

ET 171

Electrical connection of refrigerant compressors



Description

- correct electrical connection of a refrigerant compressor
- use of a real refrigerant compressor
- design and investigation of a safety chain

The wiring of electrical components for the start and operation of refrigerant compressors is a typical task in the field of refrigeration. Safety aspects also play an important role. With ET 171 this knowledge and these skills can be acquired. All components are operated and tested with mains voltage to provide high relevance for practice.

The electrical components for the start and operation of the refrigerant compressor are arranged clearly visible. The electrical connection of the individual components is made with cables via the lab jacks. The components are e.g. the capacitor and start-up relay necessary to start the motor. The circuit diagram on the front panel enables the easy allocation of the individual components.

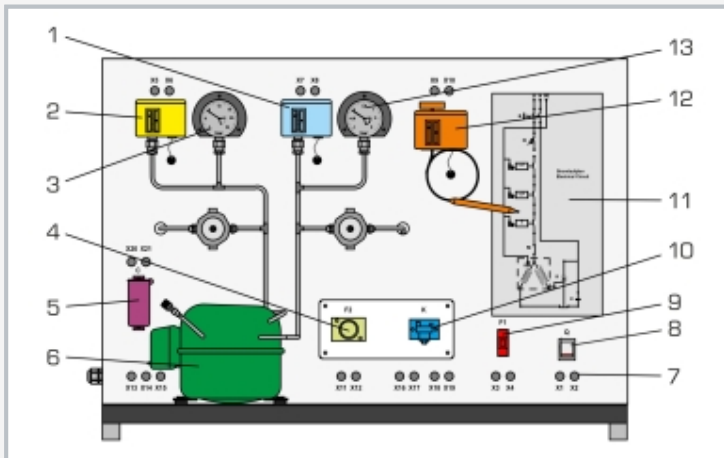
The refrigeration circuit with compressor and receiver enables the checking of the pressure switches on the intake and delivery side of the compressor. The pressure is set via valves and the pressure switch tripped. Two manometers enable the monitoring of the pressure curve. If one of the pressure switches trips, the current supply to the compressor is interrupted. The wiring and checking of other typical components of the safety chain, e.g. circuit breaker and automatic fuse, is also carried out.

Learning objectives/experiments

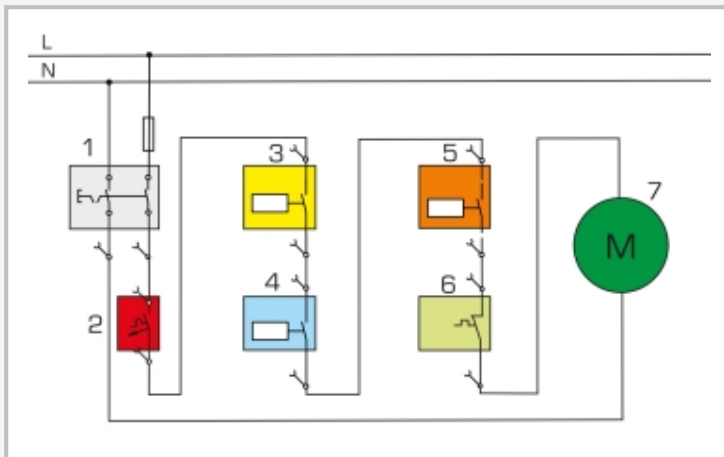
- read, understand, wire and test electric circuit diagrams for refrigerant compressors
- design and operation of electrical components of refrigerant compressors
 - ▶ start-up capacitor
 - ▶ start-up relay
 - ▶ overheat protection
 - ▶ automatic fuse
 - ▶ pressure switch
 - ▶ thermostat
- design and testing of a safety chain
- representation methods in electrical engineering
 - ▶ symbols
 - ▶ circuit diagrams
- safety aspects when handling mains voltage

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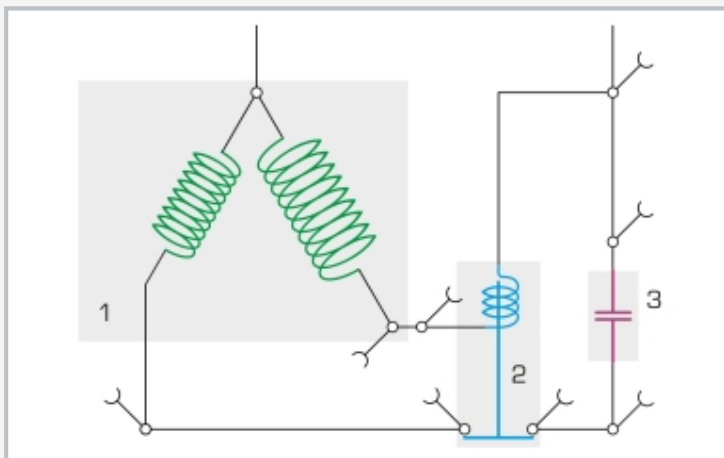
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1 pressure switch intake side, 2 pressure switch delivery side, 3 manometer delivery side, 4 overheat protection, 5 start-up capacitor, 6 refrigerant compressor, 7 lab jacks, 8 main switch, 9 automatic fuse, 10 start-up relay, 11 circuit diagram, 12 thermostat, 13 manometer intake side



Safety chain: 1 main switch, 2 automatic fuse, 3 pressure switch delivery side, 4 pressure switch intake side, 5 thermostat, 6 overheat protection, 7 refrigerant compressor with start-up components



Refrigerant compressor with start-up components 1 refrigerant compressor, 2 start-up relay, 3 start-up capacitor

Specification

- [1] experimental unit from the GUNT practical series for the training of mechatronics engineers for refrigeration
- [2] correct electrical connection of a refrigerant compressor
- [3] refrigerant circuit with compressor, receiver, 2 valves and 2 manometers to investigate pressure switches on the delivery and intake sides
- [4] electrical components for the start and operation of the compressor mounted clearly visible
- [5] lab jacks and cables to connect the electrical components
- [6] operation of a thermostat
- [7] circuit diagram on the front panel for easy identification of the components
- [8] refrigerant R513A, GWP: 631

Technical data

Refrigerant compressor

- power consumption: approx. 193W at 5/55°C
- refrigeration capacity: 374W at 5/55°C

Receiver: 0,8L

Manometer measuring ranges

- delivery side: -1...24bar
- intake side: -1...9bar

Pressure switch control range

- delivery side: 8...32bar
- intake side: -0,9...7bar

Thermostat: -5...35°C

Electrical components for the compressor

- start-up capacitor
- start-up relay
- overheat protection (bimetallic)
- automatic fuse

Refrigerant

- R513A
- GWP: 631
- filling volume: 300g
- CO₂-equivalent: 0,2t

230V, 50Hz, 1 phase

230V, 60Hz, 1 phase; 120V, 60Hz, 1 phase

UL/CSA optional

LxWxH: 920x410x660mm

Weight: approx. 45kg

Scope of delivery

- 1 experimental unit
- 1 multimeter
- 1 set of laboratory cables
- 1 set of instructional material

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Optional accessories

WP 300.09

Laboratory trolley