



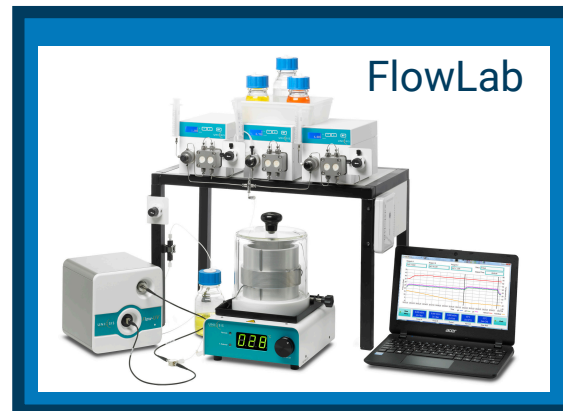
High-Performance Continuous Flow Chemistry Systems and Modules

Robust • Accurate • Flexible • Safe

AsyntFlow

Flow chemistry systems from Asynt

Asynt designs and manufactures not only batch devices but also a range of benchtop continuous flow chemistry systems. Suitable for a wide range of applications within chemical, materials and pharmaceutical research. Our objective is to make flow chemistry accessible to both novice and experienced users alike.



The **FlowLab** is a 2 channel, flow chemistry system that incorporates manual switching valves to afford a cost-effective entry into flow chemistry. FlowLab software provides data logging and real-time reaction monitoring.

The **FlowLab Plus** is a modular flow chemistry system with full automated capability that is built around a dual channel reagent delivery module (BPM). It has the capability to control up to 4 reactor modules and a fraction collector.

Both systems can be expanded with additional pumps.

Entry level systems for cost-effective flow chemistry

AsyntFlow

FlowLab™ & FlowLab Cold™

FlowLab is an entry-level flow chemistry system that combines chemically resistant, high pressure pumps with the HotCoil, HotChip, ColdCoil, ColdChip, Borealis (Photochem) stand-alone reactor modules.

The components can be controlled individually using their manual interfaces or remotely using user-friendly PC software that also provides real-time data logging and allows experiments to be saved or exported.

The system can be controlled wirelessly to avoid the need to place the computer in the fume cupboard or run Ethernet cables across the lab.



- LAN or Wi-Fi remote control
- Up to 3 chemically resistant high pressure pumps (100 bar)
- RT to 300 °C temperature range (FlowLab)
- -40 °C to 150 °C temperature range (FlowLab Cold)
- Complete with 5 mL PTFE and stainless steel coil reactors
- User-friendly control software with real-time data logging and archiving of experiments
- Compatible with all of our standalone reactor modules

Fully integrated systems for total ease of use

FlowLab Plus

FlowLab Plus is a dual channel flow reactor system. Two chemically resistant, high pressure pumps operating at up to 100 bar* deliver reagents via a mixer into your choice of flow reactor modules. Back pressure regulators prevent backflow and pressurise the system allowing reactions to be superheated up to 260°C*. A wide variety of coil, glass chip and column reactors are available and flow paths can be constructed from 316L stainless steel, PTFE or Hastelloy C for maximum chemical compatibility.

With FlowLab Plus an experiment can be programmed to run automatically after which the flow path is automatically flushed with clean solvent ready for the next experiment.

The system can be readily upgraded and the functionality extended by adding optional components such as fraction collectors, liquid handlers, gas-liquid reactors, cryogenic modules, photo reactors and additional pumps.

Individual reactions can be scaled up using the Maxi pumps to throughputs approaching 100 mL/min.

- Carry out superheated reactions up to +260 °C and 100 bar*
- Wide range of coil, chip and column reactors available in a variety of materials for optimal chemical compatibility
- Seamlessly scale reactions up to 60 mL reactor volume and flow rates approaching 100 mL/min
- Choose flow path from PTFE, 316L stainless steel or Hastelloy C
- Future proof - numerous upgrade options available for maximum flexibility

*200 bar and 300 °C options available on request



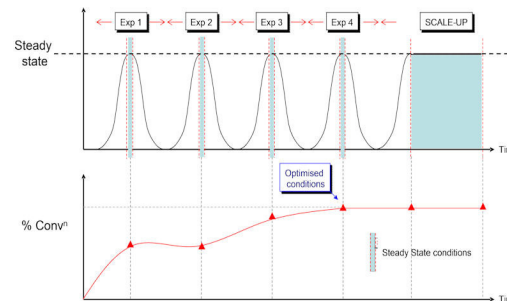
Fully integrated systems for total ease of use

FlowLab Plus and Multi-X™ - automate multiple experiments

A convenient and versatile multi-experiment package for automating a series of reactions, the Multi-X upgrade is ideal for optimising reaction conditions in flow.

