



elcoring

SF6 Gas Insulated Switchgear
and Controlgear (RMU)



**SF6 Gas Insulated Switchgear
and Controlgear (RMU)**



www.elkoelektrik.com.tr



Namely **elcoring** SF6 gas insulated switchgear and controlgear offers:

- Compact design up to 36 kV, pre-fabricated and type tested
- Hermetically sealed SF6 gas filled stainless steel tank
- Sealed pressure system, less than leakage rate % 0,5 per year
- No need re-filling SF6 gas through its full service lifetime
- High level operator safety, high level operating reliability
- Resistant to pollution, insensitive to humidity and altitude
- Maintenance -free, minimize operating costs
- Modular, Compact type (Extensible and Non-extensible) options to meet client's requirements
- Withstand to internal arc faults
- Different feeder combinations with switch disconnecter with vacuum circuit breaker and with switch-fuse combination
- Suitable for remote control and monitoring
- Comply with relevant IEC and EN standards

Fields of Major Application:

- Secondary Electricity Distribution Networks
- MV/LV Distribution Transformer Substations
- Wind Power Plants
- Areas where industrial pollution is considerable
- Holiday villages, shopping centers
- High humidity areas



Front view (Cover is open)



Side view Extensible Compact Type

- Main busbar & Switching Compartment [1]
- MV Cable Connection Compartment [2]
- HV Fuse Compartment [3]
- Operating Mechanism Compartment [4]
- LV Panel Compartment [5]

Compact type:

- Extensible compact
- Non-extensible compact

According to the customer requirement:

- RIGHT SIDE extensible or
- LEFT SIDE extensible or
- BOTH SIDE extensible type compact RMU's are available

Abbreviations :

elcoring 24 : Non- extensible compact type (up to 24 kV)

elcoring 24⁺ : Extensible compact type (up to 24 kV)

elcoring 36 : Non- extensible compact type (up to 36 kV)

elcoring 36⁺ : Extensible compact type (up to 36 kV)

Incoming/outgoing feeder with switch-disconnector:

- Three-phased and three-positioned switch-disconnector is used.
- All live parts and switching devices are placed in a stainless steel tank filled with SF₆ gas.
- For modular type, each functional unit has its own tank.



Unused side is covered with dummy plugs.

Abbreviations for functional units;

- **elcoring 36.S** (for up to 36 kV),
- **elcoring 24.S** (for up to 24 kV)



Switch-fuse combination for transformer feeder:



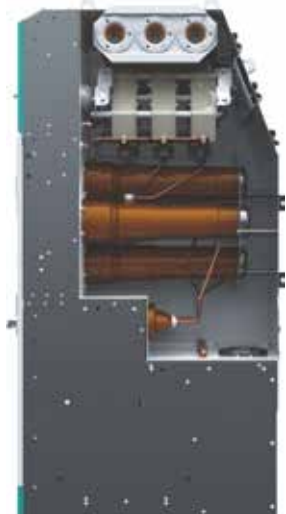
- Three-phased and three-positioned switch-disconnector is used.
- All live parts, switching devices and fuse holders are placed in a stainless steel tank filled with SF₆ gas.
- For modular type, each functional unit has its own tank
Unused side is covered with dummy plugs.
- Both sides of MV fuses are earthed via earthing switches before accessing the fuse compartment. In this way, replacing and changing the MV fuses are done safely.



In service

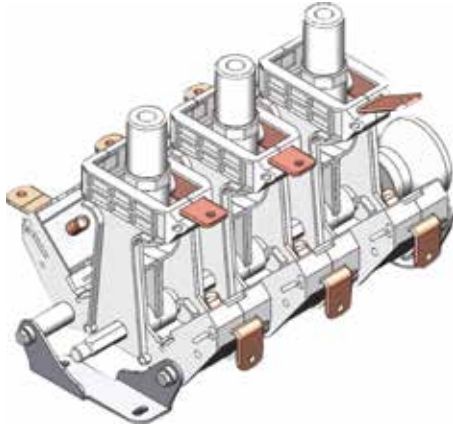


Blown up



Abbreviations for functional units:

- **elcoring 36.f** (for up to 36 kV)
- **elcoring 24.f** (for up to 24 kV)



Switch-disconnector:

- General purpose, comply with IEC 62265-1
- Three-phased, three-positioned (OPEN-CLOSED-EARTHED)
- Arc-quenching with SF6 gas

Switch-disconnector:

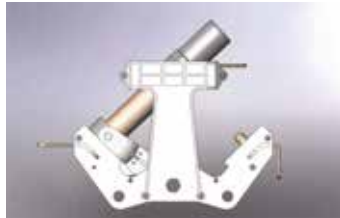
- Electrical endurance : E3
- Mechanical endurance : M1

Earthing Switch:

