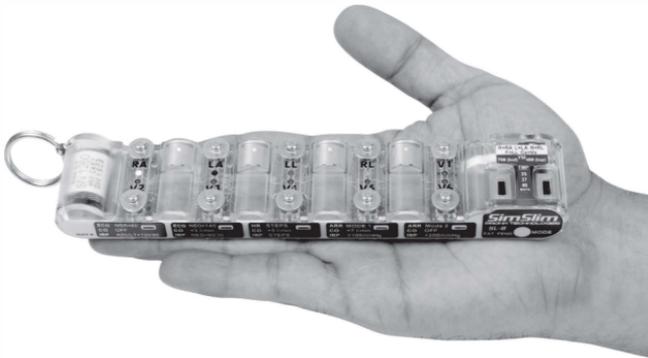


SimSlim™ Patient Simulator Operator's Manual



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www.pronktech.com

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CAUTION:

Risk of explosion if lithium battery is replaced by an incorrect type. Dispose of used batteries according to country and state specific laws and regulations.

Compliant products conforming to the relevant standards and directives required for CE have a CE Mark label, as shown below, affixed to the unit. CE Marked products also comply with the WEEE directive for category 9 Monitoring and Control Instrumentation products. Do not dispose of this product as unsorted waste. To dispose, contact Pronk Technologies at support@pronktech.com. A Return Material Authorization will be issued to return the unit for disposal.



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Introduction

The **SimSlim™** simulator is a compact, rugged, easy to use multi-parameter patient simulator with the following features:

- 10 Snap/Banana plug ECG, Resp and Pacer Simulation.
- 4 Invasive Blood Pressure Channels via four 6 pin mini-din connectors.
- Cardiac Output Simulation.
- YSI 700 and 400 Temp Simulation via two 3.5mm stereo jacks.
- Up to 10 Year Battery Life (no charging or changing required).
- Simple, single button operation.
- 4mm and 1/8" banana plug grooves for easy hook up to 12 lead carts.
- 50+ different selectable simulations.

Getting Started - please refer to each parameter section in this manual, for more detailed operational information

1. Turning the SimSlim Simulator on

- You never have to. The SimSlim simulator runs all day, every day for up to 10 years (depending how often the LEDs are lit and the duration of various modes selected) on its internal battery.

2. Mode Selection

- The label on the front face has 5 blue boxes, each with an LED. Each box represents a different mode.
- To show the current mode, click the MODE button.
- To change the mode, double click the MODE button.
- After two hours with no button presses, the SimSlim simulator will return to the ECG NSR/ADULT mode.

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3. Waveform Selection Within a Mode

- Some of the SimSlim simulator modes contain multiple waveforms.
- An example of this is ARR MODE 1 which has NSR with PVCs, VTACH, VFIB and Asystole waveforms.
- These waveforms are listed on the bottom label.
- To change between waveforms within a mode, click the mode button once.

4. Zeroing Invasive Blood Pressures

- Click the mode button once to zero all blood pressures for 15 seconds, then zero monitor within that 15 seconds. After 15 seconds the blood pressures will return to their prior values. You may shorten the 15 second wait time to resume IBP simulation mode by pressing the MODE button once any time after zeroing the monitor.

5. Cardiac Output Readings

- Double click the mode button to select the desired C.O. mode.
- Enter into the monitor the appropriate computational constant determined by referencing the injectate temperature listed on the CC table on the bottom label of the SimSlim
- Hold the mode button for 2 seconds to start a simulated C.O. injection.

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Detailed ECG Operation

- **Connecting the ECG Leads**

ECG lead wires with snaps can be connected directly to the SimSlim simulator snaps. The snaps are clearly labeled with the name and color code of the lead. If your lead wires have banana plugs rather than snaps, the banana plugs are slid into the grooves under the snap such that the metal part of the plug is against the underside of the snap. Two different size grooves are provided for different size banana plugs.



- **ECG Size**

ECG size is 1mV, Lead II, in ECG NSR MODE. Resp size is 4.0 Ohms in ECG NSR, ECG NEO and HR STEPS MODES.

- **ECG NSR MODE**

Simulates a patient with a NSR waveform at 60 BPM. Resp is at 30 BPM.

- **ECG NEO MODE**

Simulates a patient with a NSR waveform at 140 BPM. Resp is at 70 BPM.

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- **HR STEPS MODE**

This mode offers a selection of heart rates and resp rates. The rates available are shown on the bottom label of the unit and are 30, 60, 90, 120, 160, 200, and 240 BPM. When entering the mode the HR will be 30 BPM. Click the MODE button to advance to the next HR. In this MODE the resp rate is always 1/2 of heart rate.

