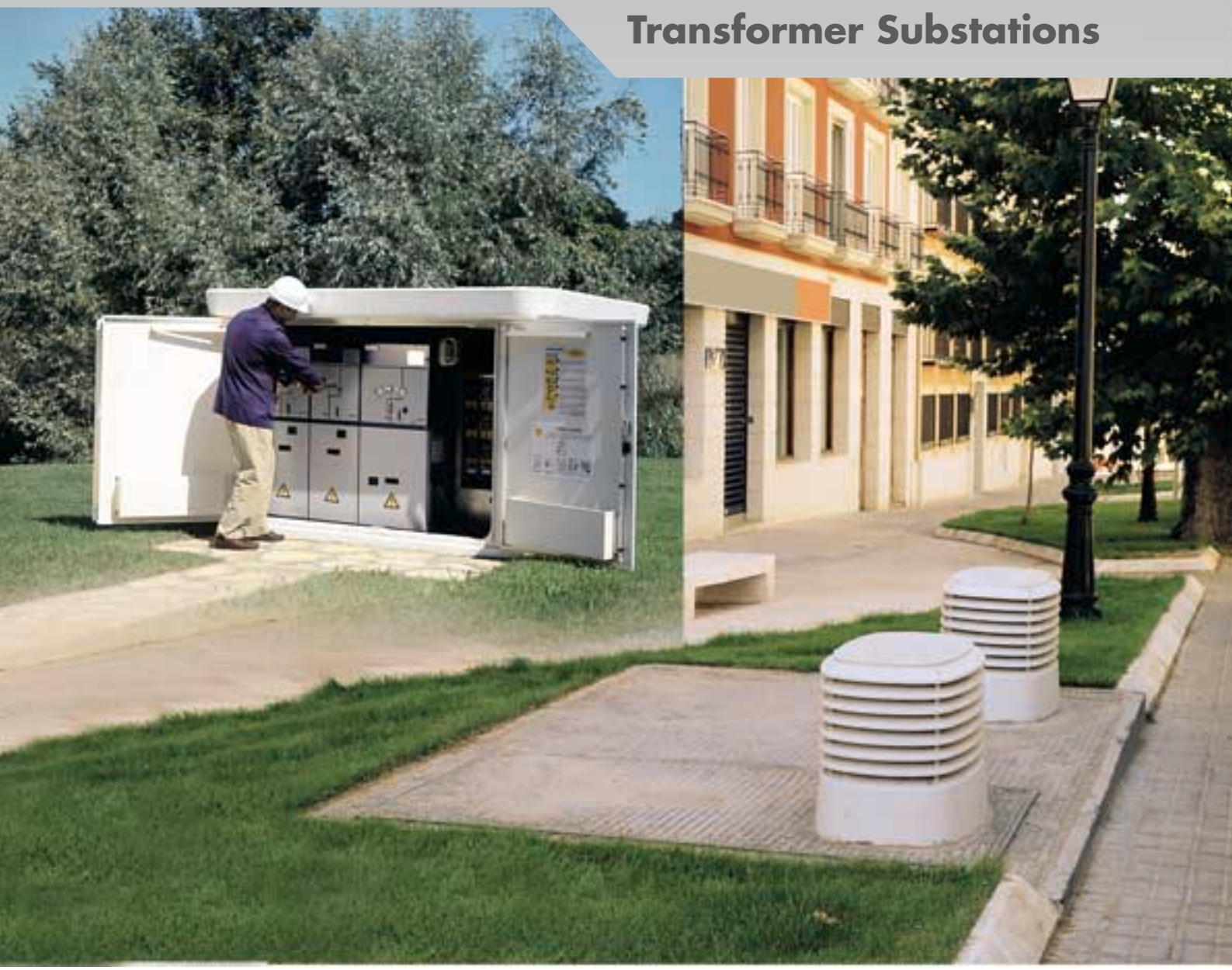
ORMAZABAL

Transformer Substations



Prefabricated Transformers Substations

Up to 36 kV

Index

The quality of the products designed, manufactured and installed by Ormazabal is guaranteed by the implementation and certification of a quality assurance system that conforms to the ISO 9001 international standard.

Our company's commitment to the environment protection is asserted by the implementation and certification of an environmental management system that conforms to the ISO 14001 international standard.

As a result of the constant development of standards and new designs, the characteristics of the items shown in this catalogue may be changed without prior notice.

Characteristics and availability of materials must be confirmed by our Technical-Commercial department.

PFU House-Type Monoblock Transformer Substations

OVERVIEW

The **PFU** Transformer Substations consist of a concrete monoblock-structure enclosure that houses all electrical switchgear from MV switchgear to LV switchboards, including transformers, control devices and interconnecting equipment for the various elements.

The main advantage of these Transformer Substations is the fact that both the construction, assembly and built-in equipment can be entirely factory-built, thus ensuring uniform quality and significantly minimising any on-site construction and assembly work. In addition, the careful design of the substations allows the substations to be installed in both industrial and urban environments.

PFU-5 with 2 transformers,1000 kVA each

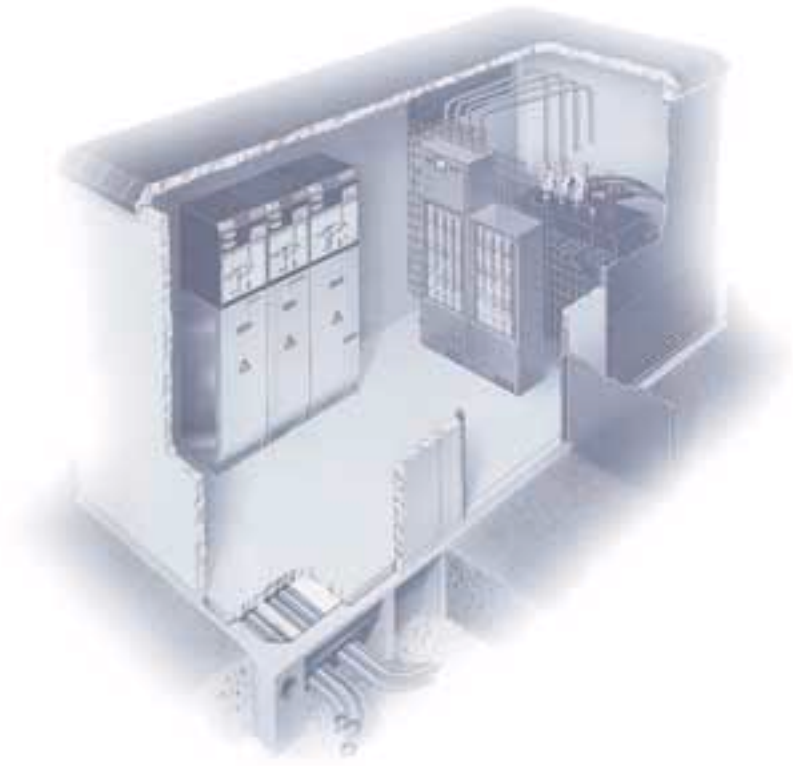
FIELD OF APPLICATION

PFU Transformer Substations allow typical power supply arrangements consisting of up to 2 transformers with a maximum unit power of 1000 kVA[1] to be installed.

INSTALLATION

The installation of **PFU** substations is simple, since "on-site" operations can be reduced to positioning on the trench and connecting the supply service cables, which are threaded into the substation through knockout holes located on the bottom.

PFU-3 with 1 transformer



(1) For further conditions, please contact our Technical/Commercial department.

PFU House-Type Monoblock Transformer Substations

CGM switchgear panels inside a **PFU** substation

OPERATION

Access to the Transformer Substation is possible through a front door, which enables access to the equipment compartment that accomodates MV panels, LV panels and control devices of the substation. If operating conditions so require, a second access door for personnel can be added and a physical separation between the utility company and customer panels can be created.

Each transformer is provided with its own door so it can be removed from the substation or accessed for maintenance purposes.

