

# PINGGAO

GROUP INTERNATIONAL ENGINEERING CO.,LTD

## PRODUCTS BROCHURE



中国电气装备  
China Electrical Equipment



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# 01 ABOUT PINGGAO

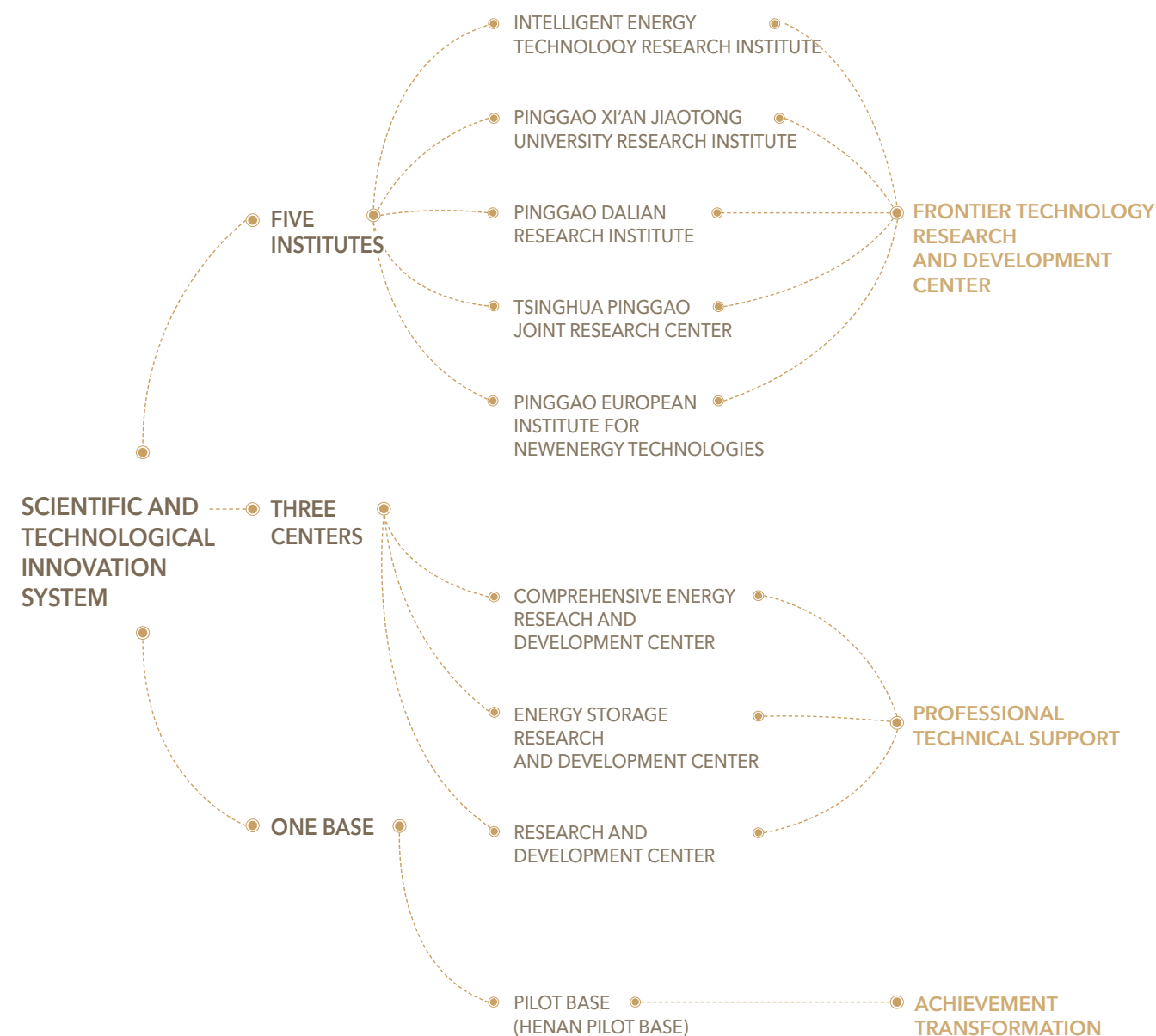
## BUILDING A WORLD-CLASS SMART ELECTRICAL EQUIPMENT GROUP

Pinggao Group Co., Ltd. is an important subsidiary of China Electrical Equipment Group Co., Ltd., a pillar enterprise of major technical equipment in China's electrical industry, a national innovative enterprise, a R & D and manufacturing base of major equipment for medium and low voltage, high voltage, extra-high voltage and ultra-high voltage switches, and the first high-tech enterprise certificated to the Chinese Academy of Sciences and the Ministry of science and technology (Double High Certification). It has formed a main business layout of power equipment R & D and manufacturing and energy system integrated solutions, which takes power equipment manufacturer and energy system Integrator at a basic and take switch at a core.

The business scope covers R & D, design, manufacturing, sales, testing, operation and maintenance of power transmission and distribution equipment and related equipment complete sets, EPC contractor in power engineering, whole process engineering consultation, comprehensive energy services, powerenergy storage, electric boilers and thermal energy storage, offshore wind power grid connection equipment, smart grid equipment, charging and exchanging facilities, etc. and other businesses.

Pinggao Group International Engineering Co., Ltd., as the core platform of Pinggao group's overseas projects, focuses on the EPC of power transmission and transformation, new energy and energy storage business, equipment export and comprehensive foreign trade services. To achieve high-quality leapfrog development, we will focus on improving the power grid business, expanding the equipment supply business and strengthening the new energy business.

# 02 R&D SYSTEM PINGGAO



Under the strategic background of tarbon emissions peaking, carbon neutrality and the newpower system based on new energy, Pinggao Group strengthens the leading advantages of traditional technologies, promotes emerging technologies, and establishes five institutes, three centers and one base as the group-level R&D organization. Under the technology + operation" mode of management and control, Pinggao highlights the market orientation of the core technology and continuously improves the operation efficiency of the scientific research system. Meanwhile, the Group comprehensively enhances the core competitiveness, industrial influence and market share in emerging technologies, and cultivates emerging industry groups to create a new engine for the Group's development.



