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EIE INSTRUMENTS

Fluid Mechanics Testing

A practical approach to experimental research

EIE INSTRUMENTS PVT. LTD.

Established in 1978, **EIE Instruments** designs, develops and manufactures a comprehensive range of Laboratory Testing products catering to various engineering and academic sectors, such as **Soil Testing, Material Testing and Asphalt Testing Laboratories, POY, Textiles, Tiles-Ceramic, Cement, Concrete and Healthcare Industries, Clinical Research Laboratories, Hospital and Medical Colleges, Universities and Research Institutes**. The company is also renowned as a leading provider of technical teaching equipment for Schools, Colleges, Universities and Industrial Training Centres worldwide.

Our technical teaching instruments portfolio includes **Fluid Mechanics Testing Equipment, Heat and Mass Transfer Lab Equipment, Refrigeration & Air Conditioning Lab Equipment, Thermodynamics Lab Equipment** etc.

In addition to supplying individual equipment in these subject areas, **EIE** also undertakes complete turnkey projects for the design, supply, installation and commissioning of entire laboratories. We are fully ISO 9001 compliant.

Quality

Quality is prominent to us and we, at **EIE Instruments**, follow TQM (Total Quality Management) concept. It is not just another goal, it is our basic strategy for survival and future growth. Customization, flawless product and on-time delivery is our eminence strength. Our own Calibration Lab is furnished with sophisticated master Calibration Instruments (i.e. Fluke, Insize, Mutitoyo). We take utmost care and ensure that our production process right from checking of raw materials to final shipment of consignments confirm to industrial standards and norms.

Product Development

EIE Instruments operates a continual product improvement process to ensure that our teaching equipment stays ahead of the competition and meets our customers' needs. Our product ranges are reviewed in line with worldwide curricula and hence, regularly updated and developed as per the international norms. State-of-the-art manufacturing facilities, spread over an extensive area, at our India plant enables our in-house engineering team to work alongside production workforce to ensure that quality products are designed and built to give end users many years of safe, accurate and reliable usage. Our infrastructure is segregated into different units such as Manufacturing Plant, Calibration Laboratory, Quality Control, R&D Department, Warehousing & Packaging unit to maintain work flow in streamlined manner.

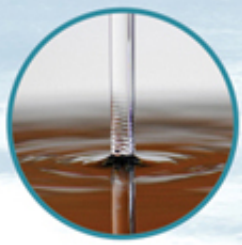
Product Quality

Maintaining the high quality of all **EIE** products is essential. Strict quality control procedures at each stage of design and production ensure our products always meet the highest quality standards. The equipment are robustly designed to withstand long term, heavy laboratory and classroom use. This ensures reliable operation over many years and a high standard of teaching and learning. All **EIE** products include high-quality user guides, which provide relevant theory, technical information and experiments. The comprehensive level of support helps students understand the principles involved with each experiment, enabling them to put theory into practice.

Type of Flow

Laminar Flow

Laminar flow, is sometimes called streamline flow. A laminar flow is one in which all the particles of a fluid within a layer are moving at the same rate, in contrast to turbulent flow, in which the fluid undergoes irregular fluctuations and mixing. The velocity, pressure, and other flow properties at each point in laminar fluid remain constant. Examples include the flow of oil through a thin tube and blood flow through capillaries.



Turbulent Flow

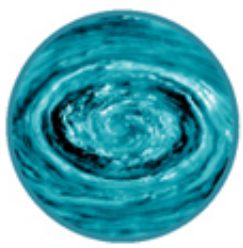
Turbulent flow is a type of fluid (gas or liquid) flow in which the fluid undergoes irregular fluctuations, or mixing, in contrast to laminar flow as explained above. In case of turbulent flow, the speed of the fluid, at any point within the flow continuously varies in both magnitude and direction. vortices, eddies and wakes make the flow unpredictable. Examples include lava flow, atmosphere currents, ocean currents, the flow through pumps and turbines etc.

Vortex Flow

In fluid dynamics, a vortex is a region within a fluid where the flow is mostly a spinning motion about an imaginary axis, straight or curved. That motion pattern is called a vortical (Vortex) flow. Within such a vortex, the fluid's velocity is greatest next to the imaginary axis, and decreases in inverse proportion to the distance from it. Common examples are smoke rings, the whirlpools often seen in the wake of boats and paddles, and the winds surrounding hurricanes, tornadoes and dust devils.

Whirlpool Flow

A rapid circular current of liquid. A vortex is any whirlpool with a downdraft. A maelstrom is the term applied to the most powerful whirlpools. The most powerful "natural" whirlpools are the result of tidal changes and the resulting fast-flowing water through narrow shallow straits.



Our Values

EIE abides by the following list of core values. These values reflect upon our company culture and guide the way we make decisions.

Importance of Fluid Mechanics Study

Fluid mechanics is an essential subject in the study of the behavior of fluids, equally - when fluid is at rest and when it is in motion. Fluid mechanics plays a critical role in development of many real life applications or the products. Application can be ranging from a house hold application - such as the mains water supply, natural gas supply and residential structure of pipe drainage network to Industrial applications - such as the design of the body of an Automotive Car, Olympic Swimsuits, Aero Plane, Train or the provision of electricity from a hydro-power plant.

Any applications or products inheriting this basic concepts of fluid mechanics can be studied with real life experimental models.

Hence, we, at **EIE Instruments**, have attempted to capture and implements fundamental concepts of fluid mechanics in more simpler way by designing and developing practical testing instruments.

EIE's Distinctive Perspective on Developing Fluid Mechanics Equipment

EIE believes that student shall have access to real-life practical applications and shall be able to perform hands-on experience to thoroughly understand & digest the basic theory and fundamentals of fluid mechanics principles. **EIE** attempts to offer an answer to the academic demand for teaching and learning the basics of Fluids Mechanics, in an easy and practical way. This can transform the academic industry into knowledge imparting/serving industry and thereby helping India to emerge as a globally reputed nation.

EIE Fluid Mechanics Instruments tackle the various governing laws and principles of fluid mechanics demonstrating the critical parameters in a very clear and easy way. These equipment which are designed and developed by our highly trained professionals through many years of research and experiments, examine fundamentals of fluid flow with application to engineering problems. These equipment help students to understand various fluid principles such as-fluid statics and kinematics; conservation equations for mass, momentum, and energy; Bernoulli and Euler equations; potential flow; laminar and turbulent viscous boundary layers; laminar and turbulent pipe flow; and compressible fluid flow.

EIE presents a flexible and modular-based system for learning basic Fluid Mechanics properties. Any desired configuration can be chosen (browsed through the entire catalog), according to the working application and areas of study. Being a modular and open system, it is very economical for the universities and research institutes to procure and upgrade the existing laboratory facilities.