Capable of running unattended, it will perform up to 10 sequential experiments and collect the results as discrete fractions or steady state samples ready for off-line analysis.

Efficient, effective and straightforward to use - our most popular system!



- Automatically runs up to 10 sequential experiments
- Vary reaction temperature, residence time and stoichiometry
- Choice of 'optimisation' or standard 'fractionation' protocols
- Single and 4 rack fraction collector options
- Compact footprint

Modular systems for total flexibility

Binary Pump (Reagent Delivery) Module

If you need complete flexibility and/or prefer to build your own continuous flow chemistry system from scratch, then we can help.

Our **Binary Pump Module (BPM)** can fulfil the dual role of a stand-alone two-channel reagent delivery system and a control hub for a bespoke continuous flow system tailored to your requirements. Simply add a PC-based control program and your choice of reactor modules. You can also combine two **BPMs** to create a four-channel reagent delivery system.

In addition to the **BPM**, we offer a wide range of add-on modules to enable according to your application requirements.

- Dual high pressure pumps (100 bar^a)
- All stainless steel high pressure components
- Integrated mixer module
- 3 Hastelloy/ceramic pressure transducers as standard
- Perfluoropolymer or Hastelloy® flow path options
- Chemically resistant back pressure regulators
- Integrated mixer and back pressure regulator
- Dedicated user-friendly control software compatible with all of our modular reactors

^a 200 bar option on request



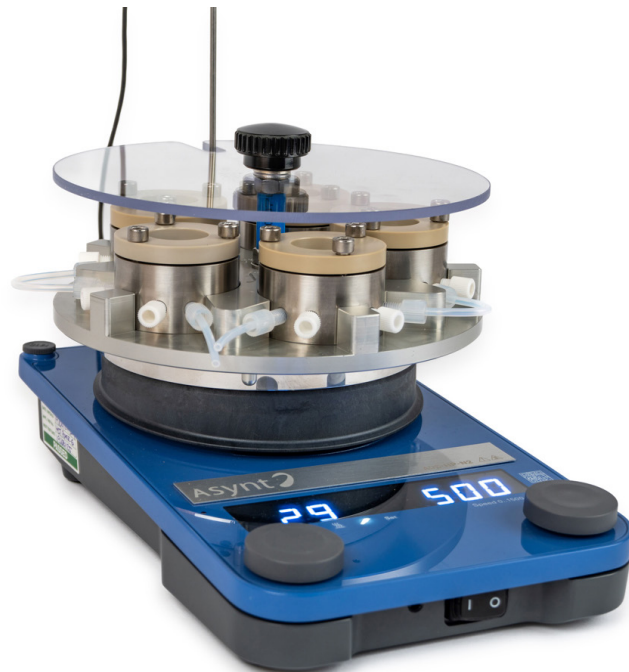
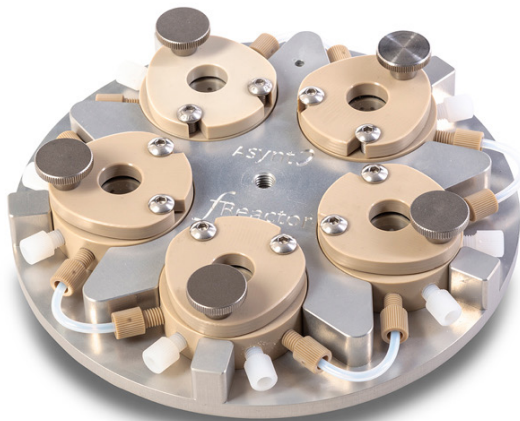
fReactor

"One For Every Lab" Professor John Blacker

The fReactor CSTR* is ideal for both multiphase and homogeneous flow reactions.

