

Sensorium™ Smart Bolt — Installation & Quick-Start Guide

Install a Smart Bolt in place of a standard fastener, torque it to spec, pair it to the Sensorium™ Gateway over BLE, and confirm a baseline load reading on the 5Tech Platform.

[sensorium-smart-bolt-installation](#) · Revision Draft (Preliminary) · 2026-07-07 · Status:

PRELIMINARY

PRELIMINARY. This guide describes the *intended* installation and commissioning procedure. Steps are complete, but every value marked [\[TBD\]](#) — torque, tool sizes, timings, indicator colours — is pending engineering confirmation and **must not** be treated as final. Do not substitute a guessed value; obtain the confirmed figure from the joint's engineered fastening specification and the released product data before installing.

1. Before you start

The **Sensorium™ Smart Bolt** is a connected fastener: a structural bolt with an embedded sensing element ([\[TBD\]](#)) that monitors load / clamping-force, vibration, and looseness in service. It installs in place of a standard fastener, pairs over **Bluetooth Low Energy** to the **Sensorium™ Gateway**, and streams data to the **5Tech Platform**, where the *Sense → Connect → Decide* chain turns it into monitoring, trends, and maintenance alerts. It provides **monitoring support — not a certified structural-health inspection**.

Intended use. Install a Smart Bolt only where the structural fastening design calls for a fastener of the equivalent grade, size, and torque. The Smart Bolt does not change the joint's mechanical requirements — it instruments them.

Qualified personnel only. Installation must be performed by personnel qualified for the bolted-joint work involved (correct fastener selection, calibrated torquing, joint inspection). Commissioning to the Gateway and Platform additionally requires access to the site's 5Tech deployment.

Conventions in this guide

- Numbered steps are performed in order; each step is a single action.
- A safety notice always appears **before** the step it protects.
- *Result:* lines state the condition you should observe before continuing.

Signal words (per the 5Tech manual & installation standard):

SIGNAL WORD	MEANING
DANGER	Imminent hazard that will cause death or serious injury.
WARNING	Hazard that could cause death or serious injury.
CAUTION	Hazard that could cause minor injury.
NOTICE	Practice that could cause equipment damage or invalid data.

