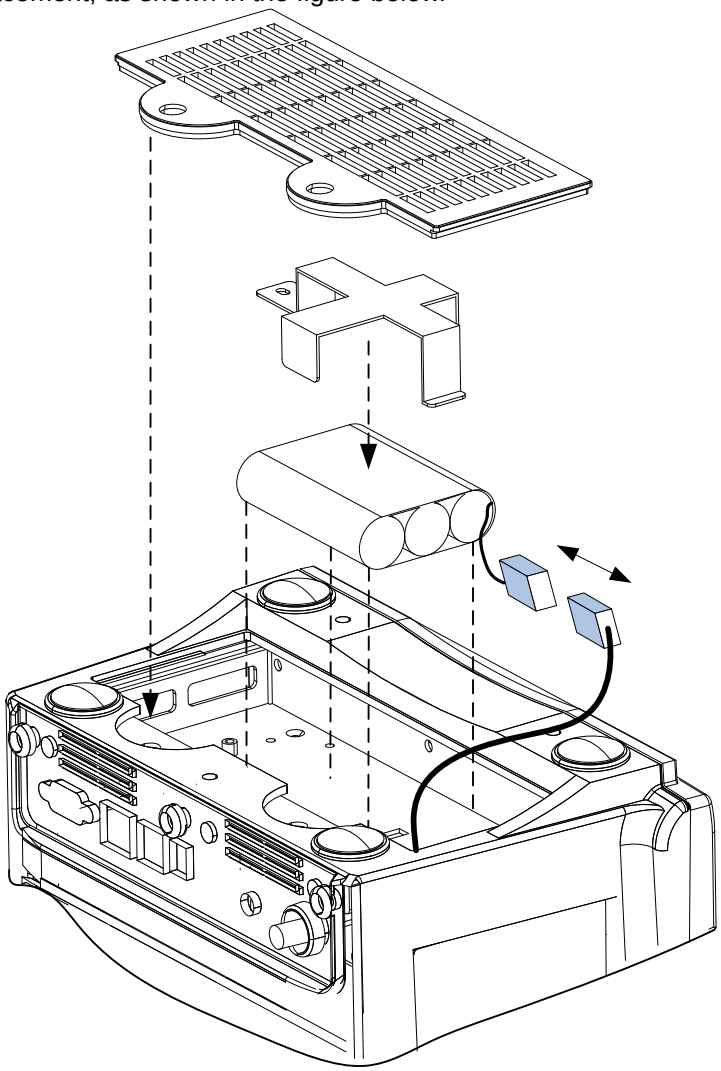
7. Low power supply: When power is less than 16V, the battery indication disappears and the ”LOW” indication is active.

Display of low power

Note
When the batteries are replaced, remove and replace the DC adapter.

To insert and remove the battery pack.

Assembly or replacement, as shown in the figure below.



The Impact of Lithium-Ion Battery Technology on the Battery

The following are the key points you should know about Lithium-Ion battery technology:
The battery will discharge on its own, even when it is not installed in a monitor. This discharge is the result of the Lithium-Ion cells and the bias current required for the integrated electronics.
By the nature of Lithium-Ion cells, the battery will self-discharge.
The self-discharge rate doubles for every 10°C (18°F) rise in temperature.
The capacity loss of the battery degrades significantly at higher temperatures.
As the battery ages, the full-charge capacity of the battery will degrade and be permanently lost. As a result, the amount of charge that is stored and available for use is reduced.

Conditioning Guideline

The battery in the monitor should be fully charged and discharged every six months and condition it using the battery charger.

Storage Guideline

Store the battery outside of the monitor at a temperature between 20°C to 25°C (68°F to 77°F).
When the battery is stored inside a monitor that is powered by an AC power source, the battery cell temperature increases by 15°C to 20°C (59°F to 68°F) above the room's ambient temperature. This reduces the life of the battery.
When the battery is stored inside a monitor that is continuously powered by an AC power source and is not powered by battery on a regular basis, the life of the battery may be less than 12 months.
BIONET recommends that you remove the battery and store it near the monitor until it is needed for transport..

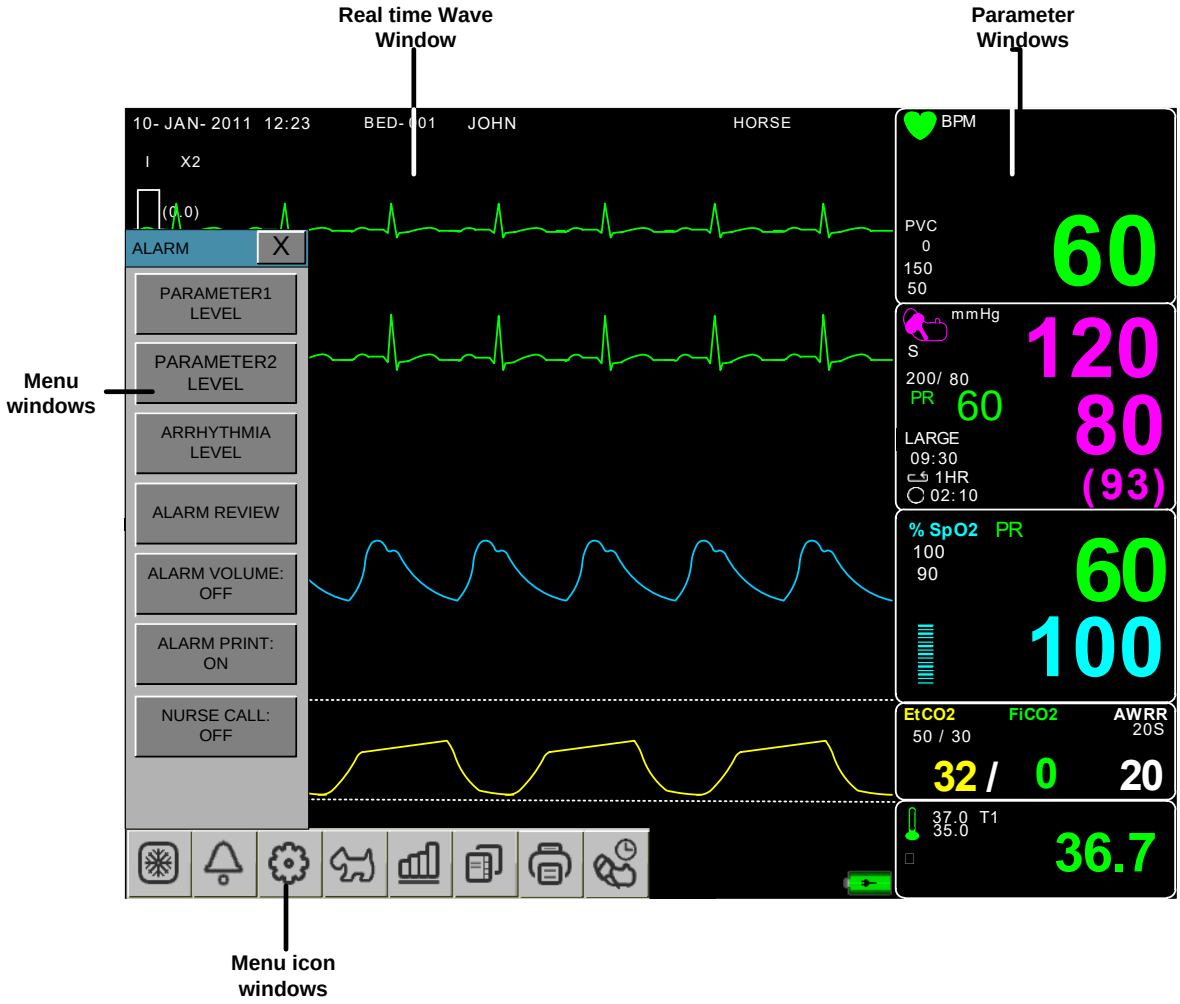
How to Recycle the Battery

When the battery no longer holds a charge, it should be replaced. The battery is recyclable. Remove the old battery from the monitor and follow your local recycling guidelines.

WARNING
EXPLOSION HAZARD — DO NOT incinerate the battery or store at high temperatures. Serious injury or death could result.

1.7 General Menu Operation

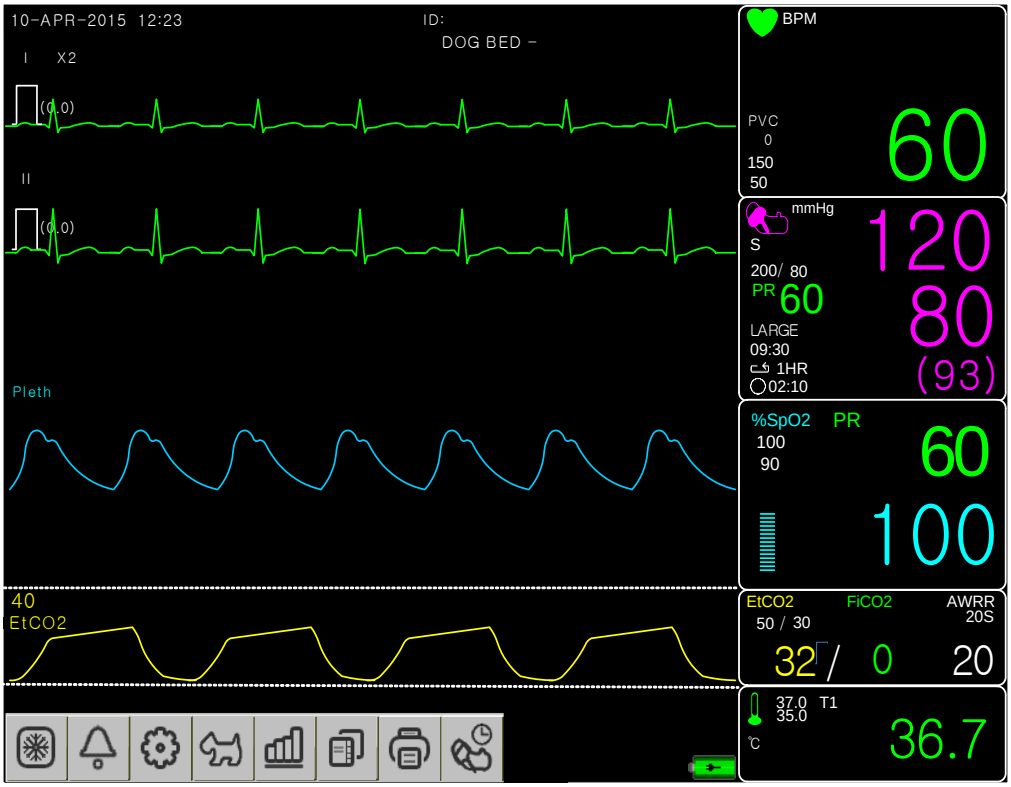
Screen Composition



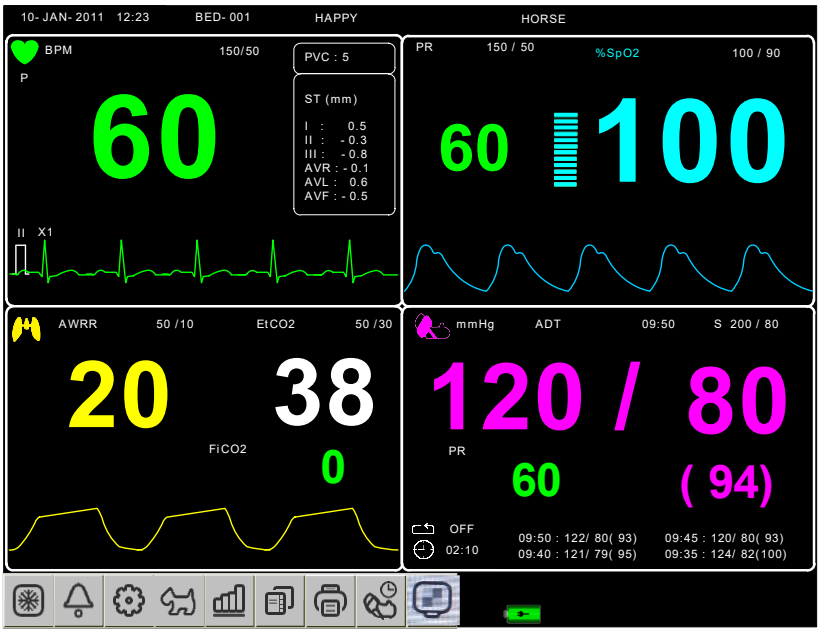
Real Time Wave Window：	Displays measured results by up to seven waves.
Menu icon windows:	A menu displays icons for each function.
Menu Select Window：	Menus appear when they are activated..
Parameter Window：	Measured and setup data are displayed in five windows.

The screen consists of a total of two modes
NORMAL MODE: As the figure shows the waveform parameters of the screen
PARAMETER MODE: Selected figures show only the 4 parameters of the screen

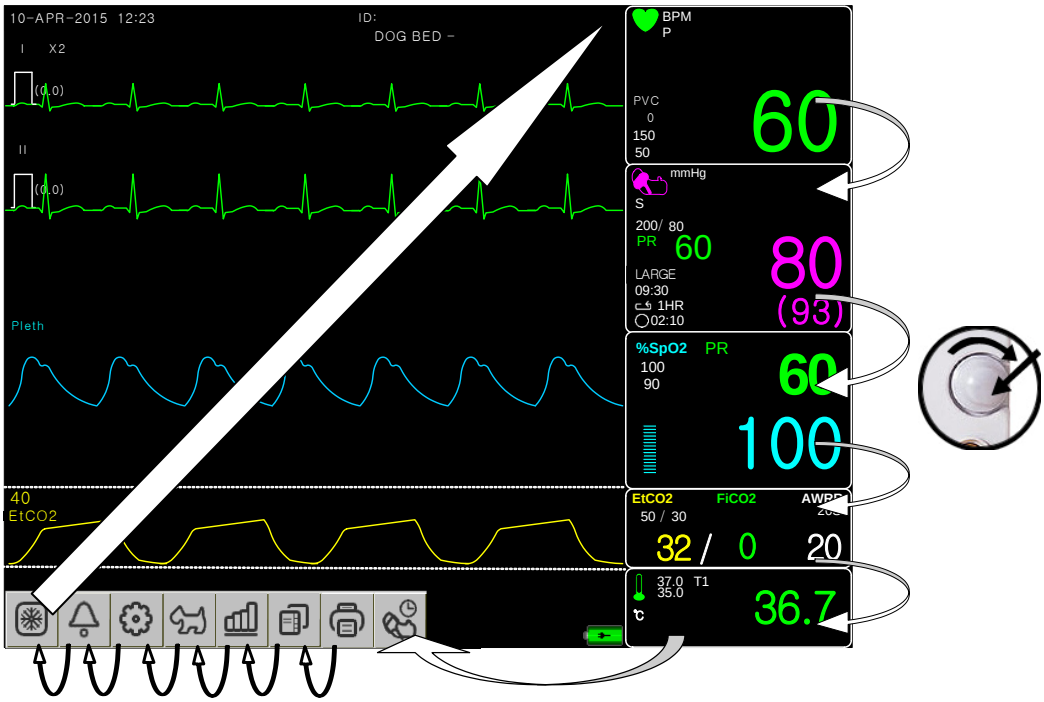
NORMAL MODE



PARAMETER MODE



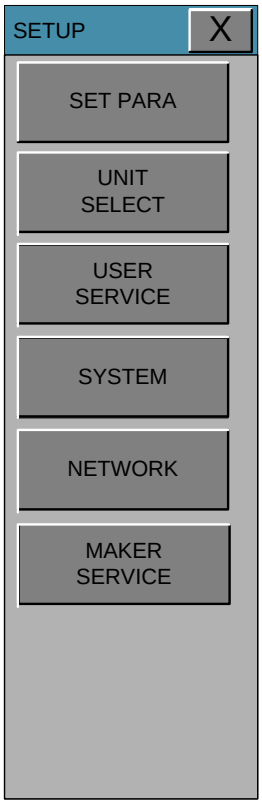
Menu Selection



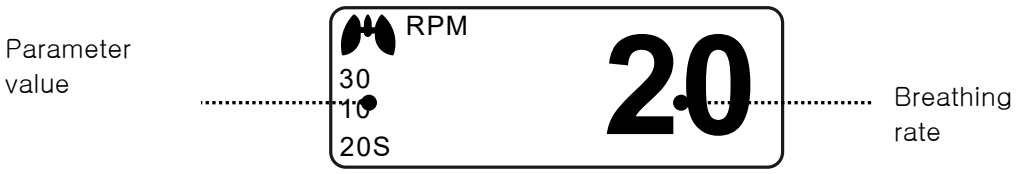
When the Trim Knob Key is turned, menus are selected in the order indicated above. The above screen shows that the MORE menus is selected. The menus move to the right in the order of MORE MENU → ECG → NIBP →SpO_2 → RESP ($EtCO_2$) → TEMP. An inactivated window is jumped off.

Menu Composition

More Menu Window
When the additional menu is selected it will set and cancel the functions.

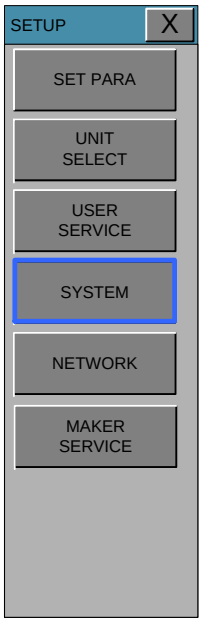


Numerical value sign widow
This window displays a measured parameter, function setup, and the boundary of parameter values.



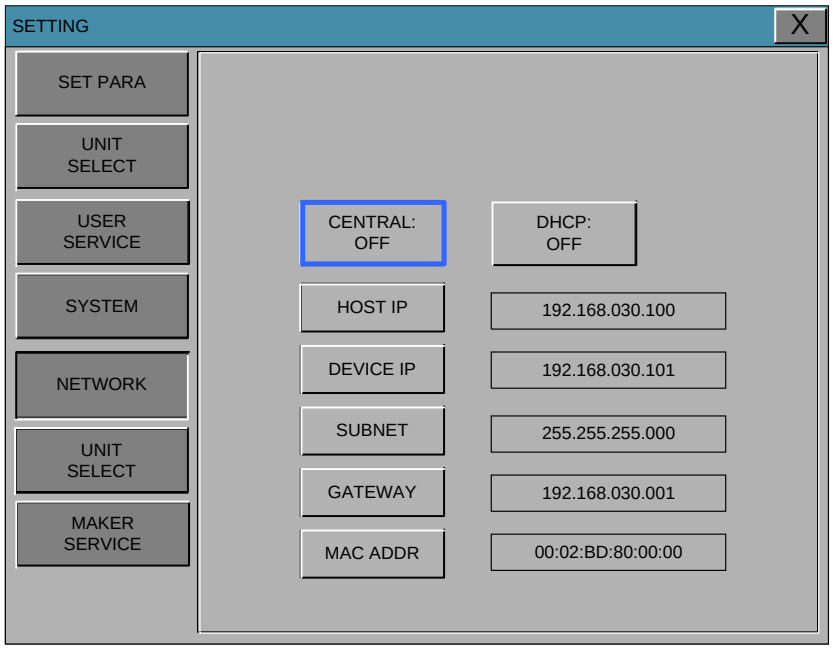
Menu selection by using Trim Knob key

As the key is turned to the right, the menu selection moves clockwise. As the key is turned to the left, the menu selection moves counterclockwise. The menu selection is activated when you depress Trim Knob key.



Menu selection with touch keys

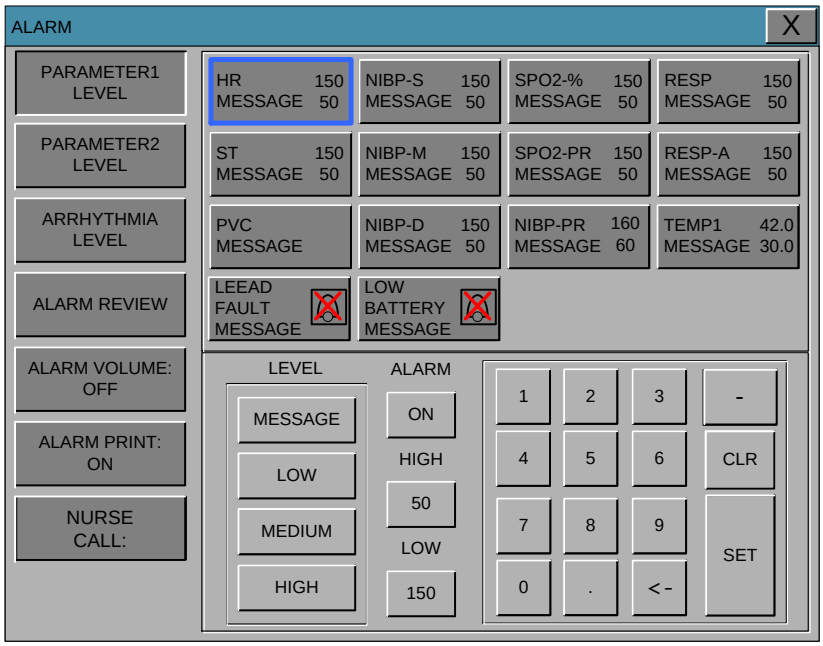
Touch the desired menu, the menu will be selected.



Word feature menu

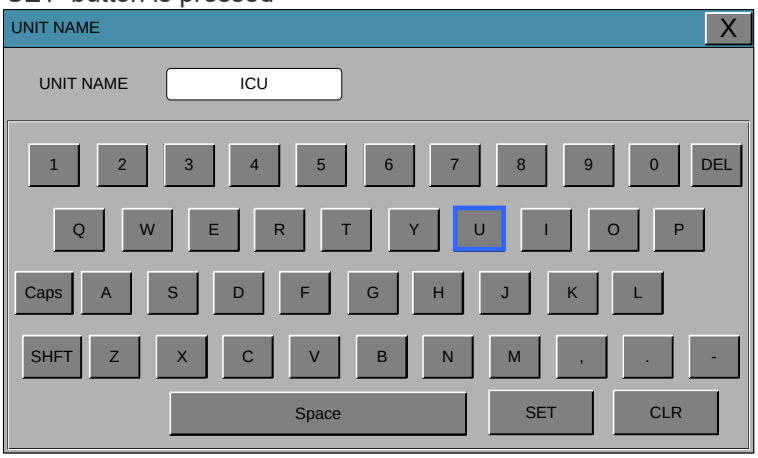
The following figure shows the screen where the word sequence menu is activated within the word sequence correction menu. Here, the cursor moves over the words when the Trim Knob key is turned in the clockwise direction.

Touch the desired menu box, select the menu is available



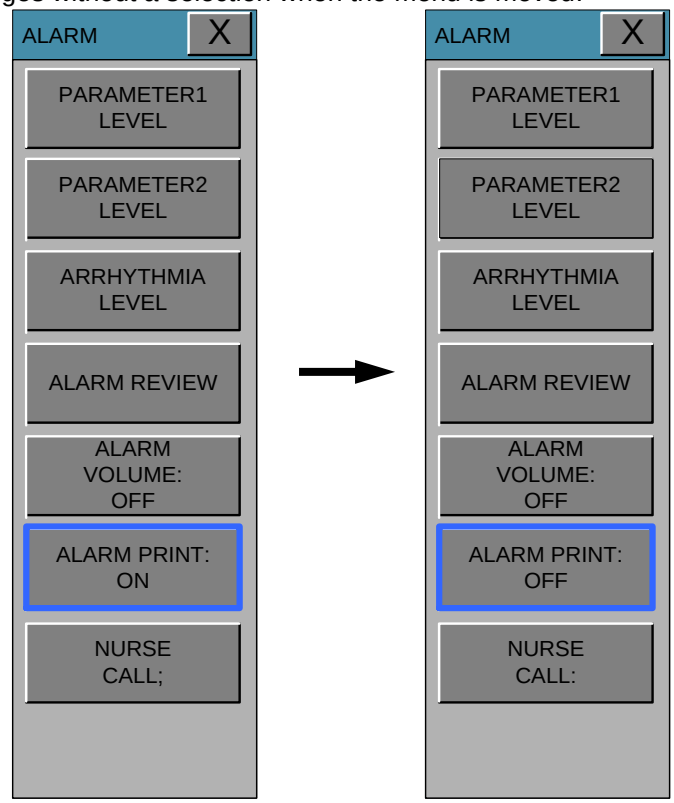
Word feature menu

The following figure shows the screen where the word sequence menu is activated within the word sequence correction menu. Here, the cursor moves over the words when the Trim Knob key is turned in the clockwise direction.To enter letters and numbers at the touch of their letters and numbers after the ‘SET’ button is pressed



Operation menu

The setup value changes without a selection when the menu is moved.



2. ANIMAL/DATA MANAGEMENT

2.1 ADMIT

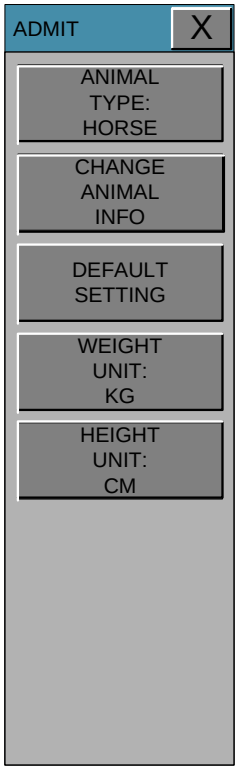
ANIMAL TYPE
CHANGE ADMIT INFO
DISCHARGE
HEIGHT
WEIGHT

2.2 ALARM

Alarm for the Product
PARAMETER1 LEVEL
PARAMETER2 LEVEL
ARRHYTHMIA LEVEL
ALARM REVIEW
ALARM VOLUME
ALARM PRINT
NURSE CALL

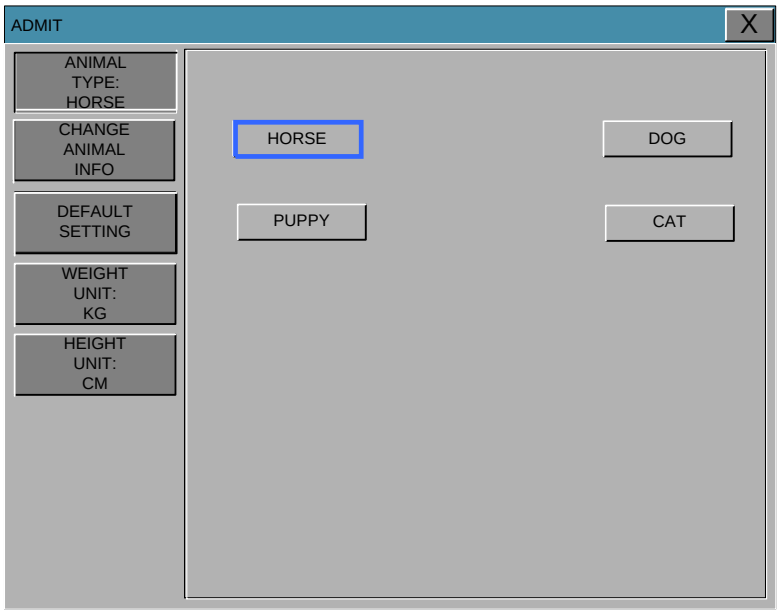
2.1 ADMIT

CHANGE ANIMAL INFO
ANIMAL TYPE
DEFAULT SETTING
HEIGHT UNIT
WEIGHT UNIT



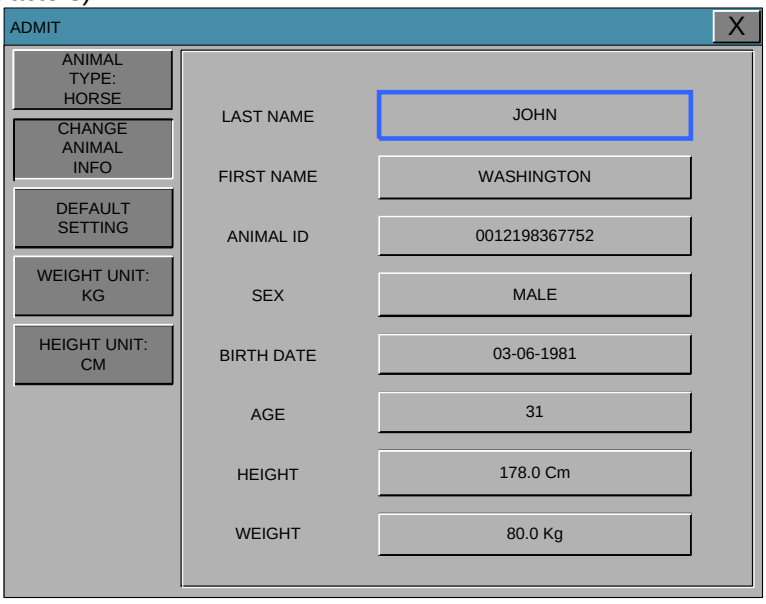
ANIMAL TYPE

Set the patient environment of equipment in Animal Type.
HORSE : LARGE ANIMAL // DOG: MEDIUM ANIMAL
PUPPY : SMALL ANIMIAL // CAT: TINY ANIMAL



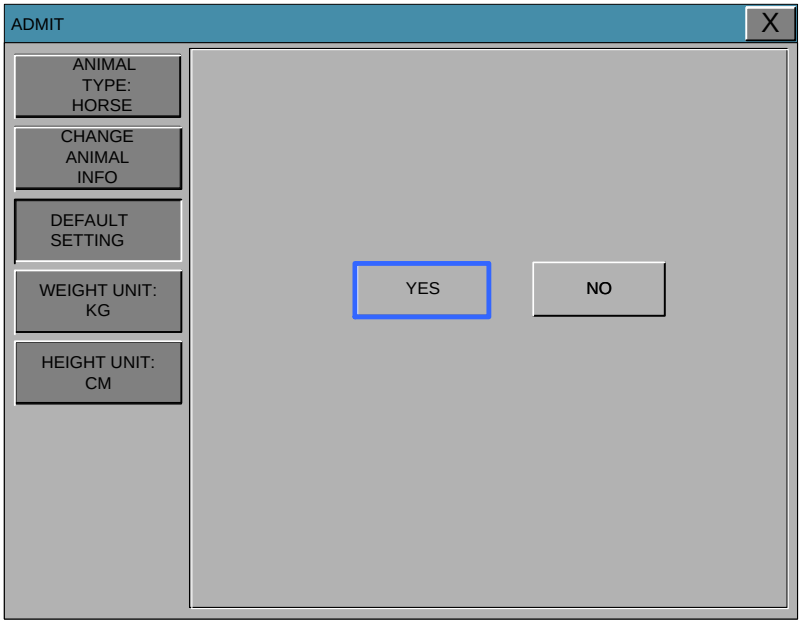
CHANGE ANIMAL INFO

Last and first name (11 letters for each), sex (male or female), date of birth, weight, height, and Animal ID (11 characters)



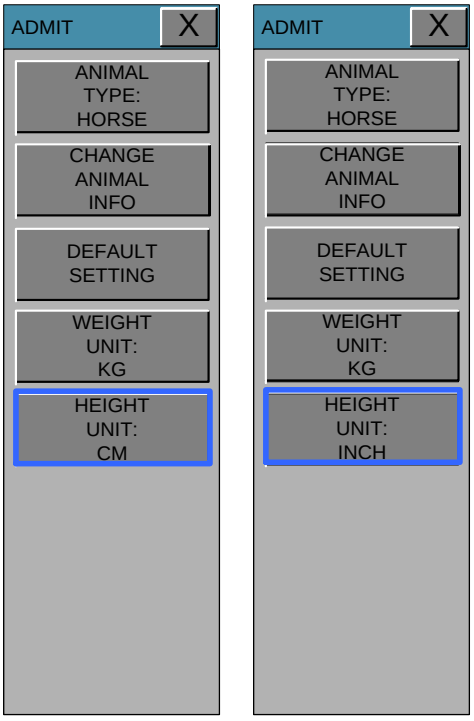
DEFAULT SETTING

Parameter range settings, alarm settings, and Animal-specific initialization settings.



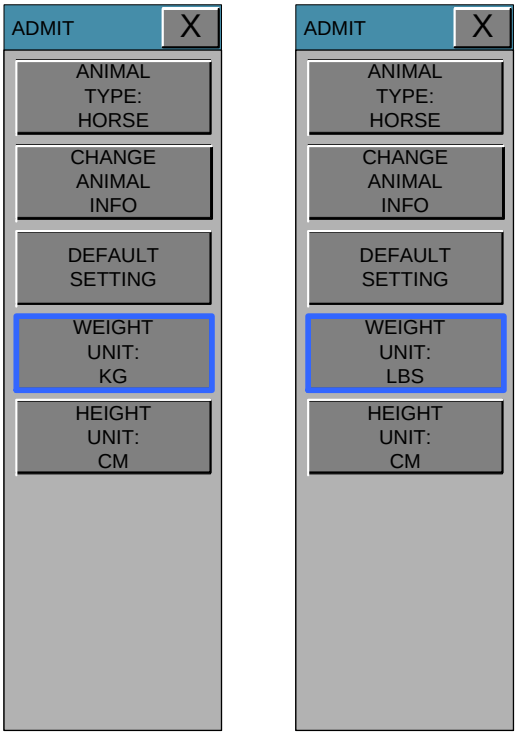
HEIGHT

Unit of height is set as Cm / Inch.



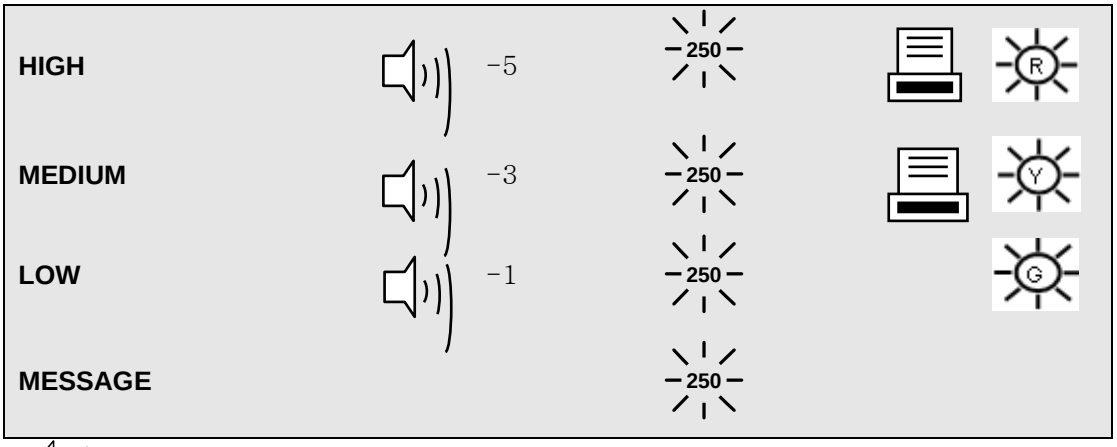
WEIGHT

Unit of weight is set as Kg / LBS.



2.2 ALARM

Alarm is divided into two, alarm for the Animal's condition and for the product's condition.
The Animal's alarm sounds when the diagnostic functions (ASYSTOLE, VTAC/VFIB, and VTAC) are detected. Each alarm sound differs in order and volume according to the levels of HIGH, MEDIUM, LOW and MESSAGE.




: Alarm sounds

: Number flashes


: Waves are printed out

Alarm for the Product

The machine gives alarm sounds for its system with a related message flashing.

LOW -1

ALARM LIMITS：The machine enables one to see and change the limits of alarm for all parameter functions.

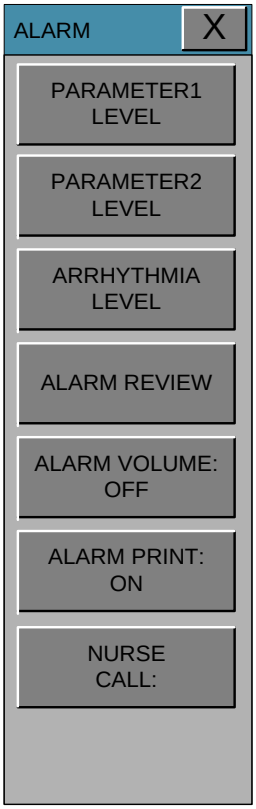
ALARM PRINT：with an ON/OFF setup, the related information is printed out whenever an alarm is given.

ALARM VOLUME：volume of each alarm can be adjusted in 10 steps.

ALARM LEVEL：Priority of each parameter alarm can be set up.

ALARM REVIEW： Shows the priority order information for all alarms of each measurement.

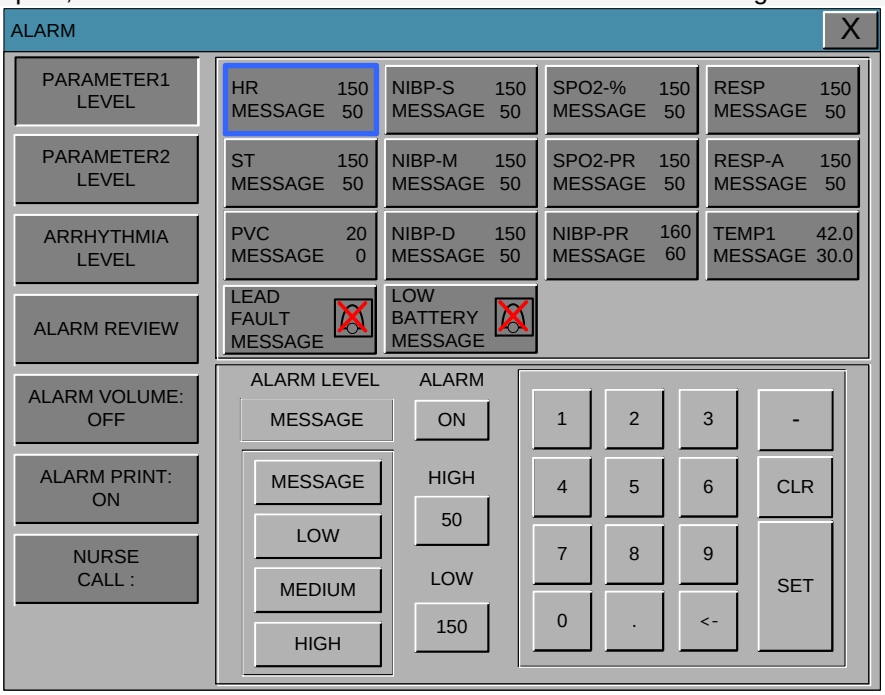
NURSE CALL： Set the feature of the NURSE CALL.



Able to see and change all the alarm functions.

