# Paired TruStrength Mode

## Complete Setup Guide

Last updated: April 2026 | Applies to: Hawkin Capture app (iOS and Android), data viewable in Hawkin Cloud.

## What is Paired TruStrength Mode?

Paired TruStrength Mode connects two TruStrength units simultaneously, recording left and right limb force independently within a single test. Both units synchronise automatically and sample at 1,200 Hz each, producing bilateral force-time traces and individual limb metrics from one test.

The recommended application at launch is **bilateral adductor strength testing** using a fixed 32.5 cm pad-to-pad geometry. The mode supports three supine adductor positions — the long-lever 0° hip and 0° knee Copenhagen 5SST as the primary protocol, with 45° hip and 90° hip variants available for length-tension profiling. **Further use cases will be released in the coming weeks.**

| Feature | Single Unit | Paired Mode |
|---|---|---|
| Units required | 1 | 2 |
| Force channels | Total only | Left · Right · Total |
| Left / Right Peak Force | — | ✓ |
| Left / Right Peak Net Force | — | ✓ |
| Asymmetry visible on trace | — | ✓ |
| Synchronised sampling | N/A | 1,200 Hz per unit |

## What you'll need

• **2× Hawkin TruStrength units of the same generation** (e.g., 2× Gen3 TruStrength units), both running the latest Hawkin Capture–compatible firmware.

• **1× Hawkin clamp mount.**

• **A solid frame to mount onto** — a gym rack or secure vertical post (or similar). The frame must be rigid.

• **The Hawkin Capture app** (latest version) on a compatible iOS or Android device.

• **An athlete prepared in the supine test position** (see *Test positions* below).

> ***A note on the 32.5 cm pad-to-pad distance.*** *The 32.5 cm geometry is calibrated for* ***2× Gen3 TruStrength units fitted with the supplied small paddles****. Other TruStrength generations or alternative paddle sizes may produce a different effective pad-to-pad distance.*

## Setting up your TruStrength units

The 32.5 cm fixed pad-to-pad geometry is achieved by mounting both TruStrength units on the Hawkin clamp mount.

**1.** Clamp the first TruStrength unit to the rack or vertical post, force-applying surface facing inward.

**2.** Clamp the second TruStrength unit to the opposite side, force-applying surface facing inward.

**3.** Set the height of both units on the rack or post to suit the chosen test position (see below).

**4.** Tighten the clamps so the units are hand tight and not moving. Do not load the units before zeroing them.

**5.** Confirm the setup is stable — neither unit should move under load.

## Pad height per test position

| Position | Pad contact point |
|---|---|
| Long-lever Copenhagen 5SST (0° hip / 0° knee, primary) | 5 cm above the medial malleoli (ankles) |
| Supine — 45° hip / 90° knee | Medial knee |
| Supine — 90° hip / 90° knee | Medial knee |

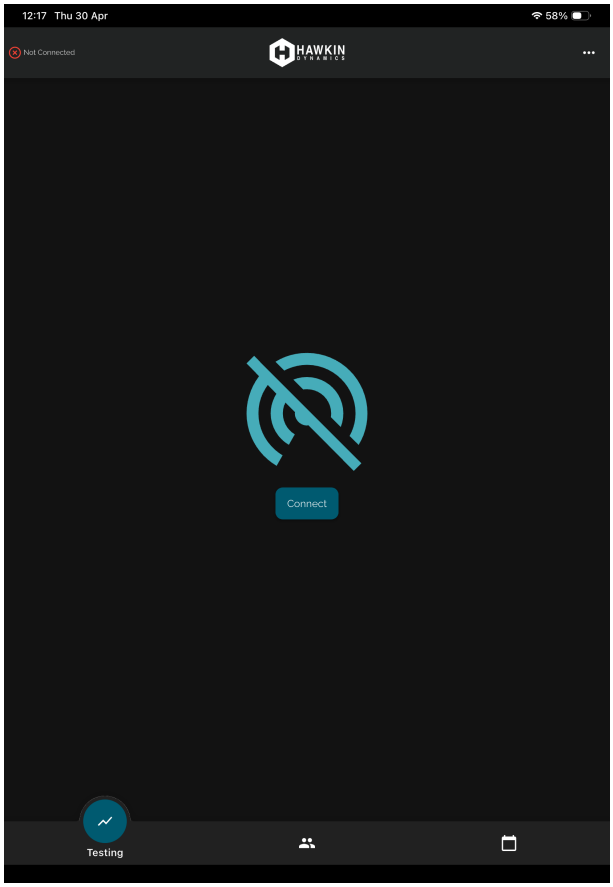
> ***Tip.*** *Mounting on the clamp mount fixes the pad-to-pad distance at 32.5 cm (assuming 2× Gen3 TruStrength units fitted with the supplied small paddles). No measurement is required — only the height of the units changes between test positions.*

*Two TruStrength units on the Hawkin clamp mount — frontal view.*

*Two TruStrength units on the Hawkin clamp mount — closer view.*

# Connecting your devices

Open the Hawkin Capture app. If no devices are connected, the home screen shows a **Connect** button.




*Hawkin Capture home screen — tap **Connect** to open the connection panel.*

## Step 1 — Select device type

If TruStrength is not already selected, tap **Change Device Type** and choose TruStrength from the list.

