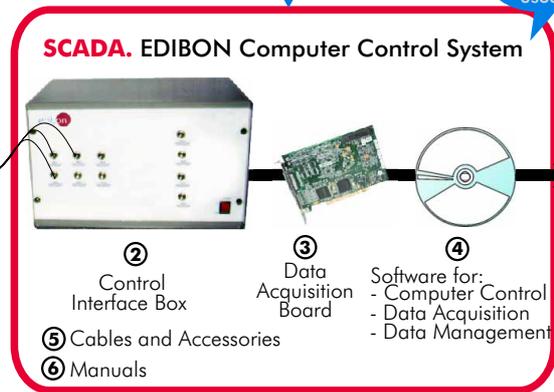


EDIBON PATENT



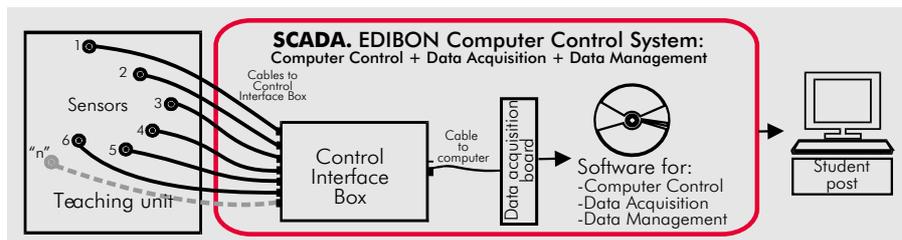
① Unit: PDSC. Sedimentation Tank

Always included in the supply:



Teaching Technique used

**OPEN CONTROL
+
MULTICONTROL
+
REAL TIME CONTROL**



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Units
13.-Environment

DESCRIPTION

PDSC is a teaching unit designed by EDIBON to demonstrate the sedimentation process and to familiarize with the settling principle of discrete or flocculated particles settling into a tank. It will also allow to study the hydraulic characteristics of a rectangular sedimentation tank which works in continuous.

As it is a laboratory unit, it allows to obtain valid conclusions about its operation and to apply them to the operation of a real scale unit.

The great advantage of the PDSC unit is that its sedimentation tank is made in transparent methacrylate. So, this allows the student to understand the sedimentation principles. This fact allows to carry out several practices, as well as to make easier the comprehension of the different variables influence on the process.

The practices start preparing a suspension in the suspended solids tank, placed at the unit lower part. A pump drives the suspension from the suspended solids tank to the sedimentation tank with a flow selected by using a regulation valve. This suspension is mixed with clean water at the sedimentation tank inlet. The clean water flow is controlled by using a regulation valve and flow sensor.

Once the fluids are mixed, the current is passed into the sedimentation tank through the inlet weir. Here, the solids in suspension settle at the bottom.

The clarified water outlet is produced through the outlet weir at the tank outlet section. In this tank outlet section there is a flexible pipe on which the outlet clarified water quality can be analyzed.

