



ORMAZABAL

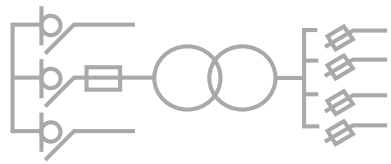
Focus on Medium Voltage








Prefabricated Transformer Substations IEC 62271-202



Compact Prefabricated Transformer Substations
miniBLOK and miniSUB Up to 36 kV



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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 the international standard ISO 9001:2000.

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 notification.

These characteristics, as well as the availability of components, are subject to confirmation by Ormazabal's Technical-Commercial Department.

PREFABRICATED TRANSFORMER SUBSTATIONS

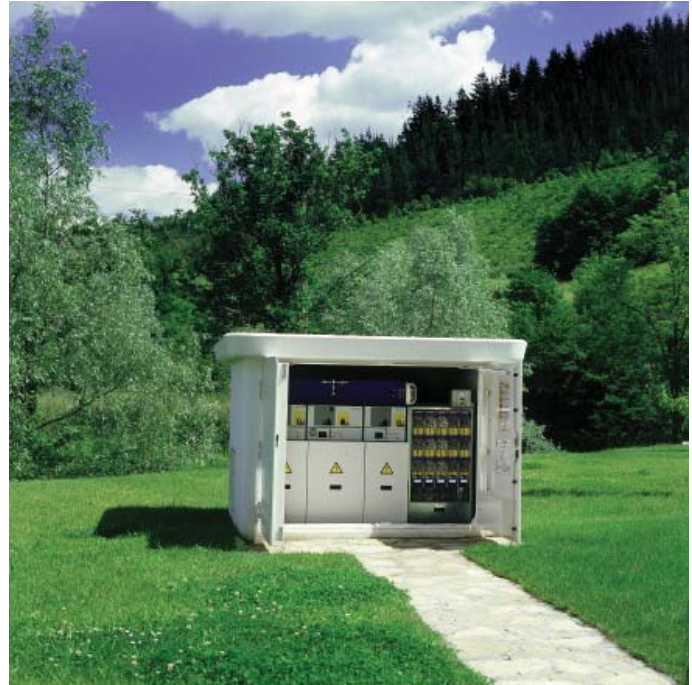


GENERAL INFORMATION

A Prefabricated Transformer Substation is a **product** developed according to standards **IEC / EN 62271-202***, and defined as: assembly subjected to standard tests, composed of an enclosure that includes one or more transformers, Low and Medium Voltage switchgear, connections and auxiliary equipment for supplying low voltage power in underground networks from a High/Medium Voltage network or vice-versa.

Therefore, Prefabricated Transformer Substations are products, standard-built, tested and supplied as a unit.

The Transformer Substations are installed in locations accessible to the public and must ensure the protection of persons and property according to the specified service conditions, paying special attention to the personal safety of the operators and the general public, even under fault conditions.



The correct design and operating characteristics of **Ormazabal's** Transformer Substations are verified with the standard tests described in standard IEC 62271-202. This standard gives an **IAC classification** to Transformer Substations that pass the internal arc tests, certifying their effectiveness to provide protection in case of an internal fault.

Also, in terms of safety, and related to the Transformer Substation, it is essential to install an earthing circuit that channels the fault currents, protecting persons and property, as established in the local regulations.

A Prefabricated Transformer Substation comprises the following main components:



Distribution transformers.



MV and LV electrical equipment.



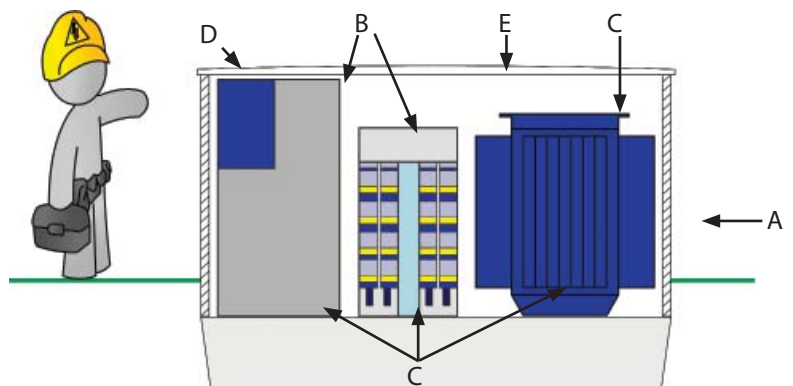
MV and LV interconnections.



Auxiliary equipment and circuits.



Enclosure.



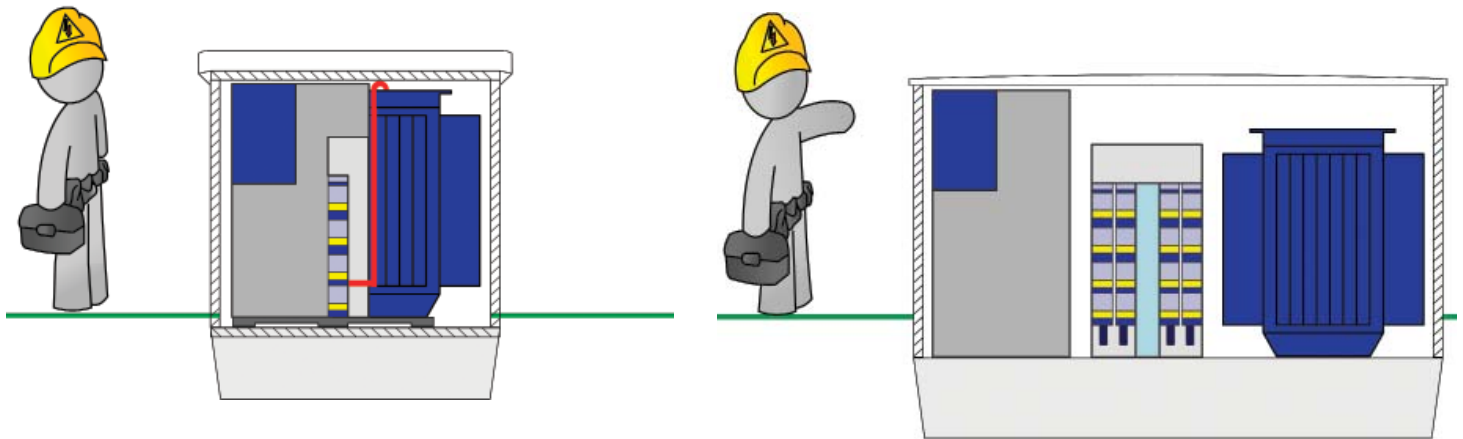
(*) Standard EN 50532: Compact Equipment Assembly (CEADS) has also been taken into account; under development at the time of publication of this catalogue.