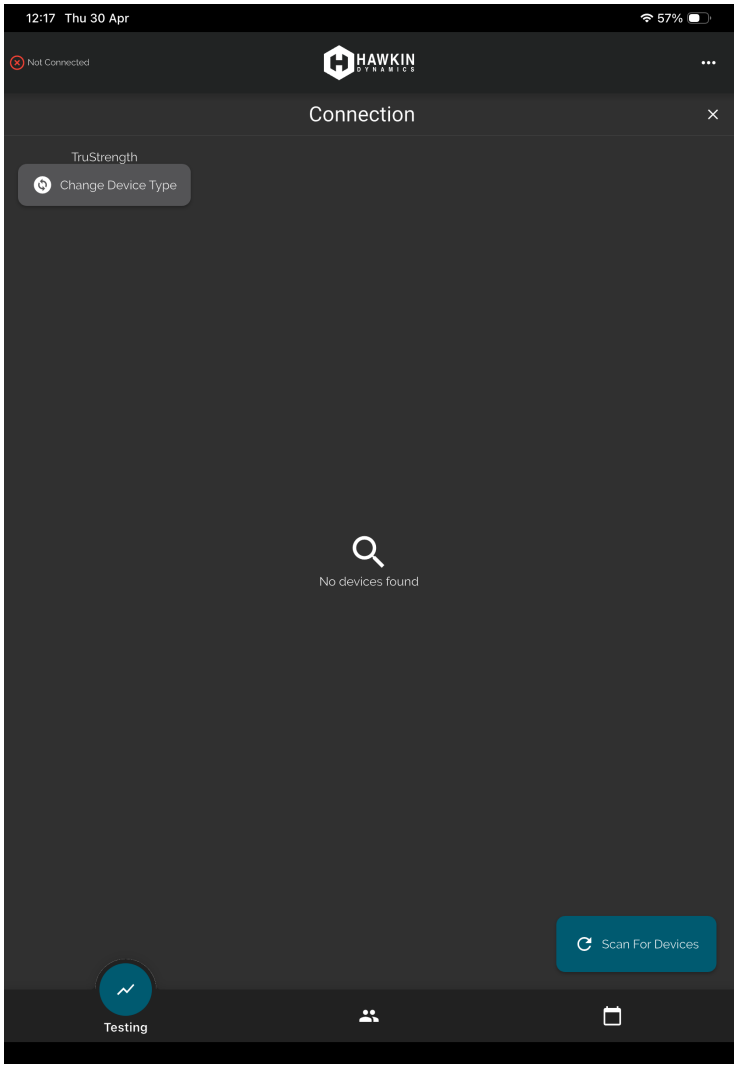

*Select Device Type — TruStrength, TS x The Difference, Force Plates (BLE).*

## Step 2 — Scan and connect the first unit

**1.** Power on both TruStrength units.

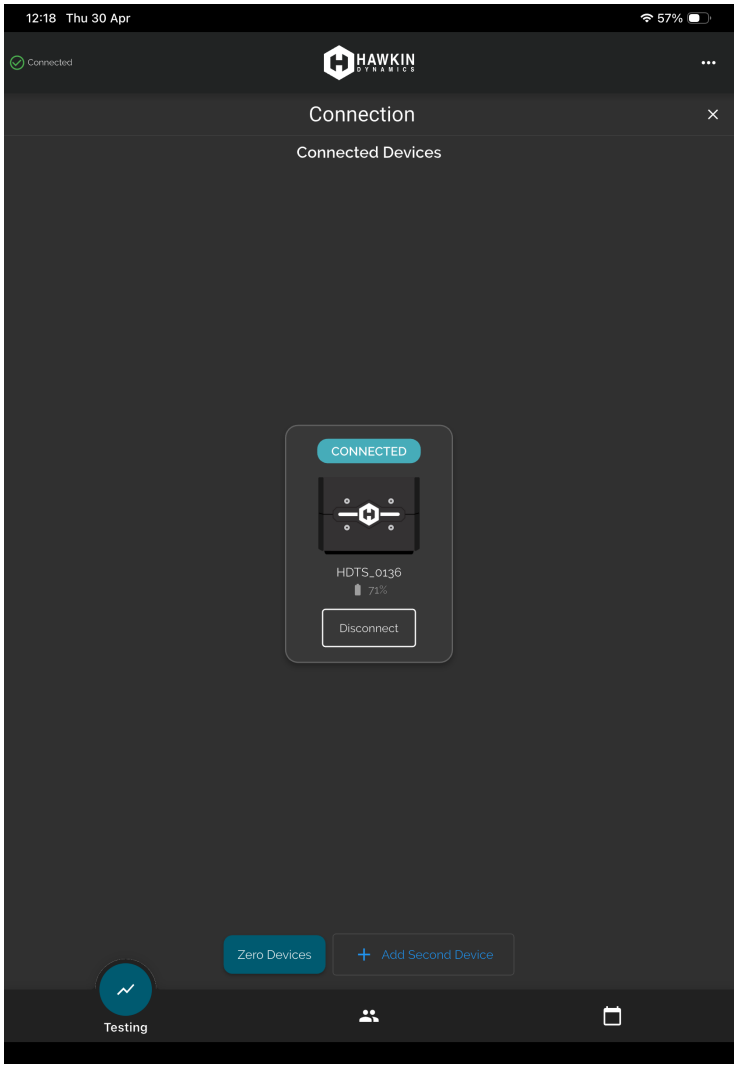
**2.** Tap **Scan For Devices**. Available units appear in the list.

**3.** Tap the first unit to connect it. It appears as **Connected** with a **+ Add Second Device** button at the bottom.