- Electrical endurance : E2
- Mechanical endurance : M1



OPEN



CLOSED

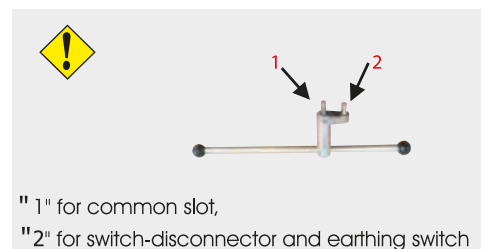


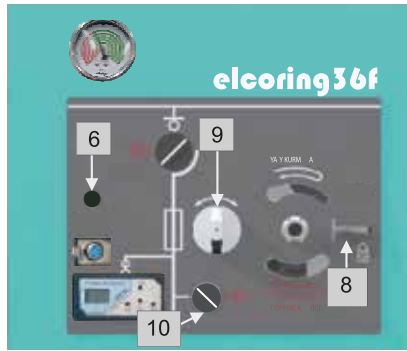
EARTHED

Operating mechanism:

Type	Operating principle	Usage
SM	<ul style="list-style-type: none"> ■ Stored energy operation, ■ Independent of the operator operation, ■ The state change (closing, opening or earthing) operation is performed manually by the operator using lever. For motorized type, operation is performed by the geared motor. 	<ul style="list-style-type: none"> ■ Feeder with switch-disconnector
FM	<ul style="list-style-type: none"> ■ Stored energy operation, ■ Independent of the operator operation, ■ Energy storing is performed by the operator using lever or charging via geared motor (with motorized mechanism) ■ Releasing of energy is performed with shunt opening release electrically or with strik combination. 	<ul style="list-style-type: none"> ■ Feeder with switch-disconnector ■ Feeder with switch-fuse combination

	Voltage	Power
Motor	220 VAC, 220 VDC, 110 VDC 24VDC, 48 VDC	150 W
Release	24 VDC, 48 VDC, 110 VDC	100 VA





- 1 Position indicator for switch-disconnector
- 2 Terminal for OPENING/CLOSING with cable
- 3 Common shaft for Operating Handle
- 4 Operating actuating slot for switch-disconnector
- 5 Operating actuating slot for earthing switch
- 6 Motor starting button (on motorized mechanism)
- 7 Voltage presence indicator
- 8 Padlocking
- 9 Thumb knot for OPENING and CLOSING
- 10 Position indicator for earthing switch (for 1 kA)
- 11 SF6 gas pressure indicator with temperature compensation

Standard equipments:

- Operating mechanism suitable for motor retrofit (with operating handle)
- Integrated capacitive voltage presence indicator, VPIS (one set for each feeder)
- Adjustable cable supports
- SF6 gas pressure indicator with temperature compensation
- Transformer alarm set (For MV/LV transformer protection feeder)
- Auxiliary switches (2 NO+2 NC)
- Padlocking facility

Optional equipments also available as retrofit:

- Geared motor
- Fault indicator
- Painted side walls
- Voltage detection system (VDS)
- MV fuses
- AC/DC Supply
- Remote OPENING/CLOSING with cable
- Separable Cable Connectors

NO: **N**ormaly **O**PEN
 NC: **N**ormaly **C**LOSED



elcoring B includes vacuum circuit breaker and three-positioned disconnecter in series.

It is equipped with a multi-curve overcurrent protection relay. In this way, **elcoring B** is used for general purpose feeder protection or protection of MV transformer.

Current transformers are toroidal type and placed in cable compartment.

Operating mechanism for circuit breaker:

- Energy stored type mechanism, independent of operator
- Needed energy for operation is obtained by the compression of a spring

Storing energy:

- Manually by operating handle
- Electrically by a geared motor unit

Releasing of energy:

- Manually by the button on the control panel
- Electrically by the shunt coil

Standard equipments:

- Geared motorized mechanism and operating handle for circuit breaker
- Integrated capacitive voltage presence indicator, VPIS (one set for each feeder)
- Multi-curve overcurrent protection relay
- SF₆ gas pressure indicator with temperature compensation
- Transformer alarm set (For MV/LV transformer protection)
- Operating handle for disconnector/earthing switch
- Adjustable cable supports
- Padlocking facility

Optional equipments also available as retrofit:

- Self-powered relay
- Painted side walls
- Voltage detection system (VDS)
- AC/DC Supply
- Separable Cable Connectors
- Remote OPENING/CLOSING with cable

Abbreviations for functional units:

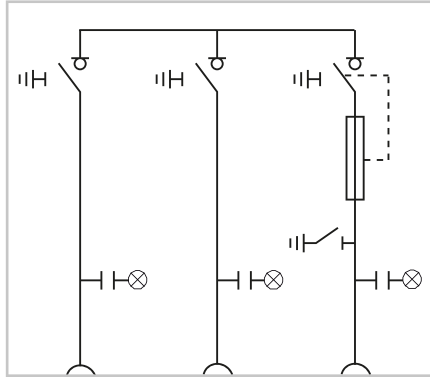
- **elcoring 36.B** (for up to 36 kV)
- **elcoring 24.B** (for up to 24 kV)

