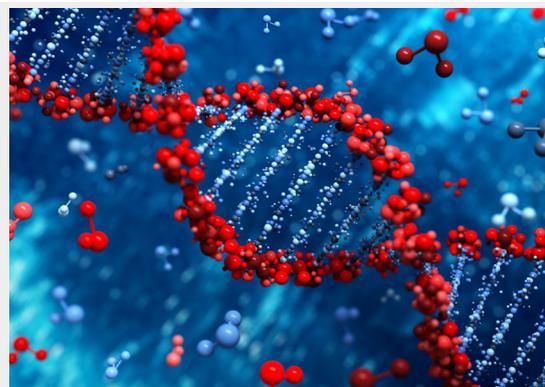


QUENCH FLOW



# QFM-4000.

Micro-Volume Quench-Flow



# Save time, money *and* samples!

A combination of innovative technology and high performance has made BioLogic a benchmark for Rapid Kinetics product design for over 35 years.

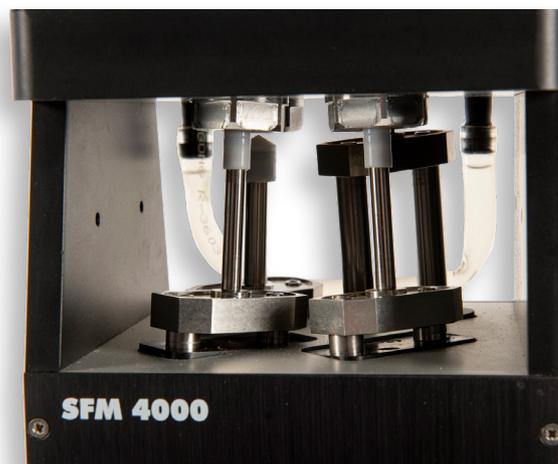
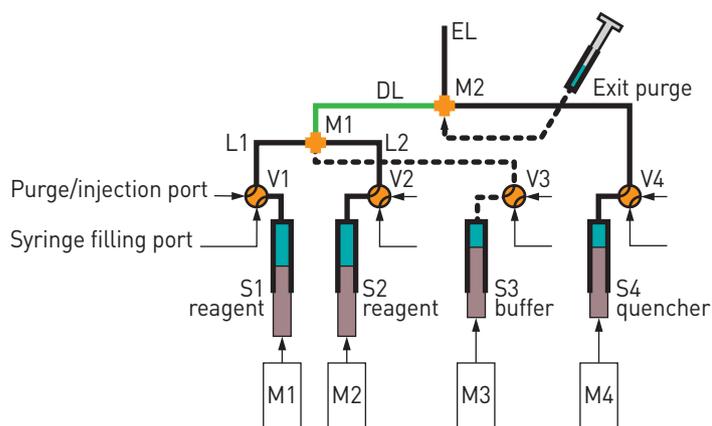
Standout technology such as independent stepping motors, EMFA\* method and CD kinetics allow rapid kinetics users to work faster, more efficiently and save precious samples.

While products such as the SFM-4000/Q have set quality standards for triple mixing experiments such as De/H exchange, older QFM models have been known as instruments of choice for microvolume operation for many years. The QFM-4000 capitalizes on this success and exploits the latest SFM-series technology.

The advanced design of the QFM-4000 allows the measurement of chemical reaction rates from a few milliseconds to many minutes. The quench flow technique is widely recognized for analyzing enzymatic reactions, single turnover reactions, and DNA cleavages. It is also widely used to identify reaction intermediates.

The **QFM-4000 is the MUST HAVE instrument** for all single mixing quench-flow applications. It offers the best specifications in the world in terms of sample consumption, user-friendliness, modularity and automation.

## Schematic of QFM-4000



Each syringe is driven by an independent stepping motor.

Solutions are loaded into the instrument using 4 position valves, which are also used to select the traditional quench-flow mode, or extra-small volume mode.

Mixers are specially engineered to provide turbulent mixing over a very large range, so that a single delay line can be used for all ageing times from 4 ms to several seconds.

Reactions are stopped in mixer 2, and the aged solution is flushed through an exit line to a collect device.

\*EMFA : Excitation Modulated Fluorescence Anisotropy

# A unique design based on a single delay line

With traditional quench-flow technology, the user must carefully select a delay line within a set to reach the desired ageing time.

The range of ageing times that can be achieved in each line is usually determined by the turbulent/laminar flow limit, and the user must choose between continuous or interrupted flow mode to age the solutions.

Sample consumption depends on the delay line volume which may be very limiting for applications where samples quantities are precious, or limited.

## sub-micro-liter precision

The QFM-4000 was designed around an innovative, pulse-flow pushing process developed at BioLogic to provide sub-micro-liter precision for sample delivery.

Thanks to this precision, samples are aged by successive aliquots rather than continuously - simplifying handling and allowing significant sample consumption reduction as all ageing can be achieved from a very short delay line.

