ASTOR®

Astor Everywhere

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ASTOR®

CONCRETE TRANSFORMER AND DISTRIBUTION SUBSTATIONS

AIR INSULATED METAL ENCLOSED MODULAR SWITCHGEARS

AIR INSULATED METAL CLAD SWITCHGEARS


ASTOR®
ASTOR®

With its experience of more than 35 years in producing and selling transformers, ASTOR is an innovative and leading company in the electromechanical manufacturing industry and represents Turkey successfully all around the world. Our company aims to provide a contribution to the sector by transferring our experience, production and quality understanding in the production of Medium-Voltage Switchgears and Compact Transformer Substations. ASTOR has started to manufacture and sell Medium-Voltage Switchgears and Compact Transformer Substations by getting required certifications as a result of R&D studies.

With an indoor area of 100 acres equipped with the state-of-the-art technology and outdoor area of 31 acres in the 2nd Organized Industrial Zone in Ankara, our new factory with its completed facilities got started in 2016 and it has been going on the production and sales of Medium-Voltage Switchgears and Compact Transformer Substations at full pelt. Our primary goal is to improve our product range, which we started with the production of SF6 Gas Insulated Disconnector and Load Breakers, Metal-Enclosed Modular Cells and Monobloc Concrete Kiosks, with other product groups by the help of R&D studies and to offer them to our customers.

Our main goal is to provide our customers with the high-quality products by following up the latest technological developments, to improve our production capacity, and to maximize customer satisfaction with the quality of our after-sales service.

ASTOR, which has all the required quality certifications, has the awareness of the fact that its products are used everywhere with the electricity and continues its production with this understanding. Our technical and administrative staff which is composed of specialists, who are open to development and who cares quality, makes a very great effort to achieve the target of R&D focused growth.

Available Indoor Area: 100.000 m^2
Available Outdoor Area: 31.000 m^2

Products:

- Air Insulated Modular Cell
- 24-36kV 630-1250A SF6 Gas Insulated Disconnector/Load Breaker
- 24-36kV 630-1250A SF6 Gas Insulated Load Breaker with Side Mechanism
- Concrete Transformer Substations
- Sheet Metal-Enclosed Transformer Substations

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AS36 SERIES

AIR INSULATED METAL ENCLOSED MODULAR SWITCHGEARS

GENERAL

ASTOR brand Air Insulated Metal-Enclosed Modular Cells are a set of switching and control devices which have been designed in accordance with TS EN 62271-200 (IEC 62271-200) standard for use in medium voltage distribution systems up to 36 kV. All type tests required by the standard have been completed in accredited laboratories in Turkey and abroad.

Various types of switchgear designs are available with the functional features required for MV distribution systems.

STRUCTURAL ADVANTAGES

- Suitable for remote monitoring and control systems
- Safe disconnection and break operations with ASTOR brand SF6 Gas Insulated Switch Disconnector, SF6 Gas Insulated Disconnector, and SF6 Gas Insulated Breaker
- Convenient and safe usage in compact dimensions in MV Distribution Transformer Substations (Monobloc Concrete Transformer Substations, Monobloc Metal-Enclosed Transformer Substations)
- With its modular structure, it can be expanded to the right or left, can be easily assembled and disassembled.
- Mechanical locks designed against improper on/off operations

DESIGN AND STRUCTURAL PROPERTIES

CONTAINERS

Galvanized sheet metal of 2 mm thickness is used on all outer surfaces of ASTOR brand Air Insulated Metal-Enclosed Cells. The covers and doors on the front side of the enclosure and the front panels of the operating mechanism are painted by using electrostatic powder paint. The enclosure has a protection rating of IP3X against the people approaching the parts with voltage and touching the moving parts.

DOORS AND COVERS

The circuit breakers, current and voltage transformers, and the compartments hosting the fuses in the ASTOR switchgears can be accessed through the OPENING doors and covers. The FIXED covers cannot be opened without using any tools and they have a "DANGER" warning sign on them.

OBSERVATION WINDOWS

The ON and OFF positions of the disconnector and earthing disconnector in the accessible section of the switchgear can be seen through the observation windows on the covers in this section.

LOCKING MECHANISMS

Locking Mechanism in the Disconnector Cells

• The Disconnector can be **switched off** when the Earthing Disconnector is **switched on** and the switchgear's access cover is **closed**.
• The Earthing Disconnector can be **switched off** when the Disconnector is **switched on**.

Locking Mechanism in the Breaker Cells

• The Disconnector can be **switched off** when the Earthing Disconnector is **switched on,** the Breaker is **switched on** and the switchgear's access cover is **closed**.
• The Earthing Disconnector can be **switched off** when the Disconnector is **switched on**.
• The Breaker can be **switched off** when the Disconnector is **switched on,** the Earthing Disconnector is **switched on,** the Breaker is **switched on** and the switchgear's access cover is **closed**.

MAIN
BUSBAR
SECTION

LV SECTION

OPERATING
MECHANISM
SECTION

BREAKER'S
OPERATING
MECHANISM
SECTION

CABLE
CONNECTION
SECTION

SECTIONS OF THE SWITCHGEARS

MAIN BUSBAR SECTION

It is located at the top of the switchgear. The main busbar terminals of the switchgears that are assembled next to each other modularly are combined with copper or aluminum busbar to form the main busbar. Access to the main busbar section is only possible by removing the cover that has a warning sign on it.

CABLE CONNECTION SECTION

It is located at the bottom of the switchgear. The incoming and outgoing medium voltage cables/busbars to/from the switchgear are connected to the switchgear in this section. The cover of this section can only be opened without using any tool after all the conductors entering the section are discharged, short-circuited, and earthed.

The components in the cable connection section depending on the switchgear's functional characteristics,

- Breaker
- MV fuses
- Earthing disconnectors
- Measurement transformers

LOW VOLTAGE (LV) SECTION

This section is located on the upper front side of the switchgear. This section can be accessed when the system is under voltage.

The components in the low voltage section depending on the switchgear's functional characteristics,

- Protection relays
- Measurement tools
- Counters
- Auxiliary relays, LV fuses, terminal arrays and other low voltage control devices and switchgears

OPERATING MECHANISM SECTION

It is located under the LV Section in the switchgear. The section, which hosts the disconnector, gas insulated disconnector, and the operating mechanisms of the earthing, has a metal enclosure with the protection rating of IP3X. The operating mechanism of the switchgears with a breaker is located on the breaker. The operating mechanism can be accessed while the system is under voltage.

The section includes the following hardware in accordance with the single line diagram on the control and display panel on the front side of the operating mechanisms;

- Mimic diagram
- Position indicators of the disconnector, switch disconnector, and earthing disconnectors
- Control lever sockets to be controlled for disconnector, and the earthing disconnectors
- "Spring adjusted" and "Spring Free" symbols
- Switch disconnector on/off buttons
- Voltage indicator and phase sequence control jack
- Operating instructions
- Sign plate

MV FUSE SELECTION

CONSIDERATIONS IN THE FUSE SELECTION

• The rated voltage of the fuse must be equal to or greater than the rated voltage of the system.

• The proper fuse must be selected in accordance with the characteristics of the fuse manufacturer. The fuses to be used in the ASTOR brand Transformer Protection Cells with Switch Disconnector and Fuses must have strike pins (medium type) in accordance with TS EN 60282-1 standard.

FUSE SELECTION GUIDE		**RATED VOLTAGE OF THE TRANSFORMER** (36 kV)	
		EFO	**İNTERTEKNİK**
RATED VOLTAGE OF THE TRANSFORMER (kVA)	**Uk %**	**RATED CURRENT OF THE FUSE** (A)	
25	4.5	2	2
50	4.5	4	4
100	4.5	6	6.3
160	4.5	10	10
200	4.5	10	10
250	4.5	10	16
400	4.5	16	16
630	4.5	20	31.5
800	6	25	40
1000	6	25	40
1250	6	40	50
1600	6	50	63

HOW TO REPLACE A FUSE

- The cover of the Cable Connection Section in which the MV fuses are placed can be opened after switching on the Switch Disconnector and both sides of the medium voltage fuses are earthed.
- The MV fuses must be placed into the socket ensuring that the strike pin side is above (**in the direction of the arrow**).
- It is recommended to replace also the fuses in the other phases in case of one or two blowing (melting) fuses in a switchgear with Switch Disconnector and Fuse in accordance with the Article 8.103 of the TS EN 62271-105 standard.

STANDARD AND OPTIONAL EQUIPMENT

CURRENT & VOLTAGE TRANSFORMERS

Two different types of current transformers are used in ASTOR brand switchgears i.e. the toroidal type and the support type. Various types of current and voltage transformers can be used in line with the customer desire and the project requirements.

DIGITAL PROTECTION AND CONTROL RELAYS

Various types of relays, with protection, measurement, and control features can be used in line with the customer desire and the project requirements. The desired values are set to the relays to be installed in the switchgear before they are shipped.

FAILURE INDICATOR DEVICE

The Failure Indicator Device, which is produced by various suppliers, displays the phase and earthing failures. The device is provided optionally with the switchgears.

MEASUREMENT TOOLS

The measuring instruments such as the ammeter, voltmeter, electricity meter, and the energy analyzer are selected in line with the customer desire and the requirements of the project.

MV FUSES

High cut-off capacity MV fuses are used based on the transformer power in ASTOR brand switchgears

REMOTE CONTROL

The operations on the switchgear can be made using the remote control, which is provided together with the ASTOR brand switchgears, **up to 5 meters**.

BUSBARS

The busbars, which are used in connecting the switchgears, are produced from high-conductivity-capacity aluminum or copper which is isolated by a shrinking tube.

TECHNICAL SPECIFICATIONS

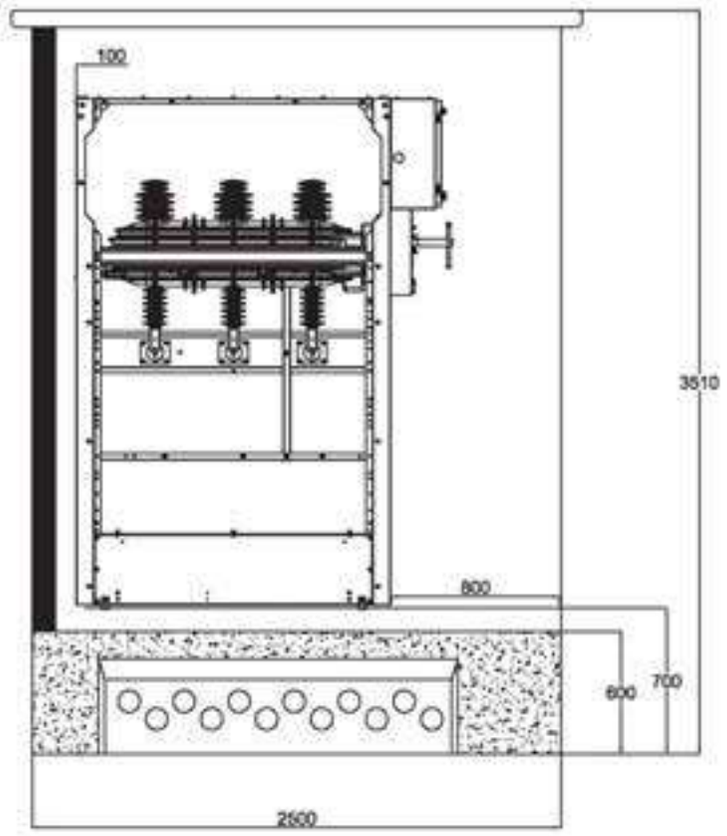
RATED VOLTAGE (kV)	36
MAIN BUSBAR'S RATED CURRENT (A)	630 ; 1250
FEEDER'S RATED CURRENT (A)	630 ; 1250*
RATED POWER-FREQUENCY WITHSTAND VOLTAGE (kV-rms)	
PHASE TO PHASE AND PHASE TO NEUTRAL	70
AT ISOLATING DISTANCE	80
RATED LIGHTNING IMPULSE WITHSTAND VOLTAGE (kV-PEAK)	
PHASE TO PHASE AND PHASE TO NEUTRAL	170
AT ISOLATING DISTANCE	195
RATED SHORT-DURATION POWER-FREQUENCY WITHSTAND VOLTAGE	16 kA-1 sec.
PEAK WITHSTAND CURRENT (kA-PEAK)	40
TRANSFER CURRENT (SWITCH DISCONNECTOR+FUSE SWITCHGEAR) (A)	200
LOSS OF SERVICE CONTINUITY CATEGORY	LSC 2A-PI
INTERNAL ARC WITHSTANDING	16 kA-1 sec.
INTERNAL ARC CLASSIFICATION	A (FL)
PROTECTION CLASSIFICATION	IP 3X
IMPLEMENTED STANDARD	TS EN 62271-200

* Does not apply to switchgears with Switch Disconnectors.

INSTALLATION

PLACING THE SWITCHGEAR

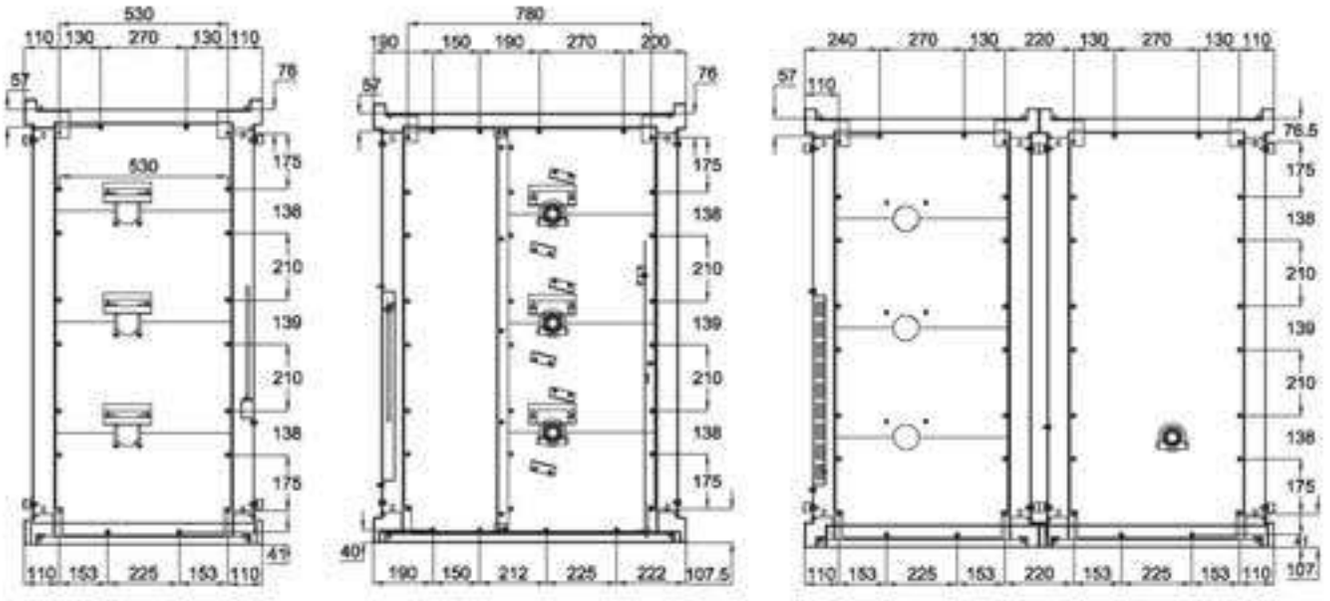
The AS36 series switchgears should be placed on a cable duct in the building, taking into account the following measurements.



