

Dan Scott & Associates, Inc. / Toll Free 1-888-866-6736



CARDELL® Model 9401

9401 - Cardell BP Monitor

Provides reliable blood pressure monitoring in a compact and affordable package. The Model 9401 offers systolic, diastolic, mean arterial pressure and heart rate in seconds. It has an automatic mode allowing the user to set measurements from 1 - 90 minutes. A STAT mode provides continuous readings for five minutes. A manual mode allows the user to take a measurement at any time. There are high and low alarms for all parameters. The Cardell BP technology is known for working well in kittens to horses in surgery to diagnosing hypertension in awake animals. It comes with 12 cuffs in 6 different sizes. List price: \$2,195.



CARDELL® Model 9402

9402 - Cardell BP + SpO2 Monitor

Along with the BP advantages cited above, the Model 9402 uses Nellcor's OxiMax® digital processing for its pulse oximetry. The OxiMax technology offers greater accuracy than conventional oximetry, even for difficult-to-monitor patients with motion or low perfusion. A lingual sensor is included. List price: \$2,995.



Cardell 9403

9403 - Cardell BP + SpO2+ECG+Resp. with Temp. capability

This monitor adds ECG and respiration to the Model 9402 offering all the parameters needed for a complete monitoring system. And temperature software is built in. Only the reusable temperature probe and adapter must be purchased. A 5-lead ECG set is included (or opt for a 3-lead set). Multiple variable lead trace waveform selection is included along with 5 gain size selections and a trace freeze option. A printer and rolling stand are optional. List price: \$3,995.



Cardell 9404

9404 - Cardell BP+ECG+Resp. with Temp. capability

For those wanting to check health status in the exam room, or who already have a pulse oximeter, this monitor offers blood pressure measurements using the superior Cardell® technology along with a 5-lead ECG. Cuffs and the leads are included. Only the reusable temperature probe and adapter must be purchased. List price: \$2,995.



*** Dan Scott & Associates is offering special discounts off the list prices this month only***

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Specifications:

Blood Pressure

Technique: Oscillometric measurement method

Parameters: Systolic, diastolic, mean arterial pressure

Modes: Manual, Auto Cycle, STAT (5 min. consec.)

Automatic Cycle Times: 1, 2, 3, 4, 5, 10, 15, 30, 60, 90.

Determination Time:

- Small cuff: 18 seconds typical @160 BPM 120/80

- Large cuff: 26 seconds typical @75 BPM 120/80

Maximum time allowed: 150 seconds

Initial Inflation: 150 mmHg; subsequent inflations to approx. 30 mmHg greater than previous systolic pressure

Blood Pressure Range: 20-265 mmHg

BP Accuracy: In humans is shown to be ± 5 mmHg with standard deviation no greater than 8 mmHg. Meets AAMI/ANSI SP10, '02. Animal types vary.

Pulse Accuracy: $\pm 2\%$

Pulse Oximetry/SpO₂

Oxygen Saturation Range: 0-100%

SpO₂ Accuracy: • 70-100% $\pm 2\%$

Pulse Rate Range: 20-300 beats per minute

Pulse Rate Accuracy: $\pm 3\% \pm 1$ digit

Selectable Pulse Beep Volume/Variable Pulse Tone

Probe: Nellcor digital lingual sensor provided with small and large animal clips

ECG

Leads: 5-lead set (3-lead set optional) using copper crocodile clips

Lead Selection: I, II, III, aVR, aVL, AVF, V. Monitor automatically detects whether 3- or 5-lead is used

Sweep Speed: 12.5, 25 & 50 mm/sec.

Gain Selection: x1, x2, x4, x8, automatic

Heart Rate Range: 20-300 beats per minute

Averaging: 4 pulse beat average

Frequency Response: 0.5 to 40 Hz.

Displays: Multiple ECG lead traces or single cascaded trace

ECG Calibration: 1mV

Pace Detect: Yes

Pace Reject: Yes

Respiration

Rate: Uses impedance pneumography derived from ECG leads

Range: 5 to 150 BrPM.

Sweep Speed: 3.0, 6.25, 12.5 mm/sec.

Temperature

Oral/Rectal Probe: (Optional) YSI 402 9F probe

General

History Mode: Maintains 8 hours or 480 one-minute events, or past 24 hours of NIBP measurements

Patient Alarms: Independent high and low limits for ECG, heart rate, respiration rate, SpO₂, pulse rate, systolic and diastolic pressures

Alarm History: The most recent 25 alarms are stored

Power:

Source: AC line or internal battery

AC Power: 100-240VAC, 50-60 Hz, 0.3A.

