Tri-MEC

Automatic Load Transfer Switches
LS Tri-NEC Automatic Load Transfer Switch is a customer- oriented product that has maximized the ease of installation and use by adopting Air Insulation for the first time in domestic market as well as subminiature digital control box.

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Heightened ease of installation by reducing the size and weight
- Adoption of Air Insulation for the first time in domestic market
  (Bus-bar or Cable connection on the connection)
- Dramatic reduction in width of the distributing board
  (product width: 1470mm → 906mm)
- Attachment of a panel door on the control box

Performance Enhancement
- Rapid transfer time (10cycle, less than 167ms)
- Increase of the rated short-circuit withstand current (12kA/1s → 16kA/1s)
- Function of monitoring open-phase of main power supply

Performance Enhancement with the adoption of the digital control box
- Able to save Event (Max. 20EA)
- It saves "what has been detected, operating status, operating result, year/month/day hour: minute" as 1 Event (E01)
- Status indicator function
  - LED: Live wire status, Switch status, Open phase, Overload status due to overcurrent, Selection of main power supply, Control setting, Controlling voltage status, Gas Low status, Battery Low status, Error status
  - LCD: voltage, current, threshold and event
- Prevention of transfer act incurred due to occasional power outage with the function of transfer time
- Function of selecting the main power supply (Power supply1, Power supply2, No selection)
- Function of checking a phase (Power supply1 vs Power supply2)

Diversification of Output Contact
- Status indication of Power supply1 and Power supply2
  - Switch status (1a1b), Live wire status (1a), Phase status (1a)
- Miscellaneous status indication
  - Overload status (1a), Control power status (1a), Battery Low status (1a), Gas Low status (1a)

KERI Development Test
- IEC 60265-1, PS 151-051
## Automatic Load Transfer Switches

### Rated and Product Name System

#### Rated

<table>
<thead>
<tr>
<th>Item</th>
<th>Rated</th>
<th>Misc.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated voltage</td>
<td>25.8</td>
<td></td>
</tr>
<tr>
<td>Rated frequency</td>
<td>60</td>
<td></td>
</tr>
<tr>
<td>Rated current</td>
<td>630</td>
<td></td>
</tr>
<tr>
<td>Load prevention current</td>
<td>630</td>
<td></td>
</tr>
<tr>
<td>Excitation current</td>
<td>21</td>
<td></td>
</tr>
<tr>
<td>Charging current</td>
<td>25</td>
<td></td>
</tr>
<tr>
<td>Rated make current</td>
<td>41.6</td>
<td></td>
</tr>
<tr>
<td>Rated short-circuit withstand current</td>
<td>16</td>
<td></td>
</tr>
<tr>
<td>Lightning impulse withstand voltage</td>
<td>125</td>
<td></td>
</tr>
<tr>
<td>Power frequency withstand voltage</td>
<td>60</td>
<td></td>
</tr>
<tr>
<td>Continuous current withstand voltage</td>
<td>78</td>
<td></td>
</tr>
<tr>
<td>SF6 gas minimum movement pressure</td>
<td>0.14(2)</td>
<td></td>
</tr>
<tr>
<td>Operation method</td>
<td>Motor spring charging method</td>
<td></td>
</tr>
<tr>
<td>Power for control circuit</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operation voltage</td>
<td>220</td>
<td></td>
</tr>
<tr>
<td>Frequency</td>
<td>60</td>
<td></td>
</tr>
<tr>
<td>Emergency power supply (Standby battery)</td>
<td>24</td>
<td>DC 24V, 10Ah x 1EA</td>
</tr>
<tr>
<td>Weight</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Body</td>
<td>285</td>
<td></td>
</tr>
<tr>
<td>Control box</td>
<td>20</td>
<td></td>
</tr>
<tr>
<td>Standby battery</td>
<td>7.65</td>
<td></td>
</tr>
<tr>
<td>Number of circuits and switches</td>
<td>3 circuits-2 switches</td>
<td></td>
</tr>
<tr>
<td>Use environment</td>
<td>Indoor</td>
<td></td>
</tr>
<tr>
<td>Voltage detection device</td>
<td>Capacitor Voltage Divider</td>
<td></td>
</tr>
<tr>
<td>Current detection device</td>
<td>CT</td>
<td></td>
</tr>
<tr>
<td>LCD indication (error range: 3%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Current</td>
<td>10~750</td>
<td>Current indication for R, S, T phases</td>
</tr>
<tr>
<td>Voltage</td>
<td>35%~120%</td>
<td>Voltage between phase for R, S, T phases</td>
</tr>
<tr>
<td>Applied Standard</td>
<td>IEC 60265-1</td>
<td></td>
</tr>
</tbody>
</table>

