Visibility Before Vulnerability

System Strength at Distribution Level:

Real-time SCL/SCR measurement for DSOs and DNOs navigating MV and LV network challenges

The rapid growth of distributed energy resources (DERs) and inverter-based resources (IBRs) on distribution networks is fundamentally changing the behaviour of MV and LV grids. As synchronous generation declines, system strength, measured by Short Circuit Level (SCL) and Short Circuit Ratio (SCR), is falling, creating new risks that traditional monitoring cannot capture.

System strength is dynamic: it changes with every generation dispatch, load variation and network switching event. Yet today it is still largely modelled rather than measured, leaving DSOs and DNOs exposed to growing visibility gaps as IBR penetration increases.

Key Trends

- Rising DER and IBR penetration on MV and LV feeders driving down fault levels
- Displacement of embedded synchronous generation reducing natural system strength
- Increasing network reconfiguration creating unpredictable topology changes
- Regulatory pressure to maximise hosting capacity while maintaining security of supply

Emerging Issues

- Protection relays calibrated on historical fault levels risk mal-operation or failure to detect faults
- Power quality degradation in zones of low system strength, triggering customer complaints
- Conservative hosting capacity limits blocking DER connections that could safely proceed
- Model divergence from real-world conditions increasing the risk of poor investment decisions

GridVerix® System Strength measurement: from estimates to evidence

Reactive Technologies' GridVerix®, formerly known as GridMetrix®, grid stability platform delivers a real-time system strength measurement solution for MV and LV networks. By moving from modelled estimates to direct measurement of SCL and SCR, DSOs and DNOs gain the confidence to act decisively on connections, protection, and investment.

Real-Time SCL & SCR

Continuous, high-resolution measurement of Short Circuit Level and Short Circuit Ratio at the grid edge

3 kHz – 48 kHz Sampling

Physics-based measurement with unparalleled data resolution, GPS time-aligned across the fleet

Active & Passive Methods

Two complementary deployment configurations, choose what fits your network and budget

Two Ways of Working

GridVerix System Strength Measurement is available in two complementary configurations, deployable independently or in combination to suit your network and investment profile:

Active Measurement

With System Strength Modulator Device

A dedicated modulator injects a controlled reactive power signal (100–500 kVAR, once per minute), delivering scheduled, high-accuracy measurements of SCL and SCR independent of natural grid events.

- Continuous, scheduled measurements, not reliant on faults or switching
- Higher accuracy and repeatability across all operating conditions
- Provides full range of SCL observed across the year
- Supports regulatory justification and investment decisions

Passive Measurement

With XMUs & Power Quality Meters only

System strength is derived from natural grid events - faults, switching operations, and load changes, using XMUs and Power Quality Meters already on the network. No dedicated injection equipment required.

- Leverages existing metering infrastructure
- Wide-area MV/LV coverage with minimal hardware overhead
- Continuous background monitoring
- Delivers SCL, SCR, and impedance trends over time

Active Measurement



Real GridVerix® field data showing SCL/SCR dropping sharply following a network fault and reconfiguration.

Passive Measurement



Real GridVerix® field data showing a detailed view of a voltage and current transient used for passive SCL/SCR calculation.

Use Cases

Calibrate models with measurement data

Challenge: As IBR penetration increases, simulation models diverge from real-world behaviour. Planners rely on outdated assumptions, leading to sub-optimal planning and investment decisions.

Solution: GridVerix provides measured SCL and SCR at key MV/LV nodes, enabling engineers to validate and recalibrate short circuit and load flow models against real network conditions.

Value: More accurate models for planning studies, investment decisions and operational analysis.

Review protection settings against real fault levels

Challenge: Protection relays and fuse settings are often based on historical or modelled fault levels. Declining system strength means these settings may no longer be appropriate, risking mal-operation, undetected faults, or unsafe conditions for field staff.

Solution: Continuous measured SCL data gives protection engineers real-world fault level inputs to review and refine relay settings and coordination across MV and LV networks.

Value: Lower risk of mal-operation, better fault detection, improved field safety and maintained security of supply.

Unlock grid capacity with evidence

Challenge: DNOs apply conservative limits on DER connections due to uncertainty in system strength, leaving capacity unused and driving unnecessary reinforcement costs.

Solution: Node-level SCL and SCR measurements show actual system strength at connection points, providing evidence to support connection decisions that would otherwise be delayed, constrained or rejected.

Value: More DER connected safely, better use of existing network capacity, lower reinforcement costs and faster decarbonisation.

Safeguard real-time grid stability

Challenge: Line trips, transformer failures or sudden generation loss can reduce local SCL/SCR below the levels required for secure IBR operation, leaving operators with limited warning of emerging stability risks.

Solution: GridVerix Active Measurement continuously tracks SCL/SCR, flags affected nodes and helps operators apply targeted countermeasures such as IBR curtailment or network re-switching.

Value: Faster detection of post-event stability risks, evidence-based interventions and confidence that network operations remain within safe limits.

Interested in GridVerix® for your network? Get in touch

Get in touch

info@reactive-technologies.com
www.reactive-technologies.com

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