

# SF6 insulated Ring Main Units and Compact Switchgear – SafeRing and SafePlus

For safe and reliable power distribution



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**ABB**

# ABB – a global leader

ABB is a global leader in power and automation technologies that enable industrial and utility customers to improve performance while lowering environmental impact. The ABB Group of companies operates in around 100 countries across the world.

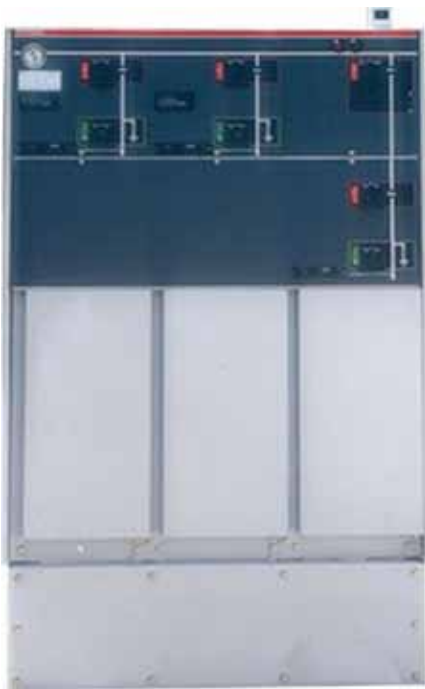
ABB's Power Technologies division offers electric, gas and water utilities as well as industrial and commercial customers a wide range of products, systems and service solutions for power generation, transmission and distribution including complete electrics, generation plants, utility automation and bulk power transmission.

ABB's power technologies cover the entire voltage range including indoor and outdoor circuit breakers, air and gas insulated switchgear, disconnectors, capacitor banks, reactive power compensators, power and distribution transformers as well as instrument transformers.

In India, ABB serves customers with the complete range of power and automation technologies. The company has a vast installed base, extensive manufacturing and a countrywide marketing and service presence.

## The ABB advantage

- ✓ 120 years of pioneering technology
- ✓ Unparalleled domain competence
- ✓ Vast global experience
- ✓ Total solution provider
- ✓ Large installed base across the world
- ✓ In-depth knowledge of international & local electrical and safety standards
- ✓ Environment-friendly technologies



Indoor three function RMU  
Extensible / Non-extensible



Outdoor four function RMU  
IP-54 Enclosure  
Extensible / Non-extensible

# SF6 insulated Ring Main Units and Compact Switchgear – SafeRing and SafePlus

ABB offers a complete solution for 12/24 kV distribution networks. This consists of SafeRing, a Ring Main Unit (RMU) that can be supplied in various configurations and SafePlus, a compact switchgear with unique flexibility. SafePlus offers extendibility and fully / semi modular configuration possibilities. Both the units have identical user interfaces.

SafeRing / SafePlus are delivered as a completely sealed system with a stainless steel tank containing

all the live parts and the switching equipment. Constant atmospheric conditions in the sealed tank ensures a high level of reliability, safety and a virtually maintenance-free system. As an option in SafePlus, an external busbar can be provided to enable a completely modular configuration. SafeRing and SafePlus can also be fitted with a remote control and monitoring unit and are suitable for both indoor and outdoor applications.

## Key features

- Compact and robust design
- Minimal moving parts
- Virtually maintenance free
- High degree of functionality with integrated features
- High flexibility
- Multiple configuration options
- Enhanced safety
- Complete solutions including applications for remote control and monitoring

## Standard equipment supplied with SafeRing / SafePlus

- Earthing switches
- Operating mechanism with integral mechanical interlocking
- Operating handle
- Facilities for padlocks on all switching equipment
- Bushing for cable connections in front with arc-resistant cable covers for utmost operator safety
- Manometer for SF6 gas pressure monitoring
- Lifting lug for easy handling
- All units are designed so that an integrated remote control and monitoring unit can be fitted when required

## Applications



*City power distribution, hotels, shopping centres, office buildings, business centres, etc.*



