

Medium Voltage Distribution

# WS-G

up to 40.5 kV

Gas-insulated metal-clad switchgear with vacuum circuit-breaker

## Catalogue



**Delivery conditions**

The General Conditions of Delivery as amended shall apply.

**Illustrations**

The illustrations are not binding.

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## Energy Supply Security is our permanent challenge.

At Schneider Electric, we are constantly developing and improving our products and services. Our aim is to satisfy our customers' high demands for a safe electrical power supply while producing highly efficient yet economical and ecological transmission and distribution equipment.

## WS-G - Safe, Secure and Ecological

Schneider Electric's Gas-Insulated Circuit Breaker Switchgear WS-G is floor mounter thanks to its high dependability, operating reliability, maximum operator safety and ergonomic operator guidance. The WS-G switchgear complies with the latest ecological requirements.

## WS-G - Easy, Innovative and Economical

WS-G is an optimum solution for different variety of requirements and applications for primary power supplies. WS-G is perfectly suited for public and industrial power distribution networks, infrastructural projects, mining, metallurgy, petrochemical oil and gas industries, railway traction power supply, container stations and ship building.

WS-G is a modern, innovative switchgear concept with a variety of equipment options. It is a gas-insulated circuit breaker switchgear with ratings up to 40.5 kV, 2,500 A and 40/100 kA.

WS-G is designed as a single or double busbar system. This compact and modular design offer both flexibility and a long, trouble-free service life. It is also ideally suited for applications in confined spaces or for replacing older switchgear - while permitting utilization of the existing locations.

WS-G is economical for in erection, extensions and disassembly on site in a straightforward fashion and - thanks to its innovative B-Link busbar connection - without any special gas handling requirements at site.

WS-G has been tested according to IEC and European EN standards, as well as the appropriate China national standards derived from them.

## Customer Benefits

- No gas handling during installation, extension work and panel replacement
- Innovative, fault-tolerant busbar link
- Intuitive operator guidance
- Maximum operational reliability and operator safety
- Low life-cycle costs
- Environmentally compatible easy to recycle



# A global view on advantages and improvements



WS-G Single busbar switchgear

## Operator safety

- Maximum protection against accidental contact thanks to complete metal enclosure of all switchgear components
- Optimum operator safety thanks to a comprehensive interlocking system
- Successfully tested classification IAC at 31.5kA/1s

## Secured operation

- The active medium-voltage components are located in hermetically sealed, gas-filled compartments and insensitive to:
  - aggressive atmospheres
  - dirt
  - dust
  - vermin
- Inert insulating gas SF6 provides protection against fire in the panel and prevents contact oxidation
- Simple drive mechanisms
- Stable and reliable gas system.

## Reliable

- Mechanical and/or electronic gas monitoring equipment for each gas compartment, each with its separate pressure relief device
- Low number of static and dynamic seals
- Best mechanical and electrical operations from the vacuum circuit breakers
- Reliable drive and interlocking system.

## User-friendly

- Compact and clear design
- Easy access to all modular function
- Good operating procedure due to its ergonomical design
- Visually highlighted control panel
- Logical operation
- Good visual operator guidance for mechanical panel operation.

## Economically efficient

- Reduced site space and surface area requirements
- Short assembly times at site
- Minimized operating costs
- Maintenance-free gas tank made of stainless chromium-nickel steel.

## Climate independant

- All HV parts in SF6 atmosphere with a slightly overpressure, thus protected against humidity and contamination, regardless of the installation altitude.

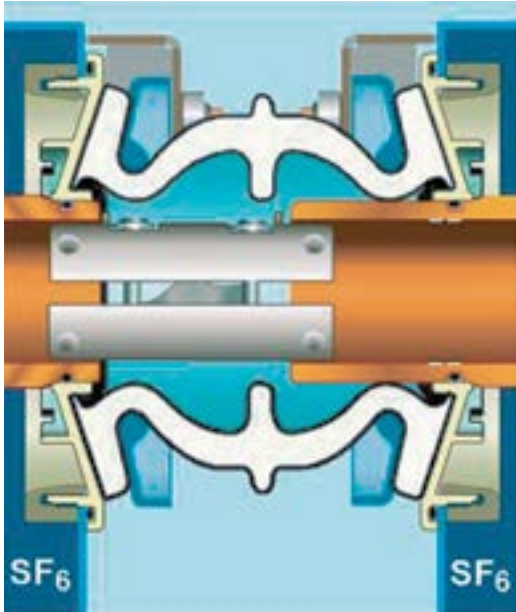
## Ecological

- Optimization of material and energy consumption during manufacturing
- No gas handling on assembly or switchgear extension on either side
- Compliance with all ecological requirements during service life
- The use of recyclable materials for efficient disposal at the end of its



WS-G Double busbar switchgear

# A global view on advantages and improvements (contd.)



B-link, connected



B-link, open

## Improved busbar connections thanks to the innovative B-link

The busbars of each WS-G switchgear panel are installed in individual gas-filled compartments. They are independent from external environmental influences and integrated into the insulating gas monitoring system. The connection of the busbars from adjacent panels is established via our innovative busbar link system: B-link. Like the gas-filled compartments, the B-link system does not require any maintenance. It enables assembly without gas work at the customer's site. Extensions or panel replacements within the panel assembly are possible without gas handling and without interference in the gas-filled compartments.

