Principles

The vacuum circuit breakers have several advantages particularly being maintenance free and capable of performing switching operations even in critical Circumstances.

The vacuum circuit breakers are perfectly conducting at opening up to the precise moment of the alternating current zero point and completely insulating instantly after that point, hence vacuum breakers can be assumed to be "the ideal circuit breaker".

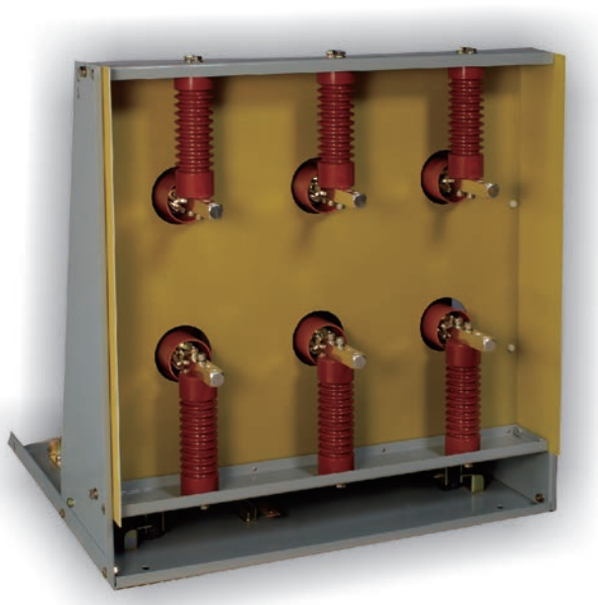
The vacuum comprises physically the idea insulator due to the theoretically impossible start of ionization process which causes the reignition after current zero point.

The energy level developed inside the arc-quenching chamber is minimum because of the very low arc voltage related to immediate recovery of dielectric strength.

Figure:F2 Type of EV-24 Vacuum circuit breaker

Description of Vacuum Circuit Breaker

EV type vacuum circuit breakers were specifically designed for installation in the compact metal switchgear cubicles. These vacuum circuit breakers have out-standing performance, i.e.
-Constant and low Contact resistance in continuous operation.
-Very high dielectric strength at opening postiion.
-Very low chopping current, the transient voltage can be ignored.
-Three vacuum interrupters with insulating frames.
-The vacuum level of vacuum interrupters less than 10^{-8} bar.
The EV type VCBs are particularly well suited to draw-out or fix construction. Meeting demands from overseas' customers, motor-spring operated types are available in addition to manual-spring operated types.



Operating conditions

EV type VCBs operate with high performance even under extreme climatic conditions, such as, temperature between - 25℃ to +55℃, humidity up to 100%, and at 1000m altitude above sea level

High operation safety and best for environment

EV type VCBs specially designed to maximize the operation safety. EV type VCBs are best for environment because they have neither operation noise nor gas exhaust to pollute the surroundings. There is no risk of explosion or fire.

Maintenance free

EV type VCBs are maintenance free for at least 20 years under normal operating conditions. (Without lubrication, adjustment, and changing vacuum interrupters)

Wide range applications

EV type VCBs are capable of handling many switch application, such as, no load cable, transformer, overhead line, induction motor, capacitor bank, and arc furnances, ect.

Durable operating life time

More than 10000 operating cycles without maintenance are guaranteed. EV type VCBs can be operated 10000 cycles under rated current, and 200 times rated interrupting current.

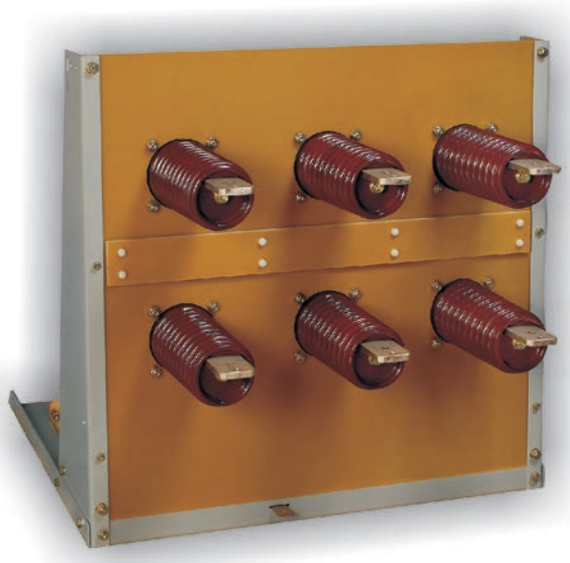
Compact

EV type VCBs have simple and compact mechanism. Space saving of switch cubicle is realized.

