ormazabal
velatia

Smart and digital grids

Green mobility

Sustainable buildings and infrastructure

Green generation and storage

ROUTE TO ZERO

PRIMARY DISTRIBUTION

sbp.zero24

F-gas-free insulated switchgear (GIS)

Up to 24 kV

IEC Standards

ormazabal.com

The quality of the products designed, manufactured and installed by Ormazabal is backed by the implementation and certification of a quality management system, based on international Standard ISO 9001.

Our commitment to the environment is reaffirmed with the implementation and certification of an environmental management system as laid down in international standard ISO 14001.

In view of the constant evolution in standards and design, the characteristics of the elements contained in this catalogue are subject to change without prior notice.

These characteristics, as well as the availability of components, are subject to confirmation by Ormazabal.

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1. Introduction

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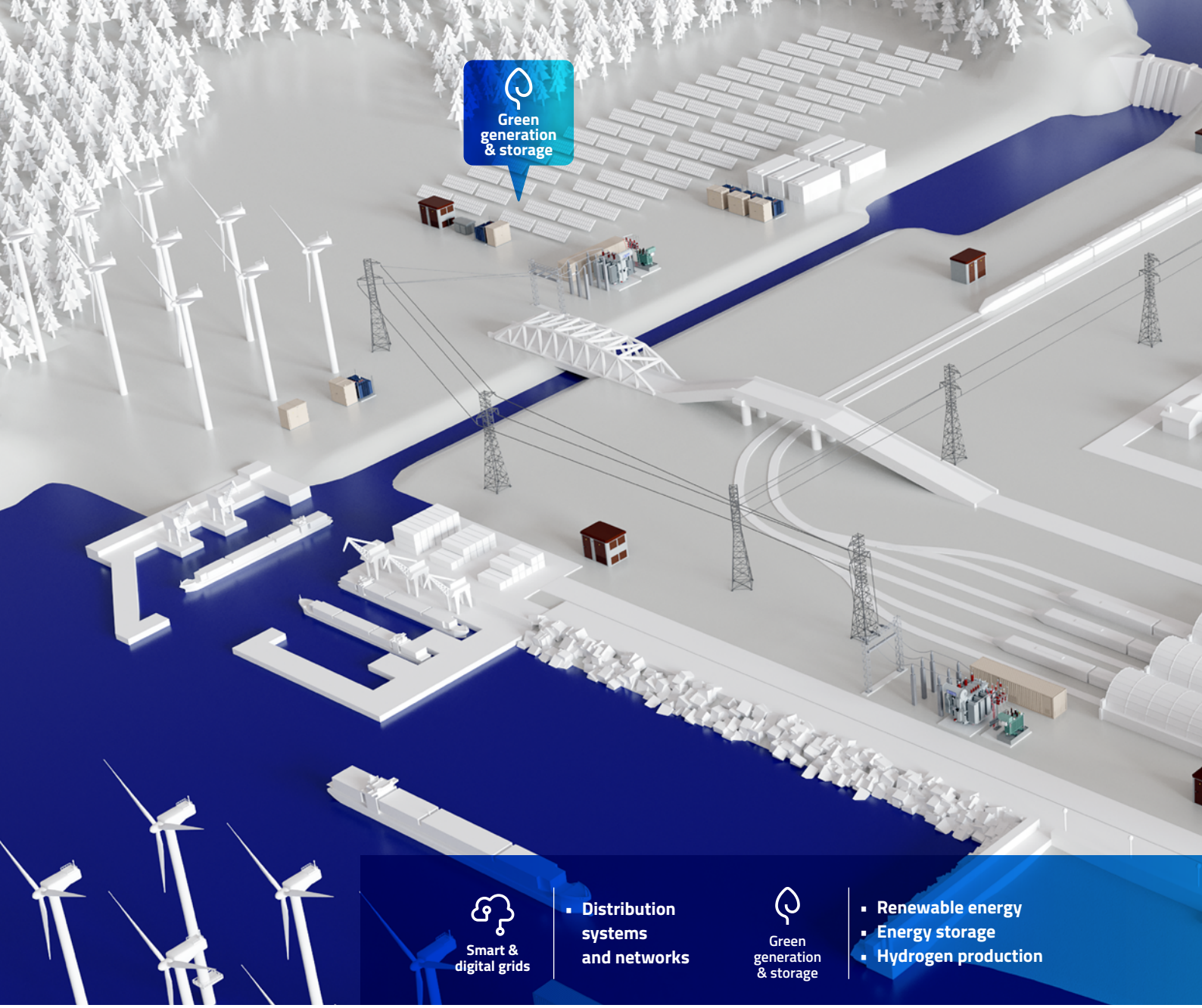
Ormazabal

We are **experts in customized, high-tech electrical solutions, with more than 55 years´ experience**.

Our solutions are focused on **digitalizing the electrical grid** in order to integrate more renewable energy generation, enable greater sustainable mobility and guarantee efficient supply for buildings and infrastructures with critical energy needs.

Thanks to our permanent commitment to technological and industrial innovation, we have positioned our technology worldwide to become a global player. Our 16 industrial plants and a network of subsidiaries and distributors all over the world help us serve **our customers' needs in over 50 countries**.

We have a unique research and technology center and a team of **more than 2,600 highly qualified professionals**, all with a common purpose: to lead the technological evolution of electrical grids enabling the energy transition.



Benefits of our solutions

Digitalisation

We respond to new requirements in smart grids with digital native solutions. Our intelligent electronic devices enable optimal network management, guaranteeing:

- Enhanced safety
- Continuity of service
- High efficiency

Efficiency

We design flexible, compact equipment for easy handling, installation and replacement, minimising the impact on the environment.