Battery: Nickel metal hydride battery pack; charge time is less than 4 hours (easily changed for extended battery life); operation on battery is 100 readings @ 5 per minute intervals

Leakage current: 100 micro amp maximum

Printer: Thermal Printer (optional) with 2 1/4" wide paper width

Printer Connection: RS232 port for printer connection and infrared port

PC Connection: Use NULL Modem cable to RS232 port

Operating Environment:

Temperature: 0°C to 50°C (32°F to 122°F)

Humidity: 15-95%, non-condensing

Altitude: 500 feet (152 meters) below sea level to 10,000 feet (3048 meters) above sea level

Storage Temperature: -20°C to 70°C (-40°F to 158°F)

Dimensions: 6.75" H x 8.5"W x 3.5"D

Weight: 4.1 lbs. (1.4 kg)

Common Question Regarding Monitoring Blood Pressure and Use of the Cardell Veterinary Monitors

Q. In what ways can blood pressure monitoring be useful?

A. For finding hypertension of secondary hypertension in renal disease; monitoring the results for drug therapy; monitoring patient condition during surgery; and to help titrate anesthesia. Also, it allows blood pressure measurements in situation where palpating with fingers is difficult, as in cats.

Q. How is it useful in surgery, specifically?

A. To make sure the animal is well oxygenated, that the blood pressure stay adequate, and to monitor the depth of than aesthesia, Dr. John Luddens, anesthesia professor at Cornell Univ. says if a patient goes out of range to high, it could mean the is too light or a patient is getting into trouble. Carbon dioxide can also build up when epinephrine is used, causing increased blood pressure and increased heat rate. If the patient goes out of range to low, it could mean the patient is too deep; hemorrhaging has indsequate fluid volume or is cold.

Q. What id typical problem in surgery that can be assisted with a BP monitor?

A. A classical problem is the dog that has been premedicated on acepromazine. The patient appears to be doing okay, the respiratory rate is consistent and the mucous membranes are pink, but the mean pressure is 58 – too low. The most common case is that animal is too deep. Lightening the anesthesia and fluids bring the blood pressure back to normal in 4-5 minutes.

Q. Besides finding hypertension, how else can BP be useful in the awake patient?

A. If the blood pressure is take as part of an annual physical exam, then when the animal is in trouble sometime in the future, the animal's healthy blood pressure is know, for comparison.

Q. Is it more difficult to get pressures in cats?

A. Yes, because of cats' physiology. Cats seem to be more vasoactive than dogs in responding to stress with peripheral vasoconstriction. Inhalation anesthetics do not depress the response. Coupled with small vessels to begin with, taking pressure measurements in cats is more difficult. Drugs used for anesthesia can also be part of the problem. Cars are often anesthetized with ketamin or telazol combined with xylazine. The reduced peripheral blood flow subsequent to drug-induced hypertension, combined with reflex bradycardia, and either sinus or ventricular dysrhythmia, complicates matters further.

Q. What are normal pressures? At what point is hypertension suspected?

A. One expert suggests the systolic pressures over 150mmHg are suspect, and that a systolic pressure over 160mmHg and/or diastolic pressure over 95mmHg usually indicates hypertension if the pressure remains thus high after animal is calm. An article in the June 1995 issue of "Veterinary Forum: includes this chart for normal pressures:

	<u>Dog</u>	<u>Cat</u>
Pulse Rate	78±15	149±8
Systolic Pressure	109±15	107±13
Diastolic Pressure	59±11	75±12
Mean Arterial Pressure	72±13	86±11

Q. How different is it from monitors using Doppler method?

A. Most commonly, one is only able to measure systolic pressure with the doppler technique, and transducer positioning is critical to good readings. The CARDELL monitor uses oscillometric method which is based on the principle that pulsatile blood flow through an artery creates oscillations of the arterial wall. These are transmitted to the cuff which passes them through the pressure hose to a transducer within the monitor. Microprocessors analyze them and determine systolic, mean and diastolic pressure values.

Q. What does the CARDELL monitor measure?

A. Diastolic, Systolic, Mean Arterial Pressure and pulse rate.

Q. How wide a range of animals will it take the pressures in?

A. Animals with pulse rate range of 20 to 300 beats per minute and who are over 5 lbs. This includes dogs, cats, pigs, cows, horses, and others. It has not been found useful in rates and mice.

Q. Will a blood pressure monitor pay for itself?

A. Many veterinarians will admit that they have lost a patient due to administering too much anesthesia. Can you put a cost on the untimely death of a patient? Most veterinarians charge anywhere from a \$10-\$15 monitoring fee during surgery or \$5-\$15 for hypertension screening during the annual exam.