WARNING!

- The distance between the back of the switchgear and the wall must be at least 100 mm.

FIXING THE SWITCHGEARS TO THE GROUND



MV DEVICE- SWITCHING DEVICES

GENERAL FEATURES

FUNCTIONS		SWITCHING ON			SWITCHING OFF			INSULATION
		UNLOADED OPERATION	OPERATION UNDER LOAD	SHORT CIRCUIT OPERATION	UNLOADED OPERATION	OPERATION UNDER LOAD	SHORT CIRCUIT OPERATION	
DISCONNECTOR	It has been designed to ensure safe insulation of the circuit. It is usually associated with a ground knife.	√	-	-	√	-	√	√
EARTHING DISCONNECTOR	It has been designed to provide safety even under power. It earths the phase conductors whose power is cut.	√	-	-	√	-	√	-
SWITCH DISCONNECTOR	It is a circuit element that switches on and off under operating conditions including over-currents. It has been designed to control the on and off position of the system. It is usually used for disconnecting. It is mostly used with a fuse at MV distribution networks.	√	√	-	√	√	√	√
BREAKER	It is used for transferring, switching on and off the rated current in the distribution systems, and cutting off the overcurrent and short circuit currents.	√	√	√	√	√	√	-

SF6 GAS BREAKERS;

ASTOR brand SF6 Gas Breakers have been designed to have a sealed pressure structure that does not require SF6 additional gas for 30 years in accordance with TS EN 62271-100 standard.

Operating Mechanism

The breaker's operating mechanism provides an "**On-Off-On**" process cycle without any need for a separate process. It operates with the energy stored in a spring mechanism, which can be set by hand or motor, and it is suitable for controlling with a remote control system. The switching-off spring is automatically adjusted by the electric motor and the switching-on spring is automatically adjusted when the breaker is switched off. If the off spring is not fully adjusted, the locking system prevents the breaker's operation.

Switching On and Off Mechanisms

Switching On and Off operations can be made remotely using the on and of coils and also it can be mechanically switched off using the button on the front of the breaker's operating mechanism in case of emergency.

On the operating mechanism, there is a mechanical indicator showing the on and off position of the breaker, and a mechanical counter, counting the number of switching on operations.

AS36 Series

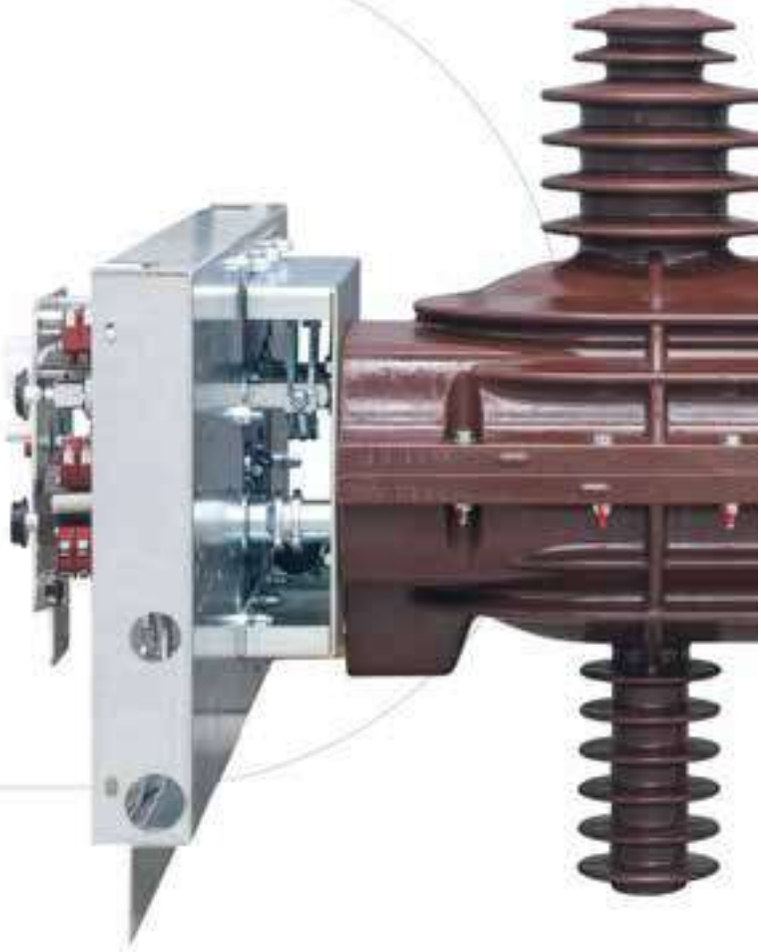
AIR INSULATED METAL ENCLOSED MODULAR SWITCHGEARS

TYPE	ACBS36
RATED VOLTAGE (kV)	36
ISOLATION VOLTAGE (kV)	70 (active-1 min.)
LIGHTNING IMPULSE WITHSTAND VOLTAGE (kV)	170 (peak-1.2-50μs)
RATED CURRENT (A)	630
RATED FREQUENCY (Hz)	50
SHORT CIRCUIT CURRENT (kA)	16
PEAK WITHSTAND CURRENT (kA)	40
SHORT CIRCUIT DURATION	3 sec.
OPERATING CYCLE	A-0.3 sec.-KA-3 min.-KA
GAS SEALING TYPE	Sealed pressure
CATEGORY	E2, C2, M2

SF6 GAS DISCONNECTORS;

ASTOR brand SF6 Gas Disconnectors have been designed to have a sealed pressure structure that does not require additional SF6 gas for 30 years in accordance with TS EN 62271-102 standard.

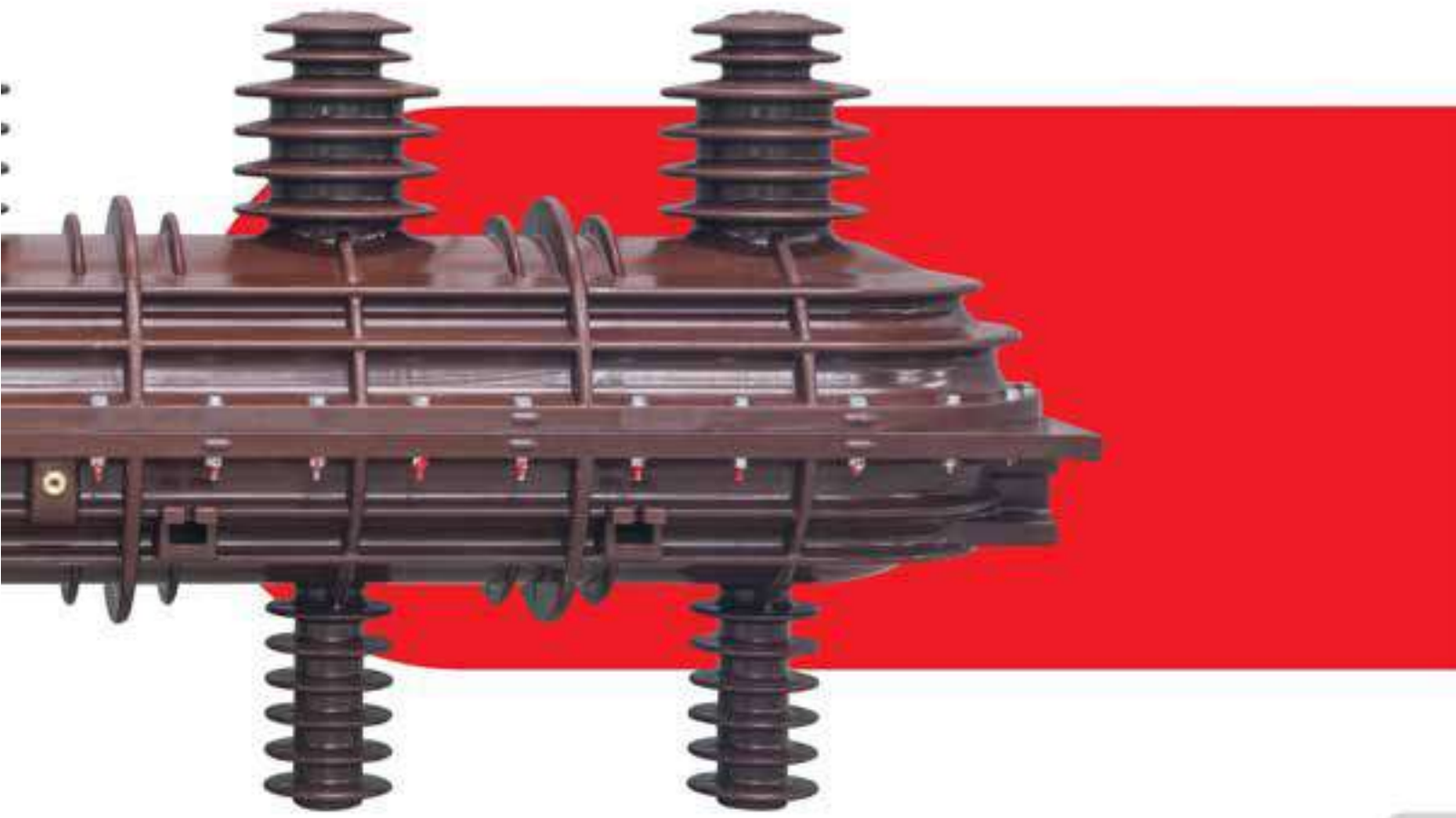
TYPE	ADS36S
RATED VOLTAGE (kV)	36
ISOLATION VOLTAGE (kV)	70 (active-1 min.)
LIGHTNING IMPULSE WITHSTAND VOLTAGE (kV)	170 (peak-1.2-50µs)
RATED CURRENT (A)	630;1250
RATED FREQUENCY (Hz)	50
SHORT CIRCUIT CURRENT (kA)	16
PEAK WITHSTAND CURRENT (kA)	40
SHORT CIRCUIT DURATION	3 sec.
GAS SEALING TYPE	Sealed pressure
CATEGORY	E0, M1
IMPLEMENTED STANDARD	TS EN 62271-102



SF6 GAS SWITCH DISCONNECTORS;

ASTOR brand SF6 Gas Switch Disconnectors have been designed to have a sealed pressure structure that does not require additional SF6 gas for 30 years in accordance with TS EN 62271-103 standard.

TYPE	ALBS36S
RATED VOLTAGE (kV)	36
ISOLATION VOLTAGE (kV)	70 (active-1 min.)
LIGHTNING IMPULSE WITHSTAND VOLTAGE (kV)	170 (peak-1.2-50μs)
RATED CURRENT (A)	630
RATED FREQUENCY (Hz)	50
SHORT CIRCUIT CURRENT (kA)	16
PEAK WITHSTAND CURRENT (kA)	40
SHORT CIRCUIT DURATION	1 sec.
GAS SEALING TYPE	Sealed pressure
CATEGORY	E3, M1
IMPLEMENTED STANDARD	TS EN 62271-103



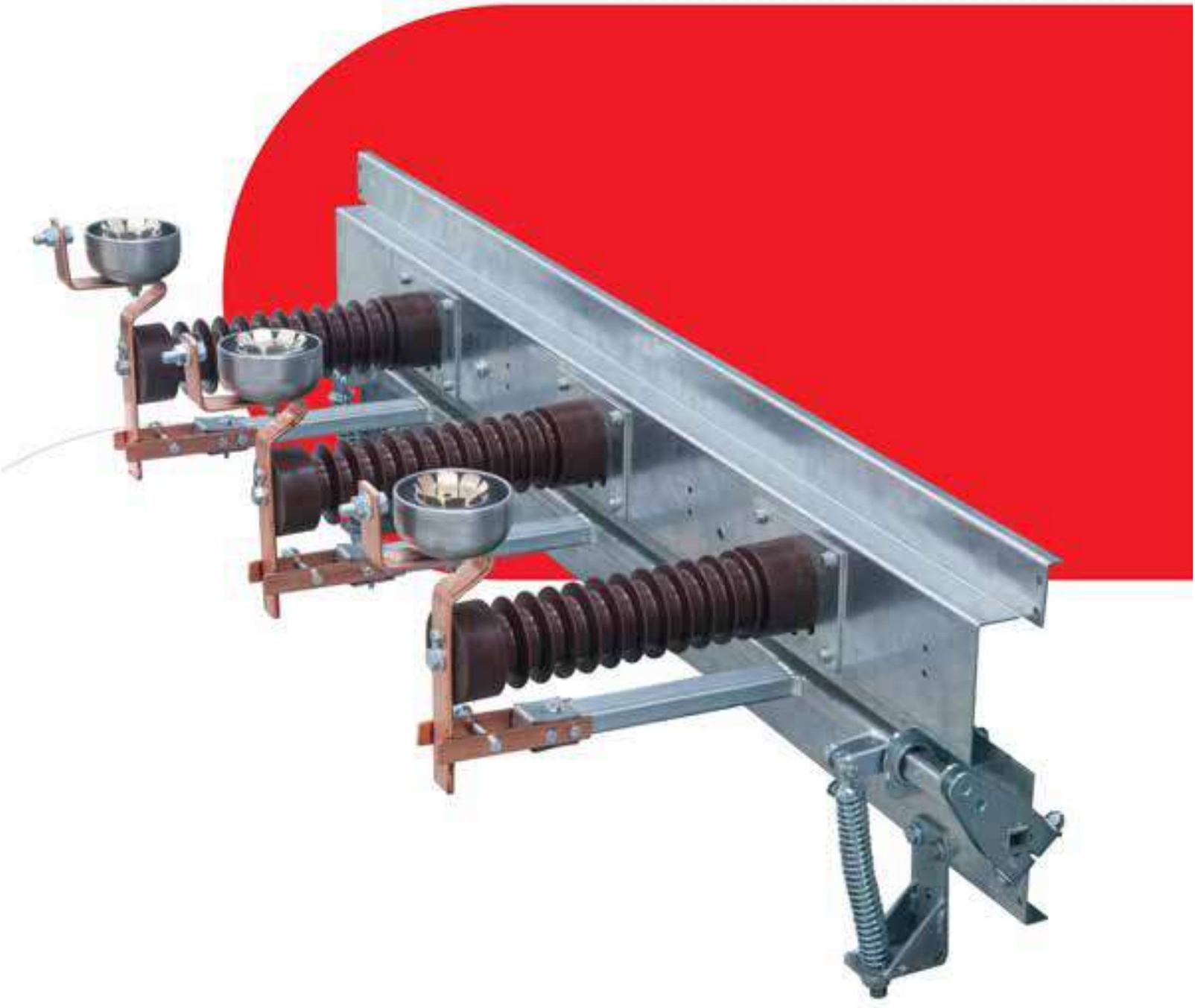
EARTHING DISCONNECTORS;

Earthing disconnectors are produced with 3 poles in accordance with TS EN 62271-102 standard.

