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ZHEJIANG SANGAO ELECTRIC CO.,LTD.



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SANGAO ZHEJIANG SANGAO ELECTRIC CO.,LTD.
ELECTRIC

20-YEAR PROFESSION





China's high-voltage electrical industry-leading brands
www.cnsangao.com

Recommended Enterprise by State Economic and Trade Commission,
and National Power Grid Construction and Retrofit
Certificated Enterprise by ISO14001 International Environmental Management System
Certificated Enterprise by ISO9001 International Quality Management System
Certificated Enterprise by ISO18001 Occupational Health and Safety Management System
New Hi-Tech Enterprise in Zhejiang Province
CCC Compulsory Certification Enterprises
Industrial Transformation and Upgrading Enterprise

About Us

Zhejiang Sangao Electric Co., Ltd. is a hi-tech enterprise which was established and develops with the glorious course of China's Reform and Opening-Up Policy, and a key enterprise integrating R&D design, production and sales in high voltage power transmission and distribution equipment manufacturing industry. Many years of development and innovation, and many years of unremitting efforts have changed the look of Sangao, have achieved the leap development, and have established the Sangao enterprise spirit, continuous self-improvement, continuous innovation, transcending ourselves, and never-say-die. Sangao is located in Liushi, China Electrical Capital with convenient transportation and beautiful environment. Our enterprise covers an area of 50 mu, and building area of 50000 square meter. There are 520 employees, including 75 middle and senior professional personnel. The registered capital is 31.8 million yuan, and the total assets about 200 million. We have the advanced production equipment and excellent product testing equipment, adopt modern ERP management system, and fully implement ISO9001:2008 quality management system, ISO14001 environmental management system, and OHSMS 18001 occupational health and safety management system. Adhering to the Sangao tenet of High Quality, High Efficiency, and High Standard, we have close cooperation and communication with Xi'an Senyuan, Beijing Electrical Power Research Institute, Xi'an High Voltage Appliance Research Institute and other technical colleges. Our main products are high-voltage vacuum load switch, high-voltage load switch, high-voltage vacuum circuit breaker, high-voltage vacuum contactor, disconnecter, grounding switch, high-voltage fuse, lightening arrester and operating mechanism, which are widely used in urban and rural power grid reformation, power transmission and distribution projects, sewage treatment, hydropower stations, wind power plants, metallurgy industry, petrochemical industry, mines, railways, construction and power engineering projects in residential communities. Sangao has gradually becoming a quality supplier in high-voltage electrical industry in China.

Limitless innovation, brave challenge! In the tide of reformation and opening-up, we will take global vision, open thinking, and the development strategy of diversification, branding and internationalization, so as to achieve the continuous, stable and harmonious development, to create value for customers, to create wealth for the country, to create opportunities for employees, to create happiness for human beings, and to create a harmonious society!





Sharp Tools Make Good Work.

Therefore we adopt Sangao hardware devices with the largest investment, adopt standard rules to guarantee the synchronous growth of equipment and enterprise. We make regular maintenance to each link of the assembly line so as to ensure the high quality of Sangao products. We have strict testing workshop and precise testing equipment for the quality of the product before delivery, which forms a safety net for users before operation. We hope all users have no worries in using our products.





Altitude Determines Perspectives!

For many years, Sangao is devoting itself to creating the most professional and the most excellent high-voltage electrical manufacturer and supplier with its perspective decision, and establish a good corporate image with our high quality products and perfect service, therefore winning a place in the fierce market competition. Facing the challenges and opportunities of the new century, we continue to strengthen the independent innovation ability, improve product quality, strengthen service consciousness and founds the core competitiveness of the brand. We are aware that quality is the life of an enterprise, and the survival and development result from constant innovation and practical attitude; to create Sangao brand is our eternal theme.



High
Quality

High
Efficiency

High
Standard



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Strategies win the market

Outstanding product quality, professional marketing team, and nationwide marketing network provide you with timely service. Make strategies to win the market and make insight into market opportunities with perfect quality and perfect service, and thus realizing win-win of both brand and benefit.





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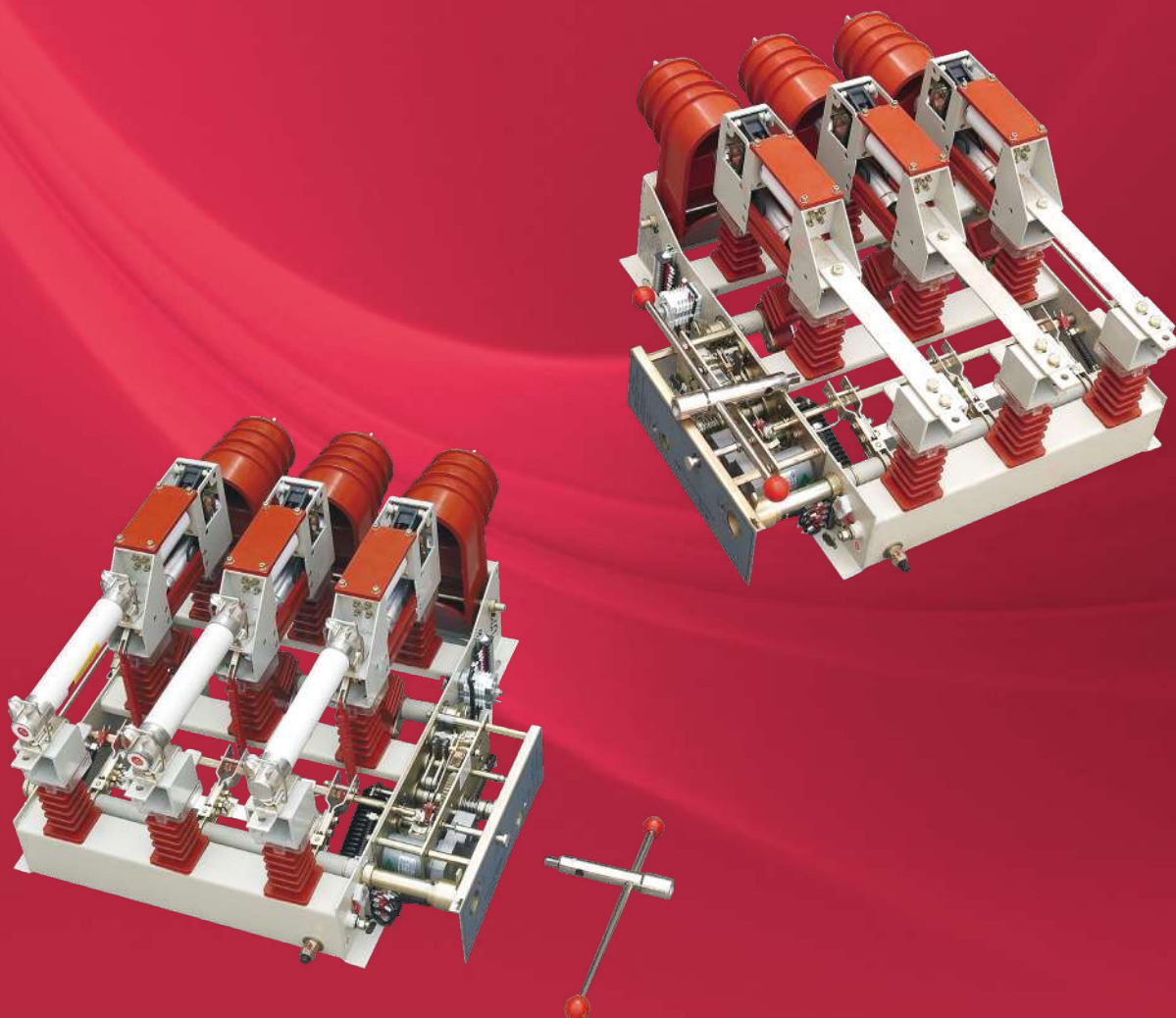
Indoor High Voltage Load Break Switch



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SG25-12 Series Vacuum Load Break Switch



SG25-12 Series Vacuum Load Break Switch [SG25、SG25R]

General

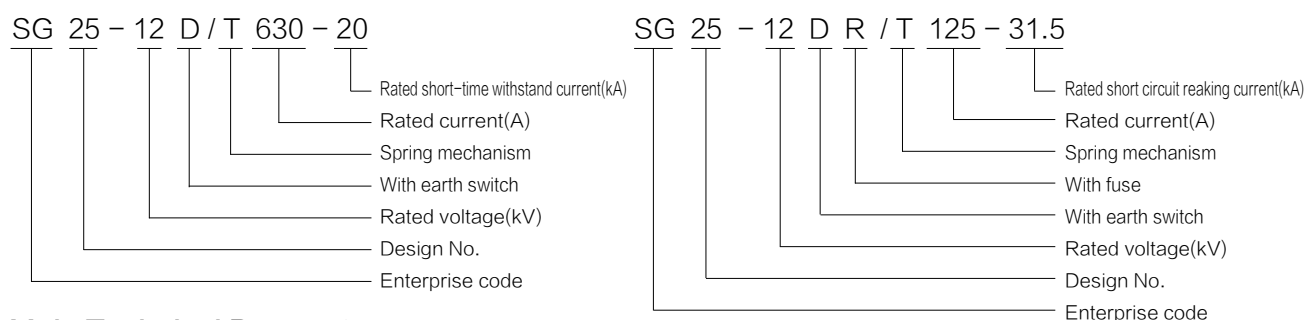
SG25 series vacuum load break switch/switch-fuse combinations are suitable for three-phase AC50Hz ring network or terminal power supply and industrial electric equipments, it's mainly used for load control and short-circuit protection. The load break switch makes and breaks the load current, closed-loop current, no-load transformer and cable charging current. The combination can break any current up to rated short-circuit current. The directly-acting isolating distance and arc-extinguishing chamber are linked, with manual and electrical function.

SG25's unique drive mechanism enables the arc-extinguishing chamber to bear high voltage only at the moment of closing and making, which realizes small volume and light weight.

It allows one-time operation for isolating distance and arc-extinguishing chamber open distance.

Grounding shutter, between the conducting tubes of fixed contact and moving contact, linked with earth switch guarantees safety and convenience for maintenance.

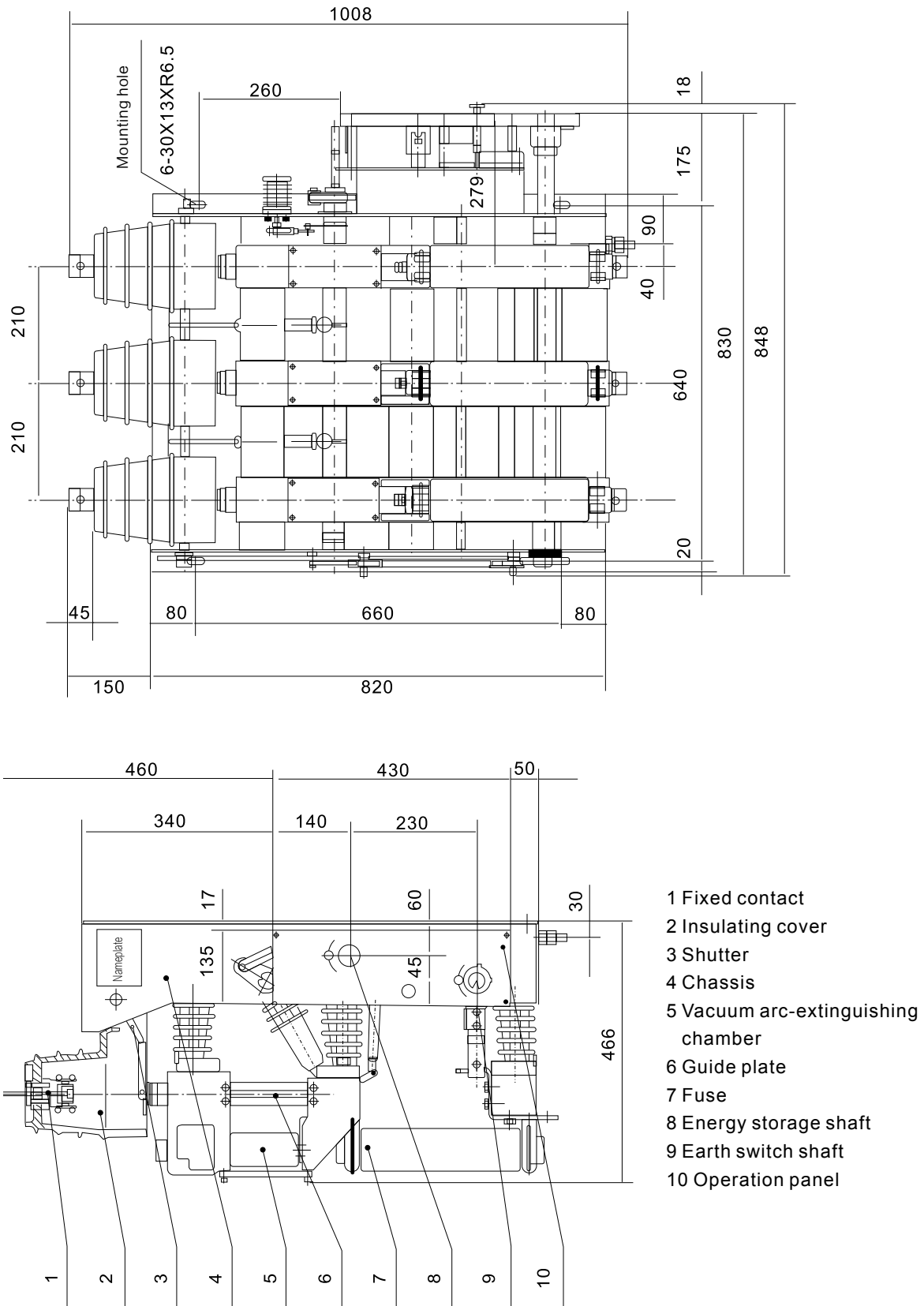
Model Implication

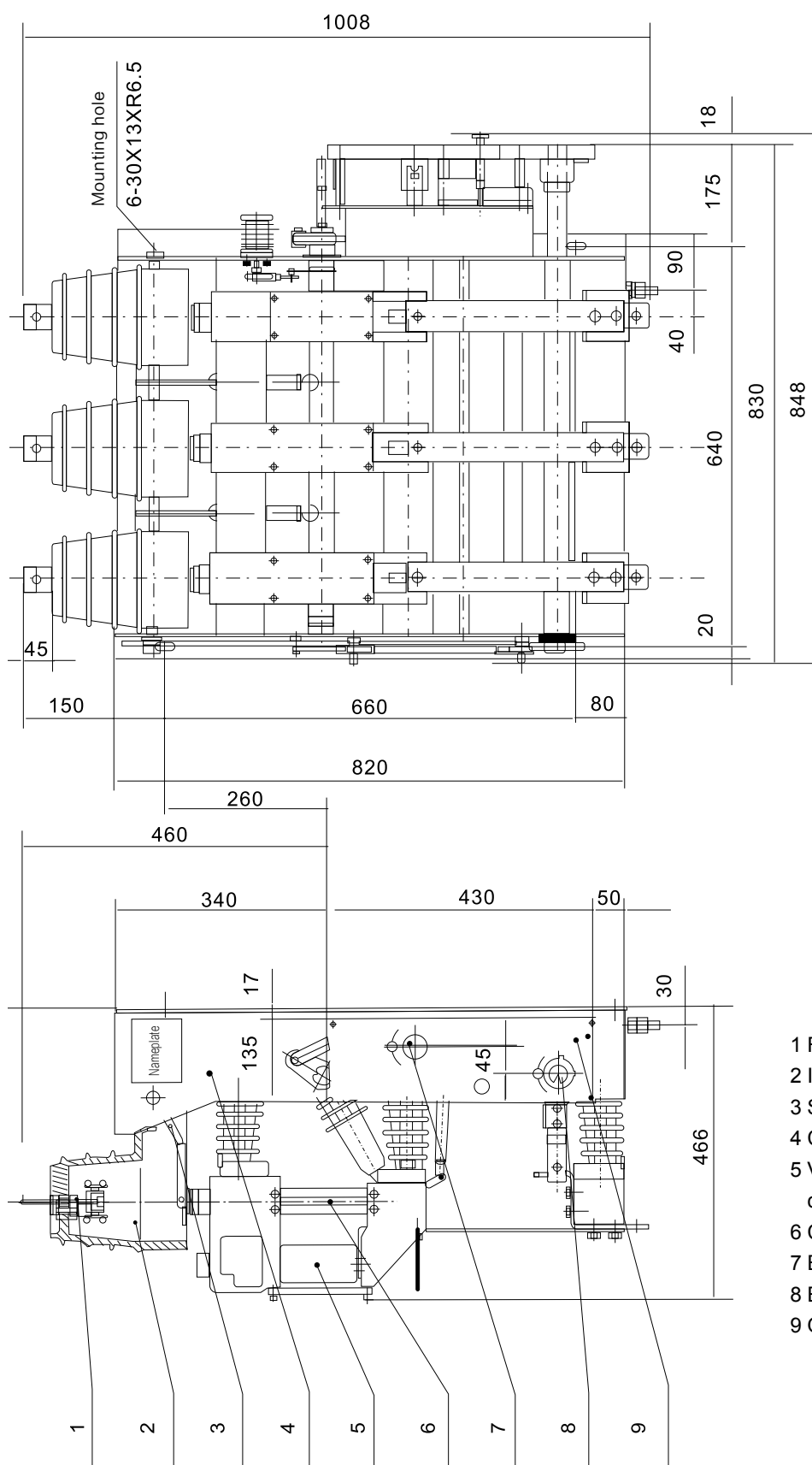


Main Technical Parameters

No.	Item		Unit	Parameter	
				SG25-12D/T630-20	SG25-12DR/T125-31.5
1	Rated voltage		KV	12	
2	Rated frequency		HZ	50	
3	Rated current		A	630	125
4	Rated Current	1min power frequency withstand voltage	KV	Arc-extinguishing chamber opening distance:30, phase-to-phase, phase-to-phase 42; across isolating distance 48	
		Lightning impulse withstand voltage	KV	Phase-to-phase, phase-to-phase 75; across isolating distance 85	
5	Rated dynamic current (peak)		KA	50	-
6	4S thermal stability current		KA	20	-
7	Rated active load breaking currentRated active load breaking current		A	630	125
8	Rated closed-loop breaking current		A	630	125
9	Rated cable charging breaking current		A	10	10
10	No-load transformer breaking capacity		KVA	1250	1250
11	Rated short circuit breaking current		KA	-	31.5
12	Rated transfer current, rated take-over current		A	-	2000
13	Model of fuse			-	SDLAJ-12 SFLAJ-12
14	Output energy of striker		J	-	2-5(Medium)
15	Rated short circuit making current		KA	50	
16	Rated dynamic current of earth switch		KA	50	
17	2S thermal stability current of earth switch		KA	20	
18	Rated voltage of auxiliary circuit		V	AC/CD220;110	
19	Mechanical life		time	10000	

