

Maintenance correction edition

sop-3-rowing-ergometers.pdf | Issued 2026-10-04

This correction supersedes the conflicting instructions in the archived original. It is not certification of every model in the brand list or permission to return equipment to service.

Withdraw unsupported shared calibration and acceptance limits

The original biomedical templates are not model-specific calibration or compliance certificates. Withdraw the shared +/-0.1 mph, +/-0.2% grade, +/-3% watts, +/-5% selector-load, 1.5-2.5 mm sensor gap, 1.5% chain elongation, zero-play and 0.5 ohm criteria as universal OEM limits. Withdraw the generic button sequence, 2.30 roller entry and automatic calibration timing; diameter and circumference are not interchangeable. Obtain the exact model, production year, serial range, market, console/controller and service-manual revision before setting a limit. Record the OEM measurement method, instrument uncertainty, applicable leakage/earth tests and As-Found/As-Left results. Electrical input watts do not establish mechanical exercise output. Concept2 self-calibration is not a generic stroke-count calibration. WaterRower Club is belt-driven; its chain test is N/A. All sample records are illustrative, not actual service evidence; a missing final measurement cannot support PASS. No return-to-service or certification is authorized by these examples.

Applicability: match model, production year/serial range, market and manual revision. An edition date is not an equipment production year. Where these are unknown, do not infer a numerical lubrication, adjustment, electrical or clinical specification. Restricted service instructions must be obtained through the owner before approval.

Reviewed sources

S2: [TRACKMASTER TMX428/TMX428CP/TMX58 service manual, revision 6](#).

S3: [NuStep T5/T5XR user manual, revision M](#).

S4: [Concept2 monitor self-calibration explanation](#).

S5: [WaterRower S4 owner's manual](#), manufacturer-hosted.

Archived original follows

The following pages preserve the supplied original for historical comparison. Conflicting instructions, numerical limits and example certifications are superseded by the correction pages above. They must not be used as current service instructions.

[Download the unchanged original PDF](#)



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BIOMEDICAL DIVISION • CLINICAL CALIBRATION & SAFETY PROTOCOL

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Clinical Calibration & Safety Protocol

Standard Operating Procedure for Rowing Ergometers in Rehabilitation Settings

DOCUMENT ID: HFR-SOP-BIO-007
REVISION: 2.1 (Clinical Grade)
EFFECTIVE DATE: August 2026
SERVICE REGION: Tampa Bay Metro
STANDARDS: Clinical PM & Audit Trail

1. CLINICAL GOVERNANCE & PATIENT SAFETY MANDATE

Rowing ergometers are widely prescribed in cardiac and orthopedic rehabilitation for their low joint-impact, full-body resistance profile. A damper or drive-chain system delivering inconsistent resistance mid-stroke alters the patient's prescribed workload and introduces a balance-loss fall risk for exactly the population these machines are chosen to protect. Undetected chain elongation compounds this risk: it produces no reliable auditory or visual warning before a skip or failure at full stroke tension. Heartbeat's Biomedical Division enforces rigid dual-reading resistance tolerances and measured chain-condition checks.

2. FOUR-STEP BIOMEDICAL PREVENTIVE MAINTENANCE & CALIBRATION PROTOCOL

STEP 1 Baseline Specification Mapping

Identify machine OEM factory tolerance thresholds from clinical service documentation. Benchmark target parameters including damper resistance curves, chain tension specification, and monitor pace-calculation calibration.

STEP 2 Multi-Point Operational Dynamic Verification

Perform dynamic physical testing across graduated resistance/damper settings: verify actual measured resistance against monitor-displayed pace and watt output at low, medium, and high damper settings.

STEP 3 Dual-Reading Calibration & Mechanical Alignment

Where resistance or pace output has drifted beyond permissible clinical thresholds ($\pm 3\%$ watt accuracy), recalibrate the monitor's flywheel sensor pickup and verify drive chain length against OEM spec.

STEP 4 Clinical Audit Trail & Certification Sign-Off

Affix tamper-evident calibration certification tags with asset ID, technician initials, and due date. Generate a digital service report cataloging chain condition, seat rail wear, and flywheel bearing play.

