



Pro-Tech sensors usage guide and FAQs

How is Respiratory Inductance Plethysmography (RIP) different from piezo?

RIP outputs a **linear signal** reflecting true chest or abdominal cross section as the patient breathes. The zRIP wire sensor is woven through the belt from buckle to buckle. This provides a more reliable signal as the sensor circles the body and results in an accurate, quality signal. As the patient sleeps and begins more shallow breathing, the signal amplitude will not be as prevalent as when the patient is awake and breathing more deeply. zRIP belts are designed to provide true breathing waveforms with no false paradoxing.

A piezo-electric sensor outputs a **non-linear** signal as the crystal sensor generates a voltage when compressed or stretched. An elastic belt is fastened around the chest or abdomen to measure changes in tension during respiratory effort. If a low signal is detected, the sleep technologist will usually tighten the piezo belt. However, piezo belts are subject to “trapping artifact” as the patient turns from side to side, which may create a false signal.

With zRIP, the belt should be snug, but not tight. See the following FAQ for proper placement of the zRIP belt.

zRIP effort belt

How do I adjust the zRIP effort belt before placing it on the patient?

To expand, or lengthen, the zRIP effort belt:

The zRIP effort belt looks to be divided into two sections. One section has three layers of belt and a male buckle end. The other section is a single belt with a female buckle end with a Pro-Tech logo. A slide lock is located in the middle of the belt.

1. Lay the belt across your hands so that the Pro-Tech logo is facing up on the female buckle and the male buckle is on your left side. Hold the female buckle end in your right hand.
2. Hold the slide lock with your left hand. Push the slide lock away from the female buckle and towards the male buckle. The three belt strips between the slide lock and male buckle will loosen.
3. Change hands and take the slide lock in your right hand and with your left hand, pull the male buckle away from the slide lock to place tension on the three belt strips. The three belt strips will flatten and tighten when pulled.



PHILIPS

RESPIRONICS

How do I adjust the zRIP effort belt before placing it on the patient? (continued)

To tighten, or shorten, the zRIP effort belt:

The zRIP effort belt looks to be divided into two sections. One section has three layers of belt and a male buckle end. The other section is a single belt with a female buckle end with a Pro-Tech logo. A slide lock is located in the middle of the belt.

1. Lay the belt across your hands so that the Pro-Tech logo is facing up on the female buckle and the female buckle is on your right side. Hold the slide lock with your right hand.
2. On your left side will be three layers of the belt. Pull the bottom layer towards the male buckle while continuing to hold the slide lock with your right hand. The single section of belt on your right hand side will shorten.
3. Take the male buckle in your left hand and pull away from the slide lock to place tension on the three belt strips. The three belt strips will flatten and tighten when pulled and the entire belt will be shortened.



What is the proper placement of a zRIP effort belt on the patient?

Adjust the belt to the patient using the sizing technique described above.

Ask the patient to cross their arms so that their hands are touching their opposing shoulders. Their elbows should be held up at a 90 degree angle from their body. Position the patient's torso in the supine position by having them stand or sit. This will help with proper belt placement.



For thoracic belt placement:

1. Wrap the belt around the patient barely above the nipple line, midpoint/halfway of the breastbone/sternum. Placing the belt higher will result in a lower signal amplitude. Don't pull it too tight or have it too loose. It should rest on the patient's shirt.
2. Bring the buckles within five to six inches of connecting (a little more than the width of a hand). Adjust the belt if needed until this distance is achieved.
3. Pull the belt buckle ends until they click together. The belt should be snug and not too tight or too loose.



What is the proper placement of a zRIP effort belt on the patient? (continued)

For abdomen belt placement:

1. Wrap the belt around the patient barely above the belly button without pulling it too tight, or having it too loose. It should rest on the patient.
2. Bring the buckles within five to six inches of connecting (a little more than the width of a hand). Adjust the belt if needed until this distance is achieved.
3. Pull the belt buckle ends until they click together. The belt should be snug and not too tight or too loose.

