

# DARAY<sup>®</sup>

## HEALTHCARE PRODUCTS



# V480

## NIBP PATIENT MONITOR OPERATING MANUAL



# DARAY®

## HEALTHCARE PRODUCTS

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# 1. Safety Information

The safety statements presented in this section refer to the basic safety information that the operator of the monitor should follow. There are additional safety statements in other sections, which may be the same as or similar to the following, or specific to the operations.

The following safety terms, warning, caution and note are used throughout this manual to point out hazards.

## **WARNING**

Indicates a potential hazard situation or unsafe practice that, if not avoided, could result in death or serious injury.

## **CAUTION**

Indicates a potential hazard or unsafe practice that, if not avoided, could result in minor personal injury or product/property damage.

## **NOTE**

Provides application tips or other useful information to ensure that you receive the best from your product.

## 1.1 Warnings

### **WARNING**

- The monitor is intended only as an adjunct in patient assessment. It must be used in conjunction with clinical signs and symptoms. It is not intended as a device used for treatment purposes.
- The monitor is intended for use by qualified clinical physicians or well-trained nurses only.
- Check the monitor and accessories function safely before use, to ensure patient safety.
- When using the monitor with electrical surgery equipment, the user should pay attention to guarantee the safety of the patient being measured.
- **EXPLOSION HAZARD:** Do not use the monitor in the presence of flammable anaesthetics, explosive substances, vapours or liquids.
- Do not pull or lift the monitor by its connection cable.
- Do not hang the monitor when transporting patients.
- Do not use the monitor and its transducer during MRI (magnetic resonance imaging) scanning because induced current could potentially cause burns. The monitor could interfere with MRI performance, and MRI could affect the measurement accuracy of the monitor.
- The monitor and its accessories may be contaminated by micro-organism during transporting, use and storage. Use the recommended methods to sterilize and disinfect the monitor or its accessories when the packing material is damaged, or it has not been used for a long time.

## 1.2 Cautions

### CAUTION

- The monitor is a sealed device. Keep its surface dry and clean, and prevent liquid from entering it.
- The device should be placed safely, avoiding strong vibration or other mechanical damage.
- Do not use mobile phones when the monitor is in use. Mobile phones may emit electromagnetic radiation which can affect the monitor performance.
- The monitor should only be used by authorised personnel.
- Before using the monitor on patients, the user should be familiar with its operation.

## 1.3 Notes

### NOTE

Important! Before use, carefully read this manual, all safety information and specifications.

## 2. General

### 2.1 Introduction

The monitor is a non-invasive, desktop patient monitor. It operates on AC or rechargeable battery power supply or standard 1.5V AA alkaline batteries. It is compact, small, light, and easy for learning and handling, suitable for monitoring adult and child patients and widely used in hospital operation rooms, clinics, out-patient department, sickroom, emergency treatment, recovery and health care organizations, or family nursing and during patient transportation.

Parameters measured by the monitor include non-invasive blood pressure (NIBP) and pulse rate (PR). The monitor measures these through a NIBP cuff and displays the measurements on the LED screen.

The monitor is operated by buttons on the front panel. It adopts a monochrome LCD screen and LED screen displaying measurements with the measuring state, and a monochrome LED and a dual-colour LED. It is capable of managing measured data and transmitting the patient's trend through a cable to a PC for displaying, viewing, saving or printing.

#### NOTES:

- The monitor is not recommended for patients experiencing seizures or tremors, or patients with hypotension, hypertension, arrhythmias, or extremely high or low heart rate. The software algorithm cannot accurately compute NIBP on patients with these conditions.
- Do not place the cuff over damaged skin tissue.
- Do not place the cuff on a limb being used for A-V Fistulas, intravenous infusion or any area where circulation is compromised or has the potential to be compromised.
- The measure patient, selected in the setup menu and the cuff size used, must be correct to obtain reliable NIBP data and to prevent overpressure in paediatric use.
- When the continue mode is used for a long time, the skin under the cuff may become sore or bleed. Periodically check the patient's limb circulation under the cuff. Check frequently when using Auto NIBP in 1 and 2 minute intervals and continue mode. Intervals below 10 minutes are not recommended for extended periods of time.

#### Packing List

Standard Packing List	
NIBP Patient Monitor main unit	1 p c
Adult NIBP cuff	1 pc
NIBP extension tube	1 pc
AC power adapter	1 pc
Communication cable	1 p c
The operator's manual	1 pc
Selectable Accessory	
Child NIBP cuff	

#### CAUTION

Using other accessories may cause damage to the device.

## 2.2 Functions

The monitor has the following functions:

- Measuring: Intelligent NIBP and PR monitoring.
- Prompts: Battery capacity indicator, speaker volume indicator and LED light flashes.
- Alarm: Judgment of exceeded limits, audio and visual alarm.
- Power saving: Automatic shutdown when no monitoring for 10 minutes.
- Data Managing: Data storage, data adding and data deletion with saved data (up to 900 groups).
- Communication: Transmitting the patient's trend data to a computer for displaying, observing, saving or printing.

For the data displaying, observing, saving and printing function, you must install the data viewer software in a computer, and connect the monitor with the computer using the correct cable.