PFU-5 with 1 transformer and **PFU-4** substation

TECHNICAL REGULATIONS/STANDARDS

IEC 61330, RU 1303A
IEC 60298, RU 6407B

UNE 21428-1, HD 428, RU 5201D
UNE 21538, HD 538
IEC 60439-1, RU 6302B

CONSTRUCTION CHARACTERISTICS

The substations have a reinforced vibrated concrete enclosure consisting of two sections: one that comprises the bottom plates and side walls which include doors and natural ventilation grilles and another one that forms the ceiling.

All concrete steel reinforcements are connected to each other as well as to the earth bus, as specified in RU 1303. In addition, the doors and grilles feature a 10 kΩ resistance to the earthing connection of the enclosure.

The standard finish of the substation is a rough acrylic paint (white for walls and brown for ceilings, doors and grilles).

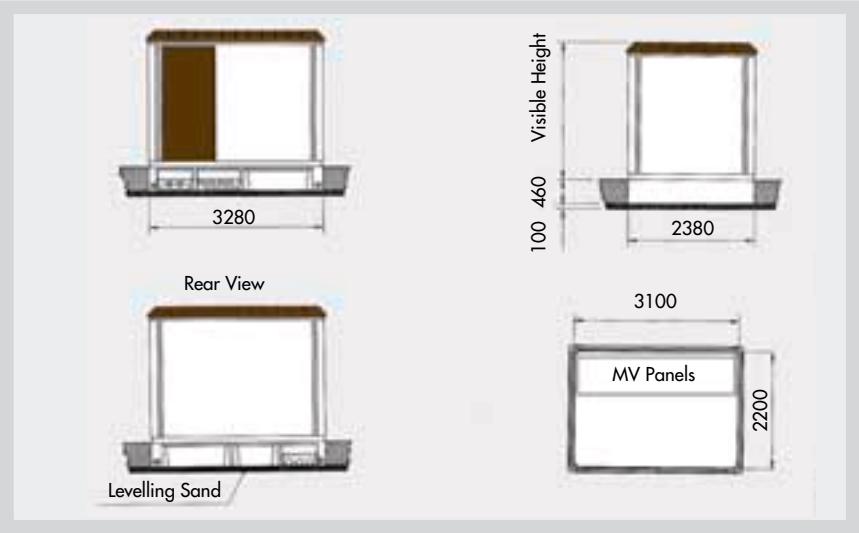
SUBSTATIONS UP TO 24 kV				
		PFU-3	**PFU-4**	**PFU-5**
Outside dimensions	Lenght [mm]	3280	4460	6080
	Width [mm]	2380	2380	2380
	Height [mm]	3045	3045	3045
	Area [m²]	7,8	10,7	14,5
	Visible Height [mm]	2585	2585	2585
Inside dimensions	Lenght [mm]	3100	4280	5900
	Width [mm]	2200	2200	2200
	Height [mm]	2355	2355	2355
	Area [m²]	6,8	9,4	13,0
Trench dimensions	Lenght [mm]	4080	5260	6880
	Width [mm]	3180	3180	3180
	Depth [mm]	560	560	560
	Weight [kg]	10500	12000	17000

SUBSTATIONS UP TO 36 kV				
		PFU-3	**PFU-4**	**PFU-5**
Outside dimensions	Lenght [mm]	3280	4460	6080
	Width [mm]	2380	2380	2380
	Height [mm]	3240	3240	3240
	Area [m²]	7,8	10,7	14,5
	Visible Height [mm]	2780	2780	2780
Inside dimensions	Lenght [mm]	3100	4280	5900
	Width [mm]	2200	2200	2200
	Height [mm]	2550	2550	2550
	Area [m²]	6,8	9,4	13,0
Digging dimensions	Lenght [mm]	4080	5260	6880
	Width [mm]	3180	3180	3180
	Depth [mm]	560	560	560
	Weight [kg]	11000	12500	18000

NOTE: Access door dimensions: 900/1100 x 2100 mm
Transformer door dimensions: 1260 x 2100/2400

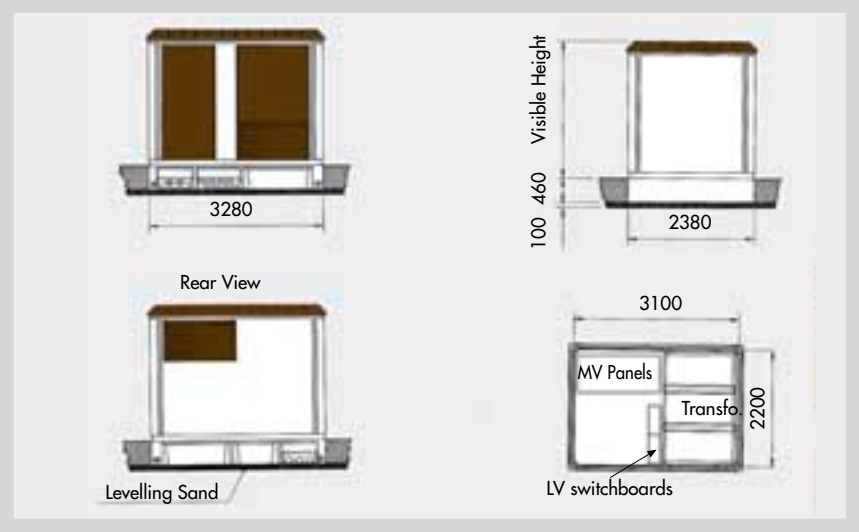
PFU House-Type Monoblock Transformer Substations

PFU-3
without a transformer

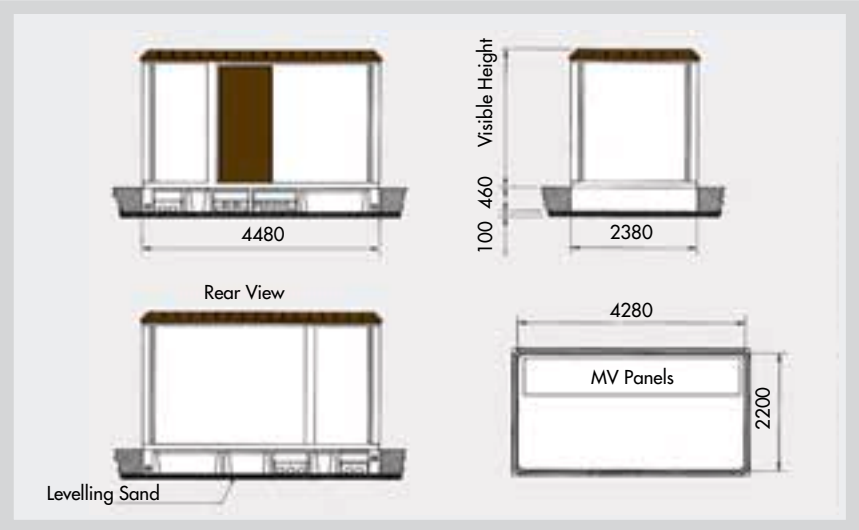


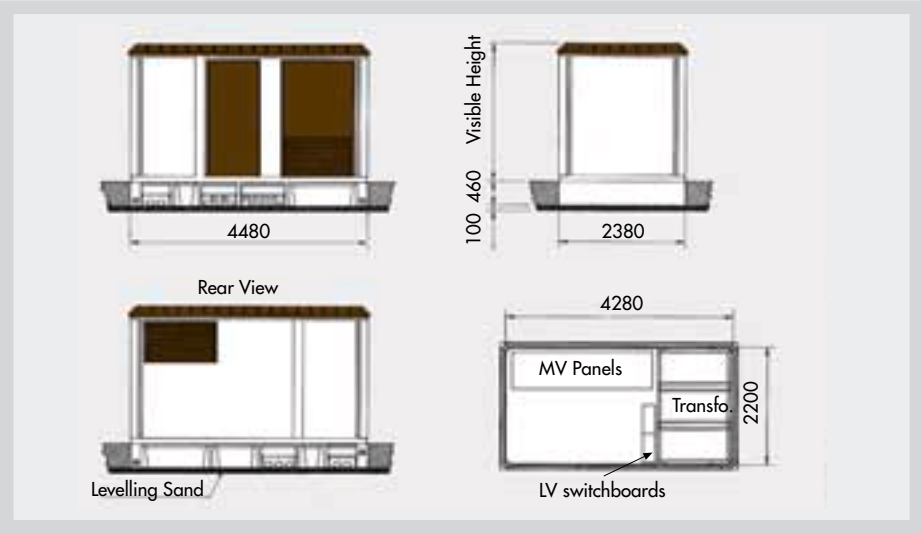
PFU-3
1 transformer

For transformers rated above 630 kVA, additional ventilation grilles are mounted on the side wall.



