

MEDIUM VOLTAGE RING MAIN UNIT

SFA-RM up to 17.5 kV





PARTNERSHIP

SAFETY

DURABILITY

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Introduction to SFA-RM

A - SFA-RM Solution

SFA-RM units are designed for supplying reliable energy, protecting electrical equipment in secondary distribution networks up to 17.5 kV. SFA-RM units are the best solution for indoor/outdoor distribution substations. Their compact design makes them suitable for various network applications such as transformer substations, wind power plants, industrial zones, etc. SFA-RM SF6 gas insulated units offer the following features:

- Compact design up to 17.5 kV; KEMA type tested
- Switching units sealed in SF6 gas filled stainless steel tank
- High level operator safety and operating reliability
- Embedded cable testing compartment, easy and safe cable testing without cable connection removal
- High quality tank welding, leakage rate of less than 0.1% per year
- Maintenance free unit offering a life expectation of over 30 years
- Smart interlocking padlocking system for maximum operator safety
- Different feeder combinations with switch disconnecter and vacuum circuit breaker
- Compatible with SCADA systems for remote control and monitoring
- Motorized options for circuit breakers and switches
- High resistance to pollution and humidity

B - Quality Management

SFA-RM units are produced with an integrated quality system carefully defined for all departments. During each stage of the manufacturing process we ensure that the SFA-RM units are built perfectly; and comply with the highest adherence standards. The SFA quality system is ISO 9001:2015 Certified.



C - Quality Checks and Tests

Every SRA-RM unit 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

The Quality Control Department prepares a test quality certificate for each unit and records the results for future accessibility and quality assurance.

Introduction to SFA-RM

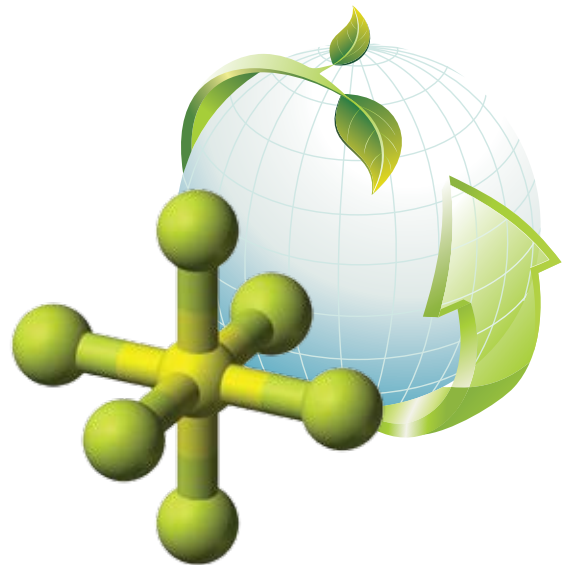
D - Environmental Precision

Using SF₆ gas inside the switchgears contributes to the improvement of the reliability, safety and easy maintenance of SFA-RM units during its life cycle.

Though the use of SF₆ gas in electrical equipment is one of the least harmful environmental emissions for utilities, some governments require SF₆ disposal methods be implemented for gas insulated RMUs at the end of its lifetime.

According to Regulation (EC) No 1907/2006 of the European Parliament and of the Council on the Registration, Evaluation, Authorization and Restriction of Chemicals (REACH), the approved procedure of treatment includes;

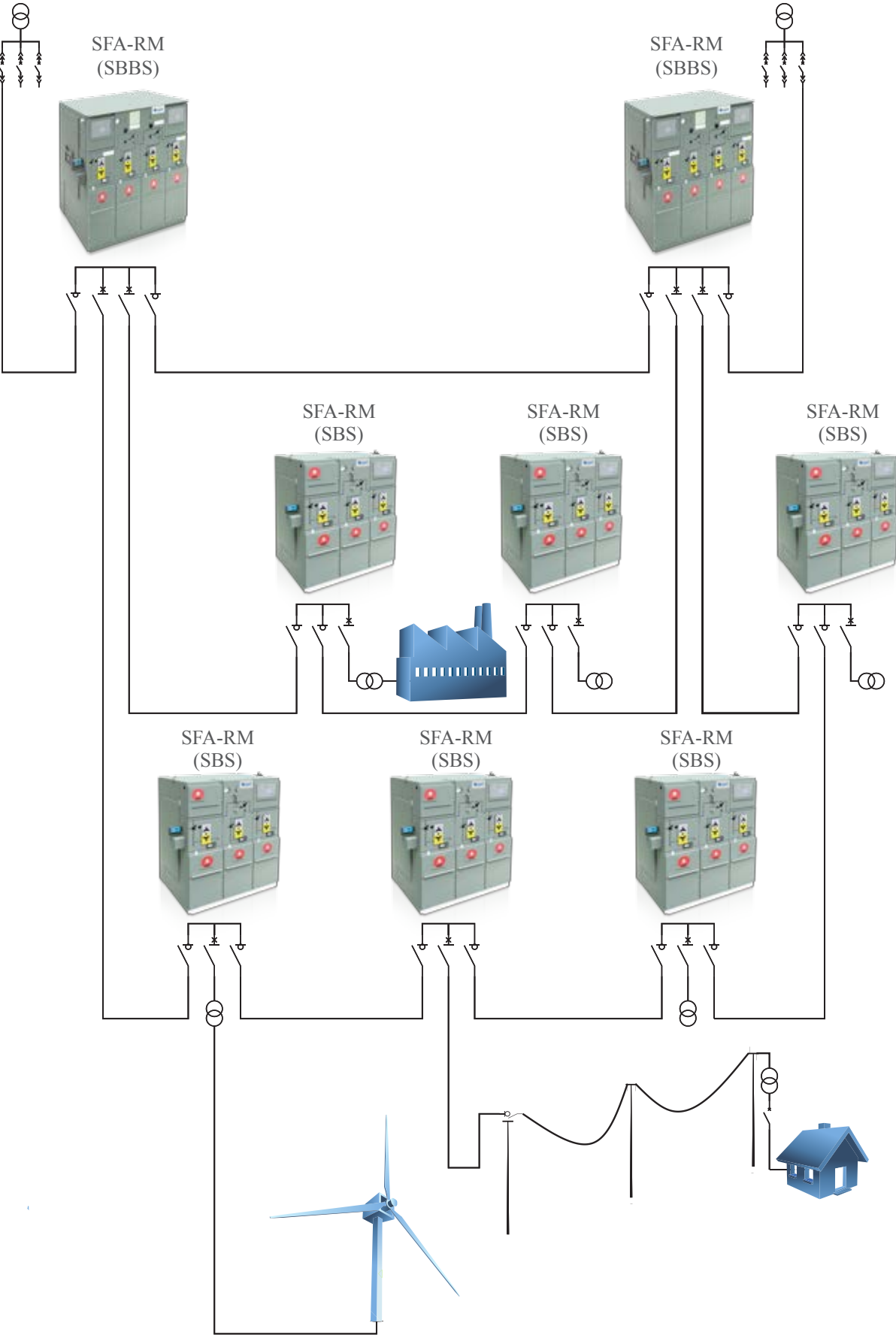
- Collection of SF₆ on site with industrial waste treatment equipment
- Heating of SF₆ at above 1,000°C at partner companies approved facility, (At these temperatures SF₆ starts to dissociate into reactive fragments, which interact with appropriate partner chemicals mainly hydrogen and oxygen to form SO₂ and HF.)
- Removal of HF and SO₂ by passing through a calcium hydroxide solution
- Neutralization of the acids and forming of solid sulfates and fluorides
- SF₆ gas can thus be destroyed with a removal efficiency greater than 99%



Greenhouse Gas	Concentration (parts per billion)	Concentration Percentage
CO ₂	353.10 ³	60%
CH ₄	17.10 ³	15%
N ₂ O	310	5%
O ₃	10.5	8%
CFC-11	0.28	4%
CFC-12	0.48	8%
SF ₆	0.002	0.10%

Table 1: Concentration Percentages of Greenhouse Gases

SFA-RM in Network



Applications

SFA-RM units are widely used in the following applications:



A - Infrastructure and buildings: ports, railway stations, airports, hospitals, schools, hotels, malls, commercial centers, holiday resorts etc.



B - Industries: water, iron and steel, automotive, oil and gas etc.



C - Energy: wind power plants, solar power plants, hydro power plants, secondary distribution networks, transformer substations etc.



D - Special applications: high air pollution areas, high humidity areas etc.

Operating Conditions and Standards

- SFA-RM has an embedded hermetically-sealed gas tank filled with SF6 gas having minimum pressure of 1.3 bar.
- The expected lifetime of the product is more than 30 years with leakage rate of less than 0.1 % per year.
- No maintenance or gas refilling is required during the lifetime of the SFA-RM.
- The main busbar and switching compartment has an IP 67 protection degree rating whereas the other sections of indoor products are rated at IP 41 and the outdoor products are rated IP 54.

Operating Conditions :

- Ambient temperature range from -25 °C to 55 °C
- Altitude range of (0-1000 m)*
- Maximum relative humidity of 100%



SFA-RM fully complies with the following IEC standards used under general operation conditions for indoor switchgears;

- a - Switchgear Standards :
 - IEC-62271-1
 - Verified lightning impulse withstand voltage
 - Maintenance free under indoor ambient conditions
 - IEC-62271-200
 - Internal Arc Classification of Accessibility
 - Type A, Classified type FLR for 21 KA / 1Sec (indoor & Outdoor)
- b- Switch-Disconnecter Standards:
 - IEC-62271-103/102
 - Class M1 / E3 / E0
 - 1000 CO cycles at rated current and 0.7 p.f.
 - 5 times close on fault
- c- Circuit Breaker Standards
 - IEC-62271-100
 - Class M1/E1
 - O-0.3 Sec - CO - 3 min - CO cycle
- d- Other Standards
 - IEC-62255 for electrical relays
 - IEC-62271-102 for alternating current earthing switch
 - IEC 61243-5 for voltage detection system

*: For 1000+ m please contact [alfanar](#)

SFA-RM Range

Compact SFA-RM units are excellent solutions for secondary distribution networks. It covers all medium voltage functions such as connection, supply and protection of MV equipment for different applications.

