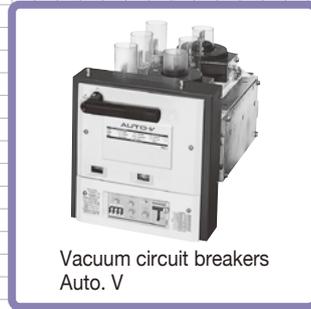


Vacuum circuit breakers
HS series



Vacuum circuit breakers
Auto. V

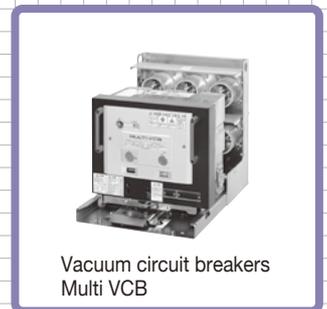


Vacuum circuit breakers
New-Auto.V

■ VACUUM CIRCUIT BREAKERS

■ VACUUM MAGNETIC CONTACTORS

■ PROTECTIVE RELAYS



Vacuum circuit breakers
Multi VCB



Vacuum Magnetic Contactors
HN series



Protective relays
QH series

HIGH
VOLTAGE
EQUIPMENT
Up to 36kV

INDIVIDUAL CATALOG **12**
from D&C CATALOG 20th Edition

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12

H.V. Vacuum circuit breakers Vacuum magnetic contactors Protective relays



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MINIMUM ORDERS

Orders amounting to **less than ¥10,000** net per order will be charged as ¥10,000 net per order plus freight and other charges.

WEIGHTS AND DIMENSIONS

Weights and dimensions appearing in this catalog are the best information available at the time of going to press.

FUJI ELECTRIC FA has a policy of continuous product improvement, and design changes may make this information out of date.

Please confirm such details before planning actual construction.

INFORMATION IN THIS CATALOG IS SUBJECT TO CHANGE WITHOUT NOTICE.

■ **FUJI vacuum circuit breakers**

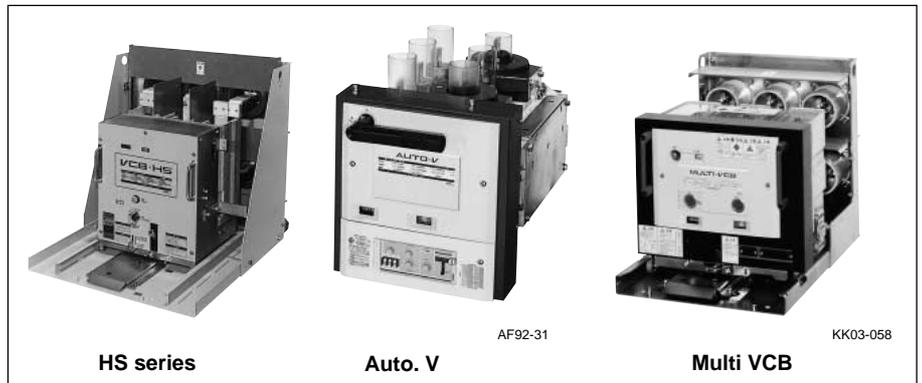
Vacuum circuit breakers are compact circuit breakers designed for safe operation, high reliability and easy maintenance, and are widely used for various types of high voltage circuits. FUJI V-circuit breakers (VCB) have been developed through the use of our many years of successful experience and advanced technology. They are compact and light-weight, and are available in a number of current ratings.

● **HS series**

These types are available in all ratings from 3.6 to 36kV, and can be applied to a variety of H.V. switchgear. The motor-spring stored-energy types feature auto-reclosing. The HS types are comparatively high in breaking current with ratings of over 7.2kV, 20kA.

- Breaking currents: 12.5kA to 50kA
- Rated voltage: 3.6kV to 36kV
- Standards: JEC, IEC

See page 12/4.



● **Auto. V**

Auto. Vs are provided with a built-in electronic overcurrent relay and toroidal-type CT.

They require little space for installation and also facilitate the system wide protective coordination.

The inverse-time operating and instantaneous trip currents can be set by means of the dial.

- Breaking currents: 8kA, 12.5kA
- Rated voltage: 3.6/7.2kV
- Standards: JIS C4603

See page 12/26.

● **Multi VCB**

The Multi VCBs are general purpose VCBs which are small in size and simple in construction thus allowing them to be applied to many types of switchgear.

- Breaking currents: 8kA, 12.5kA
- Rated voltage: 3.6/7.2kV
- Standards: JIS C4603

See page 12/45.

■ **Quick selection table**

| Breaking current (kA) | Rated current JIS, JEC (A) | Rated voltage (kV) | Closing system | Type □ : Installation | Breaking current (kA) | Rated current JIS, JEC (A) | Rated voltage (kV) | Closing system | Type □ : Installation | |
|-----------------------|------------------------------|--------------------|----------------|--------------------------|-----------------------|------------------------------|--------------------|----------------|--------------------------|-----------|
| 20 | 600 1200 2000 | 3.6/7.2 | Motor-spring | HS2006□-06Mf-E | 40 | 1200 2000 3000 4000 | 12 | Motor-spring | HS4010□-12Mf-NA | |
| | | | | HS2006□-12Mf-E | | | | | HS4010□-20Mf-NA | |
| | | | | HS2006□-20Mf-E | | | | | HS4010□-30Mf-N | |
| 25 | 600 1200 2000 | 3.6/7.2 | Motor-spring | HS2506□-06Mf-E | 50 | 1200 2000 3000 | 12 | Motor-spring | HS4010□-40Mf-N | |
| | | | | HS2506□-12Mf-E | | | | | HS5010□-12Mf-NA | |
| | | | | HS2506□-20Mf-E | | | | | HS5010□-20Mf-NA | |
| 31.5 | 1200 2000 3000 | 3.6/7.2 | Motor-spring | HS3106□-12Mf-E | 12.5 | 600 1200 | 24 | Motor-spring | HS5010□-30Mf-N | |
| | | | | HS3106□-20Mf-E | | | | | HS1220□-06Mf-K | |
| | | | | HS3106□-30Mf-N | | | | | HS1220□-12Mf-K | |
| 40 | 1200 2000 3000 4000 | 3.6/7.2 | Motor-spring | HS4006□-12Mf-E | 16 | 600 1200 | 24 | Motor-spring | HS1620□-06Mf-E | |
| | | | | HS4006□-20Mf-E | | | | | HS1620□-12Mf-E | |
| | | | | HS4006□-30Mf-N | | | | | HS2520□-06Mf-E | |
| 50 | 1200 2000 3000 | 3.6/7.2 | Motor-spring | HS4006□-40Mf-N | 25 | 600 1200 2000 | 24 | Motor-spring | HS2520□-12Mf-E | |
| | | | | HS5006□-12Mf-NA | | | | | HS4020□-12Mf-N | |
| | | | | HS5006□-20Mf-NA | | | | | HS4020□-20Mf-N | |
| 12.5 | 600 1200 2000 | 12 | Motor-spring | HS5006□-30Mf-N | 40 | 1200 2000 3000 | 24 | Motor-spring | HS4020□-30Mf-N | |
| | | | | HS1210□-06Mf-E | | | | | HS2530□-06Mf-N | |
| | | | | HS1210□-12Mf-E | | | | | HS2530□-12Mf-N | |
| 16 | 600 1200 2000 | 12 | Motor-spring | HS1210□-20Mf-E | 25 | 600 1200 2000 | 36 | Motor-spring | HS2530□-20Mf-N | |
| | | | | HS1610□-06Mf-E | | | | | HA08□-H□ | |
| | | | | HS1610□-12Mf-E | | | | | HA12□-H□ | |
| 20 | 600 1200 2000 | 12 | Motor-spring | HS1610□-20Mf-E | 8.0 | 400 | 3.6/7.2 | Motor-spring | HA08□-A□ | |
| | | | | HS2010□-06Mf-E | | | | | Fixed | HA12□-A□ |
| | | | | HS2010□-12Mf-E | | | | | | |
| 25 | 600 1200 2000 | 12 | Motor-spring | HS2010□-20Mf-E | 12.5 | 600 | 3.6/7.2 | Motor-spring | HA12□-A□ | |
| | | | | HS2510□-06Mf-E | | | | | Draw-out | HA08A□-A8 |
| | | | | HS2510□-12Mf-E | | | | | | HA12A□-A8 |
| 31.5 | 1200 2000 3000 | 12 | Motor-spring | HS2510□-20Mf-E | 8.0 | 400 | 3.6/7.2 | Motor-spring | HA08□-A□ | |
| | | | | HS3110□-12Mf-E | | | | | Fixed | HA12□-A□ |
| | | | | HS3110□-20Mf-E | | | | | | |
| 31.5 | 1200 2000 3000 | 12 | Motor-spring | HS3110□-30Mf-N | 8.0 | 400 | 3.6/7.2 | Motor-spring | HA08A□-A□ | |
| | | | | | | | | | Draw-out | HA12A□-A□ |
| | | | | | | | | | | |

Note: □ Installation : See pages 12/4 for HS series, 12/26 for Auto. V and 12/45 for Multi VCB.

H.V. Distribution Equipment

Vacuum circuit breakers

Advantages

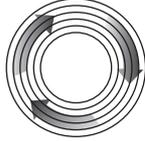
■ Description

3.6kV to 36kV, 600 to 4000A, 12.5 to 50kA

The revolutionary arc extinguishing system

● Rotary

FUJI VCBs have employed a unique design principle in which the contacts are provided with a succession of slits having toroidal-type CrCu contacts mounted on them.



The arc is driven round the circular contact surface as it is being extinguished. Since the arc is not localized at one point there is no fear of overheating. This results in much improved inter-electrode dielectric strength so ensuring excellent breaking capability. Moreover, uneven contact wear is minimized.

● Getter

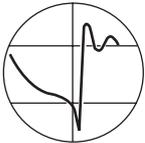
FUJI vacuum interrupters make use of the gettering effect. The toroidal-type contacts are made of a special chromium-copper (CrCu) alloy specially developed by FUJI so as to ensure a large "getter" quality.



The metallic gases thus produced at interruption and left in the vacuum are quickly absorbed by the getter. The gases are neutralized so maintaining the high degree of vacuum. The interrupters require a minimum of attention over their long service life.

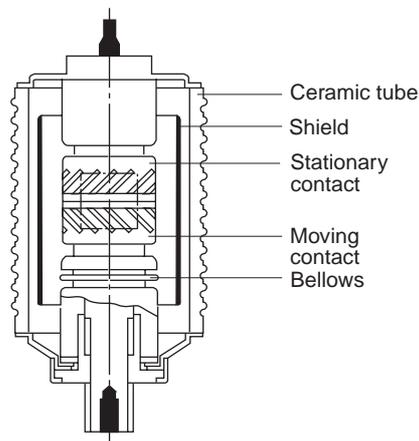
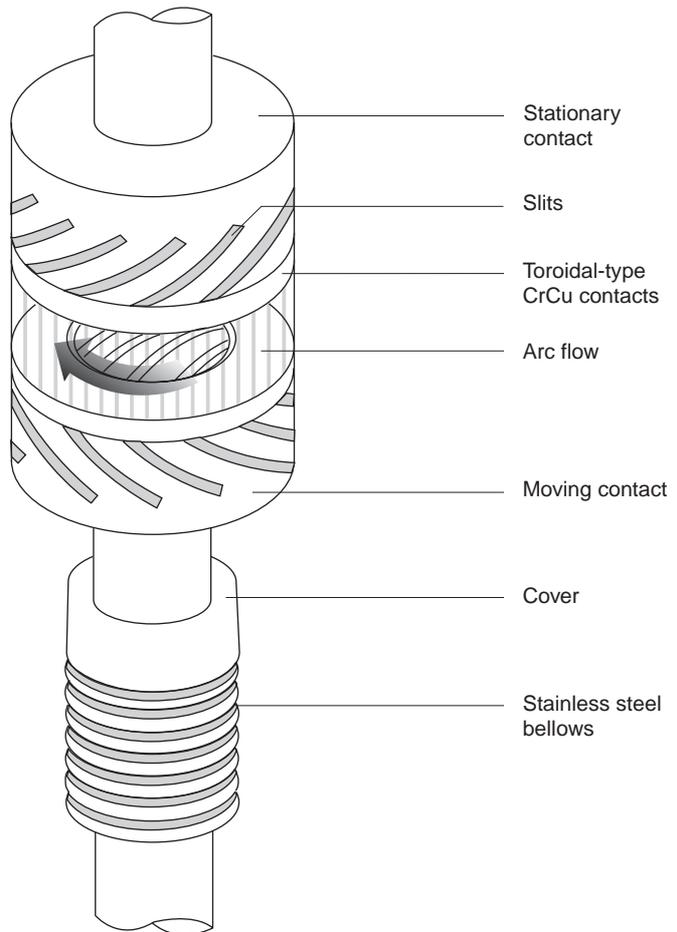
● Surge

Switching surges can be generated at small current breaking due to the VCB inherent chopping current.



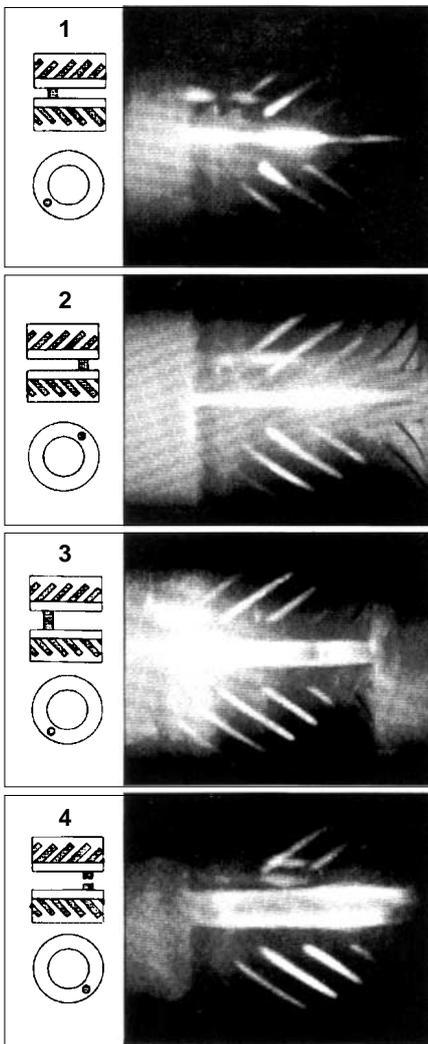
FUJI has paid much attention to this problem, and after much effort on design and materials research it has been possible to reduce the chopping current to 3.5 Amps. This very small chopping current means that the corresponding surge voltage will be reduced and cost efficient surge protection can be carried out for motors, transformers and other load equipment.

The revolutionary arc extinguishing system



● Progress of arc extinction

Arcs generated by VCBs have inherent characteristics that change when approximately 10kA is reached. Less than 10kA a dispersed arc occurs, over this value the arc is concentrated. The photos were taken consecutively and illustrate an interruption in the 25kA range (concentrated arc). About 4 1/2 rotations occurred (10ms at 50Hz). This time is typical, but varies according to breaking current and arcing times.



Explanation

1. The contacts begin to open and the arc moves from the center to the left hand side.
2. 3. The arc is driven round the toroidal-type contact surface.
4. The contacts are in the full open position just before interruption is completed.

■ Definitions

● **What is the action of the “getter”?**
Sometimes called a “degasser” the “getter” uses a special material such as zirconium alloy that has the property of absorbing metallic gases in a vacuum. This allows the high degree of vacuum to be maintained.

● Switching surges and VCBs?

Switching surges can be generated when breaking currents within several hundreds range.

VCB inherent switching surges are generated under certain specific conditions which mainly comprise current chopping surges and multiple current reignition surges. No problem is posed by switching surges when breaking current exceeds several hundred amperes.

Surge voltages

The value of the surge voltage due to switching surges varies according to the ↑

load circuit conditions.

This can be expressed in the following simple formula:

$$\text{Surge voltage} = \text{Surge impedance} \times \text{Chopping current}$$

Therefore, it is necessary to keep the chopping current low in order to reduce the surge voltage to the minimum. The peak transient voltage is obtained by adding to the above calculation the voltage on the load side at the time of current chopping.

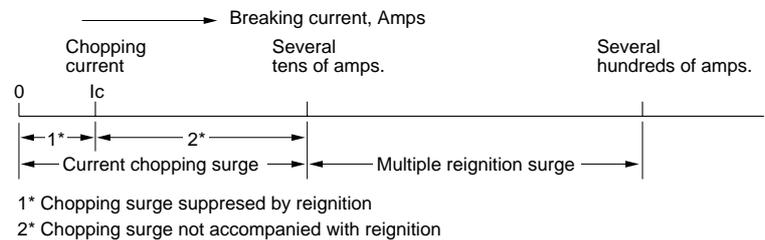
Chopping surge

The chopping surge occurs when a low current is interrupted, the arc is unstable before current becomes zero and the current is forcibly chopped. At this time a surge is generated by the energy remaining in the load inductance.

Example:

When the no-load interruption of a transformer is carried out the exciting current only is interrupted.

Chopping surge

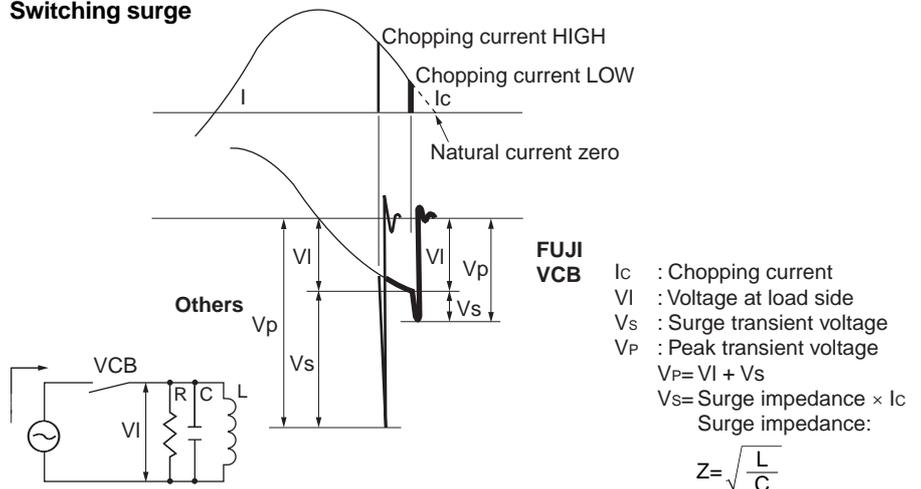


Multiple reignition surge

The multiple reignition surges can occur when breaking currents range from tens to hundreds of amperes. Although no problem is normally posed even when breaking these currents,

a high surge voltage can be generated when breaking an inrush current on starting the motors.

Switching surge



■ **Specifications**

| Type | | HS2006□ -■Mf-E | | HS2506□ -■Mf-E | | HS3106□ -■Mf-E | |
|--|--------------------------|--|-----|---|-----|--|-----|
| Rated voltage [kV] | | 3.6 | 7.2 | 3.6 | 7.2 | 3.6 | 7.2 |
| Rated current [A] ■ :06, 12, 20, 30 | JEC | 600, 1200 2000 | | 600, 1200 2000 | | 1200, 2000, 3000 | |
| | IEC | 630, 1250 2000 | | 630, 1250 2000 | | 1250, 2000, 3000 | |
| Rated breaking capacity | [kA] | 20 | | 25 | | 31.5 | |
| | [MVA] Ref. value | 125 | 250 | 160 | 310 | 200 | 390 |
| Rated short-circuit making current [kA] | | 50 | | 63 | | 80 | |
| Rated short-time withstand current [kA] | JEC: 2 sec. | 20 | | 25 | | 31.5 | |
| | IEC: 1 sec. *1 | 20 | | 25 | | 31.5 | |
| Rated breaking time [cycle] | | 3 | | 3 | | 3 | |
| Rated withstand voltage | Power frequency (1 min.) | JEC [kV] | 22 | JEC [kV] | 22 | JEC [kV] | 22 |
| | | IEC [kV] | 20 | IEC [kV] | 20 | IEC [kV] | 20 |
| | Impulse (1.2×50μs) [kV] | | 60 | | 60 | | 60 |
| Closing time at no load [sec] | | 0.04 | | 0.04 | | 0.04 (3000A: 0.05) | |
| Rated operating sequence | JEC | O-1min-CO-3min-CO, | | CO-15s-CO or O-0.35s-CO-1min-CO | | | |
| | IEC | O-3min-CO-3min-CO, | | CO-15s-CO or O-0.3s-CO-3min-CO | | | |
| Opening time [sec.] | JEC | 0.03 | | 0.03 | | 0.03 | |
| | IEC | 0.03 | | 0.03 | | 0.03 | |
| Closing system | | Motor-spring stored energy (High speed reclosing) (M) | | | | | |
| Operating voltage and current for closing | | 100V AC/DC, 1.7A*3 200V AC/DC, 1A | | 100V AC/DC, 2A 200V AC/DC, 1A | | 100V AC/DC, 2.5A 200V AC/DC, 1.7A | |
| Control voltage and current for closing | | 100V AC/DC, 4A 200V AC/DC, 2A | | 100V AC/DC, 4A 200V AC/DC, 2A | | 100V AC/DC, 5A 200V AC/DC, 2.5A | |
| Tripping system*2 | | Shunt trip (f) | | | | | |
| Operating voltage and current for tripping | | 100V DC, 4A 200V DC, 2A | | | | 100V DC, 4A 200V DC, 2A | |
| Auxiliary contact | | 4NO+4NC, Rating 100/200V AC: 20/10A, 100/200V DC: 5/3A | | | | | |
| Durability | Mechanical [operations] | 10000 | | | | | |
| | Electrical [operations] | 10000 | | | | | |
| Installation □ | | P, Y X, U (600, 1200A only) | | P, Y X, U (600, 1200A only) | | P, Y X (1200, 2000A only) | |
| Mass (draw-out type without cradle)[kg] | | 62 (X, U, Y: 600A) 66 (Y: 1200A) 117 (Y: 2000A) | | 66 (X, U, Y: 600A) 70 (Y: 1200A) 117 (Y: 2000A) | | 122 (X, Y: 1200A) 130 (X, Y: 2000A) 220 (Y: 3000A) | |

Notes: *1 Contact FUJI for the information concerning the 3 sec. rating of IEC.

*2 If capacitor tripping system is required, connect a capacitor trip device VCB-T1A or VCB-T2A (optional accessory) to AC power supply.

*3 2A for 2000A rating.

H.V. Distribution Equipment

Vacuum circuit breakers

HS series

■ Specifications

| Type | | HS4006□ -■Mf-E | HS4006□ -40Mf-N | HS5006□ -■Mf-NA | HS5006□ -30Mf-N | HS6306□ -■Mf-NB |
|--|-------------------------------|--|---|----------------------------------|----------------------------------|----------------------------------|
| Rated voltage [kV] | | 3.6 7.2 | 3.6 7.2 | 3.6 7.2 | 3.6 7.2 | 3.6 7.2 |
| Rated current [A] ■: 12, 20, 30 | JEC | 1200, 2000, 3000 | 4000 | 1200, 2000 | 3000 | 1200, 2000 |
| | IEC | 1250, 2000, 3000 | 4000 | 1250, 2000 | 3000 | 1250, 2000 |
| Rated breaking capacity | [kA] | 40 | 40 | 50 | 50 | 63 |
| | [MVA] Ref. value | 250 500 | 250 500 | 310 620 | 310 620 | 390 780 |
| Rated short-circuit making current [kA] | | 100 | 100 | 125 | 125 | 160 |
| Rated short-time withstand current [kA] | JEC: 2 sec. | 40 | 40 | 50 | 50 | 63 |
| | IEC: 1 sec. *1 | 40 | 40 | 50 | 50 | 63 |
| Rated breaking time [cycle] | | 5 | 5 | 5 | 5 | 5 |
| Rated withstand voltage | Power frequency (1 min.) | JEC [kV] IEC [kV] | 22 20 | 22 20 | 22 20 | 22 20 |
| | Impulse (1.2×50μs) [kV] | | 60 | 60 | 60 | 60 |
| | Closing time at no load [sec] | | 0.04(3000A: 0.05) | 0.1 | 0.1 | 0.1 |
| Rated operating sequence | | JEC IEC | O-1min-CO-3min-CO, CO-15s-CO or O-0.35s-CO-1min-CO O-3min-CO-3min-CO, CO-15s-CO or O-0.3s-CO-3min-CO | | | |
| Opening time [sec.] | JEC | 0.03 | 0.07 | 0.07 | 0.07 | 0.07 |
| | IEC | 0.04 | 0.07 | 0.07 | 0.07 | 0.07 |
| Closing system | | Motor-spring stored energy (High speed reclosing) (M) | | | | |
| Operating voltage and current for closing | | 100V AC/DC, 2.5A 200V AC/DC, 1.7A | 100V AC/DC, 6A 200V AC/DC, 3A | 100V AC/DC, 6A 200V AC/DC, 3A | 100V AC/DC, 6A 200V AC/DC, 3A | 100V AC/DC, 6A 200V AC/DC, 3A |
| Control voltage and current for closing | | 100V AC/DC, 5A 200V AC/DC, 2.5A | 100V AC/DC, 4A 200V AC/DC, 2A | 100V AC/DC, 4A 200V AC/DC, 2A | 100V AC/DC, 4A 200V AC/DC, 2A | 100V AC/DC, 4A 200V AC/DC, 2A |
| Tripping system *2 | | Shunt trip (f) | | | | |
| Operating voltage and current for tripping | | 100V DC, 4A: JEC 3A: IEC 200V DC, 2A: JEC 1.5A: IEC | 100V DC, 4A 200V DC, 2A | | | |
| Auxiliary contact | | 4NO+4NC, Rating 100/200V AC: 20/10A, 100/200V DC: 5/3A | | | | |
| Durability | Mechanical [operations] | 10000 | | | | |
| | Electrical [operations] | 10000 | | | | |
| Installation □ | | P, Y X (1200, 2000A only) | P, X, Y | P, Y | P, Y | Y |
| Mass (draw-out type without cradle) [kg] | | 122 (X, Y: 1200A) 130 (X, Y: 2000A) 220 (Y: 3000A) | 400 | 240 | 320 | 350 |

Notes: *1 Contact FUJI for the information concerning the 3 sec. rating of IEC.

*2 If capacitor tripping system is required, connect a capacitor trip device VCB-T1A or VCB-T2A (optional accessory) to AC power supply.

■ **Specifications**

| Type | | HS1210□ -■Mf-E | HS1610□ -■Mf-E | HS2010□ -■Mf-E | HS2510□ -■Mf-E | HS3110□ -■Mf-E |
|--|--------------------------------|---|--|--|--|--|
| Rated voltage [kV] | | 12 | 12 | 12 | 12 | 12 |
| Rated current [A] ■: 06, 12, 20 | JEC | 600, 1200 2000 | 600, 1200 2000 | 600, 1200 2000 | 600, 1200 2000 | 1200, 2000 |
| | IEC | 630, 1250 2000 | 630, 1250 2000 | 630, 1250 2000 | 630, 1250 2000 | 1250, 2000 |
| Rated breaking capacity | [kA] | 12.5 | 16 | 20 | 25 | 31.5 |
| | [MVA] Ref. value | 260 | 330 | 415 | 520 | 650 |
| Rated short-circuit making current [kA] | | 31.5 | 40 | 50 | 63 | 80 |
| Rated short-time withstand current [kA] | JEC: 2 sec. | 12.5 | 16 | 20 | 25 | 31.5 |
| | IEC: 1 sec. *1 | 12.5 | 16 | 20 | 25 | 31.5 |
| Rated breaking time [cycle] | | 3 | 3 | 3 | 3 | 3 |
| Rated withstand voltage | Power frequency (1 min.) | JEC [kV] IEC [kV] | 28 28 | 28 28 | 28 28 | 28 28 |
| | Impulse (1.2×50μs) [kV] | | 75 | 75 | 75 | 75 |
| | Closing time at no load [sec.] | | 0.04 | 0.04 | 0.04 | 0.04 |
| Rated operating sequence | JEC IEC | O-1min-CO-3min-CO, CO-15s-CO or O-0.35s-CO-1min-CO O-3min-CO-3min-CO, CO-15s-CO or O-0.3s-CO-3min-CO | | | | |
| Opening time [sec.] | JEC | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 |
| | IEC | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 |
| Closing system | | Motor-spring stored energy (High speed reclosing) (M) | | | | |
| Operating voltage and current for closing | | 100V AC/DC, 1.7A (600, 1200A), 2.5A (2000A) 200V AC/DC, 1A (600, 1200A), 1.7A (2000A) | | | | 100V AC/DC, 2.5A 200V AC/DC, 1.7A |
| Control voltage and current for closing | | 100V AC/DC, 4A (600, 1200A), 5A (2000A) 200V AC/DC, 2A (600, 1200A), 2.5A (2000A) | | | | 100V AC/DC, 5A 200V AC/DC, 2.5A |
| Tripping system*2 | | Shunt trip (f) | | | | |
| Operating voltage and current for tripping | | 100V DC, 4A 200V DC, 2A | | | | 100V DC, 4A 200V DC, 2A |
| Auxiliary contact | | 4NO+4NC, Rating 100/200V AC: 20/10A, 100/200V DC: 5/3A | | | | |
| Durability | Mechanical [operations] | 10000 | | | | |
| | Electrical [operations] | 10000 | | | | |
| Installation □ | | P, Y X (600, 1200A only) | P, Y X (600, 1200A only) | P, Y X (600, 1200A only) | P, Y X (600, 1200A only) | P, X, Y |
| Mass (draw-out type, without cradle) [kg] | | 71 (Y: 600A) 71 (Y: 1200A) 130 (X, Y: 2000A) | 71 (Y: 600A) 71 (Y: 1200A) 130 (X, Y: 2000A) | 71 (Y: 600A) 71 (Y: 1200A) 130 (X, Y: 2000A) | 75 (Y: 600A) 75 (Y: 1200A) 130 (X, Y: 2000A) | 122 (X, Y: 1200A) 130 (X, Y: 2000A) |

Notes: *1 Contact FUJI for the information concerning the 3 sec. rating of IEC.

*2 If capacitor tripping system is required, connect a capacitor trip device VCB-T1A or VCB-T2A (optional accessory) to an AC power supply.

H.V. Distribution Equipment

Vacuum circuit breakers

HS series

■ Specifications

| Type | | HS3110 -30Mf-N | HS4010 -■Mf-NA | HS4010 -■Mf-N | HS5010 -■Mf-NA | HS5010 -30Mf-N |
|--|--------------------------|---|-------------------|----------------------------|-------------------|-------------------|
| Rated voltage [kV] | | 12 | 12 | 12 | 12 | 12 |
| Rated current [A] ■: 12, 20, 30, 40 | JEC | 3000 | 1200, 2000 | 3000, 4000 | 1200, 2000 | 3000 |
| | IEC | 3000 | 1250, 2000 | 3000, 4000 | 1250, 2000 | 3000 |
| Rated breaking capacity | [kA] | 31.5 | 40 | 40 | 50 | 50 |
| | [MVA] Ref. value | 650 | 830 | 830 | 1040 | 1040 |
| Rated short-circuit making current [kA] | | 80 | 100 | 100 | 125 | 125 |
| Rated short-time withstand current [kA] | JEC: 2 sec. | 31.5 | 40 | 40 | 50 | 50 |
| | IEC: 1 sec. *1 | 31.5 | 40 | 40 | 50 | 50 |
| Rated breaking time [cycle] | | 3 | 5 | 5 | 5 | 5 |
| Rated withstand voltage | Power frequency (1 min.) | JEC [kV] IEC [kV] | 28 28 | 28 28 | 28 28 | 28 28 |
| | Impulse (1.2×50μs) [kV] | | 75 | 75 | 75 | 75 |
| | | | | | | |
| Closing time at no load [sec.] | | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 |
| Rated operating sequence | JEC IEC | O-1min-CO-3min-CO, CO-15s-CO or O-0.35s-CO-1min-CO O-3min-CO-3min-CO, CO-15s-CO or O-0.3s-CO-3min-CO | | | | |
| Opening time [sec.] | JEC | 0.04 | 0.04 | 0.04*3 | 0.07 | 0.07 |
| | IEC | 0.04 | 0.04 | 0.04*3 | 0.07 | 0.07 |
| Closing system | | Motor-spring stored energy (High speed reclosing) (M) | | | | |
| Operating voltage and current for closing | | 100V AC/DC, 6A 200V AC/DC, 3A | | | | |
| Control voltage and current for closing | | 100V AC/DC, 4A 200V AC/DC, 2A | | | | |
| Tripping system*2 | | Shunt trip (f) | | | | |
| Operating voltage and current for tripping | | 100V DC, 4A 200V DC, 2A | | | | |
| Auxiliary contact | | 4NO+4NC, Rating 100/200V AC: 20/10A, 100/200V DC: 5/3A | | | | |
| Durability | Mechanical [operations] | 10000 | | | | |
| | Electrical [operations] | 10000 | | | | |
| Installation | | P, Y | P, Y | P, Y(3000A) X(4000A) | P, Y | P, Y |
| Mass (draw-out type without cradle) [kg] | | 320 | 240 | 320 (3000A) 400 (4000A) | 240 | 320 |

Notes: *1 Contact FUJI for the information concerning the 3 sec. rating of IEC.

*2 If capacitor tripping system is required, connect a capacitor trip device VCB-T1A or VCB-T2A (optional accessory) to AC power supply.

*3 0.07s for 4000A rating.

■ Specifications

| Type | | HS1215□ -■Mf-N | HS1615□ -■Mf-N | HS2015□ -■Mf-N | HS2515□ -■Mf-N | HS3115□ -■Mf-N | HS4015□ -■Mf-N |
|--|-------------------------------|---|-------------------|-------------------|-------------------|----------------------------------|--------------------|
| Rated voltage [kV] | | 15 | 15 | 15 | 15 | 15 | 15 |
| Rated current [A] ■: 06, 12, 20, 30 | JEC | 600, 1200 2000 | 600, 1200 2000 | 600, 1200 2000 | 600, 1200 2000 | 1200 2000, 3000 | 1200 2000, 3000 |
| | IEC | 630, 1250 2000 | 630, 1250 2000 | 630, 1250 2000 | 630, 1250 2000 | 1250 2000, 3000 | 1250 2000, 3000 |
| Rated breaking capacity | [kA] | 12.5 | 16 | 20 | 25 | 31.5 | 40 |
| | [MVA] Ref. value | 325 | 415 | 520 | 650 | 820 | 1040 |
| Rated short-circuit making current [kA] | | 31.5 | 40 | 50 | 63 | 80 | 100 |
| Rated short-time withstand current [kA] | JEC: 2 sec. IEC: 1 sec. *1 | 12.5 12.5 | 16 16 | 20 20 | 25 25 | 31.5 31.5 | 40 40 |
| | | | | | | | |
| Rated breaking time [cycle] | | 3 | 3 | 3 | 3 | 3 | 5 |
| Rated withstand voltage | Power frequency (1 min.) | JEC [kV] IEC [kV] | — 36 | — 36 | — 36 | — 36 | — 36 |
| | Impulse (1.2×50μs) [kV] | | 95 | 95 | 95 | 95 | 95 |
| | | | | | | | |
| Closing time at no load [sec.] | | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 |
| Rated operating sequence | JEC IEC | O-1min-CO-3min-CO, CO-15s-CO or O-0.35s-CO-1min-CO O-3min-CO-3min-CO, CO-15s-CO or O-0.3s-CO-3min-CO | | | | | |
| Opening time [sec.] | JEC | 0.03 | 0.03 | 0.03 | 0.03 | 0.04 | 0.04 |
| | IEC | 0.03 | 0.03 | 0.03 | 0.03 | 0.04 | 0.04 |
| Closing system | | Motor-spring stored energy (High speed reclosing) (M) | | | | | |
| Operating voltage and current for closing | | 100V AC/DC, 1.3A 200V AC/DC, 0.8A | | | | 100V AC/DC, 6A 200V AC/DC, 3A | |
| Control voltage and current for closing | | 100V AC/DC, 5A 200V AC/DC, 3A | | | | 100V AC/DC, 4A 200V AC/DC, 2A | |
| Tripping system *2 | | Shunt trip (f) | | | | | |
| Operating voltage and current for tripping | | 100V DC, 4A 200V DC, 2A | | | | | |
| Auxiliary contact | | 4NO+4NC, Rating 100/200V AC: 20/10A, 100/200V DC: 20/10A | | | | | |
| Durability | Mechanical [operations] | 10000 | | | | | |
| | Electrical [operations] | 10000 | | | | | |
| Installation □ | | P, X, Y | P, X, Y | P, X, Y | P, X, Y | P, Y | P, Y |
| Mass (draw-out type without cradle) [kg] | | 130 (600A) | 130 (600A) | 130 (600A) | 130 (600A) | 195 (1200A) | 260 (1200A) |
| | | 130 (1200A) | 130 (1200A) | 130 (1200A) | 130 (1200A) | 195 (2000A) | 260 (2000A) |
| | | 140 (2000A) | 140 (2000A) | 140 (2000A) | 140 (2000A) | 320 (3000A) | 320 (3000A) |

Notes: *1 Contact FUJI for the information concerning the 3 sec. rating of IEC.

*2 If capacitor tripping system is required, connect a capacitor trip device VCB-T1A or VCB-T2A (optional accessory) to AC power supply.

