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CONCRETE TRANSFORMER
AND DISTRIBUTION
SUBSTATIONS

AIR INSULATED METAL
ENCLOSED MODULAR
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 Disconnecter 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 m²

Available Outdoor Area: 31.000 m²

Products:

Air Insulated Modular Cell

24-36kV 630-1250A SF6 Gas Insulated Disconnecter/Load Breaker

24-36kV 630-1250A SF6 Gas Insulated Load Breaker with Side Mechanism

Concrete Transformer Substations

Sheet Metal-Enclosed Transformer Substations

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 Disconnecter, SF6 Gas Insulated Disconnecter, 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 disconnecter and earthing disconnecter 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 Disconnecter Cells

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

Locking Mechanism in the Breaker Cells

- The Disconnecter can be **switched off** when the Earthing Disconnecter is **switched on**, the Breaker is **switched on** and the switchgear's access cover is **closed**.
- The Earthing Disconnecter can be **switched off** when the Disconnecter is **switched on**.
- The Breaker can be **switched off** when the Disconnecter is **switched on**, the Earthing Disconnecter 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 disconnecter, gas insulated disconnecter, 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 disconnecter, switch disconnecter, and earthing disconnectors
- Control lever sockets to be controlled for disconnecter, and the earthing disconnectors
- "Spring adjusted" and "Spring Free" symbols
- Switch disconnecter 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 Disconnecter 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 Disconnecter 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 Disconnecter 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.



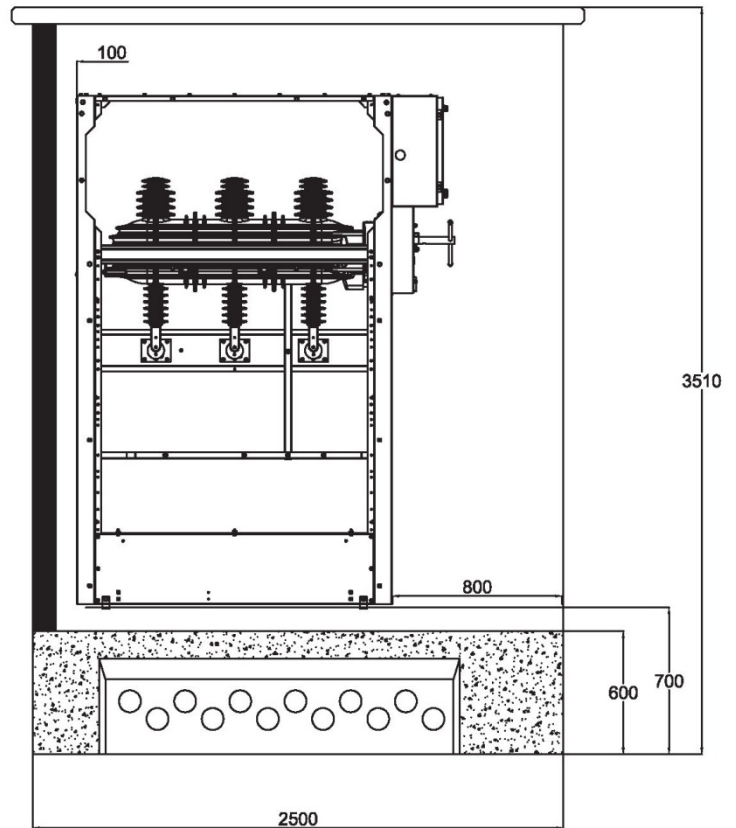
INSTALLATION

PLACING THE SWITCHGEAR

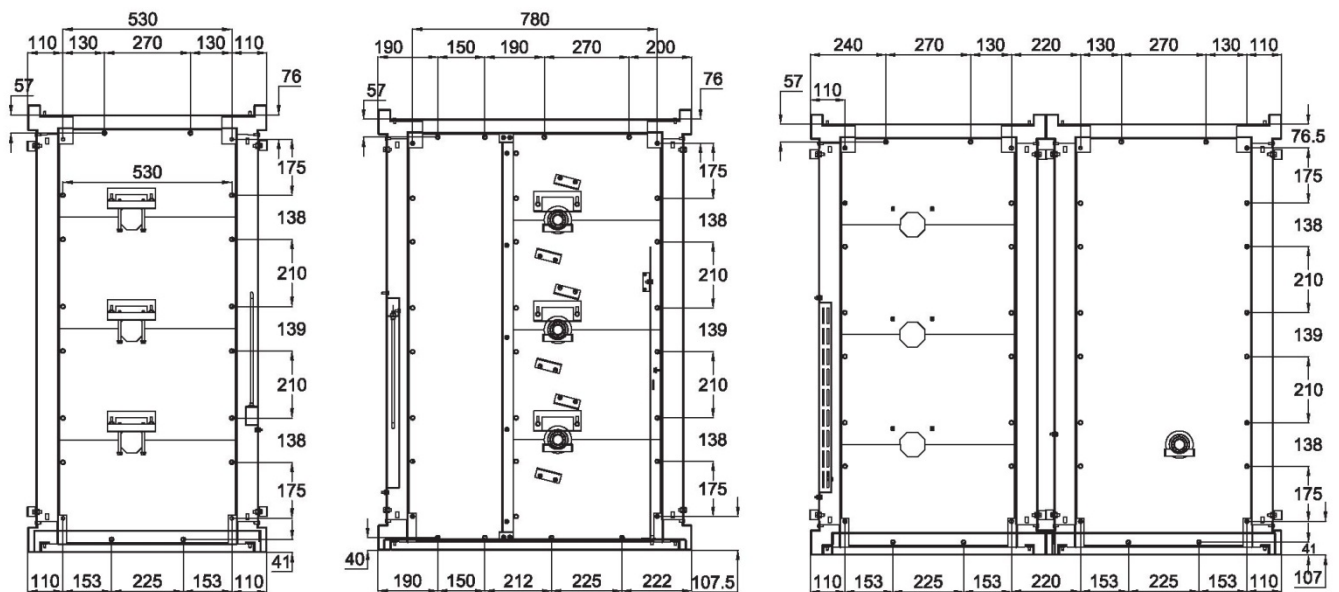
The AS36 series switchgears should be placed on a cable duct in the building, taking into account the following measurements.

