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Cooper (Ningbo) Electric Co., Ltd.
No. 439, Binhai 2nd Road, Hangzhou Bay New
Area, Ningbo City, Zhejiang Province, China
Tel: (86) 0574-63716999
Fax: (86) 0574-63486919
After-sales service hotline: 400-880-4268
www.coopernature.com
www.cooperningbo.com

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Cooper official website



WeChat public platform

Indoor power distribution product

COOPER POWER
SERIES

GSN3-12

AC metal-enclosed gas-insulated switchgear

12kV...3150A...40kA

SF₆ FREE

Edition





Electrical



Automobile



Aerospace



Truck



Hydraulic

The source of global business power

Eaton & Cooper Industries

Eaton acquired Cooper Industries in late 2012. Cooper has brought complementary cutting-edge technologies and products to Eaton, as well as its global presence, which continuously drives Eaton into a diversified global power management company. The two companies with industry-leading innovations in both manufacturing processes and product design are now united. Facing the key power management challenges in the future, we will be more focused and capable of providing more targeted overall solutions. The advantages of strong alliances allow us to see more possibilities and better opportunities, which can help customers manage power more efficiently, reduce energy consumption, meet the long-term operation of equipment, reduce costs and ensure the safety of personnel, equipment and data. Integrate the world's prestigious brand, provide customers with a variety of solution options, and create unrivaled customer value in the industry.

Cooper Industries

The former Cooper Industries was a global cross-industry equipment manufacturer, founded in 1833, with a history of nearly 200 years. It was headquartered in Houston, Texas, USA, with more than 30,000 employees worldwide and more than 100 manufacturing bases in 23 countries. Its products covered the fields of power equipment, industrial equipment, fully automated equipment, electronic products, tools and hardware, etc.

Since the early 1990s, Cooper has begun to develop its diversified businesses in China, and set up factories in local areas. It is rooted in Chinese market to achieve long-term development. With the introduction of American series power distribution products for the first time, Cooper has brought unique solutions to the transformation of China's power grid. Since the establishment of Cooper's Asia-Pacific headquarters in Shanghai, after more than ten years of in-depth development, Cooper Industries has owned many factories and more than 8,000 employees in Zhejiang, Guangdong, Shaanxi, Henan, Taiwan and other places in China, and set up offices in Beijing, Guangzhou, Chengdu, Hong Kong and other places.

Cooper (Ningbo) Electric Co., Ltd.

Cooper (Ningbo) Electric Co., Ltd. was established in 2007 as a joint venture under Cooper Industries. It is located in the south wing of the Hangzhou Bay Bridge, adjacent to Shanghai, the largest industrial city in China. The company is a power transmission, distribution and transformation equipment manufacturer specializing in R&D, production and sales of 40.5kV and below high and low voltage switchgear as well as high and low voltage component products. With advanced manufacturing mode, complete production and product testing line, based on Cooper's global R&D and sales platform, it provides the most economical, effective and reliable power distribution guarantee for China's domestic, Asia-Pacific and international power supply and distribution systems, substations, industrial and mining units, enterprises and institutions, petroleum and petrochemicals, metallurgy and electrified railways, etc. Its products include switchgear, vacuum circuit breakers, contactors, power intelligent solutions, etc. The company adheres to the principles of "wisdom and innovation, reliability and stability". It manufactures in strict accordance with international quality standards, so as to ensure that every product that leaves the factory is the best and most trustworthy.

Explore today's Eaton



Provide power for the world with ever-increasing demands

We provide the following solutions:

- Electrical solutions that reduce energy consumption, improve power reliability, and enhance safety and comfort in life and work
- Hydraulic and electrical solutions that increase machine productivity and save energy
- Aviation solutions that help achieve lighter and safer aircraft, lower operating costs, and efficient operation of airport
- Vehicle power-transmission and powertrain solutions that provide long-lasting and strong power for automobile, trucks and buses while reducing fuel consumption and emissions

Product overview

GSN3-12 is a new generation of green and environmentally friendly AC metal-enclosed gas-insulated switchgear (C-GIS for short) newly developed by the Thomas Edison R&D Center of Cooper Power Systems according to the needs of today's power grid. It is fully suitable for public and industrial distribution networks, infrastructure engineering, rail transit, metallurgy, petrochemical, docks, ships, drilling platforms and other fields, playing the roles of receiving and distributing electric energy, and controlling, protecting and monitoring circuits.

