Medium voltage switchgear for distribution network solutions

cgm.3
Modular, compact system (RMU) with full gas insulation
Up to 40.5 kV Standards IEC
Up to 38 kV Standards ANSI/IEEE

Reliable innovation. Personal solutions.
www.ormazabal.com
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The quality of the products designed, manufactured and installed by Ormazabal is backed up by the implementation and certification of a quality management system, based on international standard ISO 9001:2008.

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 notice. These characteristics, as well as the availability of components, are subject to confirmation by Ormazabal.
Introduction

Preface

Basing its DNA on decades of experience in the research, design, development, manufacture and installation of circuit breakers and medium voltage (MV) switchgear, OrmaZabal has become one of the largest suppliers of gas-insulated medium-voltage switchgear (GIS) in the world. Up to now, around 1,300,000 OrmaZabal medium voltage functional units have been installed in electricity networks of more than 100 energy companies and 600 windfarms in more than 110 countries.

The preceding version of cgm.3 was the cgm-cgc, the first integrated insulation, modular, extensible secondary distribution cubicle on the global market. cgm.3 was launched in 2008, following the international success of its predecessor. Over recent years, the cgm.3 has been upgraded with higher electrical values, e.g. up to 40.5 kV and 25 kA. cgm-cgc and cgm.3 systems have been integrated in numerous applications in smart grids and renewable energy systems. There are currently more than 165,000 functional units of these systems in service in over 35 countries.

The cgm.3 system provides reliable, efficient solutions for the distribution network (DNS) for all types of medium-voltage installations, from energy companies to infrastructure, leisure facilities to industrial installations and from windfarms to photovoltaic plants.

OrmaZabal is the leading supplier of personalised solutions for electricity companies and energy and renewable energy end customers, and for renewable energy systems based on in-house technology.

We bolster the electrical development sector in order to take on future energy challenges. We collaborate with leading local, regional and global companies in the electricity sector as part of our firm commitment to innovation in the areas of personal safety, network reliability, energy efficiency and sustainability.

Our team of highly-qualified professionals who are enthusiastic about innovation has been developing in-house products and solutions for more than a century, always establishing a close relationship with our customers, focused on achieving mutual benefits in the long term.

Velatia is a leading, global, family-oriented industrial and technological group that is active in environments such as electrical networks, electronics and communication networks, in addition to sectors including consultancy, safety and components for aeronautics where safety, effectiveness and reliability are highly-valued.

Our focus on customers has led us to develop an extensive network of factories in Spain, France, Germany, Poland, Brazil, Mexico and China, helping to meet our customers’ needs in more than 50 countries.

The solutions of the companies that make up Velatia intend to create a world that is better connected, more sustainable, more intelligent, with improved communication, safer, and more human.
Your electricity network

"Your trusted partner for reliable smart grids"

Your business and DNS applications

Our close relationship with our customers and our in-depth knowledge of the electricity business are key to our success, and mean we can offer distribution network solutions (DNS) based on high-added value products and services adapted to the needs of electricity companies and energy and renewable energy end customers.
Our product map (SSS and DNS)

We are convinced that excellence comes not only from providing **efficient products and services**, but also the ability to respond to **individual requirements and demands**.

We provide our customers with personalised projects for efficient energy management through equipment and solutions for primary and secondary distribution.

![Image of product map](image)

### Our business areas

**SSS**: Substation solutions for primary distribution

**DNS**: Secondary distribution network solutions

### Our products for your market segment

#### SSS

- cpg.1
- cpg.0
- gae 1250 kmax
- cibor
- transforma
- ormacontainer

#### DNS

- cgm.3
- gae
- ga
- cgmcosmos (IEC-ANSI/IEEE)
- cgmcosmos [HN]

#### Protection, automation and control

**CURRENT® Family**

- Advanced metering, detection & analysis, monitoring and communications
- Low Voltage Board

**transforma® Family**

- Distribution transformers
- Conventional: Oil
  - transforma.tpc
  - transforma.fine
- Unconventional: Extended range of solutions
  - transforma.e
- Conventional: Liquid
  - transforma.liquid

#### Prefabricated concrete transformer substations (TS)

- Underground
- Surface and interior operation
- Compact

- Prefabricated metal transformer substations

- CEADS

- Breaking substations

#### Concrete enclosures for transformer substations (TS)

- Underground
- Surface and interior operation
- Modular

- Metal enclosure for transformer substation
- Photovoltaic substation
- Mobile substation

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**ORMAZABAL velatia**
Main characteristics

Safety
Protection for people, the environment and electrical facilities.
Special attention is given to personal safety for operators and the general public, even in fault conditions.

Internal arc
cgm.3 cubicles have mechanical and electrical interlocking as standard in accordance with IEC 62271-200 (Class IAC)/Standard IEEE C37.20.7 (Class 1D-s).

Sealtight integrity
All low voltage components are housed in a stainless steel gas tank which is hermetically sealed throughout the working life of the product. This provides resistance in accordance with the service conditions for indoor switchgear referred to in Standard IEC 62271-1.

Interlocking
cgm.3 cubicles have mechanical and electrical interlocking as standard in accordance with IEC 62271-200, thus allowing safe, reliable operation.
Interlocking prevents unsafe operations by:
- Making it impossible to close the switch-disconnector and the earthing switch at the same time
- Allowing the medium voltage cable access cover to be opened when the earthing switch is closed

There is also the option of padlocks, interlocking with key and electrical interlocking based on customer specifications.

Indicators
Additional safety through:
- Position indicators for the connection switchgear: Visual indication in the mimic diagram, validated through the kinematic chain test in accordance with current standards (IEC 62271-102)
- Voltage capacitive indicators: ekor.vpis: a self-powered indicator which shows the presence of voltage in the phases through three permanent light signals (IEC 62271-206) ekor.ivds: voltage presence/absence indicator with light signals (IEC 61243-5)
- Acoustic alarm: ekor.sas alarm which warns against earthing when the medium voltage cables are under voltage. Works in combination with ekor.vpis / ekor.ivds
- Phase comparator: ekor.spc

Reliability
Helps ensure continuing electricity network supply.

Lifetime sealtight insulation
The insulation inside a stainless steel gas tank provides a long working life (30 years) with maintenance-free live parts.

Environmental adaptation
Resistance to environmental conditions in accordance with Standard IEC 62271-1*.
(*) For other particular conditions, please ask Ormazabal.

Immersion-tested for 24 hours
The cgm.3 system passes the immersion test at a pressure of 3 m of water column for 24 hours at rated voltage and the insulation test at power frequency.

Routine tests 100%
All switchgear is subjected 100% to routine electrical and mechanical tests in line with relevant standards. 100% sealtight integrity tests are carried out on all switchgear, along with routine tests in order to guarantee reliability throughout their working life.
- Sealtightness test
- Power frequency test
- Main circuit resistance metering
- Mechanical endurance test
- Partial discharge metering (optional)
Efficiency
High-value characteristics to make work more straightforward.

Modularity
The cgm.3 design is completely modular. It offers flexible schematic configurations, simple extensibility on both sides and minimum surface occupied.
These units can also be adapted to the evolution of the network.

Extensibility and replacement
The ormalink connecting set can be used for effortless mechanical and electrical connection between two cubicles without having to handle the gas and with the option of future extensibility.
The possibility to replace the driving mechanisms and their motorisation without interrupting the supply can help improve the quality of the electricity supply.

Prepared for smart grids
The cgm.3 system has been incorporated in numerous smart grid applications.
Ormazabal provides complete medium voltage facilities which include protection, control, automation and advanced metering management functions in line with the most stringent demands of smart grids.

Ergonomic
Cgm.3 provides the following characteristics for ease-of-use:
- Front access for installation of medium voltage cables and fuses
- Single cable connection and test
- Optimal interface with operators
- Horizontal fuse holder
- Straightforward operation of the driving mechanisms
- Small and light

Sustainability
Ongoing efforts to reduce gas emissions.
Commitment to the environment:
- Continuing reduction in the use of greenhouse gases
- Negligible SF6 emissions during the manufacture processes
- Reduced gas leaks in the switchgear
- No use of SF6 gas during installation
- Ongoing metering to reduce our environmental impact.
- Management of end of working life
- Use of highly-recyclable materials
- Ongoing investment in research into materials and alternatives and also in-house technology
- Provide self-powered relays and devices which avoid high energy consumption

Continuous innovation
Helps ensure continuing electricity network supply.
A team of focused professionals with a dedication to innovation, providing a constant supply of new developments and updates, such as:
- New modules for 25 kA
- Module operation at -30 °C
- Our metering cubicles are subjected to testing in accordance with IEC 62271-200, including IAC requirements
- Evolution in the driving mechanisms
- Integration of protection and automation units in cubicles
- System prepared for smart grids
- Voltage and current sensors
- Cable fault preventive diagnosis
- Detection of partial discharges (PD) for network diagnosis
Technical details

Family

Modular cubicles

- Feeder function
- Fuse protection function
- Circuit breaker protection function
- Busbar switch function

Compact cubicles

- 2lp (RMU)
- 2lv

- Fuse protection and feeder functions
- Circuit breaker and feeder functions

Renewable energy configurations

- Fuse protection, riser and feeder functions
- Circuit breaker, riser and feeder functions

Applicable electrical standards

**IEC**

- IEC 62271-1: Common stipulations for high voltage switchgear
- IEC 62271-200: Alternating current metal-enclosed switchgear for rated voltages above 1 kV and up to and including 52 kV
- IEC 62271-103: Switches for rated voltages above 1 kV and below 52 kV
- IEC 62271-102: Alternating current earthing switches and disconnector
- IEC 62271-105: High voltage alternating current switch-fuse combinations
- IEC 62271-100: High voltage alternating current circuit breakers
- IEC 60255: Electrical relays
- IEC 60529: IP ratings for enclosures
- IEC 62271-206: Voltage presence indicating systems (vpis)
- IEC 61243-5: Voltage detection systems (vds)

