ORMAZABAL
velatia

MV Switchgear for
Distribution Network Solutions

cgm.3

Fully gas insulated modular and compact (RMU) system

Up to 40.5 kV
Up to 38 kV

IEC Standards
ANSI / IEEE Standards

Reliable innovation. Personal solutions.

Contents

The quality of the products designed, manufactured and installed by **Ormazabal** is backed 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 notification.
These characteristics, as well as the availability of components, are subject to confirmation by **Ormazabal**.

Introduction

Preface

Getting its DNAs from decades of experience in research, design, develop, manufacture and installation of Medium Voltage (MV) apparatus and switchgear, **Ormazabal** is now one of the world's biggest suppliers of MV gas insulated switchgear (GIS). Today around 1,300,000 **Ormazabal** MV functional units have been installed in the electrical networks of over 100 electrical utilities and 600 wind farms in more than 110 countries.

The earlier version of **cgm**.3 was **cgm-cgc**, the first modular and extensible fully gas insulated secondary distribution cubicle in the world market. After the worldwide success of its antecedent, **cgm**.3 was launched in 2008. During the recent years **cgm**.3 has been extended to higher electrical ratings, e.g. up to 40.5 kV and up to 25 kA. **cgm-cgc** and **cgm**.3 systems have already been integrated into several Smart Grid and RES applications. Currently more than 165,000 functional units of these systems have been in service in more than 35 countries.

cgm.3 system provides you reliable and efficient distribution network solutions (DNS) for all kind of MV installations from electrical utilities to infrastructures, from leisure facilities to industrial installations, and from wind farms to PV solar farms.

Ormazabal is the leading provider of personalized solutions to electrical utilities, to energy end users as well as renewable energy systems applications based on our own technology.

We encourage the **development of the electrical sector** concerning the challenges of the future energy needs. We cooperate with the world's leading local, regional and global companies in the electrical sector with a strong commitment to **innovation for personal safety**, **network reliability**, **energy efficiency** and **sustainability**.

Our highly qualified and focused team of professionals thrilled by innovation have developed our own products and solutions during our more than a century long consolidated history, always by establishing close relationship with our clients towards achieving mutual long term benefits.

Velatia is an international industrial and technological group which operates in the areas of electrical networks, electronics and communication networks as well as in the consulting, security and aviation sectors, where security, efficiency and reliability are valued.

Grupo Ormazabal is now called **Velatia**. We have combined our forces to transform ourselves into a stronger group. Made up of companies with more than a hundred years of experience and committed to innovation to meet the present and future needs of our customers, wherever they may be.

The solutions of the companies in **Velatia** seek to make the world a more connected, more sustainable, smarter, better connected, safer, more humane place.

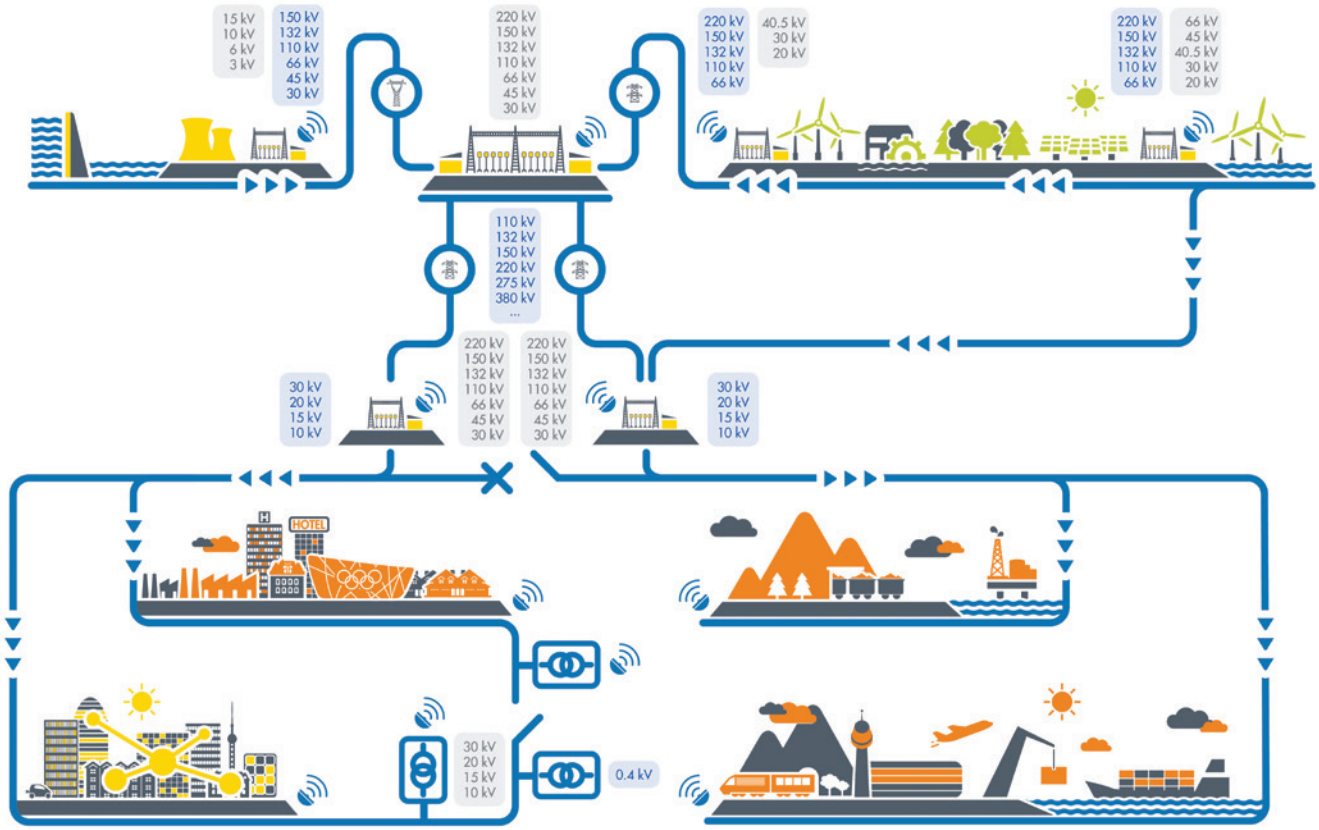
Ashegoda windfarm
(Ethiopia)

Spanish utility headquarters

Bielsa tunnel
(Spain-France)

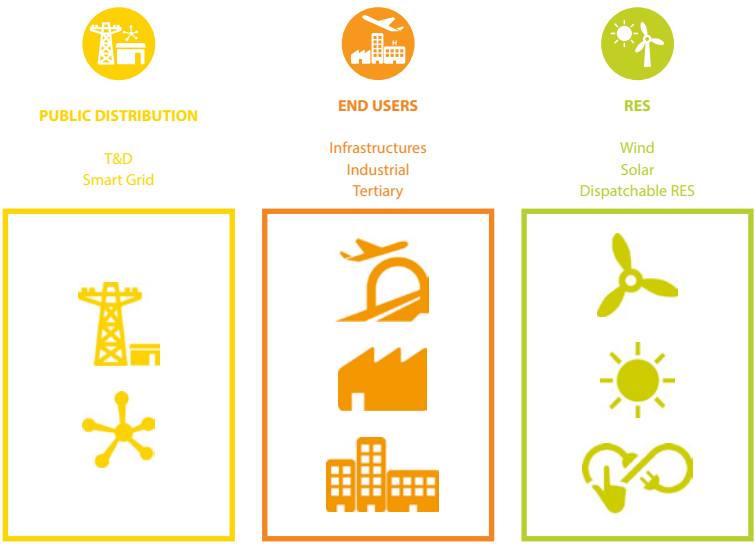
Your Electrical Network

"Your dedicated partner for reliable and intelligent electrical network"



Your Business and DNS Applications

Close relationship with our customers and the **profound knowledge** of the electrical business are the keys to success that enable us to offer **Distribution Network Solutions (DNS)** based on high added value products and services adapted to the needs of the electrical utilities, electrical energy end users and renewable energies.



Our Product Map (SSS & DNS)

We believe that **excellence** does not lie solely in offering **effective products and services**, but also in the ability to respond to **individual requirements** and **demands**.

We provide our clients with personalised projects for efficient energy management via **Primary and Secondary Distribution equipment** and **solutions**.

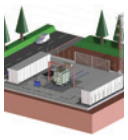
Our Business Lines

SSS: Substation Solution for primary distribution

DNS: Distribution Network Solutions for secondary distribution

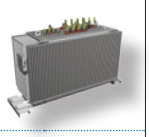
Our products for your segment

SSS

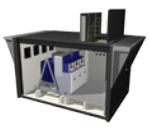
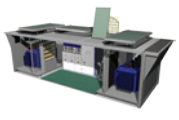
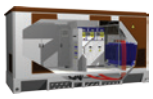
cpg.1	cpg.0	gae1250kmax	amc	cibor / nvl.cibor	transformа Power transformers	ormacontainer	Prefabricated substations
							

DNS

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

ekorsys family	transformа Distribution transformers			
Protection, automation and control	Oil	Conventional	Non-conventional: transforma.tpc	Non-conventional: transforma.fine
				
CURRENT® family Advanced metering, sensing & analytics, monitoring and communications	Low voltage board			
				
	Biodegradable dielectric liquid	organic		
				

Extended range solutions


Concrete prefabricated transformer substations (TS)			Metallic prefabricated TS	CEADS	Switching nodes
Underground	Walk-in	Compact			
					
Concrete enclosure for transformer substations (TS)			Metallic enclosure for TS	Photovoltaic substation	Mobile substation
Underground	Walk-in	Modular			
					

Main features

Safety

Protection for people, environment and your electrical installations.

Special attention paid to the **personal safety** of the operators and the general public, even **under fault conditions.**

Internal arc

The **cgm**.3 cubicles have been designed to withstand the effects of an internal arc according to IEC 62271-200 (IAC class) / IEEE Std C37.20.7 (1D-S class).

Hermetically sealed

All live components are inside a hermetically sealed for life stainless steel **gas tank**. It provides resistance acording to the **normal service conditions** for indoor switchgear refered in the standard IEC 62271-1.

Interlocks

cgm.3 cubicles have mechanical and electrical **interlocks** as **standard** in accordance to IEC 62271-200 to enable safe and reliable service.

Interlocks prevent unsafe operations:

- It makes impossible to close the switch-disconnector and the earthing (grounding) switch at the same time
- It permits the opening of the access cover to the MV cables when the earthing (grounding) switch is closed

Optional locks, key interlocks and electrical locks based on customers' specifications are available.

Indicators

Additional safety by using:

- **Switchgear position** indicators: Visual indication on the mimic diagram, validated by the **kinematic chain test** in accordance with current standards (IEC 62271-102)
- Capacitive **voltage** indicators: **ekor**.vpis: a self-powered indicator that displays the voltage presence in the phases via three permanent light signals (IEC 62271-206). **ekor**.ivds: light signalling voltage presence / absence indicator (IEC 61243-5)
- **Acoustic alarm**: **ekor**.sas alarm that warns against earthing (grounding) when MV cables are energized. It works in association with **ekor**.vpis / **ekor**.ivds
- **Phase comparator**: **ekor**.spc

Reliability

Help to maintain uninterrupted supply of your electrical network

Sealed for life insulation

Insulation inside a stainless steel gas tank provides long service life (30 years) and absence of maintenance in live parts.