The potential-controlled, externally grounded, flexible and robust silicone insulated elements of the B-link system distinguish themselves by extremely simple assembly and minimum electrical field intensities.

### Further benefits of the B-link system include:

- All silicone insulated elements are already mounted on the switchgear panel in the factory and are included in the partial discharge test in factory. On-site assembly of the B-link system is effected under visual supervision (you see what you do).
- After disassembly of a B-link system between adjacent panels, an isolating distance can be established to form separate busbar sections without gas handling.
- If necessary, the resistance can be measured separately for each busbar section, for a complete busbar system or for a panel.

## Improved, minimum space requirement

Thanks to the reduced space at site, WS-G minimizes the cost of investment. The replacement of older, conventional switchgear units by WS-G in the existing rooms is possible by step-wise commissioning of the WS-G panels while disassembling the existing old switchgear. This minimizes outage for your electrical power supply.

The WS-G switchgear is also designed for floor mounting and against the wall. Its operating/maintenance does not require a walkway at the panel back. All operating and maintenance procedures can be performed in the front of the panel.

Free-standing installation is possible as an option.

## Improved switchboard management - no on site gas handling

WS-G does not require on site gas handling for erection or extension work. All gas-filled compartments are delivered to the site of installation with the rated gas filling pressure. All gas-filled compartments are completely factory tested against leakage.

If necessary, switchgear assembly panel replacement is possible without gas works and without interference within the gas filled compartments.





## Economic efficiency thanks to diversity

**The versatile WS-G modules enable implementation of especially economic switchgear configurations:**

- Circuit breaker panels for incoming and outgoing feeders, with optional inner cone type and outer cone-type cable connection systems
- Voltage transformer with isolating device and earthing feature on HV side
- Bus couplers within one panel width for double busbars
- Bus section couplers with circuit-breaker including busbar risers within one panel width
- Bus section couplers and bus couplers with integrated busbar earthing
- Busbar risers without switching devices
- Bus sectionalizer panels with two-/three-position disconnecter
- Metering panels with current and/or voltage transformer

### Busbar accessory modules:

- Busbar voltage transformer with isolating /earthing device on the HV side
- Busbar earthing switch
- Fully insulated bus bars and cable terminals.

## Ergonomic operation



**Mechanical operation is performed the same way as with the habitual operation of conventional switchgear with stationary switching devices. Separate mechanical control elements and indicators are available for the following functions:**

- Circuit breaker ON / OFF
- Disconnecter ON / OFF
- Outgoing feeder / busbar earthing ON / OFF

The mechanical control is all located at an operator-friendly height and arranged in a recessed position on the switchgear front. The operating area is clearly visible without control elements protruding from the switchgear front.

## High variety of circuit breaker panel

### Circuit breaker module

The vacuum circuit breaker is located in a metal-enclosed gas-filled compartment. The drive units for all switching devices and the interlocks are easily accessible from the front of the gas compartments.

### Single busbar module.

The separate, gas-filled compartment accommodates the three-position disconnecter with the busbar system.

### Double busbar module

The upper gas-filled compartment accommodates the busbar system and the three-position disconnecter. The system arrangement at the rear of the panel houses the two-position disconnecter together with the busbar system.

### Safe, reliable interlocking drive

the circuit-breaker is fitted with a spring mechanism with the operating sequences for automatic reclosing. The drive mechanisms for the circuitbreaker and the two-to three-position disconnectors feature mechanical interrogation interlocks, which rule out operating errors.



## The WS-G modules

1. Low voltage cabinet
2. Circuit breaker module with busbars and three-position switch
3. Mechanism
4. Outgoing feeder block with outer cone-type system and toroidal core current transformer
5. Voltage transformer (pluggable)
6. Cable connection, e.g. double connection per phase
7. Panel framework
8. Control door
9. Front mounting frame
10. Cable compartment cover

#### Optional:

11. Outgoing feeder block with inner cone-type system, 1 cable per conductor with toroidal core current transformer and voltage transformer
12. Outgoing feeder block with inner cone-type system, 1 cable per conductor with toroidal core current transformer and voltage transformer
13. Outgoing feeder block with inner cone-type system Quadruple cable connection with toroidal current transformer and voltage transformer

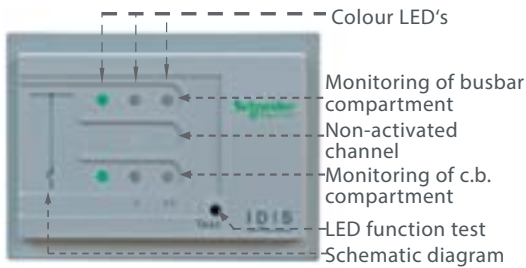
## Current transformers and voltage transformers

The current transformers are designed as toroidal-current transformers and are connected to the earth potential. There is no dielectric stress on the HV end. The transformer ratio, accuracy class and performance are adapted to the project-specific requirements.

