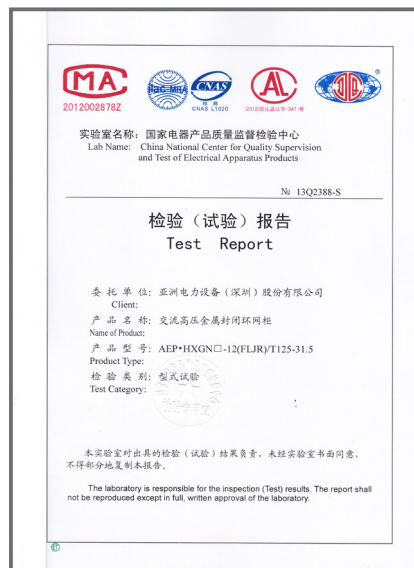


XGN15-12/24 SF6 RING MAIN UNIT



亚洲电力设备(深圳)股份有限公司
ASIA ELECTRICAL POWER EQUIPMENT (SHENZHEN) CO., LTD.

Certificates



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1. General Description

XGN15-12/24 series unit type SF6 ring main unit with SF6 load switch as main switch,for whole cabinet is suitable for electric distribution automatization and compact also expandable metal close switchgear. It characters in its simple structure, flexible operation, reliable interlocking and convenient installation etc., which can provide the satisfactory technical projects both for different application occasions and users. With the adoption of sensor technology and the protection relay up to date, plus the advanced technology and flexible assembly project,it can completely meet the requirement of continuously variable market.

1. Application

1.1 XGN15-12/24 type unit SF6 ring main unit is suitable for the electrical system with AC 50Hz and the voltage of 12kV, and widely used for the terminal of dustrial and civil cable ring net and the power supply.

1.2 Especially suitable for the following sites: urban residential district distribution, small-scale secondary transformer substation, switching substation, cabinet type transformer substation, mining and industrial enterprise, supermarket, airport, metro, electricity generation by wind power, hospital, railway and tunnel etc.

2. Service Conditions

2.1 Altitude $\leq 2500\text{m}$

2.2 Ambient temperature : $45^{\circ}\text{C} \sim -35^{\circ}\text{C}$, Maxmum temperature difference $\leq 25^{\circ}\text{C}$

2.3 Average value of daily relative humidity $\leq 95\%$

Average value of monthly relative humidity $\leq 90\%$

2.5 Anti-earthquake capacity: Earthquake intensity ≤ 8 class

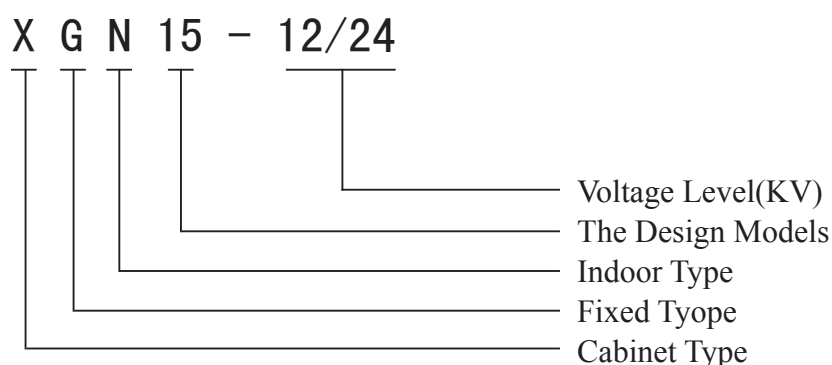
2.6 Be kept away from drastic shake and impulse, fire, chemical corrosion and explosion.

3. Standard

IEC 298. 265. 129. 694. 420. 56. 529. 932.

GB 3804. 3906. 11022.

4. Mean of molder



2. Technical Parameter for Ring Main Unit

Technical Parameter and Dimension

No.	Description		Unit	Technical Parameters	
1	Rated current		kV	12	24
2	Rated lightning impulse withstand voltage	Common value	kV	75	95
		Across insulate distance	kV	85	125
3	1min Power frequency withstand voltage	Common value	kV	42	60
		Across insulate distance	kV	48	65
4	Rated frequency		Hz	50/60	
5	Rated current	Main Bus bar	A	630 1250	
		Branch Bus bar	A	630	630
6	Rated short withstand current	Main loop	kA	25/4	20/4
		Earth loop	kA	20/3	20/3
7	Rated withstand current(peak)		kA	50	50
8	Transfer current		A	1750	1700
9	Protection degree			IP3X	
10	Load breaker switch life		Times	5000	
11	Earth switch life		Times	3000	
12	Load switch cabinet	Width	mm	375, 500, 650, 750	500, 650, 750
		Depth	mm	840, 920, 1000	920, 1000
		Height	mm	1635, 1885	1885
13	Circuit breaker cabinet	Width	mm	650, 750, 1000	750, 1000
		Depth	mm	840, 920, 1000	920, 1000
		Height	mm	1600, 1885, 2150	1885, 2150

3. Structure and Basic Components of RMU

3.1 XGN15-12/24 II Type Ring Main Unit Structure

There are 4 parts for the unit type SF6 ring main unit

- ① Bus bar chamber
- ② Switch chamber
- ③ Cable chamber
- ④ Operation mechanism, interlock mechanism, and low-voltage control chamber

The entire XGN15-12/24 type switch cabinet includes the upper unit and the lower unit, the upper unit is structured by bus-bar chamber, load switch, operating mechanism chamber and low-pressure chamber, which can be assembled to be a complete cabinet with the cable chamber of lower unit, also separated from the lower unit (see the picture). It is safe and convenient to maintenance and reconstruct the equipment inside the the upper unit and can be realized to replace the entire upper unit if necessary.

1. Bus bar chamber

The bus-bar chamber is on the upper part of cabinet. Inside the bus-bar chamber, the main bus-bars are connected together throughout the switch cabinet.