View

Single Line Diagram

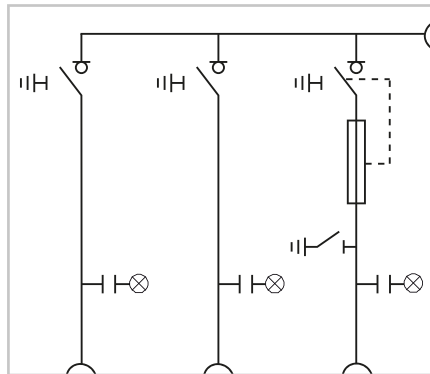
Dimensions

Non-Extensible Compact



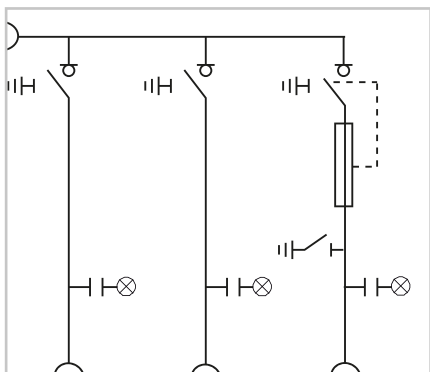
SSF	36 kV	24 kV
Width	1320 mm	1205 mm
Depth	970 mm	860 mm
Height	1800 mm	1735 mm

Extensible Compact on the Right Side



SSF +	36 kV	24 kV
Width	1350 mm	1205 mm
Depth	970 mm	860 mm
Height	1800 mm	1735 mm

Extensible Compact on the Left Side



SSF +	36 kV	24 kV
Width	1350 mm	1205 mm
Depth	970 mm	860 mm
Height	1800 mm	1735 mm



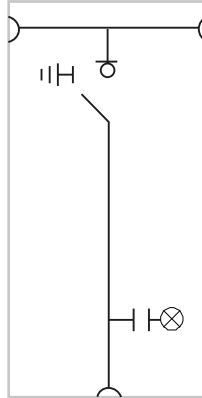
Please contact us for Extensible Compact type on **both sides** and SSB, SSSF, SSFF types.

View

Single Line Diagram

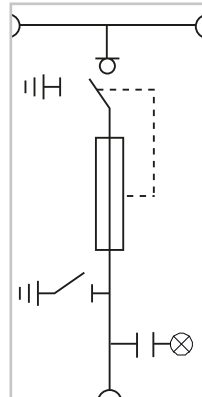
Dimensions

Cubicle with Switch-disconnector (S):



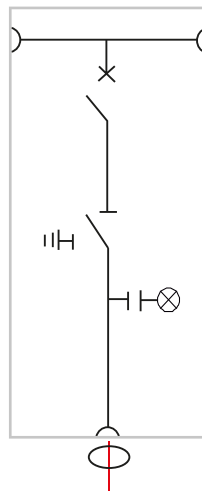
S	36 kV	24 kV
Width	450 mm	400 mm
Depth	970 mm	860 mm
Height	1800 mm	1735 mm

Cubicle with Switch-fuse Combination (F):



F	36 kV	24 kV
Width	490 mm	450 mm
Depth	970 mm	860 mm
Height	1800 mm	1735 mm

Cubicle with Vacuum Circuit Breaker (B):



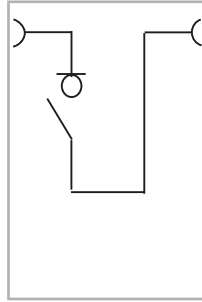
B	36 kV	24 kV
Width	500 mm	500 mm
Depth	970 mm	860 mm
Height*	1800 mm	1735 mm

* not included the LV Control Board

Single Line Diagram

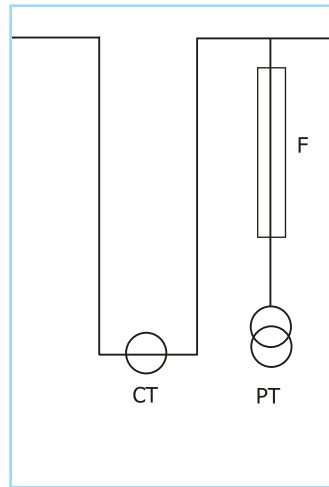
Dimensions

Busbar Coupling Cubicle with Switch-disconnector, (K):



K	36 kV	24 kV
Width	600 mm	600 mm
Depth	970 mm	860 mm
Height	1800 mm	1735 mm

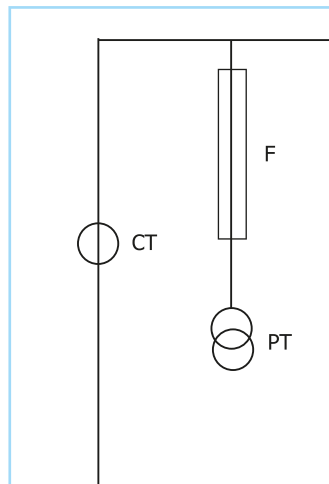
Measuring Cubicle, Type-1,(M1):



M1	36 kV	24 kV
Width	1000 mm	1000 mm
Depth	1050 mm	860 mm
Height	1800 mm	1735 mm

Air insulated

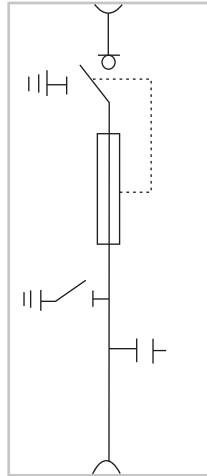
Measuring Cubicle, Type-2, (M2):



