

**VITAL SENSORS**

**TM-2562P/2564P**

**TYPE EXB**

## **INSTRUCTION MANUAL**

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Portable Bedside Monitors



A&D Company, Limited

WM:PD4000236

# **Compliance**

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## **Compliance with FCC Rules**

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

(FCC = Federal Communications Commission in the U.S.A.)

## **Compliance with European Directive 93/42 EEC for Medical Products**

The device conforms to European Directive 93/42 EEC for Medical Products. This is evidenced by the CE mark of conformity accompanied by the reference number of a designated authority.

This device is designed for all except neonates and infants.

# Safety During Use

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Obey the following precautions for safe and correct usage.

## **Warning**

### ■ **AC Adapter**

Use the AC adapter supplied with the instrument or the specified AC adapter only. Before use, check the AC adapter for cable damage or deterioration.

### ■ **Repair**

Do not open the case to repair the instrument. Do not touch or remodel internal portions. If you do, the company will not accept responsibility for damage to the instrument, fire or electrical shock to the user.

### ■ **Instrument Failure**

If an instrument fails, stop using it immediately. Place an "Out of Order" label on it or move the instrument to a place where it can not be used by mistake. It is very dangerous to continue using the instrument under such conditions. For details on repair, contact the agent where you purchased the instrument or the nearest A&D sales representative.

# **General Precautions**

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For proper safety, obey the following precautions.

**Read the instruction manual thoroughly and be fully knowledgeable about the instrument before use. It is recommended that when you operate the instrument, have the instruction manual available for reference.**

**The following points should be considered when you install or store the instrument.**

- Install or store the instrument away from moisture.
- Install or store the instrument in an environment where the instrument is not badly affected by extreme temperature, humidity, atmospheric pressure, direct sunlight, draft, dust, salinity or sulfur content in the air.
- Install or store the instrument in a secure and stable location.
- Do not install or store the instrument where chemicals, and corrosive or explosive gases are stored or present.
- Install the instrument where adequate power is provided.
- This instrument is not of the explosion-proof type. Do not use the instrument where flammable materials, such as a flammable anesthetic, are used.

**The following points should be considered before use**

- Check to make sure the instrument operates safely and accurately.  
(Be sure to perform this check when you use the instrument after an extended period of storage.)
- Check all hoses and cables for proper connection and deterioration.  
Double-check all circuitry used for direct patient connection.
- When the instrument is used in combination with other instruments, pay extra attention to avoid mis-diagnosis or other problems especially leakage current.  
Check all connections to make sure they do not interfere with each other.
- When the instrument is used in combination with other instruments, be sure to reduce the difference in potential between the instrument and others.
- When other telemeters are used, check that mutual interference will not cause a problem.
- When the instrument is operated using batteries, check the batteries for proper installation and condition.
- The instrument is protected against defibrillator discharge only when used with the patient cable KO-1839.
- When the instrument is used with an electrosurgical instrument, this could cause a burn to the patient. Disconnect electrodes and/or transducers from the instrument and patient.

**The following points should be considered during use.**

- The instrument should be used only during the time required for diagnosis and medical treatment.
- Check the patient and the instrument during use.  
If medical or operational problems are found in the instrument or the patient, stop using the instrument immediately, check the status of the patient and take proper actions.
- Do not allow a patient to come into direct contact with the instrument.
- Do not use the instrument during MRI scanning.
- Do not use the instrument on a patient using a heart-lung machine.
- High frequency interference by electrosurgery or energy discharged by a defibrillator may damage the instrument. Follow the precautions described in the manual for each device.  
(The instrument is protected against defibrillator discharge only when used with the patient cable KO-1839.)
- Do not use a cellular telephone near the instrument. It could affect the instrument's operation.

**The following points should be considered after use.**

- Follow a predetermined procedure to return the operation switches to their original positions, and then turn off the power.
- Do not forcibly pull out the cables or cuff hose.
- Keep the instrument clean and in proper operating condition so that it can be used without problem during the next operation.
- Clean the accessories and arrange them before storage.

**Perform regular maintenance and inspection of the instrument.**

- The portable bedside monitor is a precision instrument. Please check the instrument and associated parts periodically. Contact the nearest A&D sales representative for this inspection.
- If the portable bedside monitor is used for the first time after an extended period of storage, check the instrument for proper operation.
- Use a soft, dry cloth for removing stains from the instrument. Do not use solvents such as thinner or benzine.

**Environmental protection**

- Remove the built-in lithium battery from the instrument when the instrument is to be disposed of.

# Precautions During Use

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## Precautions while in use

- Do not use the instrument during MRI scanning.
- Be sure the instrument is operated at the rated supply voltage.
- Place the instrument on a stable stand.
- Do not place anything on top of the instrument.
- Avoid spilling liquid on the instrument.

## Measuring blood pressure

- Do not use the instrument on a patient using a heart-lung machine.
- Blood pressure may not be measured when noise, such as consecutive irregular heart rhythm and physical movement, is present.
- The instrument takes preventive measures against artifact and shock. However, if you have some doubts about the measured values, check the blood pressure by other methods.
- The cuff contains dry natural rubber.

Natural rubber can cause allergic reactions such as itching, redness, hives, swelling, fever, breathing difficulty, asthmatic reactions, blood pressure drop and shock. If the patient exhibits such a symptom, stop using the instrument immediately and seek medical treatment.

## Measuring pulse

- Displays the measured value with the following order of precedence:  
ECG > SpO<sub>2</sub> (TM-2564P) > Blood pressure oscillometric method
- ECG measurement: Pacemaker patient

Rate meters may continue to count the pacemaker rate during occurrences of cardiac arrest or arrhythmia. Do not rely entirely on rate meter alarms. Keep pacemaker patients under close surveillance.

## Measuring arterial oxygen saturation (SpO<sub>2</sub>) (TM-2564P only)

- Correct measurements may not be taken in the following cases:
  - When pigment is introduced into the blood vessel
  - When nails are coated with nail polish
  - When physical movement is present
  - When the sensor is firmly tightened.
  - When carboxyhemoglobin and/or methemoglobin concentration cannot be ignored.
  - When the sensor temperature is out of the range of 28°C to 42°C.

# Precautions for Using the SpO2 Sensor (TM-2564P only)

Use a sensor manufactured by Mallinckrodt Inc. (Nellcor Sensors) listed in the following table.

*Nellcor Sensors*

Type	Disposable						Reusable				
Model	OXISENSOR II					OXISENSOR				OXIBAND	
Parts #	D25	D25L	D20	I20	N25	R15	DURA-Y	DS100A	RS10	OXI-A/N	OXI-P/I
Compatibility	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	No	Yes	Yes

**Read the instruction manual supplied for the sensor carefully before use.**

## **Finger clip type sensor**

- Use only for adult fingers. Do not use the sensor on other body parts.
- For short term monitoring. If the sensor is to be used for 4 hours or longer, alternate fingers used. For extended monitoring, use a flex type sensor.
- Take special care during continuous usage with patients suffering from peripheral circular disorder.
- Do not affix the sensor to the finger with tape. This may cause congestion or edema, resulting in skin damage.
- When cleaning the sensor, clean with a cloth moistened with 70% alcohol or other disinfectant.

## **Flex type / Disposable sensor**

- Though the sensor is suitable for long term monitoring, check the skin and sensor mount at fixed intervals (every 8 hours).
- If a change or discoloration in skin is detected, move the sensor to another area.
- If strong light affects the sensor, cover it with shading material.
- When affixing the sensor with tape, avoid tightening too strongly to prevent congestion and edema.
- If the patients exhibit allergic reactions to the adhesive tape, stop using the sensor. Care must be taken while peeling off adhesive tape.

# Unpacking/Inspection

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## **Caution**

*This is a precision instrument. Handle it with care. Strong shock may cause failure.*

## **Note**

*This instrument is delivered in a packing box designed to prevent damage during normal transportation. When unpacking the instrument, check it for damage. If your instrument has been damaged, contact the agent you purchased it from. Retain the packing materials required to transport this instrument.*

Check that the following articles are included when you unpack the instrument.

### ■ Main unit

### ■ Instruction manual

### ■ Accessories

Adult cuff with 2-meter hose	1 piece
Dust cover	1 piece
SpO2 sensor (ASP-3) (TM-2564P only)	1 unit
SpO2 extension cable (TM-2564P only)	1 piece
AC adapter	1 piece
Power cable	1 piece
Printer paper (graph)	2 rolls



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# 1. Introduction

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The TM-2562P and TM-2564P are portable bedside monitors that measure and display systolic blood pressure, diastolic blood pressure, arterial oxygen saturation (SpO<sub>2</sub>) (TM-2564P only), and pulse rate.

These portable bedside monitors have been developed to reduce hospital labor and to collect patient data.

These portable bedside monitors are to be used under a doctor supervision and in a hospital's general ward, artificial dialysis, and house calls.

## Features

- The oscillometric method is used for blood pressure and pulse rate measurement.
- Measurement starting time can be set for up to five times per day.
- Automatic pressurization function of blood pressure.

Pressurization to an optimum pressure can be done according to the patient's blood pressure to prevent excessive pressurization.

- Blood pressure exact-time measurement

The interval measurement is an exact-time measurement synchronized with the built-in clock, allowing the patient record and anesthesia data to be recorded.



- Quick display of systolic blood pressure

In the interval measurement mode, the predicted systolic blood pressure value is displayed.

- The pulse oximeter is provided with a function to compensate for variations in the quantity of light transmitted according to the tissue density and skin coloration at the measurement site. (TM-2564P)
- The heart rate indication is obtained via ECG sensing. The ECG waveform can be saved and transmitted.
- Intravenous drip timer is provided for setting an optimal drip rate.
- Communications function provides great expandability.
- Adapter or battery operation allows the instrument to be used during a house call.
- The instrument is lightweight, compact and easy to carry.
- Measurement data can be output to the thermal line printer.

## 2. Specifications

### Performance specifications

Measurement	
Power supply	4 LR14 Alkaline batteries (Baby, size C) or AC adapter Approximate operating hours using batteries: 3 hours for TM-2562P 2 hours for TM-2564P The printer is available for use only when the AC adapter is used.
Power consumption	17.5W maximum
Protection against electrical shock	Battery: Internally powered equipment, Type CF  AC adapter: Class II, Type CF 
Display	Back-lit liquid crystal display
Monitoring function	Systolic blood pressure, diastolic blood pressure, pulse rate, SpO2 (TM-2564P) Flashes value and sounds alarm in an emergency
Blood pressure measurement	
Blood pressure measuring method	Oscillometric method
Pressure range	0 - 300 mmHg
Accuracy	Pressure: $\pm 3$ mmHg Blood pressure: Conforming to 1992 AAMI standard Pulse rate: $\pm 5\%$
Measurement range	Blood pressure: 10 - 280 mmHg Pulse rate: 30 - 200 bpm
Pressurizing method	Micro pump
Air pressure control method	Ceramic valve
Rapid air exhaust system	Electromagnetic valve
Safety mechanism	The electromagnetic valve is released when approx. 320 mmHg or greater is detected.
Interval measurement	CON, 3, 5, 10, 15, 20, 30, 60, 90, 120 min. Maximum length of CON measurement is 5 minutes. After five minutes, the interval is switched to 5-min interval automatically.
Arterial oxygen saturation measurement (TM-2564P)	
SpO2 measurement method	2-wavelength pulse oximetry; functional saturation
SpO2 measurement range	20 - 100% Accuracy: $\pm 3\%$ (70-100%)
Pulse rate measurement range	20 - 250 bpm Accuracy: $\pm 3$ bpm
SpO2 sensor	Nellcor Sensors

<b>ECG measurement</b>	
<b>Patient input</b>	Input: 3-electrode system Input impedance: 5 M $\Omega$ or over Differential dynamic range: $\pm 300$ mV
<b>ECG measurement</b>	Sensitivity: 10 $\mu$ V Frequency response: ON/OFF 0.3 - 60 Hz (-3 dB)/0.05 - 200 Hz (-3dB) Hum elimination: ON/OFF Measurement range: 20 - 250 beats/min Event memory: 16 sec $\times$ 5 events (stores data within 8 seconds after or before the [MEMORY] switch is pressed.) ECG data output: 0.5V/mV
<b>Printer</b>	Thermal line printer Paper width: 58 mm Graph printing/List printing/Trend printing ECG waveform printing/ECG waveform memory data printing
<b>IV drip timer</b>	Drip rate: 1 - 250 drops/min
<b>Backup function</b>	Stores last 50 data in memory by using a lithium battery backup
<b>Communications function</b>	Infrared optical communications: IrDA method Serial output: RS232C level (Not available when the optional extension box is connected)