**IEEE/ANSI**

- IEEE C37.74: IEEE requirements for switchgear for load break switches and fuse protected load break switches for alternating voltage systems up to 38 kV
- IEEE C37.20.3: Standard IEEE switchgear for metal-enclosed switches
- IEEE 1247: Standard for alternating current switches in the range above 1000 volts
- IEEE C37.123: IEEE guide for specifications for gas-insulated equipment in transformer substations
- Standard IEEE C37.20.4: Standard IEEE for indoor AC switches (1 kV-38 kV) for use in metal-enclosed switchgear.
- IEEE C37.04: Standard IEEE rating structure for AC high-voltage circuit breakers
- IEEE C37.06: Rated AC high-voltage circuit breakers on a symmetric current base: recommended ratings and related capabilities required
- Standard IEEE C37.09: IEEE standard test procedure for rated AC high-voltage circuit breakers on a symmetric current base
- Standard IEEE C37.20.7: IEEE guide for testing metal-enclosed medium voltage switchgear for internal arc faults
## Technical details

### Electrical characteristics

<table>
<thead>
<tr>
<th></th>
<th>IEC</th>
<th>ANSI/IEEE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated voltage</td>
<td>Ud</td>
<td>36 38.5 40.5 38</td>
</tr>
<tr>
<td>Rated frequency</td>
<td>f</td>
<td>50 60 50 50 60</td>
</tr>
<tr>
<td>Rated current</td>
<td>Ir</td>
<td>[A] 630 630 600 600</td>
</tr>
<tr>
<td>Busbars and cubicle interconnection</td>
<td>[A] 630 600</td>
<td></td>
</tr>
<tr>
<td>Transformer outgoing line</td>
<td>[A] 200 200 200</td>
<td></td>
</tr>
</tbody>
</table>

### Admissible rated short-term current

<table>
<thead>
<tr>
<th>con t = x [s]</th>
<th>l_r [kA]</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td>16/20 [1/3 s]</td>
<td>16/20</td>
<td>40/50/62.5</td>
<td>41/6/52/65</td>
<td>52/62.5</td>
<td>52.5/62.5</td>
</tr>
<tr>
<td>20 [1 s]</td>
<td>20</td>
<td>52/62.5</td>
<td>54.6/65</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Rated insulation level

| Rated withstand voltage at power frequency (1 min) | U_w [kV] | 70/80  | 80/90 | 95/118 | 70/77 |
| Lightening impulse rated withstand voltage       | U_p [kV] | 170/195 | 180/210 | 185/215 | 150/165 |

### Internal arc classification in accordance with IEC 62271-200

<table>
<thead>
<tr>
<th>IAC</th>
<th>AFL</th>
<th>AFLR</th>
</tr>
</thead>
<tbody>
<tr>
<td>AFL</td>
<td>16 kA 1 s/20 kA 1 s/25 kA 1 s</td>
<td></td>
</tr>
<tr>
<td>AFLR</td>
<td>20 kA 1 s/25 kA 1 s</td>
<td></td>
</tr>
</tbody>
</table>

### IP rating: Gas tank

<table>
<thead>
<tr>
<th>IP</th>
</tr>
</thead>
<tbody>
<tr>
<td>X8</td>
</tr>
</tbody>
</table>

### IP rating: External enclosure

<table>
<thead>
<tr>
<th>IP</th>
</tr>
</thead>
<tbody>
<tr>
<td>IP2XD</td>
</tr>
</tbody>
</table>

### Equipment colour

<table>
<thead>
<tr>
<th>RAL Colour</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grey 7035</td>
</tr>
<tr>
<td>blue 5005</td>
</tr>
</tbody>
</table>

### Category of loss of service continuity

| LSC2       |

### Compartmentalisation class

| PM         |

### Driving mechanism

#### Three-position switch disconnector

<table>
<thead>
<tr>
<th>B</th>
<th>BM</th>
<th>BR-A</th>
<th>BR-AM</th>
<th>AV</th>
<th>AMV</th>
<th>RAV</th>
<th>RAMV</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2</td>
<td>2</td>
<td></td>
<td>10</td>
<td>10</td>
<td>2</td>
<td>2</td>
</tr>
</tbody>
</table>

#### Vacuum circuit breaker switch

<table>
<thead>
<tr>
<th></th>
<th>2NA + 2NC</th>
<th>1NA + 1NC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Circuit breaker</td>
<td>2NA + 2NC 9NA + 9NC 2NA + 2NC 9NA + 9NC</td>
<td></td>
</tr>
<tr>
<td>Rated voltage</td>
<td>n/a 250</td>
<td></td>
</tr>
<tr>
<td>Rated current</td>
<td>16 10</td>
<td></td>
</tr>
</tbody>
</table>

### Service conditions

<table>
<thead>
<tr>
<th>Type of switchgear</th>
<th>IEC</th>
<th>ANSI/IEEE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frankfurt</td>
<td></td>
<td>Interior</td>
</tr>
</tbody>
</table>

### Ambient temperature

<table>
<thead>
<tr>
<th>Minimum</th>
<th>Maximum</th>
<th>- 30 °C*</th>
<th>+ 40 °C**</th>
</tr>
</thead>
</table>

### Minimum storage temperature

<table>
<thead>
<tr>
<th>- 40 °C</th>
<th>- 40 °F **</th>
</tr>
</thead>
</table>

### Relative humidity

| Maximum mean relative humidity, measured over a 24h/1 month period | < 95% < 90% |

### Vapour pressure

| Maximum mean vapour pressure, measured over a 24h/1 month period | 22 mbar | 16 mbar |

### Maximum height above sea level

| 2000 m** | 6500 feet** |

### Solar radiation

| Negligible |

### Ambient air pollution (dust, smoke, corrosive and/or flammable gases, vapours or salt)

| in accordance with normal service conditions of Standard IEC 62271-1 |

### Vibrations due to systemic movements or caused by causes external to the switchgear

| Insignificant** |

---

1) Tests conducted at 21 kA/52.5 kA. 2) Equivalent to IEEE C37.20.7 for 1D-S. 3) With gas output through the relief duct. Check availability in accordance with model.
Constructive structure

Front view

1. Mimic diagram and driving mechanism cover:
   1.1 Switch-disconnector (lockable with padlock)
   1.2 Earthing switch (lockable with padlock)
   2 Manometer
   3 Voltage indicator (ekor.vpis)
   4 Switch-disconnector indicator
   5 Acoustic alarm (ekor.sas)
   6 Cable compartment cover

Side view

1. Gas tank
   1.1 Busbar connection (side bushing)
   1.2 Switch-disconnector
   1.3 Lifting support pieces
   2 Front cover
   2.1 Nameplate and operating sequence
   2.2 Control box location
   3 Cable compartment
   4. Front bushing
   5. Connectors and cables
   6. Cable clamp
   7. Earthing bars
   8. Gas pressure relief duct

International certification and uses

Examples of application

International application/uses
- Public distribution: urban and rural areas
- Smart grids
- Renewable energies: onshore and offshore windfarms, photovoltaic solar plants...
- Hotels, stadiums, shopping centres
- Industrial areas
- Oil and gas industry
- Airports, ports, tunnels

ANSI/IEEE type
Design characteristics

Key components

ormalink connecting set

Pioneers in extensible connecting sets:

The ormalink connecting set, patented by Ormazabal in 1991, can be used to complete the electrical connection between different modules of the cgm.3 system. It maintains the rated insulation values, along with the rated and short-circuit currents. It also controls the electric field.

Extensible on both sides of the cubicles.

The extensible cubicles have side female bushing for easier connection between the main busbars.

Load break switch

High-performance puffer load break switch designed and developed by Ormazabal.

The switch-disconnector includes the switch, disconnector and earthing functions in a three-position unit.

Characteristics:
- Three-position switch-disconnector: open - closed - earthed
- Independent operator operation
- Switch category
  - Mechanical endurance:
    - 1000-M1
    - 5000-M2
  - Electrical endurance certificate: 5-E3
- Earthing switch category:
  - Mechanical endurance:
    - 1000-M0
    - Electrical endurance certificate: 5-E2

Vacuum circuit breaker

Circuit breaker with vacuum breaking technology, compact and highly reliable, certified in accordance with Standard IEC 62271-100, including extended electrical endurance (class E2) with quick reclosing, maintenance-free throughout its working life.

Characteristics:
- Mechanical endurance:
  - M2: 10,000 operations
  - M1: 2000 operations
- Operating sequence without reclosing
  - CO-15 s-CO
  - CO-3 min-CO
- Operating sequence with reclosing
  - 0-0.3 s-CO-15 s-CO
  - 0-0.3 s-CO-3 min-CO
- Associated with the switch-disconnector
**Main compartments**

**cgm.3** presents a structure divided into independent compartments:

1. **Gas tank**
   a) Busbar connection
   b) Making and breaking elements
2. **Driving mechanisms**
3. **Base**
   a) Cable compartment
   b) Gas expansion duct
4. **Control box**

**Gas tank**

The **tank**, sealtight and insulated with SF₆ gas, contains the busbar and the making and breaking devices. The dielectric used acts as both an insulating and extinguishing medium. The tank is fitted with a membrane which directs the gas output safely in the event of internal arc, along with a manometer to control the insulating gas pressure.

The **busbar** connects the single-phase bushing from outside the cubicle to the breaking components inside. The electrical connection between the different modules of the **cgm.3** system is made through the **ormalink** connecting set.

The **protection fuses** are set out in horizontal position in independent compartments per phase, and are installed in fuse holders. The fuse holder compartments provide insulation and sealtight integrity against pollution, temperature changes and adverse weather conditions. The movement of the fuse striker is transmitted from inside to the tripping mechanism.

**Characteristics:**
- Lifetime sealing insulation system (30 years)
- Tested against internal arc
- Stainless steel – rating IP X8
- Welding with robot
- Connection, breaking and main circuit devices:
  - Switch-disconnector
  - Circuit breaker
  - Fuse holders
- Plug-in terminal for exterior bushing
- Manometer
- Expansion membrane
- Direct busbar connection through single-phase female bushing

**Driving mechanisms**

The **driving mechanism** is used to carry out making and breaking operations in the medium voltage circuits.

The front distribution of the driving mechanisms and the use of anti-reflex levers allows safe, comfortable and straightforward operations with minimal effort.

The front **mimic diagrams** include the position indicating devices. Maximum reliability checked through kinematic chain testing of the signalling mechanism in accordance with IEC 62271-102.