Choose your need

VIPL-FM 7001

Pressure Measurement Apparatus

Purpose

Pressure is the normal force exerted by a fluid over a surface area. It is defined as the ratio of force to the area over which that force is distributed. Fluid pressure occurs in one of two situations:

1) An open condition (Static fluid pressure)
2) A closed condition (Dynamic fluid pressure)

Construction

This apparatus is used for comparing the various methods and devices for measuring pressure. orifice is installed in the test section and four different pressure tapings are measured using a Bourdon gauge, single manometer, inclined manometer, U-tube manometer or digital manometer.

Technical Specifications

Attributes	Values
Box Dimensions	1000 x 500 x 1500 mm
U- tube Manometer	300-0-300 (Mercury filled)
Inclined Tube Manometer	200-0-200 Inclined Limb (Mercury Filled)
Orifice Diameter	16 mm
Sump Tank Capacity	100 liters
MOC (Material of Construction)	SS 304 with matt buffing
	(PVC Tank can also be supplied
Pump	Motor 0.5 HP, Mono Block type, 0-60 LPM
Pressure Gauge (Bourdon Type)	(0-2 kg/cm²)
Vacuum Gauge (Bourdon Type)	(0-760 mm of HG)
Pipe Material	UPVC Pipes

Note: The instrument can also be supplied with dedicated data acquisition software & PC connectivity to acquire real time data (Computational Fluid Mechanics). (Optional)

Applications

- Compressors
- Artesian Aquifer
- Fountain & Gardening
- Automobiles engineering
- Industrial applications
- Research work

- Large syringe to demonstrate working of each device
- Piping is done with necessary valves and fittings
- Supplied with detailed technical manual

VIPL-FM 7002

Bernoulli's Theorem Apparatus

Purpose:

Bernoulli's principle can be derived from the principle of conservation of energy. This states that, "In a steady flow, the sum of all forms of mechanical energy in a fluid along a streamline is the same at all points on that streamline. This requires that the sum of kinetic energy and potential energy remain constant.

Construction:

The complete unit comprises of a test bench with sump tank & measuring tank. The pressure test section is an accurately machined clear acrylic duct of varying circular cross section. Water is supplied from the constant head tank attached to the test section. Test sections is provided with a number of side hole pressure tapings known as Piezometric tubes at different distance. These tapings allow the measurement of static pressure head simultaneously at each of 8 sections. The tapping positions and the test section diameters are narrated in the below table.

Piezometer Tube No.	1	2	3	4	5	6	7	8
Dia. of Cross Sections	34.0	27.5	22.9	25.0	28.1	31.1	34.2	37.2

Technical Specifications

Attributes	Values
Converging Diverging Test Section	300 mm (Perspex)
No. of Pressure Tapings	8 Numbers
Sump tank capacity	75 liters
MOC of Sump Tank	SS 304 with matt buffing
Volumetric Tank Capacity	40 liters
MOC of Volumetric Tank	SS 304 with matt buffing
Test Section	Made of acrylic (One piece)
Stop Watch	Digital Stop Watch
Water Circulating Pump	Motor 0.5 HP, Mono block type, 0-60 LPM

Note: The instrument can also be supplied with dedicated data acquisition software & PC connectivity to acquire real time data (Computational Fluid Mechanics). (Optional)

Applications

- Design of Aero Plane Wings
- Hydrofoil Boat
- Bunsen Burner
- Concept of Racing Cars
- The Carburetor used in many Reciprocating Engines
- Insecticide Spray and many more

- Piping with necessary valves and fittings
- Digital stop Watch with 1/10 second accuracy
- Detailed technical manual and on-site training

VIPL-FM 7003

Reynolds's Apparatus

Purpose

Reynolds's Number is a dimension less number used by engineers to determine type of Fluid flow, Whether Laminar or Turbulent. Laminar flow occurs at low Reynolds numbers, where viscous forces are dominant, and is characterized by smooth, constant fluid motion; Whereas, turbulent flow occurs at high Reynolds numbers and is dominated by inertial forces, which tend to produce chaotic eddies, vortices and other flow instabilities.

Construction

Apparatus consists of a constant head tank and a small tank. The constant head tank has a horizontal/vertical transparent tube with a flow control valve at the discharge side. The flow visualization (transparent) pipe is fitted with a bell mouth which promotes smooth entry to the pipe. The velocity of water is varied by the flow control valve. When the dye is introduced then laminar or turbulent nature of the flow can be visualized. The complete instrument consists of a sump tank, constant head tank, dye tank fitted at the top, flow visualization pipe and a stop watch.

Technical Specifications

Attributes	Values
Dye Vessel Material	Acrylic
Dye Material	Potassium Permanganate
Constant Head Tank Capacity	10 liters
MOC of Constant Head Tank	Acrylic
Sump Tank Capacity	60 liters
MOC of Sump Tank	SS - 304 with Matt Buffing
Flow Visualization Tube	Made of Acrylic (Transparent)
Flow Pipe Length	700 mm
Measuring Flask	1 liter
Stop Watch	Digital Stop Watch
Water Circulating Pump	Motor 0.5 HP, Mono Block type, 0-60 LPM

Note: The instrument can also be supplied with dedicated data acquisition software & PC connectivity to acquire real time data (Computational Fluid Mechanics). (Optional)

Applications

- To determine type of flow.

- Piping with necessary Valves and Fittings
- Digital Stop Watch with 1/10 second Accuracy
- Detailed Technical Manual and On-site Training

VIPL-FM 7004

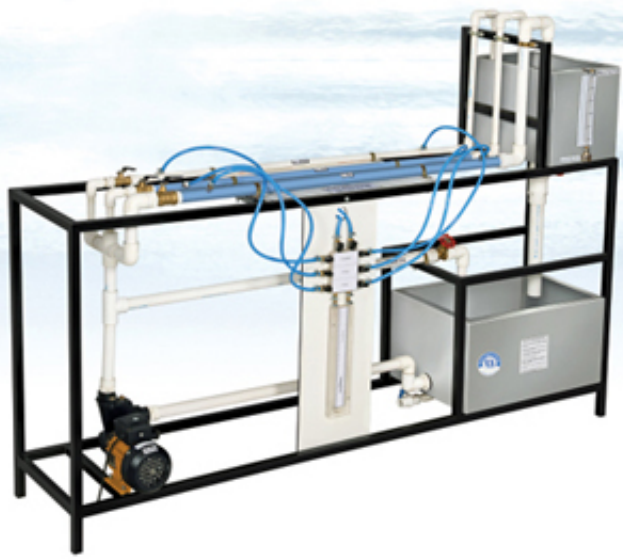
Pipe Friction Loss Apparatus (Major Loss)

Purpose:

In the chemical and manufacturing industries, large flow networks are necessary to achieve continuous transport of products and raw materials from different processing units. This requires a detailed understanding of fluid flow in pipes. Frictional energy loss (also called frictional head loss) due to the friction between the fluid and the pipe wall and internal friction within the fluid causes substantial energy loss due to frictional resistance. The apparatus has been designed to enable students measure loss of head in pipes due to friction at various flow velocities or Reynolds numbers.

