VMTEC

High-voltage capacitors for power factor correction



BIORIPHASO / TF SERIES

BIORIPHASO/TF series
High-voltage capacitors for power factor correction with an all-film dielectric and very low losses.

CAPACITORS IMPREGNATED WITH BIOIL, A BIODEGRADABLE FLUID THAT DOES NOT CONTAIN CHLORINATED SUBSTANCES OR PRESENTS ANY ECOLOGICAL PROBLEMS

GENERAL CHARACTERISTICS

The Bioriphaso/TF series consists of a complete range of capacitors for the solution of all medium and high-voltage power factor correction problems. Capacitors in the Bioriphaso/TF series are designed and built in accordance with the most advanced technology, which gives them long life and high reliability.

Conformity to standards
All standard Bioriphaso/TF capacitors fully comply with the following specifications:

CEI 33-7
IEC 871-1-2
NEMA CP.1

Bioriphaso/TF capacitors can therefore be supplied for any working and environmental conditions prescribed in the above standards.
If specified in the terms and conditions of supply, Bioriphaso/TF capacitors can be tested to the specifications of any other standards required by the customer.

Classification of models
The various models are classified under the name Bioriphaso/TF followed by the rated autput expressed in kvar and the rated voltage expressed in kV. If the capacitor has one insulated terminal and one terminal connected to the housing, the letter "E" is added to the classification.
Thus, for example, the capacitor with two insulated terminals having a rated output of 200 kvar and a rated voltage of 12.700 V. The capacitor "Bioriphaso/TF/200/12.7/E" has the same output and voltage as the previous model, but one terminal is insulated and the other is connected to the housing.

NAME-PLATE DATA

Rated voltage
Bioriphaso/TF capacitors can be supplied with any rated voltage required by the customer. All Bioriphaso/TF capacitors. will stand up to long periods in service at a voltage of up to 110% of the rated value.

Rated output
The unit rated output range of Bioriphaso/TF capacitors is from 50 to 500 kvar. All Bioriphaso/TF capacitors can operate for long periods at an output of up to 135% of the rated value.

Rated frequency
Bioriphaso/TF capacitors can be designed for a rated frequency of 50 or 60 Hz.
Special models for applications involving greater electrical or thermal stresses than those provided for by standards, capacitors of special dimensions can be designed and built. In particular, the capacitors can be supplied with a three-phase internal connection and three insulators throughout the normal power range laid down.

MANUFACTURING CHARACTERISTICS

The dielectric
The dielectric consists of layers of best-quality hazy polypropylene film.

The impregnant
The dielectric fluid used for impregnating capacitors is called BIOIL, and consists of iso-propylbyphenyl, plus stabilizing ingredients that keep the chemical and physical characteristics virtually unchanged over a period of time.
Experimental study of these impregnants began in 1970 with the object of finding a substitute for PCB. Tests conducted by standard methods showed that BIOIL is 60% biodegraded in 24 hours, and 100% in less than 7 days. Its acute toxicity is lower than that of cooking salt. BIOIL contains no chlorine derivatives which means that it can be destroyed in normal incinerators.



The housing
The housing of Bioriphaso/TF capacitors is made of stainless steel sheeting, welded together without the further addition of metal. This housing ensures that the dielectric will be well preserved and not deteriorate through pollution over a period of time.
The housing is protected by synthetic paint, suitable for outdoor use, with high mechanical resistance and good resistance to pollution, industrial fumes, and salt fog. The blue-grey colour of the paint makes for efficient heat transmission.

Bushings
The bushings are made of brown porcelain. Before mounting, all bushings are tested for mechanical strength. The bushings of standars models are suitable for installation in an environment with a moderate degree of fog and industrial fumes. For exceptionally polluted or salt environments, special bushings are used.
Bioriphaso/TF capacitors are supplied either with both terminals insulated, or with one terminal insulated and the other connected to the housing. The two different types do not affect the dimensions of the housing, given the same rated output and voltage.

ELECTRICAL CHARACTERISTICS

Losses
The dielectric losses for Bioriphaso/TF capacitors, measured at ambient temperature, are below 0.1 W/kvar.

Discharge resistors
Bioriphaso/TF capacitors have a series of discharge resistors connected internally between the terminals. The resistors reduce the residual voltage to below 75 V within 10 minutes disconnecting the capacitor from the circuit.

Partial discharges due to overvoltages and at different temperatures
Partial discharge measurements are conducted at regular intervals in the laboratory on Bioriphaso/TF capacitors. The measurements are performed during the application of overvoltage cycles at different operating temperatures.
The performance of Bioriphaso/TF capcitors during the partial discharge test is excellent.

