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NXGIS-40.5

Gas-insulated Metal-enclosed Switchgear



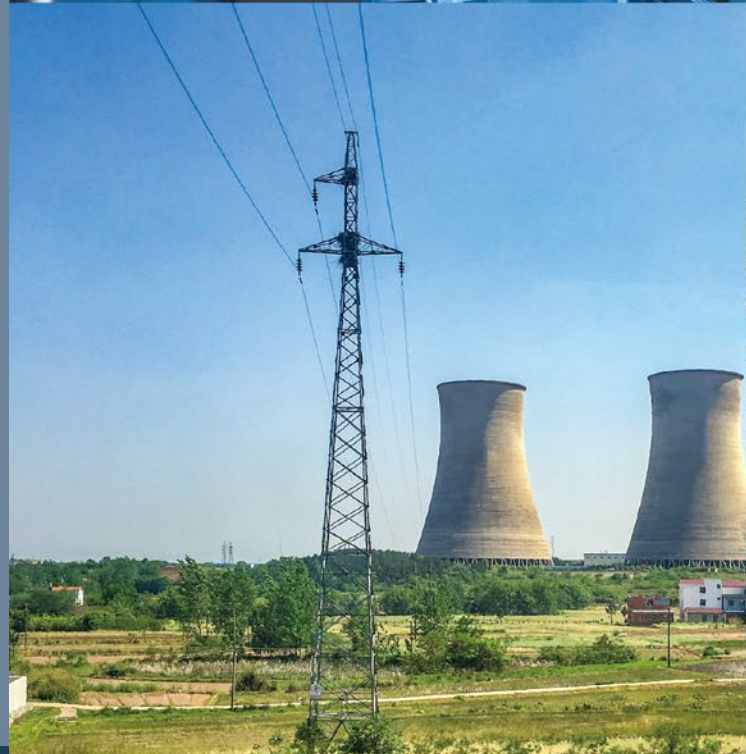
About Hertzman

Hertzman is driven by the challenges we face every day, including ever-changing technological advances, environmental pressures, the advent of digital life, and the demands of an efficient, green manufacturing industry, and is driven by the pursuit and understanding of engineering technology, and by the excellent electrification and digital products, services, and solutions to face the challenge with us. Through continuous innovation and the pursuit of technology, engineering, and process, Hertzman brings us reliable, efficient, economical, and sustainable value.

The high reliability of distribution network, new energy, new energy power and the popularization of microgrids and other new technology problems arising and solutions, these are new challenges in the field of energy and new energy, Hertzman DAVIDCLOUD energy management system and supporting intelligent components provide a package of solutions to face the challenges with customers.

Industry and manufacturing industry focus on energy reliability and economy. In the field of heavy chemical industry and manufacturing industry, Hertzman explores the high reliability of distribution systems under extreme power conditions, and through research and simulation in various unknown fields, obtains new knowledge and innovations and improvements of process engineering, which have led to the high reliability of Hertzman's distribution systems being recognized by global users.

Hertzman believes in the power of technology and engineering, actively explores the unknown world, and driven by electrification and digitalization technologies, we are striving to build and create a better life in the world.





NXGIS-40.5

Gas-insulated Metal-enclosed Switchgear

Characteristics

NXGIS-40.5 gas-insulated metal-enclosed switchgear is mainly used in three-phase AC (40.5KV) single-bus and double-bus systems, and its compact and high-reliability design makes it suitable for the primary distribution system or user terminal power supply system.

The switchgear adopts SF6 gas as the insulating medium, and all high-voltage components are hermetically sealed in tightness chambers made of stainless steel plates welding, which are assembled in the factory and then delivered for use through complete delivery tests. Combined with the comprehensive application of gas insulation technology, solid insulation technology and vacuum breaking technology, it has the technical features of high reliability, maintenancefree and miniaturization. Since all the primary components are installed in the gas box or plugin installation, the installation and operation of NXGIS is completely gas-free.

NXGIS is mainly used in electricity generation companies, industrial and mining enterprises distribution and electricity receiving, transmitting, control, protection and monitoring of power system substations.

Executive Standard

Standard		
Switchgear	IEC 62271-200	GB/T11022
Vacuum Circuit Breaker	IEC 62271-100	GB 1984
Switch-disconnectors and three-position switchgear	IEC 62271-102	GB1985
Bus earthing switches and earthing through vacuum circuit breakers	IEC 62271-102	GB 1985
Protection against accidental contact with external objects and water	IEC 60529	GB4208
Harsh environment operation - optional	IEC 60932	
Current transformers	IEC 60044-1	GB 1208
Voltage transformers	IEC 60044-2	GB 1207
Installation	IEC 61936-1	

Scenario Applications

Due to the excellent electrical features and compactness of the gas-insulated insulation, the switchgear is particularly suitable for use in power supply systems in the following applications

- Plateau scenarios
- Infrastructures especially metros and railways
- Energy
- Industry
- Heavy metal industry
- Business centers
- Data centers
- Public Buildings
- Hospitals
- Switching Stations
- Transportation



Operation Environment

Altitude: Gas insulation with relative pressure of 50kPa or more allows the switchgear to operate at different altitudes without affecting the insulation capacity

Ambient temperature: Maximum temperature: +55°C ; Minimum temperature: -25°C ;

Average temperature in 24h does not exceed 35°C .

Ambient humidity: average relative humidity in 24h does not exceed 95%; average monthly relative humidity does not exceed 90%.

