SF₆ INSULATED MEDIUM VOLTAGE MODULAR GIS CUBICLES UP TO 38 kV ACCORDING TO IEEE STANDARDS
CAUTION!

When MV equipment is operating, certain components are live, other parts may be in movement and some may reach high temperatures. Therefore, the use of this equipment poses electrical, mechanical and thermal risks.

In order to ensure an acceptable level of protection for people and property, and in compliance with applicable environmental recommendations, Ormazabal designs and manufactures its products according to the principle of integrated safety, based on the following criteria:

- **Elimination of hazards wherever possible.**
- **Where elimination of hazards is neither technically nor economically feasible, appropriate protection functions are incorporated in the equipment.**
- **Communication about remaining risks to facilitate the design of operating procedures which prevent such risks, training for the personnel in charge of the equipment, and the use of suitable personal protection equipment.**
- **Use of recyclable materials and establishment of procedures for the disposal of equipment and components so that once the end of their useful lives is reached, they are duly processed in accordance, as far as possible, with the environmental restrictions established by the competent authorities.**

Consequently, the equipment to which the present manual refers complies with the requirements of section 11.2 of the forthcoming IEC standard 62271-1. It must therefore only be operated by appropriately qualified and supervised personnel, in accordance with the requirements of standard EN 50110-1 on the safety of electrical installations and standard EN 50110-2 on activities in or near electrical installations. Personnel must be fully familiar with the instructions and warnings contained in this manual and in other recommendations of a more general nature which are applicable to the situation according to current legislation.

The above must be carefully observed, as the correct and safe operation of this equipment depends not only on its design but also on general circumstances which are in general beyond the control and responsibility of the manufacturer. More specifically:

- **The equipment must be handled and transported appropriately from the factory to the place of installation.**
- **All intermediate storage should occur in conditions which do not alter or damage the characteristics of the equipment or its essential components.**
- **Service conditions must be compatible with the equipment rating.**
- **The equipment must be operated strictly in accordance with the instructions given in the manual, and the applicable operating and safety principles must be clearly understood.**
- **Maintenance should be performed properly, taking into account the actual service and environmental conditions in the place of installation.**

The manufacturer declines all liability for any significant indirect damages resulting from violation of the guarantee, under any jurisdiction, including loss of income, stoppages and costs resulting from repair or replacement of parts.

**Guarantee**

The manufacturer guarantees this product against any defect in materials and operation during the contractual period. In the event that defects are detected, the manufacturer may opt either to repair or replace the equipment. Improper handling of this equipment and its repair by the user shall constitute a violation of the guarantee.

**Registered Trademarks and Copyrights**

All registered trademarks cited in this document are the property of their respective owners. The intellectual property of this manual belongs to the manufacturer.

In view of the constant evolution in standards and design, the characteristics of the elements contained in this manual 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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1. DESCRIPTION AND MAIN CHARACTERISTICS

The CPG system is a range of fully SF₆ insulated modular cubicles (GIS-type) for Medium Voltage primary distribution applications up to 38 kV, designed to fulfill the requirements of standards:

<table>
<thead>
<tr>
<th>Standard</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAN CSA C22.2</td>
<td>Switchgear assemblies</td>
</tr>
<tr>
<td>IEEE C37.74</td>
<td>IEEE Standard Requirements for Subsurface, Vault, and Pad-Mounted Load-</td>
</tr>
<tr>
<td></td>
<td>Interrupter Switchgear and Fused Load-Interrupter Switchgear for Alternating</td>
</tr>
<tr>
<td></td>
<td>Current Systems Up to 38 kV</td>
</tr>
<tr>
<td>IEEE C37.20.3</td>
<td>IEEE Standard for Metal-Enclosed Interrupter Switchgear</td>
</tr>
<tr>
<td>IEEE 1247</td>
<td>IEEE Standard for Interrupter Switches for Alternating Current, Rated Above</td>
</tr>
<tr>
<td></td>
<td>1000 Volts</td>
</tr>
<tr>
<td></td>
<td>Equipment</td>
</tr>
<tr>
<td>IEEE Std C37.20.4</td>
<td>IEEE Standard for Indoor AC Switches (1 kV-38 kV) for Use in Metal-Enclosed</td>
</tr>
<tr>
<td></td>
<td>Switchgear</td>
</tr>
<tr>
<td>IEEE C37.04</td>
<td>IEEE Standard Rating Structure for AC High-Voltage Circuit Breakers</td>
</tr>
<tr>
<td>IEEE C37.06</td>
<td>AC High-Voltage Circuit Breakers Rated on a Symmetrical Current Basis-</td>
</tr>
<tr>
<td></td>
<td>Preferred Ratings and Related Required Capabilities</td>
</tr>
<tr>
<td>IEEE Std C37.09</td>
<td>IEEE Standard Test Procedure for AC High-Voltage Circuit Breakers Rated on</td>
</tr>
<tr>
<td></td>
<td>a Symmetrical Current Basis</td>
</tr>
<tr>
<td>IEEE Std C37.20.7</td>
<td>IEEE Guide for Testing Medium-Voltage Metal-Enclosed Switchgear for Internal</td>
</tr>
<tr>
<td></td>
<td>Arcing Faults</td>
</tr>
<tr>
<td>IEC 60529</td>
<td>Degrees of protection provided by enclosures.</td>
</tr>
<tr>
<td>IEC 61243-5</td>
<td>Voltage detecting systems (VDS).</td>
</tr>
</tbody>
</table>

The CPG.0 range comprises the following functional units:

<table>
<thead>
<tr>
<th>FUNCTION</th>
<th>DESIGNATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Circuit-breaker cubicle</td>
<td>CPG.0-V</td>
</tr>
<tr>
<td>Main Transformer Protection</td>
<td></td>
</tr>
<tr>
<td>Feeder Protection</td>
<td></td>
</tr>
<tr>
<td>Capacitor Bank Protection</td>
<td></td>
</tr>
<tr>
<td>Auxiliary Services Transformer Protection</td>
<td></td>
</tr>
<tr>
<td>Disconnector Cubicle</td>
<td>CPG.0-S</td>
</tr>
<tr>
<td>Feeder/transformer disconnection</td>
<td></td>
</tr>
<tr>
<td>Busbar voltage metering</td>
<td></td>
</tr>
<tr>
<td>Longitudinal Busbar Coupling Cubicle</td>
<td>CPG.0-C</td>
</tr>
<tr>
<td>Longitudinal busbar coupling</td>
<td></td>
</tr>
<tr>
<td>Busbar ground connection</td>
<td></td>
</tr>
<tr>
<td>Fused Protection Cubicle</td>
<td>CPG.0-F</td>
</tr>
<tr>
<td>Auxiliary Services Transformer Protection</td>
<td></td>
</tr>
<tr>
<td>Busbar Rise Cubicle</td>
<td>CPG.0-RB</td>
</tr>
</tbody>
</table>
1.1. CUBICLE ELEMENTS

The cubicle is made up of a series of independent compartments:

1. Switch compartment
2. Busbar compartment
3. Cable compartment
4. Gas pressure relief duct
5. LV Control compartment
6. Operation interface

Figure 1.1: Main elements of CPG.0 cubicles
**Switch compartment:** This is a sealed compartment made of stainless steel and sealed for life which houses the switching and breaking switchgear, with SF₆ gas as the insulating medium.

