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Global Low Voltage Monitoring System
Smart Grids Solutions
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Global Low Voltage Monitoring System

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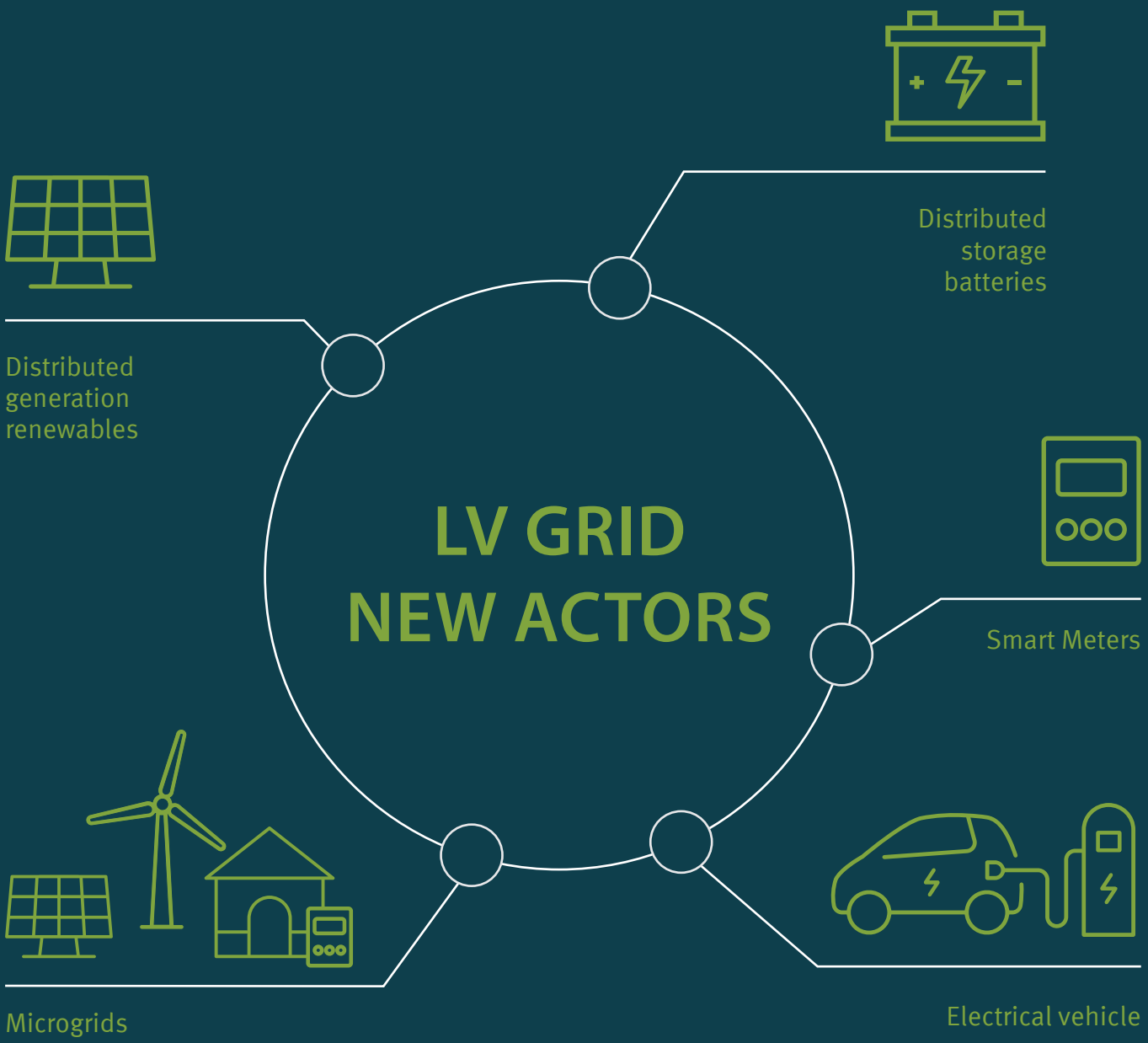
CHALLENGES OF LV ADVANCED MONITORING

- Climate change - Decarbonisation
- Demand response
- Reduction of losses/fraud
- Improve grid availability


LV GRID
NEW ACTORS
Distributed storage batteries
Distributed generation renewables
Smart Meters
Microgrids
Electrical vehicle