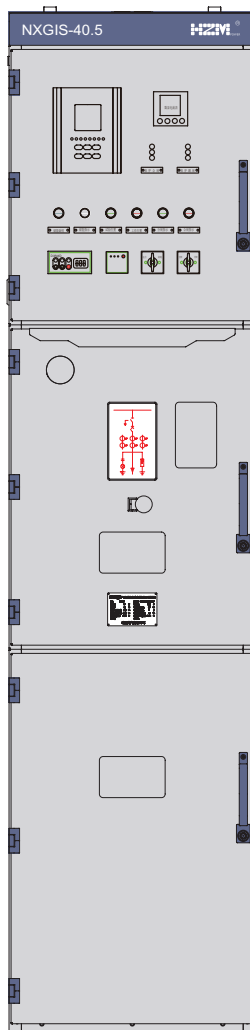
Installation environment: no explosive and corrosive gases in the surrounding air, no violent vibration impact in the installation place, and the pollution level does not exceed the C level in GB/T26218.1.

Seismic intensity: 8 degree.

When the use conditions exceed the above provisions, the solution can be determined in consultation with the user.

NXGIS-40.5

Technical Characteristics



Product Characteristic

Weather Resistance

Fully insulated and sealed stainless steel tightness welded gas box design, SF6 gas sealed insulation, so that the primary energized part of the NXGIS gas-insulated switchgear is not affected by the external environment, and is not affected by the altitude

Such as:

Humidity

Pollution

Dust

Small animals

Condensation

Other external objects, etc.

Compactness

The strong insulating properties of SF6 gas make the cabinet particularly compact, and it can be applied to public supply network substations, as well as to places where the space requirements for electricity consumption are particularly high. Such as:
Outdoor prefabricated switching substation
box transformer high-voltage incoming unit
Terminal transformer incoming unit

Maintenance-Free

The maintenance-free design of the fully sealed gas box and shielding cable terminal ensures that the cabinet is easy to use and partially maintenance-free during its service life. No need to fill gas during the entire service life
No SF6 gas is required for expansion, change, installation, etc.

Safe

The type-tested cabinet meets the requirements of strict electrical environments Fully insulated and fully enclosed design, with a gas-tight primary side sheet that is safe to touch, and all high-voltage components, including cable terminal, busbars and voltage transformers, are all metal-enclosed.

Helium-tested gas chamber Pressure venting channel function for internal combustion arcs

Capacitive voltage test system is used for voltage test system isolated from the power supply safety

Grounding making capacity through vacuum circuit breakers

Logical-mechanical interlocking prevents misoperation and realizes operational blocking

Convenient

Simple man-machine interface makes the cabinet easy to use. Expandable design of interface insulation structure, plug-in insulated busbar. Abundant cable room space, easy to install

Standardized cabinet connection method, easy to connect the cabinets

Standardized inner cone bushing cable connection

Use digitalization secondary systems, integrated protection and control devices could realize Integration of process control systems

Economical

Low cost during operation

Modular design saves resource. Small covering

Long service life

NXGIS-40.5

Technical Characteristics



Gas Box Unit

The gas box is made of 3.0mm, S304 stainless steel plate through CNC metal process, automatic stud welding, robot welding and other precision process technology.

The cabinet door panel cold-rolled steel plate and spray molding surface treatment process.

The degree of protection provide by enclosure is IP4X, and the degree of gas box is IP67

Degree of protection

- Main electrical circuit: IP67
- Operating mechanism: IP3X
- Cable compartment (with compartment door closed): IP4X
- Low-voltage box: IP4X
- Overall enclosure: IP4X
- Overall enclosure: IK07



VHZ4/G-40.5 Circuit Breaker

VHZ4/G-40.5-type circuit breaker

- Circuit breaker pole posts are placed horizontally
- The operating mechanism is outside the gas chamber
- The tie rods between the circuit breaker poles and the mechanism are connected by reciprocating seal bushing
- Earthing function advantages can be realized in conjunction with a three-position switchgear
- Circuit breakers make-earth current ·Circuit breakers have a more superior short-circuit making capacity to earthing switch
 - More breaking and making operations are possible for faults
 - No degradation of SF6 gas insulation quality due to vacuum breaking
- High frequency of breaking and earth making
- Breaking of vacuum interrupter would not affect the SF6 gas state.

EAIS/G-40.5 Three-position Isolating/Earthing Switch

External operation mechanism

Three-station operation for connecting, isolating and earthing

Few movable components inside the gas chamber

Position can be detected by sensor or auxiliary switch

Possess mechanical position indicator

NXGIS-40.5

Technical Characteristics



Circuit Breaker Operation and Interlock

The COGEAR operation mechanism is a spring mechanism with continuous automatic reclosing capacity.

The vacuum circuit breaker equipped with COGEAR operating mechanism is installed in the fully insulated stainless steel gas box, and the operating mechanism and related interlocks are located in front of the gas box, which makes the operation convenient and safe.

Operation man-machine design is reasonable, three-station isolating/earthing switch of the question-entailment approach mechanical interlocking features.

The mechanical operation of the circuit breaker and interlock is used as independent modular operation, the mechanical control panel is installed in front of the cabinet, and the arrangement of each operation hole and mechanical indication corresponds to the actual position of the corresponding components in the cabinet.

Each component and cycles on the panel are correspondingly marked by analog diagrams, such as components, position indications, paddles and handle jacks, etc. are all expressed through analog diagrams.

Mechanism panel visual display

Circuit breaker closing/tripping

Isolating closing/tripping

Outgoing/busbar Earthing closing/tripping

According to IEC62271-200 and VDE0671-200

Logical-mechanical interlocking prevents misoperation

Three-position switch can only be operated when the circuit breaker is in the tripping position

Circuit breakers can only be operated when the three-position switch is in position and the operating handle is removed

Circuit breaker with padlock device

Three-position switch with blocking, "feeder earthing" interlocking device

Optional electromagnetic locking



Current and Voltage Transformers

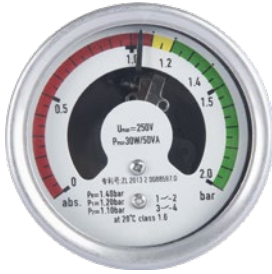
The current transformer design voltage transformer is an inductive transformer and a core-piercing current transformer with no dielectric material stress at the high voltage side. The transformation ratio, precision and performance of the current transformer meets the design requirements.

