



**ORMAZABAL**

Focus on Medium Voltage



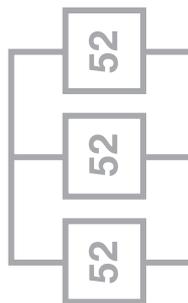
**MV Switchgear  
Primary Distribution**



**CPG.0 Single busbar gas-insulated cubicles**  
Up to 36 kV  
CPG System

The quality of products designed, manufactured and installed by **Ormazabal** is underpinned 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.

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## INTRODUCTION

The **CPG.0** range in **Ormazabal's CPG** system consists of a set of SF<sub>6</sub> gas-insulated (GIS type) modular cubicles for configuring different primary distribution electrical diagrams in Medium Voltage networks up to 36 kV.

Types of functional unit:

- Circuit-breaker **CPG.0-V**
- Busbar coupling **CPG.0-C**
- Disconnecter **CPG.0-S**
- Fuse protection **CPG.0-F**

The installation of components which enable it to withstand internal arcs in all its Medium Voltage compartments, combined with its advanced design which provides total protection against external environmental substances, make **CPG.0** cubicles the ideal solution for use in substations whether for utility companies or private companies, providing safe, reliable distribution.

The final quality of the supplied product is guaranteed by use of an automated manufacturing process, in which routine tests are performed across the various phases of the assembly procedure.



## APPLICATIONS

Designed for use in a wide range of installations, both public and private, its main applications include the following:

- Utilities
  - Primary distribution substations
  - Switching substations
  - Mobile substations
- Industrial sector
  - Cement industry
  - Chemical and petrochemical industry
  - Mining industry
  - Iron and steel industry
  - Automobile industry
  - Textile industry
  - Food industry
- Large infrastructures
  - Wind farms
  - Airports
  - Railways
- Power stations
  - Substation.



## STANDARDS

### IEC 62271-001

Common specifications for high-voltage switchgear and controlgear standards.

### IEC 62271-200

Alternating current metal-enclosed switchgear and controlgear for rated voltages above 1 kV and up to and including 52 kV.

### IEC 62271-100

High voltage alternating current circuit-breakers.

### IEC 62271-102

Alternating current disconnectors and earthing switches.

### IEC 62271-105

High voltage alternating current switch-fuse combinations.

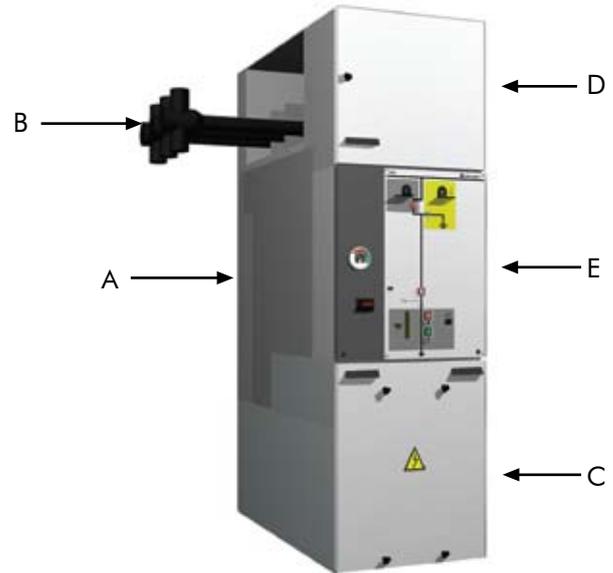




## MAIN CHARACTERISTICS

**CPG.0** cubicles are divided into separate compartments:

- A Switch compartment.
- B Busbar compartment.
- C Cable compartment.
- D Control compartment.
- E Operator interface.



Their structure consists of a metal frame, whose mechanical rigidity ensures the non-deformity of the assembly in the expected service conditions.

The frame, together with the rest of the cubicle's non-live metal parts, is connected to the general earthing busbar and thus contributes to the safety of the installation.

The cubicles are interconnected by means of a busbar, installed in the upper part of the cubicles, in a compartment outside the switch compartment.