Depending on the function for which the cubicle was designed, it may contain the following components:

- Disconnector
- Grounding switch
- Internal busbar and connections
- Fuse holders
- Vacuum circuit-breaker

**CAUTION**

This device may emit X-rays if voltage higher than rated maximum is applied across the open contacts or if contacts are spaced less than rated stroke. In such case, personnel must be protected with appropriate shielding.

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

**CAUTION**

Do not refill the switchgear

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

**CAUTION**

Pressure gauge is not intended to be used for telemetry purposes

**Busbar compartment:** This is used for connecting cubicles. It has solid and shielded insulation, grounded by means of the compartment’s specific grounding bar.

As an option, the busbar forms a device with phases segregated by means of a set of grounded metal plates (metal-clad device).

Toroidal current transformers and/or plug-in voltage transformers can be installed in this compartment, thus avoiding the need for metering cubicles.

**Figure 1.2: Switch compartments and disconnector**

**Figure 1.3: Phase segregation in the busbar (optional)**
**Cable compartment**: Located in the lower part of the cubicle, this has a cover, interlocked with the grounding circuit, which allows front access to the Medium Voltage cables.

In the most complete case, the base can house the following components:

- Phase segregation assembly
- Up to 4 reinforced shielded connection terminals (screw-in) per phase
- Cable clamps for the medium-voltage cables
- Grounding bars
- Toroidal current transformers
- Plug-in voltage transformers

All the elements making up the enclosure are grounded by means of a conductor consisting of a copper bar, sized to withstand the rated short-time current. This bar is located in the base in a way that it does not need to be dismantled in order to insert or remove a cable and its corresponding termination.

**Gas pressure relief duct**: Optional element consisting of a duct made of 2 mm sheet steel, which conducts the gases produced by an internal arc towards the top of the cubicle, from any of the three compartments: Switch Compartment, Busbar Compartment and Cable Compartment.

Control compartment: Placed at the top of the cubicle and separate from the Medium Voltage area, this is ready for installation of the metering equipment and protection relays. It contains the terminal block with the control signals already identified. All the connections are made via connectors, which makes the assembly more flexible, and allows the control box to be assembled and connected on site in a simple direct way.
Operation interface: In addition to a mimic diagram customized for each type of cubicle, this has the switching components in its middle section: disconnector/grounding switch and circuit-breaker driving mechanisms, circuit-breaker opening/closing push-buttons, status indicators, groove for access of the spring charging lever, etc.

- **CPG.0-S: Disconnectors**

  ![Mimic diagram of CPG.0-S cubicles]

  - a Name plate
  - b Pressure Switch Window
  - c Detection of voltage presence / absence ekorIVDS
  - d Operation Area:
    - GREY for disconnector
    - YELLOW for grounding switch
  - e Operating sequence legend

  **Figure 1.8: Mimic diagram of CPG.0-S cubicles**

- **CPG.0-V: Circuit-breakers**

  ![Mimic diagrams of CPG.0-V cubicles]

  - a Name plate
  - b Pressure Switch Window
  - c Detection of voltage presence / absence ekorIVDS
  - d Operation Area:
    - GREY for disconnector
    - YELLOW for grounding switch
  - e Operating sequence legend
  - f Circuit-Breaker operation area

  **Figure 1.9: Mimic diagrams of CPG.0-V cubicles**
- CPG.0-C: Busbar coupling

![Mimic diagrams of CPG.0-C cubicles](image)

<p>| | | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>a</td>
<td>Name plate</td>
<td>d</td>
<td>Operation Area:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>b</td>
<td>Pressure Switch Window</td>
<td></td>
<td>● GREY for disconnector</td>
<td></td>
<td></td>
</tr>
<tr>
<td>c</td>
<td>Relay type GEPCE, as an option</td>
<td></td>
<td>● YELLOW for grounding switch</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>e</td>
<td>Operating Sequence Legend</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>f</td>
<td>Circuit-Breaker Operation Area</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Figure 1.10: Mimic diagrams of CPG.0-C cubicles*
- CPG.0-RB: Busbar rise

![Mimic diagram of CPG.0-RB cubicles]

(a) Name plate  
(b) Pressure Switch Window  
(c) Detection of voltage presence / absence ekorIVDS

Figure 1.11: Mimic diagram of CPG.0-RB cubicles

- CPG.0-F: Fuse protection

![Mimic diagram of CPG.0-F cubicles]

(a) Name plate  
(b) Pressure Switch Window  
(c) Detection of voltage presence / absence ekorIVDS  
(d) Operation Area:  
  - GREY for disconnector  
  - YELLOW for grounding switch  
(e) Operating sequence legend

Figure 1.12: Mimic diagram of CPG.0-F cubicles
1.1.1. ekorIVDS, Voltage presence-absence indication unit

Ormazabal's ekorIVDS voltage presence/absence detector is designed and built in accordance with the recommendations laid down in standards IEC 61243-5, VDE 0682 Part 415 and IEC 61958, within the integrated detectors without auxiliary power supply category.

The unit has three light signals corresponding to phases L1, L2 and L3. On the front of the indicator, a test point is accessible for each of the phases and ground, which is used to test the balance of all phases. We recommend use of any universal phase comparator which complies with standard IEC 61243-5.

