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MME



MMC



elcoring



MBK/PBK ECSS



EMTM



SWITCHING DEVICES



ELBOW CONNECTOR



MME

Air Insulated Metal Enclosed
Switchgear And Controlgear
(LSC 2A-PI)



MME-36



MME-24

General:

The MME typed metal-enclosed switchgear and controlgear is reliable and cheap solution for medium voltage applications. It offers;

- Air insulated,
- High level personal safety,
- High level operating reliability,
- Different cubicles types allowing individual configurations and thus high flexibility,
- Modular design allows unlimited installation possibilities,
- LSC 2A-PI (Loss of Service Continuity),
- Comply with IEC 60271-200,

Structure:

- MME consist of mainly four compartments. Namely;
 - Main Busbar Compartment,
 - Cable Compartment,
 - LV Compartment and Operating Mechanism Compartment.
 - Operating Mechanism Compartment.
- The material of enclosure is 2 mm. galvanized steel sheet. No welding is used during the assembling of the structure.
- The positions of rotary disconnecter (contact positions can be checked from the surveillance window.)

Internal Arc Withstand:

MME cubicles has durable design against the thermal and dynamic effects during the internal arc.

Internal arc class is IAC A (FL) 16 kA-1 s according to IEC 62271-200

Quality Assurance System:

ISO 9001: 2008 certified by independent organisation

Environmental Management System:

ISO 14001 certified by independent organisation



Main Busbar Compartment;

- Separated from cable compartment by epoxy housing of disconnector/switch-disconnector.
- Tool based accessible compartment with regard to accessibility.
- Withstand to internal arc.
- Having IP3X protection degree.



Cable Compartment of Cubicle with Circuit Breaker

Cable Compartment:

It is the compartment where the connections between Incoming/outgoing cables and placed at the bottom of the cubicle.

- Procedure based accessible compartment with regard to accessibility.
- Withstand to internal arc.
- Having IP3X protection degree.

According to the functional type of cubicle, it contains;

- MV SF6 insulated or Vacuum circuit breaker,
- MV Measurement Transformers,
- Earthing Switch,
- MV Fuses,

Low Voltage Compartment:

It is placed on the top front of the cubicle. It has IP3X protection degree.

According to the functional type of cubicle, it contains;

- Protection relays,
- LV fuses,
- Measurement devices,
- Auxiliary contacts,
- Electrical terminal arrays,
- AC/DC Supply



Operating Mechanism Compartment:



According to the functional type of cubicle, operating mechanism compartment contains;

- Switch-disconnector mechanism,
- Earthing switch mechanism and/or
- Disconnecter mechanism.

The operating mechanism of the circuit breaker is placed on the breaker, separately.

All metal parts of operating mechanism are protected against to corrosions.

Operating mechanism is placed in a metal enclosure having IP 3X protection degree.

The Control and Monitoring Panel has;

- Mimic diagram,
- Open/close knut (latch) for both disconnecter and switch disconnecter,
- Position indicators,
- "Spring Charged" and "Spring Released" indicators,
- Operating handle slots,
- Voltage Presence Indicator,
- Padlock,
- Operating instructions.



Voltage Indicator: Capacitive Voltage Presence Indicator (VPIS) is provided with as standart equipment.

Voltage Detection System (VPS) is an obtional.

Protection Relay: Provided according to the client requirement.

Remote Monitoring and Command: Various supplementary modules and required equipments for this aim (motor drive unit, (auxiliary switch and contacts, e.g) can be attached later any time.



Operating Mechanism of Switch-Disconnecter:

The type of operating mechanism used is energy stored type. Making and closing operations are independent of the operator.

The energy necessary for operations is obtained by the compression of a spring.

Storing energy;

Manually : by an operating handle (standard)

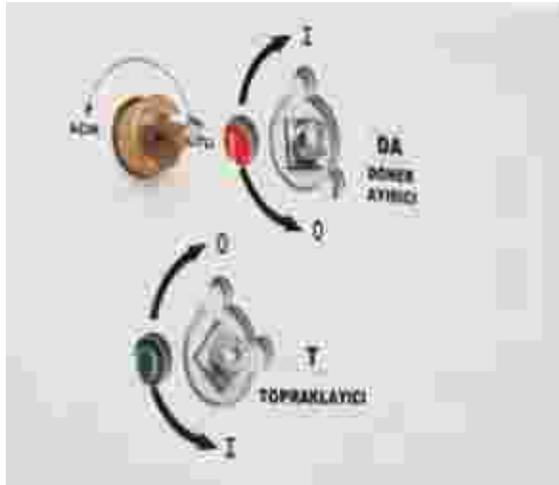
Electrically: by a motor drive unit (optional)

Releasing of energy;

Manually : by the knut (latch) on the mechanism as an standart.

Electrically : by the shunt released, as a standart for fuse-switch combinations, as an optional for switch-disconnectors.

Mechanically : with striker pin for switch-fuse combinations as an standart.



Operating Mechanism of Earthing Switches:(for E2 class)

The type of operating mechanism is quick making type. Making is independent of the operator.

Operating Mechanism of Rotary Disconnecter:

The closing and opening operations is dependent of the operator.



Cubicle with circuit breaker



Interlocking :

Interlockings prevents any false operations. The following interlocks comply with IEC recommendation 62271-200.

Cubicle with switch-disconnector and switch-fuse combination:

- The switch-disconnector can only be closed if the earthing switch is OPEN and if the cable compartment door is CLOSED.
- The earthing switch can only be closed if the switch-disconnector is OPEN.
- The cable compartment door can only be opened if the the earthing switch is CLOSED.

and also:

The switch-disconnector can be locked in the open position when the cable compartment door is removed . The earthing switch can then be operated in order to perform outgoing/incoming MV MV cable tests.

Cubicle with circuit breaker:

- The circuit breaker can only be closed if the earthing switch is OPEN and if the cable compartment door is CLOSED.
- The earthing switch can only be closed if the disconnector is OPEN.
- The disconnector can only be opened if the circuit breaker is in open position. The circuit breaker can then be operated with the key being free.

and also:

The disconnector is locked in the open position when the cable compartment door is removed. The earthing switch can then be operated in order to perform outgoing/incoming MV cable tests.

Locking:

MME cubicles can be inoperable by using padlocking. (Switch-disconnectors, earthing switch or disconnector in the OPEN or CLOSED position.)



Switch-Fuse Combinations are used for switching and protection of HV/LV distribution transformers.

- The current limiting fuses with striker pin should be used
In case of a fault on any phase, the striker of pin corresponding phase operate the mechanism and all three phases are opened simultaneously.
- The type of striker pin of fuses used within MME should be Medium Type (acc.to (IEC 60282-1),
- The door of the cable compartment having MV fuses can only be opened if the both sides of fuses are earthed. So, replacing of fuses can be taken place safely.

REMARK: It is recommended at 8.103 clause of IEC 62271-105 that all three fuses should be replaced even if only one or two fuse(s) have blow up.

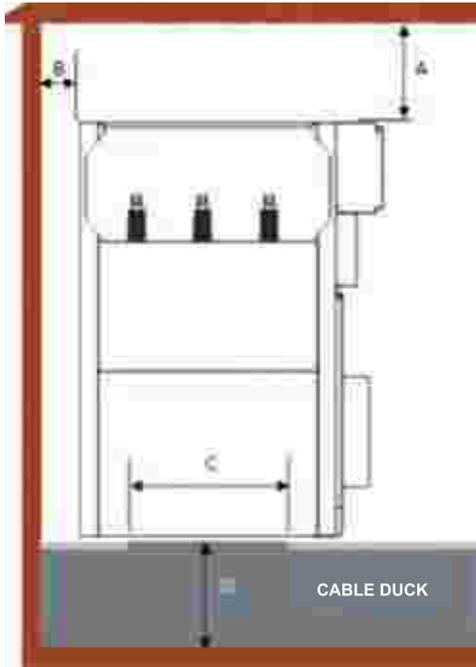
Following table should be used for selection of fuses to be used in MME cubicles according to power of transformers.

HV FUSE SELECTION TABLE									
Rated Voltage (kV)		36							
Rated Voltage (kVA)		160	250	400	630	800	1000	1250	1600
%Uk		4.5	4.5	4.5	4.5	6	6	6	6
İNTERTEKNİK (Tipi: ACT)	In	6.3 A	10 A	16 A	20 A	20 A	25 A	31.5 A	40 A
GÜRAL (Tipi: MGM)	In	4-6 A	10 A	16 A	20-25 A	20 A	25 A	30 A	40 A
EFO	In	-	-	16 A	20 A	20 A	25 A	30 A	40 A
Remark: Ask ELKO about selection of fuses for different power, voltage and % Uk ratings.									

! Important !

The fuse link should be placed in a cubicle as shown on the picture above. Otherwise the striker can not trip the mechanism.

The striker side of fuse is marked with an ARROW on the fuse.



MME switchgears should be placed on a cable duck.

The distances to ceiling and back wall is provided below:

$A \geq 400$ mm

$B \geq 100$ mm

Cable duck dimensions:

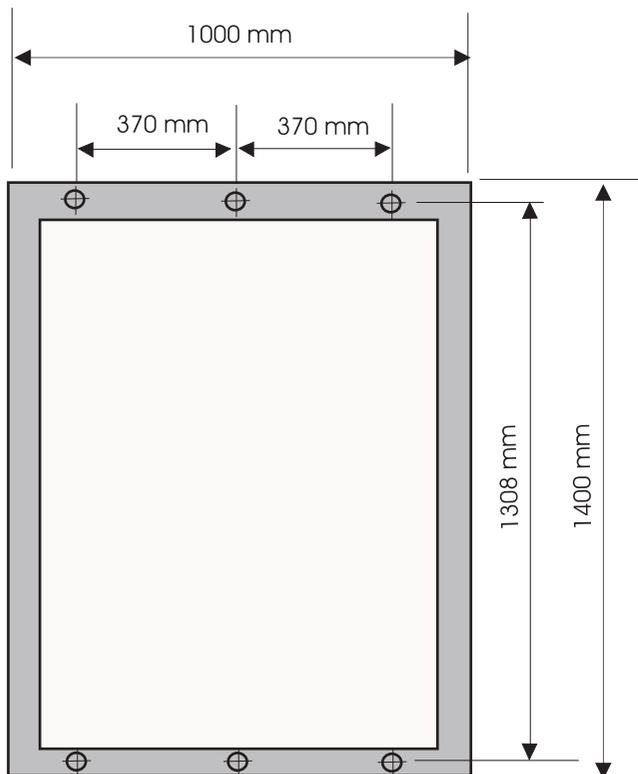
Width (C) : 900 mm

Depth (D) : ≥ 750 mm*

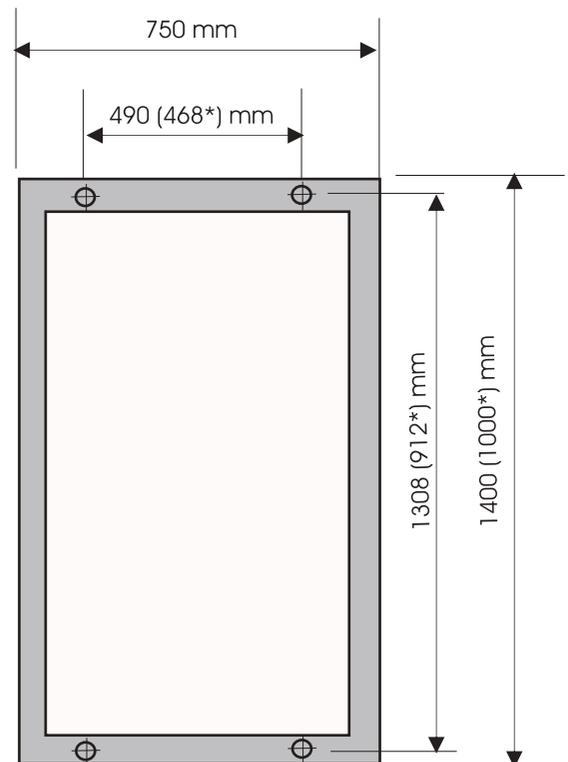
* The dimensions are for 36 kV, XLPE insulation
1x240/25 mm² cable.

Fixing the switchgear to the floor:

The base hole dimensions for MME-36 are below. The switchgear should be fixed to the well-levelled base on the cable duck by using M10X30 steel concrete insert (pin).



For cubicles with 1000 mm width,
(the diameter of holes is 13 mm)



For switchgears with 750 mm width,
(the diameter of holes is 13 mm)

*: for MME-24



Fields of Applications (mainly):

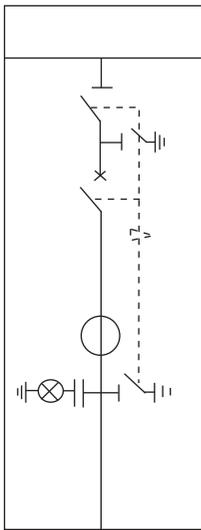
- Secondary Distribution Systems
- MV/LV Distribution Transformer Substations
- Organized Industrial Zones
- Shopping Malls
- Airports, hospitals

Optional Equipments:

- Motor and Fault Indicator for cubicle with Switch Disconnecter.
- Energy meter, Analyzer and Ammeter for cubicle with Circuit Breaker.
- Fault Indicator for cubicle with Disconnecter
- Surge arrester for incoming/outgoing cubicles.
- S_f6 gas manometer for Switch-disconnector and disconnecter.

