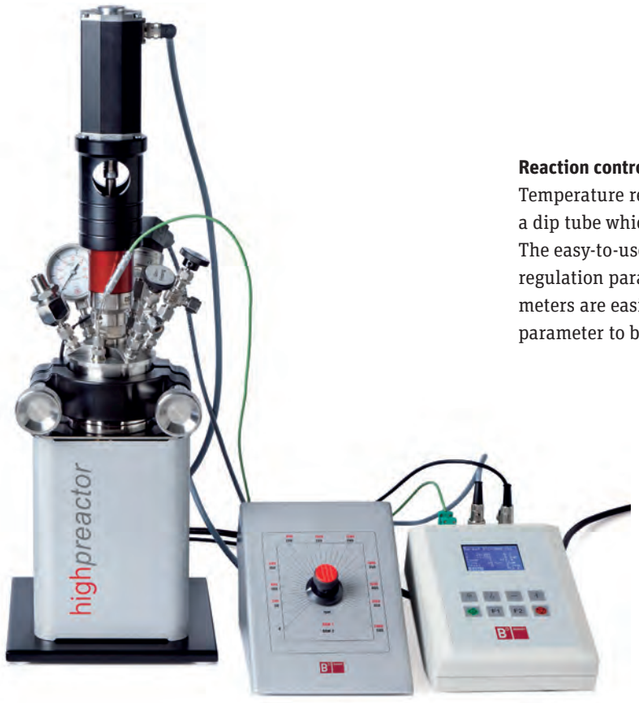
Highpreactor
Technical specifications



Reaction control
Temperature regulation is achieved with a temperature probe in a dip tube which registers the internal temperature of the reactor. The easy-to-use temperature controller combines all control and regulation parameters in one compact unit. All process parameters are easily accessible. The built-in data logger allows the parameter to be documented on a PC.

Highpreactor	
Reactor capacity	25 mL - 5.5 L
Materials	SS316TI, Hastelloy C-4, optionally with PTFE lid lining and PTFE liners
Max. operating temperature	PTFE: 230°C (446°F), SS316TI: 300°C (572°F)
Max. operating pressure	200 bar (2,900 psi)
Standard fittings	Rupture disc holder, Rupture disc, gas valve
Options	gas or liquid sampling and liquid injections at operating pressure, heating/cooling coil
Seals	FPM (e.g. Viton®), PTFE, FFKM (e.g. Kalrez®)
Connetcions	8 mm
Stirring	Magnetic stirring, magnetic coupling and different paddle shapes
Stirring speed	0-2,000 rpm

Highpreactor	
Torque value	max. 100 Ncm
Heatings	Heating block Electric heating jacket Thermostatic jacket
Temperature controller | Data logger	BTC-1000 BTC-3000 BDL-3000
Special solutions	Bottom drain valve EX-protection

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LABORATORY EQUIPMENT

High pressure reactors
Where are your limits?

BERGHOF

Modern high pressure reactors need to be technically safe, reliable, economical in use and simple to operate. With Berghof quality and safety are an integral part of the design concept. High-quality materials combined with durable PTFE lining and modular configuration options are the decisive plus points for the user.

01

Convenience

The high pressure reactors are opened and closed quickly, easily, without tools and with just a couple of hand movements by means of a clamping ring or chain. The fittings are designed to be dead volume-free so that cross-piece and T-pieces are not needed. The risk of contamination is significantly reduced. The high pressure reactors are easy to handle and maintain. All connections can be conveniently removed and remounted by the user for service and cleaning work.

Safety

Berghof high pressure reactors are designed, built and tested in compliance with 97/23/EC European equipment guideline and in accordance with the German AD-2000 set of regulations. As independent assessor the TÜV checks the construction and conducts the pressure test where this is prescribed for a CE marking. Each Berghof high pressure reactor is hydrostatically pressure-tested with mandatory overpressure and submitted to a leakage test. Once the test has been passed, and prior delivery, a Berghof high pressure reactor receives an appropriate inspection certificate documenting faultless functioning.

Flexibility

As regards the very variable configuration of the high pressure reactors customers have a choice. In addition to the extensive selection of standard fittings, optional features such as sample feeds and sample taking under operating pressure are also available. As a result of the modular concept these can be complemented at any time by additional fittings. All components can be supplied in stainless steel or Hastelloy.

Modularity

The modular concept offers a cost-efficient solution since the reactor lid can be combined with various reactor vessels and inserts so that the capacity of the reactor can be optimally adapted. In addition all inserts can be used as practical storage vessels for reaction solutions. The range of products includes low-capacity high pressure reactors of 25 mL right through to reactors with the pilot plant scale of 5.5 L.

