



## **ZN63A-12**

### **型户内交流高压真空断路器**

INDOOR HIGH VOLTAGE VACUUM CIRCUIT BREAKER

**乐清市莱洋电气有限公司**  
Yueqing Liyond Electric Co.,Ltd.

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## Brief Introduction

### 企业简介

乐清市莱洋电气有限公司是一家专业生产户内外高压真空断路器，高低压电器、隔离开关、成套设备等。产品广泛应用于电力、冶金、矿山、石油、化工、铁路等输配电系统，营销网络覆盖全国大部分省份及东南亚、西亚、中东等十余个国家。

公司始终坚持“提供给所有顾客高质量的产品和优质服务”的企业宗旨，不断总结经验，开拓创新。树立“以人为本”的理念，汇聚八方英才，共谋发展大计。在产品的设计开发方面，力求使每一个产品符合市场需求；同时我们不断充实研发队伍，长期与国内设计院和研发机构保持合作，加强技术交流，进一步提高产品的市场竞争力，确保了我们的产品处于同行业的先进行列。同时我们将不断完善企业内部管理，使企业健康发展。

目前公司已经通过了ISO9001国际质量管理体系，莱洋电气产品不仅畅销国内，并且已经开始逐步进入国际市场，并获得客户的广泛认可和赞许。

我们向顾客承诺：不仅仅提供产品，并提供解决方案及完善的售后服务来使顾客放心满意。公司全体员工愿竭诚为广大用户提供一流的产品和一流的服务。

Yueqing Liyond Electric Co., Ltd. is a professional manufacturer of indoor and outdoor high voltage vacuum circuit breakers, high and low voltage electrical isolation switch equipment. The products are widely used in electric power, metallurgy, mining, petroleum, chemical, railways and other power transmission and distribution system, marketing network covering more than a dozen countries, including most of the provinces of the country and Southeast Asia, West Asia, the Middle East.

The company has always adhered to provide to all our customers high quality products and services of the enterprise purpose. Constantly sum up experience and innovation. Establish a "people-oriented" concept, convergence Plus Yingcai a bright future. In product design and development, and strive to make each product to meet market demand, the same time, we continue to enrich the R & D team, long-term cooperation with domestic design and R & D institutions to maintain and enhance technical exchanges to further enhance the market competitiveness of products to ensure that our products advanced ranks in the same industry. We will continue to improve the internal management of enterprises, so that healthy development of enterprises.

The company has passed ISO9001 international quality management system electrical products not only sell well indomestic and have begun to gradually enter the international market, and access to a wide range of customer recognition and praise.

Our commitment to the customer: not just products, and for solutions and after-sales service to customer satisfaction assured. All employees of the company is willing to wholeheartedly provide customers with first-class products and excellent service.



