LS Medium Voltage Vacuum Contactors
Customer satisfaction through quality and service - LS medium voltage vacuum contactors

LS medium voltage vacuum contactors using LS vacuum interrupters manufactured with worldclass technology are type tested in LS PT & T that is accredited high power test lab by worldclass KOLAS.
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LS Susol Vacuum Contactors

We have the major technology that others can not catch up. LS Susol vacuum contactors provide high withstand-current strength and switching capacity as well as versatile auxiliary functions.

LS Susol Super Solution

Fixed Type

Combination Fixed Type

Drawout Type

General Description

LS Susol vacuum contactors are mainly used for the switching of motors, transformers, capacitors in AC power lines. They can be installed in multi-stack cubicles.

A vacuum contactor comprises several assemblies such as switching mechanism including vacuum interrupters, magnetic actuator, high strength molded front cover and auxiliary devices. Stable and high operating cycle is executed by the vacuum interrupters made of high alumina ceramic tube which makes it possible to degas in a high temperature with excellent mechanical strength.

Actuating is available either at instantaneous or continuous excitation. Functions for safety in connecting and disconnecting are also provided.
Operation conditions

Ambient temperature: -5 to 40°C
Maximum temperature of 24-hour mean: 35°C
Altitude: 1000m
Humidity: 24-hour measured average - max. 95% RH
1 month measured average - max. 90% RH

Applied standards

IEC Pub. 62271 - 106, IEC 60282 - 1, JEM 1167, KEMC 1126
Up-graded performance

Short Circuit Protective Device (SCPDs)

[ 7.2kV 400A ]

IEC 62271 - 106 in KOLAS certification authority by the new standard 7.2kV 400A Fuse has a combination of blocking performance verification.

Short - circuit protection

[ 40kA ]

Power fused type vacuum contactors, in-house tested according to IEC 60282 - 1, can provide short-circuit protection up to 40kA.

High performance, high reliability and long service life
LS vacuum interrupters that comply with IEC, ANSI and NEMA standards are manufactured by the process of brazing and degasing together in a high vacuum furnace to assure high reliability.

Superior mechanical strength and degasing
Providing long service life and suited for frequently operating purpose due to using high alumina ceramic tube and degasing in a high temperature.

High speed interruption and short arcing time
It has fast recovering characteristic of vacuum insulation. When opening it breaks the current at the first current - zero point to minimize the wearing of contacts.

Reliable interruption of fault current
LS current limiting power fuse can protect the devices and systems from fault current by interrupting within half cycle. High current such as short-circuit current cause a fuse blown out due to the reaction on the material inside of a fuse within such a short time.

Applied standards
IEC 282 - 1, DIN 43625, BS 2692, KSC 4612
LS Susol vacuum contactors provide several auxiliary functions for safe and comfortable use.

Mechanical Interlock Type

- Interlock button
- Drawout cradle for MCSG
- One - molded fuse holder
- Fuse checker and micro switch
- Unification bushing
- Mechanical interlock type

Additional Equipment

Suitable for Metal Clad Switchgear
The structure of G type cradle unification bushings and single - molded fuse - holder barrier enables vacuum contactors to build Metal Clad Switchgears.

Directly withdrawable equipment
This enables the withdrawing of a vacuum contactor from a panel without opening a door to prevent any possibility of electric shock.

Interlock
For the safety of an operator, an interlock is equipped as standard.

Auxiliary contacts
Available up to 5NO+5NC.
## Technical data

### Single type

<table>
<thead>
<tr>
<th>Type</th>
<th>Continuous Excitation (E)</th>
<th>Instantaneous Excitation (L)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>VC-3Z-42</td>
<td>VC-3Z-44</td>
</tr>
<tr>
<td>Rated operation voltage (kV)</td>
<td>3.3</td>
<td>6.6</td>
</tr>
<tr>
<td>Rated voltage (U) (kV)</td>
<td>3.6</td>
<td>7.2</td>
</tr>
<tr>
<td>Rated operational current (Ie) (A)</td>
<td>200</td>
<td>400</td>
</tr>
<tr>
<td>Rated frequency (fr) (Hz)</td>
<td>50/60</td>
<td></td>
</tr>
<tr>
<td>Rated breaking current (I, O - 3min - CO - 2min - CO) (kA)</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Rated short - time current (I, sec) (kA)</td>
<td>2.4kA-30s, 4kA-10s, 6kA-2s, 6.3kA-1s</td>
<td></td>
</tr>
<tr>
<td>Rated short - time peak current (kApeak - 0.5Cycle) (kA)</td>
<td>60</td>
<td></td>
</tr>
<tr>
<td>Switching frequency (AC3) (op/hr)</td>
<td>E: Continuous 1200, L: Instantaneous 300</td>
<td></td>
</tr>
<tr>
<td>Lifetime</td>
<td>Mechanical [×10, 000operations]</td>
<td>E: Continuous 300, L: Instantaneous 50</td>
</tr>
<tr>
<td></td>
<td>Electrical [×10, 000operations]</td>
<td>30</td>
</tr>
<tr>
<td>Impulse withstand (Up) (kVp)</td>
<td>60</td>
<td></td>
</tr>
<tr>
<td>Dielectric strength (Ud) (kV/1min)</td>
<td>20</td>
<td></td>
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</tbody>
</table>

### Fixed (Z) type

<table>
<thead>
<tr>
<th>Type</th>
<th>Continuous Excitation (E)</th>
<th>Instantaneous Excitation (L)</th>
</tr>
</thead>
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<tr>
<td></td>
<td>VC-3Z-42</td>
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<td>400</td>
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<tr>
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<td>50/60</td>
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<tr>
<td>Rated breaking current (I, O - 3min - CO - 2min - CO) (kA)</td>
<td>4</td>
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<tr>
<td>Lifetime</td>
<td>Mechanical [×10, 000operations]</td>
<td>E: Continuous 300, L: Instantaneous 50</td>
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<td>Electrical [×10, 000operations]</td>
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<tr>
<td>Impulse withstand (Up) (kVp)</td>
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</tr>
<tr>
<td>Dielectric strength (Ud) (kV/1min)</td>
<td>20</td>
<td></td>
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</table>

### Drawout (D) type

<table>
<thead>
<tr>
<th>Type</th>
<th>Continuous Excitation (E)</th>
<th>Instantaneous Excitation (L)</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>VC-3Z-42</td>
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<tr>
<td>Rated operation voltage (kV)</td>
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<td>Rated voltage (U) (kV)</td>
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<tr>
<td>Rated operational current (Ie) (A)</td>
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<td>400</td>
</tr>
<tr>
<td>Rated frequency (fr) (Hz)</td>
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<tr>
<td>Rated breaking current (I, O - 3min - CO - 2min - CO) (kA)</td>
<td>4</td>
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<tr>
<td>Rated short - time current (I, sec) (kA)</td>
<td>2.4kA-30s, 4kA-10s, 6kA-2s, 6.3kA-1s</td>
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<tr>
<td>Rated short - time peak current (kApeak - 0.5Cycle) (kA)</td>
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<tr>
<td>Switching frequency (AC3) (op/hr)</td>
<td>E: Continuous 1200, L: Instantaneous 300</td>
<td></td>
</tr>
<tr>
<td>Lifetime</td>
<td>Mechanical [×10, 000operations]</td>
<td>E: Continuous 300, L: Instantaneous 50</td>
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<td></td>
<td>Electrical [×10, 000operations]</td>
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<tr>
<td>Impulse withstand (Up) (kVp)</td>
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<td></td>
</tr>
<tr>
<td>Dielectric strength (Ud) (kV/1min)</td>
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</table>

