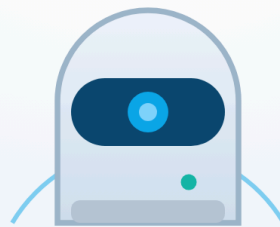


Sensorium™ Zone Awareness — Proximity & Presence Alert Sensor

Datasheet · [sensorium-safety-zone-datasheet](#) · Revision Draft (Preliminary) · 2026-07-18

PRELIMINARY — PROPOSED VALUES. Values marked ‡ are proposed, industry-typical figures for this product class, provided so no specification is left blank. They are **not measured and not final**, and no value in this document is a certification claim. Engineering must confirm every ‡ value before this datasheet is released as final. See §12 for change control.

This is an alerting sensor, not a safety device. The Zone Awareness sensor detects proximity / zone entry and raises **alerts** (a local audible/visual output and a Platform notification). It is **not** a certified safety-rated stop system, provides **no** machine-stop or functional-safety function, and must **not** be relied on as a protective (machine-stopping) measure. No functional-safety rating or protective claim is made in this document (see §9).



SENSORIUM™

Sensorium™ SafeZone

Sensorium™ SafeZone — proximity & zone safety-sensing module.

Figure FIG-001 — Sensorium™ Zone Awareness, the proximity & presence alerting module of the Sensorium™ family.

1. At a glance

The **Sensorium™ Zone Awareness** sensor is a *Sense* module of the 5Tech Sensorium™ family, built on the Sensorium™ BLE sensor-node platform in its **externally-powered (24 V DC) variant**: an industrial proximity-and-presence alerting sensor that detects when a person or object enters a **configurable monitored zone** near machines, mobile equipment, and hazardous areas. It senses with **60 GHz FMCW mmWave radar‡** — chosen because radar detects presence through airborne dust, smoke, and changing light, where optical sensing degrades; the device does **not** use LiDAR or vision AI. On a zone entry it drives a **local audible/visual output** for immediate on-site awareness *and* reports the event to the **5Tech Platform** over Bluetooth Low Energy via the **Sensorium™ Gateway**. It is an **alerting sensor — not a safety-rated / machine-stop / functional-safety device**, and does not by itself stop machinery.

Product	Sensorium™ Zone Awareness (Proximity & Presence Alert Sensor)
Family / role	Sensorium™ · Sense
Function	Proximity / presence detection near hazards; drives a local alert output and reports to the 5Tech Platform
Sensing	60 GHz FMCW mmWave radar‡ — no LiDAR, no vision AI
Detection range	0.3–10 m‡ (walking adult, radial approach, clear line of sight, 25 °C)
Coverage	120° azimuth × 60° elevation‡ (–6 dB beamwidth)
Response	Local output ≤ 200 ms‡; Platform-path annunciation ≤ 2 s‡
Uplink (to Gateway)	Bluetooth Low Energy 5.x (wireless) — the only data link
Local output	Audible / visual, solid-state 24 V DC, ≤ 0.5 A‡
Enclosure	Die-cast aluminium body with RF-transparent radome; IP65‡ (IEC 60529)
Power	Externally powered: 24 V DC (18–30 V)‡; 3 W typ‡ / 6 W max‡
Operating temperature	–20 °C to +55 °C‡ (ambient)

Key features

- **60 GHz FMCW mmWave radar**‡ presence sensing that holds through airborne dust, smoke, and changing light; the device explicitly does **not** use LiDAR or vision AI.
- **Software-defined monitored zones** — an outer **warning zone** and an inner **alert zone** around the hazard, configured through the 5Tech Platform.
- **Dual annunciation**: a fast **local audible/visual output** (≤ 200 ms‡) for on-site awareness *and* a Platform notification (≤ 2 s‡) via the Sensorium™ Gateway over BLE.
- **Externally-powered (24 V DC) variant** of the Sensorium™ sensor-node platform — radar draws more than a coin cell can supply, so this variant is line-powered; the platform also offers battery-powered variants (e.g. SmartBolt).
- **Defined fail-safe behaviour**: a dedicated **fault output** and a defined output state on power, link, or internal fault (see §3.2, §6).
- **BLE 5.x uplink** to the Sensorium™ Gateway; configuration and diagnostics travel the same authenticated, encrypted channel.

Typical applications

- Proximity / presence awareness around hazardous machinery and mobile plant.
- Personnel-presence detection within software-defined monitored zones.
- **Construction site monitoring** (alongside SmartBolt and the 5Tech dashboard).

Safety note. The Zone Awareness sensor is an **alerting sensor**: it detects zone entry and raises alerts. It is **not** a certified safety-rated protective device, provides **no machine-stop or functional-safety function**, and must not be used as a protective measure or as a substitute for guarding, emergency-stops, or a certified safety system. Its response time must **not** be used in a safety-distance (ISO 13855) calculation.

2. System context

The Zone Awareness sensor is a **Sense** device. It observes the area around machinery and streams detection data up through the **Sensorium™ Gateway** (Connect) over BLE to the **5Tech Platform** (Decide), which raises alerts and notifications; in parallel it drives a **local output** for immediate on-site awareness. Configuration and zone geometry flow back down the same chain.