- The rated voltage is 12kV, the rated current is up to 3150A, and the rated short-circuit breaking current is up to 40kA.
- Non-SF6 gas insulation, reducing the use of greenhouse gases, and truly achieving environmental protection.
- Modular design, compact structure, small volume, space saving, high investment efficiency, and low use cost during the service life.
- Adopt highly reliable electrical components and advanced plug-in technology, it is maintenance-free during the service life.
- With excellent insulation performance, it has good insulation level and excellent electrical performance even if the insulating gas pressure is at zero gauge pressure.
- Higher reliability of power supply, simple and safe operation, and maximum protection of operation and maintenance personnel.
- Fully comply with the latest environmental protection requirements, no inflation or deflation is required for on-site installation and expansion, and the use of reusable materials facilitates the recycling after service life.
- It has successfully passed the conventional type tests stipulated by national standards and industry standards, and successfully passed the IAC internal arc fault test, so the safety performance of the switchgear is greatly improved.



Product features

Modular design

The entire cubicle structure is divided into four basic modules:

- Gas tank module
- Operating mechanism module
- Cable compartment module
- Secondary instrument room module

Highly air-tight gas tank

World-class manufacturing technology, laser cutting, laser welding, helium leak detection, imported processing equipment and strict production technology ensure the safe and trouble-free operation of the switchgear and ensure that the deformation of the gas tank is within the allowable range under any operating conditions.

Modular operating mechanism

The three-position switchgear and circuit breaker adopt modular operating mechanism, which greatly reduces the number of parts, simple and reliable, with manual and electric operation functions.

Perfect five-protection interlocking device

It has a reliable mechanical and electrical interlock design scheme, which can effectively prevent misoperation and maximize the protection of personnel safety.

Perfect combination of vacuum breaking and gas insulation

Nitrogen has good insulation performance, combined with Cooper's advanced solid encapsulation technology and vacuum breaking technology, it ensures that the switchgear has good insulation performance and electrical and mechanical properties.

No gas treatment is required on site

Special busbar connector is adopted, which is easy to install and flexible to expand. The intermediate cubicle can be drawn out, and no treatment of gas system is required on site.

Not affected by the environment

The high-voltage components are sealed inside the gas tank, which are not affected by altitude or surrounding environment, and are completely maintenance-free.

