VITAL SENSOR

TM-2550/2551
TM-2560

TYPE EXB

INSTRUCTION MANUAL

Portable Bedside Monitors

A&D Company, Limited

WM:PD4000026

The contents of this manual and the specifications of the instrument covered by this manual are subject to change for improvement without notice.

Warning Definitions

The warnings described in this manual have the following meanings:

⚠ Warning

Disregarding a warning could result in bodily injury or damage to the instrument.

⚠ Caution

Disregarding the caution could result in loss of important user data or damage to the instrument.

Note

Provides information useful for the user to operate the instrument.

Compliance

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

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

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 you carry the instruction manual with you, when you operate the instrument.

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.

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.
- When other medical equipment is used at the same time, a diagnostic error or dangerous situation may occur. Check all connections to make sure they do not interfere with each other.
- 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 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 immediately, check the status of the patient and take proper actions.
- Do not allow a patient to touch or operate 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.
- 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 all functions 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

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 pulse 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.

Measuring pulse (TM-2560 only)

- Displays the measured value with the following order of precedence:
  SpO2 > Blood pressure oscillometric method

Measuring arterial oxygen saturation (SpO2) (TM-2560 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 abnormal hemoglobin (monoxide hemoglobin, 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-2560 only)

Use a sensor manufactured by Nellcor Puritan Benett, Inc.(NPB) listed in the following table.

NPB 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

⚠ 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-2560 only)	1 unit
SpO2 extension cable (TM-2560 only)	1 piece
AC adapter	1 piece

Contents

1. Introduction

The TM-2550/2551 and TM-2560 are portable bedside monitors that measure and display systolic blood pressure, diastolic blood pressure, arterial oxygen saturation (SpO2) (TM-2560 only), and pulse rate.

These portable bedside monitors have been developed to reduce hospital labor and obtain data collection.

These portable bedside monitors are used in a hospital's general ward, artificial dialysis, and in home monitoring.

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 pressurizing 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 (TM-2551/TM-2560)

  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 (TM-2551/TM-2560)

  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-2560)
- 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.

2. Specifications

Performance specifications

Measurement	
Power supply	4 LR14 Alkaline batteries (Baby, size C) or AC adapter Approximate operating hours using batteries: 10 hours for TM-2550/2551, 4 hours for TM-2560
Power consumption	5W maximum
Protection against electrical shock	Battery: Internally powered equipment, Type BF AC adapter: Class II, Type BF
Display	Back-lit liquid crystal display
Monitoring function (TM-2551/TM-2560)	Systolic blood pressure, diastolic blood pressure, pulse rate ,SpO2 (TM-2560) Flashes value and sounds alarm in an emergency
Blood pressure measurement	
Blood pressure measuring method	Oscillometric method
Pressure detection method	Capacitance type pressure transducer
Pressure range	0 - 300 mmHg
Accuracy	Pressure: ± 3 mmHg Blood pressure: Conforming to 1992 AAMI standard Pulse rate: ± 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 (TM-2551/TM-2560)	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-2560)	
SpO2 measurement method	2-wavelength pulse oximetry; functional saturation
SpO2 measurement range	20 - 100% Accuracy: ± 3 %(70-100%)
Pulse rate measurement range	20 - 250 bpm Accuracy: ± 3 bpm
SpO2 sensor	Manufactured by Nellcor Puritan Benett, Inc.

IV drip timer	Drip rate: 1 - 250 drops/min
Backup function	Stores last 50 data in memory by using a lithium battery backup
Communications function	Infrared communications: IrDA method Serial output: RS232C level(Not available when options are connected)

Environmental specifications

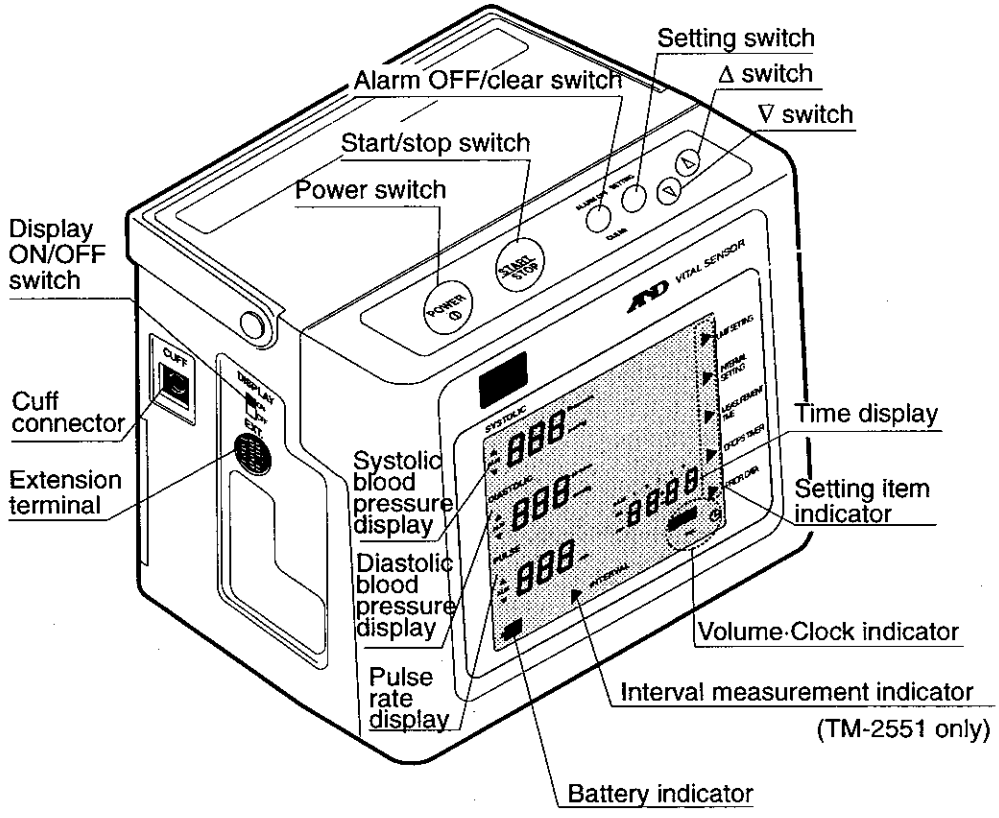
Operating temperature and humidity	10 to 40°C, 85% RH or less, non condensing
Storage temperature and humidity	−10 to 55°C, 95% RH or less, non condensing

