



CAT . No : 1642

OUTDOOR RING MAIN UNIT

Type I-RMU

Rated : 12 kv, 20kA @3sec ,Complete With Condition Monitoring of Partial Discharge Detection , Temperature and Ozone Data



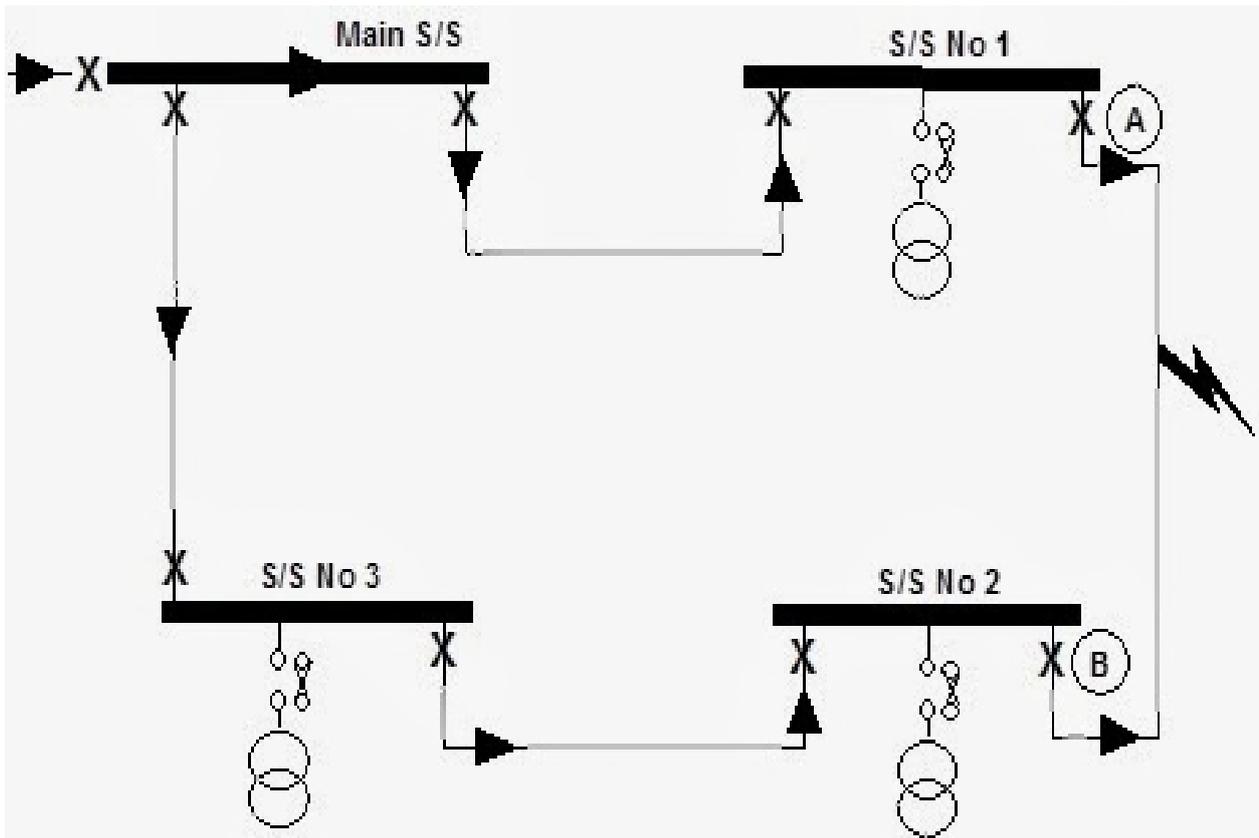


Fig 1 A Typical Ring Main Distribution System



Applications :

Basically a Ring Main unit is used for isolating and sectioning of a ring circuit for a cable underground system . Different configurations are available for different applications . The common one is a 2- In and 1 out configuration comprising of 2 load break switches on each side for the two incoming cables and the centre panel a fused switch panel outgoing to a transformer high voltage terminal (as in S/S No. 2 in above diagram)

Where the transformer MVA rating exceeds 1.6MVA then a vacuum circuit breaker is used as the center panel. With a Circuit Breaker ,a protection relay energized from a core balance Ct can be installed . Standard Fuse ratings are 12 KV rated from 6 to 80A . Where applications require more outgoing circuits to be connected then this is can be satisfied by either Load break switch panels or fused switch panels or even more VCB panels instead .



