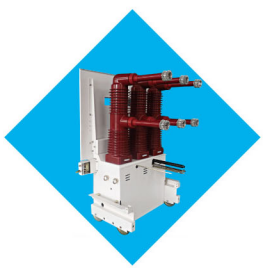
W-VB Vacuum Circuit Breaker
W-VB 真空断路器



AMERICAN WESTINGHOUSE INVESTMENT ENTERPRISE DEVELOPMENT CO., LTD
美国西屋投资企业发展有限公司

W-VB Vacuum Circuit Breaker
W-VB 真空断路器

Product Introduction 产品简介

With more than one hundred years of electric design and manufacturing experience, W-VB Vacuum Circuit Breaker is a new high performance product developed by American Westinghouse Company. It can be used under the circumstances of China Grid. We can provide safe and reliable products and timely and thoughtful service for users.

W-VB真空断路器集美国西屋公司百多年电气设计制造经验，在充分适应了中国电网的特点的基础上研发的一款高性能产品，为各种用户提供了安全、可靠的产品和及时、周到的服务。

W-VB Vacuum Circuit Breaker
W-VB 真空断路器

Product Features 产品特点

Advanced Arc Extinguishing Technology

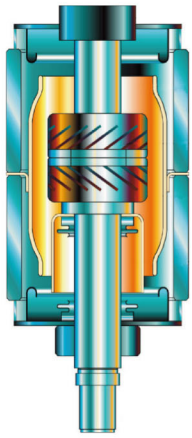
With higher instantaneous opening and accurate arc-extinguishing at zero-crossing point, special vacuum interrupter of W-VB Vacuum Circuit Breaker adopts advanced contact structure from American Westinghouse. The product can withstand higher peak current and DC component.

As the inventor of vacuum circuit breakers, Westinghouse is the leader in vacuum interrupter field. Based on the advanced arc extinguishing theory of American Westinghouse, with the improvement of vacuum arc extinguishing technology, combined with the long life of the modular operation mechanism, we develop the leading products - W-VB Series Vacuum Circuit Breaker. They have strong advantages as high breaking peak current, large DC component and low operating over-voltage.

先进的灭弧技术

W-VB真空断路器专用真空灭弧室采用美国西屋先进的触头结构，辅以更高的刚分，实现了更准确的过零点息弧，可以承受更高的峰值电流和直流分量。

美国西屋公司作为真空断路器的发明者，在真空灭弧室领域一直处于领先地位。根据美国西屋先进的灭弧理论，完善了真空灭弧技术，配以长寿命的模块化弹操机构，开发出领先的W-VB系列真空断路器。具有开断电流峰值高、直流分量大和操作过电压低等优势。



Vacuum Interrupter
真空灭弧室

Reliable Insulation Design

The solid-sealed polar poles for W-VB Vacuum Circuit Breakers adopt most advanced filling and sealing technology and imported epoxy resin and APG manufacturing process. In order to make full series standard products from 10kv to 35kv meet the application requirements under the environment above 3000 meters altitude, every product passes strict testing such as X-ray crack detection, partial discharge and insulation tests. Combined with high voltage resistance and low cut-off value of the vacuum interrupter, the product can effectively respond to the complicated condition such as seriously polluted environment, power grid harmonic component and over-voltage.

可靠的绝缘设计

W-VB真空断路器固封极柱采用目前最先进的灌封技术，及进口的环氧树脂，经APG工艺加工制造，每一个产品都通过X光的探伤、局部放电、绝缘等项目的严格检测。使得从10kV到35kV的全系列标准产品都达到了海拔3000米的使用标准。结合高耐压低截流的真空灭弧室，可以有效应对环境污秽严重、电网谐波分量大、过电压高的复杂工况。

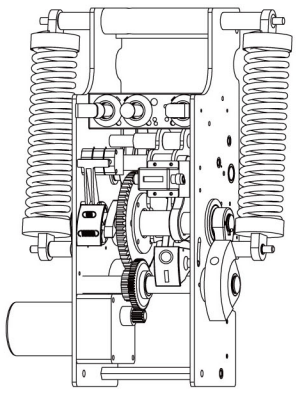
Solid-sealed polar poles
固封极柱

Integral Modular Operation Mechanism

Full gear transmission design with high strength and high compact is applicable for the full series 20~50kA products. The amount of mechanism parts is less than half of similar products. Products with this characteristic can improve the mechanical efficiency and response speed. They can also provide longer action time and stroke for closing and opening electromagnet, and reduce impulse current onto the coils, multiple improve the electric life of closing and opening coil and prolong the maintenance cycle of breaker. With compact structure, small volume and modular design, integral operation mechanism can be conveniently installed and maintained.

一体式的模块化弹操机构

高强度、高紧凑的全齿轮传动的设计，适用20~50kA的全系列产品。机构零件不到同类产品的一半，提高了机械效率和响应速度，留给了合分闸电磁铁更长的动作时间和冲程，降低了线圈的冲击电流，成倍的提高了合分闸线圈的电寿命，延长了断路器的检修周期。一体式操作机构结构紧凑、体积小，模块化设计更方便安装和维护。



Integral modular operation mechanism
一体式的模块化操作机构

Professional and Advanced Automatic Production Line

The products are produced by professional and advanced automatic production line. With the advanced testing equipment, strict quality management, we can ensure high quality from raw materials, semi-finished products to the finished products. In order to ensure the stable quality and improve the production efficiency, the production process strictly complies with ISO9001 quality system requirements, quality control and process requirements.

专业、先进的自动生产线

产品配备了专业、先进的自动生产线，通过先进的检测设备、严谨的质量管理，确保产品从原料、半成品到成品全程的质量水平。生产流程严格按ISO9001质量控制体系要求和质量控制、工序要求进行，从而确保产品质量的稳定，也提高了生产效率。

Scientific Quality Control Measures

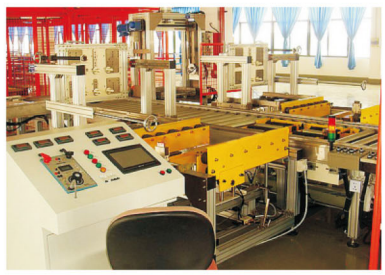
i) Handcart assembly must pass the test of high precision handcart calibration table. Distribution cabinet interlocking device of the handcart must be tested on a special detecting cabinet.

ii) Interrupter solid-sealed module adopts imported epoxy resin molded by APG process. Each module passes the strict testing such as X-ray flaw detection, partial discharge measurement.

iii) The coating of main components is all controlled by the coating detector. And the hardness of key parts shall pass the hardness test.

iv) Each loop and contact of the product must pass the test of special detector.

v) The bolt fastening of key parts is verified by a high precision torque tool.



