

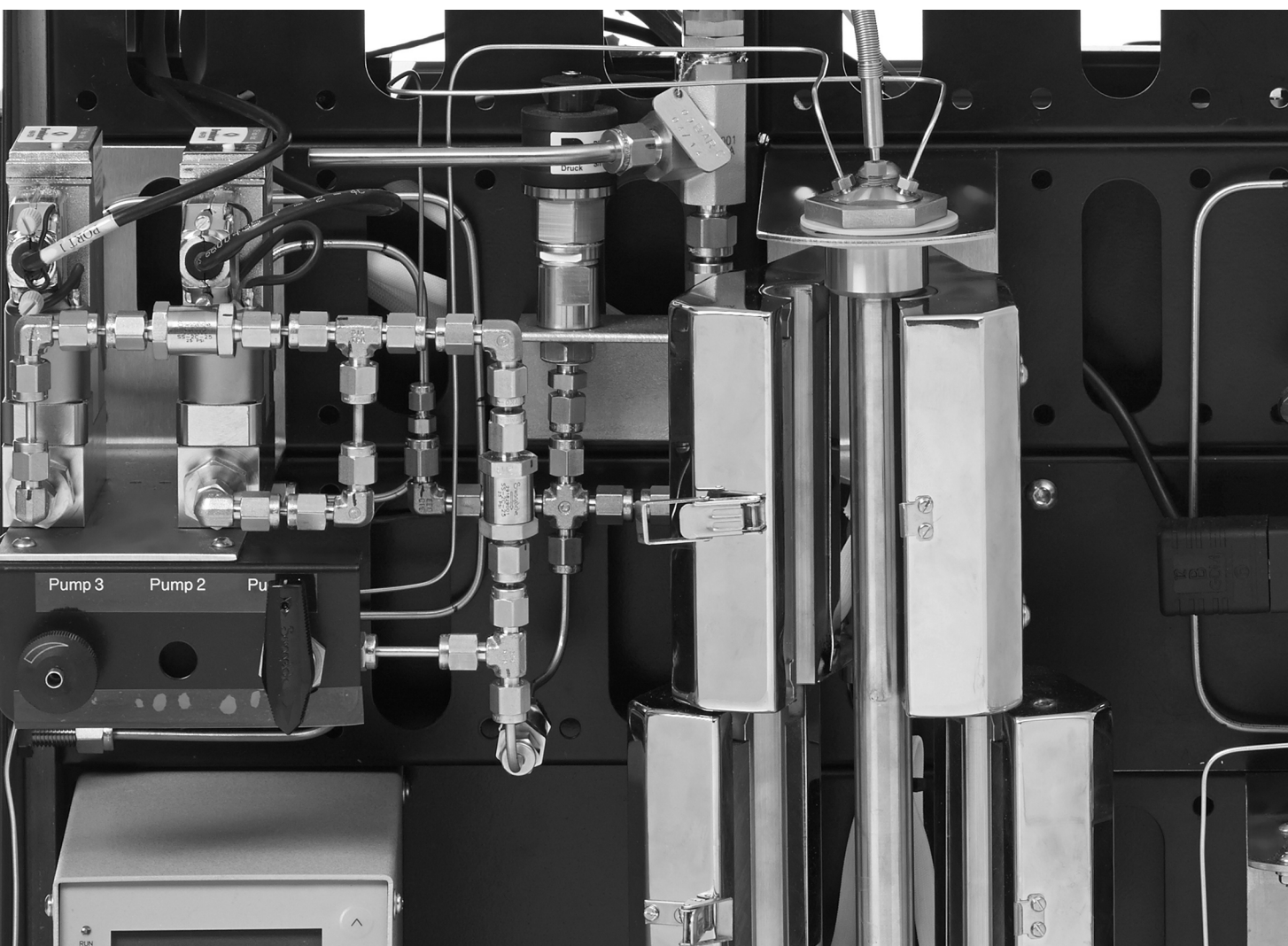
FlowCAT

Automated benchtop, high-pressure continuous flow, catalysis platform

Screen new chemistries

Optimize yield and identify new catalysts

Ideal for: Hydrogenation, oxidation, carbonylation, bio-fuel research, Fischer-Tropsch synthesis, and petrochemical processes



