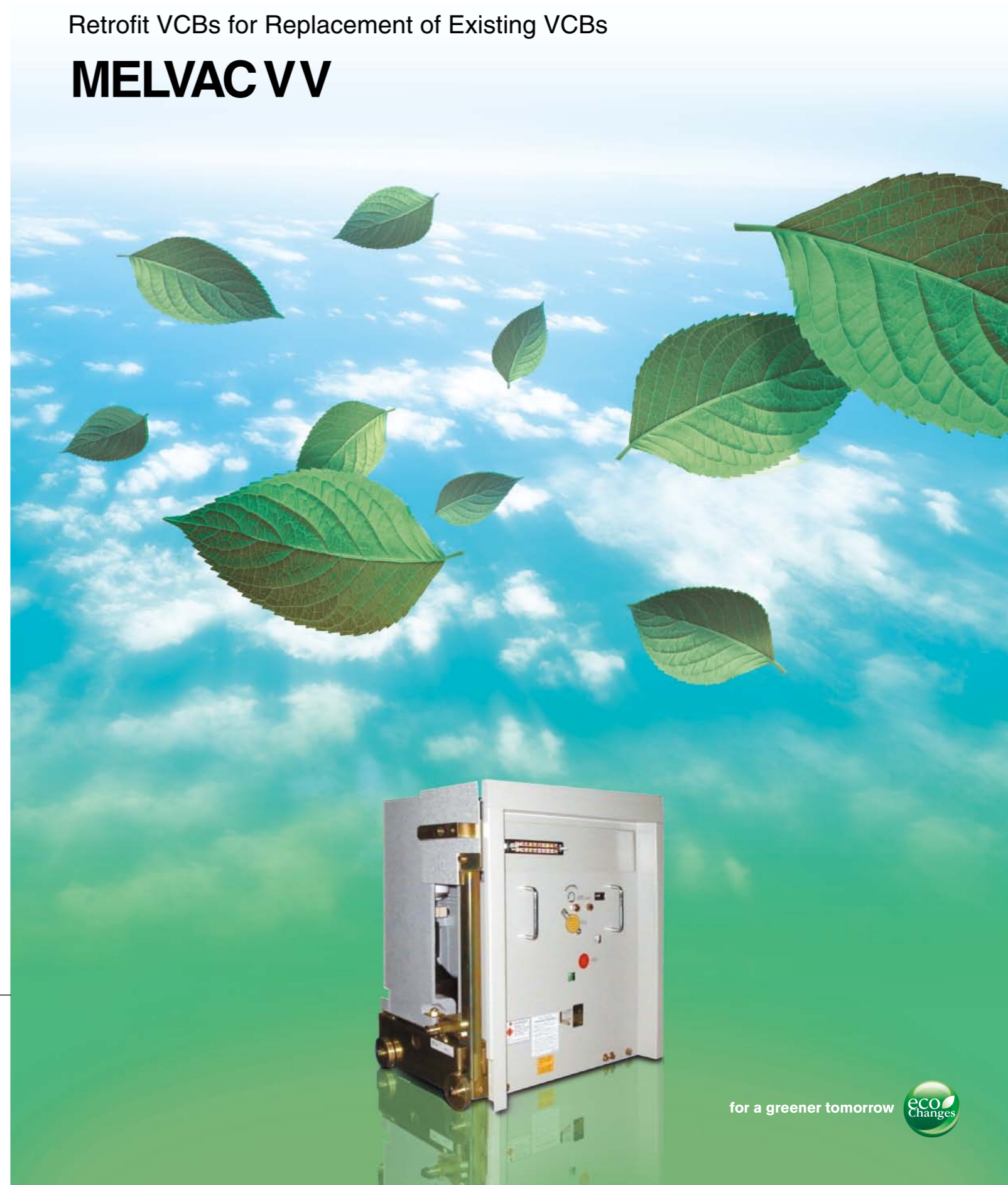


VACUUM CIRCUIT BREAKER (RETROFIT)

Retrofit VCBs for Replacement of Existing VCBs

# MELVAC VV



**for a greener tomorrow**

Eco Changes is the Mitsubishi Electric Group's environmental statement, and expresses the Group's stance on environmental management. Through a wide range of businesses, we are helping contribute to the realization of a sustainable society.