## 03 AC SWITCHGEAR

- 3.1 72.5kV-1100kV LTB  
72.5kV-800kV DTB
- 3.2 40.5kV-1100kV Disconnecter and Earthing Switch
- 3.3 72.5kV-1100kV GIS
- 3.4 72.5kV-1100kV HGIS
- 3.5 40.5kV-1100kV GIL
- 3.6 252kV/550 kV High Capacity Switchgear
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- 3.8 40.5kV-252kV Low frequency Switchgear
- 3.9 550kV-1100kV LTB for cutting filter
- 3.10 12kV-40.5kV Cabinets
- 3.11 40.5kV-1100kV CT&PT

## 3.1 72.5kV-1100kV LTB



Circuit breakers are the most critical equipment in AIS and GIS switchgear, mechanical switchgear capable of closing, carrying and switching currents under normal circuit conditions, and shutting off mechanical switchgear capable of carrying and switching specified overload currents for a specified period of time. Pinggao has a full range of circuit breakers for all voltage ratings from 72.5kV up to 1,100kV, with a high degree of reliability and flexibility. Three-phase and split-phase operation is available, and for higher voltage classes, either with brake resistor or with phase closing can be selected.

### Main characteristics:

- Series modular design, covering all voltage levels from 72.5kV to 1100kV.
- Configured with spring mechanism, hydraulic spring and other mechanisms, maintenance-free or low-maintenance
- Porcelain or composite bushing are available;
- M2-E2-C2
- Experienced in operation, millions of circuit breakers have been in service.



TECHNICAL DATA

Rated voltage(kV)	72.5	145	170	245	363	420	550	1100
Rated current(A)	4000	3150	3150	4000	4000	5000	4000	4000
Rated frequency(Hz)	50	50	50	50/60	50	50	50	50
Rated short-time withstan dcurrent(kA)	40	40	50	50	63	63	63	63
Rated peak withstand current(kA)	100	100	125	135	171	171	171	171
Rated short-duration power frequency withstand voltage(kV)	140/160	275/315	325/375	460/ 460(+130)	510/ 510(+210)	520/610	620/800	1100/ 1100+(635)
Rated lightning impulse withstand voltage(kV)	325/375	650/750	750/860	1050/ 1050(+206)	1175/ 1175(+295)	1475/ 1425(+240)	1550/ 1550(+375)	2400/ 2400+(900)
Operation type	Three-pole	Three-pole/ single-pole	Three-pole/ single-pole	Three-pole/ single-pole	Single-pole	Single-pole	Single-pole	Single-pole

APPLICATION



• LW35-252



• LW10B-550



• LW10B-1100

72.5kV-800kV DTB

TECHNICAL DATA

Rated voltage(kV)	72.5	145	245	363	550	800
Rated current(A)	2500/3150	3150	4000	5000	6300	6300
Rated frequency(Hz)	50/60	50/60	50/60	50	50	50
Rated short-time withstand current(kA)	40	40	50	63	63	63
Rated peak withstand current(kA)	104	104	130	171	171	171
Rated short-duration power frequency withstand voltage(kV)	140/160	275/315	460/ 460(+146)	510/ 510(+210)	740/ 740(+318)	960/ 960(+460)
Rated lightning impulse withstand voltage(kV)	326/375	650/750	1050/ 1050(+206)	1175/ 1175(+295)	1675/ 1675(+450)	1500/ 1300(+650)
Operation type	Three-pole	Three-pole	Three-pole/ single pole	single-pole	single-pole	single-pole



• LW55-252



• LW55-363



• LW55-550



• LW55-800



3.2

40.5kV-1100kV DISCONNECTOR AND EARTHING SWITCH



Pinggao has a full range of disconnector and earthing switch for all voltage classes, with a wide variety of models for customers to choose from : Center break(GW4)、double break (GW27)、pantograph (GW46)、semi-pantograph (GW16)、knee-type(GW17),

Characteristics:

- A variety of products are available with high and low parameters.
- The rated current varies from 2000 to 5000, and the mechanical life reaches M2 level, which can be refined for selection;
- Strong weather resistance, excellent resistance to wind and sand, waterproof, anti-vibration and other properties.

TECHNICAL DATA

Product series	Rated voltage (kV)	Rated current (A)	Rated short-time withstand current(kA)	Rated short-duration power-frequency withstand voltage(kV)	Rated lightning impulse withstand voltage(kV)	Mechanical endurance
GW4 (Center break)	72.5	2000/3150	40	160/ 160(+42)	380/ 380(+59)	M2
	145	2000/3150	40	275/315	650/750	M2
	252	2000/3150	40/50	460/ 460(+146)	1050/ 1050(+206)	M2
GW16 (semi-pantograph)	145	2000/3150	40	275/315	650/750	M2
	252	3150/5000	50/63	460/ 460(+146)	1050/ 1050(+206)	M2
	363	3150/5000	50/63	510/ 510(+210)	1175/ 1175(+295)	M2
	420	3150	50	520/610	1425/ 1425(+240)	M2
	550	3150/4000	50/63	740/ 740(+315)	1675/ 1675(+450)	M2
GW17 (knee-type)	126	3150	40	230/ 230(+73)	550/ 550(+103)	M2
	252	3150/4000/5000	50/63	460/ 460(+146)	1050/ 1050(+206)	M2
	420	4000	50	520/610	1425/ 1425(+240)	M2
	550	4000	50/63	740/ 740(+315)	1675/ 1675(+450)	M2
	800	5000	63	960/ 960(+460)	2100/ 2100(+650)	M2
GW46 (pantograph)	72.5	3150	40	160/ 160(+42)	380/ 380(+59)	M2
	126	3150	40	230/ 230(+73)	550/ 550(+103)	M2
	252	3150/4000/5000	50	460/ 460(+146)	1050/ 1050(+206)	M2
	420	4000	63	520/610	1425/ 1425(+240)	M2
	550	4000	63	740/ 740(+315)	1675/ 1675(+450)	M2
GW27 (double break)	252	3150/5000	50/63	460/ 460(+146)	1050/ 1050(+206)	M2
	363	3150/5000	50/63	510/ 510(+210)	1175/ 1175(+295)	M2
	550	5000	63	740/ 740(+315)	1675/ 1675(+450)	M2
	800	5000	63	960/ 960(+460)	2100/ 2100(+650)	M2
	1100	6300	63	1100/ 1100(+630)	2550/ 2400(+900)	M2

