# ET 500

## Two-stage piston compressor

## Description

- **two-stage compressor with intercooler**
- **compression process on a p-V diagram**
- **GUNT software for data acquisition**

Compressed air for industry and businesses that use compressed air as an energy source is generated by means of so-called compressed air generation systems. A key component of these systems is the compressor. It converts the supplied mechanical energy into a higher air pressure. Compressed air generation systems are used to drive machines in mining, for pneumatic control systems in assembly plants or tyre inflation systems at petrol stations.

ET 500 includes a complete compressed air generation system with a two-stage compressor and an additional pressure vessel as intercooler. The trainer enables the recording of compressor characteristics and representing the compression process in a p-V diagram.

The air is sucked into the intake vessel and calmed there before it is compressed in two stages. The additional pressure vessel for intercooling is located between the first and second stage. After the second stage, the compressed air is pressed into another pressure vessel through a cooling tube. To achieve a steady state, the compressed air can be released through a blow-off valve with silencer. Safety valves and a pressure switch complete the system.

Sensors measure the pressures and temperatures in both stages as well as the electric power consumption. A nozzle at the intake vessel serves to determine the intake volumetric flow rate. The measured values can be read on digital displays. At the same time, the measured values can also be transmitted directly to a PC via USB. The data acquisition software is included.

## Learning objectives/experiments

- design and function of a two-stage compressor
- measurement of relevant pressures and temperatures
- determination of the intake volumetric air flow rate
- compression process on a p-V diagram
- determination of the efficiency

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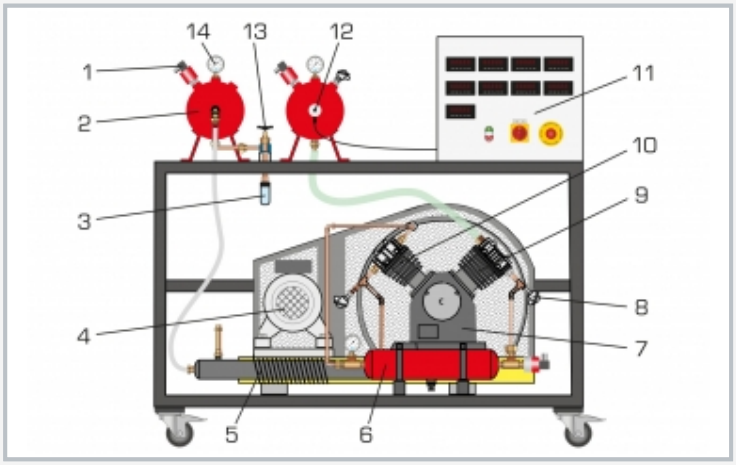
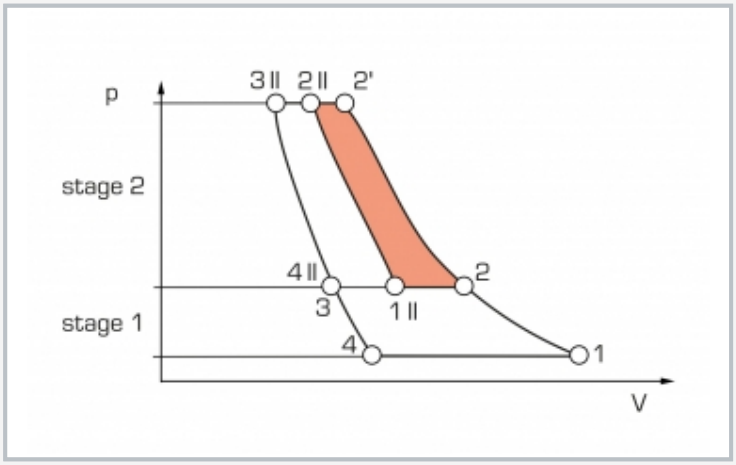
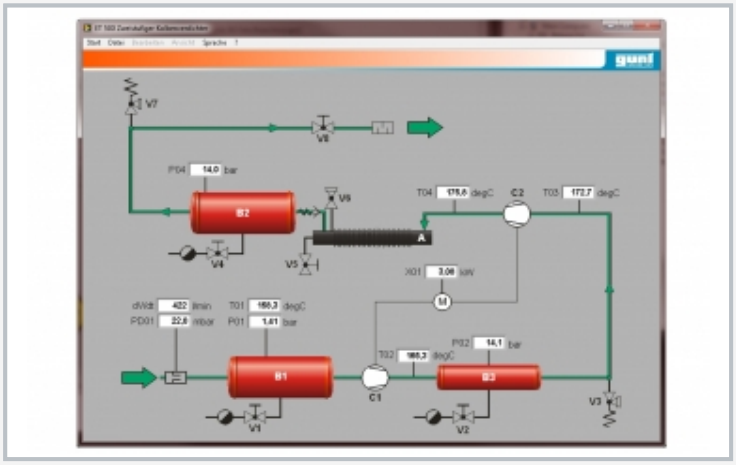



1 pressure sensor, 2 pressure vessel after 2 nd compressor stage, 3 outlet valve with silencer, 4 drive motor, 5 intercooler, 6 pressure vessel after 1st compressor stage (intermediate reservoir), 7 piston compressor, 8 temperature sensor, 9 compressor (1st stage), 10 compressor (2nd stage), 11 switch cabinet, 12 intake vessel with nozzle, 13 safety valve, 14 manometer




Two-stage compression process with intermediate cooling (2-1II) in p-V diagram
red: benefit compared to single-stage process



Software screenshot: process schematic of a two-stage piston compressor

## Specification

[1] recording the characteristic of a two-stage compressor
[2] piston compressor with 2 cylinders in V-arrangement
[3] intake vessel with nozzle to measure the intake volumetric flow rate, pressure sensor and additional manometer
[4] pressure vessel after the first stage as intercooler
[5] pressure vessel after the second stage with safety valve, blow-off valve and silencer as well as an additional manometer and a pressure switch
[6] sensors for pressures, temperatures and electric power output
[7] digital displays for temperatures, pressures, differential pressures and electric power output
[8] GUNT software for data acquisition via USB under Windows 7, 8.1, 10

## Technical data

Compressor
- two-stage
- with 2 cylinders in a V-arrangement
- power consumption: 3kW
- speed: 710min$^{-1}$
- intake capacity: 250L/min
- quantity delivered: 202L/min (at 12bar)
- operating pressure: 12bar, max. 35bar

Intake vessel: 20L
Pressure vessels, 16bar; capacity:
- after 1st stage: 5L
- after 2nd stage: 20L

Safety valve: 16bar

Measuring ranges
- differential pressure: 0...25mbar
- pressure: 1x 0...1,5bar; 2x 0...16bar
- temperature: 4x 0...200°C
- power: 0...3500W

400V, 50Hz, 3 phases
400V, 60Hz, 3 phases
230V, 60Hz, 3 phases
UL/CSA optional
LxWxH: 1550x800x1500mm
Weight: approx. 260kg

## Required for operation

PC with Windows recommended

## Scope of delivery

1 trainer
1 GUNT software CD + USB cable
1 set of instructional material