

# ET 620

## Air conditioning and ventilation system



screen mirroring is possible on up to 10 end devices

### Description

- **h-x diagram in real time**
- **high practical relevance due to real dimensions and use of commercial components**
- **manual or automatic operation**
- **Game-Based Learning: learn complex theory easily and playfully**

ET 620 represents a real air conditioning and ventilation system. The system capacity is sufficient to climatise a laboratory room. Unlike small systems that use conventional climate controllers, this experimental system is equipped with a modern building management system for control. This corresponds to the state of the art for large air-conditioning systems and is advantageous when presenting complex learning content. For example, real components with the comparative processes are converted into formative images.

The air conditioning and ventilation system includes a filter element, a ventilator with EC motor and controlled speed, a water chiller with an air cooler, an electric air heater and humidification by steam humidifier. The following functions are possible: heating / cooling and humidifying / dehumidifying. For this purpose the active components can be run either manually individually or via a central PLC in automatic operation. The PLC controls the temperature and air humidity independent of each other. In the PLC, complex processes,

such as changes of state, are visualised by real-time representation of the cycle, e.g. in the h,x diagram. Intuitive operation of the PLC makes it easy to adjust all elements of the cycle. The effect of the modifications is immediately visible on the touch screen.

Pressure losses can be measured at each section of the duct. All common components, such as filter, air heater / air cooler, outlets, smoke detector, multi-leaf dampers, inspection and fire protection flaps are available and can be investigated. The air conditioning and ventilation system consists of two independent system components: main unit and water chiller. The connection is performed via hoses. Due to the waste heat the water chiller should not be placed inside the room to be climatized.

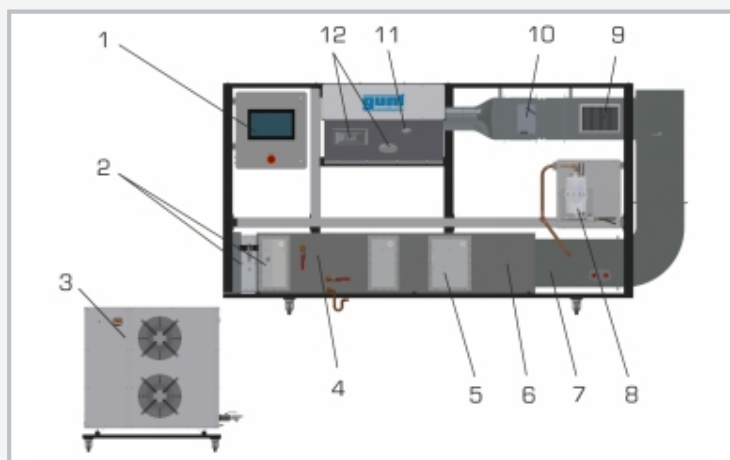
The experimental plant is controlled by the PLC via touch screen. By means of an integrated router, the experimental plant can alternatively be operated and controlled via an end device. The user interface can also be displayed on additional end devices (screen mirroring). Via the PLC, the measured values can be stored internally. Digital multimedia teaching material is available at the Media Center. In addition to real-time representation directly on the unit, Game-Based Learning is made possible with these online media, e.g. worksheets, e-learning, videos, etc.

### Learning objectives/experiments

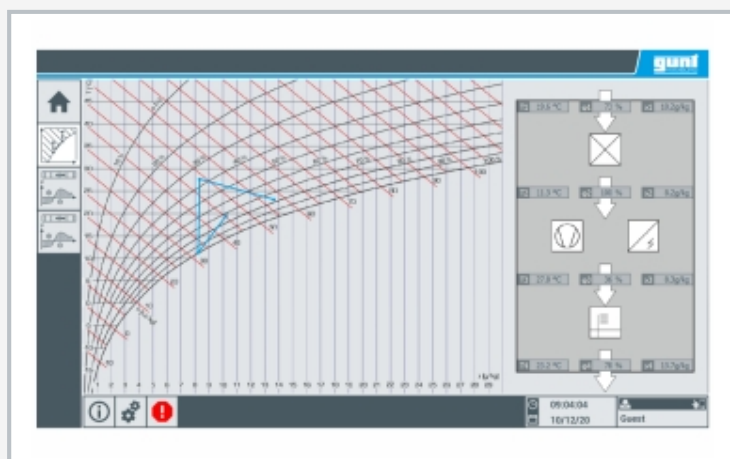
- practice-oriented principles of air conditioning and ventilation technology
- design and maintenance of an air conditioning and ventilation system
- principles of room air conditioning (h-x diagram)
- explanation of components: filter, air heater, air cooler, humidifier, condensing unit, PLC, flaps, outlets
- function of safety devices
- measurement of pressure curve and pressure losses
- effect of air cooler, air heater and humidifier on the state of the air at the outlet
- investigation of the control behaviour of an automatic air conditioning controller, determination of limiting factors
- GUNT Media Center, develop digital skills
  - ▶ retrieve information from digital networks
  - ▶ use digital learning media, e. g. Web Based Training (WBT)
  - ▶ use visualisation systems

