



**CREATIVE
MEDICAL**

Vital Signs Monitor

PC-900A

User Manual

Shenzhen Creative Industry Co., Ltd.

This Manual is written and compiled in accordance with the IEC 60601-1 (Medical electrical equipment Part1: General requirements for safety) and MDD 93/42/EEC. It complies with both international and enterprise standards and is also approved by State Technological Supervision Bureau. The Manual is written for the current PC-900A Vital Signs Monitor.

The Manual describes, in accordance with the Vital Signs Monitor's features and requirements, main structure, functions, specifications, correct methods for transportation, installation, usage, operation, repair, maintenance and storage, etc. as well as the safety procedures to protect both the user and equipment. Refer to the respective chapters for details.




The Manual is published in English and we have the ultimate right to explain the Manual.

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Marks in the Manual:

-  **Warning: must be followed to avoid endangering the operator and the patient.**
-  **Attention: must be followed to avoid causing damage to the monitor.**
-  **Note: some important information and tips about operations and application.**

Instructions to User

Dear Users,

Thank you very much for purchasing our product. Please read the following information very carefully before using this device.

Read these instructions carefully before using this monitor. These instructions describe the operating procedures to be followed strictly. Failure to follow these instructions can cause monitoring abnormality, equipment damage and personal injury. The manufacturer is NOT responsible for the safety, reliability and performance issues and any monitoring abnormality, personal injury and equipment damage due to user's negligence of the operation instructions. The manufacturer's warranty service does not cover such faults.

- ☼ Do not use this device in an environment with ignitable or inflammable gas.
- ☼ Do not place the monitor in any position that may cause it to fall on the patient.
- ☼ Check the safety and performance of this monitor every time before using it to ensure it works normally and safely
- ☼ Ensure the monitor is grounded reliably before using it, if the integrity of grounding connection is in doubt, the monitor should work by using the built-in battery.
- ☼ Equipment connected with this monitor should be IEC 60601-1 complied.
- ☼ Turn off the monitor and take away the sensors from the patient during MRI scanning. Otherwise it may cause burn to the patient and the quality of MRI image or the measurement accuracy of the monitor may be affected.
- ☼ Although biocompatibility tests had been done to all the applied parts, some exceptional allergic patients may still have anaphylaxis. Do NOT apply to those who suffer from anaphylaxis.
- ☼ All the cables and hoses of the applied parts should be kept away from the patient's neck to prevent any possible choke of the patient.
- ☼ All the parts of the monitor should NOT be replaced at will. If necessary, please use the components provided by the manufacturer or those of the same model and standards as the accessories along with the monitor which are provided by the same factory, otherwise negative effects concerning safety and biocompatibility, etc. may be caused.
- ☼ If the monitor falls off accidentally, please do NOT operate it until its safety and performance have been carefully tested and positive testing results obtained.
- ☼ Dispose of the device and its accessories, the local law should be followed.

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Chapter 1 Overview

1.1 Features

- ✧ End-tidal Carbon Dioxide (EtCO₂), Inspired Carbon Dioxide (InsCO₂), Respiration Rate (RR), SpO₂ and Pulse Rate (PR) are displayed by big, bright numerical LEDs;
- ✧ CO₂ waveform, SpO₂ plethysmogram and system parameters are displayed on dot matrix LCD screen;
- ✧ CO₂ measuring module with advanced technology for quick and accurate EtCO₂ and RR measurement;
- ✧ Unique SpO₂ measuring technique ensures sensitive and accurate SpO₂, PR and Perfusion Index (PI) measurement;
- ✧ EtCO₂ and SpO₂ trend graph display for latest 12, 24 or 96 hours;
- ✧ Audible & visible alarm with 3 levels of alarm events;
- ✧ Nurse call output is available;
- ✧ Built-in printer is optional to print out waveforms, and text information.

1.2 Product Name and Model

Name: Vital Signs Monitor














Model: PC-900A

1.3 Intended Use

This monitor is multi-functional equipment designed for monitoring the vital physiological signs of the patient. It is used to monitor continuous CO₂ and SpO₂, and report the End-tidal Carbon dioxide (EtCO₂), inspired CO₂ (InsCO₂), respiratory rate (RR) value, pulse oxygen saturation value (SpO₂), pulse rate (PR) and perfusion index (PI) of the intubated and non-intubated patient.

This equipment is applicable for use in hospitals in long-term realtime monitoring of CO₂ and SpO₂ during anesthesia / recovery. It can be used in various departments at hospital, such as Intensive Care Unit (ICU), Emergency Department, Respiratory Care and Operation Room. It also adapts to use in monitoring patient during inter-hospital transport and intra-hospital transport, for example road ambulance, fixed wing and rotary wing aircraft, and first-aid station.

1.4 Symbols on the Monitor

	Alarm Silence		DC Power
	Print		Type BF applied part
	Up		Type CF applied part with defibrillator protection
	OK		Warning, refer to User Manual.
	Down		Equal potential terminal
	Setup Menu		Nurse call output
	AC Power		

Chapter 2 Operating Principle

2.1 Conformation

The monitor consists of the main control unit, power supply board for CO₂, SpO₂ module, display panel, printer, power supply block, etc. and the related accessories for CO₂ sensor and SpO₂ measurement.

2.2 Overall Structure

The overall structure of the monitor is shown in Fig. 2.1.

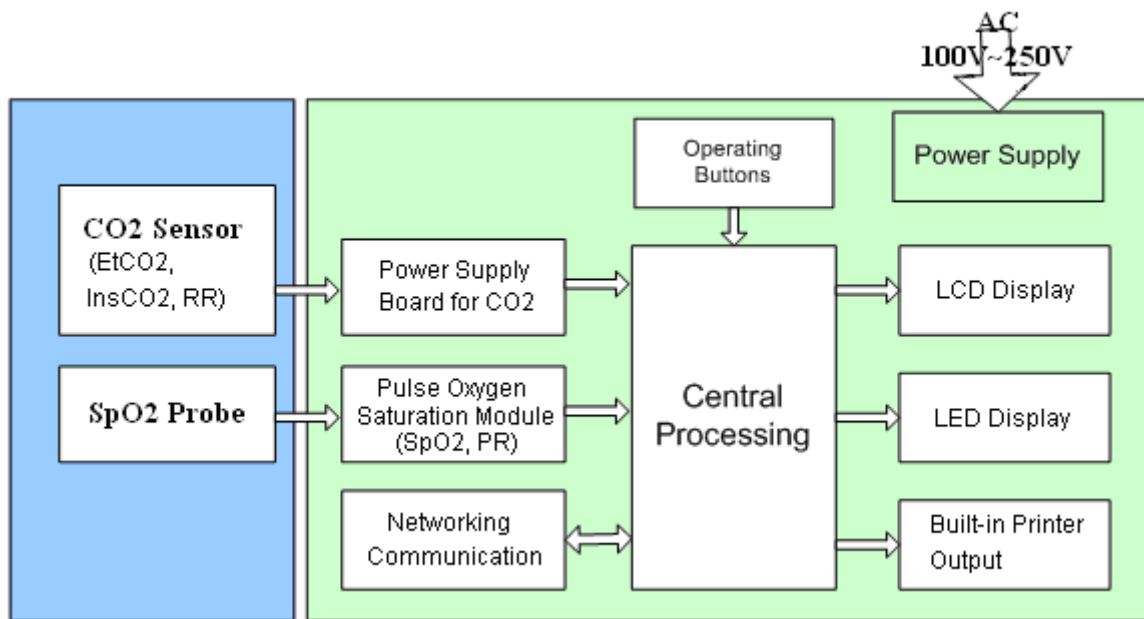


Figure 2.1

PC-900A Vital Signs Monitor is module designed product; it consists of power supply board for CO₂, CO₂ module, SpO₂ module, main control unit, built-in printer (optional), display panel, and power supply block etc.

- The CO₂ module measures EtCO₂ and InsCO₂ and calculates RR.
- Besides supplying power to CO₂ module, the power supply board for CO₂ collects all the data from the CO₂ module, including EtCO₂, InsCO₂, RR and CO₂ waveform etc.
- The SpO₂ module detects PR and SpO₂ via SpO₂ probe, and then calculates their values and provides SpO₂ plethysmogram and PI as well.
- The main control unit is in charge of LED and LCD display, keyboard input, data storage, printing, and networking function.

