Vacuum Circuit Breaker
LG Pro-MEC VCB is user-friendly to give more convenience and safety by providing high speed interrupting time (3 cycles), adopting the rapid auto-reclosing method, and having wide range of accessories.
Wide range of accessories (optional)

- Key Lock
- Button padlock
- Button cover
- Position switch (Cell switch)
- Preparatory trip coil (Secondary trip coil)
- Latch checking switch
- Charge indicator
- Position padlock
- Earthing switch

- Padlock of earth switch
- Position switch of the earth switch
- Locking coil of earthing switch
- Shutter padlock
- MOC (Mechanically operated cell switch)
- TOC (Truck operated cell switch)
- Code plate (Miss insertion prevention)
- Capacitor trip device
- Rectifier

High reliability of the operating mechanism
- Separate design of the main circuit from the operating mechanism.
- Adopt the toggle link method.
- Improved the reliability of electric circuit.
- Adopt the rapid auto-reclosing method as a standard option.
  (O-0.3sec.-CO-3min.-CO)

High interrupting performance
- Make short of the interrupting time. (3cycles)
- Increase the rated short-circuit withstand and characteristics. (1sec. to 3sec.)

Great operational safety
- Reinforce the insulation in the conduct, by adopting the molded housing in each phase.
- Built in the device making the contacts open first when draw in and out.
- Adopt the tulip-shape connection between the cradle and the VCB.
## Vacuum Circuit Breaker

### Ratings

<table>
<thead>
<tr>
<th>Type</th>
<th>LVB-20□-13D</th>
<th>LVB-20□-13D/T</th>
<th>LVB-20□-25D</th>
<th>LVB-20□-25D/T</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated voltage (kV)</td>
<td>24</td>
<td>24</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rated current (A)</td>
<td>630</td>
<td>630</td>
<td>1250</td>
<td>1250</td>
</tr>
<tr>
<td>Rated frequency (Hz)</td>
<td>50/60</td>
<td>50/60</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rated breaking current (kA)</td>
<td>12.5</td>
<td>25</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rated breaking capacity (MVA)</td>
<td>520</td>
<td>1000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rated short-time current (kA/3sec)</td>
<td>12.5</td>
<td>25</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rated closing current (kA)</td>
<td>32.5</td>
<td>65</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rated breaking time (Cycle)</td>
<td>3</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rated opening time (sec)</td>
<td>≤ 0.04</td>
<td>≤ 0.04</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No-load closing time (sec)</td>
<td>≤ 0.06</td>
<td>≤ 0.06</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Withstand voltage</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Power frequency (kV/1.2 X 50㎲)</td>
<td>50</td>
<td>50</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Impulse (kV/1.2 X 50㎲)</td>
<td>125</td>
<td>125</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Standard test duty</td>
<td>O-0.3s-CO-3min-CO</td>
<td>O-0.3s-CO-3min-CO</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Class</td>
<td>Mechanical</td>
<td>M2</td>
<td>M2</td>
<td></td>
</tr>
<tr>
<td>Electrical</td>
<td>E2 List1</td>
<td>E2 List1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Charge current breaking</td>
<td>C2</td>
<td>C2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lifetime</td>
<td>Mechanical</td>
<td>Without maintenance (Time)</td>
<td>20000</td>
<td>20000</td>
</tr>
<tr>
<td>Electrical</td>
<td>Without maintenance (Time)</td>
<td>20000</td>
<td>20000</td>
<td></td>
</tr>
<tr>
<td>Auxiliary switch</td>
<td></td>
<td>4a4b, 10a10b</td>
<td>4a4b, 10a10b</td>
<td></td>
</tr>
<tr>
<td>Installing method</td>
<td>Fixed type</td>
<td>Releasing, Fixed</td>
<td>-</td>
<td>Releasing, Fixed</td>
</tr>
<tr>
<td>Draw-out type</td>
<td>E-type</td>
<td>Releasing, Clip</td>
<td>Hermetic, Tulip</td>
<td>Releasing, Clip</td>
</tr>
<tr>
<td>F-type</td>
<td>Releasing, Clip</td>
<td>Hermetic, Tulip</td>
<td>Releasing, Clip</td>
<td>Hermetic, Tulip</td>
</tr>
<tr>
<td>G-type</td>
<td>Releasing, Tulip</td>
<td>Hermetic, Tulip</td>
<td>Releasing, Tulip</td>
<td>Hermetic, Tulip</td>
</tr>
<tr>
<td>M-type</td>
<td>-</td>
<td>Hermetic, Tulip</td>
<td>-</td>
<td>Hermetic, Tulip</td>
</tr>
<tr>
<td>Weight</td>
<td>VCB</td>
<td>E-type (kg)</td>
<td>145</td>
<td>145</td>
</tr>
<tr>
<td></td>
<td></td>
<td>F-type (kg)</td>
<td>145</td>
<td>145</td>
</tr>
<tr>
<td></td>
<td></td>
<td>G-type (kg)</td>
<td>155</td>
<td>155</td>
</tr>
<tr>
<td></td>
<td>Cradle</td>
<td>E-type (kg)</td>
<td>80</td>
<td>80</td>
</tr>
<tr>
<td></td>
<td></td>
<td>F-type (kg)</td>
<td>82</td>
<td>82</td>
</tr>
<tr>
<td></td>
<td></td>
<td>G-type (kg)</td>
<td>110</td>
<td>120</td>
</tr>
<tr>
<td>Applied standard</td>
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<td>IEC 62271-100</td>
<td>IEC 62271-100</td>
<td></td>
</tr>
<tr>
<td>Test laboratory</td>
<td></td>
<td>KERI</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Note 1) Applied cable-charging breaking current*