Concept of an Intelligent Ring Main Unit (RMU)

The I- RMU12 is designed for Utility companies that want to have the facility of progressing to a SMART Grid.It is able to perform Partial Discharge detection , S_f6 gas condition monitoring and Temperature recording 24/7 thus providing invaluable information to the Control Engineers for predictive maintenance purposes and also the reconfiguring of the network so that the faulty part of the network is isolated in time .

This means that fault can be detected before it is about to happen . Hence saving down time and loss of revenue to the power utility company **differentiating it** from a conventional RMU currently in the market. Currently majority of RMU's in most power utility companies do not provide remote monitoring and control functions. For outage power, service engineers are required to travel a long distance to the various stations to restore of the affected outage power

As all the controls can now be carried out remotely and quickly , there is now less need for deployment of engineers to difficult access substations which normally will take a long time for the restoration of power supply to be carried out. Tremendous savings to the power Company



SF6 monitoring device Non- Invasive Partial Discharge Detection Coupling capacitor

Design Features

Compact Gas Insulated Switchgear

- RMU can be fitted for remote opening and closing of load break switches.
- 3 Position Disconnecting Switches for Isolated , Body earth , Cable earthing functions
- The VCB and load break switches all sealed completely with SF6 with annual leakage of less than 0.05% per annum.
- Busbar rated 630A , Spring operating Mechanism, Sf6 , WIKA Gauges, Padlock on Face plate for all switches,
- Mechanical Interlock between Lower Front Door and Earth Switch Handle.
- Fitted with Earth Passage indicator and Heaters
- Arc Fault Proof with Pressure Relief Valve built in.
- Zero Gas work on Site.

The I-RMU12 can be operated in harsh environments-

- Ambient temperature: -30°C~+55°C (extreme low up to -40°C)
- Relative humidity: monthly average ≤ 90%, daily average ≤95%
- Altitude: ≤3000 m
- Seismic intensity: 8 degrees
- Compliant Standards

IEC 60071-1-2006: Insulation co-ordination - Part 1: Definitions, principles and rules

IEC 62271-1: High-voltage switchgear and control gear - Part 1: Common specifications

IEC 62271-100: High-voltage switchgear and control gear - Part 100: Alternating-current circuit-breakers

IEC 62271-102: High-voltage switchgear and control gear - Part 102: Alternating current disconnectors and earthing switches

IEC 62271-103: High-voltage switchgear and control gear - Part 103: Switches for rated voltages above 1kV up to and including 52 kV

IEC 62271-200: 2011: High-voltage switchgear and control gear - Part 200: AC metal-enclosed switchgear and control gear for rated voltages above 1 kV and up to and including 52 kV



Fig 2. Side View

Applications

The I-RMU12 is designed for Ring Cable Circuits with 2 Source Intake:-



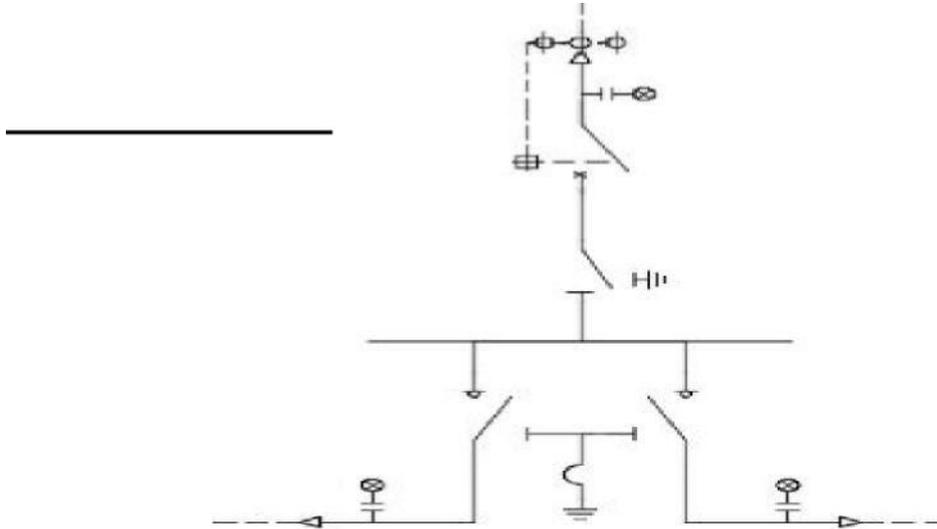


FIG 3. FRONT FACIA

Modules

IRMU-1 has two modules.

