

# petMAP+ II



## Operator's Manual



Now your petMAP+II  
can monitor ECG



[www.petmap.com](http://www.petmap.com)

Developed by:  
**RAMSEY**  
MEDICAL INC

Manufactured,  
Distributed and  
Serviced by:



This manual applies to the operation of the ECG Module (REF# 9026), available as an option with the petMAP+II. The ECG Module requires a petMAP+II to be useful. Read this manual and the petMAP+II manual completely before using the equipment.

petMAP+II is to be operated by qualified personnel only. Before use, familiarize yourself with the device and read the manuals, 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.

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# ECG Module OPERATOR'S MANUAL

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# INTRODUCTION

## Device Description

petMAP+II is a small, lightweight and portable battery operated monitoring device designed for veterinary use. In its various base unit configurations, it is capable of measuring blood pressure (systolic, diastolic and mean arterial pressures), heart rate, temperature and oxygen saturation (SpO<sub>2</sub>). The measured values are displayed and trended on the device continuously. Data trended on the petMAP+II can optionally be saved on a SD memory card via the petMAP+II's integrated SD memory card slot.

Modules for ECG and CO<sub>2</sub> can also be purchased and added to the base unit.

Use of the ECG Module allows the petMAP+II to display an ECG waveform and the HR derived from the ECG signal. The ECG Module is connected to a flat five-foot cable that plugs into the side of the petMAP+II. The Module has connections for three surface ECG lead wires and an esophageal probe that has ECG electrodes on it (sold separately). Only one set of ECG electrodes can be used at one time. The user can switch between surface leads and the esophageal probe using a slide switch on the ECG Module. The user can also adjust the gain on the ECG waveform using a slide switch on the ECG Module.

## Intended Uses

petMAP+II is intended for use on veterinary patients when measuring or monitoring of blood pressure, heart rate, temperature and/or SpO<sub>2</sub> is desired. When configured with an ECG Module and patient electrodes properly attached, the petMAP+II will also display the ECG waveform and ECG HR. 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, but awake patients are often uncooperative. ECG applications include use for surgical, ICU and trauma monitoring as well as use during procedures (imaging, dentals, etc.).

The ECG Module is a single ECG lead (uses 3 electrodes) system, and when used with surface leads attached as directed, the ECG waveform is Lead II and is used for HR calculation. When used with the esophageal electrodes the lead is similar to a Lead II, but it is better referred to as simply the Esophageal Lead since it is not identical to a surface ECG lead II.

## Configurations & Accessories

The following table summarizes the standard accessories and optional accessories available for the petMAP+// ECG Module:

	Product Code	Description
Standard Accessories (included with the Module)	<b>9026 ECG Module</b>	<ul style="list-style-type: none"> <li>➤ ECG Module</li> <li>➤ Connector Cable (5')</li> <li>➤ 3 Lead Wire Set (w/ alligator clips)</li> <li>➤ 5 ECG Comfort Clips</li> <li>➤ Operator's Manual</li> </ul>
Optional Accessories	<b>3205-0001</b>	Cat Catheter (esophageal ECG electrodes and Temperature)
	<b>3207-0001</b>	Dog Catheter (esophageal ECG electrodes and Temperature)
Replacement Items	<b>9030</b>	3 ECG Lead Wire Set
	<b>9059</b>	ECG Comfort Clips (bag of 5)
	<b>R316000</b>	ECG Module Connector Cable (5')

## Esophageal Catheters



**3205-0001  
Cat Catheter**



**3207-0001  
Dog Catheter**

# 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 harmonisation 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.

## WARNINGS & CAUTIONS (Please read and understand)



The petMAP+II and its ECG Module are intended for VETERINARY USE ONLY. Do not use on a human patient.



