

TRI
MEC

**Medium Voltage Secondary Distribution Ring Main Units
Up to 15kV, SF₆-Insulated**



Medium Voltage Secondary Distribution

Ring Main Units

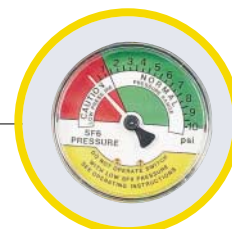
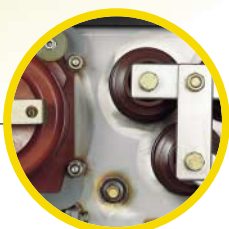
Tri-Mec Ring Main Units are mainly used for power distribution of 11/15kV class underground line and designed to enable connection, supply and protection by HRC power fuse combination.

The units are three-way combined single panels comprising incoming/outgoing feeder panels and fused protection LBS panels that protect transformers.



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Ring Main Units

The features of the product



Technology

- Metal enclosed unit for Indoor installation and type tested.
- Insulated by SF₆ Gas.
- Maintenance free and easy installation.
- Independent of climate.
- ON-OFF-Earth, three position load break switch.
- Variable cable connections - Premolded elbow boot or Heat shrinkable tube.
- Recyclable materials used.

Safety

- Approachable and operable safely in the presence of power in the cables.
- Clear indication of operation status via mimic diagram on front panel.
- Fully automatic interlocking system.
 - Operation is only possible in case enclosure is totally closed.
 - Fuse compartment is only accessible when Load break switch is earthed.
 - Voltage detector to check whether cables are lined or not.
- Rupture disk is designed to protect devices in case of emergency like gas expansion.

Durability and usefulness

- Metal enclosed tank is hermetically sealed, it means this is independent of environmental effects such as dirt, small insects, and moisture and so on.
- Load break switch operating is possible in the front of Ring Main Units.
- All switching operations can be made safely to personnel because of interlocking system that operates automatically according to the switch position by the operator.
- No requirement of recharging SF₆ gas until its service life.
- Remote operation available in case of using motor mechanism and FRTC.
- HRC power fuse will be tripped by a fuse striker pin connected to the mechanism in the event of fault happening.

Saving cost

- Any maintenance is not required other than replacement of HRC Power Fuse after installation.
- Compact design that requires minimum space to install and operate locally is main advantage especially where the space is limited.
- No additional costs for replacement because of long service life.
- Materials can be recycled after the end of its service life.

Electrical

Rated voltage(kV)	12	15
Power Frequency	50/60	50/60
Impulse rated current(kV/Bil)	95	95
Ring Switch		
Rated Current(A)	630	630
Breaking Capacity(A)		
Normal Load Current		
Earth Fault		
Off-load Cable		
Short Time Withstand current(kA/s)	20/3	21/1
Making Current(kA Peak)	50	52.5
Transformer Feeder		
Rated current	200	200
short circuit breaking capacity(kA) 1	20/3	21/1
Making Current(kA Peak) 1	50	52.5

Note) 1. Prospective value, the actual current being limited by the fuse

Standards

Tri-MEC RMU meets international standards such as followings:

- IEC 60265 High Voltage Switches
- IEC 60282 High Voltage Fuses
- IEC 60129 Alternating current disconnectors and Earthing switches
- IEC 60420 High voltage alternating current fuse - Switch combination.
- IEC 60298 AC Metal-enclosed switchgear and Controlgear for rated voltage above 1kV and up to including 52kV
- IEC 60694 Common specifications for HV Switchgear and Controlgear standards
- ISO 2063 Metallic coatings - Protection of iron and steel against corrosion - Metal spraying of zinc and Aluminum.
- DIN 43625 High voltage fuses: Rated voltages 3.6kV to 36kV: Fuse-link

Environmental conditions

- Ambient temperature
 - Maximum : 55°C
 - Minimum : -10°C
- Altitude : Under 1,000m
- Installation position : Indoor
- Protection level
 - Tri-MEC RMU : IP × 3 Class
 - RMU With the enclosure : IP × 54 Class

