petMAP™ + II
Multi-Parameter Monitor

Operator's Manual

Portability, versatility and accuracy like no other!

11:09

Cat
Tail

121 SYS
77 DIAS
94 MAP
87 HR

OFF BPcycle | OFF LoAlarm | OFF HiAlarm

95 SpO2
84 HR
101.4

OFF O2sat | OFF LoAlarm | OFF HrAudio   Pg_1

200
101
150
133
100
76
50
OFF
13:    11:
01234578

95	06	121 / 077 (094)	087
95	05	125 / 071 (089)	081
99	05	133 / 078 (096)	083
94	04	134 / 075 (094)	085
97	03	136 / 076 (096)	085
83	02	130 / 078 (095)	080
99	01	135 / 076 (095)	085
98	00	138 / 079 (098)	083

Save Screen | Species CuffSite | BP Go/Stop

petMAP+ II

☑ NIBP   ☑ HR   ☑ Temp.   ☑ SpO2   ☑ ECG   ☑ CO2

MADE IN THE USA

Developed by:
RAMSEY MEDICAL INC

www.petmap.com

Manufactured, Distributed and Serviced by: **Cardio Command**

petMAP+*II* Multi-Parameter Monitor

petMAP+*II* Base Units

| MODEL	DESCRIPTION
7451	petMAP+*II*, NIBP and Temperature Device
7457	petMAP+*II*, NIBP, SpO2 and Temperature Device
7455	petMAP+*II*, NIBP, SpO2 (Nonin) and Temperature Device

This manual applies to the above devices and their accessories. Not all devices have all of the parameters referred to in this manual. **Read this manual completely before using the equipment**.

petMAP+*II* Modules (priced separately)

9026	petMAP+*II* ECG Module
9078	petMAP+*II* CO2 Module

Note that Operator's Manuals for the ECG and CO2 Modules are included with the modules, which are packaged separately.
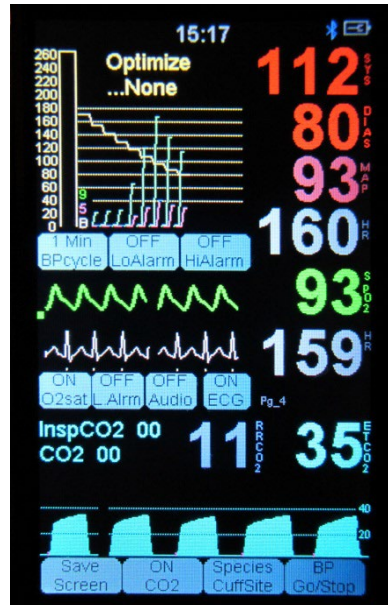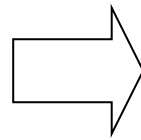
This is a typical screen display when petMAP+ *II* (#7457 or #7455) is configured with an ECG Module (#9026)
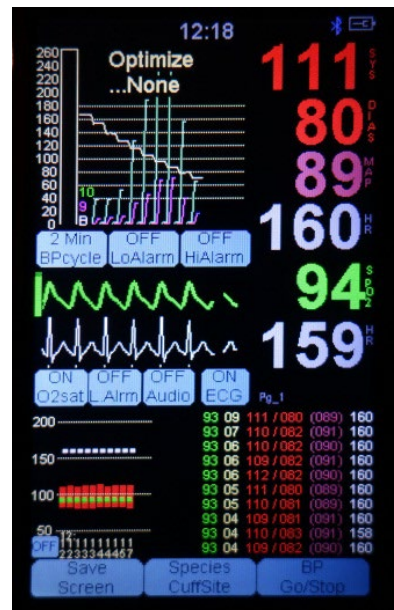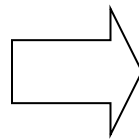
This is a typical screen display when petMAP+*II* (#7457 or #7455) is configured with a CO2 Module (#9078)
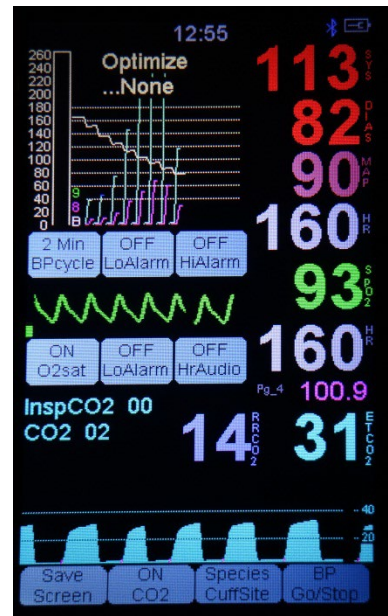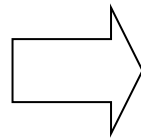
This is a typical screen display when petMAP+*II* (#7457 or #7455) is configured with both an ECG Module (#9026) and a CO2 Module (#9078)

petMAP+*II* is to be operated by qualified personnel only. Before use, familiarize yourself with the device and read this manual, including all warnings and cautions. The user should check that petMAP+*II*, along with its accessories, is functioning both safely and effectively prior to use.

petMAP+*II* OPERATOR'S MANUAL

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INTRODUCTION

Device Description

petMAP+*II* is a small, light weight and portable battery operated monitoring device designed for veterinary use. In its various configurations, the base unit is capable of measuring blood pressure (systolic, diastolic and mean arterial pressures), heart rate, temperature and oxygen saturation (SpO2). The measured values are displayed and trended on the device continuously. Modules for ECG and CO2 can also be purchased and added to the base unit. Data trended on the petMAP+*II* can optionally be saved on an SD memory card via the petMAP+*II*'s integrated SD memory card slot.

A user interacts with petMAP+*II* using its touch screen, just like many smart phones. The device has two primary modes of operation: "Clinic Mode" (where BP automatic cycling is disabled and BP determinations are triggered by the user directly) and "OR Mode" (where BP automatic cycling is enabled and BP determinations automatically repeat at the user selected time cycle). In Clinic Mode, BP measurements are made under operator control and in OR Mode, petMAP+*II* is set to monitor noninvasive blood pressure (NIBP) and heart rate vital signs automatically at user-selected time intervals. Both modes allow the user to set alarms for systolic blood pressure and/or for SpO2 saturation levels.

Intended Uses

petMAP+*II* is intended to be used on veterinary patients when measuring or monitoring of blood pressure, heart rate, temperature and/or SpO2 is desired. It can be used on a wide variety of veterinary patients, but is primarily designed for companion animals. petMAP+*II* can be used on both awake and anesthetized patients; its applications include use for surgical, ICU and trauma monitoring as well as use in the exam room and during procedures (imaging, dentals, etc.).

Features of petMAP+*II*

- Portability: petMAP+*II*'s weight and size just may make it the most portable and versatile monitoring device in veterinary medicine. It is a single device that can be used in the OR, ICU, trauma, dentals, exam room, transport and for mobile practices! And when not in use, it can be in your pocket… ready for action… anywhere, any time.
- Accuracy: petMAP's proprietary BP, including **PPO** (**P**etMAP **P**roprietary **O**ptimizations) and **NSV** (**N**ominal **S**ession **V**alue). petMAP+*II* utilizes the oscillometric method which simplifies the measurement of blood pressure over traditional Doppler techniques. petMAP+*II* also provides all of the BP parameters (systolic, diastolic, mean arterial pressure (MAP) and heart rate), enabling accurate diagnosis and management of hypertension and useful monitoring during surgical anesthesia and other procedures.
- Modularity and upgradability: Modules for ECG and CO2 may be purchased. These modules allow the base unit (#7451, #7457, #7455) to be configured by the user for added functionality. In addition, the 7451 can be upgraded to either a #7457 or #7455 as a service upgrade.

- Sensitivity: petMAP's great sensitivity permits BP measurement even in small cats and dogs, as well as in larger animals, including horses, when set in the non-optimized mode setting. Additionally, for companion animals, PPO enhances the accuracy achieved by allowing the user to select the species (dog or cat) and the cuff placement site (forearm, tail or hind foot). PPO is unique to petMAP devices and when used, improves the correlation of the readings to direct, intra-arterial pressure measurements.
- Session BP values: Like all petMAPs, petMAP+*II* provides another unique and proprietary feature, the BP "Nominal Session Value" or NSV. The NSV is not a straight average of the BP readings; rather, it is a substantially more robust statistical measure of the animal's nominal BP during the BP session since it eliminates high and low outliers and gives more weight to the session values that are in the middle of the measured BP range. The NSV enhances the veterinarian's ability to accurately diagnose, trend, and manage hypertension in awake animals in the exam room.
- Two modes of use: OR Mode and Clinic Mode. Described in more detail later in the manual, petMAP+*II* has two different display formats, one designed primarily for longer term trending in OR Mode for surgery and ICU and the other, Clinic Mode, designed for shorter term measurement periods when in the exam room. In Clinic Mode, the default display format shows three useful representations of the data: a short graphic trend line of the last 10 BP readings, a tabular list of the last 10 BP readings and the current NSV. Regardless of the current mode the user is in, either display format may be viewed by simply touching the displayed "graphic" area of the screen to toggle between the two display modes at anytime.
- Ease of use: petMAP's portability, data presentation options and intuitive user interface (no menus are required for normal use) make it one of the easiest devices to use. The touch screen controls and no menus for normal use make in-service a snap, particularly since it functions much like a smart phone or tablet…touch driven and very intuitive.

Measuring Vital Signs on Animals / General Information & Helpful Tips for BP Measurement.

Measuring blood pressure in companion animals requires:

1. A cooperative animal that is not moving

2. A patient, well trained veterinarian or technician

3. Accurate measuring equipment

4. The right size cuff properly applied to the appropriate limb. The forearm or tail is usually best for cats; the tail for dogs.

Veterinarians who teach BP seminars point out the most important requirements are the skill, training and patience of the person taking BP.   Also, a calm animal is essential. petMAP+*II* is specifically designed to allow the user to get good determinations on calm, awake animals. Even so, many animals will require extra time for calming and lots of user patience. If an animal is restless, giving them 8 to 10 minutes to calm down often helps and should restore their BP closer to their usual level. Accurate BP readings, even on a relaxed animal, require the proper cuff size and a "snug-tight" fit. For CritterCuffs, use the "OPTIMUM zone" lines to select the proper size cuff (see CritterCuff information). For QuickCuffs, ensure the cuff is "snug tight" when cuff has been squeezed to tighten around the animal's limb (See CritterCuff and QuickCuff information).

If you have trouble getting good determinations, try:

1. Calming the animal so that it is truly relaxed and not moving. Sometimes having the owner hold the animal will make it much more comfortable and relaxed.

2. Checking cuff size for "OPTIMUM" fit and snugness.

3. Gathering more operator patience. BP measurements on awake animals are sometimes difficult and a calm and collected measurement person is always a big plus in getting reliable BP readings.

Cold Animals: If the animal is noticeably cold, it may require 5 to 6 attempts in order to achieve any BP reading and clearly this is not an acceptable situation for reliable and accurate BP readings. Warm the patient with a blanket or other means before again attempting to measure BP.

Trembling Animals: It will be very difficult, or even impossible, to get accurate BP readings on a trembling animal since the rhythmic motion of the cuff can, and often does, mimic the rhythmic beat of the heart, which can result in inaccurate readings.

Unit Configurations & Accessories

The following table describes the petMAP+*II* configurations currently available:

Product Code	Description
7451	petMAP+*II*, NIBP, Temperature BT Device
7457	petMAP+*II*, NIBP, Temperature and SpO2 BT Device
7455	petMAP+*II*, NIBP, Temperature and SpO2 BT Device (Nonin)

The above configurations are capable of monitoring temperature, but only when the correct temperature probe and extension cable accessories are purchased—rectal and esophageal probes are available.

The following table summarizes the standard accessories and optional accessories available for the petMAP+*II*:

	Product Code	Description
Standard Accessories (included with the Device)	**7451** petMAP+*II* NIBP, Temp BT Device	➤ AC/DC adapter ➤ CritterCuff Kit. Includes 1 each of 2.0cm, 2.5cm, 3.0cm, 3.5cm, 4.0cm, 4.5cm and 5.5cm cuff **OR** ➤ QuickCuff Kit. Includes 1 each of 2.0cm, 2.5cm, 3.0cm, 3.5cm, 4.0cm, 4.5cm and 5.5cm cuff ➤ BP Extension Hose (2.0 – 5.5cm cuffs) ➤ BP Extension Hose (6.5 – 13.0cm cuffs) ➤ Operator's Manual ➤ Quick Reference Instructions
	7457 petMAP+*II* NIBP, Temp, SpO2 BT Device	➤ AC/DC adapter ➤ CritterCuff Kit. Includes 1 each of 2.0cm, 2.5cm, 3.0cm, 3.5cm, 4.0cm, 4.5cm and 5.5cm cuff **OR** ➤ QuickCuff Kit. Includes 1 each of 2.0cm, 2.5cm, 3.0cm, 3.5cm, 4.0cm, 4.5cm and 5.5cm cuff ➤ BP Extension Hose (2.0 – 5.5cm cuffs) ➤ BP Extension Hose (6.5 – 13.0cm cuffs) ➤ SpO2 Analog Sensor Kit ➤ Operator's Manual ➤ Quick Reference Instructions
	7455 petMAP+*II* NIBP, Temp, SpO2 BT Device (Nonin)	➤ AC/DC adapter ➤ CritterCuff Kit. Includes 1 each of 2.0cm, 2.5cm, 3.0cm, 3.5cm, 4.0cm, 4.5cm and 5.5cm cuff **OR** ➤ QuickCuff Kit. Includes 1 each of 2.0cm, 2.5cm, 3.0cm, 3.5cm, 4.0cm, 4.5cm and 5.5cm cuff ➤ BP Extension Hose (2.0 – 5.5cm cuffs) ➤ BP Extension Hose (6.5 – 13.0cm cuffs) ➤ Nonin SpO2 Sensor, Small Lingual Clip ➤ Operator's Manual ➤ Quick Reference Instructions
Optional Modules	**9026**	ECG Module
	9078	CO2 Module
Optional Accessories	**9014**	Temperature Extension Cable
	8041	Rectal Temperature Probe
	8040	Esophageal Temperature Probe
	9008	International Adaptor Plugs
	9018	Nonin SpO2 Sensor, Transflectance (used only with 7455)
	9019	Nonin SpO2 Sensor, Small Flex (used only with 7455)
	9025	Nonin SpO2 Extension Cable
	9038	Cover (available colors: black, blue, red)
	9042	Pole Mount
	9045	Table Mount
	8067	5.0cm CritterCuff
	8057	6.5cm CritterCuff
	8058	8.0cm CritterCuff
	8059	10.0cm RamseyCuff
	8060	13.0cm RamseyCuff
	8106	5.0cm QuickCuff
	8108	6.5cm QuickCuff
	8109	8.0cm QuickCuff
	8110	10.0cm QuickCuff
	8111	13.0cm QuickCuff
Replacement Items	**9009**	BP Cuff Extension Hose for sizes 2.0 – 5.5cm
	9010	BP Cuff Extension Hose for sizes 6.5 – 13.0cm
	9043	AC/DC Adapter
	9071	SpO2 Analog Sensor (used only with 7457)
	9017	Nonin SpO2 Sensor, Small Lingual Clip (used only with 7455)

Certain configurations are also upgradeable, after purchase. For instance, if 7451 was purchased and now SpO2 capability is desired, the petMAP+*II* may be upgraded by purchasing the SpO2 option. Such upgrades require the unit be returned to the service center. Contact Customer Service for more information about upgrading your petMAP+*II*.

SYMBOLS

Caution Symbol   **Consult Manual Symbol**

 Complies with the requirements of Directive 2014/30/EU of the European Parliament and of the Council of 26 February 2014 on the harmonization of the laws of the Member States relating to electromagnetic compatibility (recast) and Directive 2011/65/EU of the European Parliament and of the Council of 8 June 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment (recast).
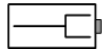
 United Kingdom Conformity Assessed - Complies with the requirements of Great Britain Legislation, The Product Safety and Metrology etc. (Amendment etc.) (EU Exit) Regulations 2019.

Battery level Icon

Battery Charging Icon

Battery AC/DC adapter polarity

WARNINGS & CAUTIONS

 Do not charge batteries other than nickel-metal hydride (NiMH). The unit is equipped with rechargeable (NiMH) batteries, but can operate with non-rechargeable alkaline or lithium batteries. If using the unit with batteries other than NiMH rechargeables, do not use the wall AC/DC adapter since such attempt to charge non-rechargeable batteries can create an unsafe situation with the potential for injury to the device and its operator.

 Cuff Only. This port is solely intended for connection of a CritterCuff, a QuickCuff, a BP Cuff Extension Hose or a RamseyCuff. Do not connect anything else to this port, especially an IV tube since that would potentially result in air being pumped into the patient with potentially fatal results. Also, fluid ingress through this port into the unit will result in severe damage to the unit.

IMPORTANT: For accurate BP readings with petMAP+*II*, only Ramsey Medical, Inc. CritterCuffs, QuickCuffs, and RamseyCuffs should be used. Improper cuff size and improper cuff fit will result in inaccurate (or no) BP readings. petMAP requires a cuff whose width is approximately 42 - 50% of the circumference of the forearm, the hind foot, or the tail of the animal. The index line on the CritterCuff should fall within the "OPTIMUM zone" shown by the dotted lines on the cuff, but NEVER outside of the solid boundary lines. For proper fit, the cuff must be snug, but not painfully tight. The sizing tabs on the QuickCuffs allows the user to tighten the QuickCuff by squeezing it while placed around the limb. If the cuff is "snug tight", the proper size has been selected (see CritterCuff and QuickCuff information).

📖 Only the AC/DC adapter supplied with petMAP+*II* should be used to charge the unit. The unit is factory equipped with 4 AA NiMH rechargeable batteries. The factory batteries can be replaced by the user with new NiMH rechargeable batteries when the charge life of the factory supplied batteries is severely degraded (this will happen over time and use), but DO NOT use the AC/DC adapter if batteries other than rechargeable NiMH batteries are installed in the unit.

⚠️ Do not mix rechargeable and non-rechargeable batteries. When replacing batteries, replace all batteries with the same type. Do not mix old and new batteries.

⚠️ When connecting this monitor to any equipment or accessories, verify proper operation before clinical use. Accessory equipment connected to the petMAP's USB port should be certified according to the respective IEC standards, i.e. IEC 60950 for data processing equipment or IEC 60601-1 for electro medical equipment. All combinations of equipment should be in compliance with IEC 60601-1-1 systems requirements. Anyone connecting additional equipment to the USB signal input port /signal output port configures a medical system, and therefore, is responsible that the system complies with the requirements of the system standard IEC 60601-1-1.

⚠️ The petMAP+*II* is intended for VETERINARY USE ONLY. Do not use on a human patient.

⚠️ Do not apply the blood pressure cuff on an extremity being used for an IV solution.

⚠️ Do not place the SpO2 sensor distal to the blood pressure cuff.

⚠️ Using a damaged SpO2 sensor may cause inaccurate readings. If a sensor appears damaged, do not use it. Contact CardioCommand, Inc. to purchase a replacement sensor.

⚠️ Use only SpO2 sensors supplied with, or specifically intended for use with, this device.

⚠️ Under certain clinical conditions the pulse oximeter may display "**?**" if unable to display SpO2 and/or pulse rate values. Under these conditions, pulse oximeters may also display erroneous values. These conditions include, but are not limited to: patient motion, low perfusion, cardiac arrhythmias, high or low pulse rates, electrical interference from electro cautery or other ESU devices, or a combination of the above conditions. It is the responsibility of the clinician to recognize the effects of these conditions on pulse oximeter readings and proceed accordingly.

⚠️ Do not immerse the device or AC/DC adapter in water or any liquid. If the unit is accidentally wetted, it should be thoroughly dried before use.

⚠️ To ensure that the unit remains in calibration, verify calibration on a yearly basis or at any time there is user suspicion that proper calibration may have been lost.

⚠️ If the petMAP+*II* has been dropped or damaged in any way, it should be checked by qualified service personnel to ensure proper operation prior to use.

⚠️ Use of accessories other than those specified by Ramsey Medical may result in increased electro-magnetic (EM) emissions or decreased EM immunity of the device.

⚠️ Follow local governing ordinances and recycling instructions regarding disposal and recycling of device components and packaging.