#### Product name and How to Order

**Inherent Product Name**
- LS switch

**How to operate**
- Manual operation
- Automatic operation

**Rated current**
- 630A

**Number of circuits and switches**
- 32 circuits-2 switches

**Rated voltage**
- 25.8 kV

**Lightning impulse withstand voltage**
- 125 kV BIL
Mechanism

- Enhanced reliability of operating devices by adopting the motor spring charging mechanism, which is applied to the No.1 vacuum circuit breaker manufactured and sold in domestic market.

Gas injection valve and pressure gauge

- The gas injection valve for charging SF6 gas is attached
- The gas pressure gauge features demonstration of different colors to facilitate the verification of SF6 gas pressure status

Bushing (power supply module)

- The potential for a gas leak of bushing itself is eliminated by using the O-Ring type bushing, which can be easily connected to the Dead Break type fittings.

Arc Suppression module

- It features a stable load switch and excellent insulation recovery by using the high-speed Rotary Puffer Arc Suppression

Anti-pressure panel

- An anti-pressure panel is installed to prevent the explosion of a tank due to the expansion of SF6 gas in case of an unexpected short-circuit inside a tank.
- Panel activation threshold pressure: 1.2~3.8kgf/cm²

Air Insulation bushing (loaded side)

- To facilitate the connection on the load module, the Air Insulation epoxy mold has been used so that you can get a connection to the Busbar or Cable without using fittings.
- In case of a cable connection, install the cable support within the distribution board considering the weight of the cable.
Automatic Load Transfer Switches

Auxiliary Devices

Rated Motor
If a charge of the closing spring is completed, the control power is off by the embedded Limit S/W.

<table>
<thead>
<tr>
<th>Rated voltage</th>
<th>Inrush current peak value (A)</th>
<th>Normal current (A)</th>
<th>Power consumption (W)</th>
<th>Charging time (sec)</th>
</tr>
</thead>
<tbody>
<tr>
<td>DC 24V</td>
<td>30</td>
<td>15</td>
<td>350</td>
<td>12</td>
</tr>
</tbody>
</table>

Note) Regular operating voltage range: 85~110%

Closing Coil, CC
The coil is operated only when the power is supplied for 45ms consecutively and the electric pumping prevention circuit is embedded.

<table>
<thead>
<tr>
<th>Rated voltage</th>
<th>Normal current (A)</th>
</tr>
</thead>
<tbody>
<tr>
<td>DC 24V</td>
<td>10</td>
</tr>
</tbody>
</table>

Note) Regular operating voltage range: 85~110%

Trip Coil, TC
The coil is operated only when the power is supplied for 35ms consecutively.

<table>
<thead>
<tr>
<th>Rated voltage</th>
<th>Normal current (A)</th>
</tr>
</thead>
<tbody>
<tr>
<td>DC 24V</td>
<td>10</td>
</tr>
</tbody>
</table>

Note) Regular operating voltage range: 70~110%

A variety of output contacts
It is equipped with a variety of contacts that shows a switch of power, live wire and phase status, overload outage, Battery Low, Gas Low as well as control power status.

<table>
<thead>
<tr>
<th>Item</th>
<th>Resistive load (A)</th>
<th>Inductive load (A)</th>
</tr>
</thead>
<tbody>
<tr>
<td>AC</td>
<td>250V</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>125V</td>
<td>10</td>
</tr>
<tr>
<td>DC</td>
<td>250V</td>
<td>0.6</td>
</tr>
<tr>
<td></td>
<td>125V</td>
<td>1.3</td>
</tr>
<tr>
<td></td>
<td>30V</td>
<td>5</td>
</tr>
</tbody>
</table>

Standby Battery Embedded
It is the battery reserved for an expected power outage of the control power. Please, install it in the distribution board.
- Rated: DC 24V, 10Ah
- Dimension: 200(W) × 97(D) × 146(H)

Closing Spring Charge Indicator
It is the device to facilitate the verification of the Closing Spring charge status.