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 off 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

ASTOR

AIR INSULATED METAL ENCLOSED MODULAR SWITCHGEARS

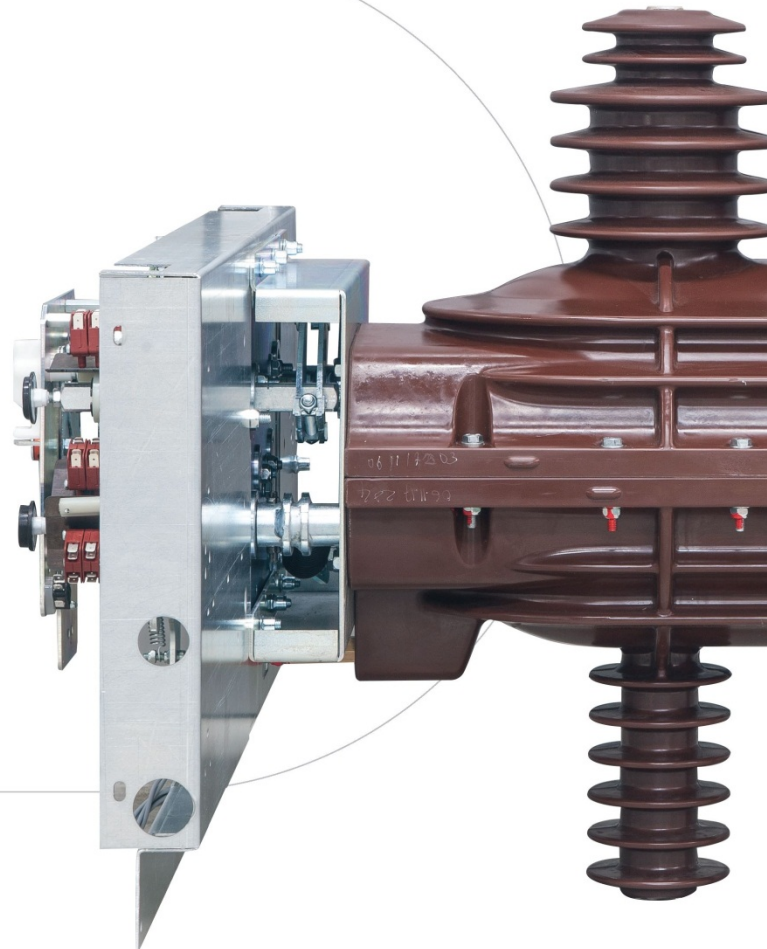
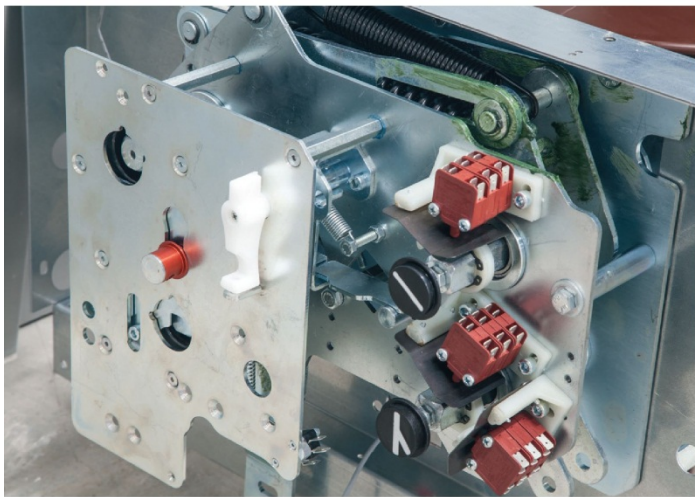
| | |
|---|---------------------------|
| TYPE | ACBS36 |
| RATED VOLTAGE (kV) | 36 |
| ISOLATION VOLTAGE (kV) | 70 (active-1 min.) |
| LIGHTNING IMPULSE WITHSTAND VOLTAGE (kV) | 170 (peak-1.2-50 μ s) |
| RATED CURRENT (A) | 630 |
| RATED FREQUENCY (Hz) | 50 |
| SHORT CIRCUIT CURRENT (kA) | 16 |
| PEAK 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 |



AS36 Series

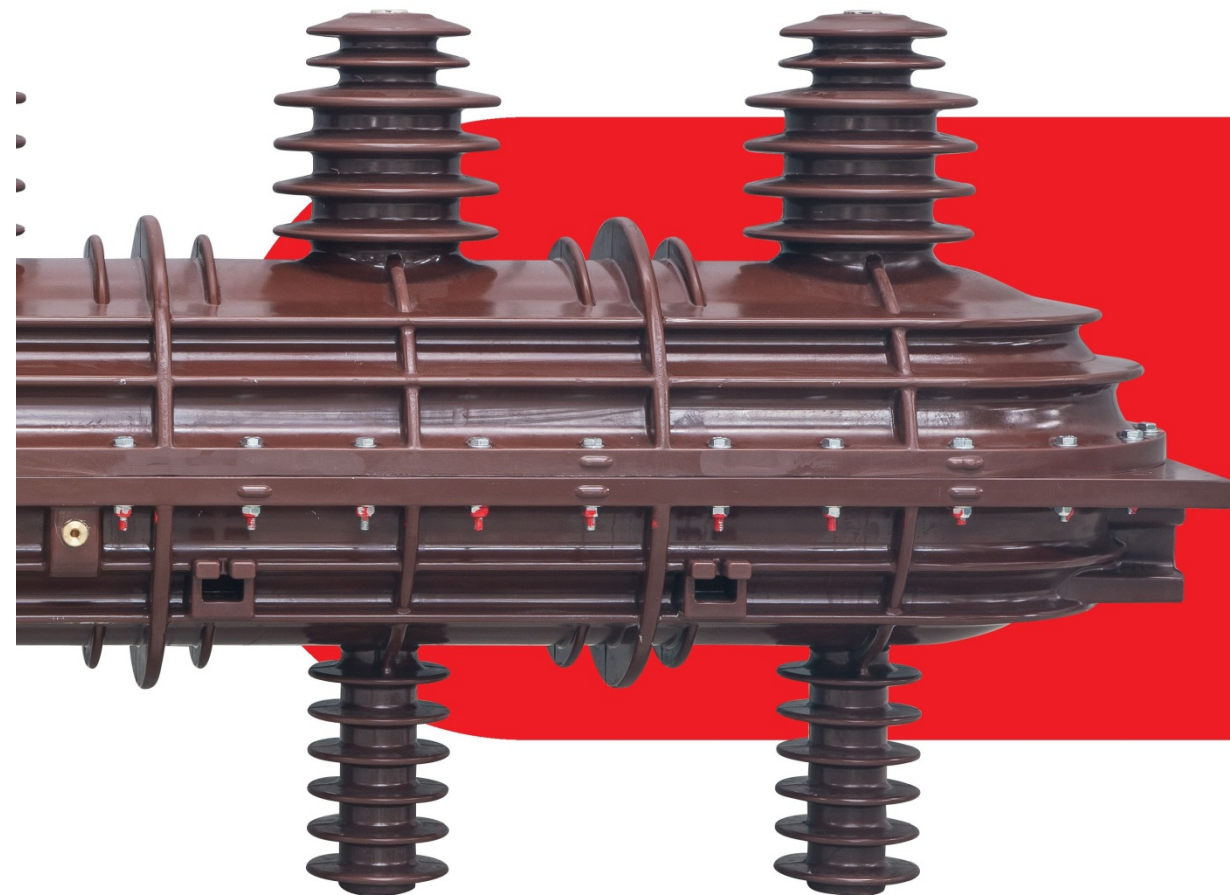
ASTOR

AIR INSULATED METAL ENCLOSED MODULAR SWITCHGEARS

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.