The user should be aware that the presence of an ECG waveform does not mean that the patient has a useful heart beat. Electromechanical dissociation (EMD) can occur under various circumstances and though the ECG appears to be normal or abnormal, there is no actual contraction of the heart and thus there is no pulse or blood pressure being generated and the animal is effectively dead unless corrected quickly. Never rely only on the ECG to judge the patient's circulatory condition. Always use the SpO<sub>2</sub>, CO<sub>2</sub> and BP in addition to ECG to judge the condition of the patient's circulatory status. The patient can die and still have a normal looking ECG for a period of time.



When a patient's heart is being paced, the pacer current can potentially produce artifacts that appear to look like a normal or an abnormal ECG. The ECG module attempts to filter out the pacemaker pulses (in certain circumstances it is not possible to filter them), and the user must be able to distinguish true ECG waveforms from pace artifact induced waveforms that can look like an ECG waveform. Always judge the adequacy of the patient's circulation using other parameters in addition to the ECG, since the ECG can appear to be present even though there is no effective heartbeat contraction. SpO<sub>2</sub>, CO<sub>2</sub>, and BP are important parameters to monitor in order to judge the patient's cardio/respiratory status and should always be used in addition to the ECG.



Use of an Electrosurgical Unit (ESU) will often result in interference on the ECG trace and potentially erroneous heart rates. Never use the ECG for determining heart rate until the ECG waveform has been stable for 10 seconds or more after ESU use. The BP and SpO<sub>2</sub> are typically not adversely affected by ESU usage, but under certain circumstances the ESU could adversely affect them. Always assure that the ESU ground plate is well placed on the patient and placed distant from the ECG electrodes.



Inaccurate ECG heart rate 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. When ESU is used, patient leads and wires should be away from the surgical operation site and other devices. This reduces the burning risk due to a poor connection of the ESU neutral electrode.



The scientific literature describes interference from a number of electrical devices that can produce artifacts that look like normal or abnormal ECG waveforms but are not actual ECG waveforms, and these potential ECG artifact generators include IV pumps, line isolation monitors, electrosurgical units, pacemakers and other stimulators, fluid warmers, bronchoscopes, etc. In such instances, these devices are usually malfunctioning in some way when producing ECG artifacts, but not always.





In rare patient arrhythmias there may be 1 or more peaked complexes with each actual beat that resemble the actual, true QRS complex. In such circumstances the unit can mistake the additional peaked complexes for a QRS and hence the heart rate displayed will be higher than the true heart rate. On the display where each QRS is detected there is a small indicator mark (yellow or red) below the detected QRS waveform to indicate it has been detected as a QRS. If in doubt about the ECG heart rate, confirm that only true QRS complexes are being identified as such by looking at the small marks. Even in the presence of such rare arrhythmias, the BP and the SpO2 heart rates should read properly.



Do not immerse the ECG Module in water or any liquid. If the Module is accidentally wetted, it should be thoroughly dried before use. If the ECG Module has been dropped into water or other fluid, it should not be used and should be returned to the manufacturer for service.



If the ECG Module 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 danger to the patient, malfunction of the monitoring unit, and additional 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 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 MRI device, even if the MRI is not operating since the MRI magnet is still active even if not in use.



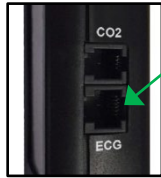
Do not gas sterilize or autoclave the device.