Ring Main Units

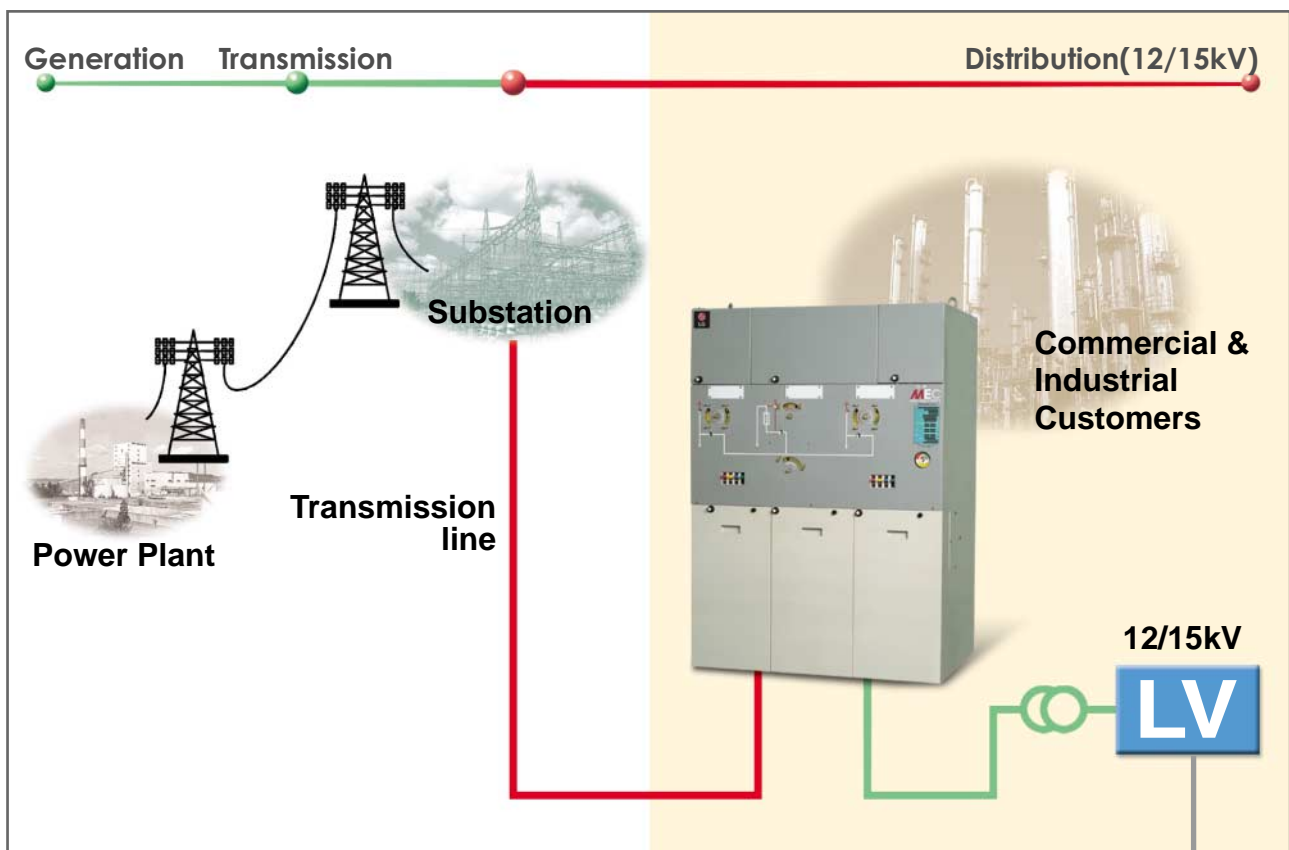
Field application

The Tri-MEC RMU is the solution to meet your medium voltage power distribution line needs.

