

Automatic Voltage Regulator APPLICATION CONSIDERATIONS



Before selecting a voltage regulator for your AC power system, you should work through these five questions:

1. Do I need a single or three- phase regulator?
2. What is the nominal voltage in my application?
3. Should I select a narrow or wide input range?
4. Do I need single or individual phase control?
5. What size WHR Series Regulator do I need?

Below, you'll find the questions, answers, and guidelines that will help you choose the best unit for your needs.

1. Single or three phase regulator?

- Single Phase
- Single Phase 240/120 volt
- Three Phase

If you want to control a single phase load, select a single phase regulator. It doesn't matter if the power system is single phase or three phase. If the power system is three phase, only one phase is used to power a single phase load.

Single phase 240/120 volt units are for use with 240/120 volt single phase power systems. This system is common in many small businesses and homes in North America. It has two, 120 volt single phase sources wired in series to also provide 240 volt single phase. A 240/120 volt regulator increases or decreases the voltage in each of the 120 volt lines. The 240 volt single phase regulator increases or decreases the voltage in only one 240 volt line.

If you have a three phase load, or you want to regulate a three phase power system feeding a combination of loads, you need a three phase regulator.

2. What is the nominal voltage?

- 120- 127 (100)
- 208 x 220- 230- 240 (277)
- 380- 400- 415 x 480
- 480 x 600

Since there are only a few nominal voltages in use throughout the world, and because automatic voltage regulators handle multiple voltages, there are only four choices. The voltages listed above are nominal, 50/60 cycle voltages.

These are the official voltage by which the power system is iden-

tified. The actual output voltage of an automatic voltage regulator can easily be set for higher and lower voltages near these nominals. The utilization voltage marked on your equipment may be slightly different than one of these nominal voltages. For example, if the equipment indicates a requirement for 115 or 117 volts, a regulator with a 120 volt nominal rating is needed.

Automatic voltage regulators do not convert one nominal voltage on the input to another totally different nominal voltage on the output. For example, they will not accept 480 volts in and deliver 120 volts out. A variety of regulation devices are available to fulfill this requirement or to meet your specific needs. However, because of the all buck and all boost capabilities of these units, automatic voltage regulators can shift the output to another nominal voltage near the input nominal. For example, the 380-400-415 x 480 volt wide range regulators can deliver regulated 380 volts when connected to a 480 volt input.

3. Narrow or wide input corection range?

- Narrow Range
- Wide Range

The input range of a regulator is the range of input voltages over which the regulator will maintain constant output voltage. For clarification and uniformity it is expressed as a percent of the set output voltage. Voltage regulators are available in standardized input ranges.

Voltage Regulators with voltage ratings of:

- 120-127
- 208 x 220-230-240
- 380-400-415 x 480

Automatic Voltage Regulators maintain constant volt- age to your equipment, even when the input voltage and system load vary widely.

Automatic Voltage Regulators

Narrow Input Range	-20% low, +10% high
Wide Input Range	-30% low, +15% high

Units with the 480 x 600 volt rating:

Narrow Input Range	-16% low, + 8% high
Wide Input Range	-25% low, +12% high

Consider a unit with narrow input range where problems are not excessive or installation space is limited. Choose wide range for installations located at the end of long lines, locations with obvious problems, or if you want the most protection. The power that must be corrected is greater for wide range units than narrow range units. Therefore, narrow range units are usually smaller and lighter.

4. Single or individual phase control?

- Single Control
- Individual Phase Control

With most single phase systems the choice is easy. Since there is only one voltage, single control is the only possibility. Single control can be used for most 240/120 volt single phase applications if the actual voltages on the two 120 volt lines match each other within 4 volts, or if the regulator is to be used only for 240 volt loads. Use individual phase control if the two 120 volt input lines do not match within 4 volts.

Note: the input neutral must be connected to the regulator if individual phase control is used or if 120 volt loads are to be connected to the regulator.

With three phase systems, many applications can use single control if the three input voltages are balanced within 2%. Single control does not correct for unbalanced line voltage. Select individual phase control if in doubt or if the input voltages are not balanced within 2%. Individual phase control corrects the output voltage of each phase separately.

For basic Wye input models the input neutral must be connected to allow neutral current to flow if individual phase control or transient voltage suppression options are used, or if the load currents are not balanced.

5. What size Automatic Voltage Regulator do I need?

- Single Control
- Individual Phase Control

The last step in selecting an automatic voltage regulator for your application is to determine the size needed. Regulator sizing is based on the maximum load initially planned, plus a small amount for future expansion (about 10% to 25%), and occasionally some derating for special conditions. The load may be stated in current (amperes) or kVA. The rating charts list both. kVA is a measure of apparent power. For any given voltage, current and kVA are directly related.

Finding the maximum load is usually simple. Several methods to determine the size regulator required are outlined below. Pick the method that applies to your situation. High room temperatures, large starting currents, high altitudes, and all boost operation are conditions which may require a regulator with additional capacity.

Single Load

If you are powering only one piece of equipment such as a welder, machine tool, X-Ray machine, transmitter, etc., choose a regulator with a rating slightly higher than the equipment's full load rating. Rated voltage, frequency, number of phases, and current or kVA, should be located on the equipment nameplate or listed in the manufacturer's literature.

Contact the equipment manufacturer if you are sizing a regulator for a single system which consists of a number of pieces of equipment such as a transmitter installation, CAT scanner, machining center or X-Ray apparatus.

Regulator sized to match feeder circuit

If there are several loads on the same feeder which need to be regulated, select an automatic voltage regulator with a current rating at least as great as the circuit feeding the loads. The entire circuit will be protected and the full capacity of the circuit can be used.

The maximum current that can be drawn from a feeder circuit is equal to the size of the circuit breaker or fuse protecting the circuit.