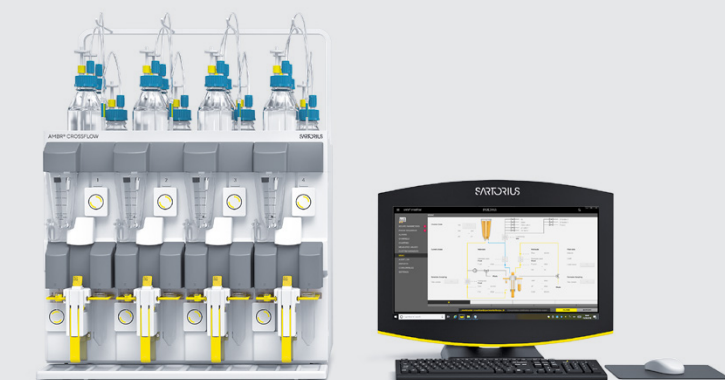


# Ambr<sup>®</sup> Crossflow

## The High Throughput Solution for Parallel Screening

### Features

- **Study factors for manufacturability**  
Collect important information about the behaviour of the molecules in downstream processing already in an early stage
- **Automated, parallel trials**  
Up to 16 channels can be managed by one control station
- **Lowest process volumes**  
Small scale screening with 10 cm<sup>2</sup> membrane area | 5 mL recirculation volume



### Product Information

Ambr<sup>®</sup> Crossflow provides at early development stages access to molecule behavior related to viscosity, buffer composition, shear stress and performance in membrane processes. It enables a lot of important additional decision criteria for the final candidate selection and speeds up this process significantly.

A small scale, high throughput automated system enables greater number of molecule | buffer combinations and process control conditions to be investigated. As a result early stage R&D productivity and efficiency will be improved significantly while costs per experiment are reduced.

Ambr® Crossflow is a benchtop crossflow system optimised for ultrafiltration and diafiltration applications. It is a small scale screening system with a minimum recirculation volume of 5 mL and a dedicated new range of Ambr® CF Filter cassettes with 10 cm<sup>2</sup> membrane area. Parallel operation is achieved with four independent crossflow channels per module, with up to four modules managed by one control station. This means Ambr® Crossflow is capable of performing membrane screenings with up to 16 Ambr® CF Filters simultaneously.

Intuitive hardware and software design ensures that the system is quick to set up and easy to use, while full system automation ensures reliable process control and reduced manual intervention.

## Description

The Ambr® Crossflow system is a small scale, high throughput device for ultrafiltration and diafiltration applications. A dedicated small scale filter cassette has been developed in parallel with this system, the Ambr® CF Filter cassette. This is a 10 cm<sup>2</sup> membrane area, single-use filter cassette. Once opened from the packet, the user simply lifts the filter holder handle, slides the filter into the housing and closes the handle – plug and play crossflow unit operation. Once the experiment is completed, product is harvested and the filter discarded. The system is fully automated, allowing for system start up, process control and clean down to be performed with no manual intervention. Intuitive yet flexible software allows for rapid process design while allowing full user modification of process set up and system control.

Four channels are located per module, with the option of running up to four modules per control system. The system has been optimised for small scale operation with a minimum recirculation volume of 5 mL. Each channel comprises of a 100 mL graduated retentate vessel situated on a load cell for level control with an integrated impeller for effective mixing. Automated pinch valves are located on the retentate and permeate streams and there are three peristaltic pumps; one to control crossflow rate, the second to load

system or experiment fluids and the third one for automated retentate samples. System fluids include: RO water, 1M NaOH as well as two pH and conductivity calibration solutions. Up to three experiment fluids can be loaded per channel, e.g. one protein feed and two diafiltration buffers.

