IR Series for Instant Reversing 115 Vac or 115/230 Vac Dual Voltage Capacitor Start Motors

Basic Operation

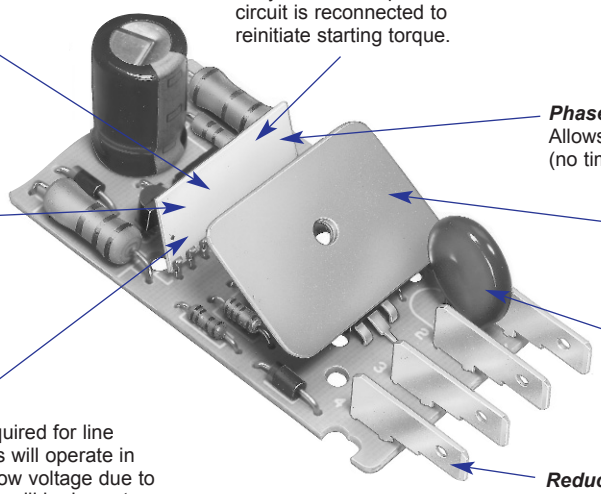
Bidirectional motors - those that can rotate in either direction – are of two classes: *1. Reversing motors*, which can change from full speed in one direction to full speed in the opposite direction. *2. Reversible motors*, which can be reversed only when the motor is not running, or is running below cut out speed. Some motor manufacturers distinguish between quick reversing and instant reversing. A quick reversing motor requires a time delay of approximately 1/25th of a second or more for the switching circuitry to react. An instant reversing motor requires absolutely no time delay. The standard SINPAC Switch can be used on reversible and reversing motors. The SINPAC IR Series Switch provides the function of a direction sensing centrifugal switch and makes a reversible capacitor start motor into an instant reversing motor.

In order to reverse a single-phase motor, it is necessary to reverse the polarity of either the start or main winding, but not both at the same time. The reversal of the winding is accomplished with an external reversing switch or contactor that is not part of the SINPAC Switch. SINPAC Instant Reverse Switch is not dependent upon how quickly the user operates the reversing switch, but only that the reversing switch did change states, i.e., forward to reverse, or vice versa. The SINPAC Switch detects the change in the phase shift between the main and start windings, and the logic circuit instantly actuates the starting switch, causing the start circuit to be reconnected to line voltage. This connection causes the motor to decelerate and then reaccelerate in the opposite direction. The SINPAC IR Series Switch interrupts the start circuit current after the motor has accelerated to the cut out speed, and reconnects the start circuit whenever the circuit senses the motor speed has fallen to cut in speed (usually about 50% of synchronous motor speed).

Environmentally Protected. Immune to moisture, dust, dirt, shock and vibration.

Electrically Protected. Designed to filter out electrical noise, so there is no concern of random switch malfunction.

Restart Capability. When motor speed drops below 50% of synchronous speed, the start circuit is reconnected to reinitiate starting torque.



Phase Comparator Logic: Allows Instant Reverse operation (no time delay).

Universal Design 50/60 Hz operation. Will work on 2, 4 or 6 pole motors of any manufacturer. Reduced inventory.

Soldered Heat Sink High cycling.

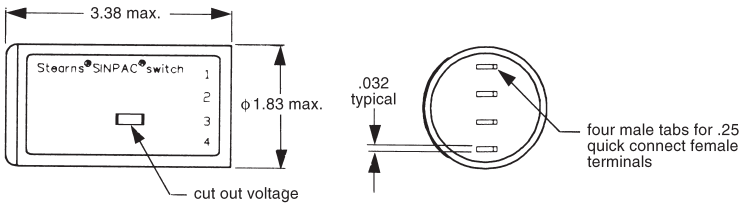
Transient Protection Transient protection tested per IEEE C62.41 - 1991 Category A3.

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. It also means there will be less stress on the starting capacitor due to over voltage.

Reduced Installation Time. Easy accessible 1/4 inch terminals and mounting, reduce the amount of time required to install SINPAC Switches or to change out mechanical switches.

