

Single-phase panel for railway power supply - UniGear R

Metal clad air insulated switchgear with single-phase circuit breaker

27.5 kV - 200 kV BIL - 2000 A - 25.0 kA - 50/60 Hz

17.5 kV - 170 kV BIL - 2500 A - 40.0 kA - 16.7 Hz



ABB

Single-phase panel for railway power supply UniGear R

GENERAL DESCRIPTION.....	3
DESIGN AND FITTING.....	3
CIRCUIT BREAKER COMPARTMENT	4
BUSBAR COMPARTMENT	4
CABLE CONNECTION COMPARTMENT	4
LOW VOLTAGE COMPARTMENT	4
THE CIRCUIT BREAKER	4
SURFACE TREATMENT AND PAINTING	5
PROTECTION AGAINST INTERNAL ARC FAULT	5
INTERLOCKING	5
PANEL INTERNAL INTERLOCKING	5
DOORS INTERLOCKING	6
PADLOCKING FACILITIES	6
TECHNICAL DATA.....	7

General description

ABB UniGear R are metal-clad switchboards are constructed by positioning completely single-phase air insulated cubicles side by side.

Circuit breaker panels house withdrawable vacuum single-phase circuit breaker of GSx type intended for railway power supply.

UniGear R switchgear panels comply with the standards and specifications for factory-assembled, metal-clad and type tested high voltage switchgears to IEC publications 60298 and 60694.

In addition, in accordance with IEC 60529, the switchgear panels have the following degrees of protection: IP 4X for the enclosure and IP 2X for the partitions.

The vacuum breaker fitting the panel has been type tested according to EN 50152-1, which is the reference standard for single-phase circuit breaker with U_m above 1 kV used in fixed installations for railways.

Every cubicle is divided into various compartments both for power equipment (Busbar, circuit breaker, cable compartment) and for auxiliaries (low voltage compartment, wiring ducts for interconnections), which are segregated by metal partitions.

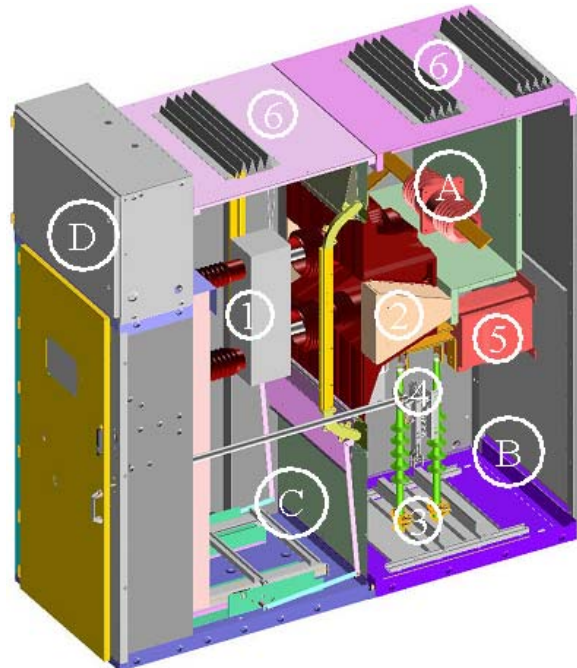
UniGear R panels are fixed to the ground with expansion bolts as standard. On request and according to civil work data, fixing metallic frame can be supplied.

Operational safety and performance are secured via integral interlocks, which, with the addition of mechanical position indicators and inspection windows, guarantee the utmost safety for the personnel.

Design and fitting

The layout below shows a UniGear panel, configuration for incomer or outgoing panel, with a withdrawable vacuum circuit breaker.

Many variants derived from the basic configuration are available to suitably address different functions and configurations (metering panel, busbar coupler, etc ...)



- A. Busbar compartment
 - B. Cable compartment
 - C. Circuit breaker compartment
 - D. Low voltage compartment
-
- 1. Single-phase circuit breaker
 - 2. Power block system with shutters
 - 3. Cable connection through sealing ends
 - 4. Make proof earthing switch
 - 5. Instrument transformer (current and/or voltage)
 - 6. Overpressure relief

Circuit Breaker compartment

This compartment (closed with a door) is designed as to accommodate the withdrawable circuit breaker complete with its truck and all accessories required for its operation.

The following components are mounted in this compartment:

- The bushing insulators containing the power connections of the circuit breaker compartment and the bus-bar compartment respectively.
- The metal shutters automatically operated by the movement of the circuit breaker truck.
- All accessories for auxiliary circuits of circuit breaker.

Busbar compartment

This compartment located in the upper rear part of the panel contains the main busbar, which is directly supported by the upper isolating contacts of the circuit breakers. The busbar made of copper and is suitably sized to withstand the thermal and electro dynamic stress of a short circuit current.

If required, this compartment can be equipped with a fault make earthing switch or a voltage transformer.

Cable connection compartment

The cable compartment is accessible from the front of the cubicle by opening the bottom door and removing the inner cover plate. It can house the following components:

- Fault make earthing switch with operation from the front side of the cubicle.
- Interlocking device between circuit breaker and earthing switch.
- Current transformers.
- Voltage transformers
- Other components on request.

An opening is provided in the compartment bottom for the passage of the power cables.

Low voltage compartment

This compartment is a metallic enclosure closed with a door, placed above the circuit breaker compartment, and housing the following components:

- Terminal boards and wiring ducts for interconnections with other equipment and systems
- Auxiliary equipments for measuring instruments, protection relays, control and signaling devices, fuses, low voltage MCBs, etc.
- Truck operated contacts signaling circuit breaker isolated or withdrawn.

