

# CT 100.11

## Exhaust gas calorimeter for CT 110



### Learning objectives/experiments

- determination of exhaust gas thermal output power given up
- determination of specific heat capacity of exhaust gas

### Description

#### ■ counterflow heat exchanger for calorimetric analysis of exhaust gases from internal combustion engines

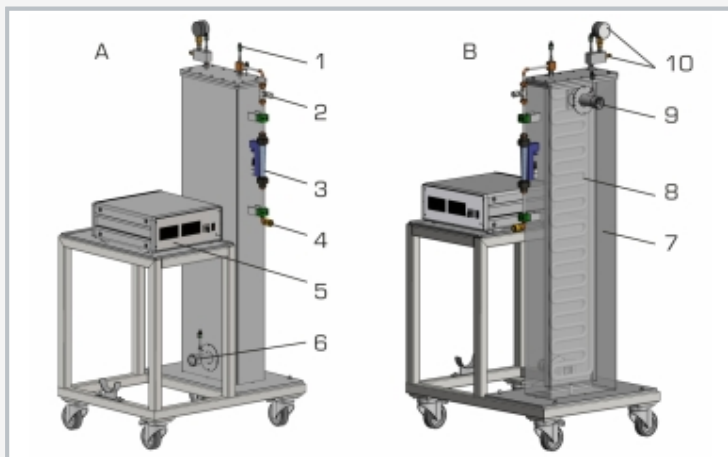
Determination of the thermal exhaust gas losses is essential when calculating an energy balance for internal combustion engines. Calorimetric measurement is an established method of doing this. It involves a largely complete and loss-free heat exchange between the exhaust gas and a cooling medium.

The exhaust gas calorimeter consists of an insulated stainless steel tank, through which the exhaust gas flows from bottom to top. While doing this, the exhaust gas gives up its heat almost completely to a finned pipe with cooling water flowing through it. The pipe is arranged in loops to achieve the maximum possible heat exchange area. Relevant temperatures (water and exhaust gas inlet and outlet) and the flow rate of the water are recorded electronically and displayed digitally using a measuring amplifier. The measured data are stored and processed using software for data acquisition included in CT 110.

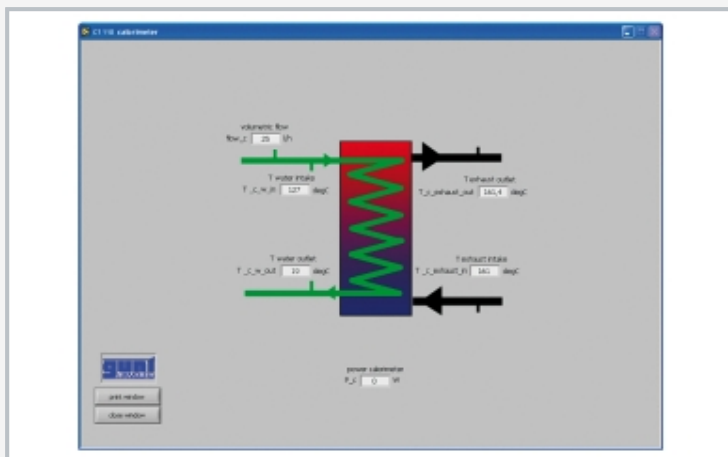
The CT 100.11 is connected to a test engine (CT 100.20 – CT 100.23) using a heat-resistant exhaust gas hose.

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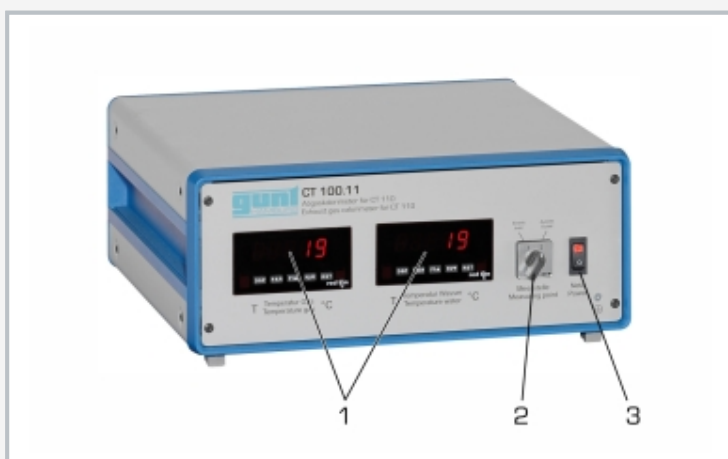
## Exhaust gas calorimeter for CT 110



A: 1 thermocouple for water inlet, 2 valve for adjusting the cooling water flow rate, 3 flow meter, 4 water inlet, 5 measuring amplifier, 6 exhaust gas inlet with thermocouple  
 B: 7 insulating, 8 chamber with finned pipe heat exchanger, 9 exhaust gas outlet with thermocouple, 10 water outlet with thermocouple and thermometer



Software screenshot: process schematic



Measuring amplifier: 1 digital displays for exhaust gas and cooling water temperatures, 2 inlet/outlet reversing switch, 3 power switch

### Specification

- [1] determination of the amount of heat contained in the exhaust gas from test engines
- [2] calorimeter consisting of finned pipe heat exchanger and insulated tank
- [3] instrumentation: 4 temperature sensors, flow meter
- [4] measuring amplifier with digital displays
- [5] connection between engine and calorimeter using exhaust gas hose
- [6] GUNT-software for calorimetric test included in CT 110 software

### Technical data

#### Calorimeter

- insulated, stainless steel

#### Measuring ranges

- temperature:
  - ▶ 2x 0...600°C (exhaust gas)
  - ▶ 2x 0...200°C (cooling water)
- flow rate: 0...160L/h

230V, 50Hz, 1 phase

230V, 60Hz, 1 phase

120V, 60Hz, 1 phase

UL/CSA optional

LxWxH: 800x600x1620mm (calorimeter)

LxWxH: 390x370x160mm (measuring amplifier)

Weight: approx. 105kg

### Required for operation

cold water connection, drain

### Scope of delivery

- 1 calorimeter
- 1 measuring amplifier
- 1 set of hoses
- 1 USB cable
- 1 manual

# **CT 100.11**

## **Exhaust gas calorimeter for CT 110**

Required accessories

CT 110            Test stand for single-cylinder engines, 7,5kW