ELECTRICAL EQUIPMENT

Ormazabal's Prefabricated Transformer Substations are comprised of compact electrical equipment or components:

- According to standard EN 50532*: "Compact Equipment Assembly for Distribution Substations", compact electrical equipment is classified into type G, type A and type I **Compact Equipment Assemblies**. They differ in the type of connection, arrangement, proximity and/or insulating medium.
- Prefabricated Transformer Substations constituted by components are those that are configured with switchgear that, complying individually with the current international regulations, are built, tested and supplied as a unit.



Also, **Ormazabal** has a wide range of products for configuring Transformer Substations, both in industrialised enclosures (monoblock or modular) and buildings for other uses, which allows to configure any Medium Voltage network up to 36 kV.

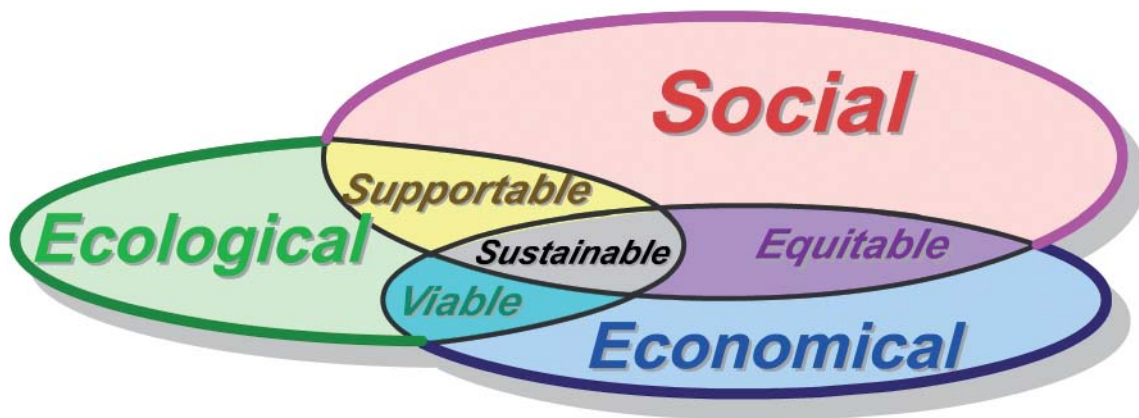
(*) Under development at the time of publication of this catalogue.



ORMAZABAL: COMMITMENT WITH SUSTAINABLE DEVELOPMENT

Ormazabal is committed to **sustainable development** for improving its solutions.

Sustainable development, as the best compromise between the **satisfaction** of **social demands**, the **care for the environment** and the **economy**.



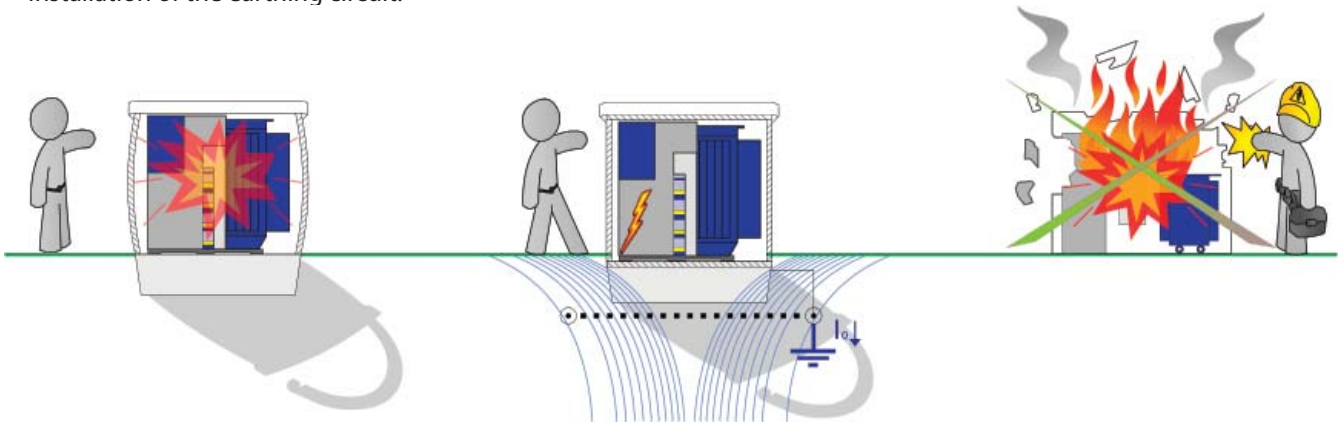
SOCIAL DEMANDS

Ormazabal designs its products and offers its services in favour of:

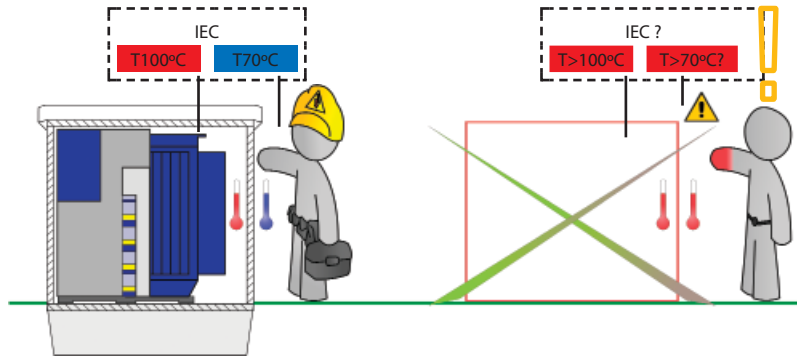
- **Continuity of service** through:
 - High electrical and mechanical characteristics.
 - Cubicles with regenerable insulation (gas) after Medium Voltage operations.
 - Admissible overloads in the transformer without compromising the safety of third parties, by access to live parts.
 - Remote-controlled switch-disconnectors.
- **Safety** through:
 - Low thermal load of the dielectrics: lower volume than other solutions in the market.
 - Fireproof insulation.
 - Equipment protection that limits the risk of fire of the liquid dielectrics.
 - Designs verified with internal arc tests.
 - Optimal interface with operators.
 - Internal interlocks.
 - Protection to avoid access to live parts.