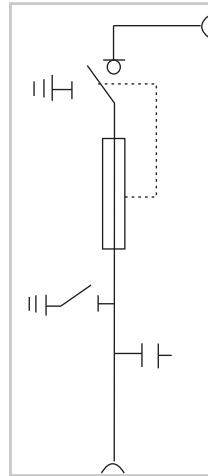
M2	36 kV	24 kV
Width	1150 mm	1150 mm
Depth	1050 mm	860 mm
Height	2100 mm	1735 mm

Air insulated

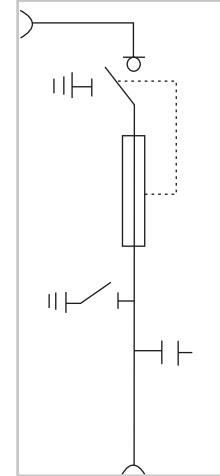
Cubicle with switch-fuse Combination for MV/LV Transformer Protection:



Main busbar connection on UPPER SIDE ,F0

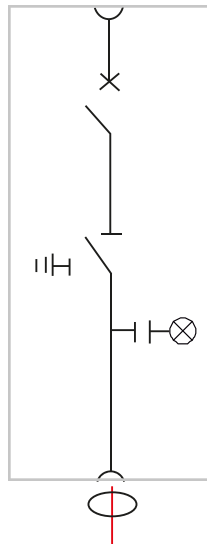


Main busbar connection on RIGHT SIDE ,F1

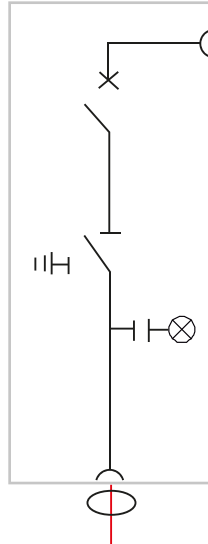


Main busbar connection on LEFT SIDE ,F2

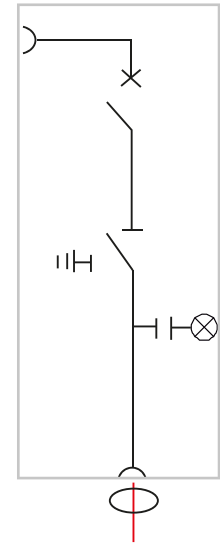
Protection with Circuit Breaker:



Main busbar connection on UPPER SIDE ,F0



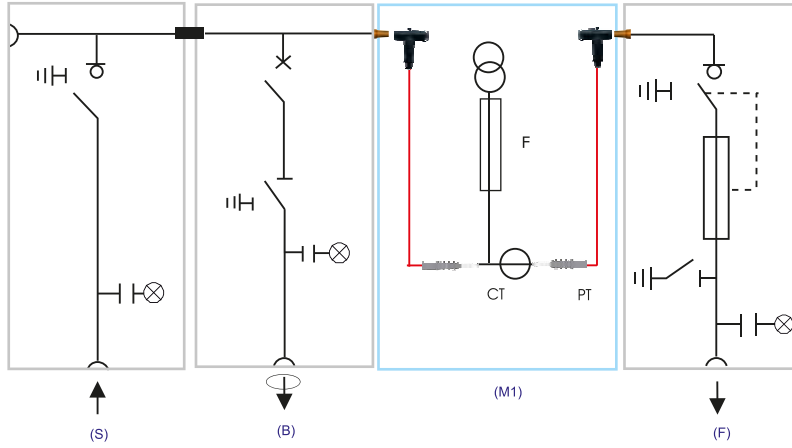
Main busbar connection on RIGHT SIDE ,F1



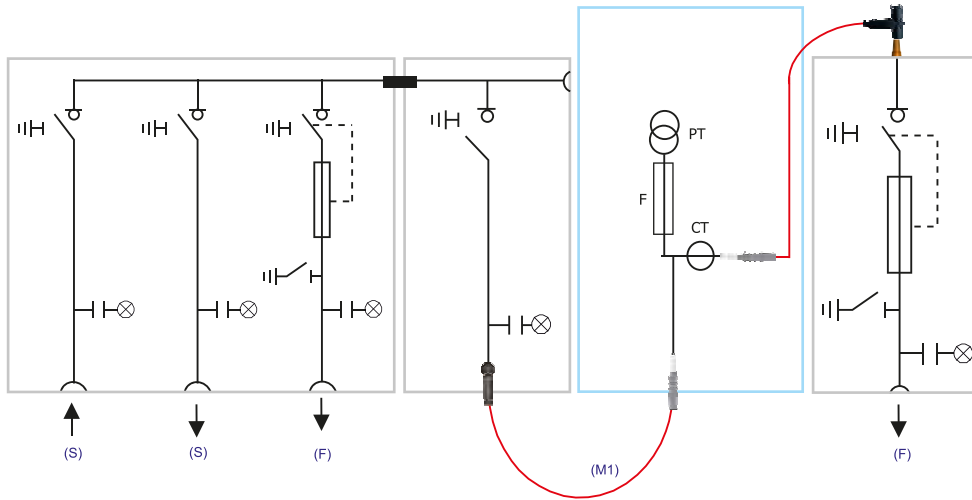
Main busbar connection on LEFT SIDE ,F2

NOTE: 300 mm should be added on the height if the connection to busbar is done from UPSIDE. 300 mm should be added on the width if the connection to busbar is done either on the RIGHTSIDE or on the LEFTSIDE.

