

SmartGRID EDGE



Ultra-high- performance software for the modern grid

Any Sensor. Any Device. Any System. Real-time
synchronized grid monitoring, asset
management, fault analysis, modelling,
compliance, oscillation, power quality,
and more.

 SmartGRID | Power Quality
Technologies | Solutions 



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v1.2

A unified platform for the modern grid

SmartGRID EDGE is an ultra-high-performance software solutions platform designed for power system engineers, grid operators, private grids, data centres, and utilities. It transforms any raw sensor data from synchrophasors, power quality, and more into actionable intelligence in real time, at the edge, and at scale.

Core capabilities

A unified platform engineered for the demands of modern power grids, from individual facility monitoring to wide-area network intelligence.

Power quality & Data Driven Analytics

Comprehensive PQ analysis tools, compliance standards (EN50160, IEEE-519, custom), reporting, and export to industry-standard formats.

Multi-Sensor Investigations

Multi-sensor synchronized investigations on the same timescale for stability analysis, event propagation, sequence of events, and more.

Synchrophasor & WAMs

Real-time phasor measurement data via IEEE/IEC 60255-118-1 (C37.118) up to 100/200 frames per second — 400x faster than SCADA systems.

Artificial intelligence & ML

With SmartGRID EDGE X1 hardware (powered by NVIDIA), world-class classification models for power quality, anomaly detection, and more. Completely Offline.

Oscillation detection & stability

Continuous sub-synchronous monitoring of oscillatory behaviour with state-of-the-art methods and visualisation.

Jupyter, Grafana & APIs

Use SmartGRID's built-in analysis dashboards, or conduct your own analysis with built-in Jupyter Notebooks and Grafana.

Modern platform

SmartGRID EDGE is built on a modern platform that is optimized for speed, efficiency, security, and reliability.

- Any Sensor. Any Device. Any System.
- Any Synchrophasor, Phasor Measurement Units (PMU)
- Real-Time Synchronized Grid Monitoring, Asset Management
- Power System Model Validation with Real-World Measurements
- AEMO Generator Performance Standards (GPS) Compliance Assessment, Hold Point Testing, R2 Validation, AEMO MASS v8.2 Very Fast FCAS
- Power Quality Compliance Monitoring, Oscillation Detection, Fault Analysis and more
- Modern, intuitive, and customizable user interface
- Responsive UI layout with dark and light modes
- Accessibility features for larger text and colour schemes
- On-premise, Cloud, or Hybrid Deployment | Online or Offline License Activation

Protocols, ingestion & tools

Connect any sensor, import any historical format, and integrate with existing systems.

C37.118 — PMU synchrophasor streaming

MODBUS TCP/IP — universal sensor & meter protocol

DNP3 — event-driven distributed network protocol

COMTRADE — IEEE C37.111 transient records.

PQDIF — power quality interchange.

IEC 61850 — substation automation & protection

CSV / Excel — manual & automated historical import

API — full data access and built-in Jupyter Notebooks

Custom — native integration for your sensors, custom modules for your applications

SmartGRID Optimized Time-Series Database (SGTSdB)

Both serverless and server-based databases are supported, including SQLite, Postgres, and SmartGRID Optimized TimescaleDB (SGTSdB). Other database types can be supported on request. Typical SQL databases were not designed for high-resolution, high-speed sensor data. SmartGRID Time-Series Database (SGTSdB) is purpose-built for time-series data, with lossless compression — retaining raw resolution at a fraction of the storage footprint.

- Up to hundreds of times faster than traditional SQL databases
- Optimised drill-down from years of data to a single event, instantly
- Freeze Analysis loads high-resolution data into memory for a chosen window, with no re-querying on zoom
- Lossless compression up to 90%, lowering storage cost and environmental impact