*Connection panel — Scan For Devices.*


*Available TruStrength Devices list — both units detected after scanning.*



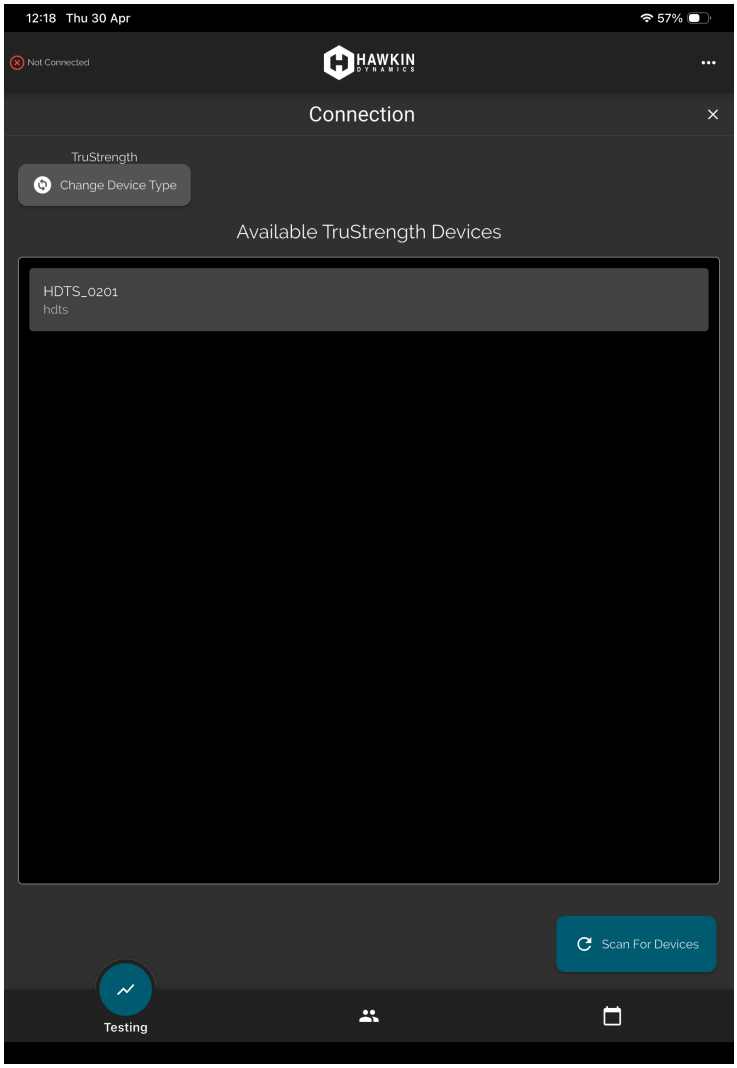

*First unit connected — tap **Add Second Device**.*

## Step 3 — Add the second unit and assign sides

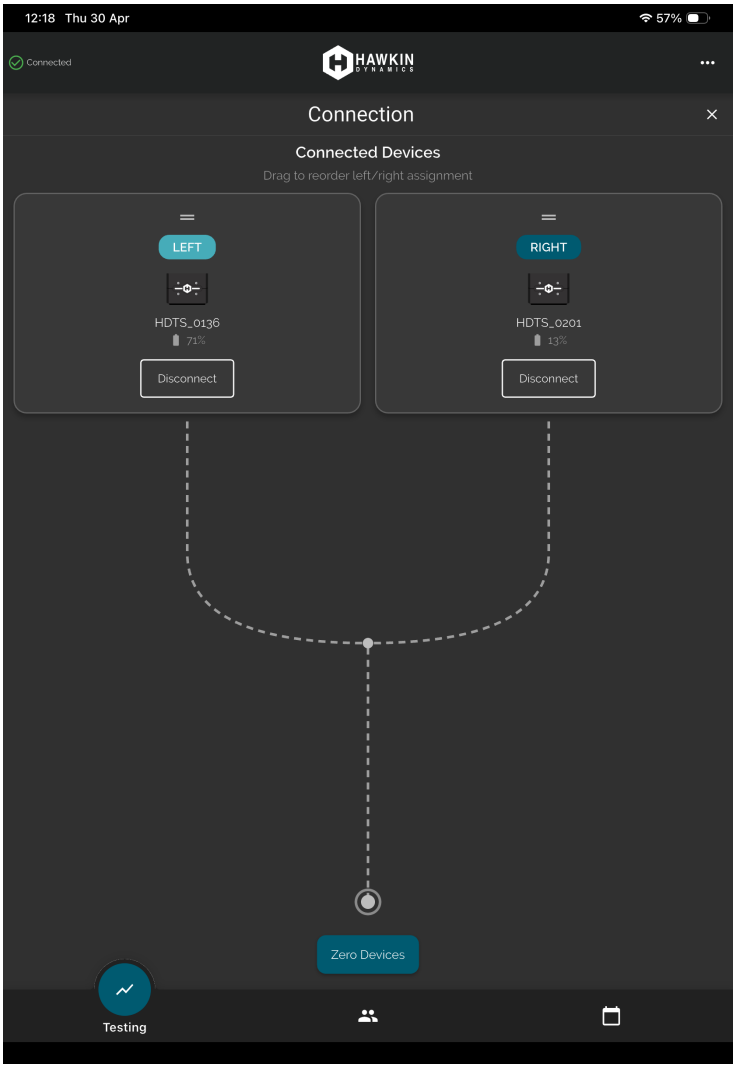
**1.** Tap **+ Add Second Device**, then tap the second unit from the list.

**2.** Both units appear side by side, labelled **LEFT** and **RIGHT**.

**3.** If the assignment is incorrect, drag either card left or right to swap.




*Available device list with the second unit ready to add.*




*Both units connected and assigned **LEFT** and **RIGHT** — drag to reorder.*

> ***Tip.** Connect the unit that will contact the athlete's left side first. It will default to LEFT, matching its position — no drag needed.*

## Step 4 — Zero both devices

With units in position but unloaded, tap **Zero Devices**. Both units zero simultaneously. Wait for the zeroing process to complete before beginning the test.