## **EMC DECLARATION**

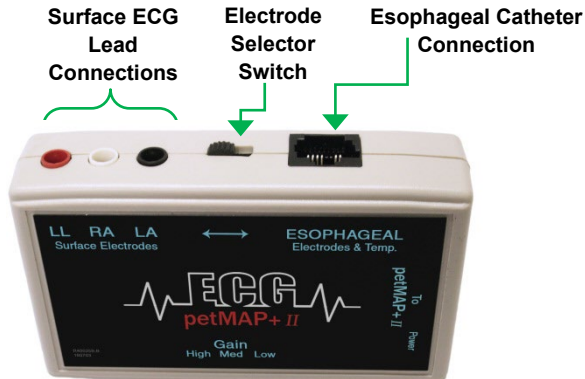
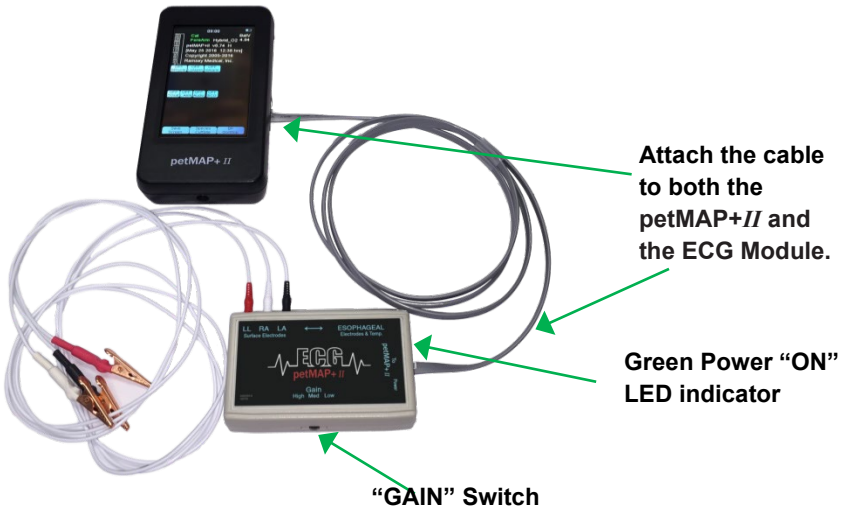
The ECG Module (REF# 9026) has been tested together with the petMAP+*II* as a system. Please refer to the petMAP+*II* Manual (R400257) for detailed EMC compliance information.

# DEVICE OVERVIEW & OPERATING INSTRUCTIONS

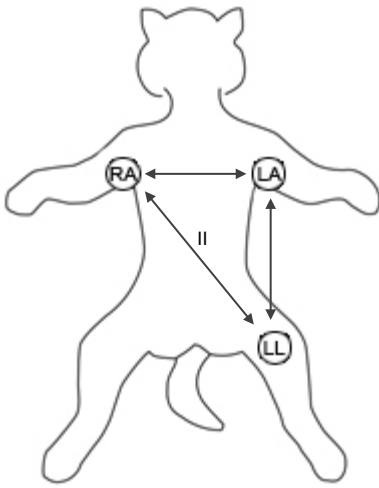
**Controls & Connections.** Note the below diagram for connecting the ECG Module to the petMAP+II.



Attach the ECG Cable to the connector labeled ECG on the petMAP+II. NOTE: If a REF# 9028 petMAP cover is in use, lift the flap to expose the connector.



## Patient Preparation & Lead/Catheter Placement.



RA = Right arm (white)

LA = Left arm (black)

LL = Left leg (red)

Accurate ECG lead placement is essential to obtaining a clear ECG trace and accurate HR. Proper skin preparation is necessary to achieve good results, like shaving and using plenty of electrode gel. Open the alligator clips on the distal ends of the lead wires to firmly but gently grasp the skin for good contact. Poor skin electrical contact is the main reason for poor ECG display quality. Alternatively, use the ECG Comfort Clips on the patient and connect the lead wire alligator clips to the comfort clips.

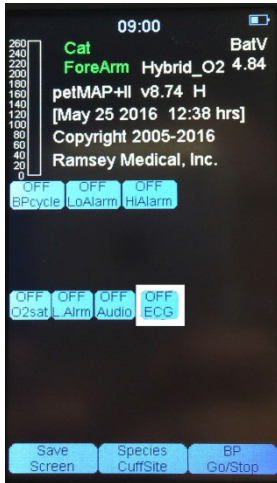
## Use of Esophageal Catheters vs Surface Lead Wires.

It is often desirable to use an esophageal catheter to obtain ECG, HR and Temperature. Catheters are available for cats (or small dogs) (REF# 3205-0001, green) and dogs (REF# 3207-0001, blue). Both catheters have 4 ring ECG electrodes and an internal thermistor, which gives the catheter an added advantage of detecting temperature.

