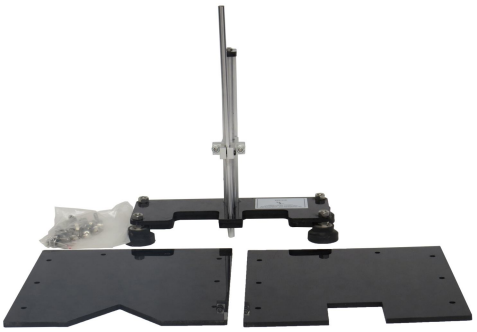
Fluid Mechanics Lab Equipment 1-Basic Fluid Mechanics Principle

ZM7104 Venturimeter, Orifice plate, Rotameter Flow Measure

Technical data: Orifice plate flow meter**,** Rotameter max. 1700L/h**,** 6 tube manometers , Weight approx. 30kg, **Related Experiment :** flow measurement with * orifice plate flow meter and measuring nozzle**,** * Venturi nozzle**,** * rotameter pressure measurement with Pitot tube, comparison of different instruments for flow measurement, determining the corresponding flow coefficients, calibrating measuring instruments,

Remark don't equip with water source, if you want water source, price will be recalculated.

ZM7105 Over Weirs Flow Measuring



Technical data: Weirs ,material PVC, self sealing, rectangular profile, LxW of the section approx. 60mm section approx. 50mm LxWxH approx. 230x190x8mm (weir) LxWxH approx. 290x190x290mm (level gauge) Weight approx. 4kg (total), **Related experiment:** free overfall at the sharp crested weir plate weirs as measuring weirs * determining the discharge Coefficient, * comparison of measuring weirs (Rehbock, homson), determining the discharge, comparison of theoretical and measured discharge

ZM7106 Temperature Measurement Tools

Technical data: Immersion heater**,** power output approx. 300W adjustment of power feed via power regulated socket, Laboratory heater with thermostat power output approx. 450W max. temperature 450°C, Vacuum flask 1L, **Related experiment:** learning the fundamentals of temperature measurement by experimentation familiarisation with the various methods, application and special features * nonelectrical methods

liquid filled hermometers, bimetallic thermometers and temperature measuring strips, * electric methods thermocouple, esistance temperature detector Pt100, thermistor (NTC) determining air humidity with a psychrometer, calibrating electric temperature sensors

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ZM7107 Pressure Measurement Pressure Gauges

Technical data

Calibration device with Bourdon tube pressure gauge for calibrating mechanical manometers included in the scope of delivery Inclined tube manometer angle 30°,Measuring ranges: Bourdon tube pressure gauge,0...60mbar / 60...0mbar, U tube, manometer...500mmWC,inclined tube manometer 0...500mmWC,Weight approx. 25kg,

Related experiment familiarisation with 2 different measuring methods, direct method with U tube manometer and inclined tube manometer, indirect principle of a Bourdon tube pressure gauge in conjunction with the calibration device included in the method with Bourdon tube pressure gauge,

the calibration device included in the method with Bourdon tube pressure gauge, principle of a Bourdon tube pressure gauge in conjunction with the calibration device included in the scope of delivery calibrating mechanical manometers

ZM7109 Hydrostatic Pressure in Liquids

Technical data

Water tank

inclination angle 0°...90°,content 0...1,8L, scale 0...250mm, effective area, max. 75x100mm, Lever arm, max. length 250mm

Dimensions (approx.) LxWxH 400x500x450 mm, Weight approx. 12kg

Related experiment

pressure distribution along an effective area in a liquid at rest

lateral force of the hydrostatic pressure, determination of the centre of pressure and centre of area determination of the resulting compressive force

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ZM7110 Osborne Reynolds Experiment Apparatus

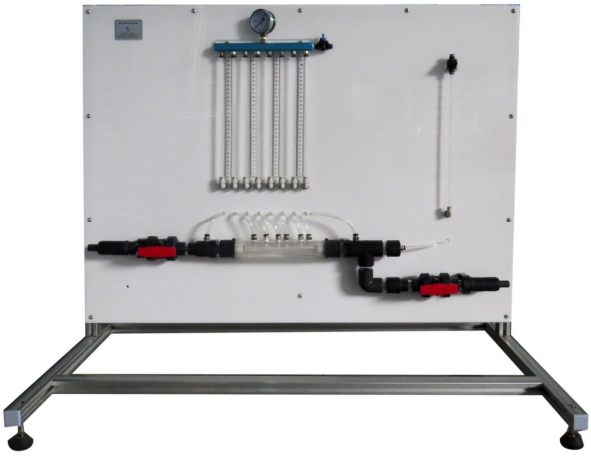
Technical data

1. Self circulation water feeder
2. 2. Experiment bench
3. Silicon controlled stepless adjustor
4. 4. Constant pressure water tank
5. Color indicated water tank,
6. Orifice plate for stable water
7. overflow plate
8. Experiment tube
9. Experiment flow adjust valve, Weight 25kgs

Related experiment

visualisation of laminar flow, visualisation of the transition zone, visualisation of turbulent flow, determination of the critical Reynolds number

ZM7111 Bernoulli's Principle Demonstration Apparatus



Technical data

Venturi nozzle, A 84...338mm², angle at the inlet 10,5°,angle at the outlet 4°

Pitot tube

movable range 0...200mm, diameter 4mm

Pipes and pipe connectors PVC, Remark don't contain water source, if you add water source, the price will be changed.

Related experiment

investigation of the continuity equation and Bernoulli's principle

determination of the dynamic pressure from the measurement data via Bernoulli's principle

calculation of the flow velocity from the

measurement data using Bernoulli's equation

pressure and velocity distribution

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ZM7112 Measurement of Jet Forces

Technical data: Tank**,** inner diameter approx. 200mm height approx. 340mm, Nozzle, diameter approx.10mm
Deflector: flat surface 90°**,** oblique surface 45°/135° semicircular surface 180°, conical surface 135°
Weight approx. 23kg, Remark don't contain water source, if add water source, price will change, visualisation of turbulent flow, determination of the critical Reynolds number
Related experiment
demonstration of the principle of linear momentum study of the jet forces
influence of flow rate and flow velocity
influence of different deflection angles

ZM7113 Horizontal Flow From A Tank(Orifice Free Jet Flow Unit)

Technical data
Tank, contents approx. 13,5L
Inserts with rounded contour (approx.)
1x diameter 4mm; 1x diameter 8mm
Inserts with square contour
1x diameter 4mm; 1x diameter 8mm; Point gauge,
8 movable rods
length approx. 350mm

Dimensions
Weight approx. 27kg, Remark don't contain water source, if add water source, price will change.
Related experiment recording the trajectory of the water jet at different, outlet velocities study of how the level in the tank affects the outlet velocity, determination of the contraction coefficient for different contours and diameters comparison of the actual and theoretical outlet velocity

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ZM7114 Vertical Flow From A Tank Measurement

Technical data

Tank; contents approx. 13L; overflow height max. 400mm;max. flow rate 14L/min; Inserts, 1x cylindrical hole, d=12mm, 1x outlet from the insert cone, d1=24mm, d2=12mm, pressure 500mmWC

Related experiment

study of the outlet jet (diameter, velocity), determination of pressure losses and contraction coefficient for different outlet contours, determination of flow rate at different discharge heads

ZM7115 Energy Losses in Piping System

Technical data: Pipe section thold fittings or measuring objects , PVC;Pipe sections, PVC sudden contraction, PVC; sudden enlargement PVC;with 2x Ypiece 45° and 2x Tpiece; with 2x 90° elbow/bend d=20x1,5mm, PVC and 2x 45° elbow d=20x1,5mm, PVC, 2x twin tube manometers 0...1000mmWC Weight approx. 58kg pressure losses in pipes, piping elements and fittings, how the flow velocity affects the pressure loss determining resistance coefficients, opening characteristics of angle seat valve and gate valve

ZM7118 Free and Forced Vortices

The Experiment Performed on the Basic Hydraulic Bench, Cylinder Clear Acrylic, Tank diameter245 mm, Overflow height180mm,Orifice Daimeters 8, 16 and 24mm, Measuring Guage, Reservoir Centre0,30, 50, 70, 90, and 110mm form centre, Pitot Tube, Length150mm, Pitot tube nose at15, 25 and 30 mm radius, Inlet tubes 9 and 12.5 mm diameter **Experimental Capabilities:** Study the difference free and forced vortices, To Investigate the surface profile of a forced vortex *Tin vestigate the surface profile and total head distribution of a free vortex, Observation of secondary flow in free vortex

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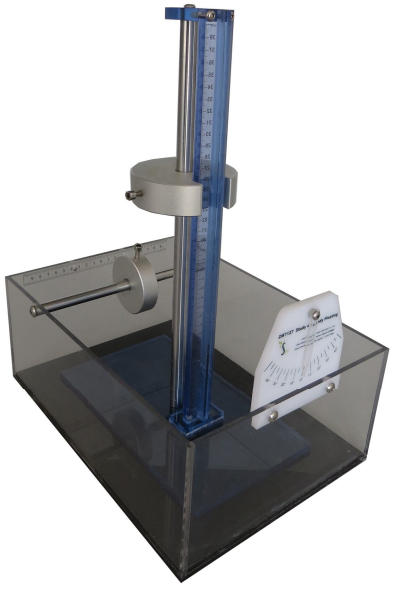
ZM7127 Study Of A Body Floating



The device will allow the study of the stability of a body as a floating vessel at the surface free liquid. It will allow study the stability of a pontoon height and horizontal position of its center of gravity **The bench should allow the following educational farms:** Study of the influence of the height of center of gravity**,** Study of the influence of the horizontal position of the center of gravity, Comparison between experimental measurements and theory, Calculation of the heel angle depending on the position of center of gravity, Research into the behavior of a partially sunken ship. **Required Specifications:** 1 water tank molded plastic 610 x 406 x 127 mm**,** 1 pontoon thin sheet metal, rectangular, weighted and equipped with a mast**,** useful Mast height 266 mm mobile pontoon weight 200 g; adjustable weight of the mast 500g**,** inclination angle 8°teach side relative the vertical Graduation by 1/2 degree, 1 lead wire connected to mast

ZF1123A Fluid Mechanics Trainer

Specification: [1] trainer for fluid mechanics experiments[2] interchangeable measuring objects, partly transparent angle seat valve, diaphragm valve, ball valve, nonreturn valve, strainer, Pitot tube, Venturi nozzle, orifice plate flow meter and measuring nozzle[3] different pipe sections[4] annular chambers allow precise measurement of pressure[5] tube manometer for measuring the differential pressure [6] flow measurement using rotameter[7] digital displays for pressure and differential pressure

Technical Data: Pump**,** power consumption 0,68kW**,** max. flow rate 7,2m³/h**,** max. head 22,8m
Storage tank 55L, Pipe section for interchangeable measuring objects, 32x1,8mm, PVC
3 straight pipe sections, length 1000mm, ½", St, galvanised, 18x1mm, Cu, 20x1,5mm, PVC
Pipe section, PVC, gradual contraction, diameter 20x1,516x1,2mm, gradual enlargement, diameter 20x1,532x1,8mm, with 90° pipe angle/ pipe bend, diameter 20x1,5mm, Tube manometer 2x 2 tubes, 1x 6 tubes, Measuring ranges differential pressure 0...200mbar, pressure 6x 0...600mbar, flow rate 0,4...4m³/h, temperature 0...60°C

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ZM7124A Cavitation Demonstration Unit

Specification: A small scale apparatus designed to demonstrate Cavitation using a Hydraulics Bench. The apparatus consists of a circular Venturi shaped section manufactured from clear acrylic. Three Bourdon gauges indicate the static pressure upstream of the contraction, inside the throat and downstream of the expansion. **Technical Details:** Upstream pressure gauge 63mm diameter, Range 0 t1 Bar, Throat vacuum gauge 100mm diameter, Range 1 to 0 Bar, Downstream pressure gauge 63mm diameter, Range 0 1 Bar, Can be operated independently from the Hydraulics Bench for visualisation only using a cold water mains supply with 0.4 litres/sec at 2 Bar gauge.

