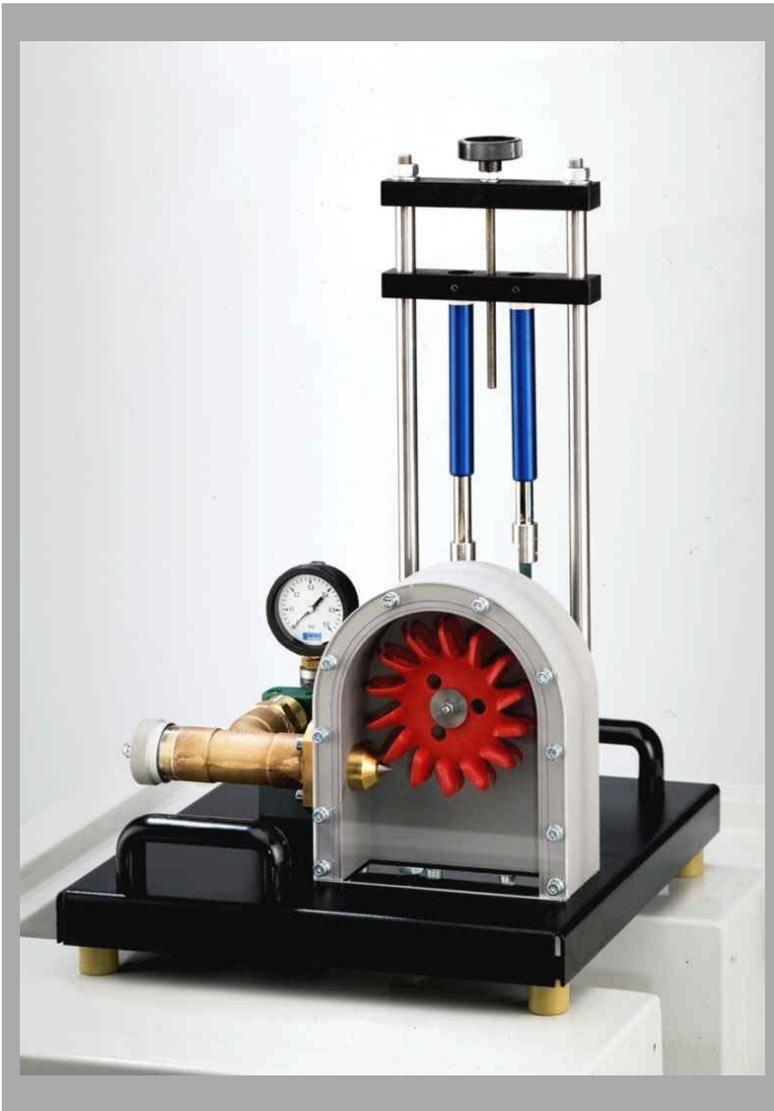


## HM 150.19 *Operating Principle of a Pelton Turbine*



- \* **Model of a Pelton turbine resp. an impulse turbine**
- \* **Transparent operating area**
- \* **Adjustable nozzle cross-section**
- \* **Loading by band brake**

### Technical Description

Water turbines are turbomachines utilising water power. The Pelton turbine is a type of free-jet or impulse turbine; such turbines convert the pressure energy of water into kinetic energy entirely in the control device. During the conversion, the water jet is accelerated in a nozzle and directed onto the vanes of the impeller tangentially. The water jet is redirected by approximately 180° in the vanes. The impulse of the water jet is transmitted to the impeller.

HM 150.19 is a model of a Pelton turbine demonstrating the function of an impulse turbine.

The experimental unit consists of the impeller, a needle nozzle used as control device, a band brake for loading the turbine and a housing with a transparent front panel. The transparent cover enables to observe the water flow, the impeller and the nozzle during operation. You can modify the nozzle cross-section and thus the flow rate by adjusting the nozzle needle.

The turbine torque is determined by force measurement on a band brake and is read on spring balances. For measuring the rotational speed, a non-contact speed sensor, e.g. HM 082, is required. A manometer shows the water pressure at the turbine inlet.

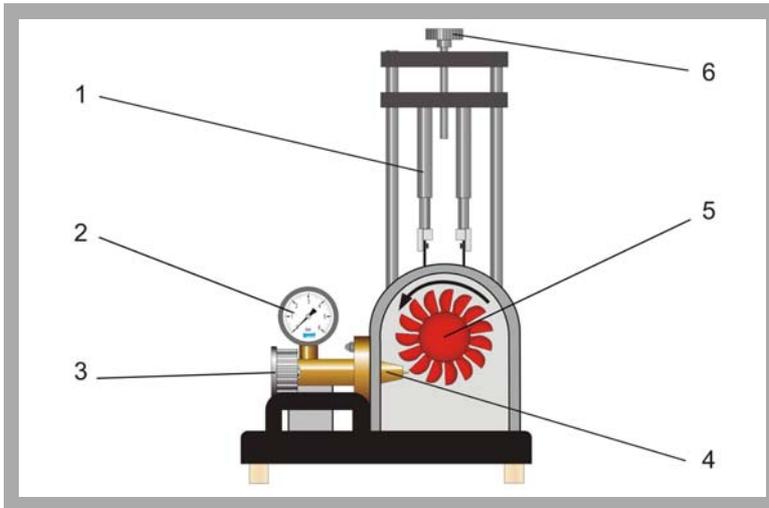
The experimental unit is positioned on the working surface of the base module HM 150 in a simple and safe manner. The water supply and flow rate measurement are provided via HM 150. Alternatively, the experimental unit can be supplied by the laboratory supply.