The most important aspects are:

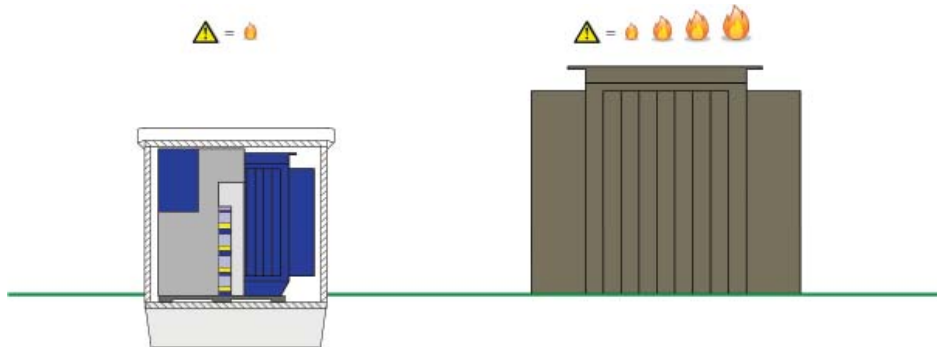
- **Personal protection**, both of operators and third parties, even in case of fault.
 - Verification with internal arc tests.
 - Installation of the earthing circuit.



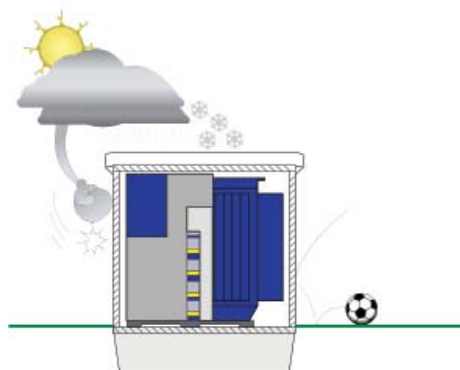
- **Physical protection** in transformer accesses with an enclosure (live parts not accessible, even in overload conditions).



- Transformer Substations with reduced dimensions and, therefore, minimum quantity of dielectric liquid in the transformers: **low thermal load.**



- **Protection** of the **switchgear** against external impacts, pollution, adverse weather, solar radiation, vandalism, etc., as it is **inside** a concrete enclosure.





Ormazabal develops its products with a commitment for the environment.

The **environmental impact** is **minimised** by:

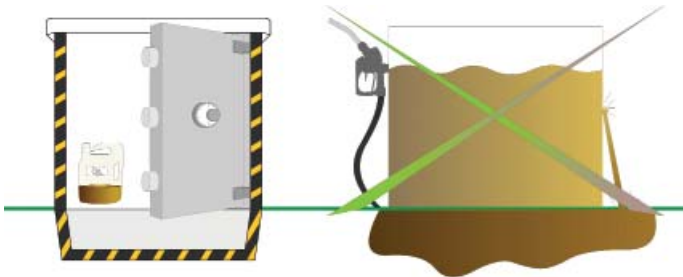
- Reduction of the volume of dielectric liquid.
- Minimum dimensions.
- Cubicle tanks sealed for life. Insignificant leakage rate.
- Reduced losses in the transformer.
- Low risk of insulator spillage on the public roads, with no harm to the environment.
- Recyclability.
- Use of improvement tools:
 - Ecodesign: design methodology where the environment is taken into account in the development process of industrial products.
 - Analysis of the complete lifecycle: manufacture, use and end-of-life.

The most important aspects are:

- **Permanent protection** against possible leakage of dielectric liquid thanks to the arrangement of the oil collection pits, with resistant and sealed lining.

- **Adaptation to the surroundings:**

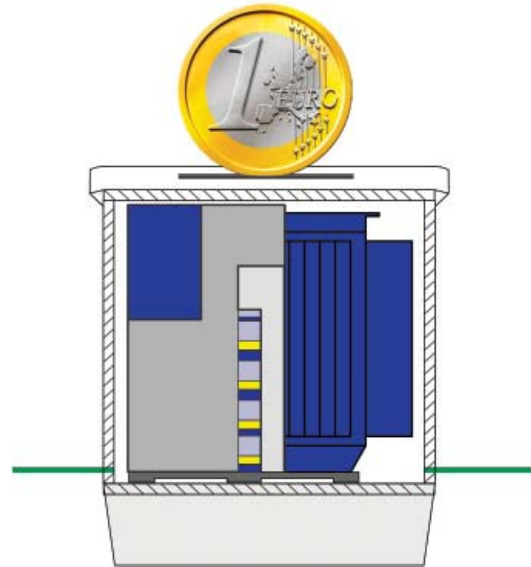
- Minimum dimensions.
- Various exterior surface finishes (colours, textures and reliefs).
- Therefore:
 - High capacity for aesthetic integration and imitation.
 - Reduced visual impact.



