HLPS-400

HOT LIQUID PROCESS SIMULATOR

Versatile Research Heat Exchanger

Expandable system accurately simulates a broad range of temperatures, pressures, and flowrates. Ideal for a wide variety of applications, including:

- Fouling research
- Heat induced particulate formation testing
- Turbine fuel thermal degradation studies
- Heat transfer coefficient determinations

Automated, PC-controlled operation with easy-to-use LabVIEW® for Windows operator interface

Comprehensive datalogging and analytical capability

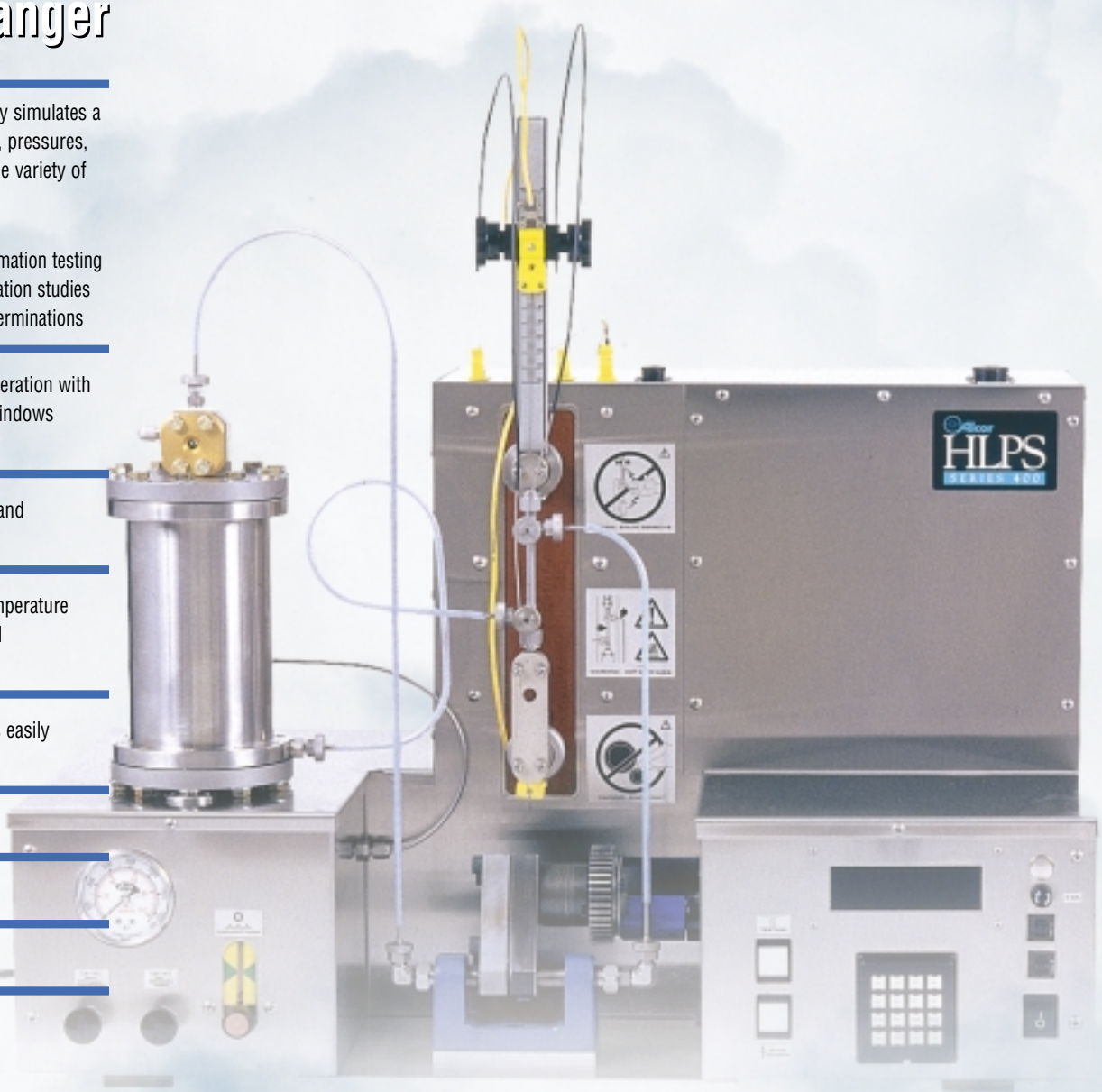
Microprocessor time and temperature control; electronic differential pressure measurement

Small footprint; base unit fits easily under a lab hood

Stainless steel construction

Simple to maintain

CE approved



HLPS-400 Hot Liquid Process Simulator

Predict Heat Exchanger Performance and Fouling Tendencies Quickly and Easily

The Alcor® HLPS Hot Liquid Process Simulator provides researchers with an accurate, yet easy-to-use tool for predicting heat exchanger performance and the fouling tendencies of specific process fluids. Temperature, pressure, and flowrate are variable up to 650°C (1200°F), 6.9 MPa (1000 PSI), and 5ml/minute respectively. Plus all may be independently adjusted and controlled to allow the simulation of an extensive range of process conditions. Typical applications include:

- Fouling research
- Heat induced particulate formation testing
- Gas turbine fuel degradation studies
- Heat transfer coefficient determinations

Easy-to-Use Windows Interface

For optimum convenience, all operational parameters and commands are selected and/or entered via a dedicated PC running LabVIEW® for Windows. Once a test is initiated, no further operator interaction is required; the HLPS executes each step of the testing process with digital precision and accuracy and then reports/stores the results automatically for later review and analysis.

