

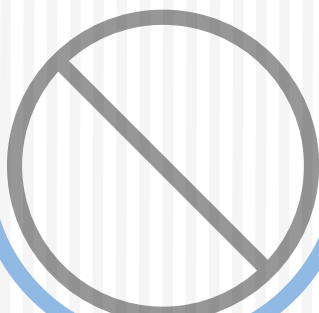


STREAMLINE
DISPENSING

Advanced
MicroFluidics



YOUR PARTNER
FOR INNOVATIVE
AUTOMATION
OEM SYSTEMS



We are experts in automating miniaturised liquid handling

To perform reliable liquid analyses, you need to create an automatic liquid management system. This requires various tools, a specific know-how and expertise in a wide range of domains. We aim to make your sequential dispensing protocol simple, precise and with minimal contamination. We create robust industrial microfluidics components and on-demand services, allowing to reduce sample size, reagent cost and experiment time. Our products are in-house and Swiss-made. Our reactive team provides quality engineering.

WHERE ARE AMF PRODUCTS USEFUL?



MANY APPLICATIONS

need to analyse liquids

LIQUID ANALYSES

require a liquid automation system

AMF SERVICES

LIQUID MANAGEMENT

uses tools to control,
mix and do other features

AMF PRODUCTS

VALVES & PUMPS

are the solution

Microfluidics dates backed to the 1950s, originally for inkjet printing. It has since then been at the heart of the R&D and is only now integrating the industrial sector.

OUR STORY

All this began when someone needed a solution that didn't exist. Our first partners were developing a complex lab automation project and could not find suitable components on the market. Knowing our passion for microfluidics, they approached us. Together, we developed a solution that specifically corresponded to their needs. Our first product was born: the automated sample preparator.

The know-how that resulted in this partnership enabled us to identify several additional market needs and develop more products. Thus Advanced Microfluidics was created.

Based in the heart of the Swiss watch and med-tech valley, in the EPFL innovation park, our team is committed to designing high-end, user-friendly fluidic solutions.

OUR MISSION

We develop and provide innovant, robust and reliable premium OEM tools for microfluidics automation and integrations.

We offer catalogue products and optimised solutions for your specific application. We help you save time and design our systems for easy integration.

OUR VISION

As pioneers in the revolutionary link between microfluidics and automation, we bring together a field, long considered as purely academic, into the industrial sector. With our innovative solutions, we strive to keep our clients satisfied by delivering high-performing and quality products & services. We are aiming to be the new reference for industrial microfluidics.

STRENGTHS



**CREATING HOME-MADE
DESIGNS**



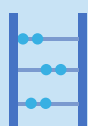
**MULTIPLE
COMPETENCIES**



**RAPID TESTING
AVAILABILITY**



QUALITY



**TAILOR EVEN FOR
SMALL QUANTITIES**

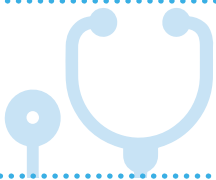



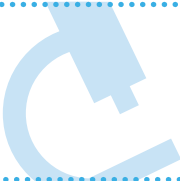





**REACTIVE
TEAM**





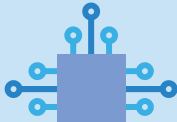

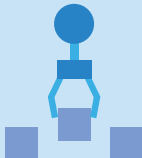


**CUSTOMER SUC-
CESS ORIENTED**

POSSIBLE APPLICATIONS

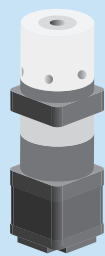
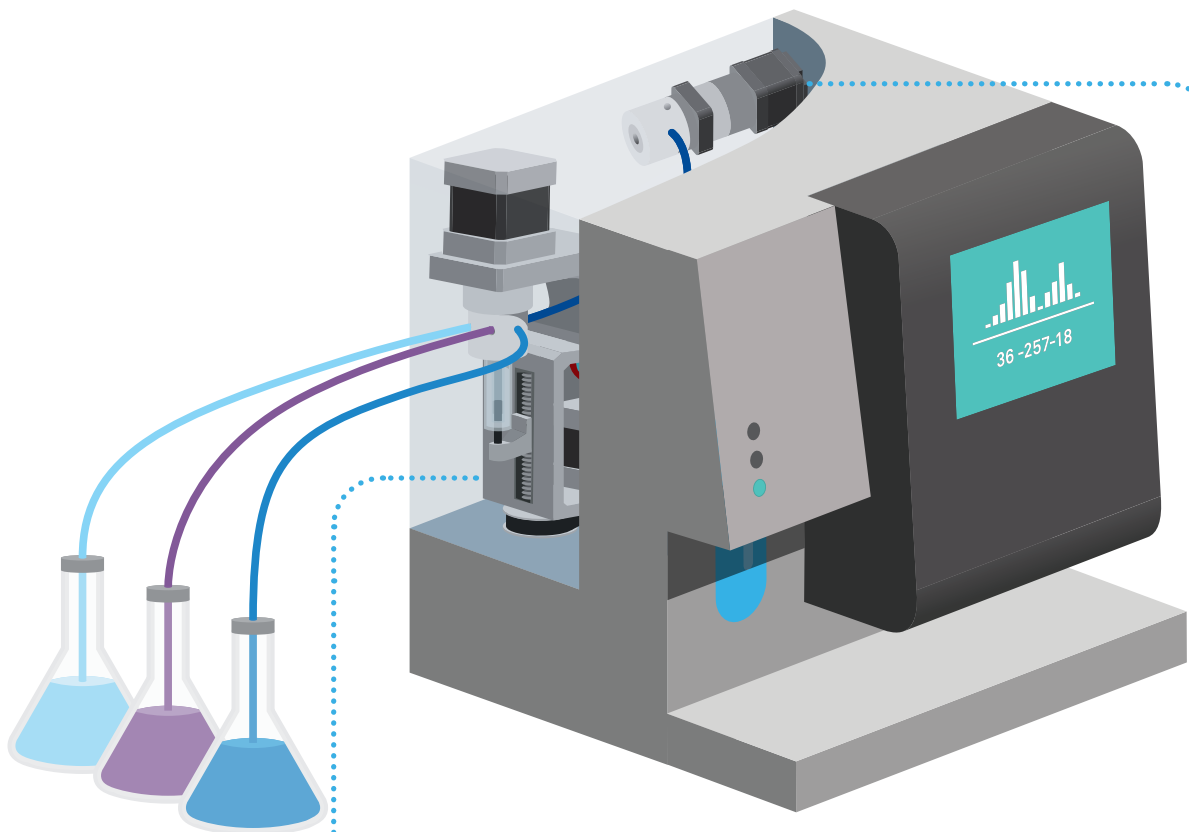
MEDICAL Clinical diagnostics Allergy testing 	ENVIRONMENT Drinking water monitoring Waste water testing 
FORENSICS Urine analysis Toxicology 	FOOD AND BEVERAGE Dairy monitoring Wine analysis 
RESEARCH Analytical chemistry Analytical biology 	LIFE SCIENCES Biosensing Cell culture 
INDUSTRIAL Automatic sample preparation Quality testing 	PHARMA / COSMETICS Perfume Product testing 

