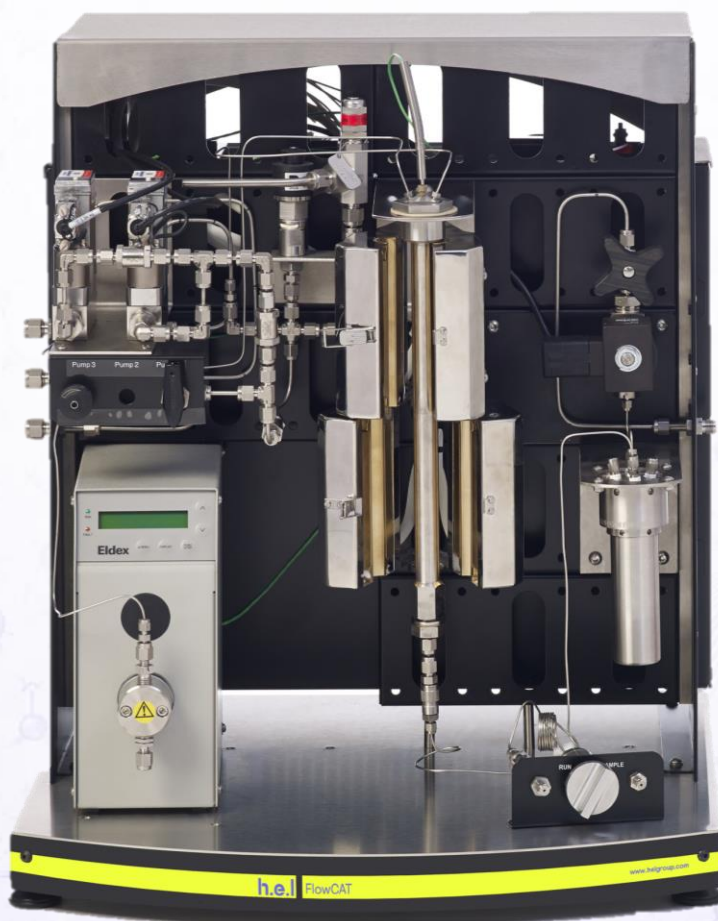


FlowCAT

Automated benchtop, high-pressure continuous flow, catalysis platform

Screen new chemistries
Optimize yield
Identify new catalysts

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



FlowCAT

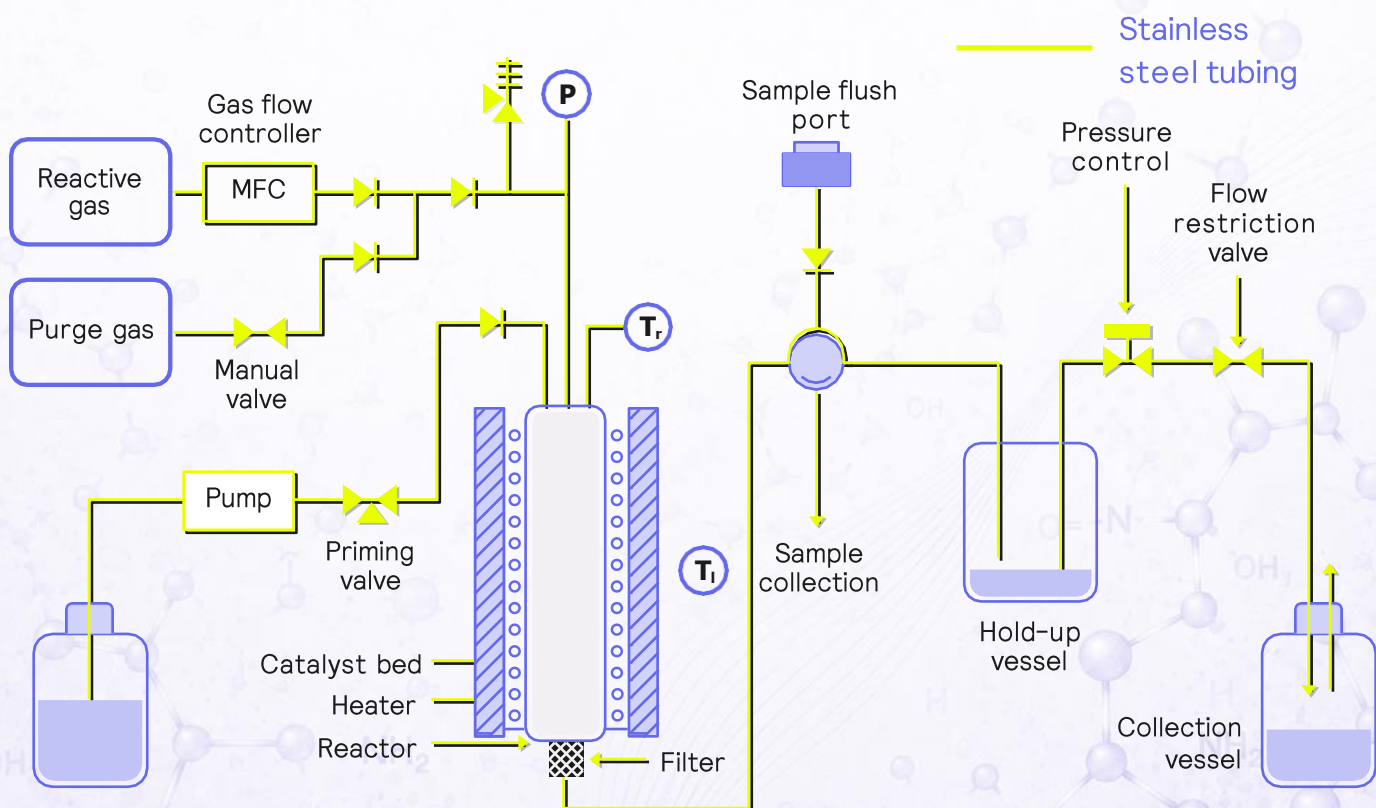
High-pressure, continuous flow reactor

The FlowCAT is an automated high-pressure continuous flow reactor, **designed for chemical process development**. It supports **independently controlled gas and liquid feeds** and enables scale-up of **homogeneous and heterogeneous chemistries**. It is typically configured as a fixed-bed catalytic reactor, using **solid or liquid catalysts** and **pressure-controlled feeds**, but can also operate in bubble-flow mode with bottom-fed reagents.

The **standard FlowCAT** operates up to 300 °C and 100 bar with one controlled liquid feed, one controlled reactive gas feed, and one inert gas feed, and an 18 cm long tubular reactor.

