



**Mechanimix**

# Top Entry Agitators | HP Series

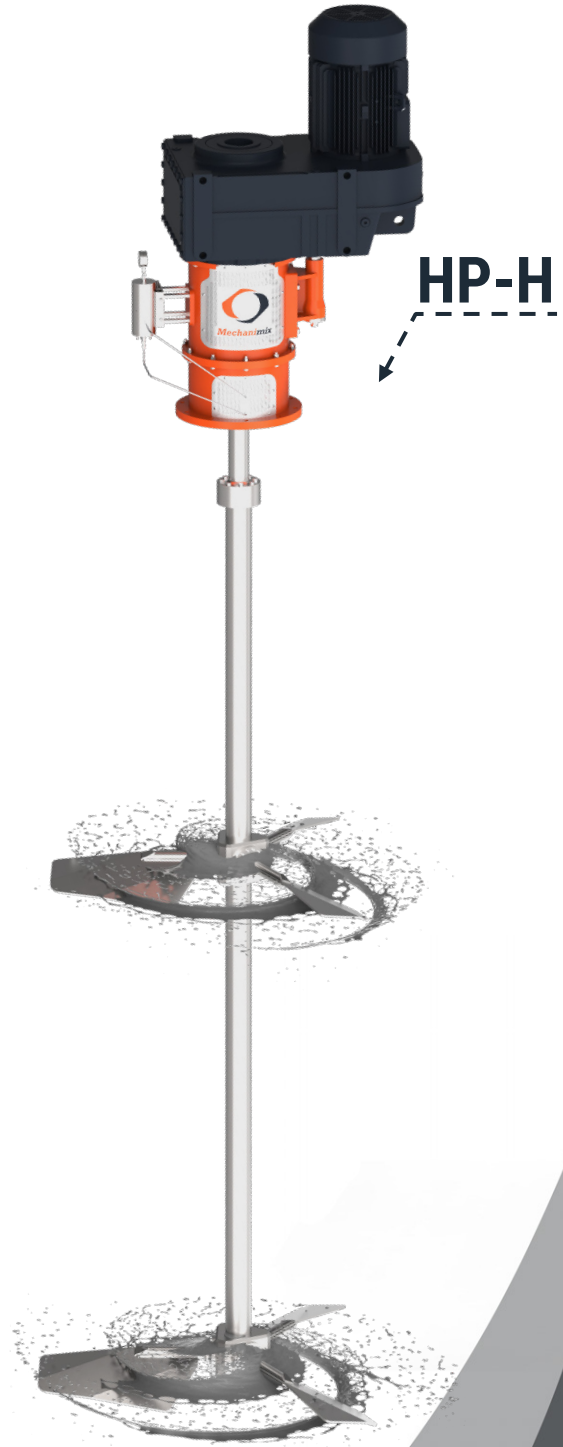
Professional Mixing Technologies

## HP Series Agitators Overview

**Mechanimix** designs and manufactures heavy-duty, pressure-resistant top-entry agitators for high-demand industrial applications.

These robust and modular agitators are ideal for use in pressurized reactors and aggressive process environments, offering reliable operation, energy efficiency and long service life. Flexible configurations with different drive systems, impeller types, shaft lengths and sealing solutions allow our agitators to adapt to a variety of mixing needs.

Powered by advanced HP Series technology, these systems deliver maximum performance with minimum energy consumption. Thanks to our extensive industry experience, **Mechanimix** offers intelligent and scalable mixing solutions for the chemical, petrochemical and pharmaceutical industries.



Impeller Type	GM, GDM, GDS, HWM, HWM-B, HVM
Impeller Diameter	300-8000 [mm]
Shaft Diameter	20-220 [mm]
Shaft Length	Up to 15 [m], in 3 steps
Motor Power	Up to 200 [kW]
Mechanical Seal	Single, Double and Dry Running Mechanical Seals, Magnetic Solutions
Materials	Stainless Steel, Carbon Steel, High Alloy Steels, and Derivatives
Models	HP-M, HP-H Series
Industries	Chemical, Oil & Gas, Biofuels, Food & Beverage, Mining, Metals, Fertilizers, Pharmaceuticals, etc.