02 Complete solution

Distribution substation

LV Edge Node

LV Panel

Fuse Switches

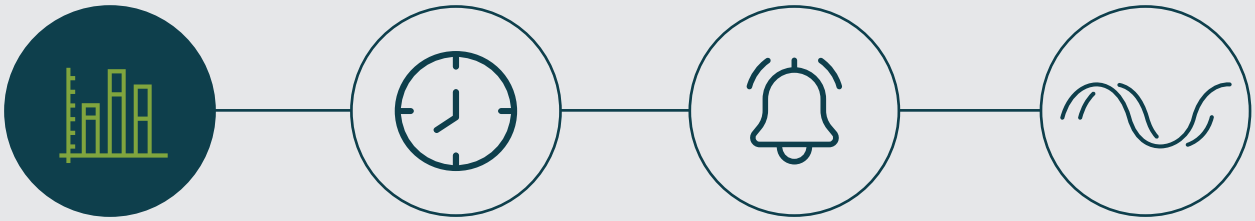
Feeder meters

SOFTWARE PLATFORM

Utility Control Center

Smart & Legacy meters

03 Main features



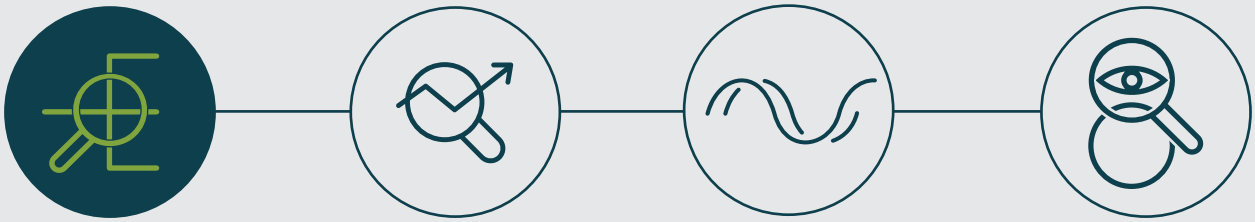
LV ADVANCED SUPERVISION

Real time electrical parameters per line and phase

Different Alarms per line and phase

Oscillography

High resolution voltage and current samples in case of an event



INCOMING SUPERVISION

Power quality

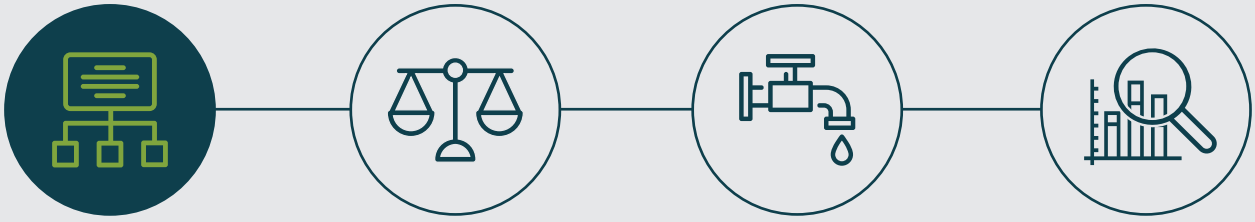
According to EN50160 / IEC61000-4-30

Oscillography

High resolution voltage samples

Transformer Supervision

Earth leakage Current measurement
Incoming measurement
Transformer regulation



METERS MAPPING

Automatic detection of transformer, line and phase of every end user meter

Energy balance

LV Panel feeder energy compared to end user meters one in that line

Loss detection / Fraud

Automatic fraud detection & Technical losses

Faster faults location

Based on meters topology

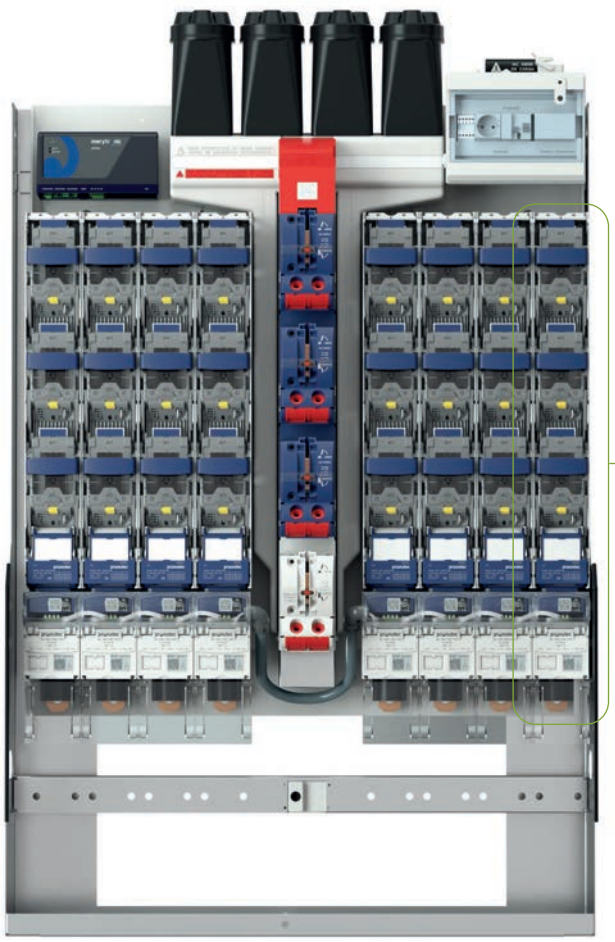