The metal-enclosed voltage transformers are inductive transformers arranged outside of the gas compartments. They are pluggable and mounted via inner cone-type systems. An HV disconnecter for the voltage transformers is integrated into the WS-G switchgear.

Power-frequency tests on the switchgear are performed without dismantling transformers or plug-and-socket connectors.





IDIS display for circuit breaker panel with single busbar

- Green: Operative
- Yellow: Pre-alarm
- Red: Main alarm

### Clearly arranged gas compartment technology

Each gas-filled compartment is monitored by means of the gas density monitoring system IDIS. The gas status is detected via pressure sensors and is retransmitted to the IDIS display by electrical signals. The gas status is monitored on the front end of the switchgear on the IDIS and separately for each gas compartment.

Up to three pressure sensors can be connected to an IDIS display. When

Rated filling pressure and starting value		Rated voltage Ur		
		12-24kV	36kV	40.5kV
Rated pressure pre	Mpa	0.030	0.050	0.060
Pre-alarm in case of drop in pressure pae	Mpa	≤0.030 >0.010	≤0.030 >0.010	≤0.050 >0.030
Main alarm in case of drop in pressure pme	Mpa	≤0.010	≤0.010	≤0.030

The pressure data refers to +20°C and an atmospheric pressure of 101.3 kPa

Each gas-filled compartment has its own pressure relief device. In case of excess pressure, the pressure is relieved towards the rear part of the switchgear. An additional switchgear pressure relief duct is optionally available.

### Safe testing for zero voltage

The test for zero voltage is effected via capacitive decoupling in the cone-type cable bushings for the cable connection.

The indicators for the zero voltage test are arranged on the front side below the control panel. All voltage testing systems are Voltage Detecting Systems (VDS) according to IEC 61243-5 and VDE 0682-415.



DXN8B-display

The basic design is a DNX8B display.

Optionally, the integrated voltage detection system IVIS is available, which means that otherwise necessary repeat tests can be dispensed with.

### Flexible low voltage compartment

The low voltage devices for protection, control and monitoring as well as terminal strips are installed in the spacious low-voltage compartment. The rugged door of the low-voltage cabinet accommodates all devices required for operation of a switchgear panel. The basic model of the metal-enclosed low-voltage compartment mounted on the panel is 800 mm high

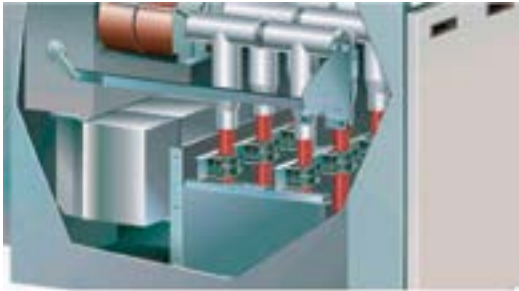
(this corresponds to a panel height of 2,380 mm). An optional a low-voltage compartment with a height of 600 mm can be realized (which corresponds to a panel height of 2,180 mm), 1,000 mm can be realized (which corresponds to a panel height of 2,580 mm) and 1,200 mm can be realized (which corresponds to a panel height of 2,780 mm).

The low-voltage cabinet is available separately hence on site assembly is required. The interface to panel on the low-voltage end is a pluggable design.

## A great variety of cable connections

The metal-enclosed cable connection compartment is easily accessible from the switchgear front, and suitable for a great variety of cable connection techniques.

The WS-G cable connection system can be selected with outer cone-type cable bushings (type C according to EN 50 181, suit for 33kV network) or for inner cone-type cable bushings (according to EN 50 181, suit for 35kV network).



### Outer-cone cable bushings

A great variety of cable types with cross sections up to 630 mm<sup>2</sup> can be connected via cable Tee screw-type plugs or terminal adapters.

Up to 3 cable Tee screw-type plugs or terminal adapters can be connected for each bushing with a current carrying capacity of 1,250 A. Cable screw-type connectors or terminal adapters can easily be combined with system-specific surge arresters.

Outgoing feeders > 1,250 A feature 2 outer cone-type bushings per phase.



### Inner cone-type bushings

For the selected cable types and cross-sections, appropriate inner cone-type bushings are available for cable connector terminal types 2 and 3 and for modified connectors, terminal type Connex size 4, manufacturer: Pfister). Up to four inner cone-type bushings per conductor can be installed in the GHA switchgear, depending on the inner-cone connection type.

One bushing per conductor is required for inner cone-type surge arresters.

For cable testing with the cables connected, the inner cone-type system features, as standard equipment, additional test sockets, terminal type 2, on the front of the switchgear.