⚠️ The petMAP+*II* monitor is designed to conform to Electromagnetic Compatibility (EMC) standard EN 60601-l -2, 2007 and will operate accurately in conjunction with other medical equipment which also meets this requirement. To avoid interference problems affecting the Monitor, do not use the Monitor in the presence of equipment which does not conform to these specifications.

POTENTIAL FOR RADIO/TELEVISION INTERFERENCE
This product has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. The product generates, uses and can radiate radiofrequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If the product does cause harmful interference to radio or television reception, which can be determined by turning the product on and off, the user is encouraged to try to correct the interference by one or more of the following measures:
- Re-orient or relocate the receiving antenna.
- Increase the separation between the product and receiver.
- Consult the dealer or an experienced radio/TV technician for help.

⚠️ The petMAP+*II* is not intended for use on patients being imaged with an MRI device since the petMAP device contains magnetically active materials and could result in injury if used too close to an operating MRI.

⚠️ Inaccurate readings may result when an electrosurgical unit (ESU) is used while monitoring with the petMAP+*II*. If this is suspected, discontinue use of the petMAP+*II* while the (ESU) is in use.

⚠️ Do not gas sterilize or autoclave the device.

EMC Declaration

Precautions regarding Electromagnetic Compatibility (EMC) are required when using Medical Equipment. The petMAP+*II* should be put into service according to the EMC information provided in this manual.

Portable and mobile RF communications equipment can affect Medical Equipment.

The measurement accuracy and user control functions as specified in this manual is determined to be petMAP+*II* essential performance.

The petMAP+*II* is designed to conform to Electromagnetic Compatibility (EMC) standard EN 60601-l -2, and will operate accurately in conjunction with other medical equipment which also meets this requirement. To avoid interference problems affecting the petMAP+*II*, do not use it in the presence of equipment which does not conform to these specifications.

Guidance and Manufacturer's Declaration

Electromagnetic Emissions		
The petMAP+*II* is intended for use in the electromagnetic environment specified below. The customer or user of the petMAP+*II* should assure that it is used in such an environment.		
Emissions test	**Compliance Level**	**Electromagnetic environment - guidance**
RF emissions CISPR 11	Group 1	The petMAP+*II* uses RF energy only for its internal function. Therefore, its RF emissions are very low and not likely to cause any interference in nearby equipment. (Unit equipped with Bluetooth radios may affect nearby electronic equipment.)
RF emissions CISPR 11	Class B	The petMAP+*II* is suitable for use in all establishments, including domestic establishments and those directly connected to the public low- voltage power supply network that supplies buildings used for domestic purposes.
Harmonic emissions IEC61000-3-2	Class B	
Voltage Fluctuations/flicker emissions IEC 610000-3-3	Complies	

Electromagnetic Immunity

The petMAP+*II* is intended for use in the electromagnetic environment specified below. The customer or user of the petMAP+*II* should assure that it is used in such an environment.

Immunity test	IEC60601 test level	Compliance Level	Electromagnetic environment - guidance
Electrostatic discharge (ESD) IEC 61000-4-2	±6 kV contact ± 8 kV air	±6 kV contact ± 8 kV air	Floors should be wood, concrete or ceramic tile. If floors are covered with synthetic material, the relative humidity should be at least 30%.
Electrical fast transient/burst IEC 61000-4-4	±2 kV for power supply lines ±1 kV for input/output lines	±2 kV for power supply lines ±1 kV for input/output lines	Mains power quality should be that of a typical commercial or hospital environment.
Surge IEC 61000-4-5	± 1 kV differential mode ± 2 kV common mode	± 1 kV differential mode ± 2 kV common mode	Mains power quality should be that of a typical commercial or hospital environment.
Voltage dips, short interruptions and voltage variations on power supply input lines IEC 61000-4-11	>95% dip in 0.5 cycle 60% dip in 5 cycles 30% dip for 25 cycles >95% dip for 5 seconds	>95% dip in 0.5 cycle 60% dip in 5 cycles 30% dip for 25 cycles >95% dip for 5 seconds	Mains power quality should be that of a typical commercial or hospital environment.
Power frequency (50/60 Hz) magnetic field IEC 61000-4-8	3 A/m	3 A/m	Power frequency magnetic fields should be at levels characteristic of a typical location in a typical commercial or hospital environment

Electromagnetic Immunity

The petMAP+*II* is intended for use in the electromagnetic environment specified below. The customer or user of the petMAP+*II* should assure that it is used in such an environment.

Immunity test	IEC60601 test level	Compliance Level	Electromagnetic environment - guidance
			Portable and mobile RF communications equipment should be used no closer to any part of the device, including cables, than the recommended separation distance calculated from the equation applicable to the frequency of the transmitter.
			Recommended separation distance
Conducted RF IEC 61000-4-6	3 Vrms 150kHz to 80 MHz	3 Vrms	$d = (1.17) \sqrt{P}$
Radiated RF IEC 61000-4-3	3 V/m 80 MHz to 2.5 GHz	3 V/m	$d = (1.17) \sqrt{P}$ 80 - 800MHz
			$d = (2.33) \sqrt{P}$ 800Mhz - 2.5GHz
			where P is the maximum output power rating of the transmitter in watts (W) and is the recommended separation distance in meters (m). Field strengths from fixed RF transmitters, as determined by an electromagnetic site survey a , should be less than the compliance level in each frequency range b. Interference may occur in the vicinity of equipment marked with the following symbol:

Recommended separation distances between portable and mobile RF communications equipment and the petMAP+*II*

The petMAP+*II* is intended for use in an electromagnetic environment in which radiated RF disturbances are controlled. The customer or user of the device can help prevent electromagnetic interference by maintaining a minimum distance between portable and mobile RF communications equipment (transmitters) and the device as recommended below, according to the maximum output power of the communications equipment.

Rated max. output power of transmitter (W)	Separation distance according to frequency of transmitter (m)		
	150kHz to 80 MHz $d =(1.17)\sqrt{P}$	180 MHz to 800MHz $d =(1.17)\sqrt{P}$	800MHz to 2.5GHz $d =(2.33)\sqrt{P}$
0.01	0.11667	0.11667	0.23333
0.1	0.36894	0.36894	0.73785
1	1.1667	1.1667	2.3333
10	3.6894	3.6894	7.3785
100	11.667	11.667	23.333

For transmitters rated at a maximum output power not listed above, the recommended separation distanced in meters (m) can be estimated using the equation applicable to the frequency of the transmitter, where P is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer.

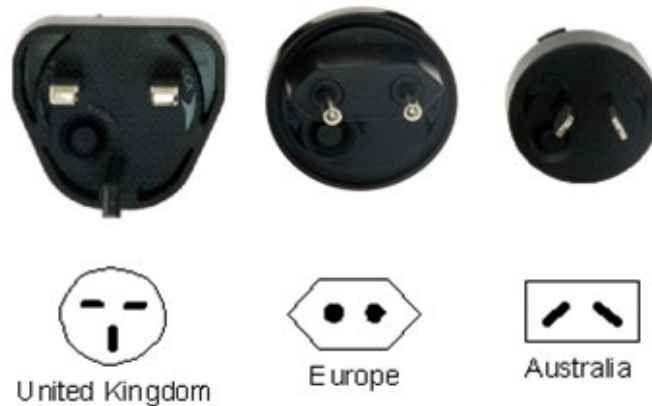Note 1: At 80 MHz and 800 MHz, the separation distance for the higher frequency range applies.

Note 2: These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects, and people.

DEVICE OVERVIEW

Power/Batteries: petMAP+*II* is equipped with 4 rechargeable AA NiMH batteries (factory installed) and an external wall outlet plug-in AC/DC adapter. (Note: completely remove the green plastic tag at the battery cover to activate the batteries before attempting first use.) The AC/DC adapter can operate the unit while charging the batteries and may be left charging continuously.

The petMAP+*II* may also operate on 4 AA alkaline or lithium batteries (these are non-rechargeable battery types); however, **the AC/DC adapter should never be used when using batteries other than NiMH rechargeable batteries.** (See **WARNINGS**)

The petMAP+*II* AC/DC adapter is equipped with standard North America/Japan blades. If purchased, accessories exist to configure the AC/DC adapter for plug compatibility to several international options. To exchange the plug, simply press the round, spring-loaded button, twist and remove the plug supplied and replace it with the appropriate one for local use. (See instructions which accompany the International Adaptor Plugs, Code 9008.)

United Kingdom   Europe   Australia

Controls & Connections. Note the diagrams for petMAP+*II* controls and connections.

Mini
USB Port
Cuff Connector
Temperature
SpO2 Connector (Not applicable to REF 7451)

Charging indicator
green – fully charged
amber - charging

SD Card
Slot
ON/OFF

AC/DC Adapter Connection

CO2 Plugin

ECG Plugin

AC/DC Adapter
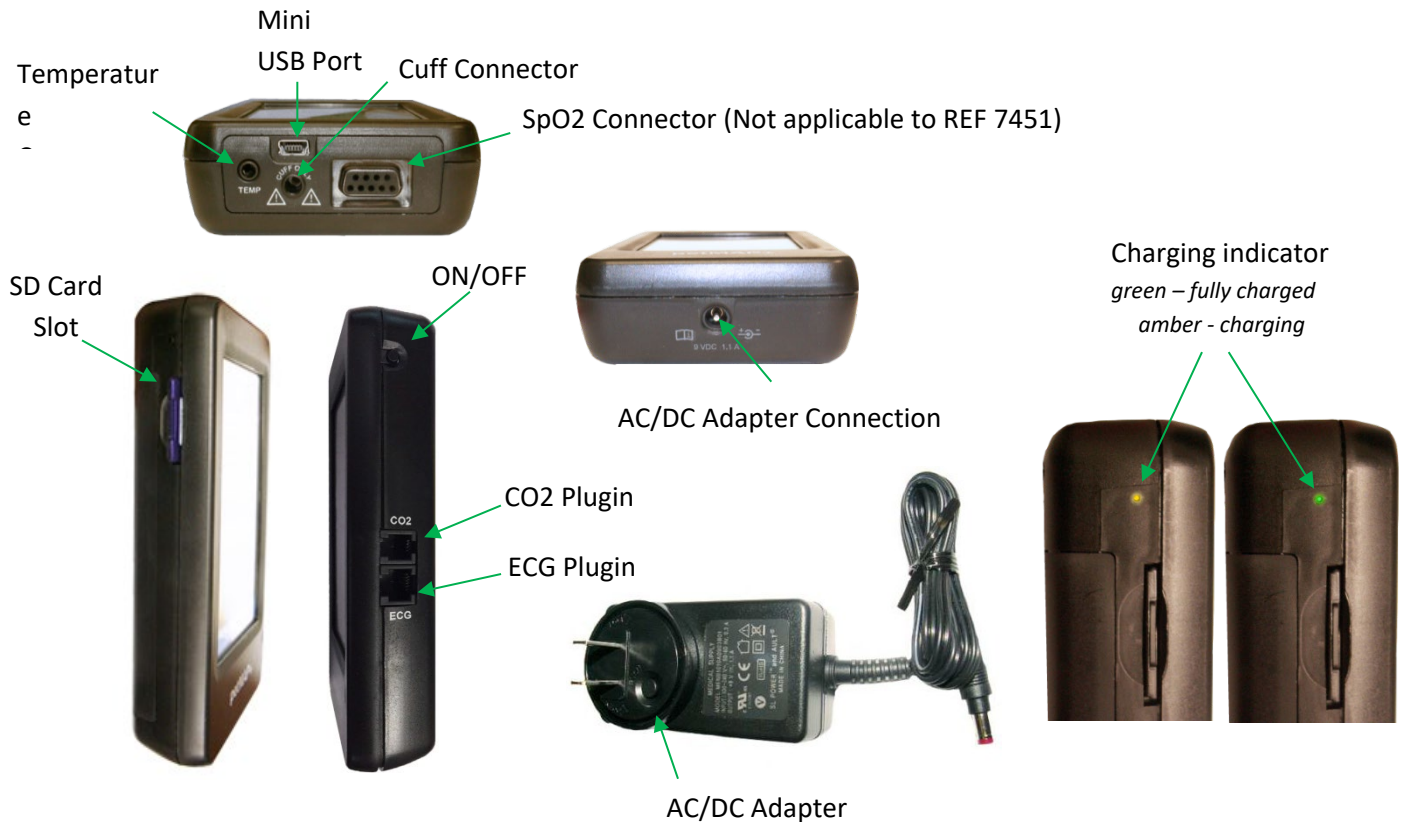
Temperature Connector. petMAP+*II* optional accessories include a temperature extension cable, an esophageal probe and a rectal probe (see **Unit Configurations & Accessories** section). While it is possible to connect the probes directly to the unit, using the extension cable allows for more placement flexibility. (Do not inadvertently plug in headsets to the temperature connector.)

Cuff Connector. Firmly push (with a slight twist) the male Luer connector of either a CritterCuff or the BP Extension Hose into this slot. When using a BP Extension Hose, be sure that the hose is the proper one for the size of the cuff, as marked, and it should be of the same diameter as the cuff hose. Do not attach anything other than the extension hose or a cuff to this connection (see **WARNINGS**) as doing so will result in a hazardous condition, since air under pressure is pumped through this connector to inflate the BP cuff!

SpO2 Connector. If equipped, this is the connection for the SpO2 sensor cable. Noting the pin orientation, push the connector firmly into place.

SD Card. To install an SD card, orient it with the label side up and push the card into the unit until it fully engages. To remove, push in and release to eject the SD card. See additional instructions in this manual for SD card use and utility. SD card not included.

AC/DC Adapter. AC/DC Adapter Connection. Only use the AC/DC adapter supplied with the device. Plug the AC/DC adapter firmly into the AC/DC adapter connection and confirm that the amber charging indicator status light is visible. It will be green when charging is complete. See **Device Overview**, Power/Batteries section, above.

Operating Modes & Displays.   Note the diagram for a description of petMAP+*II* display content.

OR MODE

BP cycle set
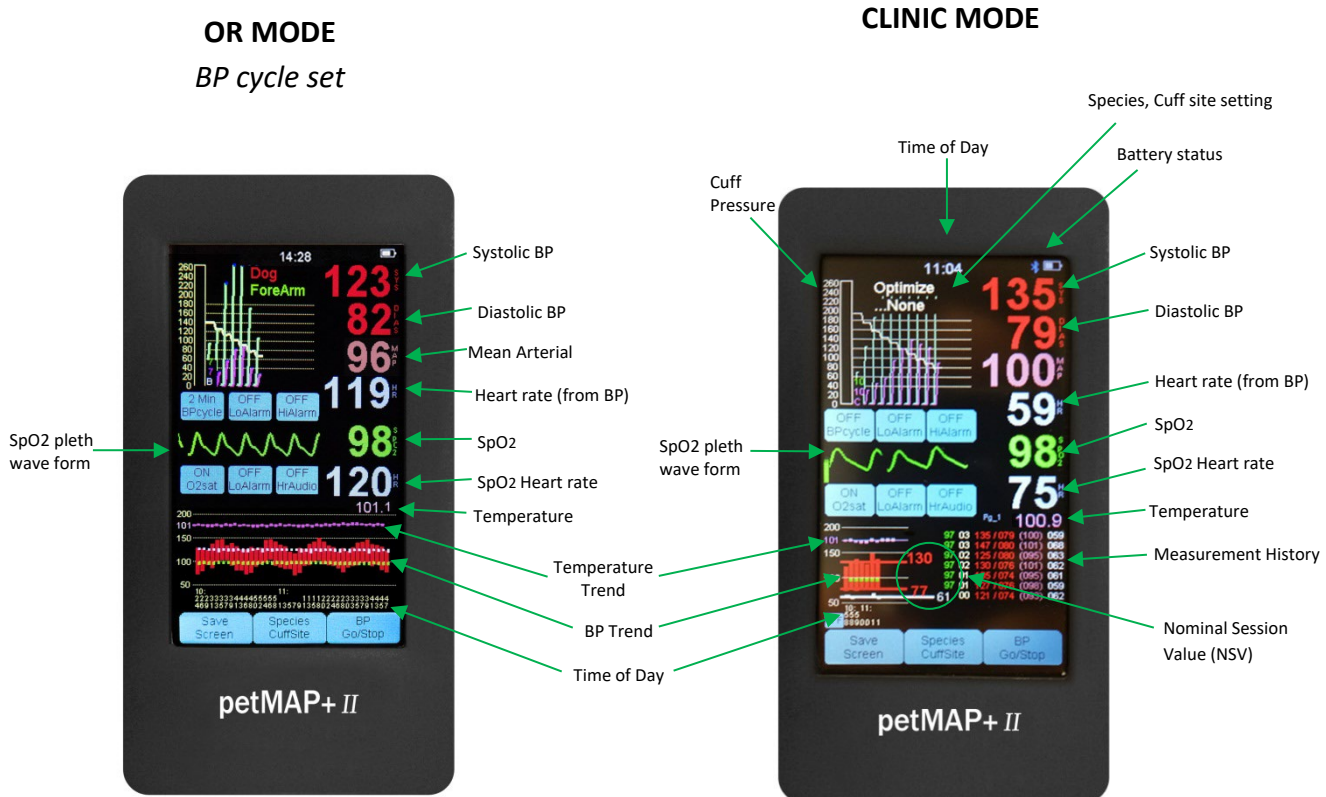
CLINIC MODE

The OR Mode is activated by selecting a measurement frequency using the "BPcycle" button. The default mode is Clinic Mode (BPcycle is OFF) in which each BP reading must be started using the "BP Go/Stop" button.

Touch Screen. The touch screen is the primary method for the user to interact with petMAP+*II*. The display has several active areas (buttons) for the user to make selections, but some functions (alarm cancelation, trend display and selection of Fahrenheit or Celsius temperature display) are invoked by simply touching the screen in areas without buttons or by touching the temperature display directly. Generally, selections are made by using a momentary *press and release* technique. A press and hold technique on buttons will restore some controls to their OFF position. Some operators find using both their fingertip and their fingernail at the same time easier than just using the pad of their fingertip since this fingernail technique allows better visibility of the text displayed on the button. However, any technique is acceptable as long as nothing sharp is used to press the buttons on the screen.

Time of Day. Time of Day is displayed below the graphical trend in three lines where the top line is the hour of day and the next two lines are minutes.

BP Trend. The BP trend is displayed as a bar where the top of the bar is the systolic pressure and the bottom of the bar is the diastolic pressure. Heart rate is displayed in white.

Measurement History. The format for the measurement history is minute of measurement, systolic value, diastolic value, MAP value (in parenthesis) and heart rate. The top value is the most recent.

User Selections. Note the diagram for petMAP+*II* user selections. The available user selections are light blue with black text.

Blood Pressure Measurement & Related Commands
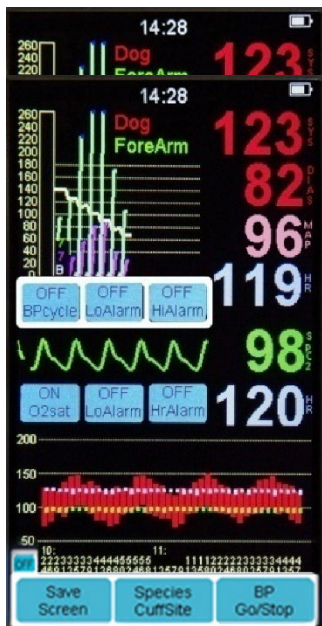
OFF BPcycle — Press and release to set the BP measurement frequency which, when set, places the device into OR mode in which BP reading are automatically repeated at the selected interval. The available BPcycle options are STAT (BP cycles rapidly for three minutes then reverts automatically to a 2 min cycle time), 1 Min, 2Min, 3 Min, 4 Min, 5 Min, 10 Min, 15 Min, 20 Min, 25 Min and 30 Min. Once the desired frequency is selected, the user must press the BP Go/Stop button to begin the measurements. Press and hold the BP cycle button to turn the cycle mode OFF.

OFF LoAlarm — Press and release to set the low limit alarm for systolic pressure. The available settings are 60, 80, 100, 120, 140, 160 and OFF. Press and hold to turn the alarm OFF.

OFF HiAlarm — Press and release to set the high limit alarm for systolic pressure. The available settings are 150, 175, 200, 225, 250 and OFF. Press and hold to turn the alarm OFF.