Construction:

The apparatus is mounted on a supporting rigid structure and is designed for use with the Hydraulic Bench or any other suitable controlled water supply and re-circulation system. Set up consists of a set of 3 different pipe test sections, supply tank, measuring tank and pump for closed loop water circulation. The test sections are connected to differential manometer for pressure measurements. The flow rate of water is measured using measuring tank and stop watch. A system of parallel pipe net work configuration and isolating valves enable tests to be conducted on different pipes without disconnecting or draining the system.



Technical Specifications

Attributes	Values
Box Dimensions	2000 x 500 x 1400 mm
U-tube Manometer	300-0-300 (Mercury filled)
Water Pipes Dimensions	GI - 1", 1/2" & UPVC - 1/2"
Sump Tank Capacity	75 Liters
MOC of Sump Tank	SS-304 with Matt Buffing
Volumetric Tank Capacity	40 liters
MOC of Volumetric Tank	SS - 304 with Matt Buffing
Stop Watch	Digital Stop Watch of 1/10 Accuracy
Water Circulating Pump	Motor 0.5 HP, Mono Block type, 0-60 LPM

Note: The instrument can also be supplied with dedicated data acquisition software & PC connectivity to acquire real time data (Computational Fluid Mechanics). (Optional)

Applications

- Pumping power requirements in large pipe networks
- Selection of efficient pipe materials
- Selection of size of pump
- To determine the placement of booster pump in residential & industrial piping network

- Piping with necessary flow control Valves and Fittings
- Digital Stop Watch with 1/10 second Accuracy
- Detailed Technical Manual and On-site Training

VIPL-FM 7005

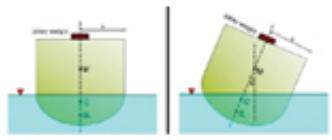
Metacentric Height of Ship Model

Purpose

The metacentric height (GM) is a measurement of the initial static stability of a floating body. It is calculated as the distance between the center of gravity of a ship and its metacenter. It is designed to demonstrate the stability of a floating cylinder and to familiarize the student with the concept of buoyancy, metacenter and metacentric height.

Construction

The complete unit comprises of a test bench with necessary accessories. A pontoon is allowed to float in a small tank having a transparent side. Removable steel strips are placed in the model for the purpose of changing the weight of the model. Displacement of weight is measured with the help of a scale. By means of a pendulum (consisting of a weight suspended to a long pointer) the angle of tilt can be measured on a graduated arc. For tilting the ship model, a cross bar with two movable hangers is fixed on the model. Pendulum and graduated arc are suitably fixed at the center of the cross bar. A set of weights is supplied with the apparatus.



Technical Specifications

Attributes	Values
Reservoir Tank Size	500 x 500 x 200 mm (L X W X H)
Reservoir Tank Material	Stainless Steel (S.S. - 304)
Ship Model Size	230 x 350 mm (l x W)
Ship Model Material	Acrylic
Circular Weights	5 Numbers
Material of weights	Brass with chrome finish
Tilt angle measurement facility	Graduated arc for measuring tilt angle

Note: The instrument can also be supplied with dedicated data acquisition software & PC connectivity to acquire real time data (Computational Fluid Mechanics). (Optional)

Applications

- In designing system flow rate for various industries.
- Large syringe to demonstrate working of each device.
- And to measure Liquid, Air and Gas velocities in industrial applications.

- Piping with necessary valves and fittings
- Digital stop watch with 1/10 second accuracy
- Detailed technical manual and on-site training

VIPL-FM 7006

Pipe Fittings Loss Apparatus (Minor Loss)

Purpose:

Pipe systems often include inlets, outlets, bends, and other pipe fittings in the flow that create eddies resulting in head losses (also termed minor losses) in addition to those due to pipe friction. Change in flow velocity due to change in the geometry of a pipe system (i.e., change in cross-section, bends, and other pipe fittings) sets up eddies in the flow resulting in energy losses.

Construction:

The apparatus is mounted on a supporting rigid structure. Set up consists of a set of 5 different pipe fittings test sections, supply tank, measuring tank and pump for closed loop water circulation. Each test pipe & pipe fitting is provided with pressure tapings to measure the pressure loss. A differential manometer is provided to measure this pressure loss. The pressure tapings are connected separately to a manifold which in turn is connected to the manometer for easy change over. The flow rate of water is measured using measuring tank & stop watch.

Technical Specifications

Attributes	Values
Box Dimensions	1000 x 500 x 1600 mm
U-Tube Manometer	300-0-300 (Mercury Filled)
No. of Pipe Fittings	5 Pipe Fittings are Installed
	(1) Bend (2) Elbow (3) Sudden Enlargement
	(4) Sudden Contraction (5) Valve
Sump Tank Capacity	75 Liters
MOC of Sump Tank	SS-304 with Matt Buffing
Volumetric Tank Capacity	40 Liters
MOC of Volumetric Tank	SS-304 with Matt Buffing
Stop Watch	Digital Stop Watch of 1/10 Accuracy
Water Circulating Pump	Motor 0.5 Mono Block Type, 0-60 LPM

Note: The instrument can also be supplied with dedicated data acquisition software & PC connectivity to acquire real time data (Computational Fluid Mechanics). (Optional)

Applications

- Pumping power requirements in large pipe networks.
- Selection of efficient pipe fittings material.
- Selection of size of pump.
- Placement of different fittings at appropriate locations.
- Shape of fluid flow path.

- Piping with necessary flow control valves and fittings
- Digital stop watch with 1/10 second accuracy
- Detailed technical manual and on-site training

VIPL-FM 7007

Notch Apparatus (Discharge Over Notch or Weirs)

Purpose

A weir or a notch is a barrier across a fluid path designed to alter its flow characteristics. Weir are commonly used to alter the flow of rivers to prevent flooding, measure discharge, and help render rivers navigable. Notches or Weirs allow hydrologists and engineers a simple method of measuring the volumetric flow rate in small to medium-sized streams, or in industrial discharge location. This apparatus helps students to understand co-efficient of discharge of various notches.

Construction

Set up is self sustained water re-circulating unit provided with sump tank and measuring tank. The lab set up consist of channel having sufficient length & width in which water is supplied from the bottom. Required notch is fitted at one end of this channel. A scale is fitted to measure the height of the fluid in flow channel. Arrangement for fixing interchangeable notch is also made. Flow control valve and by pass valve are fitted in flow line to conduct experiment on different flow rates. Flow rate is measured with help of stop watch & measuring tank.