2. Switch chamber

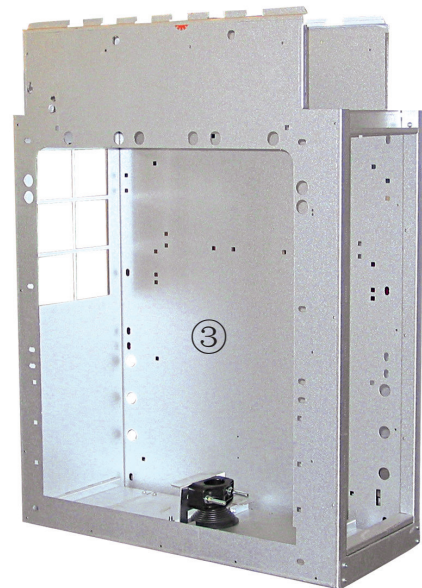
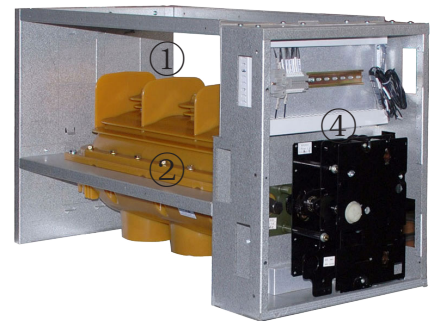
Inside the switch chamber is installed a FLN36-12D type SF6 load switch the crust of which is made by epoxide resin casting, and the SF6 gas is the insulating medium. There can be installed the SF6 gas densimeter or the gas densitor with the alarm touching point

3. Cable chamber

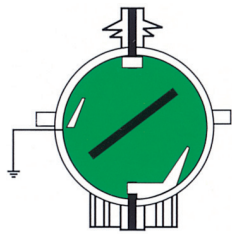
The load switch with plenty cable chamber which is mainly used for the cable connection, the single-core or three-core cable can be connected with the simplest non-shielding cable head, meanwhile the ample space can hold arrester, current mutual-inductor, lower earth switch etc. According to the standard design, there are observation window and safety interlocking device on the cabinet door. And the sealed cover and cable clip are attached with the bottom plate of cable chamber. The bottom plate of cable chamber and the front door frame are detachable, which is convenient for cable installation.

4. Operation mechanism, interlocking mechanism & low-voltage control chamber

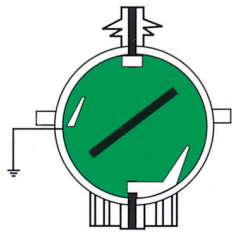
The mechanism chamber with interlocking meanwhile works as control panel. Inside mechanism chamber are installed the spring operating mechanism and mechanical interlocking device all with position indicator, also can be installed the auxiliary touching point, breaking coil, tripping mechanism in urgency, capacitive electrification indicator, key and motor device. The low-voltage chamber can hold control loop measuring meter and protection relay. The cabinet of 750mm width has two same low-voltage chambers for more accessories



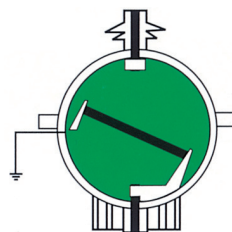
3. Structure and Basic Component of RMU



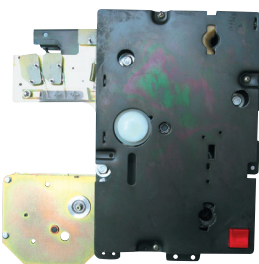
Switch on



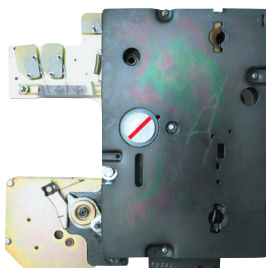
Switch off



Switch earth



K type mechanism



A type mechanism

3.2 XGN15-12/24 Ring main unit basic components

1. FL(R)N36-12/24D Load breaker switch

FL(R)N36-12/24D type switchgear is developed and produced by the company itself according to the requirement of domestic electrical system through absorbing the foreign technology, the main components of which are all the imported original binding.

The switchgear has double-fracture, three working position (can also be assembled into two working position according to customer's requirements), with SF6 as arc extinguishing medium. Reversible contactor lies in the die casting epikote crust that strengthens the structure. Every switch is permanently sealed after charged by SF6 gas with the relative pressure of 0.4bars, the gas leakage can be detected by helium detector. It is not limited for the vertical or horizontal installation, the typical installation inside the ring main unit is to place a separating steel plate between cable chamber for the horizontal installation, which isolates the bus-bar from cable connector to conform with the most strict safety requirement for running maintenance.

There are a weak point of structure behind the crust, in case inside happens the arcing when the load switch breaks and makes current, it would be pushed open, then the arc leakage valve on the top of cabinet is pushed open to lead the over-pressure gas flow out of cabinet.

2. Operation mechanism

2.1 Double-function and single-spring operation mechanism: K style

■ Function of switching on/off

Switch on / off independently by operating arm or motor.

■ Earth switch function

Switch on / off independently by operating lever, the operation energy is provided by compressed spring, connector would be on or off after the spring released.

2.2 Double-function and double-spring operation mechanism: A style

■ Function of switching on/off

Switch on / off independently by operating lever and motor, the operation energy is provided by compressed spring, connector would be on or off after the spring released.

Switch on / off independently by button (O) or tripping unit or tripping device.

■ Earth switch function

Switch on / off independently by operating lever, the operation energy is provided by compressed spring, connector would be on or off after the spring released.

