



**Mechanimix**

# Reactors | HPR Series

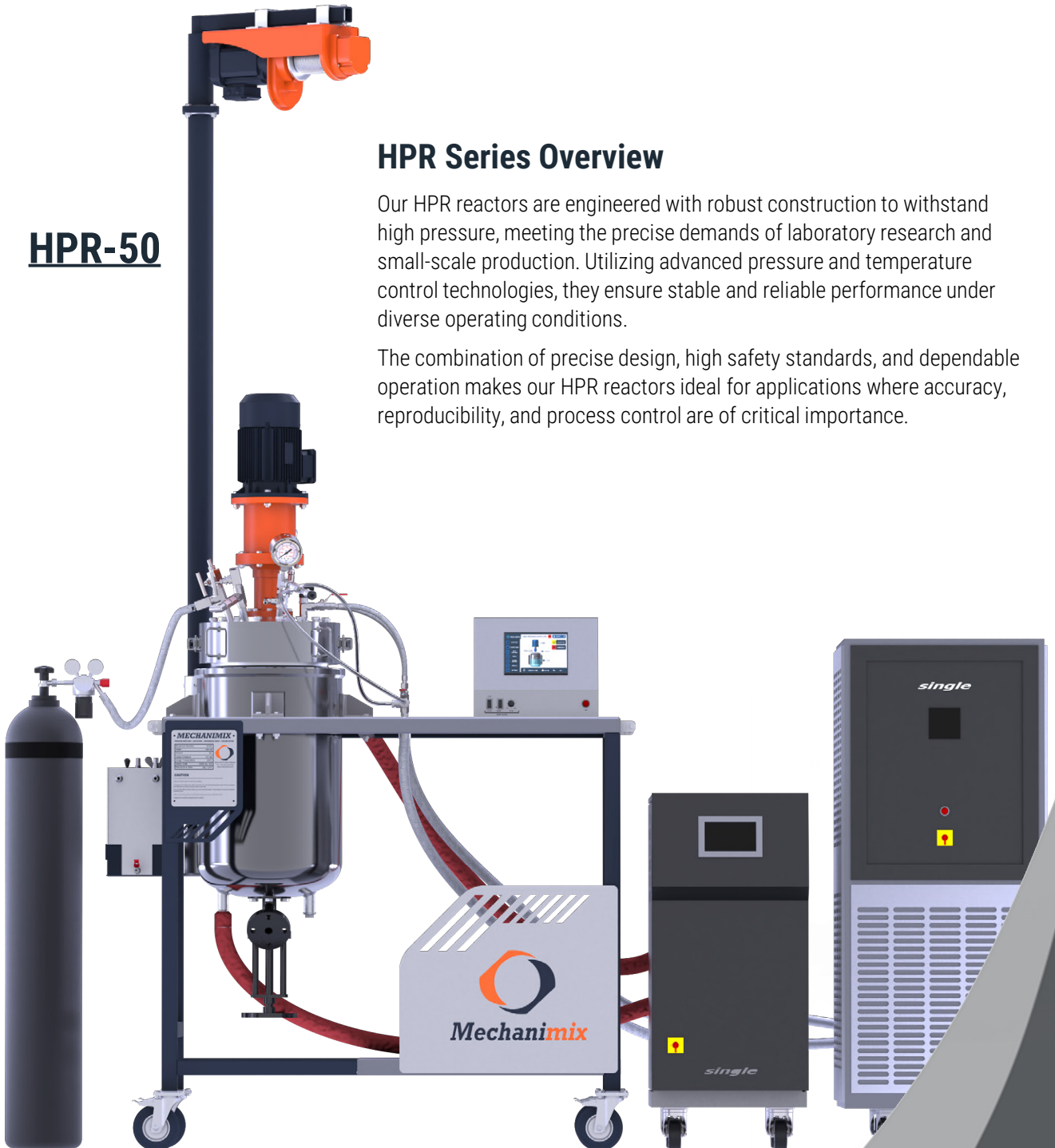
Professional Mixing Technologies

## HPR-50

### HPR Series Overview

Our HPR reactors are engineered with robust construction to withstand high pressure, meeting the precise demands of laboratory research and small-scale production. Utilizing advanced pressure and temperature control technologies, they ensure stable and reliable performance under diverse operating conditions.












