# Calibration Guide

Firmware V1.0

## 1. Overview

This guide explains how to configure and calibrate your bicycle gear computer. Calibration sets the correct servo angle for each gear position and the speed thresholds used in automatic gear-selection mode.

**The device has two operating modes:**

- Manual mode – you shift gears by pressing Up / Down. The servo moves to the angle you set for that gear.
- Automatic mode – the device reads your wheel speed and selects the appropriate gear based on the speed thresholds you configure.

**TIP** The device always starts in Manual mode after power-on, regardless of what mode it was in before.

## 2. Button Reference

| Button | Function |
|---|---|
| Up ( + ) | Normal mode: shift up one gear. Menu: scroll up / increase value. |
| Down ( − ) | Normal mode: shift down one gear. Menu: scroll down / decrease value. |
| Mode | Toggle between Manual and Automatic mode. |
| Setup | Open the setup menu. Inside menu: go back one level / cancel edit. |
| OK | Normal mode: hold 2 s to cycle screen brightness. Menu: select / confirm. |

# 3. Menu Navigation

Press Setup to open the menu. The menu has three levels:

| Level | What you see |
|---|---|
| 1 – Main menu | List of settings categories (Wheel Dia, Num Gears, Units, Angles, Speeds, Auto Cal, Disp Size). |
| 2 – Gear list | Scrollable list of gears with their current values. |
| 3 – Value editor | Large value display. Up / Down to change. OK to save. Setup to cancel. |

**TIP** Pressing Setup at any level goes back one level. Pressing Setup on the Main menu exits setup and saves all settings.

# 4. Initial Setup

Complete these steps before riding for the first time.

## 4.1 Wheel Diameter

The wheel diameter is used to calculate your riding speed.

1. Press Setup to open the menu.
2. Highlight Wheel Dia and press OK.
3. Press Up / Down to set your wheel diameter in inches (e.g. 29.0 for a 29″ wheel, 26.0 for a 26″ wheel).
4. Press OK to save.

**TIP** Common sizes: Road 700c ≈ 27.5″, Mountain 29″ = 29.0, Mountain 27.5″ = 27.5, Mountain 26″ = 26.0

## 4.2 Number of Gears

5. In the Main menu select Num Gears.
6. Press Up / Down to match the number of gears on your bicycle (2–10).
7. Press OK to save.

**TIP** Set this before calibrating angles and speeds. Changing it later will not erase your calibration data but may add unconfigured gears.

### 4.3 Speed Units

8. In the Main menu select Units.
9. Press Up or Down to toggle between km/h and mph.
10. Press OK to save.

## 5. Angle Calibration

Each gear needs a servo angle that correctly positions the derailleur. Do this step with the bike on a stand so you can turn the cranks and observe shifting.

**NOTE** Calibrate angles from the highest gear (hardest) down to gear 1 (easiest). This is the order the menu presents them.

11. Press Setup to open the Main menu.
12. Select Angles and press OK.
13. The gear list appears. Highlight G1 (or any gear) and press OK.
14. The servo immediately moves to the current saved angle for that gear.
15. Press Up to increase the angle (derailleur moves one way) or Down to decrease it (derailleur moves the other way).
16. Turn the cranks and shift until the chain runs smoothly on that gear.
17. Press OK to save the angle for this gear and return to the list.
18. Repeat steps 3–7 for every gear.

**TIP** Each press of Up / Down moves the servo by 3°. Hold the button to move quickly. Acceptable servo range is typically 0–180°.

**CANCEL** Pressing Setup instead of OK at step 7 cancels the edit and restores the previous angle.

# 6. Speed Calibration

Speed thresholds tell the automatic mode when to change gear. There are two ways to calibrate them.

## 6.1 Method A – Manual Entry

Use this method if you already know the speeds you typically ride in each gear.

19. In the Main menu select Speeds.
20. The gear list shows each gear with its current threshold.
21. Select a gear and press OK.
22. Press Up / Down to set the minimum speed for that gear.
23. Press OK to save.
24. Repeat for each gear.

**TIP** Set G1 speed to 0. Each gear's threshold should be higher than the previous one. Example for 7 gears: G1=0, G2=10, G3=18, G4=26, G5=34, G6=42, G7=50 (km/h).

## 6.2 Method B – Auto-Calibration (Recommended)

Ride the bike normally for 10 seconds and the device calculates all thresholds automatically. Best done on a flat road or gentle slope at a comfortable pace.

25. In the Main menu select Auto Cal and press OK.
26. The screen shows Start Cycling (flashing) and waits for you to start moving.
27. Start riding. As soon as speed is detected the 10-second countdown begins.
28. Ride at a natural pace. Use Up / Down to shift through as many gears as you want during the 10 seconds.
29. At the end of the countdown Done! appears and the calculated thresholds are saved automatically.
30. Press OK or Setup to return to the menu.

**TIP** The more gears you use during the 10-second window, the more accurate the calibration. Riding in at least two different gears gives the best result.

**CANCEL** You can cancel at any time by pressing Setup during the countdown. Your existing speeds will not be changed.

**How the calculation works:**

For each gear used, the average speed is divided by the gear number to get a “speed-per-gear” rate. The rates from all gears are averaged, then multiplied by each gear number to produce thresholds that scale linearly across your cassette.

# 7. Display Settings

## 7.1 Screen Brightness

Hold OK for 2 seconds while on the normal riding screen. The display cycles through:

- Dim – for night riding
- Medium – everyday use
- Bright – direct sunlight

The chosen level is shown on screen and saved automatically.

## 7.2 Menu Font Size

In the Main menu select Disp Size.

- Small – textSize 1, all items visible at once (default).
- Large – textSize 2, larger text with scrolling.

Press Up or Down to toggle, then OK to save.

# 8. Auto Power-Off

The device turns off automatically after 15 minutes of inactivity (no movement, no button presses, not charging). All settings are saved before power-off.

# 9. Quick Calibration Checklist

| ✓ Done | Step |
|---|---|
| | Set Wheel Diameter |
| | Set Number of Gears |
| | Set Speed Units (km/h or mph) |
| | Calibrate Gear Angles (all gears, chain runs smoothly) |
| | Calibrate Gear Speeds (manual entry or Auto Cal) |
| | Test in Manual mode – verify each gear shifts correctly |
| | Test in Automatic mode – verify gear changes at correct speeds |
| | Set Brightness preference |

## 10. Troubleshooting

| Symptom | Solution |
|---|---|
| Chain skips or misses in a gear | Re-calibrate the angle for that gear (Setup → Angles). Fine-tune in 3° steps. |
| Auto mode shifts too early or too late | Adjust the speed threshold for that gear (Setup → Speeds) or run Auto Cal again. |
| Speed shows 0 while riding | Check that Wheel Diameter is set correctly. Verify the hall sensor magnet is aligned. |
| Auto Cal result seems off | Make sure you were riding at a steady pace in each gear. Repeat with more gears used. |
| Screen too dim / too bright | Hold OK for 2 seconds on the riding screen to cycle brightness. |
| Servo not moving to the correct position | The servo may need its min/max angle limits adjusted. Check your servo's range matches the 0–180° defaults. |