High voltage products

PASS M0S 252 kV
Innovative solution for transmission substation up to 252 kV
Innovation

In today’s market, the HV substation is increasingly becoming a key element that must have higher reliability, take up less land space and require less maintenance, as well as greater safety and availability. PASS M0S 252 kV belongs to the second generation of integrated hybrid switchgear PASS modules. PASS M0S is the excellent outcome of an integration process featuring all the ABB multifunctional modules in the PASS family and is the latest evolution of the hybrid switchgear compact module regarding transmission voltage level. PASS M0S is the only 252 kV module with a interrupting power of 50 kA to be fully designed, assembled and tested in the workshop. The new PASS M0S 252 kV is the top compact module available, and is the result of experience gained by ABB who was the first to introduce hybrid apparatus technology.

In addition, PASS M0S can be shipped to the site fully assembled. This means that no HV tests need to be performed on site after erection and commissioning, thereby saving a lot of time and money compared to all the other 252 kV modules (GIS, AIS or hybrid).

Standard Features and Advantages

PASS M0S has been constructed as a modular component with basic standard functions, which can be increased according to other substation requirements.

PASS M0S 252 kV is available in SBB (Single Bus Bar) and DBB (Double Bus Bar) configuration, integrating the following standard functions in a single module:
- Current and voltage measurement
- Disconnection
- Breaking
- Earthing.

PASS M0S 252 kV is the excellent result of the integration process characterizing all ABB products, as indicated below:
- Operating and breaking functions are highly integrated within a grounded aluminium tank filled with pressurized SF₆
- Single-phase embedded arrangement
- Disconnecting function carried out by an innovative three-position system: sectionalizing and earthing by means of one moving contact
- Gas compartment available for all main functions with independent gas monitoring
- Robust design, fully type tested for a higher standard than IEC requirements
- Type tested according to mechanical endurance class M2 (10,000 operations)
- Site shipment by means of standard container; fully factory-assembled and pre-tested
- Rapid installation and commissioning times.

Robust Design

PASS M0s 252 kV is fully type tested according to IEC standards and, in addition, a higher and more stringent type test has been conducted in order to prove robustness of the design:
- T100 A: 4 shots instead of 1 required by IEC
- Potato Test which guarantees higher circuit-breaker chamber reliability
- Bus transfer switching current tested for 200V -1600 according to IEC 62271-102 for AIS disconnectors.
Symbols | Name
--- | ---
[Diagram] | Circuit-breaker
[Diagram] | Combined disconnector / earthing switch
[Diagram] | Density control device
[Diagram] | Gas connection
[Diagram] | Rupture disk
Components

Circuit-breaker
PASS M0S uses a self-blast type circuit-breaker. The operating energy of the circuit-breaker is provided by BLK 222 three single-pole spring operating mechanism already used for traditional circuit-breakers. All this ensures highly reliable operation, as testified by thousands of controls used in the ABB circuit-breakers and installed throughout the world.

Combined disconnector
PASS M0S is now equipped with a newly designed operating mechanism. The technology adopted in the new PASS M0S is the same as that used for GIS bays. It is therefore absolutely innovative, and has been achieved through ongoing experience. The new PASS M0S takes advantage of the same space restrictions concept adopted in all members of the hybrid switchgear PASS family. Disconnection functions are carried out by an innovative three-position system: Sectionalizing and earthing by means of one moving contact. Note that all the operations described above take place in SF₆ atmosphere. This provides further guarantees as to reliability and immutability of characteristic under demanding service conditions such as those of outdoor installations. The position of the disconnector is easily accessible by a man standing on ground level, ensuring a high level of safety.
Current transformers
The toroidal current transformers normally in use in apparatus with PASS technology are also used in the PASS MOS circuit-breakers. Several cores can be installed to meet end customers’ specifications. The transformer is generally fitted onto the front bushing, but can also be installed onto the rear one or onto both to comply with specific requirements.

Composite bushings
The success of the PASS MOS series has also been due to the use of composite insulator bushings which, compared to the porcelain ones, provide unrivalled performances, particularly in strongly polluting environments. It is also worthwhile remembering that these insulators are safer (explosion proof) and less fragile, essential features if problems caused by transport are to be avoided.

SF₆ insulation system
The new PASS MOS 252 kV technology includes use of a small quantity of SF₆ to obtain the insulating and breaking parameters required to operate the module. Each pole features a rupture disk with a particularly precise activation threshold. This prevents overpressures from reaching values that could jeopardize the installation and surrounding environment, thus guaranteeing maximum safety during operation. Along with the gas monitoring system, the product is fitted with a pressure gauge-densimeter to measure and monitor the density of the gas in the tank.

Quality Certification
New PASS MOS is fully assembled and tested in the factory in compliance with the following international Standards:
- IEC Standards pertaining to the components involved
- ISO 9001 (Quality), ISO 14001 (Environment) and ISO 18001 (OHS Health and Safety) standards
- CENELEC EN 50052.
PASS M0S 252 kV

Shipping and Installation

The PASS M0S 252 kV is shipped in two units:

– main module fully factory-assembled and pre-tested
– steel support with local control cubicle already mounted.

Site work is limited to bolting the steel support to the foundations and bolting the main module to the steel structure.

The PASS M0S 252 kV is then filled with SF₆ to the rated pressure and the control and power leads are connected to the plug-in connectors. PASS M0S is now ready for field testing and final inspection.

Fig. 8: PASS M0S SBB and DBB service position

Fig. 9: PASS M0S SBB and DBB Transportation position
## Rated characteristics

### Rated insulation level

<table>
<thead>
<tr>
<th>Description</th>
<th>kV</th>
<th>252</th>
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<tbody>
<tr>
<td>Rated voltage</td>
<td></td>
<td></td>
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<tr>
<td>Normal value</td>
<td>460</td>
<td>460</td>
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<tr>
<td>Over the isolating distance</td>
<td>530</td>
<td>530</td>
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<tr>
<td>On open circuit-breaker</td>
<td>460</td>
<td>460</td>
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<tr>
<td>Rated lightning impulse withstand voltage (1 sec)</td>
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<td></td>
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<tr>
<td>Normal value</td>
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<td>1050</td>
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<tr>
<td>Over the isolating distance</td>
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<td>1200</td>
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<tr>
<td>On open circuit-breaker</td>
<td>1050</td>
<td>1050</td>
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### Current ratings

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<th>Description</th>
<th>Hz</th>
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<tr>
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<td>Rated continuous current</td>
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<td>50</td>
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<td>Rated short-circuit duration</td>
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<td>Rated peak withstand current</td>
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<tr>
<td>Rated short-circuit breaking current</td>
<td>kA</td>
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<td>40</td>
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