 **Safety Warning**

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

**MITSUBISHI ELECTRIC CORPORATION**

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<http://Global.MitsubishiElectric.com>



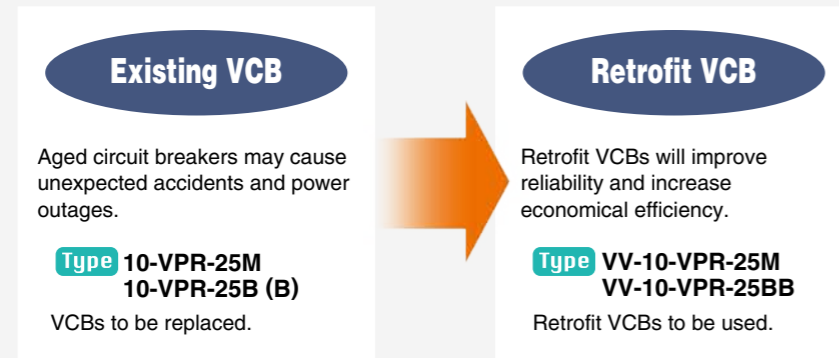
for a greener tomorrow



# We recommend to replace the aged VCBs in order to ensure the safe and reliable operation of your switchgear.

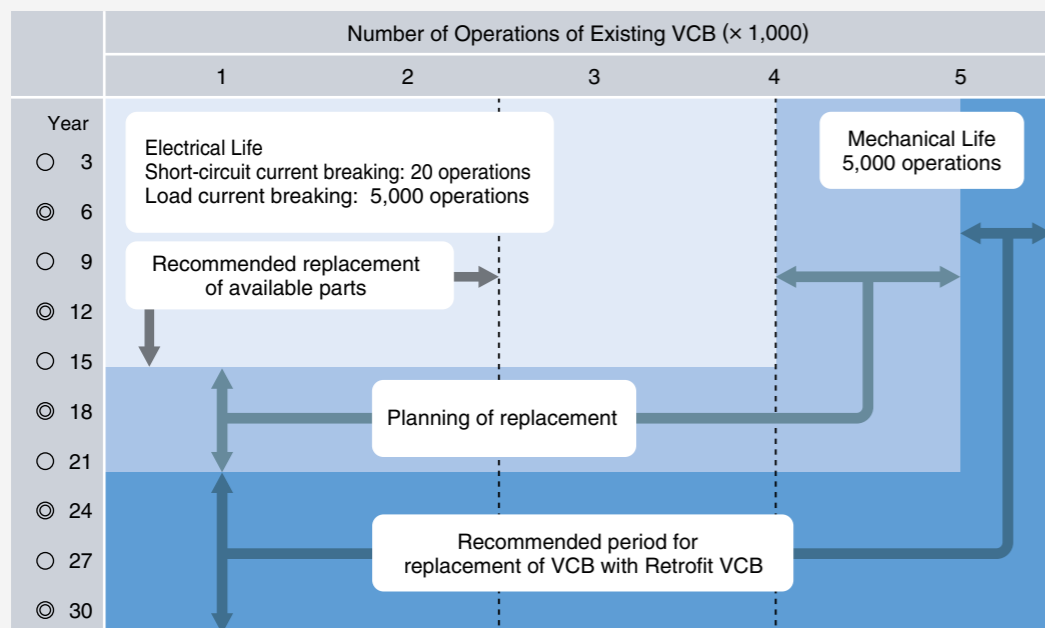
## Our solution for end-of-life VCBs

Manufacturing of VCB type 10-VPR-25M & 10-VPR-25B(B) ceased in 1983, as well as the supply of replacement parts which also was ceased in 2000. Since those VCBs cannot be supplied anymore, We recommend to replace the aged VCBs with our compatible new VCBs (Retrofit VCB) in order to extend equipment life and ensure the safe and reliable operation of your switchgear.