Cable testing (with the cables connected) does not require an additional test socket in the WS-G switchgear.

## Environmental and operating conditions

WS-G switchgear units is suitable as indoor switchgear under normal operating conditions in accordance with the standard IEC 62271-1. Operation under conditions other than these is only admissible upon consultation with and with the consent of the manufacturer.

standards and regulations		
Design,model	IEC 62271-200	GB 3906
Vacuum circuit breaker (M1/E1)	IEC 62271-100	GB 1984
Disconnecter and three position switch(M1)	IEC 62271-102	GB 1985
Busbar earthing switch and earthing via vacuum circuit-breaker (E2)	IEC 62271-102	GB 1985
Protection against accidental contact, foreign objects and water	IEC 60529	GB 4028
Aggravated ambient conditions - optional	IEC 62271-304	
Current transformers	IEC 60044-1	GB 1208
Voltage transformers	IEC 60044-2	GB 1207
Erection	HD 637 S1,if applicable IEC 61936-1	
Ambient conditions IEC 62271-1(new),IEC 60694/EN 60694		
Temperature of the ambient air:		
> Maximum value	40°C	
> Average value over 24 hours	35°C	
> Minimum "indoor" value	-5°C/°C <sup>(1)</sup>	
Installation altitude	1000m <sup>(2)</sup>	

- (1) Optional
- (2) Higher values on request

## Technical characteristics

Ratings						
Rated voltage	kV		12	24	36	40.5
Rated lightning impulse withstand voltage	kV		75	125	170	185
Rated power frequency withstand voltage	kV		28/42	50/65	70	95
Rated peak withstand current	max.	kA	80 <sup>(1)</sup>	80 <sup>(1)</sup>	80 <sup>(1)</sup>	80
Rated short-time current (3s)	max.	kA	31.5 <sup>(2)</sup>	31.5 <sup>(2)</sup>	31.5 <sup>(2)</sup>	31.5(4s)
Rated busbar currents	max.	A	2500	2500	2500	2500
Rated current of branch circuits (naturally ventilated)	max.	A	2500	2500	2500	2500
Internal arc classification IAC	max.		31.5 kA 1s <sup>(2)</sup>			

- (1) 100kA on request
- (2) 40kA on request

offered 25kA, 1s

## Dimensions of single busbar

Rated voltage		kV	12-36			40.5			
Rated current		A	800-1600	2000	2500	800-1600	2000	2500	
Main dimensions	width	mm	Incoming/outgoing, Busbar rise	600/800	600/800	900	600	600	900
			Bus coupler	800	800	1000	800	800	1000
			disconnector	600	600	600	600	600	600
	Depth <sup>(1)</sup>	mm	1340	1380	1380	1340	1380	1380	
Height <sup>(2)</sup>	mm	2400	2400	2400	2400	2400	2400		

(1) Panel depth with rear cover:1500mm .Panel depth for Internal Arc Classification AFLR: 1595 mm

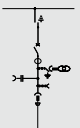
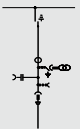

(2) Height 2780 with low-voltage cabinet 1200mm

## Dimensions of double busba

Rated voltage		kV	12-36			40.5			
Rated current		A	800-1600	2000	2500	800-1600	2000	2500	
Main dimensions	width	mm	Incoming/outgoing, Busbar rise	600/800	600/800	900	600	600	900
			Bus coupler	800	800	1000	800	800	1000
			disconnector	600	600	1000	600	600	1000
	Depth	mm	1700	1970	1970	1700	1970	1970	
Height <sup>(1)</sup>	mm	2400	2400	2400	2400	2400	2400		

(1) Height 2780 with low-voltage cabinet 1200mm

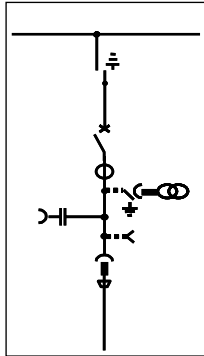
## weights of panel

Panel type		weights <sup>(1)</sup> approx. [kg]
	Outgoing unit ■ outer cone-type cable connection ■ inner cone-type cable connection	700 1000
	Incoming unit ■ outer cone-type cable connection ■ inner cone-type cable connection	700 900
	Bus section coupler	1100

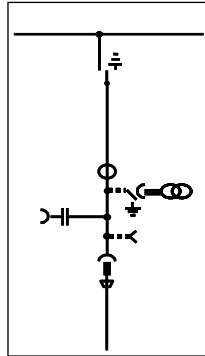
(1) including low-voltage cabinet, without voltage transformer .Voltage transformer and its accessories are fitted on busbar side: approx. 50-120kg

