

Applications Corner

Large Tonnage Solutions Marketing

This June 2010 LTS Update Newsletter's edition of Applications Corner was written by Steven Rosenzweig, LTS Products and Systems Applications Product Manager.

Electrical Definitions for Terms Found in YORKworks

Utilize the below definitions to better understand the various electrical terms found within YORKworks. If you have any questions about these electrical terms, please contact stephen.m.rosenzweig@jci.com.

Maximum Fuse / Circuit Breaker - in this case maximum is a "**not to exceed value**," it is not the recommended value for the fuse or circuit breaker of the chiller. This value is calculated by taking the Full Load Amps (FLA) x 2.25 and then taking the next nominal size smaller fuse or breaker value to get the maximum size allowed for the job.

Using the maximum value is not the proper method of applying a fuse or breaker. Customers are better served by using a fuse or breaker which is sized using FLA*1.5 or FLA*1.75, depending upon local codes. The maximum value is provided as a precautionary note to the contractor, consultant or customer.

Minimum Circuit Ampacity (Amps) – is the minimum wire size needed to guarantee that the wiring will not overheat under all operating conditions, for the life of the product. The customer may of course choose to run a larger wire.

Motor FLA vs. Job FLA - The Motor FLA is the current flowing through the line when the motor is operating at full-load torque and full-load speed with rated frequency and voltage applied to the motor terminals. For chillers it is the current drawn by the motor to drive the compressor so as to enable the chiller to produce the design chilling duty.

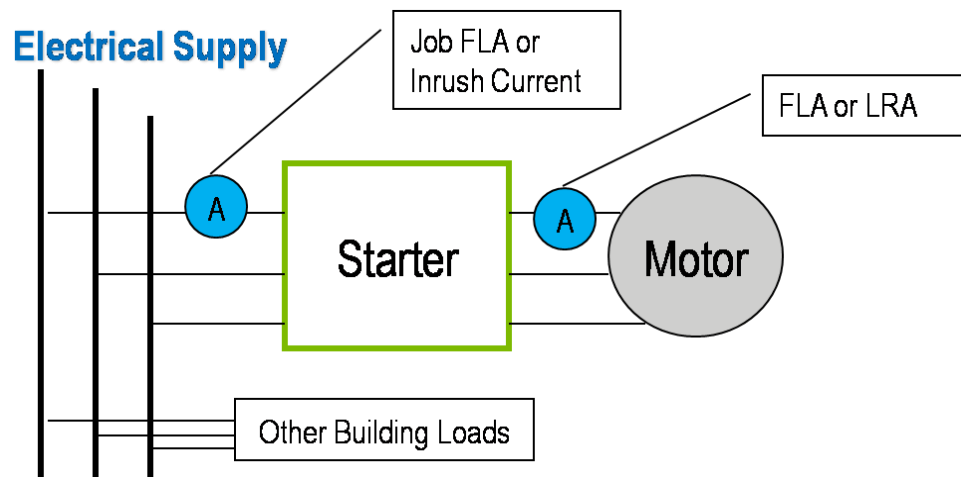
The Job FLA includes the motor FLA and the other currents (devises) required to operate the chiller. These other devises requiring current are the oil pump motor, control panel transformer and loses for the VSD or SSS. These devises do not connect to the motor terminals but they consume power (amps) and they are located on the chiller. Remote mounted starters supplied by other manufacturers other then JCI are not included in the overall chiller power consumption calculations.

Motor kW vs. Job kW – This is the same concept as the Motor FLA “vs.” Job FLA topic except we are referring to power which is made up of voltage and amps. Power (watts) = (volts) (amps) (1.732) for 3 phase power.

Locked Rotor Amps – The locked rotor current is the measured current with the rotor locked and with rated voltage and frequency applied to the motor. This is the amount of current a motor can be expected to draw under full load (torque) conditions which is seen when starting the motor.



