

HORIZON

Medium Voltage,
Air Insulated,
Metal-Clad Switchgear
up to 36kV

With Vacuum
Circuit Breaker



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Electrical Switchgear



Features

- ▶ Type tested according to IEC62271-200 standard
- ▶ Metal-clad and withdrawable design
- ▶ Equipped with Vacuum Circuit Breaker
- ▶ Modular system design allows unit configuration adapted to requirements
- ▶ Rapid exchange of trucks through integrated transport chassis
- ▶ Having rigid and reliable interlocking system
- ▶ Minimized footprint – Minimum unit width is 600mm
- ▶ Enclosures made of Aluzinc and highly resistance against corrosion
- ▶ Busbar located at top of each unit
- ▶ Protection against electric shock hazard by metal enclosure and metal cladding
- ▶ Minimum use of solid insulation material in the unit
- ▶ Units can be installed in a single row or face to face arrangements
- ▶ Remote monitoring and control is possible
- ▶ Long service periods without maintenance
- ▶ Parts subject to wear may be replaced without using special tools

General applications

Horizon system has been designed to give an optimal solution to satisfy the requirements for MV electrical networks in:

- ▶ Utilities and electricity transmission network
- ▶ Oil & Gas
- ▶ Transport
- ▶ Infrastructure
- ▶ Industry



Advantageous

► Wide range of ratings;

- o Rated voltage up to and including 36kV
- o Rated current up to and including 4000A
- o Rated short circuit withstand current up to and including 50kA
- o Rated peak withstand current up to and including 125kA

► Small footprint and highly reliable;

- o Minimum 600mm width available
- o Highly resistive in harsh environmental condition due to Aluzinc enclosure
- o Equipped with highly reliable vacuum circuit breaker

► Personal safety;

- o Internal arc tested
- o All operations carried out with door closed
- o Equipped with fast making earthing switch
- o Over pressure relief flaps located on the top of each feeder
- o Using comprehensive and robust interlocking system
- o Availability of clear position indications as well as mimic on all units
- o Cable voltage indication facilities available in front
- o Clear labeling
- o Metallic enclosure and shutters minimizing the risk of electrical shocks

► Easy installation and access;

- o Easy access to compartments
- o Having rigid and self-supporting construction
- o In line of face to face installation possible

► Easy operation and maintenance;

- o Clear status indicators for all units available
- o Mimic available on each unit
- o Operation required torques are minimized by design
- o No special tools are needed for maintenance
- o Electrical operations are possible as options



Technical description

Horizon is a metal-clad, air insulated, withdrawable and modular solution designed for near all requirements in MV electrical networks in different applications.

The solution is an optimized solution which was designed in accordance with latest version of international IEC62271-200 standard as well as today customers' main technical requirements.

Horizon is extensible on both sides and consists of modular functional units, linked by a busbar, and connected to the substation earth via an earthing bus.

