



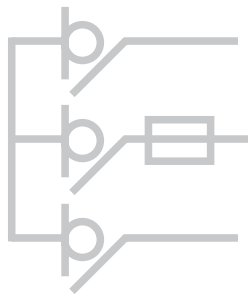
**ORMAZABAL**



MV Switchgear for Secondary  
Distribution Networks



Fully Insulated CGMCOSMOS  
Modular and Compact System  
Up to 24 kV



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The quality of the products we design, manufacture and install is backed by the implementation and certification of a ISO 9001:2000-compliant Quality Management System. Our commitment to the environment protection is asserted by the implementation and certification of an ISO 14001 Environmental Management System.

As a result of the constant development of standards and new designs, the characteristics of the items shown in this catalogue are subject to change without prior notice.

Characteristics and availability of materials shall be effective only when confirmed by our Technical-Commercial department.

## OVERVIEW

The **CGMCOSMOS** system is composed of a set of reduced size modular cubicles, single or multifunctional, for different secondary power distribution configurations up to 24 kV in both public and industrial settings.

Extensive experience with the **CGM-CGC** system, as well as the application of innovative technologies along with new materials and compliance with the IEC standards, has allowed the development of the **CGMCOSMOS** system, providing improvements in functional aspects such as greater compactness, ergonomics in equipment installation and operation, a wide range of functions and greater reliability and safety.



## MAIN FEATURES

Full SF<sub>6</sub> gas-insulation, providing protection against harsh environmental elements (including flooding), long service life and maintenance-free of live parts.

Full modularity and future extendibility in both sides using the **ORMALINK** connecting set.

Internal arcs withstand for personal protection, in accordance with IEC 60298.

Small dimensions and low weights for easier handling and installation.

Simple and safe operation, ergonomic operation elements, possibility of mounting auxiliary components under voltage, fuses in horizontal position, additional interlocks and acoustic alarm for inappropriate operations.



Easy cable connections with plug-in or screwed type terminals and no need for a cable trench or the placement of additional on-site frames.

General service conditions based on IEC 60694 standard. For other values, please contact our Technical-Commercial department.

The different modules are electrically connected by means of the **ORMALINK** connecting set (patented in 1991 by Ormazabal), allowing a high number of combinations to cover all operation and protection needs in **Transformer substations**.

Both the breaking and switching components as well as the busbar are located inside a stainless steel, SF<sub>6</sub>-filled gas tank which is permanently sealed, thus building a fully insulated unit (IP 67 - IEC 60529).

The metal enclosure of each cubicle, made of galvanised steel plate, is sturdy enough to prevent deformation and ensure protection under the expected operating conditions.



The **CGMCOSMOS** units have a front cover, properly interlocked to provide safe, convenient access to the cable terminals and fuse holders (horizontal arrangement). Optionally, bushings are also available on the sides for the incoming cable feeders.

The units are equipped with the **ekorVPIS**, which continually indicates voltage presence in the equipment. Optionally, it is available an **ekorSAS** acoustic alarm which emits an audible signal whenever an attempt of an earthing disconnector operation could produce a fault in the network.

## APPLIED STANDARDS

The **CGMCOSMOS** system meets the requirements of the following standards:

### **IEC 60298**

Metal-enclosed switchgear for alternating current rated voltages over 1 kV and under 52 kV.

The **CGMCOSMOS** system has been designed and tested to withstand an internal arc in accordance with Appendix AA.

### **IEC 60265**

High voltage switches. Part 1: High voltage switches for rated voltages over 1 kV and under 52 kV.

### **IEC 60129**

Alternating current disconnectors and earthing disconnectors.

### **IEC 62271-105**

Alternating current switch-fuse combinations.

### **IEC 60694**

Common specifications for high-voltage switchgear and controlgear standards.

### **IEC 62271-100**

High-voltage alternating-current circuit-breakers.

*The **CGMCOSMOS** system meets the immersion test at a pressure of 3 metres water column, 24 hours at rated voltage and isolation tests at power frequency.*

\*Note: The IEC standards are currently being updated, and therefore the nomenclature may vary in some cases.



TYPES OF MODULES



CGMCOSMOS-L



CGMCOSMOS-S



CGMCOSMOS-S-Pt\_



CGMCOSMOS-P



CGMCOSMOS-V



CGMCOSMOS-M



CGMCOSMOS-RC\_



CGMCOSMOS-RB\_



CGMCOSMOS-RB\_-Pt



CGMCOSMOS-2LP



CGMCOSMOS-RLP



CGMCOSMOS-2L



CGMCOSMOS-3LP



CGMCOSMOS-2L2P



CGMCOSMOS-3L2P



## TYPES OF MODULES



### CGMCOSMOS-L

**Modular cubicle, feeder or line functional unit**, equipped with a three-position switch-disconnector (closed, open and earthed).

Used for the MV incoming and outgoing feeder, enabling connection with the busbar of the overall switchgear cubicle assembly.

Extendibility: Right, left or both sides.

#### FEEDER FUNCTION

##### ELECTRICAL CHARACTERISTICS

	12 kV	24 kV
Rated voltage		
Rated current		
On busbars and cubicle interconnection [A]	400/630	400/630
Incoming feeder [A]	400/630	400/630
Rated withstand voltage at power frequency (1 min)		
To earth and between phases [kV]	28	50
At the isolating distance [kV]	32	60
Lightning impulse withstand voltage		
To earth and between phases [kV]	75	125
At the isolating distance [kV]	85	145
Short-time withstand current (main circuit)		
Rated value 1 s [kA]	16/20*/25	16/20*
Rated value 3 s [kA]	16/20*	16/20*
Peak value [kA]	40/50*/62.5	40/50*
Breaking capacity of mainly active current [A]	400/630	400/630
Breaking capacity of cable-charging current [A]	50	50
Breaking capacity of line-charging current [A]	1.5	1.5
Breaking capacity of closed loop current [A]	400/630	400/630
Breaking capacity of earth fault current [A]	300	300
Breaking capacity of cable-charging under earth faults [A]	100	100
Short-circuit making current (peak value) [kA]	40/50*/62.5	40/50*
Switch class IEC 60265-1		
“E2” [A/kA] (manual)	630/62.5	-
“E3” [A/kA] (motor)	400/40 <sup>#</sup>	400/40 <sup>#</sup>
“E3” [A/kA] (motor)	630/50 <sup>#</sup>	630/50 <sup>#</sup>
Short time withstand current (earthing disconnector)		
Rated value 1 s [kA]	16/20*/25	16/20*
Rated value 3 s [kA]	16/20*	16/20*
Peak value [kA]	40/50*/62.5	40/50*
Making capacity of the earthing disconnector (peak value) [kA]	40/50*/62.5	40/50*
Earthing disconnector class IEC 60129	E2 - M0	E2 - M0
No. of short-circuit making operations	5	5

(\*) Tests conducted with a current of 21 kA / 52.5 kA

(<sup>#</sup>) Tests conducted at a voltage of 24 kV

##### PHYSICAL CHARACTERISTICS

	Height mm	Width mm	Depth mm	Weight kg
	1740	365	735	95
Upon request	1300	365	735	86

#### NOTE:

The additional protection, measurement, control and automation functional features are described further in the respective section, as well as in the section on the ekorSYS Family.





## CGMCOSMOS-S

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

Extendibility: Both sides.

Used for load breaking of the main busbar of the transformer substation.

### BUSBAR SWITCH FUNCTION

ELECTRICAL CHARACTERISTICS			
	12 kV	24 kV	
Rated voltage			
Rated current			
On busbars and cubicle interconnection [A]	400/630	400/630	
Rated withstand voltage at power frequency (1 min)			
To earth and between phases [kV]	28	50	
At the isolating distance [kV]	32	60	
Lightning impulse withstand voltage			
To earth and between phases [kV]	75	125	
At the isolating distance [kV]	85	145	
Short-time withstand current (main circuit)			
Rated value 1 s [kA]	16/20*/25	16/20*	
Rated value 3 s [kA]	16/20*	16/20*	
Peak value [kA]	40/50*/62.5	40/50*	
Breaking capacity of mainly active current [A]	400/630	400/630	
Breaking capacity of cable-charging current [A]	50	50	
Breaking capacity of line-charging current [A]	1.5	1.5	
Breaking capacity of closed loop current [A]	400/630	400/630	
Short-circuit making current (peak value) [kA]	40/50*/62.5	40/50*	
Switch class IEC 60265-1			
"E2" [A/kA] (manual)	630/62.5	-	
"E3" [A/kA] (motor)	400/40 <sup>#</sup>	400/40 <sup>#</sup>	
"E3" [A/kA] (motor)	630/50 <sup>#</sup>	630/50 <sup>#</sup>	

(\*) Tests conducted with a current of 21 kA / 52.5 kA

(<sup>#</sup>) Tests conducted at a voltage of 24 kV

### PHYSICAL CHARACTERISTICS

	Height mm	Width mm	Depth mm	Weight kg
	1740	450	735	105



#### NOTE:

The additional protection, measurement, control and automation functional features are described further in the respective section, as well as in the section on the ekorSYS Family.

## TYPES OF MODULES



CGMCOSMOS-S-Ptd  
CGMCOSMOS-S-Pti

**Modular cubicle, busbar switch with earthing functional unit**, equipped with a three-position switch-disconnector (closed, open and earthed).

Used for load breaking of the main busbar of the transformer substation and earthing on the right (Ptd) or left (Pti) of the breaking point.

Extendibility: Both sides.