# Bilateral adductor test positions

Paired Mode supports three supine adductor positions. Each places the hip and knee at a different angle, shifting which portion of the adductor length-tension curve is loaded. The long-lever Copenhagen 5SST (0° hip / 0° knee) has the strongest published research underpinning and is the recommended primary protocol.

| Position | Hip / knee angle | Pad contact point | Tag |
|---|---|---|---|
| Long-lever Copenhagen 5SST | 0° / 0° (legs extended) | 5 cm above medial malleoli | iso_groin_supine_0 |
| Supine — 45° Hip | 45° / 90° | Medial knee | iso_groin_supine_45 |
| Supine — 90° Hip | 90° / 90° | Medial knee | iso_groin_supine_90 |

## The research base for the long-lever Copenhagen 5SST

**Light & Thorborg (2016)** compared three adductor squeeze positions in elite footballers. The long-lever 0° hip / 0° knee position produced **69% more adductor torque** than the traditional short-lever 45° squeeze in adduction (and 11% more than a 45° abduction/external-rotation variant), with the **highest test-retest precision** of the three positions tested (ICC 0.97; minimal detectable change 6.6%).

**Drew et al. (2016)**, using a hypertonic-saline experimental pain model, reported that resisted adduction at 0° hip flexion produced **the highest positive likelihood ratio (+LR ≈ 2.8) and the best ROC area-under-curve** for detecting adductor longus tendon pain of the three squeeze positions studied (0°, 45°, 90°).

**Wörner, Thorborg & Eek (2019)** applied the long-lever 5SST in 333 male professional and semi-professional ice hockey players, demonstrating significant correlations between 5SST results, self-reported function on the Copenhagen Hip and Groin Outcome Score, and bilateral adduction strength.

Paired TruStrength replicates the long-lever Copenhagen 5SST geometry directly: legs extended at 0° hip and 0° knee, abducted to the units, with force applied 5 cm above the medial malleoli — the same anatomical point at which Light & Thorborg placed their handheld dynamometer, in line with the ankle-level resistance used by Drew and Wörner. Two synchronised, instrumented force channels replace the single tester-held dynamometer used in the original method.

## How the 32.5 cm pad-to-pad distance maps onto the published methodology

In the published Copenhagen 5SST, the assessor's forearm plus the handheld dynamometer (HHD) sets the pad-to-pad distance — typically around **35 cm**. The Hawkin clamp-mounted setup at **32.5 cm** sits comfortably inside that range, so practitioners migrating from a handheld dynamometer keep the same long-lever, fully-abducted geometry while gaining a fixed, repeatable distance. The numbers compare directly across testing days, between practitioners, and against published norms.

## What an HHD setup gives up — and what Paired TruStrength fixes

Handheld dynamometry is the most common way the long-lever Copenhagen 5SST is run in the field, and it has well-known practical limitations:

• **Variable lever arm.** The pad-to-pad distance is whatever the assessor's forearm length happens to be, and changes practitioner to practitioner.

• **Single combined channel.** The HHD records one combined L+R force value — there is no independent left and right output, and no asymmetry index from a single rep.

• **Assessor load and drift.** A clinician absorbs the bilateral squeeze for every athlete in the squad. Resistance drifts as the assessor fatigues across a long testing day.

• **Manual timing.** Stopwatch-gated start and stop introduces variability in the test window.

• **Calibration variability.** HHD calibration drifts over time and requires regular re-calibration to remain trustworthy.

Paired TruStrength addresses each of these directly: the lever arm is the engineering, not the assessor; the two units record left and right force independently with a per-metric asymmetry index from a single rep; the units are clamped — there is no squeeze load on the assessor; the trigger is force-threshold-gated rather than stopwatch-gated; and TruStrength units carry traceable calibration that does not depend on the practitioner.

# Running a bilateral adductor squeeze test

The bilateral adductor squeeze (**iso_groin_supine_0**) is the primary recommended Paired Mode test. It needs only the two TruStrength units mounted on the clamp mount, takes under two minutes per athlete, and produces left, right, and total adductor force.

## Athlete position — primary (long-lever Copenhagen 5SST)

• Supine. Hips at 0° flexion, knees at 0° flexion (legs straight).

• Legs abducted so that each leg contacts the flat face of one TruStrength unit at a point **5 cm above the medial malleolus** (just above the inner ankle bone). This places the pad at the position used in the published Copenhagen 5SST methodology.

• The flat face of each unit must contact soft tissue, not a bony prominence.

• For the 45° or 90° variants, raise the units on the rack or post to the medial knee height before positioning the athlete with hips and knees flexed accordingly. The pad-to-pad distance stays fixed at 32.5 cm in all positions.

