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FLUOKIT M+

MV modular switchgear up to 24kV



**Technical
Specifications**



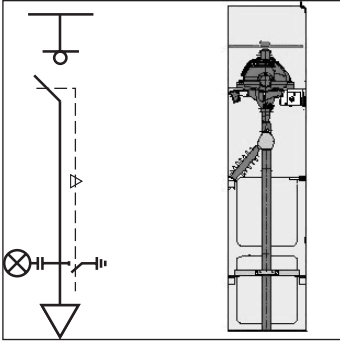
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Cubicle equipment

IS Cubicle: Incoming or outgoing



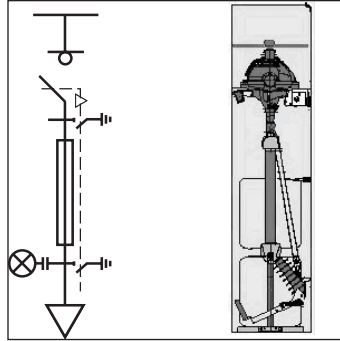
Standard equipment:

- > 3-pole busbar.
- > ISR switch-disconnector.
- > C 410 operating device.
- > Earthing switch.
- > Voltage indicator device.
- > LV compartment.

Options:

- > C 410M, C 440 or C 440M operating device.
- > 1 heating resistor.
- > 3 current transformers.
- > 3 lightning arresters.
- > Spacious LV compartment.
- > Signaling auxiliary contacts.
- > Base (Height : 400 or 700 mm).
- > Phase fault indicator.
- > Earth fault indicator.

PF cubicle: Transformer protection without 3-phase tripping



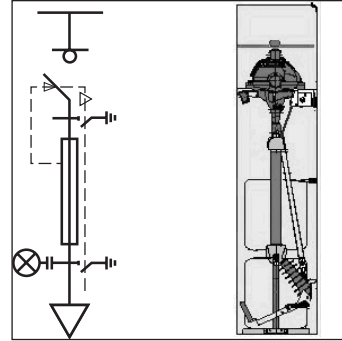
Standard equipment:

- > 3-pole busbar.
- > ISR switch-disconnector..
- > C 410 operating device.
- > 3 fuses (see fuse choice).
- > Upstream and downstream of fuses earthing switches.
- > Voltage indicator device.
- > LV compartment.

Options:

- > 1 heating resistor.
- > 3 current transformers.
- > Spacious LV compartment.
- > Signaling auxiliary contacts.
- > Base (Height : 400 or 700 mm).
- > Lateral cable outgoing.

PFA cubicle: Transformer protection with 3-phase tripping



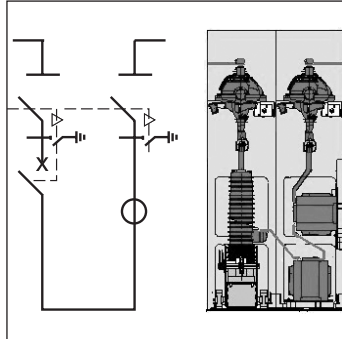
Standard equipment:

- > 3-pole busbar.
- > ISR switch-disconnector.
- > C 430 operating device.
- > 3 fuses (see fuse choice).
- > Upstream and downstream of fuses earthing switches.
- > Voltage indicator device.
- > LV compartment.

Options:

- > C 430M, C 440 or C 440M operating device.
- > 1 heating resistor.
- > 3 current transformers .
- > Spacious LV compartment.
- > Signaling auxiliary contacts.
- > Base (Height : 400 or 700 mm).
- > Lateral cable outgoing.

**PGB cubicle: Bus section
general protection**



Standard equipment:

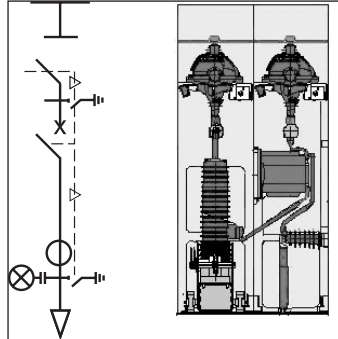
- > 3-pole busbar.
- > 2 disconnecter equipped with C 410 operating device.
- > ORTHOFLUOR FP circuit breaker equipped with BLR operating device.
- > 3 current transformers.
- > 2 earthing switch.
- > LV compartment.

Nota : Left or right arrangement.

Options:

- > 1 heating resistor.
- > BLRM electrical operating device.
- > Protection device with or without auxiliary supply.
- > 3 additional core or 3 voltage transformers.
- > Spacious LV compartment.
- > Signaling auxiliary contacts.
- > Base (Height : 400 mm).

**PGc cubicle: Cable feeder
circuit breaker protection**



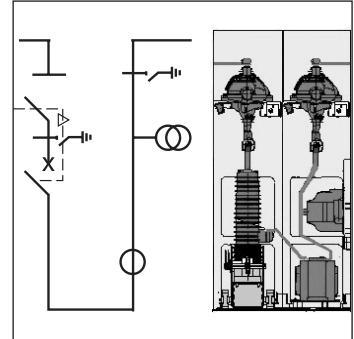
Standard equipment:

- > 3-pole busbar.
- > 1 disconnecter equipped with C 410 operating device.
- > ORTHOFLUOR FP circuit breaker equipped with BLR operating device.
- > Making capacity earthing switch with C 410 S operating mechanism.
- > Voltage indicator device.
- > 3 current transformers.
- > Earthing switch.
- > LV compartment.

Options:

- > 1 heating resistor.
- > BLRM electrical operating device.
- > Protection device with or without auxiliary supply.
- > 3 additional core or 3 voltage transformers.
- > Lightning arresters.
- > Spacious LV compartment.
- > Signaling auxiliary contacts.
- > Base (Height : 400 mm).

**PGc + LR Cubicles:
Coupling + bus riser**



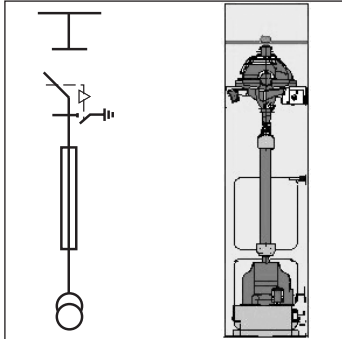
Standard equipment:

- > 3-pole busbar.
- > 1 disconnecter equipped with C 410 operating device.
- > ORTHOFLUOR FP circuit breaker equipped with BLR operating device.
- > Earthing switch.
- > 3 current transformers.
- > LV compartment.