H.V. Distribution Equipment

Vacuum circuit breakers

HS series

■ Specifications

| Type | | HS1220□ -■Mf-K | HS1620□ -■Mf-E | HS2520□ -■Mf-E | HS4020□ -■Mf-N | HS2530□ -■Mf-N |
|--|--------------------------|---|--|---|---|--|
| Rated voltage [kV] | | 24 | 24 | 24 | 24 | 36 |
| Rated current [A] ■: 06, 12, 20, 30 | JEC | 600, 1200 | 600, 1200 | 600, 1200 2000 | 1200, 2000 3000 | 600, 1200 2000 |
| | IEC | 630, 1250 | 630, 1250 | 630, 1250 2000 | 1250, 2000 3000 | 630, 1250 2000 |
| Rated breaking capacity | [kA] | 12.5 | 16 | 25 | 40 | 25 |
| | [MVA] Ref. value | 520 | 665 | 1000 | 1660 | 1600 |
| Rated short-circuit making current [kA] | | 31.5 | 40 | 63 | 100 | 63 |
| Rated short-time withstand current [kA] | JEC: 2 sec. | 12.5 | 16 | 25 | 40 | 25 |
| | IEC: 1 sec. *1 | 12.5 | 16 | 25 | 40 | 25 |
| Rated breaking time [cycle] | | 3 | 3 | 3 | 5 | 3 |
| Rated withstand voltage | Power frequency (1 min.) | JEC [kV] IEC [kV] | 50 50 | 50 50 | 50 50 | 70 70 |
| | Impulse (1.2×50μs) [kV] | | 125 | 125 | 125 | 170 |
| | | | | | | |
| Closing time at no load [sec.] | | 0.04 | 0.04 | 0.04 | 0.1 | 0.1 |
| Rated operating sequence | JEC IEC | O-1min-CO-3min-CO, CO-15s-CO or O-0.35s-CO-1min-CO O-3min-CO-3min-CO, CO-15s-CO or O-0.3s-CO-3min-CO | | | | |
| Opening time [sec.] | JEC | 0.03 | 0.03 | 0.03 | 0.07 | 0.04 |
| | IEC | 0.03 | 0.03 | 0.03 | 0.07 | 0.04 |
| Closing system | | Motor-spring stored energy (High speed reclosing) (M) | | | | |
| Operating voltage and current for closing | | 100V AC/DC, 2A 200V AC/DC, 1A | | 100V AC/DC, 2.5A 200V AC/DC, 1.7A | 100V AC/DC, 6A 200V AC/DC, 3A | |
| Control voltage and current for closing | | 100V AC/DC, 4A 200V AC/DC, 2A | | 100V AC/DC, 5A 200V AC/DC, 2.5A | 100V AC/DC, 4A 200V AC/DC, 2A | |
| Tripping system *2 | | Shunt trip (f) | | | | |
| Operating voltage and current for tripping | | 100V DC, 4A 200V DC, 2A | | | | |
| Auxiliary contact | | 4NO+4NC, Rating 100/200V AC: 20/10A, 100/200V DC: 20/10A | | | | |
| Durability | Mechanical [operations] | 10000 | | | | |
| | Electrical [operations] | 10000 | | | | |
| Installation □ | | P, X, Y | P, X, Y | P, X, Y | P, Y | P, M, X |
| Mass (draw-out type without cradle) [kg] | | 120 (P, X: 600A) 130 (P, X: 1200A) 150 (Y) | 120 (P, X: 600A) 130 (P, X: 1200A) 150 (Y) | 190 (Y: 600A) 190 (Y: 1200A) 200 (Y: 2000A) | 280 (1200A) 280 (2000A) 350 (3000A) | 280 (M, X: 600A) 280 (M, X: 1200A) 300 (M, X: 2000A) |

Notes: *1 Contact FUJI for the information concerning the 3 sec. rating of IEC.

*2 If capacitor tripping system is required, connect a capacitor trip device VCB-T1A or VCB-T2A (optional accessory) to AC power supply.

■ **Types and ratings, 3.6/7.2kV**

| Rating | | | Closing system | | Tripping voltage Shunt-trip(f) | Type | Ordering code | □ : Available installation system *1 | |
|------------|-----------------------|-------------|-------------------|-------------------|-----------------------------------|-----------------|----------------|--------------------------------------|------------|
| Volts (kV) | Breaking current (kA) | Current (A) | Closing system *2 | Operating voltage | | | | | |
| 3.6/7.2 | 20 | 600 | M | 100/110V DC | 100/110V DC | HS2006□-06Mf-E | | P, X, U, Y | |
| | | 1200 | M | 100/110V DC | 100/110V DC | HS2006□-12Mf-E | | | |
| | | 2000 | M | 100/110V DC | 100/110V DC | HS2006□-20Mf-E | | | |
| | 25 | 600 | M | 100/110V DC | 100/110V DC | 100/110V DC | HS2506□-06Mf-E | | P, X, U, Y |
| | | 1200 | M | 100/110V DC | 100/110V DC | 100/110V DC | HS2506□-12Mf-E | | |
| | | 2000 | M | 100/110V DC | 100/110V DC | 100/110V DC | HS2506□-20Mf-E | | |
| | 31.5 | 1200 | M | 100/110V DC | 100/110V DC | 100/110V DC | HS3106□-12Mf-E | | P, X, Y |
| | | 2000 | M | 100/110V DC | 100/110V DC | 100/110V DC | HS3106□-20Mf-E | | |
| | | 3000 | M | 100/110V DC | 100/110V DC | 100/110V DC | HS3106□-30Mf-E | | |
| | 40 | 1200 | M | 100/110V DC | 100/110V DC | 100/110V DC | HS4006□-12Mf-E | | P, X, Y |
| | | 2000 | M | 100/110V DC | 100/110V DC | 100/110V DC | HS4006□-20Mf-E | | |
| | | 3000 | M | 100/110V DC | 100/110V DC | 100/110V DC | HS4006□-30Mf-E | | |
| 4000 | | M | 100/110V DC | 100/110V DC | 100/110V DC | HS4006□-40Mf-N | | P, X | |
| 50 | 1200 | M | 100/110V DC | 100/110V DC | 100/110V DC | HS5006□-12Mf-NA | | P, Y | |
| | 2000 | M | 100/110V DC | 100/110V DC | 100/110V DC | HS5006□-20Mf-NA | | | |
| | 3000 | M | 100/110V DC | 100/110V DC | 100/110V DC | HS5006□-30Mf-N | | | |
| 63 | 1200 | M | 100/110V DC | 100/110V DC | 100/110V DC | HS6306□-12Mf-NB | | Y | |
| | 2000 | M | 100/110V DC | 100/110V DC | 100/110V DC | HS6306□-20Mf-NB | | | |

Notes: *1 Installation system P: Fixed type
 X: Draw-out type with cradle for JEM 1425 Class CW
 U: Draw-out type with cradle for JEM 1425 Class CW
 Y: Draw-out type with cradle and shutter for JEM 1425 Class MW, PW
 M: Motor-spring stored-energy (High speed reclosing)

*2 Closing system

■ **Types and ratings, 12kV**

| Rating | | | Closing system | | Tripping voltage Shunt-trip(f) | Type | Ordering code | □ : Available installation system *1 | |
|------------|-----------------------|-------------|-------------------|-------------------|-----------------------------------|----------------|----------------|--------------------------------------|---------|
| Volts (kV) | Breaking current (kA) | Current (A) | Closing system *2 | Operating voltage | | | | | |
| 12 | 12.5 | 600 | M | 100/110V DC | 100/110V DC | HS1210□-06Mf-E | | P, X, Y | |
| | | 1200 | M | 100/110V DC | 100/110V DC | HS1210□-12Mf-E | | | |
| | | 2000 | M | 100/110V DC | 100/110V DC | HS1210□-20Mf-E | | | |
| | 16 | 600 | M | 100/110V DC | 100/110V DC | 100/110V DC | HS1610□-06Mf-E | | P, X, Y |
| | | 1200 | M | 100/110V DC | 100/110V DC | 100/110V DC | HS1610□-12Mf-E | | |
| | | 2000 | M | 100/110V DC | 100/110V DC | 100/110V DC | HS1610□-20Mf-E | | |
| | 20 | 600 | M | 100/110V DC | 100/110V DC | 100/110V DC | HS2010□-06Mf-E | | P, X, Y |
| | | 1200 | M | 100/110V DC | 100/110V DC | 100/110V DC | HS2010□-12Mf-E | | |
| | | 2000 | M | 100/110V DC | 100/110V DC | 100/110V DC | HS2010□-20Mf-E | | |

Notes: *1 Installation system P: Fixed type
 X: Draw-out type with cradle for JEM 1425 Class CW
 Y: Draw-out type with cradle and shutter for JEM 1425 Class MW, PW
 M: Motor-spring stored-energy (High speed reclosing)

*2 Closing system

H.V. Distribution Equipment

Vacuum circuit breakers

HS series

■ Types and ratings, 12kV

| Rating | | | Closing system | | Tripping voltage Shunt-trip(f) | Type | Ordering code | □ : Available installation system *1 | |
|------------|-----------------------|-------------|-------------------|-------------------|-----------------------------------|----------------|-----------------|--------------------------------------|---------|
| Volts (kV) | Breaking current (kA) | Current (A) | Closing system *2 | Operating voltage | | | | | |
| 12 | 25 | 600 | M | 100/110V DC | 100/110V DC | HS2510□-06Mf-E | | P, X, Y | |
| | | 1200 | M | 100/110V DC | 100/110V DC | HS2510□-12Mf-E | | | |
| | | 2000 | M | 100/110V DC | 100/110V DC | HS2510□-20Mf-E | | | |
| | 31.5 | 1200 | M | 100/110V DC | 100/110V DC | 100/110V DC | HS3110□-12Mf-E | | P, X, Y |
| | | 2000 | M | 100/110V DC | 100/110V DC | 100/110V DC | HS3110□-20Mf-E | | |
| | | 3000 | M | 100/110V DC | 100/110V DC | 100/110V DC | HS3110□-30Mf-N | | |
| | 40 | 1200 | M | 100/110V DC | 100/110V DC | 100/110V DC | HS4010□-12Mf-NA | | P, Y |
| | | | M | 100/110V DC | 100/110V DC | 100/110V DC | HS4010□-20Mf-NA | | |
| | | 3000 | M | 100/110V DC | 100/110V DC | 100/110V DC | HS4010□-30Mf-N | | P, Y |
| | | | M | 100/110V DC | 100/110V DC | 100/110V DC | HS4010□-40Mf-N | | X |
| | 50 | 1200 | M | 100/110V DC | 100/110V DC | 100/110V DC | HS5010□-12Mf-NA | | P, Y |
| | | | M | 100/110V DC | 100/110V DC | 100/110V DC | HS5010□-20Mf-NA | | |
| M | | | 100/110V DC | 100/110V DC | 100/110V DC | HS5010□-30Mf-N | | | |

Notes: *1 Installation system P: Fixed type
 X: Draw-out type with cradle for JEM 1425 Class CW
 Y: Draw-out type with cradle and shutter for JEM 1425 Class MW, PW
 *2 Closing system M: Motor-spring stored-energy (High speed reclosing)

■ Types and ratings, 15kV

| Rating | | | Closing system | | Tripping voltage Shunt-trip(f) | Type | Ordering code | □ : Available installation system *1 | |
|------------|-----------------------|-------------|-------------------|-------------------|-----------------------------------|----------------|----------------|--------------------------------------|---------|
| Volts (kV) | Breaking current (kA) | Current (A) | Closing system *2 | Operating voltage | | | | | |
| 15 | 12.5 | 600 | M | 100/110V DC | 100/110V DC | HS1215□-06Mf-N | | P, X, Y | |
| | | 1200 | M | 100/110V DC | 100/110V DC | HS1215□-12Mf-N | | | |
| | | 2000 | M | 100/110V DC | 100/110V DC | 100/110V DC | HS1215□-20Mf-N | | |
| | 16 | 600 | M | 100/110V DC | 100/110V DC | 100/110V DC | HS1615□-06Mf-N | | P, X, Y |
| | | | M | 100/110V DC | 100/110V DC | 100/110V DC | HS1615□-12Mf-N | | |
| | | | M | 100/110V DC | 100/110V DC | 100/110V DC | HS1615□-20Mf-N | | |
| | 20 | 600 | M | 100/110V DC | 100/110V DC | 100/110V DC | HS2015□-06Mf-N | | P, X, Y |
| | | | M | 100/110V DC | 100/110V DC | 100/110V DC | HS2015□-12Mf-N | | |
| | | | M | 100/110V DC | 100/110V DC | 100/110V DC | HS2015□-20Mf-N | | |
| | 25 | 600 | M | 100/110V DC | 100/110V DC | 100/110V DC | HS2515□-06Mf-N | | P, X, Y |
| | | | M | 100/110V DC | 100/110V DC | 100/110V DC | HS2515□-12Mf-N | | |
| | | | M | 100/110V DC | 100/110V DC | 100/110V DC | HS2515□-20Mf-N | | |
| | 31.5 | 1200 | M | 100/110V DC | 100/110V DC | 100/110V DC | HS3115□-12Mf-N | | P, Y |
| | | | M | 100/110V DC | 100/110V DC | 100/110V DC | HS3115□-20Mf-N | | |
| | | | M | 100/110V DC | 100/110V DC | 100/110V DC | HS3115□-30Mf-N | | |
| | 40 | 1200 | M | 100/110V DC | 100/110V DC | 100/110V DC | HS4015□-12Mf-N | | P, Y |
| | | | M | 100/110V DC | 100/110V DC | 100/110V DC | HS4015□-20Mf-N | | |
| | | | M | 100/110V DC | 100/110V DC | 100/110V DC | HS4015□-30Mf-N | | |

Notes: *1 Installation system P: Fixed type
 X: Draw-out type with cradle for JEM 1425 Class CW
 Y: Draw-out type with cradle and shutter for JEM 1425 Class MW, PW
 *2 Closing system M: Motor-spring stored-energy (High speed reclosing)

■ **Types and ratings, 24kV and 36kV**

| Rating | | | Closing system | | Tripping voltage Shunt-trip(f) | Type | Ordering code | □ : Available installation system *1 | |
|------------|-----------------------|-------------|-------------------|-------------------|-----------------------------------|-----------------------|-----------------------|--------------------------------------|---------|
| Volts (kV) | Breaking current (kA) | Current (A) | Closing system *2 | Operating voltage | | | | | |
| 24 | 12.5 | 600 | M | 100/110V DC | 100/110V DC | HS1220□-06Mf-K | | P, X, Y | |
| | | 1200 | M | 100/110V DC | 100/110V DC | HS1220□-12Mf-K | | | |
| | 16 | 600 | M | 100/110V DC | 100/110V DC | HS1620□-06Mf-E | | P, X, Y | |
| | | 1200 | M | 100/110V DC | 100/110V DC | HS1620□-12Mf-E | | | |
| | 25 | 600 | 600 | M | 100/110V DC | 100/110V DC | HS2520□-06Mf-E | | P, X, Y |
| | | | 1200 | M | 100/110V DC | 100/110V DC | HS2520□-12Mf-E | | |
| | | | 2000 | M | 100/110V DC | 100/110V DC | HS2520□-20Mf-E | | |
| | 40 | 1200 | 1200 | M | 100/110V DC | 100/110V DC | HS4020□-12Mf-N | | P, Y |
| | | | 2000 | M | 100/110V DC | 100/110V DC | HS4020□-20Mf-N | | |
| 3000 | | | M | 100/110V DC | 100/110V DC | HS4020□-30Mf-N | | | |
| 36 | 25 | 600 | M | 100/110V DC | 100/110V DC | HS2530□-06Mf-N | | P, M, X | |
| | | 1200 | M | 100/110V DC | 100/110V DC | HS2530□-12Mf-N | | | |
| | | 2000 | M | 100/110V DC | 100/110V DC | HS2530□-20Mf-N | | | |

Notes: *1 Installation system P: Fixed type
 X: Draw-out type with cradle for JEM 1425 Class CW
 Y: Draw-out type with cradle and shutter for JEM 1425 Class MW, PW
 M: Draw-out type for HS2530
 *2 Closing system M: Motor-spring stored-energy (High speed reclosing)

H.V. Distribution Equipment

Vacuum circuit breakers

HS series

■ Installation and supplied accessories

| Vacuum circuit breaker | Cradle | Construction | Accessories |
|--|--|---|--|
| P-fixed mounting type  AF93-314 | | The VCB shall be fixed to the switchgear by means of 4 bolts. No draw-out system is provided. Wheels are provided to facilitate movement or transport. Open type cubicle | <ul style="list-style-type: none"> • Clamp bolts (4 ea. for one unit) • Closing handle • Plug-in connector for control circuit • On-off counter |
| X-draw-out type  AF93-312 |  SF-877 | A cradle is provided with a draw-out system. This cradle makes unnecessary the provision of rails or main circuit connector for the switchgear. No mechanical adjustment is required. JEM 1425 Class CW type metal enclosure | <ul style="list-style-type: none"> • On-off counter • Cradle with draw-out system (Main circuit connector, earthing shoe, rail, etc.) • Plug-in connector • Closing handle • Draw-out handle |
| Y-draw-out type  AF93-313 |  SF-1055 | A cradle is provided with a draw-out system to accept the metal-clad switchgear, which is provided with a shutter. All the necessary parts are provided for this type of breaker. The switchgear is very easy to assemble. JEM 1425 Class PW or MW type metal-clad switchgear | <ul style="list-style-type: none"> • On-off counter • Cradle with draw-out system (Main circuit connector, earthing shoe, rail, shutter, etc.) • Plug-in connector • Closing handle • Draw-out handle |

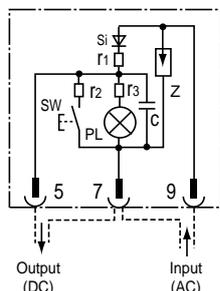
■ Optional accessories

Capacitor trip device/VCB-T1A, T2A



KK04-064

This is used when the trip circuit is connected to an AC power supply, and as well as the capacitor, semiconductors are also built in. It provides a DC output and the trip coil is DC rated.



Lifting dolly L-2HS, L-4HS



FA215

Vacuum condition tester/VC-1A

See page 12/25.

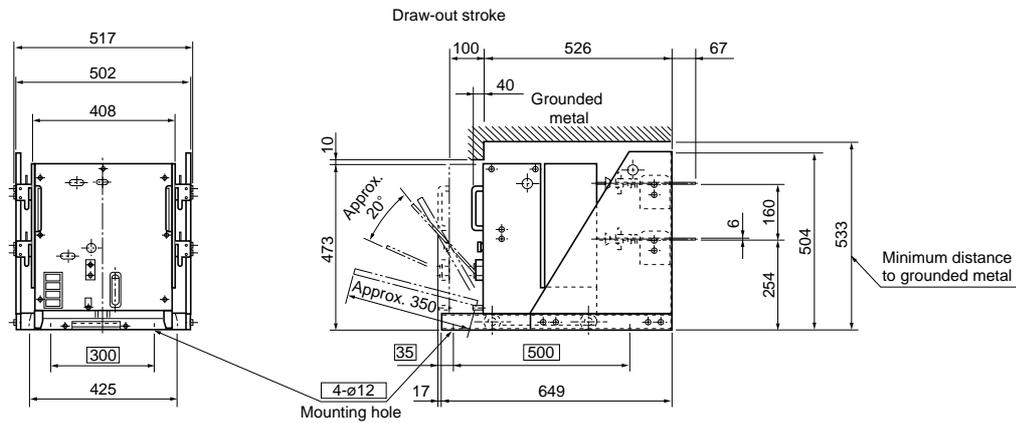
| Type | Description |
|------------------------|---|
| VCB-T1A | Capacitor trip device 100/110V AC |
| VCB-T2A | Capacitor trip device 200/220V AC |
| AF3320R3TXG0542 | C-R surge absorber for 3.3kV |
| AF6620R3TXG0543 | C-R surge absorber for 6.6kV |
| VC-1A | Vacuum condition tester 100V AC 50/60Hz |

Lifting dolly

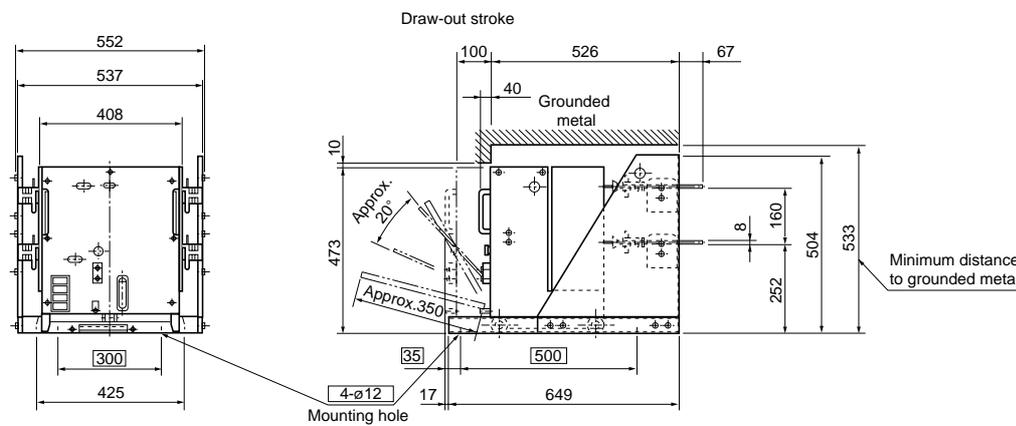
| Type | Description |
|-----------------|--|
| L-2HNB | 7.2kV: 20/25kA 12kV: 20/25kA 600, 1200A |
| L-2HS40E | 7.2kV: 31.5/40kA 12kV: 12.5/16/20/25kA 1200, 2000A 2000A |
| L-4HS43N | 7.2kV: 31/40kA 12kV: 40/50kA 24kV: 40kA 3000A 1200, 2000A 1200, 2000A |

■ Dimensions, mm
Draw-out/X type

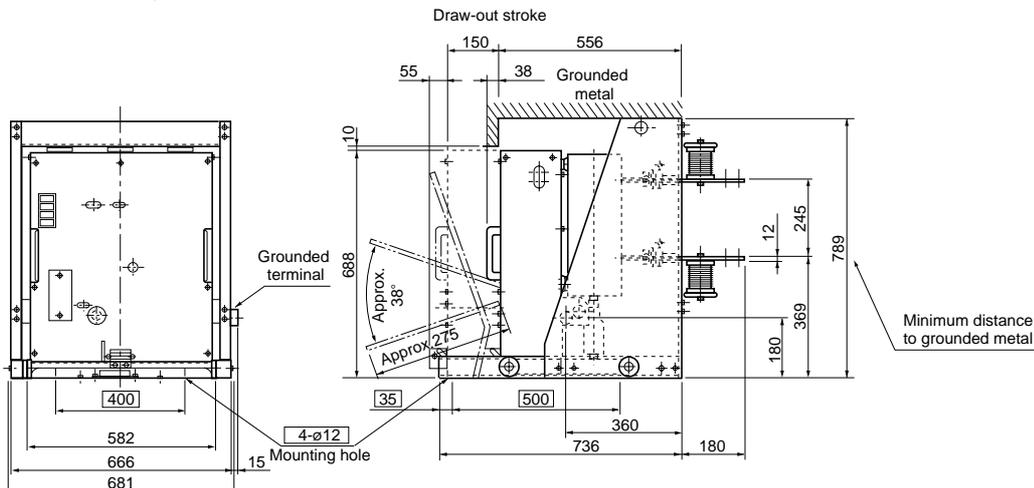
HS2006X-06Mf-E, HS2506X-06Mf-E



HS2006X-12Mf-E, HS2506X-12Mf-E



HS3106X-12Mf-E, HS4006X-12Mf-E



H.V. Distribution Equipment

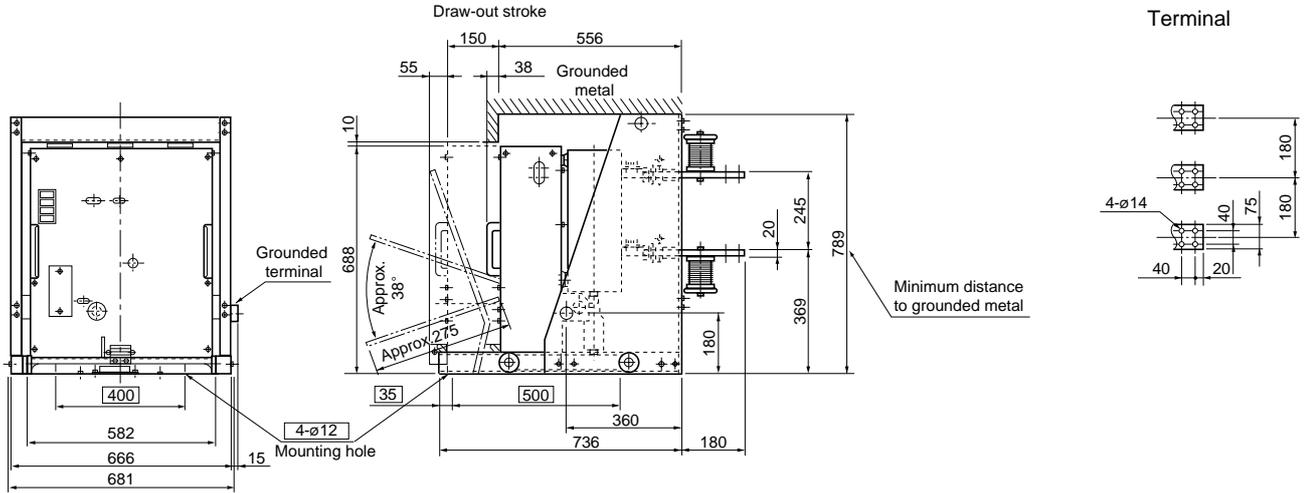
Vacuum circuit breakers

HS series

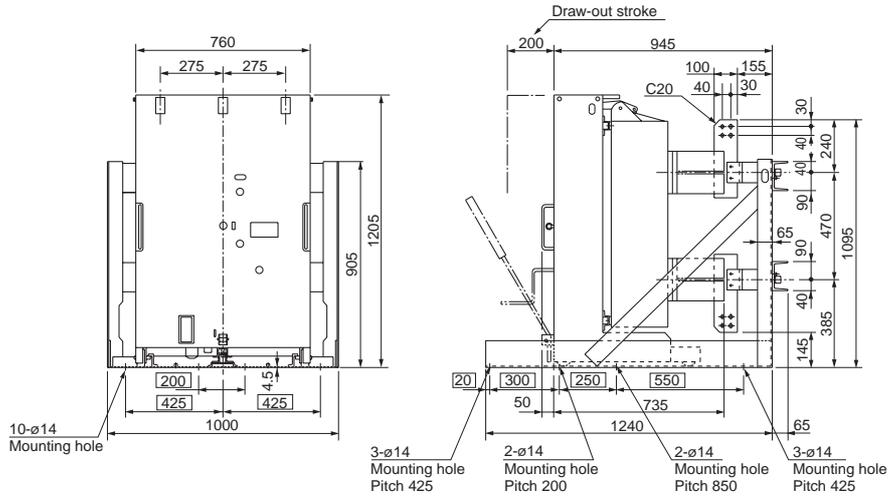
■ Dimensions, mm

Draw-out/X type

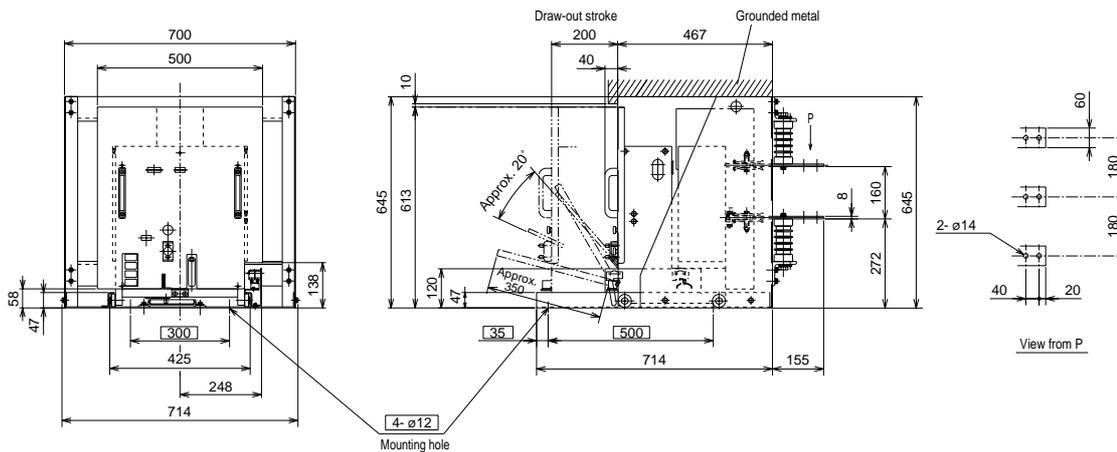
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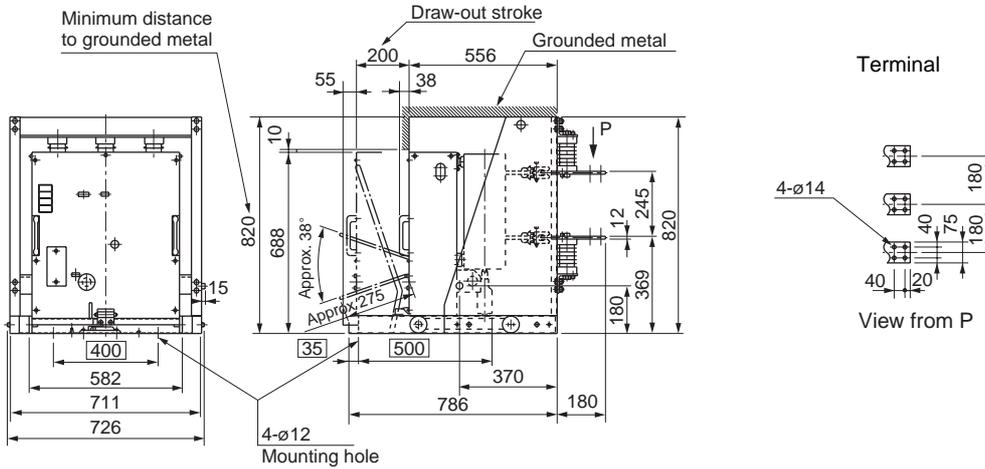


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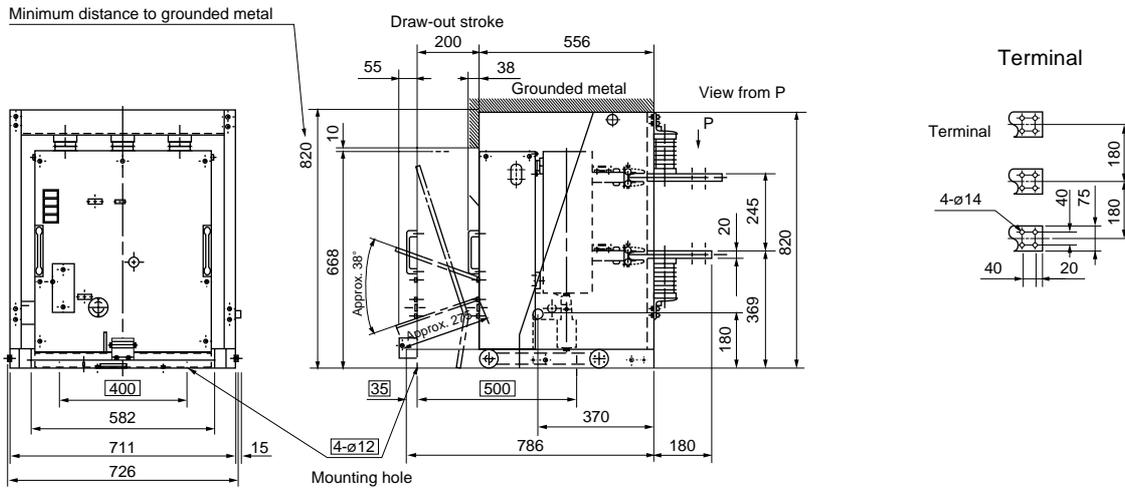


■ **Dimensions, mm**
Draw-out/X type

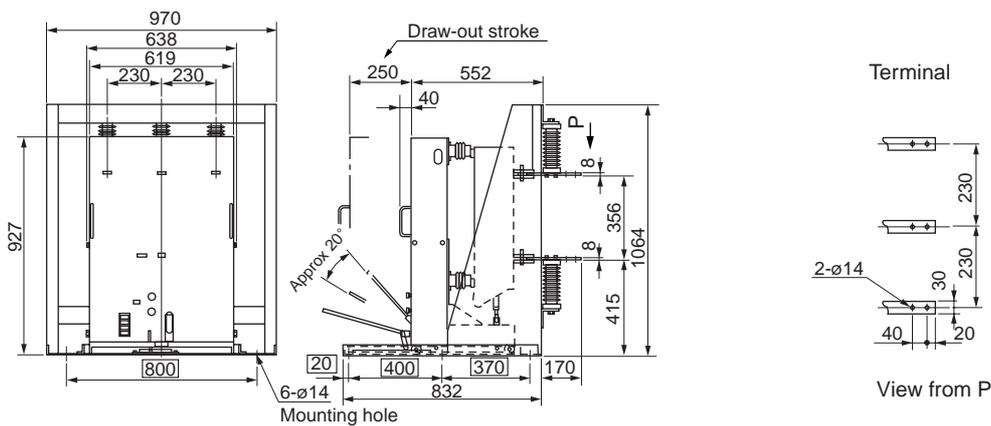
HS3110X-12Mf-E



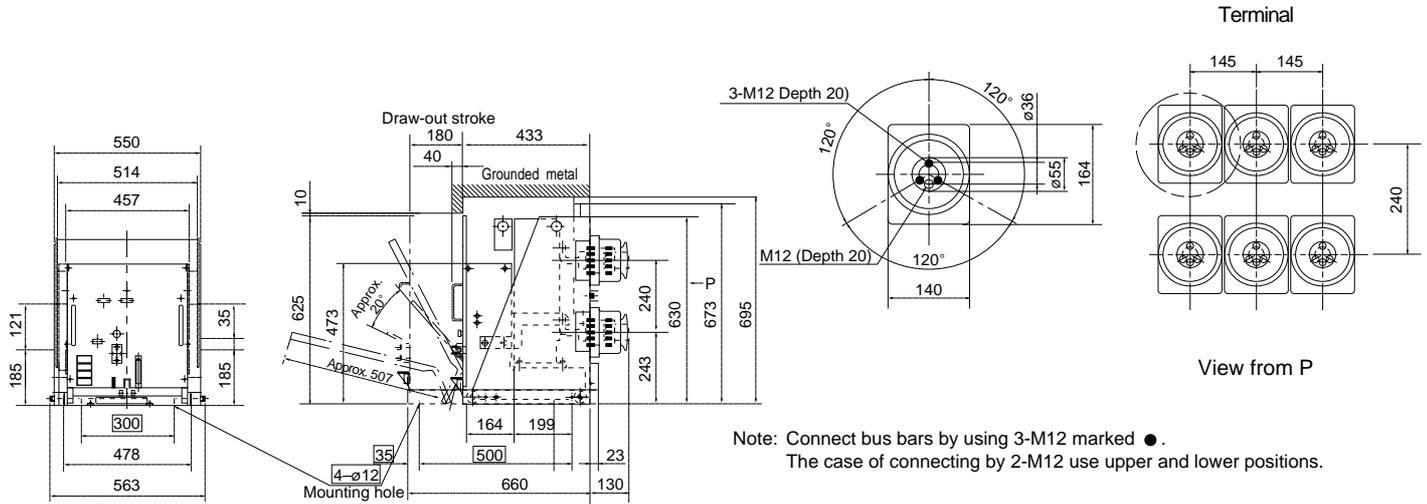
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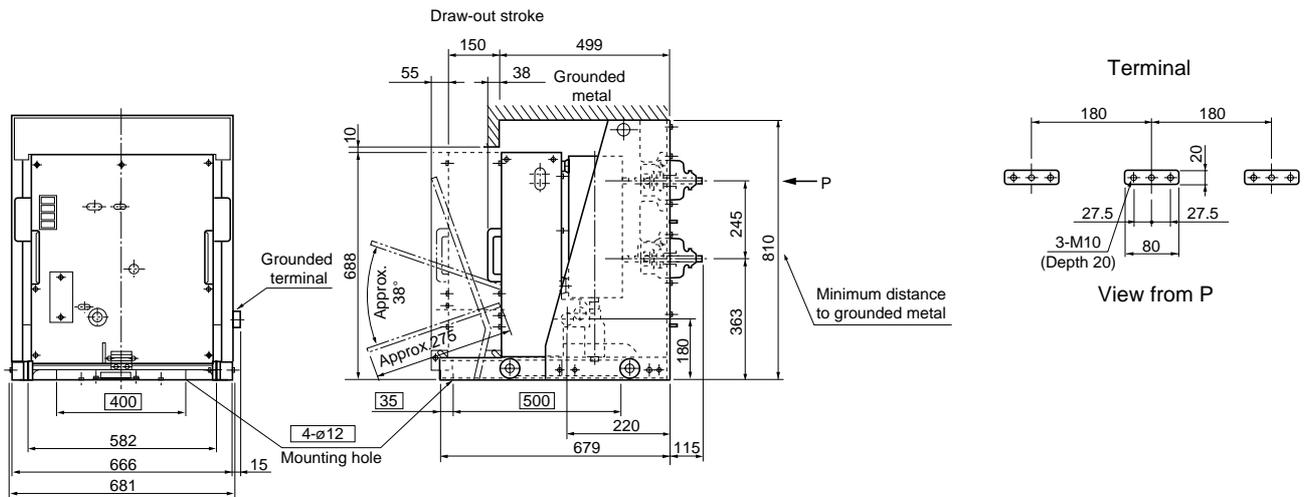
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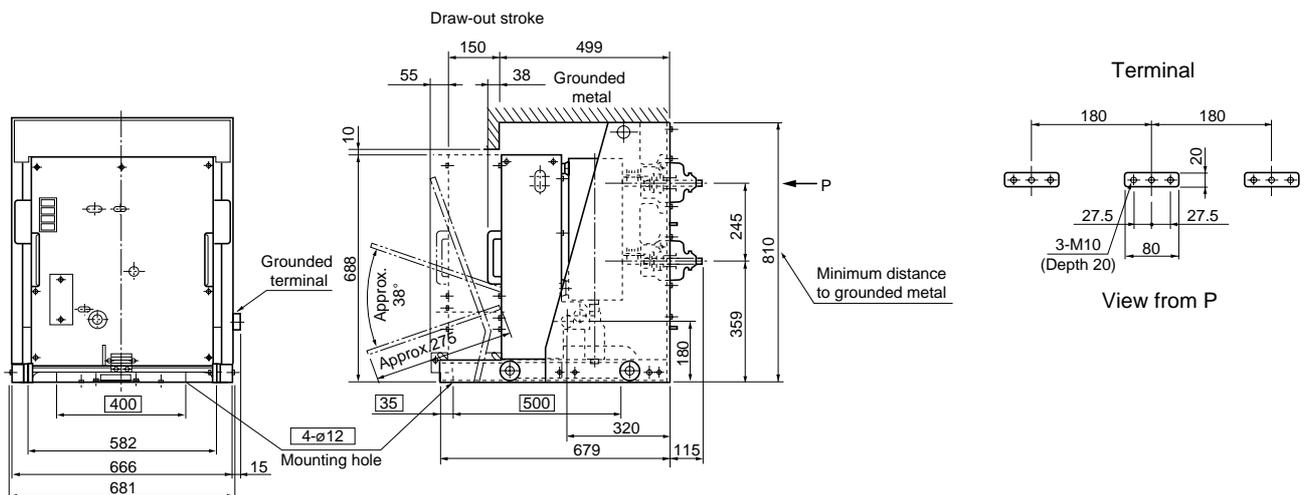
HS2006Y-20Mf-E, HS2506Y-20Mf-E