High-resolution synchrophasors

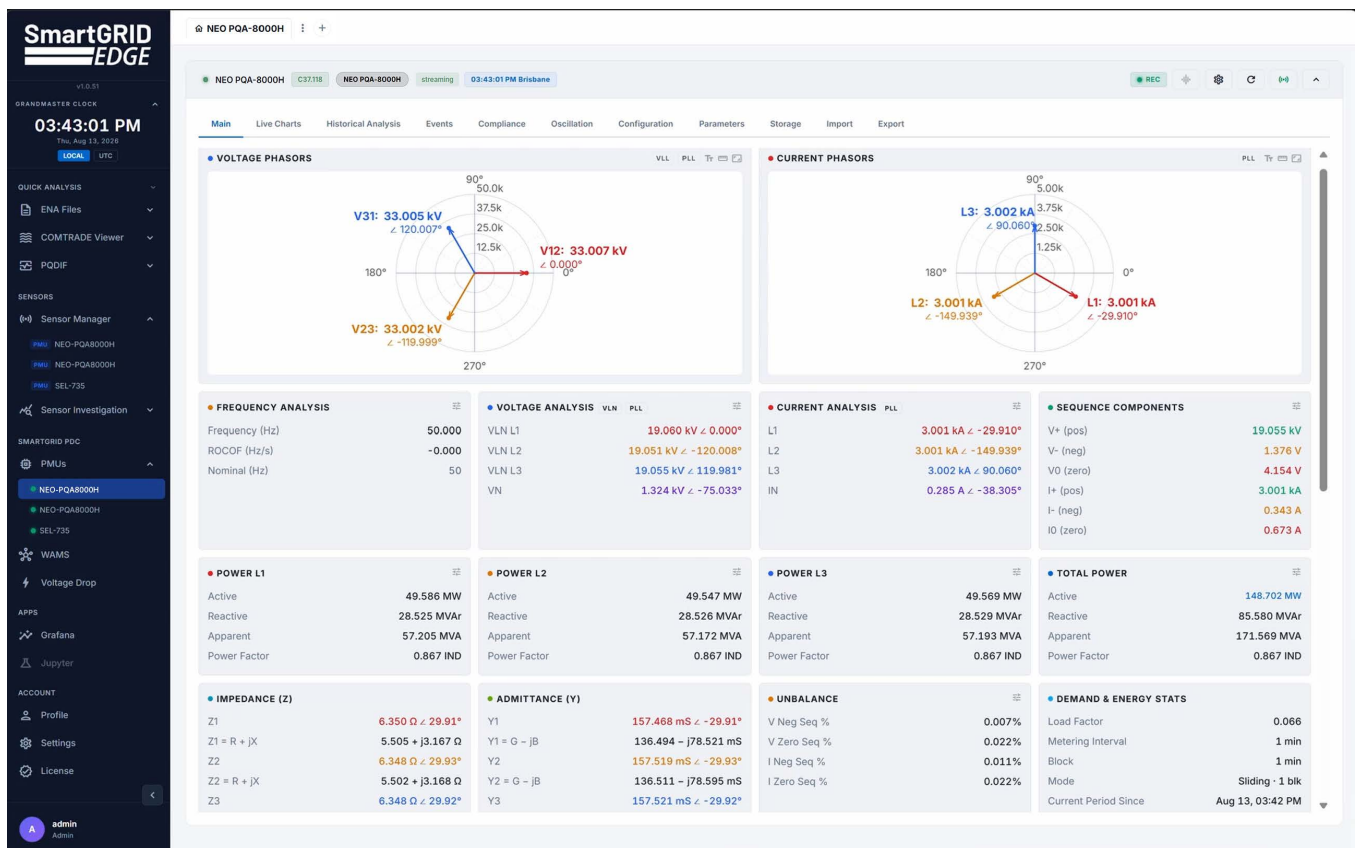
Phasor measurement units (PMUs) continuously stream real-time synchrophasors at up to 400x the speed of SCADA systems. With SmartGRID EDGE, setup is easy and works with any PMU — over 100 parameters stored at half-cycle (10ms) or cycle-by-cycle (20ms) resolution in real time, at the edge of the grid.

- Customisable dashboard, real-time phasor diagram, table view, and high-speed live charts
- Over 100 parameters at 10ms or 20ms resolution, including frequency, ROCOF, voltage, current, sequence components, power, energy, impedance, admittance, unbalance, and more...
- Accurate frequency with rate-of-change-of-frequency (ROCOF) at 10ms or 20ms
- Retrospective PMU Data Recall (RPDR) — PMU data is never lost, and is filled back in retrospectively with SmartGRID EDGE X1 hardware connected locally to the sensor

MODBUS, DNP3, IEC-61850, and more

Capture data from any protocol capable sensor that SmartGRID EDGE supports. Map vendor-specific parameters into SmartGRID's standardized model, enabling seamless multi-sensor analysis and effortless investigative workflows, even across protocols. Customizable events, compliance, and professional reports.

Additional industry standard protocols supported over time with software updates.



Data Driven Solutions

Power Quality, Synchrophasor (PMU), BESS, FCAS, Fault Location (within metres), Protection, Control, Asset Health, Bushfire Prevention, Oscillations, Supraharmonics, Grid Impedance, Islanding, and more.



Digital Twin & Context

Understand Data in Context with Digital Twin, Asset Metadata, Geospatial (GIS), Big Data. TSO, DSO, Private Grids, and Individual Facilities.



