

The electrical installation of the relevant room complies with national standards, and the instrument is used in accordance with the instructions for use.

## Terms Used in this Manual

This guide is designed to give key concepts on safety precautions.

### WARNING

A **WARNING** label advises against certain actions or situations that could result in personal injury or death.

### CAUTION

A **CAUTION** label advises against actions or situations that could damage equipment, produce inaccurate data, or invalidate a procedure.

### NOTE

A **NOTE** provides useful information regarding a function or a procedure.

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## Chapter 1 Safety Guidance

This chapter provides important safety information related to the use of the Veterinary Electrocardiograph.

### 1.1 Indications for Use/Intended Use

The intended use of the VE-300 Veterinary Electrocardiograph is to acquire ECG signals from animals through body surface ECG electrodes. The electrocardiograph is intended to be used only in hospitals or healthcare facilities by doctors and trained healthcare professionals. The cardiogram recorded by the Veterinary Electrocardiograph can help users to analyze and diagnose heart disease. However the electrocardiogram recorded by the ECG is offered to veterinarians on an advisory basis only.

#### WARNING

1. This equipment is not designed for intracardiac use or direct cardiac application.
2. This equipment is not intended for home use.
3. This equipment is not intended for treatment or monitoring.
4. This equipment is intended for use on animals only.

### 1.2 Warnings and Cautions

In order to use the electrocardiograph safely and effectively, and avoid possible dangers caused by improper operations, please read through the user manual and be sure to be familiar with all functions of the equipment and proper operation procedures before use.

Please pay more attention to the following warning and caution information.

### 1.2.1 Safety Warnings

#### WARNING

1. The electrocardiograph is provided for the use of qualified physicians or personnel professionally trained. They should be familiar with the contents of this user manual before operation.
2. Only qualified service engineers can install this equipment, and only service engineers authorized by the manufacturer can open the shell. Otherwise, safety hazards may happen.
3. Only qualified installation or service engineers can shift the mains supply shift switch (100V-115V~/220V-240V~) according to local mains supply specifications.
4. Electrodes of dissimilar metals should not be used; it may cause a high polarization voltage.
5. **EXPLOSION HAZARD** - Do not use the electrocardiograph in the presence of flammable anesthetic mixture with oxygen or other flammable agents.
6. **SHOCK HAZARD** - The power receptacle must be a hospital grade grounded outlet. Never try to adapt the three-prong plug to fit a two-slot outlet.
7. If the integrity of the external protective conductor is in doubt, the equipment should be operated by using the built-in rechargeable battery.
8. Do not use this equipment in the presence of high static electricity or high voltage equipment which may generate sparks.
9. Only the patient cable and other accessories supplied by the manufacturer can be used. Or else, the performance and electric shock protection can not be guaranteed. The electrocardiograph has been safety tested with the recommended accessories, peripherals, and leads, and no hazard is found when the electrocardiograph is operated with cardiac pacemakers or other stimulators.
10. The use of patient cable and other accessories not supplied by the manufacturer may result in increased emissions or decreased immunity of the equipment.
11. Make sure that all electrodes are connected to the animal correctly before operation.

#### WARNING



12. Ensure that the conductive parts of electrodes and associated connectors, including neutral electrode, do not come into contact with earth or any other conducting objects.
13. To avoid a polarization or DC offset voltage, use non-polarizing electrodes (which will not form a DC offset voltage when subjected to a DC current) such as silver/silver-chloride types if there is a situation where there is a likelihood that a defibrillation procedure will be necessary.
14. There is no danger for animals with pacemakers. However, if a pacemaker is used, the results given by the equipment may be invalid, or lose the clinical significance.
15. Do not touch the animal, bed, table or the equipment while using the ECG together with a defibrillator.
16. Do not touch accessible parts of electrical equipment and the animal simultaneously.
17. In order to avoid being burned, please keep the electrodes far away from the radio knife while using electro-surgical equipment.
18. If reusable electrodes with electrode gel are used during defibrillation, ECG recovery will take more than 10 seconds. The manufacturer recommends the use of disposable electrodes at all times.
19. The summation of leakage current should never exceed leakage current limits while several other units are used at the same time; otherwise, electric shock may happen.
20. The potential equalization conductor can be connected to that of other equipment when necessary, to make sure that all these devices are connected to the potential equalization bus bar of the electrical installation.

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#### WARNING

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21. If the wireless AP technology is used, in order to maintain compliance with the FCC RF exposure guidelines, the wireless AP should be installed and operated with a minimum distance of 20cm between the radiator and the animal. Use the supplied antenna only. There should be no shield in or around the room where the wireless AP is used.
22. Fix attention on the examination to avoid missing important ECG waves.
23. The disposable electrodes can only be used for one time.
24. We recommend that the electrocardiograph should be working on AC power supply at least 8 hours per month to avoid DATE&TIME missing.

25. Connecting any accessory (such as external printer) or other device (such as the computer) to this electrocardiograph makes a medical system. In that case, additional safety measures should be taken during installation of the system.
26. **SHOCK HAZARD** - Don't connect non-medical electrical equipment, which has been supplied as a part of the system, directly to the wall outlet when the non-medical equipment is intended to be supplied by a multiple portable socket-outlet with an isolation transformer.
27. **SHOCK HAZARD** - Don't connect electrical equipment, which has not been supplied as a part of the system, to the multiple portable socket-outlet supplying the system.
28. Do not connect any equipment or accessories that are not approved by the manufacturer. The operation or use of non-approved equipment or accessories with the electrocardiograph is not tested or supported, and electrocardiograph operation and safety are not guaranteed.
29. Do not use the additional multiple portable socket-outlet or extension cord in the medical electrical system, unless it's specified as part of the system by manufacturer. And the multiple portable socket-outlets provided with the system shall only be used for supplying power to equipment which is intended to form part of the system.
30. The electrocardiograph shall not be serviced or maintained while in use with a animal.
31. The appliance coupler or mains plug is used as isolation means from supply mains. Position the electrocardiograph in a location where the operator can easily access the disconnection device.

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### 1.2.2 Lithium Battery Care Warnings

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#### WARNING

1. Improper operation may cause the lithium battery (hereinafter called battery) to be hot, ignited or exploded, and it may lead to the declination of the battery capacity. It is necessary to read the user manual carefully and pay more attention to warning messages.
2. Only qualified service engineer authorized by the manufacturer can open the battery compartment and replace the battery, and batteries of the same model and specification as manufacturer configuration should be used.



3. Danger of explosion -- Do not reverse the anode and the cathode when installing the battery.

**WARNING**

4. Do not heat or splash the battery or throw it into fire or water.
5. When leakage or foul smell is found, stop using the battery immediately. If your skin or cloth comes into contact with the leakage liquid, cleanse it with clean water at once. If the leakage liquid splashes into your eyes, do not wipe them. Irrigate them with clean water first and go to see a doctor immediately.
6. The device and accessories are to be disposed of according to local regulations after their useful lives. Alternatively, they can be returned to the dealer or the manufacturer for recycling or proper disposal. Batteries are hazardous waste. Do NOT dispose of them together with house-hold garbage. At the end of their lives hand the batteries over to the applicable collection points for the recycling of waste batteries. For more detailed information about recycling of this product or the battery, please contact your local Civic Office, or the shop where you purchased the product.
7. Remove the battery from the electrocardiograph when the electrocardiograph is not used for a long time.
8. If the battery is stored alone and not used for a long time, we recommend that the battery should be charged at least once every 6 months to prevent over-discharge.

**1.2.3 General Cautions**

**CAUTION**

1. Federal (U.S.) law restricts this device to sale by or on the order of a physician.
2. Avoid liquid splash and excessive temperature. The temperature must be kept between 5 °C and 40 °C during operation, and it should be kept between -20 °C and 55 °C during transportation and storage.
3. Do not use the equipment in a dusty environment with bad ventilation or in the presence of corrosive.
4. Make sure that there is no intense electromagnetic interference source around the equipment, such as radio transmitters, mobile phones etc. Attention: large medical










electrical equipment such as electrosurgical equipment, radiological equipment and magnetic resonance imaging equipment is likely to bring electromagnetic interference.

**CAUTION**












5. Before use, the equipment, the patient cable and electrodes etc. should be checked. Replacement should be taken if there is any evident defectiveness or aging symptom which may impair the safety or the performance.
6. Ruptured fuse must only be replaced with that of the same type and rating as the original.

**1.3 List of Symbols**

No.	Symbol	Description
1		Output
2		Input
3		DEFIBRILLATION-PROOF TYPE CF APPLIED PART
4		Caution
5		Consult instructions for use
6		Equipotentiality
7		Alternating Current
8		ON (mains supply)

22		Refer to user manual (Background: Blue; Symbol: White)
23		General warning sign (Background: Yellow; Symbol&Outline: Black)
24		This way up
25		Fragile; handle with care
26		Keep away from rain
27		Stacking limit by number
28		Handle with care
29		Do not step on
30		Front

NOTE: The user manual is printed in black and white.

9		OFF (mains supply)
10		Battery check
11		Battery recharging indicator
12		Print/Stop key
13		General symbol for recovery/recyclable
14	P/N	Part Number
15		SERIAL NUMBER
16		Date of manufacture
17		MANUFACTURER
18		AUTHORISED REPRESENTATIVE IN THE EUROPEAN COMMUNITY
19		The symbol indicates that the device complies with the European Council Directive 2014/35/EU concerning medical devices.
20		The symbol indicates that the equipment should be sent to the special agencies according to local regulation for separate collection after its useful life.
21	<b>Rx Only</b>	Caution: Federal (U.S.) law restricts this device to sale by or on the order of a physician



## Chapter 2 Introduction

VE-300 Veterinary electrocardiograph gathers ECG signals of 7 leads simultaneously. It displays the operation menu, ECG parameters as well as electrocardiograms.

Veterinary ECG waves can be viewed on the LCD screen and printed out by using a high-quality thermal recorder. The screen of VE-300 is color screen.

The AUTO, MANU, OFF-AUTO, RHYT, OFF- RHYT and R-R modes can be chosen freely.

VE-300 can be powered by the mains supply or a built-in rechargeable lithium battery.

With a high resolution thermal recorder, a 32-bit processor and a large-capacity memorize VE-300 has advanced performance and high reliability. The compact size makes it suitable for clinic, hospital and ambulance use.