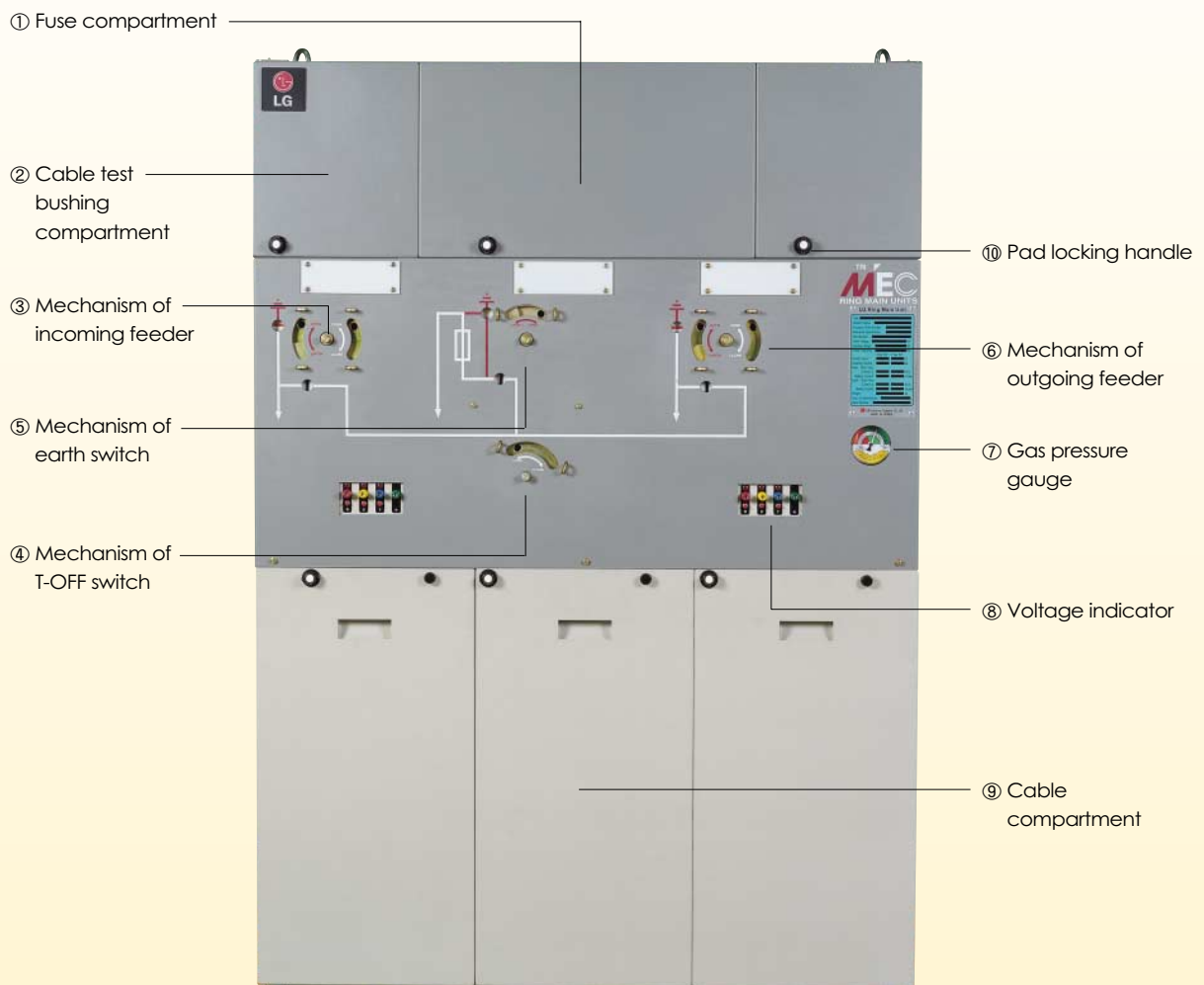
Tri-MEC RMUs enable medium voltage distribution network and are mainly used for protection of transformers in compact substations.

They are used for medium voltage distribution in compact substations, small buildings, residential housing complex, large shopping malls, airports, subway stations, etc. comprising medium voltage networks.

Market segmentation



External view



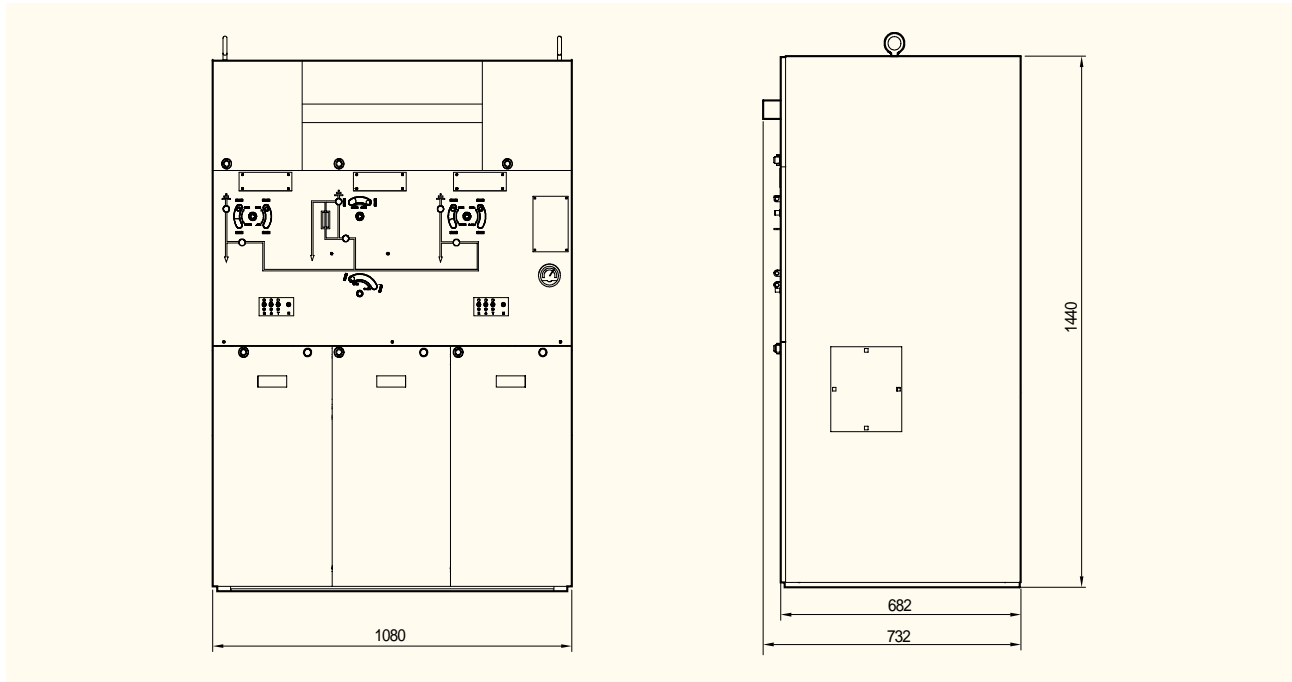
Note) Test Bushing과 HRC Power Fuse는 Optional Feature임