Analytics

Real-time Visualisation & Insights (400x SCADA), Historical Analytics, Modelling, Compliance Reporting. Any Device. Any Sensor. Any System.



Artificial Intelligence & Custom Apps

Modular, Scalable, Custom Apps. Artificial Intelligence for Anomaly Detection, Prediction, Analysis, Classification, and more. API available.

Advanced Power Quality Analysis, Compliance, Customizable Events, and Alerts

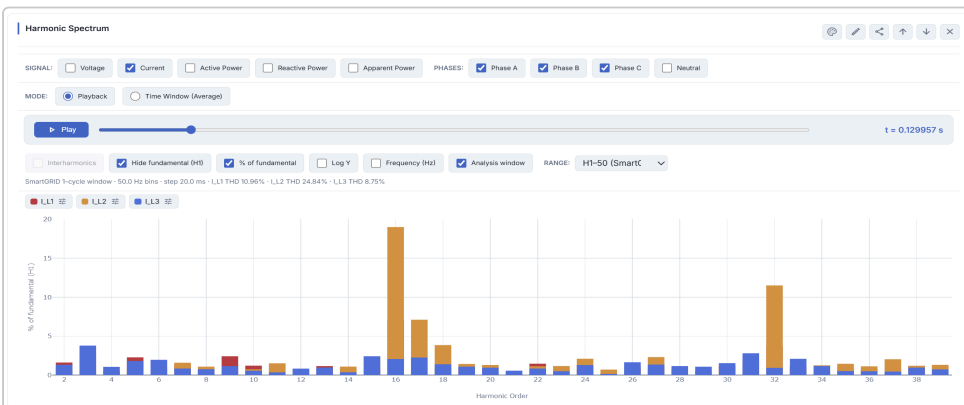
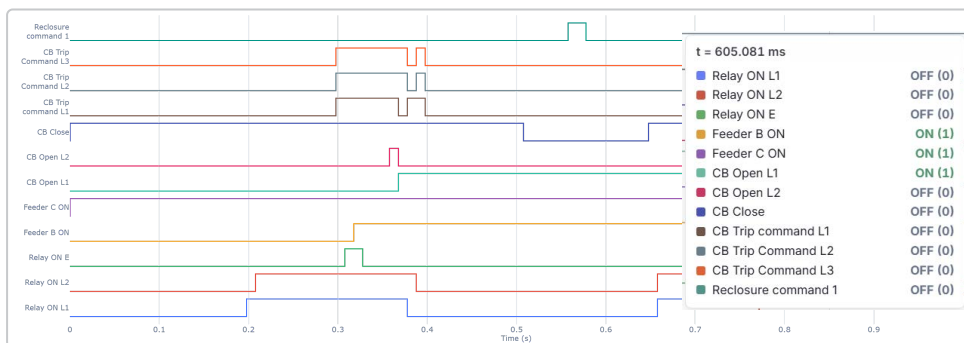
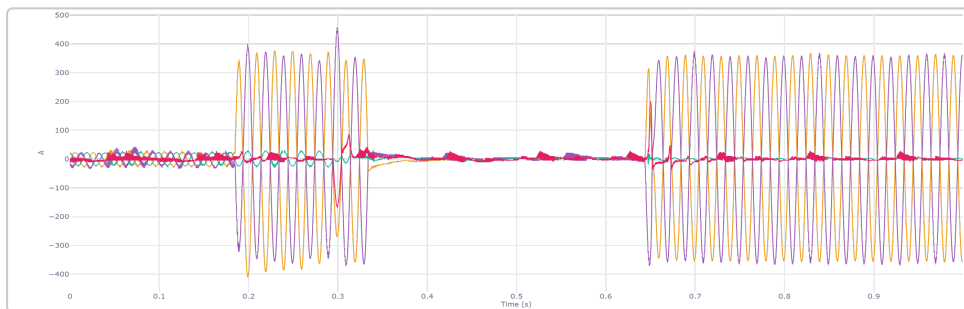
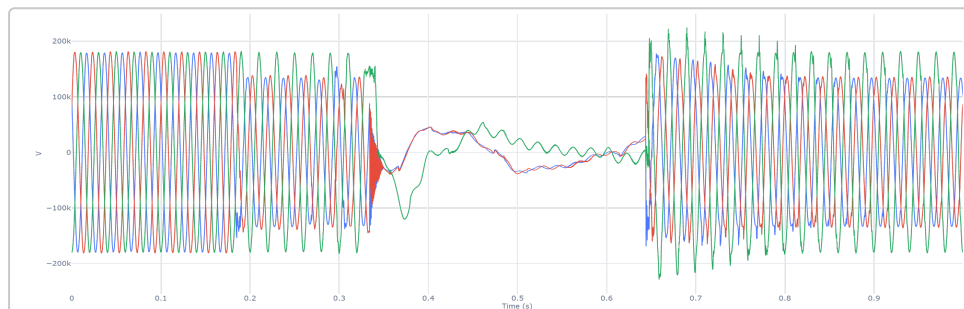
Define custom event rules; simple, complex, and compound, on any measured or calculated parameter. SmartGRID EDGE automatically detects, classifies, and stores every event in real time and historically, with notifications sent by email including event details, data snippets, and charts. Power Quality Compliance (EN50160, IEEE-519, etc.) and user defined custom compliance are supported (no complex programming).