Voltage transformer is inductive transformer, installed outside the gas chamber. The voltage transformers are of plug-in type and can be plugged into the busbar by internal cone plugs.

The HIDS isolating switch used for the voltage transformers are installed in the gas chamber. The PT scheme equipped with isolating switch, the power frequency test can be completed on the switch cabinet without removing the transformers or plug connectors.

NXGIS-40.5

Technical Characteristics



Gas Pressure Monitoring in the Gas Cabinet

Each gas chamber is monitored by a gas density meter monitoring system.

The gas status is detected by pressure gauge, optionally equipped with a digital barometer.

The digital barometer electronically transmits the pressure signal to the back office.

When an alarm signal appears, the gas alarm signal can be sent to a remote location by a contact and the current density situation can be displayed.

Each gas chamber has its own pressure venting device, once overpressurized, the pressure is released in the lower part of the gas box or backward and upward through the lower part. An additional switch cabinet pressure venting channel is also optional.



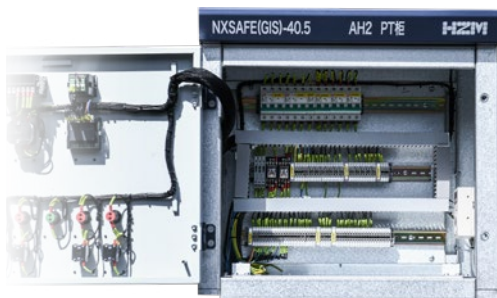
Voltage Test

The test of voltage-driven state is carried out by a capacitive voltage-driven display sensor in the cable socket in conjunction with the voltage-driven display.

The voltage-driven display is installed on the control panel on the front of the switch cabinet.

All voltage-driven test systems (VDS) comply with IEC 61243-5 and VDE 0862-415 voltage detection system standards.

The standard configuration is the DXN8B indoor high-voltage voltage-driven display.



Low-voltage Compartment

Low-voltage devices and instruments used for protection, control and monitoring, as well as terminal lines are installed inside the low-voltage compartment.

The door panel of the low voltage box is installed with devices for operating switch cabinet and display devices.

The basic dimension height of the low voltage compartment is 600-800mm.

If required, the low voltage compartment can be installed optionally and separately on site.

The secondary connection between the switch cabinet operating mechanism and the low voltage box is designed as plug-in type.

NXGIS-40.5

Cable Connection



The cable connections can be made from the front of the switch cabinet and are suitable for a wide range of cable connection techniques.

External cone cable socket (type C according to EN 50181C and suitable for 33 kV network) is optional, and internal cone cable socket (according to EN 50181, suitable for 35 kV network) is also optional.

External Cone Cable Socket

Varieties of cables with cross-sections up to 630 mm² are connected by T-type cable plugs or terminal connectors.

Up to 3 T-type cable plugs or terminal connectors can be connected to each 1250A current-carrying bushing. The cable plugs or terminal connectors can also be equipped with arresters.

When incoming > 1250A, 2 external cone sockets are equipped with every phase.

No additional test sockets are required for the cable test (with cable connection).

Note: External cone sockets can only be used up to 36kV.

Internal Cone Socket

For selected cable models and cross-sections, different models of internal cone sockets for cable terminals can be provided.

According to the internal cone connection model, a maximum of 4 internal cone sockets are equipped with every phase.

One socket in every phase can be used for internal cone arrester if required.

Optionally, a set of No. 2 terminal test sockets can be equipped in front of the switch cabinet for cable puncture test.

The NXGIS cable connection system adopts internal cone cable sockets, cable connections are conducted from the front cable chamber of the switchgear and are suitable for a variety of cable connection techniques, generally using the internal cone plug-in cable connection technique.

Structure of the internal cone plug-in cable terminal: the internal cone plug-in cable terminal consists of two major components, which is the internal cone bushing socket and the plug-in cable terminal. The socket bushing made of epoxy resin vacuum casting is installed on the air chamber in accordance with DIN 47637, and the seal flange is installed, with a connecting coupler at the end used for inserting the cable terminal contact ring.

The plug-in cable terminal consists of the following components: conductor contact system, insulation stress cone components and bell porvers flange sets. Structure and function is briefly described as follows: conductor contact system consists of the contact ring, compression cone, the contact ring contact with through the elastic contact fingers and connection coupler of socket coupler, ensures stable electrical connection, and this structure has been widely used in the switch and other electrical equipment and could be operated reliably, compression cone can be matched with a different cross-section of the copper-core, aluminum-core cables, applicable to the cable cross-section range of 50 mm² ~630 mm², this structure is different from the crimp structure, its biggest feature is that it can be loaded, removed and reused; insulation stress cone components are injection molded by highly elastic silicone rubber, the internal embedded with stress cones that could improve the cable shielding end of the electric field distribution, and the components matched with the socket coupler internal cone pressure, which also play a sealing role in the main insulation of the cable terminals; bell porvers flanges are made of aluminum alloy with high mechanical strength, playing a protective role in the cable head, the pressure spring is set in the bell porvers, so that the main insulation components could obtain constant pressure, the lower part also have other sealing measures.

Depending on the selected cable type and cross-section, internal cone sockets with different specification cable terminal can be provided. According to the internal cone connection model, a maximum of 4 internal cone sockets are equipped with every phase. One socket in every phase can be used for internal cone arrester if required. Optionally, a set of terminal test sockets can be provided in the cable chamber used for cable puncture tests.