科学的质量控制手段

1、手车的装配必须通过高精度手车校准工作台进行的验证，手车的配柜联锁装置必须在特制的检测柜上进行检测。

2、灭弧室固封模块采用进口环氧树脂经APG工艺成型，每一模块通过X光探伤、局部放电测量等的严格检测。

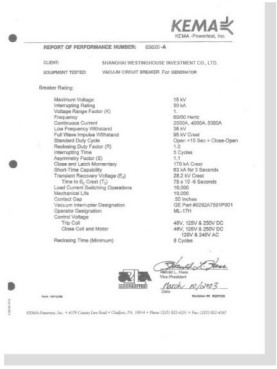
3、主要零部件的镀层均通过镀层检测仪控制，关键零部件的硬度通过硬度测试。

4、产品的控制原理图的每一个回路、每一个接点都必须通过特制的检测仪的测试。

5、关键部件的螺栓紧固均通过高精密的扭力工具验证。

Perfect Quality Control System

In the process of production, each circuit breaker adopts advanced manufacturing technology. It is tested by strict systematic testing to check its quality and consistency and comply with the quality guarantee system requirements of IS09001:2000. In the production of every new circuit breaker, every process shall be inspected and confirmed by quality department through signature to ensure the traceability and quality of products.

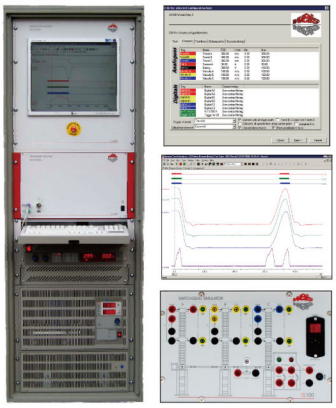


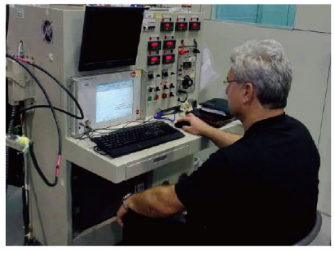
完善的质量控制体系

在生产过程中，每一台断路器均采用先进的制造工艺，经受严格系统化的试验，以检查其品质和一致性，符合IS09001：2000质量保证体系的要求，每台新断路器均由质量部门在生产过程中，对每一道工序进行检验并签字，以保证产品的可追溯性和产品的质量。

Strict and Systematic Factory Inspection Items

i) Vacuum fracture, power frequency withstand voltage test between phases and phase to earth;
ii) Circuit breaker under-voltage, over-voltage operation experiments;
iii) Insulation test of auxiliary and control circuits;
iv) Mechanical properties test (opening & closing time, speed, bounce, synchronization);
v) Mechanical fatigue test (opening & closing operation 300 times);
vi) Circuit resistance measurement;
vii) Opening & closing synchronization;
viii) Opening & closing time.
ix) Bounce time;
x) Appearance test.





严格系统化的出厂检验项目

1、真空断口、相间及对地工频耐压试验；
2、断路器欠压、过压操作实验；
3、辅助和控制回路的绝缘试验；
4、机械特性试验（分合闸时间、速度、弹跳、同期）；
5、机械疲劳试验（分合闸300次）；
6、回路电阻测量；
7、分合闸同期性；
8、分合闸时间；
9、弹跳时间；
10、外观检测。

Main Technical Parameters 主要技术参数

W-VB product design conforms to the standards

IEC26671	《AC High-voltage Circuit Breakers》
IEC60694	《Common specifications for High-voltage Switchgears and Controlgears》
GB1984	《AC High-voltage Circuit Breakers》
GBT / 11022	《Common Technical Requirements on High-voltage Switchgears and Controlgears》
DL/T402	《Order Technical Conditions for AC High-voltage Circuit Breakers》
DL/T403	《Order Technical Conditions for 12 kV - 40.5 kV High-voltage Vacuum Circuit breakers》
DL/T593	《Common Technical Requirements on High-voltage Switchgears and Controlgears》
JB/T3855	《3.6 kV - 40.5 kV Indoor AC High-voltage Vacuum Circuit Breakers》
ANSI/IEEE C037.09	《Test Procedures of AC High-voltage Circuit Breakers》

W-VB产品设计符合标准

EC26671	《交流高压断路器》
EC60694	《高压开关设备和控制设备标准用一般规范》
GB1984	《交流高压断路器》
GBT/11022	《高压开关设备和控制设备标准的共用技术要求》
DL/T402	《交流高压断路器订货技术条件》
DL/T403	《12kV—40.5kV高压真空断路器订货技术条件》
DL/T593	《高压开关设备和控制设备的共用技术要求》
JB/T3855	《3.6kV—40.5kV户内交流高压真空断路器》
ANSI/IEEE C037.09	《交流高压断路器试验程序》

The product specifications are complete.