## 2.3 Appearance

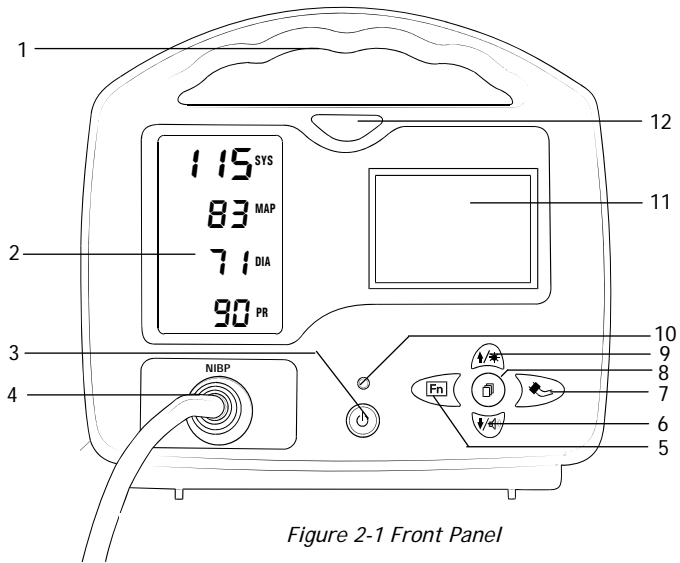


Figure 2-1 Front Panel

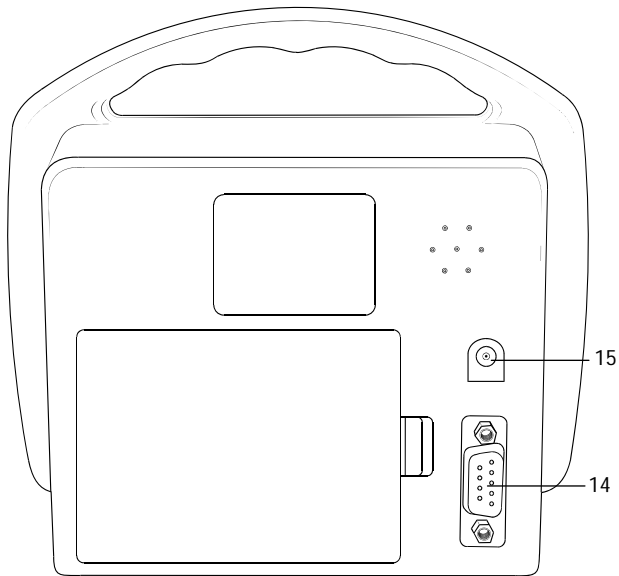








Figure 2-2 Back Panel

Table 2-1 Appearance description

No.	Description	Remarks
(1)	Handle	To lift or move the monitor
(2)	LED screen	Displays the real time or stored measurements
(3)	 button	Monitor on/off switch
(4)	NIBP socket	To connect the NIBP cuff
(5)	 button	During the monitoring state, press this button to set the monitor, and press again to choose the patient type to be set; under alarm limit set interface, press this button to choose the patient type to be set; under the list review interface, press the button to adjust the contrast of screen. More in section 4
(6)	 button	Multifunction button. Turns the speaker on or off in the monitoring state; when setting the monitor the patient type can be changed; and when setting the alarm, it will deduct the limit and reverse the page order when reviewing the stored data. More in section 4
(7)	 button	Changes the display screen
(8)	 button	Starts or stops measuring the NIBP
(9)	 button	Multifunction button. Turns the backlight on or off during the monitoring state; When setting the monitor, the patient setting can be changed; and when setting the alarm, it increases the limit, and puts the pages in order when reviewing the stored data. More in section 4
(10)	Dual-color LED	Red LED, AC power; Green LED battery
(11)	LCD	To display the monitoring interface, monitor-set interface, alarm limit set interface and two data review interface
(12)	LED	Alarm indicator, when it exceeds the limit, it flashes
(13)	Back battery panel	Remove to replace the batteries
(14)	PC data connector	Use the supplied data cable to connect to a PC
(15)	AC power	

## 3. Installation

### 3.1 Unpacking and Inspection

Open the package and carefully remove the V480 NIBP Patient Monitor and accessories. Check against the packing list.

- Check the monitor for damage.
- Check exposed wires, sockets and accessories.

Contact supplier immediately in case of any problem.

### 3.2 Connect NIBP Cuff and Extension Tube

Connect the NIBP extension tube to the cuff, and then connect the extension tube to the NIBP socket on the monitor's front panel. (Figure 2-1).

### 3.3 Power Supply

#### 3.3.1 Connect AC Power Adapter

Connect the power adapter cable to the adapter socket on the reverse of the monitor, (figure 2-2) and into the electric socket, the LED light on the power adapter will flash.

#### **WARNING**

The AC power adapter equipped with the monitor is made according to special requirements and must only be used with the monitor. Never use other adaptors, otherwise it may cause damage to the device and result in patient's injury.

### 3.3.2 Install the Battery

The monitor can be powered by five standard AA alkaline batteries. To install batteries:

1. Remove the battery door (figure 3-1).
2. Place batteries into the slots per the "+" and "-" indicators (figure 3-2).
3. Replace the battery cover.

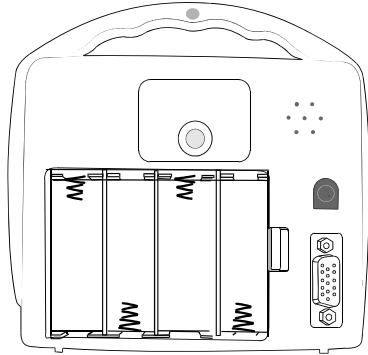


Figure 3-1 the Battery Compartment

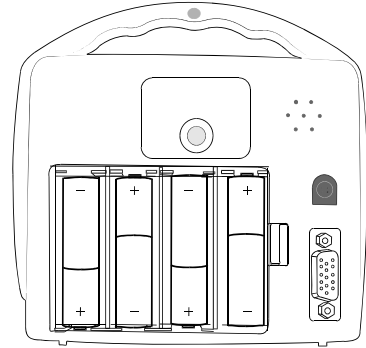


Figure 3-2 Installing Batteries

#### CAUTION

Remove the batteries if the monitor is not to be used for a long time.

