



for a greener tomorrow



**MITSUBISHI
ELECTRIC**

Changes for the Better

VACUUM CIRCUIT BREAKERS

20-VPR-16D/25D 630A/1250A



Safety & Quality

GLOBAL IMPACT OF MITSUBISHI ELECTRIC



Through Mitsubishi Electric's vision, "Changes for the Better" are possible for a brighter future.

Changes for the Better

We bring together the best minds to create the best technologies. At Mitsubishi Electric, we understand that technology is the driving force of change in our lives. By bringing greater comfort to daily life, maximizing the efficiency of businesses and keeping things running across society, we integrate technology and innovation to bring changes for the better.

Mitsubishi Electric is involved in many areas including the following

Energy and Electric Systems

A wide range of power and electrical products from generators to large-scale displays.

Electronic Devices

A wide portfolio of cutting-edge semiconductor devices for systems and products.

Home Appliance

Dependable consumer products like air conditioners and home entertainment systems.

Information and Communication Systems

Commercial and consumer-centric equipment, products and systems.

Industrial Automation Systems

Maximizing productivity and efficiency with cutting-edge automation technology.

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Safety & Quality

20-VPR-16D/25D 630A/1250A

1
FEATURES



FEATURES



1. PURSUIT OF QUALITY TO THE LIMIT

- Vacuum Interrupter
 - Pursuit of high breaking performance and high electric strength performance by applying efficient contact material.
 - Pursuit of the optimum structural design by application of the most advanced arc control technology and insulation design technology.
 - Pursuit of improvement in magnetic drive efficiency by spiral contact.
- Operation mechanism
 - The conventional BH-1H type operation mechanism is further advanced, and operation stability is pursued by simple operation principle confirmed by motion analysis technology and stress analysis technology, etc.
 - Pursuit of maintenance cost reduction by extending the operation mechanism inspection interval from 3 years of the type VPR-C to 6 years by adopting long life grease.
 - Pursuit of convenience by attempting to use the same motor for charging the closing spring for both AC and DC power sources.
- Main circuit
 - Pursuit of heat generation reduction of the main circuit by application of electric resistance welding on the shunt part and reducing the contact resistance.
 - Pursuit of contact stability by adopting 2-point contact structure by forging the primary junction.

2. PURSUIT OF SAFETY AND RELIABILITY

- Pursuit of safety by applying withdrawable with door closed operation mechanism, metal shutter and earthing switch.
- Pursuit of safety and environment by adopting excellent molding material in tracking.
- Pursuit of minimization of live outcrop which makes good use of bulk mold compound molding technique, and was proven by heat analysis technology.

3. PURSUIT OF ENVIRONMENTAL DESIGN

- No use of the six hazardous substances (mercury, cadmium, lead, hexavalent chromium, PBB and PBDE), a measure that exceeds the requirements of RoHS standards. One example is use of a rust-proofing treatment for small parts such as pins and screws that is free of hexavalent chromium, a substance known to contaminate soil.
- Marking of main resin materials to facilitate recycling.



CONSTRUCTION

1.VACUUM CIRCUIT BREAKER

The Vacuum interrupters are insulated by three-molded frames, which separate the three poles giving small pole-to-pole distance.

The frame is made of an anti-tracking bulk mold compound, which has been developed, especially for breakers. The moving contacts are mechanically connected to the lower conductors by flexible conductors to prevent rubbing damage. The Circuit breaker can be inserted when the panel door is in the closed state.

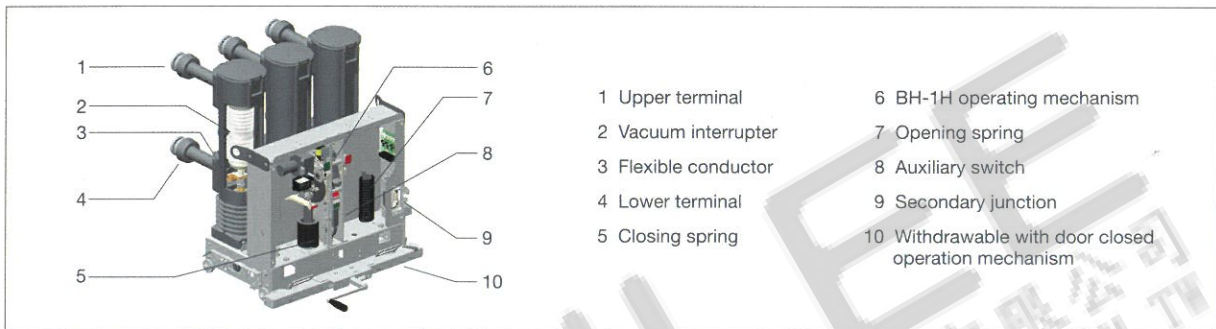


Fig.1 Construction of Vacuum Circuit Breaker.

2.VACUUM INTERRUPTER

The VIs(Vacuum Interrupters) are manufactured by Mitsubishi who has the production technology of about 160,000 units per year.

The most advanced technology of Mitsubishi Electric has been added, and optimum design of the VI internal structure by field analysis is carried out.

The contacts of the VIs are the lowest contact resistance spiral type.



Fig.2 Construction of VI.

3.OPERATING MECHANISM

The BH-1H operating mechanism has simple operating principles and a compact construction and is suitable for a wide range of ratings.

The mechanism is fitted for auto-reclosing and multi-shot without any additional parts.

The standard charging motor is suitable for both AC and DC power sources. Special long life grease is used on gears surfaces and other surfaces to extend the maintenance period.

One example of our safety policy is the manual-charging device for the closing spring, which suffers on shock or impact force even when the electric motor is energized or the breaker is operated during manual charging. There is an interlock device for protection against idle closing action by the mechanical and electrical closing command at the closed position.

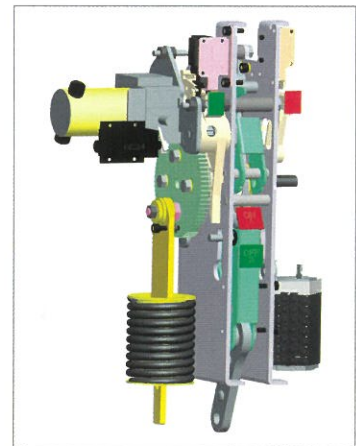


Fig.3 Construction of Operating mechanism.



RATINGS

3

RATINGS

Table 1 List of Ratings.

Type		20-VPR-16D		20-VPR-25D	
Closing operating mechanism		Motor-spring charged mechanism			
Standard		IEC 62271-100-2012			
Rated voltage	(kV)	24			
Rated noermal current	(A)	630	1,250	630	1,250
Rated frequency	(Hz)	50/60			
Rated short-circuit breaking current	(kA)	16		25	
Rated making current	(kA)	41.6		65	
Rated short-time withstand current	(kA,3s)	16		25	
Rated opening time	(s)	0.03			
Rated breaking time	(cycles)	3			
Rated withstand voltage (kV)	Power frequency	50			
	Lightning Impulse	125			
Type test class [Note 1]	Mechanical	M2			
	Electrical	E1			
	Small capacitive current switching	C2			
Rated operating sequence		O-0.3s-CO-1min-CO O-3min-CO-3min-CO CO-15s-CO			
No-load closing time (s)		0.1			
Closing operation and control current (A) [Note 2]	Motor	1 (Charging time 8s)			
	Control current (Closing coil)	4			
Tripping device		Shunt tripping coil (STC)			
Opening control current (A) (STC) [Note 2]		3.4			
Auxiliary switches [Note 3]		5a5b			
Operating counter (Mechanical)		Standard equipment			
Mounting configuration [Note4]		Withdrawable (types M, C, D and G)			
Mass [Note 5] (kg)	VCB	102	115	103	118
	Mounting frame	60			

Notes: 1.Type test class described in IEC62271-100.