↘ ECONOMY

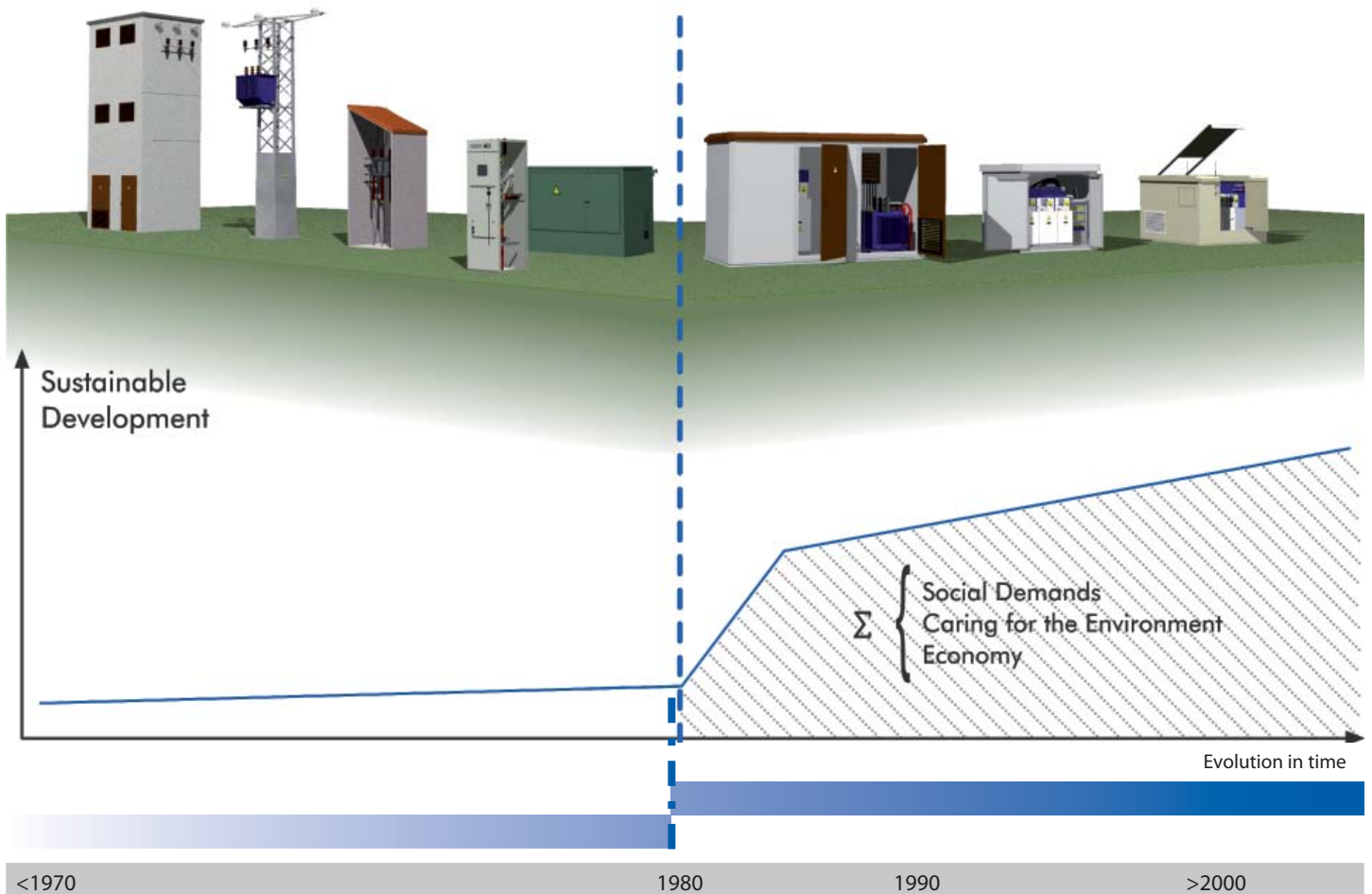
Ormazabal's products help reduce the economic impact by:

- Optimal use of raw material.
- Minimal occupation of surface.
- Longer life, endurance and robustness of the equipment.
- Equipment adaptable to the evolution of the network (remote-controllable).
- Minimal civil work (integrated oil collection pit).
- High mechanical and electrical endurance.
- Reduction of energy loss.
- Equipment durability.
- Therefore:
 - Reduced lifecycle cost of equipment



↘ SUSTAINABLE DEVELOPMENT

Sustainable development has evolved in the last decades according to social demands, the care for the environment, and the economy:





PRESENTATION

Ormazabal's MB is an associated type (A) compact equipment assembly, designed to be installed both in Prefabricated Transformer Substations and in buildings made for Transformer Substations, in public or private distribution networks up to 36 kV.

The main advantage of these assemblies is their high safety and protection for both persons and property against internal faults, their **IAC classification**, as well as their robustness and reliability.

Thanks to its manufacture, assembly, equipment and testing done entirely at the factory, **MB** offers uniform quality and a significant reduction of costs and installation time, making it possible to have an operational Transformer Substation available in a short time.

Compact Equipment Assembly Type A (Associated) according to standard EN 50532:

Assembly whose functional units, located contiguously, are modified to obtain non-conventional direct interconnections between them, or to reduce the size of the assembly. Its units can be independent or share part of the enclosure or frame.

The deviations from the standard design maintain its safety, functional and operational characteristics unaltered.

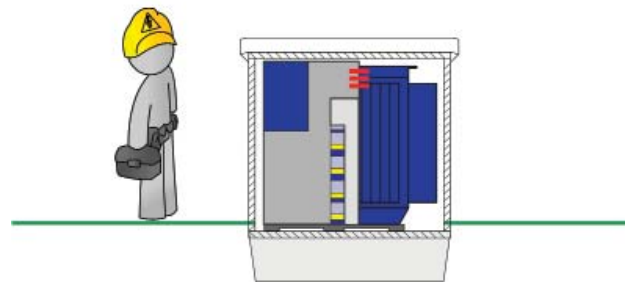
This catalogue shows the type A (associated) MB due to the fact that, while maintaining its functional properties, it represents the evolution of the type G (grouped) MB, as it has direct connections that offer a higher reliability than the conventional ones in the grouped one.



MB-24



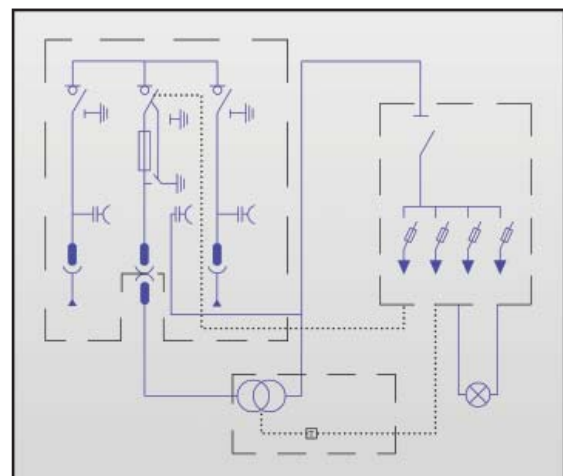
MB-36



APPLICABLE STANDARDS

- EN 50532*: Compact Equipment Assembly (CEADS)
- IEC / EN 62271-1: Common specifications for high voltage switchgear and controlgear standards.
- On request:
 - Specific regulations of the Utility.