Replace batteries of insufficient energy; abnormal power supply may lead to product damage or even personnel injuries.

#### NOTE

Follow local laws for correct disposal of used batteries.


### 3.4 Connect Computer

The monitor can be connected to a PC through a serial cable to transmit data to the computer for reviewing, saving or printing. To perform this operation, plug the cable's nine-needle socket to the PC socket on the monitor's back panel (figure 2-2) and the RS232 to the PC's serial port.

## 4. Display and Operation

The LED screen displays measurements and pulse rate. The LCD displays five kinds of interfaces; monitoring, system setup, alarm limit setup, data review in a list and in a single group, all operated by the six buttons on the front panel. (For button details, please refer to figure 2-1 and table 2-1).










### 4.1 Power-on and Power-off

Press  button and wait a few seconds to switch on the monitor. The green LED on the front panel lights up, the LED and LCD screen display. Press the power button to switch off the monitor.

#### NOTE

- The monitor is powered by a built-in rechargeable battery, standard 13V AA alkaline batteries or external AC power supply. When powered by the built-in battery, if the battery power is low, the monitor may not turn on and it must be connected to the external power supply to charge the battery. The monitor can operate on the external power supply while the battery is being charged. It will operate on the battery again when the battery is fully charged. If the monitor is supplied by alkaline battery, replace the batteries if the power is low.
- If the NIBP cuff is disconnected, or it is connected but the NIBP does not start, the monitor will automatically enter the standby mode. Under this mode, when the NIBP cuff is inflated, the monitor will automatically resume the operation mode. Otherwise the monitor will automatically shut down in 10 minutes.

### 4.2 Change the Display Screen

The LCD displays the monitoring screen first when the monitor is on. Press the  button to change the screen between monitoring, alarm limit setup and list data review. Under the monitoring screen, press the  button once to enter into the setup screen; under setup screen, press the  button four times to review the data, then press /\* button or /() to review the measurement group by group, if the  or  button are pressed, it will return to the monitoring screen, or press the  button to enter into the alarm limit setup screen.

### 4.3 Monitoring Screen

#### 4.3.1 Monitoring Display and Description

The LCD displays the monitoring screen first when the monitor on. Then LED screen displays the measurements and the LCD screen displays system setup information and system information.

When monitoring the patient's NIBP, the LED screen displays the measurements of SYS, DIA, MAP and PR, and LCD displays the monitoring patient (adult or child), NIBP measuring unit (mmHg/kPa), measuring mode (manual/auto/stat), date, alarm signal and remaining power. (Figure 4-1 and table 4-1).

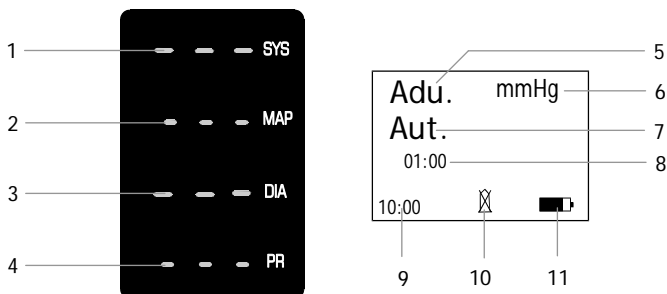


Figure 4-1 Monitoring Screen

Table 4-1 Description of displayed information on the monitoring screen

No.	Description	Remarks
(1)	SYS Measurements	Displays the result of systolic pressure of the NIBP measurement.
(2)	MAP Measurements	Displays the result of mean pressure of NIBP measurement. During measuring, it is used to display the cuff pressure.
(3)	DIA Measurements	Displays the result of diastolic pressure of the NIBP measurement.
(4)	PR Measurements	Displays the Pulse Rate measurement.
(5)	ADU/PED	Measuring patient, adult (ADU) or paediatric (PED) - to be selected
(6)	mmHg/kPa	Measuring unit, mmHg or kPa - to be selected.
(7)	Man./Auto/STAT	Measuring mode, manual (MAN), automatic (AUTO) or stat - to be selected
(8)	Cyc.	Sets up the interval time in automatic measurement mode. When the interval time is set to zero, the monitor performs measurement continuously for 5 minutes.
(9)	Date	Display the real time.
(10)		Alarm sound, on  or  off
(11)	Battery Indicator	Displays the remaining battery power.

### 4.3.2 Button Operation in Monitoring Screen

Under the monitoring screen, button, up /\* button and / button are usable.

- Button to start or stop measuring NIBP;
- /\* Button to switch on or off the LCD backlight;
- / Button to switch on or off the audio alarm.


#### NOTE

If the monitor is powered by 1.5V AA alkaline batteries, to save energy, switch off the backlight and mute the monitor.

### 4.3.3 Alarm Monitoring Function

When a parameter's measurement exceeds its alarm limit, the monitor will give audio and visual alarms simultaneously. The speaker sounds the alarm and the parameter and LED light flash continuously. If the speaker sound is turned off by pressing the Mute button or the parameter's alarm switch is set off, the alarm sound will be silenced, but the parameter's measurement still flashes to prompt the alarm. Refer to section 4.4 for the parameter alarm switch setup.