The ekorIVDS device indication is defined according to the requirements laid down in standard IEC 61243-5:

Absence of voltage: \( U < 10\% U_r \)

Uncertainty: \( 10\% U_r < U < 45\% U_r \)

Presence of voltage: \( U > 45\% U_r \)

* \( U_r \), rated operating voltage
* \( U \), phase-to-ground voltage

The presence of voltage is indicated by activation of the LEDs for each of the phases with a blink frequency above 1 Hz. If the presence of voltage is not detected, the LEDs for each of the phases remain unit.
## 1.1.2. Name plate

Every cubicle includes a name plate, with some of the following values:

<table>
<thead>
<tr>
<th>Nameplate</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>General instr.</td>
<td>Manual of General Instructions (IG) corresponding to the system</td>
</tr>
<tr>
<td>N°</td>
<td>Cubicle serial number (*)</td>
</tr>
<tr>
<td>Designation</td>
<td>Cubicle model</td>
</tr>
<tr>
<td>Type</td>
<td>Type of circuit-breaker (if applicable) / Continuous duty / Indoor General purpose</td>
</tr>
<tr>
<td>U_r</td>
<td>Equipment rated voltage (kV)</td>
</tr>
<tr>
<td>BIL (U_p)</td>
<td>Lightning impulse withstand voltage (kV)</td>
</tr>
<tr>
<td>U_d</td>
<td>Power frequency withstand voltage (kV)</td>
</tr>
<tr>
<td>f_r</td>
<td>Equipment rated frequency (Hz)</td>
</tr>
<tr>
<td>I_r / I_load</td>
<td>Equipment rated continuous current and load switching current (A)</td>
</tr>
<tr>
<td>I_cc</td>
<td>Equipment rated cable-charging switching current (A)</td>
</tr>
<tr>
<td>I_ut</td>
<td>Equipment rated unloaded transformer switching current (A) (if applicable)</td>
</tr>
<tr>
<td>M1 or M2</td>
<td>Number of mechanical operations (switch: 1000 or 5000 operations; circuit-breaker 2000 or 10000 operations)</td>
</tr>
<tr>
<td>I_k / I_p</td>
<td>Short-time withstand current/ Short-time withstand peak value - Fault making current (kA)</td>
</tr>
<tr>
<td>t_k</td>
<td>Short-time withstand current time (s)</td>
</tr>
<tr>
<td>P_re / P_me</td>
<td>Rated filling pressure for insulation / Rated filling pressure for operation (kPa)</td>
</tr>
<tr>
<td>P ме / P mm</td>
<td>Minimum functional pressure for insulation / Minimum functional pressure for operation (kPa)</td>
</tr>
<tr>
<td>U_a</td>
<td>Rated auxiliary voltage (Vac)</td>
</tr>
<tr>
<td>SF_6</td>
<td>Weight of insulating fluid (g)</td>
</tr>
<tr>
<td>Weight</td>
<td>Total weight of cubicle (kg)</td>
</tr>
<tr>
<td>Date</td>
<td>Month and year of manufacture</td>
</tr>
<tr>
<td>T_c</td>
<td>Thermal class (°C)</td>
</tr>
<tr>
<td>DC</td>
<td>Percentage of DC component in circuit-breaker cubicle (%)</td>
</tr>
<tr>
<td>Int.time</td>
<td>Rated interrupting time in circuit-breaker cubicle</td>
</tr>
<tr>
<td>Duty Cycle</td>
<td>Rated operating duty cycle in circuit-breaker cubicle</td>
</tr>
<tr>
<td>I_sc</td>
<td>Rated short-circuit switching current in circuit-breaker cubicle (kA)</td>
</tr>
<tr>
<td>Address</td>
<td>Factory address</td>
</tr>
</tbody>
</table>

(*) In the event of a problem or non-conformity, note down this number and send it to Ormazabal's Technical - Commercial Department.
### 1.2. SERVICE CONDITIONS

<table>
<thead>
<tr>
<th>Installation</th>
<th>Indoors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum ambient temperature</td>
<td>104 °F (+40 °C) (a)</td>
</tr>
<tr>
<td>Minimum ambient temperature</td>
<td>-13 °F (-25 °C) (b)</td>
</tr>
<tr>
<td>Maximum average ambient temperature, measured over a 24-hour period</td>
<td>95 °F (+35 °C)</td>
</tr>
<tr>
<td>Maximum average relative humidity, measured over a 24-hour period</td>
<td>&lt; 95%</td>
</tr>
<tr>
<td>Maximum average relative humidity, measured over a 1-month period</td>
<td>&lt; 90%</td>
</tr>
<tr>
<td>Maximum height above sea level</td>
<td>3,250 feet (1,000 m) (c) (d)</td>
</tr>
<tr>
<td>Solar radiation</td>
<td>Negligible</td>
</tr>
<tr>
<td>Environmental air pollution (dust, salinity, etc.)</td>
<td>Insignificant</td>
</tr>
<tr>
<td>Vibrations (seismicity)</td>
<td>Negligible</td>
</tr>
</tbody>
</table>

(a) For special operating conditions (maximum ambient temperature greater than 104 °F (+40°C)), please consult Ormazabal’s Technical - Commercial Department.
(b) Higher than that laid down in standard IEC 62271-001, which states the minimum ambient temperature as 23 °F (-5°C).
(c) For transport, storage and installation.
(d) For higher altitudes, please consult Ormazabal’s Technical - Commercial Department.

**NOTE**

The specifications refer to section 2.1.1 “Normal service conditions for indoor cubicles” in the IEC 62271-1 standard “Common specifications for high-voltage cubicles”.
1.3. MECHANICAL CHARACTERISTICS

1.3.1. Dimensions and weights

- CPG.0-S: Disconnector

![Dimensions of CPG.0-S cubicle](image)

**NOTE**
For information about the cubicle anchorage, refer to Annex 1.

<table>
<thead>
<tr>
<th>Cubicle</th>
<th>With low control box</th>
<th>With high control box</th>
</tr>
</thead>
<tbody>
<tr>
<td>Width (a)</td>
<td>23 (600)</td>
<td></td>
</tr>
<tr>
<td>Depth (f)</td>
<td>53 (1,365)</td>
<td></td>
</tr>
<tr>
<td>Height (h)</td>
<td>87 (2,225)</td>
<td>96 (2,425)</td>
</tr>
<tr>
<td>Weight [pounds (kg)]</td>
<td>&lt; 250 (550)</td>
<td></td>
</tr>
</tbody>
</table>
**CPG.0-V: Circuit-breaker**

![Diagram of CPG.0-V cubicle](image)

*Figure 1.15: Dimensions of CPG.0-V cubicle*

<table>
<thead>
<tr>
<th>Dimensions [inches (mm)]</th>
<th>CPG.0-V 24/36 KV 1250/1600 A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cubicle</td>
<td>With low control box</td>
</tr>
<tr>
<td>Width (a)</td>
<td>23 (600)</td>
</tr>
<tr>
<td>Depth (f)</td>
<td>53 (1,365)</td>
</tr>
<tr>
<td>Height (h)</td>
<td>87 (2,225)</td>
</tr>
</tbody>
</table>