# Overview

## Professional Mixing Technologies

<b>Views</b>		
<b>Series</b>	<b>HP-M</b>	<b>HP-H</b>
<b>Applications</b>	<ul style="list-style-type: none"> <li>– Continuous Large-scale Production</li> <li>– All industrial medium-duty applications</li> <li>– Specialty Chemical Batches</li> <li>– Flexible Multi-product Operations</li> </ul>	<ul style="list-style-type: none"> <li>– Continuous Large-scale Production</li> <li>– Petrochemical &amp; Refinery Processes</li> <li>– Mining &amp; Metallurgy (HPAL, slurry agitation)</li> <li>– Energy Sector (biofuels, syngas, CO<sub>2</sub> absorption)</li> </ul>
<b>Features</b>	<ul style="list-style-type: none"> <li>– High-Pressure Design</li> <li>– Medium and Heavy-Duty Drive Unit</li> <li>– Mechanical seal replacement with no agitator removal</li> <li>– Space-saving and ease of installation</li> <li>– Magnetic Coupling Solutions</li> <li>– Advanced Condition Monitoring Service</li> <li>– Quiet and Vibration-Free Operation</li> <li>– Available with IEC &amp; NEMA motors, both 50Hz &amp; 60Hz options</li> <li>– Ex-Proof Design for Hazardous Environments</li> </ul>	
<b>Advantages</b>	<ul style="list-style-type: none"> <li>• Minimum Downtime</li> <li>• Low Operating Costs</li> <li>• Environmental Sustainability</li> </ul>	<ul style="list-style-type: none"> <li>• Flexible Use</li> <li>• Process Optimization</li> <li>• Reliable Performance</li> </ul>



### Two Models, One Reliable Solution

HP series agitators are available in two models: HP-M (Medium Duty) and HP-H (Heavy Duty).

The appropriate model selection is determined by the tank volume and process requirements, ensuring the best performance and long service life.

- ❖ 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](#).

# Features

## Professional Mixing Technologies

### Use in Industrial Tanks

- Steel Pressure Tanks
- Glass Lined Reactors
- Stainless Steel Reactors
- PTFE or Other Special-Lined Tanks
- Jacketed (Double Layer) Tanks

### Applications in Various Reactor Types

- Batch and Semi-Batch Reactors
- CSTR (Continuous Stirred-Tank Reactors)
- Fixed Bed Reactors
- Fluidized Bed Reactors
- Pressure Bioreactors

### Hygienic Design

- High surface quality to eliminate dead spots and prevent bacterial growth
- Food-grade oil for gear lubrication
- Special TH flange to prevent external leakage into the tank
- Choice of baffle-less eccentric or hygienic baffled configuration