Outline and Installation Size







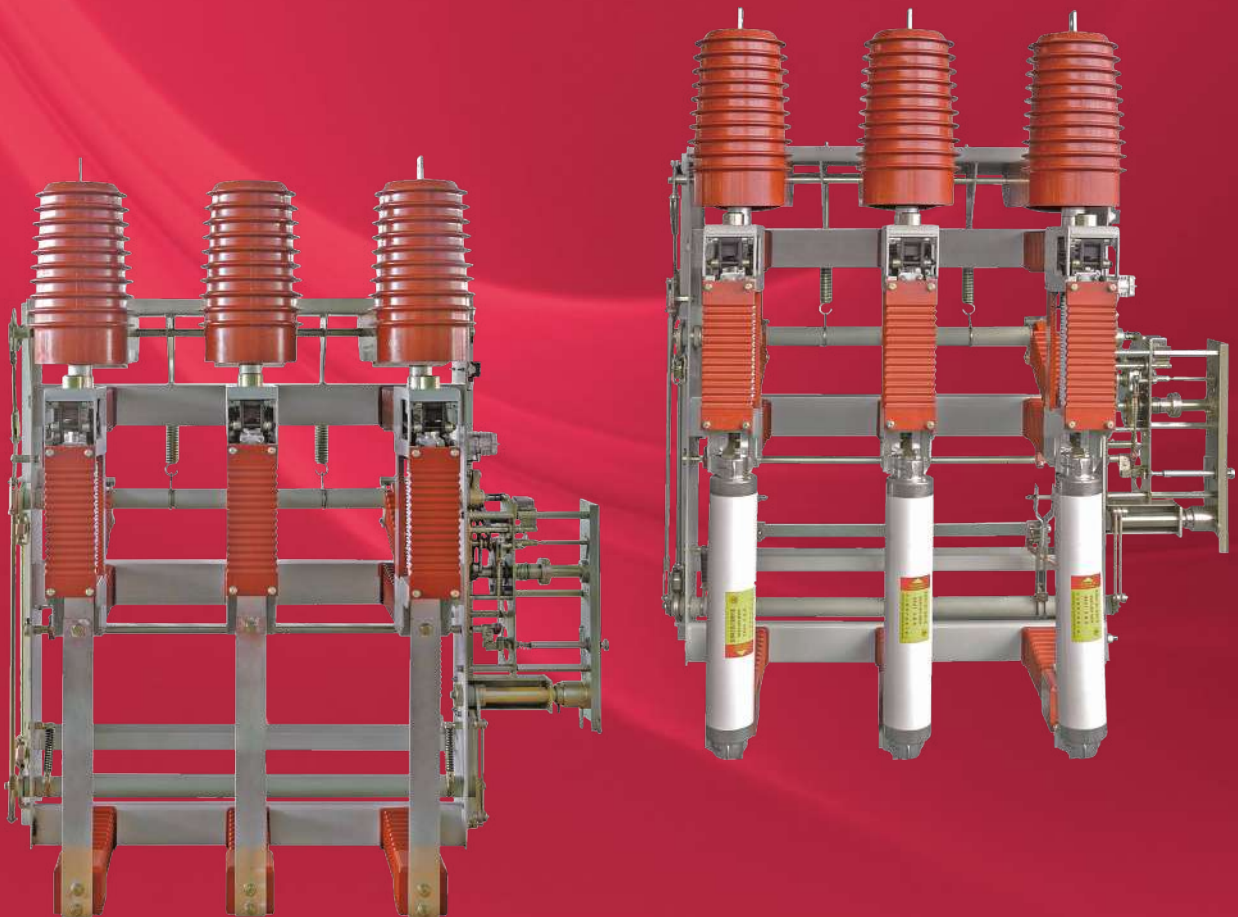
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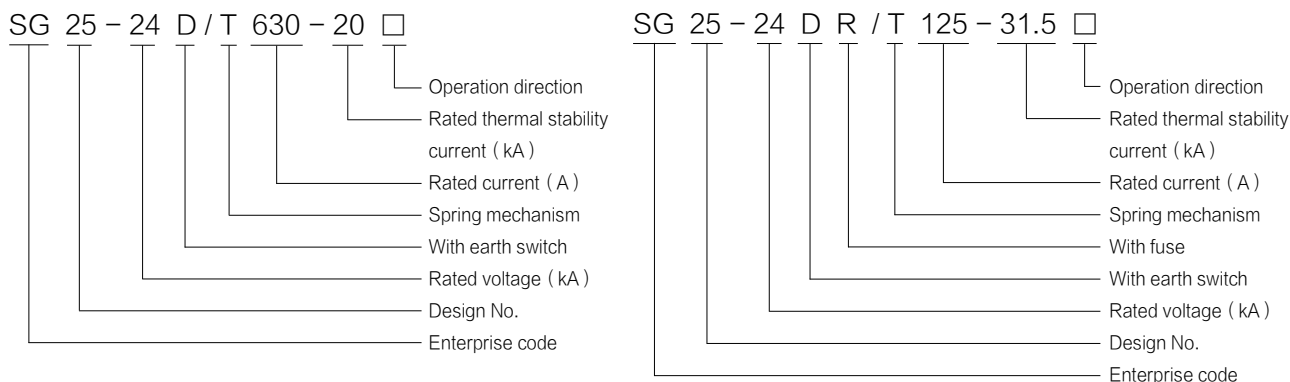
**SG25-24 Series Vacuum Load
Break Switch**

**SG25-24DR Series Vacuum Load
Break Switch/Switch-Fuse Combination**



SG25-24D/SG25-24DR Series Vacuum Load Break Switch/Switch-Fuse Combination

Model Implication



Note: 1. Generally, it's operated on the right of the load break switch, Z denotes operation on left;
 2. The rated current of fuse (A) can be selected by user as per requirement.

Main Purpose

SG25 series indoor AC high voltage vacuum load break switch/switch-fuse combination is a control and protection device for three-phase AC50Hz 24kv power distribution system, and it has been widely used for substations of industrial and mining enterprises and buildings, especially for distribution system of looped network.

Normal Work Environment

- a. Ambient temperature: upper limit +40℃ ; lower limit -25℃ (allow to store at 30℃);
- b. Altitude: ≤ 1000m;
- c. Daily average relative humidity: ≤ 95% (+20℃), monthly average: ≤ 90%(+20℃);
- d. Earthquake intensity: ≤ 8 degrees;
- e. In place free of pollution from corrosive and flammable gas or vapor;
- f. In place of no intense vibration;
- g. Pollution grade: class II.

Main Technical Parameters

Mechanical performance of SG25-24D vacuum load break switch and SG25-24DR switch-fuse combination

No.	Item	Unit	Parameters	
			SG25-24D/T630-20	SG25-24DR/125-315
1	Depth of conducting tube into fixed contact seat	mm	> 20	
2	Opening distance of vacuum arc-extinguishing chamber	mm	12+10	
3	Amount of compression for pressure spring of vacuum arc-extinguishing chamber	mm	2+10	
4	Average closing speed of vacuum arc-extinguishing chamber	m/s	0.6 ± 0.2	
5	Average opening speed of vacuum arc-extinguishing chamber	m/s	1.0 ± 0.2	
6	Closing bounce time	ms	≤ 3	
7	Closing and opening synchronism	ms	≤ 3	
8	Circuit resistance	μ Ω	≤ 200	≤ 400
9	Max torque for manual operation	N.m	≤ 160	
10	Opening time triggered by fuse	ms		30~40
11	Opening time triggered by release	ms	40~50	

Main Technical Parameters of SG25-24D and SG25-24DR

No.	Item		Unit	Parameters	
				SG25-24D/T630-20	SG25-24DR/125-315
1	Rated voltage		kV	24	
2	Rated frequency		HZ	50	
3	Rated current		A	630	125
4	Rated insulation level	1 min power frequency withstand voltage	kV	Arc-extinguishing chamber opening distance 65: phase-to-earth, phase-to-phase 65; isolating distance 79	
		Lightning impulse withstand voltage (peak)	kV	Phase-to-phase, phase-to-phase 125; isolating distance 145	
		Creepage distance of outer insulation	mm/kV	≥ 20	
		Air clear distance	mm	Phase-to-earth > 200; phase-to-phase 200	
5	Rated short-time withstand current (thermal stability current)		kA	20	
6	Rated duration of short circuit (thermal stability time)		S	4	
7	Rated peak withstand current(dynamic stability current)		kA	50	
8	Rated active load breaking current		A	630	
9	Rated closed-loop breaking current		A	630	
10	Rated cable charging breaking current		A	10	
11	No-load transformer breaking capacity		kVA	1250	
12	Rated short circuit breaking current		kA		31.5
13	Rated transfer current		A		2000
14	Model of fuse				S □ M □ J-SY24/ □
15	Output energy of striker		J		2-5(medium)
16	Rated short circuit making current		kA	50	
17	Rated short circuit closing current of earth switch (dynamic current)		kA	50	
18	Rated short-time withstand current(thermal stability current) of earth switch		kA	20	
19	Rated duration (thermal stability time) of short circuit of earth switch		S	2	
20	Rated voltage of auxiliary circuit		V	AC、DC/220、110	
21	Mechanical life	Vacuum arc-extinguishing chamber/isolating distance	time	10000/2000	
		Earth switch		2000	

Data of Energy Storage Motor

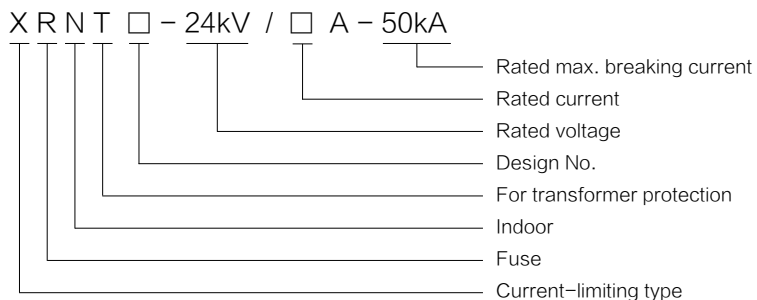
Model	Rated voltage(V)	Rated current(A)	Rated power(W)	Normal operating voltage range
ZYJ-220-66-208	DC220	0.7	70	85%-110% Rated voltage
ZYJ-110-66-208	DC110	1.5		

Data of Opening Coil

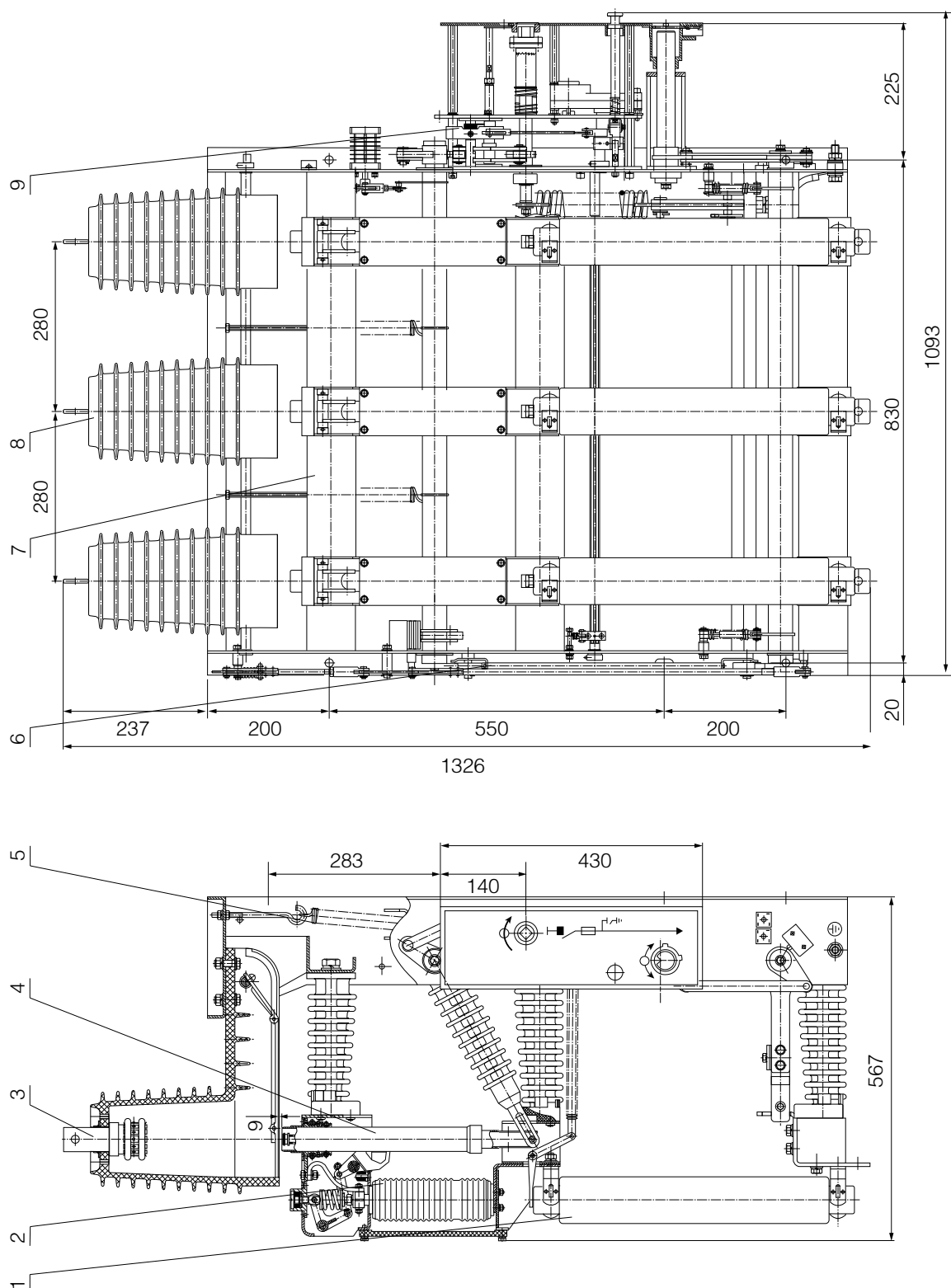
Item	Rated voltage(V)	Coil power(W)	Normal operating voltage range
Opening coil	DC220、DC110	550	65%-110% Rated voltage

Selection of Fuse For SG25-24DR Combinations

Fuse model and implication



Outline and Installation Size





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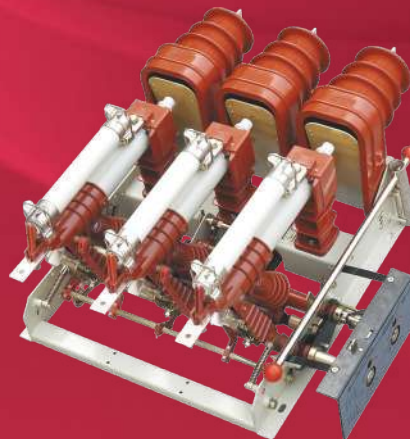
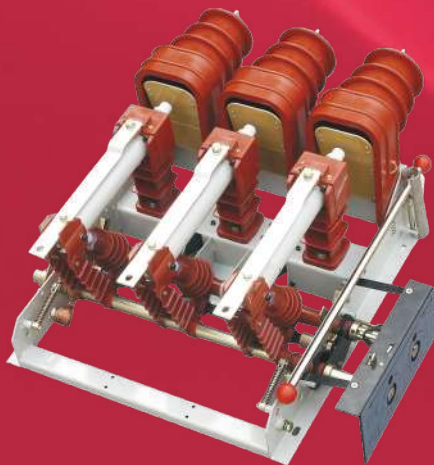
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**FN12-12D/T630-20 Series
Indoor High Voltage Switch**

**FN12-12DR/125-31.5 Series Indoor
High Voltage Switch-Fuse Combination**

(Wall-mounted)



(Side-Mounted Front-operated)

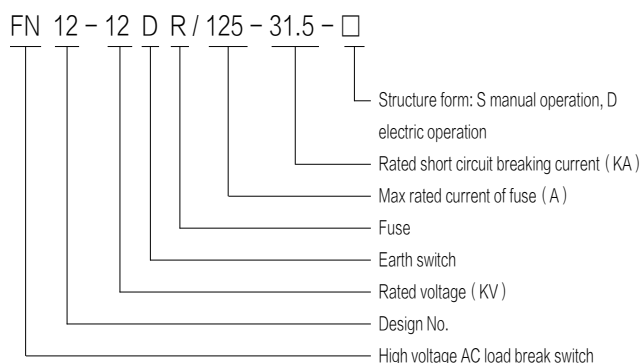
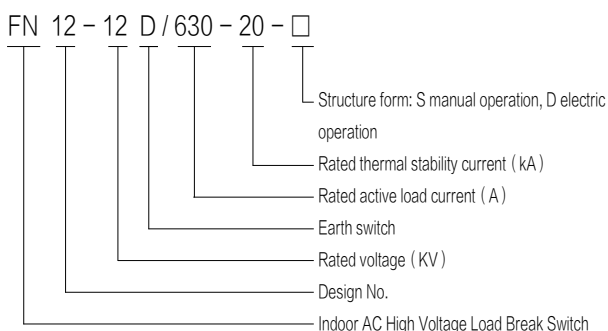


FN12-12 Series Indoor High Voltage Switch-Fuse Combination

General

FN12-12D and FN12-12DR series switch-fuse combinations is a three-phase high voltage switchgear with rated voltage of 12kV and rated frequency of 50Hz, and it's mainly used to make and break the load current, closed-loop current, no-load transformer and cable charging current, and also close short circuit current. The combination can break short-circuit current, and load break switch with earth switch can bear short circuit current. It's used for load control and short circuit protection for substations of three-phase ring network or urban buildings and industrial and mining enterprises.

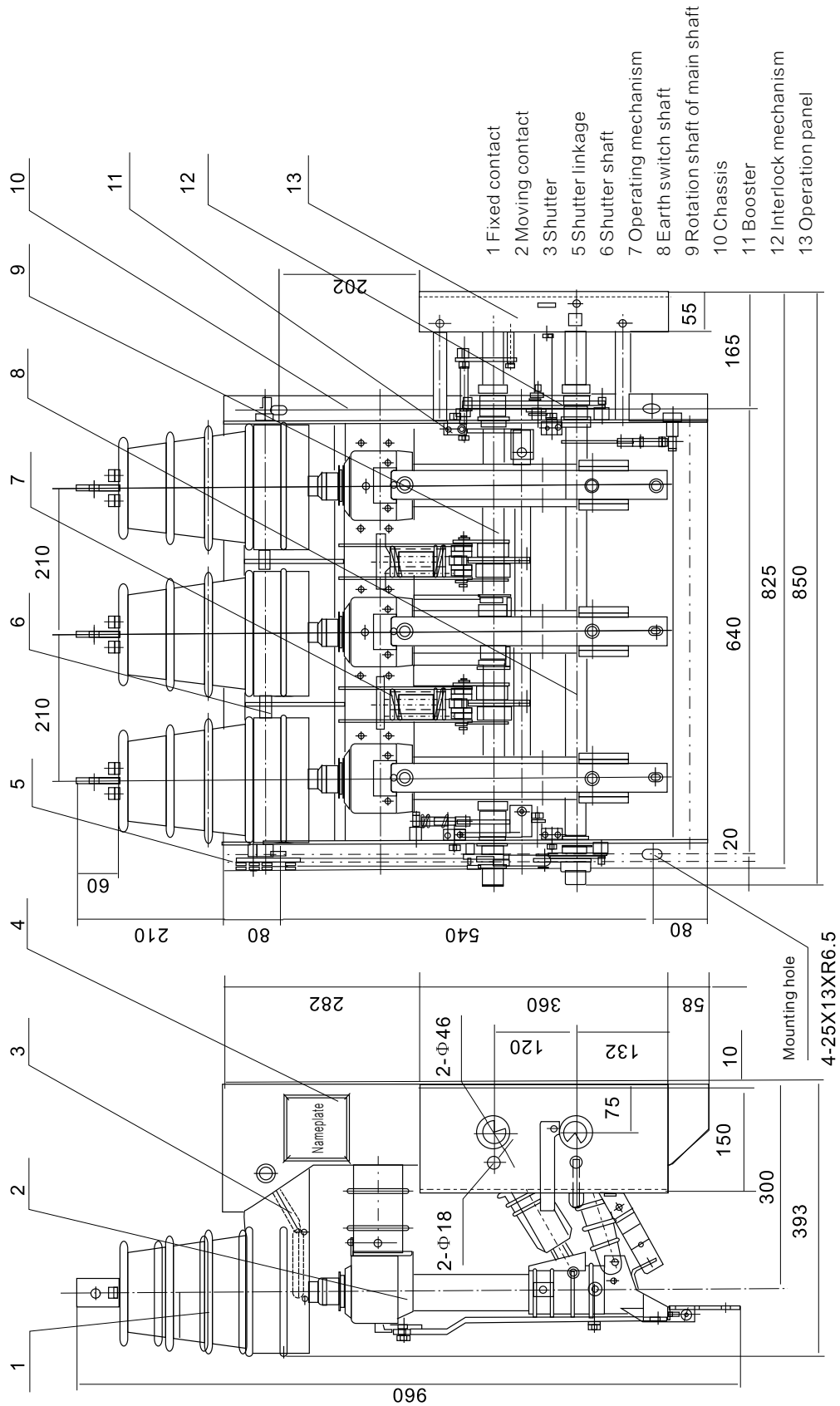
Model Implication



Main Technical Parameters

No.	Item	Unit	FN12-12/630	FNR12-12/100-31.5
1	Rated voltage	KV	12	
2	Rated frequency	HZ	50	
3	Rated current	A	630	125
4	Lightning impulse withstand voltage	KV	Phase-to-phase and phase-to-phase 75, across isolating distance 85	
5	1min power frequency withstand voltage	KV	Phase-to-phase and phase-to-phase 42, across isolating distance 48	
6	Rated thermal stability current	KA	20(4S)	
7	Rated dynamic stability current	KA	50	
8	Rated short circuit making current (peak)	KA	50	50
9	Rated short circuit breaking current (prospective)	KA		31.5
10	Rated transfer current	KA		1.5
11	No-load transformer breaking capacity	KVA	1250	
12	Rated cable charging current	A	10	
13	Mechanical life	time	4000	
14	Opening time of load switch triggered by fuse Opening time of LBS triggered by fuse	S		< 0.06
15	Dynamic current of earth switch Thermal stability current of earth switch	KA	20(2S)	
16	Dynamic current of earth switch (peak) Dynamic current of earth switch (peak)	KA	50	
17	Supply voltage of control circuit		AC/DC 110, 22	