Species CuffSite — Press and release to set the species and cuff site which is displayed at the top. The seven available settings are DOG (forearm, hindfoot and tail), CAT (forearm, hindfoot and tail) and Optimize…None. The non-optimized mode should be used on any species other than dog or cat or when comparing petMAP to Doppler or other oscillometric BP devices.

BP Go/Stop — Press and release to initiate a BP reading in Clinic Mode, or to initiate a series of automatically cycled BP readings in the OR Mode.

OFF / Save Screen — If an SD card is in use, press to capture an image of the screen in a file on the SD card. Similarly, the unit will prompt the user at power off for the same feature. (See Operator's Manual for the function of the small button, above left.)

SpO2 & Related Commands
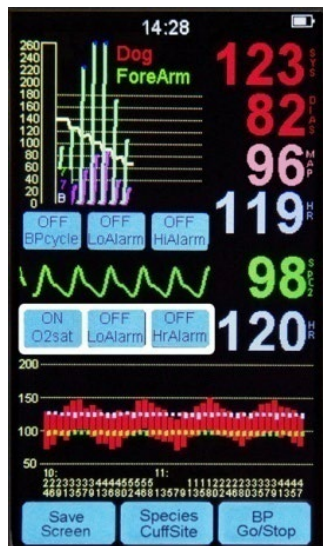
OFF O2sat — Press and release to start the measurement of O2 saturation. When the SpO2 monitor is ON, the button will show ON and the plethysmographic waveform will be displayed, along with the SpO2 value and heart rate derived from the SpO2 sensor. It may take 10-15 seconds for the display to stabilize after switching O2 ON.

OFF LoAlarm — Press and release to set the low limit alarm for SpO2. The available settings are 96, 94, 92, 90, 88, 86, 84, 82 and OFF. Press and hold to turn alarm OFF.

OFF HrAudio — Press and release to set the volume for the SpO2 audible heart rate cardiotachometer. The available settings are ON 1 – ON 5 (5 being the loudest) and OFF. Press and hold to turn the audio OFF.
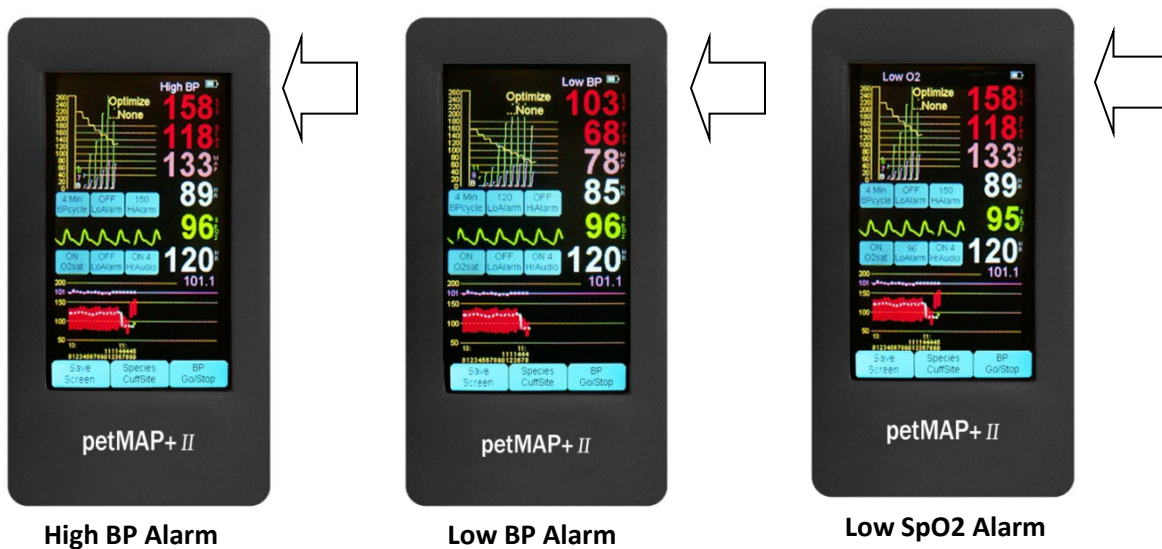
Alarms. petMAP+*II* has both User-selectable Alarms and System Alarms.

User-selectable Alarms

As mentioned above, the user may set alarms for systolic pressure (both hi and low) and SpO2 (low only). The default setting for all user selectable Alarms is OFF.

When activated by the user, the petMAP+*II* will audibly alarm when the selected alarm settings are exceeded.   When the O2 sensor alarm and/or the low SpO2 alarm conditions are resolved, the alarms will self-cancel.

The alarms begin as a subtle chirping sound and progress to a louder continuous tone after about 20 seconds. All alarms are canceled by the user by touching the screen anyplace, but make sure to only touch a button when it is desired to make a change in that button's function.

| High BP Alarm | Low BP Alarm | Low SpO2 Alarm |

System Alarms

petMAP+*II* has built in System Alarms which may sound when the device detects conditions that need attention. System Alarms are not user selectable and are always enabled.

The System Alarms include:

> **BP measurement not achieved -**The message displayed on Screen – "Patient? Motion? Cuff?" is to let the user know that adequate BP signals were not properly detected, or were substantially adversely affected by motion artifact, and that a blood pressure measurement could not be made. The user should check the patient for motion, check that the cuff is snug and sized correctly and is connected securely to the unit. Review the section: "Measuring Vital Signs in Animals" in this manual for proper BP measurement technique information.

> **O2 Sensor Alarm** – The message displayed on the screen - "O2 sensor?" is to let the user know that the SpO2 function is turned on, yet no viable signal has been detected. Ensure the sensor connector is securely plugged into the petMAP+*II*, properly clipped to the patient (the tongue is the preferred site in most animals) and that the patient is stable and well oxygenated.

Low Battery Alarm – The message "Low Batt" is displayed on the screen and the battery level indicator will turn RED. When this warning is displayed, the unit will shut off automatically after a few minutes of continued use, but BP may not be measurable even though SpO2 is still functioning. When this occurs, the AC/DC adapter should be plugged in to prevent automatic shutdown, or the unit should be taken out of service and recharged.

The system alarms may also be silenced by touching anywhere on the screen, but take care not to touch a button unintentionally when canceling an alarm condition.

| BP measurement not achieved | O2 Sensor Alarm | Low Batt Alarm |

SD Card Functions

The petMAP+*II* contains an SD card slot which can be used to automatically record all vital signs data on a user supplied SD card for archiving directly to the SD card and for optionally transferring to a PC/MAC for long term storage, display and/or printing. The SD card can also optionally record an image of the screen at any time by pressing the "Save Screen" button and/or by responding to the prompt at the time the unit is switched OFF by the user.

To use these SD card storage functions a 2, 4, 8 or 16 GB SD card must be properly inserted into the SD card slot. The card must be inserted with the card label facing up when the unit is being viewed normally and pressed firmly into the slot such that it is entirely within the slot and no portion is protruding from the side of the petMAP+*II* device. To remove the card, press it firmly further into the slot and then release pressure and the card will eject automatically. The mechanical function of the SD card in the petMAP+*II* is the same as in cameras that use SD cards for picture storage and will be familiar to most users.

It is important to note if using a 2 GB SD card, it can only accommodate 512 files on a card or errors will occur. For a 4 GB card, only 1024 files can be written on it or the same errors will be created. Should this happen, the SD card must be removed and some number of data or image files erased or a new SD card used in its place. If there is difficulty after changing the SD card, it is possible that the petMAP+*II* must be hard powered OFF (by holding the ON/OFF button down for 10 seconds, followed by a new power ON button press) or the unit will not function. For 8 and 16 GB cards, there are many more files available, but writing time will be longer than with the smaller SD card sizes, particularly when using a 16 GB card.

Checking the available files on the SD card is easily done at the same time as when copying data from the SD card to a PC/MAC. For many users, this restriction on the number of files with a 2 or 4 GB card will not be a problem if the SD card is replaced every year. However, if the device is used in an active clinic or very active OR setting and 2 monitoring sessions are done each week day and the screen image is saved each time… in a year of use, there would be too many files for even the 4 GB SD card to hold the data, ie: 260 days X 2 sessions/day X 2 files/session = 1040 files, and thus this number would slightly exceed the 1024 allowable file count on a 4 GB SD card.

During petMAP+*II* use, the data for each measurement or monitoring session is automatically captured in a .TXT file (described later in this manual) if there is an SD card in the unit. The screen image file capture (described below) is enabled by the user either by pressing the "Save Screen" button or at power OFF time. Not capturing the screen image allows a single SD card to last longer before needing replacement, but the potential usefulness of the recorded screen image will be lost. It is suggested that if recording is important to the user's practice that SD cards be checked often and the data archived on a PC/MAC before files are erased on the SD card to create more room on the card.

Using the SD Card to update petMAP+*II* with new software/firmware:

To install updates of the firmware/software in the petMAP+*II* requires several steps, the first of which will result in the upgrade files being copied from the PC/MAC to an SD card. The SD card must be a 16 GB or less in capacity; it is OK to reuse SD cards that have been used previously in the petMAP+*II* and which may have old update files or old data files on them. After the SD card is loaded with the update files using a PC/MAC, the card is then used to update the software/firmware in the petMAP+*II* unit. This process is fully described in the steps below.

Firmware/software Update Procedure:

1) If you are updating from a new SD card that already has the new firmware files on it, skip to step 2) below. If you are updating from files sent to you attached to an e-mail (or copied from the petMAP website), please copy the two files that are attached to the update announcement e-mail to an SD card using your PC or MAC. If there are already files with the same filename on your SD card, copy over them with the new files and do not try to save the old update files with the same name. Once the files are copied and confirmed to be present on the SD card, remove the SD card from the PC/MAC and proceed to step 2.

2) Before doing the actual update, make certain that the petMAP+*II* unit has adequate battery charge (1/3 charge or more) or is plugged into the AC/DC adapter. Then make certain that the petMAP+*II* unit is switched OFF. Insert the SD card containing the upgrade files into the petMAP+*II* unit.

3) Once the SD card is securely in the unit, switch the power to ON with a single press and release of the ON button. Nothing audible or visual will happen after pressing and releasing the power button and the screen will remain blank for about 15 seconds while the new firmware is automatically installed.

4) After 15-20 seconds, the unit will complete the update and then automatically startup normally and display the new firmware version on the top screen. Confirm that the displayed firmware version matches that which was specified in the email you received with the two update files or in the documents you received with the preloaded update SD card you received from the company.

5) Once the unit is updated, the SD card can be left in the device and used for data storage since the update will only take place one time for each new set of update files. That is, after each new update process, the petMAP+*II* unit recognizes at each new power ON that it is already loaded with the same update files that are on the SD card, and consequently it does not do another update until it detects that new update files are present on the SD card.

6) If the unit fails to function after an attempted update, remove the SD card, hold the ON/OFF button depressed for 10 seconds (called a hard power OFF), and then reinsert the SD card and press the ON/OFF button once and wait for 15 seconds. If it still fails, restart at step 1) and try again. If unable to successfully install the update after repeating the process, contact the company for assistance.

Mounting Options.

While petMAP+*II* can be used in the palm of your hand, several types of mounting options may be useful.

Pole Mount

Table Mount

OPERATING INSTRUCTIONS

Prior to Use — Charging the batteries.

Connect the petMAP+*II* AC/DC adapter cable to the bottom of the petMAP+*II* and plug it into a suitable power outlet; the included rechargeable NiMH batteries will charge whether the device is ON or OFF. The Battery Charge LED (viewable thru the "peephole" just above the SD Card slot on the left side of the unit) flashes AMBER when the AC/DC adapter is detected and progresses to solid AMBER while the battery is charging. It turns to steady GREEN when the batteries are fully charged. Optimally, it is best to allow the battery to fully recharge before using the monitor under battery power, but partial charge usage is acceptable if needed. It takes approximately 6 hours to recharge fully discharged batteries.

Prior to Use — Setting Date, Time and Altitude (if needed).

petMAP+*II* is manufactured in the US Eastern time zone and will generally arrive set for that time and date and set to 1000ft (304 M) altitude. Time is set and displayed with a 24-hour clock where noon is 12:00 hrs and midnight is 24:00 hrs. If a change in time or date is needed, the user must do it manually and the built in clock-battery will subsequently retain the proper settings of clock and calendar, even when the unit is powered OFF and even if the main batteries are discharged. The expected life of the clock-battery is approximately 4-5 years and must be replaced when needed at a petMAP service center.

If needed, setting the date, time and altitude requires that the user enter the setup mode. To enter the setup mode, switch the unit OFF, and then press your thumb or finger on the screen gently and then turn the unit ON while continuing to constantly hold slight pressure on the screen. The setup screen will then display (you must continue holding pressure on the screen while this is happening) and in the upper left corner of the display, a seconds counter will begin incrementing. See Figure 1.

Observe the seconds counter at the top left of the display, and when the count equals exactly 6, release your finger or thumb from the screen—and the date, time and altitude setting screen should appear, as in Figure 2. Touch **Set** repeatedly at the bottom of the display to scroll through the various settings fields. To change a setting, press **Inc** or **Dec**. Once everything is set properly, exit by pressing the **Ext button on the lower left of the display**. The unit will save the date, time and altitude and then power OFF automatically. Switch the unit back ON to observe proper time at the top center of the display.
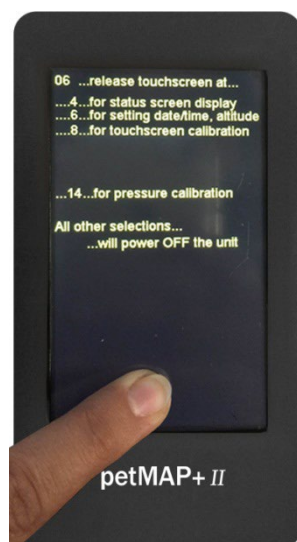
Figure 1:

Figure 2:

Power ON the petMAP+*II*. Press and release the ON/OFF button on the right side of the unit to power the device ON. The same button is used to power the device OFF.

Measuring Blood Pressure

petMAP+*II* can operate in either "Clinic Mode", where blood pressure measurement frequency is under user control, or in "OR Mode", where measurement frequency is determined by the user by setting the BP cycle time for automatically repeated BP measurements at the set cycle time.

Cuff placement. In either mode, the first step for accurate determinations is to select the proper sized cuff and to apply it, snug tight, to the best limb available. The available cuff sites include the forearm, tail or hind foot. To achieve the most accurate and consistent readings, it is recommended that the forearm or base of the tail be used on cats (either works well). For dogs, the base of the tail if the preferred site, followed by the forearm. The hind foot is the least accurate and should only be used if the forearm and/or tail cannot be used. Generally, there is no need to shave or clip the hair or fur; however, it is critical to apply the cuff snug tight. In the case of BP measurements on long haired animals, wetting the fur to allow better compression by the cuff may be beneficial in terms of ease of cuff placement and potentially better accuracy.

For species other than cats and dogs, follow the BP basics with respect to cuff sizing and placement: 1) place the cuff as close to heart level as possible, since there is an offset of +/- 2 mmHg for every inch of vertical difference between the heart and the cuff, 2) use the correct sized cuff, and 3) there should be no pressure on, nor any movement of, the limb or the animal during a BP measurement.

BP extension hoses: petMAP+*II* is supplied with two BP extension hoses, which can be used to increase the distance between the petMAP+*II* and the cuff. The extension hoses are approximately four feet long and come in two different sizes. One size is used with the smaller cuffs (2.0 – 5.5cm) and has a smaller diameter which is the same size as the smaller cuff hoses; the other extension hose is used with larger cuffs (6.5 – 13.0cm) and has a larger diameter as do the larger cuffs. It is extremely important that the proper extension be paired with the cuff being used. However, in exceptional cases of very difficult patient positioning, it may be necessary to join the two different diameter extensions together to reach a remotely placed patient, but degradation in accuracy and performance should be expected if this is done.

petMAP settings: Using the Species Cuff Site button at the bottom of the screen, press and release to set the species and cuff site appropriate for the patient being measured. There are three settings for dogs (forearm, hind foot and tail) and the same three for cats. The settings are displayed at the top center. Using these settings, which are referred to as "optimizations", will improve the correlation of the reading results to intra-arterial pressures based on petMAP's unique algorithms. If the species being measured is not a dog or a cat, the seventh setting, the "non-optimized mode", should be used. The non-optimized setting should also be selected if attempting to compare readings from other BP devices to the petMAP.

Taking BP in Clinic Mode

Clinic Mode is the mode used when the user wants to be in control of the timing and frequency of BP measurements. When used in Clinic Mode, the user must leave the BPcycle setting OFF (by definition, the OFF setting puts the unit into Clinic Mode). For each desired reading, touch the BP Go/Stop button to initiate (or stop) a BP reading. The cuff will inflate automatically after the BP determination is started. During cuff pressure deflation, petMAP+II will display the cuff pressure and the oscillometric waveform. Using the graph of the oscillometric envelope, the user can discern the quality of the determination. See examples of good, bad and ugly readings later in this section. If a determination is developing a bad or ugly waveform, stop the determination, calm the patient, and then try again.
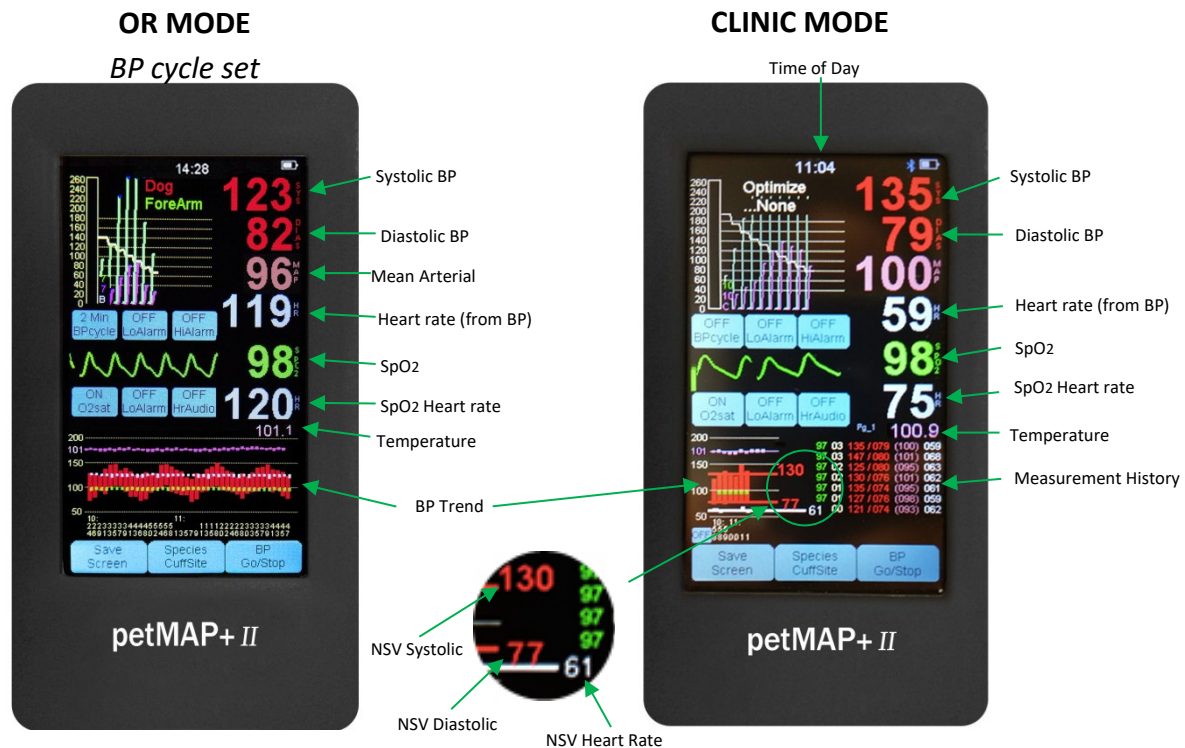
If the MAP value is desired while in Clinic Mode, simply touch the screen area below diastolic BP for it to be displayed. By default, in Clinic Mode the bottom area of the display contains both a graphical and a tabular display of measured data. In addition to the measured data in this Clinic Mode data display, the petMAP+II displays the NSV in the graphical display area. NSV stands for **N**ominal **S**ession **V**alue, a unique and proprietary petMAP feature. After the second reading, NSV is automatically calculated after each subsequent reading in the BP measurement session. NSV is not a straight average of the previous readings—all of the BP session readings are analyzed to result in a robust statistical measure of the patient's nominal BP. Outliers are eliminated and more averaging weight is given to the readings that are more similar to each other and near the median BP value measured. The OR Mode trend display (shown below) can be selected at anytime by touching the graphical data display area, and another touch returns to the Clinic Mode display.