HS3106Y-12Mf-E, HS4006Y-12Mf-E



HS3106Y-20Mf-E, HS4006Y-20Mf-E



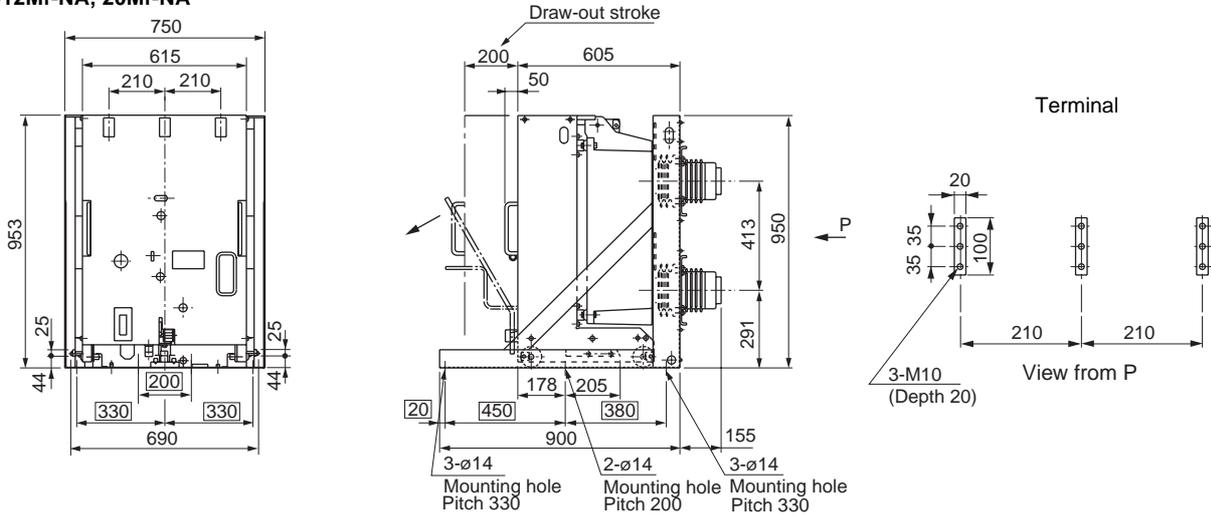
H.V. Distribution Equipment

Vacuum circuit breakers

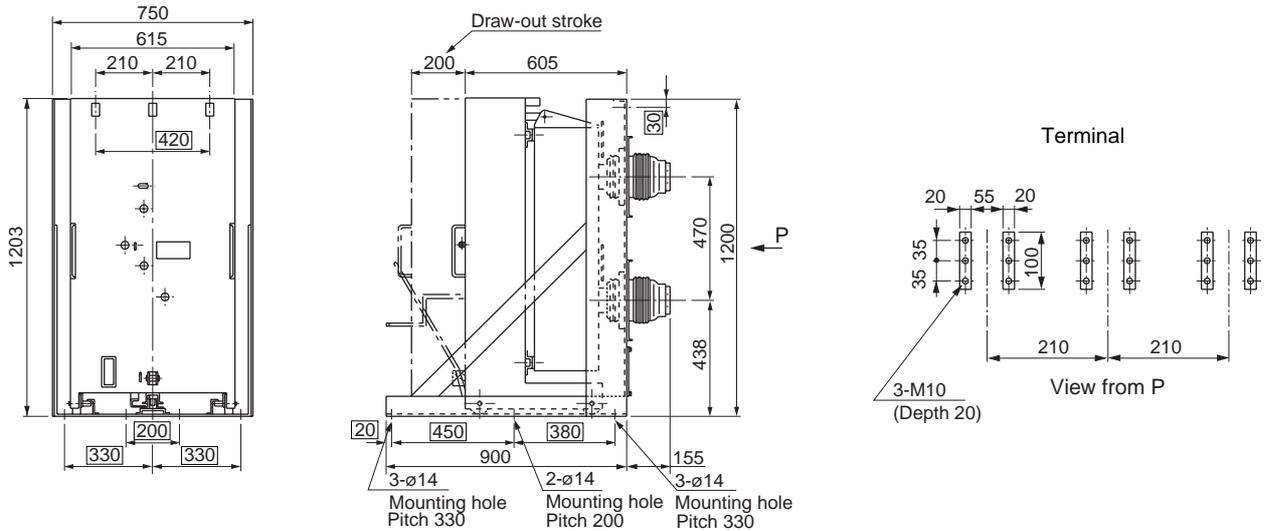
HS series

■ Dimensions, mm
Draw-out/Y type

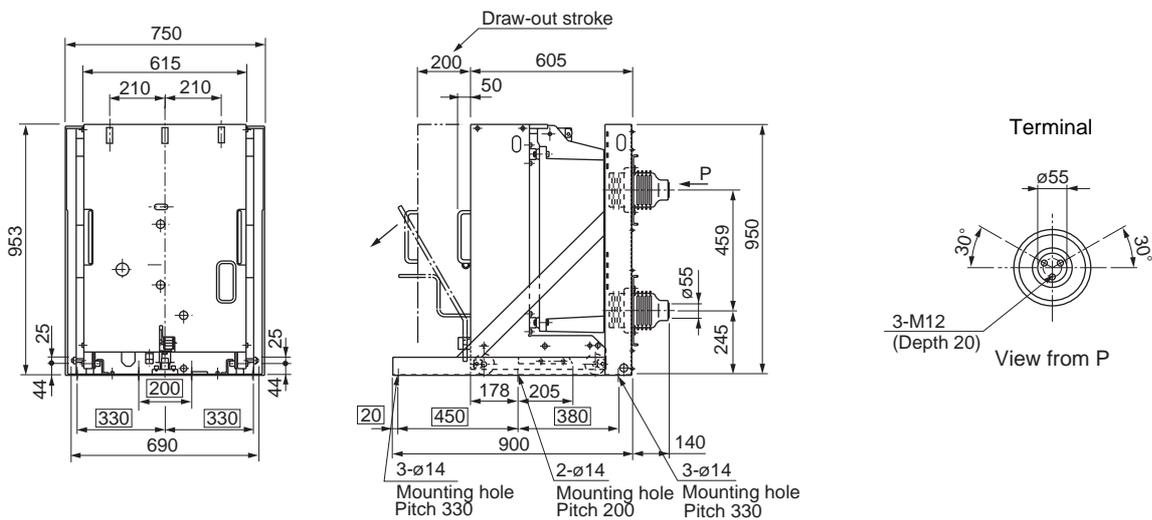
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HS3106Y-30Mf-E, HS4006Y-30Mf-E, HS3110Y-30Mf-N

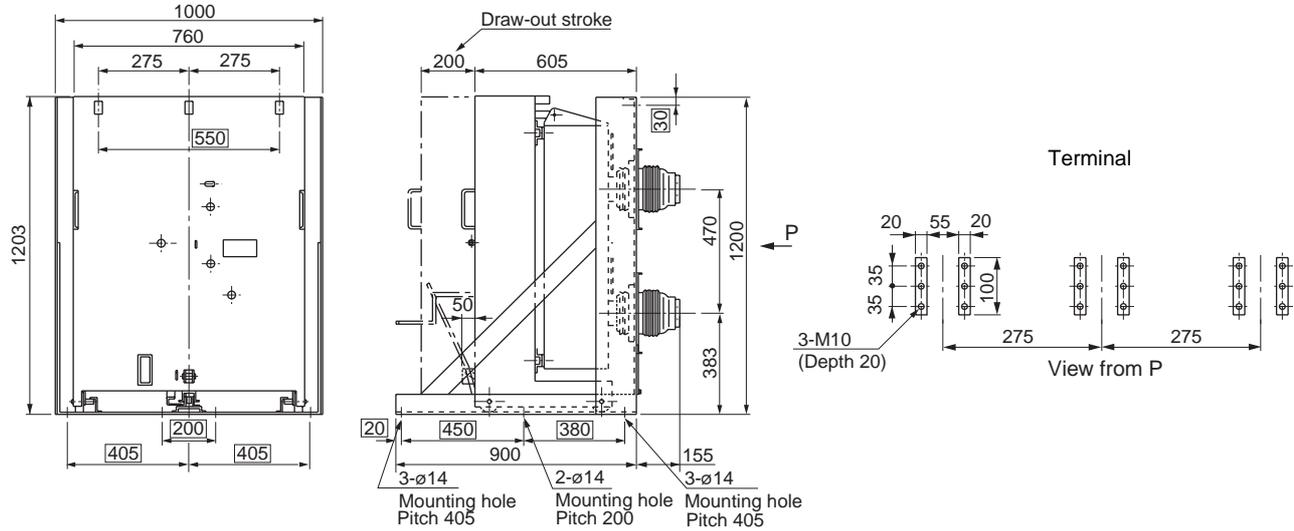


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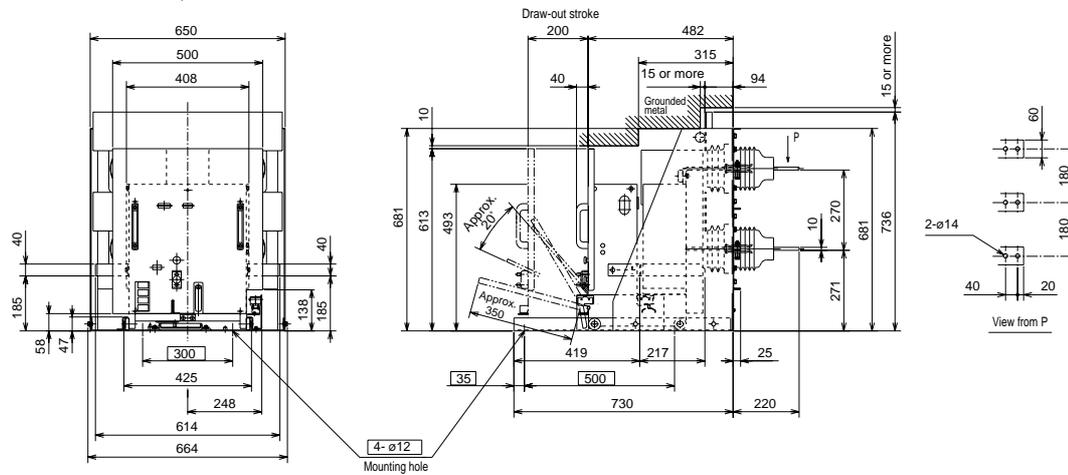


■ **Dimensions, mm**
Draw-out/Y type

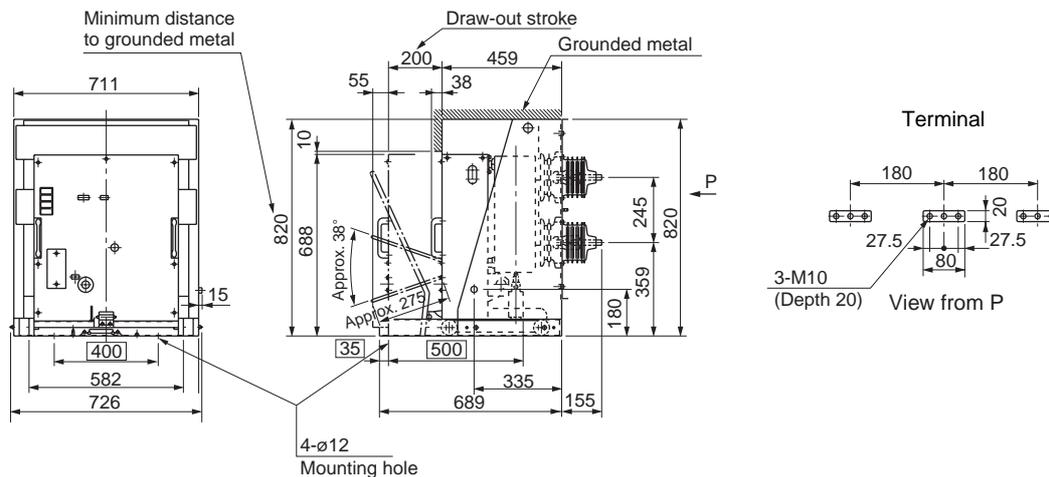
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HS2510Y-06Mf-E, 12Mf-E



HS1210Y-20Mf-E, HS1610Y-20Mf-E, HS2010Y-20Mf-E, HS2510Y-20Mf-E, HS3110Y-12Mf-E, 20Mf-E



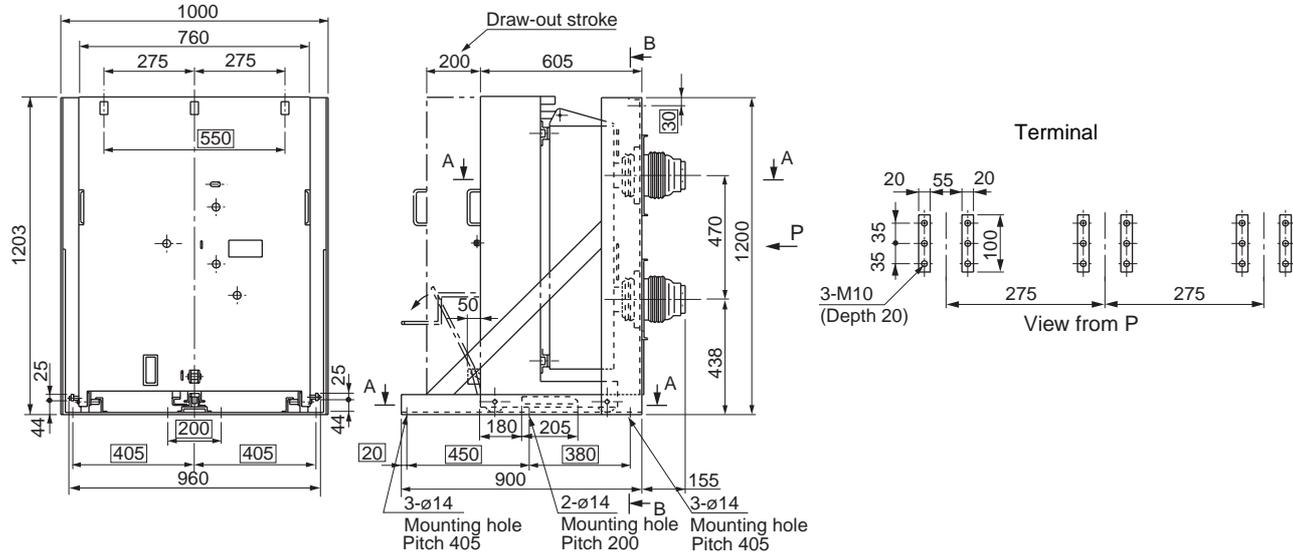
H.V. Distribution Equipment

Vacuum circuit breakers

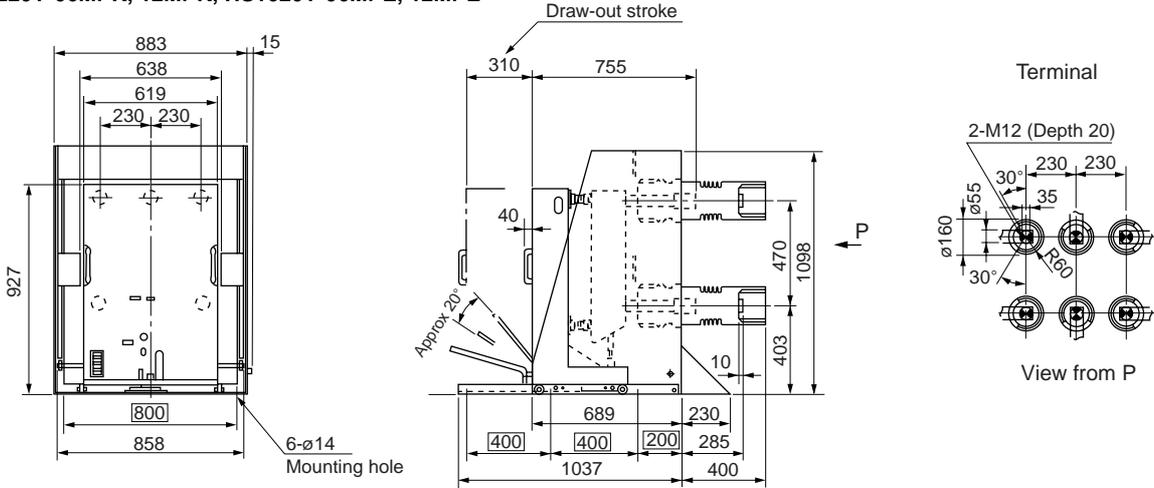
HS series

■ Dimensions, mm
Draw-out/Y type

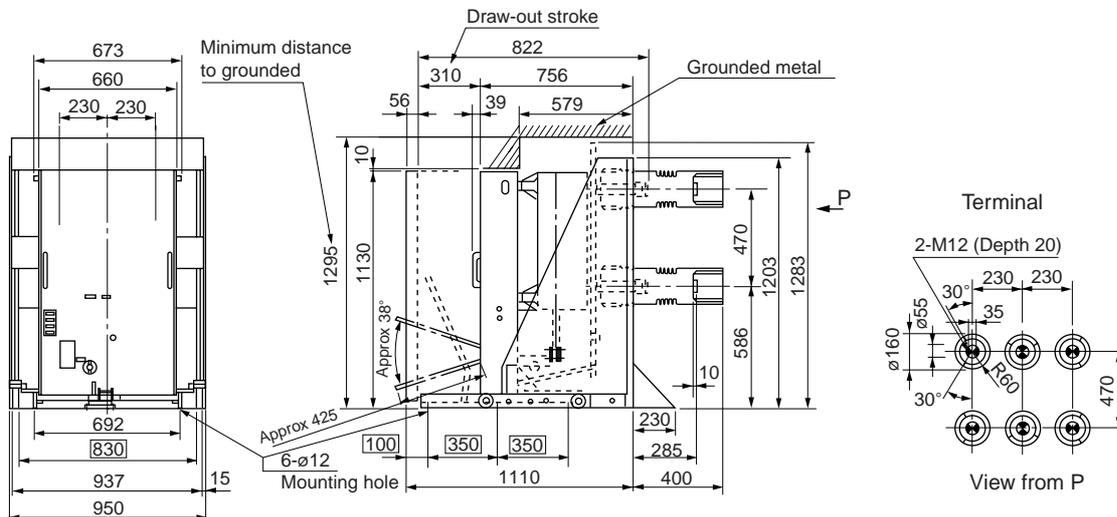
HS4010Y-30Mf-N



HS1220Y-06Mf-K, 12Mf-K, HS1620Y-06Mf-E, 12Mf-E

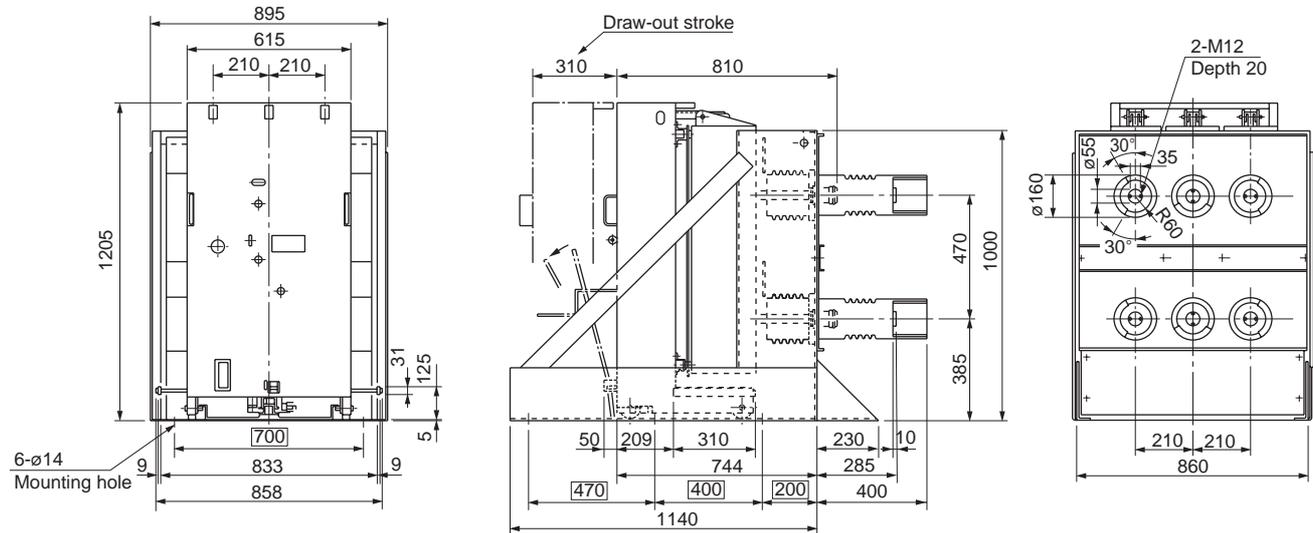


HS2520Y-06Mf-E, 12Mf-E, 20Mf-E

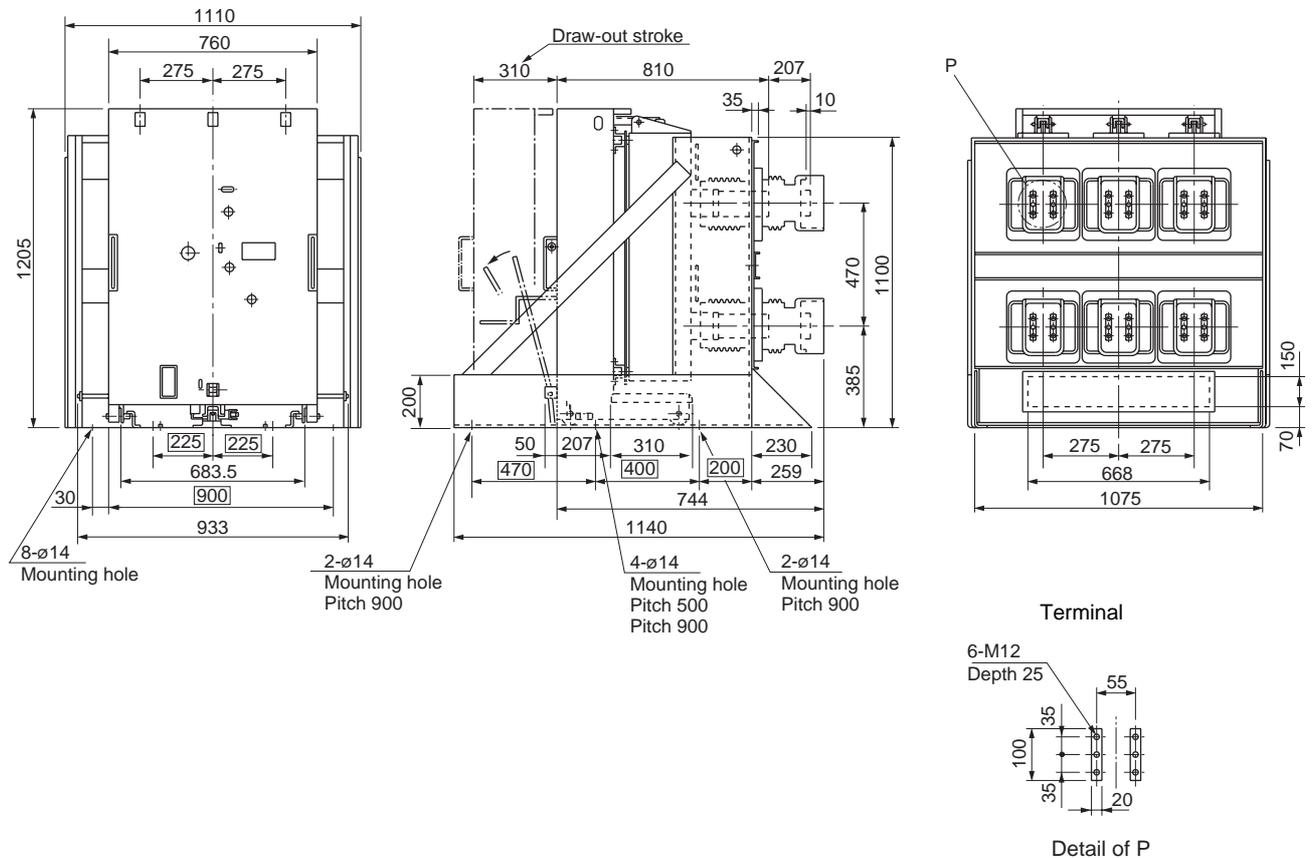


■ **Dimensions, mm**
Draw-out/Y type

HS4020Y-12Mf-N, 20Mf-N



HS4020Y-30Mf-N



■ **Dimensions of other types:** Contact Fuji.
 Fuji Electric FA Components & Systems Co., Ltd./D & C Catalog
 Information subject to change without notice

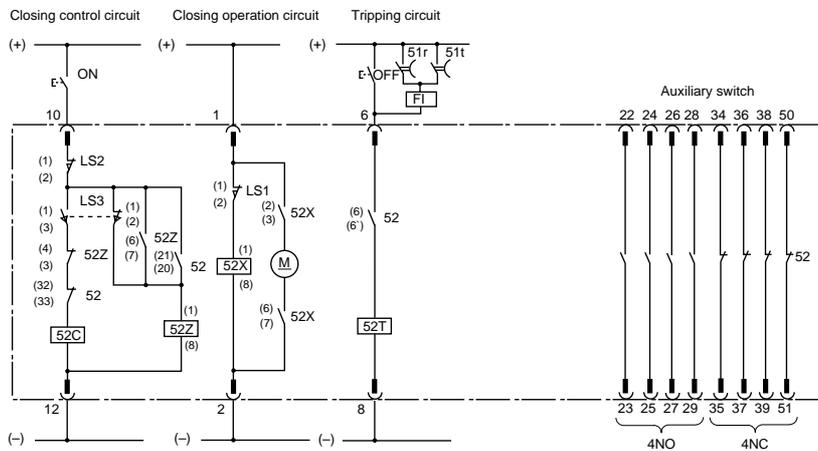
H.V. Distribution Equipment

Vacuum circuit breakers

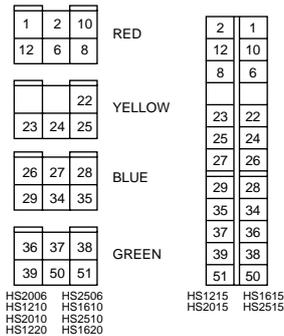
HS series

■ Wiring diagrams

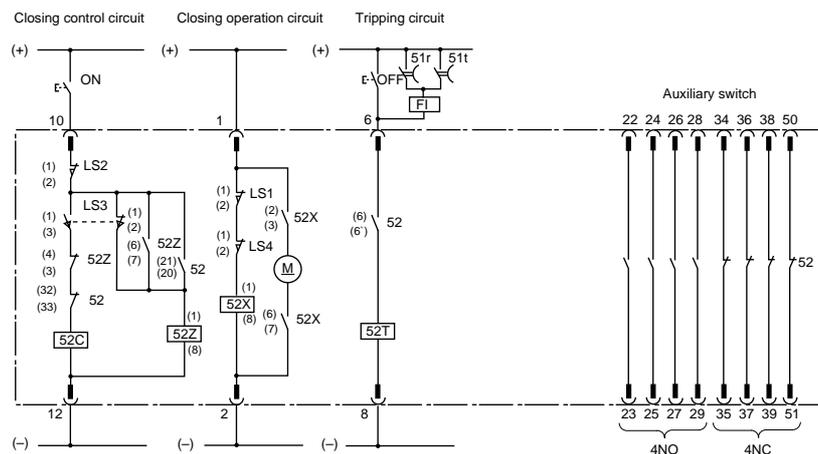
● HS2006, HS2506, HS1210, HS1610, HS2010, HS2510, HS1215, HS1615, HS2015, HS2515, HS1220, HS1620



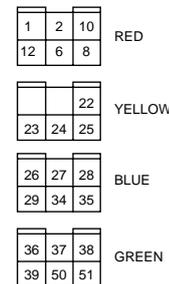
Terminal arrangement of control circuit receptacle
(A front view of CB mounted receptacles)



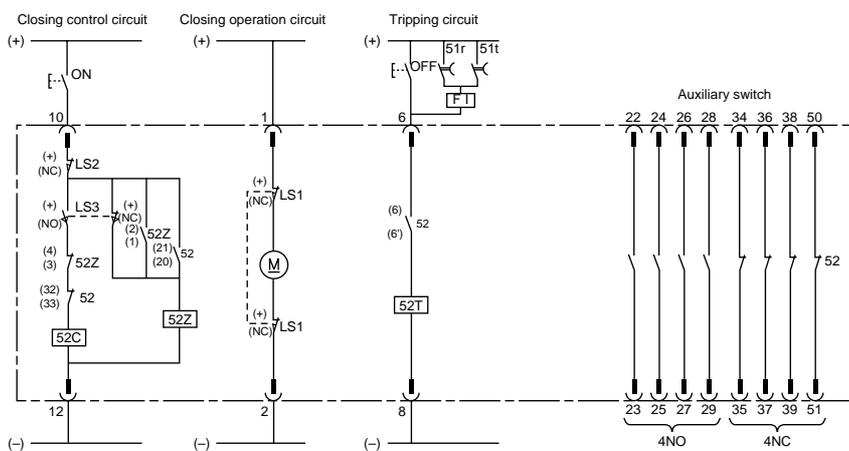
● HS3106-E, HS4006-E, HS3110-E



Terminal arrangement of control circuit receptacle
(A front view of CB mounted receptacles)



● HS3106-N, HS4006-N, HS5006, HS6306, HS3110-N, HS4010, HS5010, HS3115, HS4015, HS2520, HS4020, HS2530



Terminal arrangement of control circuit receptacle
(A front view of CB mounted receptacles)



⊖ External terminal of VCB

- 52 : VCB
- 52a : NO contact of auxiliary switch
- 52b : NC contact of auxiliary switch
- 52X : Magnetic contactor
- 52Z : Anti-pumping relay
- 52C : Closing coil
- 52T : Shunt trip coil

- M : Motor
- LS₁ : Limit switch (Opens when the closing spring is in the stored condition)

- LS₂ : Interlocking contact (Only draw-out type)
- LS₃ : Limit switch (Closes when the closing spring is in the stored condition)
- LS₄ : Limit switch (Opens when the closing pushbutton is operated)
- 51R, 51T : Overcurrent relay

■ Application guide of surge absorber

When VCBs are interrupted especially under specific overlapping conditions, chopping surges or surges due to multiple restrikes will cause an escalating effect. It is therefore recommended that surge absorbers and arresters are fitted to protect motors or transformers.

| Voltage | 3.3kV | 6.6kV | 11kV | 22kV |
|----------------------------|-------------------------|-------------------------|------------------------------|--------------------------------------|
| Load | | | | |
| Motor | ● C-R suppressor | ● C-R suppressor | ● C-R suppressor | Contact FUJI for further information |
| Molded transformer*1 | -*2, *3 (BIL ≥ 45kV) | -*2, *3 (BIL ≥ 60kV) | ●*3 Arrester (BIL ≥ 60kV) | ●*3 Arrester (BIL ≥ 95kV) |
| Oil-immersed transformer*1 | -*2, *3 (BIL ≥ 45kV) | -*2, *3 (BIL ≥ 60kV) | -*2, *3 (BIL ≥ 90kV) | ●*3 (BIL ≥ 150kV) |

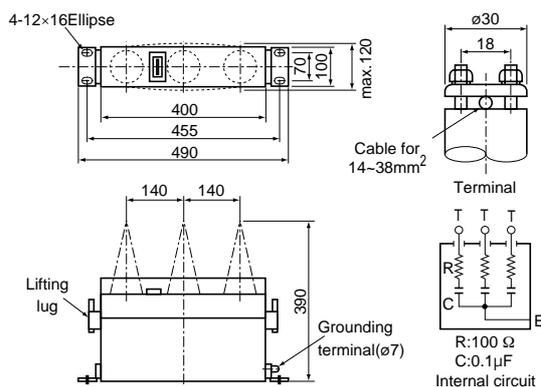
Notes: ● : Suppression device required - : Suppression device not required
 *1 The withstand voltages (impulse) of transformer must exceed the values listed above.
 *2 When breaking a magnetizing inrush current, it is recommended that a suppression device will be used.
 *3 Semiconductor device must be provided with suitable suppression devices when a semiconductor is installed on the load side of transformer.

● C-R type surge absorber

| Type | Rated voltage | Max. operating voltage | Frequency |
|-----------------|--------------------------|------------------------|-----------|
| AF3320R3TXG0542 | $\frac{3.3kV}{\sqrt{3}}$ | 115% of rated voltage | 50/60Hz |
| AF6620R3TXG0543 | $\frac{6.6kV}{\sqrt{3}}$ | | 50/60Hz |

For 11kV : Contact FUJI.

Dimensions, mm/Surge absorber



● Arrester/GLI

| Type | GLI-3G | GLI-6G |
|--------------------------------------|---------------|---------------|
| Rated voltage | 4.2kV | 8.4kV |
| Nominal discharge current | 2.5kA | 2.5kA |
| Max. clamping voltage | 15kV or less | 30kV or less |
| Discharge current withstand capacity | 30kA, 2 times | 30kA, 2 times |

■ Vacuum condition tester/VC-1A

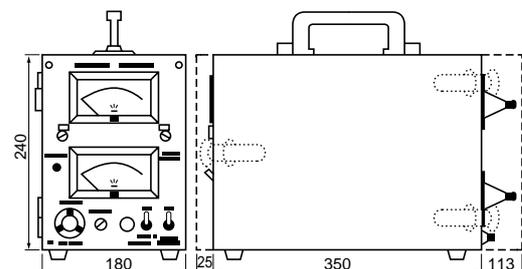
It is recommended that a withstand voltage tester (type VC-1A, sold separately) is used to check the state of the vacuum within the vacuum interrupter. The method of testing is very simple. First, withdraw the VCB from its enclosure set at the OFF position and switch the control circuit to the isolation position. Then earth the VCB together with the VC-1A tester and apply a test voltage. In this case apply 22kV (if the VCB's rated voltage is 7.2kV) between the poles of the vacuum interrupter for one minute. Under these conditions if the vacuum is normal a continuous buzzer signal will be given during the period the test voltage is applied. On the other hand an intermittent buzzer sound will be given if the vacuum is unserviceable. Replace with a new interrupter if necessary.

| Type | VC-1A (Portable type) |
|-------------------|--|
| Input voltage | 100V 50/60Hz |
| Output voltage | 22/11kV AC |
| Operation | Continuous (or 10 min. if the output is short-circuited) |
| Detecting current | When 1.0A current flows in the L.V. input circuit the detector relay operates and interrupts. 1-minute timer is built into the tester. |
| Timer | 1-minute timer is built into the tester. |
| Accessories | Input cord: 3 meters. Cord for test use (with clips): 1.5 meters (2 leads) |
| Mass | 20kg |



Vacuum condition tester VC-1A

Dimensions, mm



H.V. Distribution Equipment

Vacuum circuit breakers

Auto. V

Auto.V

■ Description

7.2/3.6kV, 400A, 600A, 8kA, 12.5kA
 FUJI Auto. Vs are vacuum circuit breakers which incorporate a built-in solid-state OCR and CT.
 As they do not require to have a CT installed inside the switchgear cubicle or an OCR fixed to the front panel, space is saved in the cubicle and wiring and installation are simplified.
 A system protection is easily arranged using Auto. Vs with primary circuit breaker and also a protective coordination with low voltage MCCBs.
 The CT is a compactly built toroidal type and it is fitted to the upper part of the VCB. Its overcurrent withstanding value is as large as 12.5kA, 1 sec.

■ Features

- Built-in solid-state OCR and CT are provided
- System protective coordination is easily arranged using the VCBs.
- Compactly assembled, so saving space
- The built-in CT has a large overcurrent withstand value of 12.5kA.
- The setting range of the rated current is 24A to 320A.
- Applicable to the receiving and distribution facilities of 6kV, 170 to 2000kVA.



■ Specifications

| Type | HA08□-H6 HA08□-H7 | HA12□-H6 HA12□-H7 | HA08□-A6 HA08□-A7 | HA12□-A6 HA12□-A7 |
|---|--|--|---|--|
| Closing system | Manual-spring | | Motor-spring | |
| Installation □ | Fixed: B, C, P | | Fixed: B, C, P | |
| Rated voltage (kV) | 3.6/7.2 | | 3.6/7.2 | |
| Rated current (A) | 400 | 600 | 400 | 600 |
| Rated frequency (Hz) | 50/60 | | 50/60 | |
| Rated breaking capacity (kA) | 8 50MVA at 3.6kV 100MVA at 7.2kV | 12.5 80MVA at 3.6kV 160MVA at 7.2kV | 8 50MVA at 3.6kV 100MVA at 7.2kV | 12.5 80MVA at 3.6kV 160MVA at 7.2kV |
| Rated making current, peak value (kA) | 20 | 31.5 | 20 | 31.5 |
| Rated closing time (s) | — | | 0.03 | |
| Rated short-time current, 1 second (kA) | 8 | 12.5 | 8 | 12.5 |
| Insulation level | Dielectric: 22kV, 1 minute Impulse (1.2 × 50μs): 60kV | | | |
| Rated breaking time | 3-cycle | | 3-cycle | |
| Opening time (s) | 0.03 | | 0.03 | |
| Operating duty | 0 — 1 min. — CO — 3 min. — CO or CO — 15 sec. — CO | | | |
| OCR | Rated operating current setting value *1 (A) | 24—30—36—42—48—60—75—90—105—120—160—200—240—280—320 | | |
| | Instantaneous trip current | 5, 7.5, 10, 12.5, 15 times the rated operating current | | |
| | Operating current | Inverse time element Instantaneous element | Within ± 10% of each setting current Within ± 15% of each setting current | |
| | Operating time | Inverse time element Instantaneous element | Time setting 10: Input 300% 10 sec. Time setting 6 : Input 300% 6 sec.±17% Less than 0.05 sec. at 200% of setting current | Input 700% 1.6 sec. Input 700% 1 sec.±12% |
| Inertia characteristic | 90% of the operating time obtained when 1,000% of the setting value input at minimum current setting value and time setting 10. | | | |
| Durability | Mechanical (operations) | 10,000 | | |
| | Electrical (operations) | 10,000 | | |
| No. of operations (operations/hour) | 60 | | | |
| Applicable capacitor capacity *2 (kVA) | 3,000 | 5,000 | 3,000 | 5,000 |
| Auxiliary contact | 2NO + 2NC (5NO + 5NC available on request) | | | |
| Alarm contact | 1NO 100/110V AC 2.0A, 200/220V AC 1.0A, 100/110V DC 0.3A | | | |
| Mass (kg) Fixed | 25 | 28 | 27 | 30 |
| Standard | H.V. circuit breaker: JIS C 4603 (1990) AC circuit breaker: JEC2300 (1998) Overcurrent relays for H. V. power receiving: JIS C 4602 (1986) | | | |

Note: *1 Operating current setting value 8 to 80A is also available.

*2 Maximum values when the VCB is used with a 6% reactor connected in a 6.6kV AC circuit.
 Halve these values for a 3.3kV AC circuit.

