

aerosensor

Quickstart Guide V1.1
08.10.23

Contents

Aerosensor Quickstart Guide 3

Aerosensor setup..... 4

Aerosensor calibration 6

Aero testing guidance 7

Data Analysis..... 7

Aerosensor basics 8

Aerosensor Quickstart Guide

What follows outlines the basic setup of Aerosensor. For more detailed information please refer to the ACS manual which you can find at the following link:

<https://aerosensor.tech/pages/getstarted/>

ACS installation

Download the ACS app to your Garmin. Go to Garmin ConnectIQ store and search for “Aerosensor” or use link below.

<https://apps.garmin.com/en-US/apps/0170243b-0384-4072-9e85-57030e4949a6>

ACS screen layout



1. FIT file recording status: Red square means not recording, green triangle means recording.
2. Aerobody connection and battery status.
3. Aerosensor connection status.
4. Aerosensor power and speed or speed/cadence sensor connection status. Green = Aerosensor connected to sensor; orange = searching; red = not connected.
5. Aerosensor battery status.
6. Back key – in menus use to go back a step, or on data screens exists app. This may be a button instead of touch screen icon depending on your Garmin Edge model.
7. Menu key. This may be a button instead of touch screen icon depending on your Garmin Edge model.


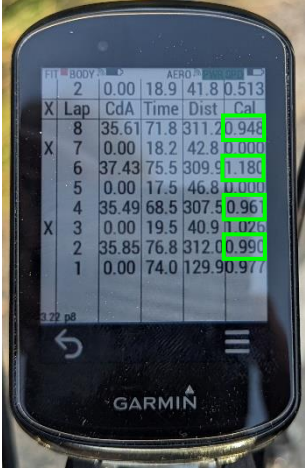

Aerosensor setup

<p>1. Install</p> 	<p>2. Pair ANT+ sensors</p> 	<p>3. Calibrate PM</p> 
<p>4. Start ACS App</p> 	<p>5. Select test type</p> 	<p>6. Connect device</p> 
<p>7. Update settings</p> 	<p>8. Check connections</p> 	<p>9. Start activity</p> 

1. **Install Aerosensor** securely, level, and centred on the bike using a go-pro mount.
2. **Pair your power meter speed sensor to Garmin.** We recommend dual sided power meter, and magnet based speed sensor.
3. **Calibrate** power meter in Garmin, and set crank length if necessary.
4. **Open ACS CIQ** app on your Garmin bike computer.
5. **Choose test type:**
 - a. **Road:** for general road cycling.
 - b. **Out and back:** for cycling out and back along a stretch of road.
 - c. **Velodrome trackless:** for velodrome use without Aerodrome lap trigger.
 - d. **Velodrome tracked:** for velodrome use with Aerodrome lap trigger.
6. **Connect Aerosensor to CIQ app.**
 - a. Turn on Aerosensor. It should connect automatically. If not:
 - b. Menu > Connections > Aerosensor.
 - c. Wait for CIQ app to find device, then click on it to connect.
7. **Input key parameters**
 - a. Menu > Aerosensor Settings > Parameters > Edit Parameters
 - b. Most important parameters to set are:
 - i. **Aero device calibration:** **Start with a value of 1.4.**
 - ii. **Total mass** (your total mass i.e. you + bike + clothing)
 - iii. **Wheel circumference** (you can get from speed sensor info in Garmin, or roll out wheel and measure distance on ground).
 - iv. **Power meter scaling** (Use 0.98 for all but hub based PMs)
 - v. **CTF calibration offset** if using an SRM PM7 or earlier PM. *This is the value reported when you calibrate your power meter on the Garmin.*
 - c. **Be sure to “Push Parameters” after exiting this menu to save any changes.**
8. **Check connections, and start activity**
 - a. Make sure your power meter and speed sensor are on, by rotating wheel and pedals.
 - b. If paired then “PWR” and “SPD” icons in top right go green. If not see ACS instructions.
9. Start activity
 - a. Press the start activity button on Garmin to start recording to FIT file. Note the red square in the top right corner turns to a green triangle.

That's it! You are now ready to go aero testing. For accurate results be sure to calibrate your aerosensor every time you change bike, or make a substantial change in your position. Don't worry, you can do this at the same time as testing and post-correct your data, so no specific runs are necessary. See next section.

