

The flexible way to connect

N-sen
Multi-purpose IoT device



The Edge Computing LoRaWAN wireless sensor for industrial IoT

The N-sen is a compact multi-purpose edge computing device that has a range of internal sensors in addition to interfacing with various sensor types, connecting across any LoRaWAN network.

The battery operated N-sen is LoRa Alliance compliant and operates at the global license free spectrum (ISM) bands, enabling public and private IoT network deployments by enterprises, service providers, governments and councils.

N-sen's rugged waterproof enclosure, ultra low power specifications, and flexible inputs and outputs make it ideally suited to many industrial and enterprise IoT applications. It can be easily customised to suit customer specific needs.

When integrated with a device and data control platform such as NNNCo's **N2N IoT Platform**, N-sen delivers a wide range of secure and scalable enterprise-class applications for industries such as energy, agriculture, cities, buildings and water.



Energy

Line fault indication, distribution and asset monitoring, electricity meter connection



Agriculture

Soil moisture, rainfall detection, irrigation systems

IoT Application Examples



Water and Industry

Flow (pulse input), pressure, level, vacuum, overflow, valve position, asset monitoring



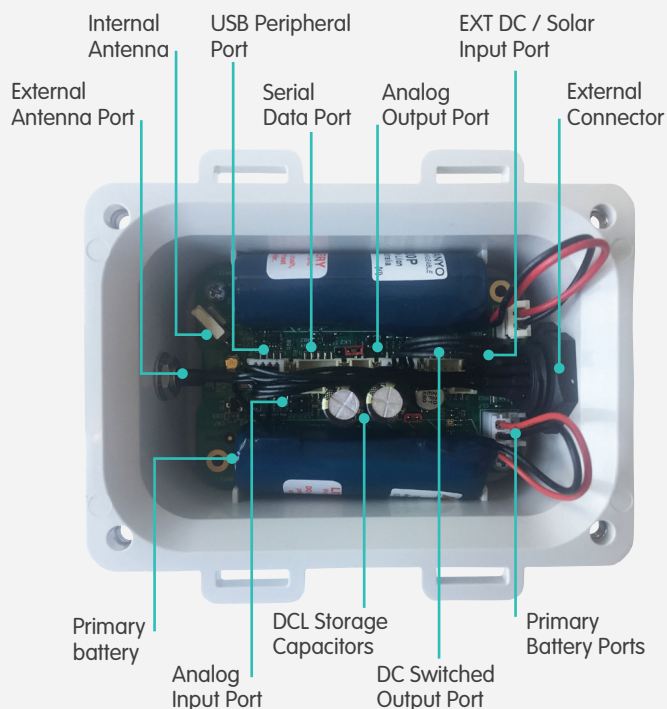
Buildings & Cities

Lifts, fire, smoke, parking, lights, temperature, wind, air quality

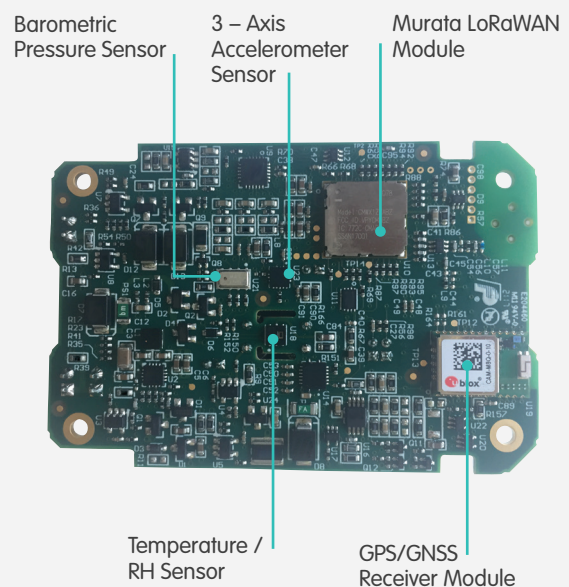
Product features

- Highly flexible and remotely configurable edge computing software capable of logging, pulse input detection, accumulation and multiple channel event triggering / reporting
- Full production device
- Flexible LoRaWAN endpoint sensor connectivity
- Ultra-low power 32 bit application specific core for enhanced edge computing capability
- Design allows for remote firmware update over LoRaWAN
- USB file store subsystem
- IP68 rugged industrial packaging for real world applications, with detection of loss of seal integrity
- Flexible inputs and outputs accessible via waterproof external connectors
- Internal or external antenna switching
- Analog and digital interface
- Optional GPS tracking
- Flexible power management options to allow for:
 - i) battery-optimised mode (low power requirements) with the potential for solar power input – LoRaWAN Class A; or
 - ii) connection to an external power source enabling always on operation, where power/battery optimisation is less critical – LoRaWAN Class C

Internal Connections



Internal Sensors and Modules



Proven in-field application

The N-sen is a full production device with proven in-field industrial-grade deployment. Combined with a device and data control platform such as the N2N IoT Platform, it delivers a range of secure and scalable, enterprise-class applications and use cases in vertical industries such as these:

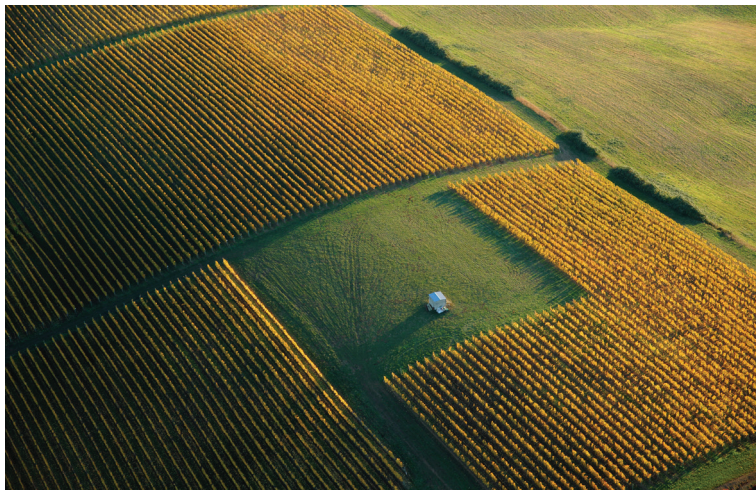


Smart Energy

Distribution monitoring – connection to existing power quality and energy monitoring devices

Line fault indication – connection to dry contact outputs of underground and overground line fault indicators to improve the reliability of the energy network

Asset monitoring – vibration shock movement and location of energy assets



Smart Agriculture

Soil moisture – connect below-ground soil moisture probes to enable granular measurement of soil moisture at different levels

Rainfall detection – automated rain gauges to remotely monitor rainfall in specific areas of the farm

Irrigation systems – manage, optimise and control water flow



Smart Water

Water metering – connecting to a myriad of pulse output water meters

Sewer level detection – sensing sewer choke and overflow

Asset monitoring – such as valve positioning



Smart Buildings & Cities

Building monitoring – including fire safety, hydraulics, lighting, security, heating and cooling

Environmental monitoring – temperature, humidity, CO2, air quality management

Smart city applications – such as parking, lighting, waste management and people movement

N-sen Product Specifications

Physical Specifications

- Enclosure: Injection moulded PC/ASA weather resistant enclosure with hook and tie mounting options
- Dimensions: 120mm x 85mm x 40mm approx
- Waterproofing: IP68

Radio Specifications

- ISM (Industrial Scientific and Medical) Band operation (915-928MHz in Australia and support for other bands including EU863-870, US902-928, AS923 and variants)
- LoRa Alliance compliant LoRaWAN endpoint device
- Class A operation for low power applications
- Class C operation for externally powered online and multicast applications
- Enhanced reference stability crystal $\pm 2\text{ppm}$.
- Enhanced transmitter PA switching allows transmit power up to +18dBm
- Internal antenna with option for external antenna port with software switching
- Receiver sensitivity to -135dBm for 125KHz SF12

Security

- Standard LoRaWAN security
- Hardware accelerated AES cryptography
- Optional ST-SAFE secure element for state of the art security and authentication

Flexible power supply options

- 1 or 2 LTC Primary Lithium cells. Up to 10 year mission life for typical pulse counting applications
- 1 x LTC Primary LTC and 1 x LION rechargeable using energy harvesting with fall back to primary cell
- Operates without batteries using EDL capacitor only for charge and burst applications
- Operates and charges from external 2.5 – 15V supply or USB supply
- Operates and charges from 4-20mA external current loop
- Optional power source from solar cells including low Lux types with maximum power point tracking

Internal Sensors

- Temperature sensor
- Internal relative humidity sensor (vented enclosure option or can be used to detect dew in sealed units)
- Barometric pressure sensor (vented enclosure option)
- 3 axis accelerometer with motion and jolt detection and derived pitch and roll angles
- External supply voltage
- Primary battery voltage and current
- Secondary battery voltage and current
- Optional GPS/GNSS receiver for tracking and geolocation

N-sen Product Specifications

External Sensor Inputs

A range of external sensor inputs provided:

- 3 x ultra-low power inputs suitable for dry contact sensors such as reed switches and open collector/drain. Further option for active pulse output sensors. This allows for a wide range of flow meters
- 3 x analogue inputs 0-3V range scalable with external resistors if required. (1Meg input resistance). Resolution 12 bits
- 1 x analogue bridge input with programmable gain and 3V excitation. Suits bridge sensors including pressure, vacuum, temperature and magnetic. Resolution 12 bits
- 1 x industry standard 4-20mA analogue loop input with energy harvesting. Resolution 12 bits

External Outputs

- 2 x DC open drain outputs rated at 30V at 100mA
- 1 x 0-3V analogue output or 0-10V when external supply is available. Resolution 12bits
- External antenna

Compliances

- LoRa Alliance compliant
- Compliant to ACMA Low Interference Potential Device (LIPD) Class Licence
- AU/NZS 4268: 2012 Radio equipment and systems – Short range devices
- AU/NZS CISPR22: 2009 Information technology equipment – Radio disturbance characteristics
- Australia/NZ – RCM

Product Variants

- N-sen-S: our standard product that includes all internal sensors, except GPS, and all external inputs and outputs
- N-sen-G: standard N-sen with GPS/GNSS base location services added
- N-sen-P: A stripped down variant of the N-sen-S intended for low cost pulse logging



About NNNCo

NNNCo is a leading Australian IoT solutions partner providing fully integrated end-to-end solutions – from devices to network connectivity, platforms, analytics and applications - in key areas such as cities, utilities, agriculture, infrastructure, access management and asset monitoring. NNNCo is taking the lead as Australia's LoRaWAN™ operator, building and operating a carrier-grade LoRaWAN network for IoT complete with redundancy and customer-focused network support.

For more information, contact us at

info@nnnco.com.au

Level 1, 18 Bulletin Place

Sydney, Australia