## Environmental specifications

Operating temperature and humidity	10 to 40°C, 85% RH or less, non condensing
Storage temperature and humidity	-10 to 55°C, 95% RH or less, non condensing
Operating atmospheric pressure	70 - 106 kPa

## Physical specifications

Overall dimensions	207 (W) x 135 (H) x 114 (D) mm
Weight	Approx. 1.4 kg

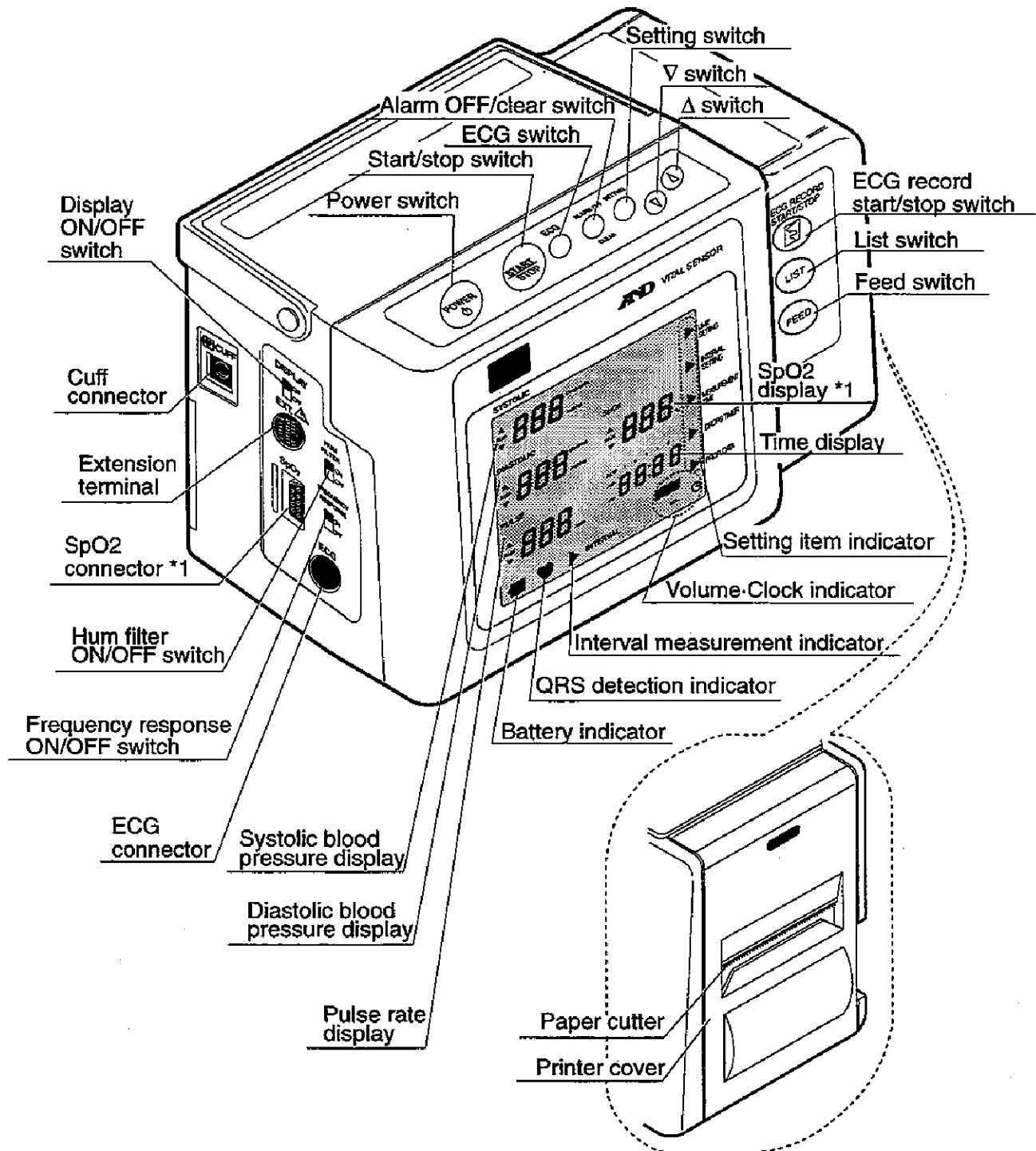
### Note

*For safety, reliability and performance of the instrument, use accessories listed in "9-1 Accessories/Options List".*

*If ECG electrodes other than listed in "9-1 Accessories/Options List" are used, please pay special attention to their type. Some electrodes may be subject to large offset potentials due to polarization.*

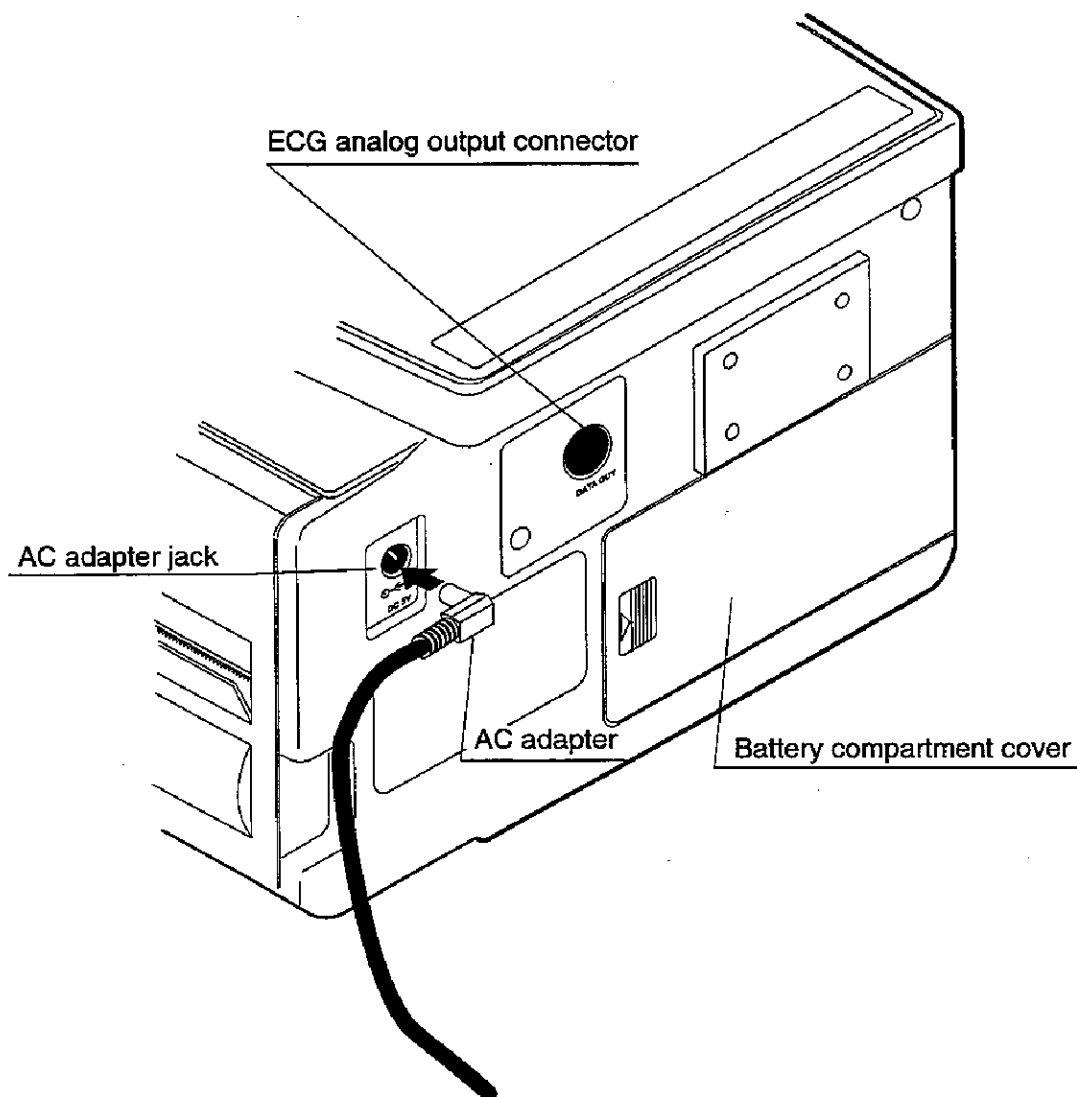
# 3. Part Names

## 3-1 Front/Top/Side Control Panels



\*1:TM-2564P only

## 3-2 Rear Operation Panel



### SYMBOLS

	Turns the instrument on or off .
	Direction guide to install batteries
	Direct current
SN	Serial number
2001	Date of manufacture
	Attention symbol. "See instruction for use."
	Type CF equipment (Defibrillator proof)
	Type CF equipment

## 4. Preparation Before Use

### 4-1 Installation Site

To operate the instrument safely, pay attention to the following points when you install the instrument.

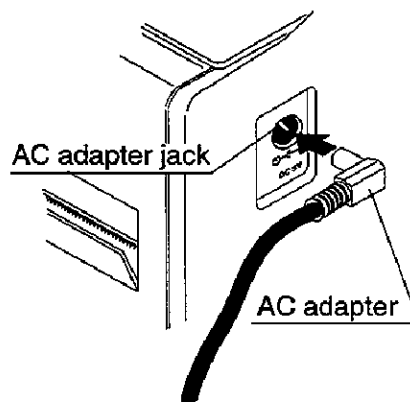
- Install the instrument away from moisture.
- Install the instrument where the temperature is between +10°C and +40°C, the humidity is 85% or less, and there is no condensation.
- Install the instrument where it is not exposed to direct sunlight.
- Install the instrument in an environment without excessive dust, salinity, or sulfur content in the air.
- Install the instrument in a secure and stable location.
- Install the instrument where chemicals are not stored, and corrosive or explosive gases are not present.

### 4-2 Power Supply

This instrument can be operated using an AC adapter or batteries.

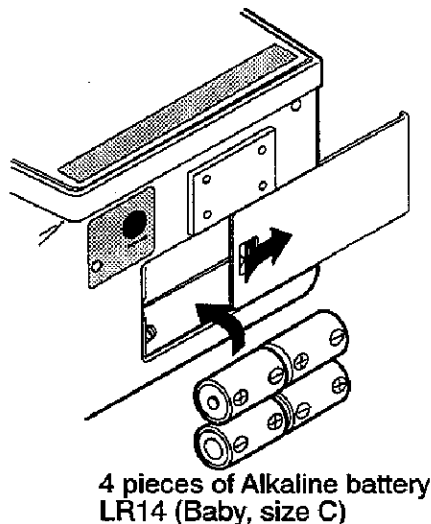
#### When an AC adapter is used:

Connect the power cable to the AC adapter. Insert the power cable into an electrical outlet and the AC adapter output into the AC adapter jack on the rear of the instrument.



#### When batteries are used:

Open the battery compartment cover and install the batteries as shown to the right.