Fn12-12D/630-20 Indoor Ac High Voltage Load Break Switch Outline and Installation Size





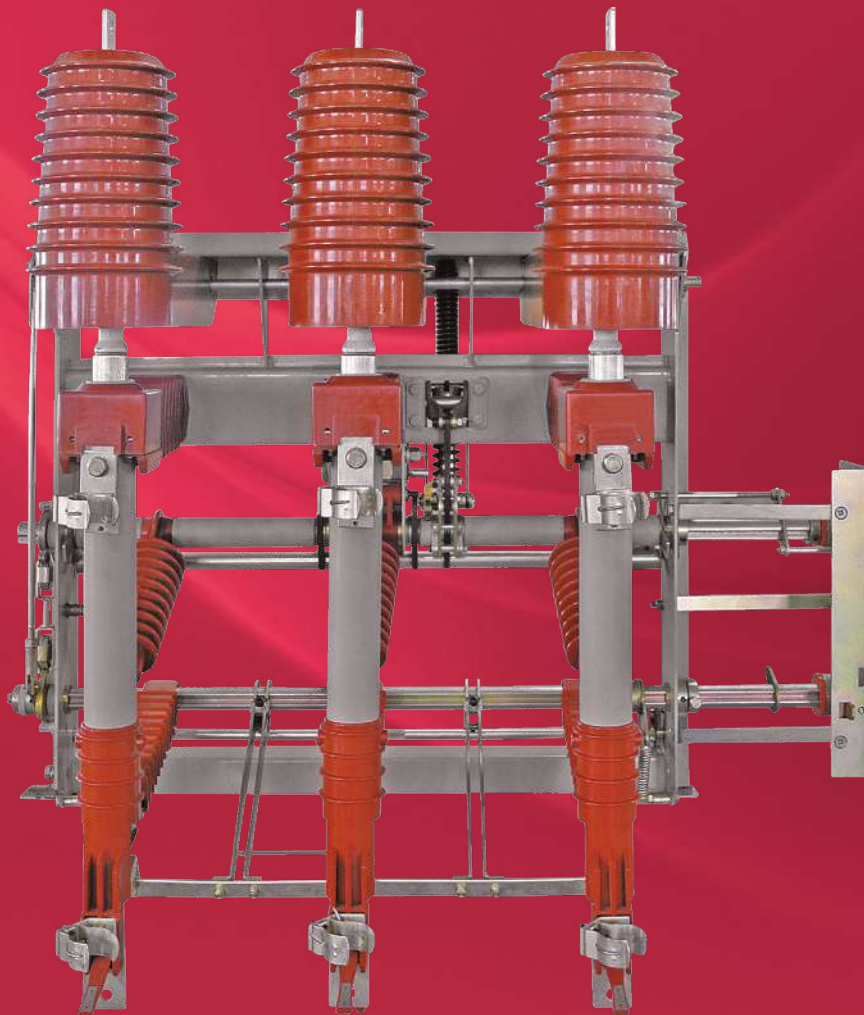
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**SG12-24D/T630-20 Series Indoor
High Voltage Load Break Switch**

**Indoor AC High Voltage Load Break
Switch-Fuse Combination**



SG12-24(D)/630-20 Series Indoor High Voltage Load Break Switch

Main Purpose

SG12-24(D)/630-20 series indoor AC high voltage load break switch (hereinafter referred to as SG12-24(D) load break switch) is a three-phase high voltage switchgear with rated voltage of 24kV and rated frequency of 50Hz, and it's mainly used to make and break the load current, closed-loop current, no-load transformer and cable charging current, and also close short circuit current. The load break switch with earth switch can bear short circuit current.

SG12-24(RD)/125-31.5 series indoor AC high voltage switch-fuse combination (hereinafter referred to as SG12-24(RD) combination), is an indoor high voltage switchgear combined with SG12-24(D) load break switch and S □ LAJ-24(XRNT □ -24) high voltage current-limiting type fuse. It can reliably break any current up to rated short circuit breaking current, the load break switch breaks operating current while the fuse breaks short circuit current, so that they unite to break any over-current among operating current and all short circuit currents, and the fuse switch off the load break switch by striker meanwhile.

Applicable Scope

SG12-24(D) load break switch and SG12-24(RD) combination are mainly used for load control and short circuit protection for substations of three-phase ring network or urban buildings and industrial and mining enterprises. Since much higher reliability.

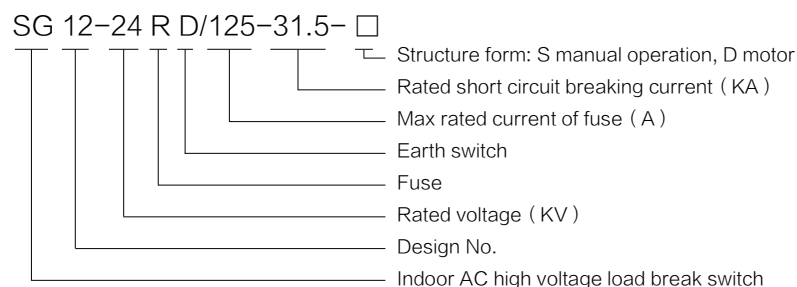
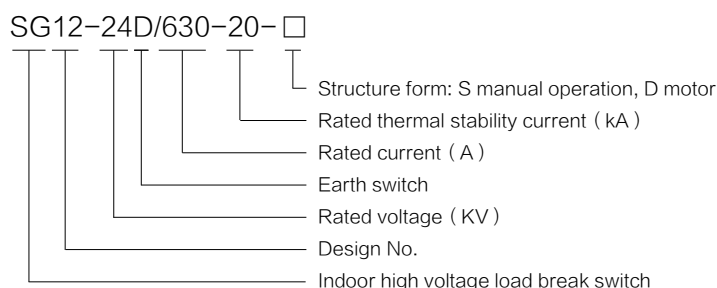
Product Standard

GB311.1-1997	Insulation Co-ordination for High Voltage Transmission and Distribution Equipment
GB3804-2004	High-voltage Alternating-current Switches for Rated Voltage above 3.6kV and less than 40.5kV
GB/T 11022-1999	Common Specifications for High-voltage Switchgear and Controlgear Standards
DL/T593-2006	Common Specifications for High-voltage Switchgear and Controlgear Standards
GB16926-2009	High-voltage Alternating Current Switch-Fuse Combinations
GB/T 1985-2004	High-voltage Alternating-current Disconnectors and Earthing Switches
GB/T 15166-94	High-voltage Alternating-current Fuses

Normal Work Environment

- a) Ambient temperature: +40°C ~ -25°C , average maximum temperature: +35°C in 24h;
- b) Daily maximum average relative humidity: ≤ 95% (+20°C) , monthly maximum average relative humidity: ≤ 90%;
- c) In environment without obvious pollution from dust, smoke, corrosive and/or flammable gas, vapor or salt fog;
- d) Altitude: ≤ 1000m;
- e) In place free of pollution from corrosive and flammable gas or vapor;
- f) In place of no intense vibration;
- g) Pollution grade: class II.

Model Implication



Main Technical Parameters

No.	Item	Unit	SG12-24D/630	SG12-24DR/125
1	Rated voltage	KV	24	
2	Rated frequency	HZ	50	
3	Rated current	A	630	125(Fuse)
4	Lightning impulse withstand voltage	KV	Phase-to-earth and phase-to-phase 125, isolating distance 145	
5	1min power frequency withstand voltage	KV	Phase-to-earth and phase-to-phase 65, isolating distance 79	
6	Rated thermal stability current	KA	20(4S)	
7	Rated dynamic current	KA	50	
8	Rated closing current (peak)	KA	50	
9	Rated short circuit breaking current	KA		31.5
10	Rated transfer current	A		1200
11	Max breaking current (reference)	A	1500	
12	No-load transformer breaking capacity	KVA	1250	
13	Rated cable charging current	A	10	
14	Rated active load current breaks number	time	> 100	
15	Opening time of load switch triggered by fuse	S		< 0.06
16	Dynamic current of earth switch	KA	20(2S)	
17	Dynamic current of earth switch (peak)	KA	50	
18	Electrical operating supply voltage (AC, DC)	V	110、220	

Mechanical Characteristic Parameters

No.	Item	Unit	SG12-24D/630	SG12-24DR/125
1	Total travel of moving contact	mm	278±5	
2	Over travel of moving contact	mm	40±2	
3	Clearance between open auxiliary contacts	mm	> 230	
4	Closing synchronism of three phases	ms	≤ 10	
5	Opening synchronism of three phases	ms	≤ 5	
6	Switch-off speed	m/s	≥ 2.5	
7	Switch-on speed	m/s	≥ 2.5	
8	Isolating distance of earth switch	mm	230±5	
9	Main circuit resistance	μ Ω	≤ 180	≤ 400
10	Max operating torque	Nm	< 160	< 180

Note: 1. The clearance between open auxiliary contacts is the distance between fixed contact and conducting tube nozzle end surface adds 30mm;
2. When the main circuit resistance of SG12-24(RD) combination is measured, conducting rod, whose resistance is negligible, should be used instead of fuse.

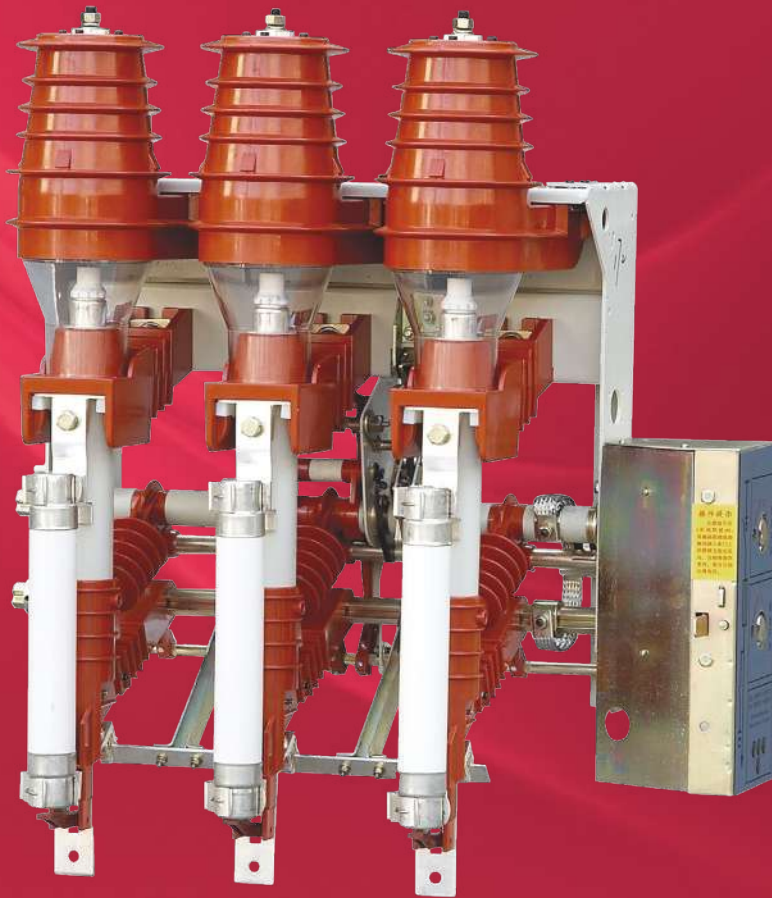


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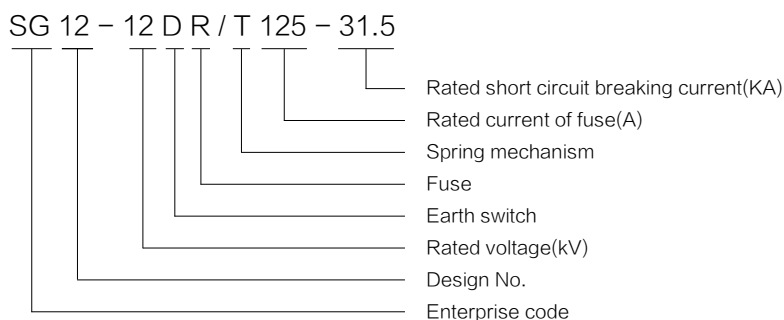
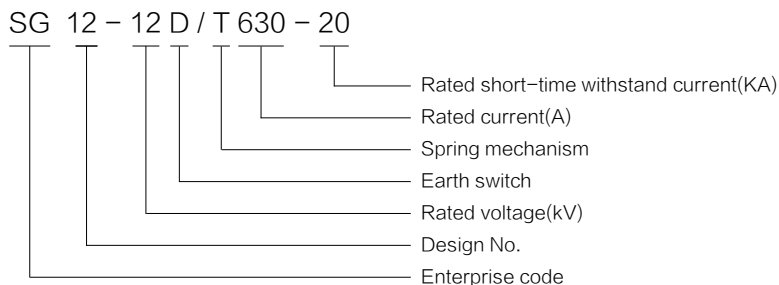
SG12-12 Series Air-Pressure Switch-Fuse Combination



(Side-Mounted Front-operated)

SG12-12 Series Air-Pressure Switch-Fuse Combination

Model Implication



Notes: there are manual and electrical operation spring mechanisms.

Main Purpose

SG12-12D Series air-pressure load break switch and SG12-12DR switch-fuse combination are suitable for three-phase distribution system of 12kV and below, and it's mainly used for control and protection for transformer, cable, aerial line and other power equipments, especially the terminal substation urban and rural power grid and box substation. In addition, it's also suitable for control and protection of ring network and radiation type supply unit.

SG12-12D series air-pressure load break switch can make and break load current and over-current.

SG12-12D series air-pressure switch-fuse combination can make and break load current and over-current, and also break short circuit current.

Normal Work Environment

1. Ambient temperature: upper limit +40℃ ; lower limit -25℃ ;
2. Altitude: ≤ 1000m;
3. Daily average relative humidity: ≤ 95%, monthly average: ≤ 90%;
4. Earthquake intensity: ≤ 8 degrees;
5. In place free of danger of fire and explosion, chemical corrosion and intense vibration;
6. Pollution grade: class II.

Structure Characteristic

1. The load break switch, earth switch, fuse and mechanism on one frame make it flexible, compact, small and easy for installation;
2. Direct-acting opening distance, high parameter for dynamic current and thermal stability current, one-time operation;
3. The insulation cover of fixed contact enables the ring main unit to be isolated structurally, which saves partitions between phases and isolating distances, preventing flashover and short-circuit accident in cabinet;
4. The unique shutter will automatically isolate the opening distance after the load break switch opens, with good protection performance;
5. The reliable mechanical interlock device among load break switch, earth switch and fuse meets "five-prevention" requirement;
6. Manual and DC/AC electrical operation is convenient to realize "three-remote" requirement of power system.

Main Technical Parameters

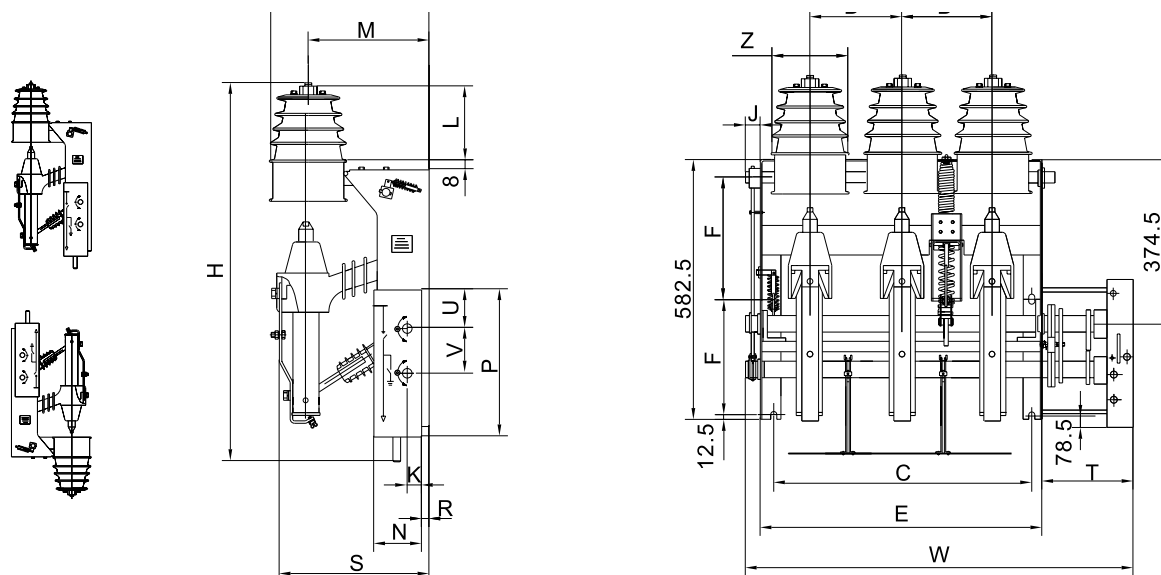
Table 1

No.	Item			Unit	SG12-12D	SG12-12DR
1	Rated voltage			KV	12	12
2	Rated frequency			Hz	50	50
3	Rated current			A	630	125
4	Rated insulation level	1min power frequency withstand voltage	Phase-to-earth, phase-to-phase	KV	42	42
			Isolating distance		48	48
		Lightning impulse withstand voltage (peak)	Phase-to-earth, phase-to-phase		75	75
			Isolating distance		85	85
5	Rated short-time withstand current		Load break switch	KA	20	—
			Earth switch		20	
6	Rated duration of short circuit		Load break switch	S	4	—
			Earth switch		2	
7	Rated short circuit making current (peak)			KA	50	—
8	Rated breaking current		Active load breaking current	A	630	—
			Closed-loop breaking current		630	—
			5% active load breaking current		31.5	—
			Cable charging current		10	—
		No-load transformer breaking capacity		KVA	1250	
9	Rated short circuit breaking current (current-limiting fuse)			KA	—	31.5
10	Rated transfer current			A	—	1200
11	Mechanical life			time	2000	2000
12	Output energy of striker			J	—	1+0.5

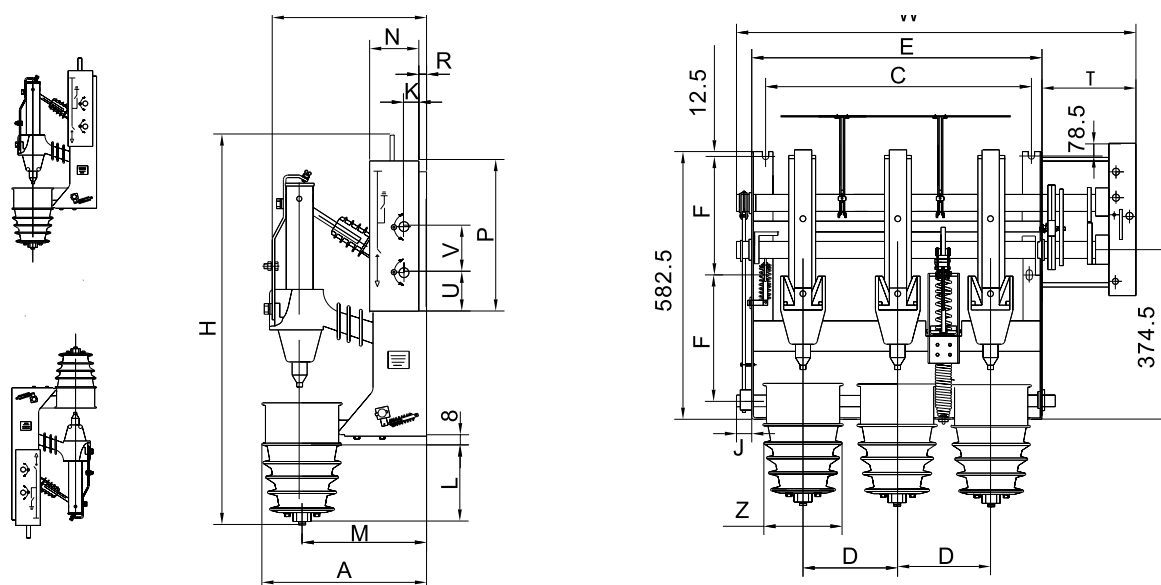
Table 2

No.	Item	Unit	Parameter
1	Isolating distance	mm	≥ 175
2	Center distance between phases		210 ± 2
3	Air gap between phases		≥ 125
4	Travel		210 ± 4
5	Over travel		≥ 40
6	Closing asynchronism of three phases	ms	≤ 10
7	Opening asynchronism of three phases		≤ 5
8	Intrinsic opening time of shunt release	ms	40~65
9	Main circuit resistance	μ Ω	≤ 130