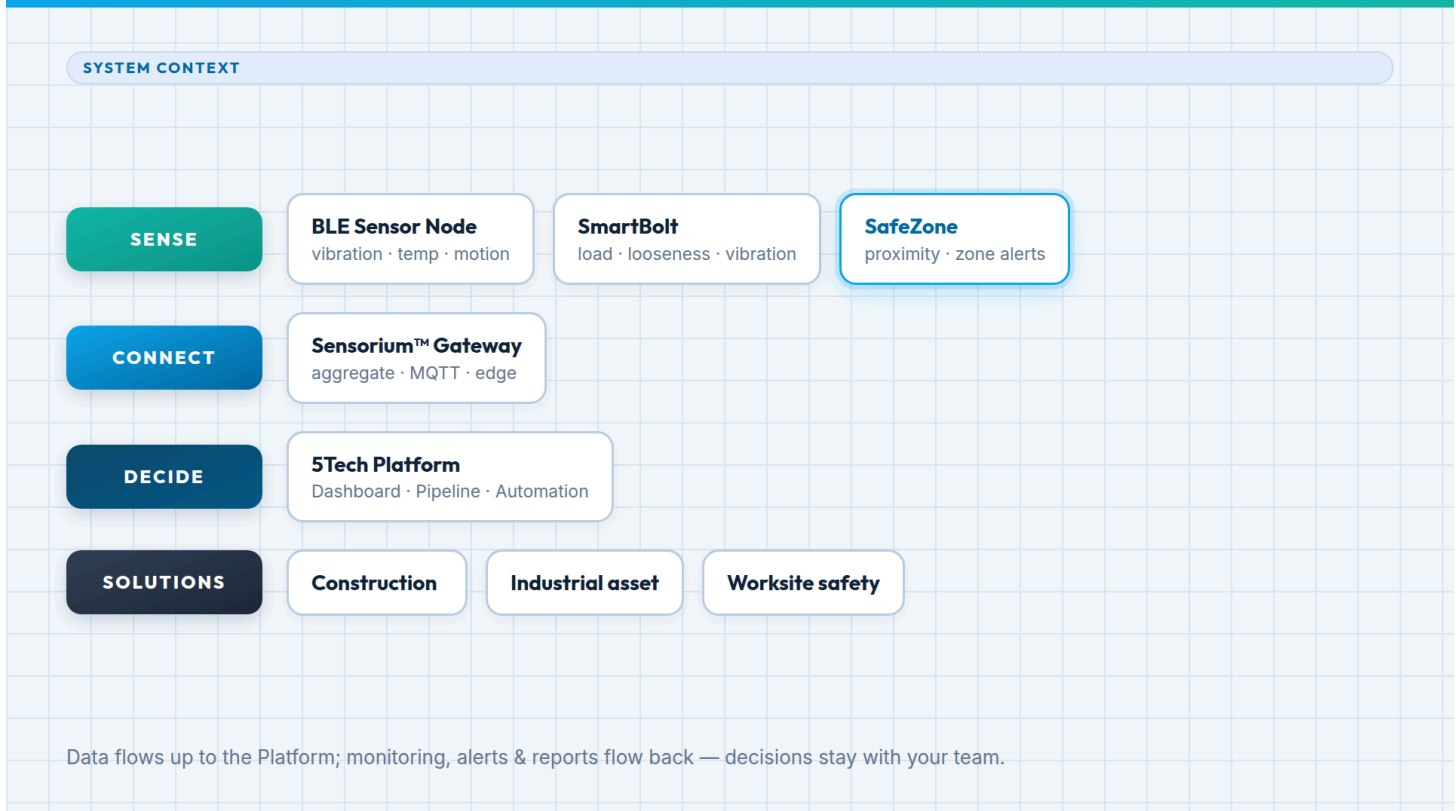


Figure FIG-002 — Sense → Connect → Decide. The Zone Awareness sensor is a Sense device feeding the Gateway → Platform, with a local alert output alongside.

- **Sense** — the **Sensorium™ Zone Awareness** sensor (proximity / presence sensing); SmartBolt alongside it.
- **Connect** — the Sensorium™ Gateway aggregates detection data over BLE and carries it to the Platform.
- **Decide** — the 5Tech Platform (Monitoring · Automation · AI assistance) turns detections into alerts and notifications.
- **Solutions** — Construction Sites Monitoring and worksite awareness are built on this chain.

