

Incoming or Outgoing, Fixed or Withdrawable Single Isolation Circuit Breaker up to 24 kV

Introduction

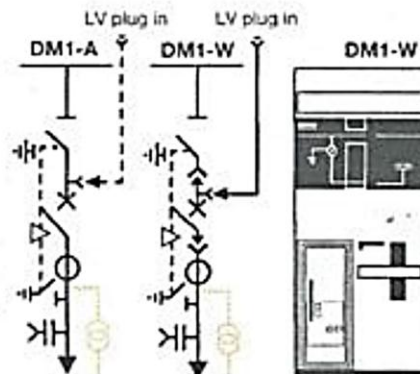
DM1-A & DM1-W are parts of SM6 product range and called as single section isolation circuit breaker. This modulator unit is used for the MV section of MV/LV substation in secondary distribution system up to 24 kV.

Application :

DM1-A is single isolation circuit breaker unit with fixed breaker, normally used as incoming or outgoing cubicle.

DM1-W is withdrawable single isolation circuit breaker unit and it is also used for incoming or outgoing feeder.

This DM1-A or DM1-W is normally installed together in system with other parts of SM6 product range such as IM, IMC, QM, QMC, CM, etc. in accordance with the design or distribution system.



Characteristic :

Rated maximum Voltage (kV)	12		24	
Rated voltage (kVrms)	7.2	12	17.5	24
Rated insulation level				
- 50Hz for 1 min (kVrms)	20	28	38	50
- impulse 1.2/50 μ S (kVp)	60	75	95	125
Rated current				
- load break switch (A)	400/630		400/630	
- busbar (A)	630		630	
- Circuit breaker (A)	400/630		400/630	
Short time withstand current				
- for rated current 400 A (kA/1s)	12.5		12.5	
- for rated current 630 A (kA/1s)	12.5		12.5	
	16		16	
	20		20	

** See fuse selection table

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Basic Equipment :

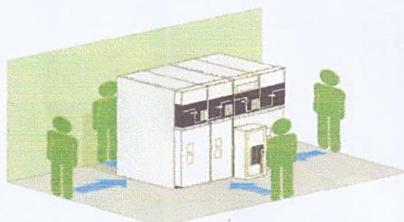
- Fluarc SF 1 circuit breaker 630 amp
- Three phase busbar 630 Amp.
- Disconnector and earthing switch.
- RI circuit breaker operating mechanism.
- CS disconnector operating mechanism.
- Enlarge low voltage compartment.
- Three current transformers.
- Auxiliary contacts on circuit breaker.
- CC earthing switch operating mechanism (only for DM1 -W)
- Downstream earthing switch.
- Heater 50 W , 220 V.
- Voltage indicator

Optional LV Control DM1-A

- DM 1-A fix LV cable connection
- DM 1-A plug In LV cable connection

Standard Recommendation

- **IEC standard :** 62271-200, 62271-1, 62271-103, 62271-105, 60255, 62271-100, 62271-102, 61869-2, 61869-3, 60044-8, 62271-206, 62271-304
- **UTE standard for 24kV :** NFC 13.100, NFC 13.200, NFC 64.130, NFC 64.160
- **EDF specification for 24kV :** HN 64-S-41, HN 64-S-43



Example of installation of an SM6-24 switchboard installed in the middle of a room downwards exhaust 16 kA 1 s, IAC: A-FLR. 4-sides internal arc protection

Internal arc withstand (in accordance with IEC 62271-200) :

- SM6-24:
 - 12.5 kA 1 s, IAC:A-FLR & IAC:A-FL
 - 16 kA 1 s, IAC:A-FLR & IAC:A-FL (Standard)
 - 20 kA 1 s, IAC:A-FLR & IAC:A-FL

Protection index :

- classes: PI (insulating partition)
- loss of service continuity classes: LSC2A (LSC1 for metering functions)
- units in switchboard: IP3X
- Between compartments: IP2X for SM6-24
- Cubicle: IK08 for SM6-24

Electro-magnetic compatibility :

- relays: 4 kV withstand capacity, as per recommendation IEC 60801.4
- compartments:
 - electrical field:
 - 40 dB attenuation at 100 Mhz
 - 20 dB attenuation at 200 Mhz
 - magnetic field: 20 dB attenuation below 30 Mhz.

Temperatures :

The cubicle must be stored and installed in a dry area free from dust and with limited temperature variations.

- for stocking: from -40°C to +70°C,
- for working: from -5°C to +40°C,
- other temperature, consult us.

