Tri-MEC

Automatic Load Transfer Switches

ALTS

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.

Contents

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

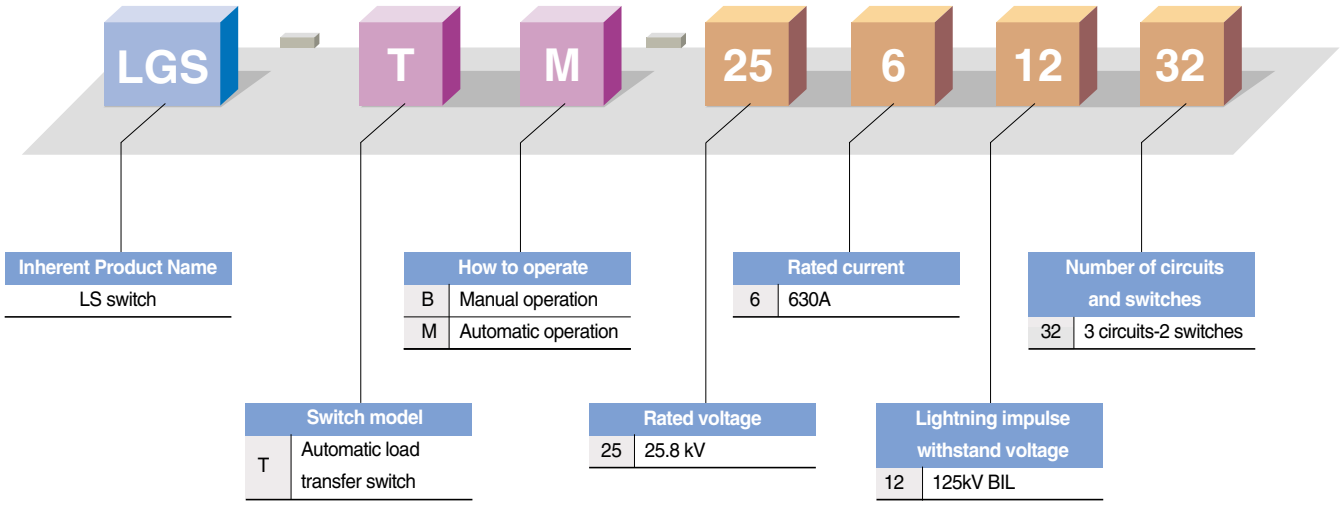
Automatic Load Transfer Switches

Rated and Product Name System

Rated

Item			Rated	Misc.
Rated voltage		[kV]	25.8	
Rated frequency		[Hz]	60	
Rated current		[A]	630	
Load prevention current		[A]	630	
Excitation current		[A]	21	
Charging current		[A]	25	
Rated make current		[kA]	41.6	
Rated short-circuit withstand current		[kA/1s]	16	
Lightning impulse withstand voltage		[kV/1.2×50㎲]	125	
Power frequency withstand voltage		[kV/1min]	60	
Continuous current withstand voltage		[kV/15min]	78	
SF6 gas minimum movement pressure		[psi.G/20℃]	0.14(2)	
Operation method			Motor spring charging method	
Power Supply for control circuit	Operation voltage	[VAC]	220	
	Frequency	[Hz]	60	
	Emergency power supply (Standby battery)	[VDC]	24	DC 24V, 10Ah×1EA
Weight	Body	[kg]	285	
	Control box	[kg]	20	
	Standby battery	[kg]	7.65	
Number of circuits and switches			3 circuits-2 switches	
Use environment			Indoor	
Voltage detection device			Capacitor Voltage Divider	
Current detection device			CT	
LCD indication (error range: 3%)	Current	[A]	10~750	Current indication for R, S, T phases
	Voltage	[kV]	35%~120%	Voltage between phase for R, S, T phases
Applied Standard			IEC 60265-1	