Technical Specifications

Attributes	Values
Box Dimensions	250 x 200 x 1000 mm (L X W X H)
Notch	50 mm wide (Rectangular), 45° V Notch
Trapezoidal Notch	Slope 1:4
Material of Notch	Acrylic
Material of Test Section	Perspex
Sump Tank Capacity	75 liters
MOC	SS-304 with Matt Buffing (Sump & Volumetric Tank)
Volumetric Tank Capacity	40 liters
Test Section	Made of Acrylic (One piece)
Stop Watch	Digital Stop Watch of 1/10 Second Accuracy
Water Circulating Pump	Motor 0.5 HP, Mono Block type, 0-60 LPM

Note: The instrument can also be supplied with dedicated data acquisition software & PC connectivity to acquire real time data (Computational Fluid Mechanics). (Optional)

Applications

- Measuring volumetric flow rate in small to medium water streams.
- Application in industrial dams.
- Measuring volumetric flow rate in industrial discharge locations.
- Application in studying & altering the river path thereby preventing floods.

- Piping with necessary valves and fittings
- Digital stop watch with 1/10 second accuracy
- Detailed technical manual and on-site training

VIPL-FM 7008

Venturi-Meter

Purpose:

A Venturi meter is a tube with a constricted throat that increases velocity and decreases pressure. Venturi meters are used for measuring the flow rate of both compressible and incompressible fluids in a pipeline. The apparatus is designed to measure the co-efficient of discharge of Venturimeter. The trainer is self-sufficient unit to study the calibration characteristics of Venturimeter.

Construction:

The setup consists of sump tank, pump, Venturi meter & measuring tank. The entire system is mounted on a sturdy MS frame. The apparatus consists of a pipeline containing Venturimeter. The pressure tapings from the Venturimeter to differential manometer to measure pressure difference is provided. By operating the valves, provided at the downstream side, the flow can be regulated. Present set-up is self-contained water re-circulating unit. Flow control valve and by-pass valve are fitted in water line to conduct the experiment on different flow rates. Flow rate of water is measured with the help of measuring tank and stopwatch.

Technical Specifications

Attributes	Values
Box Dimensions	1000 x 500 x 1670 mm (L X W X H)
U-Tube Manometer	300-0-300 (Mercury Filled)
Venturi Meter	Throat Diameter 16 ± 1 mm
MOC of Venturi Meter	Transparent Perspex
Measuring Tank Capacity	40 Liters
MOC of Measuring Tank	SS-304 with Matt Buffing
Sump Tank Capacity	75 Liters
MOC of Sump Tank	SS-304 with Matt Buffing
Stop Watch	Digital Stop Watch
Water Circulating Pump	Motor 0.5 HP, Mono Block type, 0-60 LPM

Note: The instrument can also be supplied with dedicated data acquisition software & PC connectivity to acquire real time data (Computational Fluid Mechanics). (Optional)

Applications

- Cargo educator on Oil product and Chemical ship tankers.
- Inspiratory that mix air and flammable gas in Grills, Gas stoves, Bunsen burners and Airbrushes.
- Atomizers that disperse perfume or spray paint. (i.e. from a spray gun)
- Water aspirator that produce a partial vacuum using the kinetic energy from the faucet water pressure.
- Steam siphons using the kinetic energy from the steam pressure to create a partial vacuum.

- Piping with necessary valves and fittings
- Digital stop watch with 1/10 second accuracy
- Detailed technical manual and on-site training

VIPL-FM 7009

Orifice Meter Apparatus

Purpose:

An Orifice meter is a differential pressure flow meter which reduces the flow area using an orifice plate. Orifice and Venturi meter are used to measure the rate of flow of liquid. The apparatus is designed to measure the co-efficient of discharge (Cd) using Orifice meter. The trainer is self-sufficient unit to study the calibration & characteristics of the Orifice meter.

Construction:

The setup consists of sump tank, pump, orifice meter and measuring tank. The entire system is mounted on a sturdy MS frame. The apparatus consists of a pipeline containing a Orifice meter. The pressure tapings from the Orifice meter to differential manometer to measure pressure difference is provided. By operating the valves, provided at the downstream side, the flow can be regulated. Present set-up is self-contained water re-circulating unit. Flow control valve and by-pass valve are fitted in water line to conduct the experiment on different flow rates. Flow rate of water is measured with the help of measuring tank and stopwatch.

Technical Specifications

Attributes	Values
Box Dimensions	1000 x 500 x 1670 mm (L X W X H)
U-Tube Manometer	300-0-300 (Mercury Filled)
Orifice Dia.	16 mm
MOC of Orifice Meter	Transparent Perspex
Measuring Tank Capacity	40 Liters
MOC of Measuring Tank	SS-304 with Matt Buffing
Sump Tank Capacity	75 Liters
MOC of Sump Tank	SS-304 with Matt Buffing
Stop Watch	Digital Stop Watch
Water Circulating Pump	Motor 0.5 HP, Mono Block type, 0-60 LPM

Note: The instrument can also be supplied with dedicated data acquisition software & PC connectivity to acquire real time data (Computational Fluid Mechanics). (Optional)

Applications

- Industries
- Artesian Aquifer
- Fountain & Gardening Application
- Automobiles Engineering
- Industrial Applications
- Research Work

- Piping with necessary valves and fittings
- Digital stop watch with 1/10 second accuracy
- Detailed technical manual and on-site training

VIPL-FM 7010

Venturi-Meter & Orifice-Meter Apparatus

Purpose:

An orifice is an opening made in the side or bottom of tank, having a closed perimeter, through which the fluid may be discharged. A venturi meter has a converging conical inlet, a cylindrical throat and a diverging recovery cone. Orifice and Venturi meter are used to measure the rate of flow of liquid. The apparatus is designed to measure the co-efficient of discharge of Orifice meter & Venturi meter.

Construction:

Present set-up is self-contained water re-circulating unit. Flow rate of water is measured with the help of measuring tank & stopwatch. The apparatus consists of two pipelines emerging out from a common manifold. One pipeline contains Venturi meter and other contains Orifice meter. The pressure tapings from the Venturi meter & Orifice meter are taken to differential manometer to measure pressure difference. The Venturi meter & Orifice meter are connected in parallel and anyone of them can be put in operation by operating valves provided at the downstream. These valves can also regulate the flow.

