

Micro annular gear pumps

By-pass module for the Nanoliter flow range

Flow rate starting at 1 $\mu\text{l/h}$



similar image

- **Flow rate in Nanoliter range**
flow rate from 1 $\mu\text{l/h}$ to 10 ml/h
- **Wide flow rate range**
small-volume dispensing with a
Adjusting range maximum 1:100
- **Low-pulsation delivery**
damped flow
- **Pressure resistance**
generation of pressure up to 3 bar
- **Customized system**
for use with micro annular gear pumps
mzr-2521 M2.1, mzr-2921 M2.1, mzr-2542 M2.1,
mzr-2942 M2.1 or mzr-4622 M2.1

With the by-pass module constant small flow rates reaching the nanoliter range can be obtained. The technology bases on the partitioning of flow according to the relationship of the fluidic resistance of two capillaries. The flow is generated by a micro annular

gear pump and shows a very good constancy and little pressure dependence. This technology creates an almost pulsation-free master circulation, from which a side current is derived. Smallest flow rates starting at 1 $\mu\text{l/h}$ can be achieved. Depending on the

differential pressure and flow rate range an adjusting range of 1:100 may be obtained. The lower limit of flow rate is defined by tuning of the two capillary tubes and can be adjusted according to customer's needs from 1 to 10,000 $\mu\text{l/h}$.

Applications

- Analytical instrumentation
- Flow chemistry
- Lubrication
- Biotechnology

Even if single parameters are within the indicated performance range of technical data, certain parameter combinations may not be achievable. Single parameters may exceed their indicated performance range under adequate circumstances. For detailed evaluation please contact HNP Mikrosysteme. Actual performance may vary. Specifications are subject to change without notice.

Technical data

Operating flow rate range	1 – 10,000 $\mu\text{l/h}$
Adjusting range	1 : 100
Differential pressure range	0 – 3 bar
Max. inlet pressure	1 bar
Pulsation	<1 %
Liquid temperature range	-20 ... +60 °C
Viscosity range	0.3 – 100 mPas
Fluid connection	capillary fittings 1/4"-28 UNF feed line: tubing, OD 1/8" master capillary: tubing, OD 1/8" secondary capillary: tubing, OD 1/16"
Wetted materials	by-pass manifold adapter stainless steel 316L, optional: PEEK™; fittings and tubings: ETFE, PEEK™
Dimensions (L x W x H)	32 x 25 x 25 mm (without pump)
Weight	approx. 160 g (version 316L without pump) approx. 50 g (version PEEK™ without pump)

Subject to technical changes.