Ring Main Units

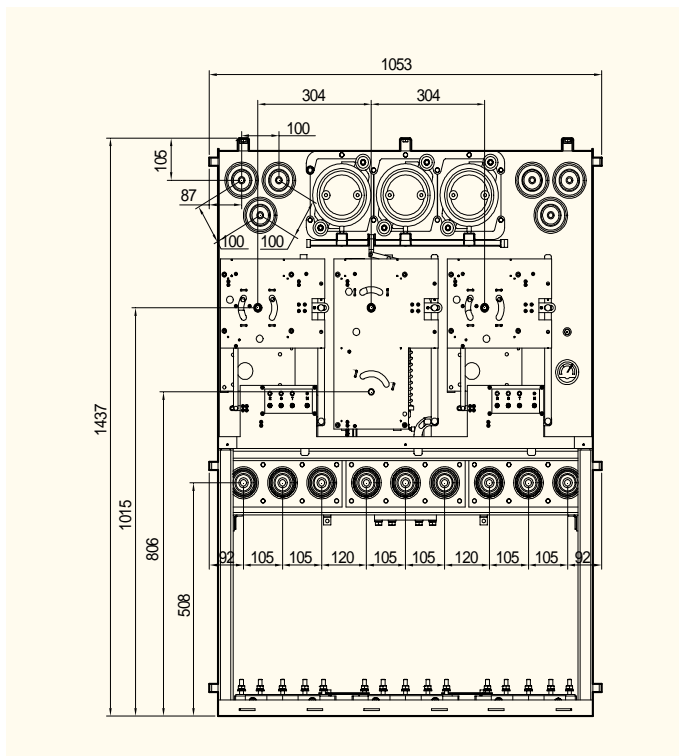
Product design

Outline drawings

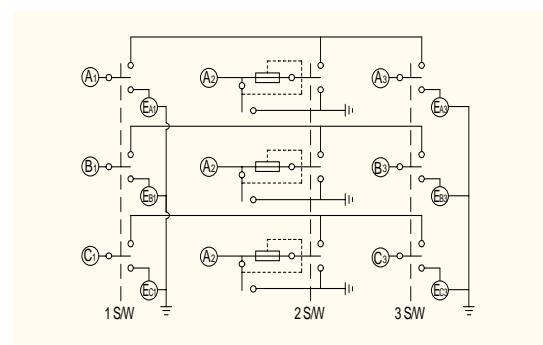
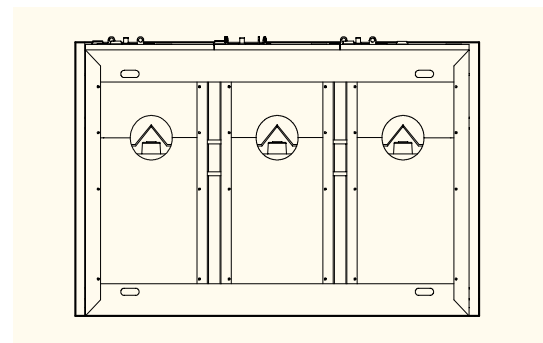
Front



