



INSTRUCTIONS

Type OFW Weathertight Motor Capacitor Units

GENERAL SAFETY INSTRUCTIONS

The objective of these instructions is to help make capacitor users aware of application and handling practices which will aid them in the use of power capacitors. The guides cover good practices in receiving, handling, installation, fusing, field testing and disposal of power capacitor units. The guides do not address themselves to the requirements of national and/or local codes, nor to requirements of insurance underwriters, which may be applicable to any given capacitor application. Compliance with codes and insurance underwriters' requirements demand individual consideration on the part of capacitor users for each particular situation and should not be assumed to have been achieved simply by complying with the suggestions contained in these instructions.

PROTECTION AGAINST SHOCK

Power must be **switched off** before doing any work on capacitors or equipments. To be **certain** that the capacitors have been disconnected from the power source, **it is necessary to make a visual check for an open-contact disconnect**. After being disconnected, the capacitors or equipments should then be shorted and grounded as follows:

Capacitors for shunt or series application on power systems have internal discharge resistors (so indicated on the nameplate) which are designed to reduce the voltage, after the power is switched off, to 50 volts or less in **ten minutes** if an underground or submersible type, in **five minutes** for all others rated over 600 volts, and in **one minute** for all others rated 600 volts or less. After the indicated time, the capacitor or equipment should be shorted and grounded by utilizing an insulated grounding stick or equivalent and then the capacitor terminals should be connected together and to the case and grounded before handling.

Other types of capacitor units such as dc energy storage, dc filter and pulse forming applications, and certain types of induction heating capacitor units do **not** have internal resistors. With these types of units, the disconnecting, shorting and grounding procedures indicated above must be followed and should be accomplished by utilizing an **external discharge resistor** of **at least** the resistance in ohms equal to the maximum charge voltage that may have been on the capacitor. The shorting connection between terminals should be left on until the unit is reconnected in the circuit.

EXPLOSION HAZARD

The correct application of capacitor fuses will greatly minimize the possibility of case rupture; but since considerable stored energy may be available upon the occurrence of a fault inside a capacitor, it is possible to get explosive case rupture in any application, even with proper fusing. For three-phase capacitors fused only on two terminals or single-phase two-bushing units fused on only one terminal, and applied on delta or ungrounded wye systems, an internal ground fault from the unfused phase to case might result in case rupture. These remote possibilities must be considered when locating the capacitors or equipments.

If capacitors or equipments are not supplied with fuses, follow the fusing guides recommended in NEMA Standard CP-1; ANSI Standard C-55.1; the General Electric Handbook Section 6212; or refer to the nearest General Electric Sales Office.

HANDLING OF FAILED CAPACITORS

Some failed capacitors may be found considerably bulged due to internal pressure from gassing prior to circuit clearing. Such units should be handled very carefully. A failed capacitor should be shorted with suitable insulated shorting sticks, to discharge any residual charge. It is further recommended that a bulged capacitor be permitted to cool before handling. This will lower the internal pressure, reducing the possibility of case rupture with leakage of gasses and liquid during subsequent handling.

In handling capacitors which have liquid leaking out, avoid contact with the skin, and prevent entry into sensitive areas such as the eyes. Close-fitting protective goggles should be worn when handling units which are leaking or might suddenly squirt impregnant while being handled. Contact with the skin is taken care of by simply washing off thoroughly with soap and water as soon as possible. However, the eyes can be quite irritated by some impregnants, so they should be flushed with large amounts of water as soon as possible and then examined by a physician.

COMBUSTIBLE IMPREGNANT FIRE HAZARD

These capacitors contain a Class III.B combustible liquid which could possibly ignite if there is a case puncture or

rupture in the presence of an electrical arc. Capacitors should be suitably protected from mechanical damage and located where possible fire would not result in damage or hazard to the surrounding area.

DISPOSAL OF CAPACITORS OR IMPREGNANT

The dielectric liquid has been formulated to be environmentally compatible. Good practice demands that the liquid be handled in a manner appropriate for the handling of hazardous chemical liquids, and that loss of the liquid into the environment should be avoided or minimized. The preferred method of liquid disposal is by incineration. If feasible, the solid portion of the capacitor, the roll pack, should also be incinerated and the capacitor case should be disposed of in a waste disposal site approved for hazardous industrial waste.