**Configuration:** main unit, power cord, earth wire, patient cable, electrodes, thermal recorder paper, fuses and lithium battery

### 2.1 Top Panel

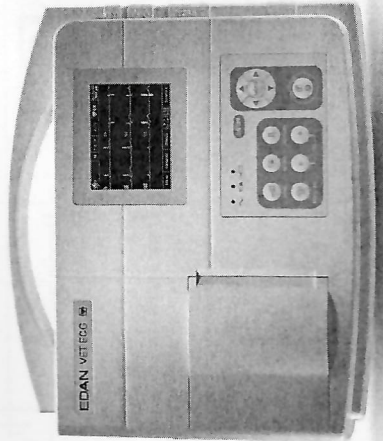


Figure 2-1 VE-300

### 2.2 Control Panel and Keys

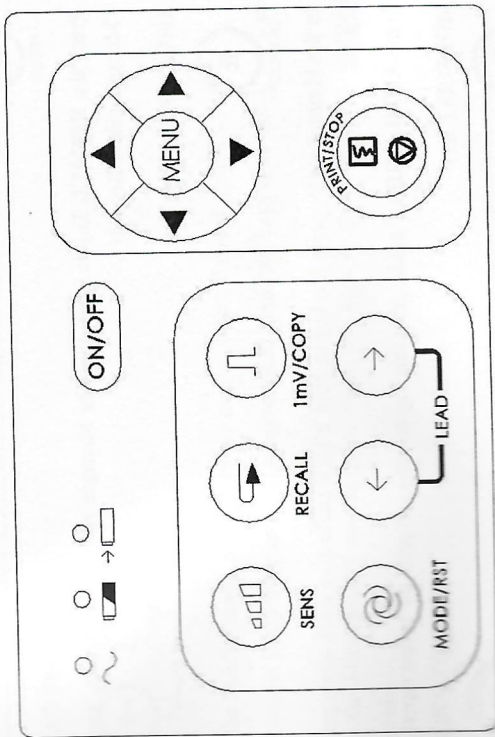


Figure 2-2 VE-300 Control Panel and Keys

#### 1) Indicator Lamp

	Mains supply indicator lamp: when the device is powered by the mains supply, the lamp will be lit.
	Battery indicator lamp: when the device is powered by a built-in rechargeable lithium battery, the lamp will be lit.
	Battery recharging indicator lamp: when the battery is being recharged, this lamp will be lit.

#### 2) Sensitivity Switch Key



The sensitivity switch order:  $\times 10 \text{ mm/mV} \rightarrow \times 20 \text{ mm/mV} \rightarrow 10/5 \text{ mm/mV} \rightarrow \times 2.5 \text{ mm/mV} \rightarrow \times 5 \text{ mm/mV}$ .

lead groups, the lead switch order can be that of AUTO (Standard) or AUTO (Cabrera), which is determined by settings of lead sequence and printing format on the System Setup Screen.

3) Recall Key



Press the **RECALL** key to open the File Manager screen. For details, see chapter "Managing ECG Records".

4) 1mV/COPY Key



In the **Manual** mode, press this key to print a 1mV calibration mark while printing ECG reports.

In the **AUTO** or **RHYT** mode, press this key to copy and print the recent report.

5) MODE/RST Key



Press this key to select a printing mode among **AUTO**, **MANU**, **OFF-AUTO**, **RHYT**, **OFF-RHYT** and **R-R**.

The switch order of lead groups in each mode is listed in Table 2-1.

In the **MANUAL** mode, press this key to reset the waveform quickly while printing ECG reports.

**WARNING**

When using the device with a defibrillator, after the defibrillator discharges, you should press the **MODE/RST** key to reset the waveform quickly.

**NOTE:** The detailed information of the automatic mode can be set on the System Setup Screen.

Table 2-1 Switch Order of Lead Groups in Different Modes

Mode	Switch Order (from Left to Right)	
AUTO(Standard)	I/II/III	aVR/aVL/aVF V
AUTO(Cabrera)	aVL/ I +-aVR	II /aVF/ III V
MANUAL	In this mode, you need to press the Lead switch key to change the	

6) LEAD Switch Key



In the **MANU** mode, press these two keys to switch the lead groups.

In System Setup → Record Info window, press these two keys to switch Setup 1 and Setup 2.

On the File Manager screen, press these two keys to go to the prev or next page of records.

7) PRINT/STOP Key



Press this key to begin or stop printing ECG reports.

8) ON/OFF Key



Press this key to turn on or off the device.

9) MENU Key



Press this key to open the System Setup Screen.

10) Up Arrow/Down Arrow Key



Press the Up or Down arrow to select an item on the Main Screen and the System Setup Screen.

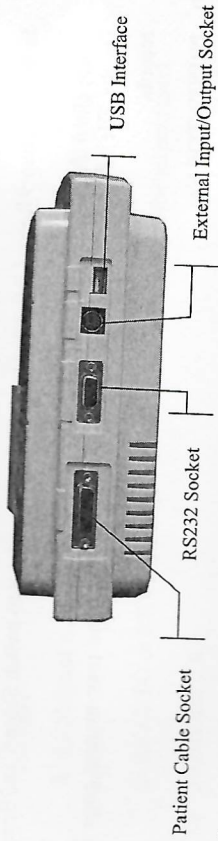


### 11) Left Arrow/ Right Arrow Key

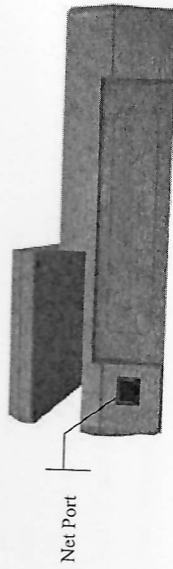


Press the Left or Right arrow to set the selected item.

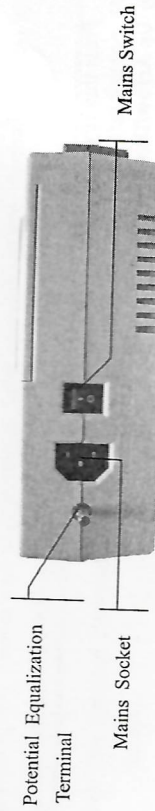
## 2.3 Patient Cable Socket and Signal Interface



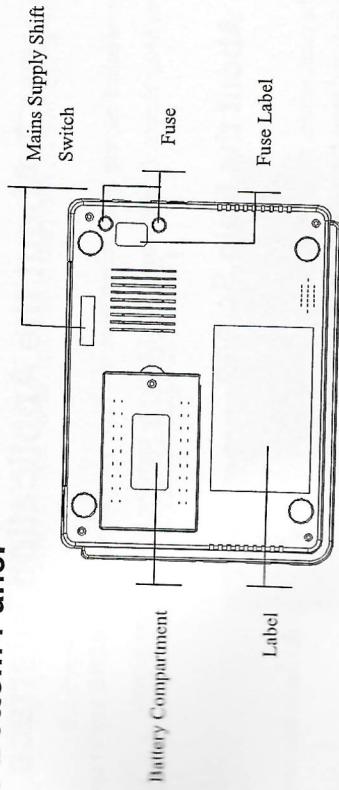
The net port is on the back of the main unit shown in the following figure.



## 2.4 Mains Connection and Switch



## 2.5 Bottom Panel



### 1) Battery Compartment

The battery label indicates the rated voltage of the rechargeable lithium battery.

### 2) Fuse

There are two fuses of the same specifications installed on the bottom of the main unit.

### **WARNING**

Ruptured fuses must only be replaced with those of the same type and rating as the original.

## Chapter 3 About the Application Interface

When switched on, the Main Screen pops up. Then you can press the MENU key to open the System Setup Screen. Or press the RECALL key to open the File Manager screen.

### 3.1 About the Main Screen

On the main screen, press the up and down arrows to move the cursor to the items that need to be modified, and press the left and right arrows to modify the value.

The Main Screen includes:

Name	Explanation
A	Animal Symbol Select the symbol and press the left or right arrow to open the animal information window
B	ID Animal ID
C	Gender Animal Gender
D	Age Input the age or choose the age group
E	Work Mode Include: AUTO, MANU, OFF-AUTO, RHYT, OFF-RHYT and R-R
F	HR The actual HR value
G	Current Time Show the current time
H	Battery Symbol Identify the current capacity of the battery
I	Waveform zone Show waveform
J	Hint Information Including <i>No Paper, Paper Error, Sampling, Analyzing, Recording, Transmitting, Memory Full, U Disk, USB Printer, Lead Off</i> . For details, please refer to Chapter 10 "Hint Information".
K	Lead Name Including <i>DEMO, Module Error, Overload</i> , Lead Name (When the leads are off, the lead names will be highlighted. For details, please refer to Chapter 9 "Hint Information".
L	25mm/s Speed
M	10mm/mV Sensitivity

### 3.2 About the System Setup Screen

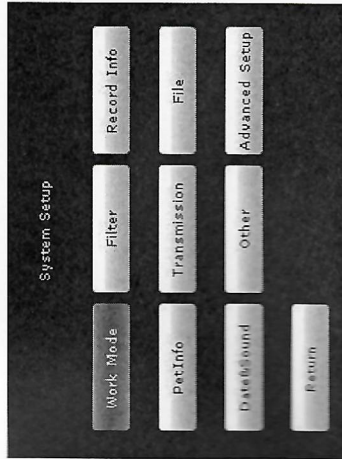


Figure 3-1 System Setup Screen

Press MENU on the main screen to display the System Setup screen.

On the System Setup screen, move the cursor on an item, and then press MENU to open the setup window of the item. And press Return or RECALL to exit the System Setup screen.

### 3.3 About the File Manager screen

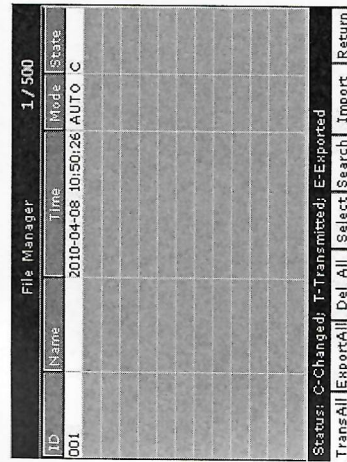


Figure 3-2 File Manager screen (a)



Press the Up or Down arrow to select the patient record, press Lead(→) or Lead (←) to switch the prev or next page.

Press the Left or Right arrow to move the cursor among **TransALL**, **ExportALL**, **Del All**, **Search**, **Import** and **Return** buttons and then press the **MENU** key to conform the operation. Press **RECALL** again to return to the main screen.

Press the Left or Right arrow to move the cursor to **Select** button and press **MENU** key to enter File Manager screen (b).



Figure 3-3 File Manager screen (b)

Press the Left or Right arrow to move the cursor among **Edit**, **Trans**, **Export**, **Delete** and **Return** buttons and then press the **MENU** key to conform the operation.

Press **RECALL** to return to the previous screen.

For details on managing patient records, please refer to chapter 7, "Managing ECG Records".

## Chapter 4 Operation Preparations

### **WARNING**

Before use, the equipment, the patient cable and electrodes should be checked. Replace them if there is any evident defectiveness or aging which may impair the safety or the performance. Make sure that the equipment is in proper working condition.

### 4.1 Power and Earthing

#### **WARNING**

If the integrity of the external protective conductor is in doubt, the equipment should be powered by the built-in rechargeable lithium battery.

#### Power Supply

The electrocardiograph can be powered either by the mains supply or a built-in rechargeable lithium battery.

#### ★ Mains supply

The mains socket is on the left side of the unit. If the mains supply is used, connect the power cord to the socket first, and then connect the power cord to the hospital grade outlet.

Operating voltage:	100V-115V~ / 220V-240V~
Operating frequency:	50Hz / 60Hz
Input current:	0.3A max

Make sure the mains supply meets the above requirements before power-on, and then press the mains switch. Then the mains supply indicator lamp (⌋) will be lit.

If the built-in rechargeable battery is weak when the mains supply is used, it will be recharged automatically at the same time. Then both the mains supply indicator lamp (⌋) and the battery recharging indicator lamp (→□) will be lit. The Veterinary electrocardiograph can not be recharged when it is printing reports, and the battery recharging indicator is black; when the Veterinary electrocardiograph is switched off, the battery recharging indicator lamp (→□) is black if the battery is fully recharged.