2.Closing operation, control and opening control currents indicated are based on 110V DC

3.Additional auxiliary contacts cannot be added.

4.Withdrawable with door closed (Type-M) is not available with mounting configuration class CW.

5.Mass of VCB units (including 8kg of Withdrawable with door closed operation mechanism and excluding for options).

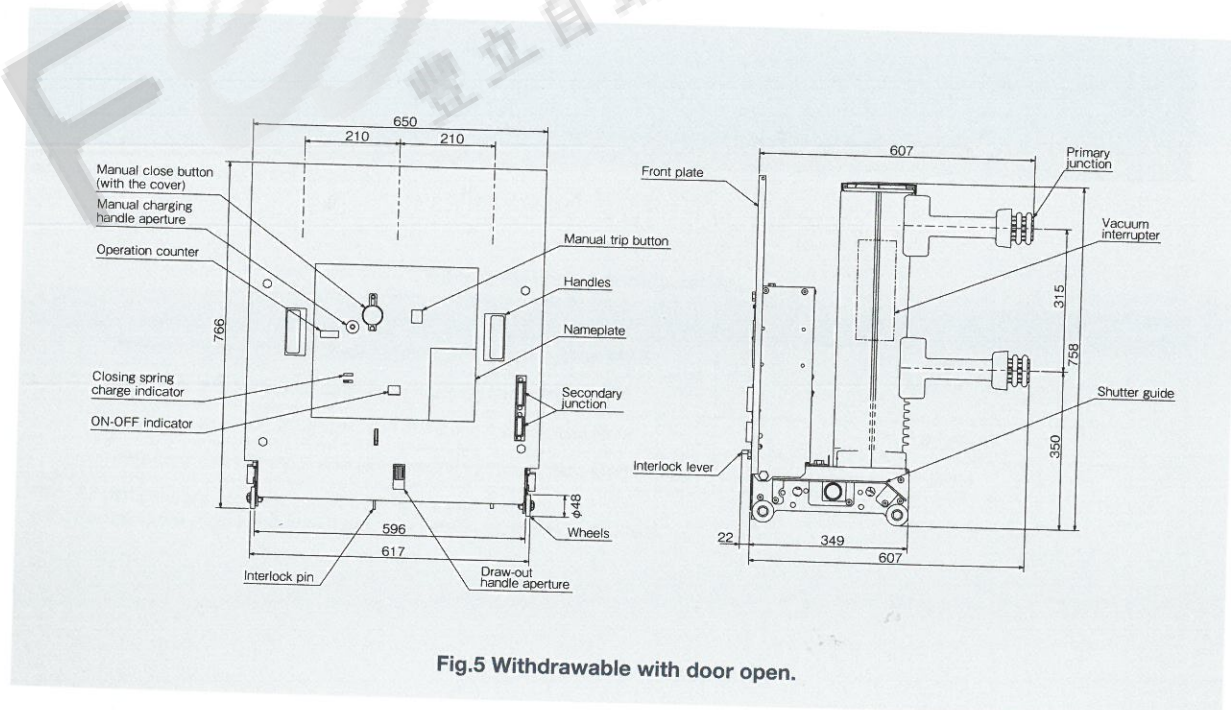
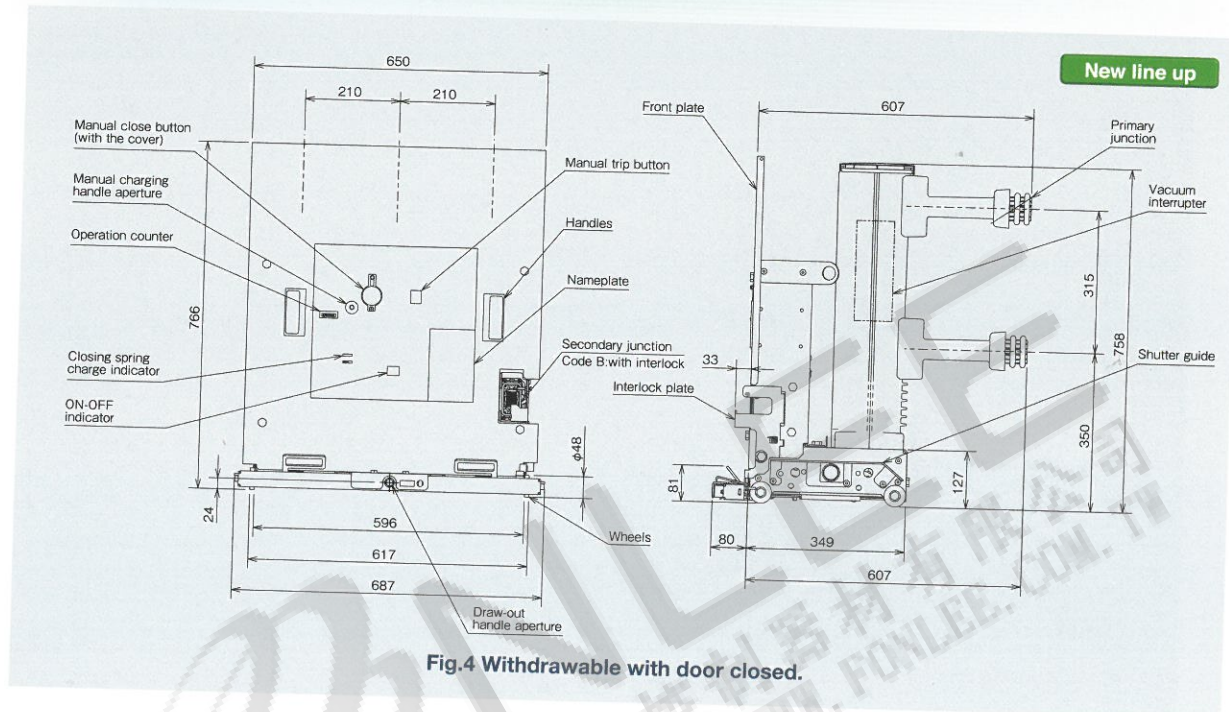
Class: Indoor Type

Please do not use in outdoor panels.