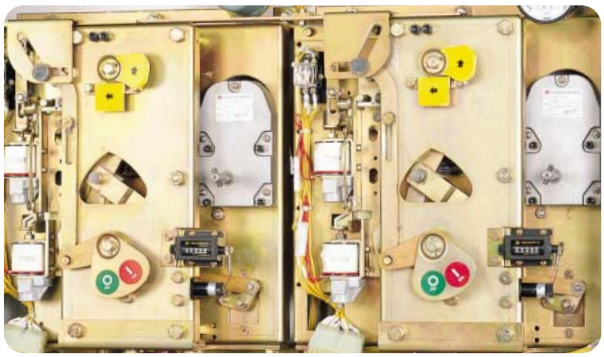
Product name and How to Order



Body Structure

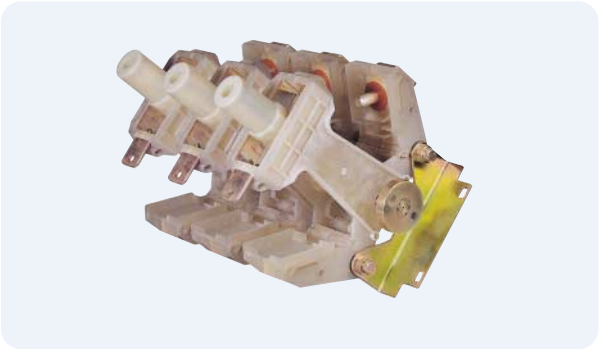
Mechanism

- 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.



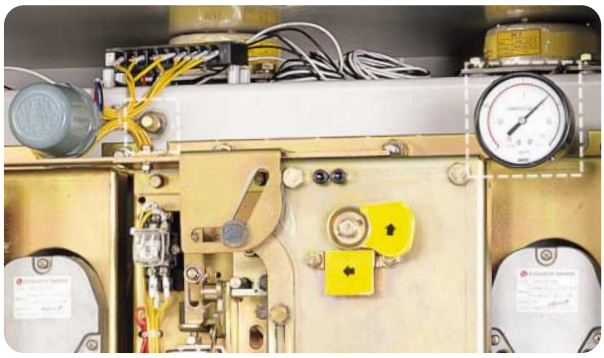
Arc Suppression module

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



Gas injection valve and pressure gauge

- The gas injection valve for charging SF_6 gas is attached
- The gas pressure gauge features demonstration of different colors to facilitate the verification of SF_6 gas pressure status



Anti-pressure panel

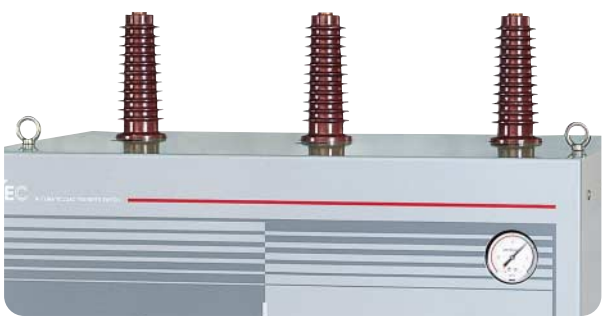
- An anti-pressure panel is installed to prevent the explosion of a tank due to the expansion of SF_6 gas in case of an unexpected short-circuit inside a tank.
- Panel activation threshold pressure: 1.2~3.8kgf/cm^2

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.

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.



Auxiliary Devices

Rated Motor

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

Rated voltage	Inrush current peak value(A)	Normal current (A)	Power consumption (W)	Charging time (sec)
DC 24V	30	15	350	12

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.

Rated voltage	Normal current(A)
DC 24V	10

Note) Regular operating voltage range: 85~110%

Trip Coil, TC

The coil is operated only when the power is supplied for 35ms consecutively

Rated voltage	Normal current(A)
DC 24V	10

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.

Item		Resistive load (A)	Inductive load (A)
AC	250V	5	2.5
	125V	10	5
DC	250V	0.6	0.3
	125V	1.3	0.65
	30V	5	2.5

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.

Charge Status

Free 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

Automatic Load Transfer Switches

Controller

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.

ⓒ **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.

ⓓ **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

ⓔ **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.

ⓕ **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.

ⓖ **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.

ⓗ **Overload Act**

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

ⓘ **Op. Phase Act**

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

ⓙ **Timer**

It is the menu where you can set the current time.

ⓚ **Event View**

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

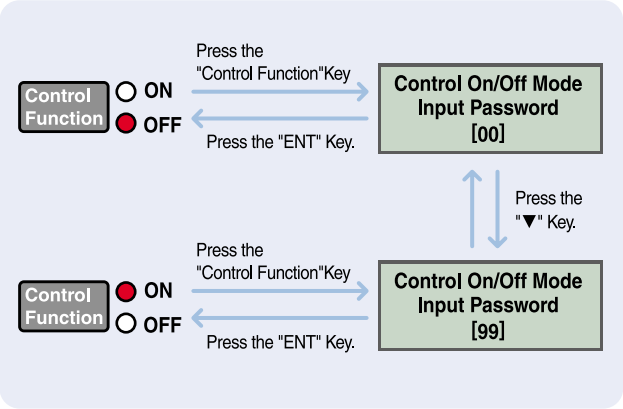
ⓛ **Cali. Mode**

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.

