# Processing and communications

zillion

## Processing nodes

These are the devices that act as the core of the system, integrating and managing information from the grid.

They include solutions such as Zillion RTU and Zillion RM, which aggregate signals from multiple feeders, structure the data, and transmit it to higher-level systems such as SCADA, DMS or IoT platforms.

These devices do more than collect information: they turn it into a comprehensive and coherent view of the grid, acting as the central hub for communications and operational intelligence.

## Asset-specific monitoring

This refers to solutions designed to monitor specific grid assets in greater detail.

It includes devices such as Zillion LVS (transformer), Zillion LVM (incoming supply) and Zillion VTN (neutral-to-earth relationship), which provide precise information on electrical status and detect specific anomalies that are not identified through general monitoring.

These solutions complement the processing nodes by providing advanced visibility into critical points of the grid.

## Key range functions

- Integration and centralization of data from multiple devices
- Conversion of electrical signals into structured information
- Communication with SCADA, DMS and IT/OT platforms
- Interoperability through standard protocols
- Continuous monitoring of grid status
- Management of alarms, events and quality of supply
- Scalability from compact solutions to distributed architectures

# 02.1 Zillion RTU – Low-voltage node

Zillion RTU (Low-voltage Node) is the central device within the monitoring system for secondary stations, acting as the communications and intelligence hub of the low-voltage grid.

It collects, manages, and transmits information from the measurement devices installed across the grid, integrating it into monitoring platforms such as SCADA, DMS, IoT, and analytics platforms.

Through its protocol gateway and data-processing capabilities, it consolidates information from different devices and transforms it into a coherent view of the grid, supporting operations, maintenance, and data-driven decision-making.

**FUNCTIONS AND FEATURES**

Data and communications management

- Collection and management of data from feeder meters.
- Protocol gateway function.
- Communication via Modbus TCP/IP, IEC 60870-5-104 and DNP3 protocols to SCADA/DMS, Ariadna or IoT platforms (e.g. MQTT, depending on the configuration).

Architecture and connectivity

- RS485 bus master function for meters using DLMS/HDLC.
- Distributed power supply through the communications bus, enabling other system devices, such as feeder meters, to be powered without additional wiring.
- Simplified architecture with reduced wiring.

Advanced monitoring

- Power quality monitoring.
- Oscillography capabilities.
- Earth leakage current measurement and advanced electrical variables.
- Power quality reports in accordance with IEC 61000-4-30.

Scalability and modularity

- Upgrade path from basic to advanced monitoring.
- Adaptable to different use cases without replacing the device.

Interface and installation

- Optional display with buttons for local operation.
- Compact design.
- Straightforward installation in secondary stations.
- Designed to operate either as a standalone device or as part of a modular system.

**MAIN USE CASES**

Integration and centralization of grid data

The RTU acts as the central aggregation point for information from multiple metering devices, consolidating data within a single system for visualization, analysis and use by operations, maintenance and asset management teams.

Advanced monitoring and digitalisation of the secondary station

It enables advanced capabilities such as power quality monitoring, incident detection, and analysis of grid behaviour. Its scalability supports progression from basic monitoring to more advanced models without replacing the device.


Zillion RTU
Low-voltage node
*Sensed by Merytronic*

# 02.2 Zillion RM – Multichannel low-voltage node

Zillion RM (Multichannel low-voltage node) is a solution designed to efficiently monitor multiple low-voltage feeders from a single device, optimizing the installation architecture in compact secondary stations.

It enables up to 10 outgoing feeders and one incoming supply to be monitored from a single central unit, simplifying wiring and reducing system complexity.

Thanks to its design, which integrates all the electronics for both feeder and incoming supply sensors into a single device, together with its optimised architecture, Zillion RM enables more cost-effective, organised and easy-to-maintain deployments, particularly in environments where space and installation efficiency are critical.

## FUNCTIONS AND FEATURES

### Multichannel monitoring

- Monitoring of up to 10 feeders.
- Monitoring of one incoming supply.
- Current measurement on each feeder and voltage measurement at the incoming supply.

### Optimized architecture

- Eliminates individual wiring for each feeder, with no separate feeder cards required.
- Direct, organized connections from the central unit.
- Reduced installation complexity.

### Installation and deployment

- Compact solution that is easy to integrate.
- Simpler, more organized wiring.
- Reduced risk of connection errors.
- Ideal for compact secondary stations.

### Operational efficiency

- Reduced number of devices.
- Lower maintenance requirements, with a single electronic unit.
- Simplified upgrades and management.

### Communications and integration

- Compatible with the Zillion architecture.
- Integrates with SCADA, DMS, IoT and analytics platforms.
- Simplified communications compared with distributed solutions.

