

## H-6210 Dynamics of Stirred Vessels Demonstrator

### Purpose

The student, using the Hampden **Model H-6210** Dynamics of Stirred Vessels Demonstrator, will acquire an understanding of non-steady state process control behavior needed to design and operate automatic process control systems. This system follows the dynamics of a well-mixed, multi-stage process operation.

### Description

This system is designed to compare the measured responses of the vessel concentrations to a deliberate change at the inlet with a theoretical prediction. The first vessel is fed liquid from either of the two feed tanks. The concentration of tracer material in one tank is different from the other, a sudden change from one feed tank to the other via a change-over valve can provide either a continuous period (step function) or short interval (pulse function). The concentration with time is measured in each of the vessels with the results compared to the predicted exponential responses for first-order systems.

### Experiment Capabilities

- Mathematical Models
- Steady-State Mass Balance
- Unsteady-State Mass Balance
- Linear Dynamic Response for One, Two or Three First-Order Systems
- Effect of Distance/Velocity Lag
- Residence Time Distribution
- Laplace Transform Visualization

### Specifications

The Hampden **Model H-6210** Dynamics of Stirred Vessels Demonstrator consists of:

- Table top base fitted with leveller feet
- Equipment panel
- Five gallon (20 liter) non-corrosive tanks (2 req'd)
- Electric adjustable stirrers (3 req'd)
- Delay measuring cell with conductivity electrode
- Delay coil

- One quart (0.8 liter) vessels each with conductivity electrode (3 req'd)
- Dual manifold for series connection and gravity flow between vessels
- Flowmeter (2 to 280mL/min)
- Change-over valve
- Needle control valve
- Sample valves (2 req'd)
- Feed pumps (2 req'd)
- Conductivity meter with four-position transfer switch
- Main Circuit breaker (GFCI)
- Stirrer speed control
- Circuit breaker switches (3 req'd) for stirrers and pumps.
- Overall dimensions: 26"H x 39"W x 24"D

### Services Required

#### Electrical:

- 120V AC 1 $\phi$  60Hz

#### Water:

- Distilled
- Drain

All Hampden units are available for operation at any voltage or frequency

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