

RR03 Transponder

Manual



Imprint

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Product

Model: RR03

Regulatory

FCC 15.21

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

FCC 15.19

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

- (1) This device may not cause interference.
- (2) This device must accept any interference, including interference that may cause undesired operation.

RSS GEN Issue 5

This device contains licence-exempt transmitter(s)/receiver(s) that comply with Innovation, Science and Economic Development Canada's licence-exempt RSS(s). Operation is subject to the following two conditions:

- (1) This device may not cause interference
- (2) This device must accept any interference, including interference that may cause undesired operation of the device.

Cet appareil contient des émetteurs / récepteurs exemptés de licence conformes aux RSS (RSS) d'Innovation, Sciences et Développement économique Canada. Le fonctionnement est soumis aux deux conditions suivantes:

- (1) Cet appareil ne doit pas causer d'interférences
- (2) Cet appareil doit accepter toutes les interférences, y compris celles susceptibles de provoquer un fonctionnement indésirable de l'appareil.

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1. Description

The RR03 transponder is an active transponder for time keeping in different sports. There are 4 variants of the transponder which are suitable for different sports or different needs.

ActiveBasic V3

The ActiveBasic V3 is designed for clubs and events that appreciate the reliability of active technology but don't have high accuracy needs.

ActivePro V3 (Endurance)

The ActivePro V3 (Endurance) combines high accuracy and speed with long battery life, store mode and tracking.

ActivePro V3 Performance

The ActivePro V3 Performance is the high end version of the transponder, designed for pro races. It delivers the highest accuracy, most stable data transmission in sprint finishes, additional tracking data and store mode.

MotorKart V3

The MotorKart V3 transponder is designed for the timing of go-karts, optimized to avoid electrical interferences at detection heights smaller than 0.5 m. It ensures highest reliability and precision over tens of thousands of rounds of kart racing.

For more information, see chapter [Technical Details](#).

2. Mounting the Transponder

CAUTION

Make sure that the active transponder is at least 5 mm away from the body after it is attached.

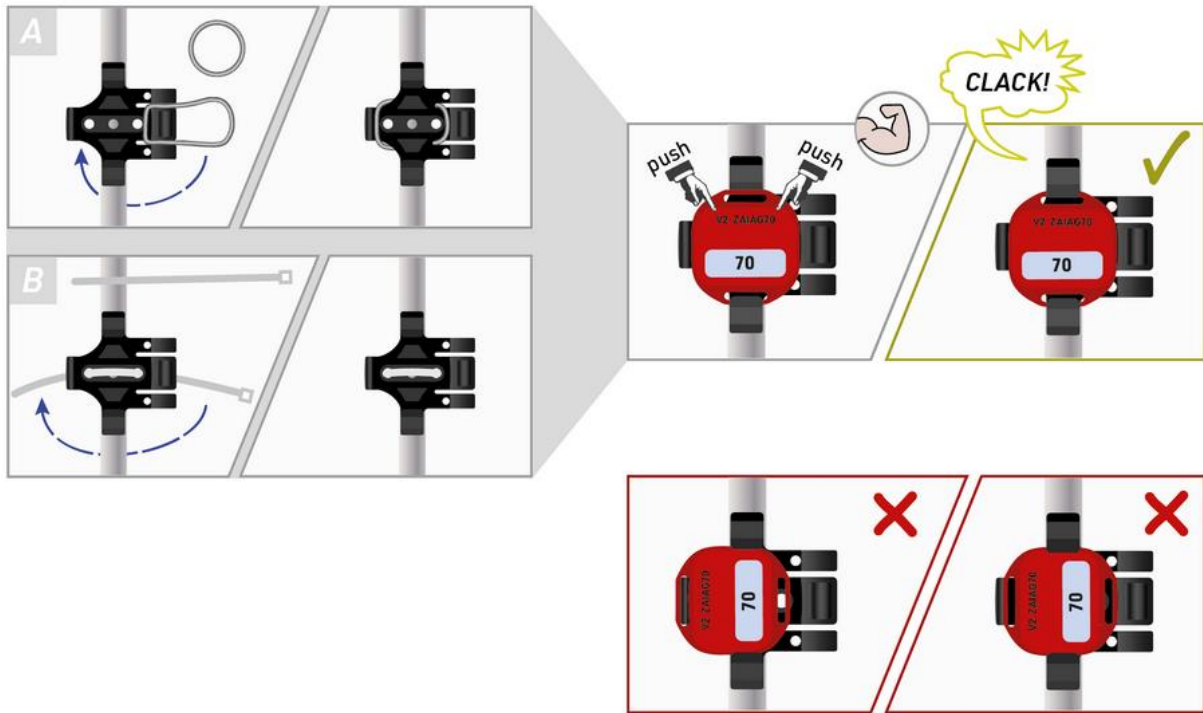
Active Transponders can be worn in different ways:

