

Technical note

High voltage generators for diesel and gas engines

Excitation and regulation systems

ABB is a leading supplier of generators for all marine and industrial applications. We have been manufacturing generators for more than 120 years and have extensive application experience with tens of thousands of installations all over the world. ABB offers reliable and efficient power generation with worldwide support.



All ABB synchronous generators have brushless excitation controlled by state of the art automatic voltage regulators. The generators are self-excited, and do not require any external source of excitation power.

Terminal boxes

The integrated terminal box is located on top as standard and can be designed to allow cable entry from either the right or left side.

For models up to frame size 1120 the standard method of cable entry is from below, for 1250 or larger, from the side. Optionally, separate terminal boxes mounted on the side of the generator are available, featuring busbars outside the generator frame and allowing connections from any specified direction.

For auxiliary and instrument cables, separate auxiliary terminal boxes may be supplied as required.



Auxiliary terminal box



Main terminal box



Two types of AVR are available for a perfect match with the application requirements of the exciter field. Installation in the cabinet or inside the generator terminal box.

Typical main components:

1. Brushless exciter

- rotor with three-phase armature winding and rotating full-wave diode bridge rectifier feeding main rotor field windings with DC current.
- stator with DC winding. The current to the stator is supplied by AVR.
- complete exciter is mounted inside generator frame with easy access through removable inspection covers.

2. Automatic voltage regulator (AVR)

A digital AVR is installed either in the cabinet or inside the generator terminal box. Typical functions and features of the AVR are:

- terminal voltage regulation in island operation or parallel with the grid (AUTO mode)
- field current regulation (MAN mode)
- power factor or reactive power regulation
- excitation current limiter (min/max)
- PQ minimum excitation limiter
- stator current limiter
- V/Hz limiter
 - voltage matching
 - Modbus TCP
 - synchronization
 - event and data logger
- machine voltage limiter
- reactive load sharing in island operation (VDC mode)
- power system stabilizer (optional)
- rotating diode monitoring (optional)
- back-up arrangement with redundant dual channel AVR (optional)

3. Excitation power source

- voltage transformer, to be connected to generator terminals, PMG (permanent magnet generator) or station auxiliary network. Short-circuit current boosting by dedicated current transformer or from station battery.

4. Current transformer for actual value measurement

- voltage and current transformer for actual voltage and current measurement.

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