# 科技创新

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## ZN63A-12

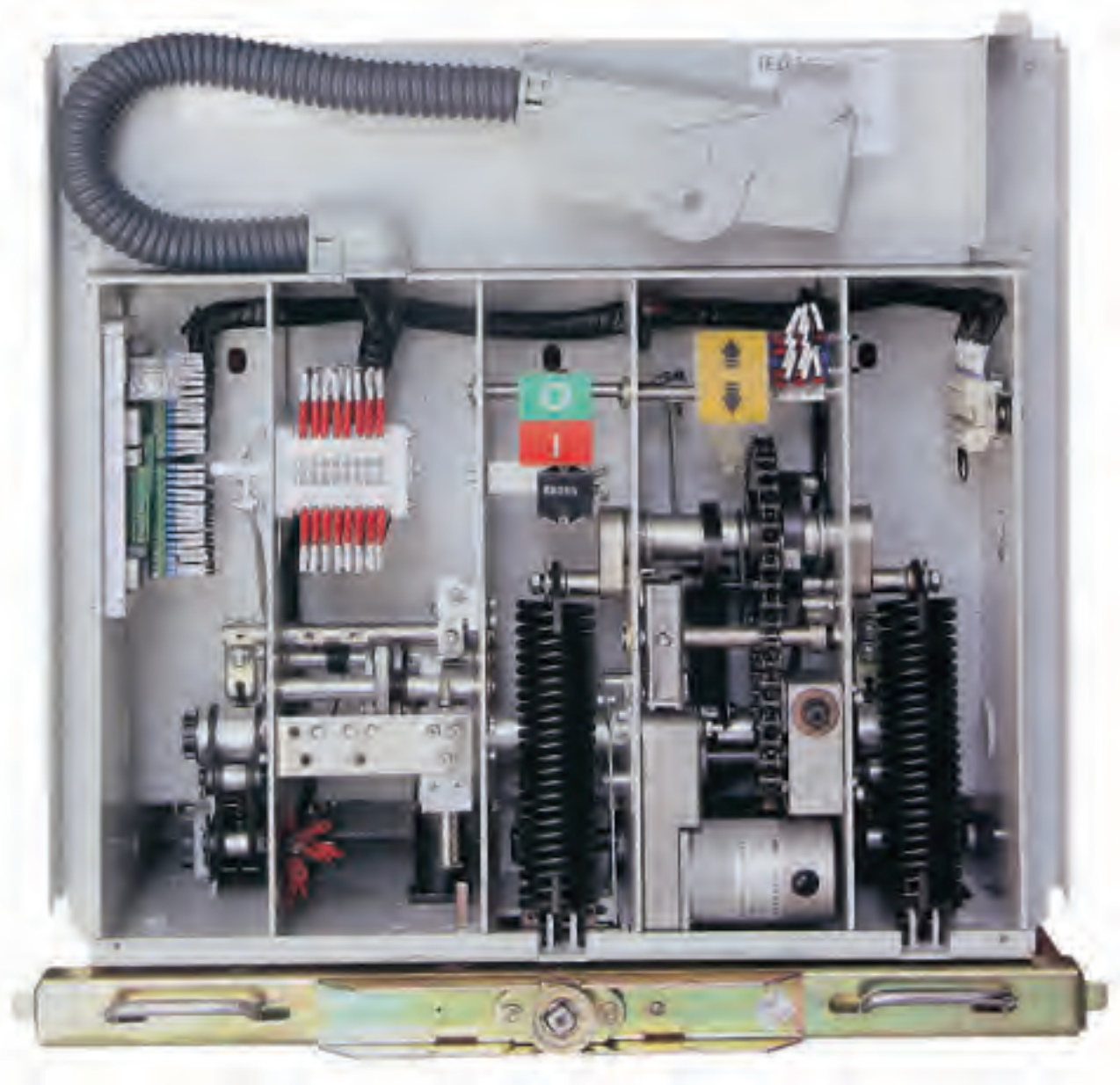
型户内交流高压真空断路器

INDOOR HIGH VOLTAGE VACUUM CIRCUIT BREAKER





### Spring Operating Mechanism



**Circuit board**



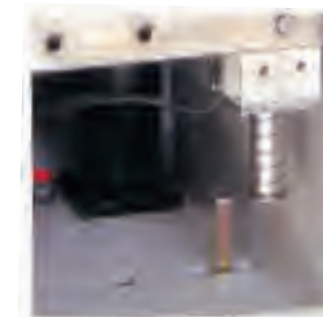
**Instruction for opening & closing**



**Opening unit**



**Closing unit**



**Oil buffer**



**Surface treatment  
Nickel-phosphorus  
alloy**

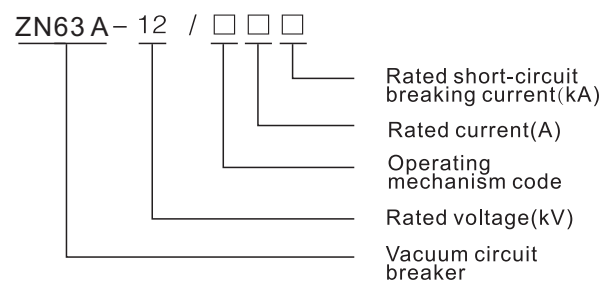




### 1.Summary

ZN63A-12 Indoor high voltage vacuum circuit breaker is a self-developed product of our company. It mainly serves in mineral enterprise, power plant and substation for control and protection of electric equipment. This VCB has merits of long life, easy maintenance, no pollution, no explosion, low noise etc, and it is fit for use in stringent work condition with frequent operation etc.It can be installed both in trolley type switchgear and fixed type switchgear.  
Standard:GB1984-2003,IEC 62271-100

### 2.Model and meaning



### 3.Relative standards

JB3855-1996 3.6-40.5kV Indoor high voltage vacuum DL/T403-2000 High-voltage vacuum circuit breaker ordering technology Comply with IEC56's relevant requirements.

### 4. Ambient conditions

- A) Ambient temperature:-15℃~+40℃
- B) Ambient humidity
  - Daily average relative humidity  $\leq 95\%$
  - Monthly average relative humidity  $\leq 90\%$
  - Daily average vapor pressure  $\leq 2.2 \times 10^{-3}$  Mpa
  - Monthly average vapor pressure  $\leq 1.8 \times 10^{-3}$  Mpa
- C) Altitude:  $\leq 1000$ m
- D) Earthquake intensity:  $\leq 8$  degree
- E) It can be used at site that has no flammable risks, explosive risks, chemistry material and intensity shake.

### 5.Main specifications and technical parameters

NO.	ITEM	UNIT	DATA		
1	Rated voltage	kV	12		
2	1 min power frequency withstand voltage		42		
3	Rated lightning impulse withstand voltage		75		
4	Rated frequency	Hz	50		
5	Rated current	A	630 1250	630 1250 1600 2000 2500 3150	1250 1600 2000 2500 3150 4000*
6	Rated short-circuit breaking current	kA	25	31.5	40
7	Rated short-time withstand current		25	31.5	40
8	Rated duration of short-circuit	s	4		
9	Rated peak withstand current	kA	63	80	
10	Rated short-circuit making current		63	80	
11	Secondary circuit power frequency withstand voltage	V	2000		
12	Rated breaking current of single/back to back capacitor bank	A	630/400(40kA为800/400)		
13	Rated capacitor bank closing current	kA	12.5 (Frequency $\leq 1000$ Hz)		
14	Opening time(Rated voltage)	ms	20-50		
15	Closing time(Rated voltage)		35-70		
16	Mechanical lifeTime	Time	20000		
17	Rated current breaking times		20000		
18	Rated short circuit current breaking times		50(40kA为30)		
19	Contact & fixed contact erosion limit	mm	3		
20	Rated closing operation voltage	V	AC110/220 DC110/220		
21	Rated opening operation voltage				



NO.	ITEM	UNIT	DATA
	"Rated voltage of storage motor	V	AC110/220 DC110/220
	Rated power of storage motor	W	70(40kA 100)
	Energy storage time	S	≤15
	Clearance between open contacts	mm	11±1
	Overtravel of contact		3.5±0.5
	Contact closing bounce time	mm	≤2(40kA≤3)
	Close/open non-synchronized of three phases		≤2
	Average opening speed (Contact open-6mm)	ms	0.9-1.2
	Average closing speed (Contact closed-6mm)	m/s	0.5-0.8
	Contact opening bouncing amplitude	mm	≤3
	Main circuit resistance	μΩ	≤50(630A) ≤45(1250A) ≤35(1600-2000A) ≤25(2500A)
	Contact closing contact pressure	N	2400±200(25kA) 3100±200 (31.5kA) 4250±250(40kA)
	Rated operating sequence		0.3s-co-180s-co

Note:4000A need force-air cooling.

## 61 Main structure

The main part of Circuit breaker is arranged in epoxy resin insulating cylinder process casting by APG technology. This structure can effectively prevent the breaker body from external shocks, polluted environment and other external factors. VCB main body mounted on the rear of the VCB frame , and with the operation mechanism connected into a whole.

The circuit breaker in the closing position when the main loop current path (Reference Picture 2)

Up light outlet 27 is fixed in the fixed contact that the upper support 26 to vacuum interrupter interior ,via the the moving contact and connected conductive clip, soft connection to the down bracket 30 to the down light outlet 31.

When Circuit Breaker leave factory ,each current levels are equipped with anti-dust insulated tube cover. In actual use, the rated current 1250A and below grade runtime don't need to be remove the insulated tube cover .But the rated current of 1600A and above grade must be removed.

## 62 Driven institutions(Reference picture 1 and 2)

Actuator for the spring operating mechanism, the circuit breaker frame built closing unit ,consisted of opening unit by one or several tripping electromagnet, the auxiliary switch, indicating devices, and other components; in the front ,has the combined sub-button, manually the storage operation hole ,spring charging state signs, signs combined points.