The **switch compartment**, which is sealed for life, houses the switching and breaking switchgear, with SF<sub>6</sub> gas as the insulating medium. Built of stainless steel, it has been designed and tested to withstand an internal arc up to 25 kA/1 s. The gases generated as a consequence of an internal arc are cooled and can be channelled through a relief duct located at the back.

Depending on its functionality, it may contain the following components:

- Disconnecter and earthing switch.
- Vacuum circuit-breaker.
- Fuse holders (CPG.0-F model).

It can be connected to the busbar and the medium voltage cables respectively by means of bushings at the top and bottom.

The gas pressure is tested by means of a temperature-compensated pressure gauge, with a potential-free contact, allowing it to be used as a remote alarm or blocking/trip for the cubicle.

The function of the **busbar compartment**, located in the upper part of the cubicle, is to house the busbar (electrical connection between the MV cubicles).

Each of the phases which make up the busbar incorporates solid and shielded insulation, earthed by means of the compartment's specific earthing bar. Due to this single-phase layout, the cubicle is extremely reliable in terms of continuity of service. Thanks to the implementation of phase segregation by means of earthed metal plates, it can withstand an internal arc of 25 kA/1s.

As an option, toroidal current transformers and/or plug-in voltage transformers can be installed in this compartment, without needing metering cubicles.

The **cable compartment**, which provides front access for the medium voltage cables, is located at the bottom of the cubicle, and has a cover which is interlocked with the earthing system.

External cone bushings are used to install the toroidal current transformers.

This compartment can be supplied ready to withstand an internal arc on the terminals of 25 kA/1 s, in line with the criteria of standard IEC 62271-200.

As an option, the base can house the following components:

- Up to 4 reinforced shielded connection terminals (screw-in) per phase.
- Cable ties for the medium voltage cables.
- Earthing bars.
- Toroidal current transformers.
- Plug-in voltage transformers.
- Surge arresters.

All the elements making up the enclosure are earthed by means of a conductor consisting of a copper strip designed to withstand the rated short-time current, allowing the MV cables and their corresponding terminals to be inserted or removed without the need to dismantle it.

The **control compartment**, placed at the top of the cubicle and separate from the medium voltage area, is ready for installation of the metering equipment and protection relays, and contains the terminal block with the control signals already identified.

Connections with the operator interface are via connectors, which makes the assembly more flexible, allowing the control compartment to be assembled and connected on site in a simple direct way.



Control compartment



Cable compartment

The **operator interface**, located in the middle, also includes the mimic diagram customised for each type of cubicle, and access for manual operation of: the disconnector driving mechanism, circuit-breaker, spring loading, etc. and the indicators.



Operator interface



### INTERNAL ARC

Both as a whole and for its various compartments, the installation of different components allows the cubicle to withstand an internal arc of 25 kA/1 s, complying with the 5 criteria of Appendix A of standard IEC 62271-200 (class IAC-AFL).