2. In the box

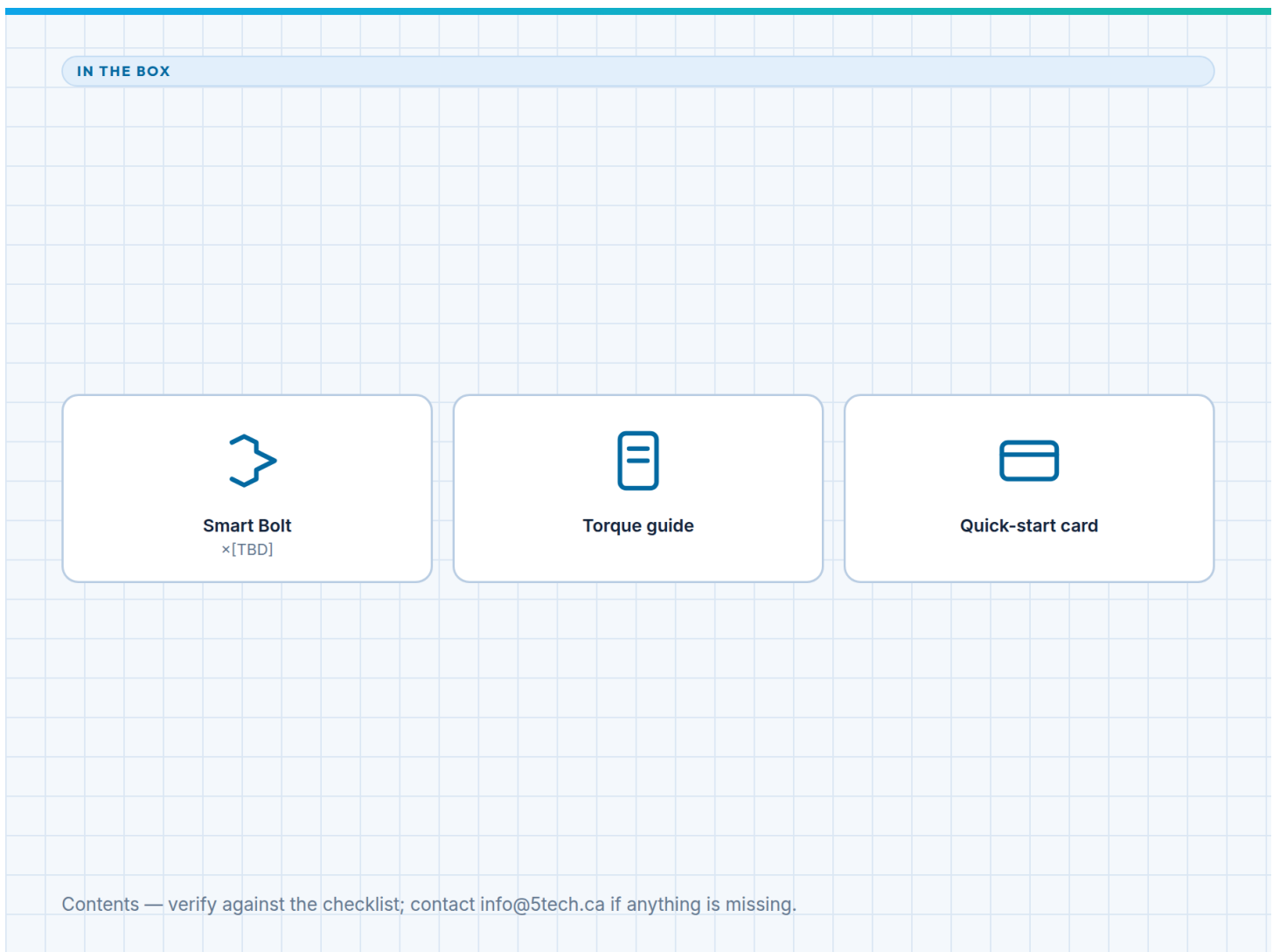


Figure FIG-001 — Everything that ships with the Sensorium™ Smart Bolt.

Confirm the contents against the list below before starting. Quantities and included companion hardware are [TBD] pending final packaging confirmation.

ITEM	QTY	NOTES
Sensorium™ Smart Bolt (connected fastener)	[TBD]	Grade / size per order code [TBD]
Companion hardware (nut, hardened washer)	[TBD]	Supplied vs. sourced on site: [TBD]
Quick-start card	[TBD]	Device ID / pairing reference
Device identity label / pairing token	[TBD]	Needed for Gateway commissioning (\$6)

NOTICE. Inspect the sensor cap at the bolt head for shipping or handling damage before installing. A cracked or crushed cap can compromise the embedded sensing and its

readings. Do not install a damaged unit; quarantine it and record the device ID.

