ORMAZABAL

Focus on Medium Voltage

Medium Voltage Switchgear
Secondary Distribution

CGMCOSMOS
Fully gas-insulated modular and compact (RMU) system

Up to 24 kV

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 9001:2000.
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.

Contents

General description

INTRODUCTION

Ormazabal's CGMCOSMOS is a system of modular and compact cubicles for Medium Voltage secondary distribution.

CGMCOSMOS is modular and extensible thanks to the ORMALINK connecting set patented by Ormazabal for obtaining any Medium Voltage diagram.

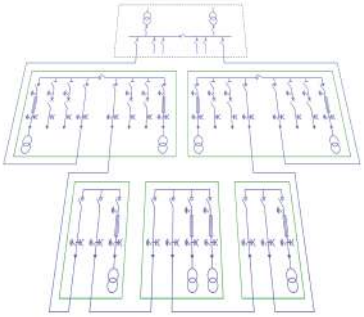
CGMCOSMOS has notable features including:

- Fully gas insulation.
- Safety, reliability and resistance in harsh environmental conditions.
- Voltage levels up to 24 kV.

AREAS OF IMPLEMENTATION

The CGMCOSMOS system is used in a wide variety of facilities, both public and private, mainly:

- Public distribution:
  - Urban and rural areas
- Medium Voltage Users:
  - Service sector
  - Industrial sector
  - Infrastructures
- Renewable energy



Public distribution

APPLICABLE STANDARDS

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 60265-1
High voltage switches. Part 1: High voltage switches for rated voltages above 1 kV up to and including 52 kV.

IEC 62271-102
Alternating current disconnectors and earthing switches.

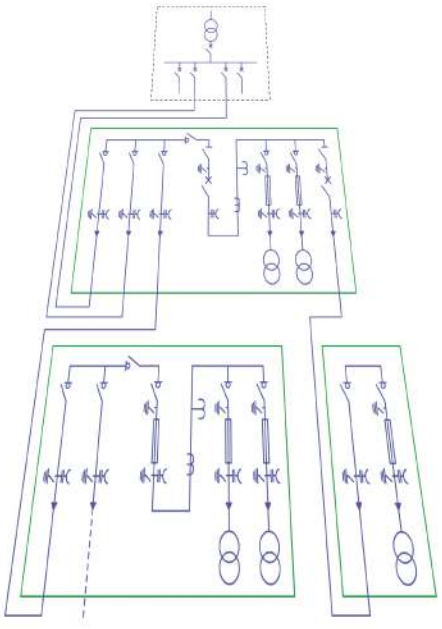
IEC 62271-105
High voltage alternating current switch-fuse combinations.

IEC 62271-100
High voltage alternating current circuit-breakers.

IEC 60255
Electrical relays.

IEC 60529
Degrees of protection provided by enclosures.

IEC 61958
Voltage presence indicating systems.



Private distribution

➔ The CGMCOSMOS system passes the immersion test at a pressure of 3 metres of water column, 24 hours at rated voltage and power frequency insulation test.

Presentation of ORMALINK

Installation of fuse and operations

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 temporary flooding), long service life and absence of maintenance in live parts through full gas insulation and the use of screened connectors.

Flexibility of configuration for any type of diagram. The ORMALINK connecting set patented in 1991 by Ormazabal offers total modularity and future extensibility in both directions.

Handling and installation tasks made easier thanks to reduced size and weight.

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

Additional safety using ekorSYS units: ekorVPIS, a light voltage presence indicator; and ekorSAS, an acoustic alarm preventing earthing.

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.

Commitment to the environment through:

- The use of highly recyclable materials.
- Minimal gas volume per functional unit.
- End-of-life cycle management.

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

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

SERVICE CONDITIONS	
Type of switchgear	Indoors
Maximum ambient temperature	+ 40 °C *
Minimum ambient temperature	-5 °C / -30 °C **
Maximum average ambient temperature, measured over a 24-hour period	+ 35°C
Maximum average relative humidity, measured over a 24-hour period	< 95%
Maximum average vapour pressure, measured over a 24-hour period	22 mbar
Maximum average vapour pressure, measured over a 1-month period	18 mbar
Maximum height above sea level	2000 m *
Solar radiation	Negligible
Environmental air pollution (dust, salinity, etc.)	Insignificant
Vibrations (seismicity)	Negligible

* For special conditions, please consult our Technical-Commercial Department:
  - Maximum ambient temperatures
  - Altitudes
  - Seismic resistance: non-negligible seismic conditions

** Storage: -40 °C. Other classes: please, consult.

DESIGN AND CONSTRUCTION CHARACTERISTICS

The CGMCOSMOS cubicle is based on compartmentalised architecture:

- (A) Tank
- (B) Driving mechanisms
- (C) Base

The **tank**, sealed and SF_6 gas-insulated, contains the busbar, switching elements and breaking elements. The dielectric used acts as both 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 CGMCOSMOS system is through the **ORMALINK** connecting set, patented in 1991 by Ormazabal.

The extensible cubicles have side female bushings that facilitate the connection between the main busbars.

Ormazabal has developed a variant of the ORMALINK that includes capacitive output to indicate the presence of voltage on bars.

The **switch-disconnector** incorporates the functions of switch, disconnector and earthing switch in a single three-position unit.

The **circuit-breaker** is based on vacuum swith-disconnector technology. The Across isolating distance is ensured with a swith-disconnector installed in series with it.

The protection **fuses** are kept horizontally in phase-independent compartments and are installed in a fuse holder carriage.

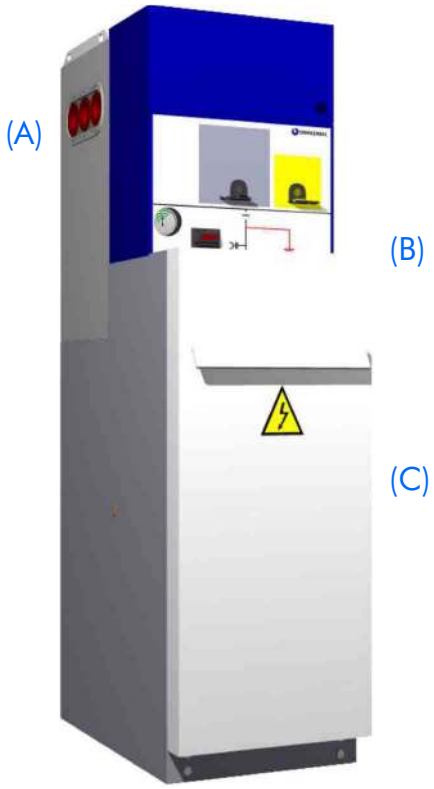
The **fuse holder compartments** provide **insulation and sealing** against pollution, temperature changes and adverse weather conditions. From the inside, the movement of the fuse striker is transmitted to the tripping mechanism.

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

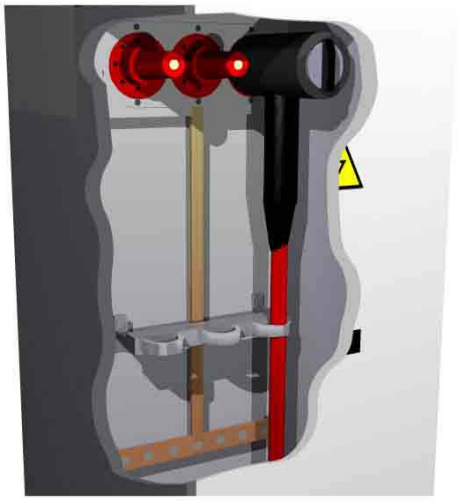
The front **mimic diagrams** include the position indicating devices. Maximum reliability verified using the kinematic chain test of the signalling mechanism in accordance with IEC 62271-102.

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

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



ORMALINK
connecting set



Cable compartment

SAFETY

Internal arc

The CGMCOSMOS cubicles are designed to protect persons and property against the effects of an internal arc in accordance with the criteria in Annex A of the IEC 62271-200 standard:

- Internal arc in tank (AF class):16 kA 0.5 s / 20* kA 0.5 s
- Internal arc in tank (AFL class):16 kA 1 s / 20* kA 1 s**
- IAC AFL class:16 kA 1 s / 20* kA 1 s**

Interlocks

These cubicles have internal interlocks fitted as standard to enable safe and reliable service, in accordance with the requirements of the IEC 62271-200 standard.

The interlock assembly prevents unsafe operations:

- It makes it impossible to close the switch-disconnector and the earthing switch at the same time
- It permits the opening of the access cover to the Medium Voltage cables only if the earthing switch is connected
- It conditions access to the cable / fuse holder area

The cubicles in the CGMCOSMOS system independently admit the locking of operations with a padlock from the switch and from the earthing switch.

Optionally, lock devices for locking operations are available.

Environmental resistance

The making and breaking elements are inside a stainless steel, hermetically sealed, SF_6 gas-insulated tank.

The full gas insulation provides resistance to harsh environmental conditions (humidity, salinity, dust, pollution, etc.) and protection against indirect contacts.

The tank enclosure has been designed and tested to withstand the effects of internal arcs, thereby protecting persons and property. The sealing maintains the optimum operating conditions throughout the cubicle's service life, in accordance with standard IEC 62271-1.

The position of the switch is reliably displayed on the mimic diagram, and validated by the kinematic chain test in accordance with current standards (IEC 62271-102).

* Tests performed at 21 kA
** Except in CGMCOSMOS-V with RAV/RAMV driving mechanism

ekorSAS acoustic alarm

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

The alarm is activated when the earthing switch actuation shaft access handle is operated while there is voltage in the cubicle's Medium Voltage incoming line. 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.