Q. Where is the cuff placed for the most accurate blood pressures?

A. For dogs, the best site of the cuff placement is on the hind leg close to the hock. Alternately, either the area over the Tarsal Artery or Carpal Artery should be used. In the cat, place the cuff over the medial surface of the forelimb between the elbow and carpus. In cats less than 4 lbs., use the medial surface above the elbow. Cuff placement on the horse should be as close to the base of the tail as possible with the arrow over the Coccygeal Artery.

Q. Can I use the printer with it?

A. The monitor has an RS232 interface connector port that can be used to hook up with a computer. A. Cable is available for this.

Q. Is there a way to see previous readings if there is no printer?

A. Yes, a "History" button allows you to see the last 99 minutes of readings.

Q. How long is the battery life?

A. Five to six hours. Then it can be recharged just by plugging it in.

Q. How is MAP(Mean Arterial Pressure) figured? Is it just an average of Diastolic and Systolic?

A. No, the lowest cuff pressure at which maximum oscillation amplitudes are sensed is determined as mean arterial pressure.

Q. Which is more important, a blood pressure monitor or pulse oximeter?

A. They are both very useful measurements of patient well being, however, a dropping blood pressure will let the user know before a pulse oximeter to reduce the anesthesia.

11 Reasons for Monitoring Arterial Blood Pressure

- 1.) To detect hypotension in injured or sick patients- helps in-patient management.
- 2.) To find and assess primary or secondary hypertension.
- 3.) To assess the results of drug and/or diet therapy in hypertension.
- 4.) To assist in properly titrating I.V. fluids and analeptic drugs in acute care patients.
- 5.) To follow BP trends in critical patients as therapeutic measure are taken.
- 6.) To help adjust therapy more accurately in patients with chronic disease to keep organ function near optimum levels.
- 7.) To provide patient data base for comparison when health is compromised.
- 8.) To assess anesthetic depth during surgery.
- 9.) To monitor the cardiovascular effects of anesthetic drugs to assist in prompt treatment when problems occur.
- 10.) To assist in evaluating postoperative recovery.
- 11.) To exhibit a higher level of patient care to clients.

Why does a veterinarian need a blood pressure monitor?

“...monitoring the adequacy of circulation during anesthesia is essential if severe and potentially irreversible consequences are to be prevented or corrected. Arterial blood pressure, although not necessarily a direct indicator of blood flow or oxygen delivery to the tissues, is the most reliable indicator of the adequacy of circulation readily available to veterinary clinicians, and *arterial blood pressure monitoring is now recognized to be an important part of management of anesthetized animals...* ”

“Arterial blood pressure monitoring in anesthetized animals.”
Ann E. Wagner, DVM,MS, and David C. Brodbelt, MA VetMB
JAVMA, Vol. 210, No.9, May 1,1997

“Now, blood pressure monitoring is becoming an essential component of care at most veterinary centers and many small animal practices. Detecting hypotension injured or sick patients will provide useful information in the management of patients at risk. Being able to properly titrate IV fluids and analeptic drugs for management of the acutely sick or injured patients is far better than the intuitive therapeutic approach. One can attend to the acute patient while measuring BP, and follow trends in patient status as therapeutic measures are taken.”

“Why arterial blood pressure monitoring is important.”
Donald Sawyer, DVM,MA, Michigan State University

Blood Pressure Statistics

Unanesthetized	Dogs (mm Hg)	Cats (mmHg)
Systolic	109 ± 15 (94-124)	119 ± 7 (112-126)
Diastolic	59 ± 11 (48-70)	84 ± 9 (75-93)
Mean	71 ± 13 (58-84)	96 ± 9 (87-105)
Pulse Rate	78 ± 15 (63-93)	157 ± 15 (142-172)

Anesthetized *	Dogs (mm Hg)
Systolic	79-97 mm Hg.
Diastolic	37-49 mm Hg.
Mean	53-70 mm Hg.
Pulse Rate	75-80 Beats/min

*Using isoflurane, atropine-acepromzine malesta premedication, and thiamylal induction; 45 minutes into anesthesia and with no surgical stimulation. Info per Dr. Donald Sawyer, Michigan State University

Minimum mean arterial pressure to adequately perfuse all peripheral tissue beds: 60-70 mm Hg.

Suspect Hypertension with systolic pressure greater than 150 mm Hg. affirmed when above 160- 170 mm Hg; also affirmed in cats when diastolic pressure is above 100 mm Hg.

Anesthetized Patients:

Generally, maintain systolic pressure above 80 mm Hg. (usual systolic pressures) 90-130 mm Hg.

- Info Dr. Donald Sawyer

Anesthetized Dogs & Cats

Systolic 90-120 mm Hg.
Diastolic 55-90 mm Hg.

- Per Dr. Jeff Ko, University of Floride