3. Required tools & safety

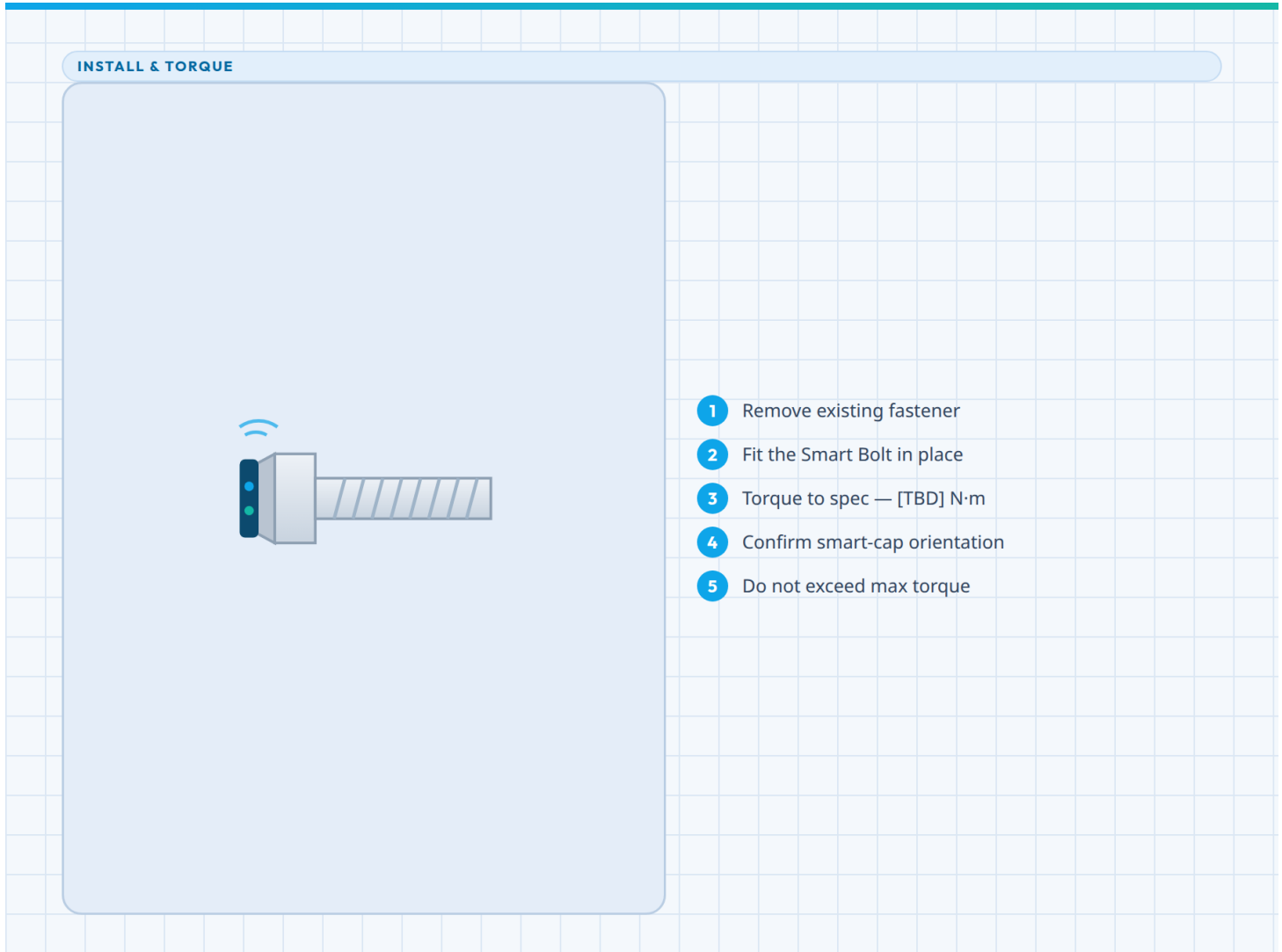


Figure FIG-002 — Replacing a standard fastener with the Smart Bolt and torquing it to the specified value.

Tools & PPE (specifications [TBD] — confirm against the released spec):

ITEM	SPECIFICATION
Calibrated torque wrench	Range covering the specified torque (per joint design); in-calibration
Socket / wrench size	[TBD] (matches bolt/nut across flats)
Backing wrench (if required to hold the bolt)	[TBD]
Thread lubricant / anti-seize (if specified)	[TBD] — affects torque value; use only if the spec requires it
PPE	Safety glasses, work gloves, and any site-mandated PPE [TBD]

WARNING. A bolted structural joint can carry high stored load. Follow the site's isolation, lockout, and load-management procedures before removing or replacing any fastener. Removing a fastener from a loaded joint can release energy and cause serious injury.