## 4.4 Alarm Limit Setup Screen

Under the monitoring screen without monitoring, or when setting the monitor or under data review, press the  button once to enter into alarm limit setup. The functions of the alarm limits setup, the system status setup and the data management are performed on the LCD setup screen.

### 4.4.1 Alarm Limit Setup Display and Description

The setup items and values are listed in a table on the system setup screen. (Figure 4-2 and table 4-2).

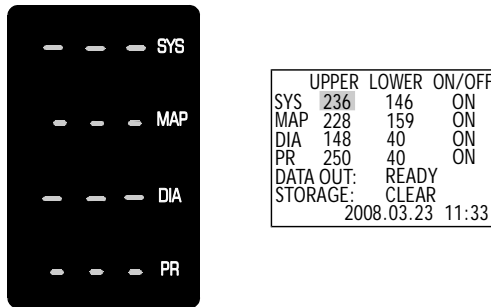


Figure 4-2 Alarm Limit Setup Screen

Table 4-2 Description of displayed information on the alarm limit setup screen

	Upper limit	Lower limit	Alarm switch
SYS (systolic)	120 - 250	60 - 180	ON or OFF
MAP(mean pressure)	100 - 230	50 - 160	ON or OFF
DIA (diastolic)	80 - 150	40 - 120	ON or OFF
PR (pulse rate)	80 - 250	40 -120	ON or OFF
Data output	READY or WAIT		
Data storage area	CLEAR or WAIT		
	Year 08 -30	Month 01 -12	Date 01 - 31 Hour 00 -23 Minute 00 -59

## 4.4.2 Button Operation in the Alarm Limit Setup Screen

When setting the alarm limit, use the buttons: **[Fn]** button, **↑/★** button and **↓/🔊** button to set the limit.

### **[Fn]** Button

The cursor moves backwards by pressing this button. The cursor, indicated by a small black square, moves to the items to be set up and is inversely displayed.

### **↑/★** Button

When the cursor is on the positions; alarm limit values, pulse sound level or date and time, values will increase by pressing this button. If these values reach the maximum, they will return to the minimum cyclically. When the cursor is on the alarm switch positions, press this button to switch the alarm ON or OFF. This button is invalid when the cursor is on the DATA OUT and STORAGE item positions.

### **↓/🔊** Button

When the cursor is positioned over the alarm limit values, pulse sound level or date and time, these values will decrease by pressing this button. If these values reach the minimum, they will return to the maximum cyclically. When the cursor is on the alarm switch positions, press this button to switch ON or OFF the alarm. If the cursor is on the DATA OUT or STORAGE item position and this button is pressed, the relevant function will be carried out. WAIT is displayed instead of READY or CLEAR, the data process will take a minute. All buttons are invalid during this time. WAIT will be replaced by READY or CLEAR again when the process is finished.

### NOTE

- Avoid adjusting system date and time randomly. Incorrect saved time interrupts the continuity of the trend time. The date or time needs to be adjusted only when it is not accurate and it is recommended to do so straight after the monitor is powered on.
- Alarm limits setup is very important when monitoring. Avoid upper limits that are too high or lower limits that are too low. For example, PR upper alarm limit should not be 20 bpm more than the patient's actual PR.

## 4.5 List Data Review Screen

The monitor saves parameter measurements each time it measures blood pressure. The storage area can store 900 groups of measurements and the new measurement will replace the old automatically after 900 groups. Saved data will never be lost even if the monitor is powered off. Data can be displayed in a list or in a single group. The List Data Review is displayed by the LCD, meanwhile, it will display "---" on the LED screen.

### 4.5.1 List Data Review Screen and Description

When the LCD displays the List Data Review screen by pressing the button, the monitor displays the measurements in a list as "SYS-DIA-HR-DATE-TIME". In total it can store 150 pages of measurements in 900 groups, and 6 groups to a page. The List Data Review of one page is shown in figure 4-3 and table 4-3.

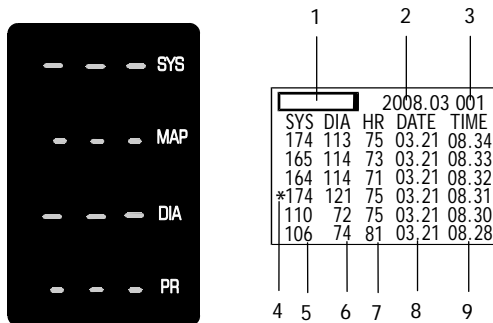


Figure 4-3 List Data Review Screen

Table 4-3 Description of displayed information on the list data review screen

No	Description	Remarks
(1)	Storage area ruler	Total size of the trend data storage area.
(2)	Date	Shows the month and year of the measurements. E.g. 2008.02
(3)	No	The number of the first group of each page. E.g. 001 on the first page, 007 on the second page.
(4)	*	Indicates the patient is moving when monitored.
(5)	SYS	Systolic measurement.
(6)	DIA.	Diastolic measurement.
(7)	HR	Pulse rate.
(8)	DATE	Measurement date. E.g. 08.21
(9)	TIME	Measurement time. E.g. 22:07

**NOTE**

When the time indicator points to the time period without monitoring, the measurement display and corresponding times are blank because nothing is saved.