### Direct - drawout (K) type

<table>
<thead>
<tr>
<th>Type</th>
<th>Continuous Excitation (E)</th>
<th>Instantaneous Excitation (L)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<td>VC-3Z-44</td>
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<tr>
<td>Rated operation voltage (kV)</td>
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<td>6.6</td>
</tr>
<tr>
<td>Rated voltage (U) (kV)</td>
<td>3.6</td>
<td>7.2</td>
</tr>
<tr>
<td>Rated operational current (Ie) (A)</td>
<td>200</td>
<td>400</td>
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<tr>
<td>Rated frequency (fr) (Hz)</td>
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<td></td>
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<tr>
<td>Rated short - time current (I, sec) (kA)</td>
<td>2.4kA-30s, 4kA-10s, 6kA-2s, 6.3kA-1s</td>
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<tr>
<td>Rated short - time peak current (kApeak - 0.5Cycle) (kA)</td>
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</tr>
<tr>
<td>Switching frequency (AC3) (op/hr)</td>
<td>E: Continuous 1200, L: Instantaneous 300</td>
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</tr>
<tr>
<td>Lifetime</td>
<td>Mechanical [×10, 000operations]</td>
<td>E: Continuous 300, L: Instantaneous 50</td>
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<tr>
<td></td>
<td>Electrical [×10, 000operations]</td>
<td>30</td>
</tr>
<tr>
<td>Impulse withstand (Up) (kVp)</td>
<td>60</td>
<td></td>
</tr>
<tr>
<td>Dielectric strength (Ud) (kV/1min)</td>
<td>20</td>
<td></td>
</tr>
</tbody>
</table>

### Power fuse

Power fuses can be installed into combination (G, B, F) type contactors for the protection of equipments and systems from short - circuit. Fuse ratings are selected properly after system analysis and some accessories such as fuse link clips should be selected by the fuse rating.
### Combination Type

<table>
<thead>
<tr>
<th>Combination Drawout(G) Type</th>
<th>Combination Direct-Drawout(B) Type</th>
<th>Combination Fixed(F) Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>Continuous Excitation (E)</td>
<td>Instantaneous Excitation (L)</td>
</tr>
</tbody>
</table>

**Rated operation voltage [kV]**
- 3.3
- 6.6
- 3.3
- 6.6
- 3.3
- 6.6
- 3.6
- 7.2
- 3.6
- 7.2

**Rated voltage U[V]**
- 3.6
- 7.2
- 3.6
- 7.2
- 3.6
- 7.2
- 3.6
- 7.2

**Rated operational current I[A]**
- 200
- 400
- 200
- 400
- 200
- 400

**Rated frequency f[Hz]**
- 50/60
- 50/60
- 50/60
- 50/60
- 50/60
- 50/60

**Rated breaking current [kA]**
- 4kA (40kA with fuse)
- 4kA
- 4kA
- 4kA
- 4kA
- 4kA
- 4kA
- 4kA

**PF Combination**
- Making 40kA
- Breaking 40kA
- Making 40kA
- Breaking 40kA
- Making 40kA
- Breaking 40kA
- Making 40kA
- Breaking 40kA

**Take over (O - 3min - O - 3min - O)**
- 4kA
- 4kA
- 4kA
- 4kA
- 4kA
- 4kA
- 4kA
- 4kA

**Switching frequency (AC3)**
- E : Continuous 1200
- L : Instantaneous 300
- E : Continuous 1200
- L : Instantaneous 300
- E : Continuous 1200
- L : Instantaneous 300
- E : Continuous 1200
- L : Instantaneous 300

**Lifetime**
- Mechanical [x10, 000 operations]
- E : Continuous 300
- L : Instantaneous 50
- Electrical [x10, 000 operations]
- E : Continuous 300
- L : Instantaneous 50
- Impulse withstand Up[kVp]
- 60
- 60
- 60
- 60
- 60
- 60
- 60
- 60

**Discharge strength Ud[kV/1min]**
- 20
- 20
- 20
- 20
- 20
- 20
- 20
- 20

**Excitation method**
- E : Continuous, L : Instantaneous
- E : Continuous, L : Instantaneous
- E : Continuous, L : Instantaneous
- E : Continuous, L : Instantaneous
- E : Continuous, L : Instantaneous
- E : Continuous, L : Instantaneous
- E : Continuous, L : Instantaneous
- E : Continuous, L : Instantaneous

**Control voltage [V]**
- DC/AC 110V, 125V, 220V
- DC/AC 110V, 125V, 220V
- DC/AC 110V, 125V, 220V
- DC/AC 110V, 125V, 220V
- DC/AC 110V, 125V, 220V
- DC/AC 110V, 125V, 220V
- DC/AC 110V, 125V, 220V
- DC/AC 110V, 125V, 220V

**Auxiliary contact**
- Current [A]
- 10 (AC)
- 10 (AC)
- 10 (AC)
- 10 (AC)
- 10 (AC)
- 10 (AC)
- 10 (AC)
- 10 (AC)

**Voltage [V]**
- 600max ~ 48min
- 600max ~ 48min
- 600max ~ 48min
- 600max ~ 48min
- 600max ~ 48min
- 600max ~ 48min
- 600max ~ 48min
- 600max ~ 48min
- 600max ~ 48min

**Arrangement**
- 2NO2NC
- 2NO2NC
- 2NO2NC
- 2NO2NC
- 2NO2NC
- 2NO2NC
- 2NO2NC
- 2NO2NC
- 2NO2NC

**Weight [kg]**
- 46
- 62
- 46
- 62
- 46
- 62
- 46
- 62
- 46

---

**Power fuse ratings combination type**

<table>
<thead>
<tr>
<th>Standard</th>
<th>Type</th>
<th>Rated voltage (kV)</th>
<th>Rated current (A)</th>
<th>Diameter (mm)</th>
<th>Length (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>DIN Type</td>
<td>LFL - 3/6G - □B</td>
<td>3.6/7.2</td>
<td>5, 10, 20, 30, 40, 50, 63, 75, 100</td>
<td>45</td>
<td>192</td>
</tr>
<tr>
<td></td>
<td>LFL - 3/6G - □B</td>
<td>3.6/7.2</td>
<td>125</td>
<td>292</td>
<td></td>
</tr>
<tr>
<td></td>
<td>LFL - 3G - □B</td>
<td>3.6</td>
<td>160, 200</td>
<td>292</td>
<td></td>
</tr>
<tr>
<td></td>
<td>LFL - 6G - □B</td>
<td>7.2</td>
<td>160, 200</td>
<td>292</td>
<td></td>
</tr>
<tr>
<td>KS Type</td>
<td>LFL - 3G - □</td>
<td>3.6/7.2</td>
<td>5(T1.5), 10(T3), 20(T7.5), 30(T15), 40(T20), 50(T30), 60(T30)</td>
<td>50</td>
<td>261</td>
</tr>
<tr>
<td></td>
<td>LFL - 3G - □</td>
<td>3.6/7.2</td>
<td>75(T50), 100(T75)</td>
<td>60</td>
<td>311</td>
</tr>
<tr>
<td></td>
<td>LFL - 3G - □</td>
<td>3.6/7.2</td>
<td>150(T100), 200(T150)</td>
<td>60</td>
<td>311</td>
</tr>
<tr>
<td></td>
<td>LFL - 3G - □</td>
<td>3.6/7.2</td>
<td>300(T250), 400(T300)</td>
<td>77</td>
<td>311</td>
</tr>
<tr>
<td>For motors</td>
<td>LFL - 3M - □</td>
<td>3.6</td>
<td>M20, M50, M100</td>
<td>60</td>
<td>200</td>
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<tr>
<td></td>
<td>LFL - 3M - □</td>
<td>3.6</td>
<td>M150, M200</td>
<td>77</td>
<td>200</td>
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<td></td>
<td>LFL - 3M - □</td>
<td>3.6</td>
<td>M300, (M400)</td>
<td>87</td>
<td>250</td>
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<tr>
<td></td>
<td>LFL - 6M - □</td>
<td>7.2</td>
<td>M20, M50</td>
<td>60</td>
<td>311</td>
</tr>
<tr>
<td></td>
<td>LFL - 6M - □</td>
<td>7.2</td>
<td>M100, M150, M200</td>
<td>77</td>
<td>350</td>
</tr>
<tr>
<td></td>
<td>LFL - 6M - □</td>
<td>7.2</td>
<td>M300, (M400)</td>
<td>87</td>
<td>450</td>
</tr>
</tbody>
</table>