Options:

- > 1 heating resistor.
- > BLRM electrical operating device.
- > Protection device with or without auxiliary supply.
- > 3 additional cores or voltage transformers.
- > Making capacity busbar earthing switch with C 410 XS operating mechanism.
- > Lightning arresters.
- > Spacious LV compartment.
- > Signaling auxiliary contacts.
- > Base (Height : 400 mm).

TM cubicle: HV metering



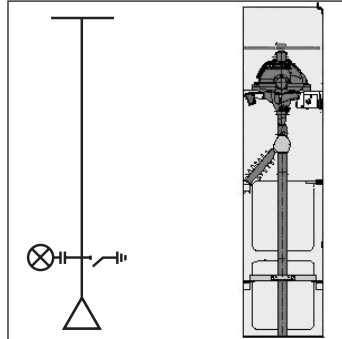
Standard equipment:

- > 3-pole busbar.
- > Disconnector.
- > Three 6,3 A MV fuses.
- > 3 voltage transformers.
- > 3 10 A LV fuses for voltage transformer secondaries protection.
- > Earthing switch.
- > LV compartment.

Options:

- > 1 heating resistor.
- > HV fuse melting signaling.
- > Spacious LV compartment.
- > Signaling auxiliary contacts.
- > Base (Height : 400 or 700 mm).
- > Multi-ratio transformers

LST cubicle: Direct incoming



Standard equipment:

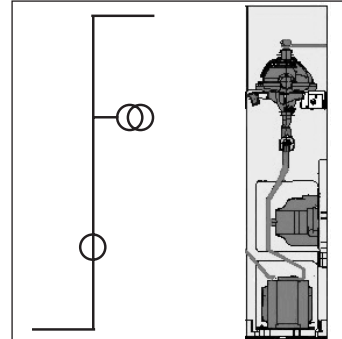
- > 3-pole busbar.
- > Bus riser.
- > Earthing switch with C 410 XS operating mechanism.
- > Voltage indicator device.

Options:

- > 1 heating resistor.
- > 3 current transformers.
- > Lightning arresters.
- > Base (Height : 400 or 700 mm).

Nota : For double supply (DD) or normal emergency (NS) cubicles, please contact us.

LR cubicle: Bus riser



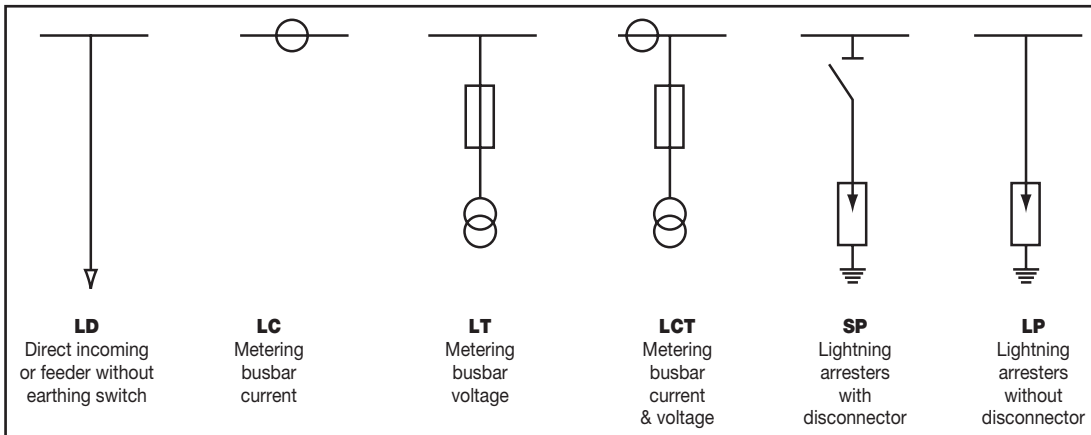
Standard equipment:

- > 3-pole busbar.
- > Bus riser.

Options:

- > 1 heating resistor.
- > 3 current and 3 voltage transformers.
- > Base (Height 400 or 700 mm).
- > 3 lightning arresters.
- > 1 earthing switch.

Other cubicles⁽²⁾ :



(2) For specifications of these cubicles, please contact us.



Cubicle technical specifications

Cubicle technical specifications (to IEC standard 62 271-200)

Rated voltage (kV)		7.2	12	17.5	24
Rated withstand voltage					
Lightning impulse (kVp)	To earth and between poles	60	75	95	125
	Isolating distance	70	85	110	145
50 Hz 1 min. (kV rms)	To earth and between poles	20	28	38	50
	Isolating distance	23	32	45	60
Short time current					
Rms value (kA 1s)	Cubicles IS/PF/PFA	12.5 ⁽¹⁾ - 16 ⁽¹⁾ 20 ⁽²⁾ - 25	12.5 ⁽¹⁾ - 16 ⁽¹⁾ 20 ⁽²⁾ - 25	12.5 ⁽¹⁾ - 16 ⁽¹⁾ 20 ⁽²⁾ - 25	12.5 ⁽¹⁾ - 16 ⁽¹⁾ 20 ⁽²⁾
	Cubicles PGB/PGC/TM/SP	12.5 ⁽¹⁾ - 16 ⁽¹⁾ 20 ⁽²⁾ - 25	12.5 ⁽¹⁾ - 16 ⁽¹⁾ 20 ⁽²⁾ - 25	12.5 ⁽¹⁾ - 16 ⁽¹⁾ 20 ⁽²⁾ - 25	12.5 ⁽¹⁾ - 16 ⁽¹⁾ 20 ⁽²⁾ - 25
	Cubicles LST/LR/LD	12.5 ⁽¹⁾ - 16 ⁽¹⁾ 20 ⁽²⁾ - 25	12.5 ⁽¹⁾ - 16 ⁽¹⁾ 20 ⁽²⁾ - 25	12.5 ⁽¹⁾ - 16 ⁽¹⁾ 20 ⁽²⁾ - 25	12.5 ⁽¹⁾ - 16 ⁽¹⁾ 20 ⁽²⁾ - 25
	Cubicles LC/LT/LCT/LP	12.5 - 16 20 - 25	12.5 - 16 20 - 25	12.5 - 16 20 - 25	12.5 - 16 20 - 25
Peak value (kAp)	Cubicles IS/PF/PFA	31.5 - 40 50 - 63	31.5 - 40 50 - 63	31.5 - 40 50 - 63	31.5 - 40 50
	Cubicles PGB/PGC/TM/SP	31.5 - 40 50 - 63	31.5 - 40 50 - 63	31.5 - 40 50 - 63	31.5 - 40 50 - 63
	Cubicles LST/LR/LD	31.5 - 40 50 - 63	31.5 - 40 50 - 63	31.5 - 40 50 - 63	31.5 - 40 50 - 63
	Cubicles LC/LT/LCT/LP	31.5 - 40 50 - 63	31.5 - 40 50 - 63	31.5 - 40 50 - 63	31.5 - 40 50 - 63
Cubicle					
Rated current (A)	Cubicles IS/LR/LST/LD	400 - 630	400 - 630	400 - 630	400 - 630
	Cubicles PF/PFA	200	200	200	200
	Cubicles LC/LT/LCT/SP/LP				
	Cubicles PGB/PGC	400 - 630 1250	400 - 630 1250	400 - 630 1250	400 - 630 1250
	Cubicles TM	50	50	50	50
Busbar rated current (A)		400 - 630 1250	400 - 630 1250	400 - 630 1250	400 - 630 1250
Internal arc withstand (kA - 1s.) IEC 62 271-200		12.5 - 16 - 20	12.5 - 16 - 20	12.5 - 16 - 20	12.5 - 16 - 20
(kA - 0.7 s) (EDF variant)		12.5	12.5	12.5	12.5
Earthing switch making capacity (kAc)					
Downstream earthing switch	Cubicles IS/LST/LR/PGC	31.5 - 40 50 - 63	31.5 - 40 50 - 63	31.5 - 40 50 - 63	31.5 - 40 50
	Cubicles PF/PFA	2.5	2.5	2.5	2.5
	Cubicles PGB + TM	2.5	2.5	2.5	2.5
Enclosure degree of protection ⁽³⁾		IP3X	IP3X	IP3X	IP3X
Approximate heat dissipation (W/Cubicle)					
	Cubicles IS/LR/LST/TM	40	40	40	40
	Cubicles PF/PFA (with fuses 43A)	280	280	280	280
	Cubicle PGB	350	350	350	350
	Cubicle PGC	250	250	250	250
Force on floor (daN)					
	Cubicles PGB/PGC	450 ⁽⁴⁾	450 ⁽⁴⁾	450 ⁽⁴⁾	450 ⁽⁴⁾
	Other cubicles (except LR)	80 ⁽⁴⁾	80 ⁽⁴⁾	80 ⁽⁴⁾	80 ⁽⁴⁾