TECHNICAL DATA

Product series	Rated voltage (kV)	Rated short-time withstand current(kA)	Rated short-duration power-frequency withstand voltage(kV)	Rated lightning impulse withstand voltage(kV)	Mechanical endurance
JW6	72.5	40	160	380	M2
	126	40	230	550	M2
	252	50	460	1050	M2
JW8	363	63	510	1175	M2
	550	63	740	1675	M2
	800	63	960	2100	M2
JW5	363	63	510	1175	M2
	550	63	740	1675	M2
	800	63	960	2100	M2
	1100	63	1100	2400	M2



APPLICATION



• GW4-126/J3150-40



• GW46-252



• GW16B-363/J5000-63



• GW17B-550



• GW46-550



• JW8A-550/J63

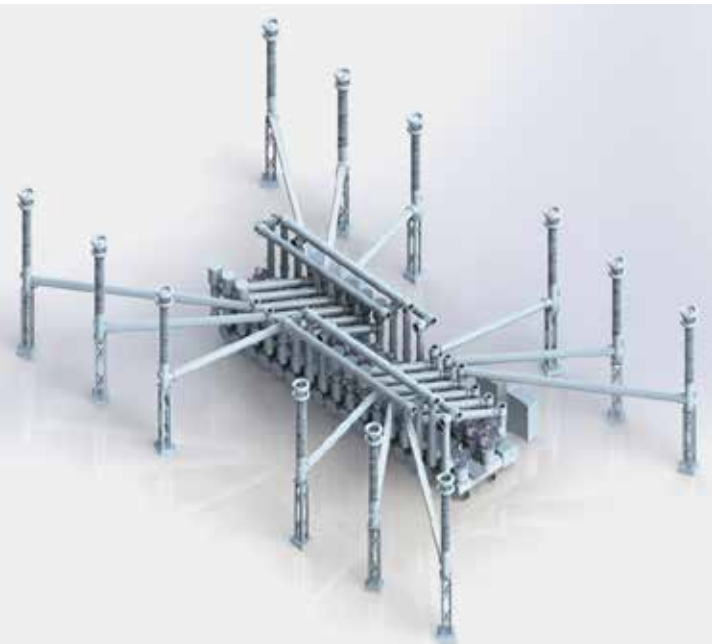


• GW27-1100/J6300-63

# 3.3 72.5kV-1100kV GIS

PG has 72.5-1100kV GIS. Through the application of new technologies, new materials and new processes, advanced optimization algorithms and fine design,the product size is more smaller, lighter and lower operating power. The new generation products has been gradually introduced to the market.

- indoor or outdoor
- spring/hydraulic spring/ hydraulic mechanism
- Can do customized design according to user needs or reconstruction of existing substation
- Continuous optimization and upgrading of products, high reliability, compact structure, saving more space
- Highly integrated, integrating busbar, circuit breaker, current transformer, voltage transformer, disconnecter, earthing switch and other components, long service life, less maintenance and even maintenance-free;
- Excellent performance parameters, higher than the IEC standard requirements.
- With rich manufacturing experience, it has been in service of millions of bays with good performance.



TECHNICAL DATA

Rated Voltage(kV)	72.5	145	245	420	550	800	1100
Rated frequency(Hz)	50/60	50/60	50/60	50	50	50	50
Rated current(A)	2000/3150	2000/3150	4000/5000	5000	6300	6300	6300/8000
Rated short-duration powerfrequency withstand voltage(kV)	140/160	275/315	460/460(+146)	650kV/605(+210)kV	740kV/740(+318)kV	960kV/960(+460)kV	1100kV/1100(+635)
Rated lightning impulse withstand voltage(kV)	325/375	650/750	1050/1050(+206)	1425kV/1425(+240)kV	1675kV/1675(+450)kV	2100kV/2100(+650)	2400kV/2400(+900)kV
Ratedshort-timewithstandcurrent(kA)	40	40	50	63	63	63	63/2
RatedPeakwithstandcurrent(kV)	104	104	130	171kA	171kA	171kA	170kA
Insulationmedium	SF6	SF6	SF6	SF6	SF6	SF6	SF6
Drive-mechanism of Circuit breaker	Spring	Spring	Spring	Hydraulic spring	Hydraulic spring	Hydraulic	Hydraulic
Ambient temperature range(°C )	-40~40	-40~40	-40~40	-40~40	-40~+55	-40~+40	-40~40
Installation(indoor/outdoor)	Indoor/ outdoor	Indoor/ outdoor	Indoor/ outdoor	Indoor/ outdoor	Indoor/ outdoor	Indoor/ outdoor	Indoor/ outdoor
Expected lifetime(year)	40	40	40	40	40	40	40
Gas leakage rate (%)	≤0.1	≤0.1	≤0.1	≤0.1	≤0.1	≤0.1	≤0.1



## APPLICATION



• ZF12B-145 Runyang, Thailand



• ZF12B-145 Puerto Seco, Spain



• ZF11C-252 Wucai Wan, Xinjiang, China



• ZF27-550 Tonghai, Jiangsu, China



• ZF27-800 Thiruvallam, India



• ZF27-1100 Shanghai, China

## 3.4 72.5kV-1100kV HGIS



### Product characteristics:

- The independent modular design of primary equipment can meet various single line diagram in typical design solutions, which is suitable for new construction, expansion or renovation of power plants, substations and railway electrification construction, and is especially suitable for upgrading and renovation of old substations, which is more convenient and economical.
- Compact, miniaturized and lightweight design, which can realize the transportation of the whole equipment and save the space, which is only about 45% of the traditional AIS.
- High reliability, low maintenance and flexible site arrangement.
- Factory pre-assembly and testing of the whole equipment, reducing on-site installation and commissioning.
- The circuit breaker adopts three-pole operation, equipped with spring mechanism, featuring low operating power, low maintenance, etc. The mechanical endurance can reach 10000 times.
- The incoming and outgoing lines are through bushing, composite or porcelain are available
- compared with GIS equipment, SF<sub>6</sub> gas usage is less (less than 50% of GIS usage), green and economic.
- Since 2018, 1,200 bays have been put into service with good performance