## Circuit diagrams of panel versions

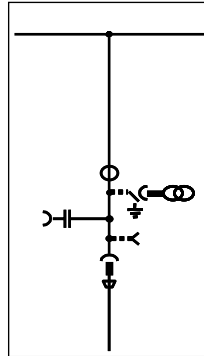
### Single busbar system



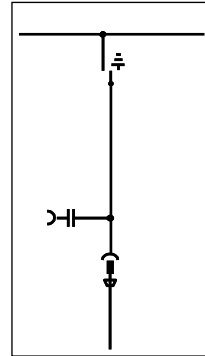
Circuit-breaker panel



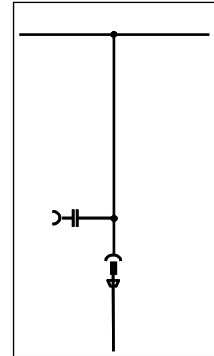
Bus riser panel with disconnector/earthing switch



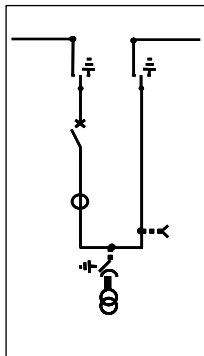
Bus riser panel without disconnector/earthing switch



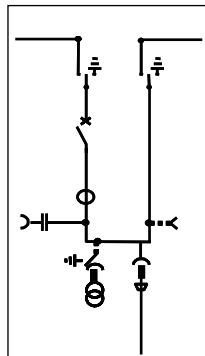
Bus riser panel with disconnector/earthing switch



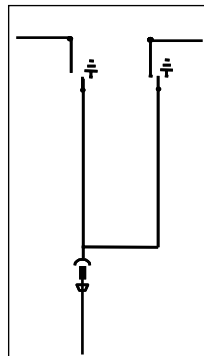
Bus riser panel without disconnector/earthing switch



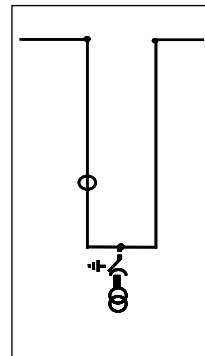
Bus section couplers panel



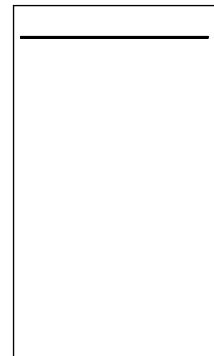
Bus section coupler in 1 panel width with outgoing