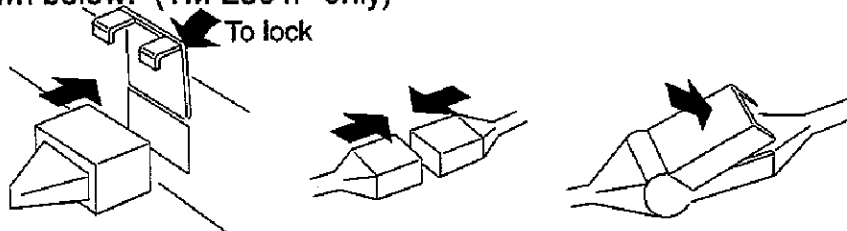


**⚠ Caution**

- *When installing the batteries, match the + (positive) and - (negative) terminals to those indicated in the battery compartment.*
- *Replace all batteries at the same time.*
- *Use the specified batteries only. Do not mix with other battery types.*
- *If the batteries are not to be used for an extended period, remove them to prevent damage caused by battery leakage.*
- *When the batteries are used, the printer is not available for use.*

## 4-3 INSTALLATION PROCEDURE

1. Attach the dust cover.
2. Connect the cuff hose to the cuff connector on the side panel.
3. Connect the SpO2 extension cable to the SpO2 connector on the side panel. Connect an appropriate SpO2 sensor (option) to the extension cable and lock it as shown below. (TM-2564P only)



**⚠ Caution**

- *Use only the extension cable supplied. Do not use the cable if it is damaged.*
- *Use only one extension cable to connect the sensor and the instrument.*

4. Insert the ECG patient cable into the ECG connector.  
Connect the ECG patient cable to the 3-lead ECG cable.

**⚠ Caution**

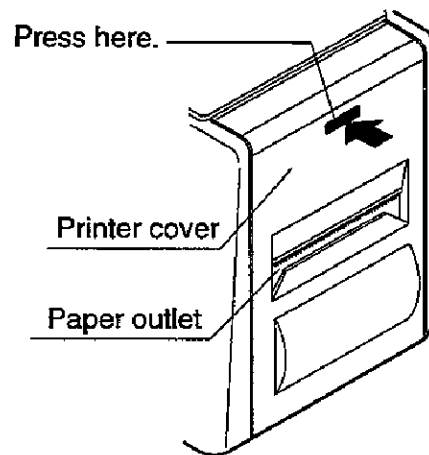
- *The instrument is protected against defibrillator discharge only when used with the patient cable KO-1839.*

**Note**

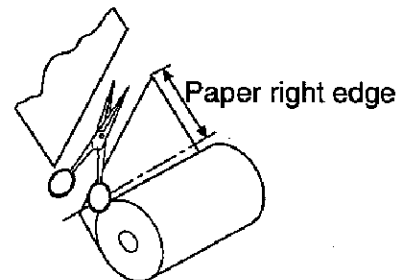
*The ECG patient cable and ECG cables are not supplied with the instrument. Purchase them separately.*

## 4-4 Setting the Printer Paper

1. Press on the top center of the printer cover to open the cover.



2. Cut the top end of the printer paper so that the right edge is longer.



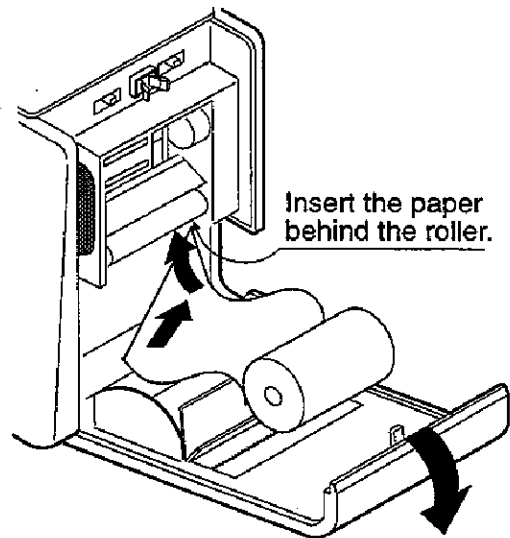
3. Insert the printer paper behind the roller, aligning the longer right edge to the printer right side as shown in the illustration.

### Note

*If the printer paper is not inserted properly, printing will not be performed.*

*If the paper right edge is not aligned to the printer right side, the paper will not feed automatically.*

4. The paper is fed automatically.  
When the paper is feeding out, hold the paper end so that the paper will not be fed back.
5. Press and hold the [FEED] switch until the paper has fed out about 10 cm. Hold the paper end so that the paper will not be fed back.
6. Thread the paper end out through the paper outlet while taking care not to cut your finger or hand with the paper cutter.
7. Make sure that the paper end is out of the paper outlet completely and close the printer cover.

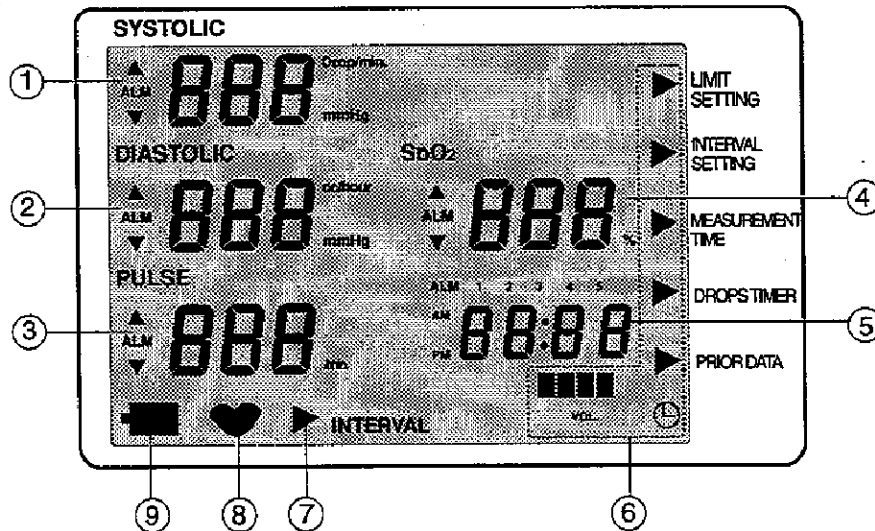


### ⚠ Caution

*Failure to set the printer paper straight along the printer may cause the paper to jam or damage to the print head.*

# 5. Description of Each Part

## 5-1 Display



(Display example: TM-2564P)

### 1. Systolic blood pressure display (SYSTOLIC)

#### Measurement mode

- Displays the systolic blood pressure value after measurement.
- When the measured value is erroneous or exceeds the monitor values, the corresponding error code or the measured value flashes.
- When the alarm is set to sound for the monitor values, the ALM indicator is illuminated.
- In the interval measurement mode, the predicted systolic blood pressure value is displayed. It is replaced with the measured value after measurement.
- Displays the unit of pressure "mmHg" always.

#### Monitor value setting mode

- When setting the systolic blood pressure upper limit value, the ALM indicator flashes and the ▲ indicator is illuminated.
- When setting the systolic blood pressure lower limit value, the ALM indicator flashes and the ▼ indicator is illuminated.
- Setting range (by tens):

Upper limit	50 - 250 mmHg
Lower limit	30 - 200 mmHg
- Displays the unit of pressure "mmHg" always.

#### IV drip timer setting mode

- The unit "Drop/min." is illuminated and displays the number of drops per minute.

## 2. Diastolic blood pressure display (DIASTOLIC)

### Measurement mode

- Displays the diastolic blood pressure value after measurement.
- When the measured value exceeds the monitor values, the displayed value flashes.
- When the alarm is set to sound for the monitor values, the ALM indicator is illuminated.
- Displays the pressure value applied during measurement.
- Displays the unit of pressure "mmHg" always.

### Monitor value setting mode

- When setting the diastolic blood pressure upper limit value, the ALM indicator flashes and the ▲ indicator is illuminated.
- When setting the diastolic blood pressure lower limit value, the ALM indicator flashes and the ▼ indicator is illuminated.
- Setting range (by tens):

Upper limit	30 - 200 mmHg
Lower limit	30 - 200 mmHg
- Displays the unit of pressure "mmHg" always.

### IV drip timer setting mode

- The unit "cc/hour" is illuminated and displays the quantity of drops per hour.

## 3. Pulse rate (heart rate) display (PULSE)

### Measurement mode

- Displays the measured value in the following order of precedence:  
ECG > SpO2 (TM-2564P) > Blood pressure oscillometric method
- Displays the updated heart rate during ECG and SpO2 measurement.
- Displays the pulse rate after blood pressure measurement, when ECG or SpO2 measurement is not performed.
- When the measured value exceeds the monitor values, the displayed value flashes.
- When the alarm is set to sound for the monitor values, the ALM indicator is illuminated.
- Displays the unit " /min." always.

### Monitor value setting mode

- When setting the pulse rate upper limit value, the ALM indicator flashes and the ▲ indicator is illuminated.
- When setting the pulse rate lower limit value, the ALM indicator flashes and the ▼ indicator is illuminated.
- Setting range (by tens):

Upper limit	50 - 200
Lower limit	30 - 150
- Displays the unit " /min." always.

#### **IV drip timer setting mode**

- The unit "Drop/cc" is illuminated and displays the number of drops per cc for the drip set used.

#### **ECG memory data print mode**

- Displays "Prt" to indicate that the instrument is in the ECG memory data print mode.

### **4. SpO2 display (TM-2564P)**

#### **Measurement mode**

- Displays the updated value during SpO2 measurement.
- Displays "LF" when the SpO2 sensor is not connected, or "—" when it is not applied to the patient.
- When the measured value exceeds the monitor values, the displayed value flashes.
- When the alarm is set to sound for the monitor values, the ALM indicator is illuminated.
- Displays the unit "%" always.

#### **Monitor value setting mode**

- When setting the SpO2 upper limit value, the ALM indicator flashes and the ▲ indicator is illuminated.
- When setting the SpO2 lower limit value, the ALM indicator flashes and the ▼ indicator is illuminated.
- Setting range: Upper limit 75 - 99 %  
Lower limit 50 - 99 %
- Displays the unit "%" always.

### **5. Time display (TIME)**

#### **Clock mode**

- Displays the current time.
- When the measurement starting time is set, numbers are illuminated depending on the setting, e.g. "1" and "2" when two starting times are set.

#### **ECG waveform memory mode**

- During the storing operation after the [ECG] switch is pressed, displays the number of stored data.
- When the number of stored data exceeds five, displays "FULL".

#### **Measurement starting time setting mode**

- Displays the number which has been set. The number is updated by the setting.
- Displays the time to be set.

### **Prior data display mode**

- Displays the time the previous blood pressure measurement was taken.

### **ECG memory data print mode**

- Displays the data number of the stored ECG waveform to be printed.

### **Interval setting mode**

- While the interval value for interval measurement is being set, displays the value in minutes.

### **Interval measurement mode**

- Alternately displays the current time and the interval value.

### **When the printer paper has run out:**

- Alternately displays "PE" (Paper Empty) and the current time.

## **6. Setting item indicator/Volume-Clock indicator**

- Pressing the  $\Delta$  or  $\nabla$  switch moves the  $\blacktriangleright$  indicator to select an item to be set; monitor value, measurement interval, measurement starting time, IV drip timer, and to display the prior data.
- In the clock setting mode, the  $\odot$  indicator is illuminated.
- In the alarm volume setting mode, the VOL. indicator is illuminated.
- Displays the alarm volume as: ■, ■■■, ■■■■, ■■■■■ to indicate 1, 2, 3, and 4 respectively.

## **7. Interval measurement indicator**

- Illuminates only during interval measurement.
- Will not illuminate upon power-on.

## **8. QRS detection indicator**

- Flashes each time QRS is detected.

## **9. Battery indicator**

- Illuminates only during battery operation.
- Flashes, and sounds the alarm every thirty seconds when the battery is low.
- Will not illuminate during AC operation.

## 10. Backlight

- The backlight will illuminate under the following conditions:

	AC adapter	Batteries
Upon power-on	O*1	O*2
During blood pressure measurement	-	-
After blood pressure measurement	O*1	O*2
During SpO2 measurement (TM-2564P)	-	-
During alarm situation	O	O
In the setting mode	O	O

\*1: If no operation is performed, goes out after 3 minutes.

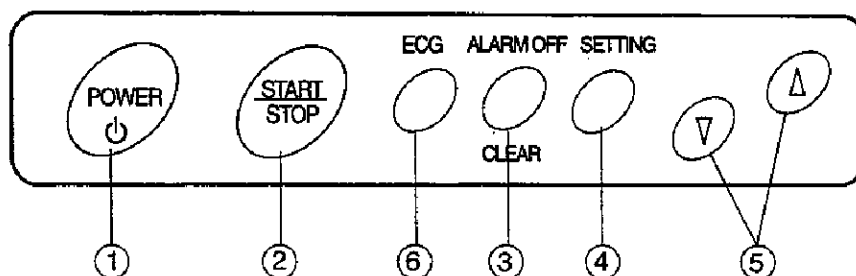
\*2: If no operation is performed, goes out after 10 seconds.

### Note

*In the blood pressure measurement wait mode, pressing the [SETTING] switch turns the backlight on and off.*

*The backlight, which is turned on by pressing the [SETTING] switch, will go out automatically after 3 minutes when the AC adapter is used, or after 10 seconds when the batteries are used if no operation is performed.*

## 5-2 Operational Panel (Top)



### 1. POWER switch

- Turns the power on and off. When turned on, all of the LCD segments are illuminated for about two seconds.