■ Design features

The four dials facilitate the setting of the overcurrent protection as followed:

● Rated operating current

Rated current range: 24 to 320A (8 to 80A)

No. of steps: 15

Steps from 24A to 320A can be set by the two dials—CT's primary current dial and multiplying factor dial of primary current. These breakers are most suitable for receiving and distributing facilities with capacities from 6kV, 170 to 2000kVA. Since the rating for the primary current can be freely changed expenses for changing the CT ratio can be saved when expanding electrical facilities.

● Operating time

No. of steps: 16 (T=50 to T=0.5)

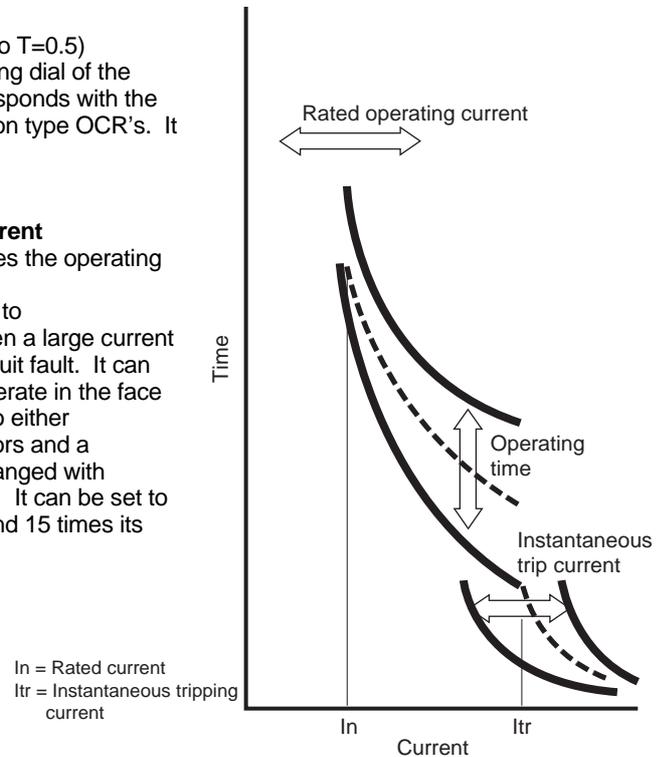
The operating time setting dial of the solid-state OCR's corresponds with the time lever of the induction type OCR's. It has 16 steps, from T = 50 to T = 0.5.

● Instantaneous trip current

Trip current: 5 to 15 times the operating current.

This device is designed to instantaneously trip when a large current flows due to a short-circuit fault. It can be set so it does not operate in the face of inrush currents due to either transformers or capacitors and a coordination can be arranged with primary circuit breakers. It can be set to operate at between 5 and 15 times its operating current.

Operating current and time setting range for Auto. V



Rated operating current setting dials

The combination of these two dials permits the setting of 15 possible combinations.

① Rated operating current value (A)

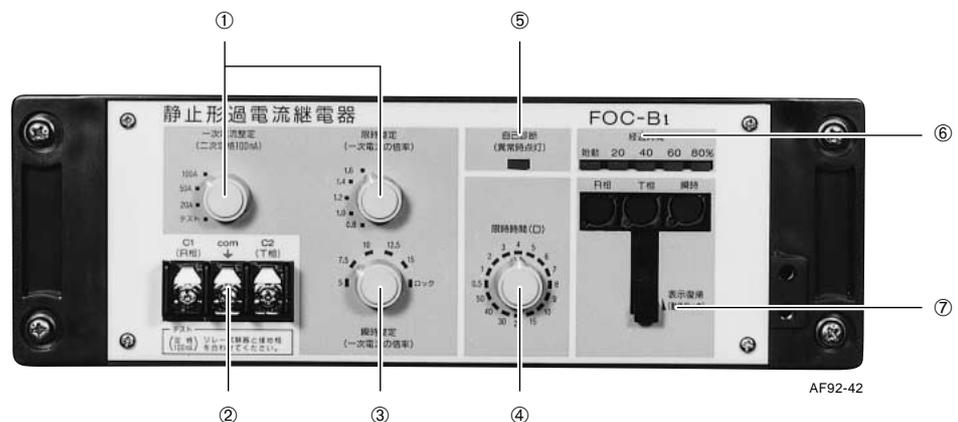
| Primary current setting dial | Multiplying factor dial | | | | | |
|------------------------------|---|-----|-----|-----|-----|-----|
| | 0.8 | 1.0 | 1.2 | 1.4 | 1.6 | |
| Standard | 30A | 24 | 30 | 36 | 42 | 48 |
| | 75A | 60 | 75 | 90 | 105 | 120 |
| | 200A | 160 | 200 | 240 | 280 | 320 |
| TEST | Set at this point when carrying out the operating test of OCR's | | | | | |

② Terminals for operating tests

When carrying out the operating test, set the rated operating current setting dial at the TEST position and apply the test current between the C1-com and C2-com terminals.

③ Instantaneous tripping current setting dial

This can be set to 5 to 15 times the rated operating current value. When set at the LOCK position the instantaneous function stops.



④ Operating time setting dial

This corresponds to the time dial for the induction type relay and can be set at 16 steps, from T = 50 to T = 0.5.

⑤ Self diagnostic function

Continuously monitors operation of the internal microcomputer and lights alarm LEDs on detection of abnormal conditions.

⑥ Elapsed operating time indicators (LEDs)

- Start: This LED lights whenever main circuit current exceeds the operating current setting for overcurrent interruption.
- Elapsed operating time: These four LEDs indicate the breaker's overcurrent activation status in 20, 40, 60, or 80% of the maximum overcurrent duration before interruption occurs.

⑦ Reset lever

Resets the OCR and its operation indicators.

H.V. Distribution Equipment

Vacuum circuit breakers

Auto. V

■ Design features

● Auto. V improves system dependability

FUJI solid-state type OCR's are provided with the ideal inverse time characteristics instead of the conventional electronic type linear characteristics.

In the case of the conventional induction type OCR's their long inverse time zone in characteristic curves do not extend smoothly, and so they do not meet the requirements of the operating characteristics of L. V. breakers thus making it difficult to arrange a coordination. The operating time of Auto. V's at 300% current has been greatly improved to 10 sec. as against 2 to 3 sec. for conventional OCR's. The function to extend the operating time by five times, an option of the previous Auto. V is included in the new Auto. V as a standard feature.

● Inertia characteristics exceed 90%

The inertia characteristics correspond with the "non-operating characteristics (permissible)".

When carrying out the coordination with the low voltage MCCB's, it is necessary to consider the "non-operating characteristics" and "coordination" in which the inertia characteristics are taken into consideration.

In the case of the induction type OCR's the inertia characteristics normally exceed 60%, thus make it difficult to establish coordination with low voltage MCCB's. On the other hand in the electronic type OCR's their inertia characteristics exceed 90%, giving them ideal operating characteristics.

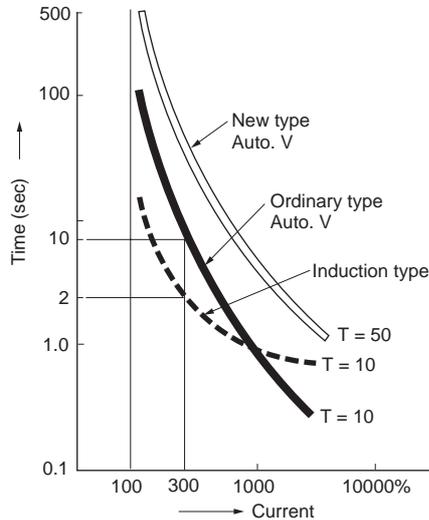
● The overcurrent withstanding value of the CT is 12.5kA

The CT built in the Auto. V is extremely small in size but its toroidal design permits it to withstand overcurrents having values as large as 12.5kA for 1 sec.

CT with large overcurrent constant

The internal CT's overcurrent constant of 20 or more was achieved by combining a CT with a very low activation power OCR. When using a CT in combination with a protective relay, the CT's overcurrent constant must be large enough for the overcurrent. To determine compatibility, overall OCR operation must be checked from the combined CT and OCR characteristics as shown in the figure at right.

The operating characteristics of Auto. V and induction type OCR (FUJI CH1-53 type)

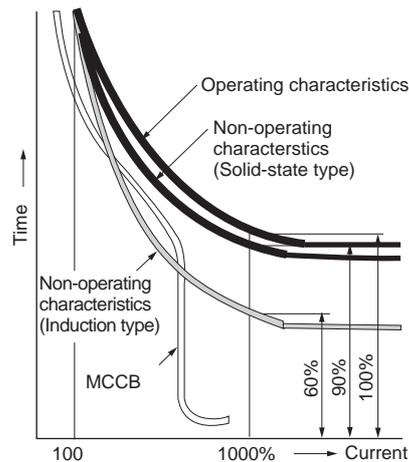


■ Operating characteristics of overcurrent relays

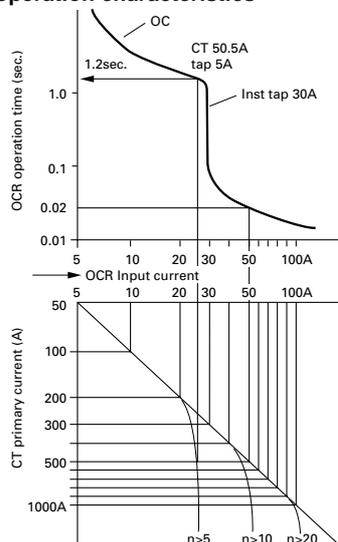
The curves indicate the time-current characteristics of OCR's. These characteristics meet the requirements of JIS C4602 "Overcurrent Relays for H. V. Power Receiving"

Note: For practical dial setting method or the test method of solid state OCR's please contact FUJI.

The inertia characteristics of Auto. V and induction type OCR



CT overcurrent constant and OCR operation characteristics



Note:

* Overcurrent constant

In CT the secondary current increases proportionally to the increase of the primary current.

When the value exceeds a certain value a saturation takes place due to magnetic saturation. The overcurrent constant(n) indicates the value obtained by dividing, the current value at the point where the error reaches 10%, by the rated current.

$$n = \frac{\text{Current at the point where the error reach 10\%}}{\text{Rated current}}$$

JEC190 (1977) instrument transformer for protective relay is stipulated as "n>5, n>10 and n>20". It is necessary that they have an adequately large overcurrent constant when incorporated with protective relays.

■ **Types and ratings**

| Ratings | Installation | Closing system System type | Operating voltage | Shunt trip 100/110V AC | | 100/110V DC | | |
|---|-----------------------------|---------------------------------------|--|--|--|--|--|--|
| | | | | Type | Ordering code | Type | Ordering code | |
| Voltage 3.6/7.2kV Breaking current 8.0kA Rated current 400A | Fixed: B Switchboard use | Manual-spring | | HA08B-H6F | HA31BH6-400F | HA08B-H7F | HA31BH7-400F | |
| | | Motor-spring | 100/110V AC/DC | HA08B-A6F | HA31BA6-400F | HA08B-A7F | HA31BA7-400F | |
| | | Instantaneous | 200/220V AC/DC 48V DC 21/24V DC | HA08B-B6F HA08B-C6F HA08B-D6F | HA31BB6-400F HA31BC6-400F HA31BD6-400F | HA08B-B7F HA08B-C7F HA08B-D7F | HA31BB7-400F HA31BC7-400F HA31BD7-400F | |
| | | Fixed: C Cubicle use | Manual-spring | | HA08C-H6F | HA31CH6-400F | HA08C-H7F | HA31CH7-400F |
| | | Motor-spring | 100/110V AC/DC | HA08C-A6F | HA31CA6-400F | HA08C-A7F | HA31CA7-400F | |
| | | Instantaneous | 200/220V AC/DC 48V DC 21/24V DC | HA08C-B6F HA08C-C6F HA08C-D6F | HA31CB6-400F HA31CC6-400F HA31CD6-400F | HA08C-B7F HA08C-C7F HA08C-D7F | HA31CB7-400F HA31CC7-400F HA31CD7-400F | |
| | Fixed: P Portable type | Manual-spring | | HA08P-H6F | HA31PH6-400F | HA08P-H7F | HA31PH7-400F | |
| | | Motor-spring | 100/110V AC/DC | HA08P-A6F | HA31PA6-400F | HA08P-A7F | HA31PA7-400F | |
| | | Instantaneous | 200/220V AC/DC 48V DC 21/24V DC | HA08P-B6F HA08P-C6F HA08P-D6F | HA31PB6-400F HA31PC6-400F HA31PD6-400F | HA08P-B7F HA08P-C7F HA08P-D7F | HA31PB7-400F HA31PC7-400F HA31PD7-400F | |
| | | Fixed: B Switchboard use | Manual-spring | | HA12B-H6F | HA32BH6-600F | HA12B-H7F | HA32BH7-600F |
| | | | Motor-spring | 100/110V AC/DC | HA12B-A6F | HA32BA6-600F | HA12B-A7F | HA32BA7-600F |
| | | | Instantaneous | 200/220V AC/DC 48V DC 21/24V DC | HA12B-B6F HA12B-C6F HA12B-D6F | HA32BB6-600F HA32BC6-600F HA32BD6-600F | HA12B-B7F HA12B-C7F HA12B-D7F | HA32BB7-600F HA32BC7-600F HA32BD7-600F |
| Fixed: C Cubicle use | Manual-spring | | | HA12C-H6F | HA32CH6-600F | HA12C-H7F | HA32CH7-600F | |
| | Motor-spring | | 100/110V AC/DC | HA12C-A6F | HA32CA6-600F | HA12C-A7F | HA32CA7-600F | |
| | Instantaneous | | 200/220V AC/DC 48V DC 21/24V DC | HA12C-B6F HA12C-C6F HA12C-D6F | HA32CB6-600F HA32CC6-600F HA32CD6-600F | HA12C-B7F HA12C-C7F HA12C-D7F | HA32CB7-600F HA32CC7-600F HA32CD7-600F | |
| Fixed: P Portable type | Manual-spring | | HA12P-H6F | HA32PH6-600F | HA12P-H7F | HA32PH7-600F | | |
| | Motor-spring | 100/110V AC/DC | HA12P-A6F | HA32PA6-600F | HA12P-A7F | HA32PA7-600F | | |
| | Instantaneous | 200/220V AC/DC 48V DC 21/24V DC | HA12P-B6F HA12P-C6F HA12P-D6F | HA32PB6-600F HA32PC6-600F HA32PD6-600F | HA12P-B7F HA12P-C7F HA12P-D7F | HA32PB7-600F HA32PC7-600F HA32PD7-600F | | |

H.V. Distribution Equipment

Vacuum circuit breakers

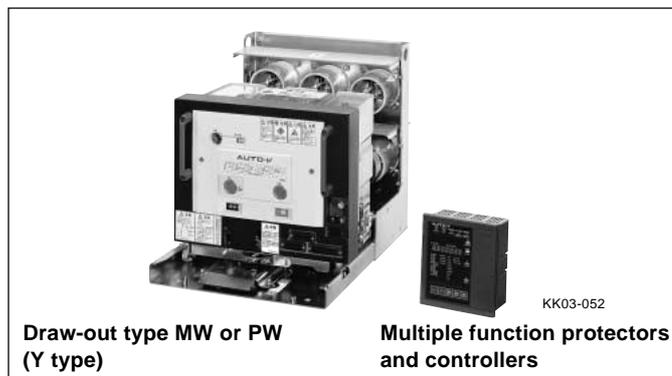
New-Auto. V

New-Auto.V

■ Description

The New-Auto.V is a circuit breaker that consists of a standard MULTI.VCB provided with a CT (current transformer), and incorporates a multiple function protectors and controllers to prevent equipment from overcurrent and other factors, thus saving energy and reducing installation man-hour.

- Multiple function protectors and controllers offers versatile features such as ground-fault directional, ground-fault overvoltage, undervoltage, and overvoltage protective functions in addition to overcurrent protection. It also includes measurement functions for a variety of items, such as current, voltage, power, power-factor, frequency, and zero-phase voltage values.



■ Highly reliable overcurrent protection

- Withstand overcurrent of CT: 12.5kA
- Overcurrent constant of CT: $n > 20$

■ Specifications

| Type | HA08A□-A8 | | HA12A□-A8 | |
|---|--|--|---|--|
| Closing system | Motor-spring | | | |
| Installation □ | Draw-out: X, Y, U | | | |
| Rated voltage (kV) | 3.6/7.2 | | | |
| Rated current (A) | 400 | | 600 | |
| Rated frequency (Hz) | 50/60 | | | |
| Rated breaking capacity (kA) | 8 50MVA at 3.6kV 100MVA at 7.2kV | | 12.5 80MVA at 3.6kV 160MVA at 7.2kV | |
| Rated making current, peak value (kA) | 20 | | 31.5 | |
| Rated closing time (s) | 0.03 | | | |
| Rated short-time current, 1 second (kA) | 8 | | 12.5 | |
| Insulation level | Dielectric: 22kV, 1 minute | | Impulse (1.2 × 50μs): 60kV | |
| Rated breaking time | 3-cycle | | | |
| Opening time (s) | 0.03 | | | |
| Operating duty | 0 — 1 min. — CO — 3 min. — CO or CO — 15 sec. — CO | | | |
| Life expectancy | Mechanical (operations) | | 10,000 | |
| | Electrical (operations) | | 10,000 | |
| No. of operations (operations/hour) | 60 | | | |
| Applicable capacitor capacity *1 (kVA) | 3,000 | | 5,000 | |
| Auxiliary contact | 5NO + 5NC | | | |
| Mass (kg) | Draw-out (X type) | | 34 | |
| | Cradle for X type | | 11 | |
| Standard | H.V. circuit breaker: JIS C 4603 (1990), AC circuit breaker: JEC 2300 (1998) | | | |

Note: *1 Maximum values when the VCB is used with a 6% reactor connected in a 6.6kV AC circuit.
Halve these values for a 3.3kV AC circuit.

■ Specifications (Multiple function protectors and controllers)

| Item | | | Specification | |
|---|--|--|---|---|
| General specification | Control power supply [V] | | 100/110DC (80 to 143DC) or 100AC (85 to 132AC) | |
| | Power consumption (main unit) [W] | | 15W max. | |
| | Rated frequency [Hz] | | 50/60 (settings selectable) | |
| | Rated current | CT primary side [A] | 30/100/300 AC (selectable) | |
| | | CT secondary side [A] | 0.1 AC | |
| | Rated zero-phase current | ZCT [mA] | 200/0.2 AC *1 | |
| | Insulation resistance | | 10MΩ between all electric circuits and ground | |
| | Vibration resistance | | 1.96m/s ² , 16.7Hz, 0.4mm double amplitude in three directions for 10 minutes each | |
| | Shock resistance | | 300m/s ² three times each in three directions | |
| | Dielectric strength | | 2kV AC between all charged parts and ground excluding MN signal line, RS-485 signal line, and transducer output terminal.*2 | |
| | Noise immunity | | Damped vibration waveform at 1 to 1.5MHz with peak voltage of 2.5 to 3kV continuously applied for 2 seconds Impulse noise in rectangular waveform (1ns/1μs) at peak voltage of 1.5kV applied for 10 minutes Radiowave frequency band: 10V/m on 140MHz, 430MHz, and 900MHz bands Cellular phone (800MHz/1.5GHz at 0.8W) or PHS (1.9GHz 10mW) in close contact | |
| | Static electric noise | | In contact with metal part: ±6kV Panel surface (not in contact with no metal parts): ±8kV | |
| | Lightning impulse | | Between all electric circuits and ground (excluding MN signal line, RS-485 signal line, and transducer output terminal) 4.5kV, 1.2x50μs, three times each on positive and negative sides | |
| | Ambient humidity | | 10°C to 60°C (with no condensation or icing) | |
| | Storage temperature | | -20°C to +70°C (with no condensation or icing) | |
| | Humidity | | 20% to 90% (on daily average with no condensation) | |
| | Operating atmosphere | | Free from corrosive gas and excessive dust | |
| | Grounding | | Ground at a resistance of 100Ω or less | |
| | Mass | | 1.4kg | |
| Permissible momentary power interruption time | | 20ms (continuous operation) with display turned off The protective relay is, however, operable for 200ms after the power is interrupted.*3 (Display turns off, communication stops, and fault output turns on) | | |
| Protective function | Overcurrent protection | Rated operation current (51) setting range | 15 to 390A | |
| | Instantaneous overcurrent protection 50 (INST) | Rated trip current | Setting range | (1 to 20) × rated current (in 0.2 increments), LOCK |
| | | | Operating value | ±15% max. of each setting current |
| | | Operating time | Operating value | 0.05s max. at 200% of setting current |
| | Short-time overcurrent protection 51DT | Rated trip current | Setting range | (1 to 20) × rated current (in 0.2 increments), LOCK |
| | | | Operating value | ±10% max. of each setting current |
| | | Operating time | Setting range | 0 to 5s (at 0.05 increments) |
| | | | Operating value | ±17% max. of 300% of setting value, ±12% max. of 700% of setting value (Lower limit: ±50ms) |
| | Time-lag overcurrent protection 51 | Rated trip current | Setting range | 50 to 130% of rated current (at 10% increments), LOCK |
| | | | Operating value | ±10% max. of each setting current |
| | | Operating time | Time-magnification (lever) setting range | (0.5 to 20) × (in 0.1 increments), (20 to 100) × (in 1 increments) |
| | | | Operating value | ±17% max. of 300% of setting value, ±12% max. of 700% of setting value (Lower limit: ±100ms) |
| | Ground fault protection 67DG and 51G | Zero-phase current | Setting range | 0.1 to 1.0A (at 0.05A increments), LOCK |
| | | | Operating value | ±10% max. of setting value |
| | | Zero-phase voltage | Setting range | 2.5% to 15% of rated voltage (at 2.5% increments) |
| Operating value | | | ±25% max. of setting value | |
| Phase | | Max. sensitivity | 30, 45, 60° | |
| | | Operating angle range | Max. sensitivity phase: ±80° | |
| | | Operating angle tolerance | ±15% | |
| Operating time | | Setting range | 0.1 to 3s (at 0.05s increments), 3 to 120s (at 1s increments) | |
| | Operating value | ±5% max. of setting value (Lower limit: ±50ms) | | |

H.V. Distribution Equipment

Vacuum circuit breakers

New-Auto. V

| | | | | | | |
|-------------------------------------|--|---|---|---|--|---|
| Protective function | Overvoltage protection 59(OV) | Voltage | Setting range | 110 to 150V (at 5V increments), LOCK | | |
| | | | Operating value | ±5% max. of setting value | | |
| | | Operating time | Setting range | 0.1, 0.2 to 2s (at 0.2s increments), 2 to 10s (at 1s increments) | | |
| | | | Operating value | ±5% max. of setting value (Lower limit: ±50ms) | | |
| | Undervoltage protection 27 (UV) | Voltage | Setting range | 20 to 100V (at 5V increments), LOCK | | |
| | | | Operating value | Setting value of 90V min.: ±5% Setting value of 85V max.: $\pm[2.3 + (110V/voltage\ setting\ value) \times 0.16] \times 2\%$ | | |
| Operating time | | Setting range | 0.1, 0.2 to 2s (at 0.2s increments), 2 to 10s (at 1s increments) | | | |
| | | Operating value | ±5% max. of setting value (Lower limit: ±50ms) | | | |
| Prealarm | Overcurrent OCA | Voltage | Setting range | 10% to 100% of rated current (at 5% increments), LOCK | | |
| | | | Operating value | ±10% max. of setting value | | |
| | | Operating time | Setting range | 10 to 200s (at 10s increments) | | |
| | | | Operating value | ±5% max. of setting value | | |
| | Leakage current OCGA | Voltage | Setting range | 50%, 60%, 70%, and 80% of 67DG or 51G operating current setting value, Lock | | |
| | | | Operating value | ±10% max. of setting value (Lower limit: ±20mA) | | |
| Operating time | | Setting range | 10 to 200s (at 10s intervals) | | | |
| | | Operating value | ±5% max. of setting value | | | |
| External I/O specifications | Input circuit | Fixed, 5 points | | CT primary rated current (30A/100A/300A): 3 points, CT test position: 1 point, trip output lock: 1 point | 100V DC (143V max.)/100V AC (132V max.) common use DC ON voltage: 40V min, 70V max. AC ON voltage: 40V min, 70V max. | |
| | | General-purpose, 3 points | | | | External making, external breaking and external reset of each one point is default. |
| | | Others, 2 points | | | | Trip coil (TC) disconnection monitoring, 52a contact: each one contact |
| | Output circuit | Input, 1 point | | Making earrent: 15 A (110V DC) | | |
| | | Off and trip, 1 point | | Permissible continuous current: 4A | | |
| | | Alarm output, 8 points | | Current made or broken: 0.2 A (110V DC inductive load, L/R=15ms) | | |
| Device failure, 1 point | | Permissible continuous current: 1A | | | | |
| Metering and display specifications | Current, demand current and demand max. current | | 0, 0.4% to CT rating and to CT rating x 1.3 Fault current of 2000% max. can be displayed | | | |
| | Zero-phase current and zero-phase current history max. value | 200/0.2mA | ZCT primary current: 0.05 to 1.0A *1 Fault current of 4A max. can be displayed | | | |
| | Zero-phase voltage and zero-phase voltage history max. value | | 1.5% to 50% *4 | | | |
| | Voltage | | 5 to 150V on VT secondary side | | | |
| | Frequency | | 45 to 55Hz (50Hz) and 55 to 65Hz (60Hz) | | | |
| | Power-factor | | Lead 0 to 1.0 to Lag 0 | | | |
| | Active power, reactive power, demand power and max. demand power | | 0, 0.4% to $(\sqrt{3} \times \text{rated voltage} \times 1.3 \ln \times \text{power-factor } 1.0) \%$ (In: CT primary rated current) | | | |
| | Active energy and reactive energy | | JIS C 1216 (meter with transformer), equivalent to table 4 normal class | | | |
| History data | | Number of protective operation times: 0 to 9999 Operating hours: 0 to 9999 x 100 hr Number of switching times: 0 to 9999 x 10 times | | | | |

Notes *1 When using ZCT, FUJI's dedicated product ZCT-□ is recommended. For details, please contact FUJI.

*2 Do not apply 2kV between lines.

*3 When you use AC power as control power supply, and 27 (UV) function, and you require that the operating time setting at power failure be operated more than 2s, the use of a UPS or AC power supply UM2P-A1 is recommended (sold separately).

*4 When you use zero-phase potential input device, use FUJI's dedicated ZPD-1.

■ **Multiple function protectors and controllers offers versatile features.**

● **A host of protective functions**

- Provided with ground-fault directional, ground-fault overvoltage, undervoltage, and overvoltage protective functions in addition to overcurrent protection.
- Allows precise settings for relay operation characteristics, to ensure easy protective coordination.

● **Additional measurement functions**

- Includes measurement functions for a variety of items, such as current, voltage, power, power-factor, frequency, and zero-phase voltage values.

● **Equipped with transducer and communications functions.**

- The transducer function (4 channels) enables the use of analog meters.
- The communications function (RS-485) enables status and other monitoring items.

■ **Wide-range CT supports equipment across a wide capacity range**

- Range of operating current settings for overcurrent protection: 15 to 390A
- Covers an equipment capacity range of 170 to 4,400kVA.

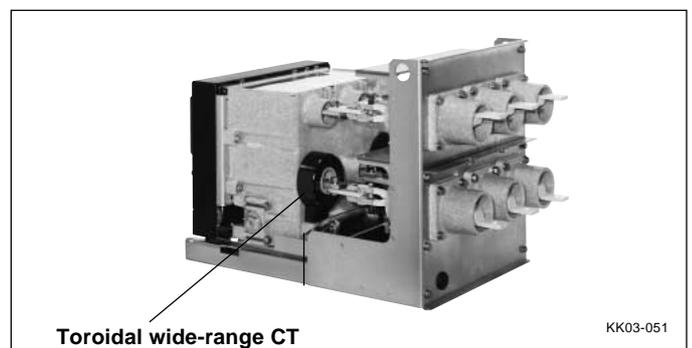
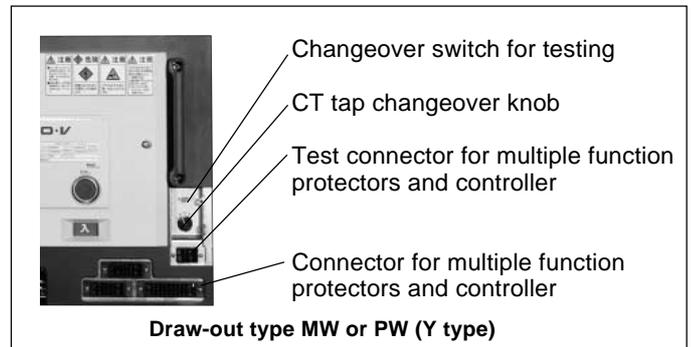
Rated operating current (A)

| CT rating | 50% | 60% | 70% | 80% | 90% | 100% | 110% | 120% | 130% |
|-----------|------|------|------|------|------|------|------|------|------|
| 30A | 15A | 18A | 21A | 24A | 27A | 30A | 33A | 36A | 39A |
| 100A | 50A | 60A | 70A | 80A | 90A | 100A | 110A | 120A | 130A |
| 300A | 150A | 180A | 210A | 240A | 270A | 300A | 330A | 360A | 390A |

- Instantaneous operating current: 1x to 20x CT rated current (at 0.2x increments)
- Time-lag time-magnification: Setting between 0.5 and 100

■ **Greatly simplifies main circuit connections**

- The compact, built-in CT eliminates the need for CT space or CT installation work on distribution boards.



■ **Types and ratings**

| Ratings | Installation | Closing system Closing system | Operating voltage | Trip system Type | |
|---|---|----------------------------------|-------------------|--|--|
| Voltage 3.6/7.2kV Breaking current 8.0kA Rated current 400A | Draw-out with cradle: X Draw-out with cradle and shutter: Y Draw-out with cradle: U | Motor-spring Instantaneous | 100/110V AC/DC | Shunt trip (Operated by signal communication with multiple function protections and controllers) 100/110V DC | HA08AX-A8 HA08AY-A8 AH08AU-A8 |
| Voltage 3.6/7.2kV Breaking current 12.5kA Rated current 600A | Draw-out with cradle: X Draw-out with cradle and shutter: Y Draw-out with cradle: U | Motor-spring Instantaneous | 100/110V AC/DC | Shunt trip (Operated by signal communication with multiple function protections and controllers) 100/110V DC | HA12AX-A8 HA12AY-A8 AH12AU-A8 |

H.V. Distribution Equipment

Vacuum circuit breakers

Auto. V/New-Auto.V

■ Closing system

| System | | Specification | Motor current | Coil current | Remarks |
|--------------|---|----------------|---------------|--------------|--|
| | | Voltage | | | |
| Motor-spring | A | 100/110V AC/DC | 0.6A | 4A | <ul style="list-style-type: none"> Use a VT with a capacity of at least 50VA. Use a 3A fuse to protect the control circuit Spring charging time is 5 seconds. |
| | B | 200/220V AC/DC | 0.5A | 2.5A | |
| | C | 48V DC | 1.5A | 5.5A | |
| | D | 21/24V DC | 1.5A | 13A | |

Note: The New-Auto.V comes only with motor-spring A.

■ Tripping system

| | System | Specification |
|---------------|------------|--|
| Auto.V *1,*2 | Shunt trip | 6 100/110V AC, 1.5VA |
| | | 7 100/110V DC, 3.4A |
| New-Auto.V *2 | Shunt trip | 8 100/110V DC, 3.4A Operated by signal communication with multiple function protectors and controller |

■ Auxiliary contact

| Contact arrangement | Specification | Remark |
|---|---------------------------------------|--|
| 2NO + 2NC standard provided (Fixed type) | 100/200V AC, 10A 100/200V DC, 5/3A | 5NO + 5NC contacts are available on request (Fixed type) |
| 5NO + 5NC standard provided (Draw-out type) | | |

Note: *1 To use AC to trip the Auto. V, use a capacitor trip device in combination with the trip system.

*2 In the case of shunt tripping with AC power supply, use the capacitor shunt trip power supply in combination. For details, refer to the information on the accessories sold separately.

■ Alarm contact

| Contact arrangement | Specification |
|-----------------------------------|--|
| 1NO standard provided (Auto.V) | 100/110V AC, 2.0A 200/220V AC, 1.0A 100/110V DC, 0.3A (time constant: 7ms) |

■ Type number nomenclature

● Auto.V

Basic type

HA 08 B - A 6 S L

Breaking current

08: 8kA (Rated current 400A)
12: 12.5kA (Rated current 600A)

Installation

B: Fixed, switchboard use
C: Fixed, cubicle use
P: Fixed, portable type

Vacuum interrupter used

Blank: Standard level vacuum interrupter
L: Low-level-surge vacuum interrupter

Rated operating current

F: 24 to 320A (standard)
S: 8 to 80A

Tripping system

6: Shunt trip 100/110V AC
7: Shunt trip 100/110V DC

Closing system

H: Manual-spring
A: Motor-spring, Instantaneous closing
100/110V AC/DC
B: Motor-spring, Instantaneous closing
200/220V AC/DC
C: Motor-spring, Instantaneous closing 48V DC
D: Motor-spring, Instantaneous closing 21/24V DC

● New-Auto.V

Basic type

HA 08 A X - A 8 L S1 K

Breaking current

08: 8kA (Rated current 400A)
12: 12.5kA (Rated current 600A)

Installation

X: Draw-out, with cradle for JEM 1425 class CW
Y: Draw-out, with cradle and shutter for JEM 1425 class MW and PW
U: For use in small depth switchboard, JEM1425 class CW

Panel lead wire

Blank: With panel lead wire
K: Plug only

Position switch

Blank: With no position switch
S1: With run position and test position, both with SPDT contacts

Vacuum interrupter used

Blank: Standard level vacuum interrupter
L: Low-level-surge vacuum interrupter

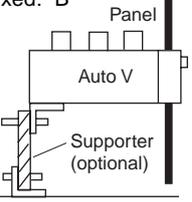
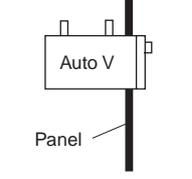
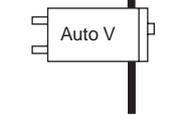
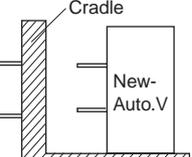
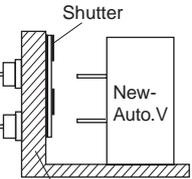
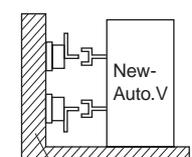
Tripping system

8: Multiple function protectors and controllers provided with built-in CT
Shunt trip 100/110V DC

Closing system

A: Motor-spring, Instantaneous closing
100/110V AC/DC

■ Installation and accessories

| | Photo | Installation system | Description | Supplied accessories | Optional accessories |
|------------|---|--|---|---|--|
| Auto.V |  AF92-35 | Fixed: B  | <ul style="list-style-type: none"> Fixed type Open-type switchboard, indoor use Manual-spring handle or motor-spring H.V. main terminals are positioned at the top of the VCB. This facilitates replacement of VCB | <ul style="list-style-type: none"> Insulation tube for main terminal Manual handle for motor-spring type | <ul style="list-style-type: none"> Supporter Capacitor trip device Vacuum condition tester Surge absorber |
| |  AF92-25 | Fixed: C  | <ul style="list-style-type: none"> Fixed type Open-type cubicle use Manual-spring handle or motor-spring H.V. main terminals is located at the top of VCB. This facilitates replacement of VCB. | <ul style="list-style-type: none"> Insulation tube for main terminal Manual handle for motor-spring type | <ul style="list-style-type: none"> Supporter Capacitor trip device Vacuum condition tester Surge absorber |
| |  AF92-64 | Fixed: P  | <ul style="list-style-type: none"> Fixed type Open-type, portable type Manual-spring handle or motor-spring H.V. main terminals is located at the back of VCB. This facilitates replacement of VCB. | <ul style="list-style-type: none"> Manual handle for motor-spring type | <ul style="list-style-type: none"> Capacitor trip device Vacuum condition tester Surge absorber |
| New-Auto.V |  KK03-055 | Draw-out with cradle: X  | <ul style="list-style-type: none"> Draw-out type Class CW type metal enclosure/indoor use Motor-spring Cradle is provided to facilitate assembly and adjustment of switchgear. Interlock system and grounding device is provided. | <ul style="list-style-type: none"> Manual handle for motor-spring type Draw-out handle Connector provided with external lead wire Lead wire for digital multi-function relay Test jumper wire for digital multi-function relay | <ul style="list-style-type: none"> Draw-out extension rail Position indicating switch Capacitor trip device Vacuum condition tester Surge absorber Lifter Testing jumper Connector with external lead wire |
| |  KK03-050 | Draw-out with cradle and shutter: Y  | <ul style="list-style-type: none"> Draw-out type Class MW, PW type metal enclosure/indoor use Motor-spring Cradle with shutter is provided to facilitate assembly and adjustment of switchgear. Interlock system and grounding device is provided. | <ul style="list-style-type: none"> Manual handle for motor-spring type Draw-out handle Connector provided with external lead wire Lead wire for digital multi-function relay Test jumper wire for digital multi-function relay | <ul style="list-style-type: none"> Draw-out extension rail Position indicating switch Capacitor trip device Vacuum condition tester Surge absorber Lifter Testing jumper Connector with external lead wire |
| |  KK03-056 | Draw-out with cradle: U  | <ul style="list-style-type: none"> Draw-out type Class CW type metal enclosure/indoor use Motor-spring Cradle with shutter is provided to facilitate assembly and adjustment of switchgear. Interlock system and grounding device is provided. | <ul style="list-style-type: none"> Manual handle for motor-spring type Draw-out handle Connector provided with external lead wire Lead wire for digital multi-function relay Test jumper wire for digital multi-function relay | <ul style="list-style-type: none"> Draw-out extension rail Position indicating switch Capacitor trip device Vacuum condition tester Surge absorber Lifter Testing jumper Connector with external lead wire |

H.V. Distribution Equipment

Vacuum circuit breakers

Auto. V/New-Auto.V

■ Supplied accessories

● Insulation tube for main terminal

Installation types: B and C



AF88-1108

● Manual handle for motor-spring type

All types



KK03-073

● Draw-out handle

Installation types: X, Y, and U



KK03-074

● Connector with external lead wire

Installation types: X, Y and U



KK03-075

● Lead wire for multiplefunction protectors and controllers

New-Auto.V type



KK03-076

● Jumper wire for digital multi-function relay test

New-Auto.V type



KK03-077

■ Optional accessories

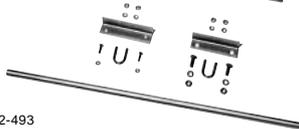
● Supporter

Supporter kit for stabilizing the back of fixed type B, C Auto. V on the floor.

