

PowerTap P1 Pedals



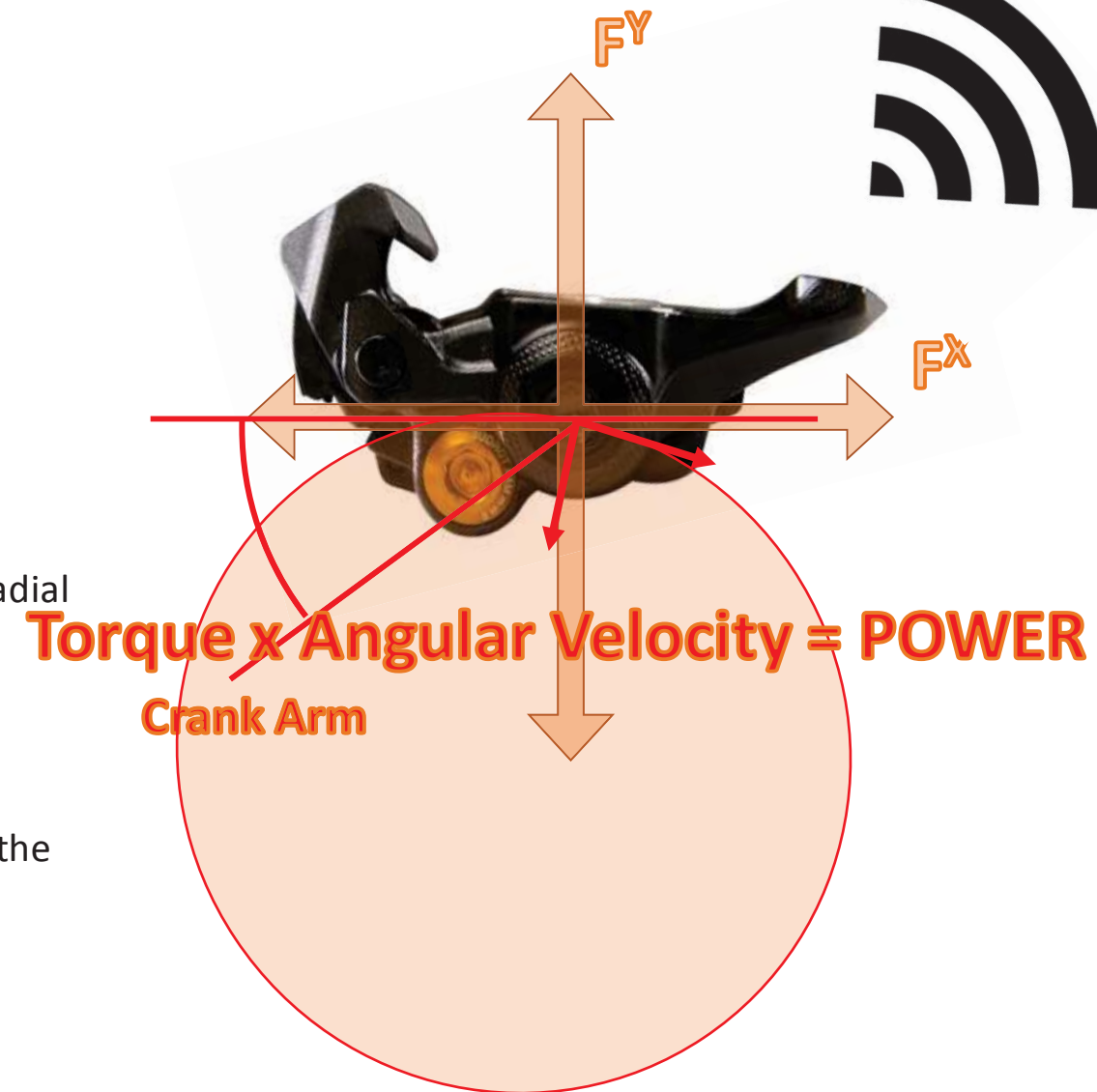
Topics of discussion

- Overview of the P1 pedal power meter
 - - FAQs
 - - Release timing
 - - Service/Warranty claims
 - - Crash replacement
 - - Allocation plan
 - - Samples
 - - Q&A

Q - How is the P1 measuring power?

