PRODUCT INFORMATION

Product news for the CHILLVENTA 2010

System for Increasing Energy Efficiency

HermEco®

LEDERLE Hermetic

HermEco® – System for Increasing Energy Efficiency

General

In accordance with the EDL directive (final energy efficiency and energy services) of the European Union, 9% energy savings over a nine-year-period – in comparison to a reference period – should be possible through targeted measures.

HermEco® from HERMETIC-Pumpen GmbH combines canned motor pumps, frequency converters, and differential pressure gauges into one system with which refrigeration plants can be operated energy efficiently with a constant differential pressure. By using **HermEco®**, energy savings of up to 70% can be achieved compared to 50 Hz mains operation. Furthermore, it is no longer necessary to protect the pumps with constant flow regulators or Qmax orifices. The rate of delivery of the system adjusts directly and completely automatically to the differential pressure that is to be set.

Application ranges

The preferred design for large refrigeration plants today (Fig. 1) is as a pumping station with forced recirculation of the refrigerant on the low-pressure side. This has several advantages over other systems:

- savings of power due to lower temperature differences with direct vaporisation
- reliable distribution and control of the refrigeration capacity with many evaporators, even ones that are at a distance
- simplification of the pipework and reduction of its dimensions
- improved heat transfer to the evaporators
- concentration of the most important machine units in one room.

Refrigerant pumps must be suitable for pumping refrigerant when it is boiling, be insensitive to cavitation to a great extent, have high operational reliability, and be maintenance-free. Hermetic pumps without shaft sealing allow broad use of refrigerant pumps independent of the refrigerant for the first time.

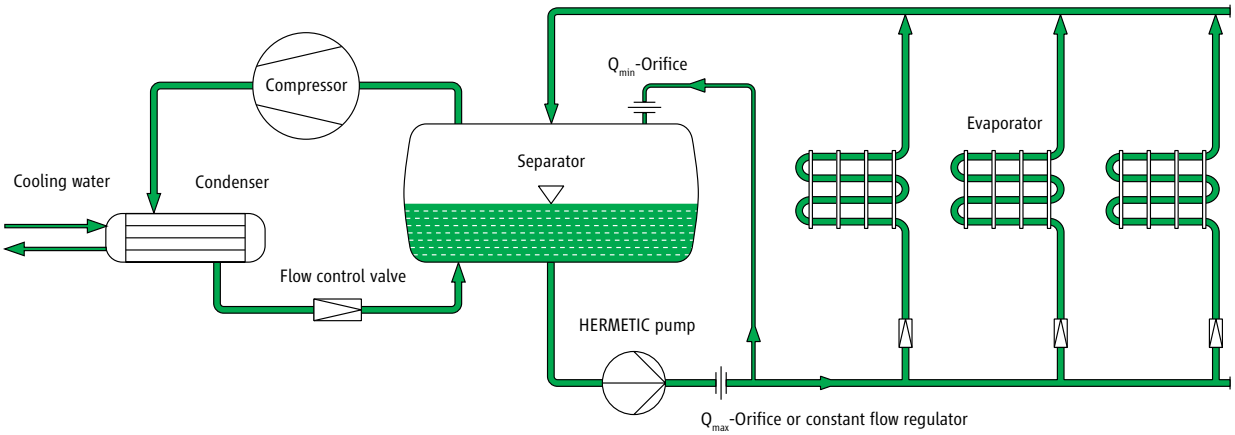

Figure 1: Schematic representation of a large refrigeration plant

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Design

A frequency converter is used for practical reasons for operating the pump. The differential pressure between the suction and pressure flange is used as a controlled variable for the frequency converter. The converter regulates the frequency in accordance with the required rate of delivery or alternatively the refrigeration capacity so that the differential pressure remains constant across the entire control range. Hence, Q becomes a clear function of the frequency. To save energy, the differential pressure must be set to a setpoint in the lower range of the characteristic curve family. There, the pump energy consumption P2 are proportionally ~n^3 smaller. However, in order to allow the largest possible control range, the frequency should not be too low.

Configuration

The system is available for our entire range of refrigerant pumps and is comprised of the following components:

- HERMETIC refrigerant pump (see table)
- differential pressure gauge
- frequency converter in IP55, 3x400 V 50/60 Hz

The **HermEco®** system is preconfigured at our company for your conditions of use. Moreover, you can adjust the settings and parameters of the system by yourself at any time. Due to the high energy savings of the **HermEco®** system, an amortisation time of less than half a year can be achieved, depending on the conditions of use and pump size.