Active Chip Holder

When fixing to a bike or go-kart, we recommend using the **Active Chip Holder** to separate the transponder and any metal parts which may impact the transponder activation.

There are three ways how to attach the holder:

- Use one of the O rings to attach it to a pipe.
- Feed a cable strap through the holes.
- Use a screw.



Velcro® Strap

The transponder can be worn on a Velcro® Strap, e. g. on the ankle.

NOTE: When you are using a Velcro® Strap, make sure the transponder code facing outwards and the strap is not covering the transponder.



Shoelaces

The transponder can be tied directly in the shoelaces of your shoes.

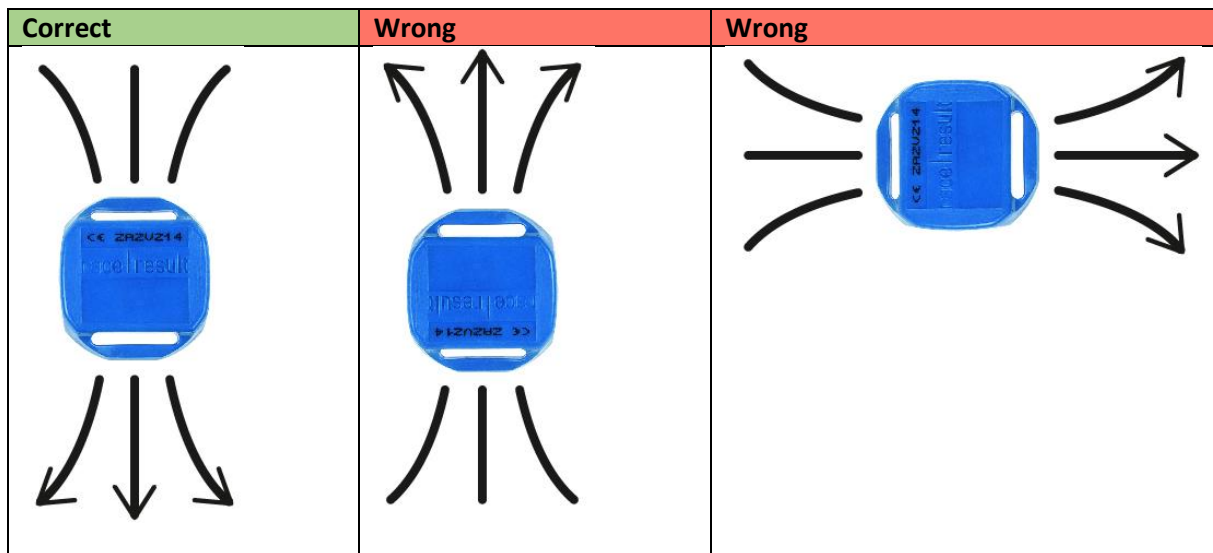
2.1 Activation Orientation of the ActiveBasic

The ActiveBasic transponder has a 1-directional activation field. This means it will only be activated reliably when orientated the correct way.

NOTE: This does not apply to the ActivePro or MotorKart transponders.

Simple rule of thumb:

You must be able to read the transponder code **HORIZONTALLY** from in front, from the back or from the side of the participant. If you need to bend your head to read it, or if you can only read it from above or beneath the transponder it is **WRONG** attached!



