Mechanical seal
机械密封

机械密封用来密封水器的转动部分（轴）与固定部分（泵体）
Mechanical seals are devices to seal machines between rotating parts (shafts), and stationary parts (pump housing).

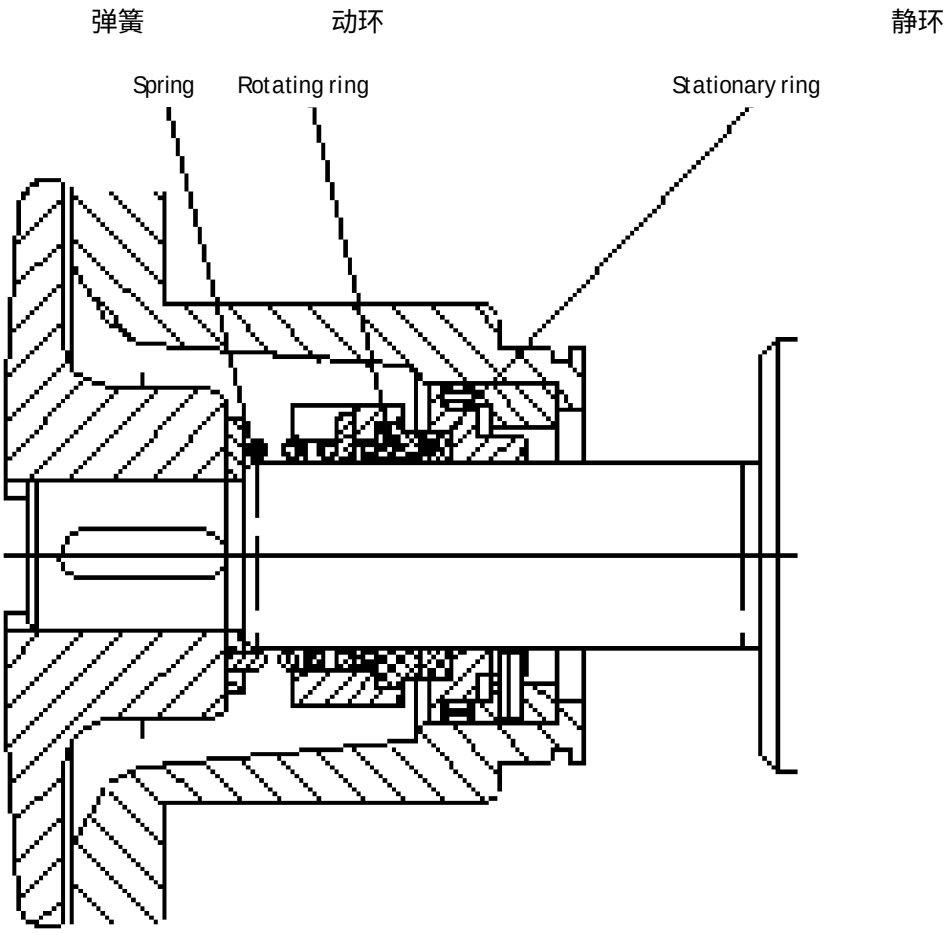
There are two types of mechanical seals: 机械密封有两种形式

- single mechanical seals 单面机械密封
- double mechanical seals 双面机械密封

Single mechanical seals 单面机械密封

机械密封由两个相对滑行的表面组成，通过弹簧把两表面压在一起
Mechanical seals consist of two surfaces which slide against each other The surfaces are pressed together by a spring. Between these two surfaces a fluid film is generated by the pumped product. 在两个表面通常是由泵送的产品产生一层润滑膜

这层液膜将防止机械密封接触固定环，没有这层液膜将导致摩檫过热
This fluid film prevents that the mechanical seal touches the stationary ring. The absence of this fluid film will result in frictional heat and the destruction of the mechanical seal (dry run of the pump). 以至损失坏机械密封（泵将无润滑运行）



弹簧是暴露在产品中的，产品压力将使弹簧对旋转密封部分产生额外压力
The spring is in the product. The product pressure acts additional to the spring on the rotating seal part.

因此此密封通常在１０ＢＡＲ压力下使用，对于更高的压力，将使用平衡式机械密封
Therefore standard mechanical seals are used only for a pressure up to 10 bar. For higher pressures, balanced mechanical seals are used.