• SBS 3-Way Compact Indoor Type RMU

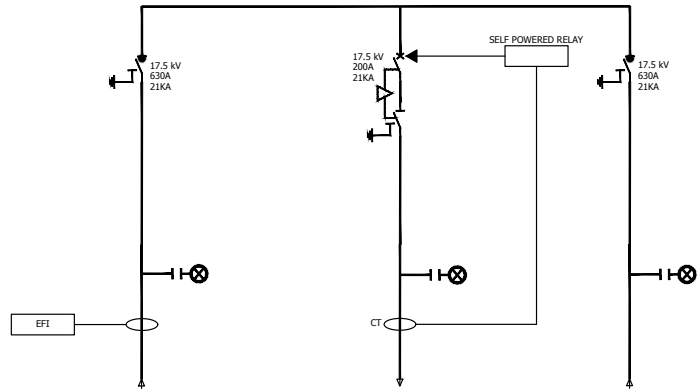


Figure 1: 17.5 kV, 2 ring switches up to 630 A + 1 vacuum circuit breaker up to 630A; front view and single line diagram

• SBS 3-Way Compact Outdoor Type RMU

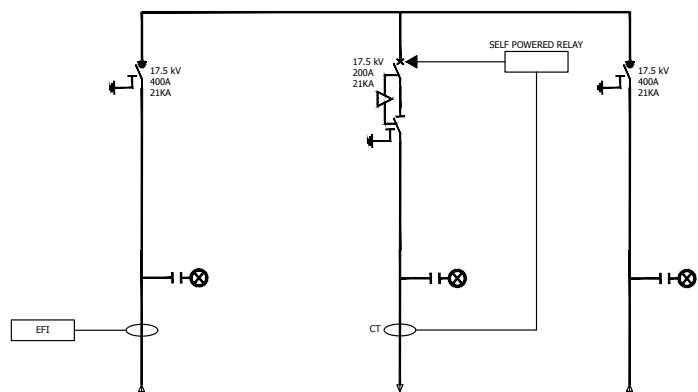


Figure 2: 17.5 kV, 2 ring switches up to 630A + 1 vacuum circuit breaker up to 630A; front view and single line diagram

SFA-RM Range

- SBBS 4-Way Compact Indoor Type RMU

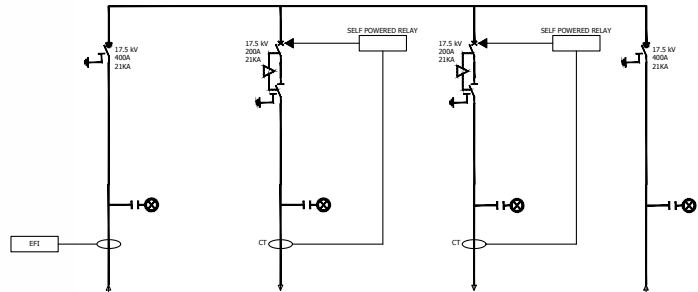


Figure 3: 17.5 kV, 2 ring switches / up to 630A + 2 vacuum circuit breakers / up to 630A; front view and single line diagram

- SBBS 4-Way Compact Outdoor Type RMU

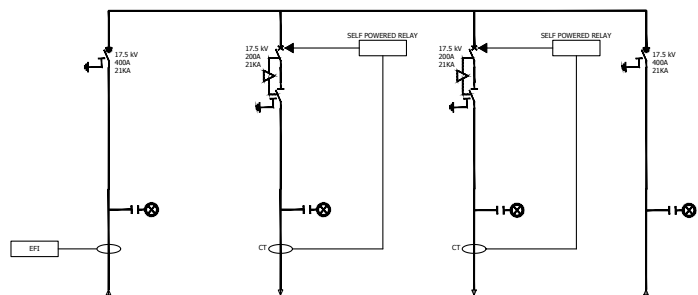


Figure 4: 17.5 kV, 2 ring switches / up to 630A + 2 vacuum circuit breakers / up to 630A; front view and single line diagram

SFA-RM Range

- SSBS 4-Way Compact Indoor Type RMU

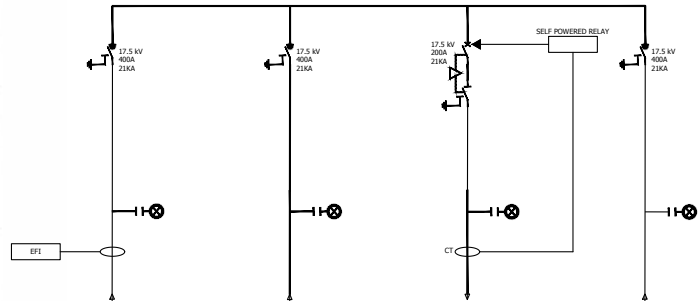


Figure 5: 17.5 kV, 3 ring switches / up to 630A + 1 vacuum circuit breaker / up to 630A; front view and single line diagram

- SSBS 4-Way Compact Outdoor Type RMU

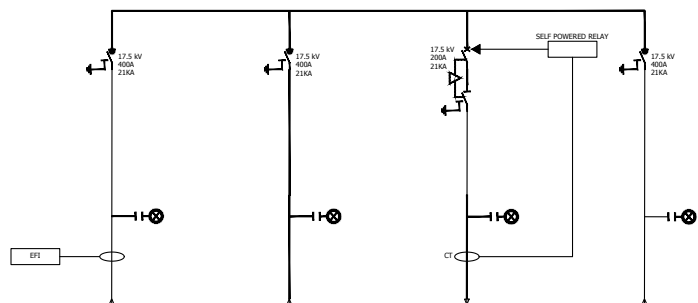


Figure 6: 17.5 kV, 3 ring switches / up to 630A + 1 vacuum circuit breaker / up to 630A; front view and single line diagram

SFA-RM Range

- B Modular

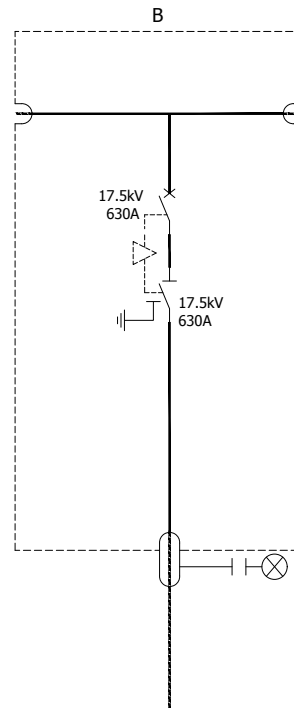


Figure 7: 12 kV, one vacuum circuit breaker / up to 630A; front view and single line diagram

- S Modular

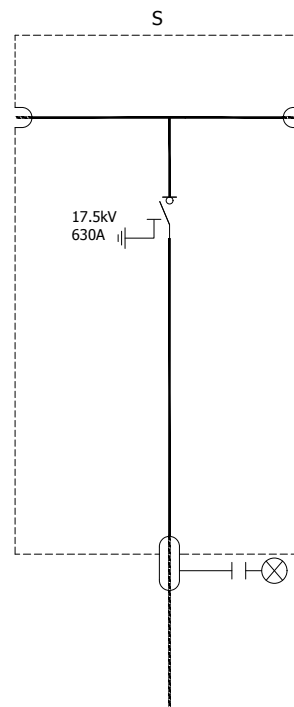
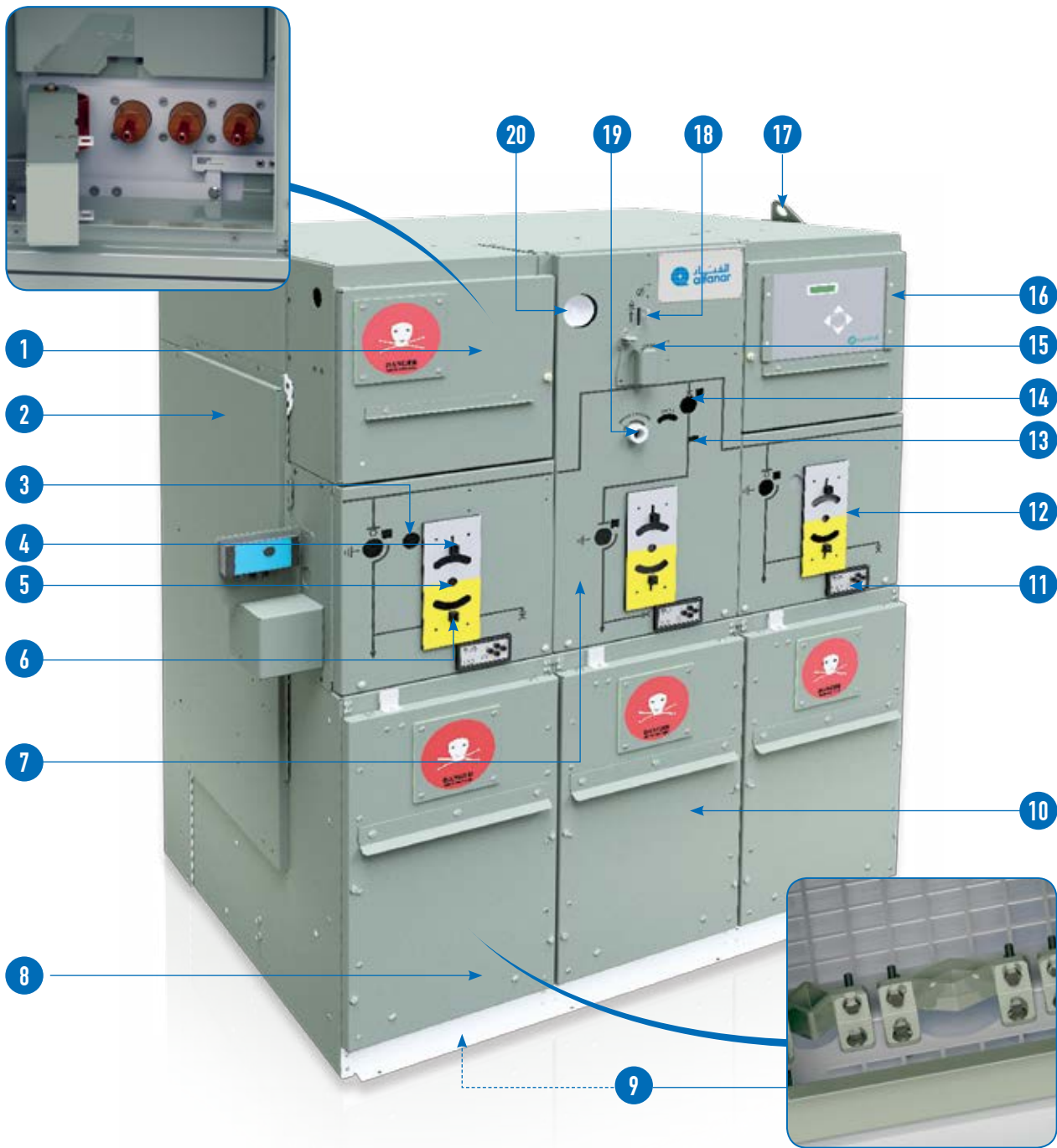