ANSWER

1. As the user applies load to the pedals, strain gages measure the forces in two planes (X and Y).
2. A custom angular encoder measures the relative position of the pedal body to the crank arm.
3. This allows the vector translation of the two forces X and Y into radial and tangential.
4. Multiplying the tangential component of force by the crank arm length results in the user applied torque.
5. Further multiplying the applied torque by the angular velocity of the crank arm results in the applied power.
6. The user's power is then wirelessly broadcast via ANT+ and BLE protocols to a display unit for further processing and recording.



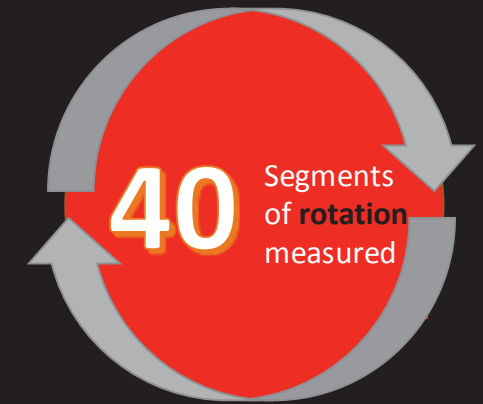
P1 - BY THE NUMBERS



1199

PRICE IN USD

RELEASE DATE: JUNE 22nd 2015



2

Number of **power meters** in each box and the number of **broadcast protocols** (ANT+/BLE)

8

Number of **strain gages** in each pedal

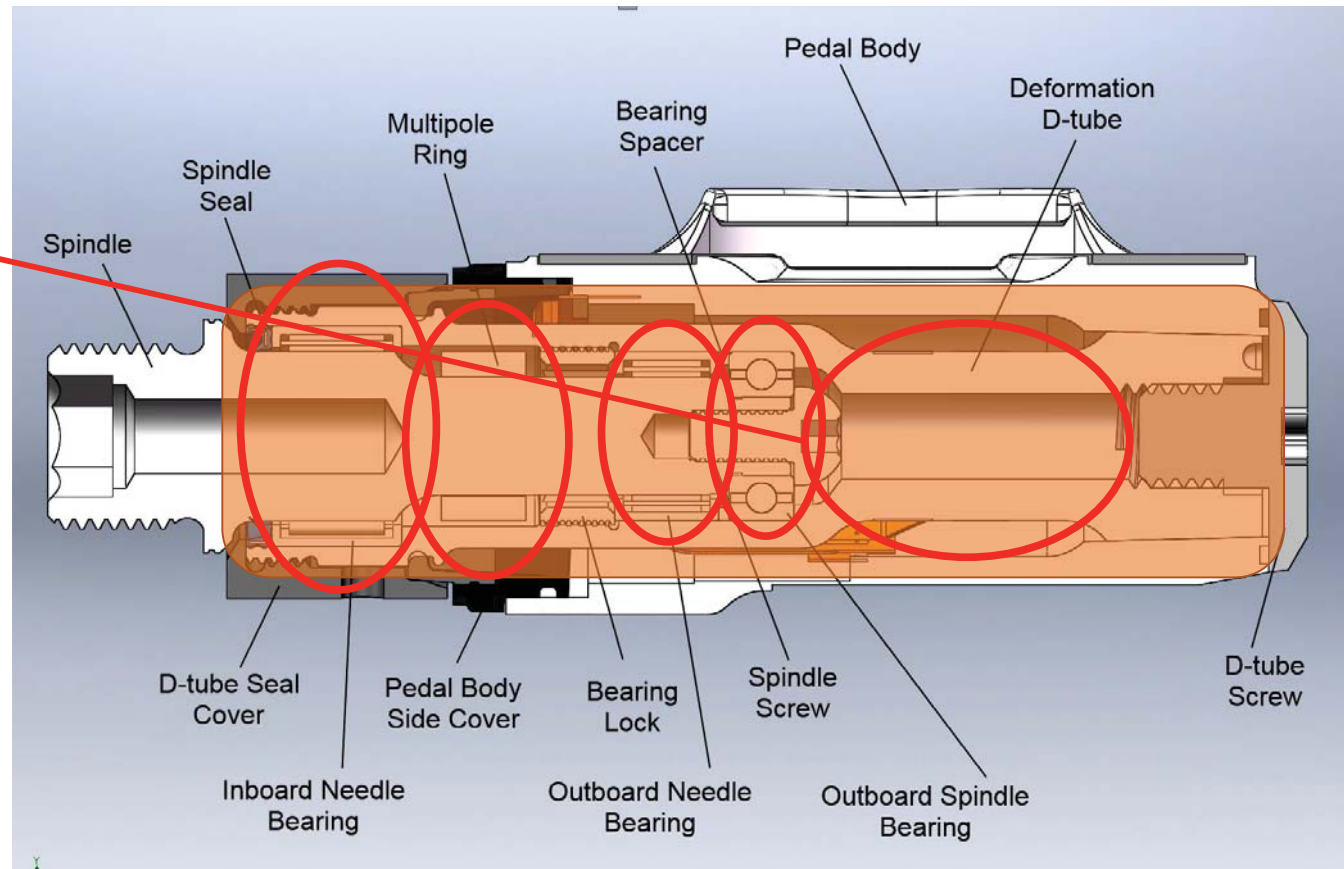
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Number of companies doing it **better**