**Characteristics:**
- Mimic diagram and pushbuttons
- Position indication (kinematic chain)
  - Making and breaking elements
  - Fuse trip
- (ekor.vpis/ekor.ivds) voltage capacitive indicator
- Interlocking (electrical and mechanical)
- Uninterrupted motorisation of the supply
- Option of replacement and motorisation on site
Types of driving mechanisms

There are different models, in accordance with the driving mechanism (3-position switch or circuit breaker):

Three-position switch-disconnector
- B and BM
  - Basic driving mechanism with independent manual (B) or motorised (BM) drive
  - Local or remote operations
  - Applicable to busbar and feeder functions
- BR-A and BR-AM
  - Driving mechanism with manual (BR-A) or motorised (BR-AM) operation and latching on opening
  - Applicable to fuse protection functions

Circuit breaker
- AV and AMV (no reclosing)/RAV and RAMV (with reclosing)
- Spring-driven driving mechanism for circuit breaker function
- This mechanism is installed in series with a B-type mechanism
- The spring unit is charged manually (AV-RAV) or by motor (AMV - RAMV)

Base

Cable compartment
The cable compartment located in the lower front section of the cubicle has a cover, interlocked with the earthing switch, to allow front access to the medium voltage cables.

The insulated medium voltage cables from the outside are connected using bushing which allows plug-in or screw-in connectors with or without shielding.

Characteristics:
- Option of up to two connectors per phase. Ask about compatibilities.
- More connectors or surge arresters through special cover
- Effortless connections (plug-in or screw-in)
- Bushing height suitable for three-core/large-size cables.
- Plug-in terminal for exterior bushing
- Simple cable earthing
- Cable test
- Front cover interlocked with the earthing switch
- Protected ducts for low voltage cables

Control box

The control box, located in the top of the cubicle and independent from the medium voltage compartments, has been defined for the installation of protection relays, and for metering and control devices.

Characteristics:
- Compartment independent from the medium voltage zone
- Ready for the installation of protection relays and metering and control equipment
- Assembly and testing in factory in accordance with customer requirements
- Standard and compact design to install the protection relays and automation units of Ormazabal
- Highly-adaptable for protection relays, control and metering units of other manufacturers, as well as equipment provided by the customer
- Personalised size and design

Coupled control boxes can also be supplied for indicator elements and operation of motorised functions.

Gas pressure relief duct

The gas pressure relief duct, located in the rear section of the base, directs the gases generated due to the effect of an internal arc through a membrane.

Characteristics:
- Expansion of the gases in the case of internal arc
- Rear conduction of the gases released
- Metal partition separating the cable compartment
- Optional: Relief duct for rear protection in the event of internal arc

IAC AFLR with rear duct

Gas tank internal arc 20 kA 1 in acc. IAC class AFL

Metering cubicle

Optional: lower gas output in 1100 mm width version.
Smart grids

The purpose of smart grids is to generate and distribute electrical energy efficiently, reliably, cleanly and safely.

The electricity, telecommunications, information technology and communication industries all converge and coexist in the added value chain of smart grids.

Ormazabal collaborates in innovative projects and provides products and solutions focused on improving efficiency in energy distribution in an ever-changing environment by developing and promoting smart grids.

Ormazabal technology, specially designed for smart grids, offers the following benefits, amongst others:

1. Allows integration of new users in the network
2. Promotes efficient network operation
3. Reinforces network safety, control, and supply quality
4. Optimises the investment plan for improving the electricity network
5. Improves market work and customer service
6. Encourages consumer participation in energy management

References
- Iberdrola STAR Project. Spain (Castellón, Bilbao…)
- Endesa Project. Spain (Malaga)
- Gas Natural Fenosa Project. Spain (Madrid)

Protection and automation

ekorsys Family

Ormazabal provides comprehensive medium voltage facilities which include protection, control and automation functions.

Ormazabal has a wide range of applications and services to meet distribution network requirements.
Protection
- Supply to medium voltage customers
  - ekor.rpg
    3 x 50/51 + 50N/51N + 50Ns/51Ns
  - ekor.rpt
    3 x 50/51 + 50N/51N + 50Ns/51Ns
- Protection for switching substations and industrial clients
  - ekor.rps
    3 x 50/51 + 50N/51N + 50Ns/51N+67+49+81+27+59N...+ control
  - ekor.rps-ci/ekor.rpa
    3 x 50/51 + 50N/51N + 50Ns/51Ns + integrated control
  - ekor.rpt-ci
    3 x 50/51 + 50N/51N + 50Ns/51Ns + integrated control
- Protection for rural transformer substations (ctr)
  - ekor.rpt-k
    3 x 50/51 + 50N/51N + 49T + integrated control
- Generator set protection unit
  - ekor.upg
- Substation protection
  - ekor.rps-tcp:
    3 x 50/51 + 50N/51N + 50Ns/51Ns +67+49+81+27+59N+50BF... + control

Automation and remote control
- Remote control
  - ekor.uct
  - ekor.ccp
  - ekor.rci
- Automatic transfer
  - ekor.stp
  - ekor.ccp
  - ekor.rtk
- Fault detection
  - ekor.rci
- Acoustic voltage presence alarm
  - ekor.sas
- Secondary switching points

Advanced metering management and communication
- ekor.gid

Control station

Software
- ekor.soft

For further information, please ask Ormazabal or visit www.ormazabal.com
Modular, compact system (RMU) with full gas insulation

Type of modules
cgm.3-l

Feeder function
Modular feeder cubicle, fitted with a three-position switch-disconnector, closed, open or earthed.

Extensibility: right, left and both sides.

<table>
<thead>
<tr>
<th>Electrical characteristics</th>
<th>IEC</th>
<th>ANSI/IEEE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated voltage U_r [kV]</td>
<td>36</td>
<td>38.5</td>
</tr>
<tr>
<td>Rated frequency f_1 [Hz]</td>
<td>50</td>
<td>60</td>
</tr>
<tr>
<td>Rated current I_r [A]</td>
<td>400/630</td>
<td>630</td>
</tr>
<tr>
<td>Rated short-term withstand voltage at power frequency (1 min) U_d [kV]</td>
<td>70</td>
<td>80</td>
</tr>
<tr>
<td>Phase-to-earth and between phases</td>
<td>80</td>
<td>90</td>
</tr>
<tr>
<td>Across isolating distance U_d [kV]</td>
<td>170</td>
<td>180</td>
</tr>
<tr>
<td>Lightning impulse rated withstand voltage</td>
<td>195</td>
<td>210</td>
</tr>
<tr>
<td>Phase-to-earth and between phases</td>
<td>AF/AFL 16 kA 1 s/20* kA 1 s/25 kA 1 s</td>
<td>AF/AFL 20* kA 1 s/25 kA 1 s</td>
</tr>
<tr>
<td>Across isolating distance U_d [kV]</td>
<td>IAC</td>
<td>AF/AFL 16 kA 1 s/20* kA 1 s/25 kA 1 s</td>
</tr>
<tr>
<td>Withstand DC voltage U_d [kV]</td>
<td>72</td>
<td>103</td>
</tr>
<tr>
<td>Switch-disconnector</td>
<td>IEC 62271-103 + IEC 62271-102</td>
<td>IEEE C37.74</td>
</tr>
</tbody>
</table>

Admissible rated short-term current (main circuit)

Value t = (x) s I_r [kA] 40/50*62.5 41.6/52*/65 52/62.5 52.5/62.5 54.6/65

Mainly active current breaking capacity

Value t = (x) s I_r [kA] 40/50*62.5 41.6/52*/65 52/62.5 52.5/62.5 54.6/65

Main circuit breaker making capacity (peak value)

Value t = (x) s I_r [kA] 40/50*62.5 41.6/52*/65 52/62.5 52.5/62.5 54.6/65

Earthing switch IEC 62271-102 IEEE C37.74

Admissible rated short-time current (earthing circuit)

Value t = (x) s I_r [kA] 40/50*62.5 41.6/52*/65 52/62.5 52.5/62.5 54.6/65

Earthing switch category

Mechanical endurance 1000-M1/5000-M2 1000/5000

Operations cycles (short-circuit making operations) - class 5-E3 3-E2 in 20 kA/5-E3 in 25 kA 3

Applications
Incoming or outgoing medium voltage cables which allow communication with the transformer substation main busbars.
Configuration

Cubicle
- Internal arc IAC AFLR
  - 16 kA 1 s
  - 20 kA 1 s
  - 25 kA 1 s
- Internal arc IAC AFL
  - 16 kA 1 s
  - 20 kA 1 s
  - 25 kA 1 s
- Internal arc AF
  - 16 kA 0.5 s
  - 20 kA 0.5 s
  - 16 kA 1 s
  - 20 kA 1 s
  - 25 kA 1 s
- Cubicle 1400 mm high
- Cubicle 1745 mm high

Gas tank
- Stainless steel tank

Gas pressure indicator:
- Contactless manometer
- Manometer with temperature compensation and two power-free contacts

Front connection:
- Bushing

Side connection:
- Extensibility on both sides
- Extensibility to the blind left/right
- Extensibility to the blind right/left

Side connection type:
- Female bushing
  - Right
  - Left
  - Both
- Cone bushing
  - Right
  - Left
  - Both

Driving mechanism
- Driving levers
- B type manual mechanism
- BM type motorised mechanism
- Acoustic alarm ekor.sas
- ekor.vpis voltage presence capacitive indicator
- ekor.ivds voltage presence/absence capacitive indicator
- Other capacitive voltage indicators
- ekor.rci Integrated control and monitoring unit
- ekor.rtk Voltage detection unit

Additional interlocking:
- Electrical interlocking
- Locking with lock
- Locking with padlocks

Cable compartment
- Screw-in IEC bushing
- Screw-in ANSI bushing
- Cover for one connector per phase
- Extended cable compartment cover for double cable connection
- Extended cable compartment cover for cable connection plus surge arrester
- Detection of partial discharges (PD) for network diagnosis

Gas pressure relief duct
- Rear pressure relief duct

Control box
- Other voltage indicators
- Other automation and metering components

Dimensions

<table>
<thead>
<tr>
<th>Dimensions</th>
<th>IEC</th>
<th>ANSI/IEEE</th>
</tr>
</thead>
<tbody>
<tr>
<td>IEC</td>
<td></td>
<td>ANSI/IEEE</td>
</tr>
<tr>
<td>In H</td>
<td>145</td>
<td>162</td>
</tr>
<tr>
<td>In W</td>
<td>52</td>
<td>20</td>
</tr>
<tr>
<td>In D</td>
<td>18</td>
<td>16</td>
</tr>
<tr>
<td>Wt</td>
<td>550</td>
<td>330</td>
</tr>
<tr>
<td>Lb</td>
<td>147</td>
<td>324</td>
</tr>
<tr>
<td>(*) IEC range</td>
<td>357 Lbm</td>
<td></td>
</tr>
</tbody>
</table>
Fuse protection function

Modular cubicle with fuse protection, fitted with a three-position switch-disconnector: closed, open or earthed and protection with limiting fuses.

