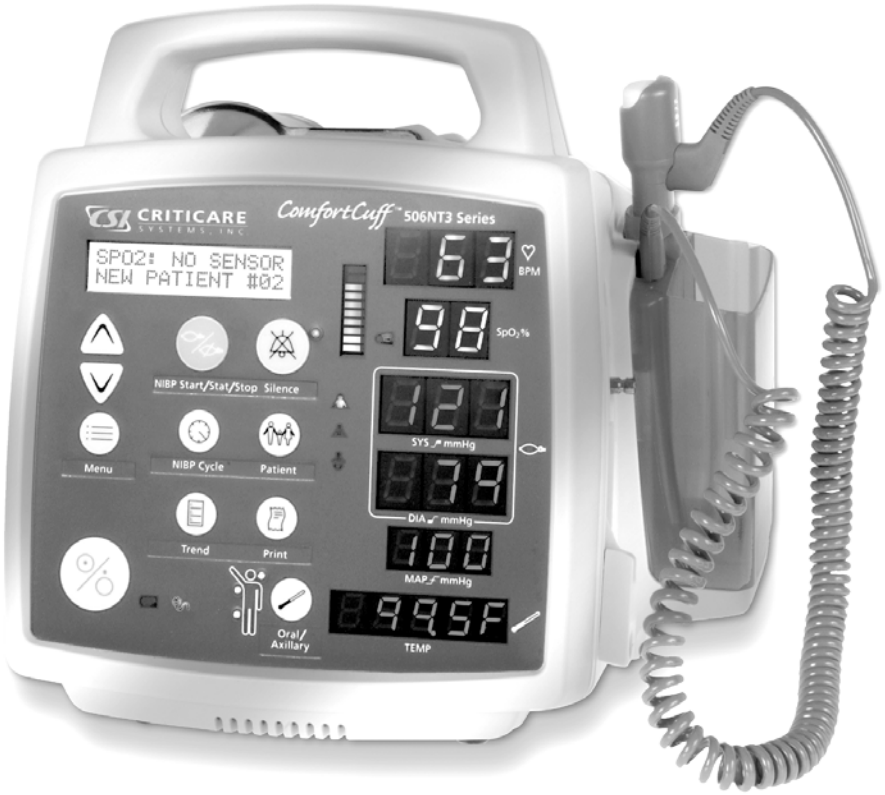
VitalCare™
506N3 Series
Patient Monitor
Operator's Manual



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Warranty

Workmanship & Materials

Criticare Systems, Inc. (CSI) warranties the 506N3 Series monitor to be free from defects in workmanship and materials for a period of one (1) year from date of shipment under normal use and service. The monitor warranty does not include batteries, sensors, probes, cables, cuffs, and hoses. CSI's obligation under this warranty is limited to repairing or replacing, at CSI's option, any part which upon CSI's examination proves defective.

Nellcor accessories carry a 90 day warranty.

EXCEPT AS DESCRIBED IN THE PARAGRAPH ABOVE, CSI MAKES NO WARRANTIES, EXPRESS OR IMPLIED, INCLUDING ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

Exemptions

CSI's obligation or liability under this warranty does not include any transportation or other charges or liability for direct, indirect or consequential damages or delay resulting from the improper use or application of the product or the substitution upon it of parts or accessories not approved by CSI or repair by anyone other than a CSI authorized representative.

This warranty shall not extend to any instrument which has been subjected to misuse, negligence or accident; any instrument from which CSI's original serial number tag or product identification markings have been altered or removed; or any product of any other manufacturer.

Safety, Reliability & Performance

Criticare Systems, Inc. is not responsible for the effects on safety, reliability and performance of the 506N3 Series patient monitors if: assembly operations, extensions, readjustments, modifications or repairs are carried out by persons other than those authorized by Criticare Systems, Inc., or

the 506N3 Series monitors are not used in accordance with the instructions for use, or

the electrical installation of the relevant room does not comply with NFPA 70: National Electric Code or NFPA 99: Standard for Health Care Facilities (Outside the United States, the relevant room must comply with all electrical installation regulations mandated by the local and regional bodies of government).

In Case of Emergency Contact

CRITICARE SYSTEMS, INC.
20925 Crossroads Circle
Waukesha, WI 53186
USA

Telephone: (262) 798-8282
Tech Support: (800) 458-2697
Orders: (800) 458-4615
Fax: (262) 798-8290

Internet: www.csiusa.com

Service Return Policy

Return Procedure

In the event that it becomes necessary to return a unit to Criticare Systems, Inc., the following procedure should be followed:

Obtain return authorization. Contact the CSI Service Department at 800-458-2697 to obtain a Customer Service Authorization (CSA) number. (Outside the US, call 001-262-798-8282.) The CSA number must appear on the outside of the shipping container. Return shipments will not be accepted if the CSA number is not clearly visible. Please provide the model number, serial number, and a brief description of the reason for return.

Freight policy. The customer is responsible for freight charges when equipment is shipped to CSI for service (this includes customs charges).

Loaner service. In the U.S. If it is necessary to provide a loaner system, CSI will ship a loaner by overnight courier. The loaner system must be returned to CSI at the customer's expense within one week after receipt of the repaired goods. If the unit is not returned to CSI within that time, the customer will be invoiced for the full purchase price of the equipment.

Outside the U.S. No loaners are available from CSI internationally. Contact your local CSI representative.

Incoming Inspection

The following incoming inspection is required whether it is a first time arrival or a return from service. Prior to clinical use, the instrument should be inspected for the following.

1. The quality inspection seal on the instrument should be unbroken. This seal indicates that the instrument has been tested according to manufacturer's specifications.
2. No physical damage is observed.
3. The instrument's battery is to be charged by connecting the instrument to a power outlet for a minimum of 6 hours prior to clinical use.
4. When connecting the instrument to a power outlet and then turning the instrument on, all displays appear to function correctly and no system errors occur.

If a discrepancy to these inspection items is observed, do not use the instrument and immediately report the discrepancy to the CSI Service Department.

EC Declaration of Conformity

506N3 Series Patient Monitors

To view the Declaration of Conformity, visit the Criticare website at www.csiusa.com. Contact Criticare's customer service department at (262) 798-8282 to obtain a faxed copy of the Declaration.

Representative in the European Union

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For the Attention of: Ref. 45 (or) Mr L. A. Heizler

Section 1 — Introduction

Description

The 506N3 Series patient monitor is a compact vital signs monitor that measures heart rate and non-invasive blood pressure (NIBP). Heart rate measurement is determined primarily by the plethysmographic waveform. For units without the oximeter module, or when the oximeter is not in use, heart rate is determined from the blood pressure data using an oscillometric method that measures during inflation.

Optional configurations include blood oxygen saturation (SpO_2), predictive oral/axillary/rectal temperature and/or an internal printer.

Models are available with a choice of oximeter (DOX or Nellcor OxiMax) and a FasTemp temperature module. The following models are available:

506N3:	NIBP, heart rate
506NP3:	NIBP, printer, heart rate
506DN3:	DOX SpO_2, NIBP, heart rate
506DNP3:	DOX SpO_2, NIBP, printer, heart rate
506DNT3:	DOX SpO_2, NIBP, FasTemp temperature, heart rate
506DNTP3:	DOX SpO_2, NIBP, FasTemp temperature, printer, heart rate
506LN3:	Nellcor SpO_2, NIBP, heart rate
506LNP3:	Nellcor SpO_2, NIBP, printer, heart rate
506LNT3:	Nellcor SpO_2, NIBP, FasTemp temperature, heart rate
506LNTP3:	Nellcor SpO_2, NIBP, FasTemp temperature, printer, heart rate
506NT3:	NIBP, FasTemp temperature, heart rate
506NTP3:	NIBP, FasTemp temperature, printer, heart rate

Intended Use

This equipment is intended for use only by qualified medical providers in conjunction with established medical protocols.

All models in the 506N3 Series are designed to monitor physiological parameters of patients, providing the health care provider with physiological data, alarms, and trend records.

The monitor is designed to be used with only one patient at a time.

Non-Invasive Blood Pressure (NIBP)

The 506N3 Series monitor uses ComfortCuff™ technology to determine non-invasive blood pressure by means of oscillometry. The oscillometric method detects volume displacements within the artery and senses pressure variations within the blood pressure cuff during inflation. The monitor uses cuffs ranging in size from neonate cuffs to adult thigh cuffs.

Comfort Cuff™ Technology

ComfortCuff™ technology measures NIBP while the cuff inflates. Consequently, a measurement is obtained more quickly and with less discomfort than with monitors which measure NIBP during cuff deflation.

- This device was clinically tested per the requirements of EN 1060 and AAMI SP-10.
- The NIBP monitor generates alarm messages in situations of extremely irregular heart beat or patient motion. The monitor automatically attempts a second measurement in either case.

Description of NIBP Measurement

The NIBP cuff begins to inflate at the beginning of the NIBP measurement cycle. As the cuff pressure approaches the diastolic pressure of the patient, the cuff pressure waveform begins to indicate the pulse waveform. The cuff pressure at this point is equal to the patient's diastolic pressure, which is stored by the monitor.

As cuff pressure continues to increase, the pulse waveform (as measured from BP cuff pressure fluctuation) becomes stronger, reaching its maximum at the patient's mean arterial pressure (i.e., when cuff pressure = mean BP). The monitor stores this value as mean pressure.

As cuff pressure increases further, it approaches the patient's systolic pressure, and the cuff's pulse waveform decreases in amplitude. The cuff pulse waveform disappears at the point where cuff pressure is equal to the patient's systolic pressure.

When the monitor determines that the cuff waveform has decreased to zero amplitude, it stores the cuff pressure value as the systolic pressure, and releases the pressure from the cuff. This typically occurs at about 10 mmHg over the patient's systolic pressure. The cuff then rapidly deflates. Because of the pulsatile nature of the pressure values, the inflation range needs to exceed the systolic and diastolic values. The dynamic measurement ranges are:

Adult:	35 to 280 mmHg
Pediatric:	35 to 130 mmHg
Neonate:	25 to 130 mmHg

Cuff Inflation and Pressure Protection

The maximum allowable cuff pressure is 300 mmHg adult mode (150 mmHg in neonate mode). Adult mode cuff pressure is allowed to remain above 15 mmHg for a maximum of 180 seconds. Neonatal mode cuff pressure is allowed to remain above 5 mmHg for a maximum of 90 seconds.

The monitor automatically deflates the cuff if the time limit is violated. The monitor contains hardware protection for overpressure conditions, pressure transducer failures, or microprocessor and pump control circuit failures.

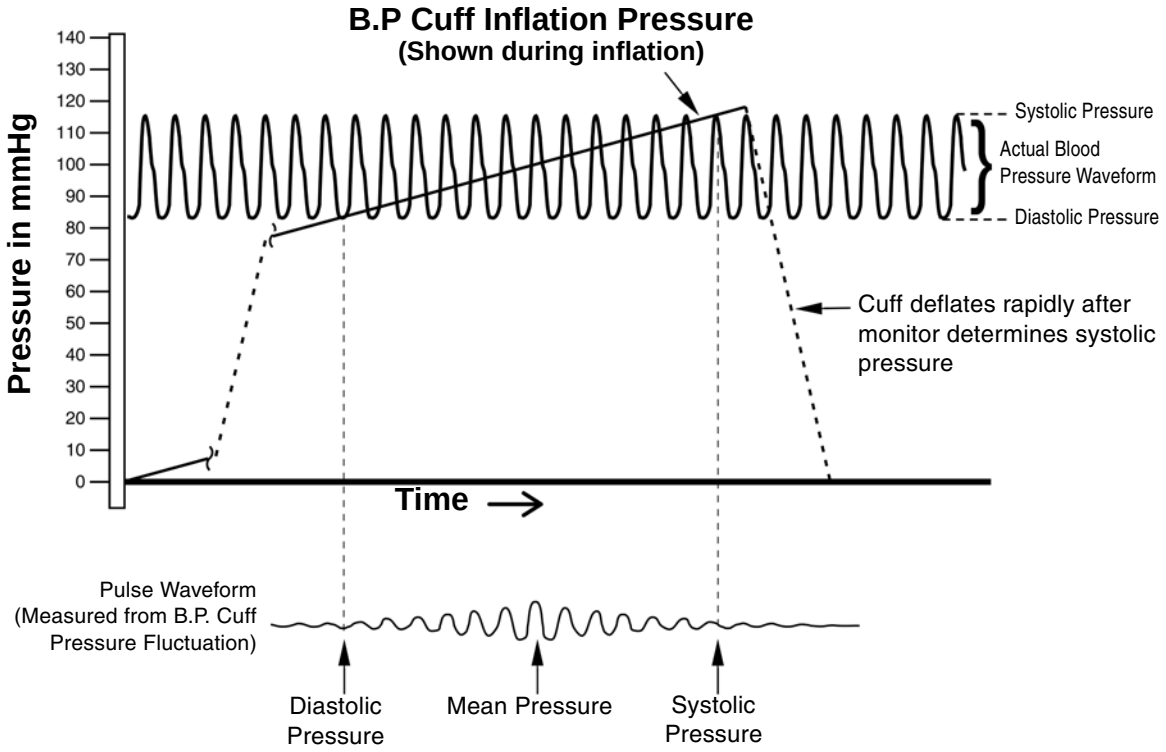


Figure 1-1: NIBP Cuff Pressure and Pulse over Time

Heart Rate

Heart rate measurement is determined primarily by the plethysmographic (SpO_2) waveform. When the oximeter is not in use, heart rate is determined from the blood pressure data using an oscillometric method that measures during inflation. The unit of measurement is beats per minute.

Under conditions where the plethysmographic based heart rate and the oscillometric heart rate are both beyond the detectable limits of the monitor, no heart rate is reported. Also, no heart rate is reported where the amplitude of the plethysmographic waveform and oscillometric waveform are beyond the detectable limits. The monitor reports error messages if valid measurements cannot be obtained. The monitor continues to look for valid SpO_2 based heart rate measurements and attempts a second NIBP measurement if the first attempt fails.

DOX™ Pulse Oximetry Measurement (SpO_2)

The 506N3 Series monitor is available with Digital Oximetry (DOX™) technology to measure blood oxygen saturation (SpO_2).

Definition

Hemoglobin exists in the blood in several forms:

- Oxygenated (Oxyhemoglobin)
- Reduced (Deoxyhemoglobin)
- Dyshemoglobins (carboxyhemoglobin and methemoglobin.)

In the monitor, SpO_2 (pulse arterial oxygen saturation) is the ratio of oxygenated hemoglobin to the sum of oxygenated hemoglobin plus hemoglobin which is available for binding to oxygen, as expressed in the following formula:

$$\text{percent oxygen saturation} = \frac{\text{oxyhemoglobin}}{\text{oxyhemoglobin + deoxyhemoglobin}} \times 100$$

Dyshemoglobins, such as carboxyhemoglobin and methemoglobin, are not directly measured and therefore are not factored into the measurement.

DOX Digital Oximetry

The monitor does not use analog circuitry for signal processing. Digital signal processing in the microprocessor results in lower noise from circuitry components, resulting in a cleaner signal and better performance under low perfusion conditions. There is also improved rejection of noise from the patient and environment, due to the availability of the “true,” unfiltered sensor signal for digital signal processing.

Method

The digital pulse oximeter measures oxygen saturation and pulse rate using the principles of spectrophotometry and plethysmography. The sensor is completely non-invasive, and there is no heat source that could burn the patient.

The pulse oximeter sensor contains two types of LEDs; each type emits a specific wavelength of light. Since oxygenated hemoglobin and deoxygenated hemoglobin absorb light selectively and predictably, the amounts of these two compounds can be determined by measuring the intensity of each wavelength that passes through the measuring site.

The light from the LEDs shines into a pulsating vascular bed. A photodetector located opposite or alongside the LEDs measures the intensity of each wavelength transmitted through the monitoring site. The light intensity is converted to an electrical signal, which is input to the monitor. The effects of skin pigmentation, venous blood, and other tissue constituents are eliminated by separating out the pulsating absorption data.

SpO_2 is calculated with every pulse and averaged with the results from previous pulses to arrive at the current numeric display value. The display is updated at least once per second with the numeric values that were calculated during the intervening period.

The plethysmographic pulse bar is not auto-gained. The amplitude display of the plethysmographic pulse bar is proportional to the pulse volume changes occurring in the tissue illuminated by the SpO_2 sensor.

SpO_2 Clinical Testing and Accuracy

All Criticare Systems, Inc., oximeters have SpO_2 calibration tables which were originally generated by monitoring desaturated human patients or volunteers and matching their displayed SpO_2 value to the value determined by sampling arterial blood and measuring functional SaO_2 with a clinical laboratory grade multi wavelength optical oximeter (i.e. CO-oximeter). The final SpO_2 calibration curve was then generated based upon numerous patients' data over the range of 40 to 99% SaO_2. All accepted data were taken from patients with dyshemoglobin (i.e., carboxyhemoglobin, methemoglobin) concentrations near zero.

This oximeter is a two-wavelength device, which is calibrated to measure functional SpO_2 only when dyshemoglobin concentrations are near zero. The accuracy specifications of this device will not be met with high concentrations of dyshemoglobins. Significant concentrations of carboxyhemoglobin results in a higher displayed SpO_2 value than is actually present in the patient.

Nellcor Pulse Oximetry Measurement (SpO_2)

The 506N3 Series monitor is also available with Nellcor OxiMax® technology to measure blood oxygen saturation (SpO_2).

Definition

The Nellcor OxiMax uses pulse oximetry to measure functional oxygen saturation in the blood. Pulse oximetry works by applying an OxiMax sensor to a pulsating arteriolar vascular bed, such as a finger or toe. The OxiMax sensor contains a dual light source and a photo detector.

Because a measurement of SpO_2 is dependent upon light from the OxiMax sensor, excessive ambient light can interfere with this measurement.

Criticare's implementation of the OxiMax oximeter rounds down SpO_2 saturation values above 99.6% that might normally be reported as 100% oxygen saturation in other implementations.

Method

Pulse oximetry is based on two principles: that oxyhemoglobin and deoxyhemoglobin differ in their absorption of red and infrared light (spectrophotometry), and that the volume of arterial blood in tissue (and hence, light absorption by that blood) changes during the pulse (plethysmography). A pulse oximeter determines SpO_2 by passing red and infrared light into an arteriolar bed and measuring changes in light absorption during the pulsatile cycle. Red and infrared low-voltage light-emitting diodes (LED) in the oximetry OxiMax sensor serve as light sources; a photo diode serves as the photo detector.

Because oxyhemoglobin and deoxyhemoglobin differ in light absorption, the amount of red and infrared light absorbed by blood is related to hemoglobin oxygen saturation. To identify the oxygen saturation of arterial hemoglobin, the monitor uses the pulsatile nature of arterial flow. During systole, a new pulse of arterial blood enters the vascular bed, and blood volume and light absorption increase. During diastole, blood volume and light absorption reach their lowest point. The pulse oximeter bases its SpO_2 measurements on the difference between maximum and minimum absorption (measurements at systole and diastole). By doing so, it focuses on light absorption by pulsatile arterial blood, eliminating the effects of nonpulsatile absorbers such as tissue, bone, and venous blood.

The display is updated at least once per second with the numeric values that were calculated during the intervening period.

The plethysmographic pulse bar is not auto-gained. The amplitude display of the plethysmographic pulse bar is proportional to the pulse volume changes occurring in the tissue illuminated by the SpO_2 sensor.

Automatic Calibration

During monitoring, the instrument's software selects coefficients that are appropriate for the wavelength of that individual OxiMax sensor's red LED; these coefficients are then used to determine SpO_2.

Additionally, to compensate for differences in tissue thickness, the light intensity of the OxiMax sensor's LEDs is adjusted automatically.

Accuracy of OxiMax Sensors

The accuracies of the OxiMax sensors are listed in the following chart:

OxiMax Sensor Models		SpO_2 Range 70-100%
Single Use Sensors	MAX-A, MAX-AL	± 2
	MAX-N (Adult)	± 2
	MAX-N (Neonate)	± 3
	MAX-P	± 2
	MAX-I	± 2
	MAX-FAST	± 2
Reusable Sensors	D-YS (Infant to Adult)	± 3
	D-YS (Neonate)	± 4
	D-YS & D-YSE (Neonate)	± 3.5
	D-YS & D-YSPD	± 3.5
	DS-100A	± 3
	OXI-A/N (Adult)	± 3
	OXI-A/N (Neonate)	± 4
	OXI-P/I	± 3

Functional versus Fractional Saturation

This pulse oximeter measures functional saturation — oxygenated hemoglobin expressed as a percentage of the hemoglobin that can transport oxygen. It does not detect significant amounts of dysfunctional hemoglobin, such as carboxyhemoglobin or methemoglobin. In contrast, hemoximeters such as the IL482 report fractional saturation — oxygenated hemoglobin expressed as a percentage of all measured hemoglobin, including measured dysfunctional hemoglobins. To compare functional saturation measurements to those from an instrument that measures fractional saturation, fractional measurements must be converted as follows:

$$\text{functional saturation} = \frac{\text{fractional saturation}}{100 - (\%\text{carboxyhemoglobin} + \%\text{ methemoglobin})} \times 100$$

Measured versus Calculated Saturation

When saturation is calculated from a blood gas partial pressure of oxygen (PO_2), the calculated value may differ from the SpO_2 measurement of a pulse oximeter. This usually occurs because the calculated saturation was not appropriately corrected for the effects of variables that shift the relationship between PO_2 and pH, temperature, the partial pressure of carbon dioxide (PCO_2), 2,3-DPG, and fetal hemoglobin. See “Figure 1-2: Oxyhemoglobin Dissociation Curve”.

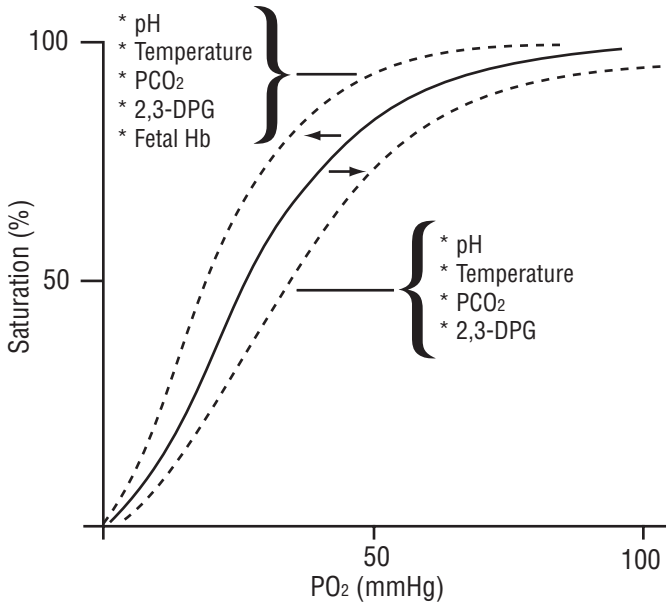


Figure 1-2: Oxyhemoglobin Dissociation Curve

Temperature

The 506N3 Series monitor is available with an optional temperature module utilizing FILAC® FasTemp® technology.

Two modes are available: Predictive and Continuous.

Predictive Mode

The default mode is Predictive Mode. This allows the thermometer to predict the end point that the thermistor would reach if it were left in the mouth until it reached mouth temperature. This predictive feature allows the thermometer to arrive at an accurate oral temperature reading within about 10 seconds.

When the probe is withdrawn from the isolation chamber, the probe's tip is preheated for approximately two seconds. During this preheat mode the temperature site LED blinks. An audio beep sounds if the preheat is terminated. Predictive temperature measurement begins and is indicated by the rightmost TEMPERATURE display digit sequencing its segments in a clockwise fashion (pinwheel). When the final predictive temperature is achieved, an audible "high-low" tone sounds and the temperature reading (in degrees and tenths of a degree) appears on the TEMPERATURE display along with either °C or °F in place of the pinwheel to indicate a final stable temperature reading.

In the event the FasTemp module is unable to achieve a predictive temperature within thirty seconds, and the sensed temperature is above 30° C, the FasTemp enters the Direct Mode in which the current sensed temperature is displayed. To distinguish this mode the temperature site LED blinks. The monitor continues to search for a stable measurement in the Direct Mode and attempts to arrive at a final stable temperature as described above. The site indicator continues to flash until a stable measurement displays.

Should the sensed temperature be 30° C or lower or higher than 43° C at the end of the thirty second interval, a Low Priority alarm sounds and a *TEMP:INVALID* message appears in the LCD message screen. The TEMPERATURE LEDs show dashes.

Continuous Mode

In Continuous Mode, the thermometer continuously measures the patient's temperature as it rises or falls. This method is not predictive and does not pre-heat the probe prior to attempting a measurement. The temperature displayed is the probe temperature. The probe must be allowed time to attain a stable temperature using the same technique as a mercury thermometer.

After proper probe cover installation and application of the temperature probe in either the oral, axillary, or rectal cavity, the temperature measurement begins. The temperature display shows the current probe temperature readings, along with an F or C. As the patient's temperature rises or falls, the display changes accordingly. All temperature site LEDs are turned off in Continuous Mode. All displayed measurements are considered to be unstable.

Clinical Testing and Accuracy

Predictive thermometry measures temperature at discrete intervals and then calculates the rate of change according to a proven algorithm.

The FILAC FasTemp electronic thermometer in predictive mode has been tested to comply with EN 12470-3 and ASTM E1112:98. The FILAC FasTemp meets these standards in its predictive mode to provide highly accurate predictive measurements. When patient fevers (at or above 37.6° C/99.7° F) are encountered by the FILAC FasTemp, measurement time may exceed 20 seconds in order to achieve the accuracy necessary for those conditions.