(*): Under development at the time of publication of this catalogue





COMPOSITION

The **MB** has the following maximum configuration:

- Fully gas insulated Medium Voltage Switchgear: **CGMCOSMOS-2LP** up to 24 kV or **CGM.3-2LP** up to 36 kV. Electrical diagram (RMU) with 2 feeder functional units, input and output, and a protection functional unit with a switch-fuse combination.
- **Ormazabal** protection, control and metering units (remote control, telemetering, integrated control, telemanagement, etc.).
- Medium Voltage Distribution Transformer, 250, 400 or 630 kVA.
- LV Switchgear: Low Voltage Board with 4 outputs, with control and protection unit, as well as an auxiliary safety supply.
- Direct MV and LV interconnections.
- Self-supporting frame with lifting device and possibility of installing castor wheels.
- Earthing circuit connection.
- Lighting and auxiliary services.

Note: For other configurations and/or values, please consult Ormazabal's Technical-Commercial Department.



TECHNICAL CHARACTERISTICS

	MB 24	MB 36
Rated voltage [kV]	24	36
Frequency [Hz]	50	50
Internal Arc (IAC class)*	16 kA / 0.5 s	16 kA / 0.5 s
Transformer		
Power [kVA]	250/400/630	250/400/630
MV Switchgear		
Rated current [A]		
In Busbars	400/630	400/630
Outgoing Line	400/630 (L) 200 (P)	400/630 (L) 200 (P)
Short-time current [kA]	16 / 20	16 / 20
Insulation level		
Industrial Frequency [kV]	50 / 60	70 / 80
Lightning impulse [kV] ^{PEAK}	125 / 145	170 / 195
Low Voltage Board		
Rated voltage [V]	440	440
Rated current [A]	1000	1000
Rated current [A]/ no. outputs	400 / 4	400 / 4

(*) Please consult Ormazabal's Technical-Commercial Department for the different configurations according to standard project.
Optionally: Anti-vibration devices and insulating platform.

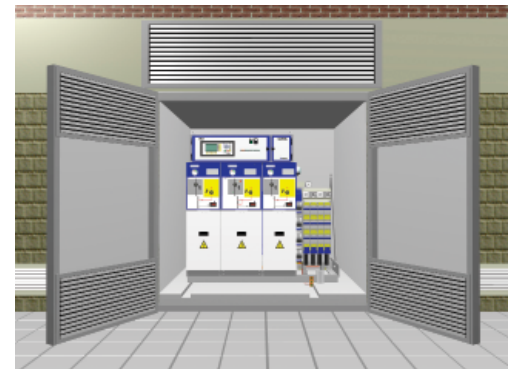


PHYSICAL CHARACTERISTICS

	MB 24			MB 36		
	250	400	630	250	400	630
Power [kVA]	250	400	630	250	400	630
Width [mm]	1890	1890	1890	1890	1890	1890
Depth [mm]	1673	1673	1673	1824	1824	1824
Height [#] [mm]	1532	1532	1532	1529	1529	1529
Weight [kg]	1600	1950	2400	1800	2100	2550

([#]) With castor wheels

Note: For other configurations and/or values, please consult Ormazabal's Technical-Commercial Department.



COMPACT PREFABRICATED TRANSFORMER SUBSTATIONS

KIOSK-TYPE COMPACT PREFABRICATED TRANSFORMER SUBSTATION

miniBLOK



PRESENTATION

Ormazabal's **miniBLOK** is a kiosk-type **Compact Prefabricated Transformer Substation**, installed on the **surface** and externally operated, with reduced dimensions, standard-built, tested and supplied from the factory as a unit.

It is characterised by incorporating an **Ormazabal MB** Medium Voltage associated type (A) compact equipment assembly, for use in both public and private distribution networks up to 36 kV.

Its careful exterior design and reduced dimensions minimise its visual impact, making it suitable when the available space is limited, in both industrial and residential areas.

The main advantage of these Transformer Substations is their high safety and protection for both persons and property against internal faults, their **IAC classification**, as well as their robustness and reliability.

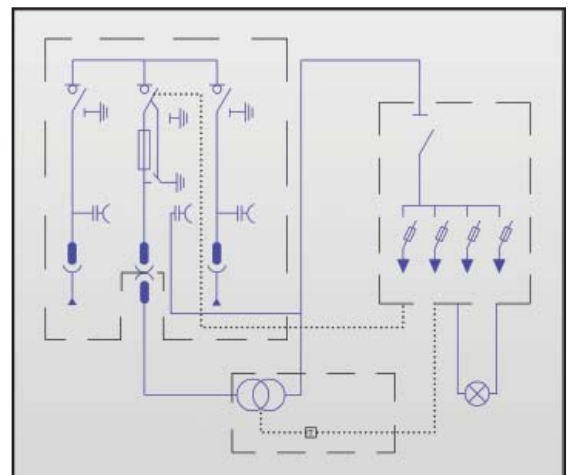
Thanks to its manufacture, assembly, equipment and testing done entirely at the factory, **miniBLOK** offers uniform quality and a significant reduction of costs and installation time, making it possible to have an operational Transformer Substation available in a short time.



APPLICABLE STANDARDS

- IEC / EN 62271-202: High Voltage Switchgear: Prefabricated Transformer Substations.
- EN 50532*: Compact Equipment Assembly (CEADS)
- On request:
 - Specific regulations of the Utility.
 - Applicable local regulations.

(*) Under development at the time of publication of this catalogue





COMPOSITION

The **miniBLOK Compact Prefabricated Transformer Substations** have the following maximum configuration:

- **MB** associated compact equipment assembly:
 - Fully gas insulated Medium Voltage Switchgear: **CGMCOSMOS-2LP** up to 24 kV or **CGM.3-2LP** up to 36 kV. Electrical diagram (RMU) with 2 feeder functional units, input and output, and a protection functional unit with a switch-fuse combination.
 - Ormazabal protection, control and metering units (remote control, telemetering, integrated control, telemanagement, etc.).
 - Medium Voltage Distribution Transformer, 250, 400 or 630 kVA
 - LV Switchgear: Low Voltage board with control and protection unit, as well as an auxiliary safety supply.
 - Direct MV and LV interconnections.
 - Self-supporting frame.
 - Earthing circuit connection.
 - Lighting and auxiliary services.
- Reinforced concrete monoblock enclosure with removable cover.
- Optional: Operating insulated platform.