## VV Maintenance Chart for VCBs

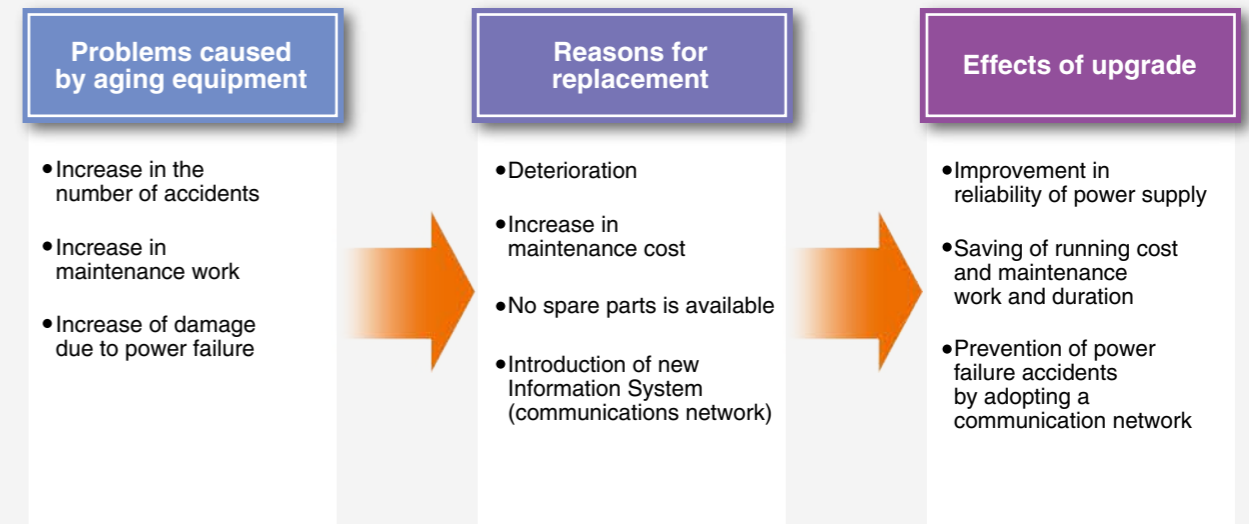
We recommend to replace the aged VCBs with Retrofit VCBs to extend the switchgear's life and to ensure the safe operation according to the table below.



○ Minor inspection    ● Major inspection

## VV General Background of Replacement

Use of aged equipment can increase the incidence of accidents, and jeopardize the reliable operation failure of the system.



### Why Retrofit VCB?

| Replacement Options           | 1 Retrofit VCB            | 2 Replacement of panel        |
|-------------------------------|---------------------------|-------------------------------|
| Item                          |                           |                               |
| Initial cost                  | 😊😊😊                       | 😊<br>(Including construction) |
| Outage time                   | 1 hour/panel<br>*see note | 2 weeks / 1 arrangement       |
| Maintenance after replacement | 😊😊😊                       | 😊😊😊                           |
| Reliability after replacement | 😊😊😊                       | 😊😊😊                           |

**Best solution**

NOTE : Outage time may be changed depending on site condition.

## VV Ratings

The VV Retrofit VCB complies with the international standard IEC 60056.

| Retrofit VCB type                         |  | VV-10VPR-25M<br>VV-10VPR-25BB            |            |
|---|--|--|------------|
| Closing operation mechanism               |  | Motorised stored energy spring mechanism |            |
| Rated voltage (kV)                        |  | 11(13.8)                                 |            |
| Rated current (A)                         |  | 630, 1250                                | 1600, 2000 |
| Rated frequency (Hz)                      |  | 50 / 60                                  |            |
| Rated short-circuit breaking current (kA) |  | 20 / 25                                  |            |
| Rated short-circuit making current (kA)   |  | 50 / 62.5                                |            |
| Rated short-time withstand current (kA)   |  | 20 / 25                                  |            |
| Rated breaking time (cycles)              |  | 3  |            |
| Power frequency withstand voltage (kV)    |  | 28 (36)                                  |            |
| Lightning impulse withstand voltage (kV)  |  | 75 (95)                                  |            |
| Rated operating sequence                  |  | O-1 min.-CO-3min.-CO CO-15sec.-CO        |            |
| Weight (kg)                               |  | 130                                      | 140        |
| Type of existing VCB                      |  | 10-VPR-25M, 10-VPR-25B(B)                |            |

NOTE : Contact MITSUBISHI ELECTRIC through our distributor, if the application of ANSI standard is required.

## VV Features of Retrofit VCB

### High reliability

- The highly reliable BH-2 operating mechanism is incorporated in the Retrofit VCB.
- This operating mechanism is used in Mitsubishi's latest VCBs.