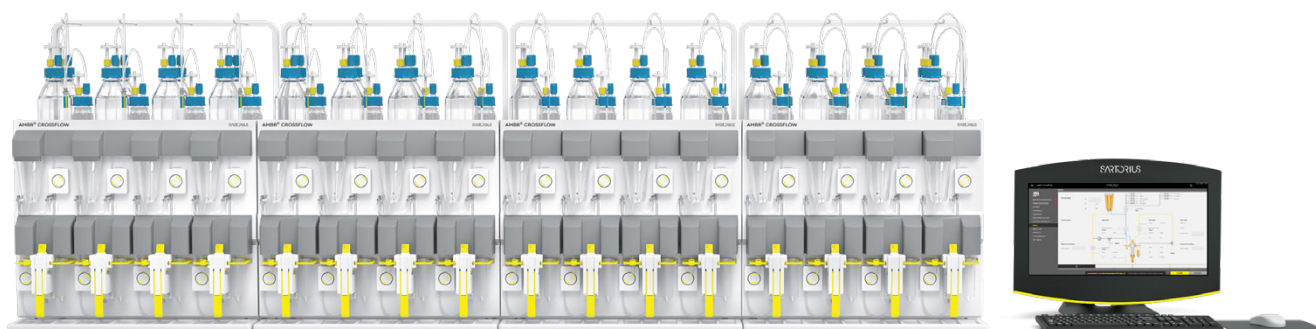
Within the filter holder there are three pressure sensors, on the feed, permeate and retentate channel. A pH-probe is located in the retentate vessel and a conductivity sensor is located in the filter housing. In addition, samples can be collected automatically for offline analysis; scheduled to occur at specific times in the process or triggered by process events. Fully automated parallel processing, control and evaluation of all crossflow experiments, with feedback from the system sensor and automated control of feed | load pumps and pinch valves – allows the same number of laboratory users to perform many more experiments without compromising on experiment quality. Ambr® Crossflow can be used as a ranking tool, to optimise process conditions, e.g. TMP, flowrate, pH or conductivity values.

## Applications

- Molecule | buffer combination screening
- Efficient candidate molecule selection
- Buffer formulation development
- Evaluate process control strategies
- Automated product formulation preparation
- QbD and DoE screening studies

## Control Functions

System control is fully automated therefore requiring minimal manual intervention when in operation. The 22" touch screen Control System displays all process information allowing for user-friendly operation, even when editing the process mid-experiment. All control and alarm functions correspond to a coloured 'status' LED on the individual crossflow channels to enable visualisation of the system state on both the software and hardware.



# Process Sequences

Recipe design is intuitive with drag-and-drop pre-programmed phases but is also flexible allowing users to design their own phases and recipes from scratch. Each channel operates independently with individual control of process conditions, set points and control strategy. Ambr® Crossflow software can additionally be installed on user PCs to enable writing of process sequences at your desk, before transferring to the Control System.

# Data Acquisition

Data is automatically collected and stored within the experiment folder. This data can be viewed on the Control System, or on a user PC with the Ambr® Crossflow software installed. Alternatively, data can be exported as a .csv files and viewed using third party data analysis packages.

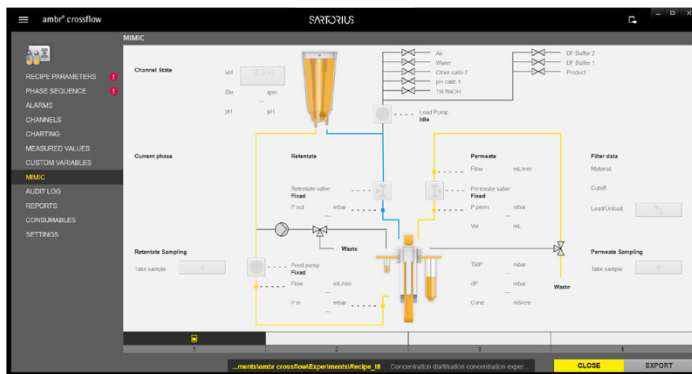
# Pre-Programmed Phases

System start up	Including automated calibration of pumps, pH and conductivity sensors
Filter test	Automated integrity, water flux and air permeation tests
Membrane pre-flush	Buffer   feed equilibration of the membrane
Concentration	Used to concentrate the product to a pre-defined final volume
Diafiltration	Diafiltration of the product to a pre-defined volume of buffer
Sample   Harvest	Used to draw a sample or harvest product from the system
CIP	Used to clean the system by flushing the system with RO water and 1M NaOH
Shutdown	System shutdown and loading of storage solution
Prediction of optima	This sequence enables the system to determine the best time to switch between UF and DF and back again for optimal savings in time and with the best recovery.
TMP optimization	The multi-parallel nature of ambr crossflow allows for simultaneous TMP scouting by varying flow rate and   or concentration on a channel basis.

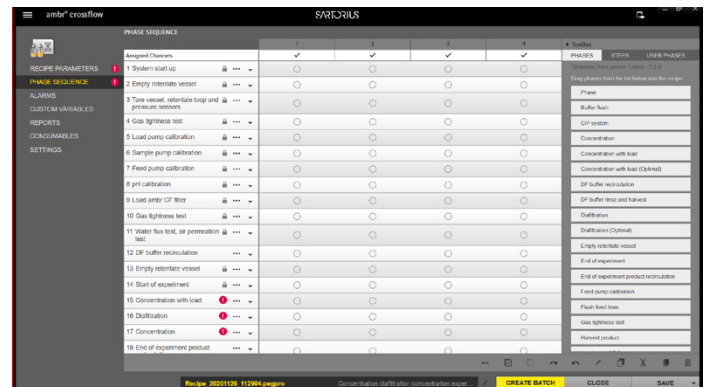
These phases are available as drag-and-drop units that can be built up into a recipe. The phases can be edited to allow for different operating conditions. Alternatively, recipes can be created from scratch to allow for complete customisation.