The cost effective fReactor is ideal both for those considering their first steps into the flow chemistry arena and more experienced flow chemists. Bringing a range of intuitive and flexible flow reactors and photochemical add-ons capable of operating with homogeneous and multiphase reactions supporting the development of materials and synthetic routes.

fReactor was developed in partnership with Professor John Blacker and Professor Nik Kapur at the University of Leeds. This straightforward modular platform is simple and easy to use, and comes with a dedicated info-site with a wealth of related resources, please visit: www.freactor.com



*CSTR - Continuous Stirred Tank Reactor

Modular components

Cooling and heating coils

We have several modular heating and cooling options - the **HotCoil™** coil heater for heating only, and the **ColdCoil™** for both cooling and heating.

HotCoil™: Standalone Coil Heater (300 °C)

Low cost coil heater module that may be controlled using the **FlowSyn** or **Binary Pump Module** or used in standalone mode in combination with your own pumps.

- Single 'push-to-set' rotary controller
- Compatible with all of our coil reactors
- Large bright display with visual heat-up and cool-down indicators
- Increases reactor capacity for easy scale-up



FlowSyn ColdCoil™ (-70 °C to 150 °C)^a

Works in combination with an existing recirculating chiller filled with a suitable thermal fluid and a **Binary Pump Module**. This unit can control reactions between -70 °C and 150 °C. The external circulator can be controlled via the **BPM** interface.

- Integral probe for precise temperature monitoring
- Compatible with all our coils and chip reactors
- Patented coil reactor clamping mechanism



Requires external chiller and/or heating/cooling circulator

Modular components

Cooling and heating of Plates and Chips

We have several modular heating and cooling options - the **HotCoil™** coil heater for heating only and the **ColdCoil™** for both cooling and heating.

HotChip Heater Module

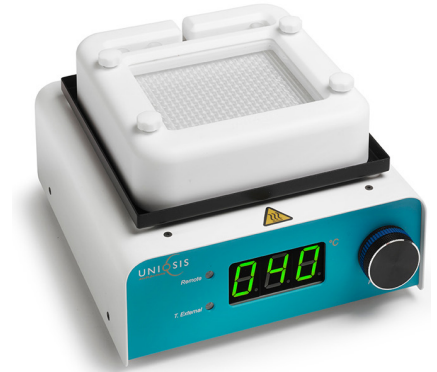
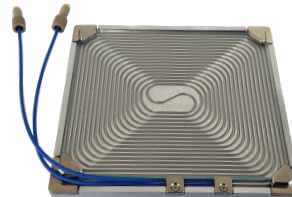
Low cost precision heater module that may be controlled using the **FlowLab** or **Binary Pump Module** or used in standalone mode in combination with your own pumps and your own control software.

Temperatures can be set either remotely (RS232, LAN) or using the 'push-to-set' control. The animated display indicates heat-up, cool-down and steady state conditions and is easily visible from outside the fume cupboard.

ColdChip (-70 °C to 150 °C)^a

Works in combination with an existing recirculating chiller filled with a suitable thermal fluid and our FlowLab, **Binary Pump Module**, or your own pumps and software, this unit can control reactions between -70 °C and +150 °C.

- Integral probe for precise temperature monitoring
- Compatible with all our GSM chips and TubePlate reactors



ColdChip Requires external chiller or heating/cooling circulator

Photochemistry in flow

fReactor PhotoFLOW LED Photoreactor

The fReactor PhotoFLOW module was developed by the University of Leeds in conjunction with Asynt and gives scientists the potential to develop and expand their flow chemistry work quickly and easily to include photochemistry. The Asynt fReactor flow chemistry platform is manufactured in the UK and available in a wide range of wavelengths to suit your requirements. Our most popular models are:

460 nm (Blue) 10w LED

365 nm (UV) 10w LED

Available to purchase individually, each fReactor PhotoFLOW module is positioned over the desired fReactor position in your set-up with easy to use plug-and-glow technology.

With a fully customisable configuration possible, you can choose to use just one of these compact Photo modules on one of the 5 fReactor CSTRs, or add further Photo modules for up to five positions running simultaneously.

You can run all five of these from just one power supply using optional splitter leads. Each module includes an individual cooling fan to ensure temperature control to the contained CSTR.



Photochemistry in flow

PhotoSyn High Power 700w flow reactor

PhotoSyn has been designed to provide scientists with a high power LED light source for continuous flow applications.

Available with a selection of different LED arrays the unit can provide outputs up to 700 W from the dedicated programmable power supply. Customised units (e.g. 385 nm, 420 nm) are available on request.