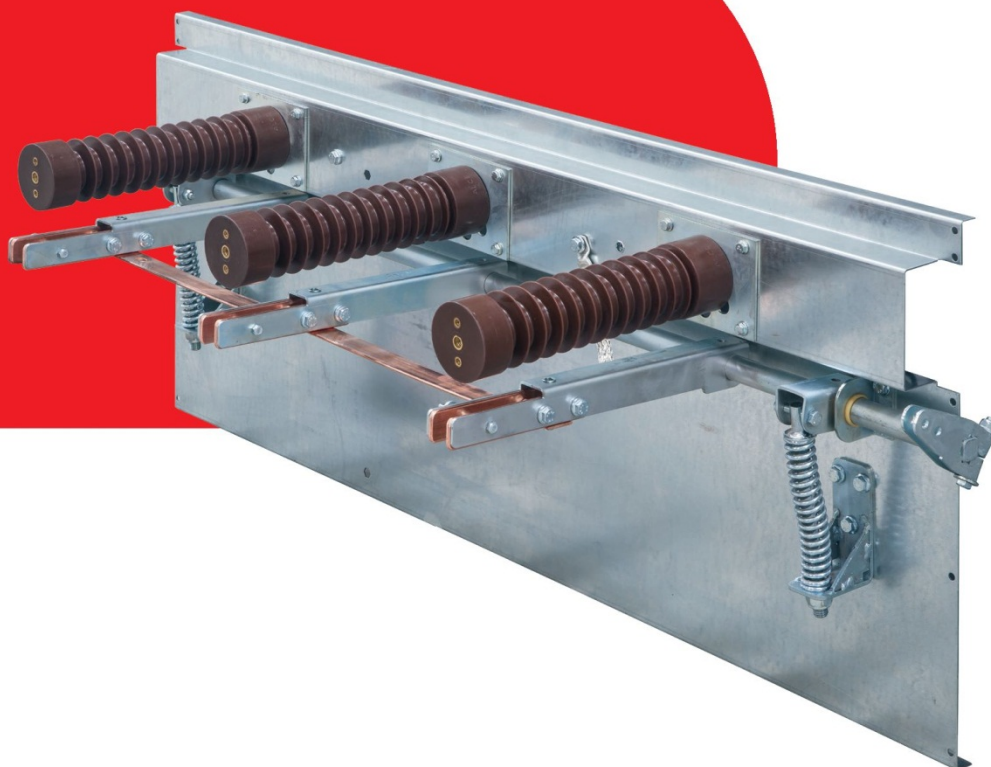
| | |
|--|---------------------------|
| TYPE | ALBS36S |
| RATED VOLTAGE (kV) | 36 |
| ISOLATION VOLTAGE (kV) | 70 (active-1 min.) |
| LIGHTNING IMPULSE WITHSTAND VOLTAGE (kV) | 170 (peak-1.2-50 μ s) |
| RATED CURRENT (A) | 630 |
| RATED FREQUENCY (Hz) | 50 |
| SHORT CIRCUIT CURRENT (kA) | 16 |
| PEAK 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.

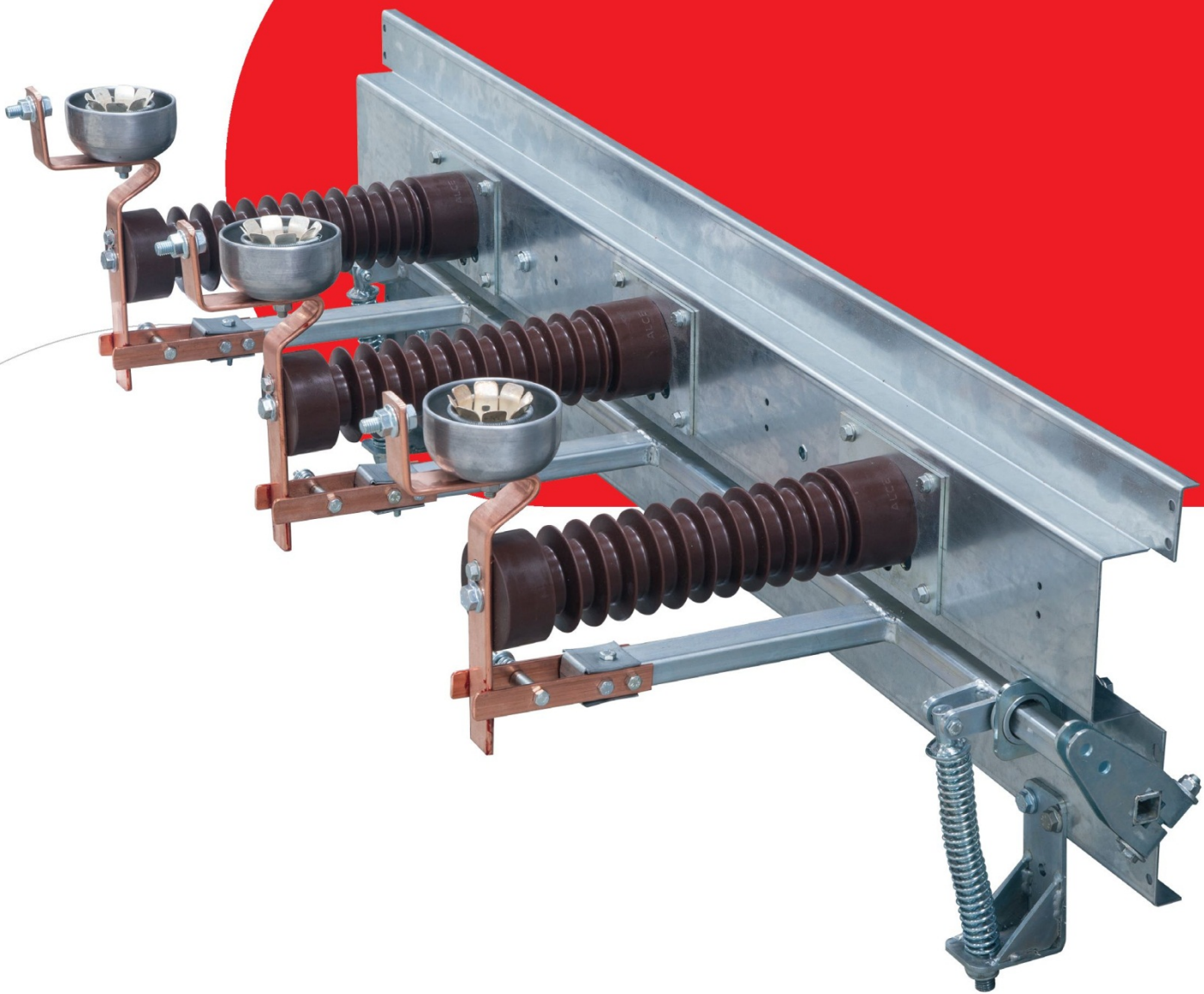
| TYPE | AES36S | AES36F |
|---|---|--|
| RATED VOLTAGE (kV) | 36 | 36 |
| RATED SHORT-DURATION WITHSTAND CURRENT (kA) | 16 | 1 |
| RATED PEAK WITHSTAND CURRENT (kA) | 40 | 2.5 |
| RATED SHORT CIRCUIT DURATION | 1 sec. | 1 sec. |
| CATEGORY | E2 | E2 |
| IMPLEMENTED STANDARD | TS EN 62271-102 | TS EN 62271-102 |
| USE AREAS DEPENDING ON THE SWITCHGEAR TYPE | <ul style="list-style-type: none"> • 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 | <ul style="list-style-type: none"> • At the lower (load) side of the MV fuse in the Transformer Protection Cell with Switch Disconnector and Fuse |