04 Product range

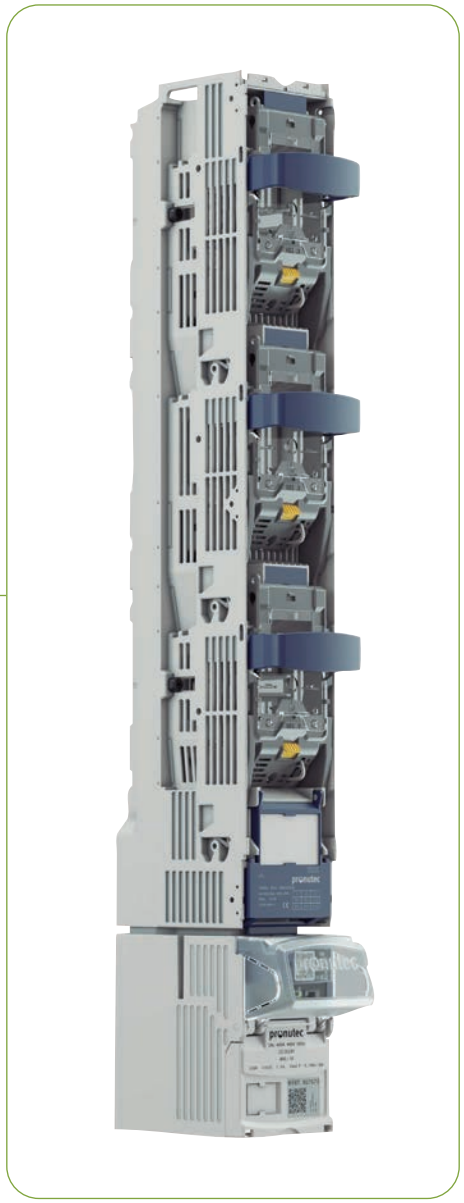
04.1 SMART FUSE SWITCH (SFS)

LOWER SOLUTION
(NH 1/2/3)

SFS Lower Solution consists of a fuse switch, a SAL (Line Advanced Supervisor) which is assembled beneath the fuse switch, and a feeder meter.

- Compact design & very few cabling
- Protection fuses
- Permits replacement of feeder meters on tension, no need of switching off
- Possible RETROFIT of existing fuse switches





FEATURES

Three phase supervisor per outgoing.
Built-in Current Transformers / Voltage taps.

LV Fuse Switch size NH 1/2/3

These fuse switches can incorporate the entire range of Pronutec accessories and terminals.

TSA (Advanced Supervision Card)

The feeder meter is assembled inside of the Supervisor (SAL). It's a three phase meter which reads all the electrical parameters and send them to the LV Remote unit through RS485 serial bus ports.

SAL (Line Advanced)

It includes built-in current transformers and a voltage taps per phase.

Available current transformers with different current ratios, based on fuse switches amperage.