◆ **Built-in rechargeable battery**

When the built-in rechargeable lithium battery is used, turn on the unit by pressing the ON/OFF key on the control panel directly. Then the battery indicator lamp ( ) will lit and the battery symbol ( ) will be displayed on the LCD screen. Because of the consumption during the storage and transport course, the battery capacity may not full. If the symbol ( ) and the Hint information *BAT WEAK* are displayed, which means the battery capacity is low, please recharge the battery first.

Please refer to the maintenance section for how to recharge the battery. When the battery is being recharged, VE-300 can be powered by the mains supply at the same time.

**WARNING**

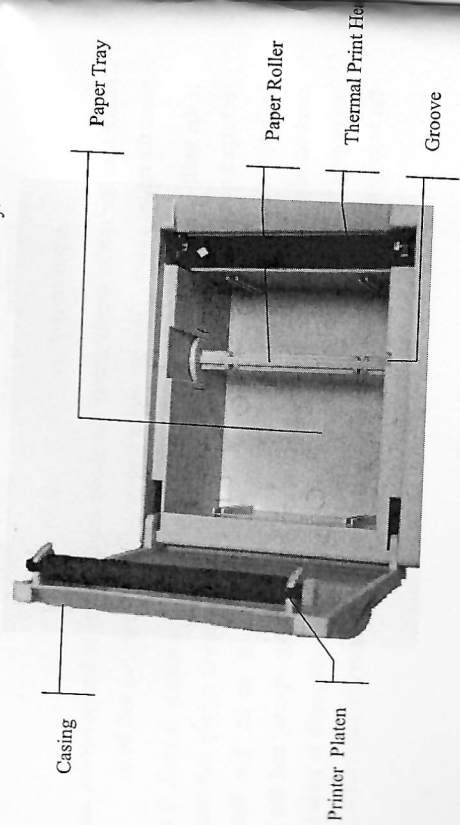
The potential equalization conductor of the unit should be connected to the potential equalization bus bar of the electrical installation when necessary.

**4.2 Loading/Replacing Recorder Paper**

There are two kinds of recorder paper. One is the rolled thermal paper with the width of 80mm and the other is the folded thermal paper with the width of 80mm.

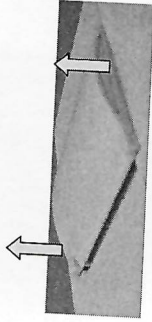
**NOTE:** When the folded thermal paper is used, the paper roller is unnecessary and must be taken out.

When the recorder paper runs out or is not loaded, warning message *Paper?* will appear on the screen. Then you should load or replace the recorder paper immediately.

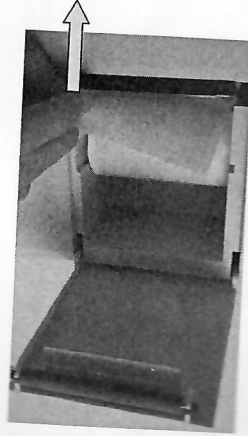


**Loading/Replacing Process of Rolled Thermal Paper:**

1) Place fingers under the two flanges of the recorder casing, pull them upwards directly to release the casing.



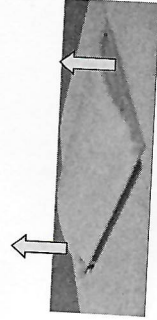
- 2) Take out the paper roller, and remove remainder paper from the roller if necessary.
- 3) Take off the wrapper of the new thermal paper roll, and then put the paper roll through the roller.
- 4) Place the paper and the roller gently in the recorder with the roller pin clicking into the groove.
- 5) Pull about 2 cm of paper out with the grid side of the paper facing the thermal print head, and shut the recorder casing.



6) Press down the recorder casing firmly.

**Loading/Replacing Process of Folded Thermal Paper:**

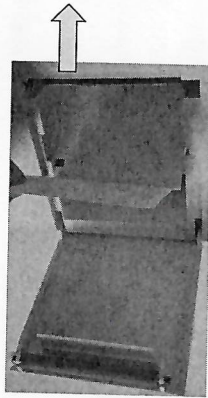
1) Place fingers under the two flanges of the recorder casing, pull them upwards directly to release the casing.



- 2) Remove remainder paper in the paper tray if necessary.
- 3) Take off the wrapper of the new folded thermal paper, and then put it in the paper tray.



- 4) Pull about 2 cm of paper out with the grid side of the paper facing the thermal print head and shut the recorder casing.

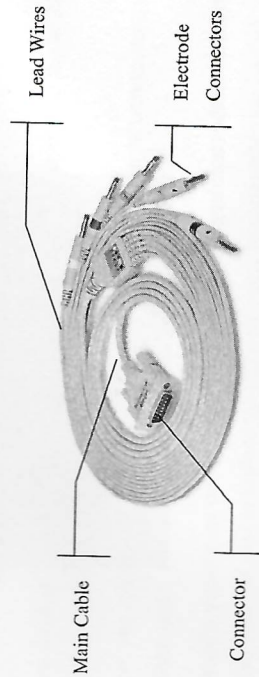


- 5) Press down the recorder casing firmly.

### 4.3 Connecting the Patient Cable

#### **WARNING**

The performance and electric shock protection can be guaranteed only if original patient cable and electrodes of the manufacturer are used.



#### 1. Connecting the Patient Cable to the Electrocardiograph

Connect the patient cable to the patient cable socket on the right side of the main unit, and then secure them with two screws.

#### 2. Connecting the Patient Cable to Electrodes

Align all lead wires of the patient cable to avoid twisting, and connect the lead wires to the corresponding electrodes according to the colors and identifiers. Firmly attach them.

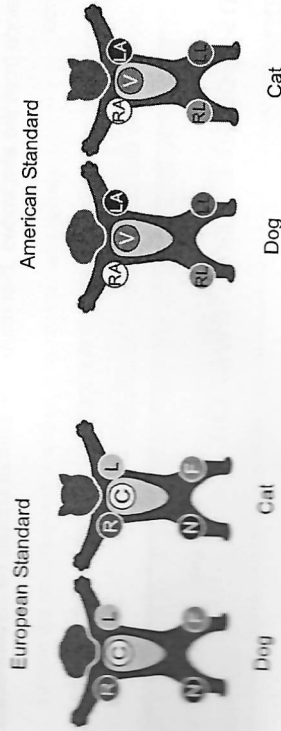
### 4.4 Attaching Electrodes to the Animal

The identifier and color code of electrode connectors used complies with IEC/EN requirements. In order to avoid incorrect connections, the electrode identifier and color code are specified in Table 4-1. Moreover the equivalent code according to American requirements is given too.

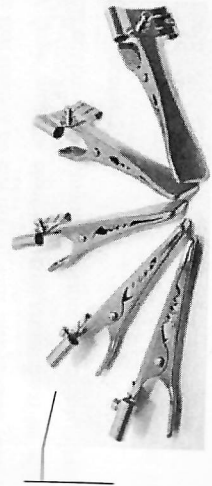
Table 4-1 Electrodes and Identifiers and Color Codes

Electrodes	European		American	
	Identifier	Color code	Identifier	Color code
Right fore limb	R	Red	RA	White
Left fore limb	L	Yellow	LA	Black
Right rear limb	N or RF	Black	RL	Green
Left rear limb	F	Green	LL	Red
Chest	C	White	V	Brown

As the following figure shows, the electrodes' positions on body surface are



The contacting resistance between the animal and the electrode will affect the quality of ECG greatly. In order to get a high-quality ECG, the skin/electrode resistance must be minimized while connecting electrodes.



Connecting to a Lead Wire

**Electrodes connection:**

- 1) Ensure that the electrodes are clean;
- 2) Align lead wires of patient cable to avoid twisting;
- 3) Clean electrode area on a short distance with alcohol;
- 4) Daub the electrode area with gel evenly;
- 5) Place a small amount of gel on the metal part of electrode clamp;
- 6) Clamp the electrode to the electrode area. Attach all electrodes in the same way.

**WARNING**

1. Be sure that all electrodes have been connected to the animal correctly before operation.
2. Ensure that the conductive parts of electrodes and associated connectors, including neutral electrode, do not come in contact with earth or any other conducting objects.
3. There is no danger when using the electrocardiograph with electrical stimulative equipment. However, the stimulation units should only be used at a sufficient distance from the electrodes. If in doubt, the animal should be disconnected from the device.
4. Electrodes with defibrillation protection should be used while defibrillating.
5. Do not touch the unit casing during defibrillation.

**4.5 Inspection Before Power On**

In order to avoid safety hazards and get good ECG records, the following inspection procedure is recommended before power-on and operation.

- 1) **Environment:**
  - ◆ Make sure that there is no electromagnetic interference source around the equipment especially large medical electrical equipment such as electro-surgical equipment, radiological equipment, magnetic resonance imaging equipment etc. Switch off the devices when necessary.
  - ◆ Keep the examination room warm to avoid muscle action voltages in ECG signals caused by cold.

**2) Power Supply:**

- ◆ If the mains supply is used, please check whether the power cord is connected to the unit well. The grounded three-phase outlet should be used.
  - ◆ When the battery capacity is low, recharge the battery before use.
- 3) **Patient Cable:**
    - ◆ Check whether the patient cable is connected to the unit firmly, and keep it far away from the power cord.
  - 4) **Electrodes:**
    - ◆ Check whether all electrodes are connected to lead wires of the patient cable correctly.
  - 5) **Recorder Paper:**
    - ◆ Ensure that there is enough recorder paper loaded correctly.
  - 6) **Animal**
    - ◆ The animal should not come into contact with conducting objects such as earth, metal parts etc.
    - ◆ Ensure the animal is warm and relaxed, and breathe calmly.

**WARNING**

The electrocardiograph is provided for the use of qualified physicians or personnel professionally trained, and they should be familiar with the contents of this user manual before operation.



## Chapter 5 Switching On/Off the ECG

### 5.1 Switching On the Electrocardiograph

- ◆ When the mains supply is used, connect the power cord, press the mains switch on the side of the unit, and then the mains supply indicator lamp (☺) is lit. Then press **ON/OFF** key on the control panel to turn on the unit. Then VE-300 is ready for use.
- ◆ When a built-in rechargeable lithium battery is used, press the **ON/OFF** key on control panel directly to turn on the unit, and then the battery indicator (☺) is lit. If equipment information such as the device name, the version number will be displayed the LCD screen after self-test. Then VE-300 is ready for use.

### 5.2 Switching Off the Electrocardiograph

- ◆ When the built-in battery is used, press the **ON/OFF** key directly to turn off the unit.
- ◆ When the mains supply is used, press the **ON/OFF** key, and then press the mains switch on the left side of the unit. Pull out the plug from the outlet.

**NOTE:** When switching off the device, please follow the above sequence strictly, or else there will be something wrong on the screen.

## Chapter 6 Sampling and Printing ECG

### 6.1 Entering Animal Information

After switched on, the electrocardiograph enters the main screen.

