

*Power factor
correction in*
Medium Voltage



Technology for energy efficiency

CIRCUTOR Profile

Since 1973, **CIRCUTOR** has specialised in the design, manufacture and marketing of energy efficiency equipment: measurement and control equipment for electricity, supply quality, industrial electrical protection, reactive energy compensation and harmonic filtration.



Measurement



Protection



Quality & Metering



Power factor correction and harmonic filtering



Electric vehicle recharging systems

The production capacity of **CIRCUTOR** is based on six production centres throughout Spain and the Czech Republic.

CIRCUTOR has committed itself to following the latest technological advances in order to add them to its products. It has its own test technology and laboratories that enable it to guarantee the quality of all its products.

The company is present in over 100 countries, with offices in Argentina, Mexico, Germany, France, Shanghai, Singapore, Dubai etc. **CIRCUTOR** holds certification in: • Quality (**ISO 9001**)• The Environment (**ISO 14001**)• Safety (**OSHA 18001**)• Waste (**RoHS RSC MS**)

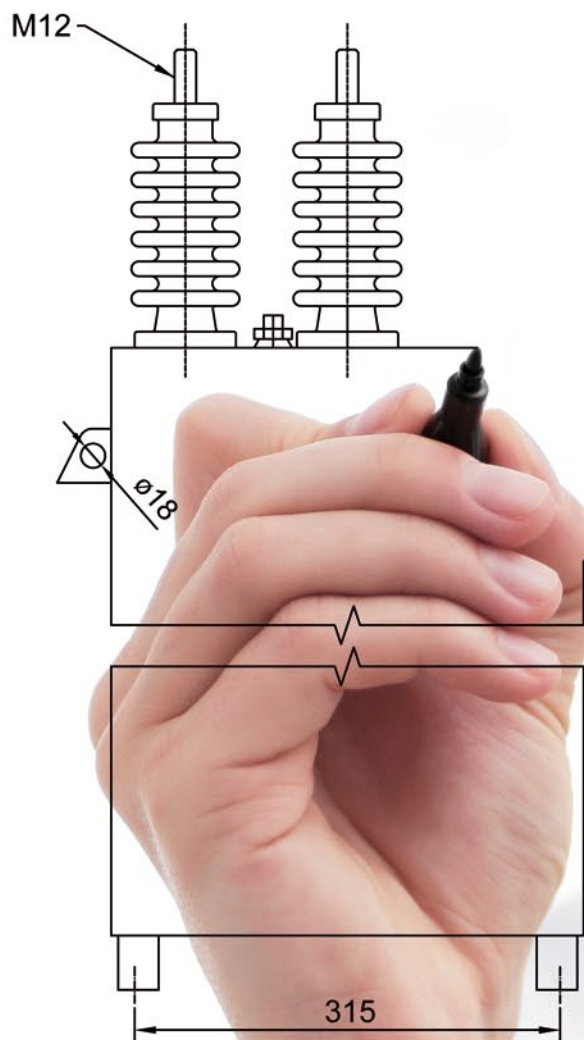


- Head office of **CIRCUTOR, SA** in Viladecavalls



- Two of the production centres of **CIRCUTOR**





"Complete solutions for power factor correction in MV"

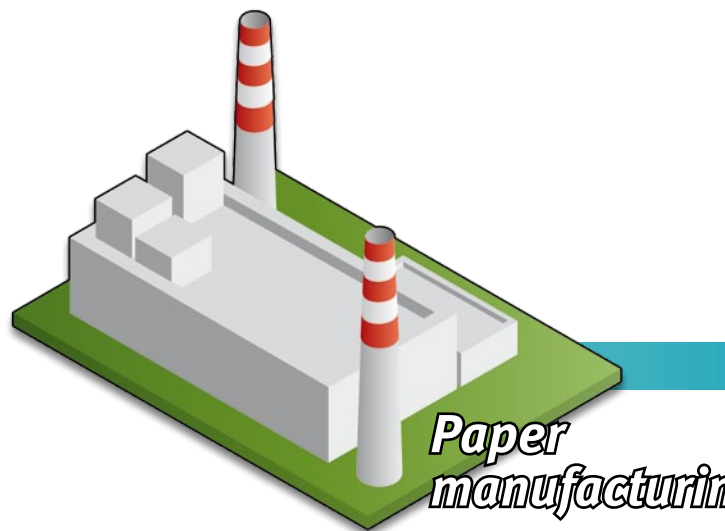
To meet market needs regarding compensation of reactive energy in medium voltage, **CIRCUTOR** has a large team of engineers and production centres, equipped with the most up-to-date technology.