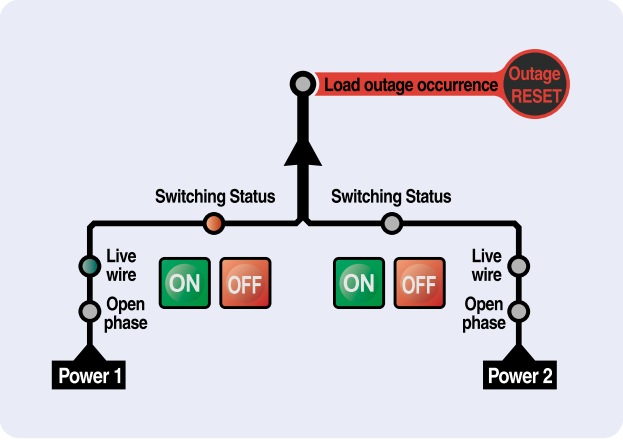
ⓒ "Outage RESET" Button

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 Powre2.

- 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

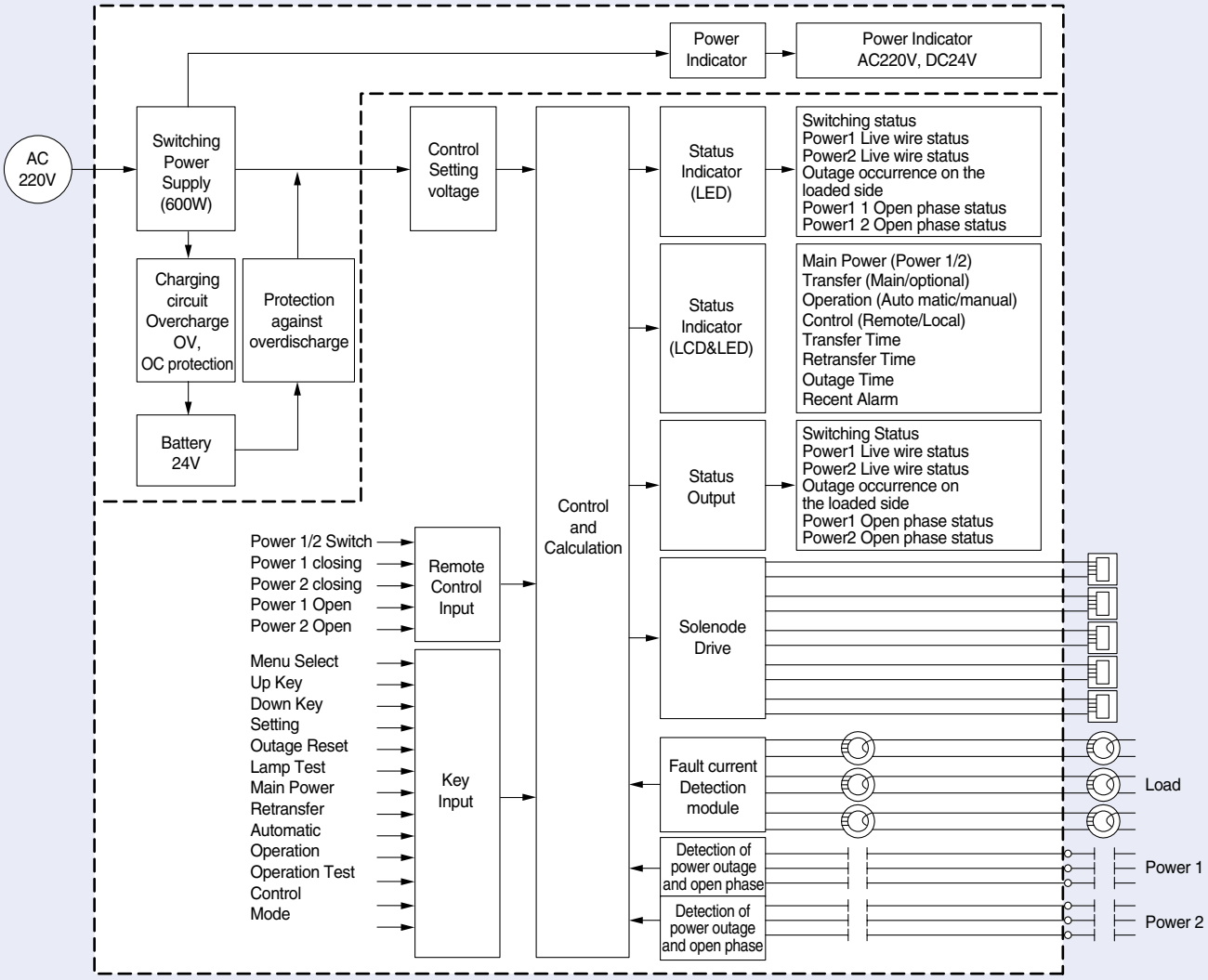
It shows whether there is a fault on the loaded side. (in case that the phase current is more than or equal to 350%(2.2kA) of the rated current)