(1) 3 s. possible / (2) 2 s. possible / (3) Mechanism covers : IP 2XC. For higher degree, call us / (4) Weight of cubicle not included.



Breaking device specifications

ISR switch-disconnector (to IEC standard 62271-102)

Rated voltage	(kV)	12	17.5	24
Rated current	(A)	400 - 630	400 - 630	400 - 630
Breaking capacity Cos $\varphi = 0.7$	(A)	400 - 630	400 - 630	400 - 630
Breaking capacity				
Cable-charging	(A)	16	16	16
No-Load transformer	(A)	16	16	16
Single capacitor bank	(A)	400	400	400
Making capacity	(kAp)	31.5 - 40 - 50 - 63	31.5 - 40 - 50 - 63	31.5 - 40 - 50
Operating time (average)				
Opening (shunt trip coil)	(ms)	50	50	50
Opening (undervoltage trip coil)	(ms)	CA=100 / CC=50	CA=100 / CC=50	CA=100 / CC=50
Arcing	(ms)	<10 ≤15	<10 ≤15	<10 ≤15
Closing	(ms)	50	50	50
Mechanical endurance	(C/O)	1000	1000	1000
Electrical endurance	(C/O at In)	100	100	100
Rated SF6 pressure (relative at 20°C)	(MPa)	0.045	0.045	0.045

ISR switch-disconnector fuses combination (to IEC standard 62271-105)

Rated voltage	(kV)	12	17.5	24
Rated transient current	(A)	2000	1600	1200
Opening time in case of sticker activation To	(ms)	44	44	44

ORTHOFLUOR FP circuit breaker (to IEC standard 62271-100)

Rated voltage	(kV)	12	17.5	24
Rated current	(A)	400 - 630 - 1250	400 - 630 - 1250	400 - 630 - 1250
Breaking capacity	(kA)	12.5 - 16 - 20 - 25	12.5 - 16 - 20 - 25	12.5 - 16 - 20 - 25
Breaking capacity				
Cable-charging	(A)	31.5	31.5	31.5
Line-charging	(A)	10	10	10
Single capacitor bank	(A)	780	780	780
Making capacity	(kAp)	63	63	63
Operating time (average time)				
Opening (shunt trip coil)	(ms)	45	45	45
Opening (undervoltage trip coil)	(ms)	CA=110 / CC=60	CA=110 / CC=60	CA=110 / CC=60
Arcing	(ms)	20	20	20
Closing	(ms)	CA/CC=80	CA/CC=80	CA/CC=80
Rated opening sequences		O - 3 min. - CO - 3 min. - CO O - 0.3 s. - CO - 3 min. - CO O - 0.3 s. - CO - 15 s. - CO		
Mechanical endurance	(C/O)	5000	5000	5000
Electrical endurance	(C/O at In)	5000	5000	5000
Rated SF6 pressure (relative at 20°C)	(MPa)	0.35	0.35	0.35



Operating device for ISR switch-disconnector

Operating principle

Operating devices used are of the energy storage type.

The energy necessary for operations is obtained by the compression of a spring. The operation, always independent of the operator, is made either

after passing through a dead point (Tumbler type), or upon action of a local control button or a coil or a fuse striker pin to release a latch.