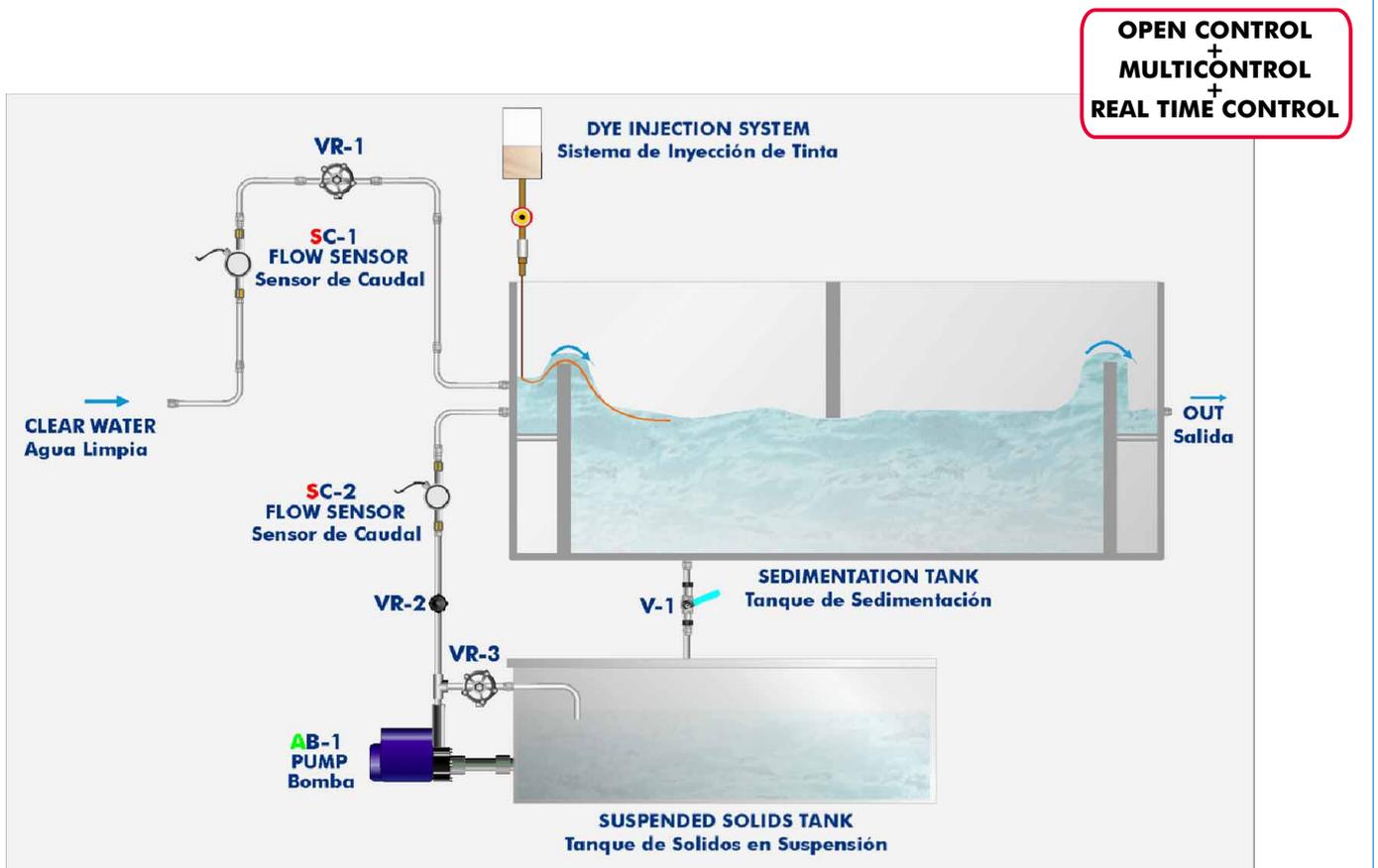
The unit has a dye injection and tracer system, which allows to study the fluid current lines into the sedimentation tank.

It also has two adjustable in height baffle plates, which can be placed at any point of the tank length, what makes easier for the student the possibility of changing the flow lines direction and its study.

As support to carry out the practices, the following accessories are supplied: two Imhoff cones and a graduated test tube of 1 litre.

This Computer Controlled Unit is supplied with the EDIBON Computer Control System (SCADA), including: Control Interface Box + Data Acquisition Board + Computer Control and Data Acquisition Software, for controlling the process and the parameters involved.

PROCESS DIAGRAM AND ELEMENTS ALLOCATION



Note: AB= Pump. SC= Flow sensor. VR= Regulation valve. V= Valve.

Items supplied as standard

① PDSC. Unit:

Anodized aluminium structure and panels in painted steel (epoxy paint).
 Main metallic elements in stainless steel.
 Diagram in the front panel with similar distribution to the elements in the real unit.
 Sedimentation tank, made in transparent methacrylate. Length: 1000 mm;
 width: 400 mm; height: 250 mm.
 Suspended solids installation, composed of:
 - Suspended solids tank of 140 litres.
 - Centrifugal pump, computer controlled. Flow up to 80 l./min.
 - Flow regulation valve.
 - Flow sensor.
 Clean water installation, composed of:
 - Flow regulation valve.
 - Flow sensor.
 Dye injection and tracer system, which allows to study the fluid current lines into the sedimentation tank.
 2 Baffle plates, adjustable in height, what makes easier for the student the possibility of changing the flow lines direction and its study.
 Sensor for measuring the inlet water temperature.
 Accessories included:
 - 2 Imhoff cones of 1000 ml., to measure the solids concentrations.
 - Graduated test tube of 1 litre.
 The unit incorporates wheels for its mobility.