Check out other applications and application notes on our website.
amf.ch/applications

TECHNICAL COMPETENCIES

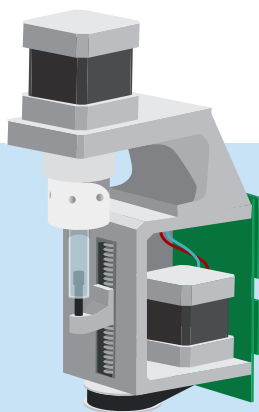
 FLUIDICS	 MECHANICS	 ELECTRONICS	
 SOFTWARE	 PRODUCTION	 BIOLOGY CHEMISTRY	 OPTICS

AMF PRODUCTS INTEGRATED IN AN ANALYTICAL DEVICE



RVM OEM rotary valve

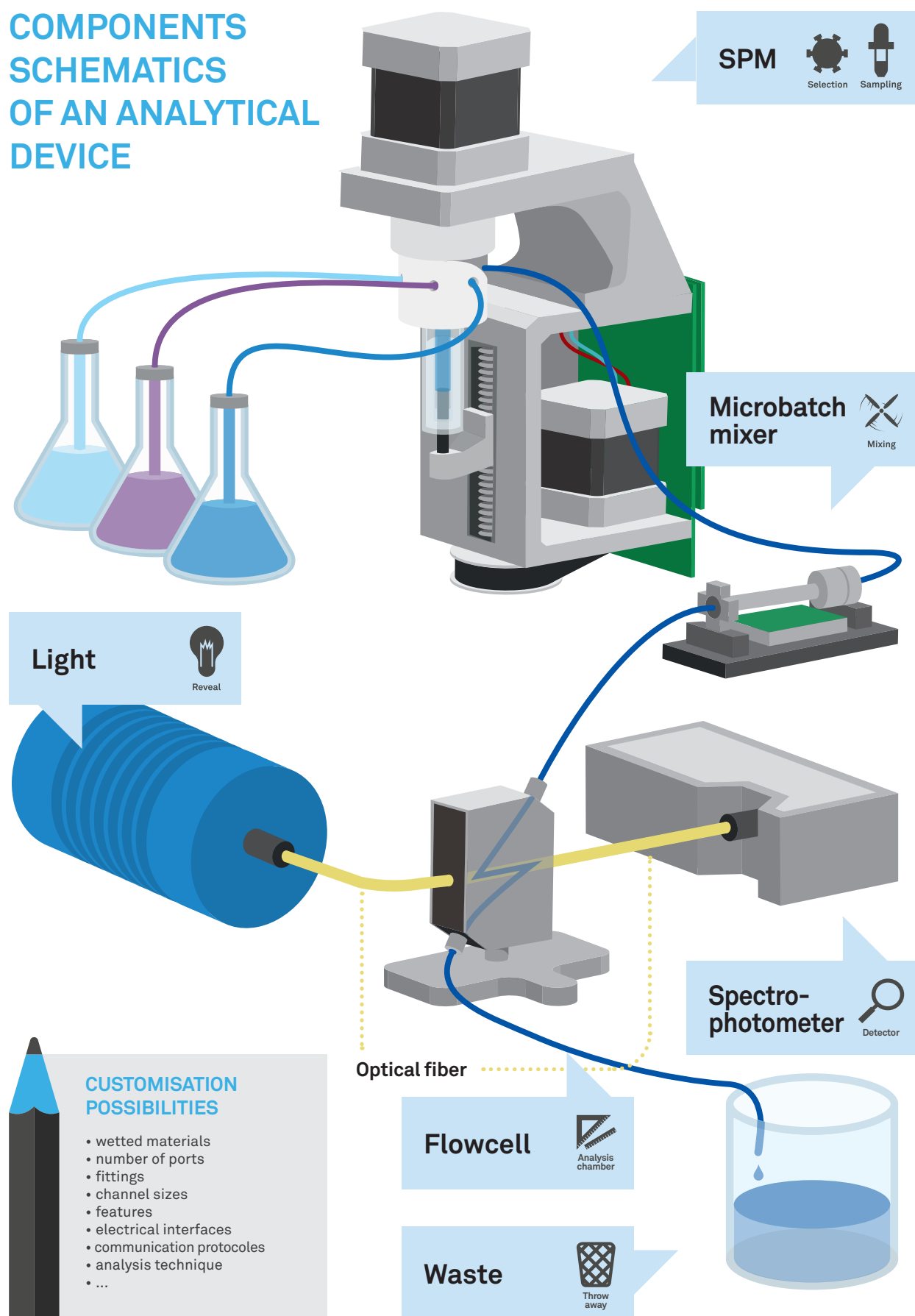
Optimised for minimal cross-contamination
Simple integration
Light and compact



SPM OEM syringe pump

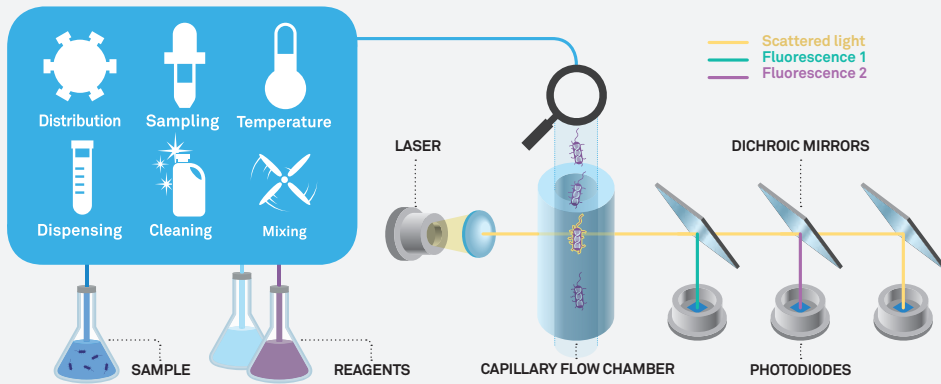
Allows for multiple liquids
Simple air removal
Optimised for minimal contamination