Taking BP in OR Mode

OR mode is the mode used when multiple BP readings are desired to be automatically measured at a specific user selected frequency of BP measurement. The BP cycle time is set by touching the BPcycle button repeatedly until you arrive at the desired time interval. The interval settings available are STAT (rapid readings for 3 minutes and then it will automatically switch to the 2 min cycle time), 1Min, 2Min, 3Min, 4Min, 5Min, 10Min, 15Min, 20Min, 25Min and 30Min. Returning to OFF can be accomplished by either cycling through all of the settings or by pressing and holding the BPcycle button until OFF appears. Once the BP cycle time is set, the BP Go/Stop button initiates the readings and must be pressed to start the automatic cycling of BP readings. To discontinue the cycle, set the BP cycle to OFF.

The STAT mode is used when rapidly repeating BP readings are desired. The STAT mode will re-inflate the cuff almost immediately after the previous reading has completed and this sequence will continue for 3 minutes at which time it automatically switches to the 2Min cycle time. After each new BP determination completes, a short beep will audibly sound to alert the user that a new BP value is available.

High and low alarms can be set for systolic pressure. To set alarms, repeatedly touch the BP Hi Alarm and/or Lo Alarm buttons until the desired alarm limit is set. If the measured value exceeds (higher or lower) the alarm limit set, the unit will both alarm and display a message at the top of the display. Silencing alarms is done by touching the display anyplace, but take care not to touch a button unintentionally.

High BP Alarm   **Low BP Alarm**

The GOOD, the BAD, and the UGLY . . .

BP determinations that are showing ragged oscillometric envelopes like the BAD and the UGLY examples below should be terminated while in process by pressing the BP Go/Stop button, and appropriate corrective action taken such as checking the fit of the cuff and calming the patient to reduce motion before a new determination is started.

GOOD	BAD	UGLY
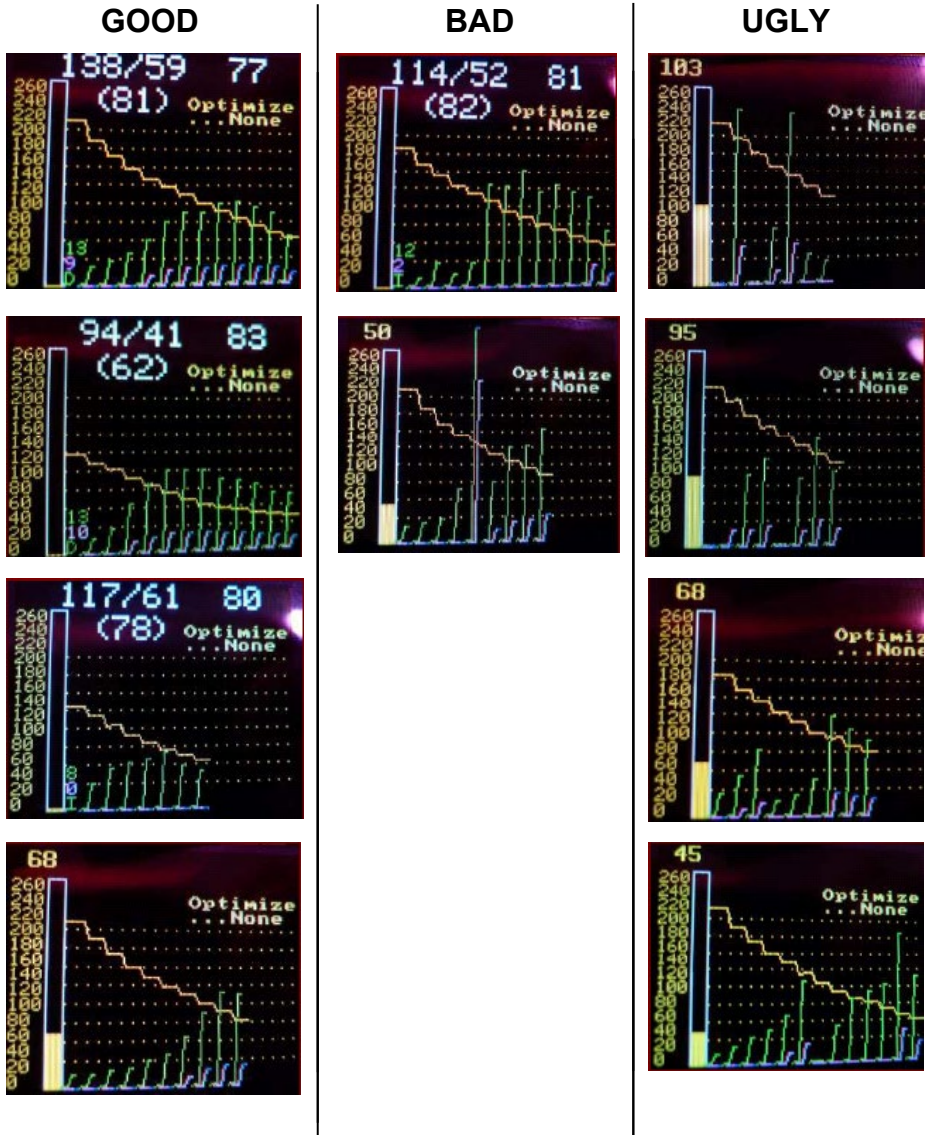
Blood Pressure Values in Cats and Dogs

Blood pressure (BP) is most accurately measured directly using an intra-arterial catheter. Knowing an animal's BP is often required for diagnosis and treatment. However, since intra-arterial pressures are often impossible or impractical to measure, a variety of indirect measurement devices (Doppler and oscillometric) have been developed to permit estimation of an animal's BP. It is important to note that the different methods and different brands of indirect BP devices will likely produce different BP values in the same animal, as each estimates blood pressure in a somewhat different way. Further, all indirect methods are dependent on the state of the animal and, to some extent, the experience and skill of the user.

petMAPs have been designed to better correlate with intra-arterial pressure readings through optimizations for species and cuff site. The result of this better correlation with intra-arterial readings is that petMAP's readings will almost always be 10-20% higher than Doppler or other oscillometric devices.   If correlation of petMAP BP readings with other BP devices (other than direct intra-arterial readings) is desired by the user, petMAP should be used in the non-optimized mode.

"Normal" BP in companion animals varies with the species, age of the animal, method used for BP determination, and the emotional state of the animal as a result of animal handling and other circumstances. "Normal" systolic values can range from 110 to 160 mmHg and most diastolic values range from 55 to 100 mmHg, if the animal is undisturbed and at rest. Normal BP is different for cats and dogs and can also vary by breed within species.

 Hypertension is generally characterized as pressure >170/110 mmHg in relaxed animals; hypotension is pressure <90/50 mmHg in the awake animal.   However, much of the BP data that has been used to establish these ranges has been measured with indirect devices and, as previously mentioned, most of these devices (Doppler and oscillometric) underestimate the intra-arterial systolic pressure by 10-20%.

The study of hypertension and its treatment is an evolving subject in veterinary medicine. It is suggested that veterinarians refer to the literature, including the ACVIM Consensus Statements, published on this topic.

Measuring SpO2

Theory of Operation

The pulse oximetry function of petMAP+*II* determines both pulse rate and SpO2 % (percent oxygen saturation) by passing two different wavelengths of low intensity light (one is a visible red and the other is an invisible infrared) through body tissue which has good blood flow to a photodetector. The sensor is divided into two halves: the emitter is the part of the sensor that glows red when powered on; the detector is the opposite part of the sensor and does not emit any light.   SpO2 values are based on calculations of the ratios of the differences in absorbance of red and infra-red light between blood saturated with oxygen and oxygen-depleted blood at each heartbeat. The variation of the absorbance of the infrared light during each heart beat is displayed as the O2 pleth trace.

Requirements for Obtaining Reliable SpO2 Readings

Proper Sensor Placement: The user must place the sensor clip on a relatively thin tissue that has good circulation, such as the tongue, lip, deep in the ear, paw, toe, toe webbing, arm or leg just above the paw, vulva, or Achilles tendon. The tissue being used must be of a thickness and color that allows proper light penetration of the tissue between the two halves of the sensor clip.   Darkly pigmented skin or dark fur can prevent proper light penetration and thus prevent O2 measurement. Note that the sensor should NOT be placed on an extremity that has a blood pressure cuff, arterial catheter or intravascular line proximal to the O2 sensor site.

Proper Sensor clamping pressure: If needed and so equipped, the sensor's clamping pressure adjustment should be used to reduce sensor clamping pressure so that the pressure of the sensor does not compress the tissue and prevent good circulation in the tissue between the sensor's two arms. This pressure reduction adjustment is made by using the grey pressure reduction slider (details below) and is often needed when measuring on the ear and tongue of small animals. Specifically, the pressure can be relieved by moving the gray strain relieve slider towards the sensor so that clamping tension is placed on the rear portion of the clip by the two sensor wires. This pressure on the rear portion of the sensor reduces the pressure on the sensor jaws which will prevent the sensor pressure from cutting off the circulation in the tissue between the sensor jaws. However, care should be taken to maintain just enough pressure to hold the sensor in place. (see lower left photo below which shows the slider snugged up close to the sensor to relieve pressure on the ear)

No subject motion: The animal must be motionless. Any motion will affect the stability and accuracy of the readings, and continuous motion such as shivering will prevent accurate measurement. Generally, SpO2 readings are best taken on anesthetized patients or patients that are not moving.

Reset O2 electronics: After any change in the sensor positioning, the O2sat ON/OFF button should be cycled OFF and then back to ON. This allows the O2 electronics to restart using the new sensor/tissue setup. It will typically take 15-20 seconds to get a first reading and up to 30 seconds for the readings to stabilize. During monitoring, disregard the SpO2 readings if the pleth trace is not stable and/or if the patient's heart rate is not reasonably correct. Either of these conditions requires sensor adjustment and resetting the O2 switch to OFF, then ON.

SpO2 Instructions

Some configurations of petMAP+*II* are capable of measuring SpO2. Currently, petMAP+*II* supports two technologies for SpO2 measurement as outlined in the following table:

Technology	Product Code	Sensor
Analog O2	7457	
Nonin O2	7455	

While the technologies are different, the instructions for use are the same. The unit will contain the necessary electronics and be equipped with a "clothes pin" type of SpO2 sensor. Generally, the best place to attach the O2 sensor is the tongue, but the ear, vulva or pedal area may be tried if the tongue is not available. Make sure the tongue is moist for best results.

To measure SpO2, first place the sensor on the patient as described above and then press the O2sat button to switch it ON. When activated, the button will show ON and the plethysmographic waveform and signal strength bar will be displayed, along with the SpO2 value and the heart rate value derived from the SpO2 sensor. After switching the O2 monitoring function ON, it may take 10-15 seconds for the system to become stable and display readings. Take care that the tongue (or other monitored site) is not in motion of any kind, since this will prevent acceptable monitoring accuracy.

A low alarm for SpO2 can be set by repeatedly touching the LoAlarm button next to the O2sat ON/OFF button. The available settings are 96, 94, 92, 90, 88, 86, 84, 82 and OFF. As with BP alarms, if the measured value exceeds the alarm limit set, the unit will both alarm (starting with alerting chirps and 20 seconds later continuously sounding) and display a message at the top of the display. Silencing alarms is done by simply touching the display in an area other than the buttons.

The user also has the option of setting an audible SpO2 heart rate cardiotachometer by pressing HR Audio. The available settings are ON1 – ON5 (5 being the loudest) and OFF.

Causes of Inaccurate SpO2 Measurements

Incorrect application of the sensor: move to alternate site; reduce pressure using gray slider (if equipped); make sure to place the sensor on an extremity that does not have a blood pressure cuff, arterial catheter or intravascular line proximal to the O2 sensor.

Tissue too thick or too dark (i.e., not enough signal): move to thinner site; wet fur and part to allow better light transmission; clip fur.

Tissue too thin (ie, too much signal): if the tissue is very thin like a cat's ear and tongue, move to a thicker tissue site.

Excessive amount of ambient light: shield the sensor by covering it with a lightweight opaque material.

Subject motion: reduce motion by appropriate means.

SpO2 Sensors

As previously outlined, petMAP+*II* has technology options for SpO2 measurement. The sensors are different, depending on the technology purchased. If petMAP+*II* was purchased with the Analog SpO2 option (#7457), it will include a SpO2 sensor and two clips. One of the clips is larger; the other smaller. The sensor can be removed from one of the clips and attached to the other—the user must decide which clip is best for the clinical situation. To switch clips, follow these directions:

1) Remove the rubber covers by sliding them off the end of the clip.

2) Carefully slide each sensing element past the end of the clip holding them in place. It may be necessary to release the cable leading up to the sensing elements from their securement points on the clip.
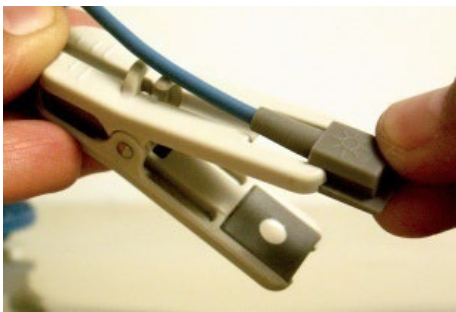
3) Slide the sensing elements onto the other clip, ensuring that the tabs slide into the notched areas at the end of the clips and that the sensing elements are facing inward. Secure the cable around the securement points.
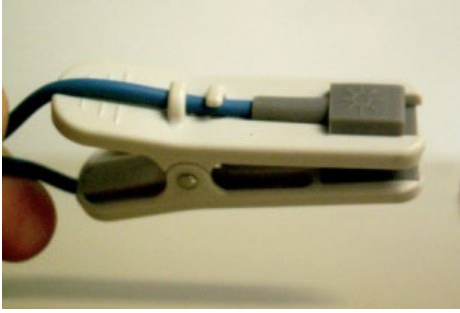
4) Install the rubber covers.
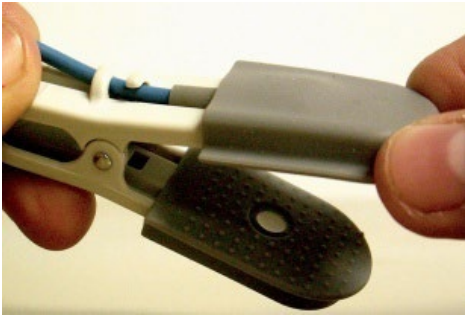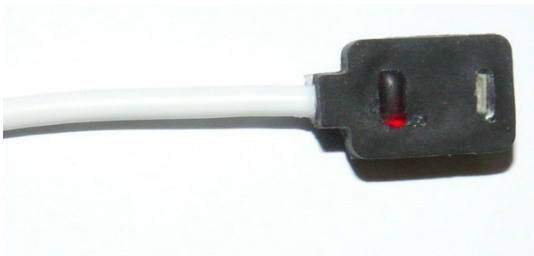

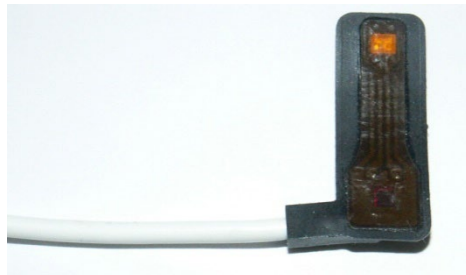Store the removed clip in an area where others will know where to find it.

If petMAP+*II* was purchased with the NONIN SpO2 technology (#7455), the sensor supplied with the unit will look like this:

Additional sensor types are optionally available for purchase.

Nonin Transflectance Sensor #9018

Nonin Flex Sensor #9019

Measuring Temperature

All configurations of petMAP+*II* are capable of monitoring temperature, provided that the proper accessories are purchased. The necessary accessories include a temperature extension cable (#9014) and either an esophageal probe (#8040) and/or a rectal probe (#8041). The temperature extension cable is 2 meters long and serves to connect the probe to the device more conveniently than using the temperature probe plugged directly into the device.

To monitor temperature, carefully insert the probe into the patient using traditional clinical procedures, and connect the probe to the extension and the extension to the top of the unit. Temperature automatically displays once the unit detects that the temperature is within the physiologic range. Temperature can be displayed in either degrees F or C but it is set initially to display degrees F. To change between degrees F and degrees C display, simply press and release directly on the currently displayed temperature value to toggle between Fahrenheit and Celsius Modes. Temperature is also trended in the data display area in purple.
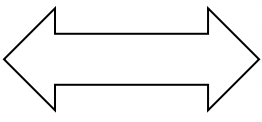
OR MODE

BP cycle set
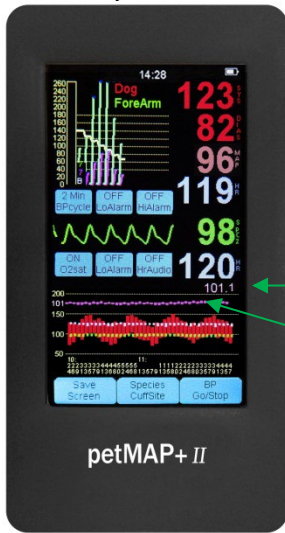
CLINIC MODE

As previously mentioned, there are two different data display formats depending on the user's selection.

The display formats are shown below and can be changed from one to the other by simply touching the graphic trend area of the display at any time.

Touch the graphic area to change trend display format.

Data Recording and Transfer—SD Card

File Name Format for Data .txt Files

If an SD card is inserted into the SD card slot, files of the data measured at each measurement session will be recorded in a file on the SD card in the .txt format (that is, in a simple text format). The filename naming convention is comprised of the MonthDayHourMinute of the time when the file is actually written to the SD card. For example, if the last BP determination of a session was done August 28 at 15:36 hours; the name of the text file containing all the readings on the SD card would be named: 08281536.txt (*the naming convention for the Save Screen .jpg files is different; please refer to that section for format*). Since the year is not a part of the file name, if multiyear retention of the saved data is important, the SD card should be replaced at least once a year to prevent the possibility that a previous file would be over written by a new one saved at the exact date and time as an old one already on the SD card from a previous year.

Measurement and Monitoring Data Recorded in Text on the SD Card

During use, the information generated in each BP determination will be recorded immediately after each determination in a single line of the text file on the SD card. Care should be used when removing the SD card so that it is not being done right at the end of the determination since this could corrupt the file being updated, and potentially harm the SD card itself. (See note at the bottom of this section for more information on corrupted files or SD cards).

The format of text output recorded on the SD card is as shown in the example below. (In the top line of column labels, Dys stands for diastolic). Note that the HR obtained during the BP determination is based on the pulsations in the limb with the BP cuff.

```
HR:MN:SC   Sys Dys  (MAP)  HR    Temp      O2   HR     CO2 RR ⎫If CO2
18:49:24   202 148  (168)  080   101.8     94   080     xx xx ⎭in use
18:49:54                                    94   080
18:50:18   202 147  (169)  082   101.8     93   080
18:51:07   202 147  (168)  081   101.8     94   080
18:51:56   199 149  (168)  080   101.8     94   080
18:52:50   201 147  (168)  080   101.8     94   080
18:53:38   201 149  (168)  080   101.8     94   080
18:54:27   202 147  (167)  079   101.8     93   080
18:55:00                                    96   080
18:55:10                                    93   080
18:55:23   200 149  (168)  081   101.8     94   080
18:56:23   201 150  (168)  081   101.8     94   080
18:57:24   202 147  (169)  078   101.8     93   080
18:58:19   152 099  (113)  079   101.8     94   080
18:59:07   147 102  (116)  080   101.8     94   080
18:59:50   153 100  (115)  081   101.8     95   080
19:00:13                                    95   080
19:00:36   147 098  (113)  081   101.8     94   081
19:01:25   147 101  (114)  080   101.8     94   080
19:01:59                                    93   080
19:02:12   153 099  (115)  079   101.8     94   080
19:05:09                                    93   080    ...
```

Importing text file into Excel

The text data file can be archived and printed directly from a PC/MAC without any changes. However, if graphics are desired, the text data file can be imported into an Excel worksheet easily by following the steps below. The steps in this example are for Excel 2007. If you have a different version of Excel, the data can also be imported, but the steps may differ a bit.