Others & Single line diagram

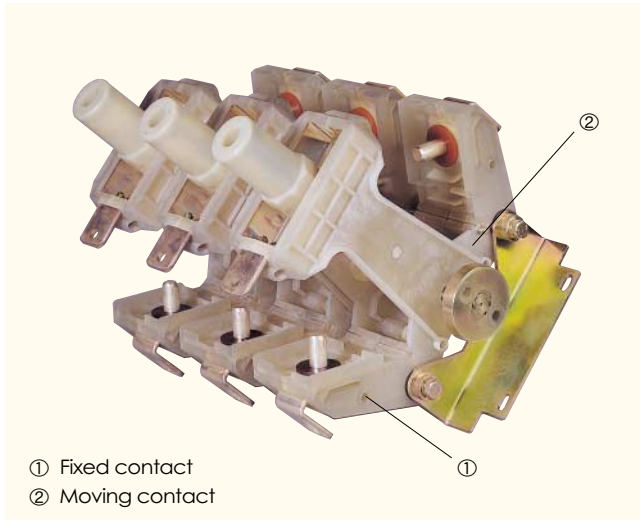


Height from the bottom



Single line diagram

Puffer type load break switch



- ① Fixed contact
- ② Moving contact

Load break switch

Characteristics

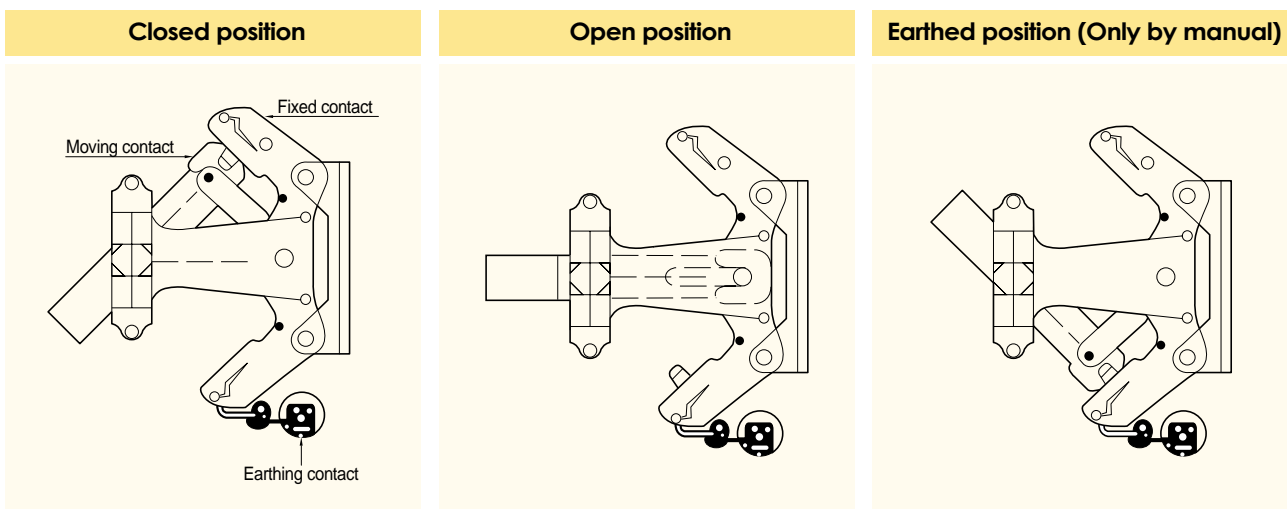
- Puffer type designed for contact parts
- 3-position switch built in : ON-OFF-EARTH
- The switching mechanism SF₆ insulated and housed in a stainless steel tank provides high degree of insulation, arc quenching and protection.

Arc quenching

The switching mechanism operates to get the SF₆ gas compressed in a cylinder and injected through a nozzle to extinguish arc quickly while the 3-position switch is opening from its closed position.

As the switch does not move directly to EARTH position from CLOSED position additional personnel safety system as well as interlocking system is applied.

3Position load break switch



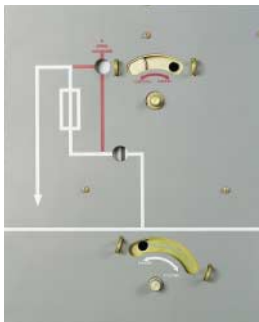
Ring Main Units

Main components

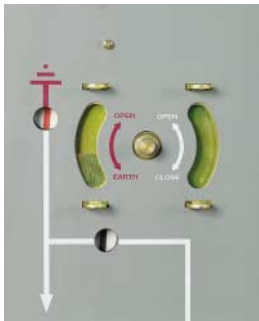
Mechanism

The 3-Position load break switch is operated in front of Ring Main Units by lever type operating mechanism.

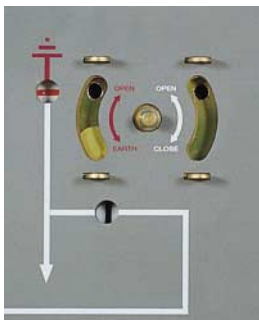
- Spring operate mechanism.
- Selectable feeder mechanism between manual and automatic mode according to the installation site conditions.
- When a fuse is blown out, Mechanism for transformer feeder is tripped automatically through ejection of striker pin in fuse housing.
- Even with the blowing of a fuse all three phases are tripped simultaneously.
- In stead of single line diagram the letters "ON", "OFF", "EARTH" are used to display the switching status so that an operator can check it comfortably.



