

# Using and Caring for Your Pocket-Dop II Doppler

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M7-0101 - Rev H

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**Nicolet**  
V A S C U L A R  
a division of VIASYS Healthcare

Transducer Model: PDII STYLE, 8 MHz  
 Operating Mode: Continuous-Wave (cw)  
 Application(s): Peripheral Vascular

ACOUSTIC OUTPUT		MI	I <sub>SPTA.3</sub> (mW/cm <sup>2</sup> )	I <sub>SPPA.3</sub> (W/cm <sup>2</sup> )	
Global Maximum Value		.02	380	0.38	
Associated Acoustic Parameter	P <sub>r</sub> (Mpa)	.042			
	w <sub>o</sub> (mW)		5.8	5.8	
	f <sub>c</sub> (MHz)	7.8	7.8	7.8	
	Z <sub>sp</sub> (cm)	0.4	0.4	0.4	
	Beam Dimensions	x <sub>-6</sub> (cm)		0.3	0.3
		y <sub>-6</sub> (cm)		0.1	0.1
	EBD	Az (cm)		0.20	
		Ele. (cm)		0.46	

**Global Maximum** values are the maximum expected values based on statistical analysis of one production lot.

I<sub>SPTA.3</sub> the **derated spatial-peak temporal-average intensity** (milliwatts per square centimeter).

I<sub>SPPA.3</sub> the **derated spatial-peak pulse-average intensity** (milliwatts per square centimeter).

MI the **Mechanical Index**.

Pr the **peak rarefactional pressure** (megapascals) associated with the transmit pattern giving rise to the value reported for MI.

W<sub>o</sub> the total time-average **ultrasonic power** (milliwatts).

f<sub>c</sub> the probe **center frequency** (MHz).

Z<sub>sp</sub> the **axial distance** at which the reported parameter is measured (centimeters).

x<sub>-6</sub>, y<sub>-6</sub> are the **-6dB beam dimensions** in the x-y plane where z<sub>sp</sub> is found (centimeters).

EBD the **entrance beam dimensions** (centimeters). These dimensions are the same as the dimensions of the transmit crystal.

**Operating conditions:**

There are no user controls which affect the ultrasound output. This transducer is intended for direct patient contact. The probe face has a liquid ingress level of IPX4.

**Measurement uncertainties:**

- Power +29%, -42%
- Pressure +17%, -23%
- Intensity +18%, -29%
- Frequency +1%, -1%

## Acoustic output tables

Transducer Model: PDII STYLE, 2 MHz  
 Operating Mode: Continuous-Wave (cw)  
 Application(s): Continuous Fetal Heart Monitoring

ACOUSTIC OUTPUT		MI	I <sub>SPTA,3</sub> (mW/cm <sup>2</sup> )	I <sub>SPPA,3</sub> (W/cm <sup>2</sup> )	
Global Maximum Value		.009	7.1	.007	
Associated Acoustic Parameter	P <sub>r</sub> (Mpa)	.032			
	W <sub>o</sub> (mW)		17.9	17.9	
	f <sub>o</sub> (MHz)	2.07	2.07	2.07	
	Z <sub>sp</sub> (cm)	2.7	2.7	2.7	
	Beam Dimensions	x <sub>-6</sub> (cm)		1.7	1.7
		y <sub>-6</sub> (cm)		2.1	2.1
	EBD	Az (cm)		1.5	
Ele. (cm)			3.2		

Transducer Model: PDII STYLE, 3 MHz  
 Operating Mode: Continuous-Wave (cw)  
 Application(s): Continuous Fetal Heart Monitoring

ACOUSTIC OUTPUT		MI	I <sub>SPTA,3</sub> (mW/cm <sup>2</sup> )	I <sub>SPPA,3</sub> (W/cm <sup>2</sup> )	
Global Maximum Value		.001	37.1	0.037	
Associated Acoustic Parameter	P <sub>r</sub> (Mpa)	.019			
	W <sub>o</sub> (mW)		18.5	18.5	
	f <sub>o</sub> (MHz)	3.0	3.0	3.0	
	Z <sub>sp</sub> (cm)	1.7	1.7	1.7	
	Beam Dimensions	x <sub>-6</sub> (cm)		0.8	0.8
		y <sub>-6</sub> (cm)		0.7	0.7
	EBD	Az (cm)		0.80	
Ele. (cm)			1.59		

