

**Features:**

- Characteristic behavior of a reaction turbine through which air flows<sup>1</sup>
- Compressed air operated, closed experimental set-up

The conversion of pressure energy into kinetic energy in the rotor is characteristic for reaction or radial flow turbines. In a reaction or radial flow 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 Radial Flow 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 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 air flow 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

Note: Specifications are subject to change.

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- Quick-action stop valve as over-speed 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 Flow turbine**

- Max. power output: 25W at 30000min<sup>-1</sup>
  - Rotor diameter: 50mm
  - 4 outlet nozzles, diameter: 1,5mm each
- Pressure controller of air preparation unit, adjustable: 0,5...8,5bar

#### **Measuring ranges**

- Temperature: -20...1100°C
- Speed: 0...50000min<sup>-1</sup>
- Torque: 0...10Ncm
- Volumetric flow rate: 25...315L/min
- Inlet pressure: 0...2,5bar
- Outlet pressure: 0...0,1bar

### **Experiments:**

Characteristic behaviour of a reaction turbine

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

### **Required Services:**

- 230V, 50Hz, 1 phase or 120V, 60Hz, 1 phase
- Compressed air supply 6...10bar, max. 300L/min

Note: Specifications are subject to change.

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