Smart Labs for Smarter Grids

KEMA Labs

It is all about reliability

Electricity networks rely on the correct operation of Intelligent Electronic Devices (IED's) for energy metering, protection, and control. In the ever-increasing world of digitalization and Internet of Things, the keywords for power stations and substations are functional performance, rugged electronic hardware design, real-time communication, reliable data, and data (cyber) security.

New technologies

New technologies are introduced to develop digital substations and digital T&D components. Non-conventional instrument transformers with digital sampled value outputs are replacing the conventional analogue types. Circuit-breakers have integrated IED's for protection, control, and status monitoring. Power transformers are equipped with all kinds of sensors to monitor temperature, oil pressure, current flows, etc. New testing techniques have been developed to type test these integrated technologies in combination with the fundamental functional type testing.

Complete testing facilities

KEMA Labs is fully equipped for testing Intelligent Electronic Devices in the field of functional performance, communication requirements, electromagnetic compatibility, product safety, accuracy, and other environmental influences.

Our impartiality, your competitive advantage

KEMA Labs Type Test Certificates & Reports open doors of every tender as proof of impartiality, quality, and trustworthiness.
Our impartial services help ensure equipment operates to the highest international standards. Certification is based on testing to determine how equipment works in reality, not just in theory or with a simple computed simulation. It demonstrates equipment will perform correctly under all network conditions, allowing utilities to provide the most reliable service possible.

Protection and Substation Automation Labs

Substations are the most important hub for Transmission and Distribution system operators, as they concentrate the most valuable assets of the grid and outages reduction is a key performance indicator. To ensure resiliency, protection equipment must communicate with the rest of the intelligent electronic devices reliably and with lowest latency.

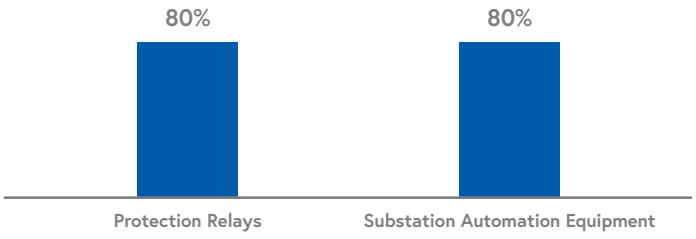
Protection systems and relays may only be called into action rarely. But if they do not operate when needed, they could endanger the electricity supply. Meanwhile a protection system that operates when it should not, could cause significant financial harm for utilities and their customers.

KEMA Labs offer independent testing and certification according to all relevant international standards. Trusted the world over, our KEMA Type Test Certificates give manufacturers, and their stakeholders confidence that protection systems will function as required – under normal and fault conditions.

Testing means no compromise on safety

Failure rates on protection relays and substation automation equipment in our Labs shows how far simulations can be from reality when considering assessment of equipment performances. (Common failures: insufficient strength to vibrations, insufficient strength to EMC immunity phenomena, wrong IP classification, temperature, and humidity influence on the performance and other more).

Never compromise on your product's quality.



Failure Rates on protection relays in the Lab

International standards

Protection and substation automation equipment are tested and certified under ISO/IEC 17025 accreditation according to a range of international standards including:

- IEC 60255 series and IEEE C37.90 series for protection relays
- IEC 61850-3 and IEEE 1613 series for utility communication/automation IEDs
- IEC 60834-1 for teleprotection equipment
- IEC 61869 series for low-power instrument transformers, stand-alone merging unit

Tests available

We offer testing and certification of all kinds of measuring relays and protection equipment.
Tests available include:

- Functionality (accuracy, operating times, reset times)
- Electromagnetic compatibility (emission and immunity)
- Climatic environmental conditions (temperature, humidity)
- Mechanical environmental conditions (vibration, shock, bump, seismic)
- Electrical safety including dielectric performance (clearance & creepage, insulation voltages, protective bonding, flammability, single fault)
- Contact and switch performance (endurance, short time, make, break)
- Energizing quantities (burden, power supply range, inrush)
- Functional tests (checking of accuracy, operating times, and stability under steady-state and transient network conditions)
- Communication protocol conformance testing
- Interoperability testing
- Other client specific tests

World-recognized quality

Once your protection equipment has successfully completed all required tests to recognized standards, it will receive a KEMA Type Test Certificate. Recognized around the world as a sign of quality, a KEMA Type Test Certificate opens doors to global business.

