

Overheating Protection of the Genteq Eon Motor

Protection of ECM Motors: ECM motors are referred to as Electronically Protected simply because there are no thermal protectors mounted on the windings to protect motors but the protection is done by the electronic control. The ECM electronic protection is recognized under UL 60730.

How does the Electronic Protection work: At operating condition there are two means of limiting current into the motor. The first one is a safe operating area limit that places an upper limit on the allowable motor current.. The motor thermal characteristics are such that at this full output the temperature of the windings does not exceed insulation rating for the motor (for example 130 Deg C for class B insulation system) or thermal rating of the electronic components. The second means of protection is done by current trip. The measured phase current is compared to a threshold that is higher than the safe operating area limit. When the current exceeds this predetermined value the electronic control automatically “trips” or stops energizing motor with current. Both of these functions are implemented in software, so there is also an internal watchdog set up to shut the outputs off if the software stops checking the current.

At Locked rotor condition, the electronic control senses “no rotation” condition and shuts down . It continues to try starting the motor but fails to do so when rotor is truly locked . It can continue trying to start the motor indefinitely but time between start attempts increases with each failed start, such that the average value of heating does not result in any heating of motor windings or electronic components.

Safety agencies(UL, CSA, DEMKO, VDE, etc.)) test this feature by mechanically locking the rotor and energizing the control with full power. They let smarts in the electronic shut down and try to start motor repeatedly till a steady state condition is reached from temperature rise point of view..

They check the temperature of motor windings and electronic components. Typically, temperature is much below insulation rating of the motor or thermal rating of the electronic components.

The temperature test is followed by Dielectric test to make sure that there is no insulation degradation.