NXGIS-40.5

Cabinet Connection Method

Fully Insulated Top Extension Busbar

Cabinet modular connecting device, when the product installed cabinet assemblies on-site, in the case of not opening the sealing cover on the sealed box, connect plug-in solid insulated busbar in the two cabinets with the circuit by using the plug-in structure and carry rated current, at the same time, establish a solid interface insulation between the main busbar conductor of the two cabinets and the metal enclosure.

No SF6 gas related technical process is required for on-site installation, cabinet combination and change.

Cabinet gas box top couplet matching.

Contains copper conductor busbars with silicone rubber insulating materials.

The primary busbar combination can be realized by the top extension connector.

The busbar is customized according to the center distance of the adjacent coupler.



Product Model

NXGIS	-40.5	-1250	-31.5	- V
Model	Rated voltage (KV)	Rated current (A)	Rated shorttime breaking current (KA)	V Circuit Breaker Program PT PT Program M Metering Program D Busbar Program I Isolation Program

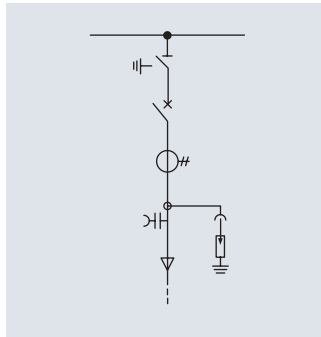
NXGIS-40.5

Typical Programs

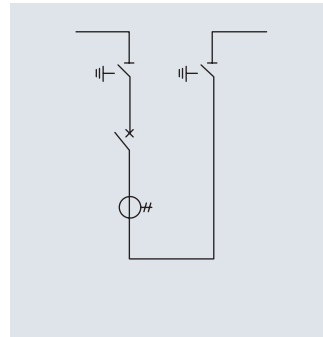
V Circuit Breaker Program

Main Components

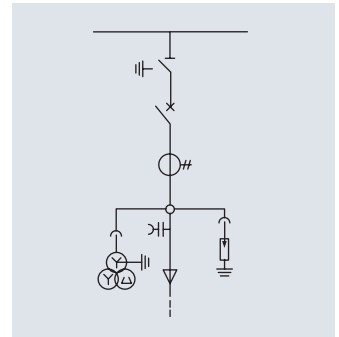
Vacuum Circuit Breaker VHZ4G-40.5
Three-position Switch EAIS/G-40.5
Current transformers
Voltage transformers
Arrester
Presence display



V Circuit Breaker



V Busbar Contact

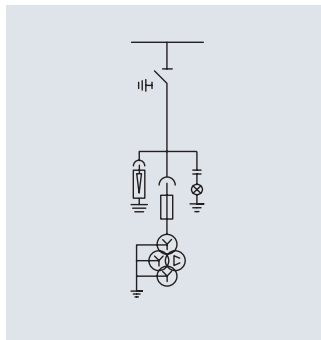


V Circuit Breaker with PT

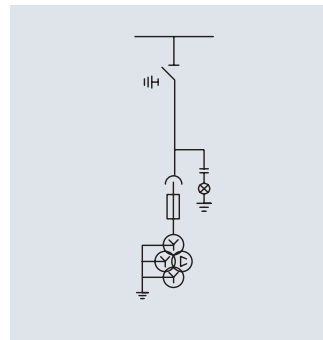
PT Program

Main Components

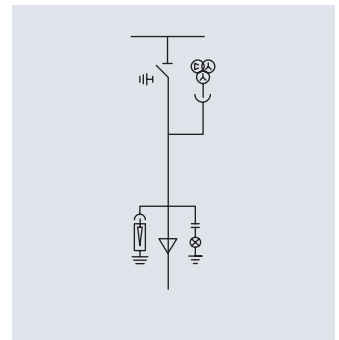
Three0position switch EAIS/G-40.5
Current transformers
Voltage transformers
Arrester
Presence display



