3B Energy

M-RING 24

SF6 Insulated Ring Main Unit

Metal-Enclosed (LSC2A)

Contents

General Description

M-RING 24 series Ring Main Unit is an extensible, SF6 insulated switchgear, with rated voltage of 12&24 kV. All its HV live parts are contained in an air-tight gas tank, which is made from stainless steel of 3mm. The whole switching assembly is SF6 insulated, and free from any external influence, ensuring it great reliability of service and maintenance free. By plug-in type busbar extension, M-RING 24 series RMU can be of free combination and full modularization. The busbar extension has passed type test for power and thermal stability, and is fully insulated and shielded, exhibiting high reliability and safety.

M-RING 24 series Ring Main unit is suitable for all MV network up to 24 kV, all compact power stations, power distribution substations in all important industries, such as petrol-chemical industry, metallurgical and mining industries, and all transformer substations and wind power system.

Advanced facilities and process

1. With the laser cutting and punching machines imported from TRUMPF (Germany), the accuracy of re-location can be 0.02mm; the cutting deviation can be less than 0.05mm, which ensures that before welding the gaps between plates of gas tank are smaller than 0.1mm.

2. The three-dimension and five-axis laser welding system, also from TURMPF, with welding laser beam of φ0.1mm and under protection of Helium gas, welds the stainless steel plates, the welding quality equals to bended steel plates, which ensure the gas tightness and uniformity of all gas tanks.

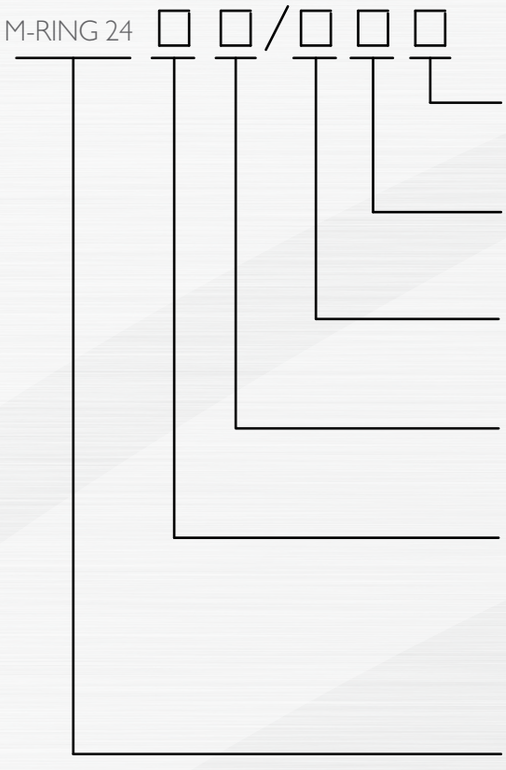
3. The fully automatic and integral helium leak detection system, made by SEILER Vakuumtechnik GmbH, through detecting of Helium leakage, brings gas leakage rate per year down to less than 0.02%, ensuring the life span of gas tank of over 30 years.

4. The ITP circuit breakers, ITP fuse holders, outgoing bushings, busbar bushing, and insulators as well as other epoxy resin insulated parts are also manufactured by fully-automatic and digitally controlled epoxy resin vacuum mixing/pressure gelatinizing system from Hedrich(Germany).

5. The busbar connector, cable connector, end-plug and other silicone rubber insulated parts are manufactured by fully-automatic and digitally controlled silicone rubber mixing/pressure gelatinizing system from VOGEL (Switzerland).

6. With the top-ranking partial discharge laboratory, Equipped with ICM compact from PD (Powev Diagnosix, Germany), which the system can guarantee the background noise level for all-condition of less than 0.3pC, and of the rated voltage up to 150kV, ensuring all components of our products highest quality available.

Definition of M-RING 24



Cable position
L: Cable in/outleft R: Cable in/out right
LR: Cable both sides None: No cable in/out

Extendible
I: Extendible left D: Extendible right
ID: Extendible both sides None Not extendible

Rated current
630A
1250A

Rated voltage
12 kV
24 kV

Panel type
k: LBS panel T: Switch-fuse panel

V: Vacuum circuit breaker panel B: Busbar panel
C: Cable panel
M: Metering panel PT: PT pane P: Power supply panel

Type

Example:

1. M-RING 24-K-12/630DL means LBS panel, rated voltage: 12kV, rated current: 630A, extensible on right side, cable in/out on left side.

2. M-RING 24-KT-12/630IR means block version, combination of LBS unit and fuse-combined unit, rated voltage: 12kV, rated current: 630A, extensible on left side, cable in/out on right side.