### Saving maintenance time

- Short maintenance time: less moving parts yields a shorter working time.
- 15 years maintenance-free BH-2 mechanism.

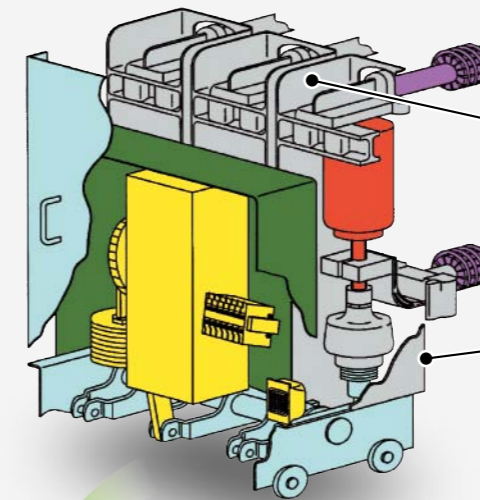
### Simple & Safe Operation

- The Retrofit VCB can be easily drawn-out or inserted by a single levering action.

### Full compatibility

- Wiring modification of control circuit is not required.  
Only an interlock plate must be installed to the floor of the VCB compartment.

## VV High Reliability & Saving Maintenance Time



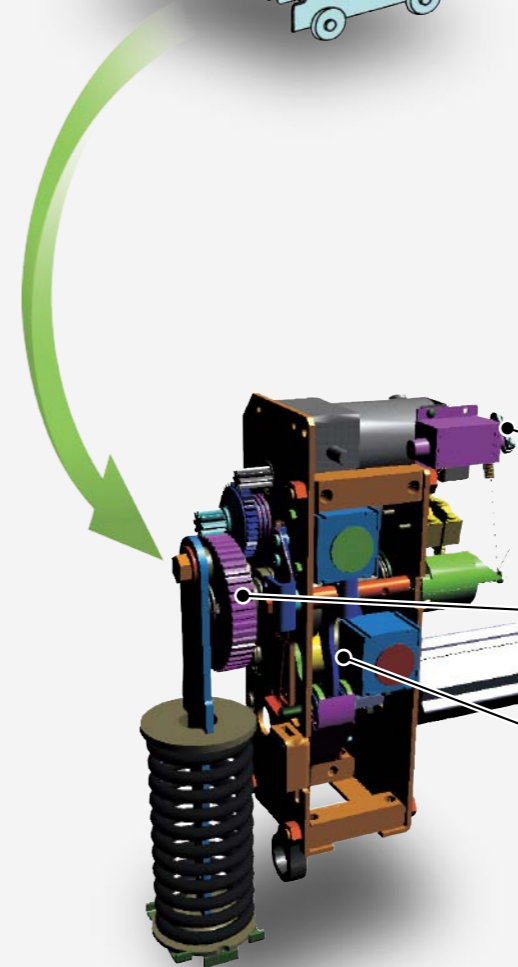
### Retrofit VCB

#### Improved insulated frame (BMC: Bulk Moulded Compound)

Superior anti-tracking characteristics & mechanical strength.  
Single mould-no use of glue.