Technical Specifications

Attributes	Values
Box Dimensions	1000 x 500 x 1670 mm (L x W x H)
U-Tube Manometer	300-0-300 (Mercury Filled)
Orifice Diameter	16 mm
Venturi Meter	Throat Diameter 16 ± 1 mm
MOC of Venturi & Orifice Meter	Perspex
Measuring Tank Capacity	40 Liters
MOC of Measuring Tank	SS-304 with Matt Buffing
Sump Tank Capacity	75 Liters
MOC of Sump Tank	SS-304 with Matt Buffing
Stop Watch	Digital Stop Watch
Water Circulating Pump	Motor 0.5 HP, Mono Block type, 0-60 LPM

Note: The instrument can also be supplied with dedicated data acquisition software & PC connectivity to acquire real time data (Computational Fluid Mechanics). (Optional)

Applications

- Industries
- Artesian Aquifer
- Fountain & Gardening Application
- Automobiles Engineering
- Industrial Applications
- Research Work

- Piping with necessary valves and fittings
- Digital stop watch with 1/10 second accuracy
- Detailed technical manual and on-site training

VIPL-FM 7011

Flow Measurement Apparatus

Purpose

Flow meter is a device that measures the rate of flow or quantity of a moving fluid in an open or closed conduit. The measurement of water flow rate is an important topic in the study of fluid dynamics. Flow may be measured by measuring the velocity of fluid over a known area.

Construction

The complete unit comprises of a test bench with sump tank & measuring tank. This apparatus is designed to introduce students to three basic types of flow meters. The venturi meter, variable area meter and the Orifice plate are installed in a parallel configuration to permit direct comparison of fluid flow. Flow through the Venturi meter, Orifice meter & Rotameter is regulated using a respective flow control valve. This together with the bench control valve permits variation of the system static pressure. Pressure tapings in the circuit are connected to an six-bank manometers which incorporates an air inlet/outlet valve in the top manifold with facilities to connect a hand pump.

Technical Specifications

Attributes	Values
Box Dimensions	1000 x 500 x 1670 mm
U-Tube Manometer	300-0-300 (Mercury Filled)
Orifice Diameter	16 mm
Variable Area Meter	0-60 LPM
Venturi Meter	Throat Diameter 16 +/- 1 mm
Sump Tank Capacity	75 liters
MOC of Sump Tank	SS-304 with Matt Buffing
Volumetric Tank Capacity	40 liters
MOC of Volumetric Tank	SS-304 with Matt Buffing
Test Section	Made of Acrylic (One piece)
Stop Watch	Digital Stop Watch of 1/10 Second Accuracy
Water Circulating Pump	Motor 0.5 HP, Mono Block Type, 0-60 LPM

Note: The instrument can also be supplied with dedicated data acquisition software & PC connectivity to acquire real time data (Computational Fluid Mechanics). (Optional)

Applications

- Design of aero-plane wings
- The carburetor used in many reciprocating engines
- Hydrofoil boat
- Bunsen burner
- Concept of racing cars
- Insecticide spray & many more
- To decide and to compare different flow meters

- Piping with necessary valves and fittings
- Digital stop watch with 1/10 second accuracy
- Detailed technical manual and on-site training

VIPL-FM 7012

Pitot Static Tube Apparatus

Purpose:

A Pitot tube is a pressure measurement instrument used to measure fluid flow velocity. The Pitot tube is used to measure the local velocity at a given point in the flow stream and not the average velocity in the pipe or conduit.

Construction:

Set up is self contained water re-circulating unit provided with sump tank and measuring tank. The Pitot static tube apparatus consists of two tubes called Stagnation pressure tube and the static pressure tube. The difference of pressure between two indicates the dynamic pressure, which is a measure of the velocity of the flow. Pitot and Actual velocities are calculated to find out calibration factor CV. The apparatus has clear perspex channel helping students understand theoretical concept. Flow control valve and by pass valve are fitted in flow line to conduct experiment on different flow rates. Flow rate is measured with the help of stop watch and measuring tank.

Technical Specifications

Attributes	Values
Pitot Tubes	Static and Stagnation Pressure tubes
Acrylic Pipe Section	25 mm ID
Input Tank	150 X 150 X 500 mm
Material of Test Section	Perspex
Sump Tank Capacity	75 Liters
MOC of Sump Tank	SS-304 with Matt Buffing
Volumetric Tank Capacity	40 Liters
MOC of Volumetric Tank	SS-304 with Matt Buffing
Stop Watch	Digital Stop Watch of 1/10 Accuracy
Water Circulating Pump	Motor 0.5 Mono Block Type, 0-60 LPM

Note: The instrument can also be supplied with dedicated data acquisition software & PC connectivity to acquire real time data (Computational Fluid Mechanics). (Optional)

Applications

- To determine the airspeed of an aircraft
- To determine the water speed of a boat
- And to measure liquid, air and gas velocities in industrial applications.

- Piping with necessary valves and fittings
- Digital stop watch with 1/10 second accuracy
- Detailed technical manual and on-site training

VIPL-FM 7013

Impact of Jet Apparatus

Purpose

To measure the force developed by a jet of water impinging upon a stationary object & comparison with the forces predicted by the momentum theory.

Construction

The complete unit comprises of a test bench with sump tank and measuring tank. Flow control valve and by pass valve are fitted in flow line to conduct experiment on different flow rates. flow rate is measured with the help of stop watch and measuring tank. The impact of jet apparatus consists of clear acrylic test cylinder, into which water is fed vertically through a nozzle and discharged vertically to strike a target carried on a stem which extends through the cover. A weight carrier is mounted on the upper end of the stem. A dead weight of the moving part is counter balanced by a Variable moving weights. The vertical force exerted on the target plate is measured by adding the weight supplied to the weight pan until the mark on the weight pan corresponded to the level gauge. A total of two targets are provided-flat plate and hemispherical.

Technical Specifications

Attributes	Values
Box Dimensions	1000 x 500 x1700 mm
Nozzle	8 mm & 10 mm
Target Plate	Flat Plate, Hemisphere Plate
Material of Test Section	Perspex
Sump Tank Capacity	75 liters
MOC	SS-304 with Matt Buffing (Sump & Volumetric Tank)
Volumetric Tank Capacity	40 liters
Test Section	Made of Acrylic (One piece)
Stop Watch	Digital Stop Watch of 1/10 Second Accuracy
Water Circulating Pump	Motor 0.5 HP, Mono Block type, 0-60 LPM

Note: The instrument can also be supplied with dedicated data acquisition software & PC connectivity to acquire real time data (Computational Fluid Mechanics). (Optional)

Applications

- Application of the momentum equation.
- In designing water turbine-especially peloton wheel.
- In deciding and generating maximum output of peloton turbine for high efficiency.

- Piping with necessary valves and fittings
- Digital stop watch with 1/10 second accuracy
- Detailed technical manual and on-site training

VIPL-FM 7014

Free and Force Vortex Apparatus

Purpose:

The spiraling motion of air or liquid around a center of rotation or vortex is an important natural phenomenon. The behavior study of vortex helps us understand electromagnetic fields, whirlpool, tornado and drag induced in Sail or Aircraft.