The switchgear unit construction

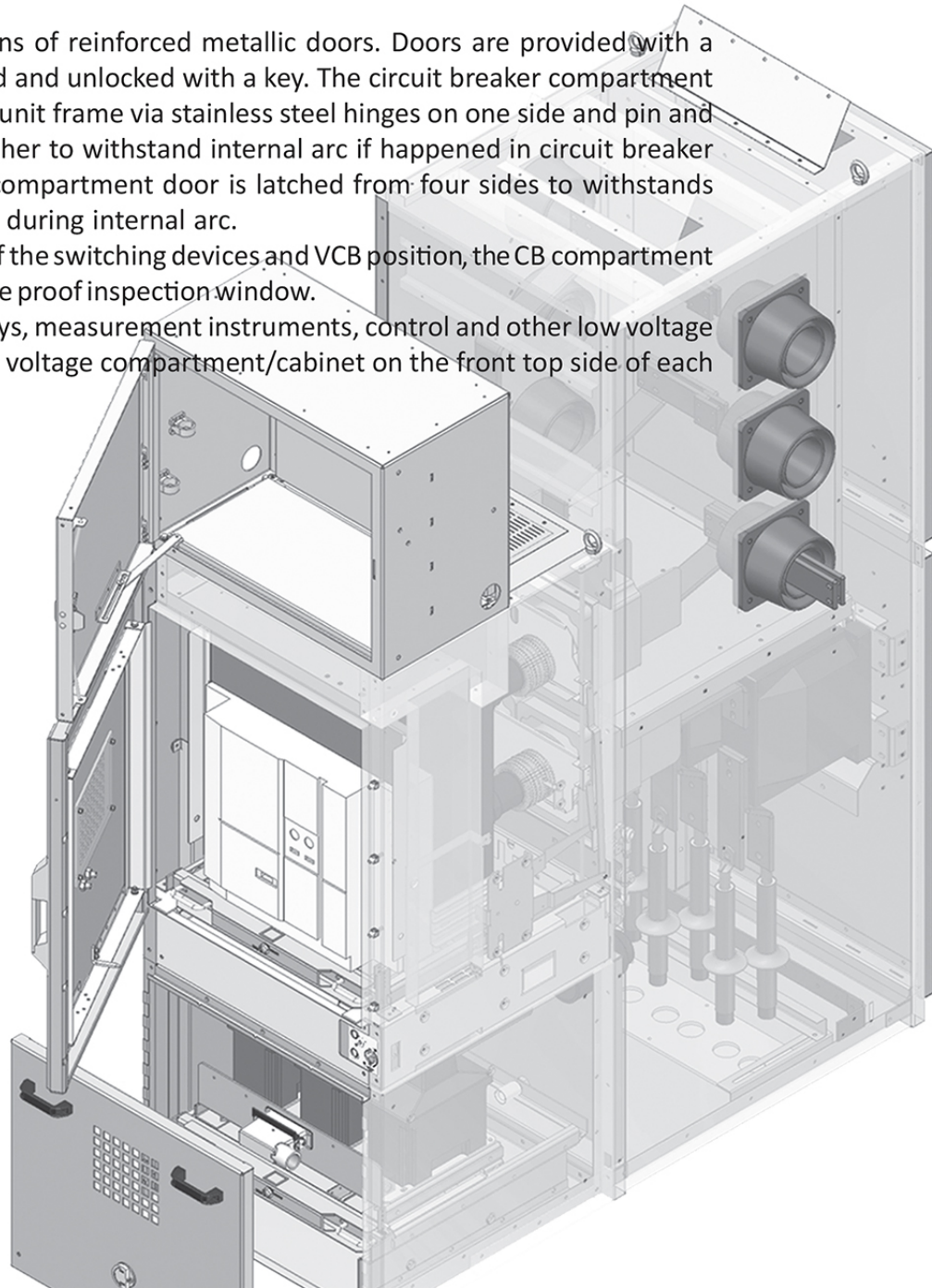
The frame and supporting parts are designed as a compound construction of bolted and riveted standardized Aluzinc sheet steel profile sections make the enclosure a robust assembled structure and highly resistance against even harsh environmental conditions.

As a metal-clad, each unit is subdivided by metallic partitions into four separate compartments, including circuit breaker, cable, busbar and low voltage compartments. As an option and depending on market requirements, each unit can be supplied with up to six compartments having VTs and CTs also separated with cable connection in their own compartments. Cable compartment is located in the rear down side of each unit.

The unit is closed by means of reinforced metallic doors. Doors are provided with a central lock which is locked and unlocked with a key. The circuit breaker compartment door are coupled with the unit frame via stainless steel hinges on one side and pin and hole mechanism on the other to withstand internal arc if happened in circuit breaker compartment. The cable compartment door is latched from four sides to withstands over pressure might occur during internal arc.

To allow safe observation of the switching devices and VCB position, the CB compartment door is fitted with a pressure proof inspection window.

