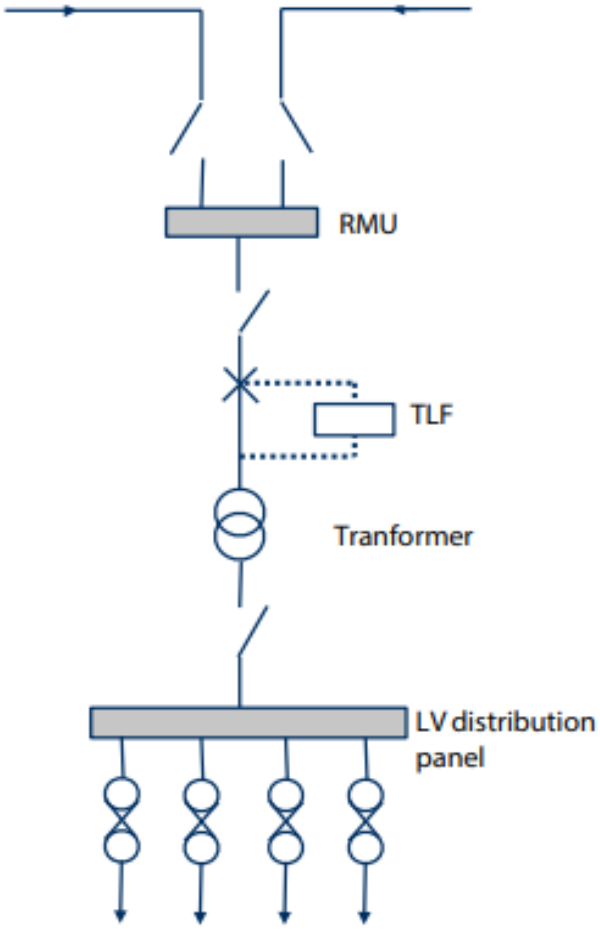
Ring Main Unit (RMU)



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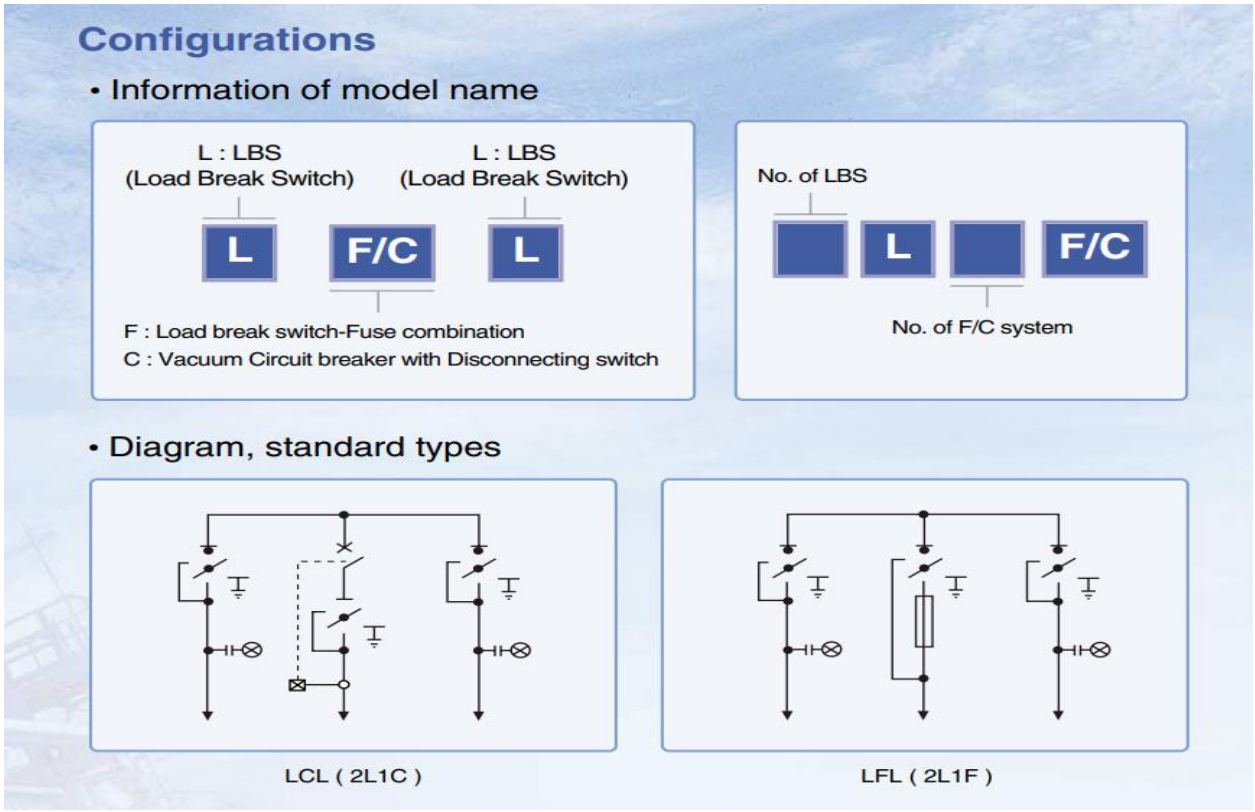
INTRODUCTION