Chapter 3 Installation and Connection

3.1 Appearance

3.1.1 Front Panel

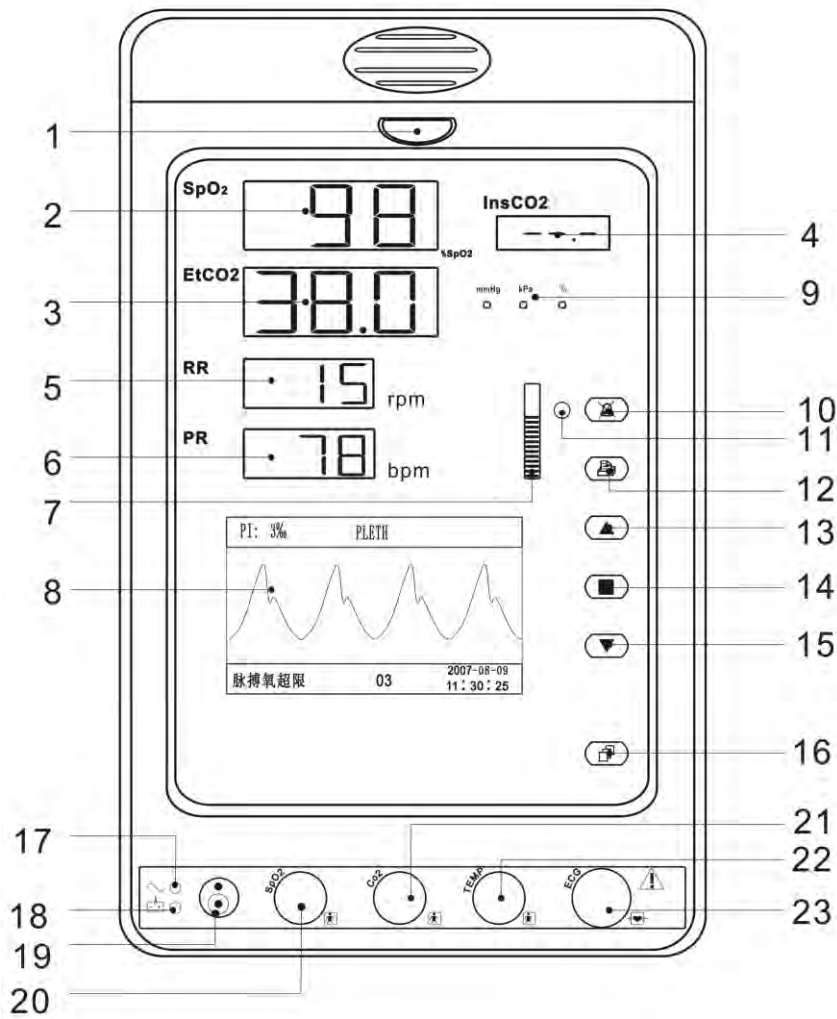











Figure 3.1 Front panel illustration


Description:

1 Alarm indicator

Alarm Indicator	Level	Events
Red flashing	High priority alarm	Exceeding the limits or low voltage
Orange flashing	Medium priority alarm	SpO ₂ probe off; No CO ₂ sensor
Green light	Normal	

- 2 **SpO₂**: display SpO₂ value; Unit: “%SpO₂”
- 3 **EtCO₂**: display EtCO₂ value;
- 4 **InsCO₂**: display InsCO₂ value;
- 5 **RR**: display respiration rate measuring value; Unit: “rpm”
- 6 **PR**: display pulse rate measuring value; Unit: “bpm (beats per minute)”.
- 7 : Bar-graph of pulse intensity
- 8 **LCD panel**
- 9 **EtCO₂ and InsCO₂ measuring unit indicator**: the unit can be set in the item of “Menu Setup→CO₂ Setup→ unit”. Three options: “mmHg”, “kPa”, “%”.
- 10  **Alarm silence key**: Enable/disable alarm silence function. When the alarm silence indicator on the left of keys is on, it means the system is in alarm silence status and it lasts for 2 minutes. When finishing counting down, the system will resume normal alarm status automatically, if alarm event occurs at this time the alarm sound will be effective again.
- 11 **Alarm silence indicator**: When it is on, it indicates that the monitor stays in alarm silence status.
- 12  **Print**: print SpO₂/CO₂ trend and waveforms.
- 13  **Up**: shift cursor forward/upward
- 14  **OK**: to perform confirmation or modification
- 15  **Down**: shift cursor backward/downward
- 16  **Display**: shift LCD display modes
- 17 : AC Power indicator
- 18 : DC Power indicator

	AC Power indicator	DC Power indicator	Descriptions
Status	ON (green)	ON (green)	The monitor is using mains power supply and the battery is full (when the battery is installed).
	OFF	ON (green)	The battery is being used
	OFF	ON (orange, blinking)	The battery is being used, but battery voltage is low, the beeper also gives warning
	ON (green)	ON (orange)	The monitor is using mains power supply and the battery is being recharged
	ON (green)	OFF	The battery is being recharged while the monitor is off.

- 19 : Power button: Press power button for 3 seconds to start the monitor or shut off the monitor.

Note: Short time pressing power button for entering the Power Saving Mode screen, then according to your need to make the device stay in the power saving mode or exit from power saving mode (this function is optional and needs hardware support).

- 20 **SpO₂**: SpO₂ sensor connector
 21 **CO₂**: CO₂ sensor connector
 22 **TEMP**: temperature probe connector (reserved)
 23 **ECG**: ECG cable connector (reserved)

3.1.2 Side Panel

The built-in thermal printer is on the left panel. It is easy for user to print waveform and data.

3.1.3 Rear Panel

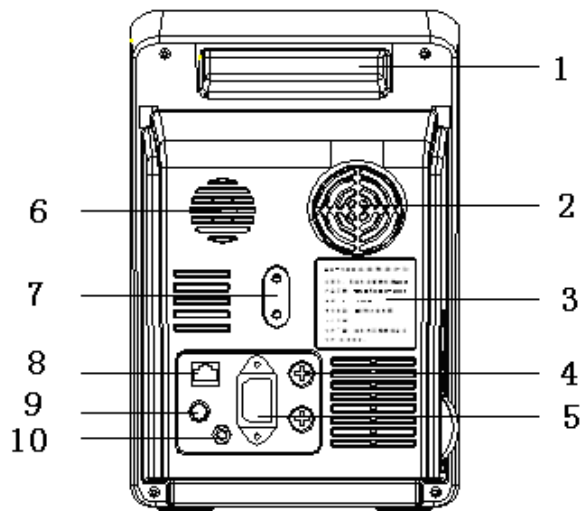



Figure 3.2 Rear Panel

Introduction to the rear panel:

- 1 **Handle**
- 2 **Fan**
- 3 **Nameplate**
- 4 **“FUSE 2×T3.15 A”**: Fuse holder. Fuse specification: T3.15AL/250V Φ5×20mm.
- 5 **“AC100~250V”** : AC power supply socket
- 6 **Loudspeaker**
- 7 **Mounting hole for hanging the monitor**
- 8 **NET**: serial communication port which is used to network with central monitoring system (optional);
- 9 **Nurse-call connector**
- 10 : Equipotential ground terminal

3.2 Installation

3.2.1 Opening the Package and Check

1. Open the package, take out the monitor accessories from the box carefully and place it in a safe stable and easy to watch position.
2. Open the accompanying document to sort the accessories according to the packing list.
 - ◆ Inspect the monitor for any mechanical damages
 - ◆ Check all the accessories for any scratch or deformity, especially on connector, wire and probe parts

If in doubt, please contact the local dealer or our company in case of any problems. We are to offer you the best solution for your satisfaction.

3.2.2 Connecting the Power Supply

1. When powered by AC mains power supply:

- ◆ Make sure that the AC mains power supply is within 100-250VAC with 50Hz or 60Hz.
- ◆ Use the power cord provided by the manufacturer. Insert one end of it to the power port of the monitor and the other end to the single-phase mains power outlet with protected earth.
- ◆ Caution: if necessary, make the monitor grounded properly by the provided grounding wire.

2. When powered by built-in battery

- ◆ Install battery: refer to Chapter 3.3.4 Battery Installation.
- ◆ Caution: it's better to recharge the battery after it is used up, the charging time should be 13~15 hours long.

3.2.3 Starting the Monitor

The system performs self-test and enters initial display after switching on the monitor, and the orange alarm indicator blinks to inform that the user can begin operating it.

- ◆ Check all the applicable functions to make sure that the monitor works normally.
 - ◆ If the battery is applied please recharge it after using the monitor to ensure sufficient power storage.
- 🔔 Do not use the device to monitor the patient if the device appears obvious damage or indication of fault. Please contact the local dealer or our company.
- 🔔 After the monitor is switched off, it's recommended to delay 1 minute to start it again.

3.3 Sensor Placement and Connection

3.3.1 CO₂ Sensor Connection

3.3.1.1 Sidestream CO₂ Sensor Connection

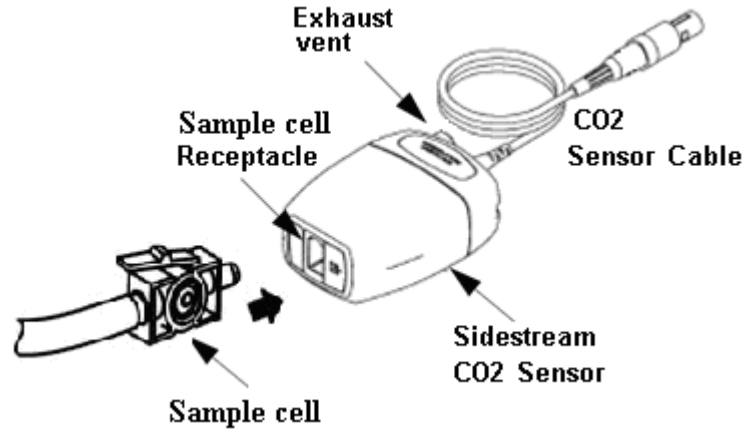


Figure 3.3 Demonstration for Sidestream CO₂ Sensor Connection

1. Take out the CO₂ Sensor and insert the CO₂ Sensor Cable into the connector labeled “CO₂” on the connector panel of the monitor.
2. The sample cell of the sampling cannula must be inserted into the sample cell receptacle of the CO₂ Sensor as shown in Figure 3.3. A “click” will be heard when the sample cell is properly inserted. Then connect to airway tube. After finishing sensor connection, and make sure that the air input end is exposed to room air and away from all sources of CO₂, including the ventilator, the patient’s breath and your own. Next, turn on the CO₂ switch at CO₂ Setup Screen and then wait 2 minutes for the sensor warm-up.