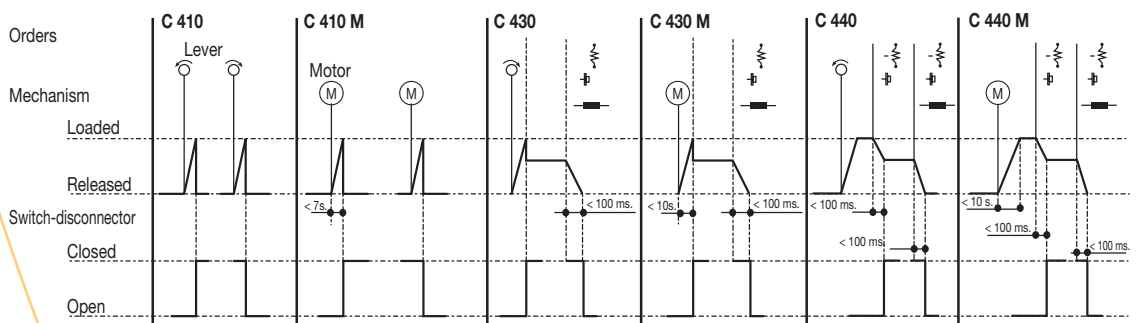
Type	Operating principle	Use
C 410 XS* C 410 C 410 S	Tumbler mechanisms. The state change (close or open) operation of the switch-disconnector or earthing switch is performed manually by the operator without any duration or time constraint. * Mechanism for some earthing switch.	Basic equipment for "incoming" and "outgoing" functions.
C 410 M	Motorized C 410 mechanism. The state change operation is performed by a motor without any duration or time constraint (operating time < 7 sec).	Remote control of switch-disconnector.
C 430	Tumbler mechanism with a latch-in feature for tripping. The operator manually performs a single operation, the Swd closing and spring charging for tripping. The mechanism is then capable of an open operation within a short time (< 100 msec) upon action of a coil or a fuse striker pin or a local control button.	Trip a switch-disconnector upon melting of one or several fuses (protection of a load by combination fuses). Release a switch-disconnector upon action of a transformer protection relay. Switch-disconnector opened in the voltage dip.
C 430 M	C 430 motorized mechanism. The closing operation is performed by a motor (set time < 10 s).	Remote control of fused switch-disconnector.
C 440	Tumbler mechanism with latch-in features for both tripping and closing. The operator manually performs a resetting operation which stores sufficient energy to perform two state change operations (close and open) without intentional delay in a short period (< 100 msec) upon action of a coil or a fuse striker pin or a local control button for opening.	All cases of network operation and tripping by melting fuses when a very short C/O cycle is required.
C 440 M	Motorized C 440 mechanism. The reset operation is performed by a motor (set time < 10 s).	All the above cases in which complete automation is required, in addition to the C/O cycle

NOTE: These operating devices also include the open and close mechanism for earthing switches with closing operation independent of the operator.

The positions of the earthing switch can be seen through windows on the front of the cubicle.

IMPORTANT: All operating devices can be interchanged with each other. The mechanism can be replaced when the switch-disconnector.

Operating diagram





Operating device for ORTHOFLUOR FP circuit breaker

These operating devices use the energy stored in springs to close and open the circuit breaker. Two types may be used:

> **BLR:** the operator manually performs a reset operation on the closing spring. This spring is kept set by a latch which causes, when released manually by a mechanical button:

- the closing spring to fully expand.
- the circuit breaker to close.
- the tripping spring, to be charged.

The circuit breaker can then be opened by releasing the tripping spring latch manually (button with mechanical action) or electrically (electromagnet).

Note: the closing spring can be set again when the circuit breaker is closed, to enable a fast reclosing cycle.

> **BLRM:** motorized BLR mechanism.

The closing spring is set by a motor (setting time < 10 sec). Closing and tripping are done electrically (electromagnets).

Note: manual setting, closing and tripping are possible.

Protection without auxiliary supply

A protection device which does not require any auxiliary supply in the substation can be installed in PGB or PGC cubicles. This device comprises:

- a protection relay, MICOM P124 S, energized by the current transformers.
- a striker trip coil K1-3, used with relay MICOM P124 S to trip the operating device,
- two test terminal boxes.

Protection with auxiliary supply

Protection relays MICOM P121 or P122 are mostly used.

Other relays are available.



Operating mechanisms and equipment choice

Operating device choice

Cubicle type	IS	PF	PFA	TM	LST	LR	PGB	PGC
Function				Disconnecter	Earthing switch	Earthing switch	Disconnecter	Disconnecter + E S
Operating mechanisms								
C 410XS					■	■		
C 410	■	■		■			■	■
C410S								■
C 410M	●							
C 430			■					
C 430M			●					
C 440	●		●					
C 440M	●		●					
BLR							■	■
BLRM							●	●

Standard equipment

Operating device type	C 410 XS	C 410	C 410M	C 430	C 430M	C 440	C 440M	BLR	BLRM
Manual tripping and closing	■	■	■	■	■	■	■	■	■
Optical position indicators	■	■	■	■	■	■	■	■	■
Motorisation			■		■		■		■
Shunt tripping coil				●	●	●	●	●	■
2 nd Shunt tripping coil									●
Under voltage tripping coil				●	●	●	●	●	●
Stricker				●		●		●	●
Shunt closing coil						●	●	●	■
Operating counter		●	●	●	●	●	●	●	■
Anti-pumping relay									■
Free auxiliary contacts									
Swd position:	2 O/C		●	●	●	●	●	●	
	4 O/C		●	●	●	●	●	●	
Spring charged position:	1 O/C				●	●	●	●	●
MV fuse melting position	1 O/C				●	●	●	●	
Earthing switch position:	2 O/C	●	●	●	●	●	●		
	4 O/C	●	●	●	●	●	●		
Circuit breaker position:	2 NO/2NC							■	■
	5 NO/6NC							●	●

MV fuse melting position for TM and PF in option.

■ = Base / ● = Option



Operating devices electrical specifications

ISR switch-disconnector

		Vdc	Vac
Rated power supply voltages	(V)	24 - 48 - 110 - 125 - 220	120 - 230
Re-arming motor			
Voltage variation range	(% of Un)	85 to 110	85 to 110
Input power (maxi)	W/VA	130	130
Start up peak	(A)	18 - 9 - 5	1,5 - 1
Reset time	(s)	<7	<7
Tripping coil:			
shunt trip			
Voltage variation range	(% of Un)	70 to 110	85 to 110
Input power	W/VA	80	80
Minimum impulse duration	(ms)	100	100
under voltage			
Voltage range for closing	(% of Un)	35 to 85	35 to 85
Voltage range for tripping	(% of Un)	70 to 35	70 to 35
Input power	W/VA	18	18
Closing coil			
Voltage variation range	(% of Un)	85 to 110	85 to 110
Input power	W/VA	80	80
Minimum impulse duration	(ms)	100	100
Auxiliary contacts:			
Rated current	(A)	12	12
Breaking capacity	(A)	0.3/125 V (L/R 5 ms)	12

ORTHOFLUOR FP circuit breaker

		Vdc	Vac
Rated power supply voltages	(V)	48 - 60 - 110 - 125 - 220	120 - 230
Re-arming motor			
Voltage variation range	(% of Un)	85 to 110	85 to 110
Input power (maxi)	W/VA	300	300
Start up peak	(A)	25	25
Reset time	(s)	<10	<10
Tripping coil:			
shunt trip			
Voltage variation range	(% of Un)	70 to 110	85 to 110
Input power	W/VA	80	80
Minimum impulse duration	(ms)	100	100
under voltage			
Voltage range for closing	(% of Un)	35 to 85	35 to 85
Voltage range for tripping	(% of Un)	70 to 35	70 to 35
Input power	W/VA	24	24
Closing coil			
Voltage variation range	(% of Un)	85 to 110	85 to 110
Input power	W/VA	80	80
Minimum impulse duration	(ms)	100	100
Auxiliary contacts:			
Rated current	(A)	10	10
Breaking capacity	(A)	10 48 Vdc (L/R =10 ms) 220 Vdc (L/R =20 ms)	



Fuse choice

- PF cubicle
- PFA cubicle switch-fuse combination
in accordance with the 62 271-105 IEC standard

PF and PFA cubicles

The PF and PFA cubicles in the FLUOKIT M24+ range are equipped with two types of standard fuses:

- FD type according to IEC 282.1 and DIN 43.625 for dimensions.

