Types of Capacitors

Three-phase and single-phase

The Capacitors are the real engine of a PFC system. Without a quality Capacitor, it does not make sense to operate all the other components.

Before explaining the differences between Three-phase and Single-phase technology, it is necessary to make a further division between **properly realized Capacitors (according to a controlled and advanced technology construction cycle),** and therefore highly reliable, and lower quality Capacitors due to different construction processes and methods.

Single-phase technology, almost entirely abandoned in most cases but still used in some areas, is a rather obsolete construction system that is inclined to exposure to greater risks.

Although the quality of its single-phase capacitors was excellent, TELEGROUP has now been completely committed to three-phase technology for about 15 years, as it is without a doubt more reliable and advantageous.

PHOTO 1

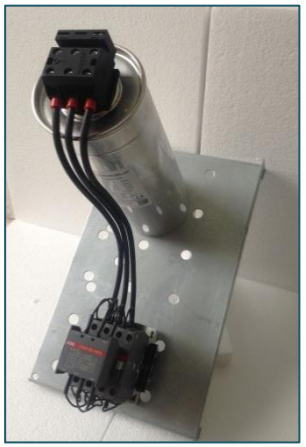

PHOTO 2

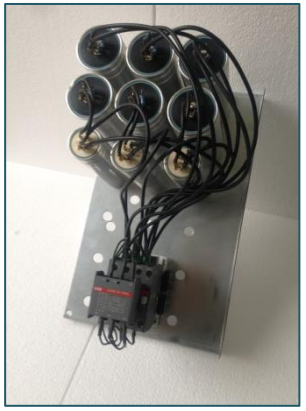

Photo 1
25 kVAr Three-phase cylindrical capacitor

Photo 2
Single-phase cylindrical capacitor connected in delta, total 25 kVAr

Types of Capacitors

Why prefer a Three-phase over a single phase?

Type	In case of failure	Space reduction	Wiring, “human error, over temperature	Maintenance	What are the economic benefits?
THREE-PHASE	In case of failure on one phase, all three phases will be simultaneously disconnected. This occurs in particular in the case of "Detuned" systems, since this will not create any imbalance on the tuning between the Capacitors and Reactors.	See PHOTO 1 and PHOTO 2. The space reduction is clear, but to give an idea of the power on larger systems, TELEGROUP realizes up to 750 kVAr in the "Standard" version and up to 500 kVAr in the "Detuned" version, in a single column.	See PHOTO 1 Only 3 cables are needed for a 25 kVAr three-phase capacitor. This added value enables less overheating inside the cabinet and simpler connection during wiring, reducing human error to almost zero.	Any possible faults are clearly visible for identification. Replacement is very fast, simple and safe thanks to the 3-wire connection.	In addition to the disadvantages from a technical point of view, the realization of single-phase Capacitor systems presents a **falso vantaggio economico.** This is because, even if the price of 3 or 9 single-phase capacitors were cheaper than a three-phase capacitor of equal power, this advantage is logically lost during System production and in the application phase, for all the reasons explained. **No technical advantage, no economic advantage. There are no reasons to prefer single-phase over three-phase capacitors.**
single-phase	In case of failure on one phase, the capacitor will not disconnect the other two phases and will continue to operate. This will create incorrect operation and a displacement of the capacitance, especially in "Detuned" panels It could occur that three different detuning frequencies occur in three different phases, due to the failure of a phase.	At least two columns are required to realize the same powers with single-phase capacitors, complying with all the indications regarding distances and air circulation imposed by regulations.	See PHOTO 2 to realize 25 kVAr using single-phase capacitors, up to 9 elements with different capacitance are required. This will force up to 18 cables to be wired, which on the one hand greatly increases the margin of human error and on the other increases overheating inside the cabinet.	It is necessary to measure the current of each Capacitor of each bank and, for safety purposes, it is always opportune to replace all the bank components (star or delta connection). This would mean disconnecting all wiring, replacing the capacitors and reconnecting everything, a significant risk margin and use of time.	