Current transformer ratios

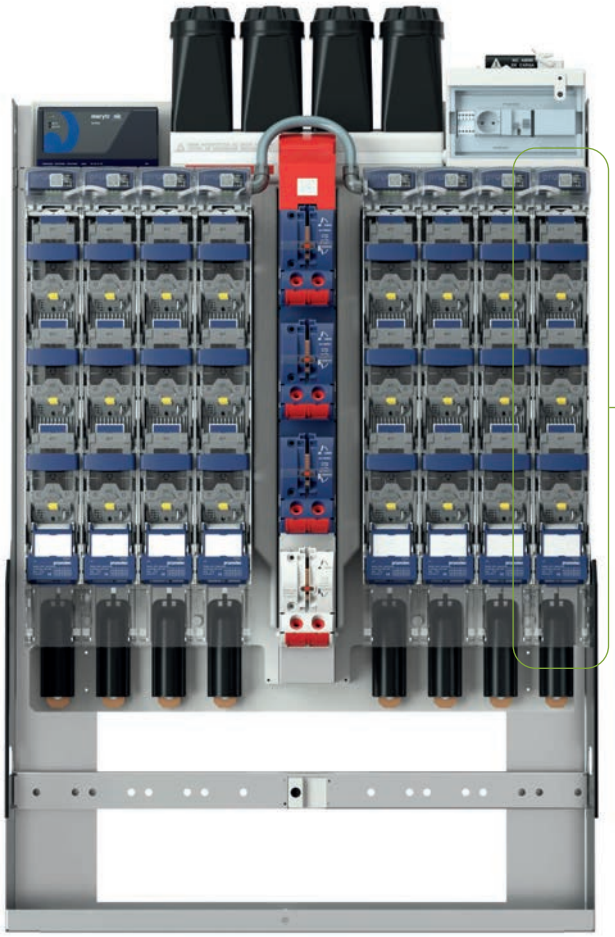
I prim.	I sec.	VA	Pr. Cl.	FS	Range
250 A	1 A	2,5 VA	0,5	‹ 5	120 %
400 A	1 A	2,5 VA	0,5S	‹ 3	120 %
600 A	1 A	2,5 VA	0,5	‹ 5	120 %

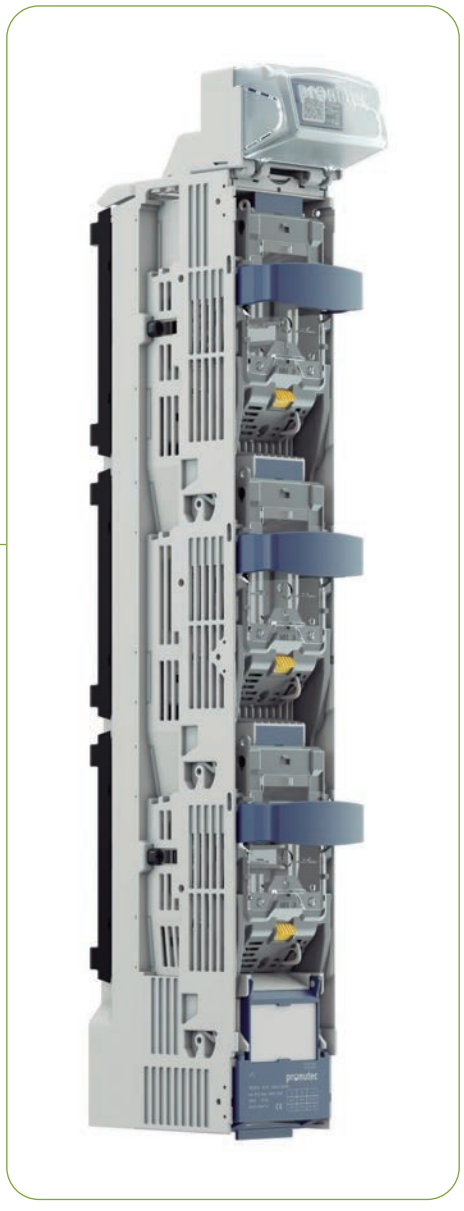
04.1 SMART FUSE SWITCH (SFS)

UPPER SOLUTION (NH 1/2/3)

SFS upper solution consists of a fuse switch, protection case on top of it, current transformers, voltage connections and feeder meter.