- 1) Configure the **PetInfo Setup** window. (Optional)
  - 1) Press **MENU** to enter System Setup Screen.
  - 2) Choose Patient Info tab and press **MENU** to enter the sub-window.
  - 3) Configure according to actual use. See more information in "Patient Info Setup".
  - 4) After configuration, press **MENU** or **PRINT/STOP** to save and quit the current window.
  - 5) Press **Return** or **RECALL** to return to the main screen.
- 2) Move the cursor to the patient symbol. Press the Left or Right arrow to enter the pet information window on the Main Screen.
  - 1) Press the Up or Down arrow to select the ID textbox, and press the Left or Right arrow to pop up the editing window.
  - 2) Press the Left or Right arrow to choose letter or number, and press **MENU** to confirm the operation.
  - 3) If the content need to be modified, press **RECALL** to delete.
  - 4) After editing, press **MENU** or **PRINT/STOP** to confirm the operation and return to the main screen.

**NOTE:** The pet information cannot be set or changed during the printing course.

### 6.2 Printing ECG Reports

There are four modes to print ECG reports.

In the **AUTO** mode, the lead groups are switched in order automatically during the printing course. There is a blank area on the recorder paper before printing the ECG signals of the next lead group. Moreover, a 1mV calibration mark will be printed at the beginning of ECG reports. The switch orders of lead groups are listed in Table 2-1.

In the **MANUAL** mode, you should switch the lead group manually. You can determine the lead group to be printed and set the printing settings or other parameters for different lead groups.

In the **RHYTHM** mode, you can print 60s rhythm-lead ECG waveforms.

In the **USBPRINT** mode, ECG reports can be printed out through a USB printer.

**NOTE:** The printing mode cannot be changed during the printing course. Stop printing reports before changing the printing mode.

### 6.2.1 AUTO Mode

In the **AUTO** mode, the lead groups are switched in order automatically during the printing course. There is a blank area on the recorder paper before printing the ECG signals of the next lead group. Moreover, a 1mV calibration mark will be printed at the beginning of ECG report. The switch orders of lead groups are listed in Table 2-1.

- 1) Press the **MODE/RST** key to select the **AUTO** mode, which will be displayed in the upper right corner of the LCD screen.
- 2) Press the **SENS** key to set the sensitivity.
- 3) Set the suitable speed value and filter value.
- 4) Or press the **MENU** key to open the System Setup Screen to set the detailed settings. Press the **Return** to return to the Main Screen.
- 5) Press the **PRINT/STOP** key to begin printing ECG reports. It will stop automatically after printing a complete ECG report of 12 leads.

Press **PRINT/STOP** during the printing course to stop printing ECG reports. Then when you begin printing ECG reports again, the system will print ECG reports from the first lead group.

### 6.2.2 MANU Mode

In the **MANU** mode, you need to switch lead groups by pressing the Lead switch key.

- 1) Press the **MODE/RST** key to select the **AUTO** mode, which will be displayed in the upper right corner of the LCD screen.

- 2) Press the **SENS** key to set the sensitivity.
- 3) Set the suitable speed value and filter value.
- 4) Or press the **MENU** key to open the System Setup Screen to set the detailed settings. Press the **Return** to return to the Main Screen.
- 5) Press the Lead switch key to select the lead group to be printed.
- 6) Press the **PRINT/STOP** key to begin printing reports.
- 7) Press the Lead switch key to switch the lead group while printing ECG reports and the system will automatically print 1mV calibration mark. Press the **1mV/COPY** key to print

out 1mV mark in the ECG report.

- 8) Press the **PRINT/STOP** key to stop printing ECG reports.

### 6.2.3 RHYT mode

In the **RHYT** mode, you can choose single lead type or three-lead type.

- 1) Press the **MODE/RST** key to select the **RHYTHM** mode; which will be displayed in the bottom right corner of the LCD screen.
- 2) Press the **SENS** key to set the sensitivity.
- 3) Set the suitable speed value and filter value.
- 4) Press the **PRINT/STOP** key, the hint information *Sampling* will be displayed on the Main Screen, and the sampling time will be counted. When the preset sampling time reaches, it begins to print ECG reports.
- 5) It will stop automatically after printing a complete report of rhythm-lead ECG waveforms. Or press the **PRINT/STOP** key again to stop printing ECG reports.

### 6.2.4 R-R mode

In the **R-R** mode, you can print ECG waveforms of 180s.

- 1) Press the **MODE/RST** key to select the **R-R** mode; which will be displayed in the bottom right corner of the LCD screen.
- 2) Press the **SENS** key to set the sensitivity.
- 3) Set the suitable speed value and filter value.
- 4) Press the **PRINT/STOP** key to begin printing reports. Or press the **PRINT/STOP** key again to stop printing ECG reports.



### 6.3 Sample ECG Reports

#### 6.3.1 ECG Reports in the AUTO Mode

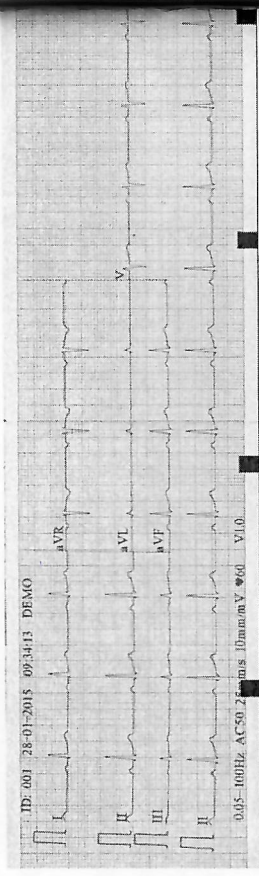


Figure 6-1 ECG Reports in the AUTO Mode (a)

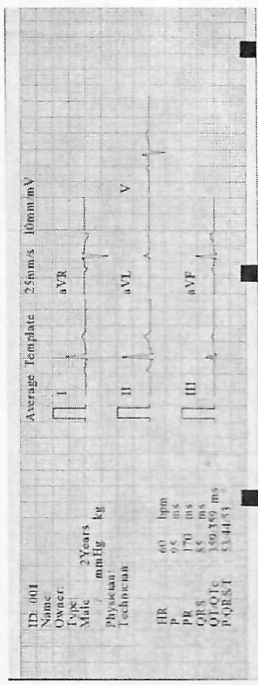


Figure 6-2 ECG Reports in the AUTO Mode (b)

Figure 6-1 and Figure 6-2 show an ECG report in the auto mode. **Template** is selected, **Record Style** is set to **3h+IR**.

The ECG report includes:

**ECG waves**

**ID, Current Date and time**

**Pet Information:** ID, Name, Owner, Type, Gender, Age, BP, Weight

**Physician, Technician**

**Measure Information:**

HR Heart Rate

P P wave duration: the average P-wave duration from several selected dominant beats;

PR P-R interval: the average P-R interval from several selected dominant beats

**QRS** QRS complex duration: the average QRS complex duration from several selected dominant beats;

**QT/QTc** Q-T interval: the average Q-T interval from several selected dominant beats / Normalized QT interval;

**P/QRS/T** Dominant direction of the average integrated ECG vectors;

**Average Template:** Average template shows the average value of 10s sampled ECG signals of every lead.

The broken lines on the template are position markers. They respectively mark the start and end points of the P and QRS waves, and the end point of the T wave.

**Bottom Information:** 0.67~100Hz (0.67Hz DFT Filter, 100Hz Lowpass Filter),

AC50 (50Hz AC Filter)

25mm/s (Paper Speed)

10mm/mV (Gain)

♥60 (Heart Rate)

V1.0 (Software Version)

## 6.3.2 PDF Report

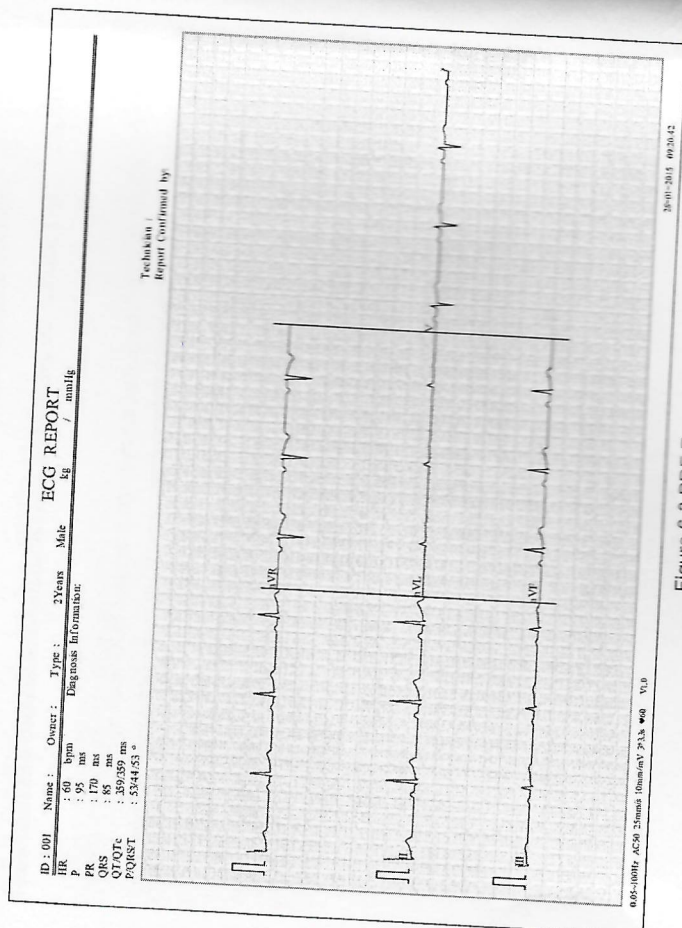


Figure 6-3 PDF Report

## Chapter 7 Managing ECG Records

If you want to save the ECG records, you should set the **Auto Save to ECG** or **To U Disk**. The default value is **To ECG**. Then the ECG records will be saved in the File Manager or in the U disk automatically.

Press the **RECALL** key to open the File Manager where patient records are displayed. The File Manager allows records to be stored, deleted, printed and transmitted. When there is no space for more records to be stored in the File Manager, the message *MemFull* will be displayed.

### 7.1 Transmitting ECG Records to the PC

**NOTE:** To transmit ECG records to the PC, Smart ECG Viewer software of the manufacturer must be installed in the PC. You should log into the Smart ECG Viewer software before the transmission.

#### 7.1.1 Transmitting ECG Records through the Serial Port

Connect the RS232 socket of the PC to the RS232 socket of the electrocardiograph with a RS232 cable. If the PC has no RS232 socket, connect the USB socket of the PC to the RS232 socket of the electrocardiograph by using the RS232-USB assembly.