1 Non-extensible module: This module accommodate with two load break switches and one vacuum circuit breaker.

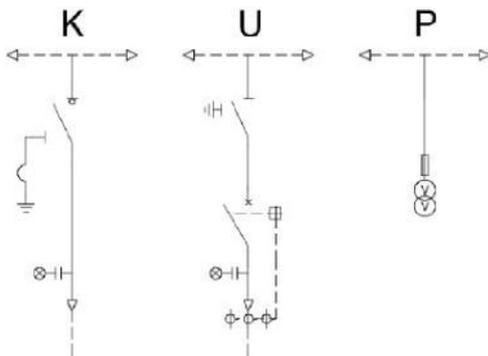


2 Extensible module: This module provides flexible combination for different requirements. Changgao provides six standard combinations, each can be equipped with external bushings on both sides.

- 1x load break switch
- 2x load break switches
- 1x load break switch with 1x vacuum circuit breaker
- 2x load break switches with 1x vacuum circuit breaker
- 1x vacuum circuit breaker
- 1x PT panel

Basic functional module:

- **K: Load break switch module**
- **U: Vacuum circuit breaker module**
- **P: PT module**



Technical Parameters OF I-RMU12

Item	Technical Parameters		
		Load break switch(K)	Vacuum circuit Breaker(U)
Rated voltage	12kV		
Rated frequency	50Hz		
Rated current	630A	630A	
Rated transfer current			
Cable charging breaking current	40A	25A	
No-load transformer breaking	16A	16A	
Breaking test at the rated short-circuit current			≥30 times
Rated short-time withstand	Main circuit	20kA/4s	20kA/4s
	Earthing switch	20kA/4s	20kA/4s
Rated short-circuit making	Main circuit	50kA	50kA
	Earthing switch	50kA	50kA
1min power frequency withstand voltage	Phase to phase, phase to ground	42kV	
	Across isolating distance	48kV	
Lightning impulse withstand	Phase to phase, phase to ground	75kV	
	Across isolating distance	85kV	
Mechanical durability	Main switch	≥5000	≥10000 times
	Earthing switch	≥3000 times	
Main circuit resistance	≤120i	≤200i Q	
SF6 gas pressure rating(20°C)	0.036MPa		
SF6 gas annual leakage rate	≤0.05%		
Rated voltage of control circuit power supply	AC110V/ AC220V/DC24V/DC48V/DC110V/DC220V		
1min power frequency withstand voltage of control circuit	2kV		
Protection index(IP)	SF6 gas tank	IP67	
	Enclosure	IP55	

Standard configuration items

- SF6-insulated
- Busbar, 630A

Load Break Switch Module: K



- Three position load break switch
- Three position single spring mechanism with two separate shafts for load break switch and earthing switch
- Switch position indicator
- 630A cable bushings
- Capacitive voltage indicator
- SF6 gas manometer (only one in IRMU-1)
- Earthing bar
- Interlocking between earthing switch and cable cover
- Cable test bushing

Optional items

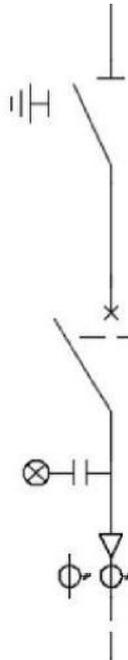
- Motor operation for load break switch 24V/48V DC, 110V/220V DC/AC
 - Control unit
 - Auxiliary contact for load break switch/earthing switch
 - Short circuit and earth fault indicators
- Current transformer (CT) and meter
 - Cable compartment allowing surge arrester or double cable connection
 - Key interlock for switch (L1 type)
 - Earthing interlock (L3 type)
 - Pad lock for operating hole
 - Manometer with signal(2 NO)

Vacuum Circuit Breaker Module: U

Standard configuration items

- SF6-insulated
- Busbar, 630A
- Vacuum circuit-breaker
- Two position double spring mechanism for vacuum circuit breaker

circuit



- Three position disconnect/earthing switch upstream vacuum breaker
- Three position single spring operating mechanism for disconnect/earthing switch
- Interlocking between vacuum circuit breaker and disconnect/earthing switch
- Switch position indicator for vacuum circuit breaker and disconnect/earthing switch
- 630A cable bushings
- Capacitive voltage indicator
- SF6 gas manometer (only one in IRMU-1)
- Earthing bar
- Interlocking between earthing switch and cable cover
- Re-close operation

Optional items

- Motor operation for vacuum circuit breaker 24V/48V DC, 110V/220V DC/AC
- Control unit
- Auxiliary contact for circuit breaker/disconnector/earthing switch
- Short circuit and earthing fault indicator
- Tripping and closing coil 24V/48V DC, 110V/220V DC/AC
- Current transformer (CT) and meter
- Cable compartment allowing surge arrester or double cable connection
- Pad lock for operating hole
- Earthing interlock (L3 type)
- Manometer with signal(2NO)
- Self-powered protection relay