COMPONENTS SCHEMATICS OF AN ANALYTICAL DEVICE



DETECTION TECHNIQUES IN AN ANALYTICAL DEVICE

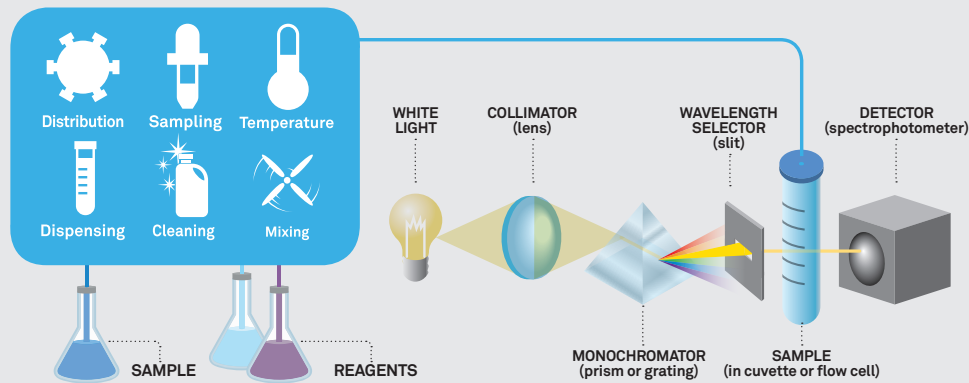
Flow cytometry



APPLICATIONS

- Cell proliferation
- Cell cycle
- Cell viability
- Cell tracing
- Cell screening
- Cell sorting
- Apoptosis
- Oxidative stress
- Phagocytosis
- Immunophenotyping
- CD markers
- ...

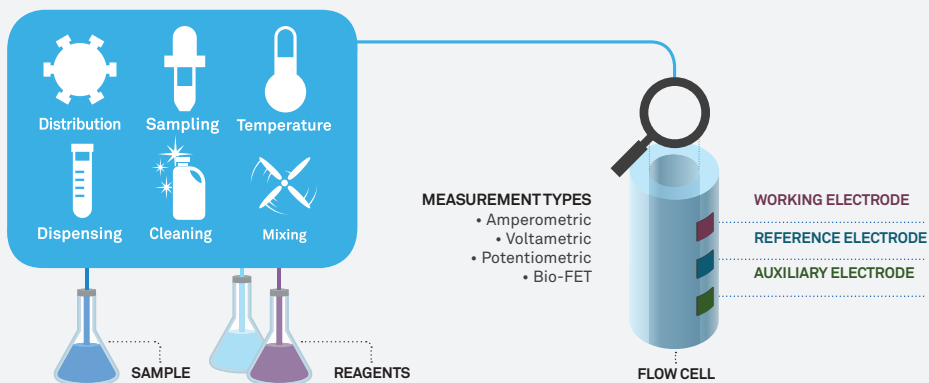
Colorimetry



APPLICATIONS

- HRP colorimetric detection
- Colorimetric AP systems
- Immuno-blot assays
- Western blot
- Southern blot
- BCA protein assay
- Bradford protein assay
- Amino acid analysis
- Class specific protein quantification
- ...

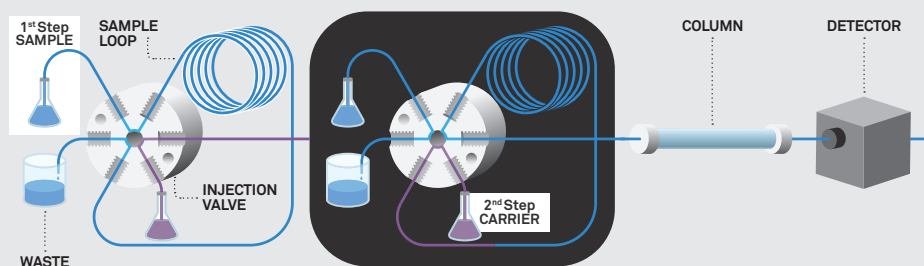
Electrochemistry



APPLICATIONS

- Biosensors
- Electrosynthesis
- Electroanalytical chemistry
- Reactive oxygen species analysis
- Cellular redox environment - monitoring
- Exocytosis - monitoring
- Cyclic voltammetry and amperometry
- Electrophoresis
- Capillary electrophoresis
- Maldi-TOF
- ...

Chromatography



APPLICATIONS

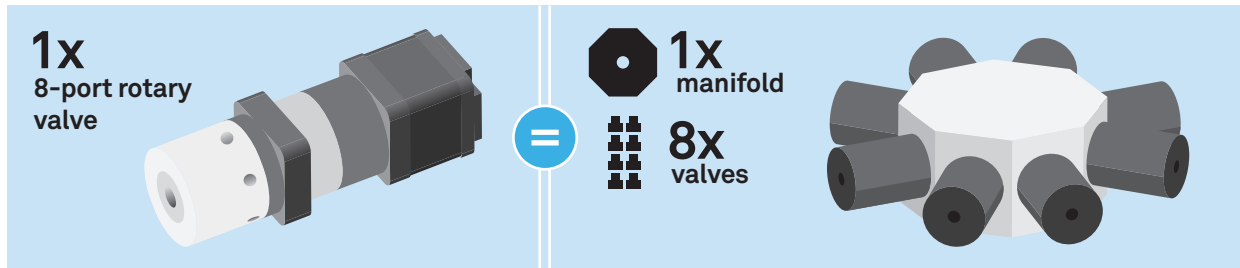
- Vaccines screening
- Food testing
- Beverage testing
- Drug testing
- Forensic testing
- Additive detection
- Nutritional quality determination
- Metabolic and proteomic
- Nucleic acid research
- Flow chemistry
- Liquid chromatography
- ...

WHY WOULD I USE A ROTARY VALVE?

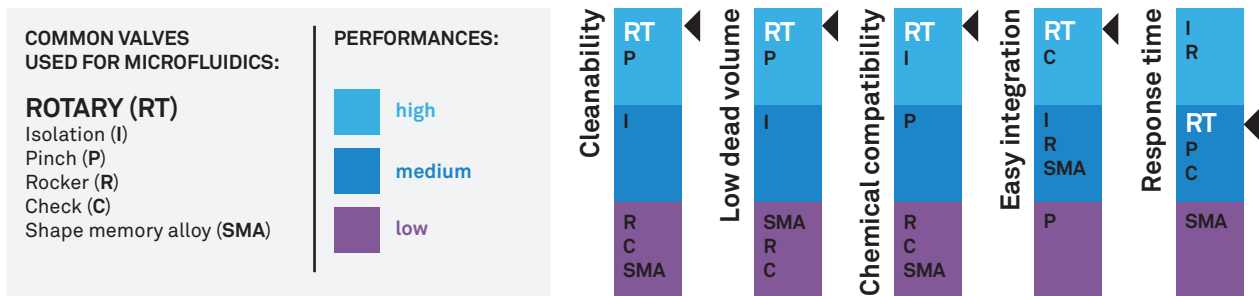
A rotary valve designed for complex multi-liquid flow path change. By acting as a manifold, it saves you space and is much easier to program and integrate.

