

SPIDER16 GAS PHASE REACTOR



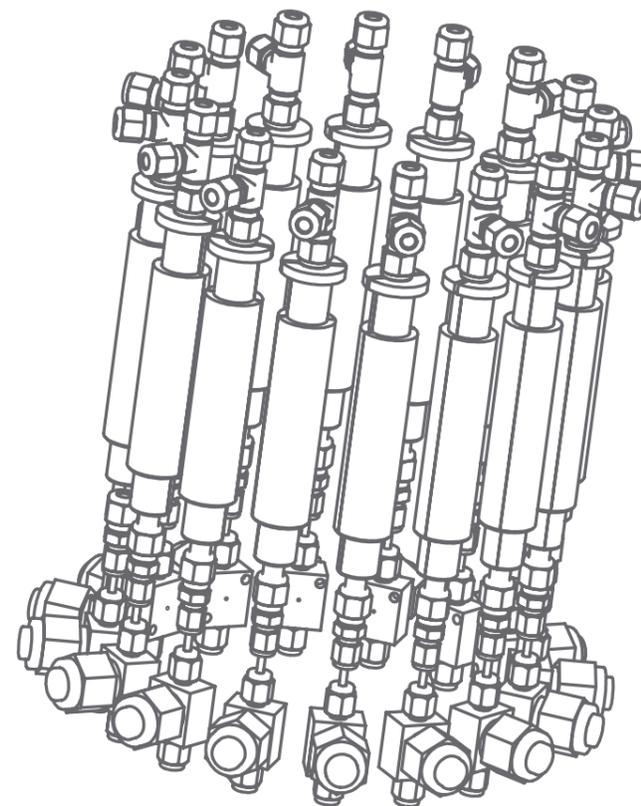
Patents

The system is covered by patents EP1273919, US2003040116 and WO0159463.

Product Information

SPIDER16 GAS PHASE REACTOR

The state of the art reactor system for parallel testing of materials and heterogeneous catalysts



Designed for

- Accurate individual flow control
- Broadest temperature and pressure range

... high fidelity experimentation



Introduction

The Spider Reactor System is a state of the art multireactor system licensed from Instituto de Tecnología Química Valencia (ITQ), which enables catalyst and materials testing at industrially relevant conditions in a defined and reliable manner. It is used for conducting simultaneous tests on materials using sixteen fixed bed continuous flow reactors in a wide range of chemical and catalytic processes at up to 550°C and 70 bar.

Each reactor has accurate individually controllable gas and liquid feeds, and an individual feed preheater/ feed preconditioner. The Spider reactor system facilitates the programmed development of catalytic activity tests on a large number of materials, achieving savings in time and investment by boosting laboratory productivity.



Specifications

The specifications presented are for the standard model, other systems can be built on request for specific applications.

System

- > 16 individual, continuous flow, fixed bed reactors, standard external diameter 3/8"; reactor external diameter can be varied between 1/8" and 1/2"
- > scalable, modular setup (Spider 4,8,16 or 2x4,2x8,2x16,etc....)
- > Stainless Steel (SS316L) reactor tubes with catalyst capacities of 0.1 to 1 g
- > Other materials on request (e.g. Inconel 600, Incoloy 800)
- > Independent feed flow control of liquids and gases with individual gas and liquid flow control for each reactor
- > User defined numbers of inlet feed gases
- > Uniform temperatures and pressures in all reaction chambers
- > Individual temperature measurement in catalyst bed in each reactor
- > Individual pressure measurement on each reactor inlet

Standard Operating Limits

- > Maximum operating temperature 550°C
- > Maximum operating pressure 70 bar
- > Apparent bed volume 4 ml
- > Gas flow rate 5-200 ml/min per reactor
- > Liquid flow rate 0.5-5g/hr per reactor
- > Other flow ranges and operating limits on request

Dimensions & Supplies Required

- > 2000 x 900 x 2000 mm (Width x Depth x Height)

Applications

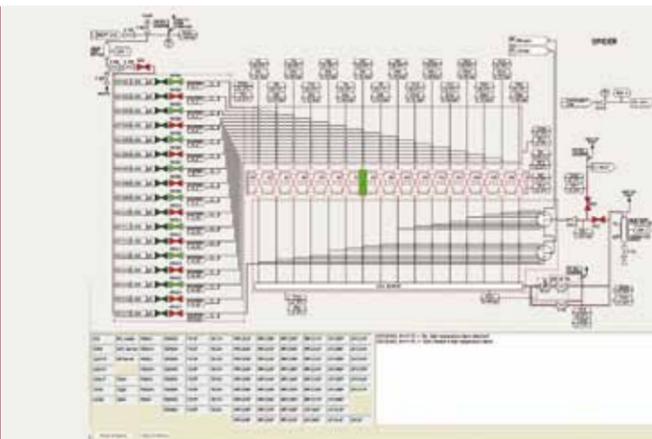
The system can be used to carry out chemical kinetics studies, including deactivation studies over broad temperature ranges and regeneration processes.

The Spider has been validated for a wide range of applications, including hydrocracking and hydrotreating, alkane isomerisation, desulphurisation of gases and gasoline, aromatics alkylation and disproportionation and selective oxidation of hydrocarbons.

The system is available in customised versions for applications where trickle flow is required, and also for gas to liquid reactions, including Fischer Tropsch Synthesis.

SPIDER16 GAS PHASE REACTOR

SPIDER16 – A state of the art reactor system for parallel testing of heterogeneous catalysts



System

Gas & Liquid Feed Supply

Each of the sixteen reaction chambers has a feed stream consisting of one gas feed (more gases are possible on request), and one liquid. Each gas and liquid feed has an individual flow controller, therefore highly accurate flows are guaranteed. The liquids and gases are preheated, mixed and optionally vaporised in an individual packed bed feed preheater. The system can be optimised for trickle flow operation in the reactors.

Reactors

Each individual feed stream is fed to a reactor which is housed in a common reactor furnace for all sixteen reactors. Standard material of construction for the reactors is stainless steel SS316L, other materials are available on request. Temperature and pressure are independently measured inside each reactor. The reactor inlets, outlets and the lines between pre-heater and the reactors are heated in order to prevent condensation in any lines or valve bodies.

Sampling & Post-Reactor Processing

Gas phase samples are alternately taken from the outgoing currents of the individual reactors using automatic multipoint switching valves, and are subsequently transferred to an appropriate analytical device.

The reaction products flow to a common buffer tank where the system pressure is controlled. The buffer tank ensures that the pressure at the outlets of all reaction chambers is exactly the same. Non-return valves prevent the back-flow of gases from the tank to reactor block or to the sampling system.

Analysis

Digital Start/Ready signals are available for synchronisation with online analytical devices (GC/MS/IR). The analysis procedure is automatically optimised to minimise the total cycle time using the analysis configuration tool. Sample information and results from most analysis devices can be integrated within the process log database.

Data Management & Automation

The entire system is controlled via a PLC in combination with a control PC for visualisation, experiment selection and manual control. The graphical user interface allows manual operation and visual depiction of the system status. A scheduling tool is provided for experimental planning, the specific experimental subroutines can be adapted to meet the specific application requirements.

Process and sample data is stored in a MySQL database, and results from most analysis devices can be integrated. All process parameters can be viewed in tabular and graphical form during experiments. System status can be remotely monitored via a LAN connection using a standard web browser.

Safety

A programmable safety PLC is integrated within the system to manage alarms. Multiple alarm classes are featured, and the alarm settings and responses can be adapted to meet on-site safety regulations.