All required protective relays, measurement instruments, control and other low voltage units will be located in low voltage compartment/cabinet on the front top side of each unit.



Circuit breaker compartment:

Located in front and middle of each unit and closed off by a door, this compartment contains a withdrawable module, fitted with a vacuum circuit breaker or voltage transformers and can be located in three positions known as "SERVICE", "TEST" and "WITHDRAWN". The module is moved easily and fast from service to test position and vice versa, using spindle and crank.

Horizon is designed so all operations of circuit breaker can be carried out with the compartment door closed to increase operators' safety.

The connection between the vacuum circuit breaker and busbar and the cable branches is made by means of withdrawable tulip shaped contacts.

In circuit breaker compartment, metallic shutters are installed which automatically open and close the access to busbar and cable compartments while racking In / Out the circuit breaker. Moving out each unit circuit breaker toward "TEST" or "WITHDRAWN" positions, metallic shutters closed automatically to cover fixed plug-in main contacts either on busbar and cable sides to prevent access to the primary circuit. By this action, access to live parts is avoided thus ensuring a protection against electrical shocks. Once the Withdrawable module has been removed, each shutter can be padlocked individually. All withdrawable modules of the identical types are interchangeable within different feeders.

An earthing system for the removable module ensures earthing continuity during removal via removable metallic wheels.

An inspection window on the door, allows the



position of the vacuum circuit breaker to be clearly seen within the compartment. Besides, the position is also shown on the mimic diagram as well as optionally on the protection relay in case of customer request.

In measuring units, voltage transformers are mounted on a movable platform, which may be positioned in to the service position or disconnected position (test position) when the unit door is closed. Again in disconnected position metallic shutter will close the access to live parts.

Vacuum circuit breaker or voltage transformers' module will be pulled out after the door has been opened and the 64 pin connection plug to become un-plugged.

IEC defined and required mechanical interlocks are considered so the truck can only be removed from the "SERVICE" position only when the CB is open. Mechanical interlock between earthing switch and truck is available as well.

Circuit breaker auxiliary connection will be connected to the low voltage compartment via a flexible tube and connected to the CB via a disconnectable 64 pin plug. A mechanical interlock, will prohibit the operator to move the CB in service position while the plug is disconnected.

Circuit breaker spring can be charge electrically by a motor or manually using a removable handle. The circuit breaker drive may be tensioned with a manual crank in the disconnected. Breakers can also be closed or opened while the door is closed both mechanically via rod inserted from related holes considered on CB compartment door and electrically via available push button on each unit LV compartment.



Cable compartment

This compartment contains:

- ▶ The copper terminals for connection of power cables.
- ▶ The cable earthing switch which is operated from the front of the cubicle by means of a removable lever
- ▶ Current transformers
- ▶ The voltage transformers
- ▶ Capacitive voltage insulators to be connected to cable voltage indicators
- ▶ Surge arresters

Cable compartment is located in the rear bottom side of each unit consisting of earthing switch, current and voltage transformer and cable connection terminals. Number of cable connection terminals for each feeder will be defined considering cable cross sections and feeder current rating.

This compartment is accessible from the rear side of the unit

Circuit breaker will be connected to cable compartment fixed terminals that are located inside the individual spouts. The access to the fixed contact in the spout is closed by the removable metallic shutters when circuit breaker is in test or removed position. Shutter will be removed automatically while circuit breaker is interested into the service position. Insulators with capacitive divider are installed inside the cable compartment connected to cable connection terminals so the availability of cable voltage can be checked via capacitive voltage indicators, located on the LV compartment door.

Earthing switch is fast make type and designed to operate using minimized torque using a removable handle. The handle connection to shaft is covered by a key cover.