Type: C



Type: B



AF92-493

● Draw-out extension rail (HZ2AE)

Used with draw-out type (X, Y, U). Use of an extension rail makes daily checking easier because the VCB can be pulled out of the panel. Double stack types do not require lifters or chain blocks.



KK03-079

● Position indicating switch (HZ2AD)

Switch for indicating the service positions and test positions of draw-out (X, Y, U). Used for interlocking to other devices attached to the cradle for draw-out type.



SG 1075

● Vacuum condition tester VC-1A

For further information see page 12/25.



SH-27

● C-R type surge absorber

AF3320R3TXG0542
AF6620R3TXG0543

For further information see page 12/25.

● Testing jumper (HZ2AG)

Use to test remote ON/OFF operation of a VCB.



KK03-078

● Arrester

GLI-3G
GLI-6G



AF94-104

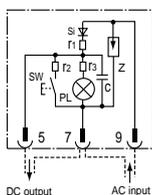
● Capacitor trip device

VCB-T1A, T2A, VCB-T1PA, T2PA

These are used when the trip circuit is connected to AC power supply.

| Type | VCB-T1A VCB-T1PA | VCB-T2A VCB-T2PA |
|----------------------|---------------------|---------------------|
| Rated input voltage | 100/110V AC | 200/220V AC |
| Shunt trip coil volt | 100/110V DC | 200/220V DC |

Wiring diagram



DC output AC input

Surface mounting

VCB-T1A, T2A



KK04-064

Flush mounting

VCB-T1PA, T2PA



SH-307

Name

r1: Charging resistor
r2: Discharge resistor
r3: Series resistor
Si: Silicon rectifier diode
PL: Pilot lamp

C: Electrolytic capacitor
SW: Discharge switch
Z: Surge absorber

● Lifter

L-2HNB



KK03-080

■ **Optional accessories**

● **AC power supply unit (for New-Auto.V)**

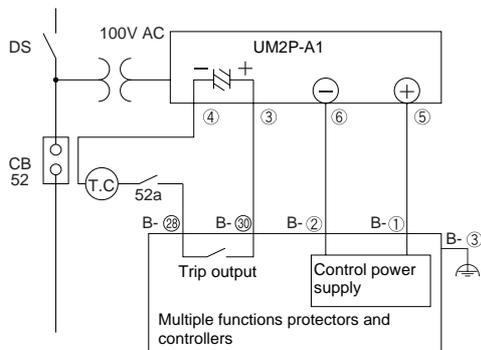
| | | |
|---------------------------------|---|--|
| Type | UM2P-A1 | |
| Rated input voltage | 100/110V AC (Allowable variation: 85 to 132V) | |
| Rated output | Control power of multiple functions protectors and controllers | 100/110V DC 0.15A |
| | Power supply of capacitor trip device | Rated charge voltage: 140V DC (C=1500 μ F) |
| Power failure compensation time | Control power of multiple functions protectors and controllers | 1s |
| | Power supply of capacitor trip device | When power failure occurs at 60V AC, the charge voltage is 75DC or higher after the elapse of 30s. |
| Operating temperature range | -10 to +60°C (no icing or no condensation) | |
| Insulation resistance | Between all electrical circuits and ground: 10MΩ (500V DC megger) | |
| Withstand voltage | Between all electrical circuits and ground: 2000V AC for 1min | |
| Lightning impulse | Between all electrical circuits and ground: 4500V 1.2/50μs | |
| Mass | 1.5kg | |

Notes: The power failure compensation time of this AC power supply unit is 1s. If you use the UV (undervoltage) function with the operation time at 1.2s or longer, connect an external capacitor (not supplied) together between this unit's terminals 5 and 6, by referring to the table below.

| Operating time of protection 27 (UV) | External capacitor capacitance | Example of capacitor |
|--------------------------------------|--|---------------------------|
| 1.2 to 2s (at 0.2s increments) | 1500 μ F (Withstand voltage: 200V DC min.) | Nichicon-made LNT2D152MSM |
| 3 to 5s (at 1s increments) | 6800 μ F (Withstand voltage: 200V DC min.) | Nichicon-made LNT2D682MSM |
| 6 to 10s (at 1s increments) | 1600 × t (μ F) | |

t = Operating time (setting value) of protection 27 (UV)

Outline of devices used in combination



UM2P-A1

OWP101

● **Specifications of AC meter (for Auto.V)**

| | |
|---------------------------------------|---|
| Product | AC meter *1 |
| Type | FR-80AS (for Auto.V) |
| Operating principle | RMS rectifying type |
| Standard scale | Normal scale |
| Full scale [A] | Low ratings: 20, 40, and 100 Standard ratings: 60, 150, and 400 *2 |
| Mass (g) | Approx. 150 |
| Class | 2.5 (JIS C 1102) |
| Dimensions [mm] (Front dimensions) | 80 × 80 |

Note: *1. Specify that the meter is to be used for the Auto.V when ordering the meter alone.

*2. Set the full scale (A) to a value twice as large as the primary current setting (A) in the built-in OCR. For example, if the primary current of the OCR is 75A, read the full scale of the AC meter as 150A.



FR-80AS

AF00-416

H.V. Distribution Equipment

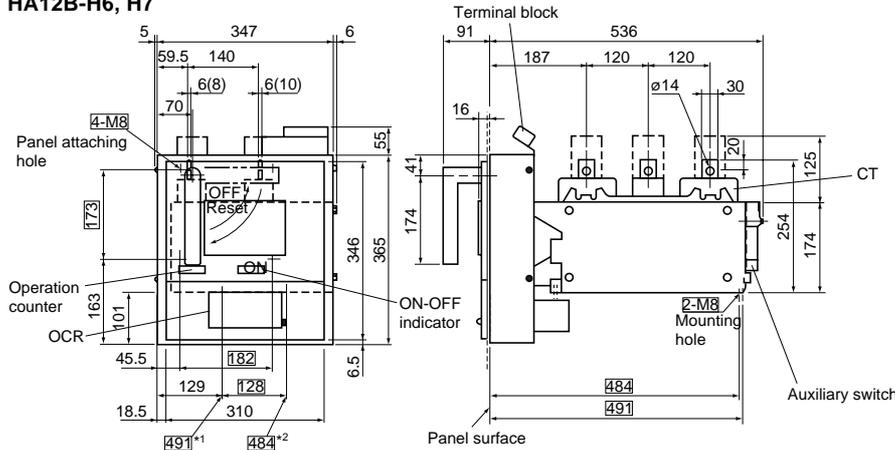
Vacuum circuit breakers

Auto. V/New-Auto.V

■ Dimensions, mm

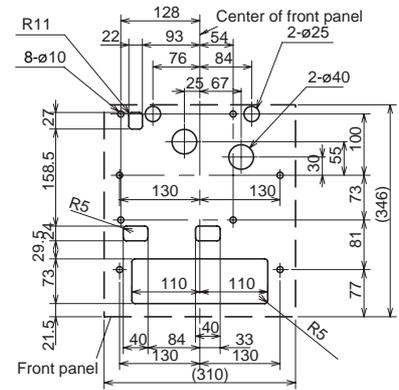
Fixed/B type

HA08B-H6, H7
HA12B-H6, H7



() : For HA12B

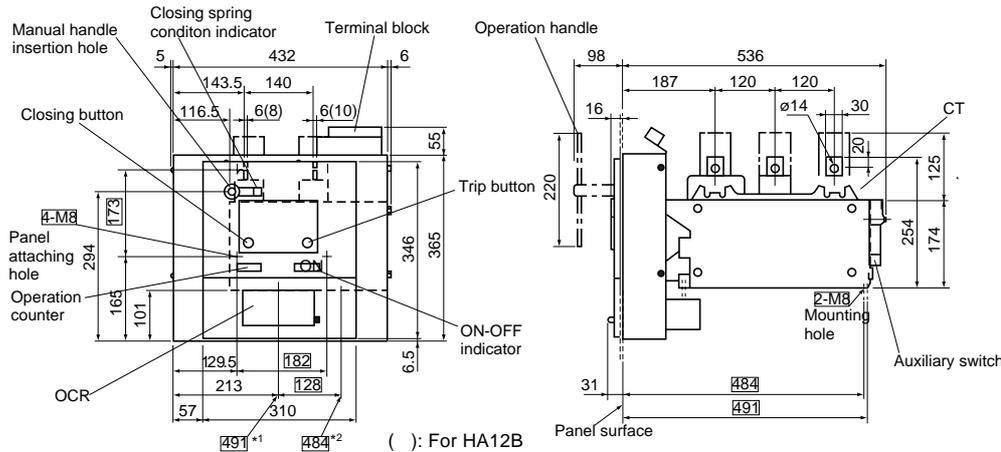
Panel cutting



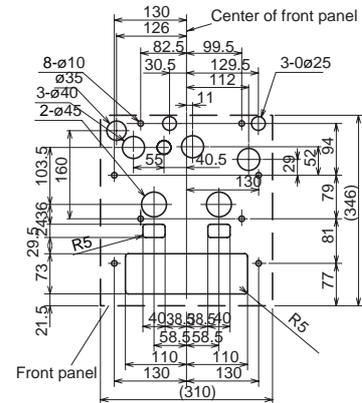
*1 Mounting-hole depth dimension pitch: 491mm side from panel surface

*2 Mounting-hole depth dimension pitch: 484mm side from panel surface

HA08B-A6, A7
HA12B-A6, A7



() : For HA12B

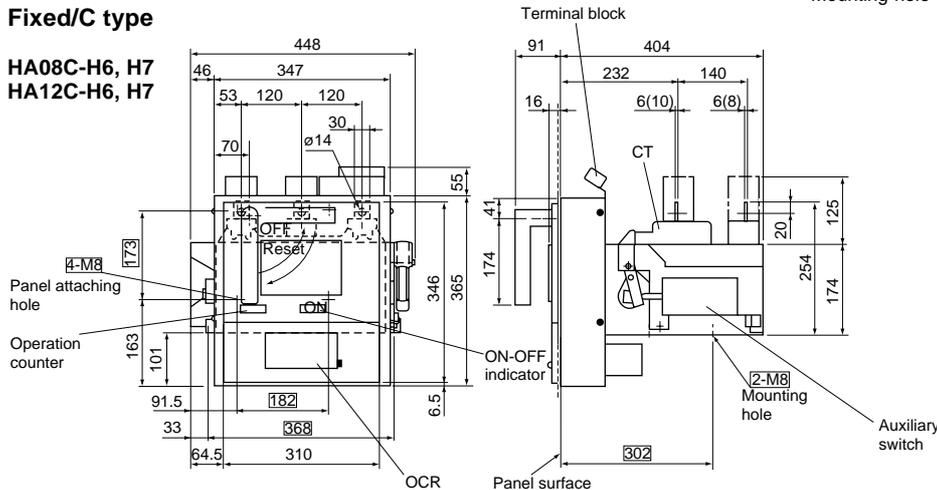


*1 Mounting-hole depth dimension pitch: 491mm side from panel surface

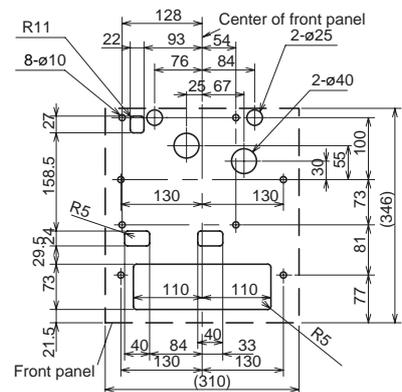
*2 Mounting-hole depth dimension pitch: 484mm side from panel surface

Fixed/C type

HA08C-H6, H7
HA12C-H6, H7

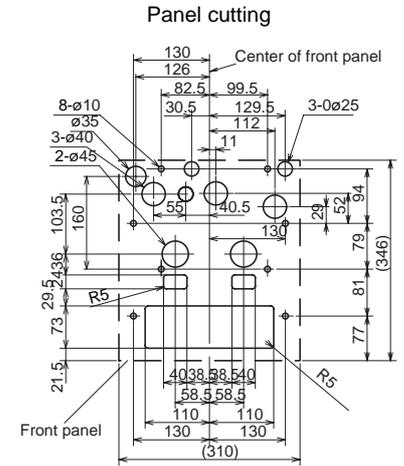
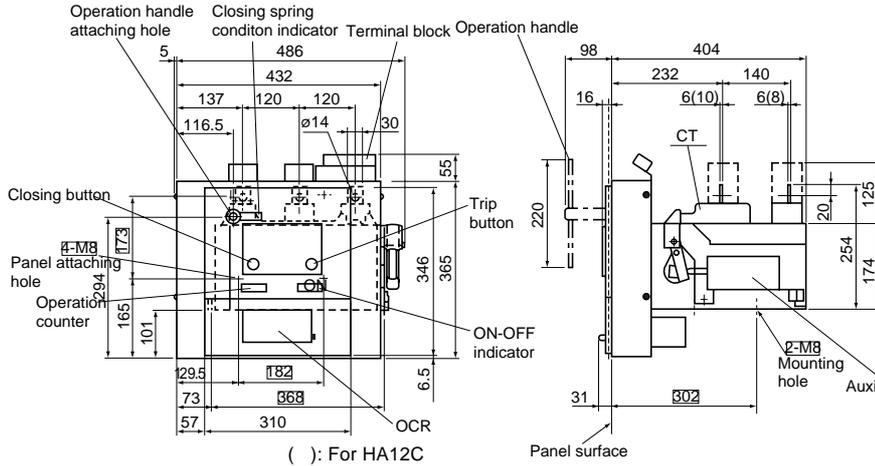


() : For HA12C



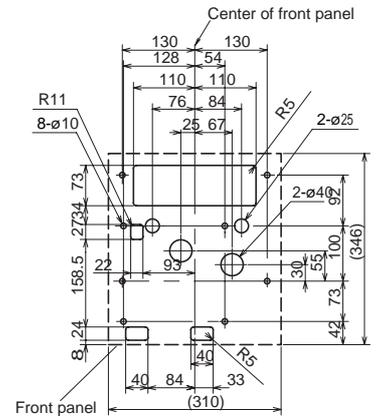
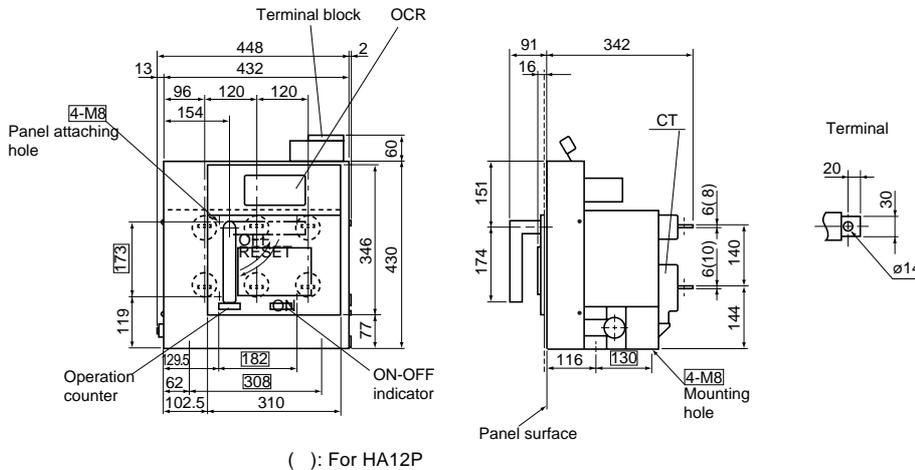
■ Dimensions, mm
Fixed/C type

HA08C-A6, A7
 HA12C-A6, A7

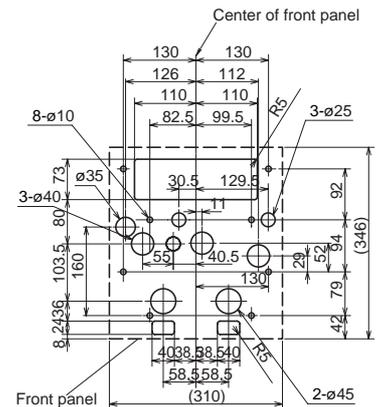
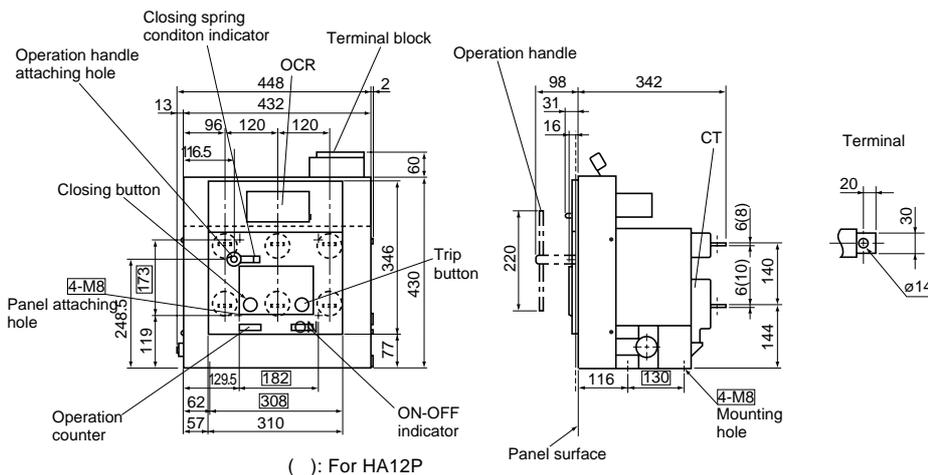


Fixed/P type

HA08P-H6, H7
 HA12P-H6, H7



HA08P-A6, A7
 HA12P-A6, A7



H.V. Distribution Equipment

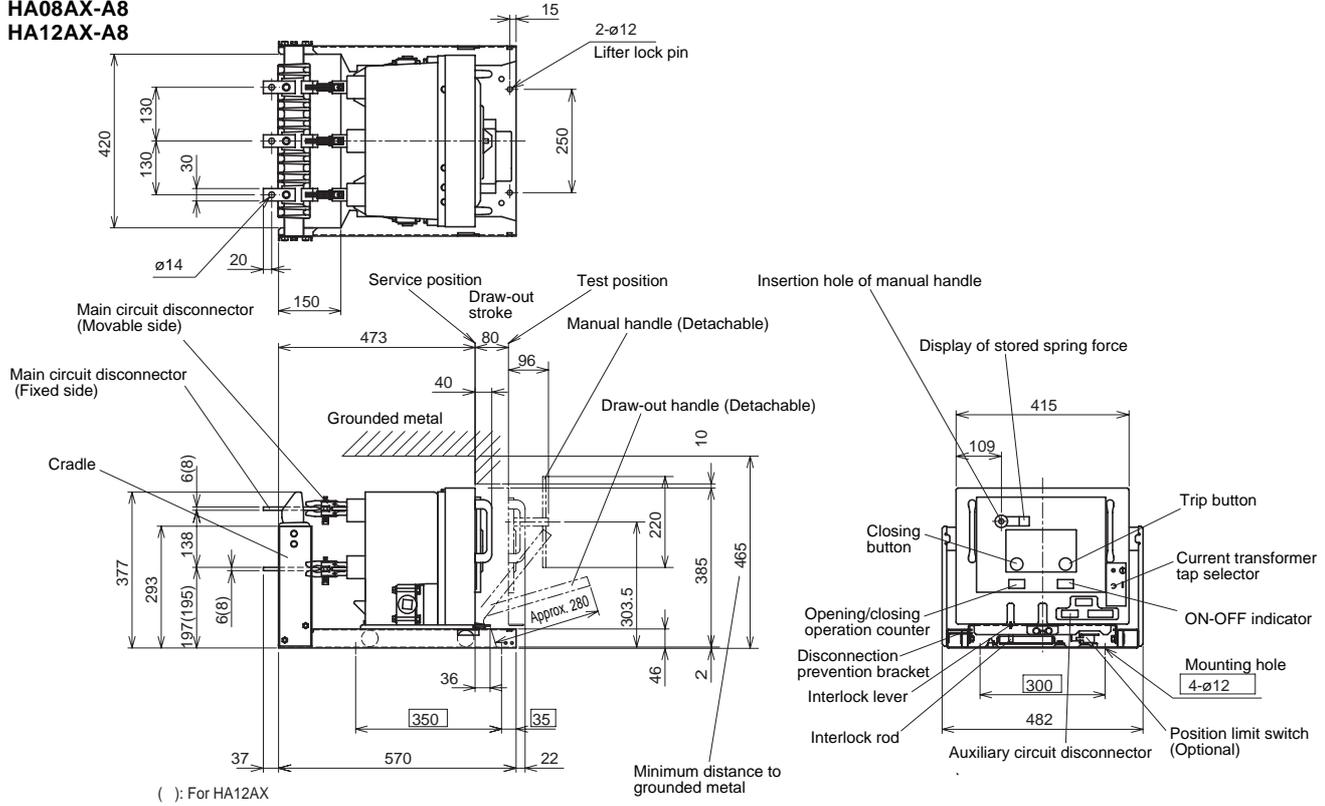
Vacuum circuit breakers

Auto. V/New-Auto.V

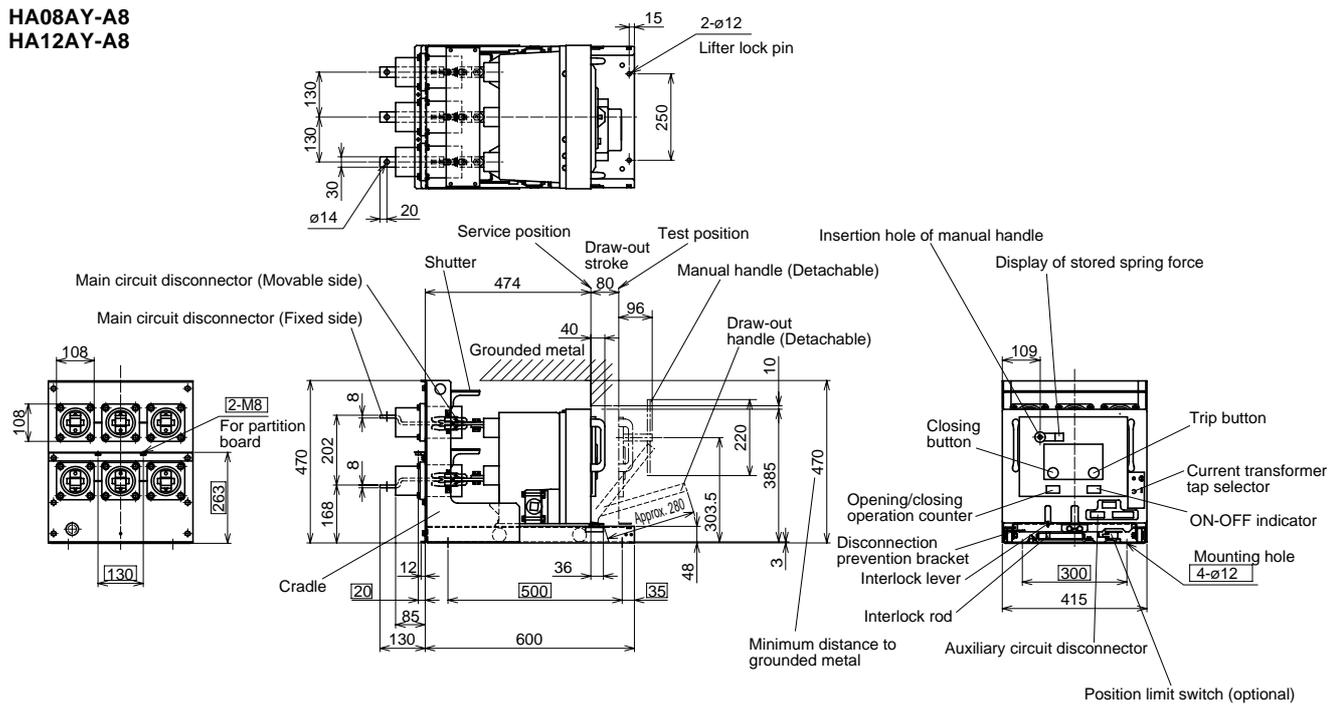
■ Dimensions, mm

Draw-out/X type

HA08AX-A8
HA12AX-A8



HA08AY-A8
HA12AY-A8



H.V. Distribution Equipment

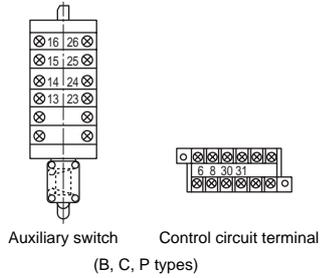
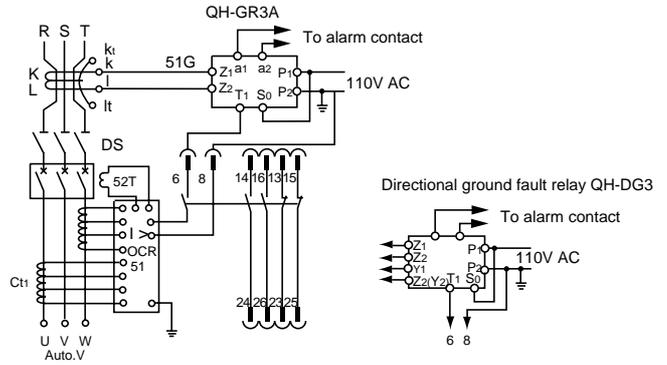
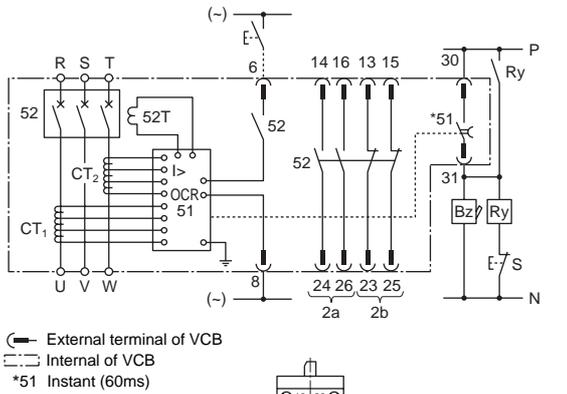
Vacuum circuit breakers

Auto.V/New-Auto.V

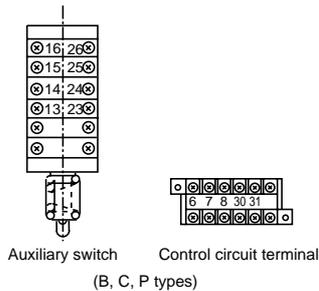
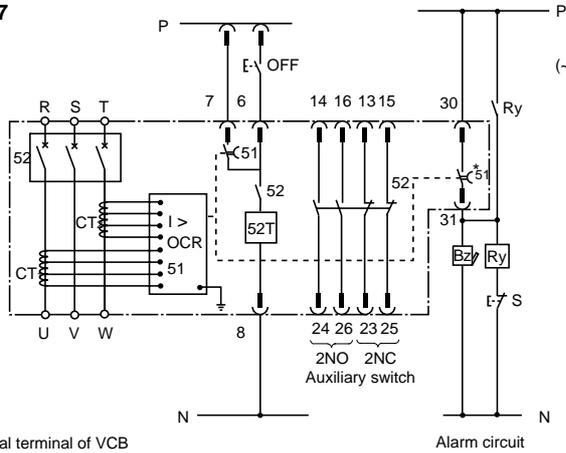
■ Wiring diagrams

HA08□-H6
HA12□-H6

Connected with ground fault relay

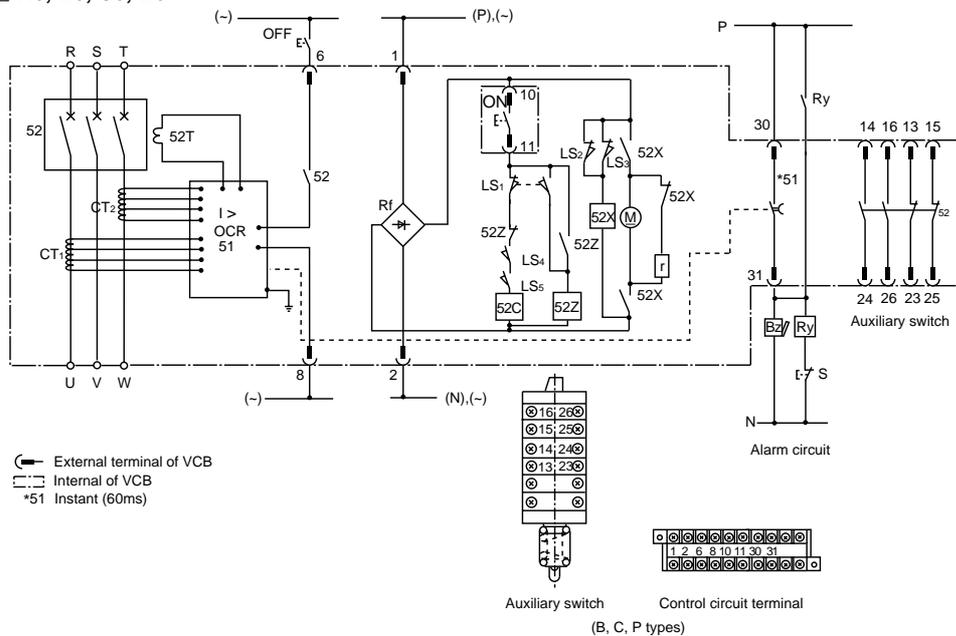


HA08□-H7
HA12□-H7

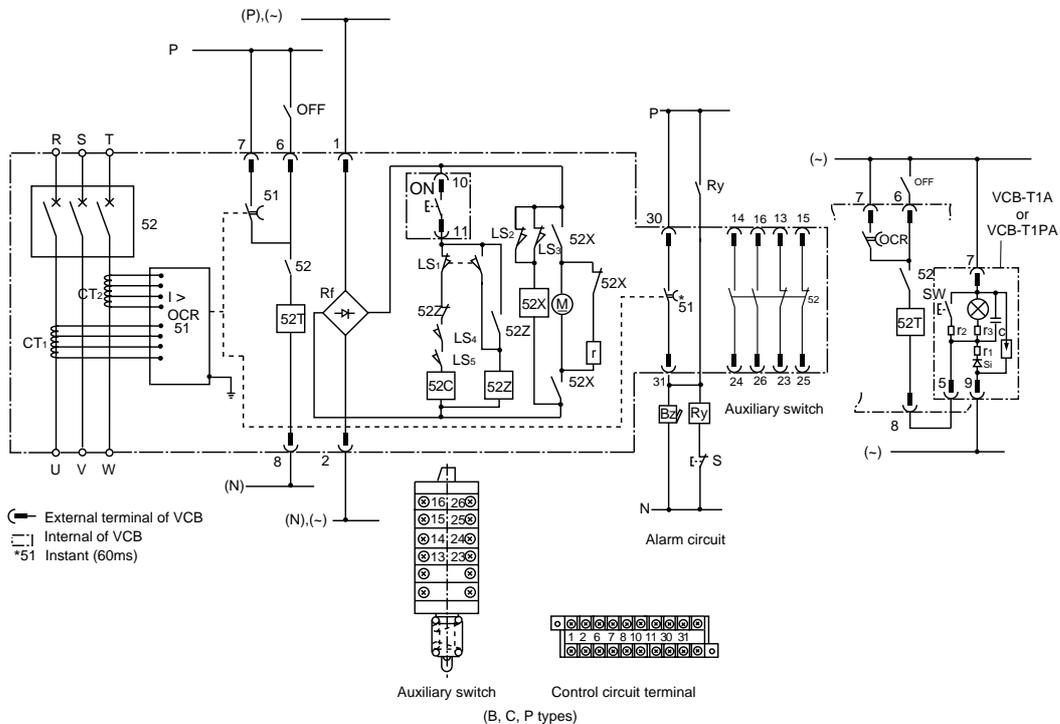


■ **Wiring diagrams**

HA08□-A6, B6, C6, D6
 HA12□-A6, B6, C6, D6



HA08□-A7, B7, C7, D7
 HA12□-A7, B7, C7, D7



52X : Magnetic contactor
 52Z : Anti-pumping relay
 52T : Shunt trip coil
 52C : Closing coil
 M : Motor
 Rf : Rectifier

LS1 : Limit switch
 LS2 : Limit switch (motor stop)
 LS3 : Limit switch (motor start)
 LS4 : Limit switch (closes when the closing spring is in the stored condition)
 LS5 : Limit switch (closes when the closing spring is in the stored condition)

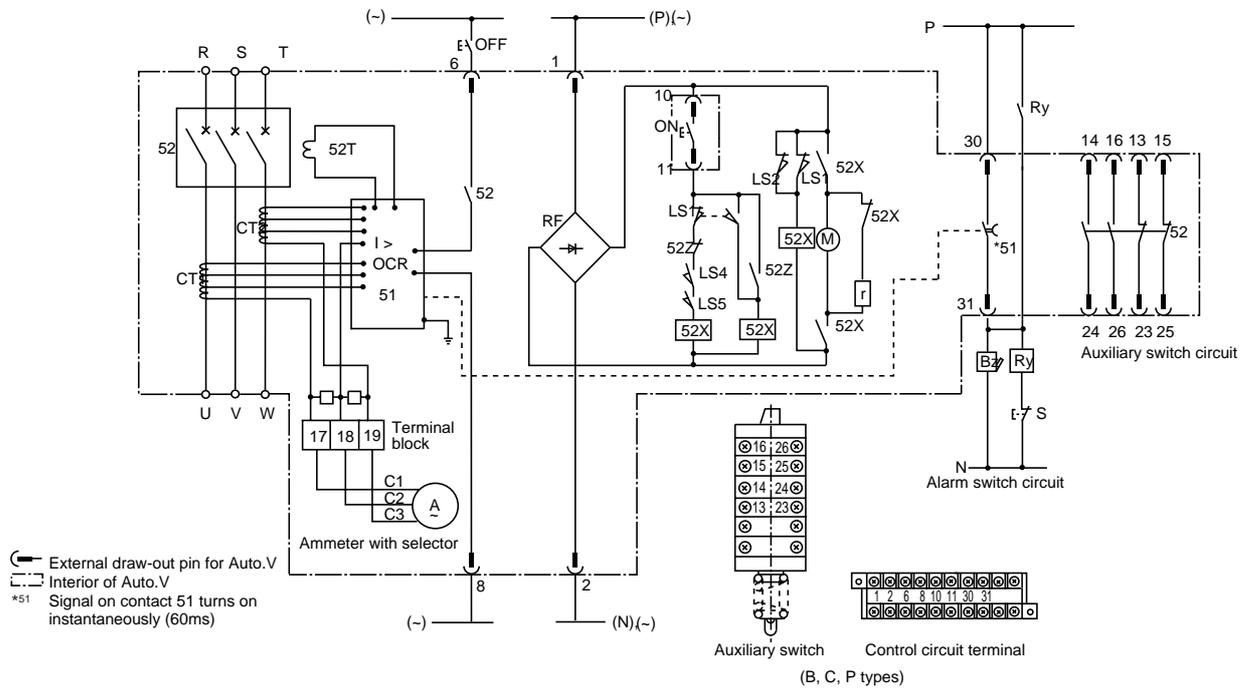
VCB-T1A, T1PA : Capacitor trip device
 OCR 51 : Overcurrent relay
 CT₁, CT₂ : Current transformer
 Bz : Fault indicating buzzer
 S : Buzzer stop switch
 Ry : Auxiliary relay (HH22 or HH23)
 51G : Ground fault relay

H.V. Distribution Equipment

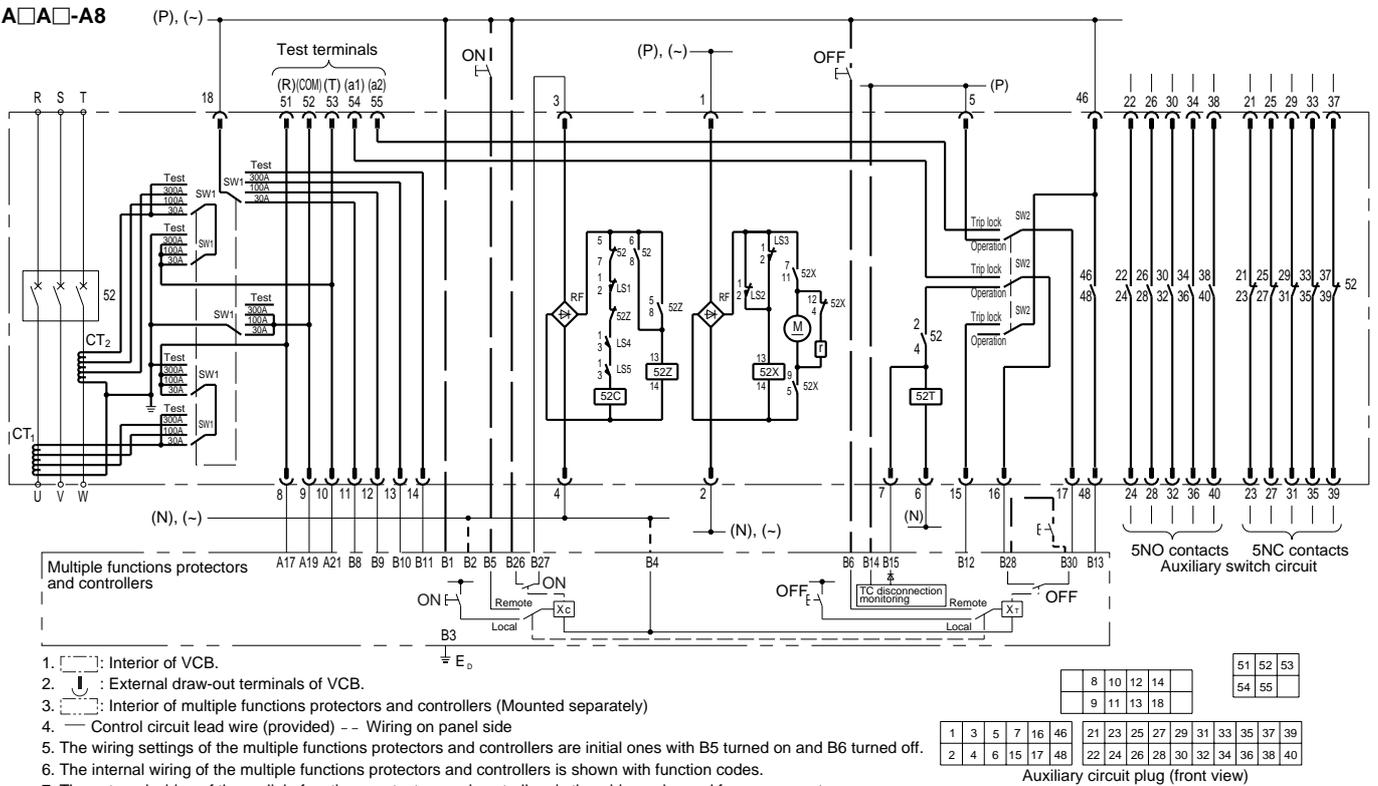
Vacuum circuit breakers

Auto. V/New-Auto.V

HA12□-A6M1



HA□A□-A8



52C: Making coil
 52T: Breaking coil
 52X: Magnetic contactor for closing circuit
 52Z: Pumping prevention relay
 M: Control motor
 RF: Rectifier
 CT1 and CT2: Current transformers

LS1: Limit switch (Draw-out interlock use)
 LS2: Limit switch (Motor stopping use)
 LS3: Limit switch (Motor startup use)
 LS4: Limit switch
 LS5: Limit switch (LS4 and LS5 are both turned on only when the circuit is ready to be turned on.)