### 2. START/STOP switch

- Starts or stops the blood pressure measurement.
- When the interval is set to any value other than OFF, pressing this switch starts the interval measurement.

### 3. ALARM OFF/CLEAR switch

- Stops the alarm sound.
- In the setting mode, deletes the setting values.
- In the IV drip timer mode, stops the timer sound and returns to the timer setting mode.
- In the prior data display mode, deletes the data in memory.
- Stops the alarm sound at the measurement starting time.
- In the blood pressure measurement wait mode, deletes the ECG waveform memory data.

### 4. SETTING switch

- Enters the setting mode. Once in the setting mode, moves to the next item.
- Pressing and holding for more than two seconds after setting terminates the setting mode.
- In the IV drip timer mode, synchronizes the timer sound to the actual drip rate.
- In the blood pressure measurement wait mode, turns the backlight on and off.

### 5. $\Delta$ $\nabla$ switches

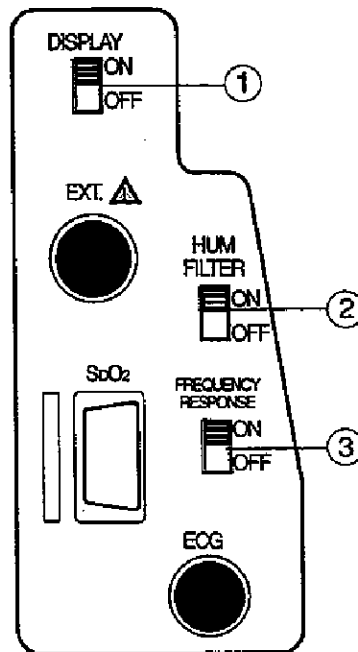
- Selects an item by moving the " $\blacktriangleright$ " (monitor value setting, measurement interval setting, measurement starting time setting, IV drip timer setting, prior data display, clock setting, and alarm volume setting).
- Increases or decreases the setting value.
- In the prior data display mode, the  $\nabla$  switch displays the older data and the  $\Delta$  switch displays the newer data.

### 6. ECG switch

- Enters the ECG waveform memory mode.



## 5-3 Operation Panel (Side )



(Panel example: TM-2564P)

### 1. DISPLAY ON/OFF switch

- When ON, the measurement data is displayed.
- When OFF, "— — —" is displayed in the measurement display area.

#### Note

*When OFF, the cuff pressure applied is displayed in the diastolic blood pressure display during pressurization.*

*"— — —" flashes in the diastolic blood pressure display during depressurization.*

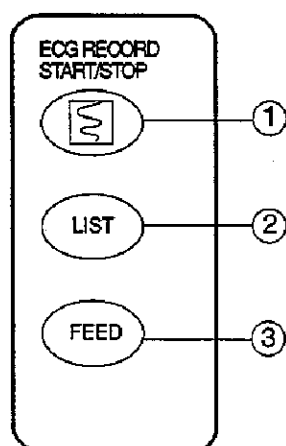
### 2. ECG HUM FILTER ON/OFF switch

- If some disturbance occurs in the ECG waveform due to poor contact between electrodes and patient, attach the ECG electrodes correctly and enable the ECG hum filter.  
In normal use, keep the switch ON to decrease the disturbance. However, please note that with the switch ON, the waveform will be a little distorted.

### 3. ECG FREQUENCY RESPONSE FILTER ON/OFF switch

- The switch corresponds to the ECG frequency response.  
"ON": 0.3 - 60 Hz (Monitoring mode)  
"OFF": 0.05 - 200 Hz (Diagnostic mode)  
In the normal use, keep the switch ON (Monitoring mode).

## 5-4 Operation Panel (Front )



### 1. ECG RECORD START/STOP switch

- Starts or stops printing the ECG waveform.  
When pressed while the ECG electrodes are attached on a patient, prints the current ECG waveform (max.16 seconds).  
When pressed while the data number of the stored ECG waveform is displayed, prints the ECG waveform stored in memory.  
See "6-9 Printing the Measurement Data".

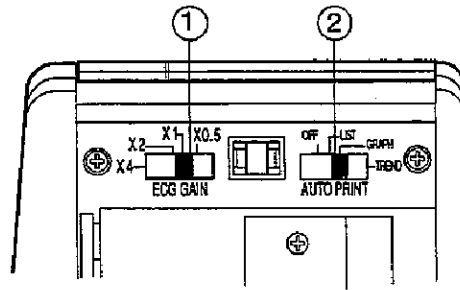
### 2. LIST switch

- Prints the prior data of blood pressure, pulse rate, and SpO2 (TM-2564P) values in tabular form.

### 3. FEED switch

- Feeds the printer paper forward while being pressed.

## 5-5 Operation Panel (Inner panel )



### Note

*The operation panel shown above is exposed by opening the printer cover.*

#### 1. ECG GAIN switch

- Switches the gain (magnification) to print the ECG waveform. (X0.5, X1.0, X2, X4)

#### 2. AUTO PRINT switch

- OFF  
Does not perform an automatic print after blood pressure measurement.
- LIST  
Prints the measurement data in tabular form automatically after blood pressure measurement.
- GRAPH  
Prints the measurement data in graph form automatically after blood pressure measurement.
- TREND  
Prints the measurement data in trend form automatically after blood pressure measurement.

For print samples, see "6-9 Printing the Measurement Data".

## 6. OPERATION

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### 6-1 Turning on the Power Switch

1. Turn on the [POWER] switch.
2. All LCD segments are illuminated for about two seconds. Then, "0" appears in the diastolic blood pressure display.
3. When power is turned on, the other displays appear as follows:

Interval measurement indicator:	OFF
Battery indicator:	Functioning
QRS detection indicator:	Functioning
Setting item indicator:	OFF
Volume indicator:	ON (battery backup)
Clock:	Functioning
Measurement starting time indicator:	ON (battery backup)
Systolic blood pressure display:	OFF
Pulse rate display:	Functioning
SpO2 display (TM-2564P):	Functioning

#### Notes

- When an error is detected, "E00" (pressure sensor zero error) flashes in the systolic blood pressure display and the alarm sounds. Switches other than the [POWER] switch will be invalid. Deflate the cuff and turn the [POWER] switch on again.
- When operating on batteries, the power is turned off automatically if no operation is performed for more than ten minutes except during interval measurement.

### 6-2 Attaching Cuff/SpO2 sensor/ECG electrodes

#### 6-2-1 Attaching the cuff

1. Attach the cuff around the upper arm with some slack in which one or two fingers can be inserted. Constriction of the upper arm caused by rolling up a shirt sleeve may prevent accurate readings.
2. Position the cuff at the same height as the patients heart.
3. During measurement, the patient should relax, keep quiet, and remain still.

#### Note

*The wrong cuff will result in an inaccurate reading.*

*If the cuff size is not proper, correct measurement will not be made. See "9-1 Accessories/Options List" to select the correct cuff.*

## 6-2-2 Applying the SpO2 sensor (TM-2564P)

### Warning

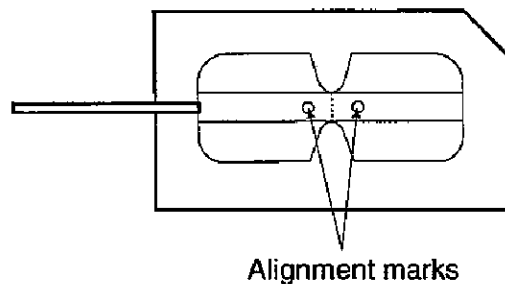
- Read the SpO2 sensor instruction manual for proper use.
- Applying the sensor on a body part other than specified or using it longer than specified may cause the patient to suffer physical injury.

### Note

- Do not apply the sensor on the same arm with an arterial catheter inserted or the cuff attached. Using the same arm will lower the reliability of the measurement data.

### How to use the disposable sensor supplied

1. Remove the plastic backing from the sensor and locate the transparent windows on the adhesive side. The windows cover the optical components. Locate the dashed line between the alignment marks on the non-adhesive side.



2. Place the sensor so that the dashed line is centered on the tip of the index finger. Wrap the adhesive flaps on the non-cable end around the finger.
3. Fold the cable end over the top of the finger so that the windows are directly opposite each other. (This can be confirmed by the alignment marks.) Wrap the adhesive securely around the sides of the finger.
4. Use care not to tighten the sensor too tightly.
5. Securely connect the SpO2 extension cable to the sensor connector.

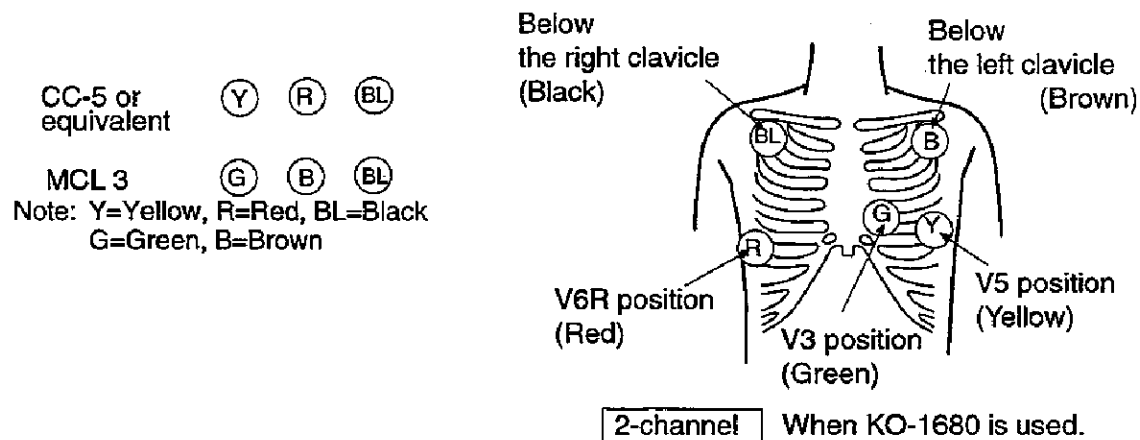
### 6-2-3 Attaching the ECG electrodes

- General information  
Several electrode induction methods are available. Among them, 3-lead electrocardiography on the chest is recommended for ECG monitoring.
- Before attaching the electrodes  
Before attaching the electrodes, use alcohol to clean the body sites where the electrodes are to be attached.
- Attaching the electrodes  
To ensure stable monitoring, attach the electrodes securely so that they are in good contact throughout monitoring.
- Patient electrode connection  
With this instrument, the chest lead can employ up to two channels, using three or five electrodes. Generally, the 3-lead electrocardiography is used because of the signal stability. The electrode placement is shown below.

#### Note

*Perform 1-channel attachment for simplified monitoring.*

### Electrode placement on chest



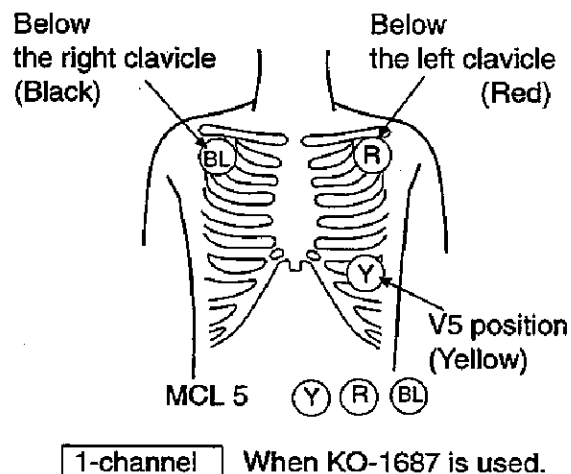
#### Note

*The instrument detect the QRS wave automatically and calculates the heart rate. To obtain stable QRS wave data, use the method as illustrated.*

ECG patient cable: KO-1839  
(Protected against defibrillator discharge)

3-lead ECG cable: KO-1687

5-lead ECG cable: KO-1680



## 6-3 Settings

### 6-3-1 Setting mode general operation

1. In the blood pressure measurement wait mode, press the  $\Delta$  or  $\nabla$  switch to enter the setting mode.
2. Pressing the  $\Delta$  or  $\nabla$  switch moves the  $\blacktriangleright$  indicator. The display goes out and the backlight goes on.
3. When the  $\blacktriangleright$  indicator points to the item to be set, press the [SETTING] switch. The item is ready to be set.
4. The setting procedure varies with the items. See each section for explanation.
5. To exit the setting mode, press and hold the [SETTING] switch for more than two seconds. If no key operation occurs for more than ten seconds, the instrument returns to the blood pressure measurement wait mode (except IV drip timer mode). The settings made so far are valid.