### 4.5.2 Button Operation in List Data Review Screen

Using ↑/\* button and ↓/⏪ button moves forwards and backwards through the pages.

## 4.6 System Setup Screen

### 4.6.1 System Setup Display and Description

The system setup screen, users can set the measuring object, unit, mode... on the LCD by pressing the **[Fn]** button, and it displays "---" on LED. Figure 4-4 and table 4-4.

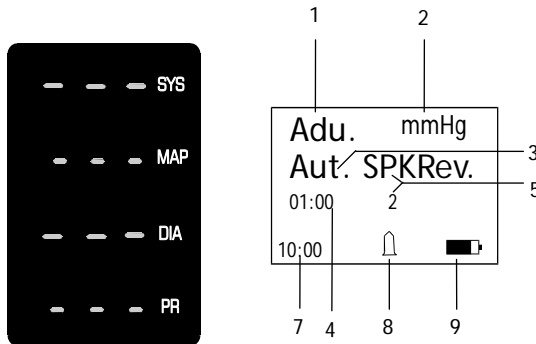


Figure 4-4 System Setup Screen

Table 4-4 Description of displayed information on the system setup display

No.	Symbols	Description
(1)	Adu./Ped.	Patient type: Adu = adult and Ped = paediatric patient.
(2)	mmHg/ kPa	Blood pressure unit: mmHg or kPa.
(3)	Auto./ Man./ STAT	Measuring mode: Auto. (Automatic), Man. (manual) or STAT (continuous).
(4)	01:00	Automatic measuring; intervals in minutes, 01:00, 02:00, 03:00, 05:00, 10:00, 15:00, 20:00, 30:00, 60:00, and 90:00.
(5)	Alarm Sound	Alarm sound, with two levels. In the monitoring screen, press <b>↓/🔔</b> button to switch on or off the alarm sound.
(6)	Rev.	Review measured results one by one by pressing <b>↑/*</b> or <b>↓/🔔</b> arrow button.
(7)	Time	Indicate the real system time.
(8)	🔔/🔕	The alarm sound symbol, 🔔 alarm sound on and 🔕 alarm sound off.
(9)	🔋	Indicates the built-in battery capacity.

### 4.6.2 Button Operation in System Setup

The five buttons: **[Fn]**, **🔑**, **↑/\***, **↓/🔔**, and **🔑** button are functional in this interface.

**[Fn]** button: Press to move the cursor to the required item to set it.

**↑/\*** or **↓/🔔** button: Press these two buttons to change the items circularly.

**🔑** button: Press this button to start measuring blood pressure.

**🔑** button: Under this screen, press this button to enter into alarm limit setup.

## 4.7 Single Data Review Screen

The monitor can store 900 groups of measurements. There are two ways to review the data: by list or single group. The list data review is mentioned in section 4.5, and in this section, the single data review function will be explained in detail.

When reviewing the data in a single group, the LED and LCD will display relevant information at the same time. LED displays specific measurements and LCD displays the relevant time and number.

### 4.7.1. Single Data Review Screen Display and Description

Under the monitoring screen with the monitoring on, press the **[Fn]** button to enter into system setup, continue pressing **[Fn]** to move the cursor to Rev. (Figure 4-5 and table 4-5).

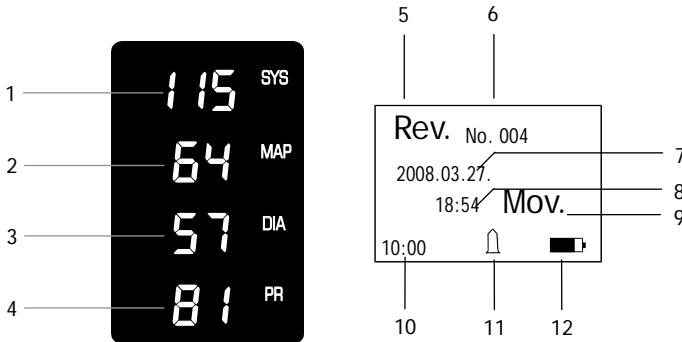


Figure 4-5 Single Data Review Screen

Table 4-5 Description of displayed information on the single data review screen

No.	Description	Remarks
(1)	SYS	Systolic measurement.
(2)	MAP	Mean pressure measurement.
(3)	DIA	Diastolic measurement.
(4)	PR	Pulse rate measurement.
(5)	Rev.	Indicates the data review interface.
(6)	Number	The number of the measurements in single increments from 001 to 900.
(7)	DATE	Date of measurement. E.g.2008.04.08.
(8)	TIME	The real time when monitoring. E.g. 15:29.
(9)	Mov.	It shows when the patient is moving when monitored.
(10)	Time	The real system time.
(11)	🔔/🔕	🔔 Alarm sound on and 🔕 alarm sound off.
(12)	🔋	Built-in battery capacity.

## 4.7.2 Button Operation in Single Data Review Screen

The five buttons: **[Fn]**, **[Esc]**, **[↑/\*]**, **[↓/⏏]** and **[Enter]** button are functional in this interface.

**[Fn]** Button: Press this button to exit the single data review interface.

**[↑/\*]** or **[↓/⏏]** button: Press these two buttons to select measurement.

**[Esc]** Button: Press this button to start measuring blood pressure.

**[Enter]** Button: Press this button to enter into the alarm limit setup interface.

## 5. NIBP Monitoring

### 5.1 Principle

The monitor measures non-invasive blood pressure by the oscillometric method. It detects the change of blood volume in the artery and change in pressure when inflating the cuff. When the cuff is deflating, the measurements will be detected by the change of pressure.

