

The Valve Mixer ensures fast particle precipitation in high quality.

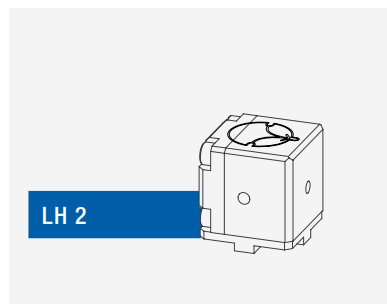
## Unique worldwide.

Because MMRS is the best option for your process.

Small, smart, and comprising more than 60 individual modules – The Modular MicroReaction System, abbreviated to MMRS, is a globally unique piece of equipment for research and development work from Ehrfeld Mikrotechnik BTS. We thus provide users with a multiplicity of options for developing new processes and intensifying their existing ones. Fast, simple, efficient. What makes our innovative system so unique is revealed by its name: the modular design is the heart of the MMRS. Mounted on a base plate in the sizes A5 to A2, the micro-structured mixers, reactors and heat exchangers can be combined with maximised flexibility for an individually customised configuration. The MMRS thus offers optimum preconditions for imaging a multi-stage synthesis reaction in a minimised timeframe, and for performing this automatically. Thanks to automation capabilities like the LabBox®, developed specifically for laboratory applications, or by using your own solution, you will swiftly obtain a large amount of data on all process parameters – an important advantage in research

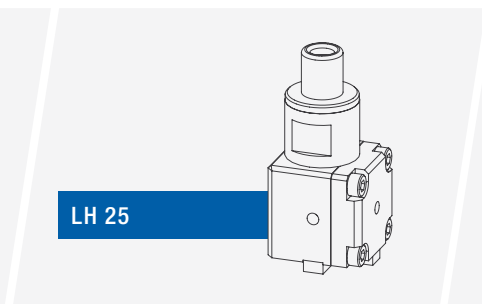
and development work. The MMRS always gives you the degree of flexibility you need for feasibility studies and small-scale syntheses. And because mixing is one of the most important basic operations in the process industry, we provide you with precisely the right type of mixer for the particular requirement involved: for unsurpassedly high mixing speeds. Our MMRS modules have proved especially efficacious in sophisticated reactions like severely exothermic ones or when using toxic and potentially explosive substances. Further pluses include the sturdy construction and simple cleaning since almost all modules can be dismantled. With this intelligent laboratory toolkit, we offer research institutions and companies an entry into continuous reaction technology, with expandable scenarios: from MMRS, there is a seamless progression into the pilot and production scales: our spectrum includes the add-on groupings Miprowa®, FlowPlate® MicroReactors and ART® plate reactors, plus numerous special models.

### Scale-up with MMRS *(here: the Slit-Plate Mixer)*



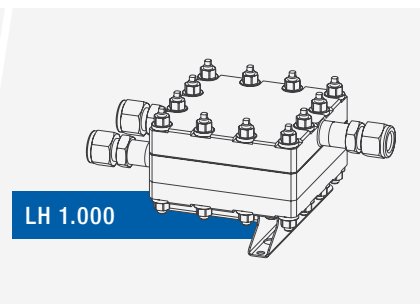
LH 2

**LAB**  
2 L/h



LH 25

**PILOT**  
25 L/h



LH 1.000

**PRODUCTION**  
1,000 L/h

## Our MMRS series subsumes:

**Mixers** – For every mixing job, no matter how specific, we can provide you with precisely the right solution, whether it's a Cascade, Slit-Plate, Comb-Type or Valve Mixer.

**Reactors** – Here, too, the choice is reassuringly comprehensive: a bandwidth of residence time reactors, cartridge reactors for heterogeneous catalysis all the way through to the Photo-Reactor.

**Heat exchangers** – We have developed the temperature control modules specifically for the MMRS. These ensure very fast heat-up and cooling, at precisely the place in your process where this function is needed.

**Sensors & actuators** – For complete-coverage process control and precise regulation of the process parameters, we offer everything you need for measuring and controlling temperature, pressure, flow rate and many other parameters.

## All the advantages at a glance: MMRS modules

- rank among the world's leading continuous-process equipment for the laboratory scale in terms of modularity and flexibility
- can be used and adapted for a multiplicity of applications in lab-scale and small-quality syntheses
- score well in terms of high mixing speeds
- are ideally suited for sophisticated reactions that are safety-critical and for many reaction types that can quite simply be continuously performed better or only in this way
- are compact, sturdy, easy to handle, and simple to clean
- can be uncomplicatedly combined with sensors and actuators for process control and with automation solutions for the laboratory, like the LabBox®
- also excel as stand-alone devices
- ensure safe, dependable and field-proven operation

Efficient screening of process parameters and catalysts.



## Technical Specifications:

Temperature range (special')	-20 – 200 °C (-60 – 600 °C)
Max. pressure process medium	up to 100 bar
Volume flows	0.01 – 30 L/h; 0.16 – 500 mL/min
Retention time	~1 s ... 30 min
Dimension (l x w)**	212 x 162 / 325 x 212 / 425 x 325 mm <sup>2</sup>
Weight (MMRS plant)	> 2 kg
Min. channel cross section	> = 25 µm
Process volume (reactors)	0.04 ... 110 mL
Material (in contact with process medium)	Stainless Steel A4 oder Hastelloy® C276/22, FFKM, PTFE
Applications	mixing/emulsification/dispersion/particle precipitation; homogeneous/heterogeneous synthesis (also with catalyst and/or multi-step); photochemistry
Scale of use	screening, process development/optimization, scale-up, small scale synthesis

\* Only specific modules and/or modules with special sealing material  
 : Other dimensions on request; height is varying depending on the module composition

Status August 2014. We reserve the right to changes and errors. Illustrations and drawings are only approximately determinant.