3. Functional overview

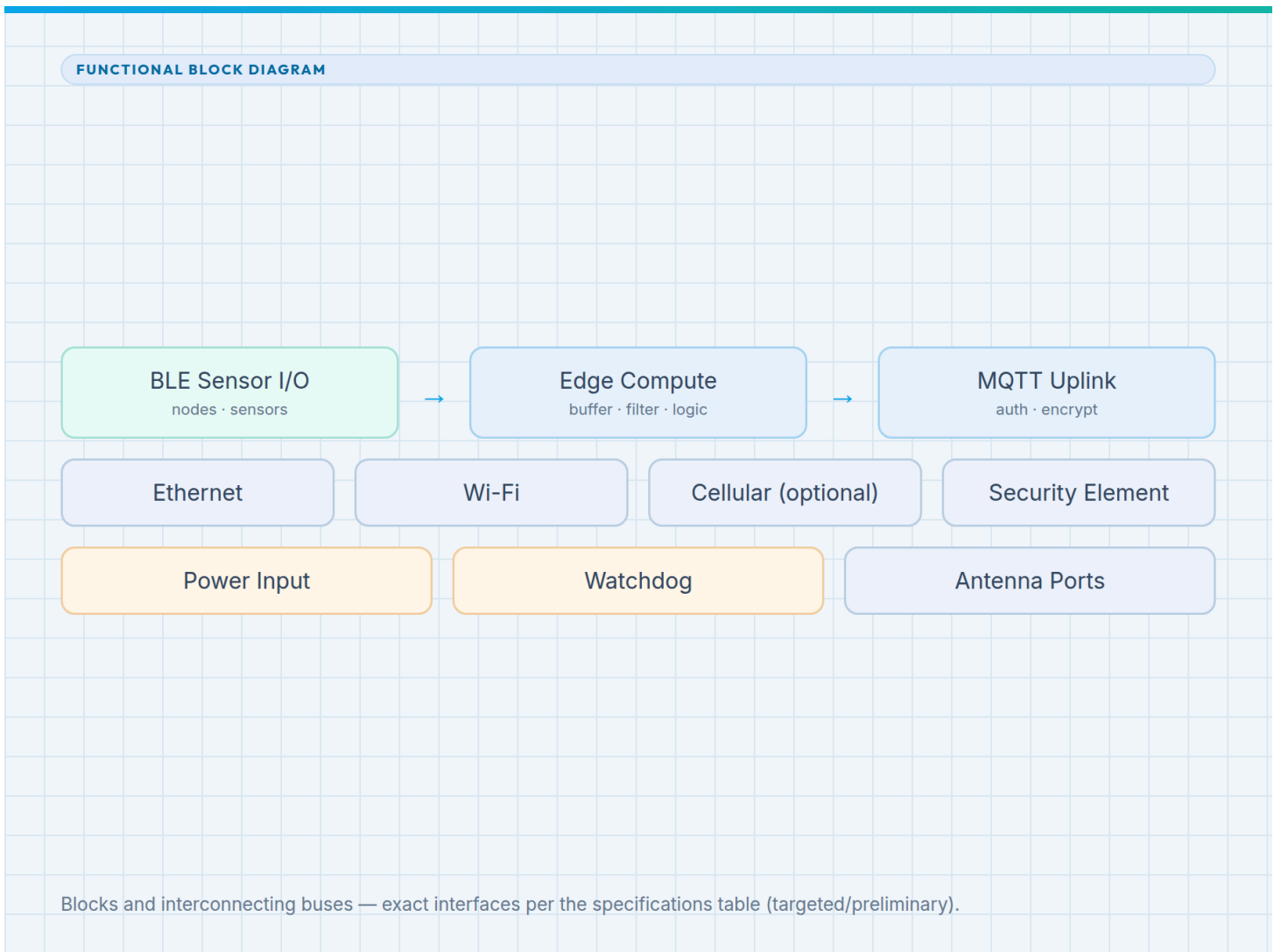


Figure FIG-003 — Functional blocks: mmWave radar front-end, detection logic, local alert output, fault output, BLE comms, and 24 V DC power.

The Zone Awareness sensor combines five functional groups:

1. **Radar sensing** — a **60 GHz FMCW mmWave radar** front-end observes the area around the sensor to detect presence and motion; it is unaffected by darkness and sees through airborne dust and smoke (no LiDAR, no vision AI).
2. **Detection logic** — edge logic distinguishes presence / motion from the static machine environment and evaluates it against the configured monitored zones.
3. **Local annunciation** — on a zone entry the device drives a **local audible/visual output** (≤ 200 ms) for immediate on-site awareness. It does not stop machinery.
4. **Reporting** — a BLE 5.x uplink carries the event to the Sensorium™ Gateway and on to the 5Tech Platform (annunciation ≤ 2 s).
5. **Power & integrity** — 24 V DC input conditioning, a hardware watchdog, and a dedicated fault output that reports loss of function (§3.2).

Data path: *monitored area* → *radar sensing* → *zone evaluation* → *local output and BLE Gateway uplink* → *5Tech Platform*. Configuration and zone geometry flow back over the same secured channel.

