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Chapter 1: Introduction

About this Manual

The Operation Manual provides installation, operation, and maintenance instructions for veterinary health-care professionals and other users, trained in monitoring respiratory and veterinary activity.

These instructions contain important information for the safe use of the product. Read the entire contents of these Instructions For Use, including Warnings and Cautions, before using the monitor. Failure to properly follow warnings, cautions and instructions could result in death or serious injury to the patient.

Definition of Symbols

SYMBOL	DEFINITION
♥	Type CF Equipment.
⚠	Attention, see instructions for use.
⚡	Refer servicing to qualified service personnel.
⏚	Alarm Select
→⊝	Input voltage
🖶	Printer On/Off
===	Direct Current
⊘	Alarm silence
%	On/Off
®	Non AP device
∧∨	Up and Down Arrows
🔔	Alarm LED
🔔⊘	Alarm Silenced LED
∿∿	Artifact LED
🔋	Low Battery LED
⊸	External power/Battery eliminator
♥bpm	Heart Rate LED
∿	Date of Manufacture
⧗	Use by
IPX1	Drip Proof (monitor only)
%SpO$_2$	Percent Oxygen Saturation
⊘	Moisture sensitive
Rx ONLY	Caution: Federal (U.S.A.) law restricts this device to sale by or on the order of a Licensed Veterinarian.

 Collect Separately	**Disposal (EU Countries)** Under the Waste Electrical and Electronic Equipment (WEEE) Directive 2006/96/EC and implementing regulations, all devices and service items within the scope of the Directive purchased new after August 13, 2005 must be sent for recycling when ultimately becoming waste. Devices and items must not be disposed of with general waste. If purchased before that date, they may also be sent for recycling if being replaced on a one-for-one, like-for-like basis (this varies depending on the country). Recycling instructions to customers using Smiths Medical products are published on the internet at: **http://www.smiths-medical.com/recycle**
	Disposal (other countries) When disposing of this device, its batteries or any of its accessories, ensure that any negative impact on the environment is minimized. Contact your local waste disposal service and use local recycling or disposal schemes. Separate any other parts of the equipment where arrangements can be made for their recovery; either by recycling or energy recovery. The main batteries are potentially harmful and will require separate disposal according to manufacturer's instructions or local regulations. **Note: If applicable, EU, national or local regulations concerning waste disposal must take precedence over the above advice.**

KEYWORD	DEFINITION
WARNING	Tells you something that could hurt the patient or hurt the operator.
CAUTION	Tells you something that could damage the device.
NOTE	Tells you other important information.

Warnings

WARNING! Do not use this device in the presence of flammable anesthetics.

WARNING! Do not use this device in the presence of magnetic resonance imaging (MR or MRI) equipment.

WARNING! Use only SpO$_2$ sensors supplied with, or specifically intended for use with, this device.

WARNING! Do not plug the monitor into an outlet controlled by a wall switch.

WARNING! This device is intended for use by persons trained in professional health care. The operator must be thoroughly familiar with the information in this manual before using the device.

WARNING! This device must be used in conjunction with clinical signs and symptoms. This device is only intended to be an adjunct in patient assessment.

WARNING! It is the operator's responsibility to set alarm limits appropriately for each individual patient.

WARNING! Prolonged use or the patient's condition may require changing the sensor site periodically. Change sensor site and check skin integrity, circulatory status, and correct alignment at least every 4 hours.

WARNING! ELECTRICAL SHOCK HAZARD when cover is removed. Do not remove covers. Refer servicing to qualified personnel.

WARNING! In the event that earth ground integrity is lost, the performance of this device and/or other devices nearby may be affected due to excessive RF emissions.

WARNING! Any monitor that has been dropped or damaged should be inspected by qualified service personnel, prior to use, to insure proper operation.

WARNING! If the accuracy of any measurement is in question, verify the patient's vital sign(s) by an alternative method and then check the monitor for proper functioning.

WARNING! Remove device batteries prior to long term storage.

WARNING! When attaching sensors with Microfoam® tape, do not stretch the tape or attach the tape too tightly. Tape applied too tightly may cause inaccurate readings and blisters on the patient's skin (lack of skin respiration, not heat, causes the blisters).

WARNING! Operation of this device may be adversely affected in the presence of strong electromagnetic sources, such as electrosurgery equipment.

WARNING! Operation of this device may be adversely affected in the presence of computed tomograph (CT) equipment.

WARNING! Use only SpO_2 sensors supplied with, or specifically intended for use with, this device.

WARNING! SpO_2 measurements may be adversely affected in the presence of high ambient light. Shield the sensor area (with a surgical towel, for example) if necessary.

WARNING! Dyes introduced into the bloodstream, such as methylene blue, indocyanine green, indigo carmine, patent blue V (PBV), and fluorescein may adversely affect the accuracy of the SpO_2 reading.

WARNING! Any condition that restricts blood flow, such as use of a blood pressure cuff or extremes in systemic vascular resistance, may cause an inability to determine accurate pulse rate and SpO_2 readings.

