COMEN

Patient Monitor
C50, C80, C86

BRIEF TRAINING

COMEN   share with the world

COMeN

Part 01

Brief Introduction

- Product Introduction

  - Appearance

  - Accessory

Introduction

Intended usage:

The multi-parameter monitor is intended for monitoring critically ill patients in operation rooms, ICUs and CCUs, and for bedside monitoring. Patient types can be adults, children and neonates.

Main parts:

- Main unit
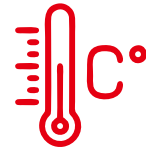- Accessory
- Trolley, Wall mount *

Introduction

The environment

Normal working environment
Ambient temperature: 5~40℃
Relative humidity: ≤93%, Non-condensing
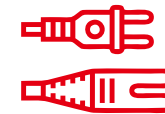Atmospheric pressure:70.0kPa ~ 106.0kPa

Power supply
AC power: 110-240V 50/60Hz
Input power: 60VA
Built-in battery: 11.1V/2200mAh, 2 hours consecutive normal use.
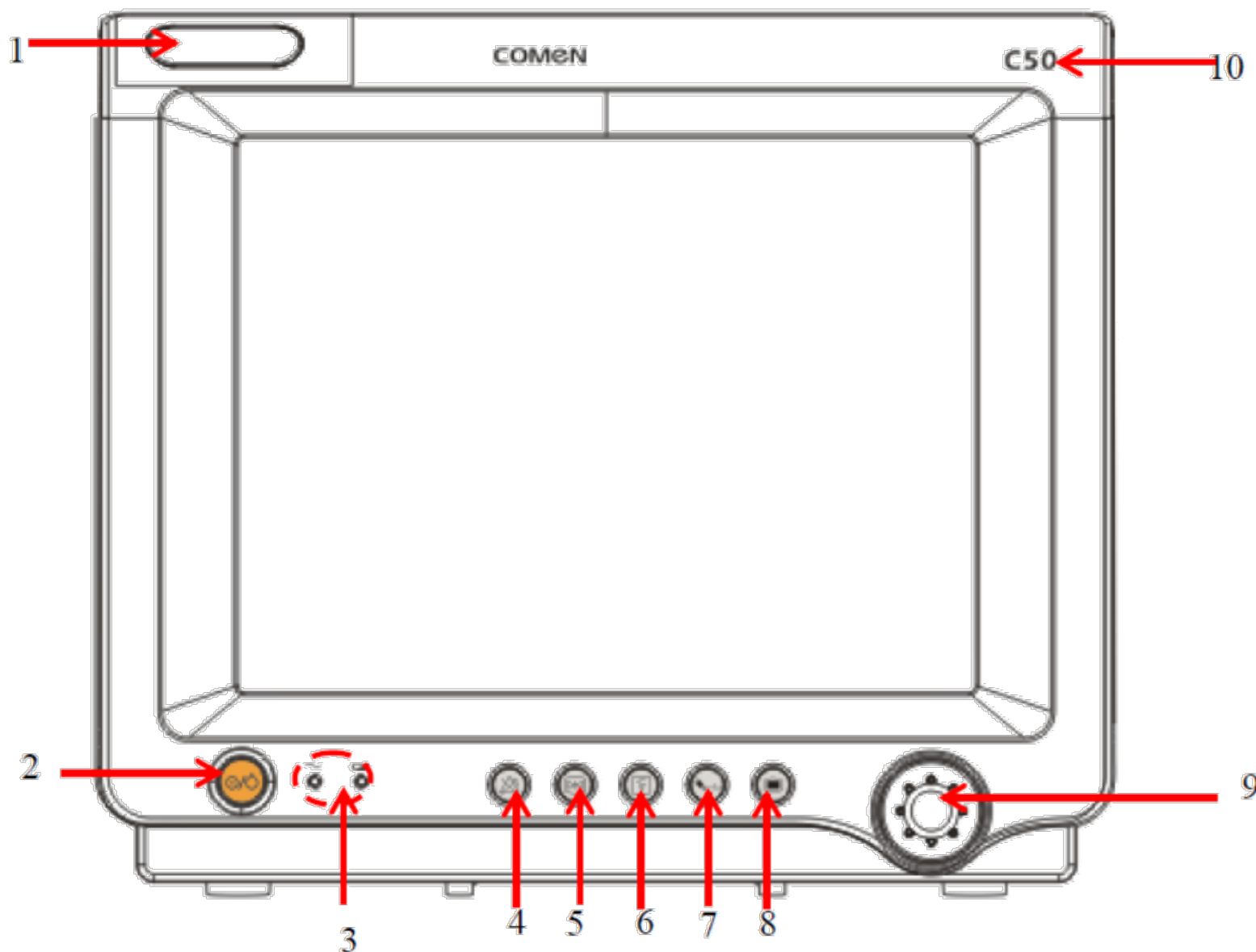4400mAh battery, it's 4 hours.

Please protect the monitor against violent impact, vibration, rain and snow in transport. The monitor should be packed, stored or transported in a well-ventilated room without corrosive gas (ambient temperature: -20~60℃; RH: ≤93%; Barometric pressure: 700hPa~1060hPa).
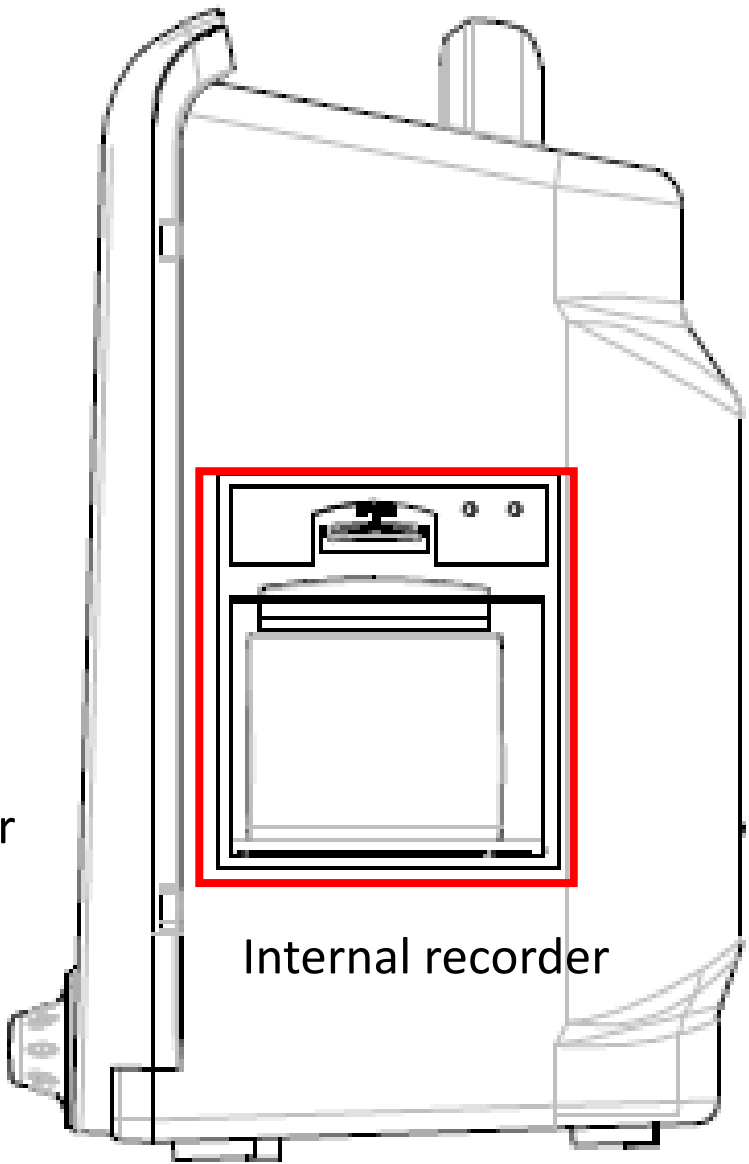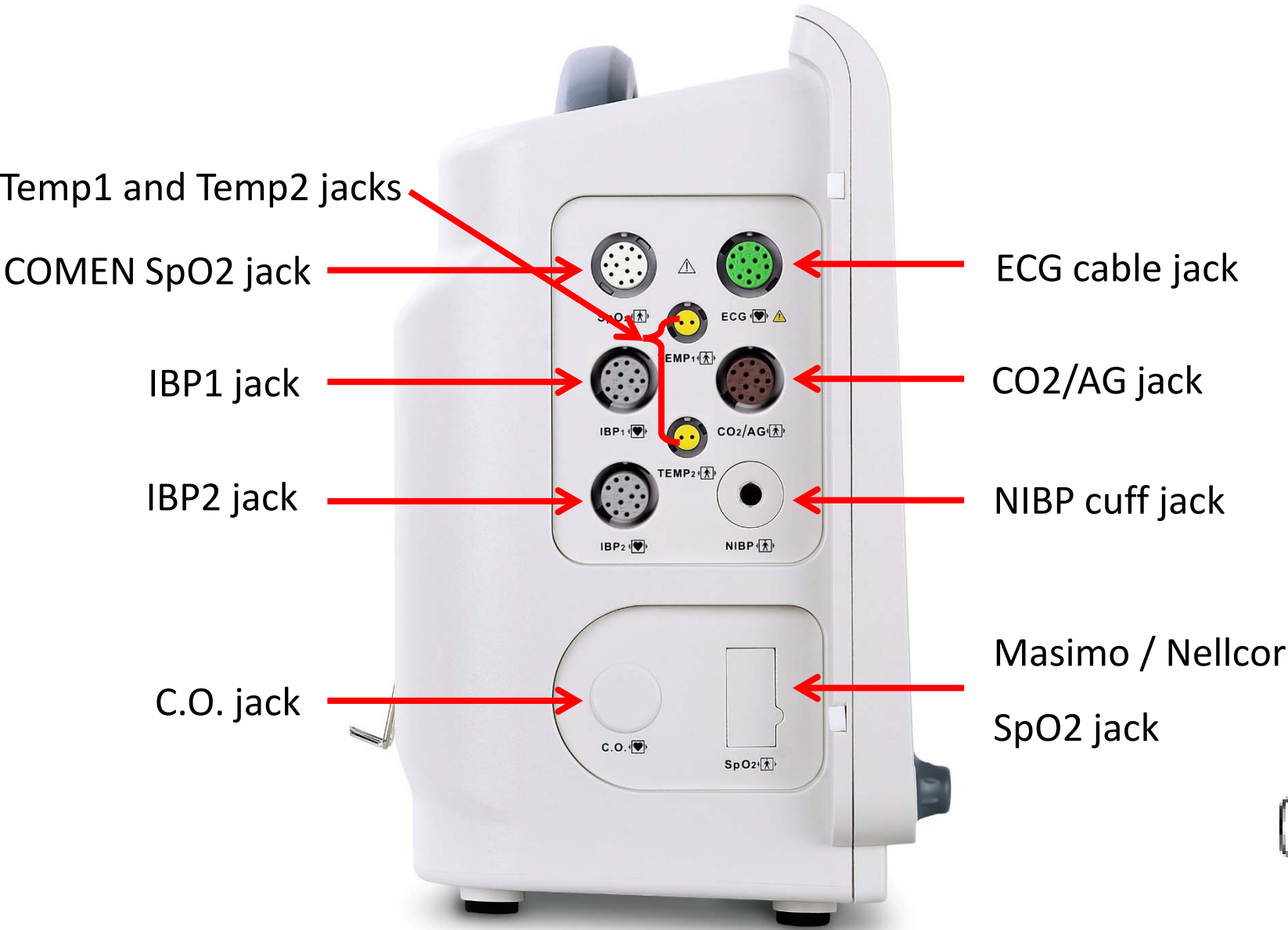
Introduction

C50 Front View

1. Alarm indicator

2. Power on/off key

3. Power indicator

4. Alarm pause key

5. Waveform freeze key

6. Record key

7. NIBP measurement key

8. Main menu key

9. Rotary knob

10. Product model

Introduction

C50 Side Panel View

COMEN

Temp1 and Temp2 jacks

COMEN SpO2 jack

ECG cable jack

IBP1 jack

CO2/AG jack

IBP2 jack

NIBP cuff jack

C.O. jack

Masimo / Nellcor

SpO2 jack

Internal recorder

Introduction

C50 Rear View

Handle

VGA port

USB port

Network port(RJ45)

