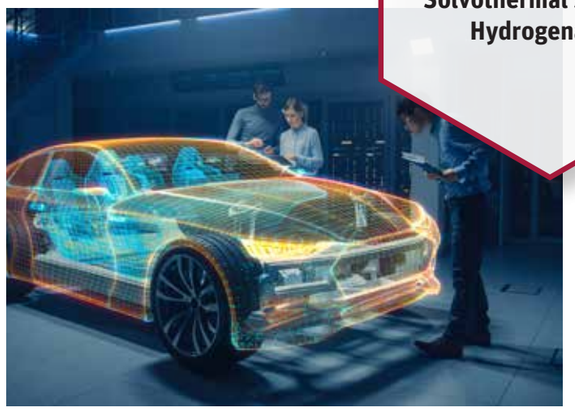
Application

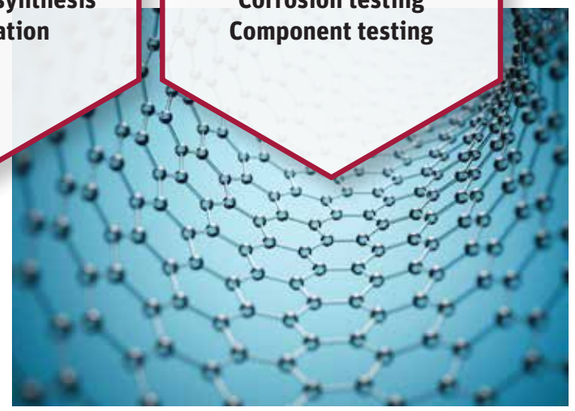
Chemical synthesis
Process optimization
Screening Experiments
catalysis research

Green Chemistry
Recycling
Alternative raw materials
Electrochemistry

Hydrothermal synthesis
Nanotechnology
Solvothermal synthesis
Hydrogenation

Aging testing
Polymer research
Corrosion testing
Component testing





BERGHOF PRODUCTS + INSTRUMENTS LTD

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BERGHOF PRODUCTS + INSTRUMENTS GMBH

highpreactor
Modular Pressure Reactors tailor-made for your application

BERGHOF

highpreactor **– universal pressure reactors**

Flexible, safe, and comfortable

BERGHOF PRODUCTS + INSTRUMENTS GMBH

Our philosophy

The philosophy of Berghof Products + Instruments can be summarized succinctly: To offer our customers added value. Starting with the product development stage, we attach great importance to designing reliable, easy-to-use and safe instruments that perfectly meet our customers‘ requirements. Our own application expertise results in products as we and our customers would want them to be: powerful, safe and durable.

highpreactors **from 25 ml to 100 l – the ideal solution for every application**

Modern high pressure reactors have to be not only technically safe, reliable and cost-effective when in use, but also easy to operate. At Berghof, quality and safety are already an integral part of the design concept. High-quality materials combined with a durable PTFE lining and modular configuration options are the key bonus points for you as a user.

Easy Operating

With our unique quick tensioning system, you can open and close the reactor in just a few steps. You don‘t need any tools or much force.

Safety

Berghof reactors offer the highest level of safety. We manufacture our reactors in accordance with the strict AD2000 standard for pressure instruments and test all devices in the factory for air tightness and pressure resistance.

Material

To manufacture the reactors, Berghof uses only materials of the highest quality. Should even the highly corrosion-resistant stainless steel 316Ti grade not be sufficient, the reactors and fittings are made of Hastelloy C22 for you.

Flexibility

Due to our standardized screw connections, you can upgrade our reactors flexibly – even at a later stage. And you can easily replace all components yourself.

Stirring

Our low-maintenance and powerful magnetic coupling ensures reliable mixing of the reactor contents with a variety of different stirrer geometries. All Berghof components are designed in such a way that they can be cleaned very easily.

PTFE-lining

Thanks to the specially developed PTFE lining, you can also work with highly aggressive media without the risk of damaging the reactor. Since PTFE is an extremely nonstick material, the components used are also easy to clean.