Environmental suitability

Resistance according to the environmental conditions specified in standard IEC 62271-1*

(*) Please consult **Ormazabal** for other specific conditions.

Immersion tested for 24 hours

cgm.3 system passes the immersion test at a pressure of 3 m high water column during 24 hours at rated voltage and power frequency insulation test.

100% Routine tested

All the switchgear is subject to 100% electrical and mechanical routine tests according to the relevant standards. Also gas tightness test has been carried out 100% of our switchgear as a routine test to guarantee the reliability throughout its operational life.

- Gas tightness test
- Power-frequency test
- Measurement of the resistance of the main circuit
- Mechanical endurance test
- Measurement of the partial discharge (Optional)

Efficiency

High valuable features that make your task easier

Modularity

cgm.3 design is totally modular. It offers flexible diagram configurations, easy extension to both sides and minimal surface occupation.

Additionally, this equipment is adaptable to the evolution of the network.

Extensibility and replaceability

The **ormalink** connecting set allows effortless mechanical and electrical connection between two cubicles without gas handling and future extensibility.

The driving mechanisms interchangeability and their motorization without interrupting supply help to improve the quality of the electrical supply.

Smart Grid ready

cgm.3 system has already been integrated into several Smart Grid applications.

Ormazabal supplies complete Medium Voltage installations that include protection, control, automation and advanced Meter Management functions according to the most demanding needs of the intelligent networks.

Ergonomics

cgm.3 presents the following user-friendly features:

- Front access to install MV cables and fuses
- Easy connection and testing cables
- Optimal interface with operators
- Horizontal fuse holders
- Simple operation of driving mechanisms
- Small size and light weight

Sustainability

Continuous efforts in gas emission reduction

Commitment to the environment

- Incessant decrease in use of greenhouse gases
- Negligible SF_6 emission in manufacturing processes
- Switchgear gas leakage rates reduction
- No SF_6 gas use during installation
- Unceasing measures to reduce our environmental footprint
- End-of-life management
- Use of highly recyclable materials
- Constant research investment in alternative materials and own technology
- Provide self-powered relays and devices to avoid extra energy consumption

Continuous innovation

Help to maintain uninterrupted supply of your electrical network

A focused team of professionals dedicated to innovation leads to a constant offer of new developments and upgrades, such as:

- New modules for 25 kA
- Modules operating in -30°C
- New metering cubicles tested according to IE62271-200, included IAC requirements
- Evolution in driving mechanisms
- Integrated in cubicle own protection and automation units
- Smart Grid ready system
- Voltage and current sensors
- Preventive cable fault diagnosis
- Partial discharge (PD) detection for network diagnosis

Technical details

Family

Modular cubicles

l

Feeder function

p

Fuse protection function

v

Circuit-breaker protection function

s

Busbar switch function
Optional earthing (grounding) s-pt

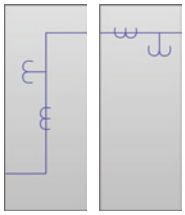
rb

Busbar rise function
Optional earthing (grounding) rb-pt

rc

Cable rise function
Version for double cable available: r2c

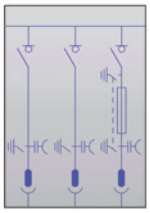
m



Metering function

Compact cubicles

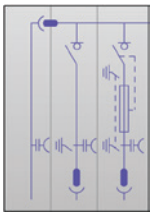
2lp **(RMU)**



Fuse protection and feeder functions

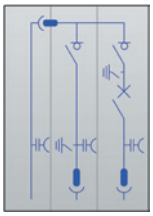
RES configurations

rlp



Fuse protection, rise and feeder functions

rlv



CB protection, rise and feeder functions

Available other RES configurations

Applicable electrical standards

IEC	
IEC 62271-1	Common specifications for high voltage switchgear and controlgear standards.
IEC 62271-200	Alternating current metal-enclosed switchgear and controlgear for rated voltages above 1 kV and up to and including 52 kV.
IEC 62271-103	Switches for rated voltages above 1 kV up to and including 52 kV.
IEC 62271-102	Alternating current disconnectors and earthing switches.
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	Degrees of protection provided by enclosures.
IEC 62271-206	Voltage presence indicating systems (vpis).
IEC 61243-5	Voltage detecting systems (vds)
IEEE / ANSI	
IEEE C37.74	IEEE Standard Requirements for Subsurface, Vault, and Pad-Mounted Load-Interrupter Switchgear and Fused Load-Interrupter Switchgear for Alternating Current Systems Up to 38 kV
IEEE C37.20.3	IEEE Standard for Metal-Enclosed Interrupter Switchgear
IEEE 1247	Standard for Interrupter Switches for Alternating Current, Rated Above 1000 Volts
IEEE C37.123	IEEE Guide to Specifications for Gas-Insulated, Electric Power Substation Equipment
IEEE Std C37.20.4	IEEE Standard for Indoor AC Switches (1 kV-38 kV) for Use in Metal-Enclosed Switchgear
IEEE C37.04	IEEE Standard Rating Structure for AC High-Voltage Circuit Breakers
IEEE C37.06	AC High-Voltage Circuit Breakers Rated on a Symmetrical Current Basis- Preferred Ratings and Related Required Capabilities
IEEE Std C37.09	IEEE Standard Test Procedure for AC High-Voltage Circuit Breakers Rated on a Symmetrical Current Basis
IEEE Std C37.20.7	IEEE Guide for Testing Medium-Voltage Metal-Enclosed Switchgear for Internal Arcing Faults

(*): Others: GB...

Technical data

Electrical characteristics			IEC			ANSI / IEEE
Rated Voltage	U_d	[kV]	**36**	**38.5**	**40.5**	**38**
Rated frequency	f_r	[Hz]	50 / 60	50		50 / 60
Rated normal current	I_r					
Busbars and cubicle interconnection		[A]	400 / 630	630		600
Feeder		[A]	400 / 630	630		600
Output to transformer		[A]	200	200		200
Rated short-time withstand current						
With t_k = (x) s	I_k	[kA]	16 / 20[1] (1/3 s) / 25 (1s)	20[1] (1/3 s) / 25 (1 s)		20[1] (1/-3 s) / 25 (1s)
Peak value	I_p	[kA]	40 / 52[1] / 62.5	52[1] / 62.5		52[1] / 62.5
Rated insulation level						
Rated power-frequency withstand voltage [1 min]	U_d	[kV]	70 / 80	80 / 90	95 / 118	70 / 77
Rated lightning impulse withstand voltage	U_p	[kV]	170 / 195	180 / 210	185 / 215	150 / 165
Internal arc classification according to IEC 62271-200	IAC		AFL 16 kA 1s / 20[1] kA 1s AFLR 20[1]kA 1s / 25 kA 1s	AFL 20[1]kA 1s AFLR 20[1]kA 1s / 25 kA 1s		AFL[3] 20[1]kA 1s / 25 kA 1
Degree of protection: Gas tank			IP X8			
Degree of protection: External enclosure			IP2XD			
Colour of equipment		RAL	Grey 7035 / Blue 5005			
Loss of service continuity category		LSC	LSC2			
Partition class			PM			

[1] Tests conducted at 21 kA / 52.5 kA [2] Consult availability [3] Equivalent to IEEE C37.20.7 for 1D-S

Driving mechanism		Three position switch disconnector				Vacuum circuit breaker			
		B	**BM**	**BR-A**	**BR-AM**	**AV**	**AMV**	**RAV**	**RAMV**
Auxiliary circuits									
Internal insulation	[kV]	2	2	10	2	10	10	10	10
Tripping coil									
Rated voltage	[V]	n/a	n/a	24 / 48 / 110 Vdc 230 Vac		24 / 48 / 60 / 110/220 Vdc 110 / 230 Vac			
Max. consumption	[W]	n/a	n/a	65		<56			
Motorised units									
Rated voltage	[V]	n/a	[1]	n/a	[2]	n/a	[3]	n/a	[3]
Max. consumption	[A]	n/a	3.2	n/a	5.4	n/a	10	n/a	10
Motor operation time	[s]	n/a	<2.3	n/a	<4.5	n/a	<15	n/a	<15
Peak current	[A]	n/a	<14	n/a	<14	n/a	<8	n/a	<8
Indicating contacts									
Switch | Earthing (grounding)			2NO + 2NC | 1NO + 1NC	1NOC // 2NO + 2NC | 1NO + 1NC	1NO + 2NC | 1NO + 1NC	2NO + 2NC | 1NO + 1NC			
Circuit breaker		n/a				9NO + 9NC			
Rated voltage	[V]	250				250			
Rated current	[A]	16				16			

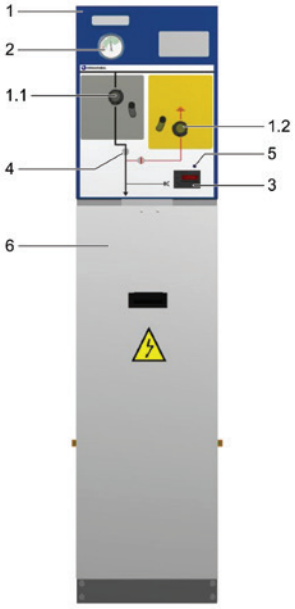
[1] 24 / 48 / 110 / 220 Vdc 110 / 230 Vac [2] 24 / 48 / 110 Vdc 230 Vac [3] 24 / 48 / 60 / 110/220 Vdc 110 / 230 Vac

Service conditions	IEC	ANSI / IEEE
Type of switchgear	Indoor	
Ambient temperature		
Minimum | Maximum	-40 °C * | ±40 °C**	-40 °F * | 104 °F **
Maximum average ambient temperature, measured over a 24-hour period	+35 °C	95 °F
Minimum storage temperature	-50 °C	-58 °F
Relative humidity		
Maximum average relative humidity, measured over a 24-hour period	<95 %	
Vapour pressure		
Maximum average vapour pressure, measured over a 24-hour period | 1-month period	22 mbar | 18 mbar	
Maximum height above sea level	2,000 m**	6,500 feet**
Solar radiation	Negligible	
Environmental air pollution (dust, salinity, etc.)	Acc. to normal service conditions of IEC 62271-1	
Vibrations (seismicity)	Negligible**	

* Consult availability and other values ** For special conditions, altitudes, please consult **Ormazabal**

Constructive structure

Front view



1 Mimic & driving mechanism cover:

1.1 Switch-disconnector (Padlockable)

1.2 Earthing-switch (Padlockable)

2 Manometer

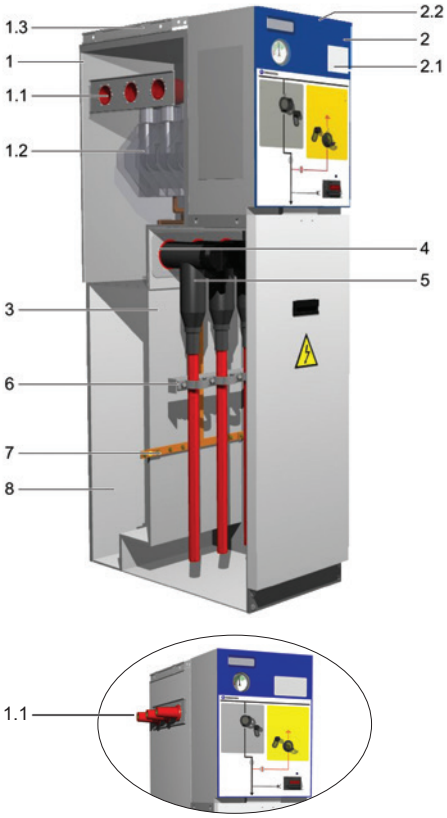
3 Voltage indicator (**ekor**.vpis)

4 Switch-disconnector indication

5 Acoustic alarm (**ekor**.sas)

6 Cable compartment cover

Side view



1 Gas tank

1.1 Busbar connection (side bushings)

1.2 Switch-disconnector

1.3 Lifting lugs

2 Front cover

2.1 Name plate + operating sequence

2.2. Control box location

3 Cable compartment

4 Front bushings

5 Connector and cable

6 Cable clamp

7 Earthing bars

8 Gas relief duct

Worldwide certification and use

Application examples

Worldwide application / use

- Public distribution: urban and rural areas
- Smart Grids
- Renewable energies: Wind on & off-shore, photovoltaic solar plants ...
- Hotels, stadiums, shopping centers
- Industrial areas
- Oil & Gas industry
- Airports, seaports, tunnels

cgm.3
ANSI / IEEE type

Design characteristics

Key components

ormalink connecting set

Pioneers in extensible connecting set:

The **ormalink** connecting set, patented by **Ormazabal** in 1991, allows for the electrical connection between different modules of the **cgm.3** system. It maintains the rated insulation values as well as 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 bushings that make easier the connection between the main busbars.

ormalink
connecting set

Presentation
of **ormalink**

Load break switch (LBS)

Puffer type high duty load break switch designed and developed by **Ormazabal**.