产品规格齐全

Rated voltage（额定电压）：12kV、24kV、40.5kV。

Rated Current（额定电流）：630A、1250A、1600A、2000A、2500A、3150A、4000A、5000A。

Rated short circuit breaking current（额定短路开断电流）：25kA、31.5kA、40kA、50kA。

Technical Data of Circuit Breakers
断路器技术数据

项目 Items		单位 Unit	数据 Data		
额定电压 Rated voltage		kV	12	24	40.5
额定绝缘水平 Rated insulation level	1 min工频耐压 Power frequency withstand voltage (1 min)	kV	42	60	60
	雷电冲击耐受电压（峰值） Lightning impulse withstand voltage (peak)	kV	75	125	185
额定频率 Rated frequency		Hz	50,60	50,60	50,60
额定电流 Rated current		A	630,1250,1600,2000, 2500,3150,4000,5000	630,1250,1600, 2000,2500,3150	630,1250,1600, 2000,2500
额定短路开断电流（有效值） Rated short circuit breaking current (rms)		kA	25,31.5,40,50	25,31.5,40	25,31.5
额定峰值耐受电流 Rated peak resistance current		kA	63,80,100,125	63,80,100	63,80
额定短路关合电流 Rated short circuit making current		kA	63,80,100,125	63,80,100	63, 80
额定短时耐受电流 Rated short-time withstand current		kA	25,31.5,40,50	25,31.5,40	25,31.5
额定短路持续时间 Rated short circuit duration		s	4		
额定单个/背靠背电容器组开断电流 Rated single/back to back capacitor bank breaking current		A	630/400(40kA为800/400)		
额定电容器组关合涌流 Rated capacitor bank making current		kA	12.5(频率不大于1000Hz) 12.5 (frequency not more than 1000Hz)		
额定操作顺序 Rated operating sequence		自动重合闸：分0.3S—合分—180S—合分 Automatic reclosing: O0.3S-CO-180S-CO	非自动重合闸：分180S—合分—180S—合分 Non-automatic reclosing: O180S-CO-180S –CO		
额定短路电流开断次数 Rated short circuit current breaking times		次 time	50次 50 times	20次 20 times	20次 20 times
分合闸机构电源额定电压 Rated voltage of opening & closing mechanism power		V	AC:110,220 DC:110,220		
机械寿命 Mechanical life		次 time	30000	20000	10000
触头开距 Contact distance		mm	9±1	14±1	18±1
触头合闸弹跳时间 Contact closing bounce time		ms	≤2		
三相合、分闸不同期性 Non-synchronism of 3-phase closing & opening		ms	≤2		
合闸时间 Closing time		ms	30~70	30~70	30~70
分闸时间 Opening time		ms	20~50	20~50	20~50

Specified value of operation time (under rated voltage) 动作时间的规定值（在额定电压下）：

Closing time 合闸时间： 30 ~ 70 ms

Breaking time 开断时间：≤70ms;

Opening time 分闸时间： 20~50 ms

Arcing time 燃弧时间： ≤ 15 ms

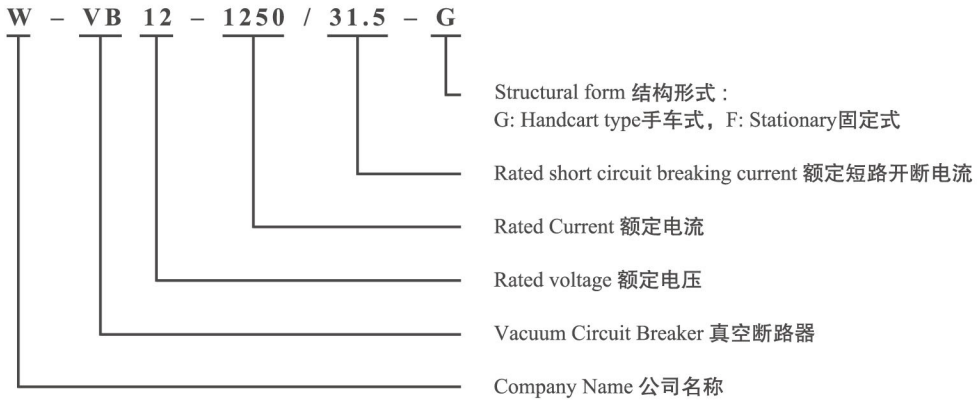
Technical Data of Energy Storage Motor
储能电机的技术数据

额定电压 Rated voltage	消耗功率 Power consumption	电流 current	储能时间（最大） Energy storage time (max)
AC/DC 110V	100 W	0.1A	10s
AC/DC 220V	100 W	0.5A	10s

Technical Data of Release and Locking Electromagnet
脱扣器与闭锁电磁铁的技术数据

名称 Name		额定电压 Rated voltage	消耗功率 Power consumption	电流 Current
分闸脱扣器 Opening release	TQ	DC 110V	220 W	2A
		DC 220V	220 W	1A
合闸脱扣器 Closing release	HQ	DC 110V	236 W	2.1A
		DC 220V	236 W	1.1A
闭锁电磁铁 Locking electromagnet	Y1	DC 110V	2.7 W	0.05A
		DC 220V	2.7 W	0.05A

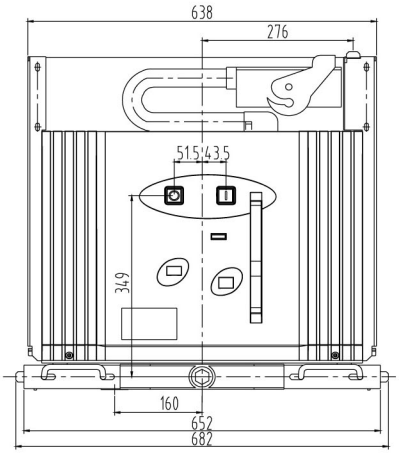
Model Specification
型号说明

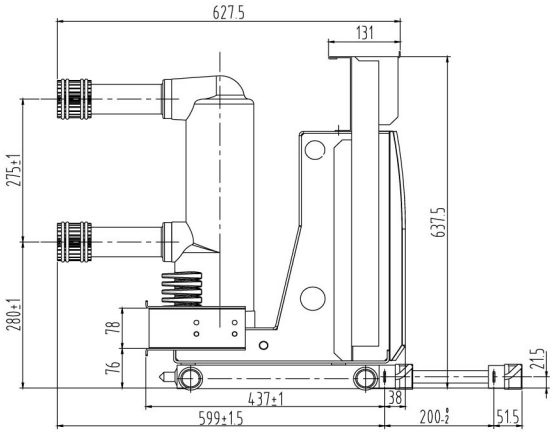


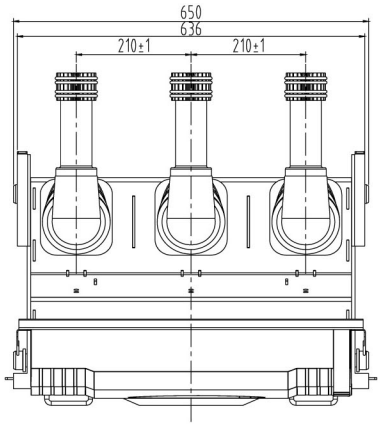
10kV Circuit Breaker Overall Size (Phase distance 210)