### BUSBAR SWITCH WITH EARTHING FUNCTION

#### ELECTRICAL CHARACTERISTICS

	12 kV	24 kV
Rated voltage		
Rated current		
On busbars and cubicle interconnection [A]	400/630	400/630
Rated withstand voltage at power frequency (1 min)		
To earth and between phases [kV]	28	50
At the isolating distance [kV]	32	60
Lightning impulse withstand voltage		
To earth and between phases [kV]	75	125
At the isolating distance [kV]	85	145
Short-time withstand current (main circuit)		
Rated value 1 s [kA]	16/20*/25	16/20*
Rated value 3 s [kA]	16/20*	16/20*
Peak value [kA]	40/50*/62.5	40/50*
Breaking capacity of mainly active current [A]	400/630	400/630
Breaking capacity of cable-charging current [A]	50	50
Breaking capacity of line-charging current [A]	1.5	1.5
Breaking capacity of closed loop current [A]	400/630	400/630
Breaking capacity of earth fault current [A]	300	300
Breaking capacity of cable-charging under earth faults [A]	100	100
Short-circuit making current (peak value) [kA]	40/50*/62.5	40/50*
Switch class IEC 60265-1		
"E2" [A/kA] (manual)	630/62.5	-
"E3" [A/kA] (motor)	400/40 <sup>#</sup>	400/40 <sup>#</sup>
"E3" [A/kA] (motor)	630/50 <sup>#</sup>	630/50 <sup>#</sup>
Short time withstand current (earthing disconnector)		
Rated value 1 s [kA]	16/20*/25	16/20*
Rated value 3 s [kA]	16/20*	16/20*
Peak value [kA]	40/50*/62.5	40/50*
Making capacity of the earthing disconnector (peak value) [kA]	40/50*/62.5	40/50*
Earthing disconnector class IEC 60129	E2 - M0	E2 - M0
No. of short-circuit making operations	5	5

(\*) Tests conducted with a current of 21 kA / 52.5 kA

(<sup>#</sup>) Tests conducted at a voltage of 24 kV

#### PHYSICAL CHARACTERISTICS

Height mm	Width mm	Depth mm	Weight kg
1740	450	735	110

#### NOTE:

The additional protection, measurement, control and automation functional features are described further in the respective section, as well as in the section on the ekorSYS Family.



## CGMCOSMOS-P

**Modular cubicle, fused-protection functional unit,** equipped with a three-position switch-disconnector (closed, open and earthed, upstream and downstream the fuses) and protection with limiting fuses.

Used for switching operations and protection, enabling connection with the busbar of the overall cubicle assembly.

Extendibility: Right, left or both sides.

## FUSED PROTECTION FUNCTION

ELECTRICAL CHARACTERISTICS			
	12 kV	24 kV	
Rated voltage			
Rated current			
On busbars and cubicle interconnection [A]	400/630	400/630	
Transformer off rated current [A]	200	200	
Rated withstand voltage at power frequency (1 min)			
To earth and between phases [kV]	28	50	
At the isolating distance [kV]	32	60	
Lightning impulse withstand voltage			
To earth and between phases [kV]	75	125	
At the isolating distance [kV]	85	145	
Short-time withstand current (main circuit)			
Rated value 1 s [kA]	16/20*/25	16/20*	
Rated value 3 s [kA]	16/20*	16/20*	
Peak value [kA]	40/50*/62.5	40/50*	
Breaking capacity of mainly active current [A]	400	400	
Short-circuit making current (peak value) [kA]	40/50*/62.5	40/50*	
Switch class IEC 60265-1			
“E3” [A/kA]	400/40 <sup>#</sup>	400/40 <sup>#</sup>	
Shortcircuit breaking capacity (fuses) [kA]	16/20*	16/20*	
Short time withstand current (earthing disconnector)			
Rated value 1 s [kA]	1/3	1/3	
Rated value 3 s [kA]	1/3	1/3	
Peak value [kA]	2.5/7.5	2.5/7.5	
Making capacity of the earthing disconnector (peak value) [kA]	2.5/7.5	2.5/7.5	
Earthing disconnector class IEC 60129	E2 - M0	E2 - M0	
No. of short-circuit making operations	5	5	
Take-over current of switch - ekorRPT relay combination (Maximum breaking current as per TD 5 IEC 60420) [A]	1250	1250	
Transfer current of switch-fuse combination (Maximum breaking current as per TD 4 IEC 60420) [A]	1500	1300	

(\*) Tests conducted with a current of 21 kA / 52.5 kA

(<sup>#</sup>) Tests conducted at a voltage of 24 kV



## PHYSICAL CHARACTERISTICS

	Height mm	Width mm	Depth mm	Weight kg
Upon request	1740	470	735	140
	1300	470	735	129

## NOTE:

The additional protection, measurement, control and automation functional features are described further in the respective section, as well as in the section on the ekorSYS Family.

## TYPES OF MODULES



### CGMCOSMOS-V

**Modular cubicle, circuit breaker protection functional unit**, equipped with a vacuum circuit breaker in series with the three-position disconnector (closed, disconnected and prepared to earth).

Used for switching operations and general protection, enabling connection to the busbar of the overall cubicle assembly.

Extendibility: Right, left or both sides.

#### CIRCUIT BREAKER PROTECTION FUNCTION

##### ELECTRICAL CHARACTERISTICS

	12 kV	24 kV
Rated voltage		
Rated current		
In busbars and cubicle interconnection [A]	400/630	400/630
Incoming feeder connection [A]	400/630	400/630
Rated voltage withstand at industrial frequency for 1 min		
To earth and between phases [kV]	28	50
At the isolating distance [kV]	32	60
Lightning impulse withstand voltage		
To earth and between phases [kV]	75	125
At the isolating distance [kV]	85	145
Short-time withstand current (main circuit)		
Rated value 1 s [kA]	16/20	16/20
Rated value 3 s [kA]	16/20	16/20
Peak value [kA]	40/50	40/50
Circuit breaker class IEC 62271-100	E2	E2
Breaking capacity of mainly active current [A]	400/630	400/630
Short-circuit making current (peak value) [kA]	40/50	40/50
Breaking capacity [kA]	16/20	16/20
Short time withstand current (earthing disconnector)		
Rated value 1 s [kA]	16/20	16/20
Rated value 3 s [kA]	16/20	16/20
Peak value [kA]	40/50	40/50

##### PHYSICAL CHARACTERISTICS

Height mm	Width mm	Depth mm	Weight kg
1740	480	850	218

##### OPERATING SEQUENCES

O	⌚	CO	⌚	CO
	0.3 s		15 s	
	0.3 s		3 min	
	3 min		3 min	

#### NOTE:

The additional protection, measurement, control and automation functional features are described further in the respective section, as well as in the section on the ekorSYS Family.



CGMCOSMOS-M

**Modular cubicle, metering functional unit.**

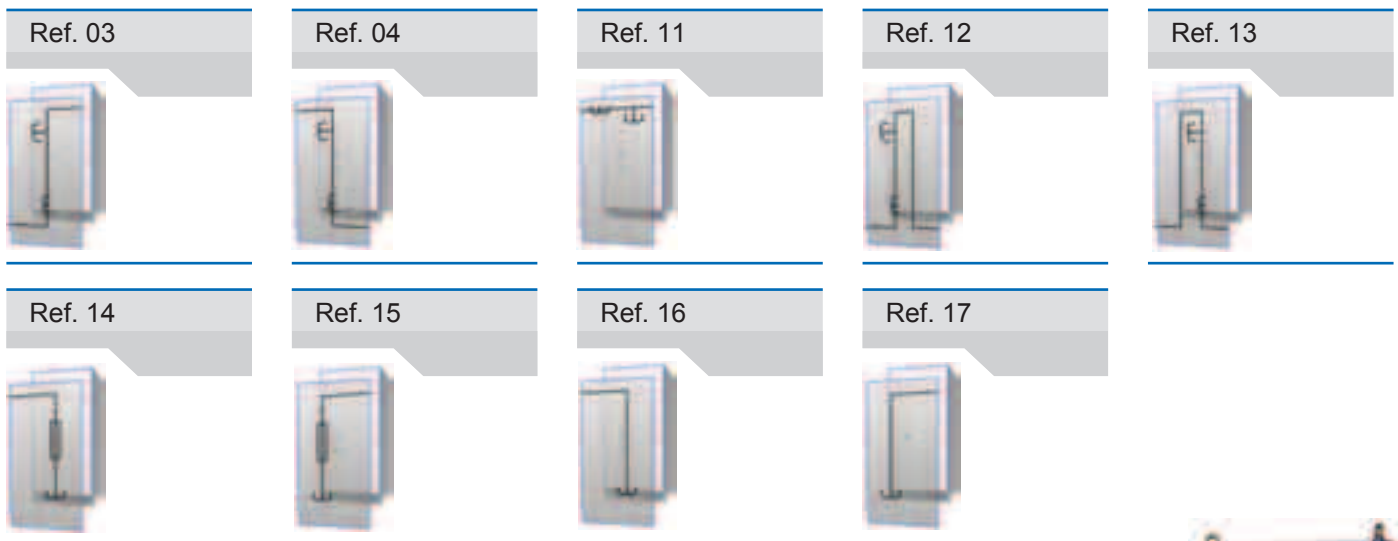
Used to house the voltage and current metering transformers, enabling connection to the busbar of the general cubicle assembly over a dry-type cable.

**METERING FUNCTION**

ELECTRICAL CHARACTERISTICS		
Rated voltage	12 kV	24 kV

PHYSICAL CHARACTERISTICS				
	Height mm	Width mm	Depth mm	Weight kg
	1740	800	1025	165 (empty)

The most frequent types of configurations for transformer mounting are as follows:



Note: For other configurations, please contact our Technical-Commercial department.

