

Applications



**Chemical Synthesis
and Catalysis**

**Carbonation
Carboxylation
CO₂ reduction**

Hydrogenation

**Oxidation reactions
Methanation
Reactions with ethylene oxide**

BERGHOF PRODUCTS + INSTRUMENTS GMBH

highpreactor
Hydrogenation Processes
safe, reproducible, efficient



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Hydrogenation Processes – safe, reproducible, efficient

In many research laboratories, hydrogenation continues to pose a challenge: manual process steps, unclear gas consumption, and heavy reliance on operating personnel affect reproducibility and increase the safety risk in experiments.

With the **semi-automatic gas burette BRG** and the fully **automated hydrogenation control system BHC**, Berghof offers two powerful solutions for precise and controlled gas consumption measurement – tailored to different requirements and budgets.

| Function | Define termination criteria and safe mode | Recipe control | Flushing with inert gas | Gas exchange with reactive gas | Gas consumption measurement | Other Gases? | Data logging |
|-------------------|---|----------------|-------------------------|--------------------------------|-------------------------------------|--------------|--------------|
| Gasboard + BHC | ✓ | ✓ | automatically | automatically | automatically, mass flow controller | ✓ | ✓ |
| Gas Burette + BRC | X | X | manually | manually | automatically, ideal gas law | ✓ | ✓ |



- Fully automatic
- High measurement accuracy
- Strong safety concept



- Semi-automatic
- Smart handling
- Cost-efficiency

BHC - Berghof Hydrogen Control

The central function of fully automated hydrogenation is the powerful Berghof Process Control software with its proprietary Gasboard. Together with a Berghof high-pressure reactor, they form the fully automated hydrogenation process control system BHC. When hydrogen is consumed during the chemical reaction, the system automatically adds gas until the previously defined reaction pressure is reached again. This keeps the reaction pressure constant throughout the entire process, while simultaneously recording and documenting gas consumption without interruption.

High Pressure Reactor up to 200bar/300°C:

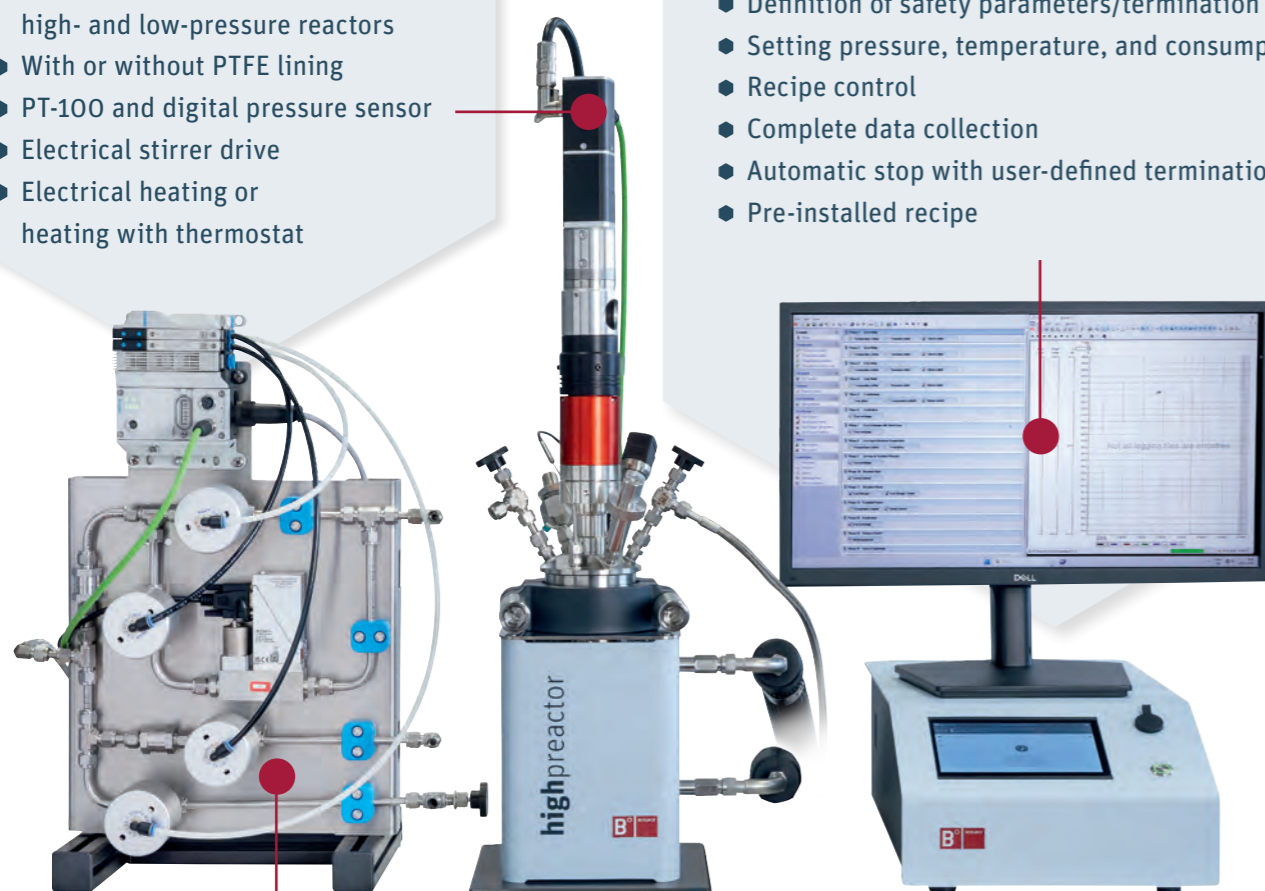
- Can be combined with all high- and low-pressure reactors
- With or without PTFE lining
- PT-100 and digital pressure sensor
- Electrical stirrer drive
- Electrical heating or heating with thermostat