SW1: Rotary switch (for CT tap or test selection)
 SW2: Toggle switch (for operation and trip lock selection)
 51 and OCR: Overcurrent relay
 Ry: Control relay
 Bx: Fault display buzzer
 S: Buzzer stop switch

■ Description

7.2/3.6kV, 400A, 600A, 8kA, 12.5kA
 The new Multi-VCB series of general-purpose vacuum circuit breakers are based on the conventional HA series and feature improved safety and ease of use. With 2300mm high switchgear cubicles they can be stacked up to four high with consequent saving of installation space. Multi VCBs are available in different mounting version such as the fixed type (B, C, P) and draw-out type (X, Y, U).

■ Features

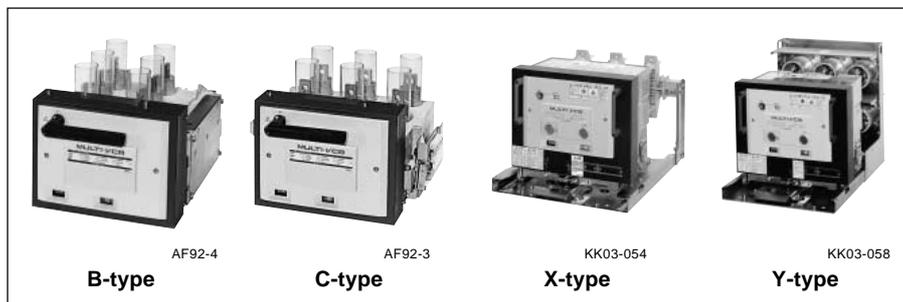
● Highly reliable and safety closing system

- Manual-spring stored energy closing system for improved operation safety, reliability, and constant closing speed.
- Half the torque formerly required for the manual operation and a new-turn-type handle improve operability.



AF92-7

AF92-8



B-type

C-type

X-type

Y-type

● Motor-spring stored energy type also improved

- Instantaneous closing system
- The new closing system ensures instantaneous closing time of 30ms. during switching to stand by circuit.
- AC/DC control circuit
Common AC and DC control circuit eases application.

■ More compact

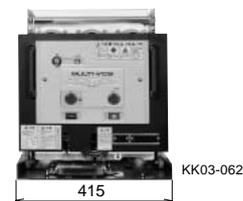
● Terminal blocks

- Terminal blocks are standard for the control circuits of motor-spring VCBs. Wire connect easily and quickly.

● Auxiliary switches

- Slide-action auxiliary switch contacts improve contact reliability.
- Auxiliary switches can have up to 5 NO contacts, and up to 5 NC contacts may be added as options for external circuits.

- The width of the draw-out type is compatible with a panel width of 500mm.
- The depth of the draw-out type is compatible with a panel depth of 700mm.



Draw-out MW and PW type



Draw-out type for small depth switchboard.

■ Specifications

| Type | HA08□-H■ | HA12□-H■ | HA08□-A■ | HA12□-A■ | HA08A□-A■ | HA12A□-A■ |
|---|--|-----------------------------------|-----------------------------------|-----------------------------------|-----------------------------------|-----------------------------------|
| Closing system | Manual-spring | | Motor-spring | | Motor-spring | |
| Installation □ | Fixed: B, C, P, | | Fixed: B, C, P | | Draw-out: X, Y, U | |
| Rated voltage (kV) | 3.6/7.2 | | 3.6/7.2 | | 3.6/7.2 | |
| Rated current (A) | 400 | 600 | 400 | 600 | 400 | 600 |
| Rated frequency (Hz) | 50/60 | | 50/60 | | 50/60 | |
| Rated breaking capacity (kA) | 8 | 12.5 | 8 | 12.5 | 8 | 12.5 |
| | 50MVA at 3.6kV 100MVA at 7.2kV | 80MVA at 3.6kV 160MVA at 7.2kV | 50MVA at 3.6kV 100MVA at 7.2kV | 80MVA at 3.6kV 160MVA at 7.2kV | 50MVA at 3.6kV 100MVA at 7.2kV | 80MVA at 3.6kV 160MVA at 7.2kV |
| Rated making current, peak value (kA) | 20 | 31.5 | 20 | 31.5 | 20 | 31.5 |
| Rated closing time | — | | 0.03 | | 0.03 | |
| Rated short-time current, 1 second (kA) | 8 | 12.5 | 8 | 12.5 | 8 | 12.5 |
| Insulation level | Dielectric: 22kV, 1 minute | | Impulse (1.2 × 50μs): 60kV | | | |
| Rated breaking time | 3-cycle | | 3-cycle | | 3-cycle | |
| Opening time (s) | 0.03 | | 0.03 | | 0.03 | |
| Operating duty | 0 — 1 min. — CO — 3 min. — CO or CO — 15 sec. — CO | | | | | |
| Life expectancy | Mechanical (operations) Electrical (operations) | | 10,000 10,000 | | | |
| No. of operations (operations/hour) | 60 | | | | | |
| Applicable capacitor capacity* (kVA) | 3,000 | 5,000 | 3,000 | 5,000 | 3,000 | 5,000 |
| Auxiliary contact | 2NO + 2NC (5NO + 5NC available on request) | | | | 5NO + 5NC | |
| Mass (kg) | Fixed | 23 | 26 | 25 | 28 | — |
| | Draw-out (X type) | — | — | — | — | 34 |
| | Cradle for X type | — | — | — | — | 35 |
| | | — | — | — | — | 11 |
| Standard | H.V. circuit breaker: JIS C 4603 (1990), AC circuit breaker: JEC 2300 (1998) | | | | | |

Note: * Maximum values when the VCB is used with a 6% reactor connected in a 6.6kV AC circuit.
 Halve these values for a 3.3kV AC circuit.

■ Trip system

Fuji Electric FA Components & Systems Co., Ltd./D & C Catalog
 Information subject to change without notice

H.V. Distribution Equipment

Vacuum circuit breakers

Multi VCB

■ Closing system

| System | Specification | Motor current | Coil current | Remarks |
|--------------|---------------|----------------|--------------|--|
| Motor-spring | A | 100/110V AC/DC | 0.5A | <ul style="list-style-type: none"> Use a VT with a capacity of at least 50VA. Use a 3A fuse to protect the control circuit Spring charging time is 5 seconds. |
| | B | 200/220V AC/DC | 0.5A | |
| | C | 48V DC | 1.0A | |
| | D | 21/24V DC | 1.5A | |

■ Tripping system

| System | Specification | Remarks |
|-------------------|---------------|--|
| Shunt trip *1, *2 | 1 | For an AC-trip control circuit, use also a capacitor trip device VCB-T1A (for 100/110 AC) or VCB-T2A (for 200/220V AC), sold separately. |
| | 2 | |
| | 3 | |
| | 4 | |
| Current trip | 5 | 3A × 2 trip coil Operating current: At least 3A The impedance of coil is less than 8Ω. |

Note: *1 To use AC to trip the Multi VCB, use a capacitor trip device in combination with the trip system.

*2 Use the static-type OCR (overcurrent relay) in combination with Fuji Electric's QH-OC1 or QH-OC2, and fault display in combination with the JH11 type (shunt trip code 1, 2: DC1A coil, 3: DC3A coil, 4: DC3A coil, or 5: AC5A coil).

■ Auxiliary contact

| Contact arrangement | Specification | Remarks |
|--------------------------------|---------------------------------------|---|
| 2NO + 2NC standard provided | 100/200V AC, 10A 100/200V DC, 5/3A | 5NO + 5NC contacts are available on request |

■ Type number nomenclature

• Fixed type

Basic type

Breaking capacity

08: 8kA (Rated current 400A)
12: 12.5kA (Rated current 600A)

Installation

B: Fixed, switchboard use
C: Fixed, cubicle use
P: Fixed, portable type

HA 08 B - A 1 L

Vacuum interrupter used

Blank: Standard level interrupter
L: Low-level-surge interrupter

Tripping system

1: Shunt trip 100/110V DC
2: Shunt trip 200/220V DC
3: Shunt trip 48V DC
4: Shunt trip 21/24V DC
5: Current trip 3A × 2-trip coil

Closing system

H: Manual-spring
A: Motor-spring, Instantaneous closing
100/110V AC/DC
B: Motor-spring, Instantaneous closing
200/220V AC/DC
C: Motor-spring, Instantaneous closing 48V DC
D: Motor-spring, Instantaneous closing 21/24V DC

• Draw-out type

Basic type

Breaking capacity

08: 8kA (Rated current 400A)
12: 12.5kA (Rated current 600A)

Installation

X: Draw-out, with cradle for JEM 1425 class CW
Y: Draw-out, with cradle and shutter for JEM 1425 class MW and PW
U: For use in small depth switchboard, JEM 1425 class CW

Closing system

A: Motor-spring, Instantaneous closing
100/110V AC/DC
B: Motor-spring, Instantaneous closing
200/220V AC/DC
C: Motor-spring, Instantaneous closing 48V DC
D: Motor-spring, Instantaneous closing 21/24V DC

HA 08 A X - A 1 L S1 K

Panel lead wire

Blank: With panel lead wire
K: Plug only

Position switch

Blank: With no position switch
S1: Run position and test position, both with SPDT contacts

Vacuum interrupter used

Blank: Standard level interrupter
L: Low-level-surge interrupter

Tripping system

1: Shunt trip 100/110V DC
2: Shunt trip 200/220V DC
3: Shunt trip 48V DC
4: Shunt trip 21/24V DC

■ **Types and ratings**

| Ratings | Installation | Closing system | | Type | Ordering code |
|---|---------------|----------------|-------------------|-------------------|---------------|
| | | Closing system | Operating voltage | | |
| Voltage 3.6/7.2kV Breaking current 8.0kA Rated current 400A | Fixed: B | Manual-spring | | HA08B-H □ | HA31BH□-400 |
| | | Motor-spring | 100/110V AC/DC | HA08B-A □ | HA31BA□-400 |
| | | Instantaneous | 200/220V AC/DC | HA08B-B □ | HA31BB□-400 |
| | | | 48V DC | HA08B-C □ | HA31BC□-400 |
| | | | 21/24V DC | HA08B-D □ | HA31BD□-400 |
| | | | | | |
| | Fixed: C | Manual-spring | | HA08C-H □ | HA31CH□-400 |
| | | Motor-spring | 100/110V AC/DC | HA08C-A □ | HA31CA□-400 |
| | | Instantaneous | 200/220V AC/DC | HA08C-B □ | HA31CB□-400 |
| | | | 48V DC | HA08C-C □ | HA31CC□-400 |
| | | | 21/24V DC | HA08C-D □ | HA31CD□-400 |
| | | | | | |
| | Fixed: P | Manual-spring | | HA08P-H □ | HA31PH□-400 |
| | | Motor-spring | 100/110V AC/DC | HA08P-A □ | HA31PA□-400 |
| | | Instantaneous | 200/220V AC/DC | HA08P-B □ | HA31PB□-400 |
| | | | 48V DC | HA08P-C □ | HA31PC□-400 |
| | | | 21/24V DC | HA08P-D □ | HA31PD□-400 |
| | | | | | |
| | Draw-out: X | Motor-spring | 100/110V AC/DC | HA08AX-A □ | HA08AX-A□ |
| | | Instantaneous | 200/220V AC/DC | HA08AX-B □ | HA08AX-B□ |
| | | | 48V DC | HA08AX-C □ | HA08AX-C□ |
| | | | 21/24V DC | HA08AX-D □ | HA08AX-D□ |
| | Draw-out: Y | Motor-spring | 100/110V AC/DC | HA08AY-A □ | HA08AY-A□ |
| | | Instantaneous | 200/220V AC/DC | HA08AY-B □ | HA08AY-B□ |
| | | 48V DC | HA08AY-C □ | HA08AY-C□ | |
| | | 21/24V DC | HA08AY-D □ | HA08AY-D□ | |
| Draw-out: U | Motor-spring | 100/110V AC/DC | HA08AU-A □ | HA08AU-A□ | |
| | Instantaneous | 200/220V AC/DC | HA08AU-B □ | HA08AU-B□ | |
| | | 48V DC | HA08AU-C □ | HA08AU-C□ | |
| | | 21/24V DC | HA08AU-D □ | HA08AU-D□ | |
| Voltage 3.6/7.2kV Breaking current 12.5kA Rated current 600A | Fixed: B | Manual-spring | | HA12B-H □ | HA32BH□-600 |
| | | Motor-spring | 100/110V AC/DC | HA12B-A □ | HA32BA□-600 |
| | | Instantaneous | 200/220V AC/DC | HA12B-B □ | HA32BB□-600 |
| | | | 48V DC | HA12B-C □ | HA32BC□-600 |
| | | | 21/24V DC | HA12B-D □ | HA32BD□-600 |
| | | | | | |
| | Fixed: C | Manual-spring | | HA12C-H □ | HA32CH□-600 |
| | | Motor-spring | 100/110V AC/DC | HA12C-A □ | HA32CA□-600 |
| | | Instantaneous | 200/220V AC/DC | HA12C-B □ | HA32CB□-600 |
| | | | 48V DC | HA12C-C □ | HA32CC□-600 |
| | | | 21/24V DC | HA12C-D □ | HA32CD□-600 |
| | | | | | |
| | Fixed: P | Manual-spring | | HA12P-H □ | HA32PH□-600 |
| | | Motor-spring | 100/110V AC/DC | HA12P-A □ | HA32PA□-600 |
| | | Instantaneous | 200/220V AC/DC | HA12P-B □ | HA32PB□-600 |
| | | | 48V DC | HA12P-C □ | HA32PC□-600 |
| | | | 21/24V DC | HA12P-D □ | HA32PD□-600 |
| | | | | | |
| | Draw-out: X | Motor-spring | 100/110V AC/DC | HA12AX-A □ | HA12AX-A□ |
| | | Instantaneous | 200/220V AC/DC | HA12AX-B □ | HA12AX-B□ |
| | | | 48V DC | HA12AX-C □ | HA12AX-C□ |
| | | | 21/24V DC | HA12AX-D □ | HA12AX-D□ |
| | Draw-out: Y | Motor-spring | 100/110V AC/DC | HA12AY-A □ | HA12AY-A□ |
| | | Instantaneous | 200/220V AC/DC | HA12AY-B □ | HA12AY-B□ |
| | | 48V DC | HA12AY-C □ | HA12AY-C□ | |
| | | 21/24V DC | HA12AY-D □ | HA12AY-D□ | |
| Draw-out: U | Motor-spring | 100/110V AC/DC | HA12AU-A □ | HA12AU-A□ | |
| | Instantaneous | 200/220V AC/DC | HA12AU-B □ | HA12AU-B□ | |
| | | 48V DC | HA12AU-C □ | HA12AU-C□ | |
| | | 21/24V DC | HA12AU-D □ | HA12AU-D□ | |

Tripping system

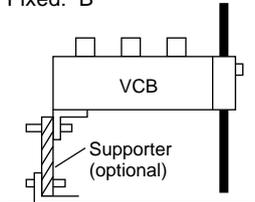
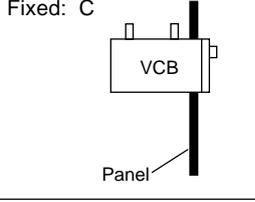
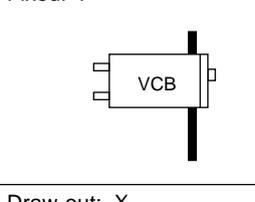
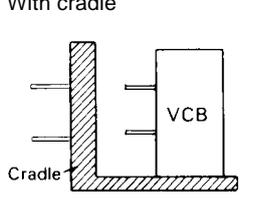
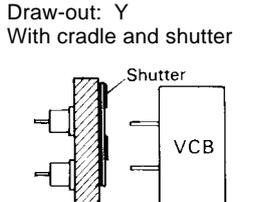
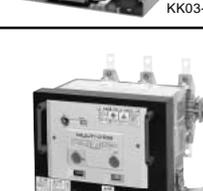
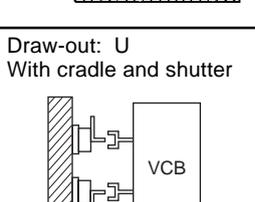
- : 1: Shunt trip 100/110V DC
- 2: Shunt trip 200/220V DC
- 3: Shunt trip 48V DC
- 4: Shunt trip 21/24V DC
- 5: Current trip 3A × 2 -trip coil (Fixed type only)

H.V. Distribution Equipment

Vacuum circuit breakers

Multi VCB

■ Installation and accessories

| Photo | Installation system | Description | Supplied accessories | Optional accessories |
|--|---|--|--|--|
|  <p>AF92-4</p> | Fixed: B  | <ul style="list-style-type: none"> Fixed type Open-type switchboard, indoor use Manual-spring handle or motor-spring H.V. main terminals are positioned at the top of the VCB. This facilitates replacement of VCB. | <ul style="list-style-type: none"> Insulation tube for main terminal Manual handle for motor-spring type | <ul style="list-style-type: none"> Supporter Capacitor trip device Vacuum condition tester Surge absorber |
|  <p>AF92-3</p> | Fixed: C  | <ul style="list-style-type: none"> Fixed type Open-type cubicle use Manual-spring handle or motor-spring H.V. main terminals are located at the top of VCB. This facilitates replacement of VCB. | <ul style="list-style-type: none"> Insulation tube for main terminal Manual handle for motor-spring type | <ul style="list-style-type: none"> Supporter Capacitor trip device Vacuum condition tester Surge absorber |
|  <p>AF92-5</p> | Fixed: P  | <ul style="list-style-type: none"> Fixed type Open-type, portable type Manual-spring handle or motor-spring H.V. main terminals are located at the back of VCB. This facilitates replacement of VCB. | <ul style="list-style-type: none"> Manual handle for motor-spring type | <ul style="list-style-type: none"> Capacitor trip device Vacuum condition tester Surge absorber |
|  <p>KK03-054</p> | Draw-out: X With cradle  | <ul style="list-style-type: none"> Draw-out type JEM 1425 Class CW type metal enclosure/indoor use Manual-spring handle or motor-spring Cradle is provided to facilitate assembly and adjustment of switchgear. Interlock system and grounding device are provided. | <ul style="list-style-type: none"> Manual handle for motor-spring type Draw-out handle | <ul style="list-style-type: none"> Draw-out extension rail Position indicating switch Capacitor trip device Vacuum condition tester Surge absorber Lifter Testing jumper Connector with external lead wire |
|  <p>KK03-058</p> | Draw-out: Y With cradle and shutter  | <ul style="list-style-type: none"> Draw-out type Class MW, PW type metal enclosure/indoor use Manual-spring handle or motor-spring Cradle with shutter is provided to facilitate assembly and adjustment of switchgear. Interlock system and grounding device are provided. | <ul style="list-style-type: none"> Manual handle for motor-spring type Draw-out handle | <ul style="list-style-type: none"> Draw-out extension rail Position indicating switch Capacitor trip device Vacuum condition tester Surge absorber Lifter Testing jumper Connector with external lead wire |
|  <p>KK03-053</p> | Draw-out: U With cradle and shutter  | <ul style="list-style-type: none"> Draw-out type Class CW type metal enclosure/indoor use Manual-spring handle or motor-spring Cradle with shutter is provided to facilitate assembly and adjustment of switchgear. Interlock system and grounding device are provided. | <ul style="list-style-type: none"> Manual handle for motor-spring type Draw-out handle | <ul style="list-style-type: none"> Draw-out extension rail Position indicating switch Capacitor trip device Vacuum condition tester Surge absorber Lifter Testing jumper Connector with external lead wire |

■ Supplied accessories

● Insulation tube for main terminal

Installation types: B and C



● Manual handle for motor-spring type



● Draw-out handle

Installation types: X, Y, and U



● Connector with external lead wire

Installation types: X, Y and U



■ Optional accessories

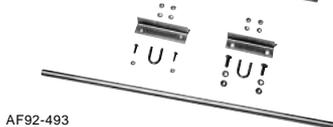
● Supporter

Supporter kit for stabilizing the back of fixed type B, C VCB on the floor.

Type: C



Type: B



● Draw-out extension rail (HZ2AE)

Used with draw-out type (X, Y, U). Use of an extension rail makes daily checking easier because the VCB can be pulled out of the panel. Double stack types do not require lifters or chain blocks.



● Position indicating switch (HZ2AD)

Switch for indicating the service positions and test positions of draw-out (X, Y, U). Used for interlocking to other devices attached to the cradle for draw-out type.



● Vacuum condition tester VC-1A

For further information see page 12/25.



● C-R type surge absorber AF3320R3TXG0542 AF6620R3TXG0543

For further information see page 12/25.

● Testing jumper (HZ2AG)

Use to test remote ON/OFF operation of a VCB.



● Arrester GLI-3G GLI-6G

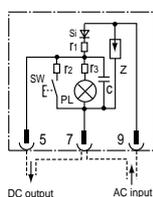


● Capacitor trip device VCB-T1A, T2A, VCB-T1PA, T2PA

These are used when the trip circuit is connected to AC power supply.

| Type | VCB-T1A VCB-T1PA | VCB-T2A VCB-T2PA |
|----------------------|---------------------|---------------------|
| Rated input voltage | 100/110V AC | 200/220V AC |
| Shunt trip coil volt | 100/110V DC | 200/220V DC |

Wiring diagram



Surface mounting VCB-T1A, T2A



Flush mounting VCB-T1PA, T2PA



● Lifter L-2HNB



Name
 r1: Charging resistor
 r2: Discharge resistor
 r3: Series resistor
 Si: Silicon rectifier diode
 PL: Pilot lamp

C: Electrolytic capacitor
 SW: Discharge switch
 Z: Surge absorber

H.V. Distribution Equipment

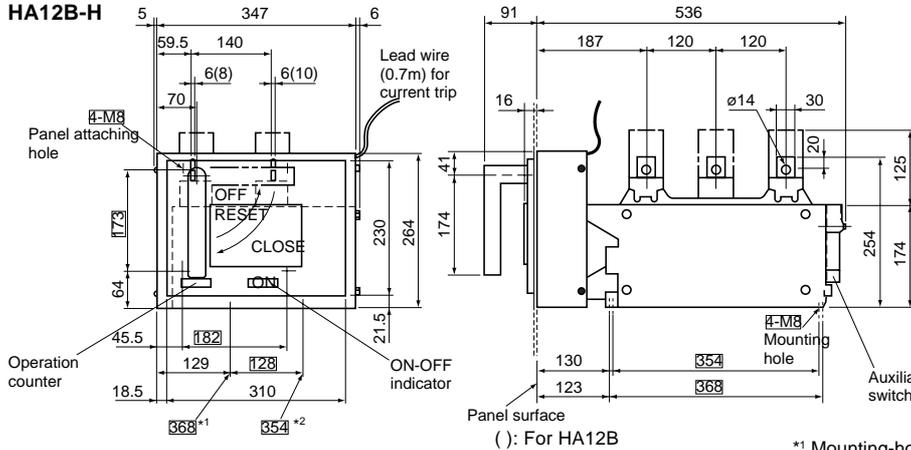
Vacuum circuit breakers

Multi VCB

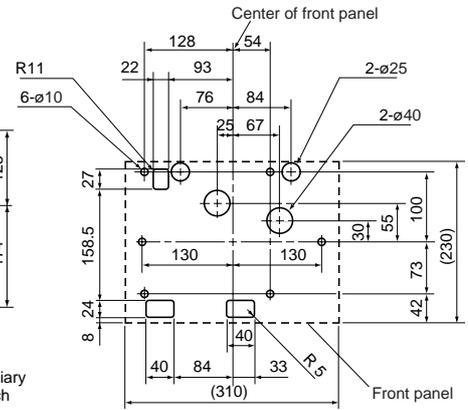
■ Dimensions, mm

Fixed/B type

HA08B-H
HA12B-H

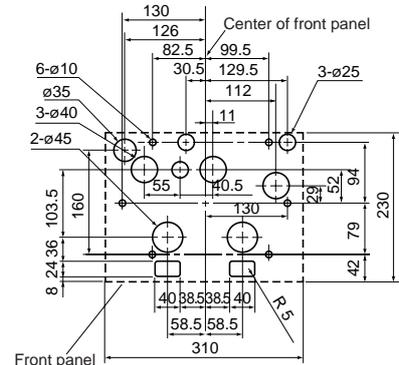
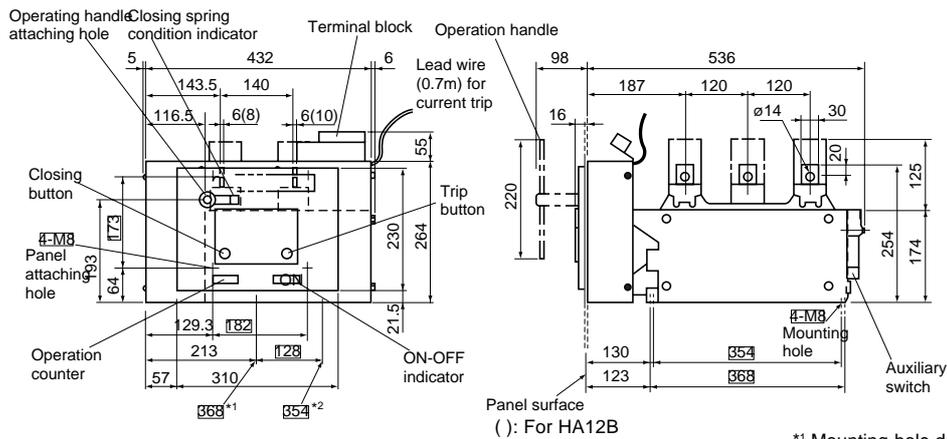


Panel cutting



*1 Mounting-hole depth dimension pitch: 368mm side from panel surface
*2 Mounting-hole depth dimension pitch: 354mm side from panel surface

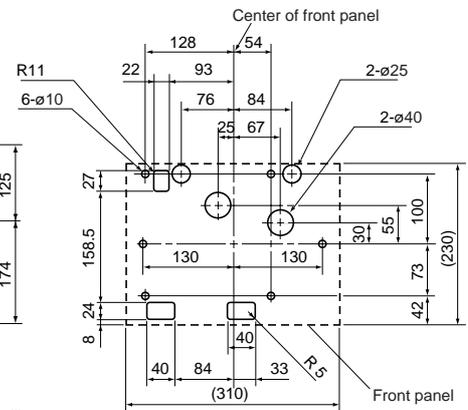
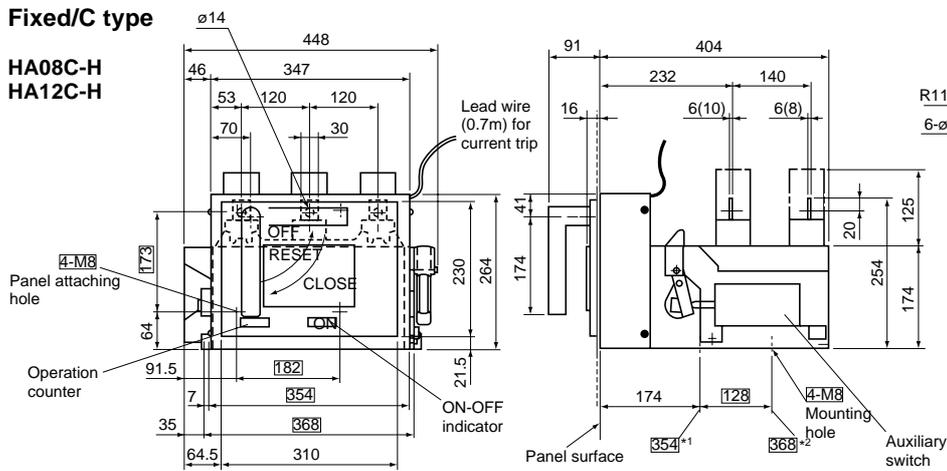
HA08B-A
HA12B-A



*1 Mounting-hole depth dimension pitch: 368mm side from panel surface
*2 Mounting-hole depth dimension pitch: 354mm side from panel surface

Fixed/C type

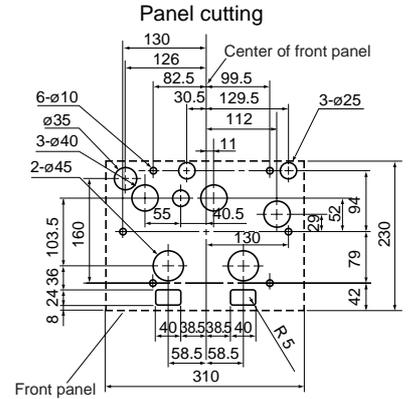
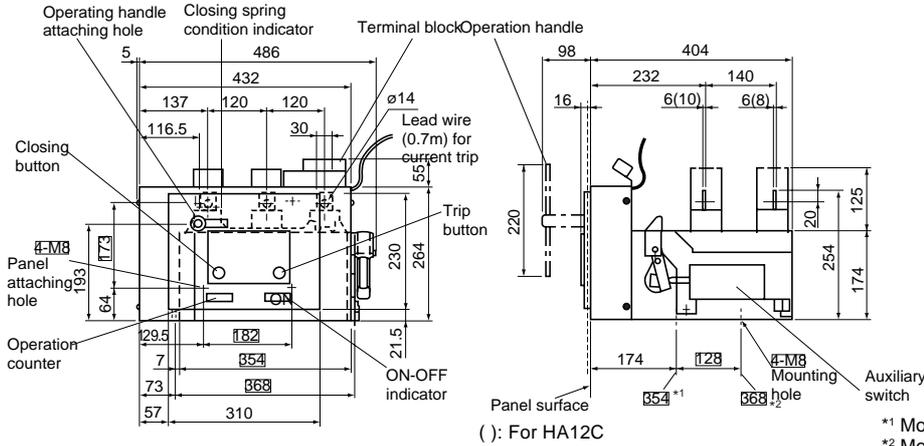
HA08C-H
HA12C-H



*1 Mounting-hole width-direction dimension pitch: 354mm side
*2 Mounting-hole width-direction dimension pitch: 368mm side

■ Dimensions, mm
Fixed/C type

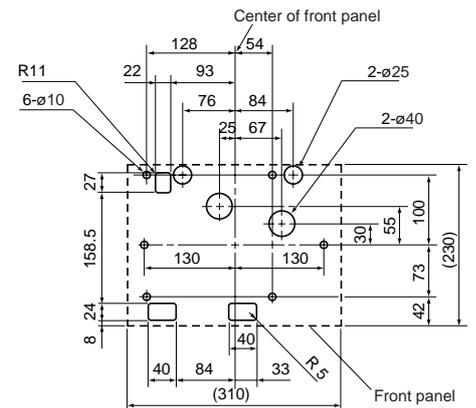
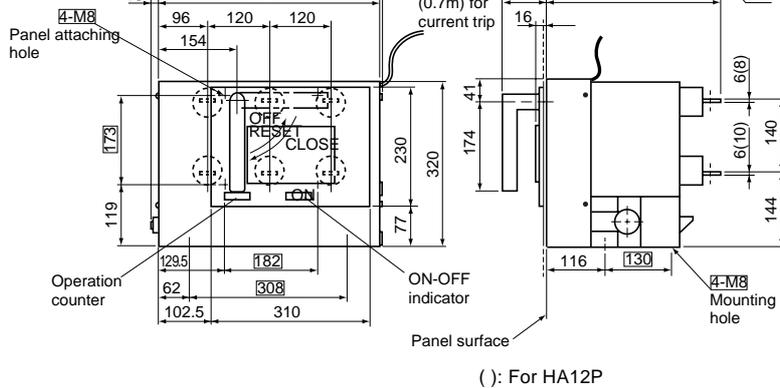
HA08C-A
HA12C-A



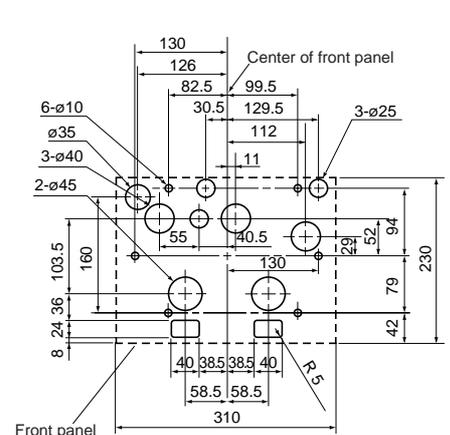
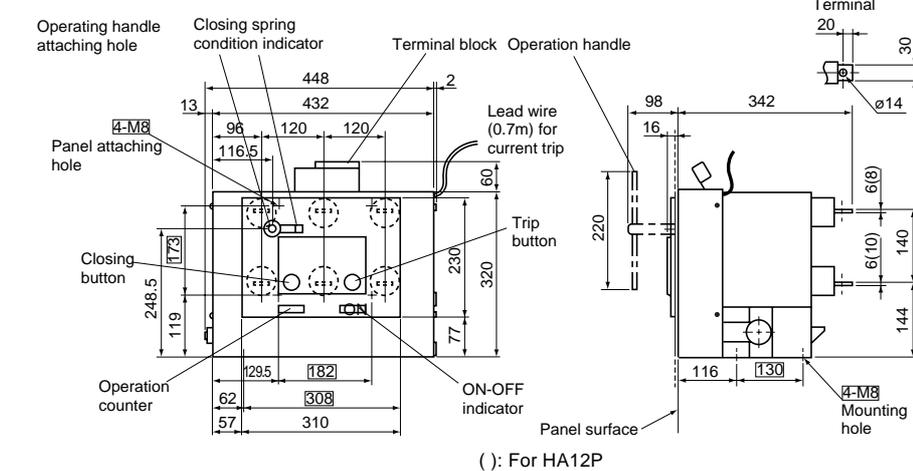
*1 Mounting-hole width-direction dimension pitch: 354mm side
 *2 Mounting-hole width-direction dimension pitch: 368mm side

