

Computerised Hydraulic Bench Model: FM12

COMPUTERISED HYDRAULIC BENCH (A)



This module is self-contained unit. This unit is used to provide all basic services for transportation and flow rate measurement of water. It has table-top as working space and several experimental modules can be easily attached or mounted on this. A wide range of experiments can be performed using this.

The bench consists of an FRP tank and an FRP tray that doubles as cover for the tank as well as notch tank and measuring tank. Submersible pump is used for supply of pressurized flow. A QRC is provided to easily and quickly connect the bench to different modules.

Differential pressure transmitter, flow transmitter with wide rangeability and digital flow indicator is built in to the Bench. A separate control panel with necessary power supply and PC interface is supplied along with a user-friendly software.

Components

- Sump tank: 200 lit, FRP
- Work bench: FRP
- Differential pressure transmitter
- Flow rate transmitter
- Digital flow-indicator
- Hardware for PC interface
- Inverted tube manometer
- Submersible Centrifugal pump
- Control panel
- Piping
- Windows based Software



The module can be interfaced with the PC and study can be carried out using a user-friendly Windows based software.

Powerful Windows based software helps analyses of various parameters acquired. Observation Table, Calculation Table and user defined graphs are available for ease of training/studies.

User defined graph plotting is possible with linear or logarithmic scale. The data can be saved and retrieved; it also can be exported to Excel for further analysis.

Two types of user login are available. Through Student login one can restrict viewing calculation tables and graphs. This enhances training capabilities. Instructor login has access to all the features of the software.



COMPUTERISED LOSSES IN PIPE FITTINGS & PIPE BENDS (B)

This module is used along with the hydraulic bench. The module used to determine the losses encountered during liquid flow through pipes, other fittings which occur due to presence of bends, valves & enlarged and diminished cross-sections. Tapings are taken at a fixed distances for measurement of differential pressure. Flow can be varied manually using combination of valves.

The module can be interfaced with PC and all the results are obtained/logged

Areas of study

1. Determination of heads loss due to friction in long bend
2. Determination of heads loss due to friction in short bend
3. Loss due to Sudden Expansion, Sudden Contraction
4. Loss due to friction in gate valve and globe valve

Components:

- 90-degree elbows (bends), a short one and a middle one.
- 90-degree curve or long elbow (large radius bend).
- Sudden expansion section
- Sudden contraction section
- Sudden direction change, miter type bend
- Gate valve



COMPUTERISED IMPACT OF JETS (C)

This module is used along with the hydraulic bench. This module helps in study of effects occurring due to the force exerted by a fluid jet on vanes of various shapes and hence evaluates the hydrodynamic force exerted.

The module can be interfaced with PC and all the results are obtained/logged.

Areas of study:

1. Measurement of force on different types of surfaces
2. Comparison of change in momentum with force
3. Effect of impact due to change in flow rate

Components:

- Enclosure: MOC: Transparent acrylic.
- Size: 220mm (Dia) X 350 mm
- Nozzle: 10 mm, Brass
- Plates (Vanes) MOC: Aluminium
- 135 deg conical surface
- 45 deg Oblique surface
- 180 deg semicircular
- 90 deg flat surface
- Force measurement transducer



COMPUTERISED LOSSES IN PIPES (D)

This module is used along with the hydraulic bench. The module used to determine the losses encountered during liquid flow through pipes. Tapings are taken at a fixed distances on the pipe for differential pressure measurement. Flow can be varied manually using combination of valves.

Pipes of different diameter and different material having different friction factor are supplied for studies.

The module can be interfaced with PC and all the results are obtained/logged

Areas of study

1. Determination of Reynolds's number
 2. Determination of friction factor
 3. Effect of material on friction factor
 4. Effect of size on friction factor

Components:

- Pipe1: MS, 9.5 mm ID (approx.)
 - Pipe2: GI, 15 mm ID (approx.)
 - Pipe3: GI, 24 mm ID (approx.)



COMPUTERISED FREE AND FORCE VORTICES (H)

The module is used along with the hydraulic bench helps in study of vortex formation when a liquid is under the influence of a rotational motion. Necessary arrangement enables complete study of the profile of both free and forced vortices under changing conditions of speed and volume of liquid.