Specifications

DOX SpO_2

Accuracy:	70 to 100: ±2% 50 to 69: ±3% 0 to 49: Unspecified Statistical, represents one st. dev. (~66%) of clinical samples
Range:	1-99%
Resolution:	1%
Indications	Numerical, Audible (pulse tone pitch varies with SpO_2)
Method:	Dual wavelength LED
Operation:	Continuous Use
Sensor Wavelength:	660nm/905nm
Sensor Power:	<80mW
SpO_2 Pulse Rate Range:	20 to 300
SpO_2 Pulse Rate Accuracy:	±1 bpm

Nellcor SpO_2 (OxiMax)

Accuracy:	70 to 100: ±2% Below 69: Unspecified Neonate: 70 to 100: ±3% Statistical, represents one st. dev. (~66%) of clinical samples
Range:	1-99%
Resolution:	1%
Indications	Numerical, Audible (pulse tone pitch varies with SpO_2)
Method:	Dual wavelength LED
Operation:	Continuous Use
Motion Artifact Rejection:	yes
SpO_2 Pulse Rate Range:	20 to 300 bpm
SpO_2 Pulse Rate Accuracy:	±3 bpm (20 to 250 bpm)

ComfortCuff NIBP

Technique:	Oscillometric measure upon inflation
Average Measurement Time:	<30 sec.
Automatic Measurement Cycles:	1, 2, 3, 5, 10, 15, 30, 45, 60 min.; 2, 4 hrs
Inflation Pressure Range:	Adult: 30 to 300 mmHg Pediatric: 30 to 150 mmHg Neonate: 20 to 150 mmHg
Max Inflation:	Adult: 300 Pediatric, Neonate: 150
NIBP Pulse Rate Range:	30 to 240
Resolution:	1 mmHg
NIBP Pulse Rate Accuracy:	±1 bpm or 1%
STAT mode:	5 min. of consecutive readings
Clinical Accuracy:	SP10:2002
Clinical Mean Error:	Less than ±5 mmHg
Clinical Standard Deviation:	Less than ±6.93 mmHg
Static Transducer Accuracy:	±2 mmHg

FasTemp Temperature

Measurement Range:	30.0° C to 43.0° C (85.0° F to 110.0° F)
Response Time Oral:	10 sec. typical
Response Time Axial/Rectal:	10 sec. typical
Continuous Mode Accuracy:	±0.1° C, ±0.2° F full range
Predictive Mode Accuracy:	For ambient temperatures 18.0° C to 28.0° C: ±0.1° C (35.5° C to 42.0° C) For full range ambient temperatures 10.0° C to 40.0° C, 50° F to 104.0° F: ±0.2° C (30.0° C to 36.9° C) ±0.1° C (37.0° C to 39.0° C) ±0.2° C (39.1° C to 43.0° C) ±0.5° F (85.0° F to 96.3° F) ±0.3° F (96.4° F to 97.9° F) ±0.2° F (98.0° F to 102.0° F) ±0.3° F (102.1° F to 106.0° F) ±0.5° F (106.1° F to 110.0° F) (Compliant with EN 12470-3 and ASTM E1112:98)
Display Resolution:	±0.1° C (±0.1° F)

Heart Rate

Source:	Plethysmograph or oscillometric NIBP data
Accuracy Range:	30 to 240 (for all parameters)
Accuracy:	506LN3 Series: ±2 bpm or 1% (for all parameters) 506DN3 Series: ±1 bpm or 1% (for all parameters)

Alarms

Characteristics:	EN 475, Adjustable
Indication:	Audible; Visual
Levels:	High, Medium, Low, Informational
Alarm Modes:	Adult, Pediatric, Neonate
Volume:	User Adjustable
Silence:	Yes; 2 minutes or permanent

Communications

Com Port:	Serial; DB-9 serial connector

Display & Controls

Display:	LCD Text, LED
Status Indicators:	Alarm Silence, Battery Status, Sensor, AC Power, Patient Size, Temperature Source
Keys:	Up to 11; membrane-activated
Languages:	English, French, German, Italian, Portuguese, Spanish, Danish, Dutch

Trend Reports & Memory

Types:	Tabular Trend Reports (User configurable by interval and parameters, multi parameter trend reports)
Trend Report Length:	24 hours max; selectable intervals
Review Mode:	On-panel review of trend reports
Interval (Review Mode):	SpO_2 recorded every minute, every valid NIBP measurement and predictive temperature measurement recorded
Data Types:	NIBP (Systolic, Diastolic, Mean), Heart Rate, SpO_2 Percent, Temperature

Printer

Recorder Type:	Internal thermal printer
Data Formats:	Tabular
Interval Print:	1, 2, 5, 10, 15, 30, 60 minutes; 2, 4, 8, 12, 24 hours
Data Types:	NIBP, SpO_2, Pulse, Temperature
Selectable Print Types:	Print on NIBP and/or Alarm

Mechanical/Electrical

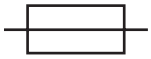
Weight:	3.0 kg; 6.7 lbs. (base unit with battery)
Size (without temperature):	22 cm (H) x 18 cm (W) x 16.5 cm (D) 8.7 in. (H) x 7.1 in. (W) x 6.5 in. (D)
Size (with temperature):	22 cm (H) x 22 cm (W) x 16.5 cm (D) 8.7 in. (H) x 8.7 in. (W) x 6.5 in. (D)
Battery:	Rechargeable; Sealed lead acid battery
Rating:	6V, 7.2 Amp Hours
Battery Life:	8 hours, with NIBP every 5 minutes
Recharge Time:	6 hours
Power Requirements:	100 – 240 VAC (±10%), 50 – 60 Hz

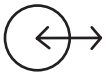
Environmental

Operating Temperature:	0° to 45° C (32° to 113°F)
Storage Temperature:	-5° to 50°C (23° to 122°F)
Operating and Storage Humidity:	15% to 90%; non-condensing
Medical Device:	Class II Equipment
Electrical Protection:	Class I Equipment
Degree of Protection:	Type CF, Defibrillator-Proof
Protection against ingress:	IPX1 rating, Drip-Proof Equipment

All specifications are subject to change without notice.

Symbols

Symbol	Definition
	Refer to Operator's Manual for Information
	Shock Hazard
	Not For Use with Flammable Anesthetic Gasses
	European Community Mark of Approval
	Electrical Testing Laboratories (ETL) Mark
IPX1	Identifies the degree of protection against fluid as drip-proof
	Type CF Equipment, defib proof
	Do not dispose of in municipal waste. Wheeled bin symbol indicates separate collection for electrical and electronic equipment. (WEEE Directive 2002/96/EEC)
	Alternating Current (AC)
	Fuse
	Technical Support Phone Number

Symbol	Definition
	Non-Invasive Blood Pressure, Connection
	Systolic blood pressure
	Mean blood pressure
	Diastolic blood pressure
	Temperature Monitoring
	SpO_2 Sensor Monitoring, Connection
	Heart Rate
	Communication Transmit/Receive Port
	Not a Sensor Connection

Safety

Definitions for Warning and Caution symbols:

⚠**WARNING**⚠	Designates a possible dangerous situation. Non-observance may lead to death or the most severe injuries.
⚠**CAUTION**⚠	Designates a possible dangerous situation. Non-observance may lead to minor injuries or damage to the product.

NOTE: Indicates that important information follows, a tip that can help you recover from an error, or point you to related details in the manual.

⚠WARNING⚠

- Read this manual entirely before attempting clinical use of the monitor.
- A possible explosion hazard exists! Do not use the monitor in the presence of flammable anesthetics.
- Cables, cords, and leadwires may present a risk of entanglement or strangulation! Verify safe and proper positioning of these items after patient application.
- Unapproved modifications to the monitor may cause unexpected results and present a hazard to the patient.

- Risk of electrical shock! Do not remove cover. Refer servicing to qualified personnel.
- U.S. Federal law restricts this device to sale by or on the order of a physician.

⚠CAUTION⚠

- Use the monitor only with recommended accessories! Use of unapproved accessories may cause inaccurate readings.
- Equipment accuracy may be affected at extreme temperatures.
- Do not store equipment at extreme temperature. Temperatures exceeding specified storage temperatures could damage the system.
- A possible explosion hazard exists! Do not use the monitor in the presence of flammable anesthetics.
- Do not press on the keys with surgical instruments or other tools. Sharp or hard objects could damage the keys. Use only your fingertips to press on the keys.
- Changes or modifications not expressly approved by Criticare Systems, Inc., may void the user's authority to operate the equipment and may also void the warranty.

Software Error Related Hazard Mediation

Criticare Systems, Inc., has quality control practices and procedures in place to review potential hazards as they relate to software.

The monitor is Year 2000 Compliant and utilizes a 4 digit year for all date, time, and leap year calculations.

Potential Interference

This device has been successfully tested to IEC 601-1-2 specified levels for emissions of and resistance to electromagnetic energy fields. External disturbances which exceed these levels may cause operational issues with this device. Other devices which are sensitive to a lower level of emissions than those allowed by IEC 601-1-2 may experience operational issues when used in proximity to this device.

MAGNETIC FIELDS
Use of the monitor in an MRI environment may interfere with MRI image quality. Use of MRI may interfere with the monitor.

RADIO FREQUENCY INTERFERENCE
The monitor conforms with IEC 1000-4-3 for radio frequency interference, and will operate with negligible adverse effects.

CONDUCTED TRANSIENTS
The monitor conforms with IEC 61000-4-4, and IEC 61000-4-5 for conducted transients, and will operate with negligible adverse effects.

X-RAY
The monitor will operate with negligible adverse effects in an x-ray environment. However, the monitor should not be placed directly in the x-ray beam, which could damage the internal electronics of the monitor.

OTHER INTERFERENCE
There is a negligible adverse effect to the monitor from electrocautery, electrosurgery, infrared energy, pacemakers, or defibrillation.

Leakage Current

The monitor complies with leakage current limits required by medical safety standards for patient-connected devices. Standards include the International Electrotechnical Commission (IEC) 601-1, 2nd edition, 1988 Part 1. A hazard caused by the summation of leakage currents is possible, when several pieces of equipment are interconnected.

Voltage Fluctuations

The monitor is suitable for connection to AC (mains) voltage as defined by EN61000-3-3 and EN61000-4-11. When operated in the line voltage range specified in this manual any fluctuation will have a negligible effect. Very low line voltage will cause the monitor to revert to battery power. Very high line voltage may cause damage to the charger circuits. The monitor is designed with circuitry that will turn the unit off before spurious readings can be caused by a low battery condition.

Defibrillation, HF, and Electronic Device Protection

The monitor when used with its recommended accessories is protected against the effects of the discharge of a defibrillator and the use of HF electrosurgical equipment. The monitor presents no known adverse effects to pacemakers or other medical safety equipment.

Biocompatibility

All patient-contact or user-contact materials in this monitor and its accessories have passed ISO 10993-5, -10, & -11 biocompatibility tests or have been in use in clinical environments in large numbers over an extended period of time predating these standards.

Latex Content

All Criticare Systems, Inc., products, including patient monitors and accessories, are free from latex in any location that may result in patient contact.

DEHP Content

All Criticare Systems, Inc., products currently shipping are free of DBP and DEHP in any areas that would be intended for patient contact with blood, mucous membranes, or continuous skin/tissue contact.

Section 2 — Controls and Displays

This section provides an overview of the 506N3 Series monitor's control panels, switches, accessory connections, and communication ports.

Front Panel

The operator's controls are on the front panel of the patient monitor. There are 11 membrane keys on the left side and up to six LED numerical displays on the right side. In the upper left corner is the LCD text display. A pulse bar is located in the top center of the panel.

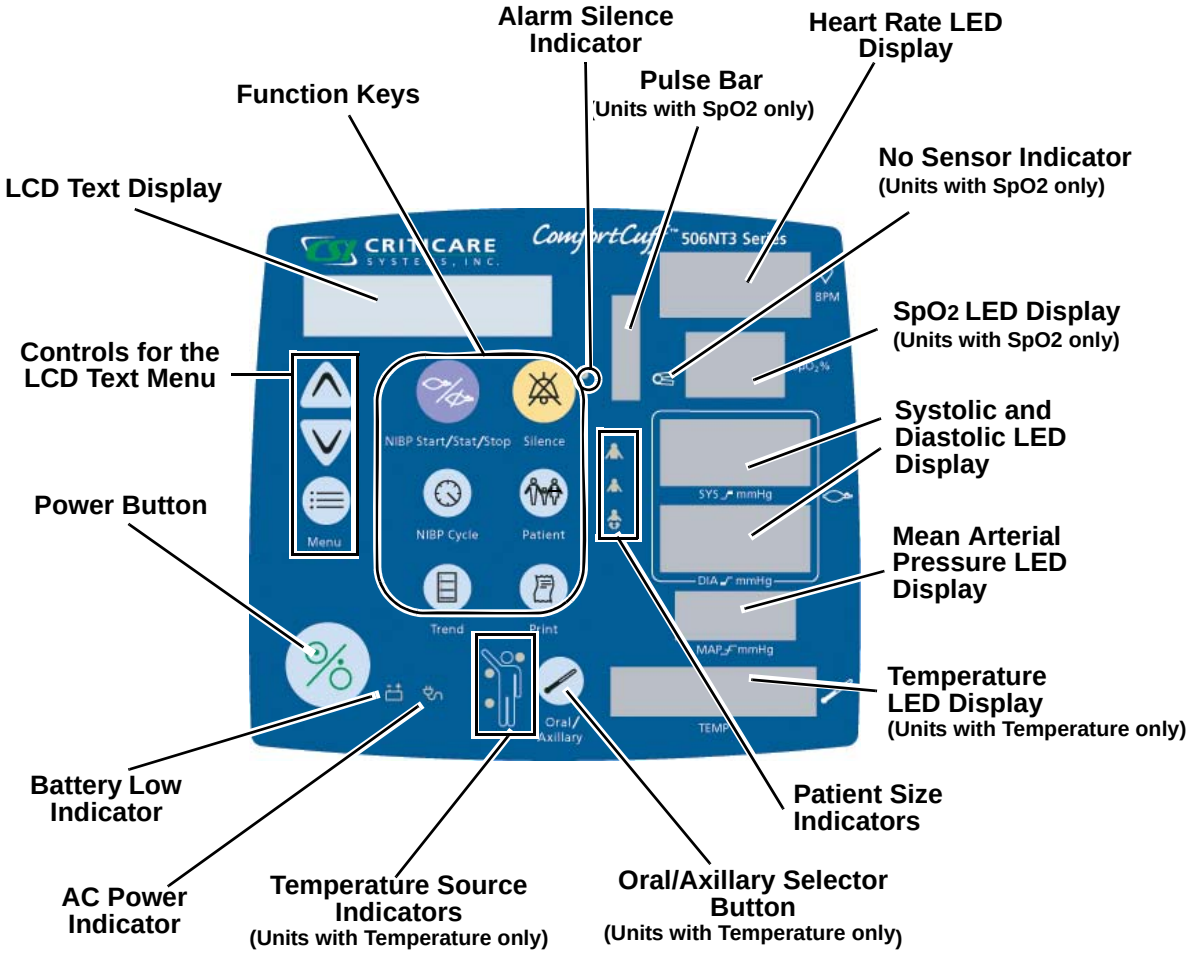


Figure 2-1: Model 506N3 Series Front Panel (Units with Temperature)

NOTE: Monitors without oximetry have no SpO_2 LED display, pulse bar or "No Sensor Indicator." Monitors without temperature have no temperature LED display, temperature source detector, or the ORAL/AXILLARY selector button. Monitors without internal printers have printing control buttons for use with external printers.

Keypad There are twelve keypad buttons. The primary function is activated with a momentary press of the key. A secondary function, if present, is activated when the key is pressed and held for two seconds.

Key	Function
 Power	On/Off control. Press to activate the patient monitor and press again to turn the monitor off.
 Menu	Press this key to enter the main menu. Press and hold key to exit any of the menus and return to the main (home) screen. Press and hold this key during power up to restore the factory default configuration.
 Up	Press this key to scroll up through menu selections or to scroll up through patient trends.
 Down	Press this key to scroll down through menu selections or to scroll down through patient trends.
 NIBP/Start/ Stat/Stop	Press this key momentarily to begin an NIBP measurement. Press key again, a second time, to cancel NIBP measurement. Press and hold key to begin 5 minutes of consecutive STAT measurements.
 NIBP Cycle	Press this key momentarily to activate the NIBP Cycle time menu. Press key again, a second time, to step through cycle time selections. Press and hold key to exit the NIBP Cycle menu.
 Trend	Press this key momentarily to enter Trend View Mode. Press key again to enter the Trend Menu. Pressing this key again will scroll through the trend settings in the menu. Press and hold key to go back through the previous trend screens.
 Silence	Press this key momentarily to begin a 2 minute alarm silence. Press and hold the key to permanently silence the alarms. Press the key again to resume normal alarms.
 Patient	Press this key to cycle through the patient size modes. Select *ADULT*, *PEDIATRIC*, or *NEONATE* mode for patient size. The appropriate LED to the right of this key illuminates to display which mode the monitor is in. Press and hold key to monitor a new patient.

Key	Function
 Print	Press this key to begin printing or serial output. Press the key again to cancel printing. Press and hold this key for a full trend printout of all patients recorded in the span of time set in the *TREND SPAN* option of the *TREND MENU*. To print a complete list of patient trends, set the *TREND SPAN* to *ALL*.
 Oral/Axillary	Press this key to chose between oral or axillary temperature. When the rectal (red) probe well is attached to the monitor, this function is inoperable. Press and hold this key to change the units from *F* (Fahrenheit) to *C* (Celsius) or vice-versa. **NOTE:** Monitors without temperature do not have this key.
 Paper Feed	Press this key to feed paper. Hold the key to continue feeding paper. This key is found at the top on the printer assembly. **NOTE:** Monitors without an internal printer do not have this key.

Numerical Displays

HEART RATE DISPLAY
The heart rate is displayed in amber LEDs on the upper right-hand side of the front panel. The heart rate is derived from the plethysmograph (SpO_2) if available or the oscillometric NIBP data.

BLOOD OXYGEN SATURATION (SpO_2) DISPLAY
The oxygen saturation percent is displayed in green LEDs on the upper right-hand side of the front panel just below the heart rate.

NOTE: Monitors without SpO_2 do not have this display.

NIBP DATA DISPLAYS
Blood pressure readings are displayed in red LEDs in the middle zone on the right-hand side of the front panel. The systolic, diastolic, and mean pressures (in mmHg) are each shown on a separate set of LED numerals.

TEMPERATURE DISPLAY
Temperature readings are displayed in red LEDs at the bottom right side of the front panel. The screen also displays if the reading is in Celsius (C) or Fahrenheit (F).

NOTE: Monitors without temperature do not have this display.

LCD DISPLAY SCREEN

The LCD (liquid crystal display) screen displays menu options, system messages, and alarm messages. A few examples are shown in the figure below.

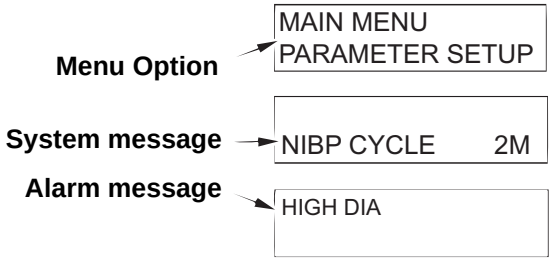


Figure 2-2: LCD Display Messages

Pulse Bar

A 10-segment green LED bar graph displays the non-gained pulse strength. The pulse bar is located vertically along the left side of the SpO_2 and heart rate LED clusters.

The pulse bar indicates the relative strength of the pulse by lighting a proportional number of LED segments (one through ten) for each valid pulse detected. The bottom LED bar corresponds to a value of “1” and the top LED bar corresponds to a value of “10”. Moderate to low perfusion lights approximately 2 to 5 segments. Normal to high perfusion lights approximately 6 to 10 segments. Very low perfusion measurements always illuminates at least 1 segment if the pulse is measurable.

The plethysmographic pulse bar is not auto-gained. The amplitude display of the plethysmographic pulse bar is proportional to the pulse volume changes occurring in the tissue illuminated by the SpO_2 sensor.

NOTE: Monitors without SpO_2 do not have this display.

LED Indicators

The following LED icon indicators illuminate under the following conditions.

BATTERY STATUS
This tri-color LED indicates the particular battery state.

- *Green*: The monitor is on AC power. A steady green light indicates the battery is fully charged and can be removed from AC (mains) power.
- *Amber*: The monitor is on AC power. A steady amber light indicates the battery is not fully charged and should remain attached to an AC (mains) source.
- *Amber (flashing)*: The monitor is on AC power. A flashing amber light indicates the battery is severly drained or bad. The battery requires a full six hour recharge time to regain full charge.

  NOTE: If the flashing amber light continues after 1 hour of charging, have the battery checked or replaced.
- *Red and Green (flashing)*: The monitor is on AC power and cannot charge because a battery circuit is disconnected or broken. Have the unit serviced.
- *Red*: The monitor is on battery power only. A steady red light indicates the battery has less than one (1) hour of run time left.
- *Red (flashing)*: The monitor is on battery power only. A flashing red light indicates the battery needs to be charged immediately.
- If the icon is *not* lit, the monitor is on battery power with adequate voltage.

Condition	Battery LED Color	Status
With AC power and battery fully charged	Green	Solid
With AC power and battery charging	Amber	Solid
With AC power and severly drained battery	Amber	Flashing
With AC power and broken battery connection	Red and Green	Flashing
No AC and with 1 to 8 hours runtime	Not illuminated	Off
No AC and less than 1 hour run time	Red	Solid
No AC and battery needs to be charged	Red	Flashing

NOTE: Battery age and quality determine the run time of the battery.

NOTE: Flashing red and green LED indicator present in monitors manufactured after 2006.

AC POWER
The monitor is connected to AC (mains) power.

ALARM SILENCE
A red light by the SILENCE button indicates that the audible alarms have been turned off.

NO SENSOR
The monitor does not detect a compatible SpO_2 sensor or the sensor is disconnected.

NOTE: Monitors without SpO_2 do not have this indicator.

ADULT MODE
The monitor is in adult monitoring mode. This icon blinks when an NIBP demand or stat measurement has started.

PEDIATRIC MODE
The monitor is in pediatric monitoring mode. This icon blinks when an NIBP demand or stat measurement has started.

NEONATAL MODE
The monitor is in neonatal monitoring mode. This icon blinks when an NIBP demand or stat measurement has started.

TEMPERATURE SELECTION
Three amber LEDs indicate the source selected for the temperature reading. The oral source is indicated with an LED by the head of the icon. The axillary source is indicated by an LED by the upraised arm of the icon. The rectal source is indicated by the LED by the legs of the icon.

NOTE: Monitors without temperature do not have this indicator.

Right Side Panel

The patient sensor and probe connections are located on the right side of the monitors. Some monitors do not have all these connections. The connections are designed to operate with Criticare approved patient monitoring accessories. See the list of accessories in “Accessories” in Appendix A.

ComfortCuff™ NIBP Connection

There is a Quick-Connect hardware fitting located on the right side of the monitor. This connection is defibrillation proof. Use either straight or coiled hoses.

Nellcor OxiMax® SpO_2 Connection

There is a custom locking sensor connection located on the right side of the monitor. This connection is defibrillation proof. Use only Nellcor OxiMax patient sensors. DOX Criticare sensors may not be used with this connector.

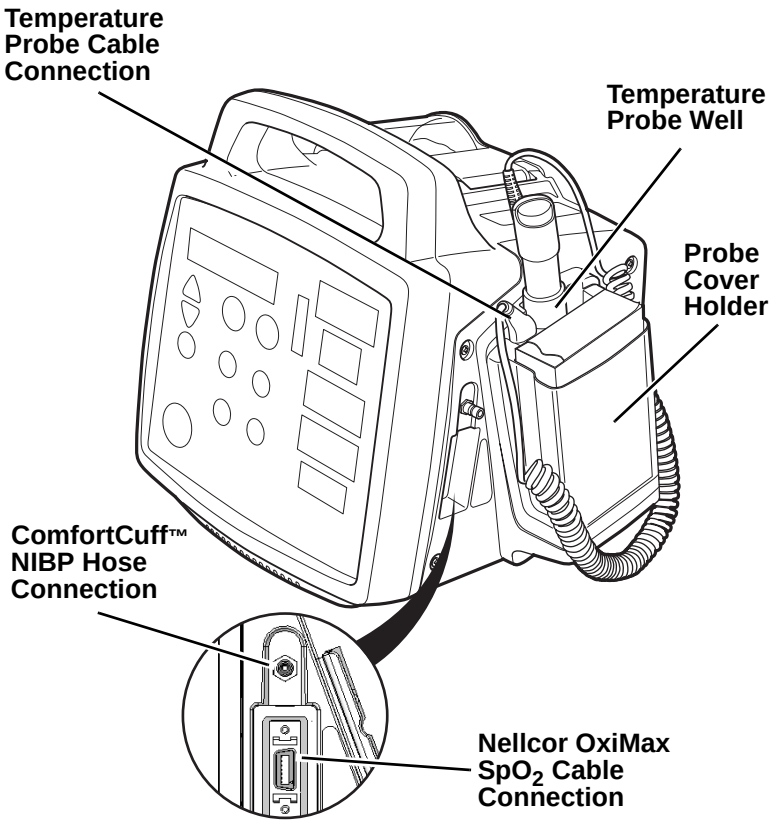


Figure 2-3: Right Side of 506N3 Series Monitor with Nellcor SpO_2 Connection

DOX™ SpO_2 Connection

There is a custom-notched DB-9 sensor connection located on the right side of the monitor. A clip is located below the sensor connection to hold the sensor in place and to provide strain relief. This connection is defibrillation proof. Use only DOX-compatible patient sensors. OxiMax sensors may not be used with this connector.