Relevant Standards

M-RING 24 series meets the following international standards and National standards:

IEC60694：2002

IEC62271－200：2003

IEC60265-1：1997

IEC62271-100:2001

IEC62271-105: 2002

IEC62271-102:2002

Service Condition

1, Ambient temperature	－40℃～＋40℃
2, Humidity	Max. daily average relative humidity ≤95%
3, Altitude	≤2000m (for above 2000m on demand)
4, Special condition	While application in special condition, contact the manufacturer to find a customized solution. While the application is in adverse environment, contact the manufacturer or supplier to find a proper solution, and/or application in the altitude exceeding 2000 m, specify definitely in order, we will supply a particular solution accordingly.

Main Technical Data

Table 1: Technical Data for 12kV Ring Main Unit

Description		Unit	M-RING 24-K	M-RING 24-T	M-RING 24-V1/V2	M-RING 24-B
Rated voltage		kV	12	12	12	12
Power frequency withstand voltage (1min)	Phase to phase/earth	kV	42	42	42	42
	Between open contacts	kV	48	48	48	48
Impulse withstand voltage	Phase to phase/earth	kV	75, (95)*	75, (95)*	75, (95)*	75, (95)*
	Between open contacts	kV	85, (110)*	85, (110)*	85, (110)*	85, (110)*
Rated frequency		Hz	50, 60	50, 60	50, 60	50, 60
Rated current		A	630	①	630	630
Rated short circuit breaking current		kA		②	20, (25)*	
Rated short time withstan current		kA/s	20/3,(20/4, 25/1)*		20/3,(20/4, 25/3)*	20/3,(20/4, 25/1)*
Rated peak withstand current		kA	50, (63)*		50, (63)*	50, (63)*
Rated short circuit making current		kA	50, (63)*	②	50, (63)*	50, (63)*
Rated transfer current				1800		
Rated active load breaking current		A	630			630
Rated closed loop breaking current		A	630			630
5% rated active load breaking current		A	31.5			31.5
Rated operating sequence					O-0.3s-CO-180s-CO	
Mechanical lifetime		Ops.	5000	5000	10000	5000
Electrical lifetime			E3		E2	E3
Thickness of stainless steel		mm	3.0			
SF6 rated pressure		kPa	30 (at 20②, 101.3kPa)			
Leakage rate per year			<0.02%			
Water treatment test			12kV 24 hours (at 30 kPa under water)			
Internal Arc Test			20kA 1s			
Protection Degree	Gas tank		IP 67			
	Fuse holder		IP 67			
	RMU		IP 4X			

Notes:

① Rated current of Switch-fuse panel depends on rating of fuse, and ≤125A.

② Rated short-circuit breaking/making currents of Switch-fuse panel depend on rating of fuse.

* Values in brackets are for special requirement, please contact manufacturer or supplier for more information.

Table 1: Technical Data for 24kV Ring Main Unit

Description		Unit	M-RING 24-K	M-RING 24-T	M-RING 24-V1/V2	M-RING 24-B
Rated voltage		kV	24	24	24	24
Power frequency withstand voltage (1min)	Phase to phase/earth	kV	50, (65)*	50, (65)*	50, (65)*	50, (65)*
	Between open contacts	kV	64, (79)*	64, (79)*	64, (79)*	64, (79)*
Impulse withstand voltage	Phase to phase/earth	kV	95, (72,5)*	95, (72,5)*	95, (72,5)*	95, (72,5)*
	Between open contacts	kV	110, (145)*	110, (145)*	110, (145)*	110, (145)*
Rated frequency		Hz	50, 60	50, 60	50, 60	50, 60
Rated current		A	630	①	630	630
Rated short circuit breaking current		kA		②	20	
Rated short time withstan current		kA/s	20/3,(20/4)*		20/3,(20/4)*	20/3,(20/4)*
Rated peak withstand current		kA	50		50	50
Rated short circuit making current		kA	50	②	50	50
Rated transfer current				1400		
Rated active load breaking current		A	630			630
Rated closed loop breaking current		A	630			630
5% rated active load breaking current		A	31.5			31.5
Rated operating sequence					O-0.3s-CO-180s-CO	
Mechanical lifetime		Ops.	5000	5000	10000	5000
Electrical lifetime			E3		E2	E3
Thickness of stainless steel		mm	3.0			
SF6 rated pressure		kPa	30 (at 20 ②, 101.3kPa)			
Leakage rate per year			<0.02%			
Water treatment test			24kV 24 hours (at 30 kPa under water)			
Internal Arc Test			20kA 1s			
Protection Degree	Gas tank		IP 67			
	Fuse holder		IP 67			
	RMU		IP 4X			

Notes:

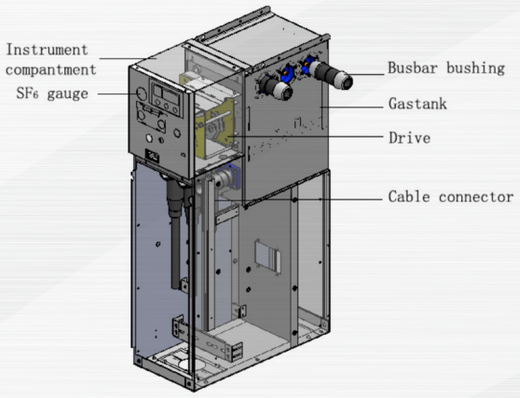
① Rated current of Switch-fuse panel depends on rating of fuse, and ≤100A.