The module can be interfaced with PC and all the results are obtained/logged

Areas of study

1. Determination of surface profile of free and vortex.
 2. Determination of total head variation in a free and forced vortex.
 3. Comparison of practical results with theoretical predictions



COMPUTERISED ORIFICE AND MOUTHPIECE (I)

The module is used along with the hydraulic bench helps in study of change in discharge of a liquid through an orifice and mouthpiece of uniform cross-section, under varying pressure heads. The experiments can also be carried out with different orifice plates by its attractive coating. Wheels/Level screw are provided for easy handling/levelling of the module.

An X-Y measurements of the trajectory of water jet is directly logged in to the software. An arrangement is made to maintain a constant pressure head. Different types and sizes of orifice mouthpieces can be studied.

The module can be interfaced with PC and all the results are obtained/logged

Areas of study:

1. Determination of coefficient of discharge
2. Verification of the relationship between flow and head

Components:

- Orifice, two different sizes
- Mouthpiece (convergent, divergent type)
- X-Y position transmitter with pointer
- Constant head tank: Transparent acrylic
- Structure



COMPUTERISED NOTCHES APPARATUS (J)

The module is used along with the hydraulic bench helps in study of the relationship between upstream water level and discharge over a notch. Changing flow patterns due to different notches can also be effectively studied.

The module is built in the tray and has a facility to mount the notch.

An electronic pointer gauge with transmitter is supplied.

The module can be interfaced with PC and all the results are obtained/logged

Areas of study

1. Determination of coefficient of discharge for each type of notch
2. Verification of relationship between head and flow for various types of notch

Components

- Notch plates: Rectangular, Triangular, Step, 45 deg and 90 deg V notch. 1 no. each
- Point gauge with transmitter



COMPUTERISED ORIFICEMETER, VENTURIMETER (K)

The module is used along with the hydraulic bench helps study of various flow meters. An orifice meter, venturi meter and Rotameter are fitted into parallel lines with valves to select the use of any one at a time. Tapping is taken on the meter for differential pressure measurement. Facility to change the flow is provided. Results obtained from various flow meters are compared and studied.

The module can be interfaced with PC and all the results are obtained/logged

Areas of study

1. Determination of flow coefficient
2. Study of variable area flow meters.
3. Comparison of different type of flow meters
4. Comparisons of pressure drop across Venturi meter and Orifice meter.

Components:

- Orifice: Upstream pipe dia: 35 mm,
- Venturi: Throat dia: 20 mm, Upstream pipe dia: 32 mm. Downstream taper: 21-degree
- Upstream taper: 14 degrees
- Rotameter: Range: 35 lpm
- Piping with fittings and QRC



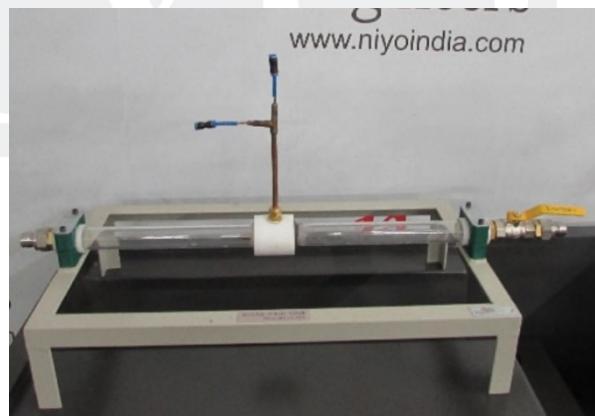
COMPUTERISED PITOT TUBE (M)

The module is used along with the hydraulic bench helps demonstrate working principle of static pitot tube. A Pitot tube is fitted into a pipe line. Facility to change the flow is provided. There is facility to adjust the position of the Pitot tip traverse across inside of the pipe. Results obtained for various flow rates and the Pitot tube is studied.

The module can be interfaced with PC and all the results are obtained/logged

Components:

1. Pitot Tube
2. Pipe
3. QRC



INSTRUCTION MANUAL

Self-explanatory operating manuals are provided with each system. Detailed theory as well as practical exercises is also included in the manual.

SERVICES REQUIRED

- Electric supply 220V A. C., 50 Hz
- Water supply and drain arrangement

Note: List of experiments mentioned under Areas of study may vary depending on model selected. accessories ordered