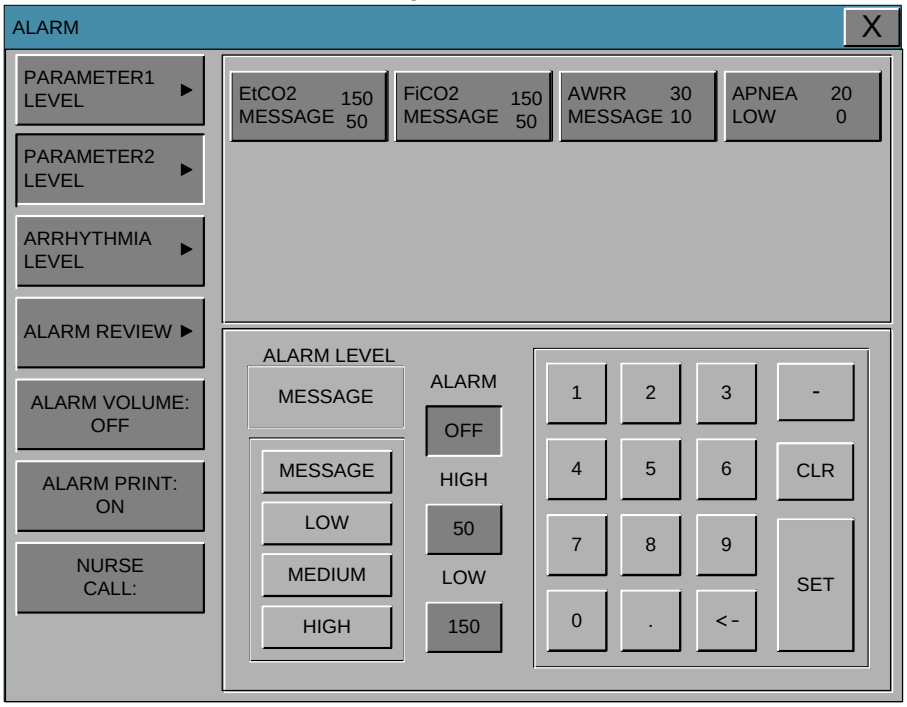
PARAMETER1 LEVEL

ECG, NIBP, SpO2, RESP and TEMP information about all of the alarm settings.



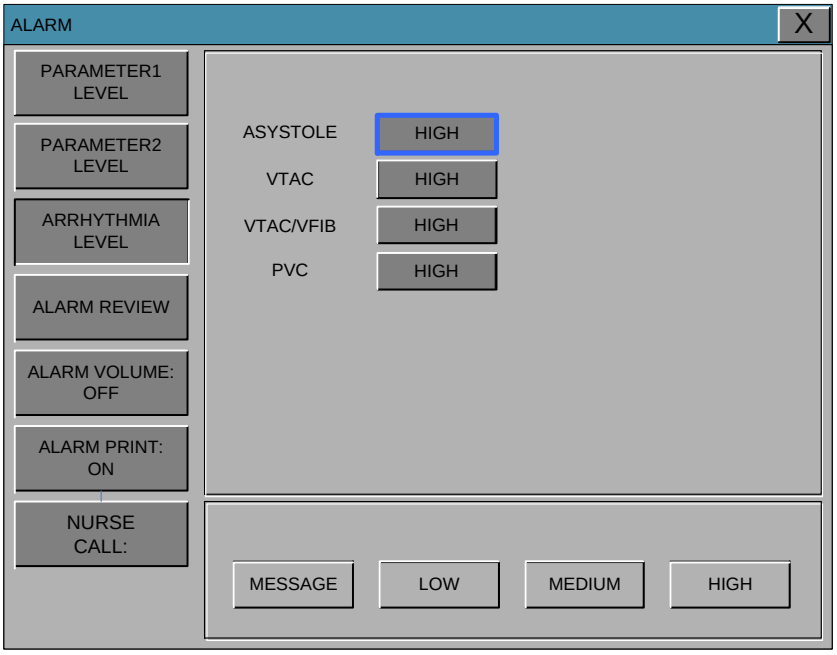
PARAMETER2 LEVEL

EtCO2 information about all of the alarm settings.



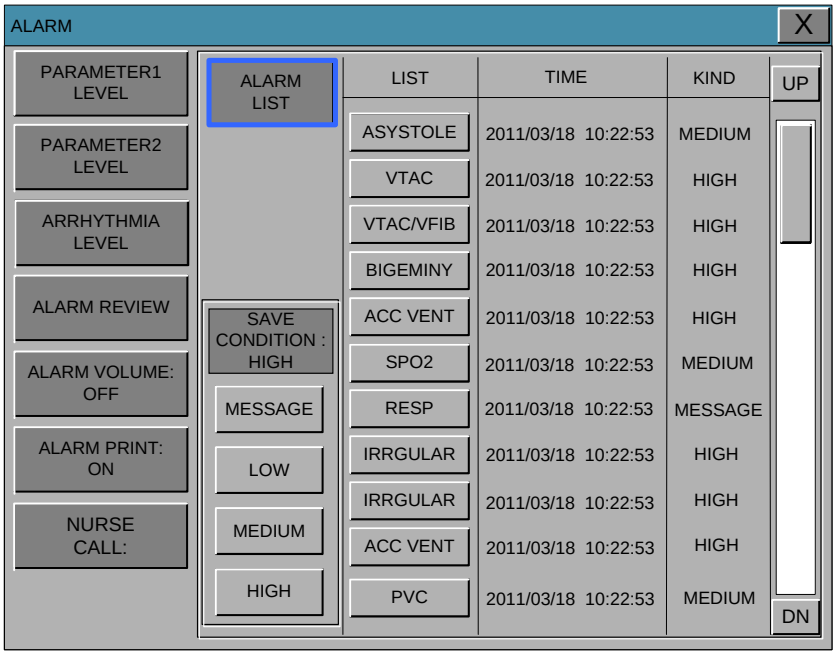
ARRHYTHMIA LEVEL

Diagnostics when the alarm is set.



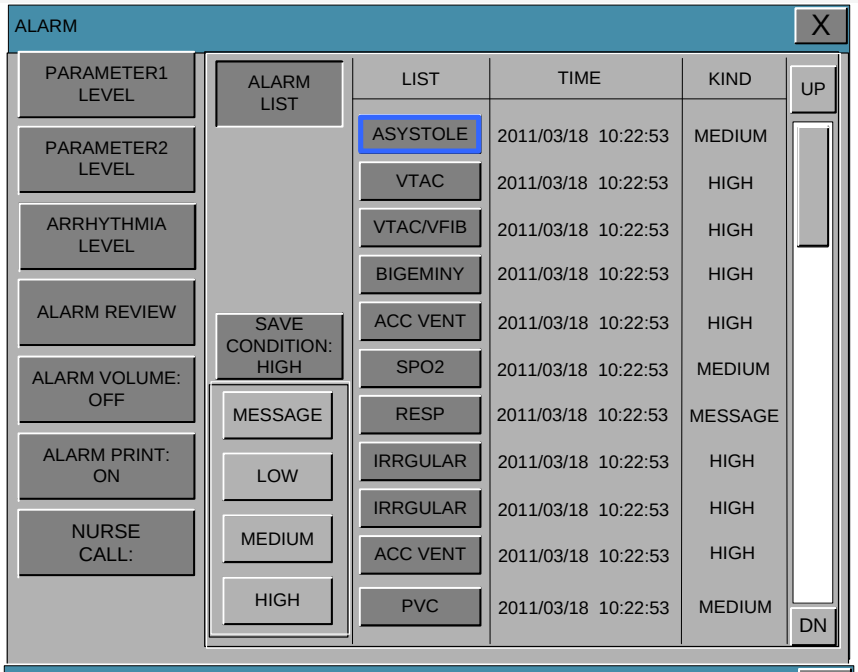
ALARM REVIEW

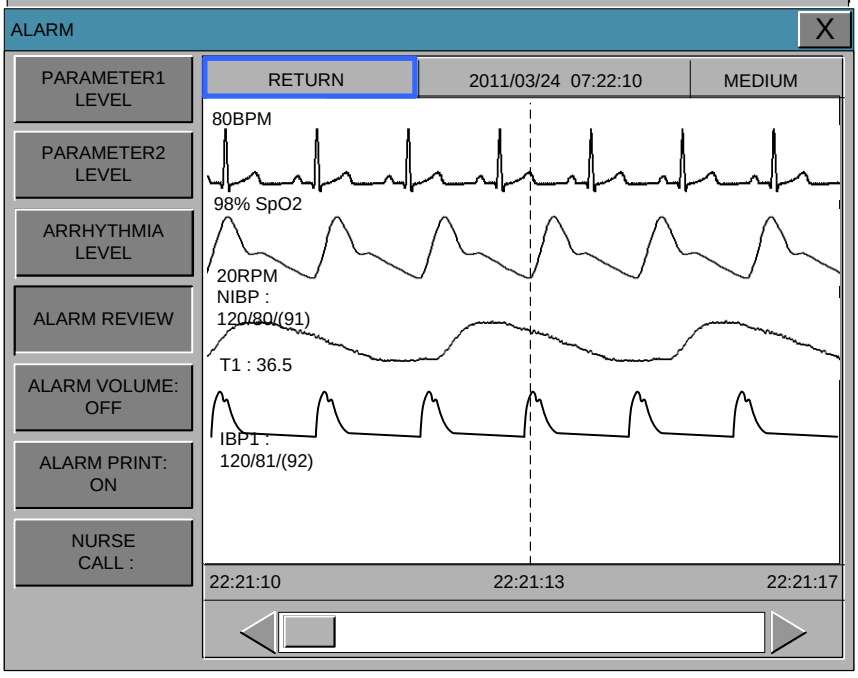
After an alarm is triggered the alarms and data wave pattern can be reviewed. Set up the priority of each parameter alarm.



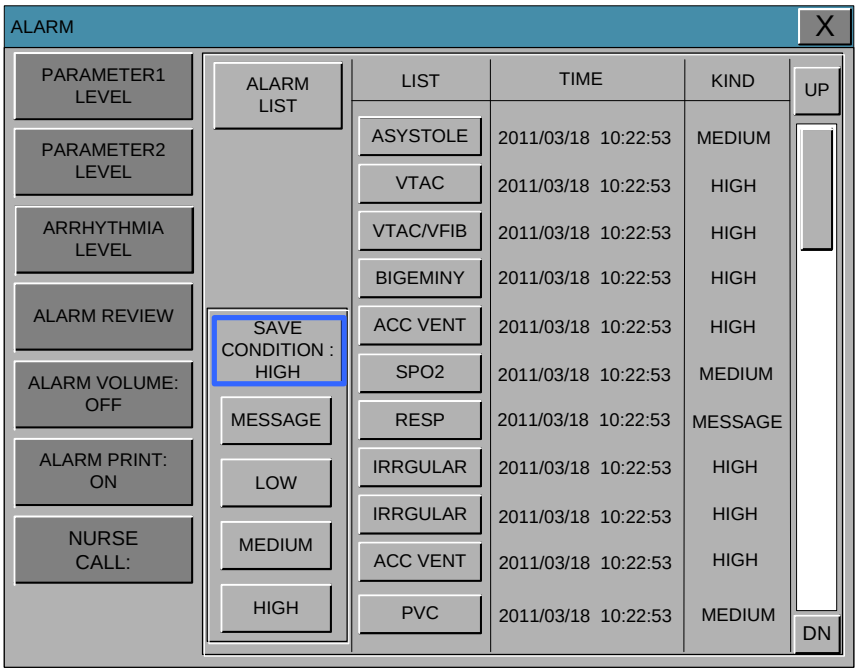
ALARM LIST

When an alarm activates, this shows the order of the alarms. Up to 20 cases of alarm can be stored.



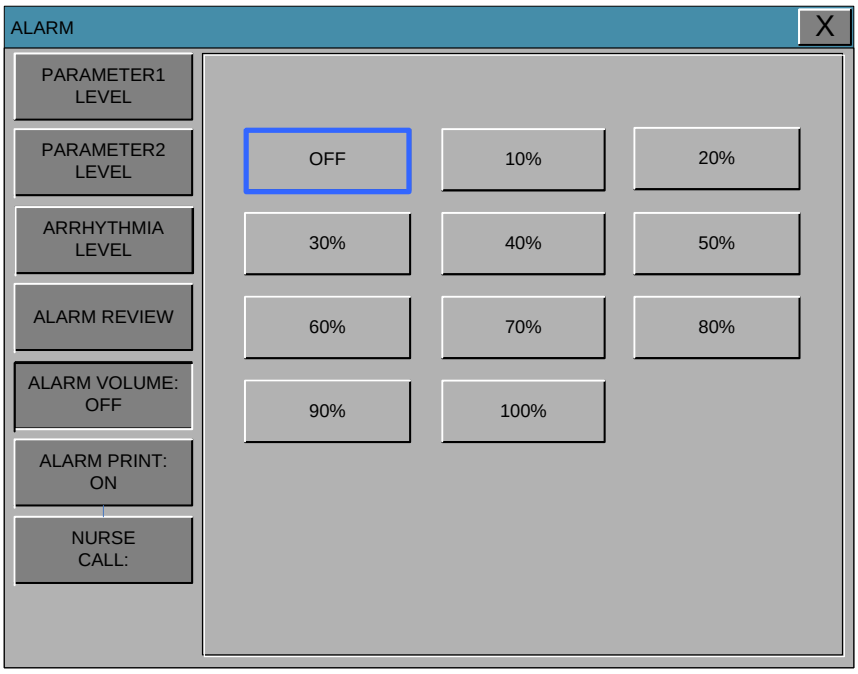


SAVE CONDITION
This determines the alarm level of parameters which are saved in the alarm list when alarm occurs. If a higher level of alarm occurs than the previously determined alarm level, data would be saved in the alarm list.



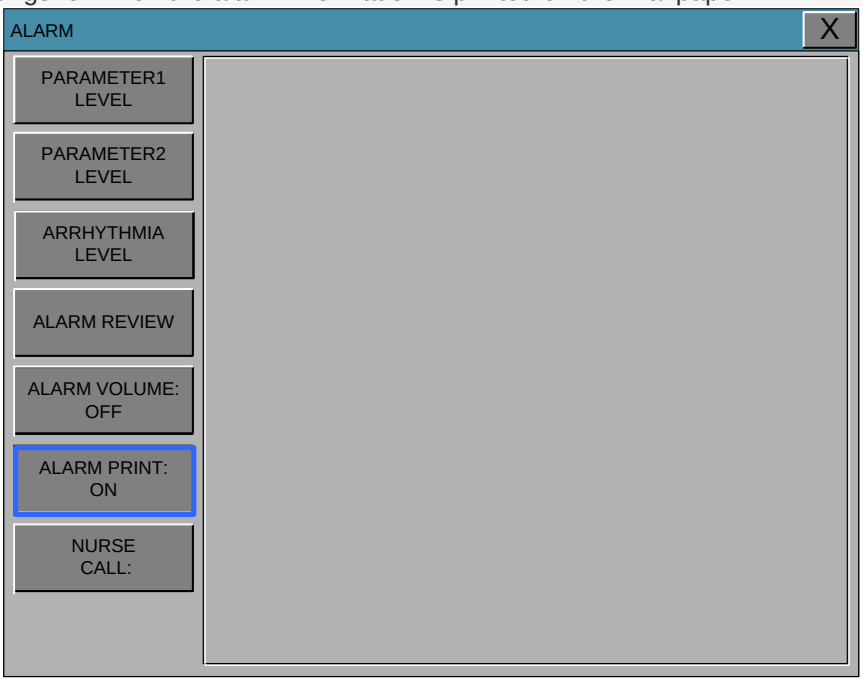
ALARM VOLUME

Set the alarm volume at 10 levels.



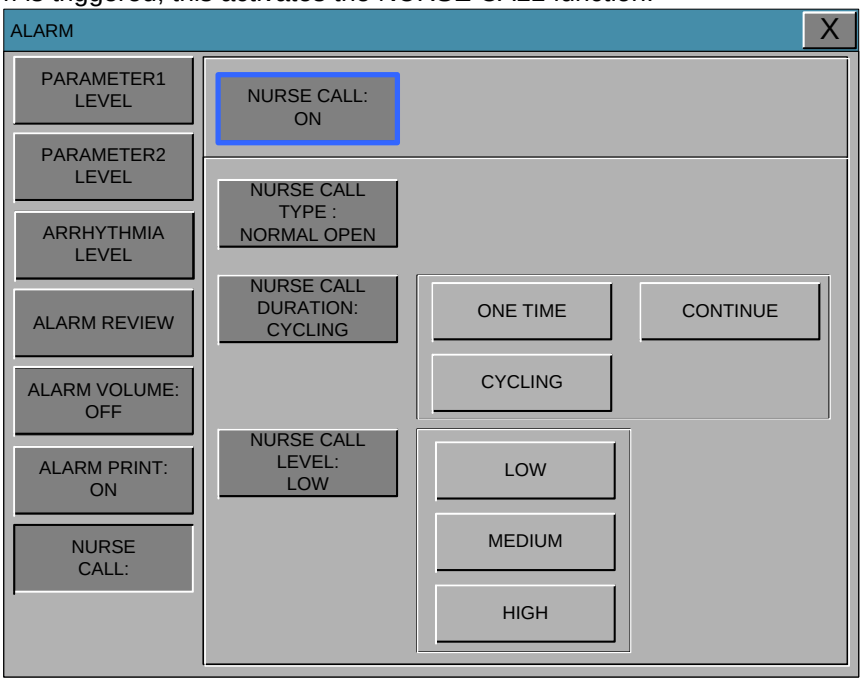
ALARM PRINT

ON / OFF settings for when the alarm information is printed on thermal paper.



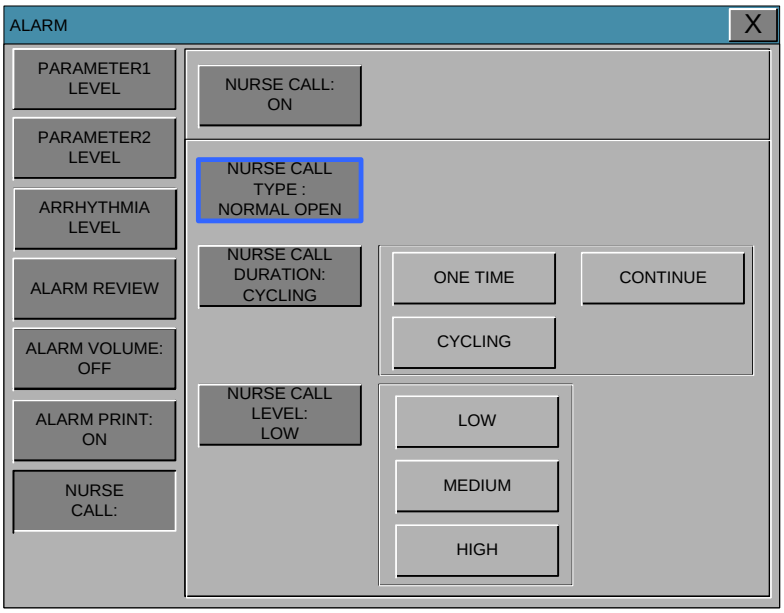
NURSE CALL

When an alarm is triggered, this activates the NURSE CALL function.



NURSE CALL TYPE

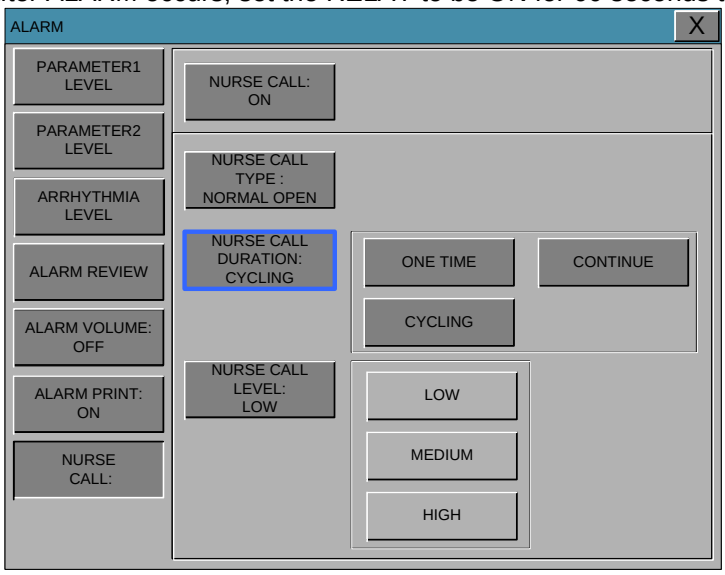
NURSE CALL function call when an alarm condition is met.
NORMAL OPEN: RELAY OPEN when ALARM does not ring, CLOSE when ALARM does ring.
NORMAL CLOSE: RELAY CLOSE when ALARM does not ring, OPEN when ALARM does ring.



NURSE CALL DURATION

NURSE CALL alarm calls when the situation is set to output mode.

ONE TIME: After ALARM occurs, set the RELAY to be ON for 3 seconds then OFF
CYCLING: Relay will cycle between ON and OFF in 1-second intervals.
CONTINUE: After ALARM occurs, set the RELAY to be ON for 60 seconds then OFF.



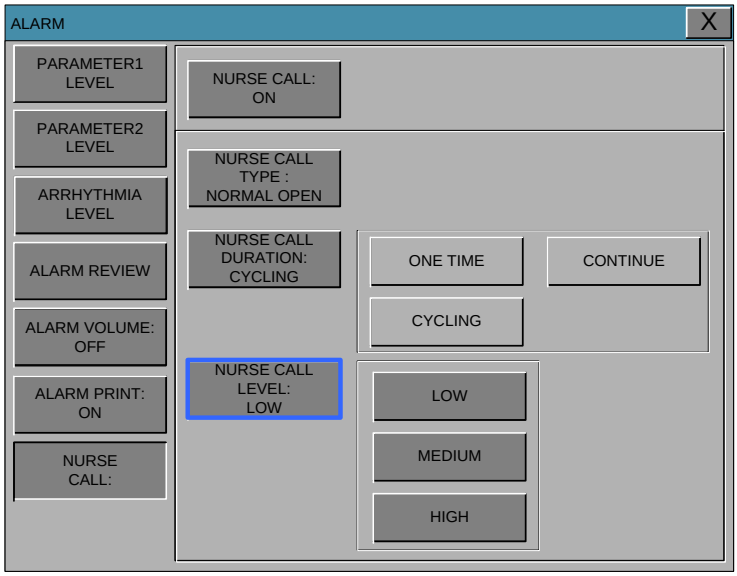
NURSE CALL LEVEL

NURSE CALL alarm level is set to operate.

LOW : If the alarm is raised above the LOW level NURSE CALL call.

MEDIUM: If the alarm is raised above the MEDIUM level NURSE CALL call.

HIGH: If the alarm is raised above the HIGH level NURSE CALL call.



3. SETUP

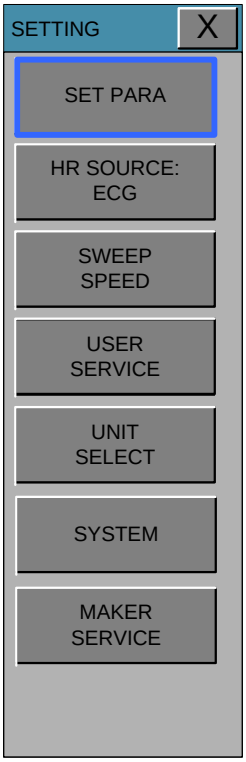
3.1 SETUP

SET PARA
UNIT SELECT
USER SERVICE
SYSTEM
NETWORK
MAKER SERVICE
FREEZE MENU

3.1 SETUP

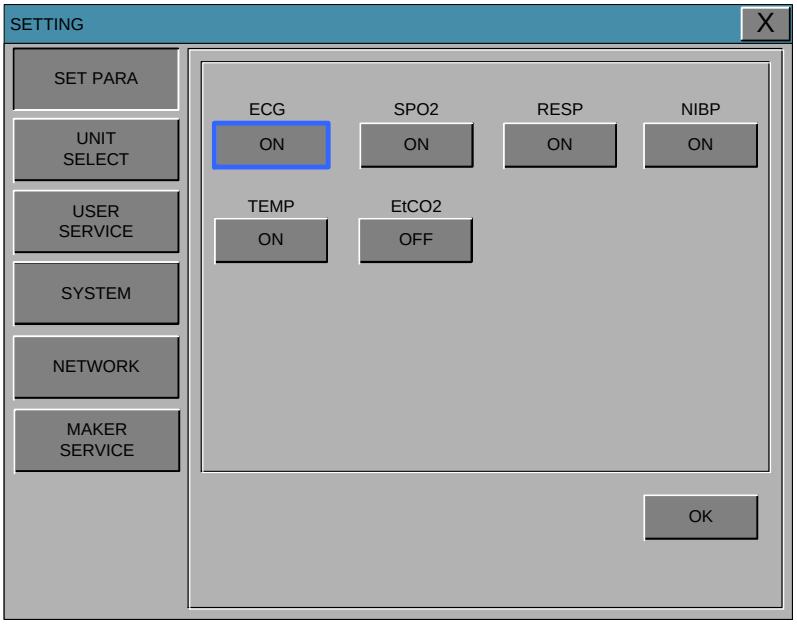
The Settings menu is displayed after pressing the icon shown above.

SET PARA : On and Off measurement parameters of patient monitor.
UNIT SELECT: Select a unit for pressure, ST, and temperature.
USER SERVICE: This is the menu to set the connection used to interface with an external computer.
SYSTEM: Display system version information.
MAKER SERVICE: This is the basic adjustment menu used to adjust the features of this product.



SET PARA

Select measurement function to use.



UNIT SELECT

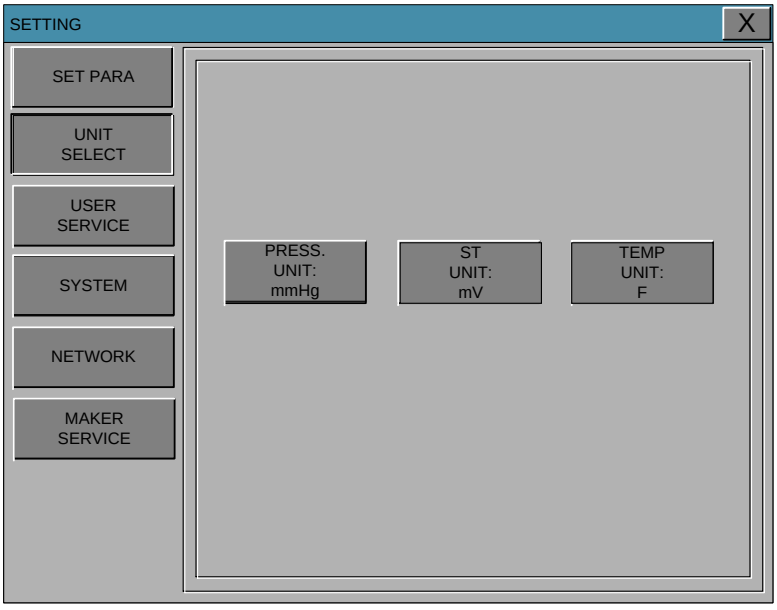
This is the menu for converting the units of BM3VET TOUCH.

The units of parameters for pressure, ST LEVEL, Temperature are able to convert

Pressure: kPa ← → mmHg

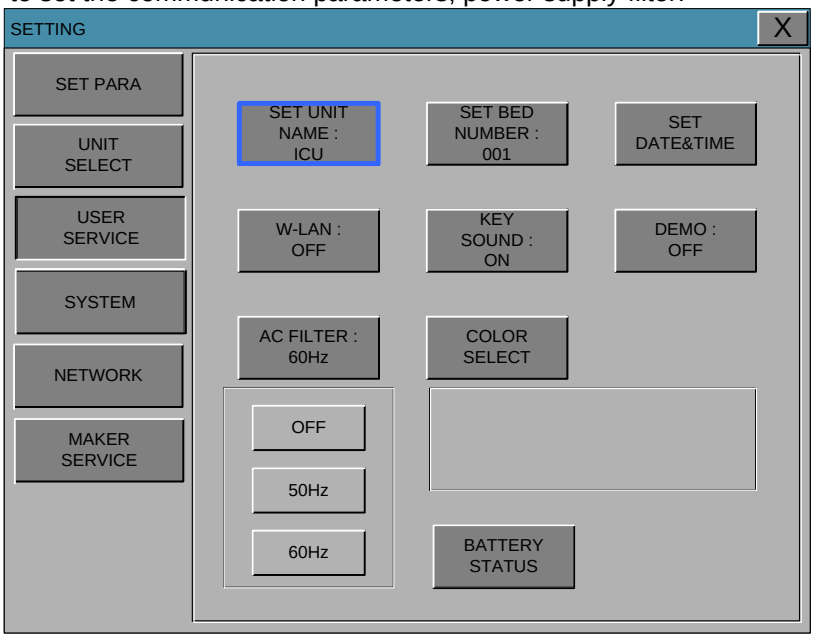
ST mm ← → mV

Temperature: ℃ ← → °F

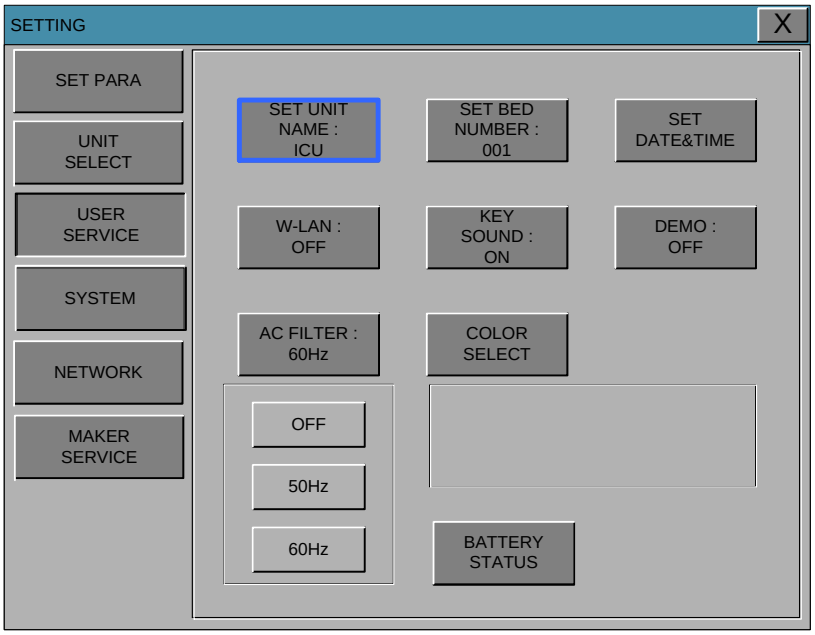


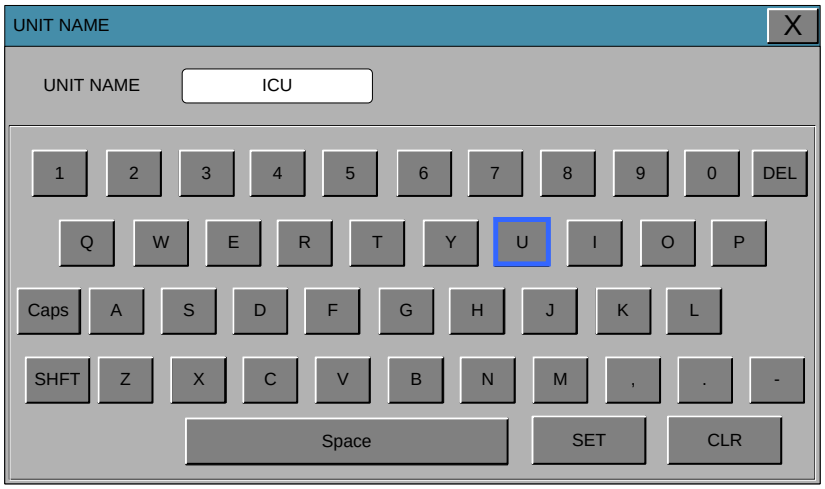
USER SERVICE

The user is able to set the communication parameters, power supply filter.

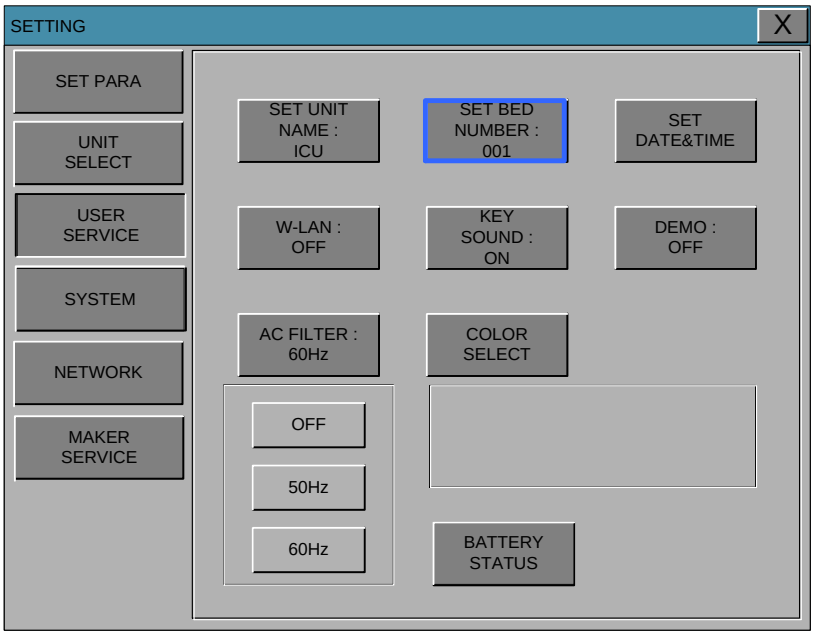


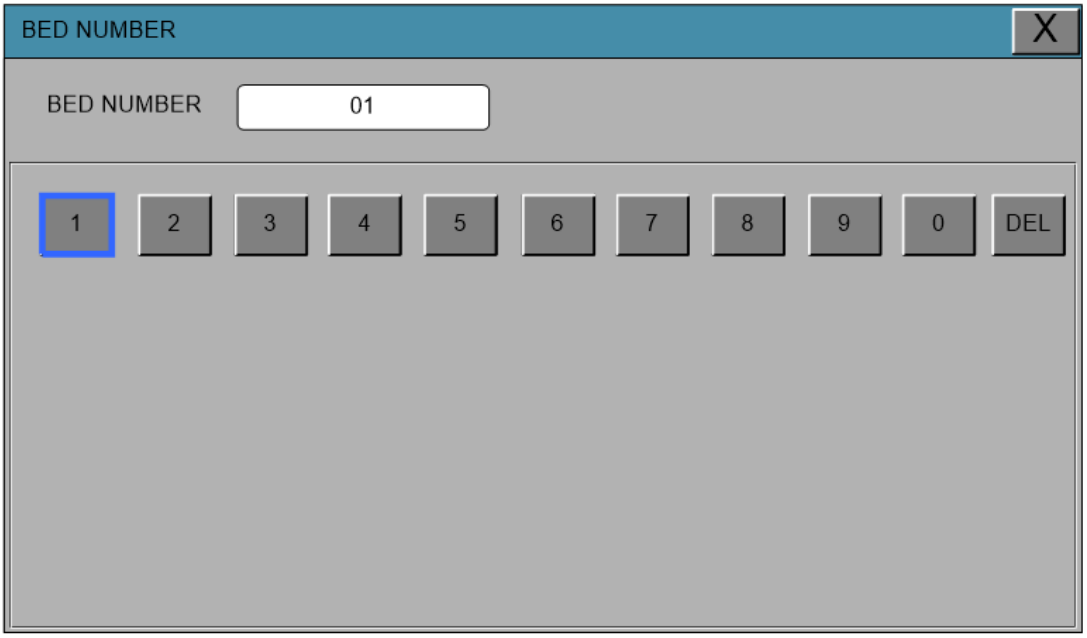
SET UNIT NAME
Set up for Equipment name





SET BED NUMBER
Set up for Animal bed number.
Allowable settings are from 1 to 10.

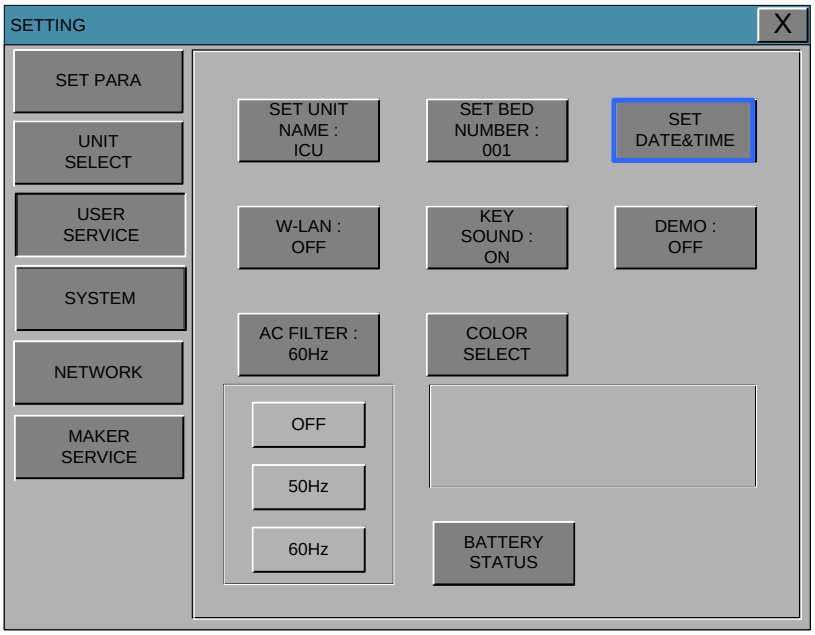


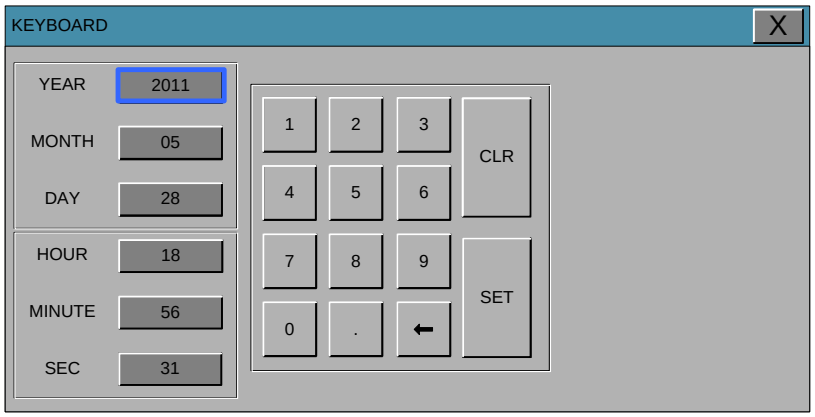


SET DATE & TIME

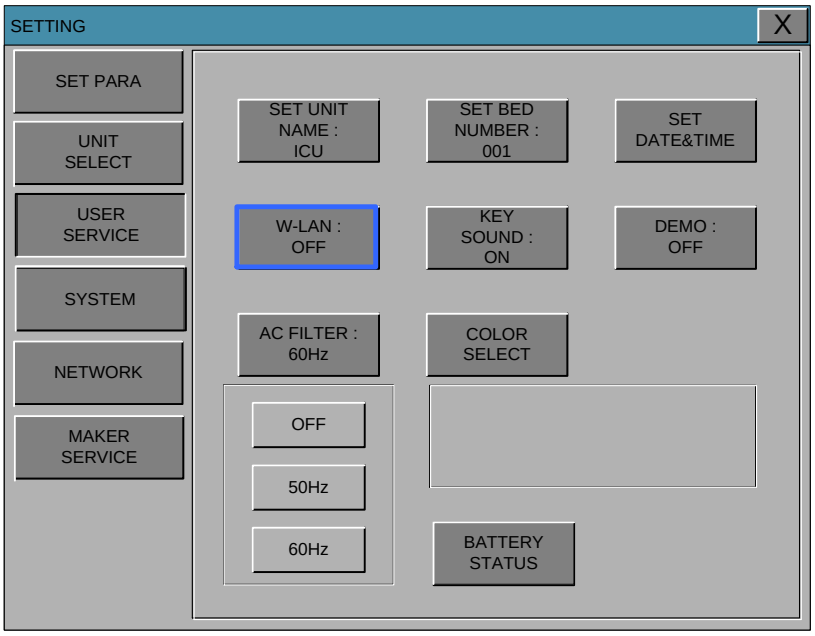
Set date and time of equipment.

