MAEX: Modular Analog Excitation System
Dynamic Excitation for Emergency Diesel Generators (EDG)

The modular design of MAEX allows easy integration into new and existing infrastructures at the highest safety level

The challenge
The excitation of generators is a key component for reliable provision of emergency power supply. The emergency diesel generator short starting times and the acceptance of large load steps must be accomplished within tight tolerances and with the assurance of the proper power quality for the emergency consumers.

The exact harmonization of the EDG output power quality with the overall plant requirements demands comprehensive knowledge and engineering skills.

Excitation systems must allow variable integration into existing or newly built infrastructures with limited space and plant specific interface conditions.

The authority approval is aggravated by the application of software-based systems with complex and costly configuration.

The solution
MAEX is a software-free modular excitation system for brushless generators. It has a highly flexible design, which can easily be applied to existing infrastructures.

The base module fulfills all safety relevant functions for voltage regulation and signalling. An optional extension module provides manual control (additional redundancy), monitoring features as well as cos φ & reactive load control.

Standard add-ons such as converters for different voltage supply allows flexible designs to consider special customer requests.

A standardized power supply interface facilitates different power supplies by a Permanent Magnet Generator (PMG), shunt supply by potential transformers (PT) or different auxiliary supply from an alternating uninterrupted power supply (UPS).

Accelerated start-up of generator voltage is accomplished by Field Flashing.

Characteristics of start-up and load sequence

Key technical features:
- Prolonged qualified lifetime of 20 years (IEEE/RCC-E/KTA)
- EMC approved
- Base, extension and add-on modules
- Base module
  - Dynamic excitation up to 15 A continuous
  - U = const regulation and U/f-limitation
  - Automatic voltage control
  - Max. 10 s excitation current up to 20 A
  - Voltage accuracy: ±0.5 % of Un
  - Voltage set point range: ±10 % of Un
- Extension module
  - Follow up-control of set point values
  - Manual control
  - Cos φ & reactive load control
  - Rotating diode monitoring (RDM)
- Operating conditions. 273-333 K, 95 % rel. humidity
- Standard seismic proven cubicle 600 x 600 x 2200 (l x w x h in mm)
Nuclear qualification

Profits

Customers profit from AREVA’s long-term experience with special nuclear requirements and qualification. For shorter lead times and reduced risks of qualification, nuclear type tests have been performed as previous effort. Amongst others, this includes ageing tests as well as seismic tests for severe earthquake spectra. The qualification procedure assures functional safety and reliability as well as customer satisfaction. The wide qualification basis covers RCC-E, IEEE and KTA regulations.

The analog core component: Automatic Voltage Regulator (AVR)

Power Supply Options:
- PMG
- PT
- UPS

Extension Module

VDC
- Rotating Diode Monitor
- Further features

Base Module

Maximum configuration of MAEX cabinet

Rotating diode monitoring (RDM):

Examples for excitation current waveforms with induced ripple under diode faults demonstrate the RDM operation principle.

Your benefits at a glance

- Pre-qualified product
- Modular variants
- Easy design adaptation
- Fast execution
- Compact and easy commissioning

The modular design and standardized interfaces of MAEX result in unique application variability for customers.