# Process Slow Rotating Mixers (PSRM)



PTS
Power Transmission Solutions

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# PSRM Series Process Mixers

## Process Overview

Process mixers refer to a specific type of agitators that are an integral part of one or more production processes. These mixers are typically installed on reactors and provide a homogeneous mixing environment, thereby improving the efficiency and quality of chemical reactions.

## Industrial Applications

These units are widely used in oil & gas, petrochemical, food processing, and mining industries as key equipment in mixing and reaction processes

| Examples of Products Produced Using Process Mixers | |
|---|---|
| **Product Name** | **Purpose of Mixer Installation** |
| **HDPE Polyethylene** | Suspension formation to improve polymerization process |
| **PVC** | Suspension formation to improve polymerization process |
| **Terephthalic Acid** | Oxidation process (gas–liquid mixing) |
| **Aluminum Hydroxide** | Crystallization process |
| **Gold and Precious Metals** | Suspension formation for leaching process |

## Process Mixers vs. Conventional Agitators



Process mixers differ from conventional agitators in several fundamental design and operational aspects, including

1- Robust mechanical design and high manufacturing quality to ensure maximum reliability and extended maintenance intervals

2- Equipped with mechanical seals to enable safe installation on pressure and vacuum-rated tanks and reactors

3-Special maintenance-friendly design allowing service operations without full disassembly of the mixer, thereby minimizing equipment downtime

4-Use of special alloys and materials to enhance resistance against corrosion and wear

5-Capability to design and manufacture large-scale, high-power heavy-duty mixers according to process requirements

# Components of Process Mixers

- Electric Motor
- Speed Reducer Gearbox
- Bearing Housing
- Mechanical Seal Housing
- Coupling
- Mechanical Seal
- Power Transmission Shaft
- Impellers
- Bottom Steady Bearing






# Mechanical Seals

A significant portion of process mixers is installed on vacuum or pressure reactors, where the sealing system plays a critical role in ensuring operational safety, stability, and long-term reliability.

## Single Dry Running Mechanical Seal



This seal type, developed by leading manufacturers such as Burgmann, John Crane, and Fluiten, is designed for low-speed applications and specific operating conditions without external cooling systems