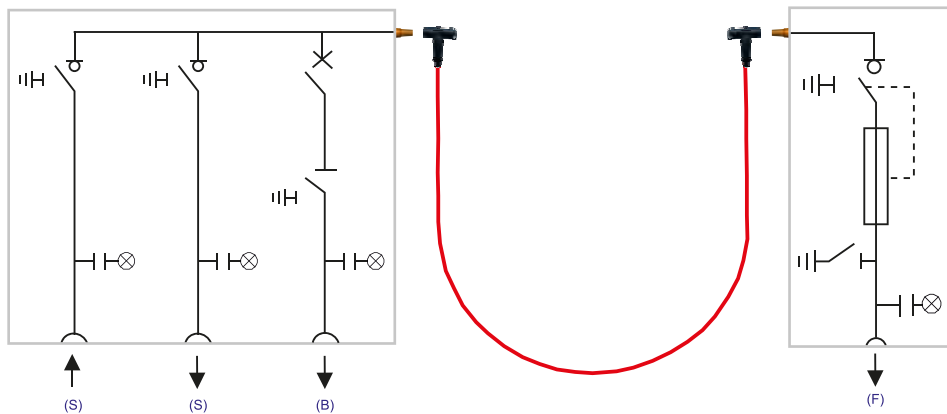
EXAMPLE-1

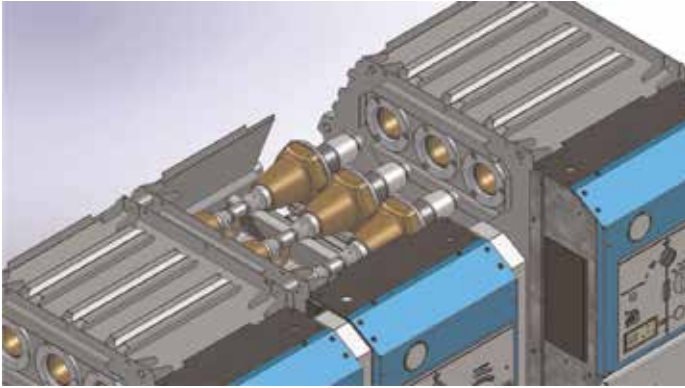


EXAMPLE-2



EXAMPLE-3





elcoring 24⁺. elcoring 36⁺. elcoring 24.S. elcoring 24.F. elcoring 24.B. elcoring 36.S. elcoring 36.F. elcoring 36.B can be provided with bushings for side extension on one or both sides.

Desired functional units can be connected by using busbar coupling equipments side by side.

The equipments used in side extension are:

- Pre-fabricated
- Type-tested

Extension kit consist of (for 36 kV):

- Bushing (Picture:1)
- Screened insulator (Picture:2)
- Busbar (Picture:3)



Picture:1



Picture:2



Picture:3



Picture:4



Unused sides are covered with Dummy Plugs (Picture:4)

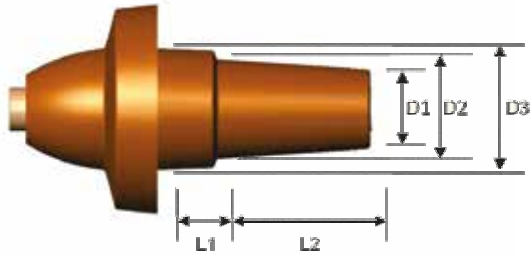
Continuous interlockings prevent incorrect operation. Access to the cable compartments and to the fuse links is only possible if the earthing switch is earthed.

	IP CLASS	ACCESSIBILITY & INTERLOCKINGS
Main Busbar and Switching Compartment	IP 67	NON-ACCESSIBLE
Cable Compartment	IP 2X	ACCESSIBLE The cover of the cable compartment has an interlock with earthing switch. Unless the earthing switch is earthed, the cover can not be opened.
HV Fuse Link Compartment	IP 3X	ACCESSIBLE The cover of the fuse link compartment has a interlock with earthing switches. Unless the both sides of fuse link are earthed, the front cover can not be opened.
Operating Mechanism Compartment	IP 2X	Accessible with a tool.

	STANDARDS	CLASSIFICATION		
elcoring	IEC 62271-200	Partition	Loss of Service Continuity	Internal Arc
		PM	LSC 2A	36 kV A (FL) 16 kA/1 sn
				24 kV A (FL) 20 kA/1 sn
Switch-disconnector	IEC 60265-1	General purpose, M1, E3		
Switch-fuse Combination	IEC 62271-105			
Circuit Breaker	IEC 62271-100	M1, E1		
Earthing Switch	IEC 62271-102	M1, E2		
Voltage Detection System	IEC 61243-5	<ul style="list-style-type: none"> ■ Voltage Presence Indicating System-VPIS ■ Voltage Detection System-VDS (Optional) 		
Plug-in Bushing	EN 50181	<ul style="list-style-type: none"> ■ Outside cone plug-in type 		

Plug-in bushings:

Plug-in bushings of elcoring are at the front of the cubicles. It is easy to connect cables and carry out the cable tests.