Note: For other configurations and/or values, please consult Ormazabal's Technical-Commercial Department.



CHARACTERISTICS

The **miniBLOK** is characterised for having:

- **MB** Associated compact equipment assembly:
 - 24 and 36 kV models.
 - Fully factory-assembled.
 - Test performed on the MB as an individual unit and as an assembly in the miniBLOK.
 - Reduced size and versatility.
 - Ideal for use in public distribution networks up to 36 kV.
 - Fast and simple replacement of the equipment.
- Prefabricated concrete enclosure:
 - Reduced dimensions: ideal for limited spaces.
 - Low height: little visual impact.
 - Monoblock enclosure with removable cover.
 - Interior dielectric liquid collection pit, with resistant and sealed lining, for protection against soil contamination.
 - Fire barrier protection elements: layer of pebbles over the dielectric collection pit.
- Ventilation:
 - By natural air circulation, class 10, through two intake grilles installed in the enclosure walls and one outlet around the upper part of the enclosure.
- Improvement tools used:
 - Tests and modelling of natural ventilation with **Ormazabal** transformers, for the optimisation of their service life.
 - On request: customised studies according to the data provided by the customer.
- Personnel access:
 - Double door with fixing in place at 90° and 180° for performing operations and maintenance.
- MV and LV cable inlet/outlet:
 - Through pre-punched orifices in the base of the enclosure.
 - Auxiliary Low Voltage feeder inlet, located on the side of the enclosure. Allows the entry of cables coming from a generator set, to supply clients in the event of an incident, via the low voltage board.

Prefabricated Transformer Substations

TECHNICAL CHARACTERISTICS

	miniBLOK 24	miniBLOK 36
Rated voltage [kV]	24	36
Frequency [Hz]	50	50
Internal Arc (IAC class)	16 kA / 0.5 s	16 kA / 0.5 s
Transformer		
Power [kVA]	250 / 400 / 630	250 / 400 / 630
MV Switchgear		
Rated current [A]		
In Busbars	400/630	400/630
Outgoing Line	400/630(L) 200(P)	400/630(L) 200(P)
Short-time current [kA]	16 / 20	16 / 20
Insulation level		
Industrial Frequency [kV]	50 / 60	70 / 80
Lightning impulse [kV] peak	125 / 145	170 / 195
Low Voltage Board		
Rated voltage [V]	440	440
Rated current [A]	1000	1000
Rated current [A]/ no. outputs	400 / 4	400 / 4

PHYSICAL CHARACTERISTICS

	miniBLOK 24	miniBLOK 36
Width [mm]	2100	2100
Depth [mm]	2100	2100
Height [mm]	2240	2240
Visible height [mm]	1600	1600
Maximum weight* [kg]	7400	7550

(*) with 630 kVA transformer and no remote control.

Note: For other configurations and/or values, please consult Ormazabal's Technical-Commercial Department.

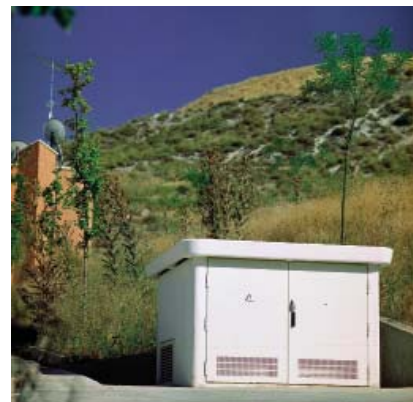


INSTALLATION

The **miniBLOK** is supplied fully factory-assembled, so the installation process only involves placing the enclosure in the excavation and connecting the MV and LV cables.

Its simple installation, reduced dimensions and weight, as well as its recoverable nature, make it easy to use both in permanent applications and temporary uses.

Note: For making the excavation please request the technical documentation from our Technical-Commercial Department.
The installer must include the study of the earthing system in the project.





INTEGRATION IN THE SURROUNDINGS

The **miniBLOK** offers a wide range of exterior surface finishes (colours, textures and reliefs), giving it a great capacity for aesthetic harmony with the surroundings, integration and imitation.

This allows a greater adaptation to the requirements of the installation, while reducing its visual impact.

COLOUR

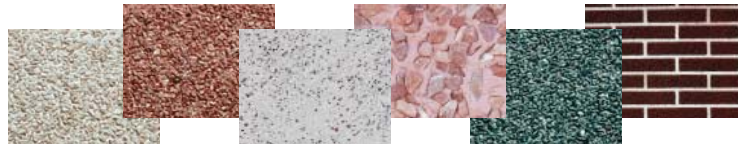
- Enclosure.
- Ventilation doors and grilles.
- Cover.

	RAL 1015
	RAL 7002
	RAL 6003
	RAL 8022
	RAL 3022
	RAL 8017
	RAL 9002
	RAL 1001
	RAL 1006
	RAL 8023

TEXTURES

On the enclosure:

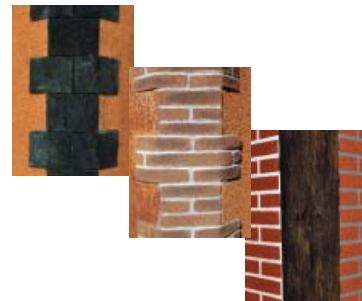
- Rough finish: Arid relief.
- Teardrop finish: Scraped single-layer.
- Exposed stone.



CORNERS IN RELIEF

Imitation in:

- Rustic brick.
- Sandstone.
- Slate-coloured stone.
- Wood.



Note: More information in the corresponding catalogue.





ADVANTAGES

- Fully factory-assembled and equipped (enclosure, switchgear, transformer and internal earthing circuit).
- Product tested as a unit.
- **High personnel safety**
 - Against internal arcs, accidental direct contact, touch and step voltage.
 - Equipotential work surface.
 - No access to live parts. Integrated in the surroundings.
- Reduced environmental, visual and acoustic impact.
- Excellent resistance to pollution and other environmental factors.
- Easy to transport due to its reduced dimensions and weight.
- Simple installation, limited to the introduction of the enclosure in the excavation and the connection of the MV and LV cables.
- Fast changes of electrical equipment.