EXTERNAL DIMENSIONS

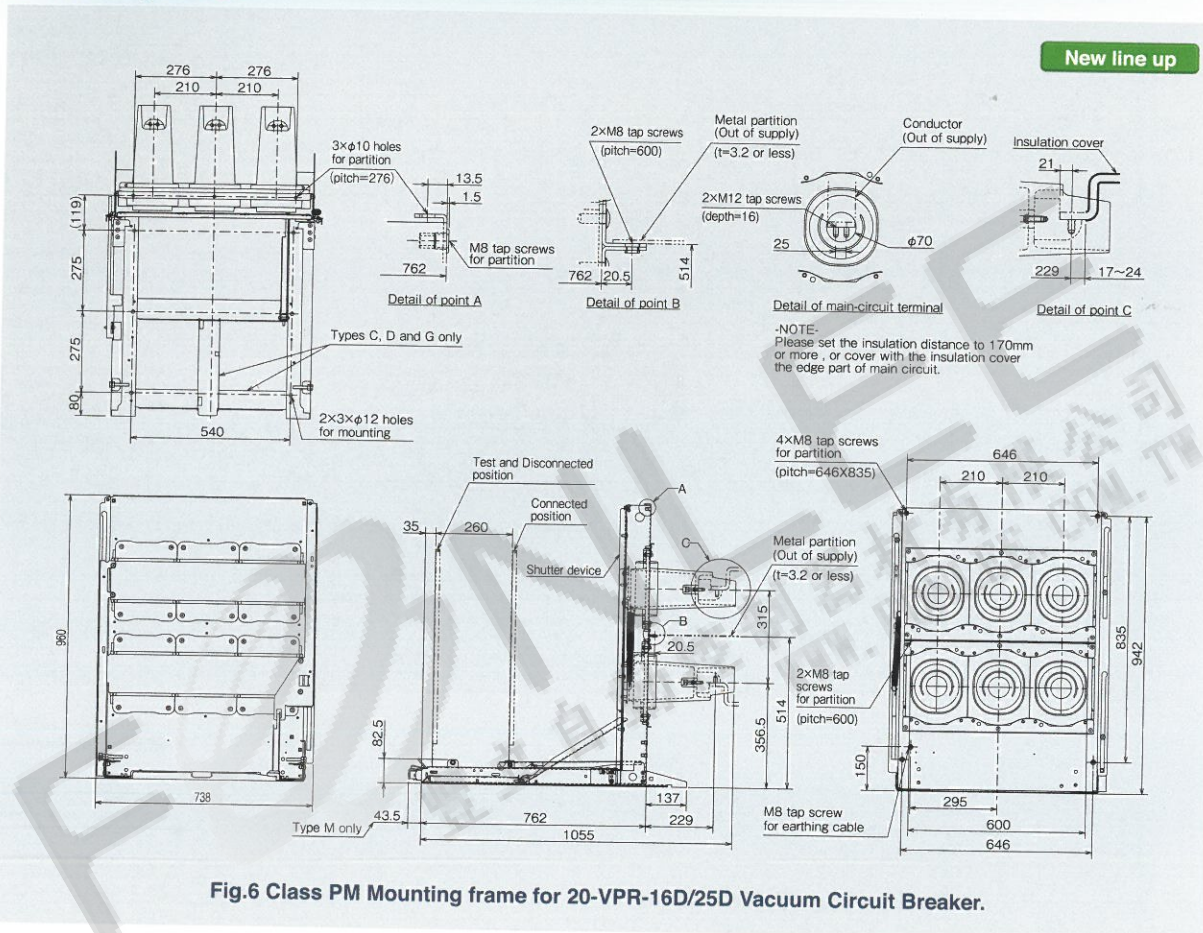
■ Circuit Breaker

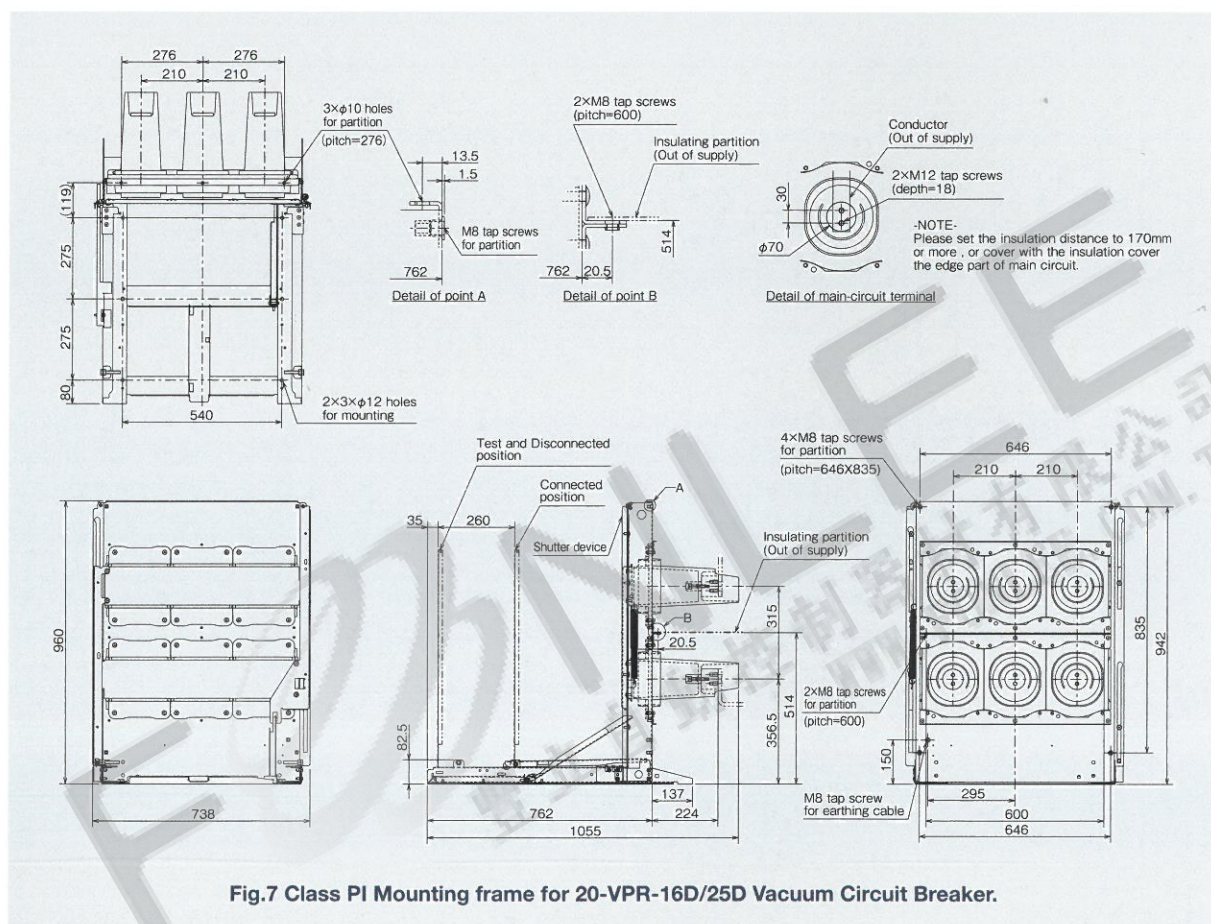




EXTERNAL DIMENSIONS

■ Mounting Frame





Note: class CW : Shutter device is not equipped.

Table 2 Mounting configuration.