### 621 Stored energy

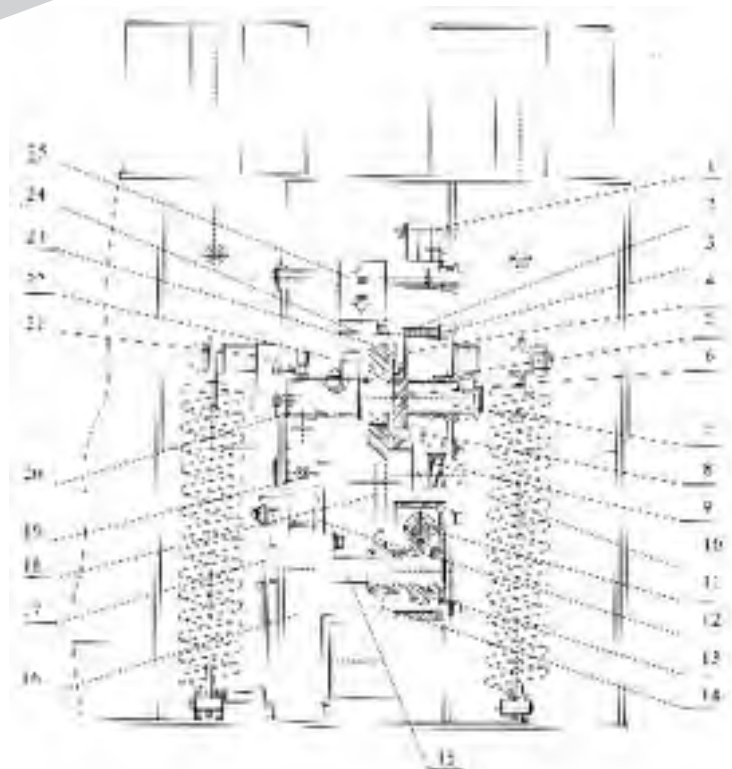
Circuit breaker closing the energy is provide by the closing spring energy storage .Energy storage can be completed by the external power supply of the drive motor, can also use the energy storage handle manually.

The operation of stored energy : is performed by the the charging motor 16 fixed on the frame, or the charging handle is inserted into the manual storage hole counterclockwise rocking electric energy storage by the motor output shaft 15 is driven by sprocket drive system (14, 23,18) manual energy through the turbine, worm (11, 13) to drive sprocket drive system sprocket 23 rotates, pin 2 to promote the slider on the wheel 6 4 7 follow the rotation of the crank arm 5 and 21 energy storage shaft stretching closing spring for energy storage, the storage position is reached when the the limit rod 3 in the frame of the reduction slider 4 so that the storage shaft and the sprocket Clutch disengaged, a storage manage engine sub 9 withstand roller 5 is held storage location, storage shaft with plate 24 driven by energy storage signs 25 Reverse storage mark and switched auxiliary switch off the power supply of electrical energy storage, at this time, the circuit breaker is in the closing state of readiness.

### 622 Closing

In closing operation, regardless of the hand to press the ON button or remote operation of the closing electromagnet action, can make energy storage to keep the shaft 19 is rotated, the engine sub loosen the wheel 8, closing spring contraction strange than 5` 21 so that the energy storage shaft 7 and the shaft of the cam 22 is rotated, the cam drive driven by the link mechanism (34 、 36` 37` 38` 39) the insulating rod 33 and the movable contact into the closing position, and compressing the contact springs 32, to maintain contact the necessary contact pressure`

The closing action is complete, the closing holding 38 and a half shaft 41 keep closing position, at the same time storage signs energy storage 、 auxiliary switch reset motor power supply loop is switched on if the external power supply is switched on again into the storage energy state, the rod of 44 pull together / signs, showing the “closing”mark, a drive rod pull the main auxiliary switch.



NO.1

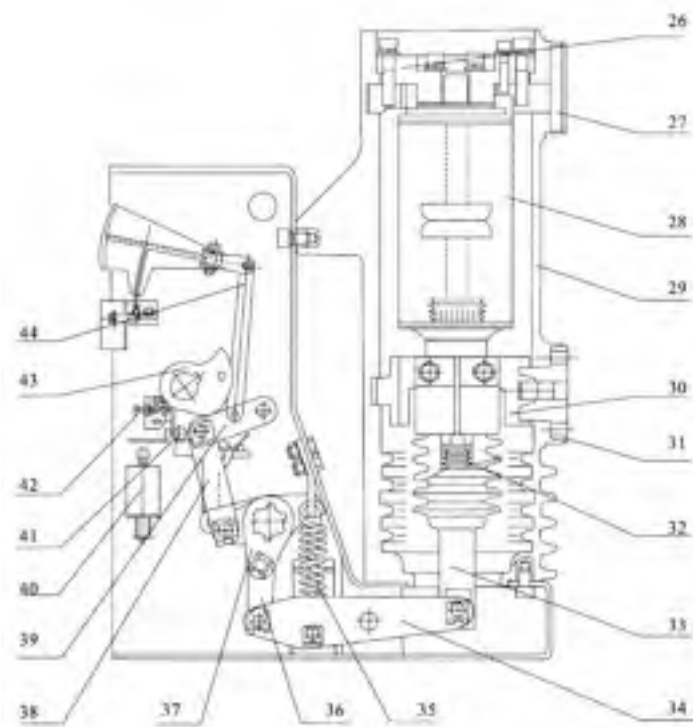
- 1. Micro switch
- 2. Pin
- 3. Limited rod
- 4. "Slide block"
- 5. Crank arm
- 6. Energy storage drive wheel
- 7. Energy storage shaft
- 8. Track roller
- 9. Energy storage maintain catch
- 10. Closing spring
- 11. Manual energy storage worm
- 12. Closing electromagnet

- 13. Manual energy storage drive turbine
- 14. Motor drive sprocket
- 15. Motor output shaft
- 16. Energy storage motor
- 17. Interlock drive bending plate
- 18. Drive chain

- 19. Energy storage maintain shaft
- 20. Latching electromagnet
- 21. Crank arm
- 22. Cam
- 23. Energy storage drive sprocket
- 24. Connecting plate
- 25. Energy storage sign

- 26. Upper bracket
- 27. Upper outlet seat
- 28. Vacuum interrupter
- 29. "Insulating cylinder"
- 30. Lower bracket
- 31. Lower outlet seat
- 32. "Disc spring"
- 33. Insulated rod
- 34. Drive crank arm
- 35. Opening spring

- 36. Drive connecting plate
- 37. Spindle drive crank arm
- 38. Closing maintain catch
- 39. Connecting plate
- 40. Opening electromagnet
- 41. Axle shaft
- 42. Manual opening ejector rod
- 43. Cam
- 44. Division sign rod



NO.2

Note: When the circuit breaker is in the closing state or optional locking pin device without the use of a locking device to unlock and in the process of hand breaker pushed out, all can't use closing operation

### 6.2.3 Opening

Either can press the "brake button", also reliably connected to an external power supply Tripping trip electromagnet or electromagnets over current tripping action closing to keep the engine sub 38 and half axle 41 unlock operation to realize opening operation. By the contact spring and sub-brake spring 35 stored energy, it can make vacuum interrupter 28 moving and fixed contact separate. In the paragraph after sub-gate process, by hydraulic buffer to absorb the remaining energy of the process of opening, and defining the position of the opening

By connecting rod 44 pull closing / opening signs, showed "closing" mark, at the same time pulling the counter to realize counter measure. The drive rod pull main auxiliary switch to switch.