Voltage Metering + Arrester



Voltage Metering

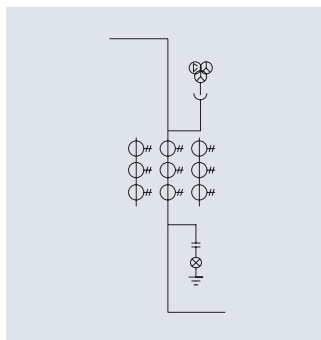


Voltage Metering

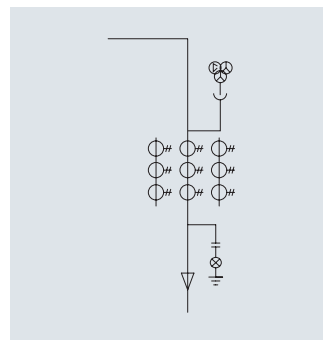
M Metering Program

Main Components

Current transformers
Voltage transformers
Presence display



Metering Upgrade



Metering Program

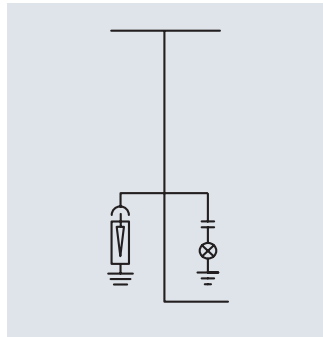
NXGIS-40.5

Typical Program

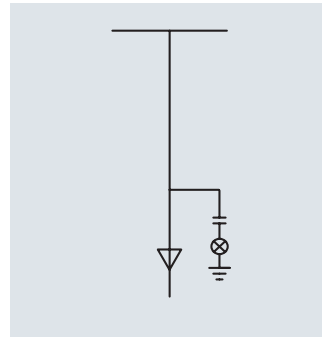
D Busbar Program

Main Components

Arrester
Presence display



Busbar Upgrading

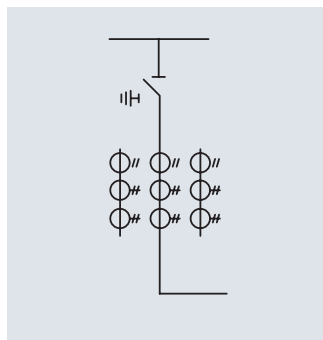


Busbar Program

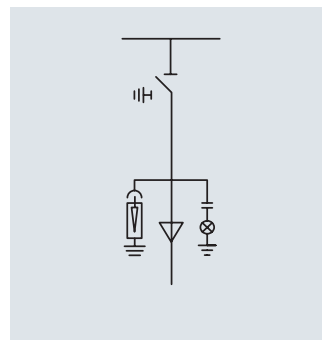
I Isolation program

Main Components

Three-position switch
EAS/G-40.5
Transformers
Arrester
Presence display



Isolation Upgrading



Isolation

NXGIS-40.5

Technical Parameters

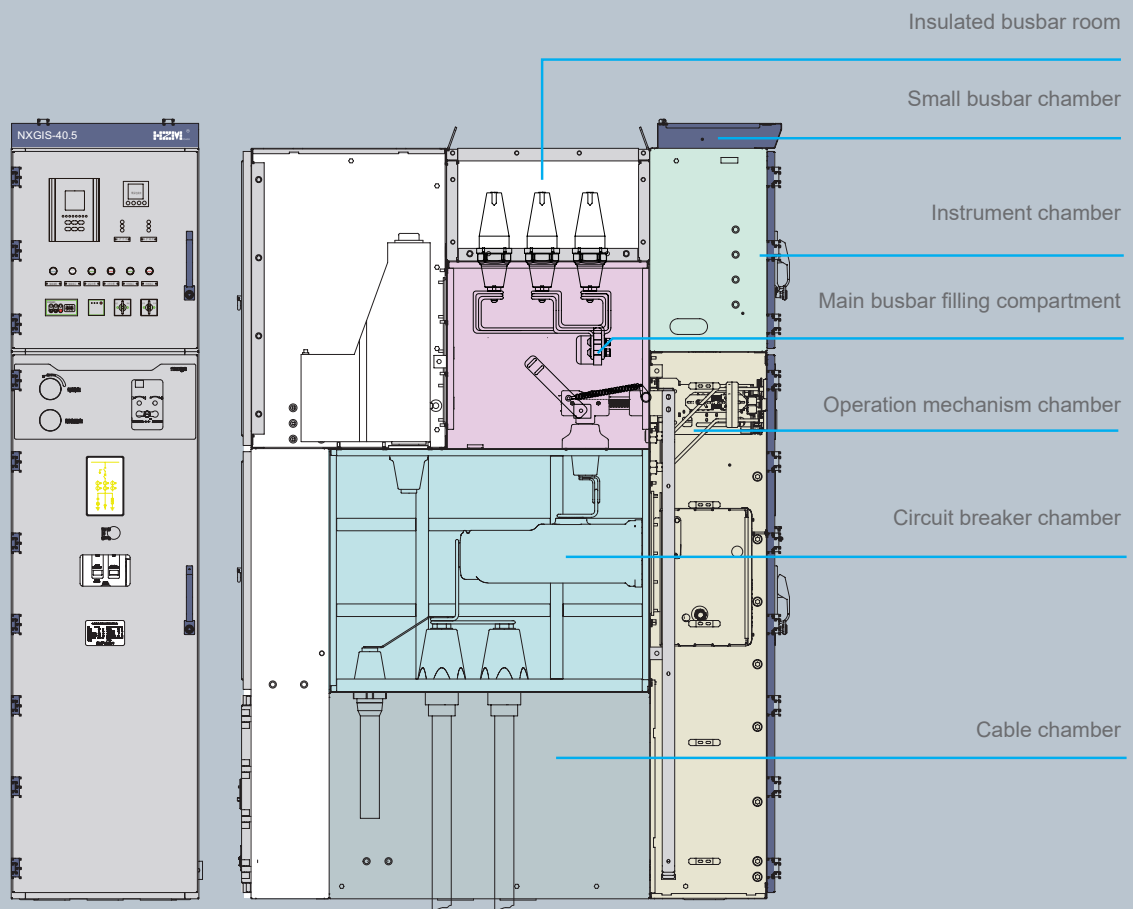
Technical Parameter Table

Series No.	Item			Unit	Parameter
1	Rated voltage(Ur)			kV	40.5
2	Rated frequency(fr)			Hz	50
3	Rated current(Ir)			A	1250/2500
4	Rated insulation level	Rated power frequency withstand voltage Ud (root-mean-square value)1min	interphase and to-ground	kV	95
			Isolation/vacuum fracture		118
		Rated lightning impulse with stand voltage Up (peak value)	interphase and to-ground		185
			Isolation/vacuum fracture		215
5	Rated short-time withstand current			ka	25(21.8) 、 31.5(27.4)
6	Rated peak withstand current			ka	63 (54.8) 、 80 (69.6)
7	Rated short-circuit current duration			S	4
8	Rated short-circuit breaking current			kA	25、 31.5
9	Rated short-circuit making current			kA	63、 80
10	Arcing duration			s	1
11	Circuit Breaker Electricity service life			V	30 times
12	Rated Filling Pressure			MPa	0.02
13	Minimum Functional Pressure				0
14	Annual gas leakage rate				<0.01%
15	Mechanical life	Breaker		Time	20000
		Isolation switch		Time	5000
		Earthing switch		Time	5000
16	Auxiliary control circuit	Rated voltage			DC:110、 220AC:110、 220
		1min power frequency withstand voltage		V	2000
17	Degree of protection				Enclosure IP41 gas chamber IP67
18	Circuit resistance	1250		uΩ	<120
		2500		uΩ	<80
19	Partial discharge	Test voltage		kV	1.1x40.5
		Single insulating material		pC	<3
		Whole machine		pC	<20
20	Loss of operation continuity category				LSC2B
21	Temperature rise test				1.1Ir
22	Service life Year 30			Year	30

NXGIS-40.5

Technical Characteristics

Product Structure



NXGIS-40.5

Technical Characteristics

Cabinet

The cabinet is made of high-strength zinc-aluminum-coated steel plate, and the cabinet door is made of cold-rolled steel plate with spray molding process, and the whole cabinet is fully assembled by digital control, with high precision and good consistency. Functional unit modular assembly design, each functional unit is reliably earthed. Reliable five-prevention interlock and cabinet door closing operation, to protect the safety of operation and maintenance personnel.