It's main advantages are:

Tube-like fluidic path | Constant power consumption | Volume variation



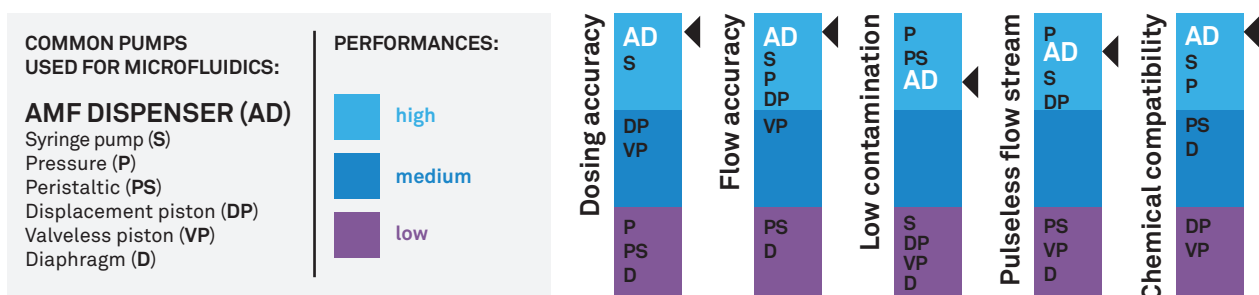
The performance of rotary valves compared to other valve types



WHY WOULD I USE A SEQUENTIAL MICRODISPENSER?

AMF's sequential microdispenser directly integrates a multi-port rotary valve. It is then optimised for dosing and handling multiple liquids, while standard syringe pumps are optimised for a single liquid.

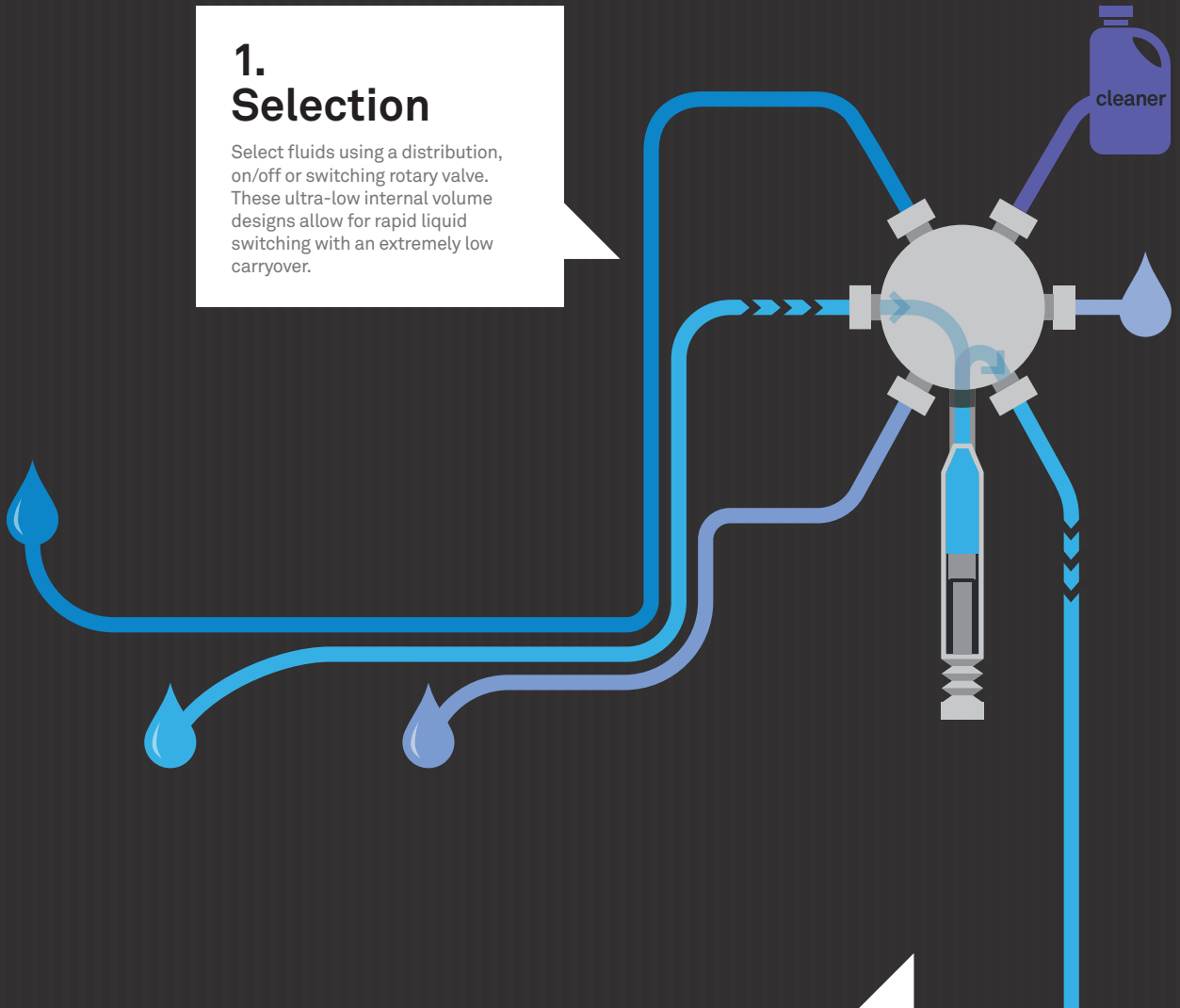
The performance of sequential microdispensers compared to other pump types for sequential injection



WE CAN HELP YOU DESIGN THE PERFECT FLUIDIC SYSTEM FOR YOUR OWN PROJECT

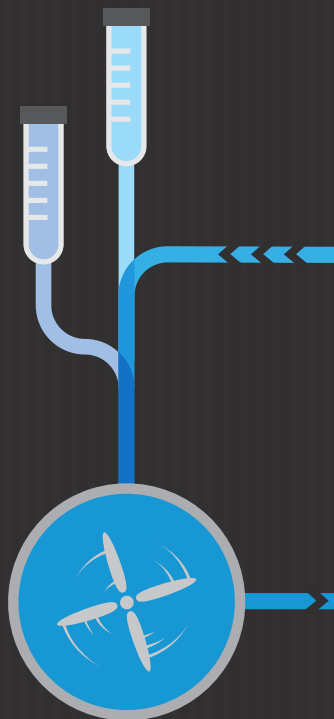
1. Selection

Select fluids using a distribution, on/off or switching rotary valve. These ultra-low internal volume designs allow for rapid liquid switching with an extremely low carryover.