Figure 8: 12 kV, one ring switch / up to 630A; front view and single line diagram

Design



- | | | | |
|----|-----------------------------------------------|----|--------------------------------------------------|
| 1 | Cable Test Compartment | 11 | Voltage Presence Indicator |
| 2 | Gas Tank | 12 | Switch-disconnector Operation (Motor Optional*) |
| 3 | Interlocking Latch for Cable Test Compartment | 13 | Operation Counter |
| 4 | Padlocking Facilities for Load Break Switch | 14 | Circuit Breaker Operation (Motor Optional*) |
| 5 | Load Break Switch Operating Mechanism | 15 | Operating Latch for Vacuum Circuit Breaker |
| 6 | Padlocking Facilities for Earthing Switch | 16 | Protection Relay |
| 7 | Vacuum Circuit Breaker | 17 | Lifting Lugs |
| 8 | Ring Switch Cable Compartment | 18 | Padlocking Facilities for Vacuum Circuit Breaker |
| 9 | MV Cable Fixing Support | 19 | Vacuum Circuit Breaker Operating Mechanism |
| 10 | Tee-Off Switch Cable Compartment | 20 | Gas Pressure Indicator |

Operating Mechanism

On the front panel of SFA-RM units, the status of the operating mechanisms can be clearly seen from the mimic diagram (closed, opened, and earthed):

- The operating mechanism triggers the moving contact assembly during the closing action. The opening spring of circuit breaker mechanism is charged while the closing operation is in process.
- The same mechanism is used for opening the circuit breaker, triggered in the opposite direction. Opening is activated by a latch or a relay.

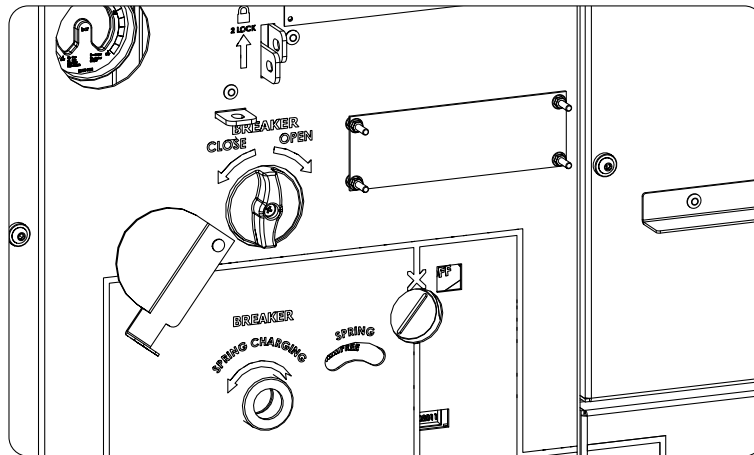


Figure 9: Circuit Breaker Mimic Diagram

- Earthing contacts are opened or closed with a specific operating shaft. The access hole of the shaft is covered by a plate, which can be opened if the load break switch or circuit breaker is in open position, and remains locked when it is in close position

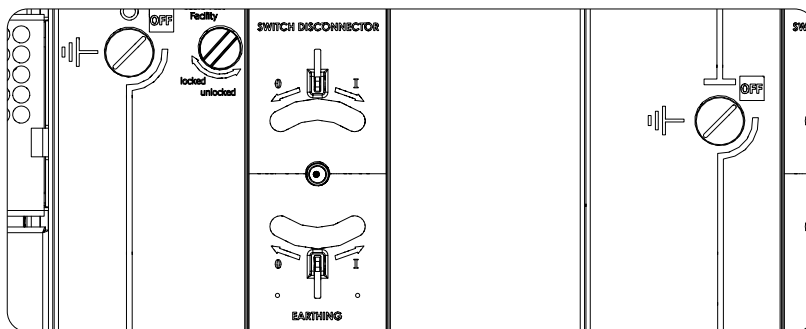


Figure 10: Switch Disconnecter Mimic Diagram

- Since the operating shafts are directly connected to status indicators, it is very easy and safe to understand the position of the switches from the front panel.
- Padlocking facilities are available for preventing access to the load break switch, circuit breaker and earthing switch operating shafts.

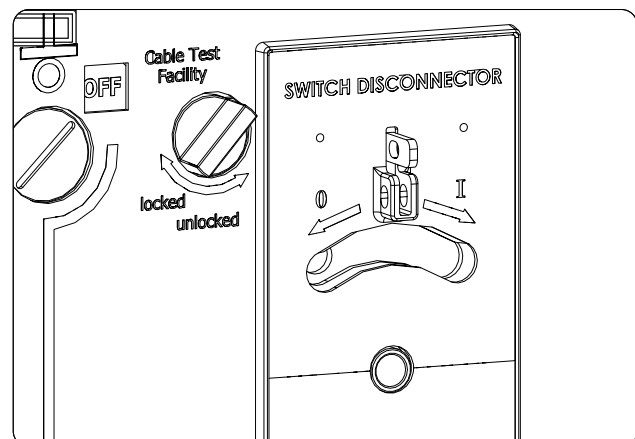


Figure 11: Switch Disconnecter Padlocking Facility

Interlocking System

- Access to the load break switch, circuit breaker and earthing switch are separated from each other to enforce safety. The cover for the earthing switch can be opened only if the load break switch or circuit breaker is in an open position.
- Access to the cable compartment is fully interlocked with the earthing switch. Access to the cable compartment is only possible when the earthing switch is in the close position.
- Access to the earthing switch is only possible when the cable compartment cover is closed.
- The earthing switch can only be accessed after closing the cable testing compartment cover.

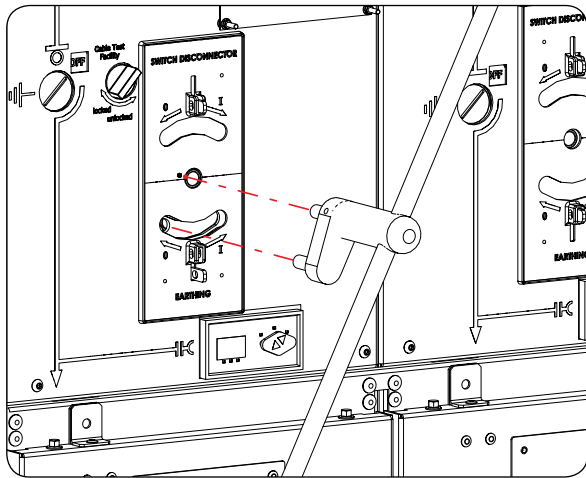


Figure 12: Earthing Switch Interlocking

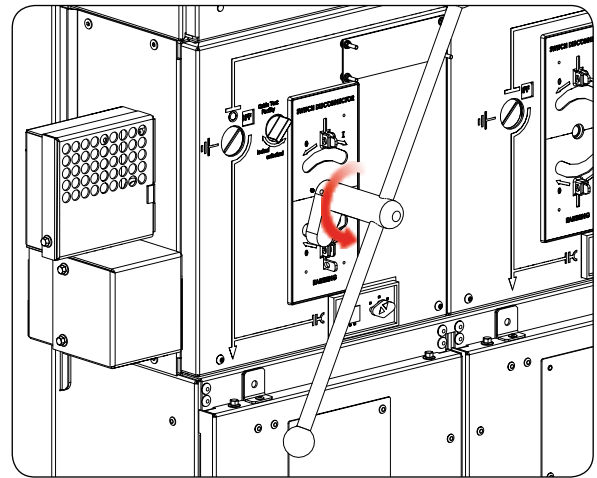


Figure 13: Earthing Switch Closing Operation

- The cable test compartment can be opened only if the earthing switch is in the close position.

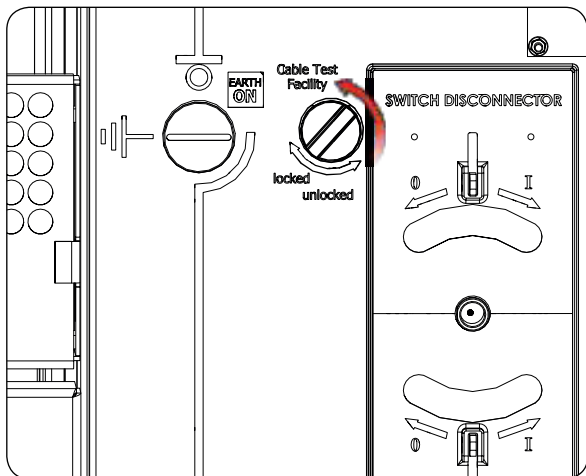


Figure 14: Unlocking of Cable Test Compartment

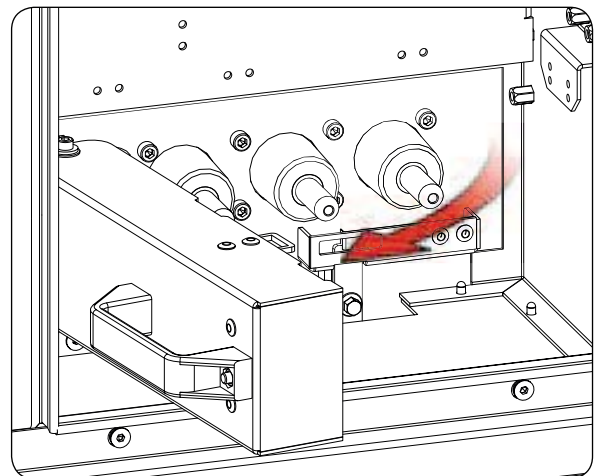


Figure 15: Opening of Cable Test Compartment

Internal Arc Withstand

SFA-RM units are designed to withstand rated short circuit current for 1 second without any danger.

Overpressure in the gas tank due to the internal arc is limited with the help of the bursting disk located at the bottom of the stainless steel tank.

The internal arc in the cable compartment and the withstand capability of the SFA-RM units have been proven and verified by CESI laboratories to comply with all clauses of IEC 62271 standards to ensure maximum operator safety.



