PRESense

Enabling the proactive management of low voltage networks

kelvatek
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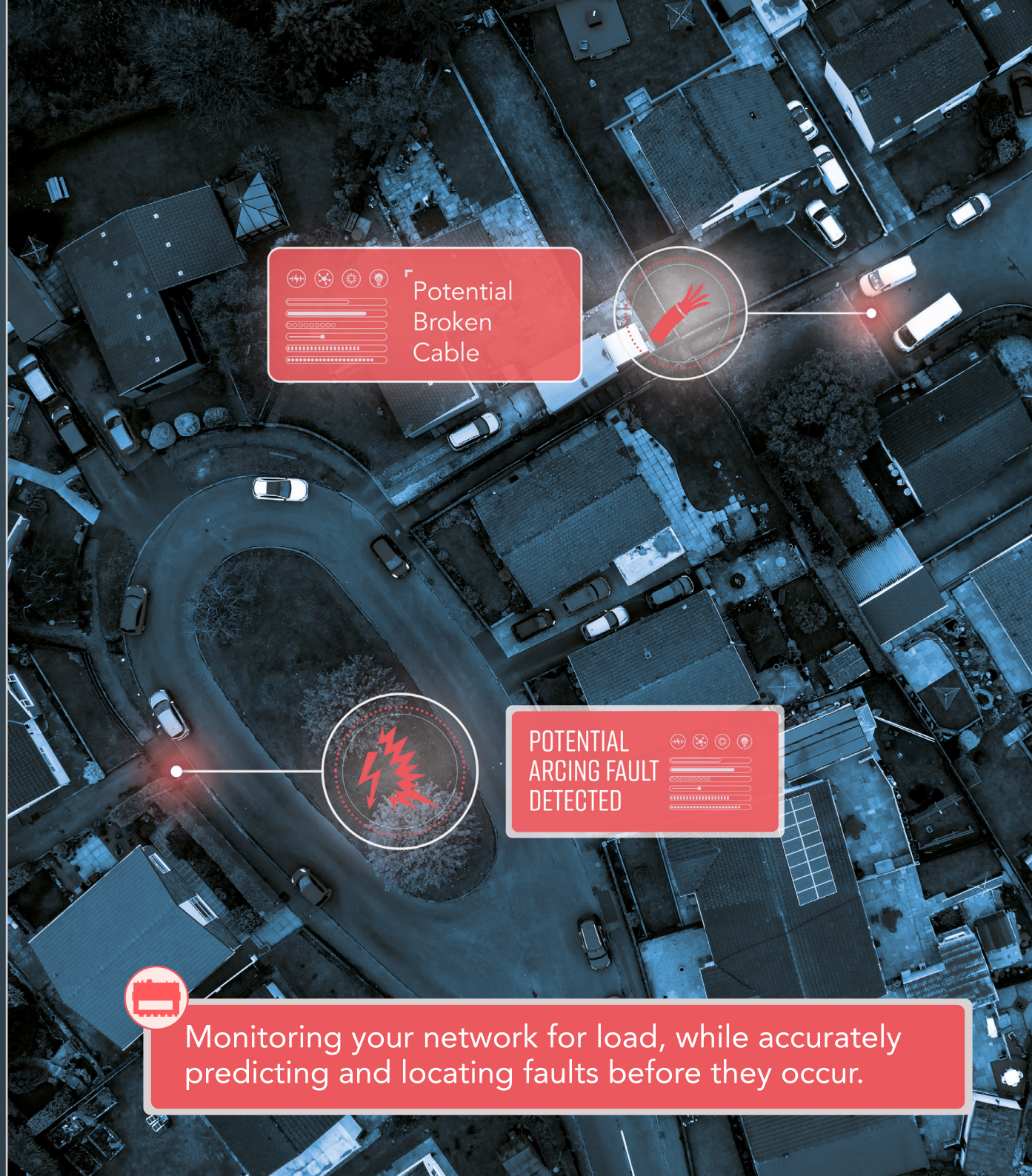


Overview

PRESense predicts the time, type and location of faults before they happen allowing Network operators to avoid penalties and plan repairs ahead of time.

