

INSTALLATION OF AUXILIARY CAPACITOR BANK CIRCUIT

Correct installation of an auxiliary capacitor bank circuit is important and plays a major roll in the success of the application. Some Roto-Phase converter models come equipped with the separate auxiliary capacitor bank (**identified as the E & B circuit**) which must be connected to the three-phase motor that matches the “maximum single horsepower” rating of the converter. To insure correct installation is achieved, a few simple tests must be performed. The only test equipment required for the testing is an analog or digital voltmeter.

Start the Roto-Phase converter first and allow it to run idle (no connected three-phase motor load is operating) then measure the voltage “phase-to-ground” at the three-phase motor starter on the 3PH equipment load. The voltage readings that are measured will be similar to an “open-delta” three-phase system. The two single-phase lines supplied from the utility power will show half of their “phase-to-phase” values, and the T3 or manufactured phase from the converter will show a voltage reading equal to the “phase-to-phase voltage reading that single-phase lines were showing. When measuring the phase-to-ground readings at the magnetic starter of the three-phase equipment, you need to note which phase line reading the T3 or manufactured phase is located.

Example

L1 to ground= 120 VAC L2 to ground = 120 VAC L3 to ground = 230 VAC

Once the line that the T3 or manufactured phase is located, then a “phase-to-phase” voltage test will be required. Measuring from the line the manufactured phase is located to one of the other two phases, a measurement for the “highest” phase-to-phase voltage reading is what is required.

Example

L1 – L2 = 230 VAC

L1 – L3 = 245 VAC

L2 – L3 = 265 VAC

The “highest” phase-to-phase voltage reading was L2 – L3. The connections for the circuits labeled **E** and **B** should be connected at the magnetic starter of the three-phase equipment across phases T2 and T3. It is important that the connection of the **E** and **B** circuits be below the contact points of the three-phase magnetic starter, but they should be above the overload heaters. On starters with bimetal or melting alloy overload heaters, the connection of these two circuits would be on the “top” holding screws that secure the overload heater in place.

PLEASE SEE PAGE 4 FOR CALCULATIONS TO DETERMINE RECOMMENDED WIRE SIZE.

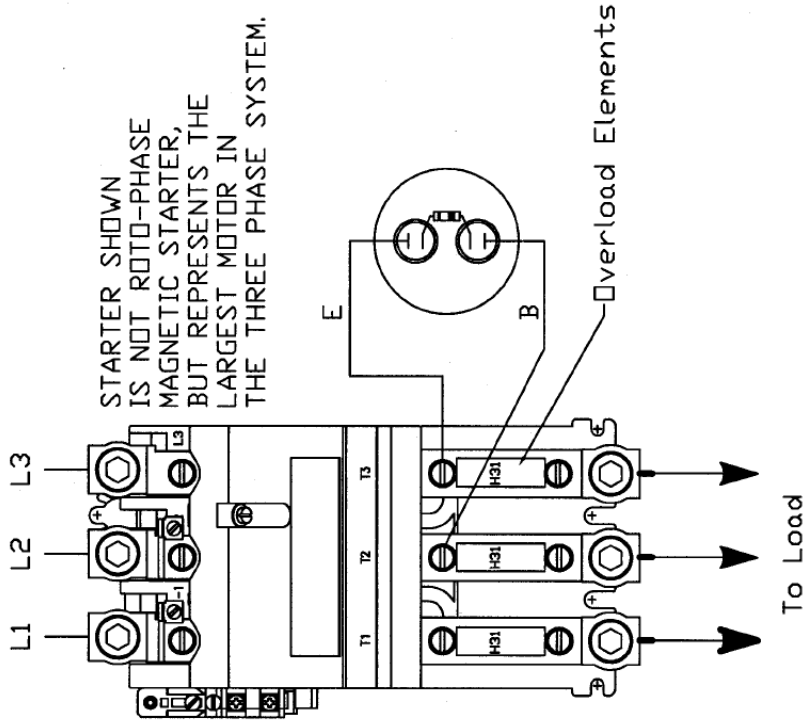
FOR ANY QUESTIONS PLEASE CONSULT THE FACTORY

"SAMPLE" INSTALLATION OF AUXILIARY CAPACITOR BANKS

Start the Roto-Phase converter and allow it to run idle (no connected 3 PH load running), then measure voltage phase to ground at the line side of the largest motor to be operated in 3 phase system. The voltage readings on the single phase lines to ground will be one half of their phase to phase readings. The manufactured phase will be approximately 220 volts to ground on a 230 volt system. Using the T3 line as a common, check the voltages phase to phase with the two single phase lines. The highest phase to phase reading is where the two capacitor lines or the E & B circuits of the auxiliary bank will be connected. An example of what Phase to Phase readings would look like on a 230 volt system; T1 T2 = 230 volts, T1 - T3 = 245 volts and T2 - T3 = 270 volts. It is imperative that the E & B circuits be installed below the contacts of the starter, but above the overload heaters. With this installation the extra capacitors are only introduced when the 3 phase motor is being operated. Placing the capacitors on the line side of the motor starter could cause overheating in the Roto-Phase and would void warranty.