3. Intelligent control

—Moto operation:

AC 220V 110V 48V

DC 220V 110V 48V

Auxiliary switch 5 often on and 5 often off

—Ripping coil (used for A type)

AC 220V 110V

DC 220V 110V

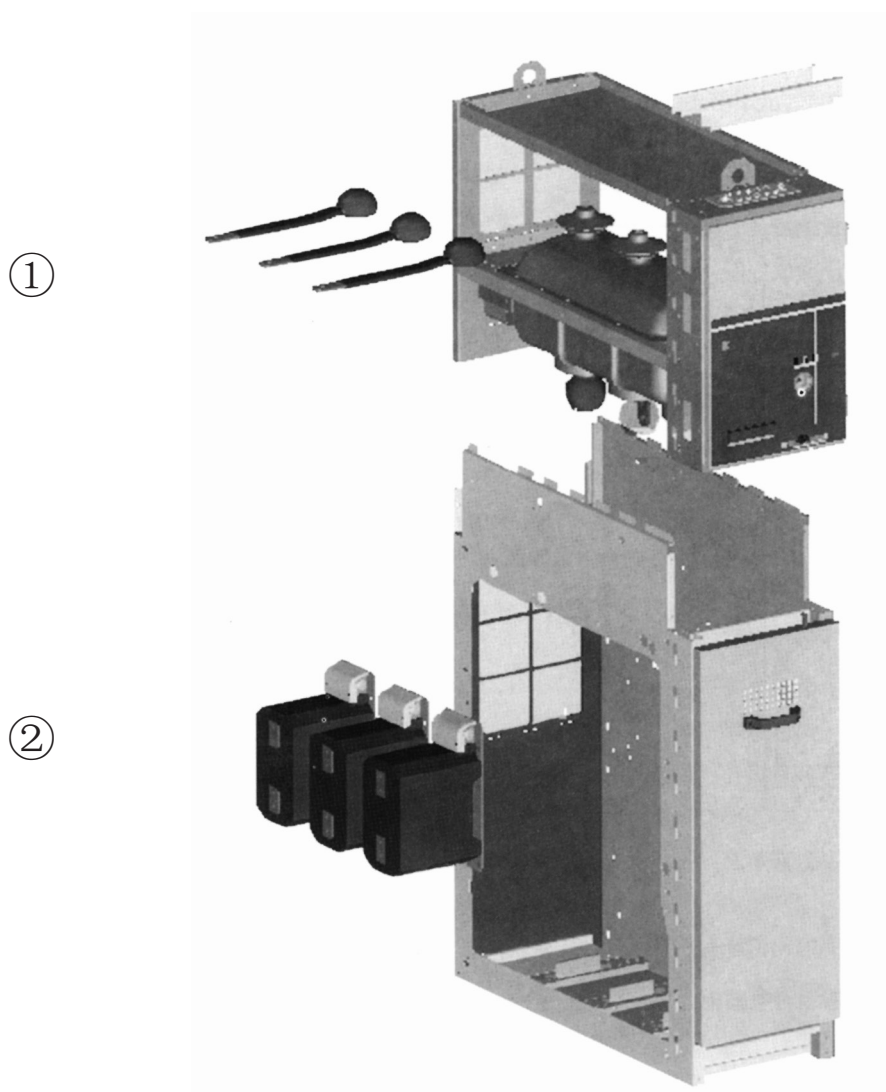
—Fuse auxiliary indication switch

—Communication interface of RTU and FTU

—Malfunction indicator

3. Structure and Basic Components of RMU

3.3 XGN15-12/24III type ring main unit structure



① Upper unit

- SFG LBS of three working position ABB series (Or Schindler Kit)
- operating mechanism with mechanical position indicator
- crust of busbar chamber
- integrated low-pressure chamber
- interlocking device
- bus bar
- control cable tank

② Lower Unit

- crust
- current mutual-inductor
- earth switch
- voltage mutual-inductor
- cable bottom plate matched with cable strutting piece

4. Structure and Basic Components of Ring Main Unit

4.1 Structure ring main unit with circuit breaker

The ring main unit matched with circuit breaker is mainly used as the main electric source inside ring net power supply system, the inlet cabinet of reserve electric source and the middle segment cabinet of two-source power supply system.

Whether II or III, they all can be matched with circuit breaker as the main switch, just the slight difference on the dimension.

■ The circuit breakers installed in the ringring main unit include:

1, vacuum circuit breaker with permanent magnetic mechanism(imported from and originally installed by Ukraine,some parts inside vacuum arc-extinguishing chamber is produced by ABB Germany)

BP1-12/1250-25

BP2-12/1250-31.5

BP2-12/1600-31.5

2. Circuit breaker with vacuum or load break switch(imported from and originally installed)

HD4-12/630-25

VD4-12/630-25

HD4-12/1250-25

VD4-12/1250-31.5

3.Vacuum circuit breaker with permanent magnetic mechanism (assembled by our company by the imported components)

VDM6-12/1250-25

VDM6-12/1250-31.5

VDM6-12/2500-31.5

■ Installation way

Fixed type of front installation, lorry style of front installation, fixed type of flank installation

■ Main structure

1. Meter chamber,bus-bar row chamber, load (isolating) switch chamber, circuit breaker chamber, cable chamber from the top to the bottom

2. Accoring to the needs of users, install CT, PT,arrester,earth switch,the protection device of overcurrent and short circuit fault relay

3. The interlocking can be realized for circuit breaker and load (isolating) switch.

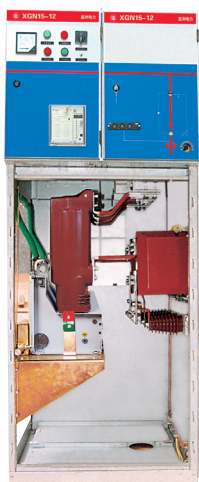
4. Circuit breaker can meet the requirement of "four remote control" when switch is installed with motor operation mechanism and FTU, RTU.