Technical Characteristics:

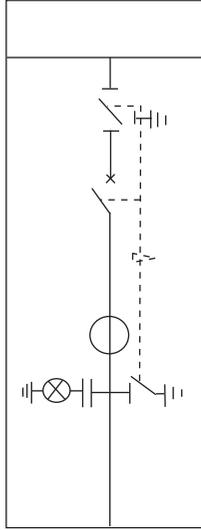
Rated voltage (kV)	12; 17.5; 24	36
Type	MME-24	MME-36
Rated main busbar current (A)	630; 1250	630; 1250
Rated feeder current (A)	630; 1250*	630; 1250*
Rated power frequency withstand voltage (kV-rms)		
■ To earth and between phases	50	70
■ Across the isolating distance	60	80
Rated lightning impulse withstand voltage (kV-peak)		
■ To earth and between phases	125	170
■ Across the isolating distance	145	195
Rated short-circuit withstand current	<ul style="list-style-type: none"> ■ 16 kA-1 s ■ 20 kA-1 s 	<ul style="list-style-type: none"> ■ 16 kA-1 s ■ 20 kA-1 s ■ 25 kA-1 s
Rated peak withstand current (kA-peak)	40/50	40/50/62.5
Rated transfer current (A) (For switch- fuse combination)	600	500
Loss of Service Continuity	LSC 2A-PI	LSC 2A-PI
Internal Arc Withstand	A (FL) 16 kA-1 sec	A (FL) 16 kA-1 sec
Protection Degree	IP 3X	IP 3X
Standards Applied	IEC 62271- 200	IEC 62271- 200
*: Valid for switchgears with circuit breaker		



SP (g)

TF (g)

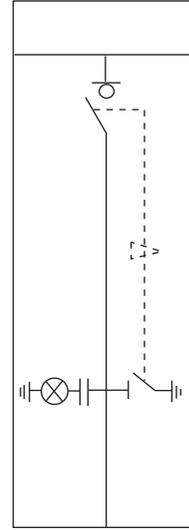
MME-17		
SP (g)	MME-24	MME-36
W	750*/850	1000
D	1000	1400
H	1970	2250



SP (h)

TF (h)

MME-17		
SP (h)	MME-24	MME-36
W	750*/850	1000
D	1000	1400
H	1970	2250



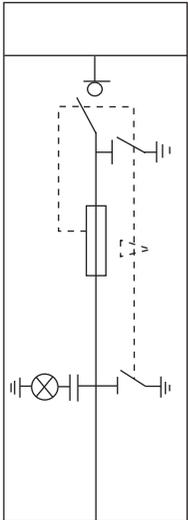
SC (g)

MME-17		
SC (g)	MME-24	MME-36
W	450*/550	750
D	1000	1400
H	1970	2250

Cubicle with Circuit Breaker
(with SF6 Insulated Disconnector)

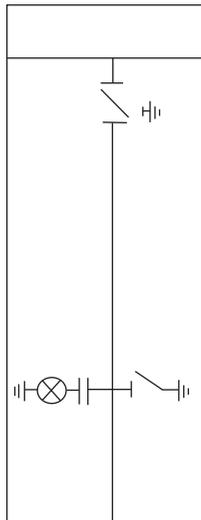
Cubicle with Circuit Breaker
(with Air Rotary Disconnector)

Cubicle with SF6 Insulated
Switch Disconnector



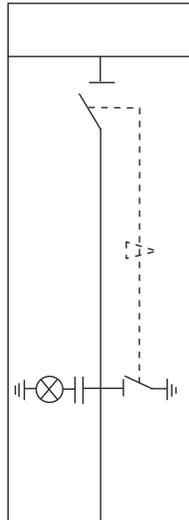
FC-G

MME-17		
FC (g)	MME-24	MME-36
W	550	750
D	1000	1400
H	1970	2250



DC (h)

MME-17		
DC (h)	MME-24	MME-36
W	750*/850	1000
D	1000	1400
H	1970	2250



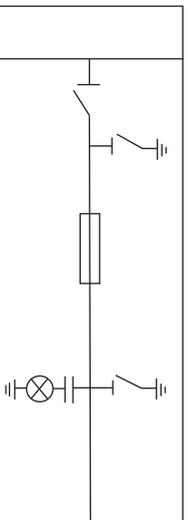
DC (g)

MME-17		
DC (g)	MME-24	MME-36
W	450*/550	750
D	1000	1400
H	1970	2250

Cubicle with Switch-Fuse Combination
(with SF6 Insulated Switch Disconnector)

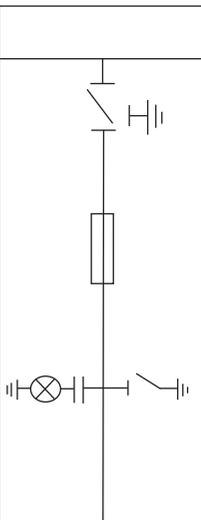
Cubicle with Air Rotary Disconnector

Cubicle with SF6 Insulated
Disconnector



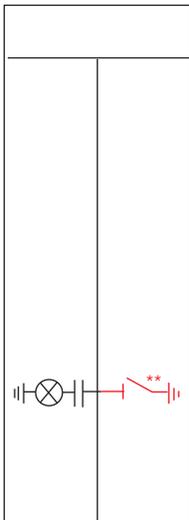
FD (g)

MME-17		
FD (g)	MME-24	MME-36
W	550	750
D	1000	1400
H	1970	2250



FD (h)

MME-17		
FG (g)	MME-24	MME-36
W	750*/850	1000
D	1000	1400
H	1970	2250



KB

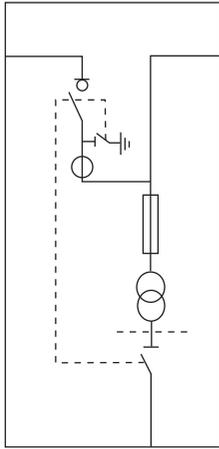
MME-17		
KB	MME-24	MME-36
W	450*/550	750
D	1000	1400
H	1970	2250

Cubicle with Fused Disconnector
(SF6 Insulated Disconnector)

Cubicle with Fused Disconnector
(with Air Rotary Disconnector) * for MME-24

Cable Connection Cubicle
** upon the request

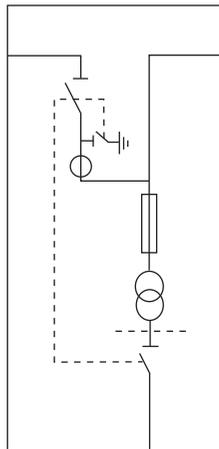
Ölçüler mm'dir.



MC (sc)

MC(sc)	MME-17	
	MME-24	MME-36
W	900*/1000	1000
D	1000	1400
H	1970	2250

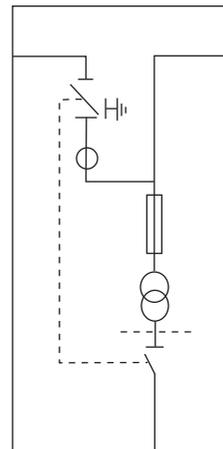
Current Voltage Measurement Cubicle (with Switch Disconnector)



MC (g)

MC(g)	MME-17	
	MME-24	MME-36
W	900*/1000	1000
D	1000	1400
H	1970	2250

Current Voltage Measurement Cubicle (with SF6 Insulated Disconnector)

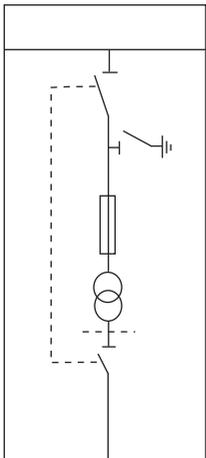


MC (h)

MC(h)	MME-17	
	MME-24	MME-36
W	900*/1000	1150
D	1000	1400
H	1970	2250

Current Voltage Measurement Cubicle (with Air Rotary Disconnector)

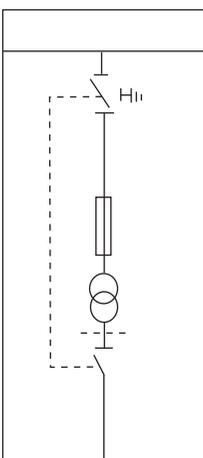
*If main busbar current is 1250 A



VC (g)
PC(g)

VC(sc)	MME-17	
	MME-24	MME-36
	450*/550	750
	1000	1400
	1970	2250

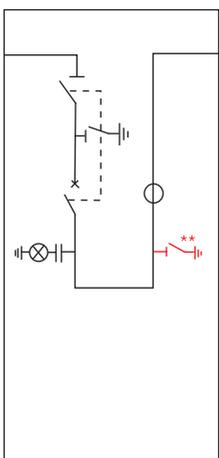
Voltage Measurement Cubicle (with SF6 Insulated Disconnector)



VC (h)
PC(h)

VC(h)	MME-17	
	MME-24	MME-36
	750*/850	1000
	1000	1400
	1970	2250

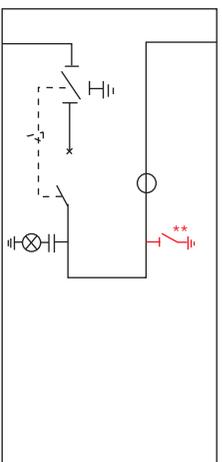
Voltage Measurement Cubicle (with Air Rotary Disconnector)



RP (g)

RP(g)	MME-17	
	MME-24	MME-36
	900*/1000	1000
	1000	1400
	1970	2250

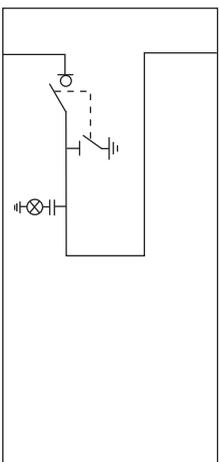
Cubicle Connection Cubicle with Circuit Breaker (with SF6 Insulated Disconnector)



RP (h)

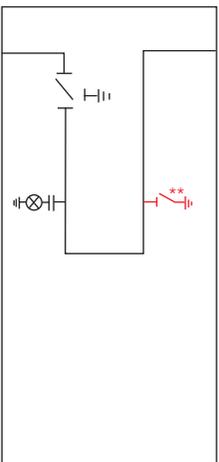
RP(h)	MME-17	
	MME-24	MME-36
W	900*/1000	1150
D	1000	1400
H	1970	2250

* for MME-24



RC (g)

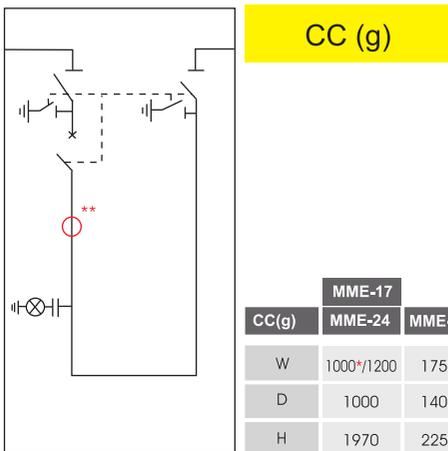
RC(g)	MME-17	
	MME-24	MME-36
W	900*/1000	1000
D	1000	1400
H	1970	2250



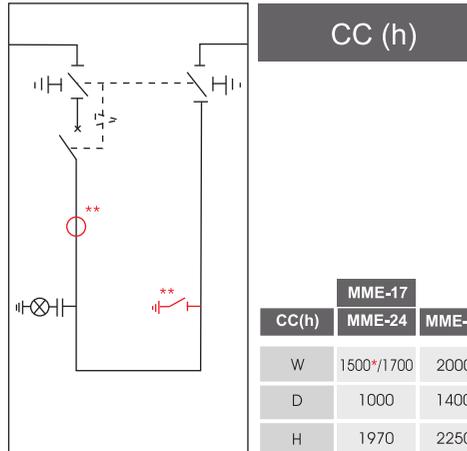
RC (h)

RC(h)	MME-17	
	MME-24	MME-36
W	900*/1000	1150
D	1000	1400
H	1970	2250

** upon the request

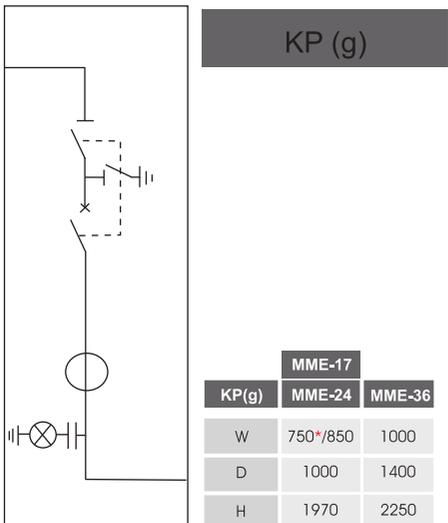


Busbar Coupling Cubicle with SF6 Insulated Disconnector

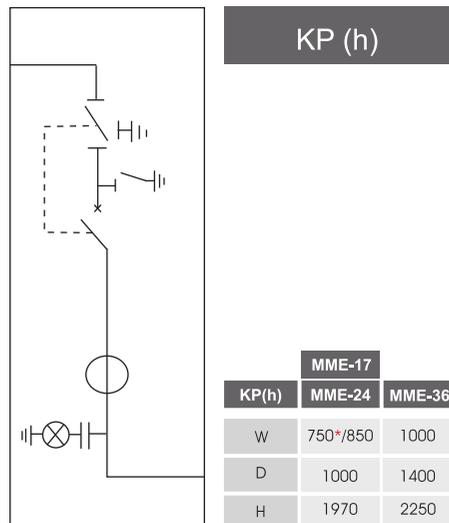


Busbar Coupling Cubicle with Air Rotary Disconnector

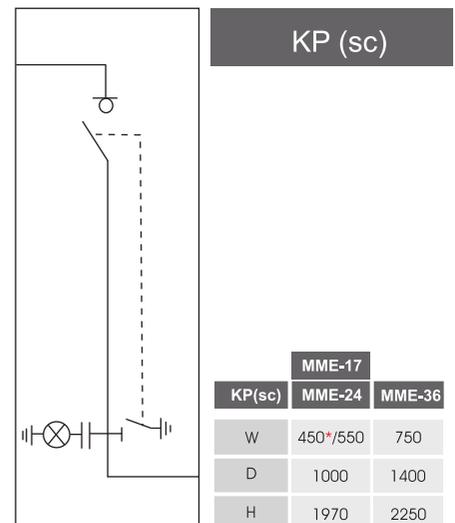
* if main busbar current is 1250 A



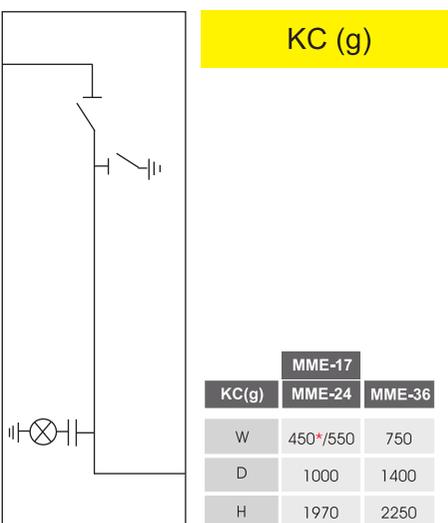
Single isolation Cubicle Lateral Outgoing (with Circuit Breaker and SF6 insulated disconnector)



Single isolation Cubicle Lateral Outgoing (with Circuit Breaker and Air Rotary Disconnector)

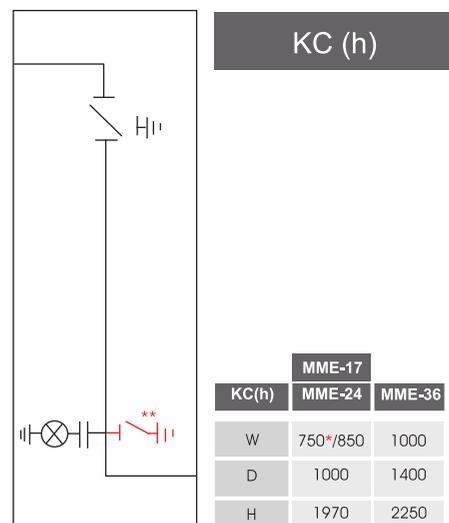


Single isolation Cubicle Lateral Outgoing (with Switch Disconnector)



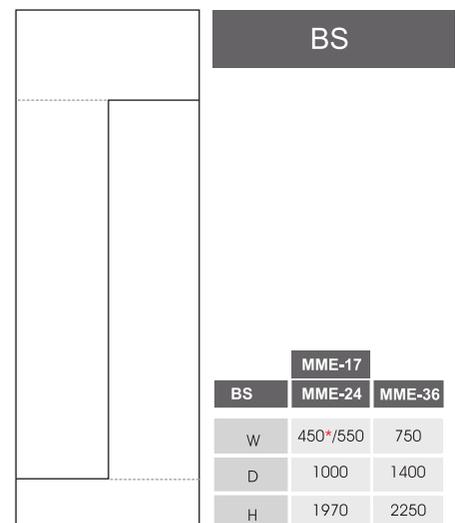
Single isolation Cubicle Lateral Outgoing (with SF6 Disconnector)

* for MME-24



Single isolation Cubicle Lateral Outgoing (with Air Rotary Disconnector)

** upon the request

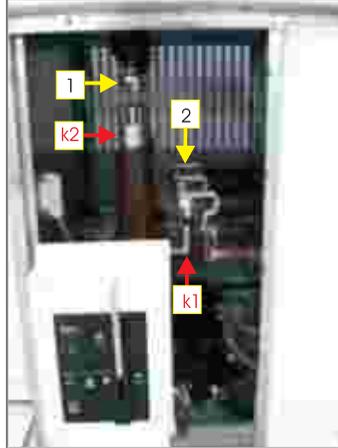


Busbar Rising Cubicle

Cubicle with withdrawable circuit breaker:



Circuit breaker position: CONNECTED



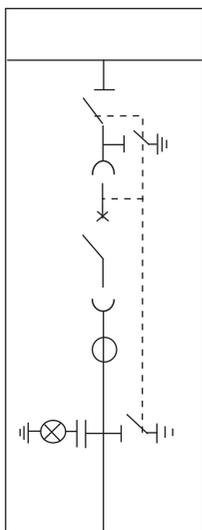
Circuit breaker position: DISCONNECTED

Connection of the Circuit Breakers (CB) to main circuit is **not fixed** connection. It is a kind of «withdrawable» type.

