



**ORMAZABAL**

Focus on Medium Voltage



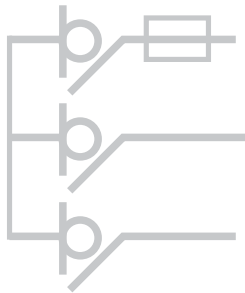
**MV Switchgear  
Secondary Distribution**

















**CGM.3 Fully Gas-Insulated  
Modular and Compact (RMU) System  
Up to 36 kV**

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The quality of designed, manufactured and installed products is underpinned by the implementation and certification of a quality management system, based on the international standard ISO 9001:2000. Our commitment to the environment is reaffirmed with the implementation and certification of an environmental management system as laid down in international standard ISO 14001.



In view of the constant evolution in standards and design, the characteristics of the elements contained in this catalogue are subject to change without prior notification. These characteristics, as well as the availability of components, are subject to confirmation by Ormazabal's Technical - Commercial Department.

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## GENERAL DESCRIPTION

Ormazabal's **CGM.3** system consists of a wide range of SF6 fully insulated modular and compact cubicles, enabling the configuration of any electrical diagram in Medium Voltage Secondary Distribution networks up to 36 kV.

**CGM.3** system results from the implementation of new technologies, standards and materials, alongside the improvements arising from the experience gained since the beginning of the 1990s with **CGM-CGC** system.

This development brings a highly safe, reliable and user-friendly assembly, capable of withstanding all environmental conditions.

The performance of routine tests across the various phases of the assembly procedure and the use of the most innovative manufacturing techniques assure the highest level of quality in **CGM.3** system, as reflected in its ISO 9001 certification.



## MAIN CHARACTERISTICS

**Protection and safety** for people, goods and equipment against internal arc effects, proven through tests performed in accordance with standard IEC 62271-200.

**Capable of withstanding** harsh environmental conditions (including flooding), long service life and absence of maintenance in live parts through full gas insulation and the use of screened connectors.

Total **modularity** and future **extensibility**, in both directions, through Ormazabal's patented **ORMALINK** connecting set. Flexibility to configure all types of diagram.

**Smaller size and lower weight**, making handling and installation easier.

Accessories and live testing as an option.

Horizontal fuse holders with front access, protected within a gas tank.

Ease of connecting cables by means of front plug-in or screw-in terminals.



Safe and simple operation through the use of user-friendly driving mechanisms, including interlocks as standard.

Extra safety: incorporation of ekorVPIS, a light voltage presence indicator; and, optionally, ekorSAS, an acoustic alarm preventing earthing.



Environmentally-friendly:

- Use of highly recyclable materials.
- Minimal gas volume per functional unit.
- End-of-life product management.

Normal service conditions indoors in accordance with standard IEC 62271-1.

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

## STANDARDS

**CGM.3** system meets the following standards:

**IEC 62271-001**

Common specifications for high-voltage switchgear and controlgear standards.

**IEC 62271-200**

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

**IEC 60265-1**

High-voltage switches. Part 1: Switches for rated voltages above 1 kV and less than 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 61958**

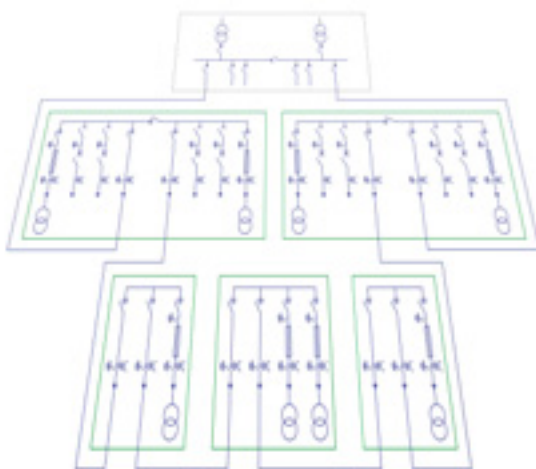
Voltage presence indicating systems.

**CGM.3** system exceeds the immersion test at a pressure of 3 metres of water column, 24 hours at rated voltage and power frequency insulation test.

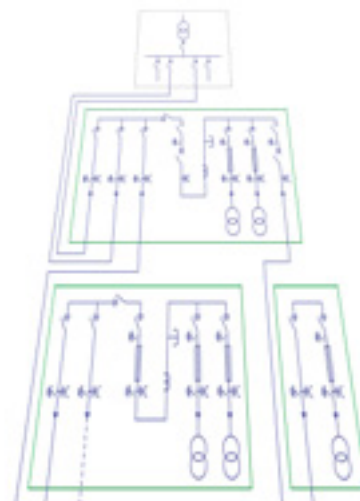
## APPLICATIONS

**CGM.3** system is used in a wide variety of facilities, both public and private, mainly:

- Utility transformer substations.
- Private transformer substations.
- Switching substations.
- Remote controlled substations.
- Infrastructures.
- Industrial facilities.
- Power co-generations.
- Wind farms.
- Photovoltaic facilities.
- etc.



Public Distribution



Private Distribution

## MODULE TYPES



CGM.3-L



CGM.3-P



CGM.3-V



CGM.3-S



CGM.3-S-Pt



CGM.3-M



CGM.3-RC



CGM.3-RB



CGM.3-2LP



### TECHNICAL CHARACTERISTICS

### CGM.3

	L	P	V(AV)	V(RAV)	S	S-Pt	M	RC	RB	2LP
<b>Rated voltage [kV]</b>	36									
<b>Rated current [A]:</b>	400/630									
Busbars	400/630									
Outgoing line	400/630	200	400/630	400/630	-	-	-	400/630	400/630	400/630(L) 200(P)
<b>Short-time current [kA 1/3s]</b>	16/20*	16/20*	16/20*	16/20*	16/20*	16/20*	-	-	16/20*	16/20*
<b>Insulation level:</b>	-									
Power frequency [kV]	70/80	70/80	70/80	70/80	70/80	70/80	70/80	-	70/80	70/80
Lightning impulse [kV] <sup>PEAK</sup>	170/195	170/195	170/195	170/195	170/195	170/195	170/195	-	170/195	170/195
<b>Rated frequency [Hz]</b>	50/60**									
<b>IP rating</b>	-									
General	IP2XD									
Tank and fuse holders	IP8X									
<b>PHYSICAL CHARACTERISTICS</b>	<b>L</b>	<b>P</b>	<b>V(AV)</b>	<b>V(RAV)</b>	<b>S</b>	<b>S-Pt</b>	<b>M</b>	<b>RC</b>	<b>RB</b>	<b>2LP</b>
<b>Height [mm]</b>	1745	1745	1745	1800	1745	1745	1950	1745	1745	1745
<b>Width [mm]</b>	418	480	600	600	418	600	900/1100	368	418	1316
<b>Depth [mm]</b>	845	1010	850	850	845	845	1160	831	850	1027
<b>Weight [kg]<sup>#</sup></b>	138	211	240	240	135	175	290*	42	138	421

(\*) Tests conducted at 21 kA

(\*\*) Values represented for 50 Hz, for other frequencies, please consult Ormazabal's Technical - Commercial Department.

(#) Not including relays, motorisations, nor transformers.



**Modular cubicle, feeder function**, equipped with a three-position switch-disconnector (closed, open and earthing).

It is used to feed the incoming or outgoing MV cables, allowing communication with the busbar in the general cubicle assembly.

Extensibility: Right, left and both sides.