The highpreactor **family**

BR-REACTORS
For maximum flexibility in all applications – from synthesis up to materials research

The BR reactors offer you maximum flexibility and functionality, while at the same time meeting the highest safety standards. The optionally available PTFE lining also allows you to work with highly corrosive media. All attachments are designed for use at temperatures of up to 300 °C (572 °F) or 230 °C (446 °F) with PTFE and pressures of up to 200 bar (2900 psi), and you can choose from a wide range of options. We offer you BR reactors in sizes from 25 ml up to 5.7 l.

- → Effective corrosion protection
- → Easy handling and highest safety
- → High flexibility and individuality

NR-REACTORS
Maximum flexibility even for volumes up to 100 l

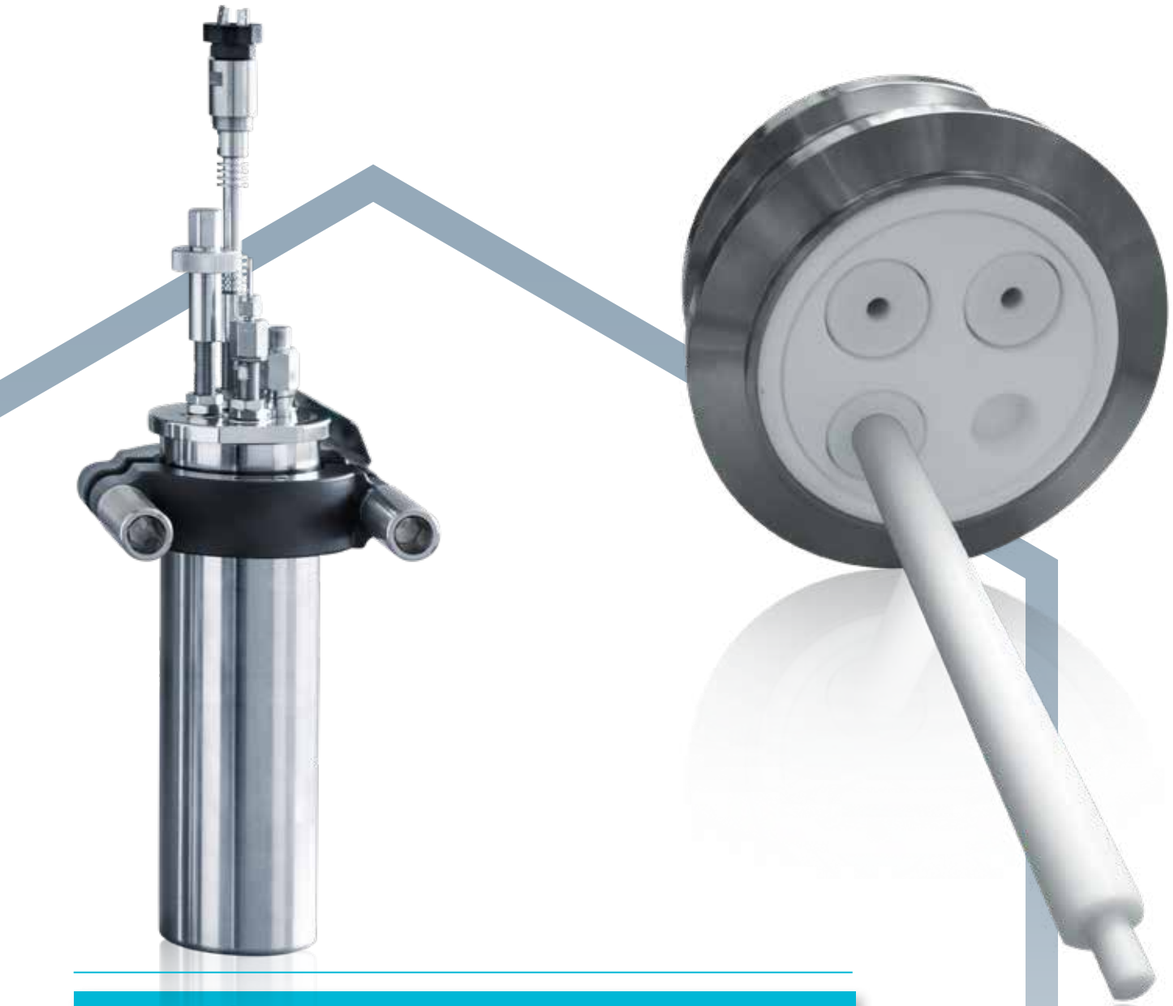
With our NR reactors, you are able to carry out tests with a volume of up to 100 l and a pressure of max. 25 bar (362 psi) – with the flexibility and safety you have come to expect from Berghof. This is because we adapt the size and functionality completely to your individual requirements. For example, to enable you to drain large sample volumes quickly and easily, our NR reactors without PTFE lining are also available with a bottom drain valve.

