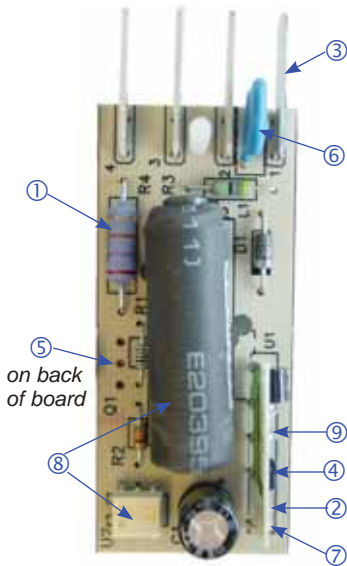


# VR Series for 115 Vac or 115/230 Vac Dual Voltage Capacitor Start/Capacitor Run Motors

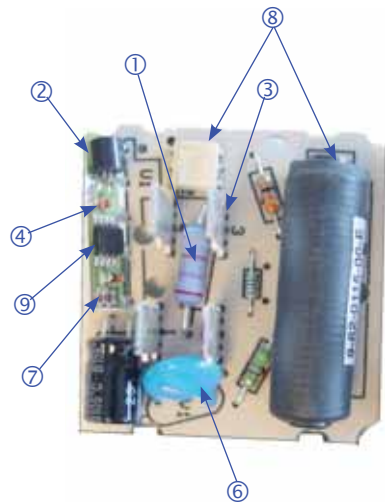
## Basic Operation

Capacitor start/capacitor run motors provide continuous voltage sensing information which can be used to extract speed data from the voltage across the motor start winding. By comparing this start winding RPM-sensitive voltage to the main AC input voltage (which serves as a reference voltage), the switch determines when the start circuit should be de-energized. The electronic switch interrupts the start circuit current after the motor has accelerated to the cut out voltage (speed), and reconnects the start circuit whenever the speed sensitive circuit senses the motor voltage (speed) has decreased to a preselected cut in voltage (RPM) level.

Capacitor start/capacitor run motors exhibit current transients and higher voltages across the start switch. These electrical stresses occur due to the switching of the two capacitors (start and run) that are connected in parallel during motor start and may have different voltages at time of restart. These stresses occur at restart with both mechanical and electronic start switches. The VR switch features circuitry designed to eliminate the effects of these conditions.



- ① **Bleeder Resistor.** Increases start capacitor life.
- ② **Electrically Protected.** Designed to filter out electrical noise, so there is no concern of random switch malfunction.
- ③ **Reduced Installation Time.** Easily accessible 1/4 inch terminals and mounting, reduce the amount of time required to install SINPAC Switches or to change out mechanical switches.
- ④ **Restart Capability.** When motor speed drops below 50% of synchronous speed, the start circuit is reconnected to reinitiate starting torque.
- ⑤ **Soldered Heat Sink.** High cycling. (Not shown)
- ⑥ **Transient Protection.** Transient protection tested per IEEE C62.41 - 1991 Category A3.
- ⑦ **Universal Design.** 50/60 Hz operation. Will work on 2, 4 or 6 pole motors of any manufacturer. Reduced inventory.
- ⑧ **Zero Voltage Detection Logic/Inductor.** Current spiking due to run capacitor no longer a problem.
- ⑨ **Line Voltage Compensation.** No modifications or changes are required for line voltage variations. SINPAC Switches will operate in areas susceptible to *brown-outs* or low voltage due to long wiring runs. Line voltage compensation results in less stress on the starting capacitor due to overvoltage.

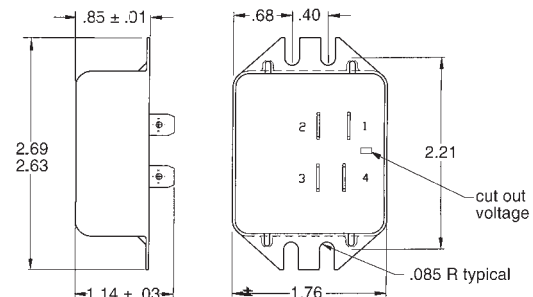
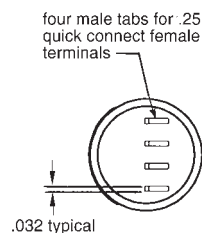
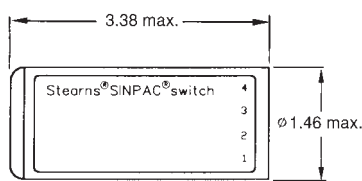


### ADDITIONAL FEATURES

- **Capacitor Shape.** Allows for easy mounting under a motor doghouse (19 package style).
- **Environmentally Protected.** Immune to moisture, dust, dirt, shock and vibration.
- **UL E71115 and Canadian UL Recognition.**
- **Completely Solid-State with No Moving Parts.** SINPAC Switches have no physical constraints to affect their operation.

No wearing parts mean high cycling, no arcing contact. Low warranty.

- **Silent Operation** - no switch noise
- **Operating Temperature:** -40°C to 65 °C (-40 °F to 149°F) [for operation between 65°C and 85°C (149°F and 185°F), consult factory.]
- **Operating Voltage:** 115 Vac SINPAC Switch: 90-130 Vac. For dual voltage motor equipped with center-tapped main winding: 90-130 Vac or 180-265 Vac.