- Compact design & very few cabling
- Protection fuses
- Permits replacement of feeder meters on tension, no need of switching off





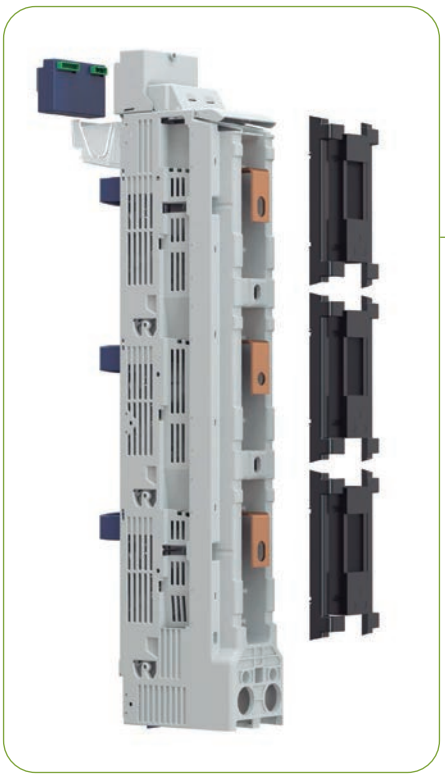
FEATURES

Protection case per outgoing.
Current Transformers /Voltage taps at the back of the fuse switch.

The feeder meter (TSA) is assembled in an upper case on top of the fuse switch. This case includes three protection fuses.

LV Fuse Switch size NH 1/2/3

These fuse switches can incorporate the entire range of Pronutec accessories and terminals.



CTs and voltage taps are wired to the protection case in which the feeder meter (TSA) is assembled.

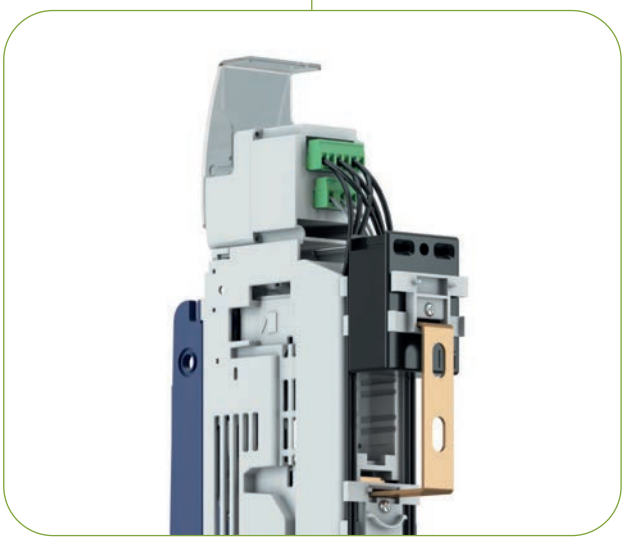
Available current transformers with different current ratios, based on fuse switches amperage.

Current transformer ratios

I prim.	I sec.	VA	Pr. Cl.	FS	Range
250 A	1 A	1,5 VA	1,0	‹ 5	120 %
400 A	1 A	1,0 VA	0,5	‹ 5	120 %
600 A	1 A	1,0 VA	0,5	‹ 5	120 %

NH 00 | UPPER SOLUTION

The SBT is the feeder meter for NH 00 switches. It´s located on top of the fuse switch, as an extension of the BTVC. The SBT is connected to the CT's and voltage taps installed at the rear of the fuse switch.



TSA (ADVANCED SUPERVISION CARD NH 1/2/3)

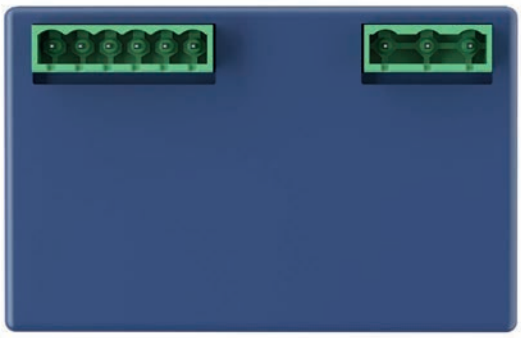
TSA is a three phase feeder meter compatible with both upper and lower LV monitoring solutions. It calculates RMS values per second of the following variables:

- Voltage per phase
- Current per phase and calculated neutral current
- Imported / exported active, reactive and apparent power per phase and total
- Power factor per phase
- Phase presence
- Frequency
- Cumulative values of imported and exported energy
- Cumulative values of reactive energy in all four quadrants
- Temperature inside the card
- Voltage and current oscilography in case of an alarm

Moreover the card can generate the following alarms per phase: blown fuse, over/under voltage,current overload, shortcircuit current.

TSA can communicate by **DLMS / COSEM** protocol on HDLC with the LV Edge Node, or by **Modbus RTU**. They are connected by a RS485 serial bus in daisychain format (maximum 24 feeder meters per bus).