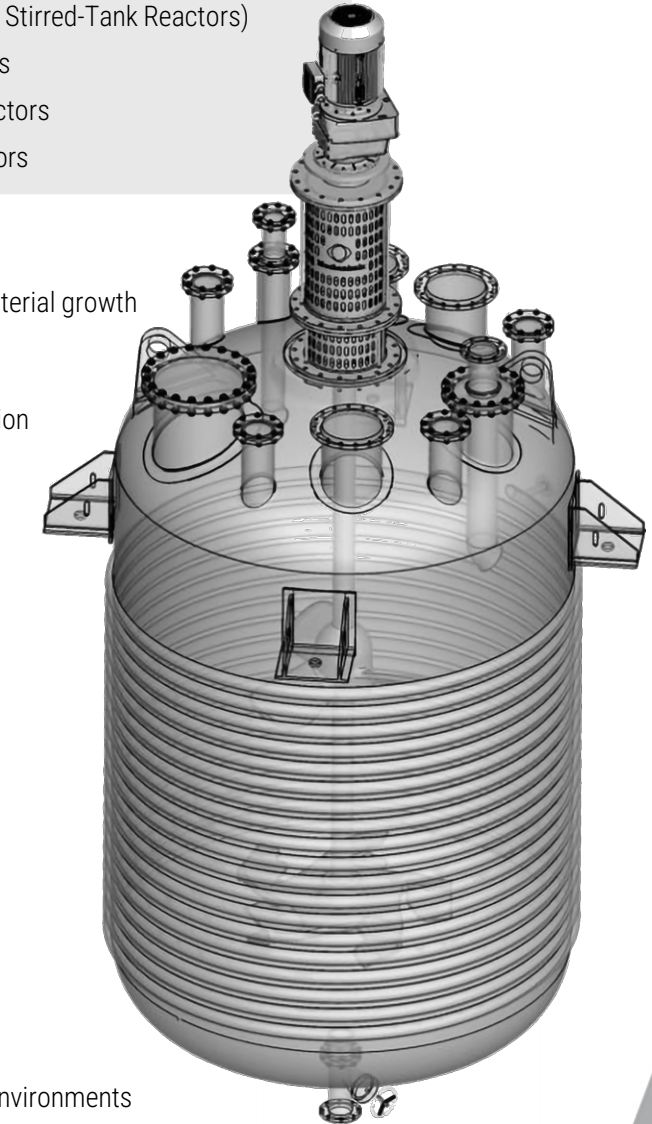
Homogeneous Stirring

### Agitator Coatings

- Tailored coatings for small-to-large agitators in aggressive environments
- Rubber, polyethylene, or ceramic coatings for mineral processing and similar industries
- Agitator coatings matched to tank surfaces to prevent wear or chemical reaction
- Seals and clearances designed to protect coating integrity under stress

### Fast Mixing

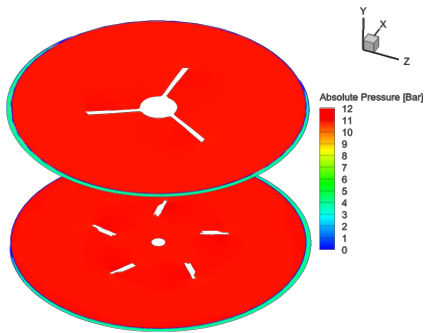
Flash agitators are designed for rapid chemical blending, often used before the flocculation stage. This uniform distribution often requires intense turbulence, but in non-viscous environments, compact and low-speed direct-drive agitators are sufficient.



Coated Impellers

# CFD Studies

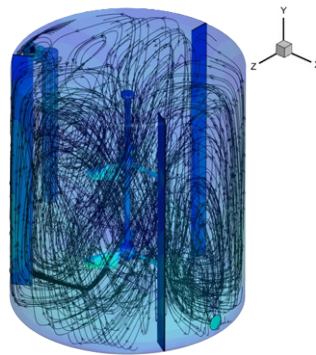
## Professional Mixing Technologies



CFD Post A

### Pressure Distribution

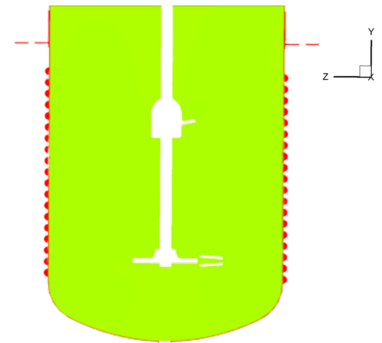
- Uniform pressure distribution ensures reactor integrity and safety
- Pressure analysis defines loads on impeller, shaft, seals, and vessel walls
- Identifying high- or low-pressure zones
- Supports optimized mechanical design, proper seal selection, and improved equipment longevity



CFD Post B

### Particle Tracking Visualization

- The paths followed by particles moving freely in the liquid are visualized
- The dispersion of particles throughout the volume by turbulence and rotational motion
- Ensures complete mixing of additives, pigments, flocculants, or dissolvable chemicals
- The visualization confirms both volumetric and dynamic continuity of the mixture



