

## Power Factor Correction Capacitors (PRB DPM)

### Installation and maintenance instructions

Read the following instructions carefully before installing a capacitor. Disregarding this installation instruction manual can result in operational failure, bursting and fire. The supplier does not accept responsibility for whatever damage may arise out of non-observance.

#### General safety notes

Check mains/system voltage, frequency, and ambient temperature against capacitor label.

Capacitor cases must be effectively earthed. Make sure to establish a conducting connection.

Discharge the capacitor before handling

Handle capacitor units carefully, as they may be charged even after disconnection due to faulty discharging devices. Also connected bus bars, cables and any other devices which are connected with them, may be energized.

#### Storage and operation condition

Do not use or store capacitors in a corrosive atmosphere, especially where chloride gas, sulphide gas, salt, acid, alkali, or similar substances are present. Provide regular cleaning of terminals in a dusty environment, to avoid a conductive path between terminals or terminal(s) and a metal case.

Capacitors are divided into temperature classes. Each class is represented by a number followed by a letter. Most standard capacitor types appertain to the -25/D class. The number is the lowest ambient temperature at which a capacitor may operate. The upper limit temperature is indicated by the letter. D means a max temperature of 55°C, an average temperature over 24 hours of 45°C, and the average temperature in one year should not exceed 35°C.

Capacitors must not operate over 2 000 m altitude.

#### Mounting

Gas filled DPMg capacitors can be mounted in any position. A position with terminals pointing downwards shall be avoided. Oil filled DPM capacitors shall be installed upright with terminals facing upwards. Consult our technical department if different mounting is required.

Shield capacitors from external heat sources: no mounting close to or above heat sources (e.g. reactors) or in the direct sunlight. Take care of sufficient heat dissipation. Capacitor installed in a cabinet should be placed on the bottom to ensure the lowest temperature stress.

Provide sufficient cooling space. A minimum distance of 20 mm between capacitors is necessary for cooling.

Keep at least 20 mm free space above capacitors without any components. This gap will allow a longitudinal extension of a capacitor case in order to ensure that the over-pressure interrupter can fully extend.

Capacitors must be earthed by using mounting stud and delivered nut and washer.

Recommended torques:

M12: torque 12 Nm max.

#### Connection

Connection cable must be of flexible type, material should be copper. Do not use solid core cables. Do not solder leads to the terminals.

When connecting, avoid the use of mechanical force on the terminals. The screws in terminal box must be fastened with maximal torque according to following table. Use two end terminals for single-phase connection (see picture).

Connection cables should be dimensioned for a current of at least 1.5 times the rated current so that no heat is conducted into a capacitor. Depending on the terminal box the cable cross-section is:

Terminal block	Fine wire cross-section	Multiple wire cross-section	Max torque
16mm <sup>2</sup>	6 – 16mm <sup>2</sup>	10 – 25mm <sup>2</sup>	2 Nm
25mm <sup>2</sup>	6 – 25mm <sup>2</sup>	10 – 35mm <sup>2</sup>	3 Nm
35mm <sup>2</sup>	10 – 35mm <sup>2</sup>	10 – 50mm <sup>2</sup>	4 Nm

### Maintenance

Periodically check that connections and terminals are tight.

Check short circuit protection fuses.

Clean terminals periodically to avoid short circuit due to dust or other contamination.

Check discharge resistor and their functioning: Connect the capacitor to nominal voltage and then disconnect it. The voltage across the terminals must decline to less than 75 V within 3 minutes.

Take current reading twice a year and compare with nominal current. Use true effective RMS meter or harmonic analyser. In case of a current above the nominal current check your application for modification.

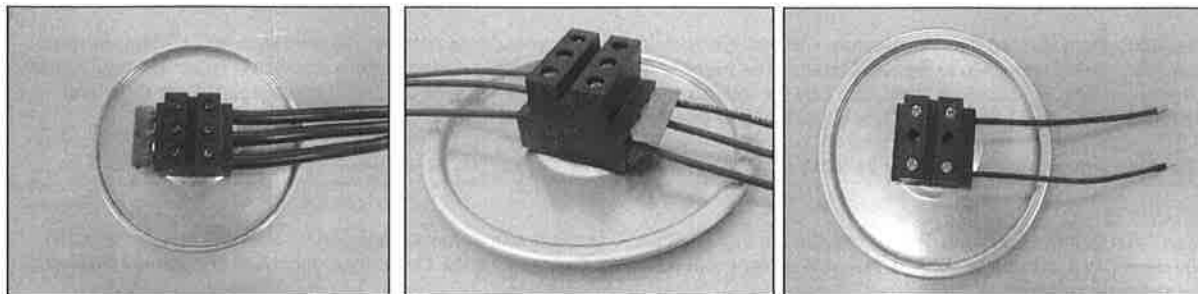
### Discharge resistors

Discharge resistors are required for discharging of capacitors to protect operating personal from electric shock hazard and for re-switching capacitors in automatic power factor correction units.

Before re-switching, capacitors must be discharged to 10% of the rated voltage or below.

According to IEC 60831 standard, a maximum of 5000 switching operations per year are acceptable.

Discharge resistor is included in the delivery package. Mount the resistor on the opposite side of the connecting cables. In case of parallel connection of capacitor always connect the cable under the discharge resistor!



Three-phase connection  
with discharge resistor

Parallel connection (3 phase)

Single-phase connection

### Harmonics

Harmonics are produced in the operation of electric loads with a nonlinear voltage / current characteristic. Harmonics are sinusoidal voltages and currents with higher frequency of a multiple of the 50 Hz or 60 Hz. They are mainly caused by loads operated with modern electronic device, such as converters, electrical drives, welding machines and uninterruptible power supplies.

In applications subject to harmonics, you should only use power capacitors with reactors, so-called de-tuned capacitors banks.

### Fuses

HRC fuses or moulded circuit breakers for short circuit protection have to be used. Short circuit protection equipment and connection cable should be dimensioned to handle the 1,5 times rated current of a capacitor permanently.

HRC fuses do not protect the capacitor against overload. They are only a short circuit protection. Use thermal/magnetic over current relays for overload protection.

HRC fuse rating has to be 1.6 ... 1.8 times nominal capacitor current.

Do not use HRC fuses for switching capacitors (risk of arcing).

### Environment hazards

Capacitors do not contain hazardous substances banned in ROHS directive and all materials are in compliance with REACH regulation.

Not classified as "dangerous goods" according to transportation rules. This product does not represent any danger for health if applied properly.

### Disposal

Capacitors should be disposed through recycling company as electric waste acc. to European Waste Catalogue (EWC) no. 160216 (Components taken from discarded equipment).