Fuse S/W mechanism



Ring S/W (Incoming)



Ring S/W (Outgoing)



HRC Power Fuse compartment

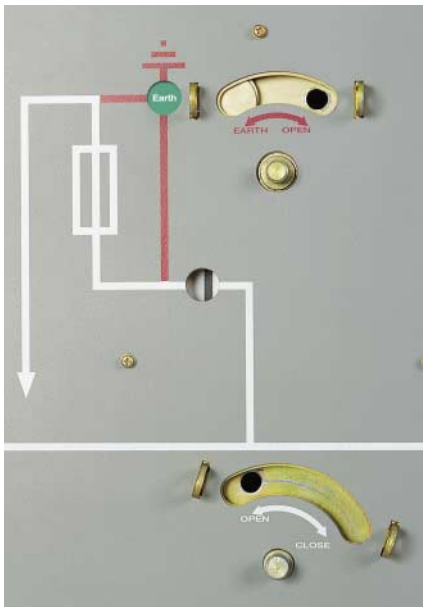
Characteristics

- LG Tri-MEC Ring Main Unit adopts HRC power fuse assembly in the line side of the transformer to protect it from fault current.
- The fuses conforming to DIN 43625 are used.
- In the event of fault current the fuse is blown out quickly to protect the transformer in the load side safely.
- Designed according to IEC60420
- SF₆ insulated cast resin type fuse housing in a tank provides higher grade of insulation than conventional air insulation types.
- For personnel safety the interlocking system is designed to allow accessing to fuse compartment only when load break switch is positioned on EARTH.

Operation method

In the event fault current happens at feeder or load side HRC power fuse will be blown out within 3 cycles. At the moment of fuse blowing out the striker pin located on lower side of fuse cap is ejected to give trip signal to transformer feeder mechanism.

Even with the fuse blowing in a phase all three phases are tripped simultaneously.



Fuse switch mechanism



Fuse insert

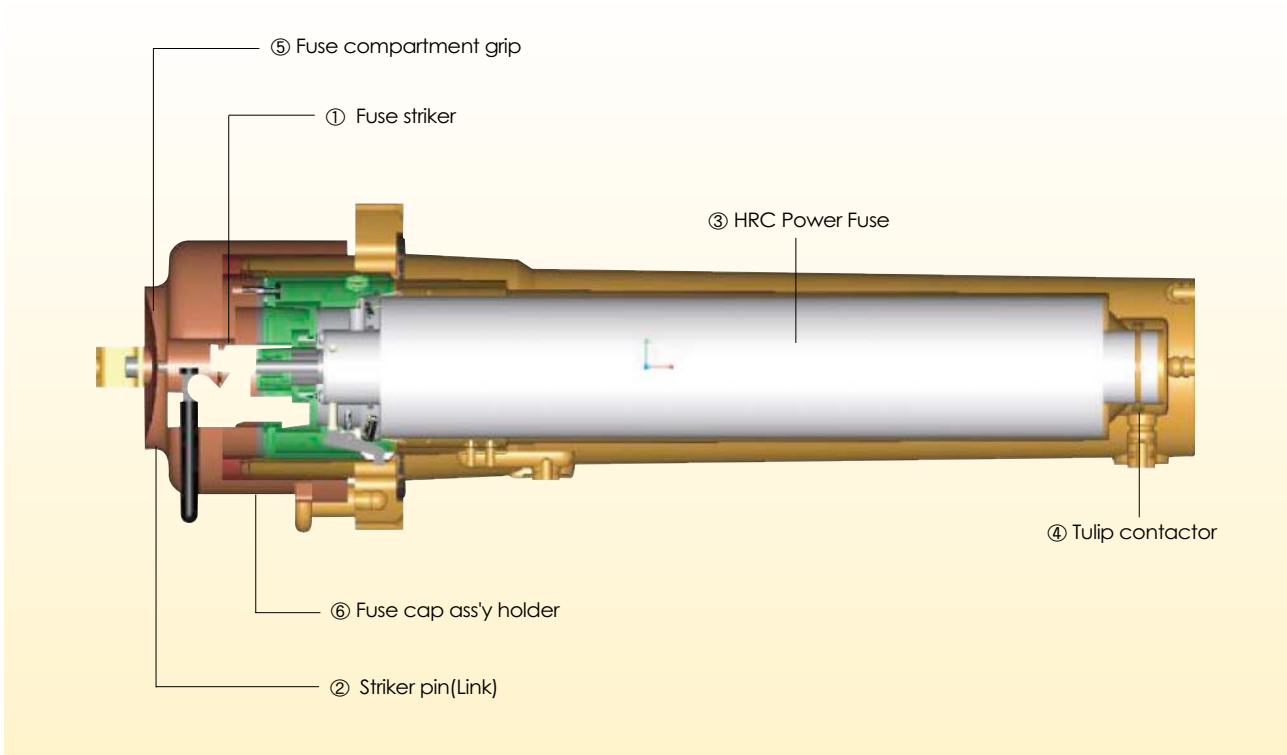
- Cf.) 1. Main mechanism
- ① CLOSE 'Close' position
 - ② OPEN 'Open' position
2. Earth mechanism
- ③ EARTH 'Earth' position

Ring Main Units

Main components

Fuse ass'y(3D)

Fuse assembly is composed of Fuse cap assembly and Fuse body assembly, and it is installed in a SF₆ insulated stainless steel tank. The body is epoxy molded for excellent insulation.