Figure 16: A Picture Taken During the Internal Arc Test of 17,5kV SFA-RM



Technical Data Sheet

Rated Voltage 17,5 kV	Up to 17,5 kV	
Busbar Rating	Up to 630 A	
Rated Frequency	50 / 60 Hz	
Rated Nominal Current For Ring Switch	Up to 630A	
Rated Nominal Current For Tee-off Feeder	200/400 / 630 A	
Rated Short Time Withstand Current	21 kA / 1 Sec 21 kA / 3 Sec	
Internal Arc Classification	A (FLR) 21kA / 1 Sec (indoor & outdoor)	
Rated Filling SF6 Gas Level For Insulation	1,2 bar (absolute)	
Minimum Functional SF6 Gas Level	1,1 bar (absolute)	
Relative Humidity	100%	
IP Class (Gas Tank / Indoor / Outdoor)	IP 67/ IP41 / IP54	
Rated Lightning Impulse Withstand Voltage	95 kV-peak	
Rated Power Frequency Withstand Voltage	38 kV-rms	
Applied Standard	IEC 62271-200	
Ring Switch Feeder (S)	Type of Switch-Disconnecter	General purpose, three-positioned (OPEN-CLOSED-EARTHED)
	Electrical Endurance Switch-Disconnecter/Earthing Switch	E3 / E0
	Mechanical Endurance	M1
	Nominal Current	Up to 630 A
	Short-Circuit Making Current	21 kA (also valid for earthing switch) 54.6kA Peak
	Applied Standard	IEC 62271-103/102
	TEE-OFF Feeder (B)	Type of Breaker
Electrical Endurance		E3
Mechanical Endurance		M1
Nominal Current		Up to 630 A
Short-Circuit Breaking Current		21 kA
Applied Standard		IEC 62271-100

Components

A - Vacuum Circuit Breaker

Standard Features

- Complying with the related standard - IEC 62271-100
- Contacts are in vacuum tubes and the whole mechanism is in an SF6 gas-filled tank isolated from climatic conditions
- Spring charge hole on the front panel with a spring position indicator
- Operating latch for opening or closing operations
- Spring operated, stored energy mechanism
- Operation independent of operator
- Padlocking facility on front panel to prevent unwanted closing operation
- Smart mimic diagram indicating the switching status clearly (ON, OFF)
- A mechanical numeric indicator counting operation cycles
- Colored position indication bar directly connected with operating shaft
- Trip coil for initiating the tripping operation via signal from self-powered relay
- Shunt trip coils for external tripping
- Electrical endurance: E1
- Mechanical endurance: M1

Optional Features

- Motor operation
- For circuit breaker: 24 VDC, 110 VDC or 220 VAC
- Communications with intelligent systems (SCADA, DAS, etc)
- Auxiliary contacts for position indication
- For circuit breaker: 8 NO and 8 NC
- For earthing switch: 2 NO and 2NC



Figure 17: Circuit Breaker and Disconnecter Assembly

Components

B - Three Position Load Break Switch

Standard Features

- Complying with the related standards - IEC 62271-103 and IEC 62271-102
- Contacts are in SF6 gas filled tank independent from climate conditions
- Three phased and three positioned (ON, OFF and Earthing) switching mechanism
- Two separate holes on the front panel for Earthing and Disconnecting functions for safe operation
- Spring operated stored energy mechanism
- Independent of the operator operation
- Padlocking facilities on front panel for both Earthing and disconnecting functions of operation
- Smart mimic diagram indicating clearly the switching status (ON, OFF, Earth position)
- Colored position indication bar directly connected with operating shaft
- Interlocking latch for accessing the cable testing compartment
- Switch-disconnector electrical endurance: E3
- Switch-disconnector mechanical endurance: M1
- Earthing switch electrical endurance: E2
- Earthing switch mechanical endurance: M1

Optional Features

- Motor operation
- For load break switch: 24 VDC, 110 VD
- Communicating with intelligent systems (SCADA, DAS, etc)
- Auxiliary contacts for position indication
- For load break switch: 3 NO and 3 NC
- For earthing switch: 2 NO

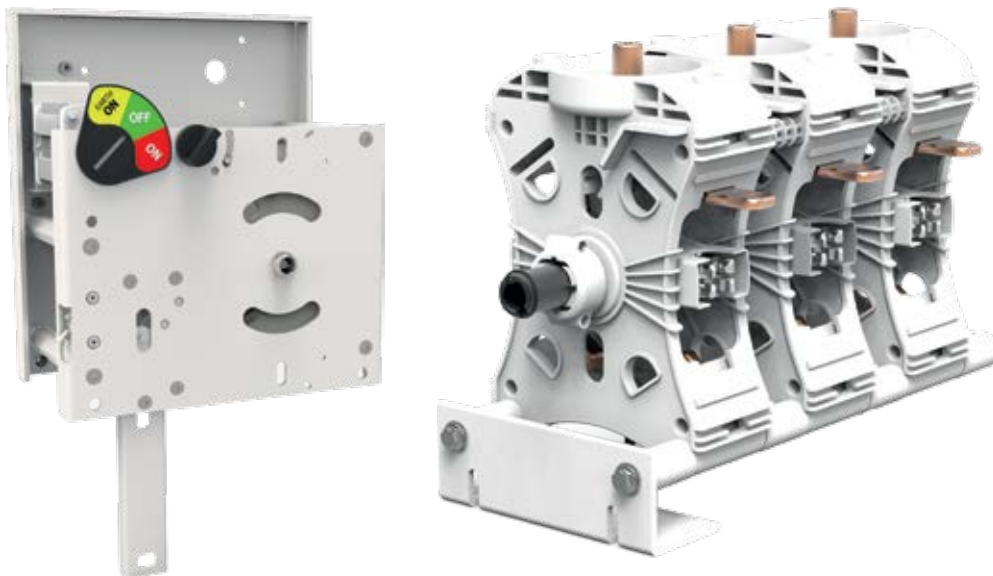


Figure 18: Switch Disconnecter Assembly

Components

C - Cable Testing Compartment

For SFA-RM units; the operator does not need to access the cable compartment for cable testing. SFA-RM units offer a safe way of cable testing from the easily accessible cable testing compartment on the front panel (Refer to Figure 17). Operators can simply conduct the cable testing through plug-in type connectors after opening the cover. The cable test cover is safely interlocked and cannot be opened unless the load break switch is earthed.



Figure 19: Front view of Cable Testing Compartment

D - Gas Pressure Indicator

Gas density is an important operating parameter for SF₆ insulated MV equipment. If the required gas density is not sufficient, safe operation cannot be guaranteed. On SFA-RM units, a gas pressure indicator is fitted to the tank for providing a reliable warning indication against low gas levels. The gas pressure indicator has sections to show the minimum pressure for safe operation.



E - Voltage Presence Indication System

All SFA-RM units are integrated with a voltage presence indication system. A voltage signal comes from the VPIS through the voltage divider positioned into the cable entrance of bushings.

The VPIS can be used to check whether a voltage is present across the cables.

Components

F - Protection Relays

• Overcurrent Protection :

1- 50P/50N Function: Phase/Neutral instantaneous overcurrent

Time of operation is independent from the current of operation flowing through the relay, hence if the phase current increases more than its determined value for an equal or greater amount of time than the specified value, then protection function activates (trips) and does not reset itself till the value of the phase drops below the point of current pick-up.

The function activates at 100% of the preset input, and deactivates at 95%, where the reset is instantaneous.

The accuracy of the operating time is equal to the present time plus a maximum of 30 ms.

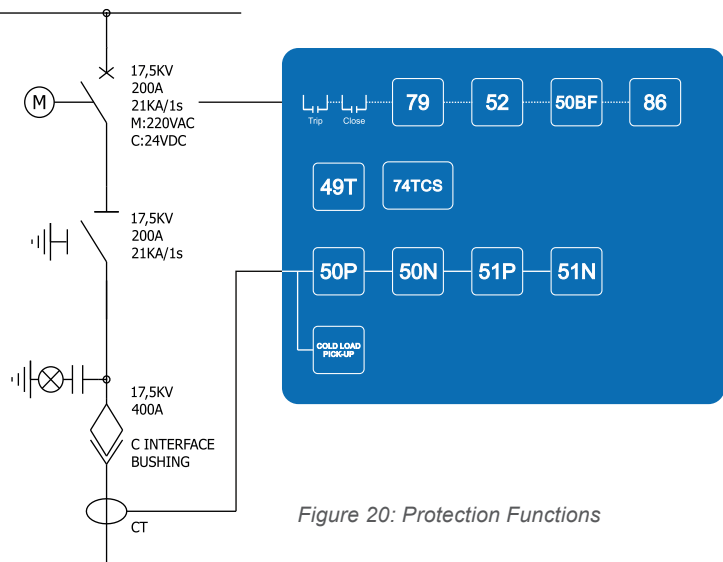
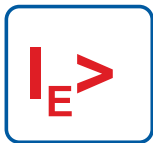


Figure 20: Protection Functions

2- 51P/51N Function: Phase/Neutral Time overcurrent Protection

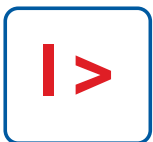
A - Definite Time O/C Protection



If the option “Definite time” is selected for the curve setting. In this case, the unit operating time is set by the parameter “Operating time” so as to trip the fault after a preset specific time setting.

If the unit operates with defined time, the function is activated at 100% of the set tap value, and it deactivates at 95%. If the unit operates with a curve, the function is activated at 110% of the set pick-up value, and it deactivates at 100%. The reset is instantaneous in both cases. The activation time is accurate to $\pm 5\%$ or $\pm 30\text{ms}$, whichever is greater, of the theoretical activation time. The curves used are IEC 60255-151.

B - Inverse Time O/C Protection (IDMT)



If a curve (e.g. inverse, very inverse or extremely inverse) is selected for the curve setting, the operating time principally depends on the current value which is set through the curve type, and dial and tap settings.

Accessories

A - Operating Handles

In SFA-RM units, there are two operating handles; the first one is for the operation of the load break switch and the second is for charging the spring of vacuum circuit breaker. The design of the operating handles enables a safe and easy operation for the user.



Figure 21: Switch Disconnecter & Disconnecter Operating Handle



Figure 22: Circuit Breaker Spring Charging Handle

B - IR / PD Windows

The SFA-RMU can be optionally equipped with IR & PD windows, a new feature that complies with the new requirements of the Saudi Electric Company.