- 1 Fixed lower terminal of the disconnecter with Sf6 gas,
- 2 Fixed terminal of the incoming/outgoing cable connection,

k1, k2: Moving terminals of the CB.

Connection of the CB to main circuit is obtained by raising the CB with the help of lever. Bolted connection is not required.



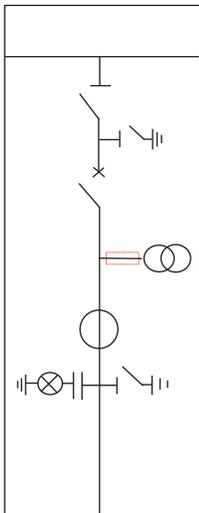
SP (w)

SP(w)	MME-24	MME-36
W	-	1000
D	-	1400
H	-	2250

Technical characteristics:

Rated current: 630/1250 A
Short time withstand current: 25 kA/1s

Cubicle with circuit breaker (current transformer + voltage transformer)



SP (vc)

Dimensions (mm)	
Width	1000*; 1150**; 1400***
Depth	1400
Height	2250

REMARKS

- * : if used toroidal type CT and VT without fuse
- ** : if used support type CT and VT without fuse
- *** : if used support type CT and VT with fuse



MMC-36

Air Insulated
Metal Enclosed Switchgear and Controlgear
(LSC 2B-PM)

MMC-36 type switchgears of ELKO offers;

- Air insulated and metal enclosed,
- Switching device on the truck,
- Loss of service continuity: LSC 2B,
- Partition: Metal partitions (PM),
- Voltage level is 36 kV.



MMC-36 is suitable for indoor applications and has various type according to functional characteristics of cubicle.

For example: Incoming/outgoing cubicle with circuit breaker, Measurement cubicle, Bus Riser, etc.

Upon the request, vacuum or SF6 Circuit Breaker can be used in the MMC-36.

Advantages:

- High level personal and operation safety,
- High level service continuity,
- Easy operation and easy maintenance,
- Convenience to extension and various feeder arrangements,
- Fast and safe switching device exchange if need.



Main Applications:

- Power generation plants,
- HV/MV and MV/LV Transformer substations,
- Distribution substations,
- For feeding MV motors,
- Industrial zones and pump stations
- Shopping malls, airports, hospitals, underground subways



MMC-36 typed metal-clad cubicles consist of;

- Metal enclosure,
- Main components (Circuit breaker, measurement transformers, etc)
- Segregated compartments,
- Metal shutters and metal partitions,
- Cover and doors

Enclosure:

The enclosure of cubicle is made of pre-galvanized sheet steel having 2 mm of thicknes. Electrostatic powder paint is used for exterior surface of enclosure.

Degree of protection

- For metal enclosure: IP 2X
- Between compartments: IP 4X

Main components:

- According to the customer request, vacuum or SF6 circuit breaker can be used as a switching device.
- Each switching device is placed on the truck and connection with main bus bar is obtained by driving the truck forward.
- In general epoxy resine support type current transformers are used. Upon request, LPCT or toroidal type current transformers also can be used.
- The earthing switch is installed in the «cable compartment» to earth incoming/outgoing cable.
- Main busbars are electrolytic copper.

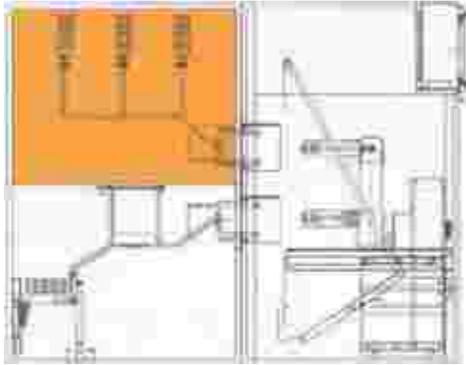


Circuit Breaker on the truck



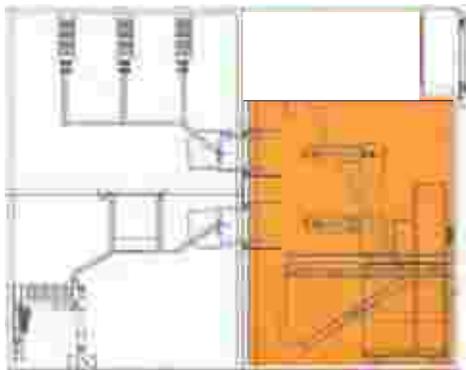
Main busbars compartment

MMC-36 typed cubicles are consist of Main Busbar Compartment, Switching Compartment, Cable Connection Compartment and Low Voltage Compartment. Compartments are segregated each other by earthed metal partitions and metal shutters.



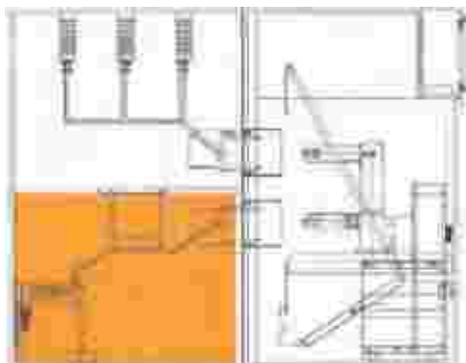
Main Busbar Compartment :

- Main Busbar Compartment is at the rear-top of the cubicle. It is not possible to access to this compartment without use of tool.
- Main busbar compartment consists of main busbars made of electrolytic copper and female contacts.
- Female contacts make the connection between main circuit and switching device.



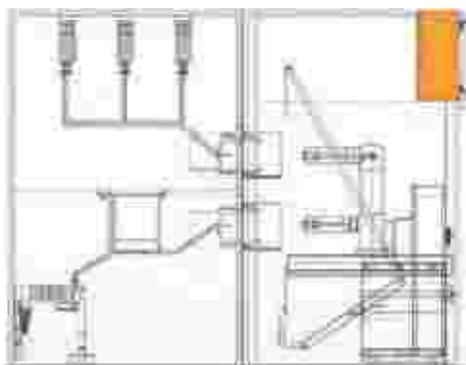
Switching Compartment :

- Switching compartment is an accessible compartment and placed on the front of the cubicle. The truck carrying switching device is inside of this compartment..
- Compartment have a door which is equipped with mechanical interlocks. The door can only be opened when the incoming/outgoing cable is earthed and the truck is at the ISOLATED (TEST) position.
- Compartment is seperated from other compartments via metal shutters and metal clads..



Cable Connection Compartment:

- Cable compartment is placed at rear bottom of the cubicle. It consist of current transformers, voltage transformers, earthing switch and fixed female contacts.
- The incoming and outgoing MV cable connections are made in this compartment.



Low Voltage Compartment:

- Low Voltage Compartment is placed at the front-top of the cubicle.
- It consist of protection relays, measurement devices, terminal box, and low voltage control equipments.
- Connection between switching device and LV panel is done with mobile connector having flexible cable.



Switching Compartment

Personal safety

- Continuous interlockings prevent incorrect operation.
- The VOLTAGE ON or VOLTAGE OFF on the main circuit can be easily monitored through the Voltage Presence Indicating System.
- Switching compartment is isolated from other compartments via metal clad partitions and metal shutters if the truck at «ISOLATED» or «WITHDRAWN» position.



Monitoring of the switching devices position form outside:

The truck and earthing switch positions can be easily checked outside of the cubicle via surveillance windows.

Truck positions:

There are three position of the truck: Those are;



Isolated Positon

Withdrawn Positon

- **Connected position:** Switching device is connected to the main circuit.
- **Isolated position (Test Position):** The truck is drawn back. There is no connection between switching device and main circuit. Shutters are closed. The switching device on the truck is only connected to Low Voltage Panel through the control socket.
- **Withdrawn position:** The truck is fully taken out of the cubicle. There is no mechanical and electrical connection between switching device and cubicle.

Internal arc withstand:

- MMC type cubicles withstand the dynamic and thermal effects of the internal arc. According to the internal arc class specification, MMC-36 cubicles have front (F), lateral (L) and rear (R) accessibility.
- Each compartment is equipped with seperate pressure relief system. In this way, the effect of internal arc neighboring compartment is minimized.



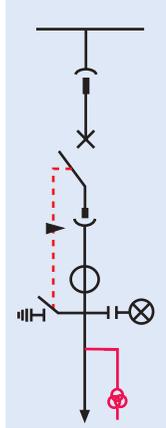
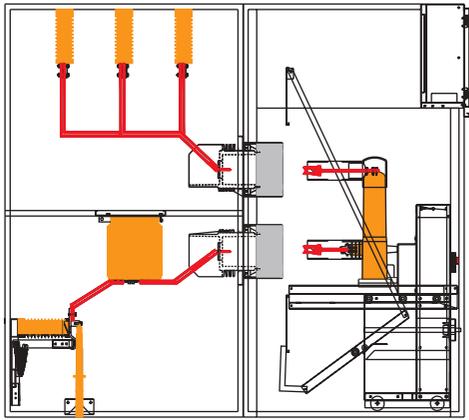
- The truck can only be moved from «isolated position» to «connected position» or vice-versa when the switching device is OPEN.
- Earthing switch can only be CLOSED when the switching device is open and the truck is at the «isolated position»
- The truck can not be moved to the «connected position» when the earthing switch is closed.
- The earthing switch can not be closed when the truck is at the «connected position»
- The door of the switching compartment can only be opened when the incoming/outgoing cable is earthed and the truck is at the ISOLATED (TEST) position.
- Access to the cable connection compartment is only when the truck is at the «ISOLATED» position and the earthing switch is CLOSED position.

Besides the above mentioned interlockings, MMC-36 typed cubicles have padlocks. In this facility undesirable operation can be prevented.



Cable Connection Compartment
(At the back side of the cubicle)

Incoming/outgoing cubicle with circuit breaker: (SP)



Standard equipments:

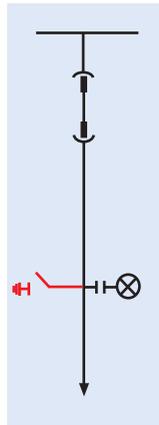
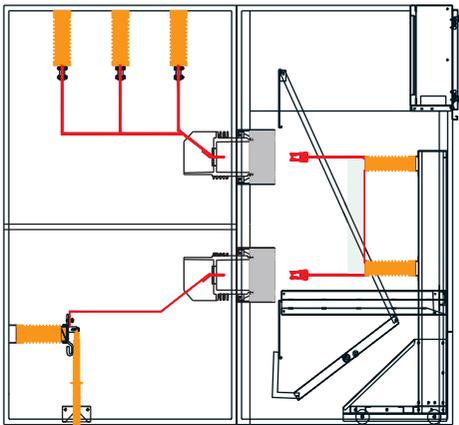
- Circuit breaker on the truck, earthing switch, current transformer, voltage presence indicating system, secondary protection, anti condensation heater with thermostat

Optional equipments:

- Voltage transformer (fixed type)

Rated Current (A)	Width (mm)	Height (mm)	Depth (mm)
630	1400	2650	2415
1250	1400	2650	2415
2500	1500	2650	2415

Incoming/outgoing cubicle with disconnecter: (SC)



Standard equipments:

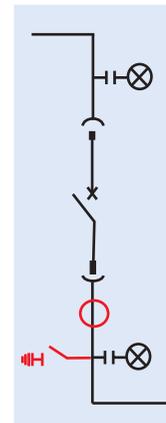
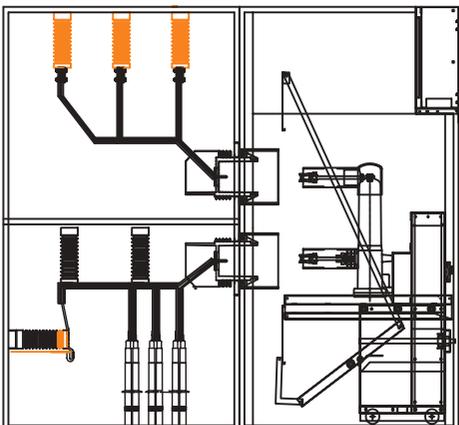
- Disconnector on the truck,
- Voltage presence indicating system,
- Anti condensation heater with thermostat

Optional equipments:

- Earthing switch

Rated Current (A)	Width (mm)	Height (mm)	Depth (mm)
630	1400	2650	2415
1250	1400	2650	2415
2500	1500	2650	2415

Sectionalizing cubicle with circuit breaker: (KP)



Standard equipments:

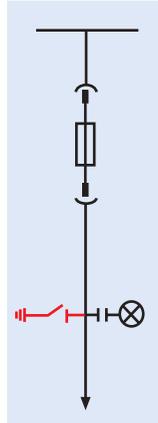
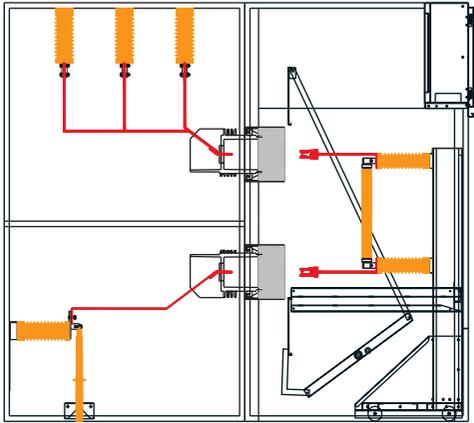
- Circuit breaker on the truck,
- Voltage presence indicating system,
- Anti condensation heater with thermostat

Optional equipments:

- Earthing switch, current transformer

Rated Current (A)	Width (mm)	Height (mm)	Depth (mm)
630	1400	2650	2415
1250	1400	2650	2415
2500	1500	2650	2415

MV/LV Transformer protection cubicle with HV fuse: (FC)



Standard equipments:

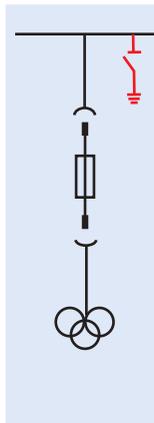
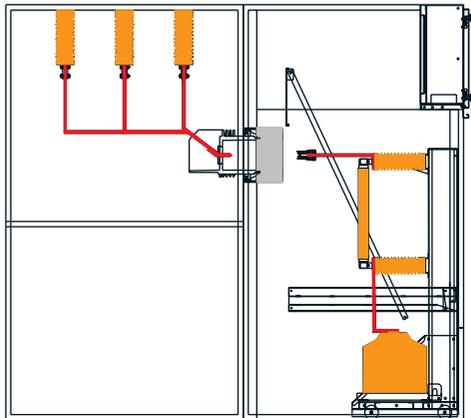
- HV fuses on the truck,
- Voltage presence indicating system,
- Anti condensation heater with thermostate

Optional equipments:

- Earthing switch

Rated Current (A)	Width (mm)	Height (mm)	Depth (mm)
630	1400	2650	2415
1250	1400	2650	2415

Voltage measurement cubicle: (VC)



Standard equipments:

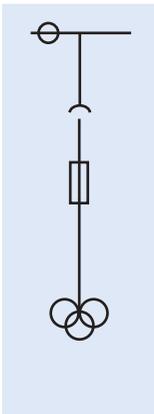
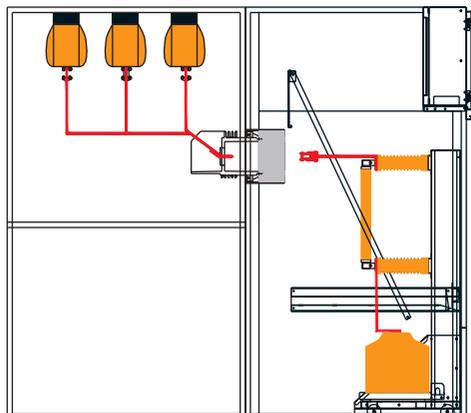
- HV fuses and voltage transformer on the truck,
- Anti condensation heater with thermostate

Optional equipments:

- Earthing switch for main bus bare

Rated Current (A)	Width (mm)	Height (mm)	Depth (mm)
–	1400	2650	2415

Measurement Cubicle: (MC)

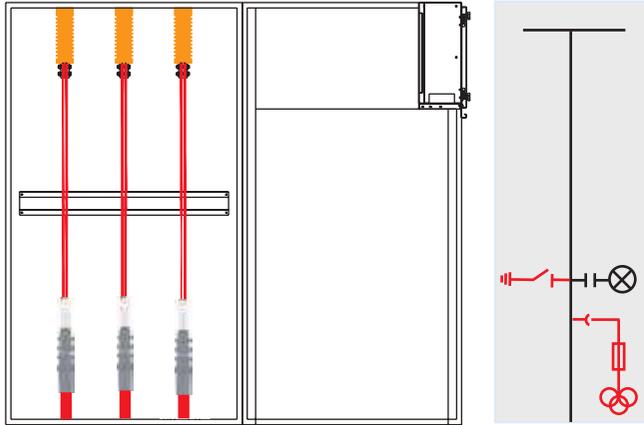


Standard equipments:

- HV fuses and voltage transformer on the truck,
- Current transformers
- Anti condensation heater with thermostate

Rated Current (A)	Width (mm)	Height (mm)	Depth (mm)
–	1400	2650	2415

**Cable connection cubicle:
(KB)**



Standard equipments:

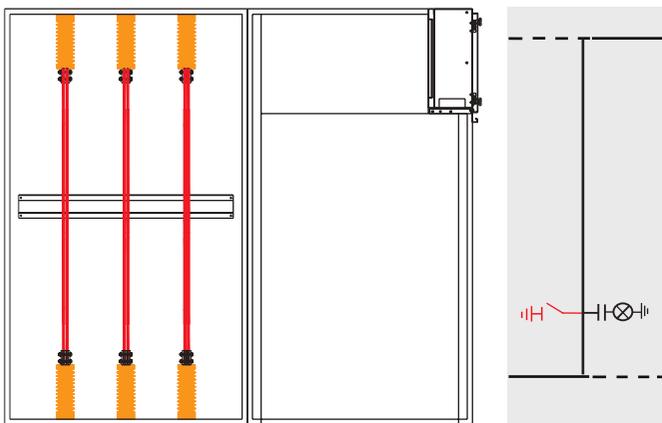
- Voltage presence indicating system

Optional equipments:

- Earthing switch
- Voltage transformer

Rated Current (A)	Width (mm)	Height (mm)	Depth (mm)
630	1400	2650	2415
1250	1400	2650	2415
2500	1500	2650	2415

**Bus riser cubicle:
(BS)**



Standard equipments:

- Voltage presence indicating system

Optional equipments:

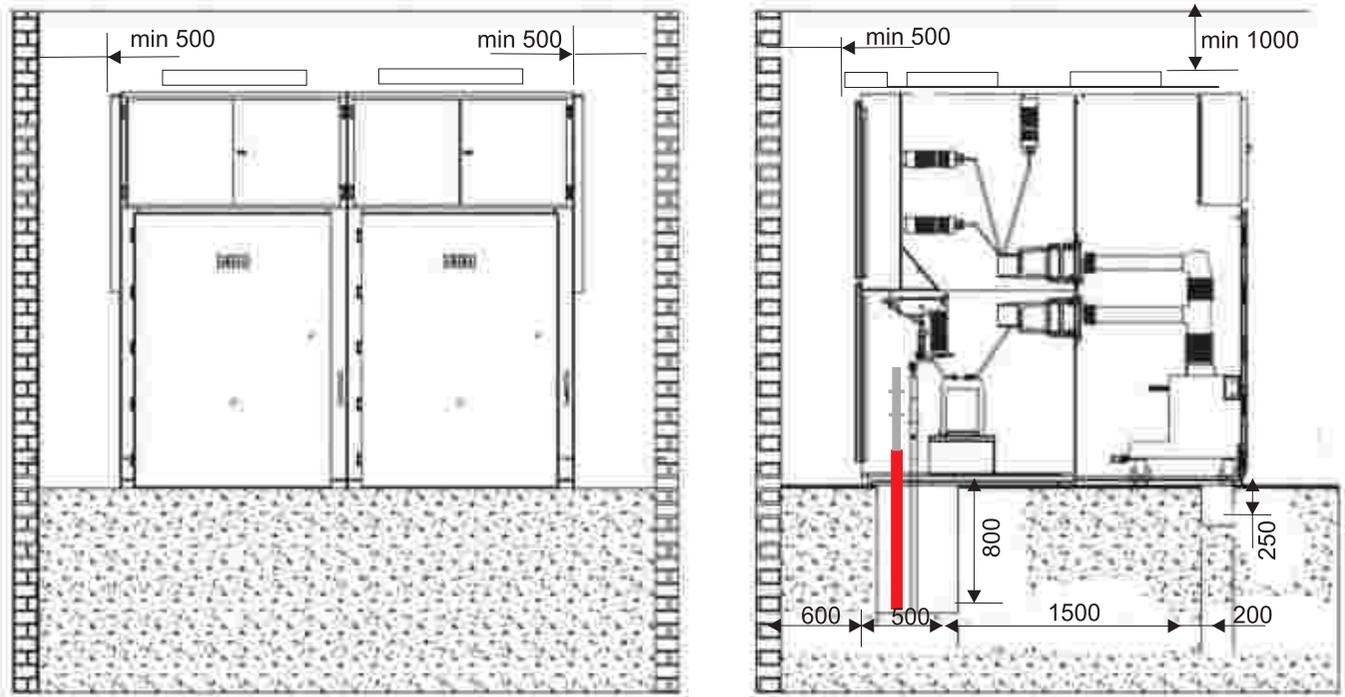
- Earthing switch

Rated Current (A)	Width (mm)	Height (mm)	Depth (mm)
630	1400	2650	2415
1250	1400	2650	2415
2500	1400	2650	2415

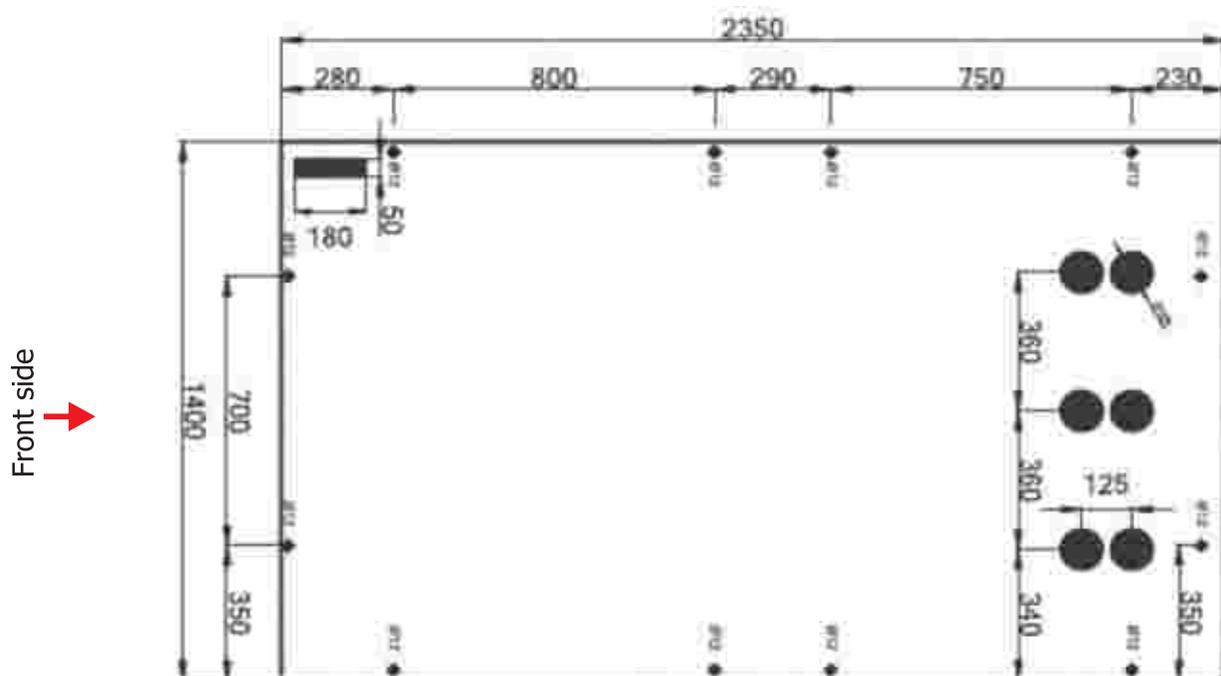
Lay-out:

(Dimensions are in mm.)

- MMC-36 typed cubicles should be mounted on a cable trench by taking into consideration foundation drawings. The surface of floor well-leveled as much as possible.
- While mounting the cubicles in building the dimensions given below drawings should be taken into account.



Foundation drawings and anchor bolts:

Front side
→

Rated voltage	36 kV
Type	MMC-36
Rated normal current for main busbar	630 A;.....;2500 A
Rated normal current for feeder	630 A;.....;2500 A
Rated power frequency withstand voltage	70 kV-etken
Rated lightning impulse withstand voltage	170 kV-tepe
Rated short time withstand current	25 kA-1 s; 31.5 kA-3 s
Rated peak withstand current	62.5 kA-peak; 78 kA-peak
Loss of service continuity	LSC 2B
Partitions	PM
Internal arc class	IAC A (FLR)-25 kA/1 s; IAC A (FLR)-31.5 kA/1 s
IP Protection degree	<ul style="list-style-type: none"> ■ For enclosure: IP 4X ■ Between compartments: IP 2X
Applied standard	IEC 62271-200

Please ask ELKO for more detailed features.



MV fuses on the truck



Voltage transformers on the truck



Circuit breaker on the truck



MMC-17

Air Insulated Metal Enclosed
Controlgear and Switchgears
(LSC 2B-PM)

MMC-17 type switchgears of ELKO offers;

- Air insulated,
- Switching device on the rack,
- ABB mark switching devices (circuit breaker, contactor, e.g)
- Up to 17.5 kV voltage level.
- Withstand to internal arc.



MMC 17 is suitable for indoor applications and has various type according to functional characteristics of cubicle. For example: Incoming/outgoing cubicle with circuit breaker, Measurement cubicle, Bus Riser, e.g.

Upon the request, vacuum or SF6 Circuit Breaker can be used.

Advantages:

- High level personal and operation safety,
- High level service continuity,
- Easy operation and easy maintenance,
- Convenience to extension and various feeder arrangements,
- Fast and safe switching device exchange if need.



Main Applications:

- Power generation plants,
- HV/MV and MV/LV Transformer substations,
- Distribution substations,
- For feeding MV motors,
- Industrial zones and pump stations
- Shopping malls, airports, hospitals, underground subways



Surveillance window for monitoring of the earthing switch position

MMC-17 type metal-clad cubicles consist of;

- Metal enclosure,
- Main components (Circuit breaker, measurement transformers, etc)
- Compartments,
- Metal shutters and metal partitions,
- Cover and doors

Enclosure:

The enclosure is made of 2 mm pre-galvanized sheet steel. External surfaces are painted with electrostatic powder paint.

Protection degree:

- For metal enclosure (The doors are CLOSED): IP 2X
- Between compartments: IP 4X

Main components:

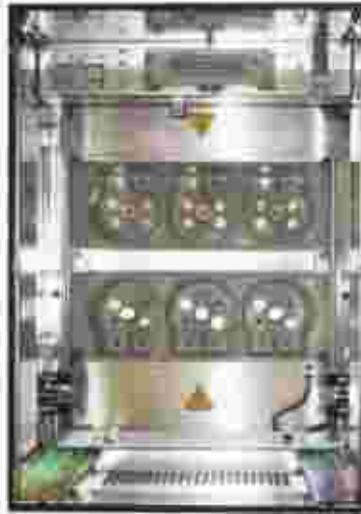
- According to the customer request, vacuum/SF6 circuit breaker or vacuum contactor can be used as a switching device.
- Switching device is placed on the rack. Connection with main bus bar is provided by moving the rack forward..



- Main busbars are electrolytic copper bars,
- Unless otherwise specified, epoxy resin support type current transformers are used. Upon request, LPCT or toroidal type current transformers/sensors also can be used.
- Voltage transformers are on the truck.
- The earthing switch, installed in «cable compartment» is capable to close on the short-circuit current.

Personal safety:

- The possibility of wrong amaneuver and access is prevented by mechanical interlockings.
- The VOLTAGE ON or VOLTAGE OFF on the outgoing/incoming cable can be easily monitored through the Voltage Presence Indicating System.



Metal shutters are OPEN.

- When the rack is at the «outside» or «test» position», switching compartment are seperated from others by the metal shutters.
- The position of the earthing switch (OPEN)or (EARTHED) can be checked through the surveillance window on the front.

Rack positions:

- **Connected (service) position:** Switching device is connected to the main circuit.
- **Isolated position (Test Position):** The rack is withdrawn. Main circuit and switching device is disconnected. Metal shutters are closed. Low Voltage is still connected.
- **Withdrawn position:** The switching device on the rack is completely has been taken out of the cubicle by using truc. There is no mechanical and electrical connection between switching device and cubicle.

