Vital Sign Monitoring

Patient vital signs monitor

- A monitor (vital signs) is used to display the patient's vital signals in the intensive care unit, emergency room and operating room as one of the essential equipment. This device is used continuously to display the patient's vital signs and collects information about the patient's vital signs and displays them on the screen and reports the necessary warnings to the medical team in case of unfavorable conditions.

The patient's vital signs

Breathing, pulse and temperature have been considered vital signs since old times. Blood pressure was later added to these three indicators.

Although vital signs vary from person to person, even at different times of the day, but there is usually a normal range for each of these symptoms. if the amount of each of these characteristics in a person be more or less than This limit, it is a sign of a disorder or a disease. Respiratory Rate or RR, Pulse Rate or PR, Temperature and Blood Pressure or BP. It is essential to record and control these symptoms at the time of admission, before, during and after surgery and diagnostic procedures, accidents and trauma, before any therapeutic interventions and when the patient feels a change in physical condition and pain. For this reason, the use of high quality and accurate patient monitoring system is very important. The symptoms that are necessary for the patient to record in different conditions of the disease are as follows:

-Patient respiration rate per minute

-Patient body temperature

-Percentage of oxygen saturation

-Invasive and non-invasive blood pressure

-Number of pulses

-The amount of carbon dioxide the patient exhales

-Cardiac signal

-Brain signal

The patient's vital signs

An advanced monitoring system for showing the vital signs that mentioned in the previous slide, requires a series of tools and modules that should be installed on the monitoring system and with the help of leads, cuffs, needles and etc . They are connected to the patient on one side and to the monitor on the other side, to show these vital signs. In addition to producing a monitoring system, Sairan Company is also self-sufficient in the production of these tools and accessories. Cuffs for measuring blood pressure, leads for measuring heart and brain signals, capnograph for measuring the patient's carbon dioxide, skin probes for measuring the patient's body temperature, sensors for measuring the percentage of saturated oxygen in the blood and transducers for The measurement of the patient's invasive blood pressure is all the product of the company that is on its monitoring system.

Cardioset ARAD P10+,Cardioset FX7
Cardioset LX110, Cardioset sina5

This monitor is used in operating rooms and different parts of ICU, CCU, NICU and emergency. It can be used for patients in infants, children and adults.

Displayable parameters: ECG + HR, SpO2 + PR, Resp. + RR, NIBP, TEMP, IBP, EEG and CO2

Features: Very beautiful appearance and low thickness (7 cm), design based on the latest and most modern technology, use of high resolution touch screen, wide viewing angle and high brightness, the possibility of working with city electricity and batteries, usable Portable, the use of four electrocardiographic amplifier channels with the ability to display seven leads simultaneously, with a video alarm when the lead is cut, the ability to nurse call system, two-way central system communication with high security through the network, usable without any fan, Highly reliable software without the need for operating system, high boot speed (5 seconds), the ability to store and display the electrocardiograph signal for up to 96 hours, the ability to store and display 100 times aggressive blood pressure measurement, display arrhythmias with dominant beat , Has a screen protector with capability, Has a set of shortcut keys for fast operation with the device, Has a screen output to connect to larger screens simultaneously, Ability to connect to the central system and Equipped with long-lasting lithium battery (4 hours).

Monitoring system tools and accessories

1- IQA vision: a tool for measuring BIS and EMG parameters

BIS: The Bio spectral Index is an indicator for controlling and observing the patient's level of consciousness, which includes a number between 0 and 100, its normal value for a normal patient should be between 40 and 60.

EMG: An electromyogram signal that indicates the activity and level of consciousness of the brain.

Attributes:

-In accordance with European standards

-Simple planning and user friendly

-Possibility to connect to Sairan monitoring by using Bluetooth

-Ability to store patient brain signals on the monitor

-Rechargeable battery with a shelf life of 6 hours

Monitoring system tools and accessories

2- Capnograph: It is a device that is used to monitor and measure the amount of carbon dioxide at the end of the patient's exhalation. This device is used in the intensive care unit, but the main use of this device is in the operating room. During the patient's anesthesia, the device provides the surgical team with information such as the patient's respiratory condition, airway obstruction and inhale air leakage. This device measures the concentration of carbon dioxide gas by red infrared rays. The amount of infrared absorption depends on the number of molecules of carbon dioxide in the exhaled air.