TYPE	AES36S	AES36F
RATED VOLTAGE (kV)	36	36
RATED SHORT-DURATION WITHSTAND CURRENT (kA)	16	1
RATED PEAK WITHSTAND CURRENT (kA)	40	2.5
RATED SHORT CIRCUIT DURATION	1 sec.	1 sec.
CATEGORY	E2	E2
IMPLEMENTED STANDARD	TS EN 62271-102	TS EN 62271-102
USE AREAS DEPENDING ON THE SWITCHGEAR TYPE	• With medium voltage cable connection ends at input/output switchgear with the disconnector • With medium voltage cable connection ends at input/output switchgear with breaker	• At the lower (load) side of the MV fuse in the Transformer Protection Cell with Switch Disconnector and Fuse

AS36 Series

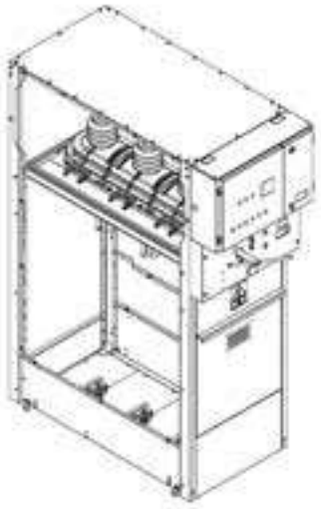
AIR INSULATED METAL ENCLOSED MODULAR SWITCHGEARS



SWITCHGEAR TYPES

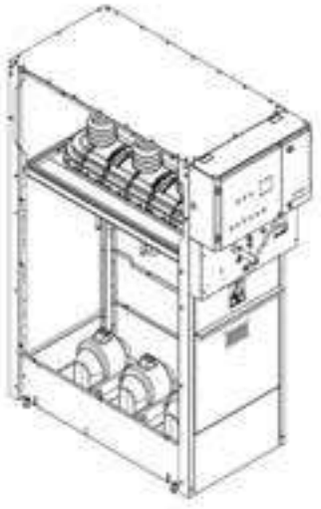
AS36 LC
INPUT OUTPUT
SWITCHGEAR WITH
SWITCH DISCONNECTOR

Un (kV)	36 kV
Width (mm)	750
Length (mm)	1400
Height (mm)	2250



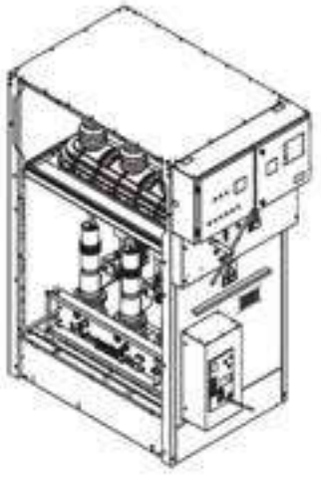
AS36 VTC
VOLTAGE TRANSFORMER
SWITCHGEAR

Un (kV)	36 kV
Width (mm)	750
Length (mm)	1400
Height (mm)	2250



AS36 CBT
TRANSFORMER PROTECTION
SWITCHGEAR WITH BREAKER

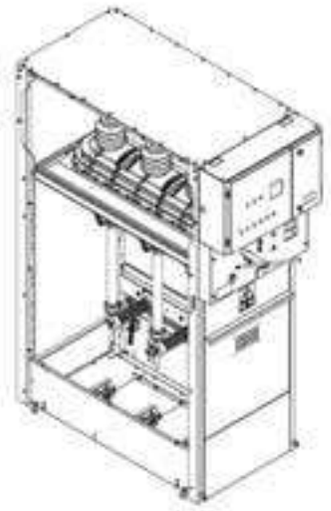
Un (kV)	36 kV
Width (mm)	1000
Length (mm)	1400
Height (mm)	2250



AS36 LF

TRANSFORMER PROTECTION SWITCHGEAR WITH SWITCH DISCONNECTOR AND FUSE

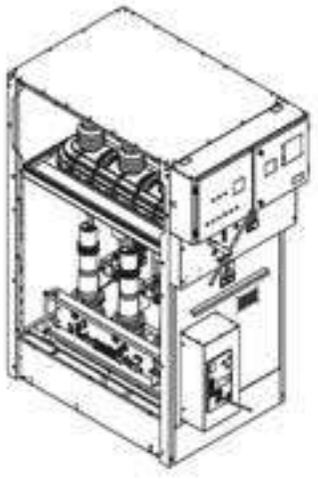
Un (kV)	36 kV
Width (mm)	750
Length (mm)	1400
Height (mm)	2250

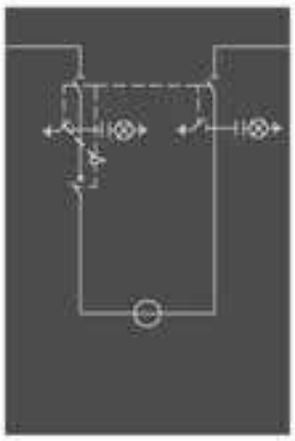


AS36 CBC

INPUT OUTPUT SWITCHGEAR WITH BREAKER

Un (kV)	36 kV
Width (mm)	1000
Length (mm)	1400
Height (mm)	2250

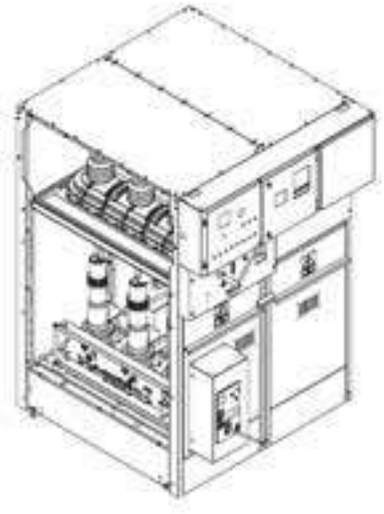




AS36 CBC-C2

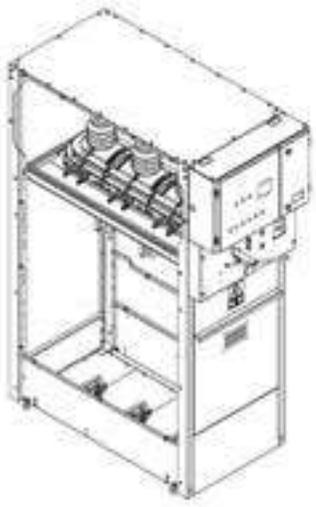
COUPLING SWITCHGEAR WITH BREAKER (WITH DOUBLE BREAKER)

Un (kV)	36 kV
Width (mm)	1500
Length (mm)	1400
Height (mm)	2250



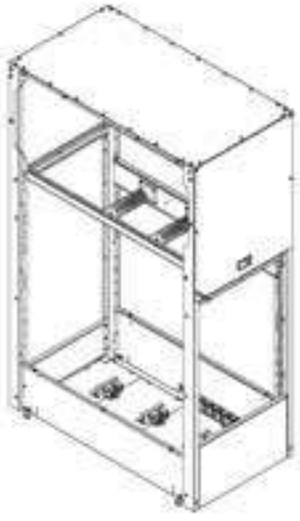
AS36 LC-G
GAS INSULATED INPUT
OUTPUT SWITCHGEAR

Un (kV)	36 kV
Width (mm)	750
Length (mm)	1400
Height (mm)	2250



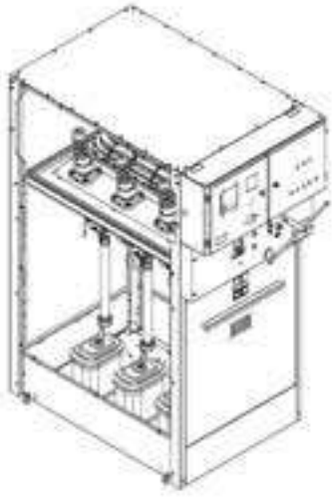
AS36 KB
CABLE
CONNECTION
SWITCHGEAR

Un (kV)	36 kV
Width (mm)	750
Length (mm)	1400
Height (mm)	2250



AS36 LCV
CURRENT VOLTAGE
MEASUREMENT
SWITCHGEAR WITH
SWITCH DISCONNECTOR

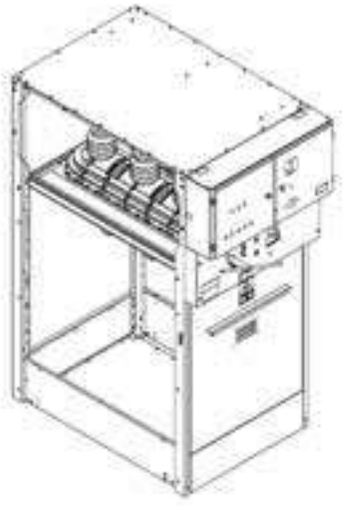
Un (kV)	36 kV
Width (mm)	1000
Length (mm)	1400
Height (mm)	2250

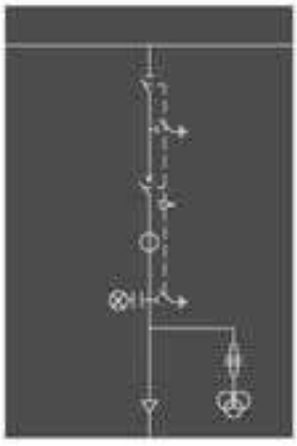


AS36 LC-Y

BUSBAR
DISCONNECTION
SWITCHGEAR WITH
SWITCH

Un (kV)	36 kV
Width (mm)	1000
Length (mm)	1400
Height (mm)	2250

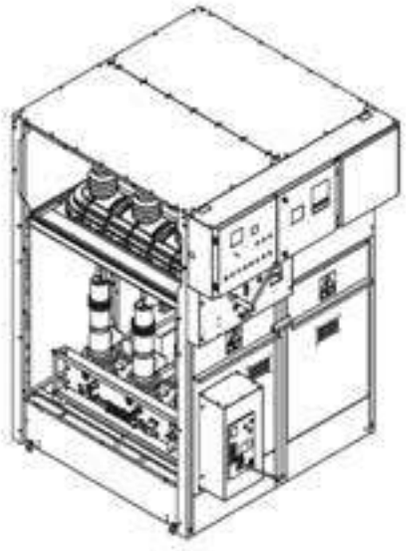




AS36 CBC-OTOP

INPUT OUTPUT
SWITCHGEAR WITH
VOLTAGE TRANSFORMER

Un (kV)	36 kV
Width (mm)	1500
Length (mm)	1400
Height (mm)	2250



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MCL SERIES

AIR INSULATED
METAL CLAD SWITCHGEARS

GENERAL

ASTOR branded Air Insulated Metal Clad MCL Series Switchgears are designed according to IEC 62271-200 standard for using up to 40.5kV. It always fulfill the needs with flexible designs which are suitable for the projects. It is ideal for safe use in facilities where have got with different climatic and geographical conditions and which cannot endurance power interruption.

MCL Series Metal Clad Switchgears are produced to be used in places where the maximum service continuity is desired. Metal Clad Switchgear is designed for indoor applications. Generally metal clad switchgear is used to distribute electric power in a variety of demanding applications such as in power plants, utility substations, cement and petrochemical factories, in mines, airports, railway, shopping mall and suitable to provide control and protection for transformers, capacitors and motors.

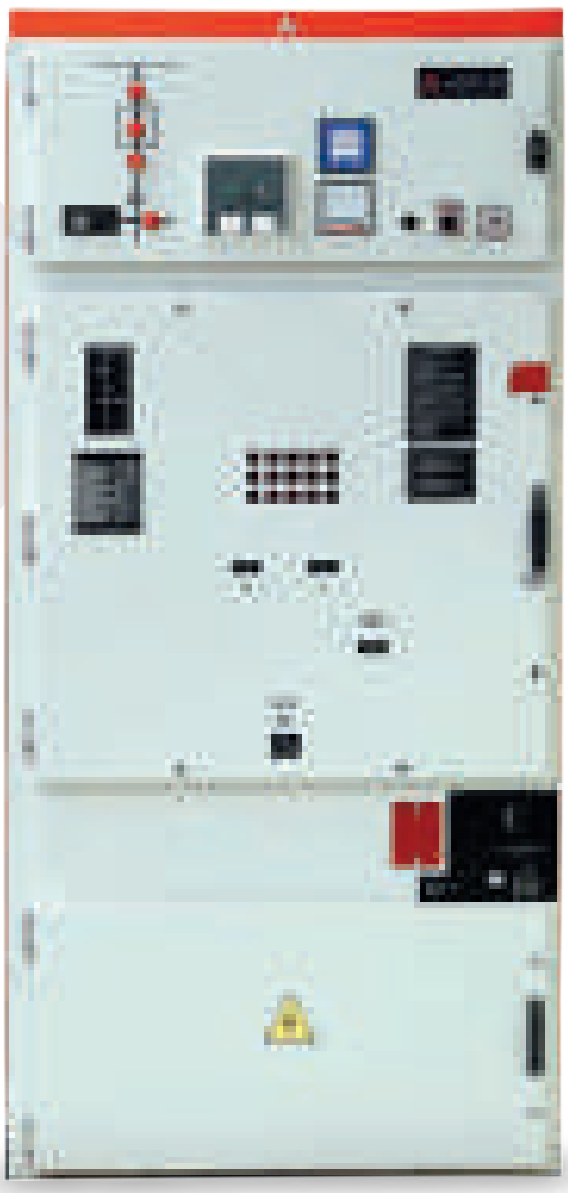
These type of switchgears, which are produced resistant to high current and short circuit current rates, are also resistant to tough environmental conditions.

During a fault or maintenance, because of circuit breakers are easily replaceable each other, power outages are eliminated as soon as possible.

ASTOR MCL Series
Metal Clad Switchgears
gives you the advantages of

- Continuity of service for your networks
- Optimized investment throughout the life of your installation
- The possibility of incorporating your medium voltage switchboard in a remote monitoring and control system.
- Provides safe cutting with vacuum circuit breaker.
- Resistance to high current and short circuit (31,5kA /3 second)
- It guarantees a high level of protection of people; when an accessible compartment is open, the other compartments and/or functional units may remain energised.
- All divisions are separated by means of grounded metal and they are fully insulated systems.
- Easily replaceable withdrawable type switching devices between the panels.
- Maintenance, reparation and on-site installation can be done from front or back side of the switchgear.
- Since the switchgear is highly modular type, this make simple selection of components required by any application.

All the installation, operation and maintenance operations can be carried out from the front of the unit.