10kV断路器外形尺寸（210相距）

手车式 Handcart type

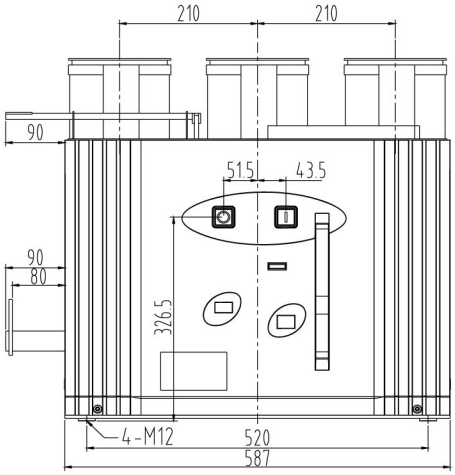


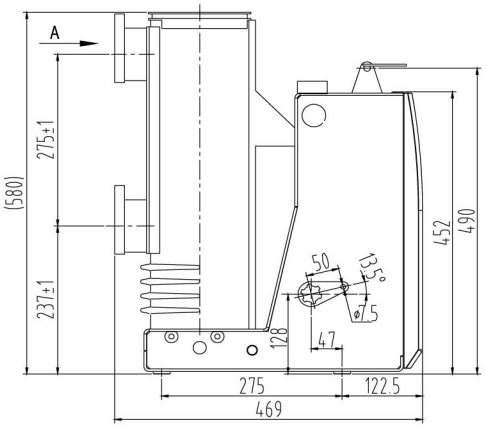




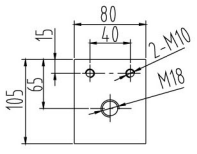
规格 Specification	配静触头 with fixed contact
630A/25~31.5kA	ϕ35
1250A/25~40kA	ϕ49
1600A/31.5~40kA	ϕ55

固定式 Stationary





A向

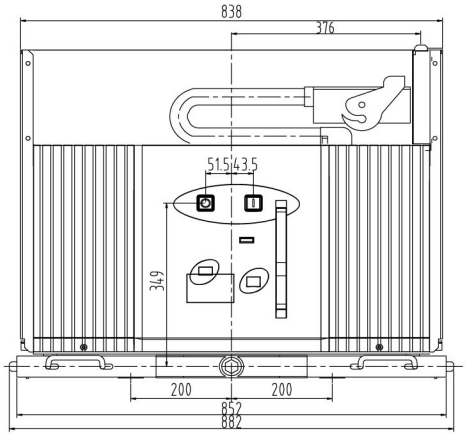


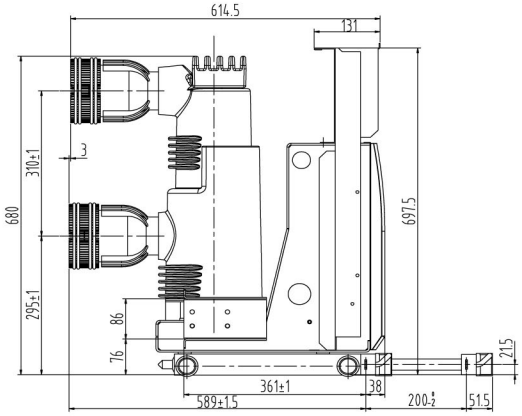
规格 Specification
630A/25~31.5kA
1250A/25~40kA
1600A/31.5~40kA

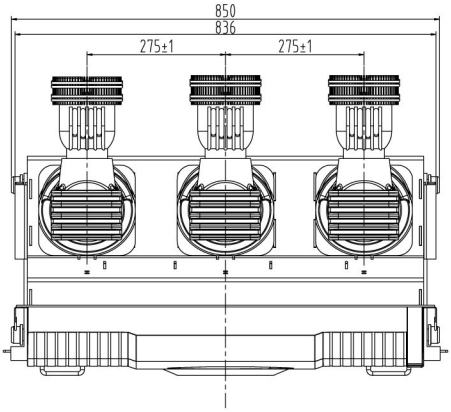
10 kV Circuit Breaker Overall Size (Phase distance 275)

10kV断路器外形尺寸（275相距）

手车式 Handcart type

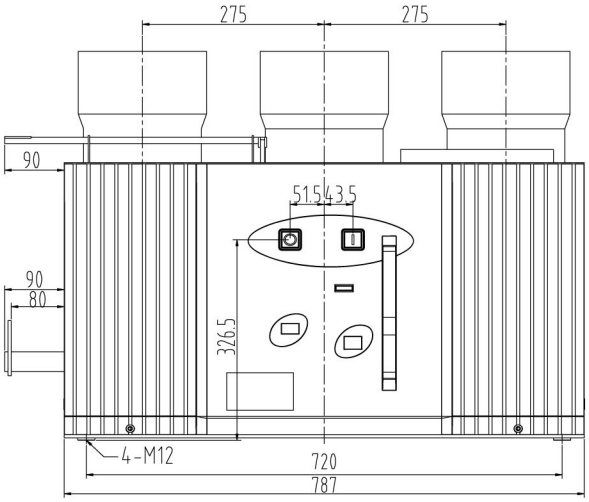


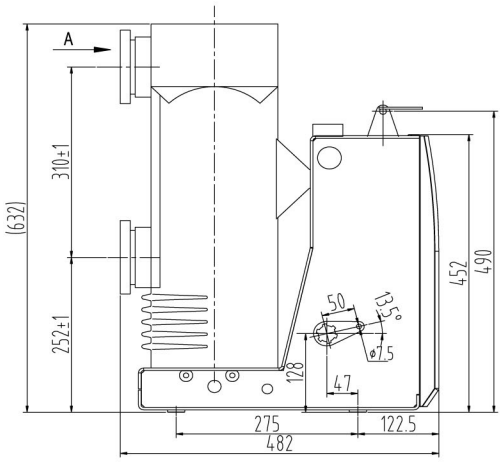


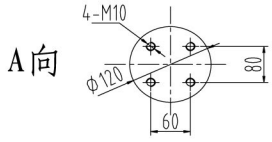


规格 Specification	配静触头 with fixed contact
1600~2000A/31.5~50kA	ϕ79
2500~3150A/31.5~50kA	ϕ109
4000A/50kA	ϕ109