## Session settings

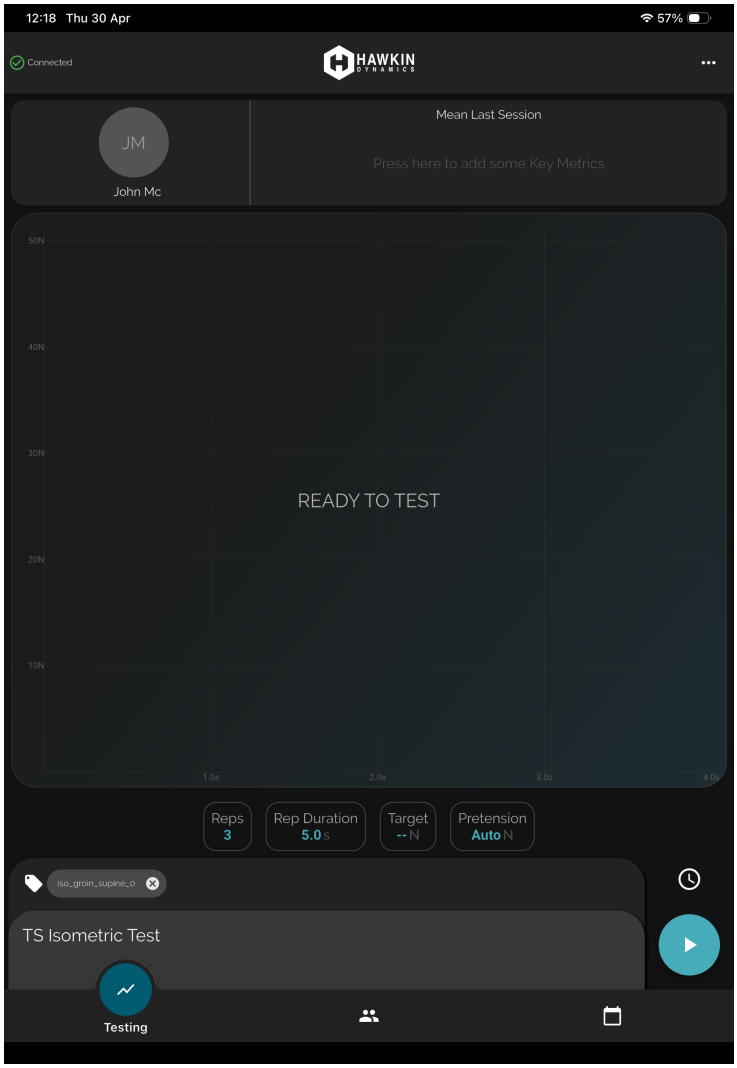
Confirm the appropriate test tag is selected (**iso_groin_supine_0** for the primary long-lever protocol, or **iso_groin_supine_45** / **iso_groin_supine_90** for the variants) and the session settings:

• **Reps** — 3 (recommended)

• **Rep Duration** — 5.0 s

• **Target** — leave as -- N. A target value (in N) can be added if a target is known for the athlete or test position.

• **Pretension** — Auto N (contraction onset detected automatically)




*Test ready screen — Reps 3, Rep Duration 5.0 s, Target --, Pretension Auto, tagged **iso_groin_supine_0**.*

## Collecting trials

**1.** Select the athlete from the roster.

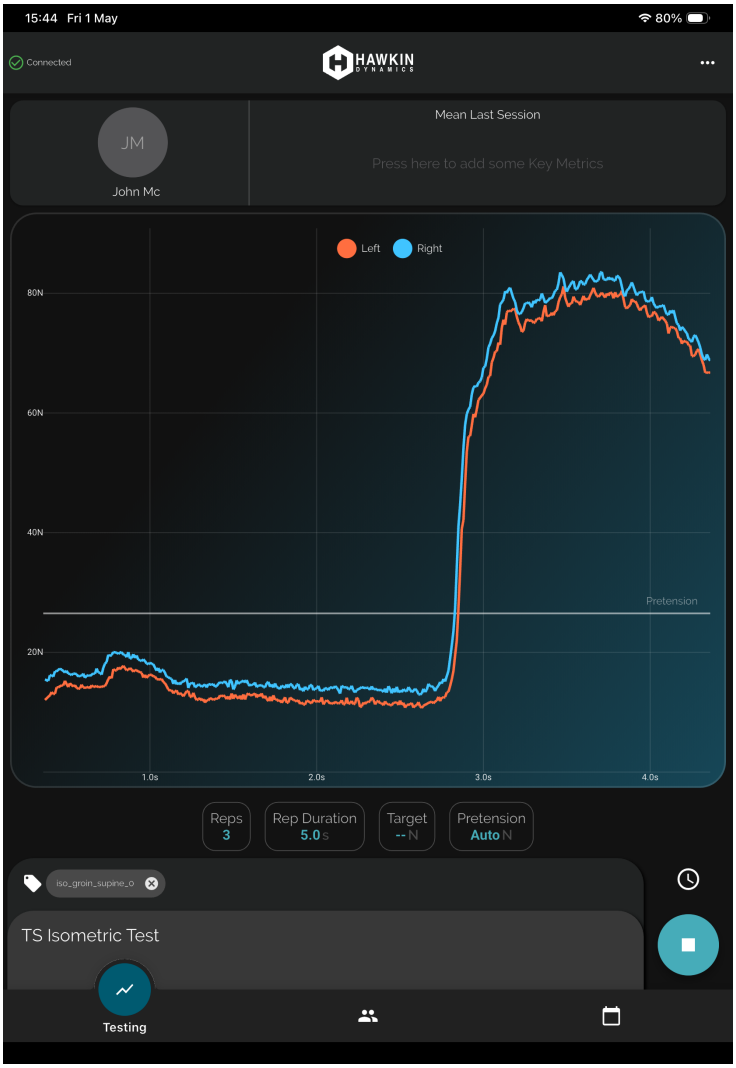
**2.** Give a standardised cue: *“Squeeze as hard and fast as you can, hold it, then relax.”*