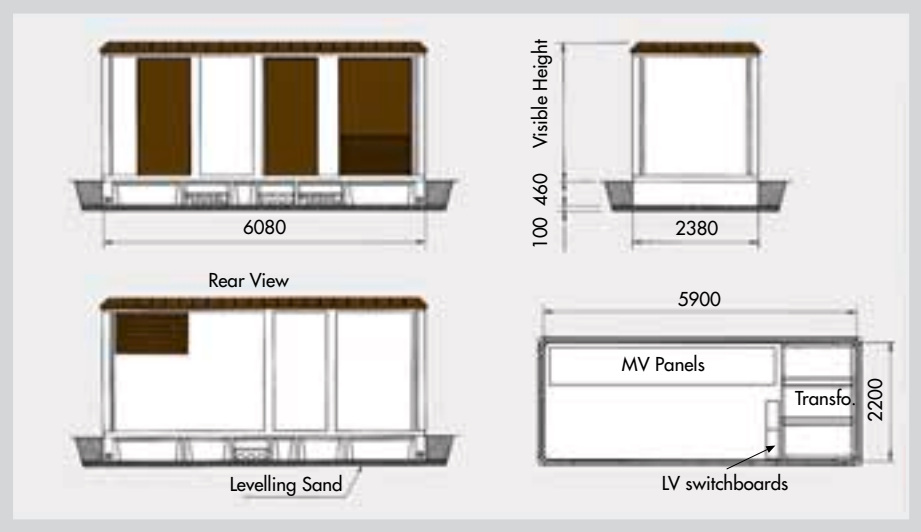
PFU-4
without transformer





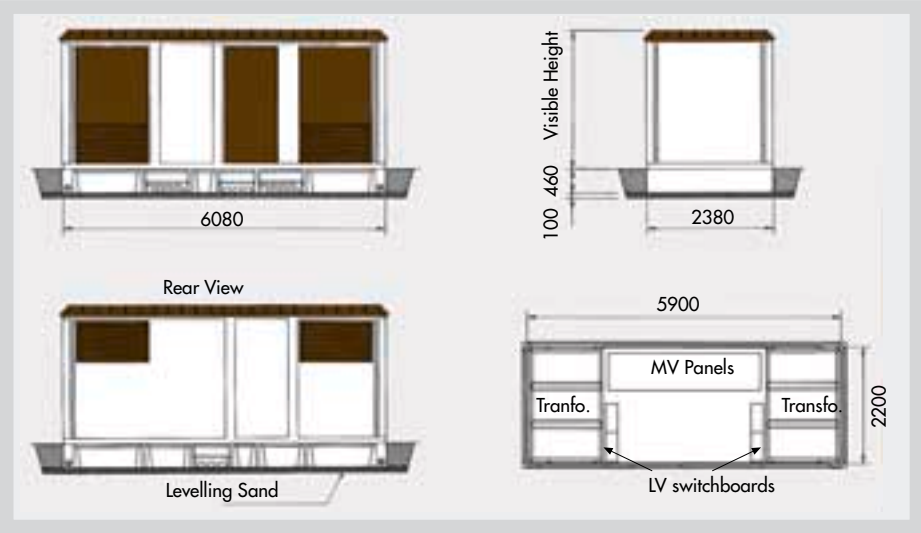
PFU-4
1 transformer

For transformers rated above 630 kVA, additional ventilation grilles are mounted on the side wall.



PFU-5
1 transformer
2 access doors

For transformers rated above 630 kVA, additional ventilation grilles are mounted on the side wall.



PFU-5
2 transformers

For transformers rated above 630 kVA, additional ventilation grilles are mounted on the side wall.

PFS Underground Monoblock Transformers Substations up to 2 Transformers

OVERVIEW

PFS Transformer Substations feature a monoblock structure and have been designed for underground installation and can house different electrical power distribution arrangements, making them suitable for public distribution and private installation load-centre substations.

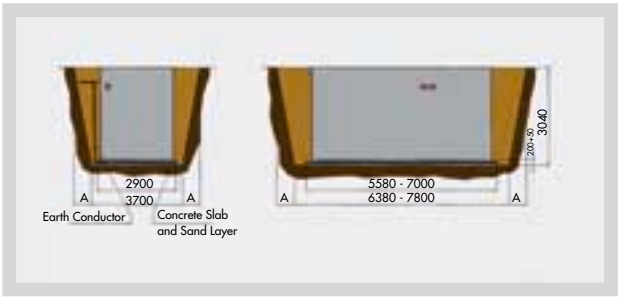
The underground installation and the easy adaptation of the substation area minimise any environmental impact.

Depending on the ventilation system, two different versions are available: **PFS-V** (vertical grille ventilation, protruding) and **PFS-H** (horizontal grille ventilation, non-protruding)

PFS-V exterior view of 1 Transformer.

PFS-2T

PFS



FIELD OF APPLICATION

PFS Transformer Substations can be used for electrical power distribution up to 36 kV, including a transformer with a maximum power of 1000 kVA or 2 transformers of maximun power of 630 kVA[1].

PFS-H exterior view

TECHNICAL REGULATIONS/STANDARDS

IEC 61330, RU 1303A
IEC 60298, RU 6407B
UNE 21428-1, HD 428, RU 5201D
UNE 21538, HD 538
IEC 60439-1, RU 6302B

INSTALLATION

Installation consists mainly in bringing the packaged substation to the trench, positioning it on a compacted sand layer and concrete slab, and then connecting the supply service and earth conductors, since switchgear assembly can be performed at the factory. All this reduces "on-site" operations to one working day, thus minimising costs and ensuring uniform quality for all substations.

PFS Substations have been designed for installation in gardens and on the sideways (even for those not protected from occasional access by vehicles, in accordance with the Instruction related to actions to be considered for road bridge projects) and substation finishing can be performed at the factory or on-site by means of gravel, floor tiles, etc.

On-site handing

(1) For further conditions, please contact our Technical/Commercial department.

OPERATION

Personnel can access the substation through an opening of 1300 x 700 mm located on the ceiling. This entrance is covered by a balanced cover plate such that it can be opened by a single operator. It also deploys a metal peripheral protection around the access opening. The operator can descend into the load-centre substation using a step ladder, with a tilting angle under 68°. The switching gangway is far from the access area, thus avoiding rainfall on the corridor.

The transformers access covers plates feature an opening of 2100 x 1270 mm, and are equipped with four tapped inserts on the outside for handling. The transformers inside the substation are separated by means of a plate and placed over the oil collecting pit.

Materials and tools can be entered through specific cover that has also four inserts on the outside for handling.

CGM 36 kV panels inside a **PFS**

View of a **PFS-V** substation with the personnel access cover opened

CONSTRUCTION DATA

The substation features an extra-sturdy monoblock structure and is made of vibrated concrete and electrically welded steel reinforcements joined to the earth bus of the Transformer Substation.

Due to an impermeable concrete surface which is resistant to the presence of sulphate on the ground, as well as the existence of watertight joints on the cable side entries as well as on the upper cover plates, the substation can be installed on grounds with a high ground-water level, even in areas with a high flood risk.

TECHNICAL DATA	1 Transformer		2 Transformers	
	PFS-H	PFS-V	PFS-H	PFS-V
Lenght [mm]	6.180	5.140	7.600	6.560
Width [mm]	2.460	2.460	3.000	2.460
Height (depth) [mm]	2.790	2.790	2.790	2.790
Visible height [mm]	0	610/820	0	610
Maximum weight [kg]	25.000	24.000	29.000	26.400

PF House Type Modular

OVERVIEW

PF Transformer Substations consist of different prefabricated concrete elements that are assembled on-site to create a building that houses all electric switchgear: from the MV switchgear to the low-voltage switchboards, including transformers, control devices and interconnecting means for the different elements.