Press the SET button after each input change you want to change the year, month, day, hour, minute, and second item during the setting will be entered.

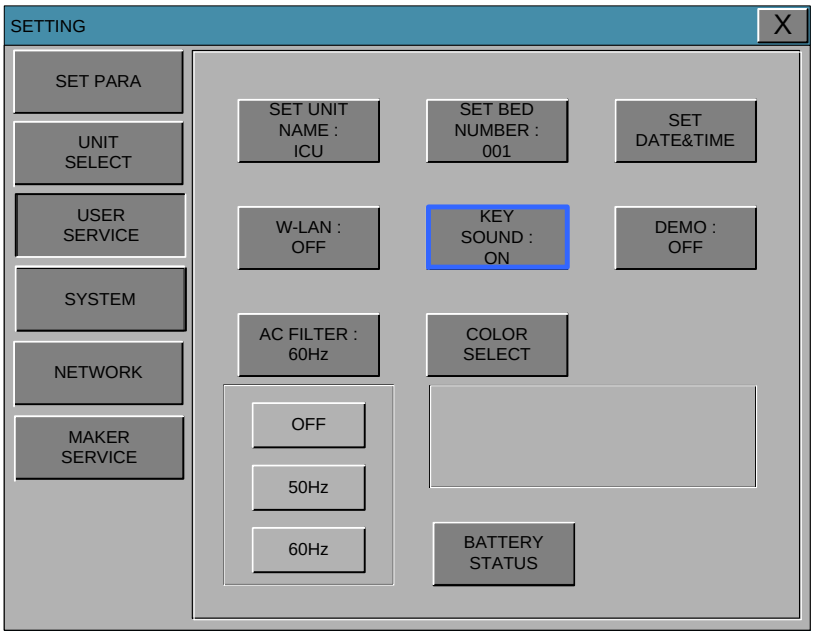




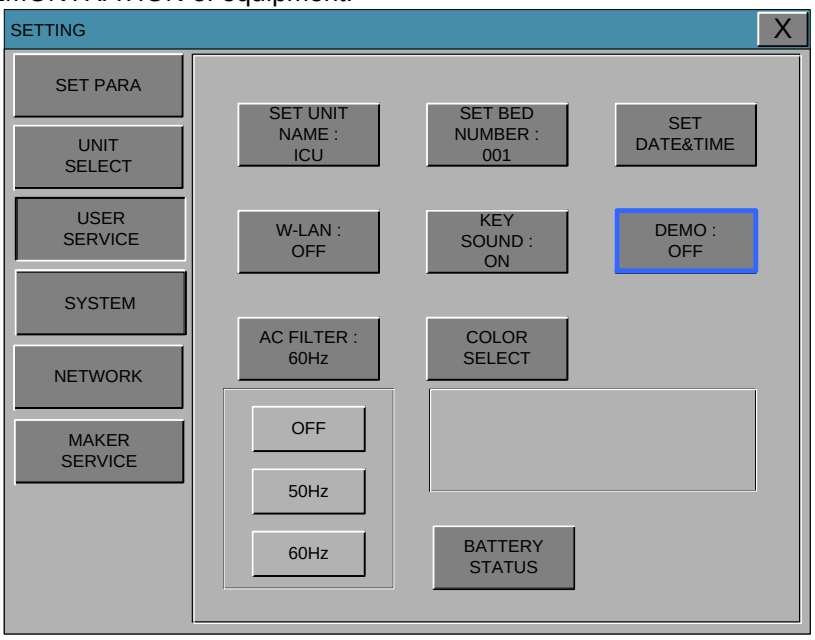
W-LAN
Power supplying of W-LAN module could be adjusted with this function



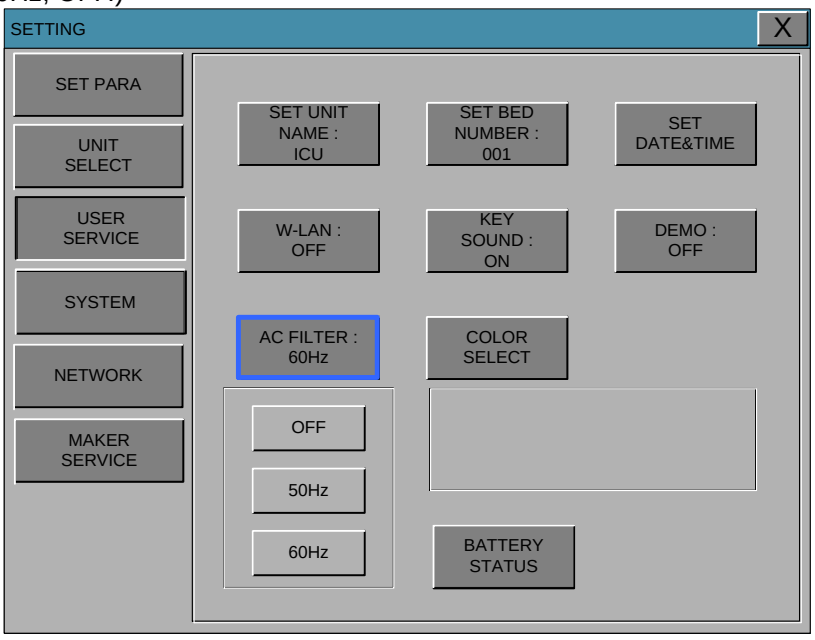
KEY SOUND
This is the menu for KEY SOUND to ON/OFF.



DEMO
Set ON/OFF DEMONTRATION of equipment.

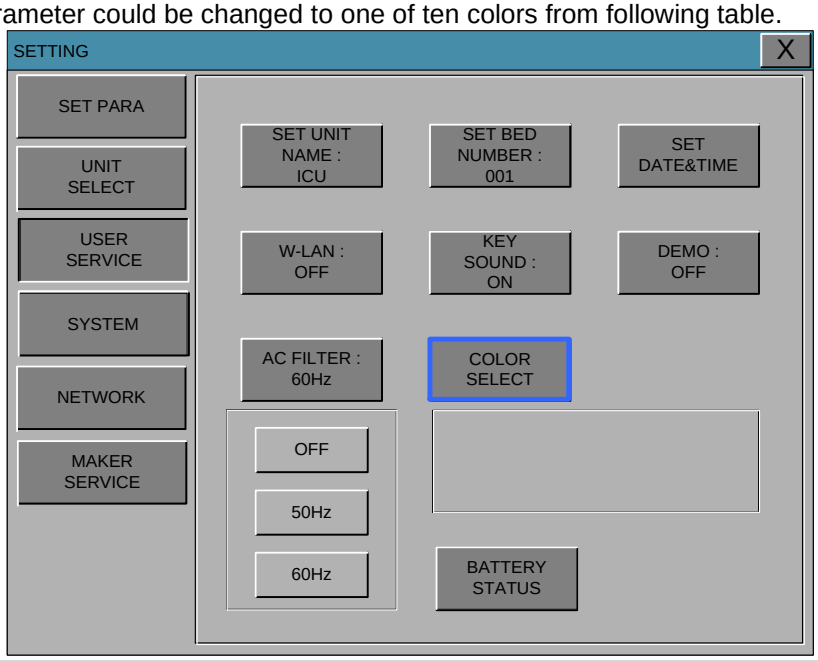


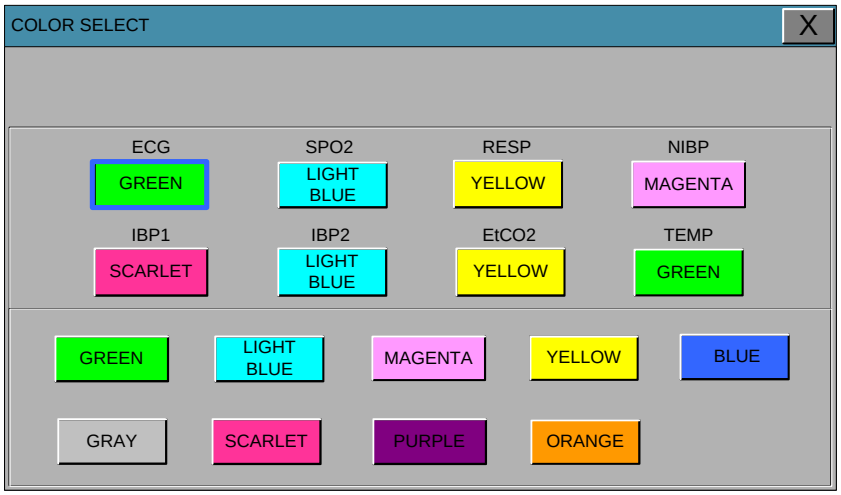
AC FILTER
AC FILTER is function where you can set power supply frequency. This feature is required because power supply frequency can be different from one country to another. . (The selectable frequencies are 50Hz and 60Hz, OFF.)



COLOR SELECT

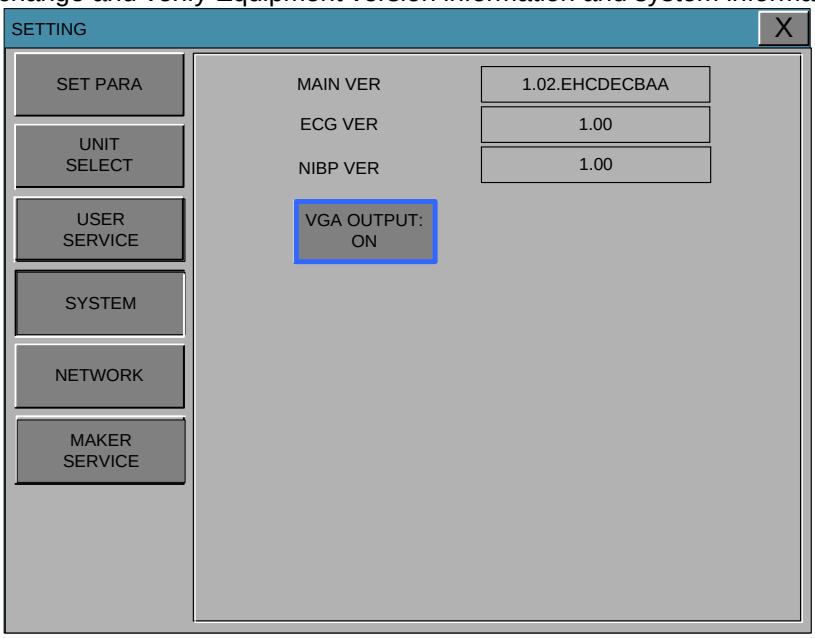
This is the menu to set the waveform and parameter color selection.
It has ten colors below table.
The color of parameter could be changed to one of ten colors from following table.





SYSTEM

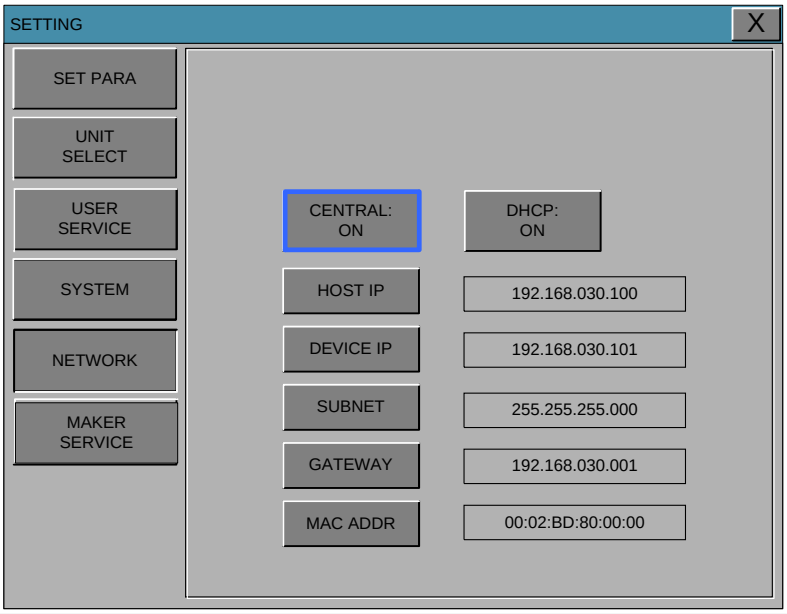
System able to change and verify Equipment version information and system information.



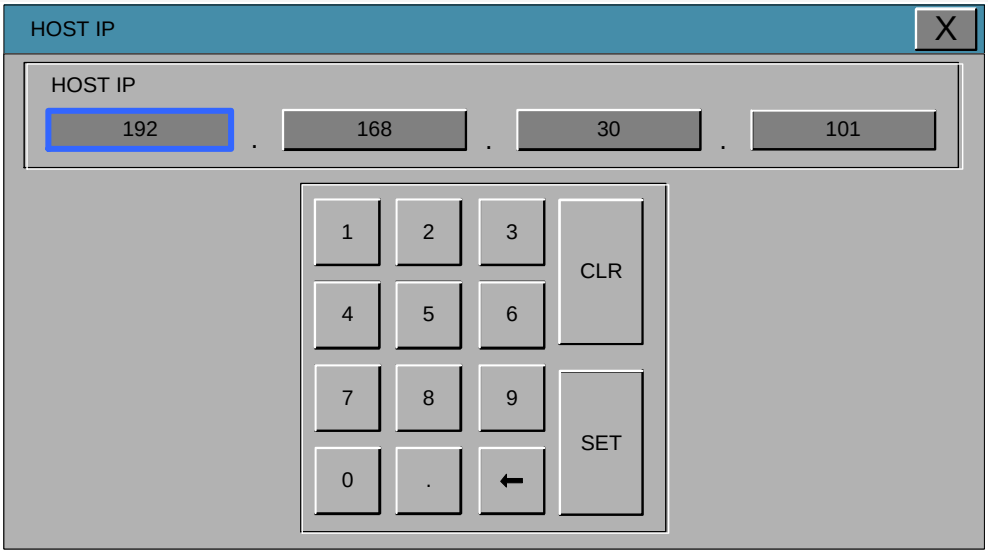
VGA OUTPUT: Turn on VGA output in order to connect external monitor.

NETWORK

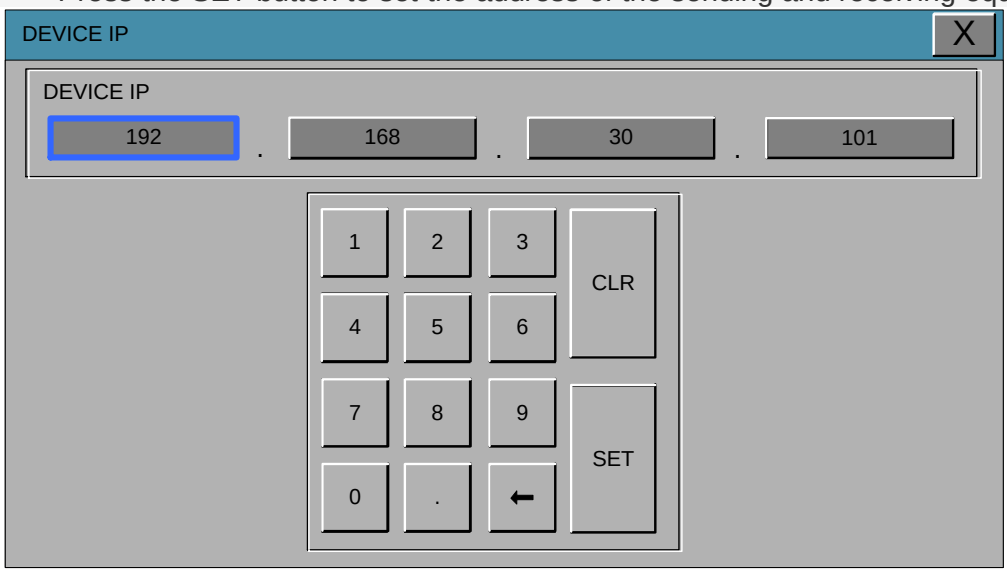
Setup network connection.



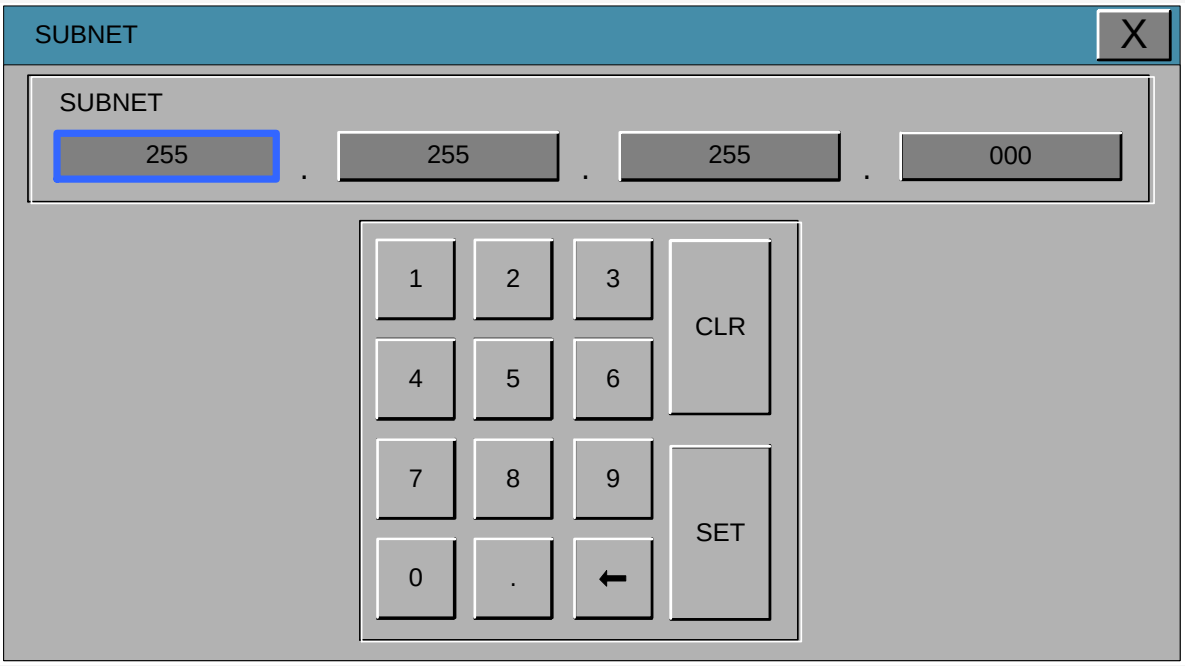
CENTRAL : If this is ON, system transfers parameter data to the computer where Host IP is assigned.
DHCP: If this is ON, system automatically obtains the device's IP from router.
HOST IP: a computer's IP address where B-Link software was installed.
DEVICE IP: Patient monitor's IP address (This will be assigned automatically, if DHCP is ON).
SUBNET: This will be assigned automatically, if DHCP is ON(Default is 255.255.255.0). GATEWAY : This will be assigned automatically, if DHCP is ON (For more GATEWAY information, contact your network administrator)..



DEVICE IP: Press the SET button to set the address of the sending and receiving equipment.

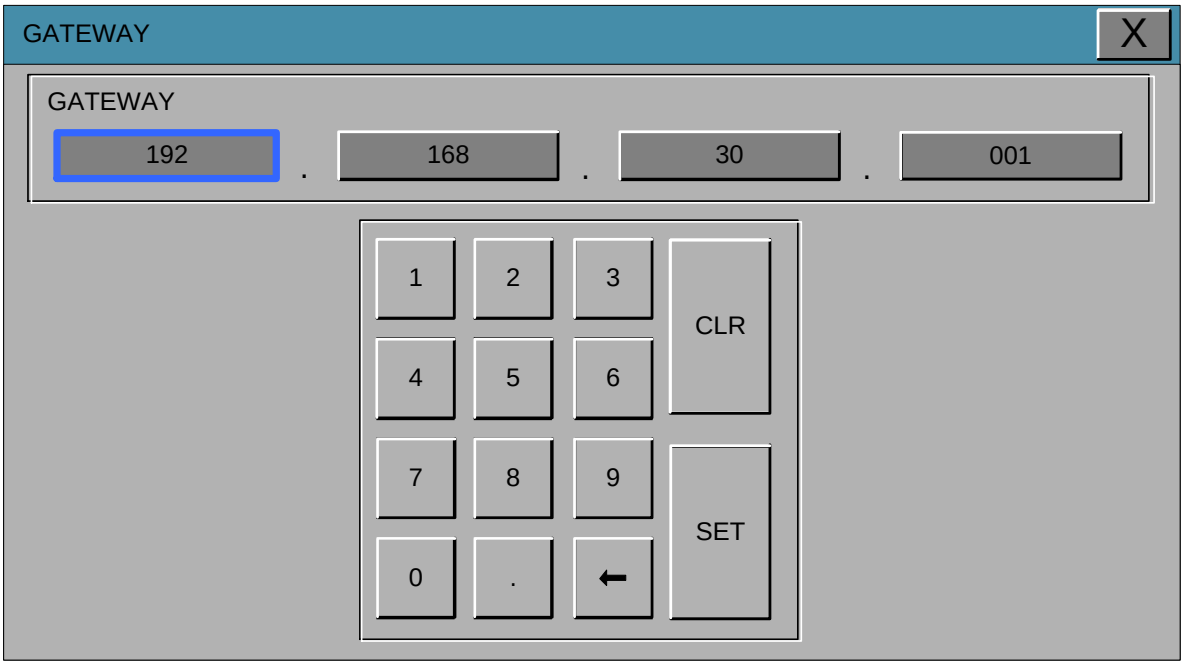


SUBNET : Press the SET button to set.

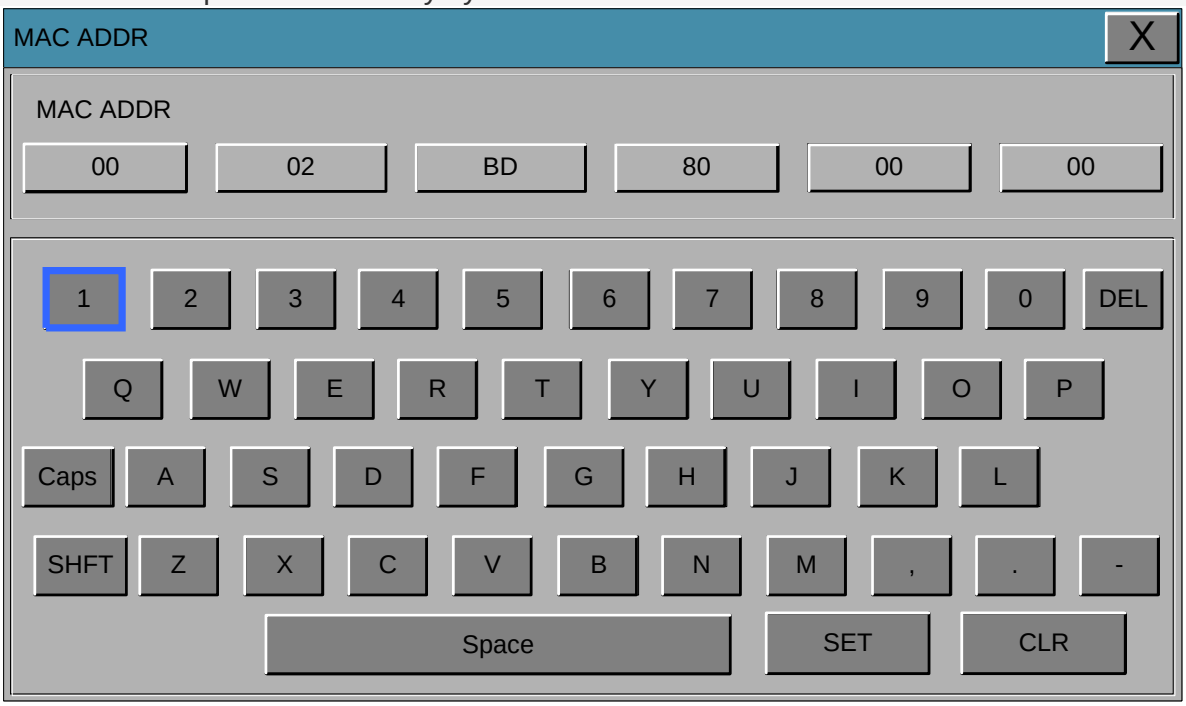


GATEWAY : Press the SET button to set the address that set up a connection at the network settings window

.

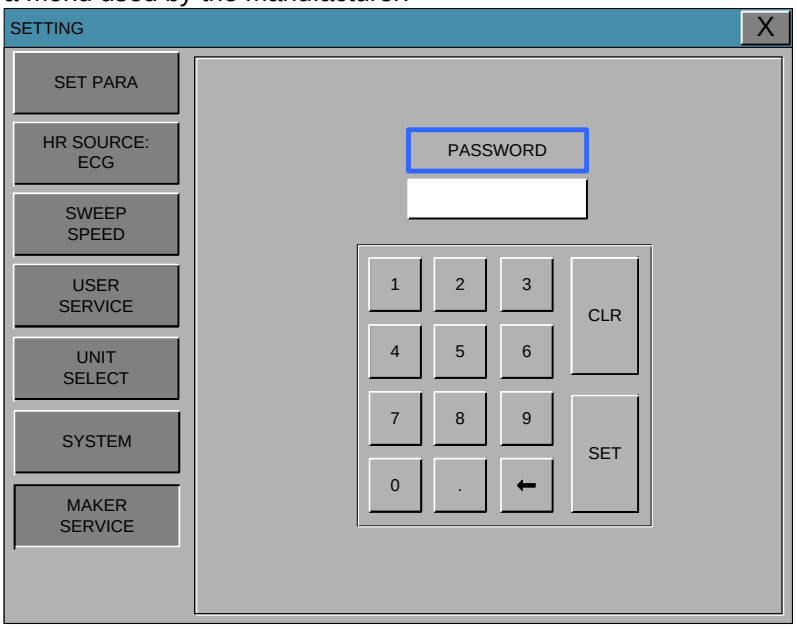


MAC ADDR : Press the SET button to set the hardware address for the network settings. (MAC ADDR는 Impossible to modify by the user.)



MAKER SERVICE

Maker service is a menu used by the manufacturer.



FREEZE MENU

If you select the icon which is located in the far left of the icon menu by controlling the rotary switch, the wave window is held and is maintained as the previous status, at the same time the parameter windows is normally showing the current Animal's status.
Whenever selecting the FREEZE menu, the FREEZE and RELEASE are repeated by turns.

The FREEZE is released by the following two conditions.

1. 3 minutes after selecting FREEZE menu.
2. Selection of the release FREEZE menu

Note
Unlike regular screen freeze screen prints during waveform output parameters of the state and its parameters.

4. TREND

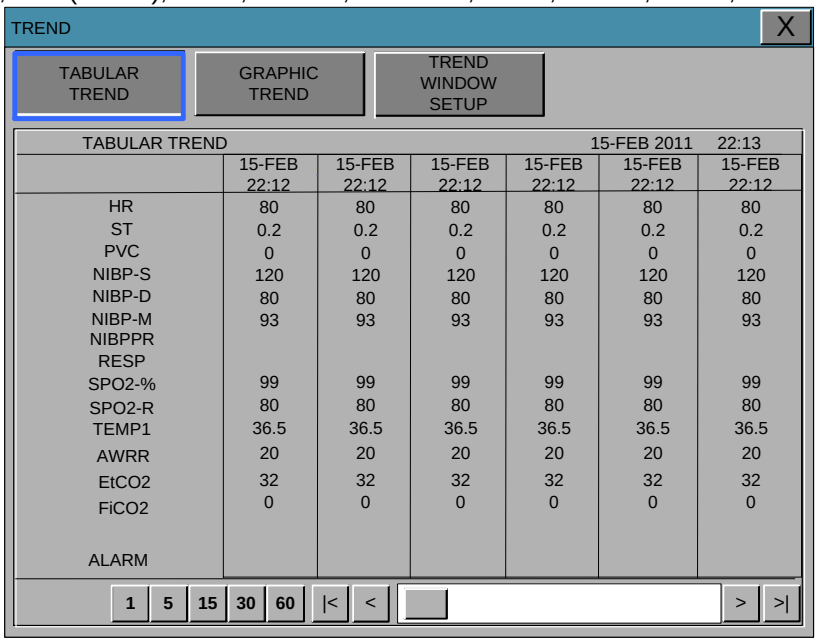
4.1 TREND

GRAPHIC TREND
TABLE TREND
TREND WINDOW SETUP

4.1 TREND

TREND shows saved data graphically displayed with numeric values.

Real-time data recording interval is 1 minute. Amount of saving time for this data will be 168hours.
The following entries are stored.
(HR,ST,PVC,NIBP(S/M/D),RESP,SPO2%,SPO2-PR,TEMP, EtCO2,FiCO2,AWRR)



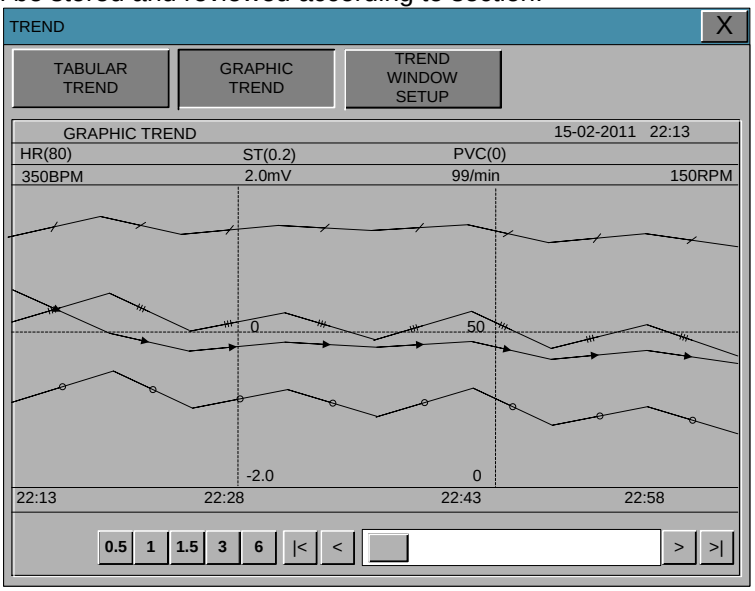
X : Move to main screen.

0.5 1 1.5 3 6 : Time period set menu

1 5 15 30 60

GRAPHIC TREND

Wave Data can be stored and reviewed according to section.

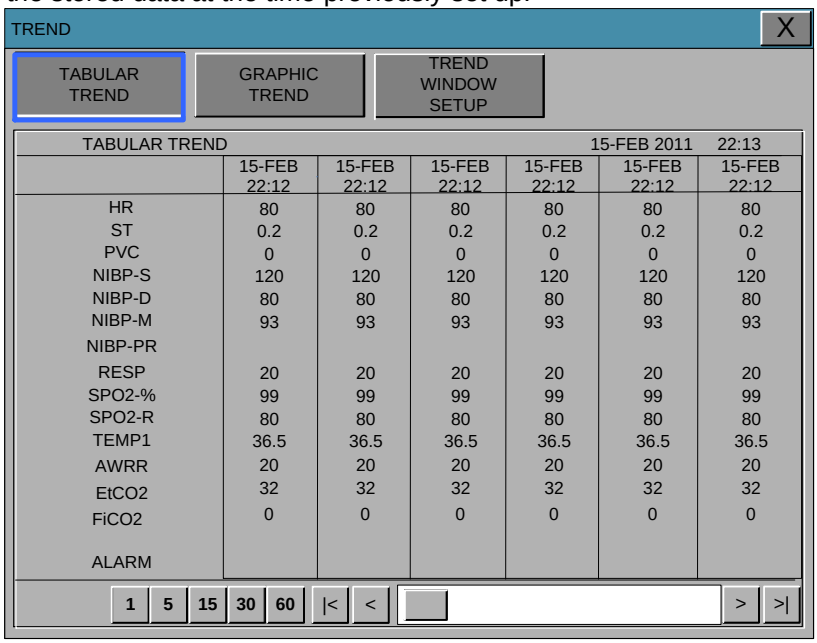


TIME PERIOD

One can set up and store data and time that one can see on a screen.

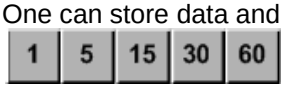
TABULAR TREND

One can see the stored data at the time previously set up.



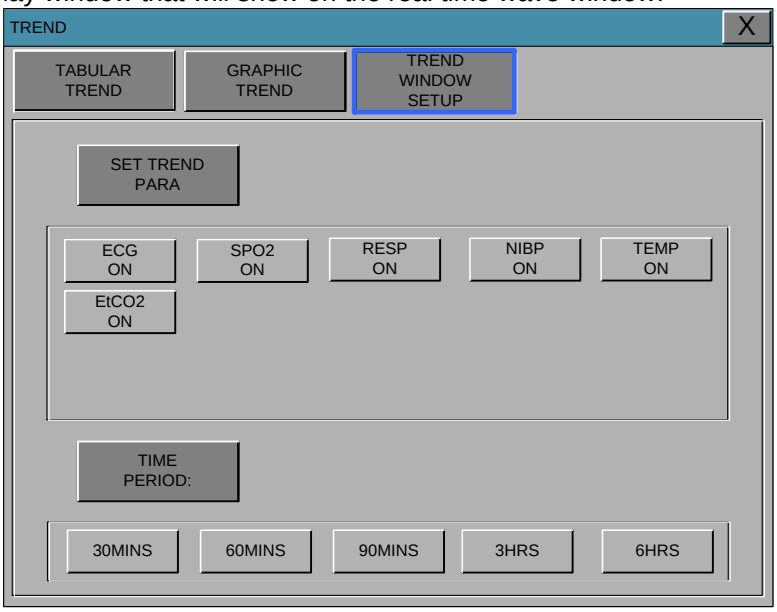
TIME INTERVAL

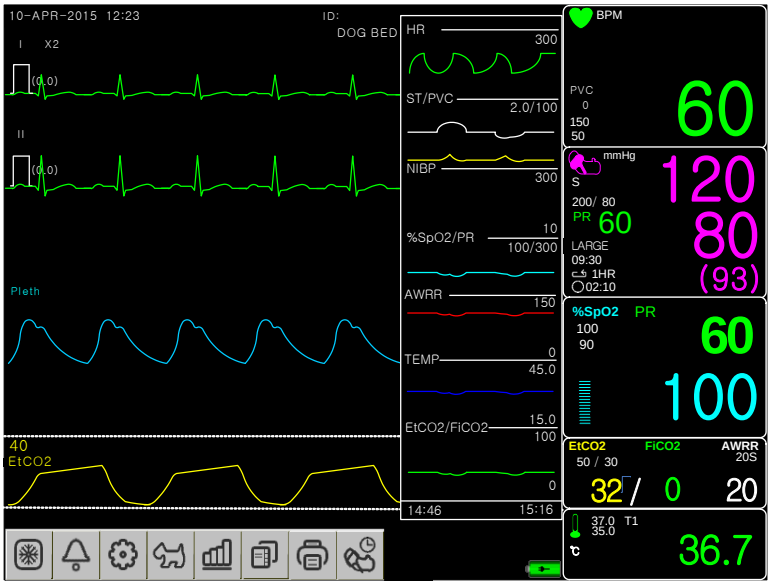
One can store data and set up time.



TREND WINDOW SETUP

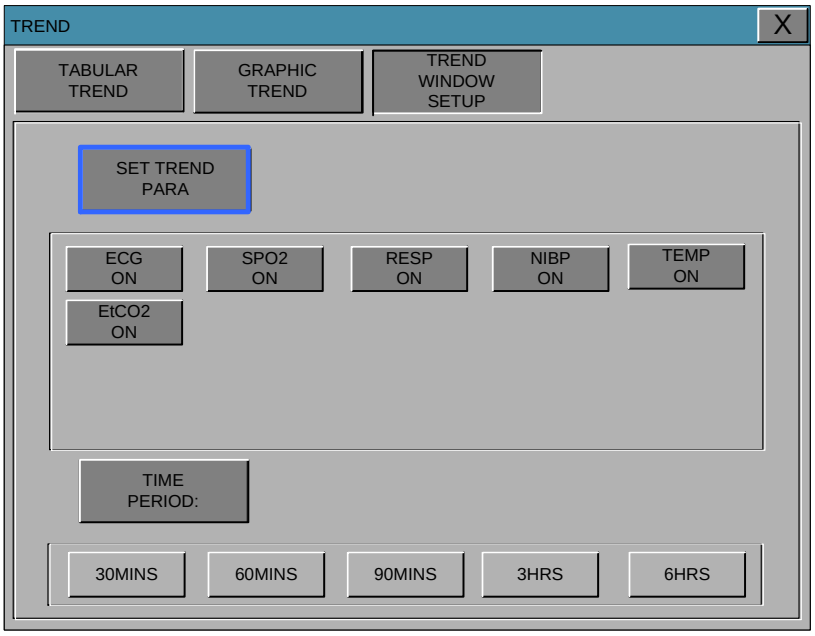
Set the trend display window that will show on the real time wave window.





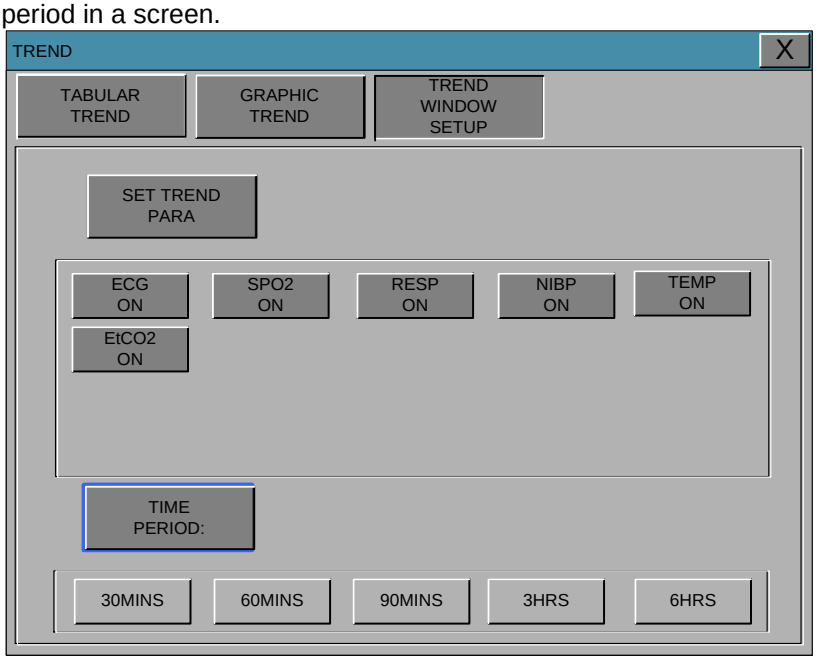
SET TREND PARA

Set visible parameters on the screen.