* LFL - 6G - 300, 400 is not possible to combine with VC

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Note: Load capacity is different from ratings of Power Fuse

* T is applied to the load capacity varies depending on the power rating of the fuse
## Ordering Information

### Susol

### Contactor

<table>
<thead>
<tr>
<th>VC</th>
<th>3</th>
<th>Z</th>
<th>4</th>
<th>2</th>
<th>E</th>
<th>E</th>
<th>D1</th>
<th>ABGH</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unique Symbol</td>
<td>Rated Voltage(kV)</td>
<td>Installation</td>
<td>Breaking Current(kA)</td>
<td>Rated Current(A)</td>
<td>Control Method</td>
<td>Modification</td>
<td>Control Voltage</td>
<td>Accessory</td>
</tr>
<tr>
<td>VC</td>
<td>Vacuum Contactor</td>
<td>3</td>
<td>3.6</td>
<td>Z</td>
<td>Fixed Type</td>
<td>4</td>
<td>4</td>
<td>200</td>
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<tr>
<td>VC</td>
<td>Vacuum Contactor</td>
<td>6</td>
<td>7.2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Instantaneous Excitation</td>
</tr>
</tbody>
</table>

### Accessories

- **A**: Pad Lock
- **B**: Button Pad Lock
- **C**: Button Cover
- **D**: Lead Wire Assy(3M)
- **E**: Plug, Pin(2Pin)
- **F**: Blue Plenem Wire(VC, Lead Wire)
- **G**: Yellow Plenem Wire(VC, Lead Wire)
- **H**: Position S/W
- **J**: 3a3b Auxiliary Contact
- **K**: 3 Position S/W
- **L**: CTD

### Installation

- **D**: Drawout Type
- **F**: Combination Fixed Type
- **G**: “Combination Drawout Type (Fuse connectable)”
- **K**: Direct - Drawout Type (For MCSG)
- **B**: “Combination Direct - Drawout Type (Fuse connectable and for MCSG)”

### Control Voltage

- **A1**: AC 110V
- **A2**: AC 220V
- **A3**: AC 125V
- **D1**: DC 110V
- **D2**: DC 220V
- **D3**: DC 125V

### Breaking Current(kA)

- **4**

### Rated Current(A)

- **200**
- **400**

### Rated Voltage(kV)

- **3.6**
- **6.7**

### Fuse Checkers

- **D1**: DC 110V
- **C**: Without General Type
- **C1**: With General Type
- **C2**: With SIBA Type

### Accessories

- **A**: Pad Lock
- **B**: Button Pad Lock
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- **J**: 3a3b Auxiliary Contact
- **K**: 3 Position S/W
- **L**: CTD

### Truck

- **T1**: Earthing Switch
- **T2**: Metal Shutter

### Fuses

- **F01**: LFL3/6G - 5-60 3.3/6.6kV 200/400A Common
- **F02**: LFL3M - 20~100 3.3kV 200/400A
- **F03**: LFL3G - 75~100 3.3/6.6kV 200/400A Common
- **F04**: LFL3G - 150~200 3.3/6.6kV 200/400A Common
- **F05**: LFL6G - 20~50 3.3/6.6kV 200/400A Common
- **F06**: LFL6M - 100~200 3.3/6.6kV 200/400A Common
- **F07**: LFL3M - 300~400 3.3kV 400A Only
- **F08**: LFL6M - 300~400 3.3/6.6kV 400A Only
- **F09**: LFL3/6G - 5~100B 3.3/6.6kV 200/400A Common
- **F10**: LFL3/6G - 125B~200B 3.3/6.6kV 200/400A Common

### Accessory

- **A**: Pad Lock
- **B**: Button Pad Lock
- **C**: Button Cover
- **D**: Lead Wire Assy(3M)
- **E**: Plug, Pin(2Pin)
- **F**: Blue Plenem Wire(VC, Lead Wire)
- **G**: Yellow Plenem Wire(VC, Lead Wire)
- **H**: Position S/W
- **J**: 3a3b Auxiliary Contact
- **K**: 3 Position S/W
- **L**: CTD
- **F09**: LFL3/6G - 5-100B
- **F10**: LFL3/6G - 125B-200B
**Cradle**

<table>
<thead>
<tr>
<th>Unique Symbol</th>
<th>Rated Voltage(kV)</th>
<th>Ratings</th>
<th>Cradle TYPE</th>
<th>Accessory</th>
</tr>
</thead>
<tbody>
<tr>
<td>VCL VCS Cradle</td>
<td>3/6 3.6/7.2kV</td>
<td>42/44 Breaking Current 4kA, Rated Current 200/400A</td>
<td>E E Class</td>
<td>- Without</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>F F2 Class</td>
<td>A 1a 1b</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>G (Gushing Type)</td>
<td>B 2a 2b</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>M Metal Shutter Direct-Drawout Type(K, B)</td>
<td>C 3 Position S/W</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>B Direct-Drawout Type(K, B)</td>
<td>D (ES/Earth S/W) With Option</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>H Earthing S/W Direct-Drawout Type(K, B)</td>
<td>E (ES) Earthing S/W(2NO2NC)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>F Earthing S/W(4a4b)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>G Earthing S/W With Key Lock</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>H ES with Locking Magnet(DC 110V)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>I ES with Locking Magnet(DC 220V)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>J ES with Locking Magnet(AC 125V)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>K ES with Locking Magnet(AC 110V)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>L ES with Locking Magnet(AC 220V)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>M ES with Locking Magnet(AC 125V)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>N Shutter Lock</td>
</tr>
</tbody>
</table>