Dimensions (approx.) LxWxH 700x400x930mm Max. 30kg

ZM7136 Series and Parallel Pumps

Centrifugal pump0.37KW,3080l./min at 20.112.8m. single phase, 220V/50Hz or 110V/60 Hz. Absolute pressure manometer placed at the pump admission, range 1 t3bar.; Manometers (manometric pressure), one of them placed in the discharge and another one in the discharge accessory, range 0 4 bar. Membrane valve for flow regulating. Two way valve 2 positions open or close. Screws, nuts, plates and Discharge accessory. Easy and quick coupling system builtin. Aluminum structure.

all the metallic elements in stainless steel or aluminum. Diagram in the front panel with similar distribution to the elements in the real unit. Quick connections for adaptation to feed hydraulics source.

Accessories: flexible pipes with quick connections. Reinforced pipe with quick connections.

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ZM7128 Hydrostatic Bench and It Accessories

This product is used in experiments in the field of hydrostatics to analyze phenomena caused by hydrostatic pressure and to determine the effects of stress. Universal Hydrometer, Range 0.70 to 2.00 subdivided in 0.01 intervals, Falling sphere viscometer40mm tube diameter, 10 to 850st. Hydrostatic pressure apparatus comprises counter balanced precision quadrant pivoted on knife edges at its centre of arc, Direct Reading Aneroid barometer Scale Range 954 1073 mbar, Thermometer Includes, Dead weight pressure gauge calibrator with 2 x 1/2 kg, 1kg, and 2 1/2 kg weights, Triple Beam Balance 02610g± 0.1g, 178mm Diameter Pan, Vernier Hook Gauge for use in Buouyance Experiments, Thermometer range 10° C t+50° C, Water manometer 0 t500 mm.; manometer 0 t500 mm, Hygrometer 10 100% RH, Vernier hook gauge 0 t150 mm, ± 0.05 mm; Archimedes' apparatus; Pascal's Apparatus, Capillary attraction plates; Capillary tubes3 Unit; Capillary viscometer2 t10 Cst, Specific gravity bottle 0 t25ml; Beakers, containers and Pipetteeach 2 nos; Metacentric height Apparatus , Storage Tank100L; Circulation Pump40 LPM @ 2M Head; Full Experimental Manuals; Height1.50M; Length1.80M; Width0.60M

ZM7125 Pipe Friction for Laminar / Turbulent Flow

Technical Data: Pipe section length 400mm, inside diameter 3mm
Tank 5L, Measuring ranges differential pressure (twin tube manometer) 2x 370mm WC, differential pressure (dialgauge manometer)0...0,4 bar
Specification: [1] investigation of the pipe friction in laminar or turbulent flow, [2] transparent tank with overflow ensures constant water inlet pressure in the pipe section for experiments with laminar flow; [3] water supply via or via laboratory supply for experiments with turbulent flow; [4] flow rate adjustment via valves

[5] twin tube manometer for measurements in laminar flow; [6] dialgauge manometer for measurements in turbulent flow; [7] flow rate determined by base module;
[8] water supply using base module or via laboratory supply

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ZM7129 Flow Visualization In Channels Module

Bench top open channel unit designed to conduct experiments related to open channel flows and to visualize stream line patterns over or around various objects. The system should consist of a clear acrylic flow channel having large width to depth ratio. Overshot and undershot weirs should be provided at the inlet and exit of the channel section. The channel section should have a bell mouth entry to reduce flow disturbances. The water flow rate can be varied using a membrane type flow control valve fixed at the exit of the flow

Experiments: 1. Study of open channel flows; 2. Study of flow over weirs over shot and under shot weirs, broad and narrow crested weirs. 3. Familiarization with water flow visualization technique.;4. Demonstration of laminar and turbulent flow.;5. Study of streamline patterns around cylinders at different Reynolds numbers. 6. Study of streamline patterns around airfoils with and without flap and various incidences. 7. Study of flow pattern around hump, disc, cuboid etc.;8. Study of vortex shedding from cylinders and bluff bodies.;9. Comparison of observed streamline patterns with theory.

Specifications: 1. Flow visualization channel with bell mouth entry, 650mm length, 20mm width and 140mm height, transparent, made of clear acrylic. 2. Supply tank with glass beads, 20 liters capacity.;3. Dye injection system, 0.5 liters reservoir capacity, 5 dye injection needles with needle valves at exit. 4. Depth gauge. 0 150mm range.;5. Model fixture.;6. Models over shot weir, under shot weir, broad crested weir, sharp crested weir, hump, small cylinder, large cylinder, symmetrical airfoil, symmetrical airfoil with flap, unsymmetrical airfoil, wing, disc and cuboid 7. Computer based learning software. Electrical Supply, 240 V, single phase, 50 Hz. Overall Dimensions approx. (HxWxL) 0.75x 0.50x0.90m

ZM2108B Energy Losses in Bends and Fittings

This product is used for fluid energy loss studies. It can study the energy loss when fluid flows through elbows of different angles and pipes of different diameters. The pipe network has a 90° elbow, a 45° elbow and a ball valve, and has a suddenly enlarged pipe. The differential pressure gauge is used to measure the energy loss on both sides of the ball valve when the fluid flows through the ball valve.

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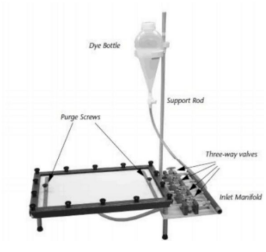
ZM7139 Basic Hydraulics Bench

1.This equipment is the basic module for fluid mechanics, it is used for supplying water source, measuring experiment platform. Allows different experiment section in fluid mechanics. Basic module supplied basic experiment equipment close circle water supply, volume flow, positioning experiment measurement to basic work module working area and collecting drop. Close type water cycle contains a strong function submersible pump and measuring tank. 2.The top working surface makes set easy to position safety. 1).When doing experiment, put this experiment module the top of experiment equipment, prevent water flow to other place, connect outlet and testing equipment inlet by soft tube. And fasten tube, savoid leakage of water. 2).First turn on decompression valve fully, turn off stop valve, power off pump, according to different experiment module, adjust the switch of decompression valve and stop valve, adjust different pressure, different flow meet experiment module water supply requirement.

ZM2108 Hydraulics Bench

Screws, nuts, plates and all the metallic elements in stainless steel. Diagram in the front panel with similar distribution tthe elements in the real unit. Quick connections for adaptation tfeed hydraulics source. Mobile hydraulic bench and mounted on wheels for mobility. Centrifugal pump, 0.37 KW, 3080 l/min at 20.112.8 m. , single phase 220V./50Hz or 110V./60Hz. Runner made in stainless steel. Sump tank capacity 165 L. Small channel 8 L. Flow measurement volumetric tank, gauged from 0 to 7 L. for low flow values and from 0 to 40 L. for high flow values. Control valve for regulating the flow. Open channel place the test module. Measuring cylinder is provided for the measurement of small flow rates. Remote hand operating dump valve in the base of the volumetric tank. Rapidity and ease for interchanging of the different modules. Dimensions 1130 x 730 x 1000 mm. approx. Weight 70 Kg. approx.

ZM8125 Heleshaw Apparatus



This must be realized study and demonstrate potential flow.
It must include a test channel where different rubber models can be pressured between two plates. Several rubber models, such as circular, rectangle and acrofoil, must be included in the basic unit. The upper glass plate must be mobile in order models. The lower one contains small hoses be connected water source or water sink. Streamlines around test models must be clearly shown by using a regulated flow of dye solution.

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ZM2165 Pelton Turbine Experiment Kit

The turbine is the use of hydraulic turbines. Impact of water turbine is a new kind of impulse turbine; Water jet nozzle in accelerated projected impact turbine blade tangential directly. The impact of the water jet is passed the impact of water turbine. This is a pelton turbine demimpact the function of the water turbine model. The impact of the experimental unit of water turbine, needle mouth as water source of power, a pelton turbine and a transparent shell band brake on the front panel. Transparent cover to observe the impact of the water turbine, in the process of operation, through the nozzle adjusting handle to change the nozzle cross section, adjust the flow of the nozzle needle to adjust. Turbine torque is determined by a belt brake force measurement, is reading in a spring balance. Pressure gauge shows the turbine inlet pressure. Experiment equipment installation convenience, interface with 3/4 "inner connection interface, connected water supply system

Learning goals/experiment: a pelton turbine design and function**,** Determination of the torque, power and efficiency**,** Graphical representation of the characteristic curve**,** Torque, power and efficiency

ZM8127 Losses in Pipe Systems and Fittings

The turbine is the use of hydraulic turbines. Impact of water turbine is a new kind of impulse turbine; The turbine will be the water pressure can be transformed into kinetic energy completely determined by the dealer. In the process of transformation, water jet nozzle in accelerated projected impact turbine blade tangential directly. The impact of the water jet is passed the impact of water turbine. This is a pelton turbine impact the function of the water turbine model.

Panel for the demonstration and visualization of friction loss, Investigation of the friction loss in pipe constrictions, elbows, bends, fittings, 13tube manometer, Circulating pump, 3 stages, max. 60W 13tube manometer 1600mmWC , Flow rate measuring range 0...1000ltr/h, Supply tank approx. 5ltr Circulating pump, Max. flow rate 60ltr/min, Max. head 4m, Pipe diameter 19.48mm, Differential pressure gauge 0 t1.4bar, Enlargement diameter 26.2mm, Contraction diameter 19.48mm, Fittings 45° mitre, 90°elbow, short bend, large bend, enlargement, contraction, Manometer range 0 t440mm, Number of manometer tubes 12, Flow rate measuring range 0...1000ltr/h

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ZM8111 Properties Offluids and Hydrostatics Bench

1.Profile : This product is used in experiments in the field of hydrostatics tanalyze phenomena caused by hydrostatic pressure and tdetermine the effect of force. The device is used tstudy the total hydrostatic pressure, ie the total pressure at which a stationary liquid acts on a plane or curved surface in contact with it.