The inclusion of an Infrared inspection window is considered as a very effective method for maintenance personnel to identify any possible problems with loose electrical terminations without the need to shut down the RMU. The window consists of polymer and mesh optics to allow thermal infrared inspection by employing a broadband media.

The inclusion of a partial discharge window is to facilitate the ability to measure partial discharge of a live RMU and estimate the expected life of insulation components.



C - Motorization Kit (LBS / VCB)

Motors with gearboxes can easily be installed to load break switch and circuit breaker mechanisms either in the factory or on-site. A built-in electrical interlocking system prevents any unintentional operations.

When the unit is installed with the motor mechanism, it can be used with intelligent systems such as SCADA, DAS, etc.

With the help of a selector switch, SFA-RM units can be controlled remotely by choosing the remote control option.



Figure 23: Motor with Gearbox

Accessories

D - Earth Fault Indicator (EFI)

EFI can also be implemented in SFA-RM units. EFIs help the operator to find the fault location easily in medium voltage ring networks.

Earth fault is indicated with a LED flashlight and a flag when asymmetrical currents are detected in three phase cables.

EFI is fed via either auxiliary supply with internal batteries or core balance current transformer.



Figure 24: EFI

E - Operation Counter for Load Break Switch Mechanism

In SFA-RM units, implementation of an operation counter for mechanical operation of load break switches is available as an option.

F - CVI Auxiliary Contacts

To automate voltage indication in SFA-RM Units, auxiliary contacts could be integrated with CVI units.

This feature makes it suitable for SFA-RM to accommodate the following:

Absence of voltage applications

- Automation on voltage loss.
- Alarms on voltage loss
- Automatic transfer systems

Presence of voltage applications

- Earth locking on presence on voltage
- Alarms on voltage presence



Figure 25: CVI Auxiliary Contacts

G - Gas Pressure Indicator with Contacts

As an optional feature; a gas pressure indicator with electrical switch contacts can be implemented.

The gas pressure indicator warns the operator when the gas density drops below the defined “alarm” level, and can block the operation.



Figure 26: Gas Pressure Indicator

MV Cable Termination

A - Cable Compartment

For safe operations, the cable compartment of SFA-RM units has an interlocking mechanism for preventing access to the cable compartment when the earthing switch is opened.

When the cable compartment is open, closing the load break switch or circuit breaker is prevented by an additional interlocking mechanism.

As an option, increasing the depth of the cable compartment is also possible for a lightning arrester installation.

The Internal Arc Withstand Capacity of cable compartment is proven by type tests performed in KEMA Laboratories.



Figure 27: Sample view of Cable Compartment

B - Bushings

Electrical current is carried from outside to inside the RMU via epoxy bushings ensuring the insulation between the energized conductor and the tank of RMU. Power frequency and partial discharge tests are conducted to each bushing used in SFA-RM units.

There are 3 types of bushings on SFA-RM units:



Figure 28: Various Bushing Types

Bushing Type	Application	Applicable Standard	Interface Type	Material	Current Rating	Voltage
RMT24	Cable Testing	IEC 60137	-	Epoxy Resin	-	24/50/125kV
RMS24	Load Break (S) Circuit Breaker (B)	IEC 60137	C	Epoxy Resin	630A, 21kA/1s	24/50/125kV
RMB24	Circuit Breaker (B)	IEC 60137	C	Epoxy Resin	630A, 21kA/1s	24/50/125kV

MV Cable Termination

C - Cable Connectors

The following types of cable terminations are available within SFA-RM units;

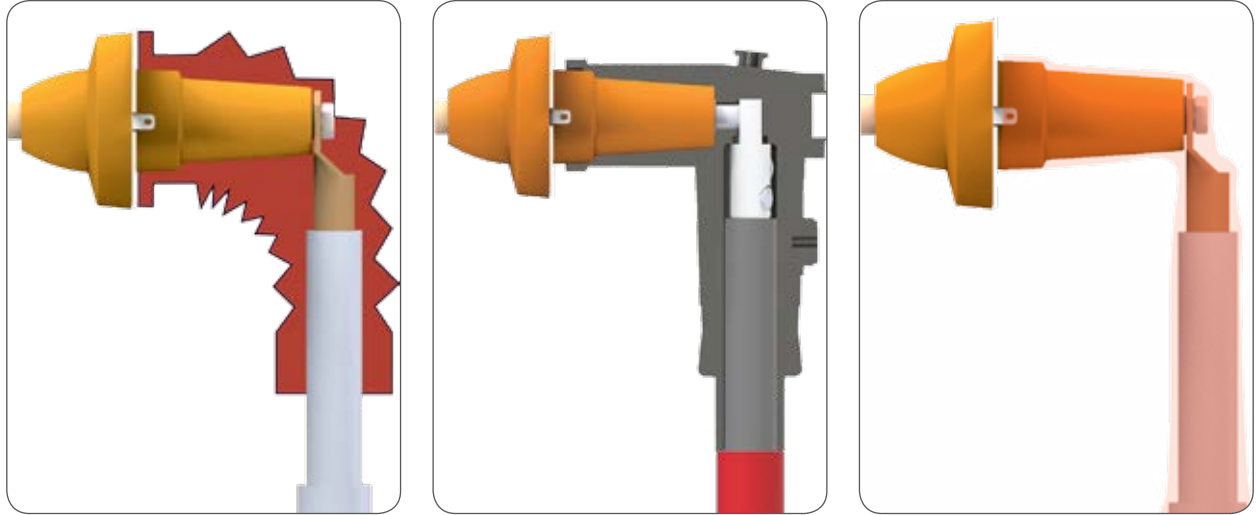


Figure 29: "L - Type" Cable Termination Alternatives

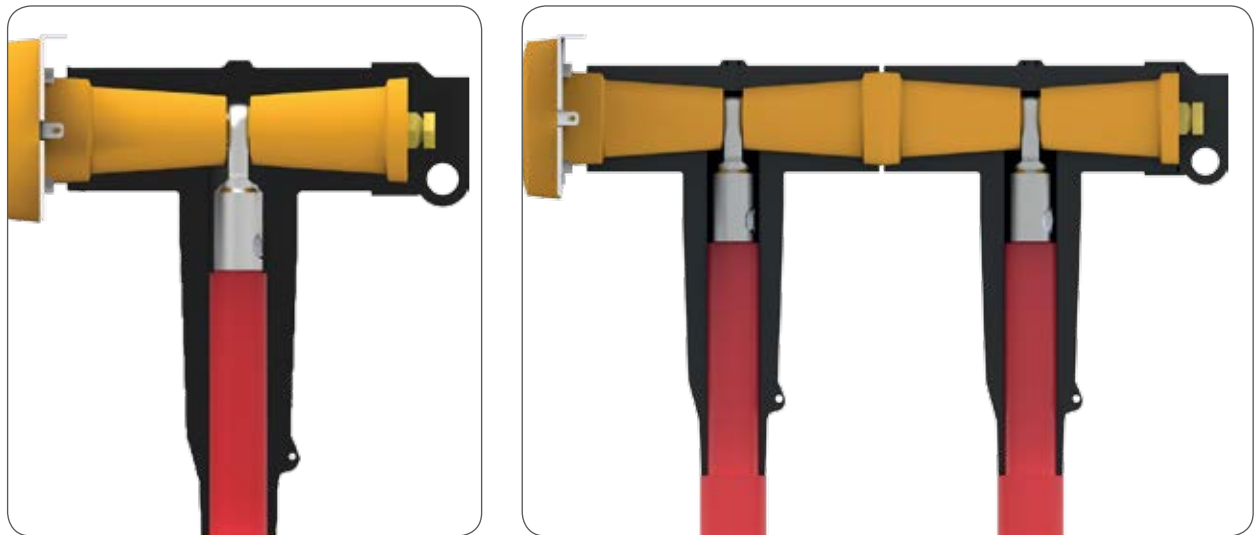
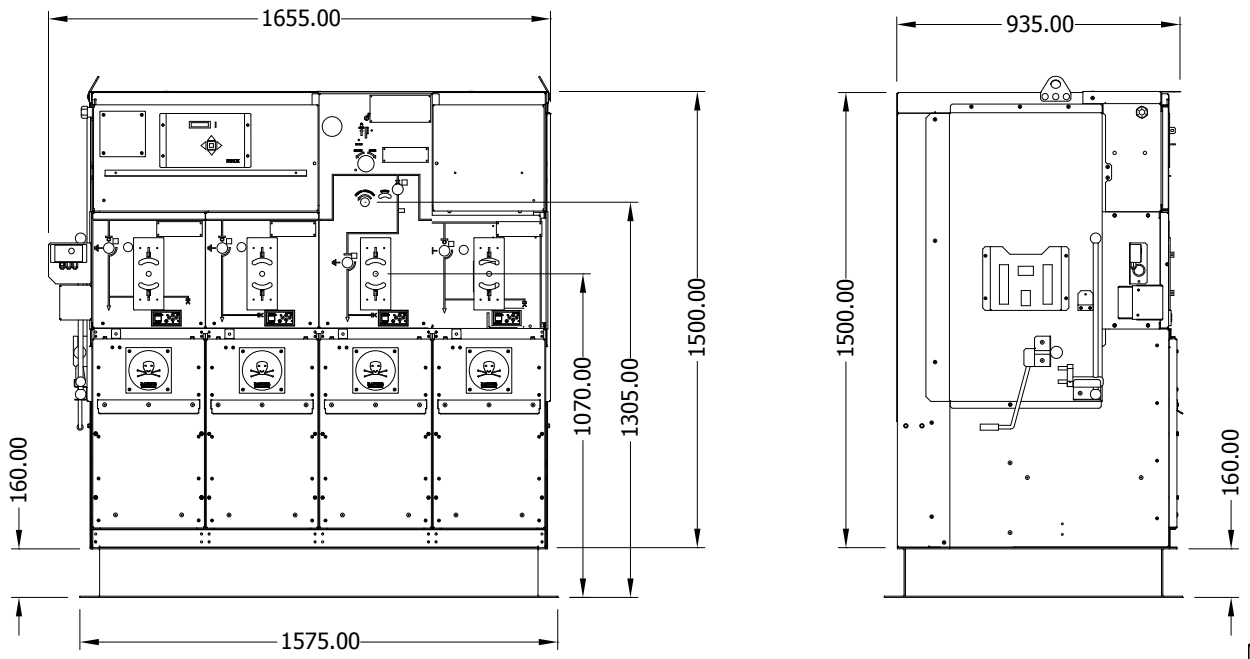