# ET 620

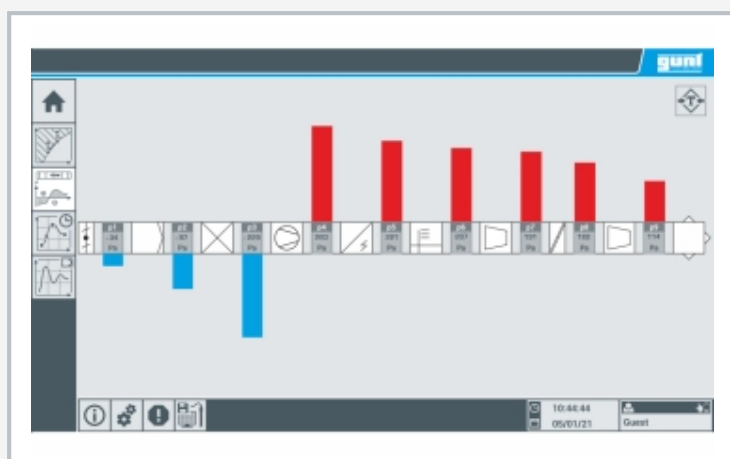
## Air conditioning and ventilation system



1 PLC, 2 air inlet with filter, 3 water chiller, 4 air cooler, 5 ventilator, 6 air heater, 7 humidification section, 8 steam humidifier, 9 ventilation grille, 10 fire protection flap, 11 smoke detector, 12 ceiling vents



Representation of the changes of state in the h-x diagram of the PLC



Pressure curve in the system

### Specification

- [1] practice-oriented air conditioning and ventilation system with 2 independent system components: main unit and water chiller
- [2] manual or automatic operation
- [3] control of the experimental plant using a PLC, operated by touch screen
- [4] screen mirroring: possible to mirror the user interface on up to 10 end devices
- [5] main unit: air duct, ventilator, air condition. system
- [6] air conditioning system with air cooler, electric air heater, humidification
- [7] hoses connect air cooler to water chiller
- [8] air duct: hot galvanised sheet with sight window, pressure measurement (record pressure curves)
- [9] air duct with filter, multi-leaf damper, ceiling vent, protective grating, vent. grille, fire protect. flap, inspection flap, sound insulation link, smoke detector
- [10] refrigerant R410A, GWP: 2088
- [11] data acquisition via PLC on internal USB memory, access to stored measured values via WLAN/LAN with integrated router/LAN connection to customer's own network or direct LAN connection without customer network

### Technical data

PLC: Weintek cMT3162X

Ventilator, EC motor

- nominal speed: 2998min<sup>-1</sup>
- power consumption: 0,5kW
- volumetric air flow rate: 1800m<sup>3</sup>/h

Air heater, infinitely: 12kW

Water chiller with scroll compressor

- rated cooling capacity: approx. 16,9kW at 15/32°C
- power consumption: approx. 4,9kW at 15/32°C
- flow: 2,9m<sup>3</sup>/h
- water tank: 70L

Steam humidifier

- steam capacity: 10kg/h
- power consumption: 7,5kW

Main duct, WxH: 712x508mm

Refrigerant: R410A, GWP: 2088, filling volume: 1,9kg, CO<sub>2</sub>-equivalent: 3,97t

Measuring ranges

- pressure: -25...25mbar

400V, 50Hz, 3 phases; 400V, 60Hz, 3 phases

230V, 60Hz, 3 phases; UL/CSA optional

LxWxH: 3900x800x1946mm; 560kg (experimental plant)

LxWxH: 1440x600x1500mm; 245kg (water chiller)

### Required for operation

water connection, drain, PC with Windows recommended

### Scope of delivery

experimental plant, water chiller, set of accessories, set of instructional material, online access to the GUNT Media Center