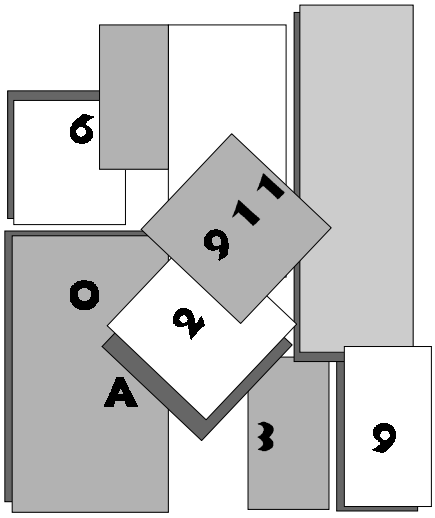
MINIPACK 911 *Series*



COMPACT, DIGITAL
VITAL SIGN MONITOR

OPERATOR'S MANUAL

CAUTION: Federal law (U.S.) restricts this device to sale by or on the order of a physician.

PaceTech™ Medical Monitors Inc.

...Excellence in Patient Monitoring

Rev.5 10/96

510 Garden Avenue. N. Clearwater, FL 34615-4126
Phone: (813) 442-8118 • Fax: (813) 443-7257

Table of Contents

SECTION 1 - INTRODUCTION

SECTION 2 - CONTROLS and CONNECTORS

SECTION 3 - DISPLAYS and INDICATORS

SECTION 4 - ALARM LIMITS SETUP and VIOLATIONS

SECTION 5 - MONITOR OPERATION

SECTION 6 - OXYGEN SATURATION MONITORING

SECTION 7 - BLOOD PRESSURE MONITORING

SECTION 8 - TEMPERATURE MONITORING

SECTION 9 - CO_2 and RESPIRATION MONITORING (Model STC Only)

SECTION 10 - PRINTER OPERATION

APPENDIX I - PRODUCT SPECIFICATIONS

APPENDIX II - BATTERY OPERATION

APPENDIX III - MAINTENANCE

SECTION 1 - INTRODUCTION

A. About This Manual

This operators manual has been prepared to provide information on the correct use of the *MINIPACK 911 SERIES* compact, digital vital sign monitor. It contains performance specifications and information for routine installation, operation and maintenance. It is intended for health care professionals trained in monitoring cardiovascular and respiratory activity.

It is up to the user to ensure that any applicable regulations respecting the installation and operation of the monitor be observed. The operator should read this manual carefully and thoroughly before attempting to use the monitor.

If the monitor is being used for the first time, follow each section in the manual sequentially. Each section builds on descriptions from the previous . Since this manual describes a full-featured monitor, disregard any descriptions that refer to features not installed in your monitor. If the monitor is set up, and you are already familiar with its operations, then proceed to the section that describes those functions you will use.

B. Warranty

Pace Tech, Inc., warrants each monitor to be free of defects in materials and workmanship for a period of one (1) year from the date of purchase. The warranty on all cuffs, probes, printers, and accessories is three (3) months.

If you discover a defect, Pace Tech will, at its option, replace or repair the product at no charge provided the monitor is returned to Pace Tech during the warranty period, transportation charges prepaid.

This warranty does not apply if the product:

- has been damaged from improper operation (misuse) or failure to follow operating instructions provided with the product (misapplication or negligence).
- has been damaged because it has been improperly connected to other equipment.
- has been damaged by accident.
- has been tampered with or modified without the express permission of Pace Tech.
- has had the serial number removed or defaced.This is the only warranty from Pace Tech, and supersedes all other warranties, expressed or implied otherwise.

This warranty is non-transferable and applies only to the original purchaser and does not extend to subsequent owners of the product.

Please fill out the self-addressed warranty registration card enclosed in the back of this Operators Manual and return it to Pace Tech, Inc. Also, save the original shipping container for service and repair returns.

For technical and service information, refer to the Service Manual, your dealer, or the Customer Service Department at Pace Tech, Inc., 510 Garden Ave. N, Clearwater, Florida 34615, phone: (813) 442-8118, (800) 722-3024, fax: (813) 443-7257.

C. General Safety

1. INDICATIONS

The *MINIPACK 911 SERIES* is intended for use by persons trained in professional health care to measure and monitor the following parameters:

- NIBP systolic, diastolic, and mean arterial pressure (MEAN or MAP) values
- Blood oxygen saturation (SpO_2 or Pulse oximetry)
- Pulse (SpO_2 and NIBP) signal strength
- Pulse rate (SpO_2 and NIBP)
- Temperature
- End-tidal CO_2 concentration ($etCO_2$)
- Inspired CO_2 concentration ($inCO_2$)
- Respiration rate

Additional options offered are:

- Add-on 27 column thermal printer
- RS-232 option
- Carrying case
- Mobile cart with accessory compartment
- Pole mount assembly

The MINIPACK *911 SERIES* is available in the following five models:

Model 911	NIBP (Non-Invasive Blood Pressure)
Model 911 S	NIBP, SpO_2
Model 911 ST	NIBP, SpO_2, TemperatureModel
911 T	NIBP, TemperatureModel
911 STC	NIBP, SpO_2, Temperature, $etCO_2$, $inCO_2$, and Respiration

2. CONTRAINDICATIONS - *Situations where risks associated with the use of the monitor are greater than the benefits.*

This monitor is <u>not</u> intended to be used as an apnea monitor.

This monitor is <u>not</u> intended to be used during MRI (Magnetic Resonance Imaging).

3. NOTES - *Supplemental information which is relevant to the equipment but should not be used to direct action*

NOTE:

- Notes will appear throughout the operators manual in this format.

4. WARNINGS - *Indicate the possibility of injury due to patient or operator associated with the use or the misuse of the monitor.*


Federal law restricts this device to sale by or on the order of a physician.


Use only accessories supplied with this monitor or specifically intended to be used with this monitor.


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


Electrical shock hazard may occur when covers are removed. Do not remove covers or panels. Refer servicing to qualified personnel.


There is no defibrillator synchronization output on this monitor. Make no connections between this monitor and a defibrillator.


Enclosure leakage current is limited internally by this monitor's adapter to less than 100 micro amperes (µA); however, always consider additional leakage current that can be caused by other equipment used on the patient at the same time as this monitor.


To ensure that the leakage current protection remains within the specifications, use only the AC adapter supplied with, or specifically intended to be used with this monitor.


Connection of non-isolated devices to the RS-232 connector may cause chassis leakage to exceed the specification standards.


To prevent electrical hazards to all personnel, this monitor must be properly grounded. The AC adapter supplied with the equipment provides for this protection. Do not attempt to defeat this protection by modifying the cords or using ungrounded adapters.


Patient connections are Type B. Use insulated probes for all connections. Do not let patient connections contact other conductive parts, including earth. See instructions for patient connections in this manual.

5. CAUTIONS - *Indicate a condition that may lead to equipment damage or malfunction.*


This monitor is intended to be operated from a main power source of nominally 110-120V/50-60 Hz or 220-240V/50-60 Hz AC through the external AC adapter or from the internal battery.

Do not autoclave, ethylene oxide sterilize, or immerse the monitor in liquid. Unplug the monitor before cleaning or disinfecting.

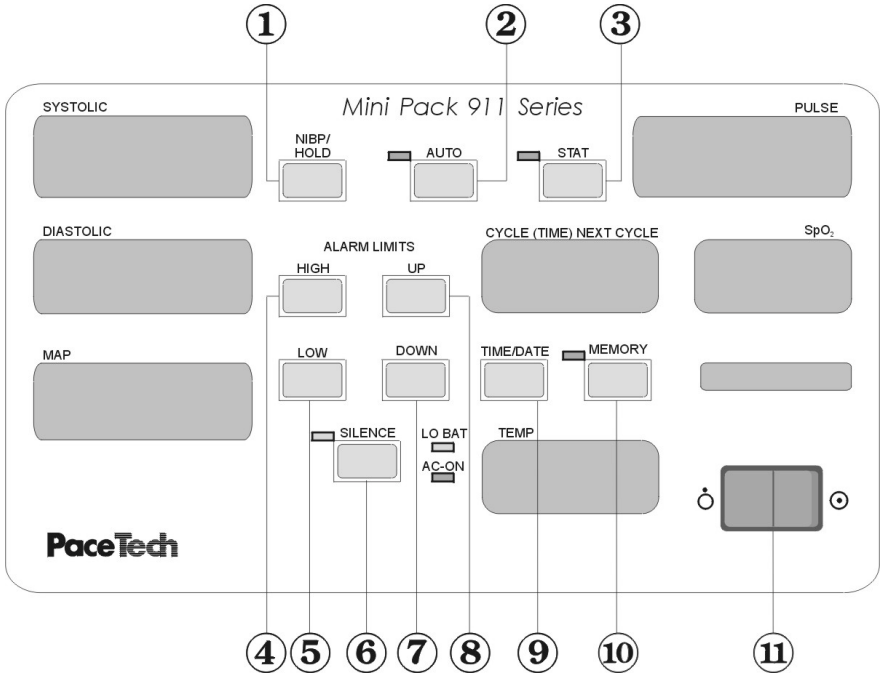
D. Symbols Chart

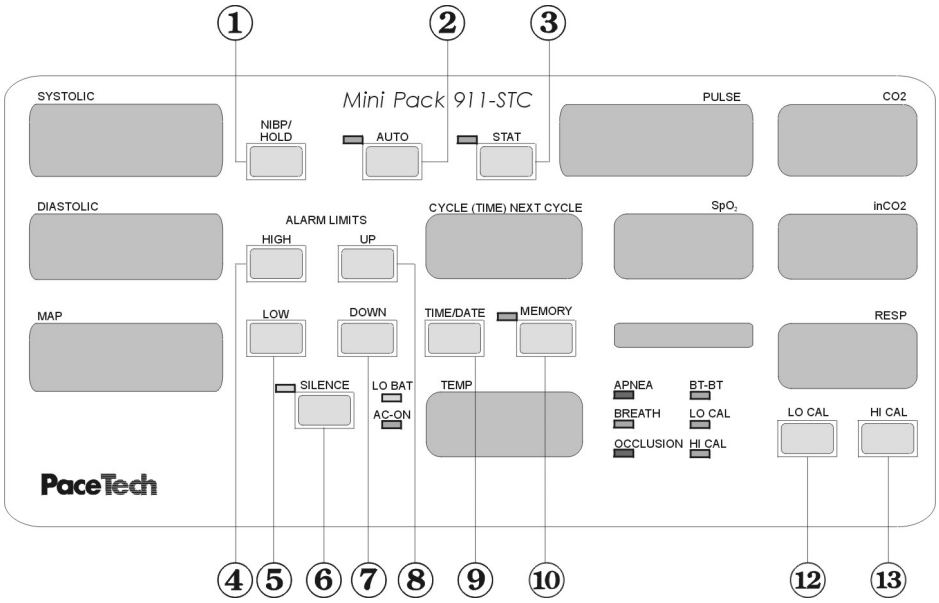
The following symbols are used on the monitors to mark equipment functions and/or features.

Symbol	Description	Symbol	Description
	On - only for a part of the equipment		Attention, consult accompanying documents
	Off - only for a part of the equipment; battery will continue to charge even if power is turned "off."		Contains lead-acid battery, please dispose of properly in recycle container. Do not incinerate or throw in the trash.
	Type B Equipment provides a particular degree of protection against electric shock, especially regarding the following: 1. allowable leakage current 2. reliability of the protective earth connection (if present).		Adjust sound volume
			Fuse information
	Type BF Equipment is isolated from all other parts to a degree so that patient leakage current is below F-type standards.		Functional Earth
	Defibrillator proof BF Equipment		Direct Current (DC) power supply
			Fuse information

SECTION 2 - CONTROLS and CONNECTORS

A. Front Panels





1. NIBP/HOLD This pushbutton will:
- initiate one blood pressure determination
- stop the Auto print cycles, or
- abort the blood pressure reading in progress

2. AUTO This pushbutton places the monitor into the *Auto* mode of operation. Repeated blood pressure readings will be taken at desired set intervals of time.

3. STAT This pushbutton places the monitor into the *Stat* mode of operation. Repeated blood pressure readings will be taken as often as possible for a desired set period of time up to 4 minutes.

4. HIGH This pushbutton will display the previously programmed upper alarm limits.

5. LOW This pushbutton will display the previously programmed lower alarm limits.

6. SILENCE This pushbutton will:
Silence the alarms for a selected period of time, or
program the automatic alarm reset interval.

7. DOWN This pushbutton will:
decrease the alarm limits, print cycle time, alarm reset interval, time and date, or
initiate the memory recall in descending order
adjust the barometric pressure compensation (Model STC only)

8. UP This pushbutton will:
increase the alarm limits, print cycle time, alarm reset interval, time and date, or
initiate the memory recall in ascending order
adjust the barometric pressure compensation (Model STC only)

9. TIME DATE This pushbutton allows viewing and setting of the time and date.

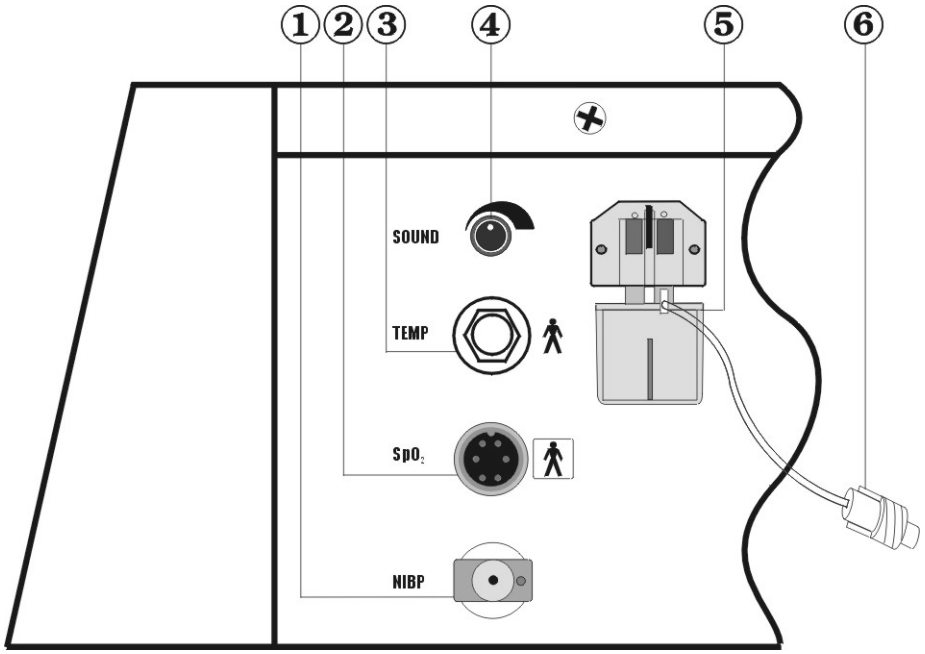
10. MEMORY This pushbutton will recall previous readings in the memory while monitoring in the *Auto* or *Stat* modes.