Depending on how the sleep technologist prefers to setup a patient, the connector on the zRIP belt can be placed in the up position (towards the head) or in the down position (towards the feet).

Note: Your patient's shape may cause the effort belt to move during the night. To prevent this, tape the belt down to the patient's bed clothes or directly to the body.



How do I adjust the belt once the patient is in the supine position?

Unlike piezo belts, zRIP effort belts should not need belt adjustment on the patient. During the study, the sleep technologist may need to adjust the gain if the patient changes position and the signal amplitude decreases.

How do I connect the zRIP module to the zRIP effort belts and PSG system headbox?

The zRIP effort system requires two wire sets (thorax and abdomen) to connect the two effort belts to the module. The module is connected to the headbox. (This is dependent on the PSG system; see other options on page 4.)

Depending on how the sleep technologist prefers to setup a patient, the connector on the zRIP belt can be placed in the up position (towards the head) or in the down position (towards the feet).

Connecting the thoracic zRIP belt to the zRIP module:

- Plug the black 1.5 mm connectors on the end of the wireset into the zRIP belt plugs. These are located next to each buckle on the belt. Plugging both ends into the belt closes the oscillating signal loop around the belt.
- The other end of the wireset, the 249 connector, plugs into the thorax (red) connection point on the zRIP module.



How do I connect the zRIP module to the zRIP effort belts and PSG system headbox? (continued)

Connecting the abdomen zRIP belt to the zRIP module:

- Plug the black 1.5 mm connectors on the end of the wireset into the zRIP belt plugs. These are located next to each buckle on the belt. Plugging both ends into the belt closes the oscillating signal loop around the belt.
- The other end of the wireset, the 249 connector, plugs into the abdomen (blue) connection point on the zRIP module.

The module will power up when the abdominal wireset is plugged into the module.



Connecting the zRIP module to the PSG system headbox:

Plug the blue and white leads from the module into the designated connection point on the headbox, blue is signal (+), white is reference (-). See your PSG system manufacturer's information for more information.

At the end of a study, both wiresets should be disconnected from the zRIP module to conserve battery power.



What are the recommended settings for the PSG?

- **Sensitivity** – Approximately $50\mu\text{v}/\text{mm}$ per channel. Adjustment of the sensitivity up or down is typically required. Response is dependent upon such variables as sensor application and patient effort.
- **Low-frequency filter/time constant** – .16 Hz / 1 second or longer. Shorter time constants or higher low frequency filter settings will significantly attenuate waveforms. Longer time constants or lower low-frequency filter settings will display more information regarding patient effort.
- **High-frequency filter** – 35 Hz

How do I clean the zRIP effort belt?

Do not use alcohol or a cleaning solution with an alcohol compound (found in liquid detergent and many hospital cleansers). Alcohol may degrade the plastic coating around the wire sensor and create a breakage in the wire. We recommend using granulated laundry soap.

zRIP effort belts are machine washable.

I have an Alice system. Do I set up the zRIP module differently?

No. The effort belt to module setup is the same as described above. The only difference is to confirm you are using an Alice zRIP module. (See photos below.)

The Sleepware gain set at the start of a study should not need to be increased through the night, as is standard for the piezo technology.



Do I have the correct module to use with my system?

Standard zRIP module

The standard zRIP module is for use with most PSG systems and is distinguished by the label on the front of the product (as shown on product to the right).