Electromagnetic Compatibility Labs

Limiting the unintentional generation, propagation and reception of electromagnetic energy which may cause unwanted effects such as electromagnetic interference, is the only way to ensure a safe and reliable operation in any environment of all electronic equipment.

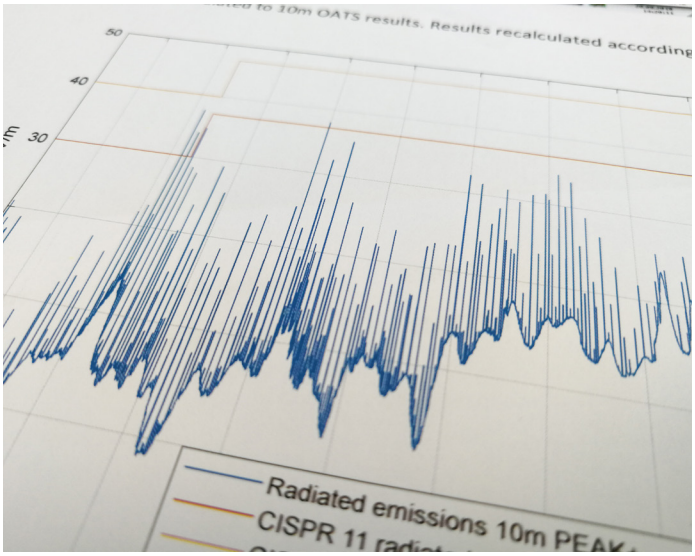
Electromagnetic waves are not seen but they are everywhere. From the 1960s onwards, the world's militaries have had to test how different electronic devices interact with each other, and devices in everyday life now need to be tested as well.

Testing Services

- Electromagnetic field immunity tests
- Conducted susceptibility tests – frequency domain
- Conducted susceptibility tests – time domain
- Insulation tests
- Indirect lighting tests
- Radiated Emission at minimum of 10m distance from the Equipment under Test
- Conducted Emission Tests – Frequency domain

Main reference standards

- RTCA DO 160-A/B/C/D/E/F/G;
- MIL-STD 461, 462, 463;
- EN 61000-4-2/3/4/5/6/7/8/9/10/11/12/13 (and the relevant correspondent Standards EN 61000-X-Y and CEI 110, CEI 210);
- CISPR 11, 13, 14, 15, 20, 22 (and relevant correspondent Standards EN 550XX and CEI 110);
- CISPR 12, CISPR 16-1;
- EN61000-6-1, EN61000-6-2, EN61000-6-3, EN61000-6-4;
- VDE 872, 875, 876, 877, 878;
- OIML R76-1, R 117, R 118;
- ENEL (R EMC 01, R EMC 02).



Main Testing Services

- Radiated Emission Tests
- Conducted Emission Tests
- Radiated Susceptibility Tests
- Electromagnetic Field Immunity Tests
- Conducted Susceptibility Tests – Frequency Domain
- Bulk Current injection susceptibility tests
- Conducted Susceptibility Tests – Time Domain

FLEX the Power Grid Future

The combination of growing proportion of power being generated from renewable energy and the imminent rise of electrical mobility mean that voltage control is getting more complex and maintaining other weight levels of power quality for all users will be more onerous.

A small issue being underestimated during development or purchasing can cause large scale outages and unacceptable service interruptions.

In the KEMA Labs FLEX Power Grid Laboratory, you will take advantage of a fully controllable grade equivalent lab capable of operating over a wide range of frequencies, harmonics, voltages, and power levels offering repeatable and realistic environment where it can be recreated recorded disturbances from the grid or build severe test programs that will stress the equipment far outside what might be experienced during small-scale network trials.

