Introduction:

- A low cost bench top unit designed to demonstrate the use of ion exchange resins for continuous softening or demineralization of water. The equipment is designed to emulate the industrial operation of units like this, including the monitoring of the "breakdown" and regeneration cycles.

Description:

- Two vertical transparent tubes mounted on a rear panel contain the cation and anion resins. A manifold at the inlet and outlet of the tubes allows the flow configuration to be changed to simulate the cycles involved in the operation of a deionizer. Union links allow the tubes to be removed from the manifolds and exchanged for softening/mineralization experiments.
- The regenerant and the test or wash solutions contained in different tanks are selected by a mobile tube and supplied to the apparatus by pumping through a control valve and a flowmeter. The effluent can be fed to a tank and the treated water can be collected in bottles for hardness, conductivity or dissolved solids tests. A conductivity meter connected to the outlet of the second ion exchange bed provides a continuous indication of demineralization progress. The apparatus is supplied with typical commercial cation and anion resins. It is possible to use other ion exchange materials, in order to measure and compare their characteristics, exchange capacity, etc.

Specifications:

- Autonomous apparatus for softening water in a single bed or demineralization in a double bed system.
- Two transparent vertical tubes contain the resins. A manifold at the inlet/outlet allows changes to the flow configuration.
- The equipment includes a pump, valves, conductivity meter and tanks for the regenerant and the test or washing solutions.
- Typical commercial resins are supplied, both cationic and anionic
- 04 methacrylate tanks

Note: Specifications are subject to change, Photos shown above are Indicative, Actual Product can Vary.

CONTROL SYSTEM, ACQUISITION AND DATA MANAGEMENT, COMPOSED BY CONTROL INTERFACE BOX:

- Control Interface Box with process diagram on the front panel, with the same distribution as the equipment elements, for easy understanding by the student.
- All the sensors with their respective signals are adequately prepared for the output to the computer from -10V to +10V.
- Cable for control interface box and computer
- The control elements of the equipment are permanently controlled from the computer, without the need for changes or connections during the entire test process.
- Simultaneous display on the computer of all the parameters involved in the process.
- Calibration of all sensors involved in the process.
- Real-time representation of the system response curves
- Storage of all process data and results in one file
- Graphical representation in real time of the responses in the system/process
- All the values of the actuators can be changed at any time from the keyboard, allowing the analysis of the curves and responses of the entire process.
- Shielded and filtered signals to avoid external interference
- PID control in real time with flexibility of modifications of the PID parameters in real time of the parameters that intervene in the process simultaneously
- Proportional control, integral control and derivative control, based on the real mathematical formula of the PID, by changing the values at any time, of the three control constants (proportional, integral and derivative constants).
- Control in real time with flexibility of parameter modifications from the computer keyboard, at any time during the process.
- Real-time control for pumps, compressors, resistances, control valves, etc.
- Open control allowing modifications at any time and in real time, of the parameters involved in the process, simultaneously.
- Three levels of security, one mechanical in the equipment, another electronic in the control interface and the third in the control software.

CONTROL SOFTWARE, DATA ACQUISITION AND DATA MANAGEMENT:

- Compatible with current Windows operating systems. Graphic and intuitive simulation of the process on the screen. Compatible with industry standards.
- Recording and display of all process variables automatically and simultaneously.
- Flexible, open and multicontrol software developed with current graphic window systems, acting on all process parameters simultaneously.
- Analog and digital PID control
- Menu for the selection of the PID and the set point required in the entire working range.
- Handling, manipulation, comparison and storage of data
- Sampling rate of 250 KS/s
- Sensor calibration system that int they emerge in the process
- Allows the entry of the alarm status and the graphic representation in real time
- Comparative analysis of the data obtained, after the process and modification of the conditions during the process.
- Open software allowing the teacher to modify texts, instructions, teacher and student passwords to facilitate the control of the teacher over the student, and that allows access to different levels of work.

Demonstration possibilities:

- The interchangeability of different resin materials
- Water softening using a cationic resin
- Regenerative efficiency of a softening system

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- Demineralization using double bed exchange
- Regenerative efficiency of a cationic resin and an anionic resin

Technical characteristics:

- Pump : Diaphragm type, self-priming
- Flowmeter range: 10 -80ml/min.
- Tank capacity: 20 liters
- Anion exchange resin: 0.75 liter
- Cation exchange resin: 1 liter

Chemicals Required (Supplied):

- Sodium chloride
- Hydrochloric acid
- Sodium hydroxide

Requirements:

- Electrical supply - 220V/single phase/60Hz
- Water supply
- Initial filling and emptying

Additional Components:

- The equipment includes data acquisition, software, and all necessary connection cables.
- Chemicals: hydrochloric acid, sodium hydroxide, sodium chloride.
- Deionized water
- Cables and accessories for normal operation
- Computer (PC)
- Manuals: Required services, assembly and installation, commissioning, safety, maintenance and Manual of practices

Overall dimensions(Approx):

- Height : 0.90-1.0m
- Width : 1.10-1.2m
- Depth : 0.45-0.50m

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