The combination of precise design, high safety standards, and dependable operation makes our HPR reactors ideal for applications where accuracy, reproducibility, and process control are of critical importance.



# Technical Specifications

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### HPR Series Technical Configuration

Description	Specification			
Model Name	HPR-5	HPR-25	HPR-50	HPR-100
Working Volume(l)	5	25	50	100
Total Volume(l)	8	30	70	130
Min. Stirrable Volume(l)	0.5	3	7	15
Design Pressure(bar)	100, 200 & 250	100 & 200	50 & 100	
Design Temperature	up to 500°C			
Material Of Construction	SS 316L wetted parts, Titanium, Monel, Nickel, Hastelloy, Inconel			
Head Mounting Style	Removable head and vessel design			
Heating Type	Electrical ceramic band heater with cladding & insulation & heater temperature control			
AC Motor	0.2 kW	0.4 kW	1 kW	2.2 kW
Explosion-proof 				
Coaxial Options				
Near Wall Agitation				
Shaft Sealing	Zero leakage magnetic drive coupling			
	4 Nm	8 Nm	12 Nm	20 Nm
Vessel I/D (mm)	135	245	345	440
Vessel I/H (mm)	360	600	600	735
External Valves & Fittings	<ul style="list-style-type: none"> <li>– Pressure gauge</li> <li>– Safety rupture disc</li> <li>– Gas inlet and liquid sampling needle valve on common dip tube</li> </ul>		<ul style="list-style-type: none"> <li>– Vent needle valve</li> <li>– Flush bottom valve</li> <li>– Ball valve for powder/ liquid inlet with funnel</li> </ul>	
Internal Fittings	<ul style="list-style-type: none"> <li>– Helical cooling coil</li> <li>– Dip tube</li> <li>– Baffles</li> <li>– Thermowell with RTD PT100 temperature sensor</li> </ul>			
Gasket	PTFE up to 300°C and grafoil gasket up to 500°C			
Closure Type	Split clamp with clamp bolts			
Lifting Arrangement	Mechanical chain pulley		Electric Hoist Arrangement	

❖ The overall dimensions are approximate and may vary depending on selected optional features or custom design configurations.

# Options for Standard Models

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### Head Mounting Style

#### Removable Head Design

The vessel features a detachable head design, allowing easy access for operation and maintenance. The main body is stationary on a support base, while the head can be raised using a chain pulley mechanism.

#### Fixed Head Design with Adjustable Vessel Movement

In this setup, the HPR reactors head is fixed on the main frame, while the vessel and heater can be raised or lowered as needed. It is ideal for systems with multiple head-mounted accessories, where frequent disconnection is inconvenient.



System Type	Principle	Advantage
Cable / Wire-Rope	Robust and reliable design using steel wire ropes for transferring high loads with minimal elongation and excellent mechanical durability	<ul style="list-style-type: none"> <li>– High load capacity with low structural weight</li> <li>– Smooth, quiet motion with distributed lifting points</li> <li>– Works in manual, electric, or hybrid configurations</li> </ul>
Hydraulic	Pressurized fluid in a hydraulic cylinder lifts or lowers the vessel smoothly and steadily	<ul style="list-style-type: none"> <li>– Damped, stable movement under varying loads</li> <li>– Very high lifting capacity for heavy reactors</li> <li>– Manual or motorized pump options</li> </ul>
Lead-Screw	Principle: vertical motion is generated by a screw-and-nut assembly, operated manually or by a geared motor	<ul style="list-style-type: none"> <li>– High precision and rigid linear movement</li> <li>– Clean, dry operation (no hydraulic fluid)</li> </ul>

### Vessel Lifting System Types for Fixed Head Design

System Type	Manual	Pneumatic	Screw	Winch	Hydraulic	Vessel Tilting
HPR-5	✗	✓	✓	✓	✗	✓
HPR-25	✗	✓	✓	✓	✗	✓
HPR-50	✗	✗	✗	✓	✓	✗
HPR-100	✗	✗	✗	✓	✓	✗

- ❖ The separable heater and vertical vessel movement simplify operation, speed up cooling, and improve overall usability.