Ur (kV)	Ir (A)	D1 (mm)	D2±0.2 (mm)	D3±0.2 (mm)	L1 (min.) (mm)	L2 (mm)	Contact type	Interface
12-24	250	31	32.5	48.5	9	48	Sliding	A
36	250	46±0.2	56	70	11	90±0.2	Sliding	B
12-24-36	400*	46±0.2	56	70	11	90±0.2	Sliding	B
12-24-36	630*	46±0.2	56	70	11	90±0.2	Bolted	C

MV Cable Connections:



The connection of "T" type:

Contact type: Bolted

Rated current: 630 A

Interface: C



The connection of "L" type:

Contact type: Sliding,
Bolted (optional)

Rated current: 250-400 A

Interface: B



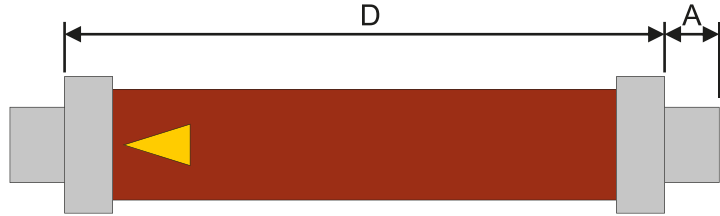
Adjustable cable supports



IMPORTANT

- The installation instructions of the manufacturer of connector must be followed.
- It is recommended that the earthing switch must be earthed and locked with pad-lock whenever cables are not connected.

Voltage	Dimensions (mm)	
	A	D
36 kV	33	537
24 kV	33	442
17.5 kV	33	367



Rated Voltage (kV)	36 kV							24 kV					
	Rated Power (kVA)	250	400	630	800	1000	1250	1600	250	400	630	800	1000
%UK	4.5			6				4.5			6		
İNTERTEKNİK (Tipi: ACT)	10	16	20	20	25	31.5	40	16	20	31.5	31.5	31.5	50
GÜRAL (Tipi: MMG)	10	16	20	25	25-30	30	40	16	20	30	40	50	63
EFO (Tipi: BİD)	10	16	20	20	25	30	40	16	20	30	30	40	50

Rated Voltage (kV)	17,5 kV				
	Rated Power (kVA)	250	400	630	800
%UK	4			6	
İNTERTEKNİK (Tipi: ACT)	20	25	40	31.5	50
GÜRAL (Tipi: MMG)	16-20	30	40	50	63
EFO (Tipi: BİD)	20	30	40-50	50	50

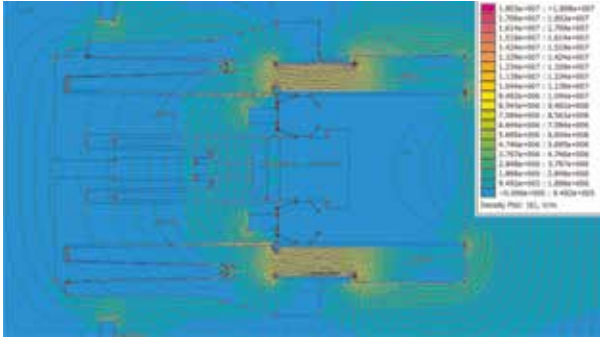


elcoring is designed for fuse-links, integrated thermal cut-outs with striker type (medium) in accordance with IEC 60282-1.



IMPORTANT

The striker pin should be always face outwards against the fuse holder when inserting the fuse link into the enclosure. (Please refer the above picture)



- Computer Aided Design (CAD)
- Computer Aided Engineering (CAE)

All products are designed and manufactured in compliance with:

- ISO 9001 (Quality Management System)
- ISO 14001 (Environmental Management System)

Tightness:

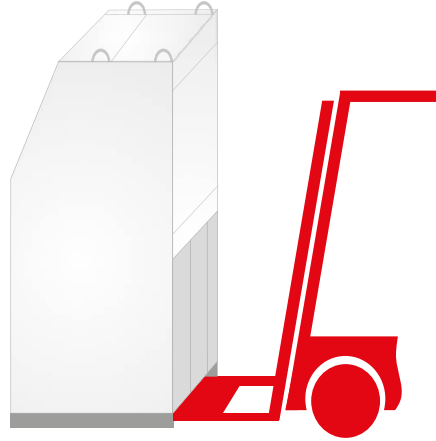
Gas tightness test is checked for every unit as a routine.



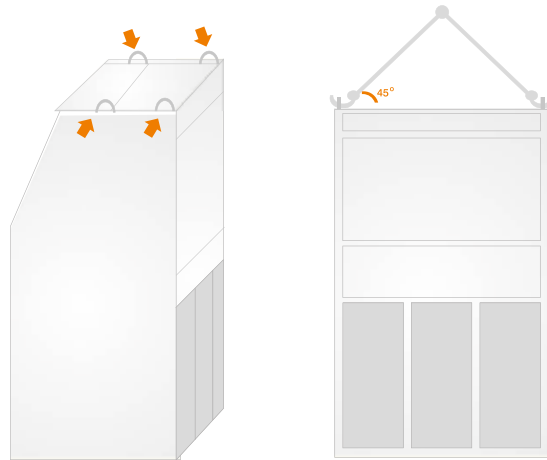
Helium is used as a tracer gas during the leakage test. Leakage test (tightness) and SF₆ gas filling are fulfilled inside the vacuum chamber.

