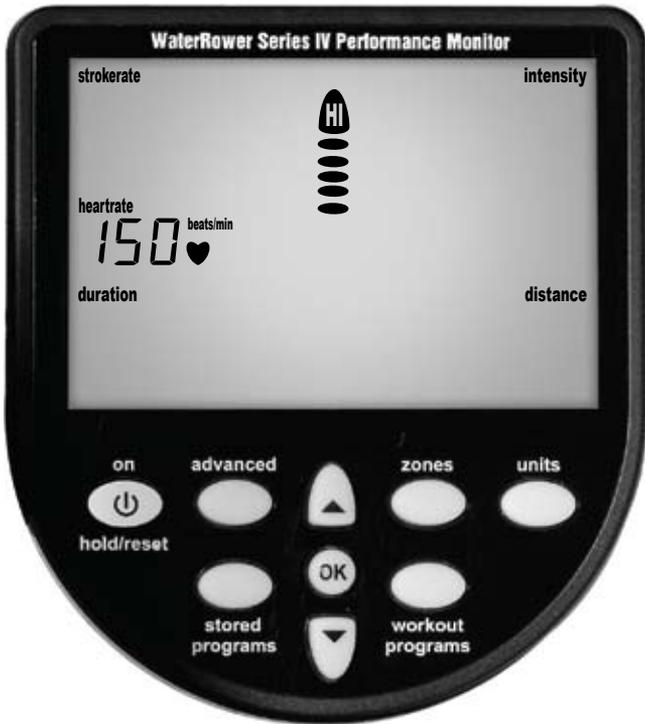




# WaterRower

## S4 Heart Rate Manual



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## **Introduction**

Congratulations on your choice of the WaterRower Heart Rate Monitoring system. We are sure that it will greatly enhance the quality of your exercise program.

Exercising at the correct intensity is a very important part of optimizing the effectiveness of your exercise program.

Individual exercise intensity is a measure of how much work your body is doing; controlling the intensity of exercise is essential in targeting and achieving your desired exercise objective.

This manual will explain how you can best achieve your exercise objective. Should you want more information please contact us or consult an exercise physiologist.

## Exercise Physiology

The principal fuels the body uses to produce energy over prolonged periods are derived from the body's stores of fat, carbohydrates or protein. The body converts these fuels into energy by one of two processes, the Aerobic metabolic process and the Anaerobic metabolic process.

**Aerobic-** the aerobic metabolic process produces energy by consuming fuel stores in the presence of oxygen (supplied by the flow of blood) producing bi-products, carbon dioxide and water (which are expelled by respiration and perspiration).

As exercise intensity is increased, more energy is required to perform the work and more oxygen is consumed. Hence an increase in breathing and heart rate.

Similarly as exercise intensity increases the body recruits different fuel stores as the main source of fuel.

**Anaerobic-** the anaerobic metabolic process occurs when there is insufficient oxygen in the blood supply to produce energy by the aerobic metabolic process alone. The anaerobic process consumes carbohydrate as its primary source of fuel and does so in the absence of oxygen to produce a product called lactic acid.

It is lactic acid which causes the fatigue and muscle soreness associated with excessive exercise. At high exercise intensities lactic acid will quickly build in the muscles until exercise must cease.

### Exercise Intensity

It is common to measure exercise intensity in terms of a percentage. This percentage figure may be seen as the range of sustainable exercise with 0% representing rest and 100% representing maximal sustainable output. Maximal sustainable output is the level below which exercise must cease due to lactic acid buildup and fatigue.

At low intensities of exercise (50-60%) the body will function purely aerobically and burn fat stores as the primary source of fuel.

At moderate intensities of exercise (60-70%) the body will function purely aerobically and burn a combination of fat stores and carbohydrate stores as its primary source of fuel.

At high intensities of exercise (>70%) the body will function aerobically and burn carbohydrate stores as its primary source of fuel. At this level lactic acid will accumulate in the blood stream faster than the body is able to expel it (though respiration, sweat, the liver and kidneys). Eventually the lactic acid levels will increase to a level where exercise must stop.