Counter
As a device installed by default, it mechanically shows the number of ON/OFF operations of a switch on a five-digit counting indicator.
Features

Voltage Monitoring function with Capacitor Voltage Divider
It generates a transfer or retransfer signal by checking the voltage fluctuation status of the main power supply module through the Capacitor Shield within bushing.
- Power Outage: The voltage of the main power supply is less than or equal to 35% of Rated voltage
- Live wire: The voltage of the main power supply is greater than or equal to 85% of Rated voltage

Automatic cancellation of blocking incurred by instant over current
Even of the blocking activity by OCR has been carried out, it is performed during the Blocking Time only and is automatically cancelled if it is incurred by the over current.

Monitoring load current through CT
You can monitor the status of load outage incurred by over current as well as current gauge on the loaded side using three CT(630A:1.26A) installed in R, S, and T phases respectively.

Power Selection
You can set the main power supply as power1, power2 or no selection(in this case, the currently used power is regarded as the main power).

Monitoring live wire
You can monitor and detect the live wire by detecting voltage, current by the Capacitor Driver of the main power and the CT on the loaded side.

Selection of Automatic and Manual
Using the “Configuration” button or “Operation” you can select either automatic or manual transfer.

Operation and cancellation of retransfer when the main power supply is recovered
When the main power is recovered, it is retransferred through the voltage monitoring function. You can control the Retransfer Time or select no selection of main power in order to prevent the unnecessary repetition of transfer and retransfer.

LED indicator
It is equipped with the LED indicators for a switch of the main power, live wire status and a variety of outages status in the control box.

System separation in case of an accident on the loaded side
It features a blocking function by OCR when a fault current (more than or equal to 350%(2.2kA) of Rated current) occurs and if the power outage time exceeds the Blocking Time in case of an accident on the loaded side, the power of the loaded site is not transferred to the standby power but the main power is completely separated from the system. After eliminating the cause of the accident, you should manually release from the blocking state by pushing the “Outage Reset” button on the control box.

Event history saving function
It saves the latest 20 fault events.
- Event Massage content : content of detection, operating status, result and date
  - Content of detection : power outage, open phase, overload accident, manual transfer
  - Operating status : transfer, Open, Close, non operation, Lock state
  - Operating result: O(normal operation), X(no operation), S(abnormal operation)
  - Operating date : year month day hour minute
The compact type digital control box features a variety of functions including various status indication, live wire monitoring, phase Check, and Event history saving.

It is recommended that you install the control box at the door of the distribution board separate from the ALTS body (Cable length: 5000mm). You should also install the support for the cable, considering its hefty weight.

**How to manipulate the control box**

1. **LCD Indicators**
   - Indication of operating status
     It shows the voltage values of power1 and power2 circuits.
   - Line Select
     You can select either Power1 or Power2 or no selection as the main power.
     - “Power1” LED light-on: Power1 is the main power and the Power2 is the standby.
     - “Power2” LED light-on: Power2 is the main power and the Power1 is the standby
     - “No selection” LED light-on: It means that the main power is not designated and if either power is cut off it is transferred to the other power but is not transferred back even if the power outage is successfully rectified.

2. **Control Setting**
   You can select either Remote control or Local control as the controlling mode. If you select
   - “LOCAL”: LOCAL LED light is on and you are able to manually as well as automatically control on the field site.
   - “REMOTE”: REMOTE LED is on and a manual control from the remote site is available but automatic one.

3. **Operating Meth**
   You can select either manual or automatic as the transfer operation method. If you select
   - “Automatic”: ALTS monitors and detects the line status. It also automatically operates depending on the setting of the control box. (operation is available only in the “Local” control setting state)
   - “Manual”: ALTS cannot operate depending on the setting of the control box but operate manually only (operation is available either in the “Local” or “Remote” control setting state

4. **Transfer Time**
   It is the threshold time(0~99.9 sec.) to prevent the transfer due to the instantaneous power outage of the main power.

5. **Retrans. Time**
   It is the threshold time(0.5~999.9 sec.) to retransfer back to the main power after the transfer due to the outage of the main power, followed by the full recovery of the main.

6. **Blocking Time**
   It is a threshold time(0.1~99 sec.) to prevent the fault due to the instantaneous over-current on the loaded side. If the power outage time exceeds the Blocking Time in case of an accident on the loaded side the loaded side is separated from the system while suppressing an automatic transfer.