CAUTION. Do not use the sensor cap as a wrench engagement point, and do not apply tooling to it. Drive the fastener only on its designed wrench flats.

Safety essentials

- Replace fasteners **one at a time** unless the joint design and a qualified engineer permit otherwise; never leave a joint understrength.
- Use only a **calibrated** torque wrench that is in date.
- Do not exceed the specified torque to "make sure it's tight" — see §5.

4. Selecting the fastener location

Choose which fastener position(s) in the joint the Smart Bolt will occupy. This determines what the structural-integrity data represents.

1. Confirm from the fastening specification that a Smart Bolt of the correct grade and size is approved for the chosen position. *Result:* the position and required fastener match the ordered Smart Bolt.
2. Select the position that best represents the load path you intend to monitor (typically the most safety- or load-critical fastener in the joint), per engineering guidance.

3. Verify BLE line-of-sight and range to the serving **Sensorium™ Gateway** is adequate for the chosen position; maximum range is [TBD]. *Result:* the position is within confirmed Gateway range.
4. Record the joint, position, and the Smart Bolt device ID for commissioning (§6) and for the site's asset register.

NOTICE. The position you choose is the physical meaning of every future reading and alert for this device. Recording it accurately now prevents misattributed data later.

5. Installing & torquing to spec

Install the Smart Bolt exactly as you would the standard fastener it replaces — same joint preparation, same tightening sequence — then torque it to the **specified** value.

WARNING. Correct torque is safety-critical. Under-torque can let the joint loosen or slip; over-torque can yield or fracture the fastener. Either can lead to joint failure and serious injury. Torque only to the confirmed specified value — per joint design — using a calibrated wrench. Never estimate it.

NOTICE. Correct torque is also data-critical. The Smart Bolt establishes its baseline clamping-force / load reference from this installation. An incorrect installation torque produces a false baseline, which corrupts every subsequent reading, trend, and maintenance alert. If in doubt, back off and re-torque to spec.

1. Prepare the joint faces and threads per the fastening specification (cleanliness, lubricant only if specified — lubricant changes the required torque value [TBD]).
2. Seat the Smart Bolt in the selected position with the sensor cap oriented per the spec, and fit the companion nut and washer. *Result:* the bolt is hand-tight and square in the joint; the sensor cap is clear of tooling.
3. Snug the fastener to the specified snug/pre-torque value [TBD], following the joint's tightening sequence if it is part of a multi-bolt pattern.
4. Set the calibrated torque wrench to the specified final torque (per joint design).
5. Torque the fastener to the set value in the specified number of passes [TBD], applying smooth, continuous force until the wrench signals the set torque. *Result:* the wrench reaches the set torque without overshoot; the joint is fully tightened.

6. Do not apply additional torque after the wrench signals the set value.
7. Confirm the sensor cap is intact and undamaged after tightening. *Result:* the bolt is installed to spec and ready to commission.