The curved, water (or gas) cooled LED arrays focus the available light on the central coil reactor to maximise the photon intensity.

The PhotoSyn has been thoughtfully engineered to completely prevent potentially hazardous light emissions from the unit, and is protected with interlocks that deactivate the light source if any attempt is made to remove the cover whilst in operation. In addition, a fan both prevents the build up of static hot air within the lamp unit and removes any vapour that may accumulate over time.

Ultimately full control of reactor temperature is possible from -40 °C to 100 °C even when at full photon flux.



Photochemistry in flow

Borealis Flow

BOREALIS FLOW is a high intensity LED lamp unit, available in a range of fixed wavelengths that converts the existing COLD COIL standalone coil reactor module into a flow reactor for photochemical applications.

The complete BOREALIS FLOW system is comprised of the:

- BOREALIS LED lamp unit.
- A 15 mL FEP coil reactor (with an internal temperature sensor).
- The ColdCoil standalone reactor module.
- A programmable power supply (PSU).
- Both the LED lamp and the reactor module require independent liquid cooling using either a piped water supply or a closed loop recirculator.

BOREALIS LED lamps of different wavelengths are automatically detected and configured when connected to the power supply.

The complete system is fully light tight and fitted with a safety interlock.

The BOREALIS LED lamps also work with the SOLSTICE™ multi-position BATCH photoreactor.

Ultimately full control of reactor temperature is possible from -40 °C to 100 °C even when at full photon flux.



Photochemistry in flow

PhotoChip Flow Reactor

PhotoChip LED photoreactor for glass static mixing reactor blocks and our PTFE TubePlate. Simple to use, powerful and effective, the PhotoChip provides an attractive and flexible solution for performing photochemistry with the benefits of both temperature control and efficient mixing in glass mixer/reactor blocks ('chips').

PhotoChip is a compact LED photoreactor module that is compatible with all of our GLASS STATIC MIXER reactor blocks (GSMs) and TubePlate reactors. Based upon the ColdChip temperature controlled GSM reactor module, it can accommodate either 1 x LARGE format or 2 x COMPACT format GSMs with total volumes from 0.27 mL – 20 mL. or one TubePlate 7 mL reactor.

The high power LED lamp unit uses single LEDs with a total power rating of either 150 W or, optionally, 180 W (150 W version shown). Both versions are available in a wide range of wavelengths (365 nm, 385 nm, 405 nm, 420 nm, 455 nm or 525 nm) and are powered by variable intensity power supplies.

Temperature Control: Connection to a thermostat allows heating and cooling with the ability to perform photochemistry down to -20 °C

The PhotoChip lamp unit is fitted with an interlock which prevents exposure to high intensity light by cutting power to the LEDs if any attempt is made to remove the light unit whilst switched 'on'. A thermal switch protects the LEDs against overheating if cooling is not connected.



Accessories & consumables

Reactor modules – coil and plate

Coil reactors

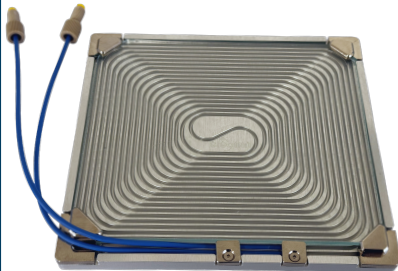


Our electronically controlled coil reactors (HotCoil) heat up rapidly and maintain a uniform temperature throughout the whole reaction. Coils are designed for quick and easy change-over utilising a proprietary clamping mechanism, and the tubing can easily be re-wound in the event of a blockage.

For optimum mixing and temperature control, combine with a mixer block/chip reactor for reagent pre-heating and pre-mixing.

- Wide range of sizes up to 60 mL for mg to kg reactions
- Range of tube materials (PFA, PTFE, SS, Hastelloy®, copper) for optimal chemical compatibility

Plate Reactors

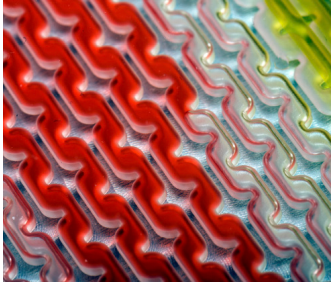


7 mL and 14 mL, plate reactors suitable for use in the HotChip, ColdChip and PhotoChip reactors. Pre-wound with PFA or PTFE tubing, as with our original coil reactors they are easily rewound with fresh tubing by the user.