Internal arc withstand:

- MMC type cubicles are resistant to dynamic and thermal effects of during internal arc.
- Each compartment is equipped with seperate pressure relief system. In this way, the effect of internal arc neigh
-

MMC-17 type metal clad type cubicles are consist of;

- (A) Main busbar compartment,
- (B) Switching compartment,
- (C) Cable connection compartment,
- (D) Low voltage compartment,

Compartments are seperated with earthed metal partitions from each other.

Main Busbar Compartment (A):

- It is on the top-back the cubicle.
It is not possible to access to this compartment without use of tool.
- Main busbar is made of appropriate cross-section electrolytic copper..
- Female contacts make the connection between main circuit and switching device.

Switching Compartment (B):

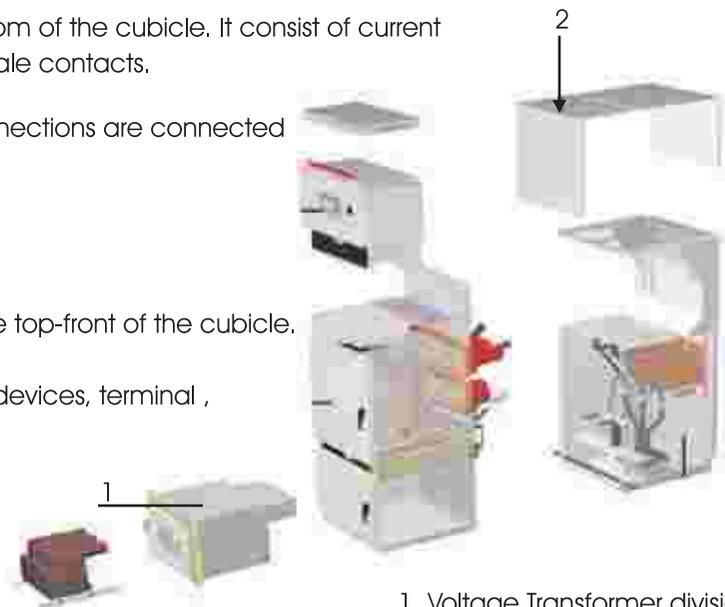
- Switching compartment is accessible and placed on the front of the cubicle. The rack which carries the switching device is placed in this compartment..
- Switching compartment is seperated from other compartments via metal shutters and metal sheet wall.

Cable Connection Compartment (C):

- Cable compartment is placed at rear bottom of the cubicle. It consist of current transformers, earthing switch and fixed female contacts.
- The incoming and outgoing MV cable connections are connected in this compartment.

Low Voltage Compartment (D):

- Low Voltage Compartment is placed on the top-front of the cubicle.
- Consist of protection relays, measurement devices, terminal , box and low voltage control equipments.



1. Voltage Transformer division
2. Arc channel

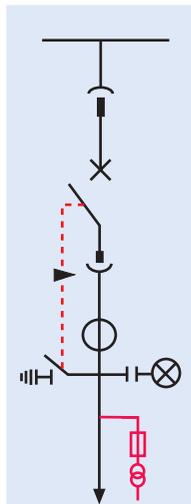
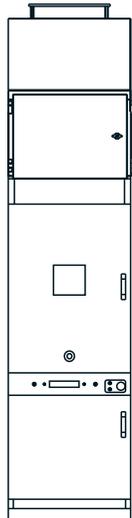
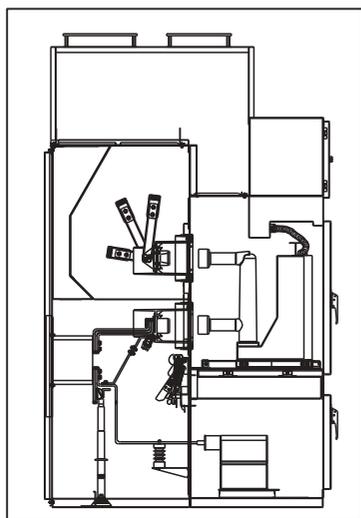
- The rack can only be moved from «isolated position» to «connected position» or vice-versa if the switching device (for example: Circuit breaker) is OPEN.
- Earthing switch can only be CLOSED if the switching device is OPEN and the rack is at the «TEST POSITION»
- The rack can not be moved to the «SERVICE POSITON» if the earthing switch is closed.
- The earthing switch can not be closed if the rack is at the «connected position»
- The rack carrying the switching device can not be moved forward/backword unless the door of the switching compartment is closed.



In addition to the above interlockings, there is a padlock to prevent the movement of the rack (forward/backward) without the approval of the authorized person.

Types

Incoming/outgoing cubicle with circuit breaker (SP):



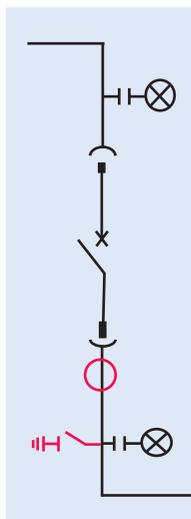
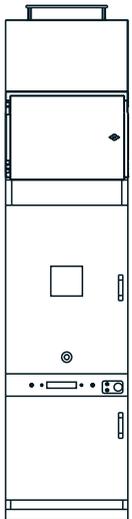
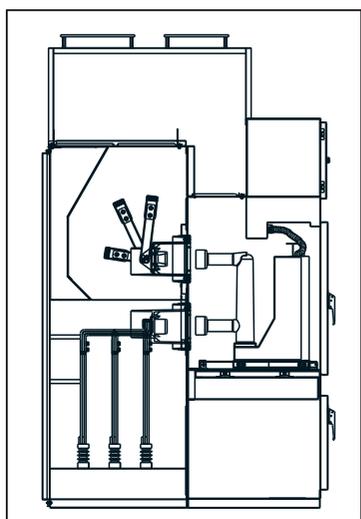
Standard equipments:

- Circuit breaker on the rack,
- Earthing switch,
- Current transformer,
- Secondary protection equipment,
- Voltage presence indicating system
- Anti condensation heater with thermostat

Optional equipments:

- Voltage transformer (fixed type)
- Voltage transformer (withdrawable type)

Sectionalizing cubicle with circuit breaker (KP):



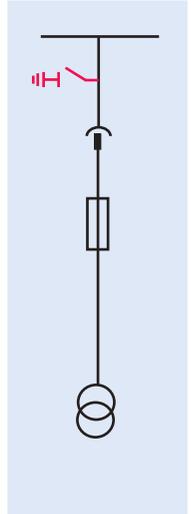
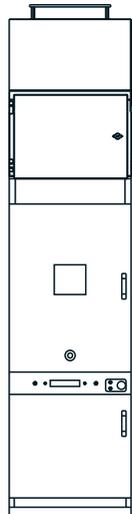
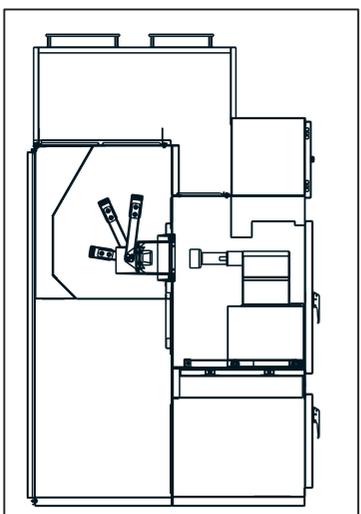
Standard equipments:

- Circuit breaker on the rack,
- Voltage presence indicating system
- Anti condensation heater with thermostat

Optional equipments:

- Earthing switch
- Current transformer + secondary protection

Voltage measurement cubicle (VC):



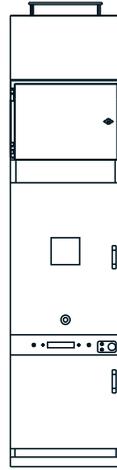
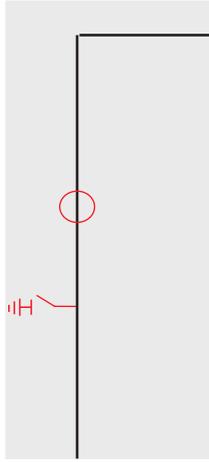
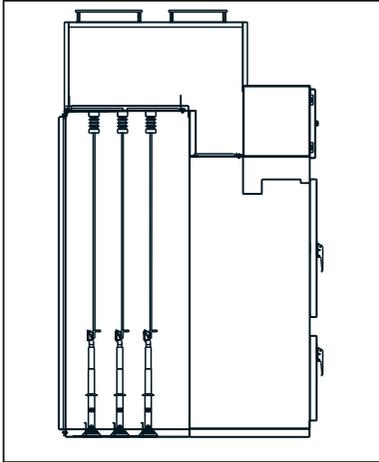
Standard equipments:

- Voltage transformer
- MV fuse
- Anti condensation heater with thermostat

Optional equipments:

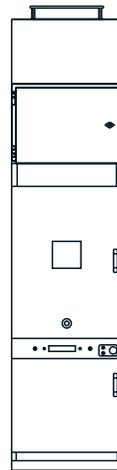
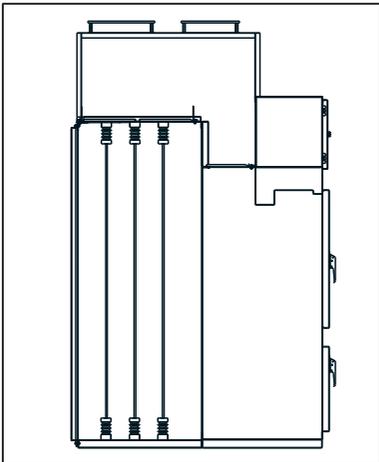
- Earthing switch

Cabler Connection Cubicle (KB):

Optional equipments:

- Earthing switch
- Current transformer

Bus Riser Cubicle (BS):



Standard equipments:

- Voltage presence indicating system

Optional equipments:

- Voltage presence indicating system
- Earthing switch

Rated voltage	12 kV	17.5 kV
Type	MMC-12	MMC-17.5
Rated busbar current	1250 A;.....;2500 A	1250 A;.....;2500 A
Rated feeder current	630 A;.....;2500 A	630 A;.....;2500 A
Rated power frequency withstand voltage (1 minute)	28 kV-eff	38 kV-eff
Rated lightning impulse withstand voltage	75 kV-peak	95 kV-peak
Rated short-time withstand current	25 kA -3 s	
Rated peak withstand current	62.5 kA-peak	
Loss of the service continuity	LSC 2B	
Partitions	Metal	
Internal arc class	IAC A (FLR) -25 kA/ 1 s)	
IP Protection degrees	<ul style="list-style-type: none"> ■ For metal enclosure: IP 4X ■ Between compartments: IP 2X 	
Applied standard	IEC EN 62271-200	



Circuit Breaker with SF6 gas.

Rated voltage (Ur)	kV	12; 17.5
Rated frequency (fr)	Hz	50/60
Rated nominal current (Ir)	A	630.....2500
Rated breaking current (Isc)	kA	16.....31.5
Rated short time withstand current	A	16.....31.5
Short circuit current duration (tk)	s	3
Applied standard	IEC EN 62271-100	

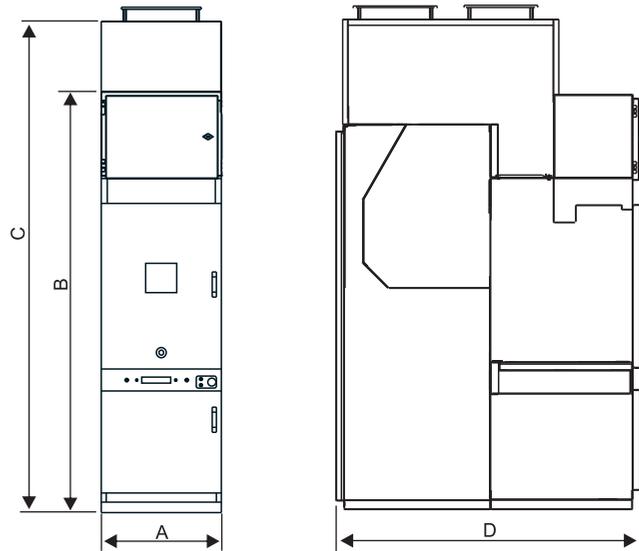


Vacuum Circuit Breaker



Vacuum Contactor

Rated voltage (Ur)	kV	7.2;12
Rated frequency (fr)	Hz	50/60
Rated current (Ir)	A	400
Making and breaking nominal current	-	1,000,000
Rated short time withstand current (1/30) s	kA	2.5/6
Rated making currentI	kA	50
Applied standard	EC 60470	



12 - 17.5 kV				(Dimensions are in mm.)
A	B	C	D	Switching devices
600	2160	2495	1550	Sf6 Circuit breaker 630-1250A/Vacuum Circuit breaker 630-1250A/Vacuum contactor 400 A
750	2160	2495	1550	Sf6 Circuit breaker 630-2500A/Vacuum circuit breaker 630-2000 A
1000	2160	2495	1550	Sf6 Circuit breaker 2500 A/Vacuum circuit breaker 2500 A

12 - 17.5 kV		Width							
		600 mm		750 mm				1000 mm	
Sf6 circuit breaker		630 A	1250 A	630 A	1250 A	1600 A	2000 A	2500 A	2500 A
Vacuum circuit breaker		630 A	1250 A	630 A	1250 A	1600 A	2000 A		2500 A
Vacuum contactor *		400 A							
Sp1	Cubicle with circuit breaker (**)	■ ■ ■	■ ■	■ ■	■ ■	■ ■	■	■	■
Sp2	Cubicle with circuit breaker (***)	■ ■ ■	■ ■	■ ■	■ ■	■ ■	■	■	■
KP	Sectionalizing cubicle		■ ■	■ ■	■ ■	■ ■	■	■	■
VC	Voltage measurement cubicle	■							
BS	Direct busbar connection cubicle	■	■	■	■	■	■	■	
KB	Bus riser cubicle	■	■	■	■	■	■	■	

* : only for 1kV

** : with fixed voltage transformer

*** : for withdrawn voltage transformer.



MBK/PBK

MV/LV Compact Transformer
Substation
(Concrete enclosed)



MBK typed compact type concrete substations are manufactured from reinforced concrete, It offers high safety for using.