3. Default Tubing Configuration

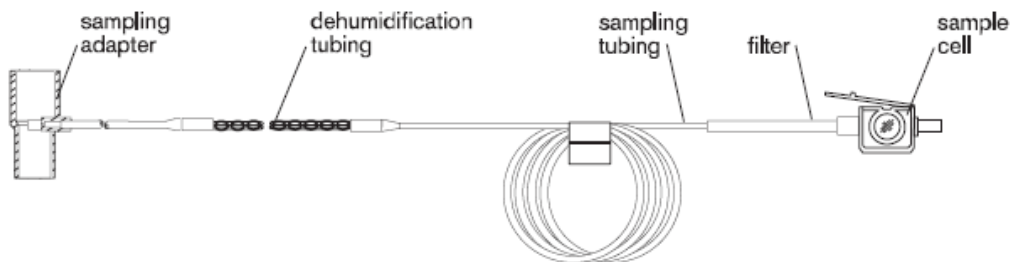


Figure 3.4 Sampling line kit (Single patient use)

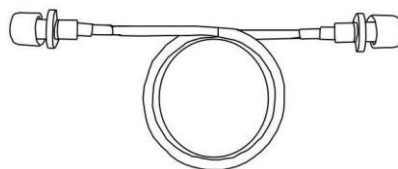


Figure 3.5 Extending airway tube for connecting to sampling tube (Single patient use)

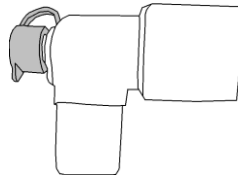


Figure 3.6 Wye Connector

4. Optional sampling cannula kits

(1) T connector sampling cannula kits

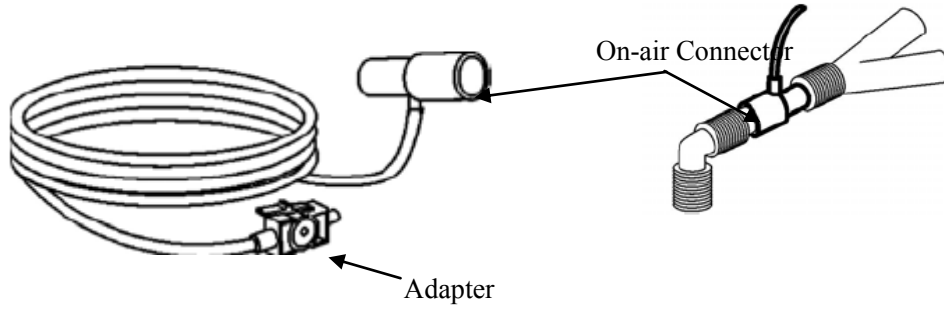


Figure 3.7

(2) Nasal Sidestream Cannula Kits

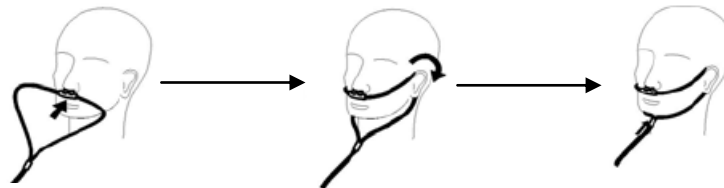


Figure 3.8

(3) Oral Sidestream Cannula Kits

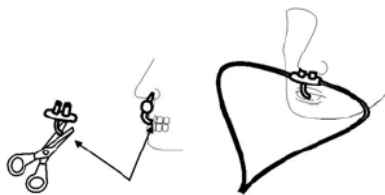


Figure 3.9

3.3.1.2 Mainstream CO₂ Sensor Connection

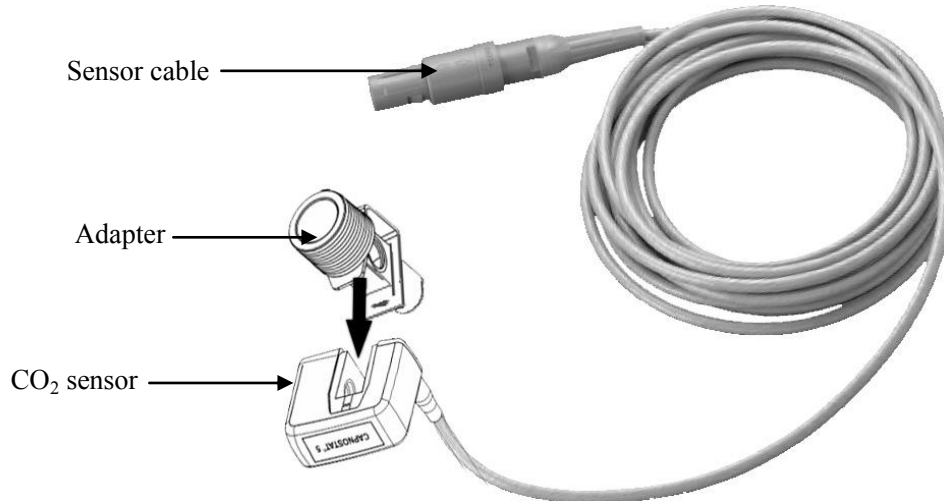


Figure 3.10 Demonstration for Mainstream CO₂ Sensor Connection

1. Take out the CO₂ Sensor and insert the CO₂ Sensor Cable into the connector labeled “CO₂” on the connector panel of the monitor;
2. Snap the CO₂ sensor onto the airway adapter as shown in Figure 3.10. A “click” will be heard when the airway adapter is properly inserted.
3. Position the airway adapter in the patient’s respiratory circuit (as close to the patient as possible) between the endotracheal tube and the ventilator circuit. Next, turn on the CO₂ switch at CO₂ Setup Screen and then wait 2 minutes for the sensor warm-up.

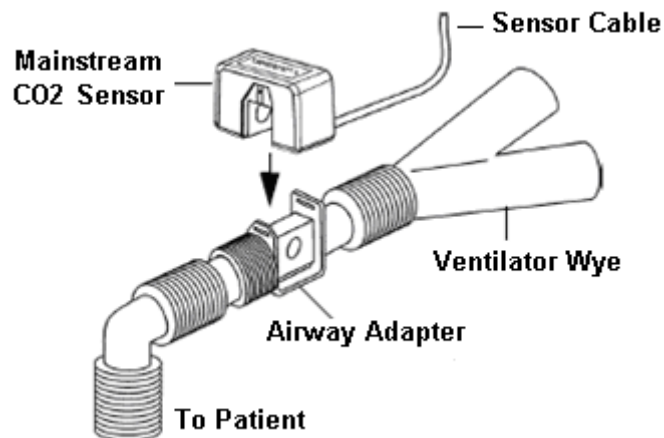


Figure 3.11

Safety Introductions for CO₂ Monitoring

- * CO₂ Sensor is a precision measuring part, please use it correctly and store it properly;
- * Precautions for electrostatic discharge (ESD) and electromagnetic interference (EMI) to and from other equipment.
- * Failure of Operation: If the CO₂ Sensor fails to respond as described in this user manual; DO NOT use it until approved for use by qualified personnel.
- * DO NOT position the sensor cables or tubing in any manner that may cause

entanglement or strangulation.

- ☼ Support the airway adapter to prevent stress on the ET tube.
- ☼ Reuse, disassembly, cleaning, disinfecting or sterilizing the single patient use CO₂ airway adapters may compromise functionality and system performance leading to a user or patient hazard. Performance is not guaranteed if an item labeled as single patient use is reused.
- ☼ Inspect the sidestream on-airway adapters and sidestream sampling kits for damage prior to use. DO NOT use the sidestream on-airway adapters and sidestream sampling kits if they appear to be damaged or broken.
- ☼ If the CO₂ waveform (Capnogram) appears abnormal, inspect the CO₂ airway adapters and replace if needed.
- ☼ Periodically check the CO₂/Flow sensor and tubing for excessive moisture or secretion buildup. Do not use then if there is excessive moisture or exterior condensation.
- ☼ Electric Shock Hazard: The CO₂ Sensor contains no user serviceable parts.
- ☼ Refer service to qualified service personnel. Do not open the sensor cabinet at will, as electric shock hazard may occur.
- ☼ Place the exhaust vent of the CO₂ Sensor in drafty ambient and do not let anything block the exhaust vent.
- ☼ Always disconnect the CO₂ Sensor before cleaning. Do NOT use if it appears to have been damaged. Refer servicing to qualified service personnel.
- ☼ DO NOT sterilize or immerse the CO₂ Sensor in liquids.
- ☞ When changing sampling tube, it is suggested choosing the default sampling tube with dehumidifying function. The sampling tube without dehumidifying function may be easily blocked by excessive moisture. (Use life: ordinary sampling tube: 6~12hours; the sampling tube with dehumidifying function: about 120hours.)
- ☞ If the measurement appears abnormality caused by sampling tube block, please replace it.
- ☞ The total length of the sampling tube and extending airway tube shouldn't be longer than 3 meters, too long may cause measurement abnormality. If using T connector sampling cannula kits, please insert the sampling tube with the tubes upward to avoid the affects of excessive moisture;
- ☞ Altitudes are different in different area, so set the Barometric Pressure setting value as the ambient barometric pressure.
- ☞ When stopping CO₂ monitor, please disconnected the CO₂ sensor from the patient monitor.