Figure 30: "L - Type" Cable Termination Alternatives

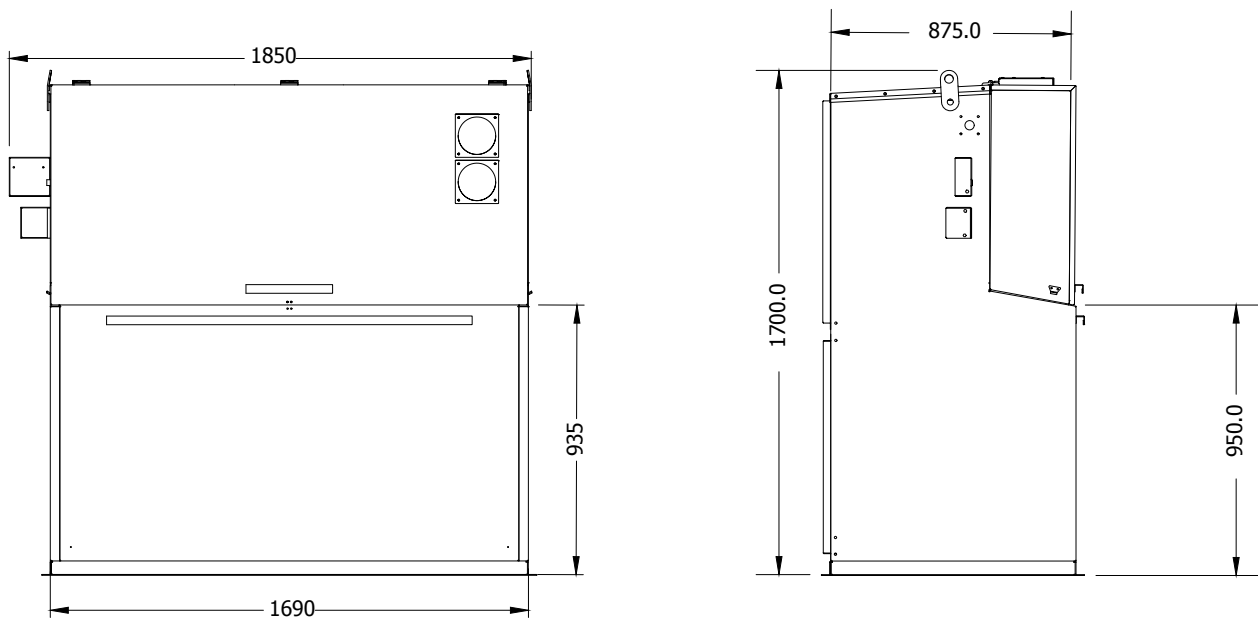
Dimensions

SSBS and SBBS 4- Way Compact Indoor Type RMU



17.5 kV, 2 ring switches Up to 630 A + 2 vacuum circuit breakers up to 630 A
 17.5 kV, 3 ring switches Up to 630 A + 1 vacuum circuit breaker up to 630 A

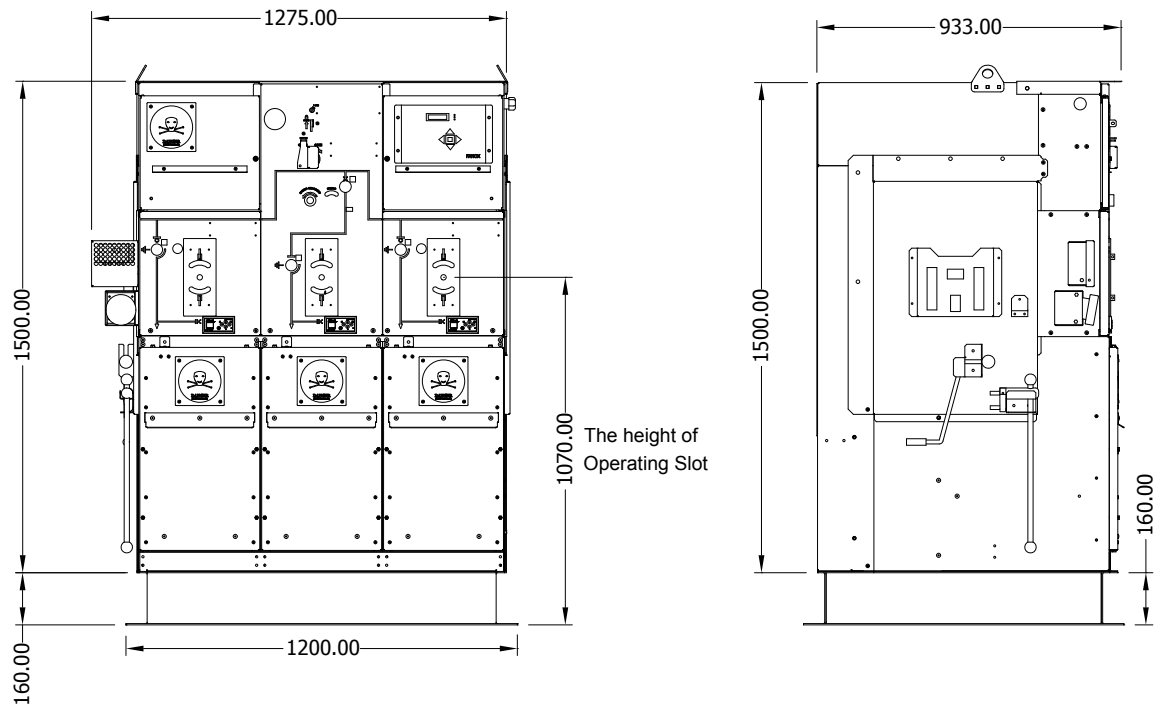
SBBS and SSBS 4-Way Compact Outdoor Type RMU



17.5 kV, 2 ring switches Up to 630A + 2 vacuum circuit breakers up to 630A
 17.5 kV, 3 ring switches Up to 630A + 1 vacuum circuit breaker up to 630A