The Basics of Ring Main Unit (RMU) is a medium voltage cabinet containing input and output cable compartments. It isolates these individual compartments with single breakers connected to cables that go out to transformers.

Ring main units can be characterized by their type of insulation: air, oil or gas. The switch used to isolate the transformer can be a fusible switch, or may be a circuit breaker using vacuum or gas-insulated interrupters.

Each compartment has load breakers and protective fuses installed also series of products is consist of standard functional units, which are completed by the factory processing, using technologically advanced load break switch , vacuum circuit breaker and fuse combination units, it using superior performance of SF6 gas as the arc extinction insulating medium. The cabinet has advantages of small volume, reasonable and compact, convenient installation, simple operation, safe and stable operation, which has been widely recognized in the 3.3kV up to 11kV, 22kV, 33kV and 35kV power supply system.



Technical parameters for RMU: -

1	Rated voltage		kV	12, 24, 33,40.5kV
2	Rated current		A	630
3	Rated frequency		Hz	50
4	Rated short time withstand current		kA	20
5	Rated short circuit duration		s	4
6	Rated withstand current (peak)		kA	50
7	Rated short circuit duration of grounding switch		s	4
8	Rated short withstand current (peak) of grounding switch		kA	50
9	Rated insulation level	1min power frequency withstand voltage (effective value)	kV	(Phase-phase, phase-earth)42; (fracture) 48
		Lightning impulse withstand voltage (peak)	kV	phase-phase, phase-earth)75; (fracture) 85
10	Rated SF6 pressure (20°C gage pressure)		Mpa	0.04
11	SF6 leakage rate per year			1%
12	Protection degree			IP3*

Ambient condition:

1. Ambient temperature: -25°c~+40°c.

2. Altitude: ≤1000m.

3. Relative humidity: daily average ≤ 95%, monthly average ≤ 90%.

4. Occasions without flammable and explosive matter, without corrosive chemical and frequent severe vibration, without strong shake.

RMU TECHNOLOGY

The RMU is enable to install on medium voltage distribution network and mainly used for protection of transformers in compact substations. It is used for medium voltage distribution in compact substations, small buildings, residential housing complex, large shopping malls, airports, wind power, etc. comprising medium voltage networks. The concept of RMU is offering a choice of other switch-fuse combination or circuit breaker with relay for protection of the transformer.

- RMU is a compact ring main unit combining all MV functional units to enable to supply and protect transformers on the secondary distribution network.

- RMU can be supplied in various and different configurations suitable for most switching applications in 3.3kV up to 11kV, 22kV, 33kV and 35kV distribution networks.

- The Important Technology of RMU is:

1-Metal enclosed unit for Indoor installation and type tested.

2-Insulated by SF6 Gas.