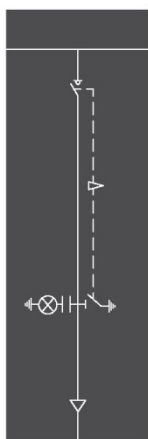
AS36 Series

AIR INSULATED METAL ENCLOSED MODULAR SWITCHGEARS

ASTOR

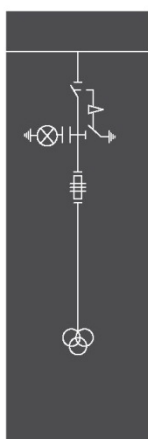
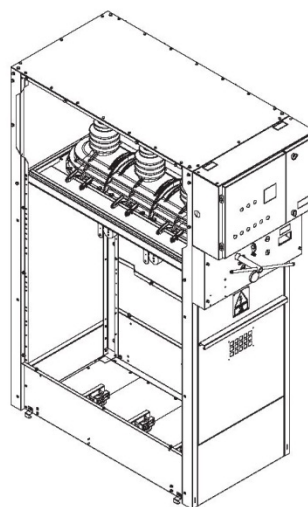


SWITCHGEAR TYPES



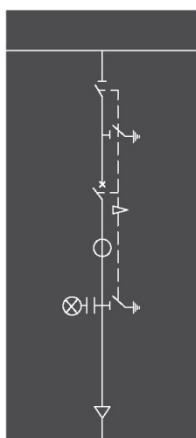
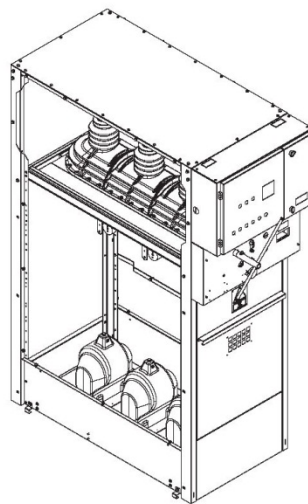
AS36 LC
INPUT OUTPUT
SWITCHGEAR WITH
SWITCH DISCONNECTOR

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



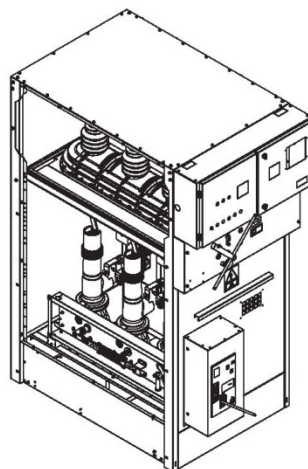
AS36 VTC
VOLTAGE TRANSFORMER
SWITCHGEAR

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



AS36 CBT
TRANSFORMER PROTECTION
SWITCHGEAR WITH BREAKER

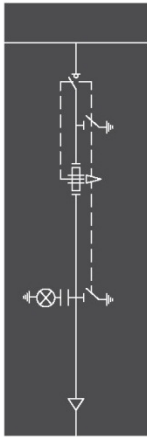
| | |
|-------------|-------|
| Un (kV) | 36 kV |
| Width (mm) | 1000 |
| Length (mm) | 1400 |
| Height (mm) | 2250 |



AS36 Series

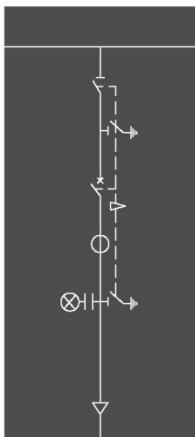
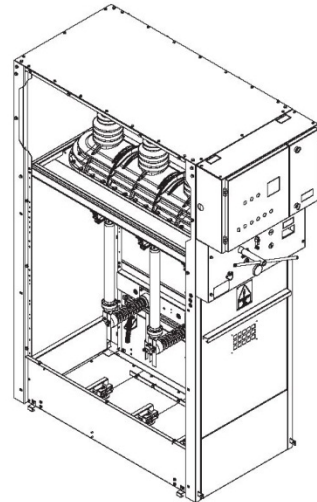
AIR INSULATED METAL ENCLOSED MODULAR SWITCHGEARS

ASTOR



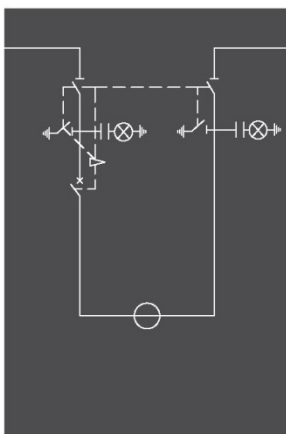
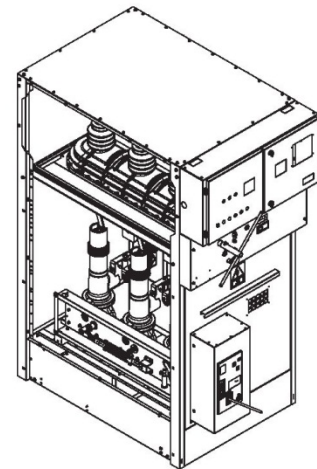
AS36 LF
 TRANSFORMER
 PROTECTION
 SWITCHGEAR WITH
 SWITCH DISCONNECT
 AND FUSE