11. POWER This toggle switch turns the power from on:  to off:  The monitor will continue to charge the battery as long as the unit is plugged in, even if the power switch is in the "off" position.

12. LO CAL This pushbutton initiates a low calibration. (Model STC only)

13. HI CAL This pushbutton initiates a high calibration. (Model STC only)

B. Side Panel



1. NIBP This receptacle accepts the connector from the blood pressure cuff hose.

2. SpO_2 This receptacle accepts the pulse oximetry extension cable plug.

3. TEMP This receptacle accepts the temperature probe.

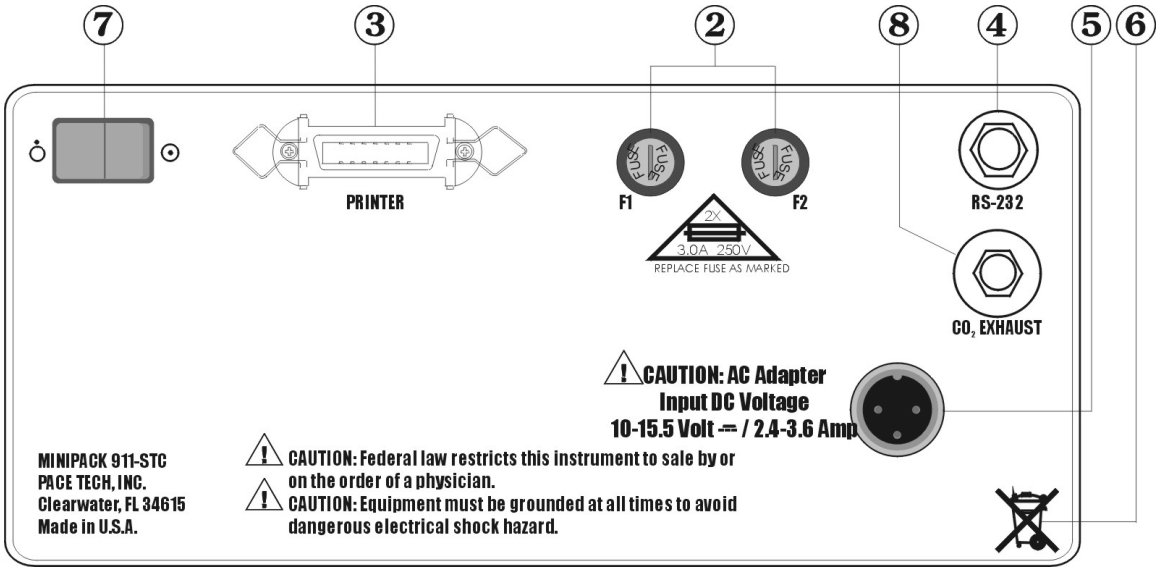
4. SOUND This control knob adjusts the volume of the pulse sounds; turning the knob clockwise will increase the volume, turning the knob counter-clockwise will decrease the volume. This knob does not adjust the audio alarm.(Model STC only)

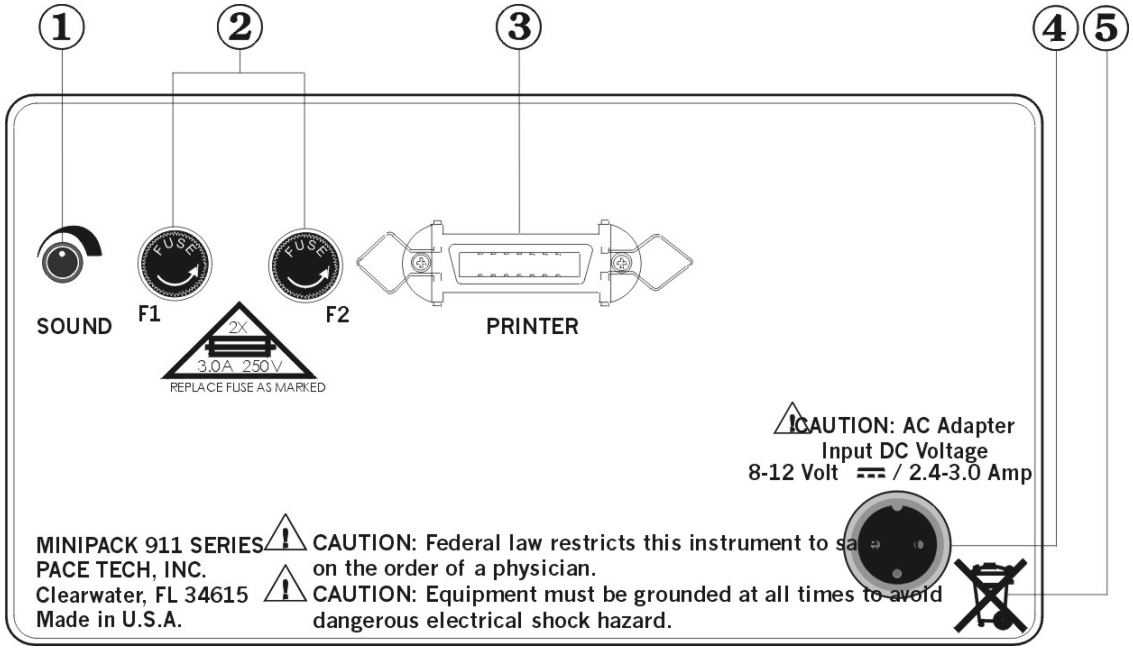
5. WATER TRAP RECEPTACLE CONNECTOR
This disposable water trap attaches to this fixture. (Model STC only)

6. WATER TRAP This disposable plastic container collects condensation from the CO_2 line. (Model STC only)

7. SAMPLE LINE CONNECTOR
This connector attaches the water trap to the respiratory gas sample line.(Model STC only)

C. Rear Panels





1. SOUND This control knob adjusts the volume of the pulse sounds; turning the knob clockwise will increase the volume, turning the knob counter-clockwise will decrease the volume. This knob does not adjust the audio alarm.

2. FUSE HOLDERS The monitor is equipped with two fuses, designated F1 and F2, which each protect a different power input:
F1- This fuse protects the internal battery. If it is blown, then the monitor can continue to operate on the AC power supply. Battery operation is not possible until the fuse is replaced.
F2- This fuse protects the AC power supply line. If it is blown, then the monitor can continue to operate under battery power. However, the monitor cannot be recharged until this fuse is replaced.

3. PRINTER This receptacle provides parallel signal lines to the optional add-on 27 column thermal printer.

4. RS 232 This digital interface connector provides serial data to most RS232 devices capable of receiving 9600 Baud. (Optional) For the RS-232 protocol, please contact Pace Tech.

5. AC ADAPTER This receptacle accepts the AC adapter used for continuous AC operation or to charge the battery.

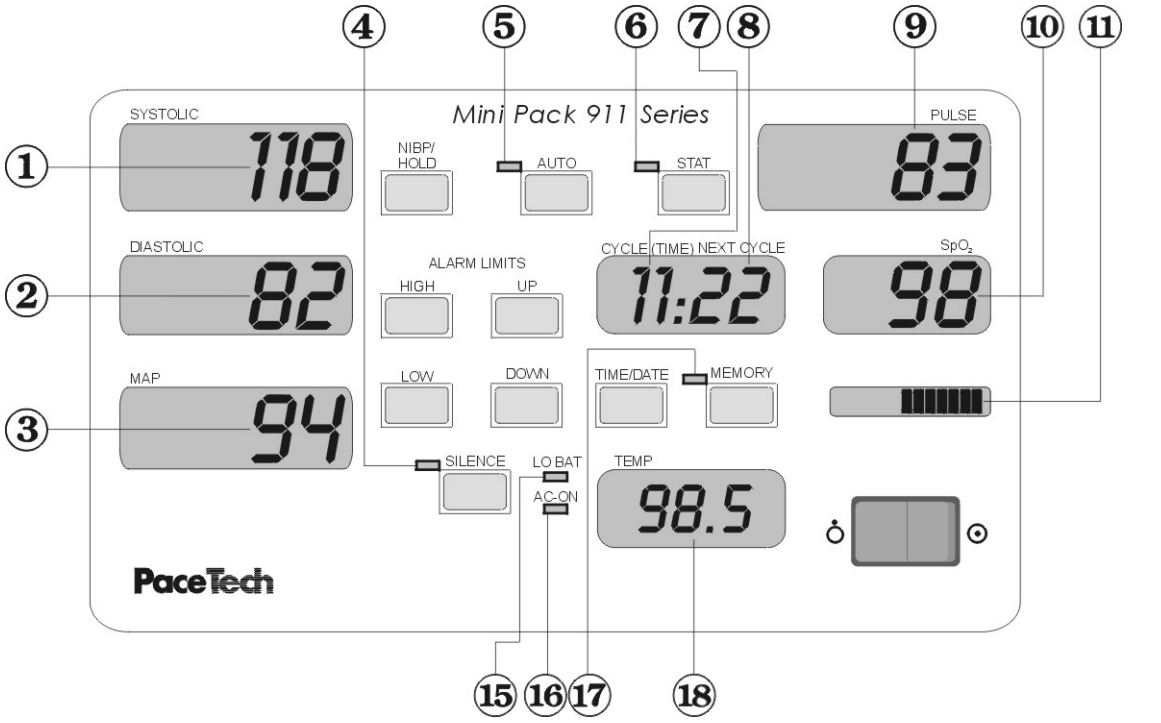
6. BATTERY DISPOSAL SYMBOL
Contains lead-acid battery, please dispose of properly in recycle container. Do not in cinerateor throw in the trash."

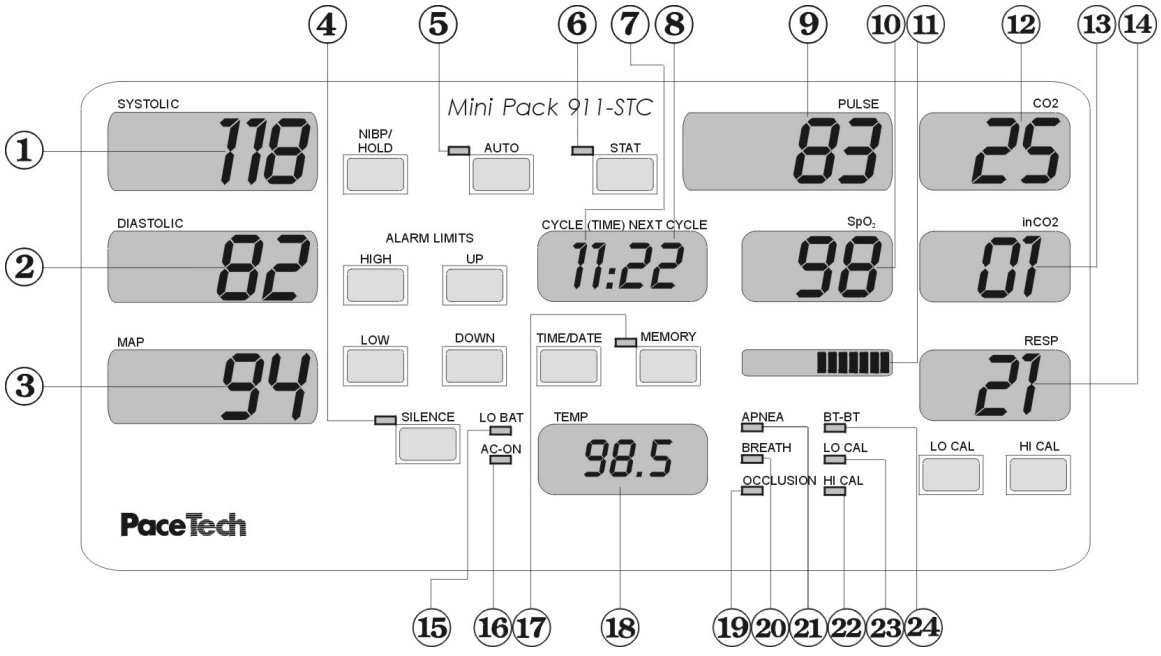
7. POWER This toggle switch turns the power from on:  to off:  The monitor will continue to charge the battery as long as the unit is plugged in, even if the power switch is in the "off" position.