Multi-function connector

Nameplate

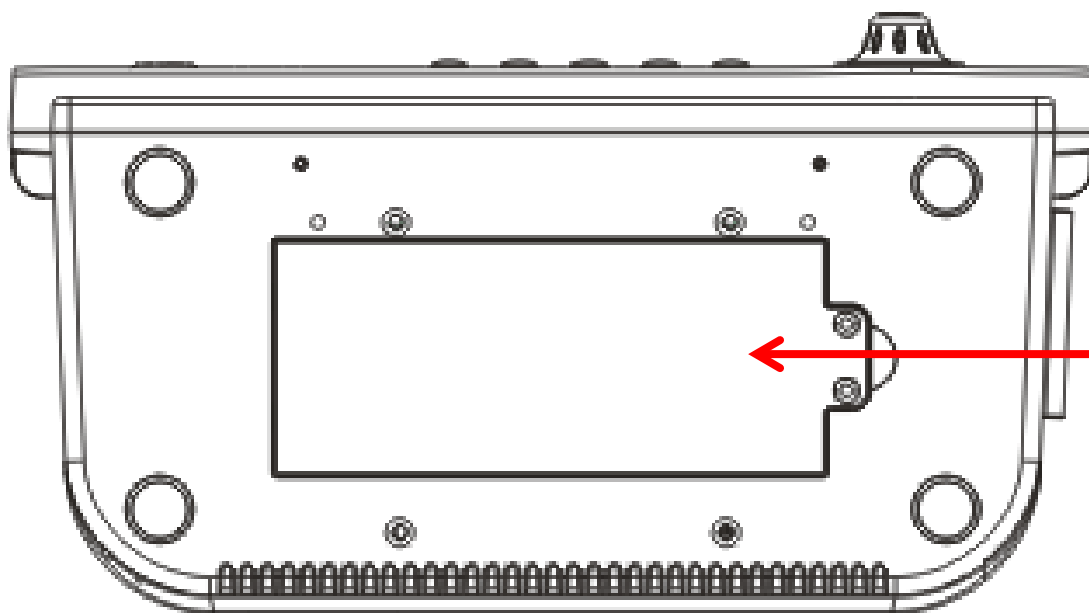Equipotential jack

100-240V ~ 60VA 50/60Hz

Power socket
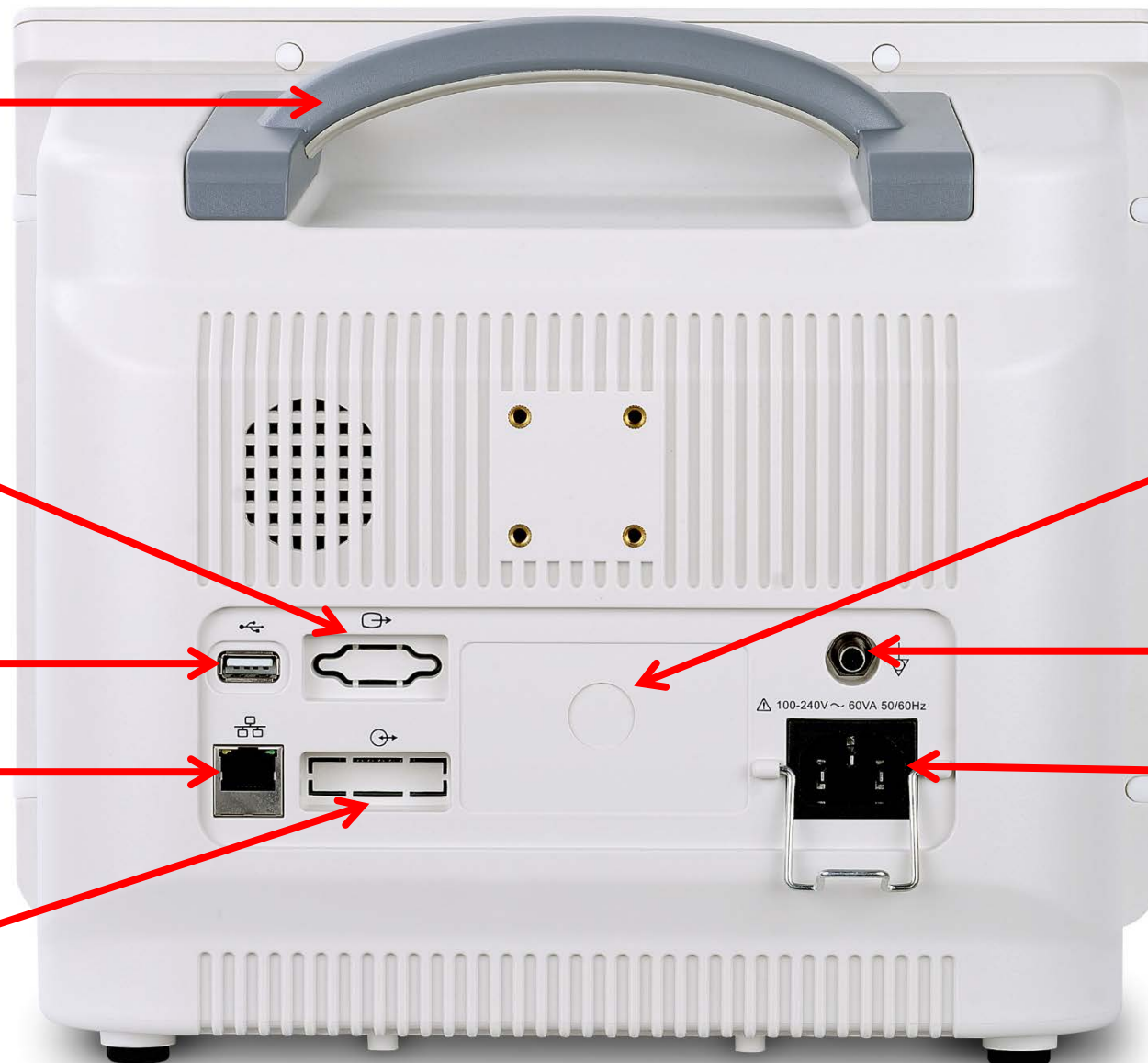
COMeN

Introduction

C50 Bottom View

Bult-in rechargeable lithium battery

Introduction

C80 Front View
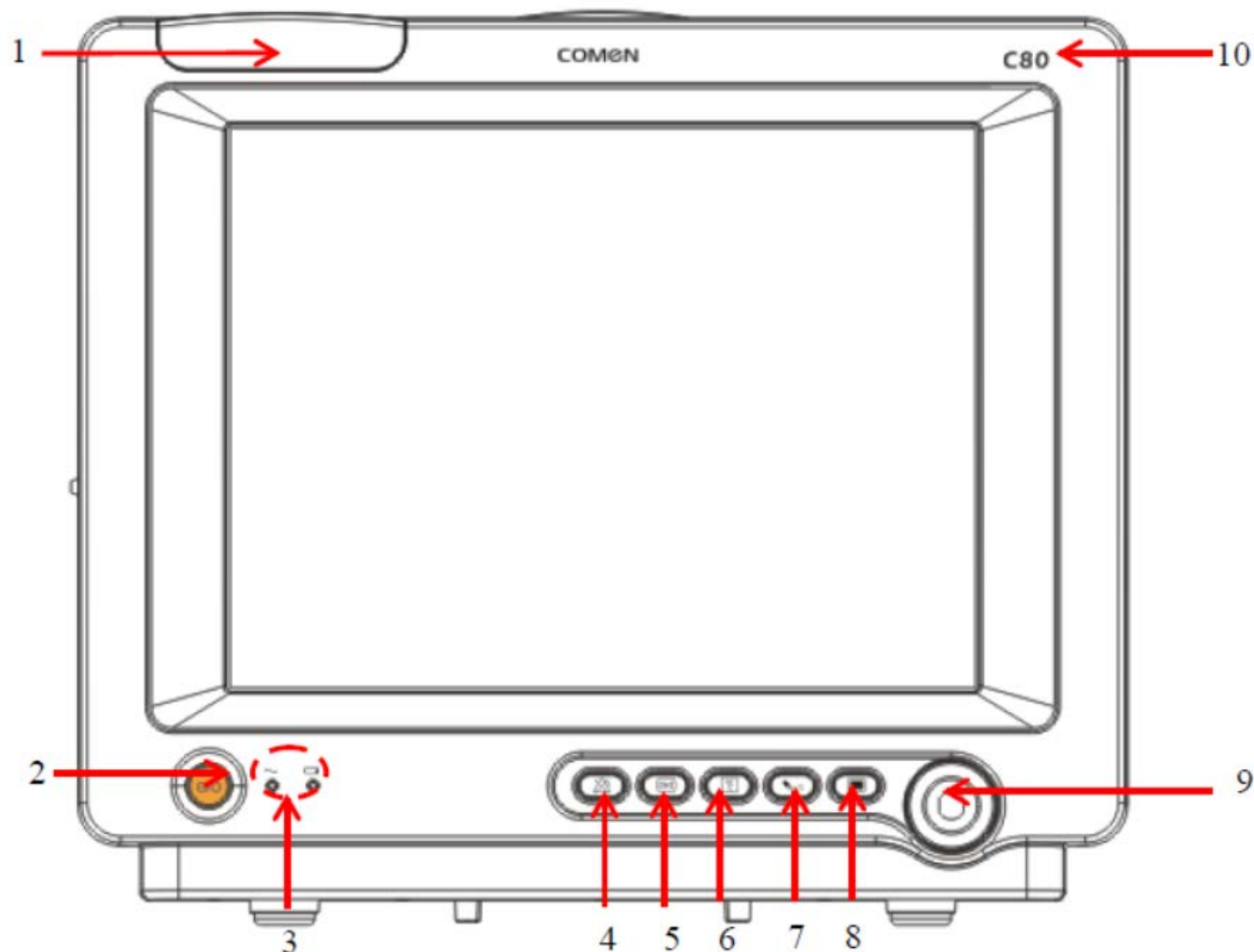
1. Alarm indicator

2. Power on/off key

3. Power indicator

4. Alarm pause key

5. Waveform freeze key

6. Record key

7. NIBP measurement key

8. Main menu key

9. Rotary knob

10. Product model
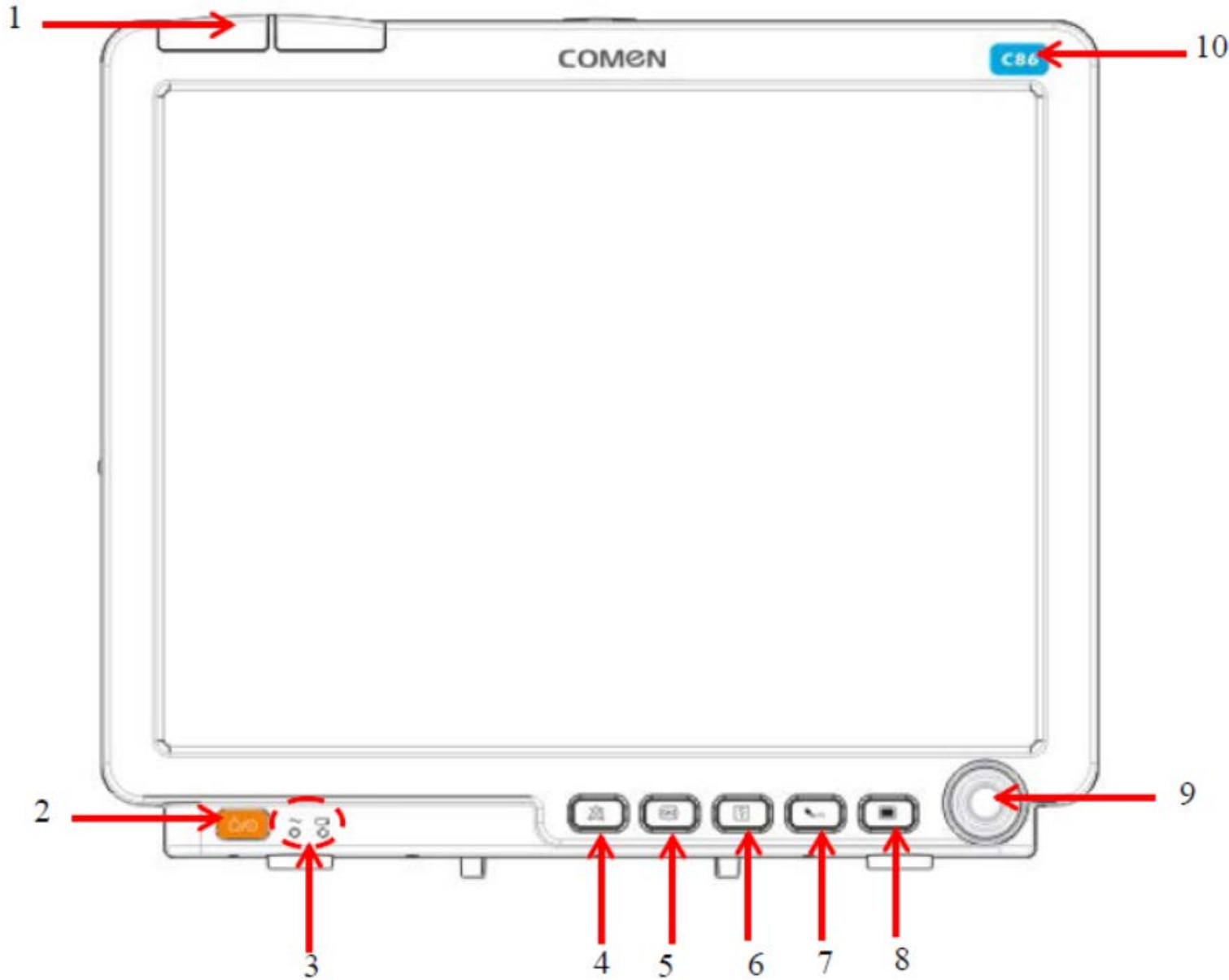
Introduction

C86 Front View

1. Alarm indicator

2. Power on/off key

3. Power indicator

4. Alarm pause key

5. Waveform freeze key

6. Record key

7. NIBP measurement key

8. Main menu key

9. Rotary knob

10. Product model

Introduction

C80/C86 Side Panel View

Temp1 and Temp2 jacks

ECG cable jack

CO2/AG jack

NIBP cuff jack

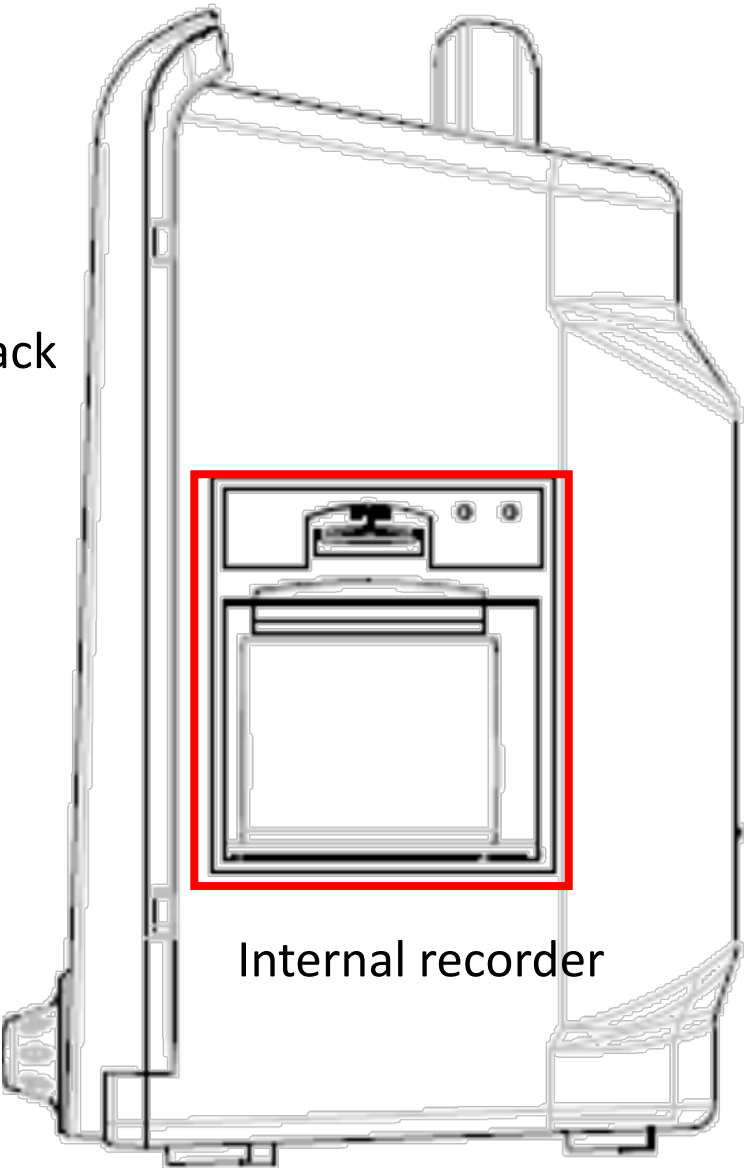C.O. jack

COMEN SpO2 jack

IBP1 jack

IBP2 jack

ICG jack

BIS jack

Masimo / Nellcor
SpO2 jack
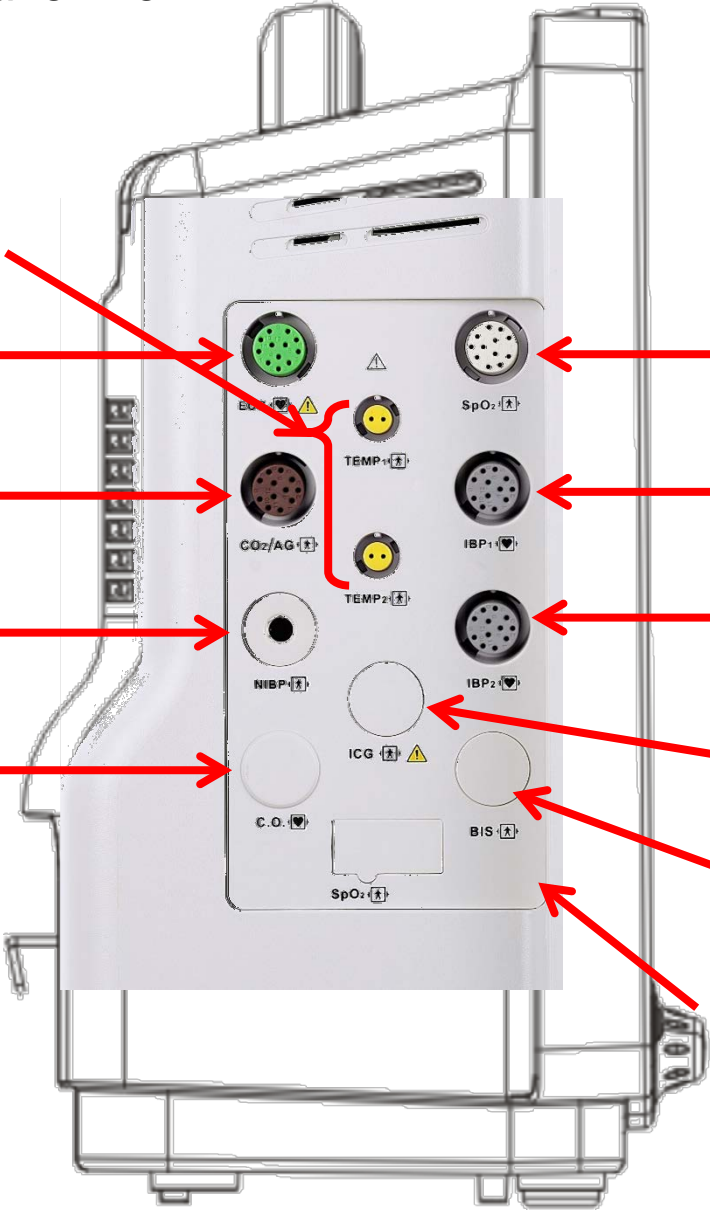
Internal recorder

Introduction

C80/C86 Rear View

Handle

VGA port

USB port

Network port(RJ45)

Multi-function connector

Nameplate

Power socket

Equipotential jack

COMeN

100-240V~
50/60Hz 60VA
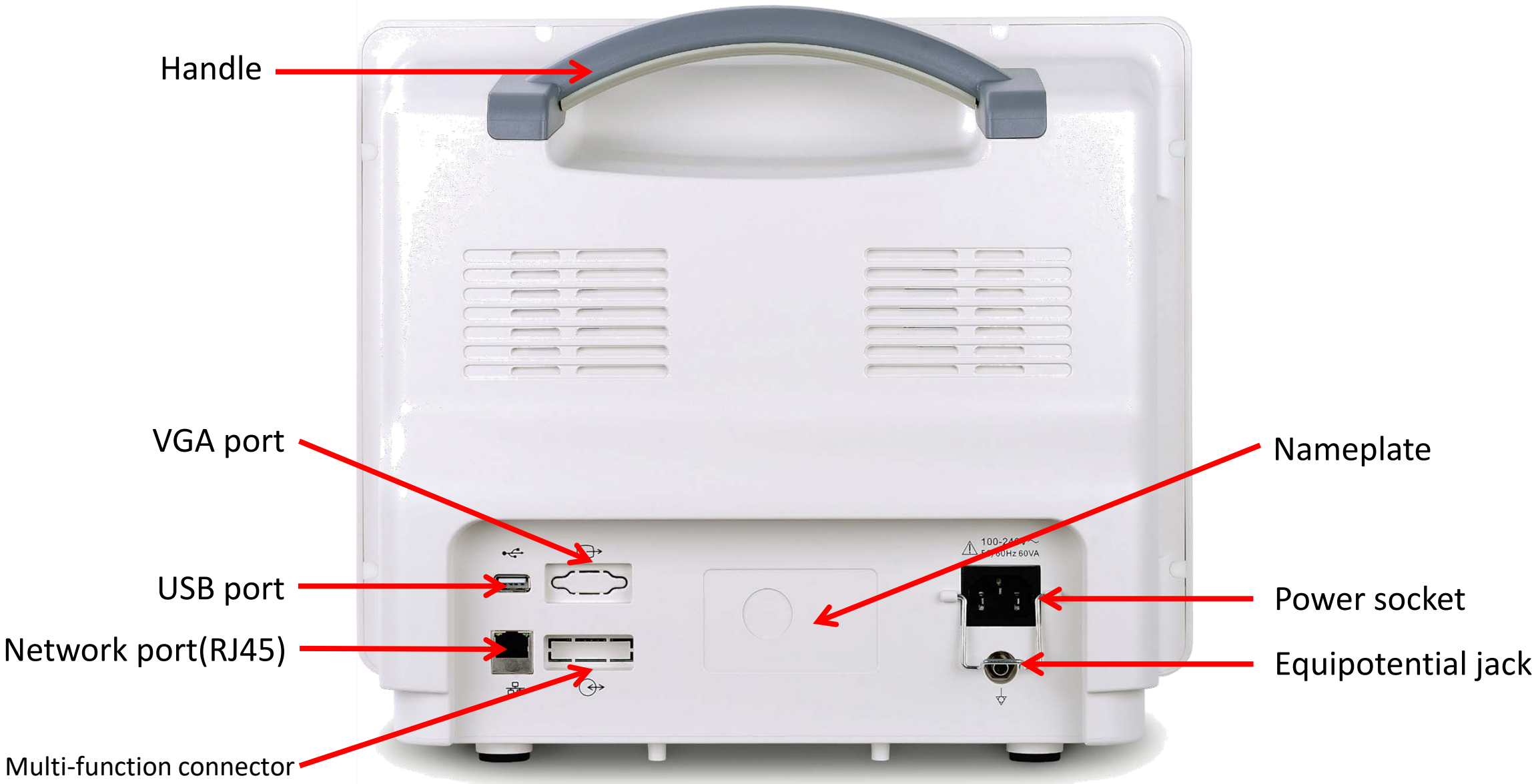
C80/C86 Bottom View
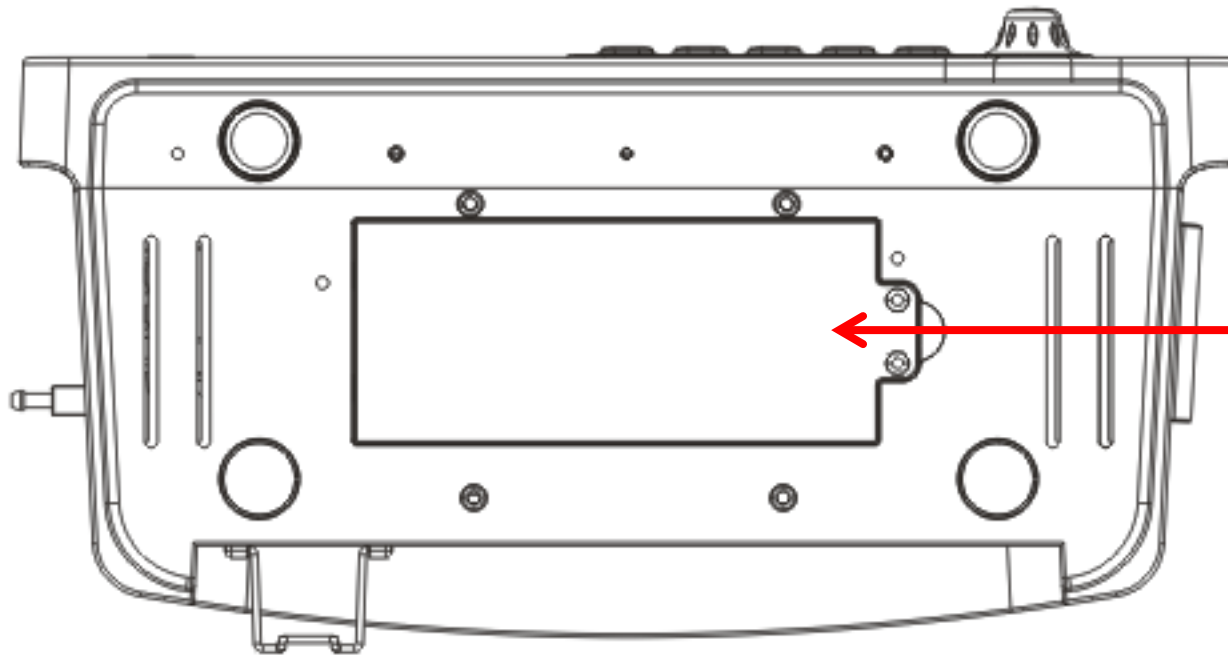
Bult-in rechargeable lithium battery

Introduction

COMEN

	C50	C80	C86
Screen size	10.4 inches	12.1 inches	15 inches
Dimension	291.7mm×146.5 mm×250mm	344.5mm×291 mm×165mm	344.5mm×291 mm×165mm
Weight	4 kg	4.3 kg	5.5 kg
Standard configuration	2200mAh Lithium-ion battery、 3/5-Lead ECG、 Comen SpO2、 PR、 TEMP、 NIBP、 RESP		
Optional	4400mAh Lithium-ion battery、 12-Lead ECG、 Masimo SpO2、 Nellcor SpO2、 EtCO2、 IBP、 C.O.、 AG、 Recorder	4400mAh Lithium-ion battery、 12-Lead ECG、 Masimo SpO2、 Nellcor SpO2、 EtCO2、 IBP、 C.O.、 AG、 BIS、 ICG、 Recorder	

Introduction

On Screen Display
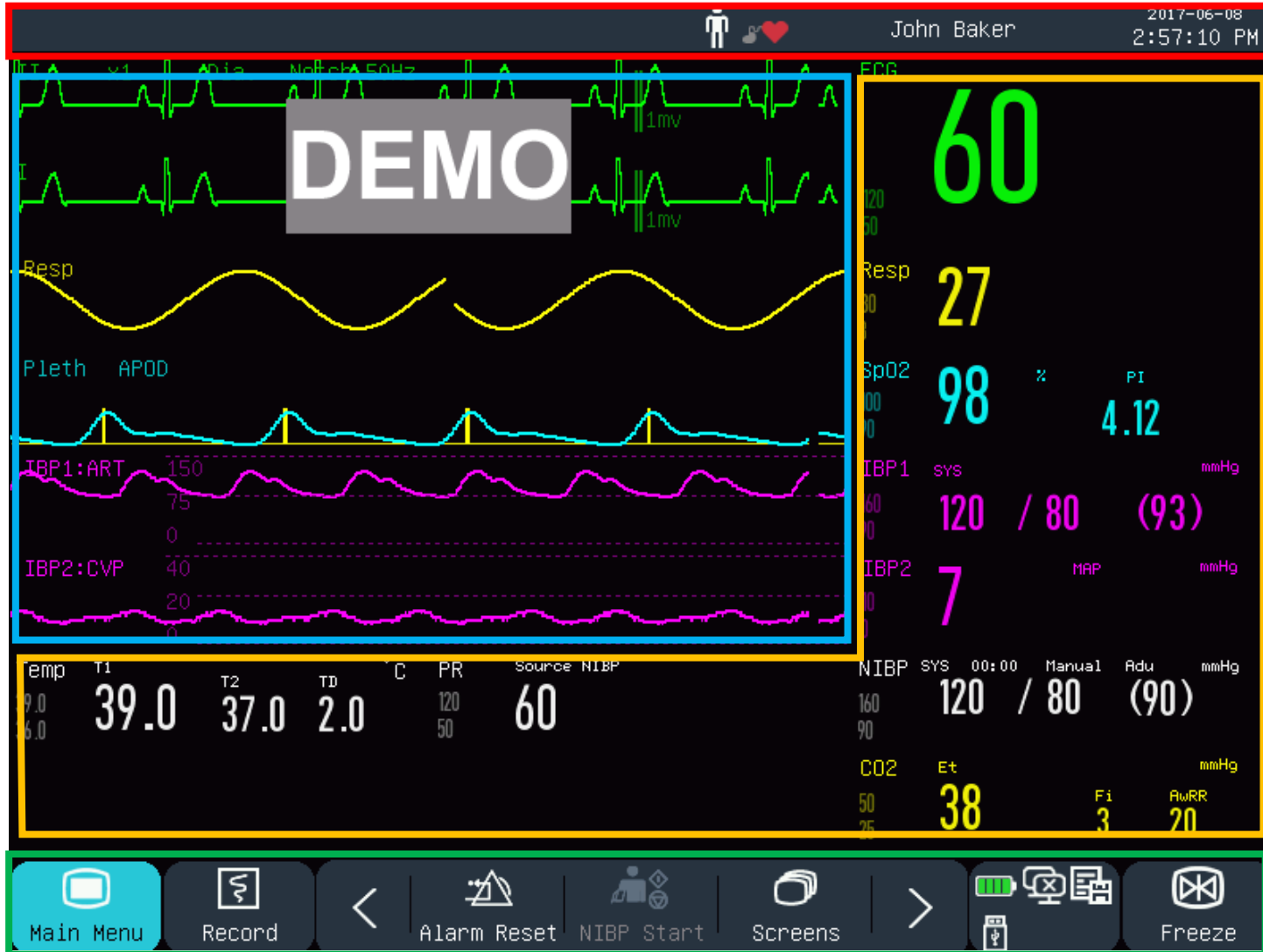
Prompt Message Area

a) Physiological alarm message

b) Technical alarm message

c) Prompt icons, Patient info, Clock

Lower Menu Bar

Shortcut keys: Main Menu, Record, Freeze, Alarm Reset, NIBP, Screens

Monitor setup area: status icons

Waveform Area

Click a waveform to open the corresponding setup window.

Parameter Area

Click to open the setup menu for this parameter

Accessory-ECG

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3 lead

5 lead

12 lead

Electrode slice

Accessory-SpO2

COMEN

Masimo SpO2

Nellcor SpO2

COMEN SpO2

Accessory-NIBP

Connectors 接头
Patient Monitor 监护仪
Air Hose 连接管
Connectors 接头
NIBP Cuff 无创血压袖带

Range
25 to 35 cm
ADULT
Adults-Erwachsene
Adults-Volwassenen

Range
18 to 26 cm
CHILD
Enfant,Kinder,
Pediatrico,Nino,
Kinderen,Chança

Range
46 to 66 cm
THIGH
Cuissard,Schenkel,
Coscia,Muslo,
Dijbeen,Coxa
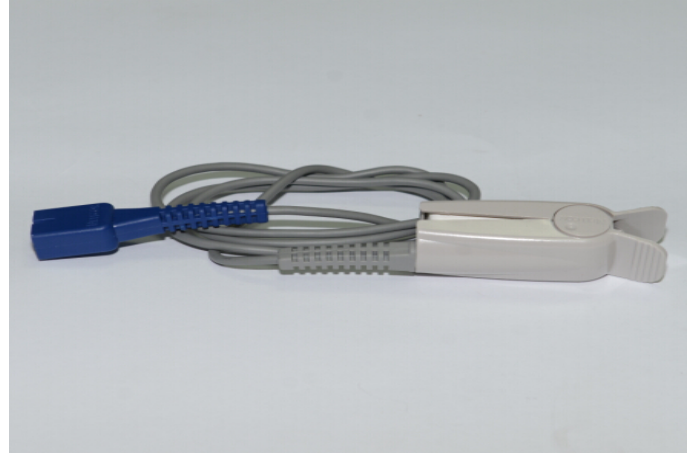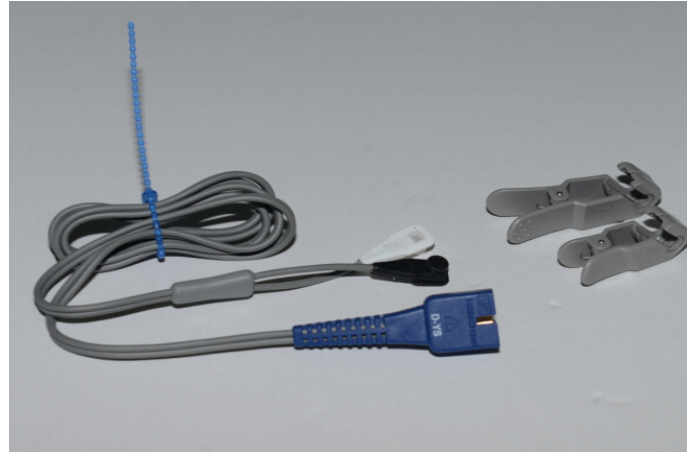
Accessory-Temperature

Body surface temperature probe

Intracavitary temperature probe

Introduction

Accessory-EtCO2

CO2 module is an external module that connects with the patient monitor, and needs the accessory to connect with the patient.