TIME PERIOD PARA

Set visible time period in a screen.



TREND PRINT

Graphic: select the number which selects a graphic trend and press print to print the selected trend.
Table: select the table number to be print and press print to print all the data in the selected Animal admit (Admit) table.

5. ECG

5.1 Introduction

Colors and Standards of Cables
Position of ECG Connector and Measuring Cable
Attaching Electrodes to the Animal
Choosing an ECG lead for Arrhythmia Monitoring
Information on the ECG waveform
5 Position of 5-Lead
Position of 3-Lead Wire Electrodes

5.2 ECG Data Window

5.3 ECG Data Setup

TRACE 1 LEAD SELECT
ALARM LIMIT
ALARM
QRS VOLUME
ECG SIZE
HEART RATE SOURCE
ECG SPEED
ANALYSIS SETTING

5.1 Introduction

It calculates the heart rate with 3 or 5 leads ECG signal acquisition and performs the alarms according to the set values.

Colors and Standards of Cables

AHA：American Heart Association (U.S.A. Certification)

IEC：International Electro technical Commission (Europe Certification)

3LEAD / 5LEAD

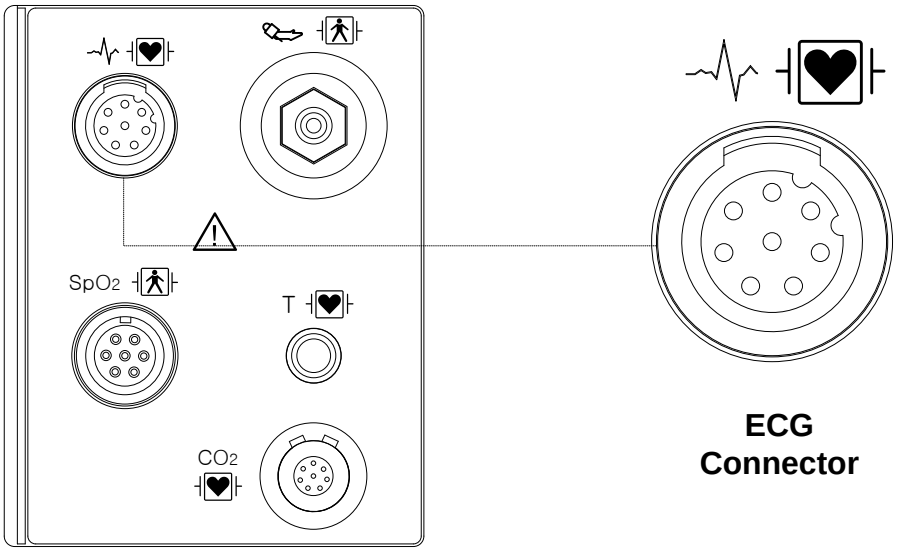
Leadwire	AHA Color code	AHA Label	IEC Color code	IEC Label
Right arm	White	RA	Red	R
Left arm	Black	LA	Yellow	L
Right leg	Green	RL	Black	N
Left leg	Red	LL	Green	F
V1(precordial)	Brown	V1	White	C1

AHA：American Heart Association (U.S.A. standard)

IEC：International Electro technical Commission (Europe standard)

Position of ECG Connector and Measuring Cable

ECG connecter +detect cable



IEC 3LEAD CABLE

AHA 3LEAD CABLE

IEC 5LEAD CABLE

AHA 5LEAD CABLE

IEC 3LEAD

AHA 3LEAD

IEC 5LEAD

AHA 5LEAD

Attaching Electrodes to the Animal

1. Shave excess hair. With a piece of cotton pad moistened with alcohol, clean the Animal's skin where the electrodes should be mounted. Avoid wrinkled or uneven skin areas. Wipe off the alcohol with a dry cotton pad.

2. Open the electrode package and take out the electrode.

3. Remove the backing paper from the electrode. Be careful not to touch the adhesive side.

4. Attach the disposable electrode to the previously cleaned skin. Avoid wrinkled and uneven skin areas.

5. The electrode lead is connected to the monitor onto the electrode.

6. Fasten the electrode lead to the skin with surgical tape with an extra length of wire between the tape and the electrode. This prevents body movement from moving the electrode lead.

Note
✓ To maintain good contact between the electrode and skin, check that the paste of the disposable electrode is not dry.
✓ When contact of the disposable electrode becomes poor, replace the electrode with a new one immediately. Otherwise, contact impedance between the skin and electrode increase and the correct ECG cannot be obtained.
✓ If the contact is bad before the expiration date on the package, replace the electrode with a new one.
✓ To obtain a stable ECG wave form rub the skin with "skin Pure" skin preparation gel or tincture of Benzion.
✓ Use only the CE certified disposable electrode.

Choosing an ECG lead for Arrhythmia Monitoring

It is very important to select a suitable lead for arrhythmia monitoring.
Guidelines for non-paced Animals:

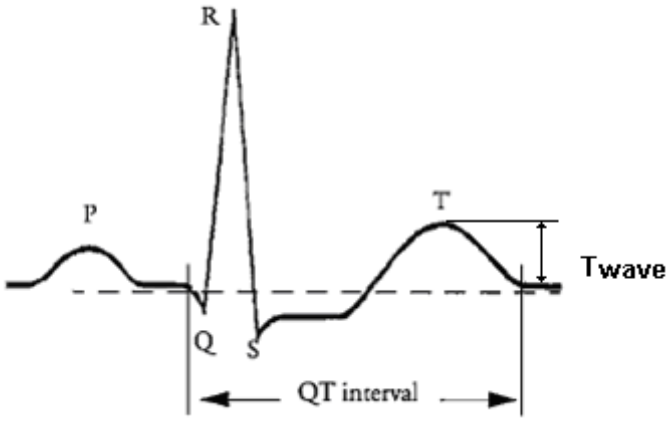
- ✓ QRS should be tall and narrow(recommended amplitude > 0.5mV)
- ✓ R wave should be above or below the baseline (but not bi-phasic)
- ✓ T wave should be smaller than 1/3 R-wave height.
- ✓ The P-wave should be smaller than 1/5 R-wave height.

For paced Animals, in addition to the above,:

- ✓ Not wider than the normal QRS
- ✓ The QRS complexes should be at least twice the height of pace pulses.
- ✓ Large enough to be detected, with no re-polarization.

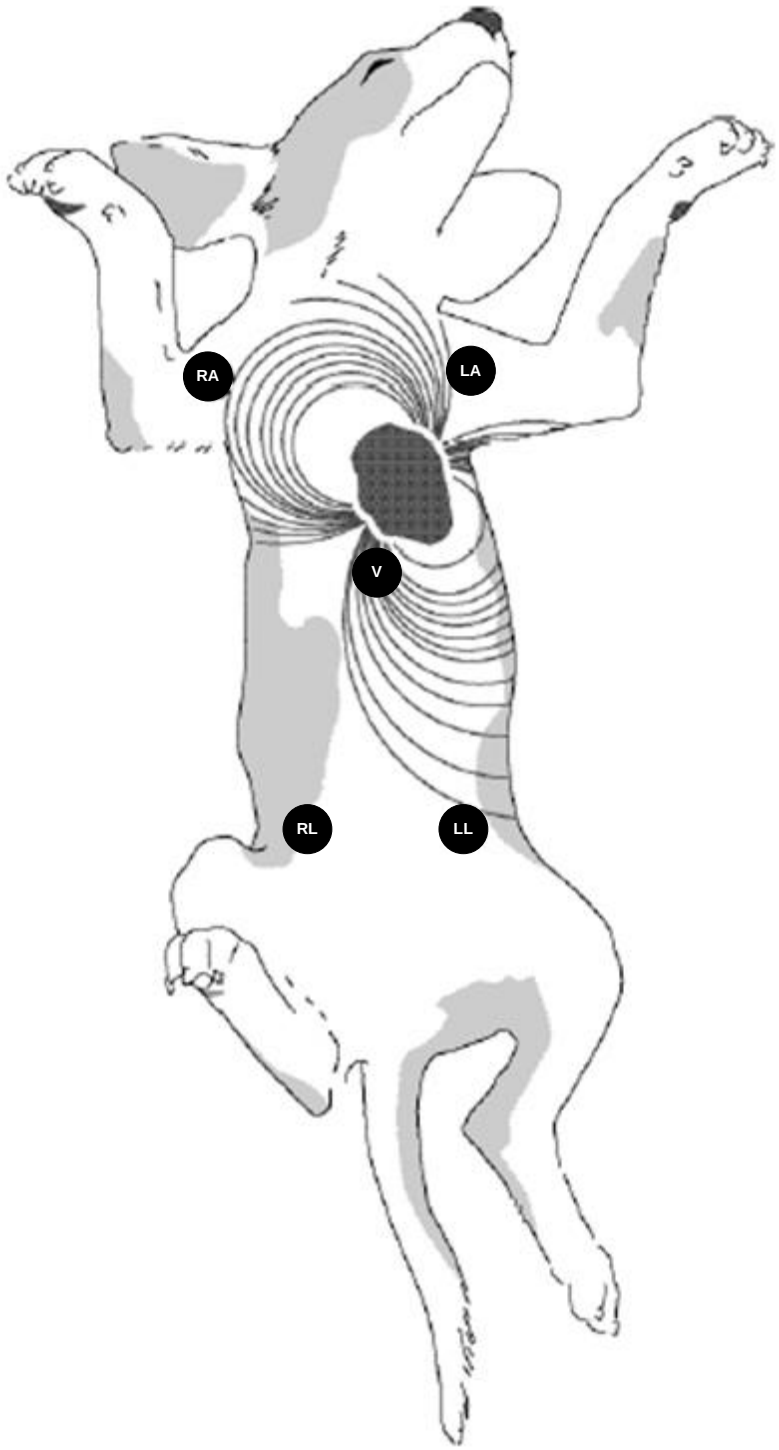
To prevent detection of P-waves or baseline noises as QRS complexes, the minimum detection level for QRS complexes is set at 0.15mV. Adjusting the ECG wave size on the monitor display(gain adjustment)does not affect the ECG signal which is used for arrhythmia analysis. If the ECG signal is too small, you may get false alarms for asystole.

Information on the ECG waveform

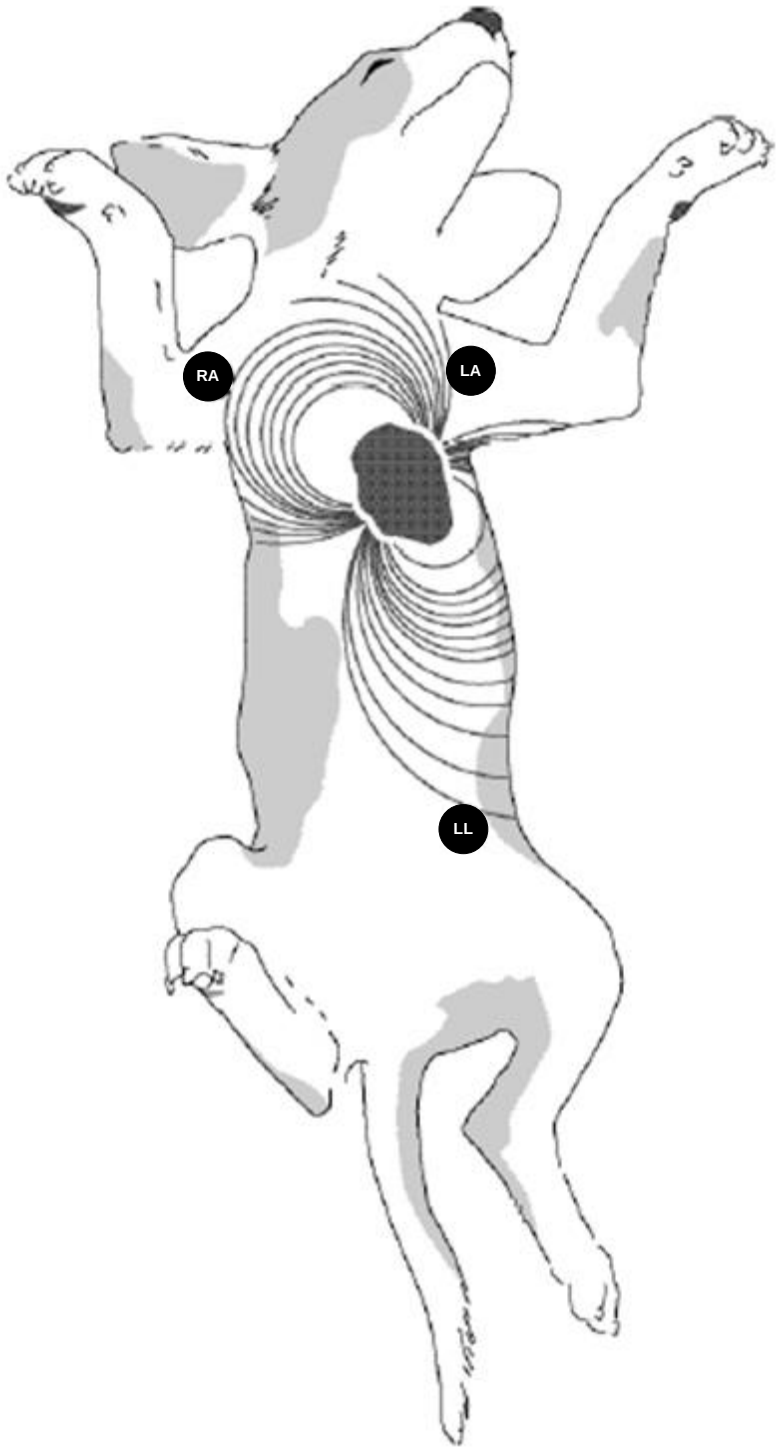


When ECG signal is 80bpm T-wave duration is 180ms, and the QT interval is 350ms.

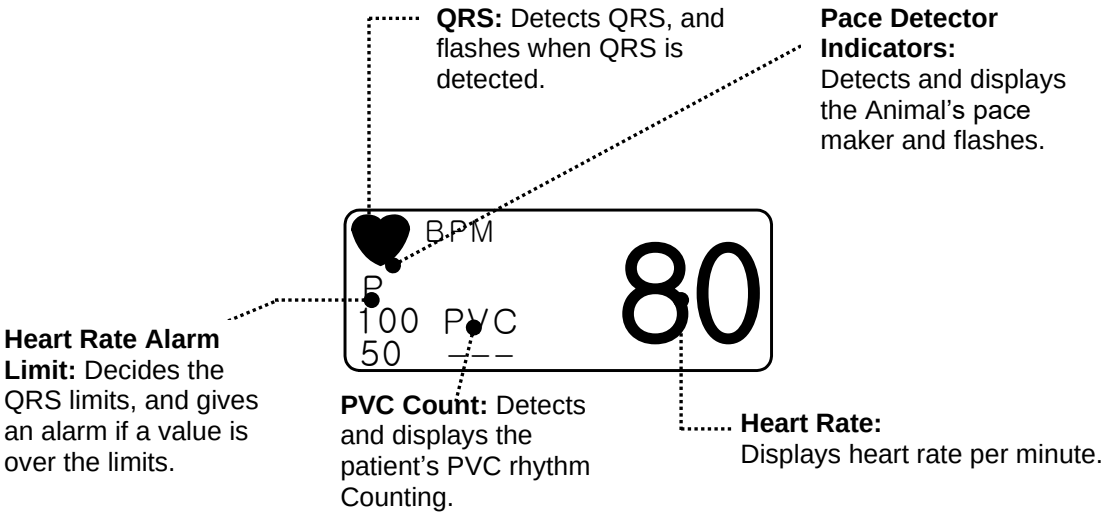
5 Position of 5-Lead



Position of 3-Lead Wire Electrodes



5.2 ECG Data Window



Note
ECG Wave Display is always on when the cable is connected.

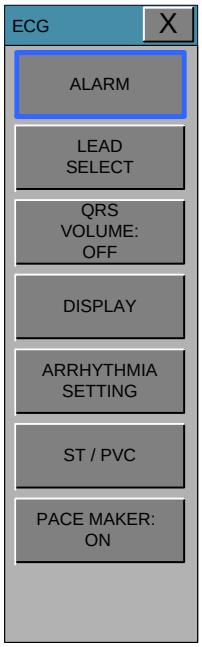
The heart rate is calculated by a moving average. The monitor detects 8 consecutive beats, averages the R-R intervals of the latest 8 beats and uses this average to calculate the current heart rate. When a new beat is detected, the heart rate is recalculated using the latest 8beats. The heart rate display is updated every 3 seconds.
Heart rate meter updates a new heart rate for a step increase or decrease in 10 seconds maximum.
When ventricular tachycardia is detected, the alarm set in 5 seconds maximum.
Check that the delay time of the output signal (alarm trigger 80ms maximum) is within the range of the connected equipment.

Safety Precautions

Warning
CABLES — Route all cables away from Animal's throat to avoid possible strangulation. **CONDUCTIVE CONNECTIONS** — Extreme care must be exercised when applying medical electrical equipment. Many parts of the human/machine circuit are conductive, such as the Animal, connectors, electrodes, transducers. It is very important that these conductive parts do not come into contact with other grounded, conductive parts when connected to the isolated Animal input of the device. Such contact would bridge the Animal's isolation and cancel the protection provided by the isolated input. In particular, there must be no contact of the neutral electrode and ground. **DEFIBRILLATION** — Do not come into contact with Animals during defibrillation. Otherwise serious injury or death could result. To avoid the risk of serious electrical burn, shock, or other injury during defibrillation, all persons must keep clear of the bed and must not touch the Animal or any equipment connected to the Animal. After defibrillation, the screen display recovers within 10seconds if the correct electrodes are used and applied in accordance with the manufacturer's instructions. Animal cables can be damaged when connected to a Animal during defibrillation. Check cables for functionality before using them again. The peak of the synchronized defibrillator discharge should be delivered within 60ms of the peak of the R wave. The signal at the ECG output on the Animal monitors is delayed by a maximum of 30ms. If the ECG waveform on the screen is too unstable to synchronize with the Animal's heart beat because of the following reason, remove the cause of an alarm, message, or unstable ECG, and then use a stable ECG lead for synchronization. ✓ ECG electrode is detached or broken. Lead wire is detached or broken. ✓ Lead wire moves. AC interference, EMG noise or noise from ESU is superimposed. ✓ Connection cable is broken or has a short circuit. Connector has poor contact. **INTERFACING OTHER EQUIPMENT** — Devices may only be interconnected with each other or to parts of the system when it has been determined by qualified biomedical engineering personnel that there is no danger to the Animal, the operator, or the environment as a result. In those instances where there is any element of doubt concerning the safety of connected devices, the user must contact the manufacturers concerned (or other informed experts) for proper use. In all cases, safe and proper operation should be verified with the applicable Manufacturer's instructions for use, and system standards IEC 60601-1-1/EN 60601-1-1 must be complied with. **Electrosurgery Unit** ✓ Electrosurgical units(ESU) emit a lot of RF interference. If the monitor is used with an ESU,RF interference may affect the monitor operation. ✓ Locate the monitor as far as possible from the ESU. Locate them on opposite sides of the operating table, if possible. ✓ Connect the monitor and ESU to different AC outlets located as far as possible from each other. ✓ When using this monitor with an electrosurgical unit, its return plate and the electrodes for monitoring must be firmly attached to the Animal. If the return plate is not attached correctly,it may burn the Animal's skin where the electrodes are attached.

5.3 ECG Data Setup

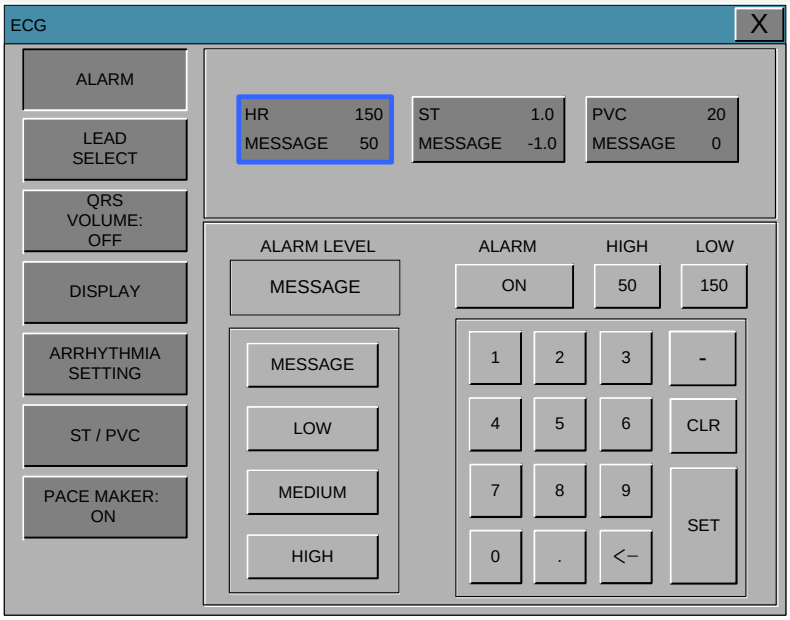
A setup window appears at lower part of the screen when the Trim Knob Key is pressed in the ECG Parameter Window. Selection is made by pressing the Trim Knob Key, while movement across the menu is performed by turning the key either clock or anticlockwise.



ALARM LIMIT

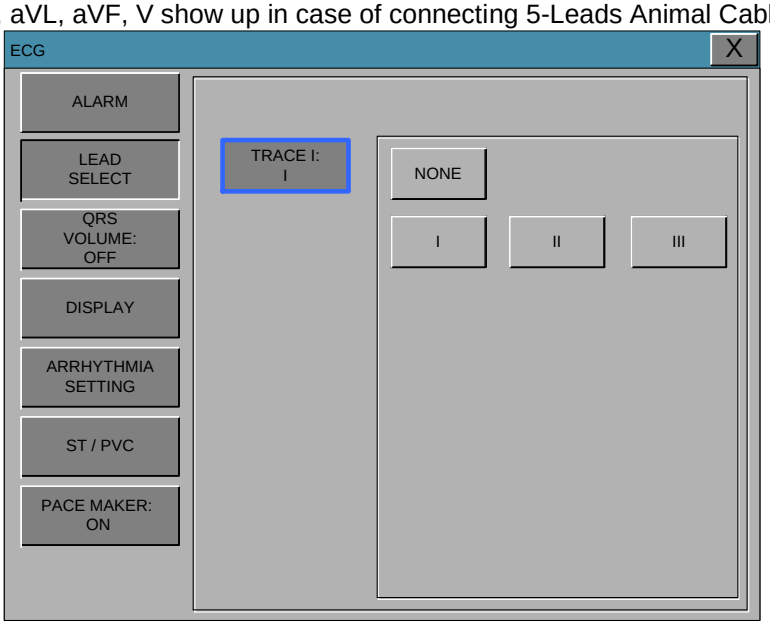
Alarm Limit is 0 ~ 300BPM.

ECG alarm feature ON / OFF and the menu is set to LEVEL.



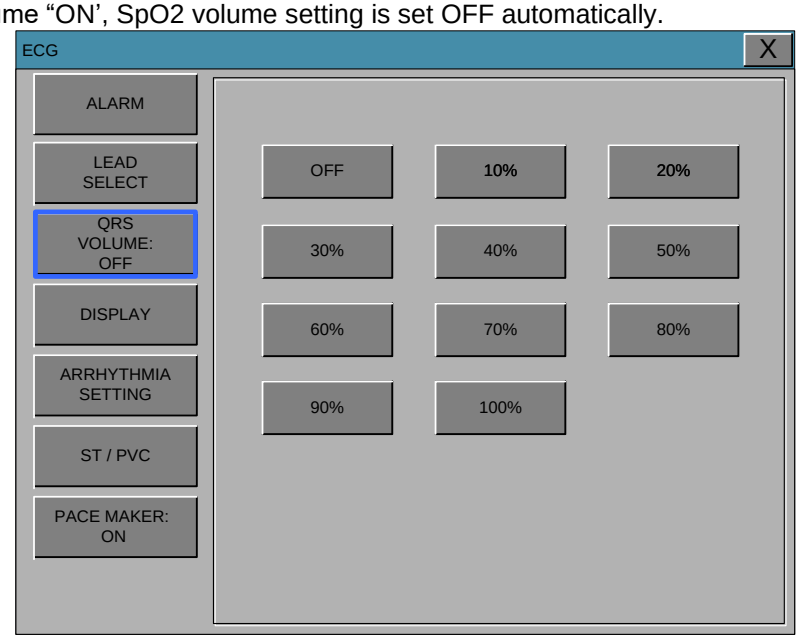
LEAD SELECT

Select channels from I to V in ECG
Lead I, II, III show up in case of connecting 3-Leads Animal Cable.
Lead I, II, III, aVR, aVL, aVF, V show up in case of connecting 5-Leads Animal Cable.



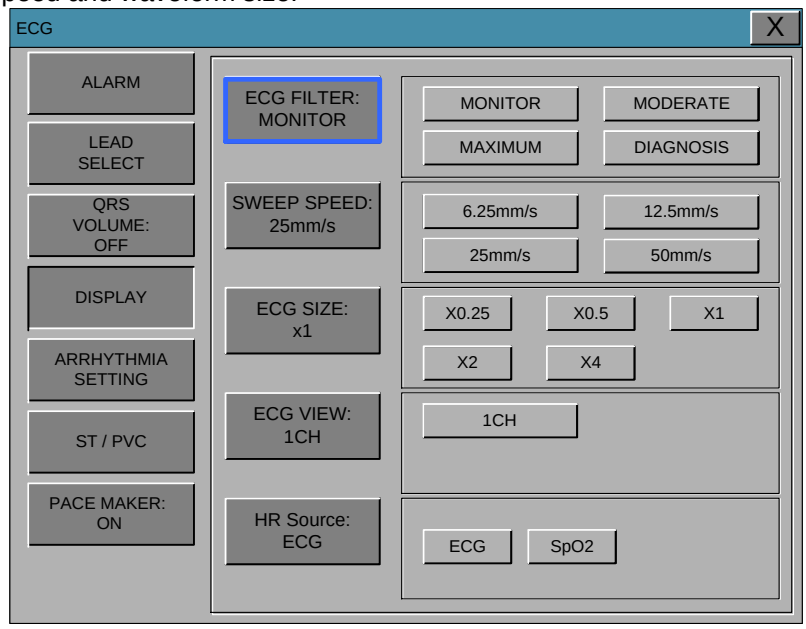
QRS VOLUME

Move the Key to select a volume rate from OFF, 10% to 100%.
When QRS volume “ON’, SpO2 volume setting is set OFF automatically.



DISPLAY

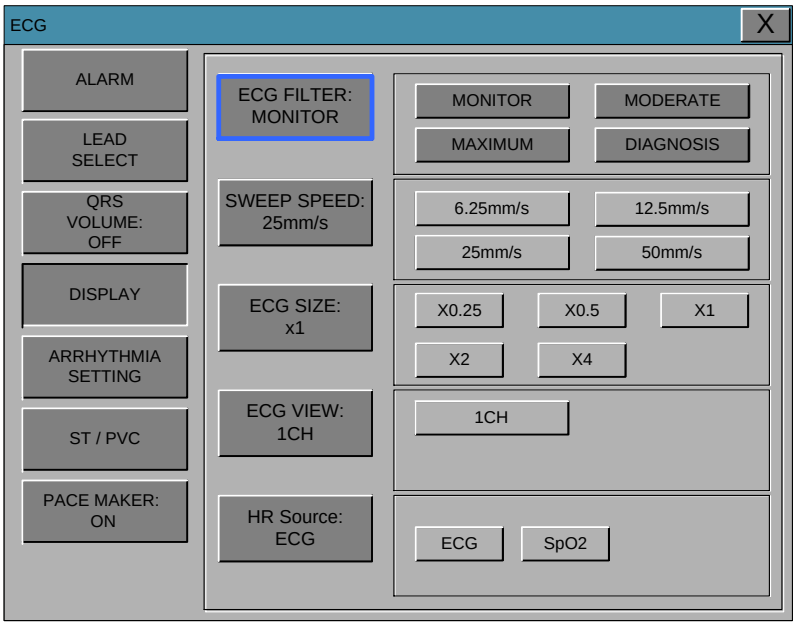
Set the sweep speed and waveform size.



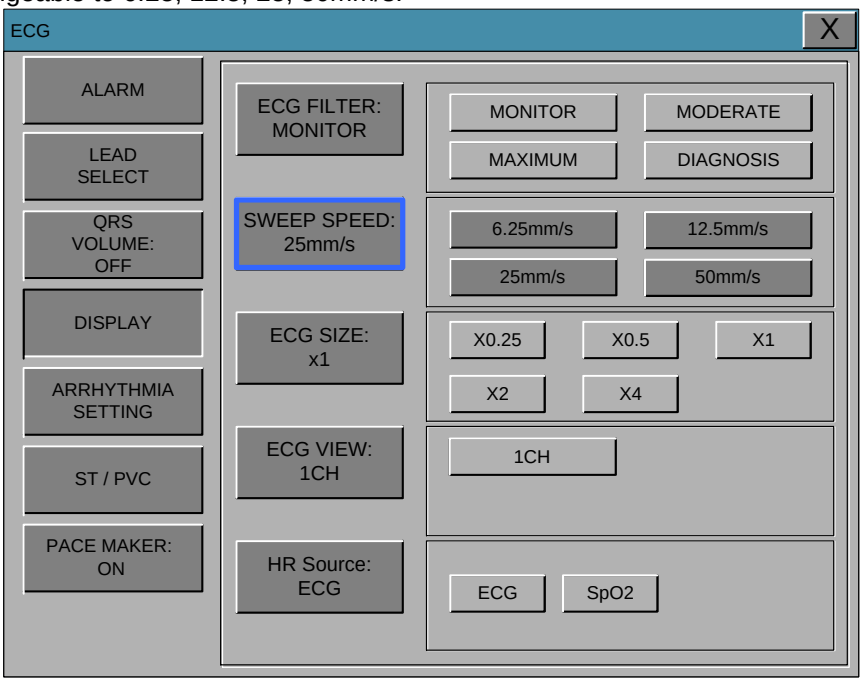
ECG FILTER

One may select from three frequency types for WAVE FILTER.

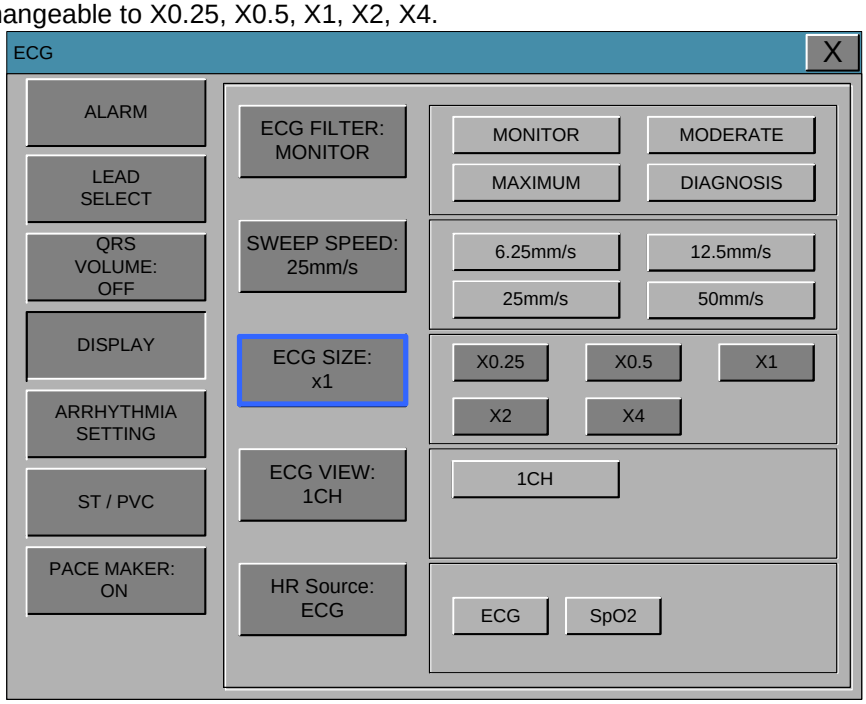
MONITOR 0.5Hz ~ 40Hz
MODERATE 0.5Hz ~ 25Hz
MAXIMUM 5Hz ~ 25Hz
DIAGNOSIS 0.05Hz ~ 150Hz



ECG SWEEP SPEED
ECG speed on the LCD is 25 mm/s.
Speed is changeable to 6.25, 12.5, 25, 50mm/s.



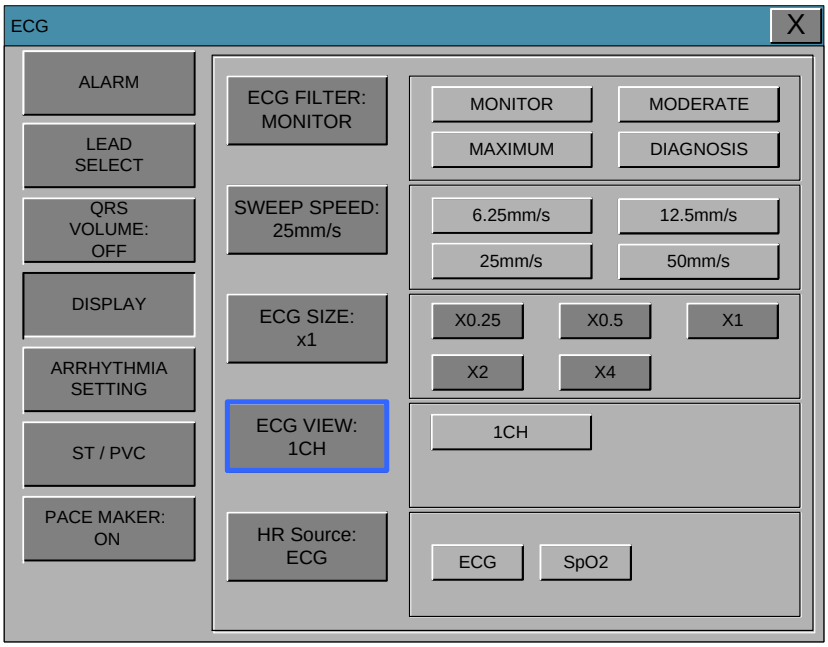
ECG SIZE
The size is changeable to X0.25, X0.5, X1, X2, X4.



ECG VIEW

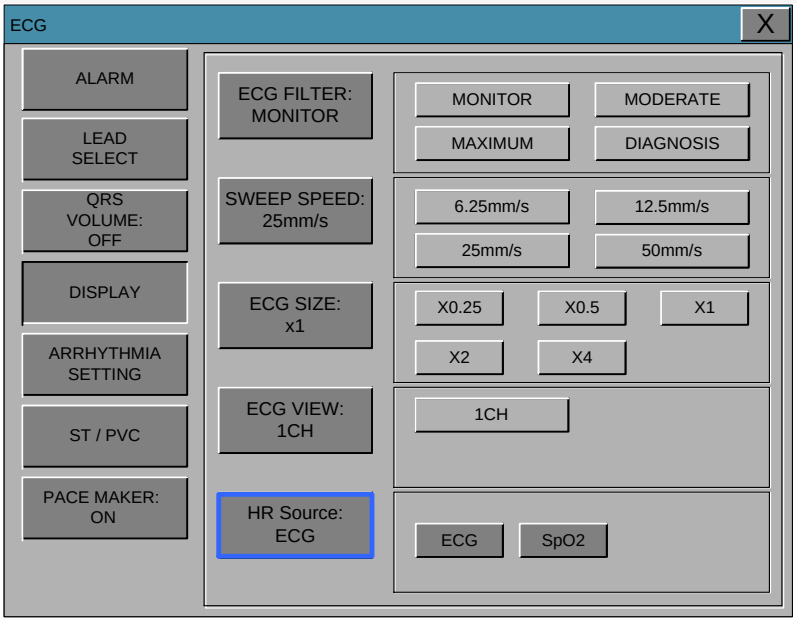
The number of ECG waves can be configured with this function.
There are 2 traces of 1 CH data at the ECG wave.

- 3LEAD or 5LEAD : 1CH



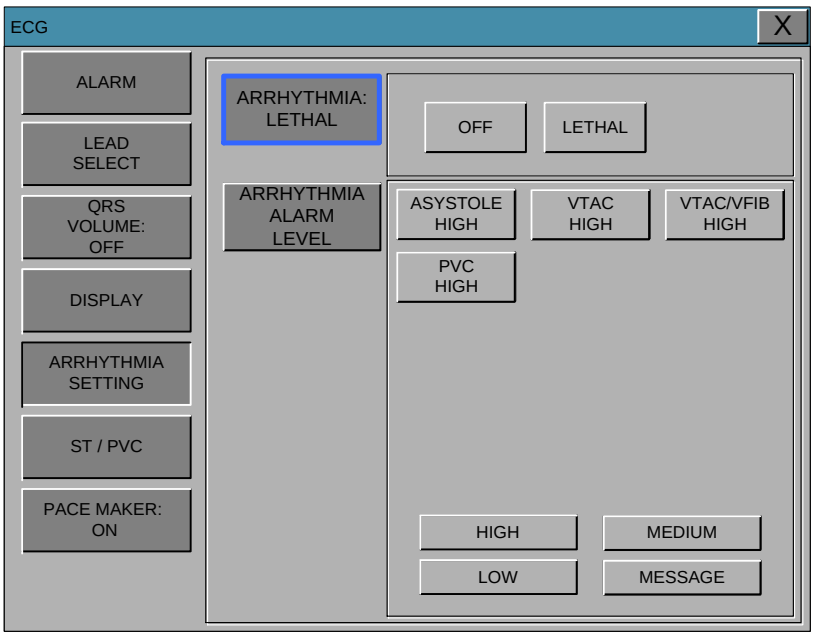
HR Source

ECG or SpO2 can be selected as heart rate source.



ARRHYTHMIA SETTING

Analysis setting is divided to 3 menus.



ARRHYTH： Sets up ON/OFF to indicate detection of diagnosis (Asys, VTAC/VFIB and VTAC).

OFF: Do not perform arrhythmia diagnosis.

LETHAL: Performs the detection of Asys, VTAC/VFIB, and VTAC at the selected lead

The Analysis algorithm uses a selected lead I, II, III, or V lead for ECG and arrhythmia analysis.