**FEEDER FUNCTION**

ELECTRICAL CHARACTERISTICS	
<b>Rated voltage [kV]</b>	<b>36</b>
Rated current	
Busbars and cubicle interconnection [A]	400 / 630
Feeder [A]	400 / 630
Rated frequency [Hz]	50/60#
Rated withstand voltage at power frequency for 1 min.	
Phase-to-earth and phase-to-phase, open disconnector [kV]	70
Isolating distance [kV]	80
Lightning impulse withstand voltage	
Phase-to-earth and phase-to-phase, open disconnector [kV]	170
Isolating distance [kV]	195
Internal arc	16/20*kA 1s
<b>Switch acc. IEC 60265-1</b>	
Short-time current (main circuit)	
R.M.S. value 1/3 s [kA]	16 / 20*
Peak value [kA]	40 / 50*
Mainly active current breaking capacity [A]	400 / 630
Vacuum cable breaking capacity [A]	50
Closed loop breaking capacity [A]	400 / 630
Earth fault breaking capacity [A]	160
Earth fault breaking capacity on vacuum cables [A]	90
Main switch making capacity (peak value) [kA]	40 / 50#
Switch category	
Mechanical endurance (operations - class)	1000 - M1 (manual) 5000 - M2 (motorised)
No. of short-circuit making operations (operations - class)	5 - E3
<b>Earthing Switch acc. IEC 62271-102</b>	
Short-time current (earth circuit)	
R.M.S value 1 s [kA]	16 / 20*
Peak value [kA]	40 / 50*
Earthing Switch making capacity (peak value) [kA]	40 / 50*
Earthing Switch category	
Mechanical endurance (operations - class)	1000 - M0 (manual)
No. of short-circuit making operations (operations - class)	5 - E2



(#) Data indicated for 50 Hz, for other frequencies please consult Ormazabal's Technical - Commercial Department.  
 (\*) Tests conducted at 21 kA/52.5 kA

PHYSICAL CHARACTERISTICS			
Height[mm]	Width[mm]	Depth[mm]	Weight[kg]
1745	418	845	138

**NOTE:**  
 The additional protection, metering, control and automation functions are described more fully in the corresponding section.

**Modular cubicle, fuse protection function**, Equipped with a three-position switch-disconnector (closed, open and earthing, ahead of and behind the fuses) and current-limiting fuse-link protection.

It is used for connection, disconnection and protection operations, allowing communication with the busbar in the general cubicle assembly.

Extensibility: Right, left and both sides.

## FUSE PROTECTION FUNCTION



ELECTRICAL CHARACTERISTICS	
<b>Rated voltage [kV]</b>	<b>36</b>
Rated current	
Busbars and cubicle interconnection [A]	400 / 630
Output to transformer [A]	200
Rated frequency [Hz]	50/60 <sup>#</sup>
Rated withstand voltage at power frequency for 1 min.	
Phase-to-earth and phase-to-phase, open disconnector [kV]	70
Isolating distance [kV]	80
Lightning impulse withstand voltage	
Phase-to-earth and phase-to-phase, open disconnector [kV]	170
Isolating distance [kV]	195
Internal arc	16/20* <b>kA</b> 1 s
<b>Switch acc. IEC 60265-1</b>	
Short-time current (main circuit)	
R.M.S value 1 s [kA]	16 / 20*
Peak value [kA]	40 / 50*
Mainly active current breaking capacity [A]	200
Main switch making capacity (peak value) [kA]	40 / 50*
Switch category	
Mechanical endurance (operations - class)	1000 - M1 (manual)
No. of short-circuit making operations (operations - class)	5 - E3
Combined switch-ekorRPT unit take-over current	490
(Maximum breaking current acc. TD 5 IEC 62271-105) [A]	
Transition current for fuse-combination unit	820
(Maximum breaking current acc. TD 4 IEC 62271-105) [A]	
<b>Earthing Switch acc. IEC 62271-102</b>	
Short-time current (earth circuit)	
R.M.S value 1 s [kA]	1/3
Peak value [kA]	2,5/7,5
Earthing Switch making capacity (peak value) [kA]	2,5/7,5
Earthing Switch category	
Mechanical endurance (operations - class)	1000 - M0
No. of short-circuit making operations (operations - class)	5 - E2

(<sup>#</sup>) Data indicated for 50 Hz, for other frequencies please consult Ormazabal's Technical - Commercial Department.

(\*) Tests conducted at 21 kA/52.5 kA

## PHYSICAL CHARACTERISTICS

Height[mm]	Width[mm]	Depth[mm]	Weight[kg]
1745	480	1010	211

NOTE:  
The additional protection, metering, control and automation functions are described more fully in the corresponding section.





**Modular cubicle, circuit-breaker function**, equipped with a vacuum circuit-breaker in series with the three-position switch-disconnector (closed, open and earthing).

It is used for connection, disconnection and general protection operations on the facility, allowing communication with the busbar in the general cubicle assembly.

Extensibility: Right, left and both sides.

## CIRCUIT-BREAKER FUNCTION

ELECTRICAL CHARACTERISTICS	WITH AV/AMV DRIVING MECH.	WITH RAV/RAMV DRIVING MECH.
<b>Rated voltage [kV]</b>	<b>36</b>	<b>36</b>
Rated current		
Busbars and cubicle interconnection [A]	400/630	400/630
Feeder [A]	400/630	400/630
Rated frequency [Hz]	50/60 <sup>#</sup>	50/60 <sup>#</sup>
Rated withstand voltage at power frequency for 1 min.		
Phase-to-earth and phase-to-phase, open disconnector [kV]	70	70
Insulating distance [kV]	80	80
Lightning impulse withstand voltage		
Phase-to-earth and phase-to-phase, open disconnector [kV]	170	170
Insulating distance [kV]	195	195
Internal arc	16/20 kA1s	16/20 kA 0,5s
<b>Circuit-breaker acc. IEC 62271-100</b>		
Breaking capacity		
Mainly active current [A]	400/630	400/630
Short-circuit [kA]	16/20*	16/20
Vacuum cables [A]	50	50
Capacitor banks [A]	400	400
Making capacity (peak value) [kA]	31/40/50	40/50
Short-time current		
R.M.S value 1 s [kA]	16/20	16/20
R.M.S value 3 s [kA]	20	20
Circuit-breaker category		
Mechanical endurance (operations - class)	2000-M1	10000-M2
Electrical endurance	E2 (without reclosing)	E2 (with reclosing)
Circuit-breaker operating sequence	CO-15s-CO	O-0,3s-CO-15s-CO
<b>Disconnecter and Earthing Switch acc. IEC 62271-102</b>		
Disconnecter category		
Mechanical endurance (operations - class)	1000-M0	1000-M0
No. of short-circuit making operations (class)	E2	E2
Earthing switch category		
Mechanical endurance (operations - class)	1000-M0	1000-M0
No. of short-circuit making operations (class)	E2	E0**

(<sup>#</sup>) Data indicated for 50 Hz, for other frequencies please consult Ormazabal's Technical - Commercial Department.  
 (\* ) Tests conducted at 21 kA  
 (\*\* ) Endurance of the full earth circuit E2

## PHYSICAL CHARACTERISTICS

	Height[mm]	Width[mm]	Depth[mm]	Weight[kg]
CGM.3-V (AV TYPE)	1745	600 <sup>##</sup>	850	240
CGM.3-V (RAV TYPE)	1800	600	850	240

(<sup>##</sup>) On request, there is also a 595 mm wide model for wind power applications.

**NOTE:**  
 The additional protection, metering, control and automation functions are described more fully in the corresponding section.