Construction:

The complete unit comprises of a test bench with Sump tank and Measuring tank. Flow control valve and by pass valve are fitted in flow line to conduct experiment on different flow rates. Flow rate is measured with the help of stop watch and measuring tank. The apparatus consists of a transparent cylindrical tank having a hole in the center of the base to fix interchangeable push-in orifices while conducting free vortex experiments. The cylinder is mounted on a base plate having leveling screws. The free vortex is generated by discharging water from the tank through the orifice in the base. Forced vortex is generated with the help of external DC motor where as free vortex can be studied by placing different diameter orifice at discharge to tank.

Technical Specifications

Attributes	Values
Box dimensions	800 x 400 x 1500 mm
Revolving Tank Dia.	250 mm
Revolving Tank Control Mechanism	DC Motor with Thyristor Drive
Speed indication	RPM Indicator with Proxy
No. of Orifices	2 Nos. (10 mm & 12 mm)
Material of Test Section	Perspex
Sump Tank Capacity	75 Liters
MOC of Sump Tank	SS-304 with Matt Buffing
Volumetric Tank Capacity	40 Liters
MOC of Volumetric Tank	SS-304 with Matt Buffing
Stop Watch	Digital Stop Watch
Water Circulating Pump	Motor 0.5 HP, Mono Block type, 0-60 LPM

Note: The instrument can also be supplied with dedicated data acquisition software & PC connectivity to acquire real time data (Computational Fluid Mechanics). (Optional)

Applications

- To study and understanding Electromagnetic field, Tornado, Whirlpool etc.
- To determine the water speed of a boat.
- And to measure liquid, air and gas velocities in industrial applications.

- piping with necessary valves and fittings
- Digital stop watch with 1/10 second accuracy
- Detailed technical manual and on-site training

VIPL-FM 7015

Orifice & Mouthpiece Apparatus

Purpose

An orifice is an opening made in the side or bottom of tank, having a closed perimeter, through which the fluid may be discharged. A mouthpiece is a short tube fitted to a same size of circular opening provided in a tank so that fluid may discharge through it. Orifice and mouthpiece are used to measure the rate of flow of liquid. The apparatus is designed to measure the co-efficient of discharge of orifice and mouthpiece.

Construction

The setup consists of sump tank, centrifugal pump, constant head tank and measuring tank. The orifice or mouthpiece can be interchanged and experiment can be performed. Flow and level of water in level tank can be adjusted so that number of readings can be taken. Arrangement has been provided for measurement of X-Y coordinates of trajectory. Test orifices of different diameters and mouthpieces of different shapes are supplied with the system. The entire system is mounted on a sturdy steel frame.

Technical Specifications

Attributes	Values
Set of Orifice	8 mm & 10 mm Dia.
Set of Mouthpiece	10mm Dia. & 30 mm Length
X-Y Probe Trajectory	5 Nos. Trajectory Probes
Constant Head Tank	300 x 300 x 400 mm
MOC	Perspex
Volumetric tank capacity	40 liters
MOC of Constant Head Tank	SS - 304 with Matt Buffing
Sump Tank Capacity	75 liters
MOC of Sump Tank	SS-304 with Matt Buffing
Stop Watch	Digital Stop Watch
Water Circulating Pump	Motor 0.5 HP, Mono Block Type, 0-60 LPM

Note: The instrument can also be supplied with dedicated data acquisition software & PC connectivity to acquire real time data (Computational Fluid Mechanics). (Optional)

Applications

- Compressors
- Artesian Aquifer
- Fountain & Gardening application
- Automobiles engineering
- Industrial applications
- Research work

- Piping with necessary valves and fittings.
- Digital stop watch with 1/10 second accuracy.
- Detailed technical manual and on-site training.

VIPL-FM 7016

Hydraulic Jump Apparatus

Purpose

In definition form, "A hydraulic jump is a sudden dissipation of energy caused by a change from super-critical to sub-critical flow." The concept is very similar to sudden expansion in pipe flow, except that the hydraulic jump occurs in open channel flow.

The objective of this apparatus is:

1) To visualize the phenomena of hydraulic jump in a sluice gate.
2) To compare the upstream and downstream depth of flows from experimental data to theoretical data.
3) To determine the energy losses and power losses through hydraulic jump.

Construction

The setup consists of sump tank, centrifugal pump, constant head tank and measuring tank. The entire system is mounted on a sturdy steel frame. Flow control valve and by pass valve are fitted in flow line to conduct experiment on different flow rates. Flow rate is measured with the help of stop watch and measuring tank. The flow is established via a constant head tank. This is a simple source condition that enforces a constant elevation head of water in a reservoir be available to drive a flow. Setup creates a constant head tank by filling the head with water from a pump at a rate greater than the water flows out under the sluice gate.

Technical Specifications

Attributes	Values
Channel Size	1000 x 250 x 200 mm
Test section	One half meter transparent tank with sluice gate
MOC of Test Section	Acrylic
Volumetric tank capacity	40 liters
MOC of Constant Head Tank	SS-304 with matt buffing
Sump Tank Capacity	75 liters
MOC of Sump tank	SS-304 with matt buffing
Stop watch	Digital stop watch
Water Circulating Pump	Motor 0.5 HP, Mono block type, 0-60 LPM

Note: The instrument can also be supplied with dedicated data acquisition software & PC connectivity to acquire real time data (Computational Fluid Mechanics). (Optional)

Applications

- Dam & Spillway design

- Piping with necessary valves and fittings
- Digital stop watch with 1/10 second accuracy
- Detailed technical manual and on-site training

VIPL-FM 7017

Hydraulic Bench Apparatus

Purpose

The basic hydraulic bench is of volumetric type and has been designed to provide continuous and controlled supply of water to conduct various experiments using auxiliary modules in typical fluid mechanics and hydraulics laboratory. The unit is an ideal service unit for conducting student projects. Once filled, no external water supply is required. Water is recycled between the experiment module, measuring Tank and the storage tank by the centrifugal pump.

Construction

Water resistant Bakelite surface acts as a working surface for most of the experiments. Larger experiments usually stands next to the bench. Quick release coupling allows easy attachment & detachment of accessories. Suitable pipe connectors are provided in the bench top to enable easy change of experiment modules. Following experiments can be carried out with common basic table with separate experimental setup (supplied at extra cost).