■ Dimension(mm)

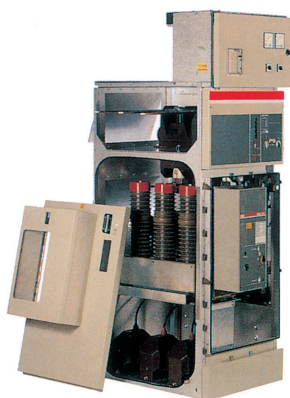
Heighth: 1635 1885 2200

Width: 650 750 800

Depth: 840 920 980 1200



Permanent magnetic CB unit (BP)



CB unit (HD4)

4. Structure and Basic Components of Ring Main Unit



VD4 Circuit breaker



BP2-12/1600-31.5



BP1-12/1250-25

4.2 VD4 type vacuum breaker (Original part of ABB)

VD4 vacuum circuit breaker is divided into fixed type, draw out type in two ways. VD4 medium voltage vacuum circuit breaker arcing chamber was pouring in the epoxy resin as a whole. Integrally pouring to be a column structure is more strong, it can provide the full protection for the vacuum arcing chamber, and can eliminate the influence of dust and moisture for the ability of the external insulation of the arc extinguish chamber. The main contact of arc chamber weitch will be permanent seal in the vacuum environment, and make up the arc extinguish unit.

■ Structure

Operation mechanism and a column fixed on a metal shell, the metal shell also is shell of fixed type installation of circuit breaker. This compact structure gurantee the strong and mechanical reliability of circuit breaker.

In addition to the isolation of contact and and the connection to the auxiliary circuit of air plug with hose, but draw out type circuit breaker assemble handcart chassis, which can realize the wave into the operation of circuit breaker under the condition of the switch cabinet door closed.

4.3 BP Series Vacuum Circuit Breaker with Permanent Magnetic Mechanism (by RZVA Ukraine)

BP series vacuum circuit breaker with permanent magnetic mechanism is a hi-tech product which is designed especially to match with 10KV ring main unit with the most up-to-date HV switch technology of the 21st century, whose permanent magnetic operation mechanism is a electronic control with in-line check components and permanent magnet electromagnetic operation mechanism ..

It has the below advantages:

△ Simple and three-phase discrete structure. Every phase includes vacuum arc-extinguishing chamber, upper and lower wiring terminal. The permanent magnetic operation mechanism is on the bottom of switch which itself has the "three remote control" interface.

△ Reliable capacity in conformity with all of the requirements of IEC and GB standards, no bounce for switching on, no rebound for switching off, 100000 times of reliable operation under the rated short circuit current.

△ Longevity, free of maintenance, 25 years of continuous operation under normal condition.

△ Small dimension: 520 length x 210 width x 570 height (mm)

4. Structure and Basic Components of Ring Main Unit

4.4 VDM6-12 Vacuum circuit breaker with permanent magnetic mechanism

Features Introduction

- ◇ Simple structure: separate three-pole structure, less spare parts for permanent magnetic mechanism, extremely high reliability, and more simple than the traditional spring mechanism with hundreds of spare parts.
- ◇ Excellent performance: switching on/off three phase non-synchronism is within 0.5ms, the consistency between the switching on/off time and average speed is extremely good, the over-zero phase select break can be realized. The operating electrical source of mechanism is compatible for alternating current and direct current, with the wide range of voltage.
- ◇ Small-sized: dimension 570 width x 420 depth x 560 height with only 60 kilogram, phase distance 210, suitable for different kinds of switch cabinet, cable branch cabinet and distribution switching substation.
- ◇ Skipping-proof: no need for additional skipping-proof relay because of the skipping-proof function of permanent magnetic mechanism itself.
- ◇ Complete functions: electric switching on/off and manual switching off, also switching on by the attached hand electricity-generating device. Longevity: 10000 times for electric life, more than 100000 times for mechanical life, 50 times of break for the rated short-circuit current.
- ◇ Free of maintenance: no need for mechanical locking, high reliability for the whole equipment running, more than 30 years of service under normal conditions, repair expense be saved



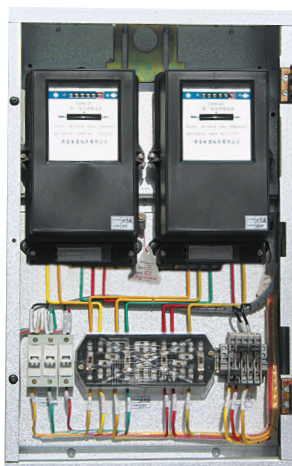
VDM6-12 Technical Parameter

No.	Item		Unit	Parameters	
1	Rated voltage		kV	12	
2	Rated current		A	1250 1600 2000	
3	Rated short circuit breaker current		kA	25	31.5
4	Rated short current making current		kA	63	80
5	Rated withstand current (peak)		kA	63	80
6	Rated short time withstand current		kA	25	31.5
7	Rated thermo stable time		s	3	
8	Automatic reclosing operation sequence		on- 0.3s - on off- 180s - on off		
9	Rated single capacitor bank making current		A	630	
10	Rated back-to-back capacitor bank making current		A	400	
11	Rated out-of-phase earth malfunction break current		kA	20×0.866	31.5×0.866
12	Insulating level	Lightning impulse withstand voltage (peak value)	kV	75	
		1min power frequency withstand voltage	kV	42	
13	Mechanical life		times	100000	
14	Electrical life	Rated current break times	times	10000	
		Rated short circuit current break times	times	100	

4. Structure and Basic Components of Ring Main Unit

4.5 SFLDJ series fuse

The product is suitable for indoor AC 50Hz and the rated voltage of 12kV.
Fuse chosen and ordered for transformer protection, see the below format



Low Voltage Cabinet

Transformer capacitance[kVA]	Transformer capacitance voltage 10kV	
	Fuse mode*	Fuse current [A]
100	12kVSDL □ J	16
125	12kVSDL □ J	16
160	12kVSDL □ J	16
200	12kVSDL □ J	20
250	12kVSDL □ J	25
300/315	12kVSDL □ J	31.5
400	12kVSDL □ J	40
500	12kVSDL □ J (SEL□T)	50
630	12kVSDL □ J (SEL□T)	63
750/800	12kVSFL □ J	80
1000	12kVSFL □ J	80
1250	12kVSFL □ J	100
1600	12kVSFL □ J	