FlowCAT

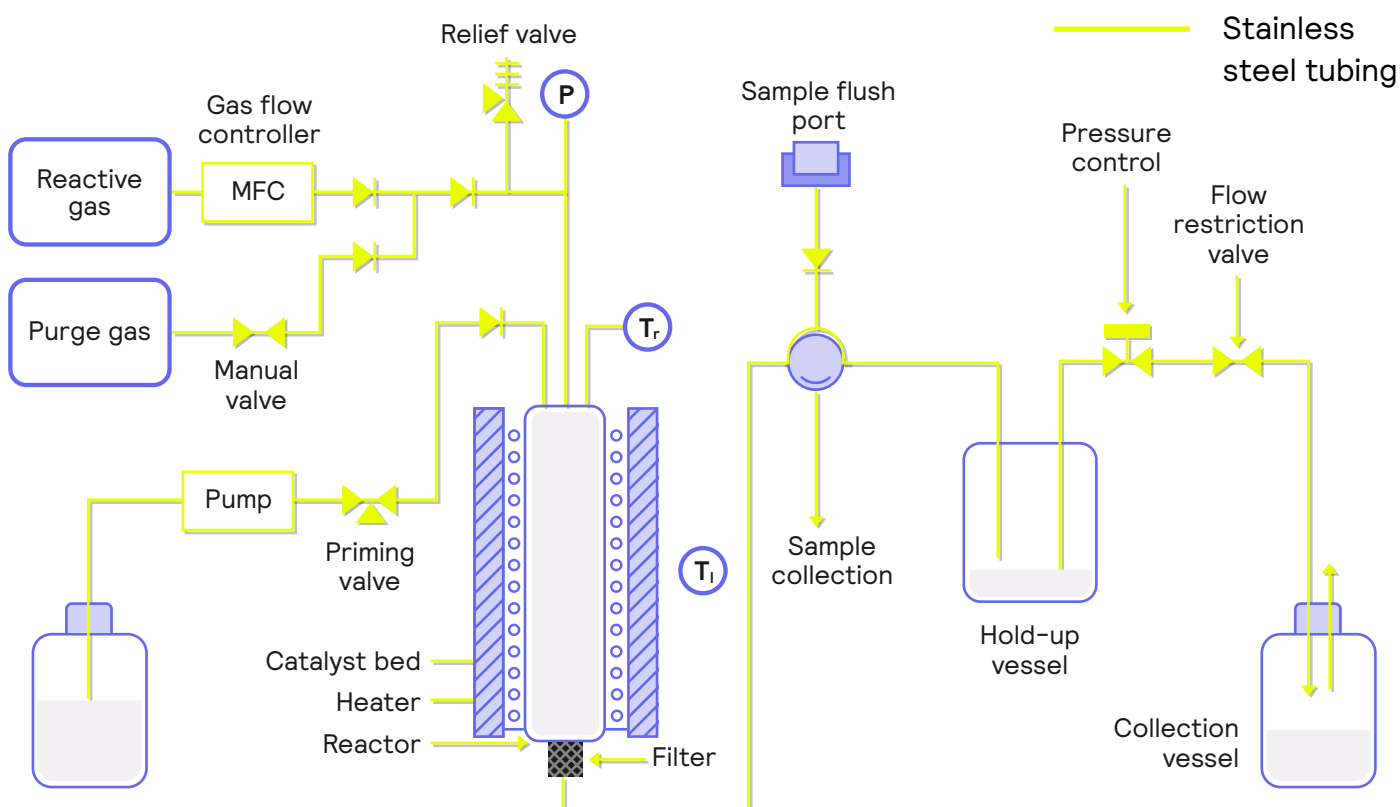
High pressure, continuous flow reactor

The **FlowCAT** is an automated high pressure continuous flow reactor, **designed to develop chemical processes**. It supports both **gas and liquid feeds** and facilitates the scale-up of both **homogeneous** and **heterogeneous** chemistry. The **FlowCAT** normally operates as a fixed-bed catalytic reactor, using **solid or liquid catalysts** and **pressure-controlled** feeds, upstream of the reaction zone. However, it can be configured to operate in Bubble Flow mode, where reagents are added at the bottom end of the reactor.

The **standard FlowCAT** is designed to operate up to 300°C and 100 bar with 1 controlled liquid feed, 1 controlled reactive gas feed, and one inert gas feed, using a 15 cm long tubular reactor.

The **FlowCAT's** modular architecture allows **customized solutions** with additional liquid and gas feeds, extended temperature range of up to 500°C, extended pressure range of up to 200 bar, etc. Upon request, custom configurations can be designed with cascade or parallel reactors.

Standard FlowCAT configuration



Features and benefits

Gas feed

One MFC standard, more optional. Pressure relief valve, gauge, pressure transducer.