## MAIN USE CASES

### Monitoring multiple feeders in compact switchboards

Enables several low-voltage feeders to be monitored from a single device, avoiding the need to install multiple standalone units. This makes it an ideal solution for small or compact secondary stations where space is limited.

### Cost optimization and simplified installation

The device significantly reduces the number of components and the amount of wiring required, enabling faster installations with a lower risk of errors.
By integrating the electronics into a single unit, it also simplifies maintenance and reduces operating costs.


Zillion RM
Multichannel low-voltage node
*Sensed by Merytronic*

# 02.3 Zillion LVS – Low-voltage transformer supervisor

Zillion LVS (Low-voltage Transformer Supervisor) is a solution designed to continuously monitor the condition of distribution transformers, combining electrical and thermal analysis in a single device.

It provides real-time visibility into asset performance, including voltage, current, power quality and oil temperature, enabling deviations to be detected before they develop into critical incidents.

Thanks to its integration with SCADA systems and straightforward installation, it enables the digitalisation of both new installations and existing transformers, improving grid reliability and optimizing maintenance management.

## FUNCTIONS AND FEATURES

### Electrical monitoring

- Measurement of current, voltage, power and harmonics.
- Power quality monitoring.
- Detection of phase imbalances, phase-angle or phase-shift issues, and abnormal consumption patterns.

### Thermal monitoring and asset protection

- Oil temperature calculation based on an ambient temperature sensor and load measurement on each phase.
- Alarm generation under abnormal conditions, including overtemperature.

### Grid management and advanced operation

- Analysis of imported and exported energy.
- Analysis of inductive and capacitive reactive energy.
- Support for environments with bidirectional power flows, including renewables and self-consumption.
- Assessment of the impact of distributed generation on the grid.

### Communications and integration

- Protocols: Modbus RTU and Modbus TCP.
- Interfaces: RS232, RS485 and Ethernet.
- Integration with SCADA systems.

### Accuracy and measurement

- Measurement accuracy: class 1 for active energy and class 2 for reactive energy.
- Up to six current inputs and four voltage inputs.

### Interface and installation

- LCD display with buttons for local operation.
- Visual status indicators.
- DIN rail mounting.
- Flexible configuration compatible with indoor or outdoor installations, new deployments and retrofit applications.
- Configurable alarms based on priority and criticality.

## MAIN USE CASES

### Transformer protection and failure prevention

Zillion LVS enables early identification of risk conditions such as overloads and overheating. This helps prevent serious failures, extend transformer service life, and reduce unplanned interventions and the costs associated with incidents.

### Grid monitoring for data-driven decision-making

The device provides continuous information on grid status and quality of supply. This enables phase imbalances, energy losses, and abnormal consumption patterns to be detected, helping operators make informed decisions and improve grid efficiency.


Zillion LVS
Low-voltage transformer supervisor
*Sensed by Merytronic*

# 02.4 Zillion LVM – Low-voltage multimeter

Zillion LVM (Low-voltage Multimeter) is a compact device designed to measure and monitor electrical parameters in real time at incoming supply points in low-voltage grids. Its integrated display provides a direct and clear view of the system's electrical behaviour, supporting monitoring, diagnostics, and maintenance tasks.

Thanks to its standard panel-mount format and straightforward installation, it is an ideal solution for both new installations and modernization projects, providing visibility without adding complexity.

## FUNCTIONS AND FEATURES

### Electrical measurement

- Three-phase measurement of voltage, current and other key incoming supply electrical parameters.
- Accurate and stable measurement of the transformer incoming supply parameters.

### Communications

- RS485 (COM) with Modbus RTU protocol in slave mode.
- Straightforward integration with monitoring systems or higher-level devices.

### Interface and display

- Colour LCD display.
- Push-button interface.
- Direct, real-time display of electrical data.

### Installation and format

- Standard 96 × 96 mm panel-mount format.
- Compact design for integration into low-voltage switchboards.
- Quick and straightforward installation.

### Architecture and connections

- 12-pole connectors for power supply (Ub).
- 14-pole connectors for voltage measurement (Um).
- 16-pole connectors for current measurement (Im).
- Design optimized for clear and straightforward connections.

### Maintenance and upgrades

- Firmware updates via SD card or Modbus RTU connection.
- Simplified communications compared with distributed solutions.

## MAIN USE CASES

### Local incoming supply monitoring

The device enables the main electrical parameters to be viewed in real time directly from the low-voltage switchboard. This supports rapid incident detection and field diagnostics, improving the efficiency of operations and maintenance teams.

### Local and remote visibility

Its straightforward integration into the panel, using a standard format, makes it a practical solution for providing visibility in installations without advanced monitoring. It is particularly suitable for retrofit projects and environments where space and simplicity are key factors.