Busbar compartment

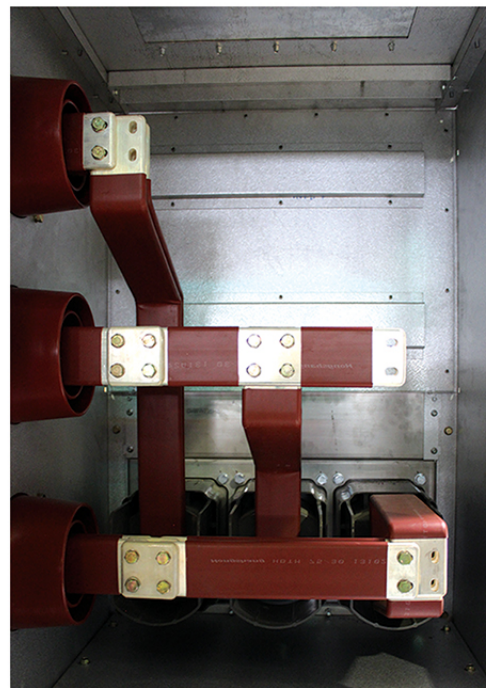
Located in upper and rear of the unit, this compartment is accessible via the top or rear side of units.

The bus bar consists of flat copper with rounded edges. The rated current will determine the number of bars to be mounted in parallel.

Horizon busbar compartments of adjacent feeders are also separated by busbar segregation and the busbar pass each feeder metallic partition via cast resin wall bushings. Busbar segregation minimizes the damage of any fault in the total switchgear by acting as a barrier and not letting hot gases and pressure to enter into other feeders.

The busbar will be connected to the circuit breaker contact via busbar connections branches that are connected to the male contacts fixed in the individual spouts. The access to the fixed contact in the spout is covered by the removable metallic shutters when the moving module is in test or removed position. Shutter will be removed automatically while circuit breaker is interested into the service position. Padlock is available as an option to lock the shutter in the closed position when the CB is removed.

As default, busbars are bared but may be silver plated or covered with heat shrinkable insulation material, considering the ratings, environmental conditions or customer request.



Low voltage compartment

This compartment contains all the secondary circuit functions for control, measurement, protection, monitoring, communication and other associated systems.

This independent compartment is a separate assembly, supplied fully assembled and tested.



Standards

Horizon metal-clad switchgear has been designed in accordance with the latest revision of IEC62271-200 standard and validated by type tests in independent laboratories.

Reference	Description
IEC62271-1	Common standard for HV equipment
IEC62271-200	Metal enclosed switchgear and control gear, from 1kV to 52kV
IEC62271-100	HV AC circuit breakers
IEC62271-101	AC disconnectors and earthing switch

Operation conditions

Standard operation conditions for indoor installation

Ambient temperature; ¹	+40°C (Max) -5°C (Min) +35°C (average over a 24-hour period)
Humidity;	95% (average over a 24-hour period)
Altitude; ²	Up to 1000 meters above sea level

- 1- For higher temperature , derating may be applied
- 2- For higher altitudes, derating will be applied. Please contact us.