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



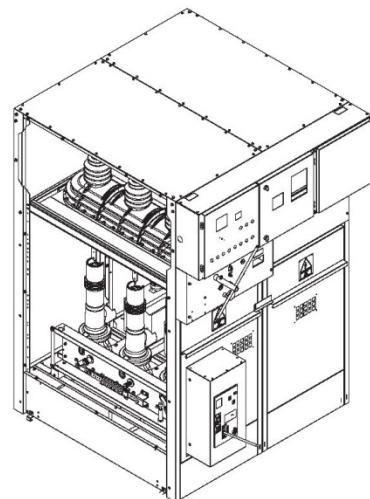
AS36 CBC
 INPUT OUTPUT
 SWITCHGEAR WITH
 BREAKER

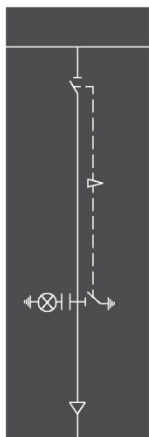
| | |
|-------------|-------|
| Un (kV) | 36 kV |
| Width (mm) | 1000 |
| Length (mm) | 1400 |
| Height (mm) | 2250 |



AS36 CBC-C2
 COUPLING
 SWITCHGEAR WITH
 BREAKER (WITH
 DOUBLE BREAKER)

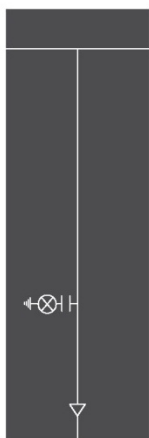
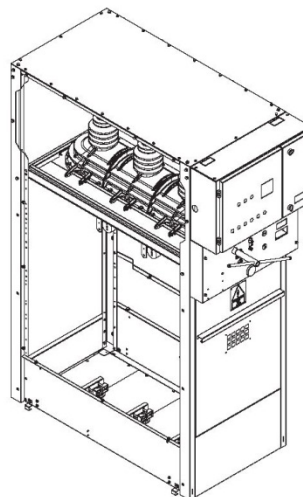
| | |
|-------------|-------|
| Un (kV) | 36 kV |
| Width (mm) | 1500 |
| Length (mm) | 1400 |
| Height (mm) | 2250 |





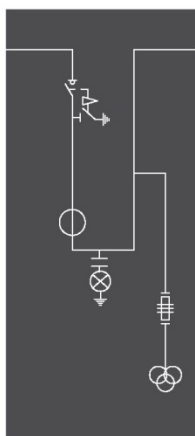
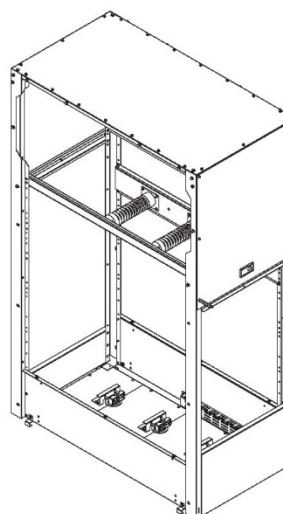
AS36 LC-G
GAS INSULATED INPUT
OUTPUT SWITCHGEAR

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



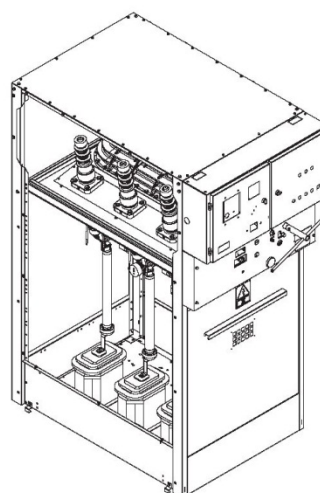
AS36 KB
CABLE
CONNECTION
SWITCHGEAR

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



AS36 LCV
CURRENT VOLTAGE
MEASUREMENT
SWITCHGEAR WITH
SWITCH DISCONNECTOR

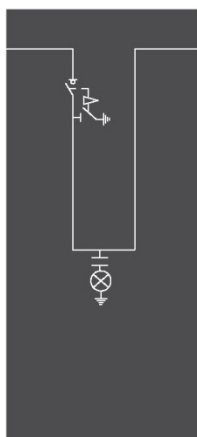
| | |
|-------------|-------|
| Un (kV) | 36 kV |
| Width (mm) | 1000 |
| Length (mm) | 1400 |
| Height (mm) | 2250 |



AS36 Series

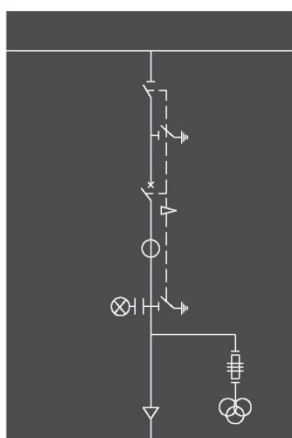
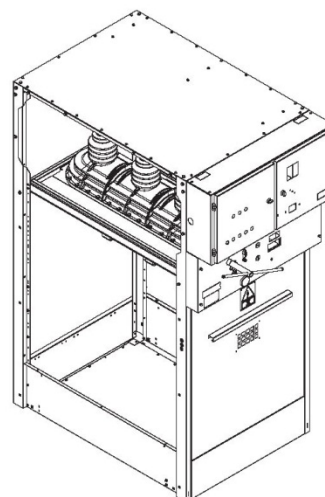
ASTOR