# Options for Standard Models

## Professional Mixing Technologies

### Frame & Support Structure

Aspect	Solution
Design	Modular and robust frame providing stability and easy customization for different vessel sizes and system layouts.
Adjustability	Configurable dimensions with height-adjustable supports and adaptable mounting points.
Reinforcement	Strengthened sections for heavy-duty applications and improved load capacity.
Vibration Control	Optional vibration-damping elements for smoother operation and noise reduction.
Integration	Space provision for control panels, lifting systems, and auxiliary equipment.
Structural Validation	Finite Element Analysis (FEA) verification for high-pressure or high-temperature performance.
Surface Finish	Anti-corrosive coatings and hygienic finishes for cleanroom or industrial environments.



# Sealing & Drive Unit

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### Magnetic Agitation System

The HPR Series reactors are equipped with a magnetic drive system that transfers torque from the motor to the agitator shaft without any mechanical connection or dynamic seal.

This design provides a completely sealed and leak-free environment, ensuring full isolation of the process zone and reliable, safe operation under demanding conditions.

### Technical Advantages

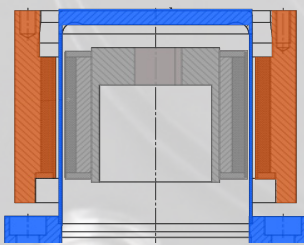
- Hermetically sealed design
- Non-contact torque transmission
- High operational safety
- Excellent chemical and thermal resistance
- Maintenance-free operation
- Compact configuration
- Vibration-free performance
- Enhanced process integrity



### Different Magnetic Drive Configurations

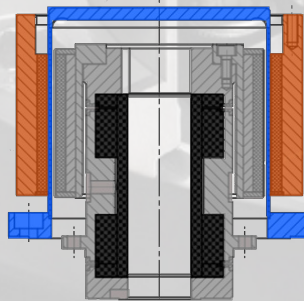
To meet various process and design requirements, the HPR Series reactors are available with different magnetic drive configurations.

Each configuration provides the same hermetic sealing and leak-free performance, but differs in mechanical layout, shaft support, and compactness.



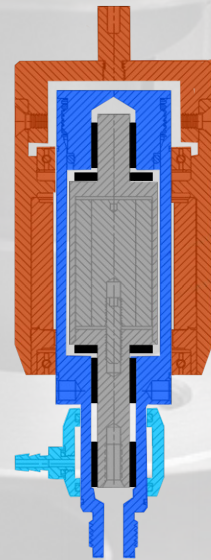
**Simple Rotor**

- Economical & efficient design
- Integrated motor mount
- Built-in bearing support
- No extra cooling needed
- Easy & quick maintenance



**Simple Plain Bearing Rotor**

- SSiC plain bearing design
- High reliability
- Long service interval
- Complex access/Service
- No external bearing unit
- Built-in cooling section
- Integrated motor mount



**Advanced Compact Rotors**

- Compact and space-saving design
- Independent and reliable unit
- Requires motor support
- Integrated cooling section
- Complex access/Service