TECHNICAL DATA

Rated Voltage(kV)	72.5	145	170	252
Rated frequency(Hz)	50/60	50/60	50/60	50/60
Rated current(A)	2500/3150	2500/3150	2500/3150	2500/3150
Rated short-duration power-frequency withstand voltage(1.2/50μs, kV)	140/160	275/315	275/315	460/530
Rated lighting impulse withstand voltage(250/2500μs, kV)	325/375	650/750	650/750	1050/1200
Rated short-time withstand current(kA)	40	40	40	50
Rated Peak withstand current(kA)	104	104	104	135
Insulation medium	SF6	SF6	SF6	SF6
Class of Circuit Breaker	E2-C2-M2	E2-C2-M2	E2-C2-M2	E2-C2-M2
Class of Disconnecter	M2	M2	M2	M2
Class of Earthing Switch	E1-M2-B	E1-M2-B	E1-M2-B	E1-M2-B
Ambient temperature range	-30~+40℃	-30~+40℃	-30~+40℃	-30~+40℃
Installation(indoor/outdoor)	(indoor/outdoor)	(indoor/outdoor)	(indoor/outdoor)	(indoor/outdoor)
Expected lifetime(year)	40	40	40	40
Gas leakage rate	< 0.3%	< 0.3%	< 0.3%	< 0.3%

APPLICATION

SPAIN



• ZHW1B-145kV Y2 Xirgu, Spain



• ZHW1B-145 Y2 Pozo Alcon,Spain

THAI LAND



• ZHW1B-145 single bay Dan Nork,Thailand

BRAZIL



• ZHW1B-145 Y2 Pindoretama, Brazil



• ZHW1B-72.5 Y2 Maracanaú ,Brazil

3.5 40.5kV-1100kV GIL



- 1100kV GIL applied in Sutong GIL integrated pipe gallery project

Product Characteristics:

- Strong flow capacity, low environmental impact;
- Simple structure, flexible installation, low unit cost;
- Effectively solve the problems of traditional transmission lines in the city and across the river.

TECHNICAL DATA

Name	Value							
Rated Voltage(kV)	1100	800	550	420	363	252	126	40.5
Rated Current(A)	6300	6300	5000	4000/5000	4000	4000	3150	3150
Insulating medium	SF6	SF6	SF6	SF6	SF6	SF6	SF6	SF6
Rated short-duration powerfrequency withstand voltage (effective value)(kV)	1150	960	740	650	510	460	230	95
Rated lightning impulse withstand voltage(peak value)(kV)	2400	2100	1675	1425	1175	1050	550	185
Rated short-time withstand current and the duration(kA/s)	63/2	63/2	63/3	63/3	63/3	50/3	40/4	40/4
Rated peak withstand current(kA)	171	171	171	171	171	125	100	100
SF <sub>6</sub> gas pressure(MPa)	0.45	0.4	0.45	0.5	0.4	0.45	0.4	0.1
Mechanical testing of sliding contacts( cycle times)	15000	15000	15000	15000	15000	15000	15000	10000
The maximum unit length(m)	18	18	18	18	18	18	9	6
Housing type	Single-phase	Split-phase	Split-phase	Split-phase	Split-phase	Split-phase	Split-phase common tank	Split-phase





• 252kV GIL China Tibet Lhasa converter station



• 550kV GIL China Zhejiang Chaoyong substation



• 800kV GIL China Shanxi Baoji substation



• Eco-friendly 1000kV GIL State Grid Ultra High Voltage AC Test Base



• Nanjing Station

# 3.6 252kV/550kV HIGH CAPACITY SWITHGEAR

The problem of short-circuit current exceeding the standard of the backbone grid frame seriously threatens the safe and stable operation of the power system, and has become a prominent factor restricting the load growth and sustainable development of the power grid. Existing short-circuit current suppression measures have obvious shortcomings such as reducing the reliability of grid power supply and increasing the cost of grid construction. In order to reduce the operation risk of the power system, increase the transmission capacity of the power grid, and positively solve the problem of short-circuit circuit exceeding the standard, Pinggao has developed 252kV/63kA, 550kV/80kA large-capacity tank-type circuit breakers and GIS switchgear.

## Product characteristics:

- Strong rated through-current capacity, high short-circuit breaking current ;
- The size of the product is close to that of similar items.

## TECHNICAL DATA

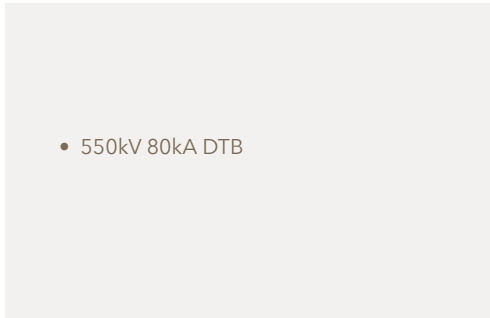
Rated voltage(kV)	252	550
Rated freque(Hz)	50	50
Rated current(A)	5000	8000
Rated short-duration powerfrequency withstand voltage(kV)	460/ 460(+130)	740/ 740(+318)
Rated lightning impulse withstand voltage(kV)	1050/ 1050(+206)	1675(+450)
Rated short-time withstand current(kA)	63	80
Rated peak withstand current(kA)	171	216
CB mechanical endurance	M2	M2
Electrical endurance	E2	E2
SF <sub>6</sub> gas leakage rate(%)	≤0.1	≤0.1
Operation type	Three-pole	Single-pole



• Qingcheng 252kV 63kA GIS, Guangdong, China



• Pingshan 252 kV substation, Shenzhen, China



• 550kV 80kA DTB





# 3.7 252kV/550kV HIGH SPEED SWITCHGEAR



In order to solve the increasingly serious problem of short-circuit current exceeding the standard in power grid, Pinggao Group firstly put forward the fast breaking technology based on sulfur hexafluoride arc extinguishing, and overcame the fast start-up technology of actuator, high-speed driving technology of contacts and extremely short arc breaking technology of arc extinguishing chamber, and successfully developed the international first 252kV and 550kV fast circuit breakers, which reduced the full breaking time of the circuit breakers from 50 milliseconds to less than 25 milliseconds, realizing a major breakthrough in the breaking time of sulfur hexafluoride circuit breakers. Translated with www.DeepL.com/Translator (free version)

Fast circuit breaker products can be widely used in key scenarios such as flexible suppression of short-circuit currents, fast removal of short-circuit currents, protection of converter transformers, etc., to increase the transmission capacity of power grids and improve the level of power grid safety.