Its modular design allows **customized solutions** with additional liquid and gas feeds, temperatures up to 500 °C, pressures up to 200 bar, and custom configurations such as cascade or parallel reactors. Multi-reactor systems with independently controlled units can also be provided.

Standard FlowCAT configuration



[View on our website and enquire](#)

Features and benefits

Gas feed

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

Heating mantles

Dual thermocouple configuration with independent control and over-temperature safety monitoring. Adapters for various reactors. Additional mantle sets for longer reactors (max 4 sets).

Back pressure regulator (BPR)

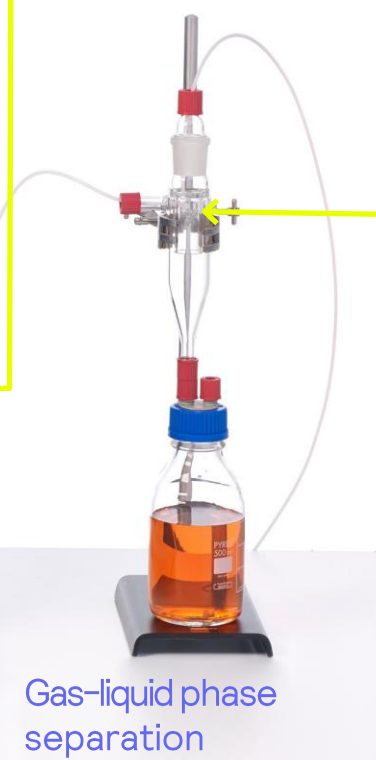
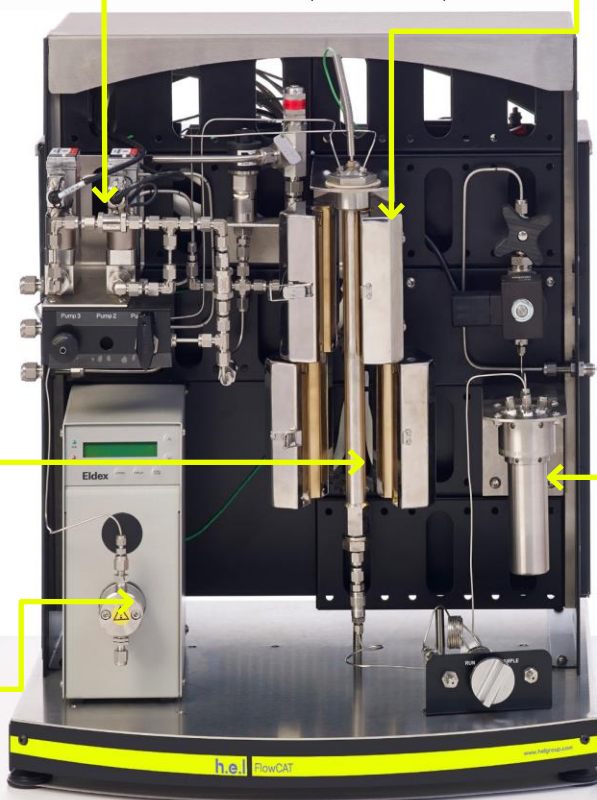
Regulation of pressure in multiphase systems. In stainless steel or Hastelloy.