*Note 2) G-Type releasing, tulip: manufactured G30, 1250A only*
Motor
When the closing spring is charged, the control power of motor is turned off by the built-in limit s/w.

<table>
<thead>
<tr>
<th>Rated voltage</th>
<th>The peak value of the inrush current (A)</th>
<th>Rated current (A)</th>
<th>Consumption power (W)</th>
<th>Charging time (Sec.)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>12.5kA</td>
<td>25kA</td>
<td>12.5kA</td>
<td>25kA</td>
</tr>
<tr>
<td>DC 24V</td>
<td>30</td>
<td>30</td>
<td>15</td>
<td>15</td>
</tr>
<tr>
<td>DC 110V</td>
<td>20</td>
<td>20</td>
<td>5</td>
<td>5</td>
</tr>
</tbody>
</table>

Note 1) Range of the normal operating voltage: 85~110%
2) DC 24V is the underdeveloped rating.

Closing Coil (C)
The coil operated only when the power is applied continuously over 45ms. It has built-in electrically anti-pumping circuit.

<table>
<thead>
<tr>
<th>Rated voltage</th>
<th>Rated current (A)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>12.5kA</td>
</tr>
<tr>
<td>DC 24V</td>
<td>10</td>
</tr>
<tr>
<td>DC 110V</td>
<td>2.5</td>
</tr>
</tbody>
</table>

Note 1) Range of the normal operating voltage: 85~110%
2) DC 24V is the underdeveloped rating.

Shunt coil (TC)
When the VCB is ‘ON’ position, even though the control power of a shunt coil is ‘OFF’, the VCB maintains the ‘ON’ position.

<table>
<thead>
<tr>
<th>Rated voltage</th>
<th>Rated current (A)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>12.5kA</td>
</tr>
<tr>
<td>DC 24V</td>
<td>10</td>
</tr>
<tr>
<td>DC 110V</td>
<td>2.5</td>
</tr>
</tbody>
</table>

Note 1) Range of the normal operating voltage: 70~110%
2) DC 24V is the underdeveloped rating.

Auxiliary switch
Standard 4a4b / Optional 10a10b

<table>
<thead>
<tr>
<th>Classification</th>
<th>General load (A)</th>
<th>Inductive load (A)</th>
<th>Contact configuration</th>
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</thead>
<tbody>
<tr>
<td>Contact Ratings: AC</td>
<td>250V</td>
<td>10</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>125V</td>
<td>10</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>250V</td>
<td>10</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>125V</td>
<td>10</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>30V</td>
<td>10</td>
<td>5</td>
</tr>
<tr>
<td>DC</td>
<td>250V</td>
<td>10</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>125V</td>
<td>10</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>30V</td>
<td>10</td>
<td>5</td>
</tr>
</tbody>
</table>

* Position of the Aux.contact switch
<table>
<thead>
<tr>
<th>VCB</th>
<th>a contact s/w</th>
<th>b contact s/w</th>
</tr>
</thead>
<tbody>
<tr>
<td>ON</td>
<td>ON</td>
<td>OFF</td>
</tr>
<tr>
<td>OFF</td>
<td>OFF</td>
<td>ON</td>
</tr>
</tbody>
</table>

Note: The contact capacity of the following accessories are the same with that of the Aux. switch. Position switch, Closing spring contact, Charging complete indicating contact, Position switch of the earthing switch, Mechanically operated cell switch, Truck operated cell switch.

Charging indicator of the closing coil
Indicating the condition of the closing spring.