3.1 Detection coverage & monitored zones

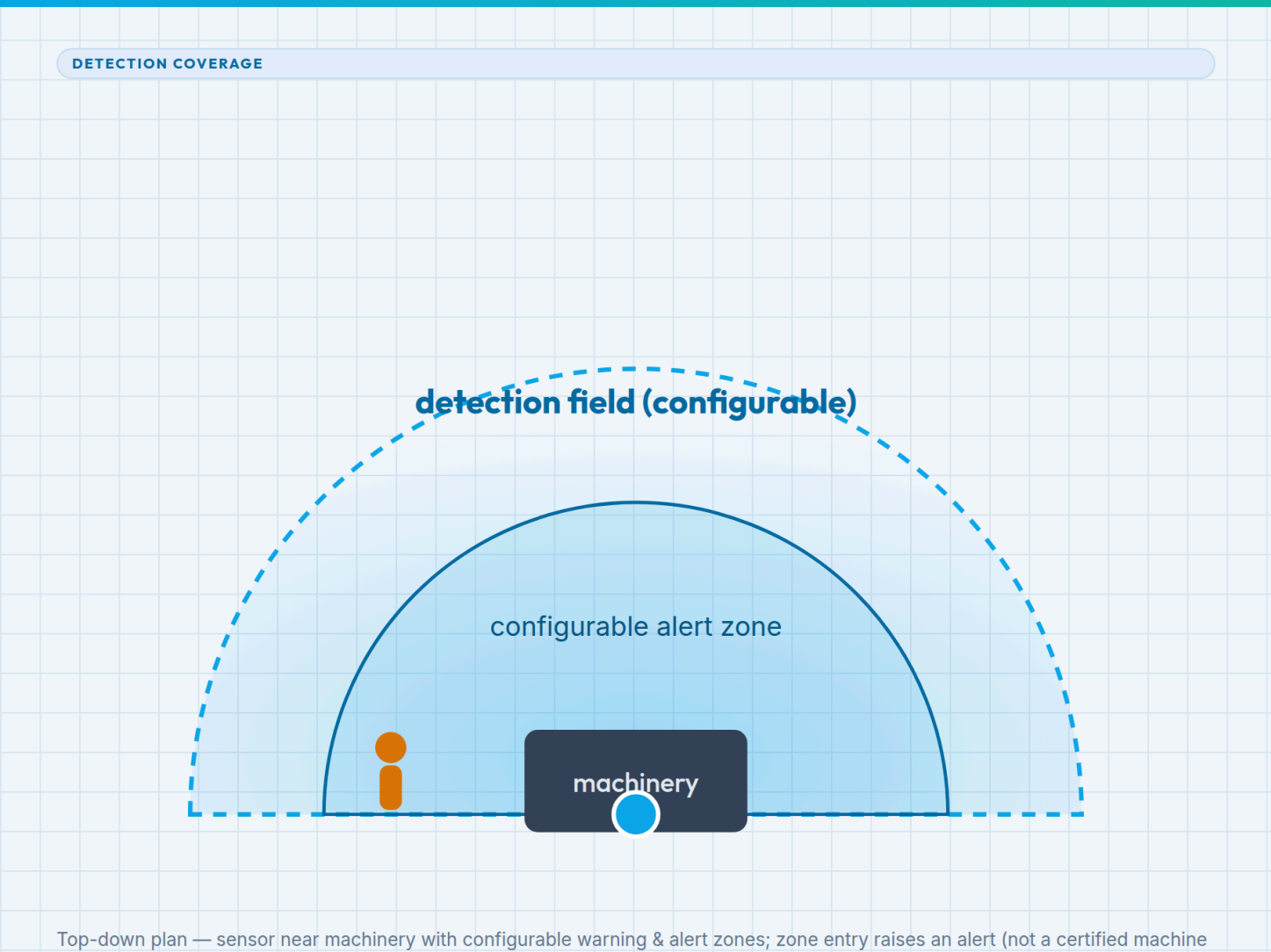


Figure FIG-004 — Top-down coverage with configurable warning and alert zones around machinery.

Monitored zones are **software-defined and configurable** — typically an outer **warning zone** and an inner **alert zone** around the hazard. When a person or object is detected inside a zone, the corresponding **alert** is driven locally and reported to the Platform. Detection performance (range, coverage, and resolution) is given in the table below, all values ‡ proposed with their measurement condition.

PARAMETER	VALUE	CONDITION
Detection range	0.3–10 m‡	Walking adult, radial approach, clear line of sight, 25 °C
Coverage (field of view)	120° azimuth × 60° elevation‡	–6 dB beamwidth
Range resolution	0.15 m‡	Two targets separated in range, radar boresight
Angular resolution	15°‡	Two targets separated in azimuth, mid-range
Minimum detectable target	Walking / standing adult, ≥ 0.5 m ² equivalent RCS‡	Person ≥ 1.0 m tall within coverage, clear line of sight
Max target speed for detection	≤ 3 m/s‡	Radial approach; detection holds through the zone boundary
Response — local output	≤ 200 ms‡	Detection to local audible/visual output asserted; target crossing a zone boundary at ≤ 3 m/s, 25 °C
Response — Platform annunciation	≤ 2 s‡	Detection to dashboard notification; nominal BLE link, Gateway online

NOTE. These figures are ‡ proposed targets, not verified by test, and the zones are for **alerting only** — they do not stop machinery. Detection range and response time must **not** be used to compute a safety distance under ISO 13855; the device provides no safety function (§9).

3.2 Fault handling & fail-safe behaviour

The device continuously monitors its own health (radar front-end, BLE link to the Gateway, and power) and exposes it as diagnostics and a dedicated **fault output**.

CONDITION	LOCAL OUTPUT	FAULT OUTPUT	PLATFORM
Normal, zones clear	Off	Energised (healthy)‡	Reports ready
Zone entry detected	Alert asserted (≤ 200 ms‡)	Energised (healthy)‡	Alert (≤ 2 s‡)
Internal / radar fault	Defined fault state‡	De-energised (fault)	Fault reported
Power loss	Off (unpowered)	De-energised (fault)	Device offline
BLE link loss to Gateway	Local output still active	Energised‡; link-loss flagged	Device offline until reconnect

NOTICE — fail-silent residual risk. The fault output is **normally energised** and de-energises on internal fault or power loss, so a downstream annunciator can detect loss of the sensor. However, the device is **fail-silent**: on power loss or an undetected fault it simply stops alerting rather than commanding any safe state. Because it provides no safety function, the machine must never depend on it for a safe state; loss of the sensor must be handled by the machine's own safeguards (see the manual §1.5).