PDSC. Unit

② PDSC/CIB. Control Interface Box:

Control interface box with process diagram in the front panel and with the same distribution that the different elements located in the unit, for an easy understanding by the student.
 All sensors, with their respective signals, are properly manipulated from -10V. to +10V computer output.
 Sensors connectors in the interface have different pines numbers (from 2 to 16), to avoid connection errors.
 Single cable between the control interface box and computer.
 The unit control elements are permanently computer controlled, without necessity of changes or connections during the whole process test procedure.
 Simultaneously visualization in the computer of all parameters involved in the process.
 Calibration of all sensors involved in the process.
 Real time curves representation about system responses.
 Storage of all the process data and results in a file.
 Graphic representation, in real time, of all the process/system responses.
 All the actuators' values can be changed at any time from the keyboard allowing the analysis about curves and responses of the whole process.
 All the actuators and sensors values and their responses are placed in only one computer screen.
 Shield and filtered signals to avoid external interferences.
 Real time computer control with flexibility of modifications from the computer keyboard of the parameters, at any moment during the process. Real time computer control for pumps, compressors, resistances, control valves, etc.
 Open control allowing modifications, at any time and in a real time, of parameters involved in the process simultaneously.
 Three safety levels, one mechanical in the unit, other electronic in control interface and the third one in the control software.



PDSC/CIB

③ DAB. Data Acquisition Board:

PCI Data acquisition board (National Instruments) to be placed in a computer slot. Bus PCI.
Analog input: Channels= 16 single-ended or 8 differential. Resolution= 16 bits, 1 in 65536.
 Sampling rate up to: 250 KS/s (Kilo samples per second).
 Input range (V)=±10V. Data transfers=DMA, interrupts, programmed I/O. DMA channels=6.
Analog output: Channels=2. Resolution= 16 bits, 1 in 65536. Maximum output rate up to: 833 KS/s.
 Output range(V)=±10V. Data transfers=DMA, interrupts, programmed I/O.
Digital Input/Output: Channels=24 inputs/outputs. D0 or DI Sample Clock frequency: 0 to 1 MHz.
 Timing: Counter/timers=2. Resolution: Counter/timers: 32 bits.



DAB

④ PDSC/CCSOF. Computer Control+ Data Acquisition+ Data Management Software:

Compatible with actual Windows operating systems. Graphic and intuitive simulation of the process in screen.
 Compatible with the industry standards.
 Registration and visualization of all process variables in an automatic and simultaneously way.
 Flexible, open and multicontrol software, developed with actual windows graphic systems, acting simultaneously on all process parameters.
 Management, processing, comparison and storage of data.
 Sampling velocity up to 250,000 data per second guaranteed.
 Calibration system for the sensors involved in the process.
 It allows the registration of the alarms state and the graphic representation in real time.
 Comparative analysis of the obtained data, after the process and modification of the conditions during the process.
 Open software, allowing to the teacher to modify texts, instructions. Teacher's and student's passwords to facilitate the teacher's control on the student, and allowing the access at different work levels.
 This unit allows that the 30 students of the classroom can visualize simultaneously all results and manipulation of the unit, during the process, by using a projector.



PDSC/CCSOF

⑤ Cables and Accessories, for normal operation.

⑥ Manuals: This unit is supplied with 8 manuals: Required Services, Assembly and Installation, Interface and Control Software, Starting-up, Safety, Maintenance, Calibration & Practices Manuals.

*** References 1 to 6: PDSC + PDSC/CIB + DAB + PDSC/CCSOF + Cables and Accessories + Manuals are included in the minimum supply, enabling a normal operation.**

Additional and optional items to the standard supply

PLC. Industrial Control using PLC (7 and 8):

⑦ PLC-PI. PLC Module:

Circuit diagram in the front panel.

Front panel:

Digital inputs(X) and Digital outputs (Y) block:

16 Digital inputs, activated by switches and 16 LEDs for confirmation (red).

14 Digital outputs (through SCSI connector) with 14 LEDs for message (green).

Analog inputs block:

16 Analog inputs (-10V. to + 10V.)(through SCSI connector).

Analog outputs block:

4 Analog outputs (-10V. to + 10V) (through SCSI connector).

Touch screen:

High visibility and multiple functions.

Display of a highly visible status.