Double mechanical 双面机械密封 seals

这样我们把两个机械密封串联，在内侧主密封将使产品停留在泵身内
In this case two mechanical seals are arranged in series. The inboard or, “primary seal” keeps the product in the pump housing. The outboard or, “secondary seal” prevents leakage of the flush liquid into the atmoshere. 在外侧次密封将防止流体泄露进大气

Ｆｒｉｓｔａｍ的双面机械密封提供两个系列
The double mechanical seals can be provided by ***Fristam*** in two different arrangements:

- Back to Back　背对背
- Face to Face　面对面

These mechanical seal arrangements are used,

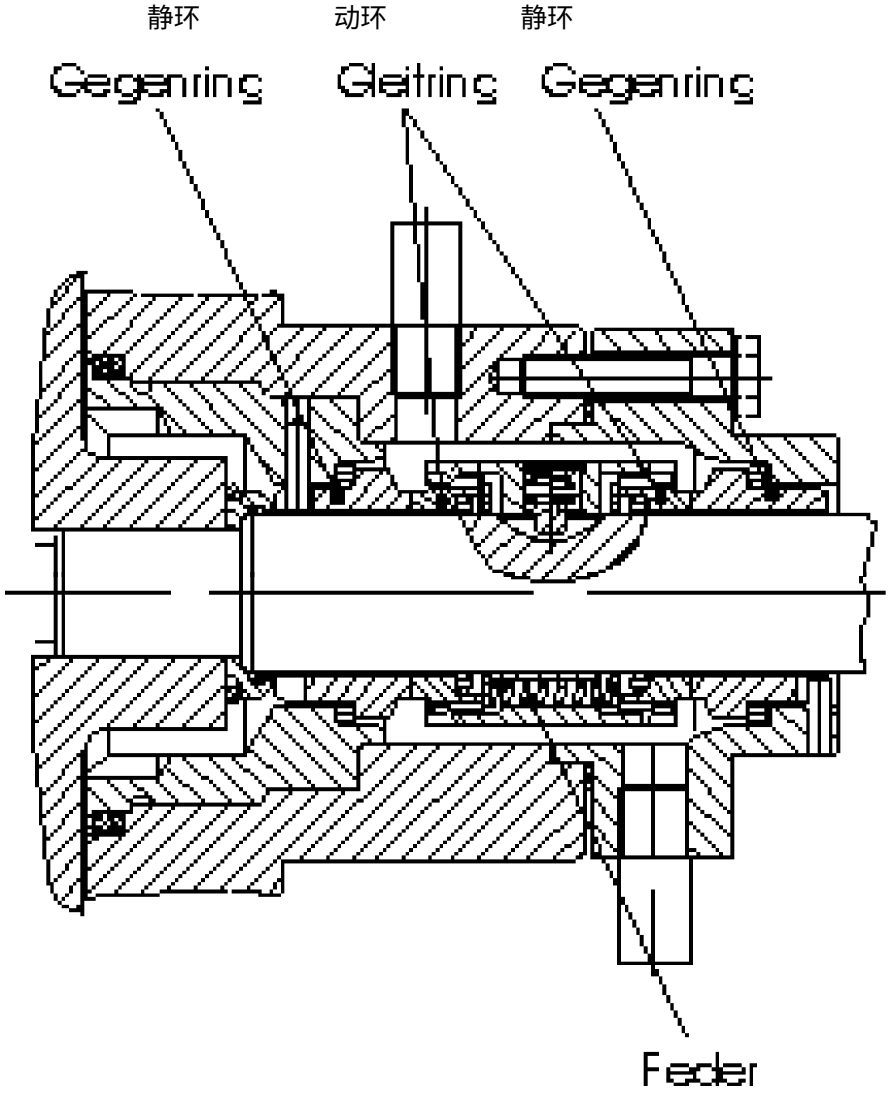
- if a fluid product leakage needs to be avoided,
- when aggressive media are used or at high pressures and temperatures,
- for many polymerising, sticky media and media which tend to sedimentation,
- for vacuum applications.

在下列情况中运用此密封
必须消除流体泄露
使用不安全的介质，以及高压，高温的情况
使用聚合介质，粘性介质。超于沉降介质时
真空条件下

“Back to Back” arrangement
背对背排列

两个动密封环背对背安装，润滑膜通常由屏障流体产生
Two rotating seal rings are arranged facing away from each other “Back to Back”. The lubricating film is generated by the barrier fluid.