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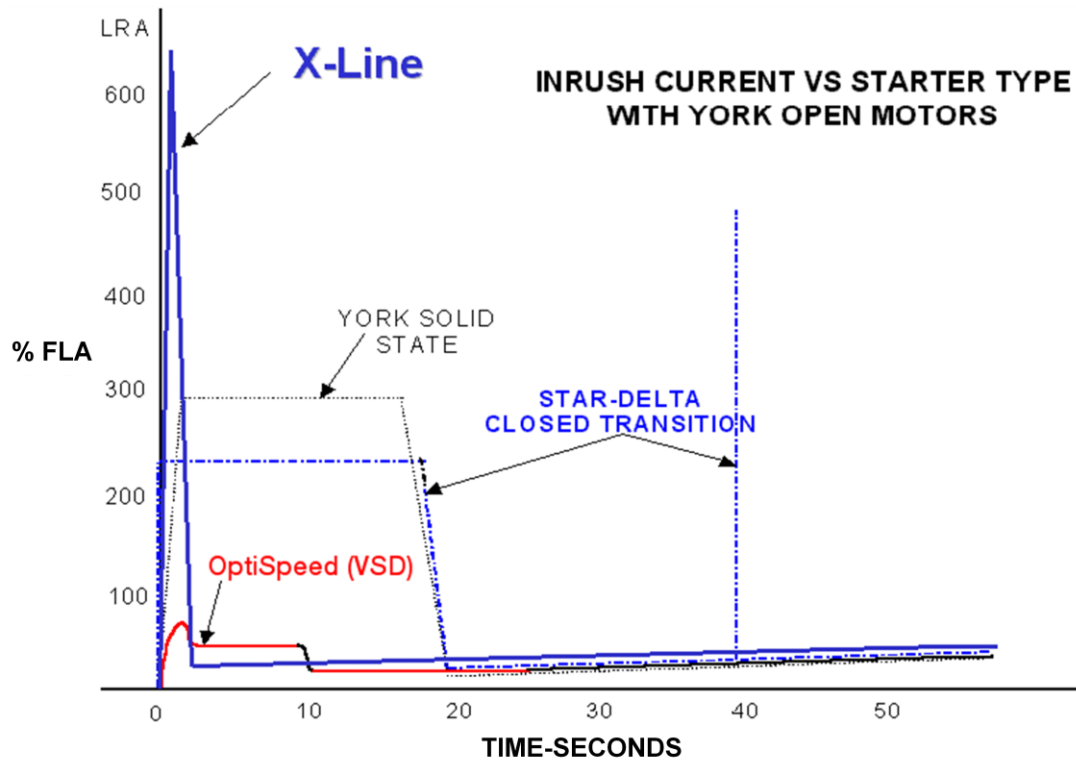
Inrush - refers to the maximum, instantaneous input current drawn by an electrical device when energized. Inrush varies with starter type. A momentary input current surge, measured during the initial turn-on of the power supply. This current reduces to a lower steady-state current once the input capacitors charge. A motor controller / starter or other forms of protection are often used to limit inrush current, because uncontrolled inrush can damage components, lower the available supply voltage to other circuits, and reduce motor life.

The next step now is to understand how different **Starter Characteristics** affect FLA, Inrush and LRA. This chiller example showing different starter values should help.

YKFSFRQ7-CSG	600 TR				460/3/60
Starter Type	Motor FLA	Job FLA	% of LRA	LRA	Inrush
Across the Line	486	486	100%	3450	3450
Auto Transformer 80%	486	486	64%	3450	2208
Solid State Starter	486	494	45%	3450	1555
Variable Speed Drive	486	496	<0%	3450	496

As you can see from the table above and the chart below, the chiller with the VSD has a lower inrush than any of the other starter types. This is an important issue because a chiller with a high inrush may require a larger transformer which means more costs. Inrush also causes heating of the motor winding which can result in a shortened motor life, so why not spend some of that money on a better starter.

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If you have a topic request for the applications corner found in the LTS Update Newsletter, please contact jill.h.woltkamp@jci.com.