### 6-3-2 Setting the monitor value

Set the upper and lower limit values for blood pressure, pulse rate, SpO2. Once each measurement value exceeds the limit values, an alarm sounds. The volume of the alarm can be set in four steps.

1. Use the  $\Delta$  or  $\nabla$  switch to select "LIMIT SETTING", and press the [SETTING] switch.
2. "ALM" flashes, " $\blacktriangle$ " (Upper limit) and the current setting appear in the systolic blood pressure display.
3. To change the value, use the  $\Delta$  or  $\nabla$  switch. Press the [SETTING] switch to confirm the changed value. Then, the display goes to the next item.  
If the current setting is not to be changed, press the [SETTING] switch to go to the next item.
4. Set each item as necessary using the same procedure. Pressing the [SETTING] switch after setting the SpO2 lower limit value for TM-2564P or the pulse rate lower limit value returns to the systolic blood pressure upper limit value setting.
5. "ALM" illuminates in the display of which the value has been set.
6. To delete the settings, select the item and press the [ALARM OFF/CLEAR] switch.
7. Press and hold the [SETTING] switch for more than two seconds to exit the setting mode.

### 6-3-3 Setting the measurement interval

1. Use the  $\Delta$  or  $\nabla$  switch to select "INTERVAL SETTING", and press the [SETTING] switch.
2. The current setting appears in the time display (in minutes).
3. Use the  $\Delta$  or  $\nabla$  switch to change the value.
4. Press and hold the [SETTING] switch for more than two seconds to exit the setting mode.

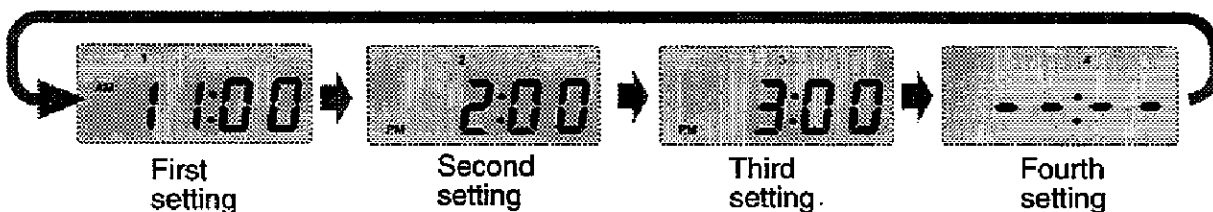
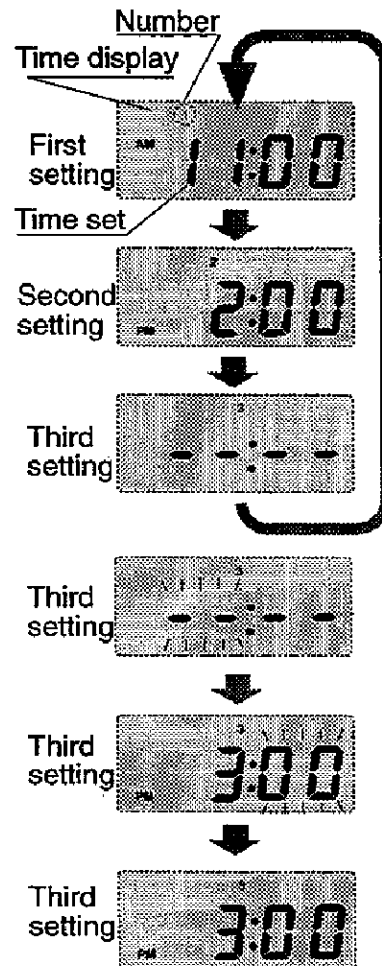
### 6-3-4 Setting the measurement starting time

When a measurement starting time has been set, an alarm sounds at the specified time. To turn off the alarm sound, use the [ALARM OFF/CLEAR] switch. Up to five measurement starting times can be set per day.

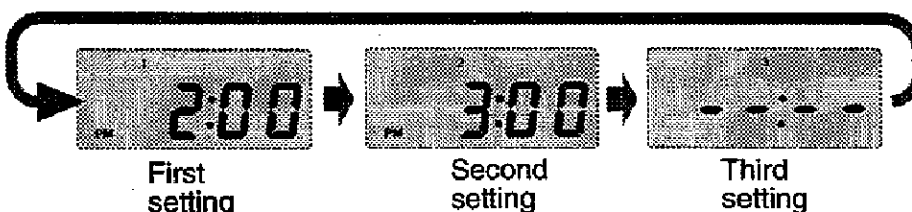
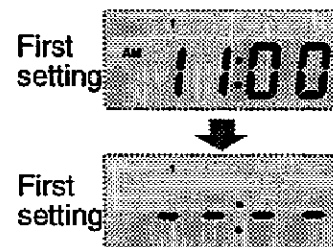
#### Note

*This mode does not function during interval measurement.*

1. Use the  $\Delta$  or  $\nabla$  switch to select "MEASUREMENT TIME", and press the [SETTING] switch.
2. Use the  $\Delta$  or  $\nabla$  switch to move between the numbers. The number currently selected and the set time appear. Each time the  $\Delta$  or  $\nabla$  switch is pressed, the numbers (the set number + 1) appear one after another. For example, if two measurement starting times have been set, the numbers are displayed as follows: 1 2 3 1 2 3 1 ..... For the number with no settings, "--:--" appears.
3. Press the [SETTING] switch to set the item for the number. First, the hour display flashes to be set. Use the  $\Delta$  or  $\nabla$  switch to set the hour.
4. Press the [SETTING] switch. Then, the minute display flashes to be set. Use the  $\Delta$  or  $\nabla$  switch to set the minute in five-minute steps.
5. If the setting number is changed, for example, from 2 to 3, the numbers are displayed as below.



6. To delete the settings, press the [ALARM OFF/CLEAR] switch. "--:--" appears in the display. And the settings will be shifted one number forward.



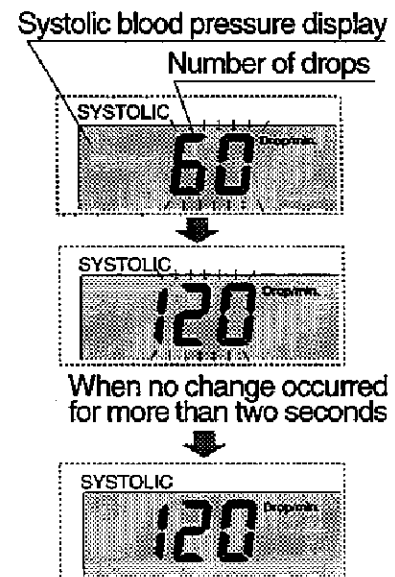


7. Press and hold the [SETTING] switch for more than two seconds to exit the setting mode.
8. When the setting has been completed, the numbers are displayed. When the designated time is reached, the alarm sounds for one minute.

### 6-3-5 Setting the IV drip timer

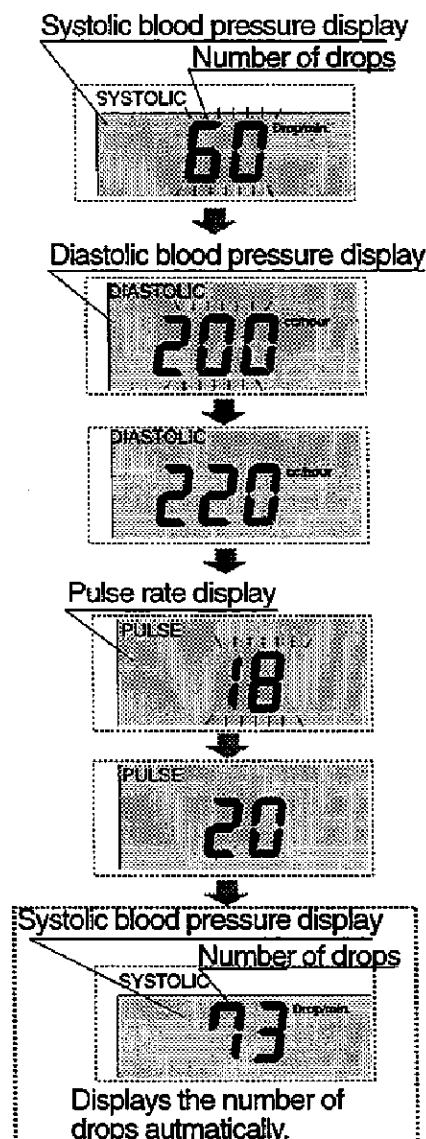
#### •Entering the number of drops per minute

1. Use the  $\Delta$  or  $\nabla$  switch to select "DROPS TIMER", and press the [SETTING] switch.
2. "60 Drop/min" flashes in the systolic blood pressure display.  
Use the  $\Delta$  or  $\nabla$  switch to set the desired number of drops. Pressing the switch increases the number by one; holding the switch increases the number by five. The setting range is from 1 to 250 drops per minute.
3. If no changes are made to the value for more than two seconds, the timer generates the sound at the specified rate. The display changes from flashing to illuminated.
4. Press the [SETTING] switch while the timer is generating the sound to synchronize the timer sound to the actual drip rate.
5. Pressing the [ALARM OFF/CLEAR] switch turns the sound off, and the display returns to the setting mode as described in step 2.
6. Press and hold the [SETTING] switch for more than two seconds to exit the setting mode.



**•Entering the number of drops per cc according to the number of drops per hour and the drip set used**

1. Use the  $\Delta$  or  $\nabla$  switch to select "DROPS TIMER", and press the [SETTING] switch. "60 Drop/min" flashes in the systolic blood pressure display.
2. Press the [SETTING] switch to display "200 cc/hour" flashing in the diastolic blood pressure display.
3. Use the  $\Delta$  or  $\nabla$  switch to set the desired number of drops per hour. Pressing the switch increases the number by one; holding the switch increases the number by ten. The setting range is from 1 to 900 cc per hour with the maximum rate of 250 Drop/min.
4. Press the [SETTING] switch to display "18 Drop/cc" (the number of drops per cc) flashing in the pulse rate display.
5. Use the  $\Delta$  or  $\nabla$  switch to set the desired number of drops per cc according to the drip set used. Pressing the switch increases the number by one; holding the switch increases the number by five. The setting range is from 1 to 100 drops per cc.
6. The number of drops per minute appears automatically in the systolic blood pressure display. (Available rate ranges from 1 to 250 Drop/min.)
7. If no changes are made to the value for more than two seconds, the timer generates the sound at the specified rate. The display changes from flashing to illuminated constantly.
8. Press the [SETTING] switch while the timer is generating the sound to synchronize the timer sound to the actual drip rate.
9. Pressing the [ALARM OFF/CLEAR] switch turns the sound off, and the display returns to the setting mode as described in step 2.
10. Press the [SETTING] switch for more than two seconds to exit the setting mode.



**Note**

*If no operation is performed for 5 minutes while the timer sound is on, the IV drip timer setting mode will be terminated.*

### 6-3-6 Setting the clock

1. Use the  $\Delta$  or  $\nabla$  switch to select "⌚", and press the [SETTING] switch.
2. The current date and time appear in the time display and "YEAR" flashes in the systolic blood pressure display.
3. Use the  $\Delta$  or  $\nabla$  switch to adjust the year, and press the [SETTING] switch to go to the next item.
4. "MONTH" flashes in the diastolic blood pressure display; "DAY" in the pulse display; "HOUR-MINUTE" in the time display. Adjust each as necessary.
5. Pressing the [SETTING] switch after setting the minute returns to the year setting.
6. Press and hold the [SETTING] switch for more than two seconds to exit the setting mode.

### 6-3-7 Setting the alarm volume

1. Use the  $\Delta$  or  $\nabla$  switch to select "VOL." (Volume indicator), and press the [SETTING] switch.
2. The icon indicating the current volume appears.
3. Use the  $\Delta$  or  $\nabla$  switch to set the volume.  
The icons, "■", "■ ■", "■ ■ ■", "■ ■ ■ ■" indicate 1, 2, 3, and 4 respectively.
4. Press and hold the [SETTING] switch for more than two seconds to exit the setting mode
5. The set volume is displayed by the corresponding icon above the volume indicator.