Other accessories

Reactor Modules – Chip Reactors

Glass static mixer reactor blocks



Our 2- and 3-channel borosilicate glass mixer block/chip reactors are designed for high throughput applications, fast mixing-dependent reactions and fast, highly exothermic reactions requiring temperature control.

For heating and cooling, the mixer block can be mounted on the HotColumn module adapter for the HotCoil reactor module, or directly into the dedicated HotChip, ColdChip and PhotoChip

- Rapid, efficient temperature-controlled mixing
- 2D or 3D chicane mixing geometries
- Choice of A + B or (A + B) + C static mixer geometries
- Simple finger-tight screw connections



2 input 1.6ml [A+B] GSM



2 input 20ml [A+B] GSM



2 input 0.5ml [A+B] GSM



3 input 1.0ml [A+B]+C GSM

Other accessories



Column reactors

10 mm, 15 mm, 20 mm, x 100 mm glass columns with adjustable end fittings, are available. Users can choose which reagents, catalysts and/or scavengers to pack into the columns. The [HotColumn](#) adapter for our coil reactors modules accepts these perfectly.

- Adjustable column length for varying reaction scale and minimal dead volume
- Easy interchange of columns

HotColumn



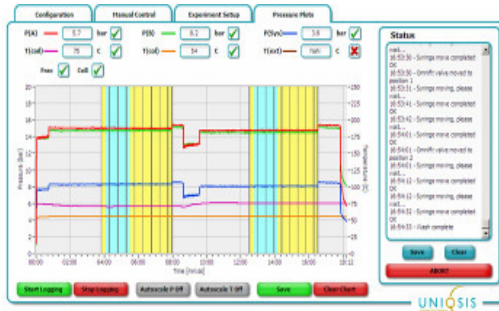
Coil-to-column reactor converter

The [HotColumn Adaptor](#) converts our [HotCoil](#) reactor module into a multi-position column reactor.

- Fits 10, 15 and 20 mm OD columns
- Accommodates up to 6 column holders
- Insulated column holders with glass viewing window
- Optional external temperature sensor

Other accessories

Software



Real-time data logging package

We have an invaluable auxiliary PC package for use with the FlowLab and FlowLab Plus that allows full real-time data-logging of system and pump pressures, and reactor temperatures.

The easy-to-use software is also able to display fractionation data when a fraction collector is attached (Multi-X) and the pressure and temperature data can be saved to a log file and exported.

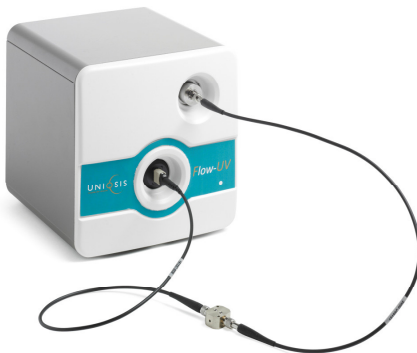
Extremely useful and highly recommended!

In-line UV-Vis spectrophotometer

The Flow-UV is a compact in-line UV-Vis specially developed for flow chemistry applications that enables real-time monitoring of dispersion and is therefore particularly useful for small scale reactions that are typically not completely under steady state conditions.

- Range: 200-1050 nm, NIR option available
- Short path length, in-line high pressure flow cell may be positioned anywhere in the flow path
- Compact and low cost

Flow-UV



System Control Software

FlowControl™ multi-channel automated flow chemistry

FlowControl is a powerful new application that allows the BPM and all add-on modules to be programmed and operated using a single user interface.

FlowControl is both intuitive and straightforward to use, but adds a more versatile experiment planner, a data-logging module, a data analysis facility and a reporting function.

Key features include:

- Create new experiments or reload and/or modify existing saved methods
- Control up to 4 flow channels (2 x BPM or standalone pumps)
- Control up to 4 reactors (coils, chips, columns, sub-ambient reactors)
- Program up to 100 independent experiments with individual fraction collection protocols
- Automated robotic filling of up to 4 sample loops (Auto-LF)
- Real time data logging, archiving and data export into Excel etc.
- Edit experiments 'on-the-fly', skip or pause the current experiment
- Analyse and manipulate saved data whilst simultaneously running other experiments
- Remote Wi-Fi control and data logging from your office using a dedicated wireless router.



More information

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