Selection table for HV HRC fuses FDw (AREVA T&D)

Type	Un	TRANSFORMERS (KVA)																	
		FUSES (A)																	
FDw type to DIN (1)	Kv	50	63	80	100	125	160	200	250	315	400	500	630	800	1000	1250	1600	2000	2500
	3.3	25	25	25	31.5	40	50	63	80	100	125	160	200	250					
	5.5	10	16	16	25	25	31.5	40	50	63	80	100	125	160	160/200	250			
	6.6	10	16	16	16	25	31.5	31.5	40	50	63	80	100	125	160	200	250	250	
	10	6.3	10	10	16	16	25	25	31.5	31.5	40	50	63	80	100	125	125		
	13.8	6.3	6.3	10	10	16	16	16	25	25	31.5	40	40	50	80	100	100	125	
	15	6.3	6.3	10	10	16	16	16	25	25	31.5	31.5	40	50	63	63	100	125	
20	6.3	6.3	6.3	6.3	10	10	16	16	25	25	31.5	31.5	40	50	63	80	100	100	

FDw size : Length 292 or 442 mm in 7.2/12 kV - 442 mm in 17.5/24 kV - Diameter 63 or 88 mm

The italic printed fuses are a FD3M variant, ø88 mm, length 442 mm.

The bold printed fuses are only available for PF cubicle.

The table is given with AREVA fuses. If other fuses are used with heat dissipation > 88 W at 0.7 In current, then the width of the cubicle must be 500 mm.

(1) Fuses without overload.

Protection of capacitor banks

Use fuses with an instantaneous nominal current more than 1.8 times the nominal current in the capacitor bank.

Replacing fuses

Fuses are accessed from the front of cubicles, with the cable compartment door removed.

When a fault burns out one or two of the fuses, the properties of the remaining fuse(s) are weakened

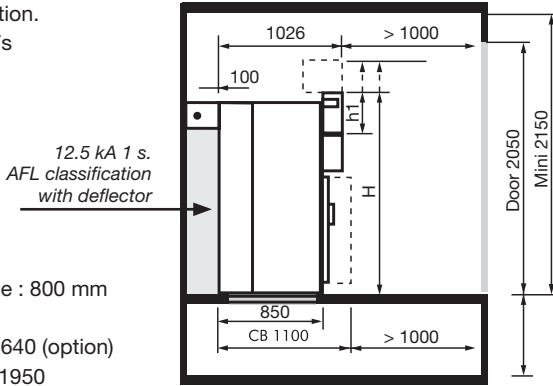
due to the short circuit effect. It is therefore recommended that the three fuses in the cubicle are replaced at the same time (IEC 282.1 Recommendations).



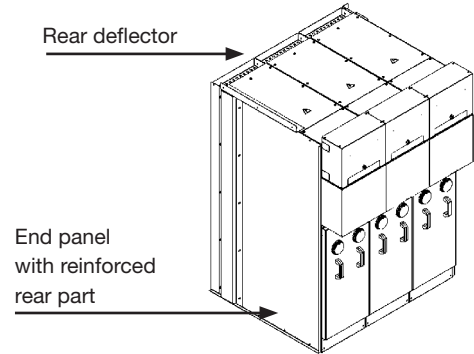
Installation

If internal arc containment required, various installation with deflectors are possible according to the switchboard access classification (**F, FL, FLR**) and the value of internal arc withstand.
(F = Front, L = Lateral, R = Rear).

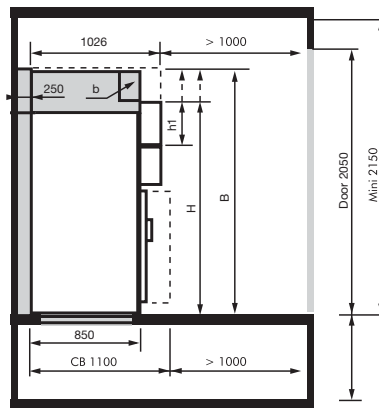
Back to wall. Installation.
IAC = AF 12.5 kA 0.7s
AF 12.5 kA 1s



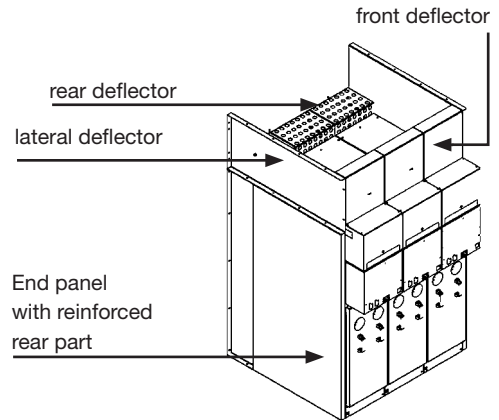
Front operation space : 800 mm
LV compartment :
h1 : 300 (standard) - 640 (option)
H : 1610 - 1950



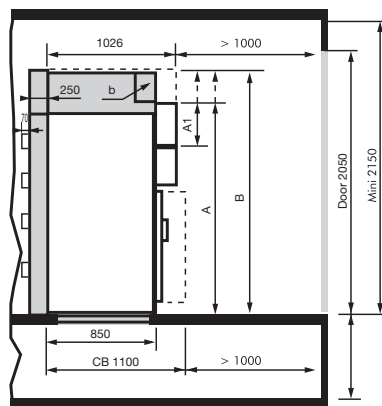
Back to wall. Installation.
IAC = AFL 16 kA 1s
20 kA 1s



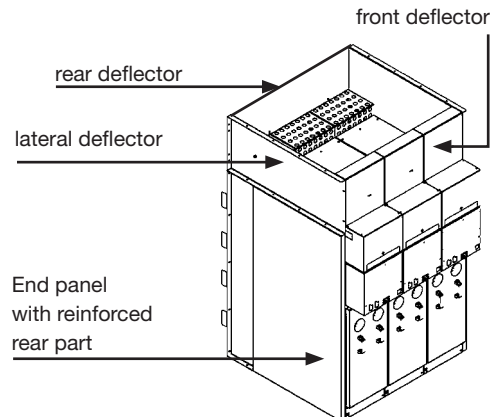
Front operation space : 800 mm
LV compartment :
h1 : 300 (standard) - 640 (option)
H : 1610 - 1950
Option :
front deflector b : 400 - B : 1950