#### Reduction in number of parts

50% of that of previous model



### BH-2 operating mechanism

20% reduction in control power consumption compared with previous model

#### Greaseless

Special low-friction NiP surface treatment of gears

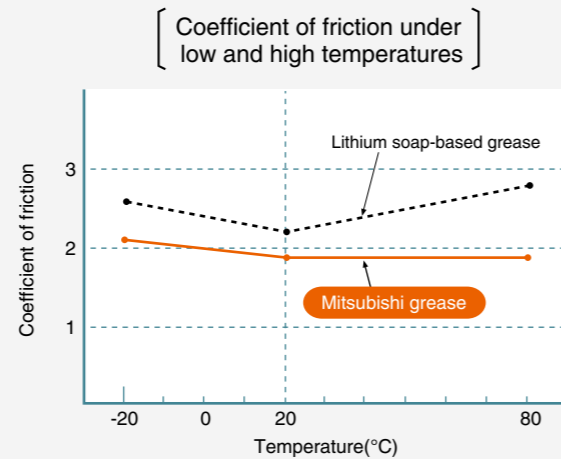
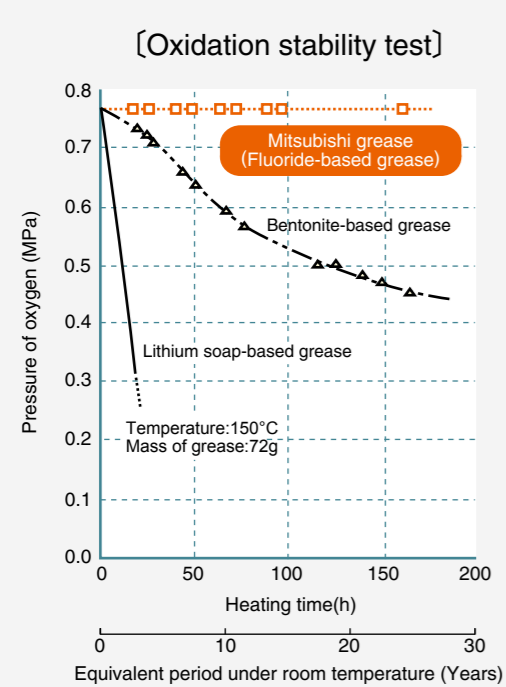
#### High performance grease

Special "long-life" grease for other surfaces  
Maintenance free for 15 years due to high quality parts and grease

## VV Maintenance free

**Maintenance free for 15 years or more.**  
**(Maintenance interval may be changed depending on environment condition)**

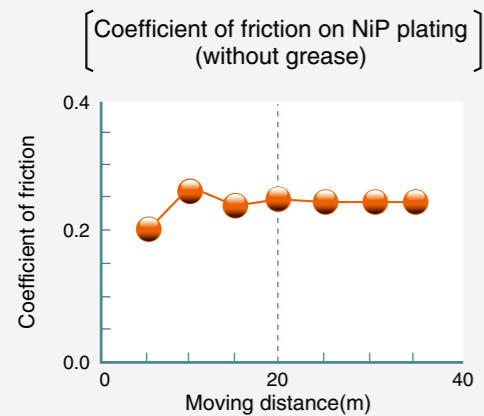
Mitsubishi Grease is fluoride-based. There was no evidence of oxidation during tests on Mitsubishi grease. It has also been confirmed that there is no increase in friction after these tests were completed. The coefficient of friction remains small and regular under both low and high temperature conditions unlike other types of grease.



## VV Greaseless surface treatment of the gears

**NiP plating removes the need for grease.**

Friction between the gear surfaces increases due to surface wear resulting from contamination. Gears easily gather contamination if they have grease applied to their surface and when they are not located in an enclosed area. The gears of a Mitsubishi vacuum circuit breaker are NiP plated in order to eliminate the need for application of grease. The coefficient of friction remains low even if no grease is applied. The wear at the contact is small due to the hardness of the NiP plating.

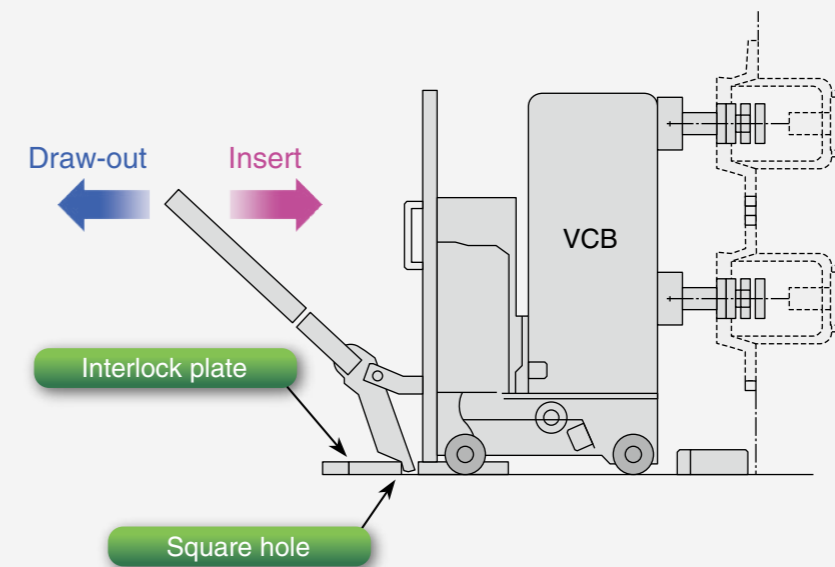


## VV Simple & Safe Operation

### Simple Operation

- The Retrofit VCB can be drawn-out or inserted in a single levering action while many rotations of a handle are required for the existing VCB. Therefore operation of the Retrofit VCB is simple and easy. (see note)

NOTE : Need to install the interlock plate to the bottom of the panel.