Aerosensor calibration

<p>1. Out/back x 2</p> 	<p>2. Average cal values</p> $Avg\ Cal = \frac{Sum\ Lap\ Cals}{Lap\ count}$  <p>In this example:</p> $\frac{0.948 + 1.180 + 0.961 + 0.990}{4} = 1.020$	<p>3. Post-correct CdA</p> $CdA\ Cor. = \frac{CdA}{Avg\ Cal}$ <p>In the velodrome you can do every run. Outdoor you should perform periodically.</p> <p>Unless making large changes to setup you do not need to do this to get correct result directionally: lower CdA is always lower CdA even if cal factor changes.</p>
<p>4. Calculate new cal</p> $New\ Cal = Old\ cal \times Avg\ Cal$ <p>In our example Old cal = 1.40 New cal = 1.400x1.020 = 1.428</p>	<p>5. Enter new cal.</p> 	

The air “sees” you coming towards it due to high pressure build up ahead of you. For this reason the air at Aerosensor’s location on your bike is slower than freestream. We need to correct for this.

1. **Perform at least two out/back or 4 laps of velodrome.**
 - a. Be sure to start recording (“Start activity” button on Garmin).
2. **On page 9 of the CIQ app you see a “Cal” value for every valid lap.** Take the average of all of these values.
3. **Post-correct your CdA values** by dividing them by this value, i.e.

$$CdA_corrected = CdA_reported / Avg_cal$$
4. **Calculate new calibration factor.**

$$AeroCal_New = AeroCal_Old * Cal$$
5. **Enter new “Aero device calibration”**

Aero testing guidance

- CdA data is only as accurate as the inputs. Make sure you check Aerosensor's settings in the ACS app before every test.
- Always calibrate power sensor before starting testing. Small calibration offsets can result in a big error in CdA measurement.
- Always start and end your test block with a baseline repeat.
- Try to maintain a constant speed through each run.
- For out and back testing we recommend a stretch between 500 and 1000m.
- The more out and backs you do, the better the repeatability will be.

Data Analysis

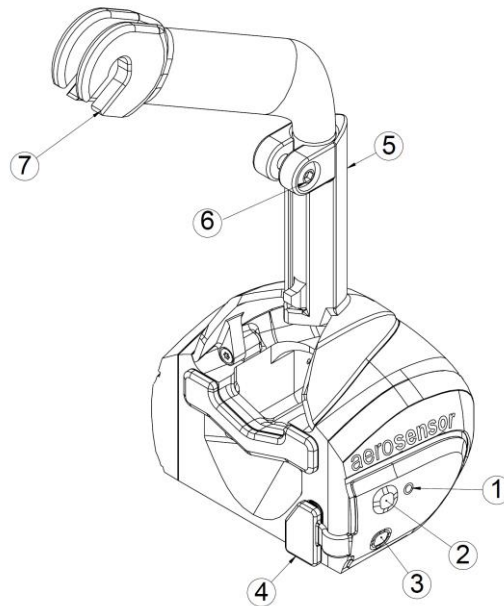
- Data is recorded to FIT file. You can view the data in Garmin Connect, or download the data to analyse in WKO or Golden Cheetah.
- More analysis tools are coming soon. Keep an out for announcements on our mailing list and social channels.
 - We are shortly launching a collaboration with Aerotune to provide an online platform tailored for Aerosensor analysis.
 - There will also be Excel sheets that automate more in-depth analysis, available on our website soon.

Aerosensor basics

Device specifications

Dimensions (H x W x D)	135 x 57 x 85mm
Mass	66g
Battery Life	57 hours
Wind speed resolution	+/- 0.1%
Wind angle resolution	+/- 0.1°
Altitude resolution	+/- 10cm

Layout



- | | |
|-------------------------------|--------------------------------|
| 1. LED | 5. Stem |
| 2. Power button | 6. Height/yaw adjustment screw |
| 3. Reset button | 7. Go-pro mount |
| 4. USB-C bung & charging port | |

Button functions

- Power button:
 - Press and release to turn on.
 - Press and hold until LED turns off then release to shut down.
 - Press and hold, push reset button, then release for full factory reset. This resets the internal settings used to calculate CdA.
- Reset button:
 - To be used in case the device becomes unresponsive. Resets device without erasing settings.

LED significance

The multi-colour LED indicates the device state as shown below:

Colour	Flashing	State	USB	Charge
Aqua	Normal	On	Unplugged	Normal
Red	Normal	On	Unplugged	Low
Amber	Slow	Off	Plugged in	Charging
Amber	Solid	On	Plugged in	Charging
Green	Slow	Off	Plugged in	Charged
Green	Solid	On	Plugged in	Charged

Note: Do not use sharp objects or tools to press buttons, this may result in damage