MCL Series Metal Clad Switchgear

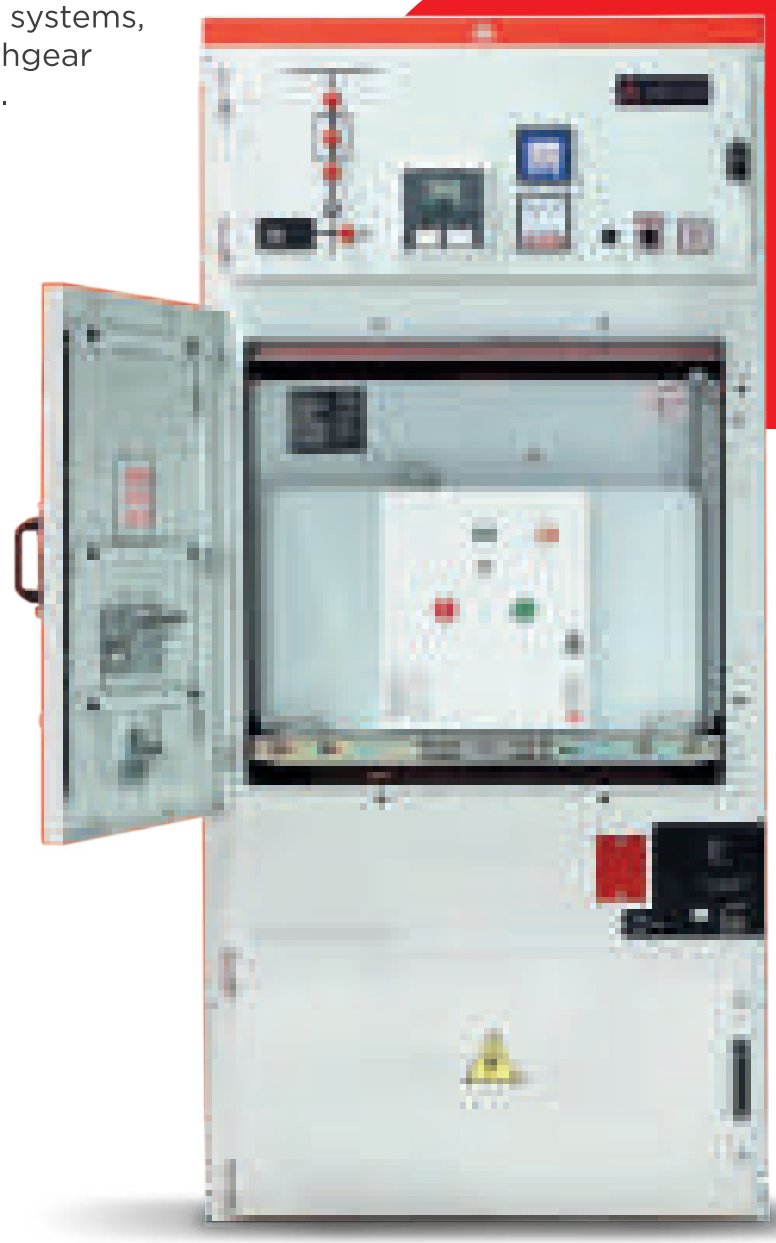
Description;

ASTOR brand Air Insulated Metal Clad Switchgears are designed by Turkish engineers and manufactured in ASTOR factory with high quality materials and workmanship.

Galvanized steel sheet is used due to its high resistance to environmental conditions and its recyclable properties.

Due to their superior switching systems, ASTOR brand Metal Clad Switchgear do not allow operational errors. Thanks to our design flexibility, Astor can easily answer to requests of customers.

The functional units of the switchgear are guaranteed arc proof in accordance with the IEC 62271-200 Standards.



MCL Series Metal Clad Switchgears are made up of several interconnected functional units.

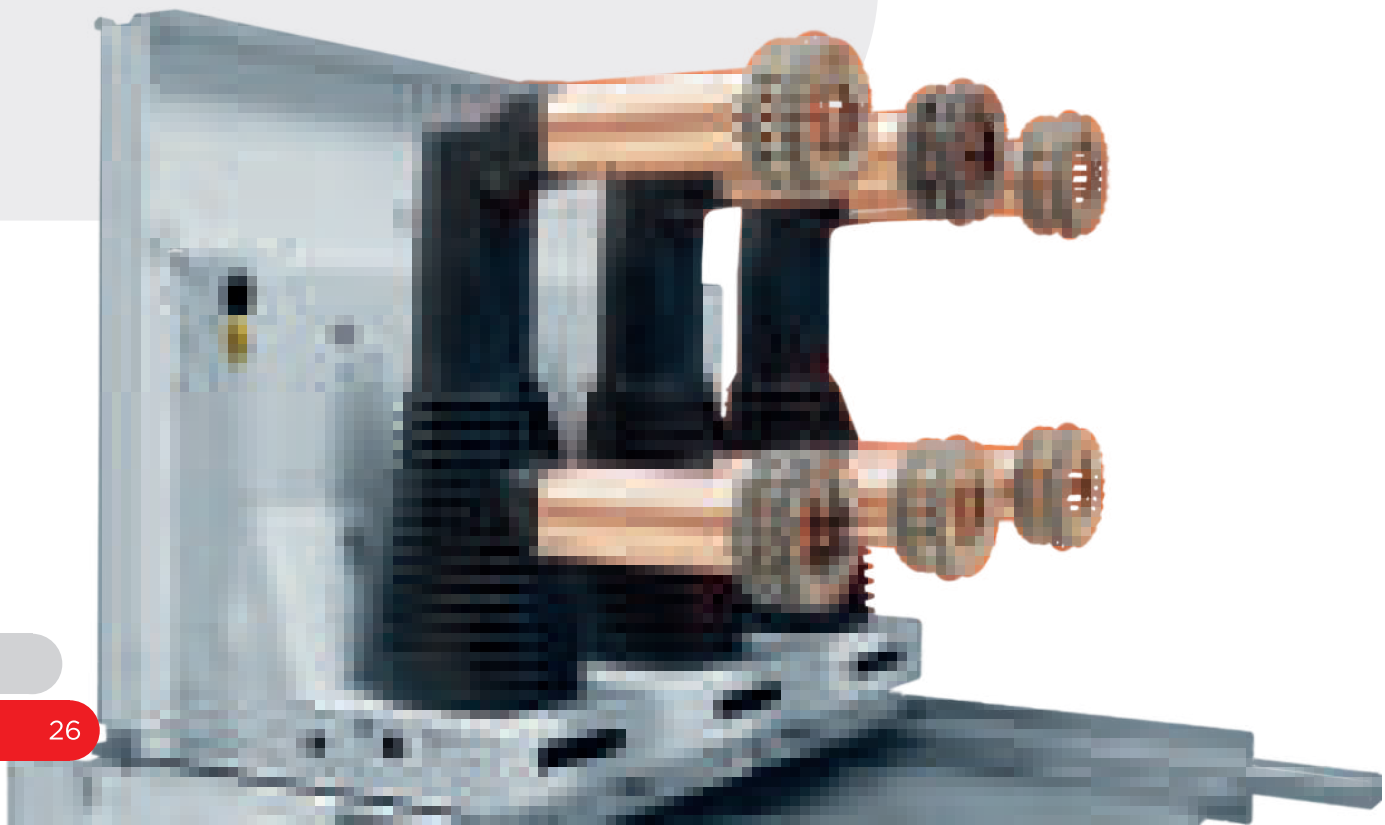
The power connections are made between the functional units within a switchboard via a single busbar.

The electrical continuity of all of the metal frames is provided by the connection of each functional unit's earthing busbar to the main earthing circuit of switchgear.

Low voltage wiring trays are provided in the switchboard above the low voltage control cabinets.

Low voltage cables can enter the switchboard through the top or bottom of each functional unit.

The switchgear and the earthing switches are operated from the front with the door closed.

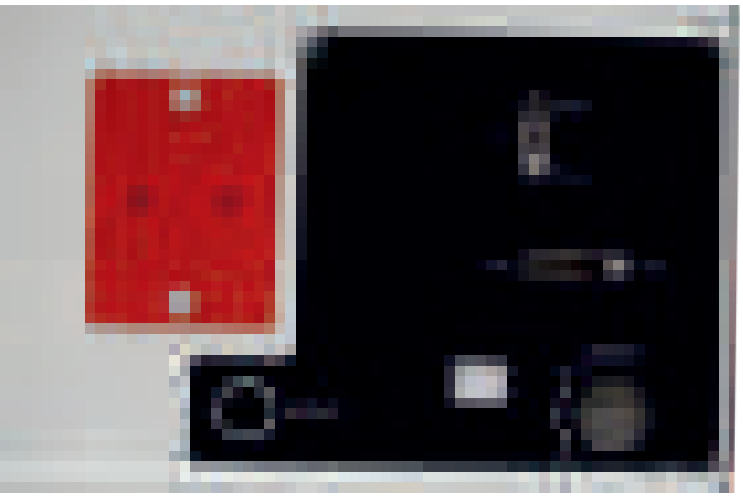


Safety

Switchgear is equipped with all the interlocks and needed accessories to guarantee the highest level of safety and reliability for both installation and personnel.

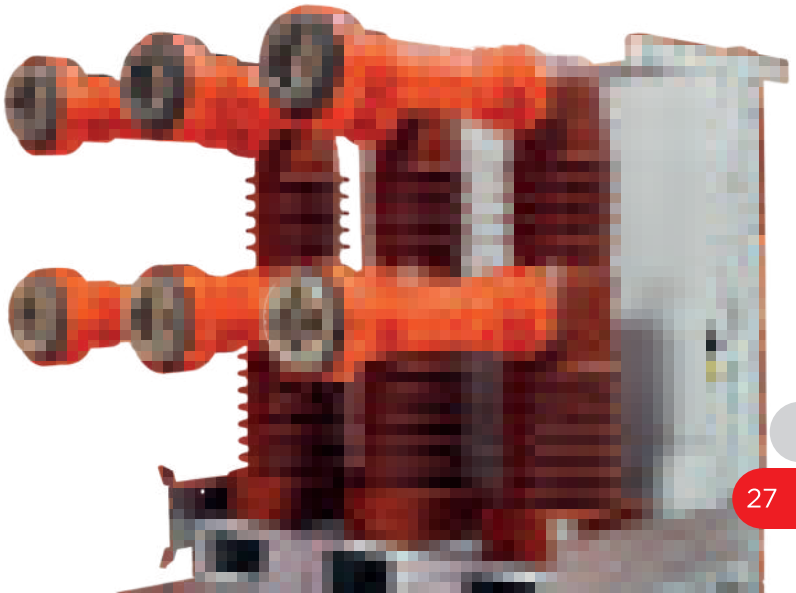
Locking System

- Locking conditions comply with IEC 62271-102 standards.
- The earthing cannot be closed until the circuit breaker is put in the test position.
- Circuit Breaker door can be opened only when breaker is in test position.



- Circuit breaker can be moved with the open and earthing switch open position.
- If it is desired to retract while the breaker is in service position, the mechanism moves the breaker to the open position.
- Behind of switchgear there is the status of the earthing switch and the indicator which Show there is energy in system or not.
- It has mechanical key locking.
- There is main busbar-to-earth disconnector locking.

- All manoeuvres can be made when the panel door is properly closed.
- Possibility of wrong manoeuvre is prevented by means of mechanical and electrical interlocks.

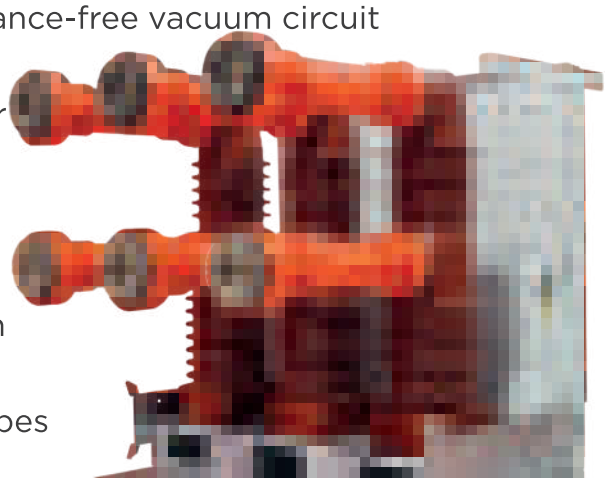


Compartments

ASTOR MCL series metal clad switchgear is with a metal enclosure, suitable for indoor installations. Metal partitions segregate the compartments from each other and the live parts are air-insulated. Each Metal Clad Switchgear unit consists of three power compartments: circuit-breaker, busbars and cables;

1) Circuit Breaker Compartment

- In the all products are used reliable and maintenance-free vacuum circuit breaker.
- Switching operations can make when the MV door is closed.
- Pressure relief is to upwards.
- Electrostatic powder coating is used.
- Invulnerable doors protect the operator when occurrence internal arc.



Cutter Compartment is suitable for the following other types of panels;

- Vacuum circuit breaker
- Disconnector
- Voltage Transformer Truck

2) Main Busbar Compartment

- The busbar compartment contains the main busbar system connected to the upper isolating contacts of the circuit-breaker by means of branch connections.
- Contains busbar array with nominal current up to rating 2500 A.
- Busbars are fixed on the epoxy support insulators.
- Pressure relief is to upwards.
- The main busbars are made of electrolytic copper.
- The busbars is insulated with original design insulated materials.

3) Cable Compartment

The cable compartment contains the branch system for connection of the power cables to the lower contacts of the circuit-breaker.

Earthing switch, current transformers install in this section and for some types can include voltage transformers and surge arresters.

There is a earthing busbar.

Pressure relief is to upwards.

Electrical and mechanical interlocks prevent to access while system in energy.

It has an earthing switch with short circuit closing capacity according to IEC 62271-102 standard.

Earthing Switch

Cable compartment can be fitted with an earthing switch for cable earthing.

The same device can also be used to earth the busbar system (measurements and bus-tie units). It can also be installed directly on the main busbar system in a dedicated compartment .

The earthing switch has short-circuit making capacity.

Control of the earthing switch is from the front of the switchgear with manual operation, and optionally, can also be motor operated.

The position of the earthing switch can be seen from the front of the switchgear by means of a mechanical coupled indicator.