- Normal status: LED off
- Fault occurrence: LED flash (red)

Automatic Load Transfer Switches

Controller

Block Diagram



T/B3 Terminal Arrangement				T/B2 Terminal Arrangement				T/B1 Terminal Arrangement			
PSWa	76	61	PSWc	BAT-LOW	46	31	COM		16	1	
P122	77	62	P136	STS-AC	47	32	COM		17	2	VBAT-
P137	78	63	P237	STS-GAS	48	33	COM	P1A2	18	3	P2A2
P222	79	64	P236	STS-LF	49	34	COM	P1A5	19	4	P2A5
P1A4	80	65	P1A4	STS-P2F	50	35	COM	P1A3	20	5	P2A3
P1A6	81	66	P1A6	STS-P1F	51	36	COM	P1A1	21	6	P2A1
P2A4	82	67	P2A4	STS-P2L	52	37	COM		22	7	VBAT+
P2A6	83	68	P2A6	STS-P1L	53	38	COM		23	8	
CTR0	84	69	CTR1	STS-P2O	54	39	COM		24	9	
CTS0	85	70	CTS1	STS-P2C	55	40	COM		25	10	
CTT0	86	71	CTT1	STS-P1O	56	41	COM		26	11	
PD1R	87	72	PD1S	STS-P1C	57	42	COM		27	12	
PD1T	88	73	PD1N	RMT-CHG*	58	43	24G	AC220V+	28	13	AC220V+
PD2R	89	74	PD2S	RMT-P2C*	59	44	RMT-P2O*	AC220V-	29	14	AC220V-
PD2T	90	75	PD2N	RMT-P1C*	60	45	RMT-P1O*	F.G	30	15	F.G

Factory Wiring		
Terminal number	Description in detail	Misc.
76–61	GAS input	Status Input Terminal
77–78	Power Supply Unit 1 Closing Contact	
62–78	Power Supply Unit 1 Trip Contact	
79–63	Power Supply Unit 2 Closing Contact	
64–63	Power Supply Unit 2 Trip Contact	
65(80)–20	Power Supply Unit 1 Closing Solenoid	Solenoid Output Terminal
66(81)–19	Power Supply Unit 1 Trip Solenoid	
67(82)–5	Power Supply Unit 2 Closing Solenoid	
68(83)–4	Power Supply Unit 2 Trip Solenoid	
18–21	Power Supply Unit 1 Motor connection terminal	Motor connection terminal
3–6	Power Supply Unit 2 Motor connection terminal	
84–69	R phase CT	Current Input terminal
85–70	S phase CT	
86–71	T phase CT	
87–73	Power Supply Unit 1 R phase Voltage	Voltage Input terminal
72–73	Power Supply Unit 1 S phase Voltage	
88–73	Power Supply Unit 1 S phase Voltage	
89–75	Power Supply Unit 2 R phase Voltage	
74–75	Power Supply Unit 2 S phase Voltage	
90–75	Power Supply Unit 2 T phase Voltage	