HOURS OF BATTERY LIFE = 60

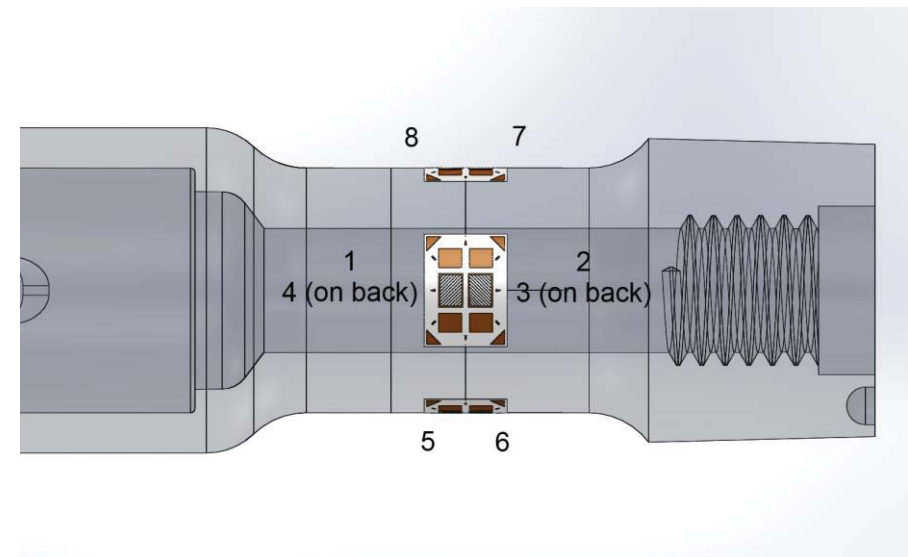
Inside the P1 – Mechanical Components

- D-Tube (deformation tube)
 - Force measurement area
 - Location of strain gages
- 3 bearings
 - 2 needle (High load capacity)
 - 1 ball
- Multipole Ring
 - 20 N/S magnets
 - Angular velocity measurement