CGM.3-V (AV type)



CGM.3-V (RAV type)

**Modular cubicle, busbar switch function**, equipped with a two-position switch-disconnector (closed and open).

It is used for load breaking on the main Transformer Substation busbar.

Extensibility: Both sides.

## BUSBAR SWITCH FUNCTION

### ELECTRICAL CHARACTERISTICS

<b>Rated voltage [kV]</b>	<b>36</b>
Rated current	
Busbars and cubicle interconnection [A]	400 / 630
Rated frequency [Hz]	50/60#
Rated withstand voltage at power frequency for 1 min.	
Phase-to-earth and phase-to-phase, open disconnector [kV]	70
Isolating distance [kV]	80
Lightning impulse withstand voltage	
Phase-to-earth and phase-to-phase, open disconnector [kV]	170
Isolating distance [kV]	195
<b>Switch acc. IEC 60265-1</b>	
Short-time current (main circuit)	
R.M.S value 1 s [kA]	16 / 20*
Peak value [kA]	40 / 50*
Mainly active current breaking capacity [A]	400 / 630
Vacuum cable breaking capacity [A]	50
Closed loop breaking capacity [A]	400 / 630
Main switch making capacity (peak value) [kA]	40 / 50
<b>Switch category acc. IEC 60265-1</b>	
Mechanical endurance (operations - class)	1000 - M1 (manual) 5000 - M2 (motorizado) 5 - E3

{#} Data indicated for 50 Hz, for other frequencies please consult Ormazabal's Technical - Commercial Department.  
 {\*} Tests conducted at 21 kA.

### PHYSICAL CHARACTERISTICS

Height[mm]	Width[mm]	Depth[mm]	Weight[kg]
1745	418	845	135

**NOTE:**  
 The additional protection, metering, control and automation functions are described more fully in the corresponding section.



**Modular cubicle, busbar switch function with earth connection**, equipped with a three-position switch-disconnector (closed, open and earthing).

It is used for load breaking on the main transformer substation busbar and earth it on the right-hand side (Ptd) or left-hand side (Pti) of the break.

Extensibility: Both sides.

## BUSBAR SWITCH FUNCTION WITH EARTH CONNECTION

ELECTRICAL CHARACTERISTICS	
<b>Rated voltage [kV]</b>	<b>36</b>
Rated current	
Busbars and cubicle interconnection [A]	400 / 630
Rated frequency [Hz]	50/60#
Rated withstand voltage at power frequency for 1 min.	
Phase-to-earth and phase-to-phase, open disconnector [kV]	70
Isolating distance [kV]	80
Lightning impulse withstand voltage	
Phase-to-earth and phase-to-phase, open disconnector [kV]	170
Isolating distance [kV]	195
<b>Switch acc. IEC 60265-1</b>	
Short-time current (main circuit)	
R.M.S value 1 s [kA]	16 / 20*
Peak value [kA]	40 / 50*
Mainly active current breaking capacity [A]	400 / 630
Vacuum cable breaking capacity [A]	50
Closed loop breaking capacity [A]	400 / 630
Earth fault breaking capacity [A]	160
Earth fault breaking capacity on vacuum cables [A]	90
Main switch making capacity (peak value) [kA]	40 / 50*
Switch category	
Mechanical endurance (operations - class)	1000 - M1 (manual)
No. of short-circuit making operations (operations - class)	5000 - M2 (motorised)
<b>Earthing Switch acc. IEC 62271-102</b>	5 - E3
Short-time current (earth circuit)	
R.M.S value 1 s [kA]	40 / 50*
Peak value [kA]	40 / 50*
Earthing Switch making capacity (peak value) [kA]	40 / 50*
Earthing Switch category	
Mechanical endurance (operations - class)	1000 - M0 (manual)
No. of short-circuit making operations (operations - class)	5 - E2



#) Data indicated for 50 Hz, for other frequencies please consult Ormazabal's Technical - Commercial Department.  
 \*) Tests conducted at 21 kA.

## PHYSICAL CHARACTERISTICS

Height [mm]	Width [mm]	Depth [mm]	Weight [kg]
1745	600	845	175

**NOTE:**  
 The additional protection, metering, control and automation functions are described more fully in the corresponding section.

# MODULE TYPES



## Modular cubicle, metering function.

This is used to house the voltage and current metering transformers, allowing communication with the busbar in the general cubicle assembly, by means of a dry cable.

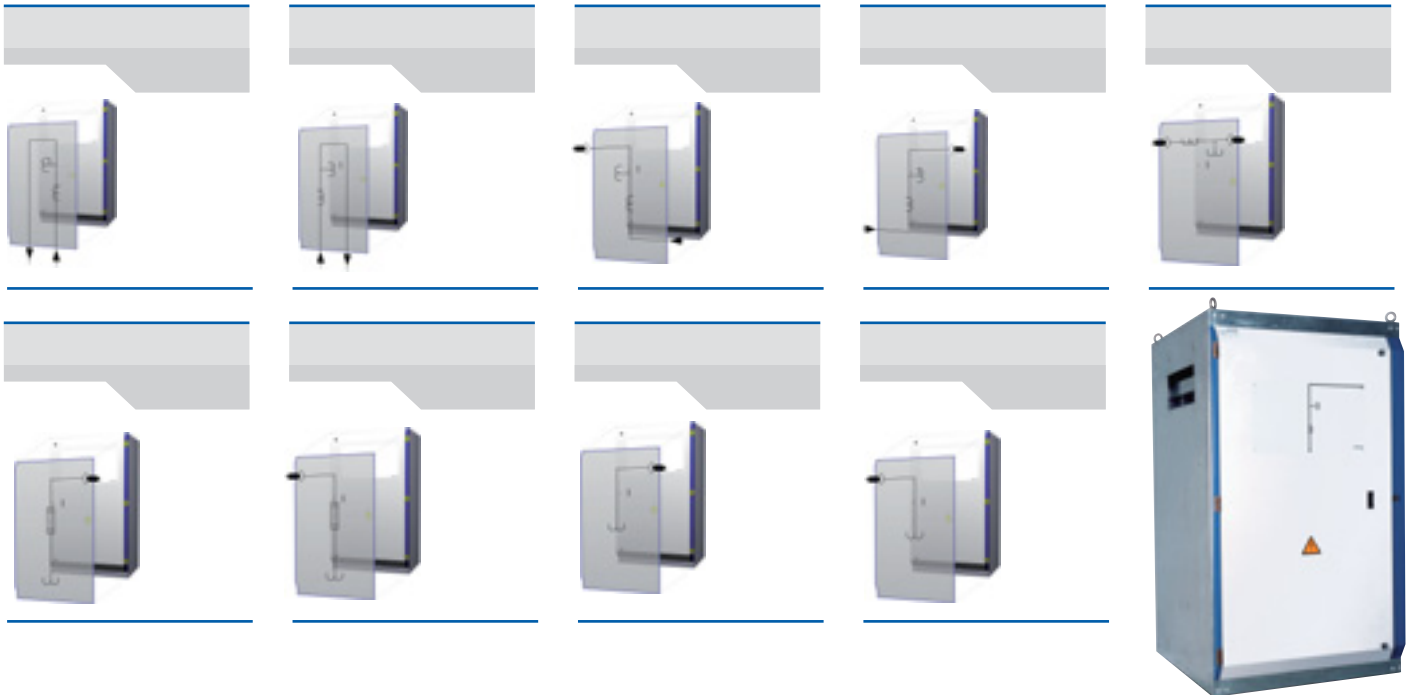
### METERING FUNCTION

ELECTRICAL CHARACTERISTICS	
Rated voltage [kV]	36
Rated current [A]	400 / 630
Rated withstand voltage at power frequency [kV]	70 / 80
Lightning impulse withstand voltage [kV]	170 / 195

PHYSICAL CHARACTERISTICS				
	Height[mm]	Width[mm]	Depth[mm]	Weight[kg]
	1950	900/1100	1160	290* / 520#

(\* ) Transformers not included.  
 (#) With 3 Voltage Transformers and 3 Current Transformers.

