

TM 280

Pressure distribution in journal bearings



Learning objectives/experiments

- visualisation and investigation of instability in journal bearings
- displacement of the shaft journal as a function of the speed
- pressure distribution in the bearing under constant load and different speeds
- critical speed as a function of the load
- critical speed as a function of the oil temperature

Description

- ideal observation of the function thanks to transparent bearing housing
- clear representation of the pressure distribution in the journal bearing
- investigation and visualisation of instability in journal bearings

In hydrodynamic journal bearings, the shaft and the bearing shell are separated from each other by a lubricating film during operation. The supporting function of the lubricating film in a journal bearing can be described by the pressure distribution in the bearing gap.

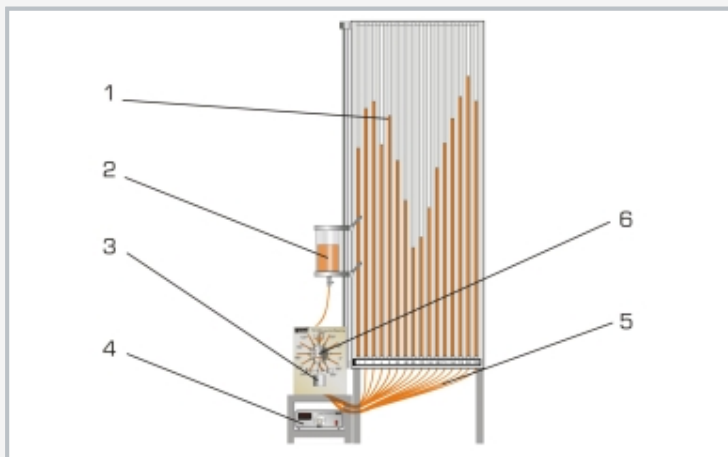
The TM 280 unit is used to visualise the pressure curve in the journal bearing with hydrodynamic lubrication. To do this, there are twelve measuring points around the circumference of the bearing shell and four measuring points in the longitudinal direction. The respective pressures can be read via a 16 tube manometers with reference to the height of the liquid columns.

The journal bearing comprises an electrically driven shaft journal that rotates in a freely movable bearing housing. Oil is used as the lubricant.

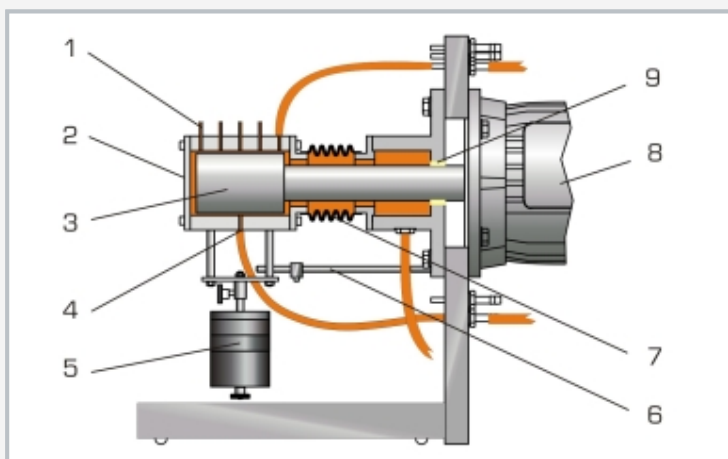
The displacement of the shaft journal depends on the speed and direction of rotation as well as the characteristic behaviour during start-up, and can be observed through the transparent bearing housing. Speed and direction can be adjusted. The load on the journal bearing can be adjusted by varying the weights. The temperature in the bearing gap is measured in order to determine the viscosity of the lubricant.

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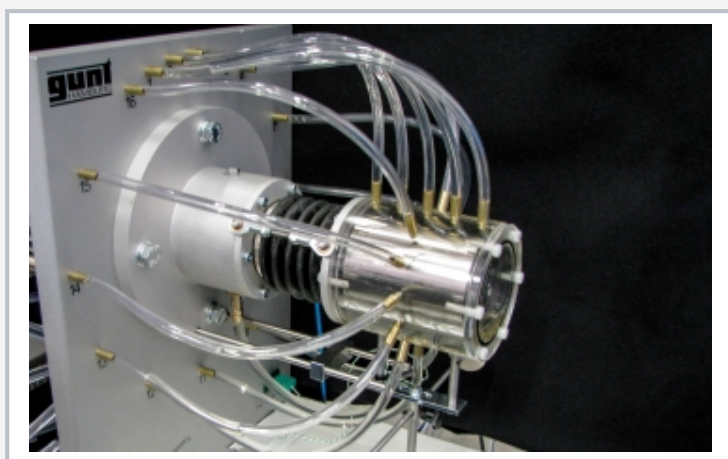
Pressure distribution in journal bearings



1 tube manometers, 2 tank for oil, 3 weight, 4 display and control unit for speed control, 5 measuring hoses, 6 journal bearing with drive



1 measuring points, 2 transparent bearing housing, 3 journal, 4 measuring point, 5 weight, 6 anti-twist device, 7 bellows, 8 drive motor, 9 radial sealing ring



Detailed view of the TM 280 journal bearing unit

Specification

- [1] visualisation and investigation of pressure distribution in journal bearings
- [2] bearing housing is completely transparent
- [3] continuously adjustable speed, electronically controlled
- [4] bearing subjected to load by means of weights
- [5] temperature measurement in the bearing housing
- [6] 12 measuring points on the periphery, 4 measuring points in the longitudinal direction
- [7] pressure distribution indicated with 16 tube manometers
- [8] digital display of speed on the display and control unit

Technical data

Bearing

- nominal bearing diameter: 51mm
- bearing gap width: 4mm
- bearing width: 75mm
- bearing load: 6,7...16,7N

Motor

- power: 0,37kW
- max. speed: 3000min⁻¹

Oil ISO viscosity grade: VG 32

Tank for oil: 2,5L

Weights

- 1x 1N (hanger)
- 2x 2N
- 1x 5N

Measuring ranges

- pressure: 1770mm oil column, 16x
- temperature: -10...50°C
- speed: 0...3000min⁻¹

230V, 50Hz, 1 phase

230V, 60Hz, 1 phase; 120V, 60Hz, 1 phase

UL/CSA optional

LxWxH: 1100x750x2650mm

Weight: approx. 110kg

Scope of delivery

- 1 trainer
- 1 display and control unit
- 1 set of tools
- 1 set of weights
- 1 hydraulic oil (5L)
- 1 handheld temperature measuring unit
- 1 set of instructional material