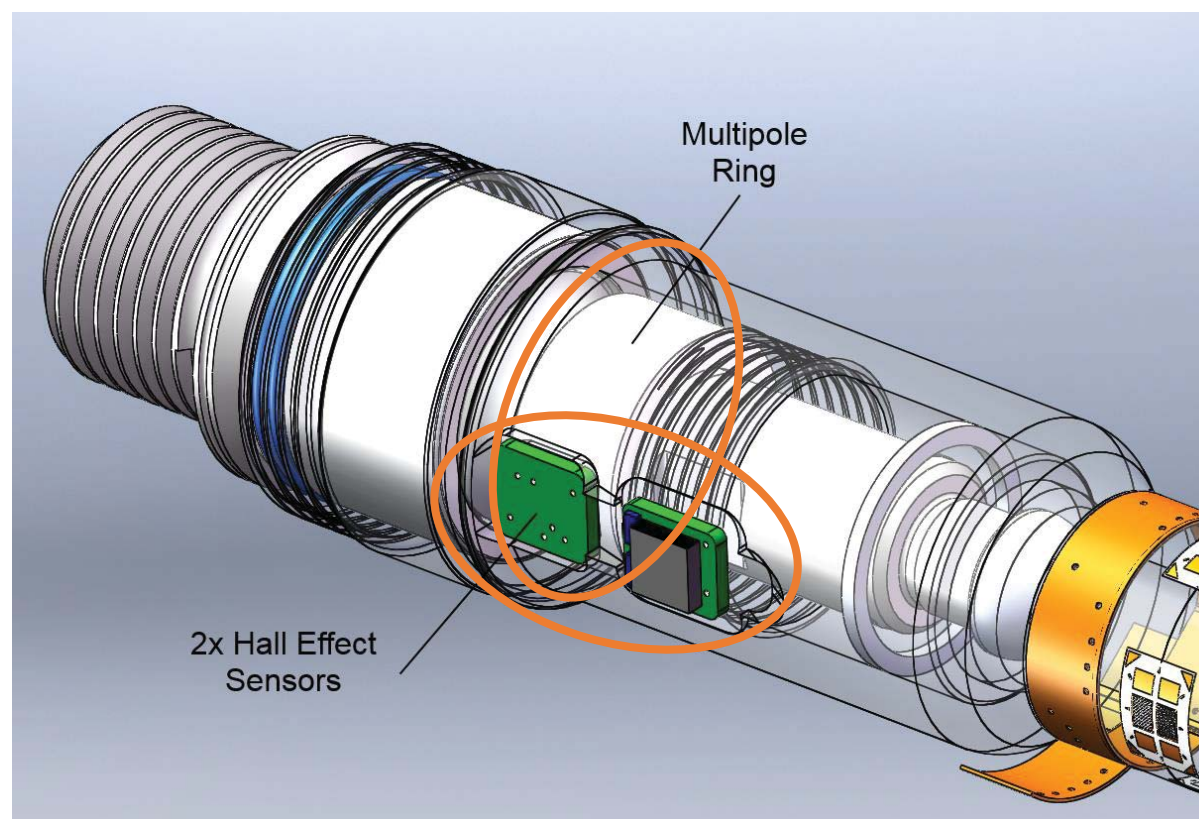
Inside the P1 – Force Measurement

- Force Measurement
 - 8 strain gages (4 pairs) orientated 90 degrees around the D-tube (deformation tube)
 - Each strain gage has its own processor
 - Accurate measure from fewer strain gages (8 P1 vs 16 Vector)



Inside the P1 – Angular Velocity Measurement






- Multipole Ring
 - 20 N/S magnets with one double pole to establish absolute angular position
- Hall Effect Sensors
 - Measures magnetic transitions
 - 2 are staggered and used to resolve poles to 40 angular positions – 9° of movement



Competitive Comparisons



PowerTap P1 vs Garmin Vector – Spec's

	PowerTap P1	Garmin Vector 2	Garmin Vector 2 S	<u>Advantage</u>
				
Price	\$1,199	\$1,499	\$899	
Attachment area	Pedal	Pedal	Pedal	
Weight	398 grams	358 grams for pair	343 grams for pair	
Added Weight to set up	150 grams	110 grams added weight	95 grams added weight	
3rd Party Validated?	No	No	No	
Claimed accuracy	1.50%	1.50%	1.50%	
User Replaceable Battery	Yes	Yes	Yes	
Battery life, type	60 hrs, AAA	175 hours, CR2032	175 hours, CR2032	
User updatable firmware	Yes	Yes	Yes	
Bluetooth Smart compatible	Yes	No	No	
Warranty	2 years	1 year	1 year	
Limatations	Pedal Type, relatively low battery life	ANT+ only, external pods, more challenging installation process, pedal type	ANT+ only, single sided measurement, more challenging installation process, pedal type	