Standarts;

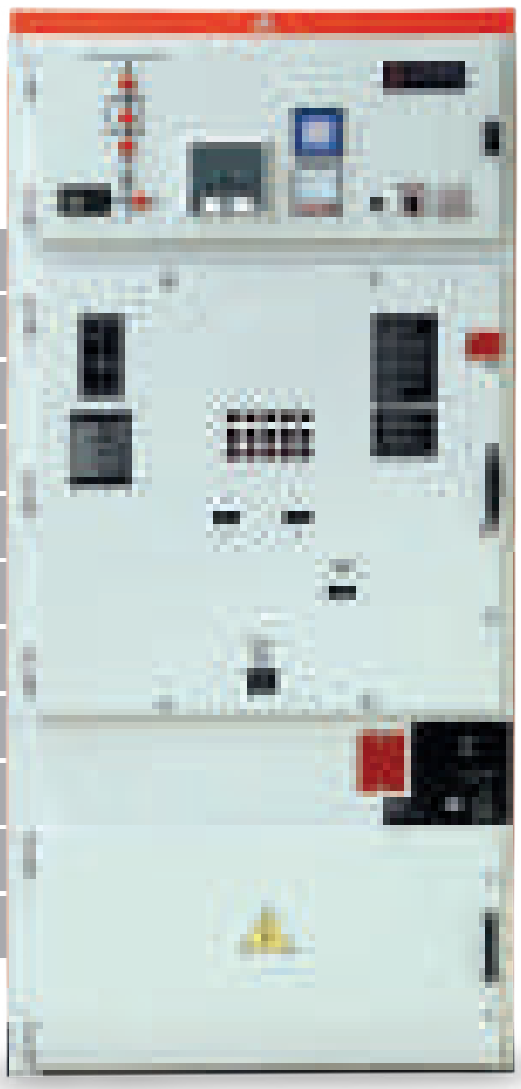
The metal clad switchgear and main apparatus contained in it comply with the Standards as below:

- IEC 62271-200 for the switchgear
- IEC 62271-1 for general purposes
- IEC 62271-102 for the earthing switch
- IEC 62271-100 for the circuit-breakers
- IEC 60071-2 for the insulation coordination
- IEC 62271-106 for the contactors
- IEC 60265-1 for the switch-disconnectors
- IEC 60529 for degree of protections

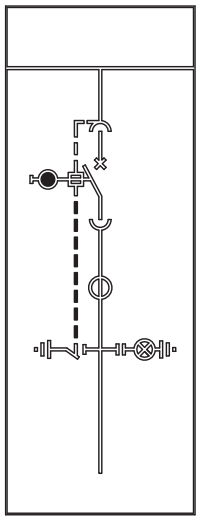
MCL12 SERIES

Technical Specification

Type	MCL 12
Rated Voltage(kV)	12
Rated Busbar Current (A)	UP TO 2500
Rated Feeder Current (A)	UP TO 2500
Rated Lightining Imp.Withstand Volt.(kV)	75
Rated Short Time Withstand Current(kA)	31.5 / 1sec
Rated peak Withstand Current(kA-peak)	62,5-80
Loss Of Service Continuity	LSC2B
IP Protection Of Enclosure	IP4X
Partitioning Class	PM
Arc Test Current(kA)	31.5 / 1sec



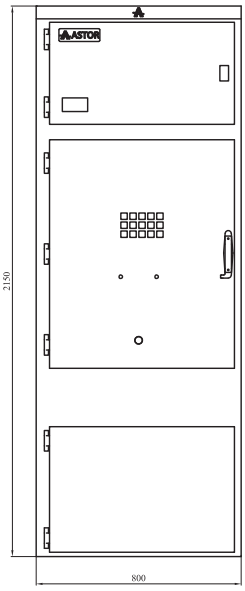
CUBICLE TYPES

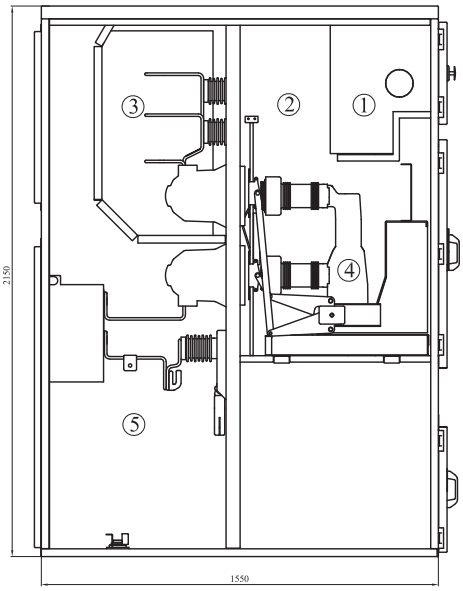


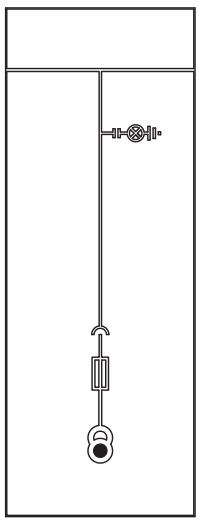
MCL12-02

Incoming / Outgoing Switchgear

Un (kV)	12
Width (mm)	800-1000
Length (mm)	1550
Height (mm)	2150



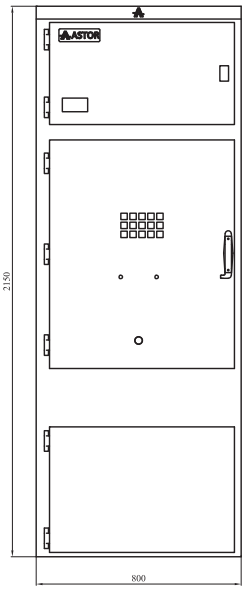


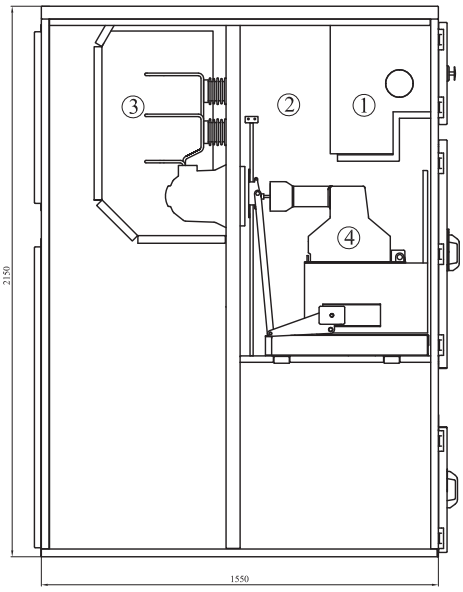


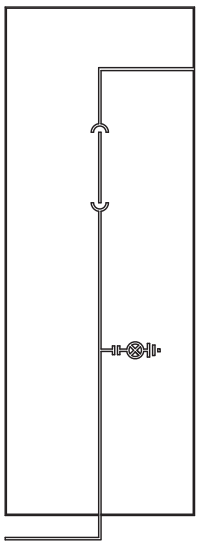
MCL12-15

Voltage Measurement Switchgear

Un (kV)	12
Width (mm)	800
Length (mm)	1550
Height (mm)	2150



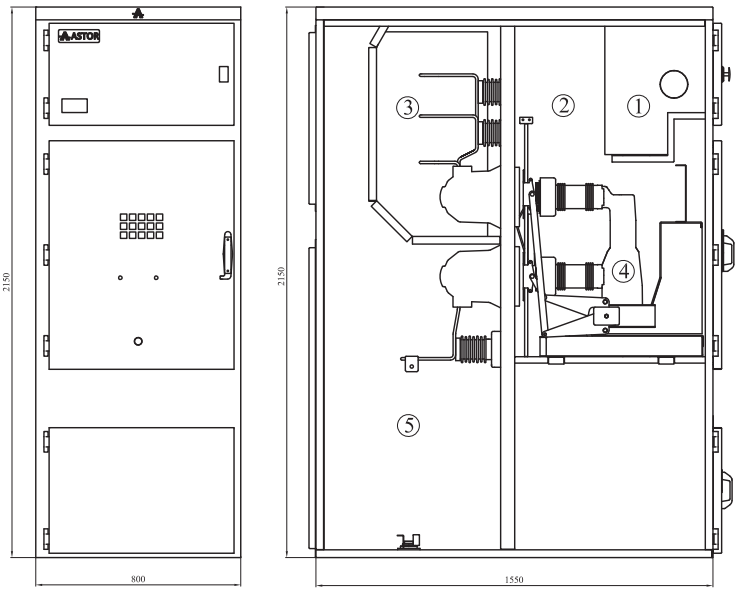


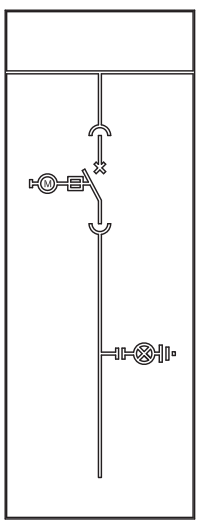


MCL12-17

Bus Riser Switchgear

Un (kV)	12
Width (mm)	800-1000
Length (mm)	1550
Height (mm)	2150

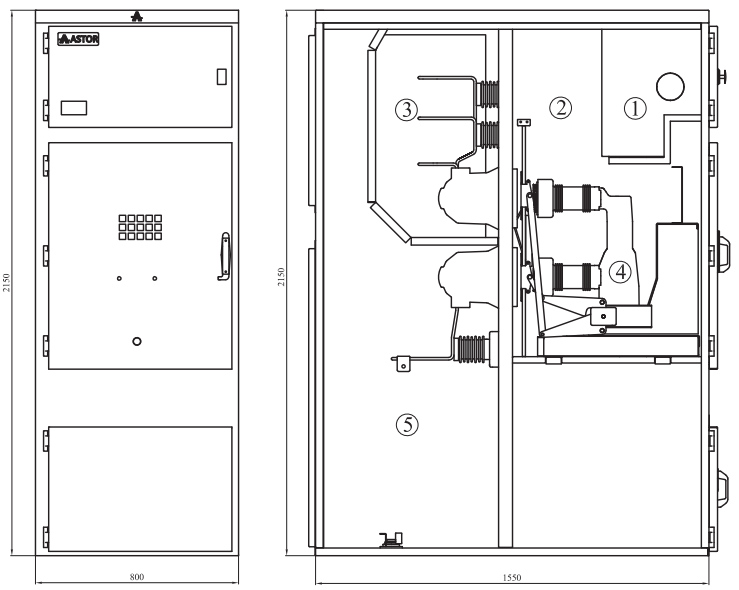




MCL12-32

Coupling Switchgear

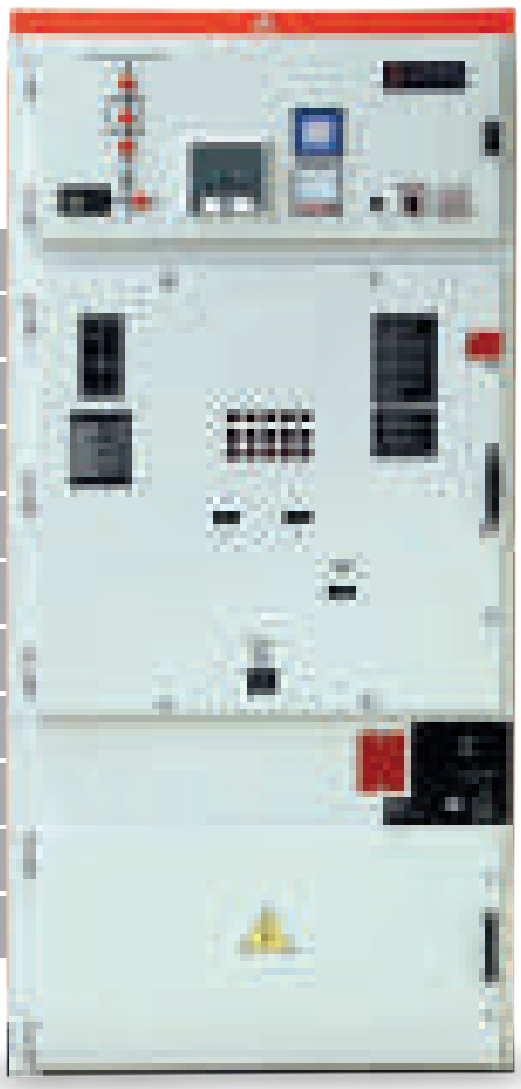
Un (kV)	12
Width (mm)	800-1000
Length (mm)	1550
Height (mm)	2150



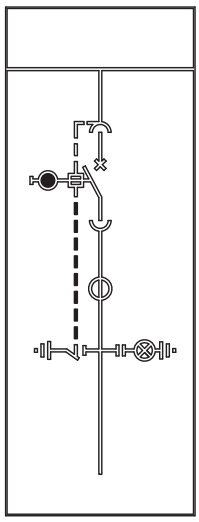
MCL12 SERIES

MCL24
SERIES
Technical Specification

Type	MCL 24
Rated Voltage(kV)	24
Rated Busbar Current (A)	UP TO 2500
Rated Feeder Current (A)	UP TO 2500
Rated Lightining Imp.Withstand Volt.(kV)	125
Rated Short Time Withstand Current(kA)	31.5 / 1 sec
Rated peak Withstand Current(kA-peak)	62,5-80
Loss Of Service Continuity	LSC2B
IP Protection Of Enclosure	IP4X
Partitioning Class	PM
Arc Test Current(kA)	31.5 / 1 sec