Physical specifications

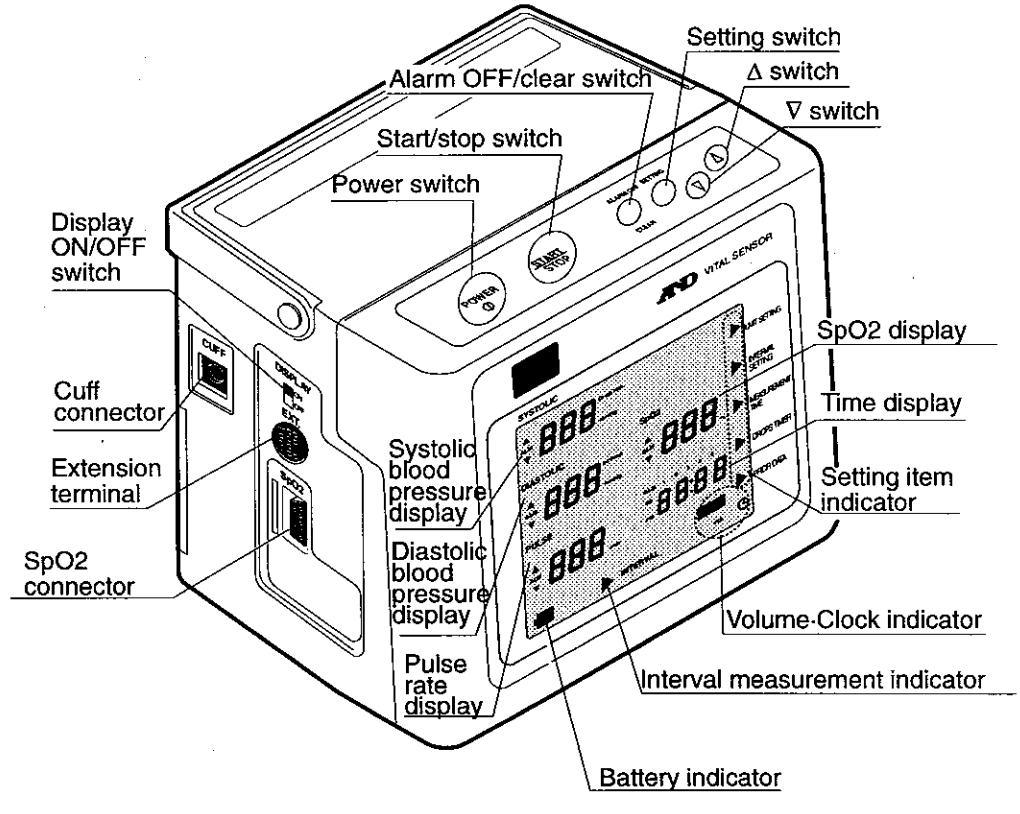
Overall dimensions	160 (W) x 135 (H) x 114 (D) mm
Weight	Approx. 1.0 kg

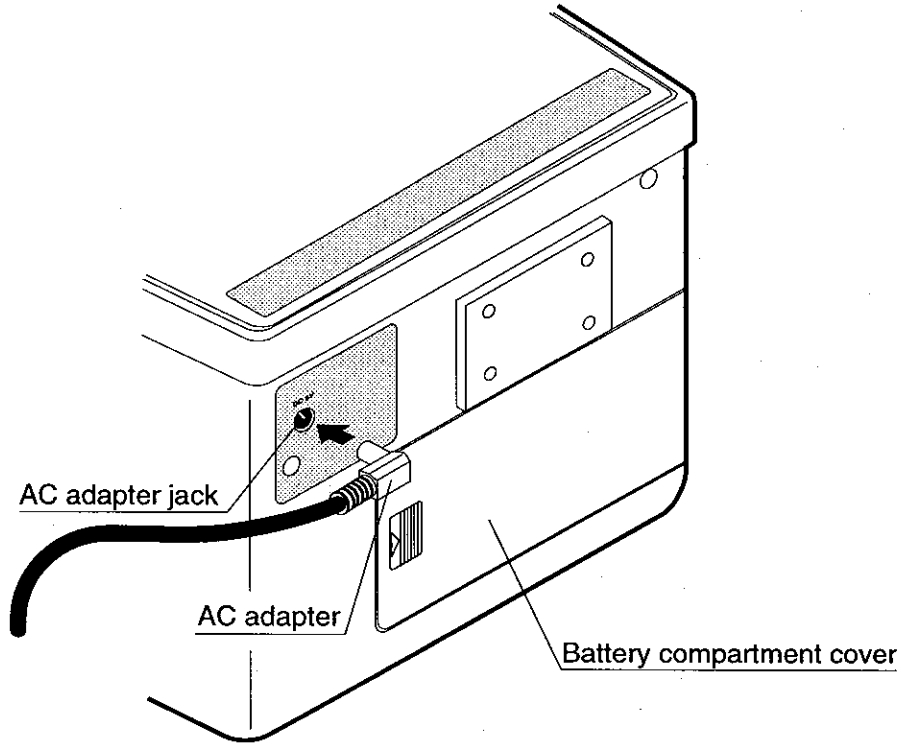
3. Part Names

TM-2550/2551



TM-2560





SYMBOLS

⏻	Turns on or off the instrument.
⊕▭⊖	Direction guide to install batteries
⎓	Direct current
SN	Serial number
1999	Date of manufacture
⚠	Attention symbol. "See instruction for use."
	Type BF equipment

4. Preparation Before Use

4-1 Place of Installation

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

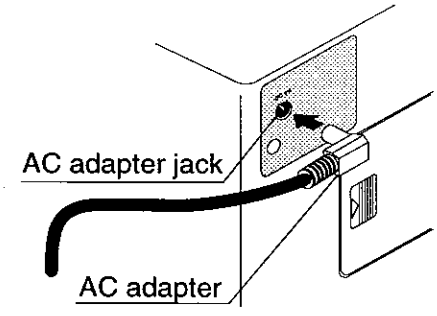
- Install the instrument away from moisture.
- Install the instrument where the temperature is between +10°C and +40°C, the humidity is 85% or less, and there is no condensation.
- Install the instrument where it is not exposed to direct sunlight.
- Install the instrument in an environment without excessive 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.