PowerTap P1 vs Garmin Vector – Use



Advantage



Installation

No torque wrench or installation torque required

Torque wrench and specific torque required for accurate measurement

Compatibility

Any crank

2 pod sizes and washers required for various crank thicknesses

Setup

Automatic installation angle – true plug and play operation

Lengthily setup process to find install angle every time pedals are installed

Temperature Compensation

Temperature sensors track and adjust offset constantly

None

Weight Limit

No weight limit

90kg limit

P1 FAQ's

WILL THE P1 NEED TO BE CALIBRATED?

There is no extra needed calibration when installed.

HOW MUCH TORQUE DO I NEED TO USE WHEN INSTALLING THE P1 PEDALS?

We recommend you follow the recommended torque guidelines from your crank manufacturer. Pedal installation torque generally ranges from 300-350 in lbs (35-40 Newton-meters).

WHAT SIZE HEX WRENCH IS NEEDED TO INSTALL THE P1?

You will need an 8mm hex wrench.

DO I HAVE TO SET THE INSTALLATION ANGLE ON THE P1?

No, you do not need to set the installation on the P1 pedals. The P1 pedals learn the position of the axle relative to the crank arm after a few pedal strokes.

CAN I MANUALLY ZERO OR AUTO ZERO THE P1 PEDALS?

Yes, just like the PowerTap hub, you can perform a manual zero. We recommend that you perform a manual zero before each ride. The pedals also have active temperature compensation where sensors within the pedal monitor the temperature and adjust the offset accordingly.

WHAT DO I DO IF MY P1 PEDALS GO OUT OF CALIBRATION?

First, perform a manual zero and LEDs for indication of potential error. For a full list of LED functionality consult the P1 user guide. If that does not fix the issue, or you see an LED indicating a failure, please call our customer service team to receive a Return Authorization number to send your pedals back to Saris Cycling Group. You will need to send back both pedals.

P1 FAQ's - continued

ARE THE PEDALS SINGLE OR DUAL SIDED?

The P1 pedals are two separate power meters, which talk to each other. The data is collected by the master pedal (Left), then sent to your head unit. The P1 pedals allow the user to receive detailed left/right leg balance.

WILL YOU BE OFFERING A SINGLE SIDED ONLY PEDAL?

Not at this time.

DOES THE P1 COME WITH CLEATS?

Yes, the P1 come with proprietary 6 degree float PowerTap cleats and hardware. We offer a 0 degree float cleat option as an extra accessory.

WHAT TYPE OF CLEATS DO THE P1 PEDALS USE?

The P1 pedals use proprietary, 3-bolt keo-style cleats. 0 degree and 6 degree float options are available.

WHAT TYPE OF BATTERY DOES THE P1 NEED?

Each pedal uses one AAA battery. Two AAA lithium batteries are included with the P1 pedals. For best performance we recommend using lithium batteries.

CAN I ADJUST THE RELEASE TENSION ON THE PEDAL?

Yes, you will need a 2.5mm hex wrench to adjust. Release tension range is 6 – 20 Nm.

DO THE P1 PEDALS HAVE A WEIGHT LIMIT?

No weight limit.

WHAT IS THE WARRANTY ON THE P1 PEDALS?

The electronics have a 2 year global warranty. The bearings, skid, and plate are all wearable items and do not have a warranty.

WILL THE P1 BE USER-SERVICEABLE?

Serviceability will be limited to external wear items like the claw, spring, pedal plate and battery cover o-ring. All other internal wear components must be serviced at PowerTap.