ET 813
Two-cylinder steam engine

The illustration shows a similar unit

Description

- **functioning of a two-cylinder piston steam engine**
- **energy balance of the steam power plant**
- **design of a complete steam power plant together with steam generator ET 813.01 and universal drive and brake unit HM 365**
- **part of the GUNT FEMLine**

In a steam power plant, thermal energy is converted into mechanical energy, and ultimately into electrical energy. A steam power plant consists of a heat source for generating steam, a turbine or steam engine with generator, and a cooling device for condensing. The steam engine is used to convert thermal energy into mechanical energy.

The ET 813 steam engine, together with the brake unit HM 365 as a consumer of the electrical energy and the steam generator ET 813.01, forms a complete steam power plant.
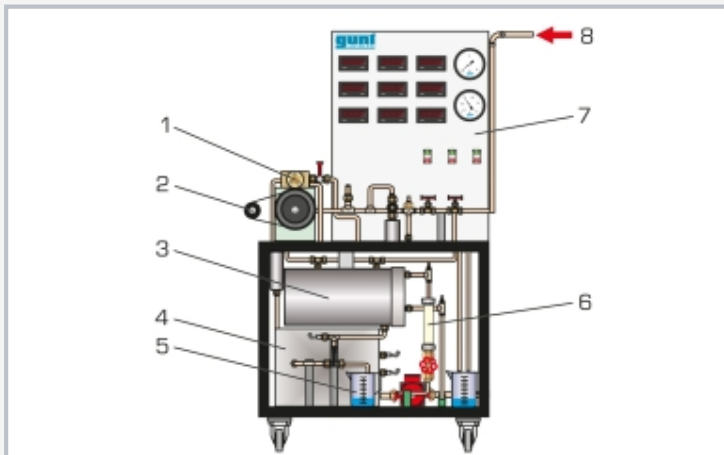
The trainer includes a steam engine, a condenser and a condensate tank, and comprehensive instrumentation.

The steam engine is a sealed two-cylinder steam engine with 180° crank offset and single-acting plunger. It can be used to show the operating properties and functioning of a piston steam engine. Since the exhaust steam in piston steam engines contains entrained lubricating oil, an oil separator and a cascade tank ensure the condensate is cleaned as necessary, so that clean water can be fed back into the feedwater tank of the steam generator ET 813.01.

Sensors record the temperature, pressure, speed, and flow rate at all relevant points. 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.

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1 steam engine, 2 belt drive to HM 365, 3 condenser, 4 condensate tank, 5 condensate measuring tank, 6 sensor for cooling water flow rate, 7 displays and controls, 8 live steam supply from ET 813.01
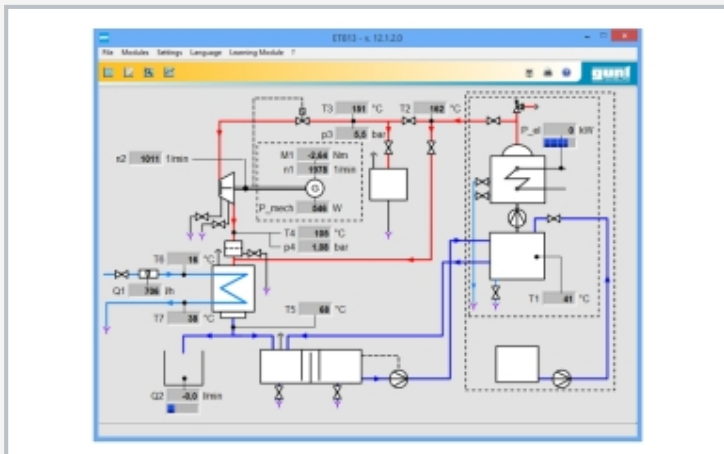
Software screenshot: process schematic

Experimental setup ready for operation: left: brake unit HM 365, centre: two-cylinder steam engine ET 813, right: steam generator ET 813.01

Specification

[1] two-cylinder piston steam engine
[2] atmospheric capacitor
[3] condensate tank as cascade tank with condensate pump
[4] steam engine loaded via brake unit HM 365
[5] sensor and display for temperature, pressure, flow rate, and speed
[6] determination of amount of steam via condensate
[7] steam supplied by steam generator ET 813.01
[8] GUNT software for data acquisition via USB under Windows 10

Technical data

Two-cylinder piston steam engine
- speed: max. 1000min^{-1}
- max. continuous power: 420W
- 2 cylinders
  - bore: 50mm
  - stroke: 40mm

Condensate pump
- power consumption: max. 60W
- max. flow rate: 2,9m^3/h
- max. head: 4m

Condenser
- transfer surface: 3800cm^2

Measuring ranges
- temperature: 7x 0...400°C
- pressure: 0...10bar / 0...1,6bar
- speed: 0...1200min^{-1}
- flow rate: 100...1000L/h (cooling water)

230V, 50Hz, 1 phase
230V, 60Hz, 1 phase; 120V, 60Hz, 1 phase
LxWxH: 950x800x1750mm
Weight: approx. 200kg

Required for operation

water connection, drain, steam (8kg/h, 7bar)
PC with Windows recommended

Scope of delivery

1 trainer
3 measuring cups
1 stopwatch
1 set of accessories
1 GUNT software + USB cable
1 set of instructional material

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Required accessories

ET 813.01	Electrical steam generator
HM 365	Universal drive and brake unit

Optional accessories

for Remote Learning
GU 100   Web Access Box
with
ET 813W   Web Access Software

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