You may use these various intensity levels to optimize achievement of your specific exercise objectives.

## **Exercise Objective**

You may use various exercise intensities to achieve a range of exercise objectives. For example;

Fat Burn (Weight Maintenance) training- the main objective is to burn fat stores as the primary source of fuel, reducing weight. To achieve this exercise objective low exercise intensities (60-70%) and longer exercise durations are required. Recent research has shown that after a period of time it is important to include short bursts of high intensity into your weight maintenance training.

Aerobic (Cardio Vascular) training- the main objective is to improve the efficiency with which the cardio vascular system can supply oxygen, enhancing endurance and well being. To achieve this exercise objective moderate intensities (70-80%) and moderate durations are required.

Maximal (Fatigue Tolerance) training- the main objective is to improve the recovery of the aerobic system after short bursts of intensive exercise. To achieve this exercise objective high intensities (>80%) are required for short sharp bursts followed by a period of recovery to avoid the onset of fatigue.

## **Monitoring Exercise Intensity**

The WaterRower contains several means of monitoring your progress. The WaterRower Series 4 Monitor provides a choice between speed in (m/s), mph, /500m, 2km, power in watts (watts), energy consumption in cal/hr.

While these measurements give an indication of your progress they are extremely subjective as an accurate measure of ones individual exercise intensity. Most importantly they fail to take account of exercise objective, level of fitness, age, gender, tiredness, hydration, stress, energy stores, physiological cycle, as mentioned earlier.

There are various means of monitoring ones individual exercise intensities and hence accurately targeting your exercise objective. One of the best researched (and convenient) means relies on the correlation between exercise intensity and heart rate.

## Heart Rate Training

There are numerous means of measuring your heart rate, the simplest being measuring your pulse. There are however several commercially available heart rate monitors which vary from the crude (and often inaccurate) ear and thumb clip types to the extremely accurate (and complex) Electro Cardiographs (ECGs) as seen in hospitals.

Probably the most popular (and accurate) means of measuring heart rate are the wrist watch type monitors as made by companies such as Polar™ and Cardiosport.

Heart Rate monitors measure the electrical impulse of the heart using a chest belt with transmitter and sends the data to a wrist watch read out via telemetry.

The WaterRower Series 4 monitor has been designed to incorporate current heart rate monitoring technology. By incorporating a small receiver box and using a chest belt with transmitter, the Series 4 monitor will display heart rate.

On the WaterRower Series 4 Monitor, when a heart rate signal is being received, the monitor will display heart rate in units of beats/min.

The WaterRower Series 4 Monitor will also allow you to set your Heart Rate Zones by a number of different methods which will be discussed later.

### Calculating Maximum Heart Rate

Your Maximum Heart Rate (MHR) is the highest possible heart rate you can achieve. It corresponds to your maximum aerobic output, and is based on your physiology and fitness level.

Maximum Heart Rates vary according to the number and size of the muscle groups used during exercise, a cycling test, for example, will have a MHR a few beats lower than a WaterRower test due to the fewer muscle groups being used.

MHR will vary from individual to individual and there are numerous laboratory based means of accurately calculating it.

Here we will use a simple “rule of thumb” as follows;

Women:	MHR = 226 - Your age
Men:	MHR = 220 - Your age

For example:

A 40 year woman would calculate her maximum heart rate as follows;  
 $226 - 40 = 186$  beats per minute (bpm).

Please note this age calculated formula is only a guideline, be aware that it does not cater for variation from individual to individual. Should you wish to determine your MHR more accurately we recommend that you consult an Exercise Physiologist.

## Calculating Resting Heart Rate

Your resting heart rate (RHR) is your heart rate taken at complete rest. This is best calculated in the morning before you rise.

TIP: Count your heart beats over a 10 second period and then multiply by 6. Take readings every day over a few days and then average these.

Periodically measuring RHR is an excellent means of detecting the onset of illness or over training. If you notice your RHR suddenly increase it may be a sign of pending illness or that you are over training and it may be best to lay off exercise for a while and/or consult a physician.