***Division of
Reactive Energy***



Compensation applications in Medium Voltage

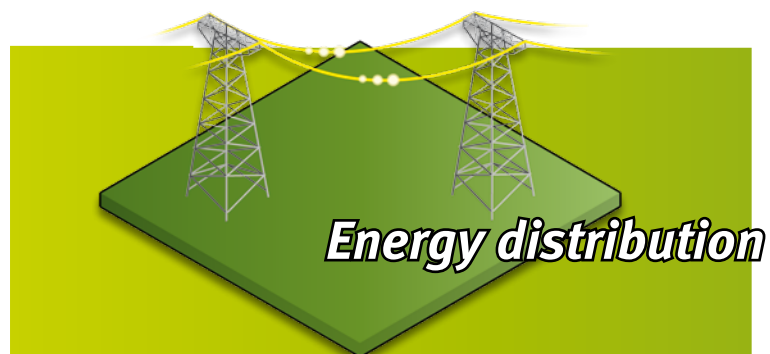
- Petrochemistry
- Water Treatment
- Cement
- Automotive industry
- Energy distribution
- Renewable energies
- Iron and steel industry
- Paper manufacture

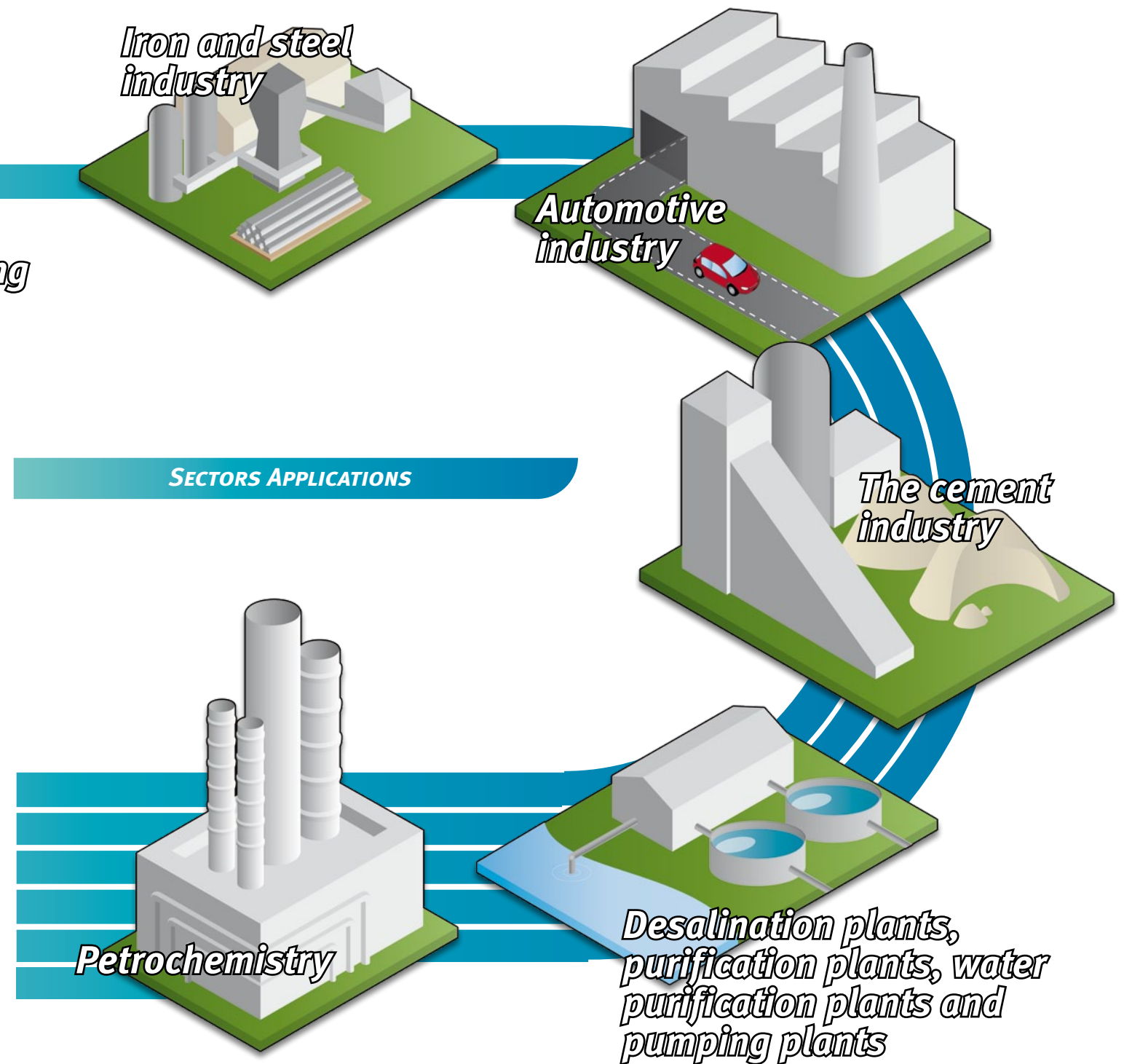


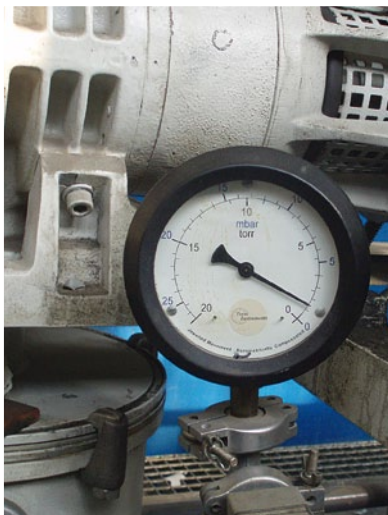
GENERATION



TRANSPORT







***“Complete Project:
Design,
Manufacture
and Test”***



Medium Voltage Capacitors

CIRCUTOR has its own technology for the design and manufacture of medium voltage capacitors, whether single phase or three-phase.

	CHV-M	CHV-T
Type	Single phase	Three-phase
Power (kvar)	50 ... 600	50 ... 500
Voltage (kV)	1 ... 24	1 ... 12
Insulation (kV)	7,2 - 12 - 17,5 - 24 - 36	7,2 - 12
Location	Indoor / Outdoor	
Impregnating agent	Biodegradable JARYLEC C101D (without PCB)	
Dielectric	Rugged polypropylene	
Resistors	Discharge at 75 V/10 minutes	
Standards	IEC 60.871-1	
Insulators	Porcelain	
Casing	Stainless steel (2 mm thick)	
Internal fuses	Yes	
Temperature	"C" -40 ... +50 °C. Average 40 °C	
Overload	1.3 I_n constant	
Overvoltage	110% 12/24 hours	

Composition of the capacitors

The **CHV** Medium Voltage capacitors are comprised of several basic capacity elements.

These basic units are connected in series and parallel groups with the objective of achieving the required power and voltage.

Capacitor protection for internal fuses

Operational advantages

- Exclusive disconnection from any damaged element
- Minimal generation of gases in the interior of the capacitor, therefore there is negligible internal excess pressure
- Continuity of service. The elimination of the damaged unit enables the continuation of the connected equipment
- Possibility of planning the maintenance of the bank
- Easier maintenance

Design advantages

- Greater capacitor power
- Use of fewer capacitors
- Reduction of the frame or cabinet sizes
- More economical cost from the bank.



