

# ET 910.11

## Refrigeration components for advanced experiments



The illustration shows the components in the frame of ET 910.05

### Description

- setup of complex refrigeration circuits
- sophisticated components for advanced experiments

ET 910.11 enables in conjunction with ET 910, ET 910.10, ET 910.05 and the accessory set ET 910.12 the performance of advanced 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 complex refrigeration components, such as capacity controller, intake pressure controller, defrost timer, four-way reversing valve and refrigeration controller. The four-way reversing valve, for example, is used to reverse the circuit. This allows for the defrosting of an iced-up evaporator by operating it temporarily as condenser. Manometers provide an insight to the pressure ratios in the refrigeration circuit.

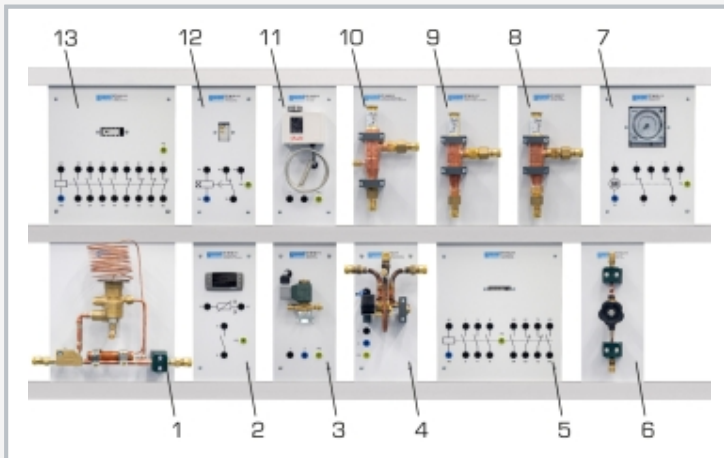
Via pressure and temperature measurements the changes of state of the refrigerant can be tracked and entered into the log p-h diagram. The temperature is measured by interlaboratory thermometers.

### Learning objectives/experiments

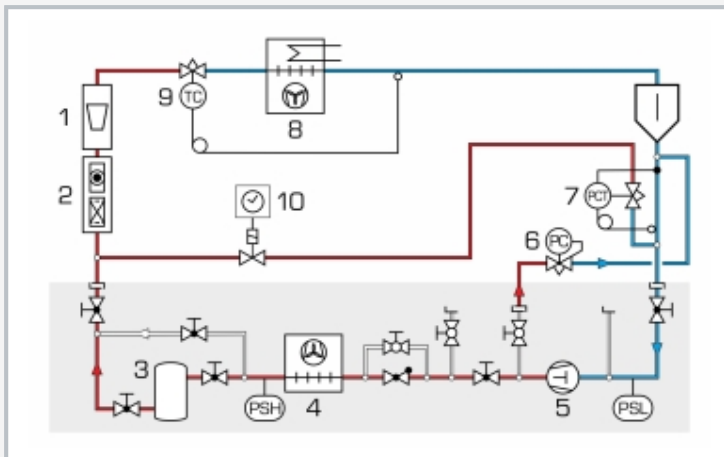
- setup of different refrigeration circuits
- design, operation and adjustment of components
  - ▶ evaporation pressure, intake pressure, capacity and refrigeration controllers
  - ▶ electric thermostat
  - ▶ manual valve as expansion element
  - ▶ post-injection valve
  - ▶ solenoid valve with coil
  - ▶ four-way reversing valve
  - ▶ power and auxiliary contactor
  - ▶ time relay
  - ▶ defrost timer
  - ▶ hot gas defrosting
- read and understand technical drawings and operating instructions
- fault finding

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1 post-injection valve, 2 refrigeration controller, 3 solenoid valve, 4 four-way reversing valve, 5 main contactor, 6 valve, 7 defrost timer, 8 capacity controller, 9 intake pressure controller, 10 evaporation pressure controller, 11 thermostat, 12 time relay, 13 auxiliary contactor



Capacity control with post-injection: 1 flow meter, 2 sight glass with filter/drier, 3 circuit breaker, 4 post-injection valve, 5 condensing unit (ET 910), 6 manometer, 7 capacity controller, 8 valve, 9 expansion valve, 10 refrigeration chamber (ET 910)

### Specification

- [1] components for the setup of complex refrigeration circuits in conjunction with ET 910 and ET 910.10
- [2] post-injection valve
- [3] refrigeration controller with PTC sensor
- [4] defrost timer, timing interval 30min
- [5] time relay
- [6] four-way reversing valve, solenoid valves
- [7] electric thermostat as temperature controller
- [8] power and auxiliary contactor

### Technical data

Thermostat: -5...35°C  
 Refrigeration controller: -40...110°C  
 Post-injection valve: -45...35°C  
 Time relay  
 ■ response delay: 0,05s...100h

### Setting ranges

- evaporation pressure controller: 0...5,5bar
- intake pressure controller: 0,2...6bar
- capacity controller: 0,2...6bar

Plate height: 297mm  
 Weight: approx. 25kg

### Scope of delivery

- 14 components on plates:
- 1 manual valve
- 1 thermostat
- 1 evaporation pressure controller
- 1 intake pressure controller
- 1 capacity controller
- 1 four-way reversing valve
- 1 post-injection valve
- 1 refrigeration controller
- 2 solenoid valves
- 1 time relay
- 1 power contactor
- 1 auxiliary contactor
- 1 defrost timer

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Required accessories

ET 910	Refrigeration training system, base unit
ET 910.10	Refrigeration components for basic experiments