## Calculating Your Target Heart Rate

Once you have your MHR and RHR, it is simple to calculate your target heart rate by the following formula, which is known as the Karvonen formula;

$$\text{Target HR} = \text{Max HR} - \text{RHR} \times \text{Exercise Intensity (\%)} + \text{RHR}$$

For Example, if your RHR is 70, your MHR is 175 and your desired exercise intensity is 70% then;

$$\text{Target HR} = 175 - 70 (70\%) + 70$$

$$\text{Target HR} = 105 (70\%) + 70$$

$$\text{Target HR} = 73.5 + 70$$

$$\text{Target HR} = 143.5 \text{ beats/min}$$

## Calculating Fat Burning Heart Rate

Fat burning is best achieved by training in the 60-70% intensity zone.

For Example, if your RHR is 70 and your MHR is 175 then your optimal Fat Burn HR zone will be;

$$\text{HR Zone} = 175 - 70 (60\%) + 70 \text{ and } 175 - 70 (70\%) + 70$$

$$\text{HR Zone} = 105 (60\%) + 70 \text{ and } 105 (70\%) + 70$$

$$\text{HR Zone} = 63 + 70 \text{ and } 73.5 + 70$$

$$\text{HR Zone} = \text{greater than } 133 \text{ and less than } 143.5 \text{ beats/min}$$

Best results will occur when you stay within this heart rate zone for longer durations. i.e. 40 minutes. Build up your workout time gradually. Begin with 20 minutes, 3 times a week and over a few months progress to 30 minutes, 4 times a week.

## Calculating Aerobic Training Heart Rate

Aerobic training is best achieved by training in the 70-80% zone.

For Example, if your RHR is 70 and your MHR is 175 then your optimal Aerobic Training HR zone will be;

$$\text{HR Zone} = 175 - 70 (70\%) + 70 \text{ and } 175 - 70 (80\%) + 70$$

$$\text{HR Zone} = 105 (70\%) + 70 \text{ and } 105 (80\%) + 70$$

$$\text{HR Zone} = 73.5 + 70 \text{ and } 84 + 70$$

$$\text{HR Zone} = \text{greater than } 143.5 \text{ and less than } 154 \text{ beats/min}$$

Best results will occur when you stay within this heart rate zone for medium to long durations. i.e. 30 - 40 minutes. The fitter you become the longer you are able to train within this zone and at an intensity closer to 80%.

## Calculating Anaerobic Training Heart Rate

Anaerobic Training is best achieved by training in the 80-90% zone.

For Example, if your RHR is 70 and your MHR is 175 and then your optimal Anaerobic HR zone will be;

$$\text{HR Zone} = 175 - 70 (80\%) + 70 \text{ and } 175 - 70 (90\%) + 70$$

$$\text{HR Zone} = 105 (80\%) + 70 \text{ and } 105 (90\%) + 70$$

$$\text{HR Zone} = 84 + 70 \text{ and } 94.5 + 70$$

$$\text{HR Zone} = \text{greater than } 154 \text{ and less than } 164.5 \text{ beats/min}$$

At these intensities lactic acid is produced in the working muscles so you will start to feel a burning sensation and fatigue in the muscles quite quickly (as soon as 1-2 minutes after exercise is begun). Be aware that this onset of fatigue can effect posture and technique.

To avoid the onset of fatigue it may be best to alternate periods of work with periods of rest (interval training). For example, 3 minutes of work separated by 3 minutes of rest.

## Maintaining Motivation

To maintain your enthusiasm and motivation, try to vary your exercise program by watching television, listening to music or holding a conversation whilst working out.

In order to ensure that you continue to improve your fitness levels, try to vary your exercise program as much as possible. For example, introduce walking, swimming, or weight-training into your exercise program.

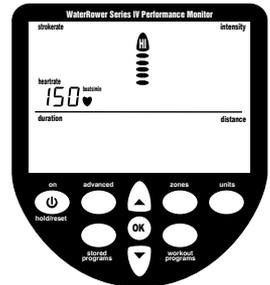
Interval and Pyramid training can also be a way of adding variety to your workouts. Please visit [www.HowToRow.com](http://www.HowToRow.com) for additional ideas on rowing programs or email [advice@watercoach.com](mailto:advice@watercoach.com).