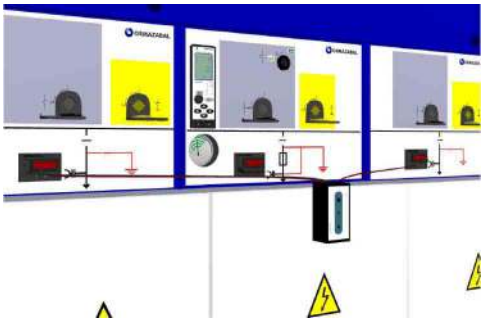
ekorSAS - ekorVPIS - ekorSPC

ekorVPIS voltage presence indicator

ekorVPIS 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 61958 standard.

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

Ormazabal's **ekorSPC** phase comparator and **ekorIVDS** voltage presence/absence detector with light signal can be supplied on request.



ekorSPC

QUALITY OF ELECTRICAL SUPPLY

The cubicles of the CGMCOSMOS system help to improve electrical distribution in Medium Voltage networks of up to 24 kV via:

- Routine tests and traceability tests performed at the factory on all equipment.
- Interlocks between the switching and breaking elements.
- Visual indication of the switchgear position on the mimic diagram, validated by the kinematic chain test in accordance with current legislation (IEC 62271-102).
- High anti-corrosion levels, obtained through the use of new materials.
- Option to mount accessories and perform live tests in the driving mechanism area.
- Easy to connect cables by means of plug-in or screw-in terminals.

Types of function

MODULAR UNITS

CGMCOSMOS-L

Feeder function

CGMCOSMOS-S

Busbar switch function

(optional earthing)

CGMCOSMOS-RB

Busbar rise function

(optional earthing)

CGMCOSMOS-P

Fuse protection function

CGMCOSMOS-RC

Cable rise function

(version for double cable available: R2C)

CGMCOSMOS-V(AV)

Circuit-breaker protection function

CGMCOSMOS-V(RAV)

Circuit-breaker protection function with reclosing

CGMCOSMOS-M

Metering function

COMPACT UNITS

CGMCOSMOS-2LP (RMU)

Fuse protection and feeder functions

(other versions: 3LP, 2L2P or 3L2P)

CGMCOSMOS-RLP

Fuse protection, feeder and busbar rise functions

CGMCOSMOS-2L

Feeder functions

TECHNICAL CHARACTERISTICS

			L	P	V (AV)	V (RAV)	S	S-Pt	RC	RB	RB-Pt	M
Rated voltage*	U_r	**[kV]**	up to 24*									
Rated frequency	f_r	**[Hz]**	50/60									
Rated current												
General busbar and cubicle interconnection	I_r	**[A]**	400/630	400/630	400/630	630	400/630		400/630			400/630
Feeder	I_r	**[A]**	400/630	-	400/630	630	400/630		400/630			400/630
in output to transformer	I_r	**[A]**	-	200	-	-	-		-			-
Rated short-time withstand current												
value t_k = 1 s or 3 s	I_k	**[kA]**	16/20**	16/20**	16/20**	20**	16/20**		-	-	16/20**	-
peak value	I_p	**[kA]**	40/52**	40/52**	40/50**	50**	40/52**		-	-	40/52.5**	-
Internal arc classification	IAC AFL		16 kA 1 s / 20** kA 1 s						-	-	16 kA 1 s / 20** kA 1 s	-
Dimensions												
High#		**[mm]**	1740									
Depth		**[mm]**	735	735	845		735		735			1025
Width		**[mm]**	365	470	480		450		365			800
Weight#		**[kg]**	100	150	240		115		40	100		165##

* See detailed information for 12 kV on the pages below. Available with Ur= 7.2 kV on request.
** Tests conducted at 21 kA / 54.6 kA
# See dimensions reduced under specifications on the following pages
The weight refers to the enclosure, with no transformer inside

CGMCOSMOS-L

Feeder function

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

Extensibility: right, left and both sides.

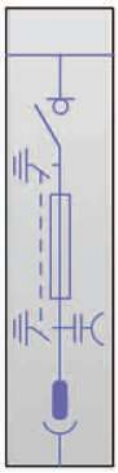
ELECTRICAL CHARACTERISTICS				
Rated voltage*	U_r	**[kV]**	12	24
Rated frequency	f_r	**[Hz]**	50/60	50/60
Rated current				
General busbar and cubicle interconnection	I_r	**[A]**	400/630	400/630
feeder	I_r	**[A]**	400/630	400/630
Rated short-duration power frequency withstand voltage (1 min)				
phase-to-earth and between phases	U_d	**[kV]**	28	50
Across isolating distance	U_d	**[kV]**	32	60
Rated lightning impulse withstand voltage				
phase-to-earth and between phases	U_p	**[kV]**	75	125
Across isolating distance	U_p	**[kV]**	85	145
Internal arc classification	*IAC AFL*		16 kA 1 s/20** kA 1 s	
IP rating	*IP*		IP3X	
Switch-disconnector acc. IEC 60265-1 + IEC 62271-102				
Rated short-time withstand current (main circuit)				
Value t_k = 1 s or 3 s	I_k	**[kA]**	16/20**/25#	16/20**
Peak value	I_p	**[kA]**	40/52**/62.5#	40/52**
Mainly active load-breaking current	I_1	**[A]**	400/630	
Cable charging-breaking current	I_{4a}	**[A]**	50/1,5	
Closed-loop breaking current	I_{2a}	**[A]**	400/630	
Earth fault breaking current	I_{6a}	**[A]**	300	
Cable- & line-charging breaking current under earth fault conditions	I_{6b}	**[A]**	100	
Main switch making capacity (peak value)	I_{ma}	**[kA]**	40/52**/62.5#	40/52**
Switch category				
Mechanical endurance			1000-M1 (manual) 5000-M2 (motor)	
Cycles of operations (Short-circuit making current)- class			5-E3	
Earthing Switch acc. IEC 62271-102				
Rated short-time withstand current (earthing circuit)				
Value t_k = 1 s or 3 s	I_k	**[kA]**	16/20**/25#	16/20**
Peak value	I_p	**[kA]**	40/52**/62.5#	40/52**
Earthing switch making capacity (peak value)	I_{ma}	**[kA]**	40/52**/62.5#	40/52**
Earthing Switch Category				
Mechanical endurance (manual)			1000-M0	
Cycles of operations (Short-circuit making current)- class			5-E2	

* Also available with Ur= 7.2 kV on request.
** Tests conducted at 21 kA/52.5 kA.
# Value only valid for tk = 1 s

APPLICATIONS

Input or output of the Medium Voltage cables, enabling communication with the busbar in the general cubicle assembly.

DIMENSIONS			
Height	**[mm]**	1740	1300
Depth	**[mm]**	735	735
Width	**[mm]**	365	365
Weight	**[kg]**	100	90



APPLICATIONS

Connection, disconnection and protection operations, enabling communication with the busbar in the general cubicle assembly.

DIMENSIONS			
Height	**[mm]**	1740	1300
Depth	**[mm]**	735	735
Width	**[mm]**	470	470
Weight	**[kg]**	150	140

CGMCOSMOS-P

Fuse protection function

Modular cubicle for fuse protection, equipped with a three-position switch-disconnector (closed, open or earthing; before and after the fuses) and protection with limiting fuses.

Extensibility: right, left and both sides.

ELECTRICAL CHARACTERISTICS				
Rated voltage*	U_r	**[kV]**	12	24
Rated frequency	f_r	**[Hz]**	50/60	50/60
Rated current				
General busbar and cubicle interconnection	I_r	**[A]**	400/630	400/630
output to transformer	I_r	**[A]**	200	200
Rated short-duration power frequency withstand voltage (1 min)				
phase-to-earth and between phases	U_d	**[kV]**	28	50
Across isolating distance	U_d	**[kV]**	32	60
Rated lightning impulse withstand voltage				
phase-to-earth and between phases	U_p	**[kV]**	75	125
Across isolating distance	U_p	**[kV]**	85	145
Internal arc category	*IAC AFL*		16 kA 1 s/20** kA 1 s	
IP rating	*IP*		IP3X	
Switch-disconnector acc. IEC 60265-1 + IEC 62271-102				
Rated short-time withstand current (main circuit)				
Value t_k = 1 s or 3 s	I_k	**[kA]**	16/20**/25#	16/20**
Peak value	I_p	**[kA]**	40/52**/62.5#	40/52**
Mainly active load-breaking current	I_1	**[A]**	200	
Main switch making capacity (peak value)	I_{ma}	**[kA]**	40/52**/62.5#	40/52**
Switch category				
Mechanical endurance			1000-M1 (manual) 5000-M2 (motor)	
Cycles of operations (Short-circuit making current)- class			5-E3	
Combined switch-relay (ekorRPT) take-over current				
Breaking I_{max} acc. TD_{ito} IEC 62271-105		**[A]**	1700	1300
Switch-fuse combination transfer current				
Breaking I_{max} acc. $TD_{itransfer}$ IEC 62271-105		**[A]**	2300	1600
Earthing Switch Category acc. IEC 62271-102				
Rated short-time withstand current (earthing circuit)				
Value t_k = 1 s or 3 s	I_k	**[kA]**	1/3	
Peak value	I_p	**[kA]**	2.5/7,5	
Earthing switch making capacity (peak value)	I_{ma}	**[kA]**	2.5/7,5	
Earthing Switch Category				
Mechanical endurance (manual)			1000-M0	
Cycles of operations (Short-circuit making current)- class			5-E2	

* Also available with Ur= 7.2 kV on request.
** Tests conducted at 21 kA/52.5 kA.
# Value only valid for tk = 1 s

CGMCOSMOS-V

Circuit-breaker protection function

Modular cubicle with circuit-breaker protection function, equipped with a serial vacuum circuit-breaker with:

- Three-position switch-disconnector (cubicle with AV/AMV driving mechanism)
- Three-position disconnector (cubicle with RAV/RAMV driving mechanism)

Extensibility: right, left and both sides.

APPLICATIONS

General connection, disconnection and protection operations for the installation, enabling communication with the busbar in the general cubicle assembly.

