

**Features:**

- Characteristic behavior of a reaction turbine through which air flows¹
- Compressed air operated, closed experimental set-up

The conversion of pressure energy into kinetic energy in the rotor is characteristic of reaction turbines. In a reaction turbine, the static pressure of the working medium in front of the rotor is higher than behind it. In this case here, the working medium is air. The experimental unit allows us to understand analogies to turbines driven by steam or water.

Tesca Reaction Turbine includes a turbine rotor fitted with four nozzle-shaped exits. The rotor is mounted in a transparent housing. The air flows through the exit nozzles of the turbine rotor, expands, and accelerates. The existing air-jet drives the turbine rotor according to the reaction principle. The load unit to determine the torque is placed outside of the housing.

Pressures at the turbine inlet and turbine outlet are indicated on manometers. The torque is determined by force measurement on a band

brake. The speed is measured with an optical speed sensor. Torque, speed, and temperatures are digitally displayed. The volumetric airflow rate is read off a rotameter. The turbine is fitted with a quick-action stop valve as a safety device in case of over-speed. The brake drum is air-cooled.

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

Specifications:

- Study of a radial reaction turbine through which air flows
- Compressed air operated, closed experimental set-up
- Turbine load using a band brake
- Air preparation unit to adjust the working pressure
- Valve for adjusting the volumetric flow rate
- Quick-action stop valve as Overspeed protection for the turbine
- Force sensor to determine the torque on turbine shaft
- Optical speed sensor for measuring the turbine speed
- Manometer to indicate pressures at inlet and outlet
- Digital displays for speed, torque, and temperature
- Rotameter for measuring the volumetric flow rate

Technical Specifications:

- Radial impulse turbine
 - Max. power output: 25W at 30000min⁻¹
 - Rotor diameter: 50mm
 - 4 outlet nozzles, diameter: 1,5mm each
- Pressure controller of air preparation unit, adjustable: 0,5...8,5bar
- Measuring ranges

Note: Specifications are subject to change.

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- Temperature: -20...1100°C
- Speed: 0...50000min⁻¹
- Torque: 0...10Ncm
- Volumetric flow rate: 25...315L/min
- Inlet pressure: 0...2,5bar
- Outlet pressure: 0...0,1bar
- Radial impulse turbine
- Max. power: 25 W at 30000 rpm
- Wheel diameter: 50mm
- 4 outlet nozzles, the diameter of each 1.5mm

Experiments:

The characteristic behavior of a reaction turbine

1. Power output dependent on volumetric flow rate, pressure, and speed
2. Recording of torque characteristic
3. Determination of the turbine efficiency
4. Investigation of partial load operation due to throttling

Services Required:

- Power Supply, 400V, 50Hz, 3 phases
- Compressed air connection: 6...10bar, max 300L/min

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