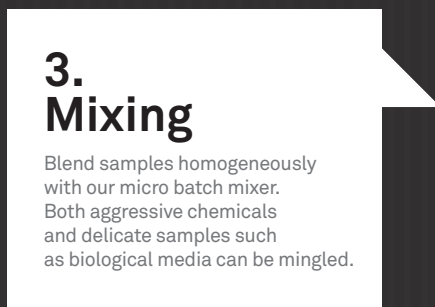
2. Multiple Sampling

Our high precision syringe pump is used for sequential aspirating/dispensing of multiple fluids. Its minimal dead volume lets you precisely prepare samples, even with the smallest volumes.



3. Mixing

Blend samples homogeneously with our micro batch mixer. Both aggressive chemicals and delicate samples such as biological media can be mingled.



5. Dispensing

Our dispensing solutions accurately control volume and flow rate. Using a multi-port valve, you can transfer the liquids between multiple sources and targets.

4. Temperature Control

Thermal regulation is an optional regulation. Mix, incubate or dispense your samples at a controlled temperature.

YOUR
TECHNOLOGY

6. Cleaning

Fully automated sample preparation requires thorough cleaning and minimal carryover between batches. Our solutions can be efficiently cleaned or rinsed thus preventing cross-contamination and biofilm formation.

INTERNAL VOLUME

Volume inside the system, from entrance to exit.

DEAD VOLUME

Volume that is “stuck” in the system (dead end), which is not cleanly swept and relies on diffusion to clear out.

CARRYOVER VOLUME

Volume of liquid that will be mixed with the next liquid. It is not stuck, but will be swept next time a liquid passes.

RVM

Electric rotary valve



BENEFITS

- Optimised to limit contamination between sequential injections
- Excellent chemical and biological compatibility
- Replaces a manifold with multiple valves
- Light and compact
- Easy to use and integrate
- Swiss quality



APPLICATIONS

- Sample preparation automation
- Multiplexing
- Sample loops
- Adapted for battery operated devices
- Adapted for Point-Of-Care
- Adapted for production



FUNCTIONS

- Select channel
- Change flow path
- Stop flow or isolation

Valves specifications, page 14
 Customisation possibilities, page 14



Distribution



Switch



On / Off

This is an OEM product.

It can be tailored for the needs of your instrument.

THE ULTRA-LOW INTERNAL VOLUME ROTARY VALVE CONTROL AND OPTIMISE YOUR FLOW PATH

Our OEM valve is a precise low-pressure electric rotary valve designed for automated microfluidic applications. Its small channels and accurate positioning system make it ideal for precise liquid handling.

Showing an unrivaled small wetted volume and an exceptional ease of use, this valve is the perfect companion for liquid distribution in your instrument or laboratory experiments at a reduced cost. A low power model is available for a minimum battery use and a fast one for your time-specific applications.

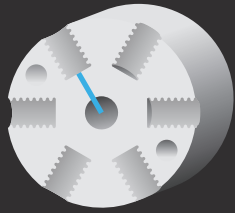
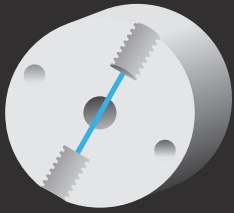
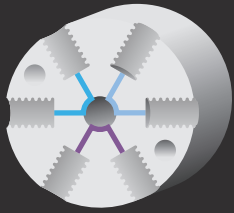
Motor specifications

REF.	TYPE	POWER	ROTATION TIME FOR 180°	WEIGHT (TOTAL MODULE)	DIMENSIONS
P200-O	Low power motor	5-10 VDC, 0.5 A peak	1.5 s	250 g	29 x 38.3 x 111.8 mm
P201-O	Fast motor	18-24 VDC, 2 A peak	400 ms	450 g	42.3 x 60 x 95.9 mm

Other specifications

Operating temperature	5 – 40°C (41-104°F)
Operating humidity	20-80%, non condensing
Max. pressure	7 bars (102 psi)
Wetted materials	PTFE or UHMW – PE, PCTFE
Channel diameter	0.5 mm (0.020 in) or 1 mm (0.039 in) (other upon request)
Internal volume	2.5 – 13.7 µL port-to-port (configuration dependent)
Carryover volume	0.55 – 6.7 µL port-to-port (configuration dependent)
Dead volume	None
Tube port fittings	Standard 1/4 – 28 UNF, flat-bottom
Electrical interface	USB mini, 9-pin D-Sub (fast motor model only)
Communication type	Serial, I2C (other upon request)

Valves types

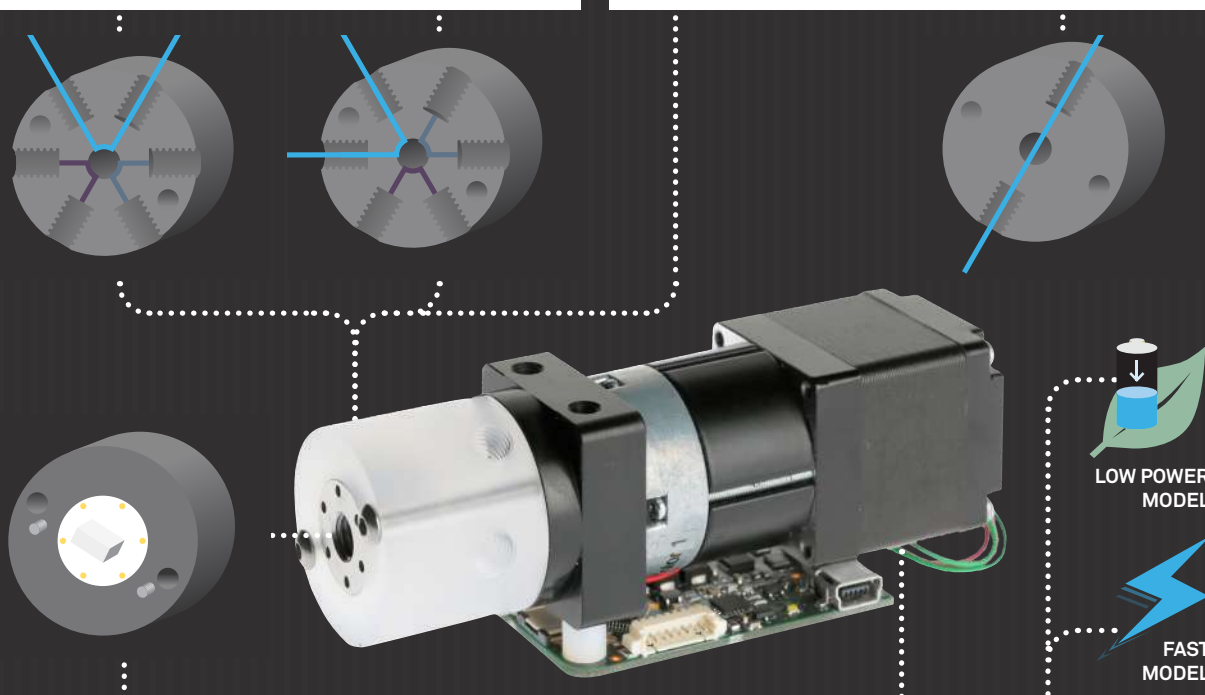
SERIE TYPE	DISTRIBUTION	ON/OFF	SWITCH
LIQUID PATH			
KNOWN ALIASES	N-port distribution valve (N+1)-port/1-channel valve N-port selection valve (N+1)-port/N-position valve	isolation valve shutoff valve	N-port/2-position valve N-port/(N/2)-channel valve switch valve loop valve