Free installation.
IAC = AFLR 16 kA 1s
20 kA 1s



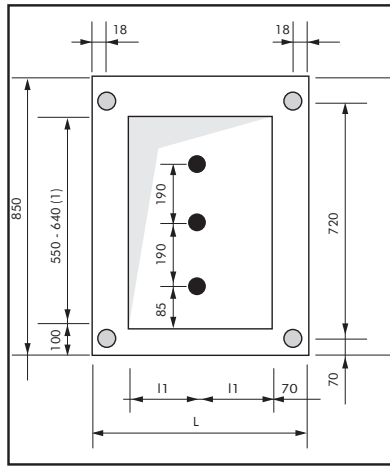
Front operation space : 800 mm
LV compartment :
A1 : 300 (standard) - 640 (option)
A : 1610 - 1950
Option :
front deflector b : 400 - B : 1950





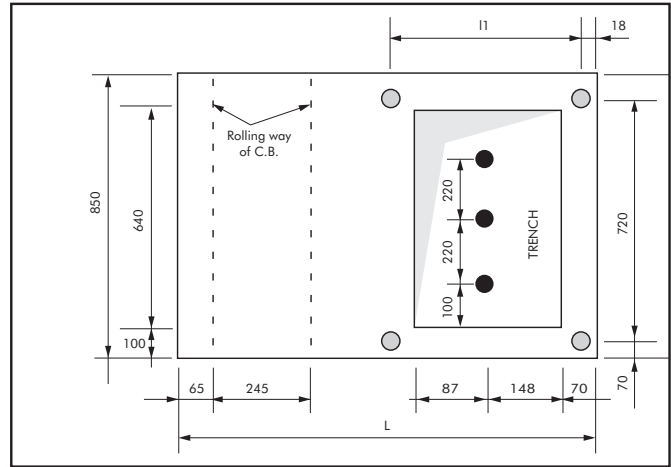
Lay-out - Dimensions

IS, PF, PFA, LST, LD Cubicles



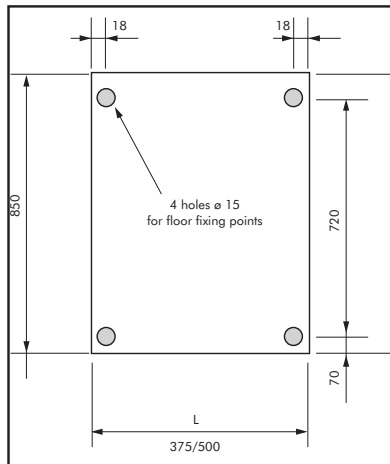
L : 375 / 500
 L1 : 117.5 / 180
 (1) 640 preferred if assembled with PGC cubicle.

PGC Cubicle



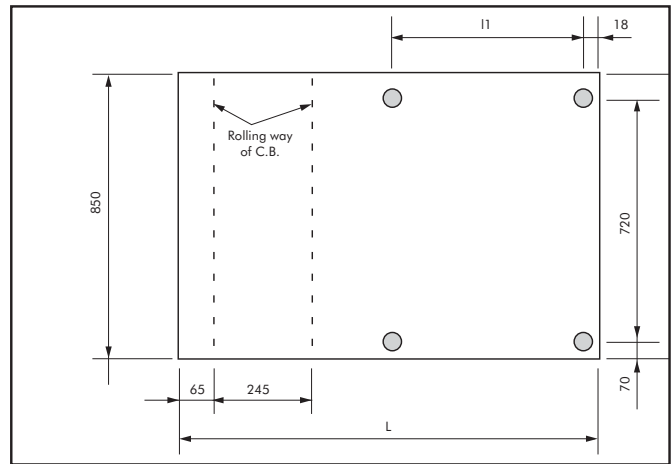
L : 750 / 875 / 1125
 L1 : 235 / 360 / 235
 L2 : 117.5 / 216 / 117.5
 L3 : 117.5 / 144 / 117.5
 L4 : 339 / 464 / 339

TM, LC, LT, LVT, LCT, LCVT, SP, LP Cubicles



L : 375 / 500

PGB, PGC + LR Cubicles

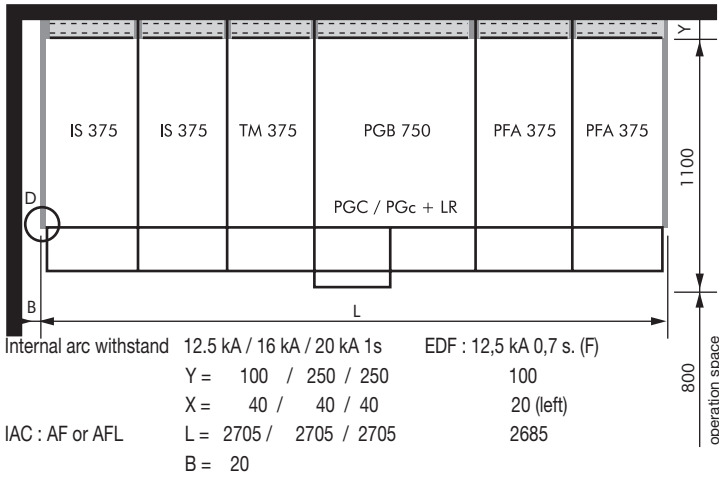


L : 750 / 875 / 1125
 L1 : 339 / 464 / 339

Dimensions in mm

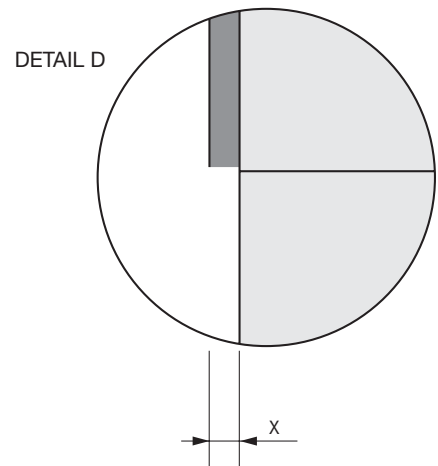
Examples of installation in indoor substations - (dimensions in mm)