The modular structure allows Transformer Substations to be easily transported for installation in hard-to-access areas and permit any arrangement of the Transformer Substation to be implemented, including the number of access doors and transformers required for each application.
Prefabrication of all elements used for building the substations and Ormazabal's Quality System ensures uniform quality in all Transformer Substations.

PF-203 with 2 transformers and **PF-201** for metering

PF-204 with 2 transformers

FIELD OF APPLICATION

PF Transformer Substations allow any electrical power supply arrangement, with a maximum transformer unit power of 1000 kV[1].

INSTALLATION

PF Substation installation is limited to on-site assembly of all prefabricated elements as well as inclusion of electrical components, and finally connection of the supply service cables that enter the substations through knockout holes located on the bottom of the side wall.

TECHNICAL REGULATIONS/STANDARDS

IEC 61330, RU 1303A
IEC 60298, RU 6407B
UNE 21428-1, HD 428, RU 5201D
UNE 21538, HD 538
IEC 60439-1, RU 6302B

OPERATION

Access to the Transformer Substation is possible through a front door that allows direct access to the equipment compartment that houses the medium-voltage panels, the low-voltage switchboards and the control elements of the substations. If operation conditions so require, a second access door for personnel can be added and a physical separation between the utility company and customer panels can be created.

Each transformer has its own door so the transformer can be removed from the substation or accessed for maintenance purposes.

(1) For higher power values, please contact our Technical/Commercial department.

CONSTRUCTION DATA

The enclosure panels are made of vibrated reinforced concrete, with the concrete steel reinforcements joined to each other and to the earth bus as specified in RU 1303. In addition, the doors and grilles feature a 10 kΩ resistance to the earthing connection of the enclosure.

A standard polyurethane finish has been used for the substation (white for walls and brown for ceiling, doors and grilles).

PF-200 SUBSTATIONS UP TO 24 kV

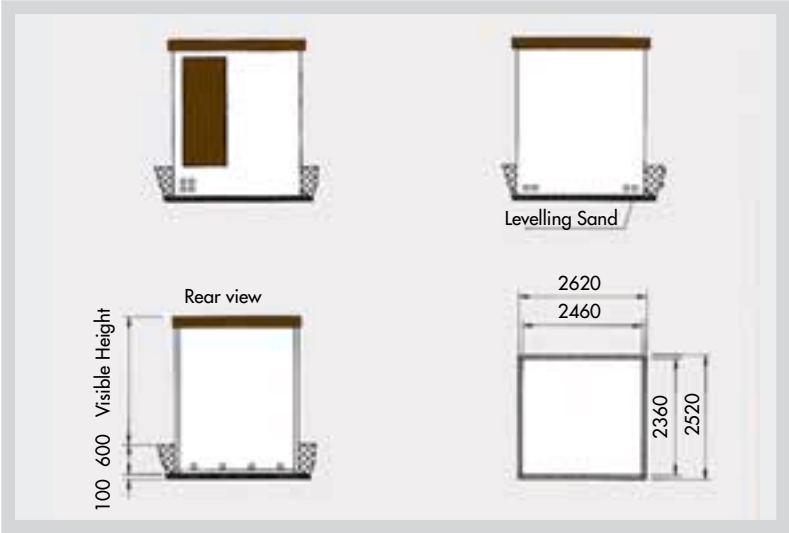
		PF-201	PF-202	PF-203	PF-204
Outside dimensions	Lenght [mm]	2620	4880	7240	9600
	Width [mm]	2520	2620	2620	2620
	Height [mm]	3195	3195	3195	3195
	Area [m^2]	6,6	12,8	19,0	25,2
	Visible Height [mm]	2595	2595	2595	2595
Inside dimensions	Lenght [mm]	2460	4720	7080	9440
	Width [mm]	2360	2460	2460	2460
	Height [mm]	2285	2285	2285	2285
	Area [m^2]	5,8	11,6	17,4	23,2
Trench dimensions	Lenght [mm]	3420	5680	8040	10400
	Width [mm]	3420	3420	3420	3420
	Depth [mm]	700	700	700	700
	Weight [kg]	10200	17100	24200	30850

PF-300 SUBSTATIONS UP TO 36 kV

		PF-301	PF-302	PF-303	PF-304
Outside dimensions	Lenght [mm]	2620	4880	7240	9600
	Width [mm]	2520	2620	2620	2620
	Height [mm]	3600	3600	3600	3600
	Area [m^2]	6,6	12,8	19,0	25,2
	Visible Height [mm]	3000	3000	3000	3000
Inside dimensions	Lenght [mm]	2460	4720	7080	9440
	Width [mm]	2360	2460	2460	2460
	Height [mm]	2700	2700	2700	2700
	Area [m^2]	5,8	11,6	17,4	23,2
Trench dimensions	Lenght [mm]	3420	5680	8040	10400
	Width [mm]	3420	3420	3420	3420
	Depth [mm]	700	700	700	700
	Weight [kg]	11000	18500	25800	32900

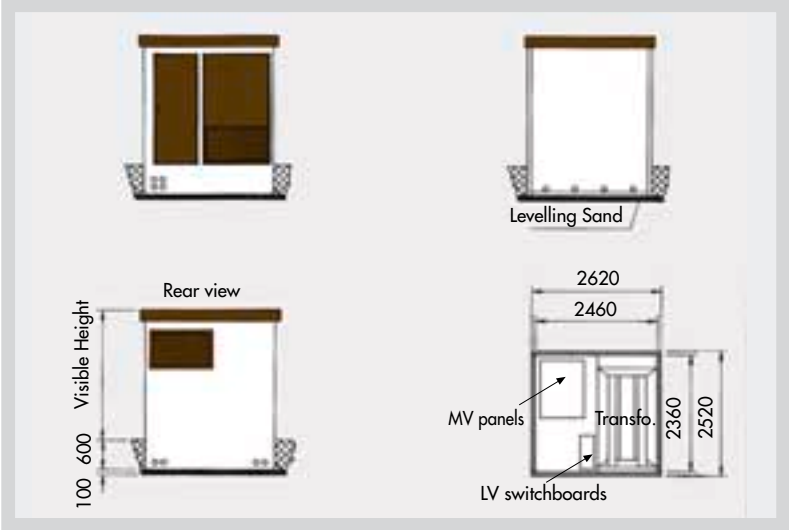
NOTES: Access door dimensions: 900 x 2100 (24 kV) / 900 x 2400 (36 kV).
Transformer door dimensions: 1260 x 2100 (24 kV) / 1260 x 2400 (36 kV).