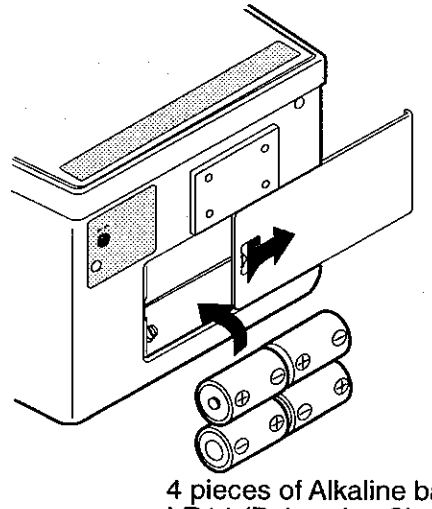
When an AC adapter is used:

Insert the supplied AC adapter into the AC adapter jack. Insert the other end of the AC adapter into an electrical outlet.



When batteries are used:

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



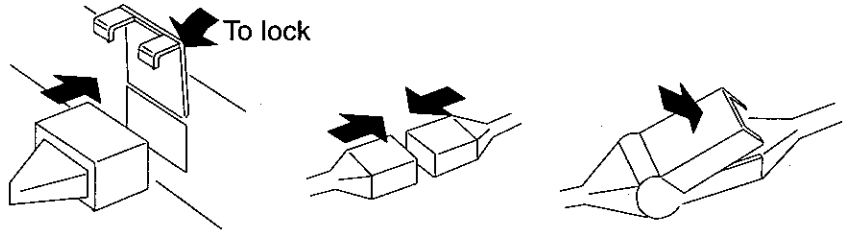
4 pieces of Alkaline battery
LR14 (Baby, size C)

⚠ Warning

- *When installing the batteries, match the + (positive) and - (negative) terminals to those 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.*

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-2560 only)

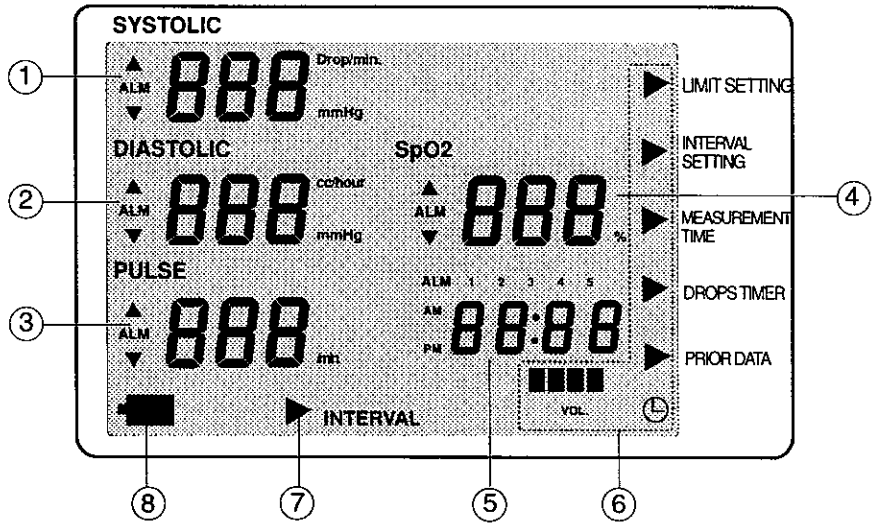


⚠ Warning

- *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.*

5. Description of Each Part

5-1 Display



(Display example: TM-2560)

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. (TM-2551/TM-2560)
- In the interval measurement mode, the predicted systolic blood pressure value is displayed. It is replaced with the measured value after measurement.(TM-2551/TM-2560)
- Displays the unit of pressure "mmHg" always.

Monitor value setting mode (TM-2551/TM-2560)

- 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 alarm is set to sound for the monitor values, the ALM indicator is illuminated. (TM-2551/TM-2560)
- Displays the pressure value applied during measurement.
- Displays the unit of pressure "mmHg" always.

Monitor value setting mode (TM-2551/TM-2560)

- 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 number of drops per hour.

3. Pulse rate display (PULSE)

Measurement mode

- Displays the measured value in the following order of precedence:
  SpO2 > Blood pressure oscillometric method
- Displays the updated heart rate during SpO2 measurement. (TM-2560)
- Displays the pulse rate after blood pressure measurement, when SpO2 measurement is not performed. (TM-2560)
- When the measured value exceeds the monitor values, the displayed value flashes. (TM-2551/TM-2560)
- When the alarm is set to sound for the monitor values, the ALM indicator is illuminated. (TM-2551/TM-2560)
- Displays the unit " /min." always.

Monitor value setting mode (TM-2551/TM-2560)

- 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.

4. SpO2 display (TM-2560)

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 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.

Measurement starting time setting mode

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

Prior data display mode

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

Interval setting mode (TM-2551/TM-2560)

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

Interval measurement mode (TM-2551/TM-2560)

- Alternately displays the current time and the interval value.

6. Setting item indicator/Volume•Clock indicator

- Pressing the Δ or ∇ switch moves the ▶ indicator to select an item to be set; monitor value (TM-2551/TM-2560), measurement interval (TM-2551/TM-2560), measurement starting time, IV drip timer, and to display the prior data.
- In the clock setting mode, the ◷ 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 (TM-2551/TM-2560)

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

8. 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.