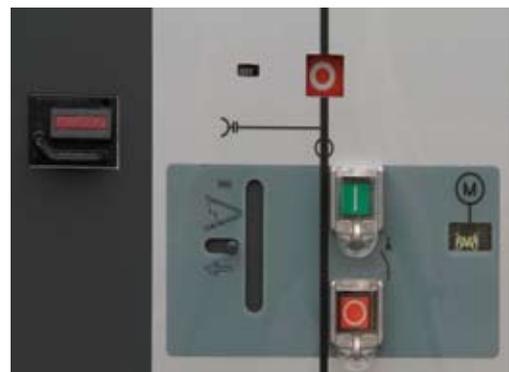
## SAFETY

- **Protected** against harsh environmental conditions (dust, pollution, humidity, salinity, etc.), **protected** against indirect contacts and long service life provided by its gas insulation, with the making and breaking components housed in separate stainless steel tanks, totally sealed for life.
- **Internal arc withstand**, accredited by means of tests conducted in accordance with the criteria of standard IEC 62271-200 (IAC-AFL 25 kA 1 s).
- **IP rating:** IP65 for the tank, and IP3X for the cubicle assembly
- **Temperature-compensated monitoring of the gas pressure** inside the tank, including a potential-free contact.
- **Presence/absence of voltage indicator**, with permanent indication (multi-LED) and optional contacts for remote display and/or creating electromagnetic interlocks.
- **Power circuit fully insulated**, including the cable terminals, all of which are screened, earthed and installed inside a metal enclosure.
- **Ergonomic design, secure access** to the control and signalling area, located outside the switch compartment.
- **Safe, simple** operation.
- Internal **safety locks** as standard, which prevent incorrect operations being performed. Optional additional safety locks.



## RELIABILITY

- **Testing, including routine tests** of all equipment in the factory.
- **Sealed assembly:** installation and assembly on site, without gas handling.
- **Circuit-breaker** with vacuum breaking technology, compact and with excellent reliability, certified in accordance with standard IEC 62271-100, including extended electrical endurance (class E2) with rapid reclosing cycle, and hence maintenance-free during its whole service life.
- **Visual indication** of the switchgear position in the mimic diagram.
- **No maintenance** on the live parts of the cubicles, increasing availability and continuity of service.
- **Ease and reliability of connecting the control** and signalling circuits via connectors.
- **Loss of service continuity category:** in accordance with IEC 62271-200: **LSC2B**.



## TYPES OF CUBICLE



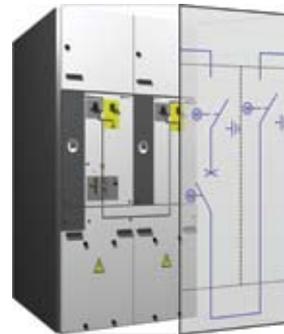
**CPG.0-V** (Circuit-Breaker Cubicle)



**CPG.0-S** (Disconnecter Cubicle)



**CPG.0-F** (Fused Protection Cubicle)



**CPG.0-C** (Busbar Cubicle)

### TECHNICAL CHARACTERISTICS

	24 kV	36 kV
<b>Rated current [A]</b>		
General busbar	Up to 1600	Up to 1600
Outgoing lines	Up to 1600*	Up to 1250*
<b>Lightning impulse [kV]</b>		
Between phases and phase-to-earth	125	170
Isolating distance	145	195
<b>Power frequency 1 min [kV]</b>		
Between phases and phase-to-earth	50	70
Isolating distances	60	80
<b>Rated short-circuit breaking current [kA]</b>	25	25
<b>Short-circuit making capacity (peak) [kA]</b>	63	63
<b>Rated short-time current [kA – 1/3 s]</b>	25	25
<b>Internal arc withstand [kA – 1 s]</b>	25	25
<b>Combined switch-fuse breaking capacity [kA]</b>	25	25
<b>Frequency [Hz]</b>	50/60	50/60
<b>IP rating</b>	IP3X	IP3X

(\*) For fused protection cubicle = 200 A





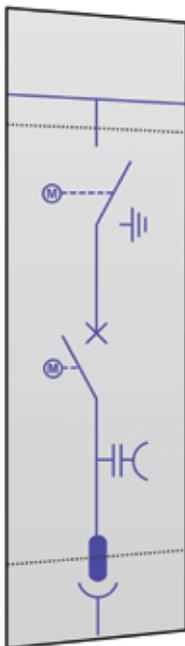
## CPG.0-V

### Circuit-breaker cubicle

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

Applications:

- Main transformer protection.
- Feeder protection.
- Busbar coupling protection.
- Capacitor bank protection.
- Auxiliary service transformer protection.