General:

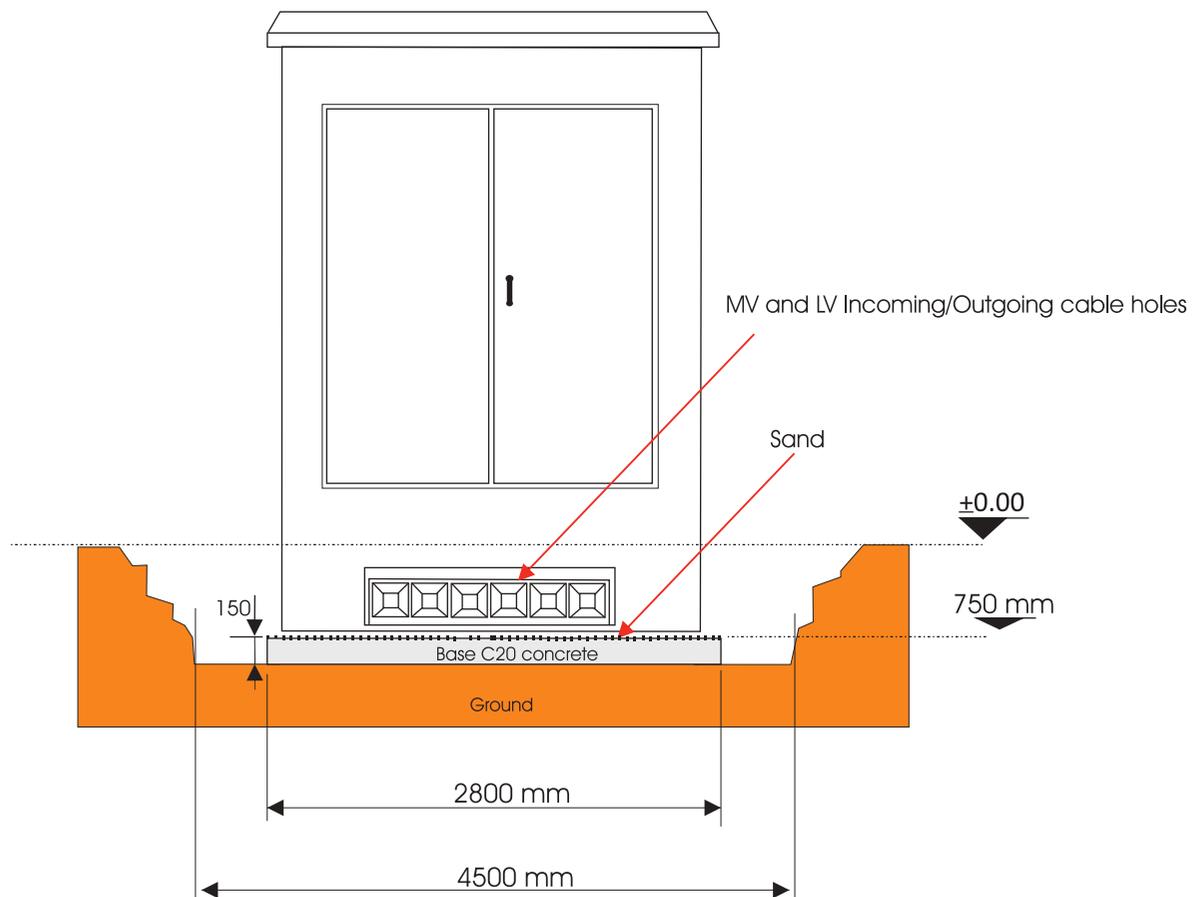
- Compact and monoblock design,
 - Roof is detechable,
 - Pre-fabricated and type tested,
 - High level operator and public safety,
 - Withstand to internal arc, (IAC (A, B)
 - Resistant to earthquake,
-
- Location can be changed any time in short period,
 - Comply with relevant IEC and EN standards
 - Concrete class: C35,
 - The doors and the ventilation openings are manufactured in 2 mm,pre -galvanized steel.
 - Naturel ventilation. If desired, fan can be added.



Field of Major Application:

- Secondary transformer substations,
- Wind and solar power plants,
- Holiday villages and shopping centers,

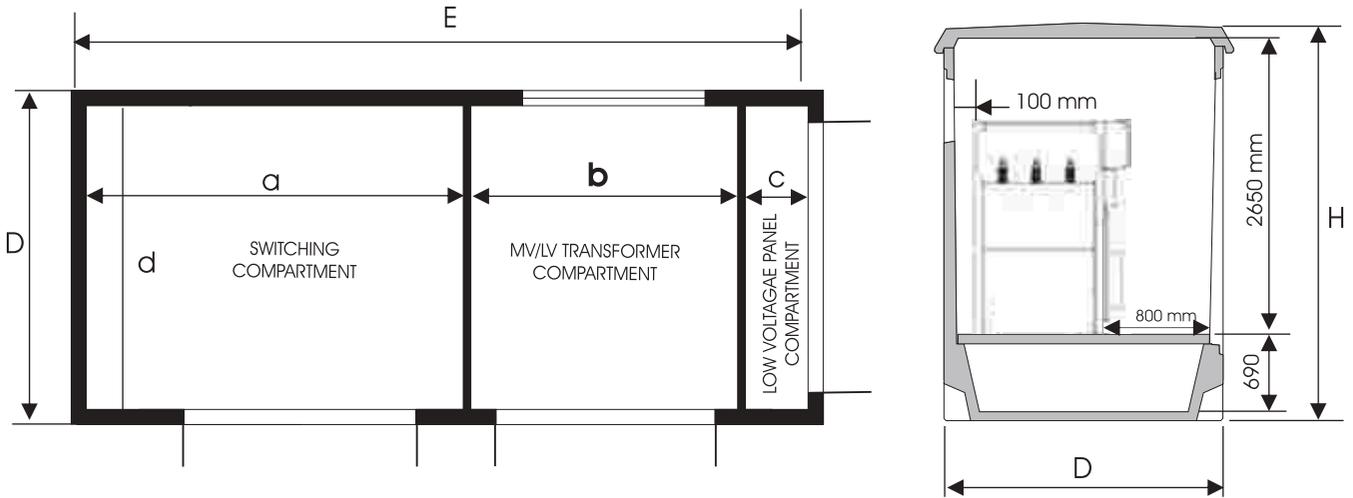




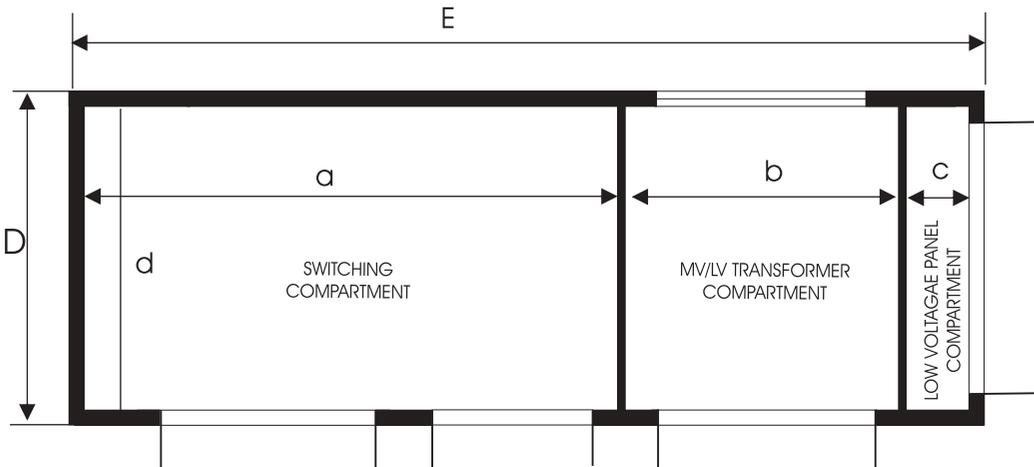
Technical Characteristics:

Rated Voltage (kV)	36 kV
Maximum Rated Power	1000 kVA; 1600 kVA
Enclosure Class	10
Internal Arc Class	(AB) 16 kA-1 s
IP Protection Degree	at least IP 23D
Applied Standard	IEC EN 62271-202

MBK-A type:



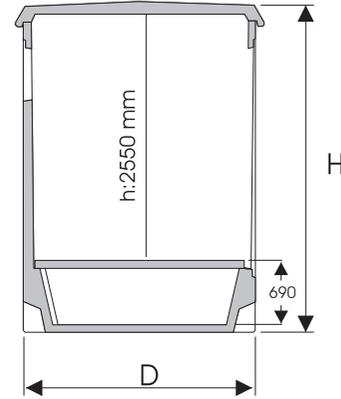
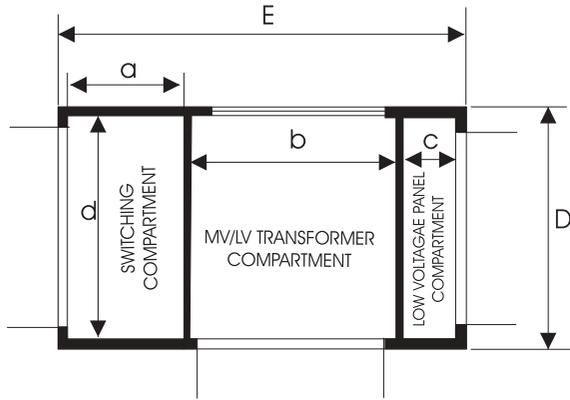
The number of the door of the switching compartment may be more than one, depending of the size of the relevant compartment.



Type designation	Rated Power (kVA)	E	D	H	a	b	c	d
MBK-A 4700	1000	4700	2500	3500	2110	1700	550	2300
MBK-A 5350	1000	5350	2500	3500	2760	1700	550	2300
MBK-A 6000	1000/1600	6000	2500	3500	3410	1700	550	2300
MBK-A 6450	1000/1600	6450	2500	3500	3860/3310	1700/2250	550	2300
MBK-A 7030	1000/1600	7030	2500	3500	4440/3890	1700/2250	550	2300
MBK-A 7300	1000/1600	7300	2500	3500	4710/4160	1700/2250	550	2300

MBK-B type:

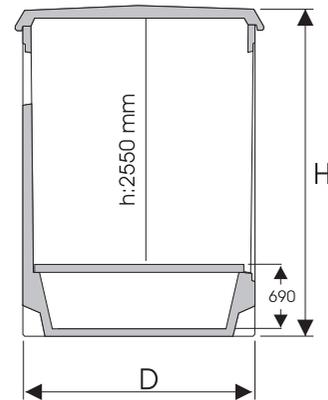
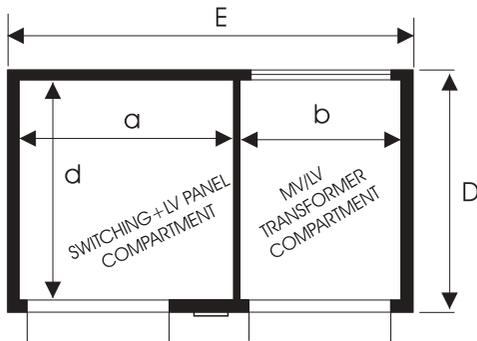
■ Non-walk in:



NON WALK-IN TYPES

Type designation	Rated Power (kVA)	E	D	H	a	b	c	d
MBK-B 3800.D	1000	3800	2500	3400	1200	1700	560	2300
MBK-B 4250.D	1600	4250	2500	3400	1200	2200	560	2300

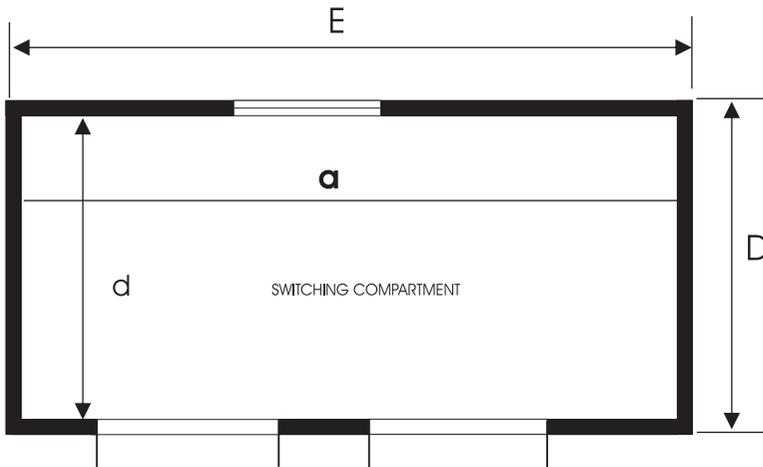
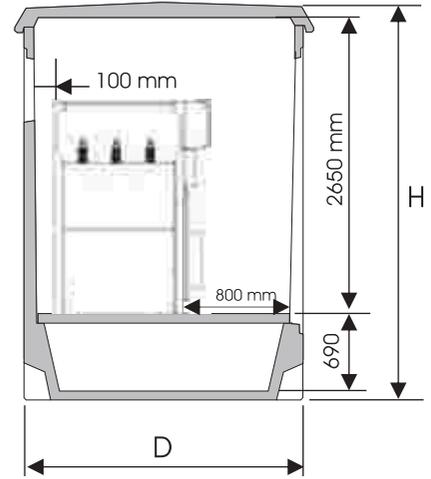
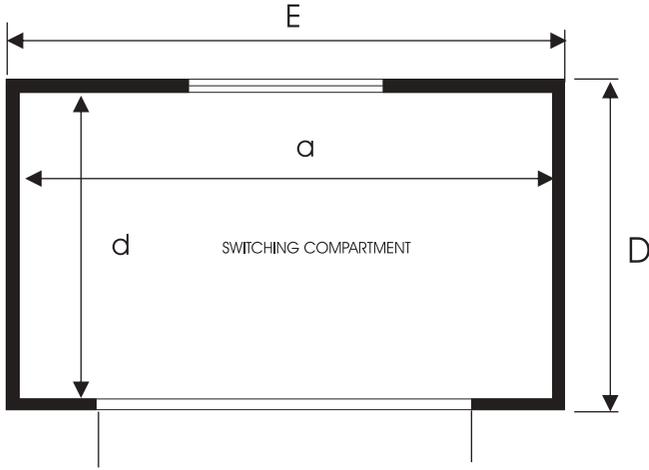
■ Walk-in:



WALK-IN TYPES

Type designation	Trafo Gücü (kVA)	E	D	H	a	b	d
MBK-B 4250.I	1000	4250	2500	3400	2270	1700	2300
MBK-B 4700.I	1600	4700	2500	3400	2170	2250	2300
MBK-B 5350.I	1000	5350	2500	3400	3370	1700	2300

MBK-D type:

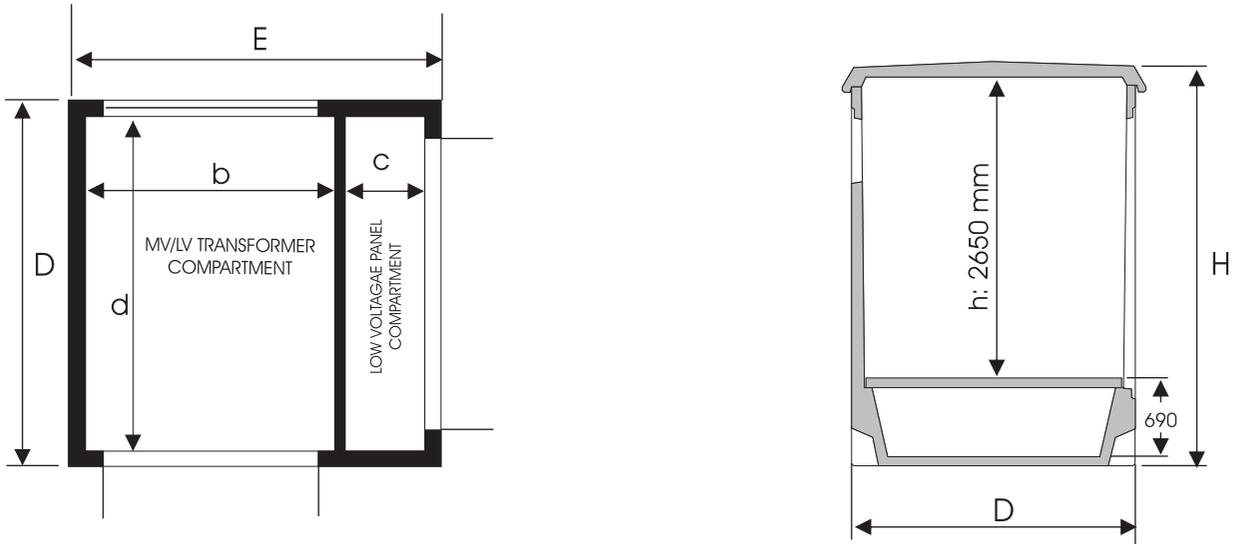


MBK- D having two doors. Types;

- MBKD 5350,
- MBK-D 6000,
- MBK-D 6450,
- MBK-D 7030
- MBK-D 7300

Type designation	Rated Power (kVA)	E	D	H	a	b	c	d
MBK-D 2550	--	2550	2500	3500	2330	--	--	2300
MBK-D 3100	--	3100	2500	3500	2890	--	--	2300
MBK-D 3650	--	3650	2500	3500	3440	--	--	2300
MBK-D 4250	--	4250	2500	3500	4030	--	--	2300
MBK-D 4700	--	4700	2500	3500	4480	--	--	2300
MBK-D 5350	--	5350	2500	3500	5130	--	--	2300
MBK-D 6000	--	6000	2500	3500	5780	--	--	2300
MBK-D 6450	--	6450	2500	3500	6230	--	--	2300
MBK-D 7030	--	7030	2500	3500	6810	--	--	2300
MBK-D 7300	--	7300	2500	3500	7080	--	--	2300

MBK-T types:



Type designation	Rated Power (kVA)	E	D	H	a	b	c	d
MBK-T 2550	1000	2550	2520	3500	--	1700	550	2300
MBK-T 3100	1600	3100	2520	3500	--	2250	550	2300
MBK-T 3650	1600	3650	2520	3500	--	2250	1100	2300

Description:

- Precast concrete parts (belonging to wall, base, roof) are combined at the site..
- Different layouts can be applied according to the Buyer's request due to the modular structure.