# Nozzle Orientation & Internal Fittings

## Professional Mixing Technologies

### Optimized Port Arrangement

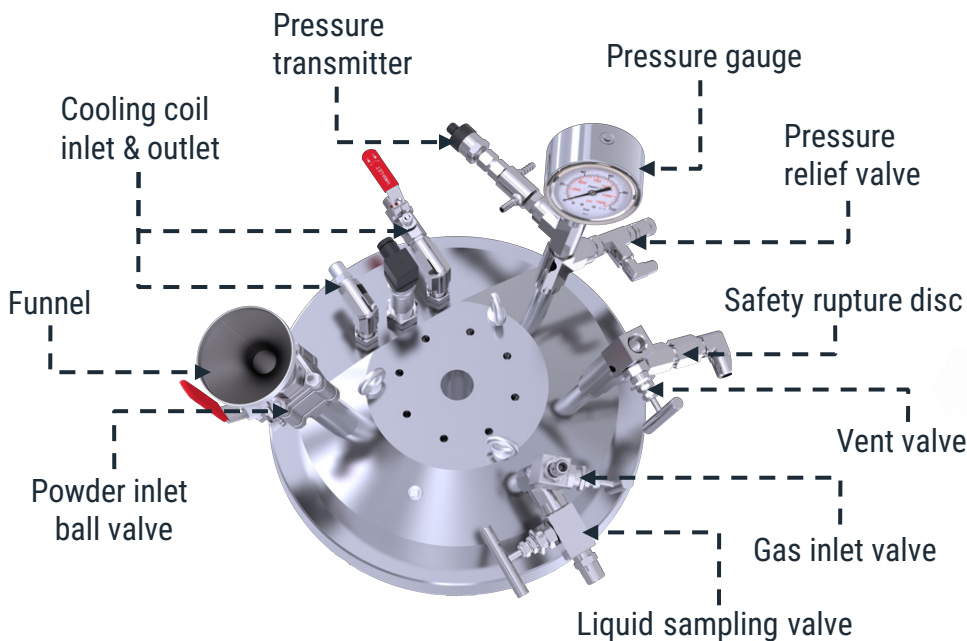
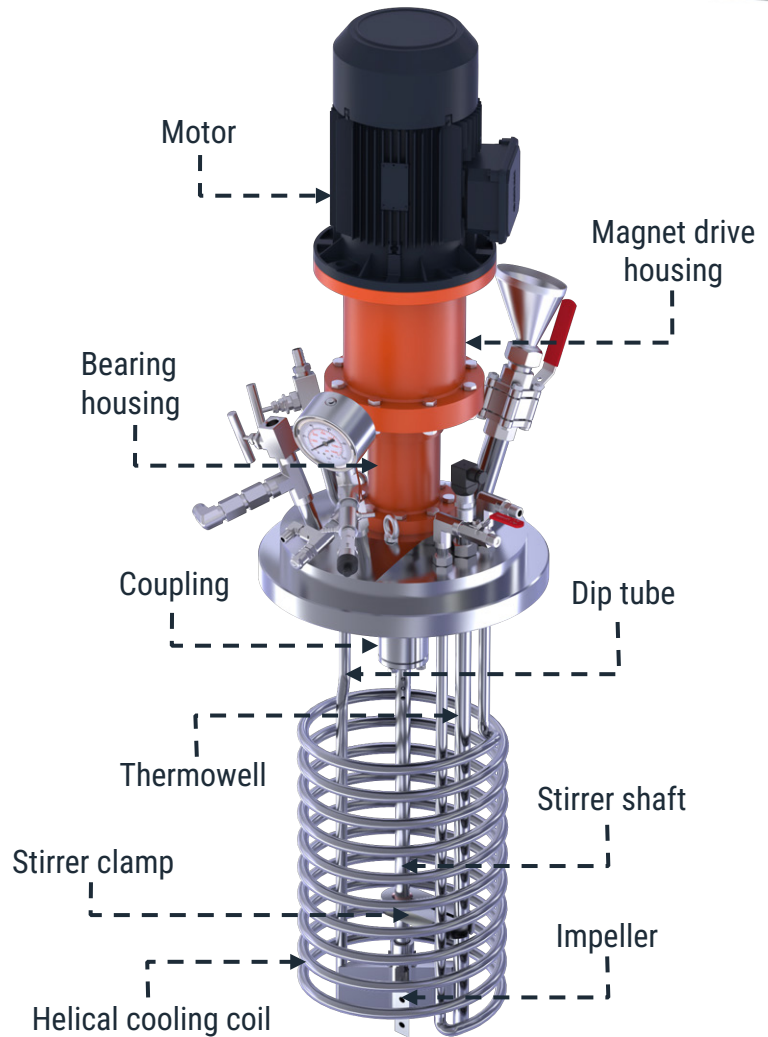
The HPR Series Reactors by Mechanimix are engineered and selected to meet relevant pressure-equipment standards. They provide a complete set of safety, instrumentation, sampling, and injection ports required for reliable high-pressure operation.