WARNING! Significant levels of dysfunctional hemoglobins, such as carboxyhemoglobin or methemoglobin, will affect the accuracy of the SpO_2 measurement.

WARNING! The monitor was not designed or tested to be an apnea monitor.

WARNING! Optical cross-talk can occur when two or more sensors are placed in close proximity. It can be eliminated by covering each site with an opaque material.

WARNING! Tissue damage may result from overexposure to sensor light during photodynamic therapy with agents such as verteporphin, porfimer sodium, and metatetrahydroxyphenylchlorin (mTHPC). Change the sensor site at least every hour and observe for signs of tissue damage. More frequent sensor site changes/inspections may be indicated depending upon the photodynamic agent used, agent dose, skin condition, total exposure time or other factors. Use multiple sensor sites.

WARNING! When connecting this monitor to any instrument, verify proper operation before clinical use. Refer to the instrument's user manual for full instructions. Accessory equipment connected to the monitor's data interface must be certified according to the respective IEC standards, i.e., IEC 60950 for data processing equipment or IEC 601-1 for electromedical equipment. All combinations of equipment must be in compliance with IEC 601-1-1 systems requirements. Anyone connecting additional equipment to the signal input port or the signal output port configures a medical system, and, therefore, is responsible that the system complies with the requirements of the system standard IEC 601-1-1.

WARNING! IEC 60950 approved equipment must be placed outside the "patient environment". The patient environment is defined as an area 1.5 m (4.92 feet) from the patient.

PATIENT ENVIRONMENT
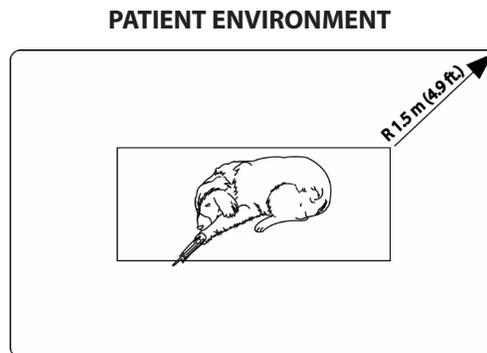
WARNING! Disconnect the AC power supply from the outlet before disconnecting it from the monitor. Leaving the AC power supply connected to an AC power outlet without being connected to the monitor may result in a safety hazard.

WARNING! Do not allow any moisture to touch the AC power supply connectors or a safety hazard may result. Ensure that hands are thoroughly dry before handling the AC power supply.

WARNING! Failure to place the monitor away from the patient may allow the patient to turn off, reset, or damage the monitor, possibly resulting in the patient not being monitored.

WARNING! Failure to carefully route the cable from the sensor to the monitor may allow the patient to become entangled in the cable, possibly resulting in patient strangulation. Route the cable in a way that will prevent the patient from becoming entangled in the cable. If necessary, use tape to secure the cable.

WARNING! If there is a risk of the AC power supply becoming disconnected from the monitor during use, secure the cord to the monitor several inches from the connection.

WARNING! Under certain clinical conditions, pulse oximeters may display dashes if unable to display SpO_2 and/or pulse rate values. Under these conditions, pulse oximeters may also display erroneous values. These conditions include, but are not limited to: patient motion, low perfusion, cardiac arrhythmias, high or low pulse rates or a combination of the above conditions. Failure of the clinician to recognize the effects of these conditions on pulse oximeter readings may result in patient injury.

WARNING! Verify that all LEDs (light emitting diodes) on the display light up upon startup of the device.

Cautions

CAUTION! Do not autoclave, ethylene oxide sterilize, or immerse the monitor or sensors in liquid. Always disconnect the power source and remove all batteries before cleaning or disinfecting the monitor.

CAUTION! Should the device become wet, wipe off all moisture and allow sufficient time for drying before operating.

CAUTION! The monitor should be operated from its internal power source if the integrity of the protective earth conductor is in doubt.

CAUTION! Pressing front panel keys with sharp or pointed instruments may permanently damage the keypad. Press front panel keys only with your finger.

CAUTION! Do not allow water or any other liquid to spill onto the monitor. Unplug the external power supply from the monitor before cleaning or disinfecting the monitor. Evidence that liquid has been allowed to enter the monitor voids the warranty.

CAUTION! Ensure the device's AC rating is correct for the AC voltage at your installation site before using the monitor. The monitor's AC rating is shown on the external power supply. If the rating is not correct, do not use the monitor; contact the Smiths Medical PM, Inc. Clinical Support department, or your local distributor, for help.

CAUTION! Connect only the printer/PC interface cable specifically intended for use with this device (see *Optional Supplies and Accessories*).

CAUTION! Chemicals used in some cleaning agents may cause brittleness of plastic parts. Follow cleaning instructions in this manual.

Notes

NOTE! Batteries are user replaceable. Follow local governing ordinances and recycling instructions regarding disposal or recycling of device components, including batteries.

NOTE! When using AC power, the Digital Oximeter is a class II device with functional earth. This earth connection is for device electromagnetic compatibility and does not provide protection to the patient or user.

NOTE! It is recommended that batteries be used with the monitor when operating with AC power to prevent monitor shutdown with loss of AC power.