### ELECTRICAL CHARACTERISTICS

<b>Rated voltage</b>	<b>24/36 kV</b>
<b>Rated busbar current</b>	1250/1600 A
<b>Rated outgoing line current</b>	630/1250/1600* A
<b>Short-circuit current (1/3 s)</b>	25 kA
<b>SF<sub>6</sub> control pressure gauge, with a potential-free contact</b>	YES
<b>Busbar</b>	
Current transformers	Optional
Voltage transformers	Optional
<b>Three-position disconnector</b>	
Motor driving mechanism (disconnecter)	Optional
<b>Interlocks**</b>	Optional
<b>Vacuum circuit-breaker</b>	
Motor driving mechanism	YES
Tripping coil	YES
2nd tripping coil	Optional
Closing coil	YES
Undervoltage coil	Optional
Open/close push-button blocking	YES
<b>Voltage presence detector</b>	YES
Auxiliary contact	Optional
<b>Cable compartment</b>	
Maximum no. of cables per phase	4
Toroidal current transformers	Optional
Plug-in voltage transformers	Optional

(\*) Valid up to 24 kV.

(\*\*) See "Interlocks" section.

### PHYSICAL CHARACTERISTICS

Height [mm]	Width [mm]	Depth [mm]	Weight [kg]
2125/2425 <sup>#</sup>	600	1365	<750

(<sup>#</sup>) Depending on size of the control compartment.



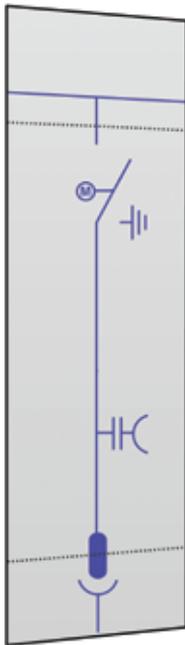
CPG.0-S

## Disconnecter cubicle

Incorporates a three-position disconnector without load breaking capacity.

Applications:

- Feeder/transformer disconnection.
- Busbar coupling riser.
- Busbar voltage metering.



### ELECTRICAL CHARACTERISTICS

<b>Rated voltage</b>	<b>24/36 kV</b>
<b>Rated busbar current</b>	1250/1600 A
<b>Rated outgoing line current</b>	630/1250/1600* A
<b>Short-circuit current (1/3 s)</b>	25 kA
<b>SF<sub>6</sub> control pressure gauge, with a potential-free contact</b>	YES
<b>Busbar</b>	
Current transformers	Optional
Voltage transformers	Optional
<b>Three-position disconnector</b>	
Motor driving mechanism (disconnecter)	Optional
<b>Interlocks**</b>	Optional
<b>Voltage presence detector</b>	YES
Auxiliary contact	Optional
<b>Cable compartment</b>	
Maximum no. of cables per phase	4
Toroidal current transformers	Optional
Plug-in voltage transformers	Optional

(\*) Valid up to 24 kV.

(\*\*) See "Interlocks" section.

### PHYSICAL CHARACTERISTICS

Height [mm]	Width [mm]	Depth [mm]	Weight [kg]
2125/2425 <sup>#</sup>	600	1365	<550

(<sup>#</sup>) Depending on size of the control compartment.



## CPG.0-F

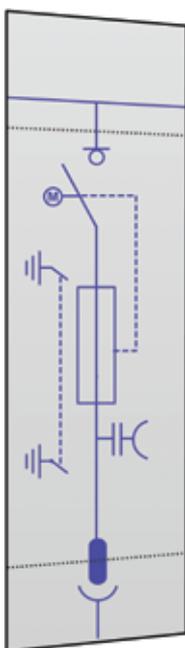
### Fused protection cubicle

Equipped with a three-position switch-disconnector (closed/open/earthing), also including fuse protection. The fuses are housed inside sealed fuse holders; these are housed inside the switch compartment, and enhance its insulation level.

As an option, the three-pole opening switch via combined fuse blow action, can be motorised.

Applications:

- Auxiliary service transformer protection.