Safety and reliability

We care about the safety of all people coming into contact with our solutions.

All our equipment is in accordance with the most relevant international standards, ensuring its operation and safety throughout its service life, while maintaining continuity of supply for the electrical grid.

Sustainability

Sustainability is a central pillar in our business strategy. We contribute to the decarbonisation of the planet by developing solutions that enhance electrical grid efficiency, always considering ESG (Environmental, Social, and Governance) aspects.

That's why:

- We optimise energy consumption for both our equipment and the entire manufacturing processes.
- We apply eco-design criteria in our entire product portfolio.
- We rationalise the use of raw materials, selecting those that can best be recycled, while continuously decreasing the most harmful ones.
- We certify the sealtight integrity of our products, reducing the risk of leakage to the environment.

2. F- gas-free insulated (GIS) technology

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Proven experience

+30 years

Since the beginnings of GIS technology (Gas Insulated Switchgear), Ormazabal has been a key player as a manufacturer of distribution switchgears for the electrical grid.

Our strong determination to innovate and develop our own technology, made us more than 30 years ago, pioneers in the development of modular secondary distribution switchgears with lateral extensibility, maintaining integral SF6 insulation. This technology was later applied in our primary distribution switchgears range to complete our GIS portfolio.

Moving away from SF6: the technological breakthrough

Sustainability and development of a new technology

Our commitment to lead the sustainable transformation of electrical grids has driven us to develop an alternative and innovative technology up to 24 kV, without the use of SF6 as the dielectric gas, which guarantees a lower environmental impact on our planet.

Active listening with customers

A collaborative process to identify the key attributes and requirements our new ranges of primary and secondary switchgears should meet.

Key attributes

- Gas
- Pressure
- Operation & exploitation
- Dimensions

An F-gas-free solution based on five requirements

We have developed a state-of-the-art technology of integral gas insulation that is materialized in two new complete ranges of distribution switchgears. Engineered with zero changes in design parameters and operation, to achieve zero uncertainties in health, safety, reliability and performance. Thus, we have the best alternative for the distribution grid to meet the following requirements:

1. Natural origin gas: industrial natural air

Natural air components. Industrially manufactured. Fully accessible.

Our innovative technology is based on a gas composed uniquely of natural components existing in the air, and industrially produced in a controlled and tested environment. A combination that contains no fluorine and that avoids the humidity present in the ambient air; while being easily reproducible and accessible as it is patent-free.

2. Minimum filling pressure

Well-known behavior. Proven tightness.

This requirement is based on more than 30 years of field experience in different site conditions, thus minimising uncertainties.

3. Easy operation & exploitation

Innovative load break switch. Circuit-breaker with proven technology.

The design of this solution features an already proven and tested switching and breaking technology in our well experienced SF6 switchgear ranges.

Regarding the switching functions, the core of the cubicle is an innovative load break switch.

In particular, for circuit breaker protection functions the solution is based on experienced, vacuum breaking technology.

4. Compact dimensions

Similar footprint. Optimised dimensions.

Our new ranges maintain similar dimensions to the existing ones with SF6 insulation, thus allowing our customers the possibility of installing them in reduced spaces.

5. Digital native

Sensoring. Automation.

Our switchgears are designed to integrate sensors and remote monitoring as well as control and protection devices. Ready for automation to enhance management and digitalization of the electrical grid.

ROUTE TO ZERO

zero changes

zero uncertainties

more sustainability for your electrical grid

Best-in-class solution: sbp.zero24

The next generation F-gas-free insulated switchgear (GIS) for 24 kV primary distribution.

Minimum filling pressure

We use 1.9 bar absolute as filling pressure, with monitoring signal associated.

Benefits:

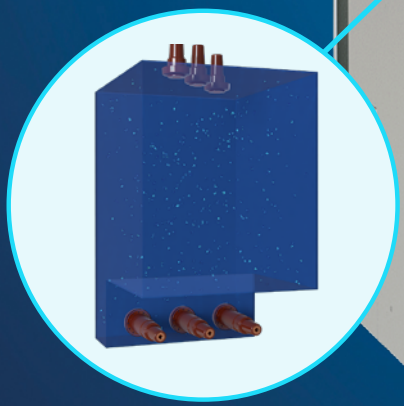
- Lowest filling pressure
- Optimised dimensions