- **ARR MODE 1**

This mode is a cardiac failure sequence, which starts out as NSR with scattered PVCs, and then progresses to VTACH, VFIB, and Asystole. Click the MODE button to advance from one waveform type to the next. The waveform will not advance until you click the MODE button. This mode is designed to give biomed's a simple way to test all life critical arrhythmia alarms. The waveform sequence is shown on the back of the unit. In this mode, resp rate is always zero.

- **ARR MODE 2**

In this mode a selection of different arrhythmia waveforms are available. These waveforms are listed on the back of the unit and are: Bigeminy, Pacer, Trigeminy, ST elevation, 2nd Degree block, and 1mV square wave. When entering the mode, the waveform will be Bigeminy. Click the MODE button to advance to the next waveform. The waveform will not advance until you click the MODE button. In this MODE, resp rate is always zero.

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Detailed Invasive Blood Pressure Operation

• Connecting the Cables

You will need a monitor specific cable to connect the SimSlim simulator IBP simulation ports to your monitor. A variety of these cables are available from Pronk Technologies and other sources. Pronk's cables are supplied as a 6' (1.8 m) extension cable which connects to a 6" (15cm) adapter cable. Most simulator cables with 6 pin mini-din connectors should work, as the 6 pin mini-din simulator IBP pin-out is fairly standard. Wiring is as follows: + Excit = pin 1, - Excit = pin 4, + Sig = pin 3, -Sig = pin 6. Contact Pronk Technologies Inc. at 800/541-9802 for more information.

The IBP simulation ports are labeled on the bottom of the unit.

• Zeroing Simulated Blood Pressures

In all modes except IBP STEPS, clicking the mode button will force all four IBP channels to 0mmHg for 15 seconds. If you desire to return to normal operation prior to the 15 second timeout, a second MODE button click will 'unzero' all channels. (Note that this 'click to unzero function' is not reliable in Beta software prior to B.3)

• Sensitivity

The SimSlim simulator simulates 5uV/V/mmHg transducers.

• ECG NSR MODE

Simulates a NSR adult patient at 60 BPM with:

- ART pressure on P1 of 120/80
- PA pressure on P2 of 30/10
- LV Pressure on P3 of 125/15
- CVP Pressure on P4 of (6) mean

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- **ECG NEO MODE**

Simulates a NSR neonatal patient at 140 BPM with:

- ART pressure on P1 of **60/30**
- PA pressure on P2 of **20/10**
- LV Pressure on P3 of **60/5**
- CVP Pressure on P4 of **(2) mean**

- **100 mmHg MODE**

Simulates static 100mmHg on all four channels.

- **200 mmHg MODE**

Simulates static 200mmHg on all four channels.

- **IBP STEPS MODE**

In this mode, a selection of static blood pressures are available on all four channels. The pressures available are shown on the bottom of the unit and are 0, 25, 50, 100, 150, 200, and 250mmHg. When entering the mode, the pressure will be 0mmHg, so zero the monitor while in this step. Click the **MODE** button to advance to the next pressure step.

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Detailed Cardiac Output Operation

• Connecting the Cables

The SimSlim simulator is designed to operate without a custom C.O. cable. Instead, use the monitor's standard C.O. cable. The connections are as follows:

1. Connect the monitor's C.O. cable to the monitor.
2. Connect the catheter connector on the C.O. cable to the C.O. port on the SimSlim simulator.
3. Make sure the normal injectate temp sensor is connected to the C.O. cable. The injectate temp sensor should be left at room temperature. It does not need to be placed in a bath of any kind, but for best results, place it somewhere the temperature will be room temperature and relatively stable (i.e. not directly, under a hot lamp or in your hand).

• Reading the Injectate Temp

With the cables connected correctly, you should be able to read the room temperature as measured by the injectate probe from the monitor.

• Looking up the Computation Constant (C.C.) Value

Once you know the current injectate temp, you can look up the C.C. value from the table on the back of the SimSlim simulator. Once you have the correct C.C. value, enter it into the monitor.

The granularity of the C.C. table on the SimSlim simulator can introduce up to a 5% error in the readings. This should be fine for most applications, but if you want better precision you can interpolate between values. For example, if your injectate temp was 25.5C, you would look up the value for 25 (0.500) and the value for 26 (.545) and split the difference (0.522).

If you want to use an injectate temp value that is not in the table, you can calculate the correct C.C. value according to $C.C.=6/(37-TI)$.

• Selecting the Simulation mode

Referring to the label on the side of the SimSlim, navigate the modes by double clicking the MODE button to select the proper mode to simulate the intended 3, 5 or 7 l/m simulation.

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- **Starting a Simulated Injection**

Hold the MODE button down for 2 seconds to start a simulated injection. When the injection is started, the LED will flash. If you are doing C.O. simulations for a long period of time, keep in mind that the injectate temperature may drift and the C.C. value may have to be updated from time to time for best accuracy.