All fittings are chosen with a strong emphasis on reliability, safety, high-pressure compatibility, and practical usability, delivering a robust and operator-friendly interface for the reactor system.

### Customizable Port Configuration

The reactor-head fittings in the HPR Series are fully customizable and can be configured according to process requirements and customer specifications.

An optimal combination of safety ports, instrumentation interfaces, sampling points, and fluid-injection connections can be selected for each application, ensuring maximum flexibility and ideal operating performance.



# Heating & Cooling System

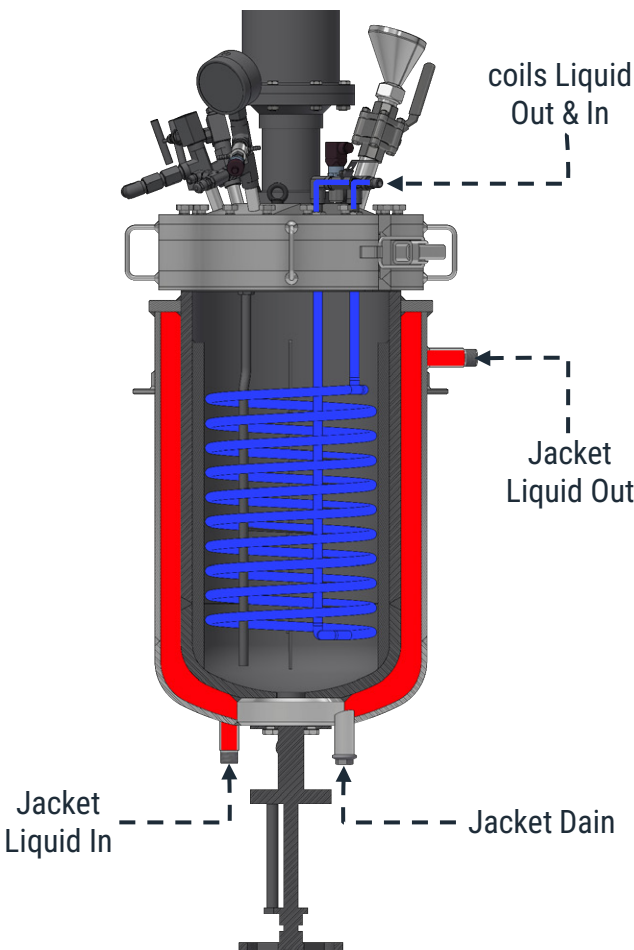
## Professional Mixing Technologies

### Thermal Management System

The HPR reactors heating and cooling systems are designed as dual independent circuits to ensure precise temperature control, stable thermal performance, and superior energy efficiency, resulting in improved process reliability and extended equipment lifespan.