8. CO_2 EXHAUST This port provides an outlet for the capnometer pneumatic exhaust (Model STC only).

SECTION 3 - DISPLAYS and INDICATORS

A. Front Panel





1. SYSTOLIC 3 digit numeric display

- shows NIBP Systolic pressure in mmHg or kPa
- displays Systolic alarm limits
- indicates a violation of a Systolic alarm limit by flashing

2. DIASTOLIC 3 digit numeric display
- shows NIBP Diastolic pressure in mmHg or kPa
- displays Diastolic alarm limits
- indicates a violation of a Diastolic alarm limit by flashing

3. MAP 3 digit numeric display
- shows NIBP Mean Arterial Pressure (MAP) of NIBP
- displays Mean Arterial Pressure alarm limits
- indicates a violation of a Mean Arterial Pressure alarm limit by flashing
- shows cuff pressure as the blood pressure cuff is inflating and deflating throughout a blood pressure determination

4. SILENCE LED which lights up when the alarm audio indicator is turned off

5. AUTO LED which lights up when the *Auto* mode is initiated

6. STAT LED which lights up when the *Stat* mode in initiated

7. CYCLE TIME 2 digit numeric display
- shows programmable *Auto* and *Stat* cycle time
- shows programmable automatic alarm reset interval
- displays real time and date
- flashes when the *Auto* cycle is on *Hold*
- displays barometric pressure (Model STC only).

8. NEXT CYCLE 2 digit numeric display
- shows the time left before the next *Auto* and *Stat* cycle begins
- displays real time and date
- flashes when the monitor is on *Hold*
- displays barometric pressure (Model STC only).

9. PULSE 3 digit numeric display
- shows Pulse rate per minute
- displays Pulse alarm limits
- indicates a violation of a Pulse alarm limit by flashing.

10. SpO_2 2 digit numeric display
- shows percentage of Oxygen Saturation (SpO_2) in the blood
- displays SpO_2 alarm limits
- indicates a violation of an SpO_2 alarm limit by flashing.

11. BAR GRAPH - indicates the SpO_2 and NIBP pulse signal relative strength.

12. $EtCO_2$ 2 digit numeric display (Model STC only)
- shows the percentage of Carbon Dioxide in exhaled breath ($EtCO_2$)
- displays $EtCO_2$ alarm limits
- indicates a violation of an $EtCO_2$ alarm limit by flashing

13. $inCO_2$ 2 digit numeric display (Model STC only)
- shows the percentage of Carbon Dioxide in inspired breath ($inCO_2$)
- displays $inCO_2$ alarm limits
- indicates a violation of an $inCO_2$ alarm limit by flashing

14. RESP 2 digit numeric display (Model STC only)
- displays Respiration rate per minute
- displays Respiration alarm limits
- indicates a violation of a Respiration alarm limit by flashing

15. LO BAT LED which lights up when the battery is discharged and indicates the need of charging with AC current.

16. AC ON LED which lights up when the monitor is connected to AC current.

17. MEMORY LED which lights up when *Memory Recall* is initiated.

18. TEMP 4 digit numeric display- shows Temperature in either Fahrenheit or Celsius readings
- displays Temperature alarm limits
- indicates a violation of a Temperature alarm limit by flashing

19. OCCL(occlusion) LED which lights up when the CO_2 sample line is kinked or obstructed (Model STC only)

20. BREATH LED which lights up with each exhalation (Model STC only)

21. APNEA LED which lights up after a 20 second period of undetected breathing (Model STC only)

22. HI CAL LED which indicates the monitor is being calibrated with a known mixture of gas (Model STC only)

23. LO CAL LED which indicates the monitor is being calibrated to atmospheric pressure (Model STC only)

24. BT-BT LED which indicates breath to breath analysis of CO_2 (Model STC only)

SECTION 4 - ALARM LIMITS SETUP and VIOLATIONS

A. Determining Previously Selected Alarm Limits

The factory alarm limits are not in effect each time the monitor is powered up; the previously selected alarm limits remain in the memory.

The alarm limits are checked by pressing the **HIGH** pushbutton to determine the upper alarm limits and by pressing the **LOW** pushbutton to determine the lower alarm limits. The parameters are displayed individually in the following sequential order on the respective display as either the **HIGH** or **LOW** pushbutton is pressed:

(1) Systolic
(2) Diastolic
(3) MAP
(4) SpO_2
(5) Pulse
(6) Temp
(7) $EtCO_2$
(8) $inCO_2$
(9) Resp

All the high alarms limits can be determined by continuing to press **HIGH** pushbutton. The high and low alarm limits of the individual parameter can be checked by pressing the **HIGH** then **LOW** pushbutton as you continue through the cycle.

B. Changing / Setting Alarm Limits

The alarm limits are set or changed by pressing the **UP** pushbutton to increase the alarm limit or by pressing the **DOWN** pushbutton to decrease the alarm limit while each parameter is displayed in the respective display.

If no change is desired, or after a change has been made, wait five (5) seconds and the monitor will return to normal operations.

C. Activating Preset Factory Alarm Limits

To set or activate the preset factory alarm limits, simultaneously press the HIGH and LOW pushbuttons for two (2) seconds. A beep will sound and immediately all the alarms limits will set to the factory default limits.

The factory alarm limits and range of programmable limits (non-overlapping) are:

PARAMETERS	FACTORY LIMITS		RANGE OF PROGRAMMABLE LIMITS	
	LOWER LIMIT	UPPER LIMIT	LOWER LIMIT	UPPER LIMIT
Systolic	100 mmHg 13.2 kPa	160 mmHg 21.2 kPa	0-254 mmHg 0-33.9 kPa	0-255 mmHg 0-34.0 kPa
Diastolic	60 mmHg 7.9 kPa	100 mmHg 13.2 kPa	0-254 mmHg 0-33.9 kPa	0-255 mmHg 0-34.0 kPa
MAP	80 mmHg 10.6 kPa	120 mmHg 15.9 kPa	0-254 mmHg 0-33.9 kPa	0-255 mmHg 0-34.0 kPa
SpO_2	90%	100%	0-99%	0-100%
Pulse	40 bpm	120 bpm	0-249 bpm	0-250 bpm
Temp	96.0°F 35.5°C	102.5°F 39.2°C	83.0-109.9°F 28.3-43.2°C	83.0-110.0°F 28.3-43.3°C
$EtCO_2$	8 mmHg	50 mmHg	0-98 mmHg	0-99 mmHg
$inCO_2$	0 mmHg	8 mmHg	0-98 mmHg	0-99 mmHg
Respiration	6 rpm	40 rpm	4-98 rpm	4-99 rpm

NOTE:

• The high SpO_2 limit will be displays as “00" since the SpO_2 LED numeric display is a two digit display.

D. Violations

When a parameter reading violates an alarm limit, the audible alarm will sound and the display will continue to flash until:

- another reading is taken which is within the alarm limits

- the alarm limit is changed or

- the monitor is turned off.

In addition, the audible alarm will sound until the SILENCE pushbutton is pressed.

E. Sensor Off Alarm

The monitor will alert the operator if:

- the SpO_2 probe becomes disconnected from the patient,

- there is no data input, or

- the extension cable becomes disconnected from the monitor.

Immediately the **SpO_2** display will register “0" and the alarm will sound. When the pulse signal is restored, the monitor will resume normal operations.

F. Alarm Silence

1. AUTO MODE

When the **SILENCE** pushbutton is pressed, the **SILENCE** LED just above the pushbutton will light up indicating that the audible alarm has been silenced. The LED indicator will remain lit until the **SILENCE** pushbutton has been pressed again, or the programmed interval time for the audible alarm has passed. The audible alarms are reactivated at that time.

2. MANUAL MODE

When you follow the above procedure in Manual mode, the LED indicator will remain lit until the SILENCE pushbutton has been pressed again, or the programmed interval time for the audible alarm has passed, but the audible alarm will not be reactivated automatically.

G. Programmable Automatic Alarm Reset

The monitor is programmed for the audible alarm to be reactivated after a selected interval of time. There is no factory set interval for the automatic alarm reset. The previously selected alarm reset interval will be displayed. This interval can be set to a selected interval of time form 10 seconds to 5 minutes, or 99 minutes.

To change this interval of time from 10 seconds to 5 minutes:

1. Press and hold down the **SILENCE** pushbutton for 6 seconds until you hear the second beep sound. The previously selected alarm reset interval then will be displayed in the **CYCLE TIME** display.

2. Press the **UP** or **DOWN** pushbutton until the desired interval is displayed in the **CYCLE TIME** display (between ten seconds and five minutes.)

To obtain a selected interval of 99 minutes:

1. Press only the **DOWN** pushbutton until 99 is displayed in the **CYCLE TIME** display.

Ten seconds after the **UP** or **DOWN** pushbutton is released, the monitor will resume normal operations.

H. Alarm Override

The operator may choose to override the programmed alarm intervals if he or she is in full time attendance. To override the programmed alarm intervals, simply push the SILENCE pushbutton twice.

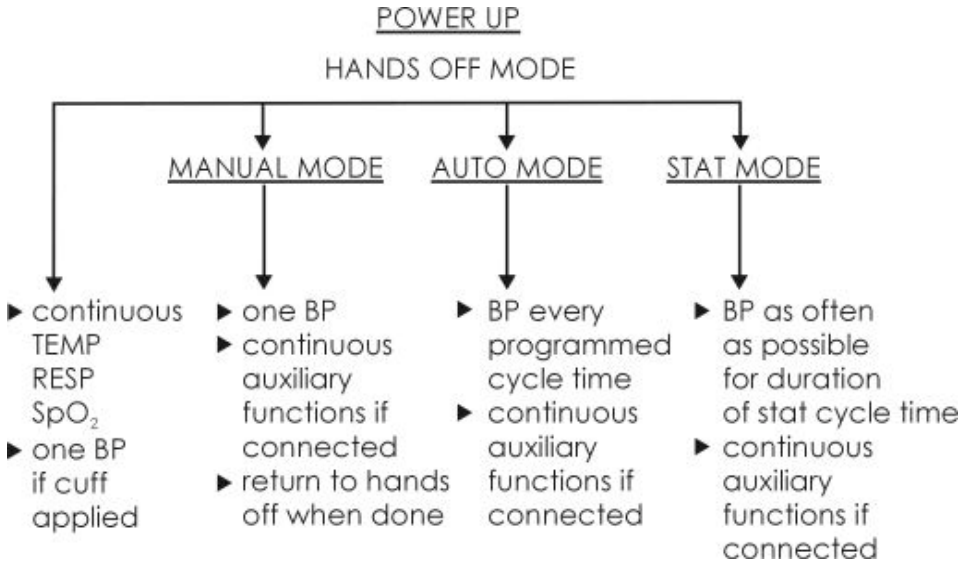
To re-establish the alarm, follow the programmable automatic alarm reset instructions in the previous paragraph.

SECTION 5 - MONITOR OPERATION

A. Modes of Operation

The *MINIPACK 911 SERIES* has four operating modes: *Manual, Auto, Stat,* and *Hands Off.*

This illustration will give an overview of the four Modes of Operation:



1. HANDS OFF

Hands Off is the normal power-up mode of operation for the monitor. This is a semiautomatic mode for the auxiliary functions of the monitor: temperature, respiration, SpO_2, and pulse.

The *Hands Off* mode is entered automatically by powering up the monitor. The monitor will detect if the temperature probe or SpO_2 probe has been applied and will initiate the first NIBP reading automatically.

If a temperature probe has been applied or if an SpO_2 probe has been connected, the monitor will also begin to inflate the blood pressure cuff. If the blood pressure cuff has not been applied to the patient, and a consistent or steady pressure is not built up in the blood pressure cuff after ten seconds, the blood pressure reading will be aborted. Meanwhile, the readings of the auxiliary functions will be monitored continuously.

NOTE:

- The pulse can be obtained from both the blood pressure cuff and from the SpO_2 probe. If the SpO_2 probe is connected, the SpO_2 pulse has priority.

2. MANUAL

The *Manual* mode can be used when a blood pressure reading is desired without an auxiliary function.

a. After applying the correct size cuff, press the **NIBP/HOLD** pushbutton and a blood pressure determination will be initiated immediately.

b. The **NIBP/HOLD** pushbutton must be pressed if another blood pressure reading is desired.

c. If the *Manual* mode is used for a blood pressure reading with auxiliary functions, the temperature, respiration, pulse and SpO_2 will be monitored continuously after the monitor reverts to the *Hands Off* mode, but the blood pressure cuff will not inflate a second time.

d. The printer will print a new heading each time the **NIBP/HOLD** pushbutton is pressed as a convenience for screening.

e. At the end of blood pressure determination in *Manual* mode, the monitor will revert to the *Hands Off* mode.

NOTE:

- Patient readings are not stored in the memory in the *Manual* mode of operation.

3. AUTO

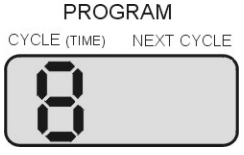
The *Auto* mode is used when continuous blood pressure determinations are desired at intervals called "*Cycle Times"*.

a. After pressing the **POWER** switch, press the **AUTO** pushbutton. The previously selected cycle time will appear on the **CYCLE TIME** display.

b. To change the cycle time, press either the **UP** or **DOWN** pushbutton until the desired cycle time appears on the **CYCLE TIME** display.

c. After either the **UP** or **DOWN** pushbutton is released, the first reading of the cycle will begin.

d. If the previously selected cycle time is desired and changes are not required, it is unnecessary to do anything after first pressing the **AUTO** pushbutton. The first blood pressure reading will begin after the cycle time is displayed in the **CYCLE TIME** display.



e. There are no factory preset cycle times. The **CYCLE TIME** display will indicate the cycle time in the memory from the previously selected cycle time.

The choices of cycle times are:

Seconds	:10,	:20,	:30,	:40,	:50
Seconds displayed as	.1	.2	.3	.4	.5

Minutes 1 through 99

The **NEXT CYCLE** display indicates the minutes remaining until the next cycle will begin (10, 5, 2, etc.). The time will be displayed in minutes until there is less than one minute left; then the time remaining will be displayed in seconds such as (.5, .4, .3, etc.).

The printer will print a new heading each time a new round of determinations begins. A maximum of 250 readings can be printed or saved in the memory for recall.