Standard zRIP module, P1732

zRIP kit, adult, P1808 (kit contains: 1 each P1732 zRIP driver module, 2 each P1133 zRIP wiresets, 2 each P1806 zRIP adult effort belts)

zRIP kit, pediatric, P1809 (kit contains: 1 each P1732 zRIP driver module, 2 each P1133 zRIP wiresets, 2 each P1807 zRIP pediatric effort belts)



Alice zRIP module

The Alice module has a specific label that states Alice on the right hand side (see image at right) and is for use with Alice 3, 4, and 5/LE systems:

Alice 5 zRIP kit, adult, P1818 (kit contains: 1 each P1736 zRIP Alice 5 driver module, 2 each P1133 zRIP wiresets, 2 each P1806 zRIP adult effort belts)

Alice 5 zRIP kit, pediatric, P1819 (kit contains: 1 each P1736 zRIP Alice 5 driver module, 2 each P1133 zRIP wiresets, 2 each P1807 zRIP pediatric effort belts)

Alice 4 and Alice 3 zRIP kit part numbers are available by calling Sleep VIP Customer Service, 1-800-345-6443 in the US and Canada or 724-387-4000 for International.



Sum RT module

The Sum RT zRIP module states Sum RT on the label (see image at right) and is for those labs that request a respiratory effort summing channel. Summing is described on page seven.

zRIP Sum RT kit, adult, P1839 (kit contains: 2 each P1133 zRIP wiresets, 1 each P1733 zRIP Sum RT driver module, 2 each P1806 zRIP adult effort belts)

zRIP Sum RT kit, pediatric, P1840 (kit contains: 2 each P1133 zRIP wiresets, 1 each P1733 zRIP SumRT driver module; 2 each P1807 zRIP pediatric effort belts)

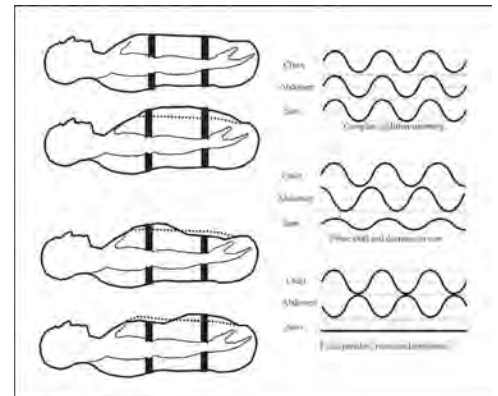


When is a module not necessary?

A module is not necessary if you are using a PSG system that already has an oscillator built into it, such as Resptrace QDC and Embla S4000. For these systems, we offer Pro-Tech sensor specific wiresets.

How does the Sum RT create a summing channel and why might I want to sum the channels?

The Sum RT adds the thoracic and the abdominal signals and divides by two. This is a breath-to-breath signal. Mathematical summing of the signals is particularly useful as an indicator for paradoxical breathing.



I do not see a signal. What could be the issue?

Check the module to make sure the blue and white leads are plugged into the headbox and the long black leads are connected to the effort belts. Depress the button on the end of the zRIP module to check the batteries. A green light means the batteries are good. If there is not a light, the batteries need to be replaced (two AAA batteries). Unplugging the abdominal wireset from the driver module will help extend the battery life.

Will the zRIP effort system work with my particular PSG system?

Go to www.pro-tech.com and select "products." This will load a product selector webpage. You can then select a specific PSG system and the Pro-Tech sensors supporting that specific system will be listed.



For more information about Pro-Tech sensors, visit: www.pro-tech.com.

Respironics, Pro-Tech, zRIP, SumRT, and Alice are trademarks of Respironics, Inc. and its affiliates.
All other trademarks are the property of their respective owners.



© 2009 Koninklijke Philips Electronics N.V. All rights are reserved.

Philips Healthcare reserves the right to make changes in specifications and/or to discontinue any product at any time without notice or obligation and will not be liable for any consequences resulting from the use of this publication.
CAUTION: U.S. Federal law restricts these devices to sale by, or on the order of, a physician.

SB 01/09/09 MCI 4102061

Philips Healthcare is part of Royal Philips Electronics

Europe, Africa, Middle East:
+33-1-47-52-30-00
Asia Pacific: +852-3194-2280

www.philips.com/respironics

Philips Respironics
1010 Murry Ridge Lane
Murrysville, PA 15668
800-345-6443
+1-724-387-4000