The diagrams most frequently used when mounting metering transformers are:



NOTE:  
 For other diagrams and a list of standard metering transformers, please consult Ormazabal's Technical - Commercial Department.

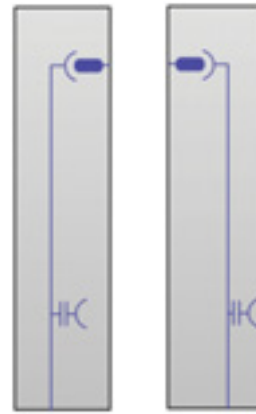


## Modular cubicle, busbar cable rise function.

This is used to house the incoming cables to the busbar in the general cubicle assembly, on the right-hand (RCd) or left-hand (RCi) side.

As an option, it can include the ekorVPIS voltage presence indication unit.

Extensibility: To the right or left.



## CABLE RISE FUNCTION

ELECTRICAL CHARACTERISTICS				
<b>Rated voltage [kV]</b>				<b>36</b>
Rated current				
Feeder and cubicle interconnection [A]				400 / 630
PHYSICAL CHARACTERISTICS				
	<b>Height[mm]</b>	<b>Width[mm]</b>	<b>Depth[mm]</b>	<b>Weight[kg]</b>
	1745	368	831	42



**Modular cubicle, busbar rise function**, gas-insulated and equipped with an earthing switch.

This is used to feed the incoming or outgoing MV cables, allowing communication with the busbar in the general cubicle assembly and its connection to earth.

Extensibility: Both sides.

## BUSBAR RISE FUNCTION

ELECTRICAL CHARACTERISTICS				
<b>Rated voltage [kV]</b>				<b>36</b>
Rated current				
Busbars and cubicle interconnection [A]				400 / 630
Feeder [A]				400 / 630
Rated frequency [Hz]				50 / 60 <sup>#</sup>
Rated withstand voltage at power frequency for 1 min.				
Phase-to-earth and phase-to-phase, open disconnector [kV]				70
Isolating distance [kV]				80
Lightning impulse withstand voltage				
Phase-to-earth and phase-to-phase, open disconnector [kV]				170
Isolating distance [kV]				195
<b>Earthing Switch acc. IEC 62271-102</b>				
Short-time current (earth circuit)				
R.M.S value 1 s [kA]				16 / 20*
Peak value [kA]				40 / 50*
Earthing Switch making capacity (peak value) [kA]				40 / 50*
Earthing Switch category				
Mechanical endurance (operations - class)				1000 - M0 (manual) 5 - E2

<sup>#</sup> Data indicated for 50 Hz, for other frequencies please consult Ormazabal's Technical - Commercial Department.  
<sup>\*</sup> Tests conducted at 21 kA.

PHYSICAL CHARACTERISTICS				
	<b>Height[mm]</b>	<b>Width[mm]</b>	<b>Depth[mm]</b>	<b>Weight[kg]</b>
	1745	418	850	138



## MODULE TYPES

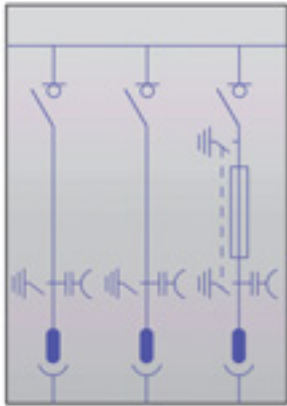


### CGM.3-2LP

**Compact cubicle, two feeder functions and one fuse protection function**, which includes the features of the feeder cubicles and the fuse protection cubicle, housed in the same tank.

Extensibility: Right, left, both sides or neither side.

#### FEEDER AND FUSE PROTECTION FUNCTIONS



ELECTRICAL CHARACTERISTICS	Feeder	Fuse Protection
<b>Rated voltage [kV]</b>	<b>36</b>	
Rated current		
Busbars and cubicle interconnection [A]	400 / 630 A	400 / 630 A
Incoming line [A]	400 / 630 A	-
Output to transformer [A]	-	200
Rated frequency [Hz]	50/60 <sup>#</sup>	50/60 <sup>#</sup>
Rated withstand voltage at power frequency for 1 min.		
Phase-to-phase and phase-to-earth [kV]	70	70
Insulating distance [kV]	80	80
Lightning impulse withstand voltage		
Phase-to-phase and phase-to-earth [kV]	170	170
Insulating distance [kV]	195	195
Internal arc	16/20* kA 1s	16/20* kA 1s
<b>Switch acc. IEC 60265-1</b>		
Short-time current (main circuit)		
R.M.S value 1/3 s [kA]	16 / 20*	16 / 20*
Peak value [kA]	40 / 50*	40 / 50*
Mainly active current breaking capacity [A]	400 / 630	200
Vacuum cable breaking capacity [A]	50	-
Closed loop breaking capacity [A]	400 / 630	-
Earth fault breaking capacity [A]	160	-
No-load cable-charging breaking capacity with earth fault [A]	90	-
Main switch making capacity (peak value) [kA]	40 / 50*	40 / 50*
Switch category		
Mechanical endurance (operations - class)	1000-M1 (manual) 5000-M2 (motorised)	1000-M1 (manual)
No. of short-circuit making operations (operations - class)	5 - E3	5 - E3
Combined switch-ekorRPT unit take-over current (Maximum breaking current acc. TD 5 IEC 62271-105) [A]	-	490
Transition current for fuse-combination unit (Maximum breaking current acc. TD 4 IEC 62271-105) [A]	-	820
<b>Earthing Switch acc. IEC 62271-102</b>		
Short-time current (earth circuit)		
R.M.S value 1 s [kA]	16 / 20*	1/3
Peak value [kA]	40/ 50*	2,5 / 7,5
Earthing Switch making capacity (peak value) [kA]	40/ 50*	2,5 / 7,5
Earthing Switch category		
Mechanical endurance (operations - class)	1000-M0 (manual)	1000-M0 (manual)
No. of short-circuit making operations (operations - class)	5 - E2	5 - E2



<sup>#</sup>) Data indicated for 50 Hz, for other frequencies please consult Ormazabal's Technical - Commercial Department.  
<sup>\*</sup>) Tests conducted at 21 kA.

#### PHYSICAL CHARACTERISTICS

Height[mm]	Width[mm]	Depth[mm]	Weight[kg]
1745	1316	1027	421

**NOTE:**

The additional protection, metering, control and automation functions are described more fully in the corresponding section.

## MODULARITY. ORMALINK

The electrical connection between the various **CGM.3** system modules is performed using **ORMALINK** connecting set, patented in 1991 by Ormazabal.

The extensible cubicles have side female bushings to connect the main busbars through this connecting set. **ORMALINK** allows the current to flow, while controlling the electric field by means of insulating elastomer layers, which are free of partial discharges.