- For mainstream module, the accessory is the **airway adaptor**.
- For side-stream type, the accessory are: **sampling tube, airway adaptor**.

Operational principle

Accessory-EtCO2

COMeN

CO₂

Mainstream CO2 module

Sidestream CO2 module

Capnopro CO2 mainstream

Protocol：NOVA

Monitor

1st step

Adaptor cable

2nd step

Airway adaptor

3rd step

CO2 Maintream sensor

Monitor

1st step

12pin-8pinCO2延长线
040-000242-01

2nd step

CO2三通道适配器
0401-040-001596-00

5th step

CO2采样管
0401-040-001594-00

万联达CO2旁流
0401-099-000228-00

4th step

3rd step

CO2脱水柱
0401-040-001593-00

4th step

CO2鼻氧管
0401-040-001595-00

Capnopro CO2 sidestream

Protocol：NOVA

Accessory-BIS

Parts:

BIS Cable
BIS Sensor
BIS Slice
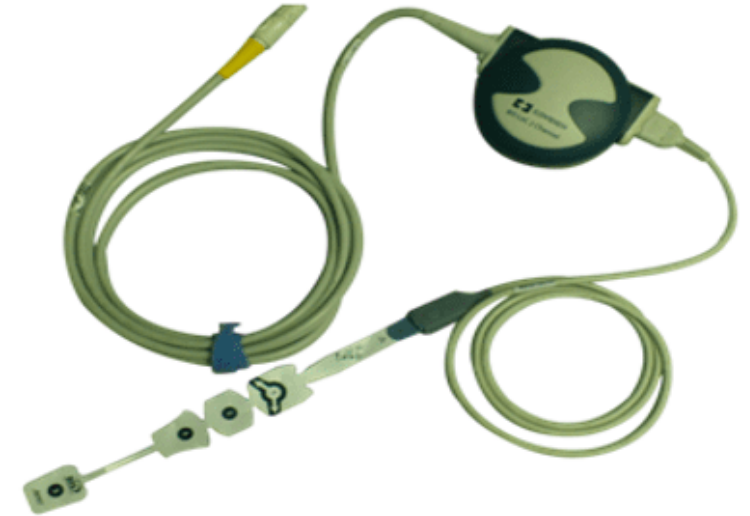
Select [BIS] in the parameter area to enter [BIS Setup] → [Electrode Impedances] (test the electrode impedances manually), and the following window will be opened:

Electrode impedance(KΩ) →

Electrode Impedances

| 00 | 00 | 00 | 00 |

Impedance Test in Process
Impedance Test Passed
Impedance Test Failed
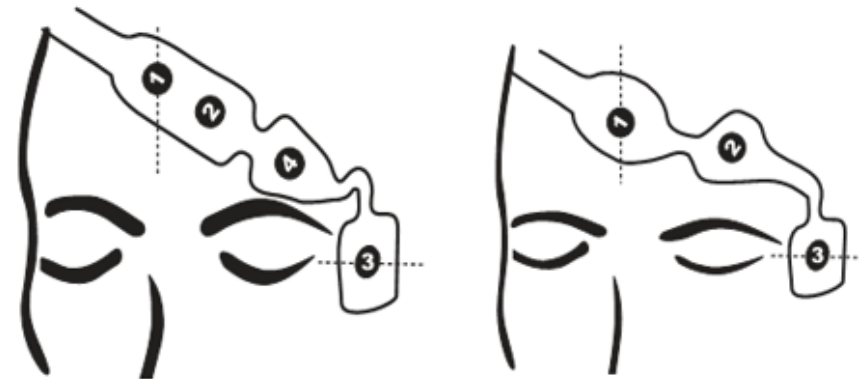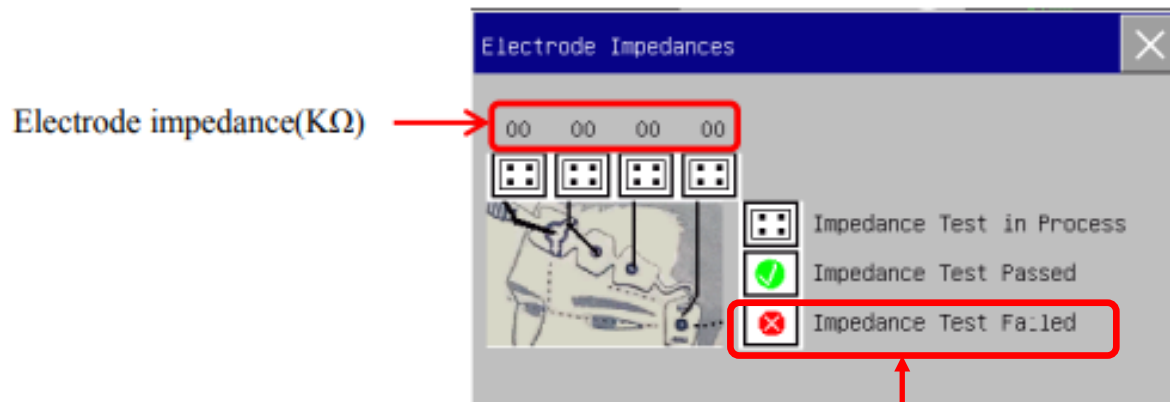
Check the contact condition between the patient cable/electrode and the skin. Clean and dry the skin if necessary.

Introduction

Accessory-IBP

IBP1:ART

IBP2:CVP

Parts:

IBP Tube
IBP Pressure transducer
IBP Cable

Pressure transducer

Pressure bag

Pressure transducer & automatic flushing system

Arterial line

Saline filled non-compressible tubing

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IBP Accessory and Connection

Abbott Edwards
Utah BD
Braun 美代型F
USB Mindray

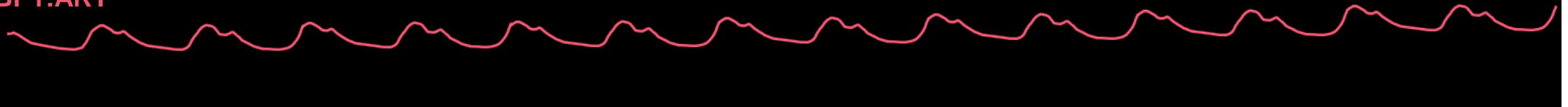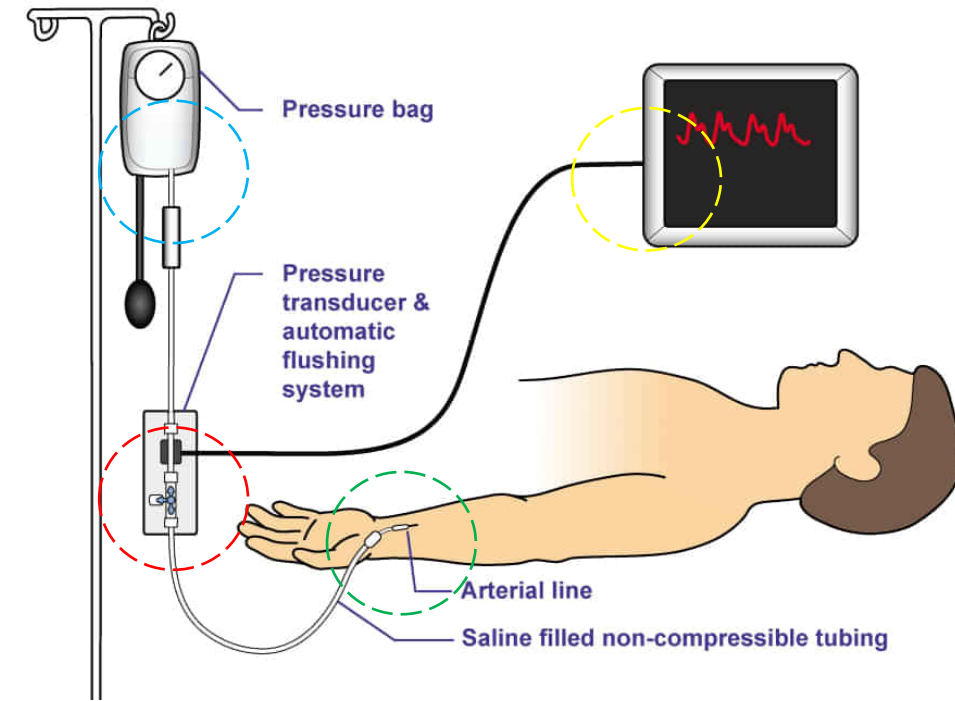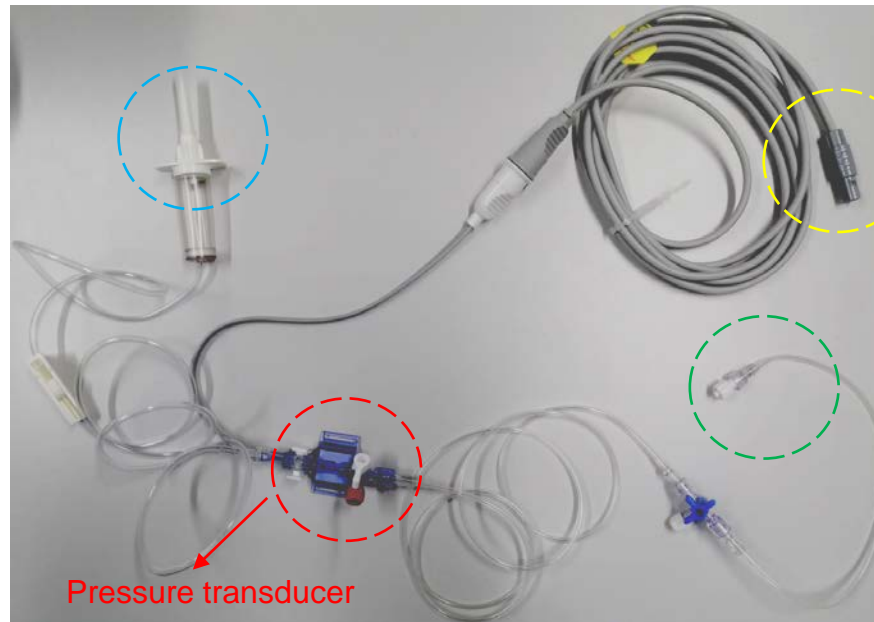Comen monitor support these five brands IBP connectors

Models need IBP module box

NC8/NC10/NC12	115-004507-00	IBP Built-in Module Box
NC19/C70/C90/C100	115-003995-00	IBP Built-in Module Box

IBP waveform

IBP1:ART

IBP2:CVP

Pressure bag

Pressure transducer & automatic flushing system

Arterial line

Saline filled non-compressible tubing
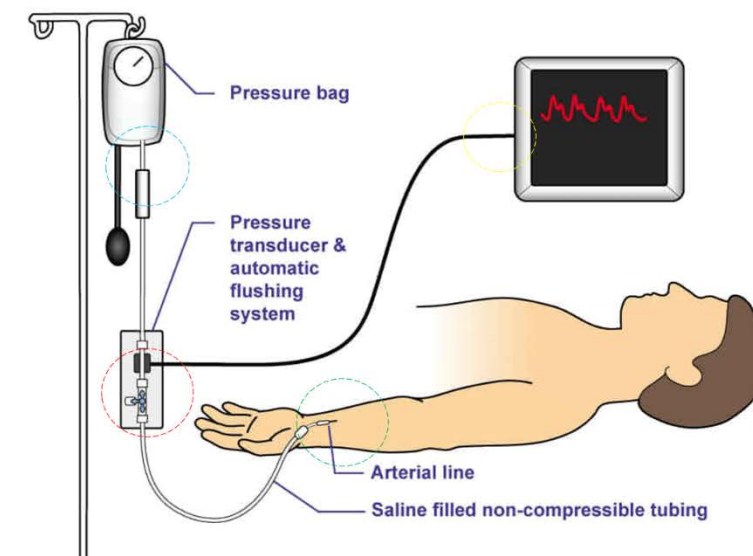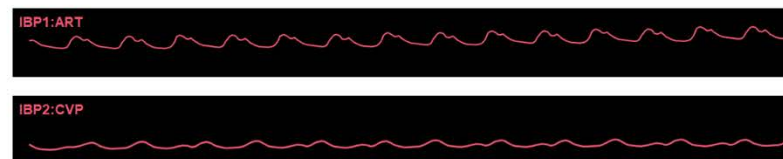
Compatible IBP Brands Accessories List

051-000834-00   IBP module (IBP board)

Abbott	040-000360-00	12Pin Interface cable with connector (Abbott)
	040-000870-00	Disposable pressure transducer kit (Abbott)
BD	040-000456-00	12Pin Interface cable with connector (BD)
	040-001450-00	Disposable pressure transducer kit (BD)
Braun	040-000455-00	12Pin Interface cable with connector (Braun)
	040-000987-00	Disposable pressure transducer kit (Braun)
Edward	040-000454-00	12Pin Interface cable with connector (Edward)
	040-000986-00	Disposable pressure transducer kit (Edward)
Utah	040-000453-00	12Pin Interface cable with connector (Utah)
	040-000945-00	Disposable pressure transducer kit (Utah)

Saline bag
12 pin interface cable with connector
Abbott brand
Disposable Pressure transducer
Arterial line

Saline bag
12 pin interface cable with connector
Abbott brand
Disposable Pressure transducer
Arterial line
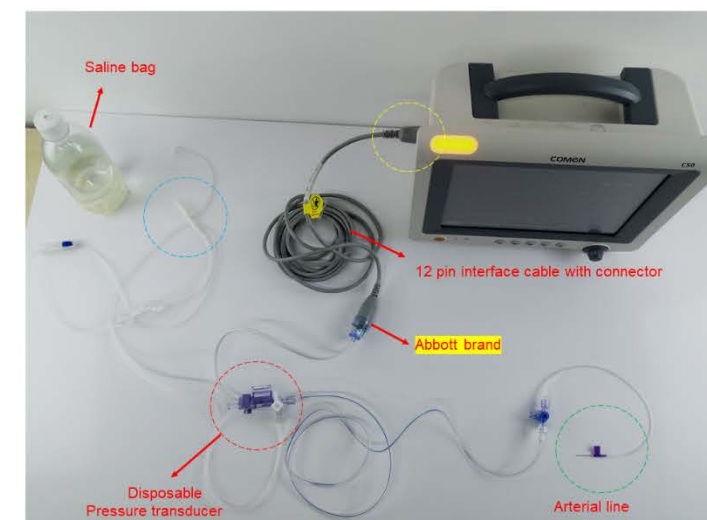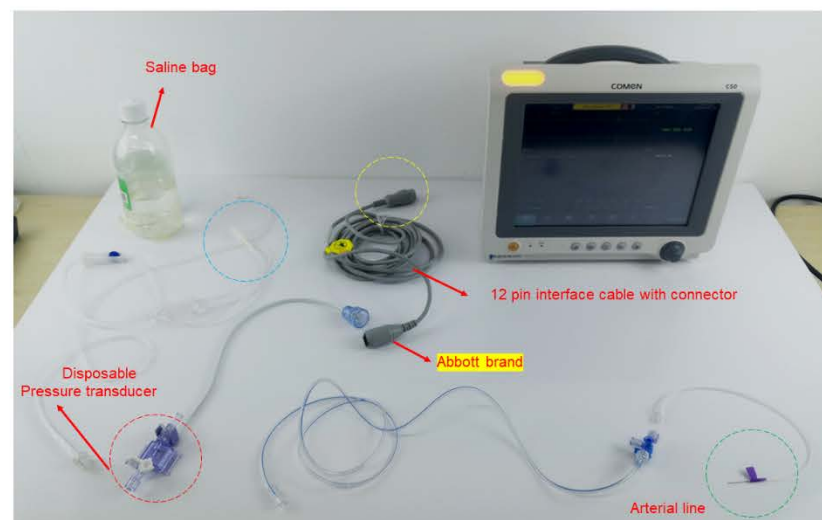
COMEN

Part 02
System Operation

- Get started

- Basic settings

- Patient and configuration management

- Screen interface, alarms

- Parameters' monitoring

- Review, recording, print

System Operation

Get started with a patient monitor

Connect the AC power

Turn on the monitor

Connect the sensors

COMEN

System Operation
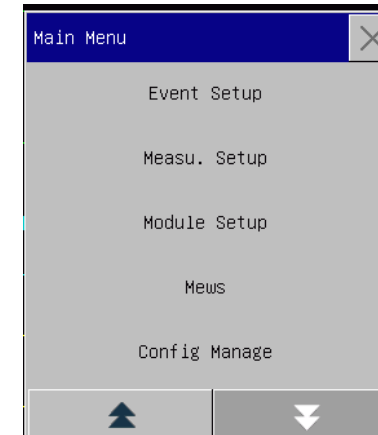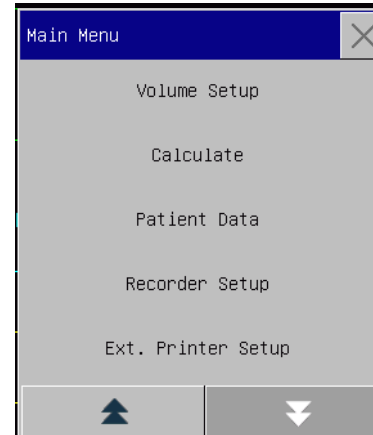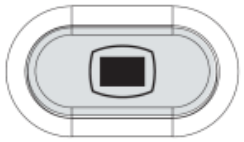
Basic settings
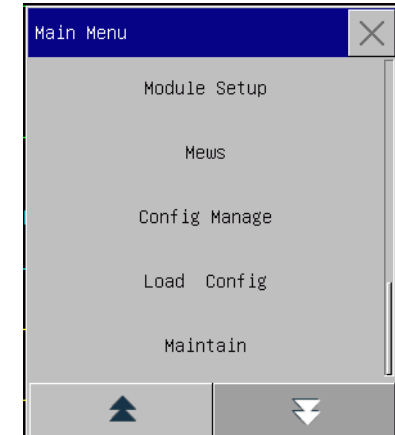
The functions included in the main menu are:

[Patient Manage]-[Alarm setup]-[Review]-[Screen Config]- [Screens]-

[Volume Setup]-[Calculate]-[Patient Data]-[Recorder Setup]- [Ext. Printer Setup]-

[Event Setup]-[Measu. Setup]-[Module Setup]- [Config Manage]-[Load Config]-[Maintain]

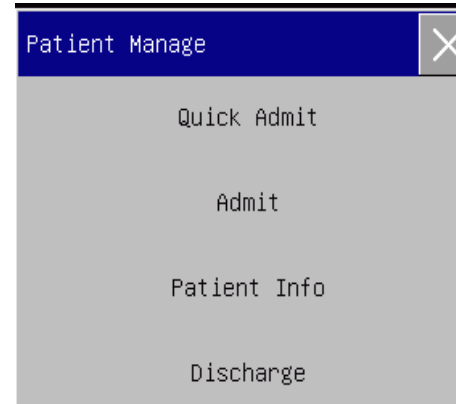*controlling can be operated through touch screen, keys, shortcut keys and the rotary knob

System Operation

Patient management

You can Admit, Quick admit, and discharge a patient when the monitor is ready to be used on a new patient.

You can inquire, review, delete and export archived patient files in [Main Menu]-->[Patient Data]

Patient Manage ✕

Quick Admit

Admit

Patient Info

Discharge

Patient Info ✕

Surname	Baker
Firstname	Johh
Patient ID	1234
Pat Type	Adu
Pace	ON

Document Manage(14) ✕

Name	MonitorTime	Patient	Bed No.	Birth Da	Sex
☐1)Anne Baker	2020/6/19 10:36:20 / 2020/6/19 10:37:54				M
☐2)Jack Ed	2020/6/19 10:35:47 / 2020/6/19 10:36:19				M
☐3)Evan Frank	2020/6/19 10:35:20 / 2020/6/19 10:35:46				M
☐4)Eden Ed	2020/6/19 10:34:48 / 2020/6/19 10:35:19				M
☐5)Devin Don	2020/6/19 10:31:05 / 2020/6/19 10:34:47				M
☐6)Sali Baker	2020/6/19 10:29:39 / 2020/6/19 10:31:05				M
☐7)John Baker	2020/6/19 10:28:57 / 2020/6/19 10:29:38				M
☐8)John Baker	2020/6/19 10:28:20 / 2020/6/19 10:28:56				M

Query View Delete Export ◄ ► ⏫ ⏬

[File Format]: options are .bin, .txt or .xls.

[Export Media]: options are USB or FTP.

● USB: Export to a USB flash drive.

● FTP: Export to a FTP server via wired NETWORK.

Select [Data Export] to start export.

When it is finished, the prompt message [Data Export] succeeded will be shown. Then please restart.