2.Experiment principle : The total hydrostatic pressure P acting on the plane of any shape is equal tthe product of the pressure of the plane centroid and the plane area A. That is P=pcA.

The total hydrostatic pressure on the rectangular plane is equal tthe volume of the pressure profile.

ZM8141 Dead Weight Pressure Gauge Calibrator

Bourdon type pressure gauge on the same principle adopted in calibrating industrial pressure gauges. **Technical data:** Precision machined piston and cylinder with leveling screws, Bourdon gauge with inlet and outlet valves, Set of weights, This calibrator functions on the same principle adopted in calibrating industrial pressure gauges. **DEMONSTRATION CAPABILITIES:** Calibrating a Bourdon type pressure gauge, TECHNICAL DETAILS, Pressure gauge Bourdon tube range 0 to 200 KN/m2 (KPa),

Area of Piston244.8 x 106 m2, Mass of piston0.5kg, Ancillary masses2X0.5kg, 1.0kg and 2.5kg

ZM8148 Orifice Discharge Apparatus

Purpose Tenable students to conduct full analysis of the flow through five different orifices over a range of flow rates. **Technical data:** Cylindrical glass tank with orifice fitted in base, Five interchangeable orifices, Pitot tube and knife edge to measure jet velocity and diameter Quick release fitting for easy connection the hydraulics bench The Orifice Discharge accessory enables full analysis of the flow through five different orifices over a range of flow rates. **Demonstration CAPABILITIES:** Determining the contraction and velocity coefficients, Calculating the discharge coefficient **TECHNICAL** discharge coefficient **TECHNICAL DETAIL:** Standard orifice sharp edged 13mm diameter, Max. head 365mm Traverse mechanism lead screw with adjusting nut calibrated 0.1mm per division

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ZM8147 Orifice and Free Jet Flow Apparatus

Purpose Tenable students demonstrate calibration of orifices of differing diameter and enables them the trajectory of the jet. **ORDERING SPECIFICATION:** Constant head tank with two inter changeable orifices, Quick release fitting for easy connection hydraulics bench, Jet trajectory measured and plotted using adjustable pointers. **MEASUREMENT CAPABILITIES:** Establishing the coefficient of velocity for a small orifice. Finding experimentally the coefficient of discharge for a small orifice with flow under constant head and flow under varying head. Comparing the measured trajectory of a jet with that predicted by simple theory of mechanics **TECHNICAL DETAIL:** Orifice diameters 3.0mm and 6.0mm, Jet trajectory probes 8, Max. constant head 410mm

ZM8152 Flow Meter Demonstration Apparatus

Purpose Tenable students to introduce the three types of flow meters. **ORDERING SPECIFICATION:** Venturi meter, variable area meter and orifice plate with control valve**,** Pressure to measure head loss from each meter**,** Supplied with manometer board with eight tubes**,** Quick release fitting for easy connection to hydraulics bench**,** This accessory is designed to introduce students to three basic types of flow meter.

DEMONSTRATION CAPABILITIES: Directly comparing flow measurement using a Venturi meter, variable area meter and orifice plate**,** Calibrating each flow meter using the volumetric measuring tank of the bench**,** Comparing pressure drops across each device

TECHNICAL DETAIL: Manometer range 0 to 400mm; Number of manometer tubes 8; Orifice plate diameter 20mm**,** Variable area meter 2 t20 litres/min; Venturi dimensions; Throat diameter 15mm Upstream pipe diameter 31.75mm; Upstream taper 210 inclusive; Downstream taper 140 inclusive

ZM8165 Pipe Network

An important task in the construction of pipelines is determine the pressure and flow rate in complex piping systems. In practice, the calculation of the total pressure losses serves as a foundation for the design of suitable drive units for heating and air conditioning systems, drinking water supply systems and parts of wastewater systems. Knowledge of pressure losses is alsused optimize operation. It enables the construction and investigation of various pipe networks, such as parallel and series connections of pipes, their

It enables the construction and investigation of various pipe networks, such as parallel and series connections of pipes, their branching and merging, and the study of individual pipes. In analogy

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Kirchhoff's laws of electricity, it is possible conduct nodal analysis. The five preinstalled pipe sections on the top of the trainer are connected pipe networks using the piping elements. Tank, pipes, piping elements and valves and fittings are made entirely of plastic. The individual pipe sections are shut off by ball valves. During the experiments, the pressure losses in various pipes and piping elements are recorded and evaluated. Two manometers for different measuring ranges are included measure differential pressure. The flow rate is measured volumetrically. The trainer has its own water supply. The closed water circuit includes a supply tank with submersible pump.

Specification

investigation of different pipe networks, five preinstalled pipe sections with different diameters, panel for piping elements, construction of pipe networks from pipe sections and various piping elements calibration of pipe sections, parallel and series connection of pipe sections, construction of a closed circular pipeline, differential pressure measurement with twin tube manometers and differential pressure manometer, flow rate measurement with measuring tank (can be shut off), stopwatch and level indicator

SRSL202 Fundamentals of temperature measurement

1. Description: The SRSL202 experimental setup covers the full range of temperature measurement methods. The well temperature is measured by the most widely used in automation applications but the conventional thermometer types are still widely used in many areas. As a nonelectrical measuring method, such as gas and liquid filled thermometers and bimetallic thermometers, all typical electric measuring methods are covered in the experiments.

2. Technical details

Experiments in the fundamentals of temperature measurement with 7 typical measuring devices Various heat sources or storage units laboratory heater, immersion heater, vacuum flask, Calibration units precision resistors and digital multimeter, Liquid, bimetallic and gas pressure thermometers Temperature sensors Pt100, thermocouple type K, thermistor (NTC), Various temperature measuring strips. Psychrometer for humidity measurement. Tool case for sensors, cables, measuring strips and immersion heater

Technical data: Immersion heater, Power output 300W, Adjustment of power feed via power regulated socket**,** Laboratory heater with thermostat, Power output 450W, Max. temperature 425°C**,** Vacuum flask 1L, Measuring ranges, Resistance temperature detector Pt100 0...100°C**,** Thermocouple type K 0...1000°C, Thermistor (NTC) 20...55°C, Liquid thermometer 10...250°C**,** Bimetallic, gas pressure thermometer 0...200°C, Temperature measuring strips 29...290°C**,** Precision resistors 10 Ω, 100 Ω, 1000

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Ω, Psychrometer, 2x temperature 0...60°C, Rel. humidity 3...96%, 230V, 50Hz, 1 phase, 230V, 60Hz, 1 phase; 120V, 60Hz, 1 phase

SRH2 Didactic apparatus for studying the stability of a floating body

Description: A training device for studying the stability of a floating body for determining the stability of a pontoon whose center of gravity, metacentric height and metacentre can be adjusted different heights. This teaching equipment makes it possible tcarry out the following practical exercises. Study of the influence of the height of the center of gravity. Study of the influence of the horizontal position of the center of gravity, Comparison between experimental measurements and theory. Calculation of the angle of lodging according the position of the center of gravity. Research on the behavior of a partially sunk ship.

STUDY OF THE STABILITY OF A FLOATING BODY: The bench must allow the following pedagogical operations, Study of the influence of the height of the center of gravity, Study of the influence of the horizontal position of the center of gravity, Comparison between experimental measurements and theory Calculation of the angle of lodging according the position of the center of gravity, Research on the behavior of a partially sunk ship.

Technical specifications required: The device will study the stability of a body like a floating boat at the free surface of a liquid. It will make it possible to study the stability of a pontoon according tthe height and the horizontal position of its center of gravity. 1 molded plastic water tank 610 x 406 x 127 mm
1 thin sheet metal pontoon, of rectangular section, weighted and equipped with a mast
Useful height of the mast 266 mm, Pontoon moving weight 200 g, Adjustable mast weight 500 g
Angle of inclination 8 ° on each side of the vertical, Graduation by 1/2 degree, 1 lead wire connected ta mast, Dimensions 356 x 203 x 76 mm, User and Practical Manual

SRH4 A stopwatch Teaching device for studying a flow through an orifice

Specifications: APPARATUS FOR STUDYING FLOWS THROUGH AN ORIFICE
The bench must allow the following pedagogical operations, Determination of contraction and speed coefficients, Calculation of the flow coefficient, Determination of the actual flow coefficient and comparison with the calculated values., determination of the different coefficients for different flow rates in order tshow the influence of the Reynolds number.

dactic apparatus for studying a flow through an orifice for studying a flow of water through a vertically mounted orifice. Supplied a complete instructional manual with practical work (TP).

Educational holdings: This teaching equipment makes it possible tcarry out the following practical exercises, Determination of contraction and speed coefficients, Calculation of the flow coefficient

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Determination of the actual flow coefficient and comparison with the calculated values. Determination of the different coefficients for different flow rates in order to show the influence of the, Reynolds number, Supplied with a complete instructional manual with practical work (TP).

Technical specifications required: Cylindrical glass tank with orifice at the bottom of this tank.
The water supply of the tank will be done through a diffuser, The vertical jet flows into the bench flow measurement tank, A pitot tube, with traversing device can be positioned anywhere in the jet. A thin edged blade attached to the Pitot tube will measure the width of the jet and thus determine the contraction coefficient. The pressure under the jet with the pitot tube and the total pressure above the orifice will be indicated by pressure tubes placed next to the tank. Manometric scale 100 mm to 390 mm Maximum load 365 mm, Maximum flow 13 liters per minute, 13 mm Thin Wall Circular Orifice in Aluminum, Dimensions approx 720 mm x 520 mm x 470 mm

SRH5 Didactic device for studying a venturi

Description: Didactic device for studying a venturi allowing students study the operation of a Venturi apparatus, apply Bernoulli's theorem and make direct comparisons between the experimental results obtained with the aid of apparatus and theoretical predictions. Supplied with a complete instructional manual with practical work (TP). **Educational holdings:** This teaching equipment makes it possible to carry out the following practical exercises**,** Measurement of the static pressure profile, Comparison of the results with the calculation**.** Measurement of the flow coefficient, Application of Bernoulli's theorem, Supplied with a complete instructional manual with practical work (TP).

Specifications for tender: APPARATUS FOR STUDYING A VENTURI**,** The device must allow the observation and the measurement of the variation of the static pressure through a horizontal Venturi. The value of the flow coefficient can be determined for different flow values. Air pressures will be measured using a multimanometer. The bench must allow the following pedagogical operations**,** Measurement of the static pressure profile Comparison of the results with the calculation**,** Measurement of the flow coefficient, Application of Bernoulli's theorem

Technical specifications required: 1 Venturi tube with dimensions Convergent inlet 26 mm in diameter, neck 16 mm diameter, Convergent outlet 26 mm diameter**,** Manometer tubes made of transparent plastic 1 pipe for the repression, 1 hand pump, 1 air pressure regulating valve (up t250 mm of water) 1 water flow control valve (maximum flow 27 l / min), Adjustable feet for leveling. Dimensions approx 720 x 650 x 300 mm

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SRH8 Didactic apparatus for studying the reaction of a jet

Description: A didactic device for studying the reaction of a jet, allowing students to study the forces produced by a jet of water striking a flat or curved surface. Supplied with a complete instructional manual with practical work (TP).

