



## UK Specialists in Sports Watches and Heart Rate Monitors [www.redlionsports.co.uk](http://www.redlionsports.co.uk)

### Heart Rate Monitor basics from the start.....

By David Knight - Personal Trainer and Managing Director of Red Lion Sports

#### **Introduction**

Red Lion Sports are dedicated specialists in Heart Rate Monitors and Sports Watches. We have sold many thousands of watches to people from all over the world and as a result have built up an excellent knowledge of the products we sell. I have used this knowledge with my experience as a qualified personal trainer to put this simple guide about heart rate monitors. Following are some of the questions that we are frequently asked by people considering the purchase of a heart rate monitor. This document is intended not only to offer advice to our customers but it is also intended to be helpful to anyone who is unsure about Heart Rate Monitors.

#### **What is a Heart Rate Monitor and what does it do?**

A heart rate monitor is a device that measures the frequency of your heart beat. In a similar way to that of hospital ECG machines they use electrodes to measure the beats of the heart. They then transmit this information to the wrist receiver (the watch) for viewing and analysing.

Heart rate monitors are manufactured by many major brands including Timex, Cardiosport, Nike, Oregon Scientific, Speedo, Garmin and Polar all of these brands can be found on the Red Lion Sports website. They vary widely in price and also in the number of functions and features they offer. The basic entry level heart rate monitors may simply only display your current heart rate - they may not even have a facility to tell the time or give you the date. If you purchase a 'mid range' heart rate monitor you may find that it provides you with additional information such as the amount of calories you have burned. Heart Monitors may also come with heart rate training zones which allow you to ensure that you are training at the correct intensity (see - Which Heart Rate Zone do I need to train in? below). The top-of-the-range heart rate monitors come with even more features that will allow you to further review/analyse and plan your workouts. Finally, several manufacturers are now combining heart rate monitors with Speed and Distance systems to allow you to also monitor information such as distance covered and pace.

#### **How Heart Rate Monitors Work.....**

Heart rate monitors actually obtain a pulse reading by picking up the minute electrical signals given off by the heart each time it beats. These signals are detected by highly sensitive electrodes fitted to either a chest strap in the case of 'normal' heart rate monitors or fitted to the face of the watch itself in the case of the strapless systems (see Should I get a Strapless Heart Rate Monitor? below).

#### **What are the Benefits of Training with a Heart Rate Monitor?**

Measuring the frequency of your heart beat is an excellent way of monitoring exactly how hard your body is working. Put quite simply, the harder you work the more oxygen your muscles need. Your heart has to beat faster in order to transport oxygen rich blood to areas where it is needed as well as to remove waste products produced by your working muscles.

As you get fitter your body becomes more efficient at using the available oxygen. As a result there is a decreased demand for oxygen from the working muscles. This means that the heart has to work less hard and beat fewer times in order to supply your working muscles with oxygen. In time as you get fitter you will see your heart rate reducing. For example, you may find that your times are reducing for your 'usual' distance but you don't feel like you are working any harder, or, you find that your average heart rate for a specific workout is getting lower.

Here is a summary of just some of the main benefits of training with a heart rate monitor.

1. **Specific to You** - Heart rate monitors allow you to train at a level specific to you.
2. **Know How Hard you are Working.** - Heart rate monitors give precise information about how hard your body is working.
3. **Efficient Training** - A heart monitor will allow you to ensure you get the most out of what training time you have available.
4. **Monitor Improvement** - Heart monitors allow you to easily measure how your body has adapted to exercise over time.
5. **Motivation** - As heart rate monitors allow you to monitor your improvements this in turn will motivate you keep training to keep the your fitness levels up and to improve further still.
6. **Fine tune your Training** - By allowing you to train in specific heart rate zones a heart rate monitor will allow you to be precise about the type of training you are going to do. For example - fat burning, improve endurance or raise aerobic intake.
7. **Prevent Overtraining** - Heart rate monitors can help to prevent you overtraining (see How do I calculate my resting heart rate? below).