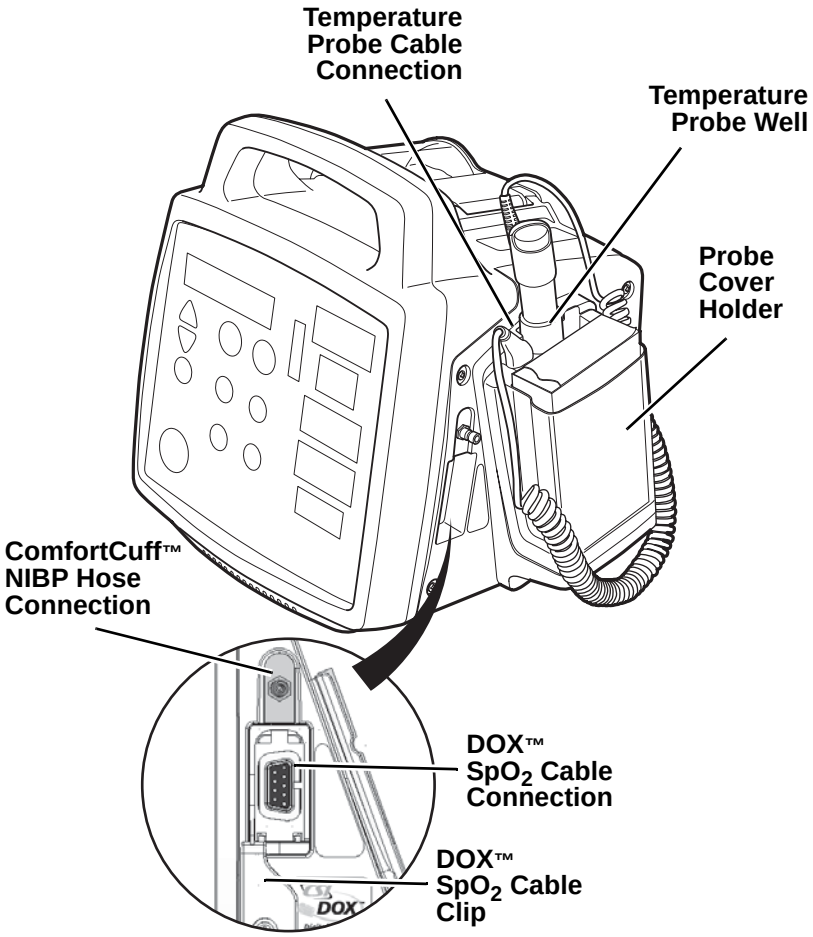


Figure 2-4: Right Side of 506N3 Series Monitor with DOX SpO_2 Connection

FILAC® FasTemp® Temperature Connection

There is a probe cable connection located on the right side of the monitor. This connection is defibrillation proof. A probe storage well is designed to hold the temperature probe when not in use. A standard box of 20 probe covers fits in the probe cover holder.

Left Side Panel

COM Port

This communications port provides serial patient data output for use by external printers and computer terminals. A standard DB-9 serial connector is available for attaching an RS232 cable. See "Communication Port" in Section 7 for a complete description of the COM Port features.

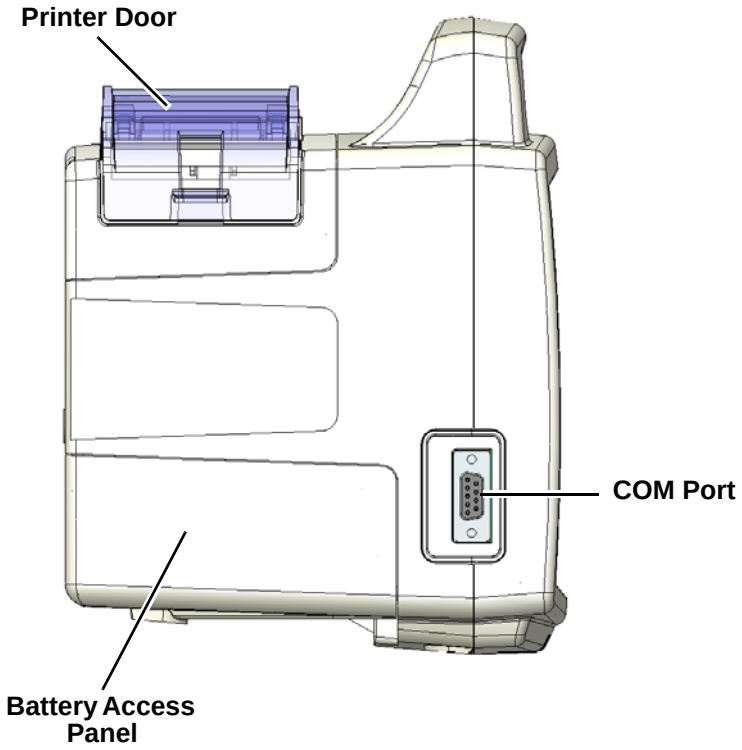


Figure 2-5: Left Side of 506N3 Series Monitor

Back Panel

Printer Paper Release

This lever controls the tension on the paper in the printer.

AC (Mains) Input Connection

⚠WARNING⚠

- Substitution of improper power cords could damage the monitor. Improper power sources can also create a shock hazard for the patient.

This socket is provided as a connection for an AC (Mains) power cord. The battery also charges while the monitor is plugged into an AC (Mains) outlet. Refer to “Battery Power” in Section 3 for more information about charging the monitor.

The center pin of the AC power connection provides a ground connection for the monitor. Criticare power cables 989, 989-UK, and 989-INT provide a grounding connection.

Monitor Fuses

The monitor uses two (2) fuses. The fuses reside in a circular housing that is screwed into place below the AC (Mains) connector.

Battery Access Panel

Remove the battery access panel to replace the battery in the 506N3 Series monitor.

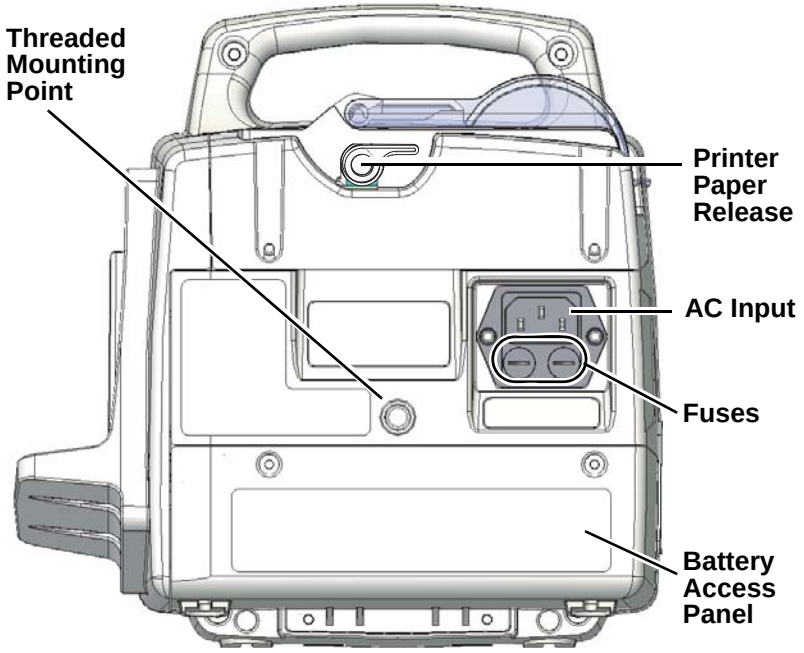


Figure 2-6: 506N3 Series Back View

Top View

Some 506N3 Series monitors have a printer at the top of the unit. Open the door to reload new rolls of paper or to clear paper jams.

Printer

The internal printer prints manual prints initiated by pressing the PRINT key, when the monitor is set to automatic printing, and when trend prints are recalled from memory. The monitor can also print to an external printer.

PAPER FEED Key

The PAPER FEED key feeds the paper through the rollers of the printer.

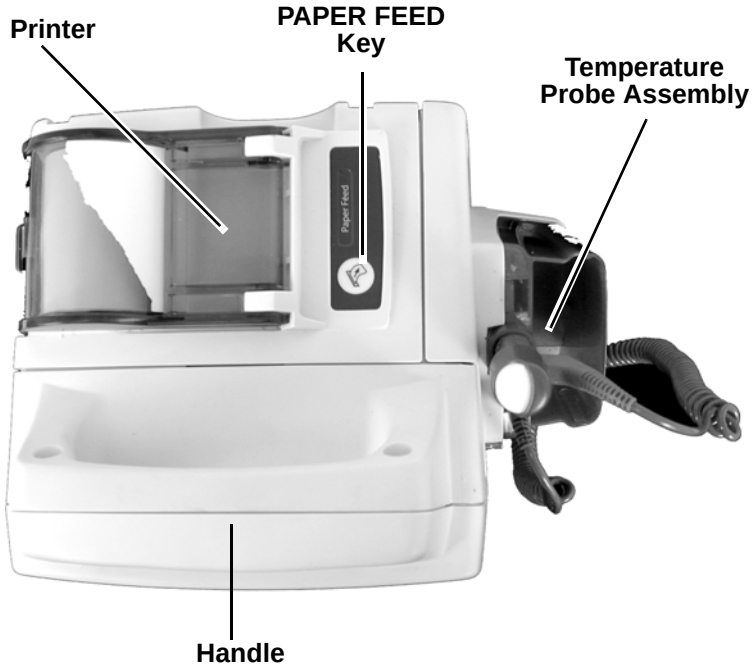


Figure 2-7: 506N3 Series Top View

Section 3 — Setup Procedure

This section describes setting up the 506N3 Series monitor, including initiating power and using the setup menus to adjust physiological monitoring settings and configuration.

Initiating Power

The monitor can be powered from an AC (Mains) power outlet or from the internal lead-acid battery.

To operate the monitor from AC power:

1. Connect the AC power cord to the power connector on the monitor's rear panel.
2. Connect the power plug to a grounded AC (Mains) power outlet. A hospital grade AC (Mains) outlet is recommended. The green AC cord icon illuminates immediately if the monitor is receiving power.
3. The battery icon illuminates either amber or green, depending on the amount of charge in the battery.
4. Press the POWER key (with the green ON/OFF symbol) on the lower left corner of the front panel of the monitor.
5. The monitor performs a brief LED test indicating that it is on.
6. The title and software revision appear briefly in the LCD text window.

Battery Power

The monitor is equipped with an internal battery that, when fully charged, operates the monitor for 8 to 10 hours (depending on use). Allow the battery to fully charge before initial use. The battery icon illuminates amber during charging and illuminates green when fully charged.

When the monitor is removed from AC (Mains) power, a red battery indicator illuminates when approximately 1 hour of battery life remains with moderate use. The indicator flashes red when only a few minutes of run time are left.

⚠CAUTION⚠

- Charge the battery completely following extended battery use to ensure a fully-charged battery is available for the next use.

Power Off

Press and hold the POWER key one second to turn off the monitor. The following functions take place when the monitor is powered off:

- Menu settings, alarm limits settings and cycle time are stored in memory.
- Trend records are stored in memory.
- The NIBP, SpO_2, and temperature parameters always return to *ON* after the power is cycled.

The monitor powers off after 30 minutes of inactivity to save battery power. This does not occur if the monitor detects an SpO_2 or temperature signal or the NIBP cycle time is set.

LCD Text Display

This LCD window consists of two-lines of text that display the current time, alarms, messages, menu items, and settings. The LCD display backlight automatically turns on whenever the menu is accessed or a system message is displayed. When no activity occurs on the LCD message bar, it remains blank and unlit.

Using the Menus

To access the main menu, press the MENU key. This displays the *MAIN MENU* and the first main menu choice, *ALARM MENU*, or the menu last accessed using the MENU key.

The menu choices appear in the second line as the DOWN key is pressed. They appear in the reverse order when the UP key is pressed.

The monitor has four main menu headings. Each of these headers has its own submenu.

ALARM MENU
PARAMETER SETUP
PRINTER SETUP
CONFIGURATION

Press the UP or DOWN key to scroll through these four options. Press the MENU key to access the desired menu when it is displayed.

- To access a menu setting, press the MENU key a second time when the desired heading is visible. The header moves to the top text line. Specific settings for each header appear underneath as a submenu.
- To view or find a current setting scroll through the appropriate submenu using the UP/DOWN keys. The settings appear below the header. Each setting has a name, an arrow and the current value listed.

- To change the current setting, press the MENU key again to choose the setting. This changes the left arrow to a right arrow, allowing the item to be changed. Then use the UP/DOWN keys to select the desired setting value. Press the MENU key to change the selected value to the current setting. The arrow changes back to a left arrow.
- The *Trend* and *Cycle* setting menus are accessed respectively by pressing and holding their dedicated keys.

Exit the Menu

To exit a menu, press and hold the MENU key. The monitor beeps once to indicate that the button was pressed and double-beeps when the key is held. The LCD text window returns to reporting messages or goes blank if no messages exist.

If there has been no keypad activity for 20 seconds the menu clears. The LCD text window returns to reporting messages or goes blank if no messages exist.

Factory Defaults

The factory default settings can be recalled from memory by turning on the monitor while holding in the MENU key. Settings in the *Parameter Setup*, *Printer Setup*, *Configuration* and the *NIBP Cycle Menu* are affected. See ”Default Alarm Settings” in Section 5 for recalling alarm limit defaults.

The monitor has built-in defaults for both hospital settings and alternate care settings. Hospital Defaults are intended for larger facilities that provide spot checks and/or long-term care.

Alternate Care Defaults are intended for smaller facilities, such as surgical centers, that do not require comprehensive monitoring.

In addition the supervising caregiver can set User Defaults. This is a default setting profile that can be set for a facility’s special needs. The settings are located in a protected menu to inhibit unauthorized changes to the User Default settings. The User Defaults are initially set to the same settings as the Hospital Defaults. See the *506N3 Series Service Manual* for complete instructions for changing and saving the User Defaults.

Alarm Menu

Alarm	Type	Range	Hospital	Alternate Care
Alarm Volume		1 to 10, Off	4	3
Pulse Volume		1 to 10, Off	Off	Off
Pulse Rate	High	80 to 250, Off	150 (Adult)	150 (Adult)
			150 (Pediatric)	150 (Pediatric)
			180 (Neonate)	180 (Neonate)
Pulse Rate	Low	20 to 150, Off	40 (Adult)	40 (Adult)
			40 (Pediatric)	40 (Pediatric)
			90 (Neonate)	90 (Neonate)
SpO_2	High	70 to 98, Off	Off (Adult)	Off (Adult)
			Off (Pediatric)	Off (Pediatric)
			Off (Neonate)	Off (Neonate)
SpO_2	Low	1 to 98, Off	90 ‡ (Adult)	90 ‡ (Adult)
			90 ‡ (Pediatric)	90 ‡ (Pediatric)
			90 ‡ (Neonate)	90 ‡ (Neonate)
NIBP Systolic	High	75 to 240, Off	200 (Adult)	200 (Adult)
			200 (Pediatric)	200 (Pediatric)
			140 (Neonate)	140 (Neonate)
NIBP Systolic	Low	50 to 150, Off	50 (Adult)	50 (Adult)
			50 (Pediatric)	50 (Pediatric)
			50 (Neonate)	50 (Neonate)
NIBP Diastolic	High	50 to 180, Off	100 (Adult)	100 (Adult)
			100 (Pediatric)	100 (Pediatric)
			80 (Neonate)	80 (Neonate)
NIBP Diastolic	Low	15 to 50, Off	30 (Adult)	40 (Adult)
			30 (Pediatric)	40 (Pediatric)
			30 (Neonate)	30 (Neonate)
NIBP Mean	High	70 to 200, Off	150 (Adult)	Off * (Adult)
			150 (Pediatric)	Off * (Pediatric)
			100 (Neonate)	Off * (Neonate)
NIBP Mean	Low	25 to 125, Off	50 (Adult)	Off * (Adult)
			50 (Pediatric)	Off * (Pediatric)
			40 (Neonate)	Off * (Neonate)
Temperature	High	87.0 to 108.0 °F, Off	100.0 °F	100.0 °F
		30.6 to 42.2 °C, Off	37.8 °C	37.8 °C
Temperature	Low	87.0 to 108.0 °F, Off	93.0 °F	93.0 °F
		30.6 to 42.2 °C, Off	33.9 °C	33.9 °C

‡ The monitor returns a minimum low value of 85 on power up.
* Mean values only appear if *MAP* is enabled in the *CONFIGURATION* menu.

Parameter Setup

Parameter	Options	Factory Default Value
NIBP Tone	Begin, Non, End, Both(+)	None
SpO_2 Search	10, 20, 30, 40	20 (DN3 Models)
SpO_2 Average	DN3 Series: 3, 6, 9, 12,15, 18, 21	12 (DN3 Models)
	LN3 Series: F (fast), N (normal)	N (LN3 Models)
Temperature Mode	Pred, Cont	Pred †
Degrees F/C	F/C	F

† The monitor returns to this setting on power up.
\+ Not available prior to Revision 1.5A Main Software.

Printer Setup

Setting	Options	Factory Default Value
Print on NIBP	On, Off	Off
Print on Alarm	On, Off	Off
Interval	10, 20, 30 seconds; 1, 2, 5, 10, 15, 30, 60 minutes; 2, 4, 8, 12, 24 hours; Off	Off
Print to	Printer, Serial, Off	Printer (with internal printer) Serial (without internal printer)
Serial	Text, CSV, CUSP*, Off	Text
Baud Rate	2400, 4800, 9600, 19200, 38400	19200

Configuration Menu

Setting	Options	Hospital Default Value	Alternate Care Default Value
Date	MM-DD-YYYY, DD-MM-YYYY	MM-DD-YYYY	MM-DD-YYYY
Time	24-Hour, AM/PM	24-Hour	AM/PM
Hour	0 - 23	N/A	N/A
Minute	1 - 59	N/A	N/A
Day	1 - 31	N/A	N/A
Month	JAN through DEC	N/A	N/A
Year	00 - 99	N/A	N/A
Contrast	5-95%	50%	50%
Enable MAP	On, Off	On	Off
NIBP	On, Off	On †	On †
SpO_2	On, Off	On †	On †
TEMP	On, Off	On †	On †
Line Frequency*+	50 Hz, 60Hz	60 Hz	60 Hz
Language*	English, French, German, Spanish, Italian, Portuguese, Danish, Dutch	N/A	N/A
Size	Adult, Ped. (pediatric), Neonate, Last	Last	Last

† The monitor returns to this setting on power up.

N/A This setting does not have a factory default value.

* The setting is only available after a MENU power up.

\+ Prior to Revision 1.2E Main Software. After 1.2E, line frequency is set in “Service Mode.”

NIBP Cycle Menu

Setting	Options	Factory Default Value
NIBP Cycle	1, 2, 3, 5, 10, 15, 30, 45, 60 minutes; 2 or 4 hours; Off	Off

NOTE: The *NIBP CYCLE* menu is accessed using the NIBP CYCLE key located on the front panel. All other default settings are accessed using the MENU key with the UP/DOWN keys.

Trend Menu

Setting	Options	Factory Default Value
Trend Int.	1, 2, 5, 10, 15, 30, 60 minutes, Off	15 minutes
Trend Format	BPT, BP, Last, No BPT, All	BPT
Trend Span	10, 15, 30, 60 minutes; 2, 4, 8, 12, 24 hours; All	4 hours

Patient Menu

Setting	Options	Factory Default Value
Mode	Adult, Pediatric, Neonatal	Adult

NOTE: The following is a list of possible menus and submenus. Depending on the model and configuration of your monitor, some submenus listed may not be applicable.

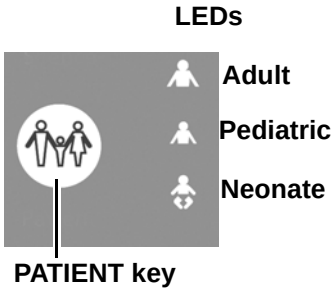
Alarm Menu

Press the MENU key to enter menus. Press the UP/DOWN keys until the *ALARM MENU* displays. Press the MENU key to enter the *ALARM MENU*.

Press the UP/DOWN keys to move through the alarm submenu until the desired item setting displays in the LCD window.

Press the MENU key to select that item, then use the UP/DOWN keys to scroll through the setting options for that item. When the desired setting displays on the LCD, press the MENU key to select that setting.

Alarm limits are set separately for adult, pediatric, and neonatal modes and are saved independently.



To set adult alarm limits, change the patient mode by pressing the PATIENT key until the ADULT LED is lit. Confirm that the ADULT indicator on the front panel is lit. Enter the *ALARM MENU*. Set all desired alarm limits for adult monitoring conditions.

To set pediatric alarm limits, change the patient mode by pressing the PATIENT key until the PEDIATRIC LED is lit. Confirm that the PEDIATRIC indicator on the front panel is lit. Enter the *ALARM MENU*. Set all desired alarm limits for pediatric monitoring conditions.

To set neonate alarm limits, change the patient mode by pressing the PATIENT key until the NEONATE LED is lit. Confirm that the NEONATE indicator on the front panel is lit. Enter the *ALARM MENU*. Set all desired alarm limits for neonate monitoring conditions.

Alarm Volume This setting adjusts the volume of the audible alarm tone. Choices are 1 through 10 and *Off* (Where 1 is the softest and 10 is the loudest). A tone is generated at each volume level as the alarm volume setting is changed.

The factory hospital default setting is 4; the factory alternate care default setting is 3. The monitor returns to the value 2 upon a power cycle if the alarm volume had been turned off or set to 1.

Pulse Volume Sets the volume for the audible pulse tone from *Off*, and 1 through 10, with 1 being the softest and 10 the loudest. The factory default value is *Off*.

High Pulse Select the high alarm limit for pulse rate. Choices are 80 to 250 bpm and *Off*. Resolution is 2 bpm. The factory default value is 150 for Adult and Pediatric modes and 180 for Neonate mode.

Low Pulse Select the low alarm limit for pulse rate. Choices are 20 to 150 bpm and *Off*. Resolution is 2 bpm. The factory default value is 40 for Adult and Pediatric modes and 90 for Neonate mode.

High SpO_2 Select the high alarm limit for SpO_2. Choices are 70-98%, and *Off*. The resolution is 1% blood oxygen saturation. The factory default setting is *Off* for all patient size modes.

Low SpO_2 Select the low alarm limit for SpO_2. Choices are 1 to 98%, and *Off*. The factory default value is 90.

If *LOW SpO_2* is set to 98%, the *HIGH SpO_2* alarm may not be changed from the *Off* setting.

The *LOW SpO_2* setting returns to a minimum value of 85% after a power cycle.

High Systolic Select the high alarm limit for systolic blood pressure. Choices are 75 to 240 mmHg and *Off*. The factory default value is 200 for Adult and Pediatric modes and 140 for Neonate mode.

Low Systolic Select the low alarm limit for systolic blood pressure. Choices are 50 to 150 mmHg and *Off*. The factory default value is 50.

High Diastolic Select the high alarm limit for diastolic blood pressure. Choices are 50 to 180 mmHg and *Off*. The factory default value is 100 for Adult and Pediatric modes and 80 for Neonate mode.

Low Diastolic Select the low alarm limit for diastolic blood pressure. Choices are 15 to 50 mmHg and *Off*. The factory default value is 30.

High MAP Select the high alarm limit for mean arterial blood pressure. Choices are 70 to 200 mmHg and *Off*. The factory hospital default value is 150 for Adult and Pediatric modes and 100 for Neonate mode. The factory alternate care default is *Off* for all sizes.

Low MAP Select the low alarm limit for mean arterial blood pressure. Choices are 25 to 125 mmHg and *Off*. The factory hospital default value is 50 for Adult and Pediatric modes and 40 for Neonate mode. The factory alternate care default is *Off* for all sizes.

High Temperature Select the high alarm limit for temperature. Choices are 87.0 to 108.0 degrees F (30.6 to 42.2 degrees C) and *Off*. The factory default value is 100.0 degrees F (37.8 degrees C).

Low Temperature Select the low alarm limit for temperature. Choices are 87.0 to 108.0 degrees F (30.6 to 42.2 degrees C) and *Off*. The factory default value is 93.0 degrees F (33.9 degrees C).

Parameter Setup Menu

Press the MENU key to enter menus. Press the UP/DOWN keys until the *PARAMETER SETUP* displays. Press the MENU key to enter the *PARAMETER SETUP*.

Press the UP/DOWN arrow keys to move through the parameter setup menu until the desired submenu item is displayed in the LCD window.

Press the MENU key to select that item (arrow will point right), then use the UP/DOWN keys to scroll through the setting options for that item. When the desired setting is displayed on the LCD, press the MENU key to select that setting (arrow will point left).

Temperature Mode

Selects *Pred* (predictive) or *Cont* (continuous) mode of temperature monitoring. The factory default value is *Pred* and the monitor returns to normal predictive mode after each power cycle.

Degrees F/C

Toggles between degrees Fahrenheit (F) and degrees Celsius (C) for the temperature display. The factory default value is Fahrenheit (F).

SpO_2 Search

Monitors with DOX SpO_2 only! The search time is the length of time that the monitor searches for a valid SpO_2 signal before clearing the displayed SpO_2 value. Choices are *10, 20, 30* or *40 seconds*. The factory default value is *20 seconds*.

SpO_2 Average

Averaging time is the period of time over which the displayed SpO_2 percent value is averaged.

For monitors with DOX SpO_2, the available averaging times are *3, 6, 9, 12, 15, 18,* and *21 seconds*. The factory default value is *12 seconds*.

For monitors with Nellcor SpO_2, the available averaging times are *F* (Fast), *N* (Normal), and *S* (Slow). The factory default value is *N*.

NIBP Tone

Selects when the NIBP tone is generated. Choices are *None*, no tone is generated; *Begin*, a tone is generated at the beginning of an NIBP measurement; *End*, a tone is generated upon completion of an NIBP measurement; and *Both*, a tone is generated at the beginning and upon completion of an NIBP measurement. The factory default value is *None*.

Printer Setup Menu

Press the MENU key to enter menus. Press the UP/DOWN key until the monitor displays *PRINTER SETUP*. Press the menu key to select the *PRINTER SETUP* menu.

Press the UP/DOWN keys to move through the PRINTER SETUP submenu until the desired item setting is displayed in the LCD window.

Press the MENU key to select that item (arrow will point right), then use the UP/DOWN keys to scroll through the setting options for that item. When the desired setting is displayed on the LCD, press the MENU key to select that setting (arrow will point left).

On NIBP The monitor prints data when an NIBP reading is taken. Choices are *On* or *Off*. The factory default is *Off*.

On Alarm The monitor prints data during a medium or high level alarm limit violation. Choices are *On* or *Off*. The factory default is *Off*.

Interval This sets the time interval for automatic interval printing of vital signs data. Choices are *10, 20, or 30 seconds; 1, 2, 5, 10, 15, 30*, or *60 minutes*; *2, 4, 8, 12*, or *24 hours*, and *Off*. The factory default is *Off*.

Print To Sets the output device of the monitor. Use *Printer* for the internal printer of the 506N3 Series. External printing and downloading is available using the *Serial* setting. Choose *Off* to disable printing.

Serial Sets the data format for the external serial port (for sending data to an external device). The choices are *TEXT*, *CSV*, *CUSP*, and *Off*. The factory default is *Text*. See “Serial Printing” in Section 7 for more information.

Baud Rate Sets the baud rate of the monitor. The choices are 2400, 4800, 9600, 19200, and 38400. The factory default is 19200 baud rate.

Configuration Menu

Press the MENU key to enter menus. Press UP or DOWN key to display *CONFIGURATION*. Press the MENU key to select the *CONFIGURATION* submenu.

Press the UP/DOWN keys to move through the *CONFIGURATION* submenu until the desired item setting is displayed in the LCD window.