9.Backlight

- The backlight will illuminate under the following conditions:

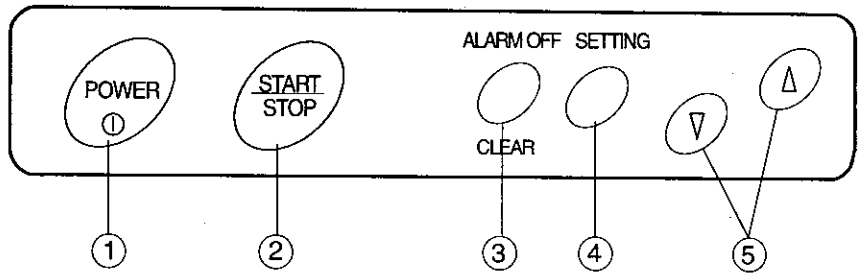
	AC adapter	Batteries
Upon power-on	O*1	-
During blood pressure measurement	-	-
After blood pressure measurement	O*1	O*2
During SpO2 measurement (TM-2560)	-	-
During alarm situation	O	O
In the setting mode	O	O

*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 .

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.
- With the IV drip timer, 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.

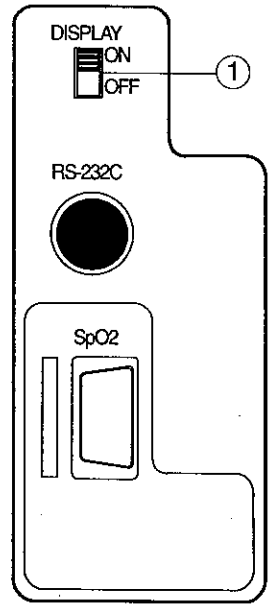
4. SETTING switch

- 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. Δ ∇ switches

- Selects an item by moving the "▶" (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 ∇ switch displays the older data and the Δ switch displays the newer data.

5-3 Operation Panel (Side)



(Panel example: TM-2560)

1. DISPLAY ON/OFF switch

- When ON, displays the measurement data.
- When OFF, displays "– – –" when the measurement is performed normally, if not, displays the corresponding error code. (For the detail on error codes, see "8-3 Before Requesting Repair".)
- When OFF, displays the pressure value applied during pressurization. Flashes "– – –" in the diastolic blood pressure display during depressurization. The systolic blood pressure display remains blank.

6. Operation

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
Setting item indicator:	OFF
Volume indicator:	ON (battery backup)
Clock:	Functioning
Measurement starting time indicator:	ON (battery backup)
Systolic blood pressure display:	OFF
Diastolic blood pressure display:	Functioning
Pulse rate display:	Functioning
SpO2 display (TM-2560):	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

6-2-1 Attaching the cuff

- 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.
- Position the cuff at the same height as the patients heart.
- 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. Refer to "9-1 Accessories/Options List" to select the correct cuff.

6-2-2 Applying the SpO2 sensor (TM-2560)

CAUTION

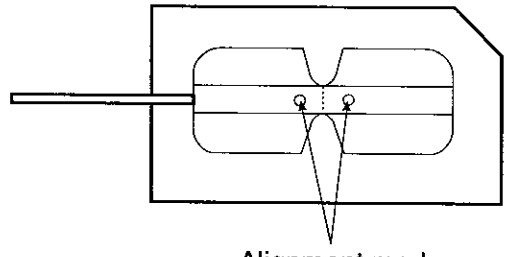
- *Read the Sp02 instruction manual for proper use.*
- *Applying the sensor on a body part other than specified or using it longer than specified may cause the patient to suffer physical injury.*

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.



Alignment marks

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.

6-3 Settings

6-3-1 Setting mode general operation

1. In the blood pressure measurement wait mode, press the Δ or ∇ switch to enter the setting mode.
2. Pressing the Δ or ∇ switch moves the ▶ indicator. The display goes out and the backlight goes on.
3. When the ▶ 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 (TM-2551/TM-2560)

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 five steps.

1. Use the Δ or ∇ switch to select "LIMIT SETTING", and press the [SETTING] switch.
2. "ALM" flashes, "▲" (Upper limit) and the current setting appear in the systolic blood pressure display.
3. To change the value, use the Δ or ∇ 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-2560 or the pulse rate lower limit value for TM-2551 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 the [SETTING] switch for more than two seconds to exit the setting mode. A mere pressing moves around the items repetitively.

6-3-3 Setting the measurement interval (TM-2551/TM-2560)

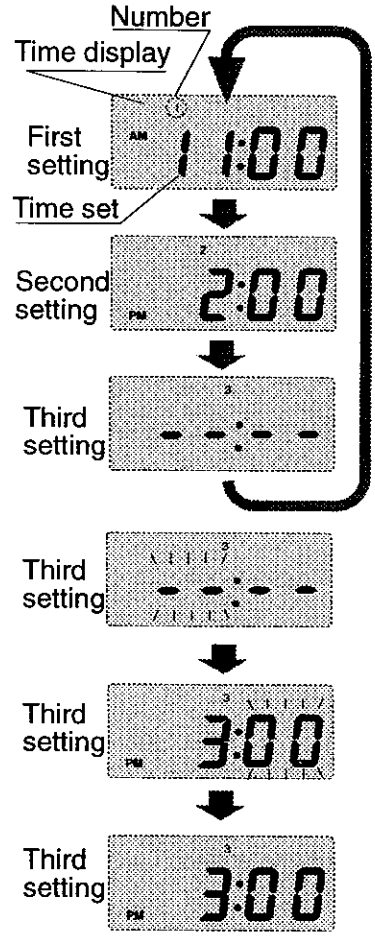
1. Use the Δ or ∇ switch to select "INTERVAL SETTING", and press the [SETTING] switch.
2. The current setting appears in the time display (in minutes).
3. Use the Δ or ∇ switch to change the value. Press the [SETTING] switch to confirm the change.
4. To delete the settings, press the [ALARM OFF/CLEAR] switch.
5. Press and hold the [SETTING] switch for more than two seconds to exit the setting mode.