Gaining a deeper insight into the Low Voltage (LV) network has never been more important to Distribution System Operators (DSOs), as the number of Low Carbon Technology (LCT) installations increase in the drive towards Net Zero.

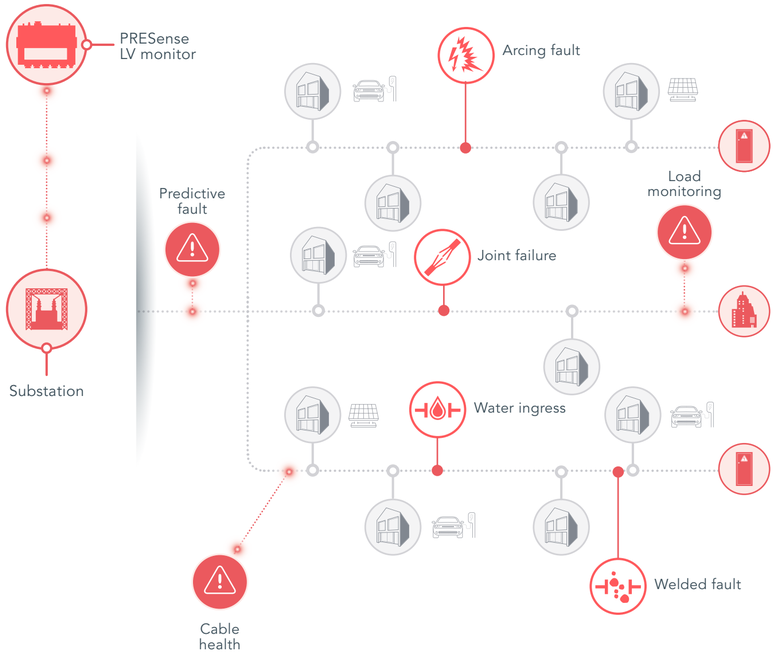
As customers become more reliant on the distribution network, the impact of a loss of supply, or a poor quality of supply will become more severe. The problems that could cause these challenges such as overloads and cable faults must be quickly identified and eliminated before service levels are impacted.

PRESense is an innovative LV monitoring platform that provides distributed intelligence and data capture. Installed at substations and other supply points on the network, PRESense captures data in two ways;

1. Routine capture of network load related data – performed to EN 61000-4-30 standards
2. Triggered data – a series of sophisticated triggers are implemented which capture relevant data based on pre-set conditions such as, developing fault indicators, fault locations, LCT detection and load disaggregation.

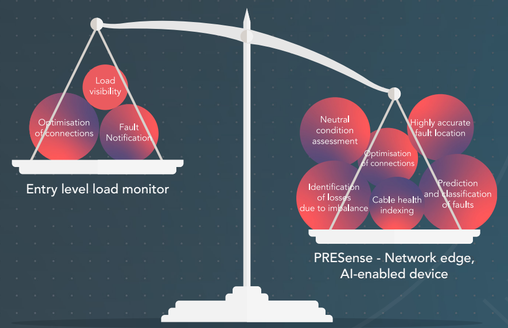
A powerful edge computing capability allows PRESense to dynamically adjust the quantity, granularity, and resolution of data that it captures in line with changing network conditions. This data can be transferred to an appropriate server for processing or can be processed on the PRESense device. Data processing rules can also be automatically and dynamically changed as supply network and communications network conditions change.

Where developing faults are identified, PRESense provides insights that enable the prediction of when these faults will have a customer visible impact – allowing prioritisation of repair activities or the pro-active deployment of fault management devices.



Benefits

Kelvatek's PRESense offering enables DNO's to realise long-term benefits for fault management, load management and asset health in a single solution. It also incorporates the option to combine these insights with 3rd party sources, such as Smart Metering data and environmental data. This helps predict when, where and how faults will occur, whilst delivering on the primary use case of load visibility.



Low Voltage Monitoring Lifetime Benefits

Targeted deployment of PRESense can return numerous benefits beyond visibility of network load:

- A 3-5-fold increase in observable faults translates to a significant increase in IIS benefits.
- Over 50% increase in operational efficiencies by enabling planned proactive repairs versus emergency excavations.
- Reduces the amounts of visits to site by up to a factor of 4 when used as part of a proactive fault repair strategy.