Educational holdings: This teaching equipment makes it possible to carry out the following practical exercises Measurement of the impact force on a flat plate and comparison with the variation of the momentum impact force on a hemispherical and comparison with the variation of the momentum.; Measurement of the impact force on an inclined plate (available separately) and comparison with the variation of the momentum; Measurement of the impact force on a conical obstacle (available separately) and comparison with the variation of the momentum. Supplied with a complete instructional manual with practical work (TP).

Specifications: APPARATUS FOR STUDYING THE REACTION OF A JET**,** The bench must allow the following pedagogical operations**,** Measurement of the impact force on a flat plate and comparison with the variation of the momentum**,** Measurement of the impact force on a hemispherical obstacle and comparison with the variation of the momentum.; Measurement of the impact force on an inclined plate (available separately) and comparison with the variation of the momentum; Measurement of the impact force on a conical obstacle (available separately) and comparison with the variation of the momentum.; The bench must allow the direct measurement of the force exerted by a jet of water on an obstacle in order study experimentally the theorem of the quantities of movement.

Technical specifications required: Diameter of the jet 10 mm; Length of the lever arm 230 mm; Maximum flow 29 l / min**,** Diameter of the flat plate 74 mm; Diameter of the hemispherical obstacle 60 mm**,** Weight of the counterweight 610 g.; Dimensions approx 720 mm x 520 mm x 470 mm

ZM8202 Centrifugal pump characteristics

Variable speed pump with similar performance characteristics to pump in Hydraulics Bench, Mounted on floor standing plinth with variable speed inverter drive, Discharge manifold with flow control valve and pressure gauges, All hoses and fittings supplied for easy connection the hydraulics bench in either series or parallel, configuration, Pump centrifugal type, max. head 21.0m H20, max flow rate 1.35 l/sec, Variable speed pump with similar performance characteristics o to pump in Hydraulics Bench, Mounted on floor standing plinth with variable speed inverter drive, Discharge manifold with flow control valve and pressure gauges

All hoses and fittings supplied for easy connection the hydraulics bench in either series or parallel configuration, Pump centrifugal type, max. head 21.0m H20, max flow rate 1.35 l/sec, Motor 0.36kW

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Speed controller PWM inverter , Speed range 0 to 1500 rpm, Pressure gauge 0 t60m H20, Compound gauge 10 t32m H2Q

ZM8205 Fluid Properties Apparatus

which can able demonstrate the basic properties of fluids) with capabilities of measuring density, specific gravity, and viscosity of fluids. Which can allow students observe and measure the effect of capillarity? Allow demonstrate Archimedes' Principle as optionally. **Technical Specification:** Need have; Pycnometer (Density bottle) with a capacity of between 25 t100 which can able demonstrate the basic properties of fluids

with capabilities of measuring density, specific gravity, and viscosity of fluids. Which can allow students observe and measure the effect of capillarity? Allow demonstrate Archimedes' Principle as optionally. Pycnometer with a capacity of between 25 t100 Barometer with a capacity ranging from 500 to 1500 ba. Universal Hydrometer with a varying resolution. Hydrometer Jars at least 2 with a diameter between 50 t100 mm. Lever balance with dual scales. Here any range value is acceptable. Spirit filled with thermometer glass. Any temperature range values are acceptable. Viscometer tubes of 2 in number. Need tbe 25 t50 mm with calibration marks at different levels. It is possible to supply a specification of the mentioned device with a value in between stated. One parallel plate Capillary tube apparatus with 5 t10 tubes in number of varying size. Need to have a length of 100 t200 mm and having different mm bores. The support frame for the components may be made of stainless steel or PVC. Archimedes' Apparatus one in number. One parallel plate Capillary apparatus. Instructional manual

ZM8207 PASCAL'S APPARATUS (Pascal's apparatus)

This apparatus, designed to demonstrate Pascal's principle, consists of a machined body incorporating a horizontal flexible diaphragm to which one of three alternative glass vessels can be fitted. The diameter at the base of each vessel is common but the shape of each vessel varies; one parallel sided, one conical and one tapering inwards. The diaphragm, located at the base of the vessel, conveys the force from the water inside the vessel to a lever arm with a sliding counterweight.

Technical details: dimensions Height 500mm, Width 300mm, Depth 156mm**,** Parallel vessel 26mm inside diameter, Conical vessel 26mm t101mm inside diameter at top**,** Tapered vessel 26mm to 9mm inside diameter at top, Diameter at diaphragm 56mm**,** Maximum depth of water 228mm (top of vessels)

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ZM8208 Fluid Statistic and Manometer apparatus

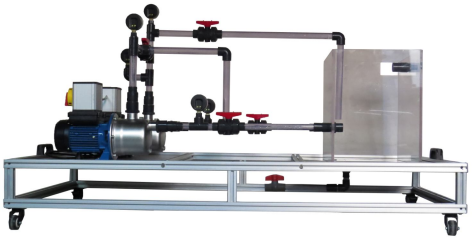
designed to demonstrate the properties of Newtonian fluids and their behaviour under hydrostatic conditions (fluid at rest). This enables students to develop an understanding and knowledge of a wide range of fundamental principles and techniques, before studying fluids in motion. These include the use of fluids in manometers to measure, pressure and pressure differences in gases and liquids. **Details:** Overall dimensions Height 1250mm (maximum top of level gauge) Width 425mm, Depth 150mm. Max depth inside reservoir 574mm, Inside diameter of reservoir 100mm, Scale length of manometer tubes 460mm, Manometer tubes incorporated 1x 'U' tube, 2x Vertical parallel tubes, 1x Vertical tube with varying cross section, 1x Vertical tube with pivot enabling, operation at three different inclinations

ZM8128 Pitot Tube Demonstrator

Technical details: Overall dimensions Length 1.00m, Width 0.55m, Height 0.23m, Net weight 6 kg, Water Supply from Basic Hydraulics Bench, Requires Hydraulics Bench Service unit**. Description**: The Pitot Tube can be moved across the cross section of the pipe in order measure the dynamic head profile. The position of the measuring tip relative the wall of the pipe can be read on a scale. It is connected pressurised water manometer

measure the differential head across the Pitot static tube.The F133 is designed for use with the Hydraulics Bench and includes compatible connecting tubes

ZM8302 MINI CENTRIFUGAL PUMP TEST



GENERAL: Consist of centrifugal pump, circulation tank, etc. Benchtop unit or mobile unit. Fully instrumented control panel. User guide/manual for students. User guide/manual for lecturers (consists of result and answer sample). **EXPERIMENTAL CAPABILITIES:** Pump characteristic curve. Pump efficiency. Series and parallel operation of pump Capacity of pump. Flow measurement. **TECHNICAL SPECIFICATIONS:** (Specification based on existing laboratory facilities) Electricity, 240VAC/1Phase, Water supply Regular tap water. Nett dimension (max), Width 1.5 m, Depth 1.0 m, Height 1.0 m, Operating Conditions Laboratory condition.

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ZM2142 Pipes Fluid Friction Venturi Method Hydraulic Bench

1 Product overview: The equipment can simulate measurement of pipeline one way resistance and principle and process of Venturi meter, make student have an elementary direct cognition on pipeline one way resistance and Venturi meter. It is equipped with storage water tank, experiment water tank and metering water tank, the experiment pipeline is transparent pipe.**1.2 Features:** (1) The training stand uses aluminum frame, the experiment water tank and metering water tank are transparent, and students can observe the variation of liquid level clearly level clearly in experiment process.

(2) with 2 independent U type differential pressure gauges that is for measuring experiment parameter of pipeline, it can combine with multiple control valves accomplish more training measuring content.(3) divided branch of one way resistance and branch of Venturi meter separately, operation is easy, the pressure gauge is transparent, which makes it clear observe the variation of liquid level. (4) The structure is firm and reliable, and it is easy move.

2 Performance parameter: (1) Storage water tank overall dimension 330*330*300mm, can contain 30L water.(2) water tank it is transparent roundness acrylic structure, overall dimension is 200*520mm, contain 15L water. (3) Metering water tank it is transparent roundness acrylic structure, bserve variation of liquid level, dimension is 200mm*200mm.(4)AC 220V power supply, flow 10L/min.(5) Aluminum frame structure, dimension 1400×400×1500mm.

SR1014 Operating Principle of a Francis Turbine

Learning Objectives / Experiments: design and function of a Francis turbine, determination of torque, power and efficiency, graphical representation of characteristic curves for torque, power and efficiency **Specifications:** [1] function of a Francis turbine, [2] transparent front panel for observing the operating area, [3] loading the turbine by use of the band brake, [4] adjustable guide vanes for setting different angles of attack, [5] marking on brake drum for noncontact speed measurement [6] instruments spring balances for determining the torque, manometer shows pressure at turbine inlet [7] flow determination by base module, [8] water supply using the base module or via lab supply

Technical Data:Turbine, output 12W at n=1100min1, approx. 40L/min,H=8m, rotor, 7 blades, blade width 5mm, external diameter 50mm, guide vanes 6 vanes, adjustable (20 stages), Measuring ranges, braking force (spring balance) 10N, pressure 0...1,0bar, Dimensions LxWxH 400x400x630mm

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Fluid Mechanics Lab Equipment 2-Flow Around A Body

SRHM170 Open wind Tunnel

Description: A wind tunnel is the classic experiment system for aerodynamic flow experiments. The model being studied remains at rest while the flow medium is set in motion, and thus the desired flow around the model is generated. It is an “Eiffel” type open wind tunnel used to demonstrate and measure the aerodynamic properties of various models. For this purpose, air is drawn in from the models. For this purpose, air is drawn in from the environment and accelerated. The air flows around a model, such as an aerofoil, in a measuring section. The air is then decelerated in a diffuser and pumped back intthe open by a fan. Extensive accessories allow a variety of experiments, for example lift measurements, pressure distributions, boundary layer analysis or visualisation of streamlines.