Cable compartment

Bushing

Epoxy molded bushings carry currents between outside live conductors of a tank and SF₆ insulated inside conductors. Tri-MEC RMUs use 630A dry type bushings that are conforming to DIN 47 636-AT 36-630.

Cable

The cable conductor is made of aluminum or Copper with single or three cores. Dry or paper impregnated type is applicable. Connection via DIN external cone device termination unit. Access to cable termination compartment only if feeder has been earthed. Both heat shrinkable tube and screened pre-molded elbow boots termination can be used.



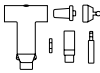
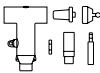



1. Ring switch

- Termination for cross sections of up to 300 by standard.
- There are various choices for the termination. Customer can choose heat shrinkable tube termination or screened pre-molded elbow plug termination in both ways.
- For cable termination suitable for ASG 36-400 and ASG 36 630 bushings with M12 terminal thread in accordance with DIN 47 636 - AT 36 - 630.
- For 400/630A rated normal currents.

2. Fuse switch

- Termination for cross section of up to 120 by standard.
- For elbow plugs of heat shrinkable tubes as male connectors, suitable for ASL 24 - 250 bushings in accordance with DIN 47 636 - AT 36 - 630.
- For 200A rated operational currents.
- Cable bushing depending on the type of installation or type of sub-station.

15kV Cable termination selection table

Company	Voltage class	Current	Description	Model number	External view
Elastmold	15kV	200A	Elbow connector	165LR-WX	
				166LR-WX	
		600A	Elbow connector	K655LR-WOX	
				K656LR-WOX	
3M	200/600A	Heat shrinkable tube	BBI-4A BBI-5A BBI-6A		
Raychem			Heat shrinkable termination	IXSU-F(RCAB)	
				IXSU-F(RCIB)	

Note) 1. Please contact cable termination manufacturer in detail.
2. Any kind of connector is acceptable for the DIN 47 636 - AT 36 - 630 bushing.

Ring Main Units

Main components

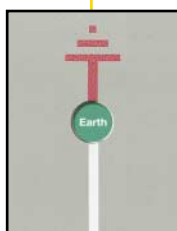
Interlocking system

Maintenance and checking are done simply by activating intelligent interlocking system with a simple operation and various safety accidents likely to take place due to carelessness of a worker at working can be prevented.

Operation method

- Switch the load break switch into EARTH position with an operation lever. As direct conversion into EARTH position from ON position is impossible due to its mechanism the it should be switched first to OFF position before the conversion into EARTH position.
- Only when load break switch is located at EARTH position doors can be opened or closed.
- In case any one of doors is opened, mechanism operation hole is clogged. Thus load break switch operation is impossible, which means switching to ON position is not allowed
- When the works such as replacement of fuse and cable repairs are finished all doors of fuse compartment, cable compartment and cable test facility should be closed before operation of LBS. The operation order to switch on is EARTH → OFF → ON.
- Each door is to be pad-locked to avoid unintentional opening that may cause accident.