STANDARDIZED TRANSFORMERS FOR THE SPANISH MARKET			
	ARTECHE	LABORATORIO ELECTROTÉCNICO	ACTARIS
VOLTAGE	UCH-12, VCL-24, VCJ-24 UCL-24, UCJ-24, UXN-24 UXJ-24, VXJ-24	VKPE-12, VKPE-24 VCF-24	U24Bha, E24Bha U24Bma, E24Bma
CURRENT	ACD-12, ACF-12, ACD-24 ACF-24, ACJ-24	AED-12, AEB-24P AED-24, AER-24	J24BM, J24BR J24BQ

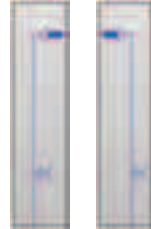
Note: For other models, please contact our Technical-Commercial department.



## TYPES OF MODULES



CGMCOSMOS-RCd  
CGMCOSMOS-RCi



**Modular cubicle, functional unit for cable rising to the busbar.**

Used to house the feeder cables to the busbar of the overall cubicle assembly on the right (RCd) or the left (RCi).

### CABLE RISER FUNCTION

#### ELECTRICAL CHARACTERISTICS

Rated voltage

12 kV

24 kV

#### PHYSICAL CHARACTERISTICS

Height mm

Width mm

Depth mm

Weight kg

1740

365

735

40



CGMCOSMOS-R2Cd  
CGMCOSMOS-R2Ci



**Modular cubicle, functional unit for double cable rising to the busbar.**

Used to house the feeder cables to the busbar of the overall cubicle assembly on the right (R2Cd) or the left (R2Ci).

### DOUBLE CABLE RISER FUNCTION

#### ELECTRICAL CHARACTERISTICS

Rated voltage

12 kV

24 kV

#### PHYSICAL CHARACTERISTICS

Height mm

Width mm

Depth mm

Weight kg

1740

550

735

60

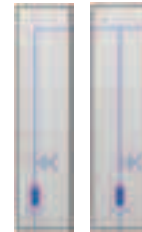


CGMCOSMOS-RBd  
CGMCOSMOS-RBa

**Modular cubicle, functional unit for busbar rising**, with gas insulation.

Extendibility: Right or both sides.

Used to house the incoming or outgoing medium-voltage cable feeder, making it possible to communicate to the busbar of the overall cubicle assembly, either on the right (RBd) or both sides (Rba).



**BUSBAR RISER FUNCTION**

ELECTRICAL CHARACTERISTICS

Rated voltage	12 kV	24 kV
Rated current	400/630	
In busbars and cubicle interconnection [A]	400/630	

PHYSICAL CHARACTERISTICS

Height mm	Width mm	Depth mm	Weight kg
1740	365	735	95

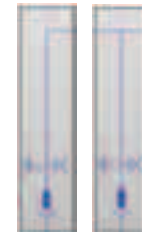


CGMCOSMOS-RBd-Pt  
CGMCOSMOS-RBa-Pt

**Modular cubicle, functional unit for busbar rising**, with gas insulation, equipped with an earthing disconnector.

Extendibility: Right or both sides.

Used to house the incoming or outgoing medium-voltage cable feeder, either on the right (RBd-Pt) or both sides (Rba-Pt) and the earthing of the cables and the busbar of the overall cubicle assembly.



**BUSBAR RISER FUNCTION WITH EARTHING**

ELECTRICAL CHARACTERISTICS

Rated voltage	12 kV	24 kV
Rated current	400/630	
On busbars and cubicle interconnection [A]	400/630	400/630
Incoming feeder [A]	400/630	400/630
Rated withstand voltage at power frequency (1 min)		
To earth and between phases [kV]	28	50
At the isolating distance [kV]	32	60
Making capacity of the earthing disconnector (peak value) [kA]	40/50*/62.5	40/50*
Earthing disconnector class IEC 60129	E2-M0	E2-M0
No. of short-circuit making operations	5	5

(\*) Test conducted with a current of 52.5 kA

PHYSICAL CHARACTERISTICS

Height mm	Width mm	Depth mm	Weight kg
1740	365	735	100

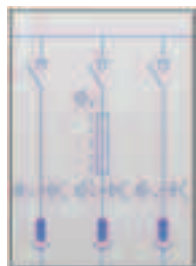
## TYPES OF MODULES



### CGMCOSMOS-2LP

**Compact cubicle, two incoming feeder and one fused-protection functional units**, including the features of both the feeder and protection cubicles, housed in a single gas tank.

Extendibility: Right, left, both sides or none.



### FEEDER AND FUSED PROTECTION FUNCTIONS

ELECTRICAL CHARACTERISTICS	12 kV		24 kV	
	Feeder	Fused Protection	Feeder	Fused Protection
Rated voltage	12 kV		24 kV	
Rated current				
On busbars and cubicle interconnection [A]	400/630	400/630	400/630	400/630
Incoming feeder [A]	400/630	-	400/630	-
Transformer off rated current [A]	-	200	-	200
Rated withstand voltage at power frequency (1 min)				
To earth and between phases [kV]	28	28	50	50
At the isolating distance [kV]	32	32	60	60
Lightning impulse withstand voltage				
To earth and between phases [kV]	75	75	125	125
At the isolating distance [kV]	85	85	145	145
Short-time withstand current (main circuit)				
Rated value 1 s [kA]	16/20*/25	16/20*/25	16/20*/25	16/20*/25
Rated value 3 s [kA]	16/20*	16/20*	16/20*	16/20*
Peak value [kA]	40/50*/62.5	40/50*/62.5	40/50*/62.5	40/50*/62.5
Breaking capacity of mainly active current [A]	400/630	400	400/630	400
Breaking capacity of cable-charging current [A]	50	-	50	-
Breaking capacity of line-charging current [A]	1.5	-	1.5	-
Breaking capacity of closed loop current [A]	400/630	-	400/630	-
Breaking capacity of earth fault current [A]	300	-	300	-
Breaking capacity of cable-charging under earth faults [A]	100	-	100	-
Short-circuit making current (peak value) [kA]	40/50*/62.5	40/50*/62.5	40/50*/62.5	40/50*/62.5
Switch class IEC 60265-1				
"E2" [A/kA] (manual)	630/62,5	-	630/62,5	-
"E3" [A/kA] (motor)	400/40 <sup>#</sup>	400/40 <sup>#</sup>	400/40 <sup>#</sup>	400/40 <sup>#</sup>
"E3" [A/kA] (motor)	630/50 <sup>#</sup>	-	630/50 <sup>#</sup>	-
Shortcircuit breaking capacity (fuses) [kA]	-	16/20*	-	16/20*
Short time withstand current (earthing disconnecter)				
Rated value 1 s [kA]	16/20*/25	1/3	16/20*/25	1/3
Rated value 3 s [kA]	16/20*	1/3	16/20*	1/3
Peak value [kA]	40/50*/62.5	2.5/7.5	40/50*/62.5	2.5/7.5
Making capacity of the earthing disconnecter (peak value) [kA]	40/50*/62.5	2.5/7.5	40/50*/62.5	2.5/7.5
Earthing disconnecter class IEC 60129	E2-M0	E2-M0	E2-M0	E2-M0
No. of short-circuit making operations	5	5	5	5
Take-over current of switch - ekorRPT relay combination (Maximum breaking current as per TD 5 IEC 60420) [A]	-	1250	-	1250
Transfer current of switch-fuse combination (Maximum breaking current as per TD 4 IEC 60420) [A]	-	1500	-	1300

(\*) Tests conducted with a current of 21 kA / 52.5 kA

(<sup>#</sup>) Tests conducted at a voltage of 24 kV

### PHYSICAL CHARACTERISTICS

	Height mm	Width mm	Depth mm	Weight kg
Upon request	1740	1190	735	290
	1300	1190	735	270

#### NOTE:

The additional protection, measurement, control and automation functional features are described further in the respective section, as well as in the section on the ekorSYS Family.





CGMCOSMOS-RLP

**Compact cubicle, a busbar riser, a fused-protection and an incoming feeder functional unit**, which includes the features of the busbar riser, feeder and fuse-protection cubicles, housed in a single enclosure.

Extendibility: Right, left, both sides or none.

**BUSBAR RISER, FEEDER AND FUSED-PROTECTION FUNCTIONS**

ELECTRICAL CHARACTERISTICS	Busbar riser	Feeder	Fused Protection	Feeder	Fused Protection
	12 /24kV	12 kV		24 kV	
Rated voltage					
Rated current					
On busbars and cubicle interconnection [A]	400/630	400/630	400/630	400/630	400/630
Incoming feeder [A]	400/630	400/630	-	400/630	-
Transformer off rated current [A]	-	-	200	-	200
Rated withstand voltage at power frequency (1 min)					
To earth and between phases [kV]		28	28	50	50
At the isolating distance [kV]		32	32	60	60
Lightning impulse withstand voltage					
To earth and between phases [kV]		75	75	125	125
At the isolating distance [kV]		85	85	145	145
Short-time withstand current (main circuit)					
Rated value 1 s [kA]		16/20*/25	16/20*/25	16/20*/25	16/20*/25
Rated value 3 s [kA]		16/20*	16/20*	16/20*	16/20*
Peak value [kA]		40/50*/62.5	40/50*/62.5	40/50*/62.5	40/50*/62.5
Breaking capacity of mainly active current [A]		400/630	400	400/630	400
Breaking capacity of cable-charging current [A]		50	-	50	-
Breaking capacity of line-charging current [A]		1.5	-	1.5	-
Breaking capacity of closed loop current [A]		400/630	-	400/630	-
Breaking capacity of earth fault current [A]		300	-	300	-
Breaking capacity of cable-charging under earth faults [A]		100	-	100	-
Short-circuit making current (peak value) [kA]		40/50*/62.5	40/50*/62.5	40/50*/62.5	40/50*/62.5
Switch class IEC 60265-1					
“E2” [A/kA] (manual)		630/62.5	-	630/62.5	-
“E3” [A/kA] (motor)		400/40 <sup>#</sup>	400/40 <sup>#</sup>	400/40 <sup>#</sup>	400/40 <sup>#</sup>
“E3” [A/kA] (motor)		630/50 <sup>#</sup>	-	630/50 <sup>#</sup>	-
Shortcircuit breaking capacity (fuses) [kA]		-	16/20*	-	16/20*
Short time withstand current (earthing disconnector)					
Rated value 1 s [kA]		16/20*/25	1/3	16/20*/25	1/3
Rated value 3 s [kA]		16/20*	1/3	16/20*	1/3
Peak value [kA]		40/50*/62.5	2.5/7.5	40/50*/62.5	2.5/7.5
Making capacity of the earthing disconnector (peak value) [kA]		40/50*/62.5	2.5/7.5	40/50*/62.5	2.5/7.5
Earthing disconnector class IEC 60129		E2-M0	E2-M0	E2-M0	E2-M0
No. of short-circuit making operations		5	5	5	5
Take-over current of switch - ekorRPT relay combination (Maximum breaking current as per TD 5 IEC 60420) [A]		-	1250	-	1250
Transfer current of switch-fuse combination (Maximum breaking current as per TD 4 IEC 60420) [A]		-	1500	-	1300