② Rated short-circuit breaking/making current of Switch-fuse panel depends on rating of fuse.

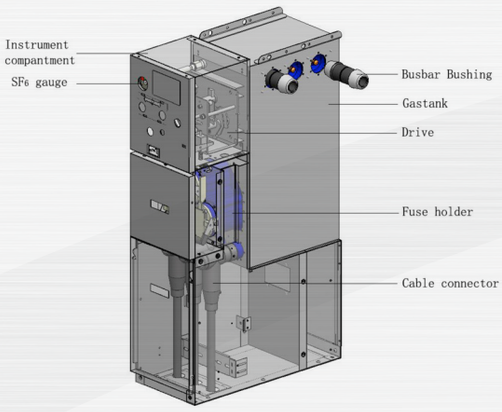
* Values in brackets are for special requirement, please contact manufacturer or supplier for more information. If 20KA/4s is required for rated short time withstand, please specify definitely when you are ordering.

Illustration of M-RING 24 Unit Structure

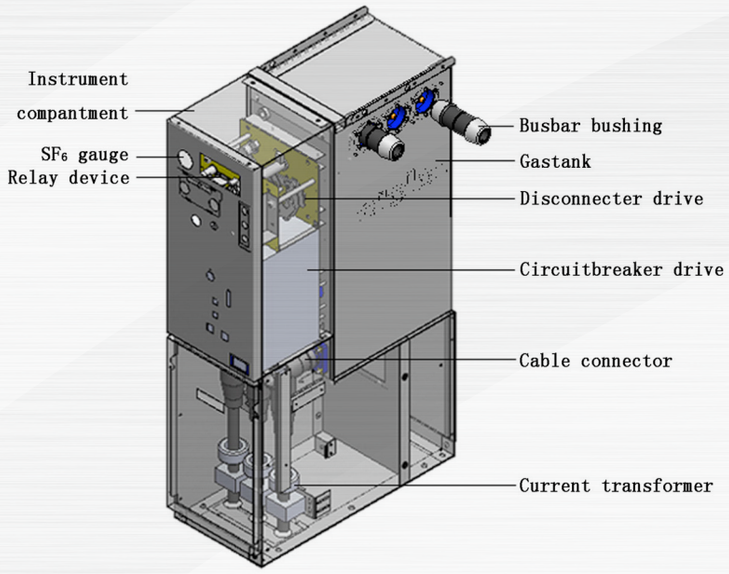
M-RING 24-K unit



M-RING 24-T unit

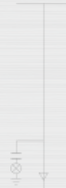


M-RING 24-V unit



M-RING 24 Series Overview

M-RING 24 Single Panels

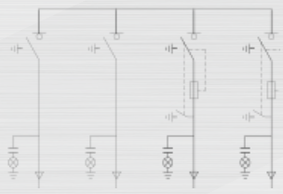
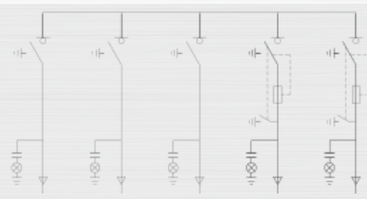
No.	Type	Description	Primary Diagram	Dimension(W x D x H mm) Weight (kg) 12kV	24kV	Remarks
1	M-RING 24-K	Load break switch panel		350x800x1380/160	350x800x1380/160 (370x850x1380/190)*	For switching connection between in/out cable amd busbar, make cable earthed, with short circuit making capacity.
2	M-RING 24-T	Switch-fuse panel		350x800x1380/190	350x800x1380/190 (480x850x1380/230)*	For control and protection for transformer up to 1250kVA
3	M-RING 24-V1	Vacuum circuit breaker panel		350x800x1380/200	350x800x1380/200 (480x850x1380/240)*	For incoming/outgoing circuit, can be equipped with microcomputer protection unit
4	M-RING 24-V2	Vacuum circuit breaker panel		350x800x1380/200	350x800x1380/200 (480x850x1380/240)*	For incoming/outgoing circuit, can be equipped with microcomputer protection unit
5	M-RING 24-B	Busbar subsection panel		350x800x1380 (on right side of block version, width: 400mm)/135	400x800x1380/135 (400x850x1380/150)*	For busbar connection
6	M-Ring 24-V	Busbar coupling VCB		350x800x1380/180	350x800x1380/180 (480x850x1380/220)*	For busbar connection , used in block verion only
7	M-RING 24-C	Cable panel		350x800x1380/100	350x800x1380/100 (370x850x1380/110)*	For in/out cable connection