The circuit breaker

It is part of the GSx family designed to cover a wide single-phase application range.

A specific brochure provides a comprehensive description of the circuit breaker.

This chapter only summarizes the main feature of the equipment.

GSx breakers are using vacuum interrupters as switching component.

A magnetic actuator operates the latest version of the GSx breakers.

This modern concept for operating mechanism construction stores its energy electrically and monitors it electrically, resulting in a completely maintenance-free drive system

The benefits of this technology are:

- Highly reduced maintenance duties
- Increased reliability of the command, thanks to less components and related settings
- Interfaces through digital inputs instead of power demanding either coils or motors
- Fast exchange of any main part

Considering the number of magnetic-driven breakers in operation, the return of experience has already demonstrated the same reliability as a spring-charge mechanism.

Surface treatment and painting

When not otherwise stated, the surface treatment and painting are foreseen as per ABB's standards for unpolluted area.

Protection against internal arc fault

The design of the panel guarantees the safety of the personnel in the unlikely event of an internal arc fault.

The enclosure and internal partitions of the panels are of 2 mm thick high quality aluminum-zinc coated steel sheets. The three high voltage compartments (busbar compartment, circuit-breaker compartment and cable connection compartment) are equipped with top-mounted and secured pressure relief flaps. These open in the case of overpressure due to an internal arc fault.

The front of the panel is closed off by pressure resistant door, which open to an angle of almost 165 °. The circuit-breaker compartments are equipped with inspection windows made of security glass.

Neighbouring panels are partitioned from one another by the sidewalls of each panel and, as a result of the design, the air cushion remains between these walls when the panels are jointed together.

With regards to internal arc, supported by a type tests carried out according to IEC 62271-200, the panel is classified LSC2B, IAC AFLR 25 kA, 1s (50 HZ) and IAC AFLR 40 kA, 0.5 s (16.7 Hz)

Besides the internal measures, the protection against internal arc fault must be studied in relation to the ceiling height.

Interlocking

Panel internal interlocking

To prevent hazardous situations and erroneous operation, there is a series of interlocks to protect both personnel and equipment:

- The withdrawable part can only be moved from the test/disconnected position into the service position (and back) when the circuit breaker and earthing switch are off
- The circuit breaker can only be switched on when the withdrawable part is in the test or service position. In the intermediate position, the circuit breaker is mechanically locked.
- In the service or test positions, the circuit breaker can only be switched off manually when no control voltage is applied and it cannot be closed (electromechanical interlock).
- Connecting and disconnecting the control-wiring plug is only possible in the test/disconnected position of the withdrawable part.
- The earthing switch can only be switched on if the withdrawable part is in the test/disconnected position or outside of the panel (electromechanical interlock).
- If the earthing switch is on, the withdrawable part cannot be moved from the test/disconnected position to the service position (mechanical interlock).

Furthermore, for panels with digital control technology, prevention of malfunction of the switch can also be achieved by means of the panel software.

Doors interlocking

If required, the panels can be equipped with the following electromechanical interlocks:

- The apparatus (circuit-breaker or similar equipment) cannot be racked-in if the apparatus compartment door is open.
- The apparatus compartment door cannot be opened if the apparatus (circuit-breaker or contactor) is in service or in an undefined position.

Padlocking facilities

- The shutters can be locked in closed position with padlocks when the withdrawable circuit-breaker part has been removed.
- Access to the operating-shaft of the earthing switch can be restricted with a padlock.
- Access to the circuit-breaker compartment can be restricted with a padlock, or a lock

Technical data

Type of panel:	UniGear-R	
Design	Metal clad, with withdrawable circuit breaker on trolley	
Insulation	Air	
Number of phase	1	
Rated frequency	16.7 Hz	50 Hz
Rated voltage	36 kV	40,5 kV
Operating voltage	17.5 kV	27,5 kV
Rated lightning impulse withstand voltage:	170 kV	200 kV
Rated power frequency withstand voltage:	70 kV	95 kV
Rated short withstand current	40 kA, 1s	25 kA, 1s
Rated peak withstand current	100 kA	63 kA
Rated nominal current		
▪ Busbar 2500 A	... 2000 A
▪ Tee-off 2500 A	... 2000 A
Internal arc fault withstand	40 kA, 0.5 s	25 kA, 1s
Altitude	≤ 1000 m	≤ 1000 m
Ambient temperature:		
▪ Maximum:	40°C	40°C
▪ Maximum 24-hour average:	35°C	35°C
▪ Minimum:	-5°C	-5°C
Dimensions		
▪ Width	1000 mm	1000 mm
▪ Height		
○ With standard LV compartment	2400 mm	2400 mm
○ With Extended LV compartment	2600 mm	2600 mm
▪ Depth	2600 mm	2600 mm
Standard applied	IEC 62271-100, IEC 62271-200, IEC 60694, IEC 60298	



ABB Sécheron Ltd
Rue des Sablières 4-6 / Voie 11A
Zone industrielle Meyrin-Satigny
CH-1217 Meyrin

Contact:
P.O. Box 2095
CH-1211 Geneva 2
Tel: +41 22 306 21 17
Fax: +41 22 306 26 82
E-mail : info.abbsecheron@ch.abb.com
www.abb.com/railway