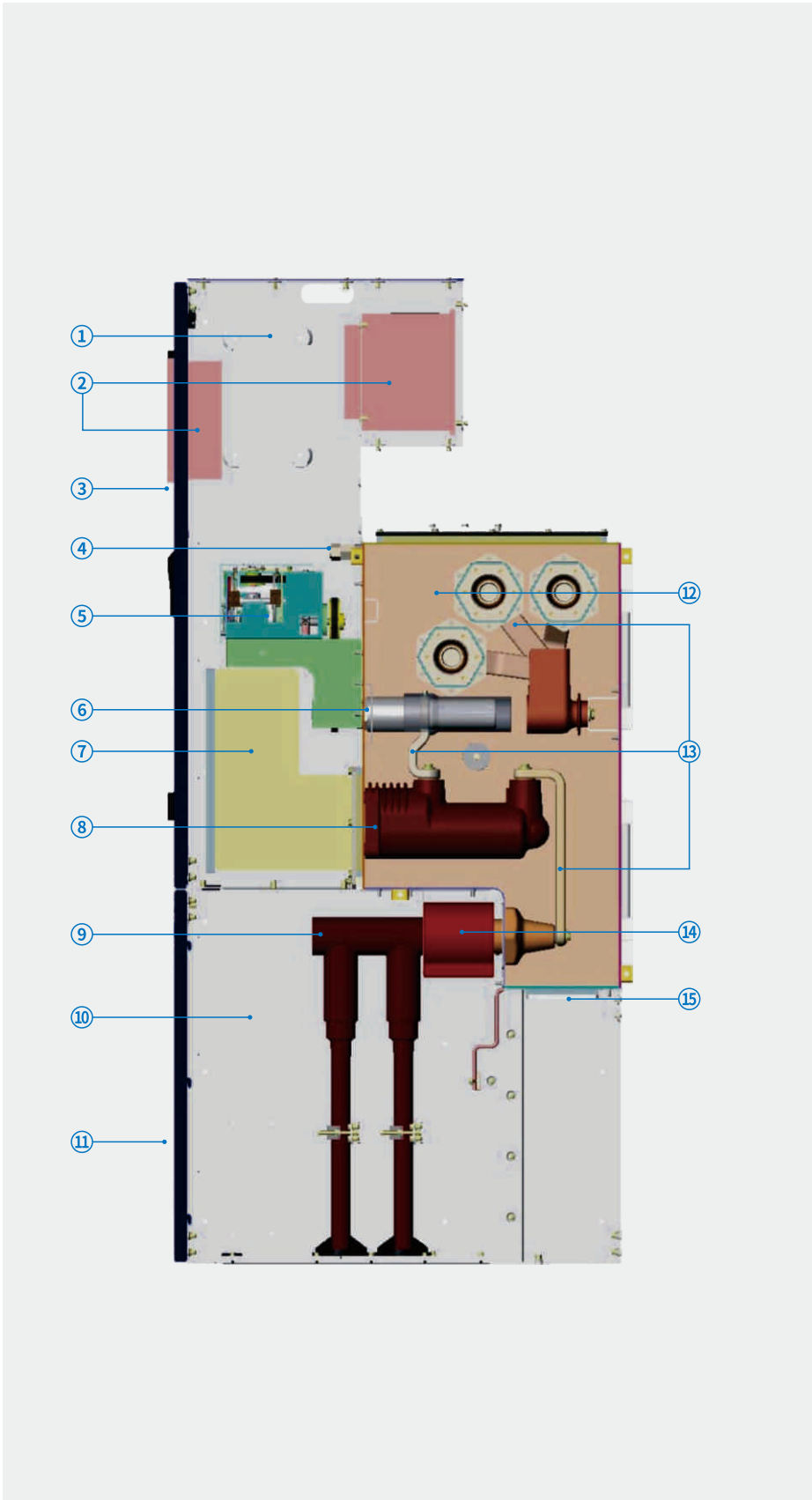
Flexible scheme configuration

With modular gas tank structure, combined with the modular plug-in components, appropriate switchgear configuration scheme can be selected as required, so as to ensure the reliable and economical operation of the switchgear.



Typical structure diagram

- 1.Control department
- 2.Protection control unit
- 3.Control department door
- 4.Gas tank inflation and pressure detection valve
- 5.Three-position switchgear operating mechanism
- 6.Three-position switchgear
- 7.Vacuum circuit breaker operating mechanism
- 8.Vacuum circuit breaker
- 9.Outer cone cable terminal
- 10.Cable compartment
- 11.Cable compartment door
- 12.Gas tank
- 13.Main busbar
- 14.Ring current transformer
- 15.Pressure relief device



Main components

Circuit breaker module

Unique design of embedded pole is adopted, the operating mechanism is outside the gas tank, and the operating mechanism and interlock of the switchgear are easy to operate in front of the gas tank. The tie rods between the embedded pole of circuit breaker and the mechanism are connected by sealing sleeve. The advanced combination technology of static sealing and dynamic sealing ensures a very low gas leak rate of the gas tank, and no gas supplementation is required during the service life.

Three-position switchgear module

- With switch-on, isolation and grounding functions
- With mechanical and electrical interlocks, preventing various misoperations
- The operating mechanism is outside the gas tank, which can realize manual and electric operations
- With clear indication of mechanical position

Current transformer

- It is installed outside the gas tank, convenient for detection and replacement
- It can meet the requirements of different accuracy and transformation ratios
- Bushing type or straight-through type can be selected as required

Voltage transformer

- Plugable structure, touchable housing
- Installed on the jack of gas tank, convenient for maintenance and replacement
- Disposable fuse built-in protection
- It can be installed on the line side or the busbar side
- It can meet the requirements of different accuracy and transformation ratios

Lightning arrester

- Plug-in metal housing structure, touchable
- Installed on the standard jack of the gas tank, convenient for maintenance and replacement
- It can be connected to discharge counter and online leakage current monitor
- It can be installed on the line side, the busbar side or in the busbar equipment cubicle

High-voltage live display

- Real-time monitoring of the live condition on the cable side and the busbar side
- It has two pairs of locking contacts, which work with electromagnet to realize forced locking
- It has phase check special jack



Main components

Busbar connector

- Special busbar connection system
- Select different specifications according to the voltage and current class
- Optimized electric field design, with large insulation margin
- Unique design, convenient for installation and maintenance of equipment
- No gas treatment is required on site

Touchable plug-in cable terminal

- Inner cone cable socket or outer cone cable socket can be selected
- According to voltage class and cable section, different specifications can be selected
- All live connectors enclose the high-voltage electric field in a solid insulating medium through interfacial insulation
- Easy to install, safe and reliable

