HIDROLOGÍA. MÓDULO MEDIO

Ref: 1311

ITEM	REFERENCIA	DESCRIPCIÓN	CANT.
1	ESHC(2X1M)	EQUIPO DE SISTEMAS HIDROLOGICOS, SIMULADOR DE LLUVIA Y SISTEMAS DE RIEGO (2X1M) , CONTROLADO DESDE COMPUTADOR (PC), COMPUESTO POR:	1
	ESHC(2X1M).Unit	EQUIPO DE SISTEMAS HIDROLOGICOS, SIMULADOR DE LLUVIA Y SISTEMAS DE RIEGO (2X1M)	1
	ESHC(2X1M)/CIB	CAJA-INTERFACE DE CONTROL ELECTRÓNICA PARA EQUIPO DE SISTEMAS HIDROLOGICOS, SIMULADOR DE LLUVIA Y SISTEMAS DE RIEGO (2X1M)	1
	DAB	TARJETA DE ADQUISICION DE DATOS	1
	ESHC(2X1M)/CCSOF	SOFTWARE DE CONTROL DESDE COMPUTADOR + ADQUISICION DE DATOS + MANEJO DE DATOS PARA EQUIPO DE SISTEMAS HIDROLOGICOS, SIMULADOR DE LLUVIA Y SISTEMAS DE RIEGO (2X1M)	1
2	ESHC/CAL	SOFTWARE DE APRENDIZAJE ASISTIDO DESDE COMPUTADOR PARA EQUIPO DE SISTEMAS HIDRALÓGICAS, SIMULADOR DE LLUVIA Y SISTEMAS DE RIEGO (CÁLCULO Y ANÁLISIS DE RESULTADOS)	1
3	ESHC/SIM	SOFTWARE DE SIMULACIÓN DE HIDRALÓGICAS, SIMULADOR DE LLUVIA Y SISTEMAS DE RIEGO	1
4	PAHSC	EQUIPO DE SUCCION DE ARENA Y HUMEDAD DE SUELOS, CONTROLADO DESDE COMPUTADOR (PC), COMPUESTO POR:	1
	PAHSC.Unit	EQUIPO DE SUCCIÓN DE ARENA Y HUMEDA DE SUELOS	1
	PAHSC/CIB	CAJA-INTERFACE DE CONTROL ELECTRONICA PARA EQUIPO DE SUCCION DE ARENA Y HUMEDAD DE SUELOS	1
	DAB	TARJETA DE ADQUISICION DE DATOS	1
	PAHSC/CCSOF	SOFTWARE DE CONTROL DESDE COMPUTADOR + ADQUISICION DE DATOS + MANEJO DE DATOS PARA EQUIPO DE SUCCION DE ARENA Y HUMEDAD DE SUELOS	1
5	PAHSC/CAL	SOFTWARE DE APRENDIZAJE ASISTIDO DESDE COMPUTADOR PARA EQUIPO DE SUCCIÓN DE ARENA Y HUMEDA DE SUELOS (CÁLCULO Y ANÁLISIS DE RESULTADOS)	1
6	PAHSC/SIM	SOFTWARE DE SIMULACIÓN DE SUCCION DE ARENA Y HUMEDAD DE SUELOS	1
7	PDSC	DEPOSITO DE SEDIMENTACIÓN , CONTROLADO DESDE COMPUTADOR (PC)	1
	PDSC.Unit	DEPOSITO DE SEDIMENTACIÓN	1
	PDSC/CIB	CAJA-INTERFACE DE CONTROL ELECTRÓNICA PARA DEPOSITO DE SEDIMENTACION	1
	DAB	TARJETA DE ADQUISICION DE DATOS	1
	PDSC/CCSOF	SOFTWARE DE CONTROL DESDE COMPUTADOR + ADQUISICIÓN DE DATOS + MANEJO DE DATOS PARA DEPOSITO DE SEDIMENTACION	1