Extensibility: right, left and both sides.

<table>
<thead>
<tr>
<th>Electrical characteristics</th>
<th>IEC</th>
<th>ANSI/IEEE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated voltage</td>
<td>U_r [kV]</td>
<td>36</td>
</tr>
<tr>
<td>Rated frequency</td>
<td>f_r [Hz]</td>
<td>50</td>
</tr>
<tr>
<td>Rated current</td>
<td>I_r [A]</td>
<td>400/630</td>
</tr>
<tr>
<td>Rated short-term withstand voltage at power frequency (1 min)</td>
<td>U_d [kV]</td>
<td>28</td>
</tr>
<tr>
<td>Lightning impulse rated withstand voltage</td>
<td>U_p [kV]</td>
<td>75</td>
</tr>
<tr>
<td>Internal arc classification</td>
<td>IAC</td>
<td>AF/AFL 16 kA 1 s/20 kA 1 s / 25 kA 1 s</td>
</tr>
<tr>
<td>Withstand DC voltage</td>
<td>n/a</td>
<td>103</td>
</tr>
</tbody>
</table>

Switch-disconnector

| IEC 62271-103 + IEC 62271-102 | IEEE C37.74 |

Admissible rated short-term current (main circuit)

<table>
<thead>
<tr>
<th>Value t_s = (x) s</th>
<th>I_k [kA]</th>
<th>16/20* (1/3 s/25 (1 s)</th>
<th>20* (1/3 s/25 (1 s)</th>
<th>20* (1/3 s/25 (1 s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peak value</td>
<td>I_k [kA]</td>
<td>40/50*/62.5</td>
<td>40/52.5*/65</td>
<td>52*/62.5</td>
</tr>
<tr>
<td>Main active current breaking capacity</td>
<td>I_m [A]</td>
<td>200</td>
<td>200</td>
<td></td>
</tr>
<tr>
<td>Main circuit breaker making capacity (peak value)</td>
<td>I_m [kA]</td>
<td>40/50*/62.5</td>
<td>40/52.5*/65</td>
<td>52*/62.5</td>
</tr>
</tbody>
</table>

Switch category

<table>
<thead>
<tr>
<th>Mechanical endurance</th>
<th>1000-M1</th>
<th>1000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operations cycles (short-circuit making operations) - class</td>
<td>5-E3</td>
<td>3-E2 in 20 kA/5-E3 in 25 kA</td>
</tr>
<tr>
<td>Combined switch-relay take-over current (ekkor.rpt)</td>
<td>I_max of breaking in acc. T.D.: IEC 62271-105</td>
<td>490</td>
</tr>
<tr>
<td>Switch-fuse combination transfer current</td>
<td>I_max of breaking in acc. T.D.: IEC 62271-105</td>
<td>820</td>
</tr>
</tbody>
</table>

Earthing switch

| IEC 62271-102 | IEEE C37.74 |

Admissible rated short-time current (earthing circuit)

<table>
<thead>
<tr>
<th>Value t_s = 1 s</th>
<th>I_k [kA]</th>
<th>1/3.15</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peak value</td>
<td>I_k [kA]</td>
<td>50 Hz: 2.5/7.8</td>
</tr>
<tr>
<td>Earthing switch making capacity (peak value)</td>
<td>I_m [kA]</td>
<td>50 Hz: 2.5</td>
</tr>
<tr>
<td>Earthing switch category</td>
<td>Mechanical endurance</td>
<td>1000-M0</td>
</tr>
<tr>
<td>Operations cycles (short-circuit making operations) - class</td>
<td>5-E2.2-E1 for 7.8 or 8.2 kA</td>
<td></td>
</tr>
</tbody>
</table>

Applications

General protection and protection for the transformer and opening and closing operations.
Configuration

Cubicle
- Internal arc IAC AFLR
  - 16 kA 1 s 20 kA 1 s
- Internal arc IAC AFL
  - 16 kA 1 s 20 kA 1 s
  - 25 kA 1 s
- Internal arc AF
  - 16 kA 0.5 s 20 kA 0.5 s
  - 16 kA 1 s 20 kA 1 s
  - 25 kA 1 s
- Cubicle 1400 mm high
- Cubicle 1745 mm high

Gas tank
- Stainless steel tank

Gas pressure indicator:
- Contactless manometer
- Manometer with temperature compensation and two power-free contacts

Front connection:
- Bushing

Side connection:
- Extensibility on both sides
- Extensibility to the blind left/right
- Extensibility to the blind right/left

Side connection type:
- Female bushing
  - Right
  - Left
  - Both
- Cone bushing
  - Right
  - Left
  - Both

Fuse trip:
- By combined fuses
- By associated fuses

Fuse holder:
- 36 kV
- 38-38.5 kV
- 40.5 kV

Driving mechanism
- Driving levers
- BR-A type manual mechanism
- BR-AM type motorised mechanism

- Tripping coil
- Acoustic alarm ekor.sas
- ekor.xr/pis voltage presence capacitive indicator
- ekor.vpairs voltage presence/absence capacitive indicator (with earthing)
- Other capacitive voltage indicators
- ekor.rpt Transformer protection unit
- ekor.rtk Voltage detection unit

Additional interlocking:
- Electrical interlocking
- Locking with lock
- Locking with padlocks

Cable compartment
- Plug-in IEC bushing
- Screw-in IEC bushing
- Screw-in ANSI bushing
- Cover for one connector per phase
- Extended cable compartment cover for double cable connection
- Extended cable compartment cover for cable connection plus surge arrester
- Detection of partial discharges (PD) for network diagnosis

Gas pressure relief duct
- Rear pressure relief duct

Control box
- Other voltage indicators
- Other protection relays
- Other automation and metering components

Dimensions

**IEC**

**ANSI/IEEE**

<table>
<thead>
<tr>
<th>Dimensions</th>
<th>[mm]</th>
<th>[inch]</th>
</tr>
</thead>
<tbody>
<tr>
<td>1400/1745</td>
<td>55/69</td>
<td></td>
</tr>
<tr>
<td>180/525</td>
<td>7/20</td>
<td></td>
</tr>
<tr>
<td>128/175</td>
<td>5-6/7</td>
<td></td>
</tr>
</tbody>
</table>

215/230 kg

(*) IEC range 474/507 Lbm
**cgm.3-v**

**Circuit breaker protection function**

Modular cubicle with circuit breaker protection, fitted with vacuum circuit breaker in series with a three-position switch-disconnector.

**Extensibility:** right, left and both sides.

<table>
<thead>
<tr>
<th>Electrical characteristics</th>
<th>IEC</th>
<th>ANSI/IEEE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated voltage</td>
<td>Ur</td>
<td>36</td>
</tr>
<tr>
<td>Rated frequency</td>
<td>f</td>
<td>50</td>
</tr>
<tr>
<td>Rated current</td>
<td>L</td>
<td>400/630</td>
</tr>
<tr>
<td>Main interconnection of busbar and cubicles</td>
<td>L</td>
<td>400/630</td>
</tr>
<tr>
<td>Phase-to-earth and between phases</td>
<td>Ue</td>
<td>70</td>
</tr>
<tr>
<td>Across isolating distance</td>
<td>Ue</td>
<td>80</td>
</tr>
<tr>
<td>Lightning impulse rated withstand voltage</td>
<td>Ue</td>
<td>170</td>
</tr>
<tr>
<td>Internal arc classification</td>
<td>IAC</td>
<td>AF/AFL* 20* kA 1 s/25 kA 1 s</td>
</tr>
<tr>
<td>Withstand DC voltage</td>
<td>Udc</td>
<td>72</td>
</tr>
<tr>
<td>Circuit breaker</td>
<td></td>
<td>IEC 62271-100</td>
</tr>
</tbody>
</table>

**Admissible rated short-term current (main circuit)**

Value $t_s = (x)$ s  
Peak value $I_{p}$ [kA]  
Mainly active current rated breaking capacity $I_{1}$ [A]  
Main circuit breaker making capacity (peak value) $I_{1m}$ [kA]  
Capacitive current capacity (50 Hz), Capacitor bank $I_{c}$ [A]  
Rated operating sequence

- No quick reclosing
- With quick reclosing

**Circuit breaker category**

- Mechanical endurance (operation class)
- Electrical endurance (class)

**Switch-disconnector**

Value $t_s = (x)$ s  
Peak value $I_{p}$ [kA]  
Mainly active current rated breaking capacity $I_{1}$ [A]  
Main circuit breaker making capacity (peak value) $I_{1m}$ [kA]  
Rated operating sequence

**Switch-disconnector category**

- Mechanical endurance
- Operations cycles (short-circuit making operations) - class

**Earthing switch**

Value $t_s = (x)$ s  
Peak value $I_{p}$ [kA]  
Main circuit breaker making capacity (peak value) $I_{1m}$ [kA]  
Rated operating sequence

**Applications**

General protection and protection for the transformer, feeder, capacitor bank, etc., along with opening and closing operations.
Configuration

Cubicle
- Internal arc IAC AFLR
  - 20 kA 1 s  □ 25 kA 1 s
- Internal arc IAC AFL
  - 20 kA 1 s  □ 25 kA 1 s
- Internal arc AF
  - 16 kA 0.5 s  □ 20 kA 0.5 s
  - 20 kA 1 s  □ 25 kA 1 s
- Cubicle 1400 mm high
- Cubicle 1745 mm high

Gas tank
- Stainless steel tank

Gas pressure indicator:
- Contactless manometer
- Manometer with temperature compensation and two power-free contacts

Front connection:
- Bushing

Side connection:
- Extensibility on both sides
- Extensibility to the blind left/right
- Extensibility to the blind right/left

Side connection type:
- Female bushing
  - Right □ Left □ Both
- Cone bushing
  - Right □ Left □ Both