Delivery time

8 weeks from receipt of order

Example: CAM 2/3 with AGX 3.0

- energy savings potential of 66.7% with Δp-2.3 bar
- frequency range 35-60 Hz

Design

A calculation algorithm was used for the design of the pump, which permitted the conversion of the 50 Hz performance curve to smaller frequencies with the help of the similarity laws:

Q~n, H~n^2, P2~n^3 as well as NPSH~$n^{4/3}$.

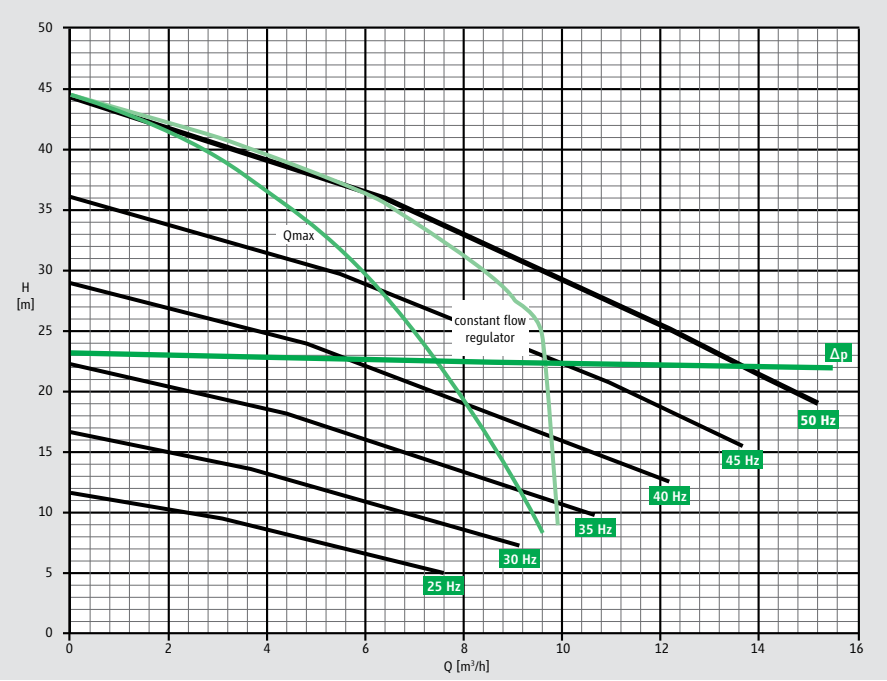
By including the speed as a new degree of freedom, the design of the pump becomes more difficult. Furthermore, it is also necessary to take the viscosity of the pumped liquid into consideration to ensure the bearing load rating.