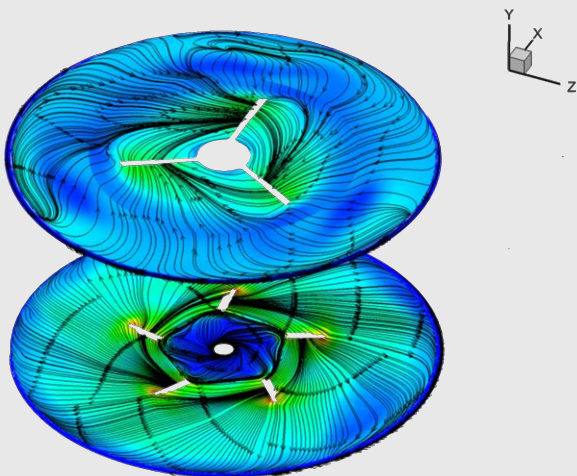
CFD Post C

### Temperature Distribution

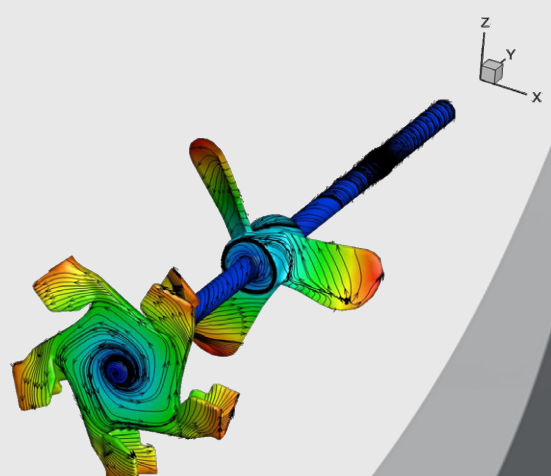
- Temperature homogeneity ensures reaction quality and safety
- Reveals temperature distribution to detect hot and cold spots
- Evaluates overall energy use in flow and heat transfer
- Evaluates uniformity and thermal performance

## Computational Fluid Dynamics (CFD)

CFD analysis can be performed on real tank and agitator combinations to verify the desired process outcome. Mechanimix has many years of experience using CFD simulations.



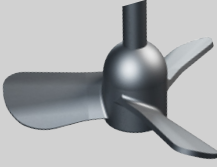
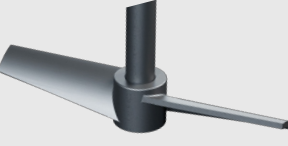
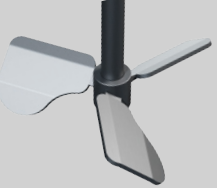



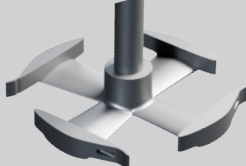
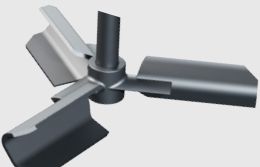
Streamlines at the mid-planes