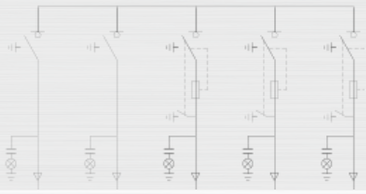
8	M-RING 24-M	Metering panel		600x800x1380 /210	800x1000x1380/210 (800x1000x1380/220)*	For metering power/energy consumption
9	M-RING 24-PT	PT panel		600x800x1380/180	800x1000x1380/180 (800x1000x1380/210)*	For monitoring voltage of busbar, providing lost voltage signal
10	M-RING 24-P	Power supply panel		600x800x1380/170	600x800x1380 /170 (600x850x1380/180)*	For providing DC 24V/48V, AC220V

Notes:

1. Values in brackets marked with "*" are the products at 24kV, power frequency withstand voltage of 65/79 kV;
2. If there are too many secondary components in the configuration, an additional compartment for them can be installed on top RMU, its height is 400mm.

M-RING 24 Block Versions-1 for 12kV&24kV (power frequency withstand voltage: 50/60 KV)

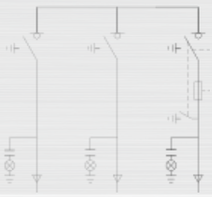
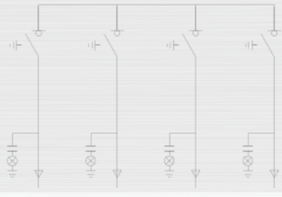
No.	Type	Unit Combination	Primary Diagram	Dimension(W x D x H mm)	Weight (kg)
1	M-RING 24-KKV	2 load break switch units and 1 vacuum circuit breaker unit		1050x800x1380	520
2	M-RING 24-KKTT	2 load break switch units and 2 switch-fuse units		1400x800x1380	700
3	M-RING 24-5K	5 load break switch untis		1750x800x1380	800
4	M-RING 24-KKKTT	3 load break switch units and 2 switch-fuse units		1750x800x1380	860

5	M-RING 24-KKTTT	2 load break switch units and 3 switch-fuse units		1750x800x1380	890

Notes:

1. If there are too many secondary components in the configuration, an additional compartment for them can be installed on top RMU, its height is 400mm.

M-RING 24 Block Versions-2 (24kV, power frequency withstand voltage: 65/79 KV)

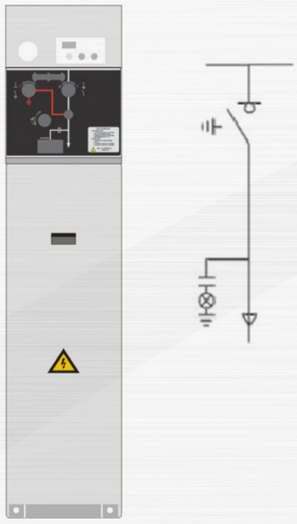
No.	Type	Unit Combination	Primary Diagram	Dimension(W x D x H mm)	Weight (kg)
1	M-RING 24-KK	2 load break switch units		740x850x1380	380
2	M-RING 24-KT	1 load bread switch unit and 1 switch-fuse unit		850x850x1380	420
3	M-RING 24-KV	1 load break switch and 1 vacuum circuit breaker unit		850x850x1380	430
4	M-RING 24-KKT	2 load bread switch units and 1 switch-fuse unit		1220x850x1380	580
5	M-RING24-KKKK	4 load break switch units		1480x850x1380	760

Notes:

1. For block versions of this rating, RMU contains K unit up to 4 units, T unit or V unit, up to 3 units.
2. If there are too many secondary components in the configuration, an additional compartment for them can be installed on top RMU, its height is 400mm.