4. Ordering information

Order codes below are the proposed scheme; the base identifier and suffixes are ‡ pending confirmation. Configure = base + range option.

ORDER CODE	CONFIGURATION	NOTES
SEN-ZA-100 ‡	Base sensor	60 GHz radar‡, 24 V DC, BLE 5.x, local alert + fault outputs
SEN-ZA-100-X ‡	Extended-range variant	Base + narrower-beam / longer-range radar option‡

Accessories and spares: see §10.

5. Mechanical specifications

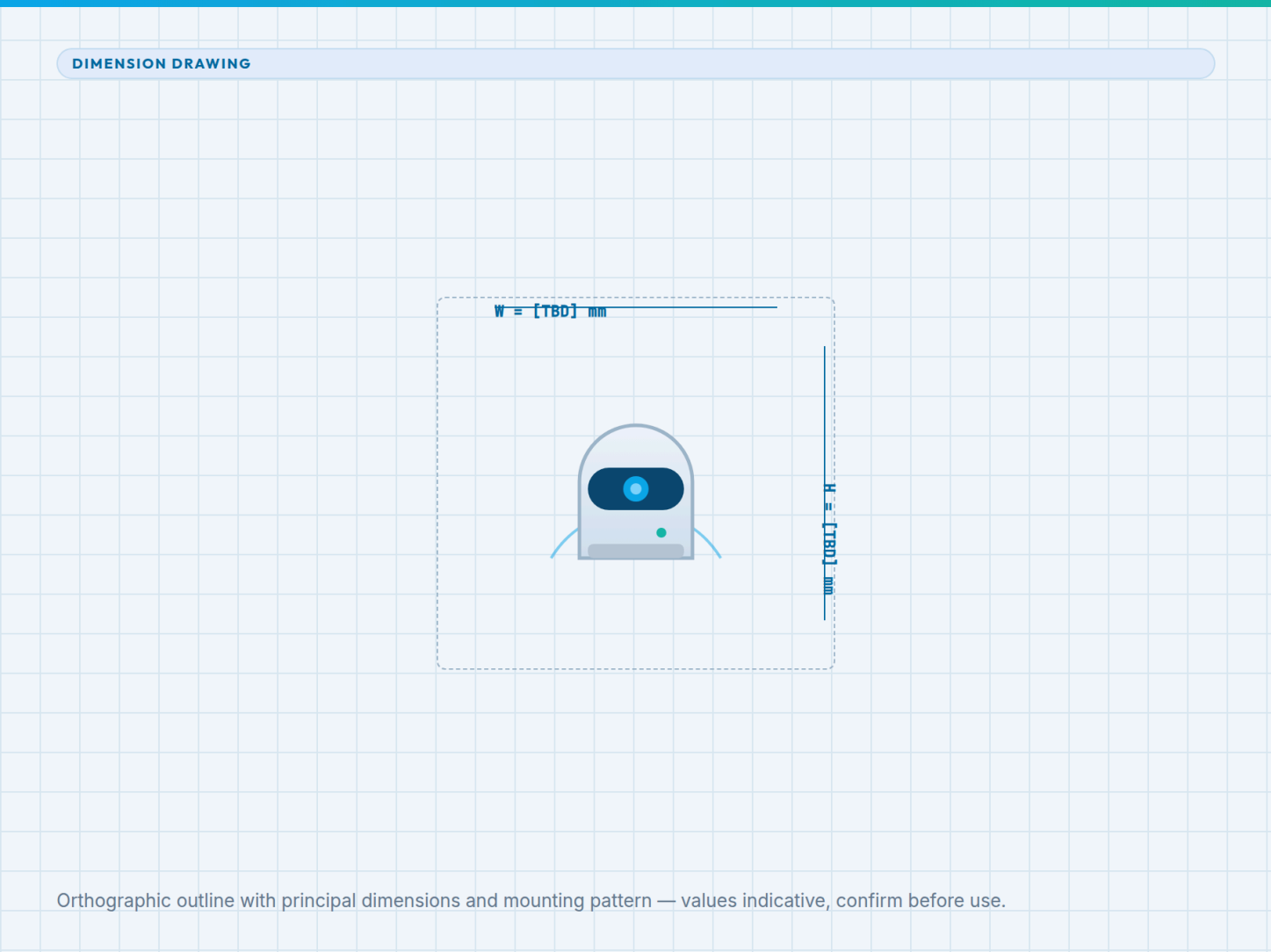


Figure FIG-005 — Front and side elevations with mounting pattern (mm). Values ≠ proposed.

PARAMETER	VALUE	CONDITION / NOTE
Dimensions (Ø × H)	Ø120 × 150 mm‡	Cylindrical enclosure, excluding brackets/connectors
Weight	0.9 kg‡	Base configuration, no bracket
Mounting	Bracket or pole mount‡	Vibration-qualified per §8; see §10
Enclosure body	Die-cast aluminium, powder-coated‡	Fanless; no vents
Radome (sensing aperture)	RF-transparent polymer radome (mmWave-transparent)‡	Keep clear of metal and heavy soiling; radar radiates through it
Ingress protection	IP65‡ (IEC 60529)	See §8

Because sensing is by radar, the aperture is a radar-transparent radome, not an optical window; a light film of dust does not blind it, but heavy build-up or metal near the radome degrades detection.