The catheter is carefully and gently inserted into the esophagus and the depth is adjusted to maximize the ECG signal. The best signal is generally achieved when the lower electrode on the catheter is below the heart and the upper electrode is above the heart. Small adjustments of a few CM can greatly improve the quality and amplitude of the ECG signal.

## Operating Instructions/User Selections.

- 1) Follow the instructions (previous page) for placing lead wires or inserting the esophageal probe.



- 2) Turn ECG on by pressing the highlighted ECG ON/OFF button on the petMAP+II. Verify the Green LED on the ECG module near the petMAP+II connector is ON, indicating the ECG module is powered.

- 3) This is an example of a screen display when the ECG waveform is of adequate size. A little larger is fine (better), but it should be no smaller. If smaller, increase the gain using the Gain slide switch on the ECG Module.



- Adjust the gain, if necessary. If the signal is too low, the ECG signal may not be detected, if too high the petMAP+II will display a message to reduce the gain.



“GAIN” Switch

- When monitoring is complete, turn ECG OFF.

### ECG Cascade

Beginning with petMAP+II software version v9.47e, it is possible to view a longer segment of the ECG waveform. To do so, simply touch the screen where the BP envelope is normally displayed. The cascading ECG will continue to display until the screen area is touched again, reverting back to the view displaying the BP envelope.

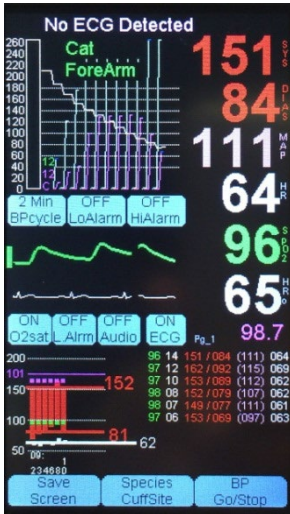


**A note about HR:** The ECG HR is displayed if the detected ECG HR is judged by the unit to be accurate and within expected limits. Otherwise, the SpO2 HR is displayed and a small 'o' is displayed below the HR label if the ECG is ON to indicate that the HR displayed is not from the ECG, but is from the SpO2

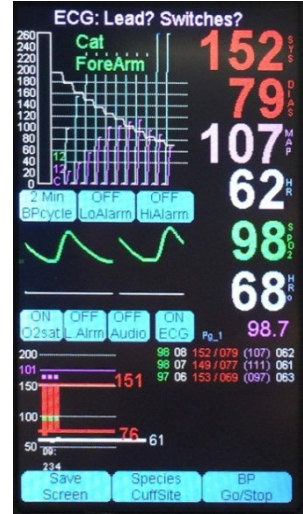
## Alarms

The following alarms can be generated by the ECG feature and displayed on the petMAP+II:

### No ECG Detected or O2 Sensor? ECG?



### ECG Lead OFF? or ECG: Lead? Switches?



### Situation:

- The ECG signal or waveform amplitude is insufficient to be detected.

### Probable causes and/or suggestions:

- The patient has no cardiac electrical activity or rhythm.
- The amplitude or strength is inadequate. Adjust the electrodes, and/or increase the gain.

NOTE: The “No ECG detected” alarm becomes “O2 Sensor? ECG?” if at the time the no ECG detected alarm is triggered, there is already a SpO2 alarm active.

### Situation:

- Either a lead is off or the ECG module has incorrect switch settings.

### Probable causes and/or suggestions:

- Check the ECG leads. Reposition electrodes and add gel to surface leads if necessary.
- Check to make sure that both switches are correct:
  - Esophageal or surface
  - Gain

## Other ECG Alarms

**Fast ECG or Noise**                      Displayed when HR > 260 BPM

**Slow ECG Detected**                      Displayed when HR < 40 BPM

**ECG or Patient Problem.** A non-specific alarm that could be caused by a potentially lethal arrhythmia or by ECG interference noise. In any event, it always requires user investigation to determine a possible cause and correction.