Position indicator of the main contacts
Indicating the ‘Close’ or the ‘Open’ of the main contacts.
Close position: ‘ON’, Open position: ‘OFF’

Indicator of the contact wear
Indicator of the contact wear of the Vacuum Interrupter. When it indicate ‘3’, the user need to replace the VI.

Counter
Mechanically counts the switching of the VCB by 5digit analog type counter (Standard option)
Vacuum Circuit Breaker

Constructional and operating characteristics

Manual charge
Insert the charge handle into the manual charge hole in the front of a VCB, and rotate it to clockwise over 20 times and the charge complete with a metal sound.

Motor charge
If you apply the control power to a VCB, the closing spring will be charged automatically by a motor and then the control power will be turned off by the built-in limit s/w. Please use the same control voltage for motor, Closing coil, Trip coil.

Sequence of the switching mechanism

1. Charge Indicator of the closing coil
2. Close button
3. Key lock (Optional)
4. Trip button
5. Manual charge hole
6. Position indicator of the main contacts
7. Counter
8. Draw-in and out screw hole
9. Rating label
10. Indicator of the contact abrasion
11. Mounting hole
12. Safety cover

Manual charge

Motor charge

Sequence of the switching mechanism
Vacuum Interrupter (Breaking part of a VCB)

The core part of a Vacuum Interrupter is the ‘Contact’. The contact is strong against the withstand voltage and has little contact wear rate, because it is made of the ‘CuCr’ material and it adopt the spiral shape contact structure.

With unique structure, the spiral shape contact lead the arc, drawn between the surfaces of contact, to rotate around the contact. So, it prevent the partial heating and strong against the contact wear and the breaking time is short.

![The current flow and arc rotation in a spiral shape contact](image1)

![Internal structure of a Vacuum Interrupter](image2)

![Arcing and interruption phenomena of a Vacuum Interrupter](image3)
Control circuit diagram

Control terminal configuration

Note 1) LCS1: Latch checking switch
Note 2) Position switch: 4a (Terminal No.: 1, 2, 3, 4, 5, 6, 7, 8)
Note 3) TC1: Secondary trip coil (Preparatory trip coil Terminal No.: 82,83)
Note 4) In fixed type VCB, LS1 (Closing-coil limit switch) is not available.

※ Above circuit diagram is based on OFF status of VCB and closing spring is charged.
External dimension (VCB)

LVB-20P-13D, 25D (Releasing, Fixed type) - 630/1250/2000A

- Front
- Side

<Terminal conductor>

LVB-20E, F-13D / (T), 25D / (T)  E, F class - (630/1250/2000A)

- Front
- Side
Vacuum Circuit Breaker

External dimension (VCB)

**LVB-20G-13D, 25D**  
G class (Releasing, Tulip contact) - 630/1250A

- Front
- Side

**LVB-20G-13D/T, 25D/T**  
G class (Hermetic type, Tulip contact) - 630/1250/2000A

- Front
- Side
LCL-20E-13D, 25D  G class (Releasing, Clip contact) - 630/1250/2000A

• Front

• Side

<table>
<thead>
<tr>
<th>Rated</th>
<th>A</th>
<th>B</th>
<th>T</th>
</tr>
</thead>
<tbody>
<tr>
<td>630/1250A</td>
<td>768</td>
<td>175.5</td>
<td>10</td>
</tr>
<tr>
<td>2000A</td>
<td>778</td>
<td>180.5</td>
<td>20</td>
</tr>
</tbody>
</table>

External dimension (Cradle) (Unit : mm)

• Top

<Terminal conductor>

<Earthing terminal>
LCL-20E-13D/T, 25D/T  E class (Hermetic type, Tulip contact) - 630/1250/2000A

- **Front**

- **Side**

<table>
<thead>
<tr>
<th>Rated</th>
<th>A</th>
<th>B</th>
<th>T</th>
</tr>
</thead>
<tbody>
<tr>
<td>630A, 1250A</td>
<td>768</td>
<td>120</td>
<td>12</td>
</tr>
<tr>
<td>2000A</td>
<td>778</td>
<td>180.5</td>
<td>20</td>
</tr>
</tbody>
</table>

- **Top**

<Terminal conductor>

<Earthing terminal>
LCL-20F-13D, 25D  F class (Releasing, Clip contact) - 630/1250/2000A

- Front

- Side

<table>
<thead>
<tr>
<th>Rated</th>
<th>A</th>
<th>B</th>
<th>T</th>
</tr>
</thead>
<tbody>
<tr>
<td>630, 1250A</td>
<td>768</td>
<td>175.5</td>
<td>10</td>
</tr>
<tr>
<td>2000A</td>
<td>778</td>
<td>180.5</td>
<td>20</td>
</tr>
</tbody>
</table>