NOTE! SpO_2 averaging is the number of pulse beats over which the SpO_2 value is averaged; pulse averaging is the number of seconds over which the pulse value is averaged.

NOTE! All user and patient accessible materials are non-toxic.

NOTE! Each input and output connection of the monitor is electrically isolated.

NOTE! Performance and safety test data are available upon request.

NOTE! To comply with government requirements for patient monitoring, the indefinite high priority alarm, medium priority alarm, and low priority alarm tone silence feature may not be available in monitors shipped to your country.

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Chapter 2: Intended Use and General Information

Intended Use

The Veterinary Handheld Digital Pulse Oximeter is a low cost monitor for spot checking or continuous monitoring of SpO_2, pulse rate and pulse strength. The monitor is a battery powered pulse oximeter. It may be used in the hospital or clinical environment, and during emergency land transportation. The oximeter will operate accurately over an ambient temperature range of 32 to 131°F (0 to 55°C). The oximeter works with all SurgiVet® oximetry sensors providing SpO_2 and pulse rate on all patients from neonatal to adult.

This device is intended for continuous patient monitoring with adjustable alarm limits as well as visible and audible alarm signals.

NOTE! The monitor was not designed or tested to be an apnea monitor.

Monitor Features

- Provides fast, reliable SpO_2, pulse rate, and pulse strength measurements.

- Ideally suited for use in intensive care units, outpatient clinics, emergency rooms, and during emergency land transport.

- Portable and lightweight. Weighs only 454 grams (16 ounces), with batteries.

- Ergonomically designed to fit comfortably in the palm of your hand.

- Uses six (6) standard "AA" (type IEC LR6) alkaline batteries.

- Battery life is approximately twenty-four (24) hours without printing.

- Bright, easy-to-read LED displays indicate SpO_2 and pulse rate measurements.

- An eight-segment LED bar graph indicates pulse strength.

- Adjustable volume (including silence) "beep" sounds with each pulse beat. Pitch of pulse "beep" corresponds to SpO_2 value.

- Positive identification of SpO_2 or pulse rate alarm. Adjustable high and low alarm limits for SpO_2 and pulse rate measurements.

- Adjustable volume for alarm and alert tones (including silence).

- User-adjustable delayed audible system alarms.

- SpO_2 and pulse rate averaging settings are user-selectable.

- Artifact indicator informs user of excess motion and other artifacts.

- User-adjustable trend storage rate, ranging from 4 to 30 seconds per sample, for many applications.

- Low battery indicator lights when about 30 minutes of battery use remains. A yellow Low priority alarm LED turns on and an audible 5-beep burst notifies the user of low battery life.

- Data log prints SpO_2 and pulse rate readings in real time, once every five (5) seconds through the IR port to an optional printer.

Theory of Operation

The pulse oximeter determines %SpO$_2$ and pulse rate by passing two wavelengths of low intensity light, one red and one infrared, through body tissue to a photodetector. Information about wavelength range can be especially useful to clinicians. Wavelength information for this device can be found in the *SpO$_2$ Specifications* section of this manual.

Pulse identification is accomplished by using plethysmographic techniques, and oxygen saturation measurements are determined using spectrophotometric oximetry principles. During measurement, the signal strength resulting from each light source depends on the color and thickness of the body tissue, the sensor placement, the intensity of the light sources, and the absorption of the arterial and venous blood (including the time varying effects of the pulse) in the body tissues.
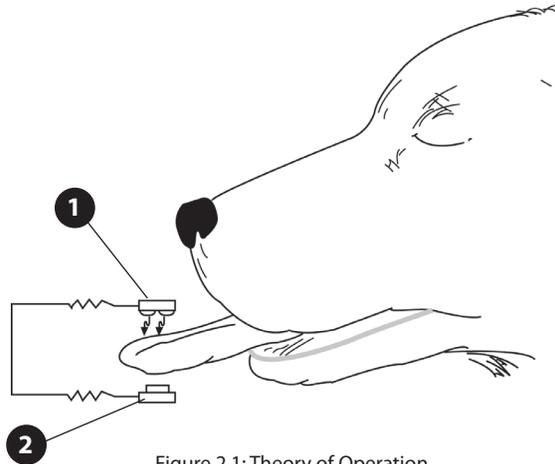

Figure 2.1: Theory of Operation

1 **Low intensity Red and Infrared LED light sources**

2 **Detector**

Oximetry processes these signals, separating the time invariant parameters (tissue thickness, skin color, light intensity, and venous blood) from the time variant parameters (arterial volume and SpO$_2$) to identify the pulses and calculate functional oxygen saturation. Oxygen saturation calculations can be performed because blood saturated with oxygen predictably absorbs less red light than oxygen-depleted blood.