## Product characteristics:

- Adopting compressed air type interrupter, with disc spring hydraulic mechanism, simple and reliable structure;
- Strong continuous current capacity, high short-circuit breaking current, short breaking time, less than 25ms;
- The size of the product is the same or close to the conventional circuit breaker, good interchangeability, circuit breaker can be replaced on-site



## TECHNICAL DATA

Rated voltage(kV)	252	550
Rated current(A)	4000	6300
Rated frequency(Hz)	50	50
Rated short-time withstand current(kA)	50	63
Rated peak withstand current(kA)	125	171
Rated industrail frequency withstand voltage(kV)	460(+146)	740(+318)
Rated lightning impulse withstand voltage(kV))	1050(+206)	1675(+450)
Mechanical endurance	5000	5000
Electrical endurance	E2	E2
Operation type	Single-pole	Single-pole
Rated(fast)breaking time	≤25ms	≤25ms





3.8

40.5kV-252kV LOW FREQUENCY SWITCHGEAR

Flexible low-frequency transmission technology combines the advantages of flexible network organization of AC transmission technology and low transmission loss of DC transmission technology, which has obvious advantages in the scenarios of medium and long-distance offshore wind power transmission, new energy aggregation and ransmission, etc., and has become a new solution. Reducing the grid frequency from 50Hz to 20Hz will cause the longest arc-burning time of GIS circuit breaker to increase by more than 60%, which exceeds the limit breaking capacity of the existing circuit breaker.

Pinggao Group breaks through the key technical bottleneck of low-frequency disconnection through key technological innovations such as disconnection mechanism research, arc simulation, matching of motion characteristics and optimization of structural materials, and successfully develops the world's first 20Hz 72.5kV and 252kV low-frequency GIS, which realizes the breakthrough of flexible lowfrequency AC transmission equipment from "0" to "1", and provides key equipment support for the first flexible low-frequency transmission demonstration project "220kV Tingshan - Zhongbu Project".

TECHNICAL DATA

Rated Voltage(kV)	40.5
Rated frequency(Hz)	20
Rated current(A)	1250A
Rated short-time withstand current(kA)	31.5kA
Rated Peak withstand current(kA)	80kA
Insulation medium	SF6
duration of ignition arc	≥0.5s
Mechanical endurance	M2
Electrical endurance	E2
Capacitive switching	C2
IAC rating	AFLR
Expected lifetime(year)	40
Bay width	3050/3200
Bay height,depth(depending on bay arrangement)	1400×2600
Bay weight	2~3t



• Flexible Low Frequency Demonstration Project, Taizhou, Zhejiang, China



LOW FREQUENCY GIS

TECHNICAL DATA

Rated Voltage(kV)	72.5	252
Rated frequency(Hz)	20	20
Rated current(A)	3150	4000
Rated short-duration power-frequency with stand voltage(1.2/50μs, kV)	160	460
Rated lighting impulse with stand voltage(250/2500μs, kV)	380	1050
Rated short-time withstand current(kA)	31.5	50
Rated Peak withstand current(kA)	80	125
Rated short-circuit breaking current(kA)	31.5	50
Insulation medium	SF6	SF6
Ambient temperature range	-25°C ~+40°C	-25°C ~+40°C
Installation(indoor/outdoor)	Indoor/ Outdoor	Indoor/ Outdoor
Expected lifetime(year)	40	40
Mechanical endurance	5000 (CB)	5000(CB)
Gas leakage rate	≤0.1%	≤0.1%



• 72.5kV low frequency GIS,Zhejiang,China



• 252kV low frequency GIS, Zhejiang,China



- 4.1 ±150/400/800/1100kV DC Wall-through bushing
- 4.2 ±550/800/1100kV DC Arrester
- 4.3 ±210/350/550kV DC GIS
- 4.4 ±400/800/1100kV DC Bypass switchgear
- 4.5 ±10kV-±1100kV DC Disconnecter
- 4.6 ±100/150kV DC Transfer switchgear

4.1 ±150/400/800/1100kV DC WALL-THROUGH BUSHING



DC through-wall bushing is the key equipment in high-voltage and extrahigh voltage projects, which can carry extra-high voltage and high current, play the role of through-flow, insulation and mechanical support, and is the only channel between the valve of high-voltage converter station and the DC field, which determines whether the converter station can work normally or not.

Pinggao Group adopts the technical route of pure SF6 gas insulation for DC throughwall bushing, which is simple in structure, light in weight and strong in throughcurrent capability. Pinggao Group has taken the lead in completing the development of the world's first ±1100kV gas-insulated DC through-wall bushing, and has gradually formed a series of products.

Product characteristics:

- High insulation parameters;
- High environmental adaptability,suitable for altitude of 3000 meters;
- High through-current capacity, temperature rise current up to 7000A.

TECHNICAL DATA

ITEM	DC wall-through bushing			
	BWP±1122	BWP±816	BWP±408	BWP±150
Rated voltage(DC,kV)	800	800	400	150
Temperature rise test current (AC,A)	7000	7000	7025	7025
Maximum continuous DC voltage, to ground( peak value, DC, kV)	1122	816	408	150
Rated lightning impulse withstand voltage(peak value, kV)	2420	2300	1255	770
Rated switching impluse Test Voltage( peak value, kV)	2100	1925	1060	685
Power-frequency 1 min test voltage( effective value,kV)	1273	1105	640	365
DC tolerance test and local discharge measurement( DC, kV)	1683	1565	785	290
Polarity Reversal Test and Local Discharge Measurement( DC, kV)	1403/+1403/-1403	1305/+1305/-1305	655/+655/-655	290/+290/-290
SF <sub>6</sub> gas rated pressure( 20°C , MPa)	0.5	0.4	0.4	0.4



• ±1100kV DC wall-through bushing, Changji, China



• ±800 and ±400kV DC wall-through bushing, Wuhan, China



4.2

±550/800/1100kV DC ARRESTER



Pinggao produces metal oxide arresters for DC systems covering voltage levels of ±1100kV and below; low-frequency transmission projects covering voltage levels of 252kV and below; and flexible DC transmission projects covering voltage levels of ±500kV and below.

Product characteristics:

- Multi-application scenarios: for converter valves (V), for busbars (DB), for lines (DL), etc;
- Small size, light weight, large absorption capacity, etc.