ITEM	REFERENCIA	DESCRIPCIÓN	CANT.
8	PDSC/CAL	SOFWARE DE APRENDIZAJE ASISTIDO DESDE COMPUTADOR PARA DEPOSITO DE SEDIMENTACIÓN (CÁLCULO Y ANÁLISIS DE RESULTADOS)	1
9	PDSC/SIM	SOFTWARE DE SIMULACIÓN DE DEPOSITO DE SEDIMENTACIÓN	1
10	PEFP	FLUIDIZACION Y PERMEABILIDAD	1
11	PEFP/CAL	SOFTWARE DE APRENDIZAJE ASISTIDO DESDE COMPUTADOR PARA FLUIDIZACION Y PERMEABILIDAD (CÁLCULO Y ANÁLISIS DE RESULTADOS)	1
12	1311PARTS	COMPONENTES Y REPUESTOS	1
13	1311PA	PARTIDA ALZADA	1
14	1311IYPM	INSTALACIÓN Y PUESTA EN MARCHA	1
15	1311CAPRO	CAPACITACIÓN Y ACTUALIZACIÓN DE PROFESORES	1
16	1311TD	TÉCNICAS DIDÁCTICAS "KNOW-HOW"	1
17	1311MANU	DOCUMENTACIÓN Y MANUALES	1

Notas:

a)Opción de multipuesto:

* Este módulo tiene una unidad solamente en cada item, nosotros podemos recomendar el número de unidades para que 10 o 20 estudiantes puedan trabajar simultáneamente.

b)Condiciones de suministro:

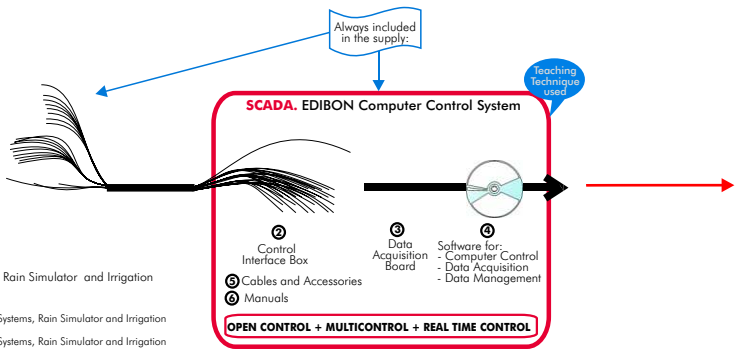
* Condiciones técnicas:
  - Adaptación de los laboratorios.
  - Instalación de todos los equipos.
  - Puesta en marcha de todos los equipos.
  - Entrenamiento de cada uno de los ejercicios a ser realizados con cada uno de los equipos.
  - Formación de profesores, relacionada con cada equipo didáctico y cada una de las técnicas de enseñanza aplicada.
  - Transferencia de tecnología.

* Condiciones comerciales:
  - Embalaje.
  - Gastos de financiación.
  - Gastos C.I.F.

* Otras condiciones:
  - 8 Manuales para cada uno de los equipos didácticos de EDIBON:
    . Manual de servicios requeridos.
    . Manual de montaje e instalación.
    . Manual de la interface y del software/consola de control.
    . Manual de puesta en marcha.
    . Manual de normas de seguridad.
    . Manual de prácticas.
    . Manual de mantenimiento.
    . Manual de calibración.

Ver catálogos en las páginas siguientes

ESHC. Computer Controlled **Hydrologic Systems, Rain Simulator and Irrigation Systems Unit** *



① Unit: ESHC. Hydrologic Systems, Rain Simulator and Irrigation Systems Unit.
Versions available:
- ESHC (2x1m). Hydrologic Systems, Rain Simulator and Irrigation Systems Unit (2x1m).
- ESHC (4x2m). Hydrologic Systems, Rain Simulator and Irrigation Systems Unit (4x2m).

SPECIFICATIONS SUMMARY

Items supplied as standard

① ESHC Unit:
There are two versions:
ESHC (2x1m). Hydrologic Systems, Rain Simulator and Irrigation Systems Unit (2x1m).
ESHC (4x2m). Hydrologic Systems, Rain Simulator and Irrigation Systems Unit (4x2m).
Diagram in the front panel with similar distribution that the elements in the real unit.
Test tank, which is a large sized tank that provides a large working surface:
For ESHC(2x1m): tank dimensions: L=2m, W=1m.
For ESHC(4x2m): tank dimensions: L=4m, W=2m.
Storage tanks, that supply the water required:
For ESHC (2x1m) = two 400 litres tanks.
For ESHC (4x2m) = four 400 litres tanks.
2 porous "well" tubes. Drain. Water outlet river simulation. 2 Over flow outlet pipes. Filter. Single-phase motor pump with 7 bar at maximum pressure, 100 l/min as maximum flow. Rain simulator comprised of 8 spray nozzles, and 2 showers. 3 outlet tanks for the flow measurement in the drains and wells. 6 water inlet valves (2 auxiliary inlets, rain inlet, river inlet, 2 french wells inlets). 2 Independent flexible pipes. 34 Pressure sensors. 27 Sample capturing takings. 7 Flow sensors (orifice plate). Load Cell. Pump with speed control.