Screens
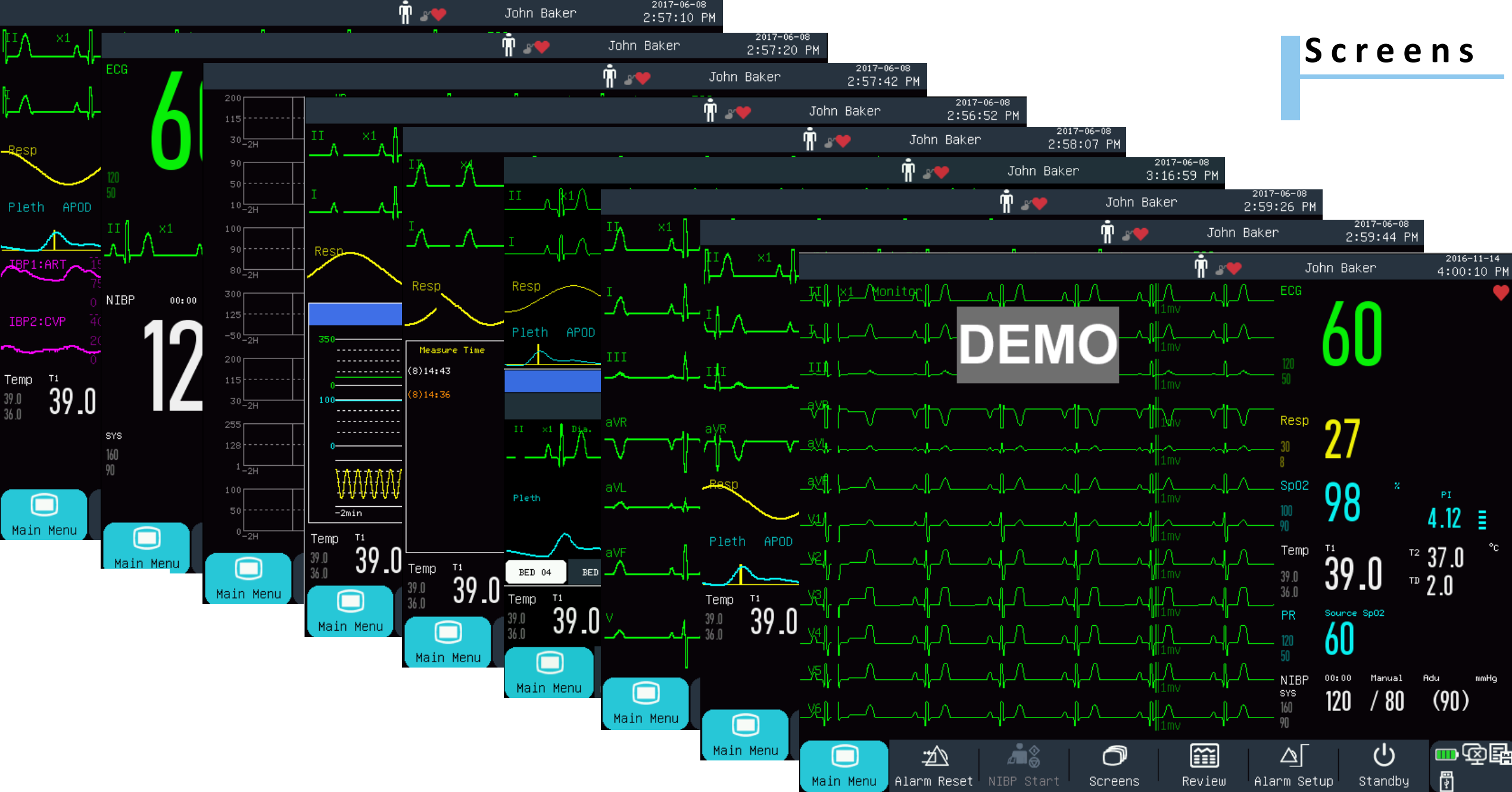
12-Lead ECG

System Operation

Review

Trend Review

160 hrs trend graph and 160 hrs trend table review

NIBP Review

2000 sets NIBP review

Alarm Event Review

200 sets alarm event review

Wave Review [User Maintain]-[Wave Save]

48 hrs holographic waveform review

ST Analysis Review （ECG setup→ST Analysis→ST Analysis Review）

20 groups of ST analysis fragments for reference and review. A ST analysis fragment shows a complete QRS wave fragment of all ST leads.
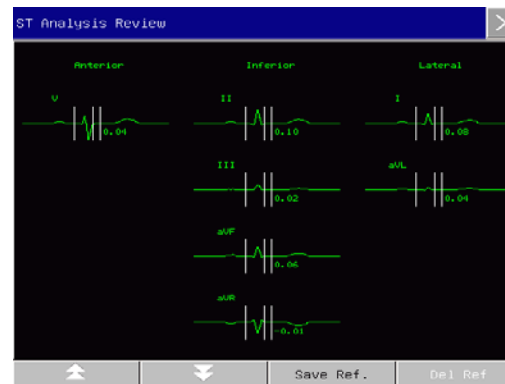
System Operation

Configuration management

In order to configure the monitor more effectively and rapidly, this monitor provides a variety of configurations to meet the requirements of different patient types and different hospital departments. You can also customize a configuration according to actual conditions and save it as a **user-defined configuration**. You can import / export, and load a configuration quickly in **[Main Menu]-->[Config Manage]:**

Configuration info includes:

>Department

General, OR, ICU, NICU, CCU

>General Configuration

The monitor's general settings, such as Alarm Setup, Screen Layout, and Record.

>Parameter Configuration

Settings related to parameter measurements, such as Wave Gain, Speed, Unit, Alarm's ON/OFF, Alarm Limit.

>Maintenance Configuration

Settings related to maintenance, such as Wave Draw, Language, and Nurse Call.

System Operation

Configuration management

- Enter [Main Menu] → [Config manage] →password:5188
- The menu options as below.
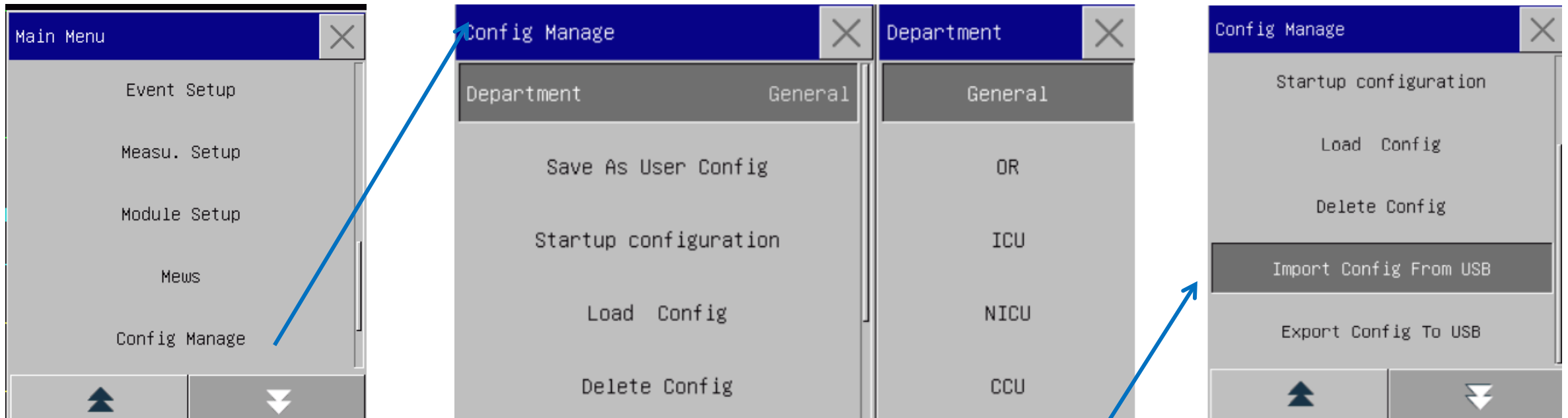
Plug in USB disk>config manage(input 5188)>export config to USB>import config from USB

System Operation

Screen layout, interface style

[Main Menu]-->[Screen Config] -->[Brightness]/[Key light]/[Privacy Mode]/[Night Mode]/[Screen Layout]

In this window, you can adjust the position of waveforms and parameters.

Only parameters that have been turned ON (module setup)are shown on the screen.

The first line of this window always shows the first ECG waveform and parameter.

In [User Maintain], set the following:

wave style/module color/wave draw/wave fill

System Operation

Alarm Setup
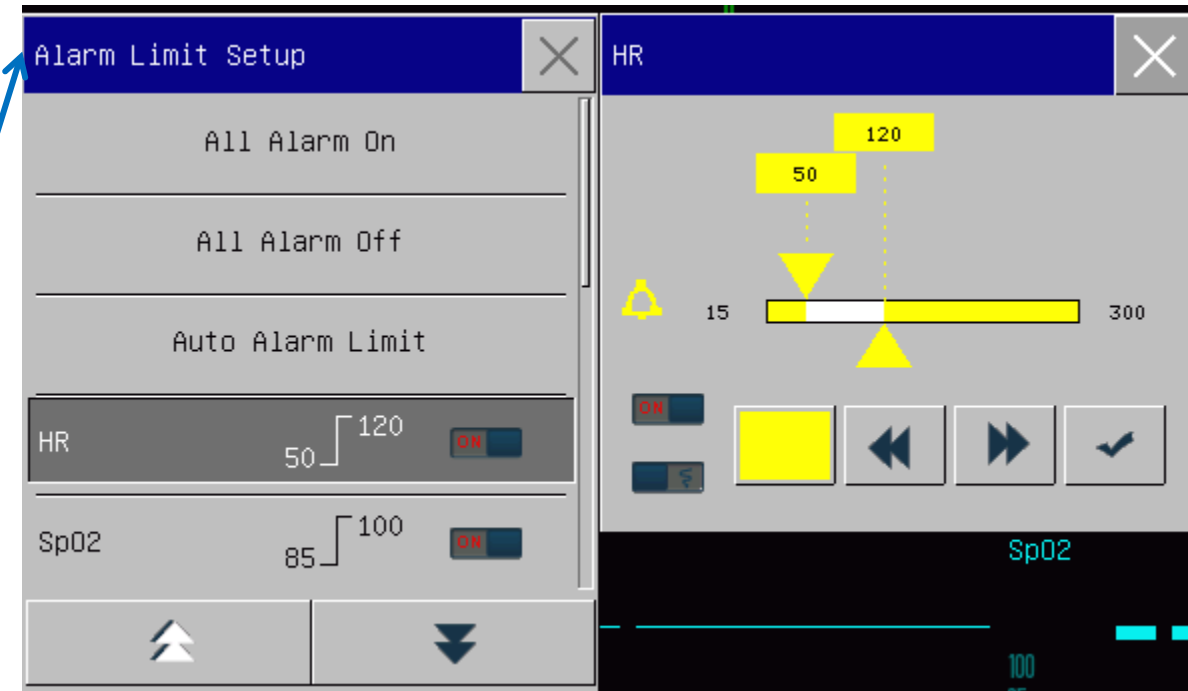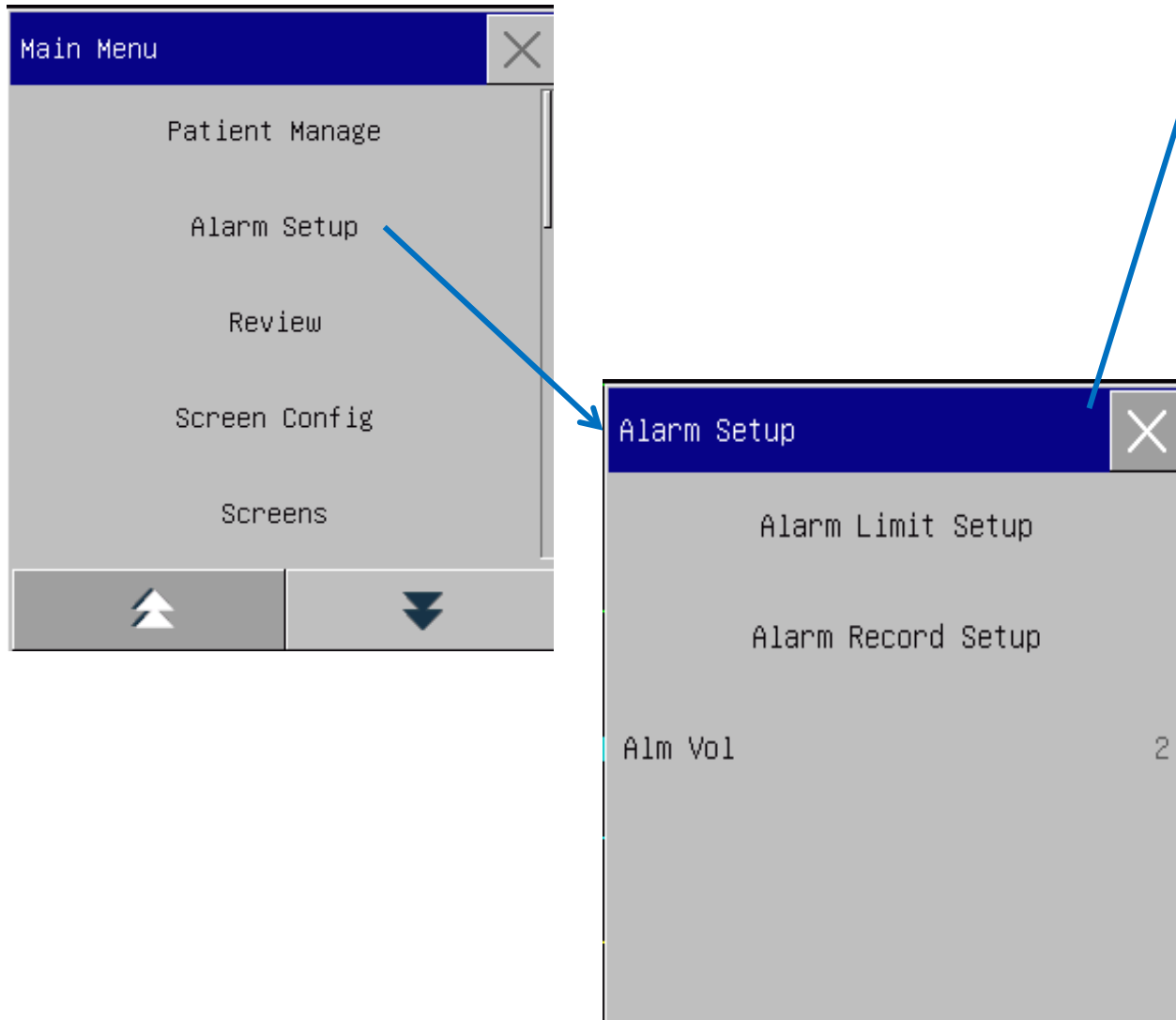
Take RESP as an example:

1. Select RESP parameter area;
2. Select [Alm Limit Setup];
3. Click the button to switch the alarm level.

Module Setup
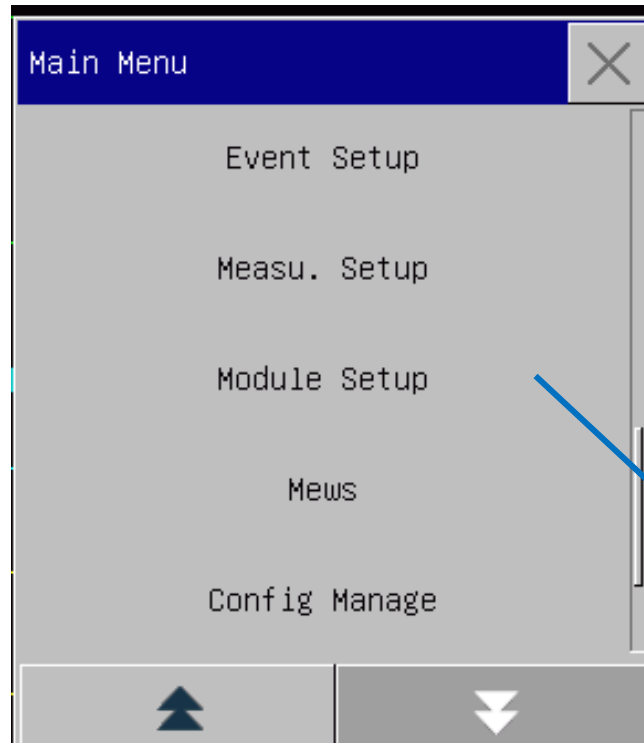
You can turn On/Off parameter modules as needed. When a parameter module is turned OFF, the corresponding waveform and parameter are not displayed on the screen, and the monitor stops measurement, analysis and alarm function for that module.
1) Enter [Main Menu] → [Module Setup].
2) Turn On/Off a parameter in the Setup menu

Alarm Type

(1) Physiological alarm
Physiological alarm is usually caused by a certain physiological parameter of the patient which exceeds the set upper/lower limit scope or by the physiological abnormality of the patient. The alarm message of the physiological alarm will appear in the physiological alarm message area.

(2) Technical alarm
The technical alarm is also referred to as a system error message, indicating the alarm is caused by a mis-operation or system malfunction thereby causing improper operation of a system function or distortion of monitored results. The alarm message of the technical alarm will appear in the technical alarm message area.

System Operation

Alarm Pause，Alarm Delay，Minimum Alarm Volume

Every time the monitor is turned on, the system will enter the alarm pause state automatically.

After the alarm pause time (set by user) expires, the monitor will cancel alarm pause automatically; user can press the alarm pause/cancel key to cancel alarm pause.

Operation steps for alarm pause:
1) Enter [User Maintain] → [Alarm Setup] → [Alm Pause Time].
2) Set the appropriate pause time: **[1min], [2min], [3min], [5min], [10min], [15min]**.

Alarm delay cannot be applied to ECG and IBP.
 Operation steps:
1) Enter [User Maintain] → [Alarm Setup] → [Alarm Delay].
2) Set the appropriate delay time： **[Not Allowed], [5s], [10s], [15s] and [20s]**.

Follow the operation steps below to set up the minimum alarm volume:
1) Enter [User Maintain] → [Alarm Setup] → [Min. Alm Volume].
2) Set the appropriate volume.

System Operation

User Maintain

[User Maintain] 5188→ [Language]/[Time Setup]/[Unit Setup]/[Quick Key Config]/[Set User PassWord]/[Net Protocol]/[ECG Calibrate]/[NIBP Verify]/[Leakage Test]/[Demo]/[Touch screen calibrate]/[Format SD Card]
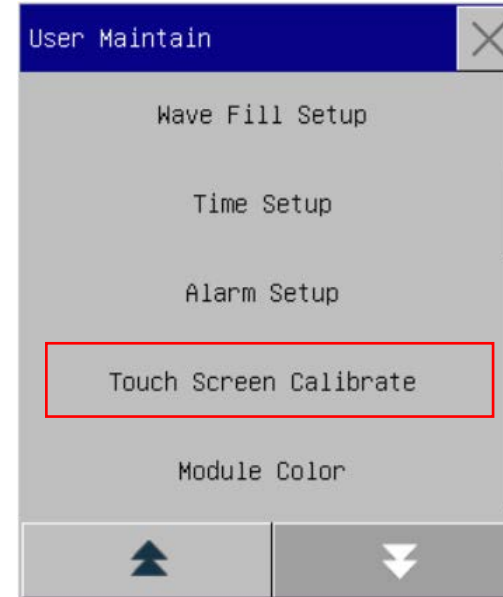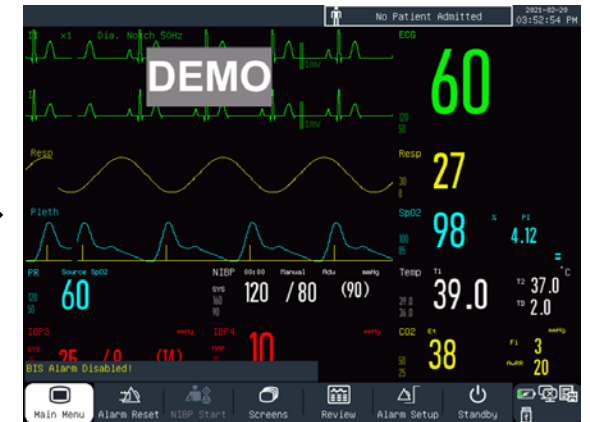
Factory Maintain

Factory Maintain	✕
TempType	CY-F1
CO2Type	NOVA
SpO2Type	Analog
NIB...	
COM...	

Factory Maintain	✕
COMD	C.O.
Pulse Volume Mode	EU
Pulse Volume Type	Mode 1
CO2Ty...	

Factory Maintain	✕
IBP Calibration	
O2 Span Calibrate	
Acquire Data	
NIBPT...	

Factory Maintain	✕
Monitor Info	
FTP Update Online	
Module Update	

Factory Maintain	✕
TempType	CY-F1
CO2Type	NOVA
SpO2Type	Analog
NIBPType	Super
COMC	CO2
⇑	⇓

Factory Maintain	✕
TempType	CY-F1
CO2Type	
SpO2Type	A
NIBPType	
COMC	
⇑	⇓

Factory Maintain	✕
TempType	CY-F1
CO2Type	NOVA
SpO2Type	Analog
NIBPType	Super
COMC	CO2
⇑	⇓

Factory Maintain	✕
TempType	CY-F1
CO2Type	NOVA
SpO2Type	Analog
NIBPType	Super
COMC	CO2
⇑	⇓

COMC	✕
CO2	
AG	

System Operation

Recording

An internal thermal-sensitive printer which supports several
record types and can output patient info, measured data, reviews
and at most 3 waves.

After long-term use of the recorder, scraps of paper and
impurities will be accumulated on the print head, which will affect
the quality of recording and the service life of print head and roll
shaft. Use a cotton ball with alcohol to wipe and clean the print
head.

Printer latch
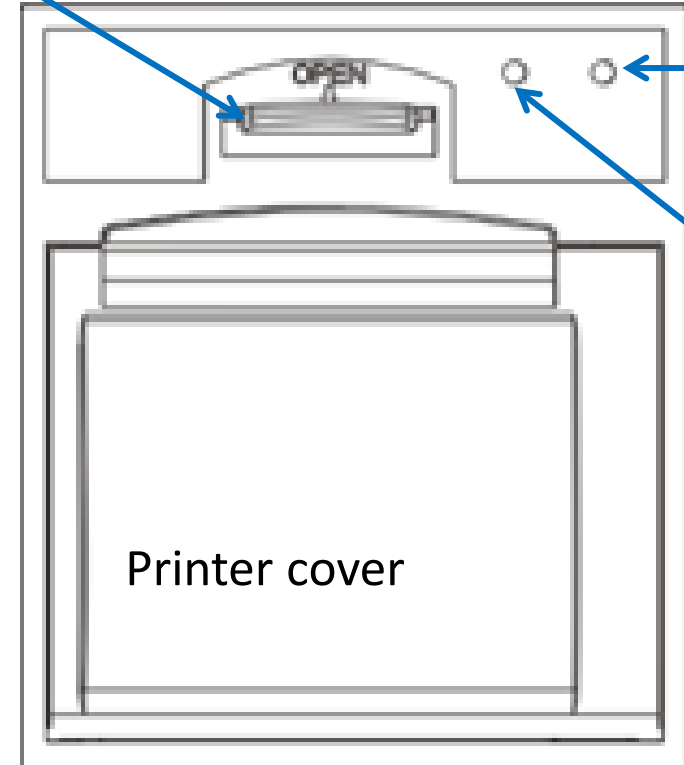
Fault indicator

Power indicator

Printer cover

System Operation

Print

An external printer can be connected with the monitor to print reports: trend graph, trend table, NIBP list, event review, wave review, real-time wave. The compatible printers with PCL language support A4 paper, resolution 300 dpi, include the following brand and model:

HP Laserjet pro M403n

HP Laserjet 1505n

HP Laserjet P2035n

HP Laserjet P4015n

HP Laserjet 1606dn

Lenovo LJ2650DN

Lenovo LJ4600DN

System Operation

Other functions

1. Nurse call

2. Analog output

3. Synchronized defibrillation

   Multi-function connector

4. Format the SD card

5. Lock the screen

6. Connect to the CMS system(STAR8800)

Part 3
Hardware Introduction

- AC power module
- DC power board
- Mainboard
- 7Parameter NIBP board
- ECG module
- SpO2 module
- IBP module
- Buttons board
- LCD adaptor board （C50）
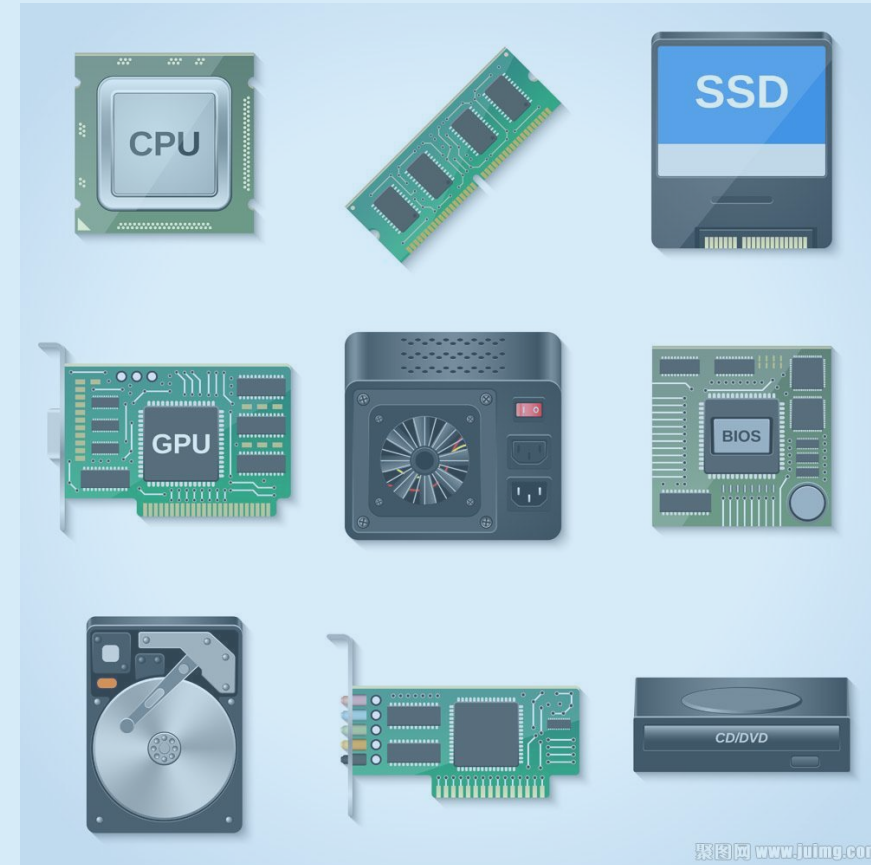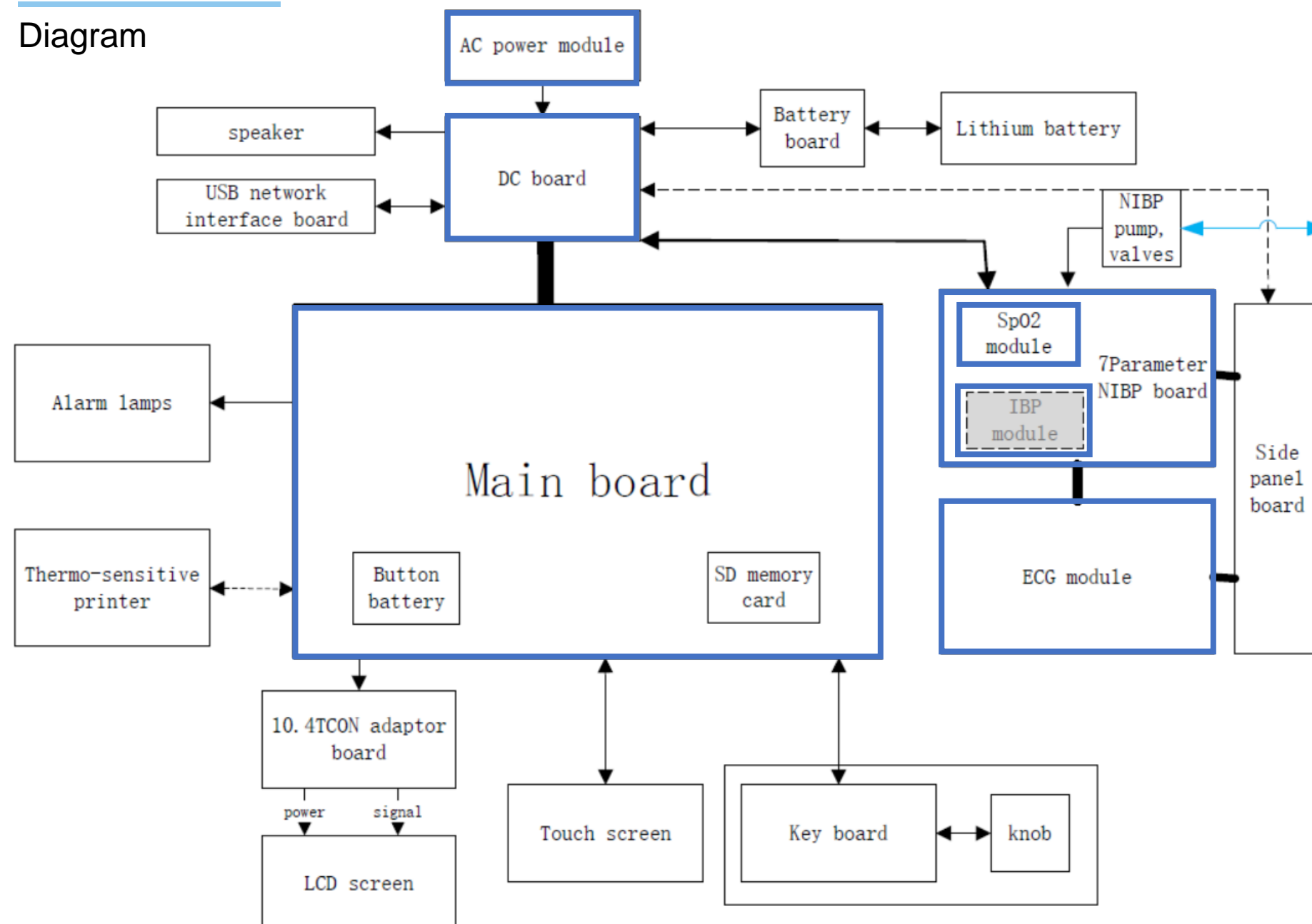
Diagram

AC power module

speaker

DC board

Battery board

Lithium battery

USB network interface board

NIBP pump, valves

SpO2 module

7Parameter NIBP board

IBP module

Alarm lamps

Main board

Side panel board

Thermo-sensitive printer

Button battery

SD memory card

ECG module

10.4TCON adaptor board

power   signal

Touch screen

Key board

knob
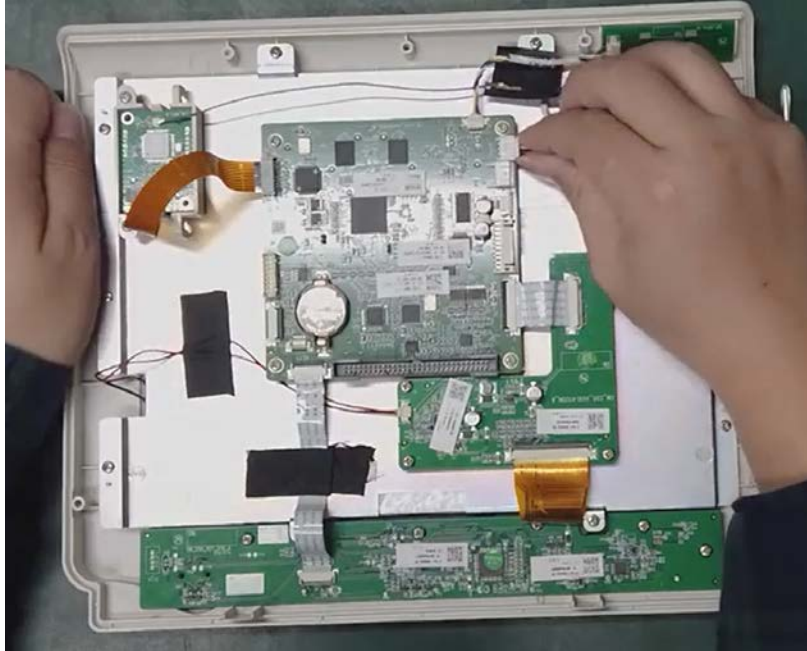
LCD screen

Disassembly parts (C50)

Disassembly parts (C80,C86)

AC power module

To DC power

From AC power source

DC board

DC board control charging & power management , distributing different DC power to main board ,7-parameter board, USB port, speaker and battery charging.

Main board

Main board is the core of the whole monitor, responsible for processing: input and output, control, data storage and processing, Display, system control, communication management...
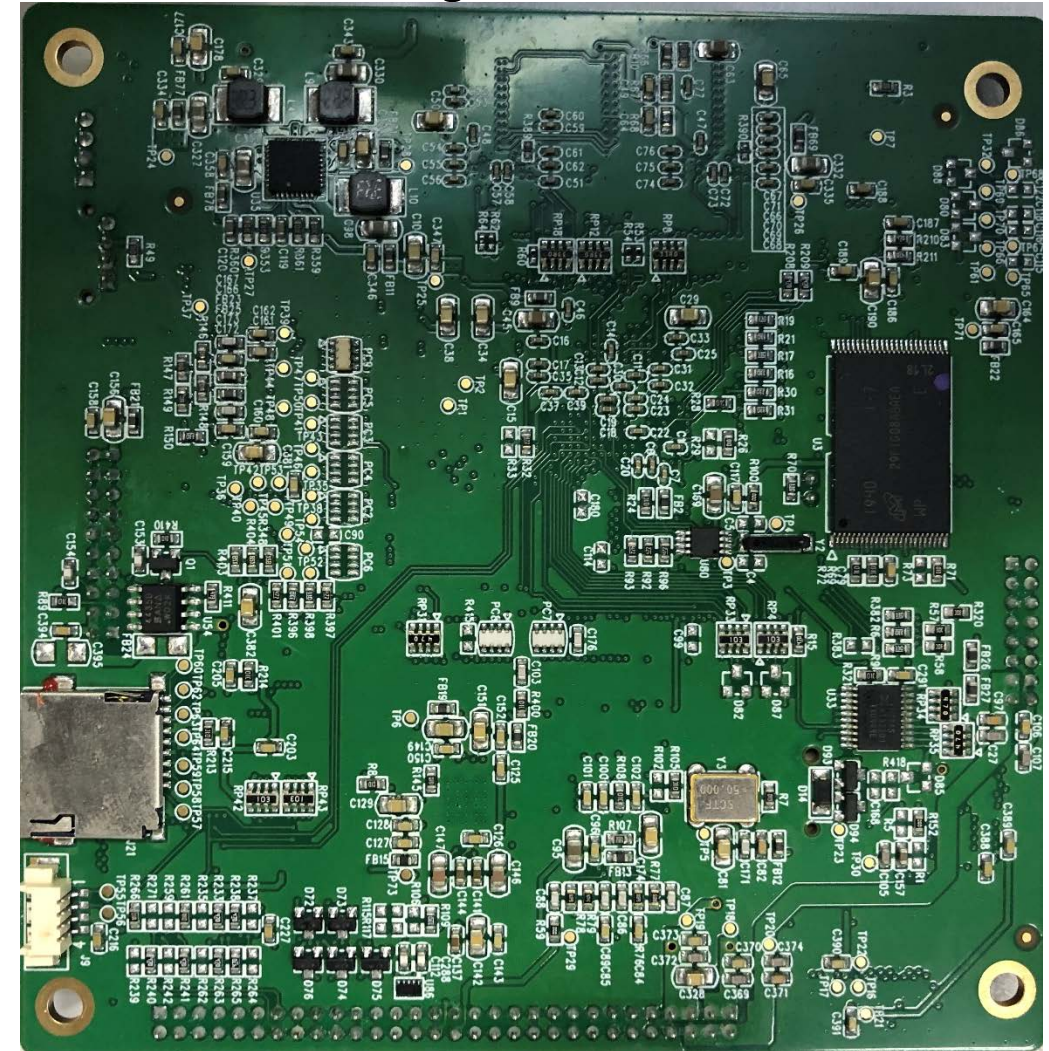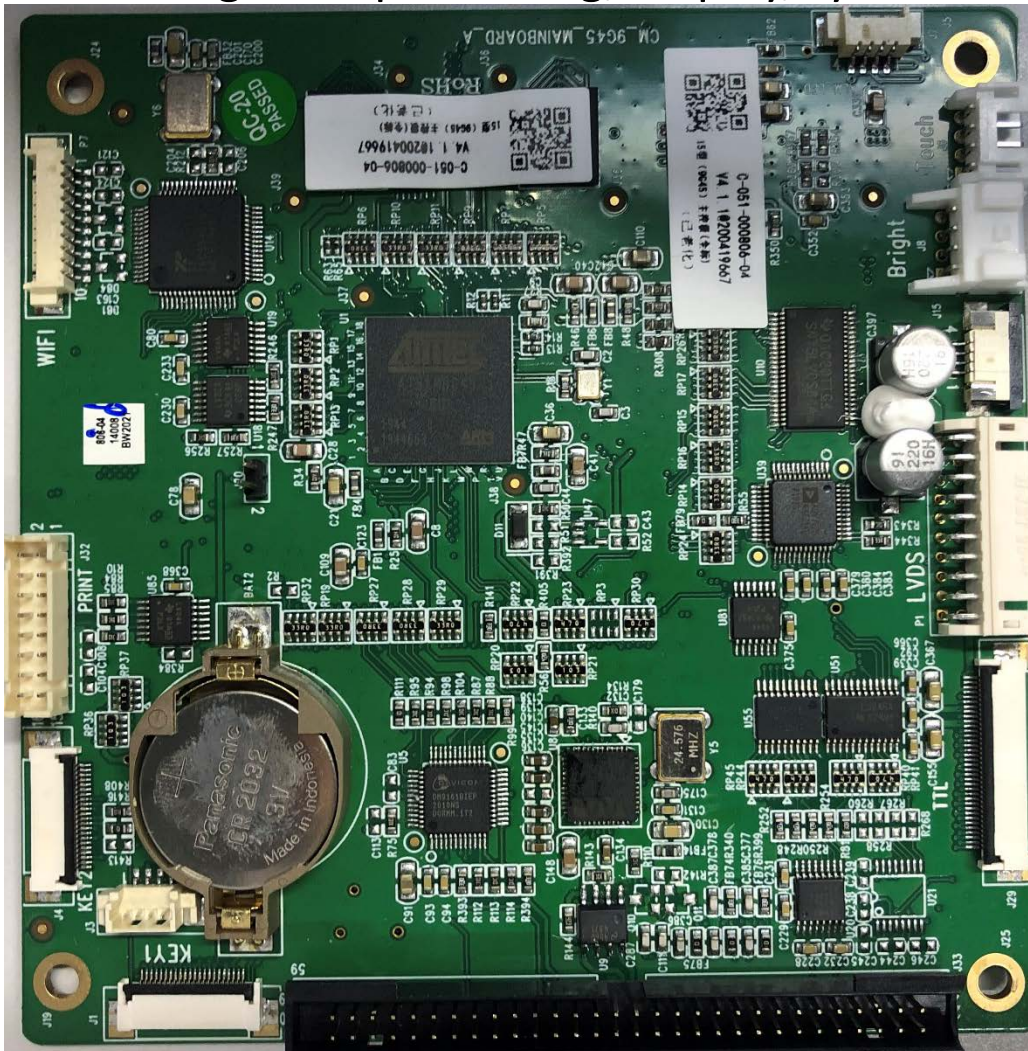
7Parameter NIBP board

7Parameter NIBP module is responsible for:

- NIBP motor pumping, pressure detection, overpressure protection and other functions.

- Carry SpO2 module, IBP module.

- Communicate with other modules.

NIBP communication interface

ECG module

- ECG module is responsible for the detection of ECG and body temperature signals, data processing and communication with the NIBP board.
- Finally the measurement is in the form of waveforms and volumes, accurately assessing the patient's real-time physiological state.

ECG communication interface

SpO2 module
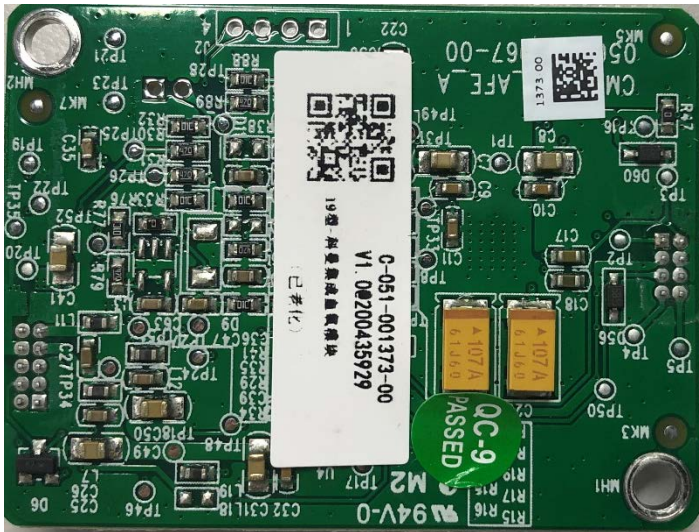
COMEN SpO2   Masimo SpO2   Nellcor SpO2
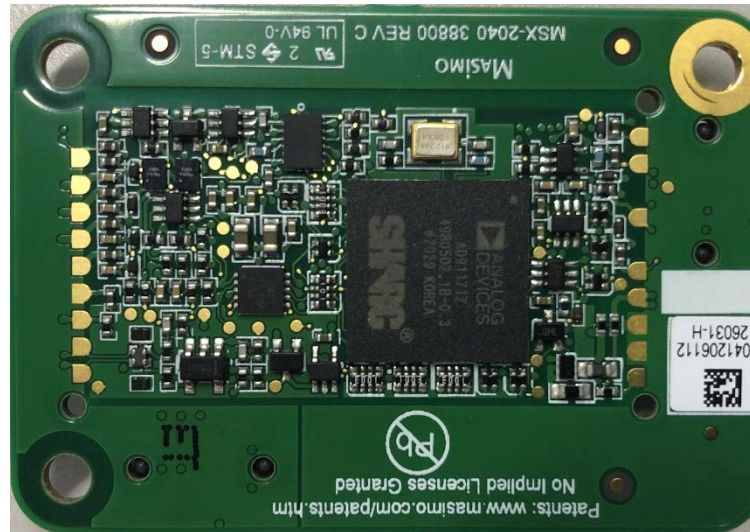
SpO2 board realizes SpO2 signal acquisition, amplification simulation, relative digital-to-analog conversion and signal processing.

During the monitoring process, the pulse amplitude of the optical signal changes. Through calculation, the SpO2 parameters, pulse rate signal and pulse width waveform are obtained. These data will be transmitted to the main board through a special communication protocol.

Hardware Introduction

COMEN

IBP module is designed to measure and calculate IBP of the patient.
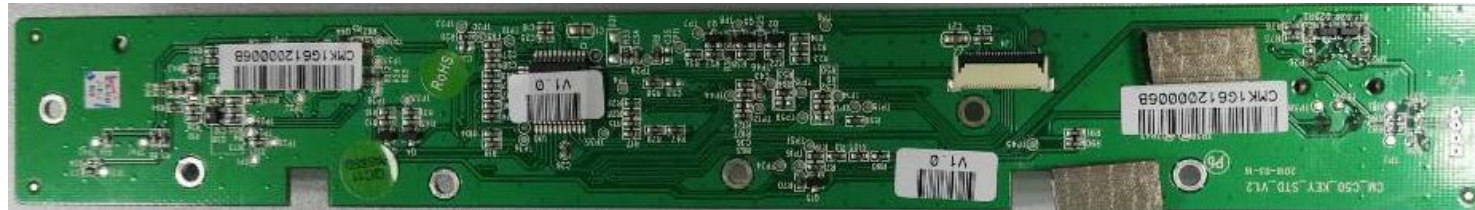
Key board(C50)

Keys board(C80)

10.4TCON LCD adaptor board (C50)

Hardware Introduction

C50 exploded view
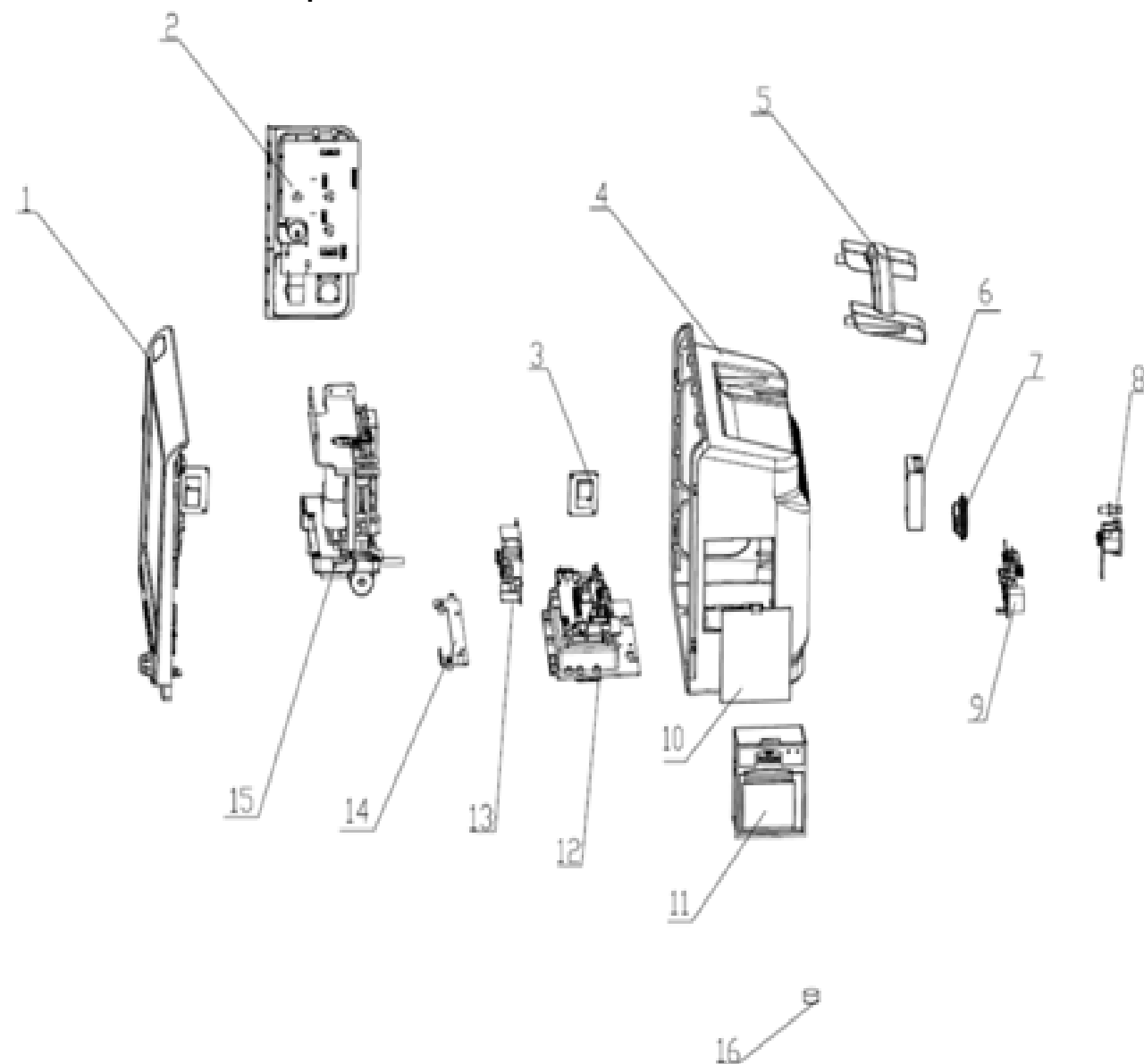
Part NO.	Description	Remark
1	C50 front assembly	front housing, 8.0 inch LCD screen, LCD screen adapter board etc.
2	C50 side panel assembly	side panel(plastic), side panel(PCB) etc.
3	WIFI board	1 pcs
4	C50 rare housing	1 pcs
5	C50 Handle assembly	1 pcs
6	AG module bracket	1 pcs
7	Speaker	1 pcs
8	AC socket	1 pcs
9	Interface board	1 pcs
10	Printer door	1 pcs
11	Printer assembly	printer, printer bracket
12	Power supply assembly	DC power board, battery etc.
13	AC power board	1 pcs
14	C50 Front and rear housing connectors	1 pcs
15	7-parameter assembly	7-parameter NIBP board, 7-parameter ECG board, air pump, air valve etc.
16	Rubber feet	4 pcs