ASYSTOLE

Ventricular asystole occurs whenever the displayed heart rate drops to zero.

PVC

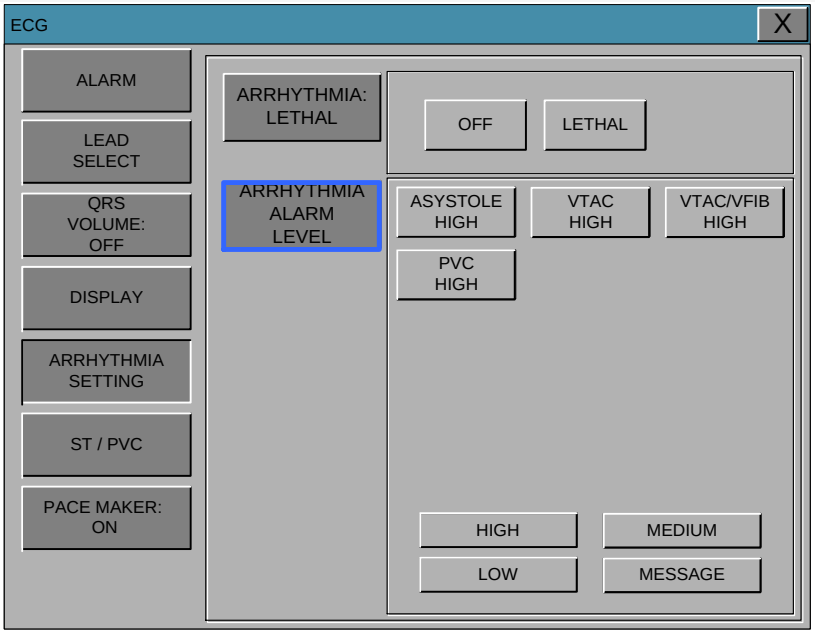
Isolated premature ventricular complexes occur when a premature ventricular beat is detected and has non-ventricular beats before and after.

VFIB/VTAC

Ventricular fibrillation occurs when the ECG waveform indicates a chaotic ventricular arrhythm.

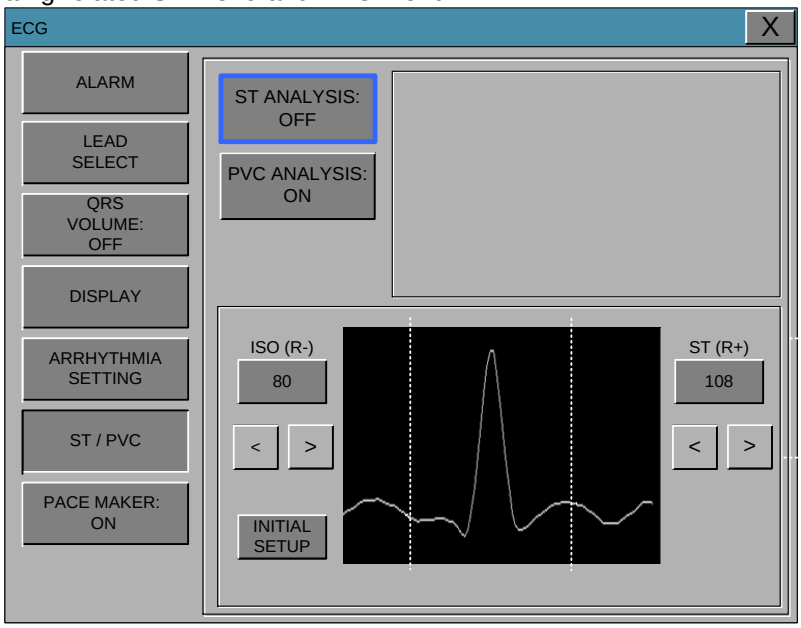
ARRHYTHMIA ALARM LEVEL

Diagnostic alarm level is set.

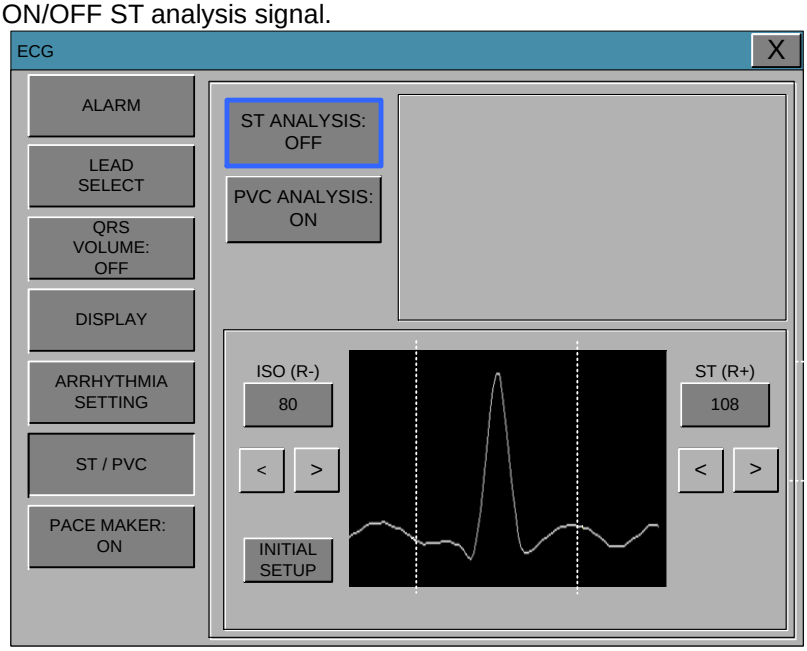


ST/PVC

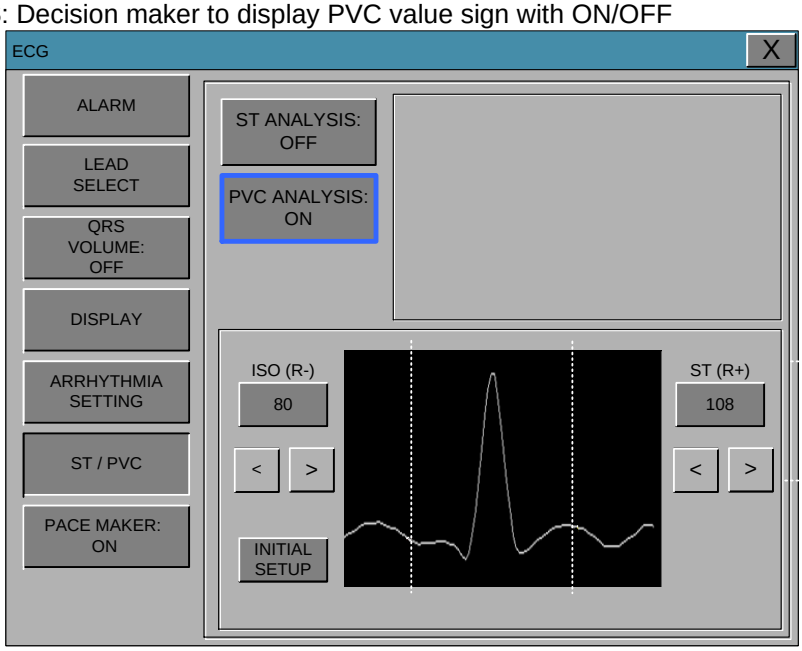
ST signal and setting related ST menu and PVC menu.



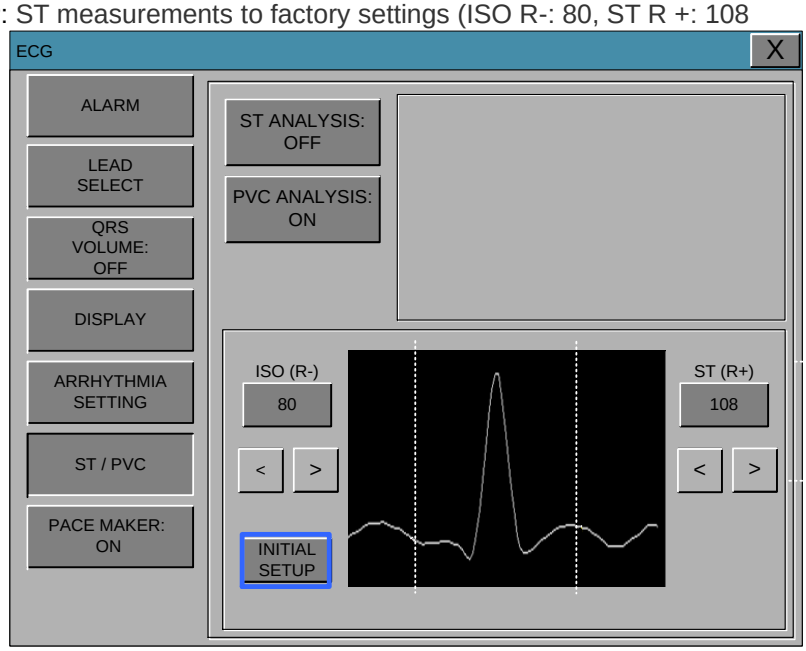
ST ANALYSIS: ON/OFF ST analysis signal.



PVC ANALYSIS: Decision maker to display PVC value sign with ON/OFF

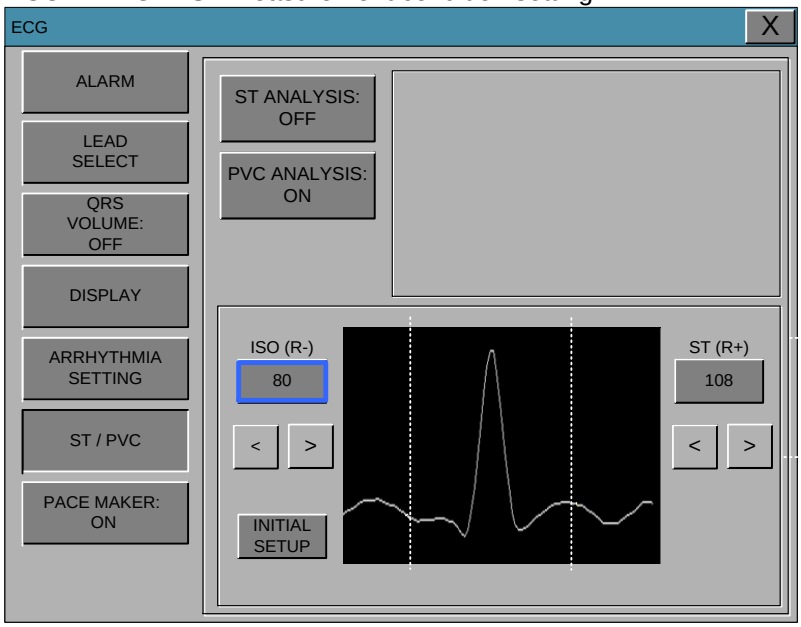


INITIAL SETUP: ST measurements to factory settings (ISO R-: 80, ST R +: 108



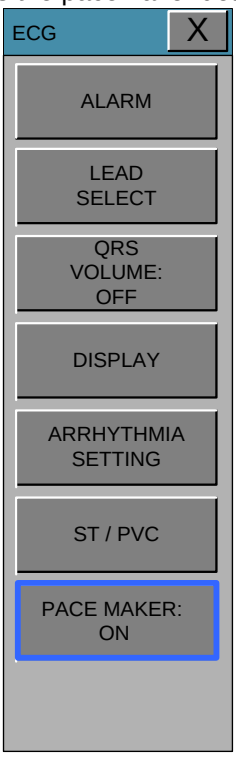
ST MEASUREMENT CONDITION fine-tune the ISO and ST in order to position the cursor keys to select the rotary and then to be adjusted and controlled at ISO and ST TOUCH TOUCH button arrow and then fine-tuning is possible when TOUCH.

MEASUREMENT CONDITION: ST measurement condition setting



PACE：Sets up ON/OFF to indicate that the Animal has PACE.

The PACE menu option enables/disables the pacemaker detection program.



Be aware of the warning below when monitor an animal with a pacemaker.

Warning
FALSE CALLS—False low heart rate indicators or false asystole calls may result with certain pacemakers because of electrical overshoots. MONITORING PACEMAKER ANIMALS—Monitoring of pacemaker Animals can only occur with the pace program activated. PACEMAKER SPIKE—An artificial pacemaker spike is displayed in place of the actual pacemaker spike. All pacemaker spikes appear uniform. Do not diagnostically interpret pacemaker spike size and shape. ANIMAL HAZARD—A pacemaker pulse can be counted as a QRS during asystole in either pace mode. Keep pacemaker Animals under close observation. PACEMAKER ANIMALS. Rate meters may continue to count the pacemaker rate during occurrences of cardiac arrest or some arrhythmias. Do not rely entirely upon rate meter ALARMS. Keep pacemaker Animals under close surveillance.

CAUTION

FDA POSTMARKET SAFETY ALERT

The United States FDA Center for Device and Radiological Health issued a safety bulletin October 14, 1998. this bulletin states “that minute ventilation rate-adaptive implantable pacemakers can occasionally interact with certain cardiac monitoring and diagnostic programmed rate.”

The FDA further recommends precautions to take into consideration for Animals with these types of pacemakers. These precaution for Animals with these types of pacemakers. These precautions include disabling the rate responsive mode and enabling an alternate pace mode. For more information contact:

Office of Surveillance and Biometrics, CDRH, FDA
1350 Packard Drive, Mail Stop HFZ-510 Rockville, MD 20850 U.S.A

NOTE

ECG monitoring with Animals in non-invasive trans coetaneous pacemakers may not be possible due to large amounts of energy produced by these devices. Monitoring ECG with an external device may be needed.

WARNINGS

VENTRICULAR ARRHYTHMIAS

The arrhythmia analysis program is intended to detect ventricular arrhythmias. It is not designed to detect a trial or supra ventricular arrhythmias. Occasionally it may incorrect identify the presence or absence of an arrhythmia. Therefore, a physician must analyze the arrhythmia information in conjunction with other clinical findings.

SUSPENDED ANALYSIS

Certain conditions suspend arrhythmia analysis. When suspended, arrhythmia conditions are not detected and alarms associated with arrhythmias do not occur. The messages which alert you to the conditions causing suspended arrhythmia analysis are : ARR OFF, ARRHYSUSPEND, LEADS FAIL, ALARM PAUSE, ALL ALARMS OFF, and DISCHARGED.

Trouble shooting

Problem :

Inaccurate heart rate and/or false a systole.

Solution :

Check ECG signal from Animal:

1. Check/adjust lead placement.
2. Check/perform skin preparation.
3. Check/replace electrodes.

Check amplitude of ECG waveform:

1. Select ECG parameter label.
2. Select DISPLAY LEAD,
3. Scroll through all ECG leads and check for 0.5mV amplitude at normal (1X) size. (at least 0.5mV amplitude is required for QRS detection.) for borderline signals, validate on a graph.
4. If amplitudes are low, electrodes may need to be repositioned or replaced.

Problem :

False ventricular calls.

Solution :

Check ECG signal from Animal: (the chest lead may exhibit polarity changes which may occasionally cause an inaccurate call.)

1. Check/adjust lead placement.
2. Check/perform skin preparation.
3. Check/replace electrodes. (if chest lead is a problem, move the chest lead to another chest position or leg position.)

Problem :

Inaccurate pacemaker detection

Solution :

Use pacemaker processing:

1. Select ECG parameter label.
2. Display the lead of ECG with the greatest amplitude in the top waveform position.
3. Select ANALYSIS SETTINGS.
4. SELECT DETECT PACE.

6. SpO_2

6.1 Outline

SpO_2 Connector Location and Measuring Cable

6.2 SpO2 Data Window

Signal and Data Validity

6.3 SpO2 Data Setup

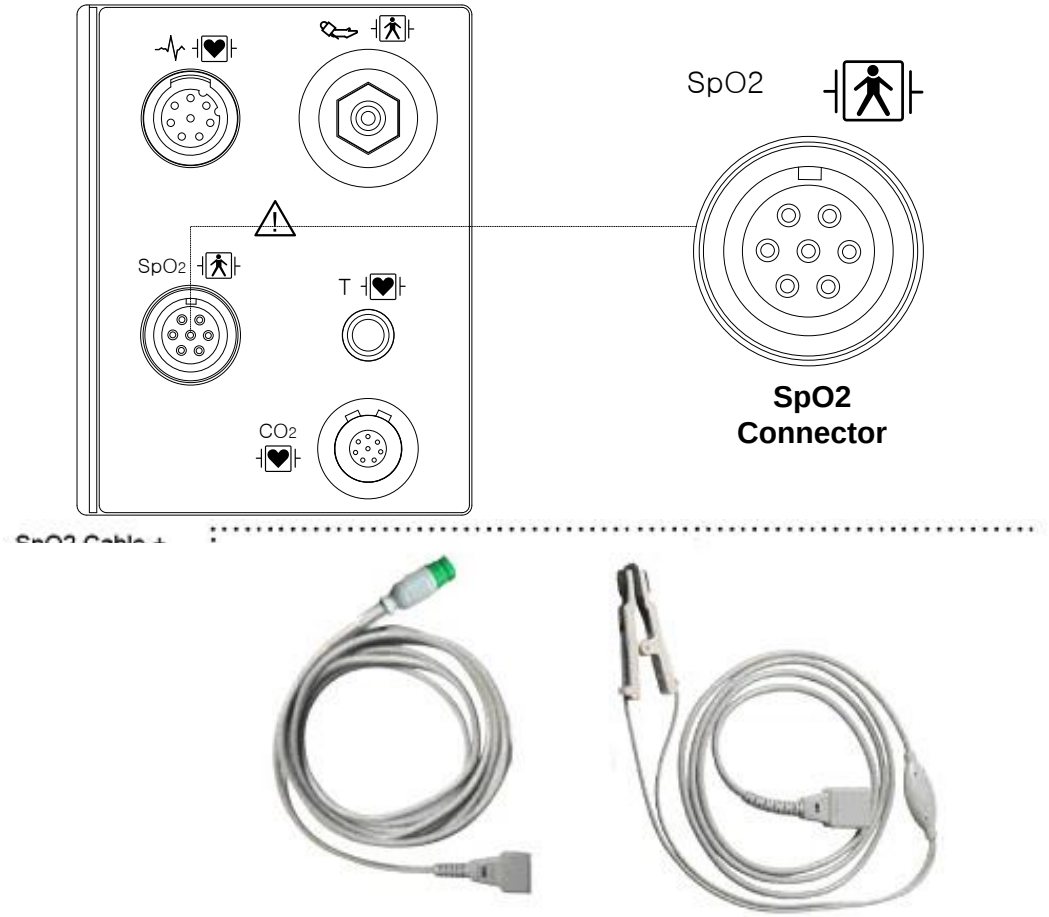
ALARM
RATE VOLUME
LEAD FAULT Condition
SPO2 Messages

6.1 Outline

SPO2 monitoring is a noninvasive technique used to measure the amount of oxygenated hemoglobin and pulse rate by measuring the absorption of selected wavelengths of light. The light generated in the probe passes through the tissue and is converted into an electrical signal by the photodetector in the probe. The monitor processes the electrical signal and displays on the screen a waveform and digital values for SpO2 and pulse rate. It detects SpO2 in the way of transmitting the red and infrared rays into the capillary vessel to take the pulsation. Also performs the alarm function according to the set values.

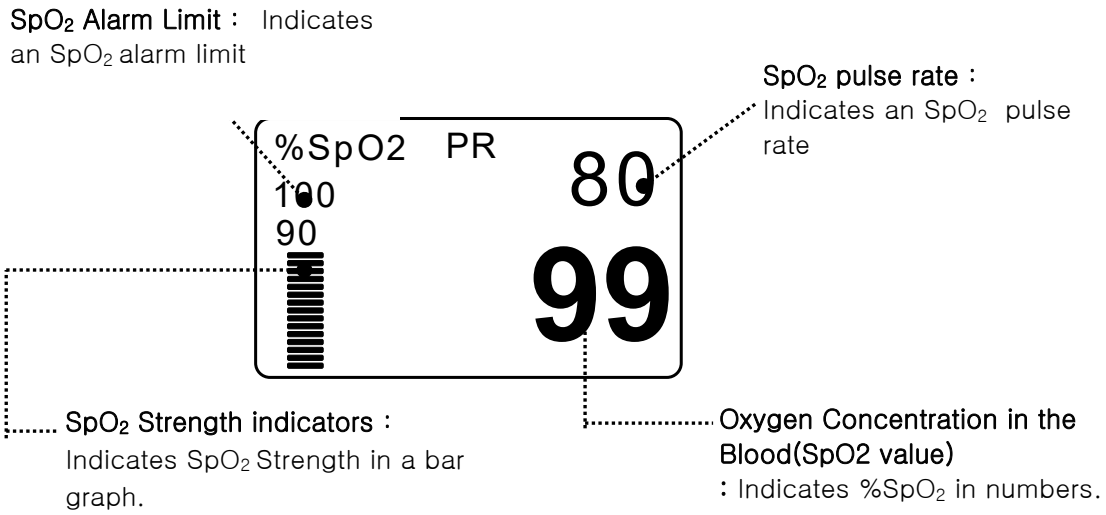
SpO2 Connector Location and Measuring Cable

SpO_2 connector



Note
The signal input is a high-insulation port and it is defibrillator proof ( ) The insulated input ensures Animal safety and protects the device du efibrillation and electrosurgery.

6.2 SpO2 Data Window



The current SPO2 value and the derived pulse rate (RATE) are displayed. The block sets indicate the strength of the signal (twenty block bars indicate the strongest signal). The SPO2 measurements are averaged over a 6-second period of time.
The monitor display is updated every second.
The SPO2 monitoring features are found in the SPO2 menu. These features include alarm limit adjustment, display of RATE, and RATE volume.

Note
SpO_2 WAVE SIZE is changed automatically.

Signal and Data Validity

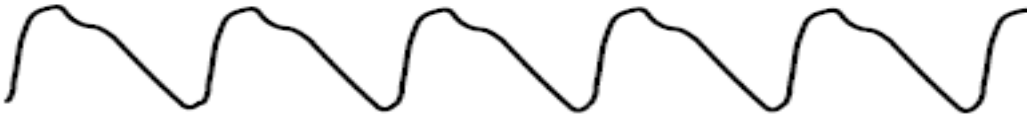
It is extremely important to determine that the probe is attached to the Animal correctly and the data is verifiable. To make this determination, three indications from the monitor are of assistance—signal strength bar, quality of the SPO2 waveform, and the stability of the SPO2 values. It is critical to observe all three indications simultaneously when ascertaining signal and data validity.

Signal Strength Bar

The signal strength bar is displayed within the SPO2 values window. This bar consists of 20 blocks set depending on the strength of the signal. Proper environmental conditions and probe attachment will help to ensure a strong signal.

Quality of SPO2 Waveform

Under normal conditions, the SPO2 waveform corresponds to (but is not proportional to) the arterial pressure waveform. The typical SPO2 waveform indicates not only a good waveform, but helps the user find a probe placement with the least noise spikes present. The figure below represents an SPO2 waveform of good quality.



Good Quality SPO2 Waveform

If noise (artifact) is seen on the waveform because of poor probe placement, the photodetector may not be flush with the tissue. Check that the probe is secured and the tissue sample is not too thick. Pulse rate is determined from the SPO2 waveform which can be disrupted by a cough or other hemodynamic pressure disturbances. Motion at the probe site is indicated by noise spikes in the normal waveform. (See the figure below.)

SPO2 Waveform with Artifact

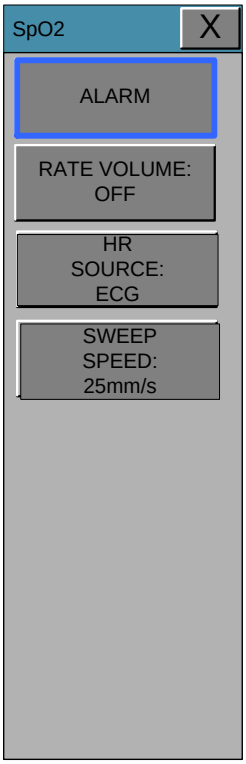
Stability of SPO2 Values

The stability of the displayed SPO2 values can also be used as an indication of signal validity. Although stability is a relative term, with a small amount of practice one can get a good feeling for changes that are artifactual or physiological and the speed of each. Messages are provided in the SPO2 values window to aid you in successful SPO2 monitoring.

WARNING
In the monitoring of Animals the coincidence of adverse conditions may lead to a disturbed signal going unnoticed. In this situation artifacts are capable of simulating a plausible parameter reading, so that the monitor fails to sound an alarm. In order to ensure reliable Animal monitoring, the proper application of the probe and the signal quality must be checked at regular intervals.

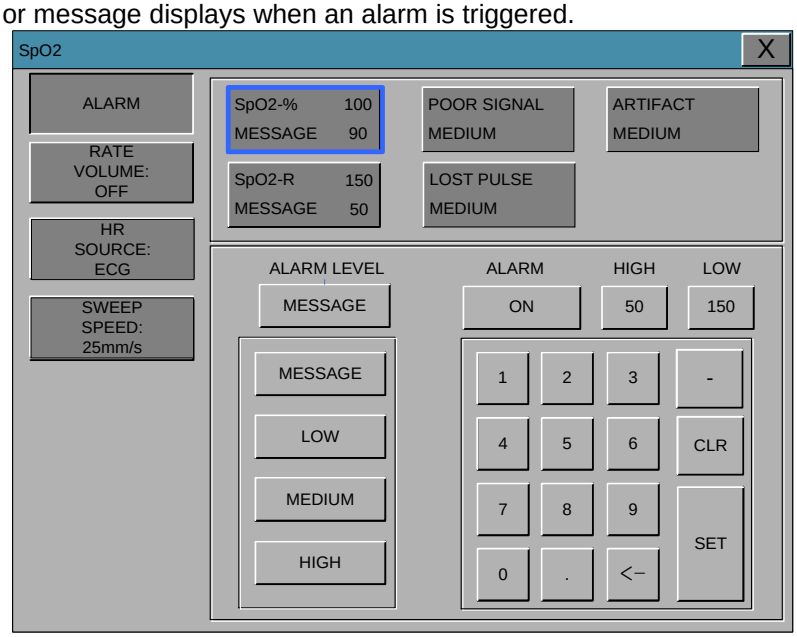
6.3 SpO2 Data Setup

ALARM ： SpO_2 alarm limit set up.
RATE VOLUME： SpO_2 volume set up.
HR SOURCE: Heart rate in ECG window source selection menu(same as ECG menu).
SWEEP SPEED: ECG and SpO_2 waveform display sweep speed selection menu(same as ECG menu).



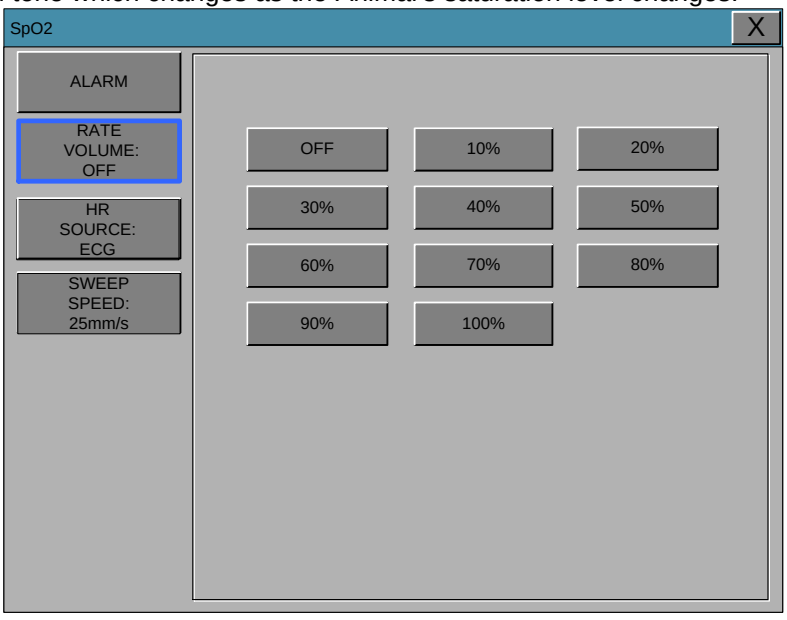
ALARM

Two menus: ALARM LIMIT, ALARM provided in the alarm menu
Number setting of alarm value of %SpO2 is 0 ~ 100
Warning sound or message displays when an alarm is triggered.



RATE VOLUME

Move the KEY to select the volume from OFF to 100%.
The SpO2 volume setting turns on a tone which sounds each time an SpO2 pulse is detected. This is a variable pitch tone which changes as the Animal's saturation level changes.



LEAD FAULT Condition

When using a reusable finger probe, there is a system alarm to alert you when the probe is off the Monitor. The monitor defaults this " LEAD FAULT" condition as a System Warning alarm, however, you can set it as a System ALARM LEVEL in Monitor Defaults.

SPO2 Messages

Below is a list of system status alarm messages which may be displayed in the SPO2 parameter window during monitoring.

CHECK PROBE
Reusable finger probe is off the Animal. Check the probe. *The factory default for this alarm is MESSAGE ALARM.*
PULSE SEARCH
Detection by the monitor of a repeatable pulse has ceased. Check the Animal and the probe site.
POOR SIGNAL
The SPO2 signal is too low. No SPO2 data is displayed. This can be due to a low Animal pulse, Animal motion, or some other interference. Check the Animal and the probe.
LOST SIGNAL
SPO2 data continues to be displayed, but the quality of the signal is questionable. Check the Animal and the probe.
ARTIFACT
It indicates that something happened to the pulses; determine if the artifact to be abnormal and irregular

7. RESPIRATION

7.1 Outline

7.2 RESPIRATION Data Window

7.3 RESPIRATION Data Setup

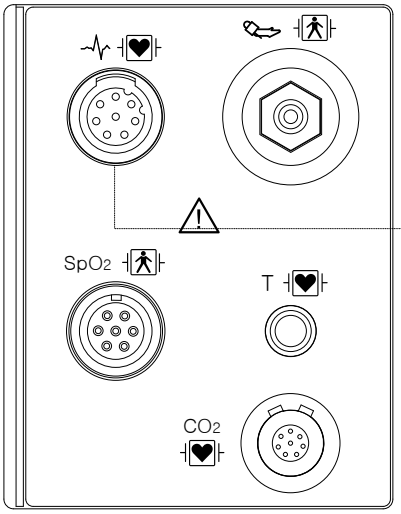
Alarm
APNEA DETECT
RESPIRATION SPEED
RESPIRATION SIZE

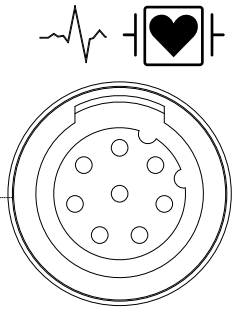
7.1 Outline

Respiration expands the skin area of the chest, causing changes in the resistance of the skin. Through this it calculates respiration value per minutes and performs the alarm function according to the set value.

Respiration Connector and Measuring Cable

Respiration Connecter





ECG/Respiration Connector

Respiration Measuring Cable

IEC 3LEAD CABLE

AHA 3LEAD CABLE

IEC 5LEAD CABLE

AHA 5LEAD CABLE

IEC 3LEAD

AHA 3LEAD

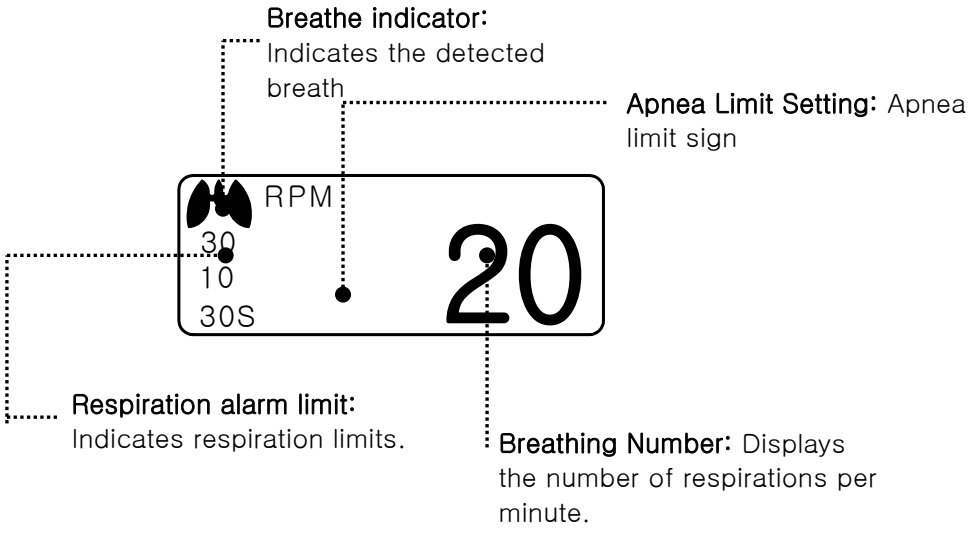
IEC 5LEAD

AHA 5LEAD

Note
RR uses the ECG cable and lead wires.

Alcohol (Ethanol 70%, Isopropanol 70%, Window cleaner)
Alcohol (Ethanol 70%, Isopropanol 70%, Window cleaner)

7.2 Respiration Data Window



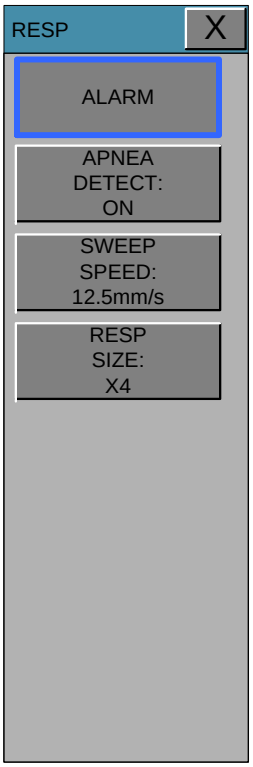
7.3 Respiration Data Setup

ALARM: Respiration alarm setting menu

APNEA DETECT: A menu to setup APNEA alarm display

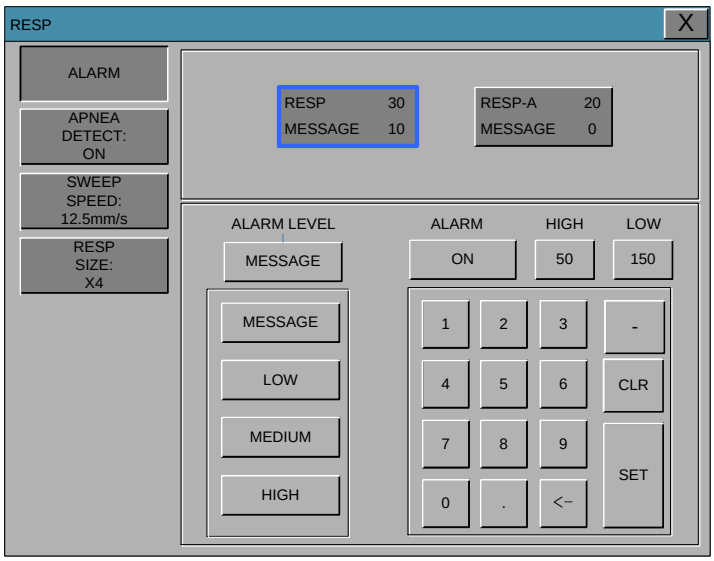
SWEEP SPEED: A menu to setup Wave Display of speed

RESP SIZE: A menu to setup Wave Display



ALARM

Alarm menu provide ALARM LIMIT and ALARM SOUND .



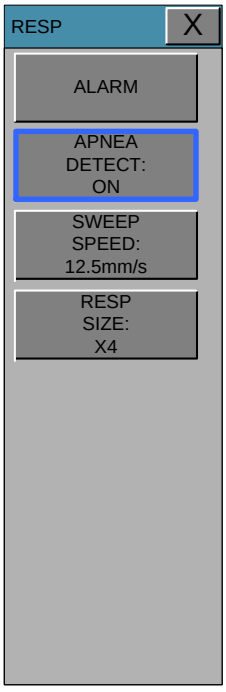
Alarm Limit of Respiration Numeric Value is 5 ~ 150bpm

Alarm Limit of RESPIRATION APNEA Numeric Value is 3 ~ 30sec.

Warning sound or message displays when Respiration ALARM occurs.

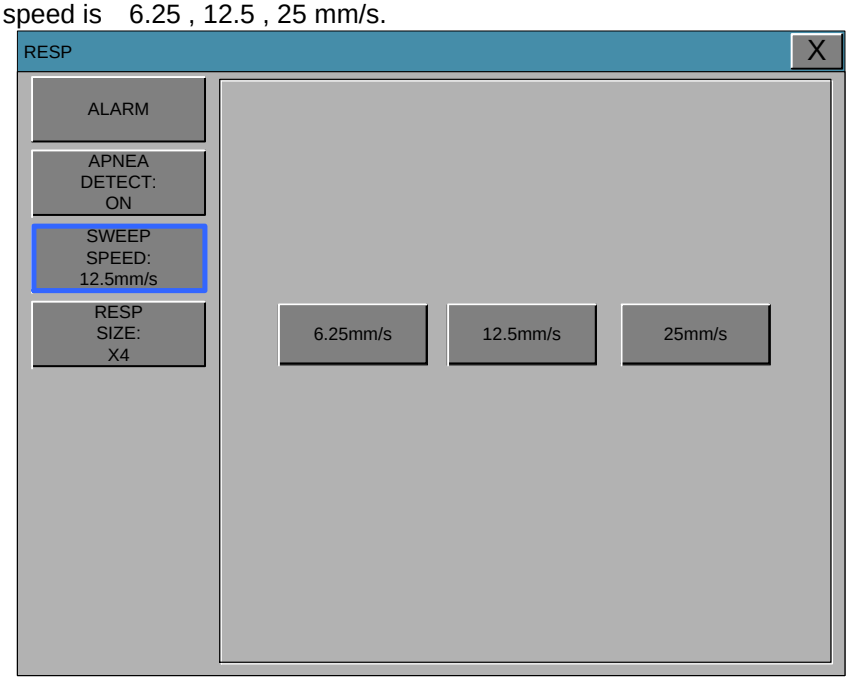
APNEA DETECT

Deciding function of activating Apnea Alarm



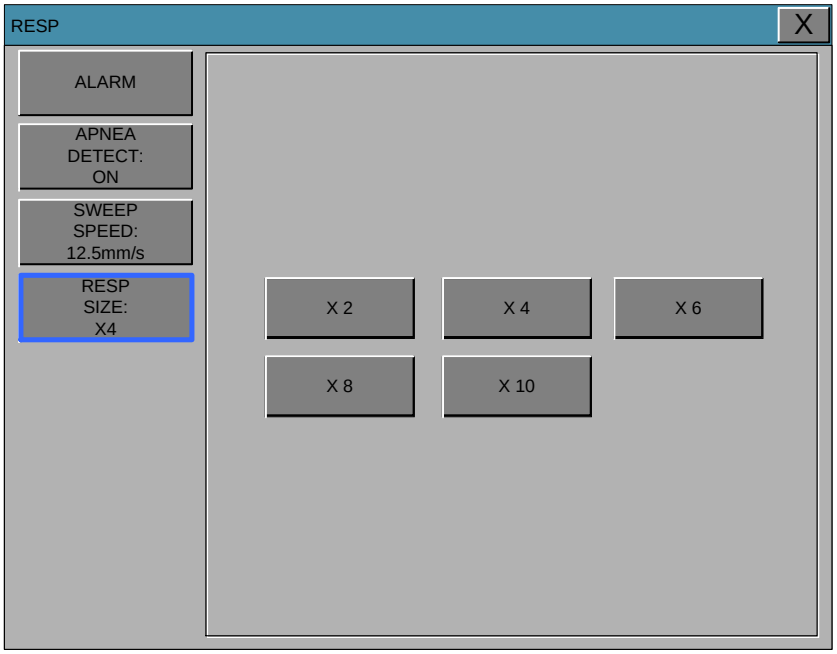
RESPIRATION SPEED

Wave pattern speed is 6.25 , 12.5 , 25 mm/s.