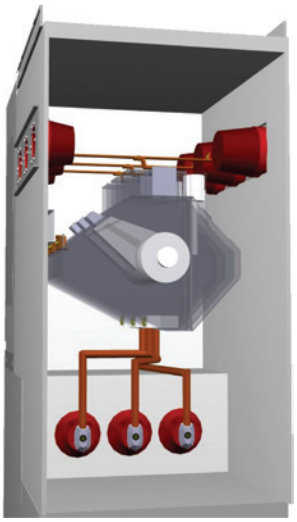
The switch-disconnector includes the functions of switch, disconnector and earthing (grounding) switch in a single three-position unit.

Features:

- 3 position switch-disconnector: Open - Close - Earth (Ground)
- Operator independent operation
- Switch category
  Mechanical endurance:
  - 1000-M1 (manual)
  - 5000-M2 (motor)
  - Electrical endurance certification: 5-E3
- Earthing (grounding) switch category:

Mechanical endurance:

- 1000-M0 (manual)
- Electrical endurance certification: 5-E2

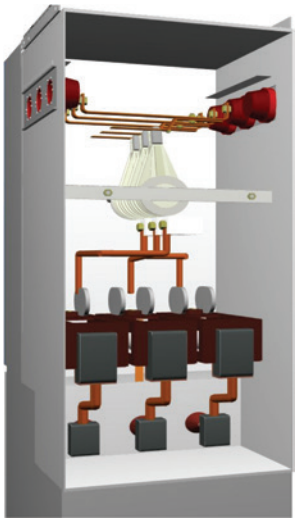


Vacuum circuit breaker (VCB)

Circuit-breaker with vacuum breaking technology, compact and with excellent reliability, certified in accordance to IEC 62271-100 standard, including extended electrical endurance (class E2) with rapid reclosing cycle and hence maintenance-free during its whole service life.

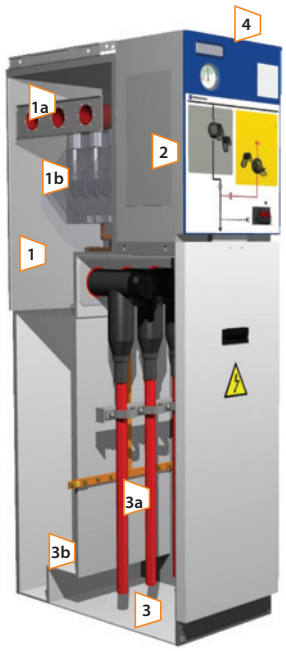
Features:

- Mechanical endurance:
  - M2: 10000 operations
  - M1: 2000 operations
- Operating sequence without reclosing
  - CO-15 s-CO
  - CO-3 min-CO
- Operating sequence with reclosing
  - O-0.3 s-CO-15 s-CO
  - O-0.3 s-CO-3 min-CO
- Associated with switch-disconnector



Main compartments

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



1. Gas tank
   a) Busbar connection
   b) Switching devices
2. Driving mechanism
3. Base
   a) Cable compartment
   b) Gas relief duct
4. Control box

Gas tank

The **tank**, sealed and SF_6 gas-insulated, contains the busbar, as well as the switching and breaking devices. The dielectric used acts both as an insulating and extinguishing medium. The tank is equipped with a diaphragm to safely direct the output of the gases in the event of an internal arc, and a manometer to control the pressure of the insulating gas.

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

The **protection fuses** are kept horizontally in phase-independent compartments and are installed in a fuse holder carriage.
The fuse holder compartments provide insulation and sealing against pollution, temperature changes and adverse weather conditions. From the inside, the movement of the fuse striker is transmitted to the tripping mechanism.

Features:

- **Sealed-for-life** insulation system (30 years)
- **Internal arc** tested
- **Stainless steel – IP X8** rating
- **Switching, breaking** and **main circuit** devices:
  - Switch-disconnector
  - Circuit-breaker
  - Fuse holders
- **Outer-cone** bushing **plug-in** type terminal
- **Manometer**
- **Pressure relief diaphragm valve**
- Direct **busbar connection** through single-phase **side bushings**

Driving mechanism

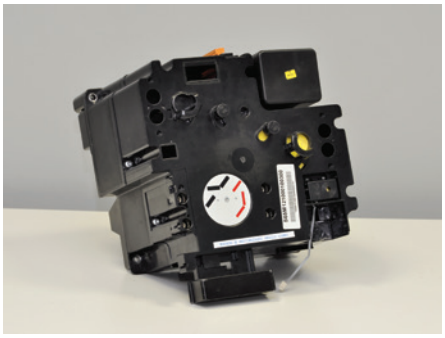
The **driving mechanism** is used to perform making and breaking operations in the MV circuits.

The front layout of the driving mechanisms and the use of anti-reflex levers permits safe, comfortable, simple operations with a minimum of effort.

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

Features:

- **Mimic diagram** and pushbuttons
- **Position display (Kinematic chain)**
  - Switching devices
  - Fuse tripping
- Capacitive voltage indicator (**ekor**.vpis / **ekor**.ivds)
- **Interlocks (electrical and mechanical)**
- **Motorization** without interrupting supply
- **Replaceability and motorization at site**



Types of driving mechanisms

Depending on the operating mechanism (3-position switch or circuit breaker), there are different models:

Three-position switch-disconnector

- B and BM
  - Basic driving mechanism with independent manual operation (B) or motorised (BM)
  - Local or remote controlled operations
  - Applicable to feeder and busbar functions
- BR-A and BR-AM
  - Driving mechanism with manual (BR-A) or motorised operation (BR-AM) and with latched opening
  - Applicable to fuse protection functions

These may be replaced live in any of the positions (closed, open or earthed).

Circuit-breaker

- AV and AMV (without reclosing) / RAV and RAMV (with reclosing)
  - Spring loaded driving mechanism for circuit breaker funcition
  - This mechanism is intalled in series with a B type mechanism
  - The spring set is reloaded manually (AV-RAV) or motorised (AMV - RAMV)

Base

Cable compartment

The **cable compartment**, located in the lower front section of the cubicle, has a cover interlocked with the earthing (grounding) switch, thus allowing front access to the Medium Voltage cables.

The insulated MV cables coming from the outside are connected using **bushings** which admit plug-in or screw-in terminals insulated with or without equipotential screens.

Features:

- Available up to **two connectors** per phase. Consult compatibilities.
- More cable connectors or surge arresters with special cover
- **Effortless connections (plug-in or screw-in)**
- **Suitable bushing height for 3-core / big size cables**
- **Outer-cone** bushing **plug-in** type terminal
- **Easy cable earthing (grounding)**
- Cable test
- **Front cover interlocked** with the earthing (grounding) switch
- **Protected ducts** for low voltage cables

Control box

The **control box**, placed in the upper part of the cubicle and independent of the MV compartments, is defined for installing protection relays, as well as metering and control devices.

Features:

- **Independent compartment** from MV area
- **Ready** for installing protection relays, control and metering equipment
- **Factory assembled and tested** according to customer needs
- **Standard and compact design** for installing **Ormazabal**'s protection relays and automation units
- **High adaptation** capabilities for other manufacturers' protection relays, control and metering units as well as customers' provided equipment
- **Customized size and design**

Attachable control boxes can be supplied optionally, for the location of signalling elements and the activation of motorised functions.

Gas tank internal arc
20 kA 0.5

IAC AFLR with rear chimney

Pressure relief duct

The **pressure relief duct** situated on the back side of the base channels through a diaphragm valve the generated gases as a result of an internal arc.

Features:

- **Expansion** of gases in case of internal arc
- **Rear conduction** of exhaust gases
- **Metal separation** from the cable compartment
- Optional: **Chimney** for rear internal arc protection

Gas tank internal arc
20 kA 1 s / IAC class AFL

Metering cubicle

Smart Grids

The aim of the intelligent networks or Smart Grids leads to generate and share electrical energy in a more efficient, reliable, cleaner and safer way.

In the value chain of the Smart Grids it converges and coexists the sectors of the electrical energy, telecommunications and information and communications technology.

Ormazabal collaborates in innovative projects and provides solutions and products focused on improving the energy distribution efficiency in a continuous changing environment as driver and dynamic factor for Smart Grids.

The **Ormazabal** technology specifically developed for the intelligent networks promotes, among others, the following benefits:

1. It allows the integration of new users in the network
2. It drives the efficiency of the network operation
3. It reinforces the safety of the grid, the control and the quality of supply
4. It optimizes the plan of investments for the electrical network improvement
5. It improves the market working and the customer service
6. It promotes the consumer participation in the energy management

References

- Iberdrola Star project. Spain (Castellón, Bilbao…)
- Endesa project. Spain (Malaga)
- Gas Natural Fenosa project. Spain (Madrid)

Protection & Automation

ekorsys family

Ormazabal supplies complete Medium Voltage installations that include protection, control and automation functions.

Ormazabal, have a wide portfolio of applications and services to respond to the needs of the distribution network.

Protection

- Supply to Medium Voltage customers
  - **ekor**.rpg
    3 x 50 / 51 + 50N / 51N + 50Ns / 51Ns

Powers to protect with Circuit Breaker and ekor.rpg

Network voltage	Minimum power	Maximum power
[kV]	[kVA]	[kVA]
25	200	20 000
30	250	25 000

  - **ekor**.rpt
    3 x 50 / 51 + 50N / 51N + 50Ns / 51Ns

Powers to protect with fuses and ekor.rpt

Network voltage	Fuse rated voltage	Minimum power		Maximum power	
		Fuse rating		Fuse rating	
[kV]	[kV]	[A]	[kVA]	[A]	[kVA]
25	18/30	25	200	80*	2000
30	18/30	25	250	80*	2000

* SSK SIBA fuse

For other values, please, consult **Ormazabal**.