Transducer Model: PDII STYLE, 5 MHz  
 Operating Mode: Continuous-Wave (cw)  
 Application(s): Peripheral Vascular

ACOUSTIC OUTPUT		MI	I <sub>SPTA,3</sub> (mW/cm <sup>2</sup> )	I <sub>SPPA,3</sub> (W/cm <sup>2</sup> )	
Global Maximum Value		.028	100.8	0.101	
Associated Acoustic Parameter	P <sub>r</sub> (Mpa)	.063			
	W <sub>o</sub> (mW)		21.5	21.5	
	f <sub>o</sub> (MHz)	5.3	5.3	5.3	
	Z <sub>sp</sub> (cm)	0.8	0.8	0.8	
	Beam Dimensions	x <sub>-6</sub> (cm)		0.6	0.6
		y <sub>-6</sub> (cm)		0.2	0.2
	EBD	Az (cm)		0.47	
Ele. (cm)			0.95		

**Note:** See page 11 for terminology descriptions.

## Care of the instrument

Keep the instrument clean by wiping it periodically with a damp cloth. **DO NOT IMMERSE** in fluids. **DO NOT AUTOCLAVE!** If for some reason it is desired to sterilize the Pocket-Dop II, this can be done with a cold gas sterilization (such as ethylene oxide at less than 140 degrees F) or the Sterrad System. The user is responsible for verification of sterility.

## General hints & limitations

The specific techniques for using your Doppler are beyond the scope of this manual, but are covered in many recent publications. The Pocket-Dop II is designed to be reliable, but it is a medical instrument and should be treated with care. When being used, personnel trained in its use should be present at all times. The use of this device is not a substitute for medical training and knowledge and it is intended only to augment the user's medical skills. The Pocket-Dop II is not explosion proof. Do not use in the presence of flammable or explosive gas.

These general hints may help in any Doppler examination:

**USE PLENTY OF GEL.** Ultrasound is almost completely stopped by any air or bubbles between the skin and the probe. Liberally use the special ultrasound gel for best results.

**MOVE THE PROBE SLOWLY.** When searching for the fetal heartbeat a slow rocking and rotating motion will minimize noise and help avoid missing the it. Rest your fingers on the patient to stabilize the probe and avoid unwanted motion and noise.

**DON'T PRESS TOO HARD.** This is not only uncomfortable to the patient, but may squeeze out most of the gel.

This unit complies with criteria set forth in EN60601-1-2 tested to 3 Volts/ Meter.

When in the presence of audible interference, the heartbeat sounds may become diminished.

## Obstetrical Uses

Doppler ultrasound is primarily used to reassure the mother. In some patients the fetal heartbeat can be heard as early as 8 to 12 weeks. It should be audible in 95% of 12 week pregnancies, and nearly 100% after 14 weeks.

## Obstetrical exam

The preferred position is with the patient supine, although it may also be accomplished in a sitting or standing position.

Expose the abdomen and apply a liberal amount of coupling gel to the face of the probe. It is important to maintain good coupling at all times with no air bubbles between the probe and the abdomen.

The key to the examination is to intercept the fetal heart with the beam from the probe. The beam travels in a relatively straight direction much like a flashlight beam.

In the first trimester, the best technique usually starts with the probe on the midline of the abdomen aimed down behind the pubic bone. The probe should be rocked very slowly to search the most likely areas. Because the fetal heart sounds are faint at this time, care must be taken not to scan too quickly or the sounds may be missed.

## Vascular exams

### Flow or Pulse Detection

Place the vascular probe of your Doppler over the underlying vessel using sufficient coupling gel. It is not necessary to press hard. The probe should be held with a 30 to 45 degree angle to the skin. The correct amount of pressure and the angle of the transducer affect the quality of the signal. These techniques can be easily mastered in a short period of time. When you first listen to Doppler sounds they resemble a series of "swishes and hums." With practice, auditory acuity improves rapidly. As you gain expertise in identifying sounds, your diagnostic ability improves as well.