Technical details: experiments from the field of aerodynamics and fluid mechanics with an “Eiffel” type wind tunnel, wide range of accessories available, transparent, closed measuring section, inlet contour, nozzle and diffuser made of GRP, variablespeed fan motor for energy efficient operation, flow straightener reduces turbulence, inclined tube manometer for displaying the air velocity, electronic two component force sensor for measuring the drag and lift forces

digital display of drag and lift on the measuring amplifier, angle display on a scale.

optional display of measured values for velocity, forces, moment, displacement/angle, and differential pressure using system for data acquisition

Technical data: Measuring section, flow crosssection WxH 292x292mm, length 420mm, wind velocity 3,1…28m/s Axial fan, power consumption 2,2kW, Measuring ranges, force, lift ±4N, drag ±4N, velocity 3,1…28m/s; UL/CSA optional, angle ±180°

SE220 Fluidised Bed Formation

1. Description

Bulk solids can be transformed from a fixed bed into a fluidised bed when liquids or gases pass through them. The areas of application of fluidised beds include the drying of solids and a wide variety of chemical processes. A diaphragm pump delivers water from a storage tank intthe bottom of the left side test tank. The water flows upwards through a porous sinteredmetal plate. On the sintered At the time of the water is less than the socalled fluidisation velocity, the flow only passes through the fixed bed.

2. Technical details: Investigation of fluidised bed formation of solids in air and water**,** 2 transparent test tanks to observe fluidised bed formation in air/water**,** 1 manometer per tank to measure the pressure loss through each test tank**,** 1 steel rule per tank to measure the change in height of the fluidised beds

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Both test tanks removable for filling, Storage tank with diaphragm pump for water supply, Diaphragm compressor with compressed air accumulator for compressed air supply, Adjustment of flow rate for both media by valves and flow meter

Technical data: 2 test tanks, Length 550mm, Inside diameter 44mm, Scale division 1mm, Material PMMA Diaphragm pump (water), Max. flow rate 1,7L/min, Max. head 70m, Diaphragm compressor (air) Max. volumetric flow rate 39L/min, Max. pressure 2bar, Tanks, Water storage tank approx. 4L Compressed air accumulator 2L, Measuring ranges, Pressure 0...500mmWC (water), Pressure 0...200mmWC (air), Flow rate 0,2...2,2L/min (water), Flow rate 4...32L/min (air), Height 0...500mm

Fluid Mechanics Lab Equipment 3-Steady Flow

ZF1129A Air Flow Training Unit

The designed of the Air flow training model should demonstrate to students the principles of compressible fluid flow. Centrifugal Fan Capacity1,100 CFM, Inlet dia. approx. 180 mm, Power 2 hp Electrical 415VAC/3phase/5060Hz. Multitube Manometer Test Board No. of tubes14, Materials clear acrylic, Scale length400 mm. Venturi, Orifice and Pitot Tube Flow Measurement Test Sets Traversed pitot tube with adjustable scale. Orifice plates (to different sizes),

Venturi nozzle (twdifferent sizes). Bernoulli’s Theorem Test Set Clear acrylic duct with convergence, throat and divergence sections. (to different sizes). Bernoulli’s Theorem Test Set Clear acrylic duct with convergence, throat and divergence sections. lic 90bend squre ducting with a straight section before the bend dimension 60 x 50 mm (Require Multitube Manometer Test Board). Flow In PipesDifferent pipe sections tstudy Duct entry pressure profile, Suden enlargement losses from 65 t95mm Dia, Friction loss in 2.8m pipe (95mm Dia), Velocity of profile in 2.8m (95mm Dia). (RequireMultitube Manometer Test Board). Jet Dispersion Test Set Traversed pitot tube. Boundary Layer Growth Test Set Traversed pitot tube tmeasure velocity profile at four different locations Reversible flat plate with sharp and blunt leading edges and smooth and roughened surfaces. Smoke Generation System, Includes a smoke generator tdemonstrate visually the flow of air around models. Control Panel Fan ON/OFF switch, Variable Speed Drive Controller. Electrical415VAC/3phase/5060Hz. OVERALL DIMENSIONS Height1.20 m, Depth0.75 m, Width1.50 m

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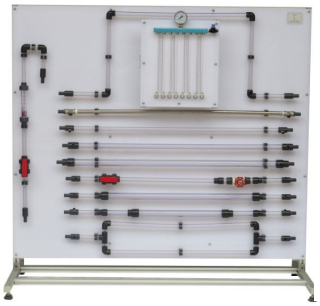
ZM8135 Pipe Friction Apparatus



I. Instructions for use: 1. Prepare the equipment and water source and close the inlet ball valve. 2. The interface between the inlet pipe and the test pipe. 3. Test management pressure measurement interface and tube pressure gauge interface connection. 4. Connect the water source to the water inlet and connect the water outlet of the corresponding test line to the appropriate container. 5. Open the inlet ball valve, the water flows through the DN15 elbow, observe the flow value on the flow meter and the value of the corresponding measuring point on the tube pressure gauge, and record the data. 6. Connect the water inlet pipe and the different test pipes in sequence according tthe above steps, and observe the corresponding pressure difference change on the pipe pressure gauge. 7. Adjust the flow of water by controlling the opening angle of the inlet ball valve, observe the pressure changes corresponding to the test points of different pipelines under different flow rates, and record the data. 8. After the experiment is completed, clean the water inside the equipment. If there are conditions, use compressed air to squeeze out the water in the tube.

II. Technical specifications: This unit must be realized for the study of the behavior of flow in pipes. It must include an horizontal pipe in stainless steel, provided with static pressure tapings at both inlet and outlet pipe in stainless steel, procided with static pressure tapings at both inlet and outlet which can be connected to a differential gauge for the measurement of pipe friction in laminar and turbulent flow condition, the static pressure tapings at each ends of test span must be provided with to plastic tubers for the connection the water manometer.

ZM8140 Pipe Networks Accessory

(which can able to show flow of water in pipes of different arrangements) with capabilities of measuring flow, losses, loss coefficients and the pressure decrease.

Technical Specification

Need have, control valve, contraction and enlargement areas, gate valve, Manometer board with at least 10 t20 tubes. The manometer range of 0 to 500 mm. Hand (electronic) pump for the purpose of giving pressure the manometers installed. Connecting points for the connection with the hydraulic bench (fittings with 450). The required fittings are elbows, contraction, enlargement, large bend and short bends. Differential pressure gauges witch can work with 0 to 5 bars and 5 to 10 in number.

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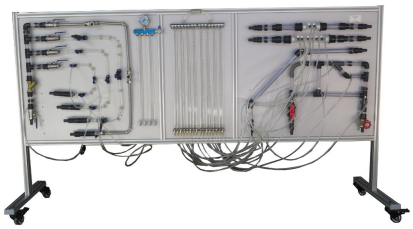
ZF1126A Didactic bench for studying pressure losses in pipes, elbows and valves



Description

Didactic bench of study of the losses of charges making it possible to study the regular and singular losses of loads in the hydraulic networks. The open design of the bench and its wide format make it an ideal tool for working with large groups of students or pairs in practical work.

Educational holdings

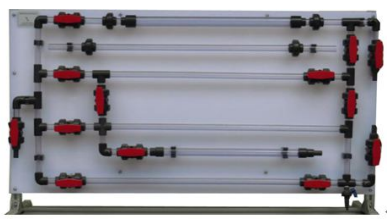
This teaching equipment makes it possible to carry out the following practical exercises
Pressure drop in straight pipes, Loss of charge in a sudden enlargement, Loss of charge in a sudden narrowing, Pressure drop in elbows (trade and sharp angle), Pressure loss in different types of valves Pressure loss in curves of different radii, Flow in a rough pipe (optional), Supplied with a complete instructional manual with practical work (TP).

Specifications: VERTICAL BENCH FOR THE STUDY OF FLUID DYNAMICS

The bench must allow the following pedagogical operations Pressure drop in straight pipes, Loss of charge in a sudden enlargement, Loss of charge in a sudden narrowing, Pressure drop in elbows (trade and sharp angle), Pressure loss in different types of valves, Pressure loss in curves of different radii, Flow in a rough pipe (optional)

Technical specifications required: The bench should allow the study of pressure losses in pipes, elbows and valves. It will consist of to piping circuits with a common inlet and outlet. These to circuits will have different diameter pipes and will include straight lengths, elbows, contractions, a valve and a ball valve. The pressure differences will be measured by piezometric tubes with back pressure, graduated in mm. For the valves, the pressure will be measured by a needle gauge, 1 straight pipe of small diameter, 1 straight pipe of large diameter, 1 rough tube (optional), 1 elbow at 90 ° at a sharp angle, 1 elbow of the trade,1 gate valve, 1 ball valve, 1 sudden contraction, 1 elbow at 90 ° of small radius, 1 elbow at 90 ° of medium radius, 1 elbow at 90 ° of large radius, 16 water pressure gauges for measurements in pipes 1 needle manometer for measurements in the valves, Vertical panel mounted on wheels, Maximum flow 17.2 l / min, Piping network copper tubes, Inside diameters 13.6 and 26.2 mm

ZM8145 Pipe Network Bench



I. Overview

The experimental device is used to measure the head loss of pipes of different sizes and the flow characteristics of parallel pipes and series pipes. Interchangeable pipes of different diameters and digital pressure gauges for measuring differential pressure are provided.

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ZM7102 Airflow System

The Airflow System and its range of optional accessories enable students to safely investigate the fundamentals of airflow and simple aerodynamic experimental procedures. The unit consists of a small footprint, high volume high pressure centrifugal fan with adjustable flow adjustable flow control, inlet and outlet couplings. The Airflow System is available with an extensive range of optional accessories that makes the unit a very flexible and economic investment The unit provides an extensive and expandable range of studies for students in the following disciplines. Aeronautical Engineering. Mechanical Engineering. Fluid Mechanics. Nuclear Engineering. Chemical Engineering. Control and Instrumentation.

Experimental Capabilities

The extensive range of optional accessories allow, investigation of Bernoulli's equation Drag forces on various shapes Investigation of a turbulent jet, Investigation of boundary layer development Pressure distribution of flow around a bend, Fan performance characteristics Jet attachment Pressure distribution around a cylinder, Pressure distribution around an aerofoil Flow visualisation studies. Air flow measurement methods. This is a training equipment which study air flow basic principle and simple experiment on air flow system. This equipment is with good flexible capacity and expandable capacity, it can supply a series of air flow system related experiment and research.

ZM7128F Fluid Friction Measurements Laboratory Equipment

System should be mounted on a supporting rigid structure mounted on wheels.

The flow velocity should be measured using Floor Mount Type Parallel Pipes 'T' & 'Y' Junctions Fluid Mechanics Friction Loss in Pipes Apparatus the calibrated variable area flow meter and the measuring tank of the Hydraulic Bench. The head loss due friction should be measured using a suitably placed static pressure tapings, multi-tube manometer and digital pressure meter. Flow velocity or Reynolds number can be varied. A system of parallel pipe network configuration and isolating valves enable tests tbe conducted on different pipes without disconnecting or draining the system.

Experiments: 1. Familiarization and training with pressure and fluid flow measurements. 2. Study of pipe friction at various flow velocities. 3. Study of pipe friction in laminar and turbulent flows. 4. Study of effect of surface roughness on friction factor. 5. Determination of relationship between pipe friction factor and flow Reynolds numbers. 6. Comparison of measured friction factors with Moody's chart.