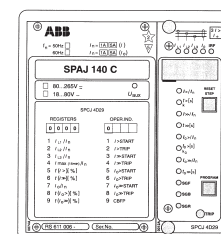
*Take into the consideration that fuse matches with switch, A must not be chosen for □

4.6 Combined Over-current and earth fault relay SPAJ 140C

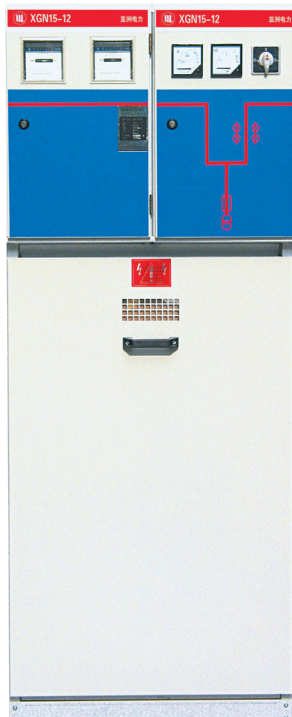
static protecting relay.....SPA
over-current measuring relay.....J
mechanical structure code.....1
type identification code.....40
type code with serial communication device.....C

Features

- three-phase definite low value over-current components with definite time-lag or inverse time lag
- three-phase high definite value over-current components with instant and definite time-lag function
- low definite value non-direction earth fault protection with definite time-lag or inverse time-lag
- high definite value non-direction earth fault protection with instant or definite time-lag function
- internal circuit breaker malfunction protection loop
- output relay device can be chosen fully
- wide range of data communication device through serial channel
- highly flexible on design, simply choose the corresponding working way according to different application conditions
- the value measured by current and the stored fault value are all displayed in digital.
- continuous self-checking unit that can automatically check the internal fault.



SPAJ 140C type
Over-current and type
earth fault relay

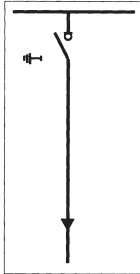


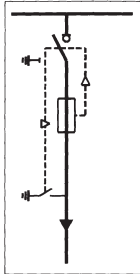
Measuring Cabine

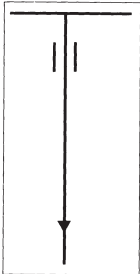
5. Ring Main Unit Types and Primary Scheme

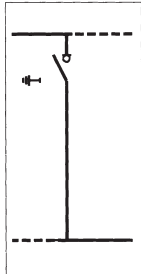
5.1 Basic type ark Primary Program

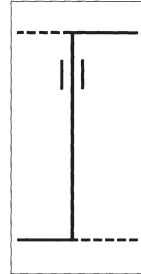
Basic type ark

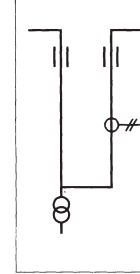
SDC


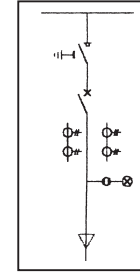
SDF




























































DBC


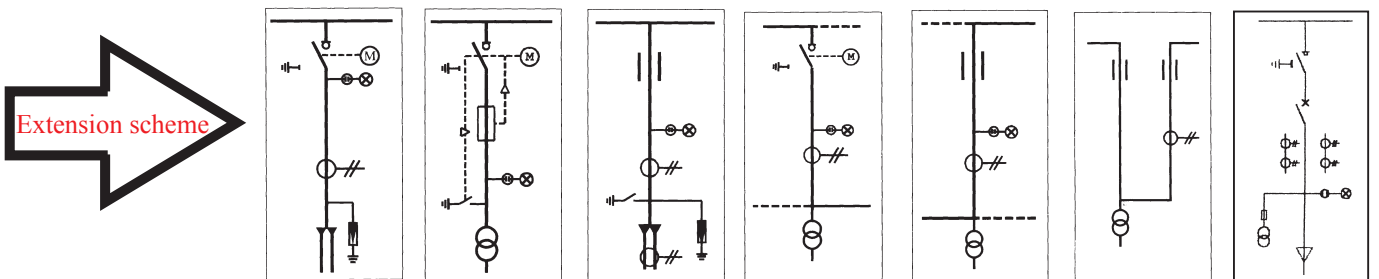
SEC







BRC


SMC


CBC-D


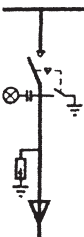

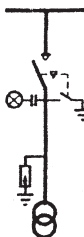
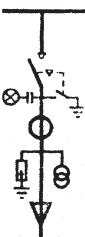

Height	Width							
1635	375	 		 				
1635	500	   	 	   	  	  		
1635	750						   	
1885	375	 		 				
1885	500	   	 	   	  	  		
1885	750						   	
2150	750							   
mm	mm							



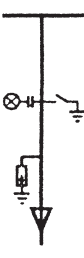
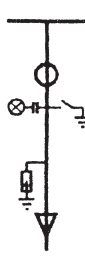
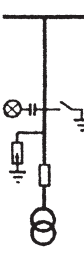


-  Voltage lamp
-  Current transformer
-  Arrester
-  Voltage transformer
-  Voltage transformer (to replace cable connection)

5. Ring Main Unit Types and Primary Scheme

5.2 Primary Program

No.		01	02	03	04	05
Main loop	Program drawing					
Dimension	Width (mm)	375or500	500	500	750	500
	Height (mm)	1885/1635	1885/1635	1885/1635	1885/1635	1885/1635
Main components	Connecting way					
	Load switch	1	1	1	1	1
	Fuse			3	3	3
	Current mutual-inductor		2or3		2or3	
	Voltage mutual-inductor			2or3	2or3	
	Arrester	3	3	3	3	
	Potential indicator	1	1	1	1	1