Gas pressure monitoring system

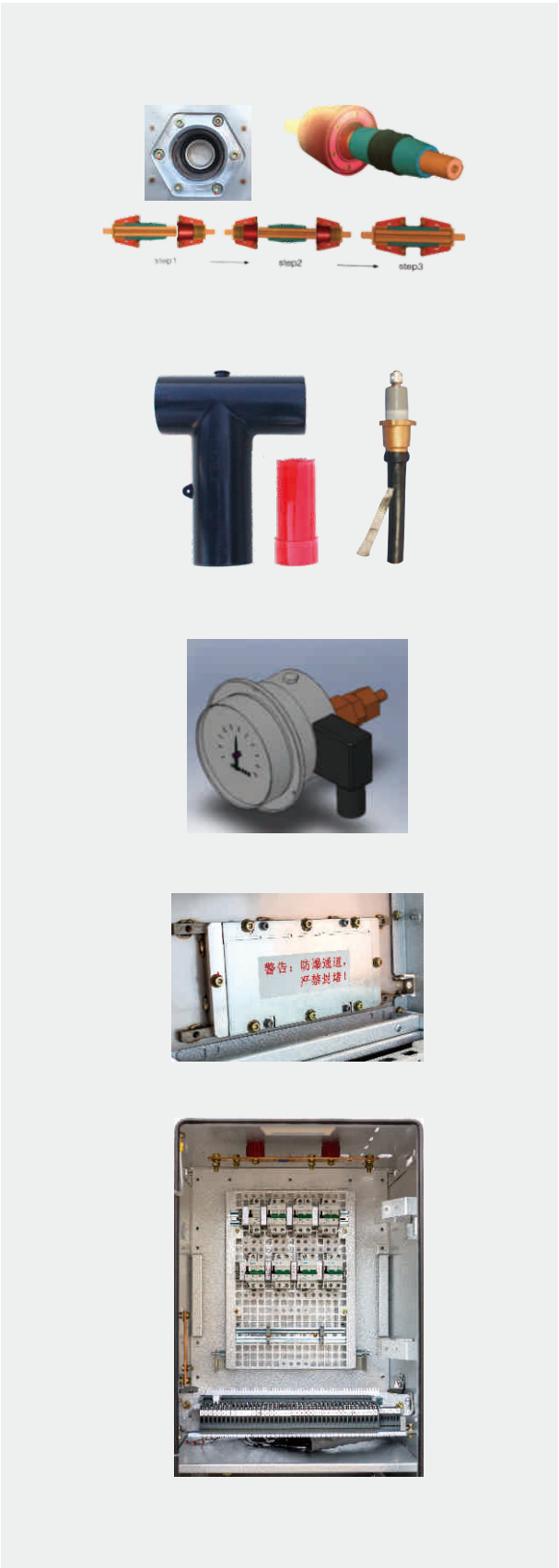
- Each gas chamber has a gas density monitoring system
- All-weather monitoring of gas chamber density status
- Density meter has temperature compensation function
- With high and low pressure contact output
- Abnormal pressure: alarm, lock, trip

Pressure relief device

A pressure release device is installed behind the bottom of the gas tank. When an internal arc fault occurs inside the gas chamber, the corresponding pressure release device will act to release overpressure through a dedicated pressure release channel to protect equipment and personal safety.

Flexible low-voltage box

- Spacious low-voltage box can accommodate all the devices required to operate the switchgear
- The low-voltage devices used for protection, control and monitoring are installed inside the low-voltage box or on the panel of the low-voltage box



Standards compliant

The products are manufactured according to the following standards:

- GB3906 3.6~40.5kV AC metal-enclosed switchgear and controlgear
- GB311.1 Insulation co-ordination for high voltage transmission and distribution equipment
- GB1984 High-voltage AC circuit breaker
- GB3309 Mechanical test at ambient temperature for high-voltage switchgear
- GB/T11022 Common specifications for high-voltage switchgear and controlgear standards
- DL/T404 3.6~40.5kV AC metal-enclosed switchgear and controlgear

Factory inspection

Each switchgear has undergone routine system tests in the production process, and has been strictly inspected by the quality control department who shall sign on the factory inspection report before leaving the factory, which not only ensures the quality of the product, but also ensures the traceability of the product quality.

