

ET 165

Refrigeration system with open compressor



Description

- capacity measurement at the open compressor with variable speed
- refrigeration chamber with adjustable cooling load
- part of the GUNT-FEMLine

ET 165 enables basic experiments in the field of refrigeration. The trainer includes a closed refrigeration circuit with open compressor, a condenser with fan, a thermostatic expansion valve and an evaporator in a refrigeration chamber with transparent door. A fan in the refrigeration chamber ensures an even temperature distribution. A cooling load is simulated by an adjustable heater in the refrigeration chamber. The drive unit HM 365 drives the compressor via a V-belt. The compressor speed is set at the HM 365. The circuit is equipped with a combined pressure switch for the delivery and intake side of the compressor.

All relevant measured values are recorded by sensors. Digital displays indicate the measured values. The simultaneous transmission of the measured values to a data recording software enables convenient analysis and the representation of the process in the log p-h diagram. The software also displays the important characteristics variables of the process, such as the refrigeration capacity and the coefficient of performance.

Learning objectives/experiments

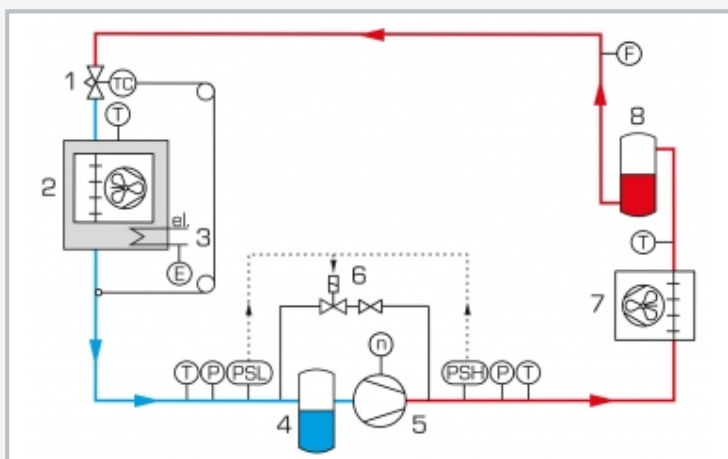
- fundamentals of refrigeration
- design and components of a refrigeration system
 - ▶ open compressor with drive
 - ▶ condenser
 - ▶ evaporator
 - ▶ thermostatic expansion valve
 - ▶ pressure switch
- determination of important characteristic variables
 - ▶ coefficient of performance
 - ▶ compressor capacity
 - ▶ refrigeration capacity
 - ▶ compression ratio
 - ▶ volumetric efficiency
- representation of the thermodynamic cycle in the log p-h diagram
- determination of the compressor efficiency
- effect of the compressor flow rate on the refrigeration circuit

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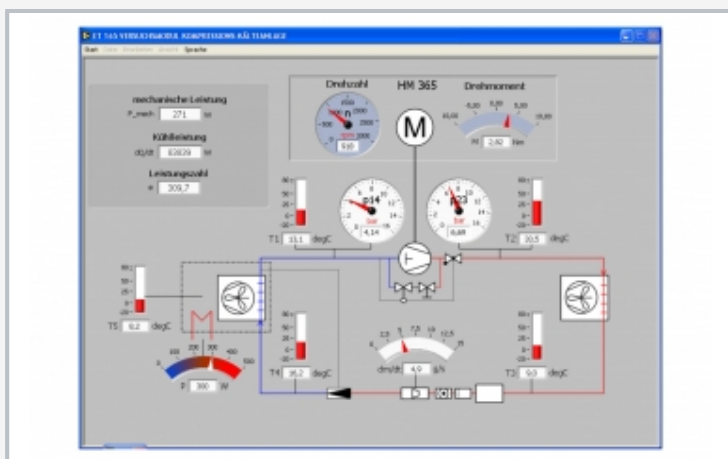
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1 expansion valve, 2 displays and controls, 3 pressure switch, 4 flow meter, 5 compressor, 6 condenser, 7 receiver, 8 refrigeration chamber



1 expansion valve, 2 refrigeration chamber, 3 heater, 4 suction line receiver, 5 compressor with connection to the HM 365, 6 solenoid valve, 7 condenser, 8 receiver; T temperature, P pressure, PSL, PSH pressure switch, F flow rate, n speed, E electric power; blue: low pressure, red: high pressure



Software screenshot: process schematic

Specification

- [1] investigation of a refrigeration circuit with speed-controlled compressor
- [2] refrigeration circuit with open compressor, condenser, thermostatic expansion valve and evaporator in refrigeration chamber
- [3] cooling load in the refrigeration chamber adjustable via heater
- [4] drive and speed adjustment of the open compressor via HM 365
- [5] condenser and evaporator with fan
- [6] pressure switch to protect the compressor
- [7] digital displays for pressure, temperature, flow rate, power and speed
- [8] GUNT software for data acquisition via USB under Windows 7, 8.1, 10
- [9] refrigerant R134a, CFC-free

Technical data

Open compressor

- refrigeration capacity: approx. 845W (at speed: 975min⁻¹ and -10/40°C)
- speed: 500...1000min⁻¹

Condenser with fan transfer area: 2,5m²

- capacity: approx. 1935W at 25°C air temperature (ambient) / Δt=15°C

Evaporator

- transfer area: 3,62m²
- capacity: 460W at 3°C air temperature (chamber) / Δt=13°C

Heater power: 500W

Measuring ranges

- temperature: 4x -5...105°C, 1x -50...250°C
- pressure: -1...15bar, -1...24bar
- speed: 1x 0...1000min⁻¹
- flow rate: R134a: 1x 2...15g/s
- power: 1x 0...500W

230V, 50Hz, 1 phase
 230V, 60Hz, 1 phase
 120V, 60Hz, 1 phase
 UL/CSA optional
 LxWxH: 1470x800x1850mm
 Weight: approx. 185kg

Required for operation

PC with Windows recommended

Scope of delivery

- 1 trainer
- 1 V-belt
- 1 GUNT software CD + USB cable
- 1 set of instructional material

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Required accessories

070.36500 HM 365 Universal Drive and Brake Unit