**3.** Tap the record button to start. The countdown begins.

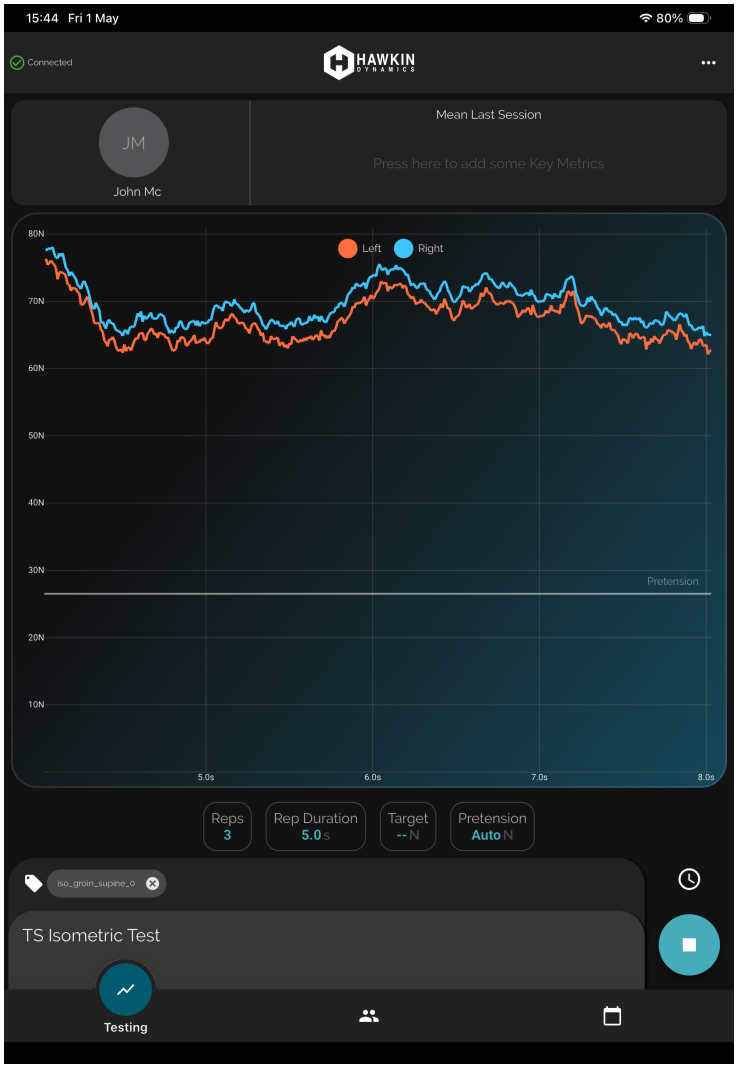
**4.** The athlete performs a maximal isometric contraction for the rep duration.

**5.** The app detects contraction onset automatically via the pretension threshold.

**6.** Repeat for all reps. The live force trace updates after each rep.



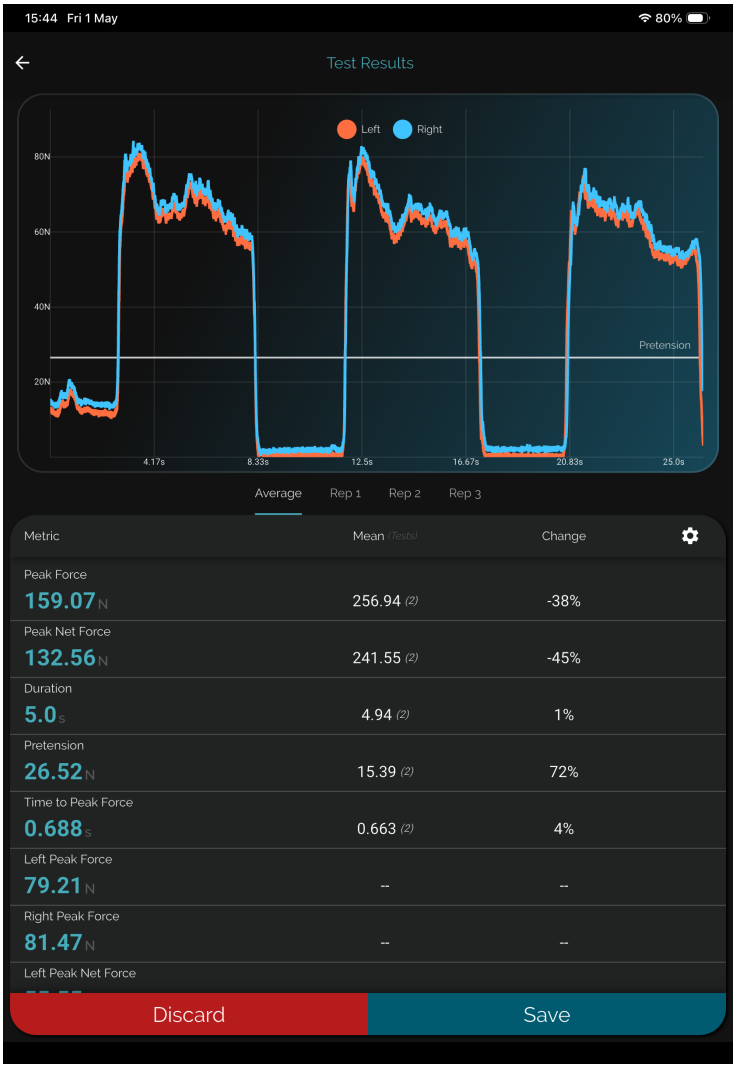

*Live trace at the start of a rep — Left (orange) and Right (cyan) below the pretension line.*




*Live trace during a maximal contraction — independent left and right channels.*

## Saving the test

After all reps are complete, the app shows the Average view across all reps with the full metric panel. Tap **Save** to store to the athlete's profile, or **Discard** to delete.