No.		06	07	08	09	10
Main loop	Program drawing					
Dimension	Width (mm)	500	375	375	375	500
	Height(mm)	1885/1635	1885/1635	1885/1635	1885/1635	1885/1635
Main components	Connecting way					
	Load switch	1				
	Fuse	3				3
	Current mutual-inductor				2or3	
	Voltage mutual-inductor	2or3				2or3
	Arrester			3	3	3
	Potential indicator	1		1	1	1

5. Ring Main Unit Types and Primary Scheme

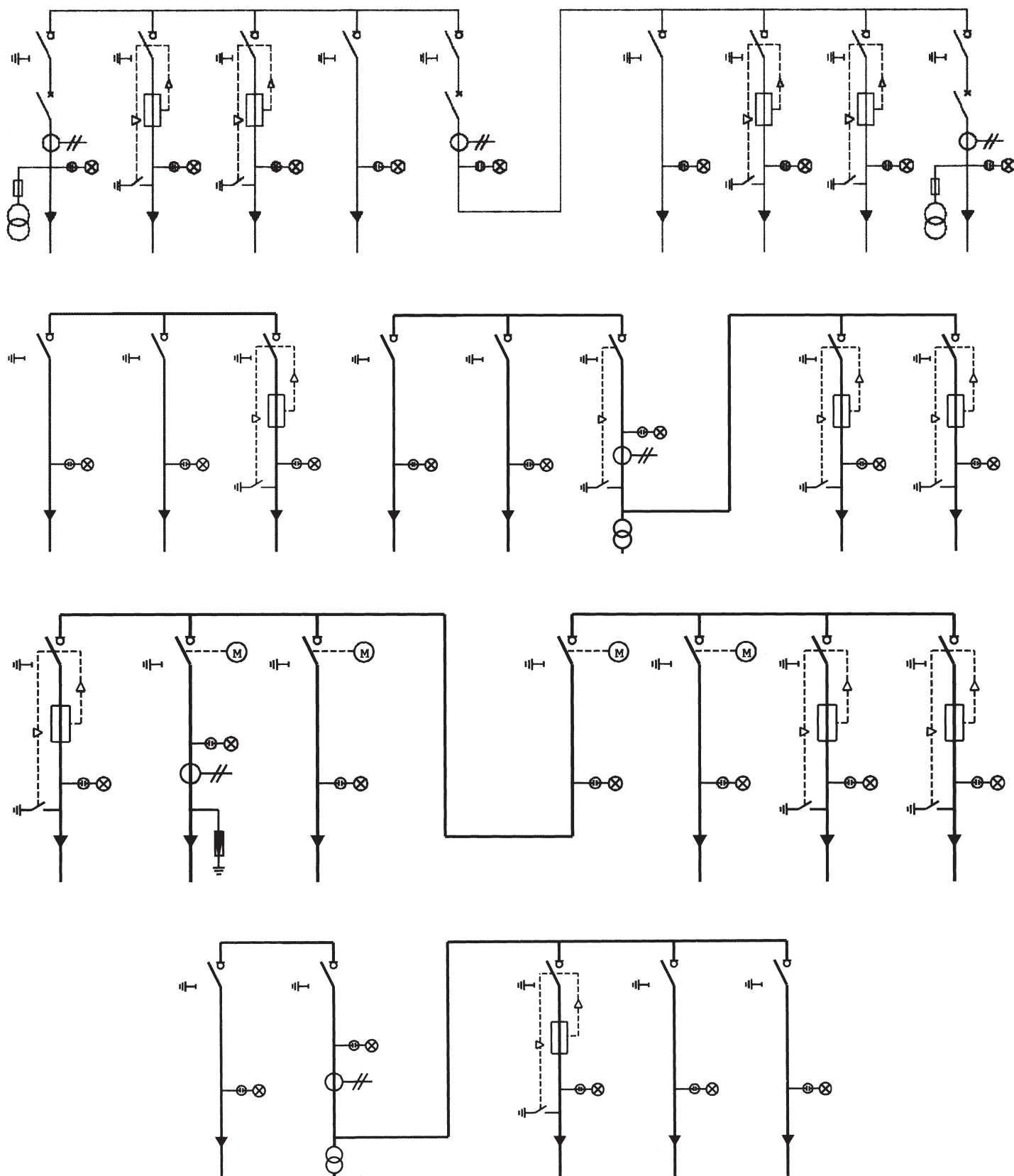
5.2 Primary Program

No.		11	12	13	14
Main loop	Program drawing				
Dimension	Width mm	375or500	500	500	750
	Height mm	1885/1635	1885/1635	1885/1635	1885/1635
Main components	Connecting way	left, right	left, right	left, right	left, right
	Load switch				
	Current mutual-inductor		2or3		2or3
	Voltage mutual-inductor			2or3	2or3
	Arrester	3	3	3	3
	Potential indicator	1	1	1	1

No.		15	16	17	18
Main loop	Program drawing				
Dimension	Width mm	750	750	750	750
	Height mm	1885	1885	1885	1885
Main components	Connecting way			left, right	left, right
	Circuit breaker	1	1	1	1
	Load switch		1	1	1
	Fuse		3		3
	Current mutual-inductor	2or3	2or3	2or3	2or3
	Voltage mutual-inductor		2or3		2or3
	Arrester	3	3	3	3
	Potential indicator	1	1	1	1