(\*) Tests conducted with a current of 21 kA / 52.5 kA

(<sup>#</sup>) Tests conducted at a voltage of 24 kV

**PHYSICAL CHARACTERISTICS**

Height mm	Width mm	Depth mm	Weight kg
1740	1190	735	290

**NOTE:**

The additional protection, measurement, control and automation functional features are described further in the respective section, as well as in the section on the ekorSYS Family.

## TYPES OF MODULES



### CGMCOSMOS-2L

**Compact cubicle, two incoming feeder functional units,** which includes the features of the incoming feeder cubicles, housed in a single gas tank.

Extendibility: Right, left or both sides.



#### FEEDER FUNCTIONS

##### ELECTRICAL CHARACTERISTICS

	12 kV	24 kV
Rated voltage		
Rated current		
On busbars and cubicle interconnection [A]	400/630	400/630
Incoming feeder [A]	400/630	400/630
Rated withstand voltage at power frequency (1 min)		
To earth and between phases [kV]	28	50
At the isolating distance [kV]	32	60
Lightning impulse withstand voltage		
To earth and between phases [kV]	75	125
At the isolating distance [kV]	85	145
Short-time withstand current (main circuit)		
Rated value 1 s [kA]	16/20*/25	16/20*
Rated value 3 s [kA]	16/20*	16/20*
Peak value [kA]	40/50*/62.5	40/50*
Breaking capacity of mainly active current [A]	400/630	400/630
Breaking capacity of cable-charging current [A]	50	50
Breaking capacity of line-charging current [A]	1.5	1.5
Breaking capacity of closed loop current [A]	400/630	400/630
Breaking capacity of earth fault current [A]	300	300
Breaking capacity of cable-charging under earth faults [A]	100	100
Short-circuit making current (peak value) [kA]	40/50*/62.5	40/50*
Switch class IEC 60265-1		
"E2" [A/kA] (manual)	630/62.5	-
"E3" [A/kA] (motor)	400/40 <sup>#</sup>	400/40 <sup>#</sup>
"E3" [A/kA] (motor)	630/50 <sup>#</sup>	630/50 <sup>#</sup>
Short time withstand current (earthing disconnector)		
Rated value 1 s [kA]	16/20*/25	16/20*
Rated value 3 s [kA]	16/20*	16/20*
Peak value [kA]	40/50*/62.5	40/50*
Making capacity of the earthing disconnector (peak value) [kA]	40/50*/62.5	40/50*
Earthing disconnector class IEC 60129	E2-M0	E2-M0
No. of short-circuit making operations	5	5

(\*) Tests conducted with a current of 21 kA / 52.5 kA

(<sup>#</sup>) Tests conducted at a voltage of 24 kV

##### PHYSICAL CHARACTERISTICS

	Height mm	Width mm	Depth mm	Weight kg
Upon request	1740	730	735	180
	1300	730	735	170

#### NOTE:

The additional protection, measurement, control and automation functional features are described further in the respective section, as well as in the section on the ekorSYS Family.



STANDARD ASSEMBLIES  
CGMCOSMOS-3LP/2L2P/3L2P

Group of modules forming one unit; composed of two or three incoming feeder functional units and one or two fused-protection functional units, depending on the specific case,

which include the features of both the incoming feeder line and protection functional units.

Extendibility: Right, left, both sides or none.

ELECTRICAL CHARACTERISTICS	Feeder	Fused Protection	Feeder	Fused Protection
	12 kV		24 kV	
Rated voltage	12 kV		24 kV	
Rated current				
On busbars and cubicle interconnection [A]	400/630	400/630	400/630	400/630
Incoming feeder [A]	400/630	-	400/630	-
Transformer off rated current [A]	-	200	-	200
Rated withstand voltage at power frequency (1 min)				
To earth and between phases [kV]	28	28	50	50
At the isolating distance [kV]	32	32	60	60
Lightning impulse withstand voltage				
To earth and between phases [kV]	75	75	125	125
At the isolating distance [kV]	85	85	145	145
Short-time withstand current (main circuit)				
Rated value 1 s [kA]	16/20*/25	16/20*/25	16/20*/25	16/20*/25
Rated value 3 s [kA]	16/20*	16/20*	16/20*	16/20*
Peak value [kA]	40/50*/62.5	40/50*/62.5	40/50*/62.5	40/50*/62.5
Breaking capacity of mainly active current [A]	400/630	400	400/630	400
Breaking capacity of cable-charging current [A]	50	-	50	-
Breaking capacity of line-charging current [A]	1.5	-	1.5	-
Breaking capacity of closed loop current [A]	400/630	-	400/630	-
Breaking capacity of earth fault current [A]	300	-	300	-
Breaking capacity of cable-charging under earth faults [A]	100	-	100	-
Short-circuit making current (peak value) [kA]	40/50*/62.5	40/50*/62.5	40/50*/62.5	40/50*/62.5
Switch class IEC 60265-1	-	-	-	-
“E2” [A/kA] (manual)	630/62.5	-	630/62.5	-
“E3” [A/kA] (motor)	400/40 <sup>#</sup>	400/40 <sup>#</sup>	400/40 <sup>#</sup>	400/40 <sup>#</sup>
“E3” [A/kA] (motor)	630/50 <sup>#</sup>	-	630/50 <sup>#</sup>	-
Shortcircuit breaking capacity (fused) [kA]	-	16/20*	-	16/20*
Short time withstand current (earthing disconnecter)				
Rated value 1 s [kA]	16/20*/25	1/3	16/20*/25	1/3
Rated value 3 s [kA]	16/20*	1/3	16/20*	1/3
Peak value [kA]	40/50*/62.5	2.5/7.5	40/50*/62.5	2.5/7.5
Making capacity of the earthing disconnecter (peak value) [kA]	40/50*/62.5	2.5/7.5	40/50*/62.5	42.5/7.5
Earthing disconnecter class IEC 60129	E2-M0	E2-M0	E2-M0	E2-M0
No. of short-circuit making operations	5	5	5	5
Take-over current of switch - ekorRPT relay combination (Maximum breaking current as per TD 5 IEC 60420) [A]	-	1250	-	1250
Transfer current of switch-fuse combination (Maximum breaking current as per TD 4 IEC 60420) [A]	-	1500	-	1300

(\*) Tests conducted with a current of 21 kA / 52.5 kA

(<sup>#</sup>) Tests conducted at a voltage of 24 kV

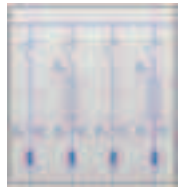
PHYSICAL CHARACTERISTICS

	Height mm	Width mm	Depth mm	Weight kg
CGMCOSMOS-3LP	1740/ 1300 <sup>e</sup>	1565	735	385/ 355
CGMCOSMOS-2L2P	1740/ 1300 <sup>e</sup>	1670	735	430/ 400
CGMCOSMOS-3L2P	1740/ 1300 <sup>e</sup>	2035	735	525/ 490

(<sup>e</sup>) Under request

NOTE:

The additional protection, measurement, control and automation functional features are described further in the respective section, as well as in the section on the ekorSYS Family.



## ORMALINK

The various modules of the **CGMCOSMOS** system are electrically connected by the **ORMALINK** connecting set, patented in 1991 by Ormazabal.

In terms of construction, the extendible cubicles have lateral female bushings that allow their main busbars to be connected by means of this assembly, allowing current to flow while also controlling the electric field by means of the respective elastomer insulation layers, which are free of partial discharges.

Nevertheless, until new modules are installed in the transformer substation, the extendible cubicles are provided with sealing plugs for the lateral female bushings, which need to be removed for connection.



Due to the design of the **ORMALINK** connecting set, an equipotential area is created inside which houses a series of contacts arranged in a circle to connect the standard bushings.

This achieves highly reliable and resistant electric continuity even resistant to short-circuit currents. Other important aspects are the ease of installation (even in transformer substations with uneven floors) and the capacity to maintain

## OPERATING SAFETY



## INTERLOCKS

The **CGMCOSMOS** system has a series of interlocks to ensure safe, reliable service, in accordance with the requirements of the IEC 60298 standard.

Based on the design and the inclusion of additional interlocks, the switch-disconnector and the earthing disconnector cannot be closed simultaneously.

An interlock operated by the earthing disconnector prevents the access cover to the MV cable terminals from opening, thereby preventing unsafe operations.

In addition, the access to the fuse holders in the protection functional units is also secured with the same interlock. Switching operations with these units cannot be performed unless the cable compartments are properly closed.