### Specifications:

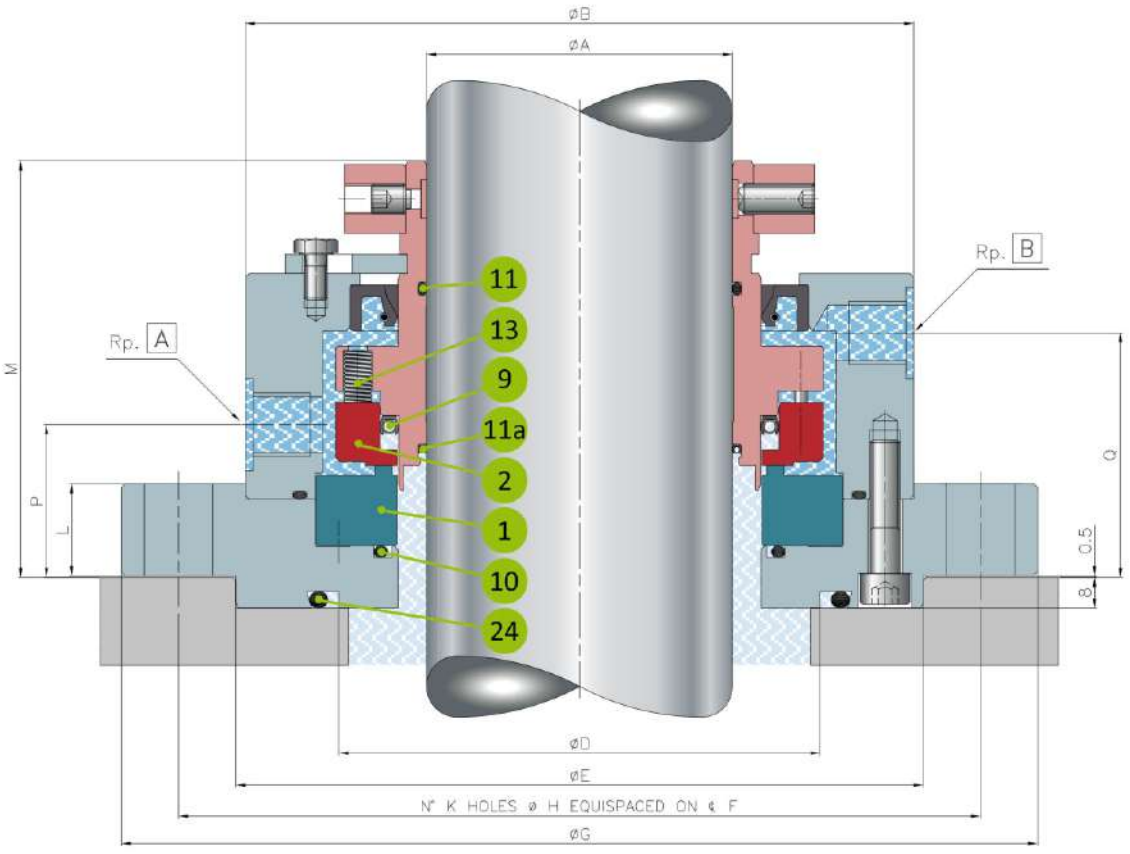
- Operating pressure range: Full Vacuum to 4 bar
- Maximum sliding speed: 3.5 m/s
- Suitable for low-speed and special operating conditions
- Serviceability: Simple design enabling fast replacement and reduced maintenance intervals
- Economic Factor: Optimized solution with minimized life cycle cost compared to liquid-lubricated seals

# Single Mechanical Seal with Cooling System (Plan 23)

This mechanical seal is designed for applications requiring controlled heat removal and improved operating stability. In this configuration, the cooling fluid circulates through an internal loop at atmospheric pressure, enhancing seal performance and operational reliability

## Performance specifications:

- Operating pressure range: Full Vacuum to 6 bar
- Maximum sliding speed: 5 m/s
- Extended maintenance intervals required
- Moderate cost solution compared to alternative sealing systems



# Double Mechanical Seal with Cooling System (Plan 23 / Plan 53A)

Double mechanical seals are among the most reliable and widely used sealing systems in process mixers, particularly in critical, high-pressure, and safety-sensitive applications.

In this configuration, the barrier/buffer chamber between the two seals is filled with a pressurized liquid or gas, providing both thermal control and effective prevention of process fluid leakage to the environment. This significantly enhances operational safety and equipment reliability.

## Performance specifications:

- Operating pressure range: Full Vacuum to 20 bar
- Maximum sliding speed: 20 m/s
- Suitable for high-pressure and critical services
- Long-term maintenance intervals required
- High total cost compared to single seal systems



# PSRM Mixer Selection

PSRM series agitators are designed and manufactured in various configurations to satisfy a wide range of process requirements and polymerization applications. General specifications of this series are presented below:

| Mixer Model | Max Power Rate (Kw) | Impeller Diameter (m) | Max Shaft Length (m) | Max Number of Impellers |
|---|---|---|---|---|
| **PSRMS** | 5.5 | 0.2 ~ 4 | 20 | 12 |
| **PSRMM** | 11 | | | |
| **PSRML** | 45 | | | |
| **PSRMVL** | 160 | | | |



These mixers are considered an integral part of polymerization processes and are widely utilized in the production of various polymer products.

To improve mixing efficiency and optimize reactor performance, Computational Fluid Dynamics (CFD) analysis is employed during the mixer design phase. These simulations enable optimized determination of impeller diameter, number of impellers, impeller spacing, flow patterns, and other hydrodynamic parameters.