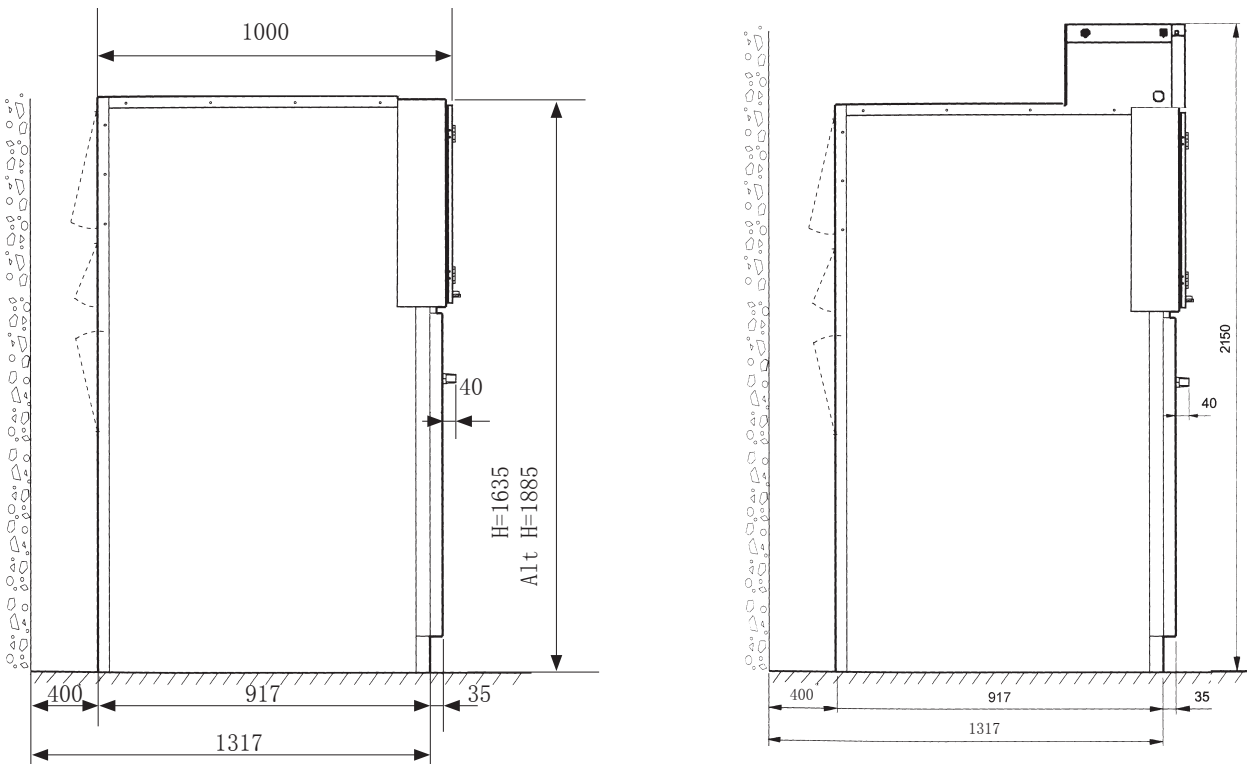
5. Ring Main Unit Types and Primary Scheme