International standards

EV type VCBs are comply with JEC-2300, IEC publication 56. 694 and IEC 62271-100

Figure:Bushing Type of EV-24 Vacuum circuit breaker



Installation and Operation

When moving a VCB, there are two lifting holes beside a side-board (draw-out type) or at the rear of the front board, and do not give a slope to a VCB to prepare for any contingency. A draw-out set must sustain on such as two angles or angle irons when installation, and do not variant when fixed. The sizes of installation are"W"and "L" in the table on page 6. Any external forces or the weight of a VCB can not sustain by the main connector of a VCB. All the installations must meet the demands of the IEC-694.

Main Circuit Wiring

The surface of a bus bar needs to be cleaned before wiring.
All junctions must lock bolt to reduce the contact resistance.
There are six silver plating cooper bus-bars at the rear of a draw-out set and each of them have two holes ϕ13 for connecting on page 6 diagram.

Auxiliary Switch

All auxiliary switch wiring connection need only in the adapter connector on the upper board of a VCB, there is no necessary to open the front board of a VCB.
This VCB need only AC 110V power supply connect to the number "3"and "4"in the adapter connector. (Page 9 control diagram)
The power supply of a capacitor-tripping device (CTD) is directly provided from AC 110V on page 9 diagram. The AC power supply of a VCB and a CTD can be connected in parallel, but the rectifier in a VCB is a full-wave rectifier and in a CTD is a half-wave rectifier, they can not connect together. In this way, we can avoid short-circuit malfunction by a rectifier, and be careful do not press the discharge button when a CTD is charged with electricity charge.

Manual Charge

Insert the charge handle into the manual charge hole in the front of a VCB, and rotate it to clockwise over 15 circles and the spring charged completed with a metal sound. Then charge indicator display "SPRING CHARGED"and the number of counter plus one. Please draw out the charge handle before closing a VCB.
We suggest removing the adapter connector on upon board and rotating it clockwise lightly if it is strenuous at the initial stage of the manual charge.

Motor Charge

If you apply the control power to a VCB, the closing spring will be charged automatically with a motor and then the control power will be turned off by the built-in limit s/w.

Manual Closing

Press the"I"button after the spring charged then the indicator turn "O" into "I", mean while the charge indicator display "charge free". (In motor charge way, the closing spring will charge again soon.)

Manual Tripping

Press the "O"button of pressure pull rod beside the left side of a VCB (draw-out type), and the indicator will turn "I"into"O".

