

# CT 400

## Load unit, 75kW, for four-cylinder engines



### Learning objectives/experiments

- in conjunction with an engine (CT 400.01 / CT 400.02)
  - ▶ plotting of torque and power curves
  - ▶ determination of specific fuel consumption
  - ▶ determination of volumetric efficiency and lambda (fuel-air ratio)
  - ▶ energy balances
  - ▶ overall engine efficiency

### Description

- control and load unit for four-cylinder diesel and petrol engines up to 75kW
- air-cooled eddy current brake with precise torque adjustment for use as load unit for engine
- easy connection of engine
- complete test stand setup in conjunction with an engine

This test stand measures the power output of internal combustion engines delivering up to 75kW. The complete test stand consists of two main elements: The CT 400 as the control and load unit and a choice of engine: CT 400.01 petrol engine or CT 400.02 diesel engine. The engine to be investigated is connected to the CT 400 using a coupling with jointed shaft.

The main function of the CT 400 is to provide the required braking power. The brake unit is an air-cooled eddy current brake. The braking torque can be precisely adjusted using the exciting current. The braking torque is measured by means of a suspended brake unit and force sensor. Due to the air cooling of the brake, the engine test stand does not require cooling water inlet or outlet. A stabilisation tank with an intake air duct for the combustion air is mounted on the frame. The quantity of air taken in is measured in the duct.

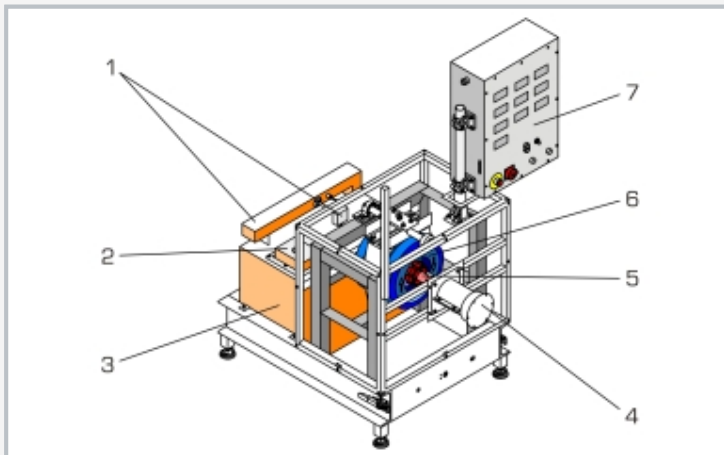
The switch cabinet contains digital displays for the speed, torque, volumetric intake air flow rate and temperatures (exhaust gas, engine oil, engine cooling water (inlet and outlet), fuel and intake air). The switch cabinet pivots, enabling the operator to adjust it to the optimum viewing angle.

Data is transferred between the CT 400 load unit and the engine via a data cable connecting the switch cabinets of the two units. 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.

In addition to the standard safety features (e.g. oil pressure, temperature limiter), the load unit contains a limit switch to monitor whether the brake and the engine are correctly connected.

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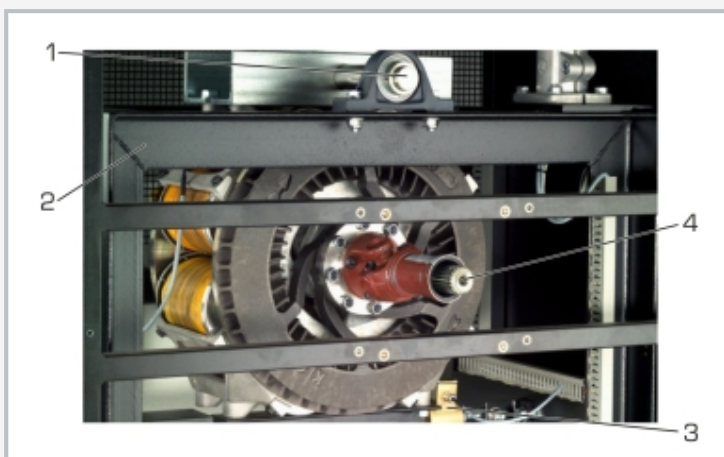
## Load unit, 75kW, for four-cylinder engines



1 air intake duct with anemometer, 2 air filter, 3 intake air stabilisation tank, 4 jointed shaft cover, 5 jointed shaft with coupling, 6 eddy current brake, 7 switch cabinet with displays and controls



The illustration shows the CT 400 in conjunction with the CT 400.02 diesel engine.



The eddy current brake is mounted in a suspended frame (1 bearing, 2 frame). The supporting force generated by the torque is recorded by a force gauge (3). 4 jointed shaft with spline

### Specification

- [1] load unit for prepared four-stroke diesel or petrol engines (CT 400.01 and CT 400.02) with a maximum power output of 75kW
- [2] air-cooled eddy current brake
- [3] force transmission from engine to brake via rotationally elastic coupling and jointed shaft
- [4] stabilisation tank for intake air approx. 220L
- [5] 2 modes of operation: 1. torque directly adjustable (full load characteristic), 2. torque is adjustable by speed, speed remains constant (partial load characteristic)
- [6] potentiometer for continuous adjustment of brake
- [7] potentiometer to "accelerate" engine
- [8] recording of braking power via speed and braking torque
- [9] measurement and display of engine load, air temperature, intake air consumption, speed
- [10] measured value displays for engine: temperatures (oil, exhaust gas, cooling water, fuel), oil pressure, fuel consumption (using precision scale)
- [11] GUNT software for data acquisition via USB under Windows 10

### Technical data

#### Eddy current brake

- max. braking torque: 200Nm
- max. speed: 5000min<sup>-1</sup>

#### Measuring ranges

- speed: 0...6000min<sup>-1</sup>
- torque: 0...240Nm
- volumetric flow rate:
  - ▶ 0...6m<sup>3</sup>/min (intake air)
  - ▶ 0...50L/min (cooling water)
- temperature:
  - ▶ -50...200°C
  - ▶ 0...1200°C (exhaust gas)

230V, 50Hz, 1 phase  
 230V, 60Hz, 1 phase  
 120V, 60Hz, 1 phase  
 UL/CSA optional  
 LxWxH: 1380x950x1920mm  
 Weight: approx. 446kg

### Required for operation

PC with Windows recommended, ventilation

### Scope of delivery

- 1 load unit
- 1 set of tools
- 1 set of accessories
- 1 GUNT software + USB cable
- 1 set of instructional material

# CT 400

## Load unit, 75kW, for four-cylinder engines

### Required accessories

#### Engines

CT 400.01 Four-cylinder petrol engine for CT 400

or

CT 400.02 Four-cylinder diesel engine for CT 400

### Optional accessories

#### Indication system

CT 400.09 Electronic engine indicating system for CT 400

with

CT 400.16 Pressure transducer and TDC sensor for CT 400.01

or

CT 400.17 Pressure transducer and TDC sensor for CT 400.02

#### Exhaust gas analysis

CT 159.02 Exhaust gas analysing unit