### Safe Operation

- Mechanical interlock**
  - When VCB is in the closed condition, and insertion from test position or the drawing-out from connected position cannot be done.
  - VCB cannot be closed by operating the manual close button when VCB is at the position between test position and connected position on the way.
- Electrical interlock**
  - When VCB is in closed condition, the interlock pin cannot be pulled out from the hole of the interlock plate. Therefore, VCB at connected position cannot be drawn-out and VCB of test position cannot be inserted.
  - VCB cannot be closed by electrically when VCB is at the position between test position and connected position on the way.

## VV Complete Interchangeability



**Existing VCB**  
Type 10-VPR-25M  
10-VPR-25B(B)

**Retrofit VCB**  
Type VV-10-VPR-25M  
VV-10-VPR-25BB

## VV Operating & Control Voltage / Current

Operation and control voltage fluctuation range

| Classification                    | Standard | IEC 60056 |
|-----------------------------------|----------|-----------|
| Closing operation/control voltage | DC       | 85~110%   |
|                                   | AC       |           |
| Tripping control voltage          | DC       | 70~110%   |
|                                   | AC       | 85~110%   |

Closing and tripping control current vs. current-flow time (see Fig. 1)

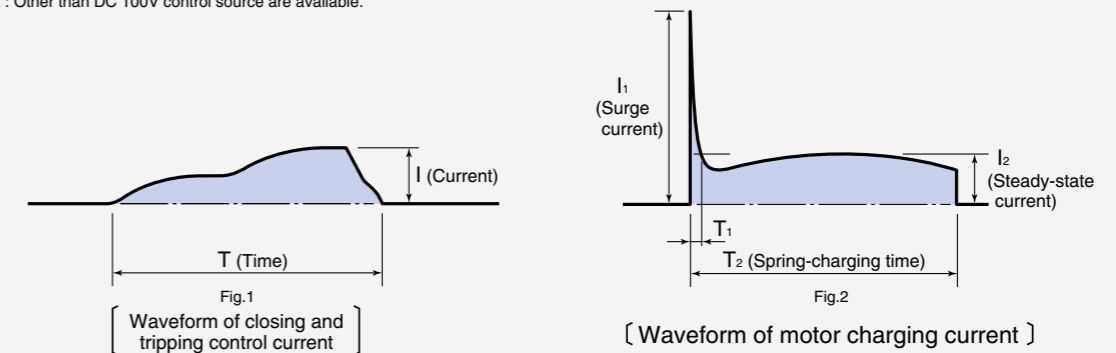
| VCB type name | Control voltage (V) | DC (V) |       |
|---------------|---------------------|--------|-------|
|               |                     | I (A)  | T (s) |
| VV-10VPR-25M  | Closing             | 3.5    | 0.05  |
| VV-10VPR-25BB | Tripping            | 3.5    | 0.03  |

NOTE : Other than DC 100V control source are available.

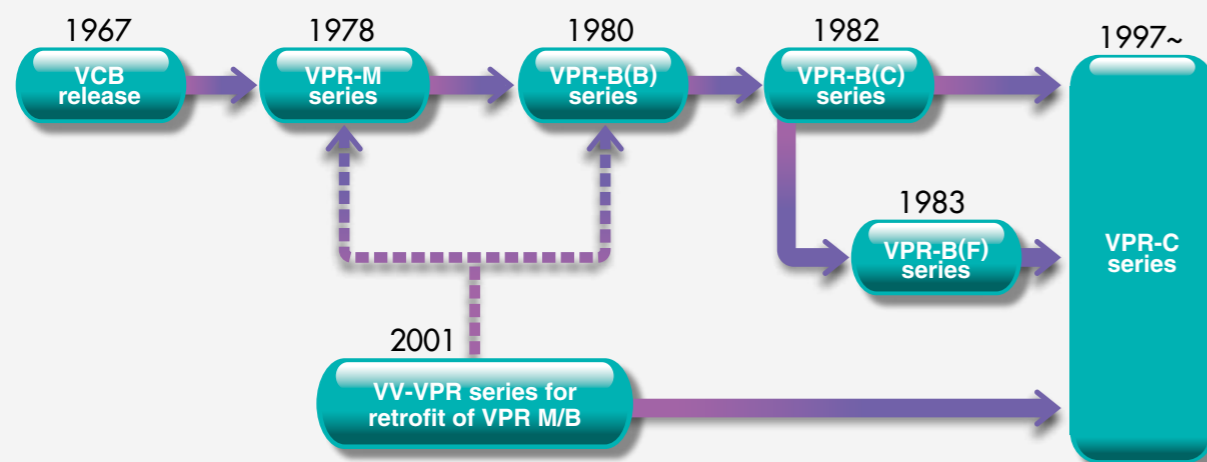
Motor-operation control current vs. current-flow time (see Fig. 2)