Press the MENU key to select that item, then use the up and down arrow keys to scroll through the setting options for that item. When the desired setting is displayed on the LCD, press the MENU key to select that setting.

Date Sets the date format to *MM-DD-YYYY* (month-day-year) or *DD-MM-YYYY* (day-month-year), The factory default setting is *MM-DD-YYYY*.

Time Sets the monitor time to *24-Hour* or *AM/PM*. The hospital default is *24-Hour*. The alternate care default is *AM/PM*.

Hour Sets the current hour.

Minute Sets the current minute.

Day Sets the current day.

Month Sets the current month.

Year Sets the current year.

Size A user-selectable power-on default patient size with selections of *ADULT*, *PED*. (pediatric), *NEONATE* and *LAST. LAST* is the default to the last patient size setting used before power down. The default is *LAST*.

Enable MAP Enables (*On*) or disables (*Off*) MAP display on the monitor. Also removes MAP from the headers and printouts when set to *Off*. The factory default is *On*.

NIBP Turns the NIBP function *On* or *Off*. This automatically resets to *On* when restarting the monitor.

SpO_2 Turns the SpO_2 function *On* or *Off*. This automatically resets to *On* when restarting the monitor.

Temperature — Turns the temperature function *On* or *Off*. This automatically resets to *On* when restarting the monitor.

Contrast — Adjusts the LCD message bar contrast from 5% to 95% in 5% increments. The contrast changes as the adjustment is made. The factory default is 50%.

International Configuration Settings

The language setting only appears in the *CONFIGURATION* submenu after the monitor has been started in the factory default mode (Press the MENU key during power up). This setting is intended to be set once upon arrival at a final destination. The language setting does not appear again until default settings are recalled again.

Language — The monitor has language settings available in English, French, German, Italian, Spanish, Portuguese, Danish, and Dutch. The monitor must be restarted before the language setting change activates.

Trend Button Settings

Press and hold the TREND button to set the trend settings.

Interval — Sets the interval of time you wish the data to print in the trend span. Choices are *1, 2, 5, 10, 15, 30*, or *60 M* (minutes) and *Off*. The factory default setting is *1 M*.

Format — Sets the format of trended data. Choices are *BP*, *BPT*, *No BPT*, *Last* and *All.* The factory default setting is *BPT.*

Span — Sets the amount of trend data you wish to print. Choices are: *10, 15, 30*, or *60 M* (minutes); *2, 4, 8, 12*, or *24 H* (hours), or *ALL*. The factory default setting is *4 H*.

Patient Button Settings

Press the PATIENT button to select the patient mode. Choices are *Adult*, *Pediatric*, and *Neonatal*. The factory default setting is *Adult*.

Section 4 — Patient Monitoring

Introduction to Clinical Use

This section provides instructions for patient connections and monitoring. The caregiver is expected to be fully familiar with patient monitoring techniques and with the functions of this monitor before using it with a patient.

Before You Begin

Protect yourself and your patient. Read the precautions for each measured parameter that appears in this section.

These instructions describe use of the basic accessories that come with your monitor. An extended list of approved accessories can be found in “Accessories” in Appendix A.

The monitor should always be checked by the caregiver before use with actual patient monitoring. Perform the following procedure before using the monitor with a patient.

1. Make sure that the monitor has been fully charged before use. Check that the AC cord is plugged in for long-term monitoring situations.
2. Check the menu and default settings to confirm that the monitor is set up correctly.
3. Examine the accessories for wear, damage, or contamination. Replace or disinfect the accessories as required.
4. Turn the desired monitoring functions to *On* in the *PARAMETER SETUP* Menu.
5. Select the correct patient mode setting of operation (*Adult, Pediatric,* or *Neonate*) with the PATIENT key on the front panel. Verify that the correct LED illuminates for the patient mode you selected.

⚠CAUTION⚠

- All accessories connected to the patient monitor must comply with all applicable standards listed for these products.
- Substitution of recommended cuffs, sensors, probes, and accessories may cause inaccurate measurements and degrade patient safety, or may damage the monitor.

Admitting and Changing Patients

The 506N3 Series monitor begins monitoring a new patient when the PATIENT key is pressed and held. The unit does not automatically admit a new patient when the power is cycled.

When a new patient is entered, the monitor displays the message *NEW PATIENT XXX* in the second line of the LED display. If a new patient is entered, and there is no data for the previous patient entered, the number does not change. If the previous patient entered contains data, then the new patient number increments by 1.

A maximum of 250 patient records can be kept in the system. If attempting to enter a new patient and a maximum number of patient records are stored, the monitor restarts numbering at *001*.

NIBP Monitoring (Non-Invasive Blood Pressure)

The following instructions describe procedures for preparing a patient for NIBP monitoring.

Shown below is the patient monitor with an adult size arm blood pressure cuff and a 4 foot long hose (Cat. No. 705). This adult arm cuff (Cat. No. 475) is one of many blood pressure cuffs available. Use the NIBP accessories only as directed.

The monitor's NIBP connection accepts any Criticare NIBP cuff using a Quick Connect style fitting.

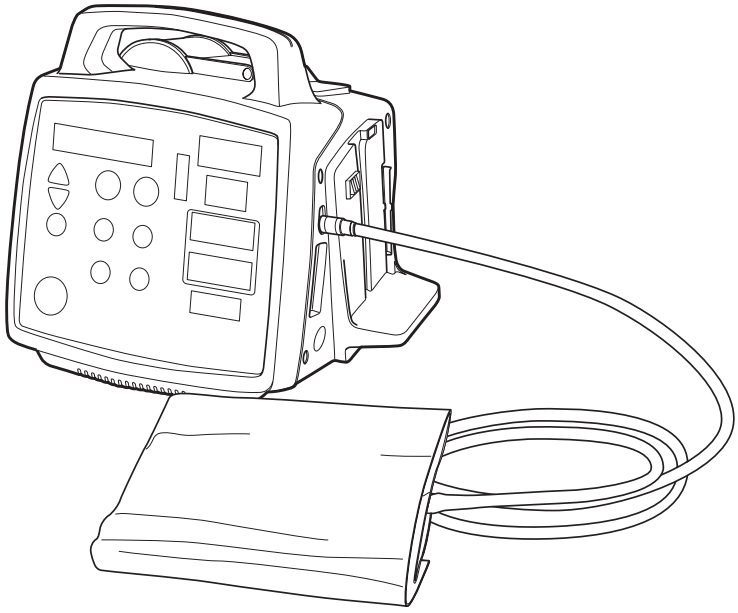


Figure 4-1: 506N3 Series NIBP Cuff Connection

⚠WARNING⚠

- Check the patient frequently to ensure the NIBP cuff is not causing prolonged impairment of the patient's circulation.

⚠CAUTION⚠

- The accuracy of noninvasive blood pressure readings may be adversely affected by the presence of drugs or therapies which alter the patient's cardiovascular dynamics.
- The sensitivity of blood pressure measurement may be affected when monitoring patients with intra-aortic balloon pumps.

Selecting Cuffs and Hoses

This monitor works with Criticare blood pressure cuffs and hoses only. Using the monitor with other brands of cuffs may cause inaccurate measurements.

Proper cuff size and placement is essential to assure accurate blood pressure measurement. The American Heart Association recommends a cuff width-to-length ratio of about 2:1, so that if the cuff width is 40% of arm circumference, the cuff bladder length encircles 80% of the arm. A cuff that is too narrow results in false high pressure readings. A cuff that is too wide results in false low pressure readings.

The cuff shown below on the left is too small for the arm, therefore, full cuff pressure is never applied to the artery. This causes an erroneously high blood pressure reading. The cuff shown on the right is of adequate width for the arm, and full cuff pressure is applied to the brachial artery.

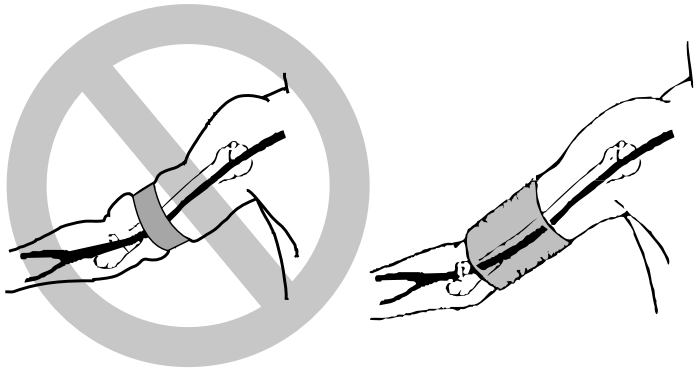


Figure 4-2: Blood Pressure Cuff Size

Cuffs for thighs are available for large patients or those where neither arm is available for cuff placement. Blood pressure measured at the thigh is typically 20-30 mmHg higher (when the patient is standing, not prone) than blood pressure measured at the upper arm.

Neonatal Cuffs and Hose

The monitor provides a neonatal NIBP monitoring mode that is specially designed for measuring low blood pressures with very small cuff sizes. Use the neonatal hose (Cat. No. 708) when monitoring in neonatal mode. Use disposable cuffs (Cat. Nos. 740, 741, 742, 743, 744). See “Accessories” in Appendix A for the complete accessory listing.

Patient Size Selection

The patient size setting affects the inflation rate and gain settings for the NIBP parameter. The correct patient size selection also reduces second attempt retries. The Pediatric mode is designed to work best with small adult, pediatric, and child size cuffs.

Placing the NIBP Cuff

⚠CAUTION⚠

- Always verify that the correct patient size has been selected.

Wrap the cuff snugly around the extremity, leaving enough room between the cuff and the extremity for two fingers. If the cuff is too loose, it cannot be inflated properly and may cause errors in measured BP values.

- It is best to wrap a bare extremity; putting the cuff over clothing may cause errors in measured values.
- Care should be taken to center the dot on the cuff directly over the brachial artery. (The dot is shown below as a circle with a vertical line.)
- The hose should not be twisted or kinked.

The end of the cuff (marked by an index line) should fall inside the range marked clearly on the inside of the cuff. If not, use a different size cuff. If the cuff is in the upper limit of the cuff range, the next larger size cuff can be used to ensure accurate measurements.

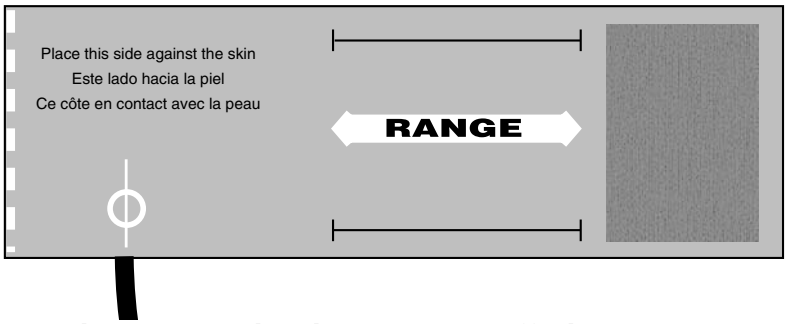


Figure 4-3: Blood Pressure Cuff Size Range

Single Measurement Procedure

1. Check the front panel for the correct mode. An indicator symbol illuminates that the monitor is in ADULT, PEDIATRIC, or NEONATAL mode. The mode is set with the PATIENT key.
2. Select a cuff as described previously in this section.
3. Connect the blood pressure cuff to the hose and the hose to the monitor.
4. Secure the cuff around the patient's extremity.
5. Make sure there are no kinks or other obstructions in the hose extending from the cuff.
6. Press the NIBP START/STAT/STOP key on the front keypad of the monitor.

Press the NIBP START/STAT/STOP key to take one measurement. The monitor may make a second attempt if there is excessive motion during the first attempt to take a measurement. A *PLEASE WAIT* message with tone appears prior to a second attempt.

The patient size indicator flashes when the NIBP START/STAT/STOP button is pressed for a demand NIBP reading or a stat measurement is taken. Verify that the correct patient size is selected.

STAT Measurement

Press and hold the NIBP START/STAT/STOP key to begin taking Stat NIBP measurements. NIBP measurements are then taken repeatedly for 5 minutes. The numerical parameters on the display are updated with each measurement.

NOTE: Repeated use of short-term automatic stat measurements may compromise blood flow.

Cycle Measurements

If an *NIBP CYCLE* time has been selected the monitor automatically continues to take NIBP measurements at scheduled intervals.

Tips for Taking Accurate NIBP Measurements

For optimum accuracy, the patient should keep the cuffed part of the arm at the same level as the heart. NIBP measurement points above the level of the heart gives reduced pressure values. Measurement points below the heart level gives increased values. These errors are due to the weight of the blood.

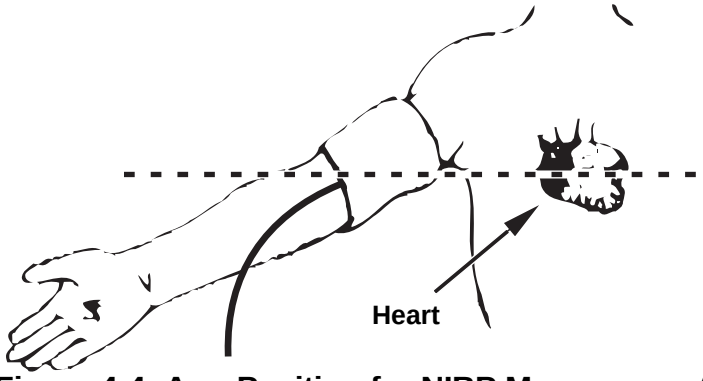


Figure 4-4: Arm Position for NIBP Measurement

⚠CAUTION⚠

- For optimum accuracy, the patient should remain still during blood pressure measurement. Excessive patient motion may adversely affect any oscillometric NIBP device.

Have the patient remain seated for approximately five (5) minutes to allow the patient's vital signs to stabilize. This provides more uniform measurements. Body posture and patient anxiety can also affect blood pressure measurements. See the American Heart Association's guidelines for more information about proper techniques for blood pressure measurements.

An average measurement on a non-moving patient takes less than 40 seconds. At the end of each measurement, the cuff automatically deflates. The monitor automatically attempts a second measurement (with a *PLEASE WAIT* message) if it cannot calculate a blood pressure on the first inflation.

If a patient experiences a sudden dramatic drop in blood pressure, the system may not measure the blood pressure on the first attempt. The system automatically attempts another pressure measurement and detects the change on the second attempt. When a second attempt is necessary, a *PLEASE WAIT* message appears to notify the user that a second attempt is in progress.

Do not compress the cuff or the cuff hose externally. Compression of the cuff or the cuff hose causes measurement error.

SpO_2 Monitoring (Pulse Oximetry)

The following instructions describe procedures for preparing a patient for SpO_2 monitoring. This section breaks out into separate subsections for DOX™ and OxiMax® SpO_2 sensors. Check the label by the SpO_2 sensor connection on your monitor to determine if the monitor uses DOX or OxiMax oximetry.

⚠CAUTION⚠

- DOX and OxiMax sensors are not interchangeable.

SpO_2 Sensor Safety

⚠CAUTION⚠

- The pulse oximeter sensor may cause skin irritation and pressure necrosis. Inspect the pulse oximeter sensor site every two to four hours or per hospital protocol. Move the sensor to a different location if skin irritation is present.
- Excessive amounts of motion at the sensor sites may cause errors in reading. Attempt a reading when motion has stopped, or move the sensor to another site.
- Do not place the sensor in the proximity of electrosurgical contacts or directly in the circuit path. Momentary disruption of the plethysmograph may occur while the electrode is in contact with the patient.

Pulse oximeter sensors may be replaced if they fail or become excessively worn. Replacement sensors may be ordered from Criticare Systems, Inc. See “Accessories” in Appendix A. Disposable sensors are for single patient use only.

Do not stretch sensor cables. Store cables carefully after forming them into loose loops. If cables are stretched, electrical failures could result.

The sensors must not be tightly wound around fingers or other objects. The cable used in CSI reusable sensors has a minimum acceptable bend radius of 0.75 inches (19mm). For short term storage, the sensor should be loosely looped or hung on a large diameter hook.

Using DOX SpO_2

DOX SENSOR SELECTION

Select a sensor based on patient size and monitoring conditions. For optimum results, refer to the following table regarding sensor selection for various patient monitoring applications.

DOX Compatible Sensors (506DN3 Models only)

Patient Size	Short Term	Long Term/ High Activity
Over 80 lbs. (>40 kg)	Reusable Adult Shell™: 934 SDN Reusable Adult Pocket: 975AD-3	Reusable Adult Shell™: 934-10DN Reusable Adult Pocket: 975AD-10 Reusable Multi-Site™: 940SD Disposable Adult: 570SD
Between 30 and 100 lbs. (>15 kg; <50 kg)	Reusable Pediatric Pocket: 975PD-3	Reusable Pediatric Pocket: 975PD-10 Reusable Multi-Site Sensor: 940SD Disposable Pediatric: 571SD
Below 30 lbs (<15 kg)	Reusable Multi-Site™: 940SD	Reusable Multi-Site™: 940SD Disposable Infant: 572SD Disposable Neonate: 573SD

Connecting the DOX Cable to the Monitor

Shown below is the patient monitor with a pulse-oximetry finger sensor attached. This adult finger sensor (catalog number 934SDN) is one of many sensor styles available. Use the SpO_2 sensors only as directed.

The monitor's DOX SpO_2 connection accepts any Criticare SpO_2 sensor using the DB-9 connection style.

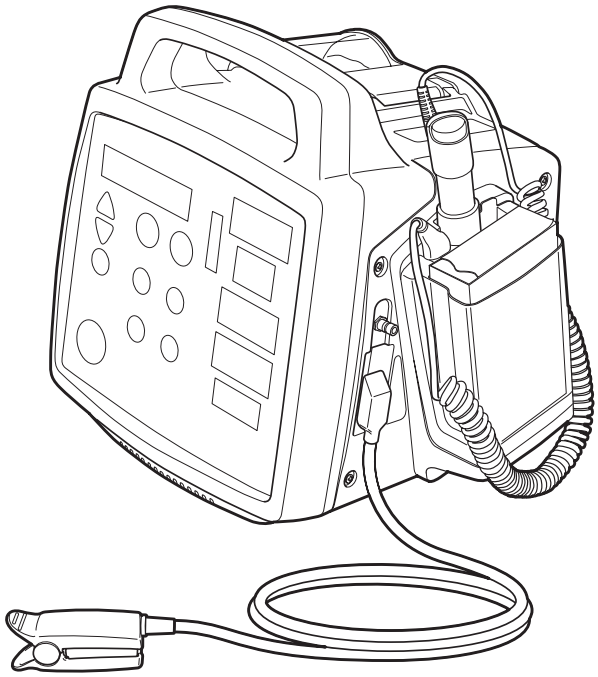


Figure 4-5: 506N3 Series SpO_2 DOX Sensor Connection

DOX SpO_2 FINGER SENSOR PLACEMENT

Apply the sensor with the LED lights positioned on the nail side of the finger and the detector on the fleshy portion of the finger.

Inspect the pulse oximeter application site every 2 to 4 hours or per hospital protocol. If there is any redness or skin irritation caused by the sensor, remove the sensor and apply it to a different location.

Do not tape over the pulse oximeter sensor housing. Taping over the housing may cause injury and sensor failure due to excessive pressure. If the sensor needs to be secured, place tape over the cable, immediately behind the sensor.

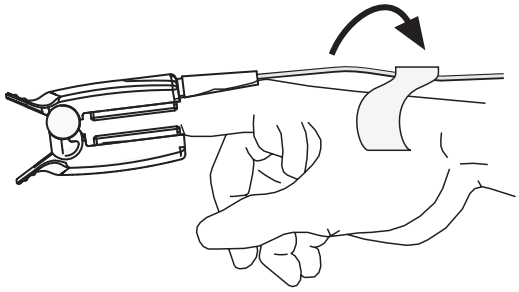


Figure 4-6: Finger Sensor Placement (934SDN)

The sensor must be properly positioned for a plethysmographic waveform to be detected. Placing tape too tightly around an extremity will reduce blood flow, thus diminishing the amplitude of the plethysmographic waveform.

If possible, do not place the pulse oximeter sensor on the same extremity as the blood pressure cuff or an arterial line. Place the pulse oximeter sensor on the side of the patient opposite the blood pressure cuff or an arterial line. The occlusion of the blood flow during blood pressure determinations could affect saturation readings.

The pulse oximeter sensor is light sensitive. Too much ambient light makes it difficult for the system to provide accurate readings. The system provides a high ambient light alarm message when it is necessary to shield the sensor from extraneous light sources such as phototherapy light or infrared heating lamps.

MULTI-SITE™ SENSOR PLACEMENT

In situations where finger sensors are not practical, a Criticare Multi-Site Sensor can be used. The sensor pads are small, light weight, and adjustable.

Figure 4-7: Multi-Site Finger Placement (940SD)

The Multi-Site Sensor can be placed using adhesive tape. Special care should be taken not to restrict blood flow in the finger tip.

Alternatively, a Posey Wrap (Cat. No. 920), that has a velcro strap, can be used to place and adjust the Multi-Site Sensor. The sensor pads fit easily into precut slots in the Posey Wraps.

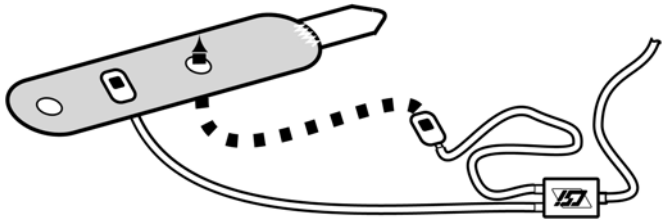


Figure 4-8: Multi-Site Sensor with Posey Wrap

An ear clip is provided with the Cat. No. 940SD sensor kit. Slide the sensor pads into the clip and place on the ear as shown below. Double-sided adhesive dots come with the 940SD sensor that can be used to adhere the clip to the ear. Replacement ear clips and adhesive dots can be ordered separately, see “Accessories” in Appendix A.

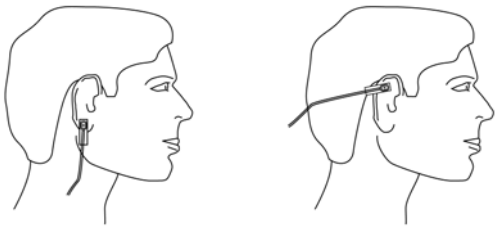


Figure 4-9: Multi-Site Sensor with Ear Clip

The Multi-Site Sensor can also be placed on the forehead. A forehead applicator and velcro head band are provided with the Cat. No. 940 sensor kit. Place the Multi-Site sensor pads into the forehead applicator.

The forehead applicator can be fastened with an adhesive strip or a head band can be used.

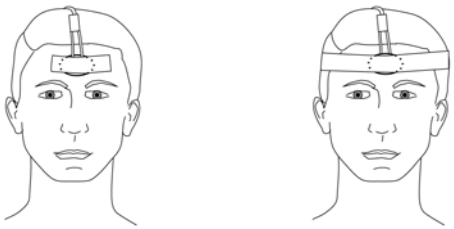


Figure 4-10: Multi-Site Sensor Forehead Application

The Multi-Site sensor can be used for measuring SpO_2 on an infant foot. Place the light emitting sensor pad on the top of the infant foot. The detector should be placed on the bottom. Adhesive tape may be used to hold the sensor pads in place.

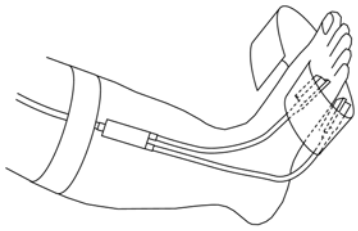


Figure 4-11: Multi-Site Sensor Foot Placement

Using Nellcor OxiMax SpO_2

NELLCOR OXIMAX SENSOR SELECTION

The oximetry module used in the 506LN3 series monitors is equivalent to the oximetry used in the N-595 pulse oximeter. Select a sensor based on patient size and monitoring conditions. For optimum results, refer to the following table regarding sensor selection for various patient monitoring applications.

OxiMax Compatible Sensors* (506LN3 Models only)

Patient Size	Short Term	Long Term/ High Activity
> 50 kg	Reusable durasensor™ DS-100A 939A	Reusable Durasensor™ DS-100A 939A Max-Fast™ adhesive forehead
> 40 kg	Reusable durasensor™ DS-100A 939A Reusable (adult finger) Oxi-A/N	Reusable Durasensor™ DS-100A 939A Adhesive (adult finger) Max-N Max-Fast™ adhesive forehead
> 30 kg	Reusable ear clip D-YSE Reusable Dura-Y™ D-YS	Reusable Dura-Y™ D-YS Adhesive finger Max-A Adhesive finger Max-AL (36" cable)
10 to 50 kg		Adhesive pediatric finger Max-P
3 to 40 kg	Reusable Pedicheck™ D-YSPD Reusable pediatric/infant Oxi-P/I Reusable Dura-Y™ D-YS	Reusable Dura-Y™ D-YS
3 to 20 kg	Reusable Dura-Y™ D-YS	Reusable Dura-Y™ D-YS Adhesive infant finger Max-I
< 3 kg	Reusable Dura-Y™ D-YS	Reusable Dura-Y™ D-YS Adhesive (infant foot) Max-N

*The OxiMax Durasensor™ model DS-100A is available through Criticare Systems, Inc., as Catalog Number 939A. Other sensors listed in this table are available through Nellcor Puritan Bennett Inc. All sensors listed above were validated with the Nellcor N-595 pulse oximeter.

Connecting the OxiMax Cable to the Monitor

Before connecting the cable to the monitor, ensure that the monitor is an OxiMax-compatible monitor. Verify that the SpO_2 connection has a tag stating: “Nellcor OxiMax works here.” If the tag does not state this, the OxiMax sensor cannot be used.

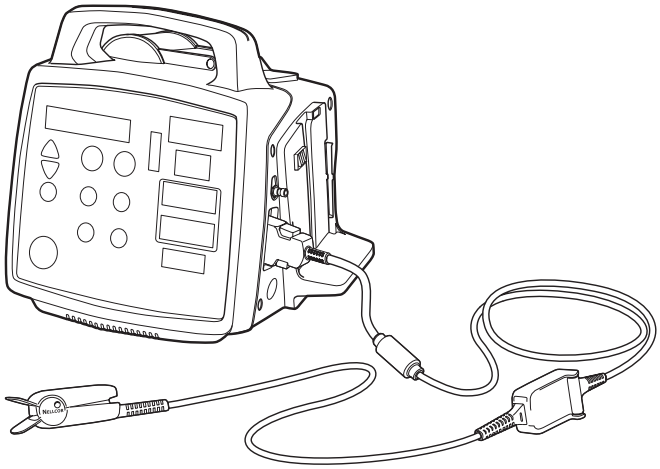


Figure 4-12: Monitor with OxiMax Sensor

Press the buttons on the sides of the extension cable connector and insert the connector into the monitor SpO_2 connection.