RESPIRATION SIZE

Set wave pattern size X2~ X10.



8. NIBP

8.1 Outline

8.2 NIBP Data Window

8.3 NIBP Data Setup

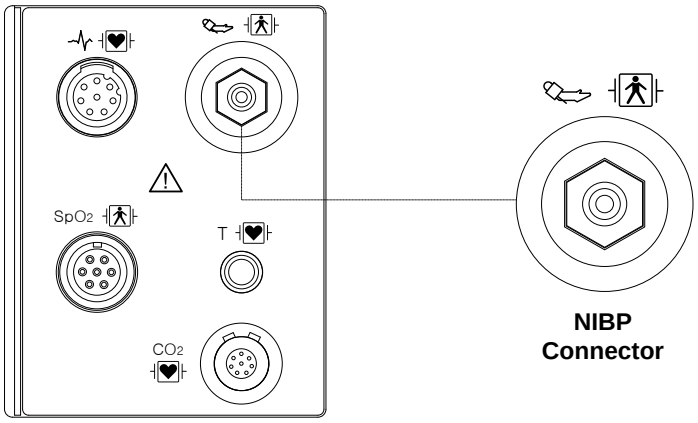
ALARM
CUFF SIZE
INFLATION
INTERVAL
NIBP STAT
NIBP VITAL SIGN
UNIT SELECT

8.1 Outline

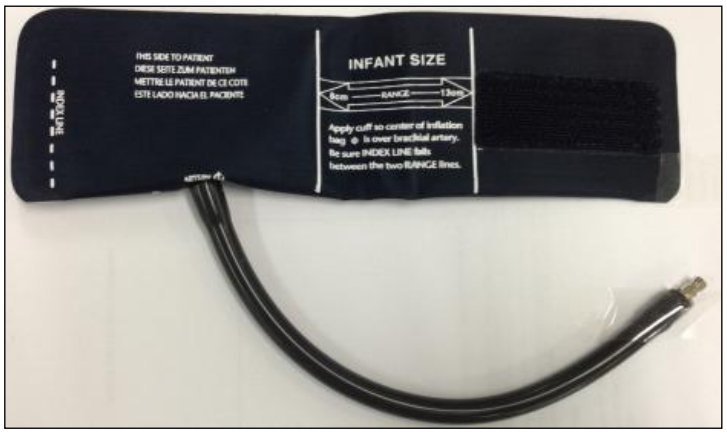
This function is to measure minimum, Maximum and average blood pressure by using Oscillometric method

Position of NIBP Connecter and cuff

NIBP Connector



INFANT CUFF



POSITION OF CUFF (CAT)

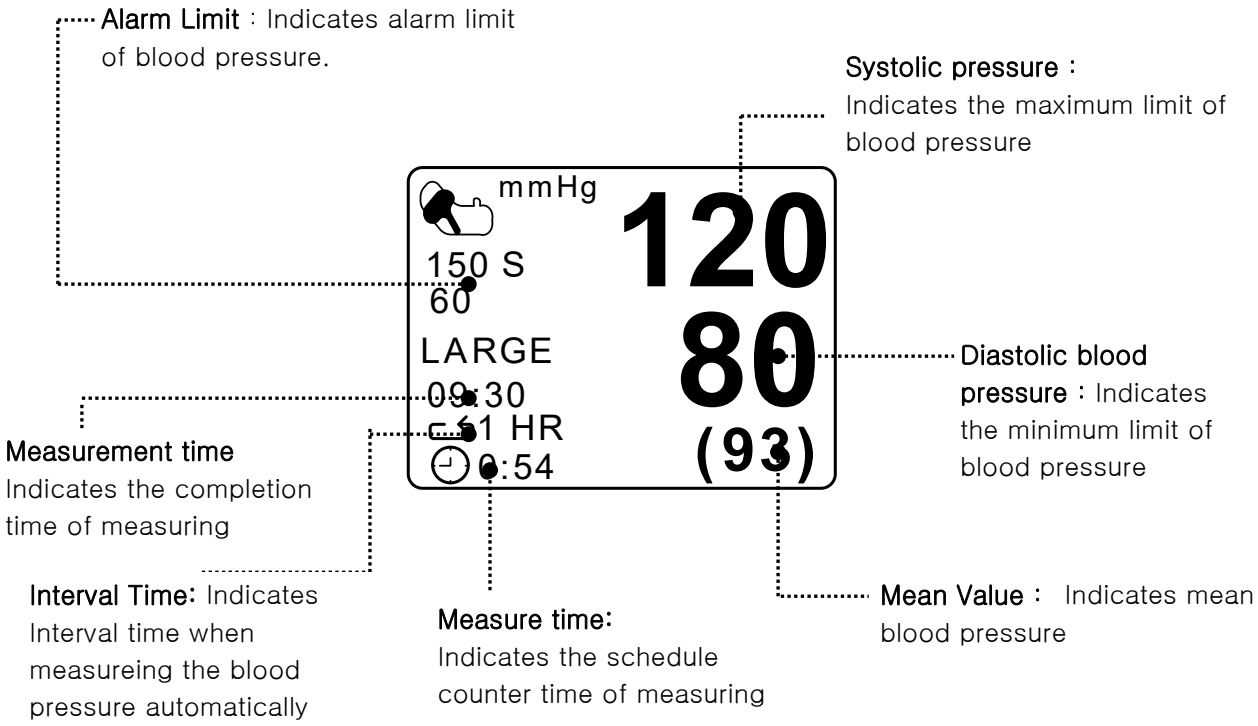
POSITION OF CUFF (DOG)

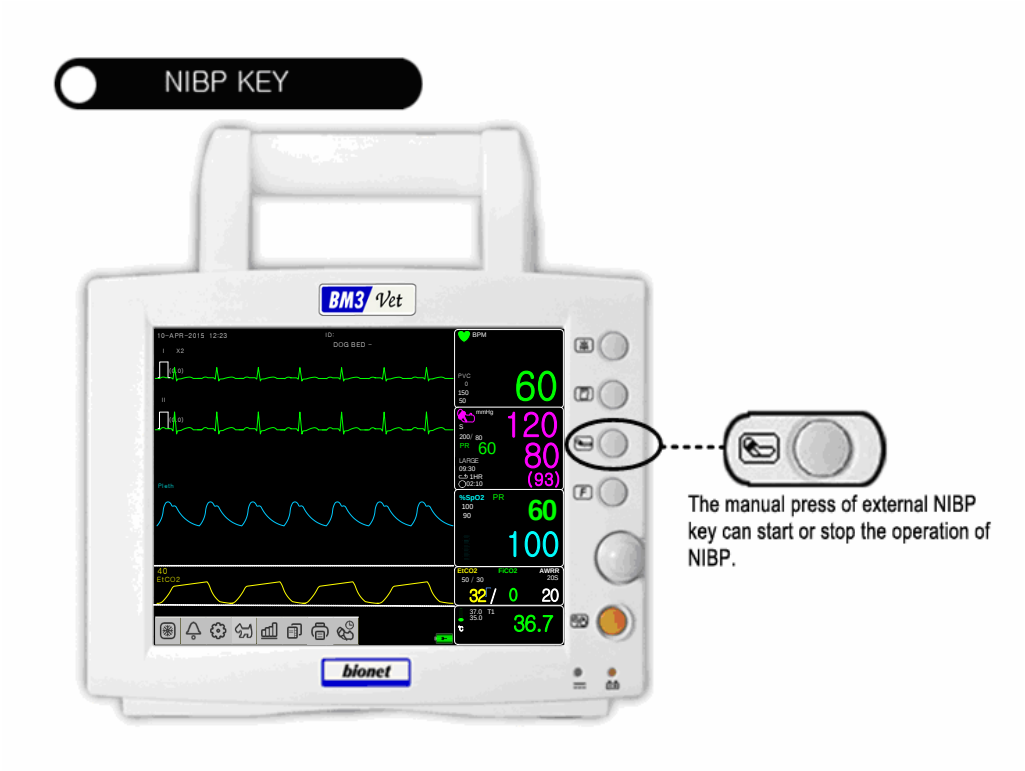
WARNING
Noninvasive blood pressure monitoring is not recommended for Animals with hypotension, hypertension, arrhythmias or extremely high or low heart rate. The software algorithm cannot accurately compute NIBP or Animals with these conditions.

Note
Tubes between the cuff and the monitor should not be kinked or blocked. The air pad should be exactly over the branchial artery. Tubing is immediately to the right or left of the branchial artery to prevent kinking when elbow is bent.

The maintenance is performed every 2 years.
Check the following list to ensure device operates properly and safety at all times.
1. Check for proper cuff size.
2. Check for residual air left in the cuff from a previous measurement.
3. Make sure cuff is not too tight or too loose.
4. Make sure cuff and heart are at same level, otherwise hydrostatic pressure will offset the NIBP value.
5. Minimize Animal movement during measurement.
6. Watch for pulses paradox us.
7. Check for leak in cuff or tubing.
8. Animal may have a weak pulse.

8.2 NIBP Data Window





POWER OFF

When power is cut off during pressure, air runs out of the CUFF automatically.

8.3 NIBP Data Setup

ALARM： A menu to set the Alarm

CUFF SIZE：A menu to select cuff size

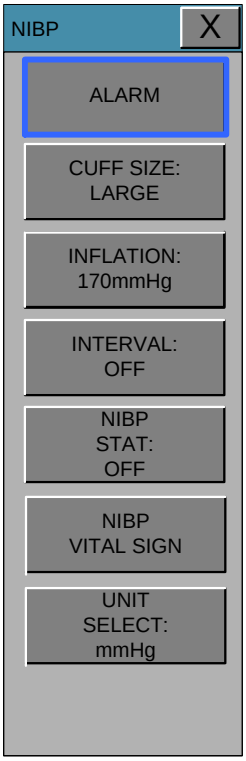
INFLATION: Initial Pressurization setting menu

INTERVAL ：A menu to set Interval time when measuring the blood pressure automatically

NIBP STAT : 5 Minutes continuous measurement

NIBP VITAL SIGN : History display of NIBP measurement value

UNIT SELECT: A menu to select the pressure unit

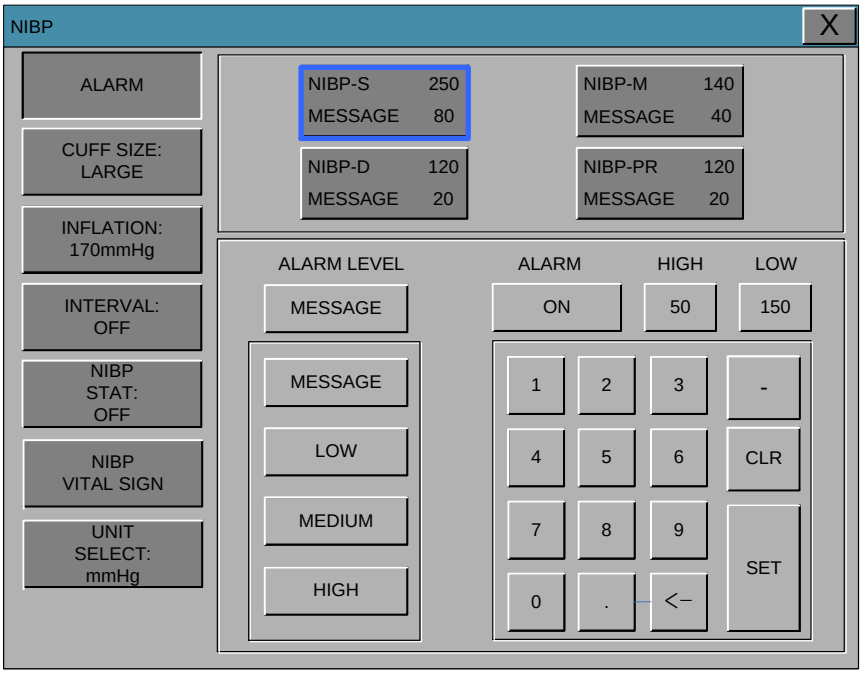


ALARM

The alarm provides ALARM LIMIT and ALARM SOUND.

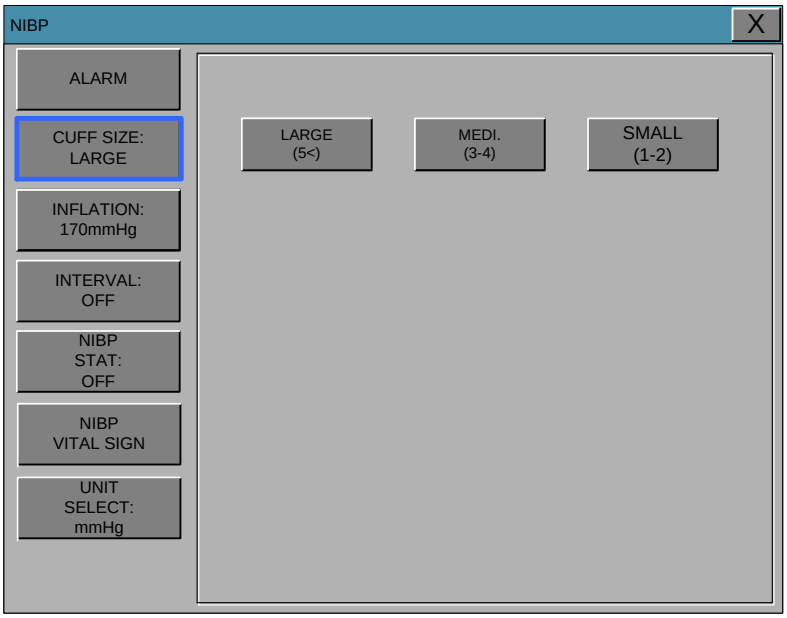
Alarm setting Numeric Value of Systolic, Diastolic, and mean pressure is 10 ~ 360mmHg.

The menu which decide activate of warning sign and message display when the respiration alarm is on.



CUFF SIZE

The user can select a CUFF between ADULT and NEONATAL.

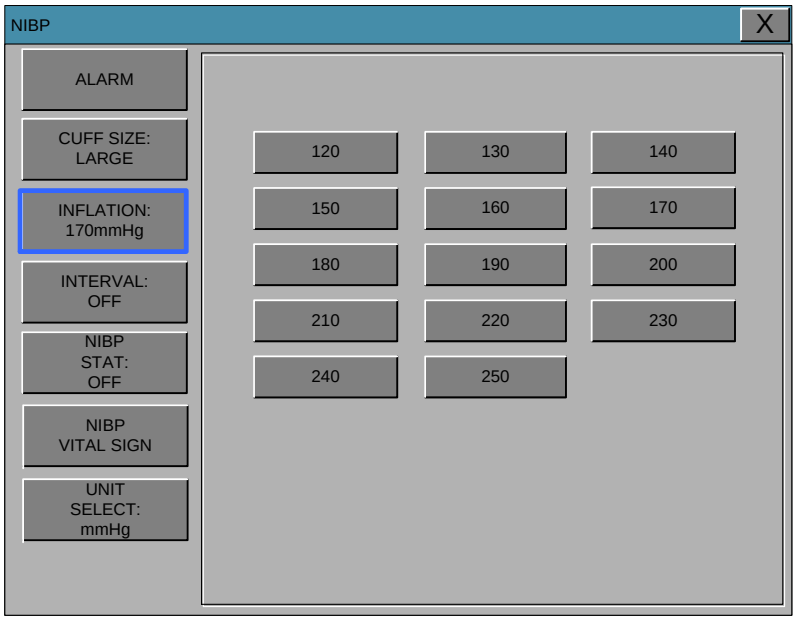


INFLATION

It is a function for set the maximum initial inflation pressure value.The range of initial inflation pressure value of BM3VET TOUCH is as follows.

LARGE : 120 – 250 mmHg / MEDI. : 120 – 250mmHg / SMALL : 60 – 140mmHg

Default Value: LARGE : 170 mmHg / MEDI. : 140mmHg / SMALL : 120mmHg

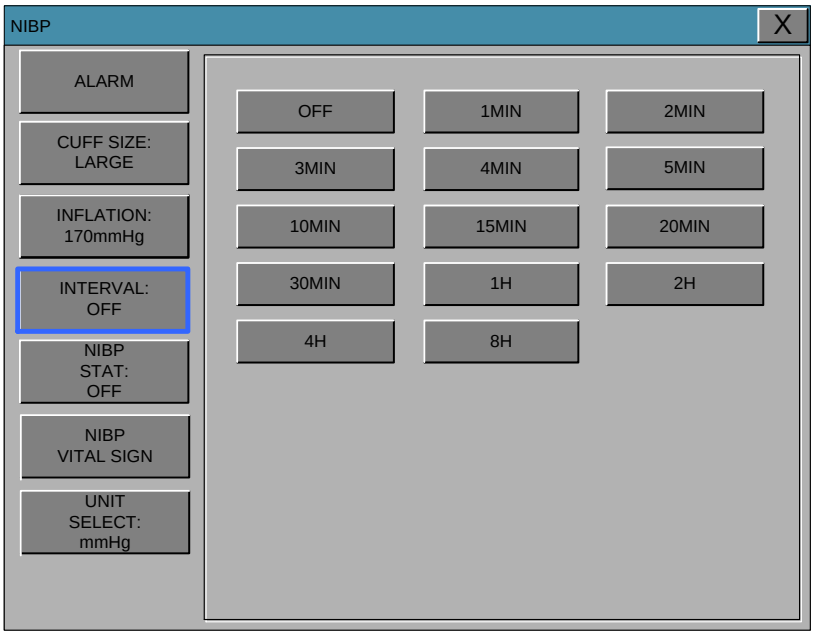


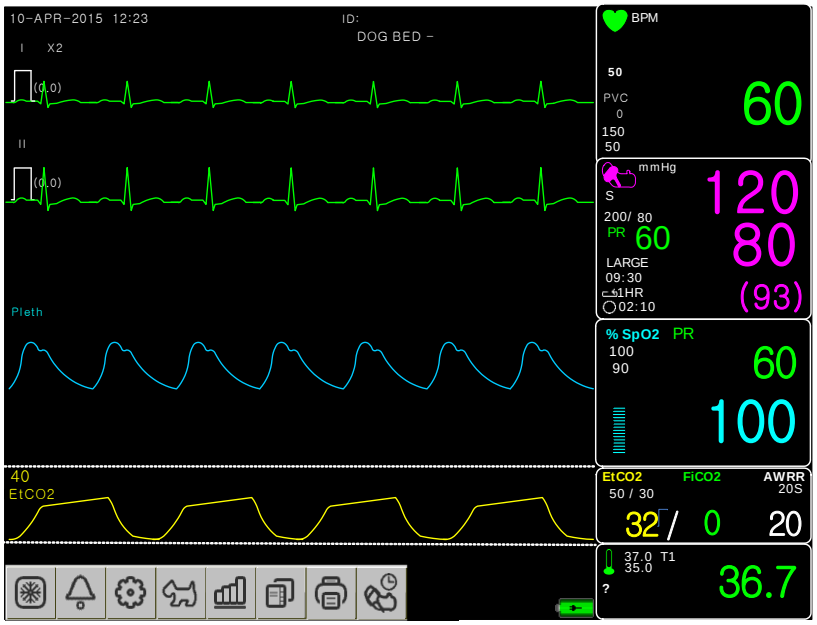
INTERVAL

This menu is used for selecting intervals when measuring the blood pressure automatically.

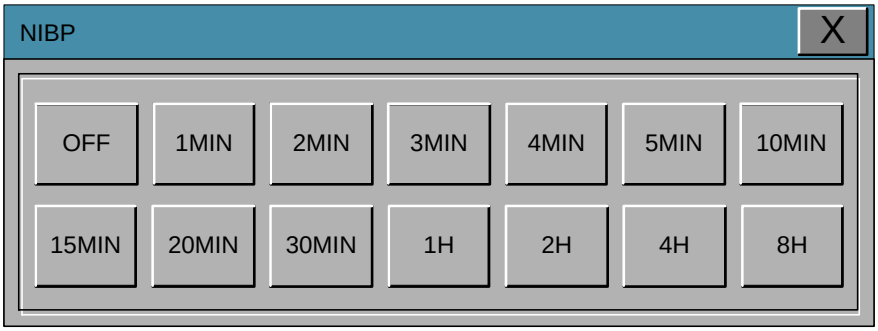
Select a target interval from 1min, 2, 3, 4, 5, 10, 15, 20, 30, 1hour, 2, 4, 8.

INTERVAL is set after the start, press the NIBP KEY to initiate readings.





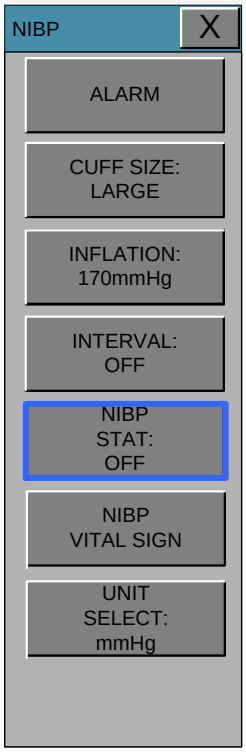
If you select the icon  from the main screen of the equipment you can select the measurement cycle.



Warning
Periodically check Animal limb circulation distal to the cuff. Check frequently when using auto NBP in 1 and 2 minute intervals. Intervals below 10 minutes are not recommended for extended periods of time.

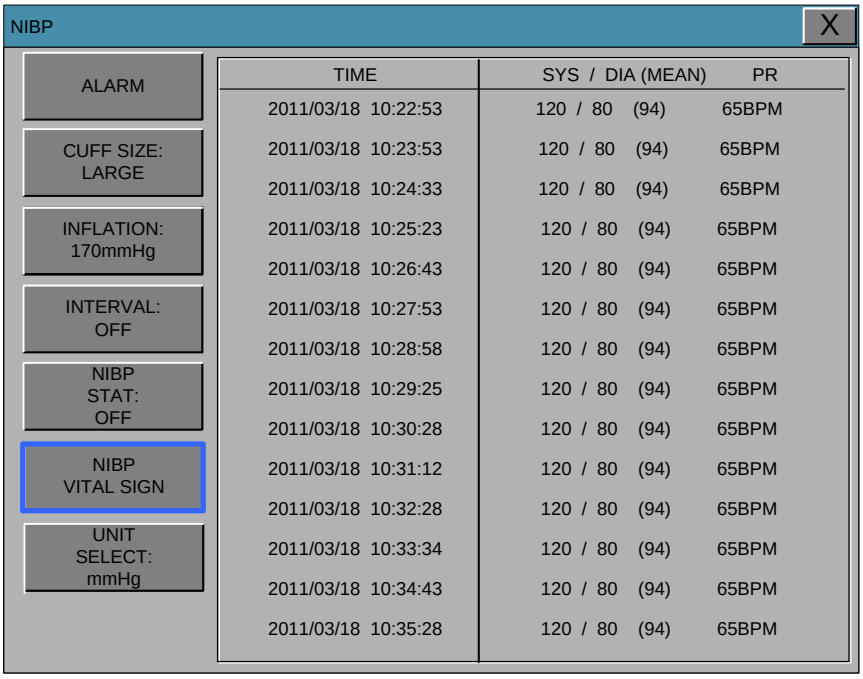
NIBP STAT

5 minutes to continuous measurement mode.



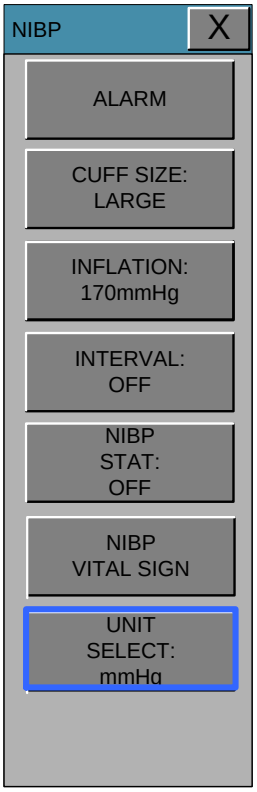
NIBP VITAL SIGN

15 recently measured blood pressure values and pulse rates are recorded.



UNIT SELECT

It is a function to set blood pressure measurement unit.
The blood pressure measurement unit provides mmHg and kPa.



Warning
Pay attention not to block connecting hose when you put cuff on Animal. Check cuff or hose connection for leaks periodically. Measurements can be inaccurate if air leaks.

9. EtCO2

9.1 INTRODUCTION

9.2 $EtCO_2$ Parameter Window

9.3 $EtCO_2$ Parameter Setting Menu

ALARM LIMIT

WAVEFORM SCALE

EtCO2 SWEEP SPEED

APNEA DETECT

MODULE INFO

MODULE SETUP

ZERO

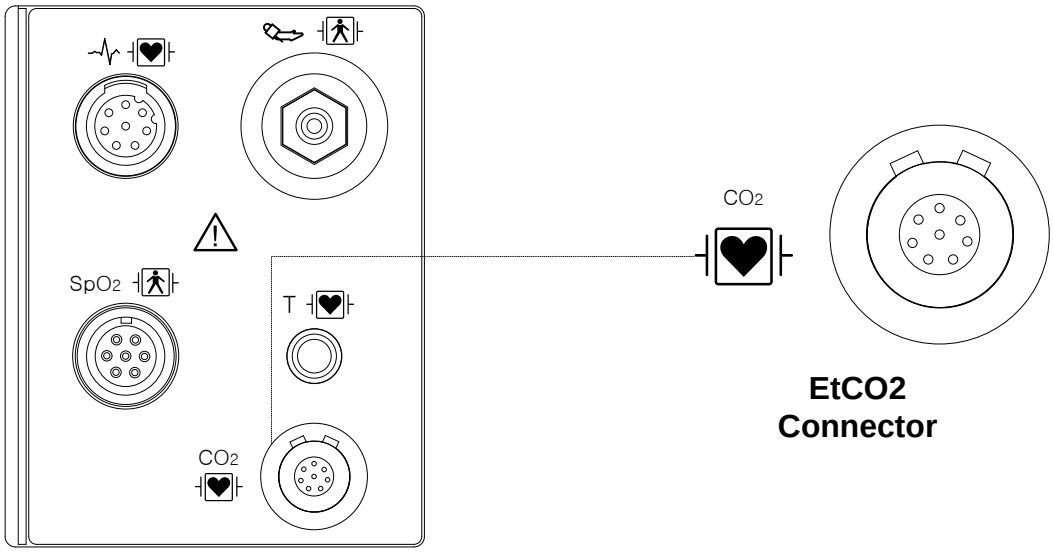
MODULE RESET

9.1 Introduction

ETCO2(End-Tidal CO2) is a device to see the concentration of end-tidal carbon dioxide, which uses a method of measurement based on the non-dispersed IR absorption of CO2 using IR ray by sampling a certain part of respiration through pipe during respiration.

EtCO2 connector position and accessory (Sidestream, Respironics)

EtCO2 Connector



LoFlo sidestream CO2 sensor and connector

Sidestream sensor

Sidestream sensor connector

EtCO2 accessories for sidestream applications

EtCO2 monitoring accessory uses the accessories for LoFlo™ sidestream module of Respironics Company.

The airway adapters for sidestream intubated applications			
3473ADU-00		Airway Adapter Kit w/ Dehumidification Tubing	Weight: 4.5 grams Deadspace – adds approximately 7 cc of deadspace **Intended for use when monitoring Animals with ET Tube sizes >4.0 mm**
3473INF-00		Airway Adapter Kit w/ Dehumidification Tubing	Weight: 5.8 grams Deadspace – adds approximately 1 cc of deadspace **Intended for use when monitoring Animals with ET Tube sizes <=4.0 mm**

Connecting the LoFlo Sample Kit

1. The sample cell of the sampling kit must be inserted into the sample cell receptacle of the LoFlo CO_2 Module as shown in Figure 1. A “click” will be heard when the sample cell is properly inserted.

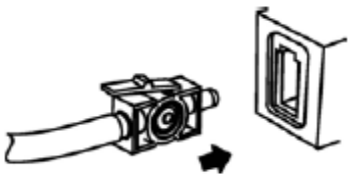


Figure 1

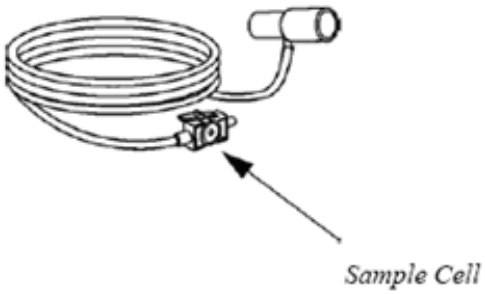


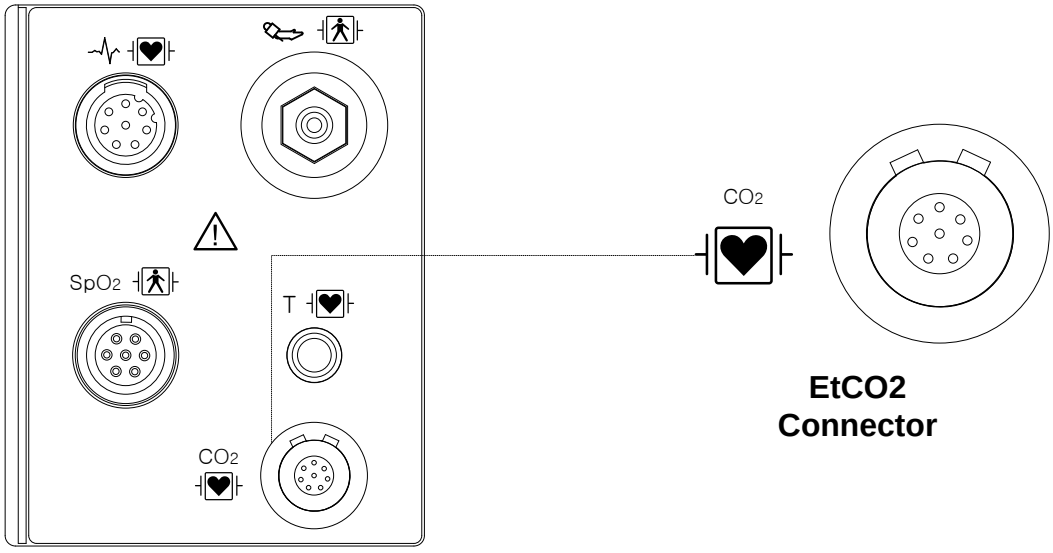
Figure 2

2. Inserting the sample cell into the receptacle automatically starts the sampling pump. Removal of the sample cell turns the sample pump off.

3. To remove the sampling kit sample cell from the sample cell receptacle, press down on the locking tab and pull the sample cell from the sample cell receptacle.

EtCO2 connector position and accessory (Mainstream, Respironics)

EtCO2 Connector



CAPNOSTAT 5 mainstream CO2 sensor and connector

Mainstream sensor

Mainstream sensor connector

EtCO2 accessories for mainstream applications

EtCO2 monitoring accessory uses the accessories for CapnoStat 5 microstream sensor of Respironics Company.

The airway adapters for mainstream intubated applications		
6063-00		Single-Animal Use Airway Adapter **Intended for use when monitoring Animals with ET Tube sizes >4.0 mm**
6312-00		Single-Animal Use Airway Adapter **Intended for use when monitoring Animals with ET Tube sizes <=4.0 mm**
7007-00		Reusable Airway Adapter
7053-00		Reusable Airway Adapter

Connecting the CAPNOSTAT® 5 CO2 Sensor to the Host System

1. Insert the CAPNOSTAT 5 CO_2 Sensor connector into the receptacle of the host monitor as shown in Figure 1.

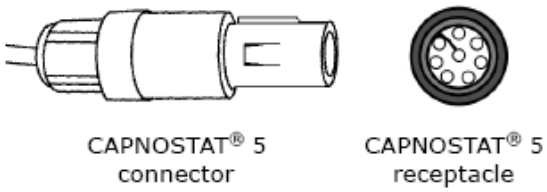


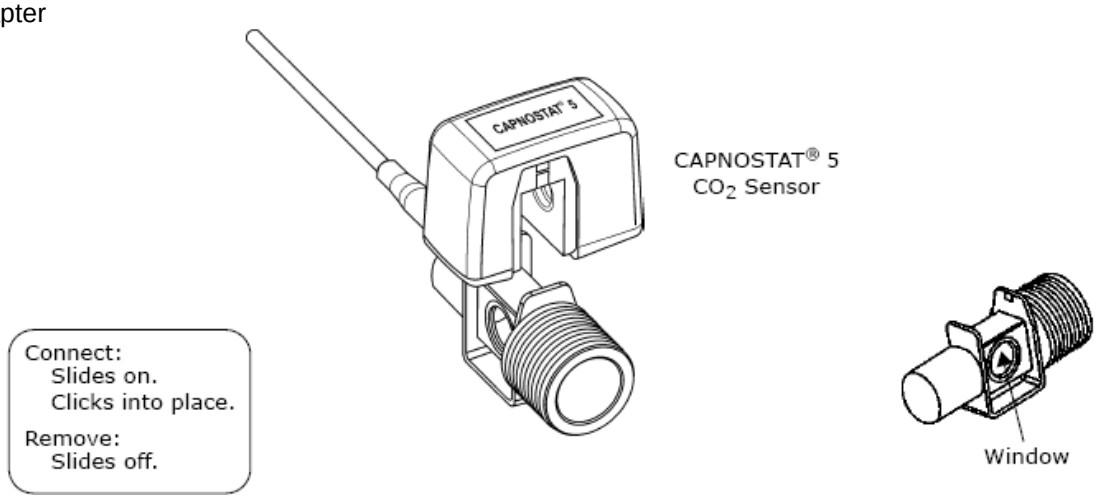
Figure 1

2. Make sure the arrows on the connector are at the top of the connector and line up the two keys of the connector with the receptacle and insert.

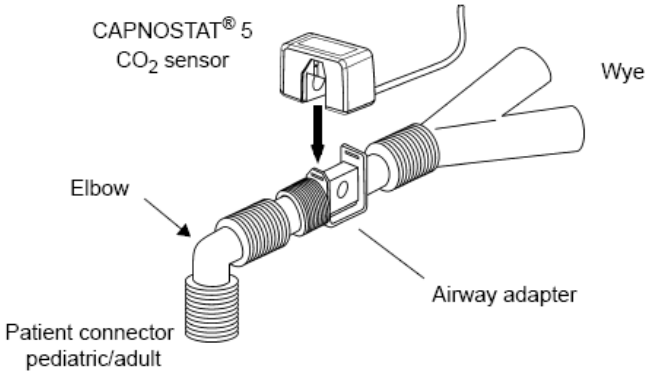
3. To remove the connector, grasp the body portion of the connector back and remove.

Note: Do not remove by pulling cable.

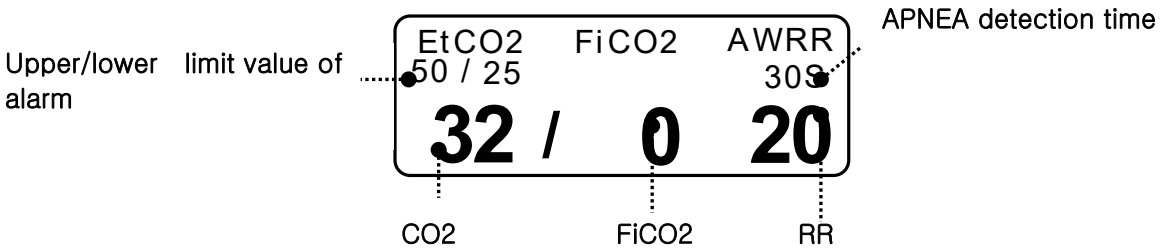
Shown below is the CAPNOSTAT 5 CO_2 Sensor connection to a Respironics Novametrix CO_2 adapter



Shown below is the CAPNOSTAT 5 CO_2 Sensor with an Animal circuit:



9.2 EtCO2 Parameter Window



S: Display of apnea setting time in seconds

Upper/lower limit value of alarm: Display of alarm setting range value for concentration of CO_2

EtCO$_2$: Display of concentration value of carbon dioxide

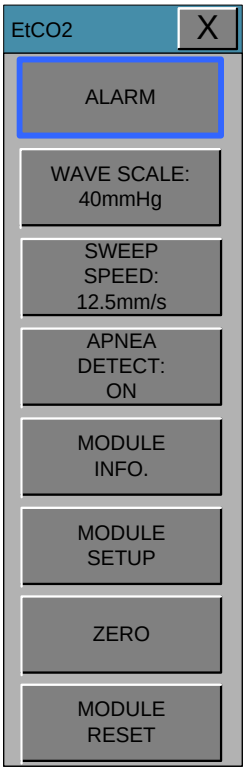
AWRR: Display of the number of respirations per minute

FICO2: Display of concentration value of carbon dioxide during inspiration

Note
$EtCO_2$ waveform is always displayed if cable is connected.

