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Refrigeration engineering for supermarkets with ebm-papst products

Refrigeration engineering for supermarkets

EC technology for Coles Myer in Australia
Coles Myer aimed at improving the efficiency of the refrigeration systems in their supermarkets and uses the latest ebm-papst EC products as sold by ebm-papst Australia.

For the trial runs, Coles Myers chose their supermarket in Ringwood and mounted 20 EC condenser fans with diameters of 800 mm. The target was simple and straightforward:

- Reducing energy consumption in keeping with corporate philosophy and guidelines
- Reducing noise emission
- Maximising the efficiency of the refrigeration system plant and simplifying installation.

Thanks to the EC technology installed in Ringwood, it will be possible to save more than 50% in energy. Other than with AC motors, the efficiency of an EC motor remains relatively constant across its entire speed range. The condenser fans precisely adjust their speed to the system load.

Initially, Coles Myer was reluctant to use such big fans in a residential area, as they feared the noise emission usually associated with such big fans.

But the EC fans made by ebm-papst soon put a stop to these fears. For one thing, there is none of the typical start-up noise when starting or speeding

up, and the fans, for another thing, only run at maximum speed if the plant actually requires this speed.
And due to their new kind of commutation electronics, the EC fans do not even generate noise when changing speed.

As far as the efficiency of the entire refrigeration system is concerned, each of the 20 EC fans with diameters of 800mm has a 0-10V signal input allowing for indefinite speed control. Thus, by simply making the 0-10V-signal available via pressure sensor, the condensing temperature of the refrigeration system can be kept constant across the daily cycle. The electronics of the fan motor also allow for functions, which conventionally have to be covered by additional external components (overload and protection devices, speed control) – making overall installation a lot easier and quicker.

Compression refrigeration plants
The compression refrigeration machine is fitted with a mechanical compressor and a thermostatic expansion valve.
Essential are one compression element and one expansion element plus two heat exchangers, all grouped in a cycle in such a way as to make sure the heat exchangers are connected on both sides between compression and expansion element.
In the cycle, the coolant is now compressed in vaporous form (input power W), is condensed (liquidised) in the subsequent heat exchanger (condenser) with heat given off (heating power QH, and then the liquid coolant is expanded at the damper due to the pressure drop. When expanding, part of the coolant evaporates and the temperature goes down. In the second heat exchanger (evaporator), the coolant takes up the induced heat (refrigeration capacity QK) and evaporates. The compressor sucks in the evaporated coolant, and the cycle is closed.

Operating the refrigeration machine relies on energy fed in from outside and taking the form of mechanical work. The condensing heat given off at the condenser is the sum total of the refrigeration energy received at the evaporator, the input power and the operational losses at the insulation and friction losses.