RAV/RAMV circuit-breaker with reclosing

ELECTRICAL CHARACTERISTICS				
Rated voltage	U_r	**[kV]**	12	24
Rated frequency	f_r	**[Hz]**	50/60	50/60
Rated current				
General busbar and cubicle interconnection	I_r	**[A]**	630	630
feeder	I_r	**[A]**	630	630
Rated short-duration power frequency withstand voltage (1 min)				
phase-to-earth and between phases	U_d	**[kV]**	28	50
Across isolating distance	U_d	**[kV]**	38	60
Rated lightning impulse withstand voltage				
phase-to-earth and between phases	U_p	**[kV]**	75	125
Across isolating distance	U_p	**[kV]**	85	145
Internal arc classification	*AFL*		20* kA 1 s	
IP rating	*IP*		IP33 + IPX7	
Circuit-breaker acc. IEC 62271-100				
Rated short-time withstand current (main circuit)				
Value t_k = 1 s or 3 s	I_k	**[kA]**	20*	
Peak value	I_p	**[kA]**	50*	
Rated breaking capacity and making capacity				
Mainly active current rated breaking capacity	I_1	**[A]**	630	
Short-circuit breaking capacity	I_{sc}	**[kA]**	20*	
Main switch making capacity (peak value)	I_{ma}	**[kA]**	50*	
Rated making and breaking capacities of capacitive currents (50 Hz)				
Capacitor banks		**[A]**	400	
Capacitor banks in parallel		**[A]**	400	
Rated operating sequence			O - 0.3 s - CO - 15 s - CO	
Circuit-breaker category				
Mechanical endurance (operations-class)			10 000-M2	
Electrical endurance (class)			10 000	
Disconnector and Earthing Switch acc. IEC 62271-102				
Rated short-time withstand current (main and earthing circuits)				
Value t_k = 1 s or 3 s	I_k	**[kA]**	20*	
Peak value	I_p	**[kA]**	50*	
Earthing Switch Category				
Mechanical endurance			1000-M0	

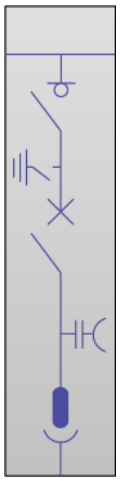
* Tests conducted at 21 kA/52.5 kA.

DIMENSIONS		
Height	**[mm]**	1740
Depth	**[mm]**	845
Width	**[mm]**	480
Weight	**[kg]**	240

AV/AMV circuit-breaker

ELECTRICAL CHARACTERISTICS			
Rated voltage	U_r	**[kV]**	24
Rated frequency	f_r	**[Hz]**	50/60
Rated current			
General busbar and cubicle interconnection	I_r	**[A]**	400/630
feeder	I_r	**[A]**	400/630
Rated short-duration power frequency withstand voltage (1 min)			
phase-to-earth and between phases	U_d	**[kV]**	50
Across isolating distance	U_d	**[kV]**	60
Rated lightning impulse withstand voltage			
phase-to-earth and between phases	U_p	**[kV]**	125
Across isolating distance	U_p	**[kV]**	145
Internal arc classification	*IAC AFL*		16 kA 1 s/20* kA 1 s
IP rating	*IP*		IP3X
Circuit-breaker acc. IEC 62271-100			
Rated short-time withstand current (main circuit)			
Value t_k = 1 s or 3 s	I_k	**[kA]**	16/20*
Peak value	I_p	**[kA]**	40/50*
Rated breaking capacity and making capacity			
Mainly active current rated breaking capacity	I_1	**[A]**	400/630
Short-circuit breaking capacity	I_{sc}	**[kA]**	16/20*
Main switch making capacity (peak value)	I_{ma}	**[kA]**	40/50*
Rated operating sequence			CO - 15 s - CO
Circuit-breaker category			
Mechanical endurance (operations-class)			2000-M1
Electrical endurance (class)			2000
Switch-disconnector acc. IEC 60265-1 + IEC 62271-102			
Rated short-time withstand current (main circuit)			
Value t_k = 1 s or 3 s	I_k	**[kA]**	16/20*
Peak value	I_p	**[kA]**	40/50*
Mainly active current rated breaking capacity	I_1	**[A]**	400/630
Main switch making capacity (peak value)	I_{ma}	**[kA]**	40/52*
Switch-disconnector Category			
Mechanical endurance			1000-M1
Cycles of operations (Short-circuit making current) - class			5-E3
Earthing Switch acc. IEC 62271-102			
Rated short-time withstand current (earthing circuit)			
Value t_k = 1 s or 3 s	I_k	**[kA]**	16/20*
Peak value	I_p	**[kA]**	40/50*
Earthing Switch making capacity (peak value)	I_{ma}	**[kA]**	40/50*
Earthing Switch Category			
Mechanical endurance			2000-M1
Cycles of operations (Short-circuit making current) - class			5-E2

* Tests conducted at 21 kA/52.5 kA.
** More breaking values: see table CGMCOSMOS-L



DIMENSIONS		
Height	**[mm]**	1740
Depth	**[mm]**	845
Width	**[mm]**	480
Weight	**[kg]**	240

CGMCOSMOS-S

Busbar switch function

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

Extensibility: both sides.

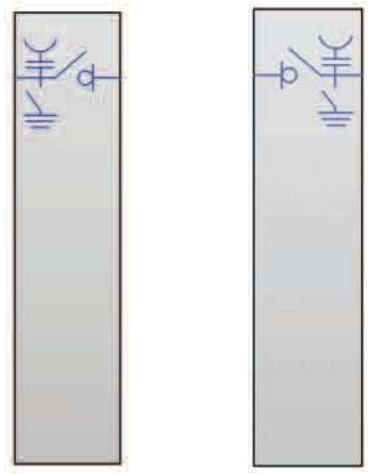
ELECTRICAL CHARACTERISTICS				
Rated voltage*	U_r	**[kV]**	12	24
Rated frequency	f_r	**[Hz]**	50/60	50/60
Rated current				
General busbar and cubicle interconnection	I_r	**[A]**	400/630	400/630
feeder	I_r	**[A]**	400/630	400/630
Rated short-duration power frequency withstand voltage (1 min)				
phase-to-earth and between phases	U_d	**[kV]**	28	50
Across isolating distance	U_d	**[kV]**	32	60
Rated lightning impulse withstand voltage				
phase-to-earth and between phases	U_p	**[kV]**	75	125
Across isolating distance	U_p	**[kV]**	85	145
Internal arc classification	*IAC AFL*		16 kA 1 s/20** kA 1 s	
IP rating	*IP*		IP33 + IPX7	
Switch-disconnector acc. IEC 60265-1 + IEC 62271-102				
Rated short-time withstand current (main circuit)				
Value t_k = 1 s or 3 s	I_k	**[kA]**	16/20**/25#	16/20**
Peak value	I_p	**[kA]**	40/52**/62.5#	40/52**
Mainly active load-breaking current	I_1	**[A]**	400/630	
Cable charging-breaking current	I_{4a}	**[A]**	50/1,5	
Rated closed loop breaking capacity	I_{2a}	**[A]**	400/630	
Earth fault breaking current	I_{6a}	**[A]**	300	
Cable- & line-charging breaking current under earth fault conditions	I_{6b}	**[A]**	100	
Main switch making capacity (peak value)	I_{ma}	**[kA]**	40/52**/62.5#	40/52**
Switch category				
Mechanical endurance			1000-M1 (manual) 5000-M2 (motor)	
Cycles of operations (Short-circuit making current)- class			5-E3	

* Also available with Ur= 7.2 kV on request.
** Tests conducted at 21 kA/52.5 kA.
# Value only valid for tk = 1 s

APPLICATIONS

Interruption in main busbar load of the transformer substation.

DIMENSIONS			
Height	**[mm]**	1740	1300
Depth	**[mm]**	735	735
Width	**[mm]**	450	450
Weight	**[kg]**	115	110



APPLICATIONS

Interruption in main busbar load of the transformer substation and its earthing on the right (Ptd) or left (Pti) of the break.

DIMENSIONS			
Height	**[mm]**	1740	1300
Depth	**[mm]**	735	735
Width	**[mm]**	450	450
Weight	**[kg]**	115	110

CGMCOSMOS-S-Pt

Busbar switch function with earthing

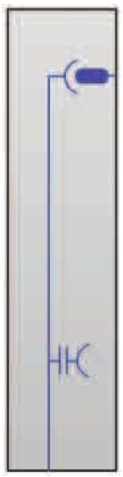
Modular cubicle with busbar switch function with earthing, equipped with a three-position switch-disconnector (closed, open or earthing).

Extensibility: both sides.

ELECTRICAL CHARACTERISTICS				
Rated voltage*	U_r	**[kV]**	12	24
Rated frequency	f_r	**[Hz]**	50/60	50/60
Rated current				
General busbar and cubicle interconnection	I_r	**[A]**	400/630	400/630
feeder	I_r	**[A]**	400/630	400/630
Rated short-duration power frequency withstand voltage (1 min)				
phase-to-earth and between phases	U_d	**[kV]**	28	50
Across isolating distance	U_d	**[kV]**	32	60
Rated lightning impulse withstand voltage				
phase-to-earth and between phases	U_p	**[kV]**	75	125
Across isolating distance	U_p	**[kV]**	85	145
Internal arc classification	*IAC AFL*		16 kA 1 s/20** kA 1 s	
IP rating	*IP*		IP3X	
Switch-disconnector acc. IEC 60265-1 + IEC 62271-102				
Rated short-time withstand current (main circuit)				
Value t_k = 1 s or 3 s	I_k	**[kA]**	16/20**/25#	16/20**
Peak value	I_p	**[kA]**	40/52**/62.5#	40/52**
Mainly active load-breaking current	I_1	**[A]**	400/630	
Cable charging-breaking current	I_{4a}	**[A]**	50/1,5	
Rated closed loop breaking capacity	I_{2a}	**[A]**	400/630	
Earth fault breaking current	I_{6a}	**[A]**	300	
Cable- & line-charging breaking current under earth fault conditions	I_{6b}	**[A]**	100	
Main switch making capacity (peak value)	I_{ma}	**[kA]**	40/52**/62,5	40/52**
Switch category				
Mechanical endurance (manual)			1000-M1	
Cycles of operations (Short-circuit making current)- class			5-E3	
Earthing Switch acc. IEC 62271-102				
Rated short-time withstand current (earthing circuit)				
Value t_k = 1 s or 3 s	I_k	**[kA]**	16/20**/25#	16/20**
Peak value	I_p	**[kA]**	40/52**/62.5#	40/52**
Earthing switch making capacity (peak value)	I_{ma}	**[kA]**	40/52**/62.5#	40/52**
Earthing Switch Category				
Mechanical endurance (manual)			1000-M0	
Cycles of operations (Short-circuit making current)- class			5-E2	

* Also available with Ur= 7.2 kV on request.
** Tests conducted at 21 kA/52.5 kA.
# Value only valid for tk = 1 s

CGMCOSMOS-RC



Cable rise function

Modular cubicle with cable rise function to the busbar.

