**BLOOD VOLUME PULSE (BVP): HR/BVP Sensor (P/N: SA9308M)**

The HR/BVP sensor is a blood volume pulse (BVP) detection sensor (also known as a photoplethysmography – PPG – sensor) housed in a small finger worn package, to measure heart rate (HR) and provide BVP amplitude, BVP waveform, HR and heart rate variability (HRV) feedback.

Although BVP signals can be sampled at 256 samples per second, it is generally recommended to use a higher sampling rate (2048) because this allows for a higher precision in the detection of heartbeats. The BVP sensor can both be used on channel B of the ProComp 2 but not on channels A, C or D. They can be used on all channels of the ProComp 5 Infiniti and ProComp Infiniti encoders but channels A and B are preferred because they allow a higher sampling rate. They can be used on all channels of the FlexComp Infiniti.

**Using the BVP sensor**

The BVP sensor does not require skin preparation as it is placed directly in contact with the skin. Place the sensor against the fleshy part of the first joint of any finger and hold it in position using the elastic strap.

**RESPIRATION: Respiration Sensor (P/N: SA9311M)**

The respiration sensor is a sensitive girth sensor worn using an easy fitting high durability woven elastic band fixed with a length adjustable webbing belt. It detects chest or abdominal expansion/contraction and outputs the respiration waveform.

The sensor is latex-free, magnet-free, and Velcro-free, and can be worn over clothing.

Since the respiration sensor can be used with any sampling rate, it can be connected to any input of any encoder (with the exception of channel A of the ProComp 2). Generally, however, it is connected to an input with a lower sampling rate.

**Operating Principle**

The respiration sensor is sensitive to stretch. When strapped around a client's chest or abdomen, it will convert the expansion and contraction of the rib cage or abdominal area, to a rise and fall of the signal on the screen. For the client's comfort, the elastic strap segment stretches when the abdomen expands during breathing.
Sensor Placement

For most applications, placing one sensor around the abdomen is required. Optionally, you can place a second respiration sensor around the chest. Using two sensors is helpful for abdominal breathing exercises.

The three straps (respiration sensor strap, elastic strap, and belt strap) are buckled together, and then placed around the client's torso.

Select the appropriate belt strap length to fit the client. Belt straps come in small (red label) and medium (blue label) sizes. For clients who need a large or extra-large strap length, combine two belt straps.

For especially petite clients the retention tab inside the cam lock of the small strap may be manually opened and the strap drawn through. Buckle the selected strap combination together and attach it around the abdomen so that the sensor is in the front.

Open the plastic cam lock and then slide it to adjust the strap tension. Ask the client to breathe out as fully as possible and close the cam lock to attach the sensor so there is minimal tension. The fit should be snug enough that the strap stays fixed when the client has fully exhaled.

There should also be enough slack in the elastic strap of the sensor so that expansion of the abdomen causes this strap to expand without being overextended.
Care and Cleaning

Hand wash the straps in lukewarm water with a mild soap, rinse them thoroughly, and hang them to air dry. The sensor unit can be wiped with a moist cloth.

**Warning:** Do not immerse the sensor unit in water. Do not allow the sensor connector to get wet.

**SKIN CONDUCTANCE: SC Sensor (P/N: SA9309M)**

The Skin Conductance sensor measures the conductance across the skin, and is normally connected to the fingers or toes. Supplied with two finger bands.

The standard measurement unit for conductance is called Siemens. Skin conductance is measured in micro-Siemens. Some biofeedback systems display skin conductance in micro-mhos (μm) - a mho is the inverse of an ohm, which is the measure of resistance. These two measures, μS and μm, are equivalent. Normal readings, for skin conductance, in a relaxed state are around 2 μS, but readings can vary greatly with environmental factors and skin type.

**Operating Principle**

Skin conductance is a measure of the skin's ability to conduct electricity. A tiny electrical voltage is applied through two electrodes, usually strapped to two fingers of one hand, in order to establish an electric circuit where the client becomes a variable resistor. The real-time variation in conductance, which is the inverse of the resistance, is calculated. SC represents changes in the sympathetic nervous system. As a person becomes more or less stressed, the skin's conductance increases or decreases proportionally.