- Protection of switching substations and industrial customers
  - **ekor**.rps
    3 x 50 / 51 + 50N / 51N + 50Ns / 51Ns+67+49+81+27+59N...+ control
  - **ekor**.rpg-ci
    3 x 50 / 51 + 50N / 51N + 50Ns / 51Ns + integrated control
  - **ekor**.rpt-ci
    3 x 50 / 51 + 50N / 51N + 50Ns / 51Ns + integrated control
- Protection of 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
- Voltage presence acoustic alarm
  - **ekor**.sas
- Second operation points

Advanced Meter Management and communication

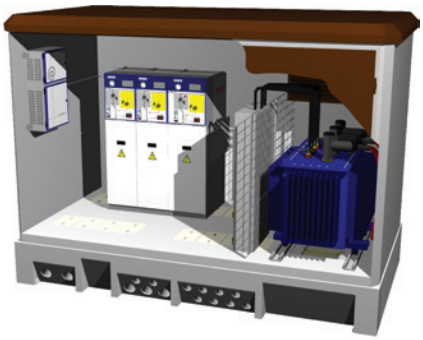
- **ekor**.gid

Dispatching center

Software

- **ekor**.soft

For further information, please refer to **Ormazabal** or visit www.ormazabal.com



Type of modules

cgm.3-I

Feeder function

Feeder modular cubicle, equipped with a three-position switch-disconnector: closed, open or earthed (grounded).

Extensibility: right, left and both sides.

Electrical characteristics			IEC			ANSI / IEEE
Rated voltage	U_r	[kV]	36	38.5	40.5	38
Rated frequency	f_r	[Hz]	50 / 60	50		50 / 60
Rated current						
General busbar and cubicle interconnection	I_r	[A]	400 / 630	630		600
Feeder	I_r	[A]	400 / 630	630		600
Rated short-duration power frequency withstand voltage (1 min)						
Phase-to-earth (ground) and between phases	U_d	[kV]	70	80	95	70
Across isolating distance	U_d	[kV]	80	90	118	77
Rated lightning impulse withstand voltage						
Phase-to-earth (ground) and between phases	U_p	[kV]	170	180	185	150
Across isolating distance	U_p	[kV]	195	210	215	165
Internal arc classification	IAC		AFL 16 kA 1 s / 20* kA 1s AFLR 20 kA 1 s / 25 kA 1 s	AFL 20*kA 1s AFLR 20* kA 1s / 25 kA 1s		AFL 20* kA / 25 kA 1s
DC withstand voltage		[kV]	n/a			103
Switch-disconnector			**IEC 62271-103 + IEC 62271-102**			**IEEE C37.74**
Rated short-time withstand current (main circuit)						
Value t_k = (x) s	I_k	[kA]	16 / 20* (1/3 s) / 25 (1s)	20* (1/3 s) / 25 (1 s)		20* (1/-3 s) / 25 (1s)
Peak value	I_P	[kA]	40 / 52* / 62.5	52* / 62.5		52*/ 62.5
Mainly active load-breaking current	I_1	[A]	400 / 630	630		600
Cable charging-breaking current	U_a	[A]	50 / 1.5	50		20
Closed-loop breaking current	I_{2a}	[A]	400 / 630	630		600
Earth (ground) fault breaking current	I_{6A}	[A]	160	160		n/a
Cable- & line-charging breaking current under earth (ground) fault conditions	I_{6b}	[A]	90	90		n/a
Main switch making capacity (peak value)	I_{ma}	[kA]	40 / 52* / 62.5	52* / 62.5		52* / 62.5
Switch category						
Mechanical endurance			1000-M1 (manual) / 5000-M2 (motor)			1000 (manual) / 5000 (motor)
Cycles of operations (Short-circuit making current)- class			5-E3			3
Earthing (grounding) Switch			**IEC 62271-102**			**IEEE C37.74**
Rated short-time withstand current (earthing circuit)						
Value t_k = (x) s	I_k	[kA]	16 / 20* (1/3 s) / 25 (1s)	20* (1/3 s) / 25 (1 s)		20* (1/-3 s) / 25 (1s)
Peak value	I_p	[kA]	40 / 52* / 62.5	52* / 62.5		52* / 62.5
Earthing (grounding) switch making capacity (peak value)	I_{ma}	[kA]	40 / 52* / 62.5	52* / 62.5		52* / 62.5
Earthing (grounding) Switch Category						
Mechanical endurance (manual)			1000-M0			1000
Cycles of operations (Short-circuit making current)- class			5-E2			3

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

Applications

Input or output of the Medium Voltage cables, enabling communication with the main busbar of the transformer substation.

Configuration

Cubicle

- ☐ Internal arc IAC AFLR
  ☐ 20 kA 1s ☐ 25 kA 1 s
- ☐ Internal arc IAC AFL
  ☐ 16 kA 1 s ☐ 20 kA 1s
  ☐ 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
- ■ 1745 mm height cubicle

Gas tank

- ■ Stainless steel tank

Gas pressure indicator:

- ■ Manometer

Frontal connection:

- ■ Cable bushing

Side connection:

- ■ Two side extensibility
- ☐ Left extensibility / right blind
- ☐ Right extensibility / left blind

Type of side connection:

- ☐ Female bushing
  ☐ Right ☐ Left ■ Both
- ☐ Cone bushing
  ☐ Right ☐ Left ☐ Both

Driving mechanism

- ■ Actuating levers
- ■ B type manual mechanism
- ☐ BM type motorized mechanism
- ■ Acoustic alarm **ekor**.sas
- ■ Capacitive voltage presence indicator **ekor**.vpis
- ☐ Capacitive voltage presence / absence indicator **ekor**.ivds
- ☐ Other capacitive voltage indicators
- ☐ Integrated control and monitoring unit **ekor**.rci
- ☐ Voltage detector unit **ekor**.rtk

Additional interlocks:

- ☐ Electrical interlocks
- ☐ Key lock interlocks
- ☐ Pad locks

Cable compartment

- ■ Screw type IEC bushings
- ☐ Screw type ANSI bushings
- ■ Cover for one cable connector per phase
- ☐ Extended cable compartment cover for double cable connection
- ☐ Extended cable compartment cover for single cable plus surge arrester connection
- ☐ Partial discharge (PD) detection for network diagnosis

Pressure relief duct

- ☐ Rear chimney

Control box

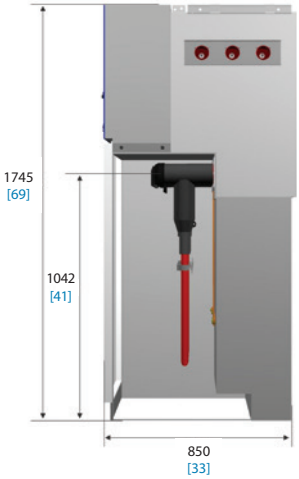
- ☐ Other voltage indicators
- ☐ Other protection relays
- ☐ Other metering and automation components

Dimensions

IEC

ANSI / IEEE

[mm]
[in]



162 kg

357 Lbm

cgm.3-p

Fuse protection function

Fuse protection modular cubicle, equipped with a three-position switch-disconnector: closed, open or earthed (grounded) and protection with limiting fuses.

Extensibility: right, left and both sides.

Electrical characteristics			IEC			ANSI / IEEE
Rated voltage	U_r	[kV]	**36**	**38.5**	**40.5**	**38**
Rated frequency	f_r	[Hz]	50 / 60	50		50 / 60
Rated current						
General busbar and cubicle interconnection	I_r	[A]	400 / 630	630		600
Output to transformer	I_r	[A]	200			200
Rated short-duration power frequency withstand voltage (1 min)						
Phase-to-earth (ground) and between phases	U_d	[kV]	28	50	35	70
Across isolating distance	U_d	[kV]	32	60	38.5	77
Rated lightning impulse withstand voltage						
Phase-to-earth (ground) and between phases	U_p	[kV]	75	125	95	150
Across isolating distance	U_p	[kV]	85	145	104.5	165
Internal arc classification	IAC		AFL 16 kA 1 s / 20* kA 1s AFLR 20 kA 1 s / 25 kA 1 s	AFL 20*kA 1s AFLR 20* kA 1s / 25 kA 1s		AFL 20* kA / 25 kA 1s
DC withstand voltage		[kV]	n/a		53	103
Switch-disconnector			**IEC 62271-103 + IEC 62271-102**			**IEEE C37.74**
Rated short-time withstand current (main circuit)						
Value t_k = (x) s	I_k	[kA]	16 / 20* (1/3 s) / 25 (1s)	20* (1/3 s) / 25 (1 s)		20* (1/-3 s) / 25 (1s)
Peak value	I_p	[kA]	40 / 52* / 62.5	52* / 62.5		52* / 62.5
Mainly active load-breaking current	I_1	[A]	200	200		200
Main switch making capacity (peak value)	I_{ma}	[kA]	40 / 52* / 62.5	4 52* / 62.5		52* / 62.5
Switch category						
Mechanical endurance			1000-M1 (manual) / 5000-M2 (motor)			1000 (manual) / 5000 (motor)
Cycles of operations (Short-circuit making current)- class			5-E3	5-E2		3
Combined switch-relay (ekor.rpt) take-over current						
Breaking I_{max} acc. TD_{ito} IEC 62271-105		[A]	490			n/a
Switch-fuse combination transfer current						
Breaking I_{max} acc. $TD_{itransfer}$ IEC 62271-105		[A]	820	700		n/a
Earthing (grounding) Switch			**IEC 62271-102**			**IEEE C37.74**
Rated short-time withstand current (earthing circuit)						
Value t_k = 1 s or 3 s	I_k	[kA]	1			1
Peak value	I_p	[kA]	2.5			2.5
Earthing (grounding) switch making capacity (peak value)	I_{ma}	[kA]	2.5			2.5
Earthing (grounding) Switch Category						
Mechanical endurance (manual)			1000-M0			1000
Cycles of operations (Short-circuit making current)- class			5-E2			3

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

Applications

General and transformer protection, as well as connection or disconnection operations.