PROTECTIONS

Bank are normally supplied either with a capacitor protection based on unbalance between neutrals or with a capacitor protection by voltage based on unbalance between phases, depending on the total power of the banks. Both protection systems provide for an initial alarm stage for small voltage unbalances and a subsequent stage at which the bank is disconnected in the event of major voltage unbalances.



SPECIAL PLANTS

ICAR's technical department can be called upon to design complete, special plant, such as equipment for filtering harmonics, modular banks with automatic switch-on, etc.
Upon request, specialized staff will come and take measurements of plant before designing the equipment.
ICAR manufactures filtered capacitor bank of both types "detuned" and "tuned". In this last case often the bank consists of several filtered unit each one tuned on the frequency of the harmonic should be filtered.
Some examples of installation are shown in these photograps.
ICAR also manufactures so call "mixed" power factor correction plant where there is both a medium voltage side (generally fixed) and a low voltage side where generally several steps are automatically switched on and off for a better compensation.

DIMENSIONS AND WEIGHTS

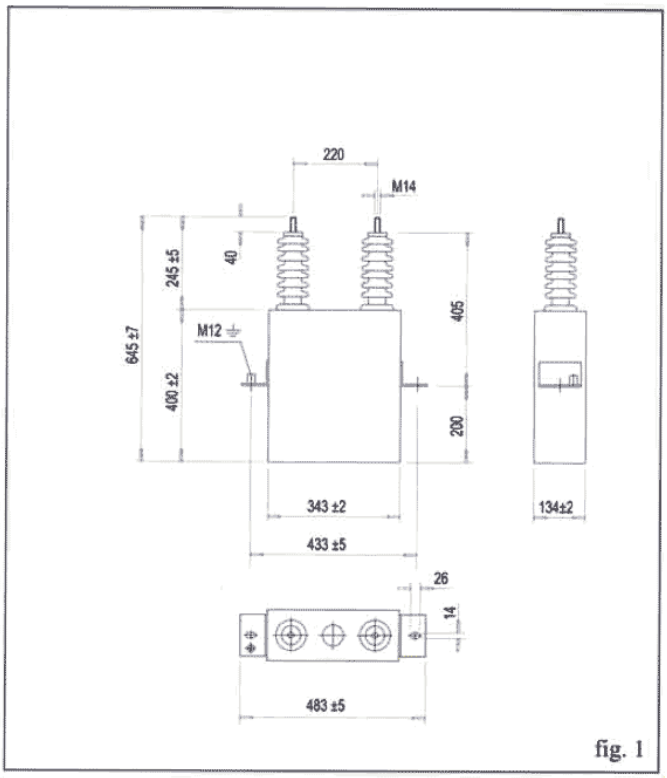


fig. 1

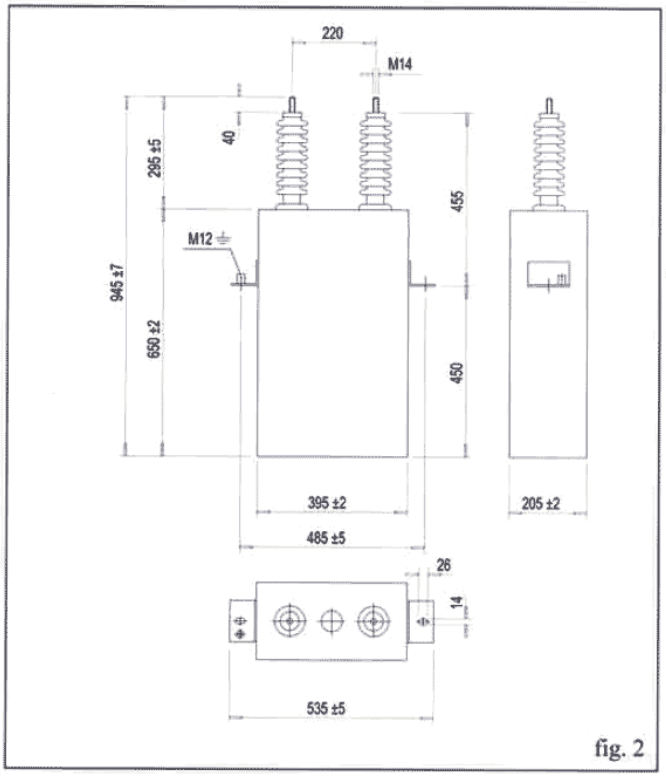


fig. 2

SPECIAL EXECUTIONS

Also Bioriphaso/AT belong to Bioriphaso series. Standard range is from 0.1 µF to 1 µF voltage up to 24.000 V.
Standard of reference are CEI 33-2 and IEC-358.
These capacitors are used for overvoltage protection of big electric machinary, such as transformers and generators and are connected between each phase and the ground.
Bioriphaso/AT are available in two executions:
- one terminal insulated and the other connected to the case;
- one terminal insulated and the other with reduced insulation to allow earthing through a suitable dumping resistor.

