

RTN: Guidelines for Sizing Phase-A-Matic Rotary Phase Converters

The following guidelines should be used when sizing our Rotary Converters to the application,

The Rotary Converter is designed to supply full running current to a three-phase motor, normally providing it with full running torque. However, most motors will draw five times their running current during start-up. When used at its maximum HP rating the Rotary Converter cannot deliver the full (5 times) starting current to the motor and therefore may not provide full starting torque. For heavy start-up loads a larger converter should be used.

Note: You can always use a larger Rotary Converter than the HP of the motor. There is no minimum load restriction for the Rotary Converter. Sometimes customers will install a Rotary Converter larger than needed to accommodate any future additions to their equipment. However, the need to add a Phase-A-Matic Voltage Stabilizer may apply if there is a wide HP variance between the load motor HP and the HP rating of the Rotary Converter. Below are the minimum Rotary Converter size recommendations for various applications:

1. Motor Load Types:

Type 1:

May be used up to the HP rating of the converter.* This applies to machinery with American made motors and which start with no load such as mills with step-pulley speed change, lathes with a clutch, sewing machines, and so forth.

Type 2:

Use a converter with HP rating of at least 50% larger than HP of the motor. They include domestic & European lathes without a clutch, some pumps, blowers, paper cutters, flywheel driven equipment, woodworking saws, dough mixers, meat grinders, motors rated below 1000 RPM, etc.

NOTE: For instant reversing (as for rigid tapping), use a converter with twice the HP rating of the motor.

Type 3:

Use a converter with twice the HP rating of the motor. They include Design "E" motors, Taiwanese, Chinese, Mexican motors, pumps starting under load, refrigeration compressors, etc., and for any motor which is used for instant reversing, as for rigid tapping.

Type 4:

Use a converter rated three times the HP to run Brazilian made WEG motors. Also size the converter three times larger to run laundry extractors, hoists, elevators, etc. This type of equipment can be extremely heavily loaded on start up. Consult Phase-A-Matic, Inc. for possibility of successfully using a converter sized less than three times on these machines.

Type 5:

Hydraulic pumps, which come under a momentary load during use, will be loaded well beyond their rated HP for the brief period of maximum PSI. Examples include bailers, compactors, paper cutters, shears, pumps, etc. The HP of the converter must be at least as high as the actual HP developed by the motor. To calculate the HP developed, you must first find the actual amperage drawn during maximum PSI. This is different from the rated amps of the motor. Next you would divide the maximum amperage by 2.8 to find the approximate HP being developed by the motor. That figure is the minimum size of converter to be used.

Example: A 10 HP compactor with a motor rated at 28 amps but momentarily draws a peak of 40 amps at maximum compression. Divide 40 by 2.8 = 14.3 approximate HP being developed; use model R-15 Rotary Converter.

2. Resistive Loads

Resistive loads must use the Rotary Converter. The static converter should never be used because it would be damaged. There are two methods to determine the HP of the converter to be used. One method is to take the amperage rating of the equipment and divide by 2.8 to find the approximate equivalent HP. The other method is to take the KW rating and multiply by 1.34, or divide by .75 to find the approximate equivalent HP of the equipment.

3. Computer, Rectifier, Transformer Loads

Transformers and electronic equipment can operate on the Rotary Converter. They include welders, lasers, EDM machines, CNC equipment, computers, plating rectifiers, power supplies, etc. Use the same formula as for resistive loads to determine the proper size converter to use. Divide the amperage by 2.8 to find the approximate equivalent HP. For CNC equipment the Phase-A-Matic™ Voltage Stabilizer may be required.

If a 4-wire wye input is required (all lines equal voltage to ground), a three-phase delta-to-wye isolation transformer must be installed between the converter and the equipment to change the delta power to wye power.

4. Multiple Motor Applications

Due to the high in-rush current required to start a motor (5 to 10 times the normal running current), most applications require sizing the HP of the Rotary Converter 50% larger, **or more** than the horsepower of the largest motor, or any combination of motors started at exactly the same time. The first motor started, **if not running heavily loaded**, generates additional 3-phase power back into the circuit. You can then run additional motors provided they do not run heavily loaded and are not started at the same time. A maximum of up to 3 times the HP rating of the Rotary Converter can run at the same time - if not heavily loaded, and not started simultaneously. For example, a 30 HP Rotary Converter potentially could run motors totaling up to 90 HP. Contact factory for verification of sizing.

If further technical assistance is required, please call Phase-A-Matic, Inc. for assistance at: 661-947-8485, Monday – Friday 6:00 AM to 4:30 PM Pacific Time.