SG12-12D side-mounted right-operated

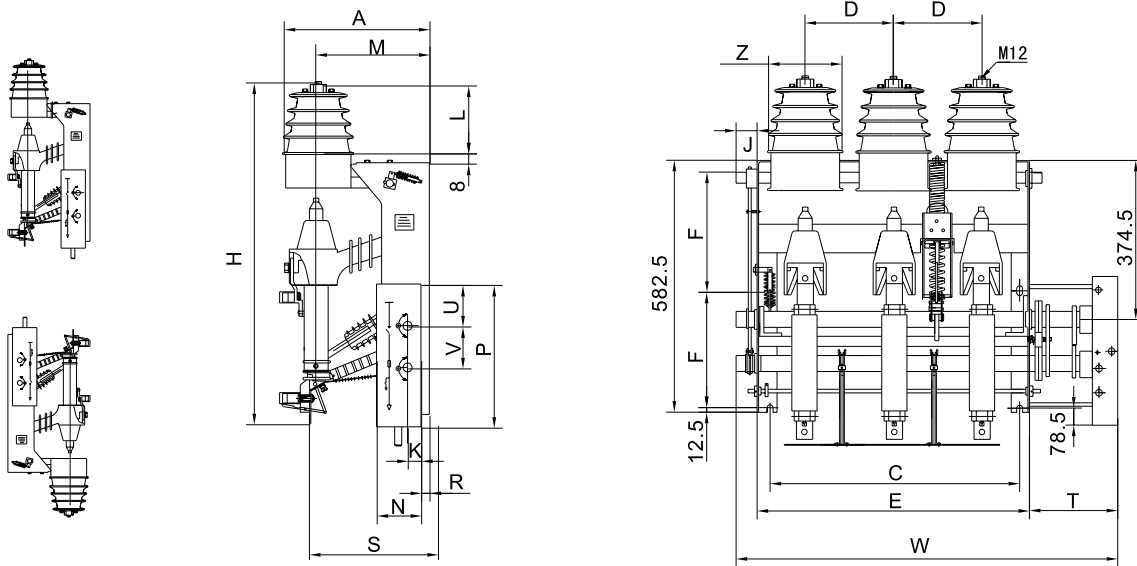


Side upside-down mounted right-operated

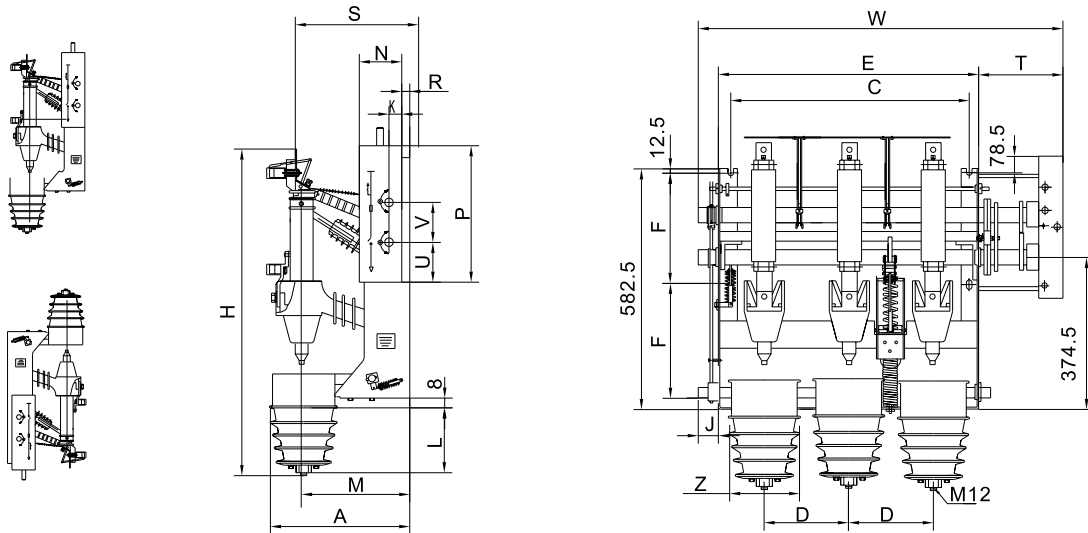


Size(mm)	A	H	C	D	E	F	K	J	L	M	N	P	R	S	T	U	V	W	Z	Weight
Model																				
SG12-12D	390	940	600	210	648	270	67	50	155	287	171	368	11	337	170	94	105	868	180	70kg

Side-mounted right-operated, Side upside-down mounted left-operated

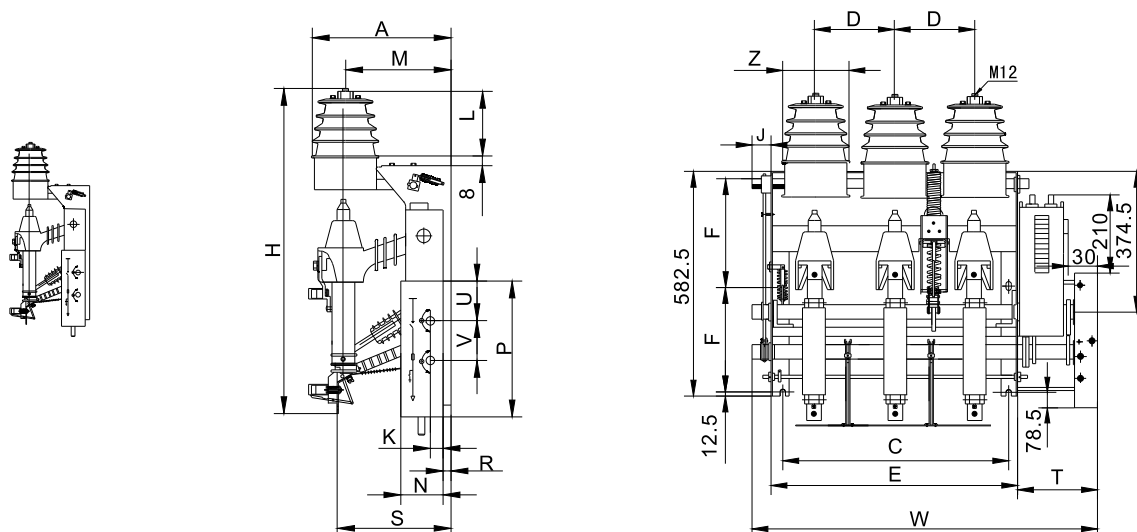


Side upside-down mounted right-operated, Side-mounted left-operated

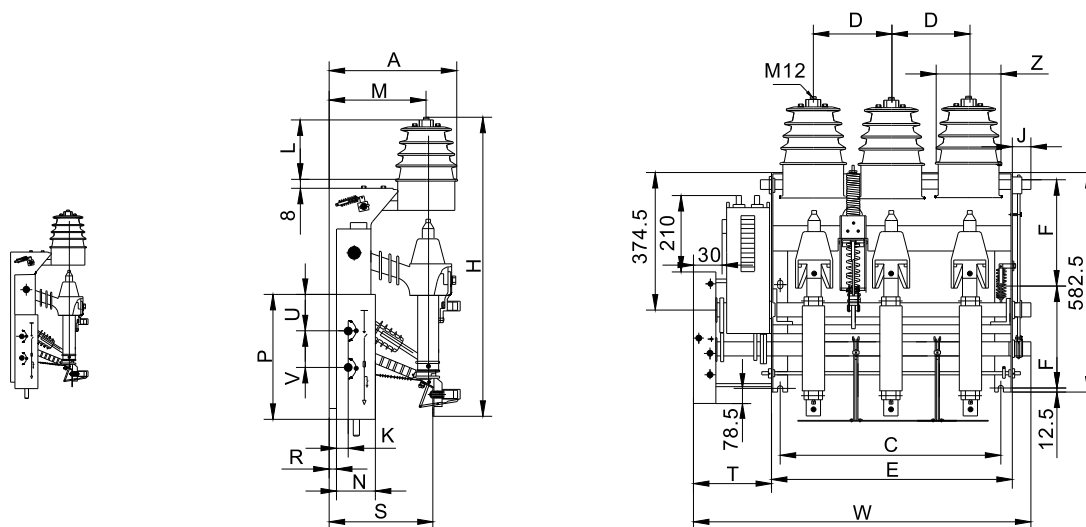


Size(mm) Model	A	H	C	D	E	F	K	J	L	M	N	P	R	S	T	U	V	W	Z	Weight
SG12-12DR	390	940	600	210	648	270	67	50	155	287	171	368	11	337	170	94	105	868	180	70kg

SG12-12D, SG12-12DR electrical mechanism side-mounted right-operated



SG12-12D, SG12-12DR electrical mechanism side-mounted left-operated



Size(mm) Model	A	H	C	D	E	F	K	J	L	M	N	P	R	S	T	U	V	W	Z	Weight
SG12-12DR	390	940	600	210	648	270	67	50	155	287	171	368	11	313	170	94	105	868	180	70kg

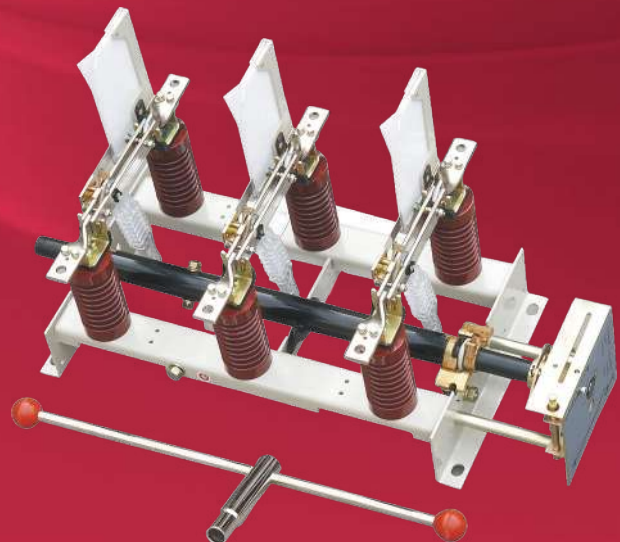
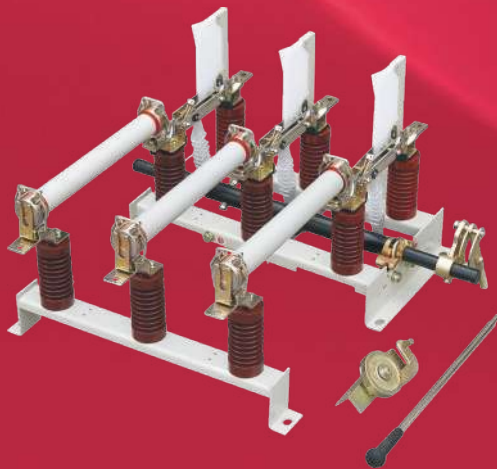
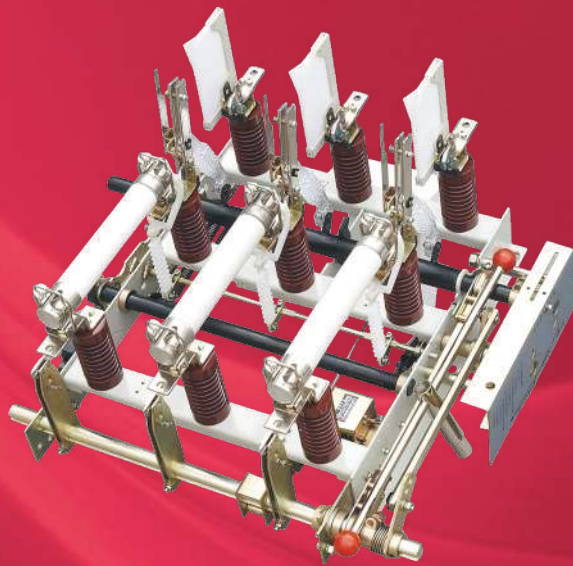


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FN7-12 Series Indoor High Voltage Switch-Fuse Combination



FN7-12 Series Indoor High Voltage Switch-Fuse Combination

General

FN7-12DR series indoor AC high voltage load break switch is mainly used to break the load current and make short circuit current in three-phase power system with rated voltage of 12KV AC50Hz. The combination can break any current up to rated short-circuit current.

Installation and Use

Normal Work Environment: Ambient temperature

upper limit +40℃

Lower limit -25℃

Altitude: ≤ 1000m;

Daily average relative humidity: ≤ 95% monthly average: ≤ 90%

In place free of pollution from corrosive and flammable gas or vapor;

In place of no intense vibration;

Rated Parameters

Rated voltage (KV. RMS)		12	
Insulation level	1min power frequency withstand voltage (KV effective)	Phase-to-phase, phase-to-earth 42	isolating distance 48
	Lightning impulse withstand voltage (KV peak)	Phase-to-phase, phase-to-earth 75	isolating distance 85
Rated current (A)		400	630
Rated thermal stability current (KA effective)		12.5	20
Rated dynamic current KA (peak)		31.5	50
Rated short circuit making current (KA peak)		31.5	50

Main Specifications

Item	Full model	DS	DX	L	R	RA	F	Purpose
		Earth switch at line incoming end	Earth switch at line outgoing end	interlock device	Fuse	Striker fuse	Electrical opening device	
Load break switch	Without striker fuse	FN7-12	-	-	-	-	-	Line load break switch
		FN7-12DSL	△	-	△	-	-	
		FN7-12DXL	-	△	△	-	-	
		FN7-12R	-	-	-	△	-	Transformer protection
		FN7-12DSLRL	△	-	△	△	-	
		FN7-12DXLR	-	△	△	△	-	
	With striker fuse	FN7-12RAF	-	-	-	-	△	Transformer protection
		FN7-12DSLRAF	△	-	△	-	△	
		FN7-12DXLRAF	-	△	△	-	△	

Note: (-) no (△) have

Outline and Installation Diagram

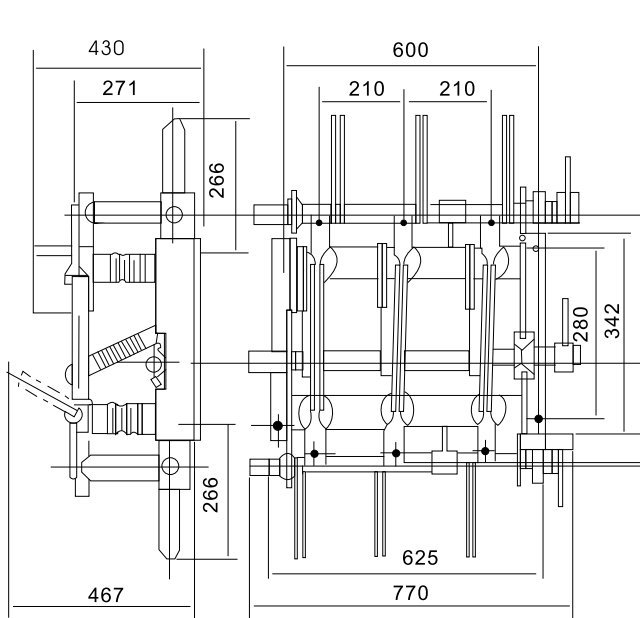


Fig. 1 LBS for line without release

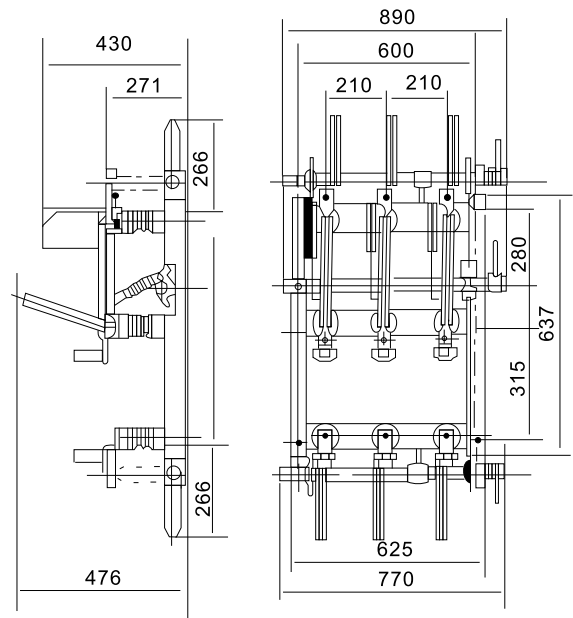


Fig. 2 LBS for transformer protection without release

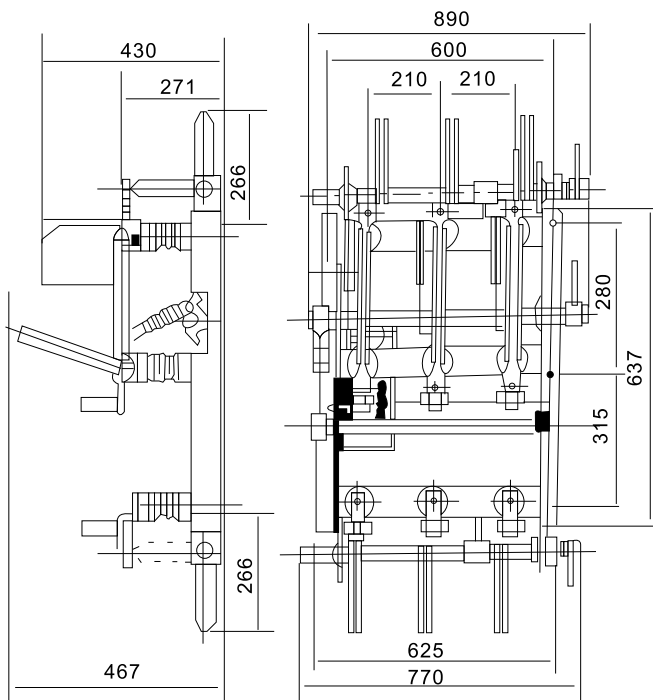


Fig. 3 Release strikes load break switch

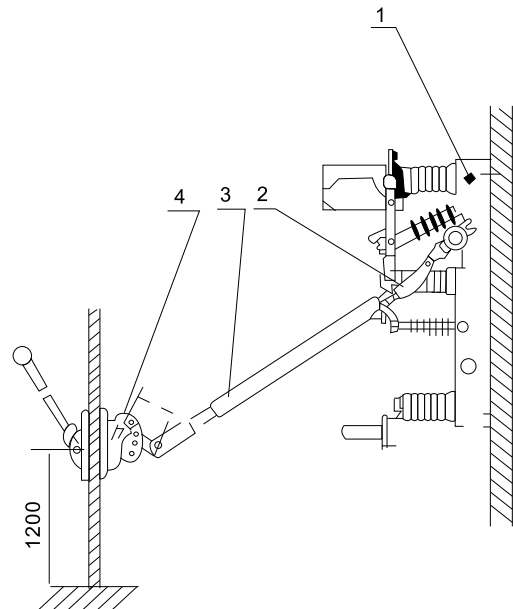


Fig. 4 CS6 operating mechanism installation schematic diagram



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FN5-12 Series Indoor High Voltage Switch-Fuse Combination



FN5-12 Series Indoor High Voltage Switch-Fuse Combination

General

FN5-12R(L) series indoor AC high voltage switch-fuse combination, after all-round type test and long-term trial operation, has met the performance requirement of IEC420 Alternating-current High Voltage Switch-Fuse Combinations (ver.1990) and GB3804 3-63KV Alternating Current High Voltage Load Switches. Compared to the same product at abroad, it has the same level of technology, and is compact and light. It's mainly used for ring main unit and box substation and has widely applied for power distribution of 10KV lines. It realizes three positions for switching, isolating and earthing, effectively avoiding phase-loss operation of equipment.