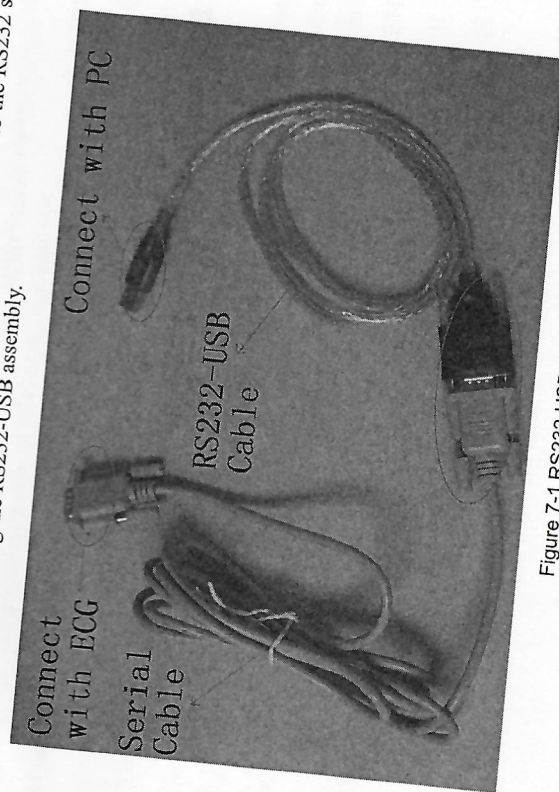


Figure 7-1 RS232-USB Assembly



- **Auto Transmission:**

- 1 Press the **MENU** key to open the System Setup Screen.
- 2 Select the **Transmission** button, and then press the **MENU** key to enter the sub-window.
- 3 Set **Auto Transmission** to **On** and set **Transmission mode** to **UART**. Then press the **MENU** key again to return to the Main Screen.
- 4 In the **AUTO, RHYT, OFF-AUTO** or **OFF-RHYT** mode, ECG data can be transmitted through the UART port automatically after an ECG report is printed out.

- **Manual Transmission:**

- 1 Press the **MENU** key to open the System Setup Screen.
- 2 Select the **Transmission** button, and then press the **MENU** key to enter the sub-window.
- 3 Set **Auto Transmission** to **Off** and set **Transmission mode** to **UART**. Then press the **MENU** key again to return to the Main Screen.
- 4 Press the **RECALL** key to open the File Manager screen (a).
  - 1) Select the **TransAll** button, and then press the **MENU** key to confirm the operation.

**NOTE:** Please make sure the settings of **Auto Transmission** and **Transmission Mode** in Transmission is correct.

- 2) If you want to transmit only one record, choose the patient record in the table, press the **MENU** key to enter the File Manager screen (b). Select the **Trans** button and then press the **MENU** key to confirm the operation.

**NOTE:** The transmission process is long, and please be patient to wait.

- 3) Press the **RECALL** key to return to the Main Screen.

### 7.1.2 Transmitting ECG Records through the Net Port

Connect the PC to the electrocardiograph with an Ethernet cable recommended by the manufacturer. If the wireless AP transmission is used, connect the PC to one wireless AP, and connect the electrocardiograph to the other wireless AP.

**NOTE:**

- 1) Only the wireless AP recommended by the manufacturer can be used.
- 2) For details on configuring the wireless AP, please refer to the user manual delivered with the wireless AP.
- 3) There should be no shield in or around the room where the wireless AP is used, or else the wireless transmission may fail.

- **Auto Transmission:**

1. Press the **MENU** key to open the System Setup Screen.
  2. Select the **Transmission** button, and then press the **MENU** key to enter the sub-window.
  3. Set **Auto Transmission** to **On** and set **Transmission mode** to **Ethernet**.
  4. Set the **Server IP** to the IP of Smart ECG Viewer.
  5. Set the first three numbers of the **Local IP** to the first three numbers of the IP of Smart ECG Viewer. The last number of the **Local IP** item can be set at random, but it can't be the same as the last number of the IP of Smart ECG Viewer.
- For example, check the IP on the **System Setting** interface of the Smart ECG Viewer software.

Local IP 192.168.7.77

Set the **Server IP** to the IP of Smart ECG Viewer. Set the first three numbers of the **Local IP** to the first three numbers of the IP of Smart ECG Viewer. The last number of the **Local IP** can be set at random, but it can't be the same as the last number of the local IP of Smart ECG Viewer.

Server IP 192.168.7.77  
Local IP 192.168.7.135

6. In the **AUTO, RHYT, OFF-AUTO** or **OFF-RHYT** mode, ECG data can be transmitted through the net automatically after an ECG report is printed out.

- **Manual Transmission:**

1. Press the **MENU** key to open the System Setup Screen.
2. Select the **Transmission** button, and then press the **MENU** key to enter the sub-window.
3. Set **Auto Transmission** to **Off** and set **Transmission mode** to **Ethernet**.
4. For IP address setting, refer to step 4 and 5 for auto transmission.
5. Other steps for transmission operation, refer to step 4 for manual transmission in section 7.1.1 "Transmitting ECG Record through the Serial Port".

**NOTE:** The transmission process is long, and please be patient to wait.



## 7.2 Copying ECG Records between the ECG Machine and U Disk

1. Connect the U disk to the electrocardiograph.
2. Press the **RECALL** key to open the File Manager screen (a).
3. Select the **TransAll** button, and then press the **MENU** key to confirm the operation. And then the **ECGDATA** folder of all the records will be transmitted to the U disk automatically.

During the transmission, if something wrong happens, the electrocardiograph will give the error information. Then you should check whether the U disk is connected to the electrocardiograph well.

4. If you want to import records from the **ECGDATA** folder of the U disk to the electrocardiograph, select the **Import** button, and then press the **MENU** key. The extended-name of imported records should be ".dat".

**NOTE:** To import records from the U disk to the electrocardiograph, there should be some records in the folder named **ECGDATA** in the U disk. The folder name **ECGDATA** must be capital letters. You should not change the name of records in the **ECGDATA** folder.

During the transmission from the U disk to the electrocardiograph, if something wrong happens, the electrocardiograph will give the error information. Then you should do the following operations:

- 1) Firstly, check whether the U disk is connected well.
- 2) If the error information is still displayed, you should check whether there is the **ECGDATA** folder including some records with the extended-name of ".dat" in the U disk. If not, you should create an **ECGDATA** folder in the U disk and add records to be imported to the U disk.
- 3) If the error information is still displayed, you should check whether the total number of records in the **ECGDATA** folder of the U disk and the File Manager of the electrocardiograph exceeds the limit. The limit of the electrocardiograph is 500. If the total number exceeds the limit, you should remove some records from the **ECGDATA** folder of the U disk, and then continue to import the remainder records to the electrocardiograph.
- 4) If the error information *The same record found!* Press **PRINT/STOP** return is displayed, you should check whether there are cognominal records in the U disk and the

electrocardiograph. If it is true, you should remove these records from the U disk, or delete these records in the electrocardiograph, and then continue to import records to the electrocardiograph.

After records are imported, the electrocardiograph will give a hint.

5. If you want to export only one record, choose the patient record in the table, press the **MENU** key to enter the File Manager screen (b). Select the **Export** button and then press the **MENU** key to confirm the operation.
6. Press the **RECALL** key to return to the Main Screen.

### NOTE:

1. The transmission process is long, and please be patient to wait.
2. During the transmission, the U disk should not be pulled out.
3. Only the U disk with FAT format can be used.

## 7.3 Deleting Patient Records

1. Press the **RECALL** key to open the File Manager screen (a).
2. If you want to delete all the records, select the **DEL ALL** button, and then press the **MENU** key.
3. If you want to delete a record, choose the patient record in the table, and then select **Delete** button.
4. Press the **RECALL** key to return to the Main Screen.

## 7.4 Printing a Patient Record in the File Manager screen

1. Press the **RECALL** key to open the File Manager screen (a).
2. If you want to print the patient record, choose the patient record in the table, and then press **PRINT/STOP** key.

**NOTE:** If you use USB printer to print the patient record, when the **PRINT/STOP** key is pressed, the electrocardiograph begins to analyze data. Then the USB printer begins to print the ECG record after 8 seconds.

3. Press the **RECALL** key to return to the Main Screen.



## 7.5 ECG Copy

In the **AUTO** mode, after an ECG report is printed out, pressing the **1mV/Copy** key can print the ECG report which was printed out last time. Pressing the **PRINT/STOP** key can stop printing the ECG report.

**NOTE:** After an ECG report is printed out in the **AUTO** mode, if you change the printing mode or the printing format, the ECG report can not be printed again by pressing the **1mV/Copy** key.

## Chapter 8 Settings

Press the Up or Down or Left or Right arrow to select the function button, and then press the MENU or PRINT/STOP to enter sub-window.

### 8.1 Work Mode

Item	Description
Mode Options	Including: <b>AUTO, RHYT, R-R MANU, OFF-AUTO</b> and <b>OFF-RHYT</b> . Each item can be set to On. When set to On, it will be available on the main screen, and you can press <b>MODE/RST</b> to switch to the mode. In the <b>MANU</b> mode, you can press the lead switch button to switch the lead group. In the <b>OFF-AUTO</b> or <b>OFF-RHYT</b> mode, the electrocardiograph samples ECG signal as well as save the patient record but doesn't print ECG report.
Display Style	Choose from: <b>3 channels, 6 channels</b> , the default value is <b>3 channels</b>
Sampling Mode (Only available in the auto mode)	Choose from: <b>Pre-Sample</b> and <b>Real-time</b> , the default value is <b>Real-time</b> Select <b>Pre-Sample</b> , 10s ECG data sampled before pressing the <b>PRINT/STOP</b> key will be printed out. <b>NOTE:</b> When <b>Sampling Mode</b> is set to <b>Pre-Sample</b> , if you press the <b>PRINT/STOP</b> key before the electrocardiograph samples for 10s, the recorder will not respond.
Rhythm Style	Choose from: <b>Single Lead</b> or <b>Three Leads</b> , the default value is <b>Three Leads</b>

### 8.2 Filter & Lead

Item	Description
AC Filter	Choose from: <b>On</b> or <b>Off</b> , the default value is <b>On</b> AC filter is used to suppress interference of AC power supply. <b>NOTE:</b> AC frequency can be set to <b>50Hz</b> or <b>60Hz</b> on the <b>Advanced</b>

**Setup** screen according to local mains supply specifications.

**DFT Filter**

Choose from: **0.05Hz, 0.15Hz, 0.25Hz, 0.32Hz, 0.5Hz or 0.67Hz**, the default value is **0.67Hz**

DFT Filter greatly reduces the baseline fluctuations without affecting the ECG signals. The purpose of this filter is to keep the ECG signals on the baseline of the printout.

The set value is the low limit of the frequency range.

**EMG Filter**

The cutoff frequency can be set to **25Hz, 35Hz, 45Hz or Off**, the default value is **Off**

EMG Filter suppresses disturbance caused by strong muscle tremor.

**Lowpass Filter**

The cutoff frequency can be set to **75Hz, 100Hz or 150Hz**, the default value is **100Hz**

Lowpass Filter restricts the bandwidth of input signals.

All the input signals whose frequency is higher than the set cutoff frequency will be attenuated.

**NOTE:** Only when **EMG Filter** is set to **Off**, can the setting of **Lowpass Filter** be effective.

**Rhythm Lead 1/2/3**

Choose from: **I, II, III, aVR, aVL, aVF, or V**, the default value is of Rhythm Lead 1 is **II**, the default value is of Rhythm Lead 2 is **aVR**, the default value is of Rhythm Lead 3 is **V**

**NOTE:** Rhythm Lead 1/2/3 must be different from each other.

**Lead Sequence**

Choose from: **Standard** or **Cabrera**, the default value is **On**

Lead Sequence	Lead group 1	Lead group 2	Lead group 3
<b>Standard</b>	I, II, III	aVR, aVL, aVF	V
<b>Cabrera</b>	aVL, I, -aVR	II, aVF, III	V

**NOTE:** To pass the distortion test, the electrocardiograph has to be configured with the highest bandwidth in filter settings. Otherwise, ECG signal may be distorted.

