

ET 795

Simulation of a gas turbine



Description

- clearly laid out system for the simulation of a turbine system
- operation with gas generator and power turbine

Nine different process parameters can be set using potentiometers on the front panel of the experimental unit.

The software provides a wide range of diagrams and graphs.

The simulator can model the theoretical system limits without hazard, limits at which real systems would be destroyed or seriously damaged.

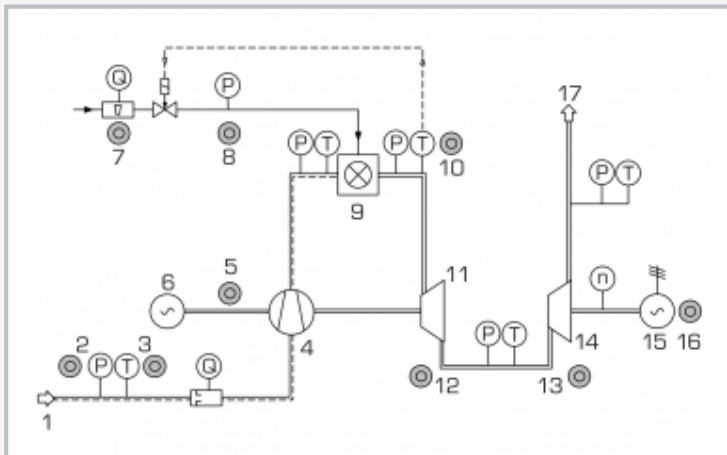
The measured values are transmitted directly to a PC via USB. The data acquisition software is included.

Learning objectives/experiments

- basic understanding of a gas turbine process
- special features of a two-shaft turbine system with free-running power turbine
- thermodynamic state variables
- starting a gas turbine
- mapping performance characteristics
- variation of efficiencies
- change in the air ratio

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Process schematic of a gas turbine

1 air inlet, 2 potentiometer: intake pressure, 3 potentiometer: intake temperature, 4 compressor, 5 potentiometer: pressure ratio, 6 starter, 7 potentiometer: mass flow rate of fuel, 8 potentiometer: fuel pressure, 9 combustion chamber, 10 potentiometer: combustion chamber temperature, 11 turbine, 12 potentiometer: efficiency compressor/turbine, 13 potentiometer: efficiency power turbine, 14 power turbine, 15 generator, 16 potentiometer: generator load, 17 exhaust;
sensors: P pressure, T temperature, Q mass flow rate, n speed



Software screenshot: control panel of a two-shaft gas turbine

Specification

- [1] simulated operation of a gas turbine system
- [2] modification of 9 system parameters using potentiometers
- [3] software calculates: air ratio λ , pressure ratio of compressor, efficiency, mass flow rates of gas and air, drive shaft power and generator power
- [4] GUNT software for data acquisition via USB under Windows 7, 8.1, 10

Technical data

- 9 potentiometers for the setting of
- intake pressure: 0...2bar abs.
 - intake temperature: 0...100°C
 - max. pressure ratio at max. speed: 0...10
 - fuel mass flow rate, valve position: 0...100%
 - fuel pressure: 0...10bar
 - max. combustion chamber temperature: 500...1500°C
 - efficiency compressor/turbine: 0...100%
 - efficiency power turbine: 0...100%
 - generator load: 0...100%

Inputs and outputs

- 16x analogue in, 1x analogue out
- 4x digital in/out

LxWxH: 610x360x490mm

Weight: approx. 20kg

Required for operation

PC with Windows

Scope of delivery

- 1 experimental unit
- 1 GUNT software CD + USB cable
- 1 manual

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Optional accessories

020.30009 WP 300.09 Laboratory trolley