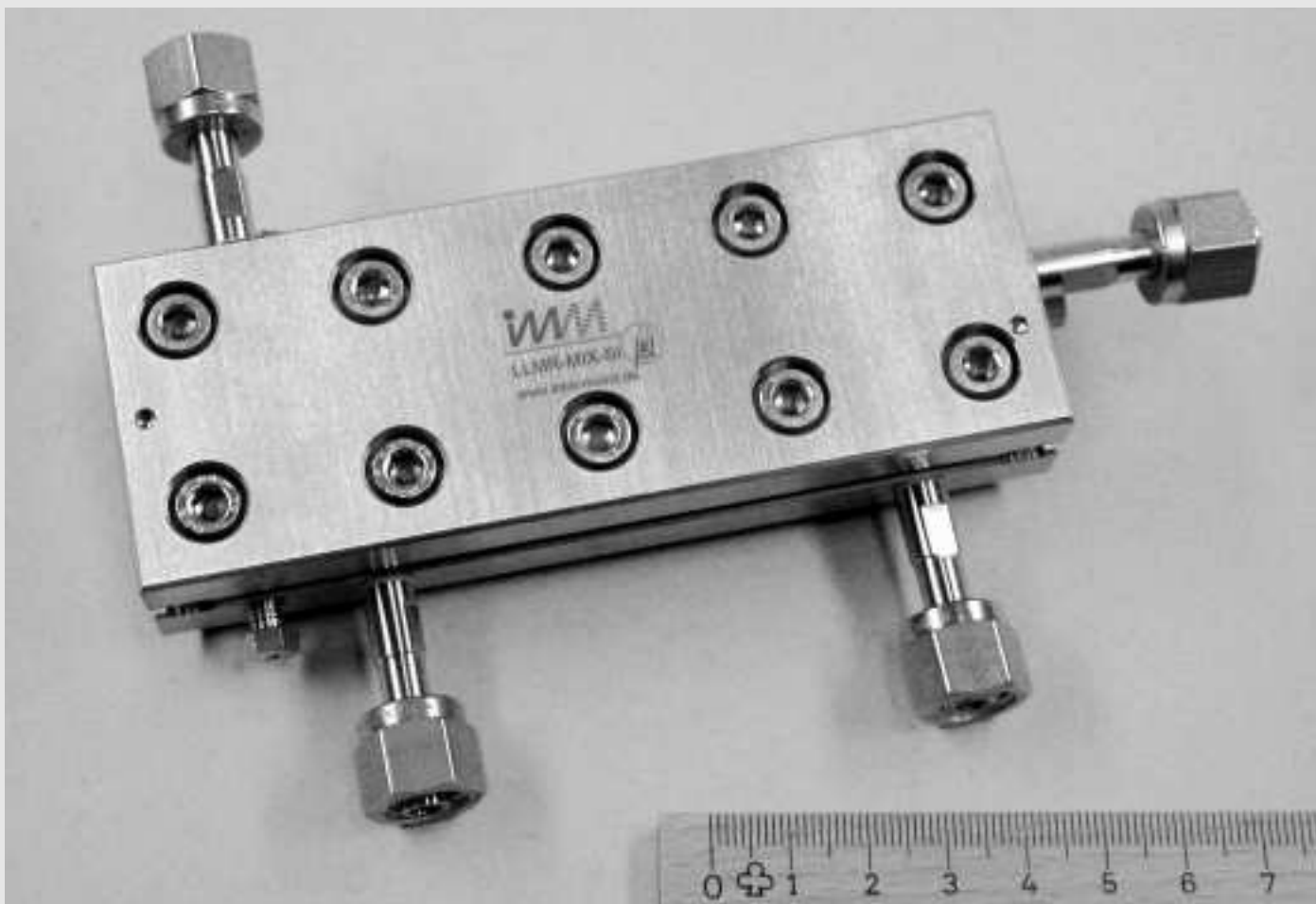


# LIQUID/LIQUID MICRO MIXER

## LLMR-MIX

03

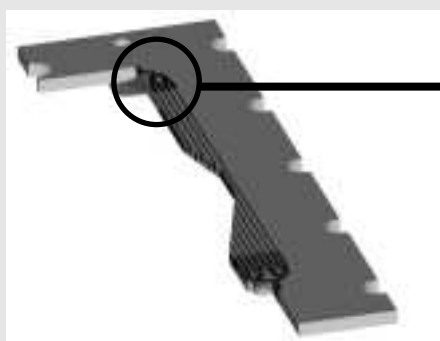


Liquid/Liquid Micro Reactor with internal Mixer –LLMR-MIX

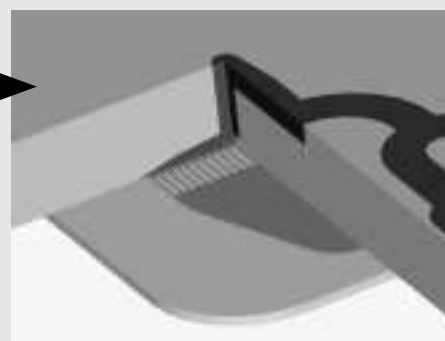
### Principle

The Liquid/Liquid Micro Reactor is mainly designed for highly exothermic reactions and can also be applied for contacting two immiscible liquids and performing a reaction thereby. It comprises two microstructured plates with integrated micro mixer and micro heat exchanger. Insofar, it is particularly designed for reactions that benefit from excellent heat transfer as well as fast mass transfer. The heat transfer is provided by specific surfaces of  $6.770 \text{ m}^2/\text{m}^3$  in micro channels of a width of  $200 \text{ }\mu\text{m}$  at an aspect ratio of 6, whilst the fast mass transfer derives from the meanwhile incorporated interdigital micro mixer, known from the SIMM series.

The LLMR-MIX can be offered of different materials on request besides the standard stainless steel. Flow rates



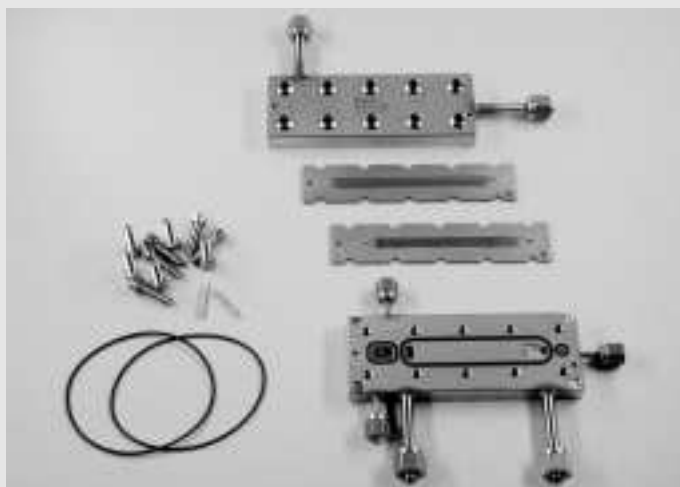
Detail of the internal mixing section