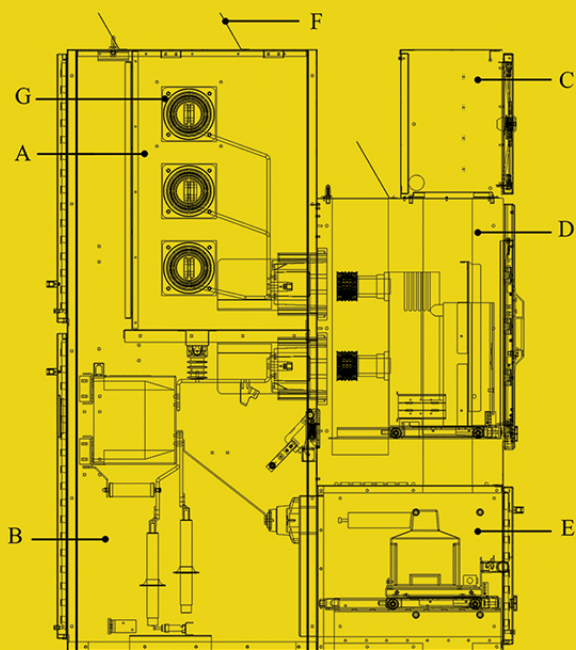
Interlocks

Actions	Interlocks
Moving the CB into "SERVICE" position	<ul style="list-style-type: none"> • LV socket connected • CB in open position • ES in open position
Moving the CB into "TEST" position	<ul style="list-style-type: none"> • CB in open position
Closing the circuit breaker	<ul style="list-style-type: none"> • CB completely plugged-in or in test position • Control connection plug connected (for electrical operation)
Closing the earthing switch	<ul style="list-style-type: none"> • CB in test or removed positions
Unplug the CB control connection plug	<ul style="list-style-type: none"> • CB in test position

Technical data

Reference		Horizon				
		7	12	17	24	36
Rated voltage	kV	7.2	12	17.5	24	36
Rated power frequency withstand voltage	kV	20	28	38	50	70
Rated impulse withstand voltage	kV	60	75	95	125	170
Rated frequency	Hz	50 / 60				
Rated short time withstand current	Up to kA	50	50	50	40	40
Rated peak withstand current	Up to kA	125	125	125	100	100
Rated current - Busbar	Up to - A	4000	4000	4000	3150	3150
Rated current - Circuit breaker feeder	Up to - A	4000	4000	4000	3150	3150
Width	mm	600 / 750 / 1000			800/ 1000	1200
Depth	mm	1780			2100	3076
Height	mm	2350			2500	2200

Typical Feeder



Up to 24 kV

A : Busbar compartment

B : Comartment of :

Earthing Switch

Current Transformer

Surge Arrester

Cable

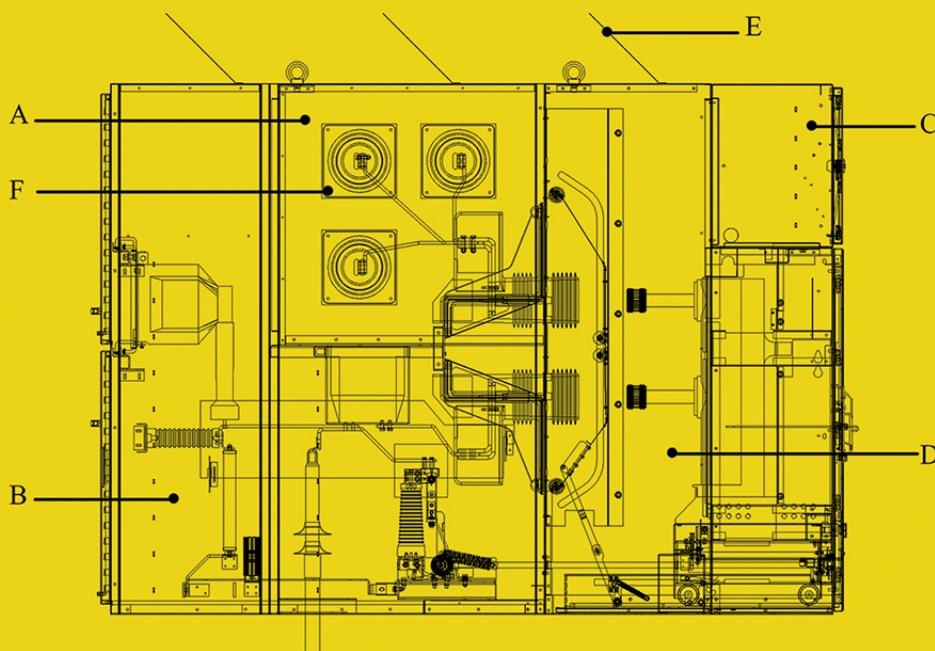
C : Low Voltage compartment

D : Circuit Breaker compartment

E : Withdrawable VT with fuse compartment

F : Pressure relief flap

G : Busbar Wall through bushing



36 kV

A : Busbar compartment

B : Compartment of :