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

Manual or automated sampling of selected gas or mixed-phase streams can be routed to third-party analytical devices (GC, MS, etc.) with heat tracing, if necessary. Real-time product analysis available with special FT-IR (and other) probes.

Product overview

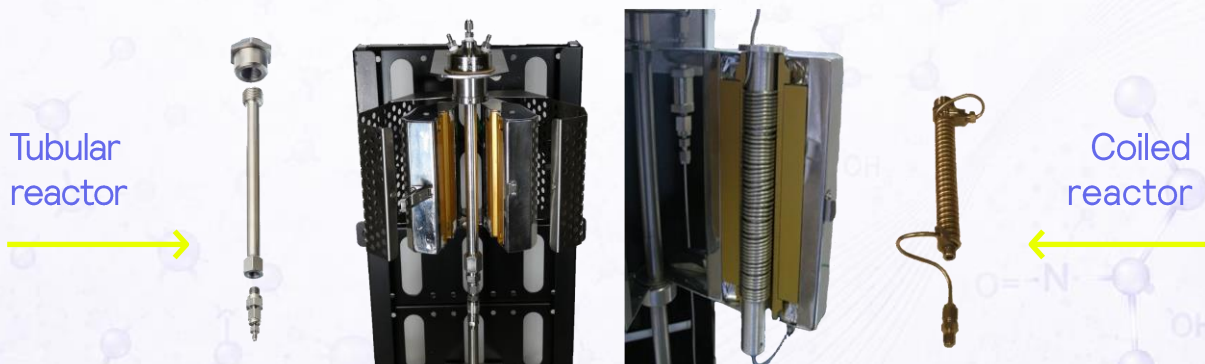
The temperature, pressure, and flow rates of the liquid and gas feeds are all automatically controlled, as well as the sampling at the end of each run and the initiation of the next.

| 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 18, 31, 44, 60 cm Diameter 6, 12, 18 mm | Stainless steel and Hastelloy |
| Tubular reactor volumes | 18 cm: 5.0 – 12.4 mL 31 cm: 20.3 – 49.7 mL 44 cm: 48.3 – 114.5 mL 60 cm: 152.6 mL | Volumes depend on internal diameter and exclude fittings/end connections |
| Coiled pipe reactors | Length 12 m, 1/8" ID Length 2.6 m, 1/16" ID | PTFE, stainless steel and Hastelloy |
| Coiled reactors volumes | Approx. 2.9 mL Approx. 0.66 mL | Excludes fittings and end features |

* Available upgrades

[Contact specialist](#)