APPLICATIONS

Housing of feeder cables to busbar in the general cubicle assembly, on the right (RCd) or on the left (RCi).

DIMENSIONS		
Height	**[mm]**	1740
Depth	**[mm]**	735
Width	**[mm]**	365
Weight	**[kg]**	40

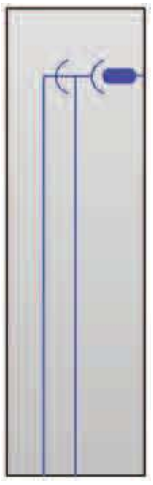
ELECTRICAL CHARACTERISTICS				
Rated voltage*	U_r	**[kV]**	12	24
Rated frequency	f_r	**[Hz]**	50/60	50/60
Rated current				
feeder	I_r	**[A]**	400/630	400/630

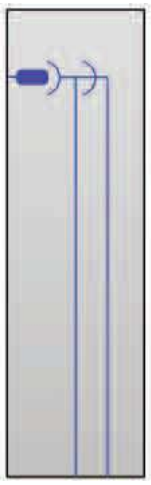
* Also available with Ur= 7.2 kV on request.

CGMCOSMOS-R2C

Double cable rise function

Modular cubicle with double cable rise function to the busbar.





APPLICATIONS

Housing of feeder cables to busbar in the general cubicle assembly, on the right (R2Cd) or on the left (R2Ci).

DIMENSIONS		
Height	**[mm]**	1740
Depth	**[mm]**	735
Width	**[mm]**	550
Weight	**[kg]**	60

➔ Electrical characteristics CGMCOSMOS-R2C:
see electrical characteristics CGMCOSMOS-RC.

APPLICATIONS

Input or output of Medium Voltage cables, enabling communication with the busbar in the general cubicle assembly, on the right (RBd) or on both sides (RBa).

DIMENSIONS			
Height	**[mm]**	1740	1300
Depth	**[mm]**	735	735
Width	**[mm]**	365	365
Weight	**[kg]**	100	90

APPLICATIONS

Input or output of Medium Voltage cables, on the right (RBd-Pt) or on both sides (RBa-Pt) and the earthing of the cables and of the busbar in the general cubicle assembly.

DIMENSIONS			
Height	**[mm]**	1740	1300
Depth	**[mm]**	735	735
Width	**[mm]**	365	365
Weight	**[kg]**	100	90

CGMCOSMOS-RB

Busbar rise function

Modular cubicle with gas-insulated busbar rise function.

Extensibility: right and both sides.

ELECTRICAL CHARACTERISTICS				
Rated voltage*	U_r	**[kV]**	12	24
Rated frequency	f_r	**[Hz]**	50/60	50/60
Rated current				
General busbar and cubicle interconnection	I_r	**[A]**	400/630	400/630
feeder	I_r	**[A]**	400/630	400/630
Rated short-duration power frequency withstand voltage (1 min)				
phase-to-earth and between phases	U_d	**[kV]**	28	50
Rated lightning impulse withstand voltage				
phase-to-earth and between phases	U_p	**[kV]**	75	125
Internal arc classification	*IAC AFL*		16 kA 1 s/20* kA 1 s	

* Also available with Ur= 7.2 kV on request.

CGMCOSMOS-RB-Pt

Busbar rise function with earthing

Modular cubicle with busbar rise function, with gas-insulation and with an earthing switch.

Extensibility: right and both sides.

ELECTRICAL CHARACTERISTICS				
Rated voltage*	U_r	**[kV]**	12	24
Rated frequency	f_r	**[Hz]**	50/60	50/60
Rated current				
General busbar and cubicle interconnection	I_r	**[A]**	400/630	400/630
feeder	I_r	**[A]**	400/630	400/630
Rated short-duration power frequency withstand voltage (1 min)				
phase-to-earth and between phases	U_d	**[kV]**	28	50
Rated lightning impulse withstand voltage				
phase-to-earth and between phases	U_p	**[kV]**	75	125
Internal arc classification	*IAC AFL*		16 kA 1 s/20* kA 1 s	
Earthing Switch acc. IEC 62271-102				
Rated short-time withstand current (earthing circuit)				
Value t_k = 1 s or 3 s	I_k	**[kA]**	16/20**/25#	16/20**
Peak value	I_p	**[kA]**	40/52**/62.5#	40/52**
Earthing switch making capacity (peak value)	I_{ma}	**[kA]**	40/52**/62.5#	40/52**
Earthing Switch Category				
Mechanical endurance (manual)			1000-M0	
Cycles of operations (Short-circuit making current)- class			5-E2	

* Also available with Ur= 7.2 kV on request.
** Tests conducted at 21 kA/52.5 kA.
# Value only valid for tk = 1 s

CGMCOSMOS-M

Metering function

Modular cubicle with metering function.

ELECTRICAL CHARACTERISTICS				
Rated voltage*	U_r	**[kV]**	12	24
Rated frequency	f_r	**[Hz]**	50/60	50/60
Rated current				
General busbar and cubicle interconnection	I_r	**[A]**	400/630	400/630
Rated short-duration power frequency withstand voltage (1 min)				
phase-to-earth and between phases	U_d	**[kV]**	28	50
Rated lightning impulse withstand voltage				
phase-to-earth and between phases	U_p	**[kV]**	75	125

* Also available with Ur= 7.2 kV on request.

The most frequent diagrams for the assembly of transformers are:

➔ Note: For other diagrams, please consult Ormazabal's Technical-Commercial Department.
➔ Class IAC under request

APPLICATIONS

Voltage and current metering transformer housing, enabling communication with the busbar in the general cubicle assembly, via a dry cable.

DIMENSIONS		
Height	**[mm]**	1740
Depth	**[mm]**	1025
Width	**[mm]**	800
Weight	**[kg]**	165 *

* The weight refers to the enclosure, with no transformer inside

CGMCOSMOS-2LP

Fuse protection and feeder functions

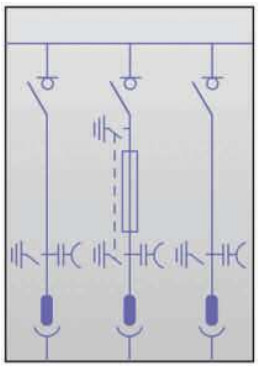
Compact cubicle (RMU) with two feeder functions and one fuse protection function, which includes the features of the feeder cubicles and of the protection cubicles, in a single tank.

Extensibility: right, left, both sides or none.

ELECTRICAL CHARACTERISTICS			L		P	
Rated voltage*	U_r	**[kV]**	12	24	12	24
Rated frequency	f_r	**[Hz]**	50/60	50/60	50/60	50/60
Rated current						
General busbar and cubicle interconnection	I_r	**[A]**	400/630	400/630	400/630	400/630
feeder	I_r	**[A]**	400/630	400/630	-	-
output to transformer	I_r	**[A]**	-	-	200	200
Rated short-duration power frequency withstand voltage (1 min)						
phase-to-earth and between phases	U_d	**[kV]**	28	50	28	50
Across isolating distance	U_d	**[kV]**	32	60	32	60
Rated lightning impulse withstand voltage						
phase-to-earth and between phases	U_p	**[kV]**	75	125	75	125
Across isolating distance	U_p	**[kV]**	85	145	85	145
Internal arc classification	*IAC AFL*		16 kA 1 s/20** kA 1 s			
IP rating	*IP*		IP33 + IPX7			
Switch-disconnector acc. IEC 60265-1 + IEC 62271-102			L		P	
Rated short-time withstand current (main circuit)						
Value t_k = 1 s or 3 s	I_k	**[kA]**	16/20**/25#	16/20**	16/20**/25#	16/20**
Peak value	I_p	**[kA]**	40/52**/62.5#	40/52**	40/52**/62.5#	40/52**
Mainly active current rated breaking capacity	I_1	**[A]**	400/630		200	
Rated no-load cable-charging breaking capacity	I_{4a}	**[A]**	50/1.5		-	-
Closed-loop breaking current	I_{2a}	**[A]**	400/630		-	-
Rated breaking capacity in the event of fault to earth	I_{6a}	**[A]**	300		-	-
Rated breaking capacity of no-load cables/lines in the event of fault to earth	I_{6b}	**[A]**	100		-	-
Main switch making capacity (peak value)	I_{ma}	**[kA]**	40/52**/62.5#	40/52**	40/52**/62.5#	40/52**
Switch category						
Mechanical endurance			1000-M1 (manual) / 5000-M2 (motor)			
Cycles of operations (Short-circuit making current)- class			5-E3			
Combined switch-relay (ekorRPT) take-over current						
Breaking I_{max} acc. TD_{ito} IEC 62271-105		**[A]**	-	-	1250	1250
Switch-fuse combination transfer current						
Breaking I_{max} acc. $TD_{itransfer}$ IEC 62271-105		**[A]**	-	-	1500	1300
Earthing Switch acc. IEC 62271-102			L		P	
Rated short-time withstand current (earthing circuit)						
Value t_k = 1 s or 3 s	I_k	**[kA]**	16/20**/25#	16/20**	1/3	
Peak value	I_p	**[kA]**	40/52**/62.5#	40/52**	2.5/7.5	
Earthing switch making capacity (peak value)	I_{ma}	**[kA]**	40/52**/62.5#	40/52**	2.5/7.5	
Earthing Switch Category						
Mechanical endurance (manual)			1000-M0			
Cycles of operations (Short-circuit making current)- class			5-E2			

* Also available with Ur= 7.2 kV on request.
** Tests conducted at 21 kA/52.5 kA.
# Value only valid for tk = 1 s

More information on the following page...