User Wiring		
Terminal number	Description in detail	Misc.
2–7	Battery connection	Connection terminal
30(15)	Frame Ground connection terminal	
28(13) –29(14)	AC220V Voltage Input terminal	Power input terminal
46–31	Batter Low Status Output Contact	Status Output Contact
47–32	AC220V External Power Status Output Checkup	
48–33	GAS Low Status Output Contact	
49–34	Overload Fault Status Output Contact	
50–35	Power Supply Unit 2 Live wire Status Output Contact	
51–36	Power Supply Unit 1 Live wire Status Output Contact	
52–37	Power Supply Unit 2 Live wire Status Output Contact	
53–38	Power Supply Unit 1 Live wire Status Output Contact	
54–39	Power Supply Unit 2 Trip Status Output Contact	
55–40	Power Supply Unit 2 Closing Status Output Contact	
56–41	Power Supply Unit 1 Trip Status Output Contact	
57–42	Power Supply Unit 1 Closing Status Output Contact	
58–43	Remote Control Input : 전환	Remote Control Input terminal
59–43	Remote Control Input:Power Supply Unit 2 Closing	
44–43	Remote Control Input:Power Supply Unit 2 Trip	
60–43	Remote Control Input:Power Supply Unit 1 Closing	
45–43	Remote Control Input:Power Supply Unit 1 Trip	

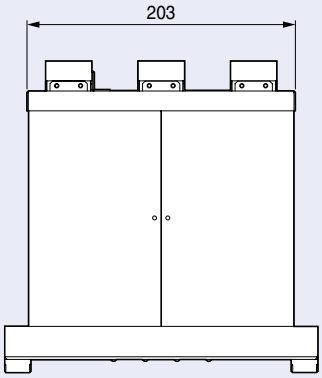
Terminal Stand

(Refer to page I1-11 for location of View "A")

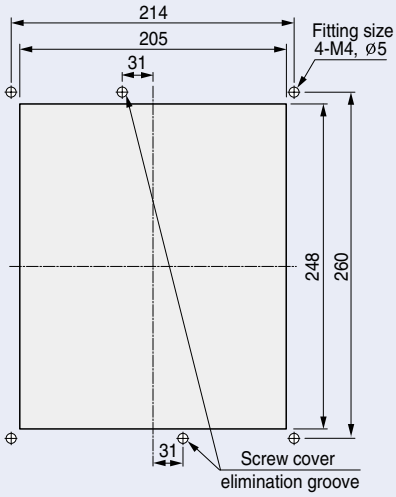
represents user wiring.