APPLICATIONS

The **miniBLOK** Transformer Substations are

- Safe
- Environmentally-friendly
- Sustainable
- Ergonomic

The **miniBLOK** is used for the following applications:

- **Generation:**
 - Photovoltaic facilities
- **Distribution:**
 - Public and private distribution
 - Urban environments.
 - Industrial environments.
 - Areas with restricted or reduced space.
 - Installations with integrated remote control, telemetering and/or telemanagement.
 - etc.





PRESENTATION

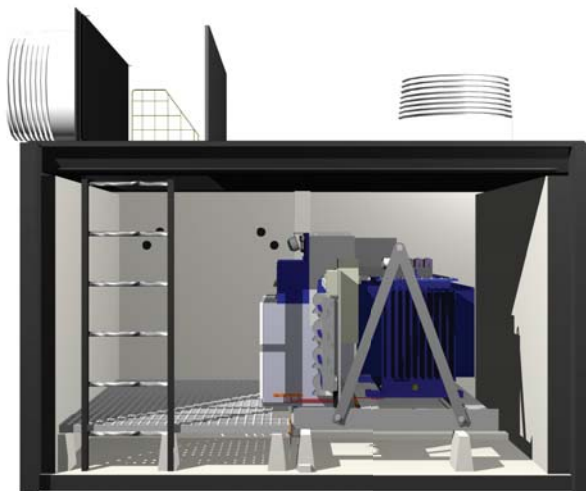
Ormazabal's miniSUB is a **Compact Prefabricated Transformer Substation** installed **underground**, with reduced dimensions, standard-built, tested and supplied from the factory as a unit.

It is characterised by incorporating an **Ormazabal MB** Medium Voltage associated type (A) compact equipment assembly, for use in both public and private distribution networks up to 36 kV.

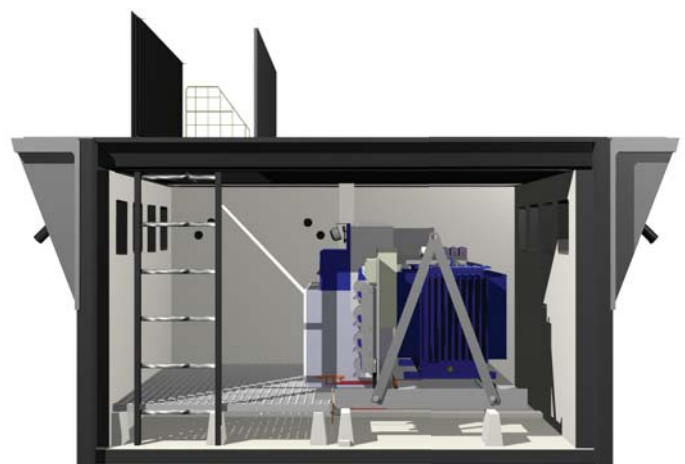
The careful exterior design and reduced dimensions minimise its visual impact, making it suitable when the available space is limited, in both industrial and residential areas.

The main advantage of these Transformer Substations is their high safety and protection for both persons and property against internal faults, their **IAC classification**, as well as their robustness and reliability.

Thanks to its manufacture, assembly, equipment and testing done entirely at the factory, **miniSUB** offers uniform quality and a significant reduction of costs and installation time, making it possible to have an operational Transformer Substation available in a short time.



miniSUB-V



miniSUB-H



COMPOSITION

The **miniSUB Compact Prefabricated Transformer Substations** have the following maximum configuration:

- **MB** associated compact equipment assembly:
 - Fully gas insulated Medium Voltage Switchgear: CGMCOSMOS-2LP up to 24 kV or CGM.3-2LP up to 36 kV. Electrical diagram (RMU) with 2 feeder functional units, input and output, and a protection functional unit with a switch-fuse combination.
 - Ormazabal protection, control and metering units (remote control, telemetering, integrated control, telemanagement, etc.).
 - Medium Voltage Distribution Transformer, 250, 400 or 630 kVA.
 - LV Switchgear: Low Voltage board with control and protection unit, as well as an auxiliary safety supply.
 - Direct MV and LV interconnections.
 - Self-supporting frame.
 - Earthing circuit connection.
 - Lighting and auxiliary services.
- Reinforced concrete monoblock enclosure with removable cover.

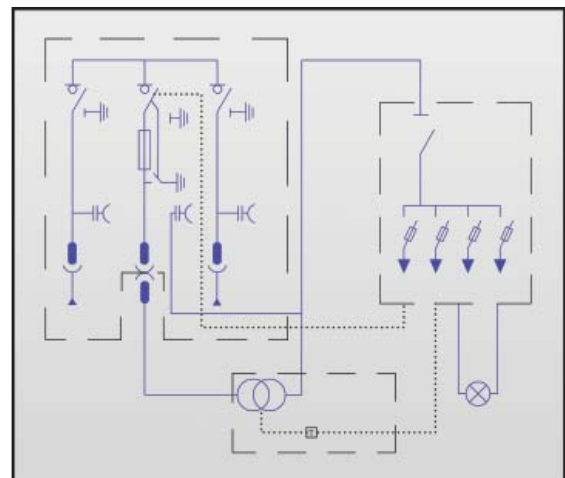
Note: For other configurations and/or values, please consult Ormazabal's Technical-Commercial Department.



APPLICABLE STANDARDS

- IEC / EN 62271-202: High Voltage Switchgear: Prefabricated Transformer Substations.
- EN 50532*: Compact Equipment Assembly (CEADS)
- On request:
 - Specific regulations of the Utility.
 - Applicable local regulations.

(* Under development at the time of publication of this catalogue.

