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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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01 New scenario of LV Distribution Grid

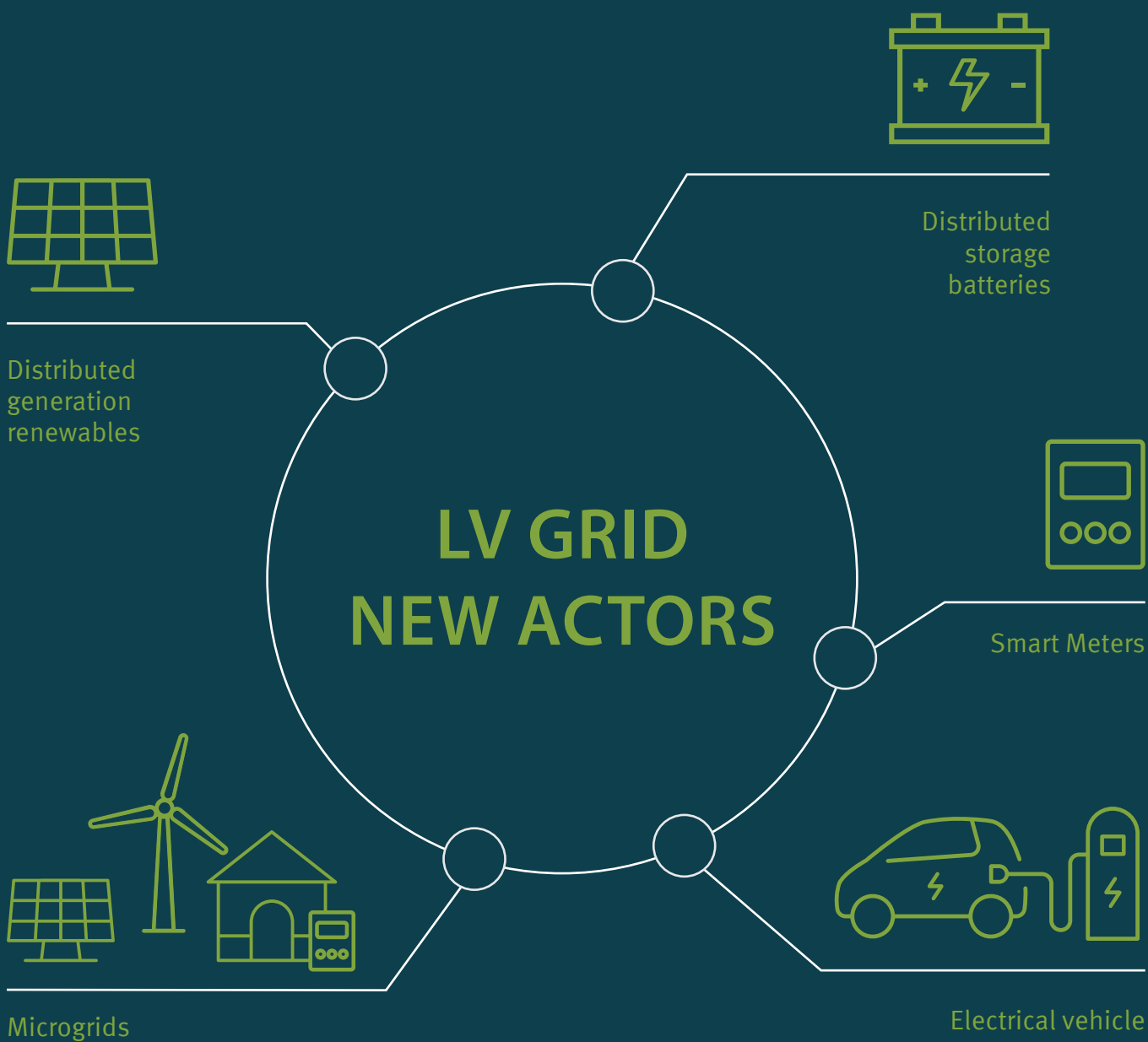