**8.3 Record Info Setup****8.3.1 Setup 1**

Item	Description
Record Style	Choose from: <b>3Ch, 1Ch+IR, 1Ch or 3Ch+IR</b> , the default value is <b>3Ch</b> Select a style to print the ECG waves of 12 leads in the auto mode. <b>NOTE: Record Style</b> is corresponding with <b>Work Mode</b> .
Auto Record Sequence	Choose from: <b>Sequential</b> or <b>Synchronous</b> , the default value is <b>Sequential</b> Select <b>Sequential</b> , the lead group is printed one by one in a certain sequence. The start time of a lead group is just the end time of the previous lead group. Select <b>Synchronous</b> , the lead group is printed one by one in a certain sequence. All leads are printed with the same start time.
Auto Record Length	Choose from: <b>Short (2.5s)</b> and <b>Long (10s)</b> , the default value is <b>Short (2.5s)</b> <b>NOTE: Auto Record Length</b> is corresponding with <b>Record Device, Sampling Mode and Record Sequence</b> .
Manual REC Style	Choose from <b>3 channels, 6 channels and 12 channels</b> , the default value is <b>12 channels</b> Select a style to print the ECG waves in the manual mode.
Rhythm Mode	Record Choose from: <b>Save Paper</b> or <b>Quickly</b> , the default value is <b>Save Paper</b> Select <b>Save Paper</b> , 10s after pressing the <b>PRINT/STOP</b> key on the main screen, an ECG report is printed in the RHYT mode. Select <b>Quickly</b> , pressing the <b>PRINT/STOP</b> key on the main screen to begin printing an ECG report immediately in the RHYT mode.
Speed	Choose from: <b>5mm/s, 6.25mm/s, 10mm/s, 12.5mm/s, 25mm/s or 50mm/s</b> , the default value is <b>25mm/s</b> <b>NOTE: Speed</b> is corresponding with <b>Work Mode</b> .
Gain	You can set the indicated height of 1mV ECG on the paper. Choose from: <b>2.5mm/mV, 5mm/mV, 10mm/mV, 20mm/mV or 10/5mm/mV</b> , the default value is <b>10mm/mV</b> <b>10/5mm/mV</b> means that the gain of limb leads is set to <b>10mm/mV</b> , while



the gain of chest leads is set to **5mm/mV**.

**AGC** means auto gain control.

Choose from: **On** or **Off**, the default value is **Off**

Select **On**, the gain can be automatically adjusted according to actual signals.

**Baseline Adjustment**  
Choose from: **Horizontal, Auto** or **Off**, the default value is **Horizontal**  
Select **Horizontal**, the baselines of the lead groups are adjusted simultaneously, and the baselines of the leads in the same row are on the same line.

Select **Auto**, the baselines of the lead groups are adjusted respectively.  
Select **Off**, the baselines of the lead groups are adjusted equally in the ECG reports.

**Paper Marker**  
**Paper Marker** is used to identify the start point of each page of the recorder paper.

Choose from: **Yes** or **No**, the default value is **No**

Select **Yes** if the paper with black markers on the bottom is used, and the device can identify the start point of each page of the recorder paper while printing ECG reports.

### 8.3.2 Setup 2

Item	Description
Measure	Choose from: <b>On</b> or <b>Off</b> , the default value is <b>On</b> When it is set to <b>On</b> , the Measure information will be printed in the ECG report.
Template	Choose from: <b>2Ch+1R, 3Ch</b> or <b>Off</b> , the default value is <b>Off</b> When it is set to <b>Off</b> , the template will not be printed in the ECG report
Position Marker	Choose from: <b>On</b> or <b>Off</b> , the default value is <b>Off</b> When it is set to <b>Off</b> , the template printed in the ECG report will not have position marker.
Device No.	Choose from: <b>On</b> or <b>Off</b> , the default value is <b>On</b> When it is set to <b>On</b> , the Device No. will be printed in the ECG report.

**Record Device**  
Choose from: **Thermal, HP 2010/1050/2000, HP 2015/2035/1525, or HP 1020, or HP 1505**, the default value is **On**

You should connect the corresponding USB printer **HP 2010/1050/2000** and **HP 2015/2035** to the electrocardiograph.

#### **WARNING**

If the printer used is not the type listed above, additional safety measures (such as applying an isolation transformer to supply the medical system) should be taken when the safety of the medical system has not been evaluated. If in doubt, consult our technical service department or your local distributor.

#### **CAUTION**

It is forbidden to connect or disconnect a U disk or a USB printer during the transmission course.

#### **NOTE:**

- During the **USB** printing course, pressing the **PRINT/STOP** key again cannot stop printing ECG reports.
- For details of the ECG report printed by the USB printer, please refer to section 6.3.2 "PDF Report".
- USB printing is ineffective in the auto mode, **OFF-AUTO**, **RHYT** mode and **OFF-RHYT** mode.
- Make sure that paper is installed in the USB printer before printing. Error may occur if no paper is loaded in the USB Printer.
- Make sure the type of USB printer connected is matched with the type you choose in the Record Device. Error may occur if the USB printer type is not matched.

**USB Record Style**  
Choose from: **3Ch, 3Ch+1R, 3Ch+3R**, or **All**, the default value is **3Ch**  
It defines the style of USB report.

**Grid of Report**  
Choose from: **On** or **Off**, the default value is **Off**  
When it is set to **On**, the grid will be printed while printing ECG reports with the thermal recorder or USB printer.



## 8.4 Pet Information Setup

Item	Description
ID	Choose from: <b>Auto</b> , <b>Time</b> or <b>Manual</b> , the default value is <b>Auto</b>
ID Hint	Choose from: <b>On</b> or <b>Off</b> , the default value is <b>Off</b> In the auto, rhythm mode, when <b>ID</b> is set to <b>Manual</b> and <b>ID Hint</b> is set to <b>On</b> , if you do not input the patient ID before pressing the <b>PRINT/STOP</b> key, a hint will pop up to remind you to input the patient ID.
Age	Choose from: <b>Age</b> , <b>D.O.B</b> or <b>Age Group</b> , the default value is <b>Age</b>
Pet Refreshed	Choose from: <b>On</b> or <b>Off</b> , the default value is <b>On</b> Select <b>On</b> , the pet information will be refreshed after the ECG report is printed out and all the leads are off.
Weight Unit	Choose from <b>kg / lb</b> , the default value is <b>kg</b>
BP Unit	Choose from: <b>mmHg</b> or <b>kPa</b> , the default value is <b>mmHg</b>

## 8.5 Transmission Setup

### NOTE:

- To transmit ECG data to the PC in DAT format, the Smart ECG Viewer software produced by the manufacturer must be installed in the PC. You should log into the Smart ECG Viewer software before transmission.
- To transmit ECG data to the PC in DICOM/SCP/FDA-XML/PDF format, the FTP receiving software must be installed in the PC. You should log into the FTP receiving software before transmission.

Item	Description
Device No.	Enter Device No., it should be within 7 ASCII characters.
Auto Transmission	Choose from: <b>On</b> or <b>Off</b> , the default value is <b>Off</b> Select <b>On</b> , ECG data will be transmitted automatically after an ECG report is printed out in the auto or rhythm mode; in the off mode, 10s ECG data sampled before pressing the <b>PRINT/STOP</b> key can be saved and transmitted, but cannot be printed.
Transmission Mode	Choose from: <b>Ethernet</b> or <b>UART</b> , the default value is <b>Ethernet</b>
FTP Information	Enter data in the <b>FTP Path</b> , <b>FTP User Name</b> textboxes.
IP Addresses	Set <b>Server IP</b> , <b>Local IP</b> , Set <b>Gateway</b> , Set <b>Subnet Mask</b> For details, please refer to Section 7.1.1 "Transmitting ECG Data in DAT Format". <b>NOTE:</b> If <b>WiFi</b> is enabled and <b>Auto Get IP</b> is selected in the <b>WiFi Setup</b> window, IP addresses can be acquired automatically.

## 8.6 File Setup

Item	Description
Auto Save	Choose from: <b>Off</b> , <b>To ECG</b> or <b>To U Disk</b> , the default value is <b>To ECG</b> Select <b>Off</b> , ECG data will not be saved. Select <b>To ECG</b> , ECG data in the auto or rhythm mode will be saved in the ECG automatically. Select <b>To U Disk</b> , ECG data in the auto or rhythm mode will be saved in the automatically saved to the directory of <b>ECGDATA\ECG-X\Store\Examination Date</b> of the U disk after an ECG report is printed out. <b>NOTE:</b> 1. Please insert the U disk recommended by the manufacturer. Please set the format to <b>FAT</b> or <b>FAT32</b> when formatting the U disk. 2. X in the directory of <b>ECGDATA\ECG-X\Store\Examination Date</b> can be set in the <b>Device No.</b> textbox in the <b>Transmission Setup</b> window.

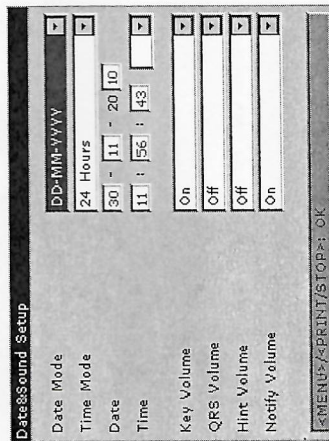


**File Format** Choose from: **DAT** and **PDF**, the default value is **DAT**  
To select **SCP/FDA-XML/DICOM**, you should first activate the **SCP/FDA-XML/DICOM** function on the **Advanced Setup** screen. For details, please contact the manufacturer or the local distributor.

**Del. After Trans.** Choose from: **On** or **Off**, the default value is **Off**  
**Or Export** Select **On**, the files will be automatically deleted from the **File Manager** screen after they are transmitted to the PC or exported to the U disk.

**Replace When Memory Full** Choose from: **On** or **Off**, the default value is **On**  
Select **On**, if the stored files reaches 200, the files will replace the earliest one automatically.

## 8.7 Date&Sound Setup



**NOTE:** Please set **DATE&TIME** correctly when it's the first time you use the electrocardiograph.

Item	Description
Date Mode	Choose from: <b>DD-MM-YYYY</b> , <b>MM-DD-YYYY</b> or <b>YYYY-MM-DD</b> , the default value is <b>DD-MM-YYYY</b>
Time Mode	Choose from: <b>24 Hours</b> or <b>12 Hours</b> , the default value is <b>24 Hours</b>
Date&Time	Enter the current date and time displayed on the main screen and in the ECG reports.
Key Volume	Choose from: <b>On</b> or <b>Off</b> , the default value is <b>Off</b>

Select **On**, the electrocardiograph gives a short sound when you press keys on the keyboard.  
Select **Off**, there is no sound.

**QRS Volume** Choose from: **On** or **Off**, the default value is **On**  
Select **On**, the electrocardiograph gives a sound when an **R** wave is detected.

Select **Off**, there is no sound when an **R** wave is detected  
**Hint Volume** Choose from: **On** or **Off**, the default value is **On**  
Select **On**, the electrocardiograph gives a sound when a hint such as **Lead Off**, **Overload**, **Battery Weak** etc. is displayed.  
Select **Off**, there is no hint sound.