3.3.2 SpO₂ Sensor Connection

SpO₂ sensor is a very delicate part. Please follow the steps and procedures in operating it. Failure to operate it

correctly can cause damage to the SpO₂ sensor.

Operation procedure:

1. Connect the SpO₂ sensor to the connector labeled “SpO₂”. **When unplugging the probe, be sure to hold the head of the connector and pull it out.**
2. If the finger clip SpO₂ sensor is used, insert one finger into the sensor (index finger, middle finger or ring finger with short nail length) as shown in the figure below.

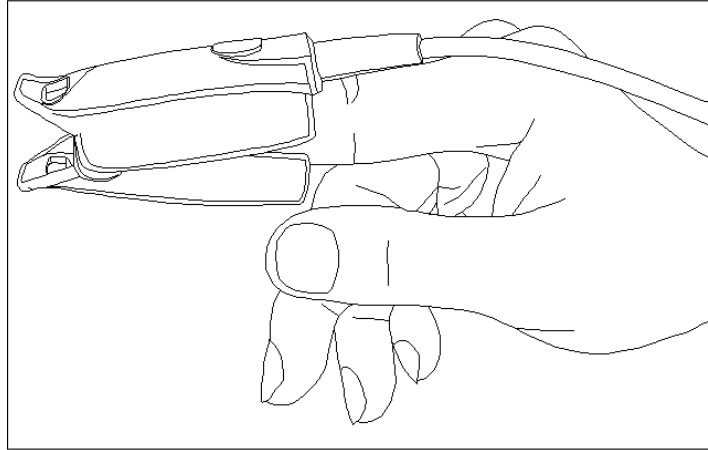


Figure 3.12 Finger clip SpO₂ sensor placement

3. If the neonate SpO₂ sensor is used, please follow Figure 3.13 to connect.

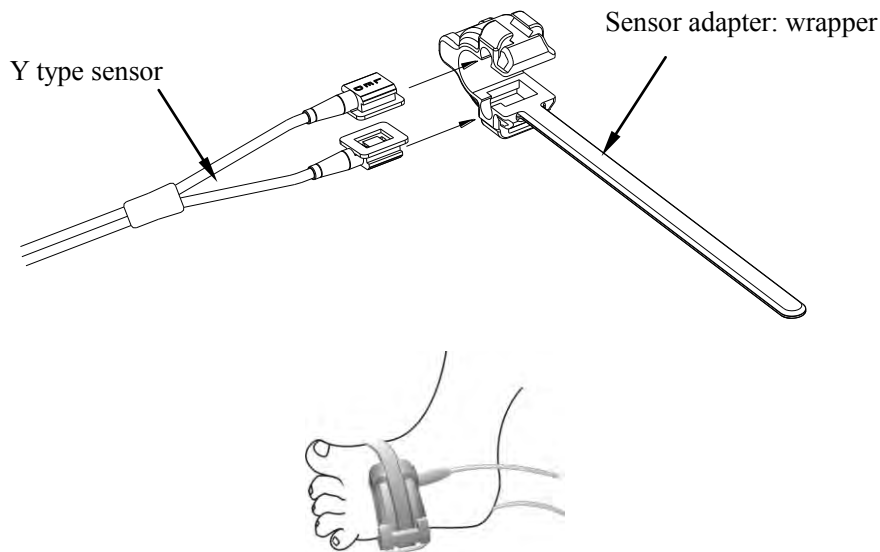


Figure 3. 13 Neonate SpO₂ sensor placement

Safety Introductions for SpO₂ Monitoring

- ☛ Continuous use of finger clip SpO₂ sensor may result in discomfort or pain, especially for those patients with microcirculatory problem. It is recommended that the sensor should NOT be applied to the same finger for over two hours.
- ☛ SpO₂ measuring position must be examined more carefully for some special patient. Do NOT place the SpO₂ sensor on the finger with edema or fragile tissue.
- 🔔 Please do not allow the cable to be twisted or bended.

- 🔔 Do NOT put the SpO₂ sensor and pressure cuff on the same limb, otherwise the NIBP measuring will affect SpO₂ measuring and cause the alarm error.
- 🔔 Using nail polisher or other cosmetic product on the nail may affect the accuracy of measurement.
- 🔔 The fingernail should be of normal length.
- 🔔 Do NOT use the damaged SpO₂ sensor.
- 🔔 The SpO₂ sensor can not be immersed into water, liquor or cleanser completely, because the sensor has no capability of waterproofness.

3.3.3 Loading printing paper

Operation procedures for loading printing paper:

1. Press both "OPEN" notches with force on printer shield with two thumbs to open it.
2. Move the tab of rubber roller lock at the left 90° upwards to unlock it, refer to the following figure with mark ①.
3. Cut one end of the paper into triangle, and load the paper from the underside of the rubber roller.
4. Turn the roller clockwise to get the paper rolled, and put the paper roll into the compartment.
5. Pull the paper out of paper slot on the shield.
6. Move the tab of the rubber roller lock 90° downwards to lock it.
7. Put the shield back in position and secure it.

Operation procedures for taking out printing paper roll:

- 1~2 steps are the same with the 1~2 steps mentioned above for loading printing paper.
3. Roll the loading roller anti-clockwise and pull the paper out.
- 4~5 steps are the same with the 6~7 steps mentioned above for loading printing paper.

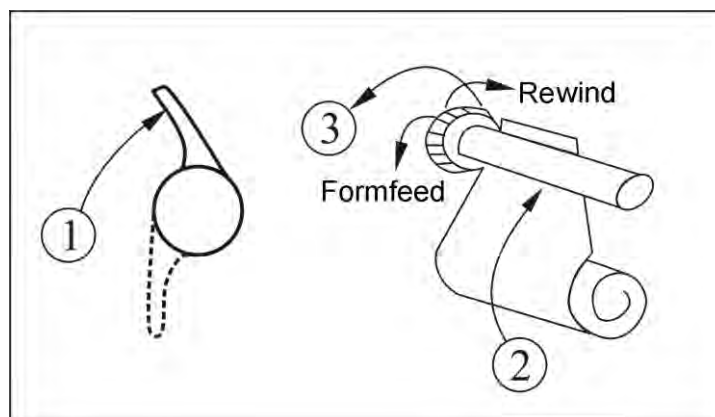


Figure 3.14 Loading and taking out printing paper

3.3.4 Battery Installation

1. Ensure that the monitor is not connected to AC power supply and the monitor is turned off.
2. Open the battery cover and place the battery in the direction as shown in Fig. 3.15 to insert the battery into any one of battery compartments. Do not insert battery with their polarities reversed.
3. Move the battery baffle to secure battery.

4. Close the battery cover.

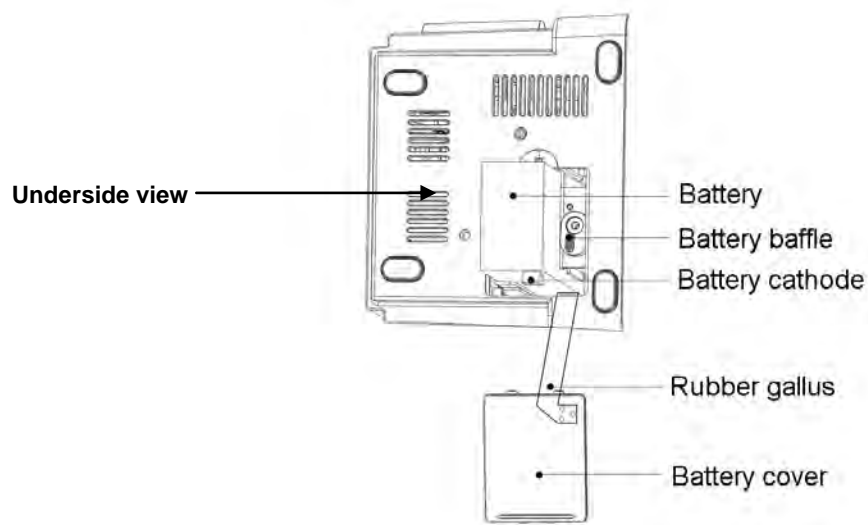


Figure 3.15 Battery Installation

Note:

- **Do not insert battery terminal with its polarities reversed, or the monitor can not be started.**
- **Please take out the battery before transport or storage.**

Chapter 4 Operations

4.1 Initial Monitoring Screen

Insert the SpO₂ sensor cable into the connector labeled “SpO₂”, follow the instructions of Section 3.3.1 to connect the SpO₂ sensor and its accessories, and then connect to patient well. The LCD will display the initial monitoring screen, and it is the default display screen as well.