Driving mechanism
- Driving levers
- B-type switch mechanism
- BM type motorised mechanism
- AV type manual mechanism
- RAV type manual mechanism with reclosing
- AVM type motorised mechanism
- RAVM type motorised mechanism with reclosing
- Tripping coil
- Bistable coil
- Second trip coil
- Closing coil

- Minimum voltage coil
- Acoustic alarm ekor.sas
- ekor.vpis voltage presence capacitive indicator
- ekor.ivds voltage presence/absence capacitive indicator (with earthing)
- ekor.rpg Protection unit
- ekor.rtk Voltage detection unit

Additional interlocking:
- Electrical interlocking
- Locking with lock
- Locking with padlocks

Cable compartment
- Screw-in IEC bushing
- Plug-in IEC bushing
- Screw-in ANSI bushing
- Cover for one connector per phase
- Extended cable compartment cover for double cable connection
- Extended cable compartment cover for cable connection plus surge arrester
- Detection of partial discharges (PD) for network diagnosis

Gas pressure relief duct
- Rear pressure relief duct

Control box
- Other voltage indicators
- Other protection relays
- Other automation and metering components

Dimensions

<table>
<thead>
<tr>
<th>IEC</th>
<th>ANSI/IEEE</th>
</tr>
</thead>
<tbody>
<tr>
<td>595/600 [23.43 /24]</td>
<td>240/255 kg</td>
</tr>
<tr>
<td>1400/1745 [55/69]</td>
<td>(*) IEC range</td>
</tr>
<tr>
<td>350/695 [14 /27]</td>
<td>259/562 Lbm</td>
</tr>
<tr>
<td>310/695 [14 /27]</td>
<td>259/562 Lbm</td>
</tr>
<tr>
<td>850 [33]</td>
<td>259/562 Lbm</td>
</tr>
</tbody>
</table>

(*) IEC range
**cgm.3-s**

**Busbar switch function**

Modular busbar switch cubicle, fitted with a two-position switch-disconnector (closed and open). Earthing switch optional (s-pt).

Extensibility: on both sides.

<table>
<thead>
<tr>
<th>Electrical characteristics</th>
<th>IEC</th>
<th>ANSI/IEEE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated voltage</td>
<td>Uₚ  [kV]</td>
<td>36</td>
</tr>
<tr>
<td>Rated frequency</td>
<td>fₚ  [Hz]</td>
<td>50</td>
</tr>
<tr>
<td>Rated current</td>
<td>Iₚ  [A]</td>
<td>400/360</td>
</tr>
<tr>
<td>Rated short-term withstand voltage at power frequency (1 min)</td>
<td>Uₚ  [kV]</td>
<td>70</td>
</tr>
<tr>
<td>Lightning impulse rated withstand voltage</td>
<td>Uₚ  [kV]</td>
<td>170</td>
</tr>
<tr>
<td>Internal arc classification</td>
<td>IAC</td>
<td>AF/AFL 16 kA 1 s/20* kA 1 s</td>
</tr>
</tbody>
</table>

**Switch-disconnector**

IEC 62271-103 + IEC 62271-102  
IEEE C37.74

**Admissible rated short-term current (main circuit)**

<table>
<thead>
<tr>
<th>Value tₛ = [x] s</th>
<th>Iₛ  [kA]</th>
<th>16/20* (1/3 s)</th>
<th>20* (1/3 s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peak value</td>
<td>Iₛ  [kA]</td>
<td>40/50*</td>
<td>41.6/52*</td>
</tr>
<tr>
<td>Mainly active current breaking capacity</td>
<td>Iₛ  [A]</td>
<td>400/630</td>
<td>600/800</td>
</tr>
<tr>
<td>Vacuum cable breaking capacity</td>
<td>Uₛ  [kV]</td>
<td>50</td>
<td>20</td>
</tr>
<tr>
<td>Closed loop breaking capacity</td>
<td>Iₛ  [A]</td>
<td>400/630</td>
<td>600/800</td>
</tr>
<tr>
<td>Earth fault breaking capacity</td>
<td>Iₛ  [A]</td>
<td>160</td>
<td>n/a</td>
</tr>
<tr>
<td>Vacuum lines and cables breaking capacity in earth fault conditions</td>
<td>Iₛ  [A]</td>
<td>90</td>
<td>n/a</td>
</tr>
<tr>
<td>Main circuit breaker making capacity (peak value)</td>
<td>Iₛ  [kA]</td>
<td>40/50*</td>
<td>41.6/52*</td>
</tr>
</tbody>
</table>

**Admissible rated short-time current (earthing circuit)**

<table>
<thead>
<tr>
<th>Value tₛ = [x] s</th>
<th>Iₛ  [kA]</th>
<th>16/20* (1/3 s)</th>
<th>20* (1/3 s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peak value</td>
<td>Iₛ  [kA]</td>
<td>40/50*</td>
<td>41.6/52*</td>
</tr>
<tr>
<td>Earthing switch making capacity (peak value)</td>
<td>Iₛ  [kA]</td>
<td>40/50*</td>
<td>41.6/52*</td>
</tr>
</tbody>
</table>

**Applications**

Load breaking of the main busbar of the transformer substation and earthing on the right (ptd) or left (pti) of the breaking point.
### Configuration

**Cubicle**
- Internal arc IAC AFL
  - 16 kA 1 s  □  20 kA 1 s
- Internal arc AF
  - 16 kA 0.5 s  □  20 kA 0.5 s
  - 16 kA 1 s  □  20 kA 1 s
- Cubicle 1745 mm high

**Gas tank**
- Stainless steel tank

**Gas pressure indicator:**
- Contactless manometer
- Manometer with temperature compensation and two power-free contacts

**Side connection:**
- Extensibility on both sides

**Side connection type:**
- Female bushing
  - Right  □  Left  □  Both
- Cone bushing
  - Right  □  Left  □  Both

**Earthing:**
- With earthing switch on the left side. Type s-pti
- With earthing switch on the right sides: ptd

**Driving mechanism**
- Driving levers
- B type manual mechanism
- BM type motorised mechanism
- Acoustic alarm ekor.sas
- ekor.vpis voltage presence capacitive indicator (with earthing)
- ekor.ivds voltage presence/absence capacitive indicator (with earthing)
- Other capacitive voltage indicators
- ekor.rci Integrated control and monitoring unit
- ekor.rtk Voltage detection unit

### Dimensions

<table>
<thead>
<tr>
<th>Dimensions</th>
<th>[mm]</th>
<th>[inch]</th>
</tr>
</thead>
<tbody>
<tr>
<td>IEC</td>
<td>418</td>
<td>16</td>
</tr>
<tr>
<td>ANSI/IEEE</td>
<td>1745</td>
<td>69</td>
</tr>
<tr>
<td>Width</td>
<td>850</td>
<td>33</td>
</tr>
</tbody>
</table>

**Additional interlocking:**
- Electrical interlocking
- Locking with lock
- Locking with padlocks

**Gas pressure relief duct**
- Rear pressure relief duct

**Control box**
- Other relays
- Other automation and metering components

**Options**

cgm.3-s-pt

<table>
<thead>
<tr>
<th>IEC</th>
<th>ANSI/IEEE</th>
</tr>
</thead>
</table>

Width = 600 mm (24 inch)
Weight = 185 kg/407.8 Lbm

143 kg
315 Lbm
**cgm.3-rb**

**Busbar riser function**

Modular cubicle with gas insulation and busbar rise. Optional earthing switch (rb-pt).

**Extensibility:** right and both sides.

<table>
<thead>
<tr>
<th>Electrical characteristics</th>
<th>IEC</th>
<th>ANSI/IEEE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated voltage</td>
<td>$U_r$ [kV]</td>
<td>36</td>
</tr>
<tr>
<td></td>
<td></td>
<td>38.5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>40.5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>38</td>
</tr>
<tr>
<td>Rated frequency</td>
<td>$f_r$ [Hz]</td>
<td>50/60</td>
</tr>
<tr>
<td></td>
<td></td>
<td>50</td>
</tr>
<tr>
<td></td>
<td></td>
<td>50/60</td>
</tr>
<tr>
<td>Rated current</td>
<td>$I_t$ [A]</td>
<td>400/630</td>
</tr>
<tr>
<td>Main interconnection of busbar and cubicles</td>
<td></td>
<td>630</td>
</tr>
<tr>
<td>Line</td>
<td>$I_t$ [A]</td>
<td>400/630</td>
</tr>
<tr>
<td>Rated short-term withstand voltage at power frequency (1 min)</td>
<td></td>
<td>600</td>
</tr>
<tr>
<td>Phase-to-earth and between phases</td>
<td>$U_{d}$ [kV]</td>
<td>80</td>
</tr>
<tr>
<td>Across isolating distance</td>
<td>$U_{d}$ [kV]</td>
<td>80</td>
</tr>
<tr>
<td>Lightning impulse rated withstand voltage</td>
<td></td>
<td>90</td>
</tr>
<tr>
<td>Phase-to-earth and between phases</td>
<td>$U_{d}$ [kV]</td>
<td>170</td>
</tr>
<tr>
<td>Across isolating distance</td>
<td>$U_{d}$ [kV]</td>
<td>195</td>
</tr>
<tr>
<td>Internal arc classification</td>
<td>IAC</td>
<td>AF/AFL 20°/kA 1 s/25°/kA 1 s</td>
</tr>
<tr>
<td></td>
<td></td>
<td>AFLR 20°/kA 1 s/25°/kA 1 s</td>
</tr>
<tr>
<td>Earthing switch</td>
<td>IEC 62271-102</td>
<td>IEEE C37.74</td>
</tr>
<tr>
<td>Admissible rated short-time current (earthing circuit)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Value $t = (x) s$</td>
<td>$I_t$ [kA]</td>
<td>16/20°(1/3 s/25° (1 s))</td>
</tr>
<tr>
<td></td>
<td></td>
<td>20°(1/3 s/25° (1 s))</td>
</tr>
<tr>
<td></td>
<td></td>
<td>20°(1/3 s/25° (1 s))</td>
</tr>
<tr>
<td>Peak value</td>
<td>$I_t$ [kA]</td>
<td>40/52.5°/62.5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>41.6/54.6°/65</td>
</tr>
<tr>
<td></td>
<td></td>
<td>52°/62.5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>52°/62.5</td>
</tr>
<tr>
<td>Earthing switch making capacity (peak value)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$I_{sw}$ [kA]</td>
<td></td>
<td>40/52.5°/62.5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>41.6/54.6°/65</td>
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<tr>
<td></td>
<td></td>
<td>52°/62.5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>52°/62.5</td>
</tr>
<tr>
<td>Earthing switch category</td>
<td>Mechanical endurance</td>
<td>1000-M0</td>
</tr>
<tr>
<td></td>
<td>Operations cycles (short-circuit making operations) - class</td>
<td>5-E2</td>
</tr>
</tbody>
</table>