9.3 EtCO2 Parameter Setting Menu

ALARM: A menu to set the alarm limit
WAVE SCALE: menu to set the size of waveforms on the on-screen
SWEEP SPEED: Speed to draw the signal waveform. (6.25mm/s, 12.5mm/s, 25mm/s)
APNEA DETECT: Menu for the detection of apnea
MODULE INFO.: Menu where you can see the MODULE information
MODULE SETUP: Menu to set module information.
ZERO: Atmospheric pressure and zero adjustment menu
MODULE RESET: EtCO2 MODULE menu to initialize the run

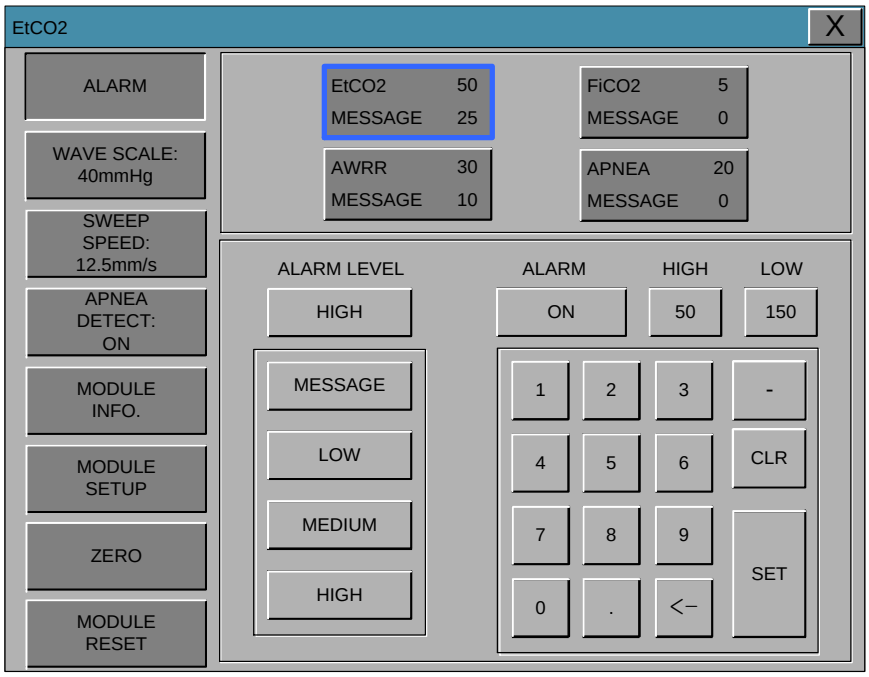


ALARM LIMIT

(Upper/lower limit value of alarm)

Upper/lower limit value of alarm differs depending on the position of measurement.

The basic setting range of alarm setting value for EtCO2, FiCO2, AWRR, APNEA.



The following table shows standard alarm limit of parameter and setting value of scale when setting the label.

Parameter	Adult			Neonatal		
	Low	High	Scale	Low	High	Scale
EtCO2	0	98	40	0	98	40
FiCO2	0	20		0	20	
AWRR	0	100		0	100	
APNEA	0	40		0	40	

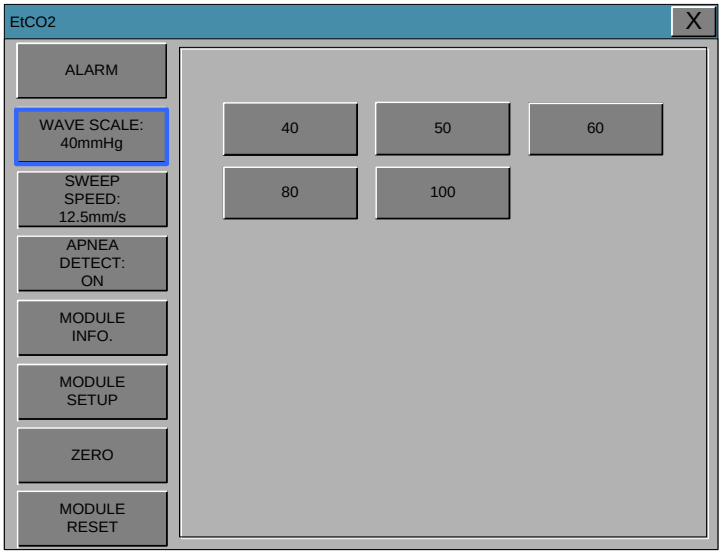
WAVEFORM SCALE

(Measured waveform scale setting)

This sets the range of measured waveform versus pressure.

Selectable numerical value means the maximum pressure range value that is shown with waveform.

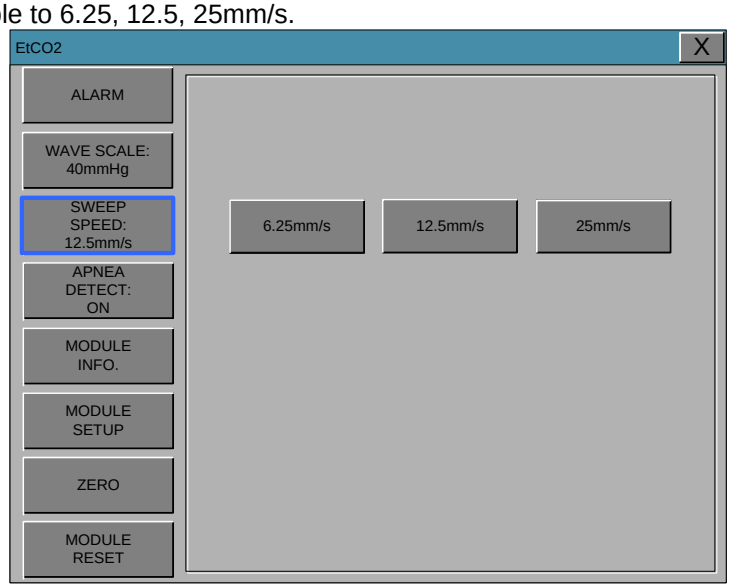
Pressing the knob switch key and then selecting the desired range value displays the selected pressure range value below the upper dotted line among two dotted lines in the left middle of wave window.



EtCO2 SWEEP SPEED

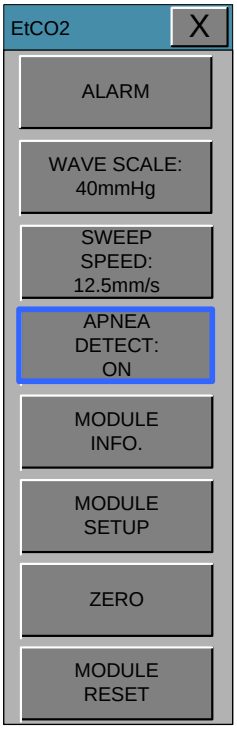
EtCO2 speed is 6.5mm/s.

Speed is changeable to 6.25, 12.5, 25mm/s.



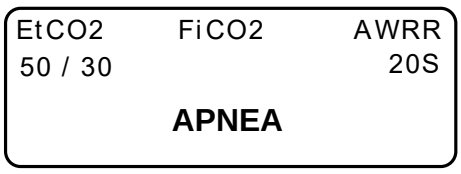
APNEA DETECT

Turn the APNEA detection alarm off and on



APNEA ALARM: This performs a function to set the display of apnea message alarm.

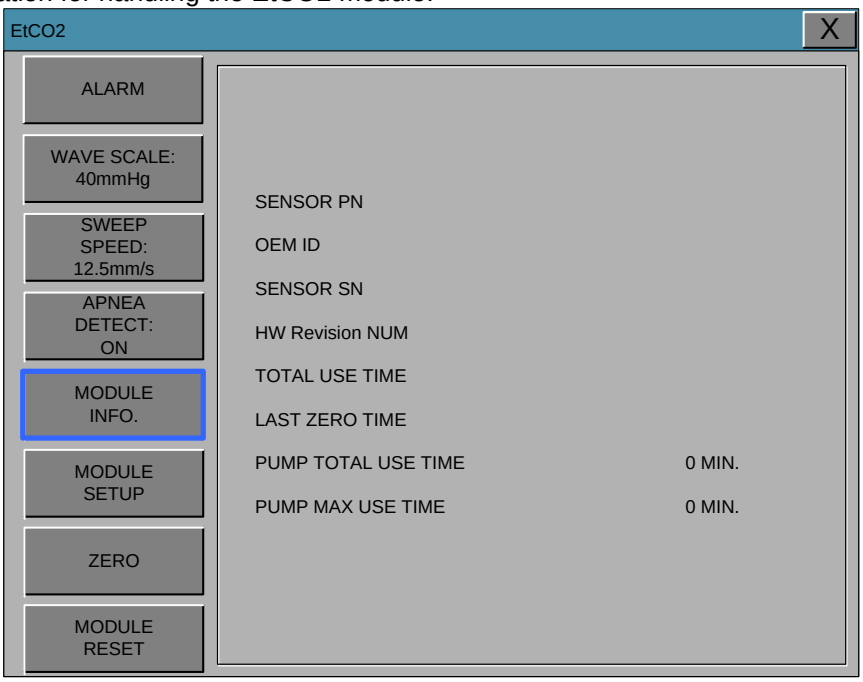
This displays a “apnea” message at the center of parameter window as shown in the figure below with apnea alarm on in case of apnea until the set apnea period is passed through.



With apnea alarm off, measured values are displayed instead of message.

MODULE INFO

This is information for handling the EtCO2 module.



SENSOR PN(part number) : The sensor part number

OEM ID : The id is a 7bit identifier which is set at the factory to a unique value for each OEM.

SENSOR SN : The serial number of the module.

HW REVISION NUM : The hardware version number of the module.

TOTAL USE TIME : Total use time of the module.

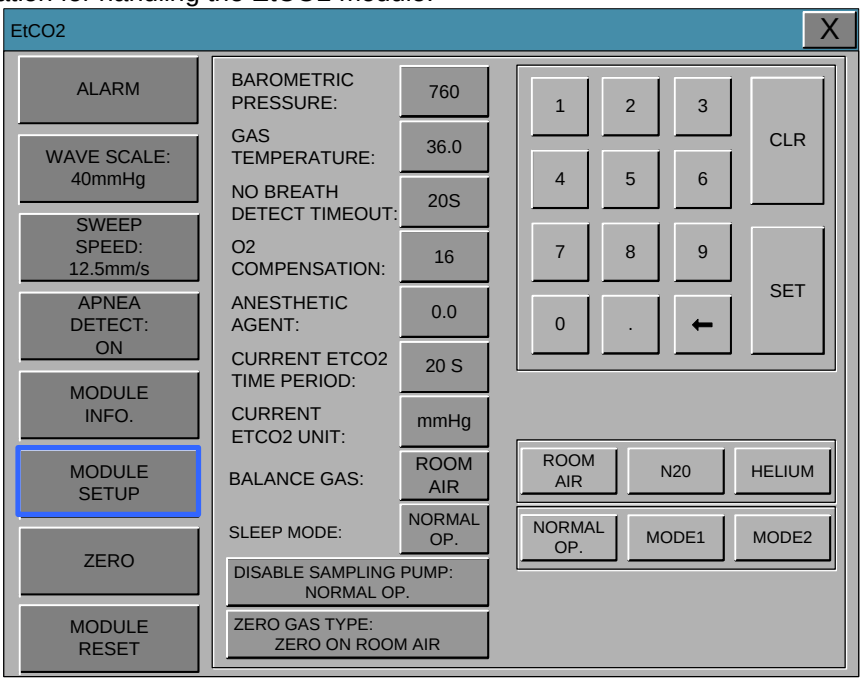
LAST ZERO TIME : This is the total time that has elapsed with the sensor since the last zero.

PUMP TOTAL USE TIME : This is the total time the pump has been on.(LoFlo only)

PUMP MAX USE TIME : This value indicates the maximum rated lifetime of the sampling pump. (LoFlo only)

MODULE SETUP

This is information for handling the EtCO2 module.



BAROMETRIC PRESSURE: This setting is used to set current Barometric Pressure.

GAS TEMPERATURE: This setting is used to set temperature of the gas mixture. This setting is useful when bench testing using static gasses where the temperature is often room temperature or below.

NO BREATH DETECT TIMEOUT: This setting is used to set the no breaths detected time-out. This time-out is the time period in seconds following the last detected breath at which the Capnostat will signal no breaths detected.

O2 COMPENSATION
ANESTHETIC AGENT
BALANCE GAS: Use this setting to correct for the compensation of the gas mixture administered to the Animal. Anesthetic agent is ignored when the balance gas is set to helium.

CURRENT ETCO2 TIME PERIOD: This setting is used to set the calculation period of the $ETCO_2$ value. The end-tidal CO_2 value is the highest peak CO_2 value of all end of expirations (end of breaths) over the selected time period. If less than two breaths exist in the selected time period, the value will be the maximum $ETCO_2$ value for the last two breaths.

CURRENT CO2 UNIT: Continuous waveform mode commands (the CO_2 Waveform Mode command [command 80h] and the CO_2/O_2 Waveform Mode command [command 90h]) MUST NOT be active when this command is used otherwise this command will be ignored and the setting will remain unchanged.

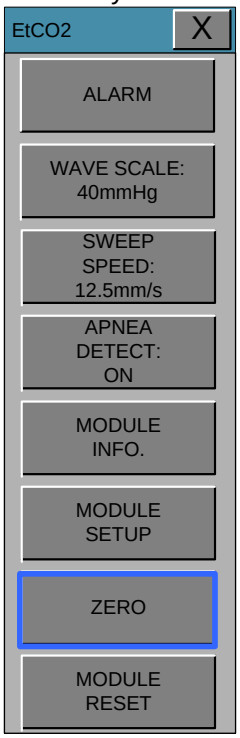
SLEEP MODE: Sleep mode is used to save power when the host monitor is in standby mode. There are two sleep modes available for the Capnostat. Using Sleep Mode 1 maintains the heaters so the Capnostat is able to run immediately after exiting the sleep mode. Mode 2 will require the Capnostat to go through its warm up sequence when exiting this mode and a delay will be introduced until the system has stabilized.

ZERO GAS TYPE: When performing a zero on room air, this setting should be set to room air (the default). Only change to nitrogen (N_2) when performing a zero on 100% N_2 gas; this is provided for use in a laboratory environment.

DISABLE SAMPLING PUMP: This setting allows the pump to be forced off. In Normal Operating Mode, the pump will be turned on when the sampling cell is connected and no pneumatic system errors are detected. In Pump Disabled Mode, the pump will remain off in all circumstances.

ZERO

This function is used to initiate a Capnostat zero.
A zero is used to correct for differences in airway adapter types.
The Capnostat zero must be performed free of any CO2.

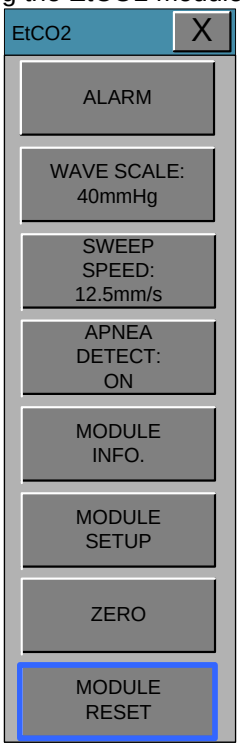


1. Set the Host to the zeroing function.
2. Connect the CAPNOSTAT 5 CO2 Sensor
3. Place the CAPNOSTAT 5 CO2 Sensor onto a clean and dry CO2 adapter that is exposed to room air and away from all sources of CO2, including the ventilator, the Animal's breath and your own.
4. Start the adapter zero. The maximum time for a CAPNOSTAT zero is 40 seconds. The typical time for a zero is 15~20 seconds.

Note
For best result, connect the CAPNOSTAT 5 CO2 Sensor to an adapter and wait 2 minutes before performing the Adapter Zero procedure.

MODULE RESET

This performs a function to reset handling the EtCO2 module.



Warning
If defibrillation is performed while doing CO2 monitoring, remove the CO2 FilterLine from Animal Defibrillation without removing the FilterLine can result in serious electrical burn, shock, or injury due to electric discharge energy.

9.4 TROUBLESHOOTING

Following is a list of some of the messages that may appear on the monitor when monitoring CO2. The message should clear when normal operating criteria are met or a solution is found.

*** SENSOR OVER TEMP**

- Cause : The sensor temperature is greater than 40'C
- Solution : Make sure sensor is not exposed to extreme heat(heat lamp,etc.)

*** SENSOR FAULTY**

- Cause: One of the following conditions exist : Capnostat Source Current Failure
  EEPROM Checksum Faulty , Hardware Error
- Solution : Check that the sensor is properly plugged in. Reinsert or reset the sensor if necessary.

*** SENSOR WARM UP**

- Cause : Sensor under temperature , Temperature not stable, Source Current unstable
- Solution : This error condition is normal at startup. This error should clear when the warm up is complete.

*** CHECK SAMPLING LINE**

- Cause : This error occurs whenever the pneumatic pressure is outside the expected range.
- Solution : Check that the sampling line is not occluded or kinked. Replace the sample line

*** ZERO REQUIRED**

- Cause : Zero Required , Zero Error
- Solution : To clear, check airway adapter and clean if necessary. If this does not correct the error, perform an adapter zero. If you must adapter zero more than once, a possible hardware error may exist.

*** CO2 OUT OF RANGE**

- Cause : The value being calculated is greater than the upper CO2 limit(150mmHg)
- Solution : If error persists, perform a zero.

*** CHECK AIRWAY ADAPTER**

- Cause : Usually caused when the airway adapter is removed from the Capnostat or when there is an optical blockage on the windows of the airway adapter. May also be caused by failure to perform Capnostat zero when adapter type is changed.
- Solution : To clear, clean airway adapter if mucus or moisture is seen. If the adapter is clean, perform a Capnostat zero.

Note
In the following monitoring conditions, the measured values may be inaccurate. Read the measured values carefully. 1. When using this in an environment of using nitrous oxide gas of high concentration 2. When using this in an environment where abrupt temperature change takes place 3. When using this in an environment with severely high humidity.

Caution
● The measured values may be inaccurate when using this equipment for Animals who have very fast or irregular respiration. ● When measuring CO2 from the Animal under the anesthesia, check it when gas mixture comes in. Otherwise, the measured result values may be inaccurate. ● When using an anesthesia machine that uses a volatile anesthetic, CO2 values may be inaccurate.

10. TEMPERATURE

10.1 Outline

10.2 Temperature Data Window

10.3 Temperature Data Setup

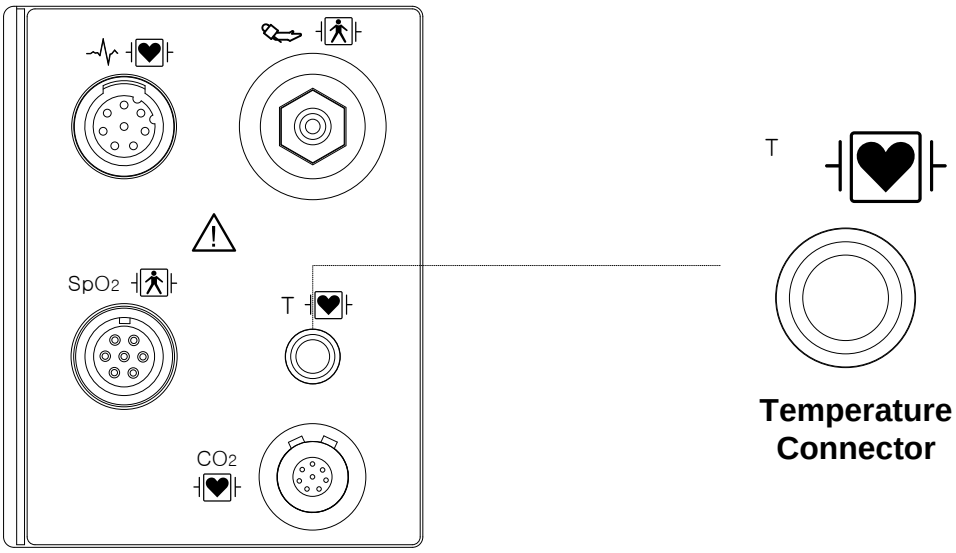
ALARM LIMIT
UNIT SELECT

10.1 Outline

This function is used to indicate the changes of resistance generated by the changes of temperature in numbers. The function involves the process of transferring the changes into electric signals.

Temperature Connector and Measuring Cable

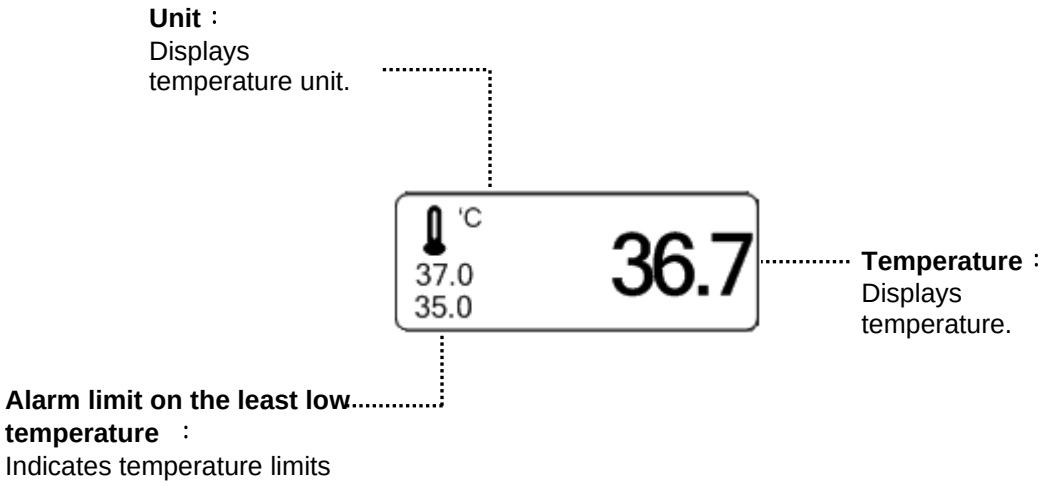
Temperature Connector



Temperature
Measuring
Cable

Note
Temperature probe is correctly positioned and fixed to do not disconnect on the Animal. Temperature cable is attached to the monitor.

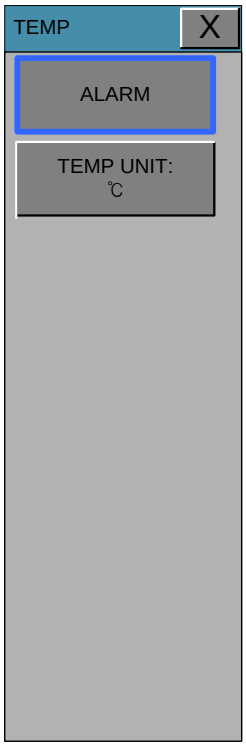
10.2 Temperature Data Window



Note
The minimum measuring time required to obtain accurate readings at the specific body site is at least 3 minutes.

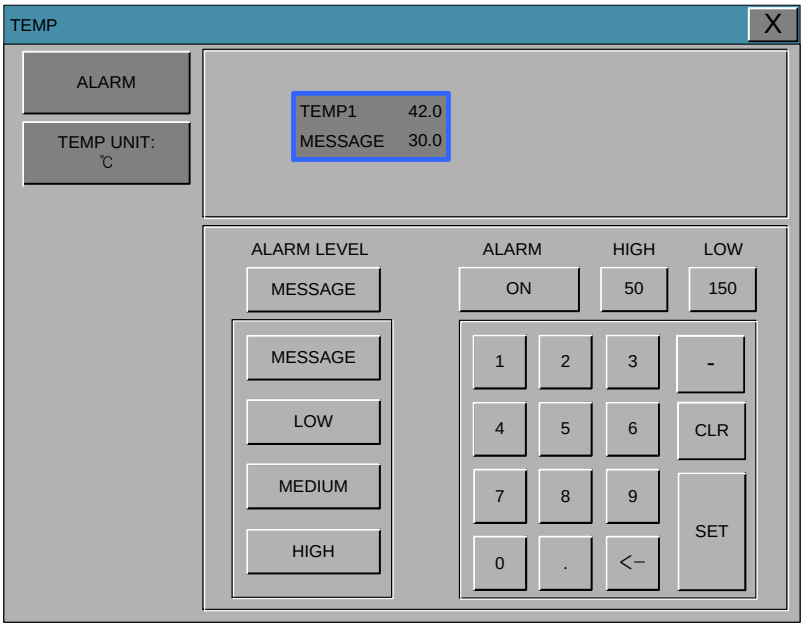
10.3 Temperature Data Setup

ALARM： Temperature measurement alarm set
UNIT: Temperature measurement unit set



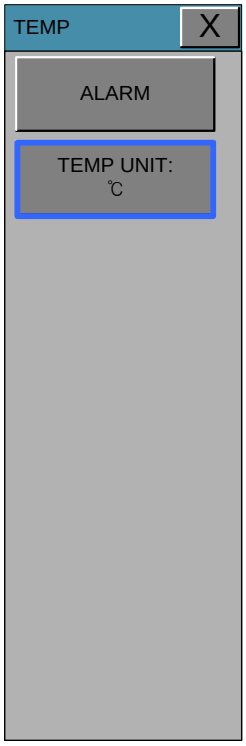
ALARM

Alarm menu provide ALARM LIMIT and ALARM.
Setting numeric value is 15.0℃ ~ 45.0℃.



UNIT SELECT

Able to select unit between °C, °F.



Warning

To measure the peripheral temperature, attach the probe to the ankle or palm.

If the patient sweats heavily or moves violently, fasten the pad with surgical tape.

NOTE

When the measuring site is exposed directly to air, the temperature may be lower than normal.
It take about 20 to 30 minutes to reach the equilibrium temperature after attaching the sensor.

11. PRINT

11.1 Print

Printer and Heat Sensitivity Paper
Function and Setup Menu

11.2 Paper Change

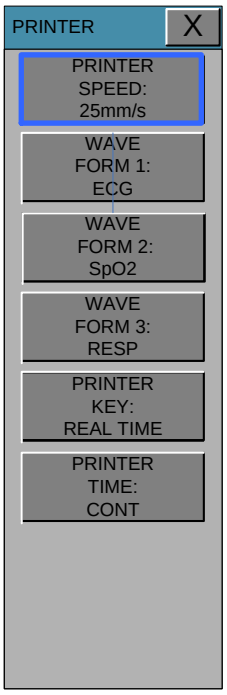
11.1 Print

Printer and Heat Sensitivity Paper

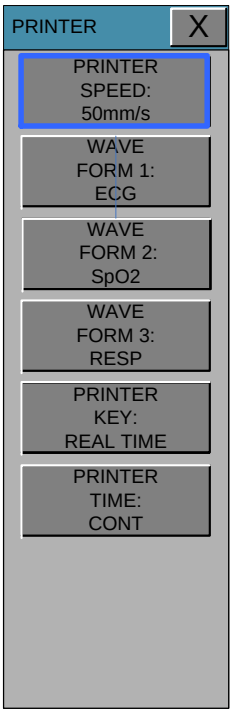
A printer used to print data onto thermal paper.
Size of the thermal paper roll: 58mm wide x 38mm in diameter any thermal paper of same size can be used for the printer.

Side View of Printer

Function and Setup Menu

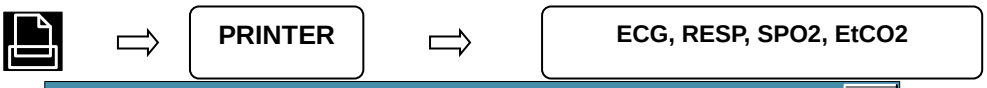


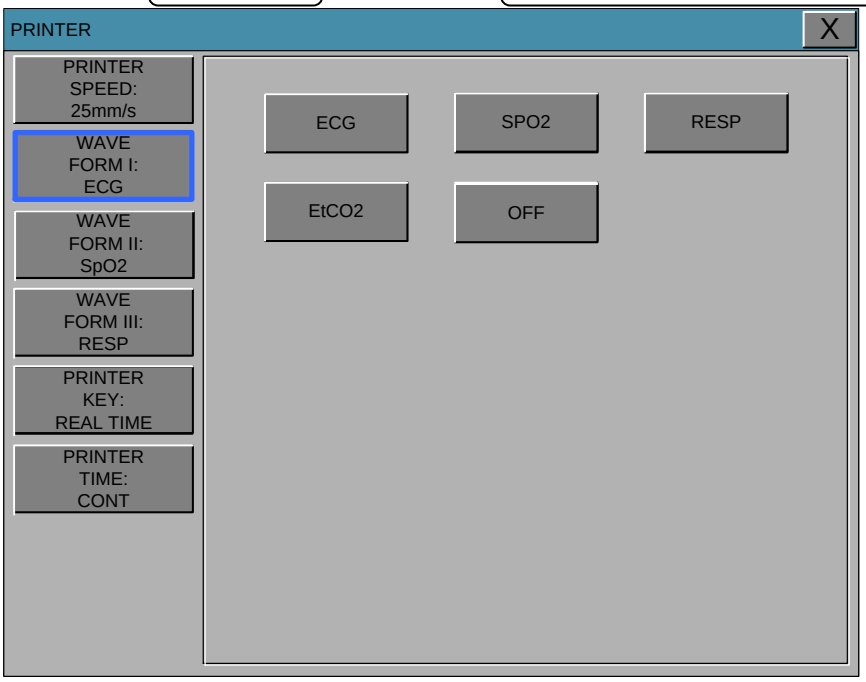
1. Press the PRINT Key for continuous printing.
2. Select Printing Speed 25, 50 mm/s.

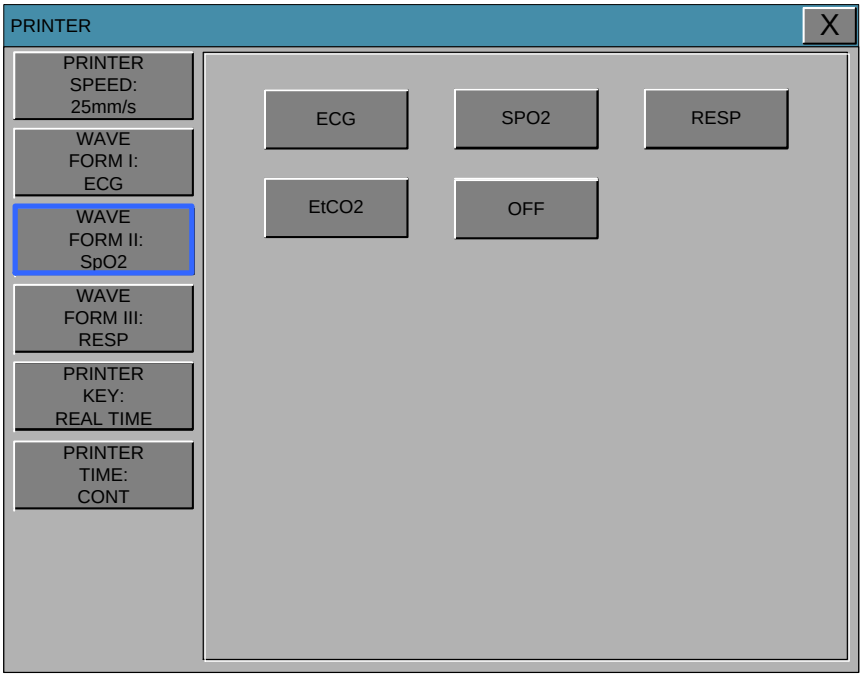


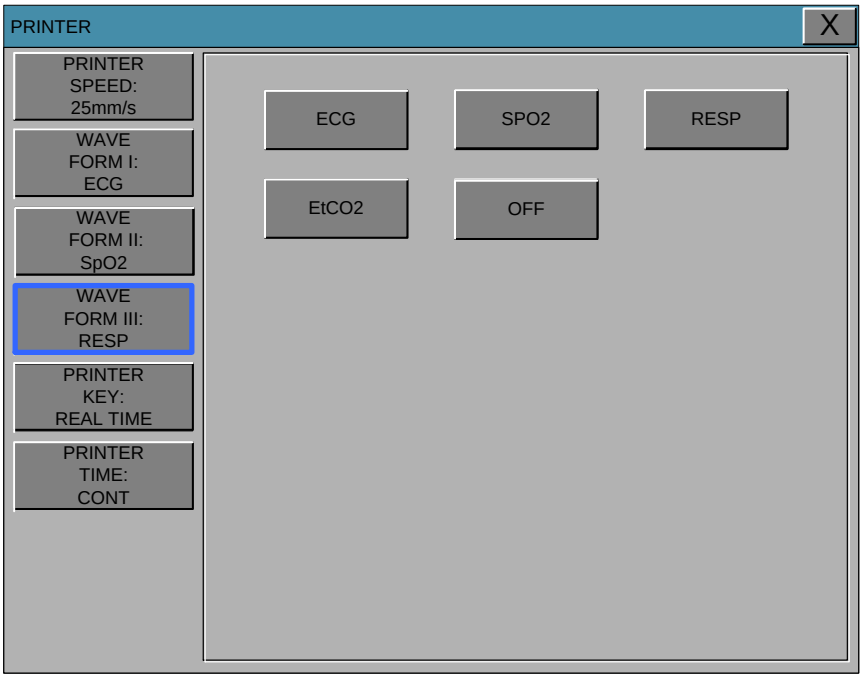
3. Set up ALARM PRINT in the MORE menu to activate print on ALARM.

4. Data is printed in a selected wave form along with personal information of the Animal.
   3 channels select 3 parameters to print.



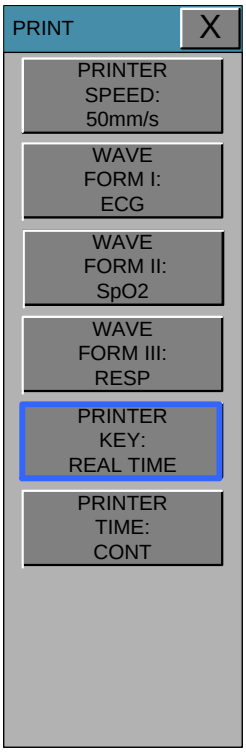





PRINTER
X
PRINTER SPEED: 25mm/s
WAVE FORM I: ECG
WAVE FORM II: SpO2
WAVE FORM III: RESP
PRINTER KEY: REAL TIME
PRINTER TIME: CONT
ECG
SPO2
RESP
EtCO2
OFF

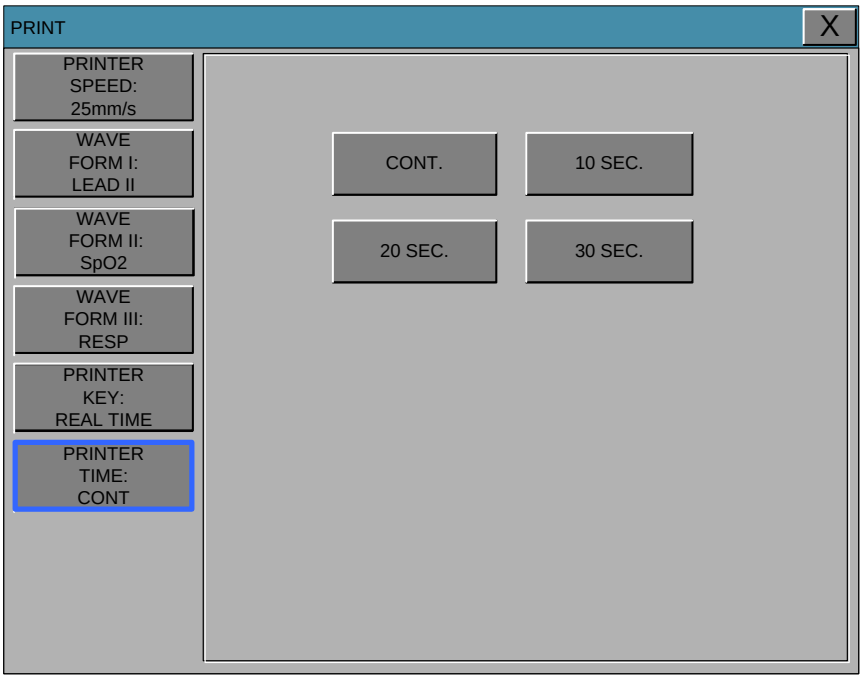
PRINTER KEY

This menu is setup printing time delay in normal printing.
There are two menus for time configuration. One is Real-time, another is Delayed Time.
Real-time: This configuration makes printing out the newest data when the Printer Key is pushed.
Delayed time: This configuration makes printing out the data after 5 seconds from the Printer Key is pushed.



PRINTER TIME

This is configuration of printed time in normal printing.
If the print out is not stopped in manual by PRINTER KEY, BM3VET TOUCH print out for setup time after starting print out with PRINTER KEY. The configuration of time could be setup with 4 types in CONTINUOUS, 10 sec, 20 sec and 30 sec. The configuration of PRINTER KEY(Real-time/Delayed time) is applied at print out with PRINTER TIME configuration.



If there is no print sheet, no paper icon of  appears.

Thermal Paper Storage

To avoid fading of traces or deterioration, follow these precautions:

Note
These precautions apply to both unused paper as well as paper that has already been run through the printer.

• Store in cool, dark locations. Temperature must be below 27°C (80°F). Relative humidity must be between 40% and 65%.
• Avoid exposure to bright light or ultraviolet sources such as sunlight, fluorescent, and similar lighting which causes yellowing of paper and fading of tracings.
• AVOID CONTACT WITH: cleaning fluids and solvents such as alcohols, ketones, esters, ether, etc.
• DO NOT STORE THERMAL PAPER WITH ANY OF THE FOLLOWING:
  • carbon and carbonless forms.
  • non-thermal chart papers or any other products containing tributyl phosphate, dibutyl phthalate, or any other organic solvents. Many medical and industrial charts contain these chemicals.
  • document protectors, envelopes, and sheet separators containing polyvinyl chloride or other vinyl chlorides.
• DO NOT USE: mounting forms, pressure-sensitive tapes or labels containing solvent-based adhesives.

To assure MAXIMUM TRACE IMAGE LIFE, thermal paper should be stored separately in: manilla folders, polyester or polyimide protectors.
Plastic document protectors, envelopes, or sheet separators made of polystyrene, polypropylene, or polyethylene will not degrade thermal traces in themselves. However, these materials afford no protection against fading from external causes.
Paper manufacturers advise us that these thermal products should retain their traces when properly imaged and stored for about 3-5 years.
If your retention requirements exceed these guidelines, we recommend you consider alternate image storage techniques.

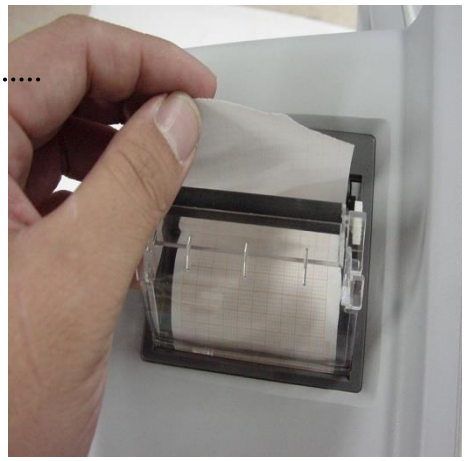
11.2 Paper Change

1

Open the window of the printer.

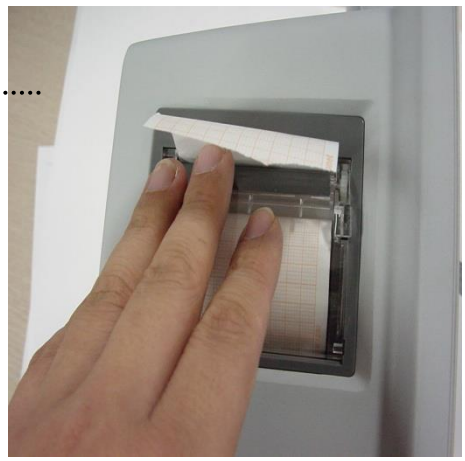
2

Insert the paper roll offered with the product into the printing unit. Place the roll in a proper way so that the printed paper can roll out upwards.



3

Press the printer window until it is properly shut. Incomplete closure may cause failure in printing.