PF-201 / 301
without a transformer



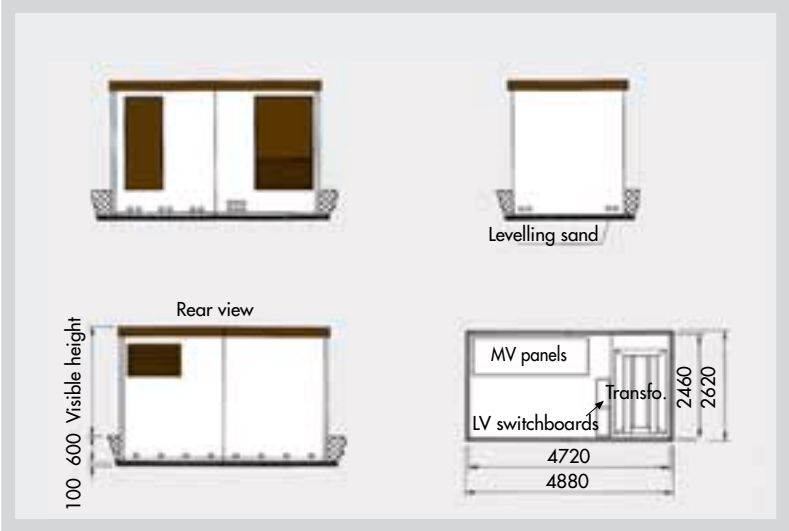
PF-201/301
1 transformer

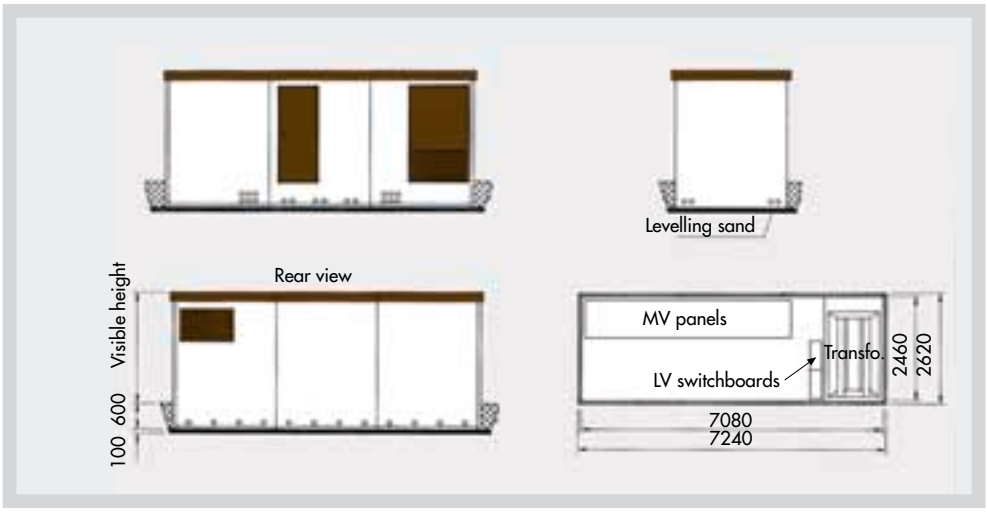
For transformers rated above 630 kVA, additional ventilation grilles are mounted on the side wall.



PF-202/302
1 transformer

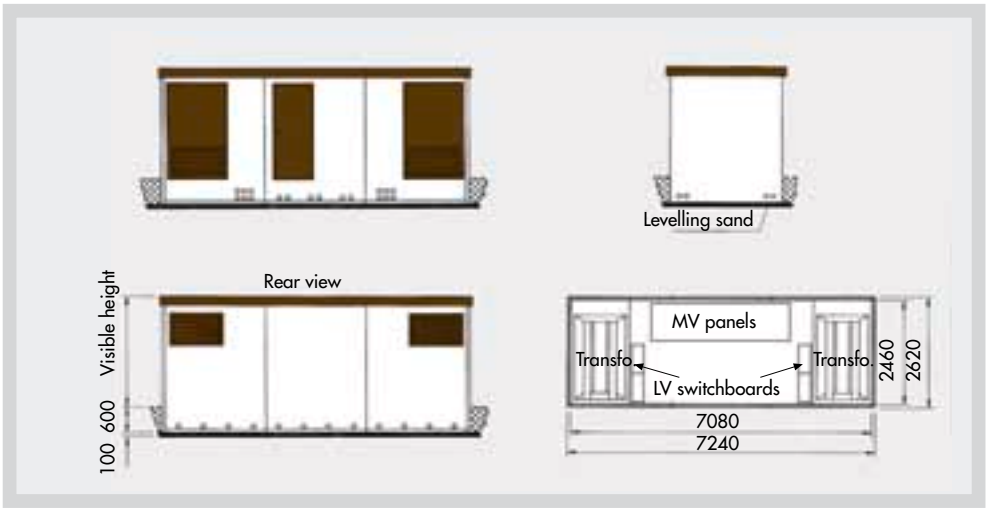
For transformers rated above 630 kVA, additional ventilation grilles are mounted on the side wall.





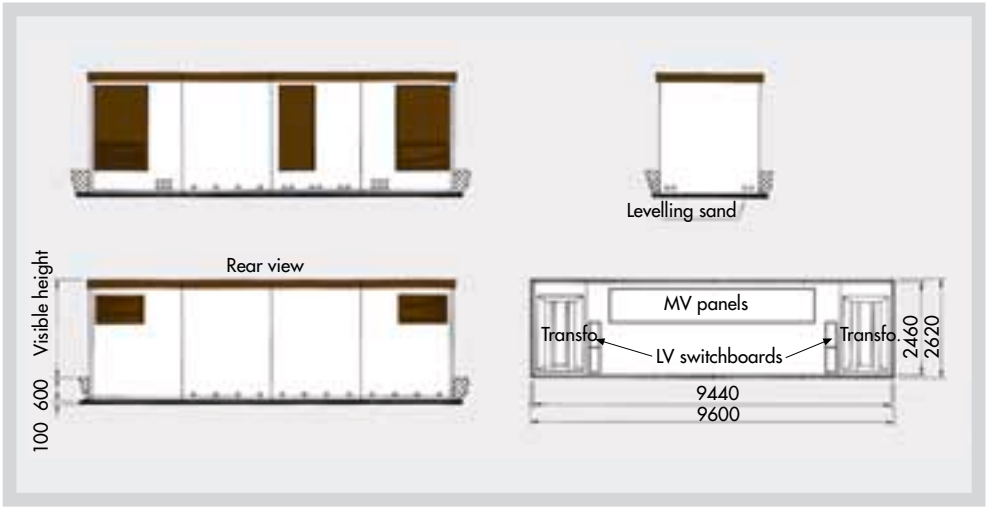
PF-203/303
1 transformer

For transformers rated above 630 kVA, additional ventilation grilles are mounted on the side wall.



PF-203/303
2 transformers

For transformers rated above 630 kVA, additional ventilation grilles are mounted on the side wall.



PF-204/304
2 transformers

For transformers rated above 630 kVA, additional ventilation grilles are mounted on the side wall.

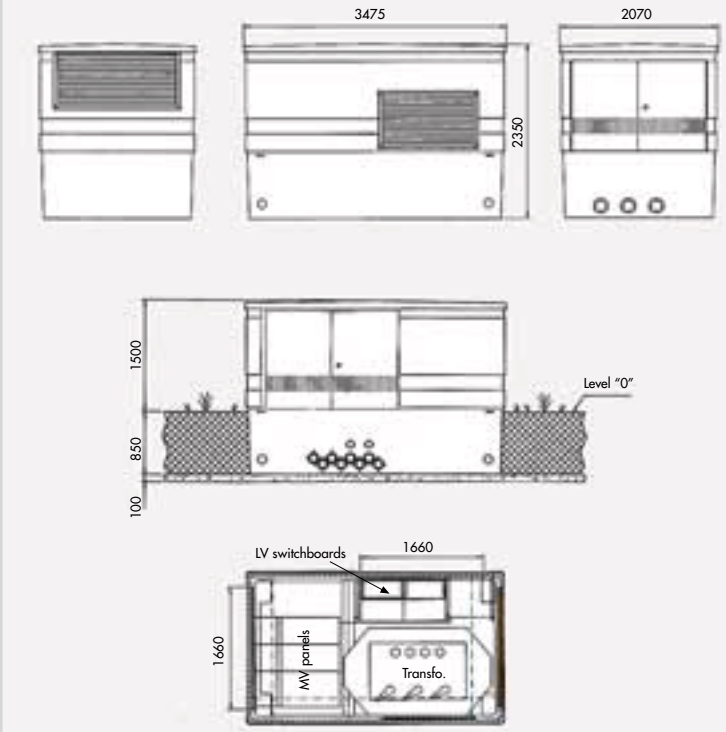
ORMASET Half-buried Packaged Transformer Substations

OVERVIEW

The **ORMASET** is a packaged Transformer Substation that has been designed for half-buried installation, incorporating MV switchgear with SF_6 as insulation and interrupting medium (**CGM/CGC**), a transformer, a LV switchboard as well as interconnecting and auxiliary devices.

Its careful outdoor design, compact size and half-buried installation (visible height 1.5 m) reduces the substation visual impact, making it suitable for both industrial and residential areas.