### ELECTRICAL CHARACTERISTICS

<b>Rated voltage</b>	<b>24/36 kV</b>
<b>Rated busbar current</b>	1250/1600 A
<b>Rated outgoing line current</b>	200 A
<b>Short-circuit current (1/3 s)</b>	25 kA
<b>Switch-fuse combination breaking capacity.</b>	25 kA
<b>SF<sub>6</sub> control pressure gauge, with a potential-free contact</b>	YES
<b>Busbar</b>	
Current transformers	Optional
Voltage transformers	Optional
<b>Three-position disconnecter</b>	
Motor driving mechanism (disconnecter)	Optional
<b>Interlocks*</b>	Optional
<b>Fuses combined with the switch-disconnector</b>	YES
<b>Voltage presence detector</b>	YES
Auxiliary contact	Optional

(\*) See "Interlocks" section.

### PHYSICAL CHARACTERISTICS

Height [mm]	Width [mm]	Depth [mm]	Weight [kg]
2125/2425 <sup>#</sup>	600	1403	<550

(<sup>#</sup>) Depending on size of the control compartment.



CPG.0-C

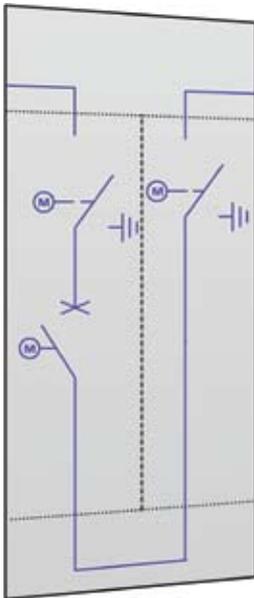
## Busbar coupling cubicle

Includes a vacuum circuit-breaker and two three-position disconnectors in series with it, one upstream and the other downstream of the circuit-breaker.

These components are located inside the switch compartments.

Applications:

- Busbar longitudinal coupling.



### ELECTRICAL CHARACTERISTICS

<b>Rated voltage</b>	<b>24/36 kV</b>
<b>Rated busbar current</b>	1250/1600 A
<b>Rated outgoing line current</b>	1250/1600* A
<b>Short-circuit current (1/3 s)</b>	25 kA
<b>SF<sub>6</sub> control pressure gauge, with a potential-free contact</b>	YES
<b>Busbar</b>	
Current transformers	Optional
Voltage transformers	Optional
<b>Three-position disconnector</b>	
Motor driving mechanism (disconnector)	Optional
<b>Interlocks**</b>	Optional
<b>Vacuum circuit-breaker</b>	
Motor driving mechanism	YES
Tripping coil	YES
2nd tripping coil	Optional
Closing coil	YES
Undervoltage coil	Optional
Open/close push-button blocking	YES
<b>Cable compartment</b>	
Lower busbar	YES
Toroidal current transformers	Optional

(\*) Valid up to 24 kV.

(\*\*) See "Interlocks" section..

### PHYSICAL CHARACTERISTICS

Height [mm]	Width [mm]	Depth [mm]	Weight [kg]
2125/2425#	1200	1365	< 1300

(\*) Depending on size of the control compartment.



## SWITCHING AND BREAKING COMPONENTS



### DISCONNECTOR AND EARTHING SWITCH

**24/36 kV**

#### Disconnecter

Mechanical endurance	M0 (1000 Operations)
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#### Earthing switch

Making capacity	63kA (50Hz) / 65 kA (60Hz)
Electrical endurance	E0*

<b>Rated current</b>	630/1250/1600** A
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<b>Short-time current</b>	25 kA - 1/3 s
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(\* ) The earthing switch does not in itself have any making capacity, since this has been transferred to the circuit-breaker. The electrical endurance of the whole earthing circuit is E2 (5 short-circuit making operations)

(\*\*) Valid up to 24 kV.

#### Features:

- 3 positions (closed - open - earthing).
- Actuation and independent levers for operations:
  - Closed - open (Motor driving mechanism option).
  - Open - earthing.

