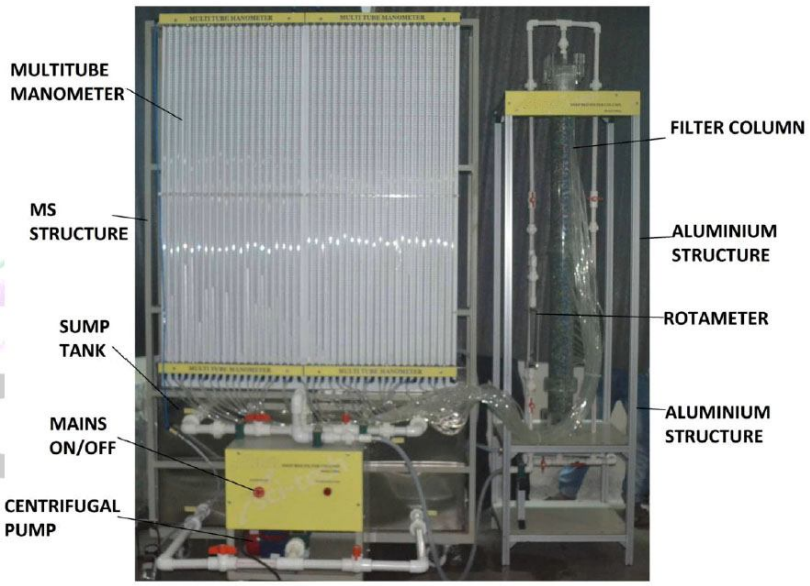
KFM-103 **DEEP FILTRATION APPARATUS**



Features

- Removal of solids by depth filtration (sand filter)
- Pressure loss: plotting of Micheau diagrams
- Backwash of sand filters

Depth Filtration Apparatus Model KFM-103 with sand filters is a key unit operation in water treatment. Its enables this process to be demonstrated. Raw water contaminated with solids is pumped from above into a sand filter. The solids are captured and retained as the raw water flows through the filter bed. The water itself passes through the filter bed and emerges at the bottom end of the sand filter. The treated water (filtrate) flows into a tank. Over time, more and more solids are deposited in the filter bed which increases its flow resistance This process is detectable by the increasing pressure loss between the sand filter inlet and outlet. The flow through the sand filter decreases. Backwashing with treated water cleans the filter bed and reduces the pressure loss again.

The sand filter is equipped with a differential pressure gauge. There are also several pressure measuring points along the filter bed. The pressures are transmitted to tube manometers via hoses and displayed there as water columns. This can be used to plot Micheau diagrams. The flow rate, temperature, differential pressure and system pressure are measured. The flow velocity in the filter bed (filter velocity) can be adjusted. Samples can be taken at all relevant points. Optionally software program is provided to control the operating states and measure data. A process schematic shows the current operating states of the individual components and the measured data. E.g. diatomite can be used to produce the raw water.

Specification

- Comparison of a Pelton turbine as impulse turbine and a Francis turbine as reaction turbine accessories for the Turbine Supply Unit
- Operation by use of the Universal Brake and Drive Unit
- Constant torques and speeds can be adjusted with Universal Drive and Brake unit
- Transparent front panel in the turbines for observing the operating area
- Adjustable nozzle needle for setting different nozzle cross-sections (Pelton turbine)
- Adjustable guide vanes for setting different angles of incidence (Francis turbine)
- Pressure sensor at the Francis turbine for measuring the pressure at the turbine outlet
- Digital display for flow rate, pressures and temperature in Turbine Supply Unit
- Braking torque and speed measured in function of a Kaplan turbine
- Closed water circuit with submersible pump, throttle valve and tank adjustment of flow rate with throttle valve
- Loading the turbine by use of air-cooled eddy current brake impeller with fixed vanes

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- Adjustable guide vanes for setting different angles of attack
- Non-contact speed measurement at the turbine shaft and force sensor at the brake for measuring the torque
- Digital display for pressures, temperature, flow rate, speed and torque

Technical Specifications

- Sand filter
  - ~ outer diameter: 120mm
  - ~ inside diameter: 106mm
  - ~ filter bed height: approx. 700mm
- Raw water pump
  - ~ max. flow rate: approx. 150L/min
  - ~ max. head: approx. 7,6m
- Backwash pump
  - ~ max. flow rate: approx. 50L/min
  - ~ max. head: approx. 14m
- Tanks for raw water and treated water
  - ~ capacity: each 180L
- Measuring ranges
  - ~ flow rate: 0…1300L/h
  - ~ tube manometers: 10x 0…1500mmWC
  - ~ differential pressure: -1…1bar
  - ~ system pressure: 0…2,5bar
  - ~ temperature: 0…100°C
  - ~ filter velocity: 0…70m/h

Experiments

- Learning the fundamental principle of depth filtration by sand filters
- Observation of the pressure conditions in a filter bed
- Determination of pressure losses
- Plotting of Micheau diagrams
- Principle of backwash

Services Required

- Mains power supply: 220-240V, 1Ph, 50Hz
- Water: Tap water supply & Drain.

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