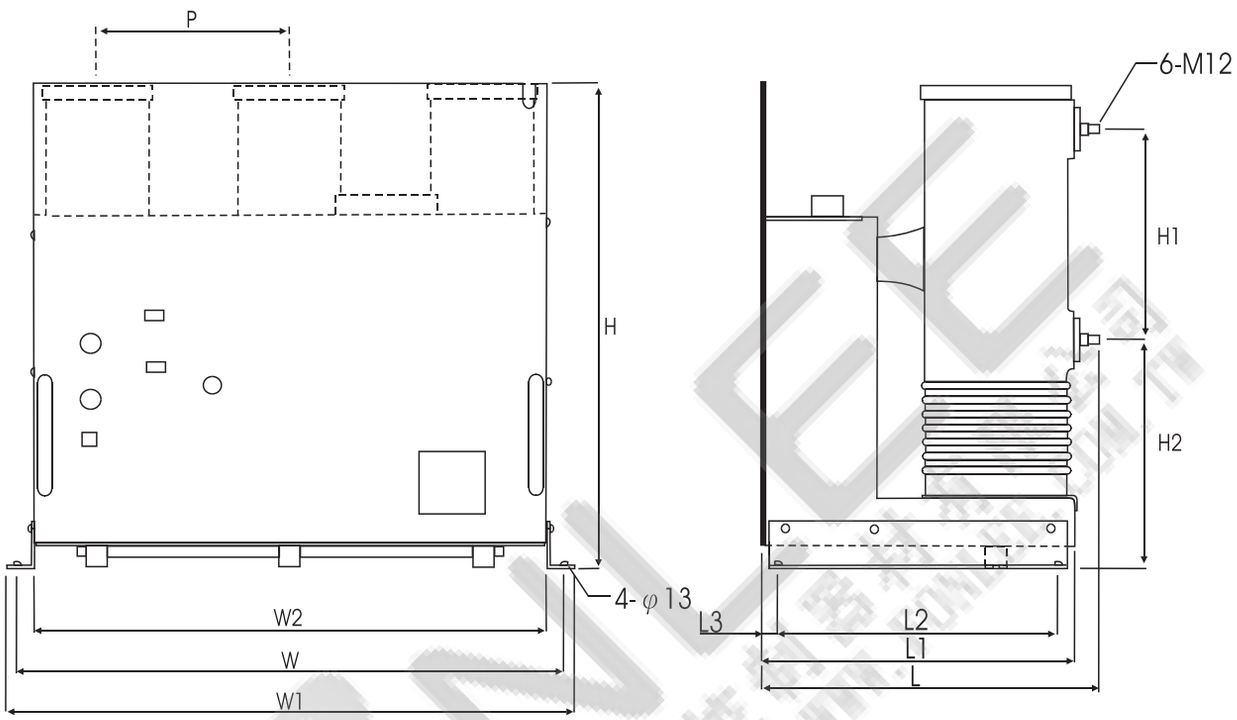
Power-Operated Operation

Whether to close or to trip the device of "CS "controls a VCB.

Specification of Circuit Breaker type EV

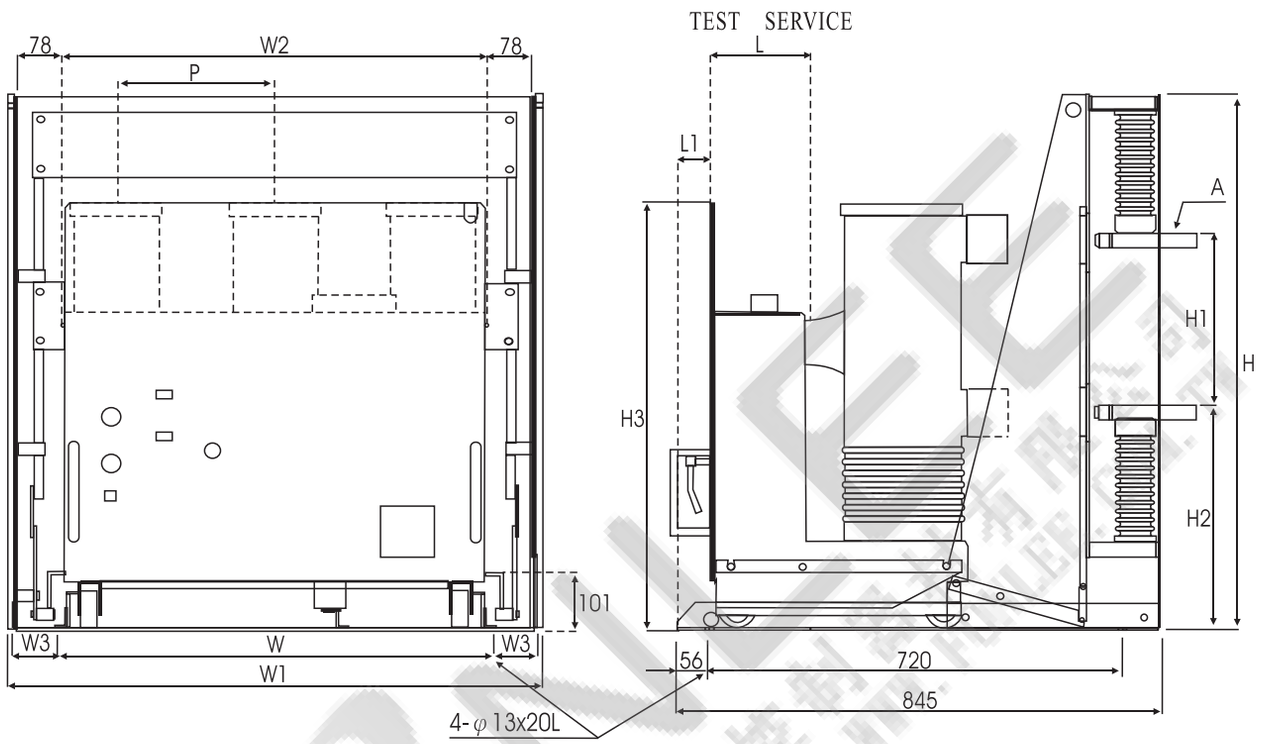
Type / Specifications	EV-12 630-12	EV-12 630-20	EV-12 630-25	EV-12 1250-25	EV-24 630-16	EV-24 630-25	EV-24 1250-25
Rated voltage (kV)	12				24		
Rated current (A)	630	630	630	1250	630	630	1250
Rated interrupting current (kA)	12.5	20	25	25	16	25	25
Rated making current (kA)	31.5	50	63	63	41.6	65	65
Short-time current 3 sec (kA)	12.5	20	25	25	16	25	25
AC withstand voltage lmin (kV)	28				50		
Lightning impulse withstand voltage 1.2/50 μs (kV)	75				125		
Rated frequency(Hz)	50/60						
Electric life times (at rated current)	20000				10000		
Mechanical life times	30000				10000		
Max. permissible switching cycle per hour	45						
Operation duty	O-1 min-CO-3 min-CO O-0.3s-CO-15s-CO				O-1 min-CO-3 min-CO O-0.3s-CO-180s-CO		
Gap of contactors(mm)	8				11		
Operation Power Source: Motor / Close / Trip	DC110V、AC110V						
Figure	Fixed type Draw out type(F2) Bushing type(B) Bushing type with Earth Switch(B-ES)						