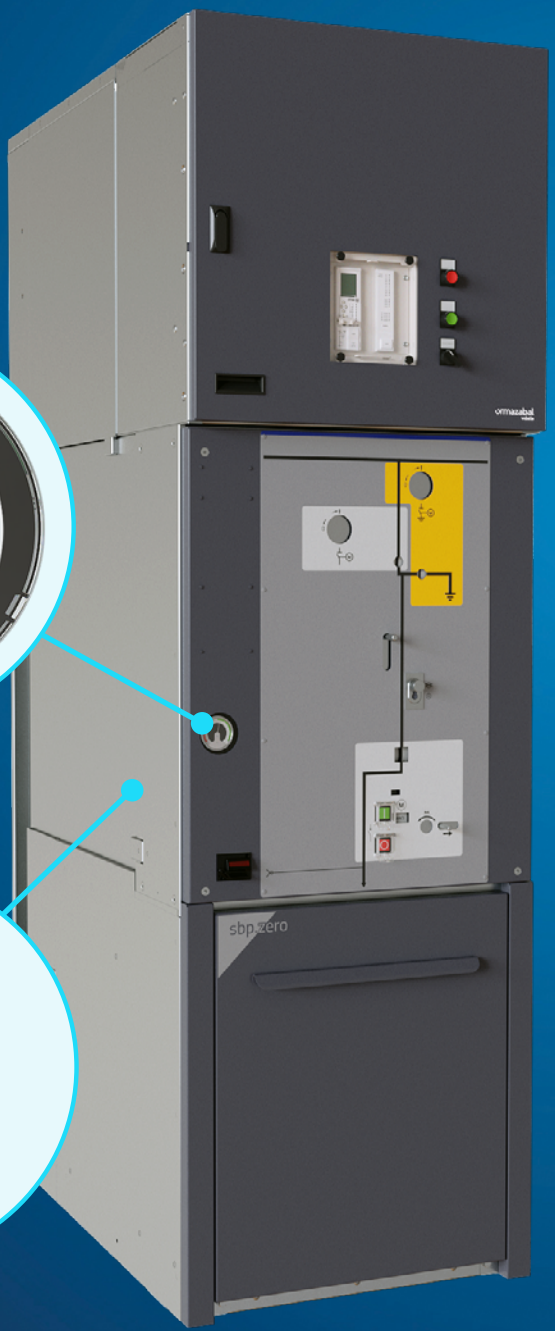
Natural origin gas

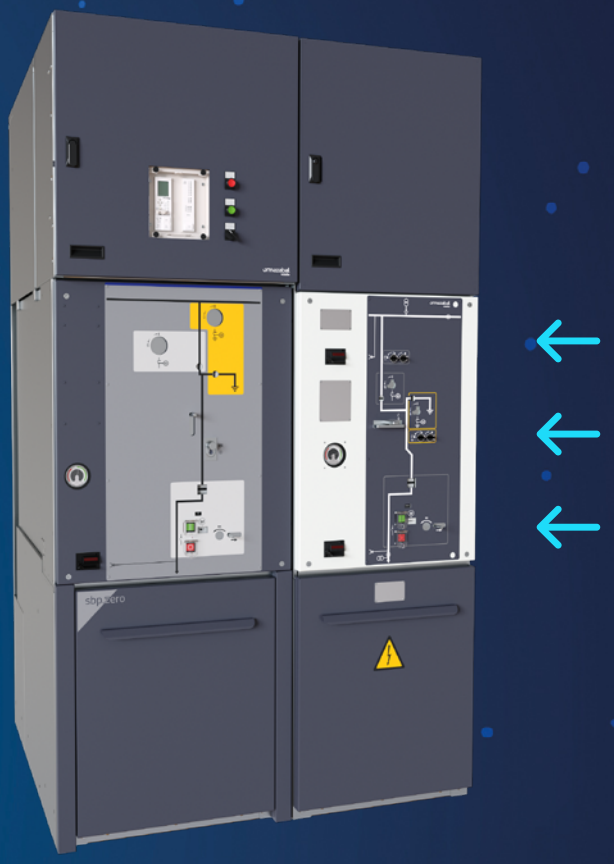
We select industrial natural air as insulation medium.

Benefits:

- Non F-gas
- No impurities
- No humidity
- Free of patents
- GWP<1

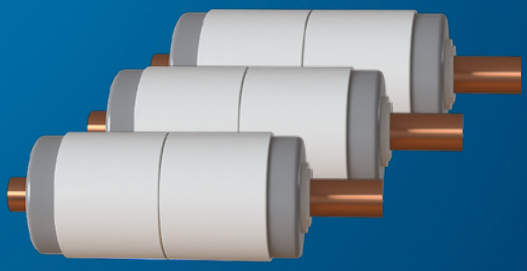






Experienced breaking and operation

We choose experienced technological systems for breaking.



Circuit breaker

Circuit breaker with vacuum breaking technology, compact and well-proven reliability.

Benefits:

- Experienced technology
- Ensuring isolation distance with a disconnector in series

Compact dimensions & compatibility

We have similar footprint as SF6 switchgear and fully compatible with cpg.0 lite.

Benefits:

- Space efficiency
- Easy upgrade of existing SF6 substation

3. Range description

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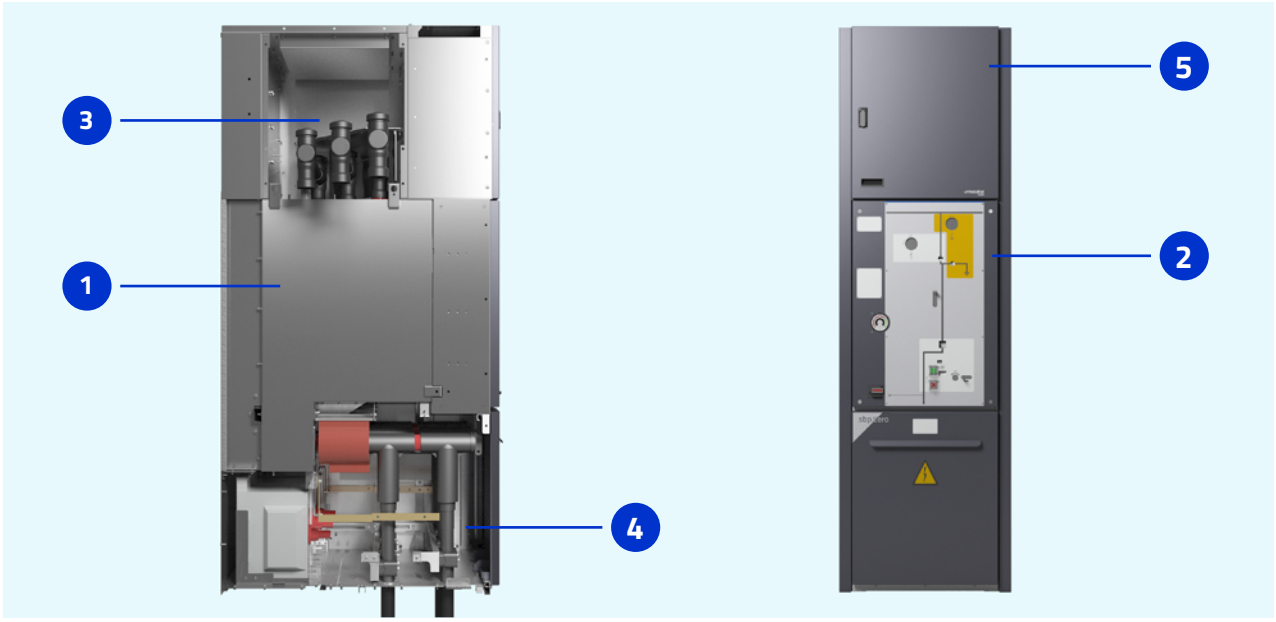
Design