- → Effective corrosion protection
- → Large volumes
- → Easy handling and highest safety
- → Maximum flexibility and individuality

The highpreactor **family**

DB-REACTORS
Best corrosion protection – even with hydrochloric acid

Our comprehensive and high-quality PTFE lining prevents the reactor contents from getting into any contact with metal – both in the liquid and in the gas phase. As a result, we offer you the highest level of protection against corrosion and contamination with metals. Despite the PTFE lining, temperature and pressure measurement inside the reactor remains possible. The reactor‘s stable surface made of stainless steel allows working conditions of up to 230 ° C (446 °F) and 200 bar (2900 psi).



→ Metal-free reactors
→ Pressure and temperature monitoring despite complete PTFE lining
→ Easy handling and highest safety
→ Maximum corrosion protection

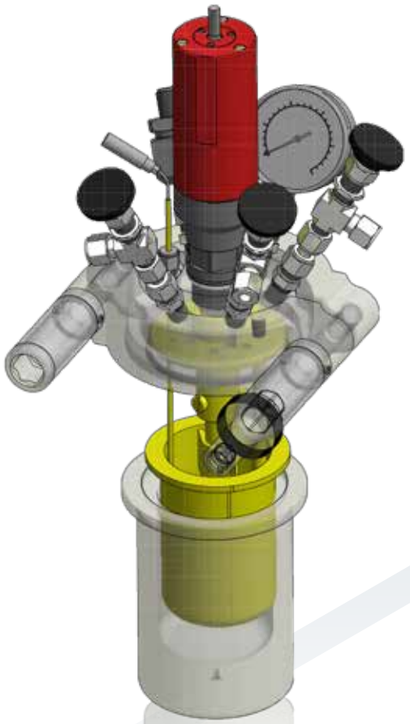
DAB-REACTORS
Intuitive handling und maximum corrosion protection

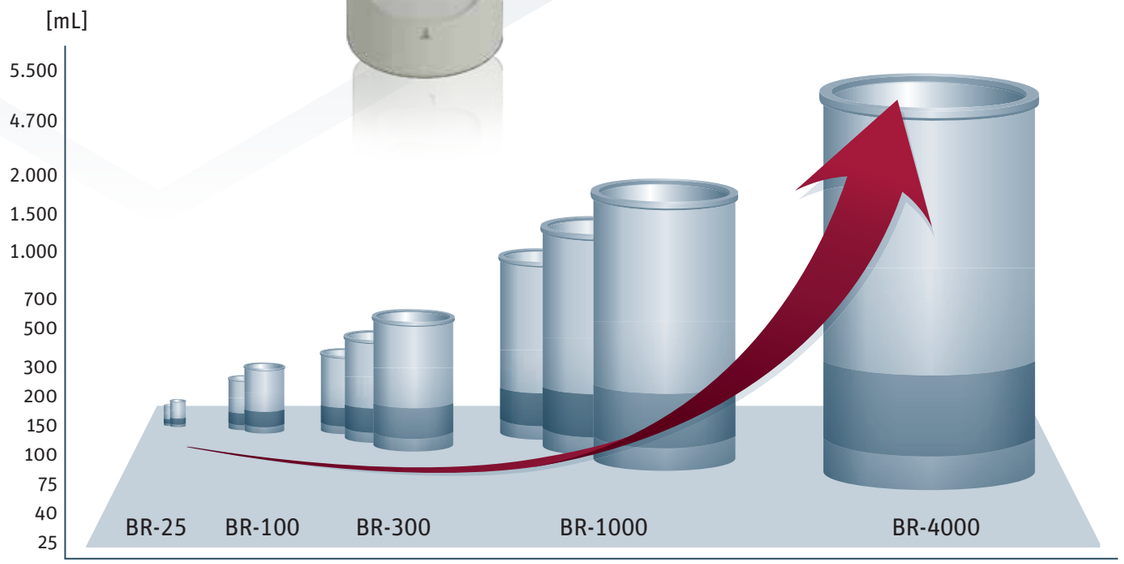
Originally, we designed our DAB reactors to be used for pressure digestions with concentrated mineral acids. The robust and simple system allows maximum working conditions of up to 250 °C and 200 bar (2900 psi). The surface sealing system, which works without O-rings, prevents the medium from getting into any contact with the metal. Our DAB reactors show their strength above all in parallel screening experiments: You can perform up to 48 screening tests in parallel under the same conditions.