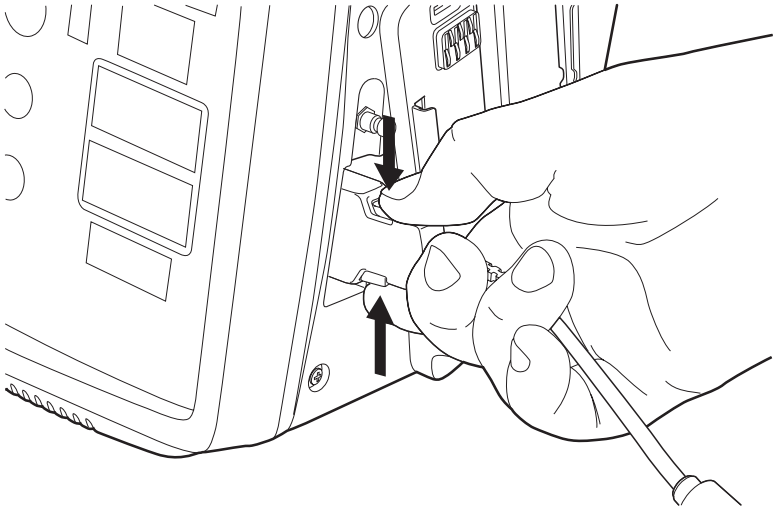


Figure 4-13: Insert SpO_2 Cable into SpO_2 Connector

Connect the SpO_2 cable to the SpO_2 extension cable. Snap the clear plastic cover in place to hold the connection firm.

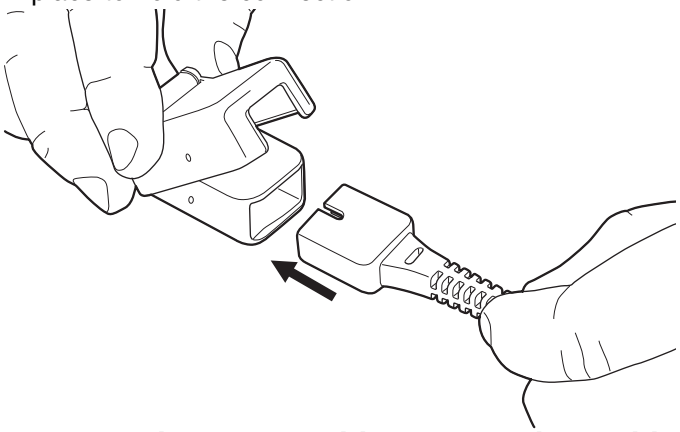


Figure 4-14: Connecting SpO_2 Cable to Extension Cable

NELLCOR OXIMAX SpO_2 SENSOR PLACEMENT: GENERAL GUIDELINES

Do not tape over the pulse oximeter sensor housing. Taping over the housing may cause injury and sensor failure due to excessive pressure. If the sensor needs to be secured, place tape over the cable, immediately behind the sensor.

The sensor must be properly positioned for a plethysmographic waveform to be detected. Placing tape too tightly around an extremity will reduce blood flow, thus diminishing the amplitude of the plethysmographic waveform.

If possible, do not place the pulse oximeter sensor on the same extremity as the blood pressure cuff or an arterial line. Place the pulse oximeter sensor on the side of the patient opposite the blood pressure cuff or an arterial line. The occlusion of the blood flow during blood pressure determinations could affect saturation readings.

The pulse oximeter sensor is light sensitive. Too much ambient light makes it difficult for the system to provide accurate readings. The system provides a high ambient light alarm message when it is necessary to shield the sensor from extraneous light sources such as phototherapy light or infrared heating lamps.

Inspect the pulse oximeter application site every 2 to 4 hours or per hospital protocol. If there is any redness or skin irritation caused by the sensor, remove the sensor and apply it to a different location.

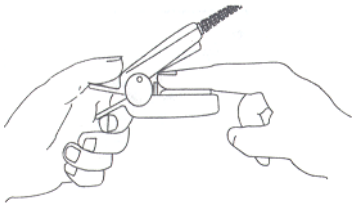
NELLCOR OXIMAX DURASENSOR PLACEMENT (DURASENSOR DS-100A)
The Durasensor DS-100A is a finger sensor. When selecting a site, select a finger free of an arterial catheter, blood pressure cuff, or intra vascular infusion line.

NOTE: Do not place the DS-100A sensor on a thumb or toe or across a child's hand or foot.

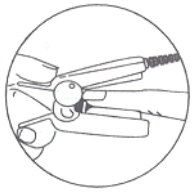
Inspect the pulse oximeter application site every 2 to 4 hours or per hospital protocol. If there is any redness or skin irritation caused by the sensor, remove the sensor and apply it to a different location.

To apply the Durasensor:

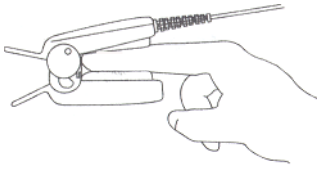
1. Place the index finger over the sensor window of the DS-100A with the finger tip against the stop.



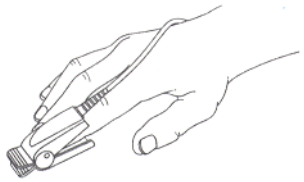
NOTE: If the fingernail is long, the nail tip extends over the finger stop.



2. Spread open the rear tabs of the sensor to provide even force over the length of the pads. Check the position of the sensor. If an index finger cannot be positioned correctly, use a smaller finger.



3. Orient the sensor so that the cable is positioned along the top of the hand.



4. The sensor is ready for patient use.

NELLCOR OXIMAX SpO_2 ADULT SENSOR PLACEMENT (MAX-A, MAX AL, MAX-N)

Apply the sensor with the sensor attached to the cable positioned on the nail side of the finger and the detector on the fleshy portion of the finger.

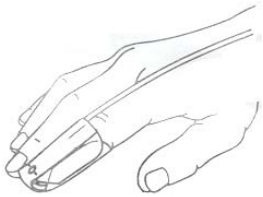


Figure 4-15: Adult Finger Sensor Placement

NELLCOR OXIMAX SpO_2 PEDIATRIC SENSOR PLACEMENT (MAX-P)

Apply the sensor with the sensor attached to the cable positioned on the nail side of the finger and the detector on the fleshy portion of the finger.

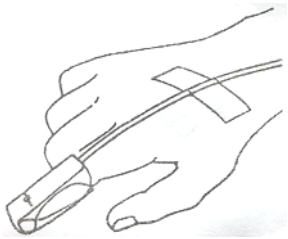


Figure 4-16: Pediatric Finger Sensor Placement

NELLCOR OXIMAX SpO_2 NEONATE FINGER SENSOR PLACEMENT (MAX-I)

Apply the sensor with the sensor attached to the cable positioned on the nail side of the finger and the detector on the fleshy portion of the finger.

Figure 4-17: Neonate Finger Sensor Placement (Max-I)

NELLCOR OXIMAX SpO_2 INFANT FOOT SENSOR PLACEMENT (MAX-N)

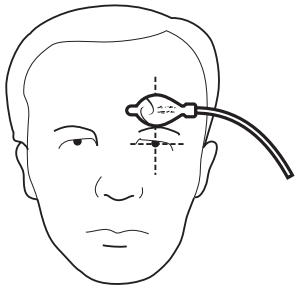
Place the sensor with the sensor attached to the cable around the foot of the Neonate patient, so that the cable is positioned at the bottom of the foot.

Figure 4-18: Neonate Foot Sensor Placement (Max-N)

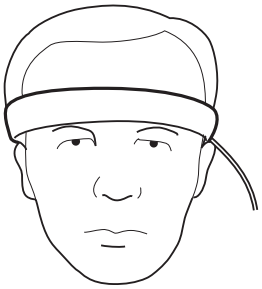
NELLCOR OXIMAX MAX-FAST SpO_2 SENSOR PLACEMENT (MAX-FAST)
An option for OxiMax sensors is the Max-Fast® headband sensor. The Max-Fast is designed for use on the patient's forehead, a site closer to the heart. The Max-Fast sensor responds to changes in arterial oxygen saturation typically one to two minutes sooner than digit sensors for patients with weak pulses. Unlike ear sensors, which may cause pressure necrosis and are subject to vasoconstriction, the Max-Fast sensor maintains stronger signal integrity.

To apply the Max-Fast sensor:

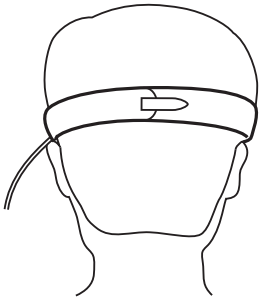
1. Attach the sensor to the forehead. Position the sensor above the eye.



2. Wrap the foam band around the head, covering the sensor.



3. Affix the Velcro® fastener snug to the head to prevent movement.



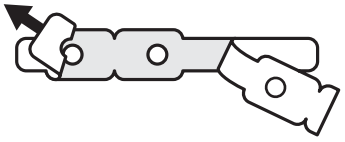
NELLCOR OXIMAX OXI-P/I PEDIATRIC/INFANT SENSOR PLACEMENT (OXI-P, OXI-I)

The Oxi-P and Oxi-I are extremity sensors. When selecting a site, select an extremity free of an arterial catheter, blood pressure cuff, or intra vascular infusion line.

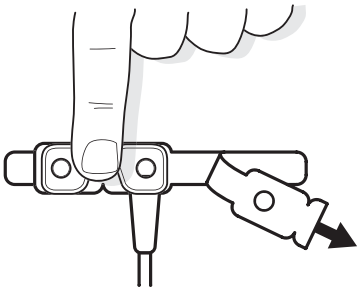
Inspect the pulse oximeter application site every 2 to 4 hours or per hospital protocol. If there is any redness or skin irritation caused by the sensor, remove the sensor and apply it to a different location.

To apply the Oxi-P or Oxi-I sensor:

1. Remove the short backing strip from the sensor wrap.



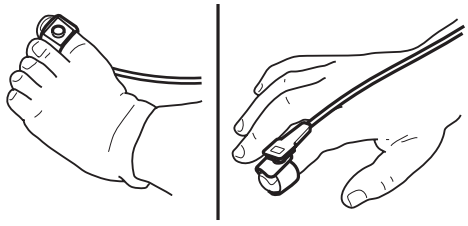
2. Push the sensors into the holes in the wrap.



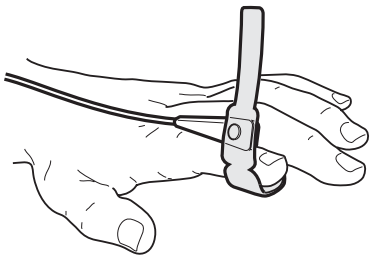
3. The sensor and wrap are ready for patient use. Select the location.

   For pediatric patients, the preferred location is the index finger, with the cable positioned along the side of the hand and arm.

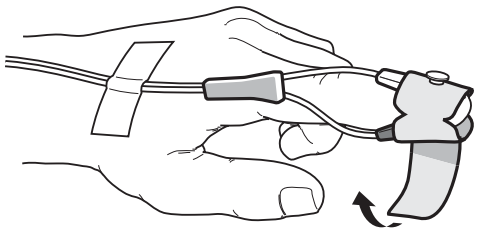
   For infants, the preferred location is a great toe, with the cable positioned along the side of the foot.



4. Position the sensor with the notches centered on the side of the finger or toe.



5. Wrap the sensor so that the optical components are directly opposite each other. Secure the wrap firmly but not too tightly.



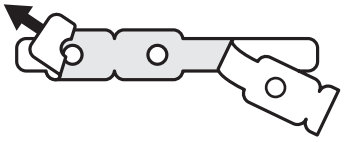
NELLCOR OXIMAX OXI-A/N ADULT/NEONATE SENSOR PLACEMENT (OXI-A, OXI-N)

The Oxi-A and Oxi-N are extremity sensors. When selecting a site, select an extremity free of an arterial catheter, blood pressure cuff, or intra vascular infusion line.

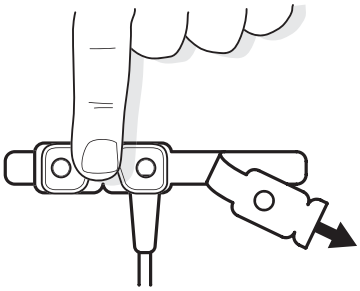
Inspect the pulse oximeter application site every 2 to 4 hours or per hospital protocol. If there is any redness or skin irritation caused by the sensor, remove the sensor and apply it to a different location.

To apply the Oxi-A or Oxi-N sensor:

1. Remove the short backing strip from the sensor wrap.



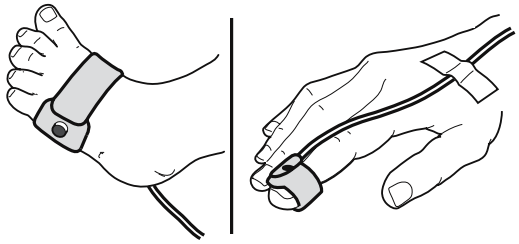
2. Push the sensors into the holes in the wrap.



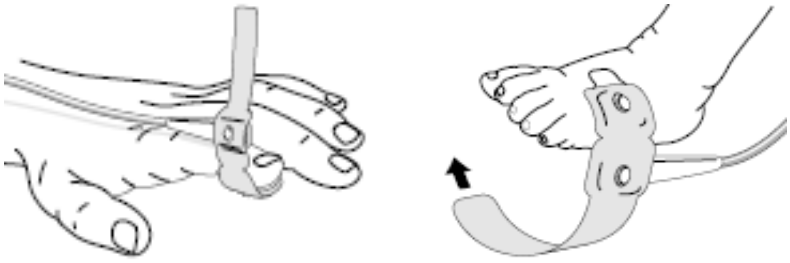
3. The sensor and wrap are ready for patient use. Select the location.

   For adult patients, the preferred location is the index finger, with the cable positioned along the side of the hand and arm.

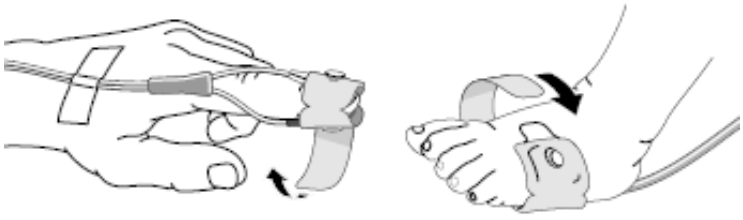
   For neonates, the preferred location is a foot, with the cable positioned along the side of the foot.



4. Position the sensor with the notches centered on the side of the finger or foot.



5. Wrap the sensor so that the optical components are directly opposite each other. Secure the wrap firmly but not too tightly.



NELLCOR OXIMAX DURA-Y SENSOR PLACEMENT (DURA-Y D-YS)

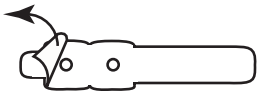
The Durasensor is a multi-site sensor. When selecting a site, select an extremity free of an arterial catheter, blood pressure cuff, or intra vascular infusion line.

When applying the Durasensor on a finger or toe, place the white sensor pad on the nail side of the finger or toe.

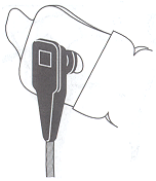
Inspect the pulse oximeter application site every 2 to 4 hours or per hospital protocol. If there is any redness or skin irritation caused by the sensor, remove the sensor and apply it to a different location.

To apply the Dura-Y sensor:

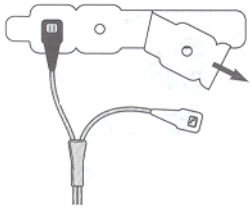
1. Remove the short backing strip from the sensor wrap.



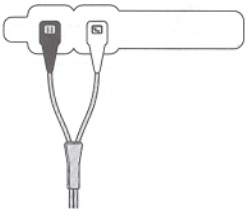
2. Push the “button” on the black sensor pad through the sensor wrap hole.



3. Remove the remainder of the backing strip from the sensor wrap.

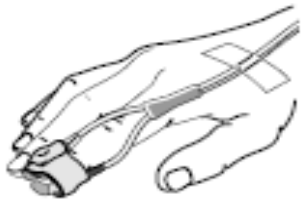


4. Insert the “button” on the white sensor pad through the remaining sensor hole.



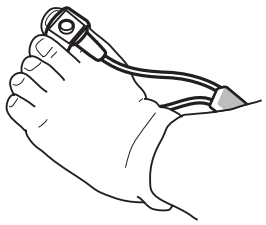
5. The sensor and wrap are ready for patient use. Select the location.

   For adult patients, the preferred location is the index finger, with the cable positioned along the side of the hand and arm. The white sensor pad must be on the nail side.

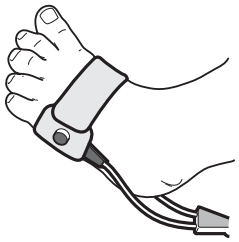


   If both index fingers are unavailable, use a thumb, a smaller finger, or a great toe, with the cable positioned along the side of the foot.

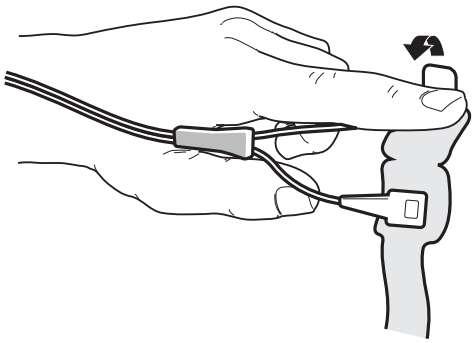
   For infants, the preferred location is a great toe, with the cable positioned along the side of the foot.



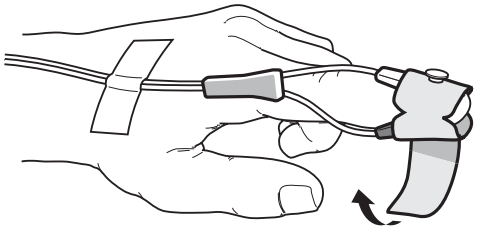
   For Neonates, proximal to the toes, with the cable positioned along the side of the foot.



6. Position the black sensor pad first. Secure to the patient's skin with the clear adhesive tab.



7. Place the white sensor directly opposite the black sensor pad. Wrap the remaining wrap around the site.



NELLCOR OXIMAX DURA-Y EAR SENSOR PLACEMENT (DURA-Y D-YSE)

The Dura-Y D-YSE sensor is an ear sensor. Inspect the pulse oximeter application site every 2 to 4 hours or per hospital protocol. If there is any redness or skin irritation caused by the sensor, remove the sensor and apply it to a different location.

To apply the Dura-Y sensor:

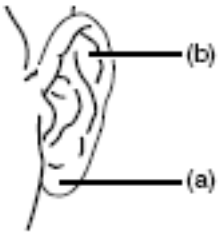
1. Press open the ear clip with the thumb and forefinger.

2. Slide one of the Dura-Y sensor alignment buttons along the ear clip slot until the sensor pad is fully engaged in the clip.

3. Slide the second Dura-Y sensor button along the other ear clip slot until the second sensor pad is fully engaged in its side of the clip.

   NOTE: Be sure that the Dura-Y sensor pads are oriented as shown in the illustrations. The optical components must face each other.

4. The sensor is now ready to be applied to the patient. The appropriate sensor sites are either the ear lobe (a), or the ear pinna (b).



5. Clip the sensor onto the ear so that the sensor cable runs down the side of the patient's face and body.

If problems arise in fitting the sensor to the ear with the ear clip, consider using the Nellcor Dura-Y sensor (with an adhesive wrap instead of the ear clip) on another body site, as described in the Directions for Use for the Dura-Y sensor in "Nellcor Oximax Dura-Y Sensor Placement (DURA-Y D-YS)" in this section.

Temperature Monitoring

506NT3 Series monitors have a FILAC® FasTemp® temperature monitoring module. The module has two operational modes for both spot check and long-term temperature monitoring. The Temperature Mode is selected using the *PARAMETER SETUP* menu. The factory default is Predictive Mode.

⚠WARNING⚠

- Do not use the temperature probe without a probe cover. Probe covers are required for optimal performance and patient safety.

⚠CAUTION⚠

- Use only Kendall brand probe covers (Model 202020) as specified. Decreased monitor accuracy of temperature reading may result from poorly fitting covers.
- Do not push the base of the probe or eject the probe cover while the probe is in the patient.
- Do not re-use probe covers. Probe covers are disposable and are not intended to be disinfected.

Probe and Storage Well

The temperature monitoring connection and the probe storage well are located on the right side of the monitor. A holder is provided for the probe cover box. Use the red rectal and blue oral probes and probe covers only.

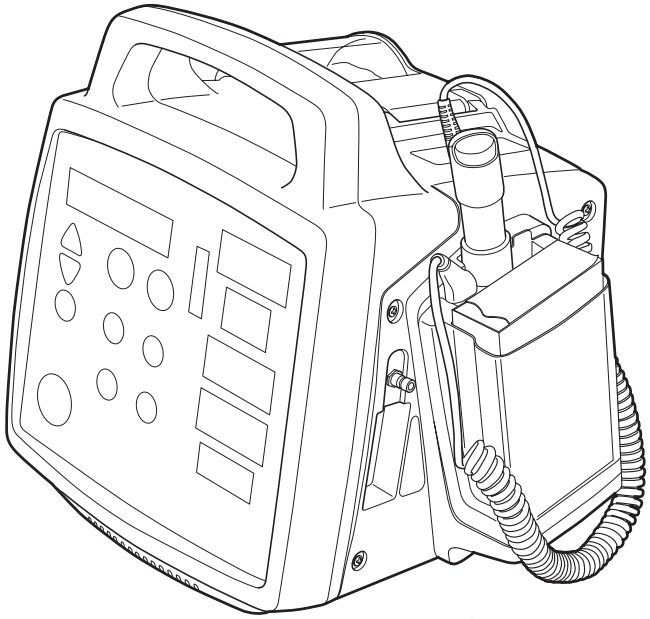


Figure 4-19: Temperature Connection

Predictive Mode (Normal)

The default Predictive Mode is predictive electronic thermometry. Predictive thermometry measures temperature at discrete intervals and then calculates the rate of change according to a proven algorithm. This allows the thermometer to predict the end point that the thermistor would reach if it were left in the mouth until it reached mouth temperature. This predictive feature allows the thermometer to arrive at an accurate oral temperature reading within about 30 seconds.

After proper probe cover installation and application of the temperature probe in either the oral, axillary, or rectal cavity, a tissue contact indicator (pinwheel) appears in the rightmost position of the Temperature display during the temperature measurement process. When the final temperature is achieved, an audible tone shall sound and the temperature reading (in degrees and tenths of a degree) appears on the TEMP display along with either °*F* or °*C* in place of the tissue contact pinwheel to indicate a final temperature reading.

Continuous Mode

Temperature monitoring in Continuous Mode is intended for relatively long-term patient monitoring. Operation is similar to Predictive Mode temperature monitoring, except that after placing the thermometer probe in the patient, the temperature indicated on the display slowly rises until, after 3 to 5 minutes, it stabilizes. No audible tone sounds.

To select Continuous Mode for temperature:

1. Press the MENU key.
2. Scroll down to the *PARAMETER SETUP* menu. Press MENU key.
3. Scroll down to *TEMP MODE* and press MENU key to select *Cont* as the value setting.

Should the sensed temperature be 107.9 °F (42.1 °C) or higher, a Low Priority alarm sounds and a *TEMP:INVALID* message appears in the LCD message screen. The TEMP (temperature) display shows dashes.

Switching Isolation Wells

The monitor uses different isolation wells and probes for rectal temperature (red) and for oral/axillary temperature (blue). The probe and isolation well must be changed if the location for temperature measurement changes. To change the isolation well and probe:

1. Install the desired thermometer probe cord into the correct isolation well of the temperature assembly (red with red; blue with blue).

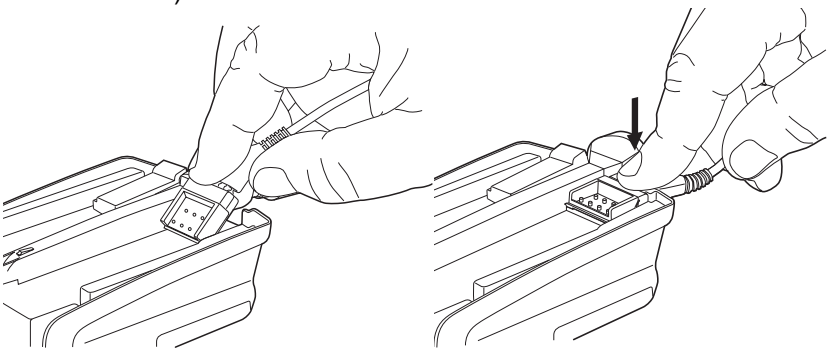


Figure 4-20: Attach Probe to Isolation Well

2. Remove the existing isolation well from the monitor. Pull the tab away from the monitor to release the isolation well from the monitor.

