VFDS AND MAXIMUM INRUSH CURRENT

Question:

What can be would be the expected inrush current on the input of a Variable Frequency Drive that is controlling a motor?

Explanation:

Although we do not have a specification for input current inrush on our VFD's, you can consider it to be between 100-150% of the applied motor's full load amps (FLA) with modern pulse width modulation (PWM) drive designs.   The actual peak current demand in normal operation is primarily related to demands of the load and its inertia along with the time in which it is accelerated to maximum speed. Firmware parameters can also limit peak currents. (Please also note that ABB requires fast acting semiconductor type fuses that are designed to open rapidly if the current rises above the value of their rating.)

Low inrush current is an inherent advantage for a PWM VFD over other control methods because of the way a VFD will control the motor flux while starting up a motor. The reason for this comes from a basic understanding of VFD design. Drives manage the flux of the motor. The motor's magnetic flux will be directly proportional to the voltage and inversely proportional to frequency, so the flux is held constant and current is limited while full torque can be delivered. In other words, the V/Hz ratio is essentially maintained as a constant value throughout the speed range. This means that constant torque can be maintained below the base speed of the motor while limiting the need to provide the high starting currents that would be characteristic of an across the line start or a soft-start device.

It is also important to note that current is limited on the application of input power by the design of the drive's pre-charge circuit. The dc bus capacitors are soft charged based on an RC time constant such that the current at power up will be well below the motor's FLA.