BPC – Berghof Process Control:

- Definition of safety parameters/termination criteria
- Setting pressure, temperature, and consumption limits
- Recipe control
- Complete data collection
- Automatic stop with user-defined termination criteria.
- Pre-installed recipe

Gasboard:

- Inert gas and reactive gas supply up to 200 bar
- Integrated mass flow controller
- Bypass function for accelerated reactive gas supply
- Exhaust for reactor ventilation
- Prepared for space-saving wall mounting



BHC - Plug and Play with pre-installed recipe

The BHC enables fully automated process control based on individually definable recipes. All safety- and process-related steps are performed reliably and reproducibly, independent of the operating personnel.

Automated process steps:

Define safety parameters and safe mode

Inertization – purging with inert gas

Leak test

Gas exchange with reactive gas

Start of reaction, including termination criteria

Re-dosing and gas consumption measurement

Inertization and controlled end of reaction



- Safe & efficient
- Reproducible
- User-independent

BRG – Berghof Reactor Gas Burette

The BRG offers an easy-to-use and cost-effective solution for automated gas dosing with simultaneous gas consumption measurement. The semi-automated control system ensures high reproducibility and simplified process control. Thanks to its flexible applicability for a wide range of gases, the BRG is the ideal entry-level solution for automated gas consumption measurement in chemical research.

Digital Gas Burette:

- Inert gas and reactive gas supply up to 100 bar
- Digital pressure sensor
- Electric valve valve
- Rupture disc
- Optional: ATEX version



High pressure Reactor up to 200bar/300°C:

- Can be combined with all high- and low-pressure reactors
- With or without PTFE lining
- PT-100 and digital pressure sensor
- Electric stirring drive
- Electric heating or heating with thermostat