### 6.3 Anti-misuse interlock

Circuit breaker can provide perfect fool proof function (Reference picture 3-4)

**6.3.1** After the completion of the closing operation of the circuit breaker, the closing interlock bending plate 1 proceeds downward movement and hold closing maintaining the closing bending plate 2, and it will not be able to once closing again when the circuit breaker is not opening.

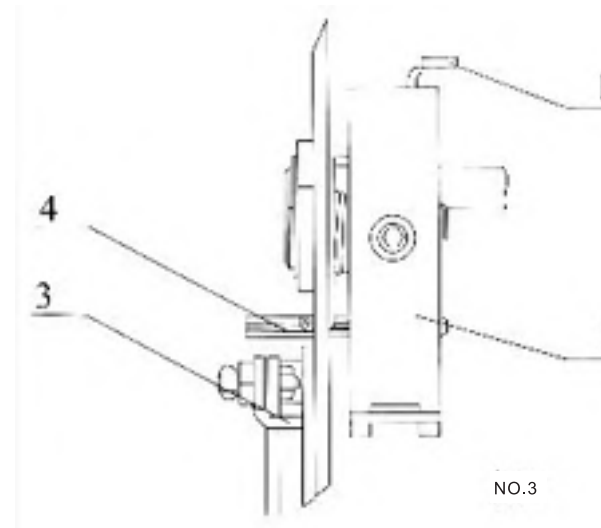
**6.3.2** After the end of circuit Breaker closing process, if closing electrical signal is not promptly remove, the breaker internal anti-jump control circuit will cut off the closing loop to prevent multiple reclosing (option)

**6.3.3** Handcart circuit breaker when not yet reached the test position or work location, interlock plate bending withhold the closing curved plate 2 on pin 4, and **cut off the closing loop to prevent the circuit breaker in the closing state** into the load area

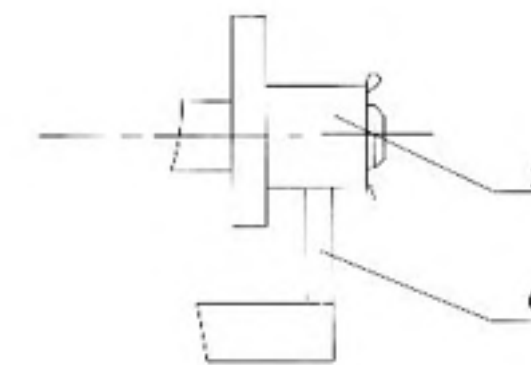
**6.3.4** Handcart type breaker at the working position or test position after closing, roller pressure by 5 propulsion mechanism locking plate 6, hand car would be unable to move, to prevent the push and pull of load in the closing state

**6.3.5** If choose electrical switching blocking, it should stop closing operation without make locking device unlock

Note: Closing lockout device power is 2.7W, operating voltage range of 0.65-1.1 times rated voltage



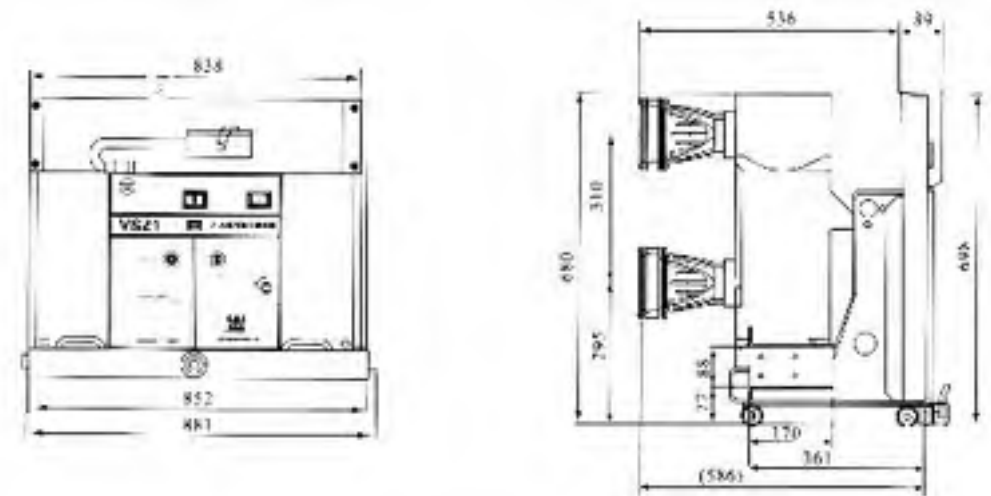
NO.3



NO.4

## ZN63A-12 INDOOR HIGH VOLTAGE VACUUM CIRCUIT BREAKER

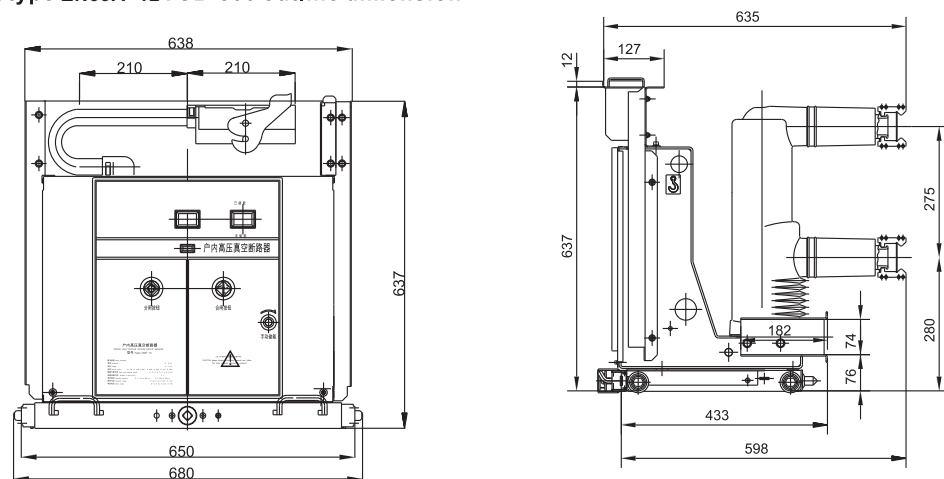
Draw-out type ZN63A-12outline dimension



Contact & fixed contact mesh size  $\geq 15\text{mm}$  Phase spacing:  $275 \pm 1.5\text{mm}$

Rated current(A)	1600	2000	2500	3150
Rated short-circuit breaking current(kA)	31.5, 40	31.5, 40	31.5, 40	40
Contact size (mm)	$\Phi 79$		$\Phi 109$	