TECHNICAL DATA

ITEM		Value		
System Nominal Voltage(kVdc)		Un	±800	±1100
Rated voltage(kVrms)		Ur	1000	1400
Continuous operating voltage(kVcrest)		CCOV	850	1190
DC reference voltage(kV)		Udc	≥1015	≥1400
Maximum residual voltage(kVcrest)	lightning impulse	8/20μs	≤1625/20	≤2125/20
	operating impact	30/60μs	≤1391/1	≤1826/1
High Current Impact Tolerance (kVcrest)		4/10μs, 2Times	100/Piece	100/Piece
Square Wave Current Impact Tolerance(A)		2ms,18Times	2500/Piece	2500/Piece
Energy absorption capacity(kJ)			≥16500	≥34184
Coat insulation resistance strength(kVcrest)	Rated lightning impulse voltage		2500	2550
	Rated operating withstand voltage		1850	2100
Rated short-circuit current(kArms)		0.2s	65	65

TECHNICAL DATA

ITEM		DATA		
System Nominal Voltage(kVdc)		Un	±800	±1100
Rated voltage(kVrms)		Ur	278	220
Continuous operating voltage(kVcrest)		CCOV	95	90
DC reference voltage(kV)		Udc	≥296	≥278
Maximum residual voltage(kVcrest)	lightning impulse	8/20μs,	≤431/20	≤431/20
	switching impluse	30/60μs	≤393/7	≤398/7
High Current Impact Tolerance (kAcrest)		4/10μs, 2Times	100/Piece	100/Piece
Square Wave Current Impact Tolerance(A)		2ms,18Times	2500/Piece	2500/Piece
Energy absorption capacity(kJ)			≥53400	≥81000
Shel insulation resistance strength(kV)	Rated lightning impulse voltage		623	600
	Rated operating withstand voltage		519	550
Rated short-circuit current(kArms)		0.2s	65	65

TECHNICAL DATA

ITEM		DATA	
Rated voltage(kVdc)		536	
Continuous operating voltage(kVdc)		440	
Minimum operating voltage(kVdc)		275	
Continuous current(mA)		≤10.2	
Residual voltage(kV <sub>peak</sub> )	Fixing element	558	
	Controlled components	119	
	Overall	677	
ted DC withstand voltage, to earth (kVdc)		720	
Rated switching impulse withstand voltage peak, to earth (kVpeak)		957	
Rated lightning impulse withstand voltage peak, to earth(kVpeak)		982	
Energy Load-Dump(MJ)		≥480	
Total weight (kg)		176800	



• +11000kV CNB2 lightning arrester



• ±800kV DC converter valve lightning arrester



• ±800kV self-healing energy dissipation arrester



# 4.3 ±210/350/550kV DC GIS

In order to meet the lightweight and economic requirements of offshore wind power converter platforms, and to solve the problems of large volume and exposed live parts of DC field open switchgear, Pinggao Group has completed the development of the first series of ZZF1-210/350/550 DC GIS in China. Through long-term live assessment, the technical parameters are internationally leading.

### Product features:

- Single pole arrangement, SF6 gas insulation;
- DC GIS has no horizontal basin as a whole,
- Modular design, compact structure; Small footprint, low operation and maintenance costs, flexible layout, and customizable design of main wiring according to actual needs.

### TECHNICAL DATA

ITEM	ZZF1-210 (L)	ZZF1-350 (L)	ZZF1-550 (L)
System nominal voltage (kV DC)	200	320	525
Rated voltage (kV DC)	210	350	550
Rated lightning impulse withstand voltage (kV)	1050	1175	1675
Rated operating impulse withstand voltage, (kV)	450	950	1300
Rated DC withstand voltage (phase to ground, kV)	400	630	825
Rated current (A dc)	4000	4000	5000
Rated short-term thermal current (kA)	50(1s)	50(1s)	63(2s)
Peak withstand current (kA)	125	125	171



• ZZF1-210 (L)/J4000-50 DC GIS (long-term energized test )



• ZZF1-350 (L)/J4000-50 DC GIS (long-term energized test)

# 4.4 ±400/800/1100kV DC BYPASS SWITCHGEAR

The DC bypass switch shortens the converter bridge during its exit from operation, and transfers the current to the converter valve during the operation of the converter bridge. The DC bypass switch is the core equipment of the converter station in the DC transmission system, which can increase the operating mode of the ultrahigh voltage DC system, reduce the number of complete single pole shutdowns, and improve the reliability and energy utilization of the DC transmission system.

### Product features:

- Low non-uniformity coefficient and high reliability: The arc extinguishing chamber adopts a double break series structure, and a resistance capacitance voltage equalization device is set between the breaks;
- Strong current carrying capacity, rated short-term DC current up to 8000A, strong breaking capacity, rated DC transfer current of 2500A;
- High mechanical stability and long mechanical life: The mechanism adopts a hydraulic disc spring mechanism with modular design, and has passed 10000 mechanical operation assessments;
- High insulation parameters, meeting the requirement of an altitude of 3000 meters;
- Wide application range, can be applied in -40°C .





TECHNICAL DATA

UNIT	TECHNICAL DATA			
	1120kV	816kV	408kV	
Maximum continuous voltage (to earth) (kV)	1120	816	408	
Rated short-duration DC current (A)	6300	8000	8000	
Rated DC transfer current (A)	2500	2500	2500	
DC withstand voltage, 1h(kV)	To earth	1680	1568	784
	Across the isolating distance	840	784	784
Rated operating impulse withstand voltage (kV)	To earth	2100	2010	1140
	Across the isolating distance	1175	1140	1140
Rated lightning impulse withstand voltage (kV)	To earth	2700	2496	1504
	Across the isolating distance	1300	1504	1504
Rated short-duration withstand current (kA)	25	25	25	
Time of duration(s)	3	3	3	
Rated peak withstand current (kA)	63	63	63	
Mechanical endurance (times)	5000	10000	10000	
Terminal static load (horizontal longitudinal, horizontal transverse, vertical) (N)	3000, 2000, 2000	3500, 2000, 3500	3500, 2000, 3500	



• 816kV DC bypass switch (Shaanbei converter station)



• 408kV DC bypass switch (Shaanbei converter station)

# PINGGAO

## SF6-FREE-SWITCHGEARS

In order to actively respond to the global warming crisis, Pinggao Group vigorously responds to the goal of "carbon peak and carbon neutrality", adheres to the concept of green development, serves the green construction of the power grid, helps improve the national electrification level, is committed to reducing the use of sulfur hexafluoride gas, and actively carries out research and developon vacuum breaking technology.