- Protection class inspection
- Mechanical characteristic test
- Interlocking device inspection
- Auxiliary circuit check
- Circuit resistance measurement
- Mechanical operation test
- Main switch and its operating mechanism
- Electrical operation test
- Insulation performance test
- Main circuit resistance test
- Gas tank seal test
- Insulating gas moisture test



National and industry standards



Type test report

Quality assurance

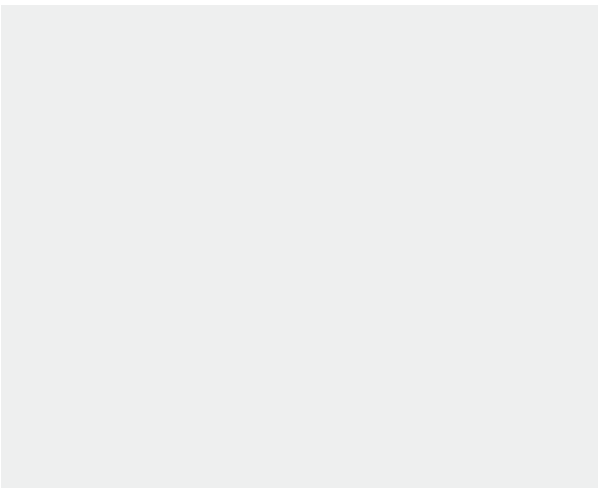
World-class production equipment

Cooper (Ningbo) has world-class flexible processing equipment, which fully guarantees the high quality and high efficiency of production and realizes the optimization of human resources. Among them, the world-class Italian Salvagnini full-automatic sheet metal flexible processing production line is full-automatic from the feeding, conveying, stacking to unloading of metal materials. In addition, the high-quality busbar processing production line and advanced inspection equipment composed of high-quality busbar vulcanization equipment, high-quality busbar electroplating equipment and CNC busbar punching and shearing machine also ensure excellent and stable product quality.



Industry-leading switchgear production line

Cooper (Ningbo) is committed to providing customers with technologically advanced, high-quality and reliable products. With the spirit of active innovation, we have changed the traditional switchgear manufacturing mode, designed and installed the first revolutionary switchgear intelligent production line in the industry, which is at the leading level in China's medium-voltage switchgear manufacturing industry. It has changed the traditional installation mode of immobile equipment while mobile personnel, and adopted the production mode of mobile equipment while immobile personnel. This line reasonably divides the entire installation process of the switchgear into multiple standard workstations. Each installation workstation realizes modular unit production and automatic control of subway-type transmission, and there is a visual electronic production kanban to record production information in real time. The unified and intelligent management of each process is realized via computer, which enables the switchgear to have excellent and reliable overall performance and fully guarantees that the switchgear will always have superior performance throughout its service life.



Switchgear assembly line



Automatic sheet metal flexible processing production line

Advanced GSN gas tank assembly line

- Atlas fixed-torque equipment is adopted, which has the function of error proofing and tracing.
- Automatic running-in/circuit resistance test/secondary circuit test integrated equipment.
- Automatic inflation leak detection equipment, voltage withstand partial discharge chamber and testing equipment.
- Circuit breaker hoisting manipulator is safe and efficient.

The industry's top-level circuit breaker production line

Drawing on the mature experience of today's manufacturing industry, through the design of professional manufacturers, strict and meticulous demonstration, we have built the industry's top-level circuit breaker automatic production line by referring to IEC standards;

The whole line is equipped with imported SEW drive motor, PLC control system, Omron sensor and material shortage alarm system, which fully guarantees the automatic and stable operation of the line;

The assembly station of the circuit breaker production line is supplemented by a manipulator and an automatic lifting and turning device to reduce labor intensity, and the main test sites realize full-automatic testing, including an automatic running-in room with special sound insulation materials;

Mechanical characteristic testing station using A100 characteristic tester;

Strictly closed and insulated automatic withstand voltage test station and infrared camera device for dimensional inspection and verification;

The entire line has three Siemens PLC control units, which can automatically adjust the production takt, and can remotely monitor and view production records, completely realizing paperless records.

Quality inspection center

The company has made a huge investment in building a professional quality inspection center. After the purchased components enter the factory, they must go through strict quality inspection to eliminate hidden quality risks from the source and ensure the high quality and reliability of the company's products.



GSN gas tank assembly line



Vacuum tank helium leak detection system

VN3X circuit breaker production line



Circuit breaker assembly line



Quality inspection center

System certification

Environmental management system

Certified by a third-party independent agency;
ISO14001:2015 compliant.

Quality assurance system

Certified by a third-party independent agency;
ISO9001:2015 compliant.



Occupational health and safety management system

Certified by a third-party independent agency; OHSAS18001:2007 compliant
Occupational health and safety management certification.