An alternate method of disposal to be considered is the incineration of the liquid and the disposal of the solid remainder, consisting of the roll pack and the capacitor case, in a waste disposal site approved for hazardous industrial waste.

Disposal of the whole capacitor, including the liquid in a site approved for hazardous industrial waste is a third method which may be considered for the disposal of the power capacitors.

APPLICATION

Type OFW (Oil Field Weathertight) capacitor units are designed for service with motors in oil field or other pumping installations. They may also be used in other 480-volt power distribution systems.

RECEIVING

Check the capacitor when received to make sure that no damage occurred during shipment. Minor damage such as small dents will not harm the unit's performance, but units with large dents, leaks, or broken bushings should not be installed. See the section on "Maintenance" for the method of handling units with leaks. In case of major damage, file a claim against the carrier and also notify the nearest Sales Office of the General Electric Company for instructions regarding the disposition of the capacitor.

Check the capacitor nameplate to make certain that the capacitor voltage rating is the same as the applied voltage. According to NEMA Standard CP-1 the recommended maximum continuous-working voltage to be applied to the capacitor shall be 110 percent of the nameplate rating. The peak continuous working voltage, including all harmonics, shall be $1.1 \times \sqrt{2} \times$ the nameplate voltage rating. Any lower voltage is permissible.

INSTALLATION

Capacitors may be installed indoors or outdoors.

Each capacitor is furnished with a flexible-cable and weathertight connector to simplify connection. Standard 3/4-inch pipe threads can be provided for optional conduit connection. Units may be mounted vertically or horizontally, either directly to a pole or to a motor control support.

FUSING

These capacitors are intended primarily for direct application at motor terminals where they are protected by the motor fuses; for this reason, fuses are not included.

AMBIENT TEMPERATURE

High operating temperatures will reduce the life of a capacitor. For this reason, the capacitor should be located in an area of unrestricted ventilation and the capacitor should also be mounted away from hot objects or surfaces. Maximum ambient is 46 C (115 F).

Capacitors may operate continuously at any low temperature. However, if the internal temperature of an unenergized capacitor drops to less than -40 C (-40 F), the unit should not be energized. The unit then must be brought to at least -14 C (7 F) before it may be energized without possibility of damage. For this reason, if extremely low temperatures are anticipated, it is advisable to switch capacitors onto the line to keep the internal temperature above the critical point.

MAINTENANCE

Units with large dents may be checked for operation as described under TESTING. If such testing is impossible or if results are unsatisfactory, contact the nearest GE Sales Office regarding the possibility of factory test and repair.

Type OFW capacitors are designed to be weathertight; therefore, if a ruptured case is noted, cover the rupture immediately in the event the unit may be repairable. The possibility of factory repair is dependent upon the extent of the damage; therefore, contact the nearest GE Sales Office for recommendations regarding disposition.

Under normal service conditions, once a capacitor is installed no further maintenance is required during the life of the unit. Repainting of the units may be desired for appearance. Capacitors may be inspected periodically to see that they are operating; this can be done most easily by de-energizing (reference Protection Against Shock) and immediately feeling the case side. An operating unit will be warm.

These instructions do not purport to cover all details or variations in equipment nor to provide for every possible contingency to be met in connection with installation, operation or maintenance. Should further information be desired or should particular problems arise which are not covered sufficiently for the purchaser's purposes, the matter should be referred to the General Electric Company.

TESTING

Field tests may be made to evaluate the operating conditions of the capacitor. Such tests are warranted only if trouble is indicated or if the units have been damaged. For further tests or details, see NEMA Standard Publication CP1-1976 (or latest issue).

1. Open circuits, internal short circuits, and kva capacity can be tested by measuring the current taken by the capacitor when connected to a suitably protected circuit of rated voltage and good waveform.

2. The insulation between terminals and case can be tested by applying rated voltage from a suitably protected test source between the short-circuited terminals and case.

WARRANTY

The following basic information must be provided with respect to warranty claims:

Serial number, date in service, date failed, type of installation (i.e., pole type, stack rack), fixed or switched, conditions at the time of failure. Do not scrap an in-warranty capacitor unless authorized by manufacturer.

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