Dimensions

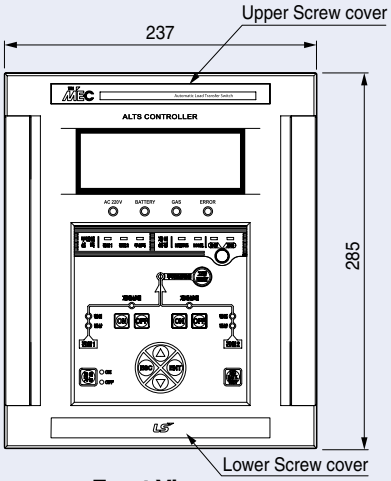
Controller



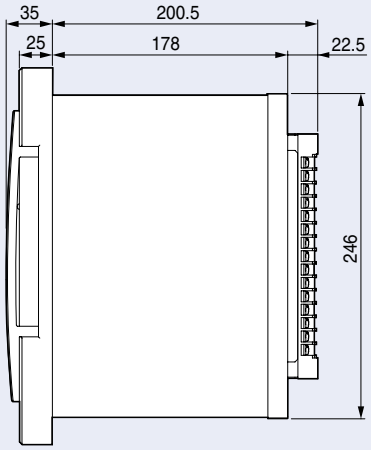
Top



Panel cutting and Fitting size

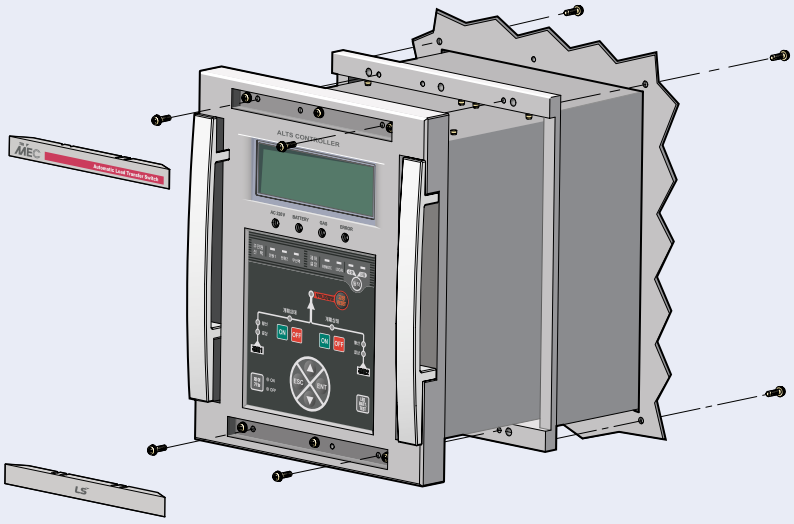


Front View



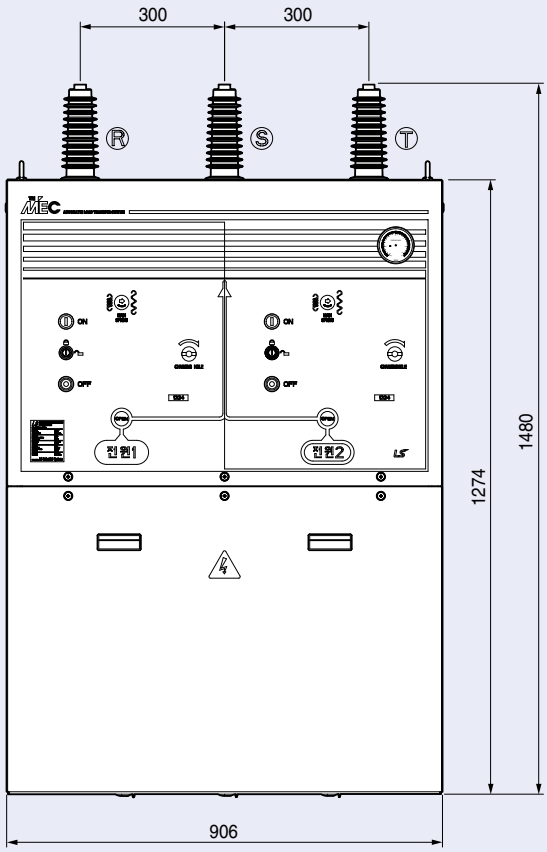
Side View

← View "A"
(Refer to page 10)