### CIRCUIT-BREAKER

**24 kV**

**36 kV**

#### Breaking capacity

Short-circuit (asymmetry)	25 kA	25 kA
DC	34%	38%
No-load cable current	31,5 A	50 A
Capacitor bank	400 A	400 A
Electrical endurance	E2	E2

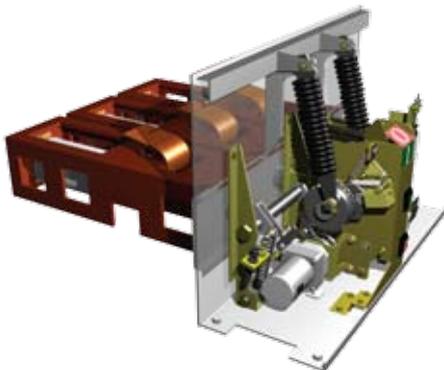
<b>Reclosing sequence</b>	O-0,3"-CO-15"-CO	O-0,3"-CO-15"-CO
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<b>Mechanical endurance</b>	M2 (10000 operations)	M2 (10000 operations)
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<b>Rated current</b>	630/1250/1600 A	630/1250 A
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<b>Short-time current</b>	25 kA - 1/3 s	25 kA - 1/3 s
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<b>Opening time</b>	<45 ms	<45 ms
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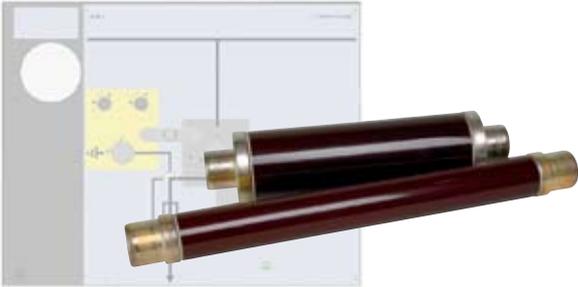


#### Features:

- Vacuum circuit-breaker.
  - Manual operation via push-button (padlockable).
- Motor driving mechanism 125 Vdc
  - Spring loading time <15 seconds.
- Coils operative in the 125 Vdc range:
  - 1 shunt trip opening coil.
  - 2nd coil optional.
  - 1 closing coil.
  - 1 undervoltage coil (optional)

Note: For other values, please consult Ormazabal's Technical - Commercial Department

# Primary Distribution MV Switchgear



## SWITCH-DISCONNECTOR (Combined with fuses)

	24 kV	36 kV
<b>Switch</b>		
Rated current	200 A	200 A
Main switch making capacity	63 kA	63 kA
Switch category	E3	E3
Electrical endurance	100	100
Electrical endurance (s-c making ops)	5	5
Electrical endurance (manual)	M1 (1000)	M1 (1000)
<b>Earthing switch</b>		
Making capacity	7,5 kA	7,5 kA
Disconnecter category	E2	E2
Electrical endurance (s-c making ops)	5	5
Short-time current*	25 kA - 1/3s 3 kA - 3s (earthing)	25 kA - 1/3s 3 kA - 3s (earthing)
<b>Combined switch-fuse breaking capacity</b>		
	25 kA	25 kA
<b>Transfer current</b>		
	>820 A	>820 A

(\*) Fuse-limited.

### Features:

- 3 positions (closed - open - earthing).  
Actuation and independent levers for operations:
  - Closed - open.
  - Open - earthing.
- Switch driving mechanism:
  - Latched manual (BR) with tripping coil at 125 Vdc.
  - Option: Switch-disconnector motorisation at 125 Vdc.



## PROTECTION, METERING, CONTROL AND INDICATION: ekorSYS FAMILY

This family groups together a set of units which, when integrated in **CPG.0** cubicles, provide protection, metering,

control and indication functions in Medium Voltage electrical distribution networks:



Substation Protection Unit specially designed for vital applications in the field of Primary Distribution. Its incorporation in **CPG.0** cubicles endows them with the necessary characteristics for inclusion in Integrated Control systems.



### FEATURES OF THE ekorRPS UNIT

#### Protection

Overcurrent	50/51 - 50 N/51 N
Sensitive neutral	50 Ns/51 Ns
Directional overcurrent	67/67 n
Overvoltage	59
Undervoltage	27
Frequency	81
Unbalance	46 - 47
Reclosing	79

#### Control

Switch status and control  
 Disconnecter status and control  
 Switch monitoring  
 Local panel

#### Metering

From 30 electrical parameters including voltage, current, power and energy.