PT MODULE : P

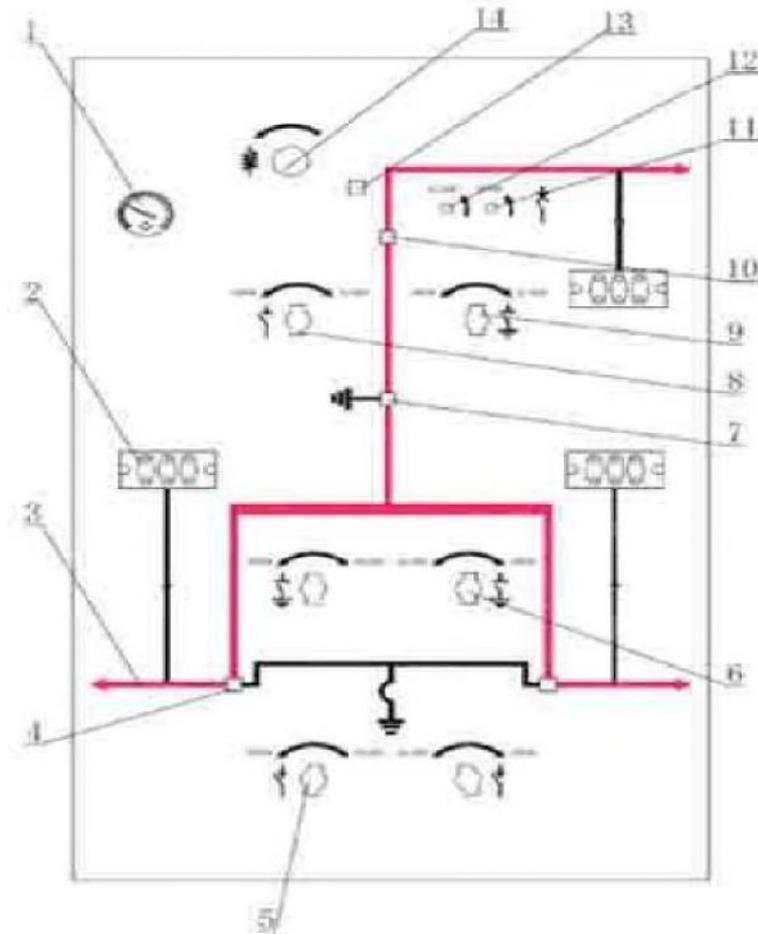
Standard configuration items

- Air-insulated
- Busbar,630A
- Side connection
- One JSZV12-10R potential transformer
 - 3 fuses for PT protection
 - One voltmeter and switch

Optional items

- Capacitive voltage indicator
- Fixable surge arrester
- Charger and storage battery
- Bottom cable entry
- Cable cover with electromagnetic lock

Front Facia Description



Legend

1. Pressure indicator
2. Voltage indicator
3. Mimic diagram
4. Three-position Switch position indicator
5. Load break switch operating hole
6. Earthing switch operating hole
7. Three-position disconnector position indicator
8. Disconnector operating hole
9. Earthing switch operating hole
10. Vacuum circuit breaker position indicator
11. Vacuum circuit breaker open handle
12. Vacuum circuit breaker open handle
13. Vacuum circuit breaker spring charged indicator
14. Vacuum circuit breaker spring charging hole

Load Break Switch

The load break switch is installed inside the SF6 tank.

It is a 3-position switch. With the arc extinguishing grid plates, the K module can easily break rated currents.

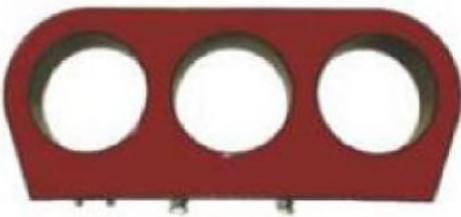
The load break switch can be used with single spring mechanism or double springs operating mechanism. which can realize the instantly tripping function instantly.

Vacuum Circuit Breaker

The vacuum circuit breaker is driven by spring mechanism, and consists of 2-position circuit breaker with 3-position disconnect/earthing switch.

By using the vacuum interrupter, the circuit breaker can break up to 20kA current.

Current Transformer



The LSY-10 series bushing CT provides 3 phases CT and natural CT as a combination. All wiring work will be done when manufacturing which will help to reduce the work load and avoid mistakes during onsite installation.

Other types of open-ring or ring-core type CTs are also available.