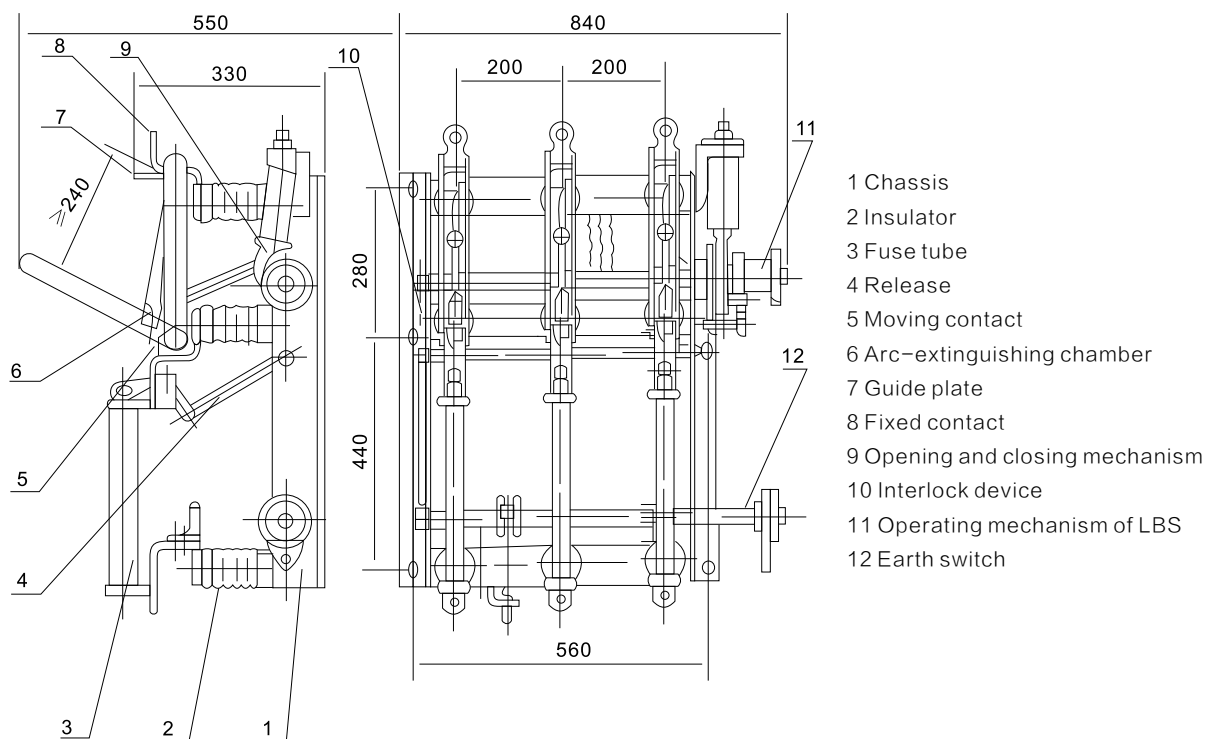
Main Technical Parameters

Rated voltage kV	1min power frequency withstand voltage KV	Rated current A	4s thermal stability current A	Dynamic current (peak) KV	Rated breaking current A	Short circuit making current KA
12	42	400	12.5	31.5	400	31.5
	48	630	20	50	630	50

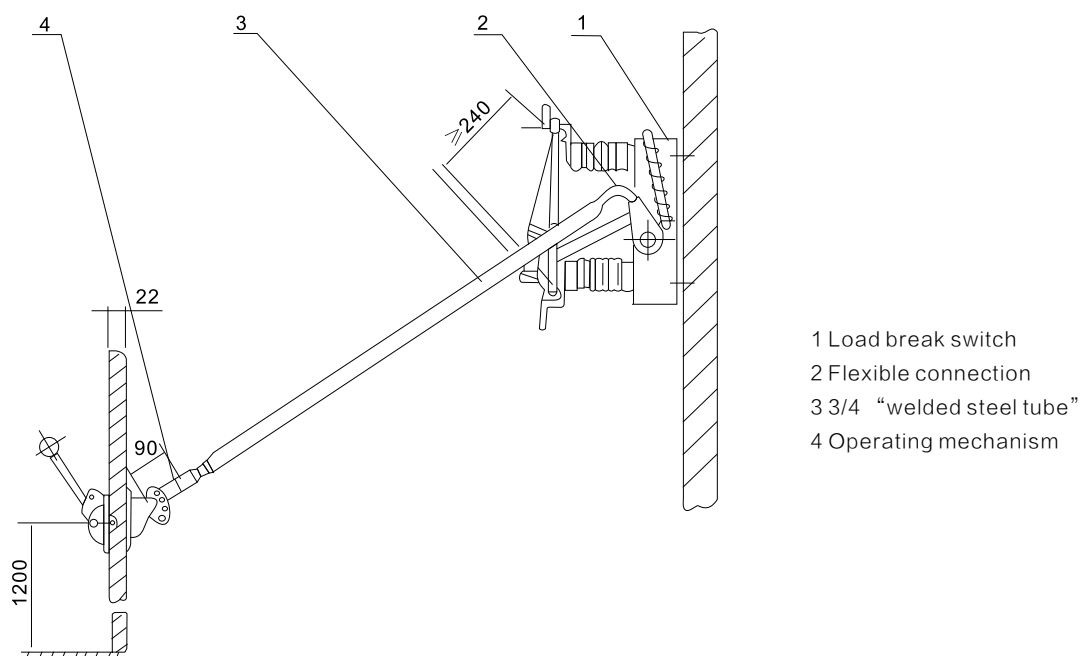
Rated Parameter of Fuse

Model	Rated voltage KV	Rated current A	Rated current of fuse-element A
SDLA*J	12	50	6,3,10,16,20,25,31,5,40
SFLA*J	12	100	50,63,71,80,100
SKLA*J	12	125	125

Outline and Installation Size



FN5-12RD(L) indoor AC high voltage load break switch



Installation Diagram for Coupling of Load Break Switch and CS6-I



Indoor High Voltage Vacuum Circuit Breaker

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VS1 Series Indoor High Voltage Vacuum Circuit Breaker



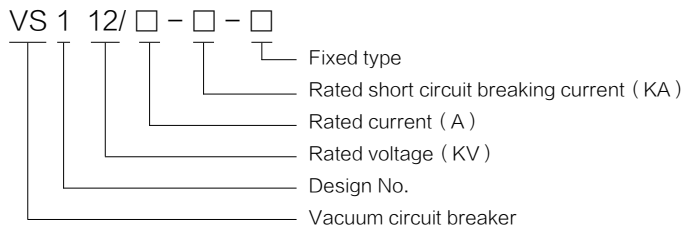
VS1 Series Indoor High Voltage Vacuum Circuit Breaker

Main Purpose

VS1-12 Series indoor high-voltage vacuum circuit breaker is an indoor switchgear mainly used in three-phase 12KV AC 50Hz power system, it's used as protective and control unit for power equipment of power network and industrial and mining enterprise. It's especially suitable for places requiring frequent operation under rated operating current or multi-time short-circuit breaking.

The circuit breaker integrates operating mechanism and breaker into one whole, which can not only be as fixed unit, but also can be equipped with special driving mechanism to form a trolley.

Model Implication



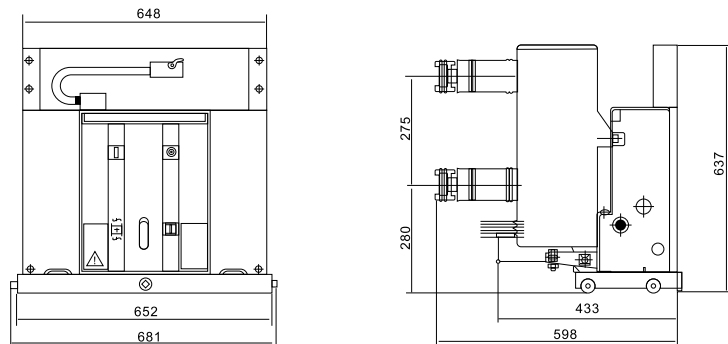
Normal Work Environment

- a. Ambient temperature: +40°C ~ -15°C ;
- b. Altitude: less than ≤ 1000m (rated insulating level shall be enhanced for higher altitude)
- c. Earthquake intensity less than 8 degree.
- d. Daily average relative humidity: ≤ 95%, monthly average relative humidity: ≤ 90%
- e. In places of no danger of flammability and explosion, no severe pollution, no corrosive chemical and no intense shake.

Main Technical Parameters

No.	Item		Unit	Parameter			
1	Rated voltage		KV	12			
2	Rated frequency		Hz	50			
3	Rated insulation level	1min power frequency withstand voltage	kA	Phase-to-earth/phase-to-phase 42/48			
		Lightning impulse withstand voltage (peak)		Phase-to-earth/phase-to-phase 75/85			
4	Rated short circuit breaking current		kA	20	25	31.5	40
5	Rated current		A	630	630	1250 1600	1250 1600
				1250	1250	2000 2500	2000 2500
6	Rated short-time withstand current (effective)		kA	20	25	31.5	40
7	Rated peak withstand current			50	63	80	100
8	Rated short circuit making current (peak)			50	63	80	100
9	Rated duration of short circuit		S	4			
10	Mechanical life		time	20000			
11	Secondary circuit power frequency withstand voltage (1min)		V	2000			
12	Rated operating sequence			O-t-CO-t1-CO			
Note:20kA、25kA、31.5kA t=0.3s t1=180s; 40kA t=180s t1=180s							

Outline and Installation Size



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VS1-12 Series Side-Mounted Indoor High Voltage Vacuum Circuit Breaker



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VS1-24 Series Indoor High Voltage Vacuum Circuit Breaker



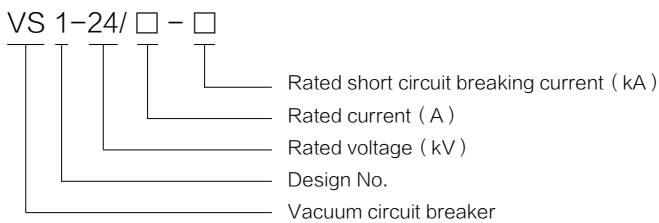
VS1-24 Series Indoor High Voltage Vacuum Circuit Breaker

Main Purpose

VS1-24 Series indoor high-voltage vacuum circuit breaker is an indoor switchgear mainly used in three-phase 24KV AC50Hz power system, it's used as protective and control unit for power equipment of power network and industrial and mining enterprise. It's especially suitable for places requiring frequent operation under rated operating current or multi-time short-circuit breaking.

The circuit breaker integrates operating mechanism and breaker into one whole, which can not only be as fixed unit, but also can be equipped with special driving mechanism to form a trolley.

Model Implication



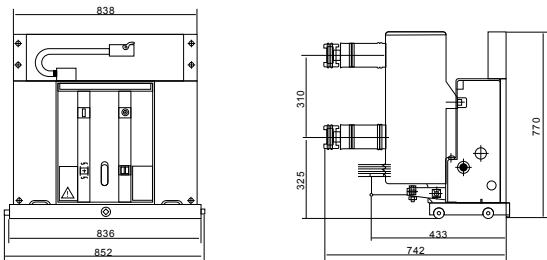
Normal Work Environment

- a. Ambient temperature: +40℃ ~-15℃ ;
- b. Altitude: less than ≤ 1000m (rated insulating level shall be enhanced for higher altitude)
- c. Earthquake intensity less than 8 degree.
- d. Daily average relative humidity: ≤ 95%, monthly average relative humidity: ≤ 90%
- e. In places of no danger of flammability and explosion, no severe pollution, no corrosive chemical and no intense shake.

Main Technical Parameters

No.	Item	Unit	Parameter			
1	Rated voltage	KV	24			
2	Rated short time power frequency withstand voltage (1min)		65/79 (phase-to-phase, phase-to-earth/opening distance)			
3	Rated lightning impulse withstand voltage (peak)		125/145 (phase-to-phase, phase-to-earth/opening distance)			
4	Rated frequency	HZ	50			
5	Rated current	A	630 1250	630 1250 1600 2000 2500 3150	630 1250 1600 2000 2500 3150	
6	Rated short circuit breaking current	KA	20/25	31.5	40	
7	Rated short time withstand voltage		20/25	35.5	40	
8	Rated duration of short circuit	S	4			
9	Rated peak withstand current	KA	50/63	80	100	
10	Rated short circuit making current		50/63	80	100	
11	Secondary circuit power frequency withstand voltage (1min)	V	200			
12	Rated breaking current of single/back-to-back capacitor bank	A	630/400(40KA, 800/400)			
13	Rated inrush making current of capacitor bank	KA	12.5 (frequency ≤ 1000Hz)			

Outline and Installation Size



No.	Item	Unit	Parameter
14	Mechanical life	time	20000
15	Rated current breaks number (electrical life)		20000
16	Rated short circuit breaks number		50(40KA ≤ 30)
17	Allowed wearing thickness of moving and fixed contact	mm	3
18	Energy storage time	s	≤ 10
19	Clearance between open contacts	MM	16 ± 1
20	Over travel		3.5 ± 0.5
21	Contact closing bounce time	MS	≤ 2(40KA ≤ 3)
22	Opening and closing synchronism of three phases		≤ 2
23	Average opening speed (contact open-8mm)	M/S	1.5 ± 0.2
24	Average closing speed (8mm-contact close)		0.8 ± 0.2
25	Main circuit resistance	μ Ω	≤ 50(630A) ≤ 45(1250A) ≤ 35(1600-2000A) ≤ 25(2500A Above)
26	Rated operating sequence		0-0.3S-CO180S-CO

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VSG1-12 Series Indoor Permanent Magnetic Vacuum Circuit Breaker



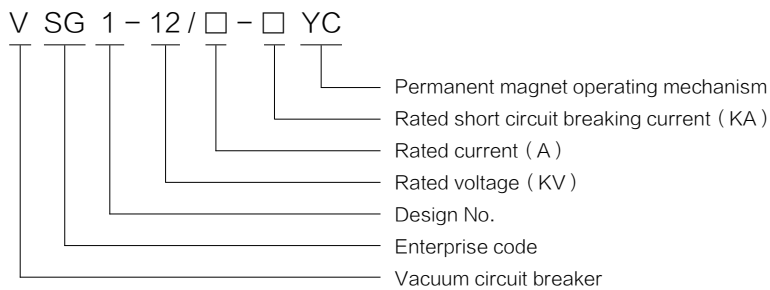
VSG1-12 Series Indoor Permanent Magnetic Vacuum Circuit Breaker

Main Purpose

VSG1-12 Series indoor high-voltage vacuum circuit breaker is an indoor switchgear mainly used in three-phase 12KV AC50Hz power system, it's used as protective and control unit for equipment of power network and industrial and mining enterprise. It's especially suitable for places requiring frequent operation under rated operating current or multi-time short-circuit breaking.

The circuit breaker integrates operating mechanism and breaker into one whole, which can not only be as fixed unit, but also can be equipped with special driving mechanism to form a trolley.

Model Implication



Property

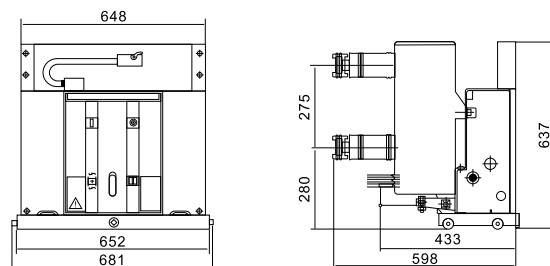
This product is equipped with bistable-state permanent magnetic operating mechanism, the permanent magnet inside the mechanism provides holding power, which enables the switch to be in on or off condition. Compared to general spring mechanism, it reduces mass quantity of mechanical parts, shortens transmission chain, and greatly improve the reliability and life.

Main Technical Parameters

No.	Item	Unit	Parameter			
1	Rated voltage	KV	12			
2	Rated frequency	HZ	50			
3	Rated insulation level	KV	Phase-to-earth/phase-to-phase 42/48			
			Phase-to-earth/phase-to-phase 75/85			
4	Rated short circuit breaking current	KA	20	25	31.5	40
5	Rated current	A	63	630	1250 1600	1250 1600
			1250	1250	2000 2500	2000 2500
6	Rated short-time withstand current (effective)	KA	20	25	31.5	40
7	Rated peak withstand current (peak)		50	63	80	100
8	Rated short circuit making current (peak)		50	63	80	100
9	Rated duration of short circuit	S	4			
10	Mechanical life	time	20000			
11	Power frequency withstand voltage of secondary circuit (1min)	V	2000			
12	Rated operating sequence		O-t-CO-t1-CO			

Note:20KA、25KA、31.5KA t=0.3s t1=180s;40KA t=180s t1=180s

Outline and Installation Diagram



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VSG2-12 Series Indoor High Voltage Permanent Magnetic Solid-Encapsulated Vacuum Circuit Breaker



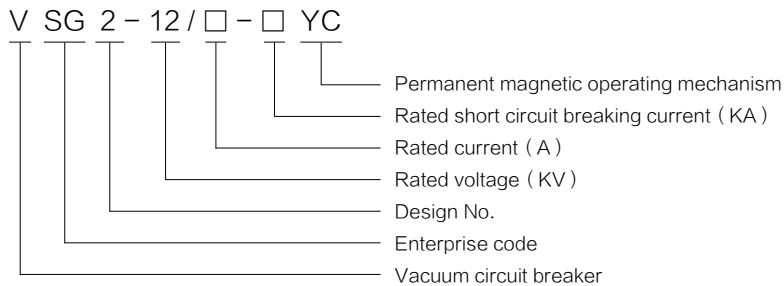
VSG2-12 Series Indoor High Voltage Permanent Magnetic Solid-Encapsulated Vacuum Circuit Breaker

Main Purpose

VSG2-12 Series indoor high-voltage vacuum circuit breaker is an indoor switchgear mainly used in three-phase 12KV AC50Hz power system, it's used as protective and control unit for equipment of power network and industrial and mining enterprise. It's especially suitable for places requiring frequent operation under rated operating current or multi-time short-circuit breaking.

The circuit breaker integrates operating mechanism and breaker into one whole, which can not only be as fixed unit, but also can be equipped with special driving mechanism to form a trolley.

Model Implication



Performance advantages

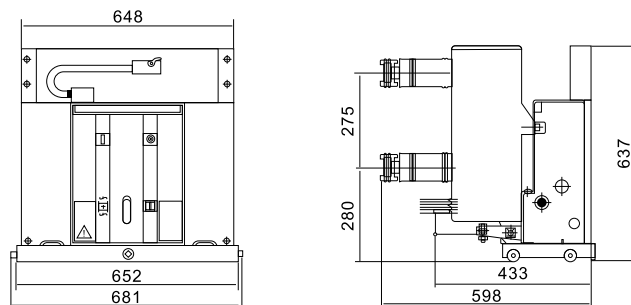
This product is equipped with bistable-state permanent magnetic operating mechanism, the permanent magnet inside the mechanism provides holding power, which enables the switch to be in on or off condition. Compared to general spring mechanism, it reduces mass quantity of mechanical parts, shortens transmission chain, and greatly improve the reliability and life.

