

# ET 910.10

## Refrigeration components for basic experiments



The illustration shows the components in the frame of ET 910.05.

### Description

- **setup of simple refrigeration circuits**
- **practice-oriented basic experiments using real components from within the industry**

ET 910.10 enables in conjunction with ET 910, ET 910.05 and the accessory set ET 910.12 the design and performance of various basic experiments related to refrigeration.

Commercial components are used in practical experiments. These components are mounted on plates ready to be connected and are arranged clearly in the frame of ET 910.05.

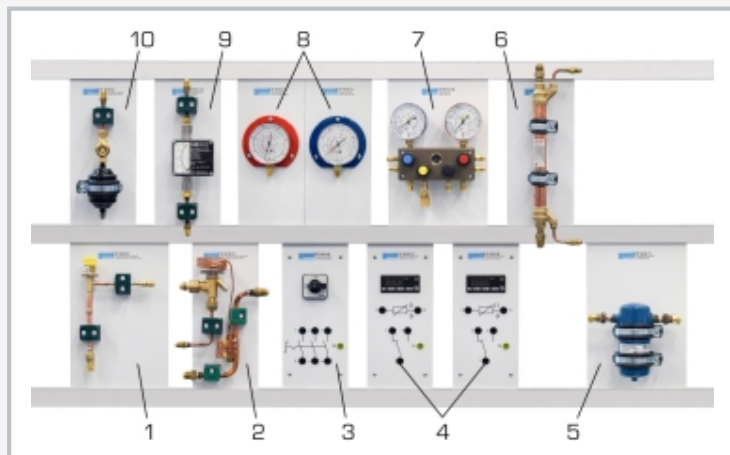
The set includes simple refrigeration components, such as expansion elements and filters, as well as electrical components, e.g. switches and thermostat. The superheater included in the set is a heat exchanger ensuring the complete evaporation of the refrigerant before entering the compressor whilst the liquid refrigerant is supercooled upstream of the expansion element. The control behaviour of the expansion element is monitored at the flow meter. Manometers provide an insight to the pressure ratios in the refrigeration circuit. Via pressure and temperature measurements the change of state of the refrigerant can be tracked and entered into the log p-h diagram. The temperature is measured by interlaboratory thermometers.

### Learning objectives/experiments

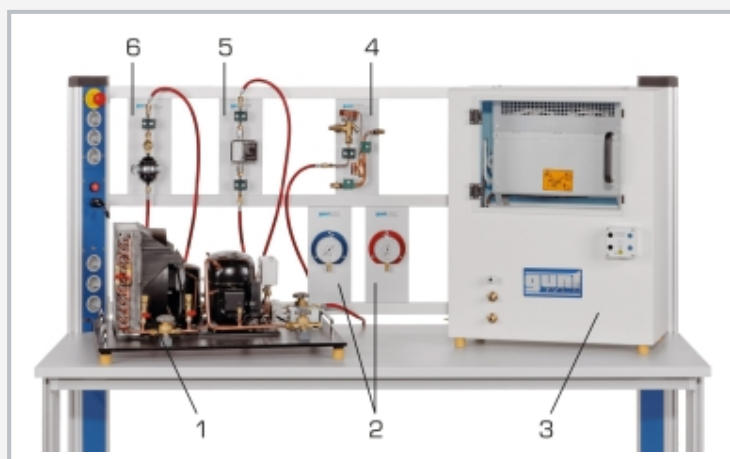
- design of different simple refrigeration circuits
- design, operation and adjustment of components
  - ▶ sight glass with filter/drier
  - ▶ flow meter
  - ▶ delivery and intake manometer
  - ▶ assembly aid
  - ▶ superheater
  - ▶ pressure-controlled expansion valve
  - ▶ thermostatic expansion valve
  - ▶ 3-pin circuit breaker
  - ▶ electric two-point thermostat with switch hysteresis
  - ▶ liquid separator
- read and understand technical drawings and operating instructions
- fault finding

# ET 910.10

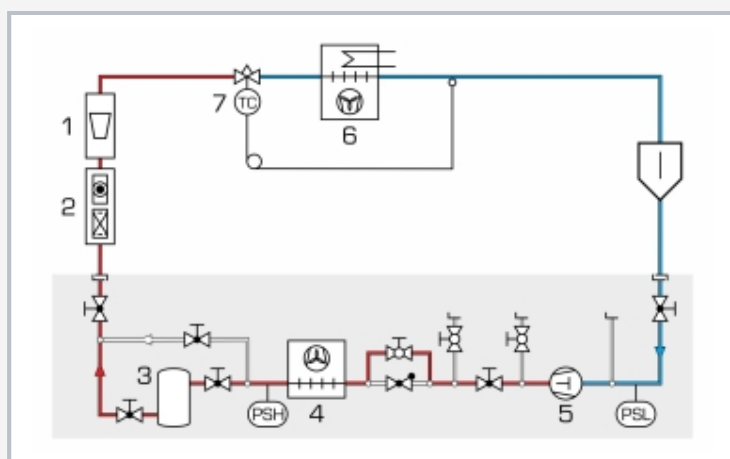
## Refrigeration components for basic experiments



1 pressure-controlled expansion valve, 2 thermostatic expansion valve, 3 circuit breaker, 4 electric thermostat, 5 liquid separator, 6 heat exchanger, 7 assembly aid, 8 manometer delivery side/intake side, 9 flow meter, 10 sight glass with filter/drier



1 condensing unit with condenser and receiver, 2 manometer (ET 910.10), 3 refrigeration chamber with evaporator and electric defrost heater, 4 expansion valve (ET 910.10), 5 flow meter (ET 910.10), 6 sight glass with filter/drier (ET 910.10)



1 flow meter, 2 sight glass with filter/drier, 3 receiver, 4 condenser, 5 compressor, 6 evaporator, 7 thermostatic expansion valve; PSL, PSH pressure switch; red: high pressure, blue: low pressure

### Specification

- [1] components for the setup of simple refrigeration circuits in conjunction with ET 910
- [2] heat exchanger as superheater
- [3] 3-pin circuit breaker
- [4] assembly aid: 4-port directional valve with sight glass
- [5] sight glass with humidity indicator
- [6] pressure-controlled expansion valve
- [7] thermostatic expansion valve
- [8] 2 thermostats with different temperature ranges
- [9] components mounted on plates ready to connect
- [10] abrasion-proof symbols and labels on plates

### Technical data

#### Pressure-controlled expansion valve

- pressure range: 1...7bar

#### Thermostatic expansion valve

- evaporation temperature: -45°...20°C

#### Circuit breaker, 3-pin: 3kW

#### 2 electric thermostats

- -5...25°C

- -25...5°C

#### Heat exchanger

- capacity: approx. 2.5kW at -10°C evaporation temperature

Liquid separator: 0,3L, max. 28bar

#### Measuring ranges

- pressure: -1...9bar, -1...24bar

- flow rate: 3...41kg/h

Plate height: 297mm

Weight: approx. 20kg

### Scope of delivery

- 12 components on plates:
  - 1 pressure-controlled expansion valve
  - 1 thermostatic expansion valve
  - 1 circuit breaker
  - 2 electric thermostats
  - 1 heat exchanger
  - 1 assembly aid
  - 2 manometers
  - 1 flow meter
  - 1 sight glass with filter/drier
  - 1 liquid separator

## **ET 910.10**

### **Refrigeration components for basic experiments**

Required accessories

ET 910                    Refrigeration training system, base unit

Optional accessories

ET 910.11              Refrigeration components for advanced experiments