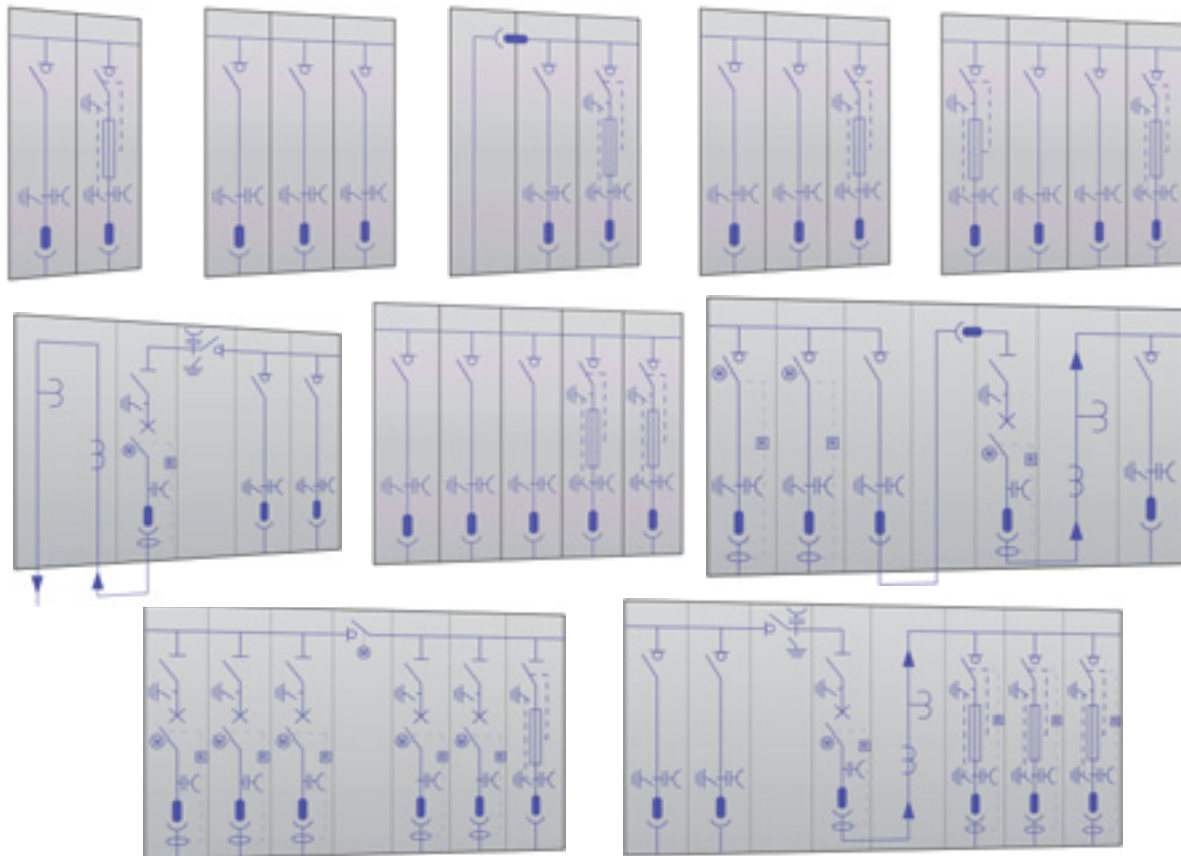
Thanks to the design of **ORMALINK** connecting set, an internal equipotential area is created. Here a number of contacts are distributed in a circle for connection to the female bushings.

A reliable, strong electrical continuity is therefore achieved, even when exposed to a short-circuit current. The connecting set also maintains all operational features of the cubicles. While the installation is not being extended, the extensible cubicles have removable sealing elements for the female bushings.



**ORMALINK** cubicle connecting procedure stands out for its ease and speed of on-site installation, including in Transformer Substations with uneven floors. In addition, **CGM.3** system is fully compatible with the **CGM-CGC** system.

The modularity and extensibility of **CGM.3** system ensure maximum flexibility to configure creating any MV diagram, such as the following examples.



NOTE:  
For other configurations, please consult Ormazabal's Technical - Commercial Department.

## SAFETY



### INTERNAL ARC

CGM.3 cubicles have been designed to protect people and goods against internal arc effects, according to the criteria in appendix A of standard IEC 62271-200:

Internal arc in tank: 16 kA 0,5 s / 20\* kA 0,5 s  
Internal arc in tank: 16 kA 1 s / 20\* kA 1 s#  
Class IAC AFL: 16 kA 1 s / 20\* kA 1 s#

(\*) Note: Tests conducted at 21 kA  
(#) Except in CGM.3-V with RAV driving mechanism



### ENVIRONMENTALLY PROTECTED

The breaking and making components are located inside a hermetically-sealed, SF<sub>6</sub> insulated, stainless steel tank. Being fully gas-insulated, it is protected against harsh environmental conditions (humidity, salinity, dust, pollution, etc.) and indirect contacts.

The tank enclosure has been designed and tested to resist the effects of internal arcs, protecting people and goods. Its sealing maintains optimum operating conditions throughout its entire service life, in accordance with standard IEC 62271-1.

The layout on the front of the driving mechanisms and the use of anti-reflex levers allows operations to be performed safely, comfortably and easily with minimum effort. The switch position is indicated reliably in the mimic diagram, and validated by the kinematic chain test in accordance with current regulations (IEC 62271-102).



### ekorVPIS VOLTAGE PRESENCE INDICATOR

ekorVPIS is a self-powered indicator, integrated in the cubicles which indicates the presence of voltage in the phases by means of three permanent light signals. It has been designed in accordance with standard IEC 61958.

It has easily-accessible test points for performing the phase balance test. Ormazabal's ekorSPC phase comparator can be supplied on request.



### INTERLOCKS

These cubicles have internal safety locks as standard which ensure safe, reliable service, in accordance with the requirements of standard IEC 62271-200.

The set of interlocks avoids unsafe operations being performed: it prevents the switch-disconnector and the earthing switch being closed simultaneously, only allows the MV cable access cover to be opened with the earthing switch in closed position, restricts the access to the area where the cables/fuse holders, etc are located.

In addition, CGM.3 system cubicles independently allow locking of operations by padlocking the switch and the earthing switch.

Optional devices are available for locking operations by means of a simple lock.



### ekorSAS ACOUSTIC ALARM

ekorSAS earthing prevention alarm unit is an acoustic indicator which works in association with the earthing switch shaft and the voltage presence indicator, ekorVPIS.

The alarm is activated when there is voltage in the cubicle MV feeder and the access handle to the earthing switch actuating shaft is operated. At this instant a sound alerts the operator that a short-circuit may occur in the network if he performs the operation, providing greater safety for people and goods, and for the continuity of supply.





## RELIABILITY

CGM.3 system cubicles contribute to improving electrical distribution in Medium Voltage networks up to 36 kV by means of:

- Testing, including routine tests and tracking, of all equipment in the factory.
- Interlocks between the switching and breaking components.
- Visual indication of the switchgear position in the mimic diagram, validated by the kinematic chain test in accordance with current regulations (IEC 62271-102).
- High anti-corrosive levels, achieved by the use of new materials.
- Accessories and live testing as an option, in the driving mechanism area.
- Ease of connecting cables, by means of plug-in or screw-in terminals.

## PROTECTION FUNCTIONS

### WITH FUSES

The short-circuit protection on the MV network is provided by fuses installed in the fuse protection functions.

The fuse holders are protected inside the gas tank in a horizontal position, thus achieving a uniform temperature all along their length. With their covers closed they are completely hermetically sealed and they maintain this sealing in the face of floods and external pollution.