The **CGMCOSMOS** cubicles allow switching to be disabled by padlocks (up to three) for both the switch-disconnector and the earthing disconnector.

Optionally, switching defeating devices with locks are available for any of the operations.



### EKORVPIS VOLTAGE PRESENCE INDICATOR

The **ekorVPIS**, a self-powered indicator integrated in the cubicles, indicates the presence of voltage in the phases by means of three permanent indicator lights and has been designed to meet IEC 61958. Readily accessible test points are provided for testing the phase coincidence. The **ekorSPC** phase comparator can be supplied as an option.



### EKORSAS ACOUSTIC ALARM

The **ekorSAS**, acoustic alarm to prevent earthing, is a self-powered audible indicator that works along with the **ekorVPIS** voltage presence indicator. The device is activated when an attempt is made to operate the earthing shaft under power cable voltage, thereby alerting the operator of the attempt to perform an improper switching operation. This provides greater safety for goods and services during network operation, preventing no-voltage conditions in the network and improving power quality.

## PROTECTION FUNCTIONS



### WITH FUSES

MV network short-circuit protection is provided by fuses installed in the cubicles.

The fuse holder tubes are installed horizontally (for uniform temperature over the entire length) in the gas enclosure, and are fully leak-proof (in the closed position), ensuring tightness against flooding and external pollution.

In accordance with IEC 60420, the switch-fuse relationship may be "associated" or "combined", with the tripping of any fuse indicated in the latter case on the synoptic of the cubicle. The switch-fuse assembly was heat tested under normal operating conditions as per IEC 60694.



### WITH FUSES AND TRIP COIL

This option allows the switch-disconnector to be automatically opened by an external signal, such as one sent by the transformer thermostat in case of overheating.



### SELECTION TABLE FOR RECOMENDED SIBA LOW-LOSS FUSES WITH MEDIUM-SIZE STRIKER

#### Transformer Rated Power WITHOUT OVERLOAD (kVA)

Rated Voltage [kV]	Transformer Rated Power WITHOUT OVERLOAD (kVA)																		
	25	50	75	100	125	160	200	250	315	400	500	630	800	1000	1250	1600	2000		
Network	Fuse rated current [A] IEC 60282-1																		
Cubicle	6.3	10	16	16	20	20	25	31.5	40	50	63	63	80	100	160	200*	250*		
Fuse	6.3	6.3	10	16	16	20	20	25	31.5	40	50	63	63	80	100	-	-		
10	12	6/12	6.3	10	16	16	20	20	25	31.5	40	50	63	63	80	100	160	200*	250*
13.2	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	160*	-
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

- Notes:
- \*Ratings correspond to the associated fuse values.
  - There is a 292 mm fuse-holder trolley adapted to the size of the 6/12 kV fuses, except for the 1600 and 2000 kVA ratings, where the length is 442 mm.
  - For other brands and for transformer overload, please contact our Technical-Commercial department.

## PROTECTION FUNCTIONS

### WITH FUSES AND EKORRPT PROTECTION, MEASURING AND CONTROL

The option of including the **ekorrPT** unit also provides protection against overcurrents and earth faults, thereby increasing facility protection in a more reliable manner and making it completely selective with other protection devices, whether phase or earth.

The **ekorrPT** unit was specifically developed for application to the fused-protection functional unit of the **CGMCOSMOS** system. The unit consists of an electronic relay with communication capabilities, as well as current sensors, bistable tripping unit and, depending on the model, self-powered toroidal current transformers, if powered directly from the medium-voltage current and not by external power supplies. Moreover, the unit comes completely factory-installed and tested.

When an overcurrent within the admissible values for the switch under load conditions, the relay acts on the bistable tripping unit, causing the circuit to open. If the values are higher, the relay will not act, with the protection function assumed by the fuses. If the unit trips, then the fault current, reason, duration, date and time are recorded in memory. When the earth fault current is less than 10% of the phase current rating, ultrasensitive protection should be used.

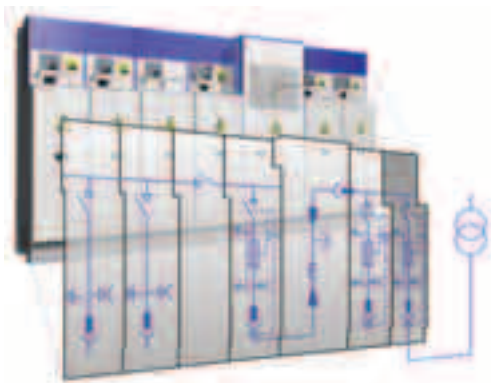
The current is measured with sensors having a high transformer ratio, which allows a broad range of power ratings to be protected using the same unit. This has a potential-free input associated with the transformer temperature thermostat to provide protection against overheating.

For the adjustment and monitoring of parameters using a personal computer, please refer to the section on **ekorSOFT**.

The **ekorrPT** unit is self-powered from 5 A (150 kVA at 20 kV), and is fully autonomous with no need for batteries or any other type of outside power source. For rated currents below 5 A, auxiliary power units are also available.

The unit is used to protect distribution equipment between 50 and 2000 kVA. High-value polyphase short-circuits are cleared by fuses.

For automated/remote controlled facilities, some **ekorrPT** models come with integrated control function.



TRANSFORMER PROTECTION



GENERAL PROTECTION



CGMCOSMOS-P with ekorrPT

#### POWER RATINGS TO BE PROTECTED WITH ekorrPT

Network voltage [kV]	Fuse rated voltage [kV]	MINIMUM transformer power rating		MAXIMUM transformer power rating	
		Fuse rating [A]	[kVA]	Fuse rating [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

NOTE:

Further information in the section on the ekorSYS Family.

(\*) 442 mm cartridge  
(\*\*) SIBA SSK 125 A fuse



WITH CIRCUIT BREAKER AND EKORRPG PROTECTION, MEASURING AND CONTROL UNIT

This functional unit equipped with a vacuum circuit breaker provides for making and breaking capacity, even under fault conditions (overcurrent and short circuit) in the general MV network.

The protection functions are carried out exclusively by the **ekorRPG** unit, which has been specifically developed for use with the **CGMCOSMOS-V** circuit breaker function. This unit consists of an electronic relay with communication capabilities, as well as current sensors and, depending on the model, power supply card and/or self-powered toroidal measuring transformers, if not powered by external power supplies. Moreover, it comes completely factory-installed and tested.

This unit acts when there are 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 tripping unit that operates the circuit breaker, causing the circuit to open. If the unit trips, then the fault current, reason, duration, date and time are recorded in memory.

When the earth fault current is less than 10% of the phase current rating, ultrasensitive protection should be used.

For the setting and monitoring of parameters using a personal computer, please refer to the section on **ekorSOFT**.



CGMCOSMOS-V with ekorRPG



GENERAL PROTECTION

The **ekorRPG** unit is self-powered from 5 A (150 kVA at 20 kV), and is fully autonomous with no need for batteries or any other type of outside power sources. For rated currents below 5 A, auxiliary power units are also available.

The unit is used for protecting distribution equipment between 50 and 15000 kVA.

For automated/remote controlled facilities, some **ekorRPG** models come with integrated control function.

POWER RATINGS TO BE PROTECTED with ekorRPG

Network voltage [kV]	Minimum power [kVA]	Maximum power [kVA]
6.6	50	5000
10	100	7500
12	100	10000
13.2	100	10000
15	100	12000
20	160	15000

NOTE:  
Further information in the section on the ekorSYS Family.

## DETECTION, AUTOMATION AND CONTROL FUNCTIONS



### WITH FEEDER FUNCTIONAL UNIT AND/OR BUSBAR SWITCH FUNCTIONAL UNIT AND EKORRCI INTEGRATED CONTROL UNIT

The option to include the **ekorRCI** unit allows the distribution network to be automated. This facilitates immediate identification and subsequent isolation of the faulted zones, attaining a noticeable improvement in power quality, as well as fewer switching operations of the network components.

The **ekorRCI** unit has been developed for use with the feeder and busbar switch functional units of the **CGMCOSMOS** system. This unit consists of an electronic relay with communication capabilities, as well as current sensors. Moreover, it is completely factory-installed and tested.

The **ekorRCI** unit is equipped with fault indication, voltage presence or absence detection, automatic sectionalizer function, switch operation and communications means for remote control.

For the setting and monitoring of parameters using a personal computer, please refer to the section on **ekorSOFT**.



CGMCOSMOS-S-Ptd with ekorRCI



CGMCOSMOS-L with ekorRCI

NOTE:  
Further information in the section on the ekorSYS Family.



## EKORSYS FAMILY



## OVERVIEW

This family includes a series of units, patented by Ormazabal, which can be integrated in the **CGMCOSMOS** system to provide protection, measuring, control and signalling functions in the Medium-Voltage Distribution Networks.

The various units provide added value to the facilities by extending service life, while further ensuring equipment and personal safety and enhancing the quality of service:

- **ekorRPT**: Protection, measuring and control unit, specifically developed for application to the fused protection functional unit.
- **ekorRPG**: Protection, measuring and control unit developed for application to the circuit breaker functional unit.
- **ekorRCI**: Signalling, measuring and control unit, specifically developed for application to the feeder functional unit.
- **ekorRTK**: Detection unit for the presence/absence of voltage.
- Measuring **sensors and self-power toroidal current transformers**.
- Power supply **card**.
- **Bistable tripping unit**.
- **ekorVPIS**: Integrated signalling voltage presence indicator.
- **ekorSPC**: Phase comparator. Device to indicate phase coincidence between two cubicles.
- **ekorSAS**: Acoustic alarm to prevent earthing.
- **ekorCCP**: Programmable cubicle controller.
- **ekorSTP**: Automatic incoming feeder transfer.
- **ekorSOFT**: ekorSYS family management software.
- **Mercury**: Computer application for remote control of transformer substations from a SCADA-based control station.