Hardware Introduction

C80 exploded view
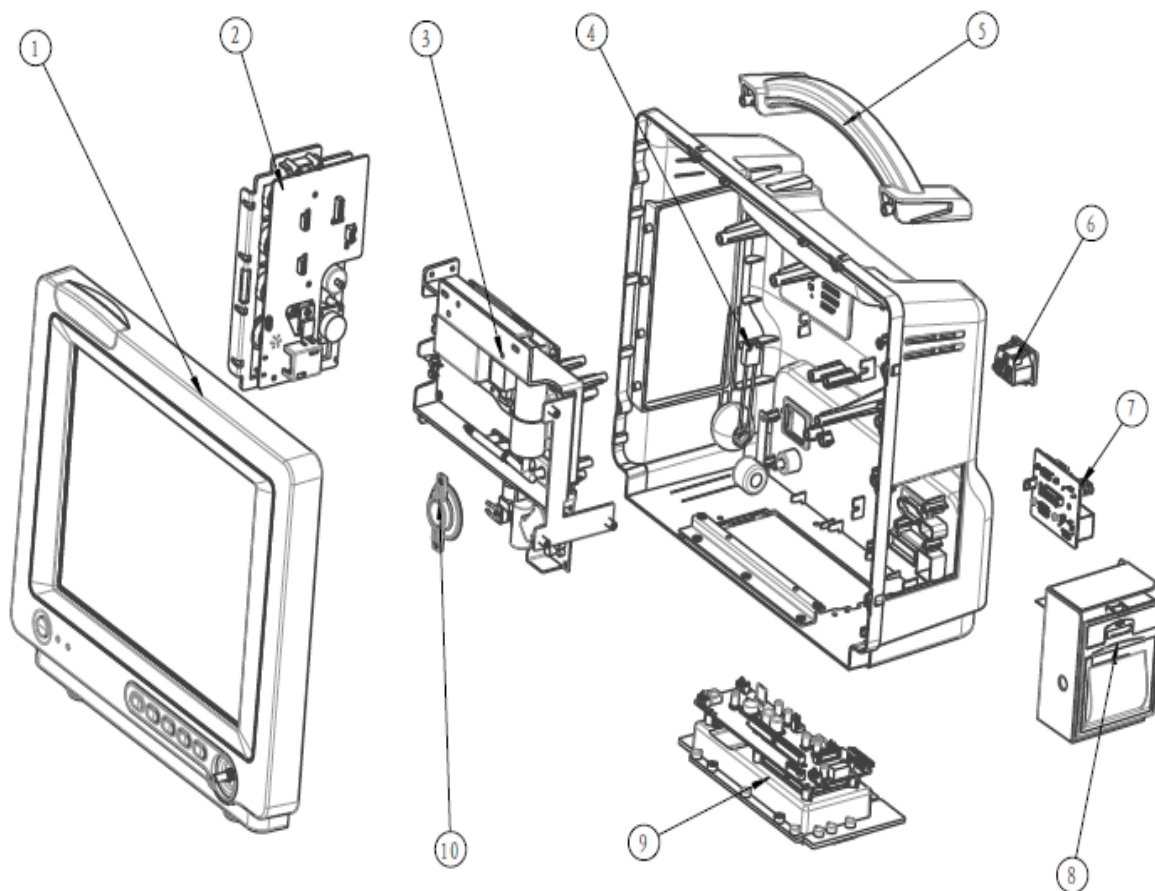
Part NO.	Description	Remark
1	C80 front assembly	front housing, 8.0 inch LCD screen, LCD screen adapter board etc.
2	C80 side panel assembly	side panel(plastic), side panel(PCB) etc.
3	7-parameter assembly	7-parameter NIBP board, 7-parameter ECG board, air pump, air valve etc.
4	C80 rare assembly	1 pcs
5	Handle	1 pcs
6	AC socket	1 pcs
7	Interface board	1 pcs
8	Printer assembly	printer, printer bracket, Printer button etc.
9	power supply assembly	DC power board, AC power board, battery etc.
10	Speaker	speaker, C80 speaker bracket

Part 4
Troubleshooting
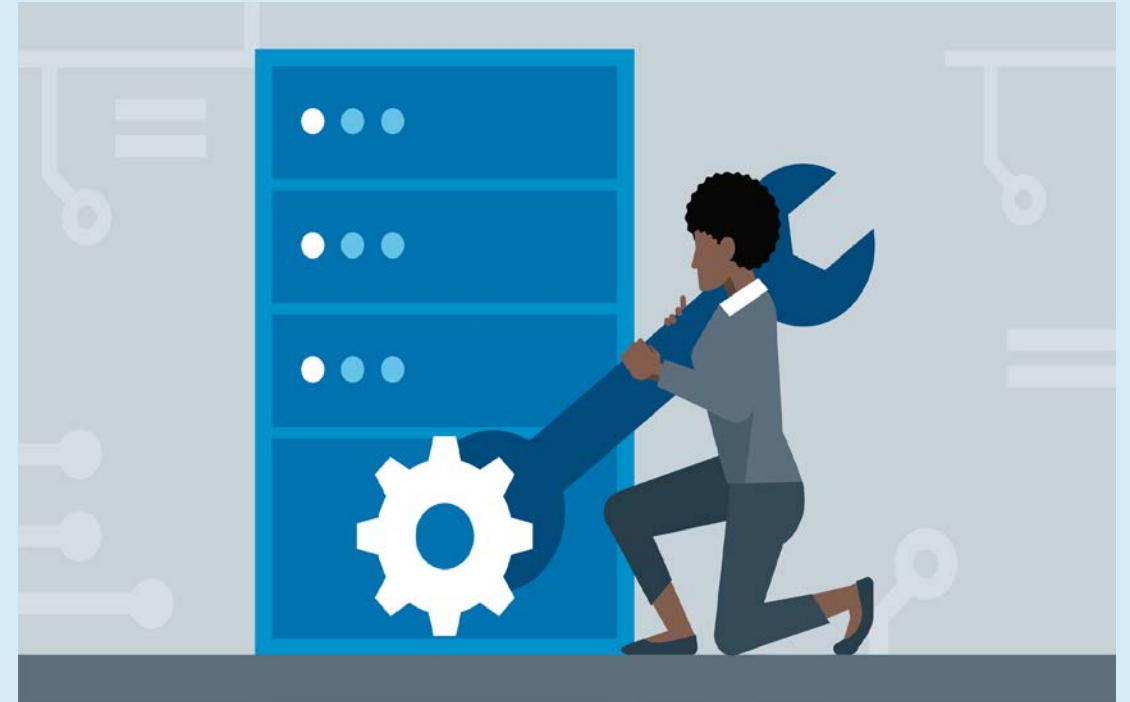
Troubleshooting

Power on failure

Symptoms	Possible Cause	Corrective Action
The patient monitor fails to start	AC power cable not connected	Check that AC power is properly connected
	The battery capacity is too low	Check that the battery capacity is sufficient.
	Cables defective or poorly connected	1. Check the cables from power module to main board.
		2. Check that cables and connectors are not damaged
	Power module is defective	Replace the power module
	Key board is Defective	Replace the key board (power indicator lighting)
	Main board is defective	Replace the main board

- When the monitor is connected to AC power, the AC indicator light is on. Under normal circumstances, the lighting state of the AC indicator can be used as a judgment sign of the power supply cable and the condition of AC power supply board.
- In general, when the battery is power supply separately, the battery indicator lights can be used as a judgment sign for the normal condition of the battery and DC power board.

Troubleshooting

Display failure

Symptoms	Possible Cause	Corrective Action
Integrated display is blank but the patient monitor still works	Cables connected mainboard with LCD screen defective or connected poorly.	Check the cables from the LCD to the main board
	The screen drive board is defective	Replace the screen drive board　(C50)
	Screen cable is defective	Replace the screen cable
	Screen is defective	Replace the Screen.
LCD Screen displays splash or flashing specks	Cables defective or are poorly connected.	Check that the cable between the display and the main board
	The screen drive board is defective	Replace the screen drive board　(C50)
	The screen is defective	Replace the screen
	The screen cable is defective	Replace the screen cable
Stuck at logo interface	Software problem	Update software
	SD card is defective	Pull out the SD card
	The main board is defective	Replace the main board.

After three minutes of startup, press the NIBP measurement button to confirm whether the monitor is working.

Software Update

COMEN

8Gb Sandisk

SOFTUPDATE


```
Start update process...
Update bootloader...                    success.
Update logo...                          success.
Update kernel...                        02%
```
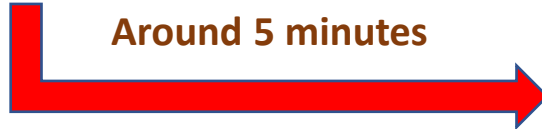
```
Start update process...
Update bootloader...                    success.
Update logo...                          success.
Update kernel...                        success.
Update filesystem...                    success.

Update finished, please remove usb device and reboot.
```

Around 5 minutes

1. Put this File "SOFTUPDATE" into root directory of USB flash disk.

2. Insert and Startup the machine.

3. It will automatically enter upgrading interface.

4. When it's finished as shown above, please take off the USB flash disk and reboot.

Troubleshooting

Battery failure 、 Touch screen failure

Symptoms	Possible Cause	Corrective Action
Battery can't be recharged or use the battery does not boot the monitor	Battery is defective	Recharge the battery for about 4 hours, check out how long it can operate and check out its voltage with a multimeter Please refer to our international after sales Dept about the exact values.
	DC board is defective	Replace DC board.

Symptoms	Possible Cause	Corrective Action
Touch screen does not respond	Touch screen disabled	Perform touch screen calibration.
	The touch screen is squeezed	Loosen the screws of the screen bracket
	Touch screen is defective	Replace the touch screen.
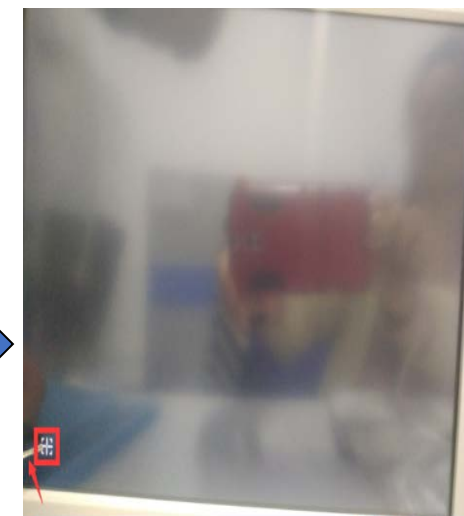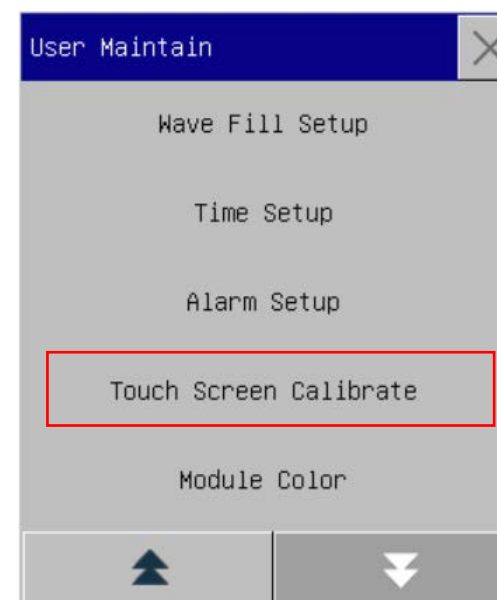
Troubleshooting

ECG failure

Symptoms	Possible Cause	Corrective Action
No ECG waveform	The parameters are not set correctly	Check the ECG channel, lead cable type, and lead type Settings
	The patient's dry skin caused the lead to fall off	Replace electrode slice, clean skin and apply coupling agent
	The accessory is defective	Replace the accessory
	Poor contact between the ECG module and the side panel socket	Check the ECG module and side plate socket
	Poor contact between the ECG module and the 7-parameter NIBP board	Check the ECG module and 7-parameter NIBP board
	ECG board is defective	Replace ECG board
Inaccurate ECG waveform or HR value	Poor contact of skin and electrode slices or poor contact of electrode slices and ECG cable	Check the connection and reconnect
	Interference from some electronic devices	Remove some electronic devices near the monitor
	ECG board is defective	Replace ECG board
ECG comm stopped	Poor contact between the ECG module and the 7-parameter NIBP board	Check the ECG module and 7-parameter NIBP board
	ECG board is defective	Replace ECG board

Troubleshooting

SPO2 failure

Symptoms	Possible Cause	Corrective Action
SPO2 no value and waveform	Poor connection	Check the connection between patient and sensor
		Check the connection between sensor and side panel
	Error SPO2 type	Choose the correct SPO2 type
	SPO2 sensor is defective	Replace the SPO2 sensor
	SPO2 board is defective	Replace the SPO2 board
SPO2 value is inaccurate	Long-term measurement of the same limbs	Start SPO2 measureme
	SPO2 sensor is defective	Replace the SPO2 sens
	SPO2 board is defective	Replace the SPO2 boa

SPO2 COMM ERROR
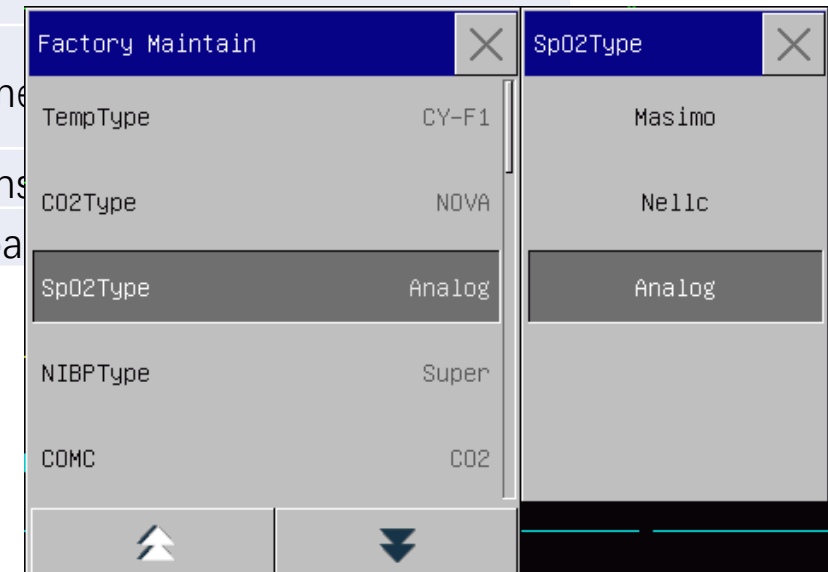
Troubleshooting

NIBP failure

Symptoms	Possible Cause	C
NIBP do not work	Poor connection	C... p...
	Buttons board is defective	S...
	Air pump is defective	R...
	Air valve is defective	R...
	7-parameter NIBP board is defective	Replace the 7-parameter NIBP board
	NIBP type error	Choose the correct NIBP type
NIBP value is inaccurate	Error patient type	Choose correct patient type
	Long-term continuous measurement	The measurement interval is set at least 5 minutes or more
	Air leakage	NIBP cuff or tube leakage
	7-parameter NIBP board is defective	Replace the 7-parameter NIBP board
Repeated charge, but there is no result	Error patient type	Choose correct patient type
	Air pump is defective	Replace the air pump
	Air valve is defective	Replace the air valve
	Air leakage	NIBP cuff or tube leakage
	7-parameter NIBP board is defective	Replace the 7-parameter NIBP board
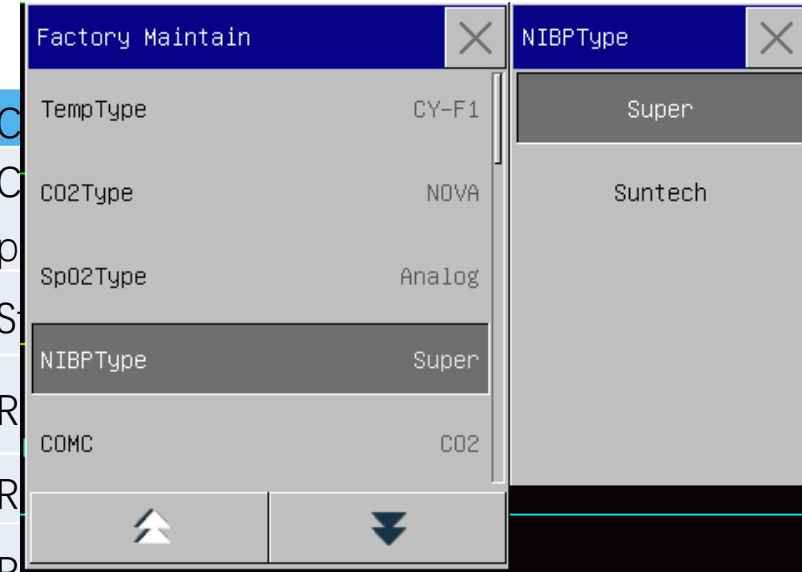
Troubleshooting

RESP failure

Symptoms	Possible Cause	Corrective Action
No value and waveform	Resp function is disabled	Check the set in "module setup"
	ECG cable or electrode slice failure	Replace the ECG cable or electrode slice
	Poor connection	Check the connection between ECG board and 7-parameter NIBP board
	ECG board is defective	Replace the ECG board
RESP value and waveform is inaccurate	Weak signal of patient	Check the patient's condition
	ECG cable or electrode slice failure	Replace the ECG cable or electrode slice
	ECG board is defective	Replace the ECG board

Troubleshooting

TEMP failure

Symptoms	Possible Cause	Corrective Action
No temperature value	Temperature exceeds the monitoring range of the monitor	Check whether the body temperature is within the normal range
	Poor connection	Check the connection between 7-parameter NIBP board to ECG board and to side panel
	Temperature probe is defective	Replace the temperature probe
	ECG board is defective	Replace the ECG board
TEMP value is inaccurate	Weak signal of patient	Check the patient's condition
	ECG cable or electrode slice failure	Replace the ECG cable or electrode slice
	ECG board is defective	Replace the ECG board
Numerical display is unstable	Temperature probe is defective	Replace the temperature probe
	ECG board is defective	Replace the ECG board

Troubleshooting

IBP failure

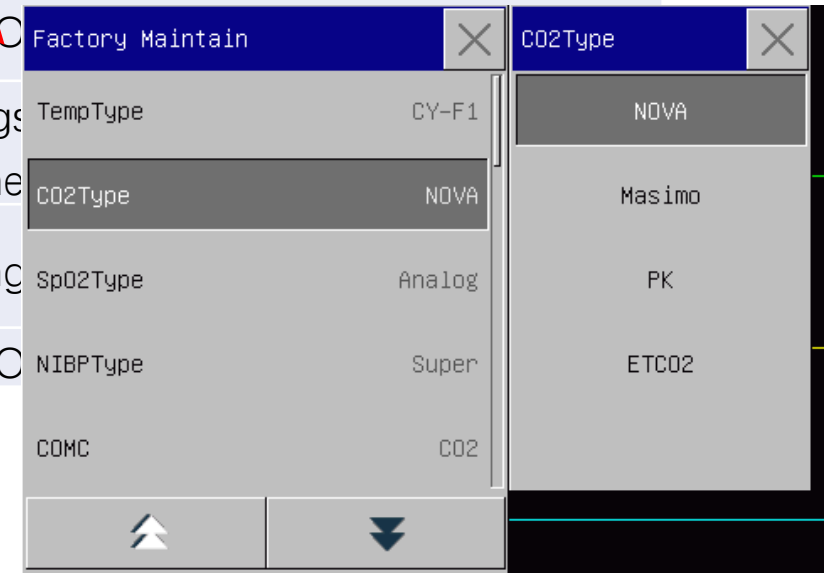| Symptoms	Possible Cause	Corrective Action
No value and waveform	IBP function is disabled	Check the set in "module setup"
	Poor connection	Check the connection between 7-parameter NIBP board to IBP board
		Check the connection between IBP board to side panel
	IBP board is defective	Replace the IBP board
IBP value and waveform is inaccurate	Error settings	Check the settings on the menu to ensure that the channels that are operating are consistent
	There is no zero before operation	Operate the "Zero" before usage or replacement
	Accessory defective	Replace IBP transducer
	IBP board is defective	Replace the IBP board

How To zero IBP and connect IBP - Onedrive
https://1drv.ms/v/s!Aj4lc-thpU3R4hFghCOy4iqU9M4b?e=36qnZi

Troubleshooting

EtCO2 failure

Symptoms	Possible Cause	Corrective Action
No value and waveform	EtCO2 function is disabled	Check the set in "module setup"
	CO2 type error	Choose the correct CO2 type
	Sampling tube or airway adapter is defective	Replace sampling tube or airway adapter
	Extension cable is defective	Replace the extension cable
	EtCO2 module is defective	Replace the EtC...
EtCO2 value and waveform is inaccurate	Error settings	Reset the settings... "Zero" every time...
	Sampling tube or airway adapter is defective	Replace sampling...
	EtCO2 module is defective	Replace the EtC...

CO2 COMM ERROR

Factory Maintain	
TempType	CY-F1
CO2Type	NOVA
SpO2Type	Analog
NIBPType	Super
COMC	CO2

CO2Type
NOVA
Masimo
PK
ETCO2

Troubleshooting

Recorder failure

Symptoms	Possible Cause	Corrective Action
No printout	Paper reversed	Re-install the paper roll.
	The record door does not close well	Check out door and indicator light
	The type of paper is wrong	Install the right paper
	Cable defective or poorly connected	1. Check that cable between recorder and main board is properly connected.
		2.Check that connecting cables and connectors are not damaged.
	Recorder power supply failure	Check if the power module outputs 5 V DC and 12V DC correctly.(Please contact our International Service Dept.
	Recorder failure	Replace the recorder.
Poor print quality	Paper roll not properly installed	Stop the recorder and re-install the paper roll.
	Print mechanism dirty	1. Check the thermal print mechanism
		2. Clean the thermal print mechanism with an appropriate cleaning solution.
	Recorder failure	Replace the recorder.