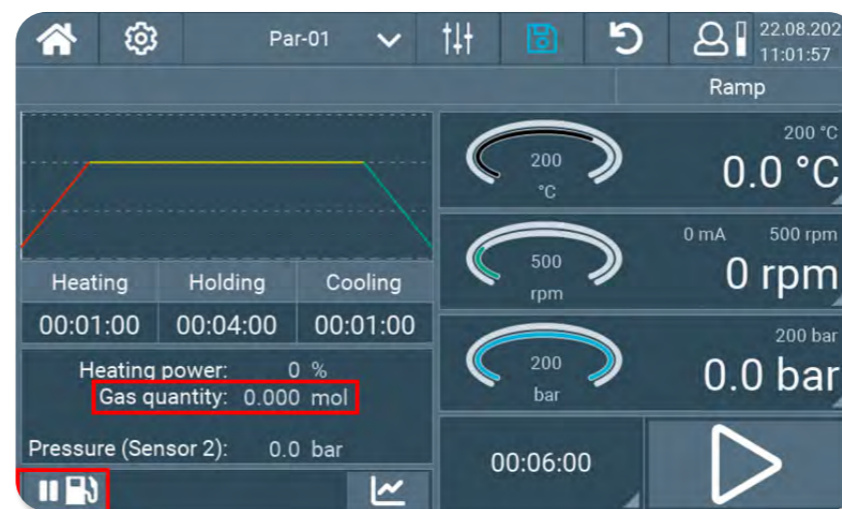


BRC- Berghof Reactor Controller:

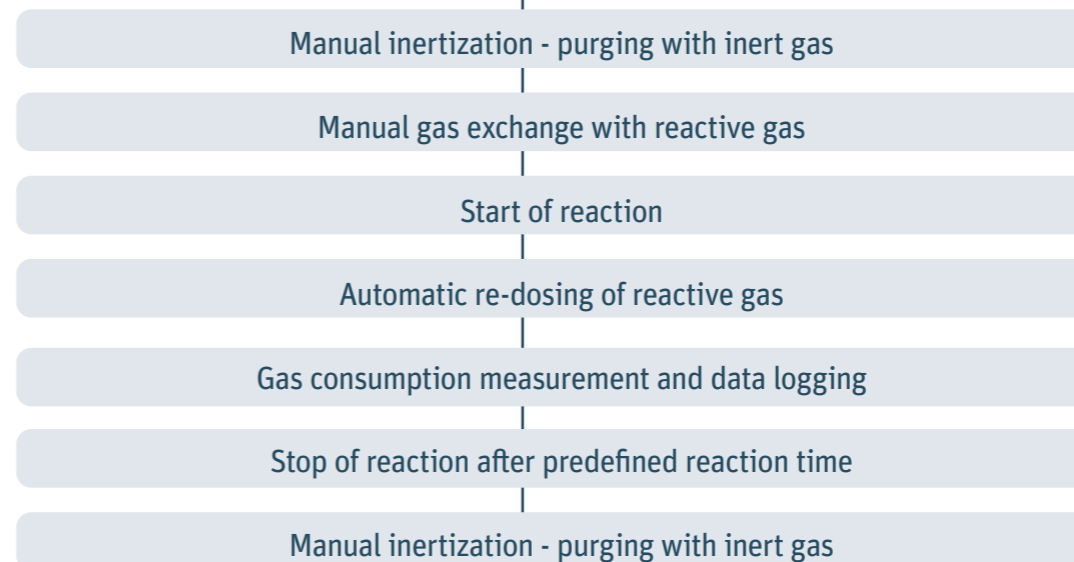
- Control of reactor temperature and stirring
- Pressure monitoring of reactor and gas burette
- Automatic gas dosing via the integrated ramp mode
- Determination of gas consumption
- Data logging of all process parameters

BRC – Key to intuitive control

An essential element of the digital gas burette is the control of the process via the Berghof Controller BRC, which offers optimal conditions for precise process control and partial automation thanks to an intuitive user interface and specially developed control software. When hydrogen is consumed during the chemical reaction, the system automatically adds enough gas to restore the previously defined reaction pressure. This keeps the reaction pressure constant throughout the entire process. Gas consumption is determined by the pressure drop in the storage vessel.



Semi-automated Process Steps



- Safe & Reproducible
- Smart handling
- Cost-Efficient