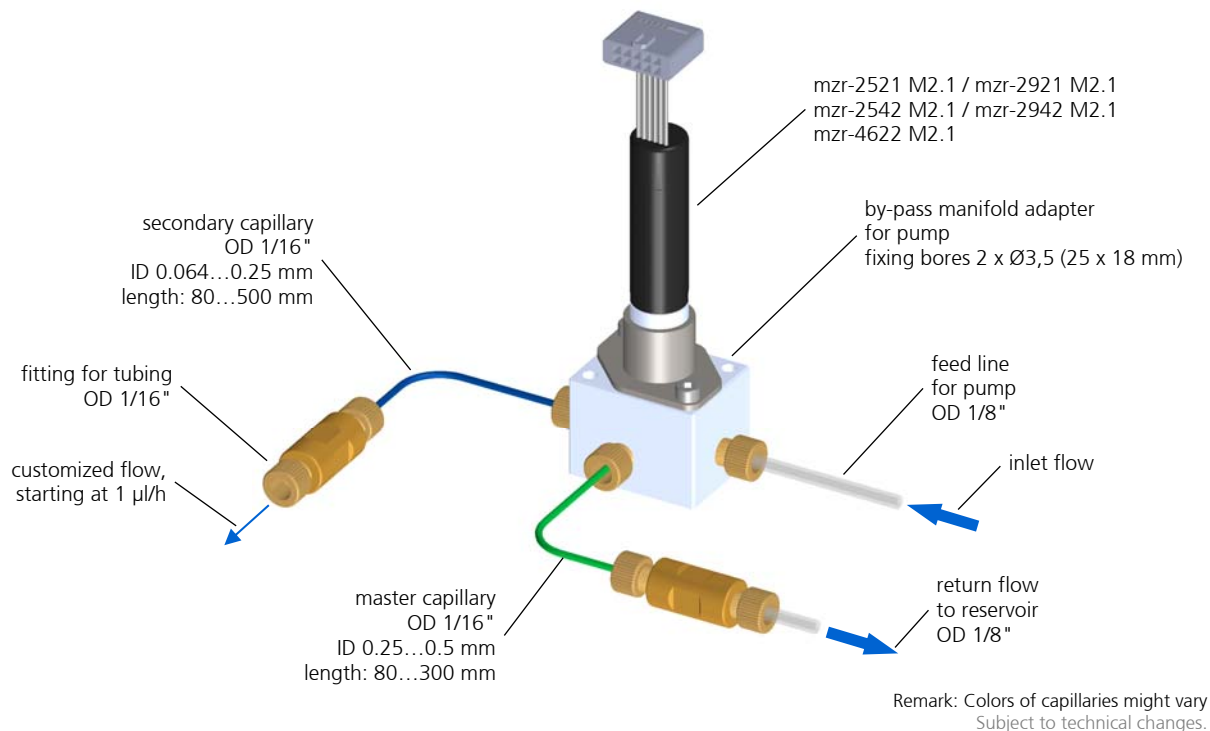
Contact

HNP Mikrosysteme GmbH
Bleicherufer 25 · D-19053 Schwerin

phone +49 385 52190-301
fax +49 385 52190-333

e-mail info@hnp-mikrosysteme.de
<http://www.hnp-mikrosysteme.de>

Setup of By-pass module and pump



Working principle

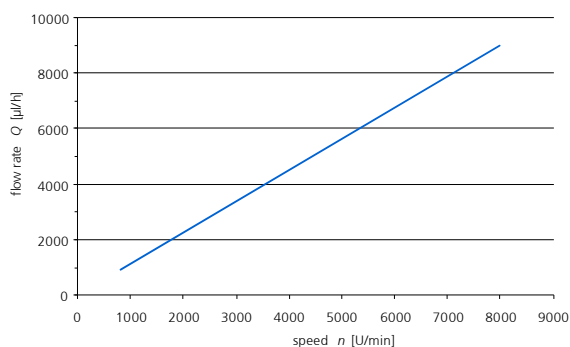
The by-pass module shown in the picture consists of a main circulation with a micro annular gear pump and a master capillary tube. A secondary capillary diverts the dosing flow from the main circulation according to the differential pressure ratio in both capillary tubes.

The customized dimensioning of the system is carried out by analogy with the bleeder chain rules in electrical engineering. The main and the secondary capillary correspond to hydraulic resistors, which split the flows reciprocally proportional. Pump size and capillaries

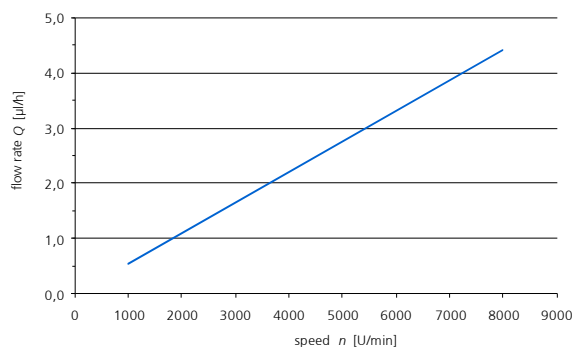
are adapted to each other in such a way that the pump is in the right working range and the desired outlet pressure is achieved. The by-pass module serves as a fixture for integration of a micro annular gear pump. The by-pass module is tested and adjusted.

Sample characteristics

flow rate 900 – 9,000 $\mu\text{l/h}$



flow rate 0.6 – 4.4 $\mu\text{l/h}$



Item number

11 06 03 45

By-pass module with manifold adapter for mzr-2521 M2.1 and mzr-2921 M2.1
mzr-2542 M2.1 and mzr-2942 M2.1, capillaries and fittings,
customized and tested flow

11 06 03 44

By-pass module with manifold adapter for mzr-4622 M2.1, capillaries and fittings,
customized and tested flow

By-pass systems for higher number of dispensing lines on request.
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