VACUUM CIRCUIT BREAKER

KOYO

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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".

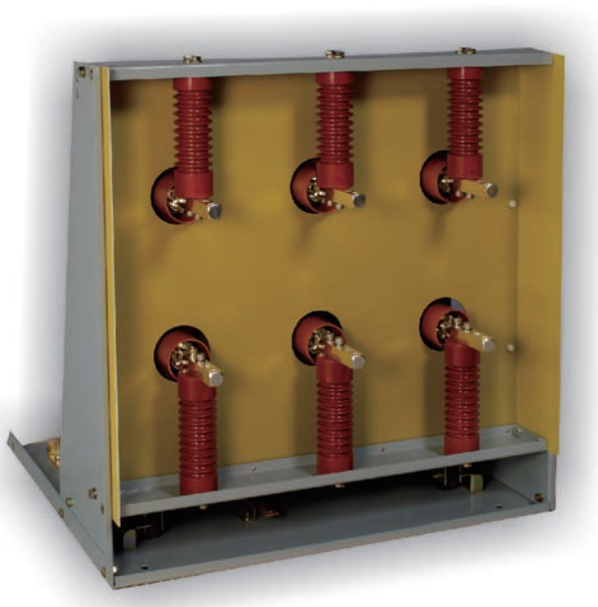
The vacuum comprises physically the idea insulator due to the theoretically impossible start of ionization process which causes the reignition after current zero point.

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.

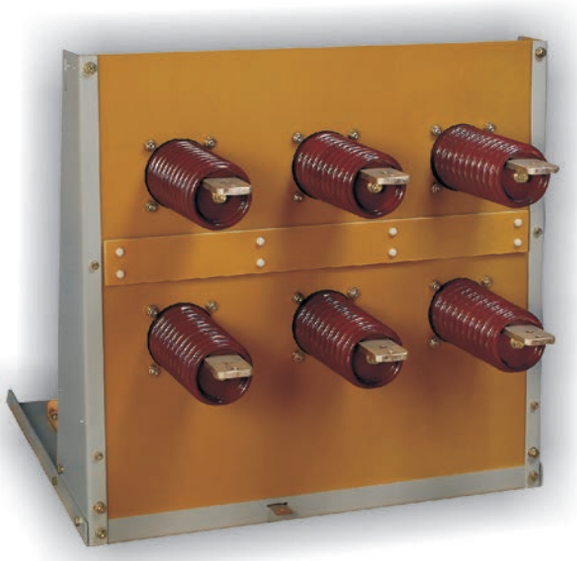
Compact

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(2008-04)

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 ϕ 13 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-24 800-16	EV-24 1250-25
Rated voltage (kV)	12				24			
Rated current (A)	630	630	630	1250	630	630	800	1250
Rated interrupting current (kA)	12.5	20	25	25	16	25	16	25
Rated making current (kA)	31.5	50	63	63	41.6	65	41.6	65
Short-time current 3 sec (kA)	12.5	20	25	25	16	25	16	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)							