**Dimensions [inches (mm)]**

<table>
<thead>
<tr>
<th>Cubicle</th>
<th>CPG.0-V 2000 A</th>
<th>CPG.0-V 2250 A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Width (a)</td>
<td>31 (800)</td>
<td>39 (1000)</td>
</tr>
<tr>
<td>Depth (f)</td>
<td>60 (1,545)</td>
<td>60 (1,545)</td>
</tr>
<tr>
<td>Height (h)</td>
<td>87 (2,225)</td>
<td>96 (2,425)</td>
</tr>
</tbody>
</table>

**Weight [pounds (kg)]**

| Total | < 342 (750) |
| Total | < 500 (1,100) |

**NOTE**

For information about the cubicle anchorage, refer to Annex 1.
CPG.0-C: Busbar coupling

![Dimensions of CPG.0-C cubicle](image)

**Dimensions [inches (mm)]**

<table>
<thead>
<tr>
<th>Cubicle</th>
<th>CPG.0-C 24 kV– 36 kV 1250 /1600 A</th>
<th>CPG.0-C 24 kV / 2000 A</th>
<th>CPG.0-C 24 kV / 2250 A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Width (a)</td>
<td>With low control box</td>
<td>47 (1,200)</td>
<td>63 (1,600)</td>
</tr>
<tr>
<td>Depth (f)</td>
<td>With high control box</td>
<td>53 (1,365)</td>
<td>60 (1,545)</td>
</tr>
<tr>
<td>Height (h)</td>
<td>With low control box</td>
<td>87 (2,225)</td>
<td>96 (2,425)</td>
</tr>
<tr>
<td>Total</td>
<td>With high control box</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Weight [pounds (kg)]**

<table>
<thead>
<tr>
<th>Total</th>
<th>CPG.0-C 24 kV– 36 kV 1250 /1600 A</th>
<th>CPG.0-C 24 kV / 2000 A</th>
<th>CPG.0-C 24 kV / 2250 A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>&lt; 591 (1,300)</td>
<td>&lt; 1000 (2,200)</td>
<td>&lt; 1091 (2,400)</td>
</tr>
</tbody>
</table>

**NOTE**

For information about the cubicle anchorage, refer to Annex 1.
- CPG.0-RB: Busbar rise

![Figure 1.17: Dimensions of CPG.0-RB cubicle](image)

<table>
<thead>
<tr>
<th>Dimensions [inches (mm)]</th>
<th>With low control box</th>
<th>With high control box</th>
</tr>
</thead>
<tbody>
<tr>
<td>Width (a)</td>
<td>23 (600)</td>
<td></td>
</tr>
<tr>
<td>Depth (f)</td>
<td>55 (1,400)</td>
<td></td>
</tr>
<tr>
<td>Height (h)</td>
<td>87 (2,225)</td>
<td>96 (2,425)</td>
</tr>
<tr>
<td>Weight [pounds (kg)]</td>
<td>&lt; 227 (500)</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**NOTE**
For information about the cubicle anchorage, refer to Annex 1.
- CPG.0-F: Fuse protection

![Diagram of CPG.0-F cubicle](image)

**Figure 1.18: Dimensions of CPG.0-F cubicle**

<table>
<thead>
<tr>
<th>Dimensions [inches (mm)]</th>
<th>With low control box</th>
<th>With high control box</th>
</tr>
</thead>
<tbody>
<tr>
<td>Width (a)</td>
<td>23 (600)</td>
<td></td>
</tr>
<tr>
<td>Depth (f)</td>
<td>55 (1,403)</td>
<td></td>
</tr>
<tr>
<td>Height (h)</td>
<td>87 (2,225)</td>
<td>96 (2,425)</td>
</tr>
<tr>
<td>Weight [pounds (kg)]</td>
<td>&lt; 250 (550)</td>
<td></td>
</tr>
</tbody>
</table>

**NOTE**

For information about the cubicle anchorage, refer to Annex 1.
### 1.4. MAIN ELECTRICAL CHARACTERISTICS

#### 1.4.1. Voltage

<table>
<thead>
<tr>
<th>Function</th>
<th>Circuit-Breaker</th>
<th>Disconnector</th>
<th>Busbar Coupling</th>
<th>Fuse Protection</th>
<th>Busbar Rise</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated [kV]</td>
<td>$U_r$</td>
<td></td>
<td></td>
<td></td>
<td>27</td>
</tr>
<tr>
<td>Power frequency [kV]</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>38</td>
</tr>
<tr>
<td>Between phases and phase-</td>
<td>$U_d$</td>
<td></td>
<td></td>
<td></td>
<td>60</td>
</tr>
<tr>
<td>to-ground</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>80</td>
</tr>
<tr>
<td>Isolating distance</td>
<td>$U_d$</td>
<td></td>
<td></td>
<td></td>
<td>66</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>88</td>
</tr>
<tr>
<td>Lightning impulse [kV]</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Between phases and phase-</td>
<td>$U_p$</td>
<td></td>
<td></td>
<td></td>
<td>125</td>
</tr>
<tr>
<td>to-ground</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>170</td>
</tr>
<tr>
<td>Isolating distance</td>
<td>$U_p$</td>
<td></td>
<td></td>
<td></td>
<td>145</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>195</td>
</tr>
</tbody>
</table>

#### 1.4.2. Current

<table>
<thead>
<tr>
<th>For 27 kV</th>
<th>Circuit-Breaker</th>
<th>Busbar Coupling</th>
<th>Fuse Protection</th>
<th>Disconnector</th>
<th>Busbar rise</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated [A]</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>General busbar</td>
<td>$I_r$</td>
<td>1,250 / 1,600 / 2,250</td>
<td>1,250 / 1,600 / 2,250</td>
<td>1,250 / 1,600 / 2,250</td>
<td>1,250 / 1,600 / 2,250</td>
</tr>
<tr>
<td>Outgoing line</td>
<td>$I_r$</td>
<td>1,250 / 1,600 / 2,250(*)</td>
<td>1,250 / 1,600 / 2,250</td>
<td>200</td>
<td>1,250 / 1,600</td>
</tr>
<tr>
<td>Short-circuit [kA - 1 or 3 s]</td>
<td>$I_r/t_k$</td>
<td>25</td>
<td>25</td>
<td>25</td>
<td>25</td>
</tr>
</tbody>
</table>