### 6-3-8 Displaying the prior data

#### •Recalling the prior data

1. Use the  $\Delta$  or  $\nabla$  switch to select "PRIOR DATA", and press the [SETTING] switch.
2. Press the  $\nabla$  switch to display the data previously measured one after another. Press the  $\Delta$  switch to display the newer data one after another.
3. Each time the data is displayed, the date and time the data was measured appears in the time display.
4. Press the [ALARM OFF/CLEAR] switch to delete all the data of blood pressure and SpO2 values in memory.
5. Press and hold the [SETTING] switch for more than two seconds to exit the setting mode.

### Notes

- *Up to 50 data can be stored.*
- *When the prior data exceeds the monitor values, the displayed value flashes and the ▲ indicator is illuminated if the value exceeds the upper limit value; the ▼ indicator is illuminated if the value exceeds the lower limit value.*
- *The prior data can be output to the printer by pressing the [LIST] switch located on the front operation panel. See "6-9 Printing the Measurement Data".*

### 6-3-9 ECG waveform memory data print mode

See "6-9 Printing the Measurement Data".

## 6-4 Measuring the Blood Pressure

### Notes

- *Position the cuff at the same height as the patients heart.*
- *During measurement, the patient should relax, keep quiet, and remain still.*

### 6-4-1 Measuring the blood pressure

1. Press the [START/STOP] switch.
2. The cuff pressure is adjusted automatically according to the patient's blood pressure value. If the blood pressure cannot be measured, the measurement is repeated up to three times.
3. To cancel the measurement, press the [START/STOP] switch.
4. After determining the systolic blood pressure, diastolic blood pressure and pulse rate, the air is rapidly exhausted from the cuff. The systolic blood pressure, diastolic blood pressure and the pulse rate is displayed in its display.
5. The pulse rate is displayed in the following order of precedence:  
ECG > SpO2 (TM-2564P) > Blood pressure oscillometric method

### 6-4-2 Interval measurement mode

1. Press the [INTERVAL SETTING] switch to set the interval to other than OFF.
2. Press the [START/STOP] switch. The buzzer sounds three times and the "►" (Interval measurement indicator) illuminates. The instrument measures the blood pressure once and enters the interval measurement mode. In the interval measurement mode, the current time and the interval value appear alternately in the time display.
3. With "CON" interval set, measurement is made repeatedly with ten seconds between each measurement for the first five minutes. When five minutes have passed, the continuous mode is automatically switched to the 5-minute interval measurement mode (C-5).
4. The blood pressure interval measurement is performed at the exact-time (every 3 minutes or more) in synchronization with the built-in clock.
5. If the interval is changed during interval measurement, the next measurement will be performed at the new interval.
6. While in the interval measurement mode, blood pressure can be measured at any time by using the [START/STOP] switch.
7. If the clock is changed during interval measurement, the next interval measurement starting time will change accordingly.
8. To terminate interval measurement, press the [INTERVAL SETTING] switch and set the interval to "OFF".

### Notes

- *During the interval measurement, the alarm set for measurement starting time will be canceled.*
- *Even if the interval has been set when power is turned on, the interval measurement will not start until the [START/STOP] switch is pressed.*

#### 6-4-3 Quick systolic display

During interval measurement, the predicted systolic blood pressure flashes. It is replaced with the measured value after measurement.

### 6-5 Measuring the Arterial Oxygen Saturation (TM-2564P)

When the SpO2 sensor is applied, SpO2 and pulse rate measurement will start automatically. The measured values are averaged in 5-7 seconds and are displayed.

#### Notes

- *For SpO2 measurement, the function of automatically compensating the LED to obtain suitable emission for the patient works. Thus, it may take approximately 30 seconds to display the measured value. At this time, "CAL" may appear in the SpO2 display.*
- *Do not apply the sensor on the same arm with the cuff attached. SpO2 may not be measured correctly during blood pressure measurement.*

### 6-6 Measuring Heart Rate by ECG

The instrument performs real-time detection of the QRS wave, measures the RR interval, and converts it into the heart rate. When the QRS is detected, the QRS detection indicator starts to flash and the sound is generated to synchronize the pulse detection.

#### Notes

- *The heart rate is obtained by averaging the latest four beats.*
- *It may take approximately 10 seconds to display the heart rate after the electrodes are attached.*
- *When the instrument is under the condition of inoperative ECG monitoring, the heart rate display goes blank and the QRS detection indicator displays no pulsation.*

## 6-7 Stopping the Alarm Sound

The alarm sound can be stopped by pressing the [ALARM OFF/CLEAR] switch. Please note that the alarm-OFF condition after the [ALARM OFF/CLEAR] switch is pressed depends on the measurement item.

- Blood pressure  
The alarm will remain OFF until the next measurement starts.
- Pulse rate, SpO2  
The alarm will remain OFF for two minutes. If the condition, which caused the alarm to sound, persists after two minutes, the alarm will sound again.

### Note

*To delete the blood pressure and SpO2 data stored in memory, see "6-3-8 Displaying the prior data".*

## 6-8 Storing Data/Deleting Data

1. Blood pressure and SpO2 (TM-2564P) are stored each time blood pressure is measured. For memory recall, see "6-3-8 Displaying the prior data". Up to 50 data can be stored.

### Note (TM-2564P)

*For SpO2, the value before blood pressure measurement is stored.*

2. Storing the ECG waveform  
Press the [ECG] switch. The ECG data within 8 seconds before and after the [ECG] switch is pressed will be stored. During the storing operation, the number of stored data appears in the time display, and the buzzer beeps intermittently. Once the operation is finished, the buzzer stops. Up to 5 ECG waveforms can be stored. When MEMORY is full, "FULL" appears in the time display and the buzzer beeps for 2 seconds.
3. Deleting the ECG waveform  
To delete the stored ECG waveform data, in the blood pressure measurement wait mode, press and hold the [ALARM OFF/CLEAR] switch until the buzzer stops (about 3 seconds).  
To delete the stored data of blood pressure and SpO2 values, please see "6-3-8 Displaying the prior data".

## 6-9 Printing the Measurement Data



**Caution**

*Cutting the paper forcibly or during printing may damage the print head.*

### 6-9-1 Printing the blood pressure, pulse and SpO2 data

#### •Printing type

- List printing:  
Prints the measurement data in tabular form.
- Graph printing:  
Prints the measurement data in graph form. The dotted lines indicate the systolic and diastolic pressures.
- Trend printing:  
Prints the measurement data in trend form. The blood pressure is indicated using a graph, pulse rate using "X", and SpO2 using "□"..

#### •Printing data automatically after blood pressure measurement

- Set the [AUTO PRINT] switch to positions other than OFF. The data will be printed automatically after blood pressure measurement in a format as indicated by the switch position.
- If the data exceeds the monitor values, the value will be printed inverted (white on black) except in the trend printing mode.

#### •Printing the memory data

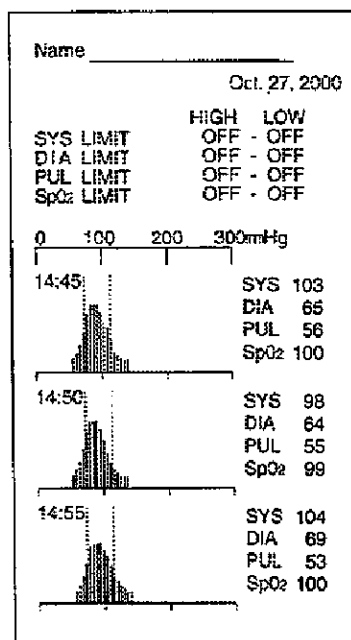
- Press the [LIST] switch to print the memory data in tabular form. Up to 50 data (blood pressure and SpO2) are stored in memory.

#### •Print sample

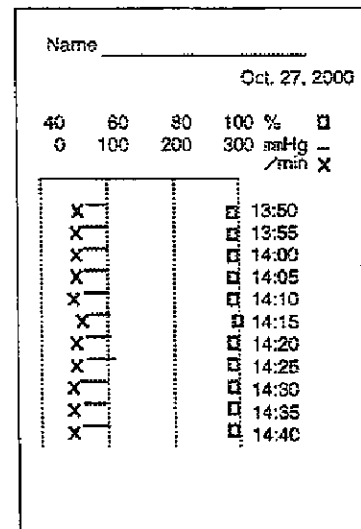
##### LIST

Name	Oct. 27, 2000				
	HIGH	LOW			
SYS LIMIT	OFF	OFF			
DIA LIMIT	OFF	OFF			
PUL LIMIT	OFF	OFF			
SpO2 LIMIT	OFF	OFF			
TIME	SYS	DIA	PUL	SpO2	
	mmHg		/min	%	
13:50	98	65	54	99	
13:55	100	58	50	99	
14:00	103	62	52	99	
14:05	101	63	53	99	
14:10	101	63	50	99	
14:15	106	67	61	100	
14:20	105	65	53	99	
14:25	112	68	54	99	
14:30	101	58	53	99	
14:35	103	66	52	99	
14:40	106	63	54	99	
14:45	103	65	56	100	
14:50	98	64	55	99	
14:55	104	69	53	100	
15:00	105	59	51	99	

##### GRAPH



##### TREND



□ : SpO2 value  
— : Blood pressure value  
X : Pulse rate value

## 6-9-2 Printing the ECG waveform

### •Printing the ECG waveform

1. Press the [ECG RECORD START/STOP] switch. An ECG waveform of 16 seconds will be printed. (It takes about 30 seconds to print it out.)  
The date, time and HR (heart rate) printed with an ECG waveform is the data when the [ECG RECORD START/STOP] switch is pressed.
2. To stop the ECG waveform printing, press the [ECG RECORD START/STOP] switch.
3. GAIN indicates the magnification (X0.5, X1.0, X2.0, X4.0) and can be changed using the [GAIN] switch.  
The waveform for calibration will be printed at the beginning and end of the waveform data. (The waveform for calibration indicates that for 1 mV.)

### •Printing the ECG waveform memory data

1. In the blood pressure measurement wait mode, press the  $\Delta$  or  $\nabla$  switch to enter the setting mode.
2. Press the  $\Delta$  or  $\nabla$  switch until "Prm" appears in the pulse display.
3. Press the [SETTING] switch. The data number (0-5), of stored ECG waveform, appears in the time display. 0 (zero) indicates that no ECG waveform is stored in memory.
4. Press the  $\Delta$  or  $\nabla$  switch to select the data number to be printed.
5. Press the [ECG RECORD START/STOP] switch. The waveform of the selected data number will be printed. To cancel printing, press the [ECG RECORD START/STOP] switch.

### Note

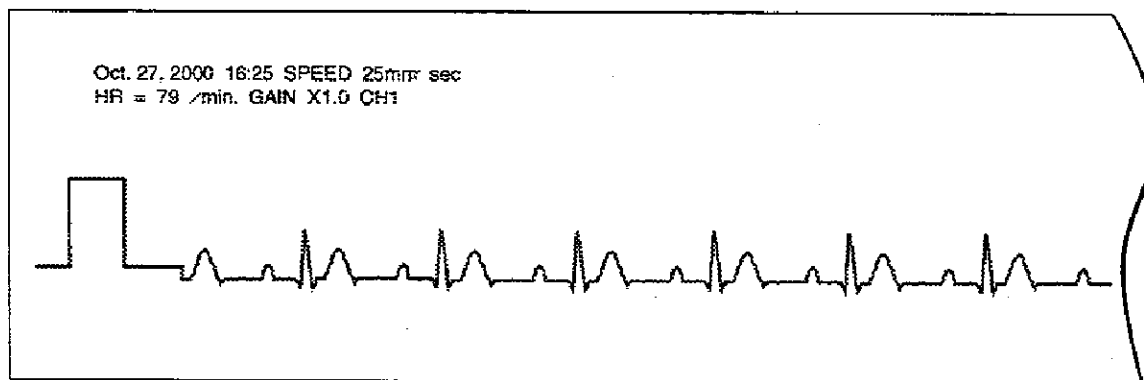
- Recording mode of ECG waveform is fixed to 25 mm/s.

### Caution

- ECG waveform memory data can not be printed while ECG waveform data is being output continuously with the extension box installed.

### •Print sample

#### ECG





## 6-10 Setting the Functions

The following functions can be changed to meet your requirements.