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

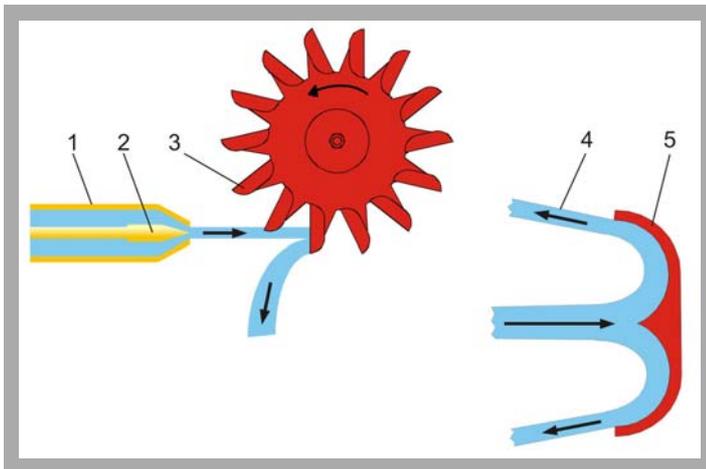
### Learning Objectives / Experiments

- design and function of a Pelton turbine
- determination of torque, power and efficiency
- graphical representation of characteristic curves for torque, power and efficiency

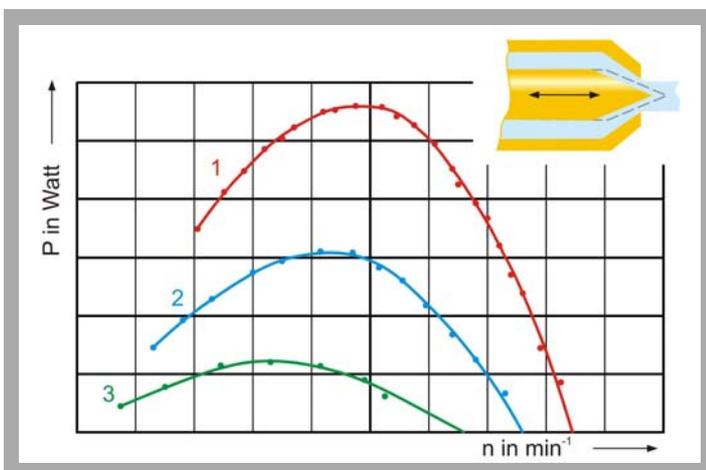
## HM 150.19 Operating Principle of a Pelton Turbine



1 spring balance, 2 manometer, 3 adjustment of the nozzle cross-section, 4 needle nozzle, 5 impeller, 6 adjustment of the band brake



Operating principle of the Pelton turbine:  
1 needle nozzle, 2 adjustable nozzle needle, 3 vane on the impeller, 4 redirected water jet, 5 profile of the vane



Turbine output curves at different positions of the nozzle needle:  
1: Q=31,6L/min, 2: Q=18,8L/min, 3: Q=11,5L/min; n speed, P turbine output

### Specification

- [1] function of a Pelton turbine
- [2] transparent front panel for observing the operating area
- [3] loading the turbine by use of the band brake
- [4] adjustable nozzle needle for setting different nozzle cross-sections
- [5] marking on brake drum for non-contact speed measurement
- [6] instruments: spring balances for determining the torque, manometer shows pressure at turbine inlet
- [7] flow rate determination by base module HM 150
- [8] water supply using base module HM 150 or via laboratory supply

### Technical Data

Pelton turbine

- output: 5W at 500min<sup>-1</sup>, approx. 30L/min, H=2m
- impeller
  - 14 vanes
  - vane width: 33,5mm
  - external diameter: 132mm

Needle nozzle

- jet diameter: 10mm

Measuring ranges

- braking force (spring balance): 10N
- pressure: 0...1bar

### Dimensions and Weight

LxWxH: 400x400x620mm

Weight: approx. 15kg

### Required for Operation

HM 150 (closed water circuit) or water supply, drain

### Scope of Delivery

- 1 experimental unit
- 1 set of instructional material

### Order Details

070.15019 HM 150.19 Operating Principle of a Pelton Turbine



## HM 150.19 *Operating Principle of a Pelton Turbine*

Available accessories and options:

**Product no. Order text**

070.08200 HM 082 Tachometer