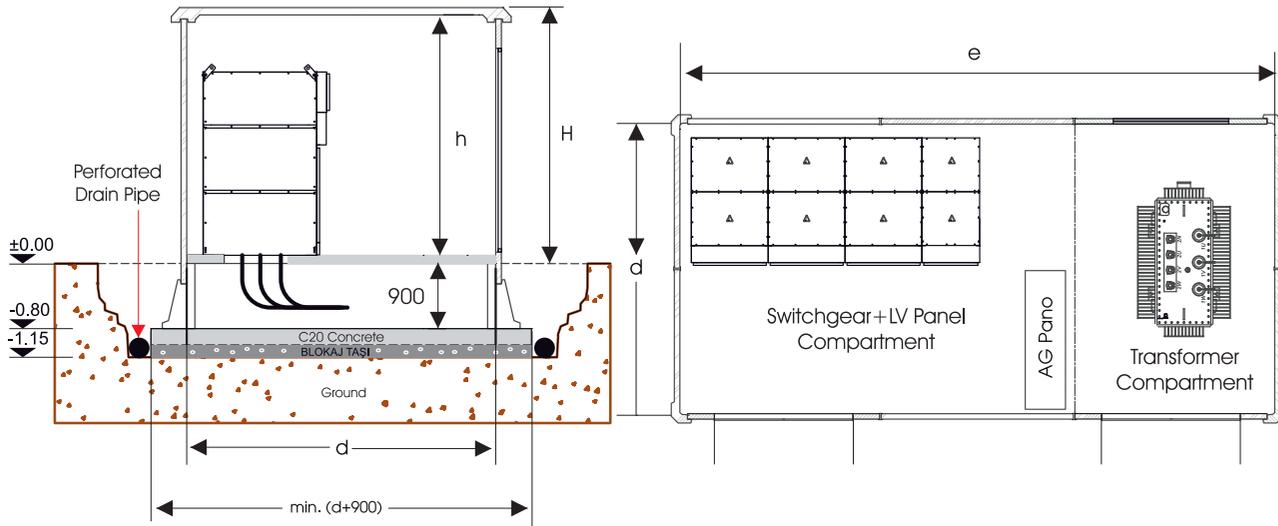
Operated type

- Walk-in type (inside operated),



TECHNICAL DATA	
Rated voltage (kV)	36
Maximum rated power of transformer (kVA)	1600; 2500
Enclosure class	5: 10

Dimensions:



CAUTION: To prevent water to enter into the foundation, a drainage system should be applied.

	LENGTH (e)*	DEPTH (d)*	HEIGHT	
			h*	H**
PBK 5945	5945	3800 (4200**)	2950 (3200**)	3140 (3390**)
PBK 6950	6950			
PBK 7740	7740			
PBK 8760	8760			
PBK 9475	9475			
PBK 10260	10260			
PBK 11280	11280			
PBK 11975	11975			
PBK 12780	12780			
PBK 14200	14200			

* Interior dimensions

** Upon the request



ECSS

MV/LV Compact Transformer
Substation
(Metal enclosed)



- Enclosure is made of 2 mm, pre-galvanized steel sheet. No welding is used.
- Operated type: Non walk-in (outside operated) type or, Walk-in (inside operated) type.
- The whole enclosure (doors, openings) are electrically joined to each other to form equipotential structure.



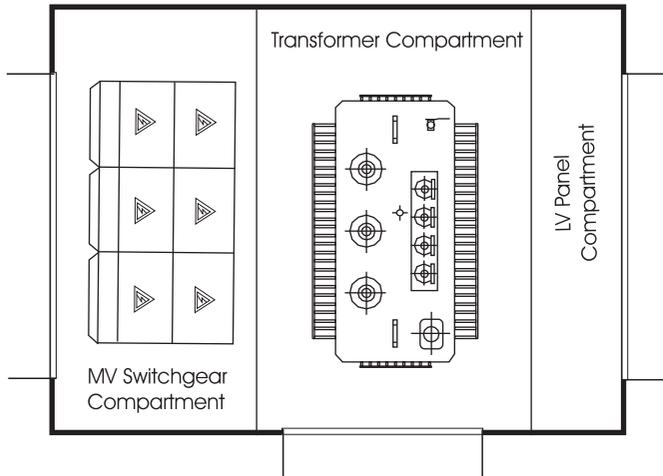
ECSS type non-walk in substations contains;

- MV Switchgear Compartment,
- Transformer Compartment,
- LV Panel Compartment.

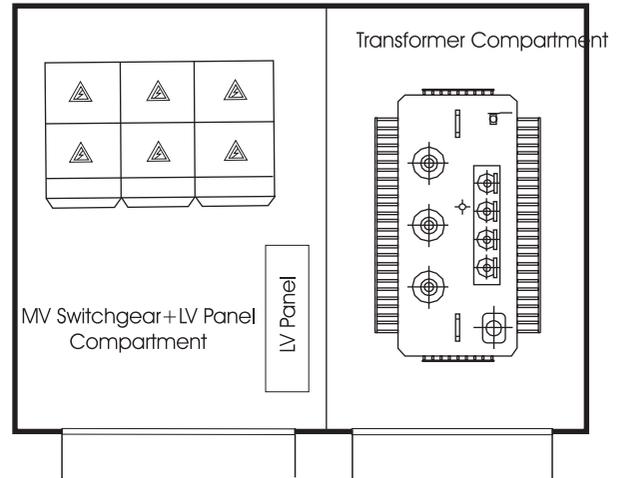
Each compartment has own door.



Non Walk-in Type (Outside Operated):



Walk-in Type (Inside Operated):



Technical Data:

Rated voltage (kV)	12; 24; 36
Maximum rated power (kVA)	630; 1000; 1250
Enclosure class	10; 20
Enclosure protection class (EN 3033 EN 60529)	IP 23D; IP 43
Internal arc class	20 kA-1s
Applied standart	IEC EN 62271-202

Dimenisions:

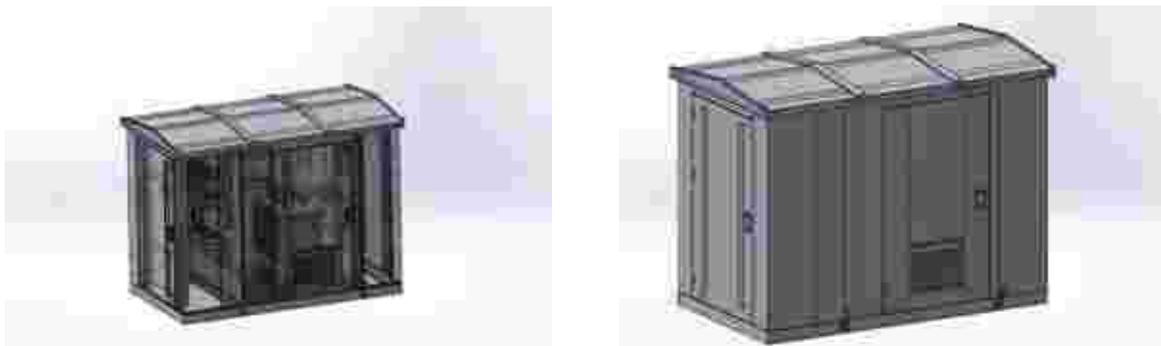
For dimensions, please refer to ELKO with your projects.

Examples (1):



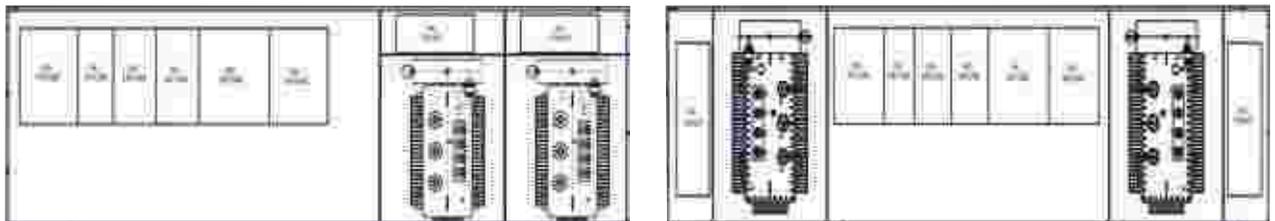
- Description:**
- Having three compartment (Transformer, MV Switchgear and LV Panel compartment)
 - Very suitable for electrical networks having MV and LV overhead lines.
 - MV and LV outputs from the roof.
 - For dimensions, please contact with ELKO, with your projects.

Examples (2):



- Description:**
- Having three compartment (Transformer, MV Switchgear and LV Panel compartment)
 - MV and LV outputs from the bottom of the substation.
 - For dimensions, please contact with ELKO, with your projects.

Examples (3): (For substations with two transformers)



For dimensions, please contact with ELKO, with your projects.



EMTM

Mobile Transformer
Substations



132/11.5 kV 25 MVA



33/11.5 kV 16 MVA



33/11.5 kV 16 MVA



33/0.4 kV 1250 kVA

Mobile substations could be installed in reduced area without any special civil works.

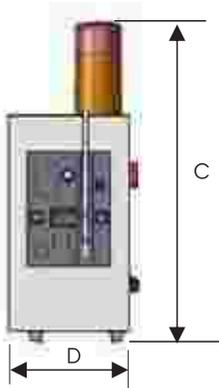
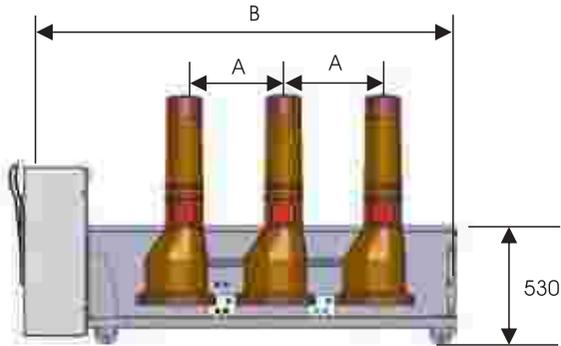
Main Applications Areas:

- Emergency situations
 - Refurbishment,
 - Maintenance
 - Failure
- Naturel disasters
 - Floods,
 - Fires,
 - Earthquake
- Temporary needs,
- Primary distrubution in isolated areas



Switching Devices

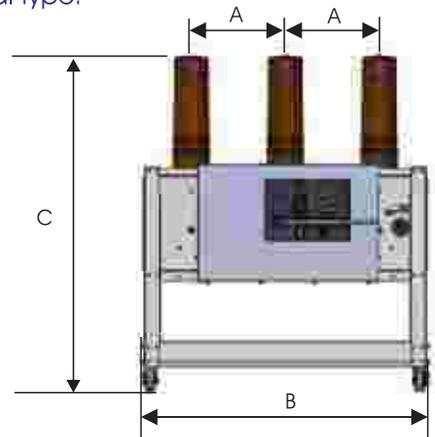
■ Lateral type:



mm.

Lateral	A	B	C	D
ETK-12/24	285	1125	970	335
ETK-36	350	1520	970	335

■ Frontal type:



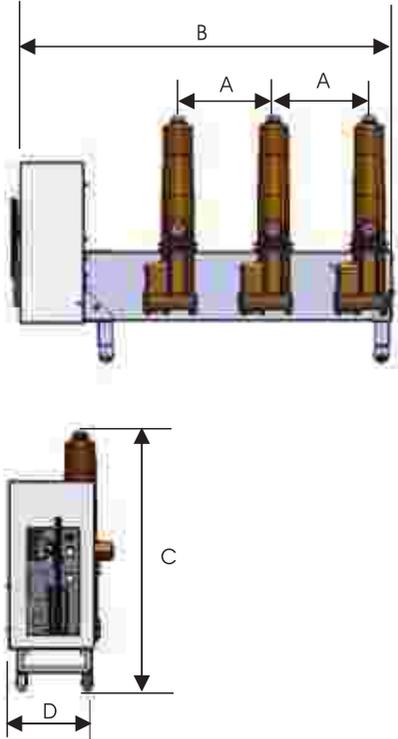
mm.