| VCB type name | Control voltage (V) | DC (V)             |                    |                    |                    |
|---------------|---------------------|--------------------|--------------------|--------------------|--------------------|
|               |                     | I <sub>1</sub> (A) | I <sub>2</sub> (A) | T <sub>1</sub> (s) | T <sub>2</sub> (s) |
| VV-10VPR-25M  | 100                 | 5                  | 1.8                | 0.1                | 5                  |
| VV-10VPR-25BB | 100                 | 5                  | 1.8                | 0.1                | 5                  |

NOTE : Other than DC 100V control source are available.



## VCB History and Retrofit VCB Series



## VV Applicable Standards

### Special Environment and Application

#### • Operation Environment

MV type vacuum circuit breaker conforms to the JEC-2300 and IEC 60056 (high voltage alternating current circuit breaker) and designed/manufactured as an indoor unit. Therefore, this circuit breaker should be operated under normal environments specified in right table.

Daily and periodical check and maintenance should be carried out enough according to VCB's instruction manuals. If it is necessary to operate this circuit breaker under special condition not listed in right table, consult the manufacture.

#### • Instructions for Installation

If it is necessary to operate this circuit breaker in a dusty place, a place with corrosive gas, at a location exposed to abnormal vibration or impact, or in an outdoor panel environment, etc., special care must be paid to deal with items such as dust, corrosion, vibration, impact, water drops, condensation, and etc.

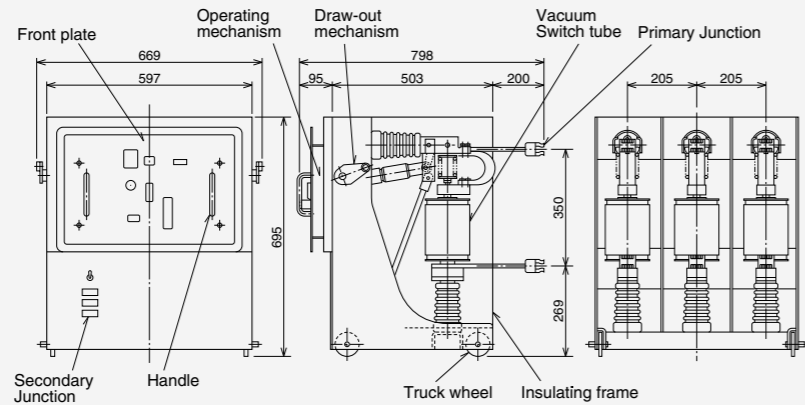
#### Normal operation condition

- Altitude: 1,000m or less**
- Ambient temp: -5°C~40°C**  
(The average temperature for 24 hours must not exceed 35°C.)
- Relative humidity: 45%~85%**  
(Relative humidity; there must be no dew condensation.)
- Degree of pollution: There must be no pollution.**  
(As a guideline, the equivalent salt deposit density should be less than 0.01 mg/cm<sup>2</sup>)
- Poisonous gas etc.: There must be no corrosive gas.**
- Powder dust: There must be no excessive powder dust.**  
(As a guideline, the powder dust should be less than 2 mg/m<sup>3</sup>)