Configuration

Cubicle

- ☐ Internal arc IAC AFLR
  ☐ 20 kA 1s ☐ 25 kA 1 s
- ☐ Internal arc IAC AFL
  ☐ 16 kA 1 s ☐ 20 kA 1s
  ☐ 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
- ■ 1745 mm height cubicle

Gas tank

- ■ Stainless steel tank

Gas pressure indicator:

- ■ Manometer

Frontal connection:

- ■ Cable bushing

Side connection:

- ■ Two side extensibility
- ☐ Left extensibility / right blind
- ☐ Right extensibility / left blind

Type of side connection:

- ☐ Female bushing
  ☐ Right ☐ Left ■ Both
- ☐ Cone bushing
  ☐ Right ☐ Left ☐ Both

Fuse tripping:

- ■ Via combined fuses
- ☐ Via associated fuses

Fuse holder:

- ■ 36 kV
- ☐ 38-38.5 kV
- ☐ 40.5 kV

Driving mechanism

- ■ Actuating levers
- ■ BR-A type manual mechanism
- ☐ BR-AM type motorized mechanism
- ■ Tripping coil
- ☐ Acoustic alarm **ekor**.sas
- ■ Capacitive voltage presence indicator **ekor**.vpis
- ☐ Capacitive voltage presence / absence indicator **ekor**.ivds
- ☐ Other capacitive voltage indicators
- ☐ Transformer protection unit **ekor**.rpt
- ☐ Voltage detector unit **ekor**.rtk

Additional interlocks:

- ☐ Electrical interlocks
- ☐ Key lock interlocks
- ☐ Pad locks

Cable compartment

- ■ Plug-in type IEC bushings
- ☐ Screw type IEC bushings
- ☐ Screw type ANSI bushings
- ■ Cover for one cable connector per phase
- ☐ Extended cable compartment cover for double cable connection
- ☐ Extended cable compartment cover for single cable plus surge arrester connection
- ☐ Partial discharge (PD) detection for network diagnosis

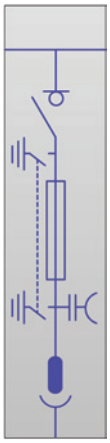
Pressure Relief Duct

- ☐ Rear chimney

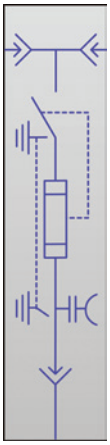
Control box

- ☐ Other voltage indicators
- ☐ Other protection relays
- ☐ Other metering and automation components

Dimensions

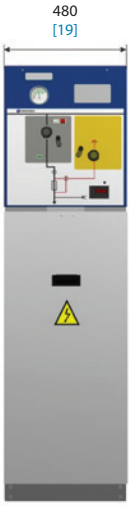


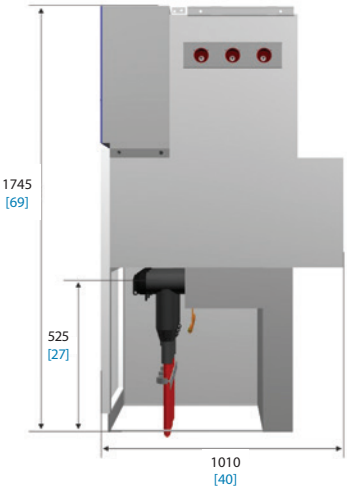
IEC



ANSI / IEEE

[mm]
[in]





230 kg

507 Lbm

cgm.3-v

Circuit-breaker protection function

Circuit breaker protection modular cubicle, equipped with a vacuum circuit-breaker in series with a three-position switch-disconnector.

Extensibility: right, left and both sides.

Electrical characteristics			IEC			ANSI / IEEE
Rated voltage	U_r	[kV]	36	38.5	40.5	38
Rated frequency	f_r	[Hz]	50 / 60	50		50 / 60
Rated current						
General busbar and cubicle interconnection	I_r	[A]	400 / 630	630		600
Feeder	I_r	[A]	400 / 630	630		600
Rated short-duration power frequency withstand voltage (1 min)						
Phase-to-earth (ground) and between phases	U_d	[kV]	70	80	95	80
Across isolating distance	U_d	[kV]	80	90	118	88
Rated lightning impulse withstand voltage						
Phase-to-earth (ground) and between phases	U_p	[kV]	170	180	185	150
Across isolating distance	U_p	[kV]	195	210	215	165
Internal arc classification	IAC		AFL 16 kA 1 s / 20* kA 1s AFLR 20 kA 1 s / 25 kA 1 s	AFL 20*kA 1s AFLR 20*kA 1s / 25 kA 1s		AFL 20* kA / 25 kA 1s
DC withstand voltage		[kV]	n/a			103
Circuit-breaker			**IEC 62271-100**			**IEEEC37.20.3**
Rated short-time withstand current (main circuit)						
Value t_k = (x) s	I_k	[kA]	16 / 20* (1/3 s) / 25 (1s)	20* (1/3 s) / 25 (1 s)		20**
Peak value	I_p	[kA]	40 / 50* / 62.5	50** / 62.5		52**
Rated breaking capacity and making capacity						
Mainly active current rated breaking capacity	I_1	[A]	400 / 630	630		600
Short-circuit breaking capacity	I_{sc}	[kA]	16 / 20*/ 25	20* / 25		20
Main switch making capacity (peak value)	I_{ma}	[kA]	40 / 50* / 62.5	50* / 62.5		32
Capacitive current capacity (50 Hz). Capacitor banks		[A]	400	n/a		n/a
Rated operating sequence						
Without reclosing			CO-15 s-CO CO-3 min-CO			CO-15 s-CO CO-3 min-CO
With reclosing			O-0,3 s-CO-15 s-CO O-0,3 s-CO-3 min-CO			O-0,3 s-CO-15 s-CO O-0,3 s-CO-3 min-CO
Circuit-breaker category						
Mechanical endurance (operations-class)			10000 - M2 2000 - M1			10000 - M2 2000 - M1
Electrical endurance (class)			E2-C2			E2-C2
Switch-disconnector			**IEC 62271-103 + IEC 62271-102**			**IEEE C37.74**
Rated short-time withstand current (main circuit)						
Value t_k = (x) s	I_k	[kA]	16 / 20* (1/3 s) / 25 (1s)	16 / 20* (1/3 s) / 25 (1s)		20* (1/-3 s) / 25 (1s)
Peak value	I_p	[kA]	40 / 50* / 62.5	50* / 62.5		50* / 62.5
Mainly active current rated breaking capacity	I_1	[A]	400 / 630	630		600
Main switch making capacity (peak value)	I_{ma}	[kA]	40 / 50* / 62.5	50* / 62.5		50* / 62.5
Switch-disconnector Category						
Mechanical endurance			1000-M1 (manual) / 5000-M2 (motor)			1000 (manual) / 5000 (motor)
Cycles of operations (Short-circuit making current)- class			5-E3			3
Earthing (grounding) Switch			**IEC 62271-102**			**IEEE C37.74**
Rated short-time withstand current (earthing circuit)						
Value t_k = (x) s	I_k	[kA]	16 / 20* (1/3 s) / 25 (1s)	20* (1/3 s) / 25 (1 s)		20* (1/-3 s) / 25 (1s)
Peak value	I_p	[kA]	40 / 50* / 62.5	50* / 62.5		50* / 62.5
Main switch making capacity (peak value)	I_{ma}	[kA]	40 / 50* / 62.5	20* / 62.5		20* / 25
Earthing (grounding) Switch Category						
Mechanical endurance			2000-M1			2000
Cycles of operations (Short-circuit making current)- class			5-E2			3

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

Applications

General protection and protection of transformer, feeder, capacitor bank, etc, as well as connection or disconnection operations.

Configuration

Cubicle

- ☐ Internal arc IAC AFLR
  ☐ 20 kA 1 s ☐ 25 kA 1 s
- ☐ Internal arc IAC AFL
  ☐ 16 kA 1 s ☐ 20 kA 1s
  ☐ 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
- ■ 1745 mm height cubicle

Gas tank

- ■ Stainless steel tank

Gas pressure indicator:

- ■ Manometer

Frontal connection:

- ■ Cable bushing

Side connection:

- ■ Two side extensibility
- ☐ Left extensibility / right blind
- ☐ Right extensibility / left blind

Type of side connection:

- ☐ Female bushing
  ☐ Right ☐ Left ■ Both
- ☐ Cone bushing
  ☐ Right ☐ Left ☐ Both

Driving mechanism

- ■ Actuating levers
- ■ B type switch mechanism
- ☐ BM type motorized mechanism
- ■ AV type manual mechanism
- ☐ RAV type manual mechanism with re-closing
- ☐ AVM type motorized mechanism
- ☐ RAVM type motorized mechanism for re-closing
- ☐ Tripping coil
- ■ Bistable coil
- ☐ 2nd Tripping coil
- ☐ Closing coil
- ☐ Undervoltage coil
- ☐ Acoustic alarm **ekor**.sas
- ■ Capacitive voltage presence indicator **ekor**.vpis
- ☐ Capacitive voltage presence / absence indicator **ekor**.ivds
- ■ Protection unit **ekor**.rpg
- ☐ Voltage detector unit **ekor**.rtk

Additional interlocks:

- ☐ Electrical interlocks
- ☐ Key lock interlocks
- ☐ Pad locks

Cable compartment

- ■ Screw type IEC bushings
- ☐ Plug-in type IEC bushings
- ☐ Screw type ANSI bushings
- ■ Cover for one cable connector per phase
- ☐ Extended cable compartment cover for double cable connection
- ☐ Extended cable compartment cover for single cable plus surge arrester connection
- ☐ Partial discharge (PD) detection for network diagnosis

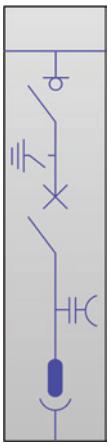
Pressure Relief Duct

- ☐ Rear chimney

Control box

- ☐ Other voltage indicators
- ☐ Other protection relays
- ☐ Other metering and automation components

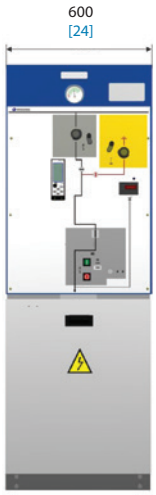
Dimensions

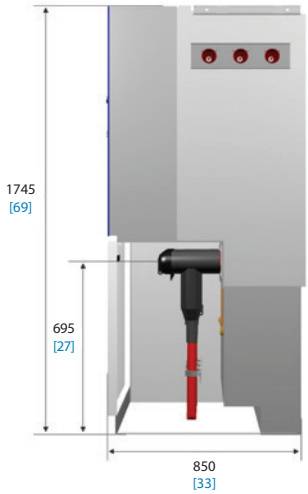


IEC

ANSI / IEEE

[mm]
[in]





255 kg

562 Lbm

cgm.3-s

Busbar switch function

Busbar switch modular cubicle, equipped with a two-position switch-disconnector (closed and open)
Optional earthing (grounding) switch (s-pt).

Extensibility: both sides.