### Should I get a Strapless Heart Rate Monitor?

We get many enquiries from customers asking if we sell a strapless heart rate monitor. These enquiries are usually from people who feel that they would be uncomfortable wearing a chest strap while exercising. While a very small percentage may find a chest strap uncomfortable the vast majority of people find that they completely forget that the strap is there once it has been on for a couple of minutes. It is like wearing an item of clothing, jewellery or a watch - once put on you soon forget all about it.

Heart Rate Monitors with a strap have a distinct advantage over their strapless rivals. The wearing of a strap means that your monitor can provide you with constant information about what your heart is doing. This allows you to easily train within your 'heart rate training zone' (see Which Heart Rate Zone do I need to train in? below). Strapless systems will only provide your pulse rate after you have actually activated the monitor by placing your fingers in the appropriate place on the sensors - they will only provide heart rate at that specific time.

Having said that strapless systems are still very popular. People will generally choose a strapless system for one of the following reasons.

1. They wish to monitor their heart while taking part in a sport or pastime that doesn't suit the wearing of a strap. 'With chest strap' heart rate monitors rely on maintaining a good contact between the electrodes on the strap and the user's chest. Some activities prevent this constant bond and as a result the heart rate reading is obstructed. Swimming is one such sport. The action of swimming combined with the movement of water across the chest can interfere with the contact and therefore interrupt or stop the heart rate monitoring. We would not recommend the use of a 'with strap' system for constant monitoring while swimming. Swimmers can use a strapless system and obtain their pulse at the end of a session or length simply by placing their fingers onto the watch.
2. They really do not like the feel of the strap in their chest during exercising. As stated above most people forget the strap is there. The strap should not be worn too tightly, just tight enough to hold it in place.
3. Constant monitoring is not wanted or needed. Some people are perfectly happy to take their heart rate at a specific time and do not wish to workout in a 'heart rate zone'.
4. Medical reasons. Many of our customers have purchased the strapless systems after being diagnosed with a medical condition that requires them to keep a close eye on what their heart is doing. This is very often after receiving advice from their doctor.

### Once I get my Heart Rate Monitor how do I use it?

Depending on how accurate and how specific you want your training to be you have two options.

1. The basic way.  
For those that are new to training with a heart rate monitor or simply do not need high levels of accuracy this is probably the way for you. First of all you will need to calculate your maximum heart rate. Our maximum heart rate decreases approximately one bpm (beat per minute) per year with the average start value being 220 for males and 226 for females. Therefore to calculate your current maximum you subtract your age from the number 220 (or 226), for example I am a male aged 33 so my maximum heart rate would be about 187 beats per minute ( $220-33=187$ ). This 187 figure is your maximum heart rate. Now you have your maximum heart rate figure you can start to work out what level you want to train at. These 'levels' are shown as a percentage of your maximum heart rate i.e. 50% MaxHR (maximum heart rate). Take a look at the table below to see what you want to achieve from your workout and then train with your heart rate 'in that zone'.

2. The slightly more complicated but more accurate way.

A more accurate method of calculating your heart rate zones is by using the Karvonen formula. This formula calculates your training zones by taking into account your resting heart rate (see below for working out your resting heart rate) *and* your maximum heart rate. Your resting heart rate is a good gauge of your current level of fitness so this method takes into account both your age (as discussed above) *and* current fitness level. First of all you subtract your resting heart rate from your maximum. You then work out the heart rate percentage at which you want to work i.e. 60%-80% before adding your resting heart rate back on to that figure.

For example, let's say your resting heart rate is **60** beats per minute and you are **40** years old.