## MAIN FEATURES

- **Integration**

Lowered risk of wiring and installation errors, due to full integration in the **CGMCOSMOS** system, also reducing the commissioning time and minimizing the need to install control boxes on the cubicles.

- **Optimization**

From the point of view of electric maintenance, these equipments offer a number of advantages that reduce the time and probability of errors involved in checking and resetting tasks. This is done by means of test sockets, terminal strips that can be accessed and disconnected for testing by means of current injection, test contacts, etc.

- **Evolution**

These units include state-of-the-art microprocessors for processing signals from the measuring sensors and are also equipped with digital displays, keypads for local settings and operation, etc.

- **Self-powering**

Depending on the models, toroidal current transformers can be optionally used to power the units when the primary current is above 5 A. This level is sufficient for proper operation.

- **Data logging**

The last few trips are stored in a log with a date-time stamp, the total number of switching operations, and the various settings and configuration parameters of the system. The local, menu-driven interface provides instantaneous values of the current measurement for each phase and for zero-sequence current, as well as the reasons for tripping.

- **Communicability**

The RS-232 port on the front of the relay allows communication to computer devices, allowing the configuration and/or setting from the **ekorSOFT** software as well as event logging. The RS-485 port can be used for remote control functions.

## APPLIED STANDARDS

The **ekorSYS** protection, measuring, control and signalling units have been designed to meet the specifications of the following standards:

**IEC 60298**

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

**IEC 60255**

Electrical relays.

**IEC 61000**

Electromagnetic compatibility (EMC).

**IEC 60068**

Environmental testing.

**IEC 60044**

Instrument transformers.

\*Note: The IEC standards are currently being updated, and therefore the nomenclature may vary in some cases.



## TYPES OF UNITS

The **ekorRPT** protection, measuring and control unit installed in the fused-protection functional unit offers the following features:

FEATURES of the ekorRPT unit	
<b>GENERAL</b>	
No. of phase current sensors	3
Earth (zero-sequence) current sensor	Optional
No. of digital inputs	2
No. of digital outputs	2
Power supply: 24-125 VDC / 24-110 VAC	Optional
Self-powering (*)	Optional
<b>PROTECTION</b>	
Phase overcurrent (50-51)	Standard
Earth fault overcurrent (50N-51 N)	Optional
Ultrasensitive earth fault (50-51 Ns)	Optional
Thermometer (49T)	Standard
<b>DISPLAYS</b>	
Indication of reason for tripping	Standard
Error display	Optional
<b>MEASURING</b>	
Current	Standard
<b>COMUNICATIONS</b>	
MODBUS-RTU	Standard
RS-232 configuration port	Standard
RS-485 remote control port	Standard
ekorSOFT setup and monitoring program	Optional
<b>TESTING</b>	
Test block for current injection	Standard
Test output contact	Standard



(\*) For single-phase currents from 5 A (150 kVA at 20 kV).  
It allows 230 VAC power supply.



## TYPES OF UNITS

### ekorRPG

The **ekorRPG** protection, measuring and control unit installed in the circuit breaker functional unit offers the following features:



FEATURES of the ekorRPG unit	
<b>GENERAL</b>	
No. of phase current sensors	3
Earth (zero-sequence) current sensor	Optional
No. of digital inputs	2
No. of digital outputs	2
Power supply: 24-125 VDC / 24-110 VAC	Optional
Self-powering (*)	Optional
<b>PROTECTION</b>	
Phase overcurrent (50-51)	Standard
Earth fault overcurrent (50N-51 N)	Optional
Ultrasensitive earth fault (50-51 Ns)	Optional
Thermometer (49T)	Standard
<b>DISPLAYS</b>	
Indication of reason for tripping	Standard
Error display	Optional
<b>MEASURING</b>	
Current	Standard
<b>COMUNICATIONS</b>	
MODBUS-RTU	Standard
RS-232 configuration port	Standard
RS-485 remote control port	Standard
ekorSOFT setup and monitoring program	Optional
<b>TESTING</b>	
Test block for current injection	Standard
Test output contact	Standard

(\*) For single-phase currents from 5 A (150 kVA at 20 kV). It allows 230 VAC power supply.



## TYPES OF UNITS

**ekorRCI**

The **ekorRCI** detection, automation and control unit installed in the feeder and busbar switch functional units offers the following features:

FEATURES of the ekorRCI unit	
<b>GENERAL</b>	
No. of phase current sensors	3
Earth (zero-sequence) current sensor	Optional
Voltage sensors	Standard
Power supply: 24-125 VDC / 24-110 VAC	Optional
Self-powering	No
History logs	Standard
Clock synchronization	Standard
<b>DETECTION</b>	
Phase-to-phase overcurrent (DT)	Standard
Phase-to-earth overcurrent (DT, NI, VI, EI)	Optional
Ultrasensitive overcurrent (DT, NI, VI, EI)	Optional
Voltage presence/absence detection	Standard
<b>AUTOMATION AND CONTROL</b>	
5 inputs	Standard
7 outputs	Standard
Switch status	Standard
Switch operation	Standard
Switch abnormality	Standard
Earthing disconnecter status	Standard
Automatic sectionalizer	Standard
Display reset	Standard
<b>MEASURING</b>	
Current	Standard
Voltage (presence/absence)	Standard
<b>COMMUNICATIONS</b>	
MODBUS-RTU	Standard
RS-232 configuration port	Standard
RS-485 remote control port (twisted pair and fibre optics)	Standard
ekorSOFT setup and monitoring program	Optional





## TYPES OF UNITS

Detection unit for the presence/absence of voltage in MV networks, developed for the **CGMCOSMOS** system. Targeted for use in automated facilities, this device provides a separate signal for each phase, thereby avoiding the use of voltage transformers:

### TECHNICAL CHARACTERISTICS of the ekorRTK

RATED VALUES		
Network voltage	Detection values	3.5/13.8/15/20/30 kV
	Measuring tolerance	± 10%
Display time	Time setting	50/100 ms
	Time tolerance	± 10 ms
Output contacts	Voltage	380 VAC, 230 VDC
	Current	16 A (AC)
	Switching power	500 VA (resistive load)
Input voltage	AC	17 V...260 V
	DC	17 V...360 V
Power consumption		< 2.5 W
Temperature	Operation	-10 °C...+60 °C
	Storage	-25 °C...+70 °C





## MEASURING SENSORS

These sensors are toroidal current transformers with a transformer ratio of 300/1 A or 1000/1 A. The sensors are typically factory-installed and tested in the standard bushing of the cubicles, which greatly simplifies field assembly and connection. The inner diameter of the toroidal current transformers allows cables with a cross-section of up to 400 mm<sup>2</sup> to be used without any difficulty, and subsequent maintenance testing is trouble-free.

The main advantages of using these sensors with the CGMCOSMOS system are as follows:

- **Greater reliability.** Signal pick-up is more accurate due to high transformer ratios.
- **Greater safety.** Active parts exposed to the air are no longer used, ensuring greater personal safety.
- **Smaller volume.** The design dimensions allow the equipment to be installed even in the standard bushing of the cubicle.
- **Broad range.** These units do not need to be replaced with others having a higher transformer ratio when upgrading the facility power rating.
- **Easy maintenance.** The equipment can remain in service during the tests.

A zero-sequence transformer ( $I_f \leq 10\% I_r$ ) is available for ultrasensitive detection of the earth current.



## BISTABLE TRIPPING UNIT

The bistable tripping unit is an electromechanical actuator built into the switching mechanism of the MV cubicle. It requires only a low operating energy for tripping.



## SELF-POWER TOROIDAL-TYPE TRANSFORMERS

The units provide the power necessary to supply the **ekorRP** units, using a single-phase current above 5 A (150 kVA at 20 kV) in the medium-voltage network.



## POWER SUPPLY CARD

### *Self-powered*

Converts the signal of the toroidal-type transformers to direct current, powering the relay.

### *With auxiliary power input*

Equipped with a 230 VAC input with a 10 kV insulation level, for direct connection of the card to the substation's LV board. Optionally, models for 24 to 125 VDC power supply are available.

Regardless of the type of power supply, the card also includes a protection trip test circuit, as well as the connectors necessary for functional testing using current injection during maintenance and check-up operations.



## TYPES OF UNITS

The **ekorCCP** is a programmable cubicle controller designed to be used for control applications (local or remote), switching and signalling in medium-voltage substations which require automation functions, such as feeder transfer, load shedding, reclosures, electrical interlocks between cubicles, alarm centralization, etc.

The versatility of this equipment allows applications where the unit is used alone (e.g., as a local control component) in addition to applications where the unit must work with other controllers over a communications network.

It has a modular structure with two fixed modules (CPU and power) and four for expansion, allowing the equipment to be flexibly adapted to the specific needs of each facility.

The equipment is compatible with various communications technologies (radio, fibre optics, GSM, etc.) through its channels and allows both existing and future protocols to be used.

Key features:

- Complete integration in the **CGMCOSMOS** system cubicles.
- Eliminación de los errores de cableado.
- Reduced commissioning time with respect to PLCs or conventional devices.
- Harmonious look.

