

## High-Performance Continuous Flow Chemistry Systems

Robust • Accurate • Flexible • Safe



## Flow chemistry systems from Uniqsis

Uniqsis designs and manufactures a range of bench top 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.

### FlowLab™



*Entry-level flow chemistry system*

### FlowLab™ Plus



*Modular flow chemistry system  
with automated control*

### FlowSyn™



*Integrated flow chemistry synthesis  
system with automated control*

**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.

**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.

**FlowSyn** is a compact, fully integrated flow reactor that can be operated in either manual or automated modes. FlowSyn can be readily upgraded and the functionality extended to include additional pumps, fraction collectors, liquid handlers, gas-liquid reactors and cryogenic modules.

# Entry level systems for cost-effective flow chemistry

## Uniqsis FlowLab™ & FlowLab Cold™ entry level flow chemistry systems

**FlowLab** is an entry-level flow chemistry system that combines chemically resistant, high quality HPLC pumps with the **HotCoil** or **Polar Bear Plus Flow** standalone reactor modules.

The components can be controlled individually using their manual interfaces or remotely using simple PC software that also provides real-time data logging and allows experiments to be saved and exported. Optional manual inlet selection valves facilitate reagent input and product collection.

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.



- Wi-Fi remote control
- Dual high pressure pumps (100 bar<sup>a</sup>)
- RT to 260°C<sup>b</sup> temperature range (FlowLab)
- -40°C to 150°C temperature range (FlowLab Cold)
- Complete with 5 ml PTFE and 5 ml 316L stainless steel coil reactors
- User-friendly control software with real-time data logging and archiving of experiments

<sup>a</sup> 200 bar option on request; <sup>b</sup> 300°C option available

## Fully integrated systems for total ease of use

### FlowSyn™ & FlowSyn Maxi - a complete system in one box

FlowSyn is a complete dual channel flow reactor system. Two chemically resistant, high pressure pumps operating at up to 100 bar<sup>a</sup> deliver reagents via a mixer into electrically heated flow reactor modules. Back pressure regulators prevent back flow and pressurise the system allowing reactions to be superheated up to 260°C<sup>a</sup>. 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.

FlowSyn can be controlled manually or 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 and additional pumps. Upgrading to FlowSyn Auto-LF allows full combinatorial reaction optimisation or compound library generation. Alternatively, individual reactions can be scaled up using the FlowSyn Maxi to throughputs approaching 100 ml/min.

- Carry out superheated reactions up to +260°C and 100 bar<sup>a</sup>
- Wide range of coil, chip and column reactors available in a variety of materials for optimal chemical compatibility
- Seamlessly scale up reactions up to 60 ml and 100 ml/min (FlowSyn Maxi)
- Choose flow path from PTFE, 316L stainless steel or Hastelloy C
- Future proof - numerous upgrade options available for maximum flexibility

<sup>a</sup> 200 bar and 300°C options available on request



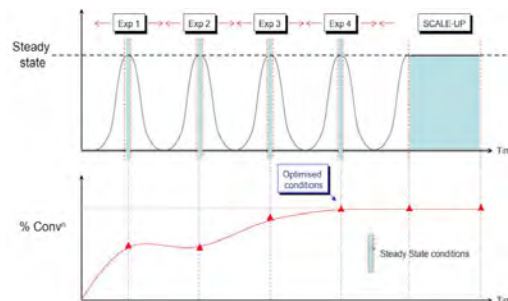
# Fully integrated systems for total ease of use

## FlowSyn Multi-X™ - automate multiple experiments

A convenient and versatile multi-experiment package for automating a series of reactions, the FlowSyn 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
- Integrated control interface - no need for a separate PC
- Single and 4 rack fraction collector options
- Compact footprint

## Fully integrated systems for total ease of use

### FlowSyn Auto-LF - 2 or 4 channel system

A fully automated system that efficiently runs combinatorial library or optimisation experiments employing multiple reagent inputs under varying reaction conditions. Simultaneous loop filling and fraction collection saves valuable time, whilst integrated wash steps prevent cross-contamination.

- Automate experiments with multiple combinatorial reagent inputs
- Powerful intuitive PC interface for real-time reaction monitoring and data logging
- Stacked, small format XYZ sampler/fraction collector minimises space requirements
- In-built automated wash protocols
- No unreliable sample injection ports
- Septum-piercing liquid handling ensures reagent solutions are preserved
- Air bubbles prevent sample dispersion when loading sample loops to minimise reagent wastage



## Modular systems for total flexibility

### Uniqsis Binary Pump (Reagent Delivery) Module

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

The **Uniqsis 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. 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 new **BPM**, we offer a wide range of add-on modules to enable you to create a complete flow system according to your application needs.

- Dual high pressure pumps (100 bar<sup>a</sup>)
- 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 Uniqsis modular reactors

<sup>a</sup> 200 bar option on request



# Modular components

## Cooling and heating

Uniqsis offers several modular heating and cooling options - the **HotCoil™** coil heater for heating only, the **Polar Bear Plus Flow™** and **FlowSyn ColdCoil™** for both cooling and heating, and the **Polar Bear™** for cooling only.

### 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 FlowSyn 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)<sup>a</sup>

In combination with an existing recirculating chiller filled with a suitable thermal fluid and a **FlowSyn** or **Binary Pump Module**, this unit can control reactions between -70°C and +150°C. The external circulator can be controlled via the **FlowSyn** interface.