CRITICAL CLINICAL ACCEPTANCE TOLERANCES

- **Resistance / Pace Accuracy:** $\pm 3\%$ of monitor-indicated watt output across full damper range
- **Chain Elongation:** $< 1.5\%$ deviation from OEM specified chain length
- **Seat Rail Play:** Zero measurable vertical or lateral play at full slide extension

SAFETY CONDEMNATION CRITERIA: Any device exhibiting a drive chain measuring beyond 1.5% elongation from OEM spec, a cracked or delaminating seat rail, or a non-functional emergency handle release must be immediately tagged CONDEMNED / OUT OF SERVICE.

- **Flywheel Bearing Play:** Zero measurable radial play at flywheel axle
- **Emergency Handle Release:** Immediate, unobstructed handle release under load at any stroke position
- **Monitor Pace Calibration:** Sensor pickup verified against manual stroke-count reference

● 3. STEP-BY-STEP TECHNICAL CALIBRATION SEQUENCE (ROWING ERGOMETERS)

STEP	PROCEDURAL ACTION & CONSOLE INTERACTION	VERIFICATION PARAMETER	TECHNICAL TOLERANCES & NOTES
1	Isolate & Inspect: Power down monitor (if electronic). Remove chain guard for direct chain access.	Chain fully visible along its entire length.	Never measure chain tension under active stroke load.
2	Measure Chain Length: Use a calibrated tape measure across a fixed link count; compare to OEM spec.	Measured length within 1.5% of OEM specification.	Elongation beyond spec is a condemnation trigger, not a lube fix.
3	Inspect Sprocket Wear: Visually and tactilely check drive sprocket teeth for hooking or rounding.	Teeth show square profile with no visible hooking.	Worn sprockets accelerate chain wear even after chain service.
4	Verify Seat Rail Condition: Slide the seat through full travel by hand; check for play or cracking.	Smooth, uniform travel with zero play at either end.	Rail cracking is most common at the forward stop bracket.
5	Calibrate Monitor Pace Sensor: Enter monitor service mode; verify flywheel sensor pickup against manual stroke count.	Monitor stroke count matches manual count exactly over 20 strokes.	Document As-Found reading before any sensor adjustment.
6	Resistance / Watt Verification: Apply calibrated test pulls at low, medium, and high damper settings.	Displayed watt output within ±3% of measured value at all settings.	Record both As-Found and As-Left readings in the compliance log.
7	Emergency Handle Release Check: Simulate release under load at multiple stroke positions.	Handle releases immediately and cleanly at every position tested.	A delayed or snagged release is an immediate condemnation trigger.

● 4. CLINICAL FIELD VERIFICATION CHECKLIST & EQUIPMENT AUDIT LOG

ASSET ID / TAG	EQUIPMENT MAKE & MODEL	SERIAL NUMBER	CHAIN CONDITION	SEAT RAIL PLAY	AS-FOUND WATT	AS-LEFT WATT	CLINICAL STATUS
PT-RW-01	Concept2 Model D RowErg	C2-MD-51190	✓ PASS (0.4%)	✓ PASS	24W / drift +7%	25W / ±2%	CERTIFIED
PT-RW-03	WaterRower Club	WR-CLB-2207	✓ PASS	✓ PASS	N/A (Water)	Tank level verified	CERTIFIED
PT-RW-06	Concept2 Model E RowErg	C2-ME-60215	1.8% elongation	Minor play	30W / drift +11%	Chain replaced	TAGGED / OK
[Blank Log]			___% elong.	[] PASS [] FAIL	___ W	___ W	[] PASS [] COND

LEAD BIOMEDICAL FIELD ENGINEER

Name: _____

Certification ID: _____

Signature: _____

HOSPITAL / FACILITY CLINICAL DIRECTOR

Facility Name: _____

Authorizing Sign: _____

Inspection Date: _____

CALIBRATION AUDIT TRAIL STATUS

Compliance: Annual PM Protocol Complete

Next Due Date: _____

Emergency Dispatch: 727-512-5120

SCHEDULE CERTIFIED BIOMEDICAL SERVICE

Heartbeat Fitness Repair's Biomedical Division performs this full calibration and safety protocol on-site, with a complete clinical audit trail for facility compliance records.

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