Event log  
 Fault report  
 Oscillograph  
 Chronology  
 Self-monitoring  
 Cold load  
 Fault impedance/distance  
 Automation

#### Communications

IEC 870-5-103 IEC 61650  
 ModBus RTU  
 DNP3.0.  
 PROCOME



General Protection Unit designed to protect against overcurrent in electrical installations with Conventional Control. It is specially designed to protect a wide range of power ratings.

### FEATURES OF THE ekorRPG UNIT

#### Protection

Overcurrent	50/51 - 50 N/51 N
Sensitive neutral	50 Ns/51 Ns
Reclosing	79

#### Control

Switch monitoring

#### Fault report

#### Self-monitoring

#### Communications

ModBus RTU  
 PROCOME



Each cubicle has a voltage **presence/absence detector** with permanent light indication and, as an option, a free auxiliary contact for remote display of the corresponding indication.

The indicator, with fixed installation, has been designed in accordance with standard IEC 61243-5 and VDE 0682 Part 415.





## CURRENT TRANSFORMERS

Transformers developed by **Ormazabal** whose main characteristics are:

- Toroidal type.
- Encapsulated.
- Installed outside the switch compartment, upstream of the MV connectors.
- Capable of withstanding all environmental conditions.
- Ease of assembly and error-free during installation (earths).

### Installation:

- Busbar compartment.
- Cable compartment.



### ELECTRICAL CHARACTERISTICS

Insulation level	0,72 kV
Rated withstand alternating voltage	3 kV / 1 min
Rated frequency	50/60 Hz
Continuous thermal current	1,2 I <sub>r</sub>
Insulation class	E

RATIO		METERING PROTECTION		
Primary	Secondary			
150* A	600* A			
200 A	800 A			
250 A	1.000 A	1 A	CL 0,2	5P10
300* A	1.200 A	5 A	CL 0,5	5P20
400 A	1.600 A			
500 A	1.600 A			

(\*) Main ratios.

Note: Rated burden in accordance with current ratings.



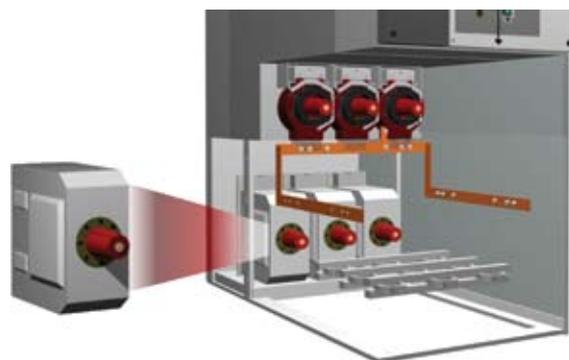
## VOLTAGE TRANSFORMERS

### Features:

- Plug-in type.
- Single-phase.
- Insulated.
- Shielded.
- Inductive operation.
- Installed outside the switch compartment.
- Capable of withstanding all environmental conditions.
- Anti-explosive.

### Installation:

- Busbar compartment.
- Cable compartment.



### ELECTRICAL CHARACTERISTICS

Rated voltage	3,6 – 36 kV
Continuous voltage factor.	1,2 Un
Rated voltage factor U <sub>r</sub> /8 hrs	1,9
Voltage in the secondary	100/√3 V - 110/√3 V - 100/3 V - 110/3 V
Burden	25 - 50 VA
Accuracy class	0,2-0,5-1 (metering) 3P - 6P (protection)