3. Modes

3.1 Tracking Mode

With the Tracking Mode you can live updates on maps and easily add many more split times to your race, without additional GPS trackers for the athletes.

The active transponders, that support this mode, send a ping in tracking mode, which is received by track boxes along the route. The Track Boxes forward the transponder signal, including GPS location and time, to the timing software or to a preconfigured URL. The accuracy is around 1s.

Application Scenario: Triathlon bike course live update

The Track Boxes are placed along the track. They need no detection loop on the road. They wirelessly detect the athletes passing by. On a map, spectators can follow the progress of their favorite athletes.

Application scenario: Checkpoint on remote location

For a mountain bike race, a volunteer brings the Track Box to the top of a mountain pass. Without needing to carry a whole timing system to the remote location, you can now get live data of participants reaching the checkpoint and can provide this data to the race officials.

3.1.1 Activating the Tracking Mode

Transponders only send track pings when the Tracking Mode is activated. There are 2 options to activate the Tracking Mode:

Scan the transponder manually:

1. Set a Management Box to TRACK > START mode.
2. Choose one channel for tracking.
NOTE: This channel should not be used for timing at all, and all the active Track Boxes used at the event should be set to that channel too.
3. Connect the small brass antenna which is supplied with the Management Box.

4. Scan all your chips at once before chip collection starts.
NOTE: Scanning them one-by-one as participants collect their chip is also an option, but it is easy to forget one.

Setup an extra loop for the Tracking Activation

1. Set a Management Box to TRACK > START mode.
2. Choose one channel for tracking.
NOTE: This channel should not be used for timing at all, and all the active Track Boxes used at the event should be set to that channel too.
3. Setup an active loop at a location that all participants will definitely cross.
NOTE: If there is a timing system at the start, avoid putting the activation loop close to it. We recommend leaving a gap of at least 20 m between the timing loop and the tracking activation loop.
4. Your tracking activation loop should be 60 cm wide.
5. Connect the Management Box to the loop.

The Management Box displays a count of single activations.

3.1.2 Deactivating the Tracking Mode

The Tracking Mode on transponders can also be deactivated:

1. Set a Management Box to TRACK > STOP mode.

3.2 Store Mode

Save split times on the transponder, that support this mode, and transmit them at the next main timing location.

When live timing at remote split points is not possible or necessary, you can use the Store Mode to save split times on the transponder. You can do this for example with our Loop Box. At a later timing point all saved split times will be collected from the transponder with a timing system and transmitted to the software.

Application Scenario: MTB Downhill

The start time is recorded by a Loop Box and stored in the transponder, as are the sector times along the course. At the finish line, the transponder transmits all times collected to the main timing system. The software now calculates the overall and sector times. Instead of several main timing systems, you only need one, and add the smaller and cheaper Loop Boxes to start and split points. Neither a cable connection nor mobile phone reception is necessary at those timing points.

3.2.1 Activating the Store Mode

There is no need to activate the Store Mode on the transponder. The Loop Box triggers the mode when it is set on the Loop Box.

4. Battery

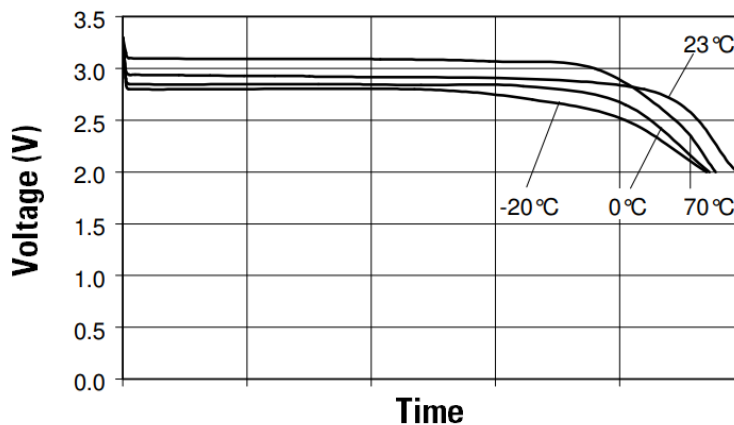
The RR03 transponders report their battery level in the timing module with every single detection. Alternatively, when you scan the chip with a USB-Timing Box or Management Box you can view more details via the RACE RESULT TagTool.