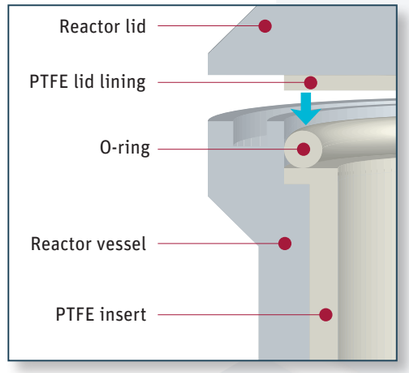
→ Metal-free reactors
→ Ideal for parallel screening experiments
→ Easy handling and highest safety
→ Maximum corrosion protection

PTFE-lining

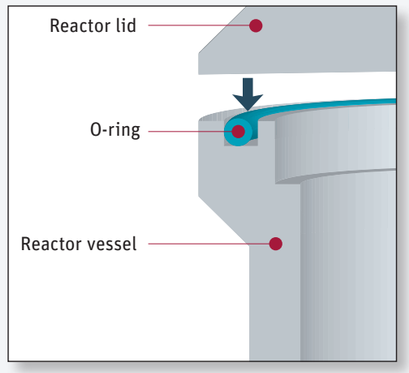
Unique concept: Our stable PTFE lining with a thickness of several millimeters covers not only the reactor vessel. The reactor lid is also provided with a PTFE lining. The dip tube for the thermosensor is PFA coated and all other parts in contact with the media inside the reactor are made of PTFE. The result: Using Berghof reactors you can work with highly corrosive media without contaminating them or destroying the reactor.







The quick and easy-to-use closure and sealing system of the Berghof reactors allows the use of O-ring seals. By combining these seals with our PTFE lining, we avoid any contact between the reactor vessel and the contents. As a result, we reduce corrosion to a minimum – even with highly aggressive media.



Berghof reactors allow for very flexible use. You can operate our reactors both with and without PTFE inserts. Moreover, the reactor volume can be adapted exactly to your requirements by selecting the size of the insert. Furthermore, PTFE vessels can be used as practical storage containers. If the reactor is used at high capacity or if there is a risk of cross-contamination, the use of several PTFE vessels for one reactor is an option.

High Flexibility

Adding & Removing

Our specially developed components allow you to add and remove reagents or samples even while the reactor is running.

Equipment

A variety of sample holders and catalyst baskets provide the best possible conditions for material testing or catalysis.

Stirrer

Whether you are looking for a gassing stirrer, a jet stirrer, or an anchor stirrer – our large selection of stirrer geometries guarantees you perfect mixing of your reaction solution.