This unique asset focuses on system level research and testing of cyber-physical systems using Power Cybernetics principles.

Scope of services

- Power-quality realted tests
- Dynamic-performance tests
- Model-validation tests
- Grid compliance tests
- Electrical and functional-related type tests

Overall Capabilities

- 1 MVA grid simulator capable of operating over a wide range of frequencies, harmonics, voltages, and power levels.
- AC three-phase voltage range up to 24 kVAC
- A fundamental frequency controllable from DC to 75 Hz
- Independent control of harmonics up to the 25th
- Bidirectional power flows in four quadrants
- A DC voltage range up to 2 kVDC, bidirectional power flow up to 1,32MW
- Power hardware in the loop capabilities to perform system level testing on products or systems. The main specifications of the HIL setup are as follows:
- A power rating of 200 kVA
- 16 individual high bandwidth power amplifiers with
  - 10kHz voltage control bandwidth
  - 5kHz current control bandwidth
  - 100kW each (DC power from 750Vdc bus)
- Real time digital simulator with:
  - 4 CPU cores available (approx. 300 nodes)
  - FPGU cores available (Kintex-7)

Some of the testable equipment

- PV inverters
- Battery Energy Storage Systems
- Battery Chargers / Rectifiers
- UPS Systems
- EVSE Chargers

Smart Metering Labs

Today's energy meter market is highly globalized, with manufacturers and customers all over the world. To stand out, meter manufacturers must show their products are accurate, reliable, and stable in all conditions for all regions. KEMA Labs offers world-renowned, impartial testing and certification of all kinds of energy meters according to all relevant international standards.

As electricity supplies become smarter, utilities need accurate and reliable metering that is stable over time to ensure correct customer billing and tracking of energy usage.

KEMA Labs energy meter testing services provide impartial evidence of accuracy, reliability, and stability – giving your customers complete peace of mind that your energy metering solutions satisfy all their quality requirements.

Our services cover the whole range of energy meters: from domestic meters to industrial/network units, electronic or digital, and billed or prepaid.

We test and certify energy meters against all relevant industry standards including Measuring Instruments Directive 2014/32/EU (MID) – essential for energy meters intended for European markets. Tests cover the accuracy of the meter itself and its ability to operate under extreme conditions such as temperature and electromagnetic compatibility (EMC). We can also test the protocols, communications interfaces and cyber security measures used in your meter and ancillary hardware such as measuring instrument transformers.

International standards

Smart energy meters are tested and certified with the ISO 17025 accreditation according to a range of international standards including:

- European Measuring Instruments Directive 2014/32/EU (MID)
- IEC 62052-11/31
- IEC 62053-11/21/22/23/24
- IEC 62054-21
- IEC 62055-31
- IEC 62059-32-1/41
- EN 50470-1/2/3
- ANSI C12
- OIML R46

Certification against multiple standards can be combined increasing the accessible market for your product (example of combining MID and IEC certification).

Test available

We offer testing and certification of smart energy meters for all applications. Tests available include:

- Accuracy
- Mechanical requirements
- Insulation properties
- Electrical safety and requirements
- Electromagnetic compatibility
- Climate effects
- Salt spray, weatherometer and rain testing
- Terminal block material
- Durability and long-term stability tests
- Protocol testing
- Load switch utilization testing
- Timekeeping
- Advanced facilities and support

World-recognized quality

Once your meter has successfully completed all required tests to recognized standards, it will receive a KEMA Type Test Certificate. Recognized around the world as a sign of quality, a KEMA Type Test Certificate opens doors to global business.

Kema Labs is CESI's world-leading Testing, Inspections & Certification Division. With sites across the globe, we combine tradition and experience with state-of-the-art equipment, meaning we can test all kinds of grid equipment, from low-to ultra high voltage, satisfying today's increasingly demanding requirements for peromance and safety.

KEMA Labs

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