

SERVICE INSTRUCTIONS FOR LOW VOLTAGE POWER CAPACITOR

1.- Installation:

The installation of the capacitors should take into account the rules and recommendations of **CEI 60831-1-1/2** Standard. The capacitors are for **indoor** installation away from heat sources and in well ventilated places. There shall be a minimum distance of **20 mm** between capacitor.

Check that the voltage and frequency given on the capacitor name plate are appropriate for the mains where it is to be installed.

Connection cables will be sized for minimum **1.43 times** the rated current of the capacitor.

We recommend not using the capacitor terminals to connect in parallel other capacitors.

The control equipment shall be of sufficient capacity to withstand the heavy capacitor switch in currents which can arrive to be **100 times their rated current** (we recommend that you check with the equipment manufacturers and use contactors with preload resistors and/or limiting choke coils).

The capacitors shall be protected against possible shortcircuits by fuses or automatic switches. The fuses shall be sized for **1.3 to 1.8 times** the capacitor rated current.

The capacitors shall be protected against possible leakage by earth leakage relay with adjustable delay time and sensitivity.

The capacitor box shall be earthed by means of the pertinent terminal.

2.- Commissioning:

- Check that the terminals are clean and the connections tight. (Maximum 1.7 N.m in M4 terminals, 2.5 N.m in M5 terminals, 4 N.m in M6 terminals and 5 N.m in M12 terminals).
- Connect the capacitors.
- Check that the terminal voltage and the current drawn do not exceed the limits given in Section 3. • It is desirable to repeat these measurements several times during the early days of service, particularly during low load hours.
- Check that the ambient temperature does not exceed the levels given in Section 3.1.

3. - Operating conditions:

3.1. - Temperature:

The operating temperature is an extremely important parameter for the reliable capacitor operation. The capacitors are classified in categories according to the ambient temperature at which they may operate.

The ambient temperature shall never exceed the level stated for that temperature category.

To check the capacitor working conditions, the air temperature is measured at steady state at the hottest point between two capacitors.

When only one capacitor is installed, the air temperature is measured at 2/3 of its height at a distance of 0.1 m.

The LIFASA power capacitors belong to the temperature category C.

The IEC 60831 standard lays down the following limiting levels for this category:

Air temperature		
Maximum	Highest mean over a period of	
	24h	1 year
55°C	45°C	35°C

If there is any possibility of exceeding these levels, the installation of forced cooling should be considered.

3.2. - Voltage:

Reliable operation of the capacitors requires the service voltage not to exceed the rated voltage. Nevertheless, under special conditions not foreseen at the time of installation, overvoltages within the following limits are allowed:

Factor x U_N	Maximum duration
1.00	Continuous
1.10	8h in every 24h
1.15	30min in every 24h

In any case, it should be remembered that operating under overload conditions considerably shortens the capacitor life.

3.3. – Current and harmonics:

It should be checked that the rms value of the current consumed by the capacitor should not exceed **1.3 times** the rated current thereof.

If the current in the capacitor is above 1.3 times the rated current (due to **harmonics** or due to a **supply voltage above the rated voltage**), the lifetime of these capacitors can be seriously affected. Besides, they could cause serious damages.

As indicated for voltage, it should be remembered that operating under overload conditions considerably shortens the capacitor life.

If excessive currents are detected, the capacitors should be disconnected and LIFASA should be consulted to find the best solution to the problem (harmonics filters, etc.).

4. – Switch off:

The capacitors are equipped with discharge resistors reducing the terminal voltage to a value below 75 V within three minutes of being disconnected from the mains (conforming to IEC 60831 Standard).

WARNING: Before handling a capacitor, it should always be switched off from the mains, followed by a five minute wait and the terminals should be shortcircuited and earthed.

If the capacitors are for installation as part of an automatically regulated bank, quick discharge resistors should be installed in the bank contactors which will ensure a maximum residual voltage in the terminals of the capacitors smaller than 0.1 times the rated voltage before allowing a new connection.

5. - Maintenance:

Before handling the terminals of a capacitor or a battery, read the foregoing instruction. The maintenance required by power capacitors is very small, but very desirable for reliable operation. The following operations are recommended:

MONTHLY:

- Check the capacitors visually
- Examine the protection fuses
- Check the temperature
- Check the service voltage (particularly at low load times)

HALF YEARLY:

- Check the current of each capacitor phase

ANNUALLY:

- Clean the capacitor terminals and insulators
- Check that the terminal connections are tight
- Check the condition of the switching devices contacts
- Check the current of each capacitor phase

6. - Guarantee:

LIFASA guarantees its products against any manufacturing defects for a period of **TWO YEARS** from the date of purchase. In no case shall this guarantee last longer than 18 month from the commissioning.

In the case of banks with automatic regulation, this guarantee does not cover neither those protective devices (fuses) nor the components of the operating equipment that are subject to wear and tear.

LIFASA will repair or replace, as it deems fit, any defective product that is returned within the term of guarantee.

This guarantee shall be considered null and void if the product installation and maintenance instructions have not been followed or if the apparatus has been misused in any way.