HLPS-400 System

HLPS-400 with optional Differential Pressure System

Expandable, Modular Design

The HLPS features a modular design which can be easily expanded as your research needs change. The basic system consists of a base unit, dedicated PC, and reservoir; differential pressure and heating modules can be added as required.

HLPS-400 System — Base and Control

Major Options

- Differential Pressure System
- Heated System
- Power Control System

Applications Assistance

Your PAC Representative will assist in specifying the system appropriate for your applications

Base Module—This module is the very heart of the HLPS; it serves as the main test heat exchanger and is where all actual testing and measurement takes place.

Control Module—This is a dedicated personal computer running LabVIEW® for Windows. It provides the system's user interface and is used for test setup, initiation, and datalogging. A printer is included with the PC.

Differential Pressure System—This is required for simulations in which the differential pressure must be measured, such as in gas turbine fuel thermal degradation studies and heat induced particulate formation testing. It incorporates a fine filter and electronic pressure transducers to determine the ΔP across the filter as particulate accumulates.

Heated System—Simulations involving the use of crude oil or similar high viscosity liquids often require heating to ensure proper flow through the system. This system enables the user to control and monitor sample reservoir, pump, and line heating from the base system.

Power Control System—This system provides control of the heat exchanger by metering the available power. This is important in rigorous heat transfer experiments and for studies involving metals for which tubing is not readily available. The Power Control System is primarily an internal option.

Typical Applications

Basic Heat Transfer Testing: Fouling and the Overall Heat Transfer Coefficient, U

The overall heat transfer coefficient, U, is the most practical indicator of heat exchanger performance. And while there are various methods of studying heat transfer, one of the best is the careful measurement of U in a real system. The HLPS-400 provides an accurate, yet simple means of performing all the necessary measurements using the actual fluid of interest and expected operational conditions.

For maximum flexibility, the HLPS-400 can be set to control the heater tube temperature or fluid outlet temperature. The former is used to simulate systems where there is a constant or maximum heat flux, such as in an economizer or other process exchanger; the later is more representative of applications where there is a need for temperature maintenance, such as in a furnace or reboiler system.

Typical test fluids include crude oil, sour crude oil, reduced crude oil, fuel oil, diesel oil, HDS feed, and FCC feed. Typical applications are anti-foulant performance testing, heat transfer fluid performance testing, and lubricant cycle testing.

Advanced Heat Transfer Testing: Heat Induced Particulate Formation

The heat induced formation of particulate can create a problem just as real, albeit more subtle, as the decline of the overall heat transfer coefficient, U. Particulate formation may be seen as a rise in pressure, ΔP, across a heat exchanger as the material deposits and restricts flow. It may also show up later in the process by providing seed material for the formation of deposits such as “sheets” or “popcorn” polymer.

HLPS systems with the differential pressure system permit testing for this heat induced particulate formation. As fluid passes through a fine filter in this module, any particulate present is deposited, creating a rise in the differential pressure across the filter. The ΔP is measured with a precision differential pressure transducer and the resulting value(s) output to the computer control module.

Typical test fluids for this type of investigation include liquid petroleum gases, light naphthas, gasoline, kerosene, diesel oil, HDS feed, and monomer feedstock. Typical applications are anti-foulant/anti-oxidant performance testing, thermal oxidation studies, and fuel stability testing.

HLPS-400 with optional Heated System

Specifications

Base Module and Control Module

Sample Capacity	One liter (under system pressure); unlimited at ambient pressure.
Heater Tube Temperature	650°C (1200°F) maximum.
System Pressure	6.9 MPa (1000 PSI) maximum.
Water Pressure	700 kPa (100 PSI) maximum.
Flow Rate	0.25 to 5.0 ml per minute.
Dimensions	Base — 0.8 (W) x 0.6 (D) x 0.7 (H) meter (31.5 x 23.5 x 27.5 inches). Control — Varies depending on personal computer and printer provided.
Weight	Base — 80 kg (175 pounds) net. Control — Varies depending on personal computer and printer provided.

Differential Pressure System

Differential Pressure	Across filter, 250 mm Hg; kPa scale available.
Pressure Output	Digital display and logged.

Heated System

Four Controllers	Pump, reservoir, line, and spare.
Temperature	200°C (380°F) maximum.
Lines	24 V resistance heater jacket.

Power Control System

	Meters available power.

Installation Requirements

Power	110/120 VAC or 220/240 VAC, 50/60 Hz., 10/5 amp maximum. Standard operation is ±10% of stated voltage.
Nitrogen	Regulated at 6.9 MPa (1000 PSI) maximum.
Cooling Water	40 liters/hour (10 gallons/hour) at 200 to 700 kPa (30 to 100 PSI).
Drain	For cooling water discharge.
Hood or Equivalent Lab Space	For base unit installation to control spillage and organic vapors.

Due to our commitment to continual product improvement, specifications subject to change without notice.

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For more information, please contact us:

ExpotechUSA
10700 Rockley Road
Houston, Texas 77099
USA

281-496-0900 [voice]

281-496-0400 [fax]

E-mail: sales@expotechusa.com

Website: www.ExpotechUSA.com