



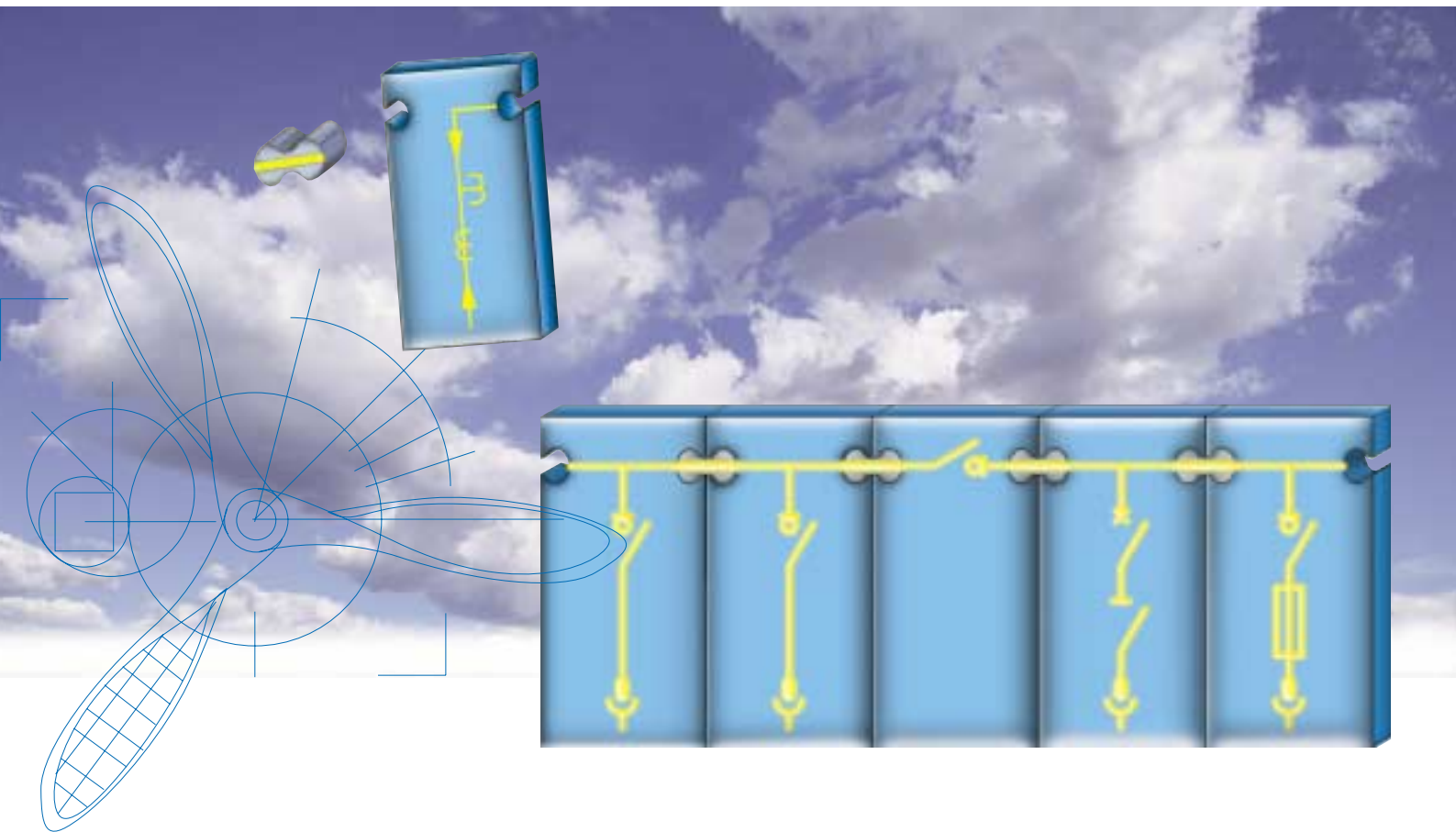
Transformer Substations



ORMAZABAL

***Transformer substations for
Wind Farms***

Up to 36 kV



Due to the constant evolution of applicable standards and new designs, the specifications of the components listed in this catalogue are subject to change without any prior warning.

These specifications, together with materials availability, are only valid upon confirmation by our Technical-Marketing Department.

General Description

The CGM (modular) - CGC (compact) systems build a compact MV equipment range, with a wide spectrum of functions covering any power distribution configuration.* Each unit has its own metallic enclosure which houses a gas tank containing the operating components, as well as the busbars.

The tests carried out on each unit during the manufacturing process, according to ISO 9001 quality assurance certification, guarantee operation under a range of temperature and pressure conditions, an aspect which must be taken into consideration for normal wind farm installation sites.