COMTRADE & transient formats

IEEE C37.111 Common Format for Transient Data Exchange for waveform-based fault records with sequence of events (SEQ) data.

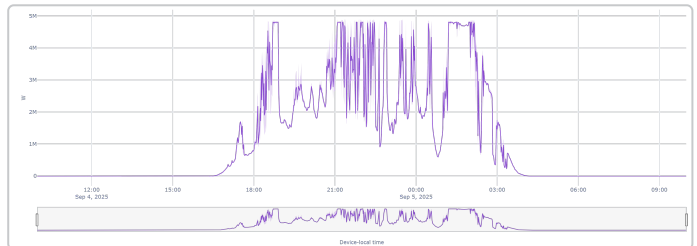
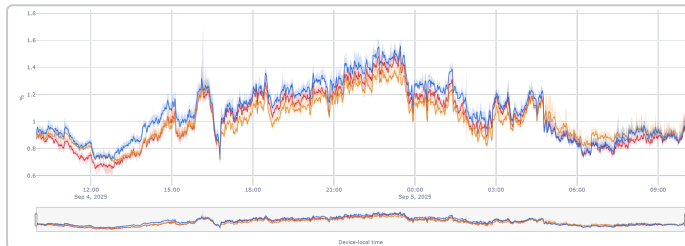
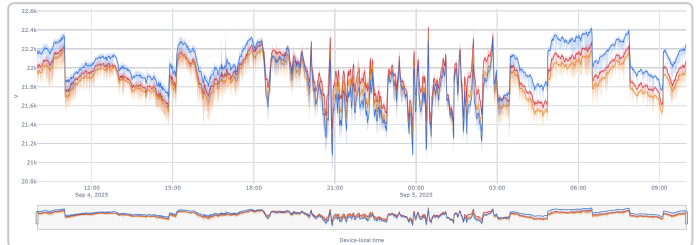
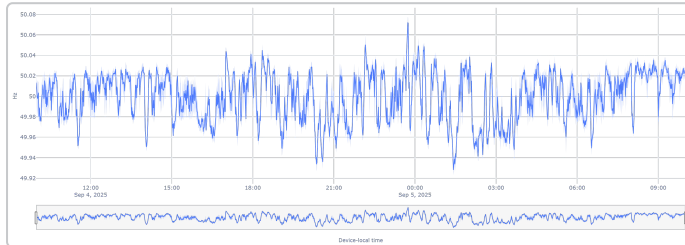
- Fast imports and analysis of COMTRADE format (all editions including IEEE C37.111-1991, IEEE C37.111-1999, IEEE C37.111-2013)
- Intuitive layout for Sequence of Event (SEQ) data
- **Over 10,000 calculated power parameters including support for custom user-defined parameters**
- Automatic isolated collection (via FTP/FTPS/SFTP) of COMTRADE files for individual sensors through on-demand, interval-based, or scheduled data acquisition. Manual import of COMTRADE files also supported
- Multi-sensor analysis: any sensor (COMTRADE or otherwise) in SmartGRID EDGE can be compared and analysed on the same timescale
- Supports SmartGRID EDGE Freeze Analysis — waveform/transient data is loaded into SmartGRID EDGE memory for fast analysis, with no need to wait for re-querying of data while zooming in/out
- Phasor playback and harmonic spectrum playback at up to ½ cycle resolution to allow easy detection of magnitude/angle deviations and identification of problematic switching frequencies
- Custom transient formats are also supported — contact SmartGRID to learn more
- Customisable COMTRADE PDF or Word reports (manual and automatic)
- Email support (optional) and In-App Alert Notifications
- Export data to CSV and other formats



PQDIF

Power Quality Data Interchange Format (IEEE 1159.3).