Material concept

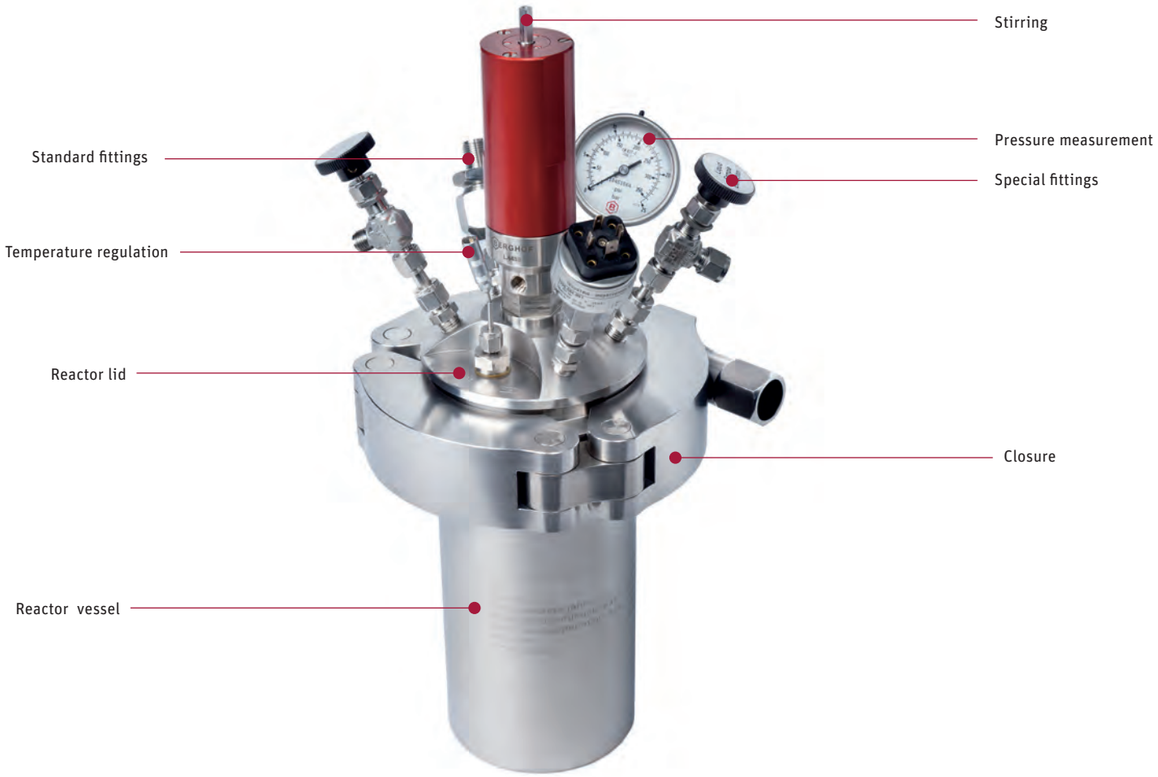
With the integrated material concept of Berghof high pressure reactors the most suitable material can very easily be found for all reaction media. The high pressure reactors and fittings can be supplied in stainless steel or Hastelloy. Such high pressure reactors are particularly suited to organic solvents. The distinctive feature of Berghof reactors is the complete PTFE lining of the reactor vessels and lids. Being several millimetres thick, the robust walls of the inserts and linings offer the most effective protection for all components that come into contact with corrosive materials such as acids and bases. The high quality of the materials used and the precision of the finish result in Berghof high pressure reactors having an above-average service life.

Sealing concept

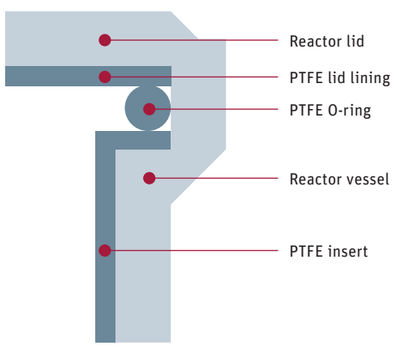
Easy handling combined with unsurpassed safety form the basis for the sealing concept of Berghof high pressure reactors. Sealing is effected reliably with a conical flange lock and an O-ring made of PTFE or other materials, thus guaranteeing hermetic sealing of the reactors.

01 Berghof high pressure reactors are easy to handle.

Highpreactor
Features



Sealing concept



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02

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Berghof high pressure reactors offer considerable scope for customers' individual configuration of the reactor systems. An extensive range of accessories makes laboratory work easier.

Reactor lid and vessel

The high pressure reactors are constructed of stainless steel or Hastelloy. The thick-walled PTFE lining of the reactor lid provides effective protection against corrosion. To protect instruments from corrosion in the gas phase where strong mineral acids or aggressive gases are applied the use of fittings made of Hastelloy is recommended. For optimal corrosion protection of the reactor vessels stable PTFE inserts of various capacities are available.

Locking

Berghof high pressure reactors offer unsurpassed ease of use. They are opened and closed quickly, easily and without tools with just a couple of hand movements by means of a clamping ring or chain.

Seals

Conical flange locks with O-rings are used to seal the reactors. The materials used for the O-rings have various application-specific characteristics. PTFE exhibits an unsurpassed resistance to nearly all chemicals and permits application temperatures up to 230°C. FPM (e.g. Viton®) or FFKM (such as Kalrez®) are true elastomers suitable for application temperatures up to 230°C or 300°C.