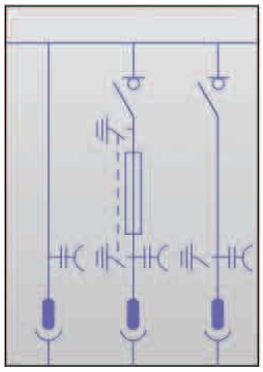
CGMCOSMOS-2LP DIMENSIONS			
Height	**[mm]**	1740	1300
Depth	**[mm]**	735	735
Width	**[mm]**	1190	1190
Weight	**[kg]**	310	290

CGMCOSMOS-RLP

Fuse protection, feeder and busbar rise functions*

Compact cubicle with one busbar rise function, one fuse protection function and one feeder function, which includes the features of the cable rise cubicles, fuse protection and feeder cubicles, housed in a single tank.

Extensibility: right, left, both sides or none.



DIMENSIONS			
Height	**[mm]**	1740	1300
Depth	**[mm]**	735	735
Width	**[mm]**	1190	1190
Weight	**[kg]**	295	275

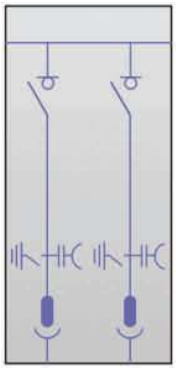
CGMCOSMOS-2L

Feeder functions*

Compact cubicle with two or three feeder functions, which includes the features of the feeder cubicles, in one single tank.

Extensibility: right, left, both sides.

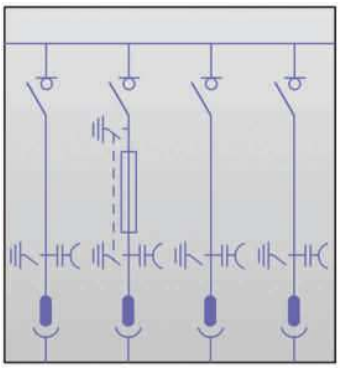
CGMCOSMOS-3L configuration via module grouping.



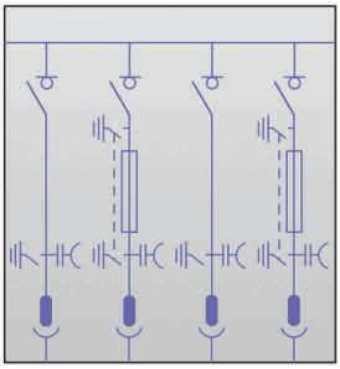
DIMENSIONS		CGMCOSMOS-2L	
Height	**[mm]**	1740	1300
Depth	**[mm]**	735	735
Width	**[mm]**	730	730
Weight	**[kg]**	210	210

DIMENSIONS		CGMCOSMOS-3L	
Height	**[mm]**	1740	1300
Depth	**[mm]**	735	735
Width	**[mm]**	1095	1095
Weight	**[kg]**	310	400

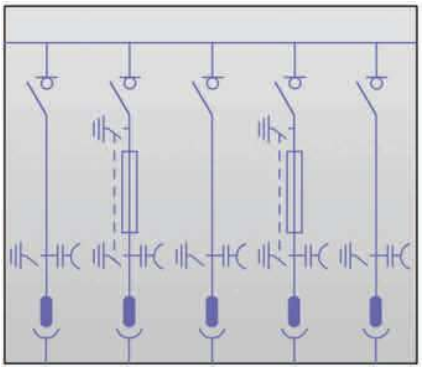
➔ * Please see ELECTRICAL CHARACTERISTICS tables for the RB, L and P functions on previous pages.



CGMCOSMOS-3LP



CGMCOSMOS-2L2P



CGMCOSMOS-3L2P

CGMCOSMOS-3LP/2L2P/3L2P

Fuse protection and feeder functions*

Group of modules forming a unit consisting of two or three feeder functions and one or two fuse protection functions, depending on each case, and includes the features of feeder cubicles and protection cubicles.

Extensibility: right, left, both sides or none.

CGMCOSMOS-3LP

CGMCOSMOS-2L2P

DIMENSIONS

		3LP	2L2P	3L2P
Height	**[mm]**	1740/ 1300*	1740/ 1300*	1740/ 1300*
Depth	**[mm]**	735	735	735
Width	**[mm]**	1565	1670	2035
Weight	**[kg]**	385/355*	430/400*	525/490*

* Under specifications

CGMCOSMOS-3L2P

* Please see ELECTRICAL CHARACTERISTICS tables for the L and P functions on previous pages.

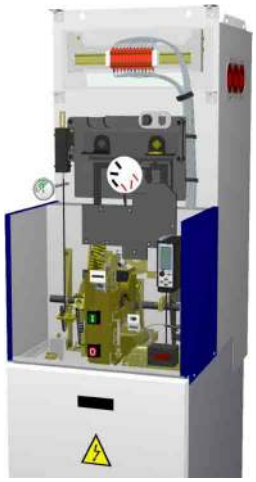
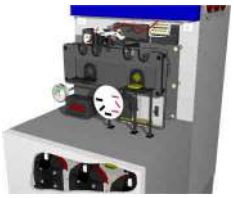
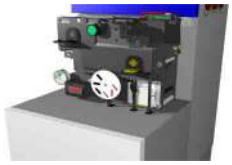
Main functional elements

OPERATION SAFETY

Driving mechanisms

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 position is reliably indicated, and it complies with the kinematic chain test.

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

Three-position switch-disconnector	Circuit-breaker
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.  	**AV and AMV** Spring loaded driving mechanism for circuit-breaker function. This mechanism is installed in series with a B type mecanishm. The reloading of the spring assembly is manual (AV) or motorised (AMV). 
BR/AR and ARM Driving mechanism with manual (BR/AR) or motorised operation (ARM) and with opening toggle. Applicable to fuse protection functions.  	**RAV and RAMV** Spring loaded driving mechanism for circuit-breaker function with reclosing. The spring set is reloaded manually (RAV) or is motorised (RAMV). 
The mechanical endurance of the driving mechanisms of the 3-position switch is class M1 for manual mechanisms and class M2 for mechanisms with frequent operations (IEC 60265–IEC 62271-102). These may be replaced live in any of the positions (closed, open or earthed).	The driving mechanisms of the automatic switch receive the classification M1 (AV/AMV) and M2 (RAV/RAMV), conforming to the IEC 62271-100 standard, giving them the maximum features in applications with or without reclosing.

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

ELECTRICAL CHARACTERISTICS

THREE-POSITION SWITCH-DISCONNECTOR

Driving mechanism		B	BM	BR	AR	ARM
Internal insulation	**[kV]**	2	2	10	10	2
Tripping coil (opening)						
Rated voltage*	**[Vcc]**	-	-	24 / 48 / 110 / 125 / 230		
	[Vca]	-	-	125 / 230		
Maximum consumption	**[W]**	-	-	80		
Motorised units						
Rated voltage*	**[Vcc]**	-	24 / 48 / 110 / 125 / 230	-	-	24 / 48 / 110 / 125 / 230
	[Vca]	-	125 / 230	-	-	230
Motor operation time	**[s]**	-	<3	-	-	<3
Peak current	**[A]**	-	<5	-	-	<5
Indicating contact						
Switch		2 NO + 2 NC		1 NOC + 2NO / 2 NO + 2 NC	2 NO + 2 NC	
Earthing		1 NO + 1 NC				
Rated voltage*	**[Vca]**	250				
Rated current	**[A]**	16				

* According to IEC 62271-1 chapter 4.8.2

ELECTRICAL CHARACTERISTICS

CIRCUIT-BREAKER

Driving mechanism		AV	AMV	RAV	RAMV
Internal insulation	**[kV]**	2	2	2	2
Tripping coil (opening). Máximum of 2					
Rated voltage	**[Vcc]**	24 / 48 / 110 / 125 / 230			
	[Vca]	230			
Maximum consumption	**[W]**	130	80	60	60
Closing coil					
Rated voltage	**[Vcc]**	-	24 / 48 / 110 / 125 / 230	-	24 / 48 / 110 / 125 / 230
	[Vca]	-	230	-	230
Maximum consumption	**[W]**	-	80	-	60
Undervoltage coil					
Rated voltage	**[Vcc]**	24 / 48 / 110-125 / 230			
	[Vca]	230			
Maximum consumption	**[W]**	150			
Motorised units					
Rated voltage	**[Vcc]**	-	24 / 48 / 110 / 125	-	24 / 48 / 110 / 125
	[Vca]	-	230	-	230
Motor operation time	**[s]**	-	<15	-	<15
Peak current	**[A]**	-	<9,6	-	<9,6
Indicating contact					
Switch		2 NO + 2 NC			
Earthing		1 NO + 1 NC			
Circuit-breaker		4 NO + 5 NC		5 NO + 6 NC	
Spring loading		-	1 NO + 1 NC	-	1 NO
Rated voltage	**[Vca]**	250	250	250	250
Rated current	**[A]**	16 / 20	16 / 20	20	20

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

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 operation of each of the fuses is indicated on the front mimic diagram of the cubicle. The fuse-switch assembly has been temperature-rise tested under normal service conditions according to IEC 62271-1.

