Fixed Power Factor Correction Capacitor Banks

April 2016
Rev A

Installation and Maintenance Instructions

WARNING

Power factor correction capacitors store a significant amount of energy after being disconnected from the power source. The capacitors are design to bleed off voltage to 50V or less within one minute after being disconnected from the power source. *Wait at least one minute and ground all terminals once it has been isolated from the power source before servicing the equipment.*

These instructions are intended to cover the receiving, installation, inspection, and maintenance of low voltage power factor correction capacitors. These instructions are not intended to serve as a substitute for training and experience in safe working procedures. Installation and maintenance should be performed only by personnel familiar with the operation of this type of equipment.

RECEIVING

Examine the equipment for damage and the nameplate ratings to ensure the desired rating has been received. If damage exists or the equipment is not the requested rating, please notify your local representative.

INSTALLATION

Locate the equipment so that it is accessible and not exposed to physical damage.

Location

Locate the equipment so that it is accessible and not exposed to physical damage.

- Locate in an ambient temperature between - 40°C (-40°F) and 40°C (104°F).
- Do not locate is a corrosive environment or an environment that exposes the equipment to vibration and/or shock.
- For outdoor locations, the capacitor must be marked for outdoor use and appropriate conduit entries into the enclosure must be rated for outdoor coupling.

Mounting

The capacitor equipment should be secured to the mounting surface utilizing ½" mounting hardware. A minimum of 2" airspace should be provided around the capacitor to allow for natural airflow and heat dissipation.

Grounding

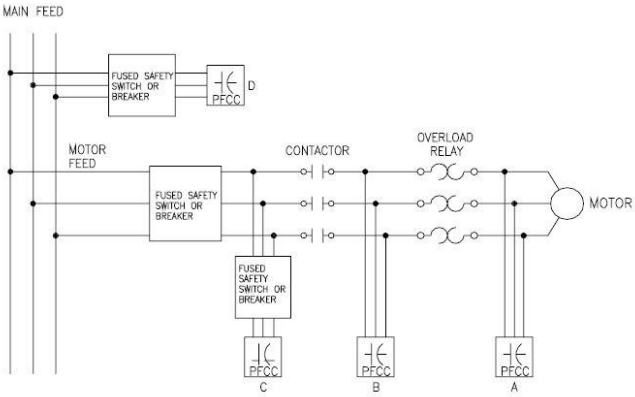
Ground the capacitor equipment to the lug identified as ground. Grounding must be in accordance with NEC Article 460.

Conduit and conductor connections

- Install conduit to prevent moisture, dust, or dirt from entering the enclosure.
- Size conductors per the appropriate NEC articles. The table on the following pages indicates current levels for common capacitor ratings.
- Maintain proper electrical clearances per electrical codes.

INSPECTION

Measure capacitor voltage and current with a true RMS meter to ensure that the capacitor is operating within it's design ratings. If voltage or current is above design ratings, the life of the capacitor could be severely shortened. Measurements in excess of 135% of rated current and 110% of rated voltage may indicate possible system resonance and capacitors should be removed from the line until a thorough evaluation of the entire distribution system is performed.



LOCATIONS FOR CAPACITORS ON MOTOR CIRCUITS

Option A: On the secondary of the overload relay
Option B: Between the contactor and the overload relay
Option C: Between the circuit breaker and the contactor
Option D: As a central compensation source connected to the main distribution bus

MAINTENANCE

A planned maintenance program should be established and carried out on a regular basis to ensure maximum capacitor performance. It is recommended the maintenance program include the following checks at least once per calendar year:

- Connections – Examine for looseness or overheating. Re-tighten if necessary.
- Fuses (optional accessory) – Optional fuses are included if specified. Check fuses for continuity and replace any fuse that is found defective. Fuses must be replaced with the same style and current rating.

Installation and Maintenance Instructions

3PH KVAR	Rated Current Per Phase (amperes)
240 Volt	
10	24.1
15	36.1
25	60.1
50	120.3
75	180.4
100	240.6
125	300.7
150	360.8
175	421.0
200	481.1
480 Volt	
25	30.1
50	60.1
75	90.2
100	120.3
125	150.4
150	180.4
175	210.5
200	240.6
225	270.6
250	300.7
300	360.8
350	421.0
400	481.1
450	541.3
500	601.4
600	721.7
700	842.0
800	962.3
900	1082.5
1000	1202.8
1100	1323.1
1200	1443.4
600 Volt	
25	24.1
50	48.1
75	72.2
100	96.2
125	120.3
150	144.3
175	168.4
200	192.5
225	216.5
250	240.6
300	288.7
350	336.8
400	384.9
450	433.0
500	481.1
600	577.4
700	673.6
800	769.8
900	866.0
1000	962.3
1100	1058.5
1200	1154.7

Extracts from NEC Code Requirements*

Section 460-8: Conductors

Ampacity

The ampacity of capacitor circuit conductors shall not be less than 135% of the rated current of the capacitor equipment. The ampacity of conductors that connect a capacitor to the terminals of a motor or to motor circuit conductors shall not be less than 1/3rd the ampacity of the motor circuit conductors themselves and in no case less than 135% of the rated current of the capacitor.

Overcurent Protection

- An overcurrent device shall be provided in each ungrounded conductor for each capacitor bank. *Exception: A separate overcurrent device shall not be required for a capacitor bank connected on the load side of a motor overload protective device.*
- The rating or setting of the overcurrent device shall be as low as possible.

Disconnect Means

- A disconnect means shall be provided in each ungrounded conductor for each capacitor bank. *Exception: A separate disconnect means shall not be required for a capacitor bank connected on the load side of a motor overload protective device.*
- The disconnect means shall open all ungrounded conductors simultaneously.
- The disconnect means shall be permitted to disconnect the capacitor from the power source as a regular operating procedure.
- The rating of the disconnect means shall not be less than 135% of the rated current of the capacitor equipment.

Section 460-9: Rating or Setting of Overload Device

Where a motor installation includes a capacitor connected on the load side of the motor overload device, the rating or setting of the motor overload device shall be determined in accordance with Section 430-32. *Exception: Instead of using the full load rated current of the motor as provided in Section 430-32, a lower value corresponding with the improved power factor of the motor circuit shall be used. Section 430-22 applies with respect to the rating of the motor circuit conductors.*

Recommended Sizing

• Power Cables	135% of capacitor equipment current rating*
• Time Delay Fuses	165% of capacitor equipment current rating
• Fast Acting Fuses	300% of capacitor equipment current rating
• Fusible Disconnect Switch	165% of capacitor equipment current rating (when using time delay fuses)
• Molded Case Circuit Breaker	150% of capacitor equipment current rating

*** For specific applications, refer to the appropriate sections of the NEC code.**