Weight: 7.200 kg (without a transformer)



ORMASET (view of LV switchboard access doors)

FIELD OF APPLICATION

The **ORMASET** Transformer Substation allows electrical power supply arrangements with a transformer up to 1000 kVA(1), at 24 and 36 kV, to be implemented, where the maximum configurations are:

24 kV → 3L + 1P (3 feeder protection panels and one fused protection panel).
36 kV → 2L + 1P (2 feeder protection panels and one fused protection panel).

TECHNICAL REGULATIONS/STANDARDS

IEC 61330, RU 1303A
IEC 60298, RU 6407B
UNE 21428-1, HD 428, RU 5201D

OPERATION

The MV switchgear and the LV switchboard can be accessed from outside through independent doors, thus making operations easy.

INSTALLATION

Prefabrication of the Substitions allows full equipment assembly at the factory, such that "on-site" operations can be limited to final positioning of the building on the trench, as shown in the figures, and connection of electrical service supply cables.

View of the **CGM** panel and the LV switchboard access doors in a **ORMASET**

(1) at the transformer, pluggable terminals are used.

MINIBLOK Outdoor Packaged Transformer Substation

OVERVIEW

The **MINIBLOK** is a compartmentalised packaged Transformer Substation, with operation from the outside that has been designed by Ormazabal for use in public MV distribution networks.

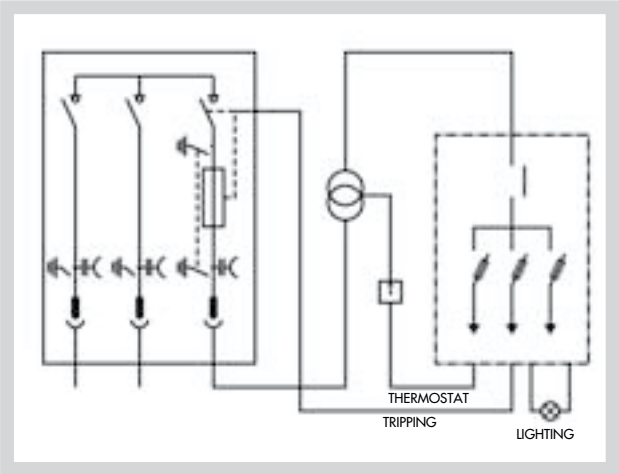
Basically it consists of a compact prefabricated concrete enclosure that houses the **CGC** system MV compact switchgear, a transformer, a LV switchboard and the respective interconnecting and auxiliary devices. The substation is shipped fully factory-assembled to ensure a uniform, high-quality finish.

The conceptual design of these substations, which keeps all components separate from each another, limits the use of combustible insulating liquids and makes replacement of any component easy.

Additionally, the use of SF_6 total-insulation MV voltage switchgear reduces maintenance needs and gives excellent characteristics in terms of resistance to pollution and other environmental factors, including resistance to possible flooding of the Transformer Substation.

Finally, the optimised ventilation provided in this building reduces transformer overheating, and allows maximum use and optimal operating conditions to be achieved.

Outside view of a **MINIBLOK**



FIELD OF APPLICATION

The **MINIBLOK** can be integrated in distribution networks up to 24 kV, where a 250, 400 or 630 kVA(1) transformer is required.

The electrical diagram that is available in medium voltage has two feeder protection panels (incoming and outgoing feeder) and a fuse-switch panel for operation and protection of the transformer as well as a LV switchboard with fused outgoing cables.

Its compact size makes the substation an appropriate solution when limited space is available. Also, its low visible height enables a reduction of visual impact.

(1) For higher power output values, please contact our Technical-Commercial department.

MV and LV switchgear in a **MINIBLOK**

INSTALLATION

Installation of a **MINIBLOK** requires digging a trench of the dimensions shown in the figure. The trench foundation should be levelled by a compacted sand layer on which the packaged substation will be placed.

Installation operations consist of positioning the packaged substation on the dug trench and connecting the MV and LV cables and the outside earthing network. The knockout holes provided on the enclosure should be drilled so this can be done.

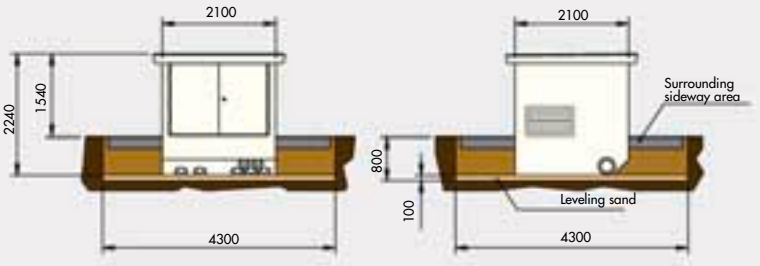
After bringing these cables in, the cable service entrances should be sealed to prevent water from entering the substation, before the trench is covered.

OPERATION

MV or LV switching operations as well as replacing MV or LV fuses are performed by opening the packaged substation doors, with access inside the substation not being necessary.

There are two safe opening positions: at 90° and 180°.

Maximum weight: 7.500 kg (630 kVA)



CONSTRUCTION CHARACTERISTICS AND TECHNICAL SPECIFICATIONS

General		
Rated voltage	24kV	
Insulation level		
At power frequency	50kV	
At lightning impulse	125 $[kV]_{peak}$	
Prefabricated enclosure		IEC 61330, RU 1303A
Rated protection	IP 23D	
Impact resistance	IK 10	
Class	10K	
MV panels		IEC 60298, IEC 60298, RU 6407B
Rated busbar current	400 A	
Rated transformer-off current	200 A	
Rated short-time current (3 s)	16/20 kA	
Switch-fuse combination breaking capacity	20 kA	
Transformer		UNE 21428-1, IEC 60076, HD 428, RU 5201D
Power	250, 400 or 630 kA	
No-load secondary voltage	420 V	
Vector group	Dyn11	
Short-circuit voltage	4%	
LV Switchboard		IEC 60439
Rated voltage	440 V	
Rated current	630 or 1000 A	
Rated current at outputs	160, 400 or 630 A	

MINISUB Underground Packaged Transformer Substation

OVERVIEW

MINISUB is a compact packaged Transformer Substation that has been designed by Ormazabal to be used for public MV distribution networks. The substation has been designed for underground installation.

Inside the compact concrete enclosure, the **CGC** system MV panels, the transformer and the LV switchboard, as well as the interconnecting elements between these elements and the rest of accessories, are installed at the factory.

Two versions are available: **MINISUB-H**, in which the ventilation grilles are located on a horizontal plane, where stepping is possible without any restrictions, and the **MINISUB-V**, which has ventilation grilles located in appropriate small ventilation towers that have been designed to be integrated with all other typical elements of sideways or parks and gardens.

The construction of the foundation and walls that form a single concrete part prevents water from filtering from the underground.

This feature, together with the use of gaskets on the upper cover plate and the access door, prevents water from entering the Transformer Substation. The design of the ventilation grilles in the **MINISUB-V** model prevents rainfall and even surface water from entering the enclosure until it reaches an approximate height of 200 mm. In the **MINISUB-H** model, manholes are available that can be coupled to the general rain water sewer to remove water that enters through the grilles, thus preventing it from entering the Transformer Substation.

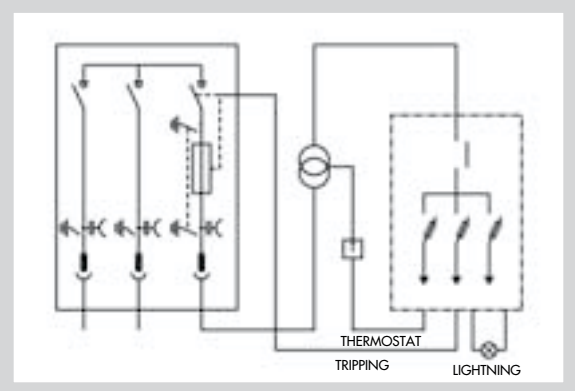
In addition, the use of SF_6 total insulation MV switchgear in the **CGC** system reduces maintenance needs and provides the unit with excellent characteristics in terms of resistance to pollution and other environmental factors, including possible flooding of the Transformer Substation.

The compartmentalization of these **MINISUB** Substations keeps all components separate from each other, making component replacement easy.