6. Pairing to the Gateway

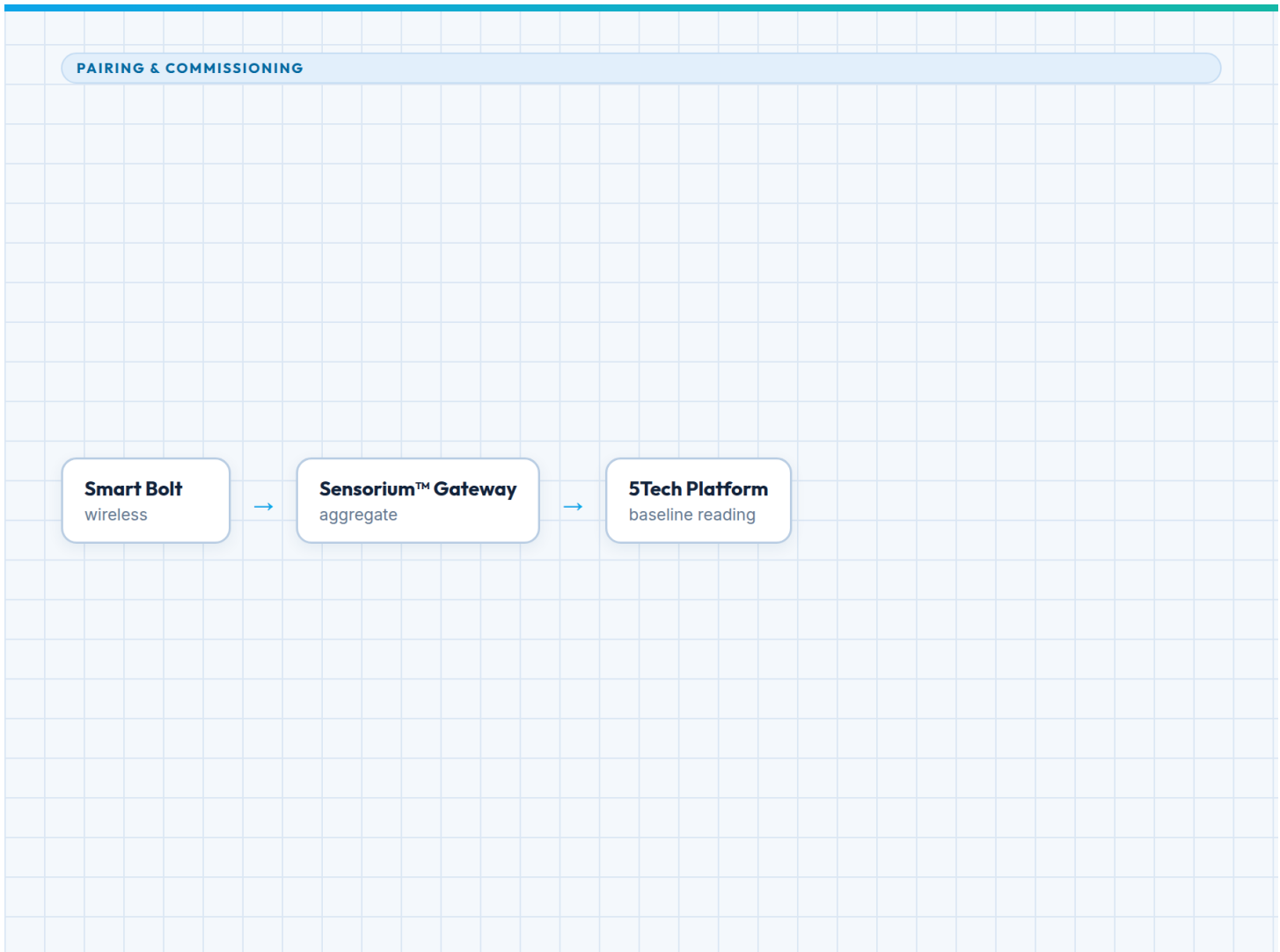


Figure FIG-003 — The Smart Bolt pairs over BLE to the Sensorium™ Gateway, which relays data to the 5Tech Platform.

The installed Smart Bolt is commissioned to the serving Sensorium™ Gateway, which aggregates and uplinks its data. Confirm the Gateway is installed, powered, and online before pairing.

1. On the Gateway's commissioning interface, open the device list and start **add / pair a device** [TBD] (exact control name per the Gateway interface).
2. Enter or scan the Smart Bolt's device identity / pairing token from the label or quick-start card (§2). *Result:* the Gateway shows the Smart Bolt as *discovered / pairing*.

