AC DIMMER TO CONTROL AC VOLTAGE, SPEED OF INDUCTION MOTOR OR HEATER COIL

A voltage controller, also called an AC voltage controller or AC regulator is an electronic module based on either thyristors, TRIACs, SCRs or IGBTs, which converts a fixed voltage, fixed frequency alternating current (AC) electrical input supply to obtain variable voltage in output delivered to a resistive load. This varied voltage output is used for dimming street lights, varying heating temperatures in homes or industry, speed control of fans and winding machines and many other applications, in a similar fashion to an autotransformer. Voltage controller modules come under the purview of power electronics. Because they are low-maintenance and very efficient, voltage controllers have largely replaced such modules as magnetic amplifiers and saturable reactors in industrial use.
Induction motor speed control is done by varying the frequency of the applied voltage. Raising or lowering the voltage can have some speed control effects but these will be small, difficult to control, load-dependent, possibly cause the motor to overheat and, are not generally recommended.
This applies to three phase induction motors and single phase induction motors using a start/run capacitor.
People use VFDs to control induction motor speed but even these are not particularly helpful (a generalism of course) with single phase induction motors that use a capacitor.
Except for small fan motors, single-phase motors are generally not suitable for speed control. Universal motors are DC-type motors with commutators that can be used for either AC or DC. They are suitable for simple dimmer-control type speed control.
The best and usually the only alternative for an AC motor is to buy a motor that is suitable for variable speed and a matching controller. There are VFDs rated up to a few horsepower that convert single-phase input power to three-phase output. Also available are commutator-type DC motors with either field windings or permanent-magnet fields. DC motors controllers, similar to dimmers, are available for both types. Brushless DC motors are also available. They use another type of controller.

**AC Load**

**DIAC**

**TRIAC**

**Charging Capacitor**

**Variable Resistor**

**AC Voltage**