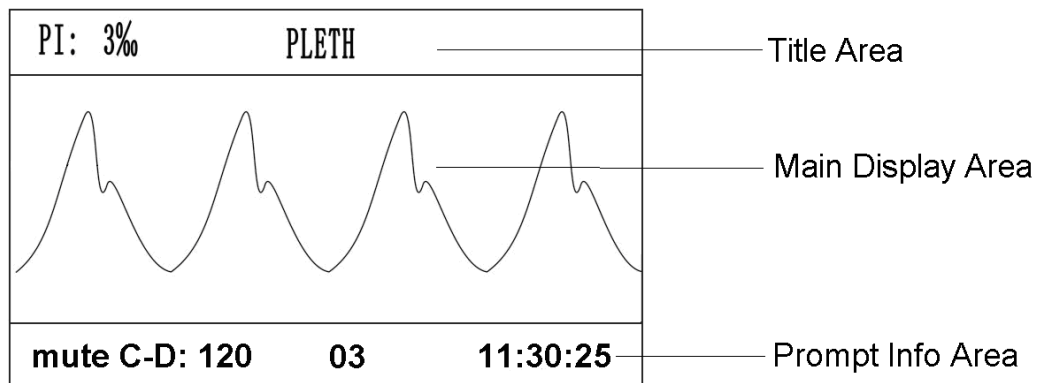



Figure 4.1 Default Display Screen

The LCD screen will display the information by different display views, short pressing “

4.1.1 Screen Description

Title area (See Figure 4.1):

- ✧ “**PI: 3%**”: the perfusion index is 3%; it displays only when “Setup Menu→SpO₂→PI Display” is set as “ON”.
- ✧ “**PLETH**”: Mark of SpO₂ plethysmogram, when “PLETH” displays in title area, the main display area will be SpO₂ plethysmogram and this display screen is the default screen.

Main display area (See Figure 4.1):

When SpO₂ sensor is placed on the patient and connected to the monitor well, a trace of sweeping waveform (plethysmogram) will be displayed in the main display area (as shown in Figure 4.1).

If the SpO₂ sensor is disconnected from the monitor or off from the patient, the plethysmogram will become a base line in main display area and “Probe off” will appear at the left side of prompt info area (as shown in Figure 4.2).

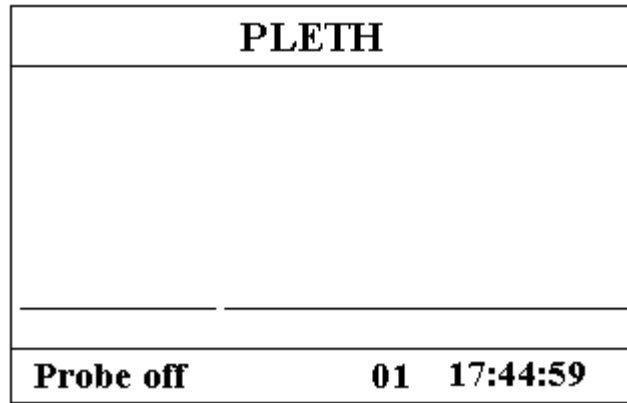


Figure 4.2 Probe Off

Prompt Info Area (See Figure 4.1):

- ✧ **Status or event indication segment:**

This segment will display the probe status, CO₂ sensor status, alarm silence counting-down timer, over limit warning and other error messages for technical warning. If more than one event occurs or more status appears, the indication message will be displayed alternately at this segment.

“**mute C-D: XXX**”: the counting-down timer of alarm silence is XXX seconds. This prompt message appears only when the alarm silence is enabled.

Note: refer to Appendix I for detailed explanations.




- ✧ **Patient ID segment:**

“**03**”: Patient ID number.


- ✧ **Real time clock segment:**

“**11:30:25**”: the current time.

4.1.2 Operation Instructions

- ✧ “” key: press this key to shift display mode.
- ✧ “” key: press it to print a trace of SpO₂ plethysmogram, press it again to stop printing.
- ✧ “” key: press it to enable/disable alarm silence.

4.2 CO₂ Monitoring Screen

Insert the CO₂ sensor cable into the connector labeled “CO₂”, follow section 3.3.1’s instruction to connect the CO₂ sensor and its accessories, and then connect to patient well, next turn on the CO₂ Switch Short time press “ Display” key to shift the screen view to CO₂ monitoring screen, as shown in Figure 4.3.

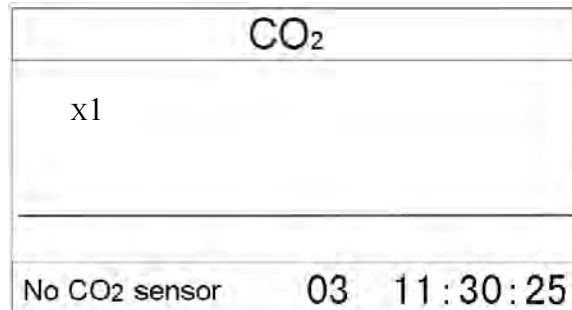


Figure 4.3 CO₂ Monitoring Screen (No CO₂ sensor)

If the CO₂ sensor cable is disconnected from the monitor, the CO₂ waveform will become a base line in main display area (as shown in Figure 4.3). When CO₂ tube is attached on the patient and CO₂ sensor cable is connected to the monitor well, CO₂ waveform will be displayed in the main display area (as shown in Figure 4.4).

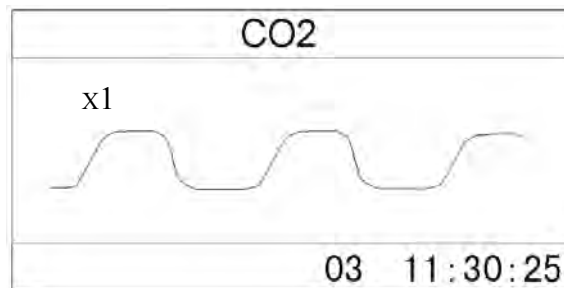


Figure 4.4 CO₂ Monitoring Screen

4.2.1 Screen Description

Title area:

- ✧ “CO₂”: indicate the current waveform displayed is CO₂ waveform.

Main display area:

- ✧ “×1”: CO₂ waveform scale. Three options: “×1/2”- waveform reduced to half of nominal scale; “×1”- nominal waveform scale; “×2”- waveform with doubled scale;
- ✧ CO₂ waveform will be displayed in the main display area. If the CO₂ sensor cable is disconnected from the monitor, the CO₂ waveform will become a base line in main display area (as shown in Figure 4.3).

Prompt Info Area






- ✧ **Status or event indication segment:**

If the CO₂ sensor cable is disconnected from the monitor, the CO₂ waveform will become a base line


in main display area and “No CO₂ sensor” will appear at the left side of prompt info area (as shown in Figure 4.3).

Note: CO₂ sensor needs to warm up. Prior to CO₂ measurement, please wait for sensor warm-up. Otherwise, the measuring result may be inaccurate.

4.2.2 Operation Instructions

- ◇ “” key: press this key to shift display mode.
- ◇ “” key: press it to print a trace of CO₂ waveform, press it again to stop printing.
- ◇ “” key: press it to enable/disable alarm silence.
- ◇ “” key or “” key: press it to change CO₂ waveform scale. It can also be set in the item of “Menu Setup→CO₂ Setup→ Gain”.

4.3 Trend Graph Display

Short pressing “ Display” key to shift the screen view to trend graph display screen, as shown in Figure 4.5.

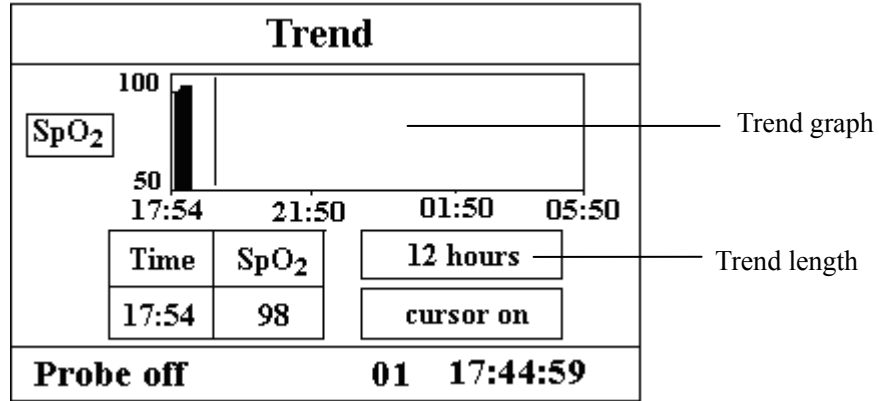








Figure 4.5 SpO₂ Trend Graph

4.3.1 Screen Description

- ✧ “12 hours”: the trend length of trend graph; three options: “12”, “24” or “96” hours; when the selection is 12 hours, the upper trend graph will display SpO₂ trend curve for last 12 hours.
- ✧ “cursor on”: enable the display of cursor on trend graph, i.e. the vertical cursor line displayed in trend graph, so the user can move the cursor to inspect the SpO₂ value at the given time.
- ✧ “”: indicate that the trend graph beside it is SpO₂ trend. Let the cursor stay here and press “” key to confirm, then press “” key or “” key again to select trend graph type:

“”: SpO₂ trend graph

“”: EtCO₂ trend graph, as shown in Figure 4.6.