Cable Bushings



The connection of the HV-cables is made by cable bushings. The bushings are made of cast resin with molded-in conductors. In addition, a screen is molded-in to control the electrical field and is also used as the main capacitor supplying the voltage indicating systems.

The bushings are designed according to Cenelec EN 50181, EDF HN 52-S-61 and IEC 60137. Bushing type: Interface C (400 series with M16 bolted contact)

Cable Testing/ Terminations



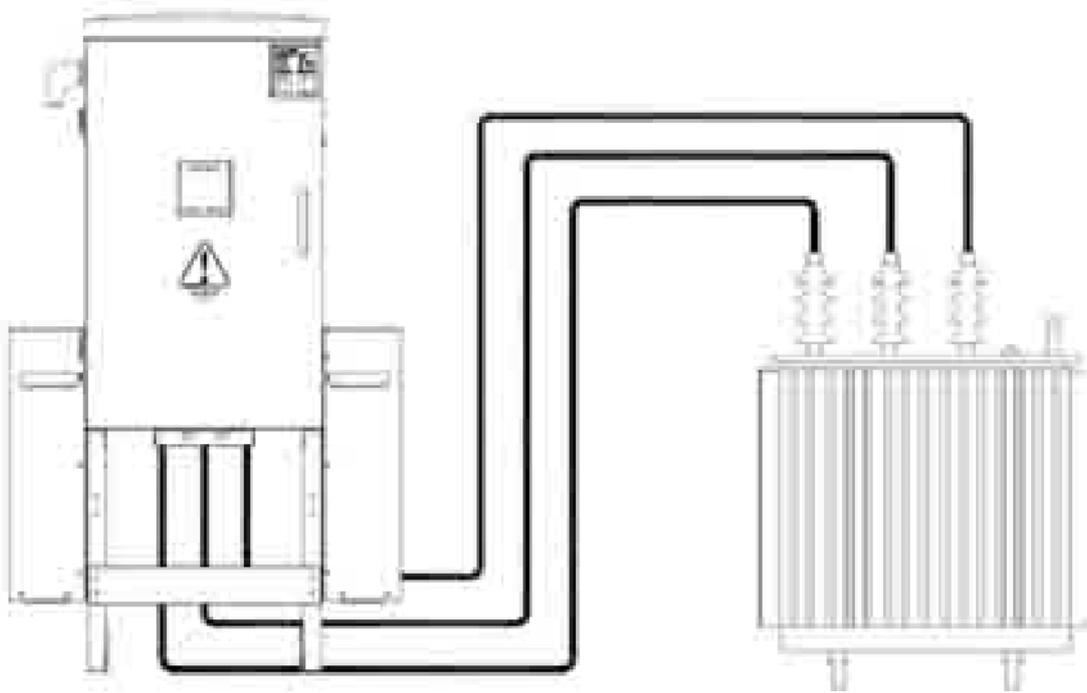
Cable Test Bushing



The cable test bushings are designed for the both K modules and run through the bottom of the tank externally under the tank, cable insulation test can easily be done according to the following procedure:

1. Close the earthing switch after having checked the voltage indicators
2. Open compartment cover
3. Install the injection device onto the access terminals
4. Open the removable earthing bridge
5. Perform cable testing
6. Re-install the earthing bridge
- 0.
7. Remove the injection device
8. Close compartment cover

Transformer Protection



IRMU-1 offers vacuum circuit breaker in combination with relay for transformer protection. The circuit-breaker with relay offers protection against low over-currents. Circuit-breaker with relay is always recommended for higher rated transformers.

For IRMU-1 the relay is a self powered relay that utilizes the energy from the CTs under a fault situation, for energizing the trip coil. The self powered relay can also be used for cable protection and more details on the different relays can be found in next page.

Typical features of a vacuum circuit breaker protection: -

- Good protection against short-circuits
- Very good for protection of over currents
- Small fault currents are detected in an early stage

Relays

ST260E Self powered relay



ST260E is a CT powered numerical feeder protection relay, designed for the protection of utility and industrial power systems, where auxiliary power is not available or cannot be guaranteed.

Input from 3 phases current input for Conventional 1 A or 5A CT.

Protection function:

Non-directional over current protection, 3 stages
Non-directional earth-fault protection, 2 stages



ST280G is a comprehensive feeder relay for protection and measuring.

Protection function:

Non-directional over current protection, 3 stages

Non- directional earth-fault protection Three-phase undervoltage , Re-close Function

Measurement

Three-phase current

Three-phase voltage

Power monitoring with P, Q, S, power factor, frequency

Communication

port RS-485

Control Unit



A control unit is provided for motor operation.