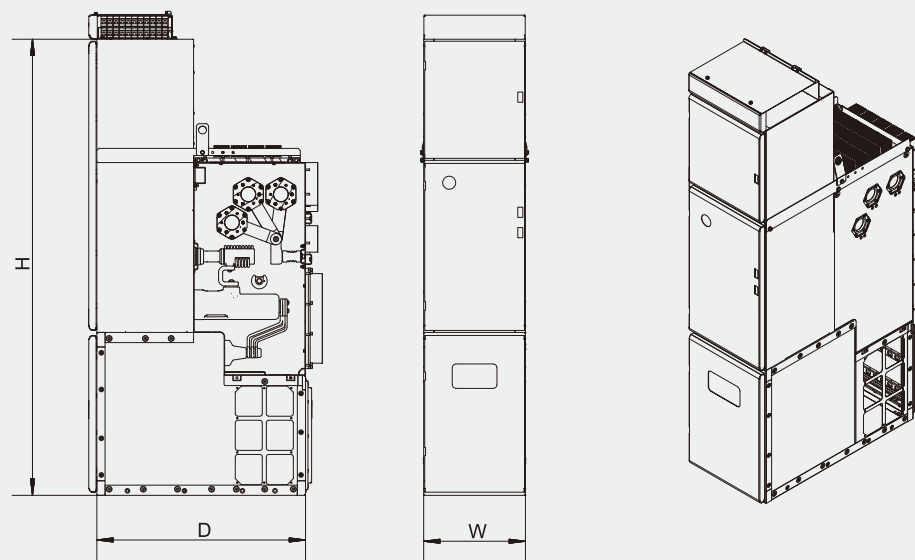
Conditions of working environment

Max. temperature	40℃
24h average temperature	35℃
Min. temperature	-25℃
Relative humidity	Daily average ≤ 95%, monthly average ≤ 90%
Value of vapor pressure	Daily average ≤ 2.2kPa, monthly average ≤ 1.8kPa
Seismic capability	The earthquake intensity not exceeding Magnitude 8
Installation site	The ambient air is not seriously polluted by corrosive or flammable gases and dust

Technical Parameters

Item		Unit	Parameters
Rated voltage		kV	12
Rated frequency		Hz	50
Insulating medium			N2
Rated insulation level	1min power frequency withstand voltage (zero gauge pressure)		42
	Lightning impulse withstand voltage (zero gauge pressure)	kV	75
	Auxiliary circuit 1min power frequency withstand voltage		2
Partial discharge (under 1.1 times rated voltage)		pC	≤ 10
Rated current		A	≤ 3150
Rated short circuit breaking current		kA	≤ 40
Rated short circuit closing current		kA	≤ 100
Rated short-duration withstand voltage (4S)		kA	≤ 40
Rated peak withstand current		kA	≤ 100
Switching single/back-to-back capacitor bank current		A	630/400
Rated cable-charging breaking current		A	25
Circuit breaker electrical endurance		time(s)	50
Circuit breaker mechanical endurance		time(s)	10000~30000 (based on rated current)
Mechanical endurance of isolating switch and earthing switch		time(s)	3000
Internal arc level		kA/s	IAC A FLR 31.5kA / 0.5s, 25kA/1s
Temperature rise test (zero gauge pressure)		/	1.1Ir
Rated operating cycle		/	O-0.3s-CO-180s-CO
Rated inflation pressure (relative)		MPa	0.02
Alarm pressure (relative)		MPa	0.01
Min. working air pressure (relative)		MPa	0
Annual leak rate		%/Y	< 0.05
Protection grade		/	Gas tank: IP65; others: IP4X

Outline dimensional drawing
and weight of switchgear



Rated current of main busbar	Cubicle type		Width W(mm)	Depth D(mm)	Height H(mm)	Weight (kg)	Remarks
Cable inlet In≤1250A	Inlet, outlet		500/600*	1025/1175***	2240	480 ~ 590	*The outlet side of this set is equipped with PT **PT tertiary ***The busbar of this set is plugged into PT
	Busbar equipment		500/800**			500 ~ 700	
	Sectional, isolating		500			480 ~ 530	
	Metering	Gas	500	1025	630	*Determined according to voltage and current	
		Air	800-1200*	1175	700 ~ 900		
Cable inlet 1600A≤In≤2500A	Inlet, sectional, isolating		800	1025/1275***	2240	800 ~ 900	*The outlet side of this set is equipped with PT **PT tertiary ***The busbar of this set is plugged into PT
	Outlet (In≤1250A)		500/600*			540 ~ 650	
	Busbar equipment		500/800**			500 ~ 700	
	Sectional, isolating, with cable outlet		800	1205	800 ~ 900		
Bridge inlet 1600A≤In≤2500A	Inlet, sectional, isolating, with tray outlet		800	1375	2240	800 ~ 1000	*The outlet side of this set is equipped with PT **PT tertiary ***The busbar of this set is plugged into PT
	Sectional, isolating		800	1125/1275***		800 ~ 900	
	Outlet (In≤1250A)		500/600*			500 ~ 700	
	Busbar equipment		500/800**		500 ~ 700		
Bridge inlet 2500A<In≤3150A	Inlet, sectional, isolating		800	1375	2240	800 ~ 1000	*The outlet side of this set is equipped with PT **PT tertiary ***The busbar of this set is plugged into PT
	Sectional, isolating, with bridge outlet		800			800 ~ 900	
	Outlet (In≤1250A)		500/600*			540 ~ 650	
	Busbar equipment		500/800**	1205/1355***	500 ~ 700		