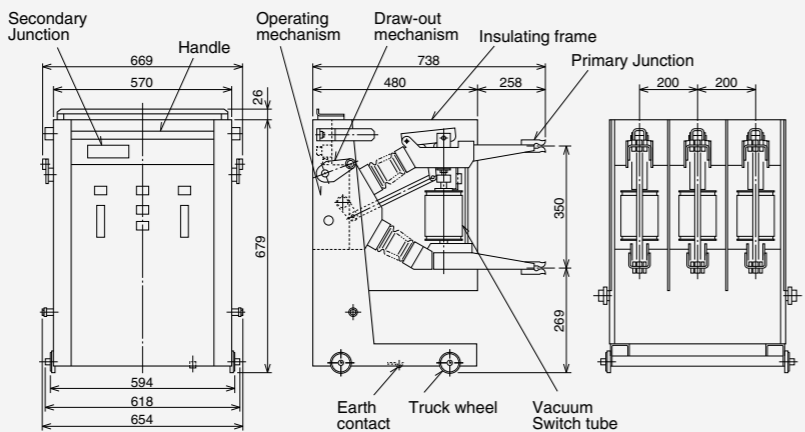
# VV Outline and Dimensions

## Existing VCB

Type 10-VPR-25M  
1250 A (Typical)

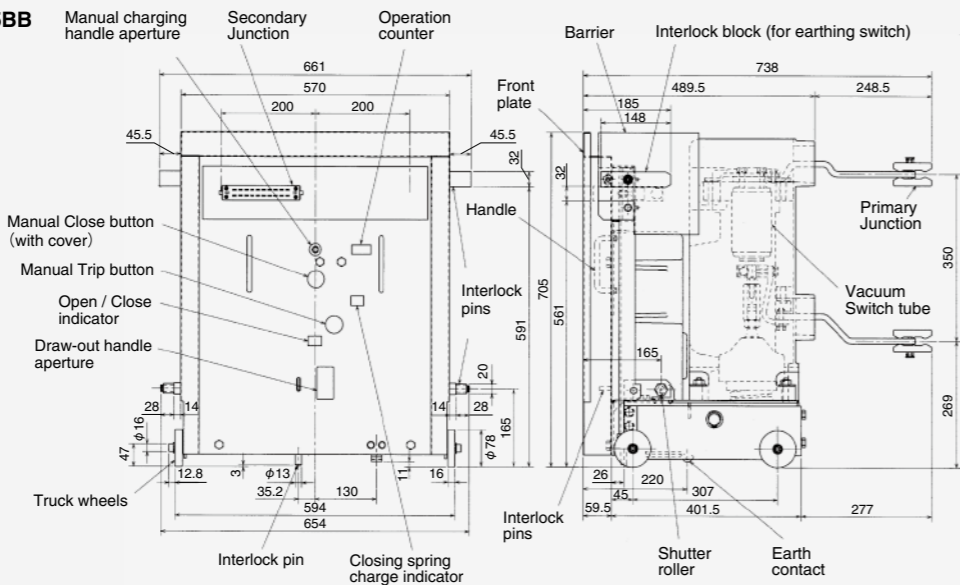


Type 10-VPR-25B (B)  
1250 A (Typical)



## Retrofit VCB

Type VV-10-VPR-25M/25BB  
1250 A (Typical)



# VV Information for Replacement

| Item                 | Description   |
|----------------------|---|
| Retrofit VCB type    | 10-VPR-25M , 10-VPR-25BB  |
| Standard accessories | <ul style="list-style-type: none"> <li>• Draw-out handle</li> <li>• Manual charging handle</li> <li>• Contact exhaustion limit gauge</li> </ul> One set of the above will be provided for each 5 VCBs. Additional sets can be provided, on request. |
| Interlock plate      | An interlock plate will be fitted to the floor of the CB compartment.   |

NOTE : Customers can perform the replacement at site as detailed instruction manuals are provided. Training by MITSUBISHI ELECTRIC staff is available on request.

# VV Details of Panel Modification

As mentioned, the interlock plate need to be installed on the floor of the VCB compartment as following procedure. Total modification work will take about 1 hour per 1 VCB.

- Step1** : Make 6 holes ( $\phi 5.2\text{mm}$ ) at the marked points on the floor by using a guide plate.
- Step2** : Make threads in the holes by using M6 hand tap to tighten the bolts.
- Step3** : Fix the interlock plate with 6 bolts (M6 $\times$ 12) on the floor.
- Step4** : Put the stickers for indicating both test and service positions on the floor.

**Caution:** For your safety, shutdown must be required during the modification.