- Top

<Terminal conductor>

12.5kA 630A

25kA 630A

12.5kA 1250A

29kA 1250, 2000A

<Earthing terminal>
Vacuum Circuit Breaker

External dimension (Cradle)

LCL-20F-13D/T, 25D/T  F class (Hermetic type, Tulip contact) - 630/1250/2000A

- Front

- Side

<table>
<thead>
<tr>
<th>Rated</th>
<th>A</th>
<th>B</th>
<th>T</th>
</tr>
</thead>
<tbody>
<tr>
<td>630, 1250A</td>
<td>768</td>
<td>175.5</td>
<td>10</td>
</tr>
<tr>
<td>2000A</td>
<td>778</td>
<td>180.5</td>
<td>20</td>
</tr>
</tbody>
</table>

- Top

<Terminal conductor>
- 1250A
- 2000A

<Earthing terminal>
Vacuum Circuit Breaker

External dimension (Cradle)

LCL-20G-13D/T, 25D/T      G class (Hermetic type, Tulip contact) - 630/1250/2000A

- Front
- Side
- Top
- Earthing Switch

<Terminal conductor>

VIEW “A”

VIEW “B”
Optional accessories of the VCB

**Key lock**
When it is locked by a key, the closing operation is not available (electrically and mechanically) without a Key.

**Button padlock**
Button padlock protects ‘ON’ or ‘Trip’ button when accident is occurred by operation at discretion. It is available to operate after release button padlock.

**Button cover**
Button cover protects ‘ON’ of ‘Trip’ button when accident is occurred by operation at discretion. It is available to operate by push bar.

**Position switch (Cell switch)**
Indicating the position (Run or Test) of a VCB, by mechanically pressing the switch when a VCB change the position.
- RUN : 2a
- TEST : 2a

Note: In case of VCB is fixed on “TEST” or “RUN” position it will be transfer to “b” contact.
Optional accessories of the VCB

**Secondary coil (Preparatory trip coil)**
The main coil and the preparatory coil is connected in parallel. So even though there happens a fault in the trip coil, the VCB can be tripped by one of the two trip coils.

**Latch checking switch**
When the Latch is in abnormal position, the Latch checking switch prevent the closing operation even though there is the 'Closing' signal.

**Charge indicator**
Remotely indicates the charging is completed.
[Standard Feature]
- Terminal No.: 9, 10

**Position padlock**
The hole to prevent the draw-in and out of a VCB from the present position.['Run' or 'Test']
Standard option in the interlock lever of the E, F class draw-out type VCB. (Hole size = Ø 8)
Optional accessories of a Cradle

**Earthing switch**
(for G class draw-out type only)
For the safety during the maintenance of a VCB panel, discharge the charging current in the load side of a VCB with this earthing switch.

**Padlock of earthing switch**
(for G class draw-out type only)
The hole to prevent the accident through carelessness earthing switch operation, the locking of the earthing switch is available when the switch is in 'OFF' position. (Hole size = 8)

**Position switch of the earthing switch**
(for G class draw-out type only)
Indicates the 'ON' or 'OFF' status of the earthing switch. (5a5b)

**Locking coil of earthing switch**
(for G class draw-out type only)
To prevent the accident through carelessness earthing switch operation, the earthing switch can be changed to 'ON' position after releasing the lock by magnetizing the coils.
Optional accessories of a Cradle

**Shutter padlock**
- **Standard offer in the draw-out type**
  The hole to lock the shutters (load and line side) in close position, to increase the safety during the maintenance of a VCB draw-out position. (Hole size = ¥ 8)

**Mechanically operated cell switch (MOC)**
- **for G class draw-out type only**
  The auxiliary switch (3a4b), which indicate the 'ON' or 'OFF' condition of a VCB, but operated only when the VCB is in 'Run' state. (Installed in the bottom of a cradle)

**Truck operated cell switch (TOC)**
- **for G class draw-out type only**
  The auxiliary switch (3a4b), which indicate the 'Run' state of a VCB and is operated by the movement of a VCB frame. (Installed in the bottom of a cradle)

**Code plate (Miss insertion prevention)**
- **for E,F class draw-out type only**
  To prevent the insert a VCB to a cradle, when the ratings of VCB and cradle are different.