Small Busbar Chamber

The small busbar chamber is used for coating 15 circuit or 20 circuit small busbars to provide the switch cabinet with the power required for the control circuit or auxiliary circuit. The small busbar adopts $\psi 6$ copper rods or multi-stranded cords and is connected to the neighboring cabinets through terminals. The matching number of small busbars is used according to the schematic diagram provided by the user.

Operation Mechanism Chamber

Mechanism operation chamber is equipped with three-position isolation switch and vacuum circuit breaker operating mechanism and its interlocking mechanism, and SF6 gas pressure gauge, etc. The front door of the cabinet needs to be opened for manual operation of the mechanism.

Operation Mechanism Chamber

The switch cabinet instrument chamber can install relay protection components instrument, voltage-driven monitoring indicator and a variety of secondary equipment. The top plate of the instrument chamber is equipped with a small busbar crossing hole, and the top cover plate of the small busbar chamber can be dismantled for installation when wiring.

Main Busbar Filling Compartment

The filling compartment is a sealed compartment, insulated with low pressure SF6 gas; the gas chamber is welded and formed by 3mm thick stainless steel plate; the protection level of the gas chamber is IP67; the back of the compartment is equipped with a pressure relief bursting film; and the top is equipped with a cover plate for mounting and overhaul. This compartment is equipped with the main busbar, branch busbar, three-position isolation switch, vacuum circuit breaker, internal cone cable plug, busbar coupler socket and the main circuit of busbar bushing.

The three-position isolating switch operating mechanism is installed outside the compartment, which can realize its function of working, isolation, earthing and interlock of each function; the integrated spring operating mechanism of the circuit breaker is installed outside the compartment, which realizes the dynamic sealing connection inside and outside the circuit breaker compartment through direct sealing device; the electrical connection of the main busbar between cabinets can be realized through the busbar coupler and busbar coupler sockets; the busbar bushing realizes the electrical connection between the main busbar filling compartment and circuit breaker filling compartment and serves as a support material for the main circuit of the three-position isolating switch at the same time, which simplifies the structure. The rotary shaft lip-type sealing ring realizes the dynamic sealing connection inside and outside the three-position isolation switch compartment; the internal cone cable plug-in socket is installed at the bottom of the compartment, i.e. it serves as the support for the busbar inside the compartment, and it can also realize the connection with cables, arresters and voltage transformer.

Voltage transformer on the high voltage side with isolation/earthing switch available on the busbar side.

Busbar earth switch.

Cable or fully insulated busbar terminals.