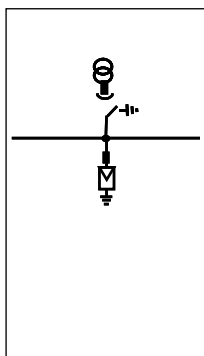
Busbar-Disconnector with outgoing panel



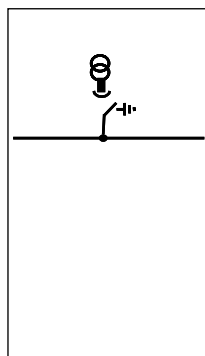
Metering panel



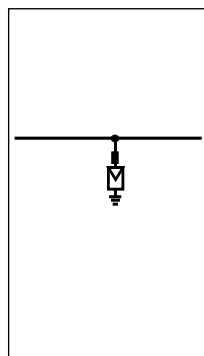
Average-panels



Bus surge arrester panel with voltage transformer

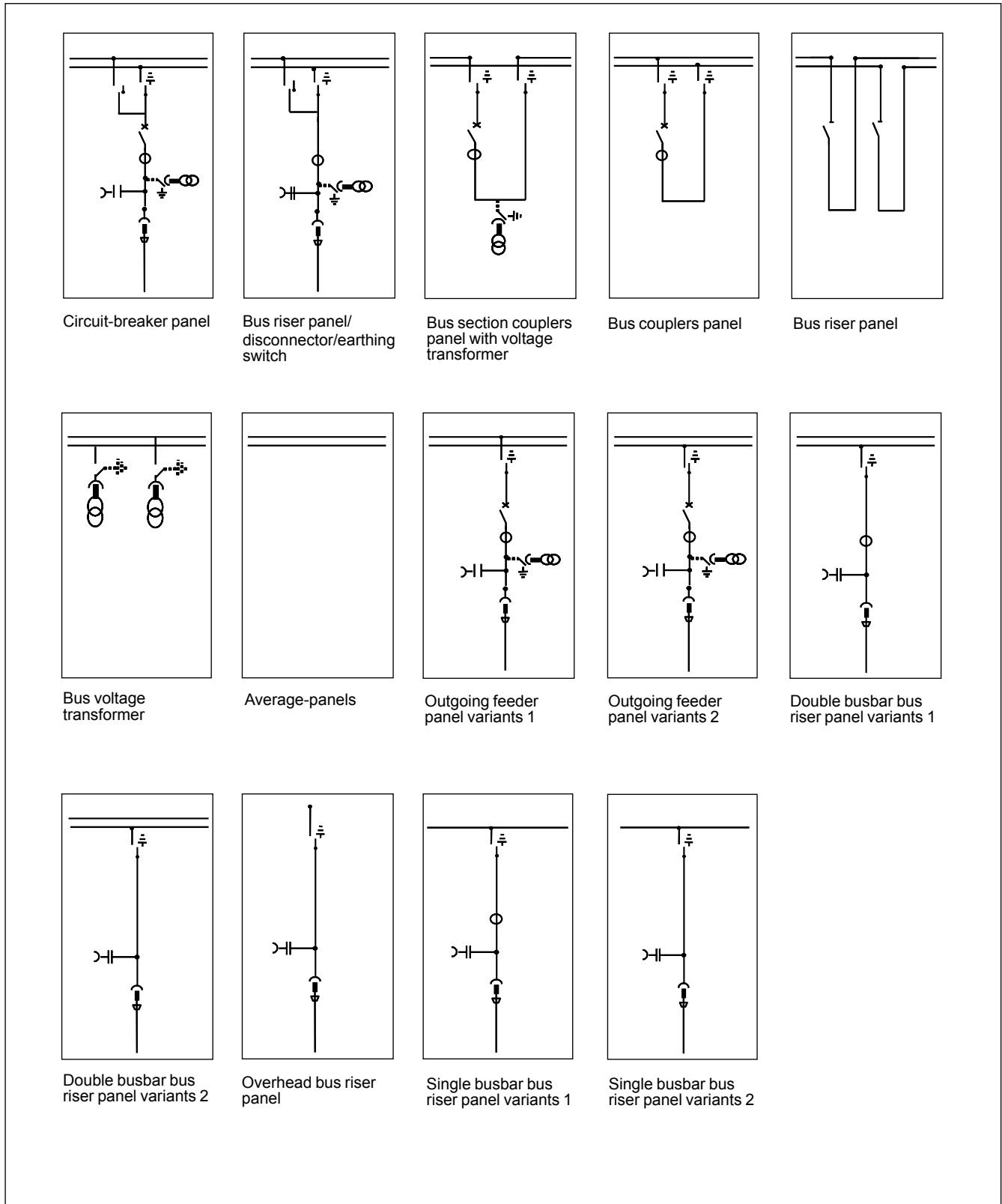


Bus voltage transformer panel



Bus surge arrester panel