■ CHV-T

Individual test of 100% of the capacitors in accordance with IEC 60871-1

RMV shock reactors

To limit transitory voltage phenomenons and high currents associated with the connection of capacitor banks, it is essential to use **RMV** shock reactors to ensure that the peak values are below that indicated in the **Standard IEC 60871-1** (less than 100 times the nominal current), and therefore maintain the integrity of the capacitors, as well as of the installation regarding voltage surges.

The value of the inductance is variable depending on the conditions of the installation, basically depending on the following parameters:

- Short-circuit power of the installation
- The existence of more capacitor banks
- Breaking capacity of the automatic switches. The peak residual connection current, once the reactance is installed, must also be lower than the shutdown power of the equipment.



■ RMV, shock reactance

RMV-260

Type	I (A)	L (μH)
RMV - 260 - 50 - 350	50	350
RMV - 260 - 60 - 250	60	250
RMV - 260 - 100 - 100	100	100
RMV - 260 - 125 - 50	125	50
RMV - 260 - 175 - 30	175	30

RMV-330

Type	I (A)	L (μH)
RMV - 330 - 60 - 450	60	450
RMV - 330 - 75 - 350	75	350
RMV - 330 - 90 - 250	90	250
RMV - 330 - 125 - 100	125	100
RMV - 330 - 200 - 50	200	50
RMV - 330 - 250 - 30	250	30

LVC vacuum contactor

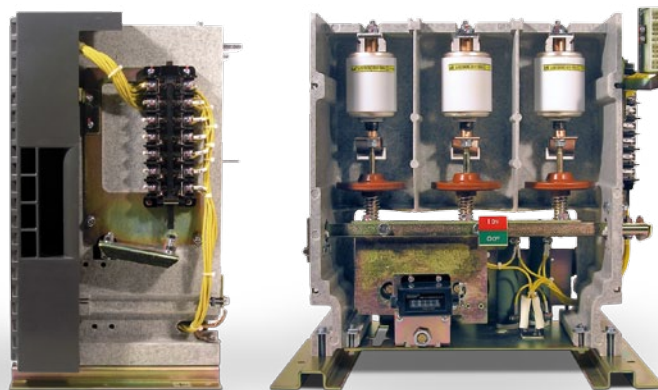
The **LVC** vacuum contactor is the perfect equipment for the handling of capacitor banks from 3.3 up to 6.6 kV. Their general characteristics are:

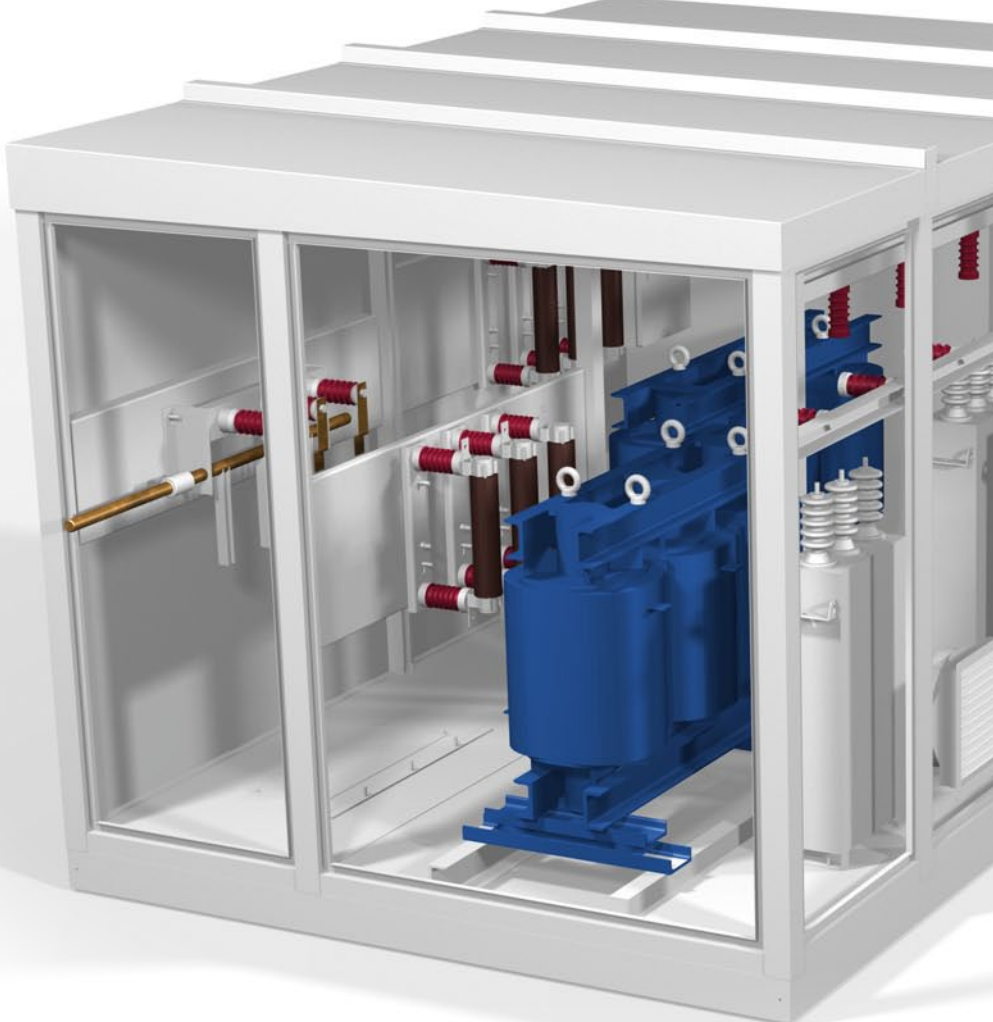
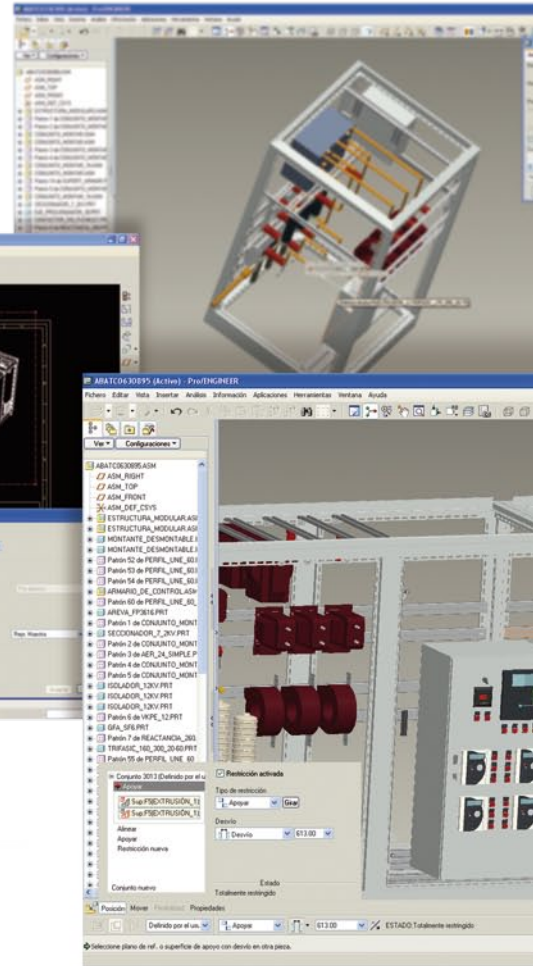
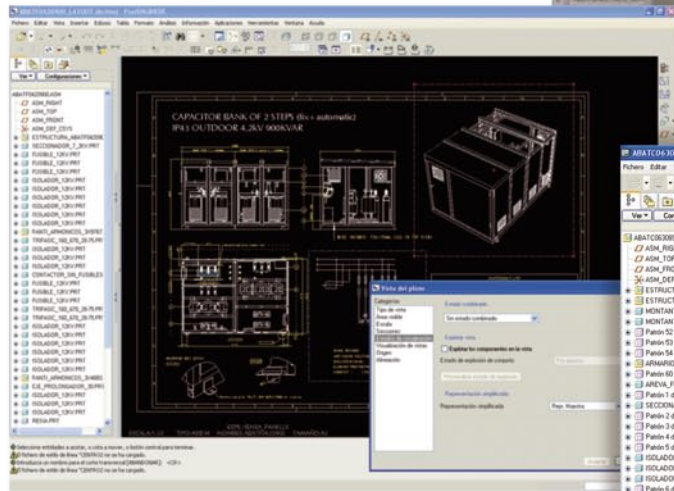
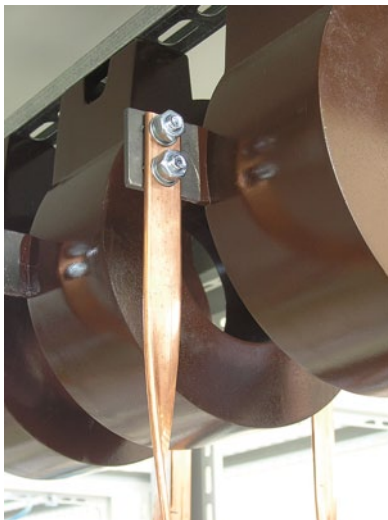
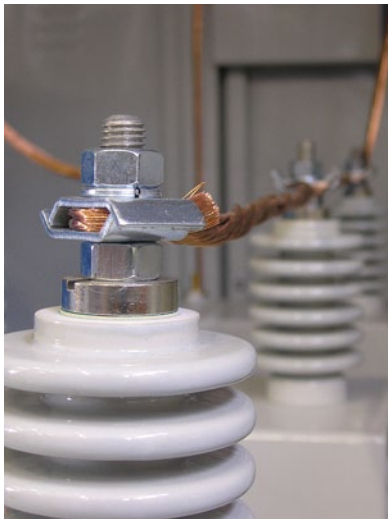
- Interrupting methods, vacuum
- Perfect control of the electric arc in capacity handling
- Long life
- High insulation of the bank, made up of three independent vacuum poles assembled in a insulated structure
- Small size
- Light equipment with optimised weight
- Easy to maintain