**MI (With Only VC)**

<table>
<thead>
<tr>
<th>Unique Symbol</th>
<th>Product Name</th>
<th>Vacuum Contact(VCC)</th>
<th>Control Voltage(V)</th>
<th>Vacuum Contact(VCC)</th>
<th>Control Voltage(V)</th>
</tr>
</thead>
<tbody>
<tr>
<td>VC MI VC</td>
<td>MI MI (With Only VC)</td>
<td>32E VC - 32 - 42EE</td>
<td>D1 DC 110V</td>
<td>32E VC - 32 - 42EE</td>
<td>D1 DC 110V</td>
</tr>
<tr>
<td></td>
<td></td>
<td>34E VC - 32 - 44EE</td>
<td>D2 DC 220V</td>
<td>34E VC - 32 - 44EE</td>
<td>D2 DC 220V</td>
</tr>
<tr>
<td></td>
<td></td>
<td>34E VC - 32 - 44EE</td>
<td>D3 DC 255V</td>
<td>34E VC - 32 - 44EE</td>
<td>D3 DC 255V</td>
</tr>
<tr>
<td></td>
<td></td>
<td>34L VC - 32 - 44LE</td>
<td>A2 AC 220V</td>
<td>34L VC - 32 - 44LE</td>
<td>A2 AC 220V</td>
</tr>
<tr>
<td></td>
<td></td>
<td>64L VC - 62 - 44LE</td>
<td></td>
<td>64L VC - 62 - 44LE</td>
<td></td>
</tr>
</tbody>
</table>
External View

Combination Drawout Type

Combination Direct - Drawout Type

1. Front Cover
2. Fuse Checking Window
3. Auxiliary Switch
4. ON/OFF Indicator
5. Operation Counter
6. Manual Trip Button
7. Drawout Carrier
8. Direct - Drawout Carrier
9. Drawout Handle
10. Interlock Lever
11. Hole for Interlock Lever Insertion
12. TEST/RUN Indicator
13. Cradle
14. Fuse Case
15. Shutter
Safety components

CTD (Condenser Trip Device)

CTD is built as standard in the contactor with AC control of instantaneous excitation so that the contactor can be tripped within 30 seconds in the event of an electricity failure. The automatic trip circuit in the event of an electricity failure is to be built by a customer.

<table>
<thead>
<tr>
<th>Rating Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated input voltage (V)</td>
<td>AC 100/110</td>
</tr>
<tr>
<td>Frequency (Hz)</td>
<td>50/60</td>
</tr>
<tr>
<td>Rated impulse voltage (V)</td>
<td>140/155</td>
</tr>
<tr>
<td>Charging time</td>
<td>Within 5 sec.</td>
</tr>
<tr>
<td>Trip command possible time</td>
<td>Max. 30 sec.</td>
</tr>
<tr>
<td>Input voltage range</td>
<td>85%~110%</td>
</tr>
<tr>
<td>Capacitor rating (μF)</td>
<td>400</td>
</tr>
</tbody>
</table>

Fuse case
Made of high strength BMC resin to offer superior insulation and safety.

Note) Applied fuse combination type.

Bushing
It is mono-block bushing to be used in the cradles of G-type drawout contactors. It provides high insulation level, so recommended to use in contactors for MCSG.

Note) Applied G-Class Cradle.

Direct - drawout carrier
It is a screw-sliding type drawout equipment to draw in and draw out a contactor directly out of a panel for personal safety. It is built in DB and GB type contactors.

Handle
It is a bent-lever to actuate a direct-drawout carrier by inserting and turning in DB and GB type contactors.

Counter
This is a ON/OFF operation counter by using 5 digit.

Test/Run position indicator
This enables checking contactor positions visibly when connecting or disconnecting a contactor.

Note) Applied direct drawout type only.

ON/OFF indicator
To visibly check whether power is supplied or not.

Fuse checking window
Enables the visible check of a fuse like its outside status and temperature-rise in a fuse combination type contactor.
Main contact part
Consists of vacuum interrupters, main terminals and moving shunts that are supported by a one-moulded frame that maintains insulation between phases. Vacuum interrupters are operated by means of the actuating mechanism that is connected to movable parts of a vacuum interrupter with an insulation rod.

Actuating mechanism
Designed simply without any linkage to be suited for frequent-operation and long service life. The actuating lever connected to a moving core of an actuating magnet that carries out the function of an actuating shaft moves up and down to control the contact pressure for stable operations.

Control method
Continuous excitation - During a contactor is closed the control coil is required to be excited continuously to pull the moving core magnetically. In case of discontinuing the control power the moving core is to be returned by a spring because of the disappearance of magnetic force, which causes the opening of a contactor.

Instantaneous excitation - In this method the continuous exciting of a control coil to maintain the closing of a contactor is not required as the latch built in it holds the mechanism. In case of manual tripping, a contactor will be tripped by releasing the latch when turn on the manual trip button.

<table>
<thead>
<tr>
<th>Type</th>
<th>Control method</th>
<th><em>Control voltage (V)</em></th>
<th><em>Closing current (A)/time (ms)</em></th>
<th><em>Trip current (A)/time (ms)</em></th>
<th><em>Holding current (A)/time (ms)</em></th>
</tr>
</thead>
<tbody>
<tr>
<td>VC - 36 - 42/44 - EL</td>
<td>Continuous Excitation (E)</td>
<td>DC/AC 110V</td>
<td>3/100</td>
<td>-</td>
<td>0.6/40</td>
</tr>
<tr>
<td></td>
<td></td>
<td>DC/AC 125V</td>
<td>3/100</td>
<td>-</td>
<td>0.6/40</td>
</tr>
<tr>
<td></td>
<td></td>
<td>DC/AC 220V</td>
<td>2/100</td>
<td>-</td>
<td>0.6/40</td>
</tr>
<tr>
<td></td>
<td>Instantaneous Excitation (L)</td>
<td>DC/AC 110V</td>
<td>5/100</td>
<td>3/35</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td></td>
<td>DC/AC 125V</td>
<td>5/100</td>
<td>3/35</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td></td>
<td>DC/AC 220V</td>
<td>10/100</td>
<td>6/35</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Instantaneous Excitation (L) (With CTD)</td>
<td>AC 110V</td>
<td>5/100</td>
<td>5/35</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td></td>
<td>AC 125V</td>
<td>5/100</td>
<td>5/35</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td></td>
<td>AC 220V</td>
<td>10/100</td>
<td>10/35</td>
<td>-</td>
</tr>
</tbody>
</table>
Vacuum interrupters

Features
Vacuum interrupters
In the closed position, normal current flows through the interrupter. When a fault occurs and interruption is required, the contacts are quickly separated. The arc which is oriented between surfaces of contact shall diffuse at the contact structure of flat shape. It prevents local heating and damage. The arc burns in an ionized metal vapor, which condenses on the surrounding metal shield. The arc is extinguished and vapor production is ceased at current zero. The metal vapor plasma is very rapidly dispersed, cooled, recombined, and deionized, and the metal vapor products are quickly condensed so that the contacts withstand the transient recovery voltage.

LS vacuum interrupters consists of spiral contact, the material of which is CuCr to provide a long service life and high withstand voltage characteristic.

Ratings

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated voltage (kV)</td>
<td>7.2</td>
</tr>
<tr>
<td>Rated current (A)</td>
<td>400</td>
</tr>
<tr>
<td>Rated interrupting current (kA)</td>
<td>4.5</td>
</tr>
<tr>
<td>Contact stroke (mm)</td>
<td>4.75</td>
</tr>
<tr>
<td>Opening speed average (m/s)</td>
<td>0.6</td>
</tr>
<tr>
<td>Closing speed average (m/s)</td>
<td>0.3</td>
</tr>
<tr>
<td>Contact force (kg)</td>
<td>7 Min</td>
</tr>
<tr>
<td>Moving side weight (kg)</td>
<td>0.23</td>
</tr>
<tr>
<td>Interrupter weight (kg)</td>
<td>0.52</td>
</tr>
<tr>
<td>Max. contact erosion (mm)</td>
<td>1</td>
</tr>
</tbody>
</table>
Fuse checker / Micro switch

Fuse checker is operated in case of fuse blowing and output mechanical signal at same time. A micro switch is a part of fuse checker. The mechanical input signal is changed to electrical out signal by micro switch.