Interchangeable reactors and heating mantles

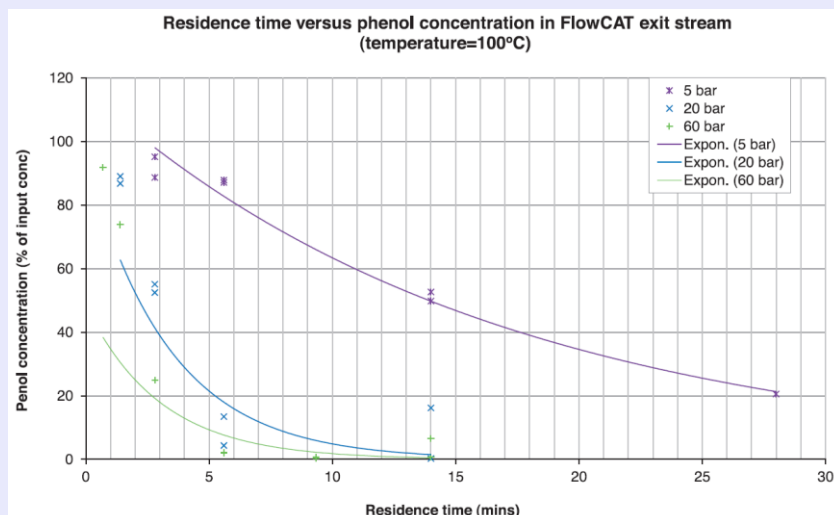


- Depending on the reactor length, one or more software-controlled mantles are used.
- 31 cm reactors use one additional heating mantle to supplement the standard 15 cm heating mantle, while the 44 cm reactors use two additional heating mantles.
- Coiled pipe reactors are recommended for homogenous reactions, e.g., thermal rearrangements, or reactions using a liquid catalyst.

FlowCAT applications

Heterogeneous catalysis

The FlowCAT is commonly configured as a fixed-bed, plug flow, or trickle flow reactors, is in heterogeneous catalysis. The gas-liquid mixtures are passed over a solid catalyst bed, typically at elevated temperatures and pressures.

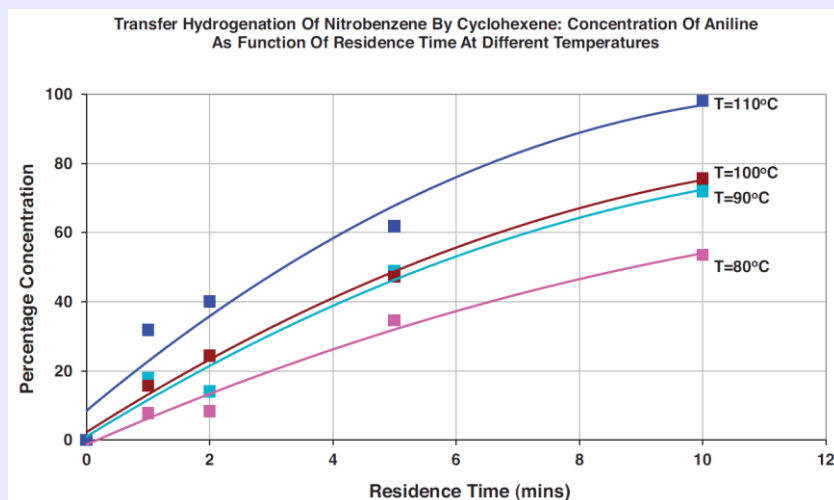


Change in reactant concentration with residence time at different pressures for a typical heterogeneous hydrogenation reaction.

Liquid-liquid reactions & thermal processes

In the FlowCAT, immiscible phases are dispersed into controlled flow segments, maximizing interfacial area and ensuring rapid mass transfer. This enhances mass transfer, improving reaction kinetics, selectivity, and process consistency.

Its precise thermal control makes processes that are difficult to scale in batch safer, more predictable, and easier to optimize.



Change in product concentration with residence time at different temperatures for a typical homogeneous hydrogenation reaction.