**Notify Volume** Choose from: **On** or **Off**, the default value is **On**  
Select **On**, the electrocardiograph gives a sound after ECG report is printed.  
Select **Off**, there is no sound after ECG report is printed.

## 8.8 Other Setup

Item	Description
Power Off	Input the power-off time manually. If you enter <b>0 Minutes</b> or nothing, this function will not be effective. <b>NOTE:</b> 1. Power-off time is counted from the time when you last press the keys on the keyboard. 2. Only when the device is powered by the battery, can the set automatic power-off time be effective.
Institution	Input the institution name manually within 40 ASCII characters. <b>NOTE:</b> The total number of supported characters may be fewer if special Latin characters are entered.
Demo Setup	Choose from: <b>Normal</b> , <b>abnormal</b> or <b>Off</b> , the default value is <b>Off</b> When it is set to <b>Normal</b> , the main screen will display demo of normal

ECG signal.

When it is set to **abnormal**, the main screen will display demo of abnormal ECG signal.

#### Grid

Choose from: **On** or **Off**, the default value is **Off**

Select **On**, the waveforms on the main screen will be displayed with a background grid.

#### External Input

The external input socket is equipped in the electrocardiograph, through which the electrocardiograph can receive signals from the external equipment.

Choose from: **On** or **Off**, the default value is **Off**

Select **On**, the electrocardiograph will display the signals which it receives from external input port.

#### External Output

The external output socket is equipped in the electrocardiograph, through which the electrocardiograph can send rhythm lead signals to the external equipment.

Choose from: **Off**, **Standard** or **Triggered**, the default value is **Off**

Select **Standard**, the electrocardiograph sends ECG signals of rhythm lead 1.

Select **Triggered**, the electrocardiograph sends pulses with the height of 5V and the width of 45ms, based on the data of rhythm lead 1.

#### Language

Select the language displayed on the main screen and in the ECG reports.

#### System Password

Type a password that allows you to access the **System Setup** window.

#### Load Factory

Press to restore the factory settings.

#### Settings

## Chapter 9 Hint Information

Hint information provided by VE-300 and the corresponding causes are listed in Table 9-1.

Table 9-1 Hint Information and Causes

Hint Information	Causes
Lead off	Electrodes fall off the animal or the patient cable falls off the unit.
Paper?	Recorder paper runs out or is not loaded.
PaperErr	The system doesn't detect any black signs while the paper style is set as "Folded" on the System Setup Screen.
BAT WEAK	The built-in battery is weak.
Demo	The system is in the demonstration mode.
Sampling/Analyzing/Recording	ECG signals are being sampled / analyzed / recorded.
Transmitting	ECG data is being transmitted from the electrocardiograph to the PC through the net or serial cable in the auto or rhythm mode.
Transmitting fails!	Transmitting ECG data fails.
MemoryFull	There is no space for saving more records.
U Disk / USB Printer / USB Scanner / keyboard	A U disk, USB printer, USB scanner, or keyboard is connected to the USB interface.



## Chapter 10 Troubleshooting

### 1) Operating Problems

Q1: I want to save the ECG data without any printing, could it be possible?

A1: Yes, set the current mode to OFF-AUTO or OFF-RHYT. In the same way, if the transmission settings have been configured, the ECG data could be transmitted to the PC without printing.

### 2) Printing Problems

Q1: There was double impression in printing when I printed ECG reports by using an ink-jet printer. What's wrong with it?

A1: It may be the result of the coexisting black and color ink cartridges. Taking out the color ink cartridge may solve the problem.

Q2: I was encountered with paper-jam, what was I supposed to do?

A2: If it happened for the first time, it might be the result of an inappropriate placement of the paper. In this case, please open the paper casing, pull the paper out of the paper tray, tear the pages with rumples, and then put the paper in the paper tray again, adjust the position of the paper carefully and close the casing.

If the above-mentioned situation is not applicable, there might be some problem with the printing module. Please contact the manufacturer or the local distributor for further disposal.

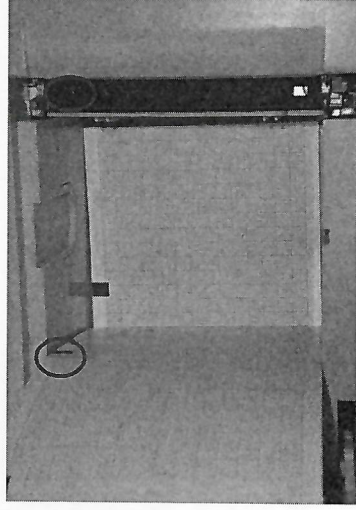
Q3: The hint PaperErr is displayed on the screen, what should I do?

A3: Check if the paper maker setting is right or might be the result of unsuccessful detection of the black markers, first open the paper casing so as to clear the error information, and then check whether the black marker is on the top of the paper. Reload the paper in the paper tray. If it doesn't work, change the paper.

If the problem still exists, please contact the manufacturer or the local distributor for further disposal.

Q4: The hint Paper? is displayed on the screen, what should I do?

A4: Check whether the paper runs out, or the black marker is just facing the black marker detection window on the thermal printing head, as the following figure shows.



Reload the paper in the paper tray, close the paper casing firmly. If the problem still exists, please contact the manufacturer or the local distributor for further disposal.

Q5: I pressed the **PRINT/STOP** key, but the ECG didn't start printing, what's wrong with it?

A5: Please check whether there is any error information displayed on the screen.

If the hint *Paper?* or *PaperErr* is shown on the screen, please deal with it according to the above-mentioned measures.

If the hint *Transfer* is shown on the screen, which means that the ECG is transmitting the data to the PC, please wait a few seconds. You can start the printing after the data has been transmitted.

If the problem still exists, please contact the manufacturer or the local distributor for further disposal.

### 3) Transmitting Problems

Q1: The ECG doesn't respond to any keys after a long time of transmitting. It transmits nothing for there is no new data appearing on the interface of the PC software. What should I do?

A1: Some error may occur during the transmission course, for example, the connection between the ECG and the net cable may loosen. In this case, please restart the ECG. If it doesn't work, please restart the PC.

If the problem still exists, please contact the manufacturer or the local distributor for further disposal.

**4) Main Unit Problems**

Q1: I was doing the examination when the machine suddenly gave out a sound and displayed the hint *Lead Off*. What should I do?

A1: The leads are not connected well. Please check whether the electrodes are connected to the patient skin well, and then make sure that the patient cable socket is connected to the patient cable firmly.

If none of the above-mentioned measures take effect, please contact the manufacturer or the local distributor for further disposal.

**Chapter 11 Cleaning, Care and Maintenance**

Use only the EDAN-approved substances and methods listed in this chapter to clean or disinfect your equipment. Warranty does not cover damage caused by using unapproved substances or methods.

Edan Instruments has validated the cleaning and disinfection instructions provided in this User Manual. It is the responsibility of the healthcare professional to ensure that the instructions are followed so as to ensure adequate cleaning and disinfection.

**11.1 General Points**

Keep your electrocardiograph and accessories free of dust and dirt. To prevent the device from damage, please follow the instructions:

- Use only the recommended cleaning agents and disinfectants listed in this manual. Others may cause damage (not covered by warranty), reduce product lifetime or cause safety hazards.
- Always dilute according to the manufacturer's instructions.
- Unless otherwise specified, do not immerse any part of the equipment or any accessories in liquid.
- Do not pour liquid onto the equipment.
- Do not allow liquid to enter the case.
- Never use abrasive material (such as steel wool or silver polish).
- Inspect the electrocardiograph and reusable accessories after they are cleaned and disinfected.

**CAUTION**

If you spill liquid on the equipment or accessories, or they are accidentally immersed in liquid, contact your service personnel or EDAN service engineer.

The equipment is chemically resistant to most cleaning agents, disinfectants and non-caustic detergents used in hospital, but cleaning agents or disinfectants that are not listed in this manual are not recommended. For example, didecyl dimethyl ammonium bromide, which contains quaternary ammonium salt, may corrode the equipment and accessories.



## 11.2 Cleaning

If the equipment or accessory has been in contact with the patient, then cleaning and disinfection is required after each use.

The validated cleaning agents for cleaning the electrocardiograph and reusable accessories are:

- Mild near neutral detergent
- Ethanol (75%)
- Isopropanol (70%)

Cleaning agents should be applied or removed using a clean, soft, non-abrasive cloth or paper towel.

### 11.2.1 Cleaning the Main Unit

#### **WARNING**

Turn off the power before cleaning. The mains supply must be switched off if it is used.

1. Switch off the main unit and disconnect it from the power cord.
2. Wipe the exterior surface of the equipment using a soft cloth dampened with the cleaning solution until no visible contaminants remain.
3. Wipe off the cleaning solution with a fresh cloth or towel dampened with tap water after cleaning until no visible cleaning agent remains.
4. Dry the main unit in a ventilated and cool place.

### 11.2.2 Cleaning the Patient Cable

1. Wipe the patient cable with a soft cloth dampened with the cleaning solution until no visible contaminants remain.
2. Wipe off the cleaning solution with a fresh cloth or towel dampened with tap water after cleaning until no visible cleaning agent remains.
3. Wipe off with a dry cloth to remove residual moisture.
4. Leave the patient cable to air dry.

#### **CAUTION**

Any remainder of cleaning solution should be removed from the main unit and the patient cable after cleaning.

### 11.2.3 Cleaning the Reusable Electrodes

1. Wipe off with a soft cloth to remove residual gel.
2. Wipe the electrodes with a soft cloth dampened with the cleaning solution until no visible contaminants remain.
3. Wipe off the cleaning solution with a fresh cloth or towel dampened with tap water after cleaning until no visible cleaning agent remains.
4. Wipe off with a dry cloth to remove residual moisture.
5. Leave the electrodes to air dry.

## 11.3 Disinfection

To avoid permanent damage to the equipment, it is recommended that disinfection is performed only when it is considered as necessary according to your hospital's regulations.

Clean the equipment and reusable accessories before they are disinfected. The validated disinfectants for disinfecting the electrocardiograph and reusable accessories are:

- Ethanol (75%)
- Isopropanol (70%)

If Ethanol or Isopropanol is used for both cleaning and disinfecting, then a new cloth is required to be used for the disinfection step.

#### **CAUTION**

1. Do not use high-temperature, high-pressure vapour or ionizing radiation as disinfection methods.
2. Do not use chloric disinfectant such as chloride, sodium hypochlorite etc.
3. Clean and disinfect reusable electrodes after each use.

### 11.3.1 Disinfecting the Main Unit

#### **WARNING**



Turn off the power before disinfection. The mains supply must be switched off if it is used.

1. Switch off the main unit and disconnect it from the power cord.
2. Wipe the exterior surface of the equipment using a soft cloth dampened with the disinfectant solution.
3. Wipe off the disinfectant solution with a dry cloth after disinfection if necessary.
4. Dry the main unit for at least 30 minutes in a ventilated and cool place.

### 11.3.2 Disinfecting the Patient Cable

1. Wipe the patient cable with a soft cloth dampened with the disinfectant solution.
2. Wipe off the disinfectant solution with a dry cloth after disinfection.
3. Leave the patient cable to air dry for at least 30 minutes.