*Tests conducted at 21 kA/52.5 kA
Values for 50 Hz

**Applications**

Incoming or outgoing medium voltage cables which allow communication with the transformer substation busbars, on the right side (rbd), on the left side (rbi) or on both sides (rba).
## Configuration

**Cubicle**
- Internal arc IAC AFLR
  - 20 kA 1 s
  - 25 kA 1 s
- Internal arc IAC AFL
  - 16 kA 1 s
  - 20 kA 1 s
  - 25 kA 1 s
- Internal arc AF
  - 16 kA 0.5 s
  - 20 kA 0.5 s
  - 20 kA 1 s
  - 25 kA 1 s
- Cubicle 1745 mm high

**Gas tank**
- Stainless steel tank

**Gas pressure indicator:**
- Contactless manometer
- Manometer with temperature compensation and two power-free contacts

**Front connection:**
- Bushing

**Side connection:**
- Extensibility on both sides: rba
- Extensibility to the blind right/left: rbd
- Extensible left side/blind right side: rbi

**Side connection type:**
- Female bushing
  - Right
  - Left
  - Both
- Cone bushing
  - Right
  - Left
  - Both

**Earthing:**
- With earthing switch on the left side
- With earthing switch on the right side

**Driving mechanism**
- B type manual mechanism
- Acoustic alarm ekor.sas
- ekor.vpis voltage presence capacitive indicator (with earthing)
- ekor.ivds voltage presence/absence capacitive indicator (with earthing)

## Dimensions

<table>
<thead>
<tr>
<th>IEC</th>
<th>ANSI/IEEE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dimensions (mm)</td>
<td>158 kg</td>
</tr>
<tr>
<td>Dimensions (in)</td>
<td>348.3 Lbm</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Configuration</th>
<th>Dimensions (mm)</th>
<th>Dimensions (in)</th>
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</thead>
<tbody>
<tr>
<td>Cubicle</td>
<td>1745</td>
<td>69</td>
</tr>
<tr>
<td>Gas tank</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gas pressure indicator</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Front connection</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Side connection</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Side connection type</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Earthing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Driving mechanism</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**cgm.3**
Modular, compact system (RMU) with full gas insulation

**cgm.3-rc**

**Cable riser function**

Cable rise modular cubicle (through to main busbar) with air insulation.

Extensibility: Right or left.

### Electrical characteristics

<table>
<thead>
<tr>
<th></th>
<th>IEC</th>
<th>ANSI / IEEE</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Rated voltage</strong> U&lt;sub&gt;r&lt;/sub&gt; [kV]</td>
<td>36</td>
<td>38.5</td>
</tr>
<tr>
<td><strong>Rated frequency</strong> f [Hz]</td>
<td>50/60</td>
<td>50</td>
</tr>
<tr>
<td><strong>Rated current</strong> I&lt;sub&gt;r&lt;/sub&gt; [A]</td>
<td>400/630</td>
<td>630</td>
</tr>
<tr>
<td><strong>Internal arc classification</strong> IAC</td>
<td>AF/AFL 20* kA 1 s/25 kA 1 s</td>
<td>AFL 20* kA 1 s/25 kA 1 s</td>
</tr>
</tbody>
</table>

* Tests conducted at 21 kA/52.5 kA
Values for 50 Hz

### Applications

Connection cable housing through to main transformer substation busbar, on the right (rcd) or on the left (rci).

### Configuration

**Cubicle**

- Internal arc IAC AFLR
  - 20 kA 1 s 25 kA 1 s
- Internal arc IAC AFL
  - 16 kA 1 s 20 kA 1 s
  - 25 kA 1 s
- Cubicle 1745 mm high

**Connectivity**

- Extensibility: Right side rcd or left side rci

**Indicators**

- ekor.vpis voltage capacitive indicator
- ekor.ivds voltage capacitive indicator

### Options

**cgm.3-cl**

Side connection box
(width = 365 mm, weight = 20 kg)

**cgm.3-r2c**

Double cable riser function (without IAC class option)
(width = 550 mm, weight = 65 kg)

---

**Dimensions**

IEC

**IEC**

**ANSI / IEEE**

<table>
<thead>
<tr>
<th>Width</th>
<th>Height</th>
<th>Length</th>
</tr>
</thead>
<tbody>
<tr>
<td>1590 [63]</td>
<td>1067 [43]</td>
<td>831 [33]</td>
</tr>
</tbody>
</table>

42 kg
93 Lbm

**ORMAZABAL velatia**
cgm.3-m

Modular metering cubicle with air insulation.

Electrical characteristics

<table>
<thead>
<tr>
<th>Parameter</th>
<th>IEC</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated voltage</td>
<td>U₀</td>
<td>36</td>
</tr>
<tr>
<td>Rated frequency</td>
<td>f₀</td>
<td>50</td>
</tr>
<tr>
<td>Rated current</td>
<td>I₀</td>
<td>400/630</td>
</tr>
<tr>
<td>Rated short-term withstand voltage at power frequency (1 min)</td>
<td>U₀</td>
<td>70</td>
</tr>
<tr>
<td>Lightning impulse rated withstand voltage</td>
<td>Uₚ</td>
<td>170</td>
</tr>
<tr>
<td>Internal arc classification</td>
<td>IAC AFL</td>
<td>16/20/25 kA 0.5 s/20* kA 0.5 s/16 kA 1 s/20* kA 1 s</td>
</tr>
<tr>
<td>Admissible rated short-term current value tₘ (x) s</td>
<td>Iₘ</td>
<td>16/20 (1/3 s) 25 (1 s)</td>
</tr>
</tbody>
</table>

* Tests conducted at 21 kA/52.5 kA
** For cgm.3-m 1100 mm width = AFL 20 kA 1 s with expansion of gases to trench

Applications

Housing for voltage and current metering transformers, allowing communication with the transformer substation busbar through dry cables or bars.

Configuration

Cubicle
- IAC AFL 16/20/25 kA 0.5 s
- IAC AFL 20 kA 1 s
- IAC AFL 20 kA 1 s (width 900 mm)
- IAC AFL 20 kA 1 s (width 1100 mm, gas expansion to trench)
- Heating element
- Protection mesh
- Locks

Busbar connections
- Unscreened rigid top connection
- Unscreened rigid bottom connection

Cable connections
- Bottom cable connection

Metering transformers
- Current transformers installed (3 CTs)
- Voltage transformers installed (3 VTs)
- No transformers

Control box
- Other automation and metering components

Options

Width = 900 mm  Width = 1100 mm

Dimensions

290 kg* (900 mm)
520 kg* (1100 mm)

(*) Empty enclosure
cgm.3
Modular, compact system (RMU) with full gas insulation

cgm.3-2lp

Fuse protection and feeder functions
Compact cubicle (RMU) with two feeder functions and one fuse protection function, housed in a single gas tank.

Extensibility: right, left, both sides or none.

<table>
<thead>
<tr>
<th>Electrical characteristics</th>
<th>IEC</th>
<th>l - p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated voltage</td>
<td>$U_r$ [kV]</td>
<td>36</td>
</tr>
<tr>
<td>Rated frequency</td>
<td>$f_r$ [Hz]</td>
<td>50</td>
</tr>
<tr>
<td>Rated current</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Main interconnection of busbar and cubicles</td>
<td>$I_{l_r}$ [A]</td>
<td>400/630</td>
</tr>
<tr>
<td>Line</td>
<td>$I_{l_r}$ [A]</td>
<td>400/630</td>
</tr>
<tr>
<td>Transformer outgoing line</td>
<td>$I_{l_r}$ [A]</td>
<td>200 (p)</td>
</tr>
<tr>
<td>Rated short-term withstand voltage at power frequency (1 min)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Phase-to-earth and between phases</td>
<td>$U_{d_r}$ [kV]</td>
<td>70</td>
</tr>
<tr>
<td>Across isolating distance</td>
<td>$U_{d_r}$ [kV]</td>
<td>80</td>
</tr>
<tr>
<td>Lightning impulse rated withstand voltage</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Phase-to-earth and between phases</td>
<td>$U_{d_r}$ [kV]</td>
<td>170</td>
</tr>
<tr>
<td>Across isolating distance</td>
<td>$U_{d_r}$ [kV]</td>
<td>195</td>
</tr>
<tr>
<td>Internal arc classification</td>
<td>IAC</td>
<td>AF/AFL 16 kA 1 s/20* kA 1 s</td>
</tr>
<tr>
<td>Switch-disconnector</td>
<td>IEC 62271-103</td>
<td></td>
</tr>
</tbody>
</table>

Admissible rated short-term current (main circuit)

<table>
<thead>
<tr>
<th>Value $t_s = (x) s$</th>
<th>$I_{l_r}$ [kA]</th>
<th>16/20* (1/3 s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peak value</td>
<td>$I_{l_r}$ [kA]</td>
<td>40/50*</td>
</tr>
</tbody>
</table>

Mainly active current breaking capacity

| $I_{l_r}$ [A] | 400/630 (p) 200 |

Vacuum cable breaking capacity

| $I_{l_r}$ [A] | 50/1.5 |

Closed loop breaking capacity

| $I_{l_r}$ [A] | 400/630 |

Earth fault breaking capacity

| $I_{l_r}$ [A] | 160 |

Vacuum lines and cables breaking capacity in earth fault conditions

| $I_{l_r}$ [A] | 90 |

Main circuit breaker making capacity (peak value)

| $I_{l_r}$ [kA] | 40/50* |

Switch category

Mechanical endurance 1000-M1/5000-M2

Operations cycles (short-circuit making operations) - class 5-E3

Combined switch-relay take-over current (ekor.rpt)

| $I_{max}$ of breaking in acc. TD, IEC 62271-105 | [A] | (p) 490 |

Switch-fuse combination transfer current

| $I_{max}$ of breaking in acc. TD, IEC 62271-105 | [A] | (p) 820 |

Earthing switch

IEC 62271-102

Admissible rated short-time current (earthing circuit)