3-Maintenance free and easy installation.

4-Independent of climate.

5-ON-OFF-Earth, three position load break switch.

6-Recyclable materials used.

- Safety of RMU

1-Approachable and operable safely in the presence of power in the cables.

2-Clear indication of operation status via mimic diagram on front panel.

3-Fully automatic interlocking system.

- Operation is only possible in case door is totally closed.

- Fuse compartment is only accessible when Load break switch is earthed.

- Voltage detector to check whether cables are lined or not.

4-Rupture disk is designed to protect devices in case of emergency like gas expansion.

5-Internal arc withstand is tested for the operator safety in case of accident current occur. (21kA/1s, without SF6 Gas

- Durability and usefulness

1-Metal enclosed tank is hermetically sealed, it means this is independent of environmental effects such as dirt, small insects, moisture and so on.

2-Load break switch operating is possible in the front of Ring Main Unit.

3-All switching operations can be made safely to personnel because of interlocking system that operates automatically according to the switch position by the operator.

4-No requirement of recharging SF6 gas until its service life.

5-Remote operation available in case of using motor operating mechanism and FRTU.

6-HRC power fuse will trip the mechanism automatically by a fuse striker pin connected to mechanism in the event of fault happening.

- Saving cost

1-No maintenance is required other than replacement of HRC Power Fuse after installation.

2-Compact design that requires minimum space to install and operate locally is main advantage especially where the space is limited.

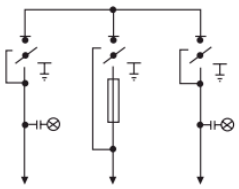
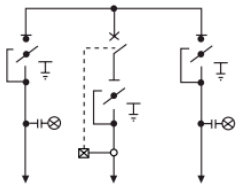
3-No additional costs for replacement because of long service life.

4-Materials can be recycled after the end of its service life.

- Type Of RMU with Diagrams:

1. standard type

1. standard type

LFL (2L1F)	LCL (2L1C)
	
1030×1400×752	1030×1400×752

2. Load break switch combinations

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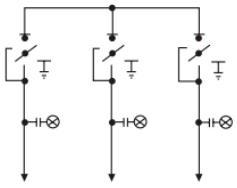
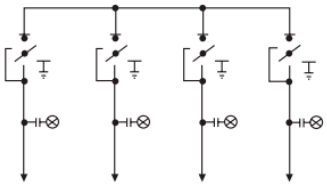
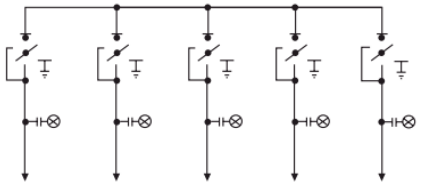
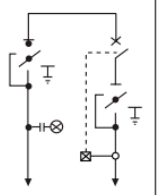
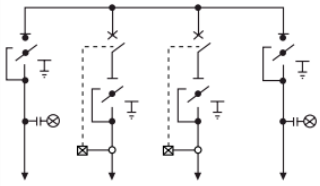
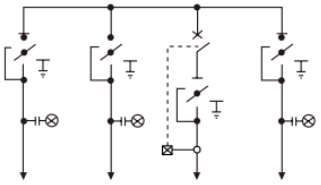
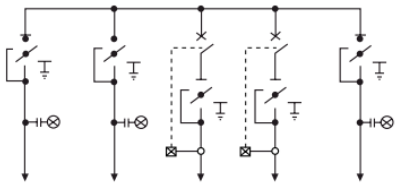
LLL (3L)	LLLL (4L)	LLLLL (5L)
		
