



MOTOR PROTECTOR DETERMINATION FOR SINGLE PHASE HERMETIC COMPRESSORS

General characteristics

Manufacturer:		Compressor code:	
Voltage:	Frequency:	Nominal power:	
Nominal current:	Full load current:	Number of poles:	
Fan: (no , 1 , 2)			
Other data:			

Overload running tests:

overload must not trip and maximum allowed winding temperature is 140°C

Test	voltage [V]	suction pressure [°C]	discharge pressure [°C]	main winding temp. [°C]	ambient temp. [°C]	shell temp. [°C]	location temp. [°C]	total current [A]
1	V(min) - 6%							
2	V(max) + 6%							

- Ambient temperature is usually 43°C
- Take measures after thermal stabilisation
- The worst condition is usually at minimum voltage
- Location temperature is the one to which the bimetal disc of the protector is sensitive: to measure this a protector plastic case (no disc, no heater) provided with a thermocouple must be placed on the usual location and the compressor is run under the loading conditions.

Ultimate trip tests:

overload must trip and maximum winding temperature allowed is 160° C

Test	voltage [V]	suction pressure [°C]	discharge pressure [°C]	main winding temp. [°C]	ambient temp. [°C]	shell temp. [°C]	location temp. [°C]	total current [A]
1	V(min) - 15%							
2	V(max)+10%							

If the overload protector does not trip, the following procedure must be applied:

- First increase the discharge pressure to + 76 °C, then, if still the protector does not trip:
- decrease the heat exchange between compressor and ambient by covering the compressor itself with clothes or
- gradually decrease the supply voltage in steps of 4% each of the nominal voltage until tripping or stabilisation occurs, under running or stall conditions. Wait for stabilisation at each step.

Locked rotor tests

Test	circuit	voltage [V]	cycling time [s]	main winding temp. [°C]	aux winding temp [°C]	ambient temp [°C]	shell temp. [°C]	location temp [°C]	total current [A]
1	Main winding	V (min)							
2	Main winding	V (max)							
3	Both windings	V (min)							
4	Both windings	V (max)							

- Ambient temperature is usually 20°C.
- Stop test when maximum winding (main and aux) temperature is reached under steady state conditions: record last values.
- It is recommended to test either with both windings or with the main winding only energised, to check the most severe condition.
- If capacitors are provided, it is recommended to test with and without capacitors in the circuit.
- Shell maximum temperature must not be higher than 150°C.
- Winding temperatures must not be higher than the maximum expected one for the life and integrity of the motor itself: it could be as high as 200°C depending on the grade of the wire and insulation class of the motor.
- Cycling time must not be so long that, once extended over a period of 15 days, could lead to more than 10.000 cycles, thus affecting the reliability of the overload protector.
- The above tests have the purpose of the determination of the overload protector. Once this has been determined, the 15 days locked rotor test must be suitably performed: after the 15 days locked rotor test the insulation integrity of the compressor is checked through high potential test and the protector integrity must be proved by the regularity of the cycling time.

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