In accordance with standard IEC 62271-105, the switch-fuse ratio can be said to be 'associated' or 'combined', the latter case indicating actuation of any fuse in the cubicle's front mimic diagram. The switch-fuse assembly has been temperature-rise tested in normal service conditions in accordance with IEC 62271-1.

### WITH FUSES AND TRIPPING COIL

The combined switch-fuse option allows switch-disconnector opening to be prompted by an external signal, such as the signal sent by the transformer thermostat in the event that it overheats.



### SELECTION OF RECOMMENDED FUSES, WITH STRIKER MEDIUM SIBA TYPE, LOW LOSSES

#### Rated Transformer Power WITHOUT OVERLOAD [kVA]

Ur [kVA]	Rated Fuse Current [A] IEC 60282-1													
	100	125	160	200	250	315	400	500	630	800	1000	1250	1600	2000
25	6,3	10	16	16	16	20	20	31,5	31,5	40	40	50	63	80 <sup>[*]</sup>
30	6,3	6,3	10	16	16	16	20	20	31,5	31,5	40	40	63	63

### Considerations:

- General conditions of use: Without overload and temperature < 40°C
- [\*] Values corresponding to SSK-type fuses
- Maximum permitted fuse losses: < 75 W
- Recommended fuses: SIBA 20/36 kV, HH type, medium type striker
- Temperature-rise testing of switch-fuse assembly, conforming to IEC 62271-105.
- For other brands and for protection without overload, please consult Ormazabal's Technical - Commercial Department.



## WITH FUSES AND ekorRPT PROTECTION, METERING AND CONTROL UNIT

**ekorRPT** unit has been developed specifically for use in the fuse protection functions. The option of incorporating the ekorRPT unit also provides overload protection and earth fault protection, reliably increasing the facility protection, making it completely selective with previous protections, for both the phases and the earth.

It consists of a communicating electronic relay, current sensors, bistable trigger and, depending on the model, self-powered toroidal-core current transformers if powered directly by the medium voltage current, instead of by external power sources. It is supplied fully factory installed and tested.

When an overcurrent is detected within the permitted values for the load break switch, the relay acts on the bistable trigger, causing the circuit to open. If the values are higher, the relay does not actuate, rendering the fuse protection function ineffective.

If the unit trips, the fault current, the reason for it, the duration of the fault and its date and time of occurrence, are all recorded in the memory.

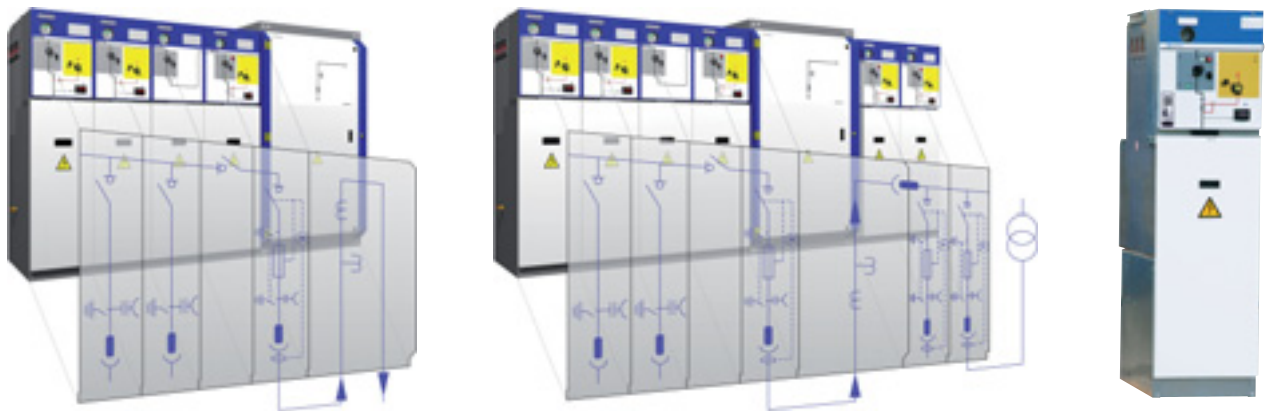
In the case of earth faults, when the fault current is less than 10% of the installation rated current, an ultrasensitive type protection should be chosen.

Current metering is performed with sensors with a high transformation ratio, meaning that the range of power ratings which can be protected with the same unit is very wide. It has one volt-free input which, when associated with the transformer thermostat, provides protection against overheating.

**ekorRPT** unit is self-powered from 5 A (250 kVA in 30 kV), and is therefore completely autonomous, needing neither batteries nor any other type of external power source. For rated currents less than 5 A, auxiliary power supply units are available.

Its use specifically relates to protection of distribution installations between 50 and 2000 kVA. You should take into account the fact that high-value polyphase short-circuits are cleared by the fuses.

For automated and/or remotely-controlled installations, models of the ekorRPT unit are available with an integrated control function.



CGM.3-P + ekorRPT

### POWERS TO BE PROTECTED WITH ekorRPT

Network Voltage [kV]	Rated Fuse Voltage [kV]	MINIMUM Power		MAXIMUM Power	
		Fuse rating[A]	[kVA]	Fuse rating[A]	[kVA]
25	18/30	25	200	80*	2000
30	18/30	25	250	80*	2000

(\*) SSK fuse from SIBA



WITH CIRCUIT-BREAKER AND  
ekorRPG PROTECTION,  
METERING AND CONTROL UNIT

Protection functions with a circuit-breaker are exclusively performed by the **ekorRPG** unit, which has been developed for use specifically in the **CGM.3-V** protection cubicle with circuit-breaker. This function, equipped with a vacuum circuit-breaker, has the capacity to connect and disconnect, including in fault conditions (overcurrent and short-circuit) in the general MV network.

**ekorRPG** unit consists of a communicating electronic relay, current sensors and, depending on the model, self-powered toroidal-core current transformers for cases where energy is not provided by external power sources. It is supplied fully factory installed and tested.

This unit intervenes in the event of overcurrents, earth faults, phase-to-phase and phase-to-earth short-circuits. When an overcurrent is detected, the relay acts on the low-power bistable trigger which actuates the circuit-breaker, causing the circuit to open. If the unit trips, the fault current, the reason for it, the duration of the fault and its date and time of occurrence, are all recorded in the memory.

In the case of earth faults when the fault current is less than 10% of the installation rated current, an ultrasensitive type protection should be chosen.



CGM.3-V with ekorRPG



**ekorRPG** unit is self-powered from 5 A (250 kVA in 30 kV), and is therefore completely autonomous, needing neither batteries nor any other type of external power source. For rated currents less than 5 A, auxiliary power supply units are available.

Its use specifically relates to protection of distribution installations between 50 and 25000 kVA.

For automated and/or remotely-controlled installations, models of the **ekorRPG** unit are available with an integrated control function.

POWERS TO BE PROTECTED with ekorRPG

Network voltage[kV]	MINIMUM Power [kVA]	MAXIMUM Power [kVA]
25	200	20000
30	250	25000

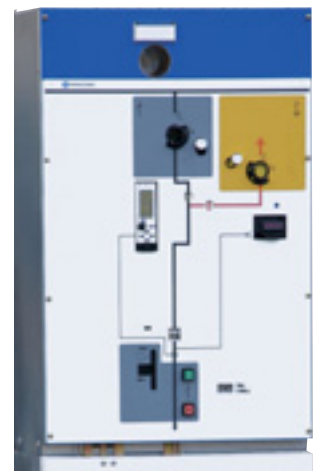


## ekorRPT and ekorRPG UNITS

**ekorRPT** and **ekorRPG** protection, metering and control units installed in the fuse protection and circuit-breaker functions respectively, incorporate the features indicated in the table.