■ LVC vacuum contactor



LVC-6Z44ED	
Rated operation voltage	6,6 kV
Rated voltage	7,2 kV
Rated operational current	400 A
Rated frequency	50/60 Hz
Rated breaking current	4 kA
Isolation level	BIL 20/60
Excitation method	E: continuous, L: instantaneous (optional)
Control voltage	110 V c.a.; 220 V c.a.; 110 V c.c.
Maximum applicable	
Motors	3 000 kW
Transformers	4 000 kV·A
Capacitors	2 000 kvar
Weight	24 kg





Capacitor banks for Medium Voltage

Capacitor banks are vital for the adequate technical and economic management of the electrical system, optimising its operation.

The capacitor banks for MV have the following advantages:

- Fixed automatic or regulated compensation models
- 7%, 14%, and 5.6% rejection filters
- Modular cabinet design
- Different cabinet finishes (to order)
- IP 00 to IP 43 degree of protection
- Use of recognised protective and control system brands
- Remote monitoring of the capacitor bank (optional for banks regulated by the **plus** system)

Insulation levels					Forma / Types	
7.2 kV	12 kV	17.5 kV	24 kV	36 kV		
CMF7T CMF7D	CMF12T CMF12D	CMF17D	CMF24D	CMF36D	Standard	Fixed
CMFR7T CMFR7D	CMFR12D	CMFR17D	CMFR24D	CMFR36D	With rejection filters	
CMA7T CMA7D	CMA12T CMA12D	CMA17D	CMA24D	CMA36D	Standard	Automatic
CMAR7T CMAR7D	CMAR12D	CMAR17D	CMAR24D	CMAR36D	With rejection filters	

“Experienced Leaders in Design and Manufacture”

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