1. Insert SD card into designated slot on computer.

2. Open a blank Excel worksheet.

3. Select the Data tab in the tool bar of the Excel worksheet. In the *Get External Data* section of the tool bar (right most section) select **From Text**.

4. A window will pop up for you to select the text file you are importing. Once you have selected the file, click Open.

5. The next window that pops up will ask you to select the original data type and in what row to begin the import. Select Fixed width for the original data type, and row 1 to start the import. Click Next.

6. The following window will allow you to adjust the widths of the columns if you feel necessary. Click Next.

7. The last window allows you to select the data format for each column. As a default, all columns are set to General. It is recommended that you select the (MAP) column by clicking on it, and at the top right of that window selecting **Text.** This adjustment is made so the MAP values will show up in a parenthesis and not as negative numbers. Click Finish.

8. A small *Import data* window will pop up. Select okay.

Your data is now imported, should appear on the worksheet and can be graphed using normal Excel graphing commands.

Screen Image Capture in JPG Format (.jpg) to the SD Card

 If there is an SD card in the SD card slot, the user can save the screen to a .jpg file by pressing the Save Screen button at any time or by setting the automatic screen save option (described below). Also, whenever the petMAP+*II* unit is switched OFF using the power button on the upper right of the unit (press and release), just before actually shutting the unit OFF, the screen will display a message at both the top and bottom of the screen: "Touch screen to save to SD card". When the user sees this message, if the user then presses any place on the screen within 3 seconds, the press will signify that the user would like an image of the screen at that time to be written to the SD card. After the press, the unit will remain ON while copying the image to the SD card, a process that takes about 2-3 seconds. After creating the screen image .jpg file on the SD card, the unit will automatically switch its power OFF and the screen will go blank as the unit is now OFF. The file created on the SD card is in .jpg format which is an image format that is easily read and displayed using a PC/MAC. If the user does not want to copy the screen image to the SD card, by not touching the screen for 3 seconds, the unit will switch its power OFF, and the screen image will be lost forever. Note that the option to save the screen image onto the SD card is available to the user at any time by pressing the "Save Screen" button on the bottom left of the unit.
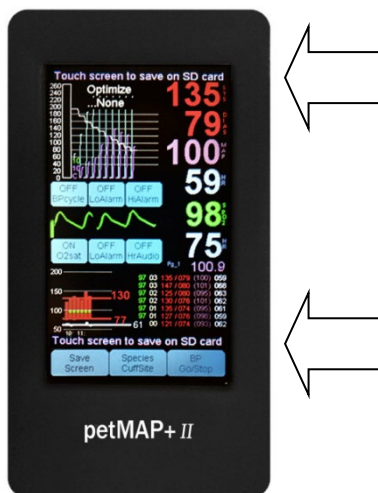
Automatic Screen Save

If the petMAP+II has an SD card in the card slot, there will be a very small button on the lower left of the screen, just above the "Save Screen" button (see figure 1).   This button controls the automatic screen save function and is OFF at power ON. By pressing the button (since it is so small, a fingernail or the tip of a hemostat or pencil can be useful if need be), the automatic save intervals are selected.
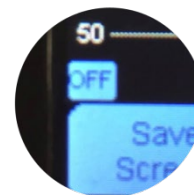
The button will change sequentially after each press as follows:

Off   Default power On condition, no automatic screen saves.

qBP   Saves the screen image automatically in JPG format after every BP determination.

q3M   Saves the screen image automatically in JPG format every 3 minutes.

q2M   Saves the screen image automatically in JPG format every 2 minutes.

q1M   Saves the screen image automatically in JPG format every 1 minute.

Wf-   This selection saves waveforms displayed on petMAP to the SD card. Waveforms are saved as .wav files that can be viewed on a PC.

Wf+   This selection is identical to Wf- but, in addition, will automatically save screen after each BP determination.

File Name Format for Save Screen .jpg Files

When the screen is saved to the SD card, the file name is constructed by using the date and time that the screen was saved and the file was created and written to the SD card. The file name format is MonthDayHoursMinutes, where the months are represented by the numbers 1-9 for January-September, and 'O' for October, 'N' for November, and 'D' for December, and the hours and minutes are each 2 digits numbers. For example, a screen saved on April 14 at 2:18pm would be named: 4141418A.jpg   The 'A' is appended to signify that this is the first screen saved during the date and time of 4141418. If the user saves the screen again during the time 4141418 (ie, during the very same minute), the screen image would be saved with the file name 4141418B.jpg, and then 4141418C.jpg and so forth. In this way, multiple screen images can be saved and uniquely named within the same minute if desired. As another example, if the date and time of the screen save is December 9 at 8:30 am, the file name would be D090830A.jpg.   As with the .txt files, since the year is not a part of the file name, if multiyear retention of the saved data is important, the SD card should be replaced at least once a year to prevent the possibility that a previous file would be over written by a new one saved at the exact date and time as an old one already on the SD card from a previous year.

(Note regarding SD card data corruption: Should SD card data corruption inadvertently occur no matter what the cause, sometimes the data can be recovered by responding affirmatively to the operating system's question regarding "Do you want to…Scan and fix files on the SD card" when the SD card is placed into a PC/MAC. This often "fixes the SD card", but it is not always successful.

Should the SD card be unreadable by the PC/MAC, it can usually be reformatted successfully and used again, but this permanently removes all data on the SD card and this reformatting must be done only by an experienced and knowledgeable computer operator! Anyone doing this reformatting of the SD card MUST DO IT VERY CARFULLY AND CARE MUST BE TAKEN TO RE-FORMAT SPECIFICALLY THE SD CARD…AND NOT BY MISTAKE REFORMAT ONE OF THE COMPUTER'S HARD DRIVES WHICH WILL DESTROY ALL DATA ON THE PC or MAC!!! Unfortunately this user mistake sometimes happens and it is catastrophic!
Be careful.)

petMAP+*II* USB

The USB connector at the top of the petMAP+*II* unit is available for <u>advanced users</u> who want to monitor the data generated by the unit during a monitoring session on a local computer monitor in real time.

The data output to the USB connector is identical to the text data that is written to the SD card and described above with an example output shown in that section; however, image data is not available on the USB connector.

The USB cable must be connected to the unit and to a PC/MAC.   However, to display and/or capture the data using the USB, the user must use a terminal type program, such as HyperTerminal, and the proper communications port for the connected USB client device (ie, petMAP+*II*) linked to the specific terminal program being used. Although such terminal programs for connecting computers to USB and serial communications devices like petMAP+*II* are widely available (some are free on the Internet), they all require user setup which can be very tricky, and may be beyond many good computer users skill set. It is suggested that if this USB function is desired, a computer person familiar with the specific program used (or at least the class of programs) be consulted to set up the system appropriately.

Setup parameters for a terminal program to connect to a petMAP+*II* are: 115.2 kBaud, 8 data bits, 1 stop bit, no parity, no flow control.

Although USB (and Bluetooth) provide capability that may be desirable in some settings, it comes at a cost in terms of complexity of setup and computer and petMAP+*II* coordination. Though the petMAP+*II* data is not displayed in realtime using the SD card for archive purposes, for most users, the SD card provides a simpler way to display and archive petMAP+*II* data on a computer rather than using the USB connection function.

petMAP BT Remote Display

(See Appendix A on page 52 for more information)

The petMAP Remote Display feature allows users to view the measurement results and waveforms displayed on a Bluetooth-equipped petMAP on a PC, laptop, tablet or smartphone in real-time.

The petMAP Remote Display software application is available for Personal Computers (PC) equipped with Bluetooth and running Microsoft Windows or Bluetooth equipped mobile devices running the Android or iOS operating systems.

Compatibility: Windows 7, 10, 11 / Android: version 4.4 and higher / iOS version14 or higher.

Installation: The installation of petMAP Remote Display is a simple two-step process comprised of installing the petMAP Remote Display application on your PC/Android or IOS device and pairing with petMAP.

Download: Obtain the iOS petMAP Remote Display software by accessing the App Store. For Android and Windows software, visit our website. Alternatively, contact Customer Service via email at info@cardiocommand.com.

CritterCuff™/RamseyCuff™ Information

The Ramsey Medical, Inc. CritterCuffs and the larger sized RamseyCuffs are designed specifically to be used with petMAP devices. Using any other brand of cuffs may result in inaccurate BP readings, or even a failure to function, and is strongly discouraged for these reasons.

It is important to have the proper size cuff and the proper snug fit. Improper size and a loose cuff application on the limb will result in inaccurate BP readings or even a failure to determine the BP.
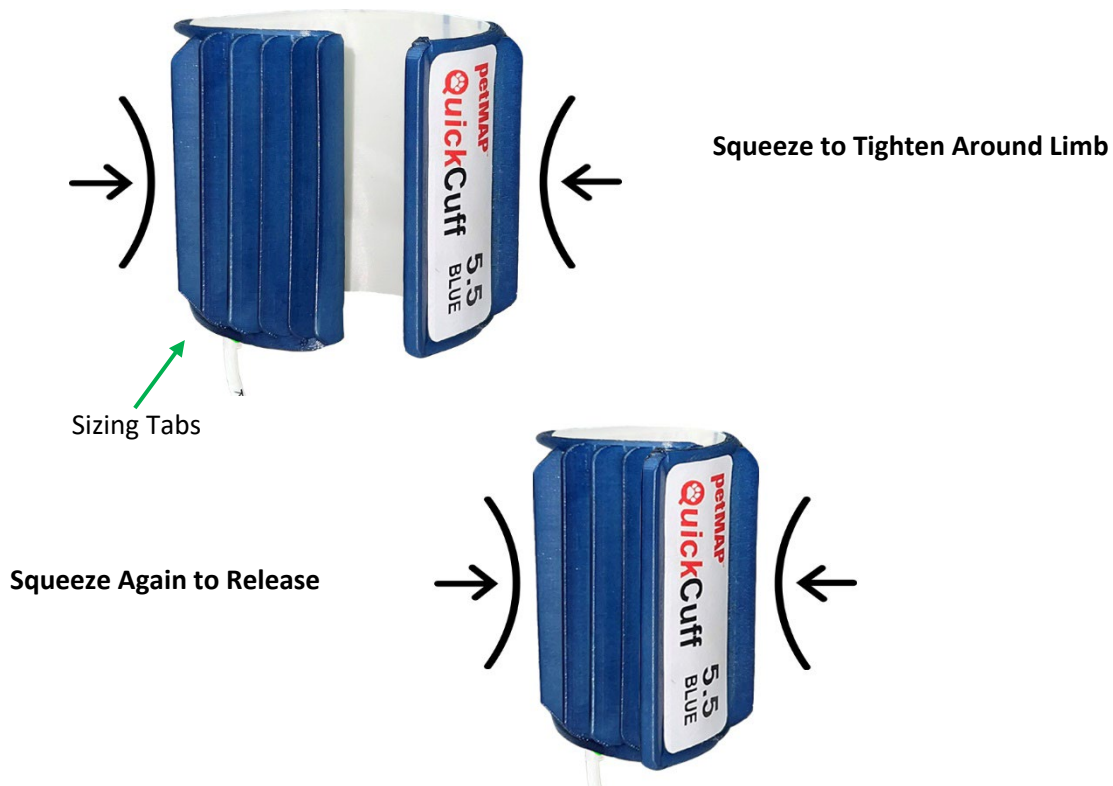
CUFF SIZE
Choose a cuff whose width is approximately 42-50% of the circumference of the leg or tail of the animal. Best results and accuracy will be achieved by using a cuff size where the cuff's index line is in the "OPTIMUM zone" marked on the cuff by dotted lines. If this is not possible, NEVER exceed the solid boundary lines!

CUFF FIT
The cuff should fit "snug tight", i.e., tight enough to get all of the air out of the cuff (attach cuff to animal BEFORE attaching the cuff hose to the petMAP+*II*), and tight enough so that it will not slip off of the limb. However, the cuff should not be so tight that it hurts the animal or is so tight it functions as a tourniquet when not inflated. *The proper size cuff for the limb chosen and its "snug tight" application are absolutely essential if good results are to be achieved! Remember also to set* petMAP+*II for species and cuff site before use, but always before recording readings on the animal's chart.*

When wrapping the cuff around the animal's limb, the index line should fall between the two "OPTIMUM zone" dotted lines, as shown, but NEVER out of the solid boundary lines.

OPTIMUM zone

INDEX LINE
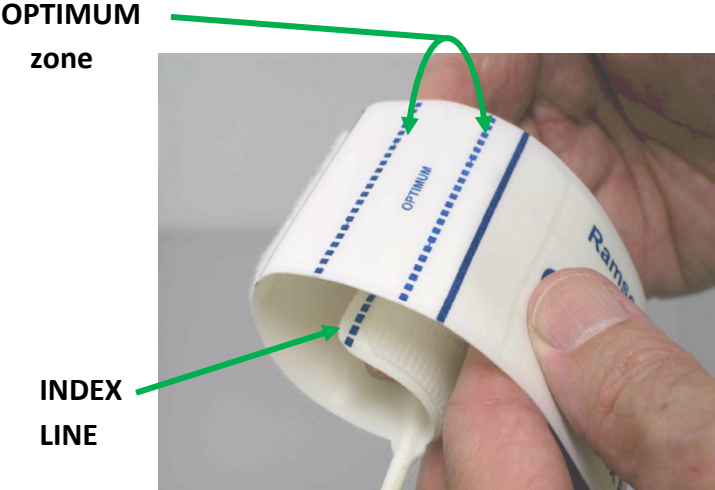
QuickCuff™ Information

The Ramsey Medical, inc. QuickCuffs are designed to be used with petMAP and other veterinary blood pressure measurement devices that use a Luer connector.

It is important to have the proper size cuff and the proper snug fit. Improper size and a loose cuff application on the limb will result in inaccurate BP readings or even a failure to determine the BP.

CUFF SIZE
Choose a cuff whose width is approximately 42-50% the circumference of the leg or tail of the animal. Best results and accuracy will be achieved by using a cuff size where the cuff fits snug tight after the sizing tabs have been secured by squeezing the cuff around the animal's limb.

CUFF FIT
The cuff should fit "snug tight", i.e., tight enough so that it will not slip off the limb. However, the cuff should not be so tight that it hurts the animal or is so tight it functions as a tourniquet when not inflated. For tapered limbs, adjust the cuff to match the patient's limb shape using the sizing tabs. Ensure a smaller fit for the narrower part of the limb and a larger fit for the wider part.

The proper size cuff for the limb chosen and its "snug tight" application are absolutely essential if good results are to be achieved! Remember also to set petMAP+II for species and cuff site before use, but always before recording readings on the animal's chart.

Squeeze to Tighten Around Limb

Sizing Tabs

Squeeze Again to Release

General Cuff Information

There are various sizes of CritterCuffs and QuickCuffs available to cover the range of limb sizes commonly encountered in companion animals. For accuracy of the reading, it is essential that the proper cuff be selected and applied snugly to the limb. Only CritterCuffs, QuickCuffs, andRamseyCuffs should be used with the petMAP since the cuff and unit form a system specifically designed for sensitive and accurate blood pressure measurement in companion animals. The "OPTIMUM zone" on the CritterCuffs and RamseyCuffs is petMAP specific.

 Seven CritterCuffs **OR** QuickCuffs are packaged with each petMAP. Their sizes are: 2.0 cm, 2.5 cm, 3.0 cm, 3.5 cm, 4.0 cm, 4.5 cm, 5.5 cm. Larger cuff sizes (6.5 cm, 8.0 cm, 10.0 cm and 13.0 cm) and a 5.0 cm cuff are available at extra charge. Call Customer Service for more information (800-231-6370 or 813-289-5555).

CUFF SIZE IS IMPORTANT!!

The CritterCuffs may be used for dogs and cats on any of the three recommended positions: forearm, hind foot or tail.   For best accuracy and reliability, the size of cuff should be chosen so that on the CritterCuff,the cuff's index line falls within the "OPTIMUM zone" of the cuff indicated by the dotted lines when the cuff is snuggly applied to the selected limb. In no circumstance should the cuff index line be outside the solid boundary lines.

For best accuracy and reliability with a QuickCuff, the size of the cuff should be chosen so that when the sizing tabs are secured by squeezing the cuff around the limb it is "snug tight".

MAINTENANCE

Device

Cleaning petMAP+*II*: As needed, *clean* the device with a soft cloth dampened with warm water and a mild detergent solution. Gently rub the soiled area until clean. Use a soft cloth to dry the device. <u>Do not use abrasive cleaners, alcohol or cleaning solutions which contain alcohol. Do not immerse in water or other liquids</u>. Care should be taken to prevent water or cleaning solution from running into or onto the screen, connector openings or crevices. As needed, clean the display window using a soft, lint free cloth sprayed with an alcohol free glass cleaner. Do not use paper towels as they may scratch the surface.

To *disinfect* the device, use 0.1% bleach (generally prepared by mixing 1 part household bleach with 9 parts water) followed by a wipe with regular water. If it is necessary to remove blood or body fluid, use a more concentrated bleach solution.

The ratio of bleach to water is dependent on the concentration of bleach purchased. The following chart provides guidance and the dilution ratio should be adjusted, as necessary, for the strength of the bleach.

Original strength of bleach (% sodium hypochlorite)	Bleach (ml)	Water (ml)	Total (ml)	Dilution ratio (bleach:water)
1%	100	900	1000	1:10
2%	50	950	1000	1:20
3%	33	967	1000	1:30
4%	25	975	1000	1:40
5%	20	980	1000	1:50
6%	17	983	1000	1:60

Cuffs

Cleaning: *Clean* cuffs with a damp cloth or hand wash in warm water with mild detergent or soap; <u>do not allow water to get into the cuff tube</u>. Pat cuff dry initially on a towel, and air dry until fully dry and ready for use.

To *disinfect* cuffs, use 0.1% bleach (see above) followed by a wipe with regular water. If it is necessary to remove blood, body fluid or other contaminants, use a more concentrated bleach solution.

After covering the ends, the cuff extension hoses may be cleaned with a soft cloth dampened with germicidal solution, but do not allow any fluid into the lumen of the tubes since fluid in the tube could damage the petMAP severely!

SpO2 Sensors

As needed, the sensor may be surface cleaned. Remove the cable from the unit. Use a soft cloth moistened in water and a mild soap solution and then wipe it with a 70% isopropyl alcohol pad. Allow the sensor to dry prior to placing it on a patient.

The SpO2 cable may be cleaned using a soft cloth dampened with a germicidal solution.

Temperature Probes/Extension Cable

Clean with a soft cloth dampened with a mild soap solution and/or a germicidal solution, as needed.
Do not autoclave.

Battery Replacement

petMAP+*II* is configured with a AC/DC adapter and 4 AA NiMH rechargeable batteries. The device can operate from charged batteries (the approximate remaining battery life is displayed in an icon at the top of the display) or from line power using the AC/DC adapter. When the AC/DC adapter is plugged in, the device charges the batteries at the same time as supplying power for its operation.

To replace the batteries, follow these steps:
1) Unplug the petMAP+*II* AC/DC adapter.
2) With the unit powered OFF, simultaneously press the battery cover latch while pressing down on the cover near the latch. Slide the cover away from the unit.
3) Remove the batteries.
4) Noting the polarity, insert the replacement batteries.
5) Slide the cover back into place, confirming that the latch has engaged.

TROUBLESHOOTING

Unit will not turn ON, or shuts OFF, after attempting a power ON .

1. If the unit is new, make sure the battery insulator strip has been removed.
2. The batteries are likely low or defective. Plug the AC/DC adapter in and confirm that the AC/DC adapter indicator is yellow (indicating it is charging, or green, indicating that the batteries are fully charged) by looking through the "peephole" on the left side of the unit just above the SD card slot.
3. Hard power OFF reset: Hold the power switch down for 10 seconds, then release it, and then press it once again to turn the device ON. This is like rebooting a computer and should be done anytime there is a problem with the operation of the unit.
4. Test with different batteries. Use other, known good AA batteries, NiMH, Alkaline or lithium to determine if the existing batteries are possibly defective. However, do not attempt to charge any battery type except for NiMH type batteries or a dangerous condition may be created.
5. If charging the unit and then doing a hard power OFF reset does not fix problem, contact Customer Service.