PRESense uses AI-driven edge computing to enable the proactive management of LV networks, resulting in a more targeted approach to load and fault monitoring, generating a greater return on investments and taking LV monitoring beyond the baseline challenges presented by increased load.

Installation costs, maintenance costs and repeated visits to site all add to the total lifetime cost of an LV monitor. PRESense has been designed to be a 'fit and forget' solution. This eliminates these costs, build quality and lack of moving parts means that once the device is deployed, repeat visits are minimised over the typical 15-year lifetime of the device.

PRESense can be configured to only send the data that you need to see, optimising data communication costs, and making data more manageable in target systems.

PRESense's combination of an advanced algorithm and a data filtering model has three key applications that help DNOs' adopt a proactive approach to fault management while delivering unrivalled network visibility: network health monitoring; cable health indexing; and predictive fault location.

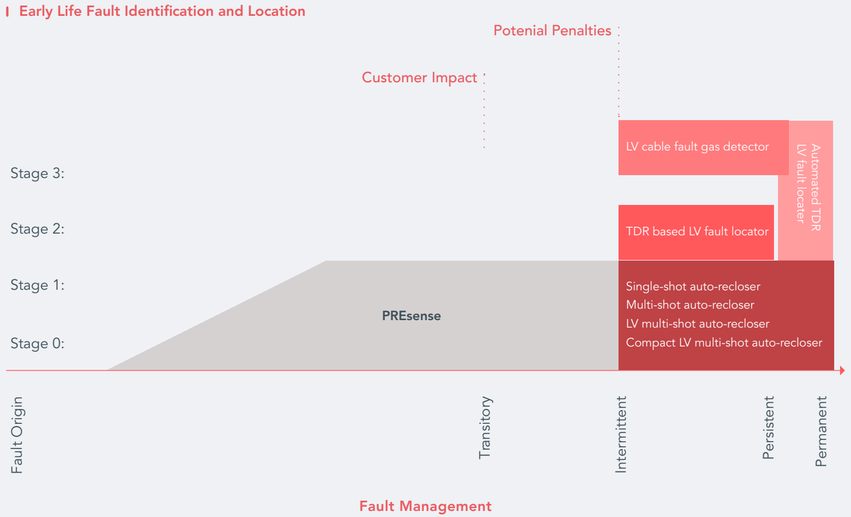
PRESense uses information from the network, individual substations and cable assets, on the performance of similar networks to predict when, where and how faults will occur.

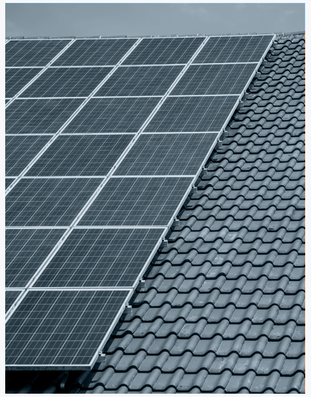
KEY APPLICATIONS FOR ADVANCED LV MONITORING

Predictive fault management

PRESense utilises multiple advanced measurement triggers to automatically capture data which can be used by Kelvatek's well-established SELF (Single Ended Location of Faults) algorithms to provide a distance to any network fault, including meshed networks which have traditionally presented significant problems to conventional fault location methods. The same measurement triggers are also used by Kelvatek's existing multi-ended and multi-point fault location systems (MELF), supporting the locating of even these most difficult faults. These two algorithms combined with the measurement triggers allow the adoption of a proactive fault management strategy. This allows network operators to pinpoint the location of faults before they go permanent, plan works and capitalise repair costs – reducing overall operational costs.

In addition to the existing measurement triggers and fault location algorithms, Kelvatek have developed Fault Activity and Trajectory Estimation (FATE). Making use of data from real network faults to correlate the development of a fault from early life through to network failure. This enables PRESense to alert users well ahead of time of a fuse ruptures and of faults likely to manifest as permanent faults. These insights are provided within a user-selected time window, allowing time to plan works and organise resources. This delivers not only a proactive fault management strategy but a truly predictive one.





Cable Health Indexing

PRESense's high resolution, high-frequency data capture and edge computing capability enables the onsite utilisation of Kelvatek's proven analytical techniques. These have been developed and perfected from extensive monitoring of data captured from the field, and in Kelvatek's unique test facility. They allow PRESense to identify, capture and measure key parameters which are used to detect any fault precursors on the feeder networks being monitored.