1030×1400×752	1390×1400×752	1720×1400×752

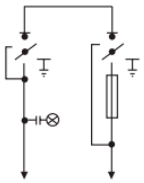
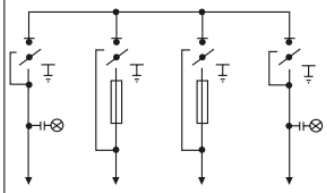
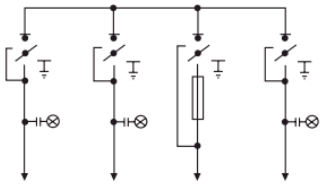
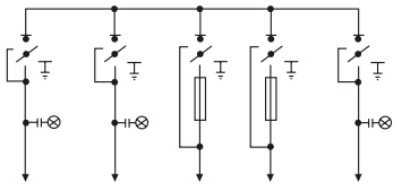
3. Transformer protection by circuit breakers

3. Transformer protection by circuit breakers

LC (1L1C)	LCCL (2L2C)	LLCL (3L1C)	LLCCL (3L2C)
			
755×1400×752	1450×1400×752	1390×1400×752	1780×1400×752

4. Transformer protection by fuses

4. Transformer protection by fuses

LF (1L1F)	LFFL (2L2F)	LLFL (3L1F)	LLFFL (3L2F)
			
755×1400×752	1500×1400×752	1360×1400×752	1830×1400×752

Fuse type of RMU (LFL)

LFL-model of Susol RMU offers the solution of transformer protection by fuses

- L : LBS (Load Break Switch) Three position Load Break Switch below 630A with disconnecting and earthing switch
- F : Switch Fuse (Load Break Switch-Fuse combination) 200A switch-fuse combination for transformer protection
- Cable bushing horizontal in front

RMU Main Parts :

1- Cable Test Compartment

2 - Gas Tank

3 - Interlocking Latch for Cable Test Compartment

4 - Padlocking Facilities for Load Break Switch

5 - Load Break Switch Operating Mechanism

6 - Padlocking Facilities for Earthing Switch

7 - Vacuum Circuit Breaker

8 - Ring Switch Cable Compartment

9 - MV Cable Fixing Support

10 - Tee-Off Switch Cable Compartment

11 - Voltage Presence Indicator

12 - Switch-disconnector Operation (Motor Optional*)

13 - Operation Counter

14 - Circuit Breaker Operation (Motor Optional*)