Handcart type ZN63A-12VCB-800 outline dimension

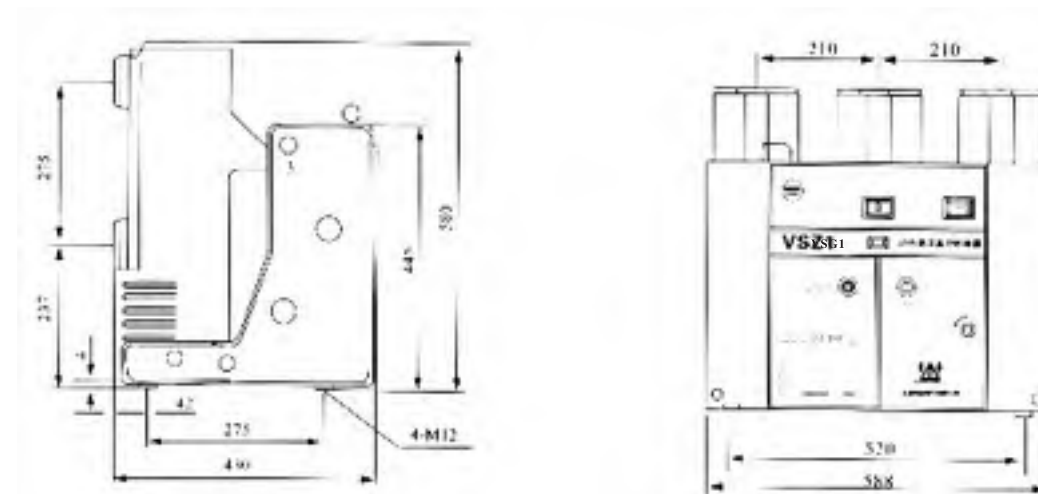


Handcart type feeding stroke 200mm

Rated current(A)	630	1250	1600
Rated short-circuit breaking current(kA)	20, 25, 31.5	25, 31.5, 40	31.5, 40
Contact size (mm)	$\Phi 35$	$\Phi 49$	$\Phi 55$
Phase spacing (mm)	$210 \pm 1.5$		

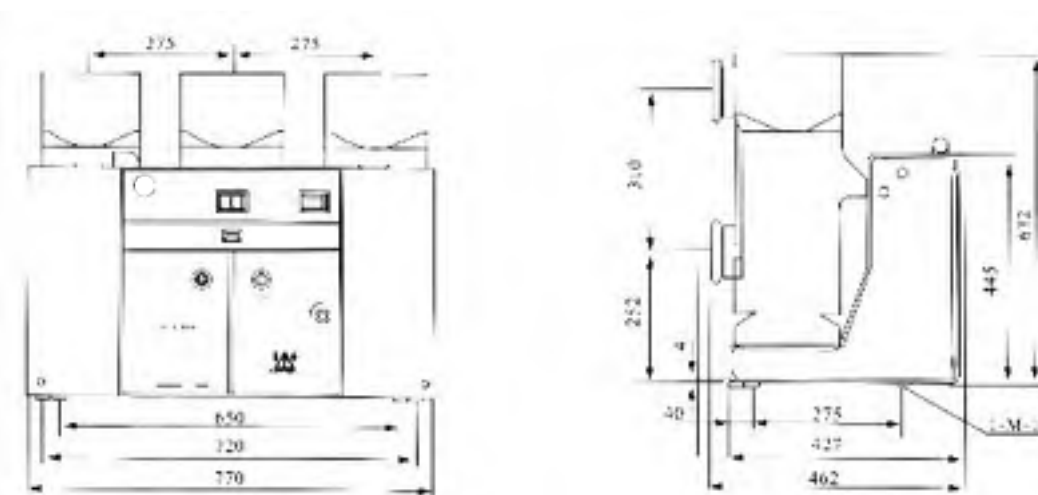
## ZN63A-12 INDOOR HIGH VOLTAGE VACUUM CIRCUIT BREAKER

Fixed type ZN63A-12outline dimension



Rated current(A)	630	1250	1600
Rated short-circuit breaking current(kA)	20, 25, 31.5	20, 25, 31.5, 40	31.5

Fixed type ZN63A-12outline dimension

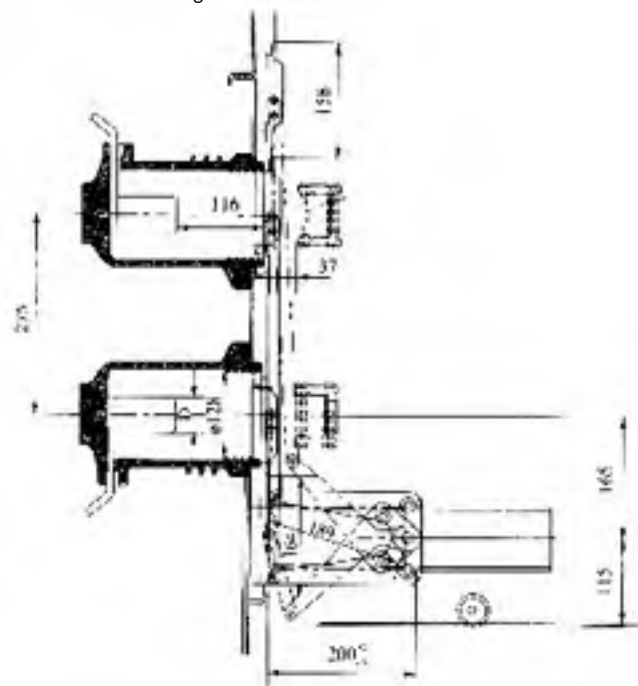


Rated current(A)	1600	2000	2500	3150
Rated short-circuit breaking current(kA)	40	31.5, 40	31.5, 40	40