CHALLENGES OF LV ADVANCED MONITORING

Climate change - Decarbonisation

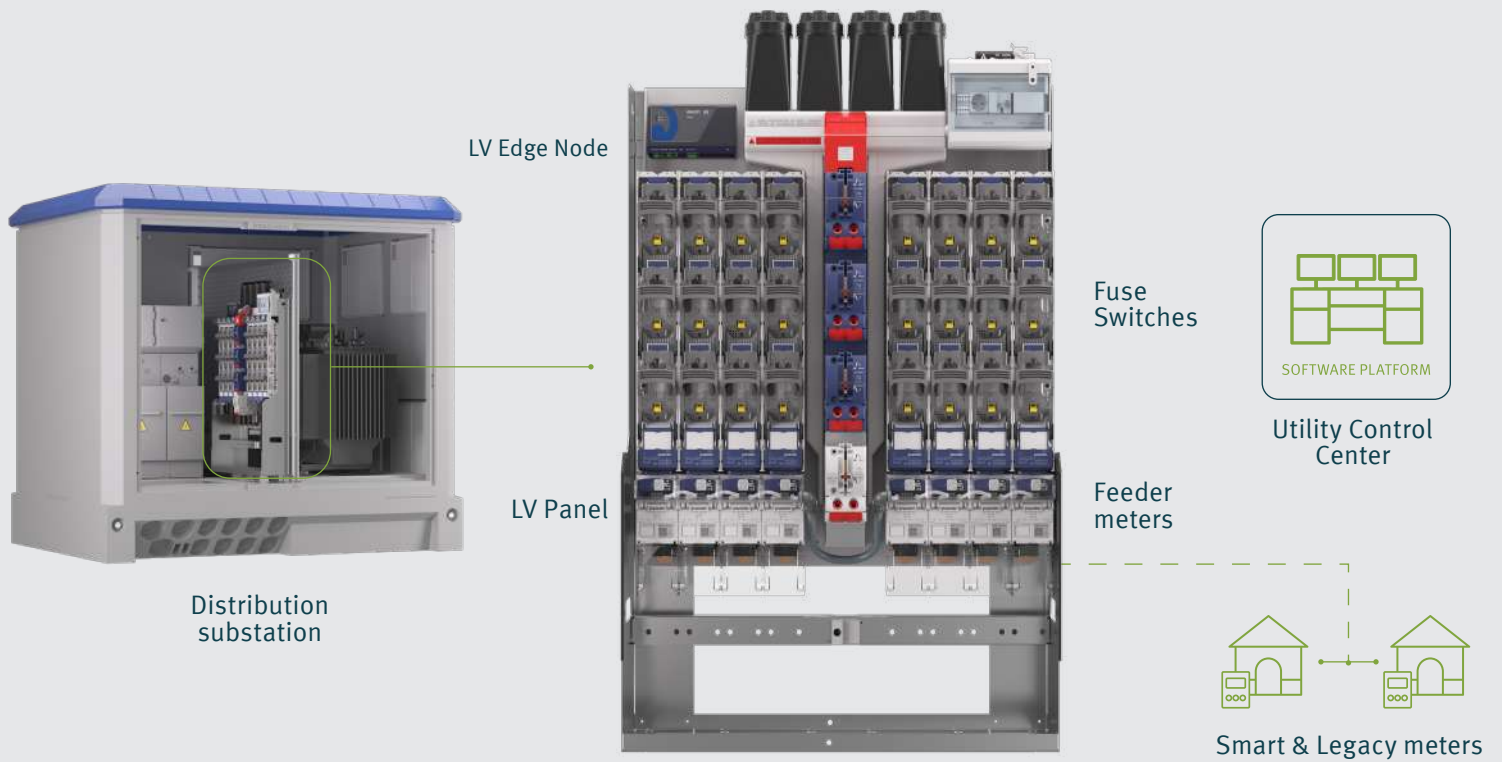
Demand response

Reduction of losses/fraud

Improve grid availability



02 Complete solution



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