1 Gas tank compartment

The tank is sealtight and gas-filled,and contains the three-position disconnector and breaking devices.

- Sealed for life
- Internal arc tested
- Stainless steel
- Switching, breaking and main circuit devices
  - Three-position disconnector
  - Circuit breaker

3 Main busbar comparment

It is located on top of the switchgear.
The interconnection between units is external and carried out via busbar.

It includes the following:

- Solid-insulated busbars
- Current and voltage sensors/transformers (optional)

4 Cable compartment

The cable connection compartment is located at the bottom of the cubicle and can be accessed by removing the front cover.

This compartment houses the:

- Bushing
- Connectors and cables
- Current and voltage sensors/transformers (optional)

2 Driving mechanism compartment

This is the compartment in which the disconnector or the circuit-breaker is operated, depending on the type of function.

It includes the following:

- Driving mechanism
- Mimic diagram and position indicator for driving mechanism
- Voltage Detecting and Indicating System
- Pressure gauge

5 Low voltage compartment

This compartment is independent of the MV area, removable and plug-in.

- Customised with high adaptability
- This compartment might houses:
  - Protection and control units
  - Metering units
  - Etc...

Components

Driving mechanism

The driving mechanism is used to perform switching operations in the medium-voltage circuits.

Disconnector and earthing switch

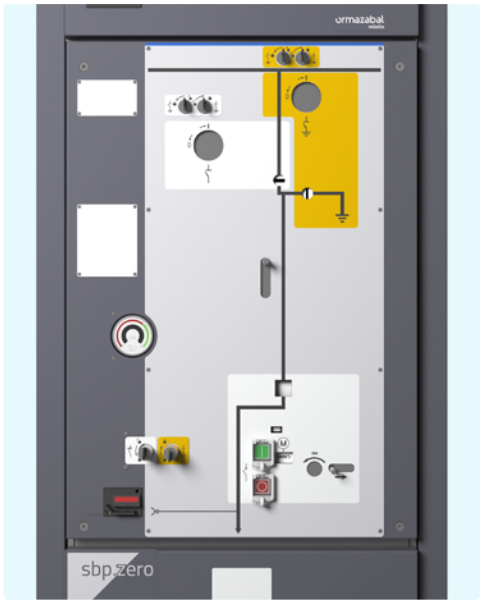
Models:

- Basic mechanism with operation-independent opening or closing by lever
- Basic mechanism with operation-independent opening or closing by motor

Circuit breaker

Models:

- Motorised circuit-breaker with rapid auto-reclosing
- Motorised circuit-breaker without rapid auto-reclosing



Interlocks

Mechanical and electrical interlocks that guarantee optimum operation of the equipment and all its elements.

Built-in functional interlocks to prevent unsafe operations (e.g. closing the disconnector and the earthing switch at the same time, opening the cable compartment access cover unless the earthing switch and the circuit breaker are closed).

Padlocking capabilities.

Key interlocking to optionally install locks blocking the disconnector mechanism in different positions (open-disconnected, closed, earthed, etc.).

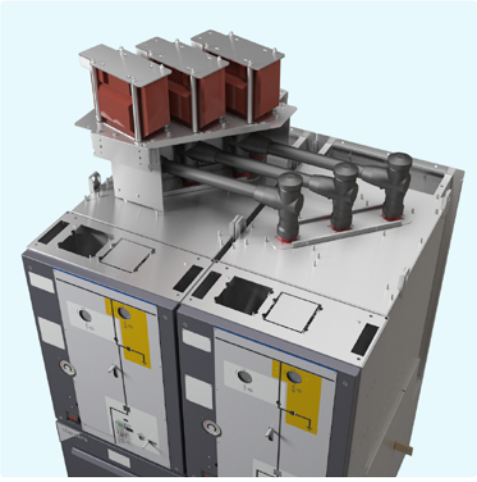
Current transformers

Characteristics

- Toroidal-core/block type
- Encapsulated
- Installed outside the gas tank
- Unaffected by environmental conditions

Installation

- Main busbar compartment
- Cable compartment



Voltage transformers

Characteristics

- Single-pole
- Isolated
- Installed outside the gas tank
- Unaffected by environmental conditions

Installation

- Main busbar compartment
- Cable compartment

Busbar system

Characteristics

- Single-pole
- Solid-insulated
- Plug-in type

Installation

- Top of the switchgear out of the gas tank
- Installation, extension and dismantling switchgear without gas handling

Technical characteristics

Electrical characteristics			IEC
Rated voltage	U_d	[kV]	24
Rated frequency	f_r	[Hz]	50
Rated current	I_r		
Busbars and cubicle interconnection		[A]	Up to 2000
Outgoing		[A]	Up to 1600
Rated short-time withstand current			
with t_k = 1 s – 3 s	I_k	[kA]	25
Peak value (max)	I_p	[kA]	62.5
Rated insulation level			
Power frequency rated withstand voltage [1 min]	U_d	[kV]	50/60
Lightning impulse rated withstand voltage	U_p	[kV]	125/145
Internal arc classification in accordance with IEC 62271-200	IAC		AFL[R][1] 25 kA 1 s
IP rating			IP3X/IP65 (gas tank)
Category of loss of service continuity		LSC	LSC2
Partition class			PM