Example 1

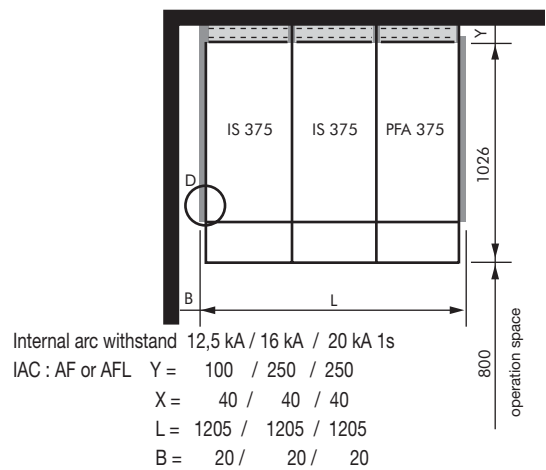
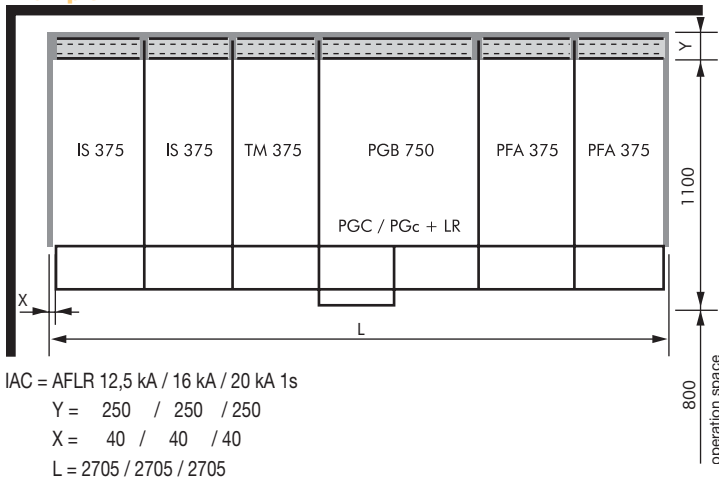


Public distribution substation :

Ring type network.



Example 2



Approximate weight (Cubicles with standard equipment).

	Width (mm)	Weight (kg)	Width (mm)	Weight (kg)	Width (mm)	Weight (kg)
IS	375	115	500	125		
PF/PFA	375	125	500	135	750	180
LR	375	110	500	125		
LST	375	110	500	120		
LC	500	195				
LCT	500	250				
LP	375	200	500	210		
SP	375	280	500	290		
LT	500	195				
LD	375	105	500	115		
PGB	750	420	875	430		
PGC	750	380	875	415	1125	470
TM	375	195	500	205		



MV cable connection

The following describes the connection of cables to FLUOKIT M+ cubicles with basic equipment as described in the “Cubicle equipment” section. Please call us when fitting options.

The HV connection to cubicles is made using dry cables equipped with short or normal ends. Two types of cables may be connected:

- Single-pole cable according to EDF HN 33 S 23 or IEC 502 specifications.
- Three-pole cable according to EDF HN 33 S 23 specification.

Maximum cable connection capacity

Cubicles	IS/LST/LD/	PGC	PF/PFA
Single-pole cable			
Number of cables per phase	1	2 ⁽¹⁾	1
Cable cross-section (mm ²)			
Short ends	240	240 ⁽²⁾	95
Normal ends	400		
Three-pole cable			
Number of cables per phase	1 ⁽³⁾		
Cable cross-section (mm ²)			
Short ends	240		
Normal ends ⁽⁴⁾	240		

(1) Cubicle width : IS / LST = 500 mm / PGC = 875 mm. - (2) With ends without wings.
 (3) For PGC cubicle : cable separated into three as far as the trench / (4) For PGC cubicle, installation with a cable tray, please call us.

Connection and clamping of cables (Dimensions from the ground in mm)

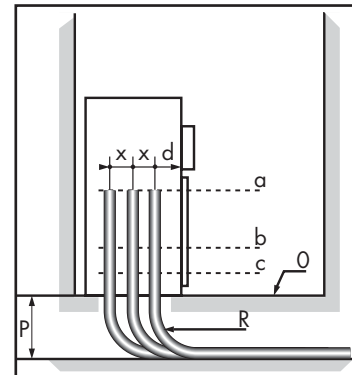
Cubicle type	Cubicle	Cable clamping		d	x
		short ends	normal ends		
	a	b	c		
IS/LST	908	475	260	185	190
PF/PFA	370	0		185	190
PGC	370	0		200	220
PGC ⁽¹⁾	675			200	220

(1) With ring core CT.

Trench depth and radius of curvature

Cable cross-section	Single pole cable		Three-pole cable	
	P	R	P	R
mm ²	mm	mm	mm	mm
50	450	450	600	600
95	450	450	700	700
150	600	600	800	800
240	600	600	900	900
300 ⁽¹⁾	600	600		
400 ⁽¹⁾	600	600		

(1) Cables with copper/aluminium lugs.





Interlocks

Functional interlocks

The following interlocks comply with IEC recommendation 62271-200 and EDF specification HN64 S41.

IS/PF and PFA cubicles:

- > The load break switch can only be closed if the earthing switch is open and if the cable compartment access door is closed.
- > The earthing switch can only be closed if the load break switch is open.
- > The cable compartment access door can only be opened if the earthing switch is closed.
- > The load break switch is locked in the open position when the cable compartment access door is removed. The earthing switch can then be operated in order to perform cable tests.

PGC cubicle:

- > The circuit breaker can only be closed if the earthing switch is open, the cable compartment access door is closed and the disconnector is closed.
- > The making capacity earthing switch and the earthing switch can only be closed if the main disconnector is open.
- > The cable compartment access door can only be opened if the making capacity earthing switch and the earthing switch are closed.
- > The main disconnector is locked in the open position when the cable compartment access door is removed. The earthing switch can then be operated for cable tests.
- > The main disconnector can only be opened when the circuit breaker is locked in opened position (key lock). Then, when the main disconnector is opened, it is possible to operate the CB with the free key.

- > The main disconnector can only be closed when the earthing switches are in opened position and the circuit breaker is locked in opened position (key lock).

PGB cubicle:

- > The transformer compartment access door can only be opened if the earthing switches are closed.
- > The circuit breaker can only be closed if the main disconnectors are locked in the "opened" or "closed" position.
- > The main disconnectors can only be opened when the circuit breaker is locked in opened position. Then, when the main disconnectors are opened, it is possible to operate the CB with the free key.

LST cubicle:

- > The cable compartment access door can only be opened if the earthing switch is closed.
- > The earthing switch can be operated to test cables when the cable compartment access door is removed.

TM cubicle:

- > The HV disconnector can only be closed if the voltage transformer compartment access door is closed and the earthing switch is in opened position.
- > The voltage transformer compartment access door can only be opened if the HV isolating switch is open.