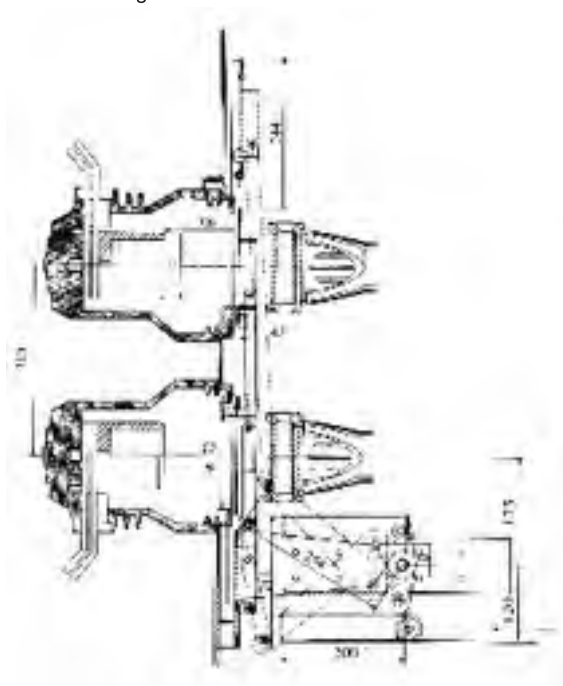


### Switchgear & Cabinet mating dimensions

ZN63A(800) & Cabinet(800) mating dimensions schematic diagram

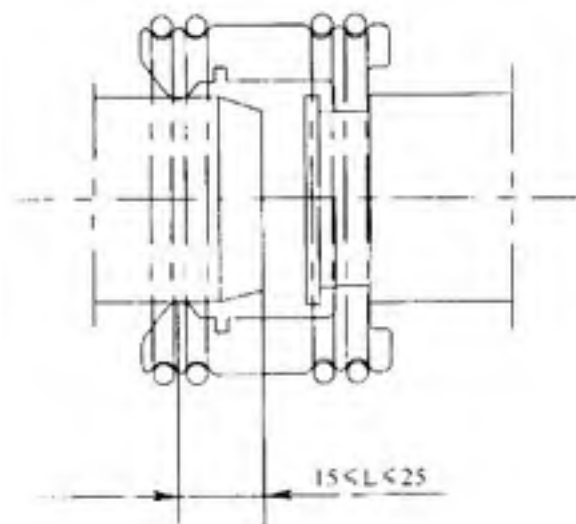


ZN63A(1000) & Cabinet(800) mating dimensions schematic diagram



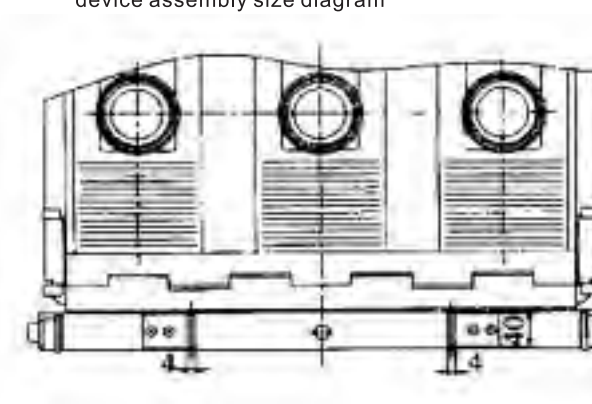
Rated current(A)	630	1250	1600	1600	2000	2000	2000	4000*
Rated short-circuit breaking current(kA)	25,31.5	25,31.5,40	31.5,40	31.5,40	31.5,40	31.5,40	31.5,40	40
Contact size (mm)	Φ35	Φ49	Φ55	Φ79		Φ109		

Fixed contact & contact mating dimensions diagram

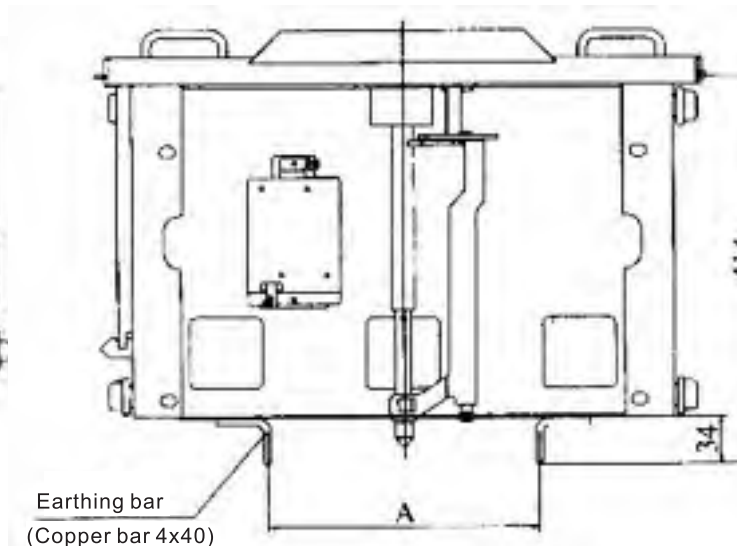


### Earthing device assembly size

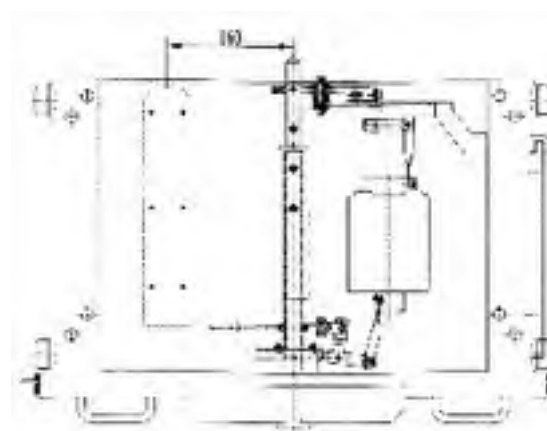
ZN63A Earthing contact (Duck-mouth type) earthing device assembly size diagram