Expected life time is more than 25 years for **elcoring** units.

Each unit is fixed on the wooden platform (pallet) and packed according to the shipping storage requirements of the customer.



Transport with lifting truck or fork-lift truck(only with pallet)



Crane transport with lifting eyes



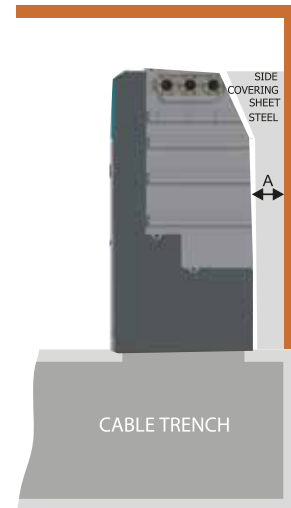
IMPORTANT

- Keep the equipment in its original package during the storage
- Avoid slipping and tilting during the transport
- Avoid condensation
- Storage temperature is advised not below than -25°C

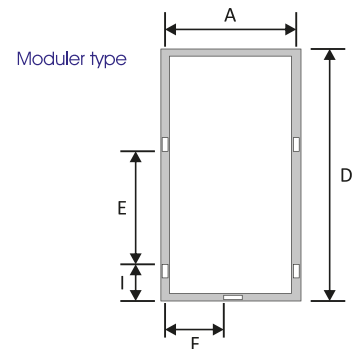
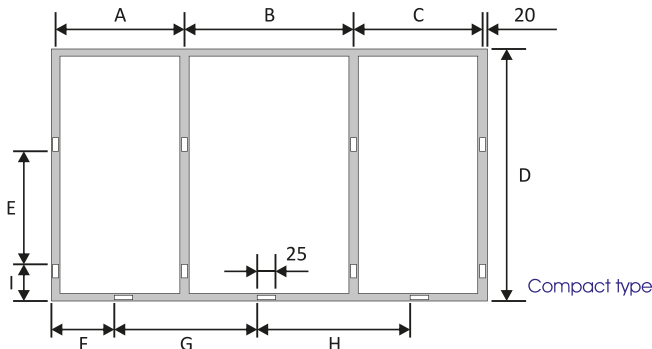
Installation of elcoring in indoor substations:



A = 100 mm
C ≤ 50 mm



Floor fixing points:



elcoring units should be installed on the well leveled floor and fixed by means M12 anchor bolts. Distances of rear side walls should be taken into considerations.

Cubicle		A	B	C	D	E	F	G	H		Dimensions in mm.
SSF	36 kV	400	457	376	879	450	211	427	417	148	3 - way
	24 kV	400	418	337	763	450	211	398	377	148	
S	36 kV	360	-	-	879	450	191	-	-	148	1 - way
	24 kV	350	-	-	763	450	181	-	-	148	
F	36 kV	400	-	-	879	450	211	-	-	146	
	24 kV	400	-	-	863	450	211	-	-	146	
B, K	36 kV	410	-	-	879	450	216	-	-	166	
	24 kV	400	-	-	863	450	211	-	-	146	
M	36 kV	1000	-	-	879	450	500	-	-	148	
	24 kV	1000	-	-	863	450	500	-	-	146	

Cubicle with switch-disconnector (General)		Unit	
Rated voltage	kV	36	12; 17; 24
Rated power frequency withstand voltage			
■ Across phases and phase to neutr	kV-rms	70	50
■ Across isolating distance	kV-rms	80	60
Rated Lighting impulse withstand voltage			
■ Across phases and phase to neutral	kV-peak	170	125
■ Across isolating distance	kV-peak	195	145
Rated frequency	Hz	50/60	50/60
Rated normal current for busbar	A	630	630
Rated short-circuit withstand current (main & earthing circuit)	kA-rms	16; 21*	21
Rated duration of short-circuit	s	1; 3*	1; 3*
Rated peak withstand current	kA-peak	40; 50*	50
Rated SF6 gas filling pressure (absolute)	bar (MPa)	1.4 (0.140)	1.4 (0.140)
Minimum SF6 gas functional pressure (absolute)	bar (MPa)	1.3 (0.130)	1.3 (0.130)
Internal arc class (IAC)		A (FL) 16 kA/1 s	A (FL) 20 kA/1 s
Switch-disconnector			
Type of switch		General, three-phased, three-positioned (OPEN-CLOSED-EARTHED)	
Electrical endurance class		E3	
Mechanical endurance class		M1	
Rated current	A	630	
Rated short-circuit withstand current (main & earthing circuit)	kA-rms	16; 21*	21
Rated peak withstand current	kA-peak	40; 50*	50
Phase number		3	
Rated frequency	Hz	50/60	
Rated earth fault breaking current	A	60	
Rated cable - and charging breaking			
Current under fault conditions	A	35	
Earthing switch			
Rated short-circuit withstand current	kA-rms	16; 21*	21
Rated duration of short-circuit	s	1; 3*	1; 3*
Making current	kA-peak	40	50
Electrical endurance class		E2	E2
Mechanical endurance class		M1	M1
Normal Service Conditions			
Ambient temperature			
■ Maximum		+40 °C	
■ Average (24 hour)		+35 °C	
■ Minimum		-25 °C	
Relative humidity		Maximum % 95	