Attributes:

-Measurement of exhaled carbon dioxide percentage between 0 to 19.7% - 0 to 150 mm Hg - 0 to 20 kPa with respiration rate 3 to 150 breaths per minute

-Environmental conditions of use of the device

-Ambient pressure 86 to 106 kPa

-Voltage 5 volts and current less than 150 mA

-Ambient temperature 5 to 50 degrees Celsius

Monitoring system tools and accessories

3- Pulse oximeter sensor: With the help of this sensor, the amount of oxygen concentration in the arterial blood can be measured. Pulse oximetry is a non-invasive method that measures and expresses the percentage of hemoglobin molecules that are fused with oxygen. Its normal rate is 95-97%. If this rate is less than 90% in patients, the alarm will sound. we Place the probe on the index finger, big toe, tip of the nose and earlobe. Between the probe, an optical receptor receives it and passes through the artery. Red light is absorbed by hemoglobin and infrared light is absorbed by oxyhemoglobin, then this information is transmitted to the device itself, where a logarithmic calculation determines the saturation of hemoglobin with oxygen. In fact, it measures the amount of oxygen as a percentage of the hemoglobin molecules that are mixed with oxygen relative to the total amount of hemoglobin molecules.

Monitoring system tools and accessories

4- Blood pressure cuff: Barometer cuff is a plastic bag that closes around the body and by increasing the volume of internal air, it covers the organ and prevents blood from passing through the veins of that organ.

5. Transducer for measuring aggressive pressure: A transducer is a device that converts an electrical or mechanical signal from one device into another electrical signal. To measure the invasive blood pressure, a needle with a transducer is inserted into the patient's vein. The patient's blood pressure is recorded by converting the mechanical pressure parameter into an electrical transducer.

Monitoring system tools and accessories

6- Skin temperature sensor: The function of this sensor is to measure the temperature of the human body and convert it into an electrical signal to display on the vital signs monitor.

7- Electrocardiographic cables and leads: Includes power cable and lead connection cables. The lead connection cables could consist of 3, 6 or 12 leads depending on the type of processing. but most monitors on the market have capable of receiving and processing twelve leads. 10 cables (electrodes) are output from the monitor. six of them, are connected to the heart area and four to the arms and legs, and the combination of the output signal from these 10 electrodes constitutes twelve leads.

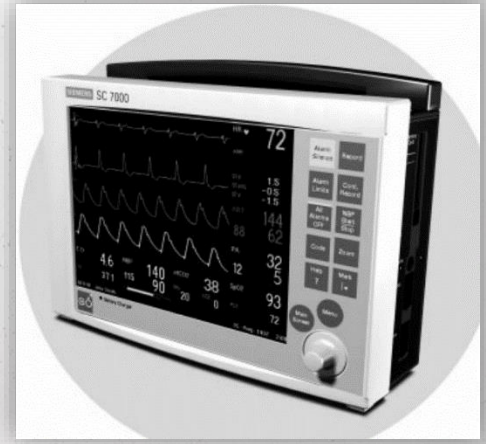
The best companies that produce vital sign monitoring system

- **SIEMENS**
- **PHILIPS**
- **GE Healthcare**
- **EDAN USA**
- **HEAL FORCE**

SIEMENS SC700 and SC9000XL patient monitor

Displayable parameters: ECG + HR, SpO2 + PR, Resp. + RR, NIBP, TEMP, IBP, CO2

Features: 15-inch concave color screen, strong cooling system, special detachable lithium battery that can be charged for 4 hours, the ability to work with electricity and batteries, can be used as a portable, has a video alarm when the leads are cut off or disconnected , Has a remote control system and nurse call, the ability to connect to the central system via Wi-Fi, the ability to store and display the patient's vital signs for 120 seconds

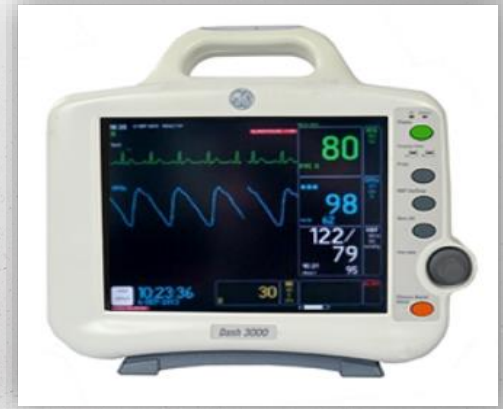


PHILIPS GE DASH 3000

It is a controllable and flexible system weighing 11.2 pounds.