AIR INSULATED METAL ENCLOSED MODULAR SWITCHGEARS



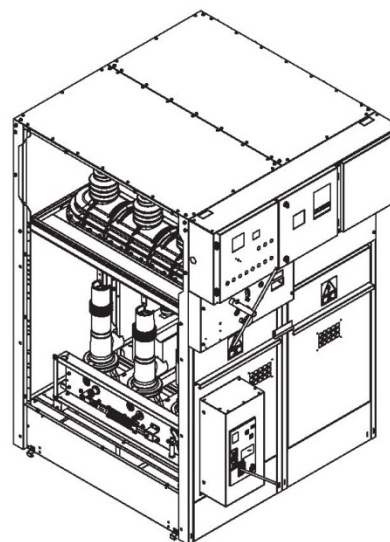
AS36 LC-Y BUSBAR DISCONNECTION SWITCHGEAR WITH SWITCH

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



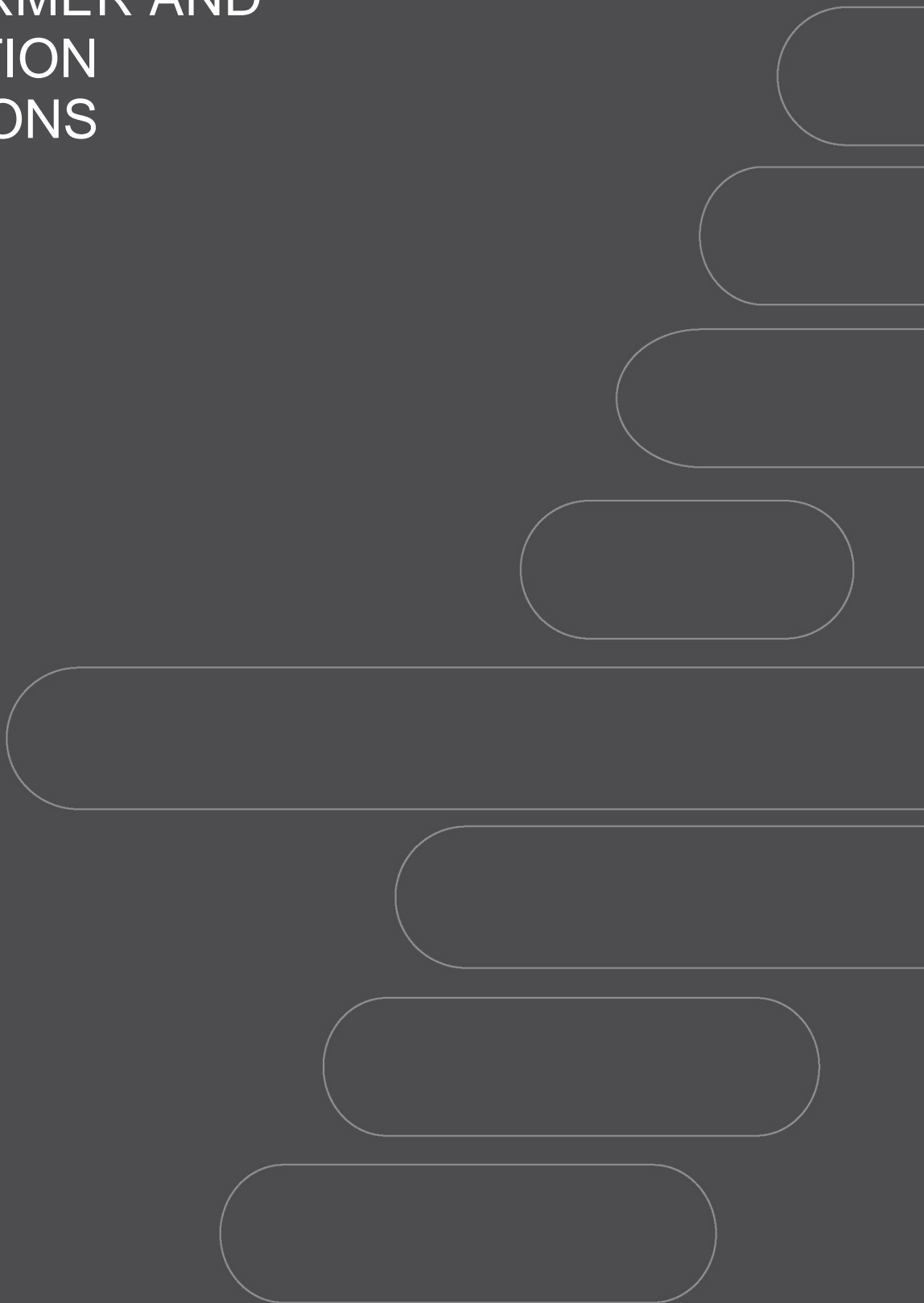
AS36 CBC-OTOP INPUT OUTPUT SWITCHGEAR WITH VOLTAGE TRANSFORMER

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



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 mm² 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/m².
- 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.