It is not possible to determine the exact voltage brand new transponders should display, since the voltage depends on a few factors, including temperature, but it should be above 2.7 V.

After a couple of years of usage, you should start monitoring the battery level of your transponders.

We do not recommend using transponders with a voltage of 2.3 V and below. The battery cannot be replaced, as the transponders are sealed, and they would not be waterproof anymore after being opened. Once the battery is empty, you will need to buy a new transponder.

The discharge curve of the battery gets very steep at the end of life, at 2.2 V it is almost empty. Theoretically, transponders can work down to 1.8 V, but we cannot guarantee reliable operation, especially when used cold.



4.1 Active Transponder Battery Testing

Almost empty batteries will start to create problems in the cold. When a battery is too low it may result in a reset, this leads to lost stored passings and deactivated tracking. A reset can best be detected by looking at the wakeup count - if it reports a lower value than before, the transponder has reset (a continue counting from 2000 shows that the restart is caused by a low battery).

This would be a typical empty battery transponder. It was able to generate a first passing with a regular Wake Up Count (WUC). Then it reset after sending the prewarn (which generated a rescue passing) during a passing. On the next WUC it restarts with 2001.

Gültig	Messstelle	Zeit	Dekoder	Transponder	Order	Hits	RSSI	Loop	CH	WUC	Batt	Temp	SFlag	Ergebnis
Zielschluss 10:44:36,35														
<input checked="" type="checkbox"/>	ZIEL	10:28:31,26	D-4294	199		42	-86/5	1	1	2002	2.3V	3°C		124: Messung4
<input checked="" type="checkbox"/>	ZIEL	10:19:12,225	D-4294	199		53	-86/4	1	1	2001	2.5V	3°C		123: Messung3
<input checked="" type="checkbox"/>	ZIEL	10:10:06,873	D-4294	199		1		1	1	1	2V	-20°C		122: Messung2
<input checked="" type="checkbox"/>	ZIEL	10:01:30,0	(Manuell)											121: Messung1 ✘
<input checked="" type="checkbox"/>	ZIEL	09:53:00,444	D-4294	199		51	-86/8	1	1	4244	2.3V	8°C		120: Messung0
Startzeit (T0) 09:52:50,6											U17 w (2003/2004), Minimale Rundenzeit: 00:04:00,0			

How to test if the battery is almost empty:

1. Put your transponders in a normal fridge cooling them down to about 5°C (40°F). You will need to leave them there for several hours for the transponders to cool down. Scan your transponders - if you see battery values 2.3 V and below at around 5°C (40°F) - they will need to be replaced.
2. Only if you are timing winter sports: put your transponders in a freezer overnight to make them cool down, then check if they still detect. Be aware: they are expected to stop detecting below -10°C (14°F) when they have under 50% battery. They will still be perfectly fine for normal temperatures, but if expect temperatures below -10°C on your event, you need to use newer transponders.

4.2 Getting the best Active Transponder Battery Life

To maximize the battery life of your transponders there are some key factors which affect the battery drain, understanding these will help to ensure you achieve the maximum life of your transponders.

4.2.1 Transponder Activation

The largest source of battery drain on a transponder is when the transponder is being activated by a magnetic field, when it is activated, it is constantly checking for a valid loop pattern.

The primary source of this comes from the timing loop, therefore if a transponder is held over a loop for a longer period, then the battery drain is significantly increased. A transponder held over a loop for 10 s is approximately equivalent to 20 passings (<0.5 s). Allowing transponders to be held over a loop, such as at a start line, for long periods should be avoided.

