

System design / Cooling

Compressors of 1/5HP and above generally require forced air circulation (or an oil cooler) to cool the electric motor and the discharge gas, to maintain reliability particularly in hot environments.

The temperature of the motor and discharge gas depends on operating conditions (e.g. pressure, return gas temperature) and airflow.

Above a certain capacity (about 1.5 HP), the suction gas mainly cools the compressor: on these models suction gases are responsible for 85% of cooling. It is therefore important to control superheat when there is no airflow across the compressor

In some cases the compressor can be insulated when the suction superheat at the compressor is low and there is no liquid present. In this case it is imperative that a safety switch be fitted to switch off the compressor if the suction superheat increases due to a system fault. (e.g. refrigerant leakage, expansion valve failure).

The application engineer should always focus on reliability as well as performance and design.

If the worst operating conditions are known, it is recommended to measure the two parameters which directly affect the compressor's reliability: the temperature of the motor windings and the discharge temperature which directly relates to the temperature at the discharge valve.

Motor temperature

Leave the application switched off overnight or for an equivalent period in a constant temperature (longer for high capacity compressors). Measure the motor winding resistance R1 at this temperature t1.

Run the application in the most difficult conditions foreseeable, switch off the machine and immediately measure the new resistance R2. The temperature t2 can easily be calculated using the following equation:

Discharge temperature

Braze a thermocouple onto the discharge pipe 5cm from the compressor and insulate for a length of 10cm. In the worst conditions foreseeable, the temperature should not exceed the following:

AZ / THB : 135°C

AEZ / AE : 127°C

AJ (CAJ - TAJ) : 135°C

FH (TFH) / AH (TAH) : 143°C

TAG / TAN : 143°C

RK (TRK) / RG : 127°C

You have to take into consideration that a dusty condenser induces higher temperatures. Then, we advise you to take a safety margin or take system measures under a dusty condenser conditions.