- Fast imports and analysis of PQDIF format
- Map vendor-specific PQDIF parameters into SmartGRID's standardized model, enabling seamless multi-sensor analysis and effortless investigative workflows
- Automatic isolated collection (via FTP/FTPS/SFTP) of PQDIF files for individual sensors through on-demand, interval-based, or scheduled data acquisition. Manual import of PQDIF files also supported
- Multi-sensor analysis: any sensor (PQDIF or other protocols) in SmartGRID EDGE can be compared and analysed on the same timescale
- Supports SmartGRID EDGE Freeze Analysis — PQDIF data is loaded into SmartGRID EDGE memory for fast analysis, with no need to wait for re-querying of data while zooming in/out
- Customisable PQDIF PDF or Word reports (manual and automatic)
- Customisable fleet or per-PQDIF-sensor compliance reports
- Email support
- Export data to CSV



SmartGRID EDGE AI Hardware — SmartGRID X1

Powered by NVIDIA. Purpose-built for edge computing co-located with sensors, for ultra-low-latency analysis and GPU-accelerated AI inference; complex calculations, anomaly detection, power quality disturbance classification, fault location, real-time oscillation detection, and stability monitoring. Completely Offline.

Software	SmartGRID EDGE
Processor	NVIDIA, with up to 16GB RAM
Storage	Up to 8TB SSD on board
Performance	Up to 100 TOPS AI performance
Interfaces	3x USB 3.2, 2x RJ45 GbE (1x PoE), RS-232/422/485, 4x DI/DO, 1x CAN
Optional	5G/4G with Nano-SIM slot, GPS module (Time Synchronization)
Build	Industrial fanless design, -20°C to +60°C. DIN-rail mountable or screw plate.

Application security controls

Authentication - Server-enforced authentication - Password hashing - Automatic login throttling & lockout - Secure session management (hashed tokens, idle timeout) with server-side revocation	Authorisation - Role-based access control (RBAC) with granular permissions - Custom roles and per-sensor scoping - Server-side enforcement including input validation	Transport & Cryptography - HTTPS mandatory and automatic - TLS with auto-generated and corporate certificates - Certificate verification & pinning for sensors (FTPS/SFTP) - AES-256-GCM encryption of stored credentials	Input Handling - Parameterised queries - File upload controls & sanitation - Sandboxed parsing of untrusted files - XSS output encoding & CSRF protection	API & Traffic Controls - Brute-force rate limiting - Request-size limits and import quotas - Concurrency gates & bounded processing queues
Logging & Monitoring - Comprehensive audit logging - Sign-ins, lockouts, permission denials, configuration changes - Managed retention, permission-gated access & export - Continuous process-health monitoring	Software Supply Chain - Code signed and cryptographically verified updates - Explicit admin install with downgrade protection - Bug fixes and security updates - Feature updates	Licensing & Compliance - Licence compliance and enforcement, including concurrent users and access - Online or fully offline activation for air-gapped networks - Hardware-locked, signature-verified licences - Anti-rollback and clock-rollback defence	Secure by default - Localhost-only until network access is enabled - Default credentials never usable remotely - No telemetry or usage analytics - Administrator recovery requires local access	

Editions & Licensing

Available in Professional, Enterprise, and Enterprise with Zaphiro SynchroGuard.

Professional Core power quality and analysis capabilities for individual facilities and single-site deployments.	Enterprise Full platform capability at scale, additional protocol support, wide-area monitoring, multi-sensor investigations, and more.	Enterprise + SynchroGuard Enterprise plus Zaphiro SynchroGuard for digital twin grid modelling, linear state-estimation, fault location, real-time falling conductor & bushfire prevention.
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SmartGRID EDGE can be activated online or entirely offline: ideal for air-gapped and secure network environments.

Two ways to license

	Perpetual Licence	Annual Subscription
Term	Own the licence, lifetime software access.	Renewed Yearly
Software Maintenance	Optional	Included and mandatory

What Software Maintenance covers

While your maintenance is active, you receive:

- New feature releases, including support for additional protocols and modules
- Bug fixes, security updates and patches
- Ongoing performance improvements

How pricing is built

Your licence is priced on four components:

- Base Enterprise Package (perpetual or subscription)
- Number of sensors — volume discounts available
- Number of concurrent users
- Specific Modules

Contact SmartGRID for a tailored quote.



Request a demo

Visit smartgridedge.com to compare editions, features, and request a quote.

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Some features described in this brochure are scheduled for future release and may not yet be fully integrated. SmartGRID Technologies & Power Quality Solutions Pty Ltd may modify, enhance, delay, or discontinue any feature at any time without prior notice in order to improve its product offering. This document may contain errors or omissions and is provided for general guidance only. Contact SmartGRID to confirm current specifications.