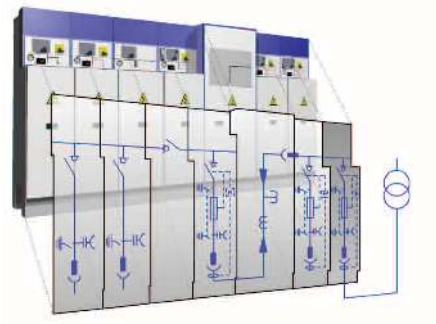
With fuses and tripping coil

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			Rated Transformer Power WITHOUT OVERLOAD															
			[kVA]															
			25	50	75	100	125	160	200	250	315	400	500	630	800	1000	1250	1600	2000
U_r Network	U_r Cubicle	U_r Fuse	Rated Fuse Current IEC 60282-1															
[kV]	[kV]	[kV]	[A]															
10	**24**	**6 / 12**	6.3	10	16	16	20	20	25	31,5	40	50	63	63	80	100	160	**200**	-
13,5	**24**	**10 / 24**	6.3	6,3	10	16	16	20	20	25	31,5	40	50	63	63	80	100	-	-
15	**24**	**10 / 24**	6.3	6,3	10	16	16	16	20	20	25	31,5	40	50	63	80	80	-	-
20	**24**	**10 / 24**	6.3	6,3	6,3	10	16	16	16	20	20	25	31,5	40	50	50	63	80	125

Remarks:

- Fuses recommended: SIBA brand with medium type striker, conforming to IEC 60282-1 (low power loss fuses).
- The values for combined fuses are given in blue.
- The fuse-switch assembly has been temperature-rise tested under normal service conditions in accordance with IEC 62271-1.
- A fuse holder carriage adapted for 292 mm 6/12 kV fuses is available.
- For ratings marked in bold the measurement is 442 mm.
- If any of the fuses blow, we recommend changing all three.
- For overload conditions in the transformer or use of other brands of fuse, please consult Ormazabal's Technical-Commercial Department.



CGMCOSMOS-P + ekorRPT
Transformer protection

With fuses and ekorRPT protection and measurement unit

The protection, metering and control unit, ekorRPT, integrated in fuse protection cubicles, offers protection against timed overcurrent (overload) and instantaneous overcurrent (short circuit) of phases and neutral.

POWERS TO PROTECT WITH ekorRPT

Network voltage	Fuse rated voltage	Minimum power		Maximum power	
		Fuse rating		Fuse rating	
[kV]	[kV]	[A]	[kVA]	[A]	[kVA]
6.6	3/7,2	16	50	160*	1250
10	6/12	16	100	160*	1250
12	10/24	16	100	100	1250
13,2	10/24	16	100	100	1250
15	10/24	16	125	125**	1600
20	10/24	16	160	125	2000

* 442 mm cartridge
** SIBA SSK 125 A fuse

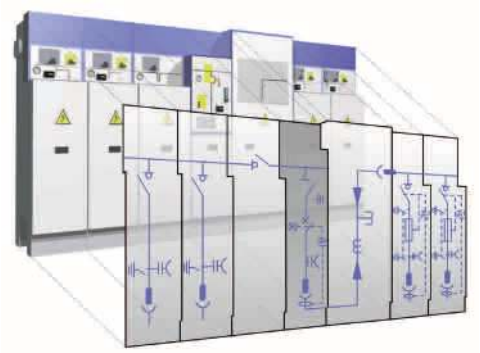
CGMCOSMOS-P + ekorRPT
General protection

With circuit-breaker and ekorRPG protection and metering unit

The protection, metering and control unit, ekorRPG, integrated in circuit-breaker cubicles, offers protection against timed overcurrent (overload) and instantaneous overcurrent (short-circuit) of phases and neutral.

POWERS TO PROTECT WITH ekorRPG

Network voltage	Minimum power	Maximum power
[kV]	[kVA]	[kVA]
6.6	50	5000
10	100	7500
12	100	10000
13,2	100	10000
15	100	12000
20	160	15000



CGMCOSMOS-V + ekorRPG
Installation protection

➔ Most noted features of ekorRPT and ekorRPG:

- Communicable electronic relay
- Current sensors (1000/1 or 300/1)
- Power supply and test board
- Self-powered toroidal-core current transformers from 5 A
- Bistable trigger
- ekorRPT provides greater selectivity than fuse protection: IEC inverse time curves
- ekorRPT protects against phase-neutral faults
- ekorRPT avoids dangerous fuse blows (I3)
- Primary and secondary tests
- Phase metering from 5 A and earth current metering from 0.5 A

ekorSYS FAMILY

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

Ormazabal, as specialists in Medium Voltage, have a wide portfolio of applications and services to respond to the needs of the distribution network.

The units of the ekorSYS family, patented by Ormazabal and integrated in the cubicle, are the ideal solution for use in the most demanding installations because they offer high levels of performance compared to conventional systems.

Protection

- Supply to Medium Voltage customers
  - ekorRPG
  - ekorRPT
- Protection of switching substations and industrial customers
  - ekorRPS
  - ekorRPGci
  - ekorRPTci
- Protection of rural transformer substations (CTR)
  - ekorRPT-K
- Generator set protection unit
  - ekorUPG
- Substation protection
  - ekorRPS-TCP

Automation and remote control

- Remote control
  - ekorUCT
  - ekorCCP
  - ekorRCI
  - CGMCOSMOS-2LPT
- Automatic transfer
  - ekorSTP
  - ekorCCP
  - ekorRTK
- Fault detection
  - ekorRCI
- Voltage presence acoustic alarm
  - ekorSAS
- Second operation points

Telemanagement and communication

- ekorGID

Dispatching center

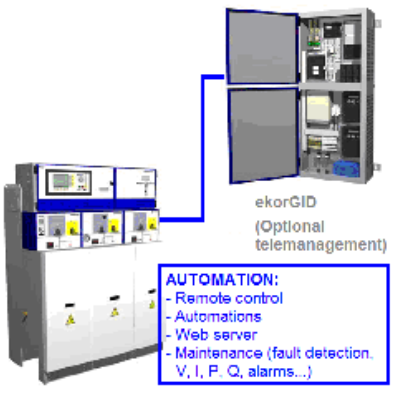
Software

- ekorSOFT

➔ For further information, please refer to our Technical-Commercial department or visit www.ormazabal.es

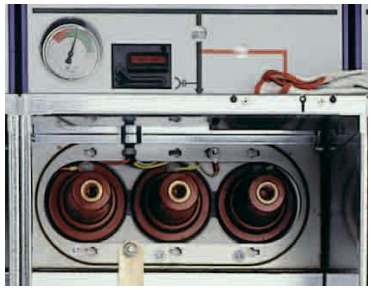
ekorRPG

ekorUCT-S



CGMCOSMOS-2LPT + ekorGID

CABLE CONNECTIONS

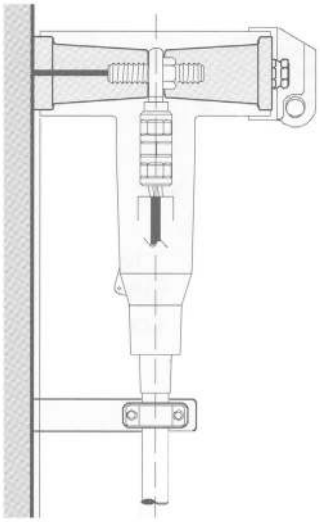


Bushing

Bushings EN 50181 (IEC type)

- Manufactured in epoxy resin, they conform to the dielectric and partial discharge tests.
- There are three types:
  - Plug-in up to 250 A
  - Plug-in up to 400 A
  - Screw-in up to 630 A
- Located in the cable compartment. Optionally, they may be placed on the side of the cubicles for direct supply to the main busbar.

➔ For the option of ANSI (IEE 396) compatible bushings, please refer to our Technical-Commercial department.



Cross-section of EUROMOLD connector

Connectors

- 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).
- 250 A plug-in connectors (straight or elbow type for rear exit of cable) in outputs to transformer (cable compartment) for fuse protection functions.
- Shielded connectors for circuit-breaker protection functions.

EUROMOLD connectors and accessories

Ormazabal recommends the use of Euromold connectors as these have been tested in the CGMCOSMOS system cubicles:

CONNECTORS FOR 250 A BUSHING

		12 kV Connector type	12 kV Cross-section mm²	24 kV Connector type	24 kV Cross-section mm²
Dry cable	Elbow	158LR	16 - 150	K-158LR	16-150
Dry cable	Straight	152SR	16 - 120	K-152SR	25-120

CONNECTORS FOR 400/630 A BUSHING

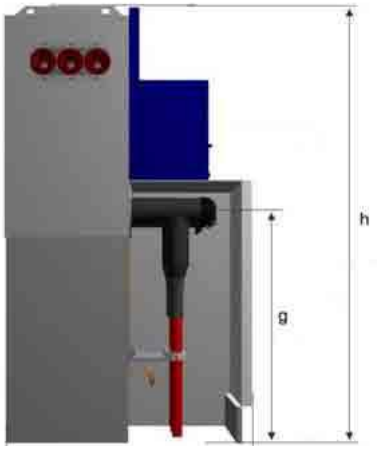
		Current Rated [A]	12 kV Connector type	12 kV Cross-section mm²	24 kV Connector type	24 kV Cross-section mm²
Dry cable	Shielded	400	400LR	70-300	K-400LR	25-300
		400	400TE	70-300	K-400TE	25-300
		630	450SR	70-300	K-450SR	35-300
		630	400LB	50-300	K-400LB	50-300
		630	400TB	70-300	K-400TB	35-300
		630	440TB	185-630	K-440TB	185-630
	Unshielded	630	15TS	35-630	UC412L	50-240
Cable with paper impregnated in oil	Shielded	630	K-400TB-MIND	25-240	K-400TB-MIND	25-240

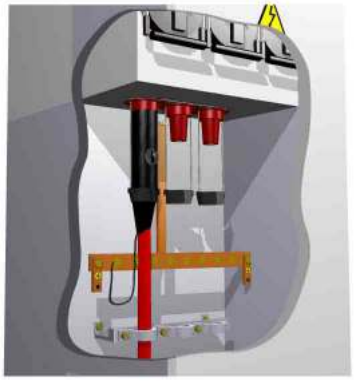
ACCESSORIES	
	Up to 24 kV
Plug-in shunt in T	250 A
Plug-in shunt in cross formation	250 A
Insulating plugs	250 A
Reducers	250 A
Connection terminals	250 A
Surge arresters	5 kA

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

➔ All the connectors and accessories listed here have been tested in the CGMCOSMOS system.