Fixed/P type

HA08P-H
HA12P-H



HA08P-A
HA12P-A



H.V. Distribution Equipment

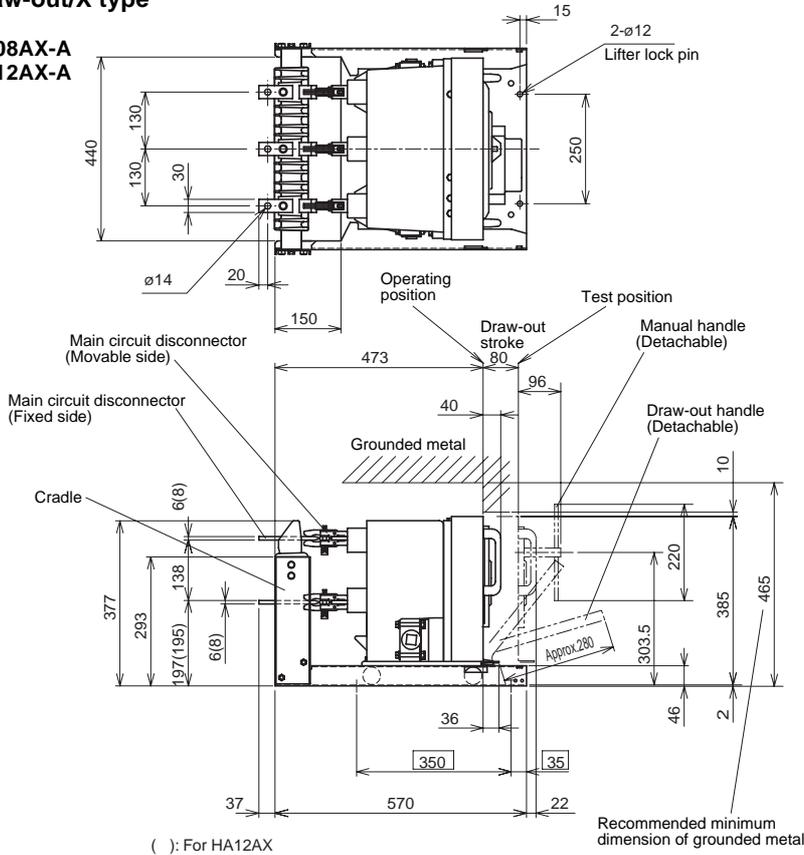
Vacuum circuit breakers

Multi VCB

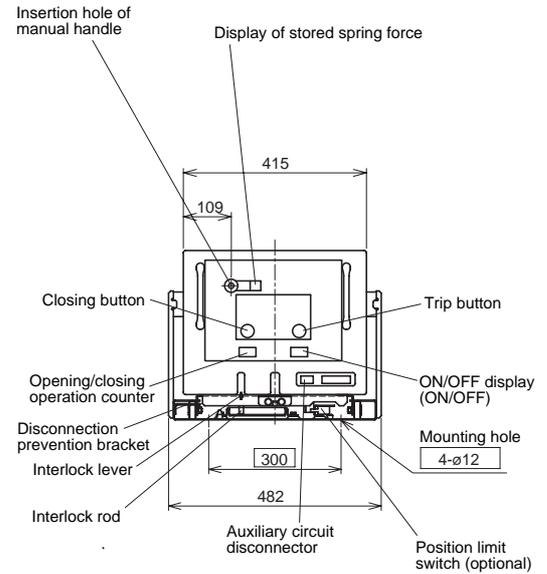
■ Dimensions, mm

Draw-out/X type

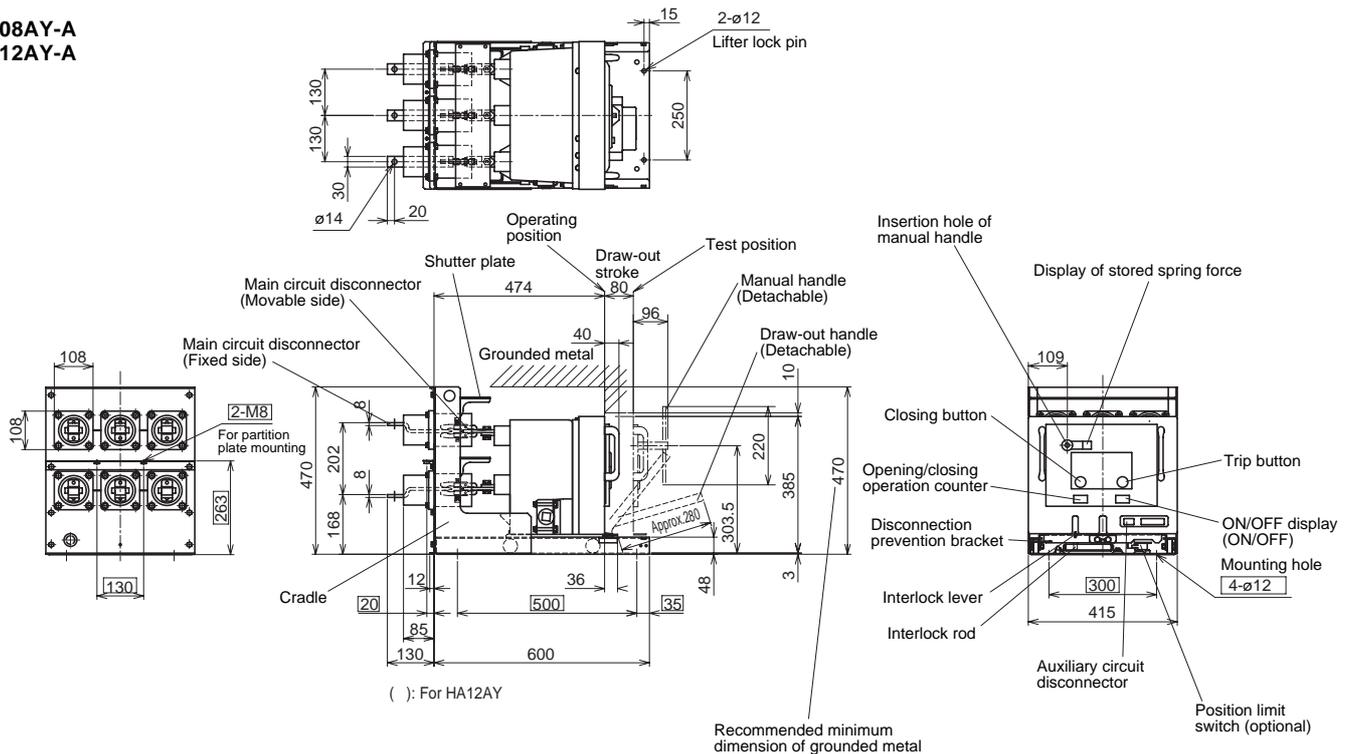
HA08AX-A
HA12AX-A



() : For HA12AX

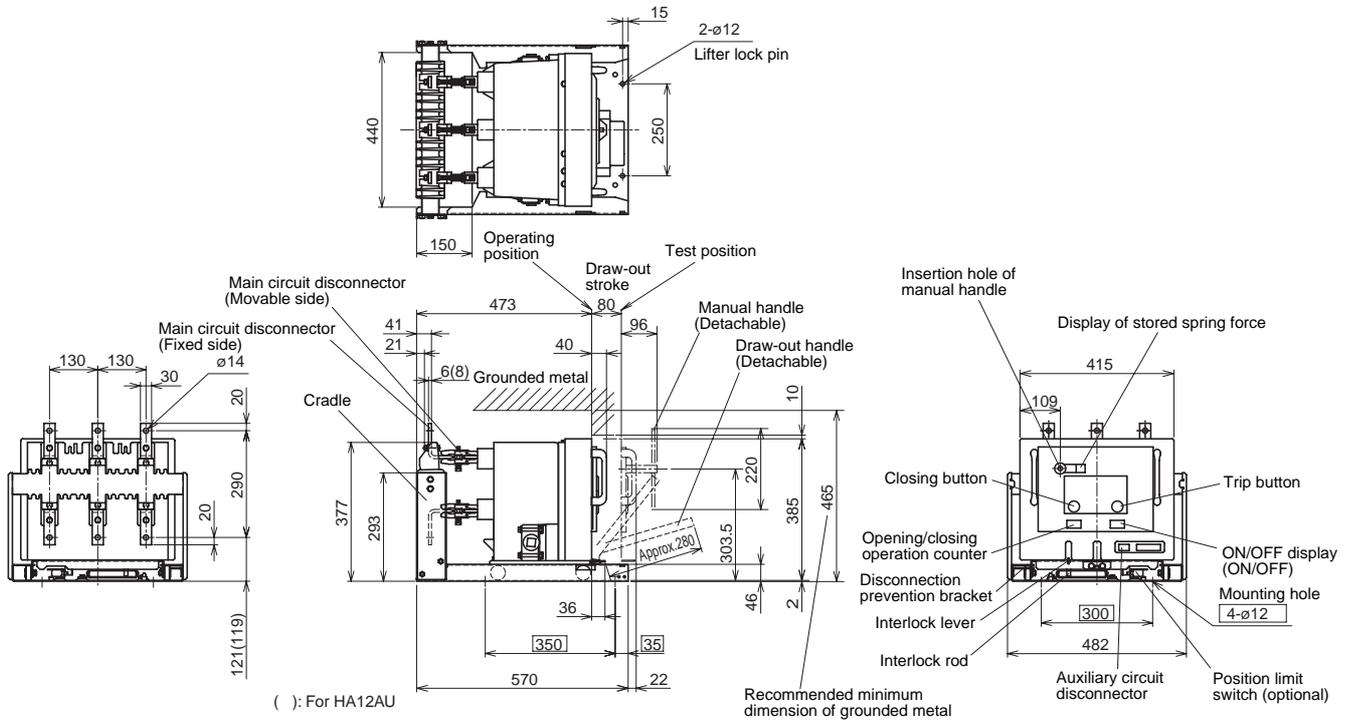


HA08AY-A
HA12AY-A



() : For HA12AY

HA08AU-A
 HA12AU-A



H.V. Distribution Equipment

Vacuum circuit breakers

Multi VCB

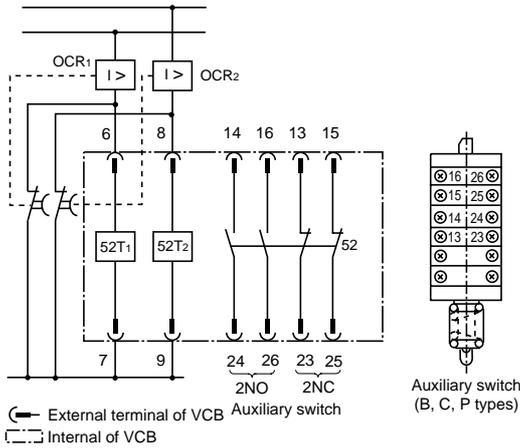
■ Wiring diagrams

● Fixed type

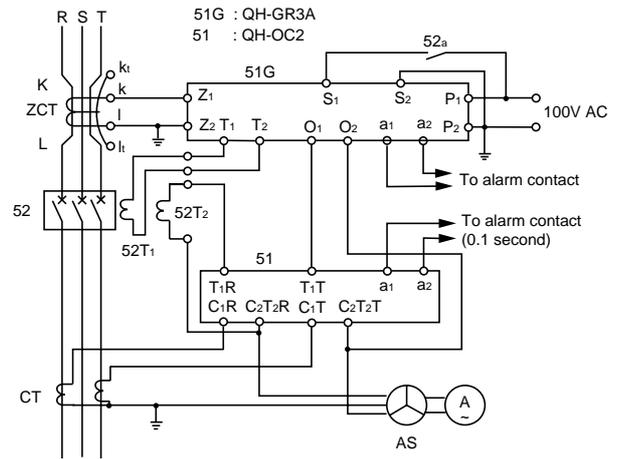
Manual-spring closing/current trip

HA08□-H5

HA12□-H5



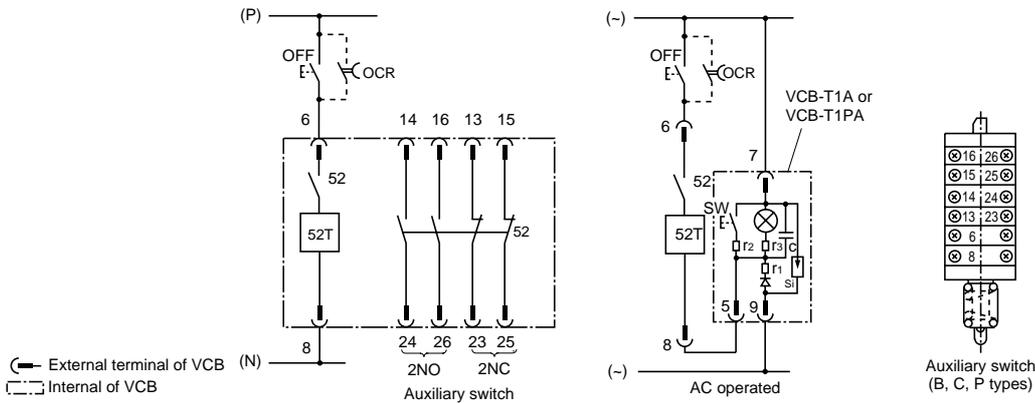
Connected with ground fault relay



Manual-spring closing/shunt trip

HA08□-H1, HA08□-H2, HA08□-H3, HA08□-H4

HA12□-H1, HA12□-H2, HA12□-H3, HA12□-H4

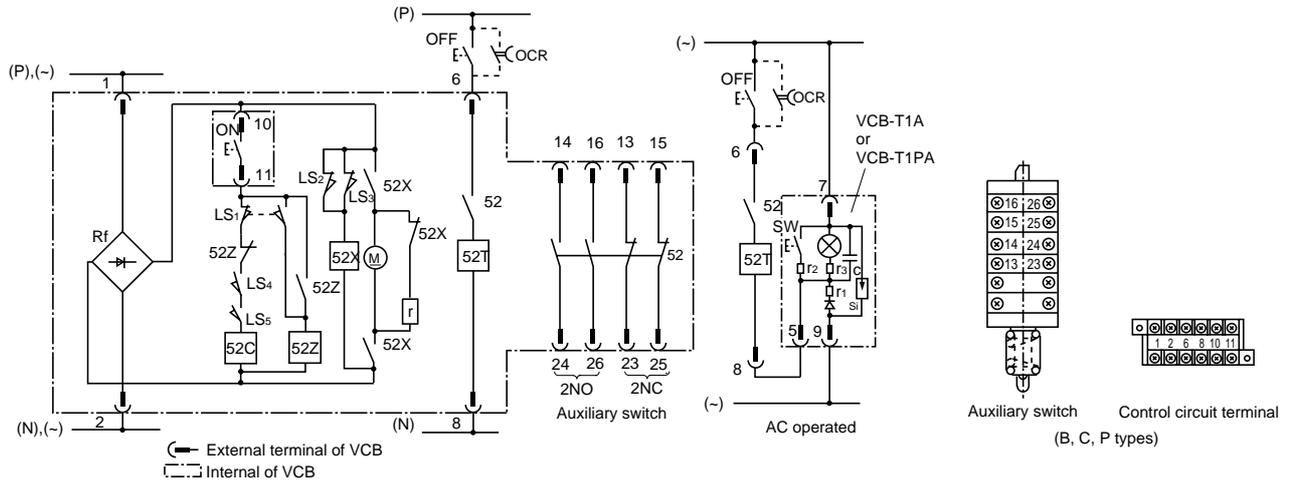


52T, 52T₁, 52T₂ : Trip coil
VCB-T1A, T1PA : Capacitor trip device (sold separately)

OCR, OCR₁, OCR₂ : Overcurrent protective relay
51G : Ground fault relay

Motor-spring closing/shunt trip

HA08□-A*, HA08□-B*, HA08□-C*, HA08□-D*
 HA12□-A*, HA12□-B*, HA12□-C*, HA12□-D*
 (* : 1, 2, 3, 4)



52X : Magnetic contactor
 52Z : Anti-pumping relay
 52T : Shunt trip coil
 52C : Closing coil
 M : Motor
 Rf : Rectifier

LS1 : Limit switch
 LS2 : Limit switch (motor stop)
 LS3 : Limit switch (motor start)
 LS4 : Limit switch (closes when the closing spring is in the stored condition)
 LS5 : Limit switch (closes when the closing spring is in the stored condition)

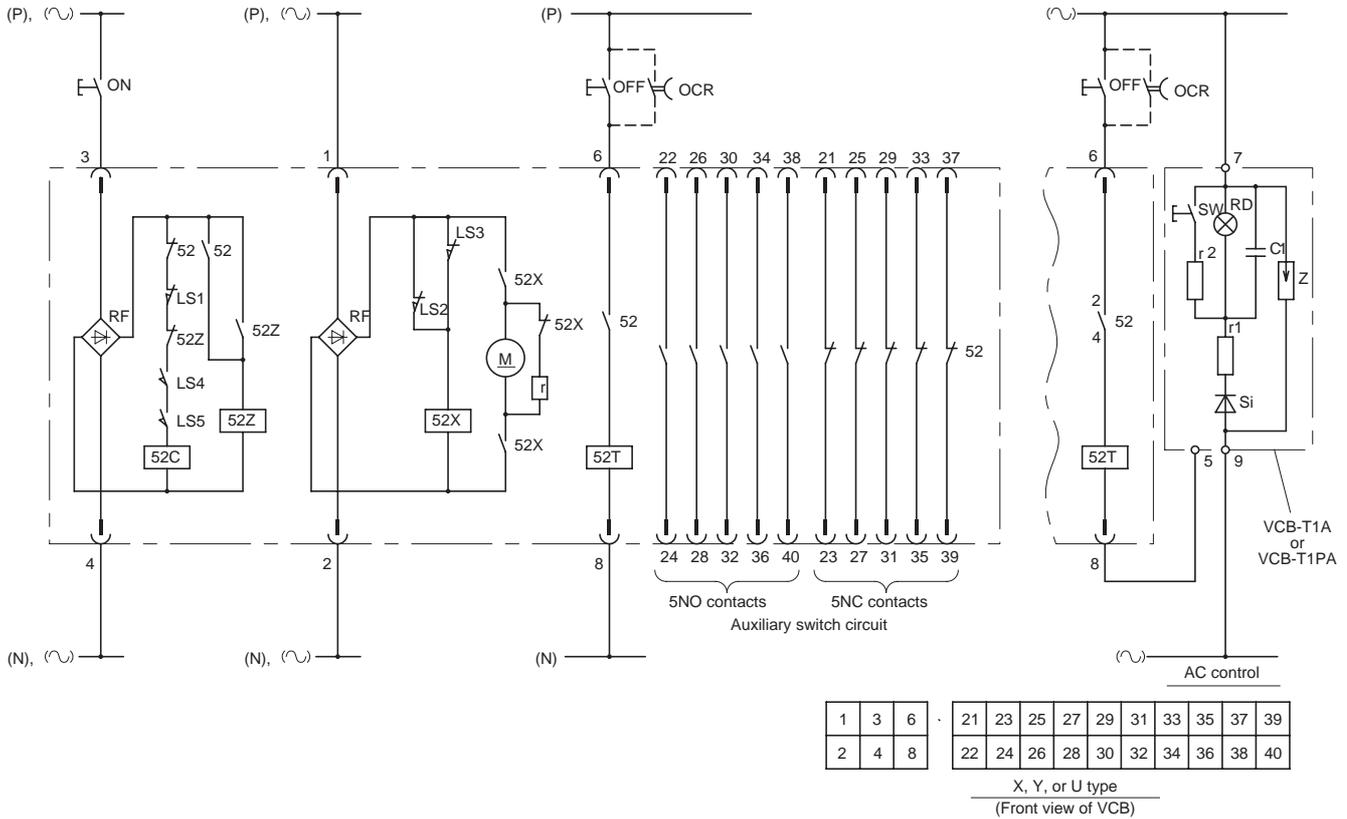
VCB-T1A, T1PA : Capacitor trip device
 OCR : Overcurrent relay

H.V. Distribution Equipment

Vacuum circuit breakers

Multi VCB

● Draw-out type
Motor-spring closing/shunt trip



52C: Closing coil
52T: Breaking coil
52X: Magnetic contactor for closing circuit
52Z: Pumping prevention relay
M: Control motor
RF: Rectifier

LS1: Limit switch (Draw-out interlock use)
LS2: Limit switch (Motor stopping use)
LS3: Limit switch (Motor startup use)
LS4: Limit switch
LS5: Limit switch (LS4 and LS5 are both turned on only when the the circuit is ready to be turned on.)

VCB-T1A or VCB-T1PA: Capacitor shunt trip power supply (Sold separately)
OCR: Overcurrent relay

■ **Description**

3.3/6.6kV 200, 400 Amps

HN-type vacuum magnetic contactors incorporate a SUPER MAGNET that has a built-in IC. The IC minimizes the power consumption used in the closing circuit. HN types vacuum magnetic contactors operate on both AC and DC power supplies. A common insulating frame for units with a rated voltage of 3kV and 6kV simplifies switchgear design.

■ **Features**

The SUPER MAGNET

- Holding currents are minimized with an IC-controlled closing circuit. This is a cost-effective feature.
- Both AC and DC power supply operation possible.
- The SUPER MAGNET holds without chattering even when the line control voltage drops.
- The SUPER MAGNET's wide range of operating voltages allows it to be used in countries throughout the world.

Operating coil voltage

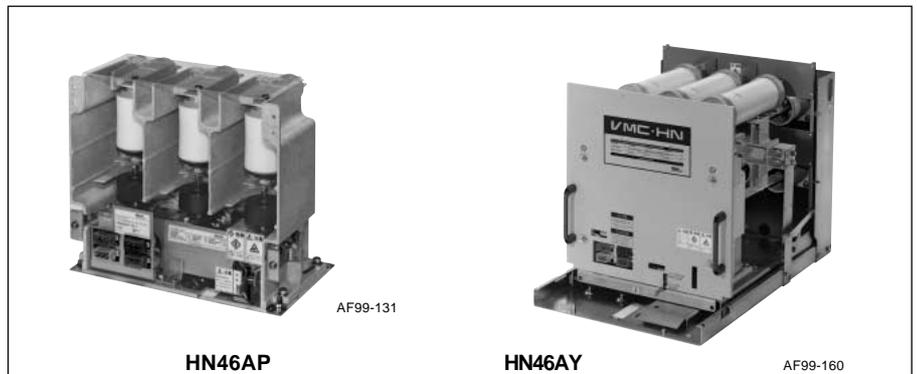
| Rated voltage | | Operating voltage range |
|---------------|----------|--------------------------|
| AC (50/60Hz) | DC | |
| - | 21-24V | 85-110% of rated voltage |
| - | 48V | |
| 100-110V | 100-110V | |
| 200-220V | 200-220V | |

Shared insulating frame for 3kV and 6kV contactors

HN type vacuum magnetic contactors have a special insulating frame. The dimensions of the frame are the same for both 3kV and 6kV models, which facilitates switchgear design.

Advanced vacuum interrupter

A high performance interrupter minimizes surges due to closing and breaking, which makes special surge precautions unnecessary.



■ **Specifications**

| Type | HN46A□*1-2 | HN46A□*1-4 |
|--|-----------------------|------------|
| Rated voltage (kV) | 3.3/6.6 | |
| Rated frequency (Hz) | 50/60 | |
| Rated current (A) | 200 | 400 |
| Rated breaking current (kA) | 4 | |
| Rated short-time current (kA) | 4 (2 sec.) | |
| Insulation level | | |
| Dielectric strength/1 min (kV) | 22 (16 between poles) | |
| Impulse 1.2X50µs (kV) | 60 (45 between poles) | |
| Making and breaking capacity (kA) | 1.6 | 3.2 |
| Operating frequency (sw/hour) | | |
| Normal energized type | 600 | |
| Mechanically latched type | 600 | |
| Electrical durability (Operations) | 250,000 | |
| Mechanical durability (Operations) | | |
| Normal energized type | 2,500,000 | |
| Mechanically latched type | 250,000 | |
| Average operating time | | |
| Opening time (ms) | 140 | |
| Closing time | | |
| Normal energized type (ms) | 100 | |
| Mechanically latched type (ms) | 20 | |
| Auxiliary contact | 3NO+3NC | |
| Max. applicable load (3.3/6.6kV) | | |
| 3-phase squirrel-cage type induction motor(kW) | 750/1500 | 1500/3000 |
| 3-phase transformer (kVA) | 1000/2000 | 2000/4000 |
| Capacitor (kVA) | 1000/2000 | 2000/4000 |
| Mass | | |
| Fixed type (Normal energized) (kg) | 19 | 19 |
| Draw-out type (Normal energized) (kg) | 34*2 | 34*2 |

□ *1: Installation system
P: Fixed type
X: Draw-out type
H: Draw-out type/Bushing type connector
Y: Draw-out type/Bushing type connector+shutter
(X, Y, H: With fuse holder)

*2: Without VT and cradle

H.V. Distribution Equipment

Vacuum magnetic contactors

HN series

■ Operating coil voltage and current

● Normal energized type

| Type | Rated operating voltage (V) * | Current (A) | |
|-----------------|-------------------------------|-------------|---------|
| | | Closing | Holding |
| HN46A□-2S1, 4S1 | 100-110 AC | 3 | 0.05 |
| | 100-110 DC | 3 | 0.05 |
| HN46A□-2S2, 4S2 | 200-220 AC | 1.5 | 0.03 |
| | 200-220 DC | 1.5 | 0.03 |
| HN46A□-2S4, 4S4 | 48 DC | 8 | 0.1 |

● Mechanically-latched type

| Type | Rated operating voltage (V) * | Current (A) | |
|-----------------|-------------------------------|-------------|------|
| | | Closing | Trip |
| HN46A□-2L1, 4L1 | 100-110 AC | 3 | 3.5 |
| | 100-110 DC | 3 | 3 |
| HN46A□-2L2, 4L2 | 200-220 AC | 1.5 | 2.2 |
| | 200-220 DC | 1.5 | 2 |
| HN46A□-2L3, 4L3 | 21-24 DC | 16 | 8.5 |
| HN46A□-2L4, 4L4 | 48 DC | 8 | 4.5 |

■ Ratings of auxiliary switch (Built-in)

| Contact arrangement | 3NO+3NC | |
|---------------------|-----------|-----------|
| Operating current | Res. Load | Ind. Load |
| 100/110V AC | — | 6A |
| 200/220V AC | — | 6A |
| 48V DC | 6A | 6A |
| 100/110V DC | 2.5A | 1.3A |
| 200/220V DC | 1A | 0.45A |

■ Types and ordering codes/Fixed types

| Installation system | Operating system | Rated voltage (kV) | Rated current (A) | Appropriate fuse type | Operating coil voltage (V) | | Type and ordering code |
|---------------------|----------------------|--------------------|-------------------|-----------------------|----------------------------|---------|------------------------|
| | | | | | AC | DC | |
| Fixed type (P) | Normal energized | 3.3/6.6 | 200 | — | 100-110 | 100-110 | HN46AP-2S1 |
| | | | | | 200-220 | 200-220 | HN46AP-2S2 |
| | | — | 48 | HN46AP-2S4 | | | |
| | | 3.3/6.6 | 400 | — | 100-110 | 100-110 | HN46AP-4S1 |
| | 200-220 | 200-220 | HN46AP-4S2 | | | | |
| | — | 48 | HN46AP-4S4 | | | | |
| | Mechanically latched | 3.3/6.6 | 200 | — | 100-110 | 100-110 | HN46AP-2L1 |
| | | | | | 200-220 | 200-220 | HN46AP-2L2 |
| — | | 21-24 | HN46AP-2L3 | | | | |
| — | | 48 | HN46AP-2L4 | | | | |
| 3.3/6.6 | 400 | — | 100-110 | 100-110 | HN46AP-4L1 | | |
| 200-220 | 200-220 | HN46AP-4L2 | | | | | |
| — | 21-24 | HN46AP-4L3 | | | | | |
| — | 48 | HN46AP-4L4 | | | | | |

■ Types and ordering codes/Draw-out types

| Installation system | Operating system | Rated voltage (kV) | Rated current (A) | Appropriate fuse type | Operating coil voltage (V) | | Type and ordering code |
|---------------------|----------------------|--------------------|-------------------|-----------------------|----------------------------|---------|------------------------|
| | | | | | AC | DC | |
| Draw-out (X) | Normal energized | 3.3/6.6 | 200 | JC-6/5 | 100-110 | 100-110 | HN46AX-2S1J |
| | | | | JC-6/10 | 200-220 | 200-220 | HN46AX-2S2J |
| | | JC-6/30 | — | 48 | HN46AX-2S4J | | |
| | | JC-6/40 | 100-110 | 100-110 | HN46AX-2L1J | | |
| | Mechanically latched | 3.3/6.6 | 200 | JC-6/50 | 200-220 | 200-220 | HN46AX-2L2J |
| | | | | JC-6/60 | — | 21-24 | HN46AX-2L3J |
| | | JC-6/75 | — | 48 | HN46AX-2L4J | | |
| | | JC-6/100* | — | 48 | HN46AX-2L4J | | |

* Provided fuse holder: K. See page 12/60 (Type number nomenclature)

H.V. Distribution Equipment

Vacuum magnetic contactors

HN series

■ Type and ordering code/Draw-out types

| Installation system | Operating system | Rated voltage (kV) | Rated current (A) | Appropriate fuse type | Operating coil voltage (V) | | Type and ordering code |
|---|----------------------|--------------------|-------------------|-----------------------|----------------------------|-------------|------------------------|
| | | | | | AC | DC | |
| Draw-out (X) | Normal energized | 3.3/6.6 | 200 | HF338E/3/20-100 | 100-110 | 100-110 | HN46AX-2S1A |
| | | | | HF338E/6/20, 30 | 200-220 | 200-220 | HN46AX-2S2A |
| | | | | | - | 48 | HN46AX-2S4A |
| | Mechanically latched | 3.3/6.6 | 200 | HF338E/3/150, 200 | 100-110 | 100-110 | HN46AX-2S1B |
| | | | | HF338E/6/40-200 | 200-220 | 200-220 | HN46AX-2S2B |
| | | | | | - | 48 | HN46AX-2S4B |
| | | 3.3/6.6 | 200 | JB-3/50-200 | 100-110 | 100-110 | HN46AX-2S1C |
| | | | | JB-6/20, 50 | 200-220 | 200-220 | HN46AX-2S2C |
| | | | | | - | 48 | HN46AX-2S4C |
| Draw-out/bushing type connector (H) | Normal energized | 3.3/6.6 | 200 | HF338E/3/20-100 | 100-110 | 100-110 | HN46AH-2S1A |
| | | | | HF338E/6/20, 30 | 200-220 | 200-220 | HN46AH-2S2A |
| | | | | | - | 48 | HN46AH-2S4A |
| | Mechanically latched | 3.3/6.6 | 200 | HF338E/3/150, 200 | 100-110 | 100-110 | HN46AH-2S1B |
| | | | | HF338E/6/40-200 | 200-220 | 200-220 | HN46AH-2S2B |
| | | | | | - | 48 | HN46AH-2S4B |
| | | 3.3/6.6 | 200 | JB-3/50-200 | 100-110 | 100-110 | HN46AH-2S1C |
| | | | | JB-6/20, 50 | 200-220 | 200-220 | HN46AH-2S2C |
| | | | | | - | 48 | HN46AH-2S4C |
| Draw-out/bushing type connector+shutter (Y) | Normal energized | 3.3/6.6 | 200 | HF338E/3/20-100 | 100-110 | 100-110 | HN46AY-2S1A |
| | | | | HF338E/6/20, 30 | 200-220 | 200-220 | HN46AY-2S2A |
| | | | | | - | 48 | HN46AY-2S4A |
| | Mechanically latched | 3.3/6.6 | 200 | HF338E/3/150, 200 | 100-110 | 100-110 | HN46AY-2S1B |
| | | | | HF338E/6/40-200 | 200-220 | 200-220 | HN46AY-2S2B |
| | | | | | - | 48 | HN46AY-2S4B |
| | | 3.3/6.6 | 200 | JB-3/50-200 | 100-110 | 100-110 | HN46AY-2S1C |
| | | | | JB-6/20, 50 | 200-220 | 200-220 | HN46AY-2S2C |
| | | | | | - | 48 | HN46AY-2S4C |
| Mechanically latched | 3.3/6.6 | 200 | HF338E/3/20-100 | 100-110 | 100-110 | HN46AY-2L1A | |
| | | | HF338E/6/20, 30 | 200-220 | 200-220 | HN46AY-2L2A | |
| | | | | - | 21-24 | HN46AY-2L3A | |
| | 3.3/6.6 | 200 | HF338E/3/150, 200 | 100-110 | 100-110 | HN46AY-2L1B | |
| | | | HF338E/6/40-200 | 200-220 | 200-220 | HN46AY-2L2B | |
| | | | | - | 21-24 | HN46AY-2L3B | |
| 3.3/6.6 | 200 | JB-3/50-200 | 100-110 | 100-110 | HN46AY-2L1C | | |
| | | JB-6/20, 50 | 200-220 | 200-220 | HN46AY-2L2C | | |
| | | | - | 21-24 | HN46AY-2L3C | | |
| | | | | - | 48 | HN46AY-2L4C | |

H.V. Distribution Equipment

Vacuum magnetic contactors

HN series

■ Optional accessories

● Position switches

Type: Position switch N1 (Ordering code: HZ1AD)
 SPDT position switches can be fitted to indicate the test position and the service position. (For X, Y, H)

Ratings of position switch

| | | |
|---------------------|--|------------------|
| Contact arrangement | Service pos. SPDT, Test pos. SPDT Service pos. 2PDT, Test pos. 2PDT | |
| Operating current | Res. Load | Ind. Load |
| 250V AC/DC | 3A | NC: 2A, NO: 1.5A |
| 125V AC/DC | 10A | NC: 7.5A, NO: 6A |
| 30V DC | 15A | 10A |
| 14V DC | 15A | NC: 15A, NO: 10A |

● VT and bushing CT (BCT)

Draw-out types have room for fitting VTs in the space box.

It is possible to fit up to 2 VTs in the space. 3 BCTs can be fitted to the bushing type connector. The ratings are shown in the Table.

Ratings of VT

| For VT | For control power supply * |
|----------------------------------|----------------------------|
| 3300V/110V, 220V 1.0 class 100VA | 3300V/110V, 220V 400VA |
| 6600V/110V, 220V 1.0 class 100VA | 6600V/110V, 220V 400VA |

* When used as control power supply, it becomes short-time rating.

Ratings of BCT

| Max. voltage (kV) | Frequency (Hz) | Primary current(A) | Secondary current(A) | Burden (VA) | Overcurrent capacity |
|-------------------|----------------|---|----------------------|-------------|----------------------|
| 6.9 | 50/60 | 20, 30, 40, 50 75, 100, 150 200, 300, 400 | 5 | 25 | 40 times, 1 sec |

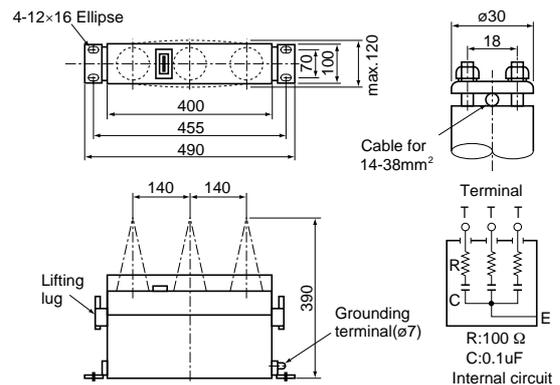
● Capacitor trip devices

| Type | Ordering code | Tripping time after power failure: | Input voltage | Tripping coil voltage |
|--------|---------------|------------------------------------|---------------|-----------------------|
| VS-T1A | HZ1NI | 30 sec. | 100-110V AC | 100-110V DC |
| VS-T2A | HZ1NJ | | 200-220V AC | 200-220V DC |

● C-R type surge absorber

| Type | Ordering code | Max. operating voltage | Frequency | Rated voltage |
|---------------------|---------------|------------------------|-----------|--------------------------|
| AF3320R3 TXG0542 | HZ1AK | 115% rated voltage | 50/60Hz | $\frac{3.3kV}{\sqrt{3}}$ |
| AF6620R3 TXG0543 | HZ1AL | | 50/60Hz | $\frac{6.6kV}{\sqrt{3}}$ |

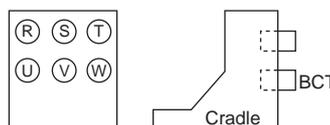
Dimensions, mm/Surge absorber



Codes of VTs and BCTs for draw-out types

| ① VT (For X, Y, H) | | | ② BCT (For Y, H) | | | | | |
|--------------------|------------|------------|------------------|---------|-------------|-------|-------------|-------------|
| Code | Voltage | No. of VTs | Code | Current | No. of BCTs | Code | Current | No. of BCTs |
| P1 | 3.3kV/110V | 1 | A2 | 20/5A | 2 | F2 | 100/5A | 2 |
| P2 | 3.3kV/110V | 2 | A3 | 20/5A | 3 | F3 | 100/5A | 3 |
| P3 | 6.6kV/110V | 1 | B2 | 30/5A | 2 | G2 | 150/5A | 2 |
| P4 | 6.6kV/110V | 2 | B3 | 30/5A | 3 | G3 | 150/5A | 3 |
| P5 | 3.3kV/220V | 1 | C2 | 40/5A | 2 | H2 | 200/5A | 2 |
| P6 | 3.3kV/220V | 2 | C3 | 40/5A | 3 | H3 | 200/5A | 3 |
| P7 | 6.6kV/220V | 1 | D2 | 50/5A | 2 | J2 | 300/5A | 2 |
| P8 | 6.6kV/220V | 2 | D3 | 50/5A | 3 | J3 | 300/5A | 3 |
| P9 | 3.3kV/110V | 1 | E2 | 75/5A | 2 | K2 | 400/5A | 2 |
| | 3.3kV/220V | 1 | E3 | 75/5A | 3 | K3 | 400/5A | 3 |
| PA | 6.6kV/110V | 1 | | | | Blank | Without BCT | |
| | 6.6kV/220V | 1 | | | | | | |
| Blank | Without VT | | | | | | | |

- Mounting position of CT
- 2 CTs- Fit to U and W poles
- 3 CTs- Fit to U, V and W poles



- Example:
- Two 6.6kV/110V VTs and no BCT
HN46A□-□□□□/P4
 - No VT and two 50/5A BCTs
HN46A□-□□□□/D2
 - Two 6.6kV/110V VTs and two 50/5A BCTs
HN46A□-□□□□/P4D2

H.V. Distribution Equipment

Vacuum magnetic contactors

HN series

■ Optional accessories

● Power fuses for draw-out types

The table indicates the appropriate current limiting fuses for use with HN vacuum magnetic contactors.

| System voltage (kV) | Type Refer to the Table below | Ratings Voltage (kV) | Breaking capacity (kA) | Minimum breaking current(A) | Current (A) | Applicable load (max) | | | |
|---------------------|----------------------------------|----------------------|------------------------|-----------------------------|-------------|---------------------------------------|----------------------|----------------------------|--------------------------|
| | | | | | | 3 ϕ Motor Squirrel-cage type(kW) | Wound-rotor type(kW) | 3 ϕ Transformer (kVA) | 3 ϕ Capacitor (kVA) |
| 3.3 | HF338E/3/20 | 3.6 | 40 (250MVA) | All excessive currents | 20 | – | 55 | 50 | 30 |
| | HF338E/3/30 | | | | 30 | – | 90 | 100 | 75 |
| | HF338E/3/40 | | | | 40 | 37 | 132 | 150 | 100 |
| | HF338E/3/50 | | | | 50 | 55 | 160 | 200 | 150 |
| | HF338E/3/75 | | | | 75 | 90 | 250 | 300 | 250 |
| | HF338E/3/100 | | | | 100 | 132 | 355 | 400 | 400 |
| | HF338E/3/150 | | | | 150 | 200 | 450 | 500 | 500 |
| | HF338E/3/200 | 200 | 355 | 630 | 750 | 750 | | | |
| | JB-3/50 | 3.6 | 40 (250MVA) | 350 | 50 | 160 | 200 | 250 | – |
| | JB-3/100 | | | | 100 | 355 | 355 | 500 | – |
| | JB-3/150 | | | | 150 | 560 | 560 | 750 | – |
| | JB-3/200 | | | | 200 | 710 | 710 | 1000 | – |
| | JC-6/5 | 3.6 | 40 (250MVA) | 11 | 5 | – | – | 5 | 5 |
| | JC-6/10 | | | | 10 | – | – | 15 | 15 |
| | JC-6/20 | | | | 20 | – | – | 50 | 30 |
| | JC-6/30 | | | | 30 | – | – | 100 | 50 |
| | JC-6/40 | | | | 40 | – | – | 150 | 75 |
| | JC-6/50 | | | | 50 | – | – | 200 | 100 |
| | JC-6/60 | | | | 60 | – | – | 250 | 150 |
| | JC-6/75 | | | | 75 | – | – | 300 | 200 |
| | JC-6/100 | | | | 100 | – | – | 500 | 250 |
| JC-6/150 | 150 | | | | – | – | – | – | – |
| 6.6 | HF338E/6/20 | 7.2 | 40 (500MVA) | All excessive currents | 20 | – | 110 | 75 | 75 |
| | HF338E/6/30 | | | | 30 | 37 | 160 | 150 | 150 |
| | HF338E/6/40 | | | | 40 | 75 | 315 | 250 | 200 |
| | HF338E/6/50 | | | | 50 | 90 | 375 | 300 | 300 |
| | HF338E/6/75 | | | | 75 | 160 | 530 | 500 | 500 |
| | HF338E/6/100 | | | | 100 | 250 | 750 | 750 | 750 |
| | HF338E/6/150 | | | | 150 | 375 | 1050 | 1000 | 1000 |
| | HF338E/6/200 | 200 | 530 | 1500 | 1500 | 1500 | | | |
| | JB-6/20 | 7.2 | 40 (500MVA) | 140 | 20 | 160 | 200 | 200 | 150 |
| | JB-6/50 | | | | 50 | 355 | 355 | 500 | 500 |
| | JB-6/100 | | | | 100 | 710 | 710 | 1000 | 750 |
| | JB-6/150 | | | | 150 | 1000 | 1000 | 1500 | 1000 |
| | JB-6/200 | | | | 200 | 1500 | 1500 | 2000 | 1500 |
| | JC-6/5 | 7.2 | 40 (500MVA) | 11 | 5 | – | – | 15 | 15 |
| | JC-6/10 | | | | 10 | – | – | 30 | 30 |
| | JC-6/20 | | | | 20 | – | – | 100 | 50 |
| | JC-6/30 | | | | 30 | – | – | 200 | 100 |
| | JC-6/40 | | | | 40 | – | – | 300 | 150 |
| | JC-6/50 | | | | 50 | – | – | 300 | 200 |
| | JC-6/60 | | | | 60 | – | – | 500 | 300 |
| | JC-6/75 | | | | 75 | – | – | 750 | 400 |
| JC-6/100 | 100 | | | | – | – | 1000 | 500 | |
| JC-6/150 | 150 | | | | – | – | – | – | – |

Notes: JB fuse: The rated current value meets the requirements of JEC-2330 (1986) M (motor).
 HF and JC fuses: The rated current value meets the requirements of JEC-2330 (1986)G (general).
 Contact FUJI when the JC fuse will be used for a motor load application.