Type	Description	High-voltage switchgear standards
M	Withdrawable with door closed and mounting frame (class MW)	LSC2B-PM
G	Withdrawable with door open and mounting frame (class MW)	
D	Withdrawable with door open and mounting frame (class PW)	LSC2B-PI
C	Withdrawable with door open and mounting frame (class CW)	LSC1

Notes: PM : All partitions are provided metallic partitions and shutters.

P I : Partitions are provided one or more non-metallic partitions or shutters.



CONNECTION DIAGRAMS

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CONNECTION DIAGRAMS

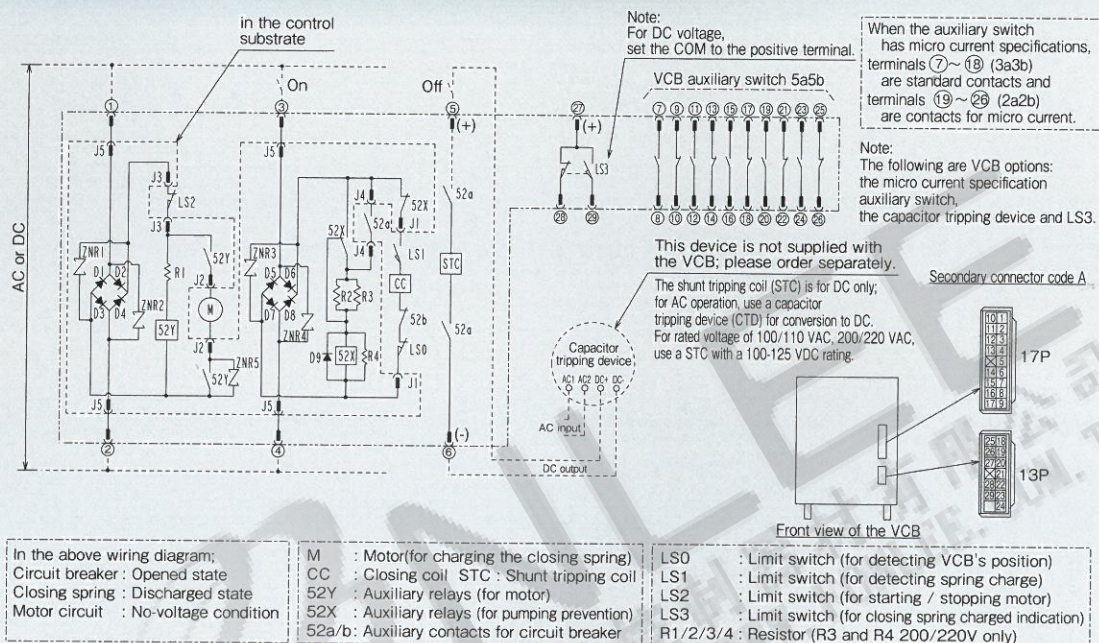


Fig.8 Connection Diagram (Code A).

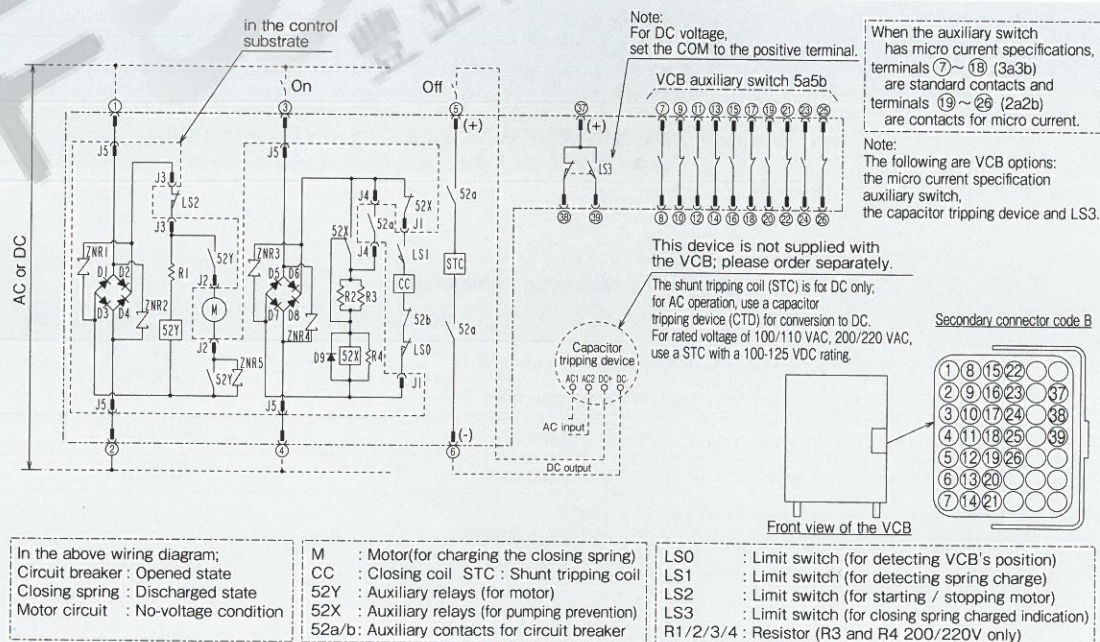


Fig.9 Connection Diagram (Code B).

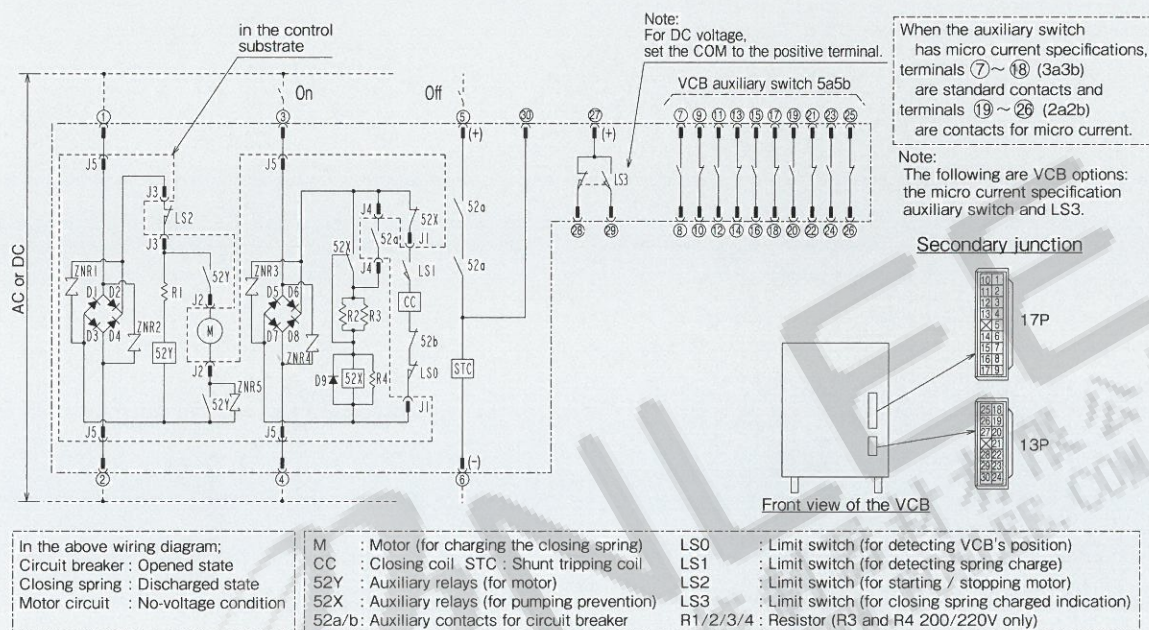


Fig.10 Connection Diagram with Tripping Coil Disconnection Monitoring (Code A).