Note) 19 - 20 : NO contact, 19 - 21 : NC contact

PT(Potential transformer)

2 each of PTs can be mounted on drawout type contactors and fuse combination type. These are 100VA and 200VA PTs rated 3.6/7.2kV.

<table>
<thead>
<tr>
<th>Rated voltage(V)</th>
<th>Secondary voltage(V)</th>
<th>Class</th>
<th>Burden(Var)</th>
<th>Frequency(Hz)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3300/6600</td>
<td>110/220</td>
<td>1</td>
<td>100/200</td>
<td>50/60</td>
</tr>
</tbody>
</table>

Fuse clip

It is used to install or uninstall a fuse link to the holder. Its dimensions depend on ratings.

Auxiliary switch

Auxiliary switches are 2NO+2NC as standard and additional 3NO+3NC can be added on request.

Position switch

This enables checking contactor positions when draw - in and draw - out. Remote checking is also possible through signaling via micro switches in each position.

Test Position

Run Position
### Drawing operations

**For standard draw - out types (D, G)**

- **When draw - in a contactor into a cradle.**
  1. Check that the contactor is in the state of open (TEST Position).
  2. While pushing the unlock push button, insert the contactor about 50mm into the cradle.
  3. Release the unlock push button and push the contactor into the cradle by the RUN position.

- **When draw - out a contactor from a cradle.**
  1. Check that the contactor is in the state of open (RUN Position).
  2. While pushing the unlock push button, draw the contactor about 50mm out of the cradle.
  3. Release the unlock push button and pull the contactor from the cradle by the TEST position.

**For direct draw - out types (K, B)**

- **When draw - in a contactor into a cradle.**
  1. Check that the contactor is in the state of open (TEST Position).
  2. While pushing the both sides of Interlock handle to the direction of the arrows, insert the contactor about 50mm into the cradle.
  3. Insert the drawout lever into a hole as shown in the fig. While pushing the Interlock push button, swing the lever clockwise two times and release the Interlock push button.
  4. Turning the lever clockwise until the contactor reaches in the RUN position.

- **When draw - out a contactor from a cradle.**
  1. Check that the contactor is in the state of open (RUN Position).
  2. Insert the drawout lever into a hole as shown in the fig. While pushing the Interlock push button, swing the lever counterclockwise two times and release the Interlock push button.
  3. Turning the lever counterclockwise until the contactor reaches in the TEST position.
  4. In case of separating the contactor from the cradle pull the contactor while pushing the both sides of Interlock handle to the direction of the arrows as shown in the fig.

*Note* Check the power before connecting or disconnecting.
**Auxiliary Device**

**Padlock and Door racking interlock**

- With this door options for H type cradle draw - in/out is allowed only when the door is closed.
- If draw - in/out is necessary when the door is open, use the operation lever put in the slot of the breaker handle. Insert it into the hole in the bottom of door interlock.
- Padlock is also optional, which can lock to prevents the draw - in/out of the breaker in the position of TEST and SERVICE.

**Trip coil monitoring contact**

- Device for monitoring the functions of the trip coils.
- To monitor the trip coils connect its terminals with the trip coil monitoring relay as shown on the circuit diagram.
  - If the trip coil is normal : closed - circuit
  - If the trip coil is damaged : open circuit
  1) monitor the trip coils in closed position of the breaker.
  2) monitor the trip coils in trip position of the breaker.
- Coil Test Unit is optional, which enable monitoring the coils by connecting in parallel with the trip coil operation switch.
**Push Bar**

- It is a protection cover to prevent an accident due to unintended operation of ON/OFF button.
- Use the push-bar to operate the ON/OFF button.
- It is to prevent manual operation of ON/OFF button due to user’s wrong handling.
- It is not possible to handle ON/OFF operation under the “Button lock” status.

* Key lock is not supplied.

**Button Cover**

**Button Padlock**

**Earthing Switch**

- For the safety during the maintenance of switchgear in the position of TEST/Drawout discharge the charging current in the load side of a VCB with this earthing switch. It is available only for K,B type Earthing Truck.
- Regarding the operations of earthing switch and related accessories see the instruction manual.
- Applicable Standards: IEC 62271 - 102
Auxiliary Device

Locking Magnet for Earthing Switch

- In case of using earthing switch it can be added to prevent the earthing switch from opening or earthing before it is energized.
- Verify if the locking magnet is energized before opening or earthing the earthing switch.
- Control voltage
  - DC 24V / DC 48V / DC 110V / DC 125V / DC 220V
  - AC 48V / AC 110V / AC 220V

Keylock for Earthing Switch

- In case of using earthing switch it can be added for two types of interlocking.
  1) Interlock to keep opening
  2) Interlock to keep earthing
Continuous Excitation (DC/AC, 110V~220V): Fixed Type

Apply the power source at terminals of 1 - 2.
Switch it using contacts of No.3 - 4 terminal.

Instantaneous Excitation (DC/AC, 110V~220V): Fixed Type

When closing: Switch it using a contact of No. 4(+), 2(-) terminal
When tripping: Switch it using a contact of No. 5(+), 2(-) terminal
→ Contactor does not operate when reverse connected

Instantaneous Excitation_CTD(AC, 110V~220V): Fixed Type

Apply the power source at terminals of 1 - 2
When closing: Switch it using contacts of No.3, 4 terminal
When tripping: Switch it using contacts of No.5, 15 terminal
Continuous Excitation (DC/AC, 110V~220V): Drawout Type

Apply the power source at terminals of 1 - 2. Switch it using contacts of No.3 - 4 terminal.

Instantaneous Excitation (DC/AC, 110V~220V): Drawout Type

When closing: Switch it using a contact of No. 4(+), 2(-) terminal
When tripping: Switch it using a contact of No. 5(+), 2(-) terminal
→ Contactor does not operate when reverse connected

Instantaneous Excitation CTD (AC, 110V~220V): Drawout Type

Apply the power source at terminals of 1 - 2
When closing: Switch it using contacts of No.3, 4 terminal
When tripping: Switch it using contacts of No.5, 15 terminal

Electrical circuit diagram
Continuous Excitation_CTD(AC, 110V~220V): Fixed Type

Instantaneous Excitation_CTD(AC, 110V~220V): Fixed Type
Mechanical Interlock Type Electrical Circuit Diagram

Instantaneous Excitation_CTD(AC, 110V~220V): Fixed Type

VC1

VC2

VC1(Upper)

VC2(Lower)
External Dimensions

Fixed Type

VC - 3/6Z - 42/44E(L)E

(Unit : mm)