### 5.2 Steps

It is important to select the proper size blood pressure cuff and place the cuff correctly.

Standard cuff size:	
Adult's upper arm	12.5 x 23cm
Adult's thigh	18.0 x 35cm
Paediatrics' upper arm	9.4 x 21cm

#### Cuff selection:

1. Identify patient's limb circumference.
2. Select appropriate cuff (limb circumference is identified on each cuff).

#### Cuff placement:

1. Place cuff firmly around extremity being used.
2. Marking on the cuff should match the artery location.
3. Cuff should be 2 to 5 cm (1 to 2 inches) above the elbow if using brachial artery.
4. The air pad should be over the brachial artery. Tubing is immediately to the right or left of the brachial artery to prevent kinking when the elbow is bent. The cuff is usually placed around the patient's arm, but if the patient is too fat, select a thigh cuff and place it around his thigh.

Ensure the tube between the cuff and the monitor is not compressed or restricted.

The arm should be placed on a surface that is level with the heart. The palm of the hand should face up. Figure 5-1 and Figure 5-2.

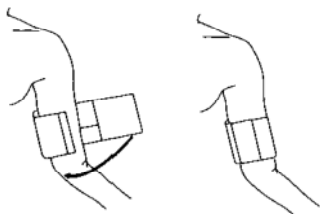



Figure 5-1 Placement of the Cuff



Figure 5-2 Placement of the Cuff

To measure blood pressure: (Figure 5-1 and 5-2)

1. Insert the sensor's connector to the monitor's NIBP socket;
2. Turn on the monitor to enter the parameter monitoring interface;
3. Place the cuff correctly around the arm;
4. Press  button to measure the NIBP;
5. The readings will be displayed on the LED screen.

### 5.3 Precautions

Cuff width should be forty percent of the limb's girth or two thirds of the upper arm length. The length of the cuffs inflated part should be fifty to eighty percent of the limb's girth. The wrong cuff will lead to an inaccurate reading.

The arm should be placed on a surface that is level with the heart. If this cannot be done amend the measured results as follows;

1. If the cuff is higher than the level of the patient's heart, you should add 0.9mmHg (0.10kPa) per cm or 2.2mmHg (0.25kPa) per inch.
2. If the cuff is lower than the level of the patient's heart, you should reduce 0.9mmHg (0.10kPa) per cm or 2.2mmHg (0.25kPa) per inch.
3. If you doubt at the veracity of the readings, please look-over the patient's life character before checking the patient monitor's function.

#### WARNING

- The monitor is not recommended for patients experiencing seizures or tremors, or patients with hypotension, hypertension, arrhythmias, or extremely high or low heart rate. The software algorithm cannot accurately compute NIBP on patients with these conditions.
- Do not place the cuff where skin tissue is damaged.
- Do not place the cuff on a limb being used for A-V Fistulas, intravenous infusion or any area where circulation is compromised or has the potential to be compromised.
- The patient measurement selected in the setup menu and the cuff size used must be correct to obtain reliable NIBP data and to prevent overpressure in paediatric use.
- When the continuous mode is used for a long time, the skin under the cuff may become sore and bleed. Periodically check the patient's limb circulation under the cuff. Check frequently when using Auto NIBP in 1 and 2 minute intervals and continuous mode. Intervals below 10 minutes are not recommended for extended periods of time.

## 6. Maintenance

### 6.1 System Check

#### 6.1.1 Check before Using

Before using the monitor, perform the following steps:

- Check if there is any mechanical damage;
- Check outer cables and accessories are in good condition;
- Check all the monitoring functions to make sure that the monitor is in correct working order.

In case of any damage, abnormal function, hidden safety danger or exception, do not use the device on a patient. Contact the technician in your hospital or the manufacturer immediately.

#### 6.1.2 Routine Check

Ensure the qualified service personnel have carried out a complete inspection, including the functional safety check, when the monitor has been used for 6-12 consecutive months, or after servicing the monitor or system upgrading. To ensure the normal operation of the system.

Store the device with a fully charged battery and charge the battery every 3 months if the monitor will be unused for a long time. Otherwise the battery may become damaged.

#### **WARNING**

Failure on the part of the hospital or institution employing the use of the monitoring equipment to implement a satisfactory maintenance schedule may cause undue equipment failure and possible health hazard.

The safety inspection or maintenance, which requires opening the monitor housing, must be performed by trained and authorized personnel only. To avoid equipment failure and possible health hazards.

## 6.2 General Cleaning

Equipment should be cleaned on a regular basis. When polluted by dust, oil, sweat or blood etc, it should be cleaned immediately. If there is heavy pollution or lots of dust, the equipment should be cleaned more frequently. Before cleaning, consult your hospital's regulations for cleaning, disinfecting and sterilizing equipment.

The exterior surfaces of the equipment may be cleaned gently with a clean, soft cloth, sponge or cotton swap, dampened with a non-erosive cleaning solution. Drying off excess cleaning solution before cleaning the equipment is recommended.

## **WARNING**

**Power off the monitor and stop charging the battery before cleaning.**

Examples of cleaning solutions:

- Diluted soap water
- Diluted formaldehyde (35%-37%)
- Diluted ammonia water
- Hydrogen peroxide (3%)
- Alcohol
- Ethanol (70%)
- Isopropanol (70%)
- Diluted sodium hypochlorite solution (bleaching agent)

## **NOTE**

Sodium hypochlorite solution with a concentration of 500ppm (1:100 diluted bleach solution) - 5000ppm (1:10 diluted bleach solution) is very effective. The amount of ppm depends on the amount of organic matter, (blood, grime etc.) existing on the surface.