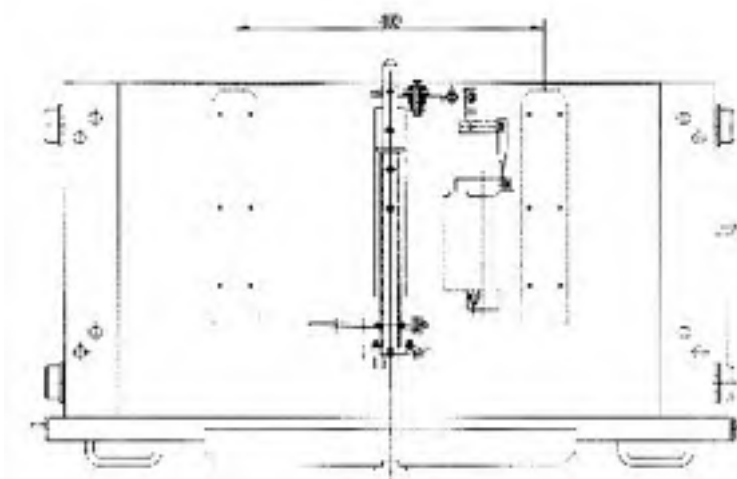
	A
ZN63A(800)	296
ZN63A(1000)	496



ZN63A (1000) Earthing bar (Crimp-type) earthing device assembly size diagram

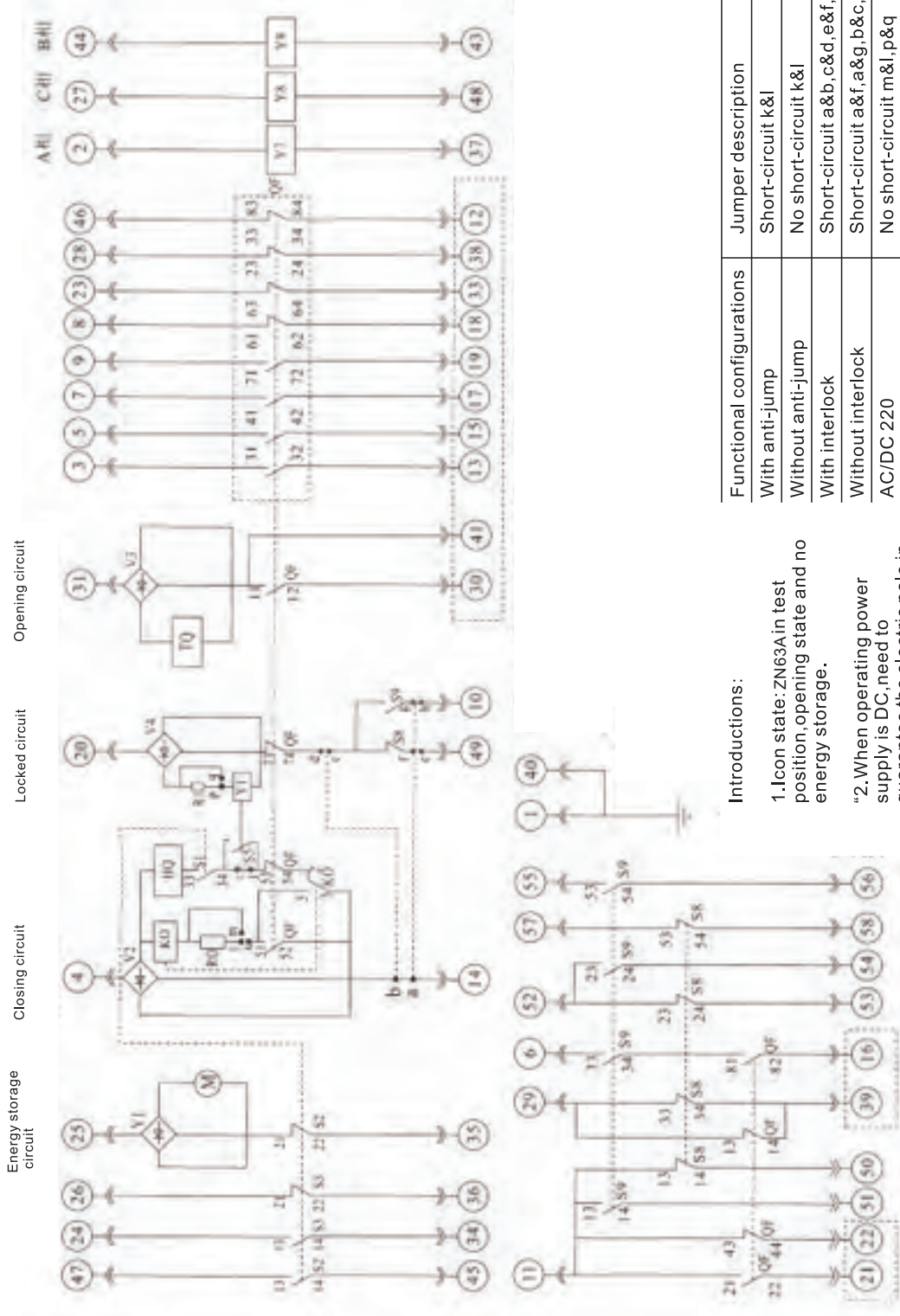


ZN63A(800) Earthing bar earthing device assembly size diagram



ZN63A(1000) Earthing bar earthing device assembly size diagram

VCB internal electrical wiring schematic (Handcart type)



**Introductions:**

- 1. Icon state: ZN63A in test position, opening state and no energy storage.
- "2. When operating power supply is DC, need to guarantee the electric pole in the dotted box is the same."

Functional configurations	Jumper description
With anti-jump	Short-circuit k&l
Without anti-jump	No short-circuit k&l
With interlock	Short-circuit a&b, c&d, e&f, g&h
Without interlock	Short-circuit a&f, a&g, b&c, i&j
AC/DC 220	No short-circuit m&l, p&q
AC/DC 110	Short-circuit m&l, p&q

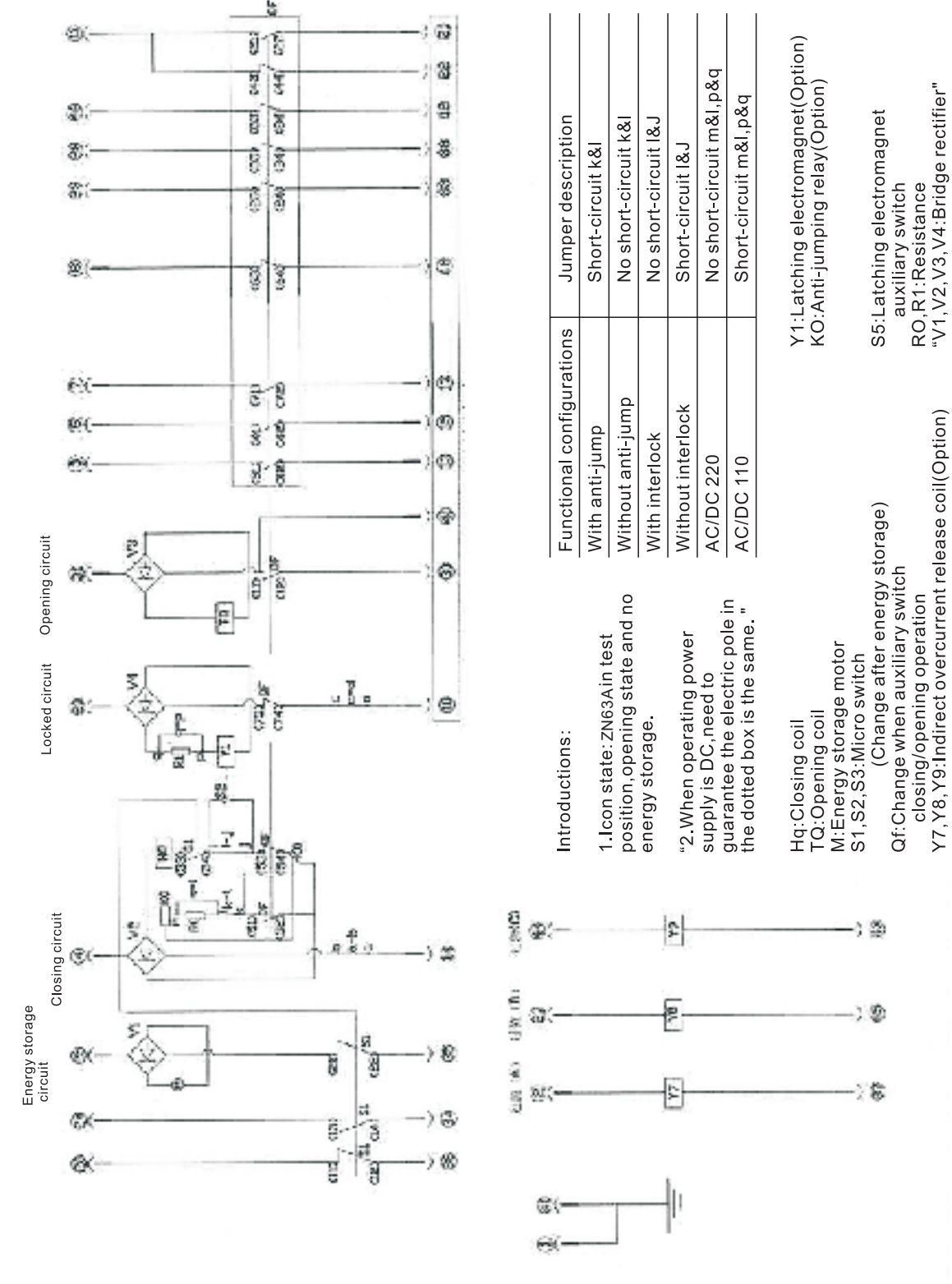
- Hq: Closing coil
- TQ: Opening coil
- M: Energy storage motor
- S1, S2, S3: Micro switch (Change after energy storage)
- Qf: Change when auxiliary switch closing/opening operation
- Y7, Y8, Y9: Indirect overcurrent release coil (Option)