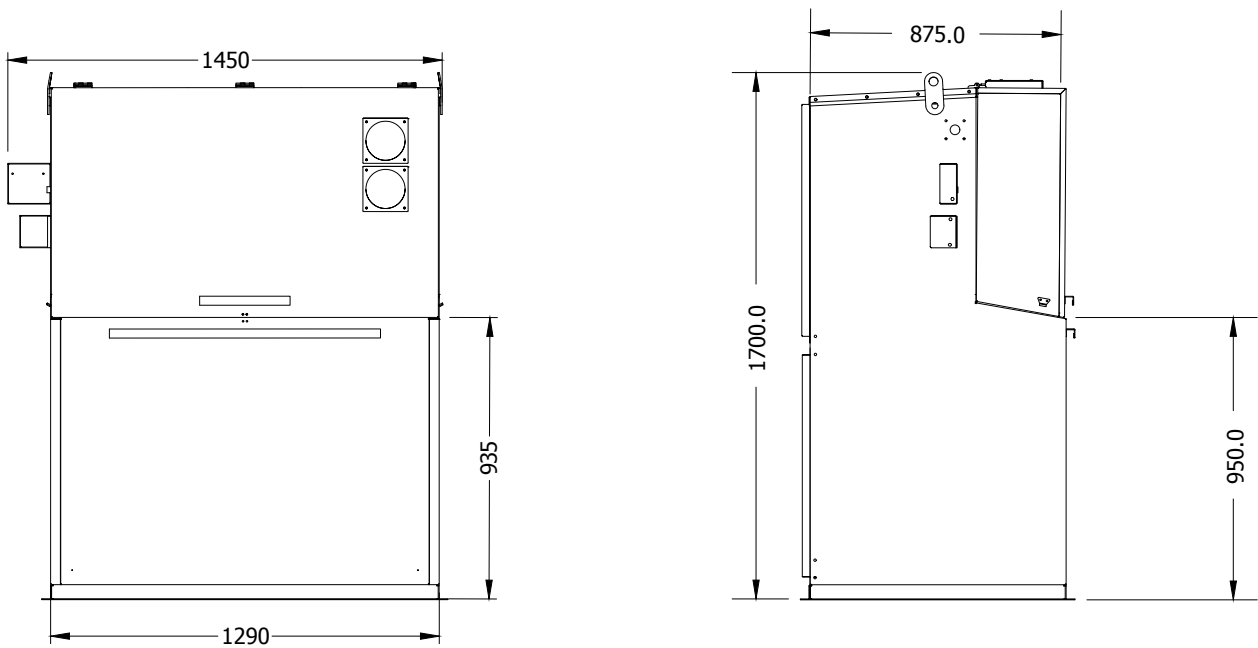
Dimensions

SBS 3 Way Compact Indoor Type RMU



17.5 kV, 2 ring switches Up to 630 A + 1 vacuum circuit breaker up to 630 A

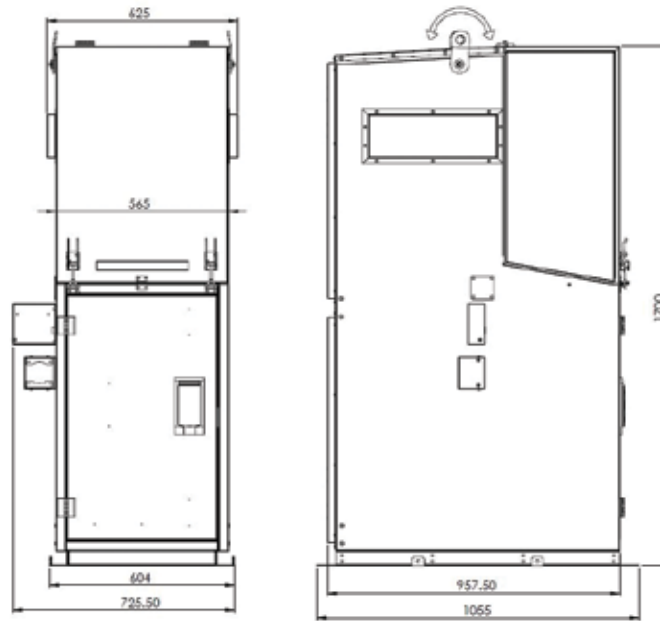
SBS 3-Way Compact Outdoor Type RMU



17.5 kV, 2 ring switches Up to 630A + 1 vacuum circuit breaker up to 630A

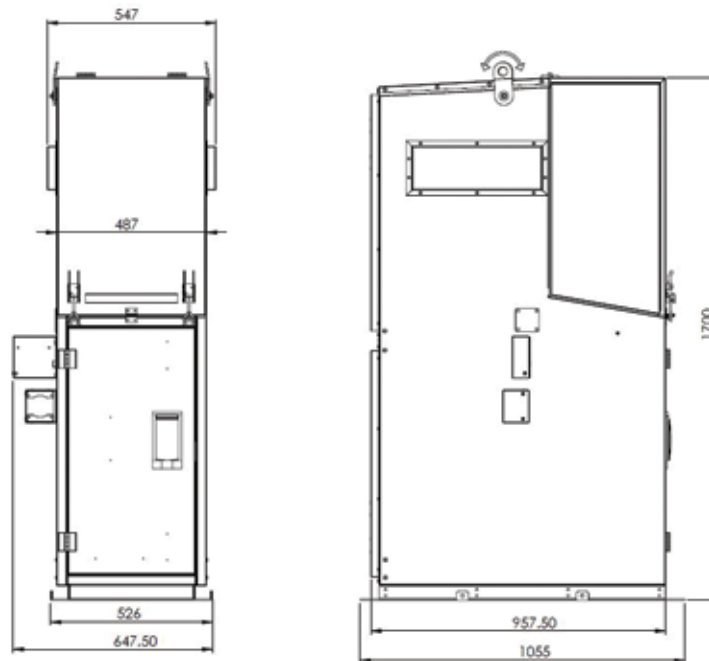
Dimensions

B Modular



12 kV, one vacuum circuit breaker / up to 630A

S Modular

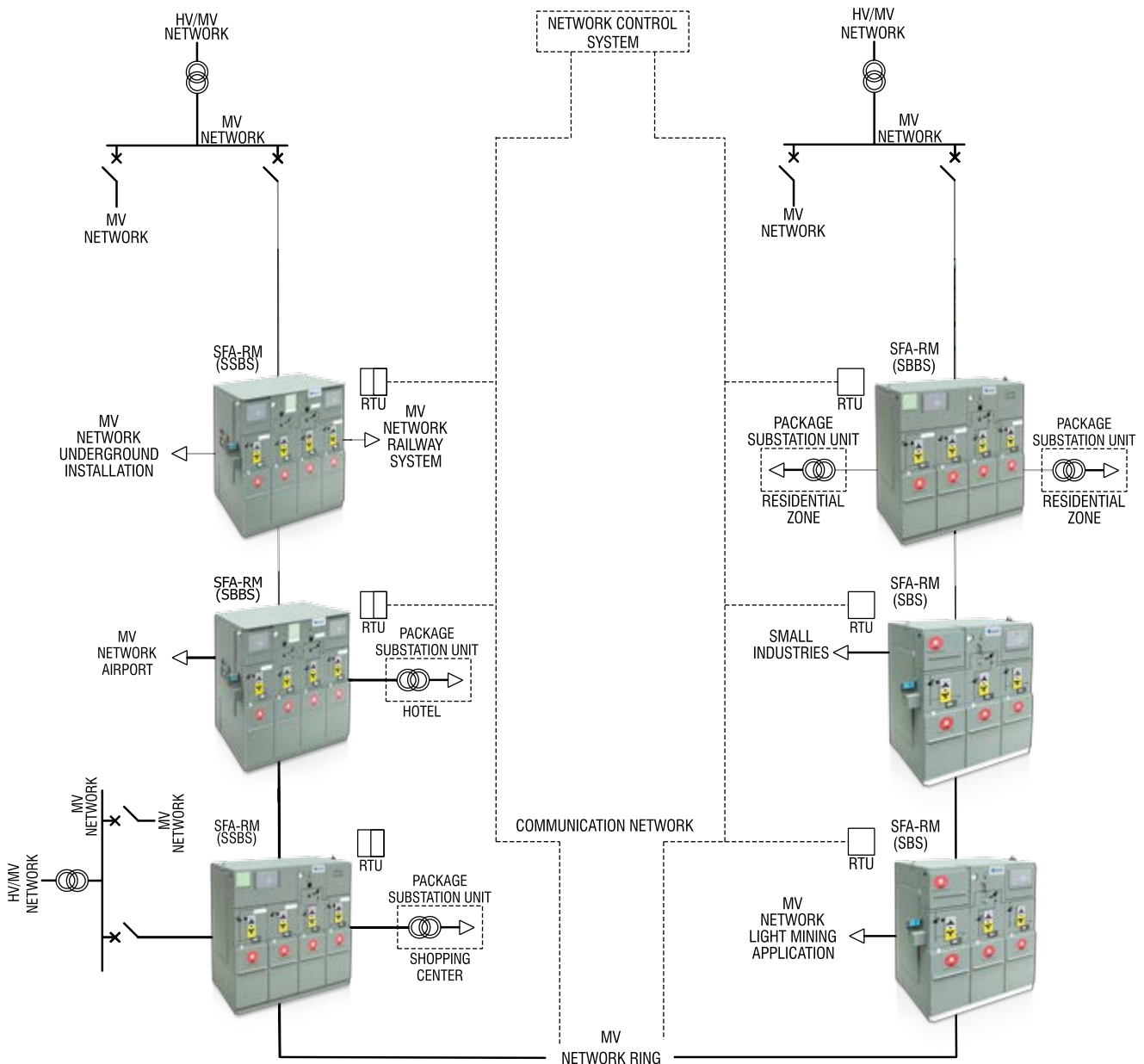


12 kV, one ring switch / up to 630A

SFA-RM - Smart

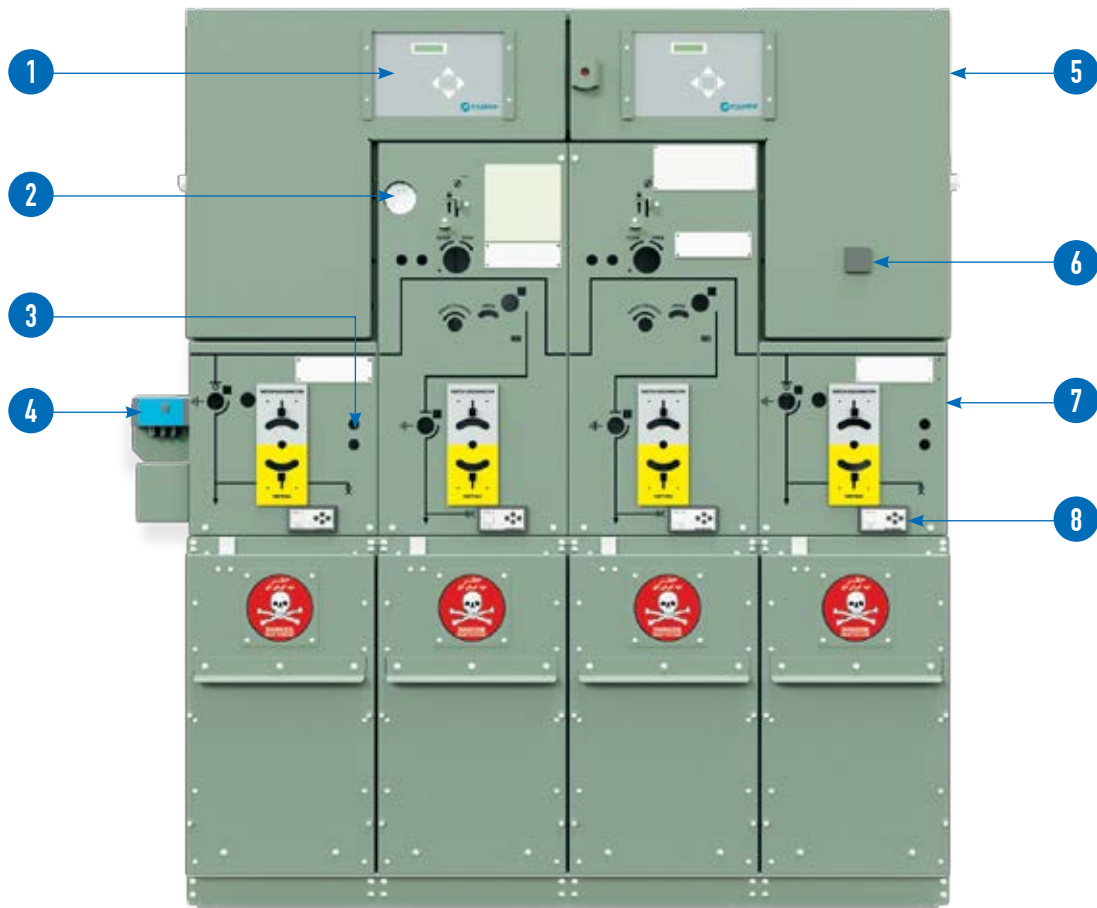
Introduction

- SFA-RM – Smart is remotely controllable with an integrated RTU and modem, it is designed to be used effectively in a medium voltage network and DAS (Distribution Automation System).
- It is self-powered equipment as the CPT (Control Power Transformer) is connected directly to the main bus.