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



<sup>a</sup>Requires external chiller and/or heating re-circulator



## Polar Bear™ High Performance Chiller Unit (ambient to -88°C)

Developed in a collaboration between Cambridge University, UK and Cambridge Reactor Design the Polar Bear standalone chiller unit delivers efficient cooling down to -88°C without the need for solid CO<sub>2</sub>, or liquid nitrogen.

- Dedicated cryogenic reactor module for flow chemistry applications
- Fast, precise cooling without the need for card-ice, liquid nitrogen or heat transfer fluids
- Compatible with all Uniqsis coil and chip reactors
- Reactor can accommodate multiple coils to allow pre-cooling of reagent solutions prior to mixing
- Maximum coil reactor volume 60 ml



FlowSyn with Polar Bear cryogenic reactor module

## Polar Bear Plus Flow™ (-40°C to +150°C)

A state-of-the-art heating and cooling reactor module for flow chemistry applications, the Polar Bear Plus Flow is completely self-contained and very easy to use. No need for card-ice, refrigerants or heat transfer fluids.

- Compact and portable - can easily be relocated in and out of fume cupboards
- A nitrogen purge can be connected to prevent 'icing-up'
- Compatible with all Uniqsis FlowSyn coil and chip reactors



FlowSyn with Polar Bear Plus Flow

# Gas-liquid flow chemistry

## Tube-in-tube Gas Addition Modules

Tube-in-tube gas-liquid reactors provide a safe and efficient means of performing gas-liquid reactions under continuous flow conditions. They utilise a gas-permeable fluoropolymer inner tubing through which a wide range of gases can rapidly diffuse into the surrounding liquid phase.

### GAM I Pre-saturation Module

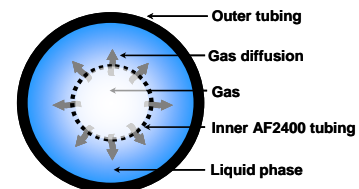
Although designed primarily as a module to provide a solvent feed that is pre-saturated with gas, the GAM I can be used at ambient temperature as a flow reactor. It has an integrated gas management manifold.

### GAM II Coil Reactor

In the GAM II, the tube-in-tube concept is incorporated into a standard Uniqsis coil reactor. This can be either heated or cooled, and gas is now supplied 'on-demand' directly to the reaction mixture to improve throughput. The outer tubing is stainless steel for safety and to ensure optimal heat transfer.

To facilitate gas management, an optional **Gas Manifold** is also available.

- Safely and reproducibly perform gas-liquid reactions in flow.
- Perform gas-liquid reactions at elevated or sub-ambient temperatures.
- Economical use of expensive gases.
- Compatible with **FlowSyn**, **Cold Coil** and **Polar Bear Plus Flow**.



Gas Addition Module GAM I



Gas Addition Module GAM II with optional Gas Manifold

# Accessories & consumables

## Reactor modules — coil and column reactors



### Coil reactors

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The FlowSyn's electronically controlled coil reactors 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 FlowSyn 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

### Column reactors

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The FlowSyn column heater accepts standard 10mm ID x 100mm glass columns with adjustable end fittings, and adapts for columns of different sizes. Users can choose which reagents, catalysts and/or scavengers to pack into the columns.

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

## Other accessories

### Reactor modules — chip reactors

#### Glass static mixer reactor blocks

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The Uniqsis 2- and 3-channel borosilicate glass mixer block/chip reactor is 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 FlowSyn column module, the [FlowSyn Cold Coil](#) reactor module, or the [Polar Bear Plus Flow™](#).

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

#### HotColumn™ Adaptor



#### Coil-to-column reactor converter

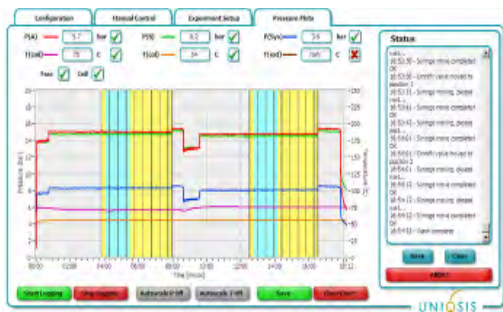
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The [HotColumn Adaptor](#) converts any Uniqsis coil reactor module into a multi-position column reactor.

- 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

Uniqsis have developed an invaluable auxiliary PC package for use with the FlowSyn 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!

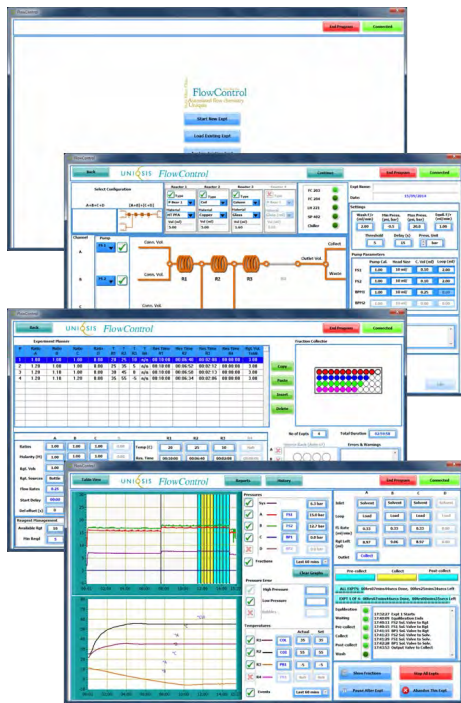
## FlowControl™ multi-channel automated flow chemistry

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

Based upon the existing FlowSyn control 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 (FlowSyn + 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-LF4)
- 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

For more detailed information of our products, their specification and application, please visit our website or contact us. We will be happy to discuss your application and give advice.



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