Eldex

MicroPro® Pumping System

Precise
fluid delivery
at extremely
low flow rates

A new low in micro flow.

The MicroPro pump provides precise fluid delivery at extremely low flow rates, overcoming the difficulties of both traditional hardware and previous syringe pump designs.

Researchers in fields ranging from HPLC and FIA to reactant feed and pilot plant work will be able to take advantage of the benefits of operating at low flow rates.

- Bio-separations
- Micro and Capillary LC
- LC-MS

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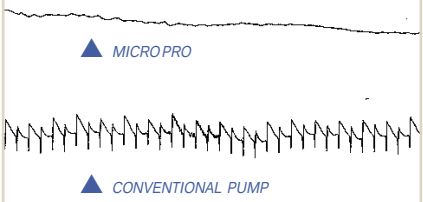
High performance

The MicroPro achieves precise, pulseless fluid delivery at flow rates as low as 0.01 µL/min (gradient flow rates as low as 1 µL/min). By taking a system wide approach to developing the MicroPro, we have been able to produce a fully integrated system, in-corporating aspects critical to low flow rate work such as temperature control and minimized system volume.

Flow output is stable and pulseless

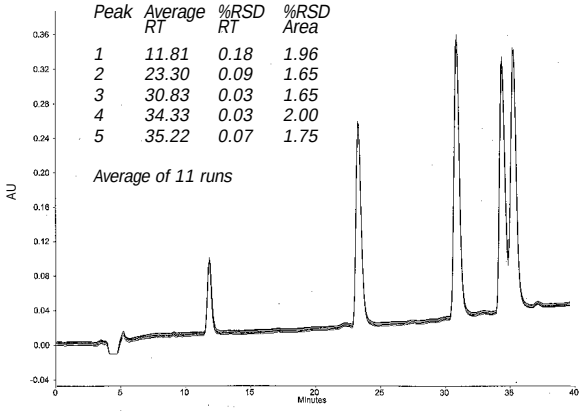
Flow: 150 µL/min.
Column: 2.1 x 250mm C-18



Reproducibility of both retention times and area indicate stable, pulseless, precise flow.

Peak	Average RT	%RSD RT	%RSD Area
1	11.81	0.18	1.96
2	23.30	0.09	1.65
3	30.83	0.03	1.65
4	34.33	0.03	2.00
5	35.22	0.07	1.75

Average of 11 runs



Sample: Peptide Test Mix
Column: 0.8 x 250mm HS HaiSil column
Flow: 20 µL/min.
Eluent: Channel A, 0.05% TFA in water. Channel B, 0.045% TFA in 40% water, 30% acetonitrile, 30% methanol
Gradient: 10% to 90% B in 40 mins.
Detector: UV @ 210nm

Pulseless flow

One of the key advantages of the MicroPro pump's syringe-based design is the ability to deliver flow without pulsation. Consequently, detector sensitivity can be increased for trace-level detection.

Flow reproducibility

The optimized syringe sizes and micro-stepping stepper motor (each micro-step is equivalent to 0.1 nanoliters) result in unmatched flow reproducibility.

Pre-pressurization

MicroPro pumps fitted with an optional pressure transducer can utilize advanced software, which automatically and rapidly ramps to the operating pressure at the entered flow rate.

Negative flow rates, constant pressure, and more

For applications requiring both infusion and withdraw, the MicroPro pump can be programmed for both positive and negative flow rates. In addition, ramping flows is as simple as entering two end points. The MicroPro can also be programmed to run in the constant pressure mode instead of the constant flow mode, or even programmed to ramp pressure or to generate pressure gradients.

Modular design

The MicroPro pump system has been designed with maximum modularity, making it possible to configure to your specific needs with minimal impact to your budget.

Syringes

Two syringe sizes are available, each tailored to specific flow requirements. You can also choose two different materials of construction, either type 316 stainless steel or Titanium.

Valve options

Three different valve options are available for the MicroPro pump system to meet your application's specific requirements. For applications requiring the greatest precision, high pressure active valves are available, while for less demanding applications, mechanical passive valves are available at a lower cost.

Transducer options

The optional pressure transducer provides the ability to set pressure limits, operate in constant pressure mode, and enable the pre-pressurization software. These advanced features add to the flexibility and safety of the MicroPro system and there are several pressure transducers available to meet your specific control requirements.

Temperature options

At extremely low flow rates, small variations in temperature can dramatically affect flow stability. For this reason, the MicroPro pump has optional temperature control of the syringe which is strongly recommended when the highest level of precision is required. You can have your pump fitted with elevated temperature control (up to 50°C) or with a cooling jacket.

Multiple pump control

A single MicroPro pump can control up to three other MicroPro pumps, whether for purposes of running gradients, for oper-ating the pumps in multi-independent mode, or for operating the pumps in the reciprocating mode.

Independent operation

You can use your MicroPro pump to control the flow rates of up to four pumps, operate them at different flow rates and feed their output to either a common stream or separate streams. Of course, you can program each syringe to change flow rates at different times, run at negative flow rates, or ramp flow rates; in short, the MicroPro provides full featured control of additional syringes.

Reciprocating operation

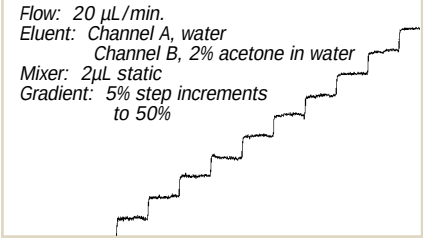
You can achieve the advantages of continuous output as well as pulseless delivery by purchasing the reciprocating version of the MicroPro. While one syringe is delivering fluid, the other is refilling. Advanced software minimizes the transition between syringe outputs.

