

The Siemens logo is displayed in a bold, teal, sans-serif font.

Ingenuity for life

Generator switchgear for hydropower plants

Vacuum switching technology –
an optimum solution up to 400 MW

Siemens high-current and generator switchgear with vacuum technology is the result of more than 20 years of continuous development, fulfilling highest technological and quality requirements. Modern vacuum generator circuit-breakers are tested according to IEEE C37.013, and can be used in hydropower applications and other power plant types, ensuring efficient synchronization and maximum operational reliability without any limitations.

It offers many benefits for the special demands of hydropower plants, like frequent switching of load currents and black start functionality. Due to the low arc energy, vacuum generator circuit-breakers enable up to 10,000 switching operations at rated current. This reduces maintenance and offers a high availability, minimizing operating costs at the same time.

Generator switchgear with vacuum technology offers tailored solutions for newly built hydropower plants, as well as for retrofit and modernization projects.

As a factory-assembled and tested solution, it can be directly installed in the power plant. The compact construction of vacuum generator circuit-breakers allows for a flexible switchgear design, enabling comprehensive retrofit solutions such as the integration of back-to-back switch, brake and excitation circuit-breakers, also in view of the limited space in a cavern.

Our technical expertise and stringent quality controls account for high operational reliability, with the customer benefit of consistently cost-efficient and uninterrupted operation.

Customer benefits:

- Increased cost-efficiency and service continuity
- Minimized installation and maintenance costs
- Optimum personal safety
- Eco-friendly design
- Solutions tailored to individual requirements



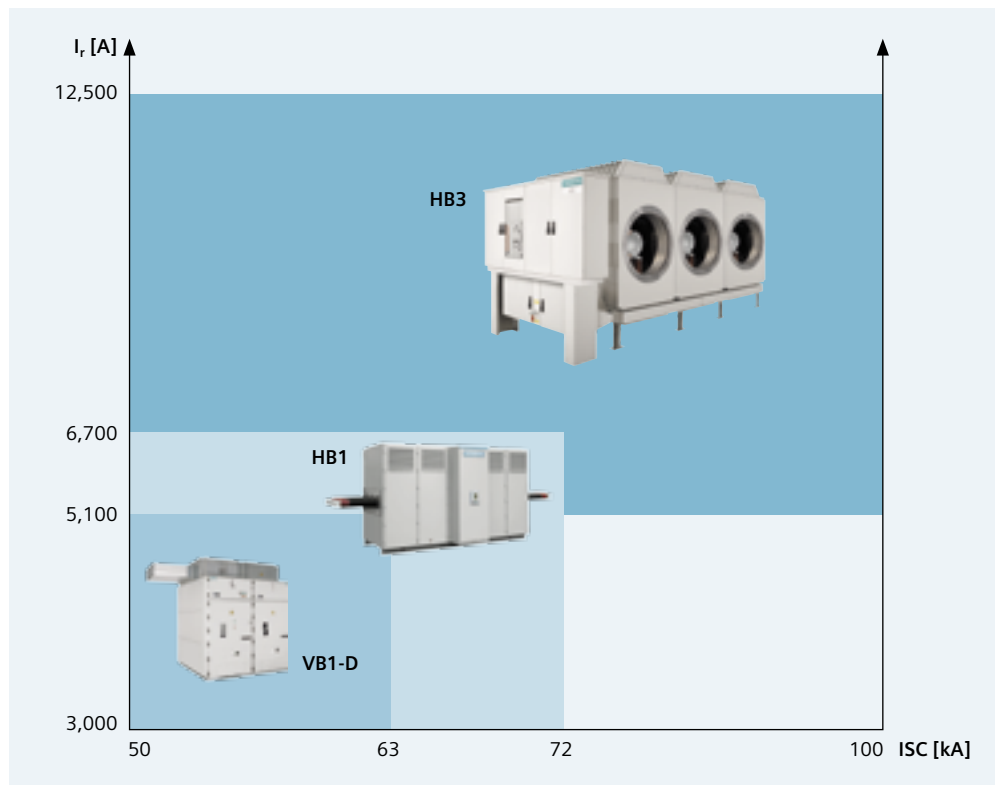
| Generator switchgear | HB3 | HB1 | VB1-D* |
|---|--|---|--|
| Application area | 80 MW–400 MW | 50 MW–170 MW | 50 MW–110 MW |
| Rated voltage | up to 24 kV | up to 24 kV | up to 17.5 kV |
| Normal current | up to 12,500 A | up to 6,700 A | up to 5,100 A |
| Rated short-time withstand current/duration | up to 100 kA/3 s | up to 72 kA/1 s | up to 63 kA/3 s |
| Rated peak withstand current | up to 274 kA | up to 180 kA | up to 173 kA |
| Internal arc classification | | up to IAC A FLR 72 kA/0.1 s | up to IAC A FLR 63 kA/0.3 s |
| Degree of protection | IP65, IP66 | IP4X, IP54 | IP4X |
| Loss of service continuity category | LSC 1 | LSC 1 | LSC 2B |
| Installation | <ul style="list-style-type: none"> Indoor Outdoor | <ul style="list-style-type: none"> Indoor Outdoor | <ul style="list-style-type: none"> Indoor |
| Type of connection | <ul style="list-style-type: none"> IPB Solid-insulated busbars | <ul style="list-style-type: none"> Cable Bus duct Solid-insulated busbars IPB | <ul style="list-style-type: none"> Cable Solid-insulated busbars |

*withdrawable

Highlights of the HB3

The HB3 is the world's first generator switchgear using vacuum interrupting technology rated up to 12,500 A, with natural cooling and 100 kA switching capacity, type-tested according to IEEE C37.013 standard.

- Maintenance-free vacuum circuit-breakers
- Compact design, modular enclosure concept
- Long service life of the switchgear and all components (exceeding 20 years)
- Easy replacement of the existing circuit-breakers and switchgear
- Factory-assembled and tested, thus reducing installation and commissioning work
- No monitoring systems required



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