

Sizing Low Voltage Capacitors at the Motor Load

Sizing capacitors at the motor load

When the determination is made that power factor correction capacitors ARE a good investment for a particular electrical system, you need to know:

- How many capacitors are needed?
- What sizes are appropriate?

The capacitor provides a local source of reactive current. With respect to inductive motor load, this reactive power is the magnetizing or “no-load current” which the motor requires to operate.

A capacitor is properly sized when its full load current rating is 90% of the no-load current of the motor. This 90% rating avoids overcorrection and the accompanying problems such as overvoltages.

One selection method: Using formulas. If no-load current is known...

The most accurate method of selecting a capacitor is to take the no-load current of the motor, and multiply by .90 (90%). Take this resulting figure, turn to the appropriate catalog page, and determine which kvar size is needed, catalog number, enclosure type, and price.

EXAMPLE: Size a capacitor for a 100hp, 460V 3-phase motor which has a full load current of 124 amps and a no-load current of 37 amps.

1. Multiply the no-load current figure of 37 amps by 90%.
37 no load amps X 90% = 33 no load amps
2. Turning to the catalog page for 480 volt, 3-phase capacitors, find the closest amp rating to, but NOT OVER 33 amps. See table 1, sample part number chart. Per the sample chart the closest amperage is 30.1 amps. The proper capacitor unit, then is 25 kvar and the appropriate catalog number depends on the type enclosure desired.

NOTE: The formula method corrects power factor to approximately .95

If the no load current is not known...

If the no-load current is unknown, a reasonable estimate for 3-phase motors is to take the full load amps and multiply by 30%. Then take that figure and multiply times the 90% rating figure being used to avoid overcorrection and overvoltages.

EXAMPLE: Size a capacitor for a 75hp, 460V 3-phase motor which has a full load current of 92 amps and an unknown no-load current.

1. First, find the no-load current by multiplying the full load current times 30%.
92 (full load amps) X 30% = 28 estimated no-load amps
2. Multiply 28 no-load amps by 90%.
28 no-load amps X 90% = 25 no-load amps
3. Now examine the capacitor selection chart for 480 volt, 3-phase capacitors. Refer again to Table 1. Here it will be seen that the closest capacitor to 25 amps full load current without going over is a 20 kvar unit, rated at 24.1 amps.
4. The correct selection, then, is 20 kvar!

Table 1 – 480 Volt, 60 Hz – 3-Phase

Enclosure size type CLMD	Kvar rating	Rated current per phase (Amps)	Approx. shipping weight (lbs.)	Indoor - NEMA 1 catalog no.
43	2	2.4	8	C484G2
	3	3.6	8	C484G3
	4	4.8	8	C484G4
	5	6.0	8	C484G5
	7.5	9.0	8	C484G7.5
	10	12.0	8	C484G10
	15	18.0	8	C484G15
	20	24.1	13	C484G20
	25	30.1	13	C484G25
53	30	36.1	13	C485G30
	35	42.1	22	C485G35