Note: Characteristics can be configured according to the type of installation

## INTERLOCKS

- The disconnect, circuit-breaker and earthing switch are interlocked in accordance with section 5.11 of standard IEC 62271-200.
- The disconnect lever can only be inserted if the circuit-breaker is open.
- The circuit-breaker can only be operated if the disconnect/earthing switch actuating lever has been removed. Also, all electrical operations are overridden if the disconnect lever is located in the actuator shaft.
- The circuit-breaker can only be connected in the end positions of the disconnect/earthing switch.
- In the earthing position, electrical commands to open the circuit-breaker are overridden.
- Access to the fuse compartment is locked by the earthing switch.
- The cable compartment is only accessible with the earthing switch closed.
- As an option:
  - Earthing switch electromagnetic interlock.
  - Lockable interlocks:
    - Earthing switch closed.
    - Earthing switch open.
    - Disconnecter open



## INSTALLATION



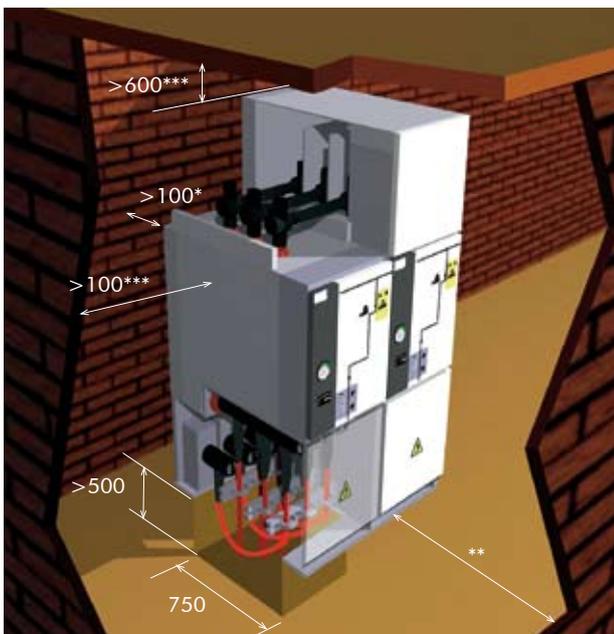
### CHARACTERISTICS

- Reduced size, therefore taking up less space, due to its careful design and the use of SF<sub>6</sub> gas as insulating medium.
- Modularity and extensibility on both sides, ensuring an installation process which is quick and economical, in a smaller space, without gas handling on site, since it is not necessary to move adjacent cubicles in order to remove a cubicle in the middle.
- Reduced dimensions of the cubicle room, due to its front access and its design without withdrawable switchgear, and not requiring operational clearance at the back.
- Optimisation of installation costs and civil engineering works due to the smaller dimensions and limited need for operating space.
- Easy housing of voltage transformers and toroidal current transformers.



### CIVIL ENGINEERING WORKS

The minimum recommended distances [mm] for correct installation, once installed in its final position, are:



(\*) Not needed with pressure relief duct.

(\*\*) Operation: > 1000 // Removal: > 1500

(\*\*\*) In accordance with Appendix A of standard IEC 62271-220

For other dimensions, please consult Ormazabal's Technical - Commercial Department

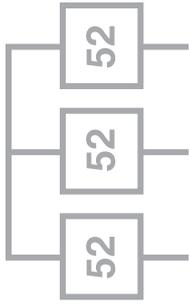


### CONNECTION BETWEEN CUBICLES

The connection between cubicles is external to the switch compartment and is via busbars with solid and shielded insulation, designed to allow a functional unit to be uninstalled without needing to move adjacent units and **without gas handling**.

The copper busbars are designed to withstand a continuous rated current of 1250/1600 A, and also the thermal and dynamic forces of the rated short-time current (25 kA/1/3 s).







# ORMAZABAL

Focus on Medium Voltage

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## Transformer Substations

- Prefabricated Transformer Substations up to 36 kV
- MV Applications for Renewable Energies up to 36 kV

## Medium Voltage Secondary Distribution Switchgear

- CGM.3 System
- CGMCOSMOS System

## Medium Voltage Primary Distribution Switchgear

- **CPG System**
- CPA-AMC System

## Protection, Control, Automation and Remote Control

## Distribution Transformers

## Low Voltage Switchgear