

**HM 362**

**Comparison of Pumps**



- \* Investigation of the operating behaviour of centrifugal, piston and side-channel pumps
- \* All pumps driven separately by three-phase AC motors
- \* Centrifugal pumps can be operated in series or parallel

**Technical Description**

The experiments familiarise students with various pump types, such as centrifugal and positive-displacement pumps.

The HM 362 trainer includes two centrifugal pumps, one piston pump as a positive-displacement pump and a self-priming side-channel pump. The side-channel pump works primarily as a centrifugal pump and, depending on liquid level, can also act as a positive-displacement pump. This means, as a special feature, the side-channel pump also permits gases to be pumped.

The pump being investigated pumps water in a closed circuit. In the process, the performance data of the pump and pressure losses in the pipeline are recorded. The centrifugal pumps can also be operated in parallel or in series. Each pump is driven by a separate three-phase AC motor. The motors for the centrifugal pumps are speed-controlled by way of a frequency converter. All motors are mounted on swivel bearings, so the torque can be measured by way of a force sensor, enabling the mechanical drive power output to be determined.

directly. One free position is likewise equipped with a reversible speed-controlled three-phase AC motor. This position can be used for mounting of any pump.

Experiments demonstrate the basic operating behaviour of various pump types.

Relevant 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. The performance data of the pump and losses in the pipeline are calculated by the software and represented by characteristic curves. The operating point of the pump can be determined from these characteristics.

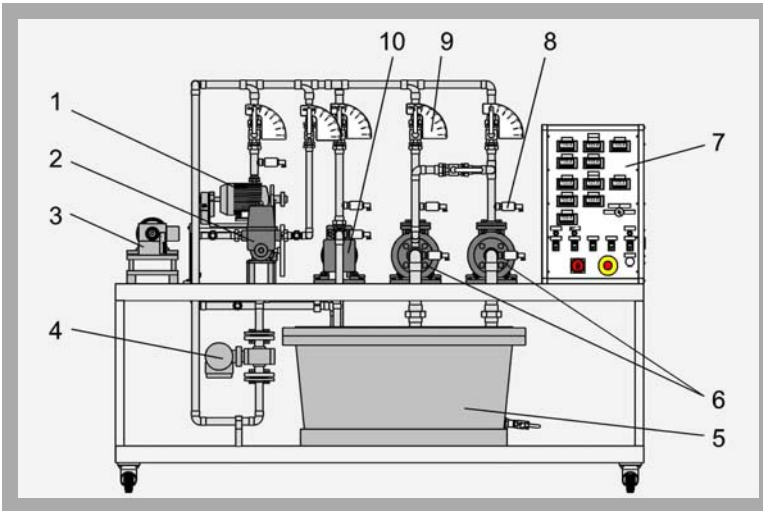
The well-structured instructional material sets out the fundamentals and provides a step-by-step guide through the experiments.

**Learning Objectives / Experiments**

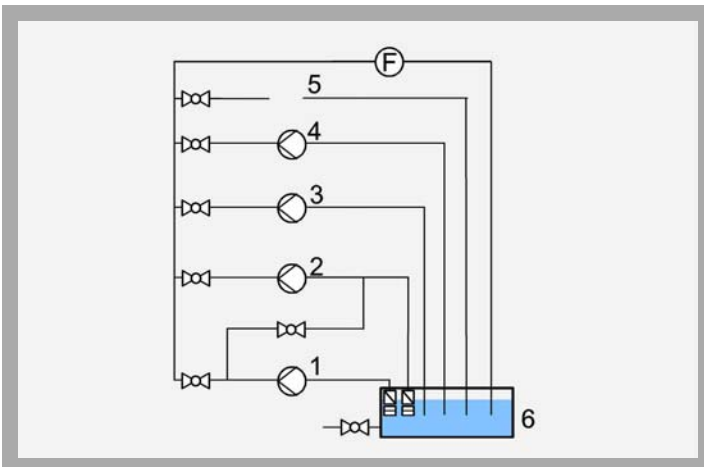
- Investigation and comparison of the operating behaviour of various pump types:
  - \* centrifugal pumps
  - \* piston pump (positive-displacement pump)
  - \* side-channel pump
- Plotting a pump characteristic curve
- Plotting a system characteristic curve
- Determining efficiency
- Investigation and comparison of parallel and series configuration of centrifugal pumps
- Comparison of pump types