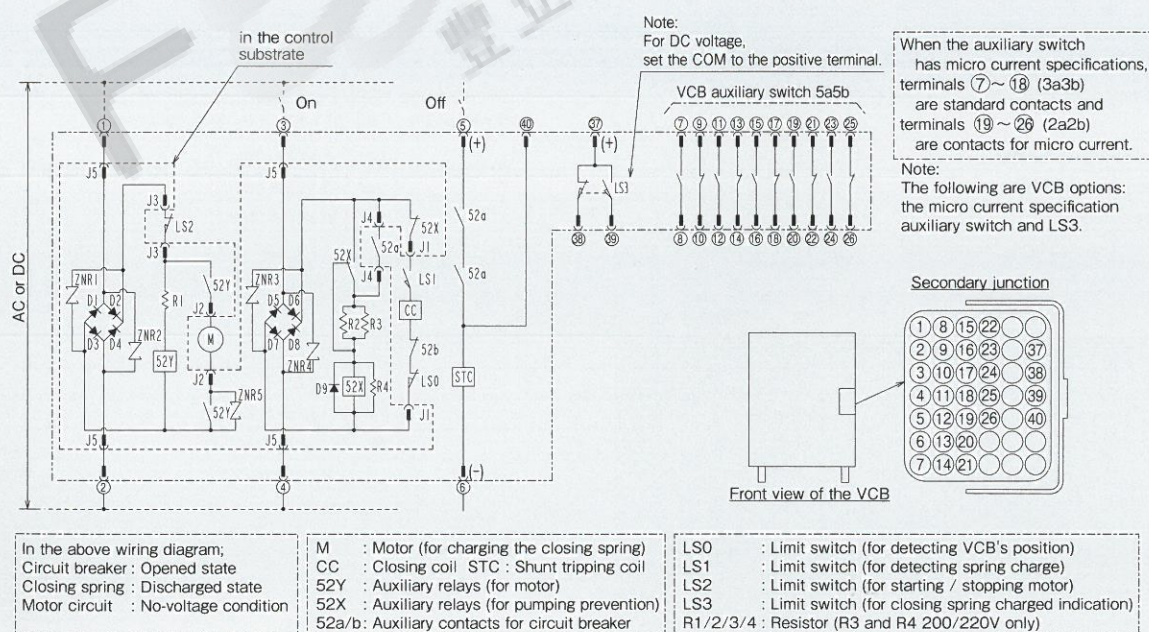


Fig.11 Connection Diagram with Tripping Coil Disconnection Monitoring (Code B).



ACCESSORIES

Accessories.



Table 3 Accessories.

Accessories	Units
①Secondary connector	1 unit per each VCB(Please specify length when the lead wire of the length of 1.5m or more is necessary.)
②Manual charging handle	1 per 1~5 VCBs (min.1)
③Insertion/draw-out handle	1 per 1~5 VCBs (min.1)
④Lifting adapter	1 per 1~5 VCBs (min.1)

Notes: 1.The bolt, washer and the nut for the connection of main circuit of fixing frame are not attached.
2.Please order separately if a higher quantity than indicated above is required.

Table 4 Auxiliary switch.

Rated insulating voltage				(V)	250 AC/DC	
Rated voltage				(V)	220 AC/DC	
Standard contact ※	Rated current	(A)	AC	AC100~125V	5 (Power factor 0.3~0.4)	
				AC200~220V	5 (Power factor 0.3~0.4)	
		DC	DC48V	5 (Time constant 40ms)		
			DC100~110V	1 (Time constant 40ms)		
			DC200~220V	0.5 (Time constant 40ms)		
	Rated continuous current				(A)	5
For micro current	Rated voltage				(V)	220 AC/DC
	Rated current	(mA)	AC	AC100~125V	1~200	
			DC	DC24~220V	1~200	
	Rated continuous current				(A)	2

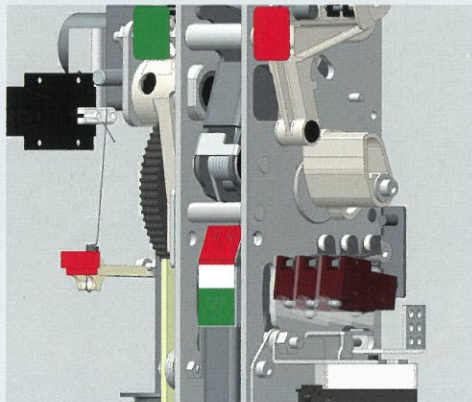
※ Avoid operating this machine by DC 48/200mA or less in the case of standard contact.

Notes: Additional auxiliary contacts can not be added to the 5a5b contacts.



OPTIONAL ACCESSORIES

■ Closing Spring Charged Indication Switch.



Used for charging/discharging output of closing springs. The contact number is 1C.

Table 5 Contact ratings.

Rated voltage (V)	Resistance load (A)	Inductive load (A)
125AC/DC	5.5	5.5
250AC/DC	3	1.5

- *1: Please refer to the standard connection diagram for the VCB (P9).
- *2: Fig. 12 shows a closed spring in a discharged state.
- *3: LS3 (limit switch for the spring charge indicator)
- *4: For DC voltage, set the COM to the positive electrode.

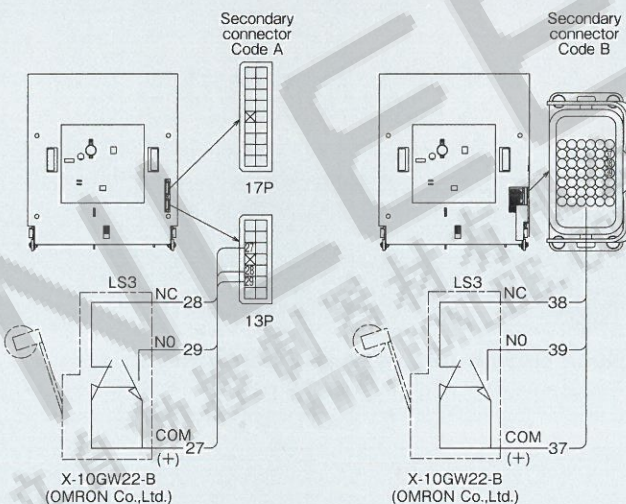
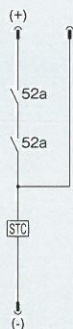


Fig. 12 Connection diagram.

■ Tripping Coil Disconnection Monitoring.