M-RING 24 Series Single Panel and Configuration

M-RING 24-K load break switch panel



Standard Configuration

Busbar 630A

Three-position load break switch

Single spring operating mechanism with three positions, independent shaft for LBS and ES

LBS and ES position indicator

Cable bushing 630A, with function of sensor, front mounted horizontally

Voltage indicator

Padlock on faceplate for every switch

SF6 gauge (only one in block version)

Earthing busbar

Interlocks between lower front door and ES/operating shaft

Optimal Configuration

Extendable busbar bushing

Electrical mechanism for LBS DC 24/48/110/220V, AC110/220V

Short-circuit and earth fault indicator

Loop current transformer for metering and ammeter

Lightning arrester or double cable connector

Auxiliary contacts

Position of LBS 3NO+3NC

Position of ES 2NO+2NC

Dew controller and heater

M-RING 24-T Switch-fuse panel

Standard Configuration

Busbar 630A

Three-position Load breaker switch with earthing switch connected to both ends of the fuse, mechanical interlocked

Single-spring operating mechanism with three positions, independent shaft for LBS and ES

LBS and ES position indicator

Integrated fuse holder (without fuse link)

Fuse status indicator

Cable bushing 630A, with function of sensor, front mounted horizontally

Voltage indicator

Padlock on faceplate for every switch

SF6 gauge (only one in block version)

Earthing busbar

Interlocks between lower front door and ES/operating shaft

Optimal Configuration

Extendible busbar bushing

Electrical mechanism for LBS DC 24/48/110/220V,AC 110/220V

Shunt release DC 24/48/110/220V,AC 110/220V

Short-circuit and earth fault indicator

Loop current transformer for metering and current meter

Lightning arrester or double cable connector

Auxiliary contacts

- Positions of LBS 3NO+3NC
- Positions of ES 2NO+2NC

Fuse used for transformer protection (specification listed in Transformer/Circuit Protection)

Dew controller and heater

M-RING 24-V Vacuum circuit breaker panel (V1&V2)

V1

V2

Standard Configuration

Busbar 630A/1250A

VCB for transformer/circuit protection, 630A

Spring operating mechanism for VCB

Disconnetor/earthing switch with three positions

Operating shaft for disconnector/earthing switch

Mechanical interlock between VCB and disconnector, position indicator

Cable bushing 630A, with function of sensor, front mounted horizontally

Voltage indicator

Padlock on faceplate for every switch

SF6 gauge (only one in block version)

Earthing busbar

Interlocks between lower front door and ES/operating shaft

Interlock between drives of VCB and disconnector

Button, indication lamp and wiring terminals

Relay protection device

Optimal Configuration

Extendible busbar bushing

Interlock between bushing and ES (ES is locked while there is voltage on bushing)

Electrical mechanism	DC 24/48/110/220V, AC 110/220V
Closing shunt release	DC 24/48/110/220V, AC 110/220V
Tripping shunt release	DC 24/48/110/220V, AC 110/220V

Loop current transformer for metering and current meter

Lightning arrester or double cable connector

Auxiliary contacts

Position of VS	2NO+2NC
Position of DS	2NO+2NC
Position of ES	1NO+1NC

Dew controller and heater

M-RING 24-B Busbar subsection panel

Standard Configuration

Busbar 630A

Two-position load breaker switch

Single-spring operating mechanism

Position indicator

Padlock on faceplate for every switch

SF6 gauge (only one in block version)

Optimal Configuration

Extendible busbar bushing

Electrical mechanism for LBS DC 24/48/110/220V, AC 110/220V

Auxiliary contacts

Position of LBS 2NO+2NC

Dew controller and heater

M-RING 24-C Cable panel

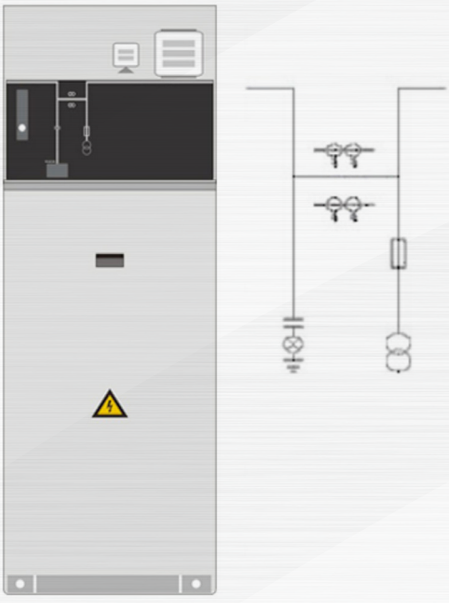
Standard Configuration

Busbar 630A

Voltage indicator

Earthing busbar

M-RING 24-C Cable panel



Standard Configuration

Busbar 630A

Two current transformers

Two voltage transformers

Fuse for PT protection

Voltage indicator

Optimal Configuration

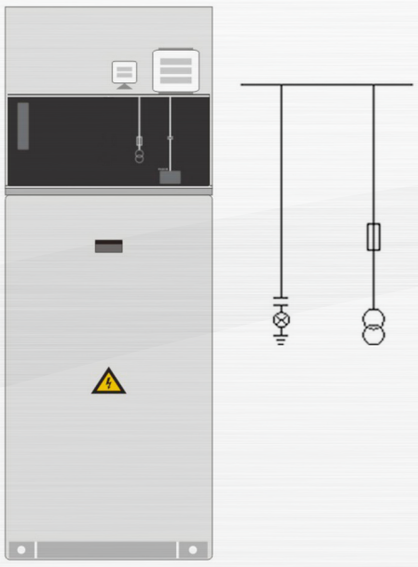
Three current transformers

Three voltage transformers (internal connection of winding in accordance with user's requirement)