Recipe function.

Bar graph function.

Flow display function.

Alarm list.

Multi language function.

True type fonts.

Back panel:

Power supply connector.

Fuse 2A.

RS-232 connector to PC.

USB 2.0 connector to PC.

Inside:

Power supply outputs: 24 Vdc, 12 Vdc, -12 Vdc, 12 Vdc variable.

Panasonic PLC:

High-speed scan of 0.32 μsec. for a basic instruction.

Program capacity of 32 Ksteps, with a sufficient comment area.

Free input AC voltage(100 to 240 V AC).

DC input: 16 (24 VDC).

Relay output: 14 (250 V A AC/2 A).

High-speed counter.

Multi-point PID control.

Digital inputs/outputs and analog inputs/outputs Panasonic modules.

Communication RS232 wire, to computer (PC).

⑧ PDSC/PLC-SOF. PLC Control Software:

For this particular unit, always included with PLC supply.



PLC-PI

Items available on request

⑨ PDSC/CAL. Computer Aided Learning Software (Results Calculation and Analysis).

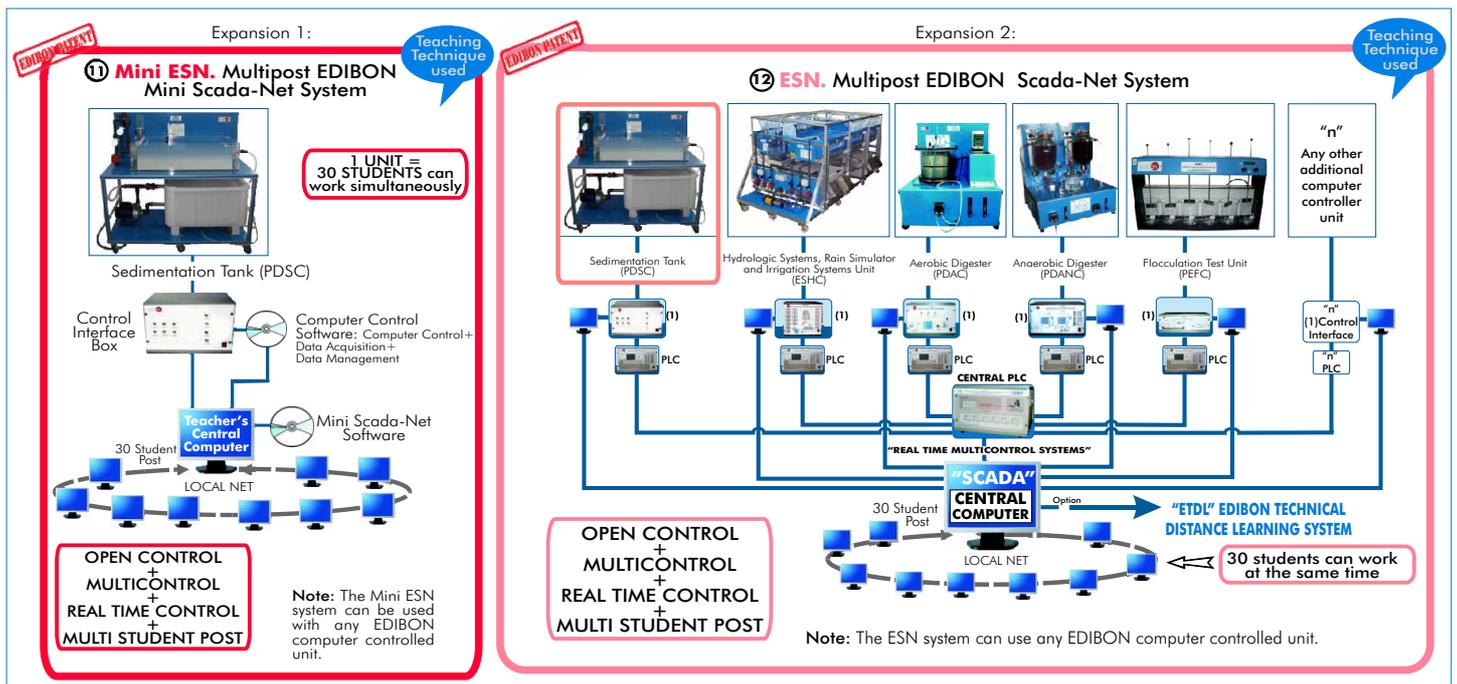
⑩ PDSC/FSS. Faults Simulation System.