Drawout Type

VC - 3/6D - 42/44E(L)E

Direct - Drawout Type

VC - 3/6K - 42/44E(L)E

Susol
External Dimensions

Combination Fixed Type

VC - 3/6F - 42/44E(L)E

* In case of applying 6M - 300/400, 543mm changes 613mm

Combination Drawout Type

VC - 3/6G - 42/44E(L)E

* In case of applying 6M - 300/400, 570.2mm changes 640.2mm

Combination Direct - Drawout Type

VC - 3/6B - 42/44E(L)E

* In case of applying 6M - 300/400, 570.2mm changes 640.2mm
E Class Cradle (Drawout Type) (Unit: mm)

B Class Cradle (Drawout Type)

F Class Cradle (Drawout Type)
External Dimensions

G Class Cradle (Drawout Type)

M Class Cradle (Drawout Type)

H Class Cradle (Drawout Type)
E Class Cradle (Combination Drawout Type)

B Class Cradle (Combination Drawout Type)

F Class Cradle (Combination Drawout Type)

* In case of applying 6M - 300/400, 672mm changes 742mm
External Dimensions

G Class Cradle (Combination Direct - Drawout Type)  
(Unit: mm)

* In case of applying 6M - 300/400, 672mm changes 742mm

M Class Cradle (Combination Direct - Drawout Type)

* In case of applying 6M - 300/400, 672mm changes 742mm

H Class Cradle (Combination Direct - Drawout Type)

* In case of applying 6M - 300/400, 672mm changes 742mm
Mechanical Interlock Type

(Unit: mm)
Power fuse

LS Prime - MEC power fuses are designed to protect equipments from fault current such as short - circuit, and generally used for the protection the circuits of transformers, capacitors and motors they protect.

For further safety and reliability the elements inside of fuses are made of silver, and high quality quartzs and and ceramic are used for magnetic rods and tubes, respectively.

LS medium voltage vacuum contactors using LS vacuum interrupters manufactured with worldclass technology are type tested in LS PT & T that is accredited high power test lab by worldclass KOLAS. To ensure the performance they, installed in a vacuum contactor, are tested according to IEC 60282 - 1 in LS PT & T that is accredited high power test lab by worldclass KOLAS.

Considerations in application

• Power fuses are suitable for the protection from a short - circuit, Overload current will not protected.
• Reset or re - use after blowing is not possible. Fuse reset or re - use is not possible after fused are blown out.
• When the fuses are selected, the inrush currents arising from the starting transformers, motors, capacitors should be considered.
• When the fuses are selected, their usage and circuit requirements should be considered.
• For the purpose of protection from the fault current below the lowest interrupting current of the fuse it is desirable to replace it with a fuse having lower interrupting rate or add other overcurrent relay in series
• Withstand voltage of the circuit should be higher than that of a fuse that protects it.
• If possible, select the fuse whose rated current is much higher than the load current. The rated current not sufficiently exceeding the normal current of the load may cause reduction in the service life.
• Replace all three fuses in case of blowing in a fuse.

Determination of the rated current

The rated current of the fuse must be selected properly after examination of the current/time characteristics of fuses, equipments and the related circuit conditions.

General considerations

• When the fuses are selected the sufficient rated current should be considered to avoid the deterioration of the fuse element due to sustained load current in the long term.
• The fuse rated current should be higher than the sum of all load currents.
• The estimated overload current should be within the fuse's time/current characteristics. The estimated overload current should not exceed the allowable overload withstand currents of the equipment and the number of its events should not exceed 100 times.
• The characteristic curve of a fuse must lie to the right of those of other equipments to be protected.
• The withstand strength such as permissible let - through current, I²t of the equipments to be protected must be higher than that of a fuse.
• Coordination of permissible time limit
  Protection equipments in the line side < Fuses < Protection equipments in the load side
• Coordination when fuses are used as back - up protection
  Permissible let - through current of a fuse < That of a protection equipment
• Use the same rating for all three phases even the differential current between phases exists.
Considerations by the type of load

1. Power fuses for transformer loads
   - The fuse with sufficient rated current must be selected to avoid the deterioration of the fuse element due to permissible overload in the long term.
   - The fuse's current/time characteristic should cover the inrush current/time of the transformer.
   - In case of power transformers the symmetrical inrush current must be within 10 times of the fuse rating and the fuse should withstand at least 0.1 second under the condition.
   - Fuse rated current ≥ Transformer rated current
   - The lowest interrupting current of the fuse < Short circuit current in the primary of the fuse
   - In case of protection of two or more transformers
     - Fuse rating should be selected on the basis of the phase condition where maximum current flows.
     - In the event of short-circuit in the secondary of the transformer
       - The lowest interrupting current of the fuse < Short circuit current in the primary of the transformer
   - In case of protection of potential transformers
     - When the fuses are selected do not consider the short-circuit happening in the secondary of the PT, but protecting PT itself and the circuit against the fault in the primary side.
     - Select the fuse with higher rated current than the load current so as not to be damaged by overcurrent.
     - The characteristic curve of a fuse must lie to the right of those of other equipments to be protected.
     - The withstand strength such as permissible let-through current, $I^2t$ of the equipments to be protected must be higher than that of a fuse.
   - Note) Refer to the general considerations other than the above mentioned.

2. Power fuses for motor loads
   - The fuse with sufficient rated current must be selected to avoid the deterioration of the fuse element due to permissible overload in the long term.
   - The fuse's current/time characteristic should cover the inrush current/time of the motor.
   - The inrush current of the motor must be within 5 times of the fuse rating and the fuse should withstand at least 10 seconds under the condition.
     - Fuse rated current ≥ Motor full load current
   - Note) Refer to the general considerations other than the above mentioned.

3. Power fuses for combination with vacuum contactors
   - The current at the intersection between a fuse characteristic curve and a contactor operation curve should greater than the lowest interrupting current of a fuse.
   - And the current at the cross point between a fuse curve and a contactor minimum dropout curve should not greater than the rated interrupting current of a contactor.
   - Note) Refer to the general considerations other than the above mentioned.

4. Power fuses for capacitor loads
   - The fuse with sufficient rated current must be selected to avoid the deterioration of the fuse element due to permissible overload in the long term.
   - The fuse's current/time characteristic should cover the inrush current/time of the capacitor.
   - The size of inrush current depends on whether or not the serial reactors and parallel capacitors exist.
   - The inrush current of the capacitor must be within 70 times of the fuse rating and the fuse should withstand at least 0.002 second under the condition.
     - Fuse rated current ≥ Capacitor rated current
   - In the case of serial reactor(6%) connected the inrush current must be within 5 times of the fuse rating and the fuse should withstand at least 0.1 second under the condition
     - Note) Refer to the general considerations other than the above mentioned.
## Selection tables