### TECHINICAL CHARACTERISTICS of the ekorCCP

<b>POWER AND CONSUMPTION</b>	
Rated voltage	48 VDC
Voltage range	36 – 72 VDC
Mean power consumption	21 W
<b>INPUTS AND OUTPUTS</b>	
Digital inputs/outputs	Maximum of 4 modules with 12 inputs + 6 outputs per module
Fibre optics outputs	Maximum of 4 modules with 7 outputs per module
<b>COMMUNICATIONS</b>	
Channels	1 RS-485 / 422 port 3 RS-232 ports
Protocols	MODBUS RTU, IEC 870-5-101, SAP20, etc.
<b>OPERATING CONDITIONS</b>	
Operating temperature	- 10 to + 60 °C
Isolation and electromagnetic compatibility	Acc. to tests conducted as per IEC regulations
<b>DIMENSIONS AND WEIGHT</b>	
Dimensions	350 x 150 x 150 mm
Weight	5 kg







## TYPES OF UNITS

### ekorSOFT

The **ekorSOFT** software is a help tool used to set and monitor the parameters of the protection, metering, signalling and control units of ekorSYS family.

It has three main operating modes:

- **Display:** Indicates the status of the entire facility, for instance, the electrical measurements, date and time, protection and detection setting; etc.
- **Settings:** Makes it easier to enter or change the operational settings.
- **History logs:** Shows the data of the last events, as well as the total operations carried out by the unit.

Minimum requirements: Pentium II computer, 32 MB of RAM, MS Windows 95 operating system or higher, and RS-232 port of communications. The installation of this software from the CD-ROM requires 3 MB free space on the hard disk.



### Mercury

Computer application for remote control and operation of transformer substations from a SCADA-based control station.

This system provides the dispatching capability for power distribution, and offers the following features:

- Database
- Communications control
- Control station viewer
- Transformer substation editor
- Terminal editor
- Event editor
- Access to the transformer or distribution substation via a geographic map and single-line feeder diagram (configurable)

Requirements: Pentium II computer or higher, MS Windows NT operating system or higher.



Note: For other requirements, please contact our Technical-Commercial department.

## OPERATING MECHANISMS

The operating mechanisms of the **CGMCOSMOS** system are manufactured by means of reliable new technologies, using highly corrosion-resistant materials. Their encapsulated auxiliary circuits increase the degree of protection and isolation, thereby preventing the effects of dust and ambient humidity.

Depending on the operating mechanism (three-position disconnect or circuit breaker), several operating mechanisms are available:

- B (manual)
- BM (motor drive)
- BR (manual with holding element, for the fused-protection functional unit)
- RAV (manual for the circuit breaker)
- RAMV (motor drive for the circuit breaker)

The mechanical endurance of the operating mechanisms for the three-position disconnect is class M1 for manual mechanisms and class M2 for motor-driven mechanisms (IEC 60265 - IEC 60129). Moreover, they can be readily replaced while still under voltage in any of the three positions (closed-open-earthed).

In compliance with IEC 60129, the indication of the position of the switch-disconnector and the earthing disconnect is performed safely (kinematic chain test).



B operating mechanism.

BR operating mechanism  
Optionally, it is supplied with a trip coil.



BM operating mechanism  
Used in remotely controller substations.



### B / BR TYPE MECHANISM TRIP COIL

Rated voltage	24 VDC/48 VDC 230 VAC	110 VDC
Maximum power consumption	80 W 80 VA	80 W
Internal insulation	2 kV	2 kV
<b>Signalling contact</b>	Standard: Switch position	1 NOC 1 NOC+2 NO
	Optional: Earthing Switch position	2 NO 2NO + 2NC switch
Rated voltage	250 VAC	
Rated current	16 A	

### BM TYPE MECHANISM MOTOR DRIVES

Rated voltage	24 VDC/48 VDC/110 VDC/125 VDC 230 VAC	
Maximum power consumption	5.1 A/3.7 A/2.1 A/2.1 A 1.5 A	
Average motor operating time	3 s	
<b>Signalling contact</b>	Switch position	2 NO + 2 NC
	Earthing	2 NO
	Rated voltage	250 VAC
	Rated current	16 A

Note: For other values, please contact our Technical-Commercial department.

The mechanical endurance of the mechanisms for the circuit breaker meets the specifications of IEC 62271-100 and is class M1, providing excellent performance in applications with or without reclosing.

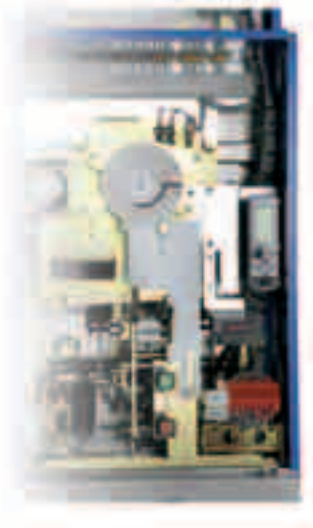
Optionally, connectable control boxes can be supplied for the installation of the signalling and operating components of the motor-driven functions.

OPERATING SEQUENCES				
O	⌚	CO	⌚	CO
	0.3 s		15 s	
	0.3 s		3 min	
	3 min		3 min	

## RAV TYPE MECHANISM TRIP COIL

	Voltage rating	24VDC/48VDC/110VDC/125VDC/230VAC
	Maximum power consumption	60 W / 60 VA
	Internal insulation	2 kV
<b>Signalling</b>	Circuit breaker position	6NO + 6NC
<b>contact</b>	Voltage rating	250 VAC
	Current rating	25 A

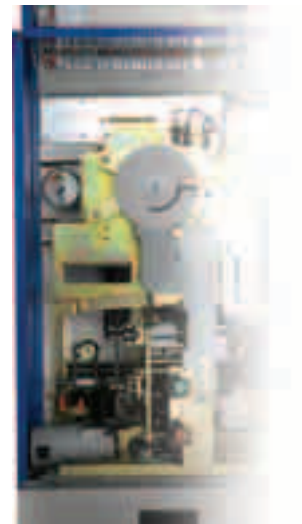
RAV type mechanism



## RAMV TYPE MECHANISM MOTOR DRIVES

	Voltage rating	24VDC/48VDC/110VDC/125VDC/230VAC
	Maximum power consumption	2.1A / 1.1A / 0.45A / 0.45A / 0.22A
	Maximum motor operating time	13 s
<b>Signalling</b>	Circuit breaker position	2 NO + 2 NC
<b>contact</b>	Earthing	1 NO + 1 NC
	Rated voltage	250 VAC
	Rated current	25 A

RAMV type mechanism



Note: For other values, please contact our Technical-Commercial department.

## CABLE CONNECTIONS

### Bushings (IEC type)

- Manufactured in epoxy resin; meet dielectric testing and partial discharge requirements.
- Three possible types (EN 50181):
  - Plug-in up to 200 A
  - Plug-in up to 400 A
  - Screw-mounting up to 630 A
- Located in the cable compartment, as an option they can be installed on the side of the cubicles for direct connection of the incoming feeder to the main busbar.

Note: For compatible ANSI bushings option, please contact our Technical-Commercial department.



## Connectors

Both for direct connection to the bushings located in the cable compartment and for those located on the side, appropriate plug-in or screw-mounted connectors should be used (when the rated current is over 400 A or the short circuit current is 16 kA or higher).

In the outgoing transformer feeders (cable compartment) of the fuse-protected functional units, 250 A plug-in connectors should be used. The connectors may be straight, or elbow connectors when rear cable output is required. Shielded connectors should be used in protection cubicles equipped with circuit breakers.



Connection detail:  
**EUROMOLD (K-158LR)**  
plug-in elbow connector



Connection detail:  
**EUROMOLD (K-400TB)**  
screw-mounted elbow connector



Connection detail:  
**EUROMOLD (K-152SR)**  
plug-in elbow connector

## CABLE CONNECTIONS



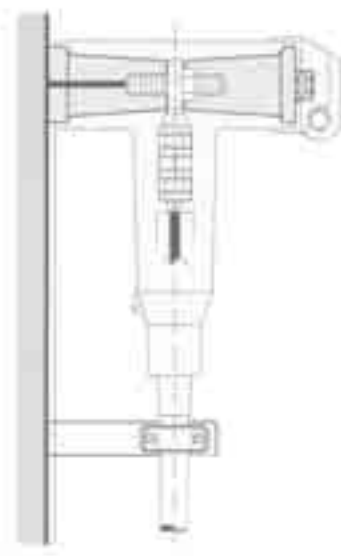
### EUROMOLD CONNECTORS TESTED IN THE CGMCOSMOS CUBICLES

#### CONNECTORS FOR 250 A BUSHING

		12 kV Connector type	12 kV Cross-section mm <sup>2</sup>	24 kV Connector type	24 kV Cross-section mm <sup>2</sup>
<b>Dry-type cable</b>	Elbow	158LR	16 - 120	K-158LR	16-120
<b>Dry-type cable</b>	Straight	152SR	16 - 120	K-152SR	16-120

#### CONNECTORS FOR 400/630 A BUSHING

		Current rating [A]	12 kV Connector type	12 kV Cross-section mm <sup>2</sup>	24 kV Connector type	24 kV Cross-section mm <sup>2</sup>
<b>Dry-type cable</b>	Shielded	400	400LR	50-240	K-400LR	25-240
		400	400TE	70-240	K-400TE	25-240
		630	400LB	25-300	K-400LB	25-300
		630	400TBR	150	K-400TBR	240
		630	400TB	35-300	K-400TB	35-300
		630	440TB	185-630	K-440TB	185-630
		630	UC412L	70-240	UC412L	50-240
<b>Oil-impregnated paper cable</b>	Shielded	630	400TB-MIND	35-300	K-400TB-MIND	35-300
		630	440TB-MIND	185-630	K-440TB-MIND	185-630



#### AUXILIARY COMPONENTS

	Up to 24 kV	Up to 36 kV
<b>Plug-in outgoing feeder in T</b>	250 A	-
<b>Plug-in outgoing feeder in X</b>	250 A	-
<b>Insulating plugs</b>	250 A	400-630 A
<b>Reducing couplings</b>	250 A	400-630 A
<b>Connection terminals</b>	250 A	400-630 A
<b>Surge arresters</b>	5 kA	10 kA

