

SCREW TYPE MOUNTING HARDWARE GUIDELINES

BEFORE CAPACITORS INSTALLATION

Kendeil recommends to follow below steps, please read the following information carefully:

- Prior to handling a capacitor be sure it is totally discharged.
- Check the specifications of the capacitors and compare them with the project's specifications.
- Do not reverse the polarity.
- Do not use a capacitor where reverse voltage is applied.
- Do not drop or otherwise impact a capacitor to avoid decline in its electric performances.
- Do not use any capacitor whose packaging has a noticeable abnormality on delivery.
- Do not deform the shape of the capacitor, this could lead major failures such as liquid leakage or short circuit. Not taking these precautions could lead to a major failure.

INSTALLATION METHOD

To fix our flat bottom capacitor use clamping rings coupled with an insulating layer between capacitor's can and the ring. Special attention has to be applied in assembling case of stud capacitors. The threaded stud termination (M8 or M12) is the bottom part of capacitor's can and it's in electrical contact with negative end termination of capacitor. Please use our plastic nut and plastic washer or other well protected system in order to avoid short circuit between stud and assembling frame. Can and stud are in electrical contact with negative end termination. Can is covered by sleeve, designed to prevent accidental short circuit during maintenances or assembling operation. Air gap between capacitors and machinery's electrical parts, active parts or machinery's frame has to be taken into consideration for good insulation as defined to many standards of machines.

MECHANICAL STRESS

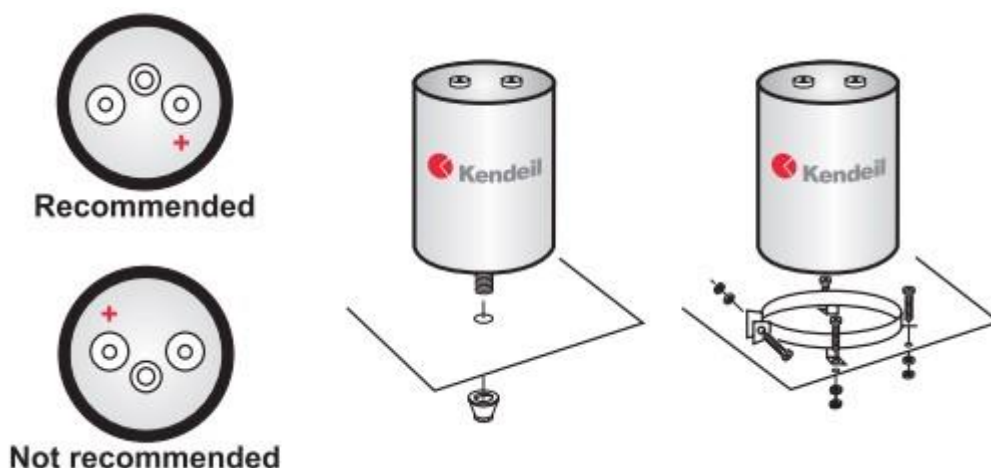
Excessive torque force applied in tightening the screws into terminals will result in stripping the threads and possibly increasing the contact resistance. On the other hand, if screws are not enough tightened enough, the high contact resistance will cause localized heating at terminals plus an early failure of the capacitor

Terminal	Recommended Torque [N/m]
M5 Insert	2
M6 Insert	4
UNF 10-32 Insert	2
UNF ¼ 4-28 Insert	4
M8 Stud	4
M12 Stud	8

POSITION OF THE PRESSURE-RELIEF VENT

During normal operation electrolytic capacitors are subjected to an internal generation of gas due to heating combined with the inside pressure. Therefore a safety vent is provided to prevent catastrophic failure. Place the capacitors so that anyone working on the equipment would be protected from the hot vapor in the event that a vent was to operate. Do not install wiring or a circuit pattern near the vent. When the vent is activated, electrolyte may spurt out resulting in short circuit followed by fire or other secondary hazard. Do not hinder the activation of the vent. Make room for clearance above the vent. If dissipation of gas is inhibited while the vent is in operation, the inner pressure will rise, with danger of explosion, fire or other major failure. The overall characteristic parameters such as capacitance, ESR, currents, etc. remain the same whatever is the orientation, but once the vent has been blown, an eventual overflow of electrolyte could damage important parts of the circuit. Furthermore, a good cooling system must be designed. Consideration must be given as to where to place the circuits especially when dealing with high ripple currents; the area around electrolytic capacitors should be well aired with enough distance between the radiant elements, both for maintenance and for security reasons.

Have been provided with a safety vent plug on the deck, a tiny rubber capsule designed to support a critical bursting pressure up to 8 bar. To fix these capacitors use the appropriate mounting clamps furnished in different diameter size. The best orientation is upright with terminals up. If mounted horizontally, orient the pressure-relief vent plug at the 12-o'clock position so that least amount of electrolyte will be expelled if the vent operates. Do not mount with terminals down as this may reduce the operating life and could impair the operation of the pressure-relief vent. In any case, screws terminal capacitors can be mounted in any position so long as the vent is free to operate.