3. Wait for the pairing handshake to complete; expected duration is [TBD]. *Result:* the Smart Bolt appears in the Gateway's device list as **paired / online**.
4. Assign the joint and position recorded in §4 to the device so its data is correctly labelled.
5. Confirm the device's status indication shows the healthy/streaming state; indicator meanings are [TBD] and are summarised in §7. *Result:* the Smart Bolt is paired to the Gateway and reporting.

NOTICE. If pairing fails, re-check Gateway range and line-of-sight from §4 and confirm the device ID is correct. Do not re-torque or disturb the installed bolt to troubleshoot a BLE / wireless issue — the mechanical installation and the pairing are independent.

7. Verifying a baseline reading

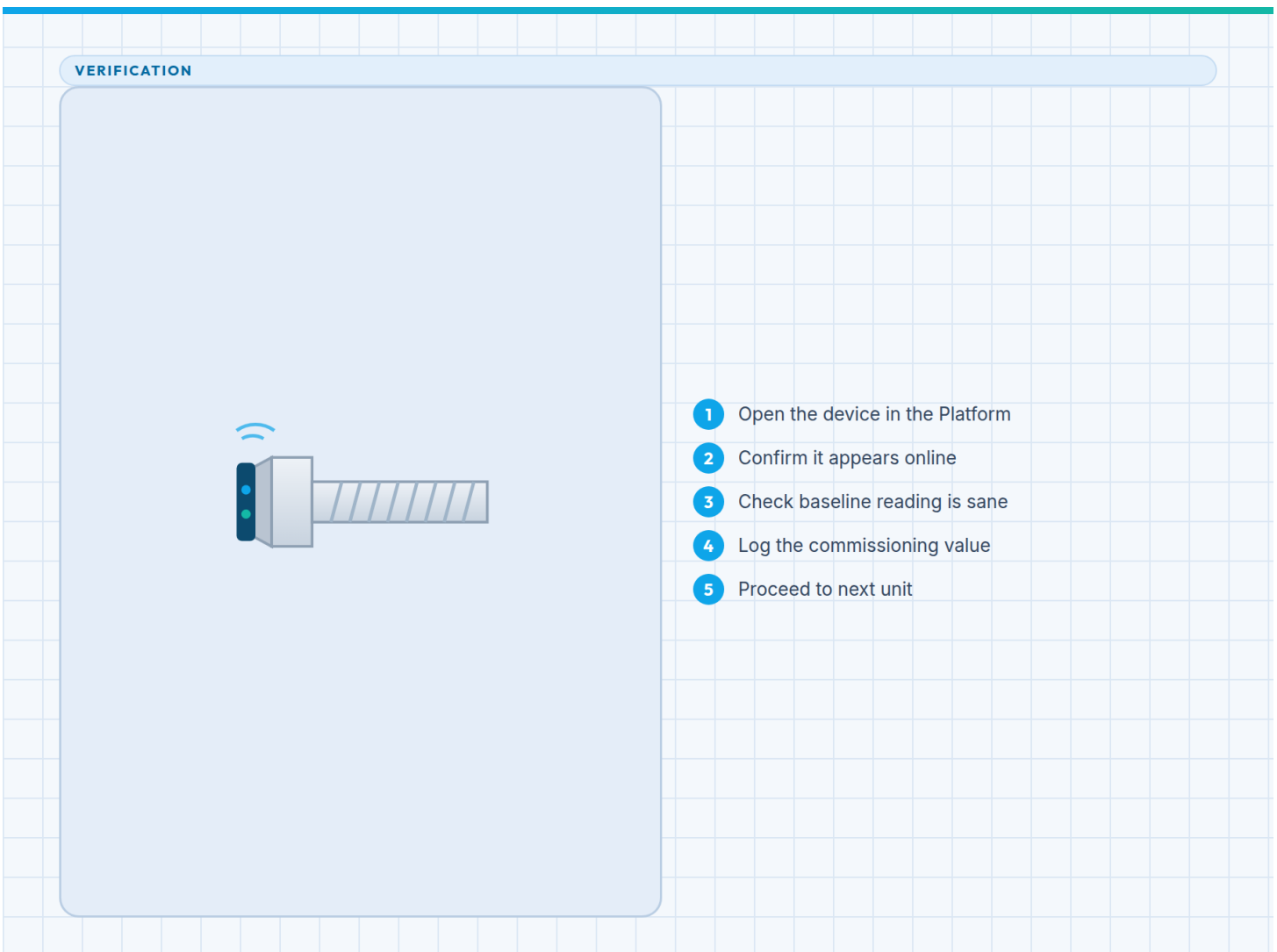


Figure FIG-004 — Confirming a healthy status indication and a first baseline reading on the 5Tech Platform.

A correct install is confirmed when a plausible baseline reading for this device appears on the 5Tech Platform.

Status indication (colours/states [TBD] — confirm against the released product):

INDICATION	MEANING
Healthy / streaming	[TBD] — device powered, paired, and reporting
Pairing / not yet commissioned	[TBD]
Fault / attention	[TBD]

Steps

1. On the 5Tech Platform, open **Monitoring** and locate the device by the joint/position label assigned in §6. *Result:* the device tile shows the Smart Bolt as **online**.
2. Confirm a first baseline reading (clamping force / load) is present and within the expected range for the joint; expected range is [TBD]. *Result:* a baseline value is displayed and begins to trend.
3. Confirm the reading is stable — not drifting or flatlined — over the confirmation window [TBD]. *Result:* the baseline holds steady, indicating a valid installation reference.

NOTICE. If no reading appears, the reading is implausible, or the baseline drifts, treat the installation as unverified. Re-check pairing (§6); if the data is present but implausible, re-examine the installation torque (§5) before accepting the baseline — an out-of-spec torque is the most common cause of an invalid baseline.