Heating mantles

1 thermocouple for readout and 1 for safety. Adapters for various reactors. Additional mantle sets for longer reactors (max 3 sets).

Back pressure regulator

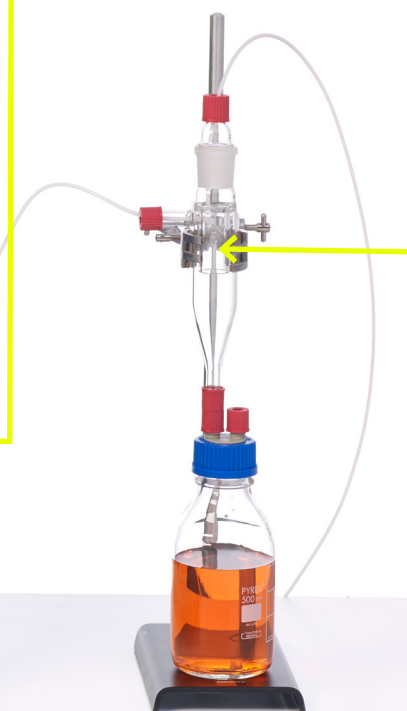
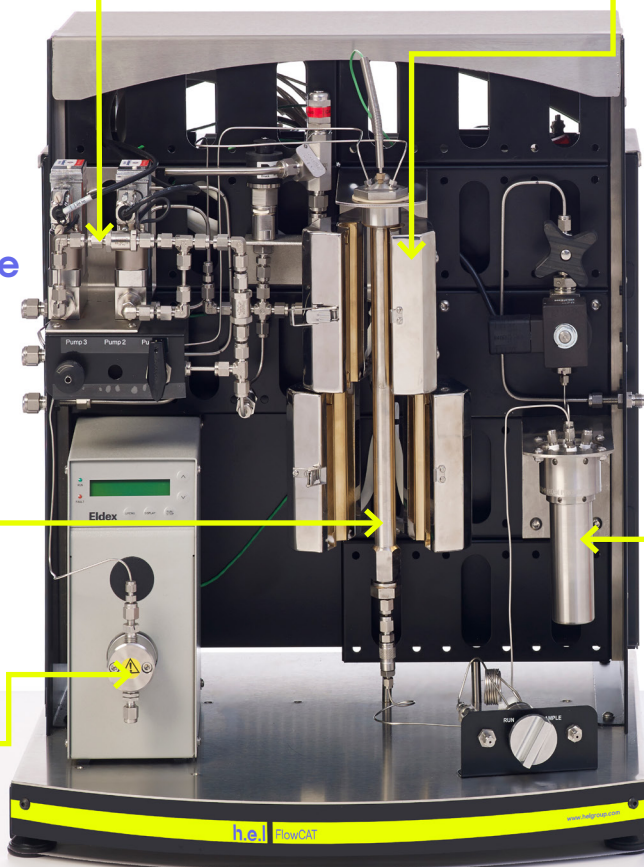
Regulation of pressure in multiphase systems. In stainless steel or Hastelloy reactors.

Interchangeable reactors

Independently-controlled reactors in stainless steel or Hastelloy.

Liquid feed

Wide range of liquids. One pump standard, and multiple feeds are optional. Variety of flow and pressure ranges.



Gas/liquid phase separation

Achieved with custom-designed cyclone separator.

Recycling of liquid and gas by-products

Additional components can be installed allowing the recycling of liquid products and excess gas. This can include further processing (e.g. drying and compression) for process development.

Sampling and analytical integration

A manual or automated sampling of selected gas or mixed-phase streams can be routed directly to third-party analytical instruments with heat tracing, if necessary.