Zillion LVM
Low-voltage multimeter
*Sensed by Merytronic*

# 02.5 Zillion VTN – Earth leakage supervisor

Zillion VTN (Earth Leakage Supervisor) is a monitoring device designed to measure in real time the potential difference between the low-voltage neutral and protective earth in secondary stations.

It enables the detection of anomalies that cannot be identified using conventional measurement systems.

Integrated into the Zillion ecosystem, VTN adds an additional layer of intelligence to the grid, improving operational safety, maintenance, and infrastructure diagnostics.

## FUNCTIONS AND FEATURES

### Specific electrical measurement

- Measurement of the voltage difference between the low-voltage neutral (service earth) and protective earth (metalwork).
- RMS value calculated every second.
- Continuous monitoring of electrical status.

### Anomaly detection

- Capable of identifying conditions such as earth leakage currents, insulation faults, return currents and structural issues in the neutral.
- Detects problems that other devices cannot identify directly.

### Data logging and analysis

- Storage of instantaneous, maximum, minimum and average values.
- Generation of configurable historical profiles.
- Data ready for operational analysis and predictive maintenance.

### Signalling and operation

- Front LEDs for checking device status, communications and voltage levels against defined thresholds.

### Architecture and integration

- Integration into secondary stations.
- Daisy-chain architecture.
- Communications: RS485 and DLMS/COSEM.
- Power supply: 24 V DC from the Low-voltage Node (RTU).

### Device interfaces

- Two RS485 ports with RJ45 connectors.
- One 2-pole connector for voltage measurement.

## MAIN USE CASES

### Early detection of earth leakage and earth faults

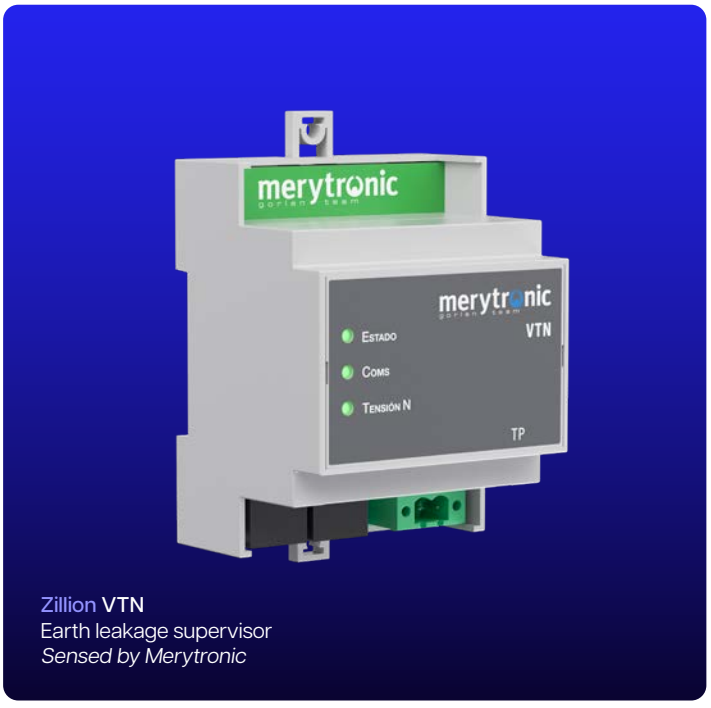
Enables deviations in the voltage between neutral and earth to be identified, indicating the presence of leakage currents or developing faults. This allows action to be taken before the issue leads to failures or operational risks.

### Identification of neutral conductor issues

The system supports the detection of neutral conductor breaks, degradation, improper sizing, and electrical imbalances, all of which are critical conditions that directly affect grid safety.

### Improved diagnostics and maintenance

Enables issues to be localized at secondary-station level, reducing fault-location times and supporting predictive maintenance strategies.




Zillion VTN
Earth leakage supervisor
*Sensed by Merytronic*

# 02.6 Zillion VRS – Vertical retrofit supervision solution

Zillion VRS (Vertical Retrofit Supervision Solution) is a comprehensive solution designed to add advanced monitoring to existing low-voltage switchboards through direct integration into the space of a fuse switch.

Its compact design allows the system to be installed in an available switchboard position, occupying the same space as a protection fuse switch and enabling fully native integration without structural modifications.

Thanks to its modular architecture, the solution can be configured to integrate different components from the Zillion ecosystem, as well as third-party devices, bringing together all the capabilities required for advanced monitoring within a single unit.

## FUNCTIONS AND FEATURES

### Integrated modular architecture

- Integration of multiple components, including current sensors such as Rogowski coils or other technologies, voltage measurement, data acquisition electronics and communications.
- Configurable according to the solution, using Zillion devices or third-party equipment.

### Physical integration into the switchboard

- Occupies the space of a standard fuse switch.
- Installation in spare outgoing feeder positions in low-voltage switchboards.
- No structural extensions or additional enclosures required.