Part 05
Calibration and Testing

- NIBP leakage test
- NIBP verification and calibration
- IBP verification and calibration
- EtCO2 module verification
- ECG test
- SpO2 test
- Temperature test
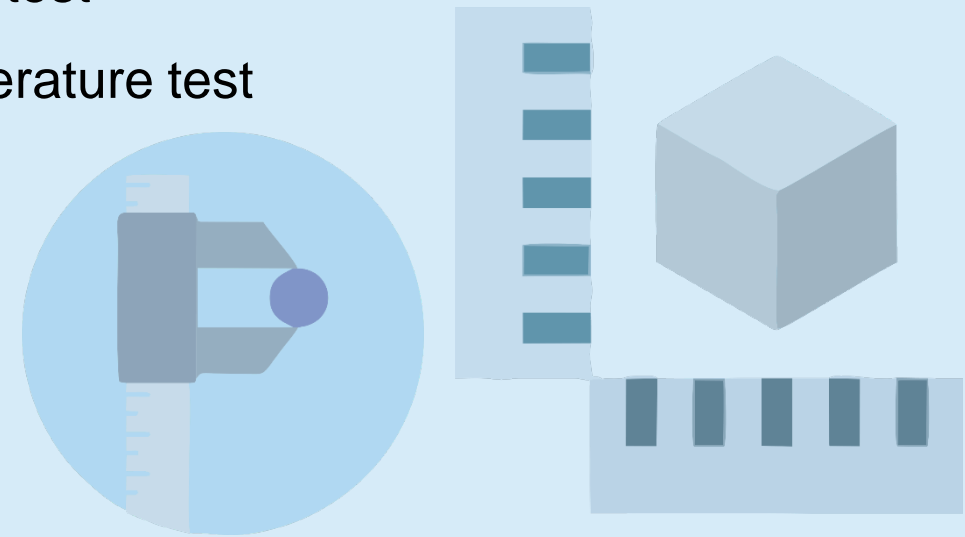
Calibration and Testing

NIBP leakage test

Tools:
- Adult NIBP cuff
- Tubes
- Cylinder

Procedure:
- Insert the cuff hose connector into the NIBP port.
- Wrap the cuff around the cylinder.
- Select [Main Menu]→[Maintain]→[Password: 5188]→[User Maintain]→[Leakage Test]
- Run [Leakage Test]
- "Leakage Testing ..." message displayed on the screen, wait for 20 seconds until the test completed
- If Pass, no prompt displayed.
- If failed, "Pneumatic Leak" message displayed on screen.
    1) Check if the entire connection loosens
    2) Run again
    3) If still failed, contact the service.
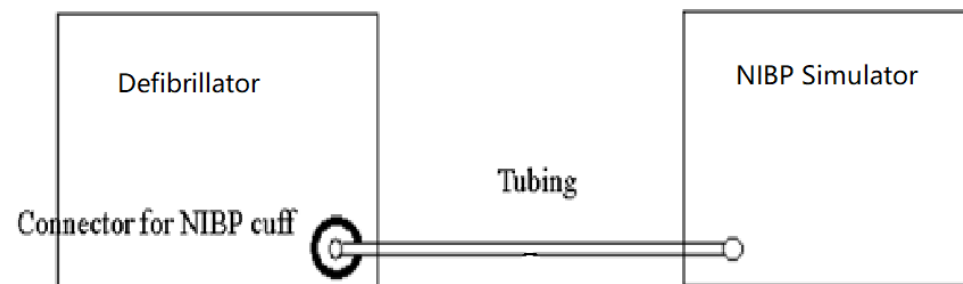

COMEN
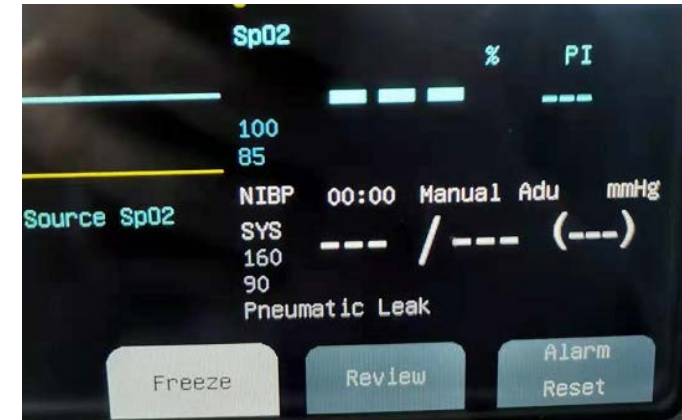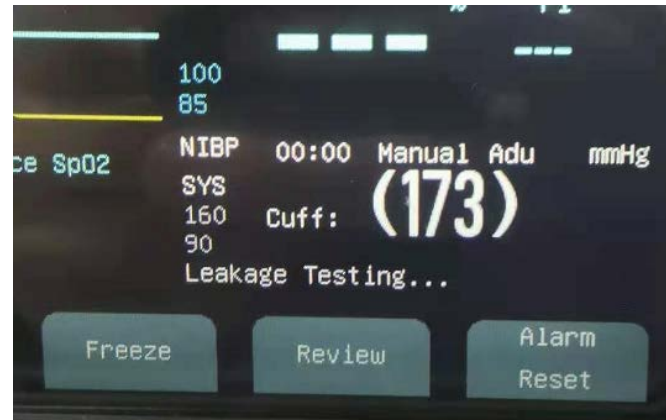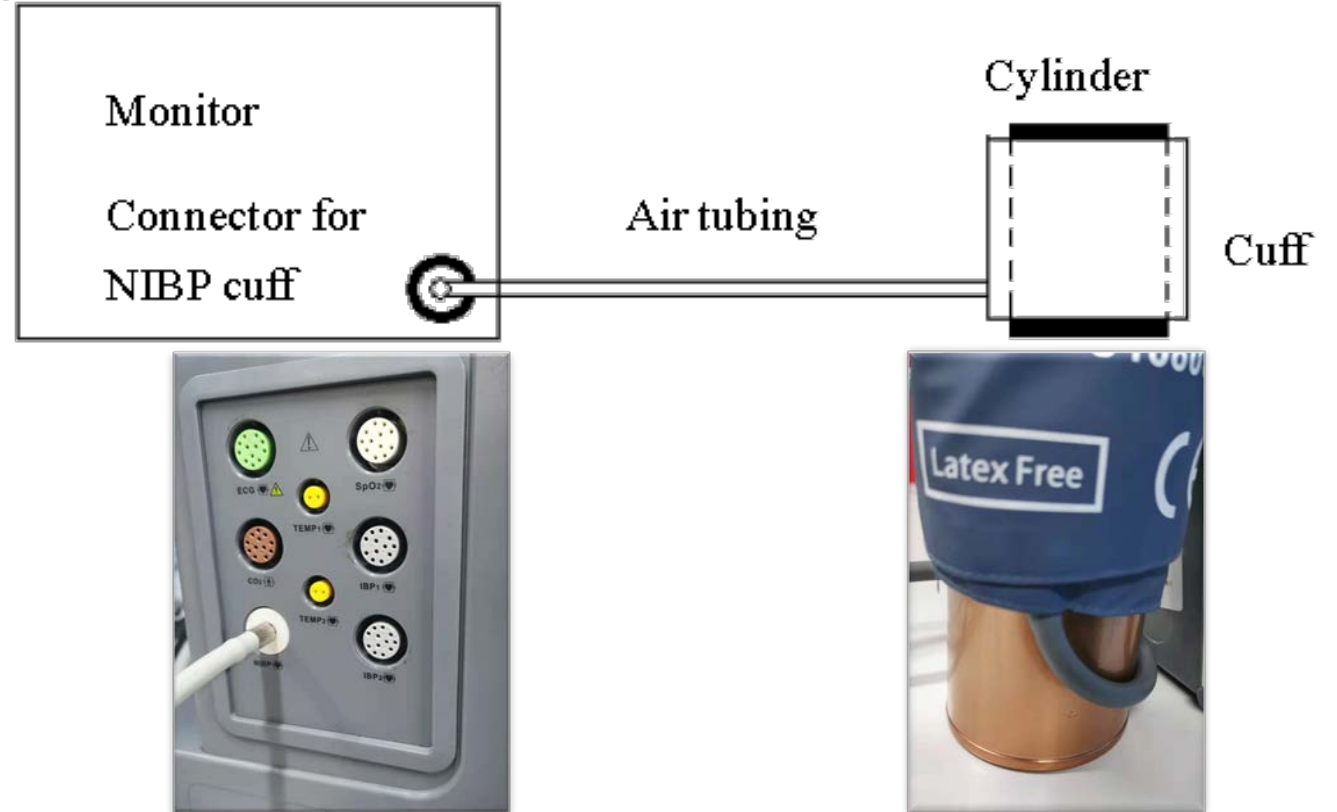
Calibration and Testing

NIBP verification and calibration

Tool:

- Tubes
- Hose and connector
- NIBP simulator(has internal adult cuff, recommended)

NIBP Cali_Veri_Test V1.1 - Onedrive
https://1drv.ms/v/s!Aj4lc-thpU3R4hNI1kdGAMbtpoC2?e=nzEb4r

Calibration and Testing

COMEN

NIBP verification and calibration

If your NIBP simulator doesn't have internal air capacitor, the following tools are required:
- Tubes
- Y junction
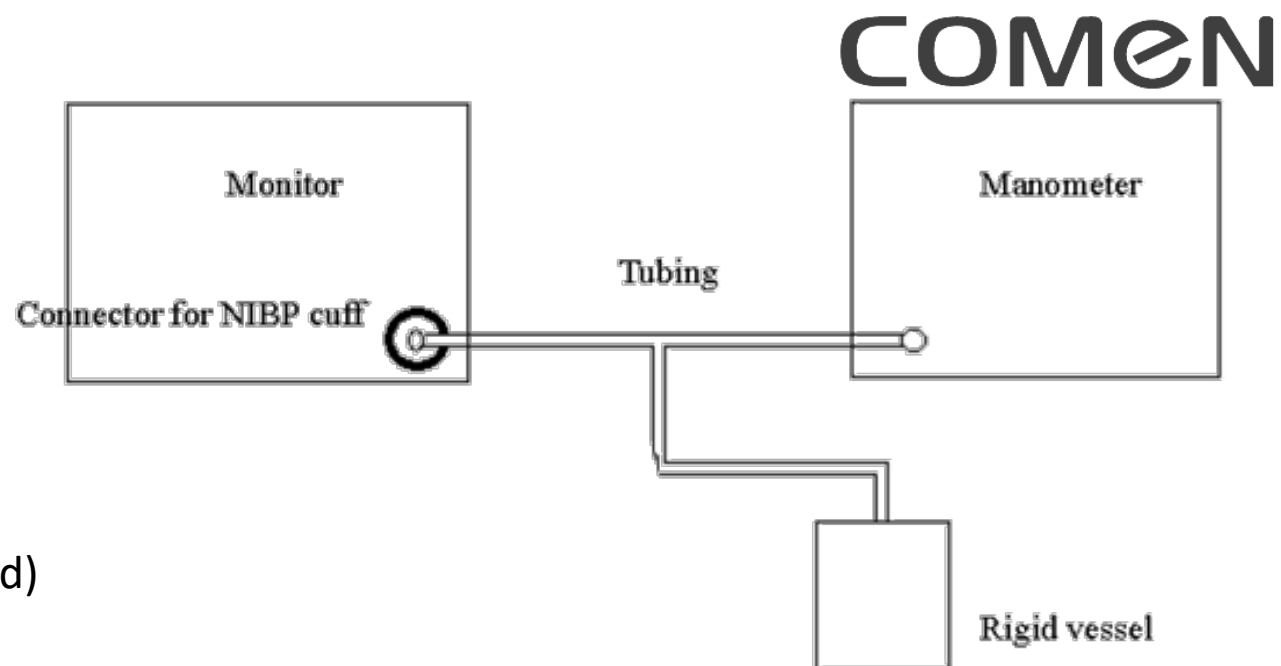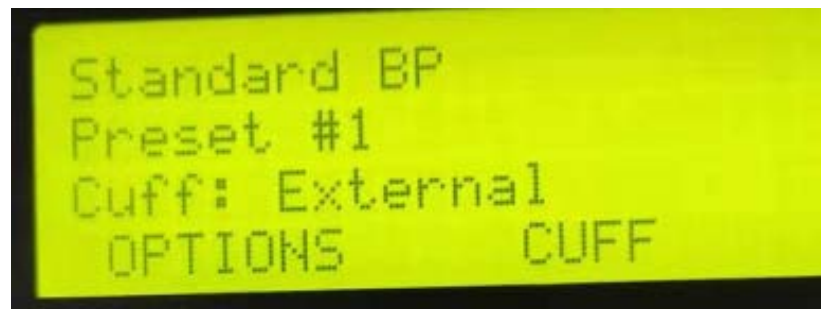- Hose and connector
- NIBP simulator(has internal adult cuff, recommended)
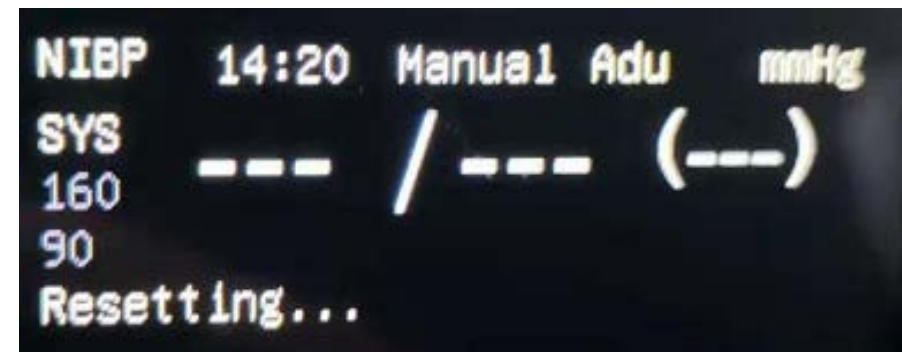- Rigid vessel(Air capacitor)

Calibration and Testing

NIBP calibration

1. Connect the simulator and the NIBP connector of the monitor.

2. Set the NIBP simulator parameter:

    a) [Pressure Source] menu, setpoint: 245mmHg

    b) [Standard BP], Cuff: Internal Adult

3. Go [Main Menu] →[Maintain]→[Password: 2016] → [Factory Maintain] → [NIBP Calibrate]

4. Run [NIBP Calibrate]

5. Start NIBP simulator. The measured pressure volume will climb up to around 255mmHg, and then slowly drop down. Once NIBP simulator's measured pressure volume reaches 245mmHg, then quickly stop [NIBP calibrate], the monitor will reset the reference point of 245mmHg.

6. Run [NIBP verify], to verify the result of calibration. If NIBP verification fails, redo NIBP calibration.

Note:

- [NIBP calibrate] can only calibrate the reference point of 245mmHg, which is for adult.
- If the measured pressure drops too fast, check the entire tube connection and the gas tightness of air capacitor.
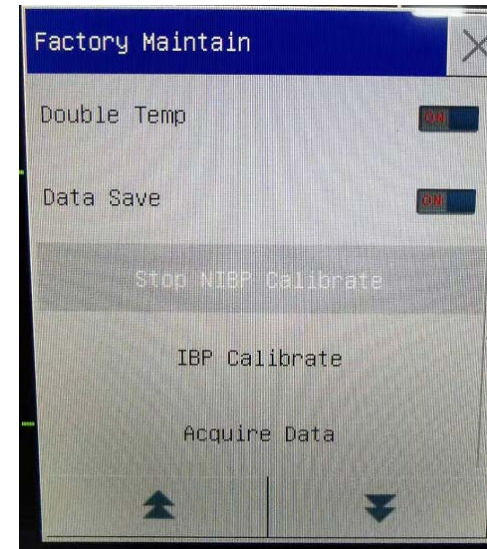
Calibration and Testing

COMEN

NIBP verification

1. Connect the simulator and the NIBP connector of the monitor.
2. Set the NIBP simulator parameter:
   1.[Pressure Source] menu, setpoint: 200mmHg
   2.[Standard BP], Cuff: Internal Adult
3. Go [Main Menu] →[Maintain]→[Password:5188] → [User Maintain] → [NIBP Verify]
4. Run [NIBP Verify], the field of NIBP screen will display "NIBP Checking".
5. Start NIBP simulator.
6. NIBP simulator will display the measured pressure volume.
7. Monitor will display NIBP volume.
8. Wait until that volumes are stable.
9. Compare the measured pressure volume form NIBP simulator and NIBP volume from monitor, whose difference should be within 3 mmHg.
10. Press [Stop NIBP verify].
11. If NIBP verification fails, then run the NIBP calibration.
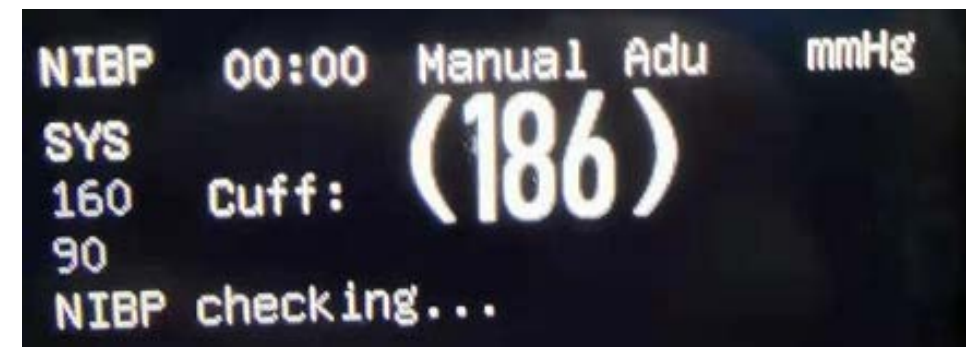
Calibration and Testing

IBP verification and calibration

Tools:

- IBP Simulator(Fluke ProSim 3 vital signs simulator recommended)
- Cable connector(Simulator and monitor's IBP connector)

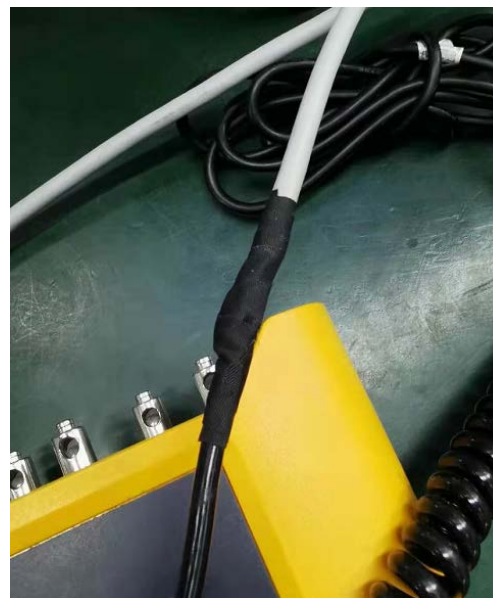IBP Zero_Cali_Test V1.0 - Onedrive
https://1drv.ms/v/s!Aj4lc-thpU3R4hL0r9mmCvimZMbl?e=mpEJyn

Calibration and Testing

IBP calibration

1. Connect the simulator and the IBP port on the monitor.

2. Go [Main Menu] →[Maintain]→[Password: 2016] → [IBP Calibration] →[IBP1] →[IBP1 Cal Pressure], set the pressure as 240.

3. Set the Fluke ProSim3 simulator parameter:

   a) [Home] menu, select: BP

   b) [Blood Pressure] menu, select: BP1

   c) [Blood Pressure 1], select: [dynamic] off

   d) [Blood Pressure 1], select: [Static] 240 mmHg

   e) Press [Enter].

4. On the monitor, press [Calibration on all IBP].
5. When the message "IBP Calibrate OK" prompt, the calibration process complete.
6. Run the IBP verification.
7. If the IBP verification OK, calibrate the IBP2.

IBP calibration

Tools:

- Mercury manometer
- T-shape connection
- IBP accessory

1. Connect the mercury manometer and IBP accessory .

2. Go [Main Menu] →[Maintain]→[Password: 2016] → [IBP Calibration] →[IBP1] →[IBP1 Cal Pressure], set the pressure as 240.

3. Press the airbag to make the pressure of mercury manometer more than 240mmHg. The rotating airbag should be slowly discharged slowly, and tighten the valve when the pressure gradually reaches 240 mmHg.

4. On the monitor, press [Calibration on all IBP].

5. When the message "IBP Calibrate OK" prompt, the calibration process complete.

6. Run the IBP verification.

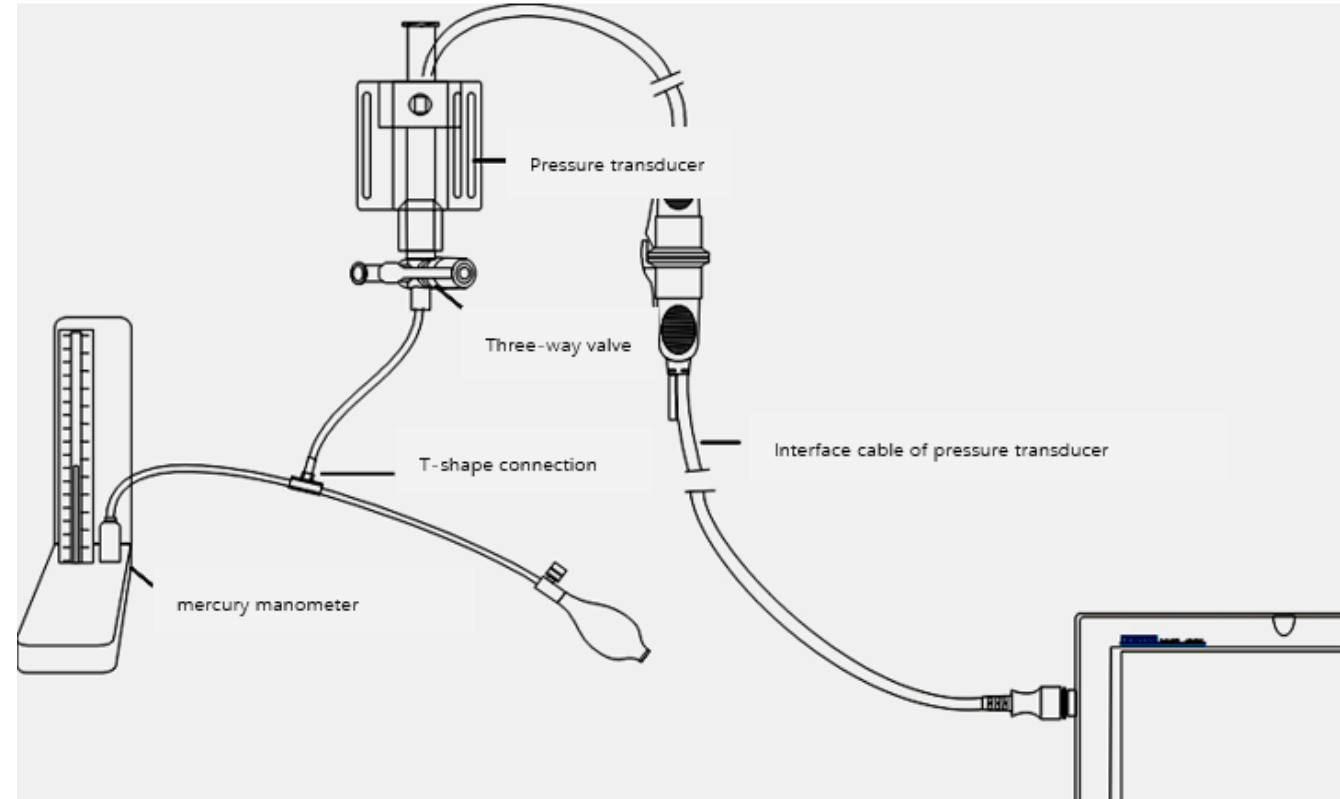7. If the IBP verification OK, calibrate the IBP2.