<table>
<thead>
<tr>
<th>Value $t_s = (x) s$</th>
<th>$I_{l_r}$ [kA]</th>
<th>(l) 16/20* (1/3 s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peak value</td>
<td>$I_{l_r}$ [kA]</td>
<td>(p) 1</td>
</tr>
</tbody>
</table>

Earthing switch making capacity (peak value)

<table>
<thead>
<tr>
<th>$I_{l_r}$ [kA]</th>
<th>(l) 40/52*</th>
</tr>
</thead>
</table>

Earthing switch category

Mechanical endurance 1000-M0

Operations cycles (short-circuit making operations) - class 5-E2

Applications
Compact cubicle (RMU) which includes the feeder and fuse protection functions.
Configuration

Cubicle
- Internal arc IAC AFL
  - 16 kA 1 s □ 20 kA 1 s
- Internal arc AF
  - 16 kA 0.5 s □ 20 kA 0.5 s
- Cubicle 1400 mm high
- Cubicle 1745 mm high

Gas tank
- Stainless steel tank

Gas pressure indicator:
- Contactless manometer
- Manometer with temperature compensation and two power-free contacts

Front connection:
- Bushing

Side connection:
- Extensibility on both sides
- Extensibility to the blind left/right
- Extensibility to the blind right/left
- Blind on both sides

Side connection type:
- Female bushing
  - Right □ Left □ Both
- Cone bushing
  - Right □ Left □ Both

Fuse holder:
- 36 kV

Driving mechanism
- Driving levers
- B and BR-A type manual mechanism
- BR-AM type motorised mechanism
- Acoustic alarm ekor.sas
- ekor.vpis voltage presence capacitive indicator
- ekor.ivds voltage presence/absence capacitive indicator
- Other capacitive voltage indicators

ekor.rci Integrated control and monitoring unit
ekor.rpt Transformer protection unit
ekor.rtk Voltage detection unit

Additional interlocking:
- Electrical interlocking
- Locking with lock
- Locking with padlocks

Cable compartment
- Screw-in IEC bushing
- Screw-in ANSI bushing
- Cover for one connector per phase
- Extended cable compartment cover for double cable connection
- Extended cable compartment cover for cable connection plus surge arrester
- Detection of partial discharges (PD) for network diagnosis

Gas pressure relief duct
- Rear pressure relief duct

Control box
- Other voltage indicators
- Other protection relays
- Other automation and metering components

Options
For other configurations with more feeder functions or fuse protection, please ask:
cgm.3-3lp
cgm.3-2l2p
cgm.3-3l2p
...
490 kg
Modular, compact system (RMU) with full gas insulation

**cgm.3-2lv**

Circuit breaker and feeder functions

Compact cubicle with two feeder functions and one circuit breaker function, housed in a single gas tank.

**Extensibility:** right, left, both sides or none.

<table>
<thead>
<tr>
<th>Electrical characteristics</th>
<th>IEC</th>
<th>I - v</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated voltage</td>
<td>U_r [kV]</td>
<td>36</td>
</tr>
<tr>
<td>Rated current</td>
<td>I_r [A]</td>
<td>400/630</td>
</tr>
<tr>
<td>Main interconnection of busbar and cubicles</td>
<td>I_m [A]</td>
<td>50*62.5</td>
</tr>
<tr>
<td>Line</td>
<td>I_s [A]</td>
<td>50*62.5</td>
</tr>
<tr>
<td>Rated short-term withstand voltage at power frequency (1 min)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Phase-to-earth and between phases</td>
<td>U_{ph} [kV]</td>
<td>70</td>
</tr>
<tr>
<td>Across isolating distance</td>
<td>U_{es} [kV]</td>
<td>80</td>
</tr>
<tr>
<td>Lightning impulse rated withstand voltage</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Phase-to-earth and between phases</td>
<td>U_{pl} [kV]</td>
<td>170</td>
</tr>
<tr>
<td>Across isolating distance</td>
<td>U_{es} [kV]</td>
<td>195</td>
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<tr>
<td>Internal arc classification</td>
<td>IAC</td>
<td>AF/AFL 20* kA 1 s/25 kA 1 s</td>
</tr>
<tr>
<td>Switch-disconnector</td>
<td>IEC 62271-103</td>
<td></td>
</tr>
<tr>
<td>Admissible rated short-term current (main circuit)</td>
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<td></td>
</tr>
<tr>
<td>Value t= (x) s l_m [kA]</td>
<td>20*25 (1 s)</td>
<td></td>
</tr>
<tr>
<td>Peak value l_p [kA]</td>
<td>50*62.5</td>
<td></td>
</tr>
<tr>
<td>Mainly active current breaking capacity</td>
<td>I_m [A]</td>
<td>400/630</td>
</tr>
<tr>
<td>Vacuum cable breaking capacity</td>
<td>I_v [A]</td>
<td>50</td>
</tr>
<tr>
<td>Closed loop breaking capacity</td>
<td>I_c [A]</td>
<td>400/630</td>
</tr>
<tr>
<td>Earth fault breaking capacity</td>
<td>I_e [A]</td>
<td>160</td>
</tr>
<tr>
<td>Vacuum lines and cables breaking capacity in earth fault conditions</td>
<td>I_v [A]</td>
<td>90</td>
</tr>
<tr>
<td>Main circuit breaker making capacity (peak value)</td>
<td>I_m [kA]</td>
<td>50*62.5</td>
</tr>
<tr>
<td>Switch category</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mechanical endurance</td>
<td>1000-M1/5000-M2</td>
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</tr>
<tr>
<td>Operations cycles (short-circuit making operations) - class</td>
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<td>5-E3</td>
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<tr>
<td>Circuit breaker</td>
<td>IEC 62271-100</td>
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<tr>
<td>Admissible rated short-time current (earthing circuit)</td>
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<tr>
<td>Value t= (x) s l_m [kA]</td>
<td>20*25 (1 s)</td>
<td></td>
</tr>
<tr>
<td>Peak value l_p [kA]</td>
<td>50*62.5</td>
<td></td>
</tr>
<tr>
<td>Making and breaking rated capacity</td>
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<td></td>
</tr>
<tr>
<td>Mainly active current rated breaking capacity</td>
<td>I_m [A]</td>
<td>400/630</td>
</tr>
<tr>
<td>Short-circuit breaking capacity</td>
<td>I_s [kA]</td>
<td>20*25</td>
</tr>
<tr>
<td>Circuit breaker making capacity (peak value)</td>
<td>I_m [kA]</td>
<td>50*62.5</td>
</tr>
<tr>
<td>Capacitive current capacity (50 Hz). Capacitor bank</td>
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<td>400</td>
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<tr>
<td>Rated operating sequence</td>
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</tr>
<tr>
<td>No quick reclosing</td>
<td>CO-15 s-CO</td>
<td></td>
</tr>
<tr>
<td>With quick reclosing</td>
<td>O-3 min-CO-3 min-CO</td>
<td></td>
</tr>
<tr>
<td>Circuit breaker category</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mechanical endurance (operation class)</td>
<td>10,000 – M2</td>
<td></td>
</tr>
<tr>
<td>Electrical endurance (class)</td>
<td>E2 – C2</td>
<td></td>
</tr>
<tr>
<td>Earthing switch</td>
<td>IEC 62271-102</td>
<td></td>
</tr>
<tr>
<td>Admissible rated short-time current (earthing circuit)</td>
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<td></td>
</tr>
<tr>
<td>Value t= (x) s l_m [kA]</td>
<td>20*25 (1 s)</td>
<td></td>
</tr>
<tr>
<td>Peak value l_p [kA]</td>
<td>50*62.5</td>
<td></td>
</tr>
<tr>
<td>Earthing switch making capacity (peak value)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Earthing switch category</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mechanical endurance</td>
<td>1000-M0</td>
<td></td>
</tr>
<tr>
<td>Operations cycles (short-circuit making operations) - class</td>
<td></td>
<td>S-E2</td>
</tr>
</tbody>
</table>

Applications

Compact cubicle which includes the feeder and circuit breaker functions.
Configuration

Cubicle
- Internal arc IAC AFL
  - 20 kA 1 s  25 kA 1 s
- Internal arc IAC AF
  - 20 kA 1 s  25 kA 1 s
- Cubicle 1745 mm high

Gas tank
- Stainless steel gas tank

Gas pressure indicator:
- Contactless manometer
- Manometer with temperature compensation and two power-free contacts

Front connection:
- Bushing

Side connection:
- Extensibility on both sides
- Extensibility to the blind left/right
- Extensibility to the blind right/left
- Blind on both sides

Side connection type:
- Female bushing
  - Right
  - Left
  - Both
- Cone bushing
  - Right
  - Left
  - Both

Fuse holder:
- 36 kV

Driving mechanism
- Spring charge and driving levers
- B and (R)AV type manual mechanism
- BM and (R)AMV type motorised mechanism
- Acoustic alarm ekor.sas (feeder function)
- ekor.vpis voltage presence capacitive indicator
- ekor.ivds voltage presence/absence capacitive indicator
- Other capacitive voltage indicators

ekor.rci Integrated control unit
ekor.rpg/ekor.rpa Protection unit
ekor.rtk Voltage detection unit

Additional interlocking:
- Electrical interlocking
- Locking with lock
- Locking with padlocks

Cable compartment
- Screw-in IEC bushing
- Screw-in ANSI bushing
- Cover for one connector per phase
- Extended cable compartment cover for double cable connection
- Extended cable compartment cover for cable connection plus surge arrester
- Detection of partial discharges (PD) for network diagnosis

Control box
- Other voltage indicators
- Other protection relays
- Other automation and metering components
Other components and accessories

HRC fuses

Characteristics:
- Horizontal fuse holder
- Front access
- Phase-independent compartments
- Protected in a gas tank
- Insulation and sealtight integrity against external agents (pollution, temperature changes, adverse weather conditions, including flooding)
- Internal interlocks for safe access to the fuse holder area

Fuse protection
Protection from short-circuits in the medium voltage network is provided through the fuse protection functions. The fuse holders reach a uniform temperature throughout the pipe when positioned horizontally in the gas tank. Thanks to their closed cover, they are completely hermetic for protection from flooding and external contamination.