② ESHC/CIB. Control Interface Box :
With process diagram in the front panel. The unit control elements are permanently computer controlled. Simultaneous visualization in the computer of all parameters involved in the process. Calibration of all sensors involved in the process. Real time curves representation. All the actuators' values can be changed at any time from the keyboard. Shield and filtered signals to avoid external interferences. Real time control with flexibility of modifications from the computer keyboard of the parameters, at any moment during the process. Open control allowing modifications, at any time and in a real time, of parameters involved in the process. 3 safety levels: mechanical in the unit, electronic in control interface and the third one in the control software.

③ DAB. Data Acquisition Board:
PCI Data acquisition National Instruments board to be placed in a computer slot. 16 Analog inputs. Sampling rate up to: 250 KS/s. 2 Analog outputs. 24 Digital Inputs/Outputs.

④ ESHC/CCSOF. Computer Control + Data Acquisition + Data Management Software:
Flexible, open and multicontrol software. Management, processing, comparison and storage of data. Sampling velocity up to 250,000 data per second. It allows the registration of the alarms state and the graphic representation in real time.

⑤ Cables and Accessories, for normal operation.

⑥ Manuals: This unit is supplied with 8 manuals.

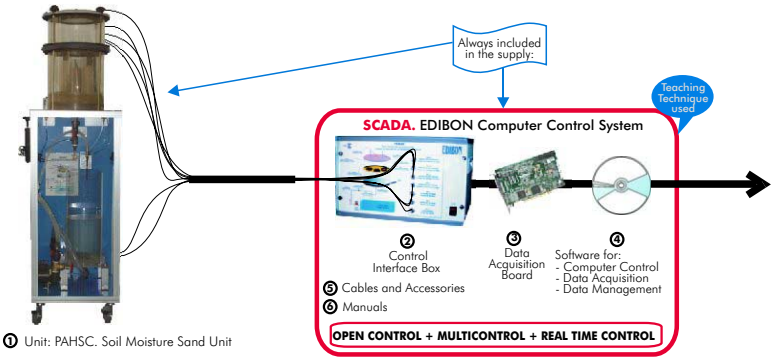
Dimensions (approx.) = ESHC (2x1m) Unit : 2700 x 1500 x 1800 mm. Weight: 950 Kg.
ESHC (4x2m) Unit : 4600 x 2250 x 1800 mm. Weight: 1990 Kg.
Control Interface: 490x330x310 mm. Weight: 20 Kg.

More information in: www.edibon.com/products/catalogues/en/units/environment/waterhandling/ESHC(2x1m).pdf