The full gas insulation implies that operation is not affected by environmental conditions, such as the humidity level, which can cause enormous problems in this type of installation. It also reduces the need for maintenance and thus minimises operational costs.

The connection between the CGM system modules or between the CGM and CGC systems, is carried simply and reliably using the so-called **ormalink** system, which permits a wide range of configurations.



ormalink

Scope of usage

These technological advantages mean that the CGM and CGC systems are ideal for installation in wind farms, independently of whether the equipment is installed in the actual tower itself or in a separate purpose-built building.

Both systems are available in specific versions for the voltage and current levels as indicated in Table 2.

National and international standards:

| | |
|----------------|-------------|
| UNE-EN 60056 | IEC 60056 |
| UNE-EN 60129 | IEC 60129 |
| UNE-EN 60255 | IEC 60255 |
| UNE-EN 60265-1 | IEC 60265-1 |
| UNE-EN 60298 | IEC 60298 |
| UNE-EN 60420 | IEC 60420 |
| UNE-EN 60694 | IEC 60694 |
| UNE-EN 61000-4 | IEC 61000-4 |

Table 1

| RATED VOLTAGE [kV] | RATED CURRENT [A] | SHORT-TIME CURRENT [kA] |
|--------------------|-------------------|-------------------------|
| 12 | 400 and 630 | 16 and 20 |
| 24 | 400 and 630 | 16 and 20 |
| 36 | 400 and 630 | 16 and 20 |

Table 2

* For further information, please refer to catalogue CA-37.

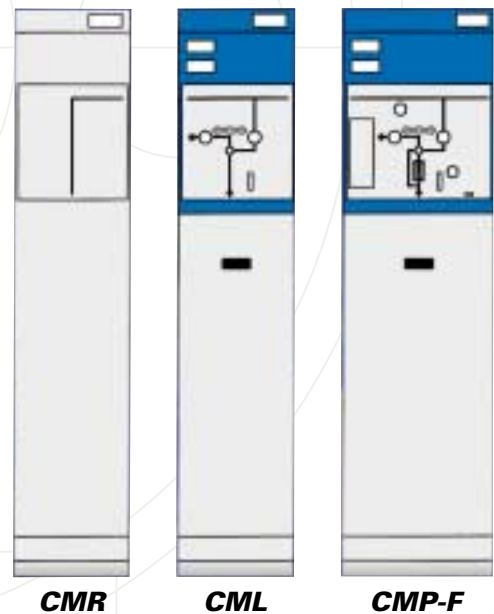
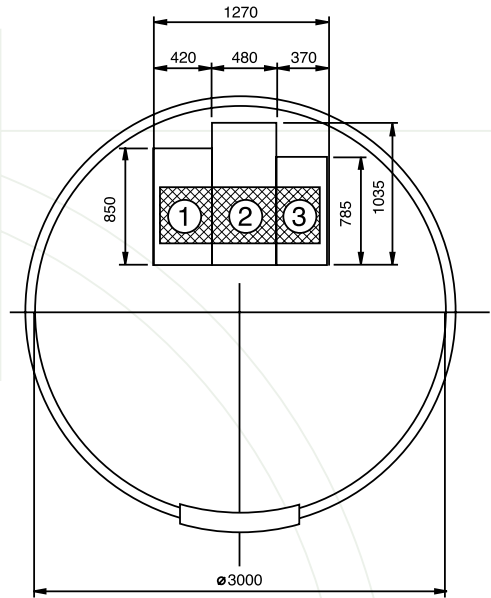
CGM modular system

The main advantages of this system, as applicable to wind farms, are the following:

- Flexibility in the adoption of configurations.
- Reduced dimensions (maximum 480 mm width is of special significance in these applications, since each module may be driven in / out through the tower door).
- In case of fault or failure one position, the others continue to function normally (so that there is no service interruption), only the replacement of the faulty position is required.
- Future enlargement through the extensibility.
- Maximum flexibility of the layout. The panel order may be configured to the customer's choice (2L1P or 1L1PL etc).