Main Technical Parameters

No.	Item	Unit	Parameter			
1	Rated voltage	KV	12			
2	Rated frequency	Hz	50			
3	Rated insulation level	KV	Phase-to-earth/phase-to-phase 42/48			
			Phase-to-earth/phase-to-phase 75/85			
4	Rated short circuit breaking current	kA	20	25	31.5	40
5	Rated current	A	630	630	1250 1600	1250 1600
			1250	1250	2000 2500	2000 2500
6	Rated short-time withstand current (effective)	KA	20	25	31.5	40
7	Rated peak withstand current (peak)		50	63	80	100
8	Rated short circuit making current (peak)		50	63	80	100
9	Rated duration of short circuit	S	4			
10	Mechanical life	time	20000			
11	Power frequency withstand voltage of secondary circuit (1min)	V	2000			
12	Rated operating sequence		O-t-CO-t1-CO			

Note:20KA、25KA、31.5KA t=0.3s t1=180s;40KA t=180s t1=180s

Outline and Installation Diagram



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VSG1-12 Series Side-Mounted Permanent Magnetic Vacuum Circuit Breaker



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VSG2-12 Series Side-Mounted Permanent Magnetic Solid-Encapsulated Vacuum Circuit Breaker





Outdoor High Voltage Vacuum Circuit Breaker



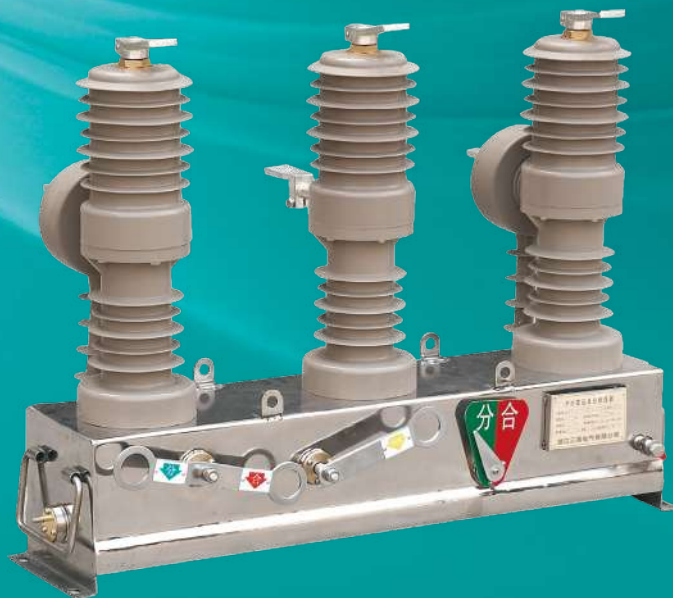
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ZW32-12 Series

Outdoor Vacuum Circuit Breaker

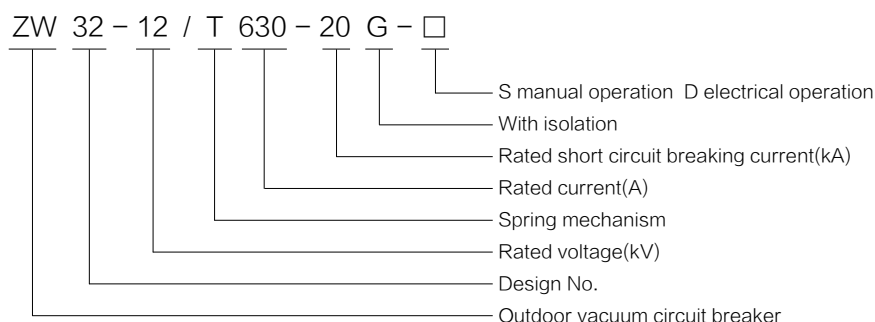


ZW32-12 Series Outdoor Vacuum Circuit Breaker

General

ZW32-12 series outdoor AC high voltage vacuum circuit breaker (hereinafter referred to as circuit breaker) is a kind of three-phase AC 50Hz outdoor power distributing equipment with rated voltage of 12kV, mainly used to make and break load current, overload current and short circuit current in power system. It's suitable for protection and control of transformer substation and industrial and mining enterprise, especially for rural power grid and places in need of frequent operation. The circuit breaker has small volume, light weight, condensation prevention and maintenance-free features, and is adaptive to severe climate condition and dirty environment.

Model Implication



Product Standard

GB1984 《AC High Voltage Circuit Breakers》
 GB11022 《Common Specifications for High-voltage Switchgear and Controlgear Standards》
 GB311.1-6 《Insulation Co-ordination for High Voltage Transmission and Distribution Equipment》
 GB763 《Heating under Long-Term Work for AC High Voltage Appliances》
 GB2706 《Dynamic & Thermal Stability Test Methods for AC High Voltage Appliances》
 GB3309 《Mechanical Test at Ambient Temperature for High-Voltage Switchgear》
 DL/T593 《Common Specifications for High-voltage Switchgear and Controlgear Standards》

Main Technical Parameters

No.	Item	Unit	Parameter
1	Rated voltage	KV	12
2	Rated frequency	Hz	50
3	Rated current	A	630
4	Rated short circuit breaking current	KA	20
5	Rated peak withstand current (peak)	KA	50
6	Rated short-time withstand current	KA	20
7	Rated short circuit making current (peak)	KA	50
8	Mechanical life	time	10000
9	Rated short circuit breaks number	time	30
10	Power frequency withstand voltage (1min): (wet) (dry) phase-to-phase, phase-to-earth/ isolating distance	KV	42/48
11	Lightning impulse withstand voltage (peak) phase-to-phase, phase-to-earth/ isolating distance	KV	75/85
12	1min power frequency withstand voltage of secondary circuit	KV	2

Outline and Installation Size

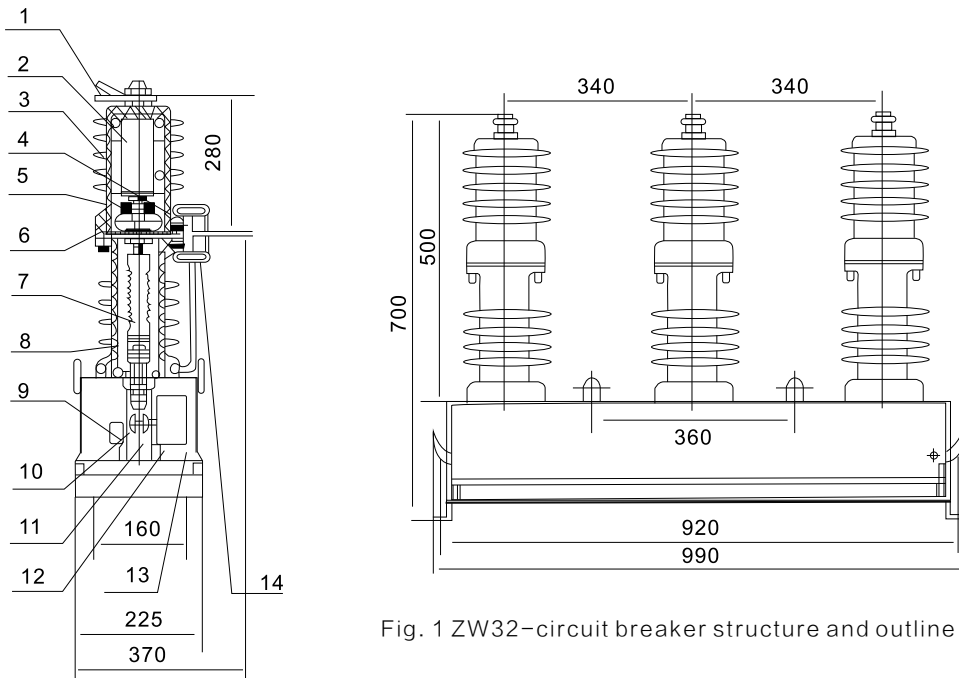
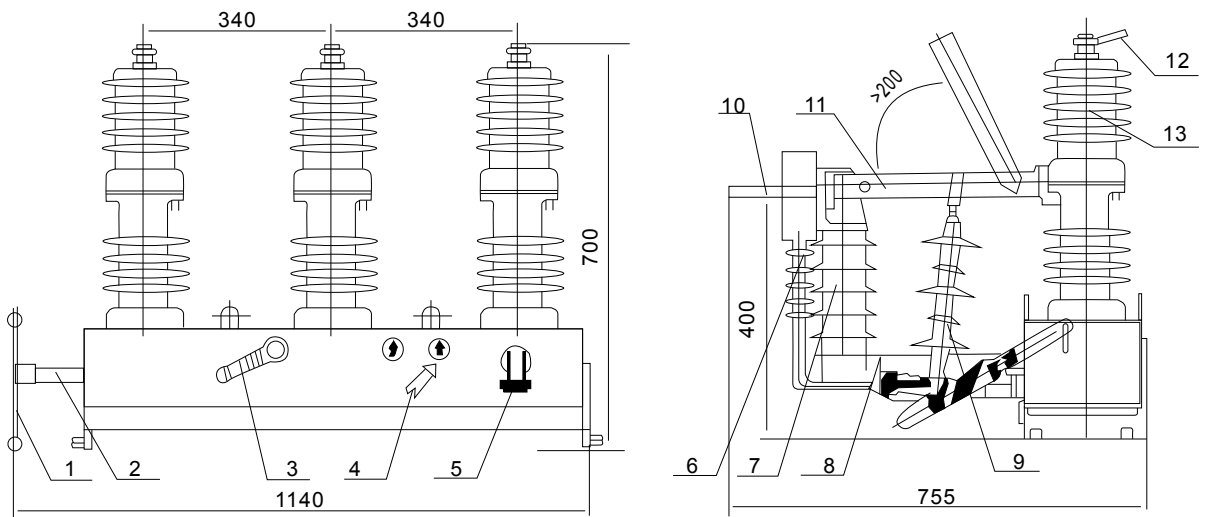


Fig. 1 ZW32-circuit breaker structure and outline size

- | | | | | |
|-----------------------------|-----------------------|---------------------------|---------------------------|------------------------|
| 1 Upper outgoing line | 4 Lower outgoing line | 7 Insulating pull rod | 10 Drive plate | 13 Mechanism box |
| 2 Arc-extinguishing chamber | 5 Conducting clamp | 8 Contact pressure spring | 11 Mechanism output shaft | 14 Current transformer |
| 3 insulating tube | 6 Flexible connection | 9 Opening spring | 12 Operating mechanism | |



- | | | | | |
|-----------------------|-----------------------|-----------------------|------------------------------|--------------------|
| 1 Operating handle | 4 ON/OFF indicator | 7 Insulator | 10 Connecting plate (inlet) | 13 Circuit breaker |
| 2 Isolator main shaft | 5 Connecting plug | 8 Isolation frame | 11 Isolating blade | |
| 3 Opening handle | 6 Current transformer | 9 Insulation pull rod | 12 Connecting plate (outlet) | |



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China's high-voltage electrical pilot brand

ZW32-24 Series Outdoor High Voltage Vacuum Circuit Breaker



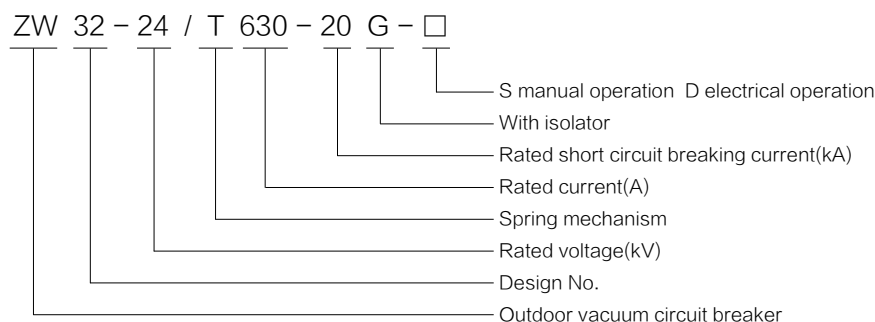
ZW32-24 Series Outdoor High Voltage Vacuum Circuit Breaker

General

ZW32-24 series outdoor AC high voltage vacuum circuit breaker (hereinafter referred to as circuit breaker) is a kind of three-phase AC 50Hz outdoor power distributing equipment with rated voltage of 24kV, mainly used to make and break load current, overload current and short circuit current in power system. It's suitable for protection and control of transformer substation and industrial and mining enterprise, especially for rural power grid and places in need of frequent operation.

The circuit breaker has small volume, light weight, condensation prevention and maintenance-free features, and is adaptive to severe climate condition and dirty environment.

Model Implication



Product Standard

GB1984 《Alternating-Current High Voltage Circuit Breakers》
 GB11022 《Common Specifications for High-voltage Switchgear and Controlgear Standards》
 GB311.1-6 《Insulation Co-ordination for High Voltage Transmission and Distribution Equipment》
 GB763 《Heating under Long-Term Work for AC High Voltage Appliances》
 GB2706 《Dynamic & Thermal Stability Test Methods for AC High Voltage Appliances》
 GB3309 《Mechanical Test at Ambient Temperature for High-Voltage Switchgear》
 DL/T593 《Common Specifications for High-voltage Switchgear and Controlgear Standards》

Main Technical Parameters

No.	Item	Unit	Parameter
1	Rated voltage	KV	24
2	Rated frequency	Hz	50
3	Rated current	A	630
4	Rated short circuit breaking current	KA	20
5	Rated peak withstand current	KA	50
6	Rated short-time withstand current	KA	20
7	Rated short circuit making current (peak)	KA	50
8	Mechanical life	time	10000
9	Rated short circuit breaks number	time	30
10	Power frequency withstand voltage (1min): (wet) (dry) phase-to-phase, phase-to-earth/isolating distance	KV	65/79
11	Lightning impulse withstand voltage (peak) phase-to-phase, phase-to-earth/isolating distance	KV	125/145
12	1min power frequency withstand voltage of secondary circuit	KV	2

Outline and Installation Size

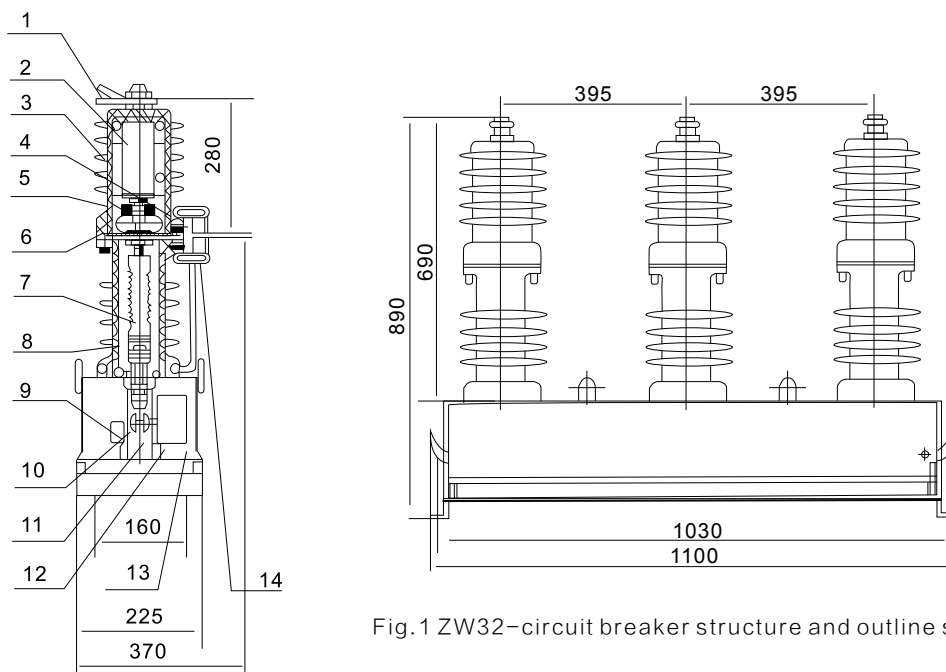
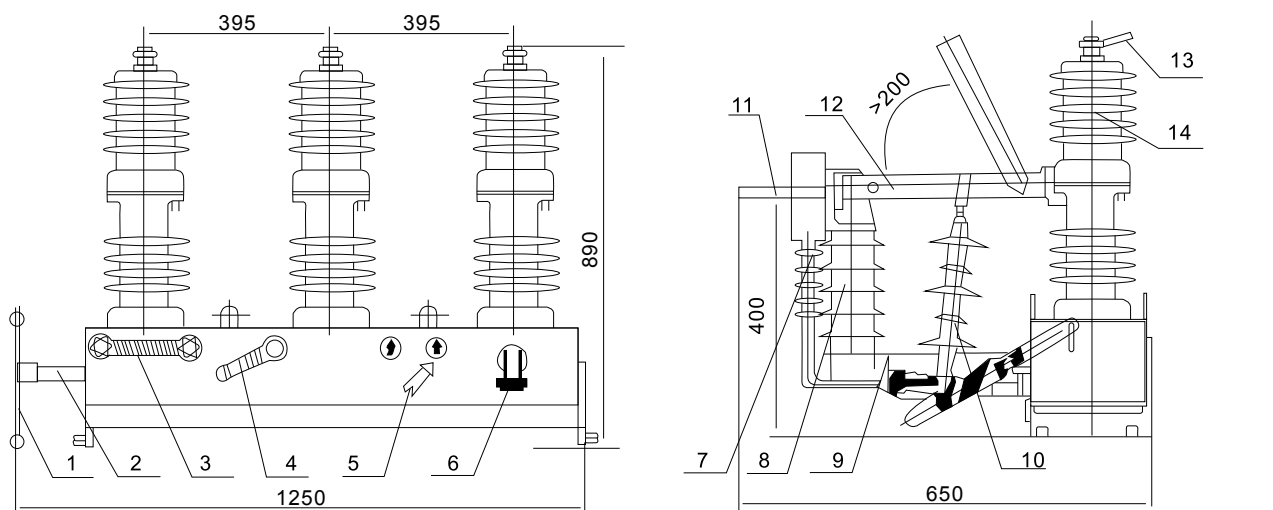


Fig. 1 ZW32-circuit breaker structure and outline size

- | | | | | |
|-----------------------------|-----------------------|---------------------------|---------------------------|------------------------|
| 1 Upper outgoing line | 4 Lower outgoing line | 7 Insulation pull rod | 10 Drive plate | 13 Mechanism box |
| 2 Arc-extinguishing chamber | 5 Conducting clamp | 8 Contact pressure spring | 11 Mechanism output shaft | 14 Current transformer |
| 3 Insulating tube | 6 Flexible connection | 9 Opening spring | 12 Operating mechanism | |



- | | | | | |
|----------------------|-------------------------|-----------------------|-----------------------------|------------------------------|
| 1 Operating handle | 4 Energy storage handle | 7 Current transformer | 10 Insulation pull rod | 13 Connecting plate (outlet) |
| 2 Isolator man shaft | 5 ON/OFF indicator | 8 Insulator | 11 Connecting plate (inlet) | 14 Circuit breaker |
| 3 ON/OFF handle | 6 Connecting plug | 9 Isolation frame | 12 Isolating blade | |

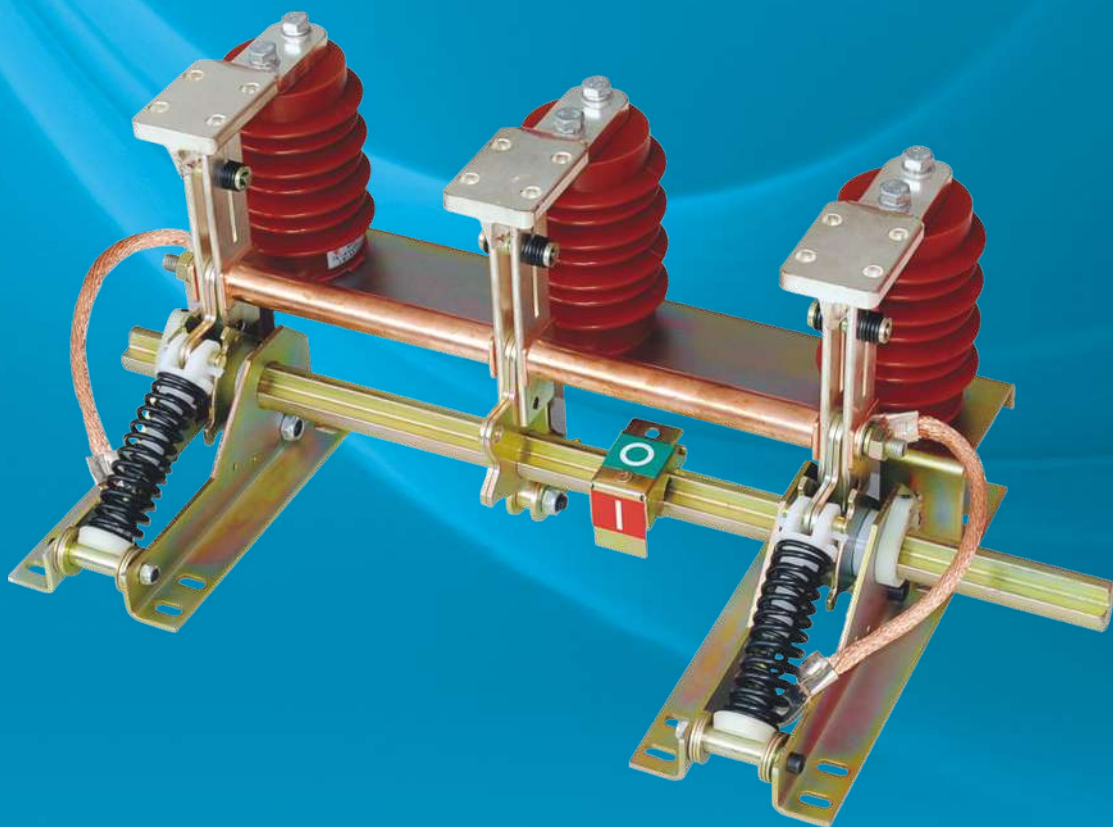


Indoor High Voltage Earth Switch

SANGAO ELECTRIC

China's high-voltage electrical pilot brand

JN15-12 Series
Indoor High Voltage Earth Switch



JN15-12 Series Indoor High Voltage Earth Switch

General

JN15-12 indoor high voltage earth switch complies with requirement of GB1985-89 and IEC129 standard, it's suitable for power system of 50Hz 12KV and below, and it can be used for earthing protection when equipped with various high voltage switch cabinets.