## WaterRower Heart Rate Operation

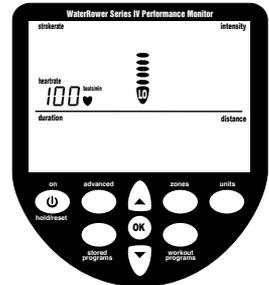
The WaterRower Series 4 Monitor incorporates a heart rate monitoring function which enables the user to not only view their current heart rate on screen, but also set Upper and Lower Heart Rate Zones.

### Setting Heart Rate Zones

The Heart Rate Zone Bar allows you to manually set a maximum and minimum heart rate window using the “Zones” button. Scroll to the Heart Rate Window using the “Zones” Button (the upper Heart Rate unit digits will appear along with the “Heart Rate” flag and the Zone Bar will flash scrolling up to HI). Scroll to the desired Heart Rate upper limit using the Arrow Buttons and press “OK”.



Once the desired upper limit is reached press “OK” (the lower Heart Rate unit digits will appear along with the “Heart Rate” flag and the Zone Bar will flash scrolling down to LO). Scroll to the desired Heart Rate lower limit using the Arrow Buttons. Once the desired lower limit is reached press “OK” and the Monitor will return to Ready Mode.

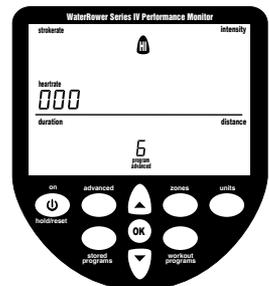


### Advanced Heart Rate Analysis

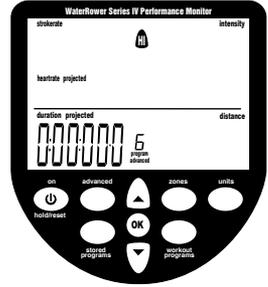
The WaterRower S4 Monitor allows Advanced Heart Rate Workout Analysis. The option is available only during Heart Rate Zone Workouts and must be used following the workout.

Scroll through your Advanced Programs Options using the “Advanced” Button. When Advance Program “6” is highlighted, press OK. Heart Rate statistics will display;

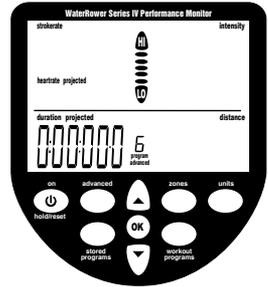
(a) Maximum (peak) heartrate- the maximum Heart Rate achieved



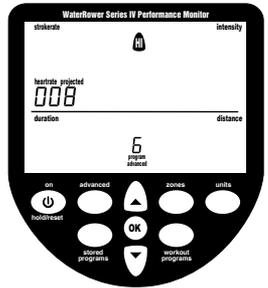
(b) Time spent above the desired Heart Rate Zone- the time spent above the Heart Rate Zone HI setting



(c) Time spent in the desired Heart Rate Zone- the time spent between the Heart Rate Zone HI setting and the Heart Rate Zone LO setting



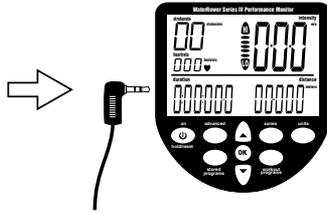
(d) Time spent below the desired Heart Rate Zone- the time spent below the Heart Rate LO setting



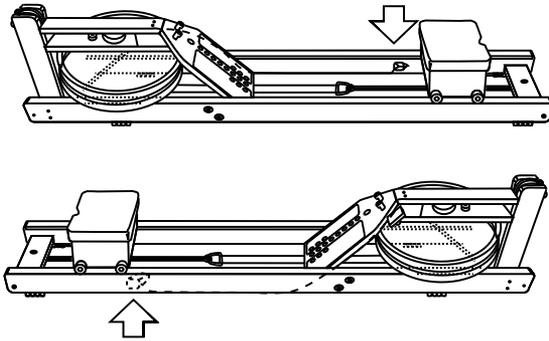
## Polar Receiver Installation

Install the WaterRower Heart Rate Receiver as follows;

Fit the TRS connector into the jack on the side of the WaterRower Series 4 monitor as shown.