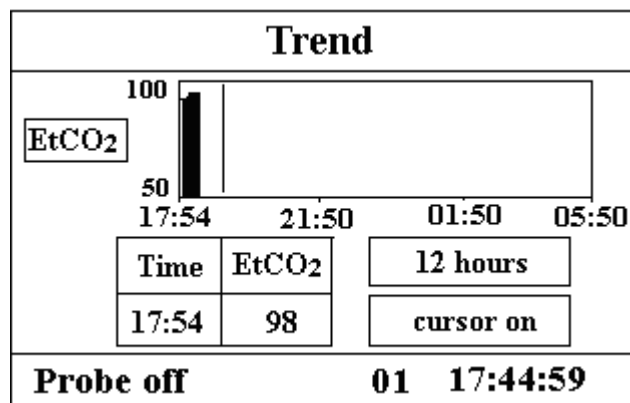




Figure 4.6 CO₂ Trend Graph

4.3.2 Operation Instructions




1. Press “” key or “” key again to select trend graph type “EtCO₂” or “SpO₂”.

2. Then press “▲” key or “▼” key to highlight “trend length” or “cursor on” selection.
3. Press “■” key to confirm.
4. Press “▲” key or “▼” key again to select value of trend length (12/24/96 hours) if the selecting box stays in “trend length” option, or to move the cursor if the selecting box stays in “cursor on” option.


Instructions for viewing the trend curve:

- Select “cursor on” and press “■” key to confirm, and “cursor on” becomes “cursor off” , then you can press “▲” key or “▼” key to move the vertical cursor, the list box below will display SpO₂/ EtCO₂ value and the time value at the point where the cursor stays. Move cursor back and forth this way, you can view the SpO₂/ EtCO₂ trend (12/24/96 hours long). Press “■” key again to exit trend viewing.
- When pressing “▲” key or “▼” key to move cursor, the moving step is variable. The rule is that the initial step is 1 point, after pressing “▲” or “▼” key towards the same direction for 5 times, the step becomes 5 points, and with 5 more pressing the step becomes 10, then 20. No matter what step is, as long as you press “▲” or “▼” key towards the other direction, the step becomes 1 and towards the other direction.

5. press:

- “” key: press this key to shift display mode
- “” key: press it to print the current displayed trend graph.
- “” key: press it to enable/disable alarm silence.



4.4 Setup Menu Screen


At any display view screen, long time press “ Display” key to shift the screen to Setup Menu screen, as shown in Figure 4.7. All the functional parameters of the system can be set through Setup Menu.

Setup Menu	
CO ₂	Patient Info
SpO ₂	Date / Time
Nurse Call	Default
System	
Probe off	01 19:56:07

Figure 4.7 Setup Menu Screen

There are 7 functional groups for setting parameters: “CO₂, SpO₂, Nurse Call, System, Patient Info, Date/Time and Default” on the Setup Menu Screen.

1. Press “▲” key or “▼” key to shift cursor to corresponding functional group setting.
2. Press “■” key to confirm and enter into corresponding functional parameter setup screen.
3. Press “” key, under the setup menu or its submenu, the SpO₂ waveform will be printed.
4. Press “” to exist from Setup Menu Screen.

Note: At Setup Menu Screen or its submenu screen, when pressing “” key, the default display screen will be printed.

The following will cover each functional parameter’s setting up.

4.4.1 CO₂ Setup



CO ₂ Setup			
Switch	<input type="text" value="off"/>	unit	<input type="text" value="mmHg"/>
Et	<input type="checkbox"/> 	Hi	<input type="text" value="70"/> <input type="text" value="10"/>
RR	<input type="checkbox"/> 	Hi	<input type="text" value="40"/> <input type="text" value="10"/>
Gain	<input type="text" value="X1"/>	Baro	<input type="text" value="760"/> >>
Probe off		01 19:30:07	

Figure 4.8A CO₂ Setup I







CO ₂ Setup			
Zero	<input type="text" value="off"/>	Balance	<input type="text" value="16"/>
Agent	<input type="text" value="off"/>	Apnea	<input type="text" value="20"/>
Probe off		01 19:30:09	


Figure 4.8B CO₂ Setup II



Screen Description:

- ◇ “Switch”: choosing the mode of CO₂. It is recommended that the switch is turned on only when

there is a need to monitor CO₂ parameter. This can not only reduce the power consumption and also extend the life of the CO₂ module.

- ✧ **“Unit”**: choosing the EtCO₂ and the minimum InsCO₂. It can be set as kPa, mmHg, and %.
- ✧ **“Et  ”**: EtCO₂ alarm switch; “ ” indicates EtCO₂ alarm is on; “ ” indicates EtCO₂ alarm is off.
- ✧ **“Et High”**: Setting the upper/lower alarm limit of EtCO₂. Range: “1~160”mmHg
- ✧ **“Et Low”**: Setting the upper/lower alarm limit of EtCO₂. Range: “0~159”mmHg
- ✧ **“RR  ”**: respiration rate alarm switch; “ ” indicates respiration rate alarm is on; “ ” indicates respiration rate alarm is off.
- ✧ **“RR High”**: Setting the upper alarm limit of respiration rate. Range: “1~150” rpm
- ✧ **“RR Low”**: Setting the lower alarm limit of respiration rate. Range: “0~149”rpm
- ✧ **“Gain”**: CO₂ waveform scale:
 - “×1/2”- waveform reduced to half of nominal scale
 - “×1”- nominal waveform scale “×2”- waveform with doubled scale
- ✧ **“Baro” (barometric pressure)**: set ambient barometric pressure. It can be determined by barometer or the ambient altitude. Altitude can be used to determine the typical barometric pressure if a barometer is not available, refer to Appendix Typical Pressures and CO₂ Readings at Altitudes for details. Range: “400~850”mmHg.

Note: When the cursor stays at “Baro” item, press “ ” key to move cursor to next item at another “CO₂ Setup” screen view as shown in Figure 4.7B CO₂ Setup.

- ✧ **“>>”**: Page down icon. When cursor stays in the Baro filed, press “ ” key to enter CO₂ Setup II screen.
- ✧ **“Zero” (CO₂ Zero)**: The CO₂ zero must be carried out in a drafty place. Set the option as “on” and press “ ” key to conform, and then the result will be displayed on the screen several seconds later. When the CO₂ zero is done successfully, the set of this item will automatically change to “off” and the corresponding information will display in prompt info area.

Note: you should perform CO₂ zero only when “Need CO₂ zero” prompts on the screen. Otherwise, it is unnecessary to perform this operation.

- ✧ **“Balance” (balance gas)**: adjust the concentration of balance gas. Use this setting to correct for the compensation of the gas mixture administered to the patient. Range: “0~100”%
- ✧ **“Agent” (Anesthetic agent)**: select whether the anesthetic gas is supplied to patient, two options: “on” or “off”. Use this setting for ensuring the accuracy CO₂ monitoring when the anesthetic gas is supplied to patient.
- ✧ **“Apnea”**: Use this setting 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 monitor will signal no breaths detected. At this time all the measuring values will be cleared. Range: “10~60”s, the default is “20”s.

Operation Instructions

1. Press “▲” key or “▼” key to move cursor to select parameter.
2. Press “■” key to confirm and active this parameter setting.
3. Press “▲” key or “▼” again to adjust or modify parameter value.
4. Press “■” key again to confirm and save the setting.
5. After setting, press “☐” key to return to upper level screen.

4.4.2 SpO₂ Setup

SpO ₂ Setup					
SpO ₂	<input checked="" type="checkbox"/>	Hi	<input type="text" value="100"/>	Lo	<input type="text" value="90"/>
PR	<input checked="" type="checkbox"/>	Hi	<input type="text" value="180"/>	Lo	<input type="text" value="40"/>
PI display	<input type="text" value="off"/>				
Probe off		01 19:30:07			

Figure 4.9 SpO₂ Setup Screen

Screen Description:

- ◇ “SpO₂ ”: SpO₂ alarm switch; “” indicates SpO₂ alarm is on; “” indicates SpO₂ alarm is off.
- ◇ “SpO₂ Hi”: high limit of SpO₂ alarm; range: “1~100”.
- ◇ “SpO₂ Lo”: low limit of SpO₂ alarm; range: “0~99”.
- ◇ “PR ”: pulse rate alarm switch; “” indicates PR alarm is on; “” indicates PR alarm is off.
- ◇ “PR Hi”: high limit of PR alarm; range: “22~250” bpm.
- ◇ “PR Lo”: low limit of SpO₂ alarm; range: “0~248” bpm.
- ◇ “PI display”: “on” means PI display is enabled; “off” means PI display is disabled.

4.4.3 Nurse Call

Nurse Call				
Output level	<input type="text" value="low"/>			
Source:	ALM	<input type="checkbox"/> H	<input type="checkbox"/> M	<input type="checkbox"/> L
Duration	<input type="text" value="pulse"/>			
Probe off		01 20:14:50		

Figure 4.10 Nurse Call Setup Screen

- ✧ **“Output level”**: two options “low” or “high” output levels are available.

When the calling system in hospital works in “Normal Open” mode, “low level” should be selected.

When the calling system in hospital works in “Normal Close” mode, “high level” should be selected

- ✧ **“Source”**: three kinds of alarm sources can trig the nurse call: high level alarm, medium level alarm and low level alarm (multi-optional). If you don’t make choice, nurse call signal will not be sent out.
- ✧ **“Duration”**: two options “pulse” or “continuous” output modes are available;

“continuous”: the continuous mode of output means the nurse call signal will keep until the selected alarm source(es) disappear, i.e. the signal will last from starting alarm to stopping alarm.

“pulse”: the output nurse call signal is pulse signal which lasts for 1 second. When several alarms occur at the same time, only one pulse signal will be sent out.

Note:

Nurse Call function can not be regarded as main alarm notice method, please do not entirely relay on it. You should combine parameter values with alarm level and patient’s clinical behavior and symptom to determine patient’s status.