固定式 Stationary





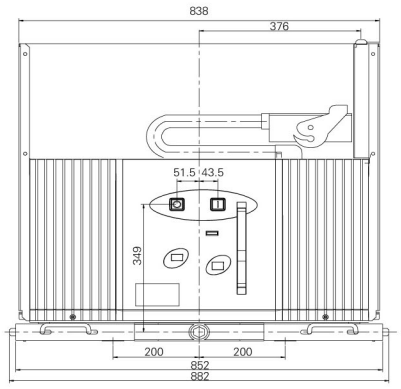


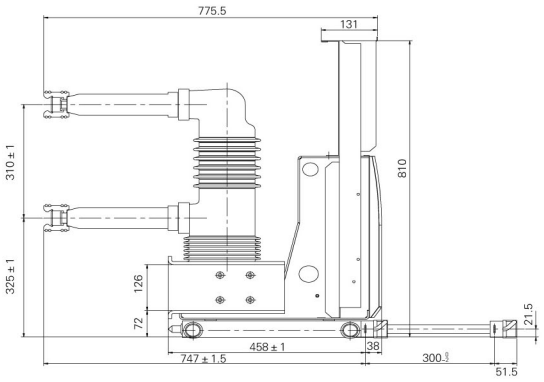
规格 Specification
1600~2000A/31.5~50kA
2500~3150A/31.5~50kA
4000A/50kA

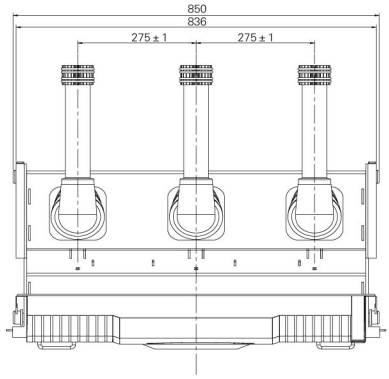
24 kV Circuit Breaker Overall Size (Phase distance 275)