(*) With forced ventilation

<table>
<thead>
<tr>
<th>For 38 kV</th>
<th>Circuit-Breaker</th>
<th>Busbar Coupling</th>
<th>Fuse Protection</th>
<th>Disconnector</th>
<th>Busbar rise</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated [A]</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>General busbar</td>
<td>$I_r$</td>
<td>1,250</td>
<td>1,250</td>
<td>1,250</td>
<td>1,250</td>
</tr>
<tr>
<td>Outgoing line</td>
<td>$I_r$</td>
<td>1,250</td>
<td>1,250</td>
<td>200</td>
<td>1,250</td>
</tr>
<tr>
<td>Short-circuit [kA - 1 or 3 s]</td>
<td>$I_r/t_k$</td>
<td>25</td>
<td>25</td>
<td>25</td>
<td>25</td>
</tr>
</tbody>
</table>
2. TRANSPORT

2.1. LIFTING METHODS

CPG.0 cubicles can be handled either by lifting (with slings) or using a forklift truck (with pallet):

During the installation period, Ormazabal provides a specific tool for lifting the CPG.0-C coupling cubicle:
3. STORAGE

Figure 3.1: Conditions for storage
4. INSTALLATION

4.1. CIVIL ENGINEERING WORKS

The minimum distances to the walls and ceiling, as recommended in standard IEC-62271-200 Annex A, are as follows (for other civil engineering layouts, please consult Ormazabal's Technical - Commercial Department):

<table>
<thead>
<tr>
<th>Minimum Distances [inches (mm)]</th>
<th>Cubicle</th>
<th>Trench</th>
</tr>
</thead>
<tbody>
<tr>
<td>Side wall (a)</td>
<td>&gt; 4 (100)</td>
<td>Depth (e)</td>
</tr>
<tr>
<td>Ceiling (b)</td>
<td>&gt; 23 (600)</td>
<td>Depth (f)</td>
</tr>
<tr>
<td>Front clearance (c)</td>
<td>Operation: &gt; 39 (1,000)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Cubicle removal: &gt; 59 (1,500)</td>
<td></td>
</tr>
<tr>
<td>Rear wall (d)</td>
<td>&gt; 4 (100)</td>
<td></td>
</tr>
<tr>
<td>Trench</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Depth (e)</td>
<td>&gt; 20 (500) *</td>
<td></td>
</tr>
<tr>
<td>Depth (f)</td>
<td>29 (750) *</td>
<td></td>
</tr>
</tbody>
</table>

(*) The dimensions of the trench depend on the characteristics of the cables used.

**NOTE**

For information about the cubicle anchorage, refer to Annex 1.
4.1.1. Assembling cubicles

1: When CPG.0 cubicles are placed against side walls, at least 4 inches (100 mm) clearance should be left.

2: The bases of the CPG.0 range cubicles have two 4x1 inches (110 x 35 mm) rectangular conduits for installation of the Low Voltage wiring and circuits.

3: As an option, the CPG.0 cubicle assembly can be finished off with end side panels inside which the control and indicating wiring, etc. can be installed.

4.2. CONNECTION BETWEEN CUBICLES

The cubicle connecting set is outside the sealed gas tank, in which the rest of the switchgear is housed.

This set consists of three separate cylindrical copper conductor busbars, with solid and shielded insulation. The cubicles are connected using a busbar section and “T” or “L” shaped connectors.

The whole set is protected against dirt and condensation; in addition, it has a metal cover to protect it against impacts.
1: Once aligned and leveled, the cubicles are joined together using M8 x 20 mm nuts and bolts.

On the side of the bases are five connecting points:

- 2 at the front (top and bottom)
- 2 in the intermediate area (top and bottom)
- 1 at the back (bottom)

2: The top racks in each cubicle have three connecting points on the side

It is advisable to alternate tightening between the top (racks) and the bottom (bases).

3: Once the cubicles have been connected, the grounding circuit for each cubicle is connected between the bases, with the corresponding interconnection bars. Then, the ground circuit is fixed on the top racks of the cubicles: both the individual bars on each cubicle, and the connection bars between them.

4: Next, by means of the grounding bar, the whole circuit is connected to the cubicle assembly general ground collector in the lower section of the bases.

5: Both connectors and intermediate connection busbars are used to make the electrical connection between cubicles.

Mount the busbars in accordance with the connector manufacturer's instructions.
6: Once all the cubicles have been connected, assemble the busbar compartment, first screwing together the back panels, then the sides and finally the front ones.

**NOTE**
For the busbar internal arc option, internal arc starters are supplied together with the side panel. These starters should be mounted on the top rack and together with the “L” shaped connectors, in the cubicle at the right-hand end (see Figure 4.12). They are incorporated in the left-hand panel.

**CAUTION**
To ensure the busbar has been mounted correctly, the electric strength test corresponding to the designated voltage must be performed for 1 minute.

7: Next, mount the cubicle separating panels (7A) by sliding them from top to bottom along the grooves between both the front and back panels. Similarly, sliding them in from top to bottom, fit the phase segregation panels (7B) lengthways along the cubicle assembly. These panels are not required if the assembly has not been fitted with the busbar internal arc option.

8: If the cubicles have a gas pressure relief duct, the duct panels of the busbar compartment must be mounted in each cubicle, screwing them to the top of the ducts and to the back panel of the busbar compartment in each cubicle. Next, close the busbar compartment, screwing together the grooved panels at the top of each cubicle and between them.
9: Once the busbar compartment has been configured, the control boxes can be installed, connecting them with their respective connectors to each cubicle.

10: Finally, the assembly can be finished off with end side panels.
5. SEQUENCE OF OPERATIONS

**DANGER**
- Do not operate if SF₆ low pressure alarm is activated
- For safety reasons, maintenance operations performed directly on the driving mechanism must be performed WITHOUT any actuating lever inserted

**CAUTION**
Do not refill the switchgear

5.1. CPG.0-S DISCONNECTOR CUBICLE

5.1.1. 1,250 A CPG.0-S cubicle

**Closing the disconnector:**
1. Perform the closing operation:

1.1. **Manual Operation**
Insert the disconnector lever, in the position indicated in figure 5.1 (grey zone), and turn 90° CLOCKWISE.

1.2. **Motorized Operation**
Activate the corresponding operation command.

![Figure 5.1: Closing the disconnector in the CPG.0-S cubicle for 1,250 A](image)

**NOTE**
In the case of manual operation, although the figure shows the beginning of the operation with the lever arm in a vertical position, it is advisable to start with the lever arm horizontal and to the right, to make the best use of the operator’s strength.