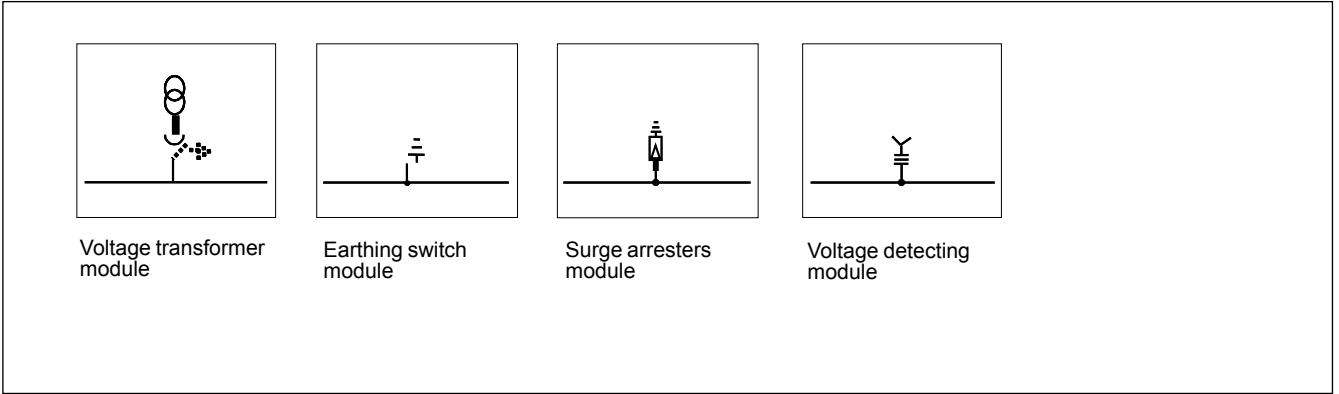
**Double busbar system**



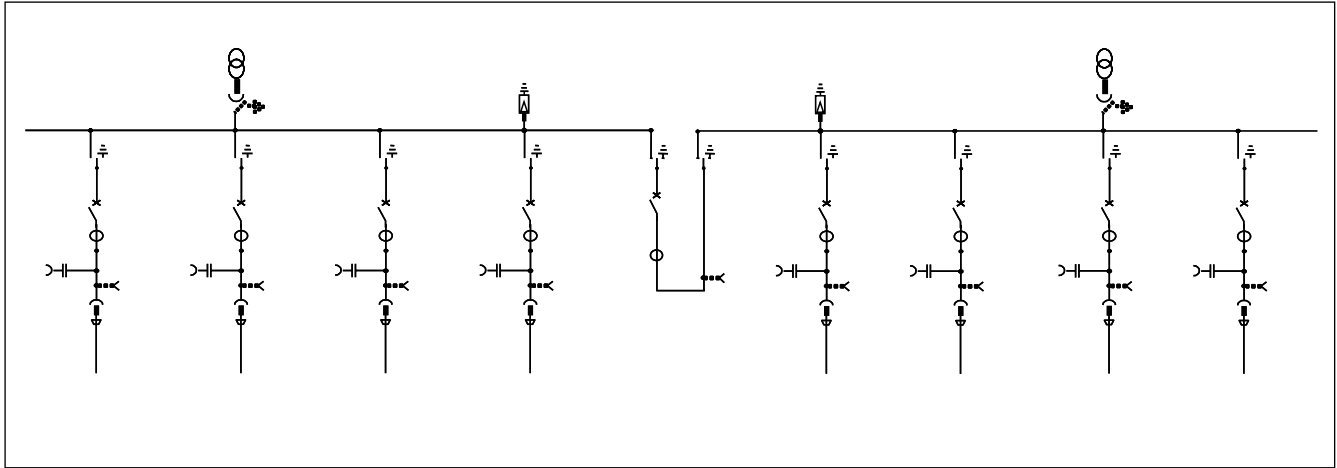
Notes: Single busbar bus riser panel is used to double busbar system for bus coupler solution.



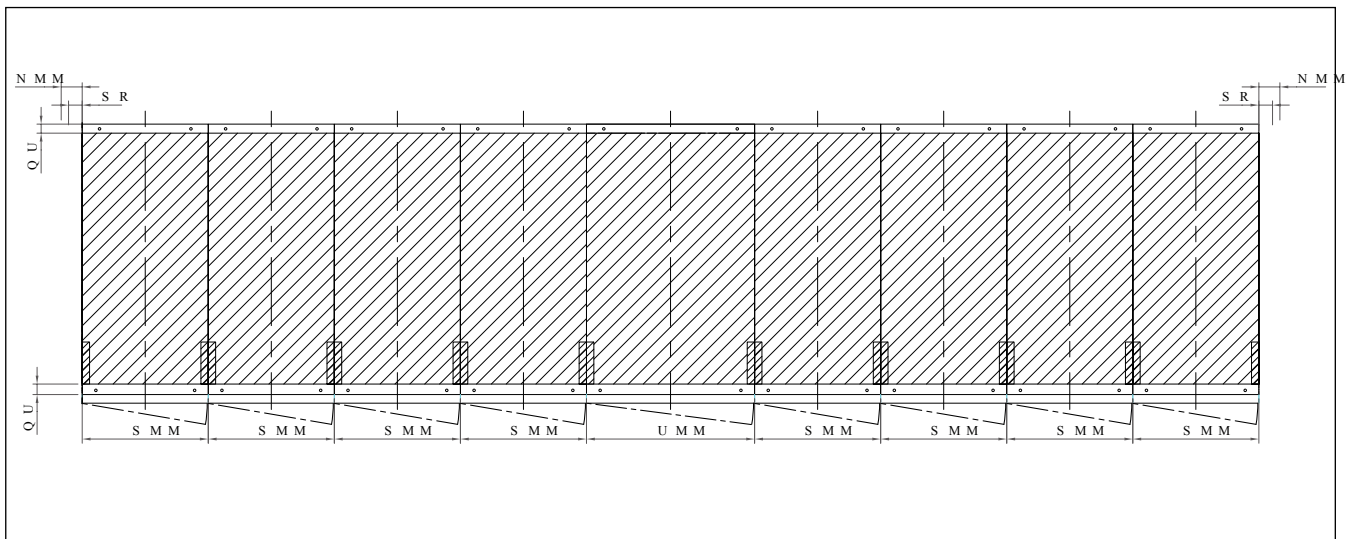
## Busbar accessory module



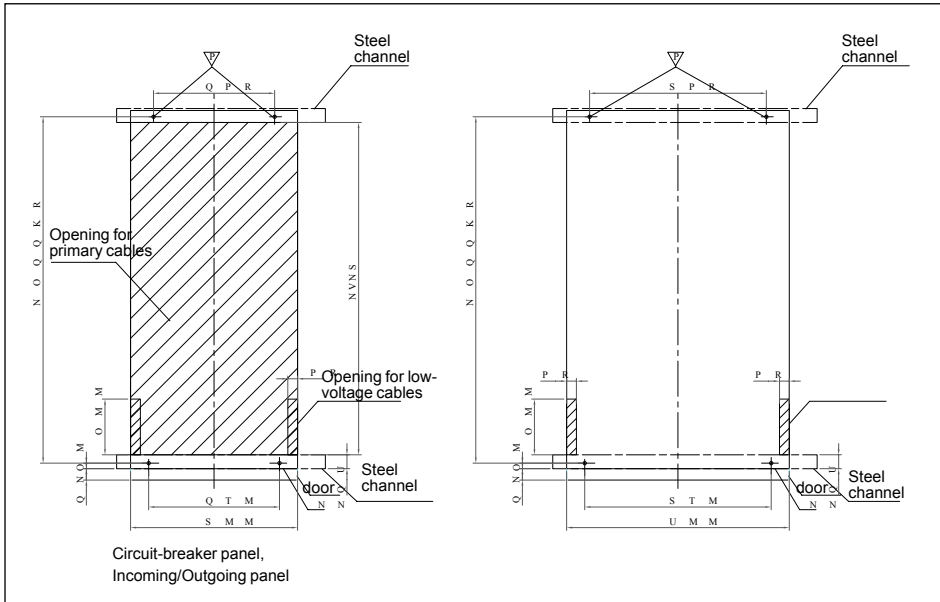
## Arrangement of switchgear(Single busbar section couple)