Depending on whether these units include integrated control functions, there are 2 ranges:  
**ekorRPT** and **ekorRPG** without integrated control and  
**ekorRPTci** and **ekorRPGci** with integrated control.

PROTECTION, METERING AND CONTROL UNITS	ekorRPT ekorRPG	ekorRPTci ekorRPGci
<b>GENERAL</b>		
Phase current sensors	Yes	Yes
Earth current sensor (zero-sequence)	Optional	Optional
Digital Inputs/Outputs	Yes	Yes
Voltage sensors	No	Yes
Time synchronisation	Yes	Yes
Power supply 24 Vdc...125 Vdc/24 Vac...110 Vac	Optional	Yes
Self-powered unit (>5 A, +230 Vac +/- 30%)	Optional	No
<b>PROTECTION</b>		
Phase overcurrent (50-51)	Yes	Yes
Earth leakage overcurrent (50N-51N)	Optional	Optional
Ultrasensitive earth leakage (50Ns-51Ns)	Optional	Optional
Thermometer (49T)	Yes	No
<b>DETECTION, AUTOMATION AND CONTROL</b>		
5 inputs/7 outputs or 10 inputs/4 outputs	No	Optional
Recloser (circuit-breaker) [79]	No	Yes
<b>COMMUNICATIONS</b>		
MODBUS-RTU	Yes	Yes
PROCOME	Yes	No
RS-232 port for configuration	Yes	Yes
RS-485 port for remote control via twisted pair	Yes	Yes
RS-485 port for remote control via fibre optics	Optional	Optional
ekorSOFT setting and monitoring program	Yes	Yes
<b>INDICATIONS</b>		
Reason for trip indication	Yes	Yes
Error indication	Yes	Yes
<b>TEST</b>		
Set of tests for current injection	Yes	Yes
<b>METERING</b>		
Current	Yes	Yes
Presence/Absence of voltage	No	Yes



**NOTE:**

For more information, please consult Ormazabal's Technical - Commercial Department or visit [www.ormazabal.com](http://www.ormazabal.com)

## ekorSYS FAMILY

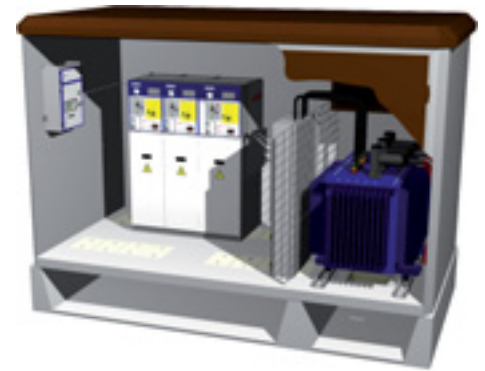


### GENERAL DESCRIPTION

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

Focusing on **Medium Voltage**, Ormazabal has a **broad range of protection and automation applications and services** capable of meeting the protection and automation needs of any distribution network.

Ormazabal's patented **ekorSYS cubicle-integrated** units provide the ideal solution for implementation in the most demanding of facilities, offering a high level of service in comparison with conventional systems.



### APPLICATIONS

#### PROTECTION

- **MV Customer Supplies**
  - **ekorRPG**: Digital protection unit developed for use in the protection function with circuit-breaker.
  - **ekorRPT**: Digital protection unit developed for use in the transformer protection function.
- **Protection for Switching Substations and Industrial Substations**
  - **ekorRPS**: Multifunctional protection unit, which acts as either a standalone protection, metering and control device, or is incorporated in an integral protection and control system.
  - **ekorRPGci**: Digital protection unit with integrated control developed for use in the protection function with circuit-breaker.
- **Protection for Rural TS (CTR)**
  - **ekorRPT-K**: Digital unit developed for use in the integral transformer protection function in the Rural Compact Transformer Substation (CTR).
- **Protection of Generator Sets**
  - **ekorUPG**: Generator Set Protection Unit used to supply LV users when incidents occur
- **Substation Protection**
  - **ekorRPS-TCP**: Multifunctional protection unit, which acts as either a standalone protection, metering and control device, or is incorporated in an integral protection and control system for electrical substations.

#### DISPATCHING CENTRE

Computer application which, via a Dispatching Centre with SCADA function can be used for remote control of cubicles installed in the distribution network. Offers the functionality of dispatching centres specifically adapted to the distribution field.

#### ekorSOFT

The ekorSOFT software constitutes a tool to aid setting and monitoring parameters on protection, metering, display and control units in the ekorSYS family.

#### AUTOMATION AND REMOTE CONTROL

- **Remote control**
  - **ekorUCT**: Compact remote control unit designed for automation and remote control of cubicles equipped with integrated control in Transformer and Switching Substations.
  - **ekorCCP**: Programmable cubicle controller, based on a microprocessor with PC structure and Linux operating system, flexible and programmable, for remote control and automation applications.
  - **ekorRCI**: Integrated control unit for supervision and control of the feeder function, consisting of an electronic relay and current sensors. With full communication capabilities, it communicates with the remote unit for the remote control functions and has a local control option.
- **Automatic transfers**
  - **ekorSTP**: Automatic line transfer unit, designed to provide a safe uninterruptible power supply, by means of the transfer between two feeder lines. ekorSTP's main components are ekorCCP (Programmable cubicle controller) and ekorRTK (relay for detection of presence/absence of voltage).
- **Fault detection**
  - **ekorDPF**: Earth fault detection electronic unit developed for use in the feeder cubicle.
- **Acoustic voltage presence alarm**
  - **ekorSAS**: The ekorSAS earthing prevention audible alarm unit is a self-powered acoustic indicator which works in association with the voltage presence indicator, ekorVPIS, in the feeder functional unit.
- **Secondary switching points**

**Ormazabal** provides protection, metering and control solutions at secondary switching points in distribution networks to improve the quality of the supply. This is mainly achieved with the **ekorRPS** and **ekorUCT** units.

#### NOTE:

For more information, please consult Ormazabal's Technical - Commercial Department or visit [www.ormazabal.com](http://www.ormazabal.com)

## DRIVING MECHANISM

Depending on the actuator mechanism (three-position switch or circuit-breaker) there are different driving mechanism models:

For the 3-position switch (switch-disconnector)

- **B:** This is a basic driving mechanism with independent manual operation. Its opening and closing operations need to be performed directly by the operator by means of an actuating lever. Used in feeder functions.



- **BM:** This is the motorised variant of driving mechanism B. It can be operated locally or remotely by means of a remote control.



- **BR-A:** This is a basic driving mechanism with independent manual operation and latched opening, for use in fuse protection functions.

The operation of closing the switch and loading the opening spring is performed in a single action. The switch can be opened by means of a push-button on the front of the cubicle, an opening coil, or due to action by the fuses.



The mechanical endurance of the driving mechanisms for the 3-position switch is class M1 for manual mechanisms and class M2 for mechanisms with frequent switching (IEC 60265-IEC 62271-102), which can easily be replaced with voltage, in any of its three positions (closed - open - earthing).

Complying with standard IEC 62271-102, the switch-disconnector and the earthing switch position are indicated safely (kinematic chain test).

## For the Circuit-Breaker

- **AV:** This is a spring-operated driving mechanism, for use in the circuit-breaker function. In it, the spring assembly is reloaded manually.



- **AMV:** This is the motorised variant of driving mechanism AV. It can be operated locally or remotely by means of a remote control.