12. MESSAGE LIST

Function	Message	Details
ECG	LEAD FAULT	Cable is not properly connected.
SpO_2	CHEK PROBE LEAD FAULT	Probe is off animal. Cable is not properly connected.
RESP	LEAD FAULT APNEA	Cable is not properly connected. APNEA gives an alarm.
NIBP	INFLATION FAILURE CHECK CUFF OVER PRESSURE DEFLATION FAILURE CHECK CUFF OVER TIME CUFF PRESSURE MEASUREMENT ERROR PULSE TOO WEAK	Cuff hose is not properly connected. Cuff pressure is excessive. Cuff is bent, preventing deflation. Measure time exceeds the preset Level. Measure signal absent
EtCO2	MODULE OFF SENSOR WARMUP CHECK ADAPTOR CHECK LINE APNEA ZERO IN PROGRESS SENSOR FAULTY	Module is not properly connected. Sensor is initializing Adaptor is not properly connected. Tube is not properly connected. APNEA gives an alarm. Zeroing procedure when necessary. Sensor is not properly measured
TEMP	LEAD FAULT	Cable is not properly connected.
ALARM	ALARM VOL.OFF SILENCED ALARM PAUSE 5MIN	Alarm volume is off. Alarm key is pressed once Alarm key is pressed twice
TREND	NO ANIMAL DATA	No Animal's data input.
PRINT	No paper Icon	No paper in the printer
BATTERY	BATTERY LOW	The battery level is low, automatically power off within 5 minutes.

13. DEFAULT SETTING VALUE

13.1 HORSE-ICU Mode

Alarm level

	High	Medium	Low	Message
Asystole	0			
VTAC/VFIB	0			
VTAC	0			
PVC			0	
ST			0	
HR		0		
NIBP - S		0		
NIBP - M		0		
NIBP - D		0		
SpO_2			0	
SpO_2-Rate				0
RR				0
RR-Apnea				0
T(° C)				0
EtCO2			0	
FiCO2				0
AWRR			0	
LEAD FAULT				0
LOW BATTERY				0

Parameter Limits

	Low	High
HR	**60**	**150**
NIBP-S	**80**	**200**
NIBP-M	**50**	**170**
NIBP-D	**30**	**150**
SpO_2	**90**	**100**
SpO_2-Rate	**60**	**150**
RR(RESP)	**15**	**100**
RR-Apnea	**0**	**20**
T ˚C/˚ F	**30.0/86.0**	**42.0/107.6**
ST	**-0.4**	**0.4**
PVC	**0**	**20**
AWRR	**10**	**30**
EtCO2	**25**	**50**
FiCO2	**0**	**5**

Display

Patient Age	**30**
Primary ECG	**II**
Arrhythmia	**LETHAL**
Detect Pace	**Off**
Print Waveform1	**LEAD II**
Print Waveform2	**SpO2**
Print Waveform3	**Resp**
Alarm Print	**On**
NIBP Interval	**Off**
NIBP Cuff Size	**LARGE**
RR(RESP) Lead	**II**
Alarm Volume	**Off**
QRS Volume	**Off**
Pulse Volume	**Off**
ECG Lead Fault	**Message**
SpO_2 Check Probe	**Message**
Units for Height	**cm**
Units for Weight	**kg**
Temperature Units	**°C**
NIBP Limit Type	**Systolic**
ECG Filter	**Monitor**
PVC	**ON**
ST	**ON**

13.2 DOG-ICU Mode

Alarm level

	High	Medium	Low	Message
Asystole	0			
VTAC/VFIB	0			
VTAC	0			
PVC			0	
ST			0	
HR		0		
NIBP - S		0		
NIBP - M		0		
NIBP - D		0		
SpO_2			0	
SpO_2-Rate				0
RR				0
RR-Apnea				0
T(℃)				0
EtCO2			0	
FiCO2				0
AWRR			0	
LEAD FAULT				0
LOW BATTERY				0

Parameter Limits

	Low	High
HR	60	160
NIBP-S	80	200
NIBP-M	50	170
NIBP-D	30	150
SpO_2	90	100
SpO_2-Rate	60	160
RR(RESP)	15	100
RR-Apnea	0	20
T ℃/℉	30.0/86.0	42.0/107.6
ST	-0.4	0.4
PVC	0	20
AWRR	10	30
EtCO2	25	50
FiCO2	0	5

Display

Patient Age	**30**
Primary ECG	**II**
Arrhythmia	**LETHAL**
Detect Pace	**Off**
Print Waveform1	**LEAD II**
Print Waveform2	**SpO2**
Print Waveform3	**Resp**
Alarm Print	**On**
NIBP Interval	**Off**
NIBP Cuff Size	**MEDI.**
RR(RESP) Lead	**II**
Alarm Volume	**Off**
QRS Volume	**Off**
Pulse Volume	**Off**
ECG Lead Fault	**Message**
SpO_2 Check Probe	**Message**
Units for Height	**cm**
Units for Weight	**kg**
Temperature Units	**°C**
NIBP Limit Type	**Systolic**
ECG Filter	**Monitor**
PVC	**ON**
ST	**ON**

13.3 PUPPY-ICU Mode

Alarm level

	High	Medium	Low	Message
Asystole	0			
VTAC/VFIB	0			
VTAC	0			
PVC			0	
ST			0	
HR		0		
NIBP - S		0		
NIBP - M		0		
NIBP - D		0		
SpO_2			0	
SpO_2-Rate				0
RR				0
RR-Apnea				0
T(℃)				0
EtCO2			0	
FiCO2				0
AWRR			0	
LEAD FAULT				0
LOW BATTERY				0

Parameter Limits

	Low	High
HR	70	180
NIBP-S	80	200
NIBP-M	50	170
NIBP-D	30	150
SpO_2	90	100
SpO_2-Rate	70	180
RR(RESP)	15	100
RR-Apnea	0	20
T ˚C/℃ F	30.0/86.0	42.0/107.6
ST	-0.4	0.4
PVC	0	20
AWRR	10	30
EtCO2	25	50
FiCO2	0	5

Display

Patient Age	**30**
Primary ECG	**II**
Arrhythmia	**LETHAL**
Detect Pace	**Off**
Print Waveform1	**LEAD II**
Print Waveform2	**SpO2**
Print Waveform3	**Resp**
Alarm Print	**Off**
NIBP Interval	**Off**
NIBP Cuff Size	**SMALL**
RR(RESP) Lead	**II**
Alarm Volume	**Off**
QRS Volume	**Off**
Pulse Volume	**Off**
ECG Lead Fault	**Message**
SpO_2 CHECK Probe	**Message**
Units for Height	**cm**
Units for Weight	**kg**
Temperature Units	**°C**
NIBP Limit Type	**Systolic**
ECG Filter	**Monitor**
PVC	**ON**
ST	**ON**

13.4 CAT-ICU Mode

Alarm level

	High	Medium	Low	Message
Asystole	0			
VTAC/VFIB	0			
VTAC	0			
PVC			0	
ST			0	
HR		0		
NIBP - S		0		
NIBP - M		0		
NIBP - D		0		
SpO_2			0	
SpO_2-Rate				0
RR				0
RR-Apnea				0
T(℃)				0
EtCO2			0	
FiCO2				0
AWRR			0	
LEAD FAULT				0
LOW BATTERY				0

Parameter Limits

	Low	High
HR	70	200
NIBP-S	80	200
NIBP-M	50	170
NIBP-D	30	150
SpO_2	90	100
SpO_2-Rate	70	200
RR(RESP)	15	100
RR-Apnea	0	20
T ˚C/℃ F	30.0/86.0	42.0/107.6
ST	-0.4	0.4
PVC	0	20
AWRR	10	30
EtCO2	25	50
FiCO2	0	5

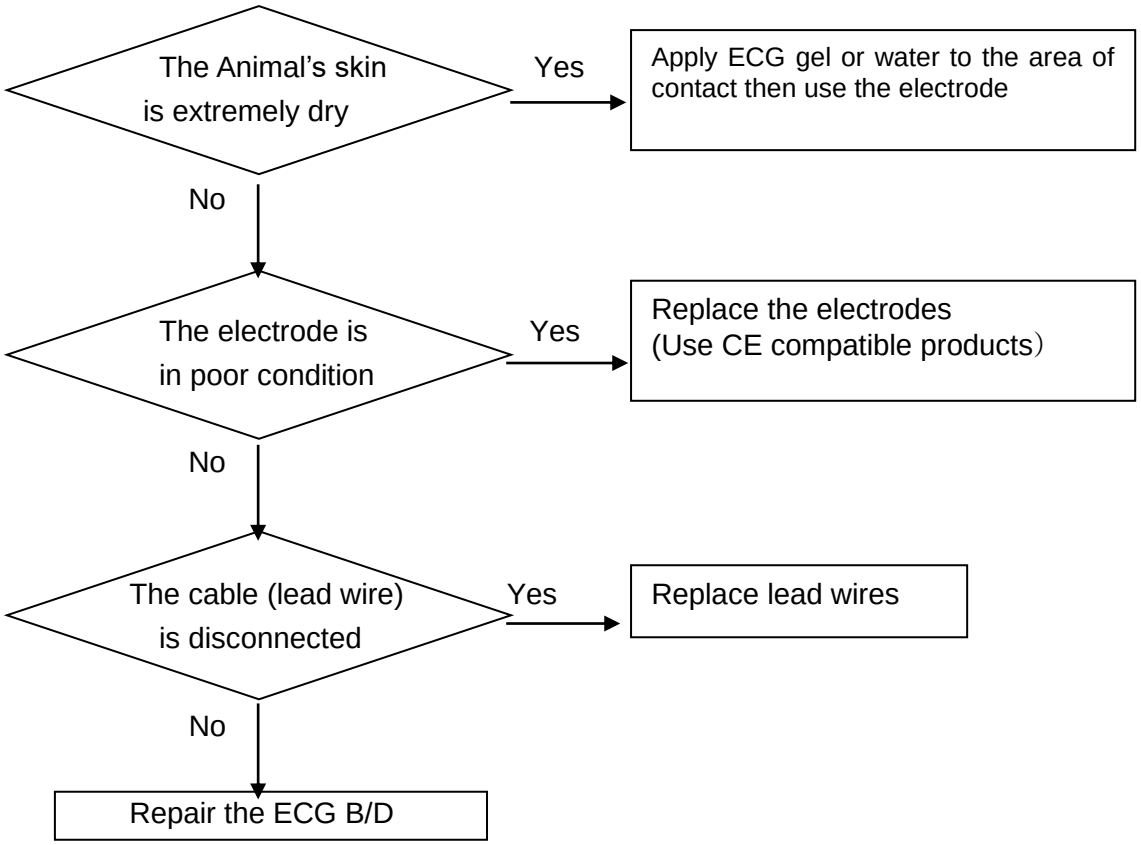
Display

Patient Age	**30**
Primary ECG	**II**
Arrhythmia	**LETHAL**
Detect Pace	**Off**
Print Waveform1	**LEAD II**
Print Waveform2	**SpO2**
Print Waveform3	**Resp**
Alarm Print	**Off**
NIBP Interval	**Off**
NIBP Cuff Size	**SMALL**
RR(RESP) Lead	**II**
Alarm Volume	**Off**
QRS Volume	**Off**
Pulse Volume	**Off**
ECG Lead Fault	**Message**
SpO_2 Probe Off	**Message**
Units for Height	**cm**
Units for Weight	**kg**
Temperature Units	**°C**
NIBP Limit Type	**Systolic**
ECG Filter	**Monitor**
PVC	**ON**
ST	**ON**

14. TROUBLE SHOOTING

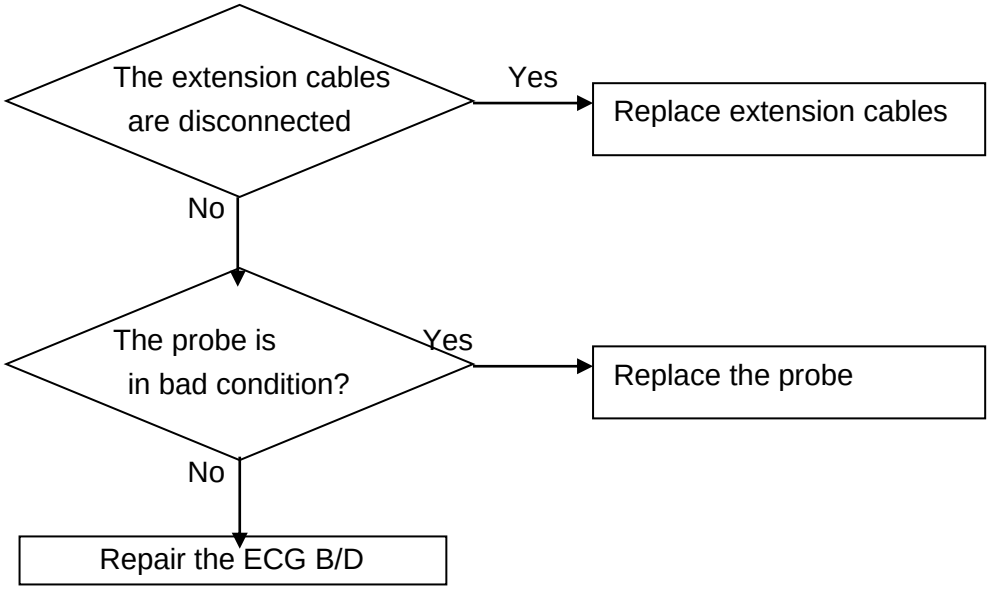
14.1 Noise in ECG

- Gel is dry
- Electrodes does not stick well to skin

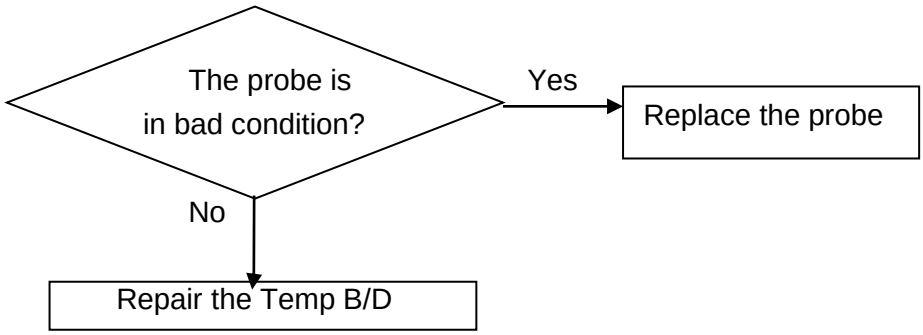


14.2 SpO2 malfunction

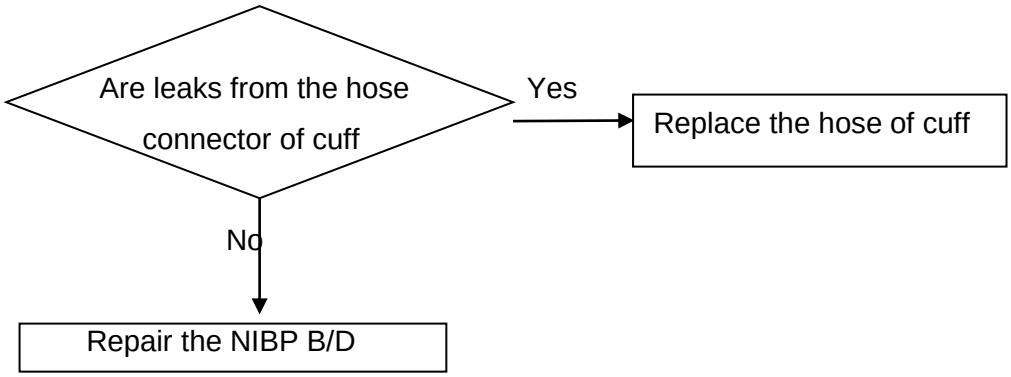
Connectors of the equipments are in bad condition?



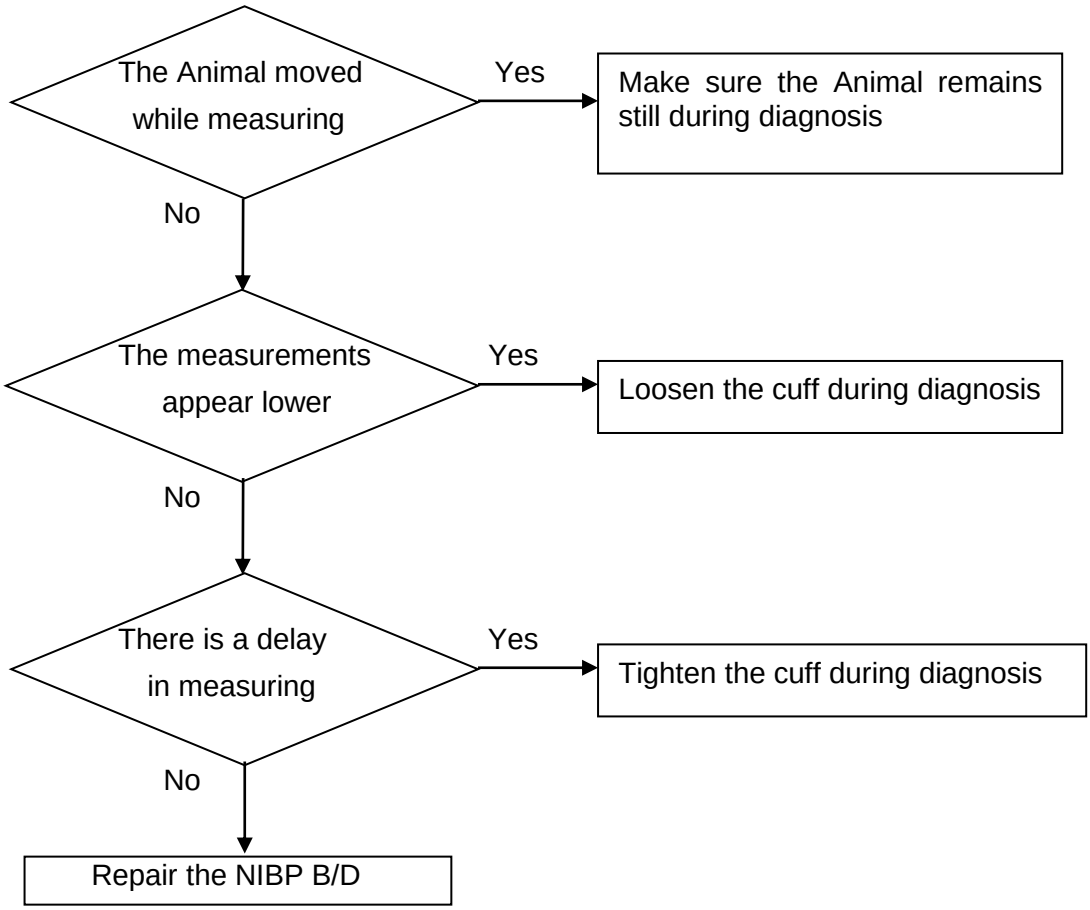
14.3 Temp malfunction



14.4 NIBP malfunction

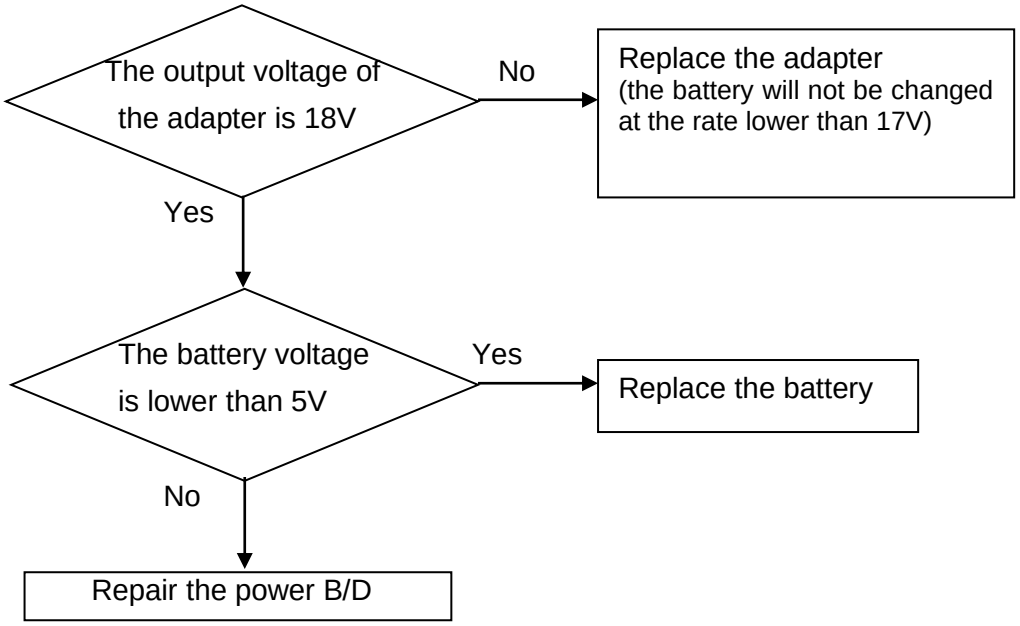


14.5 Abnormality in NIBP measurements

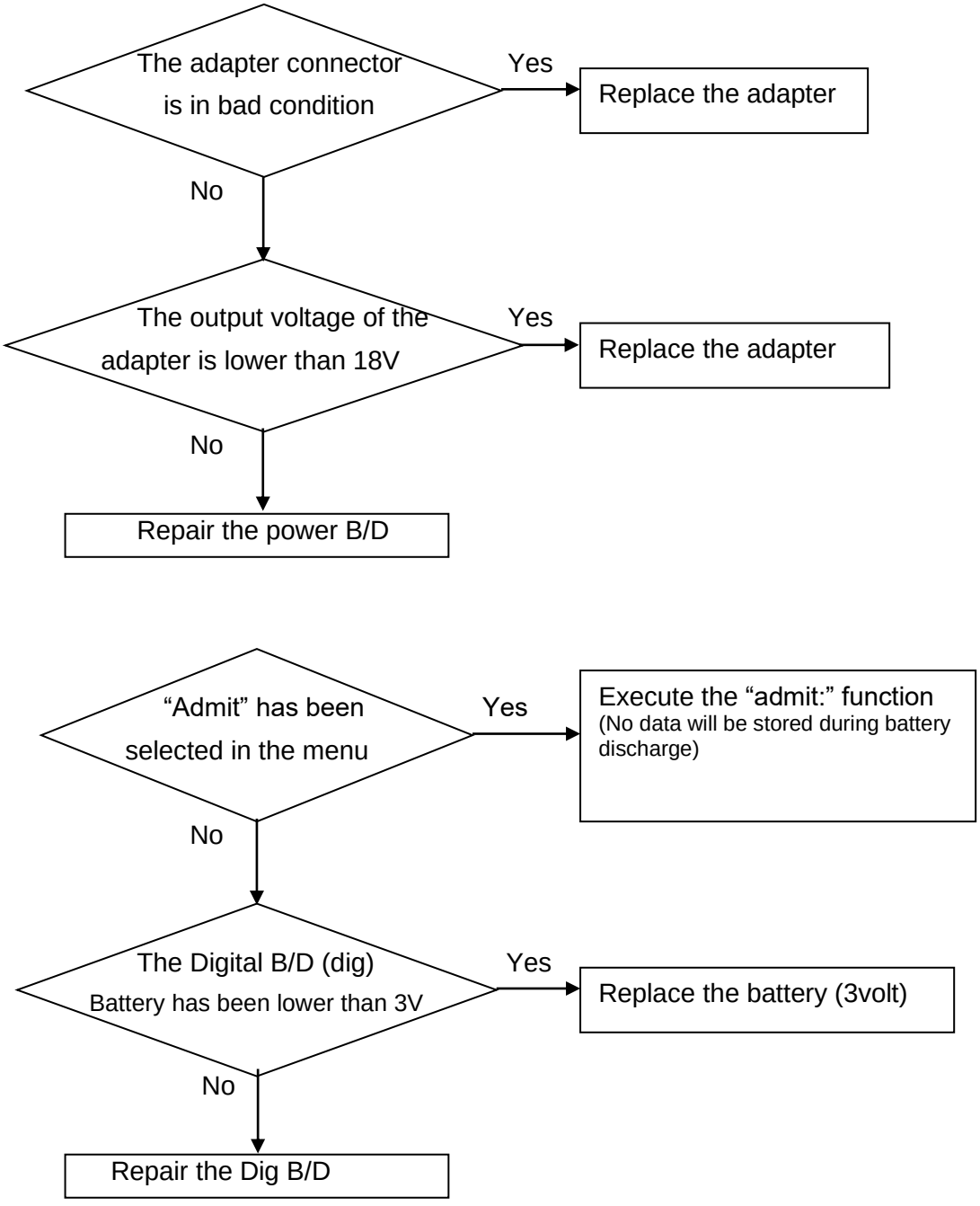


14.6 Failure in battery recharge

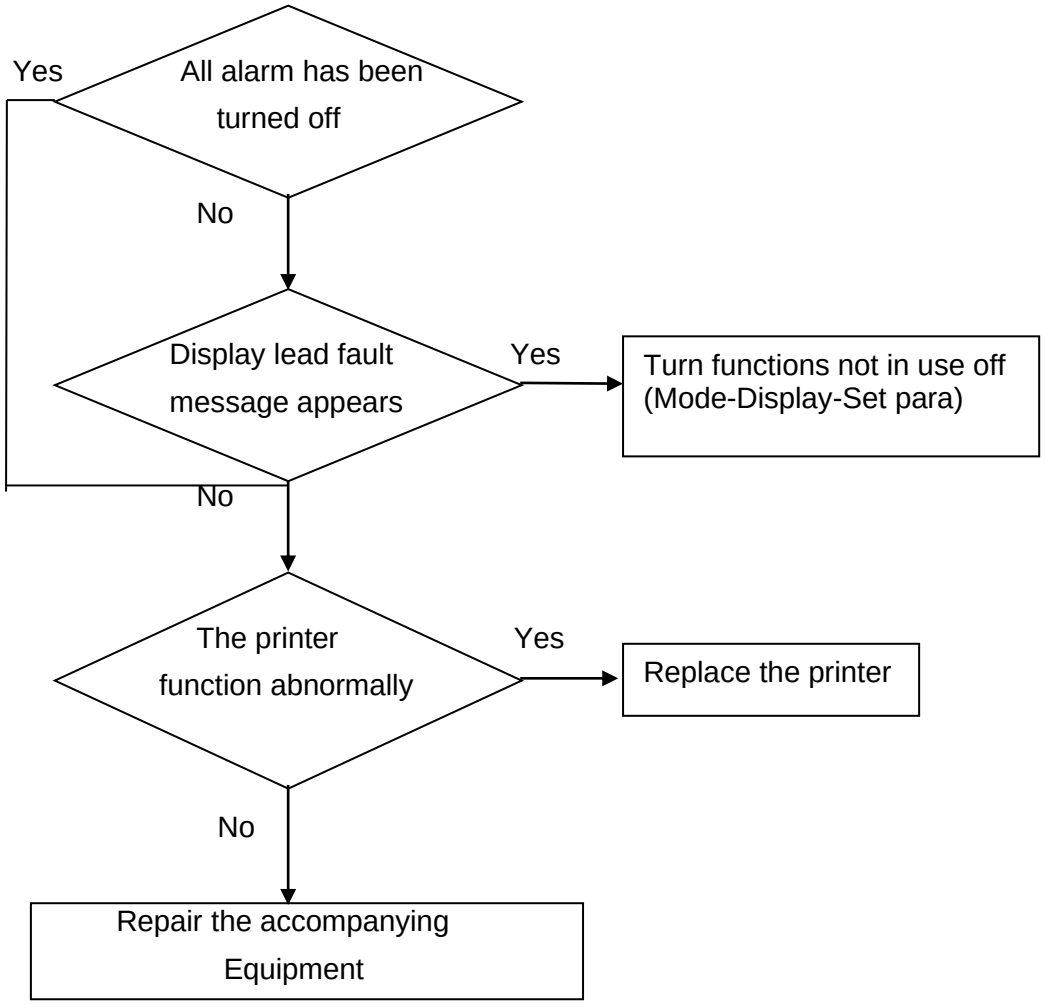
(the battery does not fully recharge in 6 hours or more)



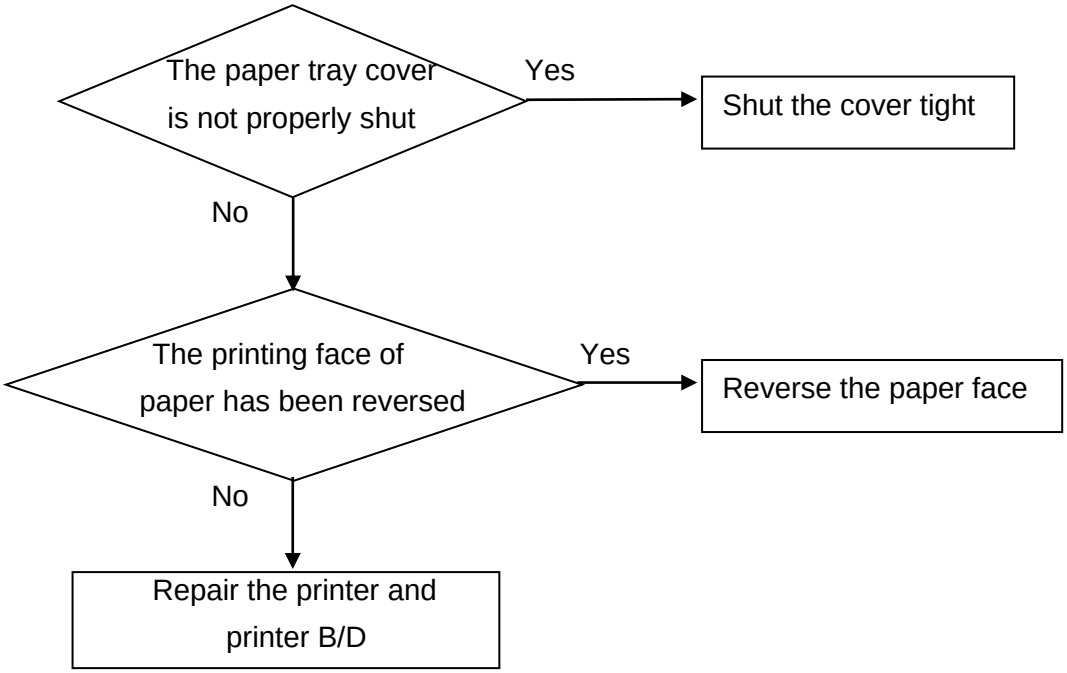
14.7 Power failure



14.8 Periodic noises



14.9 Print failure



15. SPECIFICATION

Ease of use

Additional Function

Monitor Environmental Specifications

Power

Specification

Accessories Included

Option

Ease of use
· Battery operation
· Attached printer
· Table and graphic trend

Additional Function
· LAN Connection

Monitor Environmental Specifications
· Operating Temperature： 15°C to 40°C (59°F to 104°F)
· Storage Temperature： - 10°C to 60°C (14°F to 140°F)
· Humidity： 20% to 95% RH
· Operating Attitude： 70(700) to 106Kpa(1060mbar)

Power
· AC 100-240V (50/60Hz)
· Adapter 18 V, 2.8 A

Specification

Display, Resolution	**8.0" color TFT, 800 x 600 pixels**
Dimension, Weight	238(W) x 250(H) x 163(D) mm, Approx. 3.1kg
Parameter	ECG, Heart Rate, Respiration Rate, SpO2, Pulse Rate, Systolic BP, Diastolic BP, Mean BP, **1 x Temperature, EtCO2, FiCO2, Airway Respiration Rate**
Trace	**3 waveforms : 1*ECG, SpO2, RR or EtCO2** Sweep speed : 6.25, 12.5, 25, 50 mm/sec
Indicators	Categorized alarms (3 priority levels), QRS beep & SpO2 pulse beep, Percent(%) SpO2 pitch tone Battery status, External power LED, Touch screen, Rotary knob
Interfaces	DC input connector : 12 to 18VDC, 2.5A Defibrillator Sync. Output : - Signal Level : 0 to 5V pulse - Pulse width : 100 ± 10 ms LAN digital output for transferring data, Nurse call system connection - 0.3A at 125VAC – 1A at 24VDC DC output : 5VDC, 1A Max USB Barcode Scanner, USB & SD memory data storage
Battery	Rechargeable Li-ion battery, 1hours for continuous working
Thermal Printer	Speed : 25, 50mm/sec, Paper width : 58mm
Data Storage	128hours trends, 20cases of 10sec alarm waveform
Language	English, French, Spanish, Italian, Germany, Chinese, Russian, Czech, Bulgarian, Portuguese, Romanian, Hungarian, Turkish, Polish,Korean
ECG Performance	
Lead type	3-lead, 5-lead(option)
Lead Selection	3-lead : I, II, III 5-lead : I, II, III, aVR, aVL, aVF, V
ECG waveforms	3-lead : 1 channel 5-lead : 1 channels
Heart Rate Range	30 – 300 bpm
Heart Rate Accuracy	±1bpm or ±1%, whichever is greater
Sweep speed	6.25, 12.5, 25, 50 mm/sec
Filter	-Diagnosis : 0.05Hz - 150Hz -Monitoring : 0.5 – 40 Hz -Moderate: 0.5 – 25Hz -Maximum : 5 – 25 Hz
S-T segment detection range	-2.0 to 2.0 mV
Arrhythmia analysis	ASYSTOLE,VTACH,VFIB, ,PVC,
Pacemaker Detection Mode	Indicator on waveform display (user selectable)
Protection	Against electrosurgical interference and defibrillation
Respiration Performance	
Method	Thoracic impedance
Channel selection	RA-LA or RA-LL
Measurement range	5 – 120 Breath per minute
Accuracy	±1 Breath per minute

Apnea alarm	Yes
SpO2 Performance	
Saturation range	0 to 100%
Saturation accuracy	70 to 100% ±2 digits 0 to 69% unspecified
Pulse rate range	30 to 254 bpm
Pulse rate accuracy	±2 bpm
NIBP Performance	
Method	Oscillometry with linear deflation
Operation Mode	Manual/Automatic/Continuous
Measurement range	Large Pressure : 20 to 260 mmHg Medium Pressure : 20 to 230 mmHg Small Pressure : 20 to 120 mmHg
Accuracy	Meets accuracy requirements of ANSI/AAMI SP10:1992 and 2002
Temperature Performance	
Measurement range	15 to 45℃ (59 to 113˚F)
Accuracy	±1℃
Compatibility	YSI Series 400 temperature probes
Sidestream CO2 (Option)	
Measurement range	0 to 150 mmHg, 0 to 19%
Accuracy	0-40mmHg ±2 mmHg, 41-70mmHg ±5% of reading 71-100mmHg ±8% of reading, 101-150mmHg ±10% of reading
Respiration rate	2 to 150 breath per minute
Respiration accuracy	±1breath per minute
Mainstream CO2 (Option)	
Measurement range	0 to 150 mmHg, 0 to 19%
Accuracy	0-40mmHg ±2 mmHg, 41-70mmHg ±5% of reading 71-100mmHg ±8% of reading, 101-150mmHg ±10% of reading
Respiration rate	0 to 150 breath per minute
Respiration accuracy	±1breath per minute

Accessories Included

1. Main body of BM3VET Monitor	1 EA
2. 3-Lead Animal Cable (MECA3(AHA), MECE3(IEC))	1 EA
3. 3-Lead Animal Extension Cable	1 EA
4. NIBP extension horse (NBPCBL-400)	1 EA
5. Reusable small animal NIBP cuff (ICUFF-430)	1 EA
6. SpO_2 extension cable (SPCBL-400)	1 EA
7. Reusable animal SpO_2 probe (SPASENS-400)	1 EA
8. DC Power Adaptor with Power Cord (18VDC/2.8A, BPM050S18F02)	1 EA
9. Operator`s Manual	1 EA
10. Thermal roll Paper (PAPER-400)	2 Roll
11. Reusable Temperature Probe (Rectal/esophageal, TEMPSENS-430)	1 EA

Option

1. Sidestream EtCO2 Module (Respironics)	1 SET
2. Mainstream EtCO2 Module (Respironics)	1 SET
3. Sidestream EtCO2 airway adapter sampling kit	1 EA
4. Mainstream EtCO2 airway adapter	1 EA
5. 5-Lead Animal Cable(MECA5(AHA), MECE5(IEC))	1 EA
6. 5-Lead Animal Extension Cable	1 EA

Abbreviations and Symbols

Abbreviations and symbols which you may encounter while reading this manual or using the monitor are listed below with their meanings.

Abbreviations

	A
A	amps
AC	alternating current
ADT	adult
ARRYTHM	arrhythmia
ASYS	asystole
Auto, AUTO	automatic
AUX	Auxiliary
aVF	left foot augmented lead
aVL	left arm augmented lead
aVR	right arm augmented lead
	B
BPM	beats per minute
	C
C	Celsius
CAL	calibration
cm, CM	centimeter
	D
D	diastolic
DC	direct current
DEFIB, Defib	defibrillator
DIA	diastolic
	E
ECG	electrocardiograph
EMC	electromagnetic compatibility
EMI	electromagnetic interference
ESU	electrosurgical cautery unit
	F
F	Fahrenheit
	G
g	gram
	H
HR	heart rate, hour
Hz	hertz
	I
ICU	intensive care unit
IBP	invasive blood pressure
Inc	incorporated

K

kg, KG	kilogram
kPa	kilopascal

L

L	liter, left
LA	left arm, left atrial
LBS	pounds
LCD	liquid crystal display
LED	light emitting diode
LL	left leg

M

M mean,	minute
m	meter
MIN,	min minute
MM, mm	millimeters
MM/S	millimeters per second
MMHG, mmHg	millimeters of mercury
mV	millivolt

N

NIBP	noninvasive blood pressure
NEO, Neo	neonatal

O

OR	operating room

P

PED	pediatric
PVC	premature ventricular complex

Q

QRS	interval of ventricular depolarization

R

RA	right arm, right atrial
RESP	respiration
RL	right leg
RR	respiration rate

S

S	systolic
sec	second
SpO2	arterial oxygen saturation from pulse oximetry
SYNC, Sync	synchronization
SYS	systolic

T

Temp, TEMP	temperature

U

V

V	precordial lead
V	volt
V-Fib, VFIB	ventricular fibrillation
VTAC	ventricular tachycardia

W

X

X	multiplier when used with a number (2X)

Symbols

&	and
°	degree(s)
>	greater than
<	less than
–	minus
#	number
%	percent
±	plus or minus

PRODUCT WARRANTY

Product Name	**Veterinary Monitor**
Model Name	**BM3VET TOUCH**
Approval Number	
Approval Date	
Serial Number	
Warranty Period	**4 years from date of purchase (2 years in Europe)**
Date of Purchase	
Customer Section	**Hospital Name :** **Address :** **Name :** **Phone :**
Sales Agency	
Manufacturer	

* Thank you for purchasing BM3VET TOUCH
* The product is manufactured and passed through strict quality control and through inspection.
.

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BIONET CO., LTD.

Product Name: BM3 Vet Touch