6-3-4 Setting the measurement starting time

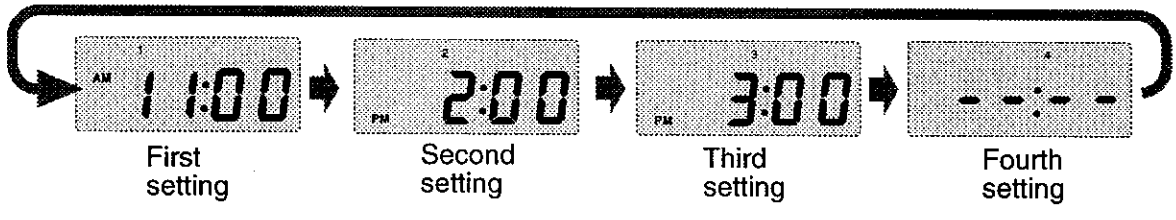
When a measurement starting time has been set, an alarm sounds at the specified time. To turn off the alarm sound, use the [ALARM OFF/CLEAR] switch. Up to five measurement starting times can be set per day.

Note

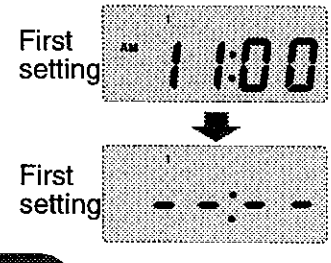
This mode does not function during interval measurement.

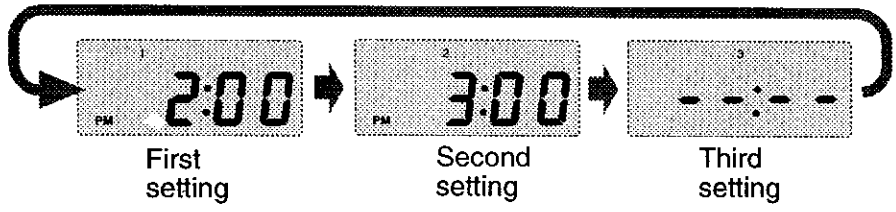


1. Use the Δ or ∇ switch to select "MEASUREMENT TIME", and press the [SETTING] switch.
2. Use the Δ or ∇ switch to move between the numbers. The number currently selected and the set time appear. Each time the Δ or ∇ switch is pressed, the numbers (the set number + 1) appear one after another. For example, 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 Δ or ∇ switch to set the hour.
4. Press the [SETTING] switch. Then, the minute display flashes to be set. Use the Δ or ∇ 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.

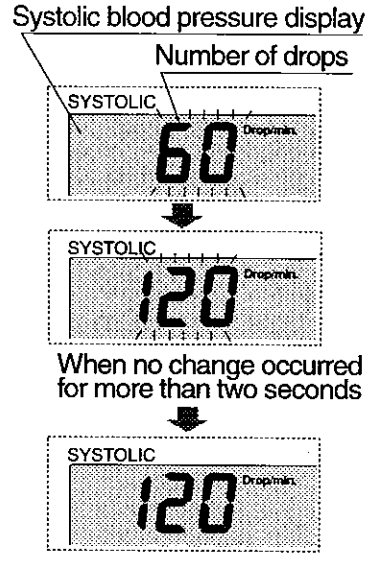




7. Press and hold the [SETTING] switch for more than two seconds to exit the setting mode.
8. When the setting has been completed, the numbers are displayed. When the designated time is reached, the alarm sounds for one minute.

6-3-5 Setting the IV drip timer

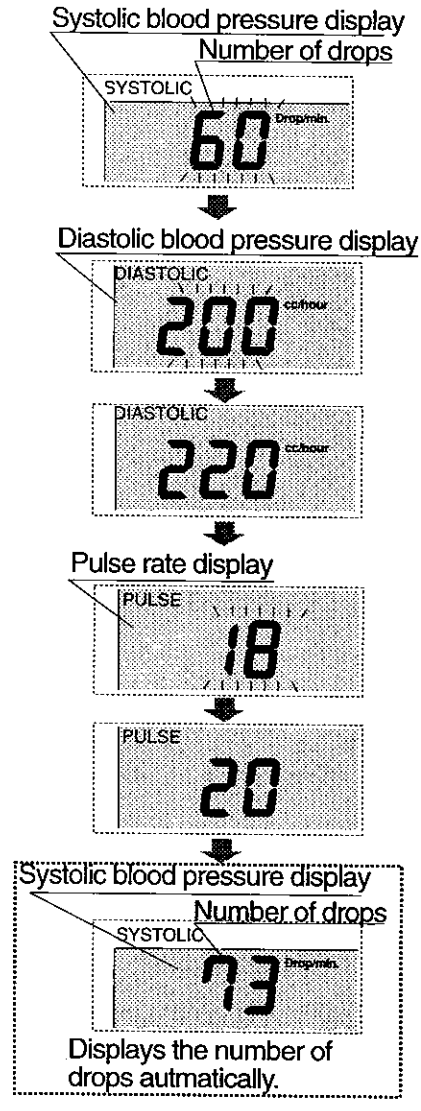
•Entering the number of drops per minute



1. Use the Δ or ∇ switch to select "DROPS TIMER", and press the [SETTING] switch.
2. "60 Drop/min" flashes in the systolic blood pressure display.
   Use the Δ or ∇ 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 Δ or ∇ 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 Δ or ∇ 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 Δ or ∇ 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.



6-3-6. Setting the clock

1. Use the Δ or ∇ 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 Δ or ∇ 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 Δ or ∇ switch to select "VOL." (Volume indicator), and press the [SETTING] switch.
2. The icon indicating the current volume appears.
3. Use the Δ or ∇ 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 Δ or ∇ switch to select "PRIOR DATA", and press the [SETTING] switch.
2. Press the ∇ switch to display the data previously measured one after another. Press the Δ 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 in memory.
5. Press and hold the [SETTING] switch for more than two seconds to exit the setting mode.

Note

Up to 50 data can be stored.

6-4 Measuring the Blood Pressure

6-4-1 Measuring the blood pressure

Press the [START/STOP] switch.

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.