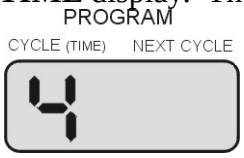
4. STAT

The *Stat* mode is used when repeated blood pressure reading are desired as quickly and as often as possible for up to 4 minutes.

a. The *Stat* mode can be entered at any time by pressing the **STAT** pushbutton.

b. This will override any existing mode and a series of blood pressure readings will be taken repeatedly and as often as possible for the duration of the *Stat* cycle time.

c. To change the *Stat* cycle time, press either the **UP** or **DOWN** pushbutton until the desired cycle time appears on the **CYCLE TIME** display. The maximum *Stat* cycle time is 4 minutes.



d. Two seconds after either the **UP** or **DOWN** pushbutton is released, the first *Stat* blood pressure reading will begin.

If the previously selected *Stat* cycle time is desired and changes are not required, it is unnecessary to do anything after pressing the **STAT** pushbutton. The first *Stat* reading will begin two seconds after releasing the **STAT** pushbutton.

There are no factory preset *Stat* cycle times. The **CYCLE TIME** display will indicate the previously selected *Stat* cycle time.

The choices are: 1, 2, 3 or 4 minutes

At the end of the *Stat* cycle, press the **STAT** pushbutton to return the monitor to the *Manual* mode.

B. Auto Cycle Interruption

To obtain an additional blood pressure reading during a cycle in the *Auto* mode, press the **NIBP/HOLD** pushbutton once to restart the *Auto Cycle* mode.

To obtain a blood pressure reading during a reading in the *Auto Cycle* mode, press the **NIBP/HOLD** pushbutton twice.

When the **NIBP/HOLD** pushbutton is pressed, it deflates the blood pressure cuff and freezes the previous blood pressure reading on the **SYSTOLIC, DIASTOLIC,** and **MAP** displays.

The **CYCLE TIME** and **NEXT CYCLE** displays will blink until the **NIBP/HOLD** pushbutton is again pressed to restart the *Auto Cycle*.

C. Hold

If for some reason a blood pressure reading must be canceled, the blood pressure reading can be aborted at any time by pressing the **NIBP/HOLD** pushbutton.

When the **NIBP/HOLD** pushbutton is pressed, it deflates the blood pressure cuff and freezes the previous blood pressure readings on the **SYSTOLIC** and **DIASTOLIC** displays.

The **CYCLE TIME** and **NEXT CYCLE** displays will blink until the **NIBP/HOLD** pushbutton is again pressed to revert to the previous mode.

The **NIBP/HOLD** pushbutton does not affect the readings that may be in progress for temperature, respiration, pulse or SpO_2 since the auxiliary readings always operate in the semiautomatic *Hands Off* mode.

D. Power Interruption

1. AC Operation

If momentary power interruption occurs, the monitor will automatically switch to battery operation. The monitor will not turn off and the readings in the memory will be retained.

2. BATTERY OPERATION

If the **POWER** switch is turned off and on, the monitor will revert to the *Hands Off* mode and the display will not show the readings. All readings in the memory are lost when the monitor is turned off.

E. Memory Recall

The readings are stored in memory when the monitor is in the *Auto* or *Stat* mode.

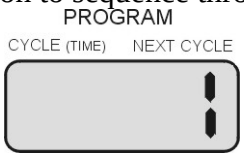
The previous readings in the memory can be recalled by pressing the **MEMORY RECALL** pushbutton. The **MEMORY RECALL** LED will light up as long as the monitor is in the *Memory Recall* mode indicating observation of previous readings.

The first (initial) reading of the patient will be displayed in the respective displays readouts and the number “1" will be displayed in the **NEXT CYCLE** display to indicate display of the first reading.

To recall other readings:

1. Press the **MEMORY RECALL** pushbutton.

2. Press the **UP** pushbutton to sequence through the readings in ascending order.



3. The readings of the patient will be displayed in the respective displays and the corresponding number of the reading (2, 3, 4, etc.) will be indicated in the **NEXT CYCLE** display.

4. The readings can be recalled in ascending order (forward) by pressing the **UP** pushbutton in descending order (backward) by pressing the **DOWN** pushbutton (4, 3, 2 etc.)

5. During the *Memory Recall* mode, the monitor will continue to take readings without interruption.

6. When the **MEMORY RECALL** pushbutton is pressed again, the monitor will revert to normal operations and display the current readings.
Up to 250 readings can be recalled in ascending or descending order.
All readings are lost when the monitor is turned OFF.

NOTE:

- Patient readings are stored in the memory only when the **AUTO** or **STAT** pushbuttons are pressed and the respective LED indicator is lit.

F. Time and Date

The monitor has a built-in time and date microchip (clock chip) which displays the time of day in military time or a 24-hour clock. This microchip has its own battery backup time keeper, which will not lose time when the monitor is turned off. The clock chip is set in the factory to the correct time and date, but it will have to be changed for daylight savings time, leap year or change of time zones.

When the monitor is powered up, the time will be displayed in the 4 digit LED display labeled **CYCLE TIME** and **NEXT CYCLE** in the following format: 16:10

To check or change the time or date:

1. Press the **TIME/DATE** pushbutton.

2. Press the **UP** pushbutton to increase or the **DOWN** pushbutton to decrease the number.

The readings will cycle in the following sequence each time the **TIME/DATE** pushbutton is pressed:

:10	minute
16:	hour
5	Day
1	month
1996	year
16:10	military time or 24-hour clock

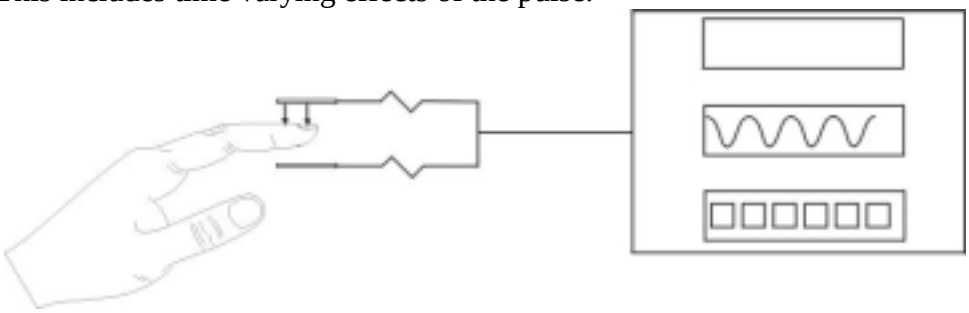
If you check or change the time and do not continue the cycle to another reading, after ten seconds the monitor will revert to normal operations and again display the time of day (16:10).

When the monitor is in the *Hold* mode, the readout in the **CYCLE TIME** and **NEXT CYCLE** display will continue to blink until the **HOLD** pushbutton is pressed again.

SECTION 6 - OXYGEN SATURATION MONITORING

A. Theory of Operation

The monitor uses the infrared method (IR) to determine the SpO_2 and pulse rate. Two wavelengths of light, one red and one infrared, are passed through body tissue to a photo detector. Plethysmographic (waveform) techniques are used to identify the pulse. Spectrophotometric oximetry principles, which are used for each light source, are dependent upon the color and thickness of body tissue, sensor placement, intensity of light sources and absorption of arterial and venous blood in the body tissue during measurement. This includes time varying effects of the pulse.



To identify the pulse and calculate oxygen saturation, the monitor processes these signals, separating the time-invariant parameters (venous blood, tissue thickness, and skin color) from the time-varying parameters (arterial volume). Blood saturated with oxygen predictably absorbs less red light than oxygen depleted blood, thus oxygen saturation calculations are obtained. Measurements are displayed both visibly and audibly. Oxygen saturation and pulse rate measurements are displayed digitally and are updated with each pulse beat. Pulse amplitude is displayed qualitatively. Additionally, the tone that signals each pulse beat varies in pitch to reflect the increase or decrease in oxygen saturation, rising and falling proportionately as saturation increases and decreases.

B. Patient Connections

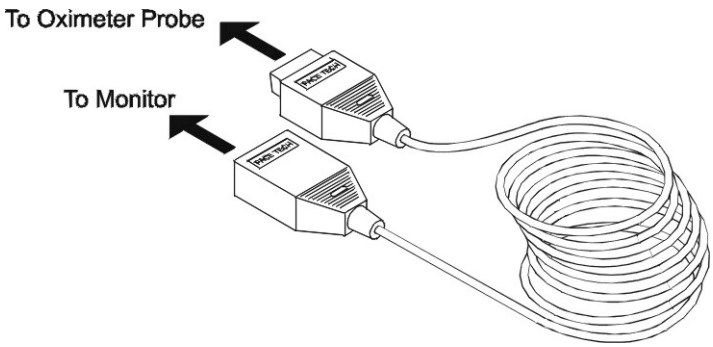
To ensure conformance with all safety and performance specifications, use only the recommended accessories. These are available from Pace Tech using the following part numbers:

Pulse Oximeter Accessories	Quantity	Order No.
Finger Probe, Reusable	One	4510
Universal 'Y' Probe, Reusable	One	4520
Patient Extension Cable, 6 ft	One	4536
Infant Wrap Probe, Reusable	One	4550
Adult/Neonatal Wrap Probe, Reusable	One	4555
Micorfoam® Surgical Tape (1" x 5.5 yds)	2 Rolls	4535
Ear Lobe Clip (use w/Universal 'Y' Probe)	One	4565
Adult Wrap Probe, Disposable	Pack of 10	4588
Pediatric Wrap probe, Disposable	Pack of 10	4589

1. CONNECTING A PROBE

a. Properly align the connector on the patient cable with the SpO_2 receptacle located on side panel of the monitor.

b. Push in firmly until the connector fully seats.



2. DISCONNECTING A PROBE

Holding the patient cable collar, gentle pull on the cable.

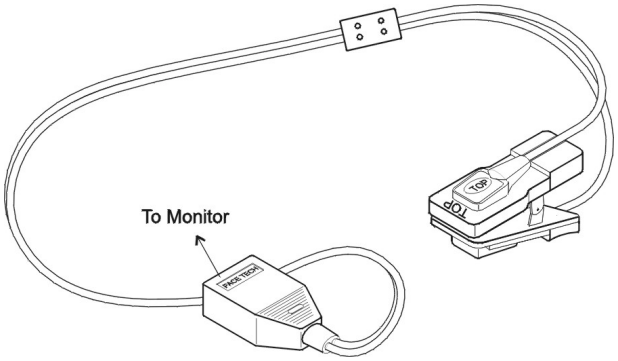
Select the appropriate oximeter probe and application technique from the following pictures and descriptions:

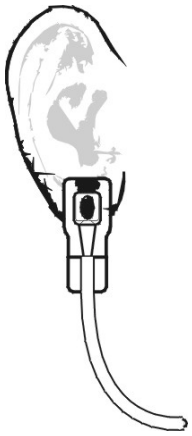
Earlobe Clip (#4565) and Universal "Y" Probe (#4520), Reusable

Attach the optional Earlobe clip to the Universal "Y" probe by sliding the "Y" probe's light source side (labeled "top") into the earlobe clip's open side (labeled "top") and the "Y" probe's detector side into the earlobe clip's opaque side

Earlobe Clip Application for Adults

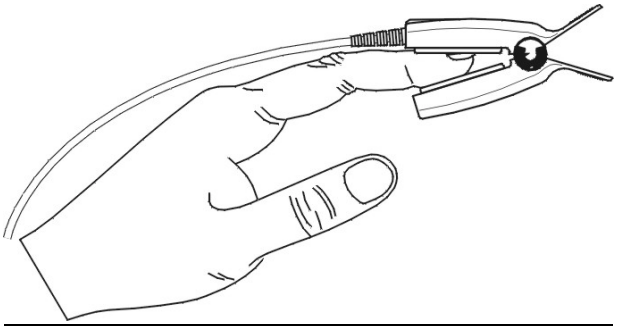
Rub the patients earlobe with an alcohol prep for 1-2 minutes. Then attach the probe and earlobe clip to a fleshy portion of the patient's earlobe with the light source to the outside.



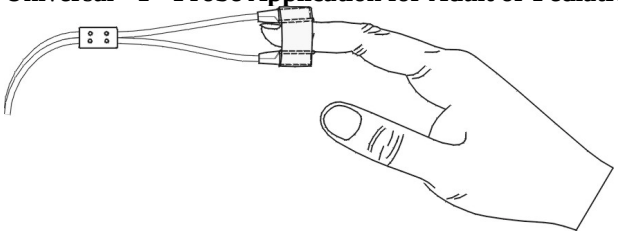


Finger Probe Application for Adults (#4510), Reusable

Attach the finger probe to the patient as shown. Be sure to fully insert the patient's finger into the probe. Run the cable along the back of the hand. For patients with long fingernails, use the Universal "Y" probe or adult/neonatal warp probe.

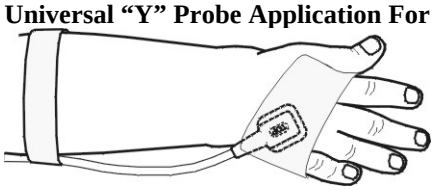


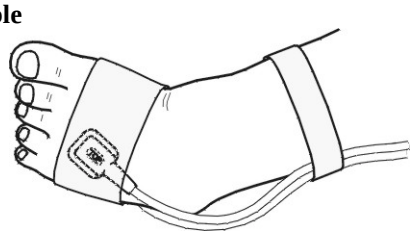
Universal "Y" Probe Application for Adult or Pediatric Finger (#4520), Reusable



Attach the Universal "Y" probe to the finger with the light source side to the fingernail. Line up the light source side with the detector side, so the source and detector are in the same plane. Secure the probe and cable with Microfoam® tape, being careful not to overly tighten the tape.