### Systolic Blood Pressure

Place an ordinary blood pressure cuff on the limb in the normal manner. Place the vascular probe over the underlying vessel before inflating the cuff to obtain optimum position for the signal of best quality. Then inflate the cuff rapidly above the systolic level, or where no flow is heard, and gradually deflate. The first sound coming through as the cuff is deflated represents the systolic level. Since the device detects flow, it is extremely difficult to determine the diastolic point as you hear flow all the way to zero pressure as the cuff is released. It is possible to detect much lower, accurate systolic pressures with your vascular Doppler than listening for the Korotkoff sounds, as in the normal blood pressure method.

## Controls

**OFF/VOLUME.** The On/Off and Volume are controlled with the thumbwheel on the side of the unit. Most examinations start with the volume of the unit near maximum until the fetal heart is found, then volume is reduced to a comfortable listening level.

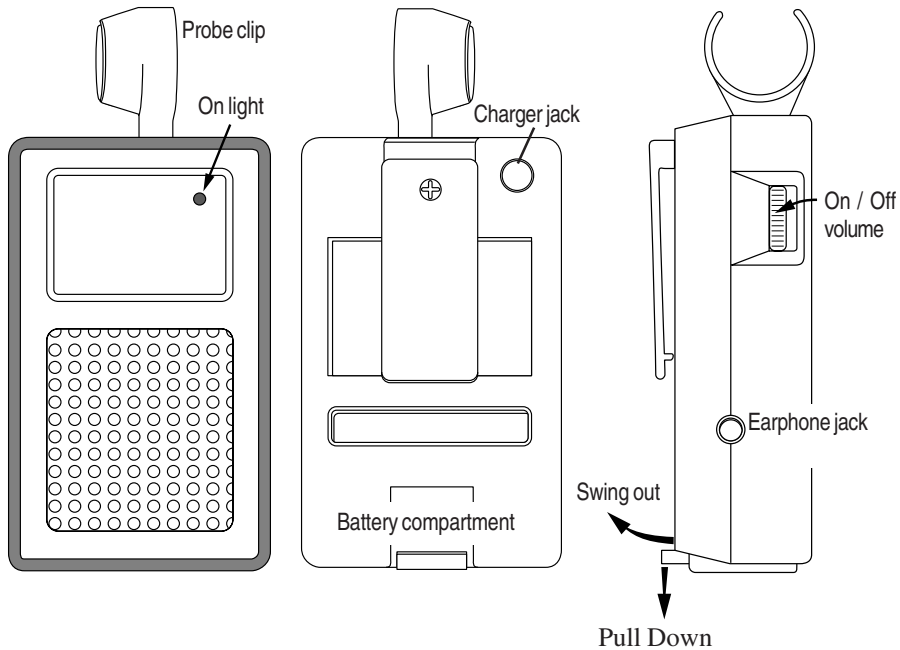
**ON LIGHT/BATTERY INDICATOR.** This indicator lights up showing the unit is on and the battery is charged. As the batteries run down, the light will go out.

**RECHARGING AND BATTERIES.** The recharger plugs into the unit on the back. Plug the recharger into a suitable outlet. It takes fourteen hours to fully charge a battery from a full discharge. Do not use the unit while it is plugged into the recharger. Batteries will last longer if they are fully discharged before recharging. The Pocket-Dop II uses two rechargeable batteries that can be charged several hundred times before replacement. If charging time is not available, standard AA size alkaline batteries may be used, with the caution below.

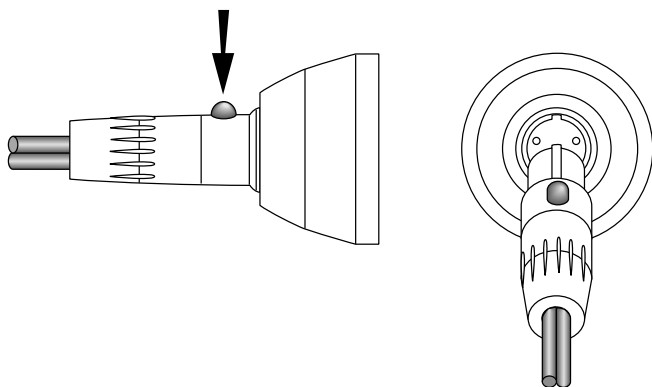
**IMPORTANT BATTERY NOTE:** If you have replaced the rechargeable batteries with alkaline (or other non-rechargeable) batteries, do not attempt to charge them. This causes them to leak corrosive fluids that will damage the unit; such damage is not covered under the warranty. This applies as well to any renewal reusable alkalines. The renewable alkalines will damage the unit if you attempt to recharge them with the Nicolet Vascular recharger. These batteries have their own special recharger station. We suggest putting a piece of tape over the recharger jack on the back while non-rechargeable batteries are in the unit.