# Service

Reliability and smooth operation of equipment are ensured through proper installation | configuration and regular maintenance by Sartorius Service experts. Extended warranty includes Preventive Maintenance visits and any software updates.



Mimic screen










Recipe design

# Technical Data

Function	Value
Filter area	Ambr® CF Filter 10 cm <sup>2</sup>
Peristaltic pump (Feed and load)	0 – 80 mL/min
Min. Recirculation Volume	5 mL
Retentate vessel	120 mL
Load cell	0 – 150 g
Mixer	0 – 500 rpm
Pressure sensors	0 – 5 bar
Max. Inlet pressure	3 bar (43.5 psi)
pH probe	Operating range 4.0 – 9.0
Conductivity probe	1 to 60 mS/cm
Dimensions (W×D×H) 4 channel system incl. control station	115,8 × 42,0 × 79,5 cm
Weight   4 channel module	42 kg (93 lbs.)
IP - Standard	IP 2X
Electrical requirements	Control System Module
	230 VAC   50 Hz 0.9 Amp 120 VAC   60 Hz 1.3 Amp 230 VAC   50 Hz 0.75 Amp 120 VAC   60 Hz 1.50 Amp

## Ordering Information

### Ambr® Crossflow System

	Ordering Code	System including Control Station
	O61-8A60	Ambr® Crossflow - 4 channel system*
	O61-8A61	Ambr® Crossflow - 8 channel system*
	O61-8A62	Ambr® Crossflow - 12 channel system*
	O61-8A63	Ambr® Crossflow - 16 channel system*
	Ordering Code	System without Control Station (extension of an existing System - up to a maximum of 16 channels)
	O61-8A70	Ambr® Crossflow - 4 channel system**
	O61-8A71	Ambr® Crossflow - 8 channel system**
	O61-8A72	Ambr® Crossflow - 12 channel system**

\*each System comes with 3 off-line software licenses, a System- and Software Manual, a 12 month warranty, including a comprehensive service and support package and is equipped with System Fluid Kit, pH - Probes and Channel Kits.

\*\*each System comes with a System- and Software Manual, a 12 month warranty, including a comprehensive service and support package and is equipped with System Fluid Kit, pH - Probes and Channel Kit.

## Ambr® CF Filter 10 cm<sup>2</sup> Membrane Area, 4 Units per Box

Membrane Polymer	Cut-Off	Material Number
Hydrosart®	2 kD	3MA1441910
Hydrosart®	5 kD	3MA1442910
Hydrosart®	10 kD	3MA1443910
Hydrosart®	30 kD	3MA1445910
Hydrosart®	100 kD	3MA1446810
Hydrosart®	300 kD	3MA1447910
Polyethersulfone	1 kD	3MA1460910
Polyethersulfone	5 kD	3MA1462910
Polyethersulfone	10 kD	3MA1462910
Polyethersulfone	30 kD	3MA1465910
Polyethersulfone	100 kD	3MA1466810
Polyethersulfone	300 kD	3MA1467910

## Ambr® Crossflow Consumables and Accessories


Ordering Code	Item	Description
061-2A27	Calibration buffer 1	Calibration buffer 1 contains pH 4, 4 bottles of 1 L, including bottle cap assemblies
061-2A28	Calibration buffer 2	Calibration buffer 2 contains pH 7, 4 bottles of 1 L, including bottle cap assemblies
061-2A29	pH Probe	Ambr® Crossflow pH probe 1 off
061-2A32	Air Filters Kit	Ambr® Crossflow set of Sartorius 0.2 µm filters, Ø 33 pack of 12 and Ø 64 pack of 6
061-2A23	System Tube Set	Ambr® Crossflow 4 channel system tube sets plus additional tubes to connect between modules
061-2A24	Waste Tube Set	Ambr® Crossflow single module waste tubing
061-2A25	Pump Head Kit	Ambr® Crossflow, 2 spare pump heads
061-2A26	Sample Tube Sliders	Ambr® Crossflow spare sliders for a module (8×, 2 per channel)
061-2A10	Channel Kit	Ambr® Crossflow tubing, retentate vessel, sample pump and stirrer for one channel
061-2A33	Experimental Fluids Bottle Kit	2 × 500 mL & 1 × 100 mL glass bottles with caps, breathers and tubing assemblies for one channel
061-2A34	Waste and System Bottle Kit	1 × 4 L, 1 × 10 L & 1 × 20 L carboy heavy walled HDPE bottles including caps, breather and tubing assemblies for one system

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