15 - Operating Latch for Vacuum Circuit Breaker

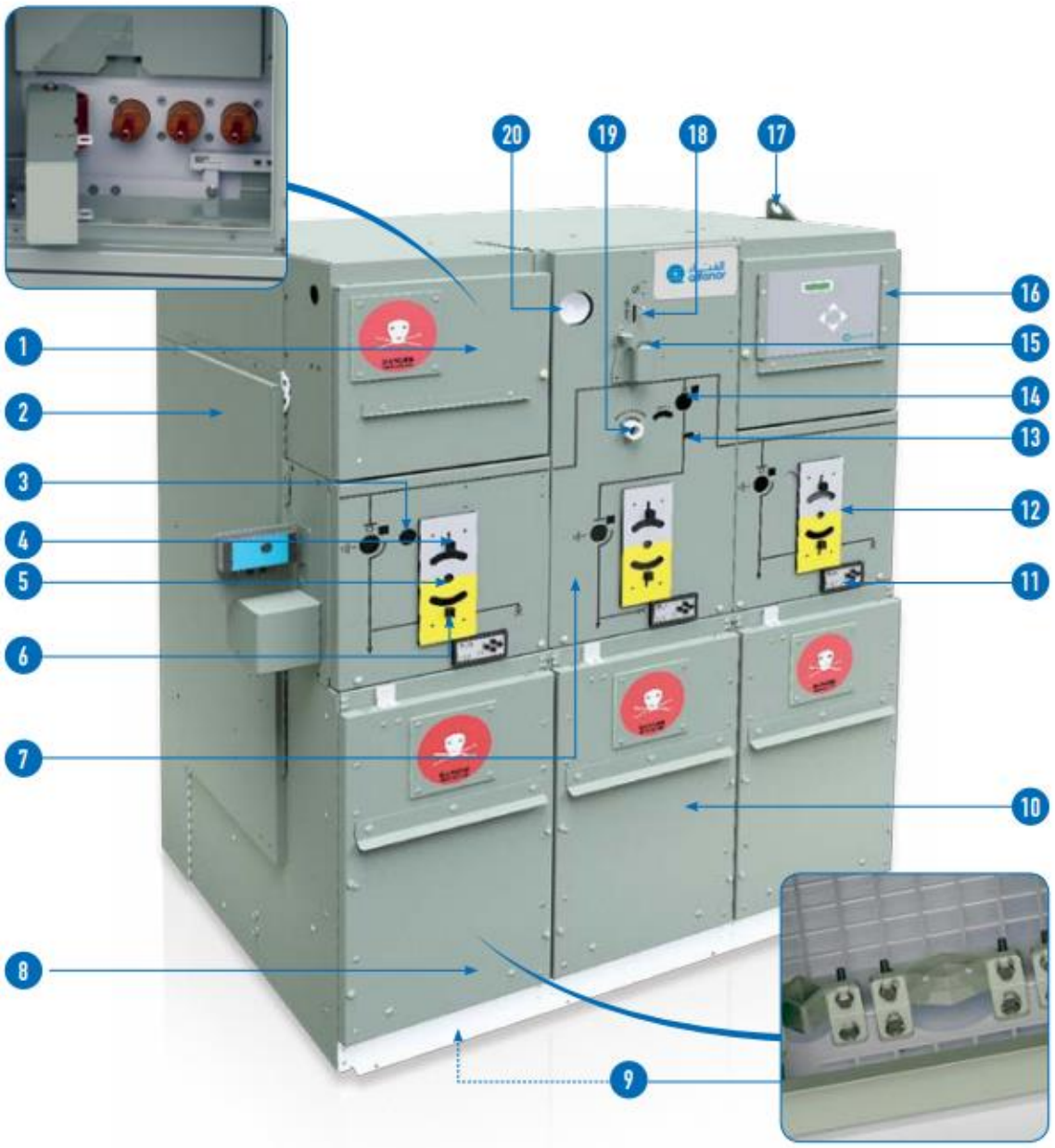
16 - Protection Relay

17 - Lifting Lugs

18 - Padlocking Facilities for Vacuum Circuit Breaker

19 - Vacuum Circuit Breaker Operating Mechanism

20 - Gas Pressure Indicator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Power Fuse of RMU :

1. The LS HRC Power Fuses belong to the PRIME MEC series. It interrupts high currents before the 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 inflicting impulse to trip link of related load break switches.

Selection of fuses: According to IEC 60787(24kV)

Transformer rating capacity (kVA)	Power Fuse rated current (A)
36 ~75	5
75 ~ 157	10
172 ~ 358	20
258 ~ 538	30
464 ~ 965	40
598 ~ 1246	50
745 ~ 1554	63
1000 ~ 1983	75

Voltage indicator lamps (Voltage Detector)

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 LED voltage indicator is provided and lamp power is supplied by bushing type capacitive dividers.

SCADA System

SCADA systems are used for the trip settings of fault current, over loading and time current curves of the protective devices. There is a connection available for C.T which is used for monitoring purpose. Also there is a communication cable available.