-Colored pushbutton for operation

-Position indicator

-Local/remote selector

VPIS

The voltage condition for each cable/bushing is shown by LED voltage indicator.

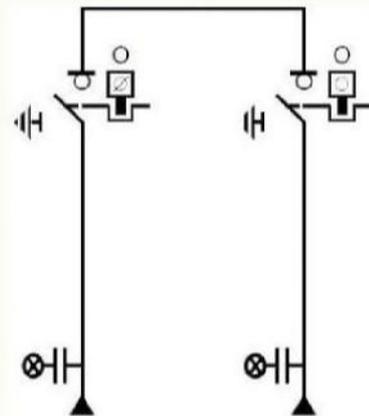
Identification of the phases is achieved by labels on the front of the voltage indicator.



The coupling systems of VPIS have connection points for phase balance checking.

Fault Indicator

Customer has a Choice of Earth Passage Indicator

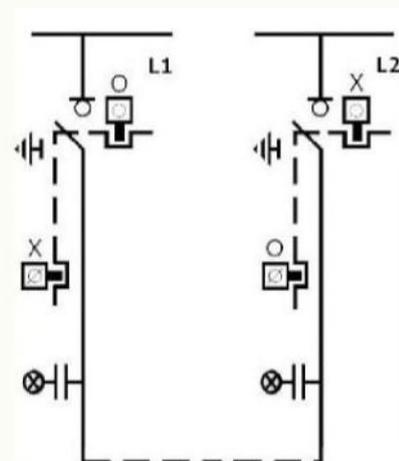


Mechanical Interlock

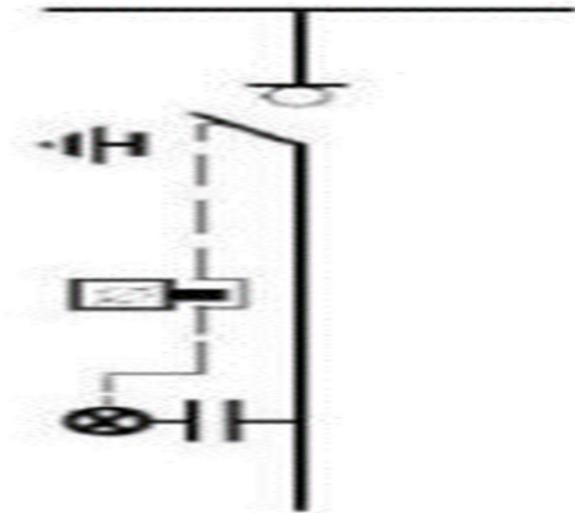
Changgao provides 3 optional interlocking system as optional for IRMU-1.

1. L1 type key interlock

Two incomers interlock: The load break switch cannot be closed when the interlocking key is removed. Thus the two incomers can be locked by one key to make sure only one switch can be closed at



L1's earthing switch cannot operate when the L2's load break switch is in the "closed" position; L1's earthing switch can only be closed when the L2's load breaker switch is in "open" position. The principle of interlock is similar to the L1-type of locking device.



L3 Earthing interlock: The orifice of the earthing switch can be locked when the bushing exists working voltage, and the cable door is locked as the earthing switch is in open position

SF6 Pressure Indicator



Standard



Optional

The pressure indicator is used to show the pressure inside the SF6 tank. The normal pressure inside is 0.036MPa. When the pointer is in the red zone, which means the SF6 pressure is low.

The optional indicator provides 2NO for the pressure alarm. One is closed when pressure is less than 0.022MPa. The other one is closed when the pressure is less than 0.017MPa.