WARNING! **Since measurement of SpO$_2$ depends on a pulsating vascular bed, any condition that restricts blood flow, such as the use of a blood pressure cuff or extremes in systemic vascular resistance, may cause an inability to determine accurate SpO$_2$ and pulse rate readings.**

WARNING! **Under certain clinical conditions, pulse oximeters may display dashes if unable to display SpO$_2$ and/or pulse rate values. Under these conditions, pulse oximeters may also display erroneous values. These conditions include, but are not limited to: patient motion, low perfusion, cardiac arrhythmias, high or low pulse rates or a combination of the above conditions. Failure of the clinician to recognize the effects of these conditions on pulse oximeter readings may result in patient injury.**

Patented Technology

The Handheld Digital Oximeter incorporates patented technology and noise reducing hardware to enhance the oximeter's ability to detect pulse amplitude in patients with poor peripheral perfusion. *Blood Pulse Detection Method Using Autocorrelation*, patent number 5,558,096, analyzes a digitized signal, in real time, and compares it with previous pulse data. If similar characteristics to previous data are recognized, the device confirms a valid pulse. In essence, an individual's pulse data is retained and used as a template to accept or reject future pulse signals. Patented technology, digital signal processing, and a greatly improved signal to noise ratio, provide for improved performance.

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Chapter 3: Controls and Features
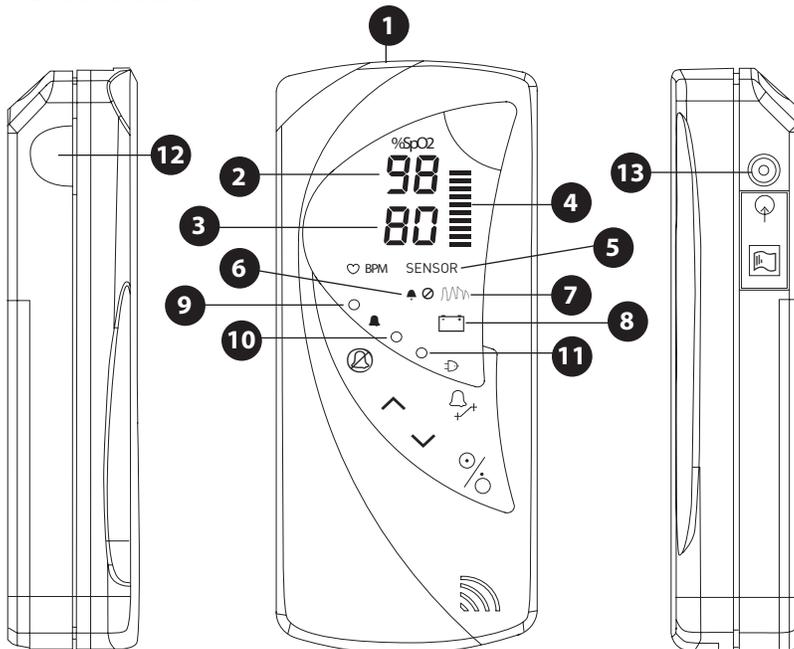
Monitor Front Panel

Figure 3.1: Monitor Controls, and Features

① Sensor/Printer Connector
The sensor connects here, or an oximetry extension cable can be connected between the monitor and the sensor. The serial printer or PC communication cable is also connected here.

② SpO$_2$ Numeric Display
A number shows the patient's SpO$_2$ value in percent. Dashes (--) mean the monitor is not able to calculate the SpO$_2$ value.

③ Pulse Rate Numeric Display
A number shows the patient's pulse rate value in beats per minute. Dashes (--) mean the monitor is not able to calculate the pulse rate value.

④ Pulse Strength Bar Graph
The pulse strength bar graph "sweeps" with the patient's pulse beat. The height of the bar graph shows the patient's pulse strength.

⑤ Sensor Problem Alert Indicator
This indicator lights steadily to inform the operator of an oximeter sensor problem.

⑥ ⏰⊘ Alarm Silence Indicator
This indicator flashes during temporary two-minute alarm silence. The indictor lights steadily during permanent/indefinite alarm silence.

⑦ 〰 Artifact Alert Indicator
This indicator informs the operator about the presence of excess artifacts.

⑧ ⊏⊐ Low Battery Indicator
During a Low Battery Attention, this LED is lit and an audible burst of 5 beeps notifies the user that approximately 30 minutes of battery use remains.

9 **High Priority Alarm LED (red)**
This LED flashes twice every second during a high priority condition. This signal indicates that immediate operator attention is needed.

10 **Low Priority Alarm LED (yellow)**
This LED indicates a low priority alarm, which lights steadily during a low priority alarm condition.

11 **Line/Power Indicator (green)**
This LED lights steadily while external power is applied.

12 **IR Printer Output**
The Digital Oximeter can transmit data to an optional HP printer via an infrared link through this port.