Universal "Y" Probe Application For Infants- Hand/Foot (#4520), Reusable

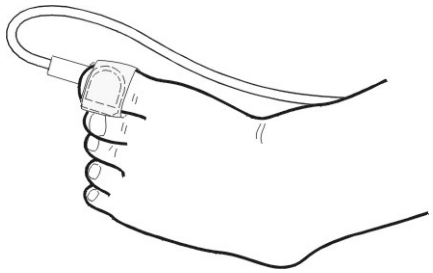




Attach the Universal "Y" probe to a fleshy portion of the infant's hand/foot. Attach the probe with the light source side on the top or outside of the hand/foot to keep the detector side away from ambient light. Line up the light source side with the detector side, so the source and detector are in the same plane. Secure the probe with Microfoam® tape, being careful not to overly tighten the tape

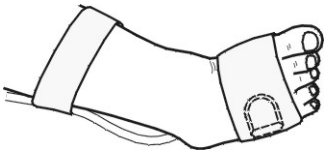
Infant Wrap Probe Application - Toe (#4550), Reusable

Attach the optional Infant Wrap probe with the light source side to the toenail.



Infant Wrap Probe Application - Foot (#4550), Reusable

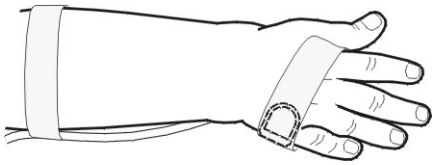
Attach the optional Infant Wrap probe with the fleshy portion of the foot.



Attach the probe with the light source side on the top or outside of the toe/foot to keep the detector side away from ambient light. Line up the light source side with the detector side, so the source and detector are an the same plane. Secure the probe with Microfoam® tape, being careful not to over tighten the tape.

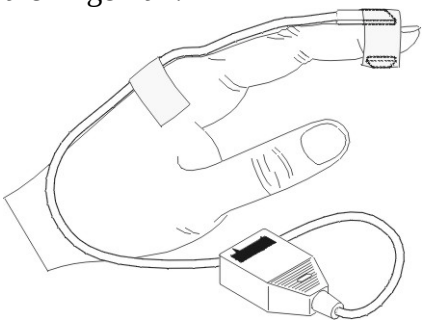
Adult / Neonatal Wrap Probe Application – Hand (#4555)

Attach the optional Adult/Neonatal Wrap probe to the fleshy part of the hand.



Adult / Neonatal Wrap Probe Application – Finger (#4555), Reusable

Attach the optional Adult/Neonatal Wrap probe to the finger with the light source side to the fingernail.



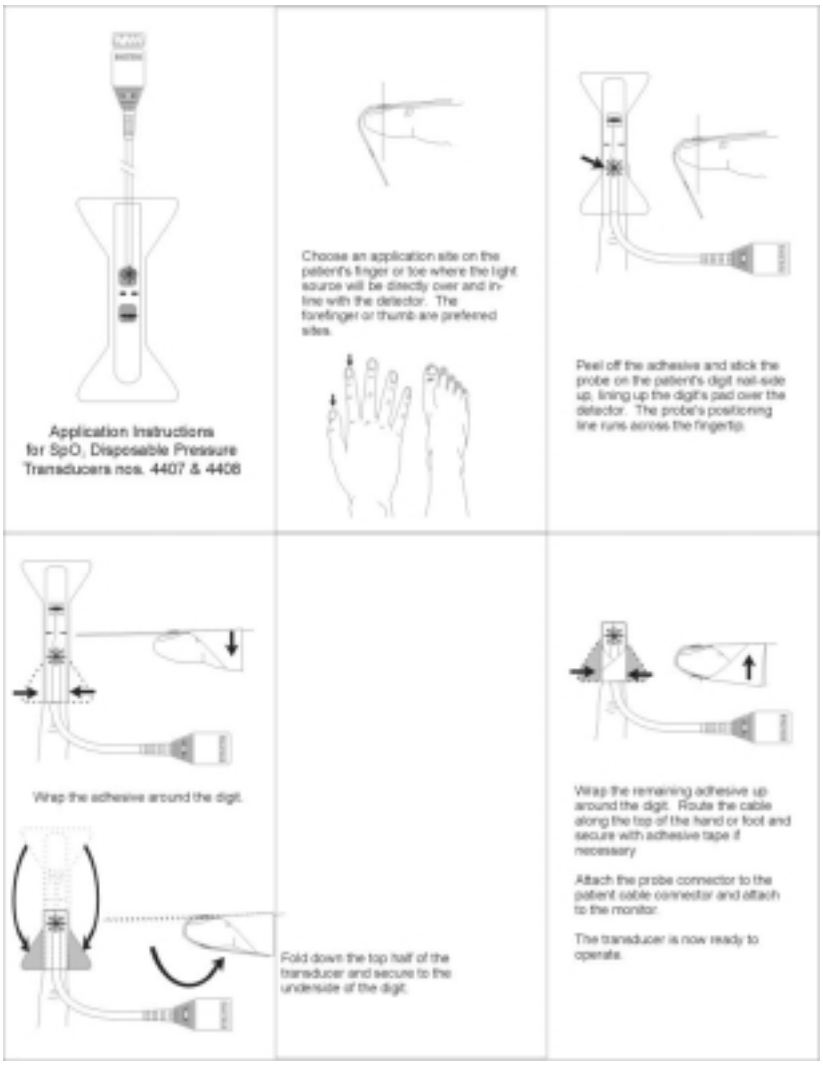
Line up the light source side with the detector side, so the source and detector are in the same plane. Secure the wrap probe and cable with Microfoam® tape, being careful not to over tighten the tape.

Application of the Disposable Adult Wrap Probe Order # 4588 and Disposable Pediatric Wrap ProbeOrder # 4589

Step 1: Choose an application site on the patient's finger or toe where the light source will be directly over and in-line with the detector (as shown to the right).

Step 2: Peel off the adhesive backing and place on the patient's foot or hand.

Step 3: Then fold down the top half of the transducer and secure to the underside of the foot or hand, making sure that the emitter lights align properly.



Step 4: Finally, route the cable along the top of the hand or foot and secure with adhesive tape if necessary.

C. SpO_2 Monitoring

1. OPERATING INSTRUCTIONS

a. Connect the patient extension cable to the receptacle on the side panel of the monitor.

b. Select an SpO_2 transducer based on application requirements and connect the appropriate probe to either the patient extension cable or directly to the monitor. (Refer to the illustration of SpO_2 accessories for the correct probe application on the previous pages.)

c. Turn the **POWER** switch on the front panel to “on”. When powered up, all display digits will momentarily show “8" to give visual assurance that the display is fully functional.

d. Set alarms according to instructions listed previously in Section 4 of this manual.
The monitor will immediately proceed to continuously monitor the SpO_2. The percentage of oxygen saturation is averaged over eight beats and the pulse rate is averaged over eight seconds.

The LED bar graph will indicate the SpO_2 pulse signal strength with variable height display.

The pulse beep sounds as each pulse beat is detected. When a drop in SpO_2 value is detected, a lower beep tone will sound. The volume of the SpO_2 tone and other non-alarm sounds can be adjusted by the **SOUND** knob located on the side panel.

2. CAUTIONS AND WARNINGS

⚠ Stretching the Microfoam® tape and attaching the tape too tightly to the skin may generate inaccurate readings and cause blisters on the patient's skin. Lack of skin respiration, not heat, causes the blister.

⚠ Reposition the probe to another site at least once every 18-20 hours (maximum 24 hours) to allow the patient's skin to respire.

⚠ Loss of pulse signal can occur if:
- the sensor is too tight,
- there is excessive illumination (e.g., a surgical or bilirubin lamp or direct sunlight),
- the sensor is placed on an extremity with a blood pressure cuff, arterial catheter, or intravascular line, or
- the patient experiences shock, hypotension, severe vasoconstriction, severe anemia, hypothermia, arterial occlusion proximal to the sensor, or cardiac arrest.

⚠ Inaccurate measurements may be caused by:
- incorrect application or use of a sensor,
- significant levels of dysfunctional hemoglobins, such as carboxyhemoglobin or methemoglobin,
- significant levels of indocyanine green, methylene blue or other intravascular dyes,
- exposure to excessive illumination, such as surgical lamps, especially ones with a xenon light source; bilirubin lamps; fluorescent lights; infrared heating lamps; or direct sunlight
- excessive patient movement,
- venous pulsations
- electrosurgical interference, or
- placement of the sensor on an extremity that has a blood pressure cuff, arterial catheter, or intravascular line.

⚠ Do not attach a probe to the same limb with a blood pressure cuff. The data received will not be valid when the cuff is inflated. Attach the probe to the limb opposite the site used for the blood pressure cuff.

D. Pulse Beep

The monitor is programmed to beep with each pulse signal.

The volume of the SpO_2 pulse beep can be adjusted but it cannot be turned off.

The pulse beep varies in pitch to reflect the increase or decrease in oxygen saturation, rising and falling proportionately as saturation increases and decreases.

SECTION 7 - BLOOD PRESSURE MONITORING

A. Theory of Operation

The monitor's automatic electronic sphygmomanometer measures and displays a patient's arterial blood pressure, mean arterial pressure, and pulse rate using the oscillometric technique. When the pressure in the cuff decreases, a sensor located in the monitor detects pressure fluctuations in the cuff. These pressure fluctuations are due to arterial volume changes that result from the blood flow as cuff pressure falls.

The first number of a typical blood pressure reading (systolic) represents the maximum pressure generated when the left ventricle of the heart contracts. When the ventricles relax, pressure in the arteries decrease as blood flows out of the arterial system into the capillary system. The lowest point that the pressure reaches before the next ventricular contraction represents the second number of the blood pressure measurement (diastolic). The mean arterial pressure (MAP or MEAN), which is calculated by the equation 1/3 (systolic + 2 x diastolic), corresponds to the maximum pulse amplitude at the lowest pressure level.

B. Cuff Selection

It is important to select the proper size blood pressure cuff. Use the following chart to match the proper cuff to the circumference of the patient's limb. These are available from Pace Tech using the following part number:

Blood Pressure Cuffs	Size Range		Order No.
Standard Adult	28 - 41 cm	(11 - 16.2 in)	4200
Large Adult	33 - 47 cm	(13 - 18.5 in)	4210
Thigh	40 - 58 cm	(15.8 - 22.9 in)	4240
Child	20 - 28 cm	(7.9 - 11 in)	4220
Pediatric/Infant	13 - 19 cm	(5.1 - 7.5 in)	4230
Neonatal	6 - 11 cm	(2.4 - 4.7 in)	4250

Disposable Blood Pressure cuffs also available by special order

1. ARM

Locate the cuff as you would to do an auscultatory blood pressure. Place the cuff around the patient's upper arm with the bottom edge of the cuff at least one inch above the inner aspect of the arm. As the cuff is wrapped around the arm, be sure it fits snugly and evenly, and the bladder of the cuff is over the brachial artery.

2. THIGH

Place the cuff around the patient's thigh with the bottom edge of the cuff at least one inch above the inner aspect of the knee. Be sure the cuff fits snugly and evenly, and the bladder of the cuff is over the popliteal artery. When patient is not horizontal, ensure that the cuff is at the level of the heart.

3. CALF OF LEG

Place the cuff around the calf of the leg with the top edge of the cuff at least one inch below the inner aspect of the knee. Be sure the cuff fits snugly and evenly, and the bladder of the cuff is over the popliteal artery.

Ensure that the cuff is at the level of the heart when doing blood pressure determinations to avoid biasing the pressure measurements. If this is impractical, correct the blood pressure readings by adding 2 mmHg for each inch the cuff is above the heart. Subtract 2 mmHg for each inch the cuff is below the heart. (0.1 kPa for each cm.)

C. Blood Pressure Monitoring

Choose the mode of operation desired according to the instructions in Section 5 - Monitor Operation. If continuous monitoring of the patient is desired, set cycle time and alarm limits at this time.

1. MANUAL MODE

When the monitor is in the *Manual* mode of operation, one blood pressure determination will be initiated immediately when the **MANUAL** pushbutton is pressed.

The monitor will automatically inflate the cuff to 170 mmHg (22.6 kPa) for adult/pediatric and 120 mmHg (16.0 kPa) for neonates. The inflation rate is 40-50 mmHg (5.3 kPa - 6.7 kPa) per second. After deflation (approx. 30 seconds), the blood pressure and other vital signs will be displayed.

If the adult/pediatric blood pressure is above 170 mmHg (22.6 kPa), the monitor will automatically reinflate to either 200 or 230 mmHg (26.6 or 30.6 kPa), or an even higher level, (depending on the intensity of the pressure) to obtain an accurate reading.

If the neonatal blood pressure is above 120 mmHg (16.0 kPa), the monitor will automatically reinflate to either 140 or 160 mmHg (18.6 or 21.3 kPa) to obtain an accurate reading.

2. AUTO MODE

When the monitor is in the *Auto* mode of operation, it will begin to inflate at the beginning of each cycle time. If for some reason the cuff has not been applied or has been removed, the NIBP reading will be aborted after pressure has not built up in the cuff within ten seconds.

3. STAT MODE

The *Stat* mode is used when continuous blood pressure readings are desired quickly, continuously and as often as possible for a maximum of four (4) minutes. During the *Stat* mode, all parameters are stored in memory

The monitor displays the results of the last blood pressure reading indefinitely until another reading is taken. If the patient's condition changes during the time interval between blood pressure readings, the

monitor will not detect the change nor indicate an alarm condition. A patient's vital sign readings may vary dramatically during the administration of medications intended to raise or lower blood pressure or heart rate. For optimal performance, it is important that the proper cuff size be selected. Refer to the Cuff Selection guide in this manual.

