E ZeroBatteryZone Dataloggers

E-ZeroBatteryZone dataloggers combine light-energy harvesting, supercapacitor energy storage and low-power NeoMesh communication to enable wireless sensing without replaceable batteries. Designed for distributed monitoring within the E-IOT ecosystem, the devices collect sensor measurements and transmit them through a mesh network to a gateway for visualization and storage.

Products shown

- Light-powered wireless sensor nodes — Different enclosure sizes and photovoltaic panel configurations demonstrate how the energy-harvesting surface can be adapted to the installation environment and application.
- Digital and analog sensor-node variants — The illustrated family includes nodes labelled for digital or analog sensing, providing different options for acquiring measurements.
- NeoMesh and NeoMesh-on-LoRa demonstrators — The picture includes NC868-labelled nodes and LR1121-labelled variants, representing different radio implementations within the product family.
- Partner technology demonstrators — Endrich designs featuring NeoCortec connectivity, with selected demonstrators highlighting Ligna Energy storage technology and Dracula Technologies light-energy harvesting.

Product features and operation

Light-powered detection

The photovoltaic element converts available light into electrical energy. A power-management circuit collects this energy and supplies the electronics while charging the energy-storage element.

Different photovoltaic technologies and panel sizes allow the design to be matched to the intended lighting conditions. Indoor operation depends on the light source, illumination level, exposure duration and panel orientation. The harvesting surface must therefore be selected together with the sensor load and reporting interval.

Supercapacitor energy storage

A supercapacitor stores harvested energy and supplies the node during measurement and radio activity. It also bridges periods when the available light is insufficient to power the device directly.

This architecture removes the need for routine replacement of disposable batteries. The achievable operating time in darkness depends on stored energy, sensor consumption, network activity and firmware settings. Sustained operation requires the energy harvested over time to cover the device's average consumption.

Selected configurations incorporate Ligna Energy supercapacitor technology as part of the battery-free design.

Sensor acquisition and reporting

The node periodically acquires measurements from its fitted or connected sensors. Digital and analog variants allow the platform to support different sensing requirements, with the actual measured quantities determined by the hardware configuration.

The firmware prepares the readings for wireless transmission and manages the timing of measurement and communication activities. Reporting intervals can be selected to balance application needs with the available energy budget.

Within the E-IOT system, received measurements can be recorded centrally to build a historical dataset. Local buffering, where required, depends on the node's memory and firmware implementation.

Low-power wireless mesh networking

NeoMesh connects the sensor nodes through a distributed wireless network. Measurements can travel through intermediate nodes to reach a gateway, allowing monitoring points to be

spread across an installation without requiring every device to have a direct gateway connection.

The illustrated family includes conventional sub-GHz NeoMesh hardware and demonstrators identified as NeoMesh on LoRa. NeoMesh on LoRa uses LoRa radio technology for mesh communication; it should not be confused with LoRaWAN. Nodes must use compatible radio and network configurations to communicate with one another.

Network planning must account for both radio coverage and the energy available to participating nodes.

Gateway and E-IOT Cloud integration

A compatible gateway transfers measurements from the mesh network to a local application or the E-IOT Cloud. Multiple sensor nodes can share this gateway and its Internet connection, reducing the need for separate uplinks at each measurement point.

The application can display current values, retain measurement history and provide configured notifications when readings exceed defined limits. A cellular gateway can support installations where a local wired or Wi-Fi Internet connection is unavailable.

Installation and maintenance

Battery-free operation is particularly useful where many sensors are distributed throughout a building or where regular battery replacement would be inconvenient. Installation focuses on suitable light exposure, reliable radio connectivity and a measurement schedule matched to the energy budget.

The modular concept allows the photovoltaic element, energy storage, sensor configuration and enclosure to be adapted to the intended application.

Typical applications

- Indoor environmental monitoring in offices and commercial buildings.
- Distributed temperature and humidity monitoring with suitable sensors.
- Ambient-light measurement and lighting-system evaluation.
- Warehouse, display-case and exhibition monitoring.
- Building automation and facility-management data collection.
- Battery-free sensing demonstrations and customized E-IOT proof-of-concept installations.