Figure:Fixed type



ITEM / TYPE EV-	P	W	W_1	W_2	L	L_1	L_2	L_3	H	H_1	H_2
24KV	275	780	810	730	480	445	400	22	691	300	332
	210	660	680	600	480	445	400	22	691	300	332
12KV	210	660	680	600	474	432	400	13	611	265	252
	170	596	634	520	474	432	400	13	611	265	252

Figure:Draw out type



ITEM / TYPE EV-	P	W	W_1	W_2	W_3	L	L_1	H	H_1	H_2	H_3
24KV	275	750	933	740	83	195	45	953	300	393	746
	210	630	801	613	79	195	45	933	300	393	746
12KV	210	630	801	613	79	190	67	748	265	312	666
	170	550	719	533	78	190	67	748	265	312	666

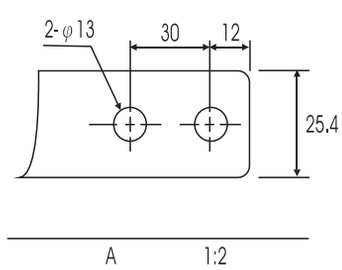
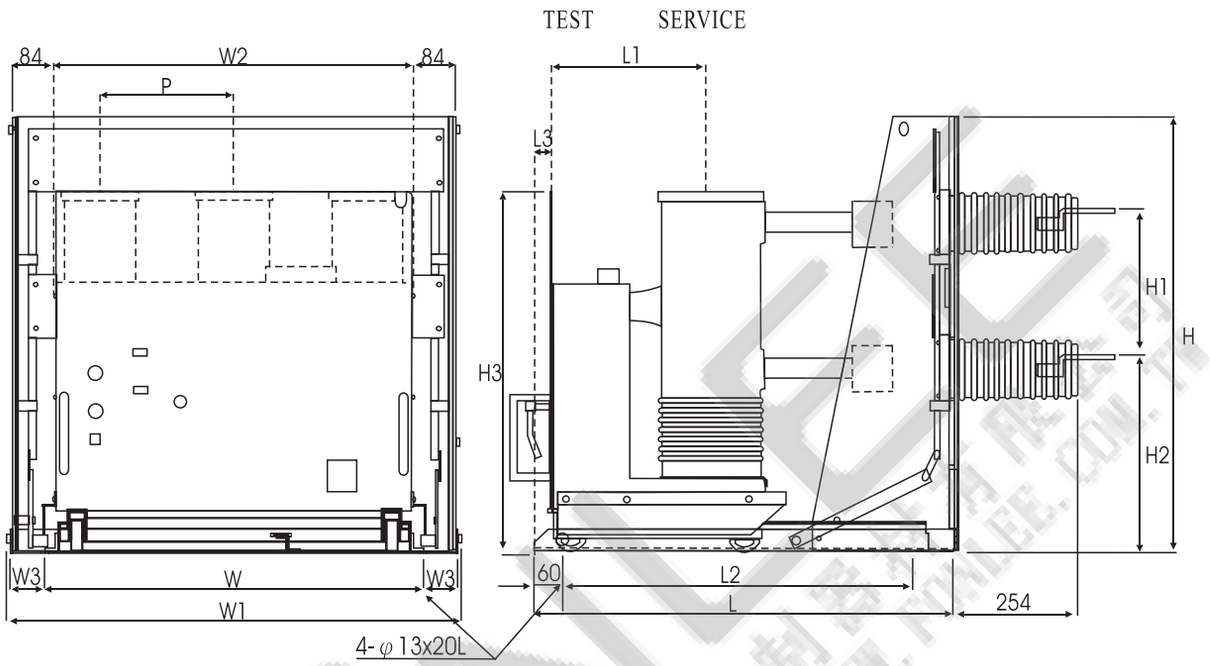
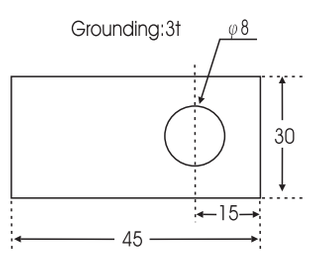
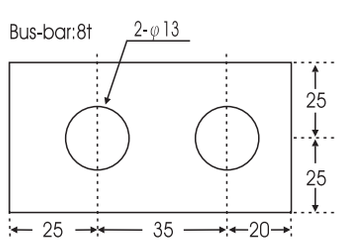