Some causes of inaccurate determination of NIBP readings are:

- leaky cuff bladder

- improper cuff size

- improper cuff application

- hose or monitor not isolated from excessive disturbance

- cuff not at heart level during determination

D. Blood Pressure Scale

The blood pressure readings can be displayed in either mmHg (millimeter mercury) or kPa (kilo Pascal). To change the blood pressure scale:

a. Start with the power off. Turn the **POWER** switch to turn the power on.

b. Press and hold the **HIGH** pushbutton for three seconds.

c. As soon as the "beep" tone sounds, release the **HIGH** pushbutton. The blood pressure readings will change either from mmHg to kPa or from kPa to mmHg.
The most recently selected scale will remain in the memory.

E. Motion Artifacts

The monitor is programmed to detect and screen artifacts due to patient movement. When motion artifacts occur, the cuff will stop deflating momentarily, analyze the incoming signals and make a determination whether the signals are pressure pulses or motion artifacts. The monitor will pause (maximum of 8 seconds) until the regular pressure pulses resume. If the motion artifacts continue, the cuff will deflate 5 mmHg (0.7 kPa) and again pause momentarily until regular pressure pulses resume. If pressure pulses do not resume and/or the motion artifact continues for up to 2 minutes, the blood pressure reading will be aborted and the display will read '00'.

 This monitor may not operate effectively on patients who are experiencing convulsions or tremors.

Follow these precautions during transport:

- The monitor should be positioned on a shelf inside the vehicle if possible with 1-1/4 inch of foam underneath the monitor in order to absorb the vibration of the vehicle.

- The arm of the patient should be stabilized on a pillow.

- The hose of the NIBP cuff should be stabilized so it is not exposed to any bumps or vibration.

SECTION 8 - TEMPERATURE MONITORING

A. Theory of Operation

The monitor utilizes a temperature probe with a thermistor to give continuous or one-time electronic temperature readings. The monitor provides one temperature measurement channel.

1. SCREENING PATIENTS

A routine or one-time temperature reading can be obtained in the *Hands Off* or *Manual* mode.

In the *Hands Off* and *Manual* mode, the initial temperature reading is predictive. The monitor computes the patient's temperature based upon probe response during the initial cycle. All subsequent readings on the same patient are actual temperatures.

In the *Auto* and *Stat* mode, all the temperatures displayed are actual temperatures.

2. CONTINUOUS MONITORING

A continuous temperature monitor is used to measure a patient's core body temperature during the administration of general anesthesia, detection and treatment of hyperthermia (and hypothermia), post-surgical recovery, and other various cases which may require constant body temperature monitoring.

The monitor will display continuous electronic temperature readings of the core body temperature via either a rectal/esophageal probe or skin temperature with an external sensor.

B. Patient Connections

Choose a temperature sensor appropriate for your application requirements. To ensure conformance with all safety and performance specifications, use only the recommended accessories. These are available from Pace Tech using the part numbers on the following page.

Temperature Probes and Accessories	Order No.	
DISPOSABLE TEMPERATURE PROBES, MEDTRONICS/ ELECTROMEDICS COMPATIBLE		
Esophageal/Rectal Temp Probe, Disposable (requires 4005)	(One)	4003
Esophageal/Rectal Temp Probe, Disposable (requires 4005)	(Pack of 10)	4013
Esophageal/Rectal Temp Probe, Disposable (requires 4005)	(Pack of 50)	4014
Skin Surface Temp Probe, Disposable (requires 4005)	(One)	4004
Skin Surface Temp Probe, Disposable (requires 4005)	(Pack of 10)	4015
Skin Surface Temp Probe, Disposable (requires 4005)	(Pack of 50)	4016
Probe Adapter Cable, Reusable (use w/4003 and 4004 probes)	(One)	4005
REUSABLE TEMPERATURE PROBES, MEDTRONICS/ELECTROMEDICS COMPATIBLE		
Esophageal/Rectal probe, adult, Reusable	(One)	4017
Esophageal/Rectal probe, neonatal, Reusable	(One)	4018
Skin Surface Temp Probe, Reusable	(One)	4019

IVAC TEMPERATURE PROBE ASSEMBLIES		
Oral Temperature Probe Assembly (1880L) w/ phone jack	(One)	4104
Rectal Temperature Probe Assembly (1882L) w/ phone jack	(One)	4105

C. Skin and Rectal/Esophageal Temperature Monitoring

1. REUSABLE

a. Select the appropriate Medtronics/Electromedics reusable temperature probe(s) and connect to the temperature receptacle on the side panel of the monitor.

b. Insert the rectal/esophageal disposable probe(s) into the rectum or esophagus, or attach the disposable skin surface probe to the desired site for monitoring.

c. Apply the temperature sensor to the patient according to the standards of practice and care and according to the temperature sensor manufacturer's instructions.

Reusable Skin Surface Temperature Probe #4603

Reusable Esophageal/Rectal Probe #4017

Reusable probes must be cleaned with a commercial cleaning solution before attaching to a new patient.

If disinfection is required, wipe the surfaces with Isopropyl alcohol or Cidex and use a water rinse. When sterilization is required, use ethylene oxide and be sure to follow hospital procedures.

Inspect the probe for wear or splitting after every disinfection/sterilization process is complete. If wearing or splitting of the probe is found upon visual inspection, a new probe should be used.

2. Disposable

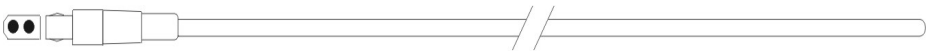
a. Connect the probe adapter cable plug to the temperature receptacle on the side panel of the monitor.

b. Select the appropriate Medtronics™/Electromedics™ compatible disposable temperature probe and connect it to the probe adapter cable.

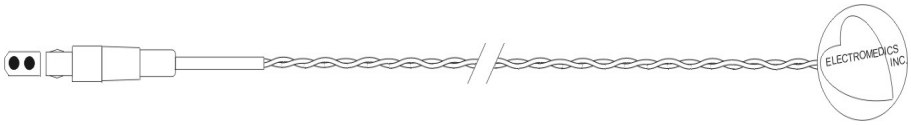
c. Insert the rectal/esophageal disposable probe into the rectum or esophagus of the patient, or attach the disposable skin surface probe to the desired site for monitoring.

d. Apply the temperature sensor to the patient according to the standards of practice and care and according to the temperature sensor manufacturer's instructions.

Probe Adapter Cable #4005



Disposable Esophageal/Rectal Probe #4003



Disposable Skin Surface Probe #4004

Disposable probes are for single use only. Do NOT attempt to reuse the products.

The first temperature reading will be displayed in approximately 15 to 20 seconds for rectal / esophageal, 35 seconds for skin. One minute later the reading will be updated and then continuously updated every second.

NOTE:

- Since the initial temperature reading is predictive in the *Manual* mode of operation, it will take longer to reach the actual temperature in patients with compromised circulation.

- If the temperature probe is disconnected from the patient, the reading 68° F (20° C) will be displayed and the alarm will be active until **HOLD** is depressed twice in succession.

- If the temperature mode is not utilizes, or if the probe is allowed to cool down below body temperature, the monitor will display a temperature of 94.0º F (34.4º C), which corresponds to the lowest temperature the monitor can register.

D. Oral Temperature Monitoring

The *MINIPACK 911 SERIES* can be special ordered to utilize a temperature probe which will give oral temperature readings. The temperature is obtained from a thermistor in the temperature probe tip of the temperature probe.

To prepare the oral temperature probe for use:

1. Connect it to the **TEMP** receptacle on the side panel of the monitor.

2. Insert the probe fully into a disposable probe cover and withdraw from box.

3. Place oral temperature probe into the patient's mouth to insure proper positioning of the probe under the patient's nostrils, a nurse or technician may need to hold the probe in place.

The oral temperature will be displayed in 25-35 seconds. One minute after the first readings are displayed, the temperature reading will be continuously updated every second.

Inaccurate determination of temperature can be caused by improper positioning of the probe.

E. Temperature Scale

The temperature readings can be displayed in either Fahrenheit or Celsius readings.

To change the temperature scale:

a. Press and release the **HIGH** pushbutton until the parameters cycle through until the temperature reading is displayed in the **TEMP** display.

b. Press the **NIBP/HOLD** pushbutton until the monitor "beeps" twice.

c. As soon as the second beep sounds, release the **NIBP/HOLD** pushbutton. The temperature reading will be changed from either Fahrenheit to Celsius, or Celsius to Fahrenheit.

F. Hypothermia Mode

In severe cases of hypothermia, temperatures below 84ºF or 29.89ºC (the normal low end of the temperature determination range) can be monitored.

To put the monitor in the hypothermia mode, press and hold the **AUTO** pushbutton for approximately 5 seconds. This will reprogram the monitor so temperature recordings as low as 69ºF (20.56ºC) can be recorded.

When the power is turned off at the end of the monitoring period, the unit will automatically reset itself to the normal temperature ranges.

SECTION 9 - CO_2 and RESPIRATION MONITORING (Model STC Only)

A. Theory of Operation

Carbon dioxide monitoring detects the presence or absence of carbon dioxide during respiration. The carbon dioxide measurement made at the end of the exhalation when CO_2 has reached its maximum level is referred to as end-tidal CO_2 ($ETCO_2$). Measurement made at the end of the inhalation, when CO_2 has reached its minimum is referred to as minimum inspired CO_2 ($inCO_2$). Carbon dioxide is produced in the body during cellular metabolism and eliminated through the circulatory and respiratory systems. The level of CO_2 exhaled from the lungs reflects changes in metabolic rate and the status of the circulatory and pulmonary systems. Increased CO_2 values can indicate hypermetabolic metabolic conditions such as sepsis (blood poisoning) and malignant hyperthermia. Decreased $ETCO_2$ is usually a result of lowered cardiac output, cardiac arrest or pulmonary embolism due to the decrease in the amount of blood flow and CO_2 delivery to the lungs. CO_2 monitors are being utilized to monitor patients during anesthesia, alert hospital staff if there is an occurrence of inadequate ventilation, airway obstruction, or blood flow, mismatch between ventilation and perfusion (pulmonary embolism), or decreased metabolic production of carbon dioxide (hypothermia).

Measurement of carbon dioxide is expressed as a partial pressure in mmHg or torr. Accepted normal concentration range of $ETCO_2$ is 38 mmHg (5%) at atmospheric pressure of 760 mmHg. Normally, the CO_2 concentration in expired breath changes rapidly from 0% at start to about 5% at end. To measure maximum concentration accurately, the analyzer must respond rapidly. The value of the CO_2 which is displayed represents the peak expired CO_2 value on either a breath-by- breath or a four breath average.

B. Patient Connections

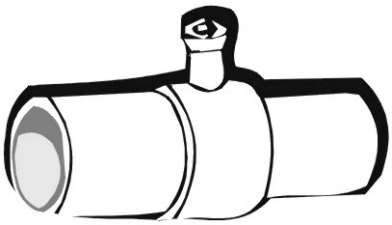
To ensure conformance with all safety and performance specifications, use only the recommended accessories. These are available from Pace Tech using the following part numbers:

CO_2 Supplies and Accessories		**Order No.**
CO_2 Calibration Kit Includes:		7114
CO_2 Water Trap w Sample/Tubing		7019
Nasal CO_2, Sample Line	(pack of 10)	7001
CO_2 Coupler	(pack of 10)	7025
Flow Controller with Gauge		7012
CO_2 Calibration Gas , (10% CO_2, 21% O_2, balance N_2)		7113
Airway Adapter, straight	(pack of 10)	7016
CO_2 Calibration Assembly		7023
Endotracheal tube Connectors with Side Port	(pack of 10) (3.0mm)	7004
Endotracheal tube Connectors with Side Port	(pack of 10)	7003

	(2.5mm)	
Nasal CO_2 Sample Line, Infant/Neonatal	(pack of 10)	7020
Nasal CO_2 Sample Line, Pediatric	(pack of 10)	7021
Airway adapter, elbow		7005

Airway Adapter, Straight(#7016) (Endotracheal tube connector)

Straight circuit adapter to be inserted between and endotracheal tube and an anesthesia or ventilator circuit with a side stream outlet

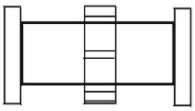


Airway Adapter, Elbow(#7005) (Endotracheal tube connector)

Elbow circuit adapter to be inserted between and endotracheal tube and an anesthesia or ventilator circuit with a side stream outlet

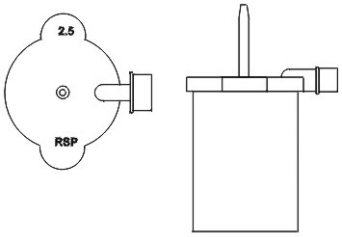
CO_2, Coupler #7025

Female to female connector used between the water trap sample line and nasal CO_2 sample line.



Endotracheal Tube Connector with Sideport (#7003 & #7004)

Circuit sample adapter to be inserted between and endotracheal tube and an anesthesia or ventilator circuit with a side stream outlet

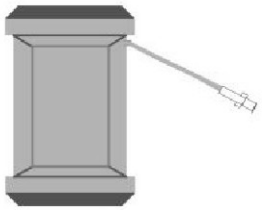


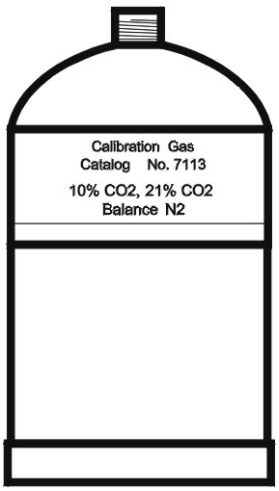
Water Trap w/sample tubing #7019

Moisture-removal system. Disposable and removable.

CO_2 Calibation gas (10% CO_2, 21% O_2, balance N_2)

Calibration gas used to establish a CO_2 calibration for monitors.





C. Calibration

The ambient barometric pressure may significantly affect the CO_2 measurement. The capnometer subsystem uses the barometric pressure adjustment to compensate for this pressure effect.