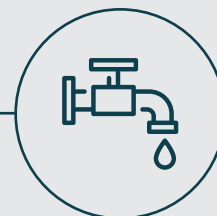
METERS MAPPING

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

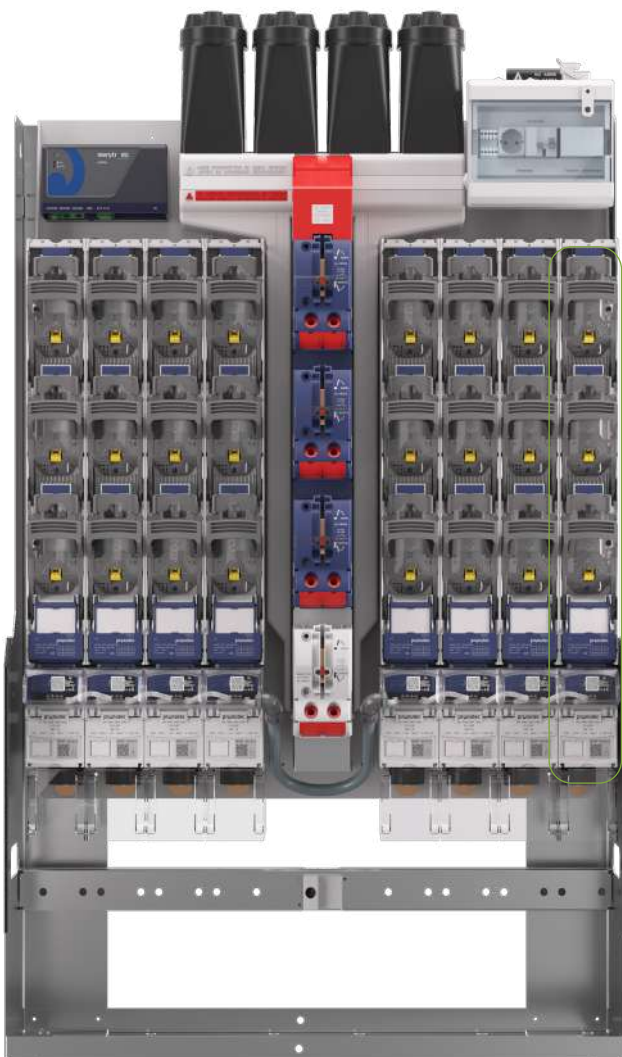
04 Product range

► 04.1 SMART FUSE SWITCH (SFS)

LOWER SOLUTION (NH 00/1/2/3)

