CT 400 SERIES: TEST STAND FOR 4-CYLINDER FOUR-STROKE ENGINES

BRAKING POWER
75 kW

The CT 400 equipment series offers a wide range of experiments on industrial engines with a power output of up to 75 kW.

The complete test stand is made up of the CT 400 brake unit and a test engine. A choice of two water-cooled engines is available:

- 4 cylinder in-line engine, petrol
- 4 cylinder in-line engine, diesel

The test engine can be connected to the brake unit quickly and easily. The CT 400 load mechanism essentially consists of an adjustable air-cooled eddy current brake. The engines can be investigated in two modes:

- **Torque control:** Manual adjustment of braking torque. The characteristic curve for the brake is changed, different full load points are approached and measurements are carried out depending on the speed.
- **Speed control:** A controller keeps the speed constant, while the engine torque is increased. This allows different load points to be approached and measurements are carried out depending on the load.

An indicating system with PC data acquisition for the pressure curves in the engines and an exhaust gas analysis unit are available as accessories.
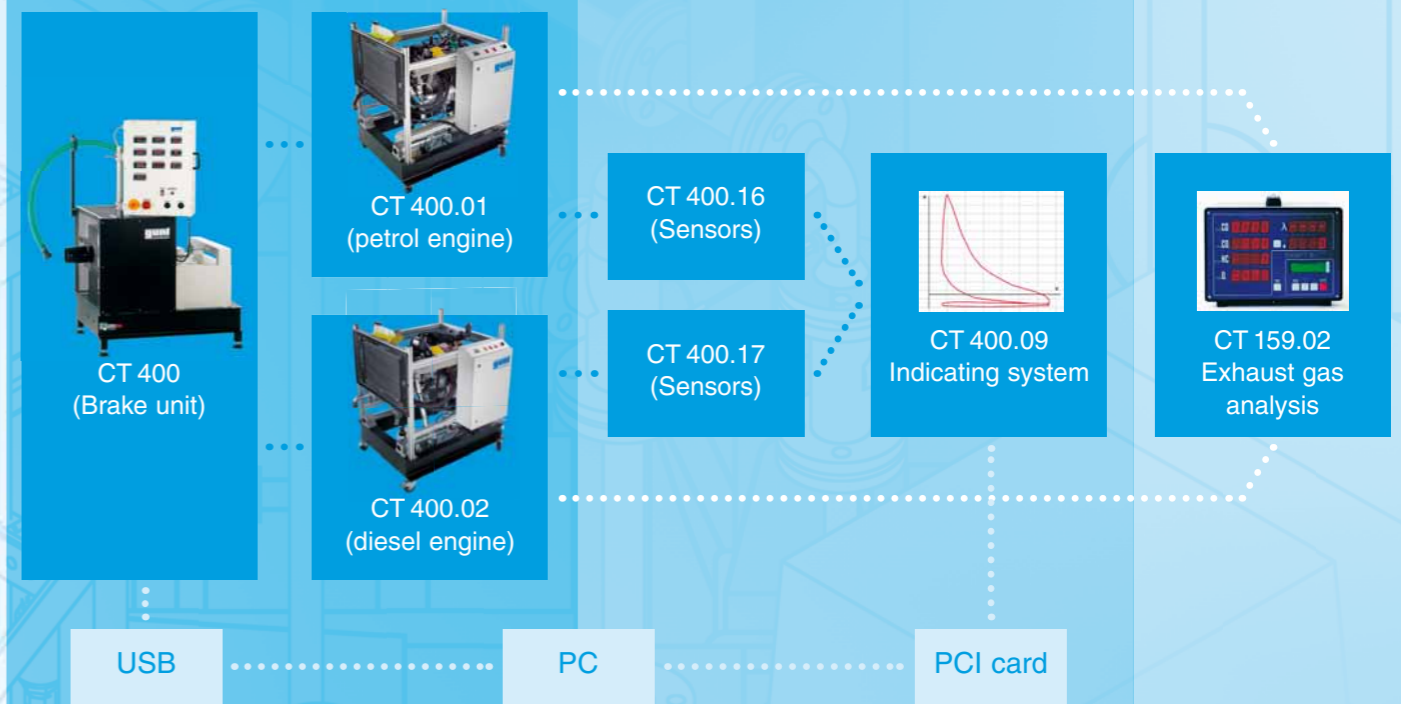
Learning content/Exercises

- Familiarisation with a 4-cylinder petrol engine
- Familiarisation with a 4-cylinder diesel engine
- Characteristic curves depending on speed
  ▶ Plotting of torque and power curves
  ▶ Specific fuel consumption
  ▶ Volumetric efficiency
  ▶ Excess air factor
- Characteristic curves depending on power output
  ▶ Specific fuel consumption
  ▶ Volumetric efficiency
  ▶ Excess air factor
- Creation of heat balances at full load
  ▶ Determination of imparted energy, effective usable power, amount of heat in cooler, amount of heat in exhaust gas losses, heat losses due to radiation and convection
  ▶ Representation in Sankey diagram
- Comparison of diesel and petrol engines

In conjunction with other accessories

Exhaust gas analysis with CT 159.02

- Electronic indication (CT 400.09) with appropriate set of sensors for engine (CT 400.16/.17)
  ▶ p-V diagram
  ▶ p-t diagram
  ▶ Pressure curve over gas cycle
  ▶ Determination of indicated power
  ▶ Determination of mechanical efficiency

CONFIGURATIONS

CT 400
(Brake unit)

CT 400.01
(petrol engine)

CT 400.02
(diesel engine)

CT 400.16
(Sensors)

CT 400.17
(Sensors)

CT 400.09
Indicating system

CT 159.02
Exhaust gas analysis

USB

PC

PCI card

Minimum configuration

CT 400 + test engine (CT 400.01 or CT 400.02) including PC data acquisition

Extending the range of experiments with

Electronic indication including PC data acquisition with CT 400.09 and engine-specific pressure transducer with TDC sensor (CT 400.16 or CT 400.17)

Exhaust gas analysis with CT 159.02

SOFTWARE FOR CT 400

Modern LabVIEW software under Windows with comprehensive visualisation functions

- Process diagrams for diesel and petrol engines with online display of all measured and calculated variables
- Calculated variables
  ▶ Specific fuel consumption
  ▶ Intake air volumetric flow
  ▶ Mechanical power
  ▶ Efficiency
  ▶ Volumetric efficiency
  ▶ Excess air factor
- Representation of up to four characteristic curves simultaneously
- Characteristic curve representation: freely selectable assignment of axes
- Storage of measured data
- Four preselectable languages
- Simple connection to PC via USB