Specifications: The Apparatus should include the following pipes for testing, Smooth bore pipes 27, 14 and 3.5 mm bore, 1800mm length, PVC, Artificially roughened pipes, 23 and 17 mm bore, 1800mm

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length, PVC. Color coding for piping system will be selected to suit user requirements, Pressure tapping is by small ball valves with quick connections will be provided at inlet and exit. Pressures are measured using multitube manometer. Pressure taps are connected ta set of manifolds by flexible pressure hoses such that differential pressure across pipe length can be measured by opening valves without removing the hoses. Flow measurement using Variable Area Flow Meter and measurement tank of the Hydraulic Bench. Water Manometer with hand air pump, 8 tubes X 800 mm with 1mm reading Mercury Manometer, 2 tubes X 500 mm with 1mm reading. Digital Pressure Meter. Electrical supply, 240 V, single phase, 50 Hz., Overall Dimensions approx. (HxWxD) 1.2x2.5x0.6 m.

Fluid Mechanics Lab Equipment 4-Instantaneous Change Fluid ZM8154 Hydraulic Ram Pump

1. Explanation of the phenomenon

In a pressurized pipeline, the flow rate of the water suddenly changes due to some external cause (such as a sudden closing of the valve and a sudden stop of the pump unit), causing an alternating change in the pressure rise and fall. This hydraulic phenomenon is called water. Hit or water hammer. Because the pump is turned on, the pump is stopped, and the switch gate valve is of the water changes drastically, especially the water hammer caused by sudden pump stop, which can damage the pipeline, the pump, the valve, and cause the pump reverse, and the pressure of the pipe network is reduced. The water hammer effect has great destructive water hammer effect, which is extremely destructive. Due the water hammer, the pressure in the pipeline increases sharply several times or even ten times higher than the normal pressure, which is very harmful. Causes cracking of the pipe.

II. Product overview: This experimental device can be used demonstrate the formation and function of water hammer and study the working principle of hydraulic impactor. The water is transported through a long circular pipe the mechanical reversing valve. At a certain water flow rate, water flows out from the mechanical reversing valve outlet. When the direction of the water flow is suddenly changed, the pressure opens the check valve under the container, and the water flows air. The container, the air cushion on the container will reduce the strength of the water hammer, and the water will rise evenly in the high position. The direction of the water flow is again changed by the mechanical reversing valve, and son, the water continuously enters the high position container by the action of the water hammer.

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ZM7117 Pipe Surge and Water Hammer Apparatus

Related experiment: Transient flow conditions in pipe systems by means of experimentation demonstrating water hammer in pipes determining the sound velocity in water, understanding how a surge chamber works, natural frequency in the surge chamber

Technical data: Pipe section for pressure oscillations Copper, ball valve, surge chamber, PMMA, height approx.825mm, inner diameter approx. 50mm Pipe section for water hammer, copper inner diameter approx. 50mm, Pipe section for water hammer, copper, distance between sensors approx. 3000mm, solenoid valve, closing time 20...30ms, Tank approx. 50L, Supply unit Pump power consumption approx. 550W, max. flow rate 230L/min, max. head 11m, Tank 1x 180L, 1x 40L (approx.)

Fluid Mechanics Lab Equipment 5-Fluid Items For Civil Engineering

EID210 DEMONSTRATION APPARATUS FOR INFILTRATION

DESCRIPTION

The apparatus consists of Graduated glass cylinders, Soil samples, Collecting container, Stand with adjustable feet, The appliance must be located near an inlet and a water outlet. Dimensions Overall dimensions 510 x 400 x 950 mm

The infiltration rate of a soil is an important quantity for the design of an irrigation system. This parameter may vary from one soil to another and depends on soil structure and moisture conditions. The Infiltration Demonstration Device EID210 provides a simple but effective way to observe these complex processes. It allows to compare infiltration rates in different types of soil, to determine the surface effects on infiltration. The EID210 Infiltration Demonstration Apparatus has 3 pyrex glass tubes in which the soil samples are placed, the base of the tubes being equipped with a perforated plate that can retain the materials while allowing the water to flow. A known volume of water is introduced into each tube and the progress of the infiltration inside the samples is observed. Each cylinder is graduated. A stopwatch supplied with the device allows measurement of infiltration rates.

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SM 165 Studies In Hydrology

1. Description: In civil engineering, studies in hydrology are conducted in connection with the design, construction and operation of hydraulic engineering systems and water management functions. The studies focus on topics such as seepage and flow of water in the soil and the use of groundwater resources. It can be used to study seepage and groundwater flows after precipitation. Variable precipitation density and areas and different groundwater supply and drain possibilities allow a wide variety of experiment

precipitation. Variable precipitation density and areas and different groundwater supply and drain possibilities allow a wide variety of experiment. The precipitation element consists of two groups of three nozzles. The core element is a sand filled, stainless steel experiment tank with inclination adjustment. Water can flow in (groundwater) or out (drainage) via two chambers on the side. The experiment tank is separated from the chambers by fine mesh screens. To study the lowering of groundwater, two wells with open seam tubes are available. Supply and water drain can be opened and closed, thus allowing a wide variety of experimental conditions. At the bottom of the experiment tank there are measured connections to detect groundwater levels, which are displayed on 19 tube manometers. The water supply is controlled by a valve and read on a flow meter. The water drain is determined by a measuring weir.

2. Technical details

Specification

Investigation of precipitation discharge relationships, storage capacity of soils, seepage flows and groundwater flows Closed water circuit Inclinable stainless steel experiment tank contains 19 measuring connections to detect groundwater levels, transparent splash guard and screens for separating the chambers, 2 wells with open seam tubes in the experiment tank Precipitation device with 8 nozzles, adjustable. Water supplies and drains can be selected individually Transparent measuring tank (flow) Instruments tube manometers (groundwater), flow meter (supply) and measuring weir in the measuring tank (drain)

Technical data

Experiment tank, Area 2x 1m2, depth 0,2m, Max. sand filling 0,3m3, Inclination adjustment 2,5...5% Precipitation device 8 nozzles, switchable in 2 groups of 4 nozzles, Flow rate per nozzle 1...4,7L/min, square spray pattern, Pump Power consumption 0,55kW, Max. flow rate 2000L/h, Storage tank, stainless steel content 180L, Measuring ranges Pressure 19x 0...300mmWC. Flow rate 1x 150...1700L/h (water supply), 1x 0...1700L/h (water drain), 230V, 50Hz, 1 phase, 230V, 60Hz, 1 phase; 120V, 60Hz, 1 phase UL/CSA optional, Required for operation, Sand (1...2mm grain size)

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SM162 Experimental Flume 309x450mm

1. Description

How does we achieve the necessary river depth for ships? How does open channel flow change during flooding? How far upstream do measures such as control structures have an effect? How can the discharge at barrages be By using experimental flumes in lab. experimental flumes in lab. it is possible to teach the basic knowledge required to understand the answers to these questions and to develop possible solutions. The experimental flume with a closed water circuit has a crosssection of 309x450mm. The length of the experimental section is between 5m and – with further extension elements a maximum of 12,5m. The side walls of the experimental section All made that tempered glass, which allows excellent observation of the experiments. All components that come into contact with water are made of corrosionresistant materials (stainless steel, glass reinforced plastic). The inlet element is designed so that the flow enters the experimental Section with very little turbulence. A wide selection of models, such as weirs, piers, flow measuring flumes or a wave generator are available as accessories and ensure a comprehensive programme of experiments. Most models are quickly and safely bolted to the bottom of the experimental section.

2. Technical details

Basic principles of open channel flow, Experimental flume with experimental section, inlet and outlet element and closed water circuit, Length of the experimental section 5m, up to 12,5m possible with additional extension elements, Smooth adjustable inclination of the experimental section, Experimental section with 20 evenly spaced threaded holes on the bottom for installing models or for water level measurement using pressure, Side walls of the experimental section are made of tempered glass for excellent observation of the experiments, Experimental section with guide rails for the possible available instrument carrier , All surfaces in contact with water are made of corrosion resistant materials
Flow optimised inlet element for low turbulence entry into the experimental section, Closed water circuit with 2 water tanks, pump, electromagnetic flow sensor and flow control, Models from all fields of hydraulic engineering available as accessories. 2 tanks, Made of GRP,1100L each, Measuring ranges, Flow rate 5,4...130m3/h, 400V, 50Hz, 3 phases. 400V, 60Hz, 3 phases, 230V, 60Hz, 3 phases, UL/CSA optional

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ZM8108 ZMPERMEABILITY/FLUIDI SATIONS TUDIES APPARATUS

DEMONSTRATION CAPABILITIES

pressure drop measurements and correlations for flow through packed beds verification of Kozeny's equation characteristics of a liquid fluidised bed measurement of permeability of selected solids attrition tests

TECHNICAL DETAILS

Sample tube I/D 38mm, Sample tube length 507mm, Flow meter range 50800ml/min, 0.5m water differential manometer, 0.5m Mercury manometer

ORDERING SPECIFICATION

Apparatus verify Darcy's Law, to examine Kozeny's equation and to observe liquid fluidisation behaviour of a granular bed. Equipment consists of a metal framework, constant head tank and transparent test section for observation. Flow is indicated by a Rotameter. A 0.5m water differential manometer and 0.5m Mercury manometer are included for pressure drop across the bed. OVERALL DIMENSIONS. Height 0.79m. Width 0.68m. Depth 0.25m

SRS12 Advanced Hydrology Study System

Technical specifications

1. A self contained floor standing apparatus for hydrology and fluvial geomorphology demonstrations, comprising (a) A 2m x 1m PVC tank, tiltable using a dual linked jacking system (b) 8 stainless steel spray nozzles mounted on an adjustable height gantry(c) A stilled tank providing a formed flow river inlet(d) Two flowmeters (3L/min & 5L/min) to measure and adjust the inlet flows (e) An outlet tank allowing both water and sediment flow to be measured f) A large plastic sump tank plus a recirculating pump

2. Experimental capabilities include:(a) Runoff hydrographs from model catchments, (b) Drawdown curves for one well and two well systems, (c) Ground water flow and hydraulic gradients. (d) Model stream flow in alluvial material, (e) Formation and development of river features over time, (f) Sediment transport, bedload motion, scour and erosion. Supply English user manual

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H312 Permeability Basin

1.Description

Permeability basin to clearly show the flow phenomena in permeable media, to visualize the flow lines, to build sheet pile curtain models of building foundations and to simulate dams. Autonomous equipment allowing a wide range of experiences.

2.Educational holdings: This teaching equipment makes it possible to carry out the following practical exercises. Determination of infiltrations under a structure. Construction of flow grids and determination of the permeability index**.** Sheet pile flow and determination of the critical infiltration force at which the 'fox phenomenon' occurs**.** Infiltration under a permeable dam. Flow under an earth dam with and without foot drain. Folding in horizontal flow (simulation of an underground water flow in a source). Determination of bearing pressures on structures such as building foundations. General studies on infiltration and drainage. Flow through porous media. Supplied with a complete instructional manual with practical work (TP).