- **RAV:** This is a spring-operated driving mechanism for use in the circuit-breaker with recloser function. In it, the spring assembly is reloaded manually.



- **RAMV:** This is the motorised variant of the spring-operated driving mechanism used in the circuit-breaker with recloser function.

Spring assembly reloading is motorised by means of an electric motor. This operation also has a manual loading option for use in emergencies.



The circuit-breaker driving mechanisms are classified M1 (AV/AVM) and M2 (RAV/RAMV), in accordance with standard IEC 62271-100, which provides them with the maximum features in applications with or without reclosing.

## CABLE CONNECTIONS

In the cable compartment there are bushings for connecting connectors for both incoming and outgoing lines and for transformer outputs.

As an option, the bushing can be fitted to the side of the cubicles to feed directly into the main busbar.



### Bushing

- Made of epoxy resin, conforming to dielectric and partial discharge tests.
- Classification according to EN 50181:

Plug-in up to 400 A  
Screw-in up to 630 A

### Connectors

Connection to the bushings can be via insulated plug-in terminals up to 400 A or screw-in terminals up to 630 A with or without equipotential screens.

In the protection cubicle with circuit-breaker, in the feeder cubicle with ekorRCI and in the fuse protection cubicle with ekorRPT, screened connectors should be used.



### PLUG-IN TERMINALS FOR BUSHINGS UP TO 400 A

		Rated current [A]	Connector type	Cross-section mm <sup>2</sup>
Dry cable	Screened	400	M400LR	25-240

### SCREW-IN TERMINALS FOR BUSHINGS UP TO 630 A

		Rated current [A]	Connector type	Cross-section mm <sup>2</sup>
Dry cable	Screened	630	M400TB	25-240
		1250	M440TB	185-630
Cable with paper impregnated in oil	Screened	630	M400TB-MIND	35-240
		1250	M440TB-MIND	185-630

### ACCESSORIES

Until 36 kV

Insulating plugs  
Connecting terminals  
Surge arresters

400-630 A  
400-1250 A  
5-10 kA

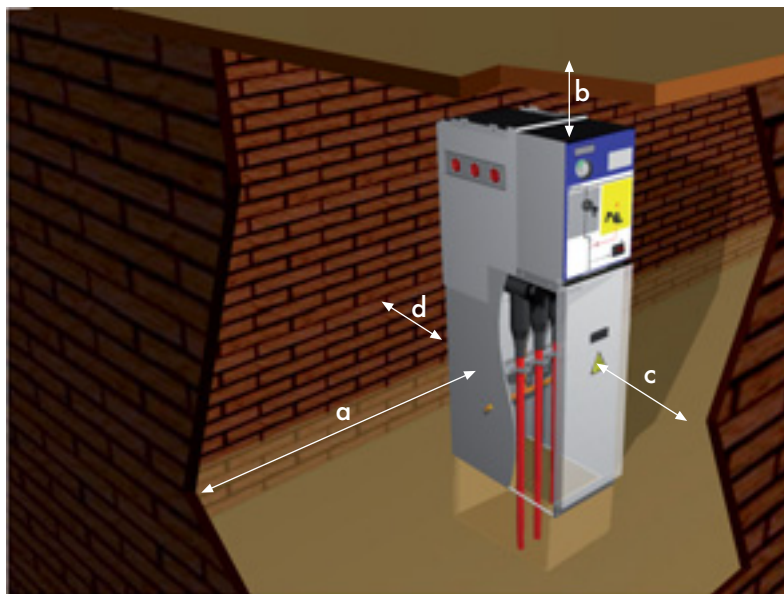
NOTE:  
Ormazabal recommends the use of Euromold connectors, for other types, values and brands please consult Ormazabal's Technical - Commercial Department.



## INSTALLATION AND CIVIL ENGINEERING WORKS

The minimum recommended distances for correct installation of CGM.3 system cubicles are as indicated in the table below:

Criteria: spaces to be maintained between the wall and the equipment once the cubicles have been fixed to the floor and in accordance with the internal arc tests performed, in a compartment 2300 mm high, for gas-insulated modules, in accordance with appendix A of standard IEC 62271-200.



### MINIMUM distances (mm)

Side wall (a)	> 100	
Roof (b)	> 600 +/- 100	
Front corridor (c)	Operation:	Cubicle removal:
	> 1000	> 2000
Rear wall (d)*		
CGM.3-L/S	> 160	
CGM.3-P	0	
CGM.3-V	> 160	
CGM.3-M	0	
CGM.3-RC/RB	> 160	

The space required to extend the assembly with an additional cubicle is 250 mm plus the width of the new cubicle.

NOTE:  
For more information or other configurations, please consult Ormazabal's Technical - Commercial Department.

## SPARES AND ACCESORIES



### DRIVING MECHANISMS

- Mechanisms: B, BM, BR-A, AV, AMV, RAV, RAMV.
- Motor driving mechanism assembly.
- Actuating levers.
- Opening coil.
- Undervoltage coil.



### ekorSYS FAMILY OF PROTECTION, METERING, CONTROL AND SIGNALLING UNITS

- Units: ekorRPT, ekorRPG, ekorRCI, ekorVPIS, ekorSPC, ekorSAS, ekorRTK, etc.
- Control boxes.



### FUSE PROTECTION

- Fuses.
- Fuse holder carriages.



### METAL ENCLOSURE

- Driving mechanism compartment cover.
- Cable compartment cover.
- Mimic diagram.
- Auxiliary profiles: recommended for installation in places with an uneven floor.
- Side feeder box.



### CONNECTIVITY

- Connecting set kit, which includes ORMALINK and the components needed to join two extensible cubicles.
- End connecting kit, which includes end plugs and the components needed to seal extensible cubicles temporarily.



### INTERLOCKS / LOCKS

- Devices for locking operations in open/closed position.



## ENVIRONMENTAL INFORMATION

Environmental Management System: ISO 14001

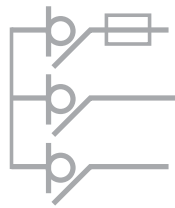
The corresponding environmental management systems have been implemented in Ormazabal's production facilities, fulfilling the requirements of international standard ISO 14001 and endorsed by the Environmental Management Certificate AENOR CGM-00/38, among others.

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

In terms of construction and depending on the model, they have a sealed SF<sub>6</sub> compartment which is designed to allow the equipment to be fully operational throughout its estimated 30-year service life (appendix GG of IEC 62271-200).

At the end of the product life cycle, the SF<sub>6</sub> gas content should be recovered for processing and recycling, to avoid it being released into the atmosphere. It should only be handled by qualified personnel, according to the instructions in standards IEC 61634, IEC 60480 and guide CIGRE 117. The rest of the materials deemed to be inert industrial waste should be separated into similar materials for possible reuse.

Ormazabal will provide any additional information required to accomplish this task in an appropriate manner, with regard to people's safety and that of the environment.





# ORMAZABAL

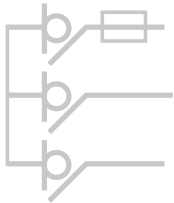
Focus on Medium Voltage

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- Transformer Substations up to 36 kV
  - Medium Voltage Applications for Renewable Energy
- Medium Voltage Secondary Distribution Switchgear
- **CGM.3 System**
- CGMCOSMOS System
- Medium Voltage Primary Distribution Switchgear
  - CPG System
  - CPA-AMC System
- Protection, Control, Automation and Remote Control
- Distribution Transformers
- Low Voltage Switchgear