One active energy meter and one reactive energy meter

Dew controller and heater

M-RING 24-PT　PT panel



Standard Configuration

Busbar 630A

Two voltage transformer

Fuse for PT protection

One voltage meter

Voltage indicator

Optimal Configuration

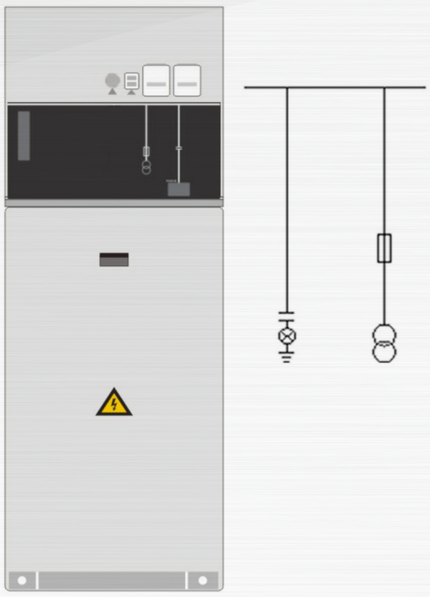
Three voltage transformers

Disconnecter

Lightning arrester

Dew controller and heater

M-RING 24-P Power Supply Panel



Standard Configuration

Standard Configuration

Busbar 630A

One operating transformer

Fuse for PT protection

One DC24V voltage meter, one AC220V voltage meter

24VDC charger and two rechargeable batteries, 12V, 24 Ah (capable of running the motor 300 operations without AC)

Voltage indicator

Optimal Configuration

Optional Configuration

Disconnector

Lightning arrester

Dew controller and heater

Transformer/circuit Protection

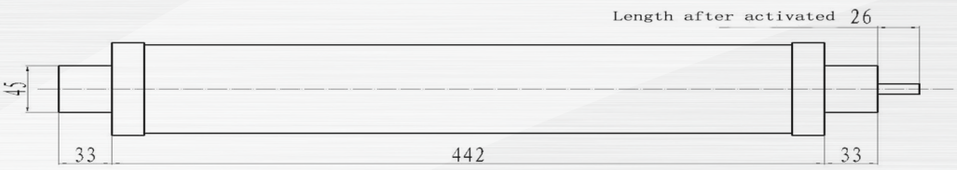
To select the rating of fuse link related to transformer, please refer to the form below:

Fuse Specification

Rated Voltage	Rated Capacity of transformer (kVA)												
	50	100	160	200	250	315	400	500	630	800	1000	1250	1600
6～7.2	16	25	32	40	50	63	100	100	100				
10～12	10	16	20	25	32	40	50	63	80	80	100	100	
13.8	6	10	16	20	25	32	32	50	50	50	63	80	
15～17.5	6	10	16	20	25	25	32	40	50	50	63	80	
20～24	6	10	10	16	16	20	25	32	40	40	40	50	80

Ambient temperature: -25℃～40℃

Standard: GB/T15166.2; Fuse link length: 442mm

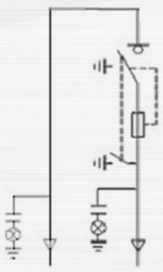


Typical Applications of Block Versions

Users of M-RING 24 can design their own block solutions. One gas tank can contain five units. All panels are extendible, fulfilling users' requirements. There are 18 standard combinations in block solution, examples as below:

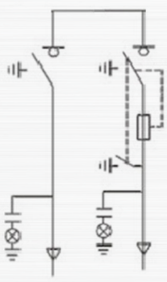
Single-line Transformer Protection

CT



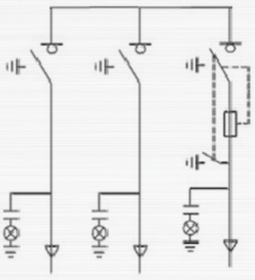
+C

KT



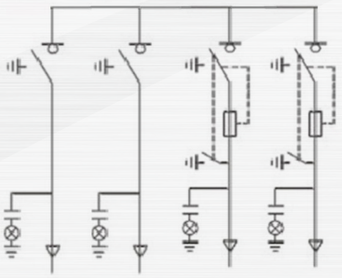
+C

KKT



+C

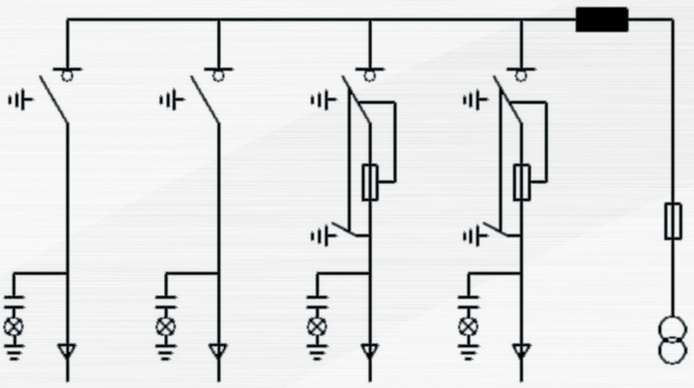
KKTT



+C

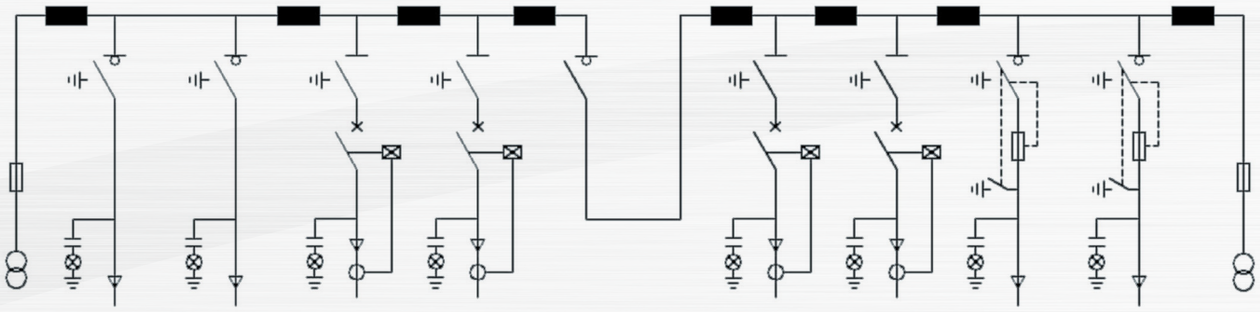
M-RING 24 Typical Application

Ring Main Transformer Protection



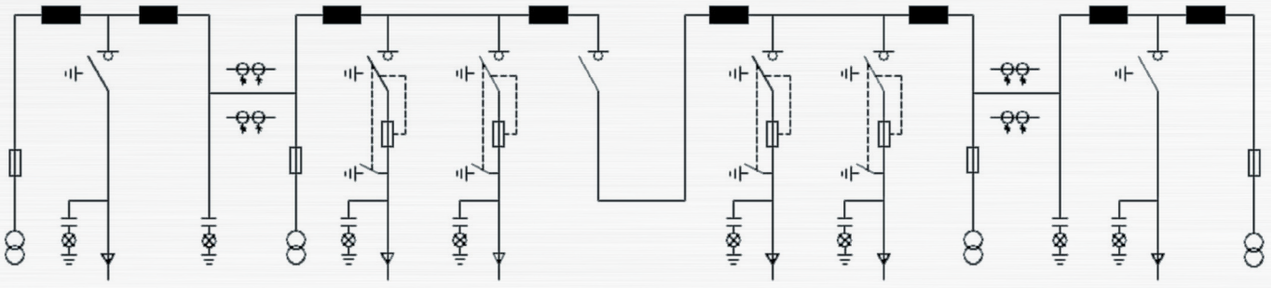
KKTT+PT

Switching Station



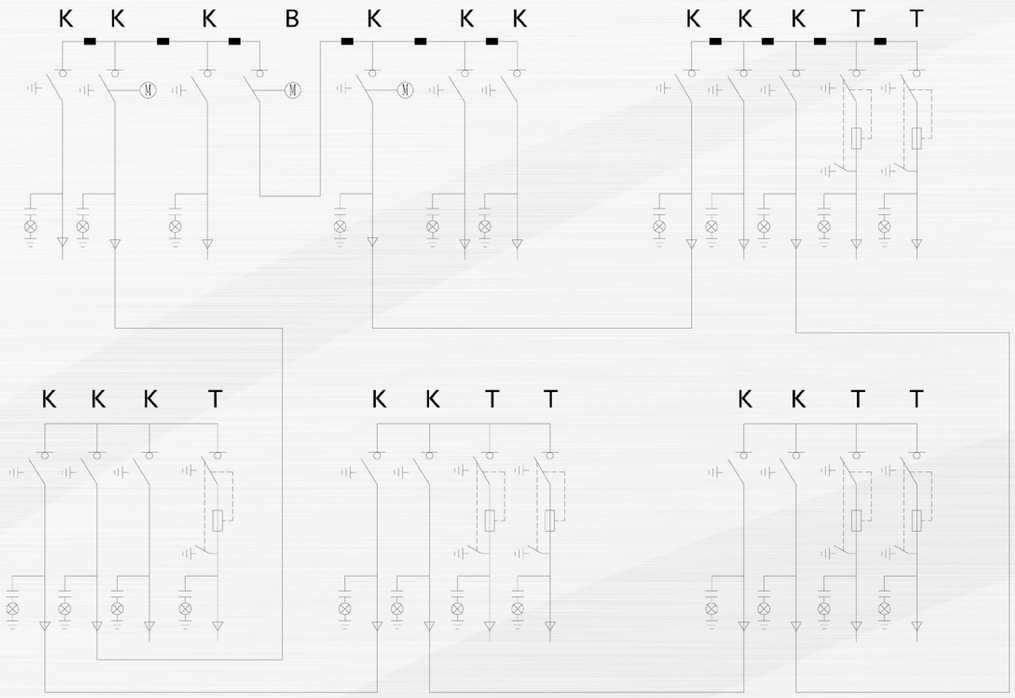
P+KK+V+V+B+V+V+TT+P

Two In-lines Solution, one line used as standby

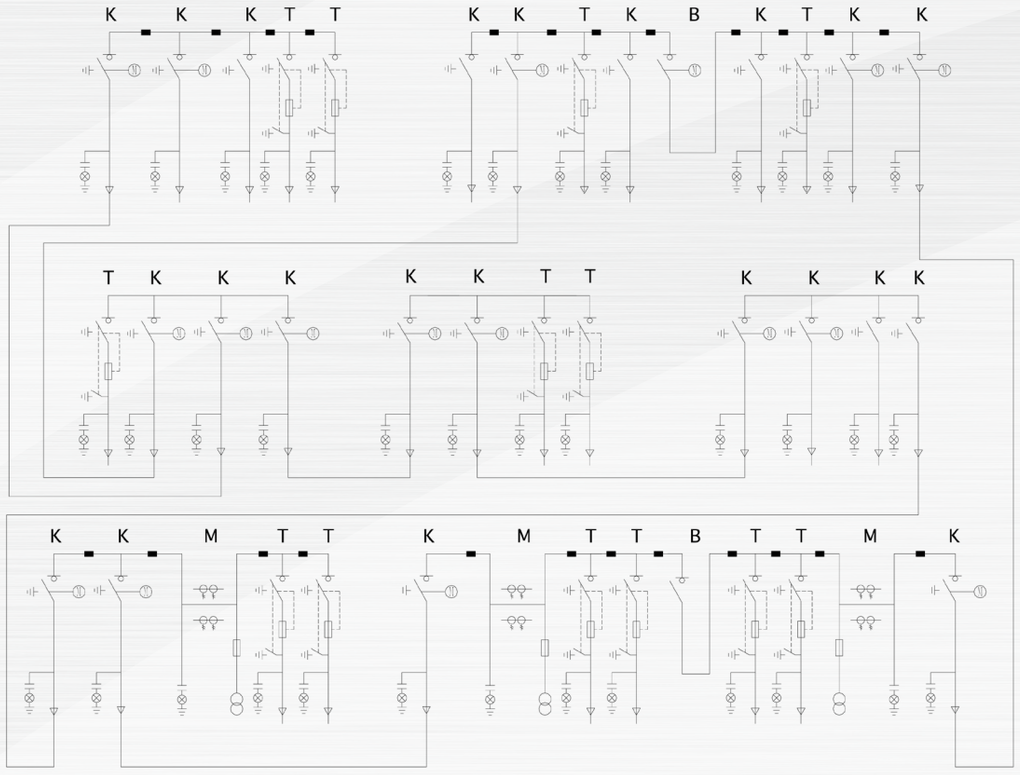


P+K+M+TT+B+TT+M+K+P

Typical Ring Main Solution 1



Typical Ring Main Solution 2



Outdoor Power Substation

It is a pre-assembled structure, protection grade up to IP33, with following characteristics:

1. Good ventilation
2. Heat insulation
3. Anti-condensation

Outline dimension:

No.	Dimensions (width x depth x height mm)	Typical combination
1	1350x1200x1750	3 units
2	1700x1200x1750	4 units
3	2050x1200x1750	5 units
4	2400x1200x1750	6 units
5	2300x1200x1750	Metering panel+4 units
6	2650x1200x1750	Metering panel+5 units
7	3000x1200x1750	4 units+metering panel+2 units

Note: specification here only for reference, not suitable for power frequency at 65/79KV of 24kV M-RING 24, for actual dimensions please contact the manufacturer.

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