13 **AC Power Jack**
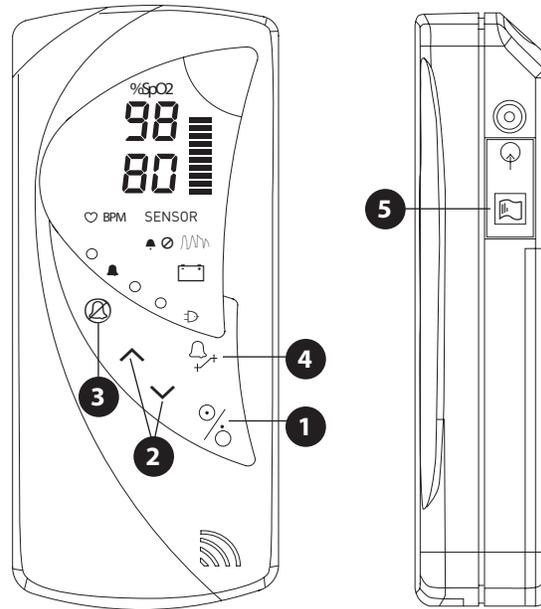An optional AC power supply connects here.

Monitor Operating Keys

Figure 3.2: Monitor Operating Keys

1 ℅ **ON/OFF Key**
Pressing this key turns the monitor ON and OFF.

2 ⌃ **Up and** ⌄ **Down Arrows**
The Up and Down arrow keys are used to adjust the following settings:

- Alarm Limits
- %SpO$_2$/Pulse Rate averaging
- Trend Interval
- Low Priority Alarms Delay
- Alarm Volume
- Pulse Volume

3 ⊘ **Alarm Silence**
Momentarily pressing the Alarm Silence key disables the alarm tone for two (2) minutes. Pressing and holding the Alarm Silence key for about three (3) seconds disables the alarm tone indefinitely (until canceled or the monitor is turned off). To cancel either the indefinite or the two-minute alarm and alert tone silenced condition, momentarily press the Alarm Silence key. The Alarm Silenced indicator will turn off.

4 🔔 **Alarm Select**
Pressing this key cycles through each of the alarm settings.

5 🖨 **PRINT/CLEAR Key**
Located on the side of the monitor. Pressing this key will send data to the optional IR printer. Pressing the key again will stop printing. Pressing and holding the Print/Clear key will clear the trend data.

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Chapter 4: Operating Instructions

WARNING! This device must be used in conjunction with clinical signs and symptoms. This device is only intended to be an adjunct in patient assessment.

Unpacking the Monitor

1. Carefully remove the monitor and its accessories from the shipping carton. Save the packing materials in case the monitor must be shipped or stored.

2. Compare the packing list with the supplies and equipment you received to make sure you have everything you'll need.

Install the Batteries

The oximeter uses 6 (six) standard "AA" alkaline cells, IEC Type LR6.

To install/replace the batteries:

1. Depress the battery door tab and lift up.

2. Install the negative end of each battery first, compressing the battery terminal spring until the positive terminal clears the positive tab. Press the battery down into place.

3. Place battery door tabs into the slots of the monitor back panel, depress the door tab, and press the door into place.

NOTE! If you install disposable batteries, be sure to dispose of them in compliance with your institution's guidelines and local ordinances.

NOTE! The unit will hold data for about one and a half minutes with no battery power. This will insure the safety of trend data during battery replacement.

AC Power

Refer also to *Chapter 12: Optional Supplies and Accessories* to verify the proper AC power supply for your application.

NOTE! The AC power supply does not act as a battery charger.

NOTE! Do not plug the monitor into an outlet controlled by a wall switch.

1611	AC power supply 105 - 152 VAC 60Hz
1612	AC power supply 208 - 252 VAC 50/60Hz
1613	AC power supply 90 - 110 VAC 60Hz

NOTE! When using AC power, the Digital Oximeter is a class II device with functional earth. This earth connection is for device electromagnetic compatibility and does not provide protection to the patient or user.

NOTE! Intermittent use of AC power will require functional "AA" cells to maintain memory and keep the oximeter from defaulting to clinician mode from other modes.

Attaching the Sensor to the Patient

WARNING! **Prolonged use or the patient's condition may require changing the sensor site periodically. Change sensor site and check skin integrity, circulatory status, and correct alignment at least every 4 hours.**

WARNING! **When attaching sensors with Microfoam® tape, do not stretch the tape or attach the tape too tightly. Tape applied too tightly may cause inaccurate readings and blisters on the patient's skin (lack of skin respiration, not heat, causes the blisters).**

Attaching the patient to the monitor requires these steps:

1. Choose the sensor.

2. Check the sensor and oximetry cable.

3. Clean or disinfect the sensor if using the reusable type (Disposable sensors are for single-patient use and do not require cleaning or disinfecting).

4. Attach the sensor to the patient.

Choosing the Sensor

Choose the appropriate sensor from the following chart.

PATIENT	SITE	SENSOR #/DESCRIPTION
Small/Medium Animal up to 60 pounds	Pinna (ears), Toe Webbing, Tongue	V1711: Large 'Y' Sensor V1702: Mini 'Y' Sensor V3078: Mini Clip Sensor
	Rectum/Tail	V1700: Reflectance Sensor V1710: Tail Wrap Sensor
	Hock, Achilles Tendon, etc.	V1707: Universal 'C' Sensor
Large Animals over 60 pounds	Pinna (ears), Toe Webbing, Tongue	V1711: Large 'Y' Sensor V1702: Mini 'Y' Sensor V3078: Mini Clip Sensor
	Rectum/Tail	V1700: Reflectance Sensor V1710: Tail Wrap Sensor
	Hock, Achilles Tendon, etc.	V1707: Universal 'C' Sensor
Equine	Tongue	V1707: Universal 'C' Sensor

Care and Handling of the Sensor

WARNING!   Misuse or improper handling of the sensor and cable could result in damage to the sensor. This may cause inaccurate readings.