Figure:Bushing type



ITEM / TYPE EV-	P	W	W_1	W_2	W_3	L	L_1	L_2	L_3	H	H_1	H_2	H_3
24KV	275	750	937	742	85	895	318	800	61	898	300	403	752
	210	630	803	612	78	895	318	800	61	898	300	403	752
12KV	210	630	803	612	78	845	290	750	58	773	265	323	672
	170	550	723	532	78	845	290	750	58	850	265	400	749

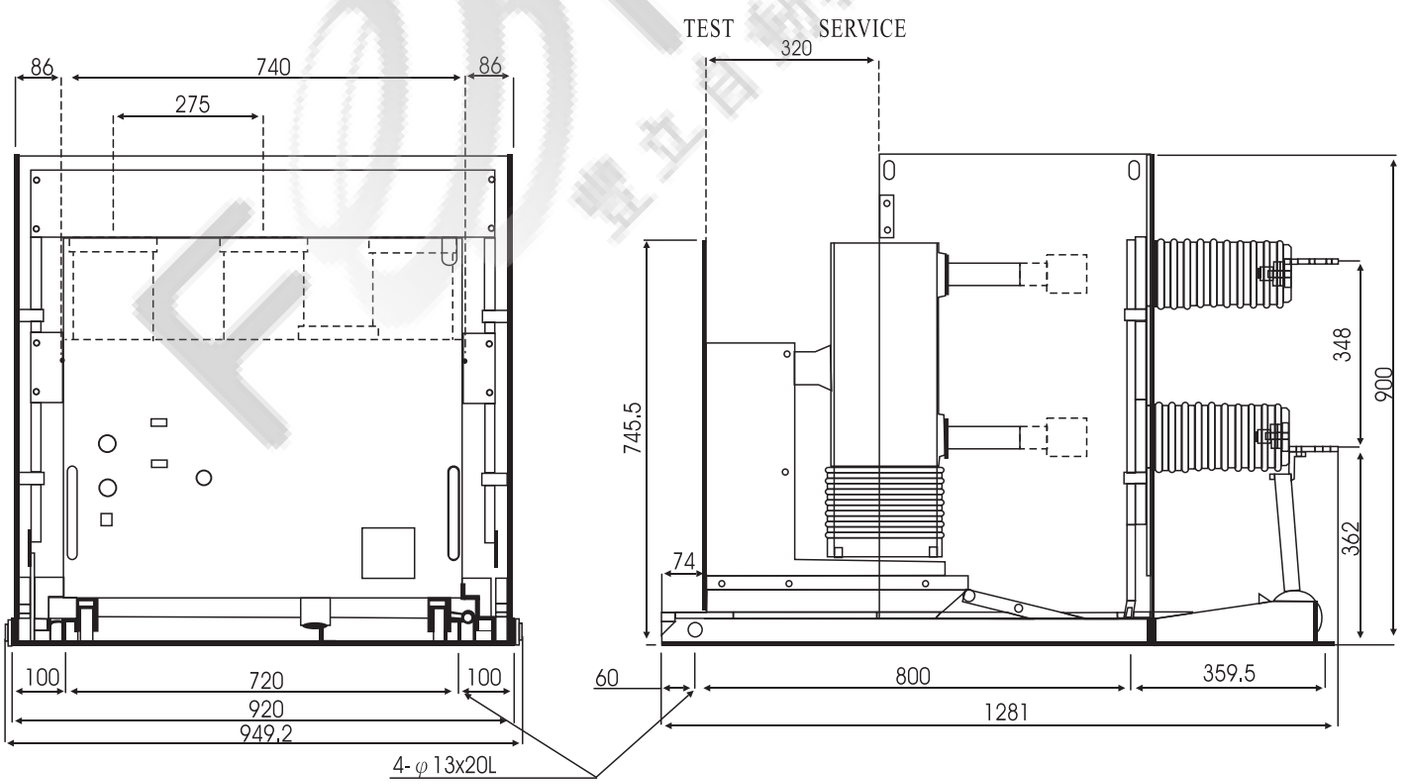


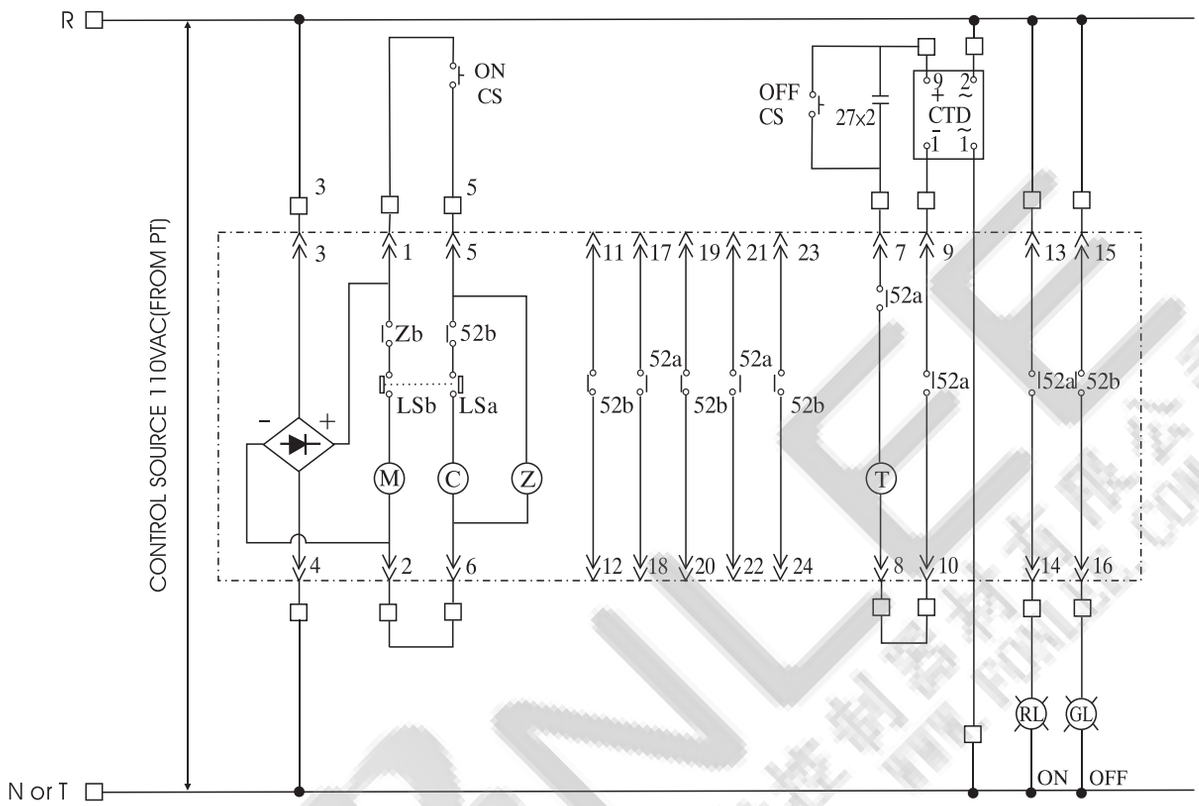


Technical features

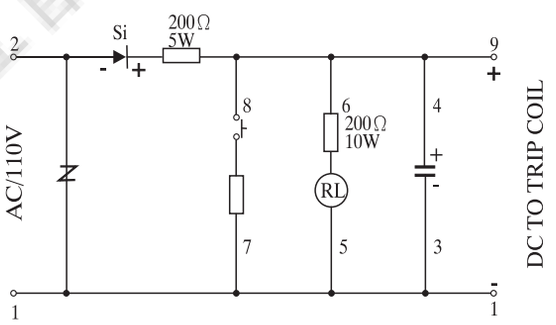
Common features	Rated frequency, for alternating current Power frequency withstand voltage during 1 min	50/60 Hz 2000V
Closing spring charging motor	Rated supply voltage, - for direct current and for alternating current Operating range of supply voltage Direct current power consumption Alternating current power consumption Starting current (the current in continuous duty) Charging time	 Un:110V 85...110%Un 75W 100VA 2.4A 5s
Shunt opening and closing release	Rated supply voltage, - for direct current and for alternating current Operating range of supply voltage - shunt closing release - shunt opening release for alternating current - shunt opening release for direct current Direct current power consumption Alternating current apparent power Minimum impulse time Rated opening time No-load closing time	 Un:110V 85...110% 85...110% 70...110% 150W 250VA 10ms ≦0.03 (sec) ≦0.05 (sec)