[1] Rear classification as optional

Driving mechanisms			Vacuum circuit-breaker	Disconnector
			IEC	
Auxiliary circuits				
Tripping coil				
Rated voltage[2]		[V]	125 V_{dc}	–
Max. consumption		[W]	56	–
Undervoltage coil				
Rated voltage[2]		[V]	125 V_{dc}	–
Peak current		[A]	< 20	–
Motorised units				
Rated voltage[2]		[V]	125 V_{dc}	125 V_{dc}
Average consumption		[W]	55	55
Motor operation time		[s]	< 15	< 10
Peak current		[A]	< 5	< 5

[2] For other values, please ask Ormazabal

Service conditions to normal service conditions of IEC 62271-1	
Type of switchgear	Indoor
Ambient temperature	
Minimum | Maximum	- 5 °C[3] | + 40 °C[3]
Maximum mean ambient temperature, measured over a 24-hour period	+ 35 °C
Relative humidity	
Maximum mean relative humidity, measured over a 24-hour period	< 95 %
Maximum height above sea level	1000 m[3]
Solar radiation	Negligible
Ambient air pollution (dust, smoke, corrosive and/or flammable gases, vapours or salt)	acc. to normal service conditions of Standard IEC 62271-1

[3] For other conditions, please ask Ormazabal.

Functional overview

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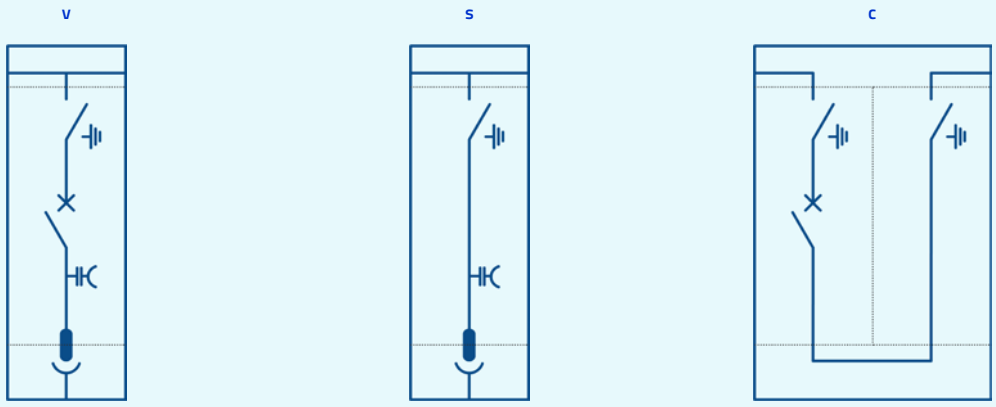
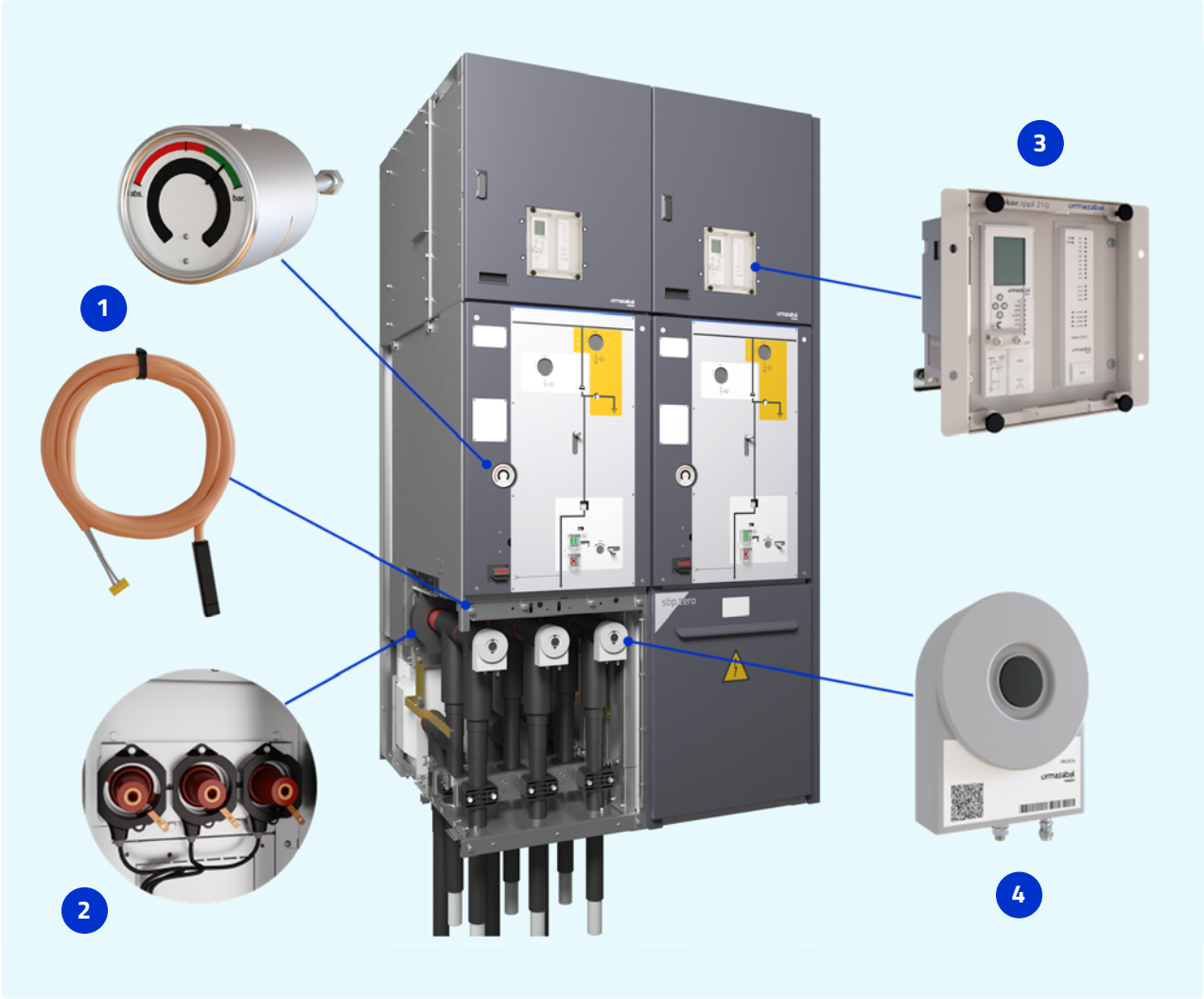