5.3 Applications

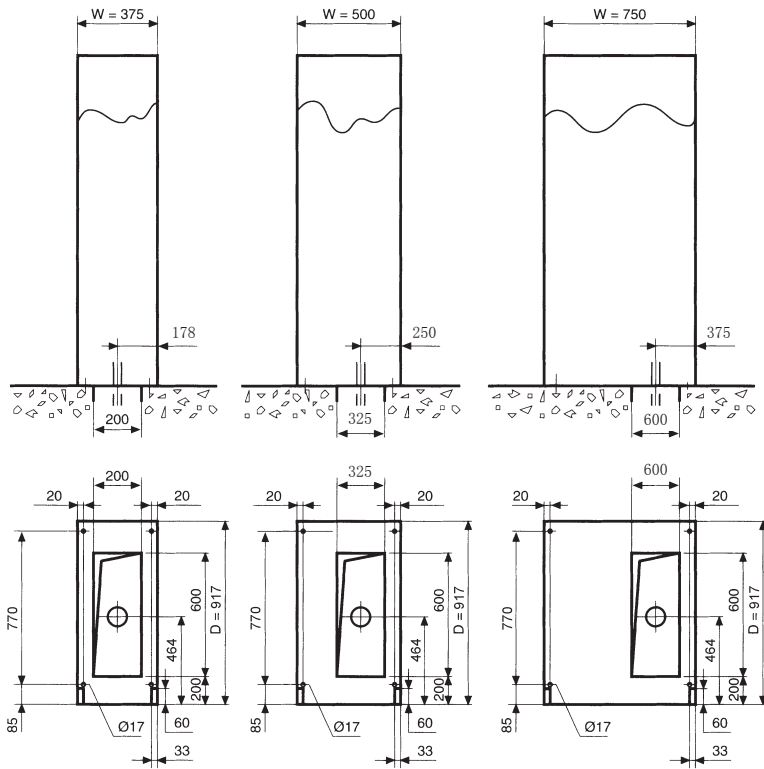


6. Installation for Ring Main Unit

6.1 Dimension of XGN15-12/24 II Type

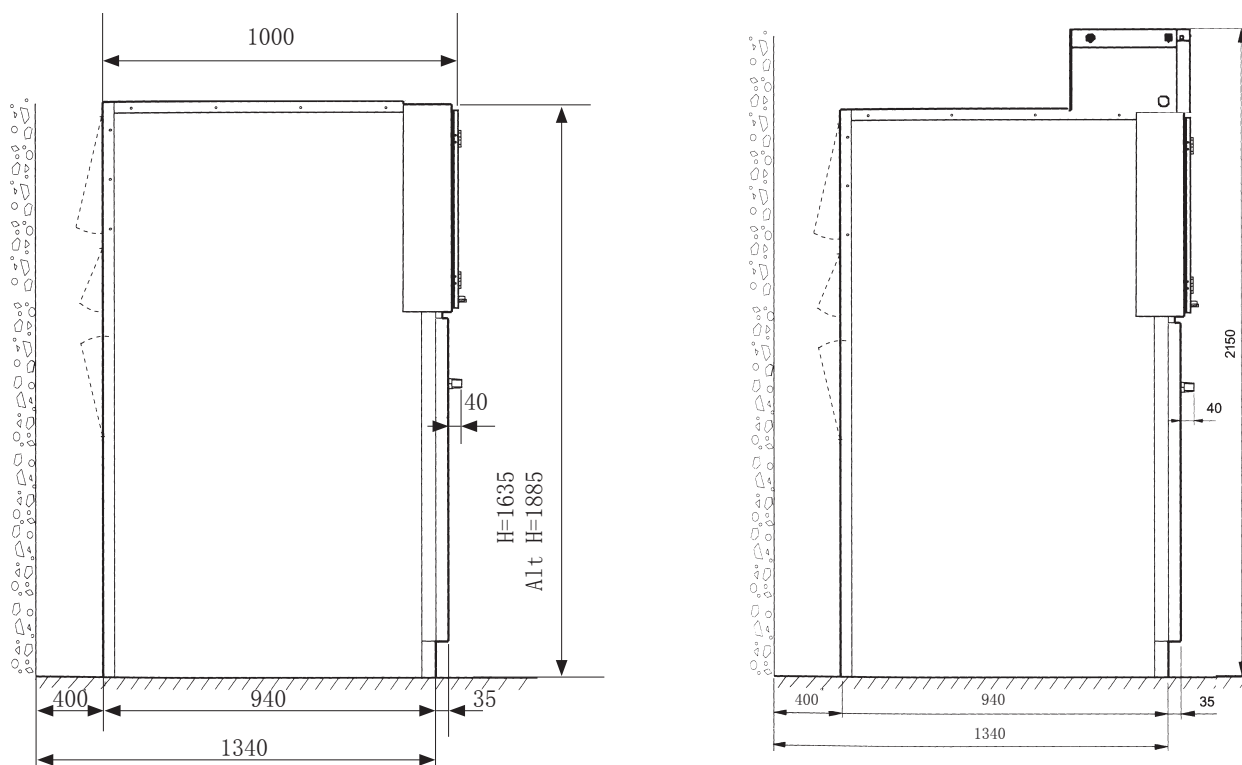


Fundamental Installation Dimension for II Type Ring Main Unit

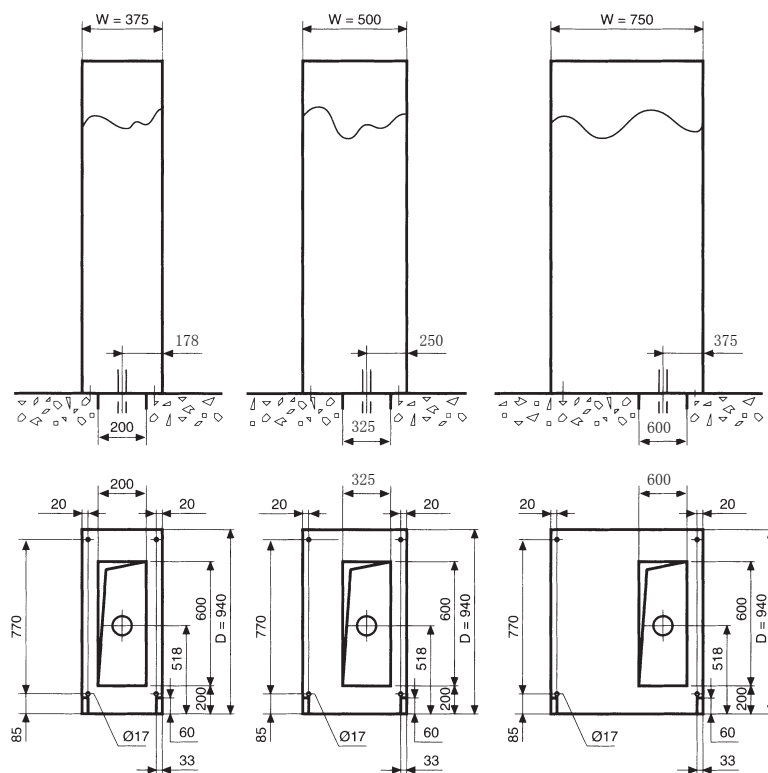


6. Installation for Ring Main Unit

6.2 Dimension of XGN15-12/24 III Type



Fundamental Installation Dimension for III Type Ring Main Unit



7. Transportation, Maintenance and Order

7.1 Transportation and Storage

◆ The switch cabinet can be transported by fork truck if guaranteed to be fixed on the bottom plate, and by handling or removing the entire entity if not fixed on bottom plate, but any case it should be transported vertically, no allowance for inversion in order not to damage the internal components.

◆ The switch cabinet (even for that with outer package) should not be exposed outside for storage for a long time. The switch cabinet that needs the long-term storage should be put in the dry and ventilative indoor warehouse. The period of validity of outer package of switch cabinet is normally no more than 1 year.

7.2 Maintenance

- ◆ Ring main unit is free of maintenance for 3 years under the normal conditions.
- ◆ There is no need of maintenance and any lubrication for the single-spring and dual-spring operation mechanism of load switch.
- ◆ The relay protection device should be checked by the requirement of the manufacturer before put into the running.
- ◆ The maintenance periodicity for ring main unit is normally one time every year.

Specific maintenance measure by the below requirement:

1. Fasten all the electrical connectors (main bus bar, switch, cable, measuring meter) required by installation and Operation Instruction
2. Clean all the parts by dust collector (main switch, auxiliary switch, tripping mechanism, motor etc. and check the appearance
3. Have a switching on/off operation for all switches including earth switch
4. Turn on auxiliary control electric source not giving the remote control signal to have a electrical order operation
5. Clean the busbar chamber and cable chamber

7.3 Order

Complete-set of Product

The below documents are attached with the switch cabinet when out of factory

- ◆ Qualification Certificate of Product
- ◆ Installation and Operation Instruction
- ◆ Packing List
- ◆ Engineering Design Document of Product
- ◆ Accessory of switch cabinet: one operating handle of load switch attached with each integration

The customer should offer the following information for order:

- ◆ Wiring Programm of Main Loop and Special Technical Requirement
- ◆ Plane Installation Arrangement Plan of Switch Cabinet
- ◆ Specification of component inside switch cabinet and the schematic diagram of auxiliary loop and control loop
- ◆ Other written documents specially required



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