**Step 1.** (220) - (your age) = MaxHR

$$220 - 40 = 180 \text{ (MaxHR)}$$

**Step 2.** (MaxHR) - (resting heart rate) = Heart Rate Reserve (HRR)

$$180 - 60 = 120 \text{ (HRR)}$$

**Step 3.** (HRR) x (lower training percentage 60%) = Lower Training Zone Percentage of HRR

$$120 \times 60\% = 72$$

**Step 4.** (HRR) x (upper training percentage 80%) = Upper Training Zone Percentage of HRR

$$120 \times 80\% = 96$$

**Step 5.** Lower Training Zone Percentage of HRR + Resting Heart Rate = Lower Heart Rate Zone Target

$$72 + 60 = \underline{132}$$

**Step 6.** Upper Training Zone Percentage of HRR + Resting Heart Rate = Upper Heart Rate Zone Target

$$96 + 60 = \underline{156}$$

Therefore to train with your heart rate in the 60% to 80% zone you will need to keep your heart rate between 132 beats per minute (bpm) and 156 bpm

Working out your training limits in this way may seem a little complicated at first but you will soon get used to the formula. Also, many of today's heart rate monitors will automatically calculate these zones for you once you have entered your personal information.

### How do I Calculate my Resting Heart Rate?

This is quite simple. In the morning when you wake up and before you get out of bed take your pulse. Either count your pulse for 15 seconds and multiply by 4 or count your pulse for a full minute - do this for three mornings in a row. You will end up with three figures e.g. 62, 65 and 57. Now work out the average of these figures by adding them together and dividing by three -  $62+65+57 = 184$ ,  $184$  divided by  $3 = 61$ . Your resting heart rate is therefore 61 bpm.

For best results you should conduct this test in 'normal' circumstances (see the factors that affect heart rate below).

### Is there a More Accurate Test to Calculate Maximum Heart Rate?

The 220-age formula mentioned above is a very general calculation. It is worked out using the 'average' person (whoever that is, in my experience very few people are average!). The 220 minus age formula used above is a very rough formula and can be very inaccurate. For example, I am 33 so my maximum heart rate should be 187. My actual maximum heart rate is 210; I know this as I have carried out a maximum heart rate test (see below). The 220-age formula will be ok for most but if you are looking to be more precise with your training there is another method - The maximum heart rate test.

The maximum heart rate test as the name suggests is an extremely demanding test. It will involve you completing a task that literally works you to your maximum. This type of test should never be conducted unless you are in good health and already have a good level of fitness. If in any doubt get the go-ahead from your doctor first. In any case, if you do decide to conduct a maximum heart rate test take someone with you, just in case.

There are numerous different ways of conducting a maximum heart rate test. I have put two examples below.

**For all of these tests please ensure that you have warmed up thoroughly prior to starting.**

1. The Hill Test

For this test you need a hill which will take you about two minutes to run from bottom to top. It also needs to be steep enough to make you feel like you will find it very hard work to run to the top without stopping. Firstly run up the hill at about 90% effort. By the time you reach the top you should be breathing hard but not completely exhausted. Once at the top turn and run back down the hill at a medium pace. Once back at the bottom turn and run back up the hill at around 95% effort. At the top again, turn and run at a medium pace back down. On the final ascent of the hill give it 100% effort. You need to push as hard as you possibly can so that you feel like you will not reach the top without stopping. During this third ascent monitor your heart rate and watch for the maximum. You will probably find that this occurs around a half to three quarters of the way up the hill - Remember this reading!! I can't stress this enough as many people forget it due to the near exhaustion they are feeling and you won't feel like completing this test again in a hurry! - Some heart rate monitors will actually record your maximum heart rate for you.

2. The Track Test

This test is good for those you can't find a suitable hill. It doesn't have to be completed on a track any safe, flat piece of road will do but it will need to be at least 400 metres (0.25km's) long. For this test you will be running the 400m stretch twice. The first stretch should be run so that you reach 90-95% effort as you near the end. At the end of the stretch you should be breathing very heavily but should not be at the state of exhaustion. Immediately after completing the first 400m run the second 400m stretch. This time you should be trying to get to 100% effort. It is during this stretch that you should note your maximum heart rate - again, don't forget it!