Difficulty obtaining consistent BP readings (greater than +/- 15 mmHg from reading to reading).

1. Animal is moving. Calm animal until they are relaxed so determinations can be made during periods of non-movement.
2. Wrong size cuff used; use a cuff sized so that the index line is in the "OPTIMUM zone" when snugly fitted to the limb.
3. Cuff not properly snug, i.e., not tight enough on initial placement. Tighten cuff on the limb, but not constricting tight.
4. Cuff is not in correct location on forearm, hind foot, or tail. Reposition cuff or move to another approved site and set petMAP using Species/Cuff Site button.
5. Determine if the cuff, hose or connector is leaking air. Observe the deflation steps on the screen during a BP determination to confirm that each step is about 10% of the cuff pressure before the deflation step. Test the cuff on your finger to observe the deflation steps to determine whether the cuff or hose is leaking. Try another cuff if in doubt to confirm proper operation. Discard any leaking cuff, as using a leaking cuff will result in inaccurate readings.

Cuff will not inflate.

1. Check cuff connections, both at the cuff port of the device and any connections between the cuff and the extension hose. Check cuff and extension hose for leaks or damage.
2. Verify that the pump is actuating when BP Start/Stop is pressed. If not, contact Customer Service.

Difficulty acquiring SpO2 readings.

1. SpO2 measurements may be adversely affected in the presence of high ambient light. Shield the sensor area (with a surgical towel, for example) if necessary.
2. Electrocautery, or other ESU-type device, can cause electrical interference with proper SpO2 function, the same as an ESU-type device often does to an ECG signal. If present, switch OFF the SpO2 and restart it after ESU use has been discontinued.

3. The tongue is usually the best site for sensor placement. Make sure the tongue is moist, since a dry tongue may not provide good readings.
4. Confirm that the rubber O2 sensor covers (if equipped) are securely in place. If they have slipped, they can cover the sensing elements resulting in a failure of the sensor to function. Some users remove the covers entirely to prevent any chance of the cover slipping and covering the sensing elements.

Screen buttons don't respond in the expected way to touch.

It's possible that the touchscreen needs recalibration. To do so:

1. Turn the unit OFF.
2. To enter the setup mode, press your thumb or finger gently on the screen and then turn the unit ON while continuing said pressure on the screen. When the counter in the upper left reaches exactly 8, release your thumb or finger from the screen and follow the screen instruction (See Figure 1).
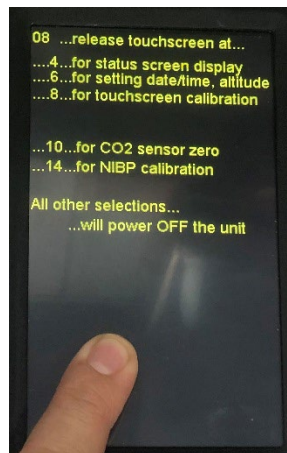
Figure 1
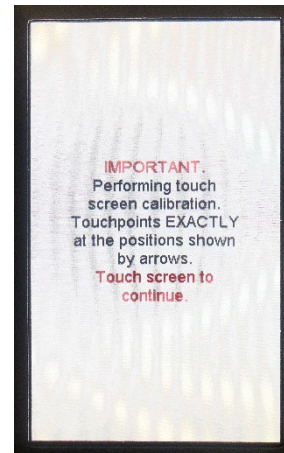
Figure 2

3. Follow the prompts on the screen by touching the arrows with a pointed object like a stylus or pencil. Do not use a sharp pointed object in order to avoid damage to the display (See Figure 2).
4. The unit will acknowledge each successful touch by beeping and counting down before moving to a different screen location.
5. Once all three locations have each been touched three times, touch the screen anywhere to exit the screen calibration function.
6. When the unit exits the setup mode and returns to its normal operating mode, verify that the touch buttons work as expected.

WARRANTY/SERVICE

Warranty

Ramsey Medical, Inc. warrants that the **petMAP+*II*** device, when new, is covered by a one year warranty against defects in materials and workmanship. All warranties begin at the date of original purchase from CardioCommand, Inc. or its authorized distributors.

petMAP+*II* accessories, including blood pressure cuffs and SpO2 sensors are warranted to be free from defects in materials and workmanship for 90 days.

Our obligation under this warranty is limited to repairing or, at our option, replacing defective parts or entire units without charge, if such defects occur as a result of normal use with prompt notification.

Damage resulting from inappropriate use or physical abuse is not covered by the warranty.

THERE ARE NO WARRANTIES WHICH EXTEND BEYOND THOSE EXPRESSLY LISTED ABOVE. IN ADDITION, THERE ARE NO WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

Customer Service & Repairs

All units returned for service and/or repairs (warranty and non-warranty) must have a RMA obtained by calling Customer Service at CardioCommand, Inc. The RMA number obtained should be written on the outside of the shipping container and the device should be sent to:

CardioCommand, Inc.
4920 W. Cypress St., Ste. 110
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                813-289-5555

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Please include a complete description of the difficulty with all units returned for service.

SPECIFICATIONS

For Veterinary Use Only

Method of BP Measurement: Oscillometric. Accuracy optimized for species (dog/cat) and blood pressure cuff site (forearm, tail, hind foot).

Parameters Measured:

> BP: Systolic, Diastolic, Mean Arterial Pressure (MAP)

> Heart Rate, both by BP cuff and SpO2 (if configured)

> Sp02

> Temperature. Esophageal or rectal probes are available.

Blood Pressure Ranges:

> Systolic: 40 – 265 mmHg

> Diastolic: 25 – 195 mmHg

> MAP: 30 – 200 mmHg

Heart Rate Range from BP: 40 – 240 BPM, +/- 5% or 3 BPM, whichever is greater.

Heart Rate Range from SpO2: 40 – 240 BPM, +/- 5%

SpO2 (if equipped):

> SpO2 displays a value within the range 40 – 100%, display resolution: increments of 1%

> SpO2 accuracy: +/- 3% at 80-100%; <80%, undefined.

Temperature

> Range: 29°C – 46°C, display resolution of .1°C (84°F - 115°F)

> Accuracy: +/- .2°C when connected to a YSI compatible thermistor probe.

Power: 4 AA batteries. Supplied with Rechargeable NiMH. Capable of using alkaline or lithium (these batteries are not rechargeable, and charging should not be attempted as a dangerous condition may result. See Warnings).

Battery Life: NiMH batteries typically can be full-discharge/full-charge cycled several hundred times.

Operating Environment:

> Temperature: 10°C – 40°C (50°F – 104°F)

> Humidity: 15% - 85%, non-condensing

> Altitude: -500 feet (152 meters) below sea level to +8000 feet (2438 meters) above sea level

Storage Temperature: -20°C to 55°C (-4°F to 131°F)

Dimensions: 6.26" H x 3.61" W x 1.22" D

Weight :   1 pound (0.46 Kg, approx., with NiMH batteries)

APPENDIX A

petMAP Remote Display Instructions for Use
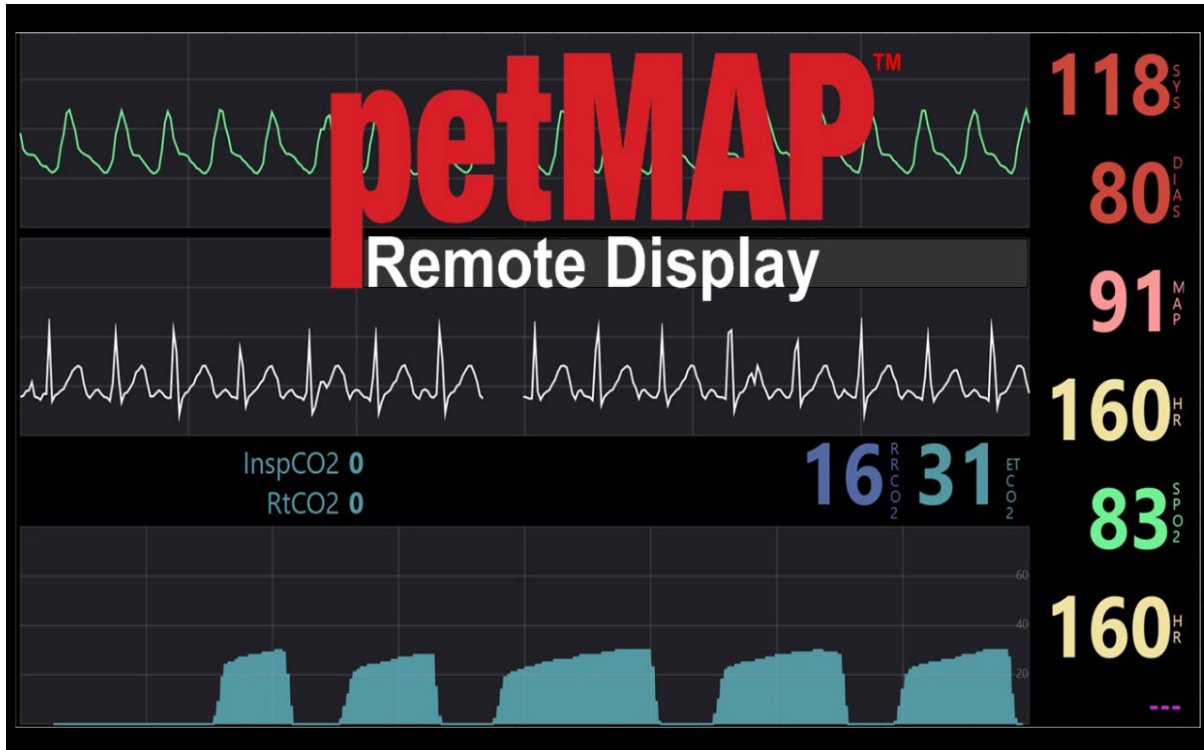
The petMAP Remote Display software application is available for Personal Computers (PC) with Bluetooth running Microsoft Windows and Bluetooth equipped mobile devices running the Android operating system.

The petMAP Remote Display allows users to view the measurement results and waveforms displayed on the petMAP's display in real-time on a PC, laptop, tablet or smartphone via a Bluetooth connection to the petMAP.

Compatibility: Windows 7, 10, 11 / Android: version 4.4 and higher / Apple IOS version 14 or higher

Installation:

The installation of petMAP Remote Display is a simple two-step process comprised of installing the petMAP Remote Display application on your PC/Android or IOS device and pairing with petMAP.

The first step is to install the petMAP Remote Display Application, Instructions for Windows and Android are detailed below.
 For Apple IOS devices, install the **PetMAP Remote Display** App from the Apple App store.

Windows:

a) Copy the provided *Setup_petMAPRemoteDisplay.msi* file to a convenient directory on the PC.

b) Navigate to the directory with the *Setup_petMAPRemoteDisplay.msi* and click it to install. Follow the on-screen instructions from the setup wizard to complete the installation.
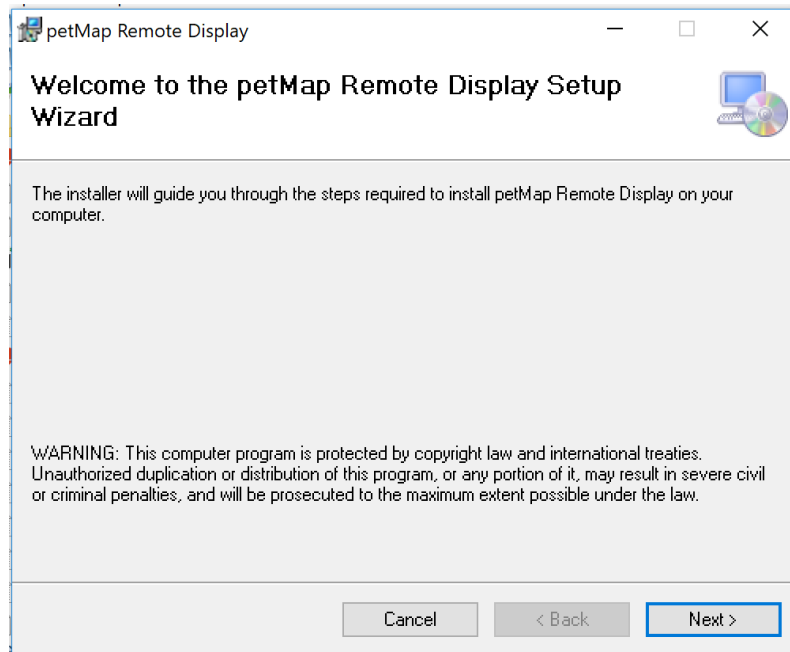
c) Once installed, the program may be launched by selecting the petMAP Remote Display program from the Windows Program Menu or by clicking the shortcut on the Windows Desktop.

Android:

    a) Copy or email the provided Android installation package, *petMAPRemoteDisplay_V1_0_12_1.apk,* to the Android Device that will be used for petMAP Remote Display.

    b) Turn ON the Android device and open your device's Settings app ⚙.

Select Settings
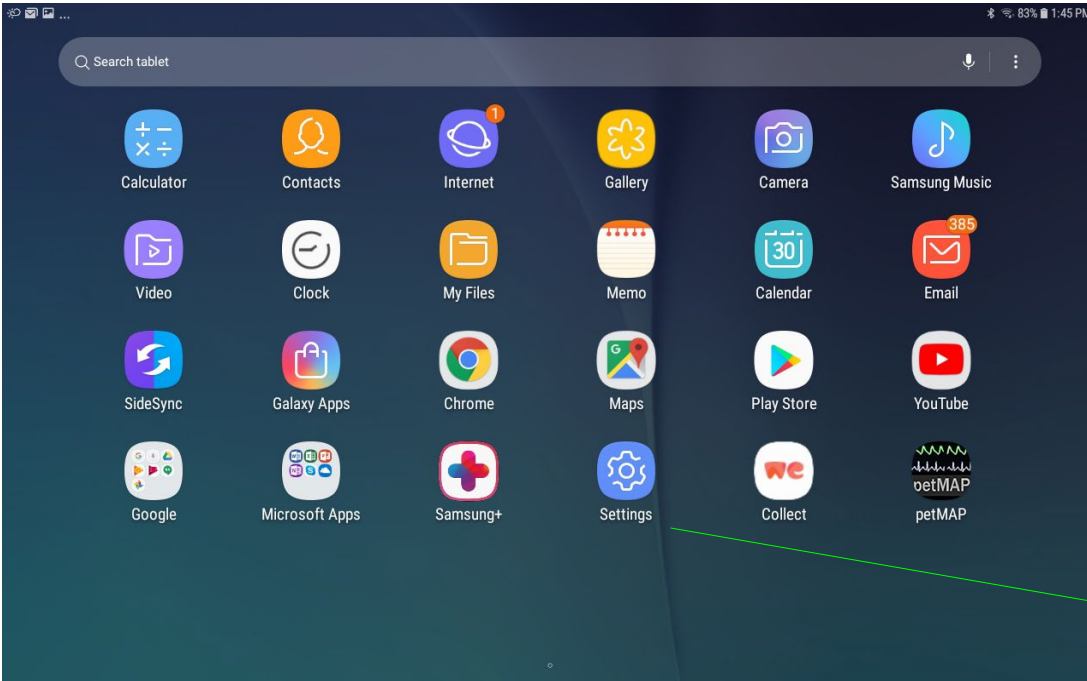
    c) Look for "Bluetooth" or the Bluetooth symbol in your settings. There will be an option to enable or disable it. Tap or swipe on it so that is in the "ON" position.

Ensure Bluetooth is ON
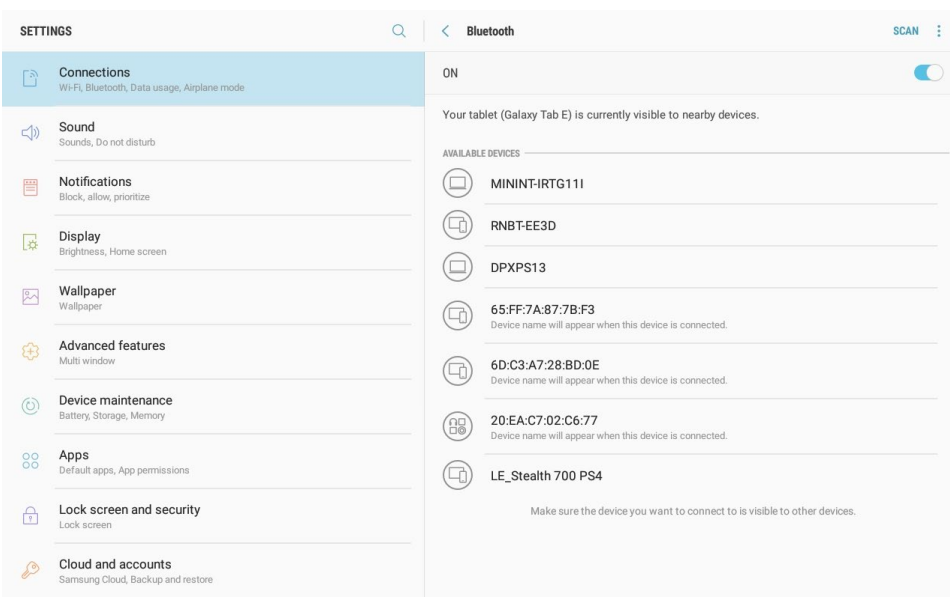
d) Next, while still in the Android Settings, navigate to "Lock screen and security"and enable "Unknown sources" to allow Android to install the petMAP Remote Display App.
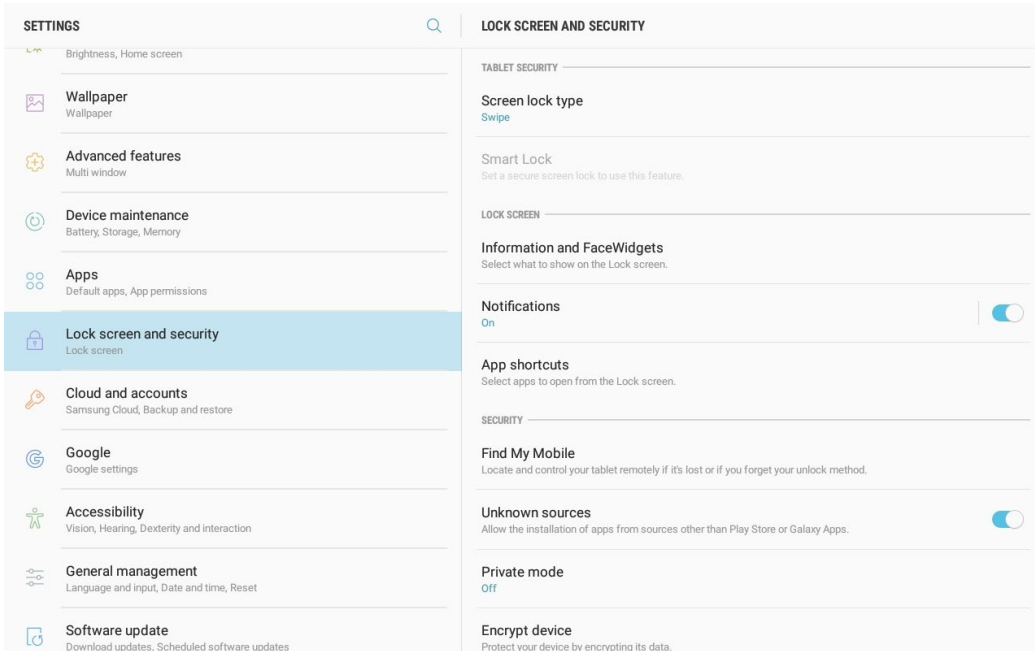
e) Navigate to the *petMAP Remote Display_V1_0_12_1.apk* location or open the email that contains it on your Android device and simply tap the *petMAPRemoteDisplay_V1_0_12_1.apk* file to initiate the install process.

f) Once installed, the program may be launched by tapping the "petMAP" icon on the Android Desktop.

petMAP Remote Display Pairing:

The second step is to pair the petMAP Bluetooth with the Windows PC.
 Android and IOS devices may be paired from within the petMAP Remote Display App.

After pairing, your devices will stay paired until you unpair them.