*Small industries*



*Compact secondary substations*



*Light mining applications, tunnels and underground railways*

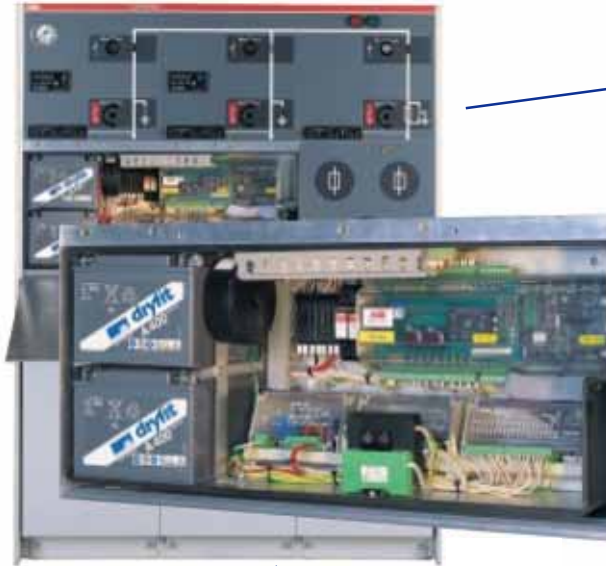
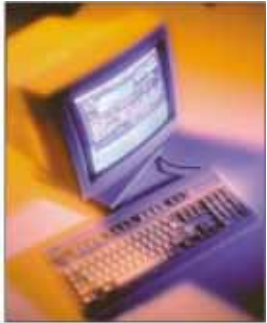


*Wind turbines*

# SafePlus and SafeRing

## Voltage and short circuit indicators

As an option these units can be equipped with fixed type or plug-in type voltage indicators as well as electronic short circuit indicators for simple fault indication.



Communications



## Circuit breaker with relay

When vacuum circuit breakers are used for transformer protection, self powered microprocessor based over current and earth fault relay are used. The protection system does not require an external power supply, as the power is taken from the current transformers.

## Remote control & monitoring unit (optional)

The use of an integrated remote control and monitoring unit offers many advantages including reduction in downtime and increased efficiency. The unit can be connected to the motor control and monitoring equipment.

A standard interface allows easy retrofit installation of the unit.

The functions include:

- Remote control and position indicators for switches and circuit breakers
- Monitoring of short circuit indicators

- Monitoring of SF6 gas pressure/density
- Additional equipment that can be supplied includes Direct Process Interface (DPI) board for:
  - Monitoring of current on the high voltage side with ring core transformers and
  - Monitoring of current and voltage on the low voltage side of the distribution transformer. (Power Quality Monitoring)

## Communication

The unit can be equipped with different types of communication media. External communication such as radio and GSM is connected via an RS232 interface.



### Manual / Motorised operation

Manually operated mechanisms for cable and transformer switches are part of standard equipment. As an option, they can also be motorised.



### Fuses

When switch fuse combinations are used for transformer protection, the fuse canisters are positioned behind a separately interlocked cover in front of the unit. To facilitate fuse replacement, the operating handle is used to remove the fuse canister covers. The fuse tripping system is located at the front, ensuring a waterproof solution.

### Arc suppressor

As an option the units can be supplied with an arc suppressor which closes automatically on the feeder bushings if an internal arc fault occurs.

### Cable connections

The units are fitted with standardised bushings that comply with DIN 47636. All the bushings are the same height from the ground and are protected by a cable cover. The cable covers are supplied with an interlocking mechanism with the earthing switches. It is also possible to connect parallel cables with a special double cable cover. Cable covers are designed to accommodate both single core and three core cables.

### Modularity and external busbar

All modules except the metering panel are only 325 mm wide. The metering panel is 650 mm wide including bus riser. SafePlus can be configured with a maximum of 5 modules in one SF6 tank with an internal busbar. To configure switchgear with more than 5 modules as many tanks as needed can be joined together with use of an external busbar. Alternatively the whole switchgear can be configured fully modular using an external busbar between all modules. The external busbar is fully insulated in order to maintain climatic independence and ensures maintenance-free operation. The internal busbar supports a maximum current of 630 A, while the external busbar has a rating of 1250 A.