Locking

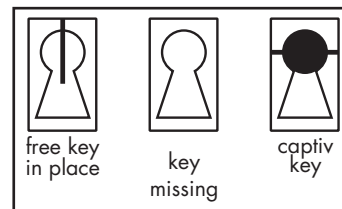
- > Cubicles can be made inoperable, particularly for locking, by padlocking load break switches, earthing switches or isolating switches in the open or closed position (up to 3 padlocks, not supplied).
- > The cable or transformer

compartment access door can also be padlocked.

Operating interlocks

Operating interlocks are made by combinations of locks and keys. The following examples concern only the most frequently used operating interlocks. Please call us for any other interlocks, or refer to the documents issued at the time of the order.

Code for drawing locks and keys

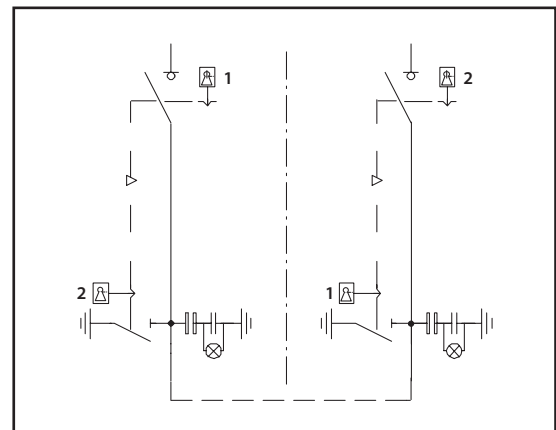


Interlocking of the MV/MV loop

On load break switch functional units:

> Principle:

Between two functional units in loop formation, this interlock ensures that the closure of the earthing switch on one of the functional units depends upon the opening of the load-break

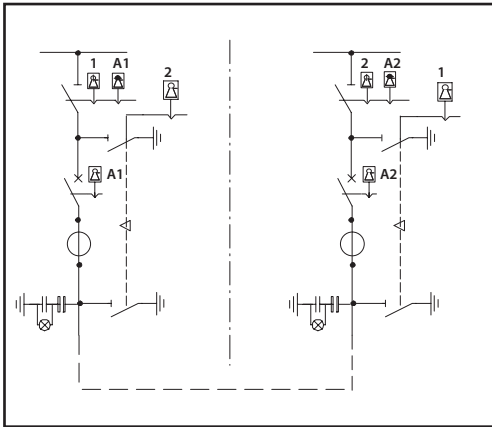


Loop interlock

> On circuit breaker functional units:

Principle:

Between two functional units in loop formation, this interlock ensures that the closure of the earthing switch on one of the functional units is dependent on the opening of the main isolator of the other functional unit.



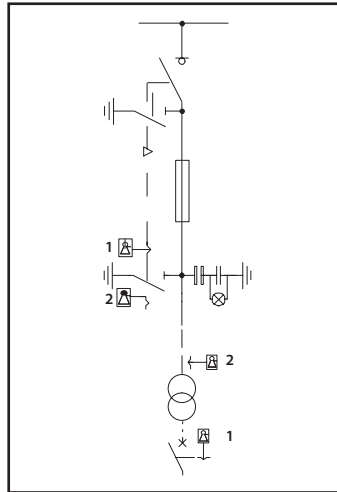
Locks A1 and A2 : functional interlocks
Locks 1 and 2 : operational interlocks

MV/LV back-feed interlock, encased dry-type transformer with puin terminals

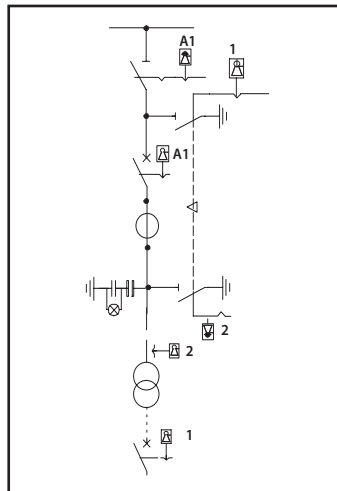
Principle:

To prohibit access inside the functional unit and to the transformer when the MV switchgear is closed, when the earthing switch is open, and when the main LV circuit-breaker is closed.

> On fuse switch-disconnector functional unit



> On circuit breaker functional unit

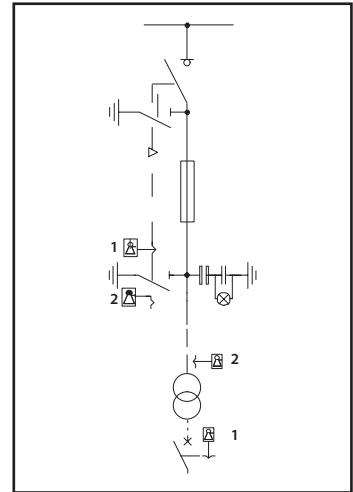


MV/LV back-feed interlock with oil-cooled transformer

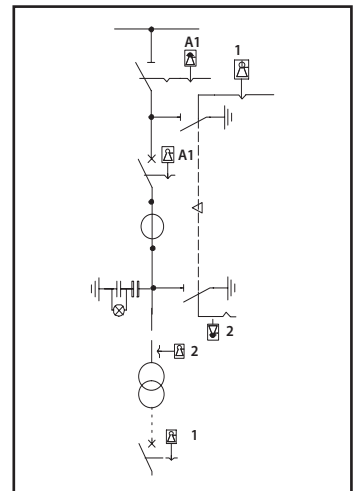
Principle:

To prohibit access inside the functional unit and to the transformer when the MV switchgear is closed, when the earthing switch is open, and when the main LV circuit-breaker is closed.

> On fuse switch-disconnector functional unit



> On circuit breaker functional unit



Accessories



Correct phase sequence box

This box is used to check the phase sequence.



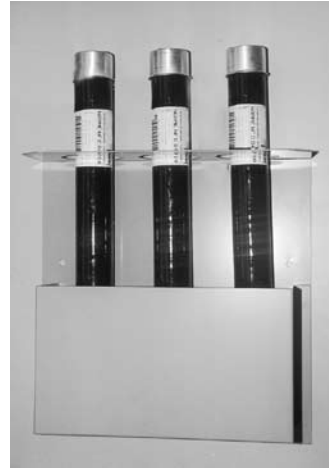
Rings for fault detectors

These rings are designed to measure phase currents or residual leakage currents.



Operating lever

This lever is used to operate load break switches, earthing switches or disconnectors.



Wall rack

This rack is installed inside the substation to store three replacement fuses (not supplied) and operating levers.



Reset lever

This lever is used to manually reset the circuit breaker operating device.



Release lever for C440.

Authorized Sole Agent :

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