Windows:
(example shown is a typical Windows 10 installation, but please be advised that there are a few different ways to pair the Bluetooth within Windows)
P

    a) First, power on the petMAP within range of the PC to be paired.
    b) Open the Windows Control Panel by typing "control panel" in the Search box at the lower left-hand side of the Windows Desktop.
    c) Click"Add a device". A window will open while the PC searches for available devices.
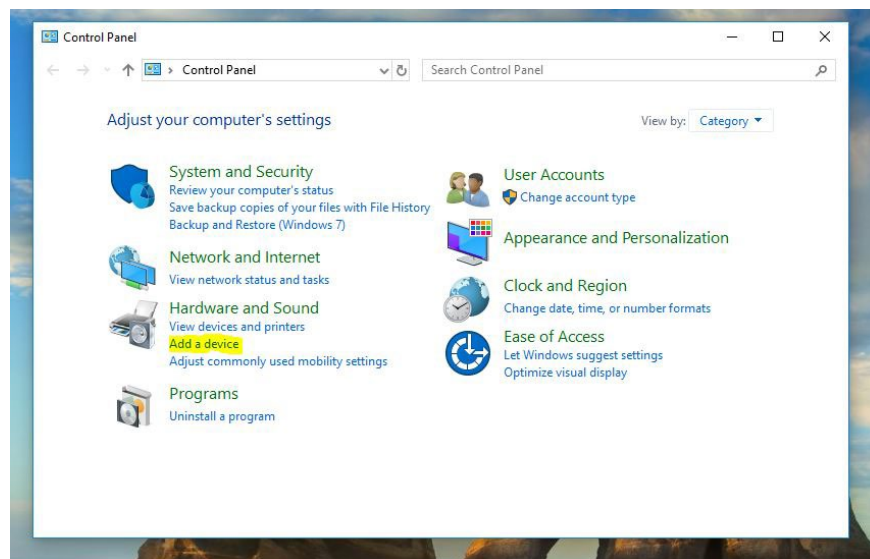
d) Wait for the PC to find devices and select the device with the RN4678 prefix (this is the petMAP Bluetooth Module) and click Next.
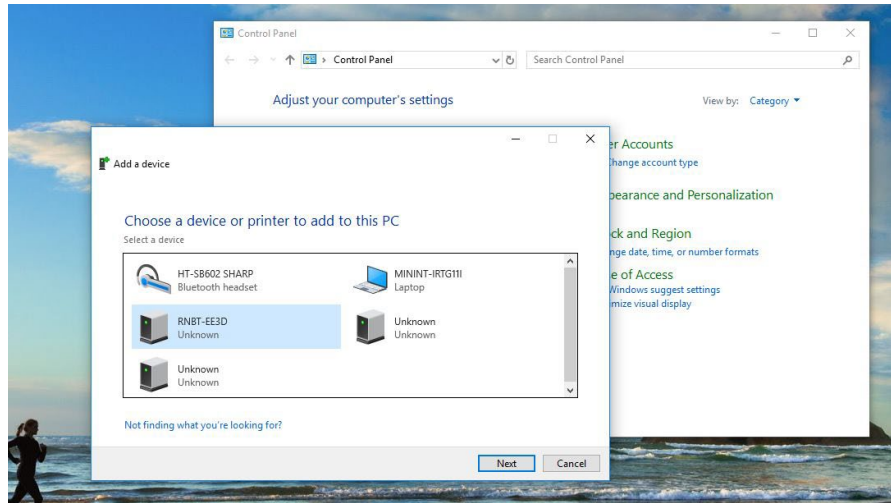
e) Accept the passcode (if required) by clicking Yes.
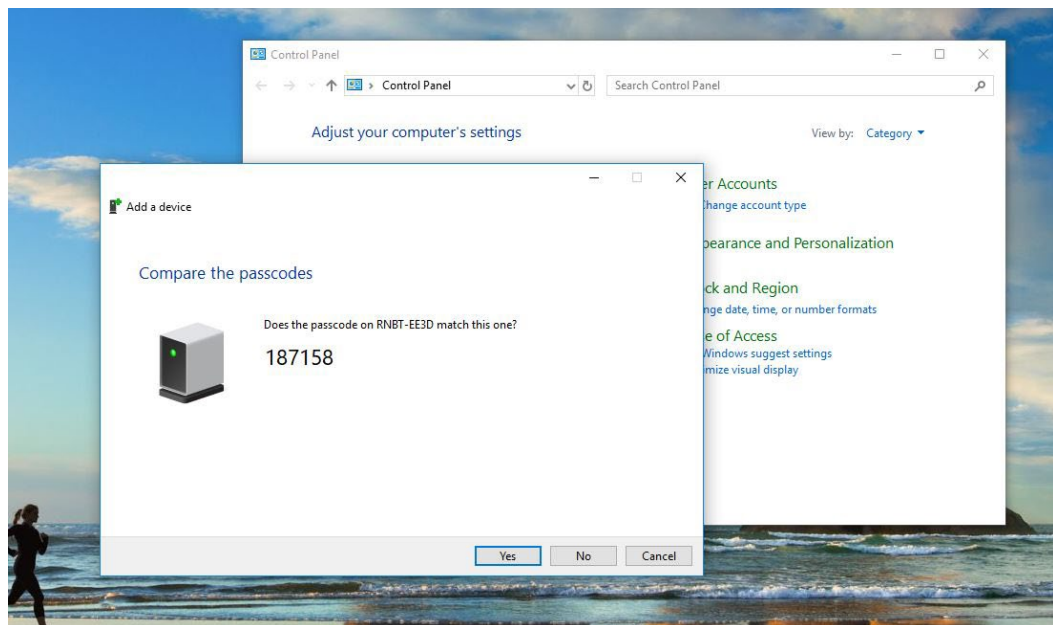
f) Windows will install and pair the device and report success!
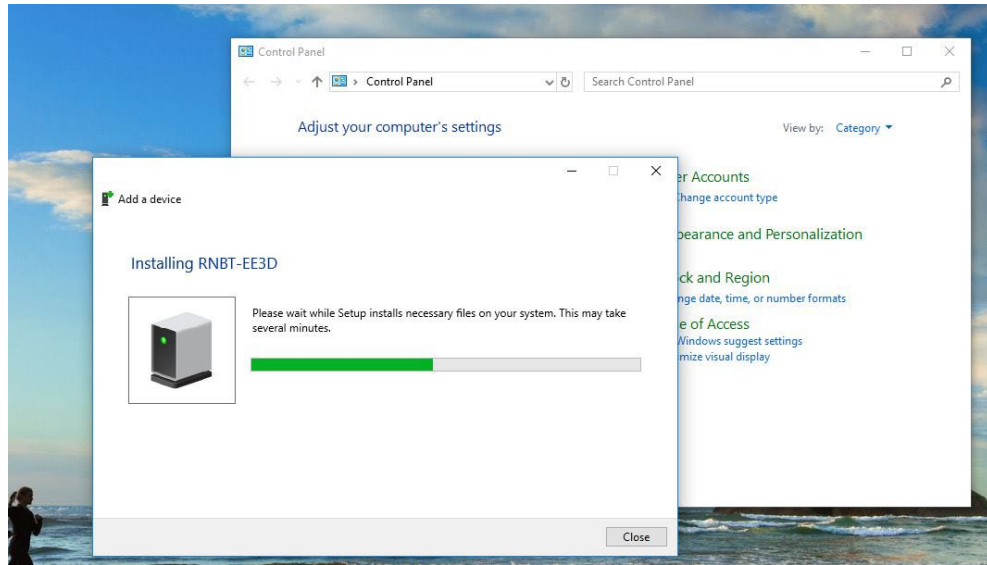
Operating Instructions:

1) Power ON the petMAP within range of the Remote Display Device.
2) Start petMAP Remote Display Software.
   Windows: Launch the petMAP Remote Display software application, by using the Desktop shortcut or the petMAP Remote Display selection on the Windows Program Menu.

   The Application will start and display the following screen while searching for and connecting to the petMAP device.
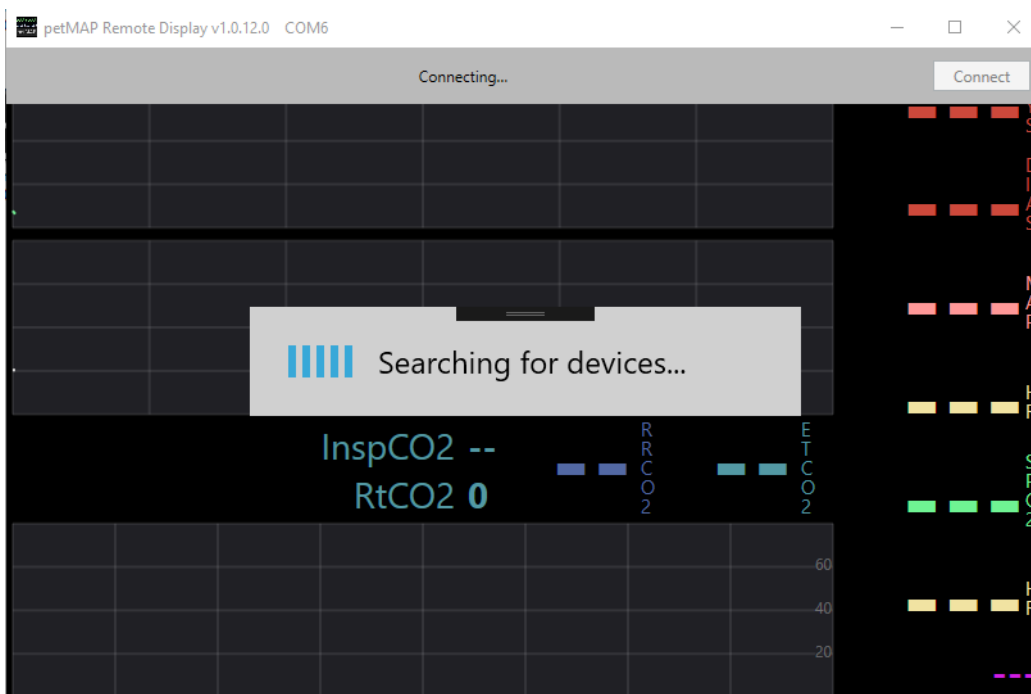
Allow thirty seconds to a minute for the Software to connect to the petMAP (it may take a little longer depending upon how many wireless devices are within the vicinity).

Note: If the following screen appears, re-start the petMAP by turning it OFF, waiting five seconds, and turning it back ON, then select Retry.
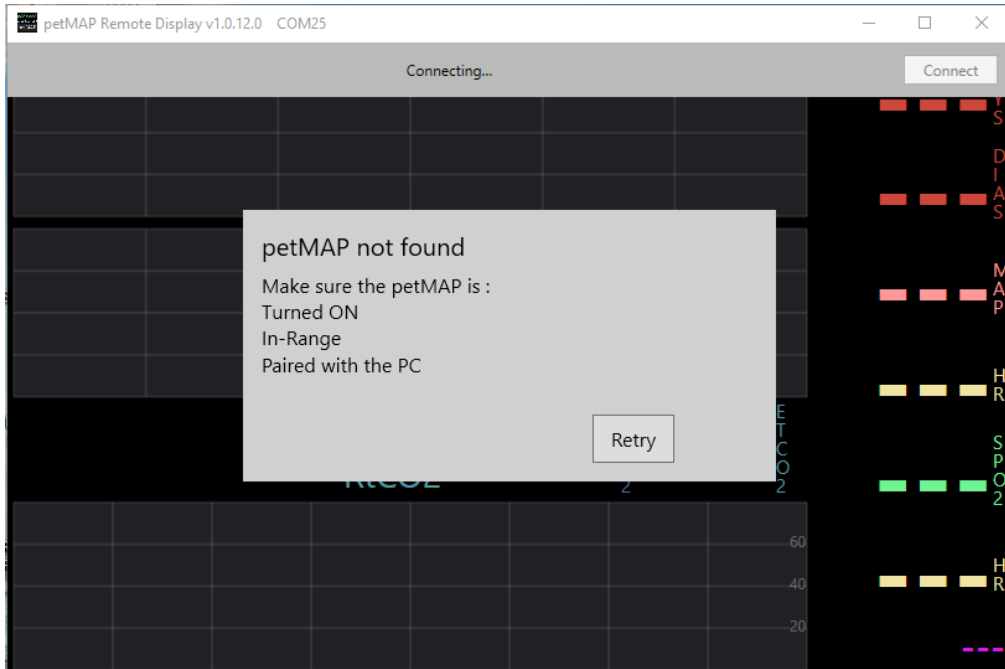
Once connected, the Bluetooth icon at the top right of the petMAP will illuminate light-blue and the petMAP Remote Display App will mirror the display on the petMAP in real-time.
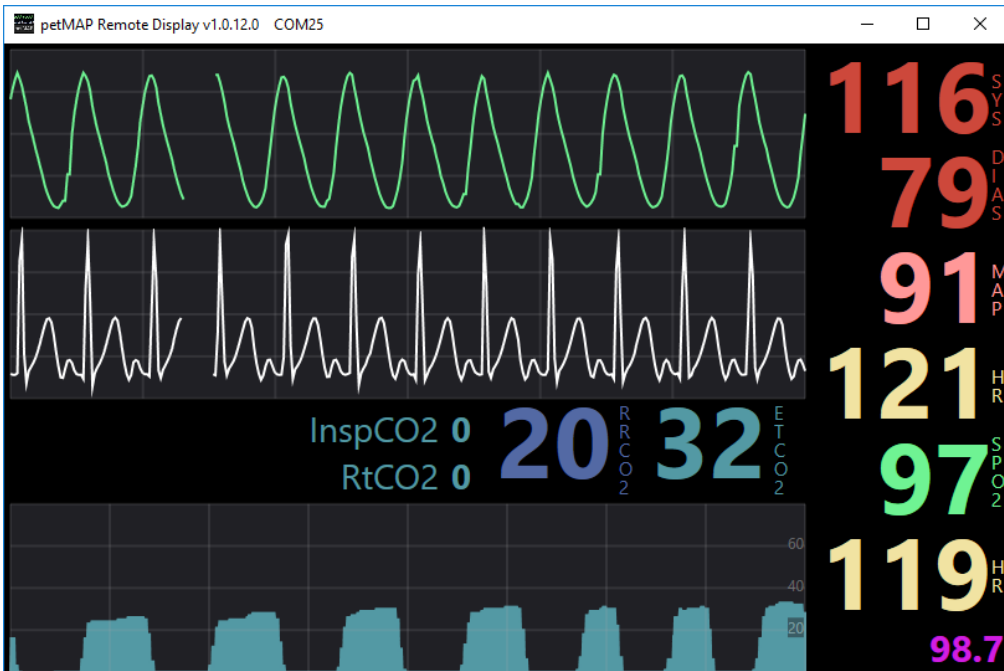
Android:

Launch the petMAP Remote Display software application by tapping the "petMAP" Icon on the Android desktop.

The Application will start and display the following screens while searching for and connecting to the petMAP device.

Press "SEARCH FOR PETMAP" as shown below and the device will start searching.

....
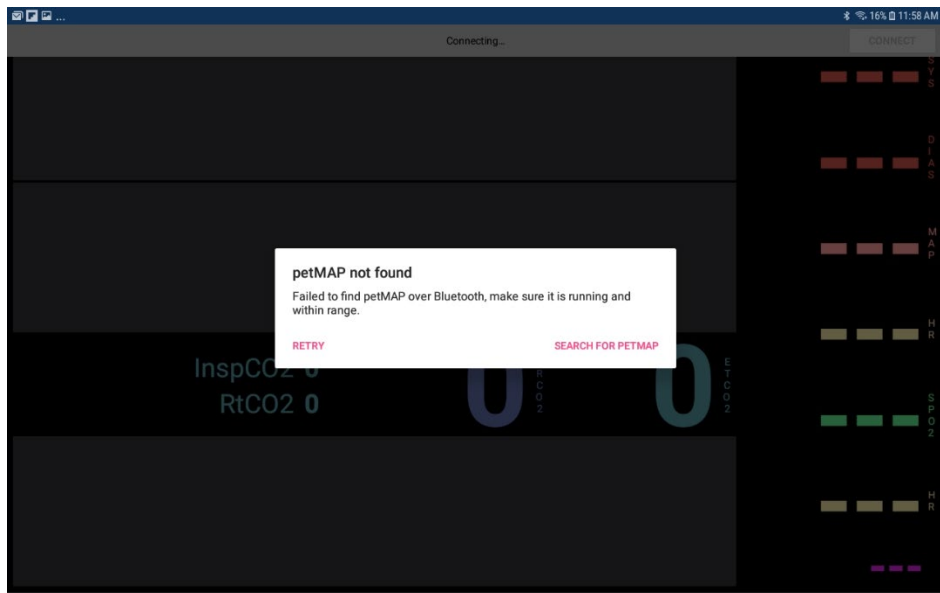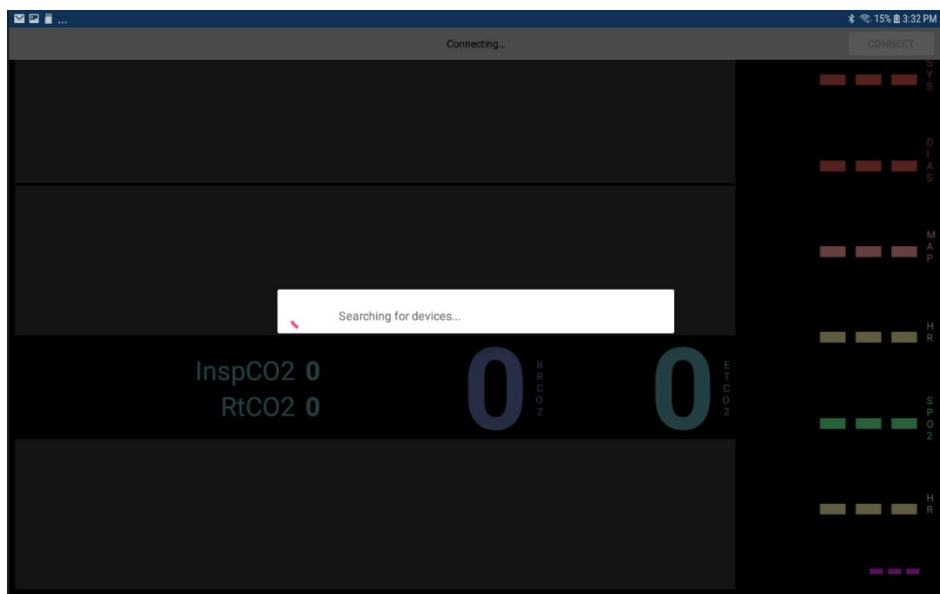
Once your Android device locates the available Bluetooth devices, select the device with the RN4678 prefix (that's the petMAP) and it will then connect. Once

