# Product information

By-pass module · Supplementary Modules


## Description

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 µl/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 µl/h.

### 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.

### Advantages

- Flow rate in Nanoliter range
  flow rate from 1 µl/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

## Applications

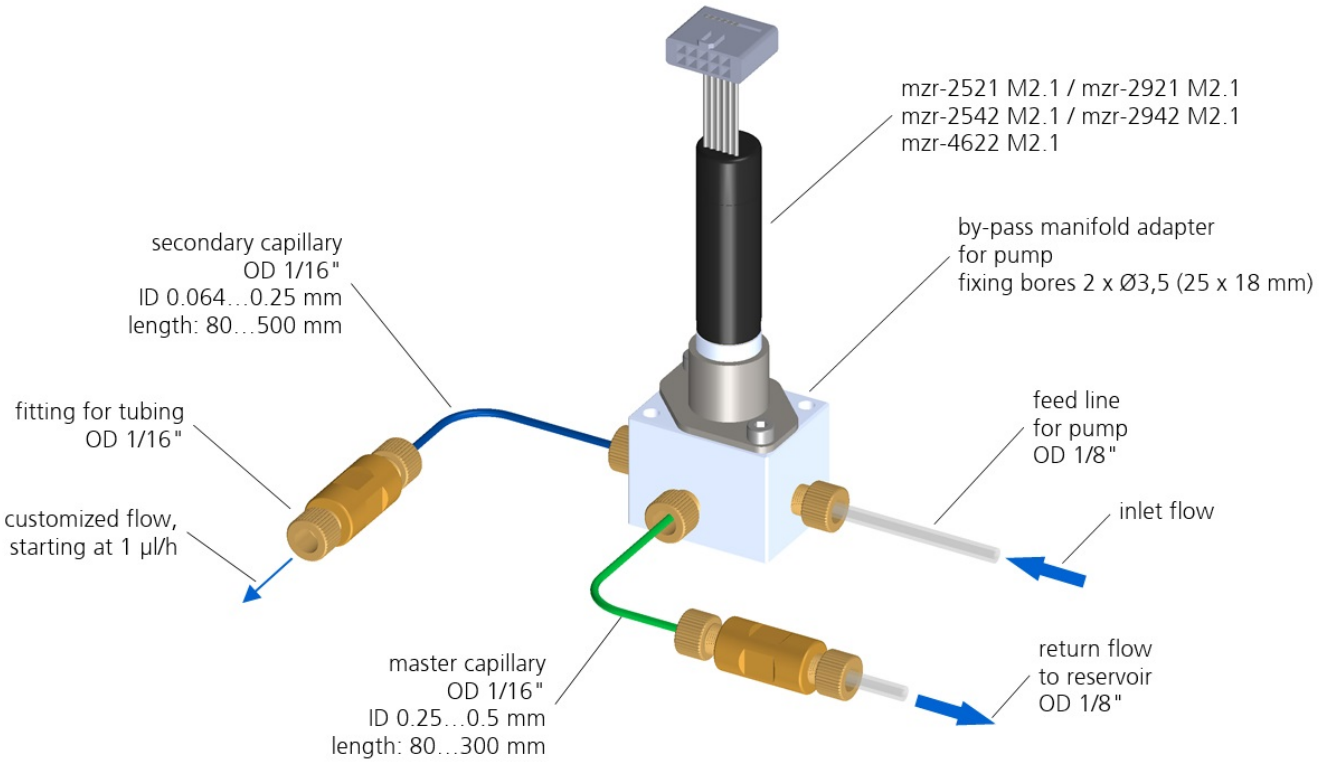
- Analytical instrumentation
- Flow chemistry
- Lubrication
- Biotechnology

## Technical data

| | |
|---|---|
| Flow rate | 1 - 10,000 µl/h |
| Adjustment range | 1 : 100 |
| Differential pressure range | 0 – 3 bar |
| Maximum 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;<br>feed line: tubing, OD 1/8“;<br>master capillary: tubing, OD 1/8“;<br>secondary capillary: tubing, OD 1/16“ |
| Wetted parts | by-pass manifold adapter stainless steel 316L, optional: PEEK™;<br>fittings and tubings: ETFE, PEEK™ |
| Dimensions (L x W x H) | 32 x 25 x 25 mm (By-pass block without pump) |
| Weight | approx. 160 g (version 316L without pump)<br>approx. 50 g (version PEEK™ without pump) |
| Remarks | subject to technical changes |

**Notice**
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.

## Setup of By-pass module and pump




## Patents and trademarks



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