Fast liquid switching

This extremely small internal volume selection valve allows to rapidly switch liquid, while maintaining an ultra low carryover.

Ultra-low internal volume

Our unique precise valves exhibit an internal volume (port-to-port) down to 2.5 μL due to their exceptionally small 0.5 mm diameter channels.



Integrated sensor

The position sensor is directly integrated into the valve to ensure precise positioning (even with game on the motor axis and potential wear!) An automatic procedure at power-up allows the valve to know its precise location. This is called the «homing».

Choice of motor

LOW POWER MODEL

This valve was designed in the most simple way to reduce its power consumption. It is USB powered. A smaller power consumption allows for a smaller power supply, and thus better portable device integration.

FAST MODEL

This valve is designed to reduce the switching speed, taking no more than 400 ms.

Valves specifications

DISTRIBUTION SERIES

REF.	CONFIGURATION	WETTED MATERIALS	INTERNAL VOLUME	CARRYOVER VOLUME	FLUID PATH DIAMETER	MAX. PRESSURE
V-D-1-6-050-C-P	6 ports	PCTFE, PTFE	2.5 µL	1.5 µL	0.5 mm	7 bars
V-D-1-8-050-C-P	8 ports	PCTFE, PTFE	2.5 µL	1.5 µL	0.5 mm	7 bars
V-D-1-8-100-C-U	8 ports	PCTFE, UHMW-PE	13.8 µL	6.7 µL	1 mm	7 bars
V-D-1-10-050-C-U	10 ports	PCTFE, UHMW-PE	3.5 µL	1.7 µL	0.5 mm	7 bars
V-D-1-10-100-C-U	10 ports	PCTFE, UHMW-PE	13.8 µL	6.7 µL	1 mm	7 bars
V-D-1-12-050-C-U	12 ports	PCTFE, UHMW-PE	3.5 µL	1.7 µL	0.5 mm	7 bars

ON/OFF SERIES

REF.	CONFIGURATION	WETTED MATERIALS	INTERNAL VOLUME	CARRYOVER VOLUME	FLUID PATH DIAMETER	MAX. PRESSURE
V-O-1-2-050-C-P	2 ports	PCTFE, PTFE	3.0 µL	—	0.5 mm	7 bars
V-O-1-2-075-C-P	2 ports	PCTFE, PTFE	6.6 µL	—	0.75 mm	7 bars

SWITCH SERIES

REF.	CONFIGURATION	WETTED MATERIALS	INTERNAL VOLUME	CARRYOVER VOLUME	FLUID PATH DIAMETER	MAX. PRESSURE
V-S-1-4-050-C-P	4 ports	PCTFE, PTFE	2.8 µL	0.8 µL	0.5 mm	7 bars
V-S-1-6-050-C-P	6 ports	PCTFE, PTFE	2.5 µL	0.6 µL	0.5 mm	7 bars

- Valve heads are interchangeable.
- Other models available upon request.

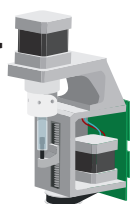
Check website for new models
amf.ch/product/oem-rotary-valve

CUSTOMISATION POSSIBILITIES

- wetted materials
- fluidic fittings
- fluid path diameter
- motor
- electrical interfaces
- communication types
- number of ports
- PCB

SPM

Sequential micro-dispenser



BENEFITS

- Allows for multiple liquids
- Optimised to limit contamination
- Excellent chemical and biological compatibility
- Simple air removal
- Easy to use and integrate
- Swiss quality



APPLICATIONS

- Sample preparation automation
- Industry
- Lab-on-chip
- Research & Education
- Biological sample handling
- Accurate flow streams of fluids
- High-precision sampling and dosing



FUNCTIONS

- Dilute samples or reagents
- Aspirate liquids
- Dispense liquids
- Control the flow rate
- Prepare complex mixes
- Alternate air / liquid samples

Syringes and valves specifications, page 17
Customisation possibilities, page 17



Distribution



Sampling



Temperature



Dispensing



Cleaning

This is an OEM product.

It can be tailored for the needs of your instrument.

THE ALL-IN-ONE SAMPLE MANIPULATOR HANDLE DELICATE SAMPLES WITH GREAT PRECISION

Our OEM sequential microdispenser is a high-precision dosing device for automated microfluidic applications. The high-accuracy dosing and low-pulse flow stream capabilities make it the perfect tool for multiple liquid handling in the range of milliliter down to nanoliter.

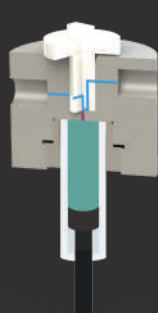
The integrated zero dead volume selection valve allows you to handle multiple fluids with one pump thanks to the high cleaning efficiency and low carryover. Coupled with its ease of use and integration, this sequential microdispenser is thus the ideal companion for your instruments and laboratory experiments at a reduced investment cost.