- Y1: Latching electromagnet (Option)
- KO: Anti-jumping relay (Option)
- S8: Test position auxiliary switch
- S9: Work position auxiliary switch

- S5: Latching electromagnet auxiliary switch
- RO, R1: Resistance
- "V1, V2, V3, V4: Bridge rectifier"

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VCB internal electrical wiring schematic (Fixed type)



**Introductions:**

- 1. Icon state: ZN63A in test position, opening state and no energy storage.
- "2. When operating power supply is DC, need to guarantee the electric pole in the dotted box is the same."

Functional configurations	Jumper description
With anti-jump	Short-circuit k&l
Without anti-jump	No short-circuit k&l
With interlock	No short-circuit l&j
Without interlock	Short-circuit l&j
AC/DC 220	No short-circuit m&l, p&q
AC/DC 110	Short-circuit m&l, p&q

- Hq: Closing coil
- TQ: Opening coil
- M: Energy storage motor
- S1, S2, S3: Micro switch (Change after energy storage)
- Qf: Change when auxiliary switch closing/opening operation
- Y7, Y8, Y9: Indirect overcurrent release coil (Option)

- Y1: Latching electromagnet (Option)
- KO: Anti-jumping relay (Option)
- S5: Latching electromagnet auxiliary switch
- RO, R1: Resistance
- "V1, V2, V3, V4: Bridge rectifier"



**7. Installation, commissioning**

**7.1** When the circuit breaker is lifted from the packaging, the hook should be hung on the lifting place with time marked of circuit breaker, moving the City shall not make on the upper/down outlet arm force, and at the same time circuit breakers should not be allowed to be larger impact vibration.

Note: Before officially into the cabinet operation, remove the lifting device as required.

**7.2** Circuit breaker before they leave the factory has been strict factory inspection, the parameters meet the technical requirements. A circuit on electric before must do the following preparation :

- A. Checking the circuit breaker whether has damaged or not, if damaged, please stop using.
- B. Clear dirty, especially the insulating surface. Dirt caused during transport or storage process will affect product insulation performance.
- C. According to the rules of operation of circuit breaker, storage energy, closing and opening in manual way, to observe the energy storage state, closing position indicating whether normal.
- D. Operating power supply circuit breaker for energy storage, on and off, to observe the energy storage state, closing position indicating whether normal.
- E. Operation of Handcart type breaker according to the following steps:

Push the handle to insert into the hole, shaken clockwise for propulsion, counterclockwise swing to launch. To promote the general schedule for 2000-3mm, in the off state, should be well into the working position or the position, please. Turn the handle 20 times, when they hear "click" sound when it is in place (do not use excessive force to damage the propulsion mechanism), and the corresponding position indicator (S8, S9) circuit switched on.

**7.3** When officially operation, rated current 1600A or runtime are required to remove the insulation cylinder cover.

**7.4** Conducted power frequency withstand voltage insulation experiment.

**Possible phenomenon during operation**

NO.	Phenomenon	Reason
1	Can't be closed	1. Not in the energy storage state
		2. In the closing position state
		3. "Handcart type VCB not completely into the working position or 10-position"
		4. Use the closing locking device, the power is not supplied or below the technical conditions
		5. Second line is not correct
2	Can't be push in & push out	1. VCB in closing state
		2. Push hand has not fully insert propulsion hole
		3. Push mechanism is not completely into the test position, lead to the tongue can not unlock with the cabinet
		4. Cabinet's grounding interlock is locked

**8. Care and maintenance**

This company produces the circuit breaker choosing special sliding bearing, the use of special surface rust prevention technology, with long-term grease, normal use conditions, ten- twenty years do not need to repair but due to the use of the environment difference, still need to undertake the necessary inspection, maintenance maintenance and maintenance

- 1. As the working environment in the June-December to cope with the circuit breaker body proper inspection, visual inspection, cleaning filthy damp part of the surface of the device with a dry cloth, wiping the surface of the insulation pieces, and then use detergent-stained silkKaiqu Grimes (Note that the cleaning agent can be applied to a plastic or synthetic plastic material).
- 2. When the heavily long-term placement, may make the breaker activities generate block, every year deal with circuit breaker for at least 5 times the energy storage and, opening operation.
- 3. Every year at least once with circuit breaker insulation testing and judging circuit breaker vacuum arc extinguish device leakage or other external causes to reduce the insulation strength.
- 4. For frequent operation place, we should note that strictly control the number of operations within the technical conditions prescribed, can no longer continue to use beyond the life.

**9. Device**

**9.1** Secondary voltage control  
DC220V AC220V DC110V AC110V

**9.2** Secondary control optional configuration

**9.2.1** Locking device: role - - - - in the second control power supply has been on easy to technical conditions for circumstances prevent switching

**9.2.2** Over current device: role ----- in the primary circuit overload or short circuit conditions, by over current relay current coil is energized action, so that the circuit breaker is generally added to the A, C phase, but also all three phases added when enough current transformer secondary output capacity, the indirect over current release program, 3.5A and 5A two kinds insufficient to provide flow off when the current transformer secondary output capacity buckle electromagnet needs, the choice of the intermediate transformer program, the intermediate transformer terminals 2.4 and 2.5 then ZN63A on over current tripping electromagnet.