*Test Results — Average view across all reps with Save and Discard at the bottom.*

> ***Team throughput.*** *With a 3-rep, 5-second protocol and 60-second rest, each athlete takes approximately 5–6 minutes from position to save. For squads of 20+, use a next-athlete rotation so the following athlete is in position while the current test is being saved.*

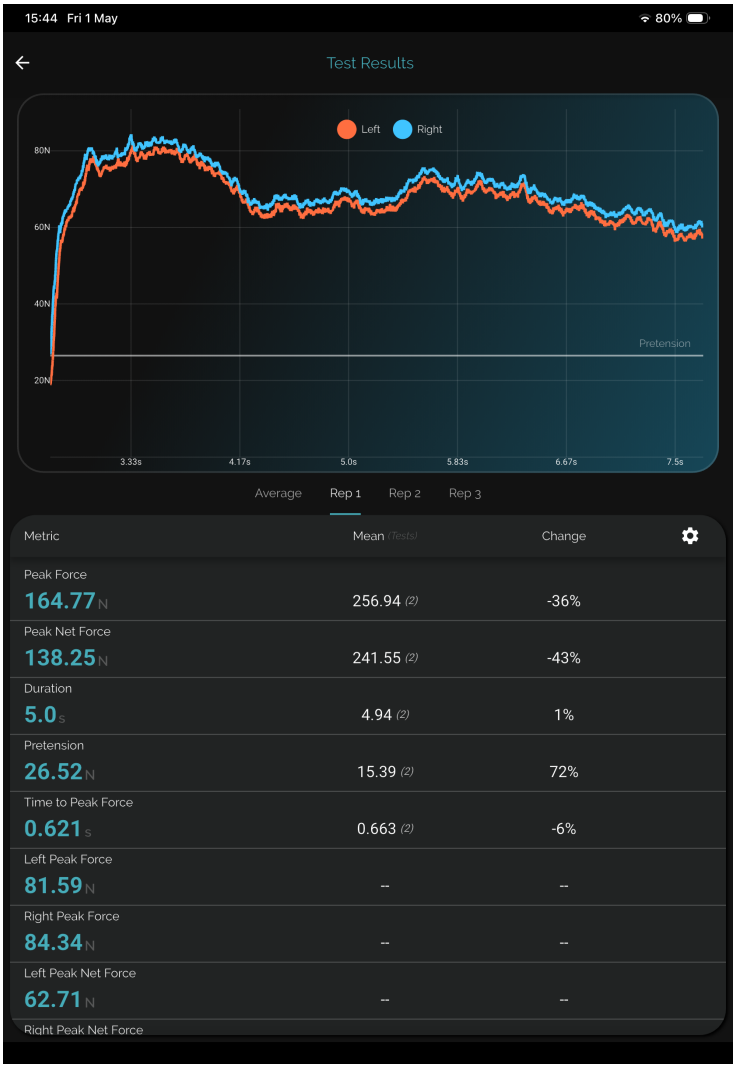
# Understanding your results

After saving, the **Test Results** screen displays the force-time traces and full metric panel. View results by individual rep or as an average across all reps. Results sync to Hawkin Cloud for review, comparison, and export.


*Hawkin Cloud dashboard — three reps of a Paired TruStrength test with the per-side metric panel on the left and the bilateral force-time traces on the right.*

## Force trace

- **Left (orange)** — force recorded by the left-side unit.
- **Right (cyan)** — force recorded by the right-side unit.
- The **Pretension** line marks the threshold used to detect contraction onset and end.
- Tap **Average** to overlay all reps, or **Rep 1/2/3** for individual reps.




*Test Results — Rep 1 view with the single-rep force-time trace and full metric panel.*

## Metrics

Paired TruStrength Mode reports per-side metrics from the left and right units independently, plus L/R asymmetry indices. Select the metrics relevant to your use case in **Manage Metrics**.

In the descriptions below, “net” refers to the value calculated relative to the pretension threshold (i.e. the force above pretension). “During the repetition” means within the rep window detected by the pretension trigger.

## Right side metrics

| Metric | Unit | Description |
|---|---|---|
| Right Peak Force | N | The peak instantaneous right force applied during the repetition. |
| Right Peak Net Force | N | The net peak instantaneous right force applied during the repetition. |
| Right Avg. Force | N | The mean right force applied during the repetition. |
| Right Avg. Net Force | N | The mean net right force applied during the repetition. |

| Metric | Unit | Description |
|---|---|---|
| Right Total Impulse | N·s | The total impulse (area under the force-time curve) from the right unit applied during the repetition. |
| Right Net Impulse | N·s | The net total impulse (area under the force-time curve to the pretension line) from the right unit applied during the repetition. |
| Right Peak RFD | N/s | The peak instantaneous right RFD applied during the repetition. |
| Right Time to Peak Force | s | The time from the beginning of the repetition until right peak force was achieved. |
| Right Explosive Strength Index | — | The net right peak force over the right time to peak force. |
| Right Net Force at 50 ms | N | The net instantaneous right force applied at 50 ms during the repetition. |
| Right Net Force at 100 ms | N | The net instantaneous right force applied at 100 ms during the repetition. |
| Right Net Force at 150 ms | N | The net instantaneous right force applied at 150 ms during the repetition. |
| Right Net Force at 200 ms | N | The net instantaneous right force applied at 200 ms during the repetition. |
| Right Net Force at 250 ms | N | The net instantaneous right force applied at 250 ms during the repetition. |