- Bernoulli's theorem apparatus
- Losses in pipe fitting & pipe bends
- Venturi & Orifice meter apparatus
- Reynold's number study
- Impact of jet on vanes
- Orifice & Mouth piece apparatus
- Losses due to friction in pipe lines
- Pipe friction
- Flow over notches and weirs
- Pitot static tube

Technical Specifications

Attributes	Values
Size of Table	1000 x 500 x 1500 mm
U-Tube Manometer	300-0-300 (Mercury filled)
Inclined Tube Manometer	200-0-200 Inclined Limb
Orifice Diameter	16 mm
Sump tank capacity	160 - 180 liters
MOC of sump tank	SS - 304 with matt buffing
Volumetric Tank Capacity	50 liters (for large flow rates) &
	2 liters measuring cylinder (for small flow rates)
Bourdon type vacuum gauge	(0-760 MM 0F HG)
Stop watch	Digital stop watch of 1/10 second accuracy
Water Circulating Pump	Motor 0.5 HP, Mono block type, 0-60 LPM

Note: The instrument can also be supplied with dedicated data acquisition software & PC connectivity to acquire real time data (Computational Fluid Mechanics). (Optional)

Applications

- To study all fluid mechanics instrument at one go.
- Combined applications of all above decrypted experiments.

- Piping with necessary valves and fittings
- Digital stop watch with 1/10 second accuracy
- Detailed technical manual and on-site training

VIPL-FM 7018

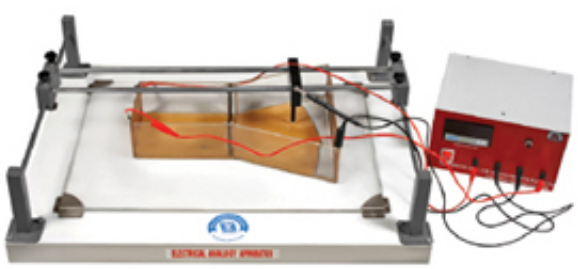
Electrical Analogy Apparatus

Purpose:

The apparatus is designed to study the actual behavior of fluid flow when an obstacle/ object is placed across its flow direction. Flow lines are observed and studied, as analogy of variation in electrical current, when fluid flow across the obstacle changes.

Construction:

The experimental setup consists of a transparent acrylic tray of 400-450 mm² area & 75 mm depth, fitted with copper conductors and Bakelite plates at two ends, which are connected with electric circuit. Water is poured in the tray such that the plates are slightly immersed in water. By adjusting the potential across the plates we can draw series of equipotential lines, where the galvanometer reads zero. A probe is mounted on a trolley, which can traverse in 2 planes to locate equipotential lines. X-Y Co-ordinate of the probe at each point can be located on the scale fitted on the cross slide. The exterior body of the entire unit is powder coated in attractive shades. necessary potential to the circuit can be provided with analogue field plotter.



Note: The instrument can also be supplied with dedicated data acquisition software & PC connectivity to acquire real time data (Computational Fluid Mechanics). (Optional)

VIPL-FM 7019

Big Notch Apparatus

Purpose:

A weir or a notch is a barrier across a fluid path designed to alter its flow characteristics. Weirs are commonly used to alter the flow of rivers to prevent flooding, measure discharge, and help render rivers navigable. This experimental set up mallow hydrologists and engineers a simple method measuring the volumetric flow rate in small to medium-sized streams, or in industrial discharge location.

Construction:

The lab set up consist of channel having sufficient length and width in which water is supplied from the bottom. Required notch is fitted at one end of this channel. A hook gauge with vernier scale is fitted to measure the height of the fluid in flow channel. Arrangement for fixing interchangeable notch is also made. Set up is self contained water re-circulating unit provided with sump tank and measuring tank. Flow control valve and by pass valve are fitted in flow line to conduct experiment on different flow rates. Flow rate is measured with the help of stop watch and measuring tank. The entire system is mounted on a sturdy steel frame.

Technical Specifications

Attributes	Values
Size of Table	3000 x 1500 x 2000 mm
Size of Channel	2500 x 500 x 350 (LxWxH) mm
Notches	V-Notch, Rectangular Notch, Trapezoidal Notch,
	Sharp Crested Weir, Broad Crested Weir, Ogeesweir
Material of Notch	Stainless Steel
Sump Tank Capacity	1000 liter of Sintex or Other similar make
MOC PVC Volumetric Tank	40 Liters
MOC of Constant Head Tank	SS-304 with Matt Buffing
Discharge Flow Measurement	Using Rota Meter
Stop Watch	Digital Stop Watch
Water Circulating Pump	Motor 2 HP, Mono Block type, 0-60 LPM

Note: The instrument can also be supplied with dedicated data acquisition software & PC connectivity to acquire real time data (Computational Fluid Mechanics). (Optional)

Applications

- Measuring volumetric flow rate in small to medium water streams.
- Measuring volumetric flow rate in industrial discharge locations.
- Application in studying and altering the river path thereby preventing floods.
- Application in industrial dams.

- Piping with necessary valves and fittings
- Digital stop watch with 1/10 second accuracy
- Detailed technical manual and on-site training

VIPL-FM 7020

Hydraulic Flume Apparatus (Tilting Flume Apparatus)

Purpose:

This flow channel and flume apparatus has been designed for students to study the principles of fluid mechanics pertaining to engineering structures in open channel flow. The flume acts as a base unit offering wide-range of experiments in connection with open flumes such as flow over weirs, flow over notches, flow through venturi flume, Hydraulic Jump, specific energy curve, velocity profiles, characteristic of waves, Open channel flow measurement etc.

Construction:

The complete unit comprises of a test bench with open flow channel, sump tank, centrifugal pump, point gauges and flow measuring devices. The set up consists of a tilting flume of 6 meter long, 25cm wide, 30cm deep with a stabilizing tank. For visual observation of flow pattern along the flume section, both sides of the flume will be provided with transparent Perspex sheet about 5meter long. The inlet section will be provided with 2 nos of baffles for streamline flow. The upstream and downstream sections will be provided with adjustable gates with rack and pinion arrangement. The instrument is accompanied with the following additional accessories.

Technical Specifications

Attributes	Values
Pointer Gauge	50 cm Long
Sump Tank Capacity	250 Liter
MOC of Sump Tank	Stainless Steel
MOC of Stabilizing Tank	Stainless Steel
MOC of Constant Head Tank	SS-304 with Matt Buffing
Discharge Flow Measurement	Using Rota Meter
Stop Watch	Digital Stop Watch
Water Circulating Pump	Motor 1 HP, Centrifugal Pump of 40x40 mm

Note: The instrument can also be supplied with dedicated data acquisition software & PC connectivity to acquire real time data (Computational Fluid Mechanics). (Optional)

Accessories

- Venturi Flume — Made of 1.5 mm thick brass sheet
- Spillway Gate — Made of 1.5 mm thick brass sheet
- Broad Crested Weir — Made of 3.0 mm thick brass sheet
- Rectangular Notch — Made of 3.0 mm thick brass sheet
- V-Notch of 90 — Made of 3.0 mm thick brass sheet
- Water Current Meter — Pigmy Cup type

The channel is also provided with pipe lining in full length between the gates for the movement of pointer gauge trolley. A pointer gauge 50 cm long is provided to measure the head of water over the model. The trolley is supported on four wheels for easy running of the railing. The channel on its one end having screw mechanical jack and hinged at the other end to giver slope of 2% in upstream and downstream. Discharge of water can be collected by the help of calibrated Orifice meter. 'U' tube manometer is provided to find out pressure difference on the Orifice meter. Rota meter of 0-50 LPM also given for measuring discharge.