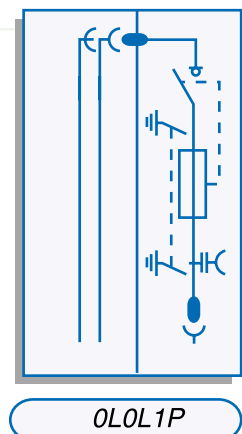
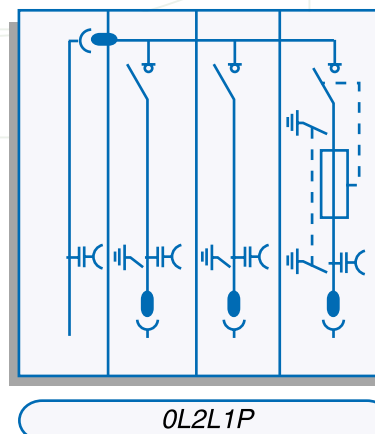
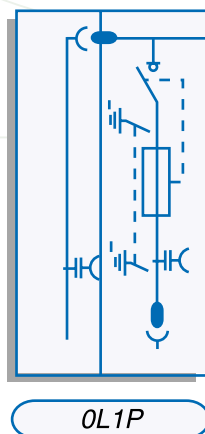
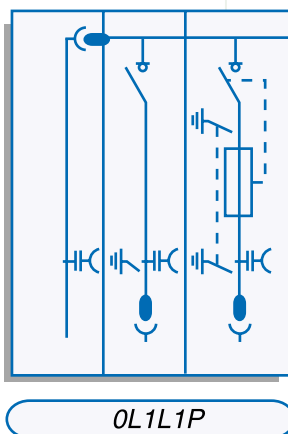
From the wide range of the CGM system, the following applications should be emphasised:

- Cable rising (CMR)
- Line (CML)
- Fuse protection (CMP-F)



Typical schemes

The extensible modular CGM system, permits any of the wind farm configurations to be adopted, in both 24 kV and 36 kV, such as:



Compact CGC system

The main advantages of this system, as applicable to wind farms, are the following:

- Reduced size.
- Fully integrated and compatible with the CGM system by its **extendability**, which enables any configuration to be adopted: 3L1P or 0L2L1P etc.
- Configuration expansion without having to replace the entire equipment.

The CGC system has two variants which are suitable for this type of application.



CGC 2L1P

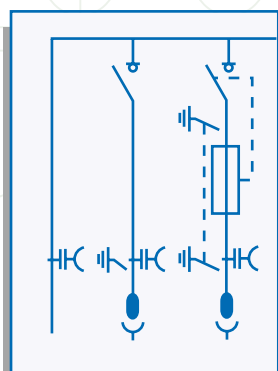


CGC 0L1L1P

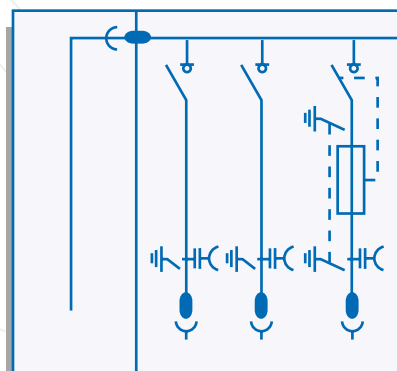


Typical configurations

The CGC system's extensibility also allows the adoption of any of the configurations employed for wind farms, both for 24 kV and 36 kV, as well as the following:



0L1L1P



0L2L1P

Description

Ormazabal has a wide range of terminals (**Elastimold**), available for producing all types of connections which, combined with the CGM and CGC systems' extensibility, provide excellent flexibility for:

- Reconfiguration.
- The connection of several cables to the same module.
- The maintenance of service in case of any panel failure, by means of specific configurations.



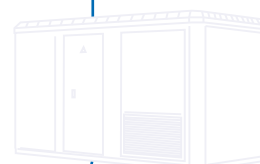
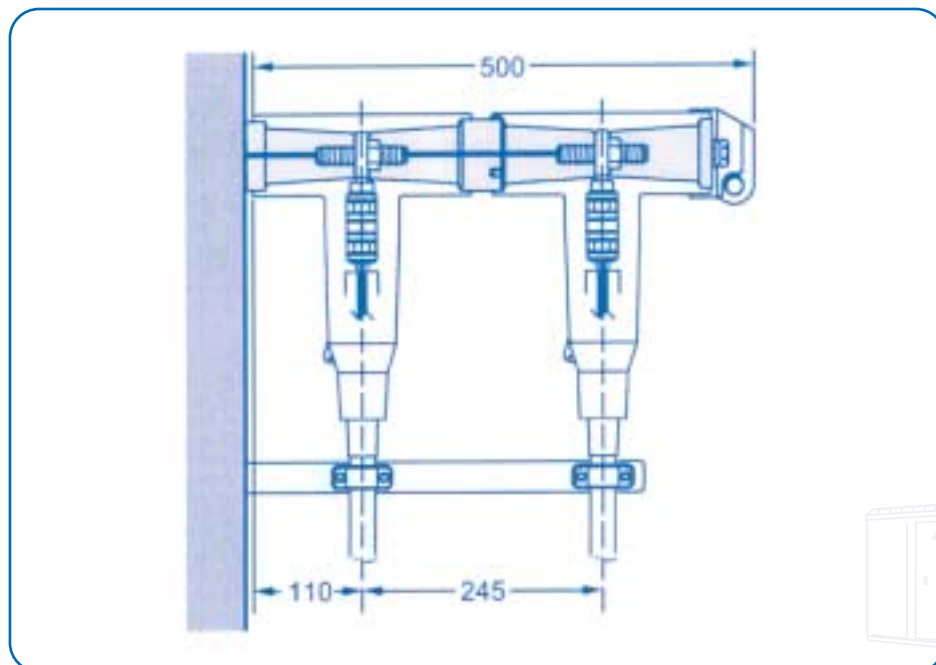
Characteristics of the terminals