Pass the receiver box underneath the footboard and along the inside of the rail until the cable is in the fully extended position as shown.



The receiver box should be positioned towards the bottom edge of the rail ensuring that it is clear from the seat. The receiver box should be orientated so that the joint in the box is horizontal (parallel with the top of the rail) and the circle on the side of the receiver box facing up.

Peel the self adhesive back from the receiver box and fix to rail. Fasten the cable along the rail using the cable clips provided.

## The Polar Chest Belt

The Polar Chest Belt Transmitter is designed to pick up the electrical charges from the heart.

The Polar Chest Belt Transmitter is shipped as two separate items, the transmitter (stiff plastic electrode piece) and an adjustable elastic strap.

## Fitting the Polar Chest Belt Transmitter

1. Attach one end of the elastic strap to the transmitter.
2. Position the transmitter across the front of your chest, just below your pectoral (chest) muscles.
3. Ensure the Polar logo on the transmitter is in an upright position.
4. Adjust the elastic strap so it wraps firmly, but comfortably, around your back and attach the other end of the strap to secure the transmitter.
5. To improve conductivity, you may need to moisten the two electrical charges on the underside of the transmitter with water or saline solution.

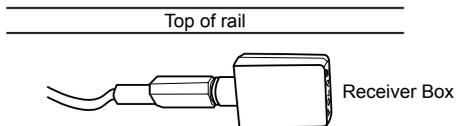
### Tips

1. Attaching the strap to the transmitter initially may be difficult and stiff, but with use it will become much easier.
2. If your heart rate reading is intermittent try sliding the transmitter a little to your left.

### Troubleshooting

Should you experience any difficulty with your Heart Rate Monitor function, please check the following items;

1. Have the chest belt transmitter contacts been moistened?
2. Is the Chest Belt being worn centrally on the torso, just below the chest, adjacent to the heart?
3. Has the receiver plug been inserted correctly?
4. Has the receiver box been positioned so that the joint in the box is horizontal to the rail?



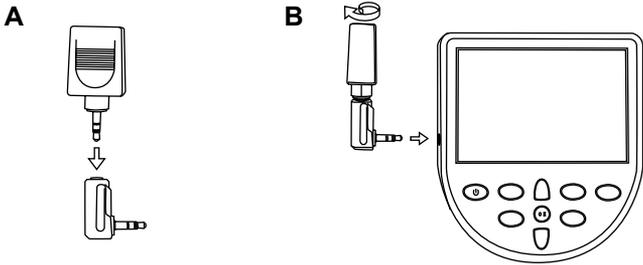
5. Have you tried adjusting the position of the receiver box? Sometimes positioning the receiver box nearer to the footboard on the rails helps with picking up the signal.

Should you be unable to rectify these problems then please contact WaterRower, at [support@waterrower.com](mailto:support@waterrower.com) or online at [www.waterrower.com](http://www.waterrower.com).

## External ANT+ Receiver Installation

Install the WaterRower Heart Rate Receiver as follows;

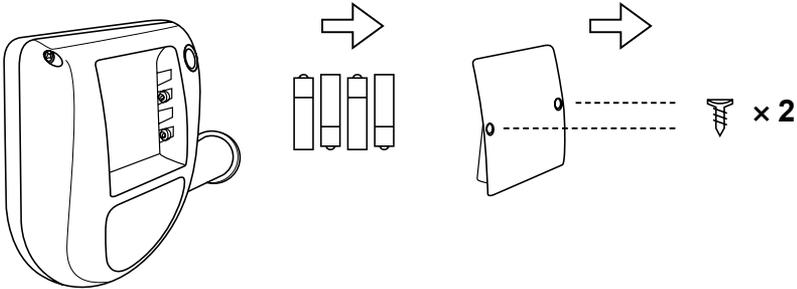
Fit the ANT+ External Receiver into the right angle connector (A), then plug the assembly into the TRS jack on the side of the S4 monitor (B).