24KV Bushing type with ES





M : Spring charge motor
C : Closing coil
Z : Anti pumping relay
T : Tripping coil
LSb: Open when spring fully charged
LSa: Close when spring fully charged
27: Relay(UV.OV.CO.LCO)



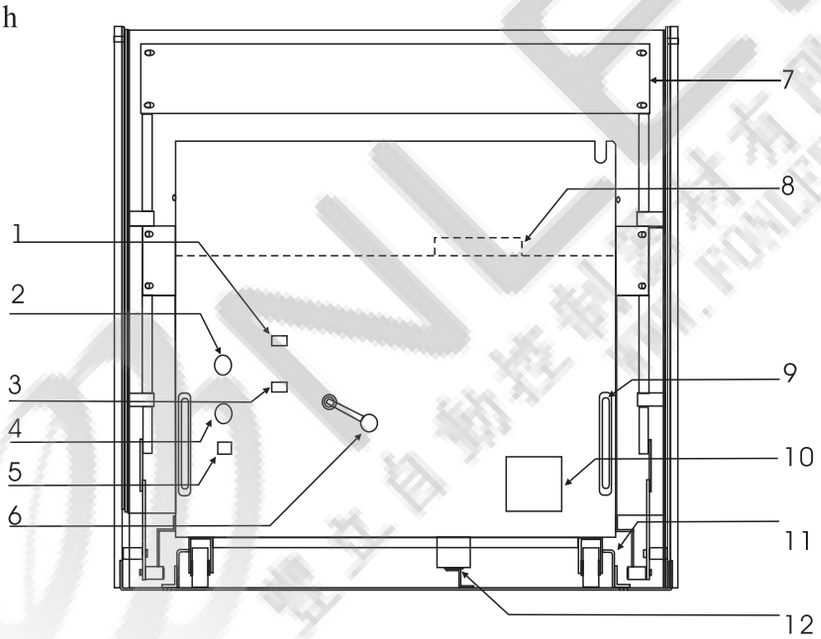
Capacitor tripping device

KOYO VCB

VCB CONTROL DIAGRAM

Standard accessories：

1.counter
2.close button
3.charge indicator of the closing spring
4.trip button
5.position indicator of the main contacts
6.charge handle
7.shutter
8.plug
9.handle
10.name plate
11.track
12.earth switch



Optional accessories:

1.key lock for closing and trip
2.take off the plug and VCB will be tripped automatically
3.auxiliary (4a4b) connector add (maximum 8a8b)
4.capacitor tripping device
5.key lock for drawing out the VCB
6.VCB can't be moved when charging
7.the charge spring must be set free when moving the VCB
8.stationary cell switch assemblies of drawing-out set with 4a4b
9.mechanical interlocking of two VCBs
10.bushing type with ES
11.draw-out set with polymer insulator
12.bushing type with propulsive system
13.Arc-fault protection system lighting
14.optional contact to remotely monitor the spring charging condition