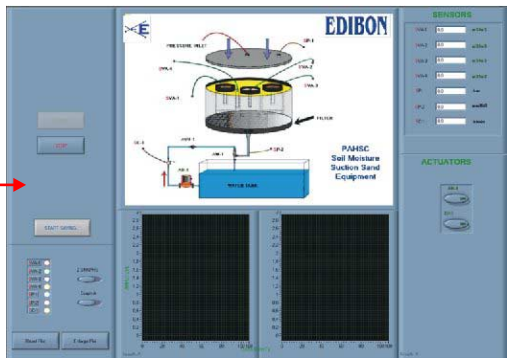
PRACTICAL POSSIBILITIES

1.- Determination of the superficial dragging.
2.- Hydrograph curve, Strong storm.
3.- Calculation of concentration time for a short storm.
4.- Storm hydrographs from single or multiple storms.
5.- Storm hydrograph from a previously saturated catchment.
6.- Storm runoff from an impermeable catchment.
7.- Drainage density determination
8.- Effect of a moving storm flood hydrograph.
9.- Effect of a reservoir storage on flood hydrograph.
10.- Effect of land drains on flood hydrograph.
11.- Reservoir filling and flooding.
12.- Gravity force of water.
13.- Fluvial-mechanical experiments.
14.- Model stream flow in alluvial material.
15.- Sediment transport in river models.
16.- Formation and development of river features over time.
17.- Meandering river.
18.- Erosion on river beds and current speed.
19.- Sediment transport, bedload motion, scour and erosion.
20.- Underground water capture studies.
21.- Well depression cone.
22.- Interaction of depression cones by two adjoining wells.
23.- Well in the centre of a circular island.
24.- Draw-down curves for one well and two wells systems.
Other possible practices:
25.- Sensors calibration.
26-44.- Practices with PLC.

PAHSC. Computer Controlled **Soil Moisture Suction Sand Unit** *



① Unit: PAHSC. Soil Moisture Sand Unit



SPECIFICATIONS SUMMARY

Items supplied as standard

① PAHSC Unit:
Anodized aluminium structure. Diagram in the front panel with similar distribution that the elements in the real unit. Suction system. Pump. Water jet pump. Water tank. Circular tank filled with sand. Filter. Soil samples. Sensors: 2 of pressure, 4 of water volume and 1 of flow.

② PAHSC/CIB. Control Interface Box :
With process diagram in the front panel. The unit control elements are permanently computer controlled. Simultaneous visualization in the computer of all parameters involved in the process. Calibration of all sensors involved in the process. Real time curves representation. All the actuators' values can be changed at any time from the keyboard. Shield and filtered signals to avoid external interferences. Real time control with flexibility of modifications from the computer keyboard of the parameters, at any moment during the process. Open control allowing modifications, at any time and in a real time, of parameters involved in the process. 3 safety levels: mechanical in the unit, electronic in control interface and the third one in the control software.

③ DAB. Data Acquisition Board:
PCI Data acquisition National Instruments board to be placed in a computer slot. 16 Analog inputs. Sampling rate up to: 250 KS/s. 2 Analog outputs. 24 Digital Inputs/Outputs.

④ PAHSC/CCSOF. Computer Control + Data Acquisition + Data Management Software:
Flexible, open and multicontrol software. Management, processing, comparison and storage of data. Sampling velocity up to 250,000 data per second. It allows the registration of the alarms state and the graphic representation in real time.

⑤ Cables and Accessories, for normal operation.

⑥ Manuals: This unit is supplied with 8 manuals.

Dimensions (approx.) = Unit: 400 x 500 x 1200 mm. Weight: 90 Kg. Control Interface: 490x330x310 mm. Weight: 10 Kg.

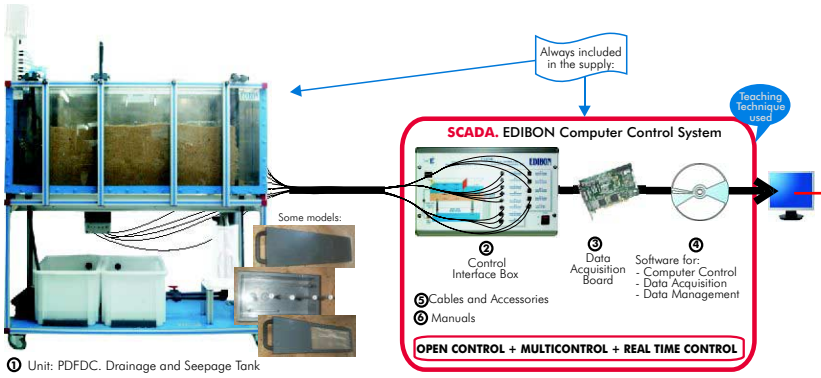
More information in: www.edibon.com/products/catalogues/en/units/environment/waterhandling/PAHSC.pdf

PRACTICAL POSSIBILITIES

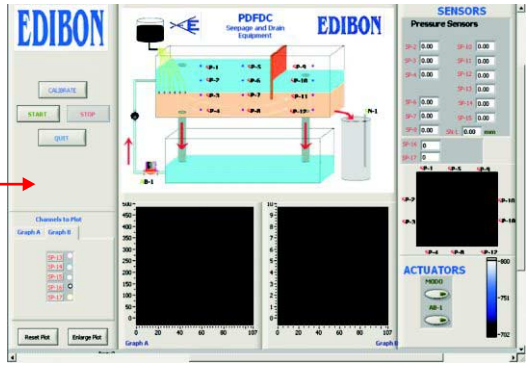
1.- To understand the relationship between water retentivity and soil.
2.- To understand the basic principles of water retentivity in terms of soil suction.
3.- Derive soil moisture characteristic curves for several soils.
4.- Effect of the atmospheric pressure.
Other possible practices:
5.- Sensors calibration.
6-24.- Practices with PLC.

