Significance of the Hot/Cold Ratio

GE Power Management No. GET-8423

DESCRIPTION

The Hot/Cold Ratio refers to the hot and cold stall times and determines the level at which the thermal capacity settles for loading below full load current. The stall time indicates the maximum duration for a stall condition. The cold stall time is longer than the hot stall time, it implies that a thermal trip (100%) should be reached sooner if the motor has been running (hot). This is achieved in the thermal model by settling to a specific thermal value (for example, 30%) based on the current drawn and the hot and cold curve ratio:

$$\mathrm{TC}_{\mathrm{used\_end}} = I_{eq} \times (1 - \mathrm{Hot/Cold}) \times 100\% \quad \text{(EQ 1)}$$

where: $\mathrm{TC}_{\mathrm{used\_end}}$ = Thermal capacity after the motor has been running at a constant current below the thermal pick up level for some time.
I_{eq} = the motor current.
Hot/Cold = The Hot/Cold Stall Time Ratio setting applied to the relay.

EXAMPLE

A motor has been running a 80% of full load current for some time. The thermal pickup is 115% of full load and the hot and cold stall times are 10 and 12 seconds, respectively. In this case,

$$\mathrm{TC}_{\mathrm{used\_end}} = I_{eq} \times (1 - \mathrm{Hot/Cold}) \times 100\% = 0.8 \times \left(1 - \frac{10\ \mathrm{s}}{12\ \mathrm{s}}\right) \times 100\% \quad \text{(EQ 2)}$$
$$= 14\%$$

Since the motor has been running, a requirement of 86% thermal increase to trip results.