## Changing probes

Exchanging probes is a simple matter of holding the probe in one hand, grasping the connector in the other hand, depressing the black button firmly and pulling straight apart. Do not twist the connector, just pull. Reconnect a probe by aligning the key on the connector with the slot on the probe and pushing together until a click is heard.



**Pull Down**  
 To Replace Batteries: Pull down on tab while swinging bottom of case out.



## Safety of Ultrasound

The American Institute of Ultrasound in Medicine (AIUM) has addressed the concerns relating to the safety of ultrasound and has issued the following statement as of March 1993:

“Diagnostic ultrasound has been in use since the late 1950s. Given its known benefits and recognized efficacy for medical diagnosis, including use during human pregnancy, the AIUM herein addresses the clinical safety of such use: “No confirmed biological effects on patients or instrument operators caused by exposure at intensities typical of present diagnostic ultrasound instruments have ever been reported. Although the possibility exists that such biological effects may be identified in the future, current data indicate that the benefits to patients of the prudent use of diagnostic ultrasound outweigh the risks, if any, that may be present.”

Nicolet has always strived to use as low an ultrasound power as practical. Prudent use on the operator’s part would include minimizing the length of time that the patient is undergoing the ultrasound exposure.

## European authorized representative

VIASYS Healthcare  
 Welton Road  
 Warwick, CV345PZ U.K.

## Pocket-Dop II troubleshooting guide

PROBLEM	POSSIBLE SOLUTION
No Sound	<p>Is light on? No? - Check batteries. Open case by pulling down on small tab on back of case at the bottom while pulling the lower part of the back away from the front. Are the batteries installed correctly per the (+) (-) label in the battery compartment? If not, replace them correctly. Sometimes the ends of the batteries or the connections inside become corroded. This can be fixed by rubbing or scraping the connections and battery tips.</p> <p>Still No? - Try recharging the unit by plugging in the recharger for an hour or so - this should be enough to light the light for a minute or more. If this works, recharge the unit overnight.</p> <p>Still No? - Try replacing the batteries with standard AA alkaline cells. If this fixes the unit, the problem is with either the recharging system or batteries. Rechargeable batteries are available at many electronic stores, department stores, or even grocery stores. (Be sure the tip of the battery is as small as those you are replacing.) Batteries are also available from Nicolet Vascular. If replacing the rechargeable batteries does not fix the problem, it is best to call and then return the complete system to Nicolet for repair, since the problem could be in either the recharger or the main unit.</p> <p>Yes? - This means the batteries are probably ok. Check to see if the volume control is turned all the way up and that the probe is connected properly and firmly to the cord from the main unit. To be sure that the probe is connected properly, try removing the probe and reconnecting it, <u>making sure that it is lined up correctly with the key on the connector going into the slot on the probe.</u> Tap on the end of the probe with a finger moistened with gel or water. If you have another Nicolet/Imex probe available, try connecting it to the main unit. If that probe works, the problem is probably in the probe and you may have to send the probe back for service. If no sound is heard, call Nicolet and arrange for service.</p>
Weak sound or distorted sound	<p>Are you using enough gel? Gel dries out after awhile and can also be inadvertently wiped off when moving the probe. Water as a couplant does not fill gaps as well. Try using more gel. Also, if the sound is distorted, try turning the volume down. Don't use more gel than necessary.</p>
Static	<p>See above comment on gel. Also, try not to move the probe over the surface of the skin as you are listening to the fetal heart. Some background "hiss" is normal.</p>

For Service, call Nicolet Vascular at (800) 525-2519

To return a unit for service: 1) call Nicolet Vascular Technical Service first to obtain a Repair Authorization Number (RMA), 2) include a note on the problem along with the name of a contact person and their phone number, and 3) send it insured to:

Attn: Service Department  
 Nicolet Vascular  
 2920 Commerce Park Drive  
 Fitchburg, WI 53719