KFM-16

PELTON TURBINE DEMONSTRATION

The **Pelton Turbine Demonstration Unit Model KFM-16** is an impulse transferred by the impact of water jet on the runner fitted with buckets. The change in the momentum of water jet results in the force on the buckets which turns the runner. The torque developed is converted into useful work. Pelton turbines are used in hydro-electric power plants operating with water source available at high heads and low volume flow rates. It is essential for students to understand the characteristics of Pelton turbines. The Demonstration Unit is necessary equipment machinery, mechanics educational institution. Pelton turbine turbine and energy is operation and performance Pelton Turbine for hydraulics laboratory any hydraulic and of fluid an educational institution.

The **Pelton Turbine Demonstration Uni**t has been designed to enable students to study the operation and characteristics of a typical Pelton turbine. The unit has to be connected to the specially designed KFM00C Water Feed System. The runner is mounted on a horizontal shaft and is fitted with buckets. A horizontal jet of water issuing from the nozzle produces a force on the bucket. The flow rate through the nozzle can be adjusted by varying the position of the needle valve inside the nozzle. The output of the turbine is measured using a brake band friction dynamometer. Digital RPM indicator with proximity sensor is provided to measure shaft speed. The runner and nozzle assembly is enclosed in a casing. The bottom of the casing is open and allows water leaving the buckets to drain. The front face of the casing is made transparent using Perspex to allow observation of turbine during operation. The unit is a compact and designed for quick and easy setting up of experiments. All components and instrumentation are placed in robust and mobile frame.

Experiments:

1. Study of construction of Pelton turbine
2. Determination constant head characteristics curve
3. Determination of constant speed characteristics curves.
4. Determination of constant efficiency curves.
5. ISO-Performance curves

Important Features and Specifications

Pelton Wheel Turbine Test Rig (1KW TYPICAL) (CC type)

a)

- Number of blades: 16
- Wheel diameter: 120mm
- Bucket depth: 14mm
- Jet diameter: 10mm
- Shaft diameter: 10mm
- Rated speed: @ 2000 rpm

b) Pelton Turbine designed for laboratory experimental purpose & to conduct test under constant head of the following specs. Net Head: 25 M, Discharge :500 LPM, Normal Speed : 1000 RPM, Power:1 KW

The unit consists of the following:
Casing: Of close grained cast iron with large circular observation window.
Runner: Of gun metal fitted with ground & accurately finished buckets.
Shaft: Of steel ground to close tolerance.
Spear Road: Of gun metal fitted with a brass opening & iron wheel for adjustment.
Inlet Pipe: Of close grained C.I. arranged so that the inlet can be either vertical or horizontal.
Brake Arrangement: Consists of a cast iron brake drum machined & polished, cooling water supply pipe from the turbine inlet, internal scoop, discharge pipe, spring balance rope brake & loading dead weights.

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c) Centrifugal pump set suitable for the supply of water for the size of 2“ (50mm) to discharge 500 LPM at a total head of 25 m. coupled to 2 HP, 1440/2880 RPM induction motor 3 Ø, 440 V AC. supply

d) Flow measuring Unit: A 50 mm (2“) Venturi meter / Orificemeter with double column differential manometer (Without Mercury) on a panel board to measure the difference of pressure.

e) Reservoir of size 0.5 m length x 0.5 m width x 0.5 m. height with drain valve of ½ ” size & a bend.

f) Starter, Switch, Digital speed indicator, Pipe line with gate valve & foot valve etc.

g) Strong iron stand to support the unit.

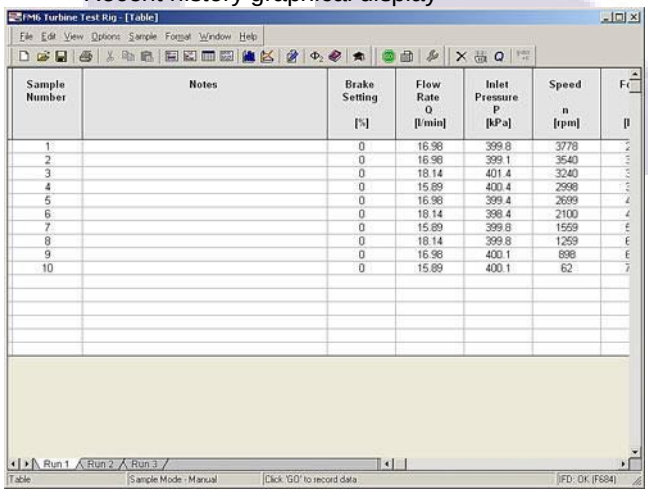
OPTIONAL SOFTWARE

Windows based software is supplied with the CAPTURE range of equipment offering a complete teaching package of coursework and laboratory investigation. The familiar Windows environment allows the student to explore the principles of each machine quickly and easily, highlighting the difference between theoretical and practical measurements, thus providing a good understanding of the principles involved.
This software runs under Windows operating systems and has been designed for maximum flexibility and ease of use. Comprehensive ‘Help’ screens guide the student through both the theoretical background and the practical investigation of the machine under examination. Suggested laboratory investigations and further questions for the student to answer are included in the software, together with all the information required to set up and run the teaching exercises.

SOFTWARE CAPABILITIES

This software includes a range of functions and capabilities designed to make the operation of the equipment and processing of the results more straightforward, and also to enhance student understanding of the subjects being covered.
It includes:

- Diagrammatic representation of the equipment, complete with real time display of the various sensor outputs
- Presentation screens, giving an overview of the software, the equipment, the procedure and associated theory
- Detailed ‘Help’ facilities giving in depth guidance
- Automatic data logging of sensor values into a spreadsheet format
- Control over sampling intervals
- Student questions and answers, including a layered ‘Hint’ facility
- Processing of sampled values (this may be linked to the questions and answers to ensure student understanding)
- Sophisticated graph plotting facilities of both measured and calculated values, including comparisons taken under different conditions
- Export of data to Microsoft Excel or other spreadsheets
- Links to user defined word processor
- Calibration facility for sensors
- Real time bar graph display of sensor outputs
- Recent history graphical display



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TECHNICAL DETAILS

The analogue output data is digitized and transferred to a computer using the standard USB (Universal Serial Bus). This allows any standard modern Windows computer to be used, including notebooks, and does not require any internal access to the computer.

The equipment is supplied complete with a USB lead for connection to the computer. The KFM-16 Turbine Demonstration Unit interfaces to the computer via the provided devices and the USB port of the computer. Also available is a software driver that allows the outputs to be read in other software programs, such as Lab view.

Services Required

- 3- ph. electrical supply, 440 V, 50 Hz.
- Water supply and drainage.

Overall dimensions:

- 1.3m x Width: 0.9m x Height: 1.1m.

The manual describing the theoretical and practical aspects of the apparatus, operation, analysis of results, and sample of results will be supplied with the equipment.

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