The two-point calibration allows the capnometer subsystem to compensate for changes due to aging that may affect the accuracy of the CO_2 measurement.

1. ADJUSTING BAROMETRIC PRESSURE COMPENSATION

The CO_2 module uses barometric pressure compensation to correct the CO_2 readings for the local atmospheric conditions.

The monitors are calibrated in the factory to the mean barometric pressure at the sea level value of 760 mmHg.

NOTE:

- A change in elevation of 2000 feet (600 meters) from sea level will reduce the barometricpressure by about 50 mmHg resulting in a reduction of about 3 mmHg in a reading that should be 38 mmHg CO_2.

The National Weather Service is a good source to obtain the mean barometric pressure in your area.

It is necessary to adjust the local barometric pressure compensation:

- Initially, if you are at a higher elevation than sea level.
- Before monitoring if the local barometric pressure changes by 10% or more.
- Before calibrating the unit.

To verify or adjust the monitor barometric compensation:

a. Turn on the Power switch on the rear panel.

b. In 10-15 seconds (up to a minute at low temperatures), the sampling pump will start Allow the pump to run for 10-15 seconds.

c. Press either the **LO CAL** or **HI CAL** pushbutton for about one second until:
- a "beep" sounds- the **EtCO_2** display shows the current CO_2 level, and- the previously established barometric pressure compensation appears in the **CYCLE TIME** and **NEXT CYCLE** display (760 mmHg for sea level).

d. Adjust the barometric pressure compensation to the value nearest the local barometric pressure by pressing either the **UP** or the **DOWN** pushbutton as needed.

e. As soon as the compensation value is adjusted, the monitor will return to normal operation in approximately ten seconds. Resume operations or proceed immediately to the HI-LO calibration.

2. CALIBRATION (HI-LO CAL)

Perform the two-point calibration or HI-LO CAL approximately once per month (at least every six months) to maintain the CO_2 measurement accuracy of the unit as follows:

NOTE:

- The correct concentration of calibration gas must be used. Selecting the wrong calibration gas may result in inaccurate readings. For MINIPACK 911 STC use 10% CO_2, 21% O_2, balance N_2. (Order # 7113).

a. Assemble the calibration gas canister, valve, and the vented connecting tubing as shown in the following illustration:

b. Connect the other end of the vented connecting tubing to a new water trap securely installed on the unit. Leave the valve turned off.

c. Ensure that the unit is drawing room air (0% CO_2) at this time and throughout the procedure. Keep the CO_2 sample inlet away from breath streams and vehicular exhaust.

d. Check the current CO_2 level by pressing the **LO CAL** pushbutton until a "beep" is heard. The EtCO_2 must show either "0" or "1". If not, check for and remove any CO_2 sources near the CO_2 sample inlet. If this does not reduce the level to "0" or "1", either the room air has too much CO_2 in it for successful calibration or you should return the unit to the factory for service

e. At this time, you can also verify and adjust the atmospheric pressure compensation to within 5 mmHg of the local barometric pressure. This will be displayed in the **TIME** display.

f. Press the **LO CAL** pushbutton momentarily. Immediately a "beep" sound will be heard. The "beep" tone indicates that the low calibration is complete.

g. Turn on the control valve of the gas calibration bottle and allow a few seconds to pass.

h. Press the **HI CAL** pushbutton until a "beep" is heard. Immediately press the **HI CAL** pushbutton again. The number displayed in the **EtCO_2** window should be 10% of the atmospheric pressure compensation. If not, repeat this step. The **HI-LO CAL** portion of the calibration procedure is now complete.

i. To resume normal operation press the **MEMORY** pushbutton twice. Otherwise, normal operation will resume in 15 seconds.

j. Turn off the gas canister valve by turning the black knob counterclockwise.

k. Disconnect the assembly from the water trap.

NOTE:

- If the "beep" tone does not sound, check the calibration equipment and repeat the procedure. Return the unit to the factory for repair if repeated calibration failures are obtained.
  After the calibration is complete, the monitor will return to normal operation in approximately ten seconds.

D. CO_2 and Respiration Monitoring

Grip the bottom of the water trap, tilt the top back slightly, and gently push the trap up and into the side panel opening. Make sure the water trap is firmly seated. The water trap is a disposable item. It is intended for single use only.

Accurate measurements require a leak free system. To verify that the system is free of leaks, place a finger over the input port on the water trap for two or three seconds. If occlusion does not appear on the display in one second, a leak exists. The seals on the water trap are the most likely source of leaks.

Examine the seals to make sure that the water trap is properly positioned. Erratic low readings indicate a leak. Set alarms if values should be changed . Refer to the section on *ALARM LIMITS SETUP*.

1. NASAL SAMPLE LINE

Using a CO_2 sample line, place the prongs in the patient's nostrils. Then route the sample line over and behind the ears. Move the slide up to the patient's chin to minimize the sample line movement. Secure the sample line to the cheeks if necessary.

Attach the connector at the end of the nasal sample line to the sample line from the water trap with the use of a CO_2 coupler.

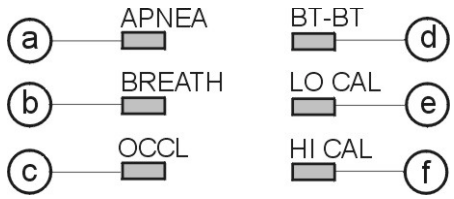
2. AIRWAY ADAPTER AND SAMPLE LINE (Intubated patients)

Use the airway adapter (endotracheal tube connector) with intubated patients (endotracheal or nasal-tracheal tubes). Connect the airway adapter between the ventilator and the endotracheal tube. The sample line connects between the airway adapter and the monitor.

The monitor will proceed to continuously monitor the $EtCO_2$ and $inCO_2$ percentages, as well as the respiration rate.

The readings will be updated on a continual basis either as breath-by-breath or a four breath average. The respiration rate is updated continuously.

3. LED INDICATORS



a. **APNEA** Lights up after a 20 second period of undetected breathing.

b. **BREATH** Lights up with each exhalation

c. **OCCL** (occlusion) Lights up when the CO_2 sample line is kinked or obstructed
The automatic occlusion purge should clear the tubing of moisture within one minute. If not, check for tubing kinks, a full water trap or thick fluids. The common causes of occlusion are condensed water, patient secretions or a kinked sample line. Thick secretions can occlude tubing. Replace occluded disposable water traps and sample lines-do not try to clean them.

d. **BT TO BT** Indicates breath to breath analysis of CO_2 and respiration
In order to change the respiration and CO_2 averaging rate from every 4 breaths to breath-to-breath (or vice-versa), simultaneously press the **HI CAL** and the **LO CAL** pushbuttons for two seconds. Immediately the averaging rate will change.
When the **BT TO BT** LED is lit, the respiration and CO_2 averaging rate is on a breath to breath rate.

e. **LO CAL** Indicates the monitor is being calibrated to atmospheric pressure.

f. **HI CAL** Indicates the monitor is being calibrated with a known mixture of gas.

4. CAUTIONS

CO_2 measurement can be affected by:

- changes in atmospheric pressure
- halogenated anesthetic vapors
- N_2O, O_2, and water vapor
- calibration drift
- fluid contamination

Inaccurate determinations of CO_2 readings can be caused by:

- reuse of or failure to change disposable cannula/water trap
- cannula not positioned properly

Never reuse the disposable single-use cannula/water traps.

The automatic occlusion purge should clear the tubing of moisture within one minute. If not, check for tubing kinks, full trap, or thick fluids. Replace line or trap if necessary.

The common causes of occlusion are condensed water, patient secretions or kinked sample line. Thick secretions can occlude tubing. Replace occluded disposable traps and lines — do not try to clean them.

It is highly unlikely that fluids will enter the monitor; nevertheless, do not let unit tilt more than 40° from horizontal to prevent aspirating patient fluids into the monitor from the trap. Remove used traps when transporting the unit to prevent fluids from entering the monitor.

Fluid entry into the monitor may be suspected if:

- the water trap has become completely full and triggered an occlusion alarm during normal operation
- the monitor has been tilted beyond 40 degrees while a fluid filled water trap is mounted
- large droplets of fluid are observed above the steel ball in the water trap.

Entry of fluid into the monitor should be presumed if the CO_2 shows a high reading that does not return to within a few mmHg of zero when drawing only room air. If fluids have entered the monitor , remove it from service immediately. Let it run for two hours, drawing room air through a new trap. Perform a calibration. If it is successful, the unit may be returned to service. If the unit fails to perform properly, return the unit to the factory for servicing.

SECTION 10 - PRINTER OPERATION

A 27 column thermal printer is available for use with the MINIPACK 911 and will produce a hard copy of the patient's vital signs, time, and date.

A. Printer Operation

1. RECOMMENDED THERMAL PAPER

Thermal paper can vary considerably in thermal sensitivity and abrasiveness. Using the proper thermal paper helps to ensure that the print quality will be acceptably dark and reduces print-head wear. The recorder's warranty may be limited if an unspecified paper is used.

To ensure conformance with all safety and performance specifications, use only the recommended accessories. These are available from Pace Tech using the following part number:

Thermal Printer Paper - 27 Column (4 rolls) Order No. 3006

Thermal paper should be stored in the dark at an average ambient temperature of less than 25° C and a relative humidity of less than 65%. Under these conditions, the paper remains printable for at least 5 years. Also printed paper, when stored under these conditions, will retain its printed image legibility for a minimum of 7 years.

2. LOADING THE PAPER

Cut the end of the paper horizontally as shown in Illustration 9-a.

To open the paper holder, place your thumb on the paper holder cover and pull the cover up and back as shown in Illustration 9-b.

Insert the tip of the paper into the insertion slot and press the **PAPER FEED** pushbutton. (The outside of the thermal paper is in the front.). Insert the paper as shown in illustration 9-a. Keep the **PAPER FEED** pushbutton depressed until the end of the paper comes out of the paper cutter.

Illustration 9-a

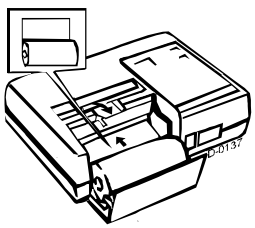
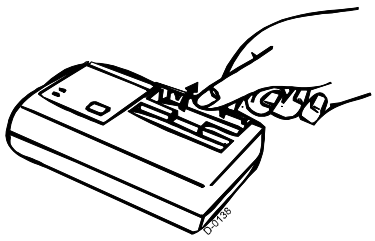


Illustration 9-b



B. Printing Mode Options

1. TO PREPARE FOR USE

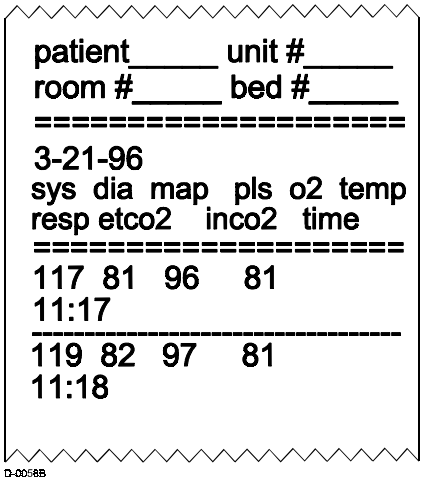
Attach the connectors of the printer cable to the receptacles on the back of the printer and on the rear panel of the monitor.

Turn ON the power to both the printer and the monitor.

Remember to turn OFF the printer whenever the monitor is turned OFF so the printer will not deplete the battery of the monitor.

2. TO PRINT IN REAL TIME

In order to obtain a print-out during the entire monitoring period, turn the printer ON at the beginning of the patient monitoring procedure. When the AUTO pushbutton is pressed, all parameters will be automatically displayed at the end of each determination cycle. Up to 250 readings can be printed.



3. TO PRINT ONLY AT CONCLUSION OF MONITORING

The printer should be in the OFF position during the Auto Print monitoring period. Then, at the end of the patient monitoring procedure, but before the monitor is turned off, turn the printer ON. Previously collected data, which has been stored in the unit, will then be down-loaded to the printer, providing one set of vitals for each programmed cycle.

4. TO OBTAIN A DUPLICATE PRINTOUT

In order to obtain a duplicate copy of the printout (whether option 2. or 3. above was used), with the monitor still ON, turn the printer OFF, then turn the printer back ON again. A duplicate copy of the original vital sign data will be printed.

⚠ As long as the monitor is not turned off, all programmed cycle data will remain stored in the unit; turning the monitor off clears the monitor's memory of all information.

⚠ The printer operates from the battery of the monitor. Remember to turn the printer OFF when the monitor is turned OFF so the printer does not deplete the battery of the monitor.

⚠ The printer will not print out any vital signs the monitor does not detect (i.e. temperature, respiration, SpO_2) if that probe is not used.

C. RS-232 Output

A RS-232 serial output connector on the rear panel is an option available which provides serial data to most RS-232 devices capable of receiving 9600 Baud. For the RS-232 protocol, please contact Pace Tech.

⚠ Connection of non-isolated devices to the RS-232 connector may cause chassis leakage to exceed the specification standards.