To cancel the measurement, press the [START/STOP] switch.

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.

The pulse rate is displayed in the following order of precedence:

SpO2 > Blood pressure oscillometric method

6-4-2 Interval measurement mode (TM-2551/TM-2560)

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 five 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 (TM-2551/TM-2560)

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-2560)

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 Storing/Deleting Data

1. Blood pressure and SpO2 (TM-2560) are stored each time they are measured. For memory recall, see 6-3-8 Displaying the prior data. Up to 50 data can be stored.

   Note (TM-2560)

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

2. Deleting stored data
   To delete the stored data, in the blood pressure measurement wait mode, hold down the [ALARM OFF/CLEAR] switch until the buzzer stops (About 3 seconds).

7. Interface

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

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 Communications

IrDA method: Communication distance 10-70 cm
Baud rate 38.4 kbps (standard)

8. Maintenance

8-1 Checking Pressure Accuracy

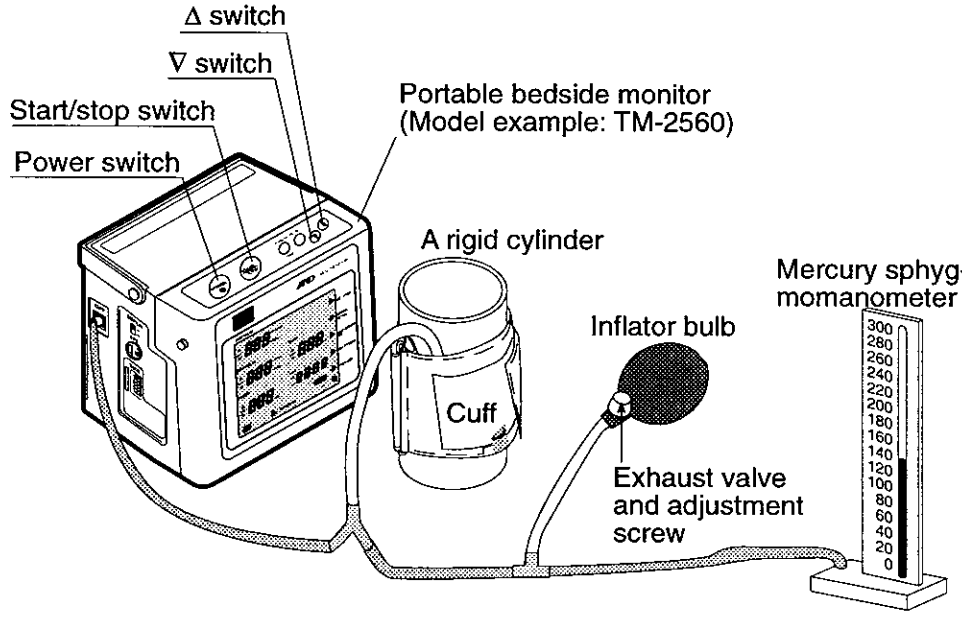
Required equipment

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

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 Δ and ∇ switches, press the [POWER] switch. "L00" appears in the systolic blood pressure display.

4. Press the Δ 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 ±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 ±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 ±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.

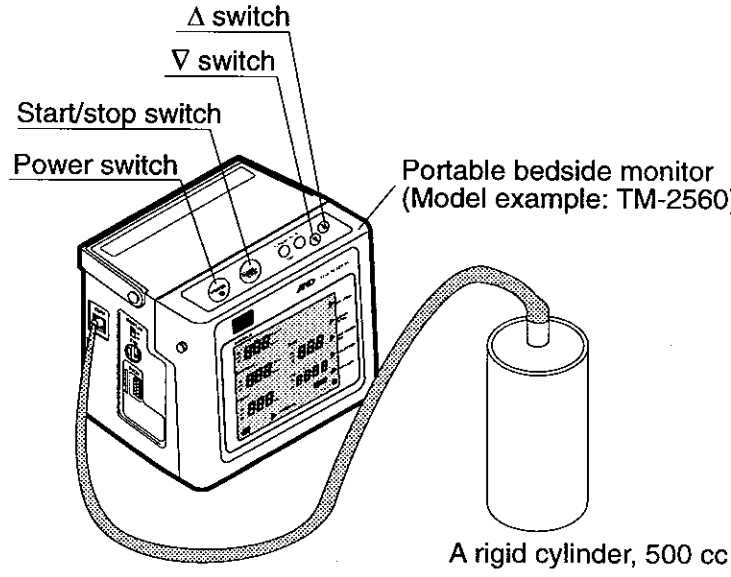
8-2 Checking Deflation Speed Control Function

Required equipment

- A rigid 500cc cylinder.

Steps for checking accuracy

1. Assemble the check system as shown below.



2. While holding down the Δ and ∇ switches, press the [POWER] switch.
   "L00" appears in the systolic blood pressure display.

3. Press the Δ 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 within 5±1.5 mmHg/s.

8-3 Cleaning

- Turn the power off before cleaning.
- 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.

⚠ Caution

- *The cuff supplied is for personal use (single-patient use) only.*
- *Select the most appropriate cuff among the options available.*
- *Do not pour water on the instrument or use water for cleaning. This instrument is not waterproof.*
- *Do not use solvents such as thinner and benzine for cleaning.*

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 you purchased the instrument from 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.

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 you purchased the instrument from or the nearest A&D sales representative listed on the rear cover of the instruction manual.

Error Codes

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	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-2560)	SpO2 self test error	Turn on the power again.
E31 (TM-2560)	Defective SpO2 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.