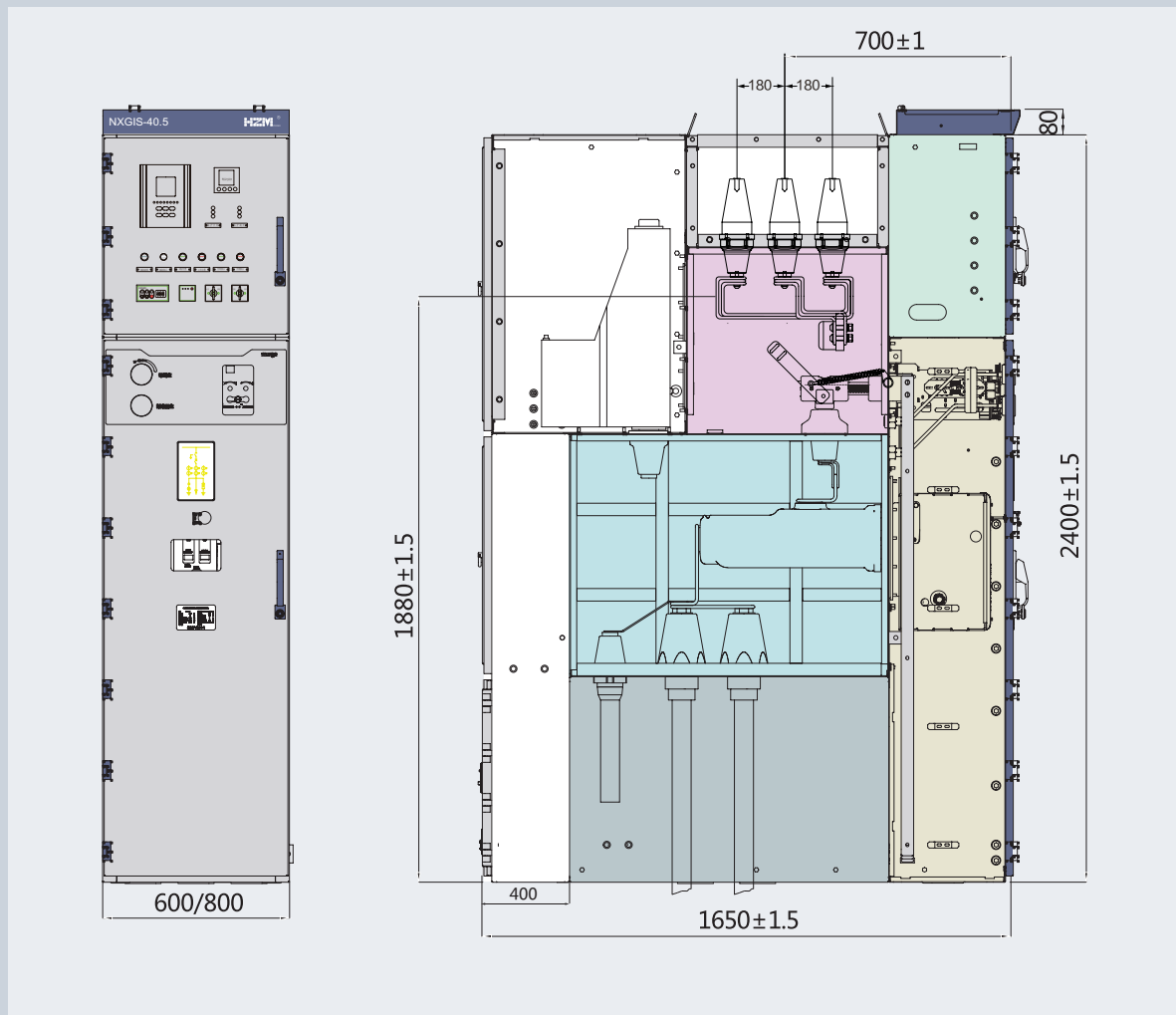
Cable Chamber

The cable chamber is an air-insulated compartment with a large cable installation space, which is convenient for installation and overhaul; the primary cable adopts the internal cone plug-in installation method, and each phase can be connected with 1~4 single-core cables, which has reliable insulating performance, is not affected by environmental factors such as salt mist and altitude and is easy to be installed; depending on the rated current of the cabinet, the current transformer is installed in the position of the cable plug-in at 630A, and the current transformer is installed in the lower part of the compartment and passes through the cables at 2500A and above. The voltage transformer and arrester are installed in the internal cone plug-in installation mode equipped with a removable sealing plate to facilitate the construction of the cable incoming cabinet.

NXGIS-40.5

Outline

Outline Dimension

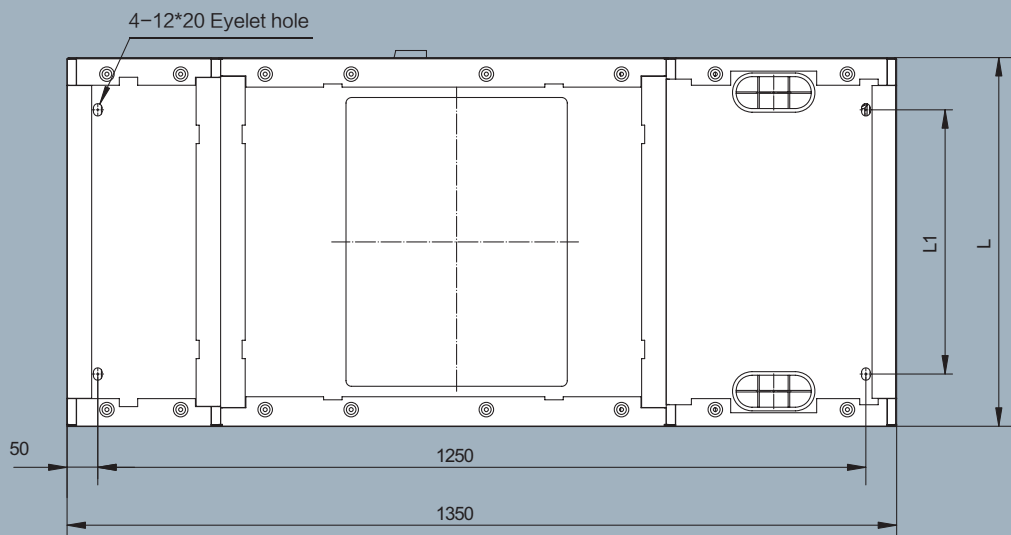


Rated voltage		kV		40.5		
Rated current		A		630	1250	2000/2500
Cabinet dimension	Width	mm	V Circuit breaker	600	800	1000
			V Busbar contact	1400	1600	1800
			V Circuit breaker with PT	650	800	1000
			PT	650	/	/
			Metering Upgrade	1400	1400	1400
			Metering program	1400	1400	1400
			Busbar upgrading	600	800	1000
			Busbar program	600	800	1000
			Isolation upgrading	600	800	1000
			Isolation	600	800	1000
	Depth	mm	1250			
	Height	mm	2480			

NXGIS-40.5

Foundation Drawing and Transportation

Outline Dimension and Foundation Drawing



Technical Requirements:

L Cabinet width (mm)	600	800
L1 Eyelet hole (mm)	430	630

1. The switchgear can be connected with the bolt to the foundation channel steel or welded to the foundation channel steel;
2. The laying of foundation channel steel should be ensured to be even, and the unevenness per meter should not be more than 1mm;.
3. The foundation should be able to withstand the maximum static load of switchgear of 2000kg and the maximum impact load of 3000kg;

Packing and Transportation Description

Vibration needs to be considered in transportation and protective measures should be taken. The switchgear should be stored in a ventilated, dry and no corrosive gas chamber, and should be checked regularly during the storage period. The switchgear should be checked according to the product instruction manual before it is put into operation, and it can be put into operation only after it is qualified.

When handling, lifting equipment should be used to lift the switchgear and then unload it from the packing chassis. Before lifting, the lifting rope should be selected according to the weight of the product, and the length of the rope should make the angle of the top of the lifting rope $\leq 60^\circ$.