Individuality

Probes & Electrodes

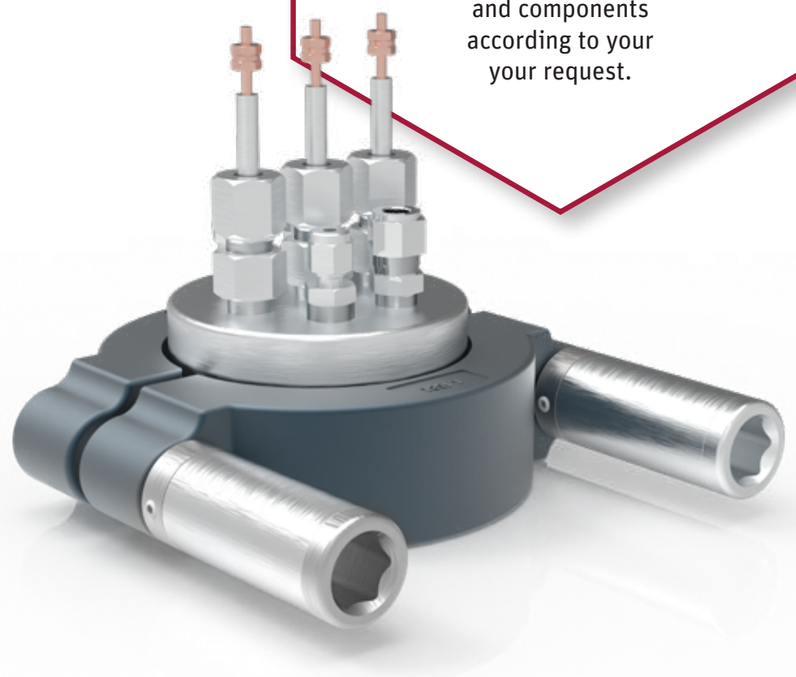
We prepare our reactor lids individually to accommodate various probes, electrodes and cable fittings.

Concept check

Our experienced specialists check each configuration individually with respect to feasibility and material compatibility.

Customized design

You haven‘t found what you‘ve been looking for? No problem. We design reactors and components according to your your request.



BRC

Everything at hand with one controller

Our BRC controller offers quick access to all important parameters and the possibility to switch electric valves directly from the controller. The **auto-tuning** function provides a quick and easy way to determine PID control values specifically for your system. Fluctuations in target temperature are reduced by more than 80%, resulting in better reproducibility and fewer unwanted by-products. With modular extensions, the BRC can be individually adapted to your requirements.

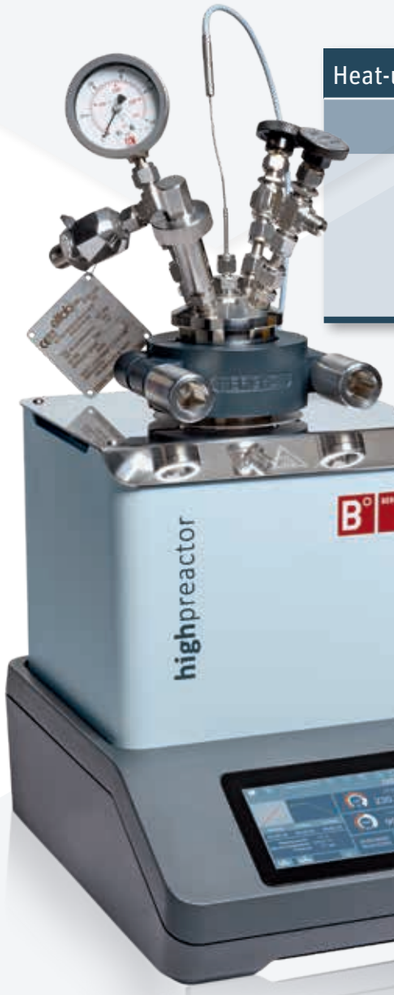
Software packages for the BRC		
Basic	Comfort	Professional
→ Data logging via PC-Software → 10 Data storage spaces → Softstart-function for Stirring	→ Complete features of the Basic package → Intelligent auto-tuning → Multi-level temperature-programs → Valve control	→ Complete features of the Comfort package → Protected settings through hierarchy of rights → Viscosity indicator

→ Intuitive application
→ Auto-tuning
→ Unit control

BR-HS

Our high-performance heating system for small reactors

In addition to the auto-tuning function, our most powerful heating system with up to 1200 watts of heating power offers you an intelligent stirring system. This system detects faults such as a break in the stirring bar movement and thus ensures stirring even without visual control. Moreover, our high-performance heating system offers you the option of **air cooling** of the reactors, which improves the cooling times and temperature accuracies during rapid heating.