Advanced design, reliable technology;
Simple structure, easy installation;
Fast opening and closing capacity.

Normal Work Environment

Altitude: $\leq 1000\text{m}$;

Ambient temperature: $+40^{\circ}\text{C} \sim -10^{\circ}\text{C}$

(allowed for storage and transportation at 30°C)

Earthquake intensity: ≤ 8 degree.

In place free of danger of flame and explosion, in places of no severe dust, chemical corrosion and no intense vibration

Main Technical Parameters

No.	Item		Unit	Parameter	
1	Rated voltage		kV	12	
2	Rated short-time withstand current		kA	31.5	
3	Rated duration of short circuit		S	4	
4	Rated short circuit making current		kA	80	
5	Rated peak withstand current		kA	80	
6	Interphase center distance		mm	150,210,275	
7	Rated insulation level	1min power frequency withstand voltage	KV	Phase-to-earth, Phase-to-phase Phase-to-phase	42/48 75/85
		Lightning impulse withstand voltage			

Outline and Installation Size

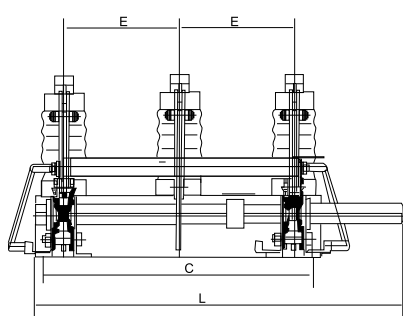
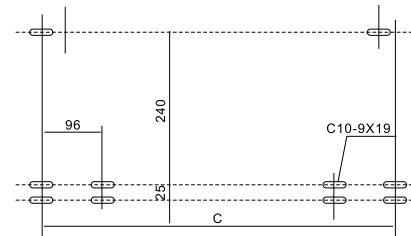
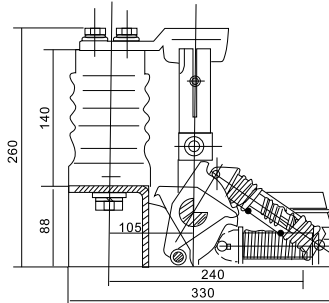


Fig. 1

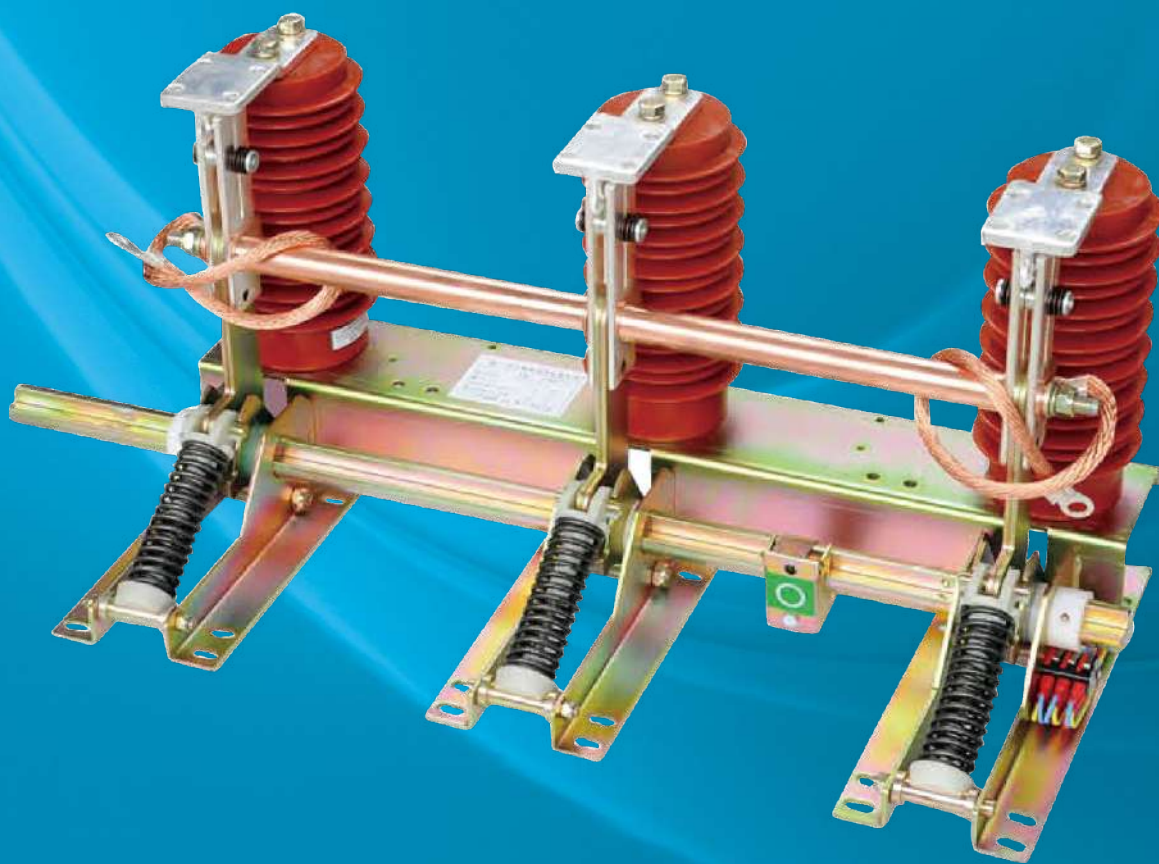


Model	L	E	C
JN15-12/31.5-210	655	210	516
JN15-12/31.5-230	710	230	556
JN15-12/31.5-250	760	250	596
JN15-12/31.5-275	810	275	646

SANGAO ELECTRIC

China's high-voltage electrical pilot brand

JN15-24/31.5 Series
Indoor High Voltage Earth Switch

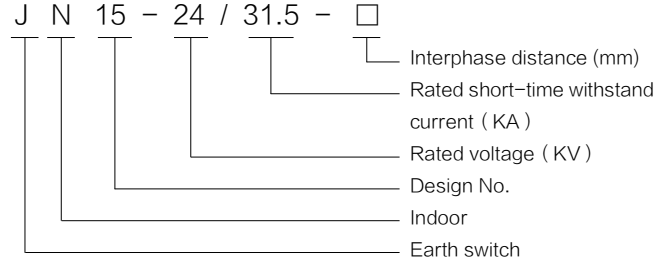


JN15-24/31.5 Series Indoor High Voltage Earth Switch

General

JN15-24/31.5 Series indoor high voltage earth switch is a new earth switch developed by our company. It's featured with advanced design, compact structure and reliable technical performance, complying with GB1985-2004 High-voltage Alternating-current Disconnectors and Earthing Switches and IEC62271-102:2002 standard. It's suitable for three-phase power system of 24KV 50(60)Hz, it owns short circuit making capacity so as to prevent the switchgear and other electric appliances from being damaged, and it can be used for earthing protection during equipment repair and maintenance when equipped with various high voltage switch cabinets.

Model Implication



Normal Work Environment

Altitude: $\leq 1000\text{m}$;
 Ambient temperature: upper limit $+40^{\circ}\text{C}$; lower limit -25°C
 Earthquake intensity: ≤ 8 degrees;
 Daily average relative humidity: $\leq 95\%$, monthly average: $\leq 90\%$
 Pollution grade: class II.

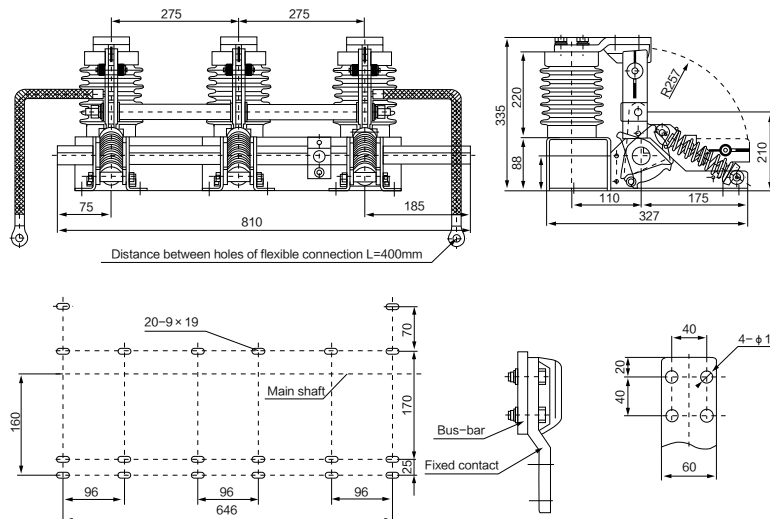
Ordering Information

- When ordering, the user shall specify model number, operating mode (right or left operation), phase distance and voltage indicator (model of indicator);
- User shall specify whether the soft connection's length shall be lengthened or not (normally $L=400\text{mm}$);
- User shall contact our company for negotiation for any other special requirement.

Main Technical Parameters

No.	Item	Unit	Parameter	
1	Rated voltage	kV	24	
2	Rated short-time withstand current	kV	31.5	
3	Rated duration of short circuit	S	4	
4	Rated short circuit making current	kA	80	
5	Rated peak withstand current	kA	80	
6	Rated insulation level	KV	Rated short-time power frequency withstand voltage	6.5
			Rated lightning impulse withstand voltage	125
7	Mechanical life	time	2000	

Outline and Installation Size





Low Voltage Intelligent Universal Circuit Breaker



SANGAO ELECTRIC

China's high-voltage electrical pilot brand

SGW1 Series Intelligent Universal Circuit Breaker



SGW1 Series Intelligent Universal Circuit Breaker

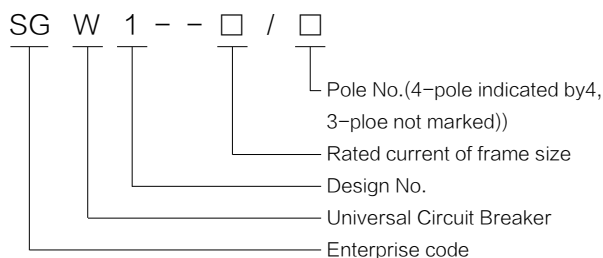
General

SGW1 series intelligent universal low-voltage circuit breaker (hereinafter referred to as circuit breaker), suitable for AC 50Hz power distribution system with rated voltage up to 690V and rated current of 400A~6300A, is mainly used to distribute electric energy and protect the circuit and power supply equipment from overload, under voltage, short circuit, single phase earth and other faults. The circuit breaker owns intelligent protection function with precise selective protection, which can improve power supply reliability and avoid unnecessary power failure. Meanwhile, the circuit breaker is equipped with open type communication interface available for "four-remote", so as to meet the requirement of control center and automated system. The impulse withstand voltage of the circuit breaker is 8000V at the altitude 2000m (the impulse withstand voltage is as per the different altitude standard, the max shall be less than 12000V). The circuit breaker without intelligent controller and transducer can be used as disconnecter, indicated with.

The circuit breaker is in conformity with GB14048.2 Low Voltage Switchgear & Controlgear-Low Voltage Circuit Breakers and IEC60947-2 Low Voltage Switchgear & Controlgear-Low Voltage Circuit Breakers.

Model Implication and Classification

1、Model implication



2.Classification

- (1)According to the installation mode: fixed type, draw-out type;
- (2)According to pole number: 3P, 4P;
- (3)According to the operating mode: electrical operation, manual operation (for repair and maintenance);

3. Release types

Intelligent over-current controller, under-voltage instantaneous (or time-delay) release, shunt release.

4. Performance of Intelligent Over-current Controller:

- (1) Intelligent controller: type H (for communication), type M (Common Intelligent type), type L (economic type)
- (2) With overload long time delay and inverse time limit, timing limit, instantaneous function. User can set by himself to form the protective characteristics needed.
- (3) Single-phase grounding protective function;
- (4)Display function: Setting current display, operating current display, line voltage display (the voltage display should be told when ordering);
- (5) Alarm Function: Overload alarm
- (6)Self-checking function: Overheat self-checking, and microcomputer self-checking;
- (7)Test Function: Test for performance Characteristics of controller.

Normal Work & Installation Condition

1. Ambient air temperature: the upper limit shall not exceed +40℃ and the lower limit shall be -5℃ , and daily average temperature shall not exceed +35℃ .Note: circuit breaker to be used at ambient air temperature higher than +40℃ or lower than -10℃ ~-25℃ shall be designed and used after negotiation of the manufacturer and user.
2. The altitude height of the installation site shall not exceed 2000m.
3. Atmospheric condition: the relevant humidity of air shall not exceed 50% at +40℃ , higher relevant humidity is allowable at lower temperature, the average max humidity in damp month can be 90% when its average minimum temperature is 25℃ . Condensation caused by temperature change shall be also considered. User shall negotiate with manufacturer for any special conditions.
4. Degree of protection: IP30.
5. Utility category: A or B.
6. Installation type: type IV is applicable for circuit breaker with rated operating voltage of 690V and below, under-voltage release and primary coil of power transformer; type III is applicable for auxiliary circuit and control circuit.
7. Installation condition: the circuit breaker shall be installed as required in this catalogue, with its vertical gradient not more than 5° (the gradient shall not exceed 15° for circuit breaker for mining).

Technical Data and Performance

1. See table 1 for rated current of circuit breaker

Table 1

Rated current of frame size InmA	Rated current InA
2000	(400) 630, 800,1000,1250,1600,2000
3200	2000, 2500,2900,3200
4000	3200, 3600,4000
6300	4000,5000,6300

2. See table 2 for rated short-circuit breaking capacity and short-time withstand current of circuit breaker, the arc distance for circuit breaker is "0" (it means no flashover for circuit breaker)

Table 2

Rated current of frame size I_{nm} (A)		2000	3200	4000	6300
Rated ultimate short circuit breaking capacity I_{cu} (kA) O-CO	400V	80	100	100	120
	690V	50	65	75	85
Rated short-circuit making capacity $n \times I_{cu}$ (kA) / $\cos \phi$	400V	176/0.2	220/0.2	220/0.2	264/0.2
	690V	105/0.25	143/0.2	165/0.2	187/0.2
Rated service short-circuit breaking capacity I_{cs} (kA)O-CO-CO	400V	50	65	80	100
	690V	40	65	65	75
Rated short-time withstand current I_{cw} (kA)1S, Time-delay0.4s,O-CO	400V	50	65	65/80 (MCR)	85/100 (MCR)
	690V	40	50	50/65 (MCR)	65/75 (MCR)

Note: the breaking capacity in table is the same for upper and lower incoming lines.

3. The max loss power of circuit breaker is 360W. Please refer to table 3 for rated lasting current variation of circuit breaker.

Table 3

SGW1 Ambient temp °C	400A	630A	800A	1000A	1250A	1600A	2000A
40	400A	630A	800A	1000A	1250A	1600A	2000A
50	400A	630A	800A	1000A	1250A	1600A	2000A
60	400A	630A	800A	1000A	1250A	1600A	2000A

Note: the derating factor for circuit breaker of 2500A and above is 0.9, and there's no derating for 4000A for circuit breaker of 6300A.

4. Intelligent over-current controller protection characteristic and function

(1) Over-current controller protection characteristic

① See table 4 for setting value I_r (I/I_n) and error.

Table 4

Long-delay	Short-delay		Instantaneous		Earth fault	
I_{r1}	I_{r2}	Error	I_{r3}	Error	I_{r4}	Error
$(0.4-1)I_n$	$(0.4-15)I_n$	$\pm 10\%$	$I_n=50kA$ ($I_{nm}=2000A$) $I_n=75kA$ ($I_{nm}=3200 \sim 4000A$) $I_n=100kA$ ($I_{nm}=6300A$)	$\pm 15\%$	$I_{nm}=2000 \sim 4000$ ($0.2-0.8$) I_n $I_{nm}=6300A$ Max1200A, $(0.2-1.0) I_n$ Min160A	$\pm 10\%$

Note: when it owns three-section protection as the same time, the setting value shall not be crossed.

② Long-delay over-current protection inverse delay action characteristic $I^2TL=(1.5I_{r1})^2TL$, see table 5 for action time of ($1.05 \sim 2.0$) I_{r1} , with time error+15%.

Table 5

$1.05I_{r1}$	$1.3I_{r1}$	$1.5I_{r1}$ Setting timeS	15	30	60	120	240	480
>2hnon-action	<1hnon-action	$2.01I_{r1}$ Setting timeS	8.4	16.9	33.7	67.5	135	270

Note: $t_l=1.5I_{r1}$ setting value, T_L -long-delay action time

③ Short-time delay over-current protection

I_t 's definite delay for short-delay over-current protection, if low-multiple is required for inverse time delay, then the characteristics: $I^2TS=(8I_l)^2t_s$, t_s denotes general delay time; when the overload current $>8I_l$, it will automatically transfer to definite time delay, see table 6 for definite time delay characteristics.

Table 6

延时时间 s				Returnable time s			
0.1	0.2	0.3	0.4	0.06	0.14	0.23	0.35

④ See fig. 1 for over-current trip protection characteristic and fig. 2 for earth fault protection characteristic.

(2) Function of M type intelligent over-current controller

① Ammeter function: displaying operating current and leakage current, maximum value in normal condition, also displaying setting current, test current and fault current or time value.

② Voltmeter function: displaying line voltage, max value in normal condition.

③ Remote monitoring and diagnostic function

A. The controller owns failure diagnosis function

When there's failure in computer, it will send "E" display or alarm for error indication and restart the computer. The circuit breaker can switch off if it's required by user.

B. When local temperature reaches 80℃, it will send alarm and switch off circuit breaker at low current (if user requires).

C. The intelligent controller owns signals for overload, earthing, short-circuit, load monitoring, pre-alarm and trip indication (OCR), which are sent by contact or optocoupler, it's convenient for external remote use, and the contact capacity is DC28V, 1A, AC125V, 1A.

④ Setting function

All parameters can be set by **[set]**, **[+]**, **[-]** and **[save]** keys. Press "set" to required setting (condition indicator indicates), then press + or - to adjust the parameter to required one, then press save, it means the setting value is locked if the save indicator flashes once. The protection parameters of controller can not be set across. After the controller recovers power supply, all parameters can be checked in cycle when pressing setting key again.

⑤ Test function

The protection characteristics of controller can be tested by setting +-, trip, non-trip, reset and other keys. Use +- key to adjust a test current for simulated failure (note: don't save or lock), then press trip or non-trip test, the controller will enter failure handling. Press trip key, the circuit breaker switches off, and press non-release key, the circuit breaker doesn't switch off, and all indicators show normal work. Other tests can be done only after pressing reset or zeroing button.

Note: in order for convenient test, no matter the earth leakage is set in trip or alarm position, it will be handled as tripping problem. Once failure happens during test, the controller will automatically stop all tests and enter failure handling.

⑥ Load monitoring function

Two setting values ILC1 with setting range (0.2-1)In and ILC2 with setting range (0.2-1)In, ILC1 has delay inverse-time characteristics, with time setting value 1/2 of long-delay setting value; there are two ILC2 delay characteristics: inverse-time delay, with a time setting value 1/4 that of long time-delay; definite-time delay with a time delay of 60s. The former is used to break the unimportant load of lower level when the current approaches to overload setting value, while the latter is used to keep the power supply for main circuit and main load circuit when the current exceeds 1LC and the unimportant load is switched off. When the current drops by ILC1. The above two monitoring protections shall be either selected, please see fig. 3 and 4 for monitoring characteristic.

⑦ MCR release and analog release protection can be cut off as per customer's requirement, and it's usually cut off during short-time delay breaking test.

MCR ON/OFF protection is mainly used for closing (at the instant of controller switching on) in line failure condition, and the controller can switch off the circuit breaker at low-multiple short circuit current.

When controller is set with extra large short-circuit current, the signal is not handled by host chip, and the controller will send release signal.