## **CAUTION**

- Never use strong solvent, such as acetone.
- ALWAYS dilute the solutions according to the manufacturer's recommendations.
- NEVER use abrasive, erosive cleaners, or cleaners containing acetone.
- NEVER permit fluids to run into the casing, switches, connectors, or any ventilation openings in the equipment.
- NEVER submerge the equipment into water or any cleaning solution, or pour or spray water or any cleaning solution on the equipment.
- ALWAYS wipe off all the cleaning solution with a dry cloth after cleaning and dry the monitor in the air. Never dry the monitor in sunshine or dry it under high temperature.
- If the monitor is polluted by chemical substance, the users should handle it effectively according to the properties of the chemical substance.

## **CAUTION**

- NEVER permit fluids to run into the cables.
- NEVER submerge the cables into any liquid.

## **WARNING**

The cleaning solutions above can only be used for general cleaning. If you use them to control infections, the manufacturer shall assume no responsibility for the effectiveness. Please consult your hospital's infection controllers or professionals.

## 6.3 Disinfection

Disinfection may cause damage to the equipment. We recommend the disinfection contained in the hospital's servicing schedule only when necessary. The equipment should be cleaned prior to disinfection.

Recommended disinfection material: Alcohol based (Ethanol 70%, isopropanol 70%), and aldehyde based.

The probe cables may be disinfected with hydrogen peroxide (3%) or isopropanol (70%). Active reagents are also effective. The connectors cannot be submerged into the above solutions.

### NOTE

- ALWAYS dilute the solutions according to the manufacturer's suggestions and use a lower concentration if possible.
- NEVER submerge the equipment into water or any solution, or pour water or any solution on the equipment.
- ALWAYS wipe off all the excess liquids on the equipment surface and accessory surface with a dry cloth.
- Never use EtO and formaldehyde to disinfect.
- Never permit high-pressure and high-temperature disinfection of the equipment and accessories.

### WARNING

Disinfection may cause damage to the equipment; therefore, when preparing to disinfect the equipment, consult your hospital's infection controllers or professionals.

## 6.4 Disposal

To avoid contaminating or infecting personnel, the environment or other equipment, ensure you disinfect or decontaminate the device appropriately before disposing of it in accordance with your country's law for equipment containing electrical and electronic parts.

## 7. Data Viewer

### 7.1 Data Viewer Software and Function

The Data Viewer Software is used with the monitor, in conjunction with the internal software of the monitor to achieve the following functions.

- Download data
- Displaying and Previewing measured data.
- Saving patient data
- Printing patient data

### 7.2 Download

1. Install the data viewer software using the disk supplied, and then open it.
2. Press "download" to download the data.
3. Connect the computer and monitor by the cable.
4. Switch on the monitor and change to the alarm limit setup interface, pressing the **Fn** button to move the cursor to "ready".
5. Press "start" on the computer to begin download.
6. Press **↓/⏏** button, the data will be transmitted to the computer.

#### NOTE

The download and installation may vary in a different operation system. For more information, please refer to help in the software instructions.

# Appendix Specifications

## 1. General

Monitoring Parameters:	NIBP and PR
Signal sockets:	NIBP socket, adapter socket and PC communication socket

Display screen	
Type:	128 x 64 dot matrix monochrome LCD and LED
LCD Display area:	46mm x 32mm
LED Display area:	35mm x 58mm
Backlight color:	White
LED:	Dual-color LED (red/green) and monochrome LED
Size:	160mm x 148mm x 85mm
Weight:	560g (does not include probes and adapter)

## 2. Electrical specifications

AC power adapter	
Input:	AC100V-240V, 50/60Hz, 0.7A
Output:	DC 8.4V, 1A

Internal battery	
Type:	1.5Ahr/8.4V Li rechargeable battery
Run Time:	15-hours of stand-by time with a full battery
Recharge time:	8 hours

## 3. Environment

Temperature	
Operation:	0°C-45°C
Transportation and storage:	-20°C-60°C

Humidity	
Operation:	15%-95% (non-condensing)
Transportation and storage:	10%-95 % (non-condensing)

Altitude	
Operation:	86 kPa-106 kPa
Transportation and storage:	50kPa-106 kPa

## 4. Parameter Specifications

NIBP	
Patient:	Adult and Paediatric
Measurement method:	Oscillometric
Measurement mode:	Manual, Auto, STAT
Measurement unite:	mmHg/kPa selectable
Measurement type:	SYS, DIA, MAP
Measurement interval in AUTO mode:	1, 2, 3, 5, 10, 15, 20, 30, 60, 90 Min
Measuring period in STAT mode:	5 Min
Range:	
Adult:	30mmHg-255mmHg
Paediatric:	30mmHg-160mmHg
Over-pressure protection:	
Adult:	300mmHg
Paediatric:	220mmHg
Resolution:	1 mmHg

PR	
Range:	30bpm-250bpm
Resolution:	1hpm
Accuracy:	± 2hpm

## Returns Policy

### IMPORTANT!

Before returning your item, you must call us on 0870 199 4299

We want you to be completely satisfied with your purchase. If you need to return goods purchased from DARAY Ltd, please read the following information carefully.