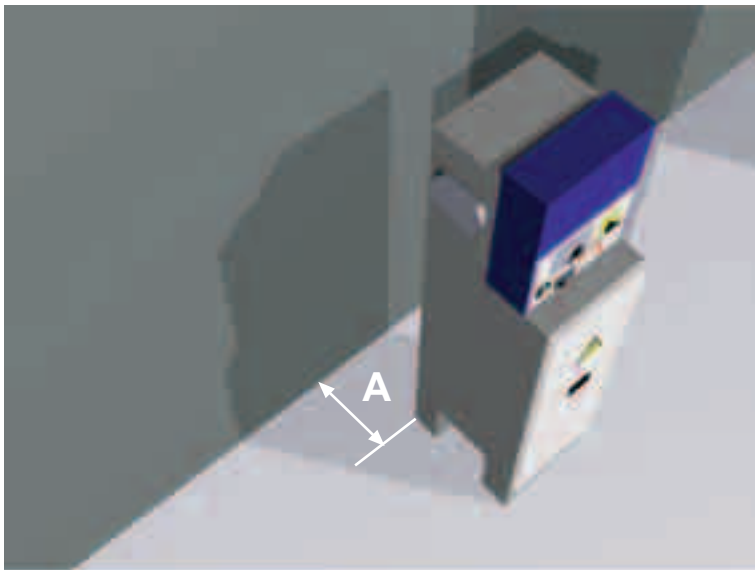
Note: For other connectors and auxiliary components, please contact our Technical-Commercial department.

All this connectors and auxiliary components have been tested in the CGMCOSMOS system.

INSTALLATION AND CIVIL WORKS

The medium voltage cable input or output in/from the cubicles of the standard **CGMCOSMOS** system (height: 1740 mm) does not require any cable trench when the feeders enter the cable compartment on the side (\*).

The recommended minimum clearances between the wall and the equipment (once the cubicles are secured to the floor) according to internal arc tests performed in a room of height 2300 mm, for gas-insulated modules, as per IEC 60298 AA Appendix are listed in the following table:



CUBICLES	
	Clearance A
CGMCOSMOS - ...	minimum 100 mm
CGMCOSMOS - V	minimum 50 mm
CGMCOSMOS -RC	0 mm
CGMCOSMOS - M	0 mm

(\* ) Note: For other configurations please contact our Technical-Commercial department.



## AUXILIARY COMPONENTS



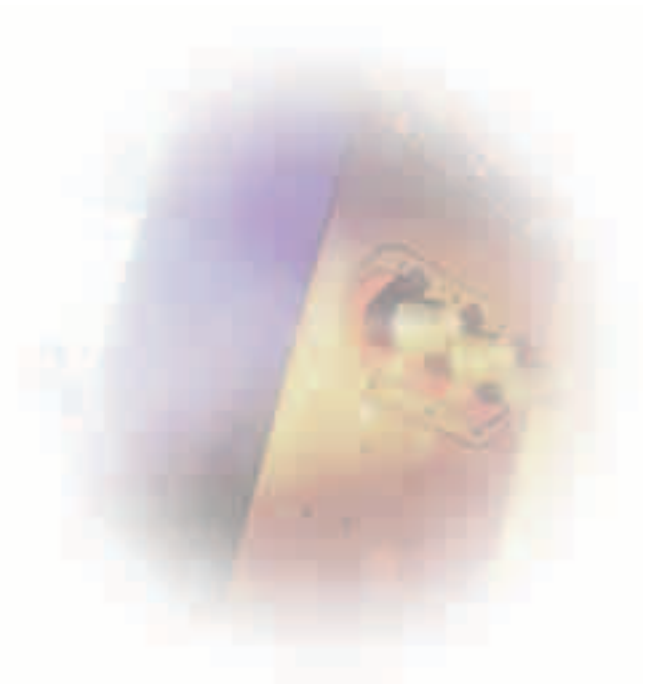
### OPERATING MECHANISMS - MOTOR DRIVES

- B operating mechanism: manual, lever-based operation for the three-position switch-disconnector.
- BR operating mechanism: manual operating mechanism with holding element for the three-position switch-disconnector (fused-protection functional unit).
- BM operating mechanism: motor-driven mechanism for the three-position switch-disconnector.
- RAV operating mechanism: manual operating mechanism for the circuit breaker.
- RMAV operating mechanism: motor-driven mechanism for the circuit breaker.
- Operating levers: for operating the switch and the earthing disconnector (optionally, antireflex).
- Control boxes.



### CONNECTIVITY

- Connecting set kit, including **ORMALINK**, earthing busbar, fasteners, instructions and other components for proper assembling of two modules.
- End connecting kit, including end plugs, metal cover to be attached on the side of one cubicle, instructions and other components for assembly.



### PROTECTION, MEASUREMENT, CONTROL AND SIGNALLING. EKORSYS FAMILY

- **ekorSPC**: Phase comparator. Indicator light to indicate phase coincidence between two cubicles.
- **ekorSOFT**: ekorSYS management software.







## FUSE PROTECTION

- 12 kV fuse holder trolley.
- 24 kV fuse holder trolley.



## METAL ENCLOSURE

- Lower front cover.
- Operating cover.
- Upper cover.
- Side box for incoming feeder connection.
- Auxiliary sections: recommended for the installation in premises with irregular floors.



## INTERLOCKS-LOCKS

- Keylock: a device for locking operations in open or closed position.



# CGMCOSMOS SYSTEM OPTIONS TABLE

OPTIONS									
	Extendible	Motor drive	ekorVPIS	ekorSAS	ekorRCI	ekorRPG	ekorRPT	Earthing	Control Box
<b>CGMCOSMOS-L</b>	Standard	Optional	Standard	Standard	Optional	N.A.	N.A.	Standard	Optional
<b>CGMCOSMOS-S</b>	Standard	Optional	Standard(*)	Optional(*)	Optional	N.A.	N.A.	Optional	Optional
<b>CGMCOSMOS-P</b>	Standard	Optional	Standard	Optional	N.A.	N.A.	Optional	Standard <sup>(double)</sup>	Optional
<b>CGMCOSMOS-V</b>	Standard	Optional	Standard	Optional	N.A.	Optional	N.A.	Standard	Optional
<b>CGMCOSMOS-M</b>	Standard	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	Optional
<b>CGMCOSMOS-RB</b>	Standard	N.A.	Standard(*)	Optional(*)	N.A.	N.A.	N.A.	Optional	N.A.
<b>CGMCOSMOS-RC</b>	Standard	N.A.	Optional	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
<b>CGMCOSMOS-2LP</b>	Optional	Optional	Standard	Standard(L)Optional(L) Optional(P)	Optional(L)	N.A.	Optional(P)	Standard	Optional
<b>CGMCOSMOS-RLP</b>	Optional	Optional(LP)	Standard(LP)	Standard(L)Optional(L) Optional(P)	Optional(L)	N.A.	Optional(P)	Standard(LP)	Optional
<b>CGMCOSMOS-2L</b>	Standard	Optional	Standard	Standard	Optional	N.A.	N.A.	Standard	Optional
<b>CGMCOSMOS-3LP</b>	Optional	Optional	Standard	Standard(L)Optional(L) Optional(P)	Optional(L)	N.A.	Optional(P)	Standard	Optional
<b>CGMCOSMOS-2L2P</b>	Optional	Optional	Standard	Standard(L)Optional(L) Optional(P)	Optional(L)	N.A.	Optional(P)	Standard	Optional
<b>CGMCOSMOS-3L2P</b>	Optional	Optional	Standard	Standard(L)Optional(L) Optional(P)	Optional(L)	N.A.	Optional(P)	Standard	Optional

- (\*) Only in the model with earthing disconnecter.  
 Standard (▬) Included as standard equipment in the indicated function.  
 Optional (▬) Optionally included in the indicated function.  
 N.A. Not applicable.

Note: For other configurations, please contact our Technical-Commercial department.

## ENVIRONMENTAL MANAGEMENT SYSTEM: ISO 14001

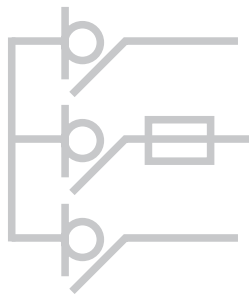
The Ormazabal production plants have implemented the corresponding environmental management systems, which comply with the requirements of the international ISO 14001 standard and have been endorsed by, among others, the AENOR Environmental Management CGM-00/38 Certificate.

The cubicles of the **CGMCOSMOS** system have been designed and manufactured according to the requirements of the international IEC 622751-200 standard.

In terms of construction and depending on the model, the cubicles have a sealed SF<sub>6</sub> compartment, which because of its design permits the total functioning of the equipment throughout the whole of its working life, which is estimated as being 30 years (Appendix GG of IEC 62271-200).

At the end of the product life cycle, the SF<sub>6</sub> gas must not be released into the atmosphere, but recovered and treated for it to be reused, according to the instructions found in the IEC 61634, IEC 60480 standards and the CIGRE 117 guide.

Ormazabal, will provide any additional information that may be required to carry out this task correctly, both for personal and environmental safety.

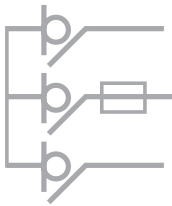


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- Transformer Substations
  - Prefabricated Transformer Substations up to 36 kV
  - Transformer Substations for Wind Farms up to 36 kV
- - Medium Voltage Switchgear for Secondary Distribution Networks
  - CGM-CGC System
  - **CGMCOSMOS System**
- Medium Voltage Switchgear for Primary Distribution Networks
- Protection, Control, Automation and Telecommand
- MV/LV Power Transformers
- Low Voltage Boards