Fuse and fuse holder

| Fuse holder | Fuse | |
|----------------------------|--------------|---------------|
| Type number 10th character | Type | Ordering code |
| A | HF338E/3/20 | HF1E-020 |
| | HF338E/3/30 | HF1E-030 |
| | HF338E/3/40 | HF1E-040 |
| | HF338E/3/50 | HF1E-050 |
| | HF338E/3/75 | HF1E-075 |
| | HF338E/3/100 | HF1E-100 |
| | HF338E/6/20 | HF2E-020 |
| | HF338E/6/30 | HF2E-030 |

| Fuse holder | Fuse | | |
|----------------------------|--------------|---------------|----------|
| Type number 10th character | Type | Ordering code | |
| B | HF338E/3/150 | HF1E-150 | |
| | HF338E/3/200 | HF1E-200 | |
| | HF338E/6/40 | HF2E-040 | |
| | HF338E/6/50 | HF2E-050 | |
| | HF338E/6/75 | HF2E-075 | |
| | HF338E/6/100 | HF2E-100 | |
| | HF338E/6/150 | HF2E-150 | |
| | HF338E/6/200 | HF2E-200 | |
| | C | JB-3/50 | HF1B-050 |
| | | JB-3/100 | HF1B-100 |
| JB-3/150 | | HF1B-150 | |
| JB-3/200 | | HF1B-200 | |
| JB-6/20 | | HF2B-020 | |
| JB-6/50 | | HF2B-050 | |

| Fuse holder | Fuse | |
|----------------------------|----------|---------------|
| Type number 10th character | Type | Ordering code |
| D | JB-6/100 | HF2B-100 |
| | JB-6/150 | HF2B-150 |
| | JB-6/200 | HF2B-200 |
| J | JC-6/5 | HF2C-005 |
| | JC-6/10 | HF2C-010 |
| | JC-6/20 | HF2C-020 |
| | JC-6/30 | HF2C-030 |
| | JC-6/40 | HF2C-040 |
| | JC-6/50 | HF2C-050 |
| | JC-6/60 | HF2C-060 |
| | JC-6/75 | HF2C-075 |
| | JC-6/100 | HF2C-100 |

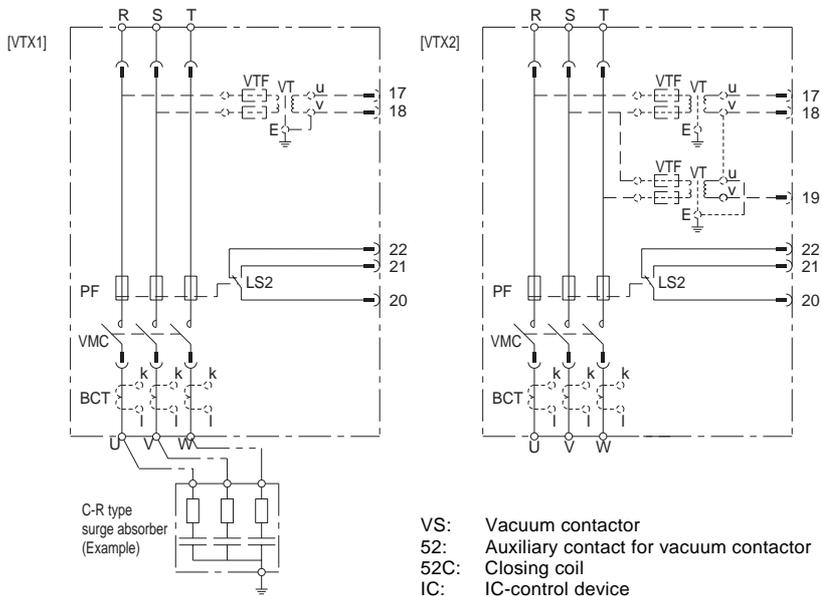
H.V. Distribution Equipment

Vacuum magnetic contactors

HN series

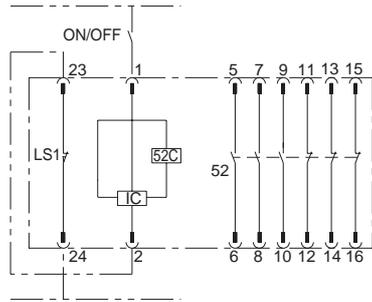
■ Wiring diagrams

Normal energized type

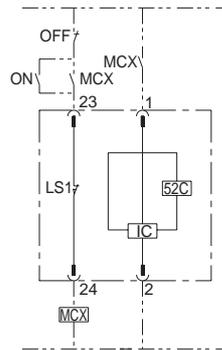


- VS: Vacuum contactor
- 52: Auxiliary contact for vacuum contactor
- 52C: Closing coil
- IC: IC-control device
- LS1: Limit switch for interlock
- MCX: Auxiliary relay for closing
- PF: Power fuse (Optional accessories)
- SW: Power fuse blown indicating contact
- VT: VT
- VTF: Fuse for VT
- BCT: Bushing type CT

- Internal circuit of contactor
- - - Wiring for optional accessories (VT, CT)
- · · External circuit



Wiring diagram for external relay circuit (Example)



■ Terminal numbers

| | Fixed type | Draw-out types Without VT | With one VT | With two VTs | | | | | | | | | | | | | | | | | | | | | | | | |
|--------|--|------------------------------|-------------|--------------|----|----|----|--|----|----|----|----|----|----|--|----|----|----|----|----|----|--|----|----|----|----|----|----|
| Red | <table border="1"><tr><td>1</td><td>2</td><td></td></tr><tr><td></td><td></td><td></td></tr></table> | 1 | 2 | | | | | <table border="1"><tr><td>1</td><td>2</td><td></td></tr><tr><td></td><td>23</td><td>24</td></tr></table> | 1 | 2 | | | 23 | 24 | <table border="1"><tr><td>1</td><td>2</td><td></td></tr><tr><td></td><td>23</td><td>24</td></tr></table> | 1 | 2 | | | 23 | 24 | <table border="1"><tr><td>1</td><td>2</td><td></td></tr><tr><td></td><td>23</td><td>24</td></tr></table> | 1 | 2 | | | 23 | 24 |
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| 1 | 2 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 23 | 24 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | 2 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 23 | 24 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | 2 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 23 | 24 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Yellow | <table border="1"><tr><td>5</td><td>6</td><td>7</td></tr><tr><td>8</td><td>9</td><td>10</td></tr></table> | 5 | 6 | 7 | 8 | 9 | 10 | <table border="1"><tr><td>5</td><td>6</td><td>7</td></tr><tr><td>8</td><td>9</td><td>10</td></tr></table> | 5 | 6 | 7 | 8 | 9 | 10 | <table border="1"><tr><td>5</td><td>6</td><td>7</td></tr><tr><td>8</td><td>9</td><td>10</td></tr></table> | 5 | 6 | 7 | 8 | 9 | 10 | <table border="1"><tr><td>5</td><td>6</td><td>7</td></tr><tr><td>8</td><td>9</td><td>10</td></tr></table> | 5 | 6 | 7 | 8 | 9 | 10 |
| 5 | 6 | 7 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 8 | 9 | 10 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5 | 6 | 7 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 8 | 9 | 10 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5 | 6 | 7 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 8 | 9 | 10 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5 | 6 | 7 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 8 | 9 | 10 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Blue | <table border="1"><tr><td>11</td><td>12</td><td>13</td></tr><tr><td>14</td><td>15</td><td>16</td></tr></table> | 11 | 12 | 13 | 14 | 15 | 16 | <table border="1"><tr><td>11</td><td>12</td><td>13</td></tr><tr><td>14</td><td>15</td><td>16</td></tr></table> | 11 | 12 | 13 | 14 | 15 | 16 | <table border="1"><tr><td>11</td><td>12</td><td>13</td></tr><tr><td>14</td><td>15</td><td>16</td></tr></table> | 11 | 12 | 13 | 14 | 15 | 16 | <table border="1"><tr><td>11</td><td>12</td><td>13</td></tr><tr><td>14</td><td>15</td><td>16</td></tr></table> | 11 | 12 | 13 | 14 | 15 | 16 |
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| 14 | 15 | 16 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 11 | 12 | 13 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 14 | 15 | 16 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 11 | 12 | 13 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 14 | 15 | 16 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 11 | 12 | 13 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 14 | 15 | 16 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Green | <table border="1"><tr><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td></tr></table> | | | | | | | <table border="1"><tr><td></td><td></td><td></td></tr><tr><td>20</td><td>21</td><td>22</td></tr></table> | | | | 20 | 21 | 22 | <table border="1"><tr><td>17</td><td>18</td><td></td></tr><tr><td>20</td><td>21</td><td>22</td></tr></table> | 17 | 18 | | 20 | 21 | 22 | <table border="1"><tr><td>17</td><td>18</td><td>19</td></tr><tr><td>20</td><td>21</td><td>22</td></tr></table> | 17 | 18 | 19 | 20 | 21 | 22 |
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| 20 | 21 | 22 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 17 | 18 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 20 | 21 | 22 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 17 | 18 | 19 | | | | | | | | | | | | | | | | | | | | | | | | | | |
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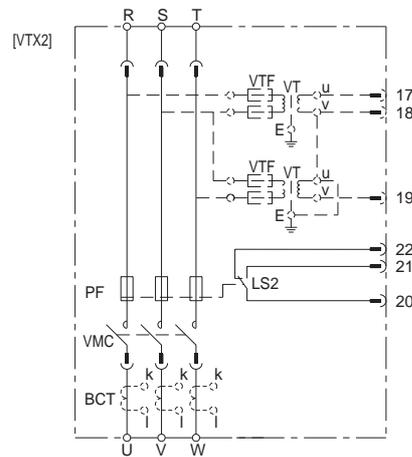
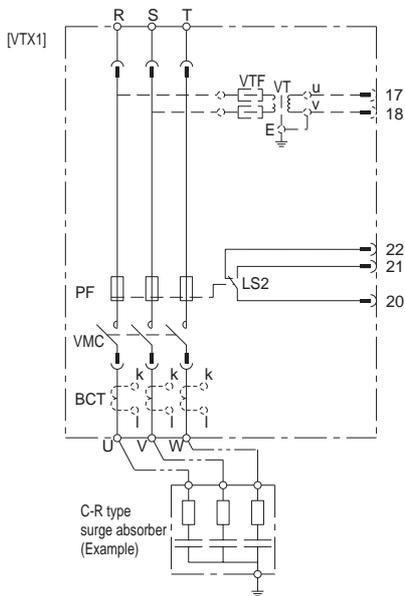
H.V. Distribution Equipment

Vacuum magnetic contactors

HN series

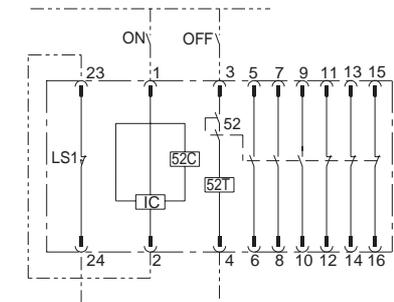
■ Wiring diagrams

Mechanically-latched type

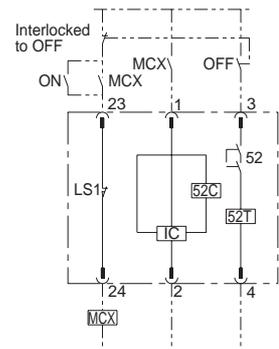


— Internal circuit of contactor
 - - - Wiring for optional accessories (VT, CT)
 ····· External circuit

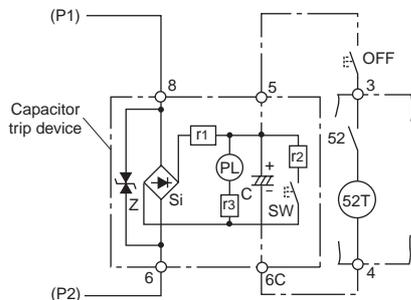
Note: IC control device is provided with protection circuit from an anti-pumping.



Wiring diagram for external relay circuit (Example)



Wiring diagram connected to capacitor trip device (Optional)



- VS: Vacuum contactor
- 52: Auxiliary contact for vacuum contactor
- 52T: Tripping coil
- 52C: Closing coil
- 52Z: Anti-pumping relay
- IC: IC-control device
- LS1: Limit switch for interlock
- MCX: Auxiliary relay for closing
- PF: Power fuse (Optional accessories)
- SW: Power fuse blown indication contact
- VT: VT
- VTF: Fuse for VT
- BCT: Bushing type CT

■ Terminal numbers

| | Fixed type | Draw-out types Without VT | With one VT | With two VTs | | | | | | | | | | | | | | | | | | | | | | | | |
|--------|--|------------------------------|-------------|--------------|----|--|--|--|----|----|----|----|----|----|--|----|----|----|----|----|----|--|----|----|----|----|----|----|
| Red | <table border="1"><tr><td>1</td><td>2</td><td>3</td></tr><tr><td>4</td><td></td><td></td></tr></table> | 1 | 2 | 3 | 4 | | | <table border="1"><tr><td>1</td><td>2</td><td>3</td></tr><tr><td>4</td><td>23</td><td>24</td></tr></table> | 1 | 2 | 3 | 4 | 23 | 24 | <table border="1"><tr><td>1</td><td>2</td><td>3</td></tr><tr><td>4</td><td>23</td><td>24</td></tr></table> | 1 | 2 | 3 | 4 | 23 | 24 | <table border="1"><tr><td>1</td><td>2</td><td>3</td></tr><tr><td>4</td><td>23</td><td>24</td></tr></table> | 1 | 2 | 3 | 4 | 23 | 24 |
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| 4 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | 2 | 3 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4 | 23 | 24 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | 2 | 3 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4 | 23 | 24 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | 2 | 3 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4 | 23 | 24 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Yellow | <table border="1"><tr><td>5</td><td>6</td><td>7</td></tr><tr><td>8</td><td></td><td></td></tr></table> | 5 | 6 | 7 | 8 | | | <table border="1"><tr><td>5</td><td>6</td><td>7</td></tr><tr><td>8</td><td></td><td></td></tr></table> | 5 | 6 | 7 | 8 | | | <table border="1"><tr><td>5</td><td>6</td><td>7</td></tr><tr><td>8</td><td></td><td></td></tr></table> | 5 | 6 | 7 | 8 | | | <table border="1"><tr><td>5</td><td>6</td><td>7</td></tr><tr><td>8</td><td></td><td></td></tr></table> | 5 | 6 | 7 | 8 | | |
| 5 | 6 | 7 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 8 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5 | 6 | 7 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 8 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5 | 6 | 7 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 8 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5 | 6 | 7 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 8 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Blue | <table border="1"><tr><td>11</td><td>12</td><td>13</td></tr><tr><td>14</td><td></td><td></td></tr></table> | 11 | 12 | 13 | 14 | | | <table border="1"><tr><td>11</td><td>12</td><td>13</td></tr><tr><td>14</td><td></td><td></td></tr></table> | 11 | 12 | 13 | 14 | | | <table border="1"><tr><td>11</td><td>12</td><td>13</td></tr><tr><td>14</td><td></td><td></td></tr></table> | 11 | 12 | 13 | 14 | | | <table border="1"><tr><td>11</td><td>12</td><td>13</td></tr><tr><td>14</td><td></td><td></td></tr></table> | 11 | 12 | 13 | 14 | | |
| 11 | 12 | 13 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 14 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 11 | 12 | 13 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 14 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 11 | 12 | 13 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 14 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 11 | 12 | 13 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 14 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Green | <table border="1"><tr><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td></tr></table> | | | | | | | <table border="1"><tr><td></td><td></td><td></td></tr><tr><td>20</td><td>21</td><td>22</td></tr></table> | | | | 20 | 21 | 22 | <table border="1"><tr><td>17</td><td>18</td><td></td></tr><tr><td>20</td><td>21</td><td>22</td></tr></table> | 17 | 18 | | 20 | 21 | 22 | <table border="1"><tr><td>17</td><td>18</td><td>19</td></tr><tr><td>20</td><td>21</td><td>22</td></tr></table> | 17 | 18 | 19 | 20 | 21 | 22 |
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| 20 | 21 | 22 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 17 | 18 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 20 | 21 | 22 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 17 | 18 | 19 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 20 | 21 | 22 | | | | | | | | | | | | | | | | | | | | | | | | | | |

Protective Relays

QH series

General information

QH series protective relays

■ Description

FUJI overcurrent relays and voltage relays have inverse-time characteristics (induction and static types). The QH series is compact budget priced version and is easily installed on panels. It is drum-shaped and ideally suited for general industrial applications. The directional ground-fault relay (DG) is used, combined with zero-phase current transformer (ZCT) and zero-phase potential input device (ZPD). The ground-fault relay (GR) is used, combined with zero-phase current transformer (ZCT).



■ Specifications

● Overcurrent relays

| Type | QH-OC1 | | QH-OC2 |
|--------------------------|--|--|--|
| Trip system | Shunt trip | | Current trip |
| Rated current | 5A | | |
| Rated frequency | 50/60Hz | | |
| Inverse time-lag element | Setting range | 3-3.5-4-4.5-5-6A | |
| | Time-lag setting | 0.5-1-2-3-4-5-6-7-8-9-10-15-20-30-40-50 (16 steps) | |
| | Operate time | 300% overcurrent: 10s ± 17% or less, 700% overcurrent: 1.67s ± 12% or less at min. operating current and time-lag setting = 10 | |
| Instantaneous element | Operate characteristic | Extremely inverse time-lag | |
| | Setting range | 20-30-40-50-60-Lock | |
| Indication LED | Operate time | 200%, 0.05s or less | |
| | Start, time-lag elapsed, operate, power, alarm | | |
| Contact | For trip QH-OC1: 1NO QH-OC2: 2NC | Making capacity 10A at 100V DC, 220V DC (L/R=7ms) Breaking capacity 1A at 110V DC (L/R=7ms) 3.5A at 220V AC (cosφ=0.4) | Breaking capacity 60A at 110V AC (depending on CT burden) |
| | For alarm, 1NO | 2A at 24V DC (max. 30W at 125V DC) (L/R=7ms) 2A at 100V AC (max. 220VA at 250V AC) (cosφ=0.4) | |
| Consumed VA | 2VA (at 5A) | 2VA (at 5A) | |
| Mass | 1.1kg | 1.1kg | |

● Voltage relays

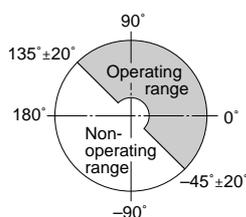
| Type | Overvoltage relay | | Undervoltage relay |
|----------------------|---------------------------------------|--|---------------------------------------|
| Type | QH-OV1 | | QH-UV1 |
| Trip system | Shunt trip | | |
| Rate voltage | 110V AC | | 110V AC |
| Setting range | 115-120-125-130-135-140-150V | | 60-65-70-75-80-85-90-95-100V |
| Operate time setting | 0.1-0.2-0.5-1-1.5-2-2.5-3-4-5-6-8-10s | | 0.1-0.2-0.5-1-1.5-2-2.5-3-4-5-6-8-10s |
| Indication | Start, operate, power | | |
| Contact | For trip: 1NO | Making capacity 5A at 250V AC (cosφ = 0.4) | |
| | For alarm: 1NO | Breaking capacity 2A at 250V AC (cosφ = 0.4) | |
| Consumed VA | 2VA | 4VA | |
| Mass | 1kg | 1.1kg | |

■ **Specifications**

● **Directional ground-fault relays**

| | | | |
|----------------------------------|---|--|--|
| Type | QH-DG3 (for receiving circuit) | | QH-DG4 *(for branching circuit) |
| Trip system | Shunt trip, current trip | | |
| Zero-phase voltage setting range | 2.5-5-7.5-10-12.5% of zero-phase voltage 3810V at full ground-fault | | - |
| Zero-phase current setting range | 0.1-0.2-0.3-0.4-0.6A (ZCT primary side) | | |
| Operating time setting | Insnt.-0.2-0.3-0.4-0.6s | | |
| Operating characteristic | Operating time | ±30ms at 130% current setting value -40ms to +0ms at 400% current setting value (when 150% of voltage setting value applied) | |
| | Zero-phase current | Within ±10% of current setting value (when 150% of voltage setting value applied) | |
| | Zero-phase voltage | Within ±25% of voltage setting value (when 150% of current setting value applied) | |
| Indication LED | Operate, zero-phase current/voltage, power | | |
| Resetting method | Auto-manual (selectable by a switch) | | |
| Test button | Provided | | |
| Contact | For shunt trip: 1NO | Making capacity: 10A at 110V AC Breaking capacity: 7.5A at 110V AC (cosφ= 0.4), 0.4A at 125V DC (L/R= 7ms) | |
| | For current trip: 2PDT | 7.5A at 110V AC (cosφ= 0.5) | |
| | For alarm: 1NO | Making capacity: 1.5A at 110V AC (cosφ= 0.4), 0.1A at 125V DC (L/R= 7ms) | |
| Rated control voltage | 110V AC 50/60Hz | | |
| Frequency | 50Hz-60Hz (changeable by a switch) | | |
| Operate phase angle | Non grounded system: Lag 45°±20°, lead 135°±20° PC grounded system: Lag 70°±15°, lead 110°±15° | | |
| Consumed VA | 7VA (at operating) | | 6VA (at operating) |
| Mass | 1.9kg | | 1.9kg |

Operating phase angle (non grounded system)



* The QH-DG4 will function as branching unit for power receiving use QH-DG3. It cannot be used solely.

● **Accessories, sold separately**

Zero-phase current transformers

| Description | Primary current (A) | Rated primary voltage (kV) | Dielectric strength | Over-current constant | Type | Mass (kg) |
|-------------------------|---------------------|----------------------------|---------------------|-----------------------|-----------------|-----------|
| Round-hole through-type | 100 | 3.3/6.6 | 22kV AC 1 min. | 40 | ZCT-561A | 0.5 |
| | 200 | | | | ZCT-562A | 0.5 |
| | 300 | 50/60Hz common use | | | ZCT-653 | 0.8 |
| | 400 | | | | ZCT-654 | 0.8 |
| | 600 | | | | ZCT-906 | 3.0 |
| Split-toroidal type | 100 | | | | ZCT-451D | 0.9 |
| | 400 | | | | ZCT-654D | 1.2 |

Zero-phase potential input device

| Type | ZPD-1 |
|---------------------------|-----------------------------------|
| Structure | Indoor use, epoxy-resin insulator |
| Rated voltage | 7.2kV |
| Electrostatic capacitance | 3 X 250pF |
| Dielectric strength | Class 6A, 22kV AC (1 minute) |
| Mass (kg) | 3.6kg (1set = 3pcs) |

Protective Relays

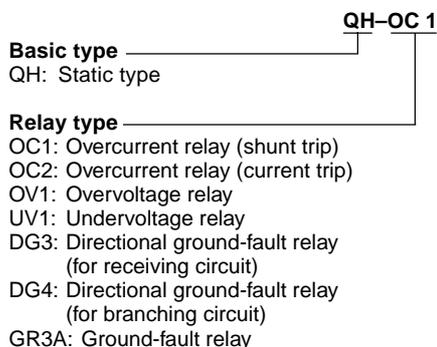
QH series

● Ground-fault relays

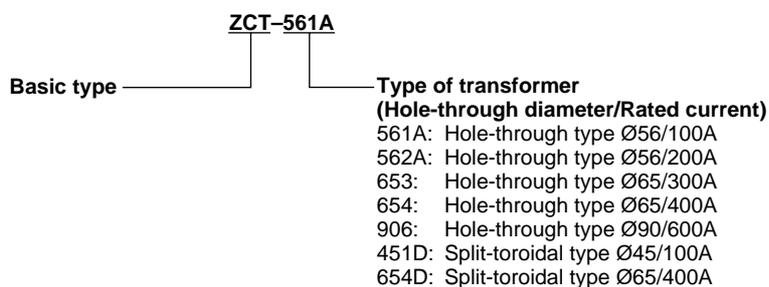
| | | |
|---------------------------|--|---|
| Type | QH-GR3A | |
| Trip system | Shunt trip, current trip | |
| Operating current setting | 0.1-0.2-0.4-0.6-0.8A | |
| Operating time | 0.1 to 0.3s at 130% current setting value 0.1 to 0.2s at 400% current setting value | |
| Indication | Operation | Magnetic inversion (manual reset) |
| | Power | Green LED |
| Contact | For trips: 2PDT | Making capacity: 10A at 250V AC ($\cos\phi=0.4$), 10A at 125V DC (L/R= 7ms) Breaking capacity: 7.5A at 110V AC (max. 825VA at 250V AC) ($\cos\phi=0.4$) 1.2A at 100V DC (max. 120W at 125V DC) (L/R= 7ms) |
| | For alarm: 1NO | 2A at 110V AC (max. 220VA at 250V AC) 2A at 24V DC (0.1A at 125V DC) |
| Consumed VA | 5VA (at operating) | |
| Test button | Provided | |
| Mass | 1.7kg | |

■ Type number nomenclature

• Protective relays



Zero-phase current transformers



• Zero-phase potential input device



■ Ordering information

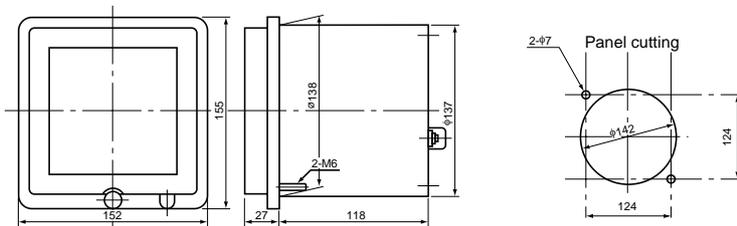
Specify the following:

1. Type number
2. Rated control voltage and frequency
3. Rated current and frequency
(Overcurrent relay)
4. Setting range (Volts or Amperes)

■ Dimensions, mm

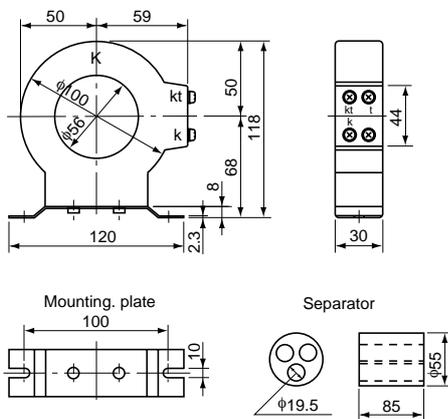
● Relays

QH-OC1, OC2, OV1, UV1, DG3, DG4, GR3A

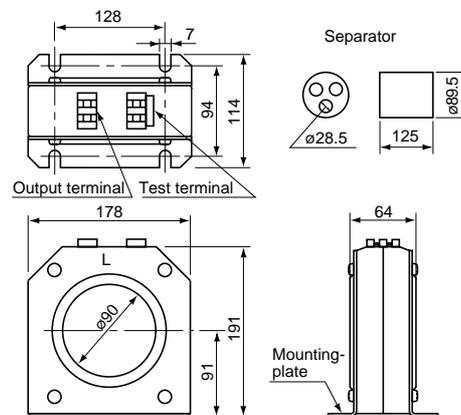


● Zero-phase current transformers

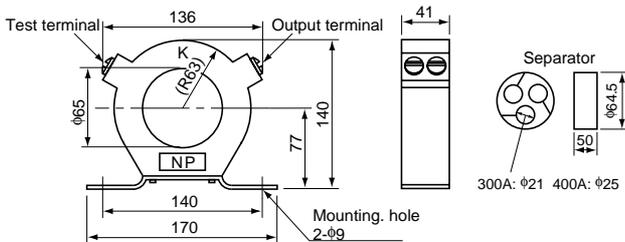
ZCT-561A, 562A



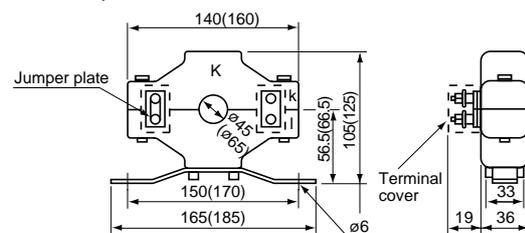
ZCT-906



ZCT-653, 654



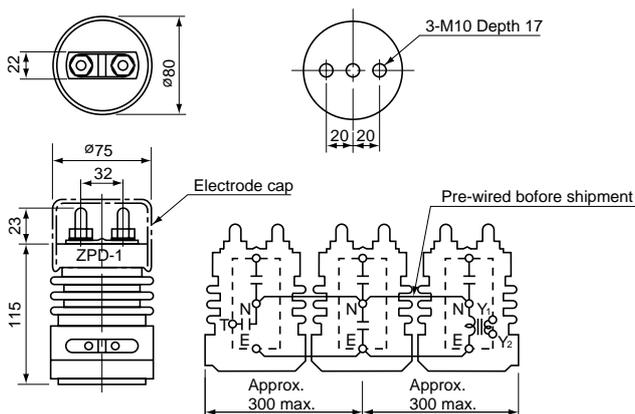
ZCT-451D, 654D



() : for ZCT-654D

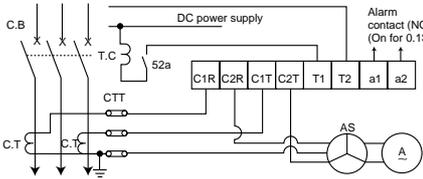
● Zero-phase potential input device

ZPD-1

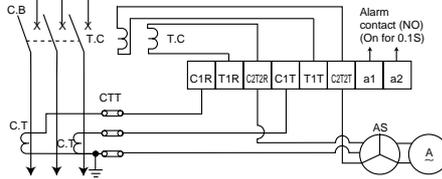


Protective Relays QH series

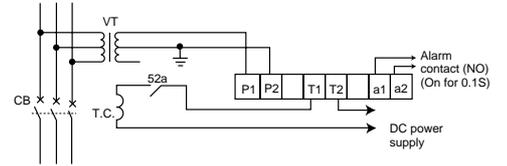
External wiring diagrams QH-OC1



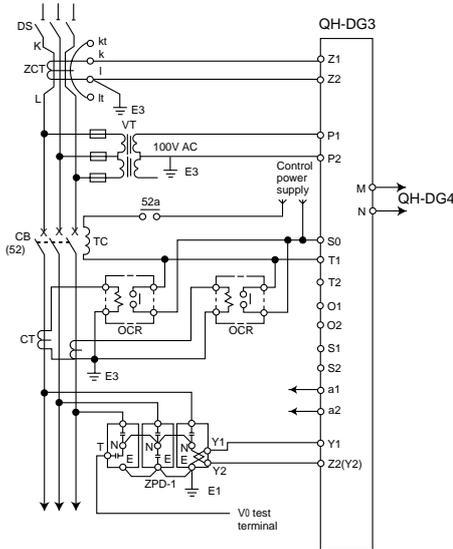
QH-OC2



QH-OV1, QH-UV1

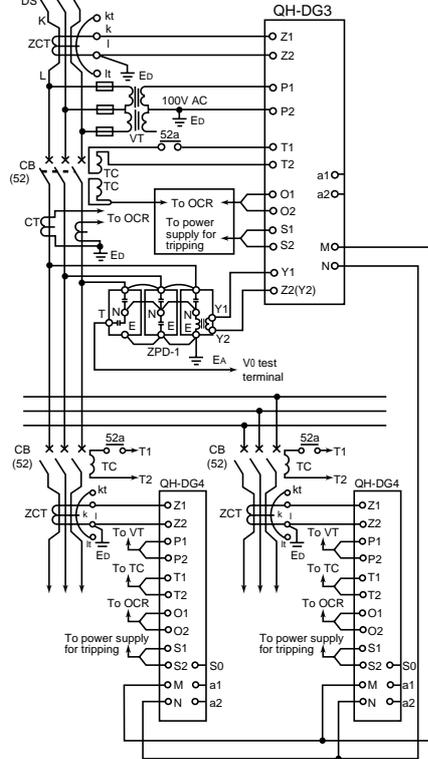


QH-DG3, shunt-trip

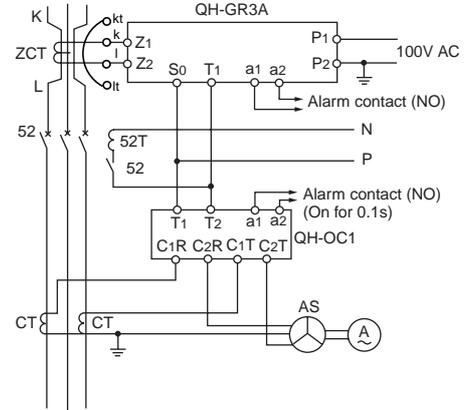


QH-DG3 with QH-DG4

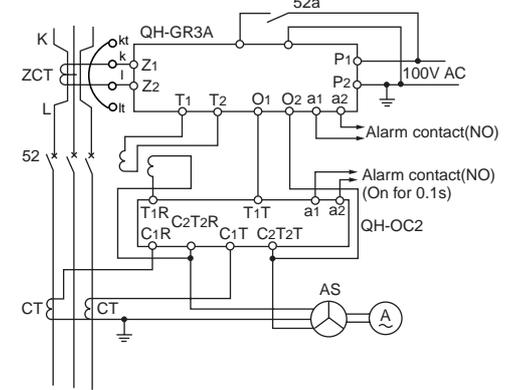
Installation at receiving point and branch point (QH-DG3 at receiving point, QH-DG4 at branch point)



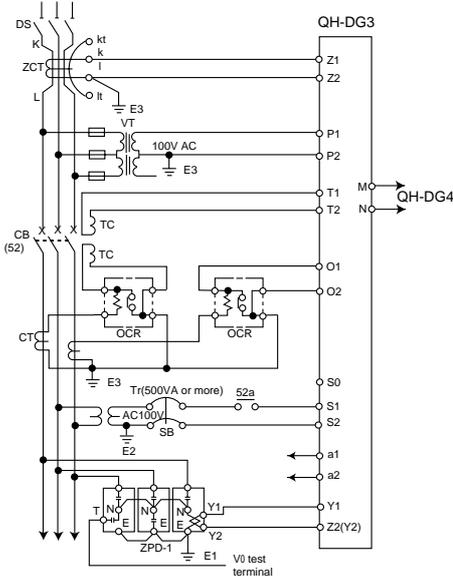
QH-GR3, shunt-trip



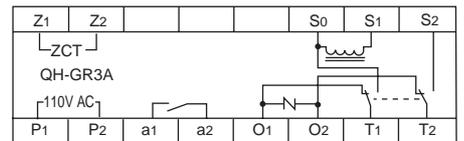
QH-GR3, current trip



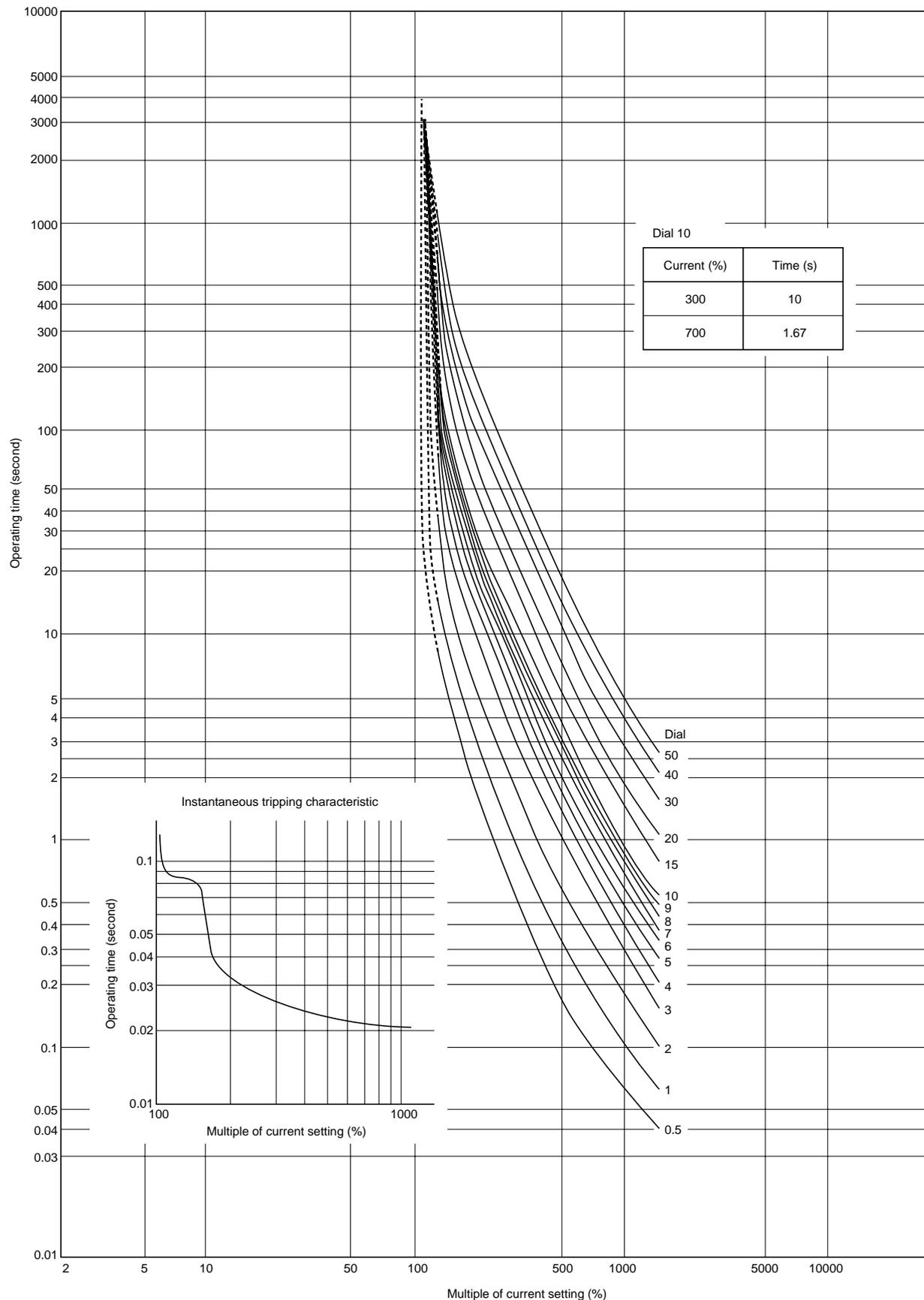
QH-DG3, current trip



Internal wiring diagram/QH-GR3



■ Characteristic curves
QH overcurrent relay



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- Follow the regulations of industrial wastes when the product is to be discarded.
- The products covered in this catalog have not been designed or manufactured for use in equipment or systems which, in the event of failure, can lead to loss of human life.
- If you intend to use the products covered in this catalog for special applications, such as for nuclear energy control, aerospace, medical, or transportation, please consult our Fuji Electric FA agent.
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Panel Switches, Terminal Blocks, Testing Terminals

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