24kV断路器外形尺寸（275相距）

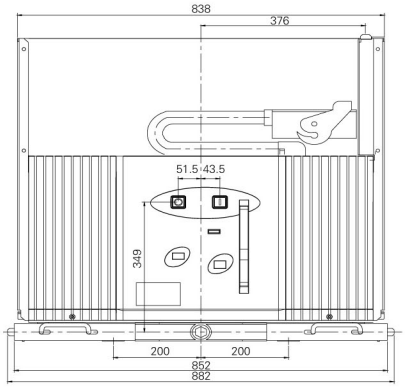
手车式 Handcart type

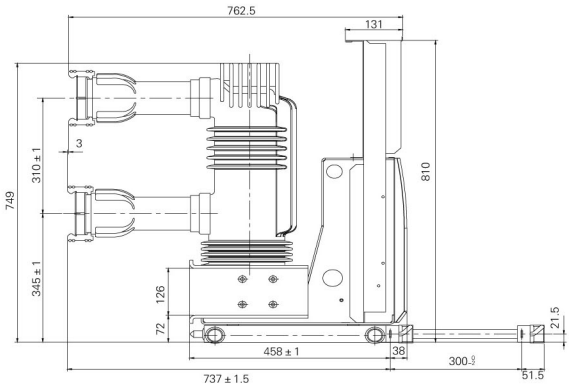


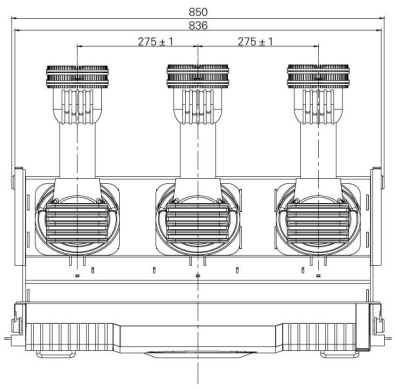




规格 Specification	配静触头 with fixed contact
630/25~31.5kA	ϕ35
1250A/25~31.5kA	ϕ49



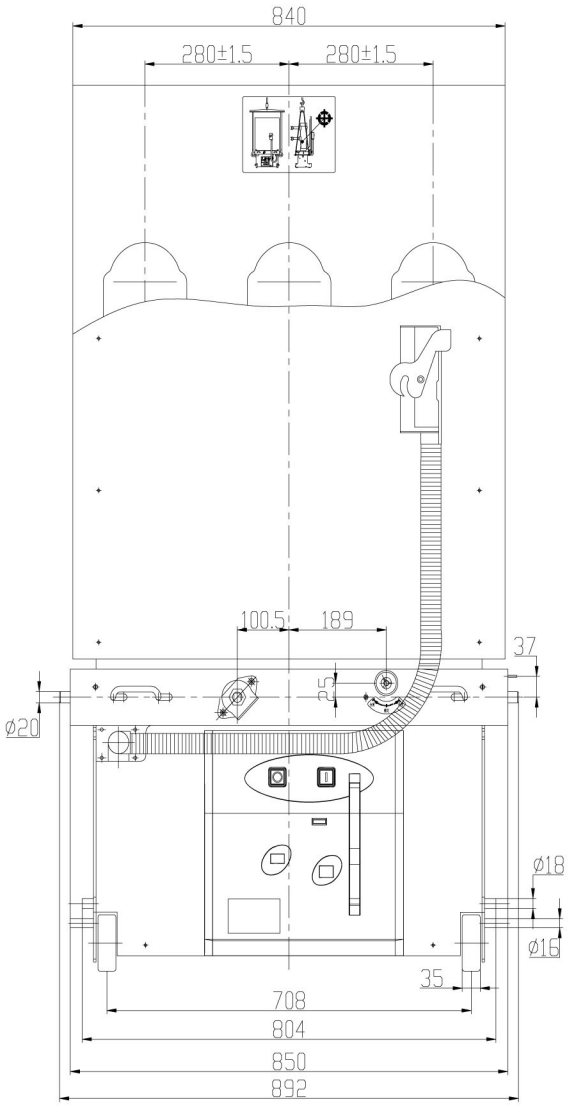


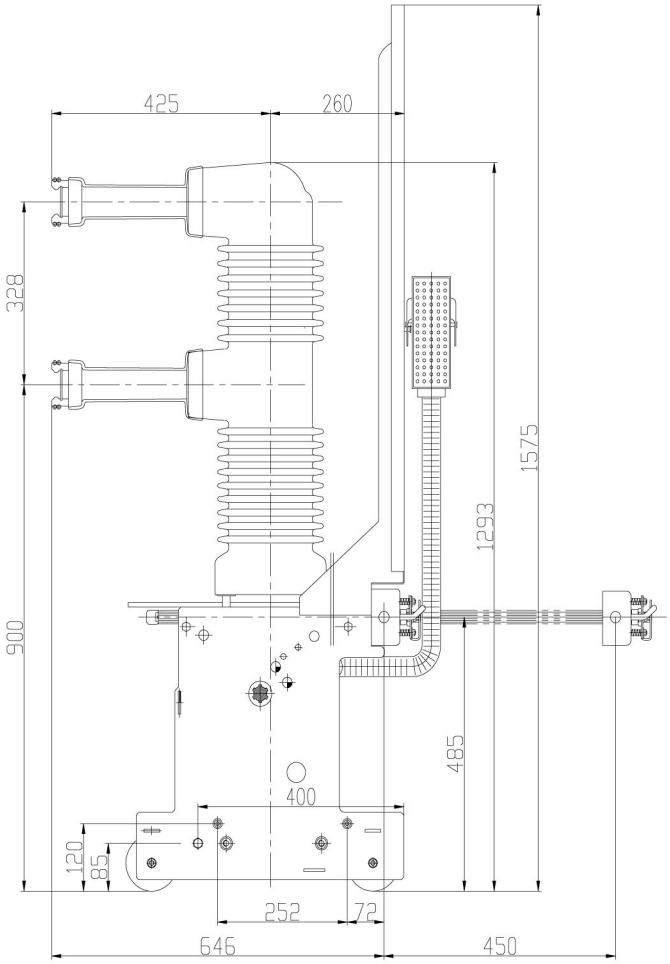


规格 Specification	配静触头 with fixed contact
1600/25~31.5kA	ϕ55
2000A/25~31.5kA	ϕ77
2500A/25~31.5kA	ϕ109
3150A/25~31.5kA	ϕ109

35 kV Circuit Breaker Overall Size (Phase distance 280)

35kV断路器外形尺寸（280相距）

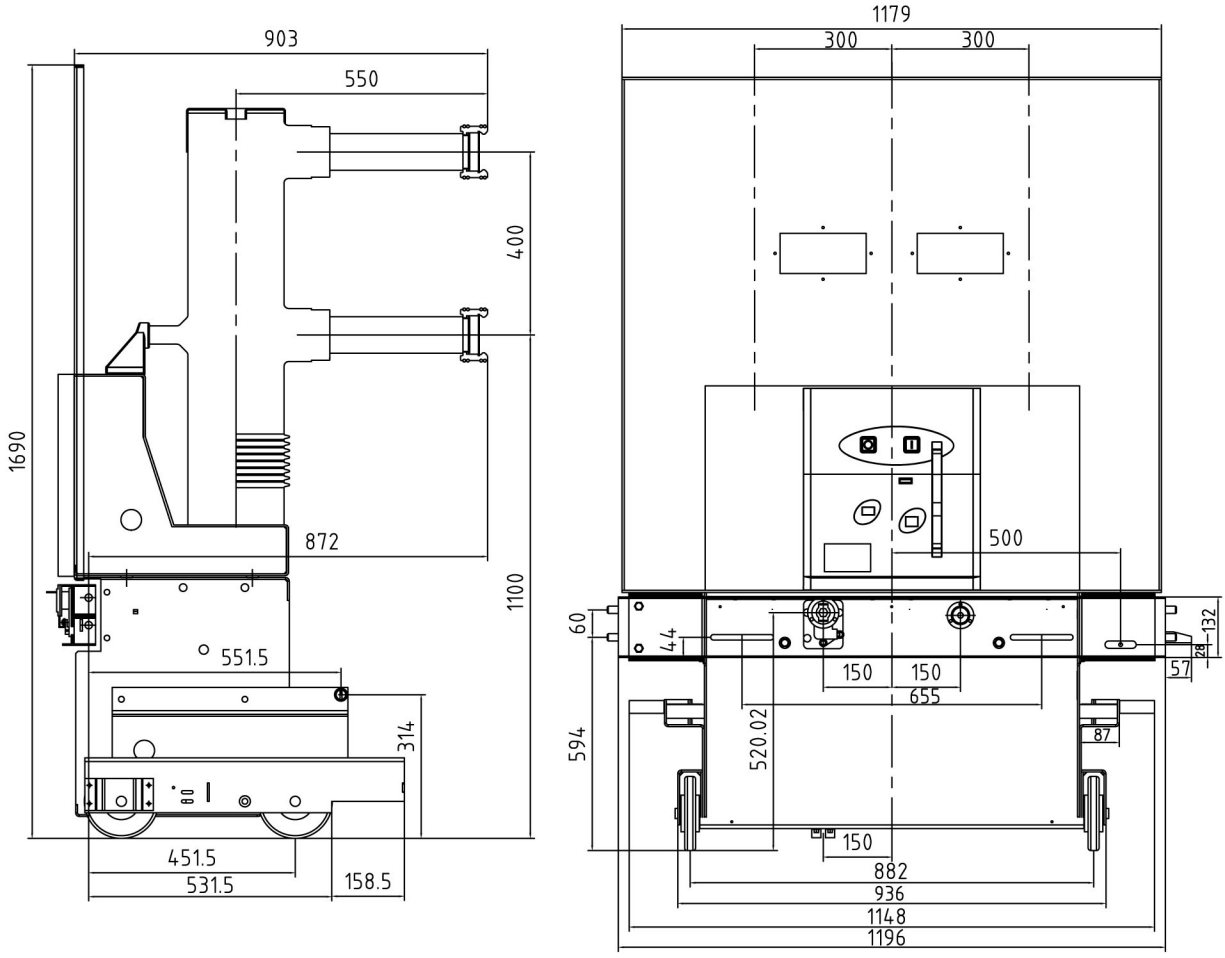




规格 Specification	配静触头 with fixed contact
1250/25~31.5kA	ϕ49
1600A/25~31.5kA	ϕ55
2000A/25~31.5kA	ϕ79
2500~3150A/25~31.5kA	ϕ109