* Non computer controlled version available.

PDFDC. Computer Controlled **Drainage and Seepage Tank** *



① Unit: PDFDC. Drainage and Seepage Tank



SPECIFICATIONS SUMMARY

Items supplied as standard

① PDFDC Unit:
Anodized aluminium structure. Diagram in the front panel with similar distribution that the elements in the real unit. Rectangular tank, with front side in methacrylate and back in stainless steel, containing sand. Water tank. Pump. Control valve. 12 Pressure sensors. Level sensor. Dye injection system.
A selection of models: seepage under a sheet pile wall, seepage through an earth dam, seepage through a phreatic layer, manometric probes bank under a dam.

② PDFDC/CIB. Control Interface Box :
With process diagram in the front panel. The unit control elements are permanently computer controlled. Simultaneous visualization in the computer of all parameters involved in the process. Calibration of all sensors involved in the process. Real time curves representation. All the actuators' values can be changed at any time from the keyboard. Shield and filtered signals to avoid external interferences. Real time control with flexibility of modifications from the computer keyboard of the parameters, at any moment during the process. Open control allowing modifications, at any time and in a real time, of parameters involved in the process. 3 safety levels: mechanical in the unit, electronic in control interface and the third one in the control software.

③ DAB. Data Acquisition Board:
PCI Data acquisition National Instruments board to be placed in a computer slot. 16 Analog inputs. Sampling rate up to: 250 KS/s. 2 Analog outputs. 24 Digital Inputs/Outputs.

④ PDFDC/CCSOF. Computer Control+Data Acquisition+Data Management Software:
Flexible, open and multicontrol software. Management, processing, comparison and storage of data. Sampling velocity up to 250,000 data per second. It allows the registration of the alarms state and the graphic representation in real time.

⑤ Cables and Accessories, for normal operation.

⑥ Manuals: This unit is supplied with 8 manuals.

Dimensions (approx.) =Unit: 1600 x 600 x 1500 mm. Weight: 190 Kg. Control Interface: 490x330x310 mm. Weight: 10 Kg.

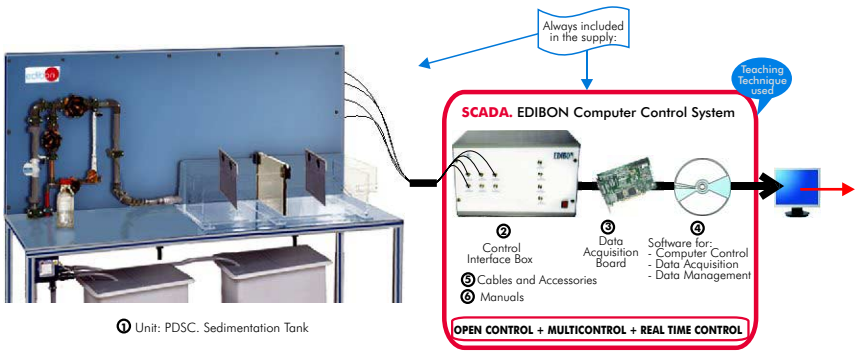
More information in: www.edibon.com/products/catalogues/en/units/environment/waterhandling/PDFDC.pdf

PRACTICAL POSSIBILITIES

1.- Flow net construction.
2.- Flow line visualisation
3.- Verification of Darcy´s Law.
4.- Comparison of experimental results with analytical solutions.
5.- To determine seepage rates.
6.- Seepage through an earth dam.
7.- Seepage underneath a sheet pile wall.
8.- Control of seepage through permeable soils by sub-soil drainage.
9.- To reduce uplift pressure and lateral thrust by drainage.
10.- Distribution of uplift pressure on hydraulic structures.
11.- Behaviour & Formation of "Quicksand".
12.- To drain an excavation site using wells.
13.- Stability of an earth dam.