Impeller streamlines

# HP Series Impeller Integration

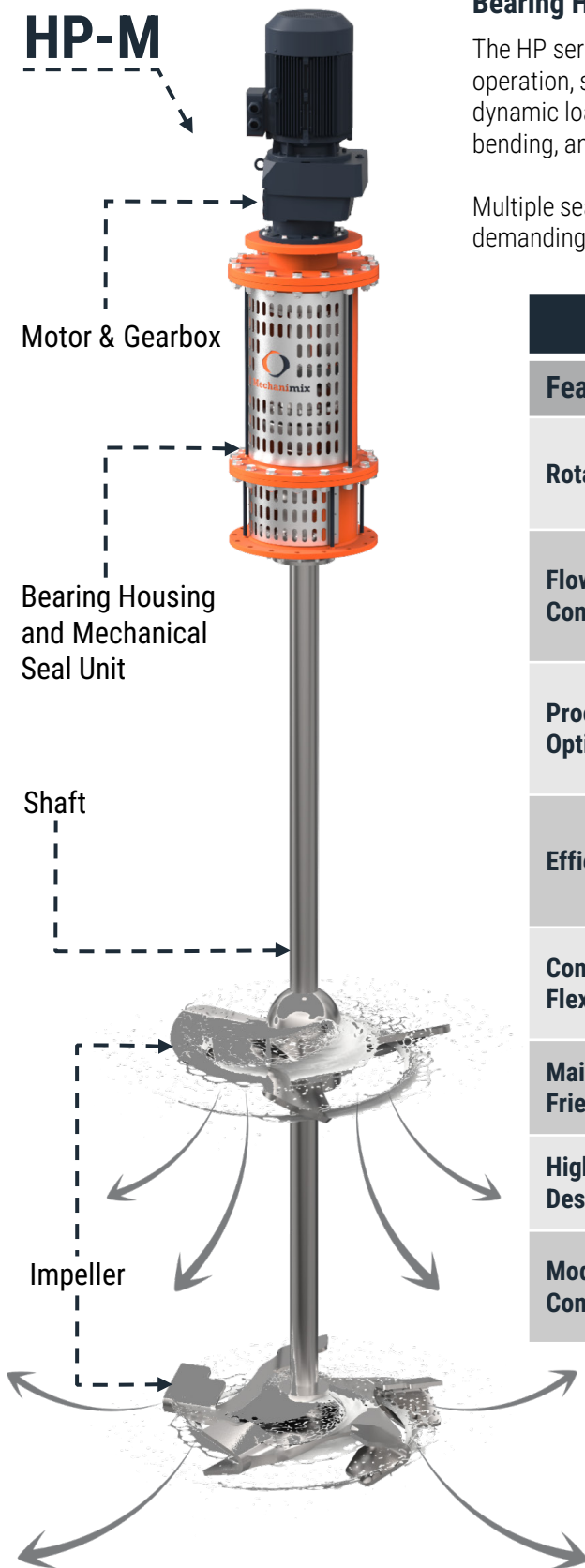
## Professional Mixing Technologies

Model	View	Features
HWM		<ul style="list-style-type: none"> <li>– Axial Thrust with Wide Blade Impeller</li> <li>– Application in Low and Medium Viscosity Systems</li> <li>– Homogeneous Energy Distribution</li> <li>– Minimum Local Turbulence</li> </ul>
HM		<ul style="list-style-type: none"> <li>– High Flow at Bottom for Solid Suspension</li> <li>– Efficient Mixing in Low/Medium Viscosity</li> <li>– Enhanced Wall Heat Transfer via Axial Flow</li> <li>– Single and Multiple Impeller Arrays</li> <li>– Double, Triple or Quadruple Blade Design</li> <li>– Adjustable Blade Angle</li> </ul>
HWM-B		<ul style="list-style-type: none"> <li>– Low, Internal Cutting Force</li> <li>– High Suspension</li> <li>– Homogenizing Function</li> <li>– Working in Gaseous Environments</li> <li>– Supporting Heat Transfer</li> </ul>
HVM		<ul style="list-style-type: none"> <li>– For High Viscosity or Critical Rheology Fluids</li> <li>– Upward or Downward Pumping as Needed</li> <li>– Ideal for Blending, Heat Transfer, or Solid Incorporation</li> <li>– Mixes to Ensure No Dead Zones Form</li> </ul>
TVM		<ul style="list-style-type: none"> <li>– Application in Low Viscosity Systems or Turbulent Flow Regime</li> <li>– Excellent Axial Thrust Velocities</li> <li>– It Does Not Leave Dead Spots Inside the Tank Inner Wall</li> <li>– Auxiliary impeller enhancing horizontal flow &amp; circulation in tall tanks</li> </ul>
GDM		<ul style="list-style-type: none"> <li>– High Suspension Performance Even at High Gas Flow Rates</li> <li>– Radial Thrust Impeller</li> <li>– Main Gas Distributor Role</li> <li>– Works Easily with Gas in Internal and External Power Supply</li> </ul>
GM		<ul style="list-style-type: none"> <li>– High Gas Supply Capacity</li> <li>– High Contact Surface Area</li> <li>– Specially Shaped Gas Channels</li> <li>– Homogeneous Energy Distribution</li> <li>– Optimum Suction Power</li> </ul>
GDS		<ul style="list-style-type: none"> <li>– Combines Strong Radial and Axial Flows</li> <li>– Excellent Gas Distribution Performance</li> <li>– Fast Mixing</li> <li>– Low Power Consumption</li> <li>– Fully Compatible with Mechanimix GDM</li> </ul>

# HP Series Modular Design

Professional Mixing Technologies

**HP-M**



## Bearing Housing Unit

The HP series features a high-rigidity bearing housing that stabilizes operation, supports precise mechanical seal positioning, and absorbs dynamic loads. Optimized shaft clearance minimizes misalignment, bending, and vibration in long shafts, extending seal life.

Multiple seal types and housing configurations are available to meet demanding pressure, temperature, and hygiene requirements.