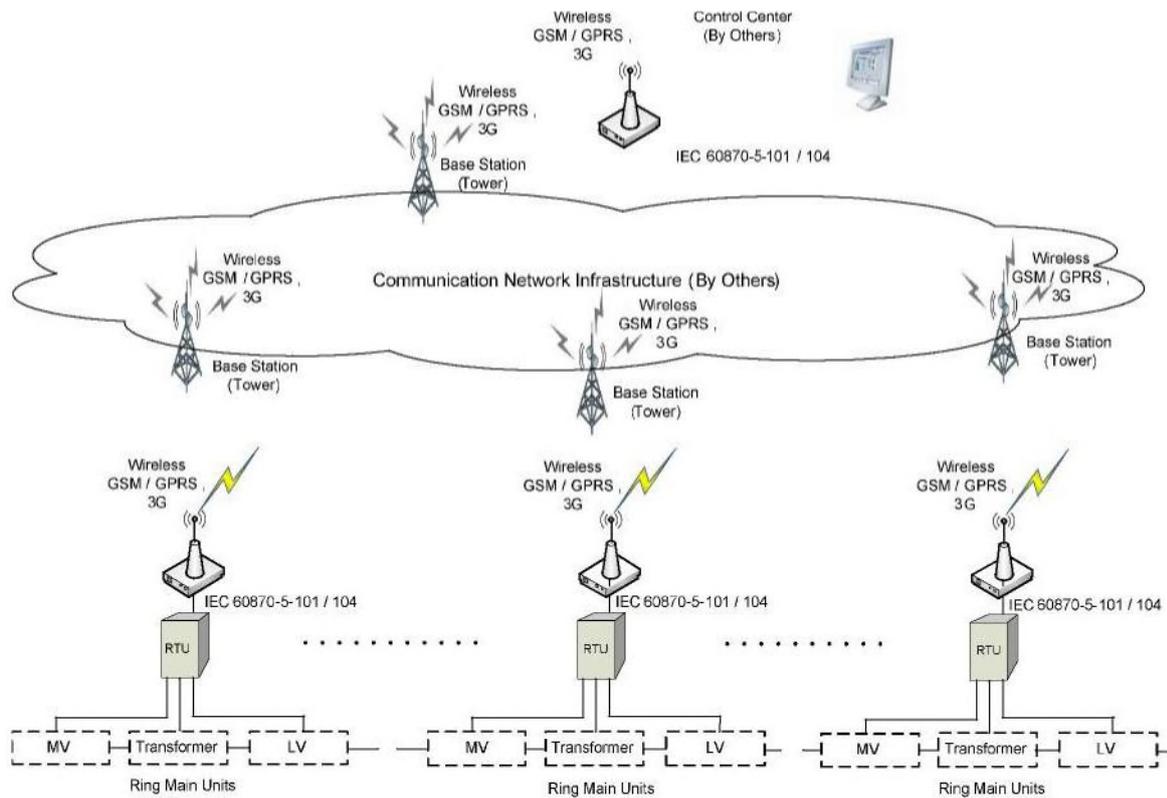
Cable Connector

HZR series Flame-retardant screened separable connector is a pre-molded connector for XLPE-insulated one or three-core cables with copper conductors for 12kV. The connector can be used for both indoor and outdoor applications. Type tested according to IEC 60502-4 and IEC 60332-1-2:2004.

SCADA CAPABILITY

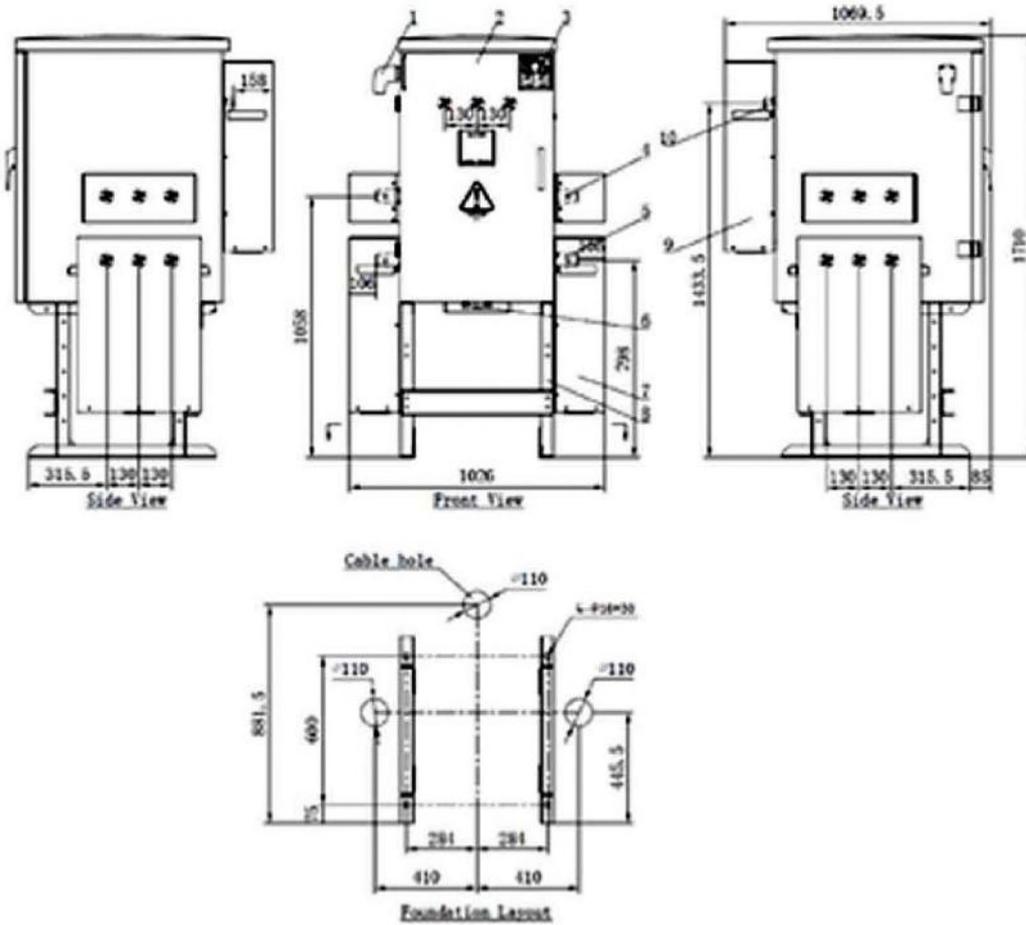
. The RMU is fitted with Wireless controllers and RTU combine that can relate the RMU information to the SCADA system by a wireless GPRS system .