In accordance with Standard IEC 62271-105, the switch-fuse relationship may be “associated” or “combined”. In the second case, tripping of any of the fuses is indicated in the cubicle’s front mimic diagram.

Fuse protection and tripping coil
The combined switch-fuse option allows the opening of the switch-disconnector caused by an external signal, such as the one sent by the transformer thermostat in the case of overheating.

<table>
<thead>
<tr>
<th>U₄ Network (kV)</th>
<th>100</th>
<th>125</th>
<th>160</th>
<th>200</th>
<th>250</th>
<th>315</th>
<th>400</th>
<th>500</th>
<th>630</th>
<th>800</th>
<th>1000</th>
<th>1250</th>
<th>1600</th>
<th>2000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fuse rated current IEC 60282-1 (A)</td>
<td>6.3</td>
<td>10</td>
<td>16</td>
<td>16</td>
<td>16</td>
<td>20</td>
<td>31.5</td>
<td>31.5</td>
<td>40</td>
<td>40</td>
<td>50</td>
<td>63</td>
<td>80*</td>
<td></td>
</tr>
<tr>
<td>25</td>
<td>6.3</td>
<td>10</td>
<td>16</td>
<td>16</td>
<td>16</td>
<td>20</td>
<td>31.5</td>
<td>31.5</td>
<td>40</td>
<td>40</td>
<td>50</td>
<td>63</td>
<td>80*</td>
<td></td>
</tr>
<tr>
<td>30</td>
<td>6.3</td>
<td>10</td>
<td>16</td>
<td>16</td>
<td>16</td>
<td>20</td>
<td>31.5</td>
<td>31.5</td>
<td>40</td>
<td>40</td>
<td>63</td>
<td>63</td>
<td>63</td>
<td></td>
</tr>
<tr>
<td>35/36</td>
<td>6.3</td>
<td>10</td>
<td>16</td>
<td>16</td>
<td>16</td>
<td>20</td>
<td>31.5</td>
<td>31.5</td>
<td>40</td>
<td>40</td>
<td>63</td>
<td>63</td>
<td>63</td>
<td></td>
</tr>
</tbody>
</table>

Fuse selection in accordance with IEEE Standards

| U₄ Fuse (kV) | 100 | 125 | 160 | 200 | 250 | 315 | 400 | 500 | 630 | 800 | 1000 | 1250 | 1600 | 2000 | 2500 |
|--------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|------|
| Fuse rated current (A) | 6.3 | 6.3 | 10  | 10  | 16  | 16  | 20  | 20  | 31.5| 31.5| 40  | 40  | 50  | 63  | 80*  |
| 34.5         | 6.3 | 6.3 | 10  | 10  | 16  | 16  | 20  | 20  | 31.5| 31.5| 40  | 40  | 50  | 63  | 80*  |

Considerations:
- Recommended fuses: SIBA brand with medium-type striker, according to IEC 60282-1 (low loss fuses)
- The values marked with an (*) correspond to SSK-type fuses
- 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 ask Ormazabal
Indicators

Acoustic alarm **ekor.sas**

The **ekor.sas** earthing prevention alarm is an acoustic indicator which works in association with the earthing shaft and the **ekor.vpis** voltage presence indicator.

The alarm is activated when the earthing switch actuation shaft access handle is operated while there is voltage in the cubicle’s medium voltage incoming line. An acoustic alarm then warns the operator of the possibility of causing a short-circuit in the network if the operation is carried out, thus improving safety for people and equipment and ensuring continuity of supply.

**ekor.vpis** voltage presence indicator

**ekor.vpis** is a self-powered indicator fitted in the cubicles which shows the presence of voltage in the phases through three permanent light signals, designed in accordance with Standard IEC 62271-206.

It has easy-access test points to carry out the concordance test between phases.

The **ekor.spc** phase comparator and the **ekor.ivds** voltage presence/absence detector of **Ormazabal** can be supplied to order.

Cable connections

**EN 50181 and IEEE 396 bushing**

- Made from epoxy resin, passing the dielectric and partial discharge tests
- There are two types:
  - Plug-in up to 400 A
  - Screw-in to 630 A (IEC) and 600 A (IEEE)
- Located in the cable compartment. Optionally, they can be located in the side of the cubicles for direct supply to the main busbar.

**Cable connectors**

**Characteristics:**

- For one-core or three-core cables
- For impregnated or dry cables
- Screened or unscreened
- Elbow connectors

**Detailed Information:**

- Direct connection to the bushing located in the cable compartment or in the side through plug-in or screw-in connectors (rated current above 400 A or short-circuit current equal to or above 16 kA)
- As an option:
  - Two symmetric terminals or symmetric terminal plus symmetric surge arrester
  - Metallic voltage transformers

### Accessory tables

<table>
<thead>
<tr>
<th>Distance (d)</th>
<th>cm</th>
<th>mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>cgm.3-rb</td>
<td>[inch]</td>
<td>[mm]</td>
</tr>
<tr>
<td>cgm.3-v</td>
<td>[inch]</td>
<td>[mm]</td>
</tr>
<tr>
<td>cgm.3-p</td>
<td>[inch]</td>
<td>[mm]</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>cm</th>
<th>mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>430</td>
<td>17</td>
</tr>
<tr>
<td>500</td>
<td>19.68</td>
</tr>
<tr>
<td>240</td>
<td>9.45</td>
</tr>
</tbody>
</table>

**Accessories**

- Insulating plugs
- Connecting terminals
- Surge arresters

*Ask **Ormazabal** for other types and values.*
Spares and accessories

**Metal enclosure**
- Covers

**Driving levers**
- Main switch-disconnector lever
- Circuit breaker levers

**Connectivity**
- ormalink: connecting set. Includes the earthing flatbar, nuts and bolts, instructions and other elements required for correct assembly of two modules.
- End kit set. Includes end plugs, metal cover to be mounted on the side of a cubicle, instructions and other elements required for assembly.
- bushlink: Side adapter which can convert a cubicle with side female bushing into a cubicle with bushing.

**Fuse protection**
- Fuse holder carriage
Handling, installation and after-sales

Handling

● Smaller size and lower weight, making handling and installation easier
● Safe delivery of the cubicle:
  ○ Upright position on a pallet, packaged in protective plastic with polystyrene corner pieces
● Handling methods (up to 4 functional units):
  ○ Lifting: Forklift truck or pallet jack
    Alternative methods: rollers or rods situated below
  ○ Hoisting: Slings and lifting beams
● Ergonomic design for straightforward connection of the cubicle and fastening to the ground

Inside buildings

● Simple handling with pallet jack
  (fits through standard-sized doors and in lifts)
● Reduced dimensions: minimum space occupied
● Operation, extensibility and removal in a reduced space
● No gas handling on site
● Optionally, installation on auxiliary profiles in the case of irregular surface or to avoid having to build cable pits

<table>
<thead>
<tr>
<th>Minimum installation distances [mm] (inches)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Side wall (a)</td>
</tr>
<tr>
<td>Roof (b)</td>
</tr>
<tr>
<td>Front clearance (c)</td>
</tr>
<tr>
<td>Rear wall (d)*</td>
</tr>
<tr>
<td>cgm.3-p/2lp/m</td>
</tr>
</tbody>
</table>

* In the case of rear pressure relief duct = 0 mm/inch
** For combined schematics with \( P_{d}=160 \text{ mm (6 inch)} \) modules

The space required to extend the set with an additional cubicle is 250 mm/9.84 inches plus the width of the new cubicle.

Ask Ormazabal for the manuals with the handling and installation instructions.
Medium voltage switchgear for
distribution network solutions

Inside prefabricated or movable transformer substations

- Turnkey solutions (complete assembly, testing and transportation from factory)
  - Uniform quality
  - Significant reduction in installation costs and time
- Option of cubicle installation on site
- Wide range of Ormazabal transformer substations:
  - Surface, underground, kiosk, compact...
- Availability of an operational transformer substation in just a short time

Inside wind turbines

- Onshore and offshore windfarms
- Supplier of medium voltage GIS cubicles for generating commercial renewable energy since 1995
- Over 10 years' experience in the offshore windfarm sector

Maximum dimensions of the trench for cubicles with internal arc test

<table>
<thead>
<tr>
<th>Function</th>
<th>A (mm/ inches)</th>
<th>F (mm/ inches)</th>
<th>D (mm/ inches)</th>
</tr>
</thead>
<tbody>
<tr>
<td>I, Pb &amp; rc</td>
<td>(330/13)</td>
<td>450 (18)</td>
<td>600 (24)</td>
</tr>
<tr>
<td>p</td>
<td>(390/15)</td>
<td>450 (18)</td>
<td>600 (24)</td>
</tr>
<tr>
<td>v</td>
<td>(510/20)</td>
<td>450 (18)</td>
<td>600 (24)</td>
</tr>
</tbody>
</table>

Dimensions of the trench [mm] (inches) for the metering cubicle

The depth of the trench, suitable for all types of cable, is [800 mm] (31 inches)

The dimensions of the trench depend on the minimum radius of curvature of the cables used. The dimensions indicated below are for the larger size trench. Check with Ormazabal to size the trench with optimal dimensions (minimum trench dimensions) for a specific type of cable.
### Commissioning and After-sales

**Services**

- Technical assistance
- Reception of products
- Collection and delivery
- Supervision and installation
- Starting-up
- Training
- Warranty
- Inspection and maintenance
- Spares and accessories
- Repair
- Retrofitting
- Recycling
- Engineering
- Purchase process
- EPCM Turnkey solutions

### Recycling and end of working life

Ormazabal’s production centres include environmental management systems in accordance with the requirements of international Standard ISO 14001, backed up by its valid Environmental Management Certificate, amongst others.

cgm.3 cubicles have been designed and manufactured in accordance with the requirements of international Standard IEC 62271-200.

By design, depending on the model, there is a seal-tight compartment, filled with SF₆, which allows the full operation of the switchgear unit throughout its working life (IEC 62271-200).

At the end of the product’s life-cycle, the SF₆ gas it contains should not be released into the atmosphere but rather recovered and processed for reuse in accordance with the instructions set out in Standards IEC 62271-303, IEC 60480 and the guide CIGRE 117. Out of respect for people and the environment, **Ormazabal** will provide any further information which may be required to carry out this task.
Notes