Hold the connector rather than the cable when connecting or disconnecting the sensor to the device as shown in Figure 4.1.
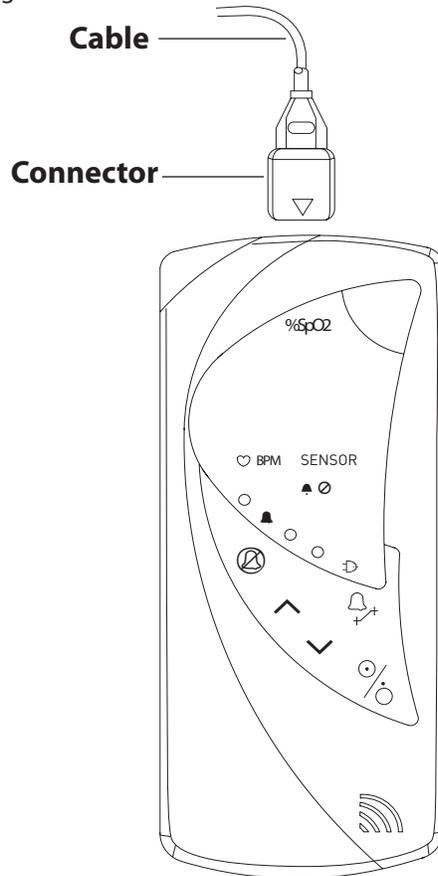

Figure 4.1: Disconnecting or connecting the sensor.

Do not use excessive force or unnecessary twisting when connecting, disconnecting, storing, or when using the sensor.

Chapter 4: Operating Instructions

Pulse Oximeter Sensors

NOTE! ⚠**Please see insert accompanying each sensor for further details.**

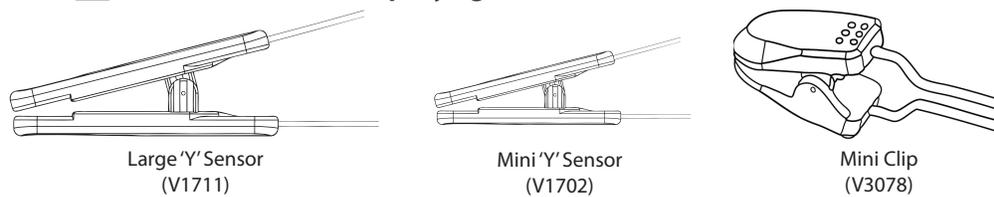| Large 'Y' Sensor (V1711) | Mini 'Y' Sensor (V1702) | Mini Clip (V3078) |

Figure 4.2: Lingual Sensors

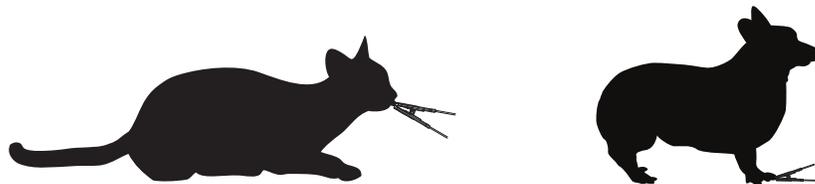Attach the sensor and clip to the patient's tongue. Make sure the light source is topside of the tongue.

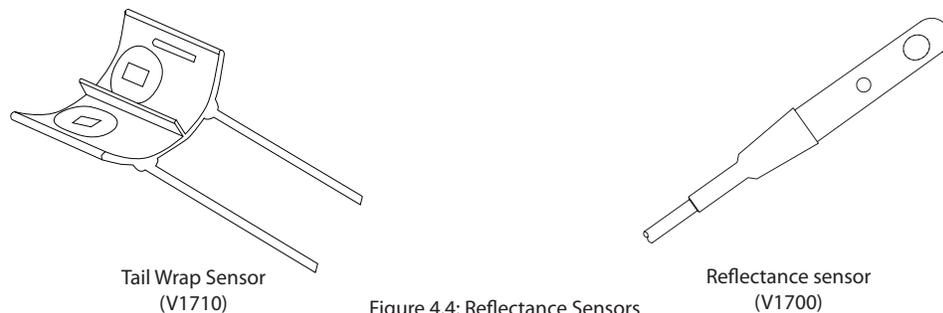Figure 4.3: Attaching the Sensor to the Animal

Reflectance Sensors

Tail Wrap Sensor
(V1710)

Figure 4.4: Reflectance Sensors

Reflectance sensor
(V1700)

For best results while using the tail wrap sensor (V1710), apply to the ventral base of the tail with the divider positioned centrally. Moisten the fur and parting at the application site or shaving a small area is required. The sensor works best on medium to large sized patients.