Earthing Switch

Current Transformer

Fixed VT with fuse

Surge Arrester

Cable

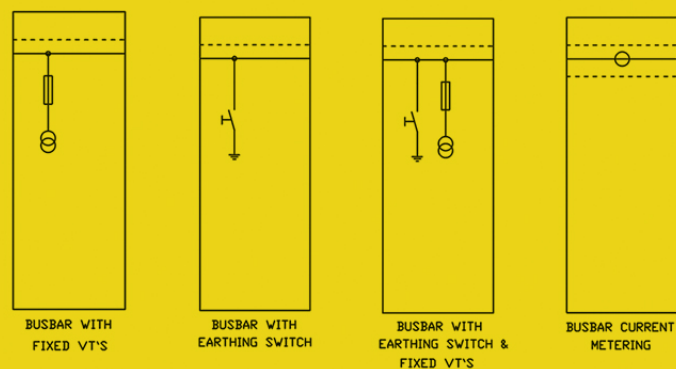
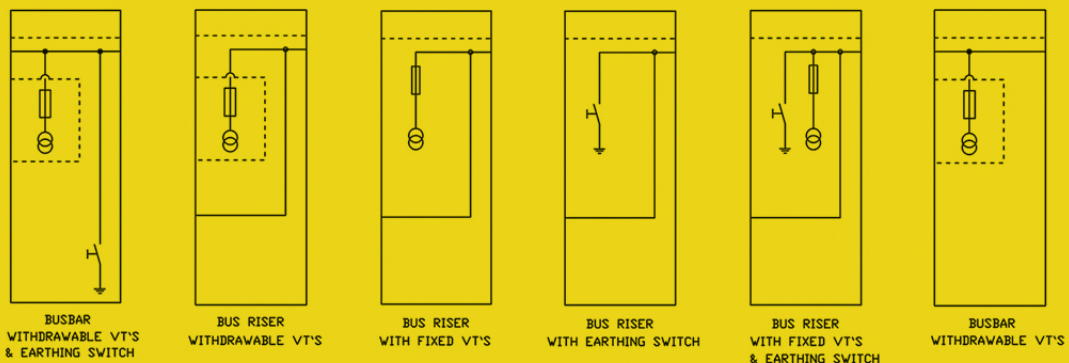
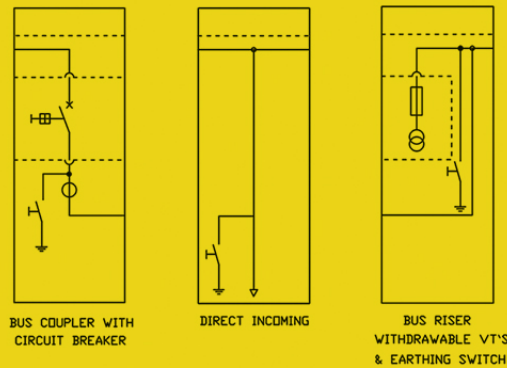
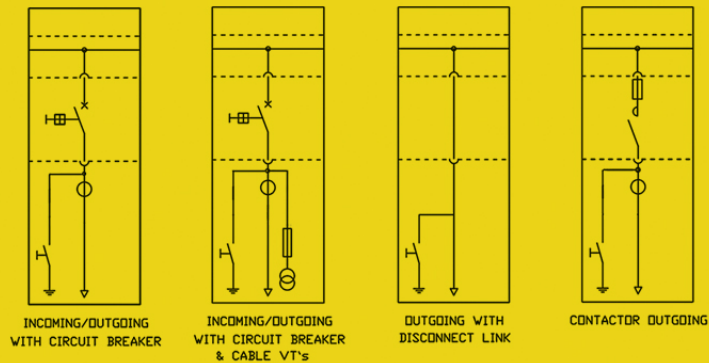
C : Low Voltage compartment

D : Circuit Breaker compartment

E : Pressure relief flap

F : Busbar Wall through bushing

Product Range





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