- 5.1 12kV-40.5kV SF6-Free Cabinet
- 5.2 72.5kV-252kV SF6-Free LTB
- 5.3 126kV-252kV SF6-Free GIS
- 5.4 72.5kVSF6-Free GIS for Wind Turbine



5.1

12kV-40.5kV SF6-FREE CABINET

The switchgear is mainly used in the processes of power generation, transformation, distribution, and energy conversion, for opening and closing, controlling, and protecting power systems with voltage levels not exceeding 40.5kV.

At present, Pinggao has developed 12kV-24kV-40.5kV N<sub>2</sub> or dry air insulated cabinets, as well as 12kV-24kV N<sub>2</sub> insulated ring main unit cabinets.



12kV/24kV/40.5kV SF6-Free Cabinets

Features:

- 3mm stainless steel laser welding
- the main circuits is gas sealed
- Single gas tank, cabinet type, modular structure
- excellent insulation performance at 0 bar gauge
- N<sub>2</sub> or dry air insulation
- Circuit breakers with solidly sealed poles, vacuum breaking
- The cabinet can be removed and replaced without moving adjacent cabinets
- Incoming mode: cable entry downwards
- Connection mode: Elbow or plug-in cable terminal (in accordance with EN 50181)



TECHNICAL DATA

Rated voltage(kV)	12			24			40.5	
Rated short-duration powerfrequency withstand voltage (at 0 bar gauge)(kV)	42/48			65/79			95/118	
Rated lightning impulse withstand voltage (0 bar gauge)(kV)	75/85			125/145			185/215	
Rated frequency(Hz)	50			50			50/60	
Insulation	N <sub>2</sub>			N <sub>2</sub>			N <sub>2</sub> , dry air	
Rated current(A)	630, 1250	1600, 2000, 2500	630,1250	630,1250	1600,2000, 2500	630,1250	1600,2000, 2500	
Rated single/back-to-back capacitor bank breaking current(A)	630/400	/		630/400	/	630/400		
Rated short-circuit breaking current(kA)	25, 31.5	25, 31.5, 40	25	25			25,31.5	
Annual air leakage rate(%)	≤0.05			≤0.05			≤0.05	
Gas moisture content(μL/L)	≤250			≤250			≤250	
Rated short-time withstand current(kA/s)	25/4, 31.5/4	25/4, 31.5/4, 40/4	31.5/4, 40/4	25/4			25/4, 31.5/4	
Rated peak withstand current(kA)	63, 80	63, 80, 100	80,100	63			63,80	
Rated cable charging breaking current(A)	25			25			50	
Rated operation sequence	O-0.3s-CO-3min-CO			O-0.3s-CO-3min-CO			O-0.3s-CO-3min-CO	
Rated inflation pressure (rel, 20°C , MPa)	0.02			0.02			0.02	
Design pressure (rel, 20°C ,MPa)	0.07			0.07			0.07	
Alarm pressure (rel, 20°C ,MPa)	0.01			0.01			0.01	
Minimum functional pressure (rel, 20°C , MPa)	0			0			0	
IAC level	AFLR 25kA/1s	AFLR 40kA/0.5s	AFLR 40kA/0.5s	AFLR 25kA/0.5s			AFLR 31.5kA/0.5s	
	AFLR 31.5kA/0.5s							
Seismic resistance level	AG5	AG3	AG3	AG3			AG5	

Fluorine free RMU

Features:

- 3mm stainless steel laser welding
- Single gas tank, box type, modular structure
- The insulation of the complete machine at zero voltage meets the requirements of electrical performance test
- N<sub>2</sub> gas insulationVacuum circuit breaker, vacuum breaking
- All gas sealing in the high-pressure circuit
- Incoming mode: cable entry downwards
- Connection mode: The plug-in cable terminal is applied with a shielded detachable connector (in accordance with EN 50181)



TECHNICAL DATA

Rated voltage	12	24	36
Rated frequency	50	50	
Rated current	630	630	
Insulation	N <sub>2</sub>	Dry air	
Rated short-time power frequency withstand voltage (1min, RMS)	42/48	50/60	70/80
	42/48	50/60	70/80
Rated lightning impulse withstand voltage (1.2/50μs peak)	75/85	125/145	170/195
Rated short-circuit breaking current	20/25	21	
Rated peak withstand current	50/63	52	
Annual gas leakage rate	≤ 0.05	≤0.1	
Rated short-circuit breaking current	20/25	20	
Mechanical endurance of main switch	10000	10000	
Mechanical endurance of earthing switch	3000	3000	
Accessible types			A(F, L, R) A (F, L, R)
Internal arc test current	-	20	
Duration of internal arc test current	-	1	
IP degree	Cabinet enclosure	IP4X	IP4X
	Gas tank	IP67	IP67



• LCG-12



• LCG-40.5

5.2 72.5kV-252kV SF6-FREE LTB



Technical Characteristics:

- The arc extinguishing chamber uses vacuum interrupter and N<sub>2</sub> as insulation medium, with GWP=0, significantly reducing the environmental impact of the product throughout its entire life cycle.
- Excellent performance, with a circuit breaker rating of E2-C2-M2, breaking through the problem of mutual restriction between the breaking capacity and rated current capacity of the vacuum arc extinguishing chamber.
- Strong environmental adaptability, meeting the requirement of -40°C low temperature, and the vacuum arc extinguishing chamber achieves maintenance free throughout its entire life cycle.
- Using silicone rubber bushing, it has excellent seismic and hydrophobic properties.
- Equipped with a spring operating mechanism, stable performance and high reliability.



TECHNICAL DATA

ITEM	ZW64-72.5	ZW64-145	ZW64-252
Rated voltage (kV)	72.5	145	252
Rated current(A)	3150	3150	4000
Frequency (Hz)	50	50	50
Rated short-circuit breaking current (kA)	40	40	50
Rated peak withstand current (kA)	100	100	125
External insulation medium	N <sub>2</sub>	N <sub>2</sub>	N <sub>2</sub>
Rated gas pressure (MPa)	0.25	0.25	E2
Electrical endurance	E2	E2	E2
Mechanical life endurance	M2	M2	M2
Environmental temperature (°C )	-40 ~+40	-40 ~+40	-40 ~+40