Other sources of magnetic fields will also result in increased battery drain, sources can include:

- Mains power cables (AC power)
- Cars with keyless start
- Motors / Machinery

4.2.2 Temperature

Cold temperatures will reduce battery life of any electronic device, at lower temperatures there is greater internal resistance which thus lowers the ability of the transponder to provide the power. The capacity remains the same, so when returned to normal temperatures the transponder can still provide regular power. A transponder may report 2.6 V at 25°C (77°F) but may also reset at -10°C (14°F). Prolonged exposure to higher temperatures may also results in a reduced battery life.

4.2.3 Tracking

Using tracking mode on transponders uses additional battery resources, the ActivePro transponders offer up to 2000 hours of tracking life from new, 20 hours of tracking is equivalent to about 1% of the normal battery life.

Remember that all battery usage is cumulative so after 1 year of use then only 1600 hours will remain, 1 year of normal use is also equivalent to roughly 16.5 days of continuous tracking.

General practice is to activate transponders at the start of an event and deactivate them using a management box as soon as possible at the end of the race.

4.2.4 Deep Sleep Mode

Deep sleep mode can extend the standby life of a Transponder by up to 40%, you could therefore expect 7 years of life of a transponder which was never used.

When entering deep sleep mode, you should consider that power is drawn when activating the transponder to enter deep sleep mode and again when coming out of deep sleep. If you scan transponders multiple times with the management box. Therefore, as a rule, we recommend only entering deep sleep if transponders will not be used for 1 month or more.

4.2.5 Storage of Transponders

Taking note of the factors which affect batteries, how and where transponders are stored will affect their battery life. These tips will ensure maximum life of your RR03 transponders:

- Store in a cool, dry environment, <20°C, when not in use.
- Keep away from power cables or any source of AC power, remember that cables may be embedded in walls.
- Don't store next to machinery which may draw large amounts of power or contains motors such as commercial printers.
- Avoid leaving in vehicles when not necessary, especially those with keyless start / entry.
- De-activate tracking mode as early as possible.

Use a Management Box to put transponders to deep sleep when not used for prolonged periods of time.

5. Technical Details

	ActiveBasic V3	ActivePro V3 (Endurance)	ActivePro V3 (Performance)	MotorKart V3
Warranty¹⁾ / Battery lifetime				
Years	4 years	5 years	3.5 years	3.5 years
Passings	50,000	100,000	50,000	300,000
Tracking fast / slow	–	400 / 1000 days	150 / 300 days	150 / 300 days
Detection				
Accuracy	0.2 s	0.004 s	0.004 s	0.004 s
Max. speed	60 km/h	120 km/h	150 km/h	120 km/h
Resolution ²⁾	0.001 s	0.001 s	0.001 s	0.001 s
2.4 GHz backup	dual	dual	quad	dual
Exit passing precisson	170 ms	100 ms	50 ms	170 ms
Reaction time	500 ms	250 ms	125 ms	125 ms
Loop antenna	2D	3D	3D	3D
Prewarn	–	–	✓	–
Detection height	2 m	2 m	2 m	0.5 m

Tracking				
Max. time between Track Boxes	–	5 h	5 h	5 h
Max. time between Loops	–	25 h	25 h	25 h
Typical track ping range	–	50 m	200 m	50 m
Activation	–	Loop ID 8 + Channel ID 8	Loop ID 8 + Channel ID 8	Management Box
Adaptive track ping intervals	–	5 s / 2 s / 1 s	1 s / 0.5 s	1 s / 0.5 s
Store Mode				
Max. passings stored	–	64	128	128
Max. store time	–	12 h	24 h	12 h
Store Mode precision	Temperature compensated +-5 ppm			
Temperature	-25 °C – 70 °C			
Features				
Extra transponder code	✓	✓	✓	✓
Adaptive noise avoidance	✓	✓	–	–
Key-value store	✓	✓	✓	✓
Deep sleep mode	✓	✓	✓	✓

1) The value reached first is applied

2) when using Ubidium

Note: All data apply to the optimal configuration of the RACE RESULT hardware. More information about the setup can be found in our [Knowledge Base](#).