9. Accessories/Options

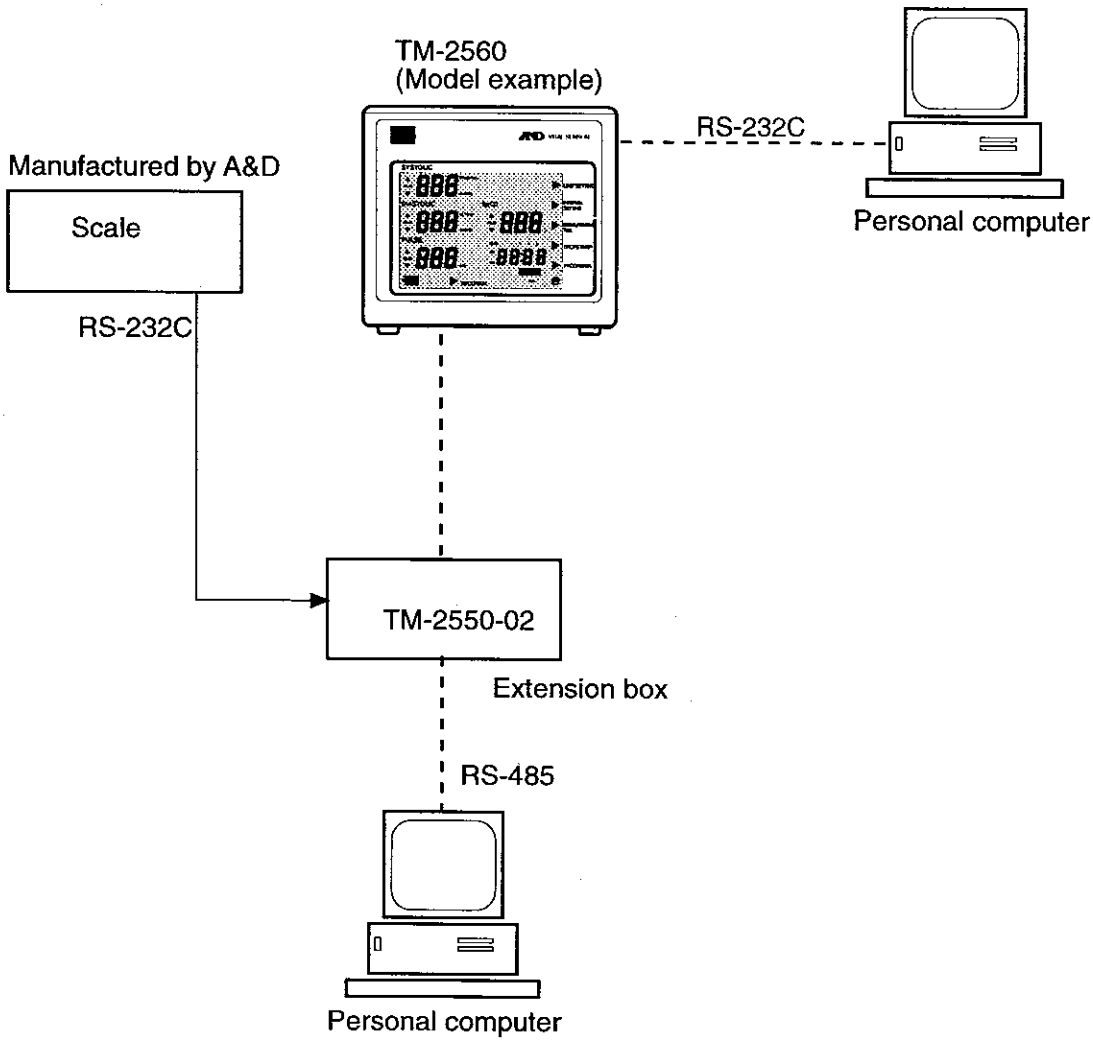
9-1 Accessories/Options List

Product Name	Model
Stand	AD-TM2540-03A
Personal cuff (without hose)	
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
Reusable cuff (without hose)	
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-TM9112D-1)	AX-13A37452-S
Hose	
2.0 m	AD-TM9137-200
3.5 m	AD-TM9137-350
SpO2 extension cable	
1.2 m	AX-SPEC4
2.4 m	AX-SPEC8
Others	
Extension box	AD-TM2550-02
AC adapter	AX-TB-210 230V AX-TB-211 120V