Photograph herebelow shows a Bioriphaso bank IP 55, 900 kvar 6.000 V - 50Hz.

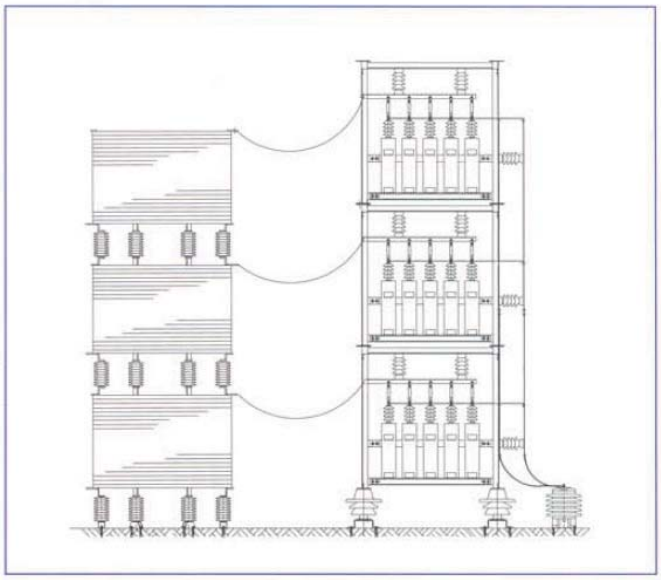
Single Phase Bioriphaso capacitors are manufactured in the range from 50 kvar (fig. 1) to 500 kvar (fig. 2) and voltage up to $33/\sqrt{3}$ kV.
In the IP 55 version the capacitor and/or the banks are equipped with:
- metal enclosure to protect capacitor terminals with removable cover for easier connection;
- brass made cable gland for income cable from the bottom;
- frame for floor-fixing complete with lifting eyes;
- outdoor installation;
- other characteristics available on request.

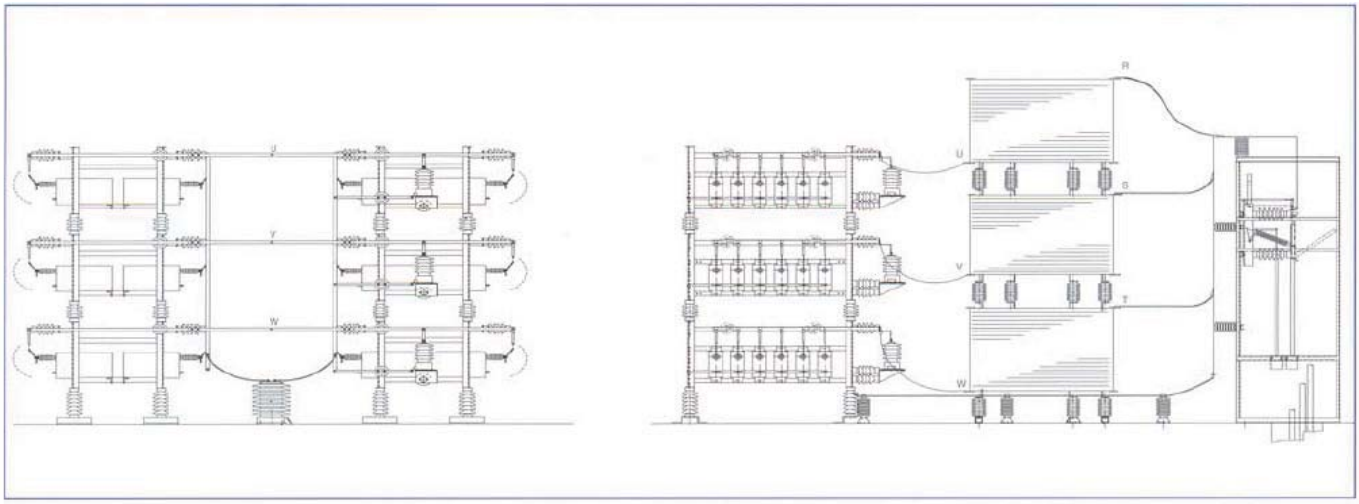




POSITION WHEN FITTED AND MODULAR FRAMES







Bioriphaso/TF capacitors can be fitted in the vertical position, or else in the horizontal position, standing on the narrow side of the housing.
The expulsion fuse is supplied on request. In fitting capacitor banks, the distances between the various units must be such as to allow the air to circulate freely for natural cooling. A minimum distance of 50 mm is advised.
Capacitors can be supplied already mounted on modular frames, ready for installing in service. The frames consist of a galvanized metal structure, on which the capacitors and their respective expulsion fuses are fixed.
Standard modular frames are suitable either for vertical or horizontal fitting of the capacitors.