### 11.3.3 Disinfecting the Reusable Electrodes

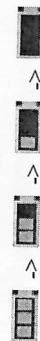
1. Wipe the electrodes with a soft cloth dampened with the disinfectant solution.
2. Wipe off the disinfectant solution with a dry cloth after disinfection.
3. Leave the electrodes to air dry for at least 30 minutes.

## 11.4 Care and Maintenance

### 11.4.1 Recharge and Replacement of Battery

#### 1) Capacity Identification

The battery capacity can be identified according to the battery symbol in the top right corner of the LCD screen.



Capacity is from full to empty.

#### 2) Recharge

VE-300 is equipped with the recharge control circuit together with the built-in rechargeable lithium battery. When the unit is connected to the mains supply, the battery will be recharged automatically. Then the battery recharging indicator lamp (→□) and the mains supply indicator lamp (∞) will be lit at the same time. During the recharging course, the symbol

→□ flashes in the top right corner of the LCD screen. When the battery capacity is full, the symbol →□ stops flashing, and the battery recharging indicator lamp (→□) is black. When the Veterinary electrocardiograph is switched off, the battery recharging indicator lamp (→□) is black if the battery is fully recharged.

Because of the capacity consumption during the storage and transport course, the battery capacity is not full when it is used for the first time. Battery recharge should be considered before the first use.

**NOTE:** If the battery has not been used for more than two months, it should be recharged before use.

#### 3) Replacement

When the useful life of the battery is over, or foul smell and leakage are found, please contact the manufacturer or the local distributor for replacement.

### WARNING

1. Only qualified service engineer authorized by the manufacturer can open the battery compartment and replace the battery, and the battery of the same model and specification provided by the manufacturer must be used.
2. Danger of explosion -- Do not reverse the anode and the cathode when installing the battery.
3. Remove the battery from the electrocardiograph when the electrocardiograph is not used for a long time.
4. If the battery is stored alone and not used for a long time, we recommend that the battery should be charged at least once every 6 months to prevent overdischarge.
5. When the battery's useful life is over, contact the manufacturer or the local distributor for disposal or dispose of the battery according to local regulations.

### 11.4.2 Recorder Paper

**NOTE:** Recorder paper provided by the manufacturer should be used. Other paper may shorten the life of the thermal print head. And the deteriorated print head may lead to illegible ECG reports and block the advance of paper.

**Storage Requirements:**



- ◆ Recorder paper should be stored in a dry, dark and cool area, avoiding excessive temperature, humidity and sunshine.
- ◆ Do not put the recorder paper under fluorescence for a long time.
- ◆ Make sure that there is no polyvinyl chloride or other chemicals in the storage environment, which will lead to color change of the paper.
- ◆ Do not overlap the recorded paper for a long time, or else the ECG reports may trans-print each other.

### 11.4.3 Maintenance of the Main Unit, the Patient Cable and

#### Electrodes

The following safety checks should be performed at least every 24 months by a qualified person who has adequate training, knowledge, and practical experience to perform these tests.

- a) Inspect the equipment and accessories for mechanical and functional damage.
- b) Inspect the safety related labels for legibility.
- c) Inspect the fuse to verify compliance with rated current and breaking characteristics.
- d) Verify the device functions properly as described in the instructions for use.

The leakage current should never exceed the limit. The data should be recorded in an equipment log. If the device is not functioning properly or fails any of the above tests, the device has to be repaired.

#### **WARNING**

Failure on the part of the responsible individual hospital or institution employing this equipment to implement a satisfactory maintenance schedule may cause undue equipment failures and possible health hazards.

#### 1) Main Unit

- ◆ Avoid excessive temperature, sunshine, humidity or dirt.
- ◆ Put the dustproof coat on the main unit after use and prevent shaking it violently when moving it to another place.
- ◆ Prevent any liquid from seeping into the equipment, otherwise the safety and performance of the electrocardiograph can not be guaranteed.

#### 2) Patient Cable

- ◆ Integrity of the patient cable, including the main cable and lead wires, should be

- checked regularly. Make sure that it is conductible.
- ◆ Do not drag or twist the patient cable with excessive stress while using it. Hold the connector plug instead of the cable when connecting or disconnecting the patient cable.
- ◆ Align the patient cable to avoid twisting, knotting or crooking in a closed angle while using it.
- ◆ Store the lead wires in a big wheel to prevent any people from stumbling.
- ◆ Once damage or aging of the patient cable is found, replace it with a new one immediately.

#### 3) Electrodes

- ◆ Electrodes must be cleansed after use and make sure there is no remainder gel on them.
- ◆ After long-term use, the surfaces of electrodes will be oxidized because of erosion and other causes. By this time, electrodes should be replaced to achieve high-quality ECG records.

#### **CAUTION**

The device and accessories are to be disposed of according to local regulations after their useful lives. Alternatively, they can be returned to the dealer or the manufacturer for recycling or proper disposal.

## Chapter 12 Accessories

### WARNING

Only the patient cable and other accessories supplied by the manufacturer can be used. Or else, the performance and electric shock protection cannot be guaranteed.

Accessory	Part Number
Power cord (European)	01.13.036638
Power cord(American)	01.13.037122
Patient Cable (European)	01.57.000935
Patient Cable (American)	01.57.000936
Multi-Function Clamp For VET	01.57.471041
Thermal Recorder Paper (Roll, 80mm×20m)	01.57.078076
Paper roller	21.51.001340
Fuse	21.21.064183
Rechargeable Li-ion Battery	21.21.064149
Thermal Recorder Paper (Folded, 80mm×70mm×200P)	01.57.078079
Grounding Wire	01.13.114214
ECG Bag	01.56.465628

VE-300 and accessories are available by contacting the manufacturer or your local distributor.

**NOTE:** The part name may vary depending on context, but the part number is constant.

## Chapter 13 Warranty and Service

### 13.1 Warranty

EDAN warrants that EDAN's products meet the labeled specifications of the products and will be free from defects in materials and workmanship that occur within warranty period.

The warranty is void in cases of:

- a) damage caused by mishandling during shipping.
- b) subsequent damage caused by improper use or maintenance.
- c) damage caused by alteration or repair by anyone not authorized by EDAN.
- d) damage caused by accidents.
- e) replacement or removal of serial number label and manufacture label.

If a product covered by this warranty is determined to be defective because of defective materials, components, or workmanship, and the warranty claim is made within the warranty period, EDAN will, at its discretion, repair or replace the defective part(s) free of charge. EDAN will not provide a substitute product for use when the defective product is being repaired.

### 13.2 Contact information

If you have any question about maintenance, technical specifications or malfunctions of devices, contact your local distributor.

Alternatively, you can send an email to EDAN service department at: [support@edan.com.cn](mailto:support@edan.com.cn).



## Appendix 1 Technical Specifications

### A1.1 Safety Specifications

Comply with:	EN 55032:2015 EN 55035:2017 EN 60950-1:2006+A2:2013
Anti-electric-shock type:	Class I with internal power supply
Anti-electric-shock degree:	Type CF
Degree of protection against harmful ingress of water:	Ordinary equipment (Sealed equipment without liquid proof)
Disinfection/sterilization method:	Refer to the user manual for details
Degree of safety of application in the presence of flammable gas:	Equipment not suitable for use in the presence of flammable gas
Working mode:	Continuous operation

### A1.2 Environment Specifications

	Transport & Storage	Working
Temperature:	-20°C (-4°F) ~ +55°C (+131°F)	+5°C (+41°F) ~ +40°C (+104°F)
Relative Humidity:	25% RH ~ 93% RH Non-Condensing	25% RH ~ 80% RH Non-Condensing
Atmospheric Pressure:	70kPa ~ 106kPa	80kPa ~ 106kPa

### A1.3 Physical Specifications

Dimensions	300mm × 260mm × 85mm, ±2mm
Weight	Approx. 2.0 kg (4.4 lbs)

	(Excluding recorder paper and battery)
Display	320×240 LCD Screen

### A1.4 Power Supply Specifications

Mains Supply:	Operating voltage = 100V - 115V ~ / 220V - 240V ~ Operating frequency = 50Hz / 60Hz Input current = 0.3A max Rated voltage = 14.8V Rated capacity = 2500mAh
Built-in Lithium Battery Pack:	When the battery is fully charged, the Veterinary electrocardiograph can work normally about 6.5 hours. It can continuously record about 3 hours in Manual mode, and record 330 reports at most in the AUTO mode.
	Necessary Charge time: 5 hours Cycle life ≥ 300 times
Fuse:	AC220V-240V: T200mA, Φ5×20 AC100V-115V: T400mA, Φ5×20

### A1.5 Performance Specifications

Recording	
Recorder:	Thermal dot-matrix recorder
Printing Density	8 dots per mm / 200 dots per inch (amplitude axes) 40 dots per mm / 1000 dots per inch (time axes, @ 25 mm/s)
Recorder Paper:	Folded thermal paper, 80mm×70mm×200pages Rolled thermal paper, 80mm×20m
Effective Width:	72mm
Paper Speed:	5mm/s, 6.25mm/s, 10mm/s, 12.5mm/s, 25mm/s, 50mm/s (±3%)
Accuracy of data:	±5% (x-axis), ±5% (y-axis)

<b>HR Recognition</b>	
Technique:	Peak-Peak Detection
HR Range:	30 bpm ~ 300 bpm
Accuracy:	±1bpm
<b>ECG Unit</b>	
Leads:	Standard 7 leads
Acquisition Mode:	Simultaneously 7 leads
A/D:	12 bits
Resolution:	2.52 $\mu$ V/LSB
Time Constant:	≥3.2s
Frequency Response:	0.05Hz ~ 150Hz (-3dB)
Sensitivity:	2.5mm/mV, 5mm/mV, 10mm/mV, 20mm/mV, 10/5mm/mV, AGC
Input Impedance:	≥50M $\Omega$ (10Hz)
Input Circuit Current:	≤0.05 $\mu$ A
Input Voltage Range	≤±5 mVpp
Calibration Voltage:	1mV±3%
DC Offset Voltage:	±500mV
Minimum Amplitude:	20 $\mu$ Vp-p
Noise:	≤12.5 $\mu$ Vp-p
Multi-channel Crosstalk	≤0.5mm
AC Filter: On / Off	
DFT Filter: 0.05Hz / 0.15Hz / 0.25Hz / 0.32Hz / 0.5Hz / 0.67Hz	
EMG Filter: 25Hz / 35Hz / 45Hz / OFF	
LOWPASS Filter: 150Hz / 100Hz / 75Hz	
CMRR	≥110dB
Sampling Frequency	1000/sec/channel

<b>External Input/Output</b>	
Input	≥100k $\Omega$ ; Sensitivity 10mm/V±5%; Single ended
Output	≤100 $\Omega$ ; Sensitivity 1V/m V±5%; Single ended

**NOTE:** Operation of the equipment below the minimum amplitude may cause inaccurate results.



## Appendix 2 Abbreviation

Abbr	English
LCD	Liquid Crystal Display
BP	Blood Pressure
ECG	Electrocardiogram/Electrocardiograph
HR	Heart Rate
aVF	Left Foot Augmented Lead
aVL	Left Arm Augmented Lead
aVR	Right Arm Augmented Lead
LA	Left Arm
LL	Left Leg
RA	Right Arm
RL	Right Leg
ID	Identification
AC	Alternating Current
USB	Universal Serial Bus
AGC	Auto Gain Control
Wireless AP	Wireless Access Point