- **Using an Injectate Temp Simulator**

It is possible to use an injectate temp simulator rather than the actual injectate temp probe. Unfortunately, different monitor vendors use such a wide variety of thermistors and connectors for injectate temperature that Pronk Technologies cannot supply these. One solution would be to fabricate an injectate temp simulator locally from an injectate probe and some resistors. Some vendors use YSI 400 or YSI 700 thermistors for injectate temp. In these cases, the internal YSI temp simulator in the SimSlim simulator can be used.

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Detailed YSI Temp Operation

- **Connecting the Cables**

The SimSlim simulator has two 3.5mm temp ports. The upper port is YSI 400 and the lower port is YSI 700. The SimSlim simulator comes supplied with a 3.5mm male to male stereo extension cable and a 3.5mm to 1/4" stereo plug converter. This should be everything you need to simulate temperature on monitors which use 1/4" or 3.5mm stereo jack connectors for temperature monitoring. Some monitors use different connectors and these will require additional adapters.

- **Selecting the Simulated Temperature**

Move the slide switch to select the desired temperature simulation values.

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Troubleshooting Tips

TROUBLESHOOTING TIPS	
SYMPTOM	SOLUTION
Not calling VTACH or VFIB	Some arrhythmia systems will not call VTACH on a straight jump out of clean NSR. At the start of ARR MODE 1 the NSR section has some PVCs and runs mixed in. In some cases, it may be necessary to let the arrhythmia system see some of these PVCs prior to transitioning into VTACH.
I am trying to advance quickly through the waveforms, but sometimes I accidentally change the mode	For rapid single clicking, watch the LED. If you click a second time while the LED is still on, this will be seen as a double click, which will change the mode. If you click a second time just after the LED has gone out, it will be seen as a second single click, which will advance the waveform.
Misshapen or undersized ECG waveform	With Hardware E6 and prior, some monitors will occasionally have interaction between the IBP and ECG. Unplug IBP to work around the problem. On E7 hardware, touching the metal shell of an IBP connector and an ECG snap at the same time can cause waveform interaction.
Not picking RESP waveform	Most monitors look for respiration drive across RA/LA leads. Some do not. If RESP waveform is not picking, try swapping the RL and LL leads. Please keep in mind that RESP is zero in ARR MODE 1 and ARR MODE 2.
No Heart rate on EASI configured telemetry	When viewing AVR or V2 lead, change the V lead to V6 snap.
Unable to resolve problem	Contact Pronk Technologies' Technical Support at: (800) 541-9802

Services (Prices subject to change without notice)

SERVICE ITEM NUMBER	DESCRIPTION	PRICE (USD\$)
Annual SimSlim Calibration	Full checkout, adjustment and calibration certificate	Call for Pricing

*Pronk Technologies recommends an annual calibration interval.

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SimSlim Simulator Limited Warranty

The SimSlim simulator is warranted against defects in materials and workmanship for a period of forty eight (48) months from the date of shipment to the original purchaser. Warranty is valid only to the original buyer. Defective equipment should be returned freight prepaid to Pronk Technologies. Equipment returned with defective parts and assemblies shall be either repaired or replaced at the manufacturer's sole discretion. This warranty is not applicable if the unit has been opened, if repair has been attempted, if the unit has been damaged due to operation outside the environmental and power specifications for the product, or due to improper handling or use.

If any fault develops, notify Pronk Technologies (see Returns and Repairs, below) giving full details of the difficulty, and include the model and serial number of the device. Upon receipt of shipping instructions, forward the device prepaid and repairs will be made at the factory. The foregoing warranty is in lieu of all other warranties expressed or implied, including but not limited to any implied warranty or merchantability, fitness or adequacy for any particular purpose or use. Pronk Technologies shall be liable only for repair or replacement of the SimSlim Simulator and optional features. Pronk Technologies shall not be liable for any incidental or consequential damages.

Order Cancellation and Refund Policy

You may return your item within 14 days of delivery for a full refund. We are unable to exchange items (however, if you received a defective or incorrect item, we will be happy to make an exchange). Item(s) returned for refund must be in its original condition, undamaged and with no missing parts, packed in its original packaging, and include both the original receipt and an RMA number.

We will notify you via e-mail or fax of your refund once we have received and processed the returned item. You can expect a refund in the same form of payment originally used for purchase within 7 to 14 business days of our receiving your return.
Returns and Repairs

Please call Pronk Technologies' Service Department at 800-541-9802 to obtain a Return Merchandise Authorization (RMA) number and the shipping address. Returns should be packaged securely in the original packaging materials. The RMA number should be clearly marked on the packaging. If the return is for a new item and is a result of our error, we will make arrangements for payment of return shipping. Otherwise, items should be returned freight prepaid to Pronk Technologies.

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