Secure sensor strap.

Tail Clip Sensor

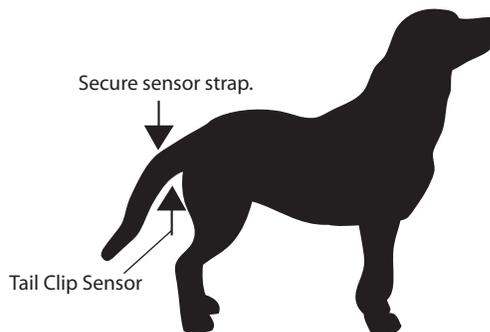Figure 4.5: Attaching the Sensor to the Animal

For best results while using the reflectance sensor (V1700), apply to the base of the tail. This sensor can also be used rectally if needed.

When using either of the reflectance sensors, ultrasound gel is recommended to enhance performance. Fur, dark pigmentation, poor perfusion and movement can affect the sensor's ability to obtain accurate readings.

Pulse Oximeter Sensor Application Tips

There is some variation depending on the manufacturer, but there are three basic types of pulse oximeter sensors made for the small animal patient:

- Large and Mini 'Y' sensors
- Mini Clip sensor
- 'C' sensor (may also be used on large animals)
- Tail Wrap sensor
- Reflectance sensor

It is very important to have a variety of sensors in order to monitor the majority of the small animal patients. It is also important to select the proper sensor for animals based on their size, color, fur type, medical condition, and type of procedure.

Testing Sensor Function

1. **To test the large and mini 'Y' sensor functions**, turn on the monitor with the lingual sensor attached. View the sensor to make sure a red light is being emitted, then place the sensor on a small finger (without nail polish). Rest the hand with the sensor on it on a table to minimize motion. Note that in most cases the red light should be shining in the same direction as the overhead or surgical lights. It is important that the light receptor is shielded in order to avoid interference from ambient light. Once placed on a patient site, the red light should be shining continuously. In some cases a blinking light indicates that the tissue thickness is either too thin or thick. Once the sensor is placed properly, both the SpO_2 and pulse rate should appear in a short period of time (10-15 seconds).

2. **Testing the 'C' sensor is performed in the same manner.** This is a stronger sensor and can be used with greater tissue thickness.

3. **Testing the tail wrap and reflectance sensors are performed in the same manner**, but it should be pressed between thumb and index finger or into the palm of your hand.

Primary Applications for Sensors

Large and Mini 'Y' Sensor and Mini Clip Sensor

- The primary application site is the tongue for most animals. On cats and small dogs, fold the tongue like a taco or use a wet gauze pad of single thickness folded over the tongue, and then place the sensor over the gauze.

- Other sites include the prepuce or vulva of larger dogs, the achilles tendon of a cat or small dog, ears, or toe webbing.

C Sensor

- For cats and small breed dogs, place the sensor on the thigh, metatarsal or metacarpal, or hock near the saphenous vein.

- For larger breed dogs, place the sensor over the Achilles tendon, tongue, prepuce or vulva, or through toe webbing.

- It may be necessary to wet and part the fur with water in order to get the sensor closer to the skin of the patient.

- For large animals (e.g. horses), place the sensor on the tongue.

Tail Wrap Sensor and Reflectance Sensor

- In most animals, wet and part the fur at the ventral tail base and use the straps on the tail wrap to hold the tail wrap sensor in place.

- When using the reflectance sensor, wet and part the fur at the ventral tail base and use non-adhesive tape to hold the sensor in place. The reflectance sensor may be used rectally if the patient has a small or no tail.

- It may be necessary to shave a small spot on the ventral tail base in patients with a thick undercoat, such as a Husky.

Limitations

Experience will quickly tell you which probes work best under different conditions. Fur, dark pigmentation, poor perfusion, and movement can all affect the sensors ability to obtain accurate readings. Well-perfused sites with little or no hair are preferable. It is also important to note that some anesthetic drugs, such as Xylazine (Rompun), Acepromazine, or Medetomidine (Domitor) can affect peripheral pulse pressures causing very weak pulsations. All pulse oximeters require a good quality pulse to work properly. Other drugs, such as ketamine, can cause the tongue to twitch, limiting the use of a lingual clip on that site.

Checking the Sensor and Oximetry Cable

Follow these instructions each time before you attach the sensor to the patient. This helps ensure the sensor and oximetry cable are working properly.

WARNING! **Using a damaged sensor may cause inaccurate readings. Inspect each sensor. If a sensor appears damaged, do not use it. Use another sensor or contact your authorized repair center for help.**

WARNING! **Using a damaged oximetry cable may cause inaccurate readings. Inspect the oximetry cable. If the oximetry cable appears damaged, do not use it. Contact your authorized repair center for help.**

1. Carefully inspect the sensor to make sure it does not appear damaged.

2. If using the oximetry cable, carefully inspect the oximetry cable to make sure it does not appear damaged.

3. If using the oximetry cable:

   a. If the sensor is not already connected to the oximetry cable, connect the sensor to the oximetry cable. Push the connectors together firmly and close the latch to secure the connectors.

   b. If the oximetry cable is not already connected to the monitor, connect the oximetry cable to the monitor. Push the connector firmly into the monitor.