**Opening the disconnector:**
2. Perform the opening operation:

2.1. **Manual Operation**
Insert the disconnector lever, in the position indicated in Figure 5.2, and turn 90° ANTICLOCKWISE.

2.2. **Motorized Operation**
Activate the corresponding operation command.

![Figure 5.2: Opening the disconnector in the CPG.0-S cubicle for 1,250 A](image)
Closing the grounding switch:

3. Perform the operation

3.1. Manual operation
Insert the grounding switch lever, in the position indicated in figure 5.3, and turn 90° CLOCKWISE.

3.2. Motorized Operation
Activate the corresponding operation command.

Opening the grounding switch:

4: Perform the opening operation

4.1. Manual operation
Insert the grounding switch lever, in the position indicated in figure 5.4, and turn 90° ANTICLOCKWISE.

4.2. Motorized Operation
Activate the corresponding operation command.

NOTE
Although the figure shows the beginning of the operation with the lever arm in a vertical position, it is advisable to start with the lever arm horizontal and to the left, to make the best use of the operator’s strength.
5.1.2. 1600 A CPG.0-S cubicle

Closing the disconnector:

1: Release the disconnector lever access interlock, pushing the vertical selector right down \([1]\).

2. Perform the closing operation:

2.1. **Manual operation:**
Insert the disconnector lever, in the position indicated in figure 5.5, and turn 90\(^\circ\) CLOCKWISE.

2.2. **Motorized operation:**
Activate the corresponding operation command.

Opening the disconnector:

3: Release the disconnector lever access interlock, pushing the vertical selector right down\([1]\).

4. Perform the opening operation:

4.1. **Manual operation:**
Insert the disconnector lever, in the position indicated in Figure 5.6, and turn 90\(^\circ\) ANTICLOCKWISE.

4.2. **Motorized operation:**
Activate the corresponding operation command.

---

**CAUTION**

If, for any reason, the motor stops halfway through a motorized operation, before restarting it you must finish the operation manually, so that the whole mechanism: sensors, controllers, etc. are in a reliable, effective and logical position for the control system of the motorized unit when it is switched back on.

\([1]\) This step is only necessary for manual operation.
Closing the grounding switch:

5: Release the grounding switch lever access interlock, pushing the vertical selector right down.

6. Perform the closing operation

6.1. Manual operation:
Insert the grounding switch lever, in the position indicated in figure 5.7, and turn 90º CLOCKWISE.

6.2. Motorized operation:
Activate the corresponding operation command

Opening the grounding switch:

7: Release the Grounding Switch lever access interlock, pushing the vertical selector right down.

8: Perform the opening operation

8.1. Manual operation:
Insert the grounding switch lever, in the position indicated in figure 5.8, and turn 90º ANTICLOCKWISE.

8.2. Motorized operation:
Activate the corresponding operation command
5.2. CPG.0-V CIRCUIT-BREAKER CUBICLE

Opening the circuit-breaker and grounding the medium voltage cables:

1: Open the circuit-breaker by pressing the “O” opening push-button

![Figure 5.9: Location of the circuit-breaker “O” push-button in the CPG.0-V cubicle](image)

2: Open the disconnector by following the sequence described in section 5.1. (For the 24 kV/630 A cubicle variant, the driving mechanism is independent).

**CAUTION**

With the motorized disconnector and/or grounding switch, motorized operation is only possible if the MOTOR/NO MOTOR selector, associated with the disconnector and/or grounding switch driving mechanism, is interlocked in the MOTOR position (see figures 5.10 y 5.11)

![Figure 5.10: Location of the Motor/No Motor selector in the CPG.0-V cubicle for 1250 A](image)

![Figure 5.11: Location of the Motor/No Motor Selector in the CPG.0-V cubicle for 1600 A](image)
3: Close the grounding switch by following the sequence described in section 5.1.

4: Close the circuit-breaker by pressing the "I" closing push-button

In this situation it is possible to access the cable compartment by lifting and removing its cover.
Closing and commissioning the circuit-breaker from the grounding position:

Once the cable compartment cover has been fitted correctly, reverse the sequence of operation, ie:

1. Open the Circuit-Breaker by pressing the “O” opening push-button.
2. Open the grounding switch by following the sequence described in section 5.1. (For the 24 kV/630 A cubicle variant, the driving mechanism is independent).
3. Close the disconnector by following the sequence described in section 5.1.
4. Close the Circuit-Breaker by pressing the “I” closing push-button.

5.2.1. Operating Sequence for Cable Testing

Preparing the Cubicle for Cable Testing:

1. Ground the MV cables in accordance with the sequence described in section 5.2.
2. Remove the cable cover.
3. With a thin screwdriver, or similar tool, push through the circuit-breaker “door open” interlock slot, releasing this interlock and the operating push-buttons.
4. Open the circuit-breaker by pressing the “O” opening push-button.
5. Open the grounding switch by following the sequence described in section 5.1.

---

For safety reasons, it is advisable to padlock access to disconnector operation.

6. Close the circuit-breaker by pressing the “I” closing push-button.
Recommissioning after the Cable Test:

To “Commission” the cubicle again, we need to perform the sequence in reverse:

1. Open the Circuit-Breaker by pressing the “O” opening push-button.
2. Open the grounding switch by following the sequence described in section 5.1.
3. Close the circuit-breaker by pressing the “I” closing push-button.
4. Lift the door interlock with a thin screwdriver, or similar, and fit the cable compartment door.
5. Open the circuit-breaker by pressing the “O” opening push-button.
6. Open the grounding switch by following the sequence described in section 5.1.
7. Close the disconnector by following the sequence described in section 5.1.
8. Close the circuit-breaker by pressing the “I” closing push-button.
5.3. CPG.0-C BUSBAR COUPLING CUBICLE

Busbar Coupling:

1. Close the right-hand feeder Disconnector in accordance with the sequence described in section 5.1.

2. Close the left-hand feeder Disconnector in accordance with the sequence described in section 5.1.

3. Close the Circuit-Breaker by pressing the “I” closing push-button.
Busbar grounding on the RIGHT:

1. Close the right-hand feeder Disconnector in accordance with the sequence described in section 5.1.

2. Close the left-hand feeder grounding switch in accordance with the sequence described in section 5.1.

3. Close the Circuit-Breaker by pressing the “I” closing push-button.

Busbar grounding on the LEFT:

1. Close the left-hand feeder disconnector in accordance with the sequence described in section 5.1.

2. Close the grounding switch on the right-hand functional unit, in accordance with the sequence described in section 5.1.