Dimensions are for estimating only. Drawings for customer reference are available upon request.

| Typical Maximum Motor hp | Typical Full Load Motor Nameplate Current Rating (amps) |               | Switch Rating and Permissible Maximum Start Capacitor Current (amps) | Start Circuit Voltage | Catalog Number | Part Number      | Cut Out Voltage Typical | Cut In Voltage Typical | Package Style |
|--------------------------|---|---------------|--|-----------------------|----------------|------------------|-------------------------|------------------------|---------------|
|                          | 115 Volts   | 115/230 Volts |  |                       |                |                  |                         |                        |               |
| 1/2                      | 8   | 8/4           | 16   | 115                   | VR-16-130      | 4-7-71016-12-UA1 | 130                     | 30                     | 12            |
| 1/2                      | 8   | 8/4           | 16   | 115                   | -              | 4-7-71016-19-UA1 | 130                     | 30                     | 19            |
| 1/2                      | 8   | 8/4           | 16   | 115                   | -              | 4-7-71016-12-UB1 | 147                     | 37                     | 12            |
| 1/2                      | 8   | 8/4           | 16   | 115                   | -              | 4-7-71016-19-UB1 | 147                     | 37                     | 19            |
| 1/2                      | 8   | 8/4           | 16   | 115                   | VR-16-165      | 4-7-71016-12-U01 | 165                     | 37                     | 12            |
| 1/2                      | 8   | 8/4           | 16   | 115                   | -              | 4-7-71016-19-U01 | 165                     | 37                     | 19            |
| 2                        | 20  | 20/10         | 40   | 115                   | VR-40-130      | 4-7-71040-12-UA1 | 130                     | 30                     | 12            |
| 2                        | 20  | 20/10         | 40   | 115                   | -              | 4-7-71040-19-UA1 | 130                     | 30                     | 19            |
| 2                        | 20  | 20/10         | 40   | 115                   | -              | 4-7-71040-12-UB1 | 147                     | 37                     | 12            |
| 2                        | 20  | 20/10         | 40   | 115                   | -              | 4-7-71040-19-UB1 | 147                     | 37                     | 19            |
| 2                        | 20  | 20/10         | 40   | 115                   | VR-40-165      | 4-7-71040-12-U01 | 165                     | 37                     | 12            |
| 2                        | 20  | 20/10         | 40   | 115                   | -              | 4-7-71040-19-U01 | 165                     | 37                     | 19            |
| 3                        | 25  | 50/25         | 50   | 115                   | VR-50-130      | 4-7-71050-12-UA1 | 130                     | 30                     | 12            |
| 3                        | 25  | 50/25         | 50   | 115                   | -              | 4-7-71050-19-UA1 | 130                     | 30                     | 19            |
| 3                        | 25  | 50/25         | 50   | 115                   | -              | 4-7-71050-12-UB1 | 147                     | 37                     | 12            |
| 3                        | 25  | 50/25         | 50   | 115                   | -              | 4-7-71050-19-UB1 | 147                     | 37                     | 19            |
| 3                        | 25  | 50/25         | 50   | 115                   | VR-50-165      | 4-7-71050-12-U01 | 165                     | 37                     | 12            |
| 3                        | 25  | 50/25         | 50   | 115                   | -              | 4-7-71050-19-U01 | 165                     | 37                     | 19            |

### Selection

Motor hp ratings are typical. For an accurate selection procedure, measure start capacitor current during a normal start or at locked rotor and select a SINPAC Switch with higher maximum current rating than that measured.

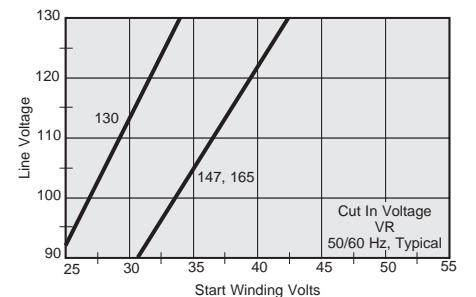
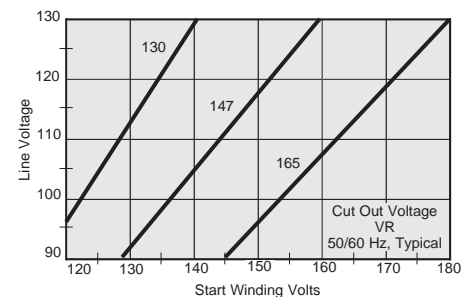
1. Be sure switch series matches motor type.
2. Be sure switch voltage rating matches auxiliary (start) circuit voltage rating.
3. Selection can be based on actual measurement of start capacitor current or two times the motor nameplate FLA rating.
4. Switch current rating must match or exceed the motor start capacitor current requirements. Always select a SINPAC Switch with the next higher current rating for:
  - a) High cycling applications.
  - b) Long acceleration time.
  - c) High ambients: Greater than 55° C.
5. To assure proper motor operation, the voltage across the start winding must reach the SINPAC Switch cut out reference voltage between 70% to 85% of motors synchronous speed.

SINPAC Switches are line voltage compensated. Changes in the line voltage will not effect system operation unless an overload condition causes reduced running speed, along with reduced voltage across the start winding.

6. Higher current switches can be used in place of lower rated switches of the same series.

### Line Voltage Compensation Charts

Induced voltage across the start winding is directly proportional to motor speed and line voltage. All SINPAC Switches use this voltage to switch the start capacitor out of the circuit. Your motor with a SINPAC Switch must generate a voltage greater than the switch reference voltage to assure cut-out of the start capacitor. Refer to charts below.



### Wiring Diagram