APPENDIX I - PRODUCT SPECIFICATIONS

A. Mechanical Description

MINIPACK 911, 911-S, 911-ST, 911-T

Size	3.25" high x 6.25" wide x 10.25" deep 8.26 cm high x 15.88 cm wide x 26.04 cm deep
Weight	7 lbs 5.4 oz (3.33 kg)
Color	Beige and Aqua

MINIPACK 911-STC

Size	3.5" high x 7.44" wide x 10.75" deep 8.89 cm high x 18.90 cm wide x 27.30 cm deep
Weight	8 lbs 12 oz (4.0 kg)
Color	Beige and Aqua

B. Power Requirements

Operation	AC / DC
Internal Battery	6V 7.0 AH Sealed Lead Acid
Battery operating time	6-8 hours full charge
Battery charge time	12 hours minimum

AC Adapter (Battery Charger)

AC mains input	Domestic AC Adapter, with 3 prong, Hospital grade plug 100-250 V/50-60 Hz 8-12VAC / 2.4-3.0 A Output, UL Listed International AC Adapter with unterminated plug 220-240V/ 50-60 Hz 8-12VAC / 2.4-3.0 A Output
Vehicle battery input	10-16 VDC via optional charging cable
Fuses	Two 3.0 A, 250 V, Fast Blow

C. Performance Specifications

1. NON-INVASIVE BLOOD PRESSURE (NIBP)

Method	Automatic oscillometric		
Parameters measured	Systolic, diastolic, mean arterial pressure, pulse		
Scale	mmHg or kPa		
Operating modes	Manual, Automatic, Stat, Hands Off		
Repeat cycles	10-50 seconds; 1-99 minutes		
Rapid cycle update	1-4 minutes (STAT mode)		
Measurement range	Systolic:	Adult/pediatric	30-250mmHg (4.0-33.3 kPa)
		Neonate	20-160mmHg (2.7-21.3 kPa)
	Diastolic:	Adult/pediatric	10-180mmHg (1.3-24.0 kPa)
		Neonate	10-140mmHg (1.3-18.7kPa)
Measurement time	Typical 50 seconds Maximum 120 seconds Typical Stat 30 seconds		
Cuff inflation rate	Not greater than 40-50 mmHg/sec (5.33-6.66 kPa/sec)		
Cuff inflation pressure	30 mmHg above last systolic (4.0 kPa)		
Cuff pressure range	Adult/pediatric	0-250 mmHg	(0-33.3 kPa)
	Neonate	0-140 mmHg	(0-18.7 kPa)
Initial cuff inflation	Adult/pediatric	170±10 mmHg (22.7±1.3 kPa)	
	Neonate	120 ±10 mmHg (16.0 ±1.3 kPa)	
Auto deflate pressure	Adult/pediatric	280mmHg±5mmHg (36.7-38.0 kPa)	
	Neonate	235 mmHg± 5mmHg (30.7-32.0 kPa)	
NIBP display accuracy	± 3 mmHg (0.4 kPa)		
NIBP alarm limits	Systolic Upper	0-255 mmHg (0-34.0 kPa)	
	Lower	0-254 mmHg (0-33.9 kPa)	
	Diastolic Upper	0-255 mmHg (0-34.0 kPa)	
	Lower	0-254 mmHg (0-33.9 kPa)	

	Mean	Upper	0-255 mmHg (0-34.0 kPa)
		Lower	0-254 mmHg (0-33.9 kPa)

Pulse rate determinations 30-254 bpm

Pulse rate averaging 4 beat average

Pulse rate accuracy ±3 bpm 40-120 bpm
±10 bpm 121-200 bpm

Pulse rate alarm limits Upper 0-250 bpm
Lower 0-254 bpm

Cuffs Reusable and disposable cuffs
Neonate, infant, pediatric, standard adult, large adult, thigh, with 6 foot air hose

2. PULSE OXIMETRY (SpO_2)

Saturation range 0-100%, adult/pediatric/neonate

Saturation averaging 8 beat average

Saturation accuracy ±2%(70-100%), ±3%(50-69%), (0-49%unspecified)

Saturation alarm limits Upper: 0- 100%
Lower: 0- 99%

Pulse rate range 30 – 254

Pulse rate averaging 8 second average

Pulse rate accuracy ±2 % 30 - 100 bpm

Pulse alarm limits Upper: 0-250 bpm
Lower: 0-249 bpm

Pulse tone Pitch adjusts to SpO_2 value;
Volume adjustable

Pulse rate display Digital, pulse amplitude

Sensor types Finger, Universal "Y", ear lobe clip, disposable and reusable wrap probes

3. TEMPERATURE

Temp scale	°F or °C	
Temp range	82.4-109.8º F (28.0-43.2º C)	
Temp accuracy	±0.2º F (±0.1ºC)	
Temp alarm limits	Upper	83.0-110.0º F (28.3-43.3º C)
	Lower	83.0-109.9º F (28.3-43.2º C)
Temp probes	Skin or rectal/esophageal Medtronics™/ Electromedics 2100 Series™ compatible Oral or Rectal Ivac™ temperature probe assemblies	

4. END-TIDAL CO_2, inCO_2(min) and RESPIRATION

Type	Side stream, non-dispersive infrared
Method Connector	CO_2 sample line with nasal cannula or endotracheal tube
CO_2 averaging	4 breaths or breath-to-breath
CO_2 range	0-99 mmHg adult/pediatric(0-13.2 kPa)
CO_2 accuracy	± 2 mmHg (0-40 mmHg)[± 0.27 kPa (0-5.33 kPa)] ± 5% of reading [(40-99 mmHg)(5.33-13.2 kPa)]
Rise time	<<300 ms 10% to 90%
CO_2 calibration	Manual with room air, and 10% CO_2 every six months
Sample aspiration rate	75 ml/min ±10 ml
Sample line purging	Automatic
Water trap	Disposable, Volume 4cc
Respiration range	4-99 rpm(respirations per minute) adult/pediatric
Respiration rate accuracy	± 2 rpm
Alarm limits	Respiration Upper 4-99 rpm

		Lower 4-98 rpm
	$EtCO_2$	Upper 0-99 mmHg (13.2 kPa)
		Lower 0-98 mmHg
	$inCO_2$ Upper	0-99 mmHg (0-13.2 kPa)
		Lower 0-98 mmHg
Alarm volume	Fixed	

D. Displays

Parameters/Alarms/Limits	High Intensity Red Led 0.56"
Time and Date	High Intensity Red Led 0.3"
Pulse Strength	10 segment Logarithmic Red LED bar graph
Signal Indicators	Yellow & Green Signal LED

E. Printer

Type	Add-on 27 column thermal printer
Output	ASCII parallel
Printing width	46mm
Printing speed	Approx. 0.8 lines per second
Paper requirements	Thermal printer paper 7m (L) x 58mm (W) 25mm roll diameter

F. Environment Specifications

Temperature	Operating	19.0° C to 30.0° C (66° F to 86° F)
	Storage	4.4° C to 43.3° C (40° F to 110° F)
Relative humidity	Operating	20-80% (non-condensing)
	Storage	10-90% (non-condensing)

SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE

APPENDIX II - BATTERY OPERATION

A. Battery

The monitor is equipped with an internal battery, 6V/ 7.0 AH sealed lead acid. This allows the monitor to operate for up to 6-8 hours under its own power.

The battery is continuously charged whenever the AC power is connected to the monitor. Charging time when the battery is fully discharged is between 15 and 20 hours.

Continuous charging will not harm the battery's expected service life with daily on-battery use.

The **LO BAT** LED indicator lights up when the battery is discharged and should be charged with AC current. Do not turn the monitor on after the **LO BAT** LED indicator is lit without first connecting it to AC main power.

B. Power Supply

The internal battery of the monitor is charged with an AC adapter. Two AC adapters are available in order to allow the battery to be charged from AC input voltage either 110-120V / 50-60 Hz or 220-240 / 50-60 Hz.

CAUTION: Equipment damage may result if an incorrect power supply is used.
Excessively long power cords may affect the safety and effectiveness of the delivered power.

Be sure the power cord is suitably heavy-gauged and rugged for the application. Avoid a light-gauge power cord sharing a heavy load.

Replace an old, worn damaged, or kinked power cord with a new one suited for the application.

C. Charging the Battery

Recharging is more rapid if it is done soon after on-battery use and even more so if the monitor is not turned on while charging.

1. Connect the AC Adapter to the receptacle on the rear panel of the monitor. Plug the power cord into a 100-250V / 50-60 Hz AC current, using a hospital grade (USA) grounding receptacle.

2. Verify that the AC ON LED comes on and stays on brightly and continuously after connecting to the power outlet. An unusually dim AC ON LED may indicate that the AC power is weak at the outlet. Unusual brightness may indicate excessive voltage. Either condition merits a checkup by a qualified technician.

3. After the battery has been charged, unplug the power cord, and turn the monitor on. If the display lights up and the number “8" appears momentarily, the monitor should be fully charged and is ready for normal operations.

Be aware that any power connection that is often cycled or flexed over an extended period of time will eventually wear out and thereby become unreliable or dangerous.

D. Optimizing The Battery Life

1. DISCHARGE CYCLES AND DEPTH

Each discharge cycle advances the battery’s age, in particular a deep discharge. Try to avoid deep discharges of the battery.

Try to charge the battery at every suitable opportunity, preferably before the LO BAT LED comes on.

2. TEMPERATURE

Heat also accelerates the battery’s aging, becoming quite significant above 86ºF (30ºC).

Avoid storing the monitor in sun-exposed compartments. It is preferable to store the monitor in a cool environment.

3. STATE OF CHARGE

A fully charged battery ages more slowly than a discharged batterry. Charge the monitor promptly after using it on-battery.

If the monitor stands discharged for an extended period of time (days), the battery capacity may take either several charge/discharge cycles or an extended charge time (several days) to fully recover.

4. EXTENDED IDLE TIME

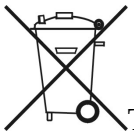
Continuous charging will not harm the battery’s expected service life with daily on-battery use.

However, if the monitor is not going to be used for a long period of time (weeks or months), charge with the power switch turned “off” for about 16 hours. Then unplug the AC power and store the monitor in a cool dry area, protected from dust.

At least every month charge the battery for about 16 hours. When use is anticipated, again charge the battery about 16 hours in advance to develop full available charge.

While in storage protect the power switch from accidental activation. If the battery were to become discharged this way for an extended time (weeks), it would permanently lose capacity.

E. Battery Disposal

 This is the universal symbol which indicates that proper disposal is required for the lead-acid battery. Do not throw the battery in the trash or incinerate the battery. The lead acid battery should be placed in the recycling bin.

F. Fuses

The monitor is equipped with two fuses which are located on the rear panel. Designated F1 and F2, each fuse protects a different power input.

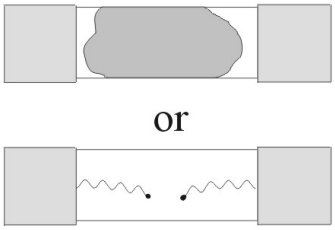
F1 

This fuse protects the internal battery. If this fuse is blown, the monitor will continue to operate on the AC Power supply. Battery operation is not possible until the fuse is replaced.

F2 

This fuse protects the AC Power supply line. If it is blown, themonitor can continue to operate under battery power. However, the battery cannot be charged until this fuse is replaced.

To determine if a fuse is blown, look to see if it has a grey, dark, or shiny coating on the inside of the glass portion, or if the wire is broken, distorted, or melted, as illustrated to the right.

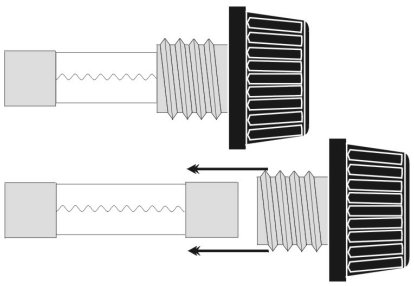


To replace a blown fuse, follow these instructions.

1. Turn the fuse holder counter-clockwise until it comes free and remove it from the monitor's rear panel.

2. Remove the fuse from the fuse holder and replace it only with a 3.0A 250V fuse,fast blow.

3. Insert the fuse holder back into the rear panel and turn it clockwise until it is snug.



APPENDIX III - MAINTENANCE

A. Monitor

When necessary, clean the exterior surfaces of the monitor with a cloth or swab dampened with a warm and mild detergent solution. Do not allow liquids to enter the interior of the instrument.

WARNING: Electrical shock and flammability hazard - always turn the monitor off and disconnect it from AC main power before cleaning.

CAUTION: Do not autoclave or pressure sterilize this monitor. Do not stack or immerse this monitor in any liquid. Do not gas sterilize this monitor.

Do not touch, or rub the display panel with abrasive cleaning compounds, instruments, brushes, rough surfaced materials or make contact with anything that can scratch the panel.

B. Probes (Pulse Oximetry, Temperature)

The probes are the only surfaces of this monitor that come in contact with the patient. Clean the probes after each patient use.

Clean the monitor's probes with a commercial cleaning solution before attaching a new patient. Probes should be cleaned until signs of wear or splitting occur. At this time, a new probe is required.

If disinfection is required, wipe the surfaces with Isopropyl alcohol or cidex and use a water rinse. When sterilization is required, use ethylene oxide and be sure to follow hospital procedures.

Inspect the probe for wear or splitting after every disinfection/sterilization process is completed. If wearing or splitting of the probe is found upon visual inspection, a new probe should be used.

C. Patient Cables (Temperature, Pulse Oximetry)

Do not autoclave the patient cables.

Wipe the cables using soap and water or alcohol. Never submerge the cables in any liquid or allow liquids to enter the electrical connections.

D. Blood Pressure Calibration Check

The MINIPACK 911 sensitivity threshold may be checked occasionally for proper calibration, using the following procedure:

1. Squeeze all the air form the cuff and place it on the arm of an assistant.

2. As in the auscultatory method, place a stethoscope on the brachial artery below the cuff.

3. Power up the monitor and press the NIBP/HOLD pushbutton.

4. Listen for the Korotkoff sounds with the stethoscope. ÿDo not watch the numbers on the screen.

5. Record the pressure when the first Korotkoff sound is detected for the systolic pressure and when the diastolic pressure is determined.

6. When the MINIPACK 911 has displayed the determination, compare the readings to assess any differences between the auscultatory and oscillometric determinations.

7. If there is a discrepancy, repeat the procedure in five minutes.

8. If consistent discrepancies of more than a few mmHg (or a few tenths kPa) persist, refer to the Service Manual or send the monitor to Pace Tech for calibration.