Displayable parameters: ECG + HR, OxyCRG, SpO2 + PR, Resp. + RR, NIBP, TEMP, IBP, CO2

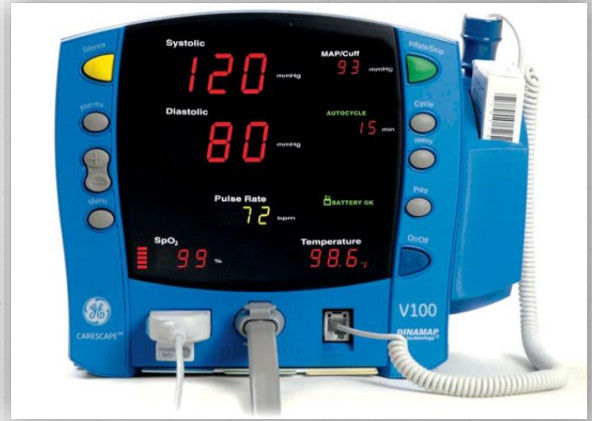
Features: 8.4-inch color screen, two rechargeable lithium batteries for 4 to 5 hours, has a built-in wireless network that allows it to connect to the central wireless network, has an alarm in case of emergency (pulse limitations Adjustable up and down for the user) and lead disconnections, uninterrupted recording of patient vital signs even while the patient is in motion, has DINAMP technology for measuring non-invasive blood pressure, has a nurse call system, measuring OxyCRG parameter as a new indicator Breathing efficiency and brain health. This parameter indicates the process of oxygen delivery to the brain in each heartbeat.



GE Healthcare CARESCAPE V100

Displayable parameters: HR, SpO2 + PR, Resp. + RR, NIBP, TEMP

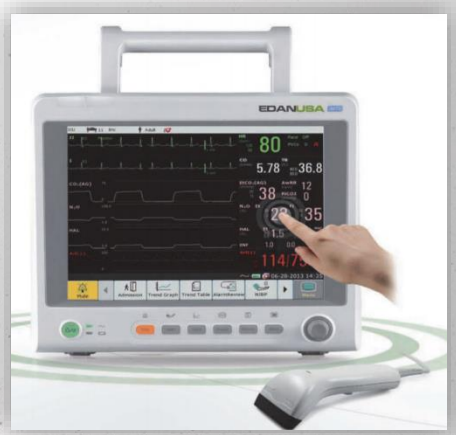
Features: 15-inch screen, rechargeable lithium battery for 11 hours, has a nurse call system, has alarms in case of lead breaks or disconnections, has DINAMP technology for measuring non-invasive blood pressure, determines the percentage of blood oxygen saturation with 3 different methods, Determining the patient's body temperature by averaging the temperature of several different points, has 2 USB ports to transfer patient data to other systems, the ability to store information.



EDAN USA iM70

Displayable parameters: ECG + HR, OxyCRG, SpO2 + PR, Resp. + RR, NIBP, TEMP, IBP, CO2

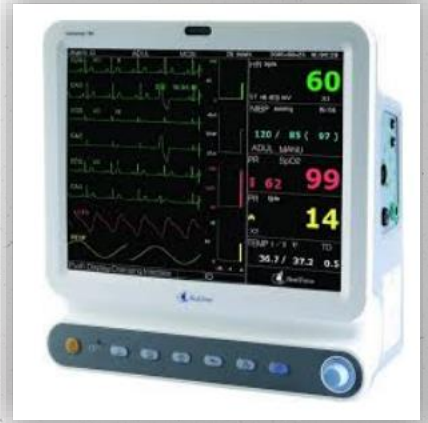
Features: 12.1-inch touch screen, waterproof probe and cable, nurse call system, has USB and VGA ports, ability to store 1200 recorded blood pressure for the patient, ability to connect to the central system using WIFI and LAN, has a lead disconnection alarm



HEALFORCE ADVANCE-150

Displayable parameters: ECG + HR, SpO2 + PR, Resp. + RR, NIBP, TEMP, IBP, CO2

Features: 15-inch screen, internal memory, nurse call system, automatic analysis of 20 heart arrhythmias, manual and automatic analysis of the ST segment, the ability to store ECG signal for up to 24 hours, has a rechargeable removable battery, network connectivity



Conclusion

parameter / company	Sairan	Siemens	Philips	GE Healthcare	Edan	Heal Force
CO_2	Y	Y	Y	N	Y	Y
IBP	Y	Y	Y	N	Y	Y
TEMP	Y	Y	Y	Y	Y	Y
NIBP	Y	Y	Y	Y	Y	Y
RESP	Y	Y	Y	Y	Y	Y
SPO_2	Y	Y	Y	Y	Y	Y
ECG	Y	Y	Y	N	Y	Y
OxyCRG	N	N	Y	N	Y	N
EEG	Y	N	N	N	N	N

feature / company	Sairan	Siemens	Philips	GE Healthcare	Edan	Heal Force
Screen	١٩"	١٥"	٨,٤"	١٥"	١٢,١"	١٥"
Outputs	None	None	None	٢USB port	VGA & USB ports	None
Battery Storage	٤h	٤h	٥h	١١h	None	٢h
Lead disconnection alarm	Y	Y	Y	Y	Y	N
DINAMP Tech	N	N	Y	Y	N	N
ST segment detection	Y	N	N	N	N	Y
Ability of data storage	Y	Y	Y	Y	Y	N
Connection with central system	Y	Y	Y	N	Y	Y