PRESense implements advanced triggering mechanisms to capture the data required to support this technique. These various parameters are then processed, weighted and combined with other relevant data in the cloud to create a health index for each cable.

The use of this data will allow network operators to target asset replacement in the most cost-effective and efficient manner – allowing deferment of replacement costs until the optimum cost/benefit situation is realised.

Taken together, these capabilities can be used to almost eliminate customer interruptions on monitored circuits, along with any associated regulatory penalties. They support cost effective pro-active remedies for any developing network issues.

Network health monitoring

PRESense captures key aspects of network health beyond basic voltage and current data. It works to gather power factor, multiple power calculations, phase balance, system frequency, Total Harmonic Distortion (THD), and measurement of individual harmonics.

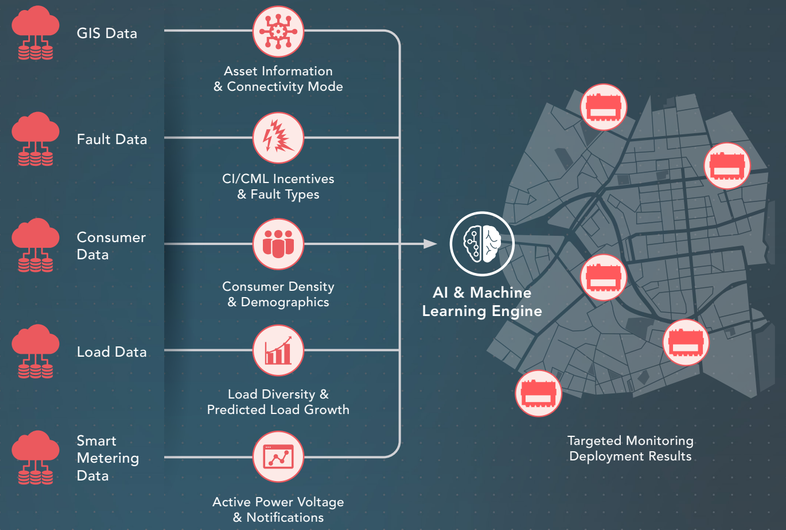
This advanced data capture helps identify developing load issues, such as potential overload caused by increasing numbers of electric vehicles reverse power flows, limited network capacity, phase imbalance, phase overloads, low voltage losses, neutral conductor issues, and transformer temperature issues. This enables network operators to plan and undertake the most effective form of remedial action – whether that is network modification, deployment of flexibility products, traditional re-enforcement or replacement of cables and transformers.

Targeted deployment strategy

To ensure the highest return on investment, PRESense can be deployed as part of an overarching targeted monitoring strategy.

Most targeting methodologies employed to date only consider load and consumer-based data to inform DSO's of where they may need to deploy monitoring solutions in order to defer reinforcement to the network.

With a tiered deployment strategy, we consider multiple factors as demonstrated in the diagram below. This means Network Operators only need to deploy PRESense on areas of the network that require it and guarantees a return on investment over the lifetime of the deployed device. Network Operators can there deploy entry-level lead monitors on areas of the network less at risk from fault or asset degradation.



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» Accelerating network performance for a sustainable future

Our vision is to help build a smarter, more sustainable future through our highly accurate ability to target interventions and investment, all while minimising unplanned interruptions. Underpinning this is our industry-leading solutions and services for Fault & Load Management, Asset Monitoring and Biogas & Gas Monitoring.

Data – and the insight it provides – drives everything we do. The powerful insights we deliver from our clients' data allow them to maximise returns from current network investments, make strategic decisions, deliver improved customer outcomes and embrace the opportunities of net-zero. The data we collect is transparent and open, putting Network Operators firmly in control of their networks.

We exist to engineer better futures. You'll see that commitment reflected in initiatives to make our operations more sustainable and to help our customers on their own journey to net zero.

Kelvatek is part of Camlin, which has a worldwide presence with facilities in 21 cities across 17 countries. Camlin's goal is to optimise the critical infrastructures that people, cities and communities around the world depend on, all day and every day.

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