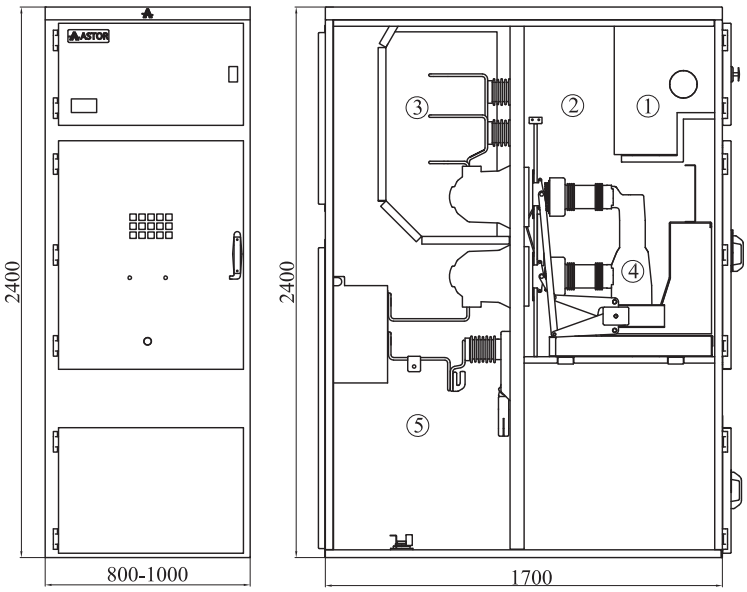
CUBICLE TYPES

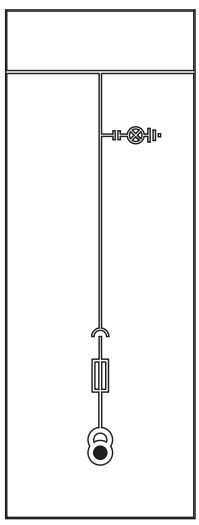


MCL24-02

Incoming / Outgoing Switchgear

Un (kV)	24
Width (mm)	800-1000
Length (mm)	1700
Height (mm)	2400

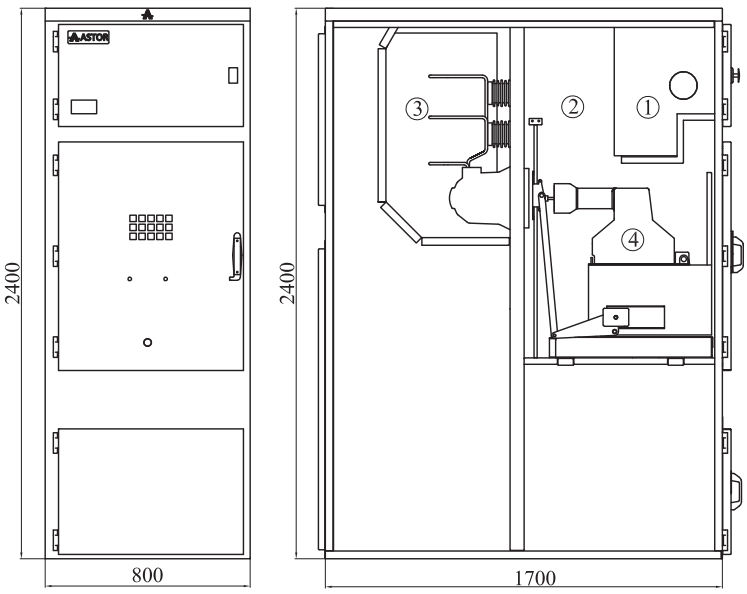


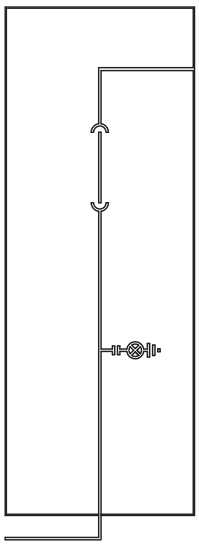


MCL24-15

Voltage Measurement Switchgear

Un (kV)	24
Width (mm)	800
Length (mm)	1700
Height (mm)	2400

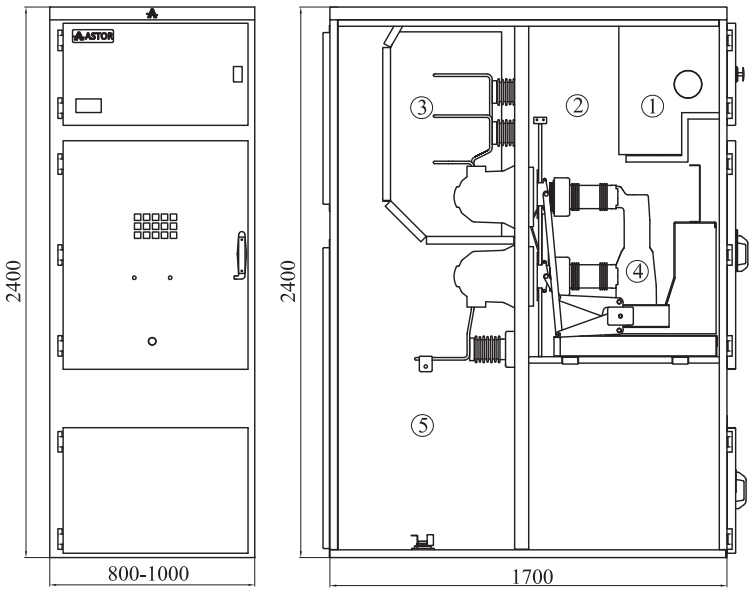


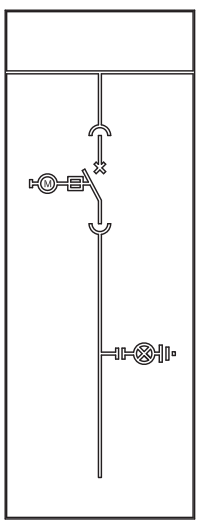


MCL24-17

Bus Riser Switchgear

Un (kV)	24
Width (mm)	800-1000
Length (mm)	1700
Height (mm)	2400

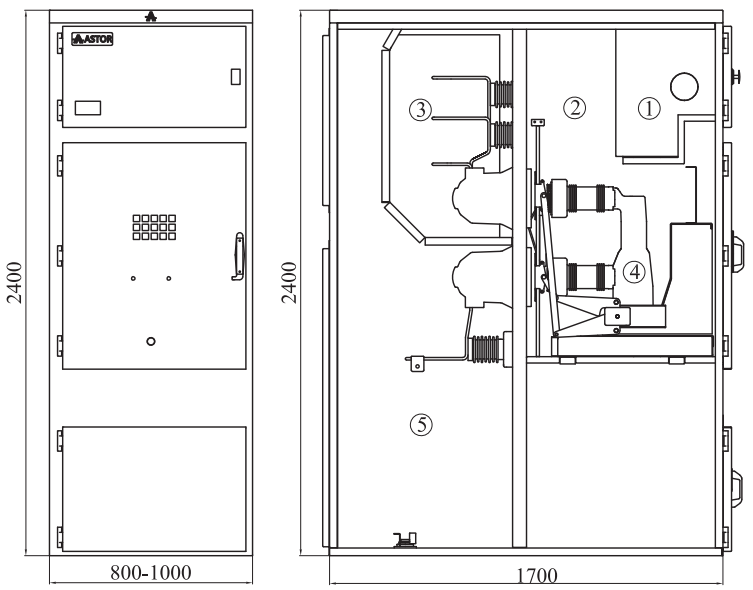




MCL24-32

Coupling Switchgear

Un (kV)	24
Width (mm)	800-1000
Length (mm)	1700
Height (mm)	2400

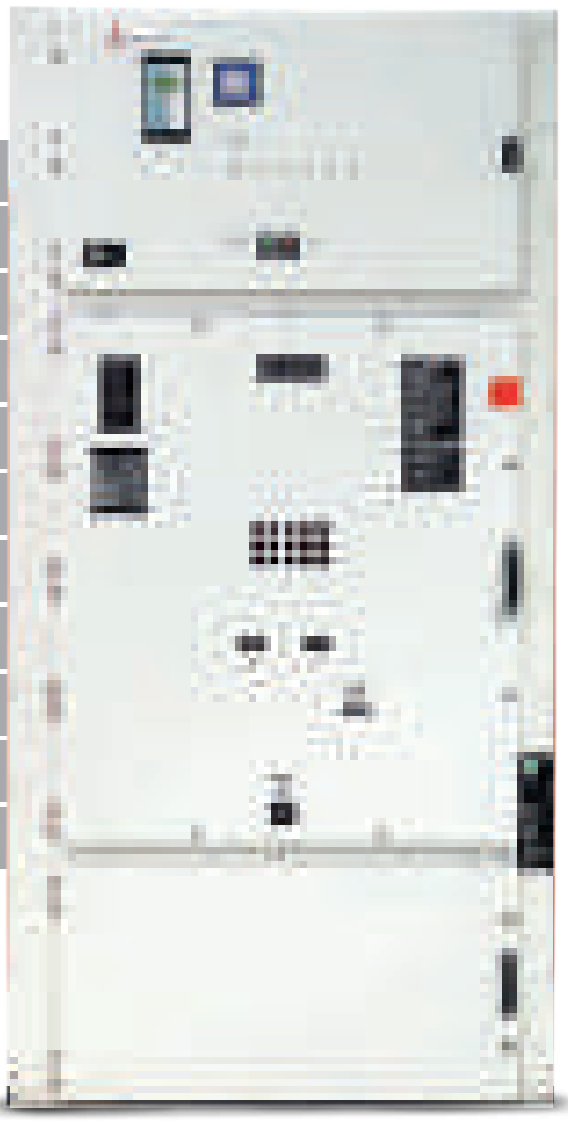


MCL24 SERIES

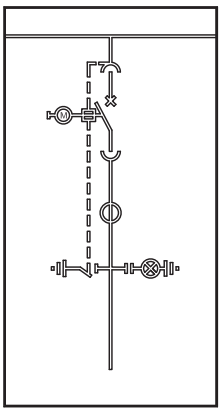
MCL40 SERIES

Technical Specification

Type	MCL 40
Rated Voltage(kV)	40.5
Rated Busbar Current (A)	UP TO 2500
Rated Feeder Current (A)	UP TO 2500
Rated Lightining Imp.Withstand Volt.(kV)	185
Rated Short Time Withstand Current(kA)	31.5 / 1 sec
Rated peak Withstand Current(kA-peak)	62,5-80
Loss Of Service Continuity	LSC2B
IP Protection Of Enclosure	IP4X
Partitioning Class	PM
Arc Test Current(kA)	31.5 / 1 sec



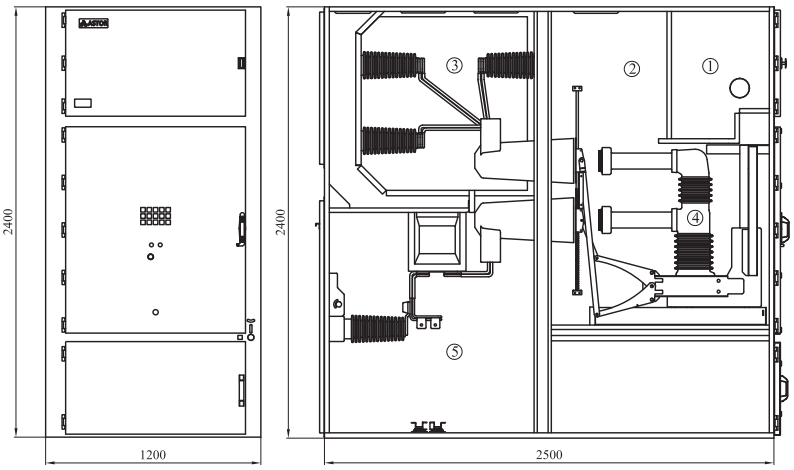
CUBICLE TYPES

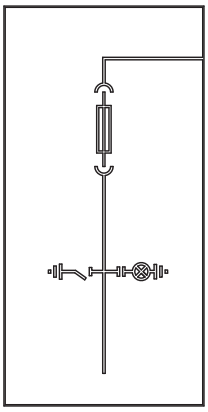


MCL40-02

Incoming / Outgoing Switchgear

Un (kV)	40.5
Width (mm)	1200
Length (mm)	2500
Height (mm)	2400

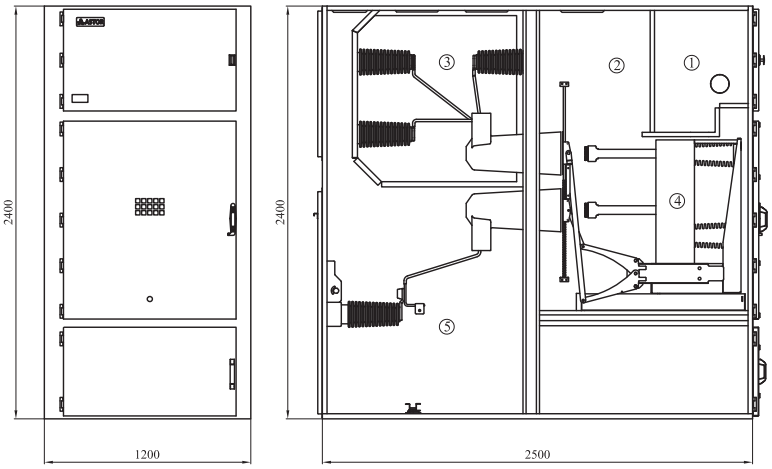


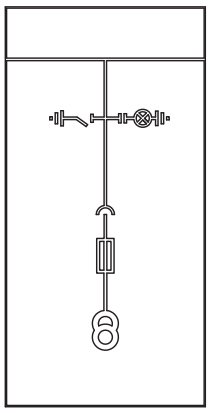


MCL40-14

Transformer Protection Switchgear

Un (kV)	40.5
Width (mm)	1200
Length (mm)	2500
Height (mm)	2400

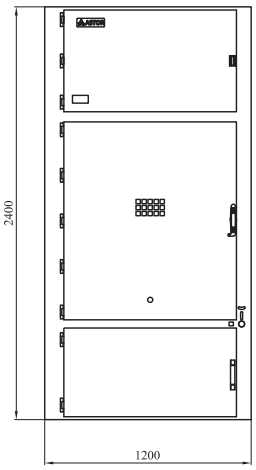


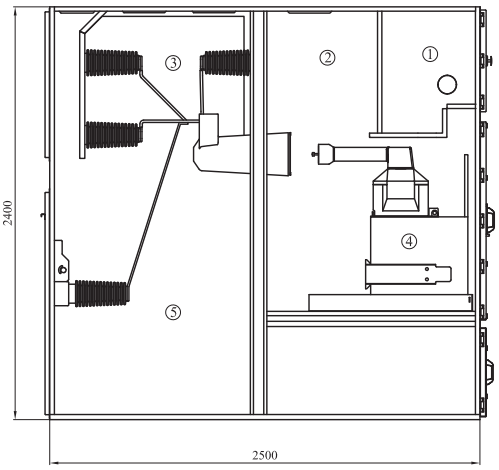


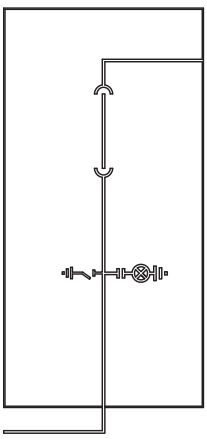
MCL40-15

Voltage Measurement Switchgear

Un (kV)	40.5
Width (mm)	1200
Length (mm)	2500
Height (mm)	2400



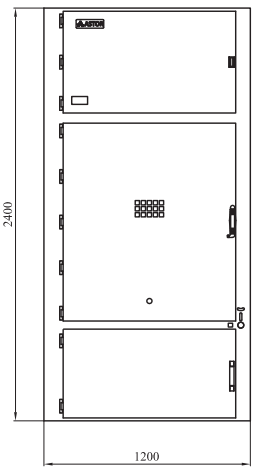


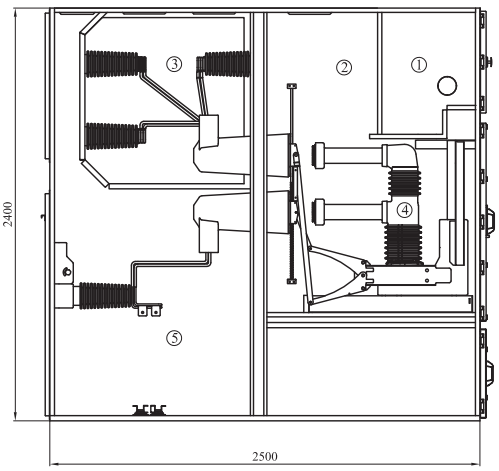


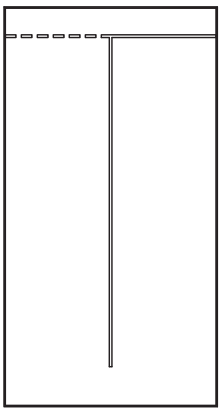
MCL40-17

Bus Riser With Diconnector Switchgear

Un (kV)	40.5
Width (mm)	1200
Length (mm)	2500
Height (mm)	2400



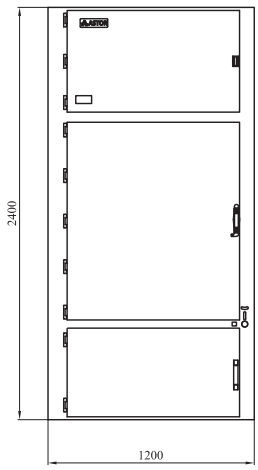


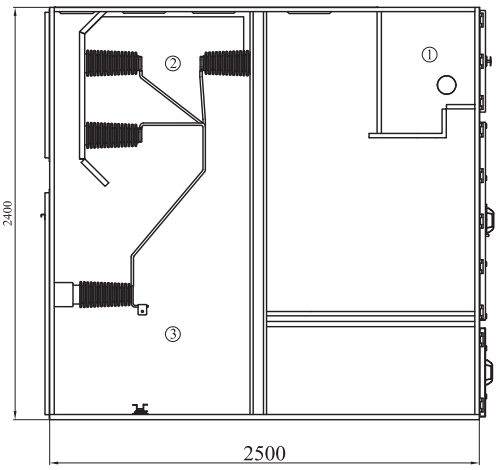


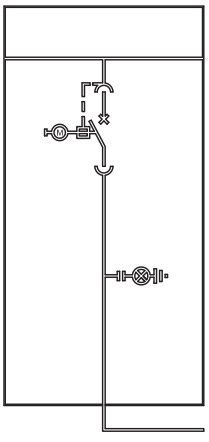
MCL40-18

Bus Riser Switchgear

Un (kV)	40.5
Width (mm)	1200
Length (mm)	2500
Height (mm)	2400



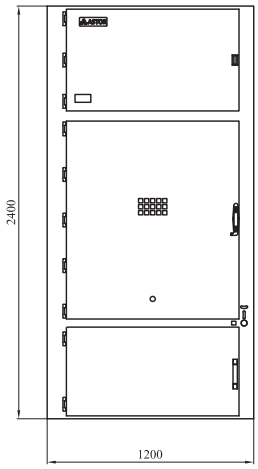


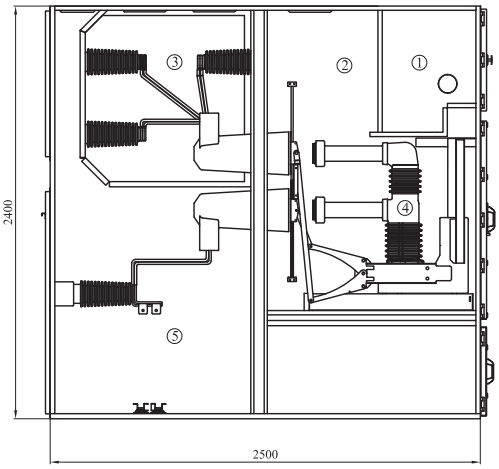


MCL40-32

Coupling Switchgear

Un (kV)	40.5
Width (mm)	1200
Length (mm)	2500
Height (mm)	2400





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ABK SERIES

CONCRETE TRANSFORMER AND DISTRIBUTION SUBSTATIONS

GENERAL

ASTOR brand MV/LV Concrete Transformer and Distribution Substations have been designed with a concrete enclosure, monobloc structure, and compact type to be used in system voltages up to 36 kV in accordance with the TS EN 62271-202 (IEC 62271-202) standard and TEDAŞ MYD technical specifications. All type tests required by the standard have been completed in accredited laboratories in Turkey and abroad.