### Susol

### DIN type

#### Application

<table>
<thead>
<tr>
<th>Model</th>
<th>Transformer load(kVA)</th>
<th>Capacitive load(kVA)</th>
</tr>
</thead>
<tbody>
<tr>
<td>LFL - 3/6G - 5B</td>
<td>125B</td>
<td>151 ~ 275 (302 ~ 550)</td>
</tr>
<tr>
<td>LFL - 3/6G - 10B</td>
<td>50B</td>
<td>85 ~ 117 (170 ~ 354)</td>
</tr>
<tr>
<td>LFL - 3/6G - 20B</td>
<td>30B</td>
<td>64 ~ 81 (128 ~ 163)</td>
</tr>
<tr>
<td>LFL - 3/6G - 30B</td>
<td>20B</td>
<td>21 ~ 42 (40 ~ 84)</td>
</tr>
<tr>
<td>LFL - 3/6G - 40B</td>
<td>10B</td>
<td>40 ~ 82 (80 ~ 165)</td>
</tr>
<tr>
<td>LFL - 3/6G - 50B</td>
<td>5B</td>
<td>49 ~ 102 (98 ~ 204)</td>
</tr>
<tr>
<td>LFL - 3/6G - 60B</td>
<td>5B</td>
<td>66 ~ 137 (132 ~ 275)</td>
</tr>
<tr>
<td>LFL - 3/6G - 75B</td>
<td>3.6B</td>
<td>68 ~ 165 (134 ~ 330)</td>
</tr>
<tr>
<td>LFL - 3/6G - 100B</td>
<td>75B</td>
<td>128 ~ 220 (256 ~ 440)</td>
</tr>
<tr>
<td>LFL - 3/6G - 125B</td>
<td>75B</td>
<td>151 ~ 275 (302 ~ 550)</td>
</tr>
<tr>
<td>LFL - 3/6G - 160B</td>
<td>3.6B</td>
<td>211 ~ 352 (496 ~ 782)</td>
</tr>
<tr>
<td>LFL - 3/6G - 200B</td>
<td>7.2B</td>
<td>265 ~ 440 (432 ~ 768)</td>
</tr>
<tr>
<td>LFL - 3/6G - 5</td>
<td>3.6B</td>
<td>150 ~ 300 (300 ~ 600)</td>
</tr>
<tr>
<td>LFL - 3/6G - 10</td>
<td>3.6B</td>
<td>200 ~ 400 (400 ~ 800)</td>
</tr>
<tr>
<td>LFL - 3/6G - 20</td>
<td>200 ~ 400 (400 ~ 800)</td>
<td></td>
</tr>
<tr>
<td>LFL - 3/6G - 30</td>
<td>300 ~ 600 (600 ~ 1200)</td>
<td></td>
</tr>
<tr>
<td>LFL - 3/6G - 40</td>
<td>400 ~ 800 (800 ~ 1600)</td>
<td></td>
</tr>
<tr>
<td>LFL - 3/6G - 50</td>
<td>500 ~ 1000 (1000 ~ 2000)</td>
<td></td>
</tr>
<tr>
<td>LFL - 3/6G - 60</td>
<td>600 ~ 1200 (1200 ~ 2400)</td>
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</tr>
<tr>
<td>LFL - 3/6G - 75</td>
<td>700 ~ 1400 (1400 ~ 2800)</td>
<td></td>
</tr>
<tr>
<td>LFL - 3/6G - 150</td>
<td>1500 ~ 3000 (3000 ~ 6000)</td>
<td></td>
</tr>
<tr>
<td>LFL - 3/6G - 200</td>
<td>2000 ~ 4000 (4000 ~ 8000)</td>
<td></td>
</tr>
<tr>
<td>LFL - 3/6G - 300</td>
<td>3000 ~ 6000 (6000 ~ 12000)</td>
<td></td>
</tr>
<tr>
<td>LFL - 3/6G - 400</td>
<td>4000 ~ 8000 (8000 ~ 16000)</td>
<td></td>
</tr>
</tbody>
</table>

### DIN type (General use type)

<table>
<thead>
<tr>
<th>Model</th>
<th>Transformer load(kVA)</th>
<th>Capacitive load(kVA)</th>
</tr>
</thead>
<tbody>
<tr>
<td>LFL - 3/6G - 5B</td>
<td>125B</td>
<td>151 ~ 275 (302 ~ 550)</td>
</tr>
<tr>
<td>LFL - 3/6G - 10B</td>
<td>10B</td>
<td>100 ~ 200 (200 ~ 400)</td>
</tr>
<tr>
<td>LFL - 3/6G - 20B</td>
<td>20B</td>
<td>200 ~ 400 (400 ~ 800)</td>
</tr>
<tr>
<td>LFL - 3/6G - 30B</td>
<td>30B</td>
<td>300 ~ 600 (600 ~ 1200)</td>
</tr>
<tr>
<td>LFL - 3/6G - 40B</td>
<td>40B</td>
<td>400 ~ 800 (800 ~ 1600)</td>
</tr>
<tr>
<td>LFL - 3/6G - 50B</td>
<td>50B</td>
<td>600 ~ 1200 (1200 ~ 2400)</td>
</tr>
<tr>
<td>LFL - 3/6G - 60B</td>
<td>60B</td>
<td>700 ~ 1400 (1400 ~ 2800)</td>
</tr>
<tr>
<td>LFL - 3/6G - 75B</td>
<td>75B</td>
<td>800 ~ 1600 (1600 ~ 3200)</td>
</tr>
<tr>
<td>LFL - 3/6G - 150B</td>
<td>150B</td>
<td>2000 ~ 4000 (4000 ~ 8000)</td>
</tr>
<tr>
<td>LFL - 3/6G - 200B</td>
<td>200B</td>
<td>3000 ~ 6000 (6000 ~ 12000)</td>
</tr>
<tr>
<td>LFL - 3/6G - 300B</td>
<td>300B</td>
<td>4000 ~ 8000 (8000 ~ 16000)</td>
</tr>
</tbody>
</table>

### DIN type (Motor protection type)

<table>
<thead>
<tr>
<th>Model</th>
<th>Transformer load(kVA)</th>
<th>Capacitive load(kVA)</th>
</tr>
</thead>
<tbody>
<tr>
<td>LFL - 3/6G - 5B</td>
<td>125B</td>
<td>151 ~ 275 (302 ~ 550)</td>
</tr>
<tr>
<td>LFL - 3/6G - 10B</td>
<td>10B</td>
<td>100 ~ 200 (200 ~ 400)</td>
</tr>
<tr>
<td>LFL - 3/6G - 20B</td>
<td>20B</td>
<td>200 ~ 400 (400 ~ 800)</td>
</tr>
<tr>
<td>LFL - 3/6G - 30B</td>
<td>30B</td>
<td>300 ~ 600 (600 ~ 1200)</td>
</tr>
<tr>
<td>LFL - 3/6G - 40B</td>
<td>40B</td>
<td>400 ~ 800 (800 ~ 1600)</td>
</tr>
<tr>
<td>LFL - 3/6G - 50B</td>
<td>50B</td>
<td>600 ~ 1200 (1200 ~ 2400)</td>
</tr>
<tr>
<td>LFL - 3/6G - 60B</td>
<td>60B</td>
<td>700 ~ 1400 (1400 ~ 2800)</td>
</tr>
<tr>
<td>LFL - 3/6G - 75B</td>
<td>75B</td>
<td>800 ~ 1600 (1600 ~ 3200)</td>
</tr>
<tr>
<td>LFL - 3/6G - 150B</td>
<td>150B</td>
<td>2000 ~ 4000 (4000 ~ 8000)</td>
</tr>
<tr>
<td>LFL - 3/6G - 200B</td>
<td>200B</td>
<td>3000 ~ 6000 (6000 ~ 12000)</td>
</tr>
<tr>
<td>LFL - 3/6G - 300B</td>
<td>300B</td>
<td>4000 ~ 8000 (8000 ~ 16000)</td>
</tr>
</tbody>
</table>

### Notes

- ※Transformer load(kVA) Capacitive load(kVA)
- ※Transformer load(kVA) Capacitive load(kVA)
- ※Transformer load(kVA) Capacitive load(kVA)
### Fuse selection by load