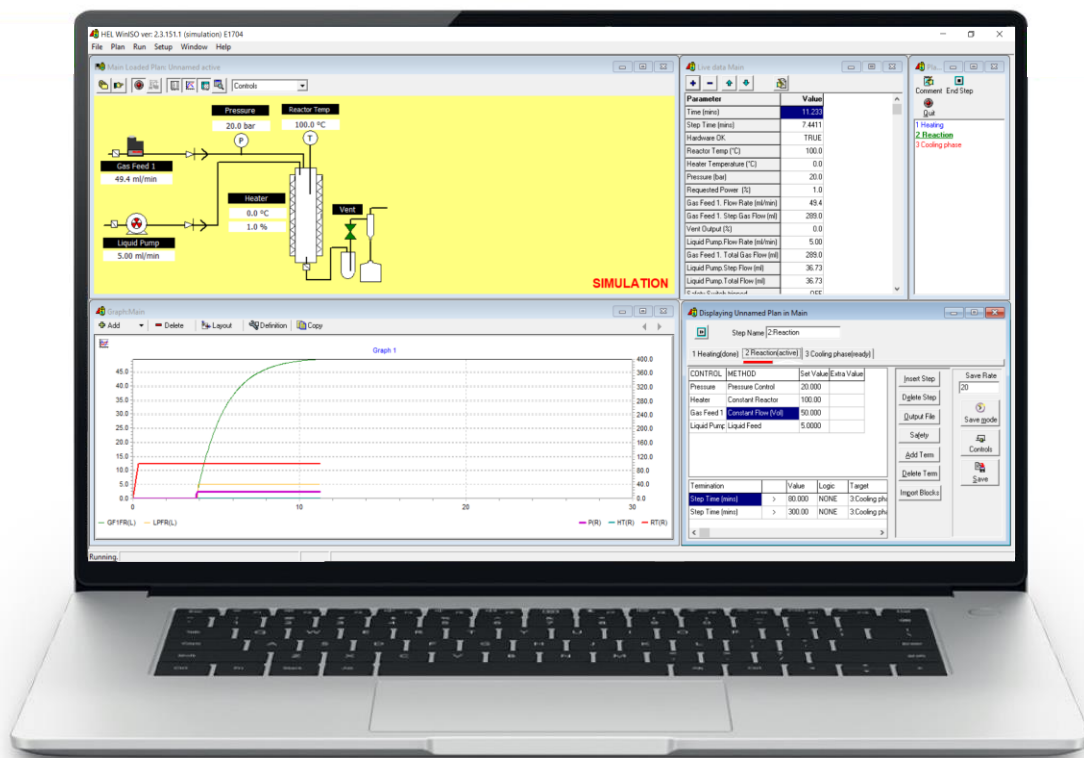
Feed preparation

- Reagents mix as they pass through inert packing.
- Pre-heating occurs in the reactor's top section, also packed with inert material.
- Heated feed vessels, wax traps, and heat-traced lines enable efficient pumping of viscous liquids and solids.

Analytical integration

- Steps triggering GC measurements can be configured in WinISO.
- Spectral files can be time-stamped with appended process data.
- Files can be viewed in real time in separate graphical windows alongside live process information.

WinISO – FlowCAT control software



WinISO intelligent software control and analysis

- User-friendly WinISO control software enables data logging, multi-step recipes, parameter control, and feedback loops.
- The software provides advanced automation, process monitoring, and feedback control capabilities.
- Full software control of pressure, temperature, and feed rates of liquid and gas in real time.
- Edit conditions at any time without stopping, allowing for changing reaction conditions with little to no downtime.
- A computer-controlled BPR valve regulates single and multiple phases of liquids and gases without the need for any adjustments.

Safety features

- Integral safety features that allow the user to stop reactions or make corrective interventions, saving time and potentially expensive starting material.
- 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



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Technical Support Requests



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About H.E.L Group

H.E.L Group partners with scientists, engineers, and biotechnology professionals to accelerate innovation and unlock the full potential of modern research and manufacturing. We design and build advanced scientific instruments and intelligent software that enhance the efficiency, accuracy, and safety of chemistry and bioprocess workflows.

With a portfolio spanning automated reactor systems, parallel screening platforms, bioreactors, and safety testing technologies, H.E.L solutions support high-value applications across chemistry, catalysis, flow chemistry, materials development, fermentation, and scale-up.

Our team combines deep technical expertise with decades of engineering experience. All products are developed and manufactured in the UK, supported by global sales and applications teams who work closely with customers to implement the right tools for their scientific and production challenges.

For more than 37 years, H.E.L has helped organizations—from leading pharma and biotech companies to chemical, energy, and academic research centers—solve complex process problems and achieve safer, more productive R&D.

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- ✓ **Application-driven support:** Dedicated technical and service teams ensure fast implementation, tailored training, and long-term reliability.
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