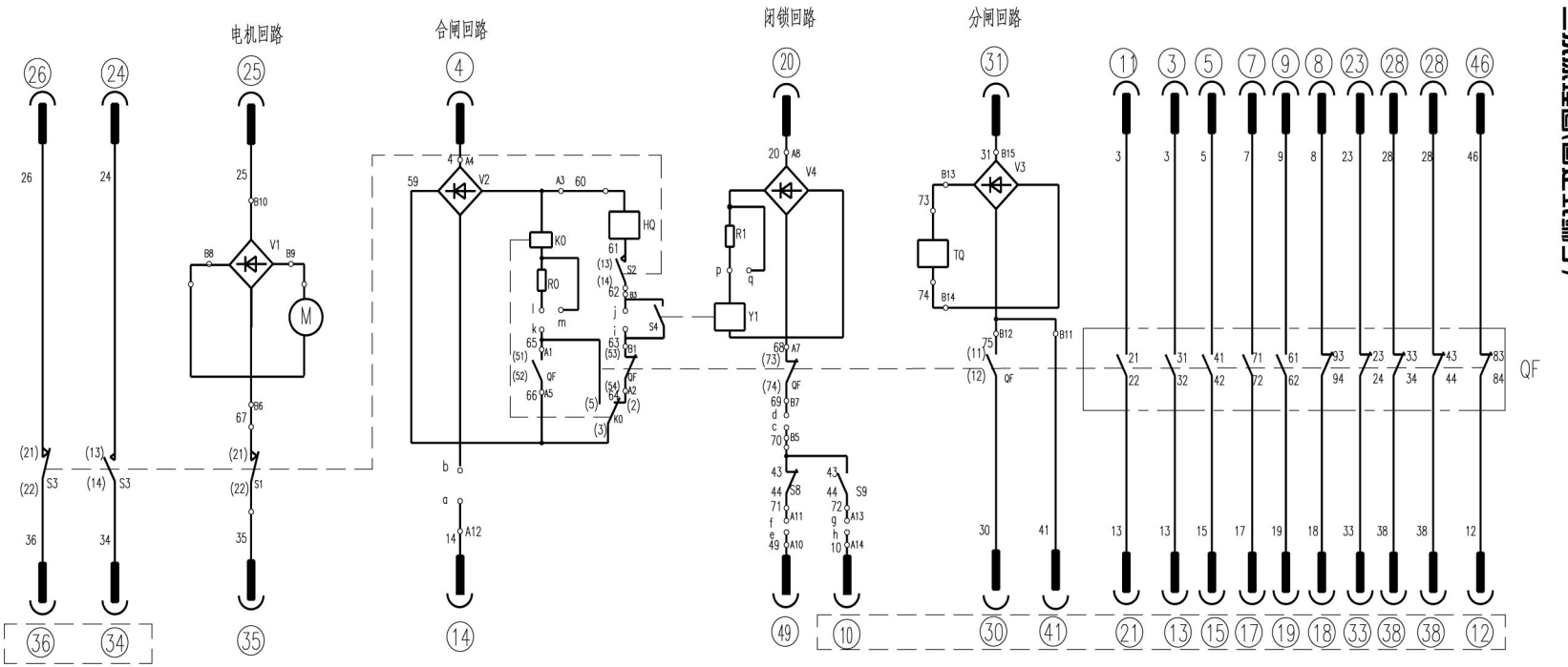
35 kV Circuit Breaker Overall Size (Phase distance 300)

35kV断路器外形尺寸（300相距）



规格 Specification	配静触头 with fixed contact
1250/25~31.5kA	ϕ49
1600A/25~31.5kA	ϕ55
2000A/25~31.5kA	ϕ79
2500~3150A/25~31.5kA	ϕ109

Secondary Principle Diagram (for stationary terminal)
二次原理图(固定式端子)



S9：辅助开关（当断路器在工作位置时） S9: Subswitch (when circuit breaker at the operating position)	HQ：合闸线圈 HQ: Closing coil	V1~V4：整流器（直流时取消） V1~V4: Rectifier (DC cancelled)
S8：辅助开关（当断路器在试验位置时） S8: Subswitch (when circuit breaker at the testing position)	TQ：分闸线圈 TQ: Trip coil	K0：机构内部防跳继电器（可选） K0: in-built of anti-jumping relay (optional)
S4：闭锁电磁铁的辅助开关 S4: Subswitch of latching electromagnet	R0~R1：电阻 R0~R1: Resistance	Y1：闭锁电磁铁（可选） Y1: Latching electromagnet (optional)
S1~S3：储能用微动开关 S1~S3: MSW microswitch of accumulation energy	a~m：跳线端子 a~m: Jumper terminal	Y7~Y9：间接式过电流脱扣器线圈（可选） Y7~Y9: Indirect overcurrent trip coil (optional)
QF：辅助开关 QF: Subswitch	M：储能电机 M: Stored energy motor	

可选件接线设置：
Connection settings of options

跳线状态 bridle wire of affairs / 配置 configuration		a-b	c-d	e-f	g-h	a-f	a-g	b-c	i-j	l-k
带防跳 with antibouncer	带闭锁 with interlock	√	√	√	√	/	/	/	/	√
	无闭锁 without interlock	/	/	/	/	√	√	√	√	√
无防跳 without antibouncer	带闭锁 with interlock	√	√	√	√	/	/	/	/	/
	无闭锁 without interlock	/	/	/	/	√	√	√	√	/