Other possible practices:
14.- Sensors calibration.
15-33.- Practices with PLC.

PDSC. Computer Controlled **Sedimentation Tank** *



① Unit: PDSC. Sedimentation Tank

SPECIFICATIONS SUMMARY

Items supplied as standard

① PDSC Unit:
Unit designed to demonstrate the hydraulic characteristics and settling efficiencies of a model settling basin. Anodized aluminium structure. Main metallic elements in stainless steel. Diagram in the front panel with similar distribution that the elements in the real unit. Settling tank (1000 x 400 x 250 mm. approx.). Baffle plate. Sediment sump tank (capacity 140 l. approx.) . Pump and motor. Flow sensors. Dye injection system to allow hydraulic tracer and flow visualization studies. Flow sparge device to continuously agitate the mix. Valves.

② PDSC/CIB. Control Interface Box :
With process diagram in the front panel. The unit control elements are permanently computer controlled. Simultaneous visualization in the computer of all parameters involved in the process. Calibration of all sensors involved in the process. Real time curves representation. All the actuators' values can be changed at any time from the keyboard. Shield and filtered signals to avoid external interferences. Real time control with flexibility of modifications from the computer keyboard of the parameters, at any moment during the process. Open control allowing modifications, at any time and in a real time, of parameters involved in the process. 3 safety levels: mechanical in the unit, electronic in control interface and the third one in the control software.

③ DAB. Data Acquisition Board:
PCI Data acquisition National Instruments board to be placed in a computer slot. 16 Analog inputs. Sampling rate up to: 250 KS/s. 2 Analog outputs. 24 Digital Inputs/Outputs.

④ PDSC/CCSOF. Computer Control+Data Acquisition+Data Management Software:
Flexible, open and multicontrol software. Management, processing, comparison and storage of data. Sampling velocity up to 250,000 data per second. It allows the registration of the alarms state and the graphic representation in real time.

⑤ Cables and Accessories, for normal operation.

⑥ Manuals: This unit is supplied with 8 manuals.

Dimensions (approx.) = Unit: 2000 x 600 x 1500 mm. Weight: 250 Kg. Control Interface: 490x330x310 mm. Weight: 10 Kg.

More information in: www.edibon.com/products/catalogues/en/units/environment/waterhandling/PDSC.pdf

PRACTICAL POSSIBILITIES

1.- Study of the effect of flow rate, inlet water temperature and baffle position on dispersion.
2.- Measuring sediment removal efficiencies and relating these to the hydraulic characteristics.
3.- To measure the flow short-circuiting and dead space using a tracer.
4 .- Comparison of real flow regimes with idealised flow models.

Other possible practices:
5 .- Sensors calibration.
6-24.- Practices with PLC.

* Non computer controlled version available.

PL. **Demonstration Lysimeter**

SPECIFICATIONS SUMMARY

Unit designed for the measurement of evapotranspiration by water-balance method.

Anodized aluminium structure. Panels and main metallic elements in stainless steel. Diagram in the front panel with similar distribution that the elements in the real unit.

Base and inner disc to support soil filled recipient and plant. Hydraulic sensing device located in the base, connected to a graduated water column. Water column (graduated) mounted above the lysimeter. Three 300 mm. diameter containers. Each container can then in turn be placed on a hydraulically mounted plate which is used to monitor system weight changes arising for evapotranspiration. Calibration weights.

Cables and accessories, for normal operation.

Manual: This unit is supplied 8 Manuals.

Dimensions (approx.) = 470 x 450 x 1700 mm. Weight: 60 Kg.

More information in: www.edibon.com/products/catalogues/en/units/environment/waterhandling/PL.pdf

PRACTICAL POSSIBILITIES

1.- Study of the measurement of evapotranspiration by water-balance method.
2.- To use lysimeter unit.
3.- To determine plant water usage.
4.- To understand the relationship between reference maximum and actual transpiration.