Standards and certifications

Applicable electrical standards	
IEC	
IEC 62271-1	Common specifications for high-voltage switchgear.
IEC 62271-100	High-voltage alternating current circuit-breakers.
IEC 62271-102	Alternating current disconnectors and earthing switches.
IEC 62271-200	Alternating current metal-enclosed switchgear for rated voltages above 1 kV and up to and including 52 kV.

Digital native

sbp.zero24 is ready for the future with integrated automation and control systems for enhanced network and asset management.



1. Condition monitoring for asset management (pressure, temperature,...)
2. Current sensors according IEC 61869-10
3. Control & automation units
4. Voltage sensors according IEC 61869-11

4. Functions

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Single busbar coupling cubicle p. 28

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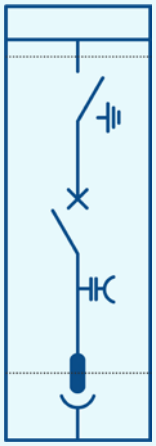
Single busbar circuit-breaker cubicle

Includes a vacuum circuit-breaker and a three-position disconnector in series with it. Both components are inside the gas compartment.

Electrical characteristics			IEC
Rated voltage	U_n	[kV]	24
Rated frequency	f_r	[Hz]	50
Rated current			
Main busbar	I_r	[A]	Up to 2000
Feeder	I_r	[A]	Up to 1600
Rated short-time power frequency withstand voltage (1 min)			
Phase-to-earth	U_d	[kV]	50
Across isolating distance	U_d	[kV]	60
Lightning impulse rated withstand voltage			
Phase-to-earth	U_p	[kV]	125
Across isolating distance	U_p	[kV]	145
Internal arc classification according to IEC 62271-200	IAC		AFL[R][1] 25 kA 1 s
Circuit-breaker			**IEC 62271-100**
Admissible rated short-time withstand current (main circuit)			
Value t_k = 1 s - 3 s	I_k	[kA]	25
Peak value	I_p	[kA]	62.5
Rated making and breaking capacity			
Mainly active current rated breaking capacity	I_1	[A]	Up to 1600
Short-circuit breaking capacity	I_{sc}	[kA]	25
Capacitive current capacity. Capacitor bank[2]		[A]	400
Rated operating sequence			
Without rapid auto-reclosing			CO-15 s-CO/CO-3 min-CO
With rapid auto-reclosing			O-0.3 s-CO-15 s-CO/O-0.3 s-CO-3 min-CO
Circuit-breaker category			
Mechanical endurance (operations class)			M2
Electrical endurance (class)			E2
Feeder disconnector			**IEC**
Admissible rated short-time withstand current (main circuit)			
Value t_k = 1 s - 3 s	I_k	[kA]	25
Peak value	I_p	[kA]	62.5
Feeder disconnector category			
Mechanical endurance			M1
Operations cycles (short-circuit making) - class			E0
Earthing switch			**IEC 62271-102**
Admissible rated short-time withstand current (earthing circuit)			
Value t_k = 1 s - 3 s	I_k	[kA]	25
Peak value	I_p	[kA]	62.5
Main switch making capacity (peak value)	I_{ma}	[kA]	62.5
Earthing switch category			
Mechanical endurance			M1
Operations cycles (short-circuit making) - class			E2 (combined with the circuit-breaker)

[1] Rear classification as optional
[2] Optional

Dimensions



$I_{outgoing}$ [A]	a [mm]	h [mm]	hp [mm]	f [mm]	Weight [kg]
630/1250	600	2300	600	1160	560
1600	700				680

The weight shown does not include busbars, medium-voltage cables, side trim panels, metering transformers or equipment inside the control box.

Available options

Gas tank
- ○ Pressure gauge with potential-free contact

Busbar compartment
- ○ Up to 2000 A
- ○ Current transformers
- ○ Voltage transformers

Driving mechanisms
Three-position disconnector
- ○ Motorised feeder disconnector
- ○ Motorised feeder earthing switch
- ○ Voltage detecting and indicating system (vdis)

Vacuum circuit-breaker
- ○ Motor
- ○ Tripping coil
- ○ 2nd tripping coil
- ○ Closing coil
- ○ Undervoltage coil
- ○ Blocking open/close pushbutton

Additional interlocks
- ○ Electrical interlocks
- ○ Keylock interlocking
- ○ Interlocking with padlock

Cable compartment
- ○ Up to 3 cables per phase
- ○ Toroidal-core current transformers
- ○ Plug-in voltage transformer
- ○ Disconnectable voltage transformers for metering in cables (see available models)

Low-voltage compartment
- ○ Signalling, control, automation and protection devices

Some specific configurations may be incompatible with each other.