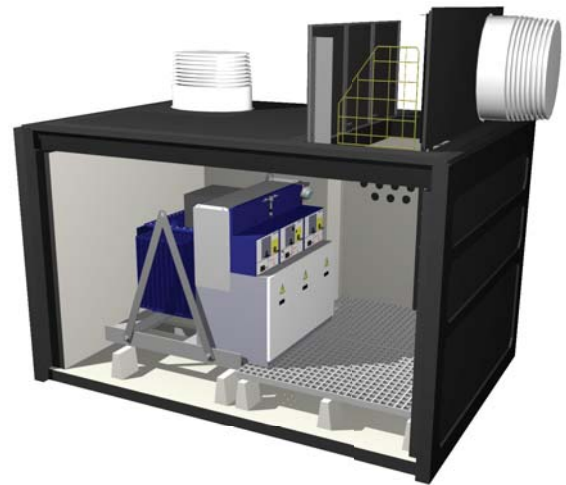




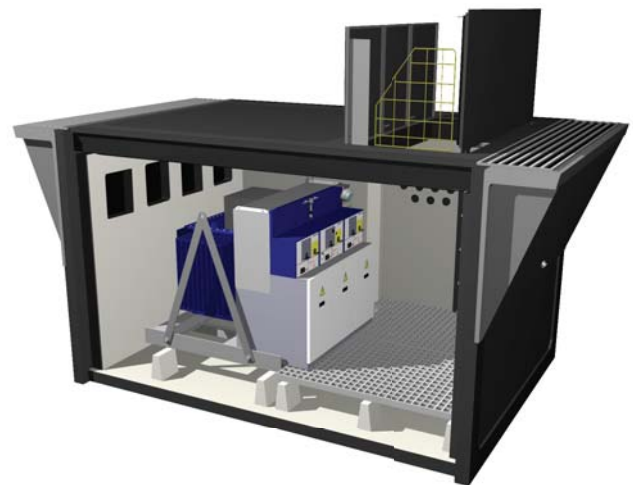
CHARACTERISTICS

The **miniSUB** is characterised for having:

- **MB** Associated compact equipment assembly:
 - 24 and 36 kV models.
 - Fully factory-assembled.
 - Test performed on the MB as an individual unit and as an assembly in the miniSUB.
 - Reduced size and versatility.
 - Ideal for use in public distribution networks up to 36 V.
 - Fast and simple replacement of the equipment.
- Prefabricated concrete enclosure:
 - Reduced dimensions: ideal for limited spaces.
 - Underground installation: minimum visual impact.
 - Monoblock enclosure with removable cover.
 - Interior dielectric liquid collection pit, with resistant and sealed lining, for protection against soil contamination.
 - Fire barrier protection elements: layer of pebbles over the dielectric collection pit.
- Ventilation
 - By natural air circulation, class 10: horizontal (miniSUB-H) made up of grilles located on the horizontal plane (level 0) or vertically (miniSUB-V) with turrets located on the vertical plane.
- Improvement tools:
 - Tests and modelling of natural ventilation with **Ormazabal** transformers, for the optimisation of their service life.
 - On request: customised studies according to the data provided by the customer.
- Personnel access:
 - Through non-slip trapdoor located on the cover. Easily opened, it deploys a perimeter safety barrier.
- MV and LV cable inlet/outlet:
 - Through 12 pre-punched orifices in the sides of the enclosure.
 - The orifices are protected with sealed feedthroughs, patented by Ormazabal.



miniSUB with vertical ventilation system



miniSUB with horizontal ventilation system

TECHNICAL CHARACTERISTICS

	miniSUB 24	miniSUB 36
Rated voltage [kV]	24	36
Frequency [Hz]	50	50
Internal Arc (IAC class)	16 kA / 0.5 s	16 kA / 0.5 s
Transformer		
Power [kVA]	250 / 400 / 630	250 / 400 / 630
MV Switchgear		
Rated current [A]		
In Busbars	400/630	400/630
Outgoing Line	400/630(L) 200(P)	400/630(L) 200(P)
Short-time current [kA]	16 / 20	16 / 20
Insulation level		
Industrial Frequency [kV]	50 / 60	70 / 80
Lightning impulse [kV] ^{PEAK}	125 / 145	170 / 195
Low Voltage Board		
Rated voltage [V]	440	440
Rated current [A]	1000	1000
Rated current [A]/ no. outputs	400 / 4	400 / 4

PHYSICAL CHARACTERISTICS

	miniSUB 24	miniSUB 36	miniSUB 24	miniSUB 36
Ventilation	H		V	
Width [mm]	4550		3460	
Depth [mm]	2460		2460	
Height [mm]	Body	- 2350	-2350	
	Ventilation	0	+ 485	
Maximum weight* [kg]	16700	16850	15200	15350

(* with 630 kVA transformer and no remote control.

Note: For other configurations and/or values, please consult Ormazabal's Technical-Commercial Department.

INSTALLATION

The **miniSUB** is supplied fully factory-assembled, so the installation process only involves placing the enclosure in the excavation and connecting the MV and LV cables.

Its simple installation, reduced dimensions and weight, as well as its recoverable nature, make it easy to use both in permanent applications and temporary uses.

Note: For making the excavation please request the technical documentation from our Technical-Commercial Department.
The installer must include the study of the earthing system in the project.





ADVANTAGES

- Fully factory-assembled and equipped (enclosure, switchgear, transformer and internal earthing circuit).
- Product tested as a unit.
- **High personnel safety**
 - Against internal arcs, accidental direct contact, touch and step voltage.
 - Equipotential work surface.
 - No access to live parts.
- Reduced environmental, visual and acoustic impact.
 - Containment of possible dielectric leakage.
 - Fire protection.
- Excellent resistance to pollution and other environmental factors.
- Waterproof and sealed.
- Easy to transport due to its reduced dimensions and weight.
- Simple installation, limited to the introduction of the enclosure in the excavation and the connection of the MV and LV cables.
- Fast changes of electrical equipment.



APPLICATIONS

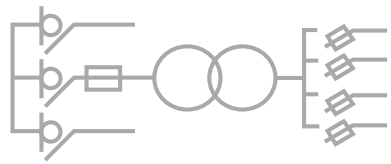
The **miniSUB** Transformer Substations are

- Safe
- Environmentally-friendly
- Sustainable
- Ergonomic

and their main application are in:

- **Distribution:**
 - Public and private distribution
 - Urban and residential environments.
 - Historical environments.
 - Large infrastructures: airports, ports, etc.
 - Areas with reduced or restricted spaces (garage accesses, etc.).
 - Installations with integrated remote control, telemetering and/or telemanagement.
 - etc.







ORMAZABAL

Focus on Medium Voltage

TECHNICAL-COMMERCIAL DEPARTMENT

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Transformer Substations up to 36 kV

Prefabricated Transformer Substations

- Medium Voltage Applications for Renewable Energy

Medium Voltage Secondary Distribution Switchgear

- CGMCOSMOS System
- CGM.3 System

Medium Voltage Primary Distribution Switchgear

- CPG System
- CPA System

Automation, Protection, Telemangement and Communication

Distribution Transformers

Low Voltage Switchgear