8. Commissioning checklist

Sign off the installation only when every item below is confirmed.

- ☐ Box contents verified and sensor cap undamaged (§2).
- ☐ Calibrated, in-date torque wrench used (§3).
- ☐ Fastener position selected and recorded with the device ID (§4).
- ☐ Bolt installed and torqued to the **specified** value (per joint design) — not estimated (§5).
- ☐ Sensor cap intact after tightening (§5).

- [] Device paired and **online** on the Gateway, with joint/position assigned (§6).
- [] Status indication shows the healthy/streaming state (§7).
- [] A stable, plausible baseline reading is visible on the 5Tech Platform (§7).
- [] Joint, position, device ID, and installed torque recorded in the site asset register.

9. Next steps

Full operation, monitoring, alert configuration, maintenance, and troubleshooting are covered in the product **manual**.

- **Manual:** [manuals/sensorium-smart-bolt-manual/](#) — operation, alerts, maintenance, troubleshooting.
- **Datasheet:** [datasheets/sensorium-smart-bolt-datasheet/](#) — grades, sizes, torque and sensing specifications.
- **Aggregated by:** [installation/sensorium-gateway-installation/](#) — the Sensorium™ Gateway that serves this device.
- **Works with:** the **5Tech Platform** (Monitoring · Automation · AI assistance).

Figures

ID	TITLE	SUBFOLDER / FILE	PURPOSE
FIG-001	In the Box	figures/in_the_box.png	What ships in the box
FIG-002	Install & Torque to Spec	figures/install_and_torque.png	Replacing the fastener and torquing to spec
FIG-003	Pairing to the Gateway	diagrams/pairing_to_gateway.png	Wireless pairing / commissioning to the Gateway
FIG-004	Baseline Reading Verification	figures/reading_verification.png	Verifying the baseline reading / status indication

This guide is preliminary and subject to change. See [revision.md](#) for change control, [references.md](#) for sources, and [figures.json](#) / [image_prompts.md](#) for the figure index. Web publication target: </resources/manuals/smart-bolt-install>.