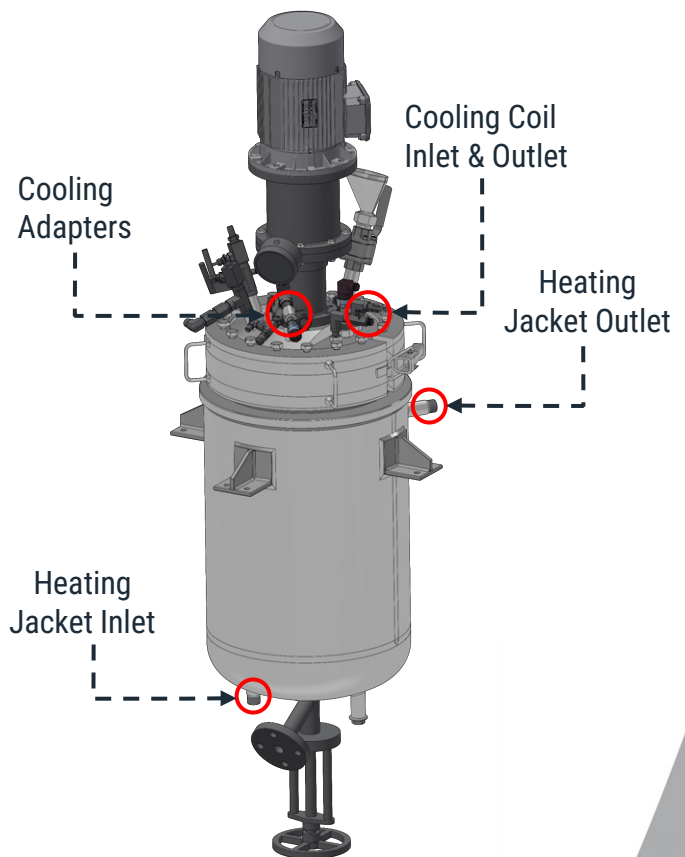
### Heating System

Heating is provided by a Double Jacket surrounding the vessel, where circulating thermal fluid ensures uniform, indirect heat transfer, preventing hot spots and enabling precise temperature control.



### Cooling System

Cooling is achieved through a separate circuit with an internal spiral coil, where circulating coolant provides fast, uniform, and adjustable cooling. The coil's corrosion- and thermal-shock-resistant design ensures long-term reliability.



### Cooling of Sensitive Components

Dedicated cooling adapters are designed for:

- Temperature sensors
- Pressure sensors
- Magnetic drive assembly

These adapters prevent unwanted heat transfer to control components, maintaining measurement accuracy and extending the lifetime of sensitive parts.

### Advantages of the Dual-Circuit Design

- Independent and precise temperature control for heating and cooling
- Enhanced safety and optimized energy consumption
- Stable operation with minimal maintenance requirements

# Mixing Technology

## Professional Mixing Technologies

### Flexible Agitation Configurations

To accommodate different process needs, **Mechanimix** HPR reactors are available in both standard agitation configurations and enhanced setups capable of handling controlled gas induction when required.

### Gas-Liquid Mixing Solutions

In many chemical and high-pressure processes, both liquid and gas phases are involved. Efficient dispersion of gas into the liquid and maintaining uniform mixing are crucial for achieving high reaction yield, enhanced mass transfer rate, and consistent product quality.