Primary wiring scheme

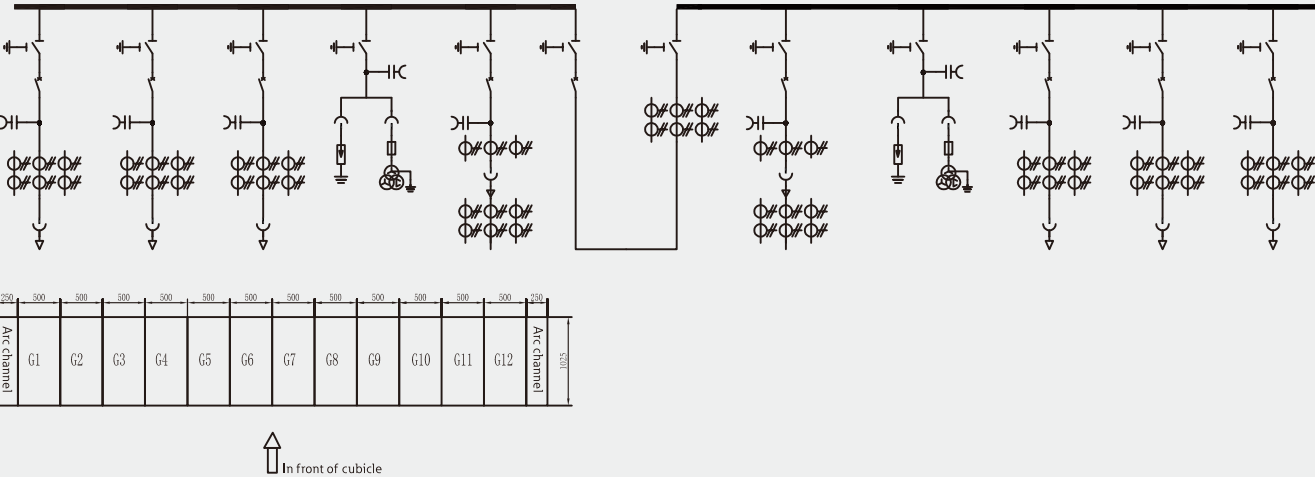
Scheme No.	01	02	03
Primary wiring diagram			
Cubicle use or name	Cable incoming and outlet cubicle	Cable incoming and outlet cubicle	Isolating and lifting cubicle
Vacuum circuit breaker model & specifications	VN3X-12	VN3X-12	
Vacuum circuit breaker	1	1	
Three-position switchgear	1	1	1
Current transformer	3	3	3
Voltage transformer			
Lightning arrester		3	
Live display	1	1	1

Scheme No.	04	05	06
Primary wiring diagram			
Cubicle use or name	Sectional circuit breaker cubicle	Sectional and isolating cubicle	Busbar equipment cubicle
Vacuum circuit breaker model & specifications	VN3X-12		
Vacuum circuit breaker	1		
Three-position switchgear	1	1	1
Current transformer		3	
Voltage transformer			3
Lightning arrester			3
Live display	1	1	1