Front view



Rear view

The solution for NH 00 fuse switches is SBT 00, with the same capabilities of TSA.

04.2 LV EDGE NODE

LV Edge Node is the central device of the LV monitoring system at the Distribution substation. Main functions:

- Storage of feeder meters data
- Communication with software platform by:
  - XML reports - web services
  - Modbus TCP
- Head of serial bus RS485 connection with feeder meters (DLMS – HDLC)
- DC power supply for feeder meters through RS485 cable
- Additional features:
  - Power quality
  - Oscillography
  - Leakage current / incoming measurement

Front view

Rear view

RS485 BUS Connections

Each feeder meter has two RJ45 connectors that implement the RS485 serial bus between one feeder meter and the next one with one single UTP cable.

Last feeder meter is connected to the LV Edge node with another UTP cable.

LV Edge Node management web access

Daisy chain connections

PROTOCOLS

LV Edge Node can send data to Ariadna PowerGridMAP and SCADA simultaneously using diferent protocols.

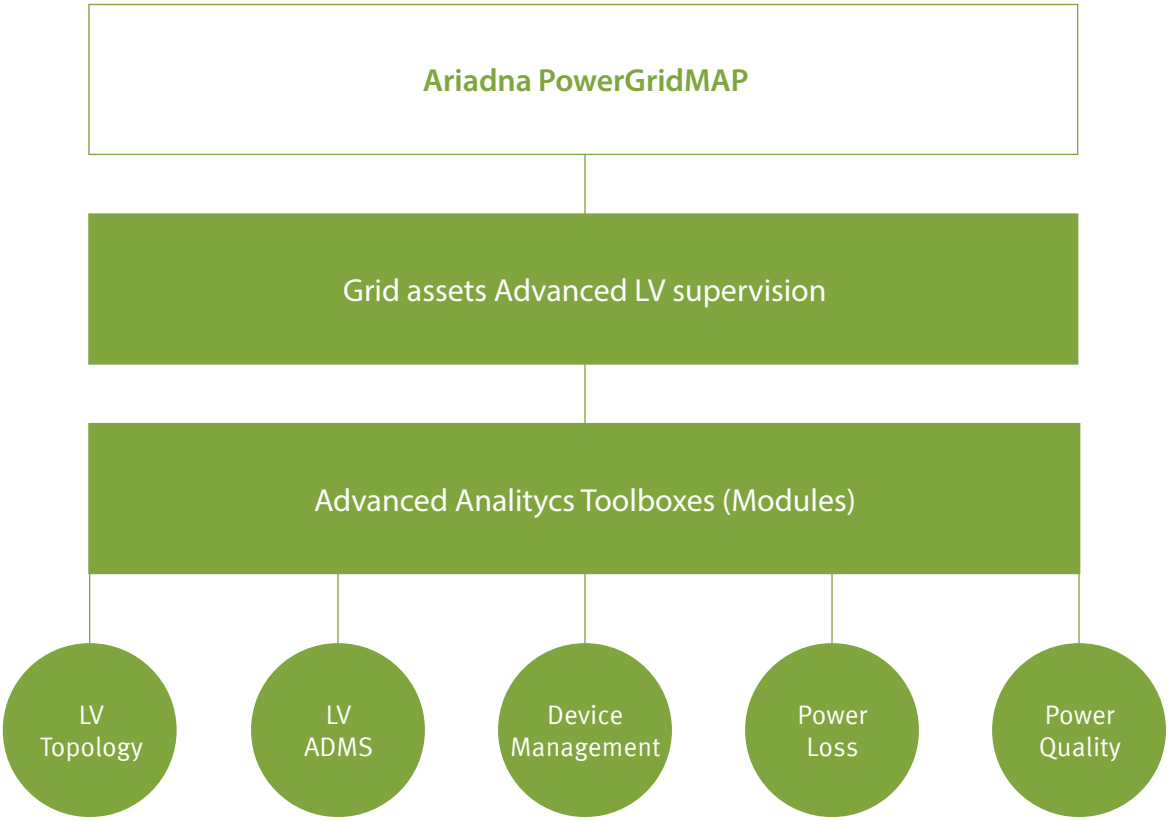
WEB SERVICES

MODBUS TCP

More and more LV monitoring information is interesting for different departments of the utilities such as LV infrastructure, O&M, Assets management, losses, etc. That's why LV Edge Node can send information simultaneously to Ariadna Powergrid LV platform by web services/XML files and to a general SCADA system using an standard telecontrol protocol.