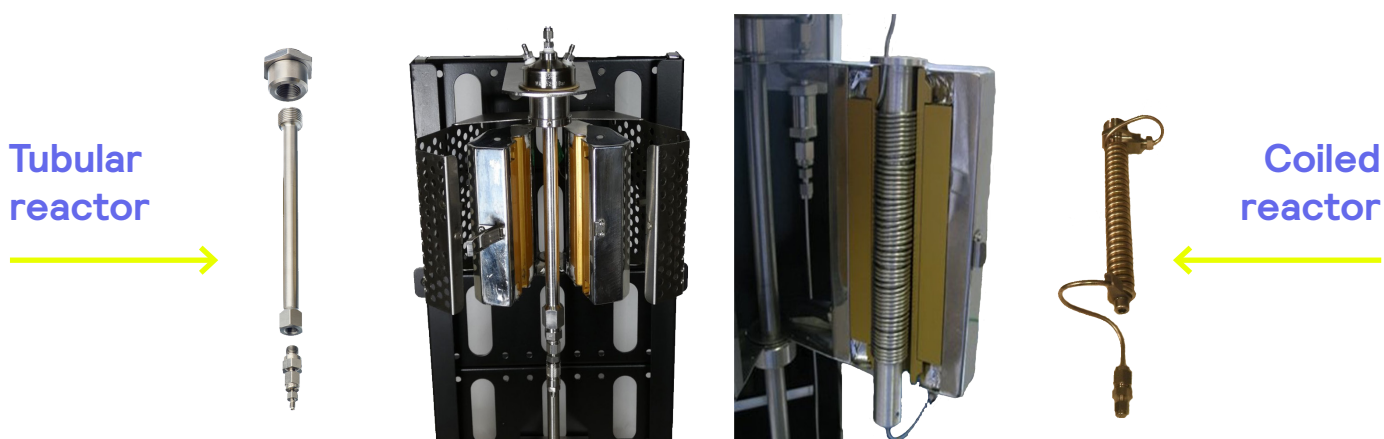
Product overview

The temperature, pressure, and flow rates of the liquid and gas feeds are all automatically controlled, as well as the sampling at the end of each run and the initiation of the next.

| Specification point | Standard configuration | Comments |
|---------------------|---|--|
| Temperature | 300°C (500°C)* | Multiple heating zones to suit larger length reactors |
| Pressure | 100 bar (200 bar)* | Precise control valve suitable for liquids, gases and two-phase mixtures |
| Feeds | 1 liquid and 1 gas as standard | Optionally, more independent feeds can be controlled |
| Tubular reactors | Length 15, 30, 45cm Diameter 6, 12, 18mm | Stainless steel and Hastelloy |
| Coiled reactors | Length 1 or 2m. Diameter 1/8", 1/16" | PTFE, stainless steel and Hastelloy |

* Available upgrades

Interchangeable reactors and heating mantles



- Depending on the reactor length, one or more heating mantles are used.
- Each additional mantle is fully software-controlled.
- 30 cm reactors use 1 additional heating mantle to supplement the standard 15cm heating mantle while the 45 cm reactors use 2 additional heating mantles.
- Coiled pipe reactors are recommended for homogenous reactions, e.g. thermal rearrangements, or reactions using a liquid catalyst.

FlowCAT control system



WinISO intelligent software control and analysis

- User-friendly WinISO control software enables data logging, multi-step recipes, parameter control, and feedback loops.
- The software adds responsive intelligence to the FlowCAT and delivers an intuitive interface that needs minimal training
- Full software control of pressure, temperature, and feed rates of liquid and gas.
- Edit conditions at any time without stopping, allowing for changing reaction conditions with little to no downtime.
- A computer-controlled back-pressure regulation valve regulates single and multiple phases of liquids and gases without the need for any adjustments.
- Integral safety features.

Safety features

- User-configurable audible alarms and shutdown states to ensure user safety.
- Emergency Pressure Relief Valve (PRV).

Third-party analytical instrument integration

- The WinISO interface allows the integration of controls of analytical equipment (e.g. GC-MS, HPLC, MS) and the possibility of including feedback control based on the analytical results.

Upgrades, Support and Training

We understand that your needs can change over time and you may require:

- A system upgrade
- Training for new team members
- Support on your processes
- To book some time with our service team

Our dedicated service team and highly knowledgeable technical staff will work with you to find the right solution.



Customer Service Enquiries & Technical Support Requests

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About H.E.L Group

H.E.L Group's mission is to work together with chemistry, safety and biotechnology experts to engineer and unleash the full potential of the scientific community. To this end, H.E.L develops and manufactures innovative scientific instruments and software designed to optimize the efficiency, safety and productivity of key processes in chemistry and biology applications.

The H.E.L team includes highly skilled process and software engineers, based at their extensive research and manufacturing facilities in the UK, as well as sales and support offices around the world.

H.E.L has a long history of solving complex challenges for customers. For more than 30 years the company has worked with businesses and laboratories globally, providing proprietary automated solutions for the pharma, biotechnology, chemical, battery and petrochemical sectors.

H.E.L is accredited with ISO 9001 : 2015 and ISO 14001 : 2015.

- With a strong focus on the customer, our **service and support** enables our customers to keep working efficiently
- Our **wide range of customizable products** put the customer at the heart of what we do, with solutions designed around their needs

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