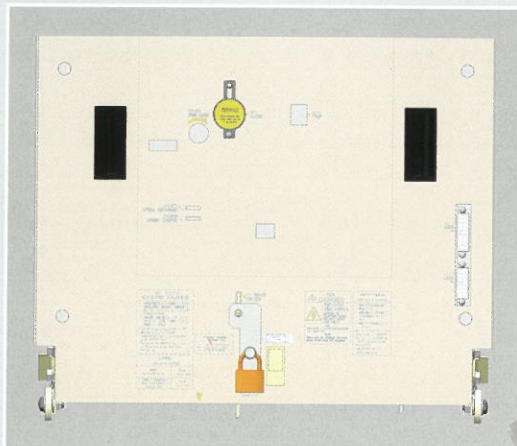
This function monitors disconnection of the tripping coil and control connector based on output from the input terminal. The disconnection monitoring current is 8mA or below (control voltage 110VDC).

Fig. 13 Connection diagram.



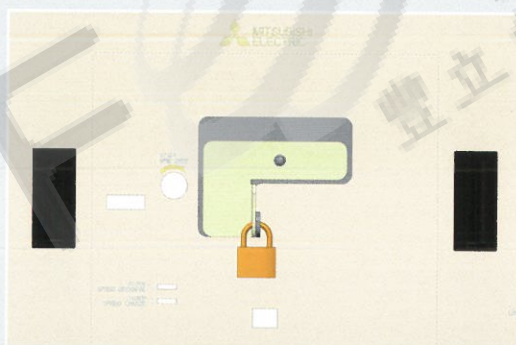
OPTIONAL ACCESSORIES

■ Draw-out Mechanism Padlock Device.



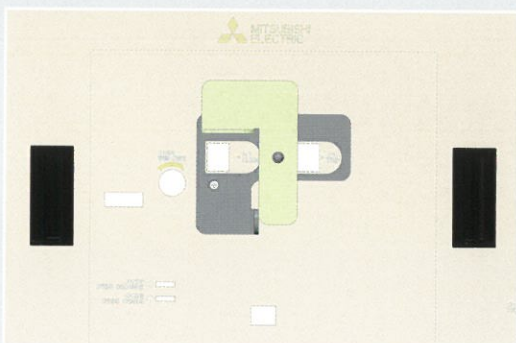
This padlock can be used to lock the VCB in the connected position or test and disconnected position. Note that users are responsible for preparing a padlock; a padlock will not be supplied by the manufacturer.

■ Padlock Device for Close and Trip Button.



New line up

This padlock board can be used to cover the VCB closing and tripping buttons and prevent manual switching operations. Note that users are responsible for preparing a padlock; a padlock will not be supplied by the manufacturer.



■ Position Switch (for withdrawable with door closed (Type-M)).

Output of the test and disconnected position as well as the connected position of the circuit breaker. The output contact number is 2C for the test and disconnected position and 2C for the connected position.

New line up

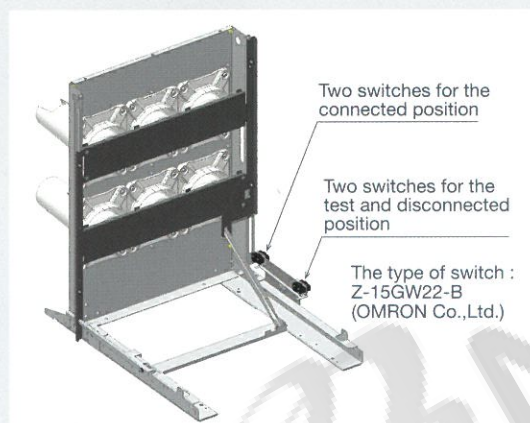


Table 6 Position contact ratings (switching).

Rated voltage (V)	Resistance load (A)	Inductive load (A)
100~125AC	15	15
100~125DC	0.5	0.05
200~250DC	0.25	0.03

Position detecting switch timing

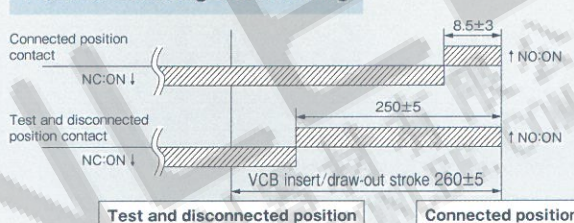


Fig. 14

■ Position Switch (for Withdrawable with door open (Types-C, D and G)).

Output of the connected position of the circuit breaker. The output contact number is 2C(1unit) or 4C(2units) for the connected position.

Position detecting switch timing

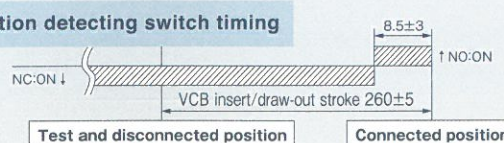


Fig. 15

Table 7 Position contact ratings (switching).

Rated voltage (V)	Resistance load (A)	Inductive load (A)
100~125AC	15	10
100~125DC	0.6	0.1
200~250DC	0.3	0.05

Table 8 Arrangement of the Position Switch.

1 Unit	For 2C	No.1 SW
2 Units	For 4C	No.1 and No.2 SW

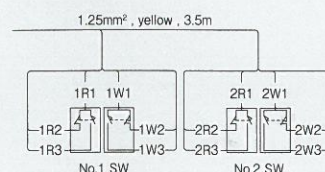


Fig. 16 Connection diagram.



OPTIONAL ACCESSORIES

■ Earthing Switch(ES).

This earthing switch is used to ground the main circuit part (lower side of the mounting frame). It enables simple safety checks at the time of maintenances and inspections.

New line up

Class E2 (25kA / 3s)

Applicable standards: IEC 62271-102-2018

Accessories: Operating handle: 1 per / 1~5 ES unit (s)

Not applicable to RoHS standard.

Table 9 Coil ratings.

Rated voltage	Current flow
100/110V DC	63mA

Table 10 Indication switch contact ratings.

Rated voltage (V)	Resistance load (A)	Inductive load (A)
125AC/DC	5.5	5.5
250AC/DC	3	1.5

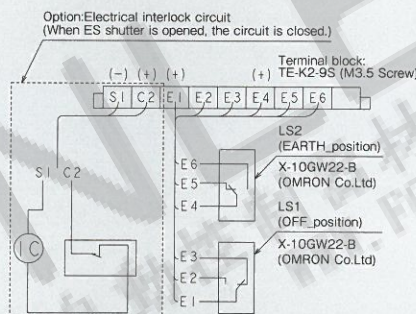
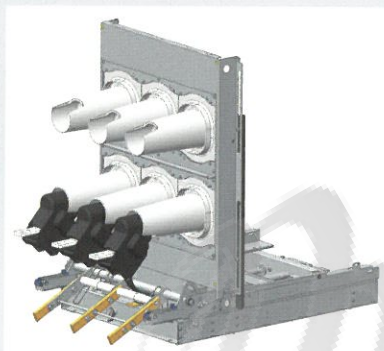


Fig.17 Connection diagram.