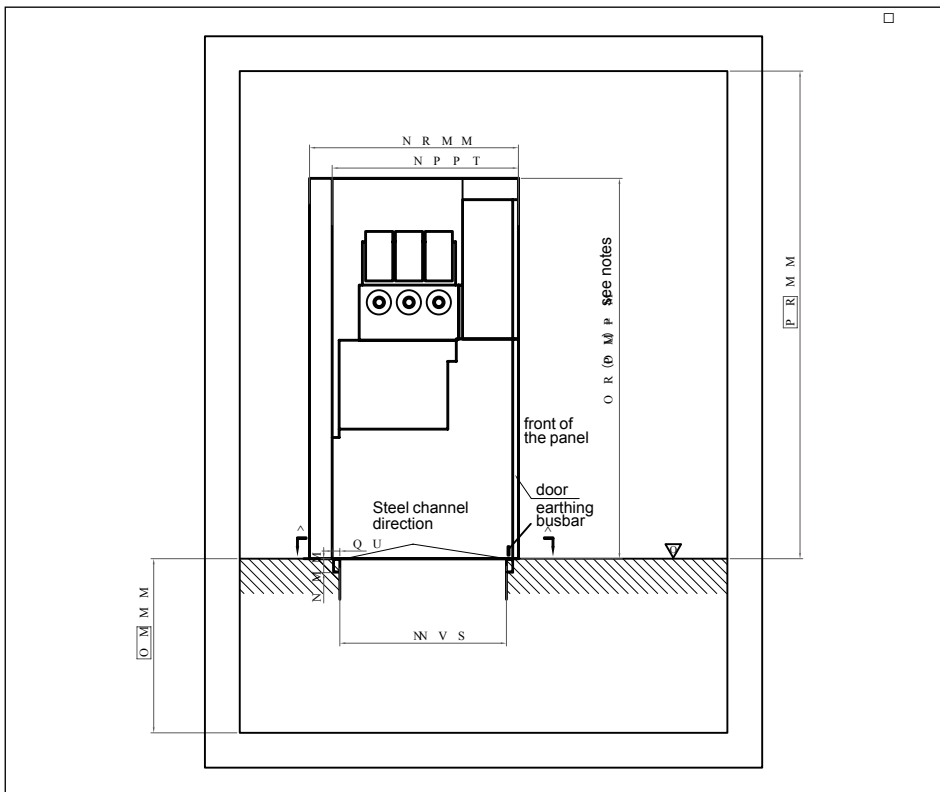
## Floor plan of civil works



Space plan of civil works



- Notes:
1. The shading on the picture are requirement size for primary and low voltage cables duct .
  2. Arrangement of floor plan should take into account the beam position when the switchgear are not installed on ground, the beam is not under income/outgoing panel, it is only for Bus couplers panel. Meanehile, heigher of the door need to be considered to ensure the switchgear through it.
  3. Steel spacer bar are vertical.



- Notes:
- Heigth 2530 mm for switchgear, heigher 2830mm with busbar surge arrestersture on site.

# Accompanying document transport and storage ordering instructions

## Accompanying document

- Production qualification
- Routine test report
- Packing List
- Instruction
- OMain system diagram and wiring diagram

## Transport and storage

- Switchgear shall not be flipped, strong vibration and damp in the rain during transport, loading and unloading.
- Switchgear should be smooth place in storage and transportation process,
- When a period of storage is foreseen, do not open the package and store in ambients which are dry, free of dust, non-corrosive, the storage time is usually not more than six months.

## Ordering instructions

The following data must be specified when placing an order. Please explain with words if there is any special requirement.

	quoto	order
Rated voltage	■	■
Operating voltage	■	■
Rated frequency	■	■
Rated short time withstand current	■	■
Rated current - busbar	■	■
Rated current - feeder	■	■
Cross-sections of HV cable	□	■
Type of cable terminal equipment(customer offer)	□	■
Detailed system diagram	■	■
Detailed documents for protection, control and monitoring device	■	■
Equipment information (customer offer)	□	■
Special regulation and specification	□	■
Layout and dimension of switchgear room	□	■
requirement for porch and transportation path	□	■
Duct, ventilation etc.	□	■

- Information must be detailed
- Information as detailed as possible



Customer Care Center Hotline:

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please ask for confirmation of the information given in this publication.



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