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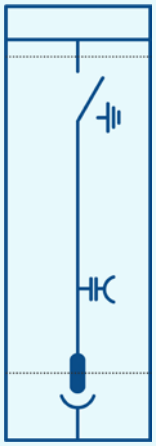
Single busbar disconnector cubicle

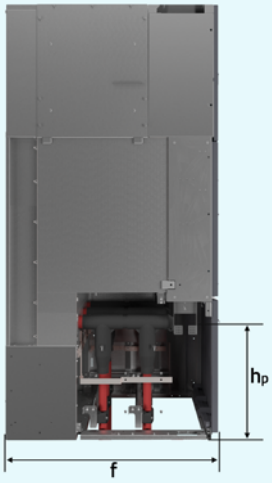
Includes a three-position disconnector without load switching capability. This component is inside the gas compartment.

Electrical characteristics			IEC
Rated voltage	U_n	[kV]	24
Rated frequency	f_r	[Hz]	50
Rated current			
Main busbar	I_r	[A]	Up to 2000
Feeder	I_r	[A]	Up to 1600
Rated short-time power frequency withstand voltage (1 min)			
Phase-to-earth	U_d	[kV]	50
Across isolating distance	U_d	[kV]	60
Lightning impulse rated withstand voltage			
Phase-to-earth	U_p	[kV]	125
Across isolating distance	U_p	[kV]	145
Internal arc classification	IAC		AFL[R][1] 25 kA 1 s
Feeder disconnector			**IEC**
Admissible rated short-time withstand current (main circuit)			
Value t_k = 1 s - 3 s	I_k	[kA]	25
Peak value	I_p	[kA]	62.5
Feeder disconnector category			
Mechanical endurance			M1
Operations cycles (short-circuit making) - class			E0
Earthing switch			**IEC 62271-102**
Admissible rated short-time withstand current (earthing circuit)			
Value t_k = 1 s - 3 s	I_k	[kA]	25
Peak value	I_p	[kA]	62.5
Main switch making capacity (peak value)	I_{ma}	[kA]	62.5
Earthing switch category			
Mechanical endurance			M1
Operations cycles (short-circuit making) - class			E0

[1] Rear classification as optional

Dimensions





$I_{outgoing}$ [A]	a [mm]	h [mm]	hp [mm]	f [mm]	Weight [kg]
1250	600	2300	600	1160	490
1600	700				560

The weight shown does not include busbars, medium-voltage cables, side trim panels, metering transformers or equipment inside the control box.

Available options

Gas tank
- ○ Pressure gauge with potential-free contact

Busbar compartment
- ○ Up to 2000 A
- ○ Current transformers
- ○ Voltage transformers

Driving mechanisms
Three-position disconnector
- ○ Motorised feeder disconnector
- ○ Motorised earthing switch
- ○ Voltage presence indicating relay

Additional interlocks
- ○ Electrical interlocks
- ○ Keylock interlocking
- ○ Interlocking with padlock

Cable compartment
- ○ Up to 3 cables per phase
- ○ Toroidal-core current transformers
- ○ Plug-in voltage transformer

Low-voltage compartment
- ○ Signalling, control, automation and protection devices

Some specific configurations may be incompatible with each other.

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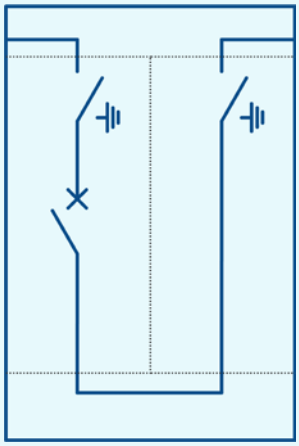
Single busbar coupling cubicle

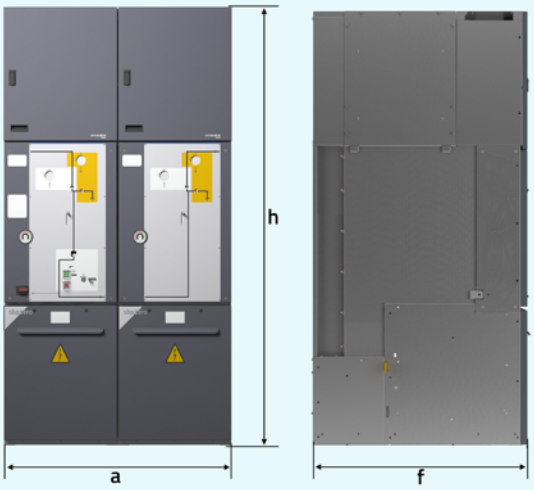
Includes a vacuum circuit-breaker and two 3-position disconnectors in series with it, one upstream and the other downstream from the circuit-breaker.
These elements are inside two separate gas tanks.