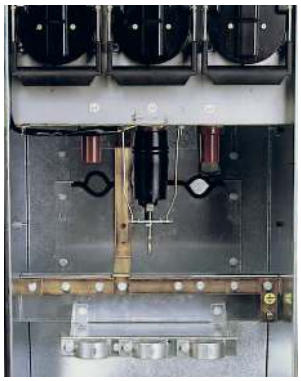
Bushing height





Bushing position in the fuse protection function (P)

		CUBICLE HEIGHT (h)	BUSHING HEIGHT (g)	
L	[mm]	1300	725	
		1740	1156	
2L	[mm]	1300	725	
		1740	1165	
P	[mm]	1300	410	
		1740	850	
V	[mm]	1740	695	
RB	[mm]	1300	725	
		1740	1165	
RC	[mm]	1740	1535	
R2C	[mm]	1740	1535	
2LP	[mm]	1190	Feeder	Protection
			725	410
			1165	850
RLP	[mm]	1190	Feeder	Protection/Rise
			725	410
			1165	850



Connection.
EUROMOLD elbow plug-in terminal (K-158LR)

Connection.
EUROMOLD straight plug-in terminal (K-152SR)

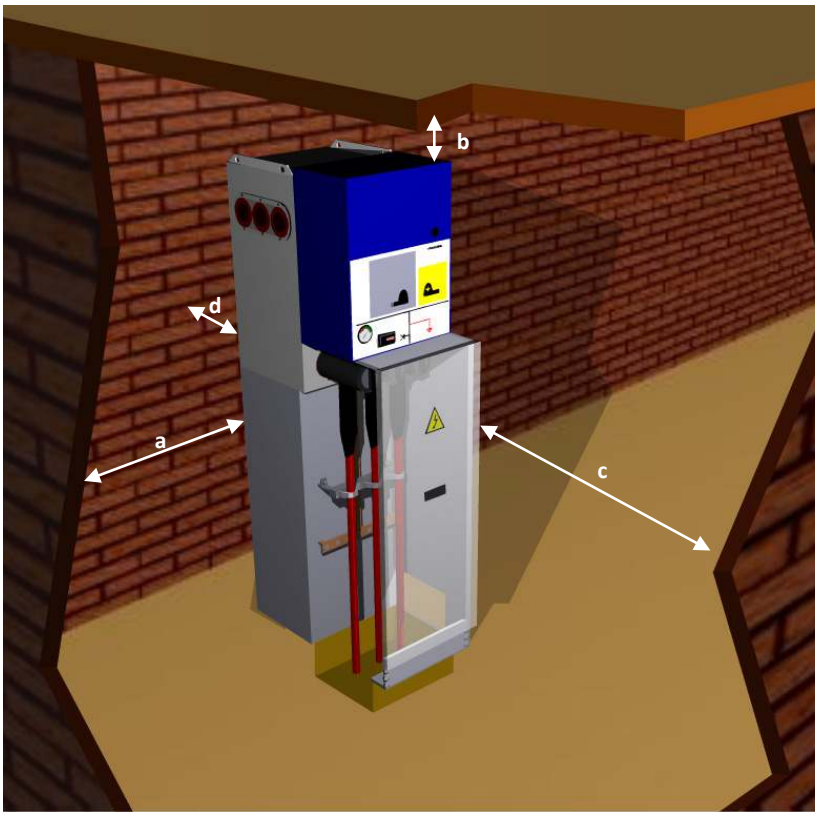
Connection.
EUROMOLD screw-in T-terminal (K-400TB)

Other connection devices suitable for CGMCOSMOS cubicles

Rated voltage [kV]				12		24	
Cable type	**Connector**	**Manufacturer**	**Rated current [A]**	**Connector type**	**Cross-section [mm2]**	**Connector type**	**Cross-section [mm2]**
Insulated cable in plastic	Elbow	KABEL-DRAHT	250	SEHDW11	25-150	SEHDW21	25-250
		F&G	250	ASW 10/250	25-120	ASW 20/250	25-120
		RAYCHEM	250	RSES	16-120	RSES	16-120
		3M	250	93-EE-8XX-2	25-95	93-EE-8XX-2	25-95
		PFISTERER	250	CAW 20/250	35-70	CAW 20/250	35-70
		PIRELLI	250	PMA-1-250/25	25-95	PMA-1-250/25	25-95
	Straight	KABEL-DRAHT	250	SEHDG11	25-150	SEHDW21	25-250
		KABELDON	250	-	-	-	-
		RAYCHEM	250	RSSS	16-95	RSSS	16-95
		PIRELLI	250	PMR-1-250/25	25-95	PMR-1-250/25	25-95
		3M	250	93-EE-8XX-2	25-95	93-EE-8XX-2	25-95
	Shielded	KABEL-DRAHT	400	SEHDW12	35-185	SEHDW22	25-250
			400	SEHDT12	35-150	SEHDT22	35-150
			630	SEHDT13	185-240	SEHDT23	185-240
			400	SEHDW12	35-185	SEHDW22	25-250
		F&G	400	AST 10/400	25-240	AST 20/400	25-240
			400	ASW 10/400	25-240	ASW 20/400	25-240
			400	ASTS 10/630	120-240	ASTS 20/630	25-240
			630	AST 10/630	25-240	AST 20/630	25-240
		PFISTERER	630	-	-	CAT 20/630	95-240
		PIRELLI	400	PMA-2-400/24	25-95	PMA-2-400/24	25-95
			400	PMR-2-400/24	50-300	PMR-2-400/24	50-300
			400	PMA-3-400/24	25-240	PMA-3-400/24	25-240
	Unshielded	KABEL-DRAHT	400	-	25-150	SEHDG23	185-240
			630	SEHDG12	35-185	SEHDG22	35-185
		F&G	400	AGL 10/630	120-240	-	-
			400	AGLS 10/630	120-240	-	-
			400	AWK 10/630	25-240	ASGS 10/630	25-240
			400	AWKS 10/630	25-240	AWKS 20/630	25-240
		KABELDON	400	KAP 300	10-300	-	-
		RAYCHEM	400/630	UHGK+RICS	120-300	UHGK+RICS	95-240
			400/630	IXSU+RICS	16-800	IXSU+RICS	16-800
		3M	400	93-EE-8XX-2	25-95	93-EE-8XX-2	25-95
Impregnated cable	Shielded	PIRELLI	400	PMA-3-400/24+CPI	25-240	PMA3-CPI	25-240
			400	PMA-2-400/24 + CPI	25-95	PMA-2-400/24 + CPI	25-95
			400	PMR-2-400/24 + CPI	50-300	PMR-2-400/24 + CPI	50-300
	Unshielded	RAYCHEM	400/630	UHGK+RICS	120-300	UHGK+RICS	95-240
			400/630	IXSU+RICS	16-800	IXSU+RICS	16-800
		KABELDON	400	KAP 300 U	10-300	-	-
		F&G	400	-	-	AGM 20/400+GKV20	25-150
			400	AWM 10/400 + SKV10	25-240	AWM 20/400+GKV20	25-150

Installation

Minimum distances to walls and ceiling for CGMCOSMOS cubicles



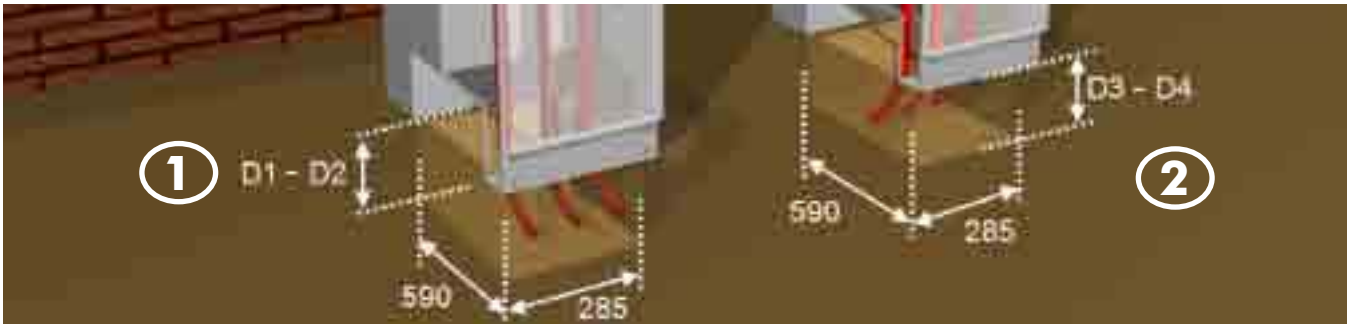
MINIMUM DISTANCES			
Side wall	**a**	**[mm]**	100
Ceiling	**b**	**[mm]**	500
Front aisle	**c**	**[mm]**	≤ 1000*
Rear wall	**d**	**[mm]**	> 100**

* Depending on current local legislation
** Except for CGMCOSMOS-V (>50 mm) and CGMCOSMOS-M (0 mm)