4.4.4 System Setup

System Setup			
VOL	00	key beep	off
LANG	ENG	priority	PR
backlite	on	contract	07
care mode	Demo	BT SD	on
Probe off		01	20:14:50

Figure 4.11 System Setup Screen

- ✧ **“VOL”**: set beeper volume, “0~7” level adjustable, the set “0” i.e. no sound.
- ✧ **“key beep”**: to turn on/off key beep;
- ✧ **“LANG”**: language selection. Two options: “ENG” for English or “CHN” for Chinese.
- ✧ **“priority”**: priority of PR value source displayed on the numerical LED. The default set is PR, it can not be set.
- ✧ **“backlite”**: turn on/off backlight;
- ✧ **“contract”**: adjust LCD display contract, “0~31” level adjustable;
- ✧ **“care mode”**: “Demo” shows the demo waveforms and data. In the demo state, all the signals and data are generated from the patient monitor for demonstration and testing purpose. “Real” shows the real time waveform, i.e. normal monitoring status;
- ✧ **BT SD**: turn on/off the pulse beeping sound.

4.4.5 Patient Info

Patient Info		
ID	01	
Probe off	01	12:14:50

Figure 4.12 Patient Info Screen

- ◇ “ID”: change or set current patient’s ID number, 01~100 adjustable;

Note: If the patient ID is changed, all the history data will be cleared, that means SpO₂ trend graph and EtCO₂ trend graph will become empty.

4.4.6 Date/Time

Date / Time					
yy	07	mm	09	dd	21
hh	10	mm	15	ss	20
Probe off	01	12:17:50			

Figure 4.13 Data/Time Setup Screen

- ◇ “yy 07 mm 09 dd 21”: date setting, “07-09-21” shows the date is September 21st, 2007.
- ◇ “hh 10 mm 15 ss 20”: time setting, “10:15:20” shows the time is 10:15:20.

4.4.7 Recover Default Settings

On Setup Menu screen, press “▲” button or “▼” button to shift cursor to “Default”, and then press “■” button, all the setting parameters will be reset to factory default setting value.

Chapter 5 Technical Specifications

5.1 CO₂ Monitoring

- A. Technology: Infrared absorption method.
- B. Mode of Sampling : Sidestream or Mainstream
- C. Measuring parameters: Respiration Rate, EtCO₂ and InsCO₂.
- D. CO₂ Response Time:
 - Sidestream: <3seconds (includes transport time and rise time).
 - Mainstream: <60ms (rise time)
- E. Typical measurement range:
 - EtCO₂:0~150mmHg
 - InsCO₂:3~50mmHg
 - Respiration Rate:2~150bpm (Sidestream) or 0~150bpm (Mainstream)
- F. CO₂ Accuracy: 0~40mmHg ±2mmHg
 - 41~70mmHg ±5% of reading
 - 71~100mmHg±8% of reading
 - 101~150mmHg±10% of reading

*NOTE: Gas temperature at 25°C for Sidestream;
Gas temperature at 35°C for Mainstream
- G. CO₂ Resolution: 0.1mmHg (0~69mmHg) 0.25mmHg(70~150mmHg)
- H. Flow rate: 50ml/min ±10 ml/min (Sidestream)

5.2 SpO₂ Monitoring and Pulse Rate Monitoring

- A. Sensor: dual-wavelength LED
- B. SpO₂ measurement range: 35%~99%
- C. SpO₂ measurement accuracy:
 - 75% - 99% ±2%
 - 50% - 74% ±3%
- D. Pulse rate measurement range: 30bpm~240bpm
- E. Pulse rate measurement accuracy: ±2bpm or 2% whichever is greater.
- F. Performance under low perfusion condition
 - The measurement accuracy still keeps the above specification while the blood perfusion index is as low as 0.4%. Display range of Perfusion Index: 0.2%~20%

5.3 Recorder

- A. Recording speed: 25mm/s

B. Recording speed accuracy: $\leq 5\%$

5.4 Power Requirement

- A. AC power supply voltage: 100~250VAC
- B. AC power frequency: 50/60 Hz
- C. Fuse specification: T3.15AL/250V $\Phi 5 \times 20$ mm.
- D. Internal power supply: 12VDC (rechargeable)
- E. Internal power supply: rechargeable sealed lead-acid battery, 12V 2.3AH

5.5 Environmental Requirement

Operating Environment

Ambient temperature range: 5°C ~ 40°C
 Ambient relative humidity range: 30% ~ 80%
 Atmospheric pressure: 70kPa ~106kPa

Transport and Storage Environment

Ambient temperature range: -20°C ~ 60°C
 Relative humidity: 10%~ 90%
 Atmospheric pressure: 53kPa ~106kPa

5.6 Classification

Complied Safety standard	IEC 60601-1
The type of protection against electric shock	Class I equipment.
The degree of protection against electric shock	Type BF applied part

5.7 Default Alarm Limits and Setting Ranges

Parameter	Settings	Alarm range	Default
	RR	High	(1~150) rpm
Low		(0~149) rpm	10rpm
EtCO ₂	High	(0~160) mmHg	70mmHg
	Low	(0~159) mmHg	10mmHg
SpO ₂	High	1%~100%	100%
	Low	0%~99%	90%
PR	High	(22~250) bpm	180bpm
	Low	(20~248) bpm	40bpm

Chapter 6 Packaging and Accessories

6.1 Packaging

The product is packed in high quality corrugated cartons with foam inside to protect the equipment against damage in the shipping and handling process.

Weight: Details see the indication on the outer package.

Dimension: 360(L)×320(W)×410(H) (mm)

6.2 Accessories

For Mainstream		For Sidestream	
Mainstream sensor (CAPNOSTAT 5)	One set	Sidestream Sensor (LoFlo C5)	One set
Airway adapter	One piece	Sampling Line Kit	One piece
SpO ₂ probe	One piece	SpO ₂ probe	One piece
Power cord	One piece	Power cord	One piece
Grounding wire	One piece	Grounding wire	One piece
User manual	One copy	User manual	One copy
Warranty	One copy	Warranty	One copy
Quality Certificate	One copy	Quality Certificate	One copy
Dust cover	One piece	Dust cover	One piece
Packing list	One copy	Packing list	One copy

Note: The accessories are subject to change. Detailed items and quantity see the Packing List.

Chapter 7 Working Principle

7.1 CO₂ Measurement

7.1.1 Working Principle

The principle is based on the fact that CO₂ molecules absorb infrared light energy of specific wavelengths, with the amount of energy absorbed being directly related to the CO₂ concentration. When an IR light beam is passed through a gas sample containing CO₂, the electronic signal from a photodetector (which measures the remaining light energy), can be obtained. This signal is then compared to the energy of the IR source, and calibrated to accurately reflect CO₂ concentration in the sample. To calibrated, the photodetector's response to a known concentration of CO₂ is stored in the monitor's memory.

The monitor determines CO₂ concentration in the breathing gases by measuring the amount of light absorbed by these gases. EtCO₂ is display as a numerical value in millimeters of mercury (mmHg), percent (%), or kilopascals (kPa). In addition, a CO₂ waveform (capnogram) may be displayed which is a valuable clinical tool that can be used to assess patient airway integrity and proper endotracheal tube placement. Respiration rate is calculated by measuring the time interval between detected breaths.

7.1.2 Mainstream vs. Sidestream Sampling

Mainstream CO₂ sensors are placed at the airway of an intubated patient, allowing the inspired and expired gas to pass directly across the IR light path. The major advantages of mainstream sensors are fast response time and elimination of water traps.

Sidestream CO₂ sensors are located away from the airway, requiring a gas sample to be continuously aspirated from the breathing circuit and transported to the sensor by means of a pump. This type of system is needed for non-intubated patients.

When using mainstream CO₂ sensors, check the window for the patient secretions pooled on periodically.

Because that condition may affect the accuracy of the measurement or even make the sensor not work.

When using sidestream CO₂ sensors, there is a water trap or a part of the sampling tube with dehumidifying function. Please periodically check the flow sensor and tubing for excessive moisture or secretion buildup.

7.2 The Principle of SpO₂/Pulse Measurement

7.2.1 Working Principle

This monitor measures the pulse oxygen saturation (SpO₂) and pulse by means of the radiograph of infrared light and the red light emitted by LED through body's peripheral areas (such as fingers), whereby the photoelectric detecting circuits will analyze the absorptivity of the oxyhemoglobin and reduced hemoglobin respectively, and give the photoabsorption rates before and after pulsation. Using the measure of photoabsorption change due to pulsatory arterial blood flow caused by PLETH waveform, the SpO₂ can be obtained.

7.2.2 Points to be noted in SpO₂ and Pulse Measuring

1. The finger should be properly placed (see the attached illustration of this instruction manual), or else it may cause inaccurate measurement result.
2. Make sure that capillary arterial vessel beneath the finger is penetrated through by red and infrared lights.
3. The SpO₂ sensor should not be used at a location or limb tied with arterial or blood pressure cuff or receiving intravenous injection.
4. Do not fix the SpO₂ sensor with adhesive tape, or else it may result in venous pulsation and consequential inaccurate measurement result of SpO₂.
5. Make sure the optical path is free from any optical obstacles like adhesive tape.
6. Excessive ambient light may affect the measuring result. It includes fluorescent lamp, dual ruby light, infrared heater, and direct sunlight etc.
7. Strenuous action of the subject or extreme electrosurgical interference may also affect the accuracy.
8. Please do not use the SpO₂ sensor when having the MRI, or burn may be caused by faradism.