6. Electrical specifications

All electrical values are ‡ proposed and stated with their measurement condition. This is the **externally-powered (24 V DC) variant** of the sensor-node platform — the radar front-end draws more than a battery/coin cell can supply, so the unit is line-powered.

PARAMETER	MIN	TYP	MAX	UNIT	CONDITION
Supply voltage	18	24	30	V DC‡	At the terminals
Power consumption	—	3‡	6‡	W	@ 24 V, 25 °C; typ = radar active, idle; max = radar + local output + BLE TX
Inrush current	—	—	8‡	A	@ 24 V, 25 °C, cold start, ≤ 200 µs
Reverse-polarity protection	—	—	—	—	Continuous‡
Surge immunity (DC input)	—	—	±1‡	kV	Line-to-earth, per IEC 61000-4-5 (1.2/50 µs)‡
Local alert output rating	—	—	0.5‡	A	Solid-state, 24 V DC, short-circuit protected; drives audible/visual
Fault output rating	—	—	0.1‡	A	Solid-state, 24 V DC; normally energised , de-energises on fault/power loss (§3.2)

7. Interfaces & protocols

INTERFACE	SPECIFICATION	CONNECTOR	NOTES
Uplink to Gateway	Bluetooth Low Energy 5.x, 2.4 GHz‡	Internal antenna	Wireless — the only data link; detections/alerts to the Sensorium™ Gateway
Local alert output	Solid-state digital output, 24 V DC ≤ 0.5 A‡	M12, sealed‡	Drives audible / visual annunciator — non-safety ; does not stop machinery
Fault output	Solid-state digital output, 24 V DC ≤ 0.1 A‡	M12, sealed‡	Normally energised; de-energises on fault/power loss (§3.2)
Power input	24 V DC (18–30 V)‡	Sealed M12 / gland‡	Power only — not a data link
Configuration / service	Via the 5Tech Platform, through the Gateway over BLE	Wireless (no service port)‡	Zone setup and diagnostics

Security. Configuration and telemetry to the 5Tech Platform travel through the Gateway over an **authenticated, encrypted BLE session‡**; the Gateway's uplink to the Platform is MQTT over TLS (see the Gateway datasheet). No plaintext configuration path is offered.

Data-link note: the uplink to the Gateway is BLE (wireless). The unit has no wired network connector — the only wired connections are power and the local alert / fault outputs.

8. Environmental & ratings

PARAMETER	VALUE	STANDARD / CONDITION
Ingress protection	IP65‡	IEC 60529
Operating temperature	−20 °C to +55 °C‡	Ambient
Storage temperature	−40 °C to +85 °C‡	
Humidity	5–95 % RH‡	Non-condensing
Altitude	≤ 2000 m‡	Operating
Pollution degree	2‡	IEC 61010-1
Overvoltage category	II‡	IEC 61010-1
Vibration	10–150 Hz, 1 g‡, 20 sweeps/axis	IEC 60068-2-6, bracket-mounted
Shock	15 g‡, 11 ms half-sine, 3 shocks/axis/direction	IEC 60068-2-27

All environmental figures are ‡ proposed targets, not yet verified by test.

9. Compliance & standards

No certification is currently held. The table lists the intended certification programme; no mark below may be shown on the product, packaging, or marketing until certified with a report on file (recorded in [references.md](#)). This device has **no** functional-safety rating and makes **no** protective (machine-stop) claim.

AREA	INTENDED STANDARD	STATUS
Functional safety (SIL / Performance Level)	Not applicable — alerting sensor, not a safety-rated stop device	N/A by design
Machinery safety function	Not claimed — raises alerts, does not stop machinery	N/A by design
Radio — BLE (per region)	FCC Part 15.247 / ISSED RSS-247 / RED EN 300 328‡	Planned — not yet submitted
Radio — 60 GHz radar (per region)	FCC Part 15.255 / ISSED RSS-210 / RED EN 305 550‡	Planned — not yet submitted
EMC	EN 61000-6-2 / EN 61000-6-4‡	Planned — not yet tested
Electrical safety	IEC/EN 61010-1‡ (pollution degree 2, overvoltage cat. II)	Planned — not yet tested
Environmental (materials)	RoHS (EU 2011/65) / REACH‡	Planned — declaration pending

Radio type-approval for both the BLE and the 60 GHz radar transmitter is required before the product may be sold in any market; it is not yet held.