Concrete Transformer and Distribution Substations consist of three parts; HV switching units, MV distribution transformer, LV distribution panel. Each section has its own independent access doors and ventilation louvers. Various door and ventilation louver configurations can be made depending on the requirement.

USE AREAS

- Transformer Substations
- Distribution Substations
- Industrial Substations
- Wind Power Plants (WPP), Solar Power Plants (SPP)
- Compensation Facilities
- Water Pump Stations
- Generator Cabinets

ADVANTAGES

- Suitable for displacement due to its monobloc structure
- Quick and easy installation
- Compatible with the environment in terms of view and structure
- Various color options
- Resistant to all weather conditions
- Long service life

DESIGN AND STRUCTURAL PROPERTIES

GENERAL

- The concrete enclosure of the compact substation is produced with a monobloc structure including the tank/foundation section and the side walls except for the roof. The roof is produced separately.
- The compact substation's roof and its enclosure with its side walls and tank/foundation section are completely waterproof.
- Tank/foundation section is suitable for the smallest bending radius of 36 kV 10x240 mm^2 cable.

TYPES

ABK-A : Compact Transformer Substations with Air Insulated Cells (1000 kVA)

ABK-B : Compact Transformer Substations with Air Insulated Cells (1600 kVA)

ABK-H : Compact Distribution Substations with Air Insulated Cells

ABK-C : Compact Transformer Substations with Air Insulated Cells without LV Panel (1000 kVA)

ABK-D : Compact Transformer Substations with Air Insulated Cells without LV Panel (1600 kVA)

ABK-T : LV Panel and Distribution Transformer Substations

ABK-R : Compact Transformer Substations with GIS

STRUCTURAL PROPERTIES

Enclosure

- The roof of the compact substation is resistant to the load of 2500 N/m^2.
- The enclosure is resistant to wind pressure of at least 34 m/s.
- The ventilation louvers and the doors are resistant to the mechanical shock (IK10) which corresponds to 20 Joules from inside and outside.
- Enclosure Classification: 10
- It has been proved that concrete transformer substations are safe against earthquake conditions.

Concrete and Steel Accessories' Properties

- C35/45 concrete is used in accordance with the TS EN 206-1 standard.
- Concrete qualification tests are carried out periodically in accredited laboratories.
- Steel fittings in accordance with TS 708 are used.

Ventilation Louvers, Doors and Lock Systems

- Ventilation louvers and doors are produced from the galvanized sheet material painted with electrostatic powder paint with a thickness of 2 mm.
- The doors have been designed in such a way that they can stay open with an angle of 120° and cannot be removed from outside.
- All locks of the compact substation have been designed as mortise locks in a special structure that they can be locked with a single key and cannot be removed from outside.

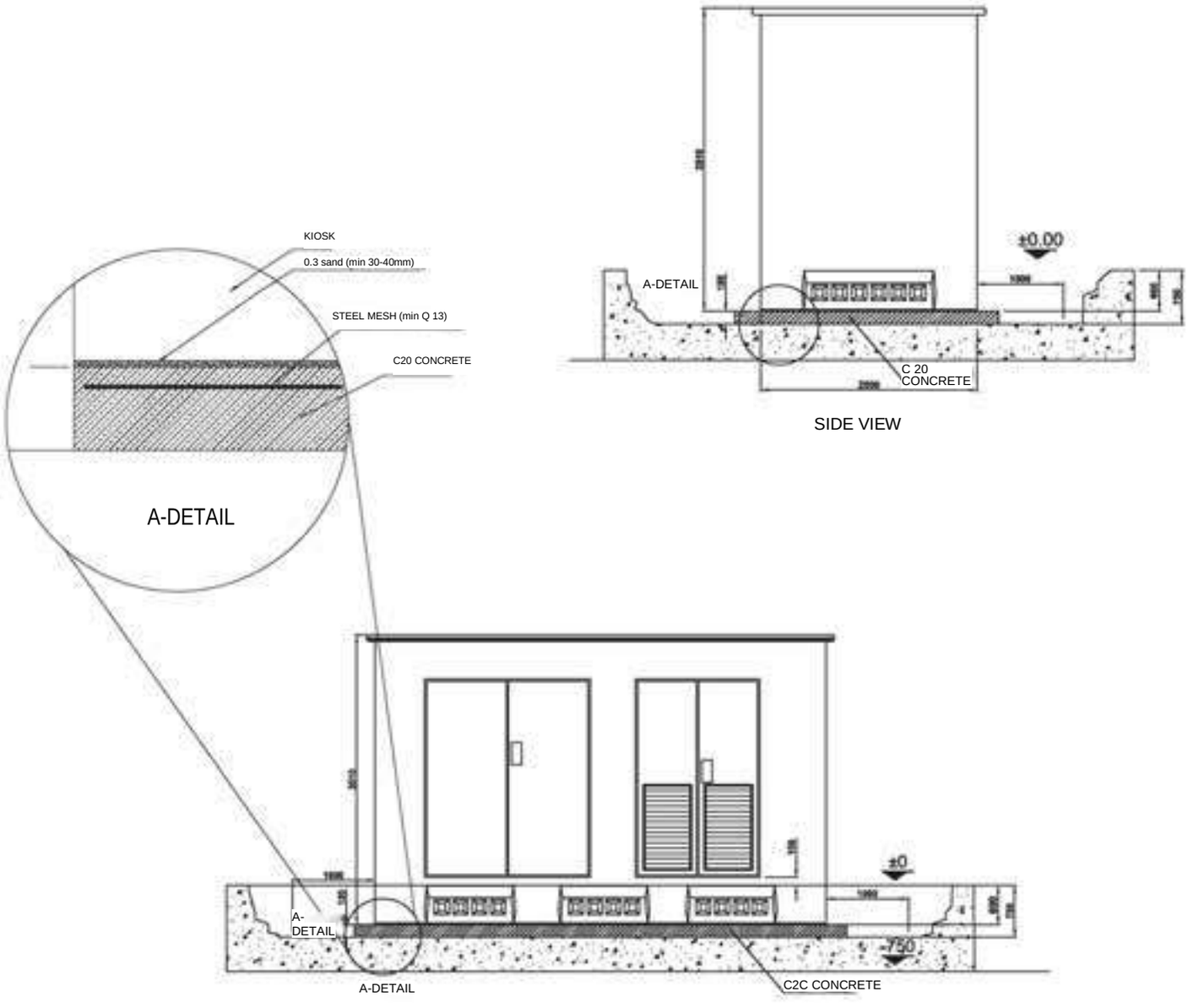
Partitions

The HV Cell Section and Transformer Section, and the Transformer Section and LV Panel Section are separated by concrete partitions.

TECHNICAL SPECIFICATIONS

RATED VOLTAGE (kV)	36
MAXIMUM RATED POWER (kVA)	1000 ; 1600
ENCLOSURE CLASSIFICATION	10
INTERNAL ARC WITHSTANDING	(AB) 16 kA-1 sec.
PROTECTION CLASSIFICATION	IP 23D
IMPLEMENTED STANDARD	TS EN 62271-202

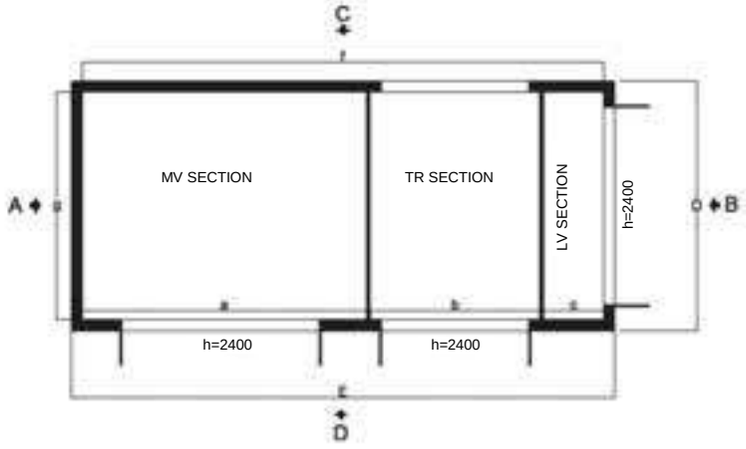
FOUNDATION CONCRETE, PREPARATION, AND ASSEMBLY



- Ground excavation is performed by paying attention to the sub-basement level.
- Earthing network is prepared
- The ground is graded. A reinforced concrete of C20 quality is poured on the ground at a thickness of about 150 mm.
- An intermediate layer is formed by covering the concrete surface with 0.3 mm sand with a thickness of about 2-3 cm.
- The concrete kiosk is placed on the ground prepared in accordance with the instructions on the kiosk.
- External LV and MV cables are connected. The cable input/output holes are sealed.
- The earthing network is connected to the Equipotential Earthing Bar located in the kiosk.
- Landscaping of the compact substation is completed.

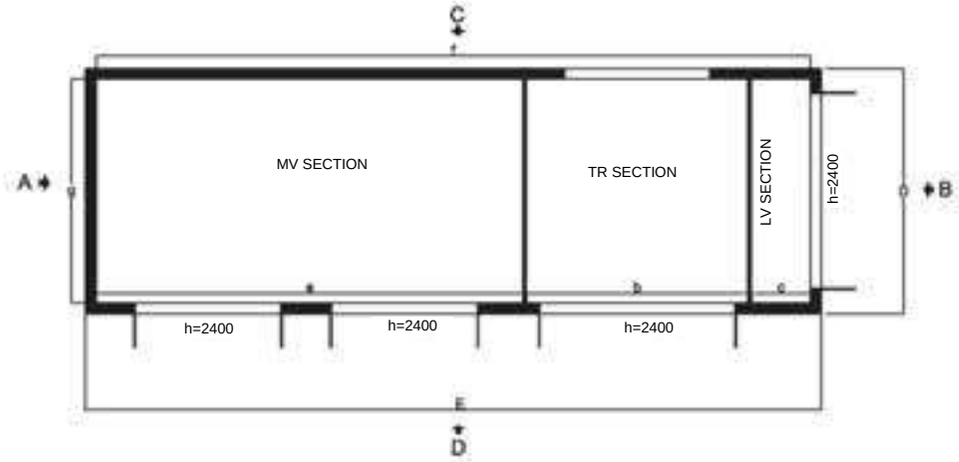
TYPES AND DIMENSIONS

ABK-A COMPACT TRANSFORMER SUBSTATIONS WITH AIR INSULATED SWITCHGEARS (1000 kVA)



TYPE (MV+TR+LV)	TRANSFORMER POWER	a	b	c	D	E	f	g
ABK-A 4350	1000 kVA	1750	1700	600	2500	4350	4130	2280
ABK-A 5450	1000 kVA	2850	1700	600	2500	5450	5230	2280
ABK-A 6000	1000 kVA	3400	1700	600	2500	6000	5780	2280
ABK-A 6490	1000 kVA	3890	1700	600	2500	6490	6270	2280
ABK-A 7500	1000 kVA	4900	1700	600	2500	7500	7280	2280

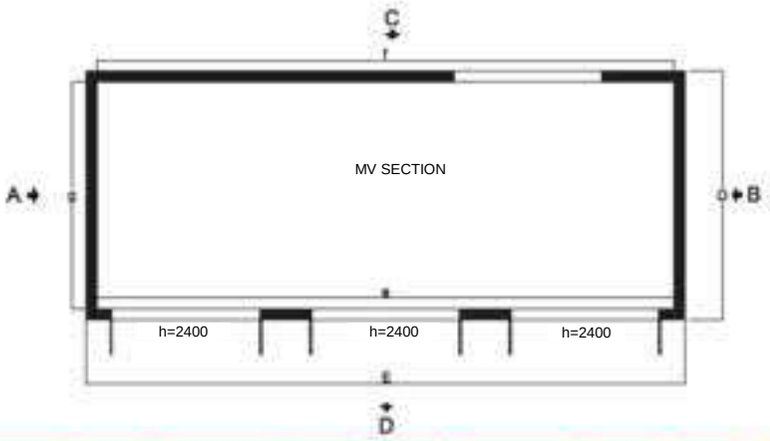
ABK-B COMPACT TRANSFORMER SUBSTATIONS WITH AIR INSULATED SWITCHGEARS (1600 kVA)



TYPE (MV+TR+LV)	TRANSFORMER POWER	a	b	c	D	E	f	g
ABK-B 5450	1600 kVA	2300	2250	600	2500	4350	5230	2280
ABK-B 6000	1600 kVA	2850	2250	600	2500	6000	5780	2280
ABK-B 6490	1600 kVA	3340	2250	600	2500	6490	6270	2280
ABK-B 7500	1600 kVA	4350	2250	600	2500	7500	7280	2280

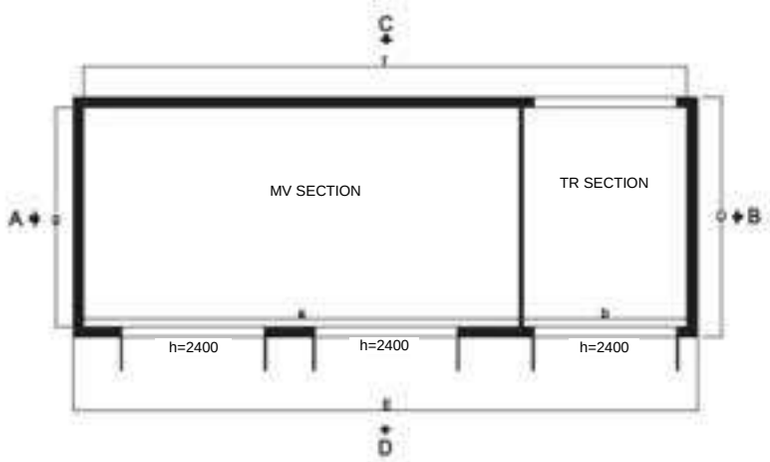
- Lowercase letters show inner measurements and the uppercase letters outer measurements.
- All measurements are shown in mm.