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 00/1/2/3

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

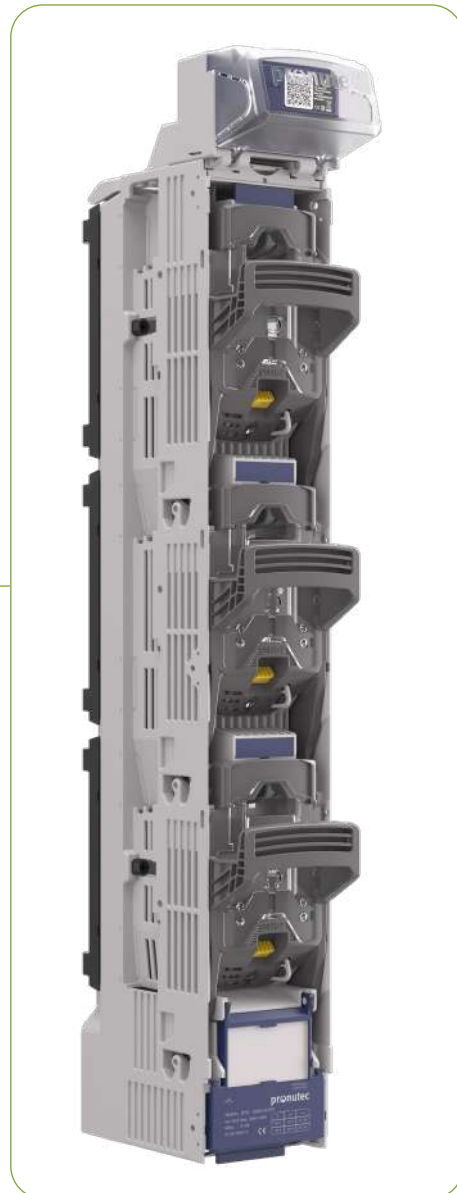
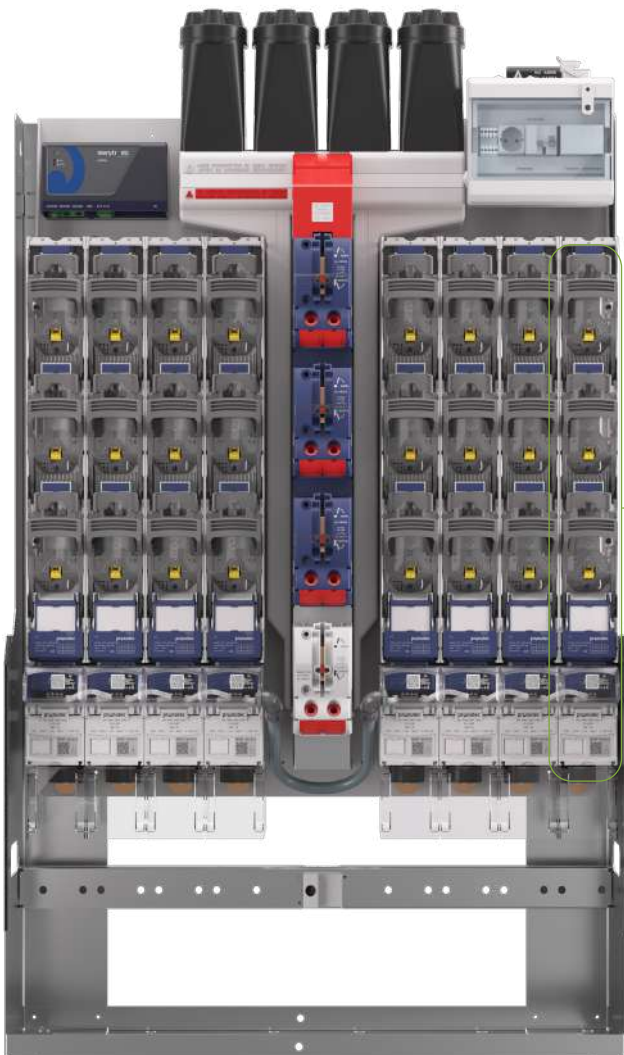
I prim.	I sec.	VA	Pr. Cl.	FS	Range
250 A	1 A	2,5 VA	0,5	< 5	120 %
400 A	1 A	2,5 VA	0,5S	< 3	120 %
600 A	1 A	2,5 VA	0,5	< 5	120 %

► 04.1 SMART FUSE SWITCH (SFS)

UPPER SOLUTION (NH 00/1/2/3)

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.