The overall results are outstanding: **using a 3  $\mu$ l delay line, the user can vary the ageing time from 4 ms to tens of seconds.**

The QFM-4000 is the only quench flow mixer available with single delay line technology, and represents a major breakthrough for quench-flow techniques.



## ZERO dead-volume Mode

An extra-small volume mode is available when sample volumes less than 250  $\mu$ l are necessary, when users have extremely valuable samples or only 10-15  $\mu$ l of solutions to perform a single ageing time to catch an intermediate.

The extra-small volume mode uses 10-15  $\mu$ l of sample for the reaction, plus 10  $\mu$ l to prime the system. After the reaction is run, the priming component is recovered for future use.

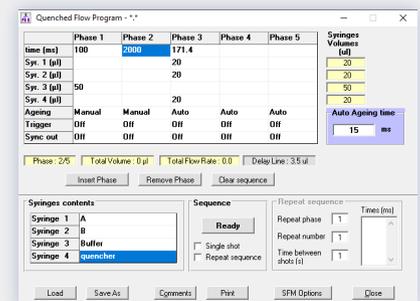
The net sample usage is the same as the amount consumed by the reaction. This means **zero dead volume, and no wasted samples!**

## A user-friendly interface

The QFM-4000 uses Bio-Kine software and a USB connected mixer controller. This powerful, comprehensive software is perfect for expert and occasional users alike. Once injection volumes for each syringe have been entered, the user only needs to indicate the desired ageing time. The duration and speed of the phase are then automatically calculated and adjusted to match user settings.

Syringes are completely independent, so washing phases can be added to sequences before, or after, mixing steps. The QFM-4000 has the most user-friendly and user-powerful quench-flow interface on the market.

With only one parameter to change between experiments, a 20 point kinetics set can be performed in less than 10 minutes, with only 220  $\mu$ l of solutions. **No other system gives you so much control, so easily, and with such small sample quantities.**



## Temperature control

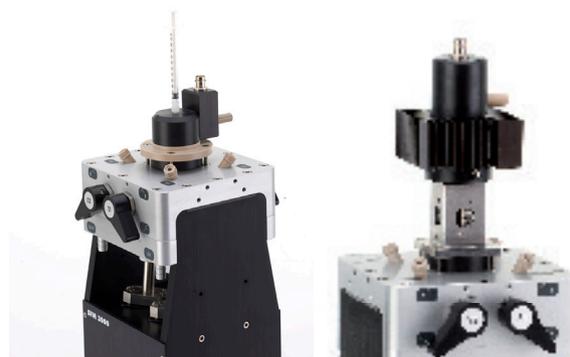
All driving syringes and the mixing chamber can be temperature controlled by connecting a water bath circulator. Individual syringe temperature control is available in case a sample is not stable at the reaction temperature. This allows a small, user-defined amount to be pre-incubated a few seconds before the experiment. The stock solutions can be stored safely in the driving syringes.

## A modular instrument

**QFM-4000** can easily be customized to match your application. Many stock and semi-custom interfaces are available for various collection and analytical devices. The control software and hardware also have options for synchronizing the system with external devices. Please contact BioLogic directly, or via your local representative, to discuss any special customization needs you might have.

Like all BioLogic mixing systems, the **QFM-4000** was designed to offer many upgrade possibilities. It can be converted into a SFM-4000/Q in few minutes, or be upgraded to become a triple mixing stopped-flow instrument (SFM-4000/S).

Reliability and durability are major benefits of the **QFM-4000**. Built-in driving syringes are made of PEEK, and are user replaceable. They cannot be broken under normal use as with glass syringes. The materials used to build the **QFM-4000** are compatible with organic solvents, so the instrument can be used for a wide range of applications from organic chemistry to biochemistry.



SFM-4000/Q

SFM-4000/S

### SPECIFICATIONS

Configuration	
Number of syringes	4
Number of mixers	2
Ageing line volume	3 $\mu$ l(factory calibrated)
Storage lines volume	15 $\mu$ l
Syringe volume	1.9 ml for S1, S2 and S4 3.6 ml for S3
Material in contact with samples	PEEK and PTFE
Duration of flow	Automatic in mixing phase 1 ms to 60 s in washing phase
Synchronization	+/- 5 V TTL pulse
Delay line purge	Air or buffer
Exit line purge	Air

Mixing performances	
Minimum ageing time	4 ms
Minimum injection volume	10 $\mu$ l
Dead volume	zero $\mu$ l in extra-small volume mode
Temperature range	0-70°C
General	
Power requirements	300 W; 110-220 V; 50/60 Hz
Communication	USB
Software	Bio-Kine
PC configuration	Windows XP, 7, 8 or 10
QFM-4000 weight	16 kg
QFM-4000 dimensions	480 x 180 x 160 mm (H x W x L)
MPS-70 dimensions	150 x 300 x 430 mm (H x W x L)