Heat-up times for a BR-100 reactor	
Target temperature	BR-HS
50°C (122 °F)	6 min
100°C (212 °F)	12 min
150°C (302 °F)	17 min
200°C (392 °F)	26 min
250°C (482 °F)	35 min
300°C (572 °F)	75 min

→ All-in-one system
→ Auto-tuning
→ Active Cooling

Static Lid lift systems

No more lifting heavy reactors

Due to their Static Lid design, the Berghof comfort lift systems allow fixed installation of all connections. Both lift systems provide for easy filling and emptying of the reactors thanks to the swivel function. The BRS-2 benchtop stand for reactors up to 1 l features an integrated electric heating jacket. It can be easily removed to the bottom for faster cooling. The BRL-1 is designed for reactors starting at 1.5 l and offers enough space for you to make optimum use of the reactors‘ bottom outlet valve.

- → Fixed installation of all connections
- → No load lifting
- → Easy access to the reactor

Stirring

Efficient stirring in a closed system

The combination of a powerful motor, effective magnetic coupling and adapted stirrer geometry allows the reactor contents to be stirred under almost all conditions. Depending on your requirements, our stirrers can achieve speeds of up to 2000 rpm or torques of 4 Nm. Should you have still higher requirements, we can install even stronger components for you. The plain bearing technology offers you a high chemical resistance with low wear at the same time. Through our 2-part containment shell you have access to all moving parts as well as to all plain bearings in mounted position.

- → High torque
- → Plain bearing technology
- → Optimized stirrer geometries

Heating

Whether purely electrical or via high-precision circulation thermostats – our BHM and BTM heating jackets ensure efficient heat transfer between the heater and the reactor. In addition, the heating jackets, thanks to their generously sized base plate, offer a safe foothold and effectively prevent the reactors from tipping over.

The heating blocks for the DAB system hold up to 12 samples. By controlling 4 such heating blocks with one controller, you can carry out 48 screening experiments in parallel under the same conditions.

→ Effektive heat transfer
→ Safe Foothold
→ Up to 48 screening experiments in parallel

Technical specifications

	BR 25 – Br 300	BR 300 – BR 4.000	NR 1.500 – NR 10.000
Reactor capacity	30 ml – 370 ml 25 ml – 300 ml in the PTFE insert	370 ml – 5,7 l 300 ml – 4,7 l in the PTFE insert	1,9 l – 11,7 l 1,4 l – 5,9 l in the PTFE insert
Materials	Stainless steel 316Ti Hastelloy C-22 Optional with PTFE lining		
Operating temperature	-40 °C (104 °F) -300 °C (572 °F) -40 °C (104 °F) -230 °C (446 °F) with PTFE lining		
Maximum Operating presssure	200 bar (2.900 psi) 150 bar (2175 psi) for BR-4000		25 bar (362 psi)
Safety features	rupture disc, optional pressure relief valve	rupture disc, opening key, optional pressure relief valve	
Closing & sealing system	Quick actuating closures with O-ring sealing made of FKM (z.B. Viton©), FFKM (z.B. Perlast©), PTFE		
Basic configuration	rupture disc, gas valve, pressure gauge (a/d), temperature sensor	rupture disc, gas valve, pressure gauge (a/d), Opening key, temperature sensor	
Connections	1/8“ tube connection	8 mm tube connection	
Stirring	Magnetic stirring	Magnetic coupling with different motors and different stirring rotors	
Stirring speed	0 - 2000 rpm		
Torque	Magnetic stirring bar	1,2 Nm	1,2 Nm oder 4 Nm, higher torque upon request
Heating	Electric heating jacket, Heating block for lab hotplate	Electric heating jacket Thermostat-controlled heating jacket	
Controller	BRC, BR-HS, BTC-3000	BRC, BR-HS, BTC-3000, BDL-3000	
Stand	Static Lid lift	Static Lid lift system, Benchtop stand	Static Lid lift system, stand for reactors with bottom drain valve
Accessories	Sampling, Sample holder	Sample loading and unloading, cooling coil, bottom drain valve, sample and catalyst holders	