7. **Overload Act**
   You can select the operation option in case of power outage accident either on Hold or Open.

   You can select the operation option in case of open phase accident either on Transfer or Hold.

9. **Timer**
   It is the menu where you can set the current time.

10. **Event View**
    You can view the list of events that have occurred up to now on this menu.

11. **Cali. Mode**
    This is the menu for the Voltage Calibration.
2. Function Buttons

ⓐ “Control Function” Button
- “ON” setting: Control setting as well as a normal operation according to the setting is available.
- “OFF” setting: LED Test as well as the indication of the current status only is available.
- Error LED acknowledgement: You can acknowledge an error when the LED is “ON” by turning the control function “OFF” and then back “ON”.

ⓑ “Operation” Button
This is the button that enables you to select the setting of the ALTS transfer act mode, either into automatic or manual. If you push the button the password window will appear. If you enter Password(“99”) the “manual” and “automatic” mode flipflops.

ⓒ “Outage RESET” Button
If the main power is fully recovered after the ALTS is separated due to the power outage incurred from the outage on the loaded side (both the main power and the standby power are cut off) you can turn the function of the control box back into the normal operation status by pushing this button.

ⓓ “LED BATT. TEST” Button
This is the button to verify the charging status of all LEDs and Batteries within the control box. If you push it all LEDs are on and the “Low Battery” is shown on the LED if the Battery Voltage is in abnormal state and the Battery status indicator LED flashes on and off

3. Status Indicator LED

ⓐ “Switch” Status LED
It shows whether the ALTS is opened or closed.
- Open status: LED off
- Closing status: LED flash (red)

ⓑ “Live wire” Status LED
It shows the Live wire status of the Power1 and Power2.
- If the power is in live wire status the LED is on (green)

ⓒ “Open phase” Status LED
It shows whether the power in current use is in Open phase status.
- Normal status: LED off
- Open phase status: LED flash (red)

ⓓ “Load Outage” Status LED
It shows whether there is a fault on the loaded side. (in case that the phase current is more than or equal to 350%(2.2kA) of the rated current)
- Normal status: LED off
- Fault occurrence: LED flash (red)
Controller

Dimensions

Top

Front View

Upper Screw cover

Lower Screw cover

Panel cutting and Fitting size

Side View

Screw cover elimination groove

Fitting size

4-M4, #5

View “A”

(Refer to page 10)
Automatic Load Transfer Switches

Dimensions

Body

Front View

Side View

Fitting Size

Control Terminal Arrangement
Example of installing Distribution Board

* Top and Bottom Protection Covers are not provided.
### Automatic Load Transfer Switches

#### Cable Connection

#### Deadbreak Type

![Deadbreak Type Diagram]

- **Connection Bolt**
- **Insulation Cap**
- **Elbow Connector**
- **Bushing**

#### Amount of Fittings required for each Model

**3circuit - 2switch/Deadbreak Type**

<table>
<thead>
<tr>
<th>Name of Fittings</th>
<th>Standard</th>
<th>325-325</th>
<th>200-200</th>
<th>100-100</th>
<th>60-60</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elbow Connector</td>
<td>K655BLR</td>
<td>6</td>
<td>6</td>
<td>6</td>
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</tr>
<tr>
<td>Insulation Plug</td>
<td>K650BIP</td>
<td>6</td>
<td>6</td>
<td>6</td>
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</tr>
<tr>
<td>Connection Terminal</td>
<td>03700-360</td>
<td>6</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Cable Adapter</td>
<td>K655CA-M</td>
<td>6</td>
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<tr>
<td>Connection Terminal</td>
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<td>Cable Adapter</td>
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<td>Connection Terminal</td>
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<td>Cable Adapter</td>
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<tr>
<td>Connection Terminal</td>
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<tr>
<td>Cable Adapter</td>
<td>K655CA-J</td>
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<tr>
<td>Insulation Tape</td>
<td>Grounding Kit</td>
<td>6</td>
<td>6</td>
<td>6</td>
<td>6</td>
</tr>
</tbody>
</table>
For your safety, please read user’s manual thoroughly before operating.

Contact the nearest authorized service facility for examination, repair, or adjustment.

Please contact a qualified service technician when you need maintenance.
Do not disassemble or repair by yourself!

Any maintenance and inspection shall be performed by the personnel having expertise concerned.