connected, the Bluetooth icon at the top right of the petMAP will illuminate light-blue and the petMAP Remote Display App will mirror the display on the petMAP in real-time.
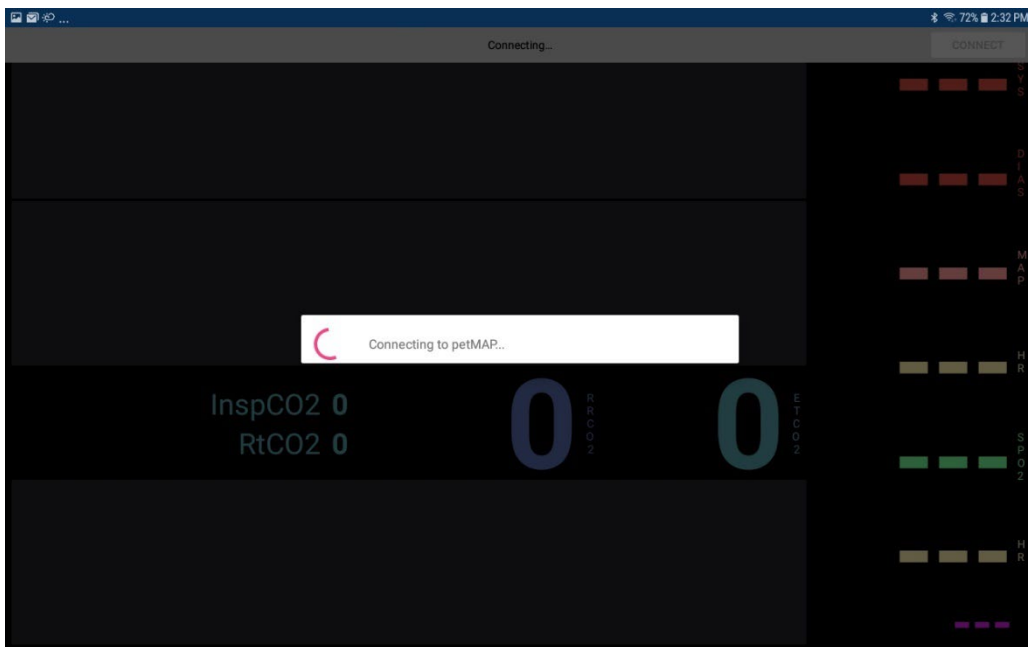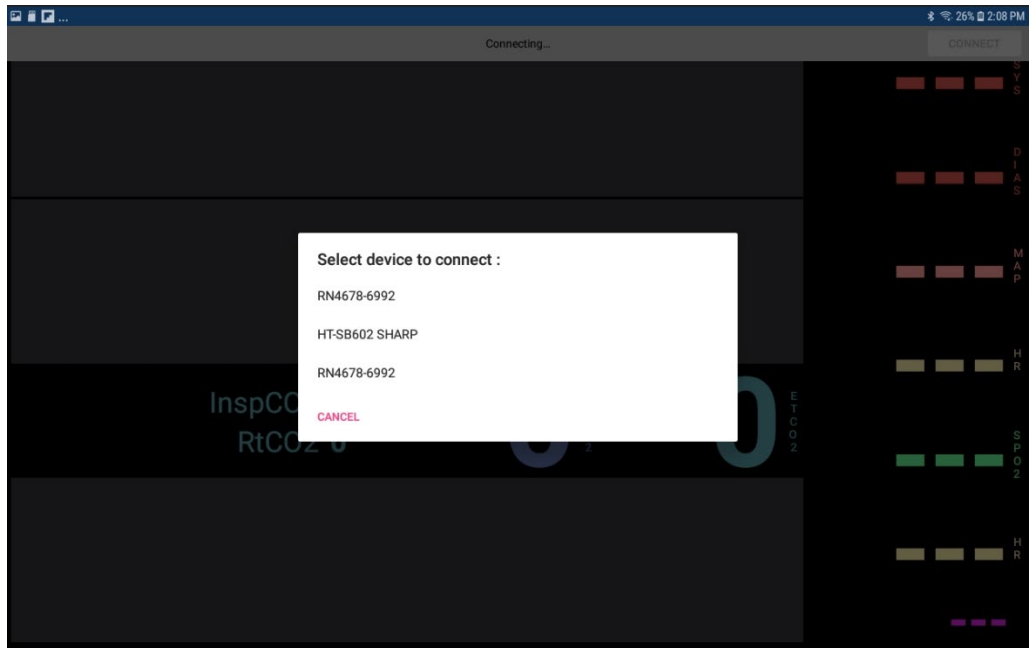
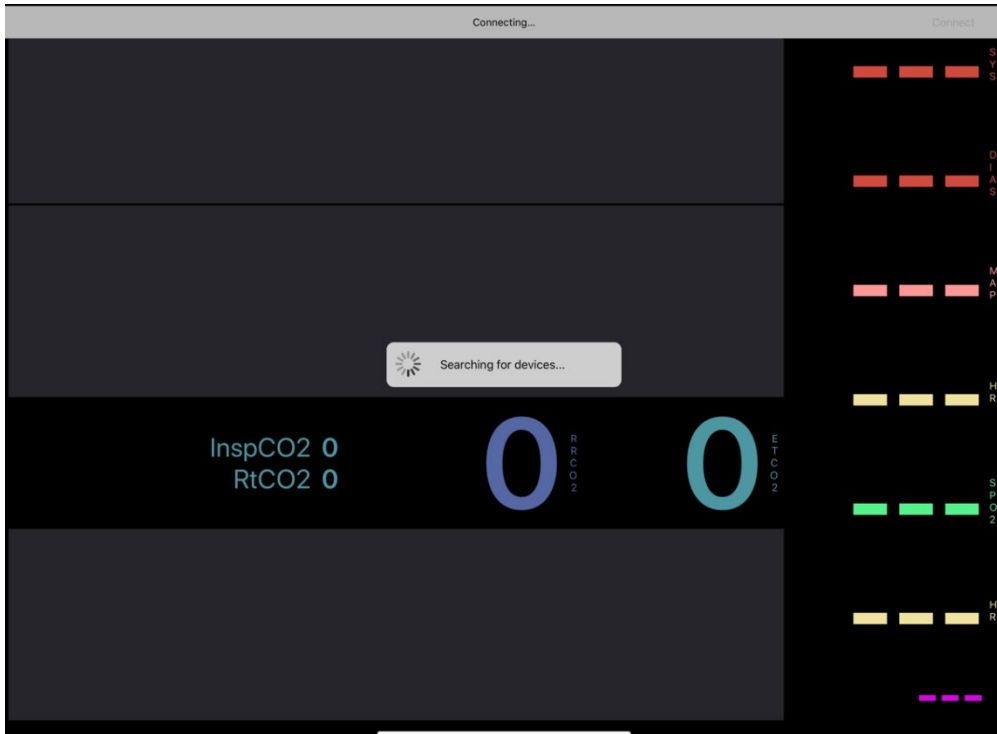Allow thirty seconds to a minute for the App to connect to the petMAP.
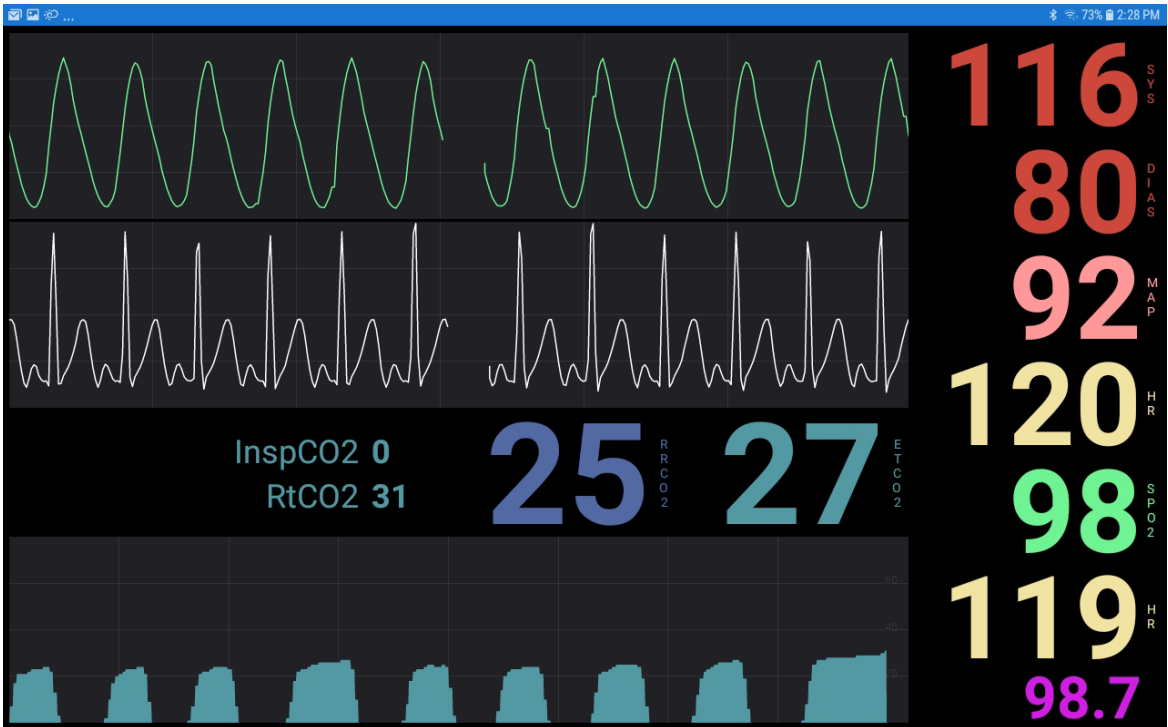
Note: If the following screen appears , re-start the petMAP by turning it OFF, waiting five seconds, and turning it back ON, then select "Search" on the Android device.
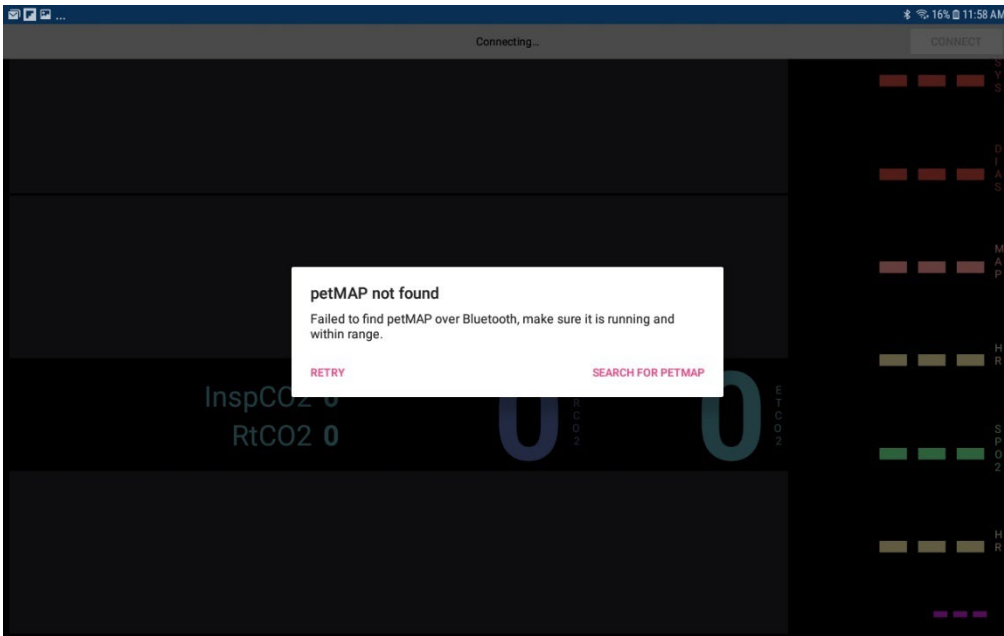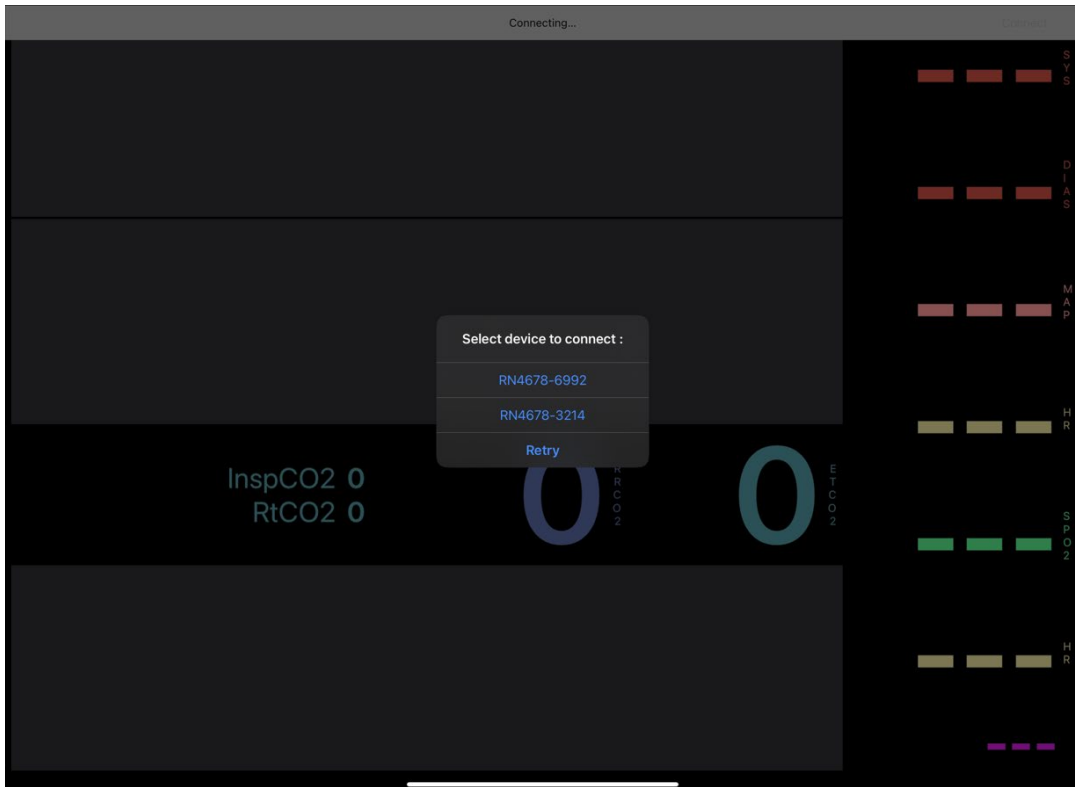
Apple IOS :

Launch the petMAP Remote Display software application by tapping the petMAP icon.

The Application will start and display the following screen(s) while searching for and connecting to the petMAP device.
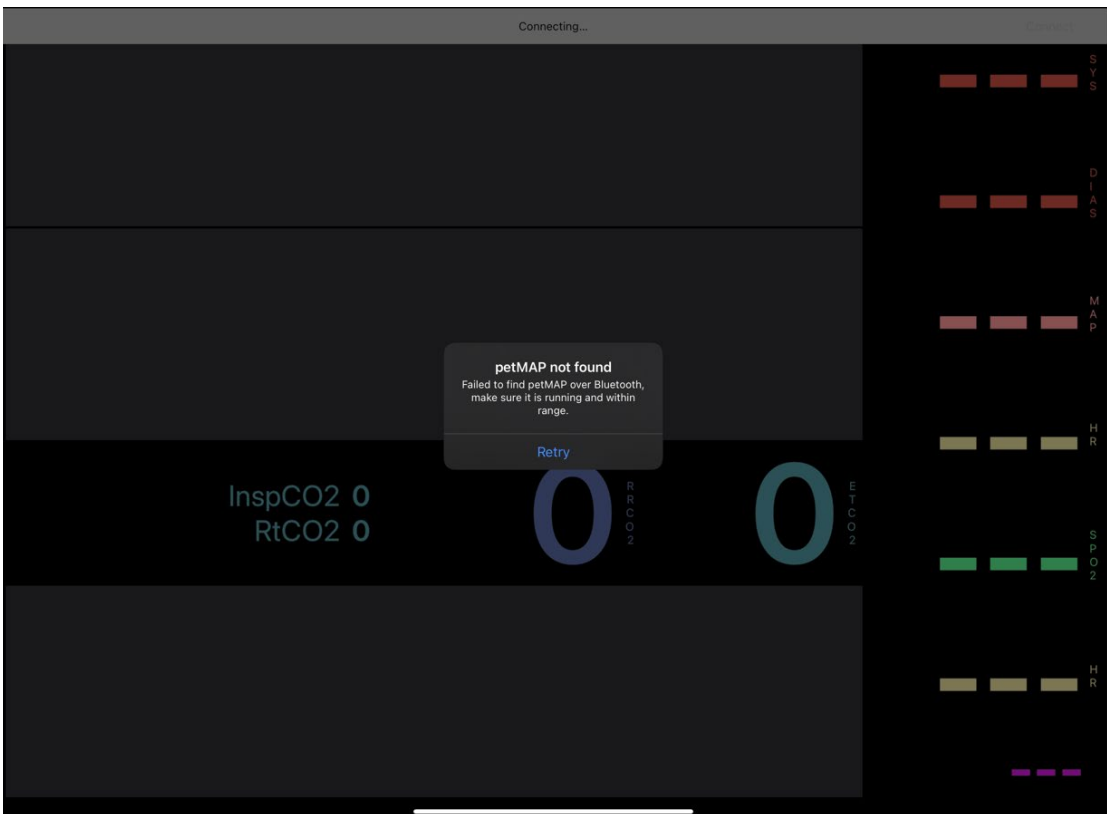
Once your Apple device locates the available Bluetooth devices, it will automatically connect to petMAP. If several Bluetooth devices are available, select a device with the RN4678 prefix (that's the petMAP) and it will then connect.

Once connected, the Bluetooth icon at the top right of the connected petMAP will illuminate light-blue and the petMAP Remote Display App will mirror the display on the petMAP in real-time.

Allow thirty seconds to a minute for the App to connect to the petMAP.
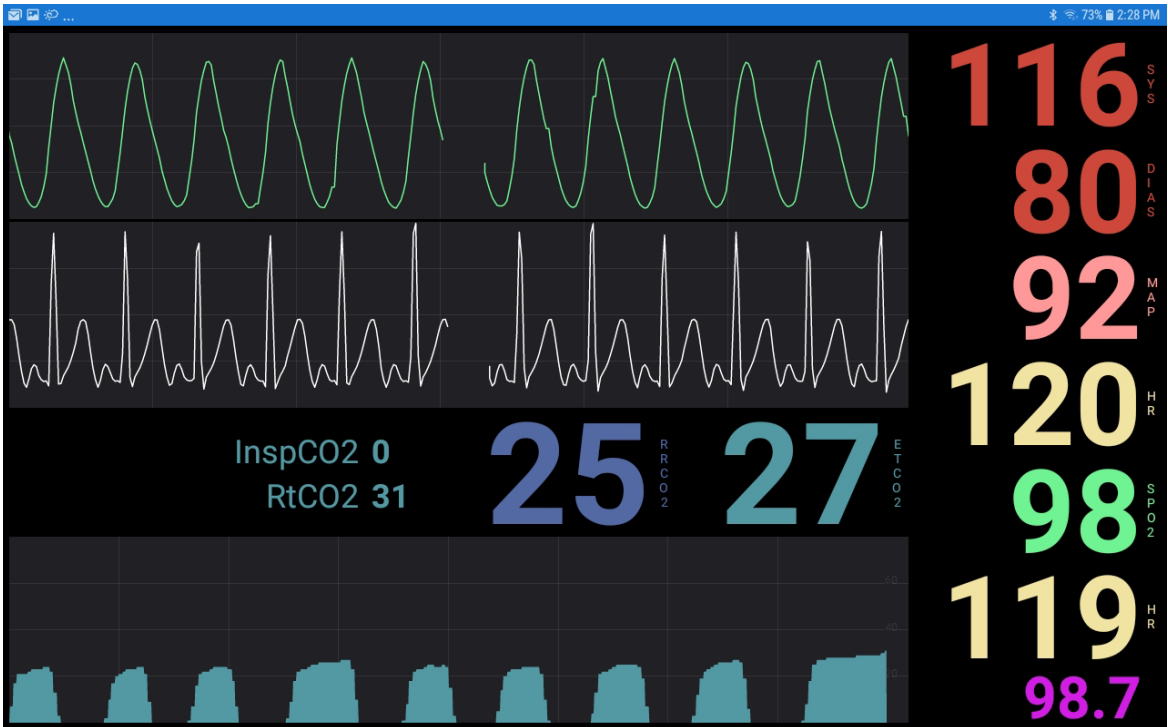
Note: If the following screen appears, re-start the petMAP by turning it OFF, waiting five seconds, and turning it back ON, then select "Retry" on the Apple device.

HISTORY OF REVISIONS

Document #/ Revision	Date	Comments
R400342-A	March 2018	Manual Released. ECO 180303
R400342-B	November 2019	Updates to reflect new features available for software version v9.47e: 1) Bluetooth transmission to petMAP Remote Display 2) ECG Cascade feature (described in the ECG Operator's Manual) 3) BP Algorithm improvements 4) Ability to save waveforms to SD card storage Addition of touchscreen calibration instructions. ECO 191104
R400342-C	May 2020	Minor updates, including cleaning instructions. ECO 200502
R400342-D	October 2020	Added new product codes for Analog SpO2 (7456, 7457, 9071). ECO 201011
R400342-E	November 2022	Manual updated with UKCA mark and standard. ECO 221010
R400342-F	December 2023	Replaced devices product codes with Bluetooth enabled codes (7451, 7457, 7455) ECO231202
R400342-G	July 2024	Updated manual with QuickCuff information. ECO 240701

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