

REDUCED VOLTAGE STARTING METHODS

Starting Method	Controller Operation	Starting Current % of Full Load Amps		Starting Torque	Open Or Closed Transition
Across the Line	Initially connects motor directly to power lines	600%		100%	None
Primary Reactor	Inserts reactance in series with motor during starting.	300% 390%		25% 42%	Closed
Primary Resistance	Inserts resistance units in series with motor during starting.	300% 390%		25% 42%	Closed
Autotransformer	Uses auto-transformer to reduce voltage to motor	<u>Tap</u> 50% 65% 80%	<u>Current</u> 175% 277% 409% *includes magnetization current	25% 42% 64%	Closed
Wye-Delta	Starts motor with windings wye connected, then controller reconnects them in delta.	200%		33%	Open or Closed
Solid State Soft Start/Stop	Uses special soft start module to control current and voltage to motor.	Varies (300-400%)		Varies (12 -100%)	Closed
Part Winding	Starts motor with only part of winding connected, then adds remainder for running.	360%-420%		50 - 60% Minimum pull-up torque 35% of full load.	Closed
Variable speed	Uses special variable frequency section to control the motor voltage and frequency	Selectable and typically set for 125%		100%	Closed

NOTES— Variable Speed

1. Consideration should be given to the method of starting and the power source. Consult the controller manufacturer for additional information.
2. The voltage drop limitation requirements of NFPA 70 695.7 and NFPA 20 9.4 are not applicable when the manual emergency handle is used on reduced voltage controllers. Under that condition the power supply need only be capable of starting and running the motor as demonstrated during acceptance testing of the fire pump system.
3. Consideration should be given to the effects of transition currents of open transition controllers on circuit breakers, generators, couplings, pump shafts and other components of the fire pump system.