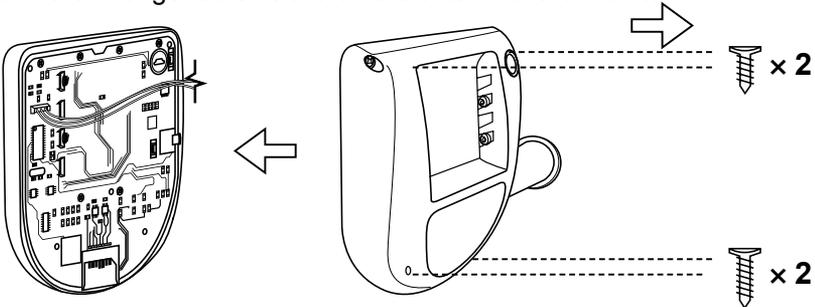
## Internal ANT+ Receiver Installation

Install the WaterRower Heart Rate Receiver as follows;

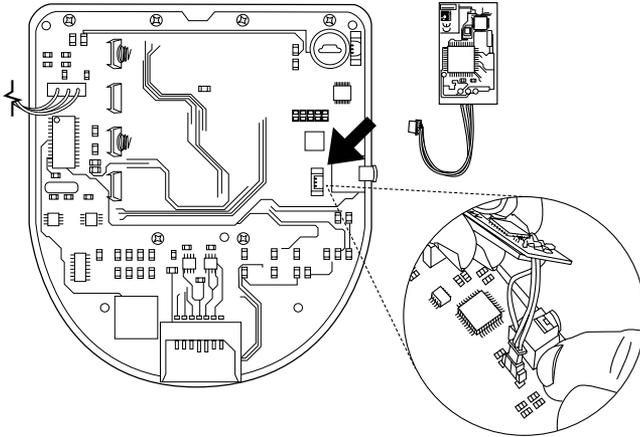
To install the Internal ANT+ chip, first remove the batteries by unscrewing the two screws holding the door closed.



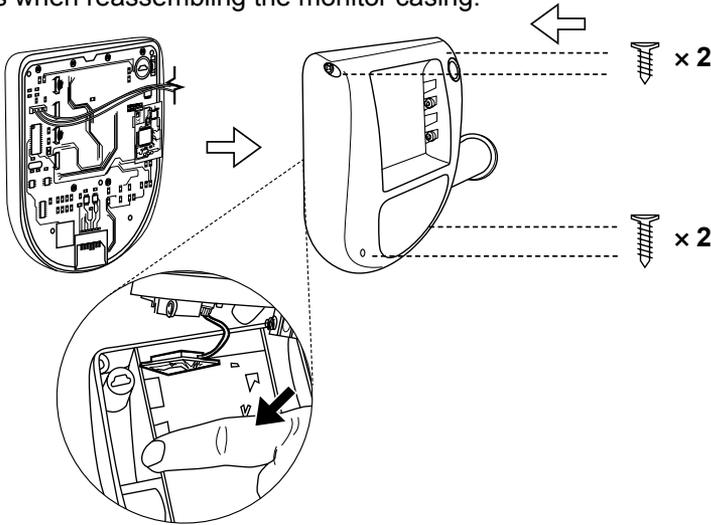
Remove the back cover of the monitor by removing the 4 screws from the back of the monitor. Please note that the 2 smaller screws are on the top, and the 2 longer screws are on the bottom of the monitor.



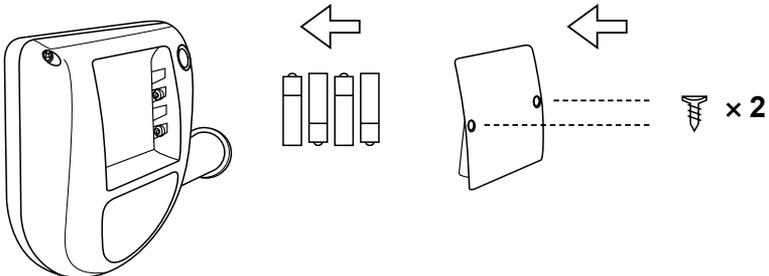
Plug the Internal ANT+ Receiver into the receptacle on the back of the monitor's circuit board. Make sure to clip the receiver firmly in place.