| | | | | | |
|-----------------|----------|-------|----------|--------------|------------|
| K158LR | 24 kV | 250 A | Plug-in | Screened | Elbow type |
| K/M400LR | 24/36 kV | 400 A | Plug-in | Screened | Elbow type |
| K/M400TB | 24/36 kV | 630 A | Screw-in | Screened | "T" type |
| K/M440TB | 24/36 kV | 630 A | Screw-in | Screened | "T" type |
| K400LB | 24/36 kV | 630 A | Screw-in | Screened | Elbow type |
| UC412L | 24/36 kV | 630 A | Screw-in | Non-Screened | Elbow type |

Table 3

Special configurations may be obtained by using a special family of accessories, such as:

- Surge arresters (400PB-10SA)
- Isolating plugs K/M400DR...
- Connection terminals K400CP...



Description

Within its own range of products, Ormazabal has a wide range of prefabricated concrete buildings, together with a number of choices for the supply and installation of packaged transformer substations for wind farms, including both indoor and outdoor operation*.

Among their many qualities, there are several which make these prefabricated concrete packaged transformer substations suitable for wind farm applications.

- Proven natural ventilation.
- The manufacture and assembly is carried out entirely at the factory under strict quality assurance.
- Installation time reduction.
- Minimum interference with other construction work being carried out at the wind farm.
- Size adapted to the equipment to be installed, achieving minimum visual impact.
- The buildings' external finish may be integrated into the environment.
- The performed tests guarantee weatherproof construction and resistance to sharp temperature changes.



ormaset



minibLOK

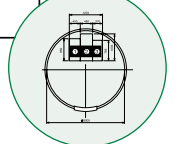
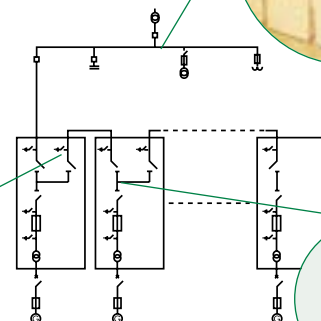


PFU

* For further information, please refer to for Catalogue CA-15.

Ormazabal, as a specialist firm in MV products, in addition to the outstanding equipment listed in this Wind Farm Transformer Substation catalogue, also has a wide product range for the configuration of other sections of the medium voltage installation, such as the actual substation itself, and offers the power equipment (MCM-MC) and the electronics range (programmable panel controller, control centre etc).

Similarly, it also has all types of integral transformer substation solutions, from medium voltage equipment, the transformer to the LV distribution board etc.



Transformer Substations

ORMAZABAL transformer substations up to 36 kV

Prefabricated concrete buildings

| | |
|------------|-----------------------------------|
| PFU | Packaged monoblock substations |
| PFS | Underground monoblock substations |
| PF | Packaged modular substations |

Compact Transformer Substations

| | |
|-----------------|--------------------------------|
| ormASET | Half-buried compact substation |
| minIBLOK | Outdoor small substation |
| minISUB | Underground compact substation |
| ormABAT | End-of-line compact substation |
| PF 15 | Switching substation |
| MB | Compact substation on frame |
| CTC | Compact transformer substation |

Media Voltage Switchgear

| | |
|---------------|--|
| CGM | Modular cells with integral gas insulation |
| CGC | Compact cells with integral gas insulation |
| MC/MCM | Power cells |

Protection and Control

| | |
|------------------|--------------------------------------|
| PCD | Distribution Control Centre |
| CCP | Programmable Cell Controller |
| RPTA/RPGM | Self-contained Protection Systems |
| RETECA | Voltage relay for Capacitive systems |

Low Voltage Distribution

| | |
|-------------|-------------------------|
| AC-4 | Unesa Low Voltage Board |
| AM-4 | BT board extension |