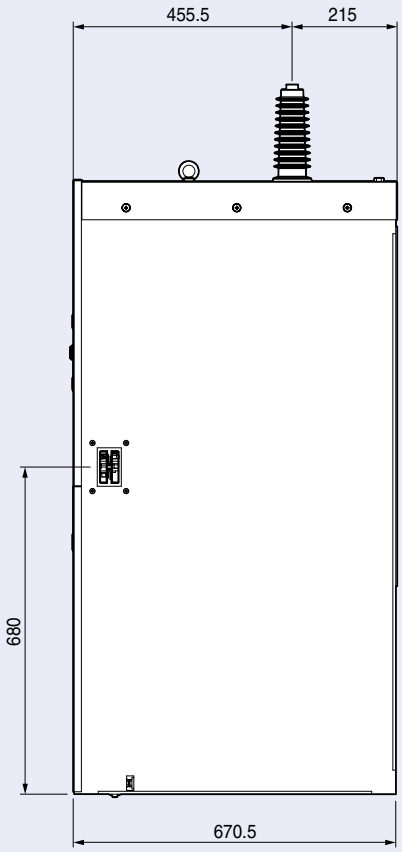


Dimensions

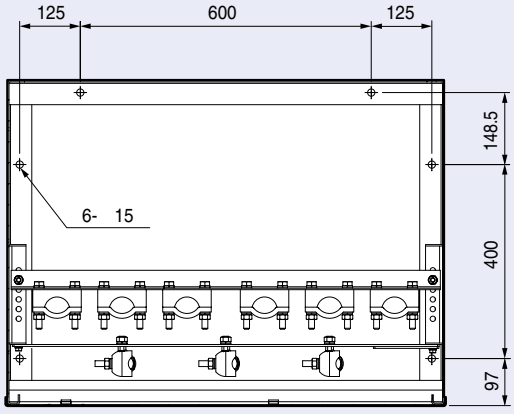
Body



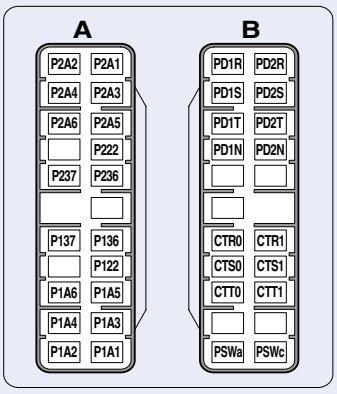
Front View



Side View

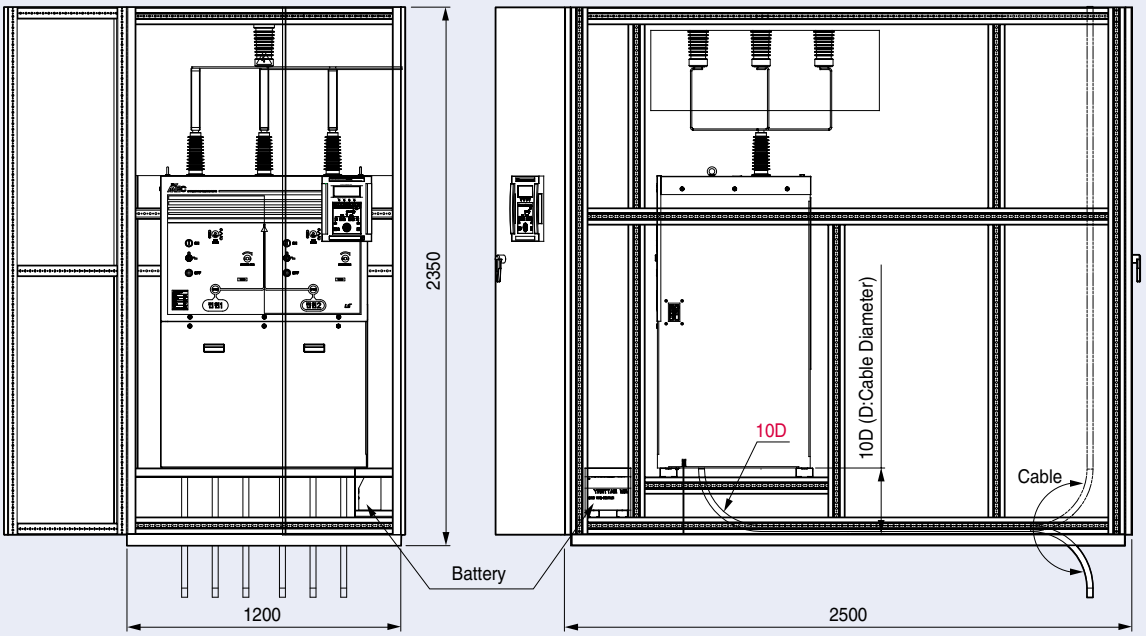


Fitting Size

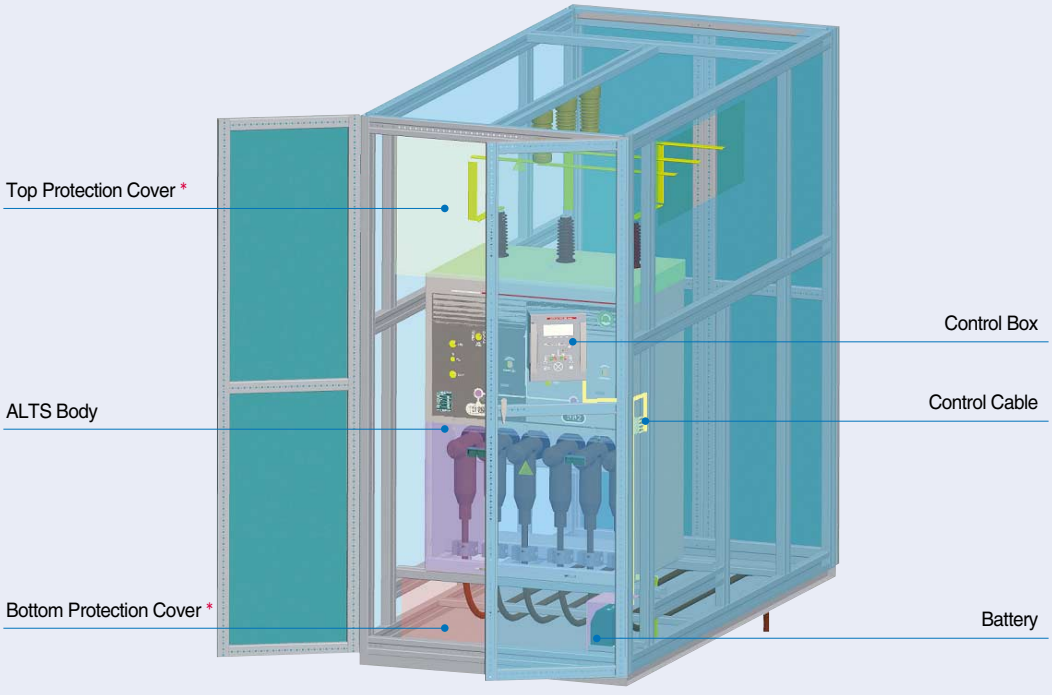


Control Terminal Arrangement

Example of installing Distribution Board



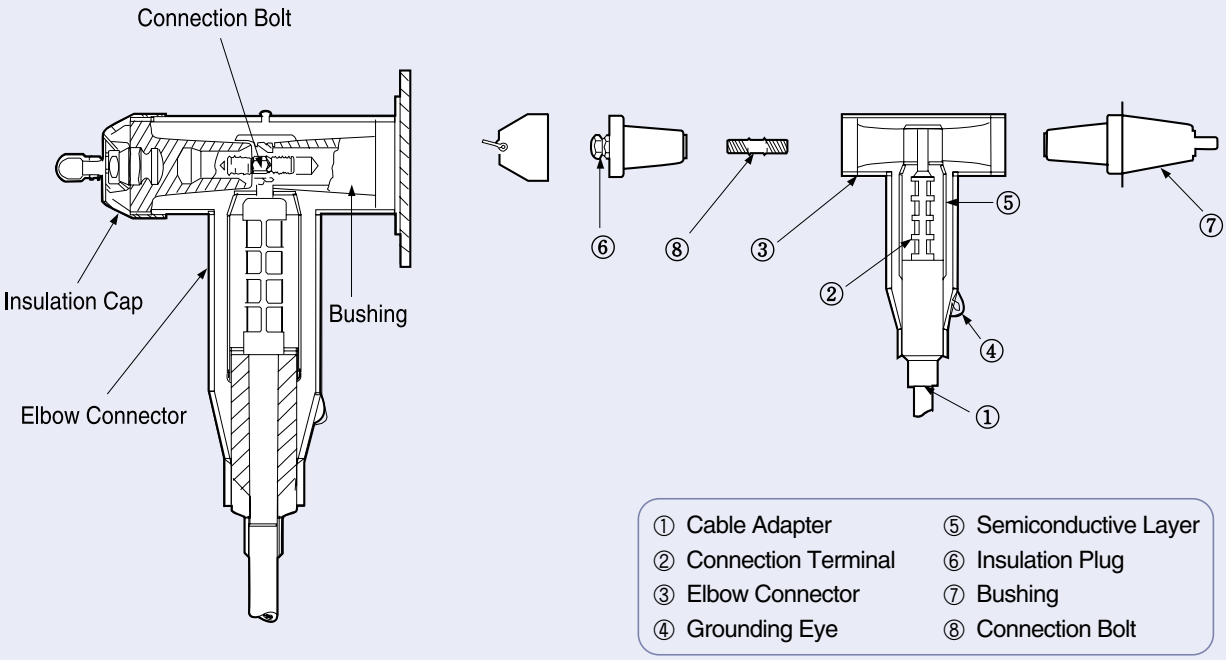
Front View **Side View**



* Top and Bottom Protection Covers are not provided.

Cable Connection

Deadbreak Type



① Cable Adapter	⑤ Semiconductive Layer
② Connection Terminal	⑥ Insulation Plug
③ Elbow Connector	⑦ Bushing
④ Grounding Eye	⑧ Connection Bolt

Amount of Fittings required for each Model

3circuit - 2switch/Deadbreak Type

Name of Fittings	Standard	Cable Size			
		325-325	200-200	100-100	60-60
Elbow Connector	K655BLR	6	6	6	6
Insulation Plug	K650BIP	6	6	6	6
Connection Terminal	03700-360	6			
Cable Adapter	K655CA-M	6			
Connection Terminal	03700-310		6		
Cable Adapter	K655CA-L		6		
Connection Terminal	03700-270			6	
Cable Adapter	K655CA-K			6	
Connection Terminal	03700-250				6
Cable Adapter	K655CA-J				6
Insulation Tape	Grounding Kit	6	6	6	6

Green Innovators of Innovation

Safety Instructions

- 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.

LSIS Co., Ltd.

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CHEONG-JU PLANT

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