

# MT 210

## Assembly & maintenance exercise: refrigeration



### Learning objectives/experiments

- reading and understanding technical documentation
- in conjunction with ET 150.02
  - ▶ planning and executing assembly steps and processes
  - ▶ making pipe joints in accordance with a system diagram
  - ▶ carrying out electrical installation in accordance with a circuit diagram
- in conjunction with ET 150.01
  - ▶ filling and evacuating of the refrigeration system
  - ▶ commissioning and checking the refrigeration system after successful assembly
  - ▶ familiarisation with the function of a refrigeration system as a system and its components as system components
  - ▶ fault analysis: fault finding, fault evaluation and repair
  - ▶ planning, executing and evaluating maintenance processes

### Description

- **study project with high practical relevance**
- **suitable for training in metal and electrical professions**
- **interdisciplinary and covering several subject areas**
- **assembly of a refrigeration system from individual components**

Using MT 210 trainees can learn working within a complex project. This involves the planning, implementation and checking of processes related to assembly, commissioning and maintenance. The assembly relates to refrigeration installation: installation of the LP and HP pressure switches, the expansion valve and the pipework of the refrigeration circuit. The pipe joints are not soldered but bolted. The electrotechnical installation includes the wiring and connection of all units and switching elements.

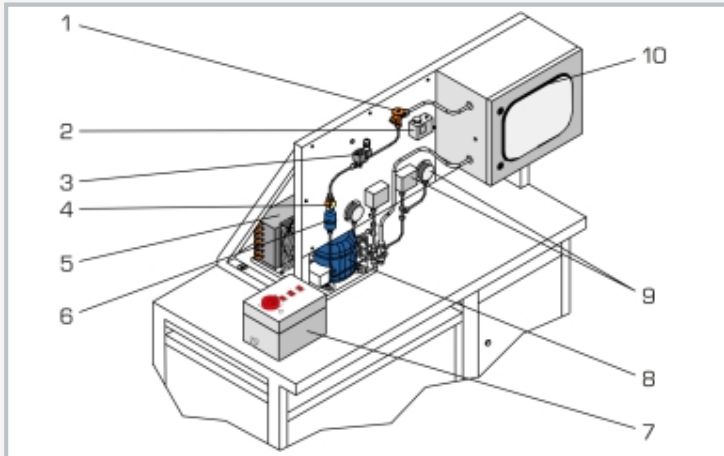
For assembly the tool set ET 150.02, for commissioning the system the filling and evacuation equipment ET 150.01 are required.

The fully assembled system MT 210 represents a fully functional, temperature-controlled refrigeration system with refrigeration chamber and electrical thermostat. Repeated assembly and disassembly are possible.

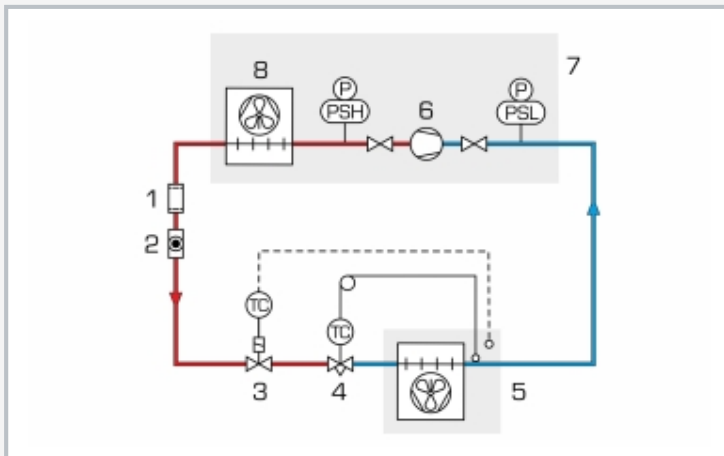
The experiment is arranged on a workbench with drawers for storing the components and tools. Assembly panel and refrigeration chamber are mounted on a frame. Frame, condensing unit and switch cabinet are bolted permanently to the working surface. The refrigeration and electrical components are attached to the aluminium assembly panel.

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1 expansion valve, 2 thermostat, 3 solenoid valve, 4 sight glass, 5 condenser with fan, 6 filter/drier, 7 switch cabinet, 8 compressor, 9 pressure switch with manometer, 10 refrigeration chamber with sight window and integrated evaporator



1 filter/drier, 2 sight glass, 3 thermostat, 4 expansion valve, 5 refrigeration chamber with evaporator, 6 compressor, 7 condensing unit, 8 condenser;  
P pressure, PSL, PSH pressure switch; blue: low pressure, red: high pressure



Leak test at the expansion valve of the fully assembled system

### Specification

- [1] assembly project for the training of mechatronics engineers for refrigeration
- [2] assembly of a refrigeration system with refrigeration chamber from a complete kit
- [3] refrigeration system designed for operation with refrigerant R513A
- [4] temperature control via thermostat
- [5] air-cooled condensing unit with compressor
- [6] refrigeration chamber with integrated show case evaporator and fan
- [7] refrigeration chamber with large sight window
- [8] assembly panel to mount the refrigeration and electrical components
- [9] electrical assembly in accordance with the circuit diagram
- [10] easy pipeworking of the refrigeration circuit using bolted pipe joints
- [11] workbench with drawers to store the components
- [12] part of the GUNT Practice Line for assembly, maintenance and repair

### Technical data

#### Condensing unit

■ power consumption: 190W

■ receiver: approx. 1L

#### Show case evaporator

■ capacity: 50W at  $t_0 = -6^\circ\text{C}$ ,  $\Delta T = 8\text{K}$

■ transfer area:  $1,06\text{m}^2$

#### Refrigeration chamber with sight window

■ LxWxH: 480x280x390mm

#### Aluminium assembly panel

■ LxW: 710x500mm

Thermostatic expansion valve, adjustable

Thermostat, adjustable:  $-30 \dots 15^\circ\text{C}$

230V, 50Hz, 1 phase

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

UL/CSA optional

LxWxH: 1530x750x1670mm

Weight: approx. 155kg

### Required for operation

approx. 1kg refrigerant (R513A)

### Scope of delivery

- 1 workbench with drawers, switch cabinet, condensing unit, assembly panel and refrigeration chamber kit, 1 set of small parts
- 1 set of instructional material, consisting of: technical description of system, complete set of drawings with lists of parts, description of assembly and disassembly sequences, description of maintenance and repair processes

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Required accessories

ET 150.02	Tool set
ET 150.01	Refrigerant filling and evacuation equipment