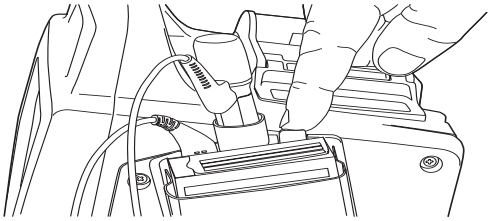


Figure 4-21: Remove Isolation Well

3. Attach the isolation well with attached probe to the monitor.

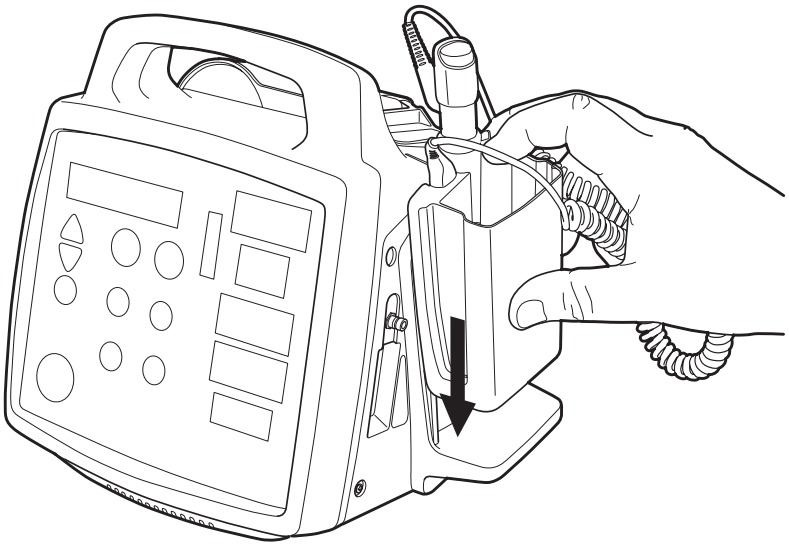


Figure 4-22: Attach Isolation Well to Monitor

Patient Oral Measurement

1. For oral temperature measurement, use the blue probe. Connect the probe and isolation well to the monitor and attach a probe cover to the probe as described in “Switching Isolation Wells” in this section.
2. Select the desired temperature measuring mode in the *PARAMETER SETUP* menu. Use Predictive Mode for performing spot checks or use Continuous Mode for long-term monitoring.
3. Inspect the temperature probe accessory for wear or damage. Replace as necessary.
4. Press the ORAL/AXILLARY button if the oral LED is not lit.

   NOTE: If the rectal LED is lit, you may have the wrong probe installed. If the red probe is installed, replace the red probe with the blue probe.
5. Insert the thermometer probe completely and firmly into a probe cover to ensure a secure fit.

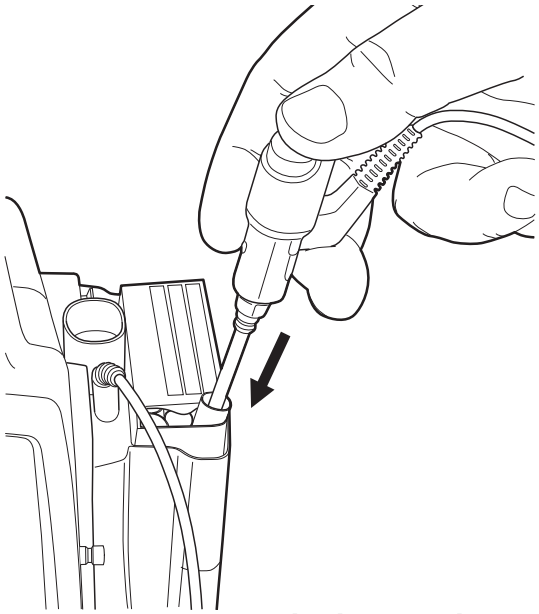


Figure 4-23: Insert Temperature Probe into Probe Cover

6. For oral temperatures using the blue (oral) probe, have the patient open the mouth slightly, then gently insert the probe tip and slide it back under the front of the tongue, along the gumline, to the sublingual (heat) pocket where the richest blood supply is located.

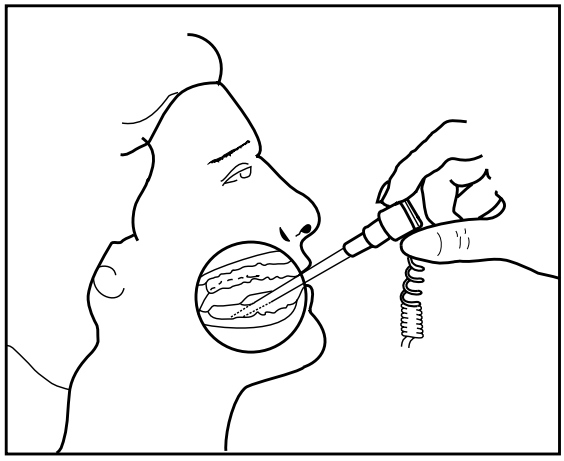


Figure 4-24: Oral Thermometer

7. Hold the probe during the entire temperature measurement process, keeping the probe tip in contact with tissue at all times; do not allow the patient to reposition the probe.
8. A tissue contact indicator (pinwheel) appears in the right-most position of the temperature display during temperature measurement process.
9. When the final temperature is achieved (an audible tone sounds in Predictive Mode) the pinwheel display changes to either *F* or *C*, and the patient's temperature (in degrees and tenths of a degree) displays on the temperature LED display for 2 minutes.
10. Examine the displayed temperature and remove the probe from the patient's mouth.

11. Hold the probe as you would a syringe, and press the base of the probe above the colored collar to eject the used probe cover into a waste container.

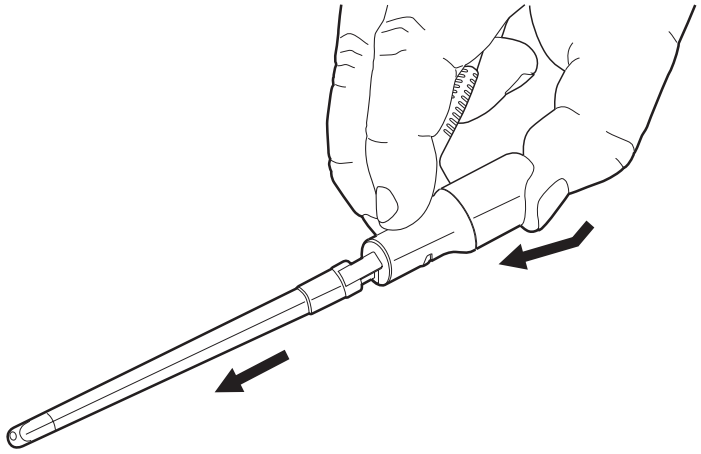


Figure 4-25: Ejecting Probe Cover

12. Return the probe to its storage well. This automatically turns off and resets the thermometer function for the next temperature measurement.

Patient Axillary Measurement

1. For axillary temperature measurement, use the blue probe. Connect the probe and isolation well to the monitor and attach a probe cover to the probe as described in “Switching Isolation Wells” in this section.
2. Select the desired temperature measuring mode in the *PARAMETER SETUP* menu. Use normal mode for performing spot checks or use monitor mode for long-term monitoring.
3. Install the desired thermometer probe cord into the TEMP connector on the side panel of the monitor.
4. Press the ORAL/AXILLARY button if the axillary LED is not lit.

   NOTE: If the rectal LED is lit, you may have the wrong probe installed. If the red probe is installed, replace with the blue probe.

5. For axillary temperatures using the blue (oral) probe, have the patient raise the arm, then place the probe tip in the axilla.

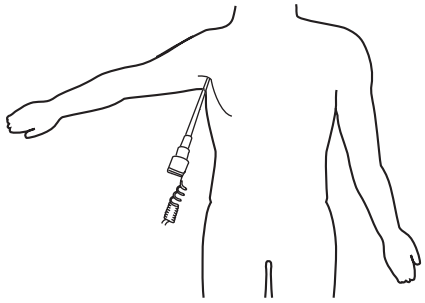


Figure 4-26: Insert Axillary Thermometer

6. Have the patient lower the arm. Hold the probe almost parallel to the arm as shown in “Figure 4-27: Taking Axillary Temperature”.

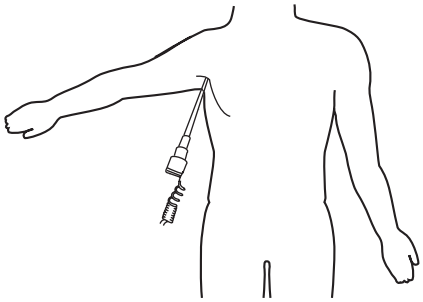


Figure 4-27: Taking Axillary Temperature

7. Hold the probe during the entire temperature measurement process, keeping the probe tip in contact with tissue at all times; do not allow the patient to reposition the probe.
8. A tissue contact indicator (pinwheel) appears in the right-most position of the temperature display during temperature measurement process.
9. When the final temperature is achieved (an audible tone sounds in Predictive Mode) the pinwheel display changes to either *F* or *C*, and the patient’s temperature (in degrees and tenths of a degree) displays on the temperature LED display for 2 minutes.
10. Examine the displayed temperature and remove the probe from the patient’s axilla.

11. Hold the probe as you would a syringe, and press the base of the probe above the colored collar to eject the used probe cover into a waste container.

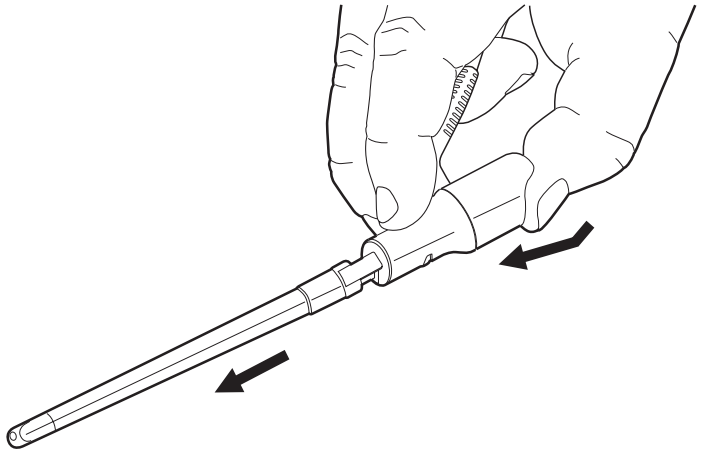


Figure 4-28: Ejecting Probe Cover

12. Return the probe to its storage well. This automatically turns off and resets the thermometer function for the next temperature measurement.

Patient Rectal Measurement

1. For rectal temperature measurement, use the red (rectal) probe. Connect the probe and isolation well to the monitor and attach a probe cover to the probe as described in “Switching Isolation Wells” in this section.
2. Ensure that the rectal LED is lit.

   NOTE: If the oral or axillary LED is lit, you may have the wrong probe installed. If the blue probe is installed, replace with the red probe.

   If the site location LED does not change after inserting a different isolation well, press the ORAL/AXILLARY button to set the monitor to the correct site.
3. Touch the tissue about one-half of an inch above the sphincter muscle and carefully insert the probe, using current hospital technique for penetration. (The use of lubricant is optional). When the final temperature is achieved, an audible tone sounds in predictive mode.

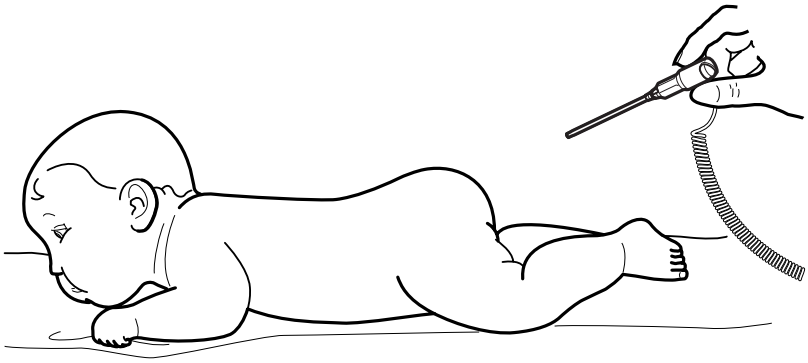


Figure 4-29: Taking Rectal Temperature

4. Examine the temperature, withdraw the probe, and eject the used probe cover as described in the oral measurement procedure.
5. Return the probe to its storage well. This automatically turns off and resets the thermometer function for the next temperature measurement.

Section 5 — Alarms and Messages

Alarm Description

The 506N3 Series monitor provides both audible and visible alarm indicators to alert the operator of status alarms and physiological parameter alarms.

The alarm feature has user adjustable physiological alarm limits. The alarm limit adjustments are retained in memory when the monitor is turned off. See the instructions for menu settings in “Setup Procedure” in Section 3.

Default Alarm Settings

There are also factory default alarm limits that are permanently stored in non-volatile memory. See the table in “Setup Procedure” in Section 3 for the factory default alarm settings.

To return to factory default settings for alarm limits, turn on the monitor by pressing the POWER key and the SILENCE key at the same time. This does not alter the settings found in the *CONFIGURATION* menu.

Alarm Testing

The alarms should be checked as part of the annual safety testing. Procedures for verifying the alarms are provided in the *506N3 Series Service Manual*. To ensure that the speaker and visual alarm indicators are functional, check the front display for unlit LEDs and check for a start-up beep while powering up the monitor.

Alarm Characteristics

All the alarms are either high level, medium level, low level, or informational alarms. There are also non-alarm informational system messages. For a full listing of all text alarms and messages, see the list at the end of this section.

Each physiological alarm limit condition or monitoring alarm message triggers both audible and visible alarms until one of the following events occurs:

- The measured value returns to within the alarm limit.
- The alarm limit is set beyond the present measured value.
- The SILENCE key is pressed. (Audible alarms only)

Audible and visual alarm characteristics are explained in detail later in the next section.

Audible Alarms

All alarms conform to EN 475 requirements for audible alarms.

HIGH PRIORITY ALARMS
The high priority alarm consists of a pair of audible bursts. Each burst consists of 5 tone pulses. The pair of bursts repeat every eight seconds. For each burst there is a short delay between the third and fourth pulse. The frequency of each pulse is 1000 Hz.

MEDIUM PRIORITY ALARMS
Each burst consists of 3 pulses. The frequency is 800 Hz and the repeat cycle is approximately 25 seconds.

LOW PRIORITY ALARMS
Each burst consists of 2 pulses. The frequency is 350 Hz and the repeat cycle is 15 seconds.

INFORMATIONAL ALARMS
Each burst consists of 2 pulses. The frequency is 300 Hz and the repeat cycle is approximately 5 minutes.

INFORMATIONAL SYSTEM MESSAGES
There is no audible alert for informational system messages.

Other Audible Indications

NIBP TONE
The NIBP tone is not an alarm. When activated the NIBP tone alerts the user that a measurement has been taken.

The tone has two pulses where the second pulse is at a lower pitch. The NIBP Tone has a “ding-dong” sound that is different from the 2 identical pulses of the low level alarm burst.

PREDICTIVE TEMPERATURE TONE
The predictive temperature tone is not an alarm. When in predictive mode, the tone alerts the user that a measurement has been taken. The tone has two pulses, the “ding-dong” sound similar to the NIBP tone.

PULSE TONE
The pulse tone indicates the pulse rate based from the plethysmographic (SpO_2) waveform data. The pitch of the tone decreases with a decrease in blood oxygen saturation.

The pulse tone volume has a different volume control than the alarms. The pulse tone can be turned off by setting the volume to *Off*. The alarm silence does not silence the pulse tone.

Alarm Silence

An alarm SILENCE key is provided on the front panel of the monitor.

SILENCE 2 MINUTES
Pressing the SILENCE key momentarily begins a 2 minute alarm silence. The alarm icon illuminates red. The message *ALARM SILENCE* appears in the first text line of the LCD display.

A new medium or high level alarms ends the 2 minute silence when the new alarm condition occurs. Pressing the SILENCE key a second time ends the silence condition and normal alarms resume.

PERMANENT SILENCE
Press and hold the SILENCE key to permanently silence the alarms. The alarm icon illuminates red and flashes. The message *AUDIO OFF* appears in the first text line of the LCD display. Notice that the long key-press tone “double-beep” occurs after holding the key in for 2 seconds, confirming that permanent silence was selected.

⚠CAUTION⚠

- Note that future alarms are also silenced and do not end the silence condition.

Pressing the SILENCE key a second time ends the silence condition.

Entering a new patient negates the alarm silence condition.

Parameter OFF Settings

When a parameter is turned *Off*, the associated audible alarms and visual indicators for that parameter are disabled. This also includes *SENSOR OFF* messages.

Alarm Volume

The alarm volume can be set to levels 1 to 10 with 10 being the loudest. This can be set in the *Alarm Menu*. The alarm volume can also be set to *Off*. The *AUDIO OFF* message appears if the volume is turned off.

Minimum Volume Auto-Reset

If the alarm volume is set to 1 or *Off*, the monitor automatically returns to the value 2 each time the monitor is turned on. If the monitor was turned off with a value setting greater than one, that value returns when the monitor is powered up again. This function cannot be disabled.

Visible Alarms

The monitor provides visible text alarms, indicators and flashing numerical parameters on the front panel.

FLASHING NUMERICAL PARAMETERS
If a physiological parameter exceeds a high limit or falls below a low limit value, the numerical value displayed flashes. This function cannot be suspended, but alarm limits may be set to *OFF*.

ALARM MESSAGE DISPLAY
There is space for two text lines provided in the LCD display. The top line is reserved for alarm messages. If multiple alarms are active, they alternate in the top line of the display. The bottom line is used for informational messages and the counter for the last NIBP measurement.

NOTE: The *AUDIO OFF* or *ALARM SILENCE* messages only appear if there is no alarm displayed on the LCD display.

Indicator Icons

The monitor has illuminated indicator icons on the front panel that identify specific monitoring conditions. See “LED Indicators” in Section 2.

ALARM SILENCE
The alarm silence icon appears, illuminated red, during alarm silence conditions as described previously in this section.

NO SENSOR
The no sensor alarm appears, illuminated red, when no SpO_2 sensor is detected or no finger is placed in the sensor.

ADULT MODE
The adult mode icon appears, illuminated amber, when the monitor is set to adult mode.

PEDIATRIC MODE
The pediatric mode icon appears, illuminated amber, when the monitor is set to pediatric mode.

NEONATAL MODE
The neonatal mode icon appears, illuminated amber, when the monitor is set to neonatal mode.

Alarms List

Included here is a list of messages and warnings that may appear in the LCD display.

Shared Source Alarms

	Priority	Description
LOW PULSE RATE	High	The heart rate value has dropped below the value set in the *ALARM MENU*.
HIGH PULSE RATE	High	The heart rate value has exceeded the value set in the *ALARM MENU.*

NIBP Alarms

	Priority	Description
BP: LOW SYS	Medium	The systolic value has dropped below the value set in the *ALARM MENU*.
BP: HIGH SYS	Medium	The systolic value has exceeded the value set in the *ALARM MENU*.
BP: LOW DIA	Medium	The diastolic value has dropped below the value set in the *ALARM MENU*.
BP: HIGH DIA	Medium	The diastolic value has exceeded the value set in the *ALARM MENU*.
BP: LOW MAP	Medium	The mean arterial pressure value has dropped below the value set in the *ALARM MENU*.
BP: HIGH MAP	Medium	The mean arterial pressure value has exceeded the value set in the *ALARM MENU*.
BP: CHECK CUFF	Low	Displayed when an adult/child cuff is used while the monitor is in the neonatal mode. Switch to neonatal mode when using a neonatal cuff. Can also indicate a leak in the cuff, or the cuff is wrapped too loosely.
BP: ERROR	Low	The monitor has detected a fault with the NIBP function. Contact CSI Service Department.
BP: LO PULSE AMP	Low	Pulse amplitude is too low. Reposition cuff.
BP: MAX PRESSURE	Low	Maximum allowed cuff pressure (300 mmHg) has been attained.
BP: MAX TIME	Low	Maximum time (2 minutes) allowed for measuring the blood pressure has been exceeded. Repeat measurement.
BP: NO DEFLATE	Low	The monitor was unable to deflate the NIBP cuff. Disconnect the cuff and contact the CSI Service Department.

	Priority	Description
BP: NOT TAKEN	Low	The monitor was unable to take a blood pressure reading due to bad cuff placement or patient motion. Check cuff size and position.
BP: FAIL	Low	The monitor cannot detect an NIBP cuff. Contact CSI Service Department.
BP: CALIB ERROR	Low	The monitor has detected a fault with the calibration. Cycle the power to the monitor. If the problem persists, contact the CSI Service Department.
BP: PLEASE WAIT	Informational	The cuff has not completely deflated. Wait for deflation and then press NIBP key again. This message also displays when an initial attempt fails and a second attempt is in progress.

SpO_2 Alarms

	Priority	Description
	SpO_2 ALARMS	
LOW SPO2	High	The SpO_2 value has dropped below the value set in the alarm menu.
HIGH SPO2	Medium	The SpO_2 value has exceeded the value set in the alarm menu.
SPO2: NO SENSOR	Low	The SpO_2 sensor is not connected, or the SpO_2 signal is not being detected due to possible sensor failure. Connect or replace the sensor. This message will not appear until at least one valid vital sign has been read. The SPO2 LED will illuminate.
SPO2: SENSOR	Low	The SpO_2 sensor is not properly positioned, or is off site. This message will not appear until at least one valid vital sign has been read. The SPO2 LED will illuminate.
SPO2: SEARCH	Informational	The SpO_2 signal has disappeared. Move the sensor to a different site.
SPO2: ERROR	Low	The monitor has detected a fault with the SpO_2 function. Contact CSI Service Department or your Biomedical Department.
SPO2: FAIL	Low	The monitor cannot detect an SpO_2 module. Contact CSI Service Department.
LOW SAT OFF	Informational	The SpO_2 low limit has been set to *Off*.

	Priority	Description
	DN3 SERIES SpO_2 ALARMS	
SPO2: LOST	Medium	The SpO_2 signal was present but became too low to detect; check for opaque material at sensor location.
SPO2: SIGNAL	Low	The SpO_2 signal is too weak to measure. Check the sensor site for low perfusion and reposition the sensor if necessary.
SPO2: HI AMBIENT	Low	Sensor is detecting excessive ambient light. Shield the sensor or reduce the amount of ambient light.
	LN3 SERIES SpO_2 ALARMS	
SPO2: NOISE	Low	Interference may be caused by incorrect sensor placement with other devices, the presence of dyes and pigments, high ambient light conditions, excessive patient activity, venous pulsation dysfunctional hemoglobi, poor peripheral perfusion, arterial occlusion proximal to the sensor, loss of pulse/cardiac arrest, EMI, or ventilator-induced pressure changes.
SPO2: PULSE LOST	Medium	The SpO_2 signal and pulse are no longer detectable.

Temperature Alarms

	Priority	Description
LOW TEMP	Medium	The temperature value has dropped below the value set in the *ALARM MENU*.
HIGH TEMP	Medium	The temperature value has exceeded the value set in the *ALARM MENU*.
TEMP: SYS ERROR	Medium	The monitor has detected a problem with the probe heater. Restart the monitor to continue monitoring. If the problem continues, contact CSI Service Department.
TEMP: INVALID	Low	The thermometer probe temperature exceeds 107.9 degrees F (42.1 degrees C).
TEMP: ERROR	Low	The monitor has detected a fault in the temperature module.
TEMP: BAD PROBE	Low	The monitor has sensed a broken electrical connection in the probe, probe connector or connecting wire. Replace probe.
TEMP: FAIL	Low	The monitor is configured for temperature but cannot detect a temperature module. Contact CSI Service Department.
TEMP:NO PROBE	Low	The monitor does not detect a probe. Verify that a temperature probe well is attached to the monitor and that all connections are secure.
TEMP: WAIT	Informational	The temperature module has not yet responded to a site or mode change and the probe has been pulled out of the chamber.

System Messages

There is no audible component for these informational messages.

	Priority	Description
Primary Messages	The following messages cycle on the first line of the LCD display.	
SYSTEM: ERROR	Low	Monitor detected a fault with the main board.
LOW BATTERY	Informational	Battery power is low. Recharge the batteries.
PRINTER: ERROR	Informational	Internal printer communication problem. Contact CSI Service Department.
PRINT: PAPER OUT	Informational	The printer has detected the end of the paper roll. Place new roll of paper in the printer.
ALARM SILENCE	Informational	A 2 minute silence condition is in effect. Only appears if no longer alarm message displays.
AUDIO OFF	Informational	A permanent silence condition is in effect. Only appears if no longer alarm message displays.
Secondary Messages	The following messages appear on the second line of the LCD display.	
NEW PATIENT #*XXX*	Informational	Indicates current sequential patient. Only shown if there are no other status messages. Does not appear if cycle measurement is active.
LAST BP *XX*:*XX*	Informational	The monitor displays a counter starting from the last NIBP measurement taken. The count is in minutes and seconds. The counter quits after 20 minutes.
STAT TIME *XX*:*XX*	Informational	The monitor indicates the amount of time remaining during a 5 minute STAT measurement.
CYCLE NIBP: *XXN*	Informational	The monitor indicates the NIBP cycle time, if the feature is on. This is not visible during STAT measurements.
PATIENT #*XXX*	Informational	Displays which patient's historical records are being viewed. This message only appears when the TREND key is pressed and the *TREND* menu is entered.

Section 6 — Trends

Stored Patient Records

The 506N3 Series monitors store spot-check and continuous measurement records. The stored data can be either viewed on the front display panel or printed. The trend data can be formatted into a variety of report types. The formats apply to both the viewed and printed trend reports.

TREND Key

The TREND key has three functions for accessing trend data:

- Press the TREND key to enter Trend View Mode and display the recorded measurements on the front panel LEDs. Press the key again to access the Trend Settings.
- Press and hold the TREND key for two (2) seconds to step back from Trend Settings to Trend View Mode. Press and hold the Trend Key in Trend View Mode to return to the main menu.
- Press the TREND key in the Trend Settings Menu to advance through the settings selections. When in the Trend Settings Menu, pressing the TREND key will function the same as pressing the DOWN arrow.

PATIENT Key

The PATIENT Key has two special trend functions:

- Press the arrow keys while holding the PATIENT key to step through the data patient by patient. The most current measurement record for each patient will be displayed.
- Press the PRINT key while holding the PATIENT key to print all the records for the patient currently being displayed in Trend View Mode.

The normal operation of the PATIENT key to add new patients and to change patient size is suspended while in Trend View Mode.

Using Trend Display

To enter Trend View Mode press the TREND key. The most recent date/time stamped record appears on the LED numerical displays. The LCD also displays sequential patient number for that record.

Pressing the UP or DOWN arrow keys will review stored records. The function wraps back around through the file to the most recent patient when it reaches the end of the data. Pressing and holding the arrow keys will accelerate the scrolling of the data displayed.

The Trend View displays records determined by the current trend settings. If there is no trend data, the Trend View appears as a single dashed record for the current patient.

Exiting Trend View Mode

Press and hold the TREND key (or the MENU key) to leave the Trend View Mode.

When in Trend View Mode (or Trend Settings Menu), the monitor will automatically return to the Home Screen if no keys are pressed within 20 seconds.

If the monitor detects valid data while in Trend View Mode, the monitor reverts back to normal operation to display current data. If a trend print is in progress, the print is completed before returning to the Home Screen display.