## Left side metrics

| Metric | Unit | Description |
|---|---|---|
| Left Peak Force | N | The peak instantaneous left force applied during the repetition. |
| Left Peak Net Force | N | The net peak instantaneous left force applied during the repetition. |
| Left Avg. Force | N | The mean left force applied during the repetition. |
| Left Avg. Net Force | N | The mean net left force applied during the repetition. |
| Left Total Impulse | N·s | The total impulse (area under the force-time curve) from the left unit applied during the repetition. |
| Left Net Impulse | N·s | The net total impulse (area under the force-time curve to the pretension line) from the left unit applied during the repetition. |
| Left Peak RFD | N/s | The peak instantaneous left RFD applied during the repetition. |
| Left Time to Peak Force | s | The time from the beginning of the repetition until left peak force was achieved. |
| Left Explosive Strength Index | — | The net left peak force over the left time to peak force. |

| Metric | Unit | Description |
|---|---|---|
| Left Net Force at 50 ms | N | The net instantaneous left force applied at 50 ms during the repetition. |
| Left Net Force at 100 ms | N | The net instantaneous left force applied at 100 ms during the repetition. |
| Left Net Force at 150 ms | N | The net instantaneous left force applied at 150 ms during the repetition. |
| Left Net Force at 200 ms | N | The net instantaneous left force applied at 200 ms during the repetition. |
| Left Net Force at 250 ms | N | The net instantaneous left force applied at 250 ms during the repetition. |

### Asymmetry metrics

| Metric | Unit | Description |
|---|---|---|
| Peak Force Asymmetry | % | The percentage difference between left and right peak force during the repetition. |
| Peak Net Force Asymmetry | % | The percentage difference between left and right net peak force during the repetition. |
| Avg. Force Asymmetry | % | The percentage difference between left and right mean force during the repetition. |
| Avg. Net Force Asymmetry | % | The percentage difference between left and right mean net force during the repetition. |

> ***Tip.*** *The* ***Mean (Tests)*** *column shows the athlete's rolling average across previous tests for this test type. The* ***Change*** *column shows how today's result compares to that mean — an at-a-glance trend signal.*

## Managing which metrics are displayed

Customise which metrics appear in the results panel after each test, to keep the screen focused on the outcomes that matter for your context.

**1.** From the results screen, tap the settings (gear) icon in the top-right of the metric panel.

**2.** The **Manage Metrics** screen shows all available metrics for the test type.

**3.** Tick the metrics you want to display.

**4.** Tap back — the results panel updates immediately.

> ***Tip.*** *For squad sessions, a focused panel of* ***Peak Force, Left Peak Force, Right Peak Force,*** *and* ***Peak Net Force*** *keeps results quick to read at high throughput.*

# Using Scoreboard 2.0 with Paired Mode

Scoreboard 2.0 supports Paired Mode test types. Select your TruStrength test from the Test Type dropdown in Scoreboard Settings (the test type is identified by its tag, e.g. **iso_groin_supine_0**). The live leaderboard updates after each saved trial.

• Set **Metric 1 (Primary)** to **Peak Force** for squad ranking.

• Add **Left Peak Force** and **Right Peak Force** as Metrics 2 and 3 to show asymmetry context on the same display.

• Use **Event Mode** on testing days to show session scores only.

• Use **Split screen** to show different squads or position groups side by side.

# Tips and common questions

### Does Paired Mode work with any combination of TruStrength units?

Paired Mode requires **two units of the same TruStrength generation** (e.g., 2× Gen3). The published 32.5 cm pad-to-pad distance is calibrated for **2× Gen3 units fitted with the supplied small paddles**. Other generations or different paddle sizes may produce a different effective pad-to-pad distance, which means the geometry no longer maps directly onto the published Copenhagen 5SST methodology. If you are running Paired Mode on a non-Gen3 setup or with different paddles, characterise your specific pad-to-pad distance before comparing against published norms.

### Do both units need to be charged before a session?

Check battery levels on the Connection screen before starting. As long as both units are powered, Paired Mode will run; charge ahead for longer sessions to avoid interruption.

### What if one unit loses connection mid-session?

The app alerts you. Data from completed reps is saved. Re-zero both units after reconnecting before continuing.

### Can I run a single-unit test within a paired session?

Paired Mode requires both units to be active. For single-unit tests, disconnect the second device and use standard TruStrength mode.

### Does the app calculate an asymmetry index automatically?

Per-metric Asymmetry % is reported when both Left and Right values are enabled in **Manage Metrics**. Limb Symmetry Index can be calculated directly from Left and Right Peak Force.

### Can I export bilateral data?

All metrics including Left and Right values are included in the data export from Hawkin Cloud (cloud.hawkindynamics.com). Contact *techsupport@hawkindynamics.com* for raw force-time trace export.

### Do I need to re-zero between athletes?

Re-zero if the units are moved or repositioned between athletes. For consecutive testing in the same position, re-zeroing at the start of each athlete is good practice.

### Which adductor position should I use?

The long-lever 0° / 0° position is the recommended primary protocol — it is the position with the strongest published research underpinning. The 45° and 90° positions are available where length-tension profiling is part of your testing programme, or where the long-lever position is not feasible for an individual athlete.

### Is Paired Mode available on the web app?

Paired Mode testing runs in the Hawkin Capture app on iOS or Android. Results are viewable and exportable from Hawkin Cloud after saving.

# References

The protocols and geometry documented in this guide are informed by the following peer-reviewed research:

• Drew MK, Palsson TS, Izumi M, Hirata RP, Lovell G, Chiarelli P, Osmotherly PG, Graven-Nielsen T. *Resisted adduction in hip neutral is a superior provocation test to assess adductor longus pain: an experimental pain study.* Scandinavian Journal of Medicine & Science in Sports, 2016; 26(8): 967–974.

• Light N, Thorborg K. *The precision and torque production of common hip adductor squeeze tests used in elite football.* Journal of Science and Medicine in Sport, 2016.

• Wörner T, Thorborg K, Eek F. *Five-Second Squeeze testing in 333 professional and semiprofessional male ice hockey players: how are hip and groin symptoms, strength, and sporting function related?* Orthopaedic Journal of Sports Medicine, 2019; 7(2): 2325967119825858.

> ***Questions?.*** *Contact us at* ***techsupport@hawkindynamics.com***