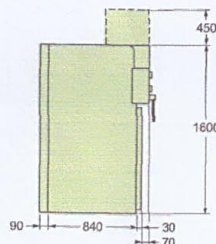
Optional Accessories :

- For Cubicle
 - Auxiliary contacts on the disconnector.
 - Protection using sepam programmable electronic units.
 - Three voltage transformers
 - Key type interlocks
- For Circuit Breaker
 - Motor operating mechanism.
 - Low energy MITOP or Undervoltage opening release.
 - Opening and closing shunt trip.
 - Operation counter.

Over all dimension	DM1-A	DM1-W
Width	750 mm	750 mm
Depth	1.230 mm	1.230 mm
Height	1.600 mm	1.600 mm
LV compartment (h')	450 mm	450 mm
Approximate weight	410 kg	410 kg
Cable connect. Height (measure from floor)	430 mm	370 mm

Cabling : Through trenches

Type of cables : single core



Low-voltage monitoring control cabinet for SM6-24

It enables the cubicle to be equipped with low voltage switchgear providing protection, control, status indication and data transmission. According to the volume, it is available in 3 versions: cover, wiring duct and cabinet.

A - LV cover: enables a very simple low voltage section to be installed such as indication buttons, push buttons or protection relays. The total height of the cubicle is then 1600mm.

B - LV wiring duct and cabinet: enables a large majority of low voltage configurations to be installed. It also takes the Sepam series 20 or series 40. The total cubicle height is then 1690mm.

C - LV control cabinet: this is only used for larger low voltage accessories or those with a depth greater than 100mm or complex equipment, such as Sepam series 60 or series 80, converters, control and monitoring units, regulating transformers or dual secondary transformers. The total height of the cubicle then becomes 2050mm. In all cases, these volumes are accessible, with cables and busbars energised, without de-energising the substation.



16 kA/1s as IAC : A - FLR (bottom exhaust gas)

SF1 circuit breaker

The Fluarc SF1 circuit breaker is made up of three separate poles, mounted on a structure supporting operating mechanism. Each pole-unit houses all the active elements in an insulating enclosure filled with gas to a relative pressure of 0.5 bars (500hp). This system offers maximum operating reliability:

■ gas tightness

The enclosure filled with SF₆ gas satisfies "sealed pressure system" requirement and seal tightness is always checked in the factory.

■ operating safety

As for switch-unit, accidental over pressure are eliminated by the opening of the safety membrane.

■ breaking principle

The circuit breaker is based on the SF₆ gas autocompression principle. The inherent qualities of SF₆ and the soft break resulting from this technique reduce switching over-voltage.

■ precompression

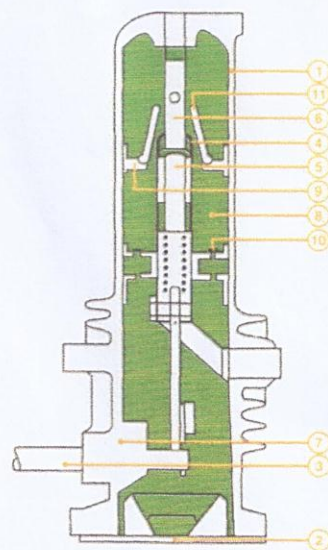
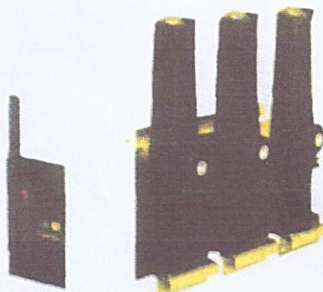
When the contacts begin to open, the piston slightly compresses the SF₆ gas in the pressure chamber.

■ arcing period

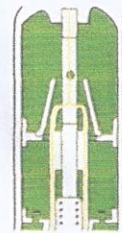
The arc then forms between the arching contacts and the piston continuous its downward movement. A small quantity of gas, directed by the insulating nozzle, is injected into the arc. The cooling of the arc is thus achieved through forced convection for the interruption of low currents, however, during the interruption of high currents, thermal expansion is responsible for the transfer of the hot gasses toward the cold parts of the pole unit. Toward current zero, the distance between the two arcing contacts is sufficient for final interruption of the SF₆ gas.

■ sweeping over-stroke

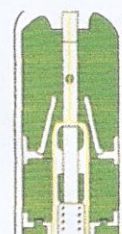
The moving parts finish their travel whereas the cold gas injection continuous until the contacts are completely opened.