Clearing Trend Data

The trend memory is clear either:

- When the time of date is changed in the menu, or
- The TREND key is held down while power is turned on to the monitor.

The trends do not clear when the patient size is changed.

Trend Data Records

The trend data records are composed of episodic (spot-check) measurements and interval measurements.

The episodic measurements include blood pressure measurements and predictive temperature measurements. These are spot-check measurements that are stored with individual time stamps at the time of completion. All episodic data (BP and Predictive Temperature) is recorded by exact time stamp.

Interval measurements are collected from continuous monitoring parameters such as SpO_2 and continuous temperature. Each interval record is date and time stamped on 1-minute interval.

If two (2) or more records have the same time stamp, they are recorded as separate records in the exact order they were generated.

The stored records are available for review and/or printing in the Trend View Mode.

Time and Date Stamp Format

The date and time appears on the top line of the LCD Message bar. If the 24-Hour format is used, the line displays *DDMMMYY_HH:MM:SS*. If AM/PM is selected the seconds will not be displayed.

The LCD displays the sequential patient marker below the date/time stamp.

24-HOUR FORMAT	**AM/PM FORMAT**
02APR05 18:32:37	02APR05 06:32:3P
PATIENT #001	PATIENT #001

Interval Data Records

At the end of every 1-minute period, the three continuously monitored parameters (SpO_2 Sat, SpO_2 HR, Continuous Temp) are automatically averaged for the period and entered as a combined data record. The record is time stamped at '00' seconds indicating it was recorded exactly at the 1-minute mark.

NOTE: Since continuous data may not be stored at exactly the same time as the records produced by the "Print On BP" and Interval Print" features, instantaneous paper records created during monitoring may differ from the interval trend records. In comparison, blood pressure measurements are episodic (spot-check) measurements and are stored independently so that they will match time-stamped printed data created by the "Print On BP" feature.

Trend Memory

The trend memory can record a total of 1440 complete, continuous monitoring, date/time stamped records for SpO_2 Heart Rate, SpO_2 Saturation, and Continuous Temperature for a total active period of 24 hours at an interval of 1 minute. The monitor also has sufficient memory to include 288 NIBP measurements and 288 predictive temperature measurements. The system can store a maximum total of 2016 continuous and episodic records.

If the memory data file is full and new data is received, the oldest data is deleted to make room for new data (FIFO; First In, First Out). The trend memory can accommodate records that span more than 24 hours of history if there are gaps where the monitor was not recording records.

Printed Trend Markers and Headers

For each patient, a NAME and ID is printed for writing the patient's name and ID. The patient number and date stamp appear on the next line. The header labels will appear on the two lines preceding the data.

The following trend markers assist in interpreting trend data:

- When the monitor enters an alarm state, the trend printout contains an asterisk (*) to the right of the parameter value that caused the alarm.
- If the monitor is in Continuous Temperature Mode, the temperature reading has an "up" arrow (^) to the left of the value.
- The heart rate source is defined with a "C" for cuff heart rate or with a "P" for Pleth heart rate. This letter appears to the right of the heart rate value.

NOTE: The markers described above, patient size changes and power cycling markers are only available in the printed reports.

Trend Settings

Press the TREND key twice to access the *TREND MENU*. If already in Trend View Mode, press the TREND key once.

Trend Menu

To select the Trend Settings, press and hold the TREND key. Press the UP and DOWN menu arrows to select the desired settings of *Interval, Format* and *Trend Span*. Additional short presses of the TREND key will step through the menu.

Trend Reports

The trend settings allow the user to review the patient data in formatted reports that can contain some or all of the stored data.

The trend selections are available for reviewing numerous short monitoring events and long-term monitoring events for single or multiple patients within the same 24 hour period. The three (3) settings of *Interval, Format* and *Trend Span* operate in coordination to produce different tabular trend views based on the needs of the facility and the work environment. It is possible to display and print a long detailed report with frequent records, or display and print the same data as an abridged report showing minimal episodic (spot-check) records.

Trend Formats

Trend formats apply both to the trend display and to the trend print output for all episodic measurements. There are five (5) types of Trend Formats: *BPT, BP, LAST, NO BPT,* and *ALL*.

BPT Trend Format

All trend records that contain blood pressure data and predictive temperature measurements are included in the BP/T Trend. The printed marker for this trend format is *BPT*.

BP Trend Format

When a *TREND INTERVAL* is selected, the displayed, printed, and serial output trends only have records that contain blood pressure data. The marker for this trend format is *BP*.

Last Trend Format

In this format, output trends for each patient contain only three records (most current and valid measurements) for blood pressure data, predictive temperature, and combined continuous monitoring data (SpO_2 saturation/heart rate/temp).

Continuous temperature information appears based on whether it was available on the most recent SpO_2 measurement record.

If no SpO_2 record is available, the most recent record containing an NIBP heart rate is included instead.

This format overrides the *TREND INTERVAL* setting and no additional intervals are presented in this format.

The marker for this trend format is *LAST*.

No BPT Trend Format

This turns off the reporting of all episodic measurements. Temperature measurements made in continuous monitoring mode are still shown. If the *TREND INTERVAL* is set to *OFF*, this option is not selectable.

All Format

All trended data, including changes in patient size and power up are included in the report.

Interval Formats

When a TREND INTERVAL has been selected the displayed, printed and serial output trends will only have continuous monitored records that fall on the intervals selected. Interval records include SpO_2 saturation, SpO_2 heart rate, and continuous mode temperature. The marker for this trend format is *INT XXM* with *M* being minutes. The shortest selectable trend interval is 1 minute and shall be time stamped on the even minute with seconds reported as padded zeros.

If the interval is *OFF*, no interval marker is shown in the printout. If *TREND FORMAT* has been set to *NO BPT*, the *OFF* option is not selectable.

No interval marker is shown if *LAST* has been selected in the *TREND FORMAT*.

Trend Span

The *Trend Span* selections are *10M, 15M, 30M, 60M, 2H, 4H, 8H, 12H, 24H,* and *ALL*. The *TREND SPAN* selection affects both the displayed trend and the printed trend. The selection of *ALL* includes data older than 24 hours.

Printing Single Patient Trend Data

Selecting a Single Patient

The 506N3 Series monitor by default displays the last monitored or current patient. However, previous patient records can be recalled and trend data printed. To access a particular patient's data:

1. Press the TREND key to enter Trend View Mode.
2. Use the UP or DOWN arrow keys to scroll through the list of patient's data.
   - Each press of UP or DOWN arrow key advances one patient's data.
   - Pressing and holding the UP or DOWN arrow keys accelerates the speed of patient records displayed.
   - Pressing UP or DOWN arrow keys while holding the Patient key steps patient by patient through the records.
3. When the appropriate patient is displayed, press the PATIENT and PRINT keys at the same time to print the trend report for that patient. The data printed is determined by the setup in the *TRENDS MENU*. See the following sections to set up for single patient printing trends.

Single Record Trends Print

The monitor is able to print a single trend record that is currently on display.

```
PATIENT #001       01-Jan-05
TREND
  TIME    RATE SPO2  TEMP
13:48:00  108C*--%* 100.7°F
```

Figure 6-1: Single Trend Record

```
PATIENT #001      01-JAN-05
INTERVAL  60M BP
  TIME   RATE SPO2  TEMP
         SYS  DIA  MAP
13:46:45 180*/120* 150*mmHg
```

Figure 6-2: Single Trend Record with NIBP

```
PATIENT #001     01-Jan-05
INTERVAL  60M
TIME      RATE SPO2 TEMP
13:44:08  ---  ---  100.7°F
```

Figure 6-3: Single Trend Record with Predictive Temperature

Single Reports and Multi-Patient Data

A printed single patient report can be quickly extracted from a large collection displayed multi-patient data. To view or print a condensed report of the most current measurements for all patients stored:

SETUP MULTI-PATIENT DATA FOR REVIEW

1. Press the TREND key twice.
2. In the *TREND MENU*, use the UP or DOWN arrow key to find the *FORMAT* submenu.
3. Press the MENU key to change the arrow from left to right.
4. Press the UP or DOWN arrow keys to display *LAST*.
5. Press the MENU key to change the arrow from right to left.
6. Press and hold the MENU key to exit the *TREND MENU*.

PRINT SINGLE PATIENT REPORT

Press the TREND key. Use the arrows to scroll up or down the list of patients.

NOTE: If the data include large numbers of patients, press the PATIENT key with the arrow keys search patient by patient.

The last valid record for each data type will be displayed for each patient.

When the appropriate patient records are displayed, press the PRINT key to print the displayed single trend record for that patient. Press the PRINT key while holding the PATIENT key to print a set of the most current records (of each type BP, SpO_2, HR etc.) for the single patient.

Trend Format for Last Valid Measurement

LAST trend interval reports include the monitor name and revision, NAME and ID block, only continuously monitored parameters with current time stamp, and an indication if the parameter was in an alarm state.

```
CSI  506N3 Series  REV 1.0B
NAME:_____________________
ID:_______________________
PATIENT #001      01-Jan-05
TREND INTERVAL   1M LAST
  TIME   RATE  SPO2 TEMP
         SYS  DIA   MAP
13:46:00 108P* 96%* 100.7°F
13:46:45 180*/120*  150*mmHg
13:47:08            100.7°F
```

Figure 6-4: Trend Report of Last Measured

The report returns the last record with a valid SpO_2 measurement, the last valid NIBP measurement, and the last valid predictive temperature measurement. The temperature listed with the SpO_2 may be predictive or continuous.

Tabular Interval Trend

Tabular interval prints include the monitor name and revision, name and ID block, all continuously monitored parameters with current time stamp, and an indication if the parameter was in an alarm state.

```
CSI  506N3 Series  REV 1.0B
NAME:_____________________
ID:_______________________
PATIENT #001      01-JAN-05
TREND INTERVAL   1M BPT
  TIME   RATE  SPO2 TEMP
         SYS   DIA MAP
13:41:00 108C* --%* 100.7°F
13:42:00 108C* --%* 100.7°F
13:43:00 108C* --%* 100.7°F*
13:43:45 180*/120* 150*mmHg
13:44:00 103P* 96%* 100.7°F*
13:45:00 101P* 96%* 100.7°F*
13:45:08            100.7°F
13:46:00 102P*99%*   ---.-°F
13:46:24 180*/120* 150*mmHg
13:47:00 102P* 99%*^100.5°F*
13:48:00 100P* 97%*^100.6°F*
13:49:00  99P* 96%*^100.5°F*
END PATIENT #001  SPAN  8H
```

Figure 6-5: Interval Print with NIBP and Temp

Two view and print a tabular interval trend:

SETUP

1. Press and hold the TREND key.
2. In the *TREND MENU*, press the UP or DOWN arrow keys to get the *INTERVAL* submenu.
3. Press the MENU key to change the arrow from left to right.
4. Press the UP or DOWN arrow keys to select the reading interval.
5. Press the MENU key to change the arrow from right to left.
6. In the *TREND MENU*, press the UP or DOWN arrow keys to get the *FORMAT* submenu.
7. Press the MENU key to change the arrow from left to right.
8. Press the UP or DOWN arrow keys to display *BPT* (or other options desired).
9. Press the MENU key to change the arrow from right to left.
10. In the *TREND MENU*, use the UP or DOWN arrow keys to find the *SPAN* submenu.
11. Press the MENU key to change the arrow from left to right.
12. Press the UP or DOWN arrow keys to select the desired span of readings to view and print.
13. Press the MENU key to change the arrow from right to left.
14. Press and hold the TREND key to return to the *TREND VIEW*.

USING INTERVAL TRENDS

The interval trend can produce long detailed trends for continuously monitored patients. The *FORMAT* can also be adjusted to not show spot-check measurements for blood pressure and temperature selectively. Use the arrow keys to scroll through the interval records.

Trend Intervals with No Blood Pressure or Predictive Temperature

NO BPT Trend intervals include the monitor name and revision, NAME and ID Block, only continuously monitored parameters with the current time stamp, and an indication if the parameter was in an alarm state.

```
CSI  506N3 Series  REV 1.0B
NAME:_____________________
ID:_______________________
PATIENT #001      01-JAN-05
TREND INTERVAL 1M NO BPT
TIME     RATE  SPO2 TEMP
13:41:00 108C* --%* 100.7°F
13:42:00 108C* --%* 100.7°F
13:43:00 108C* --%* 100.7°F*
13:44:00 103P* 96%* 100.7°F*
13:45:00 101P* 96%* 100.7°F*
13:46:00 102P* 99%* ---.-°F
13:47:00 102P* 99%*^100.5°F*
13:48:00 100P* 97%*^100.6°F*
13:49:00  99P* 96%*^100.5°F*
END PATIENT  #001  SPAN  8H
```

Figure 6-6: Interval Print with No Blood Pressure

NO BPT Interval Setup

The setup for interval viewing and printing without episodic (spot-check) measurements is the same as the interval trend previously described except that the *NO BPT* is selected as the Trend Menu *FORMAT*. This provides a trend of only SpO_2 and continuously monitored temperature.

NOTE: Continuously monitored temperature will still appear in the *NO BPT* format. To eliminate all temperature from the displays the temperature feature can be turned *OFF* in the configuration.

No Empty Records for Continuous Monitoring

The Trend Printouts do not show records for SpO_2 and temperature unless a continuously monitored value is available. A blank SpO_2 measurement may appear if an NIBP-based heart rate is currently displayed.

Printing Multi-Patient Trend Data

Multi-patient trend printouts include the same assortment of dynamic layouts available in the single patient trend. This format is intended for printing a multi-patient summary for a work shift period.

Multi-Patient, BPT

Tabular interval prints include the monitor name and revision, NAME and ID block, all continuously monitored parameters with current time stamp, and an indication if the parameter was in an alarm state.

```
CSI 506N3   Series  REV 1.0B
NAME:_____________________
ID:_______________________
PATIENT #001       01-JAN-05
TREND INTERVAL    2M BPT
  TIME   RATE  SPO2  TEMP
         SYS  DIA   MAP
         RATE  SPO2  TEMP
13:42:00 108C* --%*  100.7°F
13:42:45 180*/120*  150*mmHg
13:43:00 103P* 96%*  100.7°F*
13:43:08             100.7°F
13:44:00 102P* 99%*  ---.-°F
13:45:24 180*/120*  150*mmHg
13:46:00 100P* 97%* ^100.6°F*
END PATIENT #001   SPAN  8H

NAME:_____________________
ID:_______________________
PATIENT #002       01-JAN-05
TREND INTERVAL    2M BPT
  TIME   RATE  SPO2  TEMP
         SYS  DIA   MAP
13:11:00 POWER     01-JAN-05
13:11:15 77P   98%    98.6°F
13:13:15 76P   98%    98.6°F
13:15:15 75P   98%    98.6°F
13:16:00              98.6°F
13:17:15 120 /80    100 mmHg
13:19:15 123 /81    102 mmHg
13:21:15 121 /79     99 mmHg

NAME:_____________________
ID:_______________________
PATIENT #003       01-JAN-05
TREND INTERVAL    2M BPT
  TIME   RATE  SPO2  TEMP
         SYS  DIA   MAP
12:26:00 68P*  97%*   98.9°F*
12:28:00 70P*  98%*   98.9°F*
12:30:00 69P*  97%*   98.9°F*
12:30:35 180*/120*  150*mmHg
12:32:00             98.9°F
12:34:00 69P*  97%*  --.-°F
12:36:00 71P*  98%*  --.-°F
12:38:00 72P*  97%*  --.-°F
END MULTI-TREND    SPAN  8H
```

Figure 6-7: Interval Trend with NIBP and Temp

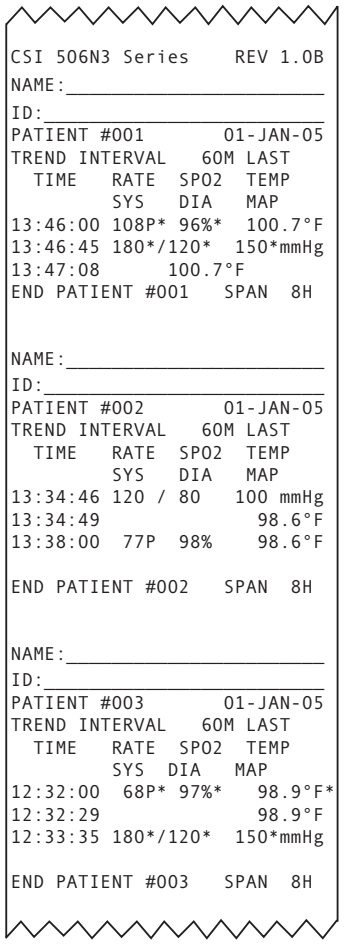
Multi-Patient BPT Prints

For a multi-patient *BPT* interval print:

1. Enter Trend Settings Menu by pressing the TREND key twice.
2. Set the *FORMAT* to *BPT*.
3. Set the *INTERVAL*, and *SPAN* as desired.

   NOTE: Setting the SPAN too short may clip off older patients and data.
4. Press and hold the TREND key to exit the *TREND MENU*.
5. Press and hold PRINT keys to print a multi-patient *BPT* trend.

Multi-Patient, Last



```
CSI 506N3 Series    REV 1.0B
NAME:_____________________
ID:_______________________
PATIENT #001       01-JAN-05
TREND INTERVAL   60M LAST
  TIME   RATE  SPO2  TEMP
         SYS   DIA   MAP
13:46:00 108P* 96%*  100.7°F
13:46:45 180*/120*  150*mmHg
13:47:08      100.7°F
END PATIENT #001   SPAN  8H


NAME:_____________________
ID:_______________________
PATIENT #002       01-JAN-05
TREND INTERVAL   60M LAST
  TIME   RATE  SPO2  TEMP
         SYS   DIA   MAP
13:34:46 120 / 80   100 mmHg
13:34:49              98.6°F
13:38:00  77P  98%    98.6°F

END PATIENT #002   SPAN  8H


NAME:_____________________
ID:_______________________
PATIENT #003       01-JAN-05
TREND INTERVAL   60M LAST
  TIME   RATE  SPO2  TEMP
         SYS  DIA   MAP
12:32:00  68P* 97%*   98.9°F*
12:32:29              98.9°F
12:33:35 180*/120*  150*mmHg

END PATIENT #003   SPAN  8H
```

Figure 6-8: Multi-Patient Last Measured Report

A multi-patient last report can be created by selecting *LAST* as the *FORMAT* in the Trend Settings Menu. Press and hold the Print Key to print the report.

Section 7 — Printing and Communication

Description

The 506N3 Series monitors may have internal printers but can also print to an external serial printer. Instructions for using the recommended serial printer and downloading to a computer terminal are also described in this section. Monitors without internal printers have serial connectivity and can print to an external serial printer.

Monitors with internal printers are equipped with a thermal dot-matrix printer which is located on the top of he unit. These monitors are capable of printing current or stored pulse rate, SpO_2, NIBP, and temperature measurements.

Printer Settings

The printer functions are set in the main menu structure under the *PRINTER SETUP* submenu. See “Setup Procedure” in Section 3 for more information about using the main menu.

NOTE: The monitor must be set to print to the correct device.

The second setting in the printing submenu is *PRINT TO*. The monitor can print to *PRINTER* (meaning the internal printer if present). The monitor can also be set to print to *SERIAL* so that the monitor sends data to the external data port instead. The monitor can also be set to print to *OFF* which disables the printing functions. If the monitor is set to print to *OFF* or *SERIAL*, the internal printer does not function.

Printer Default Settings

There are factory default printer settings that are permanently stored in non-volatile memory. See the table in “Setup Procedure” in Section 3 for the factory default printer settings.

To return to factory default settings for the printer, the default settings for configuration and parameters must also be recalled. Press the POWER key and the MENU key at the same time. This does not alter settings found in the *ALARM MENU*.

Trend Span

The *TREND SPAN* is the period of time that the trend print represents. This is set in the *TREND* submenu.

Trend Interval

The *TREND INTERVAL* is the interval at which patient data are recalled in a trend print. This is set in the *TREND* submenu.

Printing Features

The monitor printer has several different printing options. The monitor prints to an internal printer or sends the corresponding data to the external serial port when these functions are used.

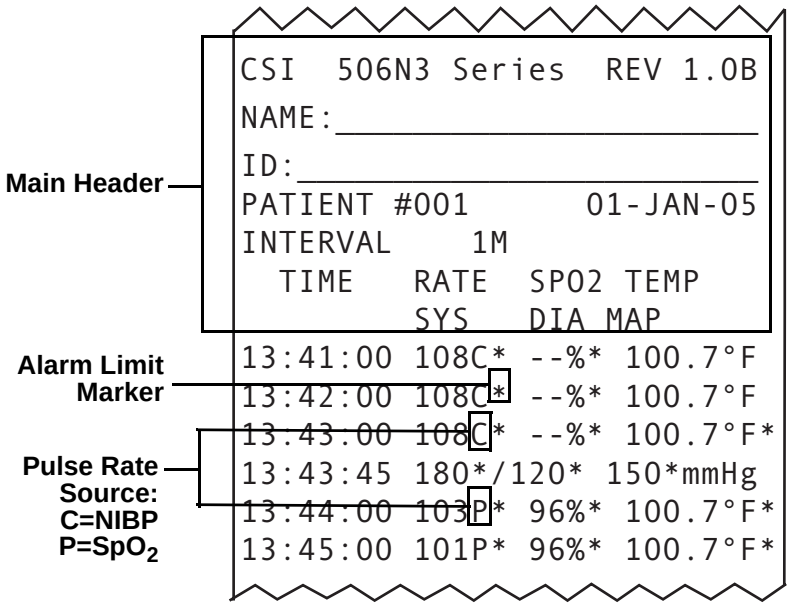


Figure 7-1: Printing Features

Main Header

The first time a print function is used after a power cycle, the monitor sends a text header to the print device. The header has the software revision information, the current date and time, a space for the patient name, and a space for a patient ID number. The sequential number for the patient monitor is also displayed together with the date, what type of printout it is, and headers for TIME, (heart) RATE, SPO2, NIBP SYStolic, DIAstolic, and MAP (mean arterial pressure). Units with temperature also include a header for TEMP; non-temperature units have this area blank.

Alarm Limit Marker

Any physiological value that exceeds the set alarm limits at the time of measurement are printed with an asterisk.

Pulse Rate

SpO_2 PLETHYSMOGRAPHIC

The letter “P” appears after each pulse rate in the prints, indicating that the measurement source was the SpO_2 plethysmographic waveform data.

NIBP OSCILLOMETRIC

The letter “C” appears after each pulse rate in the prints, indicating that the measurement source was NIBP cuff data.

Demand Print

This function prints out the current physiological measurements, along with the time and date. Press the PRINT key momentarily to print the currently measured data.

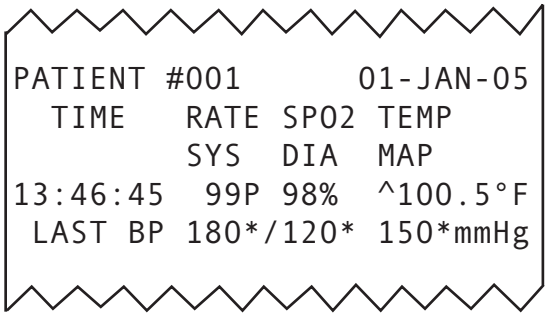


Figure 7-2: Print on Demand Printout

Trend Print

This function prints out a user selectable trend. Once the trend span and interval have been set in the menu, they do not need to be set again for future trend prints.

1. Press and hold the TREND key to enter the *TREND* submenu.
2. Press the UP or DOWN arrow keys to locate *INTERVAL*.
3. Set *INTERVAL* to the desired interval. With higher interval settings the print may include fewer data records. Set the interval to *1M* (one minute) to include all stored measurements within the span of the print.
4. Once the *INTERVAL* is set, press the UP or DOWN arrow keys to locate the *SPAN*.
5. Set the *TREND SPAN* to the desired length of the print. The maximum print length is *ALL*.
6. Press and hold the MENU key to exit the menus.
7. Press and hold the TREND and PRINT keys at the same time to print the trend.

Each time a power cycle occurs in the memory, the trend prints the date stamp.

See “Printing Single Patient Trend Data” and “Printing Multi-Patient Trend Data” in Section 6 for more details on the various trend prints.

Interval Print

Interval printing is selected in the *PRINTER SETUP* menu. When the monitor is in interval print mode, the patient's vital signs print out each time the selected time interval elapses. Interval printing begins immediately after the printer interval is changed from *Off*. If there is no valid data available when the interval elapses, the monitor prints the column headers and leaves the data fields blank.

If a single demand print is desired during the interval, press the PRINT key to generate one additional line, with full time disclosure, on the printout.

A Trend Print can be requested in the middle of a interval printing session. A record printed from memory can be distinguished from current data by the TREND header appearing before the trend data.

```
CSI  506N3 Series  REV 1.0B
NAME:_____________________
ID:_______________________
PATIENT #001      01-JAN-05
INTERVAL    1M
  TIME   RATE  SPO2 TEMP
         SYS   DIA MAP
13:41:00 108C* --%* 100.7°F
13:42:00 108C* --%* 100.7°F
13:43:00 108C* --%* 100.7°F*
13:43:45 180*/120* 150*mmHg
13:44:00 103P* 96%* 100.7°F*
13:45:00 101P* 96%* 100.7°F*
13:45:08            100.7°F
13:46:00 102P*99%*   ---.-°F
13:46:24 180*/120* 150*mmHg
13:47:00 102P* 99%*^100.5°F*
13:48:00 100P* 97%*^100.6°F*
13:49:00  99P* 96%*^100.5°F*
```

Figure 7-3: Interval Printout (set for 1 minute intervals)

NOTE: Spot-check measurements such as NIBP and Predictive Temperature will appear as separate printed records. The printed interval record for temperature can include either the current continuous measurement or the last spot-check measurement.

Print on BP

The interval can also be set to *ON BP*, indicating that the monitor prints each time a blood pressure measurement is taken. If a valid blood pressure measurement cannot be taken, there is no indication on the print that a measurement was attempted.

