

HM 284

Series and parallel configuration of pumps



Description

- **characteristic behaviour of pumps during single pump operation, series or parallel configuration**
- **closed water circuit**
- **GUNT software for data acquisition, visualisation and operation**
- **part of the GUNT-Labline fluid energy machines**

In complex systems, pumps can be connected in series or in parallel. In serial operation the heads of the pumps are added and in parallel operation the flow rates (capacities) of the pumps are added.

The experimental unit provides the determination of the characteristic behavior for single operation and interaction of two pumps.

HM 284 features a closed water circuit with a water tank and two centrifugal pumps with drive motors. The speed of one motor is variably adjustable by a frequency converter. The other pump is fitted with a motor with fixed speed, this pump can be added to the system. The impellers of both pumps are mounted in transparent housings and can be observed during operation. Valves enable to easily switch change between single pump, series or parallel pump operation. The system behaviour is analyzed with the aid of a valve at the outlet of the pump adjusting the flow resistance.

The experimental unit is fitted with sensors for pressure and flow rate.

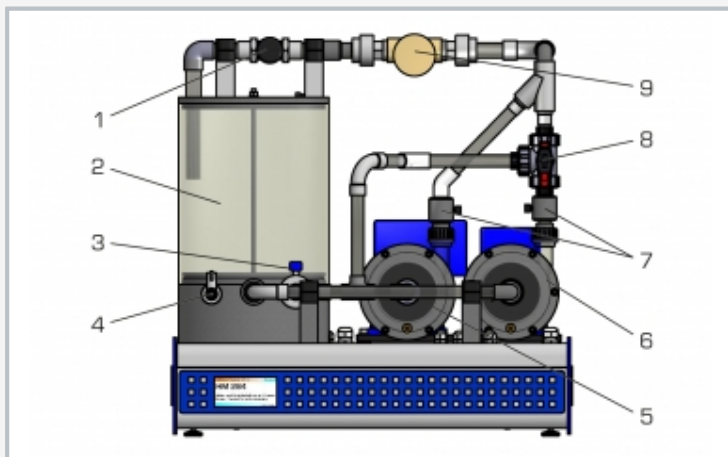
The microprocessor-based measuring technique is well protected in the housing. All the advantages of software-supported experiments and evaluation are offered by the GUNT software and the microprocessor. The connection to a PC is made by USB.

Learning objectives/experiments

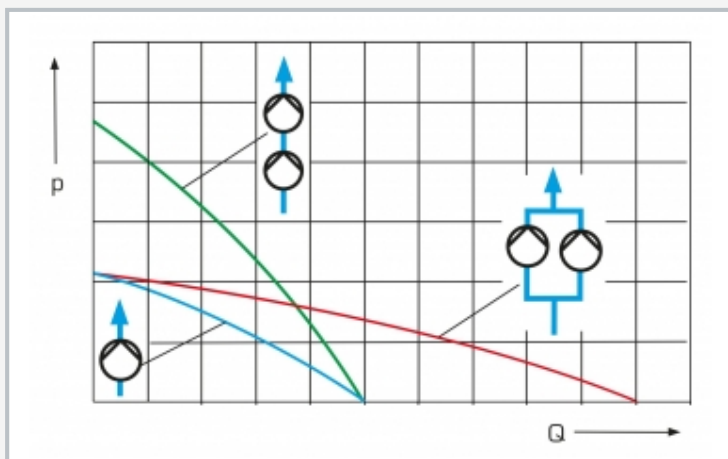
- **operating behaviour of centrifugal pumps**
 - ▶ single pump
 - ▶ series configuration
 - ▶ parallel configuration
- **recording of pump curves**
- **determination of pump efficiencies**
- **recording of system characteristic**

HM 284

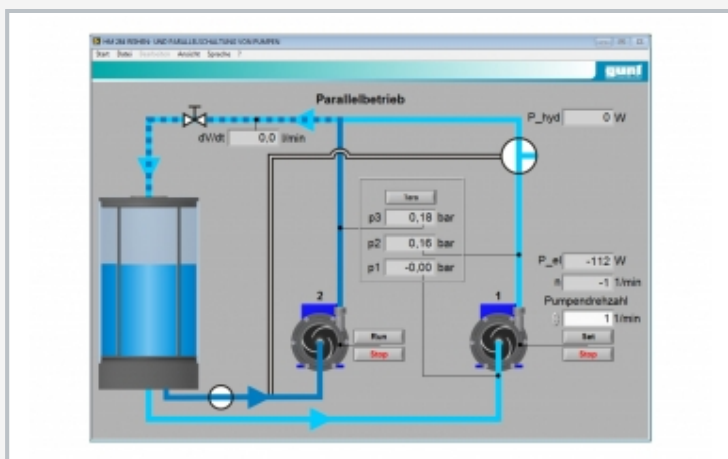
Series and parallel configuration of pumps



1 valve for adjusting the flow rate, 2 water tank, 3 valve for configuring parallel/series operation, 4 water drain, 5 pump with fixed speed, 6 pump with variable speed, 7 pressure sensor at outlet, 8 three-way valve for parallel/series operation, 9 flow meter



Characteristic curves at different operating modes
 blue: single pump operation, red: parallel configuration of pumps, green: series configuration of pumps; p pressure, Q flow rate



Operating interface of the powerful software

Specification

- [1] investigation and operating behaviour of pumps in various operating modes
- [2] single pump, series or parallel pump operation, configurable via valves
- [3] closed water circuit contains centrifugal pumps with drive motor and a transparent water tank
- [4] one pump with variable speed and one pump with fixed speed
- [5] adjustment of flow resistance by a valve at outlet of the pump
- [6] sensors for pressure at inlet and outlet of the pumps and flow rate
- [7] microprocessor-based measuring technique
- [8] GUNT software with control functions and data acquisition via USB under Windows 7, 8.1, 10

Technical data

Centrifugal pumps with motors
 ■ power consumption: 370W each

Pump with variable speed: 0...3300min⁻¹
 ■ max. flow rate: 40L/min
 ■ max. head: 10m

Pump with fixed speed: approx. 2800min⁻¹
 ■ max. flow rate: 40L/min
 ■ max. head: 10m

Water tank: approx. 15L

Measuring ranges
 ■ pressure (inlet): ± 1 bar
 ■ pressure (outlet): 2x 0...5bar
 ■ flow rate: 10...140L/min

230V, 50Hz, 1 phase
 230V, 60Hz, 1 phase; 120V, 60Hz, 1 phase
 UL/CSA optional
 LxWxH: 670x600x670mm
 Weight: approx. 62kg

Required for operation

PC with Windows

Scope of delivery

- 1 experimental unit
- 1 GUNT software CD + USB cable
- 1 set of instructional material

HM 284

Series and parallel configuration of pumps

Optional accessories

020.30009

WP 300.09

Laboratory trolley