PPD. **Drain Permeameter**

SPECIFICATIONS SUMMARY

Unit designed for the study and laboratory investigation of field drain filter materials.
This drain permeameter is suited for use both as a teaching and demonstration unit and for laboratory testing and research.
Anodized aluminium structure. Panels and main metallic elements in stainless steel. Diagram in the front panel with similar distribution that the elements in the real unit.
Transparent acrylic column of 100mm diameter, supported on a stand.
Removable test section at the base of the column to house the filter medium to be tested.
Cables and accessories, for normal operation.
Manual: This unit is supplied 8 Manuals.
Dimensions (approx.) = 400 x 400 x 1100 mm. Weight: 50 Kg.

More information in: www.edibon.com/products/catalogues/en/units/environment/waterhandling/PPD.pdf

PRACTICAL POSSIBILITIES

1.- Investigation of drain filter materials.
2.- To select optimum filter/ soil combinations.
3.- To determine relative efficiences of drain filter materials

PEIF. **Filterability Index Unit**

SPECIFICATIONS SUMMARY

The Filterability Index Unit(PEIF) enables a water quality test to be made on a suspension to be filtered through sand or similar granular media.
It utilises a bed of granular material, normally sand, which can be chosen by the student to suit his own purposes.
The measurements taken with this unit enable a filterability number to be calculated which has significance in deep bed filter performance.
Anodized aluminium structure. Panels and main metallic elements in stainless steel. Diagram in the front panel with similar distribution that the elements in the real unit.
Bench top unit. 1 l. vessel connected by transparent tubing to a 60 mm high filter unit. A needle valve controls flow, which is observed on a variable area flow meter. A 0.5 m water manometer measures head loss. Test filter cell diameter: 38 mm. Flow meter range: 20-280ml/min. The filter unit can be demounted. This unit and all tubing connections are transparent so that the operation can be observed and air bubbles avoided. 1 l. glass beaker(to collect filtrate). 1 l. measuring cylinder. 1 thermometer. 1 stopwatch.
Cables and accessories, for normal operation.
Manual: This unit is supplied 8 Manuals.
Dimensions (approx.) = 500 x 400 x 1000 mm. Weight: 35 Kg.

More information in: www.edibon.com/products/catalogues/en/units/environment/waterhandling/PEIF.pdf

PRACTICAL POSSIBILITIES

1.- To study the basic principles of filter operation.
2.- Procedure for filtration.
3.- Calculation of filterability index number from measurements taken.
4.- To measure the filterability of a given suspension performance of a standard water quality test.
5.- Preliminary assessment of pre-treatment processes and filter media.
6.- Flow through permeable layers.
7.- Deep bed filtration of suspensions with different particle layers.
8.- Filtration characteristics.

PEFP. **Permeability/Fluidisation Studies Unit**

SPECIFICATIONS SUMMARY

Unit to verify Darcy's Law, to examine Kozeny's equation and to observe liquid fluidisation behaviour of a granular bed.
Anodized aluminium structure. Main metallic elements in stainless steels. Diagram in the front panel with similar distribution that the elements in the real unit.
Permeameter: transparent acrylic cylinder of 50 mm. diameter, 500 mm. length.
2 Filter metallic disks. 4 Piezometer taps located along the vertical axis of the cylinder, distance between two taking is 125 mm. Piezometric taking collector.
Piezometer or Manometer: 1 of water: 500 mm. length.
2 Manometers, Bourdon type, of 0-1000 mm H_2O.
Constant head supply device: max. height variation: 500 mm.
Flowmeter: 2 l/min. max.
Sand of different diameters.
Cables and accessories for normal operation.
Manual: This unit is supplied 8 Manuals.
Dimensions (approx.) = 850 x 400 x 1100 mm. Weight: 70 Kg.

More information in: www.edibon.com/products/catalogues/en/units/environment/waterhandling/PEFP.pdf

PRACTICAL POSSIBILITIES

1.- Pressure drop measurements and correlations for flow through packed beds.
2.- To calculate the density of each specimen.
3.- To calculate the relative density of specimen mixing.
4.- Study and verification of Carman-Kozeny´s equation.
5.- Calculation the void ratio.
6.- To determine the permeability constant (Darcy´s Law).
7.- Observation of a liquid fluidised bed.
8.- Characteristic of a liquid fluidised bed.
9.- Attrition test.
10.- Measurement of permeability of selected solids.