Stirring

The choice ranges from reasonably priced magnetic stirring bars for low-capacity high pressure reactors up to magnetic coupling with various drives and torque levels. A variety of paddle shapes permit effective adaptation to the media being stirred. The magnetic couplings of stainless steel or Hastelloy can be supplied with PTFE, stainless steel or Hastelloy stirrers. Stirring force is transferred via a removable magnetic coupling in the reactor lid which is mechanically coupled to an external stirrer motor.

Standard fittings

All standard fittings can be supplied in stainless steel or Hastelloy. A standard fitting consists of a gas valve to vent the reactor and a rupture disc to provide protection against excess pressure. The over-pressure valves are equipped with a coupling for pressure lines to carry off released gases and vapours harmlessly.

Options

All fittings have easily accessible screw-on clamping rings, making Berghof high pressure reactors extremely service and maintenance friendly. Available fittings include systems for gas or liquid sampling as well as liquid injection under operating pressure. Test reactors can be additionally equipped with cameras and interior lighting for material testing.

Pressure measurement

Either a manometer or an electric pressure sensor is factory-installed for pressure measurement. Pressure transducer made of either stainless steel or Hastelloy can be installed to protect the pressure measuring system against aggressive media. The pressure transducer transfers the reactor pressure to the sensor or manometer without it having to come into contact with the aggressive medium.

Temperature regulation

The internal temperature of the high pressure reactor is continuously measured with the aid of a temperature probe which is inserted in a dip tube made of stainless steel or Hastelloy and which can be protected with PFA lining. Heating control can be effected with a freely programmable PID temperature regulator. To protect against overheating of the reactor a second independent temperature probe can be built in to provide excess temperature protection.

Accessories

For optimal regulation and control of the reaction parameters, heaters, temperature regulators, stirrers, stand systems, data loggers and much more round off the portfolio.

01 Sealing concept of Berghof high pressure reactors

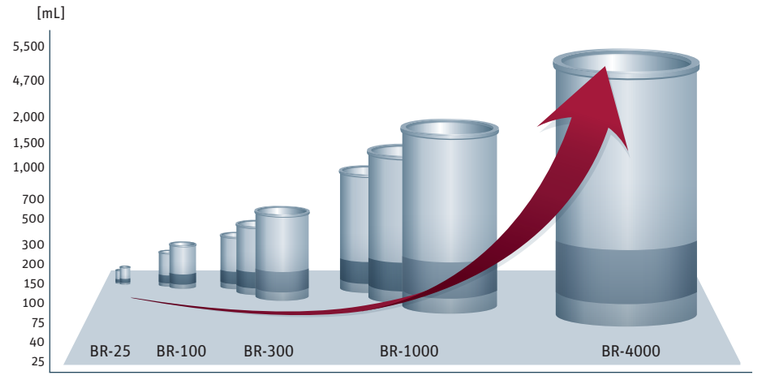
02 Individually configurable reactors for maximum flexibility

03 Easy-to-use clamping rings and chains for secure closure

Among the Berghof strengths are the knowledge and skills involved in handling of PTFE. With this know-how Berghof provides its customers with solutions, even where highly corrosive media are being used.

Reactor capacities

Overview of Highpreactor capacities (with PTFE insert)									
	BR-25		**BR-100**		**BR-300**		**BR-1000**		**BR-4000**
25 mL	(25 mL)	170 mL	(50 mL) (75 mL) (100 mL) (150 mL)	350 mL	(300 mL)	1,100 mL	(1,000 mL)	5,500 mL	(4,700 mL)
40 mL	(40 mL)	230 mL	(200 mL)	600 mL	(500 mL)	1,700 mL	(1,500 mL)		
				900 mL	(700 mL)	2,300 mL	(2,000 mL)		



PTFE lining
Berghof reactors are completely lined with PTFE to provide corrosion protection. For this a stable PTFE insert is placed in the reactor vessel. The reactor lid is, moreover, lined with an additional several mm thick layer of PTFE, while the immersion tubes are encased with PTFE. The stirrer, too, can be completely manufactured from PTFE. Thus all parts of the reactor that come into contact with the media are effectively protected from aggressive reagents.

Reactor capacities
Every series of reactors (BR-25, BR-100, BR-300, BR-1000 and BR-4000) can be supplied with various capacity modules. Here, fine tuning is achieved by the thickness of the PTFE insert, making it possible to combine the reactor lid with various reactor vessels and inserts.

Benefits
The PTFE inserts can also be used as practical storage receptacles for reaction solutions so that the risk of cross-contamination or catalyst poisoning is minimised.

Areas of application
- → BR-25: The “Small One” from Berghof is ideal for very small tests with expensive raw materials or those that involve complex manufacturing processes.
- → BR-100: The “Handy One” from Berghof is the standard reactor for everyday laboratory use.
- → BR-300: The “Universal One” from Berghof is of particular interest due to its diverse stirring and heating technology.
- → BR-1000: The “Big One” from Berghof is ideal for more extensive testing.
- → BR-4000: The “Strong One” from Berghof is just the right unit for pilot plant tests.

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