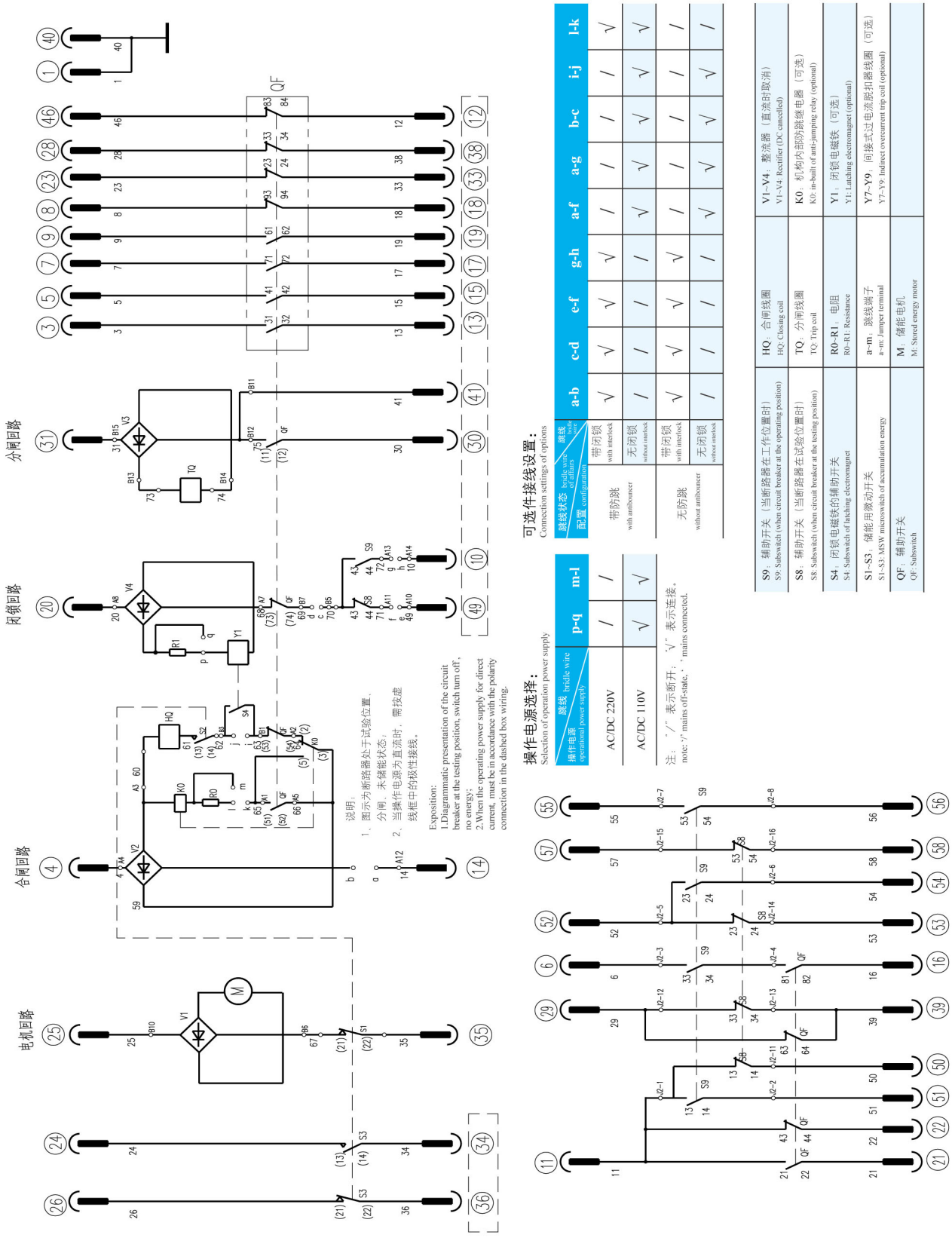
操作电源选择：
Selection of operation power supply

操作电源 operational power supply / 跳线 bridle wire	p-q	m-l
AC/DC 220V	/	/
AC/DC 110V	√	√

注：“/”表示断开；“√”表示连接。
note: '/' mains off-state, ' ' mains connected.

Secondary Principle Diagram (for handcart type with 58 pins)

二次原理图(手车式58芯)



可选件接线设置：

Connection settings of options

跳线状态 bridle wire of options / 配置 configuration		a-b	c-d	e-f	g-h	a-f	a-g	b-c	i-j	l-k
带防跳 with anbouncer	带闭锁 with interlock	√	√	√	√	/	/	/	/	√
	无闭锁 without interlock	/	/	/	/	√	√	√	√	√
无防跳 without anbouncer	带闭锁 with interlock	√	√	√	√	/	/	/	/	/
	无闭锁 without interlock	/	/	/	/	√	√	√	√	/

操作电源选择：

Selection of operation power supply

操作电源 operational power supply / 跳线 bridle wire	p-q	m-l
AC/DC 220V	/	/
AC/DC 110V	√	√

注：“/”表示断开；“√”表示连接。
note: "/" mains off-state; " " mains connected.

S9：辅助开关（当断路器在工作位置时） S9: Subswitch (when circuit breaker at the operating position)	**HQ**：合闸线圈 HQ: Closing coil
S8：辅助开关（当断路器在试验位置时） S8: Subswitch (when circuit breaker at the testing position)	**TQ**：分闸线圈 TQ: Trip coil
S4：闭锁电磁铁的辅助开关 S4: Subswitch of latching electromagnet	**R0-R1**：电阻 R0-R1: Resistance
S1~S3：储能用微动开关 S1~S3: MSW microswitch of accumulation energy	**a-m**：跳线端子 a-m: Jumper terminal
QF：辅助开关 QF: Subswitch	**M**：储能电机 M: Stored energy motor

V1-V4：整流器（直流时取消） V1-V4: Rectifier (DC cancelled)	
K0：机构内部防跳继电器（可选） K0: in-built of anti-jumping relay (optional)	
Y1：闭锁电磁铁（可选） Y1: Latching electromagnet (optional)	
Y7-Y9：间接式过电流脱扣器线圈（可选） Y7~Y9: Indirect overcurrent trip coil (optional)	