FIELD OF APPLICATION

MINISUB is applicable to electrical power distribution networks of up to 24 kV, where one transformer of 250, 400 or 630 kVA is required. The available MV electrical diagram has two feeder (incoming and outgoing) protection panels and a fuse-switch panel for operation and protection of the transformer as well as a LV switchboard with fused outgoing cables.

Its underground installation makes it the ideal solution when one of the installation goals is the use of floor space as a transit area or the minimisation of visual impact.



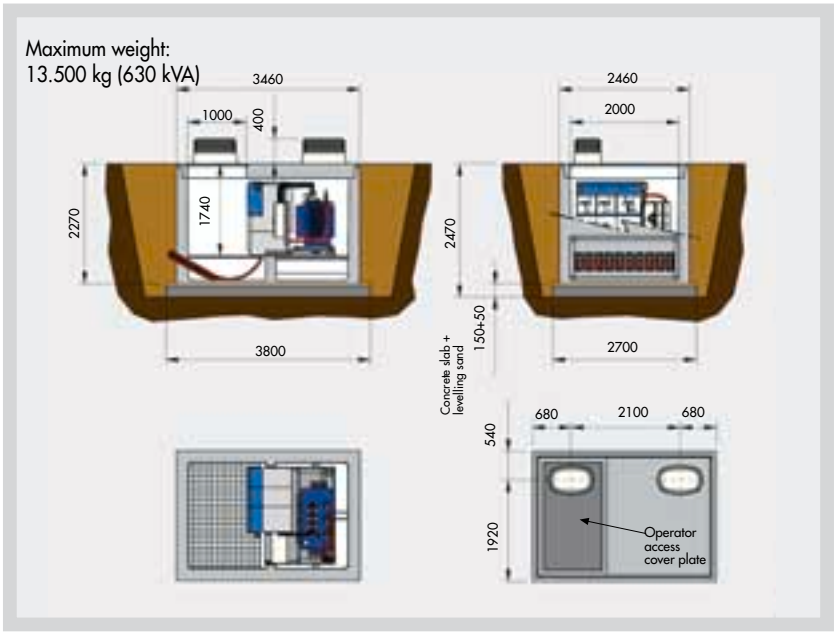
Outside view of a **MINISUB-V**

INSTALLATION

Installation of the **MINISUB** requires previous digging of a trench with the dimensions shown in the figure with concrete foundation. Levelling is performed by means of a compacted sand layer on which the packaged substation is placed.

Installation is limited to simply positioning the Transformer Substation in the trench and connecting outside earthing links and MV and LV cables. This operation is performed through knockout holes provided on the concrete enclosure. Those knockout holes are provided with gaskets that seal the inlet once cables have been connected (also connection to the rain water sewer must be performed, if that option has been chosen).

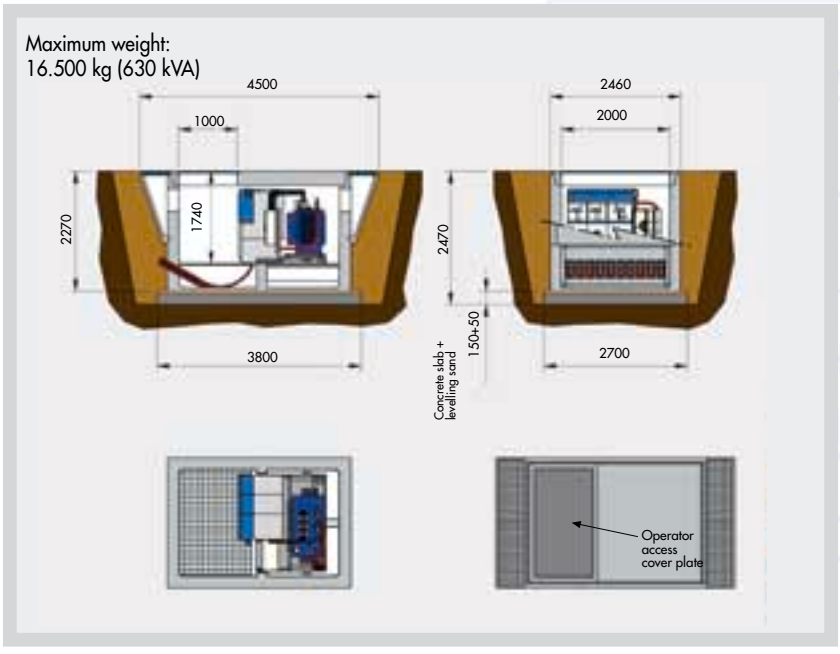
MINISUB-V



OPERATION

MV or LV switching operations as well as MV or LV fuse replacement and transformer regulator operation is done after accessing the space provided for the operator (after descending the step ladder available for that purpose). When the the operator cover plate is opened, a peripheral protection that fully surrounds the opening and allows access to the inside of the **MINISUB** is automatically deployed.

MINISUB-H



CONSTRUCTION CHARACTERISTICS AND TECHNICAL SPECIFICATIONS

General		
Rated voltage	24kV	
Insulation level		
At power frequency	50kV	
At lightning impulse	125 $[kV]_{peak}$	
Prefabricated enclosure		IEC 61330, RU 1303A
Rated protection	IP 23D	
Impact resistance	IK 10	
Class	10K	
MV panels		IEC 60298, RU 6407B
Rated busbar current	400 A	
Rated transformer-off current	200 A	
Rated short-time current (3 s)	16/20 kA	
Switch-fuse combination breaking capacity	20 kA	
Transformer		UNE 21428-1, IEC 60076, HD 428, RU 5201D
Power	250, 400 or 630 kA	
No-load secondary voltage	420 V	
Vector group	Dyn11	
Short-circuit voltage	4%	
LV Switchboard		IEC 60439-1
Rated voltage	440 V	
Rated current	630 or 1000 A	
Rated current at outputs	160, 400 or 630 A	

ORMABAT End-of-line Packaged Transformer Substation

OVERVIEW

The **ORMABAT** is a packaged, monoblock-structure Transformer Substation that has been designed for ground installation. The substation can be equipped with MV switchgear, with SF_6 as insulation and interrupting medium (**CGM**), the transformer and interconnecting and auxiliary devices.

The basic model contains a fuse-switch panel[1] for transformer protection that is operated from outside.

The Substation features easy installation, compact dimensions and low-weight and recyclable components,allowing it to be used for both permanent and temporary applications.

ORMABAT

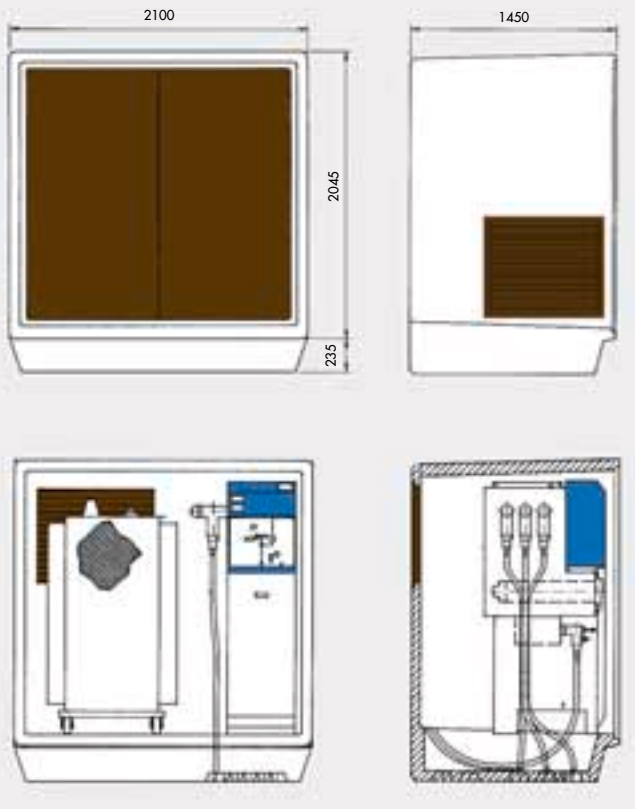
FIELD OF APPLICATION

The **ORMABAT** Transformer Substation can be used with a transformer up to 160 kVA[1] at 24 kV.