3.Specifications for tender: PERMEABILITY BASIN. The bench should allow demonstration of flow through a permeable medium with commonly used structures such as dams.must allow the following pedagogical operations. Determination of infiltrations under a structure. Construction of flow grids and determination of the permeability index. Sheet pile flow and determination of the critical infiltration force at which the 'fox phenomenon' occurs. Infiltration under a permeable dam. Flow under an earth dam with and without foot drain. Folding in horizontal flow (simulation of an underground water flow in a river or a source) Determination of bearing pressures on structures such as building foundations. General studies on infiltration and drainage. Flow through porous media. Technical specifications required Basin with transparent front, mounted on a steel frame also supporting a work table. Basin sides equipped with glass plates resistant to abrasion of the permeable medium. The rear of the basin will contain 14 pressure taps connected to piezometric tubes to measure the distribution of the load along the tank. Removable deflectors with stainless steel mesh at each end of the basin Compartments at the ends of the pool equipped with adjustable overflow pipe system to adjust the water level. The top of the pond will be open to allow students to fill the tank and install structural models Transparent, airtight plates to allow students to build models of walls, sheet piles and dams. Supplied with a dye injection system to visualize the current lines. Around the front wall of the pool will be placed graduated scales to help students position and measure the flow correctly. Dimensions of the basin 1500 mm x 550 mm x 180 m. Dimensions and weight approx 2450 mm x 700 mm x 1500 mm and 230 kg. User and Practical Manual

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SRW7 Model Sedimentation Tank

Technical specification: A rigid acrylic settling tank of 80L capacity can be fed by a mains water or a slurry supply. Slurry is pumped from a 120L sump tank via a centrifugal pump. A sparging device in the sump tank keeps the slurry in suspension.
Both supplies are fitted with a flow meter. Mains water flow meter range 0.5 5.0 litres/min; slurry flow meter range 0 2 litres/min. A dye injection system is incorporated to allow hydraulic tracer

A dye injection system is incorporated to allow hydraulic tracer and flow visualisation studies. Measuring flow regimes using a dye tracer and comparison of these with idealised flow models. Effect of variables such as flow rate and baffle position on flow regimes. Measurement of sediment removal efficiencies.

ZM7103 Flow Channel

Pump

power consumption approx. 1,0 kW (more or less); max. flow rate 22,5m³/h, max. head 13,7m. Weight approx. 500kg, 230V, 50/60Hz, 1 phase or 120V, 60Hz, 1 phase N

Related experiment

uniform and nonuniform discharge, flow formulae, flow transition (hydraulic jump), energy dissipation (hydraulic jump, stilling basin), over control structures, weirs (sharp crested, broad crested,
* discharge under gates, measuring flumes, cal losses due to obstacles, ansient flow waves
vibrating piles, transport

ZM7121 Infiltration Apparatus

Technical data: Filter element, filter chamber height 85mm, inside diameter approx. 37mm, crosssectional area approx. 11cm², tube material DURAN glass, Filter medium, sintered filter SIKA 100, pore size 100µm, thickness 2mm, material sintered metal, Dimension LxWxH 450x410x1040mm(approx.)
Related experiment: fundamentals of filtration Darcy's equation, depth filtration with different bulk solids and suspensions, cake filtration with different suspensions, identification of characteristic filtration values

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ZM7123B Ground Water Flow

1 Introduction: Through the training and teaching, familiar with the groundwater flow hydrological principle demonstration unit and its application in different projects, you can visually observe the effects of groundwater flow, drainage process and permeability, and can study the use of water wells, lake water removal and drainage, and ground. drainage works.

2 Features

(1) The demonstration unit adopts aluminum frame structure, and the experiment process is completed in the water tank, which is easy to operate and easy to demonstrate. (2) The water tank module is made of transparent material, which can visually observe the water flow in the tank. (3) Using accessories, it can simulate the groundwater pattern of various terrains; install casters for easy observation.

3 Technical parameters

(1) Dimensions 1100mm*1100mm*620mm, (2) Overall capacity <300L, (3) Weight <30kg

(4) Working conditions ambient temperature 10 ° C ~ +40 ° C

4. Product composition

4.1 FrameThe use of aluminum profiles to build the frame body, the structure is simple, the support force is large, and it is not easy to be damaged. 4.2 Experimental water tank(1) The water tank is composed of transparent and black acrylic, the box wall uses transparent acrylic, and the bottom of the box uses black acrylic. (2) There are 19 liquid level collection holes at the bottom of the tank, 2 well collection ports, and 4 upper and lower nozzles. 4.3 Liquid level displayThe carrier plate is composed of white acrylic with a scale strip; the water pipe is assembled by a pipe distributor and is equipped with a pressure relief port.4.4 Accessories. Confined aquifer model, Rectangular lake construction model

ZM8109 FILTERABILITY INDEX UNIT DEMONSTRATION CAPABILITIES

Basic principles of filter operation for student study preliminary assessment of pretreatment processes and filter media calculation of filterability index number from measurements taken **Dimension:** Height 0.97m, Width 0.45m, Depth 0.25m **ORDERING SPECIFICATION:** Equipment consists of a metal framework supporting a 1.5 litre vessel connected by transparent tubing ta 60mm high filter unit. A needle valve controls the flow which is observed on a variable area flowmeter Flow meter range 20280ml/min

A 0.5m water manometer measures head loss across the filter. Test filter cell diameter 38mm

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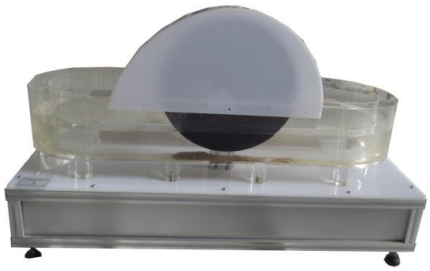
ZM7155 Fundamentals of Sediment Transport



Experimental unit for bed load transport in open channels Transparent, circular, oval flow channel as open channel Variable speed paddle to generate the flow velocity, Experimental section with transparent deepening for holding the sediment, Low turbulence flow at the inlet to the experimental section thanks to a flow straightener paddle driven via electric motor and belt drive

three different bridge piers for observing fluvial obstacle marks on piers

Technical data

Experimental section length 660mm, crosssection WxH 50x200mm, deepening 50mm. Flow channel height 150mm, width 50...72mm, Paddle 12 blades, diameter 330mm, speed at the paddle 5,2...70min1 Flow velocity approx. 0...1m/s. Dimension and weight. LxWxH 1030x410x560mm. Weight approx. 42kg

ZM8112 Drainage and Seepage Tank

BASIC ACCESSORIES: Foundation pressure plate, Straight permeable membrane, Curved permeable membrane, Lateral pressure plate, Tile drain

SERVICES REQUIRED: Electricity supply220/240V/1PH/50Hz@1Amp

OVERALL DIMENSIONS: Length 1.60m, Width 0.60m

PRACTICAL DEMONSTRATION AND VISUALISATION CAPABILITIES

Flow line visualisation, Flow net construction, Determining seepage rates, Verification of Darcy's Law, Comparison of experimental results with analytical solutions,

Typical student experiments include, Seepage underneath a sheet pile wall, Seepage through an earth dam, Control of seepage through permeable soils by subsoil drainage, Distribution of uplift pressure on hydraulic structures, Reducing uplift pressure and lateral thrust by drainage, Formation and behaviour of 'Quicksand' Stability of an earth dam, Draining an excavation site using wells

ORDERING SPECIFICATION: A self contained facility for study of flow through permeable media. The tank has a toughened glass front and aluminium back to permit the insertion of pressure required. Six tapping points are provided. The design of the side supports allows free access to the interior with minimum sight obstruction. Supply includes sump tank, pump, starter and control valve. Also a dye injection system and a selection of models. Comprehensive instruction manual with datasheets and student experiments. Working section 1500mm x 100mm x 600mm.

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ZM8115 MOBILE BED AND FLOW VISUALISATION UNIT

TECHNICAL SPECIFICATION

Working area 2 metres x 610mmor 4 metres x 610mmMax water depth 120mm

Thickness of sand bed 60mm, Flow range 03.5 litres/sec.

Sump capacity 300 litres

Accuracy of flow metering ±1.5% of full scalede flection

PRACTICAL DEMONSTRATION AND VISUALISATON CAPABILITIES

Mobile bed experiments. Flow around model engineering structures. Experimental investigation of erosion and deposition. Characteristics of meandering water courses. Two dimensional flow visualisation by the Ahlborn technique. Boundary layer suction demonstration. Velocity distribution in duct flow Hydraulic analogy to compressible flow. Civil engineering model testing. Model working length 4m Basic Accessories. Two model gate guides. Eight aluminium baffles to direct the water flow for general test purposes. One set of twelve x 50mm x 50mmaluminium Tees and six 40mm equal angles all 125mm long, to enable the laboratory staff to build additional models

ORDERING SPECIFICATION: A self contained recirculating water tank for flow visualisation and mobile bed studies. The tank is manufactured from glass reinforced plastic and all components in contact with water are of noncorroding materials. The working section has minimum dimensions of (4m) x 610mm and the flow range is 03.5 litres/sec. Fifteen models and accessories are included as standard and a sheet of coloured glass allows rapid changeover from mobile bed to flow visualisation mode. All controls are housed in a portable console which includes a flexible cable and water safe connectors. SERVICES REQUIRED Electrical supply S24MA 220/240/1ph/50Hz

OVERALL DIMENSIONS: Length (4M) 5.70m, Width 0.71m, Height 2.0m

ZM8116 RAINFALL HYDROGRAPHS DEMONSTRATION CAPABILITIES

storm hydrographs from single or multiple storms, storm hydrograph from a previously saturated catchment, storm runoff from an impermeable catchment, effect of a moving storm on flood hydrograph effect of reservoir storage on flood hydrograph, effect of land drains on flood hydrograph **TECHNICAL SPECIFICATION:** Tank dimensions Length 1.2m, Width 0.6m, Height 0.2m. Flow meter range 0.4 4.4 litres/min, Runoff

collector 17 x 0.5l compartments. The tank is 1.2m in length x 0.8m wide x0.2m deep. The flow range is 0.4 to 4.4 litres/minute.