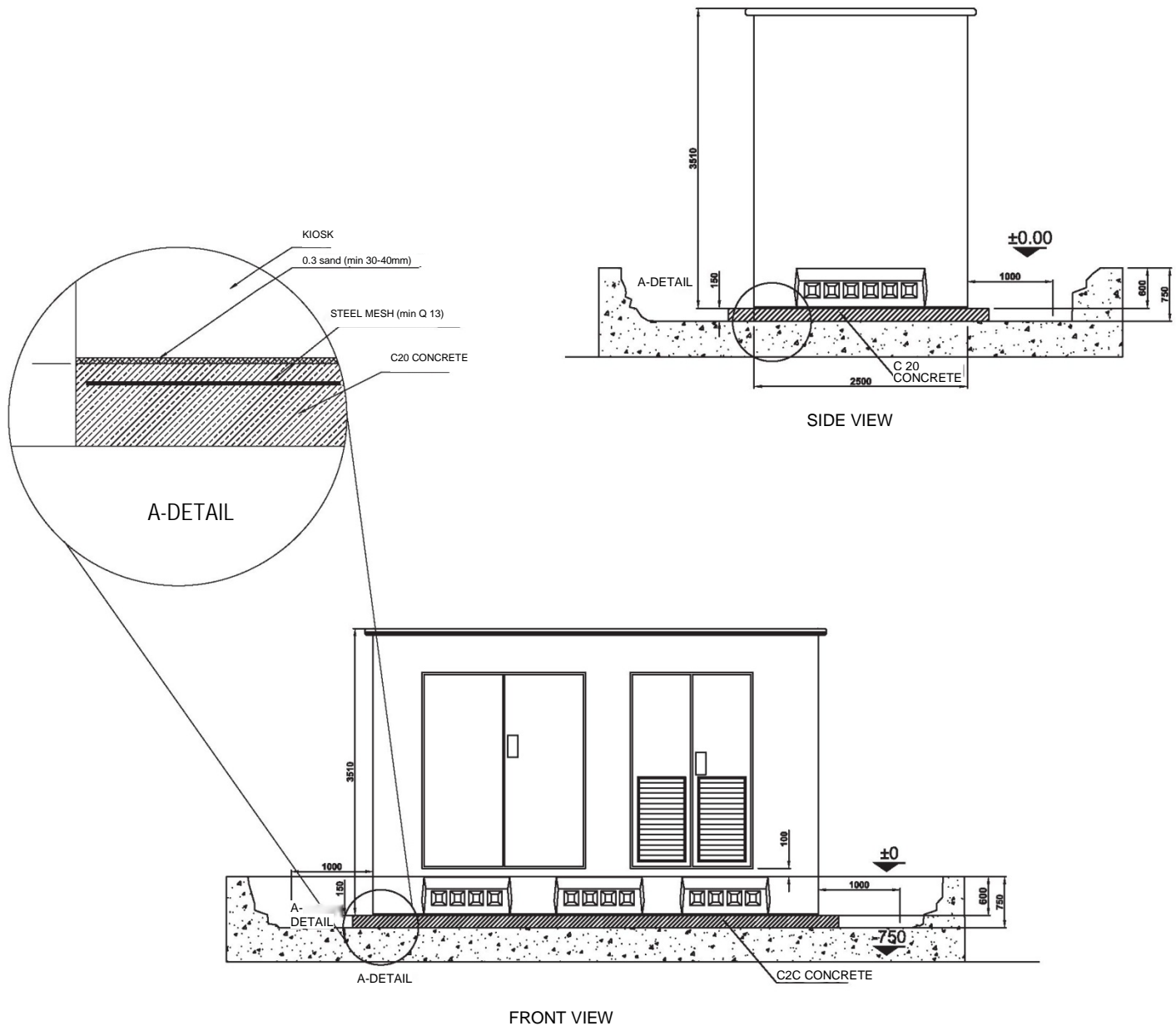


TECHNICAL SPECIFICATIONS

| | |
|----------------------------------|-------------------|
| 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 |



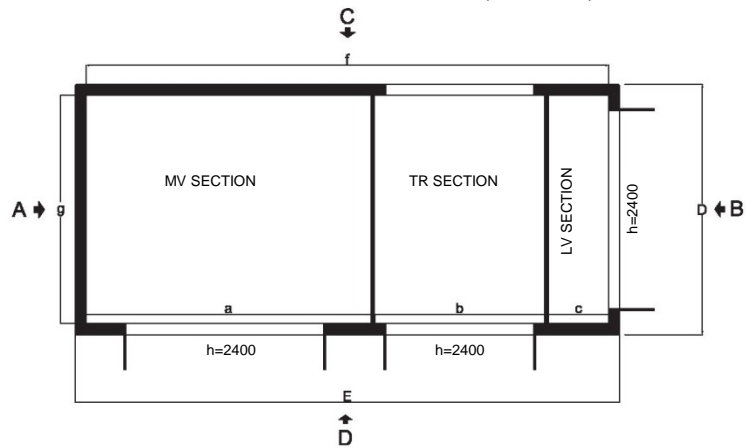
FOUNDATION CONCRETE, PREPARATION, AND ASSEMBLY



- 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.

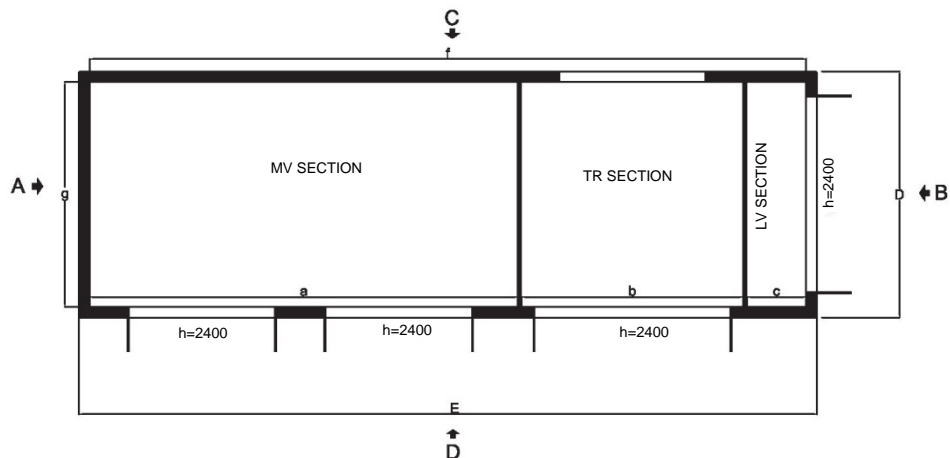
TYPES AND DIMENSIONS

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 |

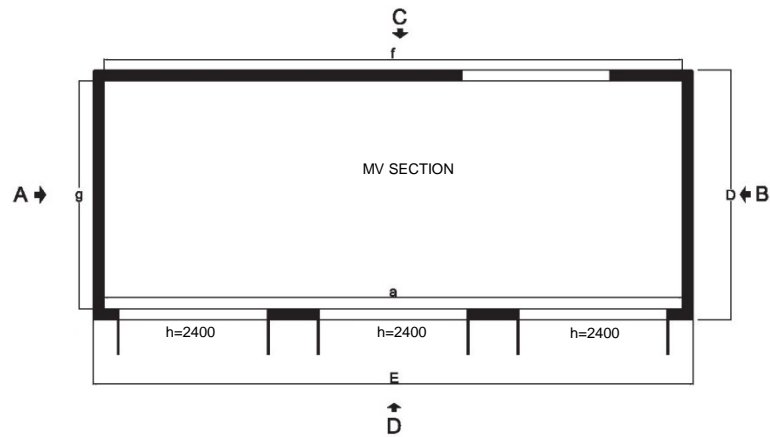
ABK-B COMPACT TRANSFORMER SUBSTATIONS WITH AIR INSULATED SWITCHGEARS (1600 kVA)



| 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 |

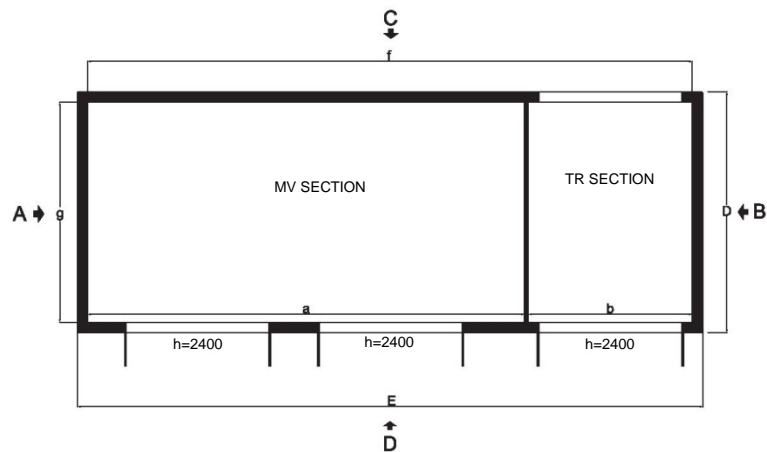
- Lowercase letters show inner measurements and the uppercase letters outer measurements.
- All measurements are shown in mm.