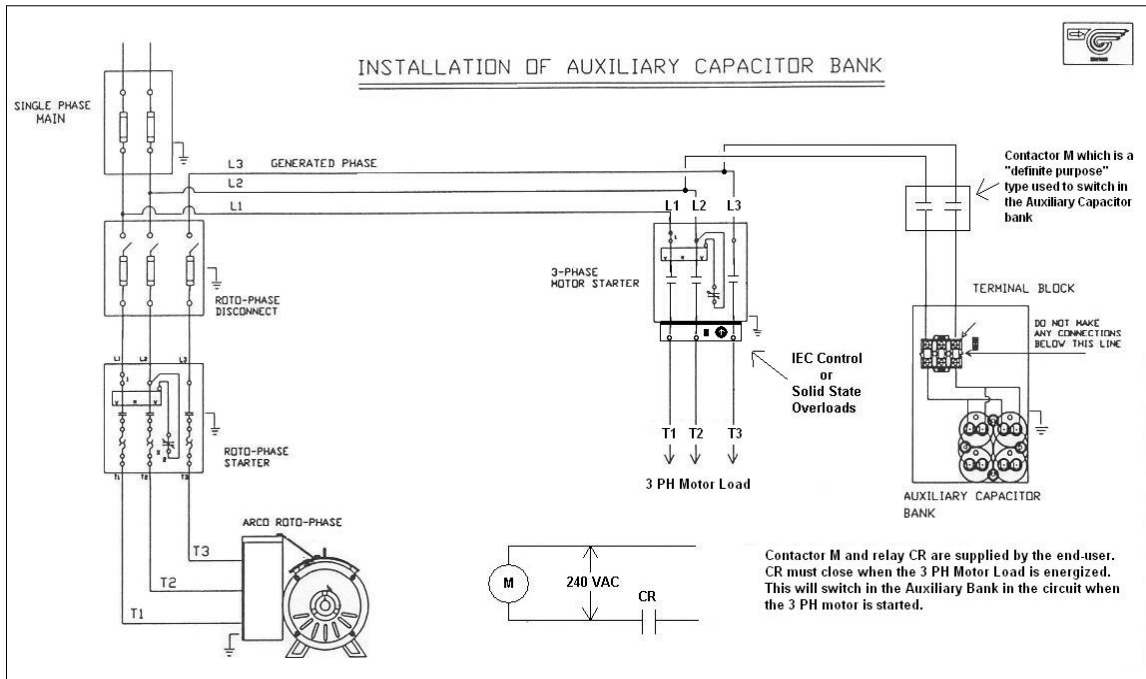
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 REV: 10/14/2010

EXAMPLE #1



EXAMPLE #2

INSTALLATION OF SEPARATE AUXILIARY CAPACITOR BANK WHEN USING IEC CONTROLS OR SOLID STATE OVERLOADS



Where the IEC or Solid State starters are involved, the Auxiliary Capacitor Bank must be connected ahead of the starter for the 3 PH motor. This can be accomplished through a Definite Purpose Contactor and interlocked with the 3 PH load motor via a relay or any normally open dry contact that will close when the 3 PH motor is energized. Correct installation of this equipment is important and plays a major role in the success of the application. To insure correct installation is achieved, a few simple tests must be performed. The only test equipment required is an analog or digital voltmeter.

Start the Roto-Phase converter and allow it to run idle (no connected 3 PH load), then measure voltage phase-to-ground at the 3 PH motor starter where the auxiliary capacitor bank will be connected. The voltage readings will be similar to an “open-delta” 3 PH system. The two 1 PH line values to the grounding lug will be equal & one half their value phase-to-phase, and the T3 Generated Phase to ground value being approximately equal to the value of the two 1 PH line values to ground.

EXAMPLE: 1 PH line-to-ground L1 = 120 VAC, 1 PH line-to-ground L2 = 120 VAC
Generated Phase line-to-ground T3 = 240 VAC

Using the T3 Generated Phase as a common, check the voltage phase-to-phase with the two 1 PH lines. The highest phase-to-phase reading is where the two lines from the E & B circuits of the auxiliary bank will be connected.

**CALCULATING THE WIRE SIZE
FOR
THE INSTALLATION OF THE AUXILIARY BANK**

The wire size from the auxiliary capacitor bank to the 3 PH motor may be determined by the following formula which will calculate the amperage rating of the circuit. Conductor size can be determined from a wire size chart. The recommended wire size is based on using a copper wire rated 90 degrees Celsius in Raceway.

Nameplate kVAR Rating x 1000 / Nameplate Voltage Rating x 1.35 = WIRE AMPACITY

**ALLOWABLE AMPACITIES OF NOT MORE THAN
THREE INSULATED CONDUCTORS
Rated 0-2000 Volts in Raceway or Cable or Earth (Directly Buried)**

TEMPERATURE RATING OF CONDUCTOR 90 Degrees Celsius Based on Copper Wire	
SIZE AWG	ALLOWABLE AMPERAGE
18	14
16	18
14	25
12	30
10	40
8	55
6	75
4	95
3	110
2	130
1	150
1/0	170
2/0	195
3/0	225
4/0	260