10. Accessories & related products

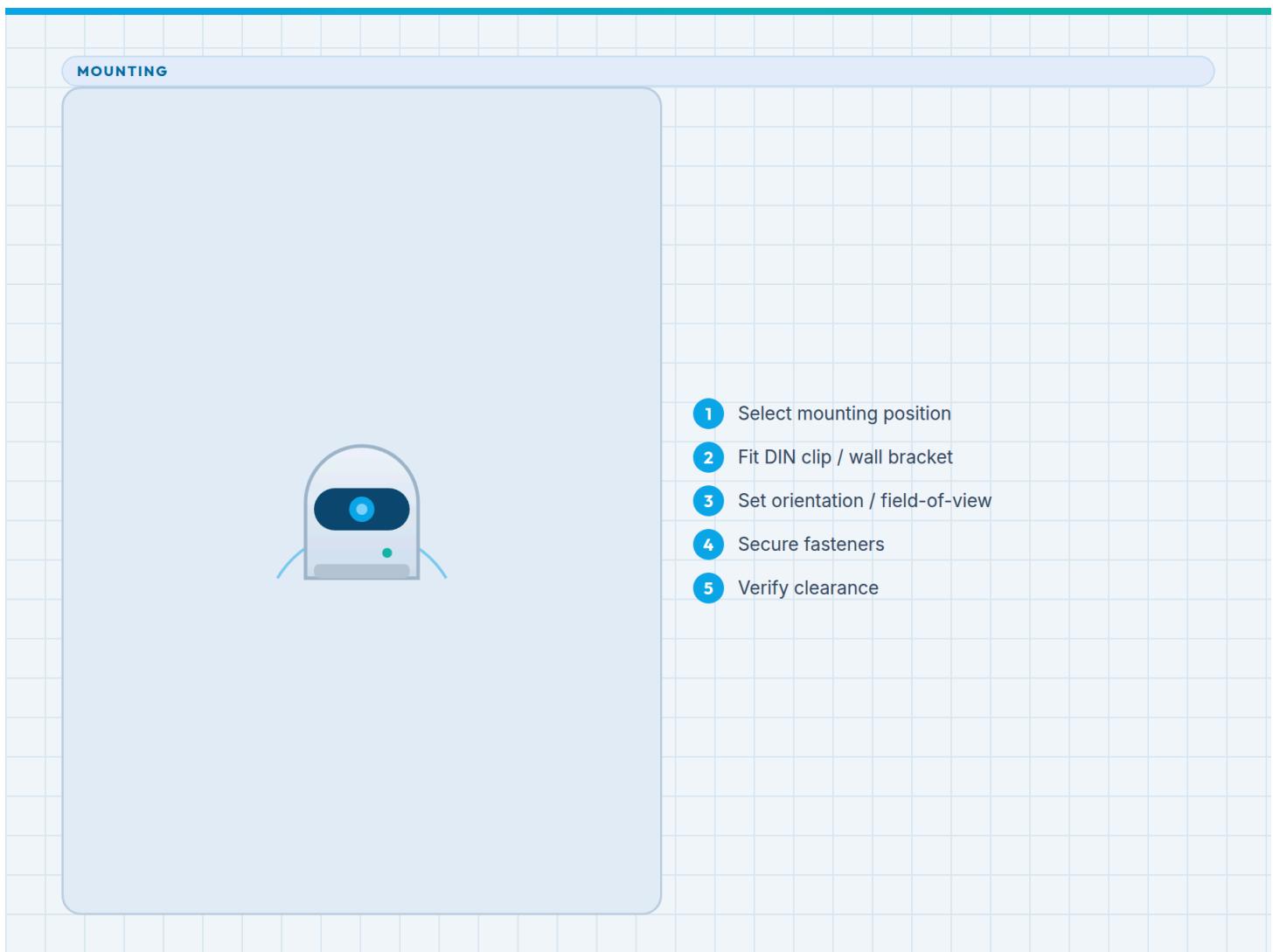


Figure FIG-006 — Mounting bracket, pole-mount kit, sealed connectors, and protective hood.

ITEM	ORDER CODE	PURPOSE
Mounting bracket	SEN-ZA-ACC-BRKT ‡	Machine-frame / surface mounting
Pole / column-mount kit	SEN-ZA-ACC-POLE ‡	Elevated / open-area mounting
Sealed M12 connector set	SEN-ZA-ACC-M12 ‡	Field wiring (power + outputs)
Protective hood	SEN-ZA-ACC-HOOD ‡	Sun / impact shield for the radome

Related documents

- **Manual:** [manuals/sensorium-safety-zone-manual/](#) — operation, zone configuration, maintenance.
- **Installation:** [installation/sensorium-safety-zone-installation/](#) — mount, wire, commission.

- **Aggregated by:** Sensorium™ Gateway datasheet (Connect layer to the Platform).
- **Platform family:** Sensorium™ Sensor Node (battery and externally-powered variants), Sensorium™ SmartBolt.
- **Works with:** 5Tech Platform (Monitoring · Automation · AI assistance).
- **Part of solution:** Construction Sites Monitoring / worksite awareness.