Pump specifications

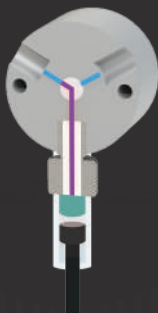
Operating temperature	5 – 40°C (41-104°F)
Operating humidity	20-80%, non condensing
Max. pressure	7 bars (102 psi)
Wetted materials	PTFE or UHMW-PE, PCTFE and borosilicate glass
Dead volume	None
Carryover volume	1.5 – 11 ml (configuration dependent)
Plunger travel	30 mm with 96'000 micro-steps for nearly pulseless flow
Plunger resolution	Selectable 3'000 steps (standard) / 24'000 steps (high)
Plunger drive	Screw drive with linear encoder for step loss detection
Valves configuration	Zero dead-volume multi-port distribution with angular encoder
Tube port fittings	Standard 1/4 – 28 UNF, flat-bottom
Cross-contamination	Typically from 1/100 to 1/1000 per cleaning cycle
Accuracy	< 1% deviation from expected value at full stroke
Electrical interface	USB mini, 9-pin D-Sub (other upon request)
Communication type	Serial, I2C (other upon request)
Power	18 VDC, 2.2 A peak, 40 W (18 VDC optimised for battery use)
Time for full stroke	2 – 3000 seconds
Dimensions	199.7 x 126.3 x 50.5 mm
Weight	1.5 kg

Dead, internal and carryover volumes

Our unique valve geometry limits the carryover volume to 1.5 μL (purple) whereas standard products exhibit up to 50 μL . The exceptionally small channel diameter of 0.5 mm reduces the internal volume to only 4 μL (blue + purple). There is no dead volume.



AMF TECHNOLOGY



STANDARD PRODUCTS

High dilution ratio

When rinsing, diluting or switching liquid, our minimal carryover volume (purple) leads to a maximal dilution ratio with the diluent (blue).



AMF TECHNOLOGY



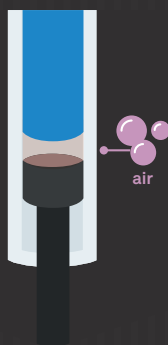
STANDARD PRODUCTS

Bubble free priming

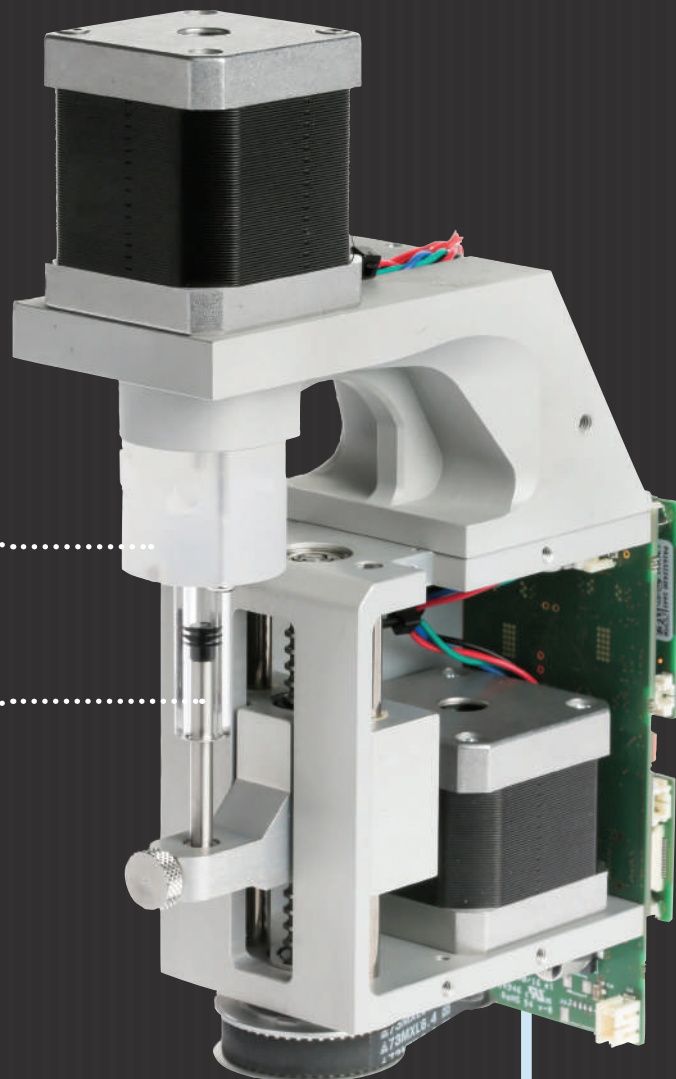
Our distinct valve design expels the air from the syringe and valve immediately, eliminating the traditional cumbersome priming procedure.



AMF TECHNOLOGY



STANDARD PRODUCTS



Sample A

Rinsing
solution
cleaner

Sample B

Fast liquid switching

The zero dead volume selection valve allows to rapidly switch liquid with an ultra low carryover.

Syringes specifications

REFERENCE	VOLUME	PLUNGER MATERIAL	MIN. FLOW RATE	MAX. FLOW RATE	MIN. DOSING VOLUME
S-25-P	25 µL	PTFE	0.25 µL/min	750 µL/min	0.05 µL
S-50-P	50 µL	PTFE	0.5 µL/min	1500 µL/min	0.1 µL
S-100-P or S-100-U	100 µL	PTFE or UHMW-PE	1 µL/min	3000 µL/min	0.2 µL
S-250-P	250 µL	PTFE	2.5 µL/min	8000 µL/min	0.5 µL
S-500-P or S-500-U	500 µL	PTFE or UHMW-PE	5 µL/min	15000 µL/min	1 µL
S-1000-P	1000 µL	PTFE	10 µL/min	30000 µL/min	2 µL

Chemical compatibility The wetted materials being PTFE, PCTFE and borosilicate glass, the pump offers an exceptional compatibility to most chemicals and biological samples.

Optional:

It is possible to add a heating/cooling module around the syringe to suit your specific application.