<table>
<thead>
<tr>
<th>Motor load (kVA)</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>Applicable holder</th>
</tr>
</thead>
<tbody>
<tr>
<td>Three phase</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6.5 ~ 10.7</td>
<td>195</td>
<td>55</td>
<td>-</td>
<td>-</td>
<td>LFH - 6G - D1HB</td>
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<tr>
<td>10.7 ~ 28</td>
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<td></td>
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<tr>
<td>28 ~ 57</td>
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<tr>
<td>50 ~ 85</td>
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<tr>
<td>85 ~ 115</td>
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<tr>
<td>115 ~ 142</td>
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<tr>
<td>138 ~ 191</td>
<td>192</td>
<td>77</td>
<td>-</td>
<td>-</td>
<td>LFH - 6G - D2HB</td>
</tr>
<tr>
<td>181 ~ 252</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>253 ~ 369</td>
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<tr>
<td>293 ~ 435</td>
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<tr>
<td>343 ~ 572</td>
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<tr>
<td>375 ~ 630</td>
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</tr>
<tr>
<td>751 ~ 1,223</td>
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<tr>
<td>1,154 ~ 1,760</td>
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<tr>
<td>1,500</td>
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</tbody>
</table>

### Dimensions (mm)

<table>
<thead>
<tr>
<th>Motor load (kVA)</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>Applicable holder</th>
</tr>
</thead>
<tbody>
<tr>
<td>Three phase</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>350</td>
<td>311</td>
<td>77</td>
<td>73</td>
<td>43</td>
<td>LFH - 6G - D2H</td>
</tr>
<tr>
<td>1,100</td>
<td>350</td>
<td>110</td>
<td>108</td>
<td>55</td>
<td>LFH - 6G - D4H</td>
</tr>
<tr>
<td>250</td>
<td>200</td>
<td>87</td>
<td>84</td>
<td>50</td>
<td>LFH - 3M - 400</td>
</tr>
<tr>
<td>311</td>
<td>200</td>
<td>77</td>
<td>73</td>
<td>43</td>
<td>LFH - 3M - 200</td>
</tr>
<tr>
<td>350</td>
<td>200</td>
<td>87</td>
<td>84</td>
<td>50</td>
<td>LFH - 3M - 400</td>
</tr>
<tr>
<td>58</td>
<td>40</td>
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<td></td>
<td></td>
<td></td>
</tr>
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<td>50</td>
<td>40</td>
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</tr>
<tr>
<td>43</td>
<td>40</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Selecting conditions and warning

1. The values in ( ) apply to the loads of 7.2kV.
2. It is assumed that the inrush current of a transformer is 10 times of the full load current of a motor for 0.1 second.
3. The rated current of a fuse is selected to carry continuously the current of 1.5 times of rated current of a transformer, (1.3 times in the case of 7.2kV).
4. In the transformer load table it is assumed that the interruption will be made at 25 times of rated current within 2 seconds.
5. It is assumed that the inrush current of a motor is 5 times of full load current for 10 seconds.
6. In the case of using the M(motor protection) type fuses for the purpose of the short - circuit protection of a motor or a starter select the proper rating in addition refer to the characteristic curves on the catalog to make the device protected from overload by a circuit breaker or a contactor.
7. It is assumed that the inrush current of a capacitor is 71 times of its rated current for 0.002 second.
8. The rated current of a fuse is selected to carry continuously the current of 1.43 times of rated current of a capacitor.
9. In case service life of more than 1000 operations is required select in the M(motor protection) type fuse table.
10. The above mentioned comments are according to KS(Korean Industrial Standard) and subject to the real situation.
Coordination graph

Coordination between fuse and transformer circuit

![Diagram showing coordination between fuse and transformer circuit](image)

※ Coordination in the graph

- Zone of [1]: Protection of primary side from short - circuit by a fuse
- Zone of [2]: Protection of a transformer
- Zone of [3]: Out of the scope of fuse operation
- Zone of [4]: Interruption is not ensured even though the fuse blows.
- Zone of [5]: Protection of a transformer is not ensured even though the fuse interrupts the circuit.
- Zone of [3]+[4]+[5]: No protection zone of a transformer Circuit breaker or low voltage fuse required for the transformer protection

When any protection device is not installed in the secondary of a transformer

- Permissible overload current of a transformer (point ③) must lie to the left of the curve ② (time/current characteristic curve of a Fuse)
- Full load current of a transformer ① ≤ Rated current of a fuse ④
- Point C (inrush current and time at no load of a transformer) must lie to the left of the point ② (time/current characteristic curve of a Fuse)
- Secondary short-circuit current ⑤ > Lowest interrupting current of a fuse ⑥
- Point B must lie to the left of the secondary short - circuit current ⑤.
- Primary short - circuit current ⑦ < Rated interrupting current of a fuse ⑥

When a circuit breaker or fuse is installed in the secondary of a transformer

- Must meet the requirements above mentioned in ①
- The characteristic curve of a secondary circuit breaker or low voltage fuse ③ must lie to the left of permissible overload characteristic curve of a transformer ② and under the point B
- The characteristic curve of a secondary circuit breaker or low voltage fuse ③ must lie to the Time/Current characteristic curve of a Fuse and under the Secondary short - circuit current ⑤.
- Secondary short - circuit current ⑤ < Characteristic curve of a secondary circuit breaker or low voltage fuse ③
- The secondary circuit breaker or low voltage fuse should meet the above mentioned requirements to each branch circuit.
- Another medium voltage protection device is required for the ensured protection against the fault happening between the secondary protection devices and the internal short - circuit of a transformer in the zone of [3]+[4]+[5].
Coordination between fuse and motor circuit

- Full load current of a motor \( \leq \) Rated current of a fuse
- Short-circuit current \( \leq \) Rated interrupting current of a fuse
- Inrush current of a motor (Locked rotor current) \( \leq \) Rated interrupting current of a fuse
- Point C must lie to the left of \( \circ \) (The lowest operation characteristic of a vacuum contactor) and \( \diamond \) (Time/Current characteristic curve of a Fuse)
- Operation characteristic of a vacuum contactor \( \circ \) must lie to the left of \( \diamond \) (Overload characteristic of a motor)
- Point A must lie to the right of \( \bullet \) Lowest interrupting current of a fuse.
- Point B must lie to the left of \( \bullet \) Rated interrupting current of a vacuum contactor.

Note) The current less than point A can be protected by a vacuum contactor, and the current greater than point B is to be protected by a fuse.
Operation curves

DIN Type

3.6/7.2kV blowing characteristic

3.6kV blowing characteristic

7.2kV blowing characteristic

3.6/7.2kV current limiting characteristic

3.6kV current limiting characteristic

7.2kV current limiting characteristic

Interrupting current (sym, kA)

Current limited (peak, kA)

Current (sym, A)

Operation time (sec)
KS Type

G (General use) type fuse

3.6/7.2kV blowing characteristic

3.6kV blowing characteristic

7.2kV blowing characteristic

3.6/7.2kV current limiting characteristic

3.6kV current limiting characteristic

7.2kV current limiting characteristic

M (Motor protection) type fuse

Interrupting current (sym, kA)

Current (sym, A)

Operation time (sec)

Interrupting current (sym, kA)

Current (sym, A)

Operation time (sec)

Interrupting current (sym, kA)

Current (sym, A)

Operation time (sec)

Interrupting current (sym, kA)