Pressure transducer

Three-way valve

T-shape connection

Interface cable of pressure transducer

mercury manometer

Calibration and Testing
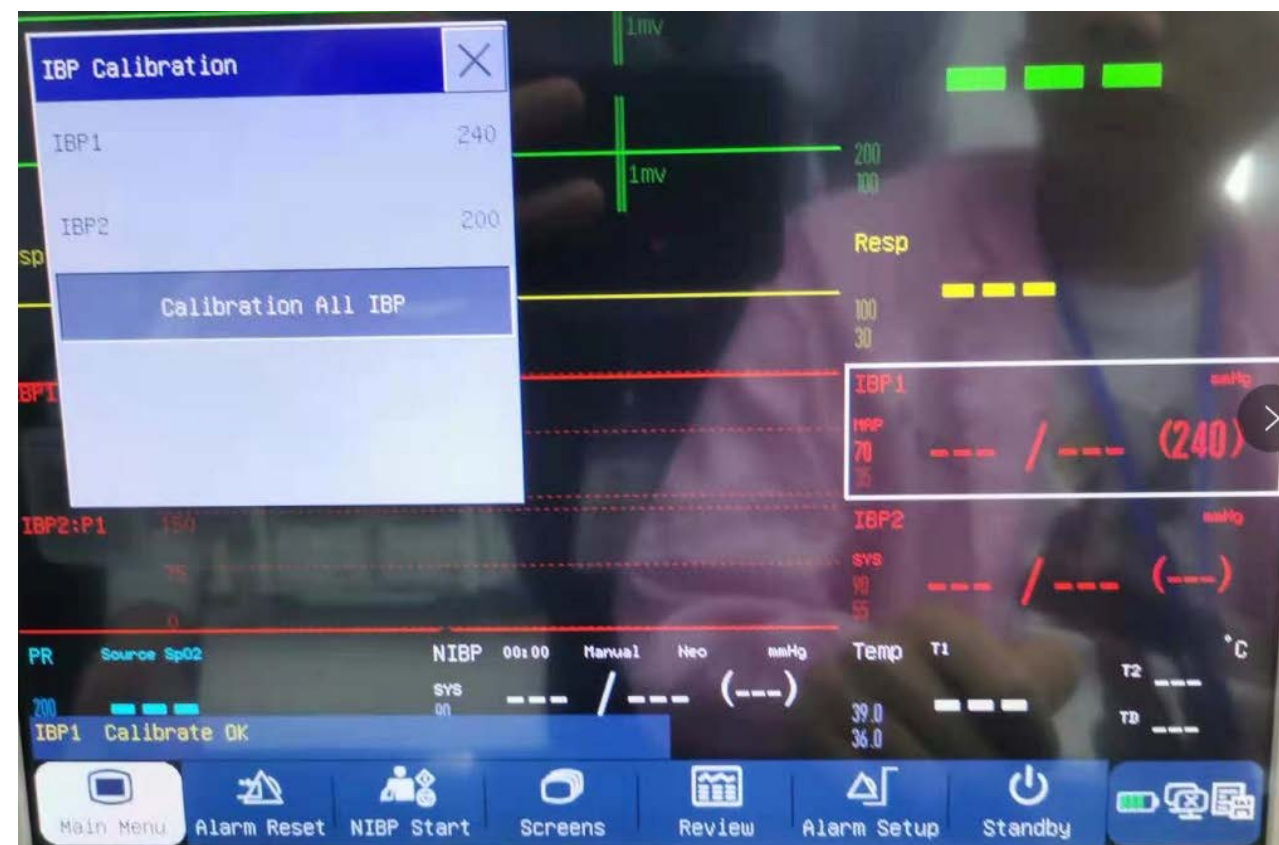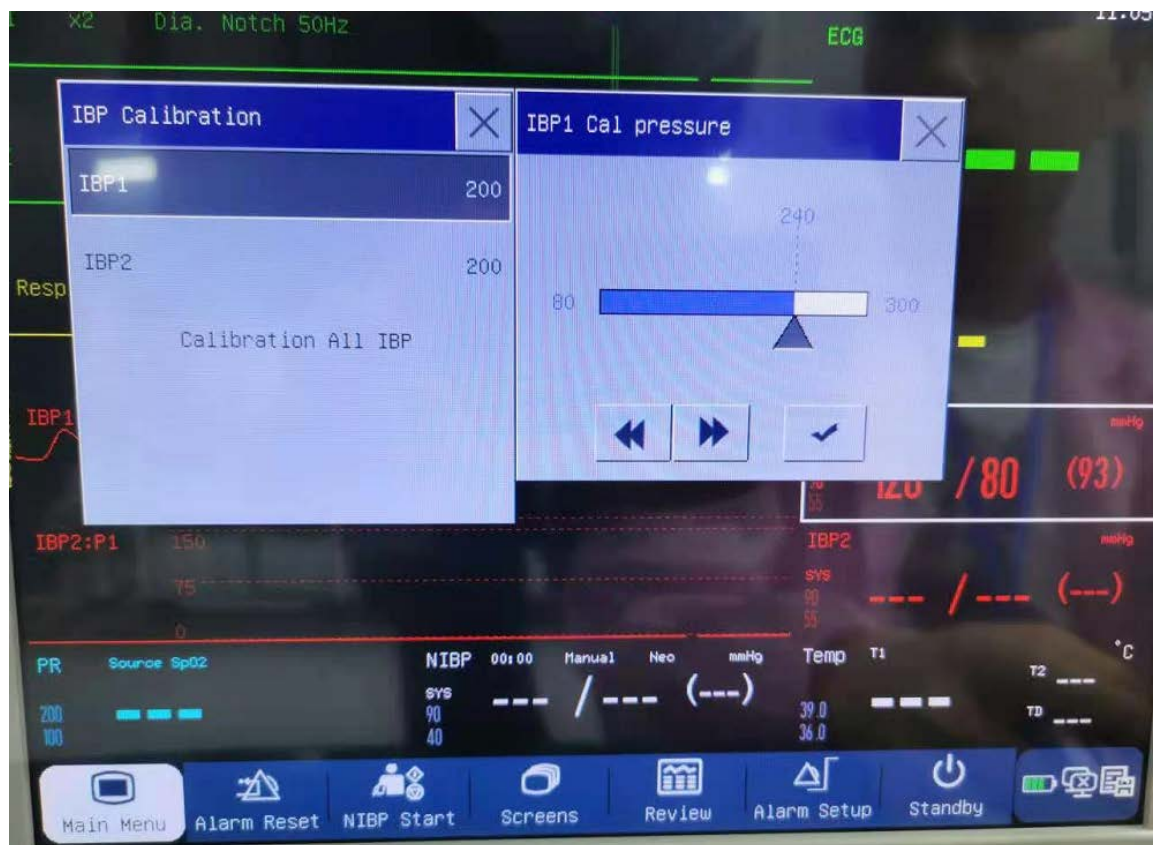
IBP calibration

Calibration and Testing

IBP verification

1. Connect the simulator and the monitor IBP port.

2. Set the Fluke ProSim3 simulator parameter:

   a) [Home] menu, select: BP

   b) [Blood Pressure] menu, select: BP1

   c) [Blood Pressure 1], select: [dynamic] off

3. Go [Main Menu] →[Measu. Setup]→[IBP1: ART Setup] → [Zero]

4. Press Zero, then wait for a while, until "IBP1 Zero succeeded"

5. set the ProSim3, [Blood Pressure 1], select: [dynamic] on, press "right" button to choose "ART 120/80", and press "Enter"

6. Compare the result on IBP1 parameter field
   - If showing 120/80, the verification test passes. Run the verification test for IBP2
   - If not showing 120/80, the verification test fail. Then calibrate the IBP1.

Note:
- There are many ways to verify the IBP accuracy. Using the IBP simulator with proper cables is convenient and fast.
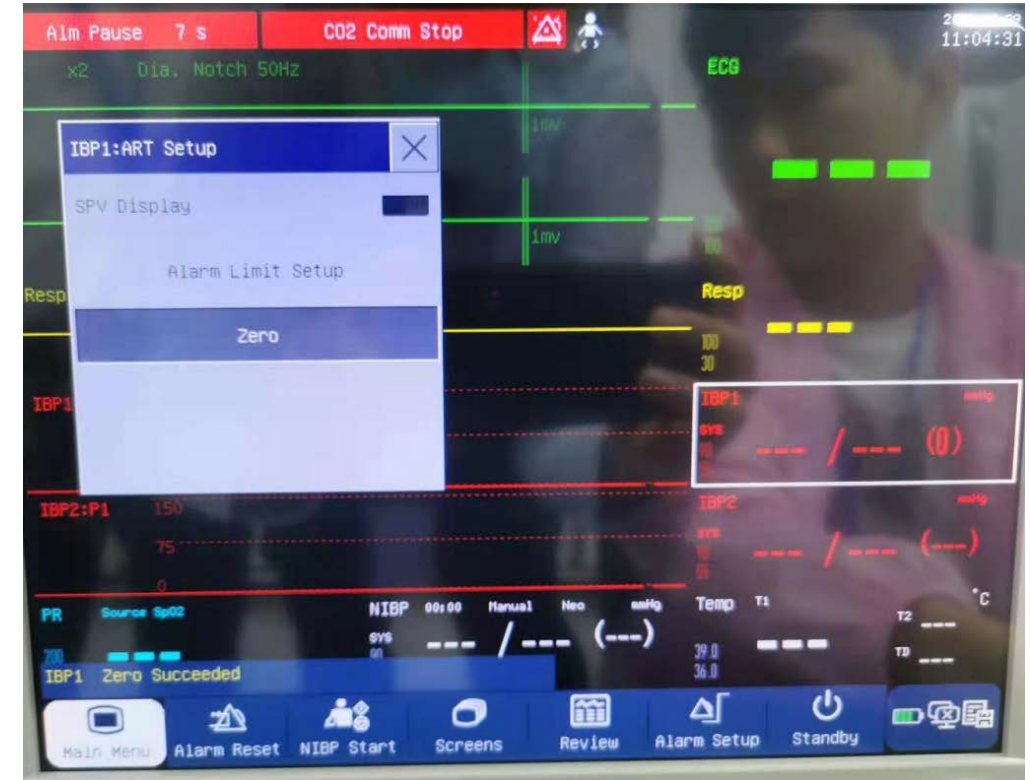
Calibration and Testing

IBP verification
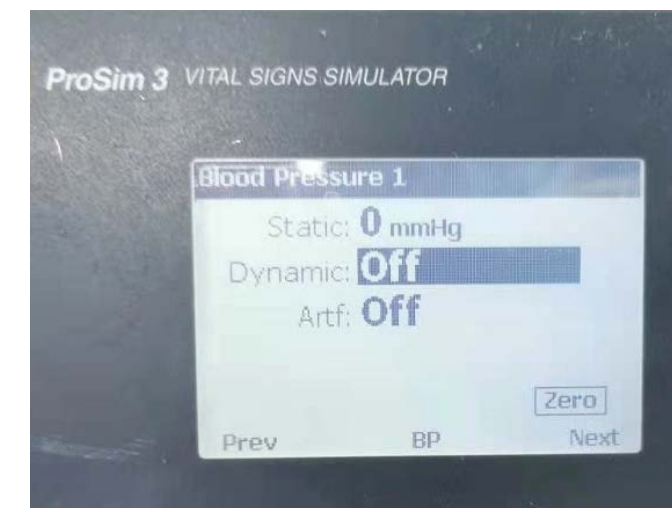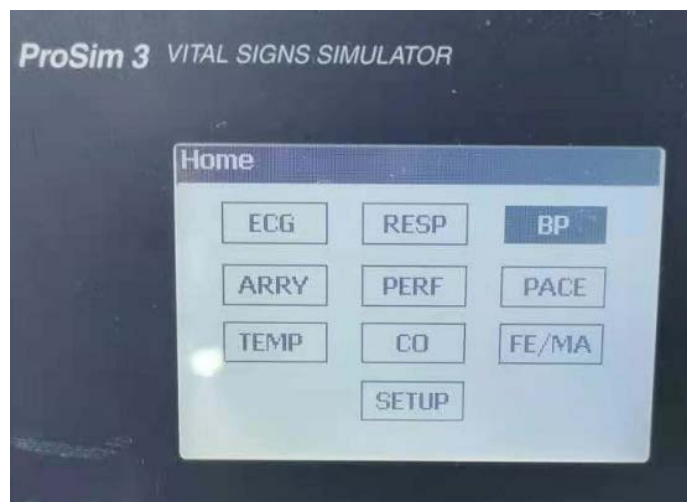
Calibration and Testing

EtCO2 module verification

1. Connect the EtCO2 external module to the CO2 port on the monitor.

2. Insufflate to the EtCO2 airway adaptor.

3. Check the EtCO2 parameter field, if the result is between 32-40, then the verification test passed.

4. If test fails, check if the module is defective.
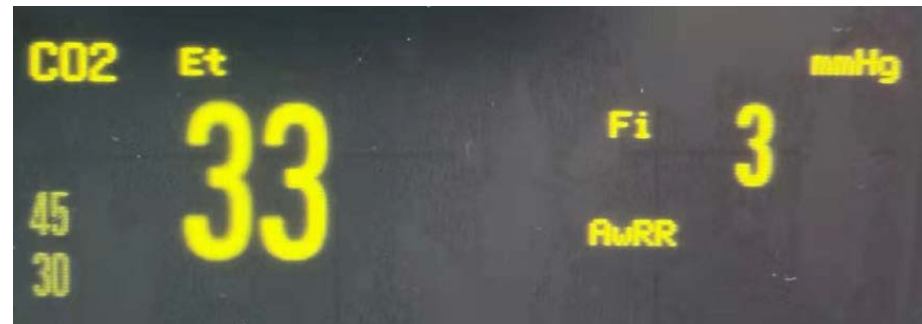
Calibration and Testing

ECG test

Tools:
- ECG lead cable
- ECG signal simulator

Calibration and Testing

ECG test

1. After the ECG simulator powered on, press the "NSR" button.

2. Set the AMP: 1.0mV, HR: 300/200/120BPM.

3. After waveforms are stable, visually observe and compare the waveform amplitude with the reference amplitude 1mv on the screen.

4. Change the gain of ECG wave form and do the comparison again.

5. For better observation, you can simplify the screen layout and only show the ECG waveform

6. If the difference of HR volume on the monitor and simulator is below ±1% or ±1bmp, the test passed.

7. If the test fails, contact COMEN service.
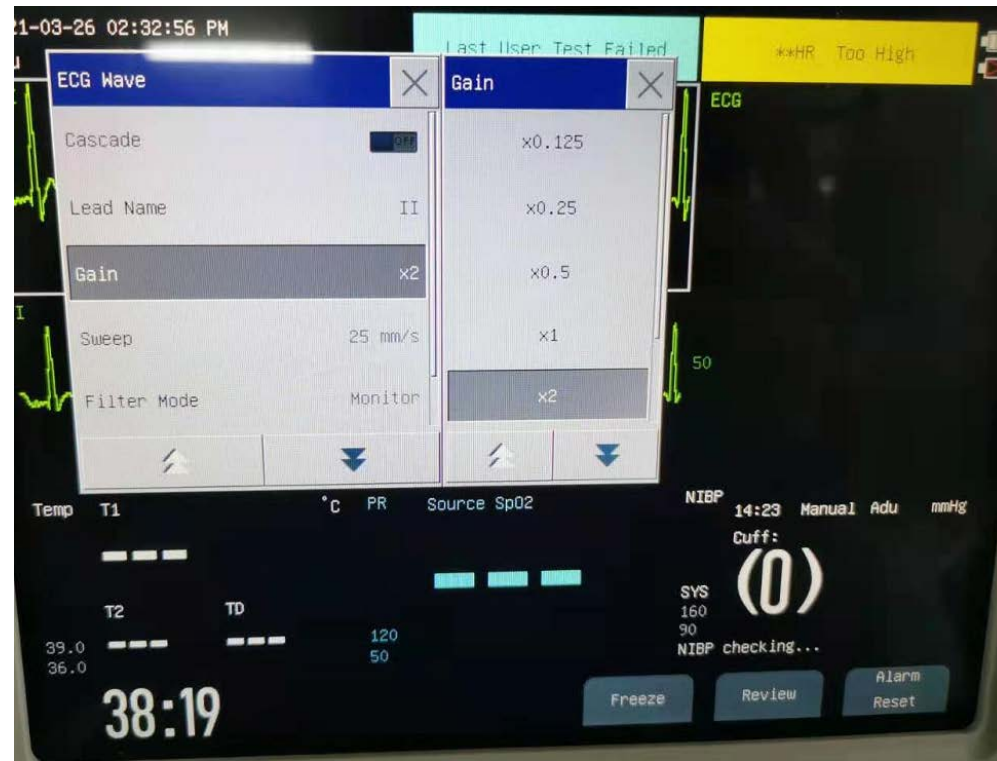
Calibration and Testing

ECG test

The HR volume is identical to the one set on simulator, which is 200 in this case.

The amplitude of simulator is set to 2.0mV. On the monitor display, we can find the reference amplitude of 1mV. In comparison, the amplitude of ECG waveform is twice of the reference amplitude.

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Calibration and Testing

SpO2 test

Tool:

SPO2 sensor

Procedure:

1. Connect the SPO2 sensor to the monitor. Set the patient type as adult.

2. Measure SPO2 on your finger. (assuming you are in good health)

3. SPO2 volume is in the range of 95%-100%.

4. Remove the SPO2 sensor from your finger and the volume and waveform gradually become zero(baseline).

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Calibration and Testing

Temperature test

Tool:

Resistor simulator

Methods:

Temperature is correlated with the specific resistance of the Temp sensor, as the table shows below:

Procedure:

1. Connect the resistor simulator to the monitor.
2. Set the resistance to 32500, check the temperature volume on the monitor screen.
3. Set the resistance to 6015, check the temperature volume.
4. Set the resistance to 3601, check the temperature volume.
5. If the error is below ± 0.2°C, the test passes. If not, contact COMEN service.

Temperature (°C)	Resistance (Ω)
0	32500
37	6015
50	3601

Part 06

Maintenance

- Battery
- Cleaning and disinfection
- Maintenance schedule

COMEN

Battery

The built-in battery must be charged after each use to ensure sufficient battery reserve.

Check battery performance

The battery life varies with the storage and operation environments, frequency of battery discharging and use time. The battery performance will degrade gradually if the battery is not being used for a longer time. To check its performance:

1) The battery icon shown on the screen should be normal.

2) The battery can be charged normally when connected to AC power supply.

3) Completely disconnect the monitor from the patient and stop all monitoring and measurement.

4) Ensure that the battery is charged uninterruptedly for at least 6h till it is fully charged.

5) Disconnect AC power supply, and use the battery to supply the monitor till the monitor shuts down automatically; meanwhile record the start time and end time of discharging.

6) The length of discharging time reflects the performance of the battery.

7) When the discharging time reduces to less than 50% of the initial volume(2 hours for 2200mAh, 4 hours for 4400mAh), the battery is thought to be poor performance and should be replaced with a new one.

Maintenance

Battery

Optimize battery performance

If it is the first time to use the battery, please ensure that the battery has undergone at least two complete optimization cycles. A complete optimization period means uninterrupted charging till the battery is fully charged, and then discharging it till the monitor shuts down automatically, like the following:

1) Completely disconnect the monitor from the patient and stop all monitoring and measurement.

2) Put the battery in the battery case of the device.

3) When charging the battery, please ensure that the battery is charged uninterruptedly for at least 6h till it is fully charged.

4) Disconnect AC power supply, and use the battery to supply the monitor till the monitor shuts down automatically.

5) Battery optimization is finished.

Note:

In order to prolong the service life of the rechargeable battery, if the battery is stored for a long period of time, it is suggested that the battery should be charged every three months to prevent excessive discharging.

The supply time of the battery depends on the configuration and operation of the device. For example, frequent NIBP measurement will reduce the supply time of the battery.

Cleaning and disinfection

Before transporting the monitor, or when you clean the device, please observe the following precautions:

- Please dilute detergent and disinfectant as specified in the user manual, or use a concentration as low as possible.
- Never allow any liquid to flow into the housing or on the screen internal parts.
- Never pour any liquid onto any part or accessory of the device.
- Never soak the device in any liquid.
- Do not use any frictional material, bleaching powder or strong solvent.

Cleaning steps:

1. Power off the device, and unplug the power cord.
2. Use a soft cloth dipped with an appropriate amount of detergent to wipe the housing of the device.
3. Use a soft cloth dipped with an little amount of detergent to wipe the display screen of the device.
4. When necessary, you can use a soft, dry cloth to remove residual detergent.
5. Put the device in a cool, well-ventilated environment to air-dry it.

The disinfection operation may harm the monitor to a certain extent. It is suggested that the device can be disinfected only when it is considered necessary in the maintenance plan of the hospital. Before disinfection, please clean the device first. The selectable detergents are listed clearly in the user manual chapter: Cleaning and maintenance.
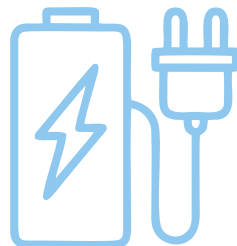
Maintenance

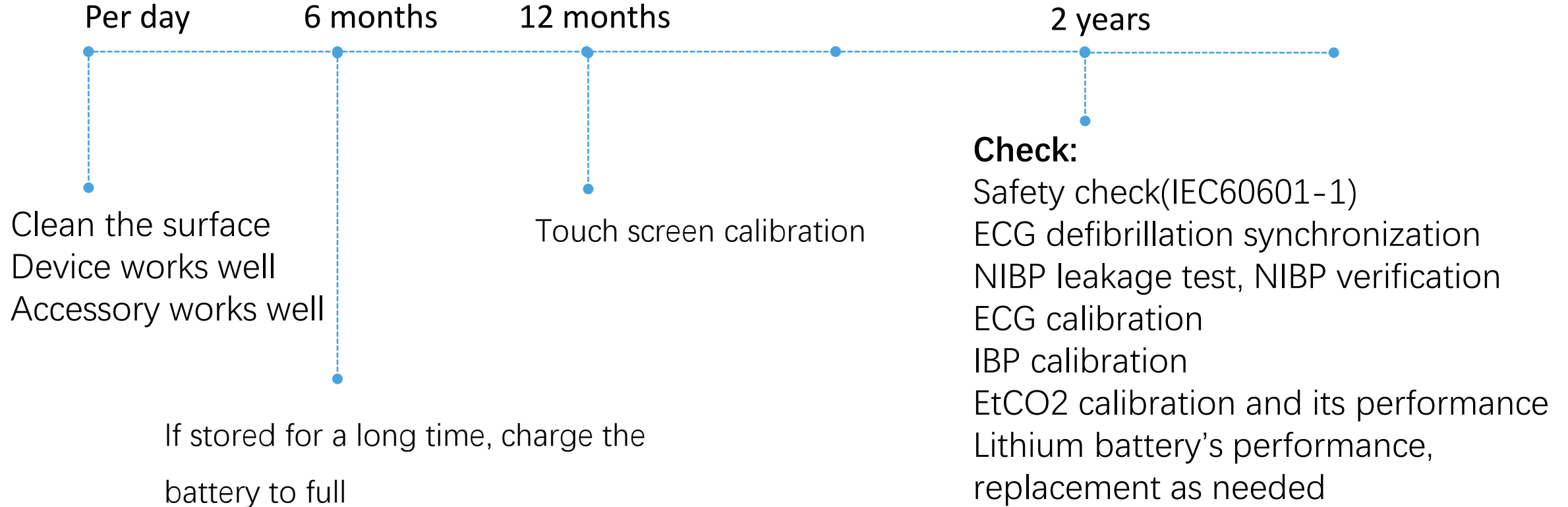Maintenance schedule

Before use, or every 6-12 months, check:

- Operating environment, power supply is appropriate.

- Device and accessory are in good condition.

- The power cord is in good condition.

- After starting, the monitoring functions are normal to monitor a patient.

- The internal battery is working normally.

- The record(if has it), is working normally and the paper is proper.

Maintenance

Maintenance schedule

COMEN

Per day	6 months	12 months	2 years

Per day

Clean the surface
Device works well
Accessory works well

6 months

If stored for a long time, charge the

battery to full

12 months

Touch screen calibration

2 years

Check:
Safety check(IEC60601-1)
ECG defibrillation synchronization
NIBP leakage test, NIBP verification
ECG calibration
IBP calibration
EtCO2 calibration and its performance
Lithium battery's performance,
replacement as needed

Thanks

THANKS YOU FOR WATCHING