* if desired

Cubicle with switch-fuse combination (General)		Unit		
Rated voltage		kV	36	12; 17; 24
Rated power frequency withstand voltage				
■ Across phases and phase to neutral		kV-rms	70	50
■ Across isolating distance		kV-rms	80	60
Rated Lighting impulse withstand voltage				
■ Across phases and phase to neutral		kV-peak	170	125
■ Across isolating distance		kV-peak	195	145
Rated frequency		Hz	50/60	50/60
Rated normal current for busbar		A	630	630
Rated short-circuit withstand current (main & earthing circuit)		kA-rms	16; 21*	21
Rated duration of short-circuit		s	1; 3*	1; 3*
Rated peak withstand current		kA-peak	40; 50*	50
Rated SF6 gas filling pressure (absolute)		bar (MPa)	1.4 (0.140)	1.4 (0.140)
Minimum SF6 gas functional pressure (absolute)		bar (MPa)	1.3 (0.130)	1.3 (0.130)
Internal arc class (IAC)			A (FL) 16 kA / 1 s	A (FL) 20 kA / 1 s
Rated transfer current		A	400	600
Take - over breaking current		A	470	
Switch-disconnector				
Type of switch			General, three-phased, three-positioned (OPEN-CLOSED-EARTHED)	
Electrical endurance class			E3	
Mechanical endurance class			M1	
Rated current		A	630	
Rated short-circuit withstand current (main & earthing circuit)		kA-rms	16; 21*	21
Rated peak withstand current		kA-rms	40; 50*	50
Phase number		Hz	50/60	
Rated frequency			3	
Earthing switch (on up-stream side)		kV	36	12; 17; 24
Rated short-circuit withstand current		kA-rms	16; 21*	21
Rated duration of short-circuit		s	1; 3*	1; 3*
Making current		kA	40	50
Electrical endurance class			E2	E2
Mechanical endurance class			M1	M1
Earthing switch (on down-stream side)				
Rated short-circuit withstand current		kA-rms	1	1
Rated duration of short-circuit		s	1	1
Making current		kA-peak	2.5	2.5
Electrical endurance class			E2	E2
Mechanical endurance class			M1	M1
Normal Service Conditions				
Ambient temperature				
■ Maximum			+40 °C	
■ Average (24 hour)			+35 °C	
■ Minimum			-25 °C	
Relative humidity			Maximum % 95	

* if desired

Cubicle with vacuum circuit breaker (General)		Unit	
Rated voltage	kV	36	12; 17; 24
Rated power frequency withstand voltage			
■ Across phases and phase to neutral	kV-rms	70	50
■ Across isolating distance	kV-rms	80	60
Rated Lightning impulse withstand voltage			
■ Across phases and phase to neutral	kV-peak	170	125
■ Across isolating distance	kV-peak	195	145
Rated frequency	Hz	50/60	50/60
Rated normal current for busbar	A	630	630
Rated short-circuit withstand current (main & earthing circuit)	kA-rms	16; 21*	21
Rated duration of short-circuit	s	1; 3*	1; 3*
Rated peak withstand current	kA-peak	40; 50*	50
Rated SF6 gas filling pressure (absolute)	bar (MPa)	1.4 (0.140)	1.4 (0.140)
Minimum SF6 gas functional pressure (absolute)	bar (MPa)	1.3 (0.130)	1.3 (0.130)
Internal arc class (IAC)		A (FL) 16 kA / 1 s	A (FL) 20 kA / 1 s
Vacuum circuit breaker			
Rated voltage	kV	36	24
Rated normal current	A	630	630
Rated short-circuit breaking current	kA-rms	16	21
Rated short-circuit withstand current (main & earthing circuit)	kA-rms	16; 21*	21
Rated duration of short-circuit	s		1; 3*
Rated operating sequence		O - 0.3 sn - CO- 3 dk- CO	
Breaking time	ms	Average 45-50	
Making time	ms	Average 65-70	
Phase discrepancy	ms	less than 5 milli second	
Applied standard		IEC EN 62271-100	
Motor		220 VAC	
Coils for tripping and closing		24 VDC, 48 VDC	
Disconnecter			
Type		General, three-phased, three-positioned (OPEN-CLOSED-EARTHED)	
Rated normal current	A	630	
Rated short-circuit withstand current (main & earthing circuit)	kA-rms	16; 21*	21
Rated duration of short-circuit	s	1; 3*	1; 3*
Rated peak withstand current	kA-peak	40; 50*	50
Mechanical endurance class		M1	
Earthing switch			
Rated short-circuit withstand current	kA-rms	16; 21*	21
Rated duration of short-circuit	s	1; 3*	1; 3*
Making current	kA-peak	40	50
Electrical endurance class		E2	
Mechanical endurance class		M1	
Normal Service Conditions			
Ambient temperature			
■ Maximum		+40 °C	
■ Average (24 hour)		+35 °C	
■ Minimum		-25 °C	
Relative humidity		Maximum % 95	

* if desired

According to the design and standards, the features of the products may be changed at any time without information.
The catalog should only be regarded as guide and is intended for information.

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