7.2.3 Clinical Limitations

1. As the measure is taken on the basis of arteriole pulse, substantial pulsating blood stream of subject is required. For a subject with weak pulse due to shock, low ambient/body temperature, major bleeding, or use of vascular contracting drug, the SpO₂ waveform (PLETH) will decrease. In this case, the measurement will be more sensitive to interference.
2. For those with a substantial amount of staining dilution drug (such as methylene blue, indigo green and acid indigo blue), or carbon monoxide hemoglobin (COHb), or methionine (Me+Hb) or thiosalicylic hemoglobin, and some with icterus problem, the SpO₂ determination by this monitor may be inaccurate.
3. The drugs such as dopamine, procaine, prilocaine, lidocaine and butacaine may also be a major factor blamed for serious error of SpO₂ measurements.
4. As the SpO₂ value serves as a reference value for judgement of anemic anoxia and toxic anoxia, the measurement result of some patients with serious anemia may also present as good SpO₂ value.

Chapter 8 Troubleshooting

8.1 No Display on the Screen

Shut down the machine and unplug the power. Use a universal meter to check if the outlet has proper voltage, if the power cable is in good condition, and if the power cable is properly connected with this apparatus or outlet. Remove the fuse from the back cover of this machine, and make sure it is in good condition.

8.2 No EtCO₂ and SpO₂ Result

1. Check that the CO₂ module cable is properly plugged in. Reinsert or reset the sensor if necessary and the set of CO₂ monitoring switch is on.
2. Check that the SpO₂ sensor cable is properly plugged in and the light in SpO₂ sensor is flash.
3. If the problems still exist, please contact the local dealer.

8.3 Blank Printed Paper

1. Check whether the printing paper is installed with its face reversed. Please reinstall it and let the sensitive page face upward.
2. If the problems still exist, please contact the local dealer.

8.4 System Alarm

1. When the parameter value is higher or lower than the alarm limits, the alarm will ring. Please check whether the alarm limit value is proper or the condition of the patient.
2. Probe off. Please check the connection of the probes.

Note: In case of trouble of this machine in the service, follow the instructions below to eliminate the problem first. If the attempt fails, contact the dealer in your local area or the manufacturer. Do not open the cabinet without permission.

Chapter 9 Maintenance

9.1 Service and Examination

9.1.1 Daily Examination

Before using the monitor, the checks below should be carried out:

- Check the monitor for any mechanical damage;
- Inspect the exposed parts and the inserted parts of all the leads, and the accessories;
- Examine all the functions of the monitor that are likely to be used for patient monitoring, and ensure that it is in good working condition;
- Make sure that the monitor is grounded properly.
- Pay close attention to the fluctuation of the local power supply voltage. A manostat is recommended when necessary.
- In case any indication of damage about the function of the monitor is detected and proven, it is not allowed to apply it to the patient for any monitoring.

9.1.2 Routine Maintenance

After each maintenance or the yearly maintenance, the monitor can be thoroughly inspected by qualified personnel, including function and safety examinations.

- ⚠ **If the hospital fails to carry out a satisfactory maintenance program about the monitor, it may get disabled and harm the patient's safety and health.**
- ⚠ **In case of ECG leads damage or aging, please replace the lead.**
- ⚠ **If there is any indication of cable and transducer damage or they deteriorate, they are prohibited from any further use.**
- 🔔 **The adjustable units in the monitor such as potentiometer are not allowed to adjust without permission to avoid unnecessary failures that affect normal application.**

9.1.3 Battery Maintenance

- ⚠ **Please pay attention to the polarity of battery, do NOT insert it into battery compartment with reversed polarities;**
- ⚠ **Do NOT use the batteries manufactured by other companies, if being inserted, the device will may be damaged;**
- ⚠ **In order to avoid damaging the battery, do NOT use other power supply device to charge the battery;**

- ☛ **After battery ageing phenomenon occurring, to avoid explosion risk do NOT throw the battery into fire.**
- ☛ **Do not hit or strike it with force;**
- ☛ **Do not use this battery on other devices;**
- ☛ **Do not use this battery below -10°C or above 40°C;**
- ☛ **Dispose of the battery, the local law should be followed.**
- 🔔 **It is recommended to use the battery once a month to ensure its strong power supply capacity and long service life, and recharge it after running out of the power.**
- 🔔 **In order to maintain battery supply time and prolong battery lifetime, please use the battery once a month and do not charge it until it is used up each time.**

Note: 1. when battery is used to supply power, user should not charge the battery until the low battery alarm rings. (After line-haul or long-time storing, using battery may not start the monitor, please charge the battery.)


2. The battery should be charged for 10 to 15 hours.

9.1.4 Service

If the monitor has functional malfunction or is not working, please contact the local dealer or our company, and we are to offer the best solution as soon as possible for your satisfaction. Only qualified service engineer specified by the manufacture can perform the service. Users are not permitted to repair it by themselves.

9.2 Cleaning, Sterilization and Disinfection


- Kept the monitor from dust.
- It is recommended to clean the outer shell and screen of the monitor to keep it clean. Only non-corrosive cleanser such as clear water is permitted.
- Use the cloth with alcohol to wipe the surface of the monitor and transducers, and dry it with dry and clean cloth or simply air-dry.
- The monitor can be sterilized and disinfected, please clean it first.
- ☛ **Switch off the monitor and disconnect the power cable before cleaning.**
- ☛ **Do not let the liquid cleanser flow into the connector jack of the monitor to avoid damage.**
- ☛ **Clean the exterior of the connector only.**
- 🔔 **Dilute the cleanser.**
- 🔔 **Do not let any liquid flow into the shell or any parts of the monitor.**
- 🔔 **Do not let the cleanser and disinfectant stay on its surface.**
- 🔔 **Do not perform high pressure sterilization to the monitor.**
- 🔔 **Do not put any parts of the monitor in the liquid.**

 **Do not pour the disinfectant on its surface while sterilization.**

9.3 Cleaning, Sterilization and Disinfection of Accessories

It is recommended to use a cloth dampened with isopropyl alcohol 70%, a 10% aqueous solution of sodium hypochlorite (bleach), a 2% glutaraldehyde solution, ammonia, mild soap or disinfectant spray cleaner to clean the accessories (including sensor, cable and plugs).

 **Do not use damaged accessories.**

 **Accessories can not be entirely immersed into water, liquor or cleanser.**

 **Do not use radial, steam or epoxyethane to disinfect accessories.**

9.4 Storage

If the equipment will not be used for long period of time, wipe it clean and keep it in the packaging, which shall be kept in a dry and good ventilation place free from dust and corrosive gases.

9.5 Transportation

This monitor should be transported by land (vehicle or railway) or air in accordance with the contractual terms. Do not hit or drop it with force.

Appendix

I Prompt information explanations

Prompt Info/Response	Description
CO₂ module fail	Check that the sensor is properly plugged in. Reinsert the sensor. If error persists, contact the local dealer or manufacturer for servicing.
Need CO₂ zero	To clear, check airway adapter and clean if necessary. If this does not correct the error, perform an adapter zero.
Check airway (Check that the sampling line is not occluded or kinked.) (To clear, clean airway adapter if mucus or moisture is seen. If the adapter is clean, perform a Capnostat zero.) (The sensor is connected unwell.)	One of the following conditions exist: This error occurs whenever the pneumatic pressure is outside the expected range. Usually caused when the airway adapter is removed from the sensor or when there is an optical blockage on the windows of the airway adapter. May also be caused by failure to perform sensor zero to when adapter type is changed. Check that the sensor is properly plugged in. Reinsert the sensor.
No CO₂ sensor	The CO ₂ module cable is not plugged in. Please connect the CO ₂ module to the monitor properly.
CO₂ zero fail	One of the following conditions exist: Breaths have been detected by the CO ₂ module within the last 20 seconds while CO ₂ zero was attempted. Check that the sensor is properly plugged in. Reinsert or reset the sensor if necessary. Temperature is not stable. The set of CO ₂ monitoring switch is “off”. Please set as “on” in CO ₂ Setup screen.
CO₂ zero OK	Success in CO ₂ zero
Sensor warm up (This condition is normal at startup.)	One of the following conditions exist: Sensor under temperature Temperature not stable
CO₂ is sleeping	The set of CO ₂ monitoring switch is “off”. Please set as “on” in CO ₂ Setup screen.
EtCO₂ over LTD	EtCO ₂ value exceeds the high/low alarm limit
RR over limit	RR value exceeds the high/low alarm limit
Probe off	SpO ₂ probe off from patient
SpO₂ over limit	SpO ₂ value exceeds the high/low alarm limit
PR over limit	PR value exceeds the high/low alarm limit
Mute C-D: XXX seconds	Alarm silence count down: XXX seconds
During DEMO	The monitor is in demo status. The entire signal is generated from the monitor and waveforms and values are displayed for demo.
Low battery	Low built-in battery voltage. Please recharge the battery.

II Typical Pressures and CO₂ Readings at Altitudes

Altitude	Barometric Pressure(mmHg)	EtCO ₂ Reading	
		(%)	(mmHg)
0m	760	5	38.0
70m	754	5	37.7
100m	751	5	37.5
200m	743	5	37.1
1500m	641	5	32.0
3000m	537	5	26.8
5000m	420	5	21.0

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