⑧ Thermal memory function

After delay release for the overload and short circuit, the controller has memory function of analog bi-metal characteristic before power interruption. The overload energy finishes discharging in 30min and short-circuit delay energy finishes discharging in 15min. In case of overload and short-circuit delay failure during the period, the release time will shorten, the controller power will be interrupted, and the energy automatically resets to zero.



Low Voltage Moulded Case Circuit Breaker

SANGAO ELECTRIC

China's high-voltage electrical pilot brand

SGM1 Series Moulded Case Circuit Breaker



SGM1-225M/3300



SGM1-63M/3300



SGM1-440L/3300



SGM1-630H/3300

SGM1 Series Moulded Case Circuit Breaker

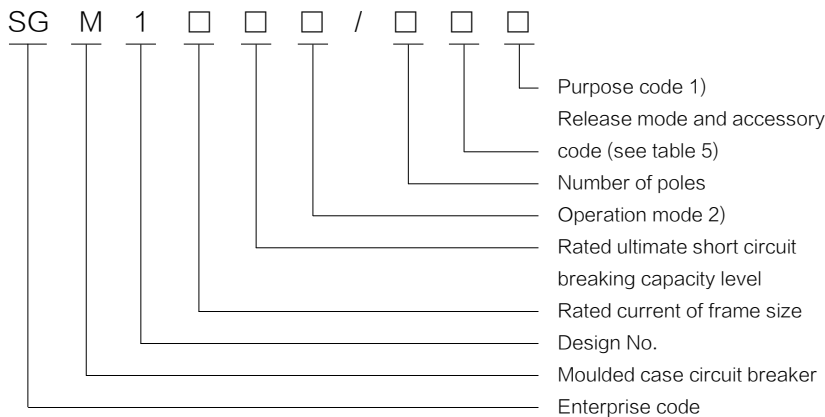
General

SGM1 series moulded case circuit breaker (hereinafter referred to as circuit breaker), a newly developed circuit breaker with adoption of advanced international design and manufacture technology, is mainly used for infrequent conversion of AC 50Hz (or 60Hz) circuit with rated insulation voltage of 800V (SGM1-63: 500V), rated operating voltage of 690V (KCM-63 $\leq$ 400V) and rated operating current up to 1250A, it's also used for infrequent startup of motor. The circuit breaker owns overload, short circuit and under voltage protection function, which can prevent the circuit and power supply equipment from damage.

The circuit breaker can be classified into four types: type C (common) type L (standard), type M (medium breaking capacity) and type H (high breaking capacity) according to rated ultimate short circuit breaking capacity (Icu). The circuit breaker owns advantages of small volume, high breaking capacity, short arcing (zero arcing for some specifications) and anti-vibration etc, and it's an ideal product used on land and marine. The circuit breaker can either be vertically (upright) or horizontally (transverse) mounted. The circuit breaker can not be connected with incoming lines, that means 1, 3, 5 connect power line and 2, 4, 6 connect load line. The circuit breaker owns isolation function, with corresponding symbol of: The circuit breaker complies with standard IEC60947-1 and GB/T14048.1 General, IEC60947-2 and GB14048.2 Low Voltage Circuit Breakers, IEC60947-4 and GB/T14048.4 Low-voltage Switchgear and Controlgear-Part4-1: Contactors and Motor-starters. Electromechanical Contactors and Motor-starters(Including motor protector)

Model Implication and Classification

1、Model implication



Note:

- 1) No code for circuit breaker for power distribution; 2 denotes circuit breaker for motor protection.
- 2) No code for direct operation; P denotes electrical operation; Z denotes rotary handle operation.

The circuit breaker is classified in to 2P (SGM1-100, 160, 225), 3P, 4P according to number of poles, there are four forms for neutral pole (pole N) of 4P product:

Type A: pole N is not mounted with over current release, and the pole N always switches on, but not switch on or off together with other three poles.

Type B: pole N is not mounted with over current release, and pole N switches on or off together with other three poles (pole N firstly switches on and then switches off).

Type C: pole N is mounted with over current release, and pole N switches on or off together with other three poles (pole N firstly switches on and then switches off).

Type D: pole N is mounted with over current release, and the pole N always switches on, but not switch on or off together with other three poles.

Classified by rated current (A):

SGM1-63L: (6) , 10, 16, 20, 25, 32, 40, 50, 63A, totally 9 classes (no overload protection for 6A);

SGM1-100: (10) , 16, 20, 25, 32, 40, 50, 63, 80, 100A, totally 10 classes;

SGM1-225: 100, 125, 140, 160, 180, 200, 225A, totally 7 classes;

SGM1-400: 225, 250, 315, 350, 400A, totally 5 classes;

SGM1-630: 400, 500, 630A, totally 3 classes;

SGM1-800: 630, 700, 800A, totally 3 classes;

SGM1-1250: 800, 1000, 1250A, totally 3 classes[specification with () is not recommended]

It is classified into front connection, rear connection and plug-in connection according to connection method.

It is classified into thermal/dynamic-electromagnetic (complex) type and electromagnetic type according to release type.

Classification by circuit breaker with or without accessory:

Internal accessory: shunt release, under-voltage release, auxiliary contact and alarm contact; external accessory: terminals of rotary handle operating mechanism, electrical operating mechanism, interlock device and auxiliary device etc.

Normal Work Installation Condition

Altitude: $\leq$ 2000m; Ambient temperature: $-5^{\circ}\text{C} \sim +40^{\circ}\text{C}$ (for marine products) Tolerable for effect from moist air; Tolerable for effect from salt mist and oil mist; Tolerable for effect from mould; Tolerable for effect from nuclear radiation; Work reliably when ship vibrates in normal condition at the highest gradient $\pm 22.5^{\circ}$; Work reliably in earthquake condition (4g); In medium of no explosion danger, in place where has no sufficient gas and conductive dust corrosive to metal and destructive to insulation; In place of no invasion of rain and snow.



**Drop-Out Switch/Drop-Out Fuse
Arrester/Insulator**

Drop-out Fuse



12KV-15KV

Model	Rated voltage (KV)	Rated current (A)	Breaking current(A)	Impulse voltage (BIL)	Power frequency withstand voltage	Creepage distance (MM)	Weight (KG)	Outline dimension (CM)
RH-33	15	100	10000	100	40	250	7.5	40 × 34.5 × 11
RH-33	15	200	12000	110	40	250	7.5	



15KV-27KV

Model	Rated voltage (KV)	Rated current (A)	Breaking current(A)	Impulse voltage (BIL)	Power frequency withstand voltage	Creepage distance (MM)	Weight (KG)	Outline dimension (CM)
Rw10	15	100	10000	100	40	250	7.5	48 × 34.5 × 11
Rw10	15	200	12000	110	40	250	7.5	



15KV-27KV

Model	Rated voltage (KV)	Rated current (A)	Breaking current(A)	Impulse voltage (BIL)	Power frequency withstand voltage	Creepage distance (MM)	Weight (KG)	Outline dimension (CM)
RD-24	24	100	8000	150	65	530	12	48 × 34.5 × 14
RD-24	24	200	10000	150	65	530	12	

Drop-Out Fuse



12KV-15KV

Model	Rated voltage (KV)	Rated current (A)	Breaking current (A)	Impulse voltage (BIL)	Power frequency withstand voltage	Creepage distance (MM)	Weight (KG)	Outline dimension (CM)
PD	11	100	6000	110	42	340	7.5	49 × 27 × 11.5
PD	11	200	8000	110	42	340	7.5	



15KV

Model	Rated voltage (KV)	Rated current (A)	Breaking current (A)	Impulse voltage (BIL)	Power frequency withstand voltage	Creepage distance (MM)	Weight (KG)	Outline dimension (CM)
HRW3	12	100	6300	100	42	380	8.8	61 × 13 × 42
HRW3	12	200	8000	110	42	380	8.8	



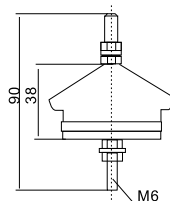
15KV

Model	Rated voltage (KV)	Rated current (A)	Breaking current (A)	Impulse voltage (BIL)	Power frequency withstand voltage	Creepage distance (MM)	Weight (KG)	Outline dimension (CM)
HPRWG2	12	100	6300	170	70	870	16	61 × 13 × 42.5
HPRWG2	12	200	8000	170	70	870	16	

HYW-0.22~0.66KV



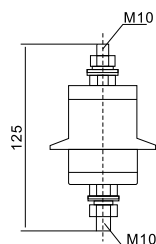
Application place	Model of arrester	Rated voltage of arrester kV (effective)	Nominal voltage of system kV (effective)	Continuous operating voltage kV (effective)	(U1mA) reference voltage kV $\geq$	Under lightning impulse current	200 μ s rectangular wave current A (peak)	4/10 μ s impulse current kA (peak)	Max leakage current under 0.75DC reference voltage μ A
Low pressure	HY1.5W-0.5/1.3	0.28	0.22	0.24	0.60	1.30	50	25	50
	HY1.5W-0.5/2.6	0.50	0.38	0.42	1.20	2.60			
	HY1.5W-0.8/3.9	0.8	0.66	0.72	1.80	3.90			



HYW-1.14KV



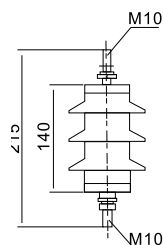
Application place	Model of arrester	Rated voltage of arrester kV (effective)	Nominal voltage of system kV (effective)	Continuous operating voltage kV (effective)	(U1mA) reference voltage kV $\geq$	Max residual voltage kV (peak)			200 μ s rectangular wave current A (peak)	4/10 μ s impulse current kA (peak)	Max leakage current under 0.75DC reference voltage μ A
						Under steep wave impulse current	Under lightning impulse current	Under switching impulse current			
Capacitance	HY0.1W-14R	1.4	1.4	1.20	2.6	9.45	6.85	3.85	250	40	50



HY5W-3~6KV



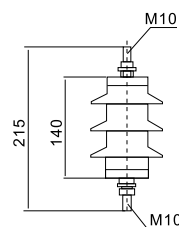
Application place	Model of arrester	Rated voltage of arrester kV (effective)	Nominal voltage of system kV (effective)	Continuous operating voltage kV (effective)	(U1mA) reference voltage kV $\geq$	Max residual voltage kV (peak)			200 μ s rectangular wave current A (peak)	4/10 μ s impulse current kA (peak)	Max leakage current under 0.75DC reference voltage μ A
						Under steep wave impulse current	Under lightning impulse current	Under switching impulse current			
Distribution (s)	HY5WS-3.8/15	3.8	3	2.0	7.5	17.3	15.0	12.8	75	40	50
	HY5WS-5/15	5	3	4.0	7.5	17.3	15.0	12.8			
	HY5WS-7.6/30	7.6	6	4.0	15.0	34.6	30.0	25.6			
	HY5WS-10/30	10	6	8.0	15.0	34.6	30.0	25.6			



HY5WZ-3~6KV



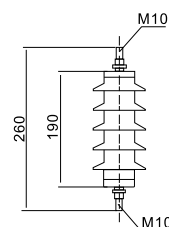
Application place	Model of arrester	Rated voltage of arrester kV (effective)	Nominal voltage of system kV (effective)	Continuous operating voltage kV (effective)	(U _{1mA}) reference voltage kV ≥	Max residual voltage kV (peak)			200 μs rectangular wave current A (peak)	4/10 μs impulse current kA (peak)	Max leakage current under 0.75DC reference voltage μA
						Under steep wave impulse current	Under lightning impulse current	Under switching impulse current			
Distribution (s)	HY5WS-3.8/15	3.8	3	2.0	7.5	17.3	15.0	12.8	75	40	50
	HY5WS-5/15	5	3	4.0	7.5	17.3	15.0	12.8			
	HY5WS-7.6/30	7.6	6	4.0	15.0	34.6	30.0	25.6			
	HY5WS-10/30	10	6	8.0	15.0	34.6	30.0	25.6			



HY5WS-10KV



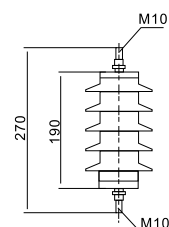
Application place	Model of arrester	Rated voltage of arrester kV (effective)	Nominal voltage of system kV (effective)	Continuous operating voltage kV (effective)	(U _{1mA}) reference voltage kV ≥	Max residual voltage kV (peak)			200 μs rectangular wave current A (peak)	4/10 μs impulse current kA (peak)	Max leakage current under 0.75DC reference voltage μA
						Under steep wave impulse current	Under lightning impulse current	Under switching impulse current			
Distribution (s)	HY5WS-12.7/50	12.7	10	6.6	25	57.5	50	42.5	75	40	50
	HY5WS-16.5/50	16.5	10	12.7	25	57.5	50	42.5			
	HY5WS-17/50	17	10	13.6	25	57.5	50	42.5			
	HY5WS-17.5/50	17.5	10	13.6	25	57.5	50	42.5			



HY5WZ-10KV



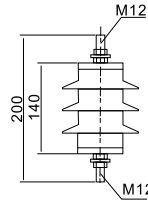
Application place	Model of arrester	Rated voltage of arrester kV (effective)	Nominal voltage of system kV (effective)	Continuous operating voltage kV (effective)	(U _{1mA}) reference voltage kV ≥	Max residual voltage kV (peak)			200 μs rectangular wave current A (peak)	4/10 μs impulse current kA (peak)	Max leakage current under 0.75DC reference voltage μA
						Under steep wave impulse current	Under lightning impulse current	Under switching impulse current			
Low pressure	HY5WZ-12.7/45	12.7	10	6.6	24	51.8	45	38.3	150	40	50
	HY5WZ-16.5/45	16.5	10	12.7	24	51.8	45	38.3			
	HY5WZ-17/45	17	10	13.6	24	51.8	45	38.3			



HY5W-3~6KV



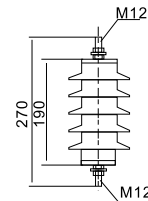
Application place	Model of arrester	Rated voltage of arrester kV (effective)	Nominal voltage of system kV (effective)	Continuous operating voltage kV (effective)	(U1mA) reference voltage kV $\geq$	Max residual voltage kV (peak)			200 μ s rectangular wave current A (peak)	4/10 μ s impulse current kA (peak)	Max leakage current under 0.75DC reference voltage μ A
						Under steep wave impulse current	Under lightning impulse current	Under switching impulse current			
Rotary motor	HY2.5W-3.8(5)/9.5	3.8(5)	—	2.0(3.0)	5.7	10.7	9.5	7.6	200	40	50
	HY2.5W-7.6(8)/19.0	7.6(8)	—	4.0(6.3)	11.2	21.0	19.0	15.0		40	
Motor neutral point	HY1.5W-2.4/6	2.4	—	1.9	3	—	6.0	5.0	200	40	
	HY1.5W-4.8/12	4.8	—	3.8	6.8	—	12.0	10.0		40	
Capacitor (R)	HY5WR-3.8(5)/13.5	3.8(5)	3	2.0(4.0)	7.2	—	3.5	10.5	400	65	
	HY5WR-7.6(10)/27.0	7.6(10)	6	7.6(10)	14.4	—	27.0	20.8		65	



HYW-10KV



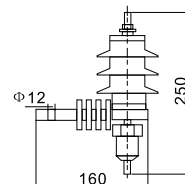
Application place	Model of arrester	Rated voltage of arrester kV (effective)	Nominal voltage of system kV (effective)	Continuous operating voltage kV (effective)	(U1mA) reference voltage kV $\geq$	Max residual voltage kV (peak)			200 μ s rectangular wave current A (peak)	4/10 μ s impulse current kA (peak)	Max leakage current under 0.75DC reference voltage μ A
						Under steep wave impulse current	Under lightning impulse current	Under switching impulse current			
Power station (Z)	HY5WR-12.7/45	12.7	10	6.6	23.0	—	45.0	35.0	400	65	50
	HY5WR-16.5/45	16.5	10	12.7	23.0	—	45.0	35.0		65	
	HY5WR-17/45	17	10	13.6	24	—	45.0	35.0		65	
Rotary motor	HY2.5W-12.7/31.0	12.7	—	10.5	18.9	34.7	31.0	25.0	200	40	
	HY2.5W-17.5/40.0	17.5	—	13.8	24.4	44.8	40.0	32.0		40	
	HY2.5W-20.0/45.0	20.0	—	15.8	28.0	50.4	45.0	36.0		40	



HY5W-3~6KV



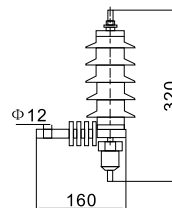
Application place	Model of arrester	Rated voltage of arrester kV (effective)	Nominal voltage of system kV (effective)	Continuous operating voltage kV (effective)	(U1mA) reference voltage kV $\geq$	Max residual voltage kV (peak)			200 μ s rectangular wave current A (peak)	4/10 μ s impulse current kA (peak)	Max leakage current under 0.75DC reference voltage μ A
						Under steep wave impulse current	Under lightning impulse current	Under switching impulse current			
Distribution (s)	HY5WS-3.8/15	3.8	3	2.0	7.5	17.3	15.0	12.8	75	40	50
	HY5WS-5/15L	5	3	4.0	7.5	17.3	15.0	12.8			
	HY5WS-7.6/30L	7.6	6	4.0	15.0	34.6	30.0	25.6			
	HY5WS-10/30L	10	6	8.0	15.0	34.6	30.0	25.6			



HY5W-10KV



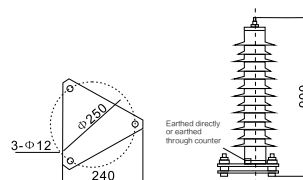
Application place	Model of arrester	Rated voltage of arrester kV (effective)	Nominal voltage of system kV (effective)	Continuous operating voltage kV (effective)	(U1mA) reference voltage kV $\geq$	Max residual voltage kV (peak)			200 μ s rectangular wave current A (peak)	4/10 μ s impulse current kA (peak)	Max leakage current under 0.75DC reference voltage μ A
						Under steep wave impulse current	Under lightning impulse current	Under switching impulse current			
Distribution (s)	HY5WS-16.5/50L	12.7	10	6.6	25	57.5	50	42.5	75	40	50
	HY5WS-16.5/50L	16.5	10	12.7	25	57.5	50	42.5			
	HY5WS-17/50L	17	10	13.6	25	57.5	50	42.5			
	HY5WS-17.5/50L	17.5	10	13.6	25	57.5	50	42.5			



HY5W-35KV



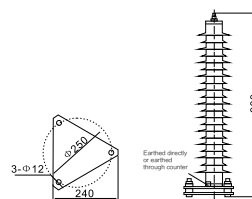
Application place	Model of arrester	Rated voltage of arrester kV (effective)	Nominal voltage of system kV (effective)	Continuous operating voltage kV (effective)	(U1mA) reference voltage kV $\geq$	Max residual voltage kV (peak)			200 μ s rectangular wave current A (peak)	4/10 μ s impulse current kA (peak)	Max leakage current under 0.75DC reference voltage μ A
						Under steep wave impulse current	Under lightning impulse current	Under switching impulse current			
Distribution (s)	HY5WZ-42/134	42	35	23	73	154	134	114	150	65	50
	HY5WZ-51/134	51	35	40.8	73	154	134	114			
	HY5WZ-52.7/134	52.7	35	40.8	73	154	134	114			
	HY5WZ-54/134	54	35	41	73	154	134	114			



HY5W-66KV



Application place	Model of arrester	Rated voltage of arrester kV (effective)	Nominal voltage of system kV (effective)	Continuous operating voltage kV (effective)	(U1mA) reference voltage kV $\geq$	Max residual voltage kV (peak)			200 μ s rectangular wave current A (peak)	4/10 μ s impulse current kA (peak)	Max leakage current under 0.75DC reference voltage μ A
						Under steep wave impulse current	Under lightning impulse current	Under switching impulse current			
Power station	HY5W-75/215	75	66	60	123	248	215	183	400	65	50
	HY5W-90/224	90	66	72.5	130	258	224	190			
	HY10W-75/250	75	66	60	127	256	250	213	600	100	50
	HY10W-75/223	75	66	60	127	256	223	190			
	HY10W-75/230	75	66	60	127	265	230	196			
	HY10W-90/224	90	66	72.5	130	258	224	190			
	HY10W-90/232	90	66	72.5	130	266	232	198			
	HY10W-90/235	90	66	72.5	130	270	235	201			



Insulator