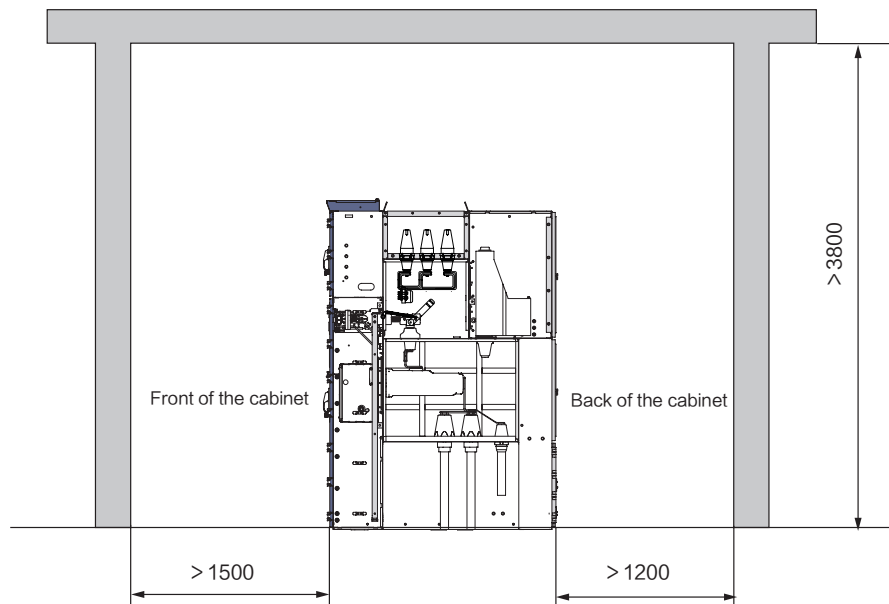
Attention:

- a) During the handling process, the transportation trolley should be padded on the bottom of the switch cabinet. It is strictly prohibited to move the switch cabinet by using rotary drum crowbar.
- b) The switch cabinet should be in the upright position during the handling process, and it is strictly prohibited to put the switchgear cabinet down and use the side, back or front side to handle the transportation.

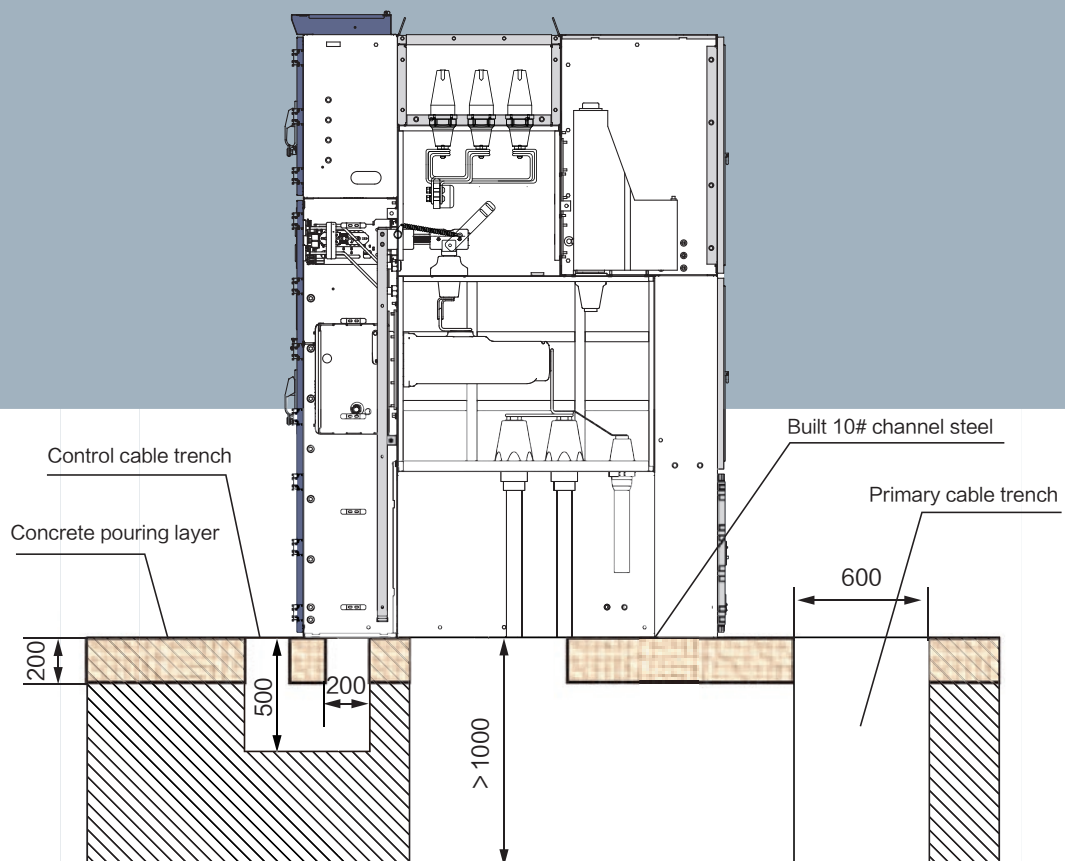
NXGIS-40.5

Installation

Layout of the switchgear



Trench Drawing



NXGIS-40.5

Delivery

Delivery

Delivery of the whole cabinet

Delivery test

Transportation unit for the whole cabinet

SF6 gas is rated pressure value

Crane or lifting truck operation

Installation

Requires an internal height of 2.8 meters or more

Installation on pre-built foundation frames or customized floor frames

Plug-in technology cable connect with the switchgear

Plug-in technology for connecting components such as transformers, arresters, etc. in the cable compartment

Commissioning

Performed by qualified specialists

Suitable plug-in test current and voltage used for tests are optional according to plug-in specifications on-site

No gas work is necessary

The tested connector can be used for cable test or maintenance earthing

Check and Maintenance

No need to fill the sealed gas chamber normally

The check item consists of visual inspection and function test

Delivery Inspection Item

Product assembly inspection

Ammonia mass spectrum leak detect

Puncture and partial discharge detect

Mechanical Characterization detect

Main circuit resistance measurement

SF6 gas moisture content measurement

Appearance Inspection

Memorandum