Flow transition between syringes is smooth, less than 1 psi

Gradients

The MicroPro pump ensures accurate, and reproducible gradients. The design of conventional pumping systems limit their ability to generate gradients at very low flow rates. The MicroPro is designed specifically for low flow rates, utilizing optimized syringe sizes and dynamic mixing chambers, resulting in thoroughly mixed, precise gradients.

Precise gradients even at low flow rates and solvent percent-



Dynamic micro-mixing

Specially designed micro-mixers with volumes as low as 15 µL provide dynamic mixing throughout the range of gradient flow rates. The interchangable mixer cartridges, providing up to three stage mixing, are ideally suited for thorough mixing of a wide range of solvents. For applications with gradient flow rates below 5 µL/min, static mixers are available.

Continuous flow gradient systems

The need to refill syringes and consequent loss of system pressure is sometimes a disadvantage in gradient chromatography. Our innovative TLD (Transitional Liquid Delivery) syringe (patent pending) can be added to a gradient MicroPro system, producing a system with continuous flow. The TLD will deliver pre-pressurized solvent to the rest of the system while the gradient syringes are refilling. Adding the TLD syringe to a gradient system can decrease turnaround time between runs and increase sample throughput.

Reproducible gradient chromatography

The proof of hardware performance is in real-life chromatographic results. Put our MicroPro pump to the test and we are confident you will be impressed.

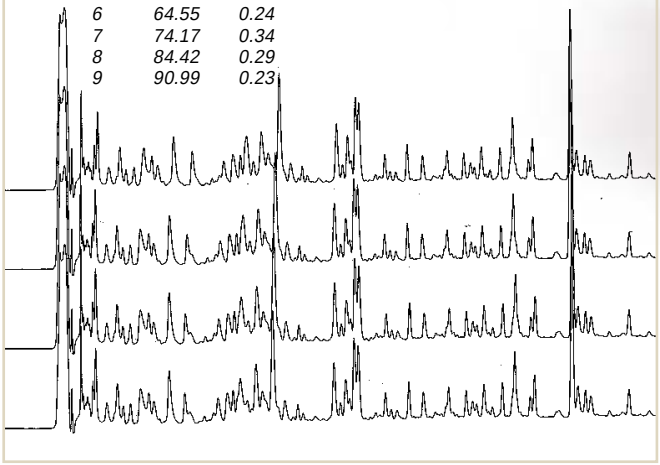
No compromise

The MicroPro pump provides researchers with a complete hardware solution to the problems of precision fluid delivery at extremely low flow rates. For optimal performance at micro flow rates, the MicroPro pump combines modularity of design with full component integration. Modularity of design lets you configure the MicroPro pump to best suit your applications needs and full component integration means that system volume is minimized, always critical for superior performance in micro flow rate applications.

MicroPro

MicroPro reproducibility is demonstrated by the reproducibility of the retention times

Peak	Average RT	%RSD RT
1	19.94	0.37
2	31.17	0.52
3	45.38	0.68
4	49.93	0.67
5	60.81	0.35
6	64.55	0.24
7	74.17	0.34
8	84.42	0.29
9	90.99	0.23



Flow: 1 µL/min.
Eluent: Channel A, 0.05% TFA in water
Channel B, 0.045% TFA in 60% acetonitrile/water
Mixer: 2µL static
Gradient: Linear, 4-74% B in 140 mins.
Sample: 50 pmole a-chymotrypsinogen A tryptic digest
Column: LC Packings Fusica 150 x .320 mm (Vydac C18, 5 mm 300Å)
Detector: UV @ 210nm w/ LC Packings U-Z View™ capillary flowcell

MicroPro

Several models are available and can be tailored to specific applications.

UV Detector

Our MicroPro Series of instruments includes a variable wavelength UV detector. Contact Eldex for details.

Specifications

System Features:

No. of syringes controlled: 4 (1 master and up to 3 slaves)

Modes of operation: single syringe, reciprocating syringe, multi-independent syringe, gradient, constant pressure

Wetted parts: 316 stainless steel, uhmw polyethylene, PEEK

Syringe sizes: 2mL or 10mL

Position sensors: 2

Pump features:

Flow rate: 2mL syringe: 0.01 - 2,000 µL/min
10mL syringe: 0.05 - 10,000 µL/min

Flow reproducibility: ±.5% typically

Set increment: 0.01 µL

Refill time: Minimum: 30 seconds, rate and time programmable

Maximum pressure: 2mL syringe: 10,000 psi (to limit of valves)
10mL syringe: 5000 psi (to limit of valves)

Gradient flow rate: 2mL syringe: 1µL/min.
10mL syringe: 5µL/min.

Gradient resolution: ±1%

Gradient reproducibility: ±.5% typically

Program features:

No. of steps: 200 (20 per file)

No. of files: 10

No. of cycles: 999

General features:

Dimensions (cm): Single: 16 W x 44 H x 36 D Dual: 34 W x 44 H x 36 D

Weight (kg): Single: 16 Dual: 30

Electrical: 100/120/230VAC; 60/60/50Hz

Remote: Start, stop, hold, 6 contact closures, RS232

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