via standard protocol IEC 60870-5-101 or 104 or even by mod bus protocol to collect all the energy meters data installed on the LV side of the Transformer Metering board .



Dimension and Installation

Size and fixing dimensions are shown in below.



- 1 . Side plug
- 2 . Front door
- 3 . Rating plate
- 4 . External connection bushings(optional)
- 5 . Bushings for K module
- 6 . Cable test bushing
- 7 . Cable cover for K module
- 8 . Structure
- 9 . Cable cover for U module
- 10. Bushings for U module

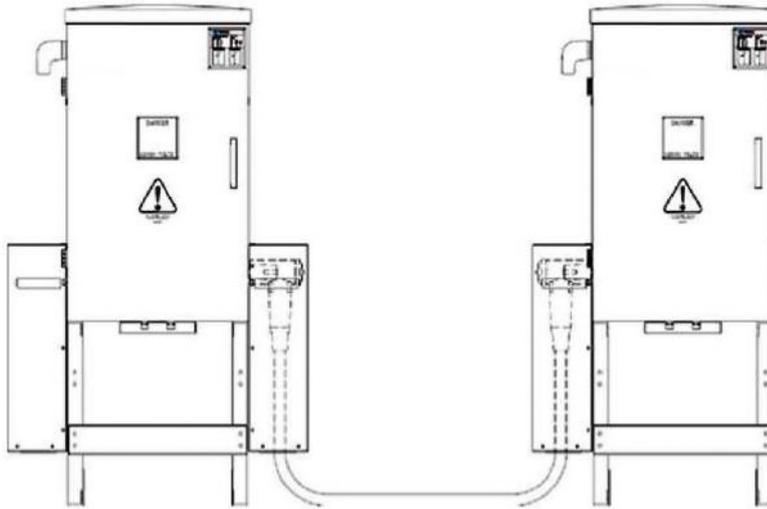
*. Cable cover for double cables please contact with Changgao

Extensible Connection

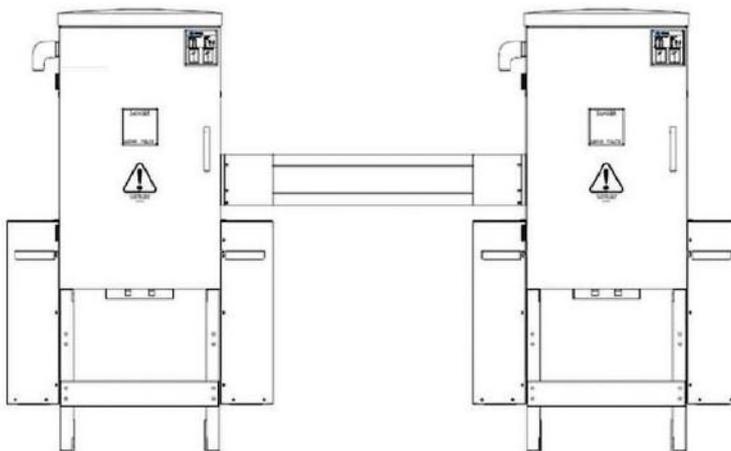
IRMU-1 could be connected by extensible connection kit. All live parts will be sealed after installation.

Changgao provides **two** ways of external connection.

1. Cable connector with cables for non-extensible module



2. BUS DUCT SYSTEM



Manufacturer

POWER T & D LTD
Sovereign Way , Chester West Employment Park
CH 1HJ
England . U.K.

LOCAL AGENT :-

NOTES