### Transformer protection

A choice is offered between a switch fuse combination and circuit breaker with relay for transformer protection. The switch fuse combination offers optimal protection against short circuits, while the circuit breaker with relay option offers better protection against low overcurrents. A circuit breaker with relay is recommended for larger transformers.

### Key interlocking

As an option the units can be supplied with a key interlocking system for circuit breakers, switches and earthing switches.

## Technical specifications

|  |    | C- module           |                    | F- module         |                            | V- module              |                    |
|--|----|---------------------|--------------------|-------------------|----------------------------|------------------------|--------------------|
|  |    | Switch disconnecter | Earthing switch    | Switch fuse       | Downstream earthing switch | Vacuum circuit breaker | Earthing switch    |
| <b>Rated voltage</b>                     | kV | 12 / 17,5 / 24      | 12 / 17,5 / 24     | 12 / 17,5 / 24    | 12 / 17,5 / 24             | 12/15,2/17,5/24        | 12/15,2/17,5/24    |
| <b>Power frequency withstand voltage</b> | kV | 28 / 38 / 50        | 28 / 38 / 50       | 28 / 38 / 50      | 28 / 38 / 50               | 28 / 38 / 38 / 50      | 28 / 38 / 38 / 50  |
| <b>Impulse withstand voltage</b>         | kV | 95 / 95 / 125       | 95 / 95 / 125      | 95 / 95 / 125     | 95 / 95 / 125              | 95 / 95 / 95 / 125     | 95 / 95 / 95 / 125 |
| <b>Rated current</b>                     | A  | 630 / 630 / 630     |                    | Ver <sup>1)</sup> |                            | 630/630/630/630        |                    |
| Breaking capacities:                     |    |                     |                    |                   |                            |                        |                    |
| closed loop                              | A  | 630 / 630 / 630     |                    |                   |                            |                        |                    |
| of load cable charging                   | A  | 135 / 135 / 135     |                    |                   |                            |                        |                    |
| of load transformer                      | A  |                     |                    | 20 / 20 / 20      |                            |                        |                    |
| earth fault                              | A  | 200 / 150 / 150     |                    |                   |                            |                        |                    |
| earth fault cable charging               | A  | 115 / 87 / 87       |                    |                   |                            |                        |                    |
| short circuit breaking current           | kA |                     |                    | Ver <sup>2)</sup> |                            | 21 / 21 / 16 / 16      |                    |
| <b>Making capacity</b>                   | kA | 62,5 / 52,5 / 52,5  | 62,5 / 52,5 / 52,5 | Ver <sup>2)</sup> | 12,5 / 12,5 / 12,5         | 52,5/52,5/40/40        | 52,5/52,5/40/40    |
| <b>Short time current 1 sec.</b>         | kA | 25 / - / -          | 25 / - / -         |                   | 5 / 5 / 5                  |                        |                    |
| <b>Short time current 3 sec.</b>         | kA | 21 / 21 / 21        | 21 / 21 / 21       |                   |                            | 21 / 21 / 16 / 16      | 21 / 21 / 16 / 16  |