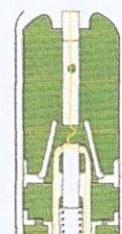
- 1 enclosure
- 2 bottom cover
- 3 operating shaft
- 4 main moving contact
- 5 moving arching contact
- 6 fixed arching contact
- 7 sealing system
- 8 compression chamber
- 9 moving piston
- 10 valves
- 11 insulating nozzle



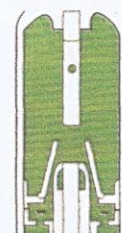
contacts closed



precompression



arcing period



contacts open

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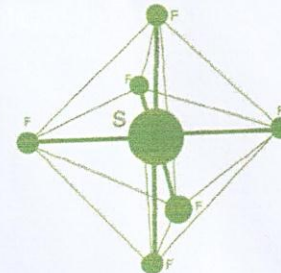
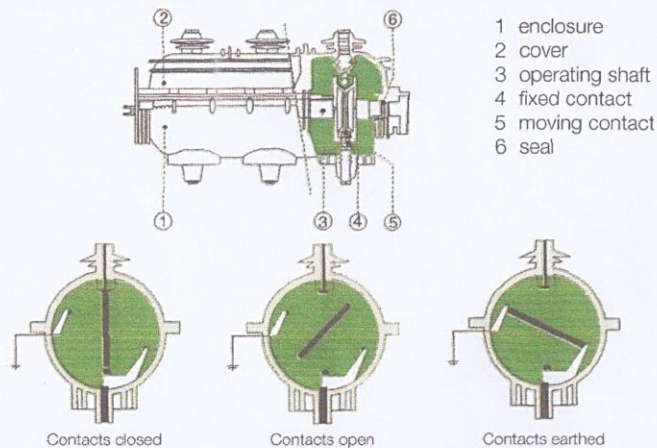
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Load break switch or disconnecter and earthing switch :



SM6 load break switches and earthing switches use sulphur hexafluoride gas (SF6) for insulation and breaking. The active parts are placed in insulated enclosure in accordance with the definition of IEC 567 Appendix EF (1987 edition) for sealed pressure system. These devices offer remarkable characteristics:

- long life service
- maintenance - free active parts
- high electrical endurance
- over - voltage levels very low
- safety operation

Current transformer for DM1-A and DM1-W units.

- Characteristic according to IEC standard 60044-1 (New Standard 61869-2)
- Double primary winding
- Double secondary winding for measurement and protection

Short-time withstand current I_{th} (kA)

I _{ln} (A)	10-20		20-40	25-50		50-100	75-150	100-200		200-400	300-600
I _{th} (kA)	5kA		12.5kA			14.5kA	16kA			25kA	
t (s)	1 s										
Measurement & Protection	5A	7.5VA-class 0.5		15VA-class 0.5		30VA - class 0.5					
	5A	5VA-5P10				5VA-5P15					
I _{ln} (A)	10-20	15-30	20-40	25-50	30-60	50-100	75-150	100-200	150-300	200-400	300-600
I _{th} (kA)	4kA	6kA	8kA		10kA	12.5kA		16kA		25kA	
t (s)	1 s										
Measurement & Protection	5A	7.5VA-class 0.2		15VA-class 0.2	10VA-class 0.2	30VA-class 0.2					
	5A	5VA-5P10				5VA-5P15					
I _{ln} (A)	10-20	15-30	20-40	25-50	30-60	50-100	75-150	100-200	150-300	200-400	300-600
I _{th} (kA)	4kA	6kA		8kA	10kA	12.5kA		16kA		25kA	
t (s)	1 s										
Measurement & Protection	5A	7.5VA-class 0.2		15VA-class 0.2	10VA-class 0.2	30VA-class 0.2					
	5A	5VA-5P10				5VA-5P15					

Current transformer for DM1-A and DM1-W units.

- Characteristic according to IEC standard 60044-1 (New Standard 61869-2)
- Single primary winding
- Double secondary winding for measurement and protection

Short-time withstand current I_{th} (kA)

I_n (A)	10	15	20	25	30	50	75	100	150	200	300
I_{th} (kA)	4kA	6kA	8kA	10kA	12.5kA	16kA	25kA				
t (s)	1 s										
Measurement & Protection	5A	7.5VA-class 0.2	15VA-class 0.2	10VA-class 0.2	30VA-class 0.2	5VA-5P15					
	5A	5VA-5P10									
I_n (A)	10	15	20	25	30	50	75	100	150	200	300
I_{th} (kA)	4kA	6kA	8kA	10kA	12.5kA	16kA	25kA				
t (s)	1 s										
Measurement & Protection	5A	7.5VA-class 0.2	15VA-class 0.2	10VA-class 0.2	30VA-class 0.2	5VA-5P15					
	5A	5VA-5P10									

Voltage transformer for DM1-A and DM1-W units.

- Characteristic according to IEC standard 60044-2 (New Standard 61869-3)

Rated voltage (kV)	24
Primary voltage (kV)	20kV/ $\sqrt{3}$ 15-20kV/ $\sqrt{3}$
Secondary voltage (V)	100V/ $\sqrt{3}$
Accuracy class	0.2 0.5
Rated output for single primary winding (VA)	25
Rated output for double primary winding (VA)	30-50