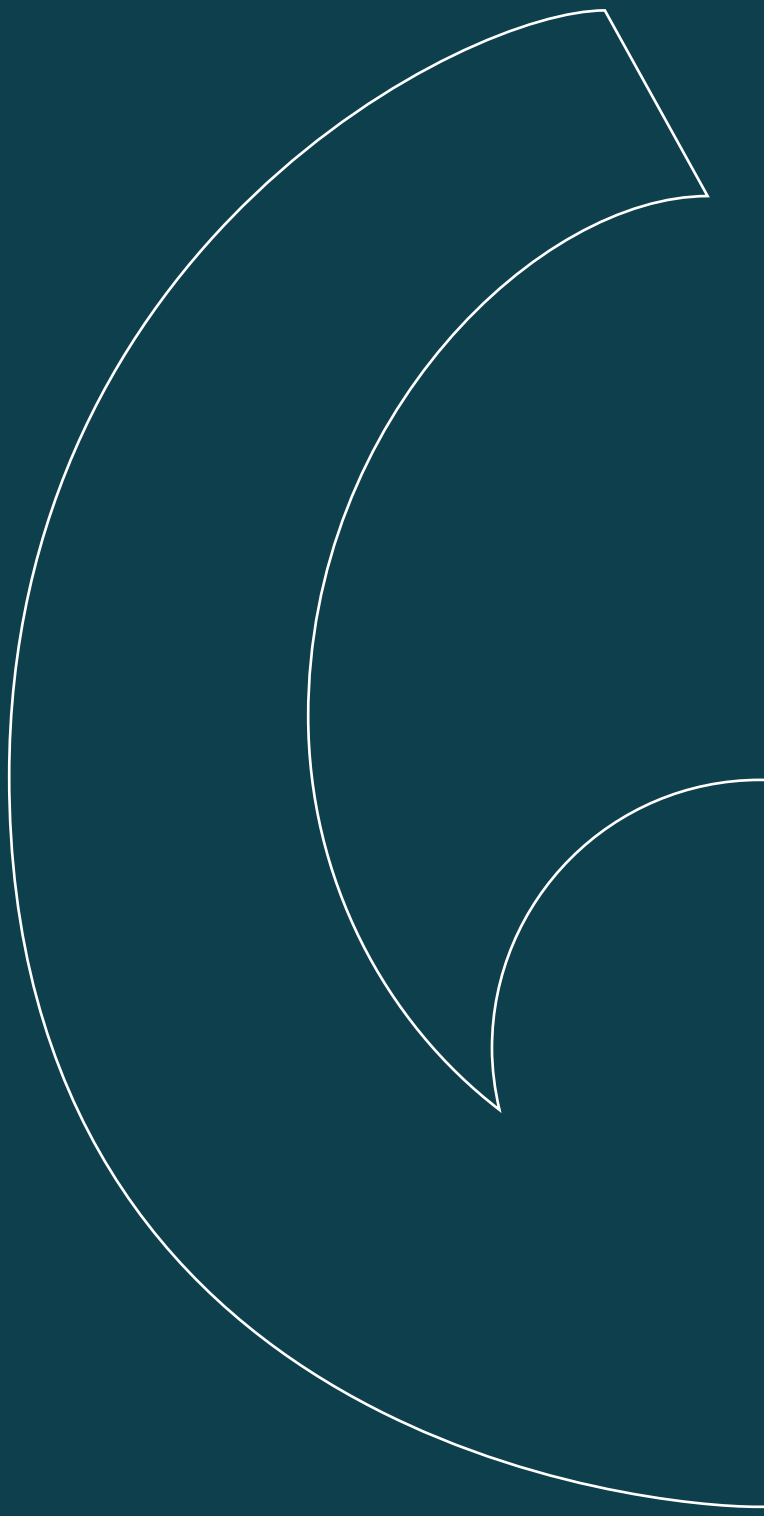
Thereby, the LV supervision hardware can deliver all information needed for an specialized LV analysis tool, and, at the same time, be easily integrated in existing SCADA system for real time monitoring.

04.4 ARIADNA POWERGRIDMAP



All this information is sent to the software platform called Ariadna PowerGridMAP. By reading grid assets, it provides advanced LV supervision.

The principal tools of its advanced analytics are: LV topology, ADMS, Device management, Power Loss detection and Power Quality.



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