The DARAY Ltd returns policy provides guidance on when you can return goods we have supplied, and what you can expect from us once you do. To see our detailed returns policy and procedure visit [www.daray.co.uk/returns](http://www.daray.co.uk/returns)

TYPE OF RETURN	REMEDY
<b>DAMAGED GOODS OR DOA*</b> Goods which are physically damaged on delivery, or which do not function.	We must be notified within 24 hours of receipt.
<b>GOODS DEVELOPING A FAULT</b> Goods which have developed a fault within the warranty period.	Within 14 days of delivery we will replace the item as DOA*. If the fault develops after 14 days, but within the warranty period, we will initiate the returns procedure.
<b>NON WARRANTY</b> Goods which have developed a fault outside the warranty period.	If a fault develops outside the warranty period, we will initiate the returns procedure.
<b>OTHER</b> Any situation which is not covered by the above.	We will try to help, but we cannot normally offer a refund.

\*DOA - dead on arrival

For additional clarification, please refer to our terms and conditions at [www.daray.co.uk/terms](http://www.daray.co.uk/terms).

In a small number of cases, we may determine that a replacement would not work any better than the original product we supplied. In such cases we will only offer a refund rather than a replacement for qualifying returns.

Replacement bulbs are not eligible for returns, unless they are faulty or damaged.

Spare parts ordered on our website or from supplied part codes are not be eligible for credit. We will accept returns and exchange for the correct item.

If you have incorrectly ordered a product and it is unopened and in perfect condition, within seven days of the original order you may order the correct product and receive a full credit for the returned item. In all other cases, items returned for credit are subject to a 25% restocking fee.

If you send us goods that do not qualify for return, you will invalidate your claim to any refund, and you will be obliged to compensate DARAY Ltd for the cost of return postage and any other reasonable costs incurred processing the goods.

Your statutory rights are not affected

# WARRANTY

## TERMS AND CONDITIONS OF WARRANTY

1. To qualify for this warranty you must register on [www.daray.co.uk](http://www.daray.co.uk) or return to DARAY Ltd (DARAY) the duly completed warranty-registration form accompanying the product.
2. DARAY warrants this product (excluding lamp) against faulty material and workmanship during the period of the warranty. The period of warranty is the period stated on your warranty card and commences on the date of purchase of the product. In the event that the product is not in good working order DARAY will provide, during the warranty period, a free repair service within the United Kingdom. The warranty is subject to proof of purchase being provided; therefore, you should retain your original receipt.
  - 2.1 The repair service consists of the provision of spare parts and/or replacement products (at DARAY's discretion) which will be provided on an exchange basis and will either be new, equivalent to new or reconditioned. All replaced spare parts and products shall become the property of DARAY.
  - 2.2 DARAY's only obligation under this warranty is the provision of the service as set out above.
  - 2.3 All products are returned to DARAY at the customer's cost and risk. Products to be returned should be adequately packed. For the address to send returns to please visit [www.daray.co.uk](http://www.daray.co.uk)
3. DARAY's arrangements for providing service provided under this warranty may include the use of sub-contractors.
4. This warranty does not cover damage or defects in the Product caused by or resulting from:
  - Wilful neglect or negligence by anyone other than DARAY;
  - Improper use, storage or handling of the product;
  - Use of non-DARAY approved parts (such as replacement lamps) not compatible with the Product;
  - Fire, accident or disaster;
  - Use of non-DARAY modifications other than in accordance with Daray's instructions;Attachment of fittings and accessories not approved by DARAY;  
Repairs, modifications carried out by service personnel not approved by DARAY;
  - Damage caused by chemical corrosion from cleaning agents not approved by DARAY.
  - Failure to use or install the product in accordance with the manufacturer's instructions.
5. Nothing in this warranty shall have the effect of restricting or excluding the liability of DARAY in respect of:
  - a) Death and personal injury caused by the negligence of DARAY, or for fraud;
  - b) Under the Consumer Protection Act 1987 to a person who has suffered damage caused by a defective product or to a dependant or relative of such a person;
  - c) Direct damage to your property caused by the proven negligence of DARAY.
6. This agreement does not give any rights other than those expressly set out above and in particular, DARAY will not be responsible for any loss of income, profits or contracts or any direct or indirect consequential loss, damage caused to or suffered by the purchaser as a direct result of this agreement.
7. This warranty is offered (subject to these terms and conditions) in addition to, and does not affect your statutory rights.
8. DARAY may disclose your details and other personal information to companies within the DARAY group including any subsidiary company or sub contractor of DARAY for the purposes of performing our obligations hereunder.
9. You must not resell outside the UK any products supplied by DARAY and covered by the Export of Goods (Control) Order 1992 (or any law that replaces it) without obtaining all necessary licences. You also agree not to sell the product in the UK if you know or think that the person buying the product intends to export it without getting the necessary licences. You agree to impose similar conditions to these on anyone you sell the product to.
10. These conditions shall in all respect be governed and construed in accordance with English law and the exclusive jurisdiction of the English courts.

# DARAY<sup>®</sup> HEALTHCARE PRODUCTS

WARRANTY REGISTRATION  
TO VALIDATE YOUR WARRANTY  
PLEASE COMPLETE IN BLOCK CAPITALS  
AND RETURN IN A WINDOWED DL ENVELOPE  
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**ALTERNATIVELY REGISTER ONLINE AT [WWW.DARAY.COM](http://WWW.DARAY.COM)**



## 1 YEAR WARRANTY

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EMAIL:
PHONE:
FAX:

ADDRESS:

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PURCHASED FROM:
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DATE OF PURCHASE:
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