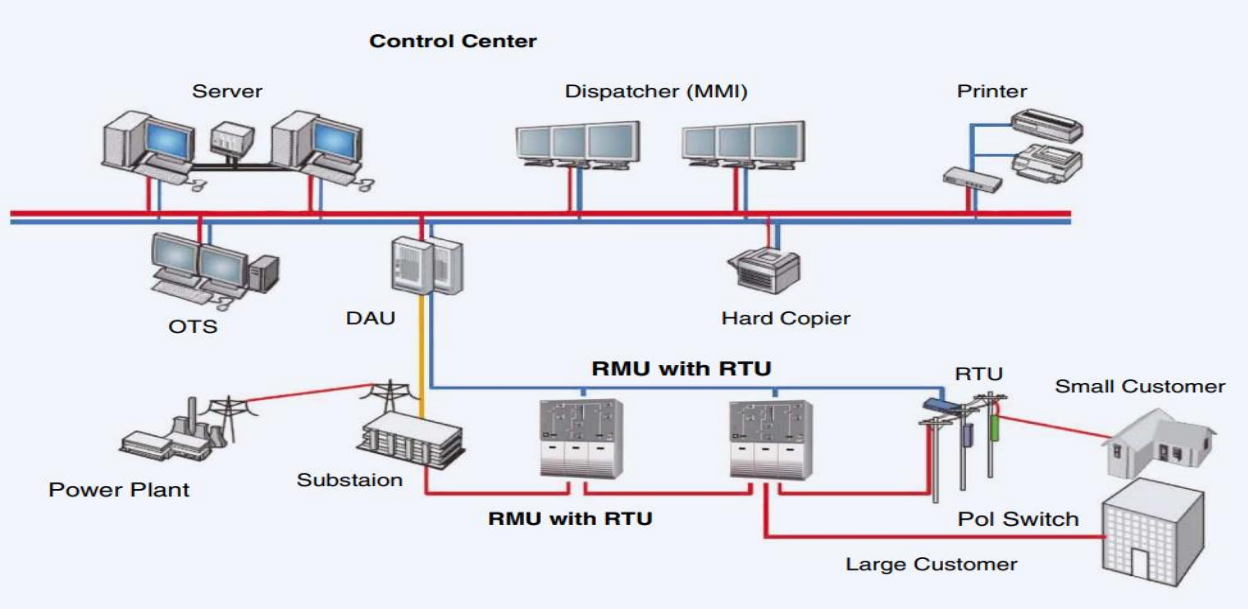
- Network remote control for DAS/SCADA

Equipped with RTU (remote termination unit), the RMU switchgear can implement intelligent application. Connecting all the IRMUs by a communication network, it enables to monitor and control the switchgear remotely, locate and isolate fault automatically as well as the system recovery. This will dramatically reduce the affected area and duration of blackout, and realize the high reliability and excellent power quality.

System configuration RMU equipped with RTU provides all the functions needed to operate the MV network in real time

RTU (Remote Terminal Unit)

The Remote Terminal Unit(RTU) collects data from field instruments & sensors and transmits the information to the Supervisory Control and Data Acquisition System (SCADA) installed in a central control room through communication systems and lines, and receives control commands from the telemeter telecontrol system to conduct online controls in real time.



In an electrical power distribution system, a ring main unit (RMU) is a factory assembled, metal enclosed set of switchgear used at the load connection points of a ring-type distribution network. It includes in one unit two switches that can connect the load to either or both main conductors, and a fusible switch or circuit breaker and switch that feed a distribution transformer.

The metal enclosed unit connects to the transformer either through a bus throat of standardized dimensions, or else through cables and is usually installed outdoors. Ring main cables enter and leave the cabinet. This type of switchgear is used for medium-voltage power distribution, from 7200 volts to about 36000 volts.

- Quality Checks and Tests for RMU

Every RMU undergoes routine quality tests and intensive related IEC Standards checks to ensure the highest quality product.

These tests are

1- Sealing check

2- Gas filling pressure check

3- Opening/Closing speed check

4- Tightness test

5- Rotational torque measurement

6- Partial discharge test

7- Dielectric test

8- Conformity with drawings and diagrams check

9- Resistance measurement

RMU Operation in case of a Fault

For example: if a fault occurs at feeder 1 side then first of all the relay will issue a trip signal at load side circuit breaker to open first and then both isolators disconnect. Now for energizing the load again isolator 2 first connects and then breaker is closed.

- Features of RMU

Some features of RMU are as follows:

- Small in size and compact insulation filled sealed switch gear.
- Used for 11KV/33KV systems. Normally rated for 630 A and 21KA interrupting rating.
- Comprises of three types of insulation: oil, air and SF6 gas. SF6 gas insulation is widely used.
- Normally has 2 incoming and one outgoing and vice versa.
- Have separate protective and measuring devices.
- Can be used in indoor and outdoor
- Reduce hazards related to fire