**Which Heart Rate Zone do I need to train in?**

**50 - 60% of Maximum Heart Rate - Maintain Healthy Heart/Get Fit**

The easiest zone and probably the best zone for people just starting a fitness program. It can also be used as a warm up for the more intense exercise to come. This zone has been shown to help decrease body fat, blood pressure and cholesterol. It also decreases the risk of degenerative diseases and has a low risk of injury. Approximately 85% of calories burned in this zone are fats.

**60 - 70% of Maximum Heart Rate - Lose Weight and Burn Fat**

This zone provides the same benefits as the healthy heart zone, but is more intense and burns more total calories. Approximately 85% of calories burned in this zone are fats.

**70 - 80% of Maximum Heart Rate - Increase Stamina and Aerobic Endurance**

The aerobic zone will improve your cardiovascular and respiratory system and increase the size and strength of your heart. This is the zone you should spend most of your time in if you are training for an endurance event. Approximately 50% of calories burned in this zone are fats.

**80 - 90% of Maximum Heart Rate - Improve Oxygen Uptake and Raise Lactic Threshold**

Benefits of this zone include an improved VO<sub>2</sub> maximum (the highest amount of oxygen one can consume during exercise), and an improved cardio respiratory system. This zone also improves the way your body deals with lactic acid which in turn means improved endurance.

As this is an anaerobic zone the majority of calories burned comes from energy stored in your muscles therefore calories burned from fat reduces to 15 %.

**90 - 100% of Maximum Heart Rate - The Red Zone**

This zone is used to further improve your oxygen uptake and improve the way your body deals with lactic acid. If you are working in this zone you are working at or near your absolute maximum and will only be able to work at this rate for very short periods of time. This zone is usually used by athletes during an interval training session where they may do several cycles of work at 80% maximum heart rate for several minutes followed by one minute in this zone. Again this is an anaerobic zone and only 10% of calories burned come from fat.

**Is there anything else that can affect your 'normal' Heart Rate?**

For the vast majority of the time your heart rate will be at a 'normal' level and you will be able to train and monitor your heart as usual. There are however, certain factors that can affect your heart rate and you should be aware of these to ensure you can adapt your training appropriately. Some of the main factors are listed below.

1. The Heat

The temperature of the environment which you are training in can have a major impact on your heart rate. Simply put, unless you are specially conditioned to train in hot or humid conditions you will probably find that

your heart rate is considerably higher than normal (when training at the same intensity), you should adjust the intensity of your training appropriately.

2. Dehydration

The average human being consists of approximately 60% water. It is no great surprise then that when we are dehydrated our performance suffers. When you are dehydrated your blood volume drops resulting in your heart having to work harder to supply oxygen and nutrients to the working muscles. Heart Rate Drift is also a direct result of dehydration. Heart Rate drift is a phenomenon that is more likely to appear in people who are taking part in an endurance training session or endurance event. As you train you naturally lose fluid through sweating this fluid loss can cause your blood volume to drop and as a consequence your heart rate increases. It is for these reasons that it is extremely important that you remain as fully hydrated as possible before, during and after an exercise session, especially if the session is what you would consider to be an 'endurance session'.

3. Time of day

Your heart rate varies throughout the day. The average person's heart rate will be lower in the morning than in the afternoon. This should be considered if you are a regular morning trainer and then switch to train in the afternoon or visa-versa.

4. Illness

As already mentioned your heart rate is a great indicator of how your body is performing. Sometimes when you are starting to suffer from an illness of some kind your heart rate will be slightly raised. You may notice this even when you have not even suffered any other symptoms.

There are many other factors that can have an impact on your heart rate, the above are just a few of the main ones just to give you an idea of how basic everyday things can affect the frequency of your heart beat. Also, don't forget that we are all different and different people will be affected by different factors and to differing degrees.

## Conclusion

There is no doubt that when used correctly a Heart Rate Monitor can greatly improve the way you train and help you achieve your fitness goals more efficiently. We will be constantly adding to this document as further heart rate monitor related issues and questions are raised. If you have anything that you feel should be included then feel free to email us at Red Lion Sports [sales@redlionsports.co.uk](mailto:sales@redlionsports.co.uk)

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