11. Monitored signals & alert behaviour (illustrative)

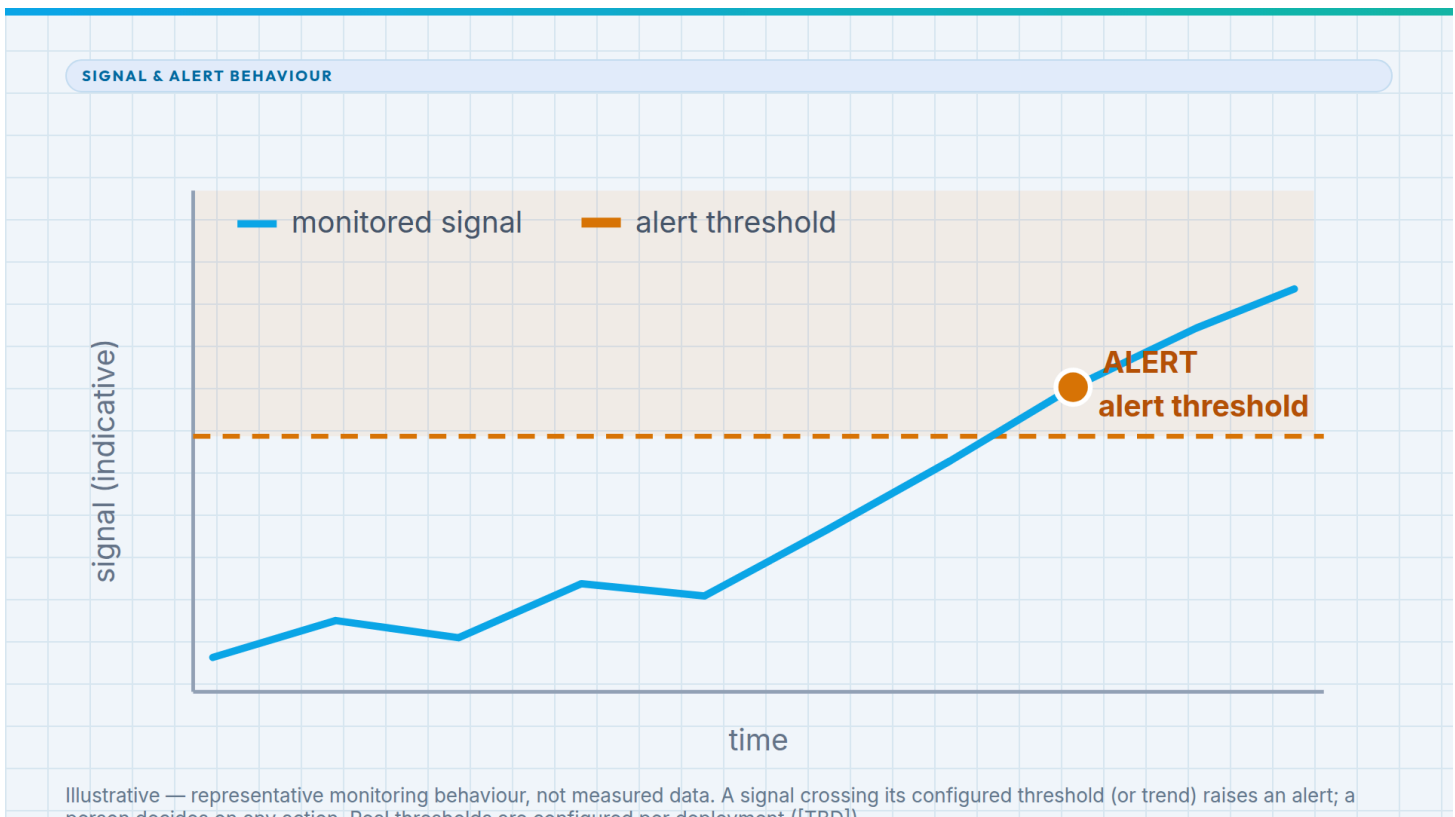


Figure FIG-007 — Illustrative — a monitored signal crossing its configured alert threshold (or an abnormal trend) raises an alert; a person decides on any action. Representative behaviour, not measured data.

The Zone Awareness sensor reports proximity and zone-entry signals; when a signal crosses a configured threshold or shows an abnormal trend, the device drives its **local output** and the Platform raises an **alert** for awareness, and a person decides on any action. It provides alerting only — it is **not a certified safety stop** and takes no autonomous protective action. Thresholds and zone geometry are configured per deployment.

SIGNAL	EXAMPLE ALERT TRIGGER‡	RESPONSE
Warning-zone entry	A person or object enters the outer warning zone	Local output + alert + notify (person decides)
Alert-zone entry	A person or object enters the inner alert zone	Local output (high-priority) + alert + notify (person decides)
Device / link health	The sensor stops reporting to the Gateway, or the fault output de-energises	Alert + notify (person decides)

Illustrative — representative, not measured; trigger values ‡ proposed and configurable.

12. Revision & change control

REVISION	DATE	CHANGE	AUTHOR
Draft (Preliminary)	2026-07-07	Initial authored content; values <code>[TBD]</code> . Product then named "Zone Awareness".	Documentation
Draft (Preliminary, PROPOSED)	2026-07-18	Renamed product to Sensorium™ Zone Awareness (display name only; slug/URLs unchanged) to remove the "Safety" implication for a non-safety device. Chose mmWave radar as the stated sensing principle; added detection performance, response times, fail-safe/fault behaviour, and the externally-powered (24 V DC) power architecture. Resolved the BLE-vs-wired and local-vs-Platform alert contradictions. Filled all specs with conditioned ‡ proposed values and specific test standards; added this revision block.	Documentation

Full change history: `revision.md`. Sources and cited standards: `references.md`.

Specifications are preliminary; ‡ values are proposed and subject to engineering confirmation and change. See `revision.md` for change control, `references.md` for sources, and `image_prompts.md` for the figure/prompt index. Web publication target: `/resources/datasheets/safety-zone/`.