TECHNICAL REGULATIONS/STANDARDS

IEC 60298, RU 6407B
UNE 21428-1, HD 428, RU 5201D

Weight: 2.800 kg



INSTALLATION

Prefabrication of these substations allows full equipment assembly at the factory such that installation operations are limited to positioning the substation in the trench and connecting the supply service cables.

OPERATION

Opening the Transformer Substation doors enables accessing the switchgear and the transformer from outside in order to perform switching and maintenance operations.

(1) For further conditions, please contact our Technical/Commercial department.

PF-15 Switching Substation

PF-15 with access from public roads

OVERVIEW

The **PF-15** is an MV Switching Substation, featuring a monoblock structure and designed for ground installation.

The **PF-15** standard configuration contains three load interrupter switches(1) for 24 kV, with SF_6 as insulation and interrupting medium (**CGM**), that are operated from outside.

The substation features easy installation, compact dimensions, low-weight and recyclable components which allow its use both for permanent and temporary applications.

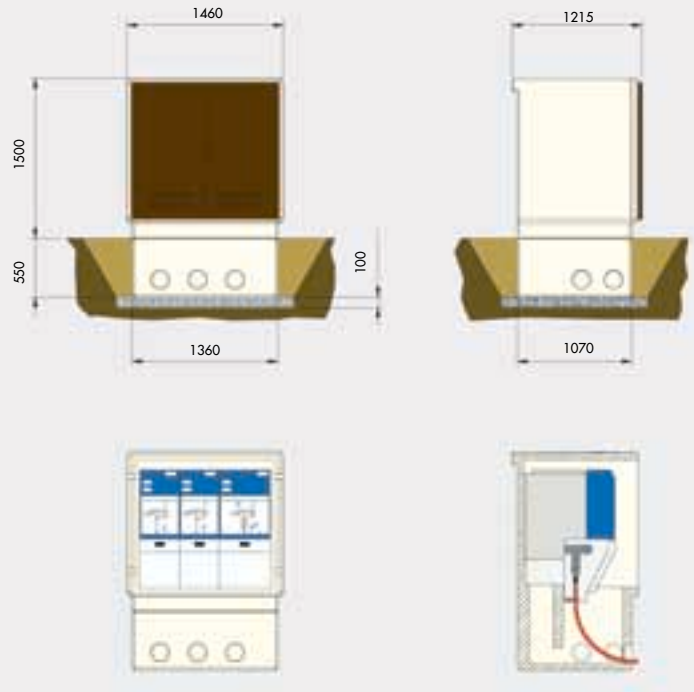
FIELD OF APPLICATION

The PF-15 switching station can be used up to 24 kV(1).

TECHNICAL REGULATIONS/STANDARDS

IEC 60298, RU 6407B

Weight: 2.400 kg



INSTALLATION

Prefabrication of the substation allows full equipment assembly at the factory such that "on-site" operations are limited to positioning the substation and connecting the supply service cables.

OPERATION

Opening the two-leaf door of the switching substation allows access of the switchgear from the outside to perform switching and maintenance operations.

(1) For further conditions or configurations, please contact our Technical/Commercial department.

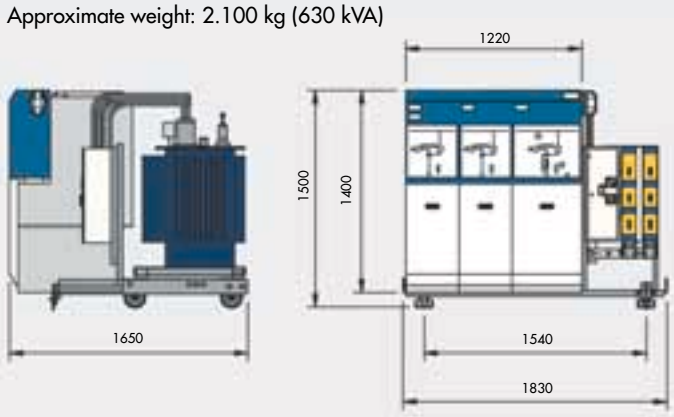
MB Frame-mounted Packaged Transformer Substation

OVERVIEW

The **MB** (Basic Module) is a compact, compartmentalised Transformer Substation that has been designed to be installed for public MV electrical power distribution networks in Transformer Substation rooms that are inside buildings used for other purposes.

It basically consists of compact MV switchgear from the **CGC** system, one transformer, one LV switchboard and the respective interconnecting and auxiliary elements. All elements are factory-built and supplied with a standalone frame equipped with wheels for transportation to ensure a uniform, high-quality finish.

Approximate weight: 2.100 kg (630 kVA)



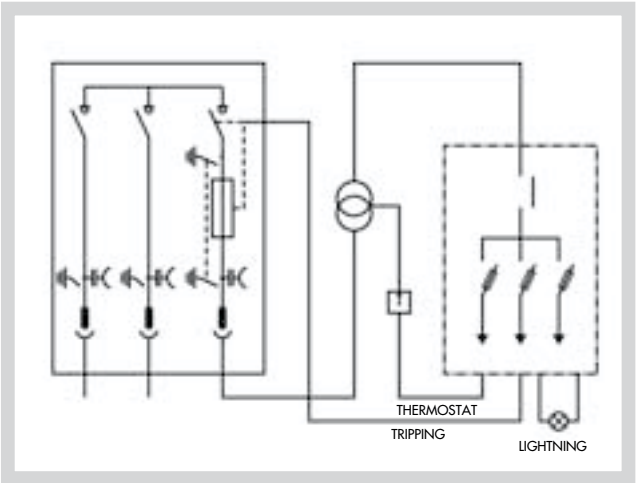
FIELD OF APPLICATION

The **MB** can be integrated in electrical power distribution networks of up to 24 kV, where a 250, 400 or 630 kVA transformer is required.

The MV electrical diagram includes two (incoming and outgoing) feeder panels and a fuse-switch panel for transformer switching and protection as well as one LV switchboard with fused outgoing circuits.

The compact size and easy installation of the substations make them ideal when available space is limited or when an old Transformer Substation is to be replaced and upgrading efforts should be minimised.

INSTALLATION



The installation of an **MB** consists basically of installing the assembly in the room, an operation that is made easy by the wheels available and the rear connection of MV and LV and earthing network connections.

The building that houses the assembly should have adequate ventilation for the transformer power output and construction characteristics of the site.

CONSTRUCTION CHARACTERISTICS AND TECHNICAL SPECIFICATIONS

General		
Rated voltage	24kV	
Insulation level		
At power frequency	50kV	
At lightning impulse	125 $[kV]_{peak}$	
MV panels		IEC 60298, RU 6407B
Rated busbar current	400 A	
Rated transformer-off current	200 A	
Rated short-time current (3 s)	16/20 kA	
Switch-fuse combination breaking capacity	20 kA	
Transformer		UNE 21428-1, IEC 60076, HD 428, RU 5201D
Power	250, 400 or 630 kA	
No-load secondary voltage	420 V	
Vector group	Dyn11	
Short-circuit voltage	4%	
LV Switchboard		IEC 60439-1
Rated voltage	440 V	
Rated current	630 or 1000 A	
Rated current at outputs	160, 400 or 630 A	

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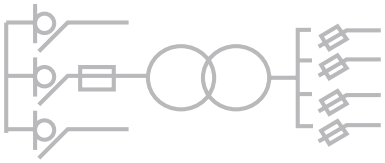

- Transformer Substations
  - **Prefabricated Transformer Substations up to 36 kV**
  - Transformer Substations for Wind Farms up to 36 kV (CA·105)
- Medium Voltage Switchgear for Secondary Distribution Networks
  - CGM System (CA·102)
  - CGMCOSMOS System (CA·100)
- Medium Voltage Switchgear for Primary Distribution Networks
  - Power Switchgear Panels (CA·104)
- Protection, Control, Automation and Telecommand
  - Protection and Control (CA·103)
  - Automation and Telecommand (CA·106)
- MV/LV Power Transformers
- Low Voltage Switchgears

CA·101·GB·0209