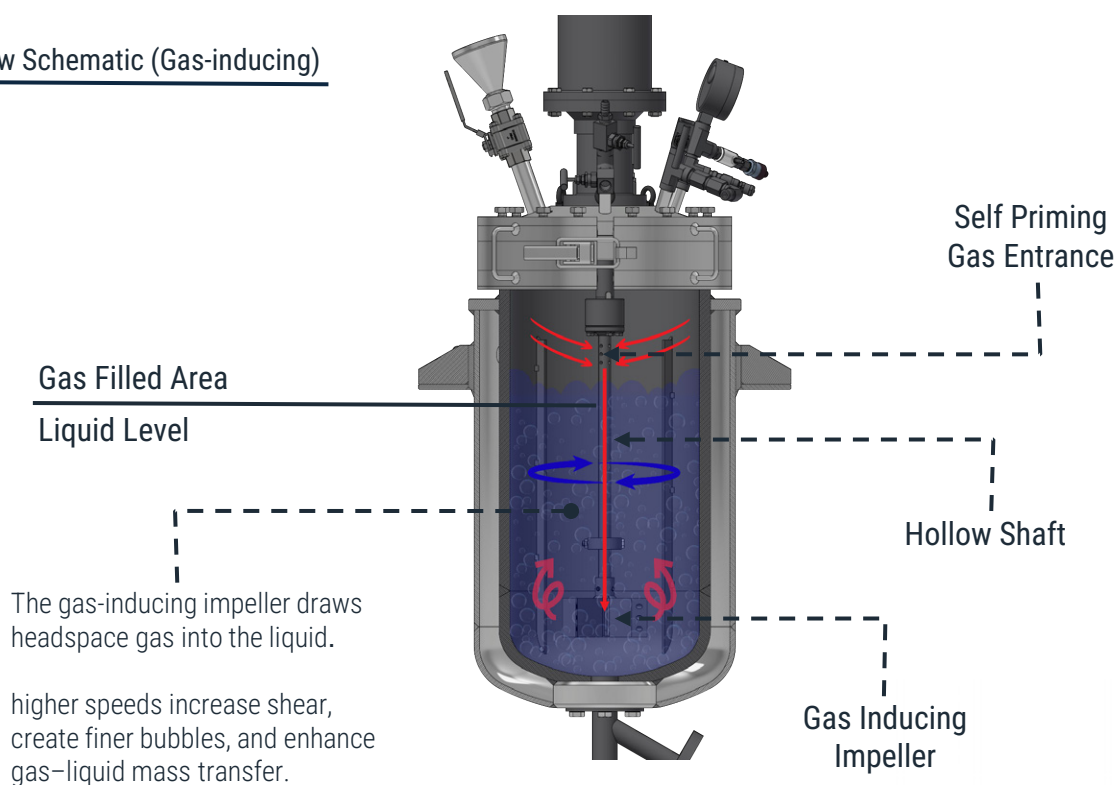
### Gas Inducing Agitation System

A Gas Inducing Agitation System is an advanced mixing technology used in high-pressure reactors to achieve controlled gas injection and efficient gas-liquid interaction.

### Extra Advantages of Gas Inducing Agitation

- Precise gas flow control (with MFC integration)
- Uniform mixing and improved thermal distribution
- Shorter reaction times and better product quality
- Stable performance under high-pressure operation

### Flow Schematic (Gas-inducing)



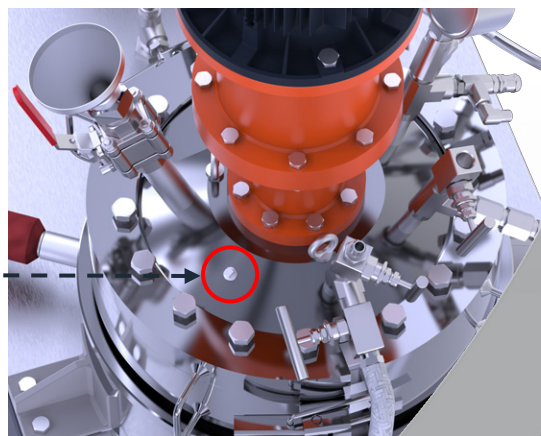
### Precise Gas Control with MFC

The Mass Flow Controller (MFC) enables accurate and stable regulation of gas feed in the reactor.

By continuously measuring and adjusting the gas flow rate, the MFC ensures:

- Stable gas induction
- Lower gas consumption
- Better reaction control

Dedicated Port For MFC



# Mixing Technologies

## Professional Mixing Technologies

### Ex-Proof Design for Hazardous Environments

#### Certification & Compliance

- Certified Ex-proof (explosion-proof) design by reliable organizations.
- Fully compliant with ATEX and IECEx international standards
- Suitable for Zone 1 and Zone 2 classifications

#### Applications

High-risk industries such as:

- Biofuels
- Chemicals
- Petrochemicals
- Solvents
- Designed for environments with explosive gases, vapors, or dust



**EX PROOF**  
EXPLOSION-PROOF

#### Key Benefits

- Ensures workplace safety in hazardous environments
- Enables continuous and safe operation under strict industrial conditions
- Can be customized for special projects requiring certified protection

### Advanced Condition Monitoring Service

#### Our Approach

- Combining technical expertise with advanced monitoring technologies
- Developed for continuous performance monitoring and early failure detection
- Ensures maximum equipment reliability

#### How It Works

- Continuous or periodic monitoring of critical parameters
- Detailed data analysis by experts
- Generation of technical reports

#### Your Benefits

- Early failure prediction
- Optimized maintenance planning
- Extended equipment lifetime
- Improved reliability and efficiency

❖ To review all the technical details regarding the service, please take a look at the brochure we have prepared specifically for the [Condition Monitoring Service](#).



# CONDITION MONITORING





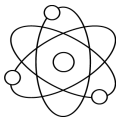
**Mechanimix**

# Scalable HPR Reactors

Professional Mixing Technologies



Designed for high-pressure experimentation across multiple scales, offering reliable performance under diverse operating pressures, temperatures, and material specifications.



A versatile platform for controlled high-temperature and high-pressure experimentation, supporting a wide range of R&D and pilot-scale applications in modern process industries.