## Adjustable Blade Angle

Features	Description
<b>Rotatable Blades</b>	Each blade can rotate around its axis via a bolted shaft connection.
<b>Flow &amp; Intensity Control</b>	Adjusting the angle regulates flow direction, flow rate, and mixing intensity.
<b>Process Optimization</b>	Enables fine-tuning of axial/radial flow ratios without impeller or drive changes.
<b>Efficiency Gains</b>	Shortens cycle time, improves process control, and optimizes energy use.
<b>Commissioning Flexibility</b>	Offers maximum adaptability during setup and operational adjustments.
<b>Maintenance-Friendly</b>	Allows easy adjustments without major disassembly.
<b>High-Performance Design</b>	Providing precise process control and robust operation.
<b>Modular Compatibility</b>	Integrates with various drives, impellers, shaft lengths, and seals.

# HP Series Agitator Applications

## Professional Mixing Technologies

Industry	Process	Key Requirements / Agitator Features
Oil & Gas / Petrochemical	Hydrodesulfurization (HDS)	<ul style="list-style-type: none"> <li>Efficient gas-liquid-solid mixing</li> <li>High-integrity sealing systems</li> <li>Corrosion resistance</li> <li>Durable design for continuous high-pressure operation</li> </ul>
	Anaerobic Digestion (Closed Reactors)	<ul style="list-style-type: none"> <li>Biomass suspension</li> <li>Stable bacterial activity</li> <li>Low-pressure sealed operation (~1–2 bar)</li> <li>Energy-efficient design</li> </ul>
Mining & Hydrometallurgy	High Pressure Acid Leaching (HPAL)	<ul style="list-style-type: none"> <li>Corrosion-resistant alloys</li> <li>Advanced sealing systems</li> <li>Handles high-temperature, acidic slurry conditions</li> </ul>
	Pressure Oxidation (POX)	<ul style="list-style-type: none"> <li>Reliable slurry agitation</li> <li>Efficient gas distribution</li> <li>Resistance to high temperature and pressure</li> </ul>
Fertilizer & Chemical	Slurry Mixing & Reaction	<ul style="list-style-type: none"> <li>Capable of handling viscous slurries</li> <li>Prevents sedimentation</li> <li>Ensures homogeneity in urea/ammonium phosphate/nitrate processes</li> </ul>
	Phosphoric Acid Production	<ul style="list-style-type: none"> <li>Suspends solid particles</li> <li>Promotes complete reaction</li> <li>Abrasion-resistant in harsh, pressurized environments</li> </ul>
Pharmaceutical	Crystallization Under Pressure	<ul style="list-style-type: none"> <li>Controls solubility &amp; particle formation</li> <li>Ensures controlled nucleation &amp; uniform crystal growth</li> </ul>
Polymer & Resin	LDPE & High-Pressure Polymers	<ul style="list-style-type: none"> <li>Homogeneous mixing</li> <li>Precise temperature and viscosity control</li> <li>Resistant to heat and chemicals to prevent degradation</li> </ul>
Food & Beverage	Fermentation	<ul style="list-style-type: none"> <li>Hygienic, mechanically sealed design</li> <li>Prevents contamination and gas leaks under pressure</li> </ul>
	Carbonation Mixing	<ul style="list-style-type: none"> <li>Even CO<sub>2</sub> dissolution</li> <li>Pressure-resistant and mechanically sealed</li> </ul>
	UHT / Sterile Processing	<ul style="list-style-type: none"> <li>High-temperature and pressure-resistant</li> <li>Hygienic design</li> <li>Ensures consistent heat distribution</li> </ul>
Biofuels & Biochemical	Hydrothermal Pretreatment	<ul style="list-style-type: none"> <li>Handles high-viscosity biomass</li> <li>Heavy-duty construction</li> <li>Ensures even heat distribution in pressurized reactors</li> </ul>



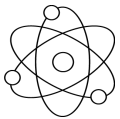
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# HP Series Agitators Dimensions

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Suitable for use in tanks with capacities ranging from 1 m<sup>3</sup> to 2000 m<sup>3</sup>.  
Designed to accommodate various flow characteristics and a wide range of viscosities.



Mechanimix offers a comprehensive range of pressurized industrial agitators engineered to meet the demanding requirements of high-pressure applications across various industries. With multiple configuration options, it delivers optimal mixing performance under elevated pressure and temperature conditions.