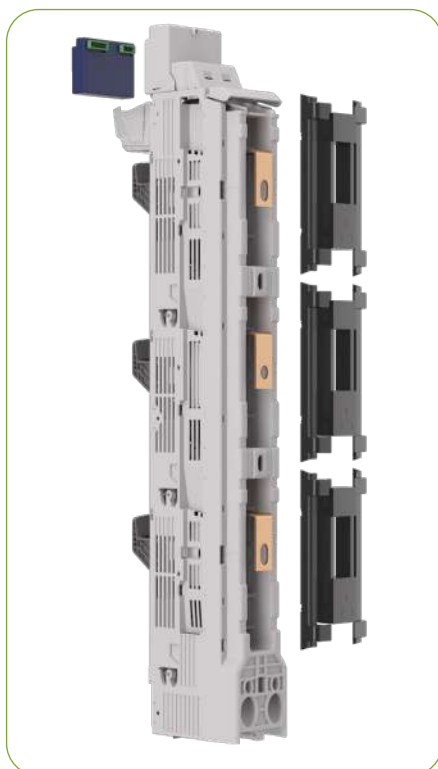
Current Transformers /Voltage taps at the back of the fuse switch.



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 00/1/2/3

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.

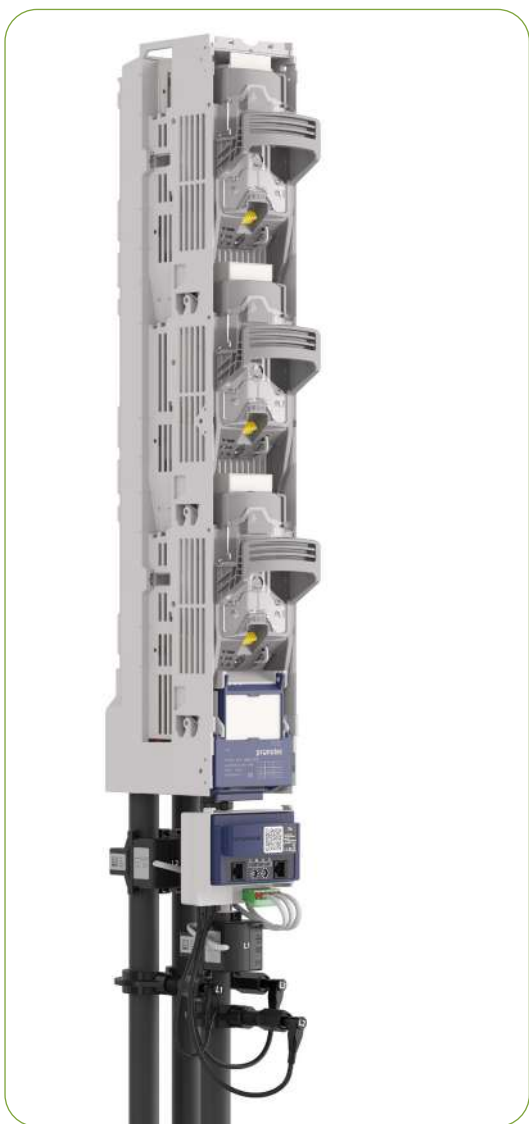
Current transformer ratios

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 %

► 04.2 LIVE RETROFIT SUPERVISOR

Live Retro it Supervisor is a new solution that allows live installation of LV advanced monitoring on any type of three pole fuse switches or circuit breakers with no interruption of the energy supply

- Live installation
- Compatible with any LV Panel, brand and type of fuse switches and circuit breakers
- Same electronic cards of our other solutions
- Same performance of our other supervisors, including measurements per line and phase
- Cabling concentrated in each line, no cable on the ground
- Flexible location of each component on the energy cables
- Fast installation



COMPONENTS



FEEDER METER CASE

Interface between sensors and electronic
Plug in connections from sensors
Protection fuses

CURRENT TRANSFORMER

Split core type
Small size
Easy assembly

VOLTAGE TAPS

Piercing type

VOLTAGE CABLES

Plug in comfortable connections



- Compatible with any infrastructure
 - › Any type, country standard and brand of fuse switches
 - › Any type and brand of circuit breakers
 - › Old infrastructures compatibles
- No need of previous review or inventory of the LV panel before retrofit

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:

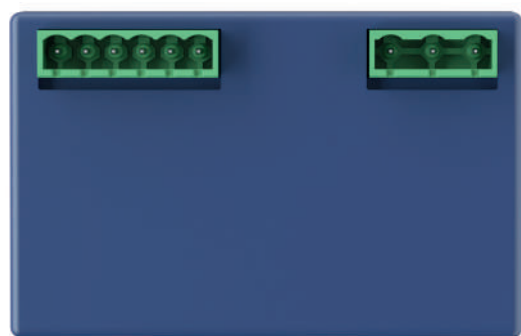
- Voltage per phase
- Current per phase and calculated neutral current
- Imported / exported active, reactive and apparent power per phase and total
- Power factor per phase
- Phase presence
- Frequency
- Cumulative values of imported and exported energy
- Cumulative values of reactive energy in all 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

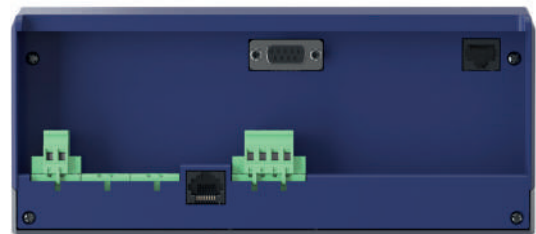
► 04.2 LV EDGE NODE

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 / IEC 60870-5-104/ DNP3.0
- 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 Smart IoT Platform and SCADA / DMS simultaneously using different protocols.



LV monitoring data is gathering interest from an increasing number of utilities departments such as LV infrastructure, O&M, Assets management, Loss detection, etc. Attending this demand, the LV Edge Node provides simultaneously information to Ariadna Smart IoT platform via web services/ XML files and to a general SCADA system using standard telecontrol protocol.

The state-of-the-art LV supervision hardware enables delivery of all necessary information for an specialized LV analysis tool and, at the same time, can be easily integrated into existing SCADA or DMS systems for real-time monitoring.

► 04.3 LV TRANSFORMER SUPERVISOR

LV Transformer Supervisor is a three phase line supervisor capable of monitoring up to two lines

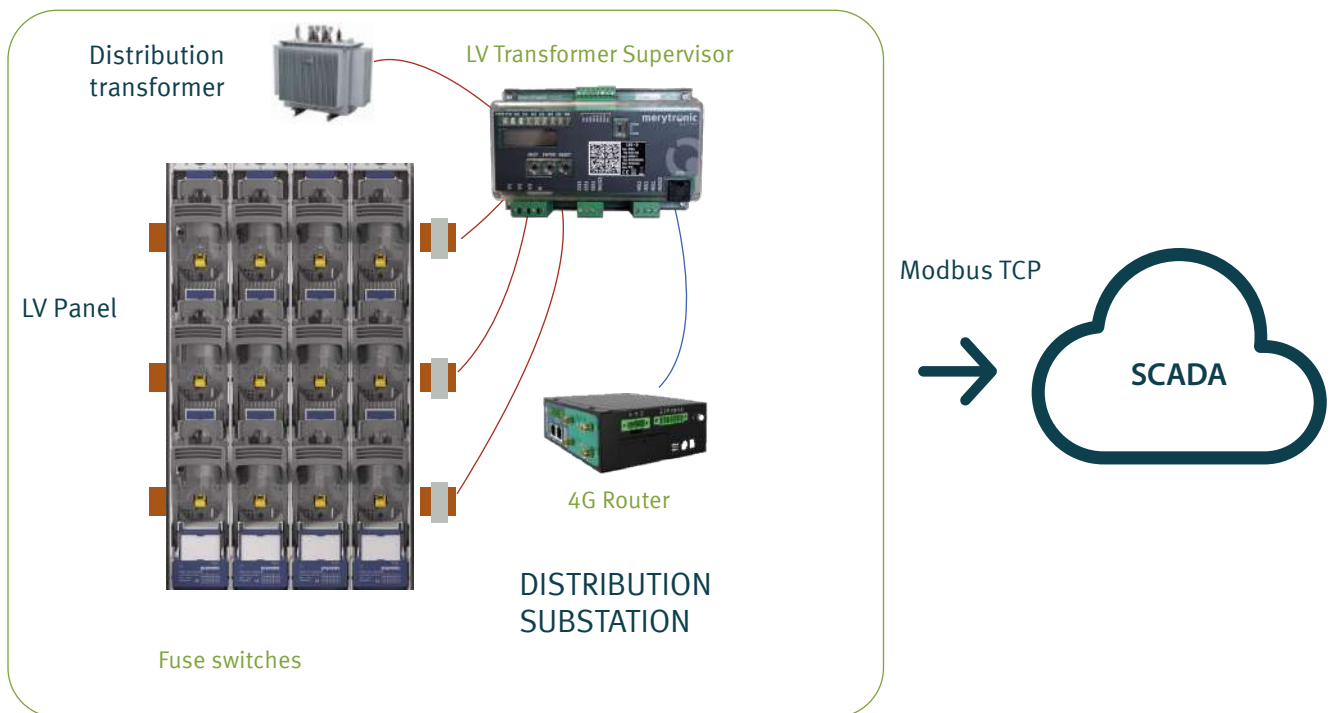
Main features:

- Up to 6 current inputs and 4 voltage inputs
- Electrical measurements: current, voltage, harmonics and temperature
- 1 RS232/RS485
- 1 Ethernet port
- PT100 input for distribution transformer oil measurement
- Class 1 active and class 2 reactive accuracy
- Easy-to-use interface: LCD display, buttons and visual indicators

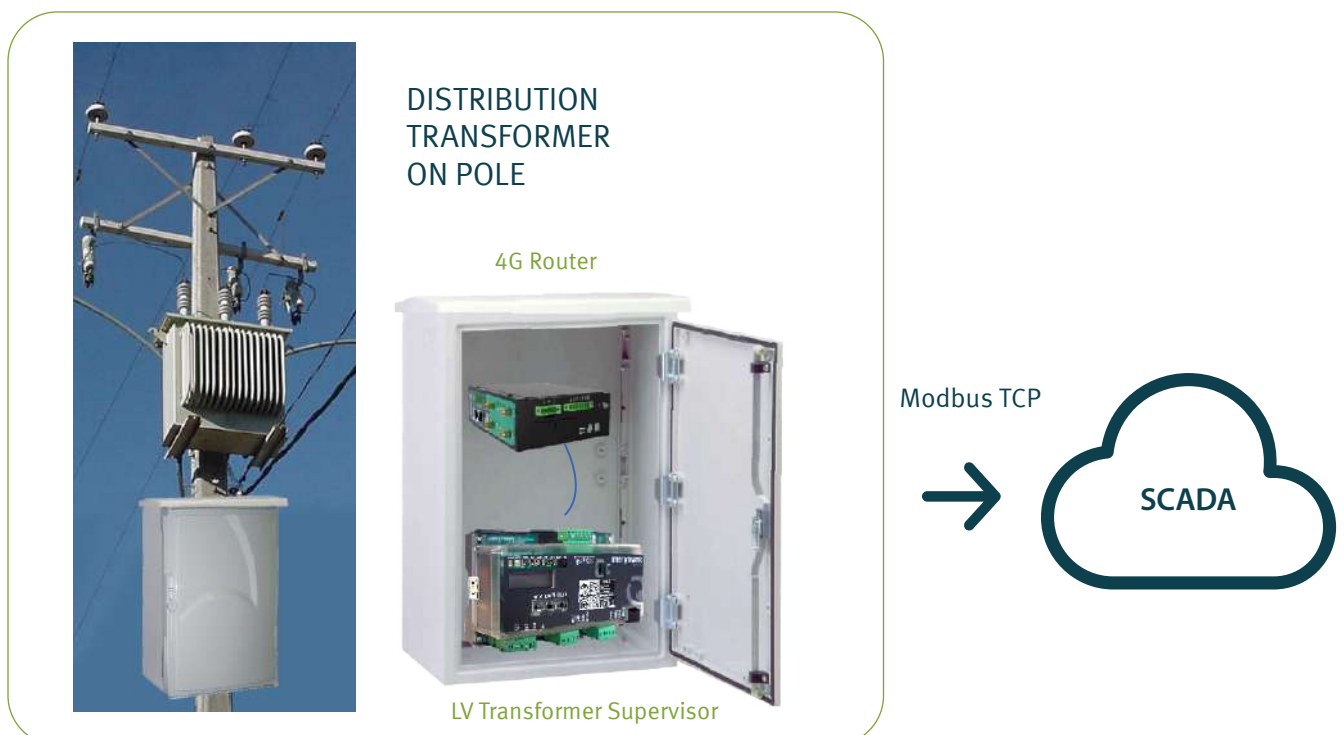


Main applications:

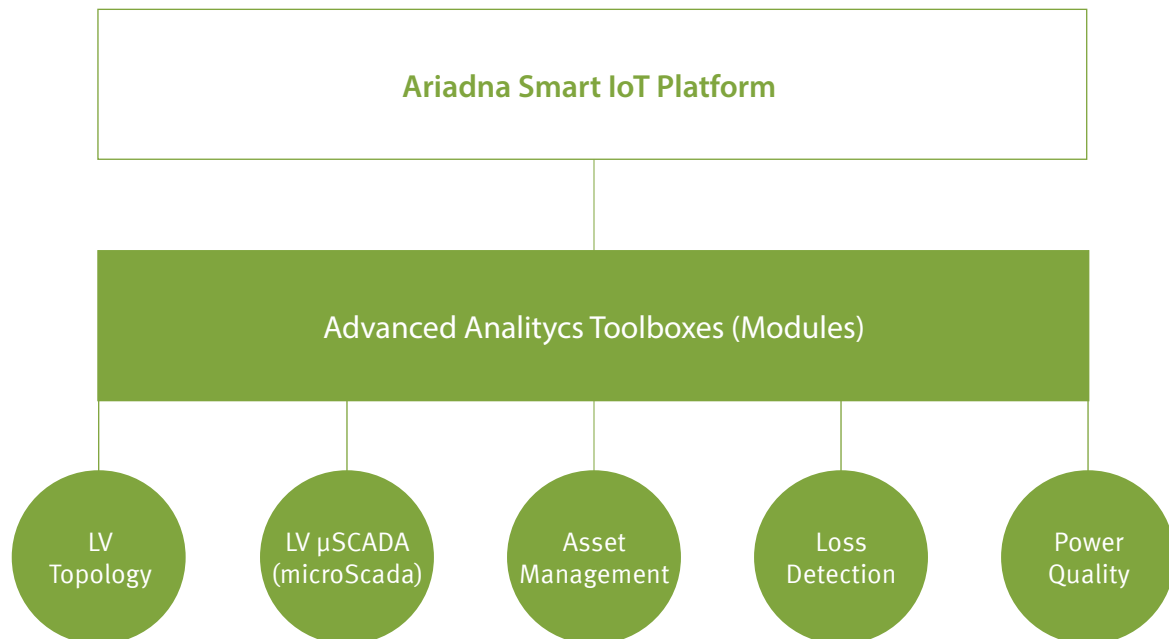
Monitoring of LV panel's incoming and distribution transformer supervision



Monitoring of the secondary of an overhead distribution transformer



► 04.4 ARIADNA SMART IOT PLATFORM



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

The principal tools of its advanced analytics are: LV topology, LV μ SCADA, Asset Management, Loss detection, Alarms and Power Quality.

The platform is scalable, modular, fully-integrated, hardware agnostic and cloud/on-premise.