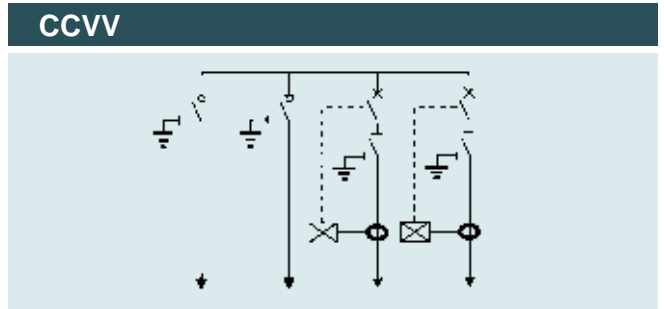
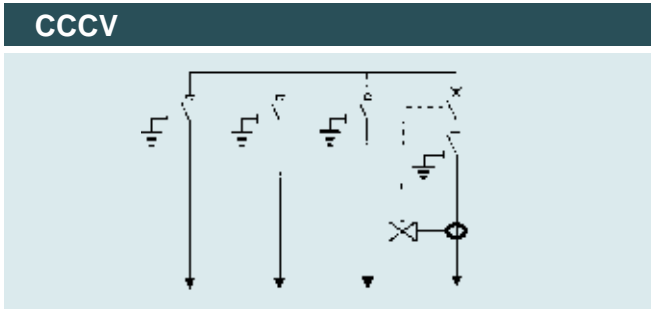
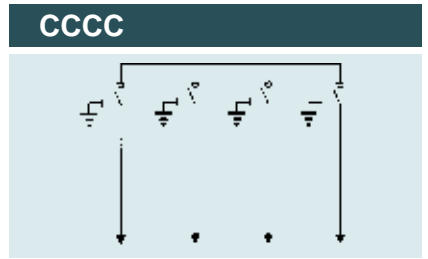
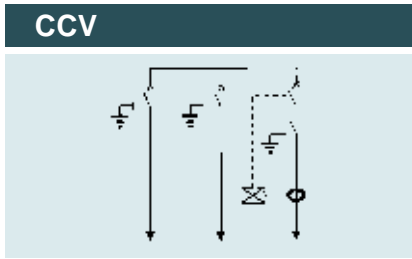
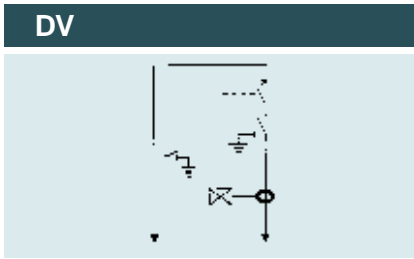
1) Depending on the current rating of the fuse 2) Limited by high voltage fuse links

SafeRing and SafePlus are tested according to IEC publications IEC 60265, IEC 60129, IEC 60056, IEC 60420, IEC 60694 and IEC 60298.

## Optional equipment

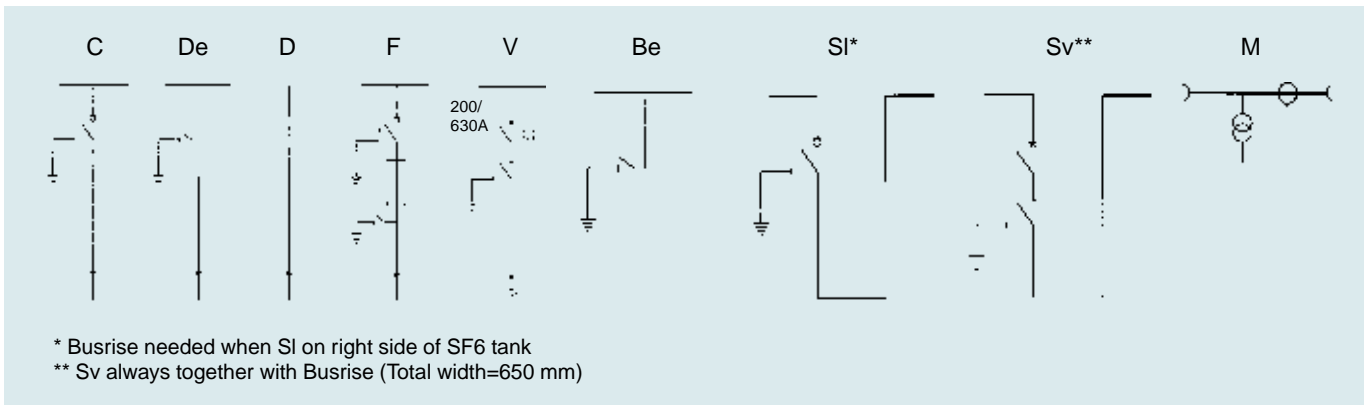
- Busbar extension LHS/RHS
- External busbar
- Metering
- LV compartment
- Manometer and signal (1 NO) from pressure indicator wired to terminals
- Voltage tester
- Auxiliary switch for vacuum circuit breaker position 2 NO + 2NC
- Auxiliary switch for disconnected position 2NO + 2NC
- Auxiliary switch for earth switch position 2NO + 2NC
- Vacuum circuit breaker tripped signal 1NO
- Auxiliary switch for load break switch position 2NO + 2NC
- Auxiliary switch for fuse blown 1NO
- Cable test bushings
- Cable support bars, non-magnetic
- Extra base frame (h=450 mm)
- Ronis interlocking system, EL 11 AP
- Current measuring
- Arc suppressor
- Integrated control and monitoring
- Trip coil open
- Trip coil open and close
- Motorised operation
- Capacitive voltage indicator
- Short circuit indicator