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ZM8118 Flume with hydraulic bench

TECHNICAL DETAILS

Width of working section 77mm. Depth of working section 150mm Length of working section 1100mm. Maximum operating flowrate 1.6 litres/sec. ESSENTIAL ACCESSORIES: Hydraulics Bench. RECOMMENDED INSTRUMENTS: Stopwatch. COMPLEMENTARY PRODUCTS. Multi Purpose Teaching Flume, Glass Sided Tilting Flume

INSTRUCTIONAL CAPABILITIE

Connects to a standardHydraulics Bench to permit the study of the following basic aspects of fluid flow, Closed conduit flow, Application of the Bernoulli and Continuity equations to converging and diverging flow, Effect of gradual and sudden change sin cross section Using a contraction as a flow measuring device, Using a Pitot tube to measure velocity / velocity profile. Flow through a Culvert, Open channel flow, Flow beneath an Under shot Weir. Flow over Sharp Crested, Broad Crested and Ogee Weirs Using hydraulic structures to measure flow in an open channel Effect of changes in upstream and downstream water level, Characteristics of Clinging, Aerated, Depressed and Drowned Nappes, Subcritical, Critical and Supercritical flow/ depth. Changes in Specific Energy and control imposedby the minimum energy condition, Characteristics of Hydraulic Jumps, Force and energy conditions in a Hydraulic Jump,Flow patterns associated with Hydraulic Jumps Flow over Drop Structures / Energy Dissipation, Changes in flow profile in relation to the Froude Number, Observation of flow patterns associated with flow around hydraulic structures Velocity of gravity waves in shallow water / Formation of surface waves near critical depth, Project work – Evaluation of user constructed hydraulic structures

ORDERING SPECIFICATION

A floor standing flow channel for use with Hydraulics Bench. Working section 77mm wide, 150mm high and 1100mm long. Can be configured to demonstrate flow in open channels and closed conduits Clear acrylic sides for visibility of flow patterns created. Stilling arrangement at inlet to promote smooth flow into the working section. Section of bed can be elevated and locked at the required height. Discharge tank incorporates flow control valve for convenience in setting up. Total and static heads indicated on multitube manometer connected to Pitot tubes and tappings at three locations in working section. Pitot tubes mounted through bed of channel for ease of priming and height adjustment. Transparent scales allow measurement of all important heights. Models of hydraulic structures supplied include Undershot Weir at the inlet, Overshot Weir at the outlet, Sharp. Crested Weir, Broad Crested Weir and Ogee Weir. Suitable for project work with alternative structures. Optional direct reading flowmeter to aid setting up. Comprehensive instruction manual supplied.

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Fluid Mechanics Lab Equipment 6- Hydraulic Fluid Machinery

ZM7140 Comparison Pump

Technical details

Specification

Experiments relating to key issues in pump engineering, Comparison of various pump types centrifugal pump, piston pump, side-channel pump, Operation of centrifugal pumps in parallel or series configuration. Free position for additional pump, Three-phase AC motors for centrifugal pumps and additional motor with variable speed by frequency converter

1. Description

The experiments familiarise students with various pump types, such as centrifugal and positive displacement pumps. The trainer includes two centrifugal pumps, one piston pump as a positive displacement pump and a self-priming side-channel pump. The side-channel pump works primary as a centrifugal pump and, depending on liquid level, can also act as a Positive displacement pump. This means, as a special feature, the side-channel pump also permits gases to be pumped. The pump is investigated pumps water in a closed circuit. In the process, the performance data of the pump and pressure losses in the pipeline are recorded. The centrifugal pumps can also be operated in parallel or in series configuration. Each pump is driven by a All of the motors of the centrifugal pumps is variably adjustable by a frequency converter. All motors are mounted on swivel bearings, so the torque can be measured by way of a force sensor, enabling the mechanical drive power Output to be determined. One free position is followed equipped with a reversible three-phase AC motor with variable speed. This position can be used for mounting of any pump. Experiments demonstrate the basic operating lessons of various pump types.

2. Technical data

Centrifugal pump 2x, Max. flow rate (Q) 300L/min, Max. head (H) 16,9m, Nominal speed 2900min-1 Three-phase AC motor 2x, for centrifugal pump, Power output 1,1kW, Side-channel pump, self-priming, one-stage, Q 83, 3L/min, H 50m, Nominal speed 1450min-1, Three-phase AC motor for side-channel pump, Power output 1,1kW, Piston pump, Q 17L/min, H 60m, Nominal speed 405min-1, Three-phase AC motor for piston pump, Power output 0,55kW, Three-phase AC motor, additional motor, reversible Power output 0,75kW, Speed range 750...3000min-1, Measuring ranges, Flow rate 0...500L/min Pressure (inlet) -1...1,5bar, Pressure (outlet) 0...10bar, Torque 0...15Nm, Speed 0...3000min -1, Pump electrical power consumption 0...2kW, 400V, 50Hz, 3 phases, 400V, 60Hz, 3 phases, 230V, 60Hz, 3 phases

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SR-H47 Centrifugal Pump Test Set

A compact, mobile and fully self-contained centrifugal pump test set that allows students to find the characteristics of a centrifugal pump. It also allows them to see (and hear) cavitation and understand the use of a Venturi meter and differential pressure measurement to find flow rate.
A motor mounted in bearings drives the pump. The pump draws water from the integral reservoir. The water travels up through a valve and filter, through an inlet valve to the pump body. Then out through a delivery valve. It then passes through a Venturi meter and returns to the reservoir for re-use. This self-contained water supply keeps water consumption to a minimum. The optional stroboscope makes the effect easier to see. Instrument and control modules fit into a frame above and behind the pump. An electronic Motor Drive controls the pump speed. A strain gauge load cell measures the driving torque of the pump and a sensor measures pump speed. A display on the Motor Drive shows speed and torque and automatically calculates and displays true 'shaft' power. The differential pressure across the Venturi gives flow rate. The adjustable inlet and delivery valves allow students to create different operating conditions.
supply a Digital Pressure Display (DP1) as standard but offer an optional, additional easy-to-read Analogue Pressure Display. Both instruments display the inlet pressure, delivery pressure and differential pressure across the Venturi. Centrifugal pump performance and characteristics, typically head versus flow and efficiency versus flow Non-dimensional performance characteristics. Flow measurement using a Venturi tube Demonstration of cavitation

ZM7145 Characteristic variables of Hydraulic Turbo machine

Technical Data

Standard centrifugal pump:- max. head 23,9m - max. flow rate 31m³/h, Drive motor with variable speed- power output 2,2kW- speed range 0...3000min-1, Storage tank 250L, Measuring ranges:- pressure 2x 0...4bar abs.- flow rate 0...40m³/h torque 0...20Nm, - speed 2x 0...4000min-1 determining characteristic variables of a centrifugal pump

determining characteristic variables of water turbines together with the accessories pelton turbine and Francis turbine, experiments on a pump in a closed water circuit with storage tank and flow control valve to adjust the back pressure, experiments on turbines closed water circuit for supplying turbines
pipes and fittings made of PVC, 3-phase AC motor for pump with variable speed via frequency converter non-contact speed measurement at the turbine shaft and force sensor at the brake for measuring the torque, digital displays for pressures, flow rate, speed and torque.

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SR3152 Oil volumetric pump study bench

Equipment composition

Aluminum profile frame structure, bottom with universal wheel, flexible movement. There are three pumps, one piston pump, one gear pump, one rotating blade pump, oil storage tank and piping system. Experimental contents The characteristic test and operation

Experimental contents The characteristic test and operation of the three pumps are compared, the circuit pressure, temperature and flow measurement of different pumps are determined, and the electrical parameters of different pumps are determined. The bench is equipped by 3 pumps one piston pump, one gear pump and a rotary vane pump. It allows the study of the characteristics and the performances of the volumetric pumps. The bench is composed of Mobile frame equipped by an oil reservoir. 3 pumps one piston pump, one gear pump and one rotary vane pump. Pump motor with speed controller. Temperature measurement sensor. Pressure measurement sensor. Flow rate measurement sensor. Consumed electric power measurement sensor. The necessary accessories for the efficient functioning. Power supply 220V/380V/50Hz.

Fluid Mechanics Lab Equipment 7- Fluid Energy

SR-HM 430C Francis turbine trainer

Learning objectives/experiments

investigation of the conversion of hydraulic into mechanical energy determination of the mechanical power and hydraulic power of the turbine, determination of efficiency, recording of characteristic curves, investigation of the influence of the guide vane position velocity triangles

Description: characteristics of a powerful Francis turbine, optimal view of the operating area of the turbine adjustable guide vanes for setting the output The Francis turbine belongs to the reaction turbines which convert pressure energy of the working medium into kinetic energy in the guide vanes and in the rotor. Francis turbines are used for medium heads. The turbine power is controlled by adjusting the guide vanes. In practice, Francis turbines are used in run-of-river power plants and in pumped storage plants. enables examinations of the function and operating behaviour of a Francis turbine. The dimensions of the trainer guarantee realistic measured values. By adjusting the guide vanes the angle of attack, the cross-section and thus the output of the turbine are changed. An asynchronous machine is used as a generator for loading the turbine. A pump with variable speed via frequency converter provides for an energy efficient operation. The speed of the turbine is recorded by means of an inductive, non-contact

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position sensor at the generator shaft. The generator is equipped with a pendulum bearing and with a force sensor to determine the torque. The pressures at the inlet and outlet of the turbine, the temperature and the flow rate are recorded by sensors. The measured values are displayed digitally and can be processed further on a PC. **Specification**

[1] investigation of a Francis turbine, [2] closed water circuit with pump, motor, flow control valve and tank with optional cooling, [3] pump with variable speed via frequency converter, [4] adjustment of flow rate via flow control valve, [5] loading the turbine by use of the asynchronous machine as generator [6] rotor and guide vanes of the turbine completely visible, [7] adjustable guide vanes for setting different angles of attack, [8] non-contact speed measurement at the generator haft and force sensor for measuring the driving torque, [9] digital display for temperature, flow rate and ressures, speed, torque and electrical power of generator SR-HM170 Open wind Tunnel

SR461 Kaplan Turbine Trainer

1 Description

Water turbines are turbo machines which convert water energy into mechanical energy. Mostly, they are used for driving generators for power generation purposes. The Kaplan turbine is a reaction turbine with an axial through flow. It has a high specific speed and is suitable for large water Flows and small to medium heads., the Kaplan turbine is used as a "classic" water turbine in run-of-the-river power plants

The SR461 helps to investigate the characteristic behaviour of a simple-regulated Kaplan turbine during operation. The trainer is provided with a closed water circuit with tank, submersible pump and throttle valve for adjusting the flow rate. The angle of attack of the rotor, And thus the power output of the turbine, are changed by adjusting the guide vanes. For determining the turbine power, the eddy current brake is equipped with a force sensor for torque measurement. The pressures at the inlet and outlet of the turbine

2 Technical details: 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**.** Rotor with fixed blades, 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

3 Contained components: Kaplan turbine, Max. output 1000W, Max. speed 3700min-1, Distributor, 8 guide vanes, adjustable -15°...45°, External Ø 120mm, Internal Ø 60mm, Rotor, 4 blades, fixed, External Ø 120mm, Internal Ø 60mm, Pitch 80mm, Submersible pump with motor, Max. flow rate 250m3/h, Max. pump head 11m**,** Nominal power 3,1kW, Tank approx. 350L, Measuring ranges, Temperature 0...100°C, Pressure (at turbine inlet) 0...1bar rel. Pressure (at turbine outlet) -1...0,6bar rel. Flow rate 13...200m3/h. Torque 0...10Nm, Speed 0...6500min-1, 400V, 50Hz, 3 phases

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