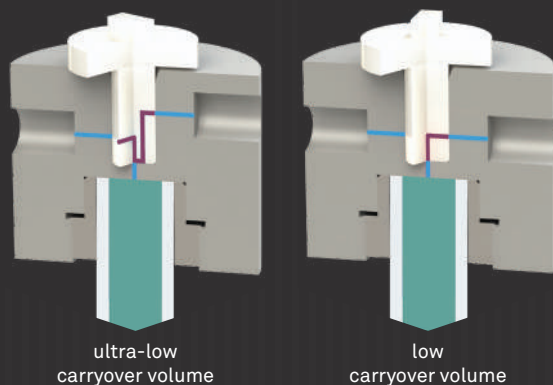
Valves specifications

REF.	CONFIGURATION	WETTED MATERIALS	INTERNAL VOLUME	CARRYOVER VOLUME	FLUID PATH DIAMETER	MAX. PRESSURE
V-D-2-6-050-C-P	6-ports ultra-low carryover volume	PCTFE, PTFE	5.2 µL	1.5 µL	0.5 mm	7 bars
V-D-1-6-050-C-P	6-ports low carryover volume	PCTFE, PTFE	3.5 µL	2.6 µL	0.5 mm	7 bars
V-D-1-8-050-C-P	8-ports low carryover volume	PCTFE, PTFE	3.5 µL	2.6 µL	0.5 mm	7 bars
V-D-1-8-100-C-U	8-ports low carryover volume	PCTFE, UHMW-PE	18.1 µL	11 µL	1 mm	7 bars
V-D-1-10-050-C-U	10-ports low carryover volume	PCTFE, UHMW-PE	4.5 µL	2.8 µL	0.5 mm	7 bars
V-D-1-10-100-C-U	10-ports low carryover volume	PCTFE, UHMW-PE	18.1 µL	11 µL	1 mm	7 bars
V-D-1-12-050-C-U	12-ports low carryover volume	PCTFE, UHMW-PE	4.5 µL	2.8 µL	0.5 mm	7 bars

- Valve heads are interchangeable.
- Other models available upon request.

Check website for new models.

amf.ch/product/oem-sequential-microdispenser



CUSTOMISATION POSSIBILITIES

- wetted materials
- fluidic fittings
- fluid path diameter
- motor
- electrical interfaces
- communication types
- number of ports

FLUIDIC MANAGEMENT SYSTEM

Are you designing a new instrument?

Do you want to check if your idea is feasible?

Are you having problems with your system and need a redesign?

Do you have the next great fluidic idea, but don't know how to bring it about?

Just ask us. We are the experts.

Automatic, robust microfluidic systems are what we do. Whether you think rotary valves and syringe pumps are the solutions that you need, or if you need a solution that just does not exist on the market, or is not good enough for you, we are there to help you.

We have successfully created fluidic systems for technologically-advanced commercial instruments.

This is an example
of a custom solution.
Let us be your OEM partner
to develop your own solution.



SELECTION



SAMPLING



MIXING



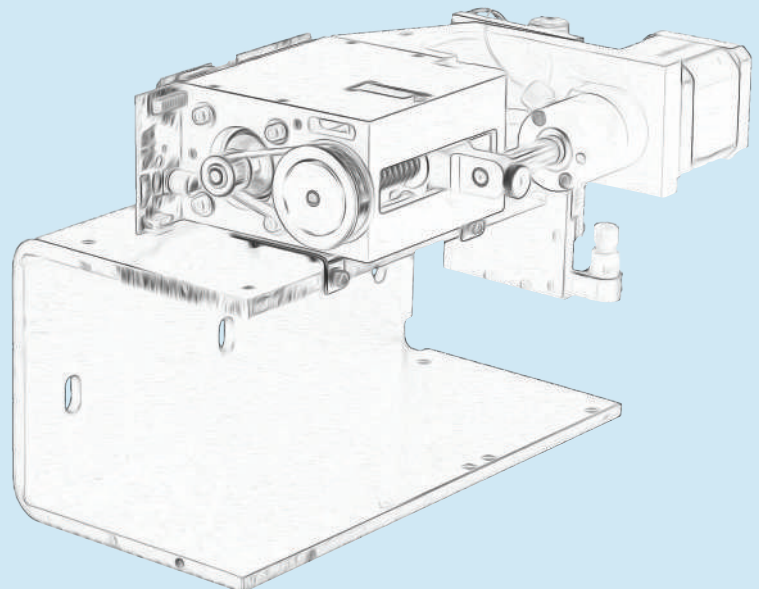
TEMPERATURE



DISPENSING



CLEANING



DYNAMIC ROTARY MANIFOLD

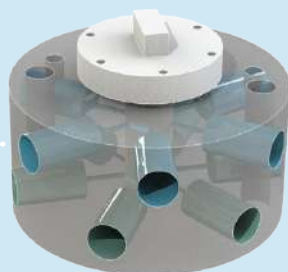
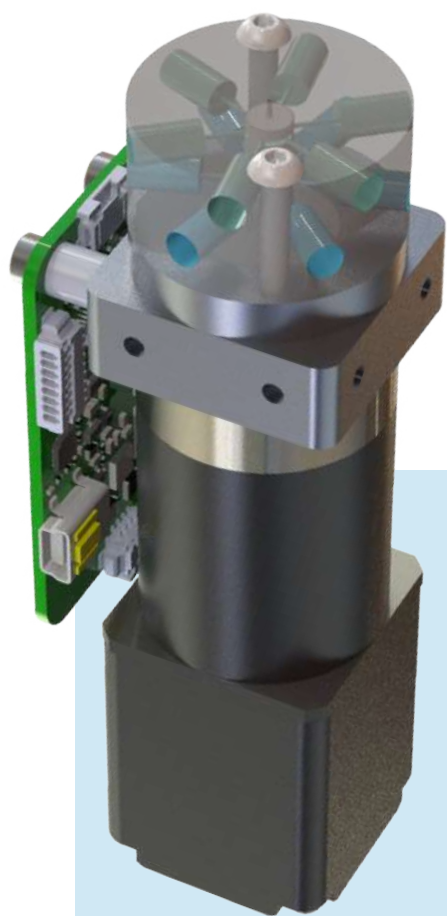
CUSTOMISATION POSSIBILITIES FOR ALL CUSTOM SOLUTIONS

- wetted materials
- fluidic fittings
- fluid path geometry
- number of ports
- multiplexing
- motor
- electrics
- electrical interfaces
- communication types
- software
- Integration

INTEGRATE MULTIPLE FLOWPATHS IN A SINGLE PIECE

Our dynamic rotary manifolds ensure a limited footprint and increased ease of use. With a fixed part that allows for multiple inlets/outlets and a rotary part which creates various interconnections, many possibilities are now offered to you.

With very precise designs and machining, Teflon materials and no dead volume, we ensure contamination-free experiments and instruments. We can work together to develop your specific design.



2x 6-port switch

One way to have two 6-port switch valves to move simultaneously is to combine them in a single valve head, actuated by the same motor.

This example is designed for 10-32 UNF, flat-bottom connectors.

4x on/off

To reduce the total footprint and allow for simultaneous switches, we can integrate 4 on-off valves in one head, which are fluidically independent. No need to have 4 motors and 4 controllers!

This example is designed for 1/4-28 UNF, flat-bottom connectors.

CONTACT US FOR MORE INFORMATION

Advanced Microfluidics SA
Ch. de la Dent d'Oche 1a
CH-1024 Ecublens
Switzerland

T. +41 21 552 14 30

info@amf.ch
www.amf.ch