Electrical characteristics			IEC			ANSI / IEEE
Rated voltage	U_r	[kV]	36	38.5	40.5	38
Rated frequency	f_r	[Hz]	50 / 60	50		50 / 60
Rated current						
General busbar and cubicle interconnection	I_r	[A]	400 / 630	630		600
Feeder	I_r	[A]	400 / 630	630		600
Rated short-duration power frequency withstand voltage (1 min)						
Phase-to-earth (ground) and between phases	U_d	[kV]	70	80	95	70
Across isolating distance	U_d	[kV]	80	90	118	77
Rated lightning impulse withstand voltage						
Phase-to-earth (ground) and between phases	U_p	[kV]	170	180	185	150
Across isolating distance	U_p	[kV]	195	210	215	165
Internal arc classification	IAC		AFL 16 kA 1 s / 20* kA 1s AFLR 20 kA 1 s / 25 kA 1 s	AFL 20*kA 1s AFLR 20* kA 1 s / 25 kA 1s		AFL 20* kA / 25 kA 1 s
DC withstand voltage		[kV]	n/a			103
Switch-disconnector			**IEC 62271-103 + IEC 62271-102**			**IEEE C37.74**
Rated short-time withstand current (main circuit)						
Value t_k = (x) s	I_k	[kA]	16 / 20* (1/3 s) / 25 (1 s)	20* (1/3 s) / 25 (1 s)		20* (1/-3 s) / 25 (1 s)
Peak value	I_P	[kA]	40 / 52* / 62.5	52* / 62.5		52*/ 62.5
Mainly active load-breaking current	I_1	[A]	400 / 630	630		600
Cable charging-breaking current	U_a	[A]	50 / 1.5	50		20
Closed-loop breaking current	I_{2a}	[A]	400 / 630	630		600
Earth (ground) fault breaking current	I_{6A}	[A]	160	160		n/a
Cable- & line-charging breaking current under earth (ground) fault conditions	I_{6b}	[A]	90	90		n/a
Main switch making capacity (peak value)	I_{ma}	[kA]	40 / 52* / 62.5	52* / 62.5		52* / 62.5
Switch category						
Mechanical endurance			1000-M1 (manual) / 5000-M2 (motor)			1000 (manual) / 5000 (motor)
Cycles of operations (Short-circuit making current)- class			5-E3			3
Earthing (grounding) Switch			**IEC 62271-102**			**IEEE C37.74**
Rated short-time withstand current (earthing circuit)						
Value t_k = (x) s	I_k	[kA]	16 / 20* (1/3 s) / 25 (1 s)	20* (1/3 s) / 25 (1 s)		20* (1/-3 s) / 25 (1 s)
Peak value	I_p	[kA]	40 / 52* / 62.5	52* / 62.5		52* / 62.5
Earthing (grounding) switch making capacity (peak value)	I_{ma}	[kA]	40 / 52* / 62.5	52* / 62.5		52* / 62.5
Earthing (grounding) Switch Category						
Mechanical endurance (manual)			1000-M0			1000
Cycles of operations (Short-circuit making current)- class			5-E2			3

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

Applications

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

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
  ☐ 16 kA 1 s ☐ 20 kA 1 s
- ■ 1745 mm height cubicle

Gas tank

- ■ Stainless steel tank

Gas pressure indicator:

- ■ Manometer

Side connection:

- ■ Two side extensibility

Type of side connection:

- ☐ Female bushing
  ☐ Right ☐ Left ■ Both
- ☐ Cone bushing
  ☐ Right ☐ Left ☐ Both

Earthing (grounding):

- ☐ With earthing (grounding) switch on left. s-pti type
- ☐ With earthing (grounding) switch on right s-ptd

Driving mechanism

- ■ Actuating levers
- ■ B type manual mechanism
- ☐ BM type motorized mechanism
- ☐ Acoustic alarm **ekor**.sas
- ☐ Capacitive voltage presence indicator **ekor**.vpis (with earthing)
- ☐ Capacitive voltage presence / absence indicator **ekor**.ivds (with earthing)
- ☐ Other capacitive voltage indicators
- ☐ Integrated control and monitoring unit **ekor**.rci
- ☐ Voltage detector unit **ekor**.rtk

Additional interlocks:

- ☐ Electrical interlocks
- ☐ Key lock interlocks
- ☐ Pad locks

Cable compartment

- ☐ Partial discharge (PD) detection for network diagnosis

Pressure Relief Duct

- ☐ Rear chimney

Control box

- ☐ Other relays
- ☐ Other metering and automation components

Options

cgm.3-s-pt

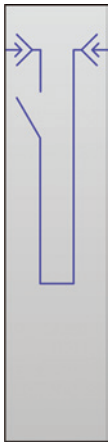
IEC

ANSI / IEEE

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

Dimensions

IEC



ANSI / IEEE

[mm]
[in]

110 / 115 kg

253 Lbm

cgm.3-rb

Busbar rise function

Busbar rise gas insulated modular cubicle. Optional earthing (grounding) switch (rb-pt).

Extensibility: right and both sides.

Electrical characteristics			IEC			ANSI / IEEE
Rated voltage	U_r	[kV]	36	38.5	40.5	38
Rated frequency	f_r	[Hz]	50 / 60	50		50 / 60
Rated current						
General busbar and cubicle interconnection	I_r	[A]	400 / 630	630		600
Feeder	I_r	[A]	400 / 630	630		600
Rated short-duration power frequency withstand voltage (1 min)						
Phase-to-earth (ground) and between phases	U_d	[kV]	70	80	95	70
Across isolating distance	U_d	[kV]	80	90	118	77
Rated lightning impulse withstand voltage						
Phase-to-earth (ground) and between phases	U_p	[kV]	170	180	185	150
Across isolating distance	U_p	[kV]	195	210	215	165
Internal arc classification	IAC		AFL 16 kA 1 s / 20* kA 1 s AFLR 20 kA 1 s / 25 kA 1 s	AFL 20*kA 1 s AFLR 20* kA 1 s / 25 kA 1 s		AFL 20* kA / 25 kA 1 s
DC withstand voltage		[kV]	n/a			103
Switch-disconnector			**IEC 62271-103 + IEC 62271-102**			**IEEE C37.74**
Rated short-time withstand current (main circuit)						
Value t_k = (x) s	I_k	[kA]	16 / 20* (1/3 s) / 25 (1 s)	20* (1/3 s) / 25 (1 s)		20* (1/-3 s) / 25 (1 s)
Peak value	I_P	[kA]	40 / 52* / 62.5	52* / 62.5		52*/ 62.5
Mainly active load-breaking current	I_1	[A]	400 / 630	630		600
Cable charging-breaking current	U_a	[A]	50 / 1.5	50		20
Closed-loop breaking current	I_{2a}	[A]	400 / 630	630		600
Earth (ground) fault breaking current	I_{6A}	[A]	160	160		n/a
Cable- & line-charging breaking current under earth (ground) fault conditions	I_{6b}	[A]	90	90		n/a
Main switch making capacity (peak value)	I_{ma}	[kA]	40 / 52* / 62.5	52* / 62.5		52* / 62.5
Switch category						
Mechanical endurance			1000-M1 (manual) / 5000-M2 (motor)			1000 (manual) / 5000 (motor)
Cycles of operations (Short-circuit making current)- class			5-E3			3
Earthing (grounding) Switch			**IEC 62271-102**			**IEEE C37.74**
Rated short-time withstand current (earthing circuit)						
Value t_k = (x) s	I_k	[kA]	16 / 20* (1/3 s) / 25 (1 s)	20* (1/3 s) / 25 (1 s)		20* (1/-3 s) / 25 (1 s)
Peak value	I_p	[kA]	40 / 52* / 62.5	52* / 62.5		52* / 62.5
Earthing (grounding) switch making capacity (peak value)	I_{ma}	[kA]	40 / 52* / 62.5	52* / 62.5		52* / 62.5
Earthing (grounding) Switch Category						
Mechanical endurance (manual)			1000-M0			1000
Cycles of operations (Short-circuit making current)- class			5-E2			3

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

Applications

Input or output of Medium Voltage cables, enabling communication with the busbar of the transformer substation, on the right (rbd), on the left (rbi) or on both sides (rba).

Configuration

Cubicle

- ☐ Internal arc IAC AFLR
  - ☐ 16 kA 1 s
  - ☐ 25 kA 1 s*
- ☐ Internal arc IAC AFL
  - ☐ 16 kA 1 s ☐ 20 kA 1s
  - ☐ 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
- ■ 1745 mm height cubicle

(*) Consult availability

Gas tank

- ■ Stainless steel tank

Gas pressure indicator:

- ■ Manometer

Frontal connection:

- ■ Cable bushing

Side connection:

- ■ Two side extensibility: rba
- ☐ Right extensibility / left blind: rbd
- ☐ Left extensibility / right blind: rbi

Type of side connection:

- ☐ Female bushing
  - ☐ Right ☐ Left ■ Both
- ☐ Cone bushing
  - ☐ Right ☐ Left ☐ Both

Earthing (grounding):

- ☐ With earthing (grounding) switch on left
- ☐ With earthing (grounding) switch on right

Driving mechanism

- ☐ B type manual mechanism
- ☐ BM type motorized mechanism
- ☐ Acoustic alarm **ekor**.sas
- ■ Capacitive voltage presence indicator **ekor**.vpis (with earthing)
- ☐ Capacitive voltage presence / absence indicator **ekor**.ivds (with earthing)
- ☐ Other capacitive voltage indicators
- ☐ Integrated control and monitoring unit **ekor**.rci
- ☐ Voltage detector unit **ekor**.rtk

Additional interlocks:

- ☐ Electrical interlocks
- ☐ Key lock interlocks
- ☐ Pad locks

Cable compartment

- ■ Cover for one cable connector per phase
- ☐ Partial discharge (PD) detection for network diagnosis

Pressure Relief Duct

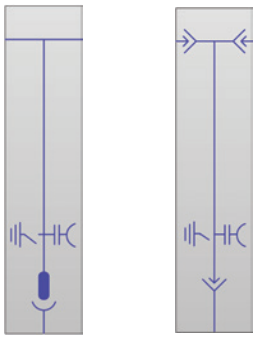
- ☐ Rear chimney

Control box

- ☐ Other voltage indicators
- ☐ Other protection relays
- ☐ Other metering and automation components

Options

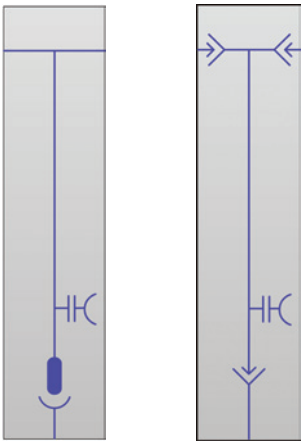
cgm.3-rb-pt



IEC ANSI / IEEE

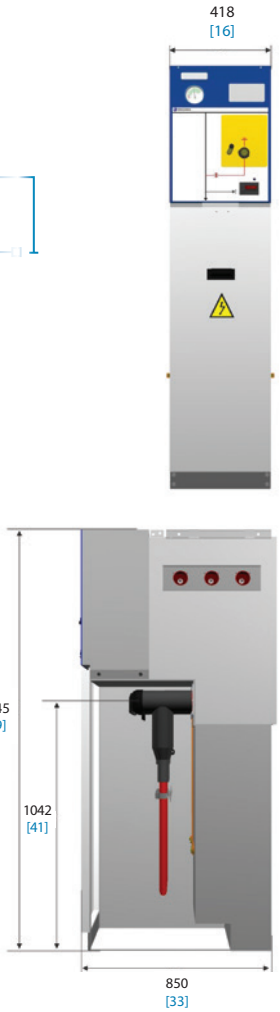
Width = 418 mm (16 inch)
Weight = 138 kg / 304.2 Lbm

Dimensions



IEC ANSI / IEEE

[mm]
[in]



158 kg

348.3 Lbm

cgm.3-rc

Cable rise function

Cable rise (up to the main busbar) air insulated modular cubicle.

Extensibility: Right or left.

Electrical characteristics			IEC			ANSI /IEEE
Rated voltage	U_r	[kV]	36	38.5	40.5	38
Rated frequency	f_r	[Hz]	50 / 60	50		50 / 60
Rated current						
Feeder	I_r	[A]	400 / 630	630		600
Internal arc classification	IAC		AFL 20 kA 1 s / 25 kA 1 s	AFL 20* kA 1s / 25 kA 1s		AFL 20* kA / 25 kA 1 s

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

Applications

Housing of the feeder cables up to the main busbar of the transformer substation, on the right (rcd) or on the left (rci).