ADDITIONAL FEATURES

- ***UL recognition and CSA certification.***
- ***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	12	12/6	25	115	IR-25-130	4-7-51025-15-UA1	130	30	15
1/2	12	12/6	25	115	IR-25-147	4-7-51025-15-UB1	147	33	15
1/2	12	12/6	25	115	IR-25-165	4-7-51025-15-U01	165	37	15
2	20	20/10	40	115	IR-40-130	4-7-51040-15-UA1	130	30	15
2	20	20/10	40	115	IR-40-147	4-7-51040-15-UB1	147	33	15
2	20	20/10	40	115	IR-40-165	4-7-51040-15-U01	165	37	15

Selection

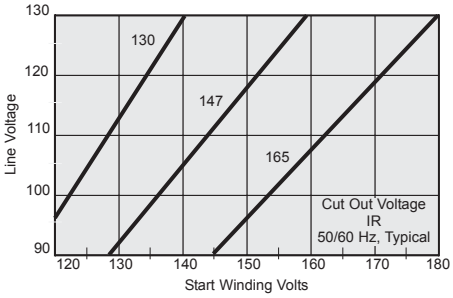
Motor hp ratings are typical. For an accurate selection procedure, measure start circuit current during a normal start or at locked rotor and select a SINPAC Switch with higher maximum current rating than that measured.

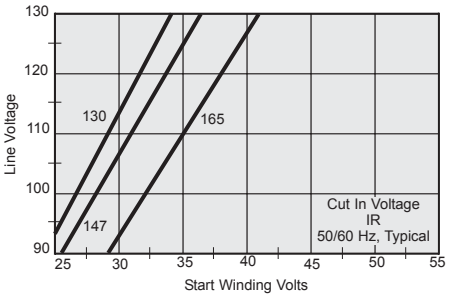
1. Be sure switch series matches motor type.
2. Be sure switch voltage rating matches (start) circuit voltage rating.
3. Selection can be based on actual measurement of start capacitor current or two times the motor nameplate FLA rating.
4. Switch current rating must match or exceed the motor start capacitor 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 voltage reference between 70% to 85% of motors synchronous speed.

   Caution: 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 on the start winding.
6. Higher current switches can be used in place of lower rated switches of the same series.

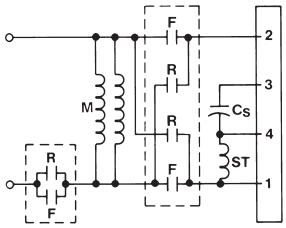
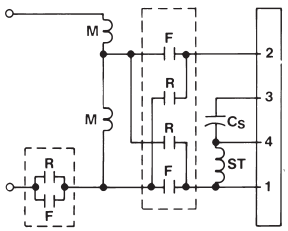
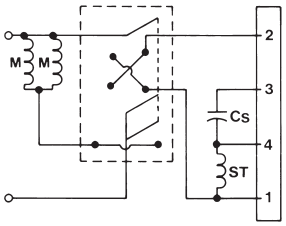
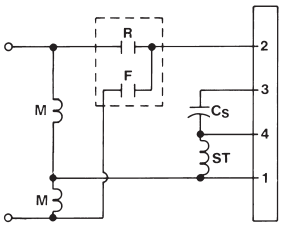
Line Voltage Compensation Charts

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 that is 20% greater than the switch cut out voltage to assure cut out of the start capacitor. Refer to charts below.





Wiring Diagram

Catalog Number	SINPAC Switch Rating	115 Volt 50/60 Hz Motor Operation	230 Volt 50/60 Hz Motor Operation
IR-25 IR-40 *Connect to Instant Reverse Start Motors*	115 Volts 1 2 3 4	**115 Volt Operation Dual Voltage Motor Using Two Full Voltage 2 or 3 Pole Single-Phase Reversing Contactors with Mechanical Interlock** *(Electrical Interlock Optional)*  Reversing contacts are not part of SINPAC Switch.	**230 Volt Operation Dual Voltage Motor Using Two Full Voltage 2 or 3 Pole Single-Phase Reversing Contactors with Mechanical Interlock** *(Electrical Interlock Optional)*  Reversing contacts are not part of SINPAC Switch.
		 Drum switch is not part of SINPAC Switch.	 Reversing contacts are not part of SINPAC Switch.

C_S– Start capacitor, **M** – Motor main winding, **ST** – Motor start winding, **F** – Forward, **R** – Reverse