ABK-H COMPACT DISTRIBUTION SUBSTATIONS WITH AIR INSULATED SWITCHGEARS



TYPE (MV)	TRANSFORMER POWER	a	b	c	D	E	f	g
ABK-H 3800	-	3580	-	-	2500	3800	3580	2280
ABK-H 4350	-	4130	-	-	2500	4350	4130	2280
ABK-H 5450	-	5230	-	-	2500	5450	5230	2280
ABK-H 6000	-	5780	-	-	2500	6000	5780	2280
ABK-H 6490	-	6270	-	-	2500	6490	6270	2280
ABK-H 7500	-	7280	-	-	2500	7500	7280	2280

ABC-C COMPACT TRANSFORMER SUBSTATIONS WITH AIR INSULATED SWITCHGEARS WITHOUT LV PANEL (1000 kVA)



TYPE (MV+TR)	TRANSFORMER POWER	a	b	c	D	E	f	g
ABK-C 5450	1000 kVA	3490	1700	-	2500	5450	5230	2280
ABK-C 6000	1000 kVA	4040	1700	-	2500	6000	5780	2280
ABK-C 6490	1000 kVA	4530	1700	-	2500	6490	6270	2280
ABK-C 7500	1000 kVA	5540	1700	-	2500	7500	7280	2280

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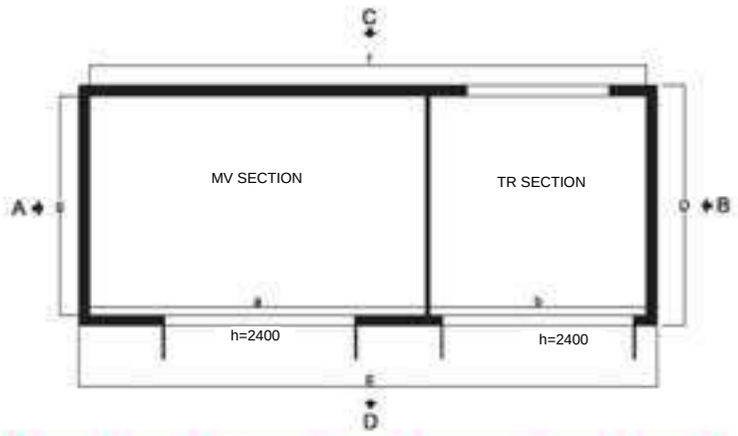
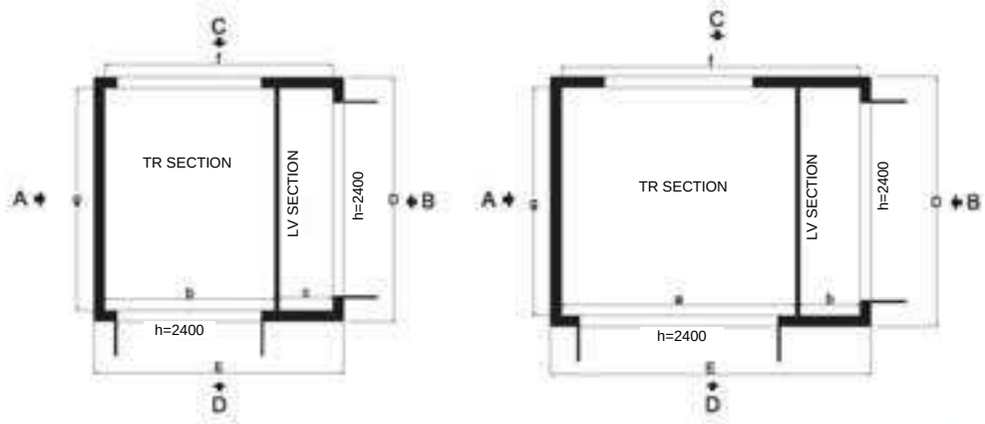
• All measurements are shown in mm.

ABK-D COMPACT TRANSFORMER SUBSTATIONS WITH AIR INSULATED SWITCHGEARS WITHOUT LV PANEL (1600 kVA)



TYPE (MV+TR)	TRANSFORMER POWER	a	b	c	D	E	f	g
ABK-D 5450	1600 kVA	2940	2250	-	2500	5450	5230	2280
ABK-D 6000	1600 kVA	3490	2250	-	2500	6000	5780	2280
ABK-D 6490	1600 kVA	3980	2250	-	2500	6490	6270	2280
ABK-D 7500	1600 kVA	4990	2250	-	2500	7500	7280	2280

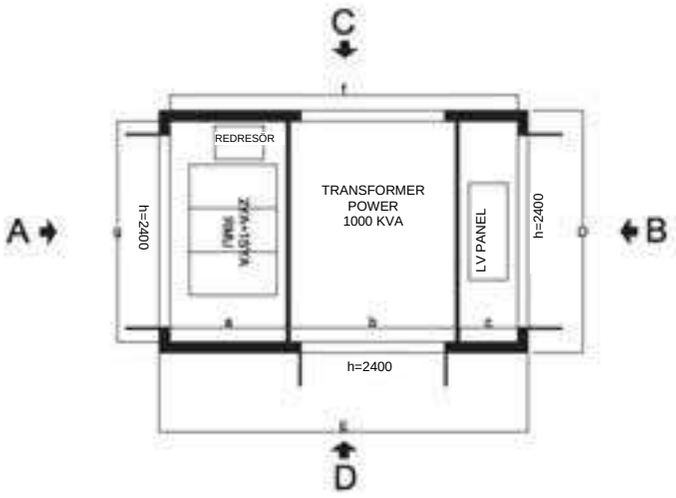
ABK-T LV PANEL AND DISTRIBUTION TRANSFORMER SUBSTATIONS

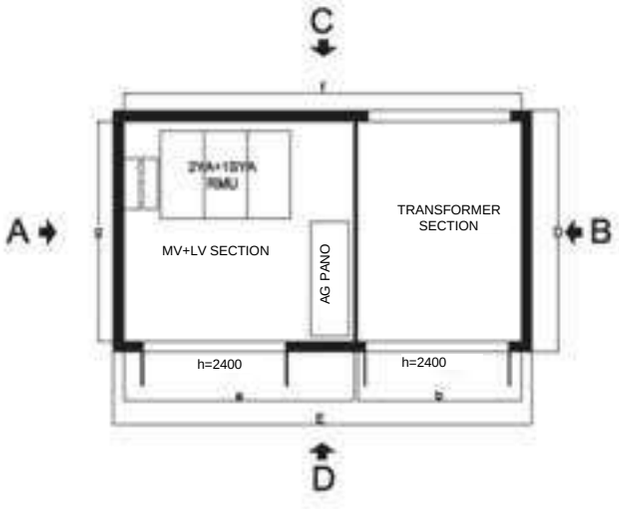


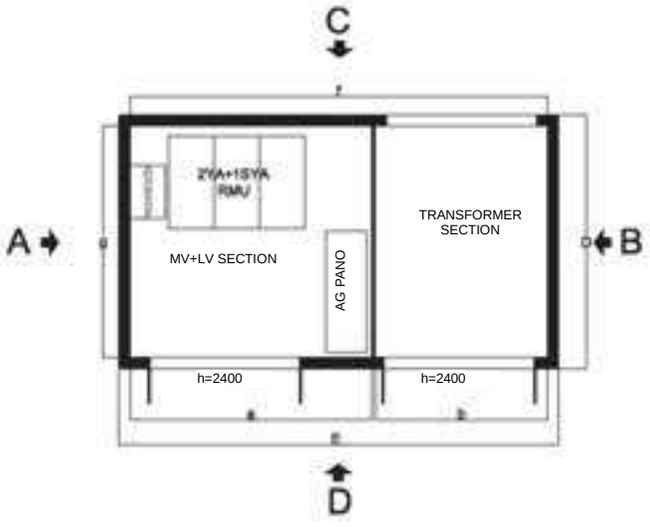
TYPE (TR+LV)	TRANSFORMER POWER	a	b	c	D	E	f	g
ABK-T 2550	1000 kVA	-	1740	550	2500	2550	2330	2280
ABK-T 3200	1000/1600 kVA	-	2340	600	2500	3200	2980	2280

- Lowercase letters show inner measurements and the uppercase letters outer measurements.
- All measurements are shown in mm.

ABK-R COMPACT TRANSFORMER SUBSTATIONS WITH GIS







TYPE (GIS)	TRANSFORMER POWER	a	b	c	D	E	f	g
ABK-R 3800 (D)*	1000 kVA	1200	1700	600	2500	3800	3580	2280
ABK-R 4350 (I)**	1000 kVA	2390	1700	-	2500	4350	4130	2280
ABK-R 5450 (I)**	1000 kVA	3490	1700	-	2500	5450	5230	2280
ABK-R 4350 (D)*	1000 kVA	1200	1700	600	2500	4350	4130	2280
ABK-R 4800 (I)**	1000 kVA	2290	1700	-	2500	4800	4580	2280

*(D) Externally operating GIS kiosk; **(I) Internally operating GIS kiosk.
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• All measurements are shown in mm.

SOLAR POWER PLANTS

ANKARA ACAZA SOLAR POWER PLANT (1 MW)
NEVŞEHİR SOLARAN SOLAR POWER PLANT (1 MW)
ŞANLIURFA VİRANŞEHİR SOLAR POWER PLANT (12 MW)
ŞANLIURFA HİLVAN SOLAR POWER PLANT (8 MW)
ŞANLIURFA YENTEK SOLAR POWER PLANT (9 MW)
KIZILELMA SOLAR POWER PLANT (3 MW)
ŞANLIURFA BÖLÜCEK SOLAR POWER PLANT (14 MW)
ŞANLIURFABOZOVA SOLAR POWER PLANT (17 MW)
KONYA KULU SOLAR POWER PLANT (1 MW)
KONYA OVASAN SOLAR POWER PLANT (1 MW)
KÜTAHYA GÜNSER AND SİMEN SOLAR POWER PLANT (2 MW)
KONYA SAYLAM SOLAR POWER PLANT (1 MW)
ÇANKIRI KURŞUNLU SOLAR POWER PLANT (3 MW)
KONYA CİHANBEYLİ SOLAR POWER PLANT (3 MW)
ÇANKIRI MİKADO SOLAR POWER PLANT (1 MW)
YOZGAT COŞKUNLAR KAROSER SOLAR POWER PLANT (1 MW)
MALATYA SOLAR POWER PLANT (3 MW)
ANKARA ELMADAĞ SOLAR POWER PLANT (15 MW)
ŞANLIURFA SOLAR POWER PLANT (14 MW)
HİPOT&ARMİN UNINCORPORATED ASSOCIATION ISPARTA GÖNEN SOLAR POWER PLANT (1 MW)
HİPOT&ARMİN UNINCORPORATED ASSOCIATION SİVAS/TOKAT/ANTALYA/BURDUR SOLAR POWER PLANT (60 MW)

HOUSING, HEALTHCARE, SCHOOL, AND SOCIAL FACILITY PROJECTS

BALIKESİR BURHANİYE 100 BED CAPACITY STATE HOSPITAL
ŞEREFLİKOÇHİSAR STATE HYDRAULIC WORKS
TOKİ SAMSUN CANİK 127 HOUSING AND TRADE CENTER
DİLOVASI MAKİNA
TRAKYA ÜNİVERSITY, FACULTY OF THEOLOGY
KIRŞEHİR TİGEM DISTRIBUTION CENTER
ELAZIĞ PROVINCIAL DIRECTORATE OF SECURITY, SERVICE BUILDING
NOSAB BOX AMBALAJ TRANSFORMER SUBSTATION
ÇAMLIYAYLA DIRECTORATE OF SECURITY
GÜLNAR COACH STATION PROJECT
İSTİNYE UNIVERSITY
NİĞDE COURTHOUSE
ANKARA MÜHYE HOUSING PROJECT
KIRŞEHİR KAMAN TOKİ 988-HOUSING CONSTRUCTION WORK
KIRŞEHİR KAMAN STATE HOSPITAL
DİYARBAKIR TOKİ 800 HOUSING
CEYLANPINAR TİGEM
TOKİ 400 STUDENT CAPACITY MERSİN ERDEMLİ STUDENT DORMITORY
MARDİN ARTUKLU UNIVERSITYİ
ŞIRNAK CİZRE DİVAN OTEL
DİYARBAKIR ÇERMİK HELİN ANMIN THERMAL FACILITIES
3RD AIRPORT SEFİNE QUARRY
3RD AIRPORT SAFA REGION QUARRY
3RD AIRPORT, CONSTRUCTION SITE OF RUNWAY 3
HASANKEYF DAM CONSTRUCTION WORK
NUSAYBİN YOUTH PARK
ELAZIĞ KARAKOÇAN 16 CLASSROOM CAPACITY SCHOOL PROJECT
NEVŞEHİR İMAMHATİP SCHOOL
İNÖNÜ ÜNİVERSITY PRESIDENT HOUSE
KKC MARMARAY METRO PROJECT

PARTIAL WORKS AT ORGANIZED INDUSTRY ZONE (OIZ)

MALATYA ORGANIZED INDUSTRY ZONE
İKİTELLİ ORGANIZED INDUSTRY ZONE
VAN ORGANİZE SANAYİ BÖLGESİ
İZMİR KEMALPAŞA OIZ BİSAN BİSİKLET AŞ FACTORY
ANKARA ASO 2ND AND 3RD ORGANIZED INDUSTRY ZONES

DISTRIBUTION COMPANIES

OSMANGAZİ EDAŞ ESKİŞEHİR/KÜTAHYA/UŞAK/AFYON/BİLECİK MAINS
AYDEM EDAŞ AYDIN/DENİZLİ/MUĞLA MAINS
GEDİZ EDAŞ İZMİR/MANİSA MAINS
TREDAŞ LÜLEBURGAZ MAINS
VANGÖLÜ EDAŞ MUŞ MAINS
ÇORUH EDAŞ GİRESUN MAINS
DİCLE EDAŞ ŞANLIURFA/MARDİN /BATMAN/DİYARBAKIR/SİİRT/ŞIRNAK MAINS
SAKARYA EDAŞ MAINS
FIRAT EDAŞ MAINS

ASTOR®


TÜRK STANDARDLARI ENSTİTÜSÜ
TÜRK STANDARDLARINA UYGUNLUK BELGESİ
TURKISH STANDARDS INSTITUTION
CERTIFICATE OF CONFORMITY TO TURKISH STANDARDS
CERTIFICATE OF REGISTRATION


Sertifika
ISO 14001:2015
ISO 9001:2015