Configuration

Cubicle

- ☐ IAC AFL 20 kA 1 s
- ☐ IAC AFL 25 kA 1s
- ■ 1745 mm height cubicle

Connectivity

- ☐ Extensibility: Right rcd or left rci

Indicators

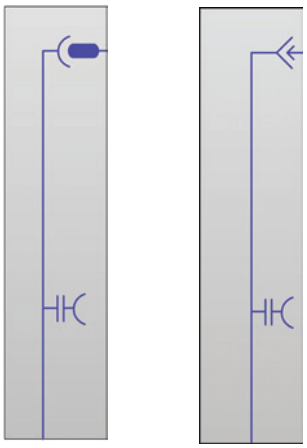
- ☐ Capacitive voltage indicator **ekor**.vips
- ☐ Capacitive voltage indicator **ekor**.ivds

Options

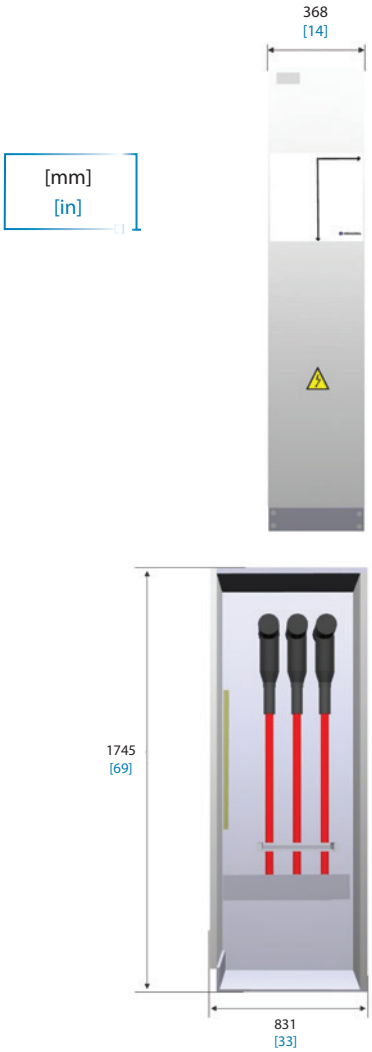
cgm.3-cl

Lateral incoming box
(Width = 365 mm, Weight = 20 kg)

Dimensions



IEC ANSI / IEEE



60 kg

133 Lbm

ORMAZABAL velatia

cgm.3-m

Metering function

Metering air insulated modular cubicle.

Electrical characteristics			IEC		
Rated voltage	U_r	[kV]	36	38.5	40.5***
Rated frequency	f_r	[Hz]	50 / 60	50	
Rated current					
General busbar and cubicle interconnection	I_r	[A]	400 / 630	630	
Rated short-duration power frequency withstand voltage (1 min)					
Phase-to-earth (ground) and between phases	U_d	[kV]	70	80	95
Rated lightning impulse withstand voltage					
Phase-to-earth (ground) and between phases	U_p	[kV]	170	180	185
Internal arc classification	IAC		AFL 20* kA 0.5 s / AFL** 20* kA 1 s		
Rated short-time withstand current Value t_k =3 s	I_r	[kA]	20*	20*	

* Tests conducted at 21 kA / 52.5 kA
** For **cgm.**3-M of1100 mm width = AF 20 kA 1 s
*** Consult availiability
Values for 50 Hz

Applications

Voltage and current metering transformer housing, enabling communication with the main busbar of the transformer substation, via busbars or dry cables.

Configuration

Cubicle

- ☐ IAC AFL 20 kA 0.5 s
- ☐ IAC AFL 20 kA 1s (900 mm width)
- ☐ IAC AF 20 kA 1s (1100 mm width)
- ■ 900 mm width
- ☐ 1100 mm width
- ■ Heater
- ■ Protection mesh
- ■ Locks

Busbar connections

- ■ Rigid unscreened top connection

Cable connections

- ☐ Cable bottom connection

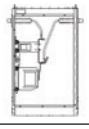
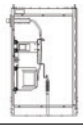
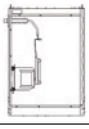
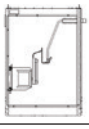
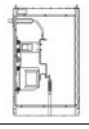
Metering transformers

- ■ Installed current transformers (3CTs)
- ■ Installed voltage transformers (3VTs)
- ☐ No transformers

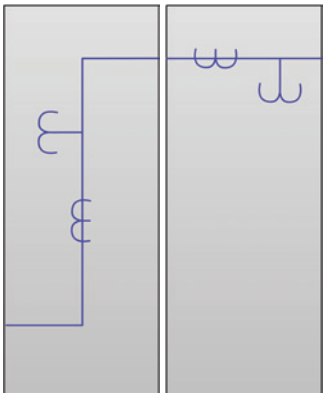
Control box

- ☐ Other metering and automation components

Options

Width = 900 mm	Width = 1100 mm
	
	
	
	
	
	
	
	
	

Dimensions



IEC

[mm]

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

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.

Electrical characteristics	IEC		L-P		
Rated voltage	U_r	[kV]	36	38.5	40.5
Rated frequency	f_r	[Hz]	50 / 60	50	
Rated current					
General busbar and cubicle interconnection	I_r	[A]	400 / 630	630	
Feeder	I_r	[A]	400 / 630	630	
Output to transformer	I_r	[A]	200 (P)		
Rated short-duration power frequency withstand voltage (1 min)					
Phase-to-earth (ground) and between phases	U_d	[kV]	70	80	95
Across isolating distance	U_d	[kV]	80	90	118
Rated lightning impulse withstand voltage					
Phase-to-earth (ground) and between phases	U_p	[kV]	170	180	185
Across isolating distance	U_p	[kV]	195	210	215
Internal arc classification	IAC		AFL 16 kA 1 s / 20* kA 1s AFLR 20 kA 1 s	AFL 20*kA 1s AFLR 20* kA 1s	
Switch-disconnector			**IEC 62271-103**		
Rated short-time withstand current (main circuit)					
Value tk = (x) s	I_k	[kA]	16 / 20* (1/3 s)	20* (1/3 s)	
Peak value	I_P	[kA]	40 / 52*	40 / 52*	
Mainly active load-breaking current	I_1	[A]	400 / 630 (P) 200	630 (P) 200	
Cable charging-breaking current	I_{4a}	[A]	50 / 1.5	50	
Closed-loop breaking current	I_{2a}	[A]	400 / 630	630	
Earth (ground) fault breaking current	I_{6a}	[A]	160	160	
Cable- & line-charging breaking current under earth (ground) fault conditions	I_{6b}	[A]	90	90	
Main switch making capacity (peak value)	I_{ma}	[kA]	40 / 52*	52*	
Switch category					
Mechanical endurance			1000-M1 (manual) / 5000-M2 (motor)		
Cycles of operations (Short-circuit making current)- class			5-E3	(L) 5-E3 (P) 5-E2	
Combined switch-relay (ekor.rpt) take-over current					
Breaking I_{max} acc. TD_{ito} IEC 62271-105		[A]	(P) 490		
Switch-fuse combination transfer current					
Breaking I_{max} acc. $TD_{itransfer}$ IEC 62271-105		[A]	(P) 820	(P) 700	
Earthing (grounding) Switch			**IEC 62271-102**		
Rated short-time withstand current (earthing circuit)					
Value t_k = (x) s	I_k	[kA]	(L) 16 / 20* (1/3 s)	(L) 20* (1/3 s)	
			(P) 1	(P) 1	
Peak value	I_p	[kA]	(L) 40 / 52*	(L) 52*	
			(P) 2.5	(P) 2.5	
Earthing (grounding) switch making capacity (peak value)	I_{ma}	[kA]	(L) 40 / 52*	(L) 52*	
			(P) 2.5	(P) 2.5	
Earthing (grounding) Switch Category					
Mechanical endurance (manual)			1000-M0		
Cycles of operations (Short-circuit making current)- class			5-E2		

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

Applications

RMU which includes the features of the feeder and the protection cubicles.

Configuration

Cubicle

- ☐ Internal arc IAC AFLR
  ☐ 20 kA 1s
- ☐ Internal arc IAC AFL
  ☐ 16 kA 1 s ☐ 20 kA 1s
- ☐ Internal arc AF
  ☐ 16 kA 0.5 s ☐ 20 kA 0.5 s
  ☐ 16 kA 1 s ☐ 20 kA 1 s
- ■ 1745 mm height cubicle

Gas tank

- ■ Stainless steel tank

Gas pressure indicator:

- ■ Manometer

Frontal connection:

- ■ Cable bushing

Side connection:

- ■ Two side extensibility
- ☐ Left extensibility / right blind
- ☐ Right extensibility / left blind
- ☐ Blind both sides

Type of side connection:

- ☐ Female bushing
  ☐ Right ☐ Left ■ Both
- ☐ Cone bushing
  ☐ Right ☐ Left ☐ Both

Fuse holder:

- ■ 36 kV
- ☐ 38.5 kV
- ☐ 40.5 kV

Driving mechanism

- ■ Actuating levers
- ■ B and BR-A type manual mechanisms
- ☐ BR-AM type motorized mechanism
- ■ Acoustic alarm **ekor**.sas
- ■ Capacitive voltage presence indicator **ekor**.vpis
- ☐ Capacitive voltage presence / absence indicator **ekor**.ivds
- ☐ Other capacitive voltage indicators
- ☐ Integrated control and monitoring unit **ekor**.rci
- ☐ Transformer protection unit **ekor**.rpt
- ☐ Voltage detector unit **ekor**.rtk

Additional interlocks:

- ☐ Electrical interlocks
- ☐ Key lock interlocks
- ☐ Pad locks

Cable compartment

- ■ Screw type IEC bushings
- ■ Cover for one cable connector per phase
- ☐ Extended cable compartment cover for double cable connection
- ☐ Extended cable compartment cover for single cable plus surge arrester connection
- ☐ Partial discharge (PD) detection for network diagnosis

Pressure Relief Duct

- ☐ Rear chimney

Control box

- ☐ Other voltage indicators
- ☐ Other protection relays
- ☐ Other metering and automation components

Options

For other configurations with more feeder or fuse protection functions, please, consult:

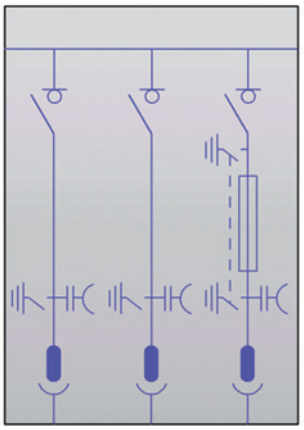
cgm.3-3l**p**

cgm.3-2l2**p**

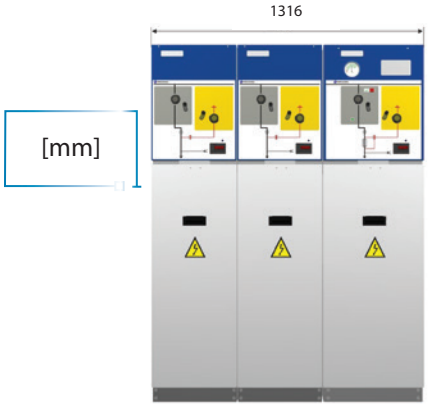
cgm.3-3l2**p**

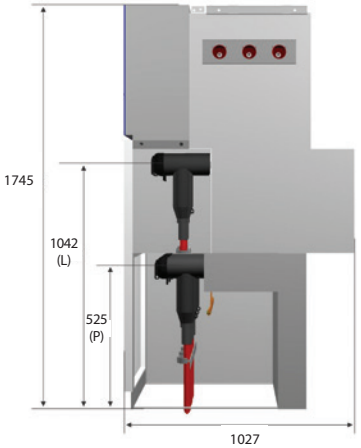
...