# Available configurations of SafeRing



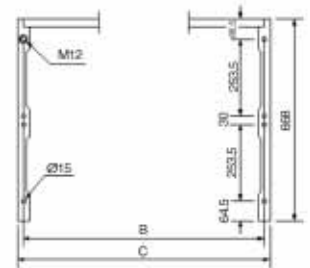
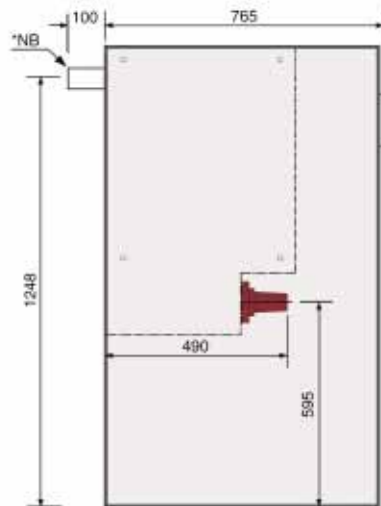
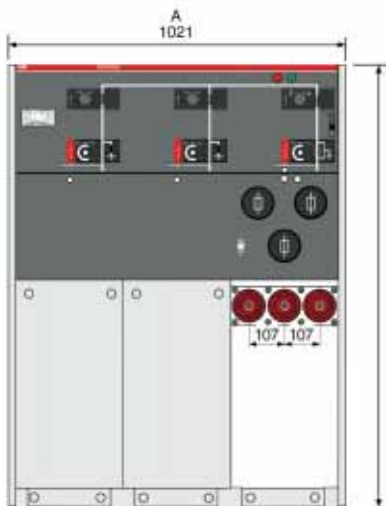
Similar versions with switch fuse are also available.

## Available modules of SafePlus



- C – Cable Switch
- De – Direct cable connection with earthing
- D – Direct cable connection
- F – Switch fuse disconnector
- V – Vacuum circuit breaker
- Be – Busbar earthing
- SI\* – Busbar sectionaliser, load break switch
- Sv\*\* – Busbar sectionaliser, vacuum circuit breaker
- M – Metering cubicle

## Dimensional drawing



| CSG   | A    | B    | C    |
|-------|------|------|------|
| 1-way | 371  | 297  | 336  |
| 2-way | 696  | 622  | 661  |
| 3-way | 1021 | 947  | 986  |
| 4-way | 1346 | 1272 | 1311 |
| 5-way | 1671 | 1597 | 1636 |

\* NB Fixing bracket



All products are manufactured in accordance with ISO9001. The latest edition of relevant IEC standards will always apply to our continuous test programme. SafeRing/SafePlus are designed for highest levels of personal safety and type tested for internal arc as per IEC standards.

ABB Limited operates a process of continuous product development. We therefore reserve the right to change designs, dimensions and data without prior notice.



ABB LIMITED



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