Screw the back plate back onto the monitor. The ANT+Internal Receiver fits into a hollow in the monitor's back plate. Make sure not to pinch any wires when reassembling the monitor casing.



Replace the batteries and the battery cover onto the S4 monitor.



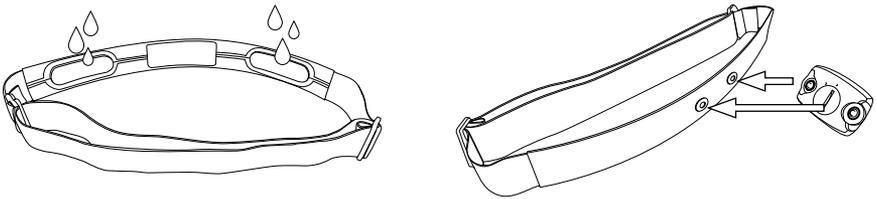
## ANT+ Chest Belt Transmitter

The ANT+ Chest Belt Transmitter is designed to pick up the electrical charges from the heart.

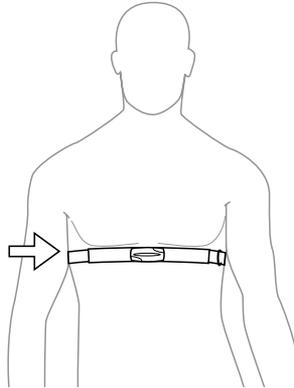
There are two parts to the ANT+ Chest Belt. The adjustable chest belt, and the transmitter that connects to the belt.

### Fitting the ANT+ Chest Belt

Moisten the electrodes on the inside of the Chest Belt with water or saline solution and snap transmitter to the front of the Chest Belt.

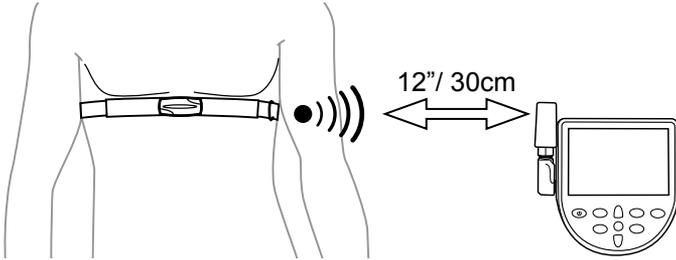


Position the transmitter across the front of your chest, just below your pectoral (chest) muscles.

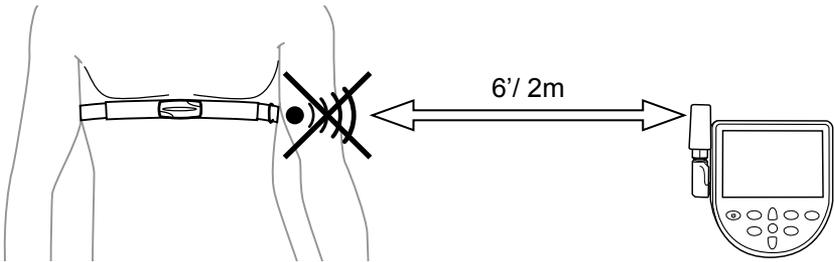


## Syncing the ANT+ Chest Belt

To make the connection between the S4 Monitor and the ANT+ heart rate transmitter, turn the monitor on, have the transmitter roughly 12 inches/ 30 centimeters away from the monitor. This will allow the transmitter and receiver to sync.



To break the connection between the S4 Monitor and the ANT+ heart rate transmitter, move away 6 feet/ 2 meters or more from the monitor.



The S4 Monitor will automatically turn off after 2 minutes of idle time.



## **WaterRower**

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