Electrical characteristics			IEC
Rated voltage	U_n	[kV]	24
Rated frequency	f_r	[Hz]	50
Rated current			
Main busbar	I_r	[A]	Up to 1600
Rated short-time power frequency withstand voltage (1 min)			
Phase-to-earth	U_d	[kV]	50
Across isolating distance	U_d	[kV]	60
Lightning impulse rated withstand voltage			
Phase-to-earth	U_p	[kV]	125
Across isolating distance	U_p	[kV]	145
Internal arc classification	IAC		AFL[R][1] 25 kA 1 s
Circuit-breaker			**IEC 62271-100**
Admissible rated short-time withstand current (main circuit)			
Value t_k = 1 s - 3 s	I_k	[kA]	25
Peak value	I_p	[kA]	62.5
Rated making and breaking capacity			
Mainly active current rated breaking capacity	I_1	[A]	Up to 1600
Short-circuit breaking capacity	I_{SC}	[kA]	25
Rated operating sequence			
Without rapid auto-reclosing			CO-15 s-CO/CO-3 min-CO
With rapid auto-reclosing			O-0.3 s-CO-15 s-CO/O-0.3 s-CO-3 min-CO
Circuit-breaker category			
Mechanical endurance (operations class)			M2
Electrical endurance (class)			E2
Feeder disconnector			**IEC**
Admissible rated short-time withstand current (main circuit)			
Value t_k = 1 s - 3 s	I_k	[kA]	25
Peak value	I_p	[kA]	62.5
Feeder disconnector category			
Mechanical endurance			M1
Operations cycles (short-circuit making) - class			E0
Earthing switch			**IEC 62271-102**
Admissible rated short-time withstand current (earthing circuit)			
Value t_k = 1 s - 3 s	I_k	[kA]	25
Peak value	I_p	[kA]	62.5
Main switch making capacity (peak value)	I_{ma}	[kA]	62.5
Earthing switch category			
Mechanical endurance			M1
Operations cycles (short-circuit making) - class			E2 (combined with the circuit-breaker)

[1] Rear classification as optional

Dimensions





$I_{outgoing}$ [A]	a [mm]	h [mm]	f [mm]	Weight [kg]
1250	1200	2300	1160	1030
1600	1400			1240

The weight shown does not include busbars, medium-voltage cables, side trim panels, metering transformers or equipment inside the control box.

Available options

Gas tank
- ○ Pressure gauge with potential-free contact

Busbar compartment
- ○ Up to 2000 A
- ○ Current transformers
- ○ Voltage transformers

Driving mechanisms
Three-position disconnector
- ○ Motorised feeder disconnector
- ○ Motorised earthing switch
- ○ Voltage presence indicating relay

Vacuum circuit-breaker
- ○ Motor
- ○ Tripping coil
- ○ 2nd tripping coil
- ○ Closing coil
- ○ Undervoltage coil
- ○ Blocking open/close pushbutton

Additional interlocks
- ○ Electrical interlocks
- ○ Keylock interlocking
- ○ Interlocking with padlock

Low-voltage compartment
- ○ Signalling, control, automation and protection devices

Some specific configurations may be incompatible with each other.

5. Installation and connection

Handling and transport

- Dimensions compatible with road, air or sea container transport
- Reduced size and weight
- Adapted packing:
  - Vertical plastic on pallet protected with polystyrene
  - Pallet pack with reinforced cardboard box
  - Wooden box

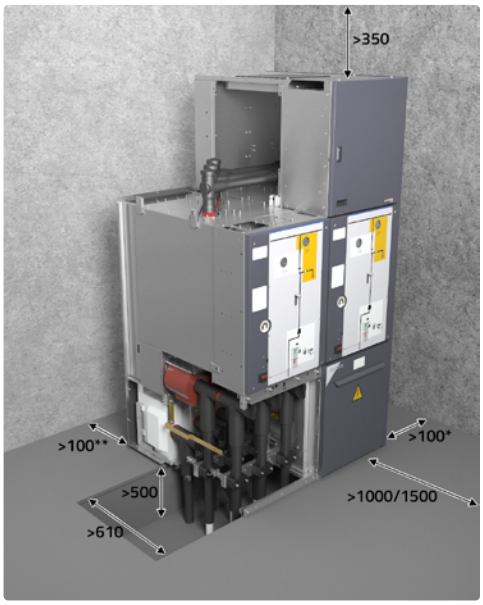
Handling methods:

- Elevation: Forklift truck or manual pallet jack
- Lifting: Slings and lifting beams

Installation

- Indoor installation, transformer substations, wind power applications (on/offshore), etc
- Easy handling
- Operation, extensibility and removal in reduced space
- Ergonomic design for easy cubicle connection and floor fastening
- No gas manipulation on site
- Installation on auxiliary profiles in the case of uneven floors or to avoid digging cable trenches

For handling and installation instructions, check with Ormazabal.



Installation distances

sbp.zero24 cubicles can be configured to best suit your needs and available space. It is important to take into account the minimum installation distances, which are defined by accessibility and the required protection conditions.

Minimum installation distances [mm]	
Side wall	100* mm
Roof	350 mm
Front aisle for manoeuvring	1000 mm
Front aisle for extraction	1500 mm
Rear wall	100** mm

* In accordance with Appendix A of Standard IEC 62271-200 (Cable trench depth depending on cable bend radius).
** Rear wall: 800 mm in the case of cubicles with IAC AFLR rating.

6. Services

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Ormazabal Services

Engineering and technical advice

Advice during the project's initial stages, providing solutions tailored to our customers' needs through innovative, efficient, sustainable products.

Assembly and commissioning

We accompany our customers at all times, from equipment factory acceptance tests through to delivery and commissioning on site.

Training and certification

Continuous personalised training for our customers, with official operation and maintenance certification for our equipment.

Ormazabal provides a wide range of services and support for its customers throughout the product's service life: from preliminary design and customisation, through to end of service life.

For further information, please check with Ormazabal.

Inspection and maintenance

Predictive, preventive and corrective inspections and maintenance of equipment in order to ensure maximum efficiency and optimal service life.

Manage parts and accessories

Availability of spare parts and accessories in order to offer a quick response on site and reduce downtime.

Modernisation and digitalisation

Upgrade equipment to the latest technologies in order to improve performance and extend service life, as well as providing remote monitoring and support for your facility.

ROUTE TO ZERO

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