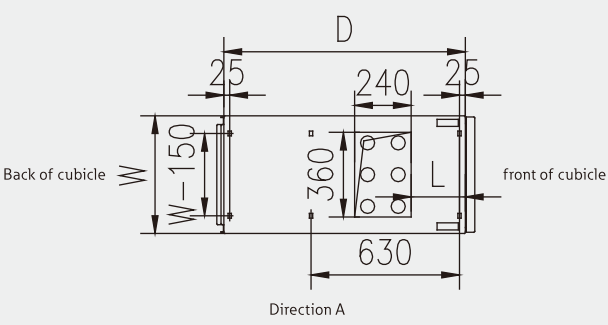
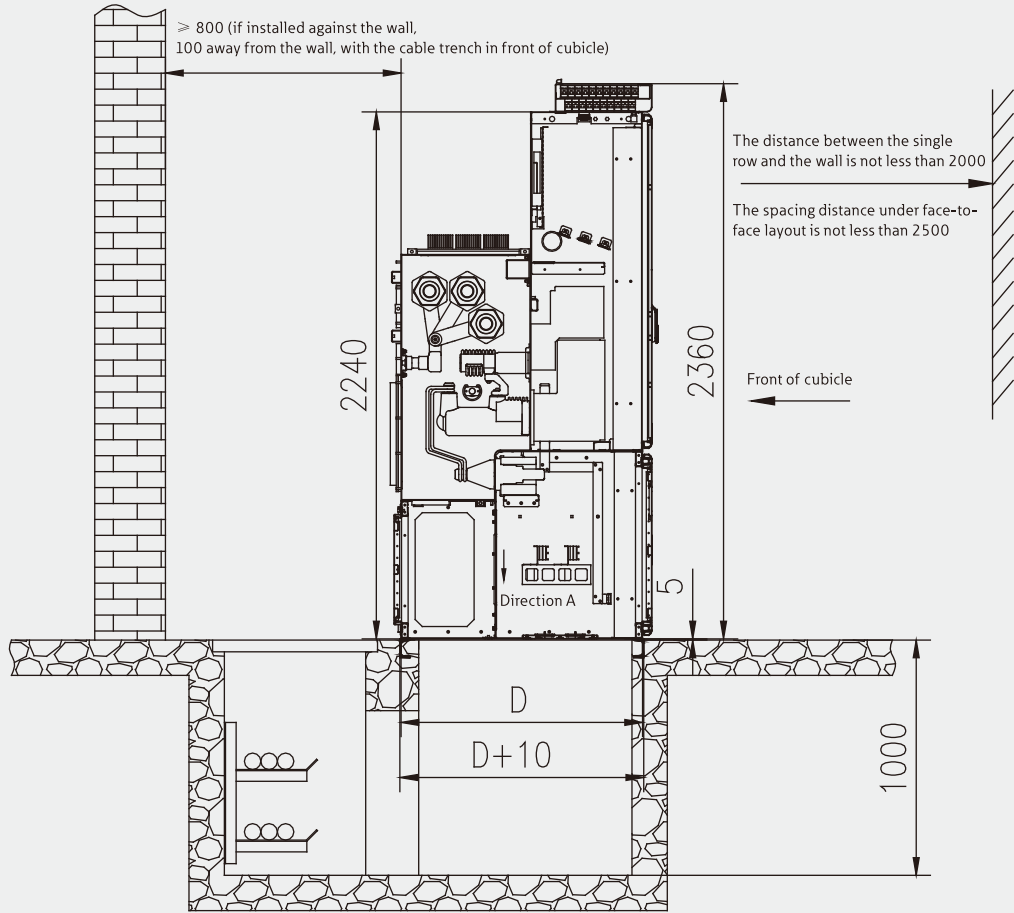
Primary wiring scheme

Scheme No.	07	08	09
Primary wiring diagram			
Cubicle use or name	Metering cubicle	PT plug-in module	Lightning arrester plug-in module
Vacuum circuit breaker model & specifications			
Vacuum circuit breaker			
Three-position switchgear			
Current transformer	3		
Voltage transformer	3	3	
Lightning arrester			3
Live display	1	1	1

Typical cubicle combination scheme



Installation base diagram



Width W (mm)	The rated current of branch busbar is up to 1250A	500
	The rated current of branch busbar is 1600A and above	800
Depth D (mm) not including cubicle door	The rated current of branch busbar is up to 1250A	1025
	The rated current of branch busbar is 1600A and above	1375
L(mm)	Cable incoming and outlet cubicle with long sleeve	180
	Cable incoming and outlet cubicle with short sleeve	230

Ordering instructions

Users must provide the following technical information when ordering:

- Rated voltage, working voltage, frequency
- Rated busbar current and feeder current
- Rated short-duration withstand voltage
- Cross section of primary feeder cable
- The type of cable terminal equipment provided by the user
- Detailed single line diagram
- Data of protection, measurement & control and monitoring equipment
- Switchgear layout and dimensions of power distribution room
- Special regulations and specifications

Accompanying Documents

- Product certificate
- Factory inspection report
- Instruction manual
- Secondary wiring diagram and switchgear arrangement diagram
- Packing list and the list of spare parts and accessories

Accessories

- Circuit breaker energy storage handle
- Three-position switchgear operating handle

Spare parts

- Ordered directly by users according to the order contract

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