SHELF LIFE

Capacitors generally can be stored at temperatures up to 50°C without any reduction of their reliability.
 In practical use, we experienced the following scheme meaningful for voltage rated classes of capacitors:

Shelf life	Nominal Voltage	Diameter
Three years	≤ 100V DC	Ø < 76mm
Two years	≤ 100V DC	Ø ≥ 76mm
Two years	> 100V DC	All Ø
18 months	≥ 550V DC	All Ø

Before assembling a capacitor bank, it is always recommended to:

- Use items from the same batch to have similar values of electrical parameters (capacitance, ESR, leakage current)
- Ensure equal conditions (current, voltage, temperature) are applied to all items

This will ensure balanced stresses and will reduce the risk of reduced lifetime and failures.

SAFETY

Handling Terminals

Always be sure that a capacitor is totally discharged before handling it. To avoid any damage, don't overstress terminations during cutting, soldering or bending. If gas is detected while the product is in use, turn off the main power supply and unplug it.

Liquid Leakage

In case of activation of the safety vent, hot gas exceeding 100 °C will escape. Do not place your face in close proximity to the vent and avoid proximity to areas exposed to the gas. When an escape of electrolyte has occurred, wash the affected area with hot water. Use rubber gloves to avoid skin contact. Any contact with eyes should be immediately irrigated with water and medical advice is sought.

Kendeil electrolyte blends do not contain materials currently listed as carcinogenic or mutagenic.

Under exposure to electrolyte skin could become dry. Other irritations or effects may be caused to the mucous membranes particularly eyes, where conjunctivitis may result.

STORAGE

It is highly recommended to store capacitors at room temperature, in a dry place, out of direct sunlight.

Long-term storage atmosphere requires these parameters: it should be free from halogen gases (like chlorine and fluorine) which presence could lead to internal corrosion, temperature range should stay between 5 °C and 40 °C at up to 75% relative



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humidity (non-condensing).

In case of having a capacitor exposed to high temperatures such as direct sunlight or heating elements, the capacitor life may be adversely affected. Also, when capacitors have been stored under humid conditions for a long period of time, humidity will cause terminals to oxidize.

Note that in case of storage below the minimum temperatures, the electrolyte may have changed from liquid to solid and will need extra time to recover.

When capacitors have been stored above room temperature, the anode foil may react with the electrolyte causing increased leakage current values. Application of normal voltages to these capacitors may result in higher leakage current values, but in most cases, they will return to normal levels in short time.

Capacitors that have been stored for long time should be subjected to a voltage reforming process which will regenerate internal dielectric layers.

CLEANING

Aluminium can be aggressively attacked by halide ions, particularly by chloride ions. Even small amounts of chloride ions inside the capacitor will cause corrosion which contributes to rapid capacitance drop and venting. Therefore, the prevention of chloride contamination is the most important check point for quality control in production. Solvent proof capacitors are required when halogenated hydrocarbons are used for cleaning. If aluminium electrolytic capacitors without the solvent-proof construction are present on the circuit board, alcohol-based solvents are recommended for cleaning.

In this case, solvents such as methanol, ethanol, propanol and isopropanol, isobutanol, propyleneglycolether, diethyleneglycol should be used. Normal tests show that any detrimental effect is eliminated. An alkaline detergent may damage the aluminium metal and marking.

Aqueous cleaning methods in conjunction with saponification are commonly used. However, it is advisable to dry immediately with hot air, which is best achieved at 85°C for few minutes.

MAINTENANCE AND SERVING

Periodical checkups should be conducted on capacitors. Before each examination, turn off the equipment and completely discharge the capacitor, then verify these checkpoints:

- Appearance: condition of the vent (open, notably swollen), liquid leaks or other considerable abnormality.
- Electrical parameters: capacity, dissipation factor, leakage current, and other terms specified in the datasheets. Standard temperature for measuring electrical performance is 20 °C, reach this value before taking measurements.
- When finding a damaged capacitor or one that has reached the end of life, remember that mixing old and new capacitors may cause an imbalance in the ripple current or voltage sharing, risking failures such as activation of the vent or short circuit, so change them all.

INSULATION

All capacitors are covered with a PVC sleeve that is used for marking, even if the sleeve present good accidental insulating properties, it degrades by oxidation over 65°C and after long period of time.

Kendeil's recommendations for stud mounted capacitors are to use our approved plastic nut and washer, for snap in capacitors with non-electrified dummy pins, it is best not to ground them but rather to let them float.

We suggest you to provide an additional level of more durable insulation if permanent high voltage is applied.

For further information contact our technical department.