SFA-RM - Smart

- Overview and Layout

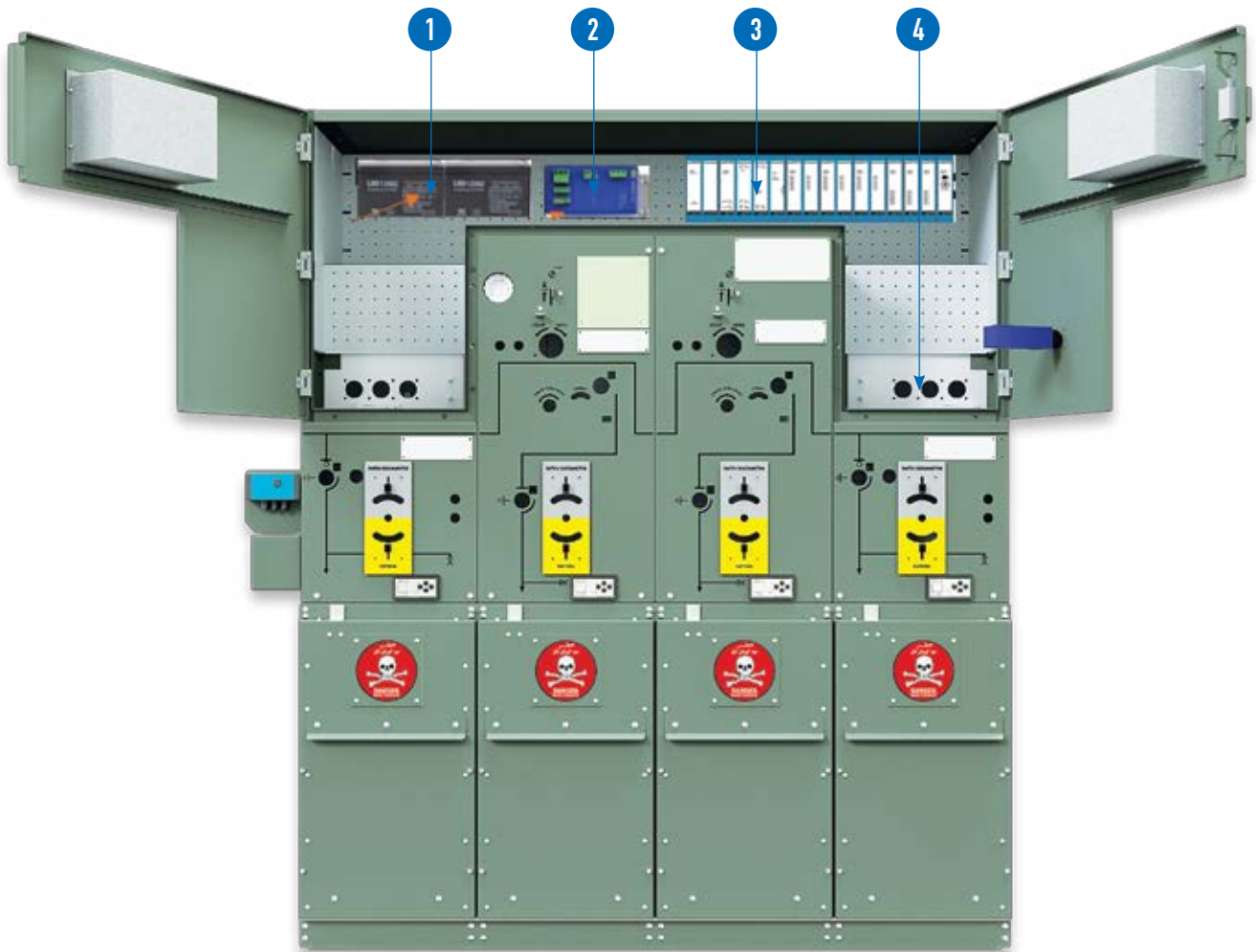


Front View

- | | | | |
|---|-----------------------|---|---------------------|
| 1 | Protection Relay | 5 | LV Compartment |
| 2 | SF6 Gas Indicator | 6 | L/R Selector Switch |
| 3 | ON & Off Push Buttons | 7 | MV Compartment |
| 4 | Earth Fault Indicator | 8 | CVI |

SFA-RM - Smart

- Overview and Layout



Open Doors View

- 1 Battery
- 2 AC/DC supply and battery charger
- 3 RTU with integrated modem and antenna
- 4 Cable test compartment

SFA-RM - Smart

- **Control and Measuring Function**



SFA-RM - Smart has an integrated (RTU) to provide the capability of remote monitoring and control via the control center.

Connection between the local RTU and control center is established over a secured Virtual Private Network connection (VPN) or through an access point named “APN”

The exchanged data

- Status information from RTU to data center
- Control signal from control center to RTU
- Analog measurements

Status information from RTU to data center

- Close/Open for each CB/LBS
- Earth status for each circuit
- Lock /Unlock for each circuit
- Selector switch status local/remote
- SF6 Gas pressure low/normal
- Power supply status
- Door open/close

Control command from control center to RTU

- Close/Open for each circuit
- Lock/Unlock for each circuit

Analog measurements

- V_ phase (A,B,C)
- I_ phase (A,B,C)
- Frequency
- Total active power [kW]
- Total reactive power [kVAR]
- Total apparent power [kVA]

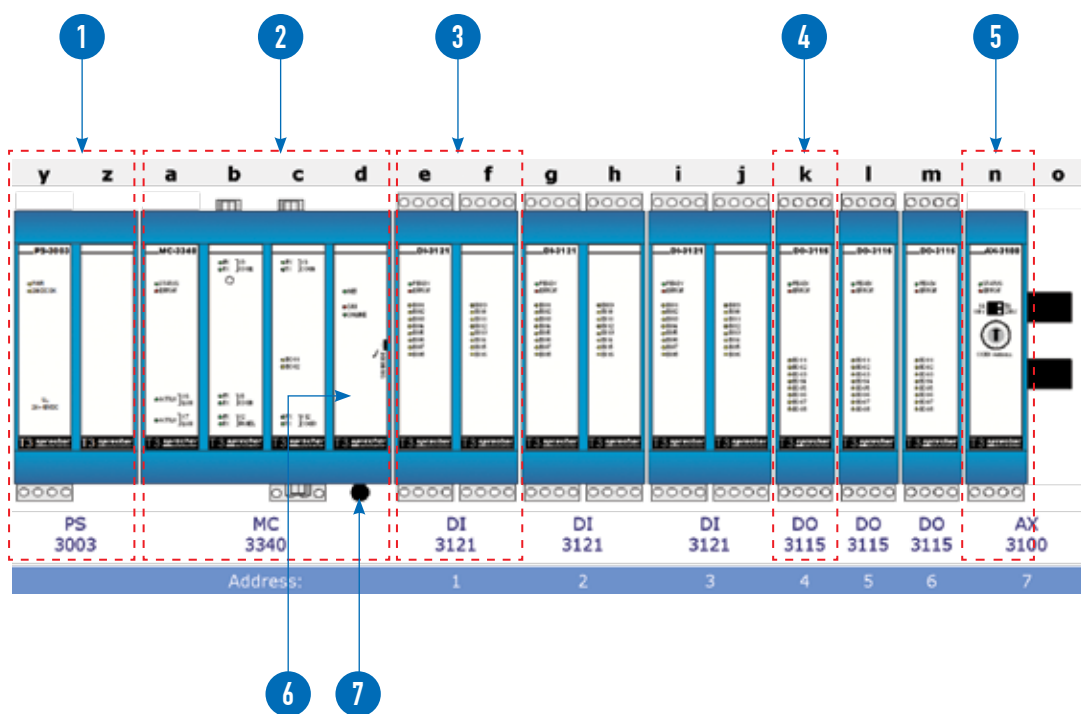
SFA-RM - Smart

- RTU (Remote Terminal Unit)

A - Overview

The RTU is a device installed at a remote location that collects data, codes the data into a format that is transmittable and transmits the data back to a central station, or master.

The RTU collects information from the master device and implements processes that are directed by the master. RTUs are equipped with input channels for sensing or metering, output channels for control, indication or alarms and a communications port.



- 1 Power Supply
- 2 CPU Processor
- 3 DI Digital Input
- 4 DO Digital Output
- 5 CT/TV Module
- 6 Integrated 3G Modem
- 7 Antenna

SFA-RM - Smart

B - Features & function:

1. Data gathering: collect digital and analog inputs from the RMU's elements and measuring sensors
2. Processing the received signals with a highly sophisticated logic engineering environment as per IEC61131-3.
3. Reporting and receiving the data from/to control center through one of the available communication ports
4. Record and retrieve event and alarm list
5. Acting as master station for the protection relay
6. Communicate simultaneously on all communication ports
7. Modular extendable RTU



C - Supported Protocols

- 1 - Tele control protocols: IEC 60870-5-101/ -104
- 2 - Station bus protocols: IEC 60870-5-101/ -104
- 3 - IED protocols:
 - IEC 60870-5-101/ -103/ -104
 - Modbus
 - SAT 1703
- 4 - Electric metering protocol: IEC 62056 (IEC 1107)
- 5 - Standards GSM/GPRS
- 6 - GSM frequencies: 850, 900, 1800, 1900 MHz

• Power Supply and Batteries:

The proposed Smart RMU is a self-powered unit, where the Supplied power comes from the CPT (Control Power Transformer) which is directly connected to the live bus and feeds the AC/DC converter and battery system by 220VAC.

The AC/DC converter and battery system feed all equipment in the LV circuit by 24 VDC including the aux relays, RTU, modem and trip close motor coils. The batteries are capable of providing sufficient power to buffer the load for more than 24 hours with up to 120 single operations.

Ordering

For easy selection please use table No 4:

Function	Code	Description
Unit Configuration	MT	Metering
	S	Load break switch
	B	Circuit breaker
Ingress Protection (IP)	41	Indoor application
	54	Outdoor application
System Voltage	17	17.5 kV
	12	12 kV
Load break Switch Rating	63	630 Amp
	40	400 Amp
Circuit Breaker Rating	2	200 Amp
	4	400 Amp
	6	630 Amp
Function	M	Motorized
	NM	Non-Motorized
	E	Extensible
	NE	Non extensible

Table 3: Code List

Unit Configuration	Voltage System	Extensibility	Ingress Protection	Load Break Switch	Circuit breaker	Motor Kit	Tee-off load rating 1	Tee-off load rating 2
S B MT SBS	12	E	54	63 40	2 4 6	M NM	T1 T2 T3 T4 T5 ¹	T1 T2 T3 T4 T5 ¹
SBS SSBS SBBS	17	NE	41 54					

Table 4: Code Map

Transformer rating (1&2) is applicable only with circuit breaker

- T1 < 250 KVA
- 250 KVA < T2 < 1500 KVA
- 1500 KVA < T3 < 3000 KVA
- 3000 KVA < T4 < 6000 KVA
- T5 > 6000 KVA

¹ Please contact **alfanar** for further clarification

Example 1: SBS

SBS	12	E	54	63	4	NM	-	T2
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Example 2: SBS+S

SBS	12	E	54	63	4	NM	-	T2
S	12	E	54	63	4	NM	-	-

Example 3: SBS+B+B

SBS	12	E	54	63	4	NM	-	T2
B	12	E	54	63	4	NM	-	T3
B	12	E	54	63	4	NM	-	T1

Ordering

Unit Configuration	Voltage System	Extensibility	Ingress Protection	Load Break Switch	Circuit breaker	Motor Kit	Tee-off load rating 1	Tee-off load rating 2

Notes

A series of horizontal dotted lines for writing notes.



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