D	C	B	A	Frontal
195	890	1125	285	ETK-12/24
190	890	1525	350	ETK-36

Rated voltage	12-17,5-24	36
Temperature class/Operating voltage	-5 °C/+40 °C / ≤ 1000 m	
Rated short-circuit breaking/making current	16 kA-rms/40 kA-peak	
Rated normal current	630 A / 1250 A	
Rated lightning impulse/power frequency withstand voltage	125kV-peak/50 kV-rms	170 KV-peak/70 KV-rms
Rated frequency	50 Hz	
Rated short circuit withstand current	16 kA-3s	
Rated operating sequence	0-0.3 s- CO- 3 min- CO	
Rated minimum functional pressure for operation	1,600 bar (relative)	
Electrical endurance class	E2* (E1), C2	
Mechanical endurance class	M1	
Applied standard	IEC 62271-100	

* for using without auto-reclosing duty

■ Lateral type:



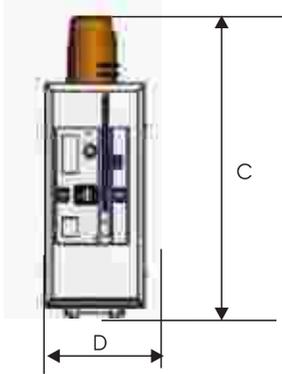
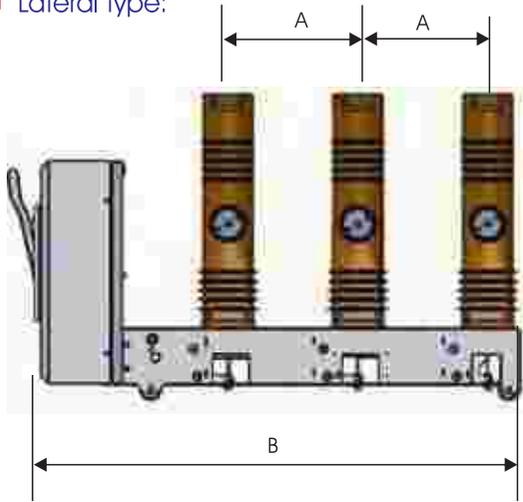
mm.

	A	B	C	D
EGK-36	350	1380	900	300
EGK-24	250/230	1125/1085	900	300
EGK-12	210	1045	900	300

Rated voltage	12-17.5-24 kV	36 kV
Temperature class/Operating voltage	-5 °C/+40 °C / ≤ 1000 m	
Rated short-circuit breaking/making current	20 kA-rms/50 kA-peak	16 kA-rms/40 kA-peak
Rated normal current	630 A	
Rated lightning impulse/power frequency withstand voltage	1 25kV-peak/50 kV-rms	1 70 kV-peak/70 kV-rms
Rated frequency	50 Hz	
Rated short circuit withstand current	20 kA-3s	
Rated operating sequence	0-0.3 s- CO- 3 min- CO	
Rated minimum functional pressure for operation	1.600 bar (relative)	
Electrical endurance class	E2* (E1), C2	
Mechanical endurance class	M1	
Applied standard	IEC 62271-100	

* for using without auto-reclosing duty

■ Lateral type:



mm.

Lateral	A	B	C	D
EVK-12/24	210/250	900/1010	680/680	
EVK-36	350	1310	825	

■ Frontal type:

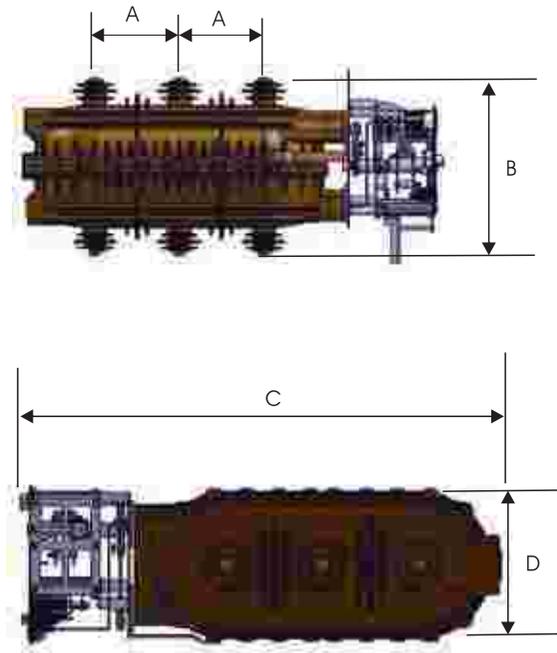
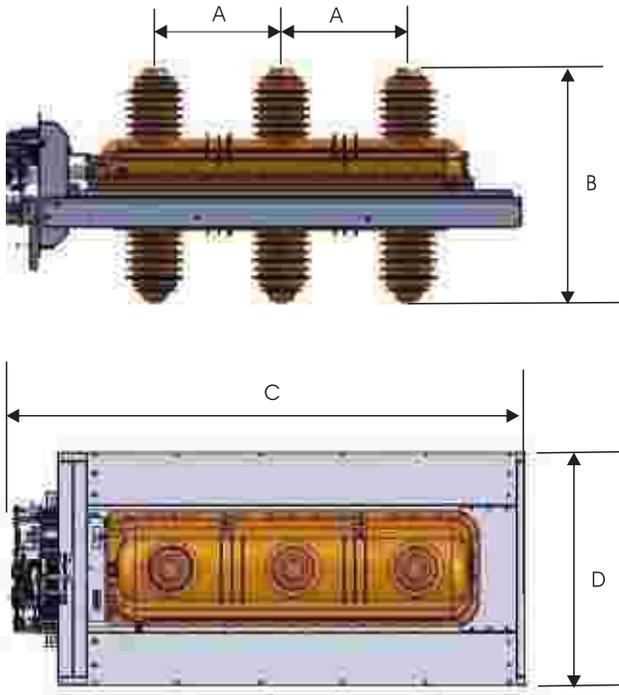
D	C	B	A	Frontal
195	890	1125	285	EVK-12/24
190	890	1525	350	EVK-36

mm.

	12-24	36
Rated voltage		
Temperature class/Operating voltage	-5 °C/+40 °C / ≤ 1000 m	
Rated short-circuit breaking/making current	20 kA-rms/50 kA-peak	16 kA-rms/40 kA-peak
Rated normal current	1250 A	630 A
Rated lightning impulse/power frequency withstand voltage	125kV-peak/50 kV-rms	170 KV-peak/70 kV-rms
Rated frequency	50 Hz	
Rated short circuit withstand current	20 kA-3s	16 kA-3s
Rated operating sequence	0-0,3 s- CO- 3 min- CO	
Electrical endurance class	E2* (E1), C2	
Mechanical endurance class	M1	
Applied standard	IEC 62271-100	

* for using without auto-reclosing duty

■ SF6 Insulated Switch Disconnector (with Earthing Switch):



	A	B	C	D
36 kV	350	690	1450	660

D	C	B	A	
330	1030	440	210	24 kV

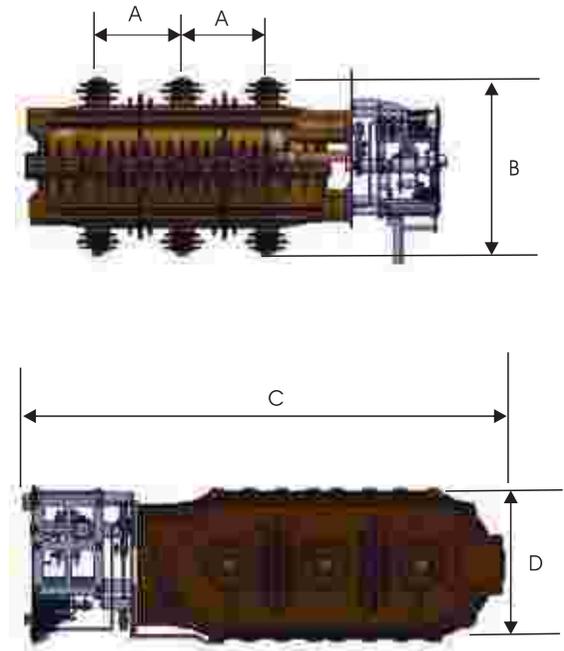
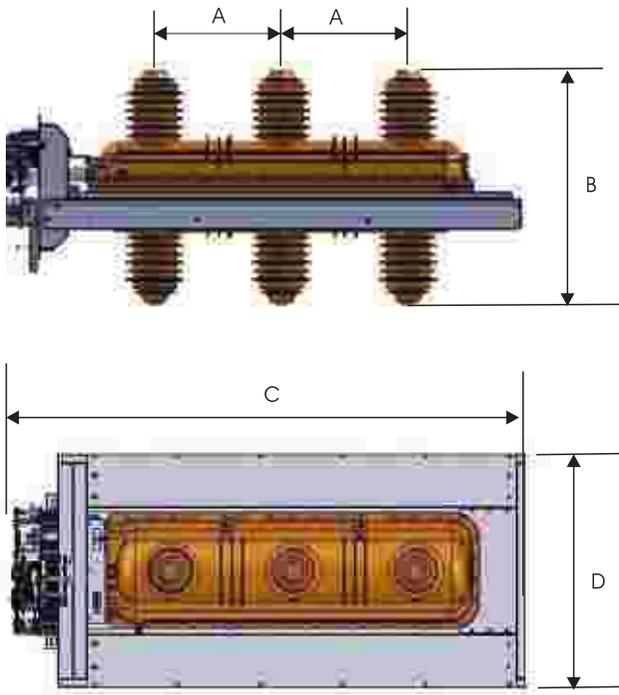
Rated voltage (kV)	36
Type	EGYA, three positioned*
Rated current (A)	630
Switch disconnector	General purpose
Rated short circuit withstand current	16 kA- 1 s
Electrical endurance	E3
Mechanical endurance	M1
Insulating medium	SF6 Gas
Gas tightness type	Sealed Pressure
Standards applied	IEC 62265- 1

24	Rated voltage (kV)
EGYA, three positioned*	Type
630	Rated current (A)
General purpose	Switch disconnector type
20 kA- 1 s	Rated short circuit withstand current
E2;E3*	Electrical endurance
M1	Mechanical endurance
SF6 Gas	Insulating medium
Sealed Pressure	Gas tightness type
IEC 62265- 1	Standards applied

Earthing Switch	
Electrical endurance	E2
Standards applied	IEC 62271-103

M: 1000 CO operations, at no load
* means OPEN-CLOSED-EARTHED

Earthing Switch	
E1	Electrical endurance
IEC 62271-103	Standard applied



mm.

	A	B	C	D
36 kV	350	690	1450	660

mm.

D	C	B	A	
330	1030	440	210	24 kV

Rated voltage (kV)	36
Type	EGA, three positioned*
Rated current (A)	630
Rated short circuit withstand current	16 kA-1 s
Mechanical endurance	M1
Insulating medium	SF6 Gas
Gas tightness type	Sealed Pressure
Standards applied	IEC 62271-103

24	Rated voltage (kV)
EGA, three positioned*	Type
630	Rated current (A)
20 kA-1 s	Rated short circuit withstand current
M1	Mechanical endurance
SF6 Gas	Insulating medium
Sealed Pressure	Gas tightness type
IEC 62271-103	Standards applied

Earthing Switch

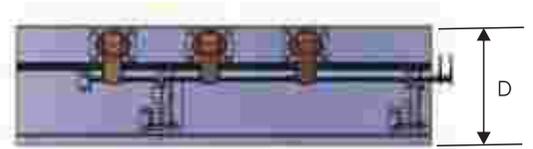
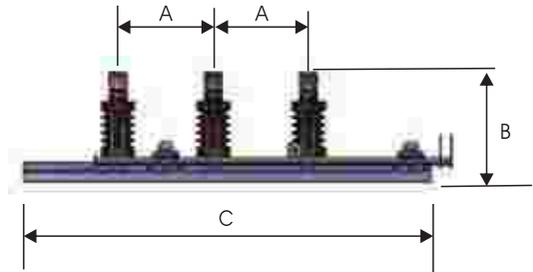
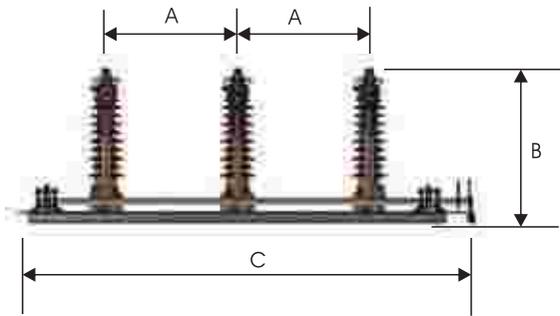
Electrical endurance	E0
Standards applied	IEC 62271-103

M: 1000 CO operations, at no load
* means OPEN-CLOSED-EARTHED

Earthing Switch

E0	Electrical endurance
IEC 62271-103	Standard applied

Air insulated earthing switch



	A	B	C	D
36 kV	360	420	1245	235

mm.

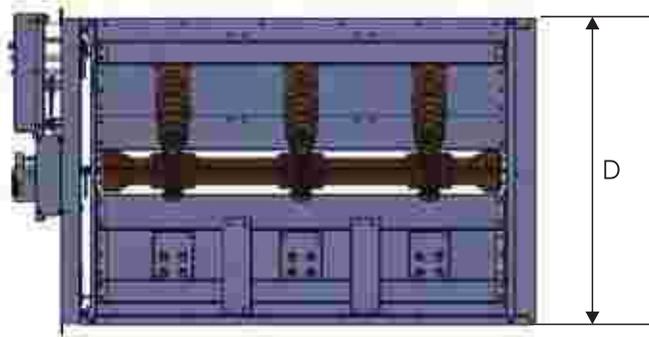
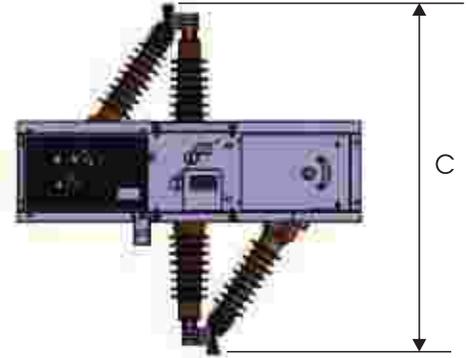
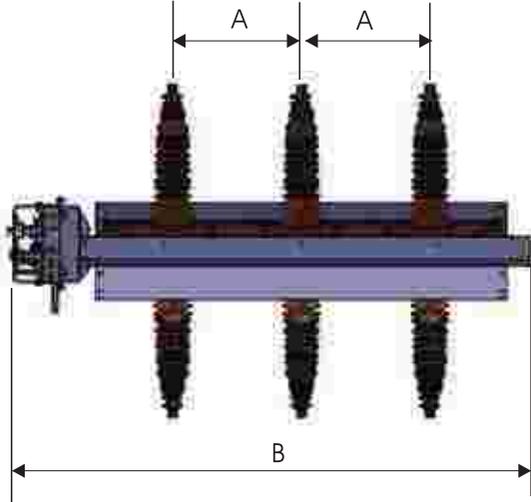
D	C	B	A	
295	900	240	210	24 kV

mm.

Rated voltage (kV)	36
Type	ETA
Rated short circuit withstand current	16 kA- 1 s
Rated making current	40 kA- peak
Electrical endurance	E2
Mechanical endurance	M1
Standard applied	IEC 62271-103

24	Rated voltage (kV)
ETA	Type
16 kA- 1 s	Rated short circuit withstand current
40 kA- peak	Rated making current
E2	Electrical endurance
M1	Mechanical endurance
IEC 62271-103	Standard applied

M1 (1000 CO operations, at no load)



	mm.			
	A	B	C	D
DA - 36	360	1465	930	860
DA - 24				

Contact position: TWO POSITIONED (CLOSED-OPEN&EARTHED)

Rated voltage (kV)	36	24
Type	DA-36	DA-24
Rated short circuit withstand current	16 kA - 1s; 25 kA-1s	16 kA - 1s; 25 kA-1s
Electrical endurance	E0	E0
Mechanical endurance	M1	M1
Standard applied	IEC 62271-103	IEC 62271-103

M1 (1000 CO operations, at no load)