Earthing operation



Fuse S/W diagram



Fuse S/W mimic diagram

Removing covers



HRC Power Fuse

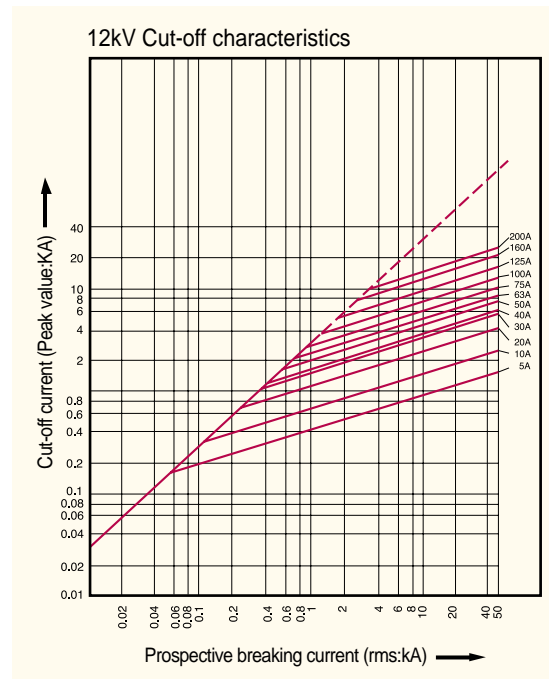
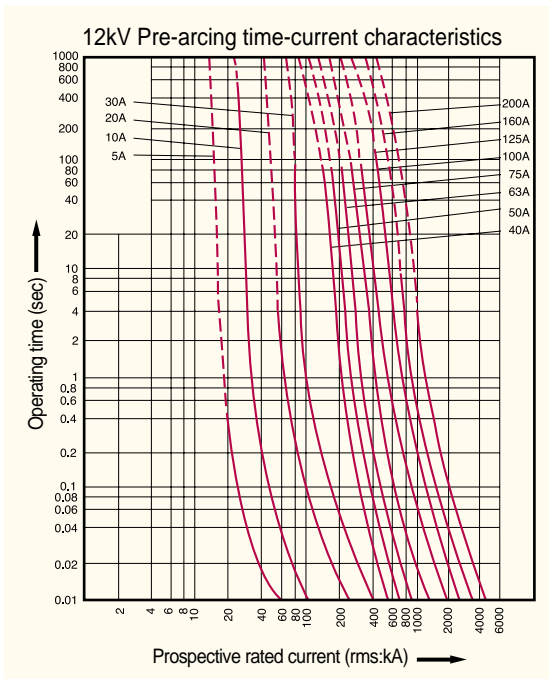
Features

1. The LG HRC Power Fuses belong to the PRIME-MEC series. It interrupts high currents before the first loop of fault current has reached its natural peak value and therefore cuts down the required withstand capacity of the associated equipment on the electric system.
2. Though small in size, it has a high breaking capacity and its enclosed type is suitable for use inside of the panel board.
3. PRIME-MEC fuses are equipped with striker pins for trip indicators as well as for operating the related load break switches.
4. Link type fuse holder enables easy maintenance and high stability when replacing the fuses.



HRC Power Fuse

Fuse characteristic curve



Transformer selection table

HRC Power Fuse application table			
11/15 kV		24 kV	
20A	70~179	20A	172~358
30A	129~269	30A	258~538
40A	232~482	40A	464~965
50A	299~623	50A	598~1246
60A	372~777	60A	745~1554
80A	500~991	80A	1000~1983
100A	800~1322	100A	923~1523

Ring Main Units

Optional feature



Cable test bushing

LG Tri-MEC Ring Main Units have test bushings for high voltage and current injection tests for the cables terminated on ring switches without disconnecting the connecting devices.

In order to test cable insulation earth bar should be removed first from test bushing. Insert test injection bar into a bushing hole and use a tester to check if there is any faults in cable insulation. The test injection bar is supplied for free on request.



Voltage indicator lamps

It is a device to check the presence or absence of voltage in the cables.

It is conforming to IEC standard 61958.

Push button type neon voltage indicator is provided and lamp power is supplied by bushing type capacitive dividers.

Inside cables in the cable box are protected with fire-resistant tapes or tubes so as not to be damaged from the heat and flame by Gas touch during termination works.

Trip button

Trip button is installed in front panel of RMU to trip load break switch easily.

Earth fault indicator

EFI can be installed at RMU frame or anywhere customer wants.

- Single Phase AC supply split core type sensor
- Automatic resetting function on AC 220~230V
- 3Phases



Earth fault indicator set

Certified quality : ISO 9001, ISO 14001

LG Industrial systems has integrated a functional organization into each of its units, the main purpose of which is to check quality and ensure the adherence to standards.



Routine quality check

While producing Tri-MEC Ring Unit various routine tests are taken for product capacity, which testing items are as shown follows.

- Filling pressure check
- Tightness check
- Opening and closing speed measurement
- Operating torque measurement
- Partial discharge check
- Dielectric check
- Conformity with drawings and diagram

The quality control department records and signs the results obtained on the test certificate for each device.



MV test cell

Ring Main Units

LGIS Global network



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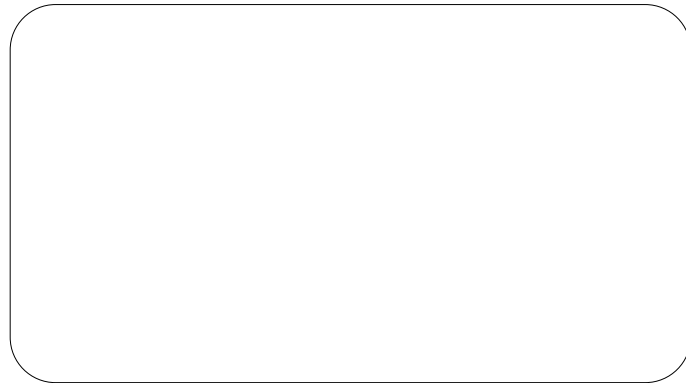
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