Alarms can be silenced by touching the screen.

The above alarms are self-canceling when the cause of the alarm is resolved.



## **MAINTENANCE**

ECG Module and Connection Cable: Clean as needed with a cloth dampened with 70% isopropyl alcohol. Do not immerse the Module or cables in any fluid.

ECG lead wires: After use, clean the metal portion of the clips with soap and water, but do not wet the connectors.

Esophageal catheters: After use, clean the catheter with soap and water. Do not wet the connector.

## TROUBLESHOOTING

Failure to display a usable ECG can be caused by a number of problems and can usually be fixed by correcting one or more of the following:

*1) Is the ECG Module connected to the proper connector on the petMAP+II and is the green LED on the Module lit when the ECG is selected ON?*

If no green LED is visible on the ECG module, there is a problem with the unit, the cable, and/or the ECG Module itself. Without the green LED on, the ECG will not function.

*2) Electrodes are not properly placed, are not making good electrical contact and/or are not properly plugged into the ECG Module.*

Make sure the lead wires are properly plugged into the ECG Module and that sufficient electrode gel is used on surface electrodes to assure good contact of the clips with the skin if surface leads are in use.

If an esophageal catheter is being used, it should be inserted sufficiently so that the most distal electrode is below the heart and the most proximal electrode is above the heart. Note that a few CM of insertion depth change can make a big difference in the quality of the ECG trace from the esophageal electrodes. Position it so that the QRS complex is at maximum.

*3) The ECG Module's electrode selector switch must be in the proper position for either esophageal or surface electrodes.*

*4) Set the gain switch on the ECG module so that the QRS peak is at or slightly above the level of the top of the numeric HR display. Reduce the gain if the QRS waveform peaks are more than slightly entering into the SpO2 trace space, or if the unit displays the suggestion.*

*5) If there is mains power noise (50 or 60 Hz noise) on the ECG signal waveform, check the surface electrodes and add electrode gel if necessary or reposition the esophageal electrode, being careful to not insert it too deeply as it could enter and injure the stomach . Check all connections for security.*

# WARRANTY/SERVICE

## Warranty

Ramsey Medical, Inc. warrants that the ECG Module, 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.

ECG Module accessories, including lead wires, connector cable and esophageal catheters, are warranted to be free from defects in materials and workmanship for 90 days. These items will require periodic replacement due to normal wear.

Ramsey Medical's obligation under this warranty is limited to repairing or, at its option, replacing defective parts or entire units without charge, if such defects occur as a result of normal use with prompt notification within the warranty period.

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  
Tampa, FL 33607  
Phone: 800-231-6370  
813-289-5555  
Fax: 813-289-5454

Please include a complete description of the difficulty with all items returned for service and/or warranty claims.

# SPECIFICATIONS

For Veterinary Use Only

**Heart Rate Accuracy:** 3% + 1 digit

**Heart Rate Range:** 20 – 240 BPM

**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:** 1.0”H x 3.93”W x 2.42”D

**Weight :** 0.2 lbs.

## HISTORY OF REVISIONS

<b>Document # &amp; Revision</b>	<b>Date</b>	<b>Comments</b>
R400279-A	August 2016	Manual Released ECO 160801
R400279-B	January 2018	Added self-canceling alarms. ECO 180101
R400279-C	November 2019	ECG cascade feature is available with petMAP+// software v9.47e or higher. Added comfort clips to the standard product.
R400279-D	June 2022	Update ECG max heart rate to 240 bpm
R400279-E	October 2022	Manual updated with UKCA mark. Added CE and UKCA standards to page 7. ECO 221004

**petMAP+II and its associated  
ECG Module are developed by:**

# **RAMSEY MEDICAL INC**

Tampa, FL 33607

USA

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Manual Revision E  
10/17/22



R400279-E  
221004