

### InfoCrank® ISIS Track Edition

- InfoCrank is a new generation of cycle power meter that sets a new standard for measurement accuracy. (High accuracy implies high precision but not vice versa). The InfoCrank also sets new standards in ease of use and robustness.
- It is built from the ground up for the purpose of measuring on a moving bike in the velodrome environment.
- The power meter functionality is integrated inside the crankset. The cranks are one of the few places that a true bilateral power meter can be installed on a bike. They are also long-lasting components (unlike pedals) that can be kept for the life of the bike and beyond.
- Accurate torque measurements are taken 256 times every second on each crank.
- For normal use, the InfoCrank transmits information from Right Crank (DS) to the left crank (NDS) which in turn is transmitted using ANT+ protocols to any ANT+ compliant device or head unit, which is paired to the InfoCrank®.
- InfoCrank® also uses additional ANT channels to transmit proprietary data to devices with approved Verve Apps.

### Designed for Purpose

- The Cranks are purpose-built to be used on the Velodrome and withstand use in that environment at the highest level.
- The Power module is integrated into the safety of the crank in a specially designed pocket. This has the triple purpose of cutting out weight, redistributing the load path to achieve precise measurement and keeping the electronics safe from danger in case of accident.
- The Transducer Class Strain Gauges are bonded with precision to 0.1mm in a Wheatstone Bridge arrangement.
- The Power module and the strain gauge arrangement is designed to be insensitive to four of the loads that occur when pedalling a bike. This ensures no error is introduced into the measurement.
- The wireless communications hardware is flush mounted on the inside of the crank under the low-profile cover allowing Plate or Aero Rings to be used as necessary. The Radio has been tuned by the one of the world's leading manufacturers of wireless systems whilst inside the crank for optimal effect.

## Technical Features and Specifications

<b>Features</b>	<b><i>Crank Set</i></b>	Drop-forged 6000 series alloy arms and 6000 series spider.
		ISIS spline compatible with ISIS Track Cartridge BBs.
		Crank set 600 gms - under 750 gms with standard Track Chain ring.
		138mm Q factor on 108 ISIS cartridges.
		Laser etched logo and markings.
		144 BCD Spider suitable for most Track Chain rings. Bolt holes designed to fit Shimano Dura-Ace Track FC-7710 Chain ring Fixing Bolt & Nut Set. Serial No: Y16S98010 ( <b>not provided</b> )
		Hard Anodised Gloss finish for durability.
		Crank and Spider colour options available (on order).
		Lengths from 155mm to 180mm.
		Designed for optimal force transfer and measurement.
	<b><i>Power Module</i></b>	Torque Transdu quality Strain Gauges.
		Bilateral Torque Measurement at 256 Hz.
		Integrated cadence sensor in each arm (if required for use with magnets). We recommend that the Cranks are zeroed after installation. Repeated zeroing is not required like other systems.
		Factory Calibration – no further calibration required.
		Temperature Compensation achieved in adherence of strain gauges.
		IP67 water and dust-proofing .
		User replaceable SR44 Batteries for constant reading.
		Expected battery life of 500 hours under normal cycling use.
		ANT+ transmissions to suit most devices and head units.
		Proprietary process for accurate cadence measurement, which does not use magnets or accelerometers in order to achieve accuracy and save battery usage.
		ANT+ transmission of all normal metrics.
		Proprietary ANT transmission of each pedal stroke with Polar, Waveform visualisations (accurate) plus Torque Streaming visualisations. NB..Increased battery usage.
		Ability to record proprietary transmissions.
		Standard Android App for visualisation available at no cost.
		Future ability to subscribe to Verve Real Time Performance Analytics. Pilot study soon.
		Future ability to have on-board memory for downloading at will with new electronics upgrade.
		Most firmware improvements by free upload.

Technical	Environmental	
	Ingress Protection	IP67 (NEMA 6)
	Operating Temp Range	- Minus 10°C to 50°C
	Storage Temp	- Minus 20°C to 80°C
	Operating Humidity	- 0 – 100%
	Impact Rating	- withstands typical on-track impacts.
	UV Resistance	- > 5000 hours
	Vibration	- Typical on-road/track vibration resistance.
	Chemical	- Resists typical lubricants and bike cleaning chemicals.
	<b>System</b>	
	Power Range	- 0 – 3000 watts (tested for operation)
	Cadence	- 20 – 180 Rpm (planned to increase to 240 rpm)
	Accuracy of Cadence	- + or – 1 Rpm with magnets or without.
	Tested True and Precise	Externally and independently tested according to methods of ISO5725 and Eurolab 2006. Specified for accuracy errors below 1% on both instantaneous torque and watts in normal operating range. Tested independently - indicative results below.
	Power	Can be calculated from any cadence value.
	Power/Torque Update Rate	Every crank rotation.
	Recommended Battery	Renata 357 OEM (Preferred, Generic SR44, 357, 303. 2 cells per crank.
	Battery Life	500 hours operational expected.
	Shelf Life	3 years with batteries installed.
	Wireless	ANT
	System Start up	<2 secs once torque is applied to each crank.
	<b>Maintenance</b>	User serviceable parts: seals, batteries and housing spares.
	Calibration Interval	Recommended 12 months.
	Storage Life	5 years with batteries removed.
	<b>Warranty</b>	2 years.