4. If not using the oximetry cable, connect the sensor to the monitor. Push the connector firmly into the monitor.

5. If the monitor is not already on, press the %O key to turn on the monitor.

WARNING! **If any of the integrity checks fail, do not attempt to monitor the patient. Use another sensor or oximetry cable, or contact the equipment dealer for help if necessary.**

6. Before the sensor is attached to the patient, check the integrity of the sensor, oximetry cable, and oximeter as follows:

  a. Make sure the red light in the sensor is illuminated.

NOTE! Obstructions or dirt on the sensor's red light or detector may cause the checks to fail. Make sure there are no obstructions and the sensor is clean.

7. You are now ready to attach the sensor to the patient.

Cleaning or Disinfecting the Sensors

Clean or disinfect reusable sensors before attaching to a new patient.

WARNING! Do not autoclave, ethylene oxide sterilize, or immerse the sensors in liquid.

CAUTION! Unplug the sensor from the monitor before cleaning or disinfecting.

Clean the sensor with a soft cloth moistened in water or a mild soap solution. To disinfect the sensor, wipe the sensor with isopropyl alcohol.
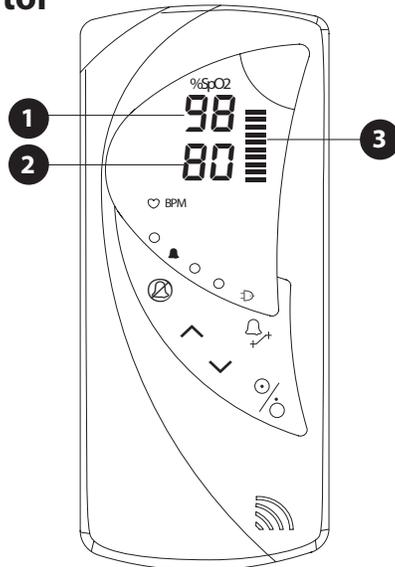
Turning On the Monitor

Figure 4.6: SpO$_2$, pulse rate, and pulse strength bar graph.

❶ Patient's SpO$_2$ Shown Here

❷ Patient's Pulse Shown Here

❸ Patient's Pulse Strength Shown Here

1. To turn on the monitor, press the ⅛ key. When turned ON, the monitor does the following:

  • The top segment of the pulse strength bar graph illuminates.
  • The monitor's software revision is momentarily displayed.
  • The patient number is momentarily displayed.

WARNING! Verify that all LEDs (light emitting diodes) on the display light up upon startup of the device.

2. The monitor has two averaging settings for %SpO$_2$ and pulse rate. To change the averaging setting, press and hold the ∧ Up Arrow while turning on the monitor. This will set the %SpO$_2$ and pulse rate averaging to 16/16. Press and hold the ∨ Down Arrow while turning on the monitor to set the %SpO$_2$ and pulse rate averaging to 4/8.

NOTE! **Increasing or decreasing the averaging setting has no effect on the data update rate.**

NOTE! **SpO$_2$ averaging is the number of pulse beats over which the SpO$_2$ value is averaged; pulse averaging is the number of seconds over which the pulse value is averaged.**

High Priority Alarms

A high priority alarm warns you about an abnormal patient condition.

A high priority alarm is activated when:

- the patient's SpO$_2$ reading matches or exceeds the SpO$_2$ alarm range.

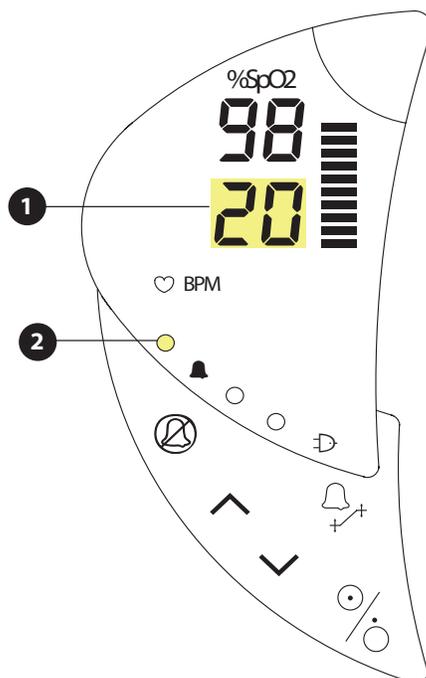- the patient's pulse rate reading matches or exceeds the pulse rate alarm range.

Figure 4.7: Alarm Example

❶ **During a high priority alarm, the numbers flash that correspond to the alarm.**

❷ **The high priority alarm LED flashes.**

a. The alarm tone sounds, if not silenced. The high priority alarm tone consists of 3 short bursts, a pause, followed by 2 more short bursts.

Note: The alarm tone does not sound if the Alarm Silenced indicator is on or flashing.

NOTE! **Both SpO$_2$ and pulse rate numbers will flash if both readings match or exceed their alarm range.**