### Advanced electrical measurement

- Voltage and current measurement at feeder and phase level.
- Technology compatible with different current and voltage sensors.
- Accuracy equivalent to fixed monitoring solutions.

### Installation and deployment

- Fast and organized installation.
- Reduced wiring, with power supply and communications combined in a single cable.
- Installation without interrupting the power supply, depending on the configuration.

### Design and efficiency

- Compact, modular column-type architecture.
- Clean integration within the switchboard.
- Eliminates dispersed standalone solutions.
- Adaptable to different grid configurations.
- Ideal for heterogeneous environments.

## MAIN USE CASES

### Complete digitalisation of existing switchboards

Enables a traditional low-voltage switchboard to be transformed into a monitored system by integrating the solution directly into an available space within the switchboard. This supports modernization without redesigning the installation or adding complex external equipment.

### Rapid deployment of advanced monitoring

Thanks to its compact, preconfigured format, the solution enables complete monitoring capabilities, including measurement, communications and sensing, to be deployed quickly and in an organized manner. It is ideal for projects where deployment time and simplicity are key.

Zillion **VRS**
Vertical retrofit supervision solution
*Protected by Pronutec*

## 02.7 Zillion SLVP – Smart low-voltage panel

Zillion SLVP (smart low-voltage panel range) transforms Pronutec's traditional low-voltage panels into smart solutions capable of integrating protection, sensing, communications and advanced monitoring within a single architecture.

While retaining the foundation and design of the standard panel range, Zillion incorporates all the capabilities of its technology ecosystem, enabling any existing configuration to become a smart node within the distribution grid.

This approach ensures maximum flexibility, adapting to different technical, regulatory, and market requirements without compromising the robustness and reliability of the traditional architecture.

Zillion's offering extends the existing panel range, enabling different levels of monitoring and digitalisation to be incorporated according to each client's needs. This makes it possible to configure anything from compact basic-monitoring solutions to advanced architectures ready for remote control, while maintaining consistency across the Zillion ecosystem.

**The smart low-voltage panel range can integrate:**

- 1. Low-voltage feeder protection and sensing solutions with Zillion SFS (smart fuse switches).
- 2. Processing and communications nodes such as Zillion RTU (Low-voltage Node) or Zillion RM (Low-voltage Multichannel Node).
- 3. Complementary monitoring levels such as Zillion LVS (Low-voltage Transformer Supervisor) or Zillion VTN (Earth Leakage Supervisor).
- 4. Local monitoring levels such as Zillion LVM (Low-voltage Multimeter).

Zillion SLVP
Smart low-voltage panel
*Protected by Pronutec*

# 02.7 Zillion SLVP – Smart low-voltage panel

**FUNCTIONS AND FEATURES**

### Advanced electrical monitoring
- Real-time current and voltage measurement.
- Monitoring of quality-of-supply parameters.
- Continuous monitoring of low-voltage grid status.

### Event analysis and logging
- Detection of electrical events through oscillography.
- Historical data logging for analysis and diagnostics.
- Improved traceability and understanding of grid behaviour.

### Modular architecture and interoperability
- Integration of different nodes within a single solution.
- Compatibility with multiple communication protocols.
- Interoperability with SCADA systems, IoT platforms and third-party solutions.

### Field operation interfaces
- Option to incorporate a display with buttons.
- Improved local interaction with the system.
- Easier on-site operation and data consultation.

### Design and integration
- Retains the structural design of Pronutec's traditional range.
- Adaptable to indoor and outdoor installations.
- Compatible with different types of electrical panels.

### Solution scalability and evolution
- Modular design enabling the integration of new elements.
- System evolution without affecting the core architecture.
- Protection of the customer's investment by avoiding complete replacements.

**MAIN USE CASES**

### Digitalisation of the low-voltage grid
Zillion smart panels integrate all the monitoring, communications and sensing capabilities required for grid management directly from the factory. This ensures that the installation is ready from the outset for advanced monitoring, maintenance, and future evolution towards remote control.

### Real-time operational monitoring of the grid
Smart panels provide complete visibility into grid status (current, voltage, quality of supply and events) directly from the panel. This improves diagnostic capabilities and operational decision-making.

### Scalability towards remote control (architecture 2.0)
In advanced configurations, the system enables not only grid monitoring but also grid operation (remote control), supporting use cases such as voltage regulation and remote asset management. This transforms the panel into an active node within the smart grid.

### Adaptation to different levels of digitalisation
The flexibility of the architectures (1.0 / 1.5 / 2.0) enables the level of monitoring to be adapted to each operator's needs, from basic solutions to advanced systems with cybersecurity and remote-operation requirements.


Zillion SFS
Smart fuse switch
*Protected by Pronutec*

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