3. Close the circuit-breaker by pressing the “I” closing push-button.
5.4. CPG.0-F FUSE PROTECTION CUBICLE

Closing and opening the switch-disconnector:

1: **CLOSING**: Insert the lever in the Disconnector shaft and turn 90° CLOCKWISE.

2: Turn the lever again 90° ANTICLOCKWISE to charge the opening springs. (The lever cannot be removed until the complete operation has been performed, in other words steps 1 and 2)

3: **OPENING**: To open the switch-disconnector, turn the opening handle ANTICLOCKWISE.

![Figure 5.25: Closing-opening sequence for the switch-disconnector in CPG.0-F](image)

Closing and opening the grounding switch:

4: **CLOSING**: Insert the lever and turn 90° ANTICLOCKWISE.

![Figure 5.26: Grounding switch closing sequence in CPG.0-F](image)

5: **OPENING**: Insert the lever in the grounding switch access and turn 90° CLOCKWISE.

![Figure 5.27: Grounding switch opening sequence in CPG.0-F](image)
5.4.1. Selection of fuses recommended for CPG.0-F

The fuses recommended for use in the CPG.0-F cubicle are defined according to tests carried out by the manufacturers. The following table shows the recommended fuse ratings according to the $U_r/P_{\text{transf}}$ ratio:

<table>
<thead>
<tr>
<th>Ur Grid [kV]</th>
<th>Ur Fuse [kV]</th>
<th>Rated Transformer Power WITHOUT OVERLOAD [kVA]</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>25</td>
</tr>
<tr>
<td>7.2</td>
<td>6/12</td>
<td>6,3</td>
</tr>
<tr>
<td>12.5</td>
<td>10/24</td>
<td>6,3</td>
</tr>
<tr>
<td>13.2</td>
<td>10/24</td>
<td>6,3</td>
</tr>
<tr>
<td>14.4</td>
<td>10/24</td>
<td>6,3</td>
</tr>
<tr>
<td>25</td>
<td>10/24</td>
<td>6,3</td>
</tr>
<tr>
<td>34.5</td>
<td>20/36</td>
<td>-</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Ur Grid [kV]</th>
<th>Ur Fuse [kV]</th>
<th>Rated Transformer Power WITHOUT OVERLOAD [kVA]</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>400</td>
</tr>
<tr>
<td>7.2</td>
<td>6/12</td>
<td>63</td>
</tr>
<tr>
<td>12.5</td>
<td>10/24</td>
<td>40</td>
</tr>
<tr>
<td>13.2</td>
<td>10/24</td>
<td>40</td>
</tr>
<tr>
<td>14.4</td>
<td>10/24</td>
<td>40</td>
</tr>
<tr>
<td>25</td>
<td>10/24</td>
<td>20</td>
</tr>
<tr>
<td>34.5</td>
<td>20/36</td>
<td>20</td>
</tr>
</tbody>
</table>

Remarks:
- Fuses recommended: SIBA brand with medium type striker, conforming to IEC 60282-1 (Low loss fuses).
- The values for combined fuses, acc. IEC 62271-105 (IEC 60420), are shown in bold.
- The fuse-switch assembly has been temperature-rise tested under normal service conditions according to IEC 60694.
- A fuse-holder carriage adapted for 11 inch es (292 mm), 6/12 kV fuses is available.
- For ratings not in bold the measurement is 17 inches (442 mm).
- If any of the fuses blows, we recommend changing all three.
- For overload conditions in the transformer or use of other brands of fuse, please consult Ormazabal's Technical-Commercial Department.
- General operating conditions: without overload, and temperature < 104 ºF (40 ºC)
- The values marked with an (*) correspond to SSK-type fuses.
- Maximum permitted power loss for a fuse: < 75 W.
5.4.2. Fuse replacement sequence in CPG.0-F

1. When a switch-fuse combination cubicle is used, any of the three fuses blowing causes the Switch-Disconnector to open automatically.

2. The unequivocal blown fuse signal is indicated by the red position indicator, which appears on the front of the driving mechanism compartment.

3. Close the grounding switch in accordance with the sequence indicated in section 5.4.

4. Open the cover to access the fuse and cable compartment, lifting the corresponding interlock.
5. Turn the handle on the fuse holder cover upwards until the locking clip is unhooked and then pull firmly outwards.

![Figure 5.31: Opening the fuse holder in CPG.0-F](image1)

6. Pull out the fuse holder carriage.

![Figure 5.32: Removing the fuse holder carriage in CPG.0-F](image2)

7. Replace the blown fuse.

**CAUTION**

Make sure that the end with the striker faces the carriage insulator end. Change all three fuses, even if they do not appear to be damaged.

![Figure 5.33: Replacing the blown fuse in CPG.0-F](image3)

8. Put the fuse holder carriage back in.

**CAUTION**

Before re-inserting the fuse holder carriage, it is important to ensure that both the carriage and the inside of the fuse holder are properly clean.

![Figure 5.34: Inserting the fuse holder carriage in CPG.0-F](image4)
9. Before closing the cover, press downwards to reset the cover striker.

10. To close the cover, first make sure that the clip (10a) is correctly engaged, and then turn the handle down into its vertical position (10b).

11. Position the access door to the fuse and cable compartment by lowering it and ensuring the door is interlocked.

12. Commission the cubicle by following the instructions indicated in section 5.4.
6. INTERLOCKS IN CPG.0

The circuit-breaker, disconnector and grounding switch are interlocked in accordance with section 5.11 of standard IEC 62271-200.

Access to the disconnector actuation shafts is only possible if the circuit-breaker is in the open position and can only be operated if any of the disconnector actuating levers has previously been removed. Also, all electrical operations are overridden if any of the levers has been inserted in the actuation shaft.

The circuit-breaker can only be put into commission in the closed and grounding positions of the disconnector or grounding switch. It also has an effective ground connection.

The cable compartment is only accessible with the grounding switch and the circuit-breaker closed (effective ground connection).

In functional units which incorporate fuses (protection by means of a switch-fuse combination and busbar voltage metering with disconnection and fuses), access to the fuse compartment is interlocked with the corresponding disconnector so that the compartment is only accessible with the grounding switch in the closed position.

Other available options are:

- Grounding switch electromagnetic interlock
- Locking with interlocks for:
  - Grounding switch in closed position.
  - Grounding switch in open position.
  - Disconnector in open position
7. MAINTENANCE

DANGER
For safety reasons, maintenance operations performed directly on the driving mechanism must be performed WITHOUT any actuating lever inserted.