EXERCISES AND PRACTICAL POSSIBILITIES

Some Practical Possibilities of the Unit:

- 1.- Study of the basic principles of solids in suspension separation.
- 2.- Efficiency of the separation by sedimentation process.
- 3.- Study of the current lines.
- 4.- Study of the effect of flow rate, inlet water temperature and baffle position on dispersion.
- 5.- Measuring sediment removal efficiencies and relating these to the hydraulic characteristics.
- 6.- To measure the flow short-circuiting and dead space using a tracer.
- 7.- Comparison of real flow regimes with idealised flow models.
- Other possible practices:
- 8.- Sensors calibration.
- Practices to be done by PLC Module (PLC-PI) + PLC Control Software:
- 9.- Control of the PDSC unit process through the control interface box without the computer.
- 10.- Visualization of all the sensors values used in the PDSC unit process.
- 11.- Calibration of all sensors included in the PDSC unit process.
- 12.- Hand on of all the actuators involved in the PDSC unit process.
- 13.- Realization of different experiments, in automatic way, without having in front the unit. (This experiment can be decided previously).
- 14.- Simulation of outside actions, in the cases do not exist hardware elements. (Example: test of complementary tanks, complementary industrial environment to the process to be studied, etc).
- 15.- PLC hardware general use and manipulation.
- 16.- PLC process application for PDSC unit.
- 17.- PLC structure.
- 18.- PLC inputs and outputs configuration.
- 19.- PLC configuration possibilities.
- 20.- PLC program languages.
- 21.- PLC different programming standard languages .
- 22.- New configuration and development of new process.
- 23.- Hand on an established process.
- 24.- To visualize and see the results and to make comparisons with the PDSC unit process.
- 25.- Possibility of creating new process in relation with the PDSC unit.
- 26.- PLC Programming Exercises.
- 27.- Own PLC applications in accordance with teacher and student requirements.

POSSIBILITIES OF OTHER AVAILABLE EXPANSIONS



ORDER INFORMATION

Items supplied as standard

Minimum configuration for normal operation includes:

- ① Unit: PDSC. Sedimentation Tank.
- ② PDSC/CIB. Control Interface Box.
- ③ DAB. Data Acquisition Board.
- ④ PDSC/CCSOF. Computer Control + Data Acquisition + Data Management Software.
- ⑤ Cables and Accessories, for normal operation.
- ⑥ Manuals.

*** IMPORTANT: Under PDSC we always supply all the elements for immediate running as 1, 2, 3, 4, 5 and 6.**

Additional and optional items to the standard supply

- PLC. Industrial Control using PLC (7 and 8):
- ⑦ PCL-PI. PLC Module.
 - ⑧ PDSC/PLC-SOF. PLC Control Software.
 - ⑨ PDSC/CAL. Computer Aided Learning Software (Results Calculation and Analysis). (Available on request).
 - ⑩ PDSC/FSS. Faults Simulation System. (Available on request).

Expansions

- ⑪ Mini ESN. Multipost EDIBON Mini Scada-Net System.
- ⑫ ESN. Multipost EDIBON Scada-Net System.

REQUIRED SERVICES

- Electrical supply: single-phase, 220V./50Hz or 110V./60Hz.
- Water supply and drainage.
- Computer (PC).

DIMENSIONS & WEIGHTS

- | | |
|------------------------|--|
| PDSC Unit: | -Dimensions: 1400 x 700 x 1300 mm. approx. |
| | -Weight: 150 Kg. approx. |
| Control Interface Box: | -Dimensions: 490 x 330 x 310 mm. approx. |
| | -Weight: 10 Kg. approx. |
| PLC Module (PLC-PI): | -Dimensions: 490 x 330 x 310 mm. approx. |
| | -Weight: 30 Kg. approx. |

RECOMMENDED ACCESSORIES

- Precipitated calcium carbonate.
- Balances.
- Colorimeter.

AVAILABLE VERSIONS

Offered in this catalogue:

- PDSC. Computer Controlled **Sedimentacion Tank.**

Offered in other catalogue:

- PDS. **Sedimentacion Tank.**

*Specifications subject to change without previous notice, due to the convenience of improvements of the product.



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