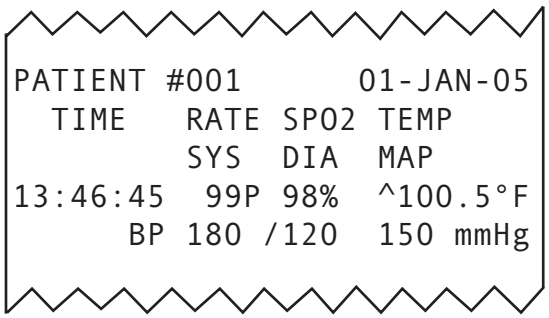


Figure 7-4: Print on BP Printout

Print on Alarm

When *ON ALARM* is selected in the *PRINT SETUP* menu, the monitor prints out parameters when any alarm limit is violated. The parameters that exceeded physiological alarm limits are followed by an asterisk in the print.

Low level and informational alarms do not trigger an alarm print condition.

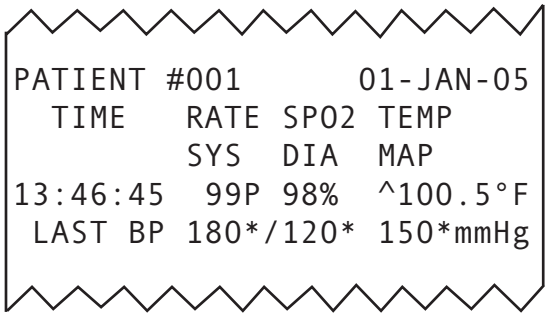


Figure 7-5: Print on Alarm Printout

Print Formats

There are two formats used by the monitor. Real-time continuous printing of current data does not have a format header. Trend prints have a TREND header.

Each time a print function is activated, column headers for time, pulse rate, SpO_2, temperature, systolic, diastolic, and mean arterial pressure are printed above the data values. Systolic pressure appears below the heart rate value. Diastolic pressure appears below the SpO_2 value.

Trend Print Format

This output type is printed beginning with the first data that appears within the *Trend Span* selected. Gaps may appear in the printout where the monitor was turned off during the trend span period. The last record of the report is always the most current data collected.

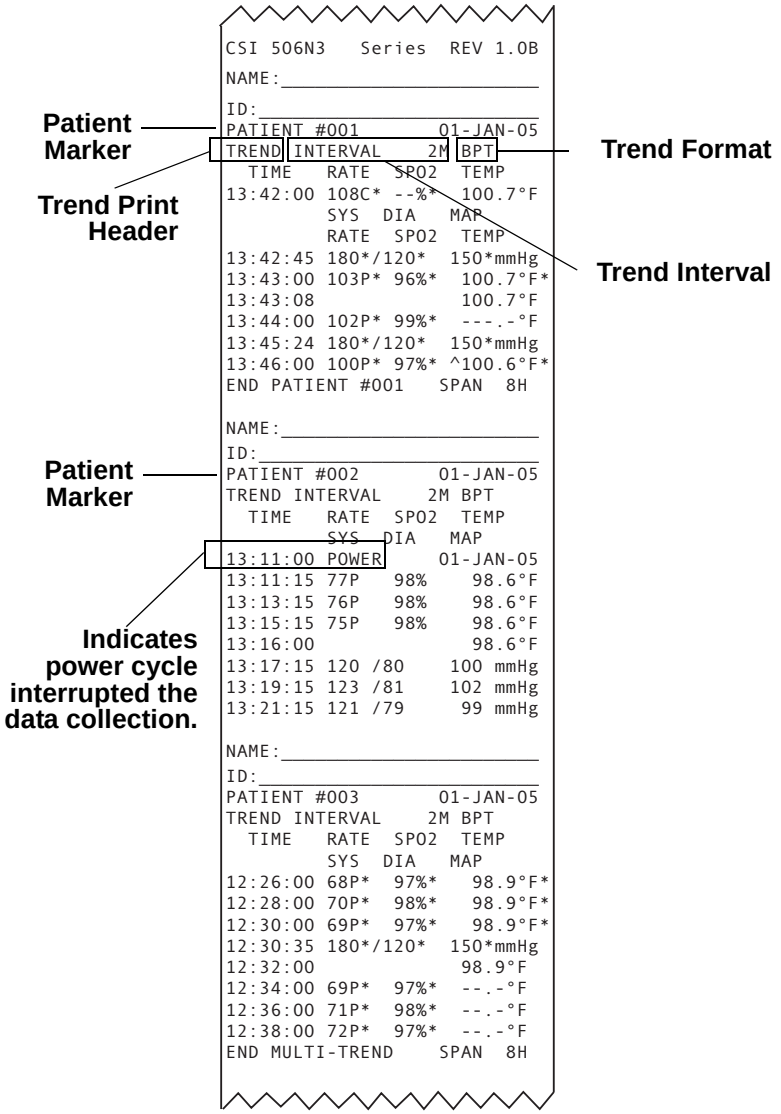


Figure 7-6: Example of Trend Print

Loading the Paper

Perform the following instructions to load the printer paper. Use Cat. No. 553 replacement thermal printer paper.

1. Cut the end of the paper roll straight.

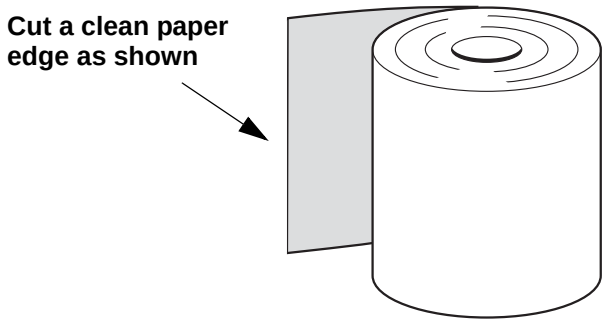


Figure 7-7: Cut the End of Paper Roll

2. Open the paper access door by pulling out and up on its projecting tab.
3. Discard the old paper spool and insert the new paper roll.

   NOTE: The thermal-active outside face of the paper roll must be down when feeding the paper into the slot. The printer does not print on the inside face of the paper roll.
4. Feed the end of the paper roll into the slot at the bottom of the paper storage compartment.
5. Press the PAPER FEED key to feed the paper through the printer.

   The autofeed may pull the paper through such that the PAPER FEED key may not be necessary.
6. Place the paper roll in the unit.
7. Thread the paper end through the slot in the cover.
8. Close the paper access door.

The printer paper is now ready for use.

Communication Port

The 506N3 Series monitors support a variety of communication functions. The communications port is located on the left side panel.

Serial Printing

The communications port supports sending data to an external serial printer or computer terminal. To send print commands as described in the beginning of this section to the communications port, the print device must be set to *SERIAL* in the *PRINTER SETUP* menu. Printing is then be routed to the communications port instead of the internal printer.

Set the serial format to *TEXT* in the *CONFIGURATION* Menu to simulate the tabular printout of the internal printer. Set the serial format to *CSV* in the *CONFIGURATION* Menu to create a “comma separated variable” table. A description of the CSV format and its applications are located at the end of this section.

Sending Data to a Computer

A serial download cable is available from CSI, use Cat. No. 932G null modem cable to connect to standard male DB-9 computer serial ports. A common computer terminal program and an unused RS232 serial port is needed for external communications.

Criticare recommends using the Windows HYPERTRM.EXE program provided with all MicroSoft® Windows® operating systems. HYPERTRM.EXE can be found in the Windows accessory directory. For older computers using MS Windows 3.1, the communications program TERMINAL.EXE can be found in the Windows directory.

Set the monitor to interval printing with serial output selected. With the computer terminal connected, a data file may be collected. The file may then be further evaluated by computer. See the description for CSV format at the end of this section.

Terminal Configuration

The cable connections should be completed and the terminal program should be configured before attempting to send data.

The required settings are as follows:

Baud Rate:	9600 or 19200
Parity:	No Parity
Stop Bits:	1
Data Bits:	8
Hardware Control:	None

External Serial Printer Accessory

The Seiko DPU-414 is pinned out as a modem would be (DCE - data communications equipment) rather than as a typical printer/computer (DTE - data terminal equipment). Use the CSI Cat. No. 1089 to connect to the Seiko printer, which provides the necessary configuration.

A standard DB-9 serial connector is located on the back of the DPU-414 thermal printer. Read the manual provided with the printer kit for additional instructions.

The selected external printer must be configured so that it can communicate with the monitor. Follow the configuration instructions provided with your printer.

The required settings are as follows:

Baud Rate:	9600 or 19200
Parity:	No Parity
Stop Bits:	1
Data Bits:	8

Communication Connections

The monitor also uses the serial port for connecting to computers and external printers, loading system software updates, and for reprogramming the monitor. Contact CSI customer service for more information about loading software.

DB-9 Cable

The monitor can be connected to a computer using an RS232 cable with standard female DB-9 pinouts. The computer must have an available COM Port. A null modem type of cable must be used when connecting the 506N3 Series patient monitor to a computer.

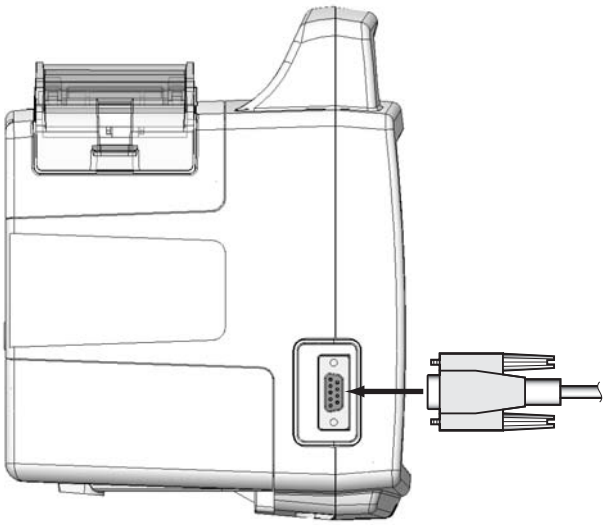


Figure 7-8: Attaching RS232 Cord to Monitor's COM Port

USB Serial Port Adapter

Adapters are also available from electronics suppliers to connect RS232 cables to computers using USB ports. They require software installation and an available COM Port.

Data Formats

The monitor can output tabular ASCII text as described earlier in the printing descriptions. The monitor can also output comma-separated variable (CSV) or CUSP formats. CUSP is a CSI proprietary communications protocol. No printing can be performed while in CUSP mode.

CSV Format

The Comma-Separated Variable output presents the data in a form that is easily imported into a spreadsheet application where further analysis can be done on the data. The data is output in ASCII format with each field (time, pulse rate, systolic, diastolic, and map) separated with a comma. Using the Microsoft® Windows® HYPERTRM.EXE (TERMINAL.EXE for Windows 3.1) program and Microsoft® Excel®, here is an example of how it may be used:

1. Connect the COM port to the serial port on the computer.
2. Start Hyper Terminal from the Accessories menu.
3. Choose Transfers|Receive File. In the “Place received file in the following folder” box, type the path of the folder in which you want to save the downloaded file.
4. In the “Use receiving protocol” list, click the protocol that the monitor is set to, and then click Receive.
5. At this point, all data transmitted from the monitor will appear on the screen and will be saved.
6. When all the desired data has been accumulated, choose Transfers|Stop to close file.
7. Start Excel and choose File|Open.
8. Enter/Click on the file name and press the Text button.
9. For Column Delimiter, choose “Comma”. For File Origin, choose “Windows (ANSI)”. Then choose OK.
10. Choose OK again from the Open dialog to open and display file.

The data is organized in a table by field. Using the Excel presentation options, this data could be graphed, printed in tabular form, or analyzed statistically in some other way.

CUSP Format

CUSP is a real-time format for use with central stations and other third party devices. The 506N3 Series monitor is fully compatible with the VitalView (System 5 or higher) and OEM central stations.

When a 506N3 Series monitor is hooked up to a VitalView central station, the VitalView central station can provide a real-time SpO_2 waveform.

Section 8 — Maintenance

Cleaning and Disinfecting

⚠WARNING⚠

- Shock Hazard! Turn the power off and disconnect the AC power cord before cleaning the monitor and accessories.
- Shock Hazard! Never immerse the monitor. The monitor has an internal power source that is active when the unit is unplugged.

Do not use abrasive cleaners on the monitor or on any sensors or probes. Abrasive cleaners can damage the monitor and accessories.

The exterior surface of the monitor, except for the display screen, may be wiped clean with alcohol and dried with a soft, dry cloth. It is best to use a cotton cloth to clean the monitor. Paper towels or tissues can scratch the surface of the display.

Do not use full strength alcohol on the LCD display. Repeated use of strong cleaners can damage the screen. Clean the display window by wiping it with a clean, soft, lint-free cloth sprayed with common glass cleaner. Do not spray glass cleaner directly on the display.

Blood Pressure Cuffs

To clean the reusable blood pressure cuff, wipe it with a damp cloth or sponge. If necessary, disinfect the cuff with 70% alcohol, mild bleach solution, or other disinfectant. Disposable blood pressure cuffs are for single patient use and are not intended to be disinfected.

Sterilize the cloth cuff and neoprene bag with commercially available disinfectants such as ethylene oxide (EtO). Rinse thoroughly to remove any residual disinfectants. Do not allow liquids to enter the neoprene bag. You may sterilize the cloth cuff in an autoclave.

If the cuffs become grossly soiled with blood or other body fluids, you should launder the cloth cuffs by hand or machine. Remove the neoprene inflation bag before you launder or sterilize the dacron cloth cuff. Feed the inflation tube back through the hole and then pull out the cloth flap.

Figure 8-1: Remove the Inflation Bag

Roll up the inflation bag and slide it out the open slot in the cloth cuff. Be sure to observe the following laundering precautions (do NOT launder disposable cuffs and neoprene inserts):

- Remove the inflatable bag from the cuff before you launder or sterilize the cuff.
- Strong bleach solutions will damage the cuff.
- Temperatures over 275° F (135° C) will damage the cuff.
- Close the Velcro® fastener before you launder the cuff
- Soaking the cuff in dark-colored solutions may stain of discolor the cuff.

Hand laundering (as opposed to machine laundering) prolongs the life of the cuff. Wash the cuff in warm, soapy water. Rinse the cuff thoroughly. After cleaning the cuff, allow the cuff to air dry, then insert the inflation bag in the cuff.

DOX Pulse Oximeter Sensors

⚠CAUTION⚠

- Do not immerse any Criticare pulse oximeter sensor connector in any liquid. Doing so may damage the connector.

The SpO_2 sensor may be wiped clean with alcohol. The SpO_2 sensor may be disinfected by placing the paddles and cable in a 2% glutaraldehyde solution. Place only the sensor paddles and cable in the solution.

OxiMax Pulse Oximeter Sensors

D-YS SENSOR

Remove the disposable wrap from the D-YS by peeling it away from the sensor. The sensor may be surface-cleaned with a solution such as 70% isopropyl alcohol. If low-level disinfection is required, use a 1:10 bleach solution. Do not use undiluted bleach (5%~5.25% sodium hypochlorite) or any cleaning solution other than those recommended here because permanent damage to the sensor could occur.

⚠CAUTION⚠

- Do not expose connector pins to cleaning solution as this may damage sensor.

To clean or disinfect the sensor using the recommended wipe method:

1. Saturate a clean, dry gauze pad with the cleaning solution. Wipe all surfaces of the sensor and the cable with this gauze pad.
2. Saturate another clean, dry gauze pad with sterile or distilled water. Wipe all surfaces of the sensor and cable with this gauze pad.
3. Dry the sensor and cable by wiping all surfaces with a clean, dry gauze pad.

To clean or disinfect the sensor using the recommended soak method:

1. Place the sensor in the cleaning solution, such that the sensor head(s) and desired length of cable are completely immersed.

⚠CAUTION⚠

- Do not immerse the connector end of the cable as this may damage the sensor.

2. Dislodge air bubbles by gently shaking the sensor and cable.
3. Soak the sensor and the cable for 10 minutes.
4. Remove from cleaning solution.
5. Place the sensor and the cable in room temperature sterile or distilled water for 10 minutes.
6. Remove from the water.
7. Dry the sensor and cable by wiping all surfaces with a clean, dry gauze pad.

⚠CAUTION⚠

- Using excessive force when removing the disposable wrap may damage the sensor.
- Do not sterilize by irradiation, steam, or ethylene oxide (EtO).

DS-100A SENSOR

The DS-100A may be surface-cleaned by wiping it with a solution such as 70% isopropyl alcohol. If low-level disinfection is required, use a 1:10 bleach solution. Do not use undiluted bleach (5%~5.25% sodium hypochlorite) or any cleaning solution other than those recommended here because permanent damage to the sensor could occur.

To clean or disinfect the sensor:

1. Saturate a clean, dry gauze pad with the cleaning solution. Wipe all surfaces of the sensor and cable with this gauze pad.
2. Saturate another clean, dry gauze pad with sterile or distilled water. Wipe all surfaces of the sensor and cable with this gauze pad.
3. Dry the sensor and cable by wiping all surfaces with a clean, dry gauze pad.

⚠CAUTION⚠

- Do not sterilize by irradiation, steam, or ethylene oxide (EtO).

EAR CLIP

⚠CAUTION⚠

- To avoid damage to the Dura-Y sensor, remove the sensor from the ear clip before cleaning either piece. To clean the sensor, refer to the instructions in the Dura-Y sensor Directions for Use.
- Do not sterilize the ear clip by irradiation, steam, or ethylene oxide.

The ear clip may be cleaned by wiping or soaking it (for 10 minutes) in isopropyl alcohol (70%). If the ear clip is soaked, be sure to rinse it with water and air dry it prior to use on the next patient.

After each cleaning and prior to use again, the ear clip should be inspected for cracking or breakage, and discarded if any defects are noted.

Discard if loss of spring tension allows slippage or movement of the ear clip from its proper position on the ear lobe or pinna. Slippage caused by loss of spring tension may result in inaccurate sensor readings.

Temperature Probes

To clean the probe tip, use a damp cloth with diluted detergent.

Accidental Wetting

⚠WARNING⚠

- Shock Hazard! The monitor is an AC powered device and an immersed monitor presents a danger to anyone who handles the device.

The action to be taken following accidental wetting of the equipment is as follows:

1. Turn the power off! Disconnect the AC power cord.
2. If monitoring a patient, transfer the patient to another monitor as quickly as possible.

3. Use a clean, dry towel or cloth to remove the liquid from the monitor housing.

4. The monitor should be inspected by an service technician as soon as possible.
5. If the internal mechanism is saturated, allow the liquid to drain out for 24 hours before shipping.
6. If liquid has entered the monitor, it needs to be dried and cleaned internally. Full testing is required before the monitor can be used. Contact the CSI Service Department as soon as possible.

Time is critical! The longer any liquid remains in the monitor, the more damage it can do. It is important to service the monitor immediately after any liquid is spilled into it.

Serviceable Components

There are no user-serviceable parts inside the monitor. For maintenance inside the monitor, contact the CSI Technical Service Department.

Battery

Changing the rechargeable battery requires opening the case of the monitor. The case should only be opened by experienced electrical technicians. Consult the *506N3 Series Service Manual* for more information about battery replacement.

⚠CAUTION⚠

- Do not open the case. Sensitive electronic components may be damaged by electrostatic discharge. Opening the case requires an electrostatic (ESD) protected work bench.
- Shock hazard. The interior of the case contains exposed circuitry.
- Do not short circuit the battery terminals! The resulting high-current discharge can cause burns.
- The battery contains sulfuric acid electrolyte which can cause severe burns and eye damage, as well as illness from sulfur oxide fumes.

Safety Testing

Refer all servicing to a qualified technician. Descriptions of these tests can be found in the *506N3 Series Service Manual*. Some tests may require specialized equipment.

Annual Safety Testing

Annual Testing should include electrical safety testing as described in the service manual. Additional functional tests are provided in the service manual. These may be performed by qualified technicians as designated by hospital protocols or as necessary. Contact the CSI Service Department for more information about testing the 506N3 Series monitors.

Have a qualified service technician perform the following performance and safety checks annually.

- Perform complete functional testing of the monitor.
- Test the monitor for electrical leakage current.

Service Checks

If the monitor shows any signs of physical damage, contact the CSI Service Department for repair.

Technical Support USA: (800) 458-2697

Technical Support International: (262) 798-8282

Accessory Testing

Check patient cables (e.g., temperature cables, SpO_2 cables) monthly for damage, loose wires/connections, loose connectors, cracked housing, etc.

The procedures for electrical testing of power cords and cables are found in the *506N3 Series Service Manual*.

Check the cuffs and hoses for leakage as part of the NIBP verification found in the *506N3 Series Service Manual*.

Maintenance Schedule

Every Patient	• Clean and disinfect the NIBP cuff and SpO_2 cable as needed. • Inspect the accessories and charger for damage.
Every Day	• Charge the monitor's battery as necessary.
Every 3 Months	• Clean the exterior of the unit (or clean as needed). • Inspect the monitor and AC (mains) cord for damage.
Every Year	• Perform the annual safety tests described in the service manual.

Battery Maintenance

The battery requires no maintenance.

Long-term Storage

No special preparation is necessary for long-term storage of the monitor. Although the battery does not have to be removed from the monitor for long term storage, the battery does drain to an unrecoverable state after 3 months without periodic charging.

Disposal

At the end of its useful life, the monitor and its accessories may be disposed of according to your institution's policies and procedures for disposal of patient-contact medical waste.

Alternately, the monitor and its accessories may be returned to Criticare Systems, Inc., for safe disposal. The shipping address is:

Criticare Systems, Inc.
20925 Crossroads Circle
Waukesha, WI 53186

Appendix A — Accessories

NIBP Accessories

Cuffs and Hoses	Infant Blood Pressure Cuff (10-19 cm)	473
	Pediatric/Small Adult Blood Pressure Cuff (18-26 cm)	474
	Adult Blood Pressure Cuff (25-35 cm)	475
	Large Arm Blood Pressure Cuff (33-47 cm)	476
	Thigh Blood Pressure Cuff (44-66 cm)	477
	NIBP Hose - 4 ft. Straight Adult Quick Connect	705
	NIBP Hose - 10 ft. Straight Adult Quick Connect	706
	NIBP Hose - 10 ft. Coiled Adult Quick Connect	707
	NIBP Hose - 4 ft. Straight Neonate Quick Connect/Clippard	708
Disposable Cuffs	NIBP Cuff Infant (Pkg. of 10)	745
	NIBP Cuff Child (Pkg. of 10)	746
	NIBP Cuff Pediatric/Small Adult (Pkg. of 10)	747
	NIBP Cuff Adult (Pkg. of 10)	748
	NIBP Cuff Large Arm (Pkg. of 10)	749
	NIBP Cuff Thigh (Pkg. of 10)	750
Disposable Neonatal Cuffs	NIBP Cuff 3-6 cm, Neonate* (Pkg. of 10)	740
	NIBP Cuff 4-8 cm, Neonate* (Pkg. of 10)	741
	NIBP Cuff 6-11 cm, Neonate* (Pkg. of 10)	742
	NIBP Cuff 7-13 cm, Neonate* (Pkg. of 10)	743
	NIBP Cuff 8-15 cm, Neonate* (Pkg. of 10)	744

(*Neonate disposable cuffs require the Cat. No. 708 hose)

SpO_2 Accessories

DOX Reusable Sensors

Adult Reusable Shell™ Finger Sensor 10 ft. 934-10DN

Adult Reusable Shell™ Finger Sensor 3ft. DB-9 ..... 934SDN

Flexible-Pocket Adult Sensor, 10-foot..... 975AD-10

Flexible-Pocket Adult Sensor, 3-foot..... 975AD-3

Flexible-Pocket Pediatric/Small Adult Sensor, 10-foot 975PD-10

Flexible-Pocket Pediatric/Small Adult Sensor, 3-foot 975PD-3

Reusable Multi-Site™ Sensor 3 ft. Kit..... 940SD
Includes: Forehead Applicator, headband, ear clip, double sided adhesives, microfoam tape.

SpO_2 Extension Cable 10ft. 518DD

Multi-Site Sensor Accessories

Ear Clip Attachment 514

Double Sided Adhesive Dots (Pkg. of 50) 525

Microfoam Tape (4" strips - Pkg. of 14) 526

Posey Wraps w/ Holes (Pkg. of 12)..... 920

DOX Disposable Sensors

Adult Disposable Sensors* (Box of 25) 570SD

Pediatric Disposable Sensors* (Box of 25)..... 571SD

Infant Disposable Sensors* (Box of 25)..... 572SD

Neonatal Disposable Sensors* (Box of 25) 573SD

Variety Pack Disposable Sensors (Box of 25) 574SD
(10 ea. Adult, 5 ea. Pediatric, 5 ea. Infant, 5 ea. Neonatal)

* Disposable sensors require a 10ft. SpO_2 Extension Cable Cat. No. 518DD

Nellcor OxiMax Sensors

Reusable Durasensor (DS-100A)..... 939A

Nellcor SpO_2 Extension Cable 10ft. 939XS

Temperature Accessories

Oral Temperature Probe (Blue) 202026

Rectal temperature Probe (Red) 202034

Probe Covers, case of 5000..... 202020

Probe Covers, tray of 500 ..... 202020-T

Oral Isolation Well (Blue) 202089

Rectal Isolation Well (Red) 202087

Battery

Battery, 6V, 7 AH 80518B001

Power Cables, Fuses

AC Power Cord (Straight Connector) 909
AC Power Cord (Right-angle Connector) USA 989
AC Power Cord (Right-angle Connector) International..... 989-INT
AC Power Cord (Right-angle Connector) United Kingdom 989-UK
AC Power Cord (Right-angle Connector) Unterminated 989-UT
AC Power Fuse 82013B001

Printing and Communications

Printer paper for internal printer (5 Rolls) 553
Seiko DPU 414, External Printing Kit 680

Mounting

Roll Stand w/basket 1043
CSI Adaptor Plate for GCX mounting..... 891
IV Pole Mount 889

Publications

Operator Manuals

506N3 Series Operator Manual — English 1445
506N3 Series Operator Manual — French 1445F
506N3 Series Operator Manual — German 1445G
506N3 Series Operator Manual — Spanish 1445S
506N3 Series Operator Manual — Portuguese.....1445P
506N3 Series Operator Manual — Italian 1445I
506N3 Series Operator Manual — Dutch 1445DU
506N3 Series Operator Manual — Danish..... 1445DA

Help Cards

506N3 Series Help Card — English..... 1449
506N3 Series Help Card — French 1449F
506N3 Series Help Card — German 1449G
506N3 Series Help Card — Spanish 1449S
506N3 Series Help Card — Portuguese 1449P
506N3 Series Help Card — Italian..... 1449I
506N3 Series Help Card — Dutch 1449DU
506N3 Series Help Card — Danish 1449DA

Service Manuals

506N3 Series Service Manual — English 1446