No.	Function	Description	Parameter	Factory setting
F10	Communication mode	To connect an option	1 to 10	1 (Standard)
F11	Baud rate		12/24/48/96	96 (9600 bps)
F12	Initial cuff pressure		AU/140/180/220	AU (Automatic)
F13	Prior data	Whether to retain prior data or not	ON/OFF	ON (To retain)
F14	Station address	To connect an option	0 to 98	0
F15	Buzzer for pulse detection		ON/OFF	ON (To sound)
F16	Stream mode	Automatic data output after blood pressure measurement	ON/OFF	OFF (No output)
F17	Data bits	Switch between 7 bits or 8 bits	ON/OFF	OFF (7 bits)
F18	ECG heart rate moving average		1/4/8	4 (Moving average of four beats)
F19	Channel for ECG printing		1/2	1 (CH1)

1. Confirm that the power is turned off.  
While holding down the [SETTING] switch, press the [POWER] switch. "F10" appears in the systolic blood pressure display.
2. Use the  $\Delta$  or  $\nabla$  switch to select the function number (F10-F19), of which the parameter setting is to be changed.
3. Press the [SETTING] switch. The current parameter setting appears in the diastolic blood pressure display.
4. Use the  $\Delta$  or  $\nabla$  switch to change the parameter setting.
5. Press the [START/STOP] switch. "┌┐┌" appears in the diastolic blood pressure display. The new setting is saved and the diastolic blood pressure display indicates "000".
6. Turn the power off, then turn it on again. The instrument will perform as specified in the function setting.

### Caution

*Do not turn the power off while "┌┐┌" is being displayed. The new settings may not be saved.*

## 7. Interface

### 7-1 RS232C (Not available when the optional extension box is connected.)

#### Note

*For details about the communication protocol, contact the nearest A&D sales representative.*

#### 1. Connection

Blood pressure measurement: Extension terminal (Mini DIN 9-pin connector)

Pin No.	Signal	Direction
1	GND	O
2	TXD	O
3	RXD	I
4	RTS	O
5	CTS	I

No connection is made to the other pins.

#### 2. Communications specification

Transfer mode: Half duplex start/stop synchronous serial communications

Baud rate: 9600 bps (standard)

Start bits: 1

Data bits: 7

Parity : Odd

Stop bits: 2

### 7-2 Infrared Optical Communications

#### Note

*For details about the communication protocol, contact the nearest A&D sales representative.*

IrDA method: Communication distance 10-70 cm

Baud rate 38.4 kbps

### 7-3 ECG Analog Output

ECG waveform monitor output : 0.5 V/10 mm (0.5 V/mV)

Frequency characteristics: 250 Hz

Connector used: DIN 7-pin connector

Pin No.	Signal
1	Channel 1
2	GND
3	Channel 2
4	Shield

#### Caution

*Make a connection to devices whose medical safety has been ensured.*

# 8. Maintenance

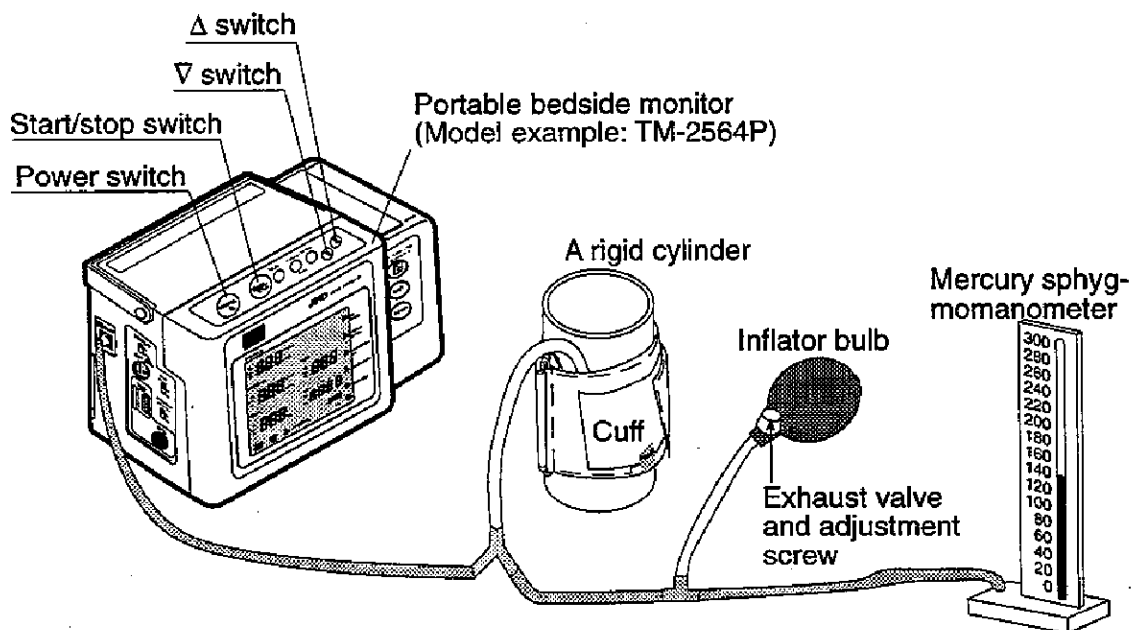
## 8-1 Checking Pressure Accuracy

### 8-1-1 Required equipment

- Accurate office mercury sphygmomanometer or aneroid gauge with inflation system.
- A rigid cylinder sized to fit the cuff under pressure.

### 8-1-2 Steps for checking accuracy

1. Turn off the portable bedside monitor and remove the air hose from the instrument.
2. Assemble the check system as shown below.



3. While holding down the  $\Delta$  and  $\nabla$  switches, press the [POWER] switch.  
"L00" appears in the systolic blood pressure display.
4. Press the  $\Delta$  switch until "L11" appears.
5. Keep the pressure at atmospheric pressure.
6. Press the [START/STOP] switch. "0" flashes (Pressure=0 mmHg).
7. Squeeze the inflator bulb until the cuff pressure reaches 50 mmHg.  
The whole number portion of the pressure value appears in the systolic blood pressure display and the decimal portion appears in the diastolic blood pressure display.
8. Check the difference between the value displayed in the portable bedside monitor and mercury sphygmomanometer. It should be within  $\pm 3$  mmHg.

9. Squeeze the inflator bulb until the cuff pressure reaches 150 mmHg  
Check the value displayed by the portable bedside monitor. The difference should be within  $\pm 3$  mmHg.
10. Squeeze the inflator bulb until the cuff pressure reaches 250 mmHg.  
Check the value displayed by the portable bedside monitor. The difference should be within  $\pm 3$  mmHg.
11. Release the cuff air and turn off the portable bedside monitor.

**Note**

*The portable bedside monitor is a precision instrument. Contact your nearest A&D sales representative for this inspection, or if you need repair.*

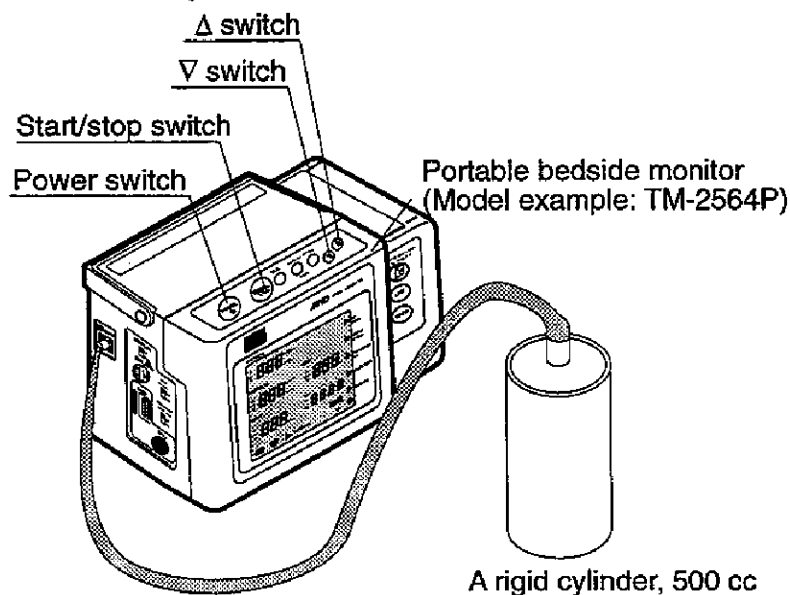
## 8-2 Checking Deflation Speed Control Function

### 8-2-1 Required equipment

- A rigid 500cc cylinder.

### 8-2-2 Steps for checking accuracy

1. Assemble the check system as shown below.



2. While holding down the  $\Delta$  and  $\nabla$  switches, press the [POWER] switch.  
"L00" appears in the systolic blood pressure display.
3. Press the  $\Delta$  switch until "L14" appears.
4. Press the [START/STOP] switch to start the test.  
Deflation speed appears in the pulse rate display.  
The displayed speed value should be  $5 \pm 1.5$  mmHg/s.

## 8-3 Cleaning

### Caution

- *Turn the power off before cleaning.*
- *Do not pour water on the instrument or use water for cleaning. This instrument is not waterproof.*
- *Use extra care to prevent water or other fluids from entering the connectors. If any fluids enter a connector, dry the connector with warm air (e.g. using a dryer). And check all monitoring functions for proper operation.*
- *Do not use solvents such as thinner and benzine for cleaning.*

Clean the instrument as described below:

- Clean the instrument exterior with a dry soft cloth. In most cases, disinfecting with detergent is sufficient.
- If the instrument is stained with blood, chemical substance, or dirt, wipe them off using a cloth dampened with a 0.1% hyamine.
- To disinfect the cuff, wipe the surface which comes into contact with the skin with alcohol such as 70% isopropyl. Do not wash the cuff.

## 8-4 Periodical Inspection

This portable bedside monitor is a precision instrument. Please check the functions periodically. Contact the nearest A&D sales representative for this inspection.

## 8-5 Adjustment

If the instrument accuracy is in doubt, contact the agent where you purchased the instrument or the nearest A&D sales representative.

## 8-6 Before Requesting Repair

### Warning

*Only qualified service personnel are allowed to open the case to repair the instrument. Do not attempt to open the instrument.*

#### 8-6-1 Error Codes

Before requesting repair, check the instrument error codes using the following table.

If normal operation of the instrument cannot be recovered though these actions have been taken, contact the agent where you purchased the instrument or the nearest A&D sales representative listed on the rear cover of the instruction manual.

When this instrument detects an erroneous measurement condition, the following error codes are displayed flashing in the systolic blood pressure display.

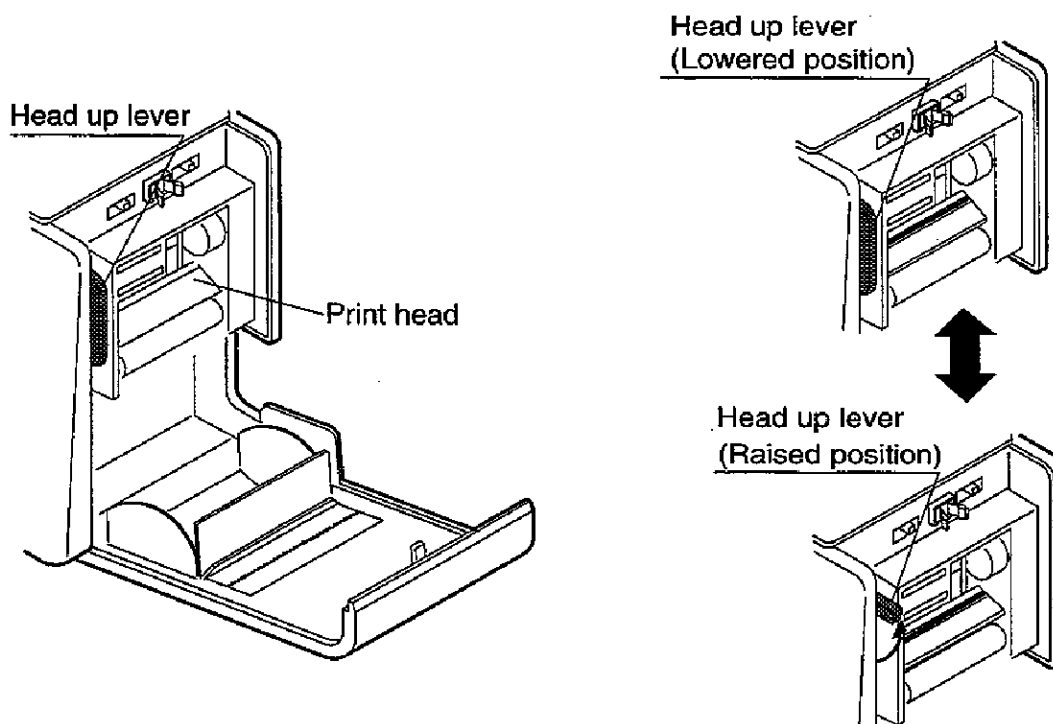
Error Code	Meaning	Action
E00	Zero point error in the pressure sensor circuit	Exhaust air from the cuff and turn on the power again .
E11	Can not pressurize.	Check the cuff and air hose for correct connection or check them for being folded.
E12	Pressurizing speed is too slow.	
E21	Measurement time is too long. Constant exhausting speed is too slow.	
E22	Exhausting speed is too fast.	
E23	Excessive pressure is detected.	
E30 (TM-2564P)	SpO2 self test error	Turn on the power again.
E31 (TM-2564P)	Defective SpO2 circuit	Contact the nearest sales representative.
E35	ECG self test error	Turn on the power again.
E36	Defective ECG circuit	Contact the nearest sales representative.
E42	Insufficient pressurization	Check the cuff for correct placement or check the patient for physical movement or for irregular pulse.
E43	No pulse is detected.	
E44	Physical movement is detected.	
E45	The diastolic blood pressure cannot be determined.	
E46	The mean blood pressure cannot be determined.	
E48	The systolic blood pressure cannot be determined.	
E61	The pulse rate cannot be determined.	
E63	The blood pressure value is inappropriate.	