**HM 362**

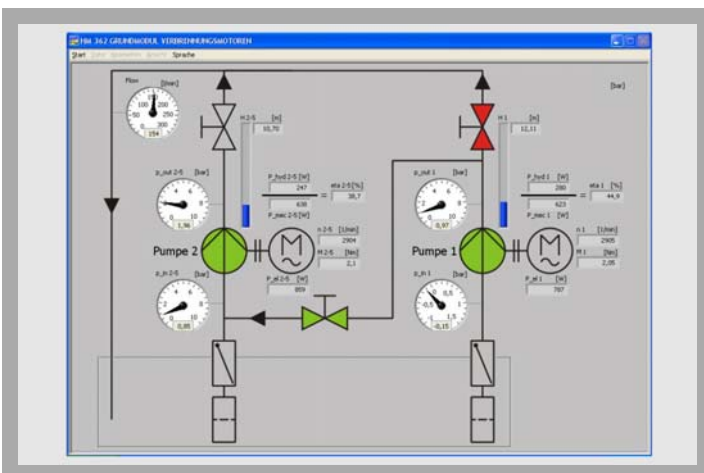
**Comparison of Pumps**



1 piston pump motor, 2 piston pump, 3 motor for additional pump, 4 flow rate sensor, 5 tank, 6 centrifugal pump, 7 switch cabinet with displays and controls, 8 pressure sensor (pressure side), 9 ball valve with scale, 10 side-channel pump



1+2 centrifugal pump, 3 side-channel pump, 4 piston pump, 5 free position, 6 tank; F flow rate sensor



Software screenshot: Series configuration of centrifugal pumps

**Specification**

- [1] Experiments relating to key issues in pump engineering
- [2] Comparison of various pump types: Centrifugal pump, piston pump, side-channel pump
- [3] Operation of centrifugal pumps in parallel or series
- [4] Three-phase AC motors for centrifugal pumps and additional motor with speed control by frequency converter
- [5] LabVIEW software for data acquisition via USB under Windows XP or Windows Vista

**Technical Data**

- Centrifugal pump 2x
  - max. flow rate (Q): 380L/min
  - max. head (H): 20m
  - nominal speed: 2900rpm
- Three-phase AC motor 2x, for centrifugal pump
  - power output: 1.1kW
  - speed range: 750...3000rpm
- Side-channel pump, self-priming, two-stage
  - Q: 80L/min, H: 25m
  - nominal speed: 1450rpm
- Three-phase AC motor for side-channel pump
  - power output: 1.1kW
  - speed: 1450rpm
- Piston pump
  - Q: 17L/min, H: 60m
  - nominal speed: 1450rpm
- Three-phase AC motor for piston pump
  - power output: 0.55kW
  - speed: 1450rpm
- Three-phase AC motor, additional motor, reversible
  - power output: 0.75kW
  - speed range: 750...3000rpm
- Measuring ranges
  - flow rate: 0...500L/min
  - intake pressure: -1...1.5bar
  - delivery pressure: 0...10bar
  - torque: 0...25Nm
  - speed: 0...3000rpm
  - pump electrical power consumption: 0...2000W

**Dimensions and Weight**

l x w x h: 2500 x 1250 x 1950 mm  
Weight: approx. 560 kg

**Connections**

400V, 50Hz, 3 phase or 230V, 60Hz, 3 phase

**Scope of Delivery**

1 trainer, 1 LabVIEW software CD + USB cable, 1 set of instructional material

**Order Details**

070.36200 HM 362 Comparison of Pumps