CAUTION
Do not refill the switchgear.

NOTE
Switchgear is guaranteed against SF₆ leakage for 30 years.

7.1. GENERAL INFORMATION

Due to its configuration in totally sealed tanks, CPG.0 cubicles do not require any type of electrical maintenance on their MV circuits.

Although the driving mechanism has proven mechanical endurance of 10,000 operations, it is advisable to undertake preventive maintenance every 5 years or 2,000 operating cycles, unless the user, together with Ormazabal, consider otherwise, based on the conditions of use.

For safety reasons, during maintenance operations the following conditions must be observed:
- Circuit-breaker open and grounding switch closed.
- Auxiliary circuit power supply cut
- Operation control equipment disconnected
- Opening and closing springs discharged

CAUTION
Adjusting elements such as: opening stop piece, damper, plugs, nuts and bolts which have been sealed must not be adjusted.

For general cleaning, do not use solvents sprayed with compressed air.

The estimated time for the whole operation is approximately one hour and the following items are needed:
- Loctite A-270
- Torque wrench
- "Super-Lube" spray lubricant
- Aerosol antioxidant

7.2. VISUAL INSPECTION

Check that the elastic rings, split pins and interlock recoil springs are in place, and have not come loose or undone. Pay special attention to those in the main driving chain.

Check that the sealed adjustments have not been altered, especially the opening stop piece and the fixing nuts on the phase transmission and output shaft.
Take care that the connection cables are not anywhere near the transmission moving areas.

If the state of the superficial protections has been altered, due to rust or dust, apply the items indicated in the lubrication section. You need to take special care with the parts inside the chassis: transmissions, pawls and cams, taking their functionality and physical appearance into account.

Take account of the number of operations registered in the counter, the date of installation and location characteristics, whether it is the first preventive maintenance, and any previous corrective maintenance when carrying out subsequent preventive maintenance.

7.3. CHECKING OPERATIONS

The objective is to check the state of the equipment prior to commencing maintenance.

Perform two manual operations:

**First:**
- Charge the spring manually, checking that it is held in a stable position on the closing ratchet and that the opening latch “returns” to position itself under the latch shaft quickly and with minimum play of 0.08 inches (2 mm).
- Close the switch and check that the opening latch is stable.
- Open the switch.

**Second:**
- Charge the closing spring
- Close
- Charge the closing spring
- Open
- Close and Open
- With the same observations and checks as the first operation.

Next, perform two motorized operations with coil (or with coils)

**First:**
- Charge with motorization (check microswitches M0, M1 and M6) and close with closing coil.
- Open with opening coil.

**Second:**
- Charge the closing spring and close with coil. Charge the closing spring.
- Open-Close and Open with coils.

Check the reset device.
7.4. TIGHTENING THE FIXING NUTS AND BOLTS

Check that none of the nuts and screws have come loose, especially the screwed joints attaching the squares supporting the chassis to the cubicle structure and those which form the driving mechanism structure.

It is not necessary to retighten them to the rated tightening torque unless you have checked that the joint requires it. Simply test it manually with a standard key.

If you detect any loose connections, use Loctite A-270. Apply the rated torque corresponding to the design specifications.

7.5. REVIEW OF ADJUSTMENTS

The driving mechanism is factory-set for its whole service life. Seal any adjustments which should not be touched.

Main adjustment of the opening stop piece:
Check that it is not loose or unsealed.

**CAUTION**

Do not touch unless Ormazabal Technicians are present.

Adjusting the damping:
Check that it is sealed. If more damping is required, lift the body of the damper.

Adjusting the coils:
Do not touch the stop pieces or positions without having the appropriate time metering equipment.

7.6. LUBRICATION

Lubricate all the turning points for the shafts, bearings, sleeves, rollers, and in general any sliding elements.

Use Super-Lube Teflon-based spray lubricant, with application tube to ensure the product is applied only where needed.

If you notice any non-functional rusting is observed on any component, apply an antioxidant spray.

Do not use harsh liquids such as solvents, etc., nor apply compressed air to get rid of small particles or accumulated dust.
7.7. CHECKING OPERATIONS

If you have made any correction to the driving mechanism, you must run through the checking operations fully twice.

If not, simply perform a number of operations to homogenize the lubricant.

7.8. MAINTENANCE OF THE ekoRIVDS UNIT

The ekoRIVDS voltage presence/absence detection unit does not require any maintenance test, since the device constantly checks whether the voltage for each of the phases is higher than the value laid down by standard IEC 61243-5, showing this by activity of the LEDs.

Should it be necessary to check that the ekoRIVDS unit is working correctly, or even to replace it, simply remove the two screws located at the top right-hand corner and the bottom left-hand corner. The unit can then be removed without any need to power down the line supply.

To check that the indication unit is working correctly, apply 220 V_ac between the ground test point and the test point of each of the phases. Operation is correct if intermittent flashing can be seen on each phase that has been checked.

To re-install the unit in the cubicle, simply insert the indicator in the cubicle and replace the two screws that were removed earlier.

![Figure 7.2: ekoRIVDS fastening points](image-url)
8. ADDITIONAL INFORMATION

8.1. SPARES AND ACCESSORIES

Although all the components of the CPG.0 cubicles have passed both routine tests during the manufacturing process and type tests prior to approval, some of them can be changed, replaced and even installed in the field:

- Circuit-Breaker motor and charging system.
- Disconnector and grounding switch operation
- Circuit-Breaker opening coil, 2nd opening coil, closing coil and undervoltage coil.
- Fused protection cubicle opening coil
- Voltage presence indicator
- Actuating lever

If any of the stated auxiliary components need to be changed, the corresponding order for the spare parts kit should be sent to Ormazabal's Technical - Commercial Department, and the instructions given in the corresponding documentation must be followed.

8.2. CUBICLES EQUIPPED WITH VIDEO MONITOR FOR VISUAL CONFIRMATION OF THE SWITCH POSITION

The camera is located in a sealed compartment, protected from dust or aggressive environment. It is, nevertheless, accessible to repairs and maintenance labors.
9. ANNEX 1: LAYOUTS AND ANCHORAGE OF CPG.0 CUBICLES

Figure 9.1: Layout and anchorage of CPG.0-V, CPG.0-C (24 kV / 36 kV – 1,250 A / 1,600 A), CPG.0-S and CPG.0-RB
Figure 9.2: Layout and anchorage of CPG.0-V and CPG.0-C (24 kV / 2,000 A – 2,250 A)
Figure 9.3: Layout and anchorage of CPG.0-F