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

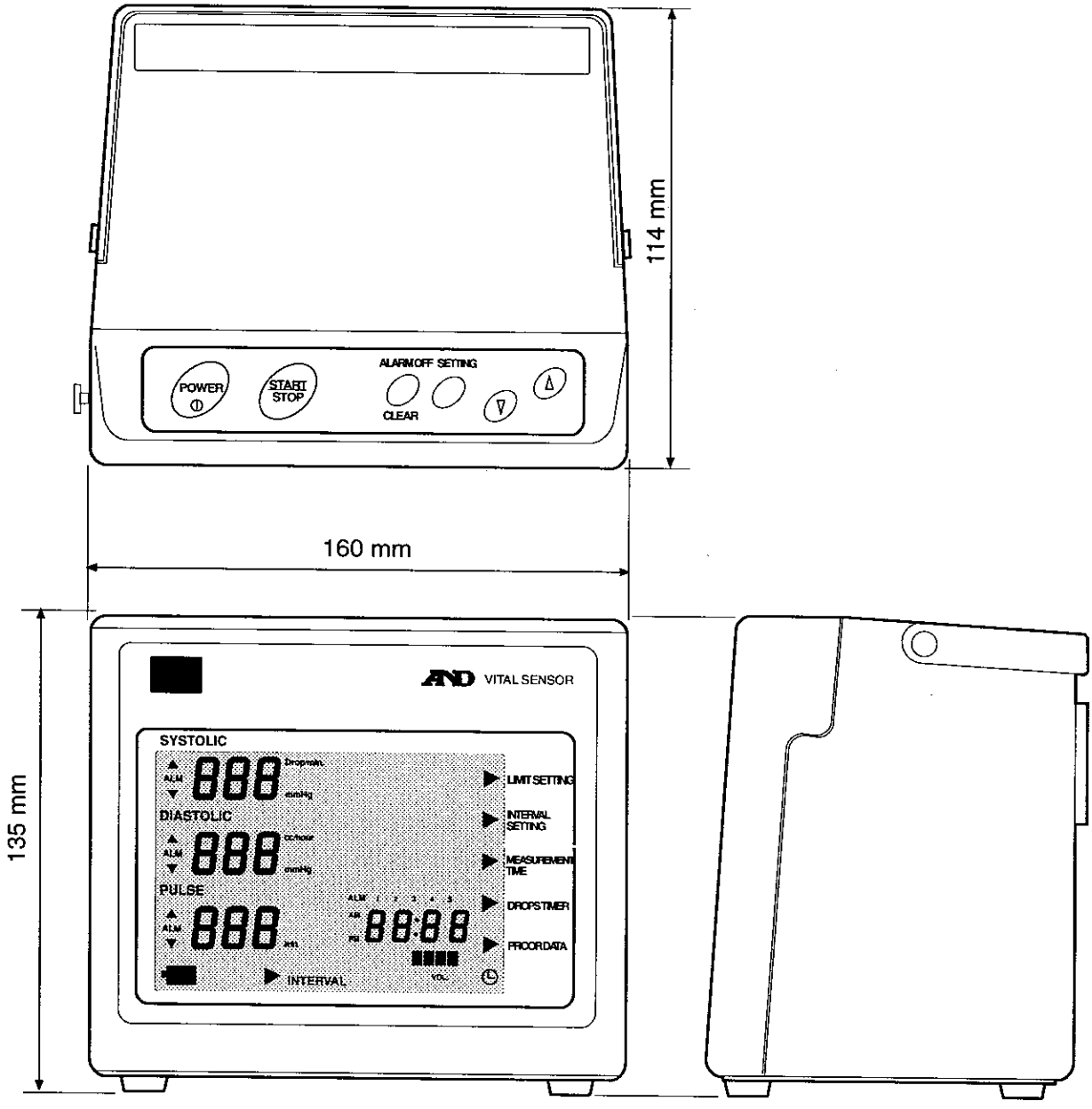


- - - Either one can be connected.

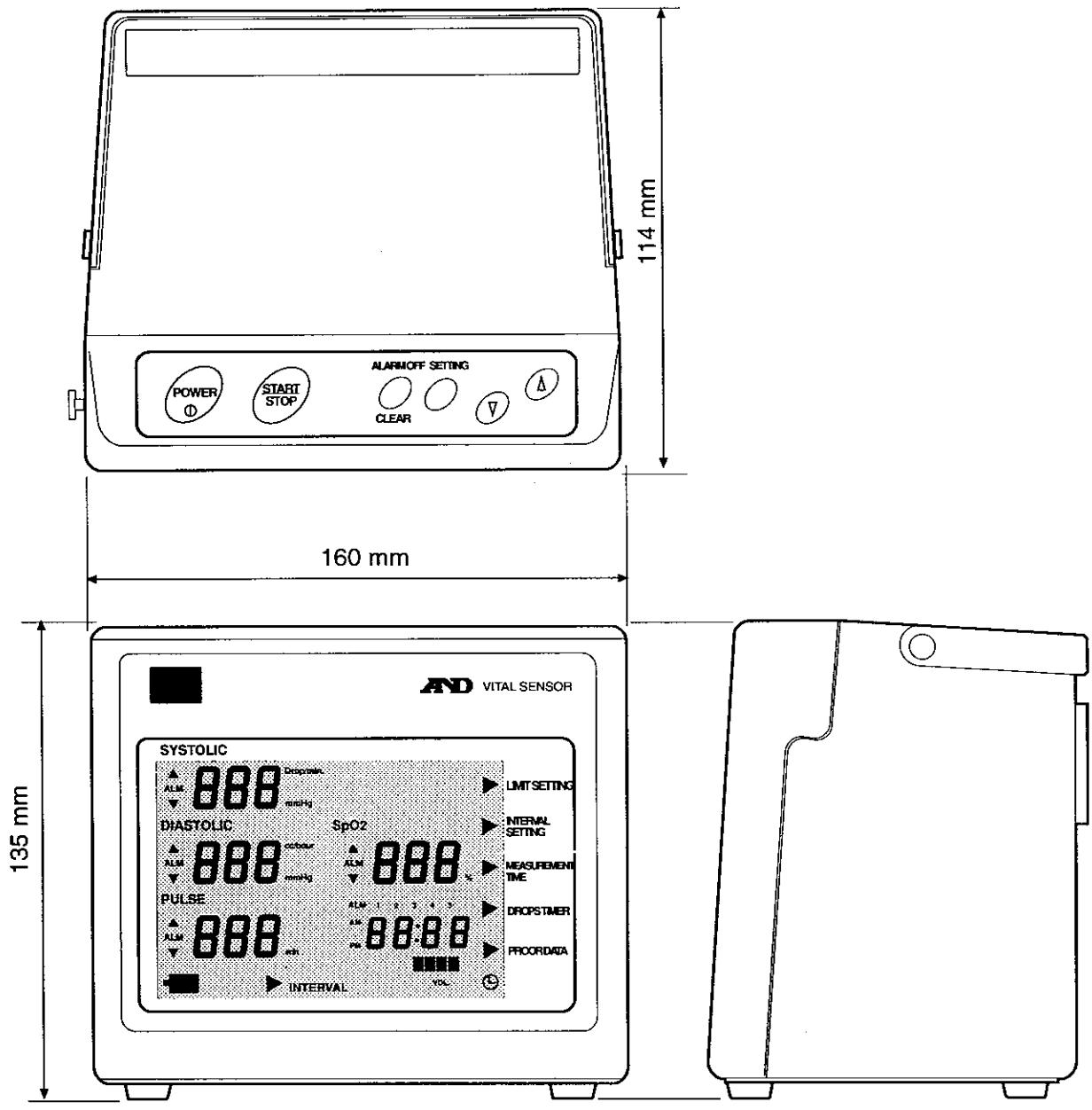
The illustrations above are not to scale.

Appendix A: External Dimensions

TM-2550/2551



TM-2560


114 mm
160 mm
135 mm
POWER
START STOP
ALARM/OFF SETTING
CLEAR
VITAL SENSOR
SYSTOLIC
DIASTOLIC
SpO2
PULSE
LIMIT SETTING
INTERVAL SETTING
MEASUREMENT TIME
DROP STIMER
PRCORDATA
INTERVAL

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