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 |

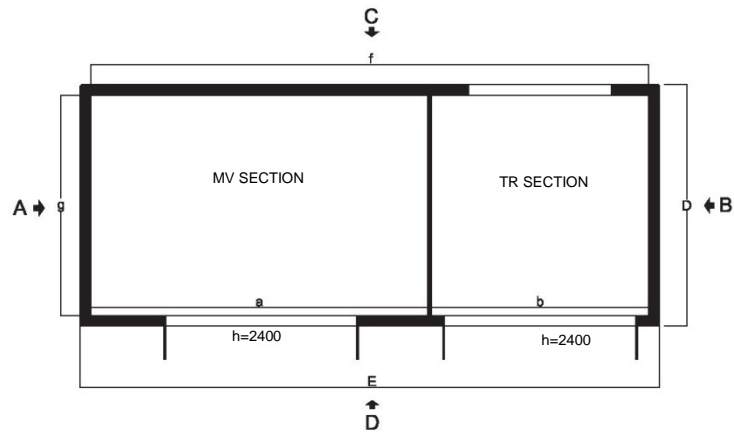
ABC-C COMPACT TRANSFORMER SUBSTATIONS WITH AIR INSULATED SWITCHGEARS WITHOUT LV PANEL (1000 kVA)



| 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 |

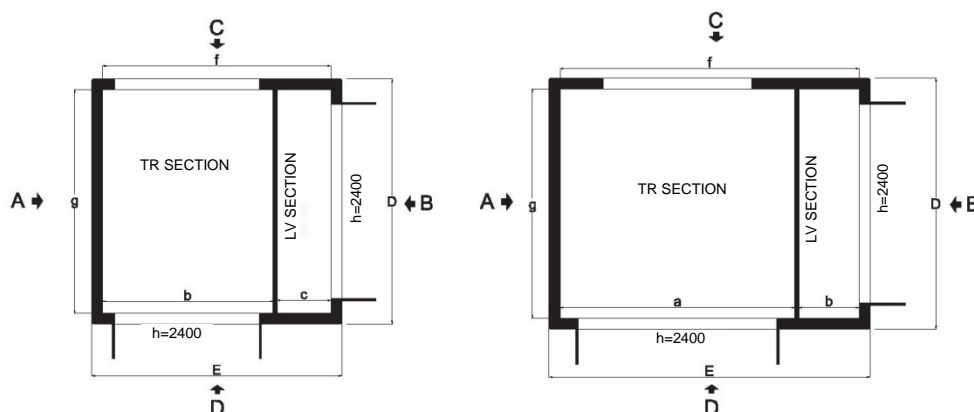
- Lowercase letters show inner measurements and the uppercase letters outer measurements.
- All measurements are shown in mm.

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 |

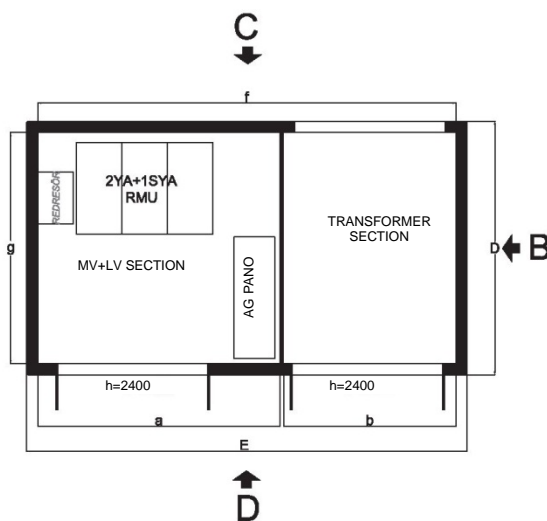
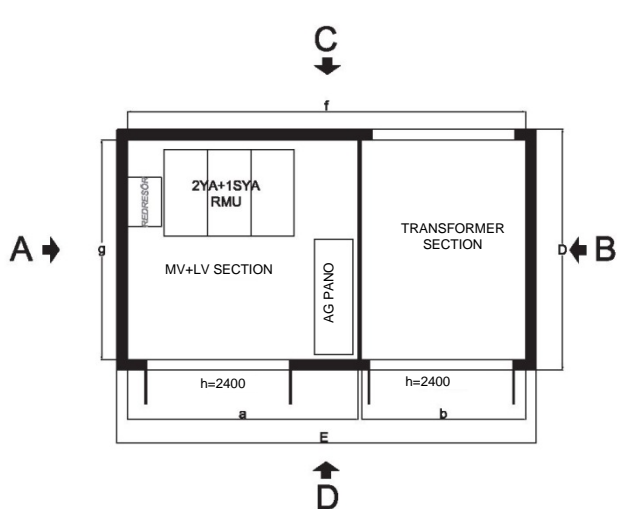
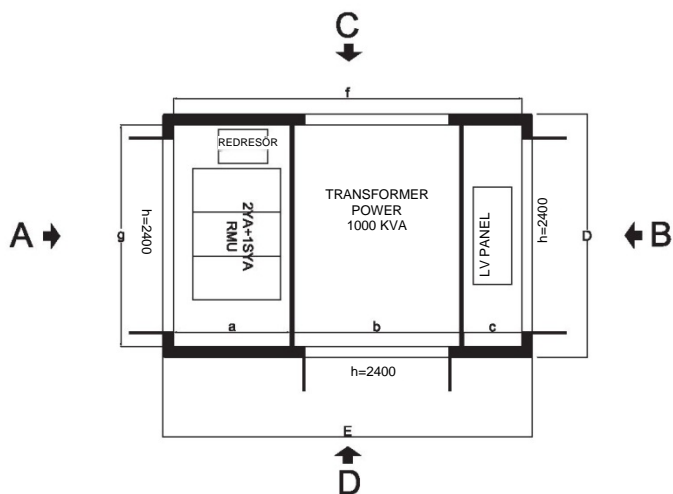
ABK-T LV PANEL AND DISTRIBUTION TRANSFORMER SUBSTATIONS



| 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.
 • Lowercase letters show inner measurements and the uppercase letters outer measurements.
 • 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 OVAŞAN 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 ÜNİVERSİTESİ, FACULTY OF THEOLOGY
KIRŞEHİR TİGEM DISTRIBUTION CENTER
ELAZIĞ PROVİNCIAL 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 UNIVERSITY
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 ÜNİVERSİTESİ PRESİDENT 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