## Accuracy Tests

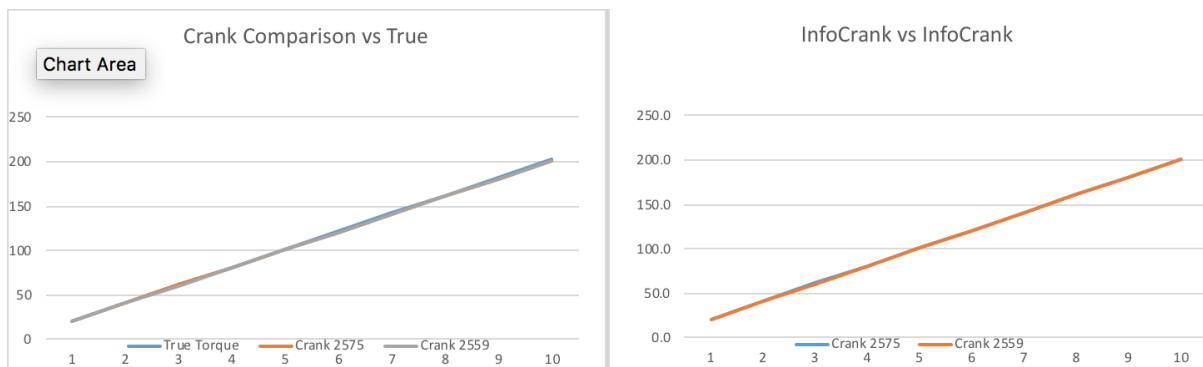
All InfoCranks® owned by British Cycling are independently and regularly tested for accuracy (compared to a known true value) and precision (compared to each other and for each crank, over time). This database of road cranks exceeds 100 and the Track InfoCrank® will also exceed this number over a short time. It is the largest collection of InfoCranks® operational globally.

Verve also internally tests calibration on an adhoc basis and on serviced cranks in our Australian office.

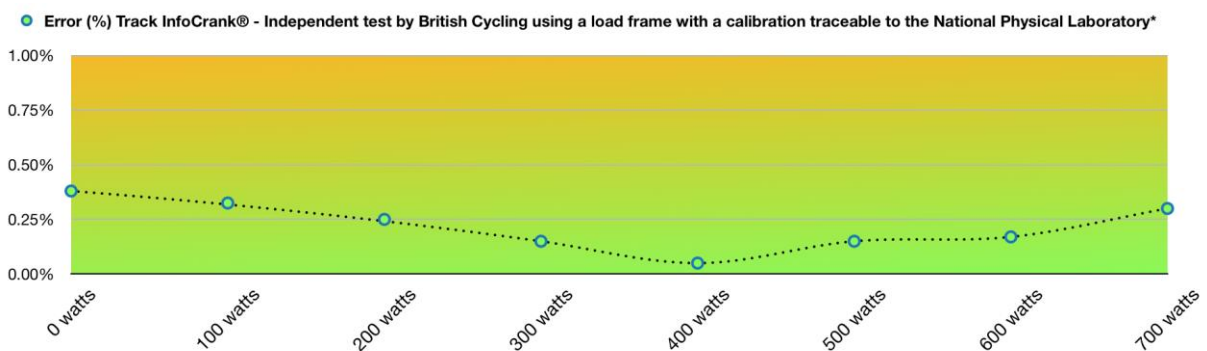
Verve also commissions independent testing of torque and power measurements using ISO 5725 and Eurolab standards of new designs.

Some indicative results of InfoCrank® tests are below in graph form. All testing done shows that InfoCrank® accuracy, repeatability and precision is well within the specified accuracy headline of 1%.

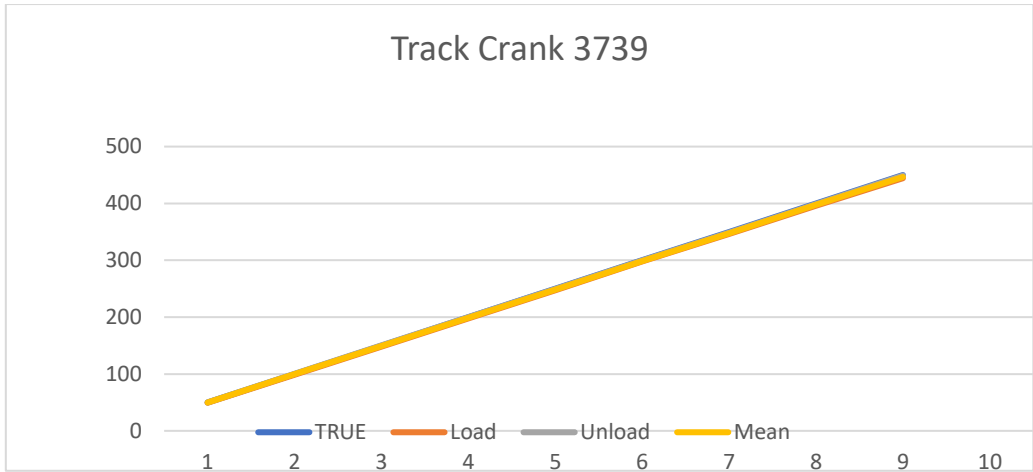
Test results of Road InfoCranks (numbered) on June 26<sup>th</sup> 2017, showing accuracy against True and also against each other on ascending/descending loads. Equivalent watts max for test was about 1250watts or 200nm. British Cycling claim that this is indicative of all testing on InfoCrank® Road versions.



Test results of first batch of Track InfoCrank® prepared by British Cycling, before improvements in hardware and calibration numbers. This site will be updated as more testing is done on production cranks.



\* The National Physical Laboratory is the national measurement standards laboratory for the United Kingdom. It is the largest applied physics organisation in the UK.



Verve can provide calibration services for high end needs beyond the standard accuracy levels achieved and illustrated here.

### InfoCrank Hardware