from  $50 \text{ ml/h}$  up to  $2 \text{ l/h}$  are feasible, with residence times in the  $0,3 - 12 \text{ s}$  range. The reactor can be used up to  $50 \text{ bar}$  and  $180^\circ\text{C}$  (Viton, Chemraz gasket) or higher if graphite is applied.



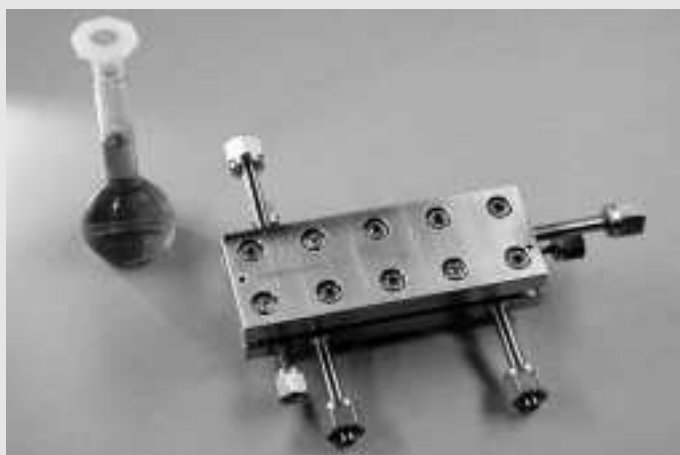
The laser-cut inlay of the LLMR-MIX



LLMR-MIX-HC276 disassembled



LLMR-MIX explosion drawing



LLMR-MIX made of Hastelloy



LLMR-SY; a reactor with internal arrangement of 4 LLMR-MIX including delay loop

## Technical Data

Name	Liquid/Liquid Micro Reactor
Order number	LLMR-Mix
Mixing principles	Multi-lamination
Size (L x B x H)	45 x 120 x 26
Connectors (Inlet/Outlet)	1/16" / 1/16" for chemicals 1/4" / 1/4" for cooling fluid
Standard mixing channels (µm)	45 x 200
Standard cooling channels (µm)	200 x 1200
Standard material	Housing, reaction and cooling plate: 1.4571 Inlay: 1.4401
Options	Other materials like Hastelloy, Monell, Titan or plastics on request

## Operating Conditions

Temperature (°C)	-40 – 200
Pressure stability (bar)	50
Flowrate (l/h)	0.05 – 2
Residence time (s)	0.3 – 12
Max Viscosity (mPas)	1000
Leakage Class	< L <sub>0,01</sub>