• ZW64-126 Guangzhou,China



• ZW64-145 Pingdingshan ,China

5.3 126kV-252kV SF6-FREE GIS

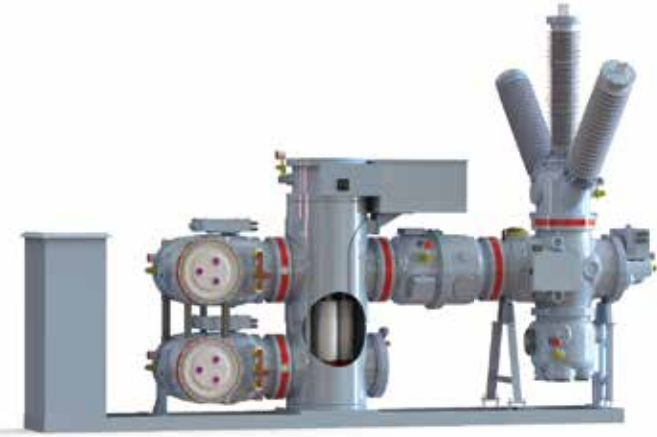


• ZF61-252kV SF6-Free GIS

SF6-free GIS uses dry air gas or CO<sub>2</sub> as the insulation medium, and the circuit breaker adopts a vacuum arc extinguishing chamber, and can be transported as the entire bay. SF6-Free GIS is the one truly achieves zero fluorine, zero toxicity, and zero gas maintenance costs, and minimizes carbon footprint to the greatest extent possible.

Technical Characteristics:

- High reliability: In the entire manufacturing process, simulation calculations are combined with process improvements to ensure the reliability of product operation;
- Environmentally friendly: using dry air or CO<sub>2</sub> as insulation medium, with GWP ≤ 1, achieving low carbonization, and intelligence.
- Economical: Good universality and strong serialization of components; no subsequent gas recovery and treatment costs;
- No maintenance or less maintenance: The vacuum arc extinguishing chamber can achieve full life cycle maintenance free; The circuit breaker adopts mature spring mechanism or motor direct drive mechanism, which is stable and reliable;
- Strong environmental adaptability, suitable for low temperature environments of -40°C, and can be used in cold regions.



• ZF61-126kV SF6-Free GIS



TECHNICAL DATA

Rated Voltage(kV)	126	145	252
Rated frequency(Hz)	50	50	50
Rated current(A)	2500	2500/3150	2500/3150
Rated short-duration power-frequency withstand voltage(1.2/50μs, kV)	230/265	275/315	460/530
Rated lighting impulse withstand voltage(250/2500μs, kV)	550/630	650/750	1050/1200
Rated short-time withstand current(kA)	40	40	40
Rated Peak withstand current(kA)	100	100	100
Insulation medium	CO <sub>2</sub>	Dry air	Dry air
Rated Pressure	0.8	0.8	0.8
Ambient temperature range (°C)	-40~+40	-40~+40	-40~+40
Expected lifetime(year)	40	40	40
Installation(indoor/outdoor)	Indoor/outdoor	Indoor/outdoor	Indoor/outdoor
Gas leakage rate(%)	≤0.1	≤0.1	≤0.1



• ZF61-126kV Huzhou Chengbei Substation, Zhejiang, China



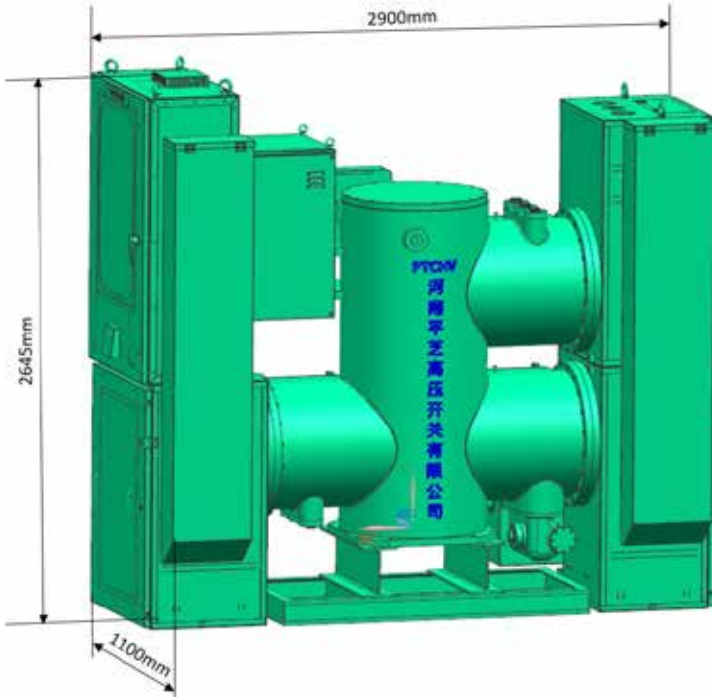
• ZF61-126kV Henan Hebi Side Substation, Henan, China

5.4 72.5kV SF6-FREE GIS FOR WIND TURBINE

72.5kV SF6-free GIS uses dry air as the insulation medium, and the circuit breaker adopts a vacuum arc extinguishing chamber. The product meets the C5-H C5-H highest level anti-corrosion requirements, with a compact structure. The GIS can enter and exit from the tower as a whole unit, achieving complete machine replacement.

Technical Characteristics:

- High reliability: In the entire manufacturing process, simulation calculations are combined with process improvements to ensure the operational reliability of the product;
- Environmentally friendly: The insulation medium is dry air, with a GWP=0, achieving green and low-carbon requirements;
- Modular design: The product has a high degree of modularity, and faulty modules can be separated and replaced directly during maintenance;
- Economical: Good universality and strong serialization of components; Good adaptability to the environment, with no subsequent gas recovery and treatment costs;
- No maintenance, less maintenance: The vacuum arc extinguishing chamber achieves full life cycle maintenance free; The circuit breaker adopts mature spring mechanism, which is stable and reliable;
- Strong environmental adaptability, suitable for low temperature environments of -30 °C, and can be used in cold regions.



TECHNICAL DATA

Rated Voltage(kV)	72.5
Rated frequency(Hz)	1250
Rated current(A)	50
Rated short-duration power-frequency withstand voltage(1.2/50μs, kV)	140/160
Rated lighting impulse withstand voltage(250/2500μs, kV)	325/375
Rated short-time withstand current(kA)	31.5
Rated Peak withstand current(kA)	80
Insulation medium	Dry air
Rated Pressure	0.8
Ambient temperature range (°C )	-40 ~+40
Expected lifetime(year)	40
Installation(indoor/outdoor)	Indoor/outdoor
Gas leakage rate(%)	≤0. 1