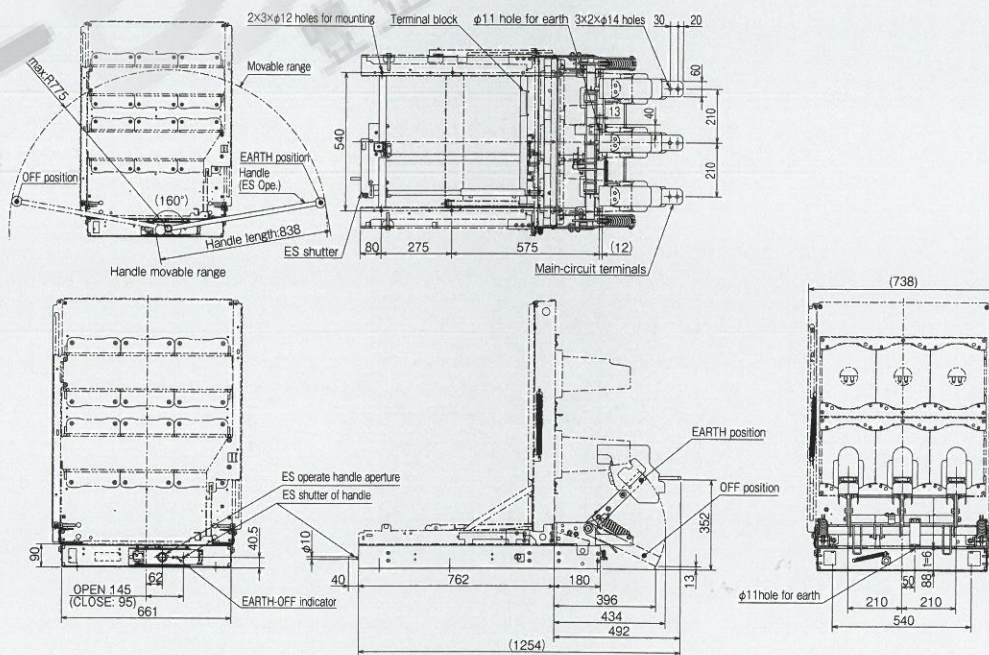
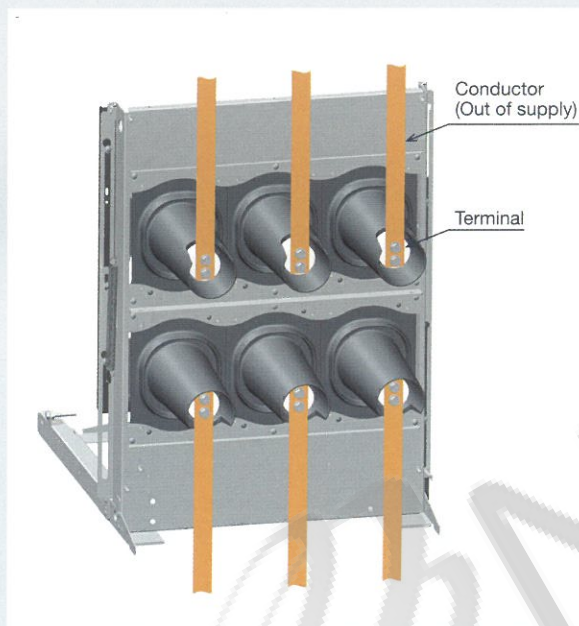


Fig.18 External dimension.

■ Optional Terminal (V: Terminal for vertical connecting (for the types-M and G)).



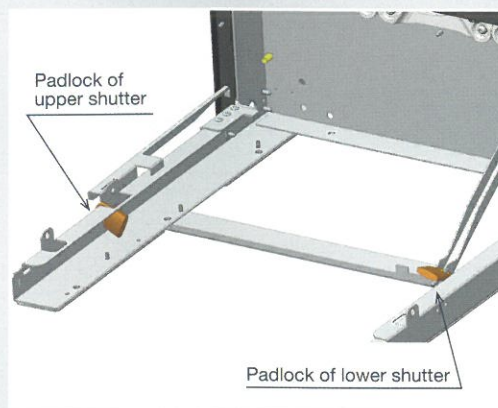
The conductors of the panel can be connected vertically. In the case of class PM, insulation cover is necessary for the terminals and the conductors. The dimensions, refer to Fig. 7.

■ Mounting Position of Shutter Padlock.

This padlock prevents release of the shutter in the mounting frame. Note that users are responsible for preparing a padlock; a padlock will not be supplied by the manufacturer.



The shutter is open position



The shutter is close position

Note : This accessory is standard equipment.



RELEVANT DEVICES

■ Capacitor Tripping Device (CTD) Sold Separately

This device makes it possible to trip the circuit breaker electrically within a fixed time via remote control even when the control power is out.

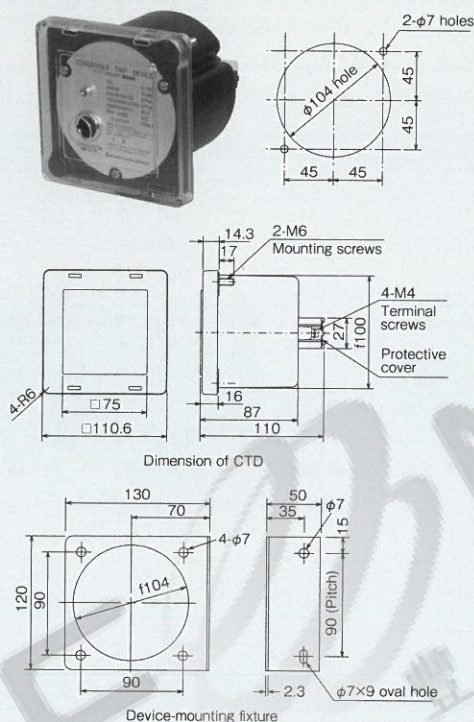


Fig. 19

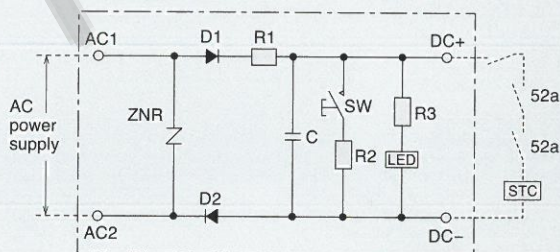


Fig. 20 Circuit diagram (KF-100E).

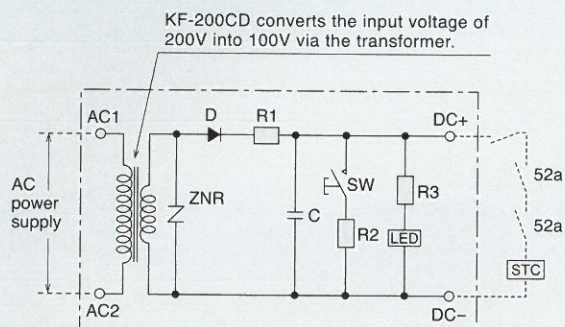


Fig. 21 Circuit diagram (KF-200CD).

Remarks

1. Capacitor tripping devices are mounted on the panel as standard.
2. Mounting fixtures that enable installation inside the panel are optional. The device can be installed facing the left, right, up or down according to the direction of the mounting fixtures.

Caution:

1. Please note that the KF-200CD output voltage is 140/155VDC. It cannot be used to open circuit breakers with a tripping voltage of 200/220VDC and may cause an accident in this case.
2. Be sure to completely charge a capacitor before performing opening operation or giving the opening command.
3. The sole purpose of this device is tripping a VCB. Do not use for any other purpose.
4. One device is required per VCB unit.
5. Recommended replacement period: 6 years

Table 11 Ratings.