Dimensions



IEC





490 kg

Other components and accessories

HRC Fuses

Features:

- Horizontal fuse holders
- Front access
- Phase-independent compartments
- Protected within the gas tank
- Insulation and sealing against external agents (pollution, temperature changes, adverse weather conditions, including floods)
- Internal interlocks for a safe access to the fuse holder area

Protection with fuses

Protection against short circuits in the Medium Voltage network is made by means of the fuse protection functions.

The fuse holder tubes reach a uniform temperature all along the tube when they are placed horizontally inside the gas tank. When the cover is closed, they are fully sealed against floods and external pollution.

In accordance with the IEC 62271-105 standard, the switch-fuse combination may be either the “associated” or “combined” type. In the latter case, the tripping of each of the fuses is indicated on the front mimic diagram of the cubicle.

Protection with fuses and tripping coil

The combined switch-fuse option enables the opening of the switch-disconnector caused by an external signal, as for example that sent by the transformer thermostat in the event of overheating.

Fuse selection according to IEC standards

U_r Network [kV]	Rated transformer power without overload [kVA]													
	100	125	160	200	250	315	400	500	630	800	1000	1250	1600	2000
	Rated fuse current IEC 60282-1 [A]													
25	6.3	10	16	16	16	20	20	31.5	31.5	40	40	50	63	80*
30	6.3	6.3	10	16	16	16	20	20	31.5	31.5	40	40	63	63
35 / 36	6.3	6.3	10	16	16	16	20	20	31.5	31.5	40	40	50	63

Fuse selection according to IEEE standards

U_r Grid [kV]	Rated Transformer Power without overload [kVA]														
	100	125	160	200	250	315	400	500	630	800	1000	1250	1600	2000	2500
	Rated fuse current [A]														
34.5	6.3	6.3	10	10	16	16	20	20	31.5	31.5	40	40	50	63	80*

Remarks:

- Fuses recommended: SIBA brand with medium type striker, conforming to IEC 60282-1 (low power loss fuses)
- The fuse-switch assembly has been temperature-rise tested under normal service conditions in accordance with IEC 62271-1
- The values marked with an (*) correspond to SSK-type fuses
- If any of the fuses blow, we recommend changing all three
- For overload conditions in the transformer or other brands of fuse, please consult **Ormazabal**

Indicators

ekor.sas acoustic alarm

The **ekor**.sas earthing (grounding) prevention acoustic alarm unit is an acoustic indicator that works in association with the earthing (grounding) switch shaft and the voltage presence indicator, **ekor**.vpis.

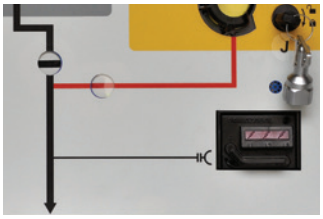
The alarm is activated when the earthing (grounding) switch actuation shaft access handle is operated while there is voltage in the cubicle's Medium Voltage incoming line. Then an acoustic alarm warns the operator that a short-circuit may be caused in the network if the operation is carried out, resulting in greater safety for individuals and equipment and the continuity of supply.

ekor.vpis voltage presence indicator

ekor.vpis is a self-powered indicator incorporated into the cubicles that displays the presence of voltage in the phases via three permanent light signals, designed in accordance with the IEC 62271-206 standard.

It has easily accessible test points for performing the phase balance test.

Ormazabal's **ekor**.spc phase comparator and **ekor**.ivds voltage presence / absence detector can be supplied on request.



Cable connections

Bushings EN 50181 & IEEE 386

- Manufactured in epoxy resin, they conform to the dielectric and partial discharge tests
- There are two types:
  - Plug-in up to 400 A
  - Screw-in up to 630 A (IEC) & 600 A (IEEE)
- Located in the cable compartment Optionally, they may be placed on the side of the cubicles for direct supply to the main busbar

Bushing

Cable connectors

Features:

- For single-core or three core cables
- For dry cable or impregnated cable
- Shielded or unshielded.
- Elbow
  Detailled information:
  - Direct connection to the bushings located in the cable compartment or on the side via plug-in or screw-in connectors (rated current greater than 400 A or short-circuit current equal to or higher than 16 kA)

		Distance (d)
cgm.3-l / rb	[mm] (In)	[430] (17)
cgm.3-v	[mm] (In)	[500] (19.68)
cgm.3-p	[mm] (In)	[240] (9.45)

Accessories

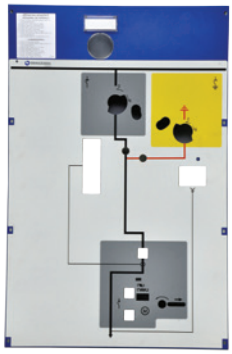
- Insulating plugs
- Connection terminals
- Surge arresters

For other types and values, please consult **Ormazabal**.

Spare parts

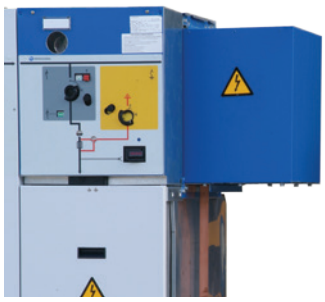
Metal enclosure

- Covers



- Auxiliary profiles for uneven floors

- Lateral incoming box (**cgm**.3-cl)



Operating levers

- Switch-disconnector general lever

- Levers for Circuit Breaker

Connectivity

- **ormalink** connecting set
  It includes the earthing bar, bolts and nuts, instructions and other elements required for the correct assembly of two modules

- End assembly kit
  It includes end plugs, metal cover to be mounted on the side of one cubicle, instructions and other elements required for assembly

Fuse holders

- Fuse holder carriage

Handling, installation and after sales

Handling

- Reduced size and weight make easier manipulation and installation tasks
- Safe cubicle delivery:
  - Upright position on a pallet, wrapped in protective plastic with polystyrene corner pieces
- Handling methods (up to 4 functional unit assemblies):
  - Lifting: Forklift truck or hand-operated pallet jack
    Alternative methods: rollers or rods underneath
  - Raising: Slings & lifting beams

- Ergonomic design for easy cubicle connection and floor fastening

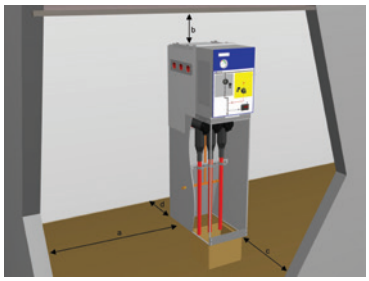
For handling and installation instructions request the corresponding manuals to **Ormazabal**.

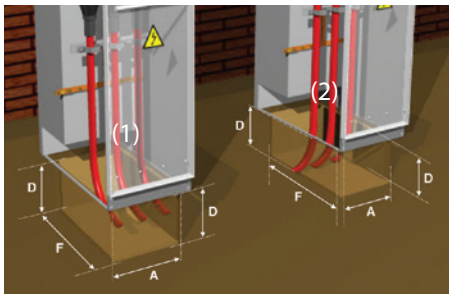
Inside buildings

- Easy handling with pallet jack (go through standard doors and elevators)
- Small dimensions: minimum room occupation
- Operation, extensibility and removal in reduced space
- No gas manipulation on site
- Optionally, installation on auxiliary profiles in case of uneven floors or to avoid cable trench works

Installation minimum distances [mm] (inches)		
Side wall (a)	[100] (4)	
Ceiling (b)	[600] (24)	
Front clearance (c)	[500] (20)	
Rear wall (d)*	**cgm**.3-l/s/rc/rb/v	[>100] (>4)**
	cgm.3-p/2lp/m	0

* In case of rear chimney = 0 mm / inches
** For diagrams combined with P modules d = 160 mm (6 inch)
The space required to extend the assembly with an additional cubicle is 250 mm / 9.84 inches plus the width of the new cubicle





Maximum trench dimensions for cubicles internal arc tested

In gastank up to 20 kA 0.5 s. Dry cable

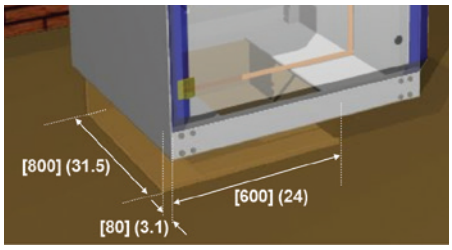
Function	A [mm] (inches)	F [mm] (inches)	(1) D [mm] (inches)		(2) D [mm] (inches)	
			Single Core	3-core	Single Core	3-core
I, rb & rc	[330] (13)	[450] (18)	[300] (12)	[650] (26)	[660] (26)	[650] (26)
p	[390] (15)	[450] (18)	[600] (24)	[1050] (41)	[600] (24)	[1050] (41)
v	[510] (20)	[450] (18)	[500] (19)	[850] (33)	[600] (23)	[850] (33)

IAC class + in gastank up to 20 / 25 kA 1 s. Dry cable

Function	A [mm] (inches)	F [mm] (inches)	(1) D [mm] (inches)		(2) D [mm] (inches)	
			Single Core	03-core	Single Core	3-core
I, rb & rc	[330] (13)	[615] (24)	[320](13)	[650] (26)	[660] (26)	[650] (26)
p	[390] (15)	[615] (24)	[600] (24)	[1050] (41)	[600] (24)	[1050] (41)
v	[510] (20)	[615] (24)	[500] (19)	[850] (33)	[600] (23)	[850] (33)

Trench dimensions [mm] (inches) for metering cubicle

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



The dimensions of the trench depend on the minimum curvatureradius of the cables used.

The dimensions given below are for the largest trench.

To dimension the trench with optimum proportions (minimum trench dimensions) for a particular type of cable, please consult **Ormazabal**.

Inside mobile or prefabricated transformer substations

- Turn-key solutions (fully assembling, testing and transportation from factory)
  - Uniform quality
  - Significant reduction of installation costs and time
- Possibility of cubicle on-site installation
- Wide range of **Ormazabal**'s TS: Walk-in, underground, kiosk, compact…
- Availability of having an operational Transformer Substation in short time

Inside wind turbines

- Off-shore & On-shore wind farms
- Since 1995 supplying MV GIS cubicles for RES commercial generation
- Over 10 years of experience in the offshore wind sector

Commissioning and after sales

Services

- Technical assistance
- FAT
- Pick-up & delivery
- Supervision & installation
- Commissioning
- Training
- Warranty
- Inspection & maintenance
- Spare part
- Repair
- Retrofitting
- Recycling
- Engineering
- Procurement
- EPCM

Recycling and end-of-life

The **Ormazabal** production centres have introduced the corresponding environmental management systems, conforming to the requirements of the international ISO 14001 standard and endorsed by the Environmental Management Certificate among others.

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

By design, and depending on the models, they have a sealed compartment with SF_6 which allows full operation of the equipment throughout its service life (IEC 62271-200).

At the end of the product life cycle, the SF_6 gas content must not be released into the atmosphere. It is recovered and treated for reuse, in accordance with the instructions given in standards IEC 62271-303, IEC 60480 and the CIGRE 117 guide. **Ormazabal** will provide the additional information required to carry out this task correctly, out of respect for the safety of individuals and that of the environment.

Notes

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