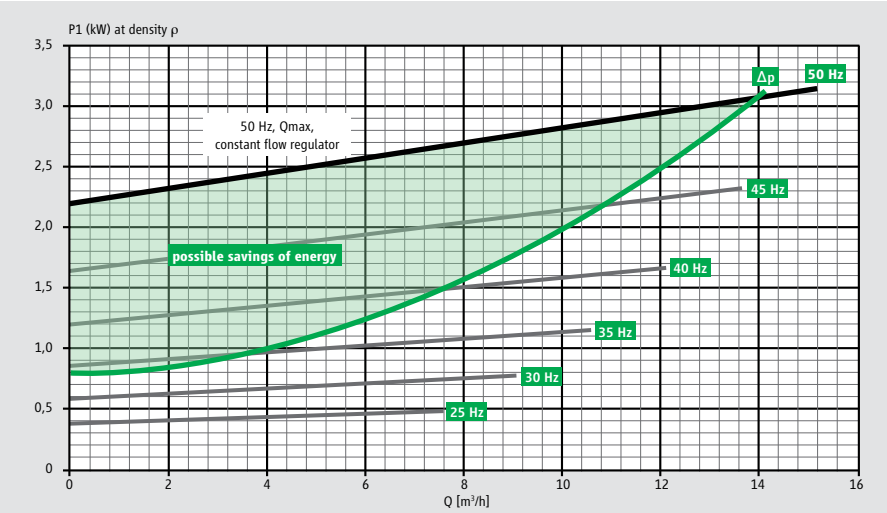
Available refrigeration pumps

Type	Motor	Pump data		
		Q [m^3 / h]	H [m.Fl.S.]	NPSH [m]
CAM 1/2	AGX 1,0	0,5 – 3,5	17 – 13	0,3 – 0,40
CAM 1/3	AGX 1,0	0,5 – 4	26 – 18	0,3 – 0,40
CAM 1/4	AGX 1,0	0,5 – 4	34 – 25	0,3 – 0,40
CAM 1/5	AGX 1,0	0,5 – 4	42 – 30	0,3 – 0,40
CAM(R) 2/2	AGX 3,0	1,0 – 10	32 – 25	0,6 – 0,55
	AGX 4,5	1,0 – 10	32 – 25	0,6 – 0,55
CAM(R) 2/3	AGX 3,0	1,0 – 10,5	44 – 30	0,6 – 0,55
	AGX 4,5	1,0 – 10,5	44 – 30	0,6 – 0,55
CAM(R) 2/4	AGX 3,0	1,0 – 11,5	58 – 36	0,6 – 0,70
	AGX 4,5	1,0 – 11,5	58 – 36	0,6 – 0,70
CAM(R) 2/5	AGX 3,0	1,0 – 12,5	72 – 42	0,6 – 0,80
	AGX 4,5	1,0 – 12,5	72 – 42	0,6 – 0,80
	AGX 6,5	1,0 – 12,5	72 – 42	0,6 – 0,80
CAM(R) 2/6	AGX 3,0	1,0 – 13,5	84 – 47	0,6 – 0,85
	AGX 4,5	1,0 – 13,5	84 – 47	0,6 – 0,85
	AGX 6,5	1,0 – 13,5	84 – 47	0,6 – 0,85
CAM 3/2	AGX 8,5	6,0 – 30	65 – 50	1,5 – 2,50
	CKPx 12,0	6,0 – 30	65 – 50	1,5 – 2,50
	CKPx 19,0	6,0 – 30	65 – 50	1,5 – 2,50
CAM 3/3	AGX 8,5	6,0 – 30	95 – 75	1,5 – 2,50
	CKPx 12,0	6,0 – 30	95 – 75	1,5 – 2,50
	CKPx 19,0	6,0 – 30	95 – 75	1,5 – 2,50
CAM 3/4	CKPx 12,0	6,0 – 35	130 – 105	1,5 – 2,50
	CKPx 19,0	6,0 – 35	130 – 105	1,5 – 2,50
CNF 40-160	AGX 3,0	4 – 23	36 – 12	1,5 – 1,7
	AGX 4,5	4 – 23	36 – 12	1,5 – 1,7
	AGX 6,5	4 – 23	36 – 12	1,5 – 1,7
	AGX 8,5	4 – 23	36 – 12	1,5 – 1,7
CNF 40-200	AGX 4,5	4 – 22	56 – 12	1,5 – 1,8
	AGX 6,5	4 – 22	56 – 12	1,5 – 1,8
	AGX 8,5	4 – 22	56 – 12	1,5 – 1,8
	CKPx 12,0	4 – 22	56 – 12	1,5 – 1,8
CNF 50-160	AGX 4,5	6 – 50	40 – 15	1,8 – 2,7
	AGX 6,5	6 – 50	40 – 15	1,8 – 2,7
	AGX 8,5	6 – 50	40 – 15	1,8 – 2,7
	CKPx 12,0	6 – 50	40 – 15	1,8 – 2,7
CNF 50-200	AGX 6,5	6 – 50	58 – 22	1,8 – 2,7
	AGX 8,5	6 – 50	58 – 22	1,8 – 2,7
	CKPx 12,0	6 – 50	58 – 22	1,8 – 2,7

Conclusion

The use of a frequency converter with Δp control can save up to 67% of the pump energy consumption compared to a 50 Hz mains operation. The heat carried into the refrigeration system is also reduced by 67% in the process. This also means that the necessary refrigerating capacity of the compressors is reduced accordingly. The speed control of the pump therefore results in a double benefit. Both the pump as well as the compressors experience an efficiency increase and hence contribute to the energy savings of the entire refrigeration plant.





PRODUKTINFO
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LEDERLE Hermetic

HERMETIC-Pumpen GmbH
Gewerbestrasse 51 · D-79194 Gundelfingen
phone +49 761 5830-0 · fax +49 761 5830-280
hermetic@hermetic-pumpen.com
www.hermetic-pumpen.com