Type	Condenser C	Resistance R1	Resistance R2	Resistance R3
KF-100E	820 μ F	10W300 Ω	10W100 Ω	0.5W240k Ω
KF-200CD	820 μ F	10W300 Ω	10W100 Ω	0.5W240k Ω

Table 12 Table of ratings.

Items	KF-100E	KF-200CD
Rated working voltage (V)	100/110AC	200/220AC
Rated frequency (Hz)	50/60	
Rated output voltage (V)	140/155DC	
Power consumption (steady state) (W)	0.1 or less	
Electric charge time constant	1	2.3
VCB operational voltage (V)	100~125DC	



APPLICABLE STANDARD

■ Operating Environment and Application.

● Operating Environment

20-VPR-D VCBs are designed and manufactured as an indoor unit and comply with IEC 62271-100. Accordingly, these VCBs require a normal service conditions specified in Table 13. Furthermore, sufficient maintenance and inspections must be performed in accordance with the VCB instruction manual. Please consult the manufacturer regarding operation of VCBs under special conditions.

● Caution for Installation Site and Surrounding Environment

The VCB service conditions must comply with the specifications shown in Table 13. Do not use the VCBs in environments that do not meet these conditions. For use in outdoor panels and special environments where there is excessive dust, corrosive gas, water/condensation or abnormal vibration/shock, be sure to take appropriate countermeasures. Non-adherence to these cautions may result in damage to the products or degraded performance in areas such as switching, current carrying capacity and insulation. vibration, impact, water drops, condensation, and etc.

Table 13 Nomal service conditions.

1	Ambient temperature	-5°C - 40°C (The average temperature for 24 hours must not exceed 35°C.)
2	Influence of solar radiation	There must be no influence of solar radiation.
3	Altitude	1,000m or lower
4	Powder dust	There must be no excessive powder dust. (As a guideline, the powder dust should be 2mg/m ³ or less.)
5	Humidity	Relative humidity: 45 - 85% (There must be no dew condensation.)
6	Vibration	There must be no excessive vibration.
7	Degree of pollution	There must be no pollution. (As a guideline, the equivalent salt deposit density should be less than 0.01mg/cm ² .)
8	Poisonous gas	There must be no corrosive gas.

■ Application of Surge Protection Device.

For the actual applications of vacuum circuit breaker, the surge protection standards for the load circuit so used, and actual application will be shown as table 14. Use the as table 14 of standard bellows as reference.

● Surge Protection Standards

Table 14

Load	Generator	Motor	Dry-type transformer	Oil transformer	Phase-advance capacitor
Applicable	Surge absorbing capacitors	Surge absorbing capacitors	Lightning arrester [Note 1]	Not required	Not required

Notes: 1.To directly switch the semiconductor rectifier unit (for example, electric power thyristor rectifier unit) in the secondary side of a transformer, use the transformer with contact-protective plate. Provide a general-purpose arrester in the primary side and the surge protective device such as a filter capacitor in the secondary side.

■ Service Life and Application.

Table 15 List of switching service life and capacities for which capacitor is applicable.

Load switching service life	10,000 times
Mechanical switching service life	10,000 times
Max. switching capacity [Note 1]	17,000 kvar
Multiple switching capacity	8,500 kvar

Notes : 1.The electrical service life for the max. switching capacity is about 2,000 times.
2.Applicable capacities with 6 ~ 13% series-connected reactor are shown.
3.Not applicable to different-system circuits, reactor circuit and electric furnace circuit.



ORDERING INFORMATION

Standard

Table 16 Code description chart (special specifications).

① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨ ⑩ ⑪ ⑫ ⑬

2 0 VPR **D** **1** **I**

Specifications	Rated voltage		Type	Rated short-circuit breaking current		Series name	Classification	Standards	Mounting configuration	Rated current	
	①	②	③④⑤	⑥	⑦	⑧	⑨	⑩	⑪	⑫	⑬
Codes and descriptions	2	0	VPR	1	6	D	1 (class E1 New optional functions)	I IEC 62271- 100-2012	M Withdrawable with door closed (type-M) and class MW	0	6 630A
				2	5				C Withdrawable with door open (type-C) and class CW	1	2 1,250A
									D Withdrawable with door open (type-D) and class PW		
									G Withdrawable with door open (type-G) and class MW		

Caution: • Withdrawable with door closed (type-M) is not available with mounting configuration class CW.

- In the case of position switch code 1, withdrawable with door open (type-C,D and G) is connected position 2C.
- In the case of position switch code 1, withdrawable with door closed (type-M) is connected position 2C + test position 2C.
- In the case of position switch code 2, withdrawable with door open (type-C,D and G) is connected position 4C.
- Withdrawable with door closed (type-M) is not available with position switch code 2.

14	15	16	17	18	19	20	21
Closing operation/control voltage	Tripping control voltage	Position switch	Secondary connector	Auxiliary switch	Closing spring charge indication switch	Mounting frame	Optional accessories
1 100-125 VAC/VDC	1 100-125 VDC	0 ×	A Code A (Without interlock)	0 Standard (5a5b)	0 ×	0 With mounting frame	0 ×
2 200/220 VAC/VDC	2 200/220 VDC	1 1 unit (See page 14)	B Code B (With interlock)	S For microcurrent Standard 3a3b contact For microcurrent 2a2b contact	1 With 1 C	X Without mounting frame	A With Optional accessories (See Table17)
7 24V DC	7 24V DC	2 2 units (See page 14)					
8 48V DC	8 48V DC						
1 is standard. 2, 7 and 8 will be manufactured upon receipt of order.							

Continued on the following page.



ORDERING INFORMATION

Optional Accessories

Table 17 Code description chart (special specifications)

Specifications	Tripping coil disconnection monitoring (T)	Draw-out mechanism padlock device (P)	padlock device for close and trip button (B)	Capacitor tripping device (1), (2)	Earthing switch (Class E2) (E), (F)	Optional terminal (V)
Codes and descriptions	T	P	B	1 For 100/110V AC	E With electrical interlock	V Terminal for vertical connecting
				2 For 200/220V AC	F Without electrical interlock	

Caution: • Earthing switches are not available with type-C in the mounting configuration.
 • When the tripping power is AC and the capacitor tripping device (CTD) is selected, select 100 - 125V for the tripping control voltage^⑨.
 • The tripping coil disconnection monitoring and the capacitor tripping device should not be used together.
 • Withdrawable with door closed (type-M) is not available with Draw-out mechanism padlock device.
 • Code V is not available with type-C,D.(Type-C,D are equipped.)

Example for Order No.

20VPR25D1ID12110B0000 (without optional accessories)

20VPR25D1ID12110B0000APE

(With Draw-out mechanism padlock device and Earthing switch with electrical interlock)

Memo

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Safety Warning

To ensure proper use of the products listed in this catalog,
please be sure to read the instruction manual prior to use.

MITSUBISHI ELECTRIC CORPORATION

HEAD OFFICE : TOKYO BUILDING, 2-7-3, MARUNOUCHI,
CHIYODA-KU, TOKYO 100-8310, JAPAN