



Vector Intelligence Labs

Engineering documentation

HARDWARE PRODUCT SPECIFICATION

SmartRowerGauge - Rowing Telemetry Hardware

A battery-powered rowing telemetry module that measures force, power and motion at the handle and broadcasts live metrics over ANT+ to the Garmin fitness ecosystem.

DRAFT - CONTENT NOT FINAL

Product Specification | Revision 1.0 | 2024-02-18

DOCUMENT CONTROL

Revision	Date	Author	Change
1.0	2024-02-18	Michael Himmelfarb	Initial release of the product specification.
site-r0	2026-09-15	Vector Intelligence Labs	Re-typeset from revision 1.0 into the shared specification template for publication on this site. Content unchanged; page composition not final.

Source: the SmartRowerGauge product specification, revision 1.0, 2024-02-18. Re-typeset into the Vector Intelligence Labs specification template; rows marked [TBD] are unresolved in the source document.

1. Overview

The SmartRowerGauge is an indoor rowing telemetry device. It captures force, power and inertial data from a rowing machine and broadcasts the processed metrics wirelessly over ANT+ to the Garmin fitness ecosystem - watches, bike computers and head units.

The unit mounts on the rower rail and is powered by a rechargeable Li-Ion cell. It requires no wired connection to a display: every measurement leaves the unit over the air, and the companion phone app renders live stroke telemetry from the same broadcast data.

2. Key features

- ANT+ broadcast at 4 Hz using the Fitness Equipment device profile.
- 24-bit strain-gauge force measurement sampled at 10 Hz.
- 3-axis accelerometer at 40 Hz for stroke-rate calculation, +/-2 g / +/-4 g / +/-8 g / +/-16 g.
- Rechargeable battery charged over USB-C.
- Wireless firmware updates over Bluetooth; no other electrical interfaces.
- Battery-powered unit that mounts on a standard rowing-machine rail.
- No wired connection to a display - every metric is broadcast over the air.

3. Technical specification

3.1 Physical

Parameter	Min	Typ	Max	Unit	Notes
Overall dimensions	-	[TBD - not published]	-	mm	Withheld from publication
Enclosure	-	3D-printed	-		Custom enclosure with a mounting clip for a standard rowing-machine rail
Weight	-	[TBD]	-	g	[TBD] in the source document

3.2 Electrical

Parameter	Min	Typ	Max	Unit	Notes
Battery voltage	3.7	-	4.2	V	Rechargeable Li-Ion cell
Charging	-	-	-		USB-C; charging current [TBD - not published]
Regulated rails	-	-	-		[TBD - not published]
Timing reference	-	-	-		[TBD - not published]
Current consumption	-	[TBD]	-	mA	[TBD] - to be measured (source document)

3.3 Sensing

Parameter	Min	Typ	Max	Unit	Notes
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Parameter	Min	Typ	Max	Unit	Notes
Force sensing	-	-	-		Strain-gauge force measurement at the handle
Force resolution	-	24	-	bits	
Force sample rate	-	10	-	Hz	
Motion sensing	-	-	-		3-axis accelerometer
Accelerometer range	-	-	-		+/-2 g / +/-4 g / +/-8 g / +/-16 g
Accelerometer sample rate	-	40	-	Hz	

3.4 Radio

Parameter	Min	Typ	Max	Unit	Notes
Telemetry protocol	-	-	-		ANT+ broadcast at 4 Hz, Fitness Equipment device profile
Transmit interval	-	4	-	Hz	Every 250 ms
Wireless updates	-	-	-		Bluetooth - firmware updates only
RF detail	-	-	-		[TBD - not published]

3.5 Environmental

Parameter	Min	Typ	Max	Unit	Notes
Operating temperature	0	-	50	degC	Estimated (source document)
Storage temperature	-20	-	70	degC	Estimated (source document)
Humidity	-	-	-		Indoor use

4. Interfaces

The end product has exactly three interfaces and no other electrical interface: no headers, no test points, no debug or programming connector, no external sensor connector and no wired data path.

- ANT+ - telemetry broadcast at 4 Hz to fitness head units (Garmin ecosystem).
- Bluetooth - wireless firmware updates only.
- USB-C - battery charging.

5. Mechanical, ordering and compliance

The unit is housed in a custom enclosure and a mounting clip attaches it to a standard rowing-machine rail.

Item	Status	Notes
Assembly	Hand-assembled prototype	

Item	Status	Notes
Regulatory	Not certified	Prototype / DIY use
ANT+ certification	Not submitted	Broadcast-only use of a public device profile
Production status	[TBD]	No production or availability commitment is made

6. Open items

- Unit weight and overall dimensions.
- Measured current consumption in each operating mode.
- Charging current and charging time.
- Confirmation of the estimated operating and storage temperature ranges.
- Certification decision (EMC, radio, safety) if the product moves beyond prototype use.