**Padlock**
To prevent the insert draw-in/out handle to a screw hole by operating G class VCB temporarily.
**Optional accessories**

**Capacitor trip device (CTD)**
When the control power is off, the CTD supply the power for tripping a VCB.

<table>
<thead>
<tr>
<th>Type</th>
<th>VCB-T1</th>
<th>VCB-T2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated input voltage</td>
<td>AC 100/110V</td>
<td>AC 200/220V</td>
</tr>
<tr>
<td>Tripping time</td>
<td>Within 30 Sec. after the AC power off</td>
<td></td>
</tr>
<tr>
<td>Voltage of the CTD</td>
<td>DC 100/110V</td>
<td>DC 200/220V</td>
</tr>
</tbody>
</table>

**Rectifier**
When the DC power is not available, rectify the AC power and get the DC power for closing coil.

<table>
<thead>
<tr>
<th>Type</th>
<th>AC Input voltage</th>
<th>Output current</th>
<th>Rating time</th>
</tr>
</thead>
<tbody>
<tr>
<td>VCB-X</td>
<td>1. 100/110V</td>
<td>40A dc</td>
<td>10 sec.</td>
</tr>
<tr>
<td></td>
<td>1. 200/220V</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Dimension**

- **Connection circuit diagram**

![Connection circuit diagram](image)

- **Connection diagram**

![Connection diagram](image)

**Standard tool**

**Handle for draw-in and out**
Handle for draw-in and out the VCB (Standard feature in the draw-out type)

**Manual charging handle**
Handle for charging the spring manually. (Standard feature)
Types and ordering information

### LG VCB

<table>
<thead>
<tr>
<th>Rated voltage</th>
<th>7.2kV</th>
<th>24kV</th>
</tr>
</thead>
</table>

#### Cradle

<table>
<thead>
<tr>
<th>Rated voltage</th>
<th>7.2kV</th>
<th>24kV</th>
</tr>
</thead>
</table>

#### Revision No.

- **A**: General type
- **D**: Pro-MEC (Standard)

<table>
<thead>
<tr>
<th>Rated voltage</th>
<th>400A</th>
<th>630A</th>
<th>1250A</th>
<th>2000A</th>
<th>3150A</th>
</tr>
</thead>
</table>

#### Control voltage

- **00**: -
- **1A**: DC110V
- **1B**: DC220V
- **1C**: DC48V
- **1D**: DC24V
- **1E**: DC125V

#### Auxiliary switch

- **00**: -
- **2B**: 4a4b (AMP Jack)
- **2E**: 10a10b (AMP Jack)
- **2G**: 4a4b (Phoenix Jack)
- **2H**: 10a10b (Phoenix Jack)

#### Accessories

- **B**: Position Switch (RUN/TEST:2a2a)
- **C1**: Button Padlock (ON)
- **C2**: Button Padlock (OFF)
- **C3**: Button Padlock (ON/OFF)
- **D1**: Button Cover (ON)
- **D2**: Button Cover (OFF)
- **D3**: Button Cover (ON/OFF)
- **E**: Button padlock (ON/OFF)
- **F**: Button padlock (OFF)
- **G**: Key Lock
- **H**: Secondary Trip Coil (Preparatory trip coil)
- **K**: Opening/Latch Checking Switch
- **N**: CTD (Capacitor Trip Device)
- **O**: Rectifier
- **P1**: Dummy VCB (AMP Jack)
- **P2**: Dummy VCB (Phoenix Jack)
- **Q**: Earthing Truck (Lower)
- **R**: Earthing Truck (Upper)
- **S**: Pad Lock (G class)
- **T**: Close up, Tulip contact

**Note:** In case 24kV, only both of 12.5kA and 25kA are available.

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### LG VCB

<table>
<thead>
<tr>
<th>Rated voltage</th>
<th>7.2kV</th>
<th>24kV</th>
</tr>
</thead>
</table>

#### Installation method

- **P**: Fixed type
- **E**: E class draw-out type
- **F**: F class draw-out type
- **G**: G class draw-out type + Bushing

#### Revision No.

- **A**: General type
- **D**: Pro-MEC (Standard)

<table>
<thead>
<tr>
<th>Rated voltage</th>
<th>8kA</th>
<th>12.5kA</th>
<th>20kA</th>
<th>25kA</th>
<th>31.5kA</th>
<th>40kA</th>
</tr>
</thead>
</table>

#### Accessories

- **A**: MOC (3a4b) + TOC (3a4b)
- **B**: Earthing Switch
- **C**: Earthing Switch Position Switch + Earthing Switch Locking coil

**Note:** A, B, C is for G class only

**Note:** In case 24kV, only both of 12.5kA and 25kA are available.
LG Industrial Systems

HEAD OFFICE
LG TWIN TOWERS, 20 Yoido-dong, Youngdungpo-gu,
Seoul, 150-721, Korea
Tel. (82-2)3777-4870
Fax. (82-2)3777-4713
http://www.lgis.com

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