### Note

*Cuffs are consumable. If a measurement error occurs frequently, they must be replaced. See "9-1 Accessories/Options List " for detail information.*

## 8-6-2 Printer Troubleshooting

- Paper is jammed:  
Raise, or pull forward, the grey head up lever to raise the print head holding the paper. Gently pull out the paper. Do not pull the paper out forcibly, the print mechanism could be damaged.
- Paper is not fed automatically:  
Check whether the head up lever is lowered. If the head up lever is raised, the paper is not fed automatically.  
Check whether the paper right edge is aligned to the printer right side. The printer paper sensor is located on the printer right side.
- Paper can not be inserted:  
When the instrument is left without paper installed for an extended period of time, the situation may arise that the paper is difficult to insert. Under such a situation, raise the head up lever and lower it. Then, insert the paper.
- Ejected paper is crooked:  
Paper is not inserted straight along the printer. Pull the paper out and re-install it, while aligning the paper right edge to the printer right side. Or raise the head up lever to adjust the paper position.
- The printer cover will not close:  
Check whether the head up lever is lowered. If it is raised, the printer cover can not be closed.





# 9. Accessories/Options

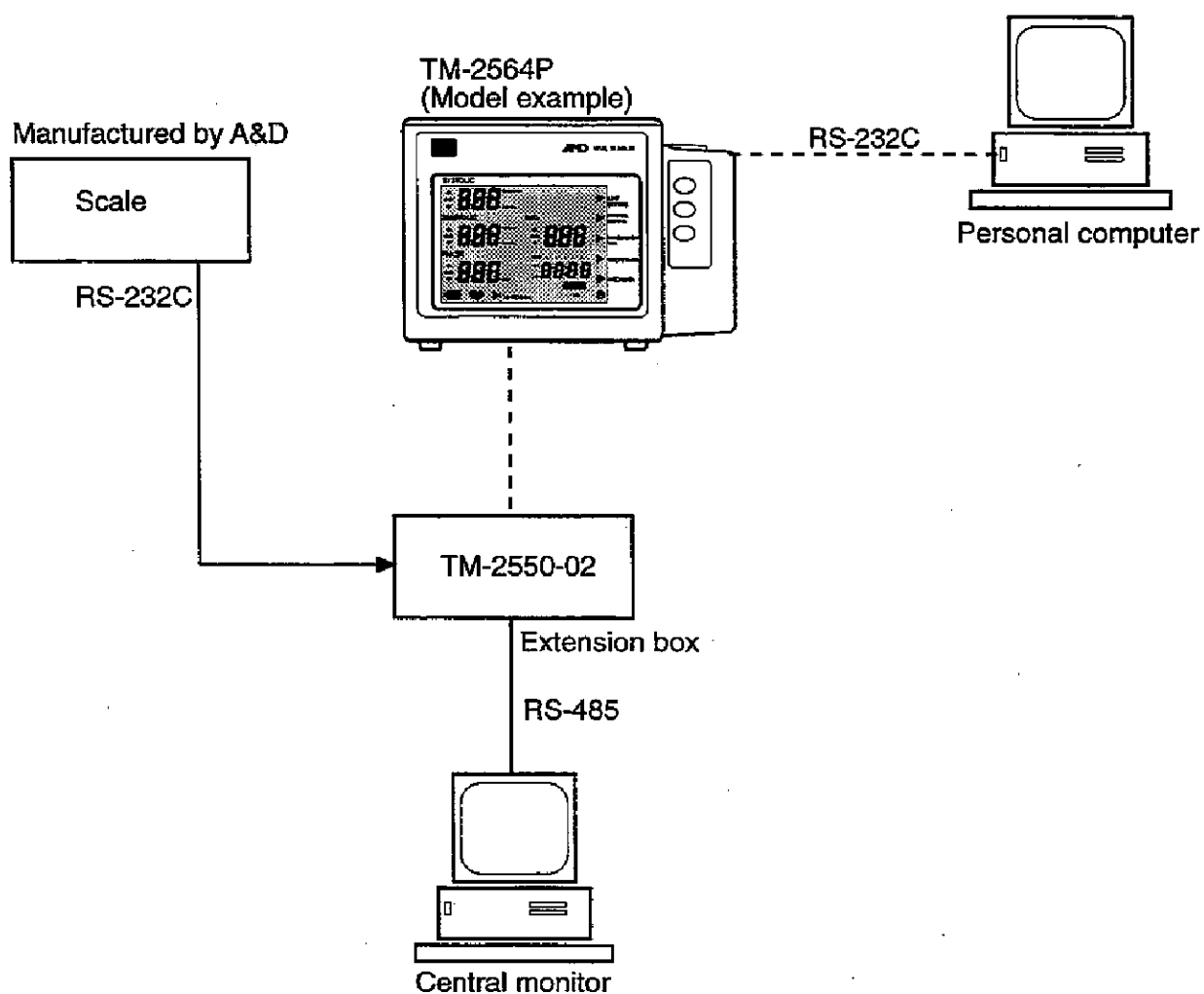
## 9-1 Accessories/Options List

Product Name	Model
<b>Stand</b>	AD-TM2540-03A
<b>Personal cuff (without hose)</b>	
Adult / Arm circumference 22-32 cm	AD-TM9159A-2
Small / Arm circumference 18-22 cm	AD-TM9159S-2
Large / Arm circumference 32-45 cm	AD-TM9159L-2
<b>Reusable cuff (without hose)</b>	
Pediatric / Arm circumference 10-17 cm	AD-TM9116B-1
Small / Arm circumference 15-22 cm	AD-TM9113B-1
Adult / Arm circumference 20-31 cm	AD-TM9112B-1
Large / Arm circumference 31-41cm	AD-TM9111B-1
Spare cuff cloth 2 pcs./set (For AD-TM9112B-1)	AX-13A37452-S
<b>Hose</b>	
2.0 m	AD-TM9137-200
3.5 m	AD-TM9137-350
<b>SpO2 extension cable</b>	
1.2 m	AX-SPEC4
2.4 m	AX-SPEC8
<b>Others</b>	
Extension box	AD-TM2550-02
AC adapter	AX-TB-212
Power cable	AX-KO-1886 (A plug) AX-KO-1887 (C plug) AX-KO-1888 (BF plug) AX-KO-1889 (S plug)
ECG electrode (150 pcs.)	AX-10502P30
ECG patient cable	AX-KO-1839
5-lead ECG cable	AX-KO-1680
3-lead ECG cable	AX-KO-1687
ECG data-output cable	AX-KO-1895
Printer paper (graph, 5 rolls/set)	AX-PP157-S
Printer paper (white, 5 rolls/set)	AX-PP132-S

### Note

*The joints of the reusable and disposable cuffs are different and require different hoses. Check the options for the appropriate hose for your cuff.*

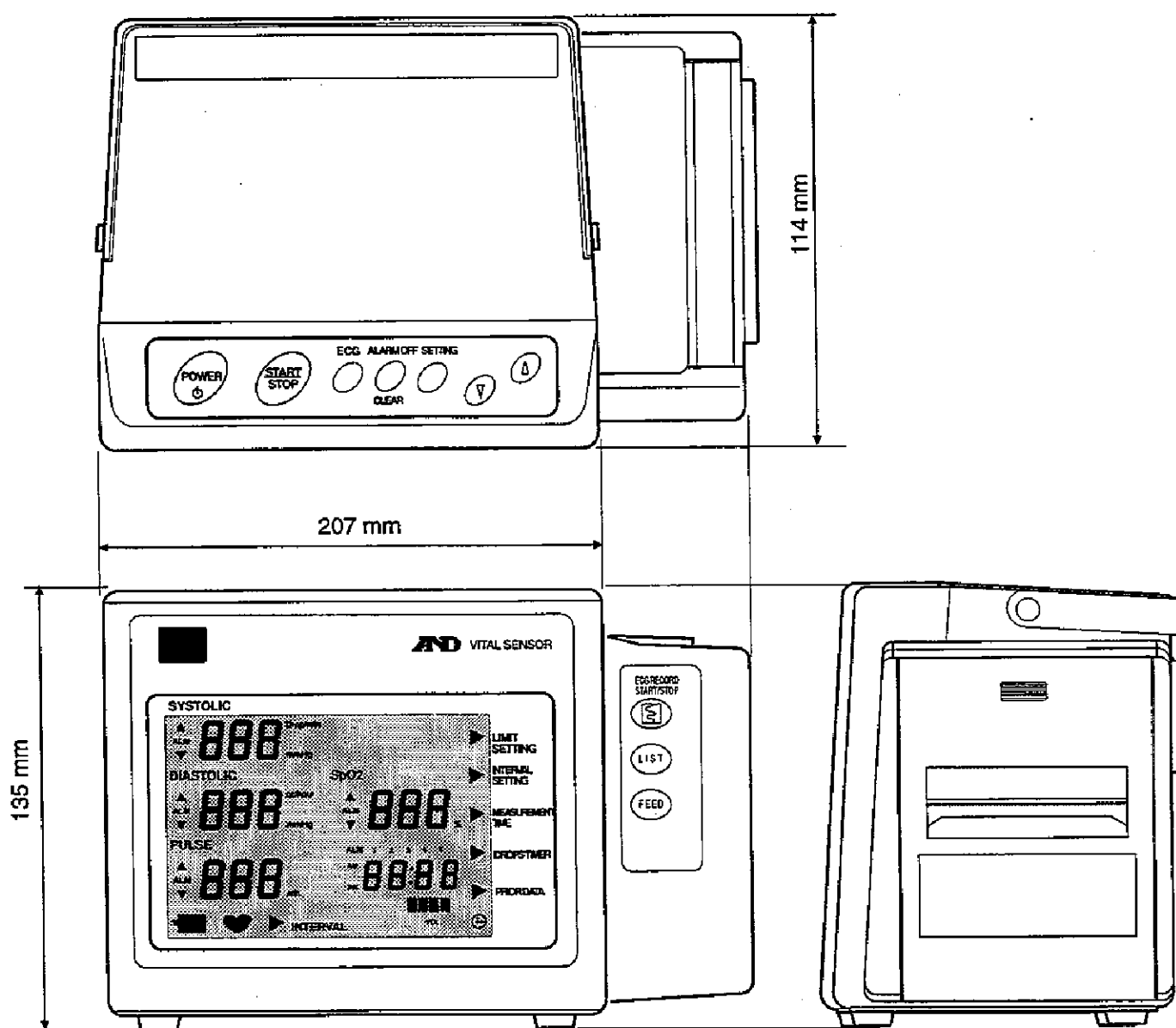
## 9-2 Options/Computer Connection



- - - Either one can be connected.

The illustrations above are not to scale.

# Appendix A: External Dimensions



## Note

The illustration above shows the display and keys of the TM-2564P. The dimensions of the TM-2562P and the TM-2564P are the same.

## This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There is no text or other markings on the paper.





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