VIPL-FM 7021

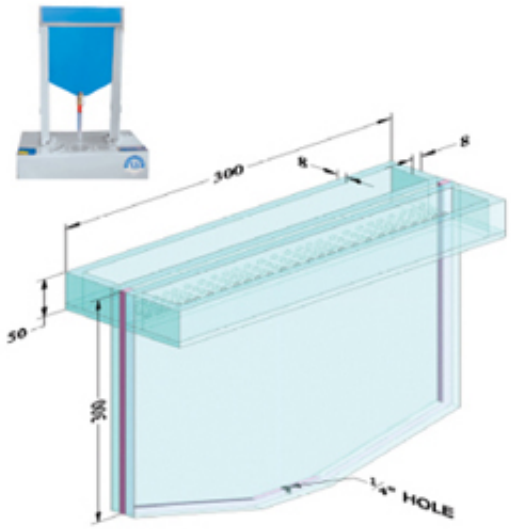
Heleshaw Apparatus (Flow Visualization Apparatus)

Purpose

Flow visualization apparatus is used to study quantitative flow patterns. Heleshaw apparatus simulates streamline of two dimensional flow. It allows students to study various source and sink arrangements and to analyze the flow pattern around unlimited variety of different shaped two dimensional models.

Construction

The setup consists of two closely spaced parallel, transparent, flat plates. The distance between these two plates are not more than 5mm. One of the flat plate being an inlet source of water and the other being an inlet source of ink. Both the reservoir tanks are equipped with several small holes at facing walls to produce streamline flow. These holes open in a vertical channel where the model can be placed to visualize the flow patterns. Hence, a student can visualize various flow pattens across the object. The generated flow pattern is almost stream lines (Laminar) which do not change direction or intermix. The apparatus comes with an Acrylic sheet from which various shapes of models are being produced.



Technical Specifications

Attributes	Values
Box Dimensions	500 x 150 x 500mm (L x W x H)
Test Sections	Made of Transparent Acrylic material
Two Dimensional Test Models	Round Fection
	Aerofoil Section
	Square Section
	Triangular Section
Stand Material	Mild Steel (M.S.)
Stop Watch	Digital Stop Watch

Note: The instrument can also be supplied with dedicated data acquisition software & PC connectivity to acquire real time data (Computational Fluid Mechanics). (Optional)

Applications

- Used as research model for ground-water study and analysis process
- Used in analysis of tidal fluctuations
- Used for analysis of Sea water intrusion
- To find the problems in wave movements
- To investigate seepage of saline water in lowlands

- Piping with necessary Valves and Fittings
- Digital Stop Watch with 1/10 second Accuracy
- Detailed Technical Manual and On-site Training

VIPL-FM 7022

Rota Meter Test Rig

Purpose:

An rota meter is a differential pressure flow meter which reduces the flow area using an orifice plate. Rota meter used to measure the rate of flow of liquid. The apparatus is designed to measure the co-efficient of discharge (Cd) using Rota meter the trainer is self-sufficient unit to study the calibration & characteristics of the Rota meter.

Construction:

The setup consists of sump tank, pump, rota meter & measuring tank. The entire system is mounted on a sturdy MS frame. The apparatus consists of a pipeline containing a rota meter. By operating the valves, provided at the downstream side, the flow can be regulated. Present set-up is self-contained water re-circulating unit. Flow control valve and by-pass valve are fitted in water line to conduct the experiment.

Technical Specifications

Attributes	Values
Box Dimensions	1000 x 500 x 1670 mm (LxWxH)
Rota Meter	0-50 LPM
MOC of Rota Meter	Transparent Perspex
Measuring Tank Capacity	40 Liters
MOC of Measuring Tank	SS-304 with Matt Buffing
Sump Tank Capacity	75 Liters
MOC of Sump Tank	SS-304 with Matt Buffing
Stop Watch	Digital Stop Watch
Water Circulating Pump	Motor 0.5 HP, Mono Block type, 0-60 LPM

Note: The instrument can also be supplied with dedicated data acquisition software & PC connectivity to acquire real time data (Computational Fluid Mechanics). (Optional)

Applications

- Industries
- Artesian Aquifer
- Fountain & Gardening application
- Automobiles engineering
- Industrial applications
- Research work

- Piping with necessary valves and fittings
- Digital stop watch with 1/10 second accuracy
- Detailed technical manual and on-site training

Our Other Products

Fluid Power Instruments



- Centrifugal Pump Test Rig
- Reciprocating Pump Test Rig
- Hydraulic Ram Test Rig
- Wind Tunnel
- Francis Turbine Test Rig
- Kaplan Turbine Test Rig
- Pelton Turbine Test Rig
- Tilting Flume Apparatus

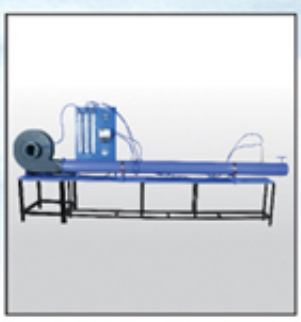
Heat & Mass Transfer Lab



- Thermal Conductivity of Metal Rod
- Heat Transfer by Natural Convection
- Heat Transfer by Forced Convection
- Stefan Boltzman Apparatus
- Thermal Conductivity of Liquid
- Thermal Conductivity of Insulating Powder
- Drop Wise and Film Wise Condensation
- Lagged Pipe Apparatus
- Heat Pipe Demonstrator Apparatus
- Pool Boiling Apparatus
- Finned Tube Heat Exchanger
- Critical Heat Flux Apparatus

Thermodynamic Lab





- Rotary Air Compressor Test Rig
- Two Stage Two Cylinder Reciprocating Air Compressor Test Rig
- Centrifugal Air Blower Test Rig

Refrigeration and Air Conditioning Lab



- Refrigeration Test Rig
- Cascaded Refrigeration Cycel Test Rig
- Computerized Refrigertion Test Rig
- Air Conditioning Test Rig
- Vapour Absorption Test Rig
- Cooling Tower Test Rig
- Display Board (Components used in Rac)
- Vapour Absorption Refrigeration Test Rig
- Window Air Conditioning Test Rig
- Ice Plant Test Rig
- Water Cooler Test Rig
- Domestic Refrigerator

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