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

➔ These measurements have been obtained in accordance with the internal arc tests which have been carried out, in a compartment 2300 mm high, for gas-insulated modules, according to annex A of standard IEC 62271-200

Maximum dimensions of trench for Medium Voltage cables



MAXIMUM TRENCH DIMENSIONS FOR CUBICLES WITH INTERNAL ARC IN GASTANK (AF) UP TO 20 kA* - 0.5 s

Function type		Cable input or output											
		① Front and Rear						② Side					
		Cubicle height [mm]											
		1300			1740			1300			1740		
		A1	F1	D1	A1	F1	D2	A2	F2	D3	A2	F2	D4
L, RB & RC	[mm]	285	590	600	285	590	600	285	590	600	285	590	250
P#	[mm]	390		500**	390		300**	390		500**	390		300**
V (AV)	[mm]	-	-	-	520		850	-	-	-	520		850
V (RAV)	[mm]	-	-	-	510	510		-	-	-	510	510	

DIMENSIONS OF TRENCH FOR INTERNAL ARC CUBICLES* UP TO 20 kA** - 1 s (IAC category)

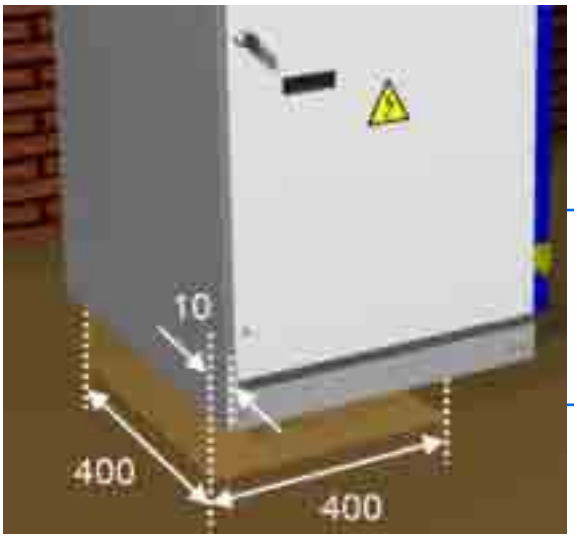
Function type		Cable input or output											
		① Front and Rear						② Side					
		Cubicle height [mm]											
		1300			1740			1300			1740		
		A1	F1	D1	A1	F1	D2	A2	F2	D3	A2	F2	D4
L, RB & RC	[mm]	285	590	600	285	590	600	285	590	600	285	590	600
P#	[mm]	390		500**	390		300**	390		500**	390		300
V (AV)	[mm]	-	-	-	520		850	-	-	-	520		850

* Tests conducted with a current of 21 kA
** Values for 250 A straight connector and unipolar dry cable. Other types consult.
# Please refer to our Technical-Commercial Department

Trench dimensions for metering cubicle [mm]

The depth of the trench, suitable for all cable types, is 800 mm.

- The dimensions of the trench depend on the minimum curvature radius 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 our Technical-Commercial Department.



Spares and accessories

Operations-motorised units

- Driving mechanism:
  - B: Manual operation, using lever, for the three-position switch.
  - BM: Motorised for the three-position switch.
  - BR/AR: Manual operation with retention for the three-position switch (fuse protection function).
  - ARM: Motorised with retention for the three-position switch (fuse protection function).
  - (R)AV: Manual operation for the circuit-breaker (R = with reclosing).
  - (R)AMV: Motorised for the circuit-breaker (R = with reclosing).
- Motor driving mechanism subassembly.
- Operating levers: for the switch and the earthing switch (optionally anti-reflex).
- Opening and undervoltage coil.

Connectivity

- Connecting set, including ORMALINK, earthing bar, bolts and nuts, instructions and other elements required for the correct assembly of two modules.
- End assembly kit, which includes end plugs, metal cover to be mounted on the side of one cubicle, instructions and other elements required for assembly.

Protection, metering, control and signalling, ekorSYS family

- ekorSPC: Phase comparator. Warning light indicating the phase balance between two cubicles.
- ekorSOFT: Management software for the ekorSYS family.

Fuse protection

- 12 kV fuse holder carriage.
- 24 kV fuse holder carriage.

Metal enclosure

- Driving mechanism cover.
- Cable compartment cover.
- Mimic diagram.
- Auxiliary profiles: recommended for premises with uneven floor surfaces.
- Lateral incoming box.

Interlocks/locks

- Open/close operation closing device.

Actuating lever

Fuse holder

ORMALINK with capacitive output for detection of voltage

Lateral incoming box CGMCOSMOS-CL

Environmental information

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 AENOR CGM-00/38 among others.

CGMCOSMOS 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, estimated at 30 years (annex GG of 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.

Configuration guide

Select **common data** of the instalation:

Rated voltage U_r [kV]
12
24

Frequency f_r [Hz]
50
60

Rated current I_r [A]
400
630

Short-time current I_k [kA - s]	
12 kV	25 - 1
24 kV	12.5 - 1
	16 - 1
	16 - 3
	21 - 1
	21 - 3

Internal arc [kA - s]	
IAC AFL	16 - 1
	20 -1
In tank: AF	16 - 0.5
	20 - 0.5
In tank: AFL	16 - 1
	20 - 1

Cubicle height [mm]
1740 (all)
1300 (models L, P and 2LP)

Instalation auxiliary voltage	
[Vcc]	24
	48
	110
	125
[Vac]	230

Installation height [m]
<2000
>2000

Ambient temperature [°C]	
Max	40
Mín	-5
	-10
	-30

Select **particular data** for your CGMCOSMOS cubicle:

SPECIFIC DATA							
CGMCOSMOS	L/2L	P	V			RB/ RB-Pt	S/ S-Pt
	2LP		V (AV)		V (RAV)		
			(A) + (B)		(C)		
Driving mechanism							
Manual	B	BR/AR	AV	B	RAV	B (RB-Pt)	B
Motorized	BM	-/ARM	AMV	BM	RAMV	-	BM
Actuating levers	(S)	(S)	(S)	(S)	(S)	(S)	(S)
Coils							
Tripping coil	-	YES/NO	YES/NO	-	YES/NO	-	-
Bistable	-	-	YES/NO	-	YES/NO	-	-
2ª tripping coil	-	-	YES/NO	-	YES/NO	-	-
Closing coil	-	-	YES/NO	-	YES/NO	-	-
Undervoltage coil	-	-	YES/NO	-	YES/NO	-	-
Connectivity							
Front bushing	(S)	(S)	(S)		(S)	(S)	-
Side connection							
Blind (non extensible)	YES/NO (2LP)		-		-	-	-
Extensible (one side)	Left/ Right	Left/ Right	Left/Right		Left/ Right	Right	-
Extensible (both sides)	YES/NO	YES/NO	YES/NO		YES/NO	YES/NO	(S)
Additional elements							
Lateral incoming box							
Left feeder	YES/NO	YES/NO	YES/NO		YES/NO	-	-
Right feeder	YES/NO	YES/NO	YES/NO		YES/NO	-	-
Extended base for double connection	YES/NO	YES/NO	YES/NO		YES/NO	-	-
Safety							
Voltage indicator							
ekorVPIS	YES/NO	YES/NO	YES/NO		YES/NO	YES/NO*	YES/NO*
ekorIVDS	YES/NO	YES/NO	YES/NO		YES/NO	YES/NO*	YES/NO*
Acoustic alarm, ekorSAS	(S)	YES/NO	YES/NO		YES/NO	YES/NO	YES/NO
Phase comaprator, ekorSPC	YES/NO	YES/NO	YES/NO		YES/NO	YES/NO	YES/NO
Manometer	(S)	(S)	(S)		(S)	(S)	-
Protection and control							
Trip	-	(1)/(2)	-		-	-	-
Fuses	-	YES/NO	-		-	-	-
Integrated control and monitoring unit, ekorRCI	YES/NO	-	-			-	-
Protection unit, ekorRPG	-	-	YES/NO		YES/NO	-	YES/NO
Protection unit, ekorRPT	-	YES/NO	-		-	-	-
Voltage detection unit, ekorRTK	YES/NO	-	YES/NO		YES/NO	-	YES/NO
(A) Circuit-breaker (B) Switch-disconnector (C) Circuit-breaker + disconnector	(1) Combined (2) Associated * With earthing				(S) Standard		

SPECIFIC DATA						
CGMCOSMOS	L/2L	P	V		RB/ RB-Pt	S/ S-Pt
	2LP		V (AV)	V (RAV)		
			(A) + (B)	(C)		
Interlocks						
Internal	(S)	(S)	(S)	(S)	(S)	(S)
Additional lock	YES/NO	YES/NO	YES/NO	YES/NO	YES/NO	YES/NO
(A) Circuit-breaker (B) Switch-disconnector (C) Circuit-breaker + disconnector	(1) Combined (2) Associated * With earthing			(S) Standard		

SPECIFIC DATA		
CGMCOSMOS	RC/R2C	M
Connectivity		
Side connection		
Extensible (one side)	Left/Right	
Safety		
Voltage indicator		
ekorVPIS	YES/NO	
ekorIVDS	YES/NO	
Diagram type		
		Bottom input / Top right output
		Bottom input / Top left output
		Top input / Top output
		Busbar voltage metering
Interlocks		
Installed current transformers (3 CTs)		YES/NO
Installed voltage transformers (3 VTs)		YES/NO
Heater		YES/NO
Protection mesh		YES/NO

ORMAZABAL

Focus on Medium Voltage

TECHNICAL-COMMERCIAL DEPARTMENT

Tel.: +34 94 431 87 31
Fax: +34 94 431 87 32

www.ormazabal.com

Products, applications, solutions:

- Primary distribution switchgear
- Secondary distribution switchgear
- Automation, protection, remote control and communications in electrical networks
- Distribution transformers
- Low Voltage boards
- Transformer substations
- Medium Voltage applications for renewable energy

CA-100-GB-1109