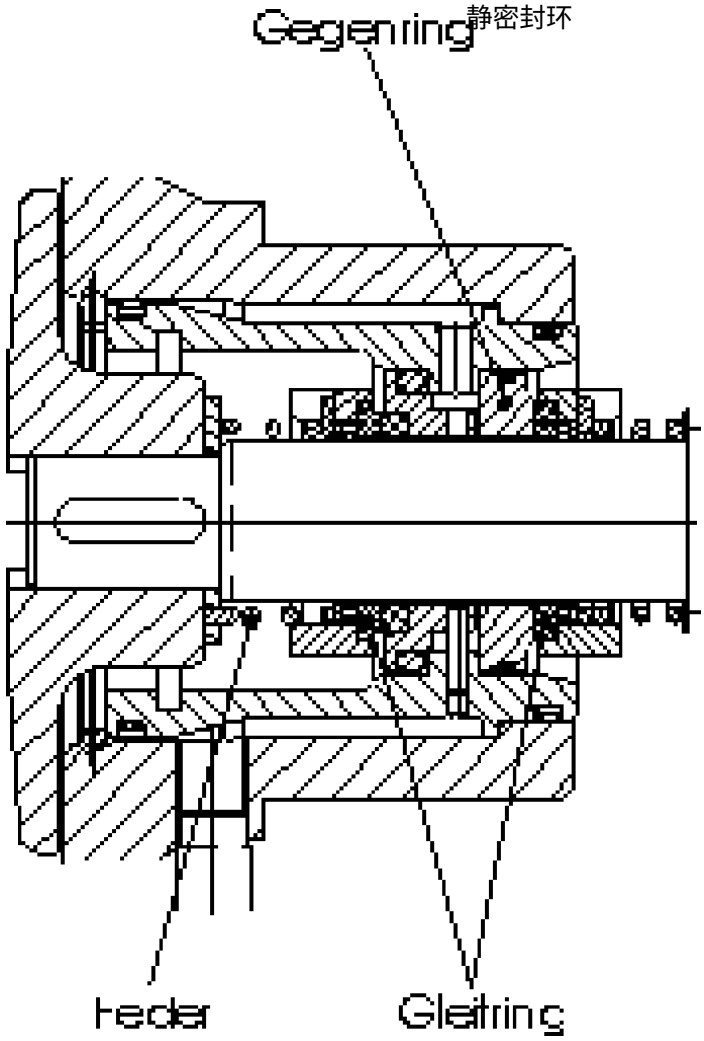
背对背排列中，屏障流体压力通常比产品压力大１．５－２．０
The barrier pressure in the case of a “Back to Back” arrangement should be 1.5 up to 2.0 bar above the product pressure in the seal area.



Mechanical seals with a “Back to Back” arrangement are mainly used in the chemical industry. In case of a leakage, the barrier liquid penetrates the product.
背对背排列的机械密封通常用于化学工业，假如渗透　，屏障流体要渗入到产品中

"Face to Face" arrangement
面对面排列

The spring loaded rotary seal faces are arranged face to face and slide from the opposite direction to one or two stationary seal part(s).
装在旋转密封面的弹簧是面对面安装的，相对一个或两个固定密封部分滑动



The mechanical seals with a "Face to Face" arrangement are often used in the food industry in particular for products which tend to stick and for vacuum applications. The barrier pressures are very low (0.2 bar). In the case of leakage the product penetrates the barrier liquid. 面对面排列的机械密封通常使用在食品工业，用于真空条件或超高粘性的产品中屏障压力非常低（0．2），在渗漏的情况下，产品将流如屏障流体中

In the case of hot products the barrier liquid also acts as a cooling agent for the mechanical seal.
在产品是热的情况下，屏障流体对机械密封有冷却的作用

Fristam在机械密封的制造有多年的经验，能为各件应用提供最适合的密封

Fristam has many years of experience in the manufacture of mechanical seals and is able to provide the best mechanical seal for any application.

Mechanical seal designs

机械密封设计

标准机械密封完全符合DIN 24 960

Standard mechanical seals in conformity with DIN 24 960 can be mounted without problems.

Seal face materials

密封面的材料

Material 材料	Properties 性能
1. Carbons 碳石墨	
synthetic resin, 合成树脂 impregnated 浸渍碳石墨	Good antifrictional properties, high temperature stability. Chemical stability is to be tested. 良好的润滑性能，高温下的稳定性，化学性能稳定
2. Metals 金属	
Chromium-Nickel-Molybdenum 铬-镍-钼	Good chemical stability. 优良的化学稳定性
3. Metal carbides 金属碳化物	
3.1 Tungsten carbide 碳化钨	Low thermal conductivity, but high hardness and wear resistance. 热传导率低，但是硬度高，耐磨性好
3.2 Silicon carbide 碳化硅	Hardness greater than with tungsten carbide, outstanding chemical stability, good antifrictional properties and thermal conductivity, but very brittle. 硬度要比碳化钨高，显著的化学稳定性，优良的润滑性能和热导性，但是易碎
4. Ceramics 陶瓷	High quality aluminium oxide, high wear resistance, good chemical stability, low thermal conductivity, sensitive to thermal shocks 高品质的氧化铝，高耐磨性，优良的化学稳定性，低的热导率，对热冲击很敏感

Mechanical seal selection

弹性体 Elastomers	材料 Material	适用温度 Range of tempesatures	特性 Properties
	腈性胶 1. Nitrile	-30 up to + 100°C	Resistant to water, vapour, mineral and vegetable shortening (fat) and oils, alcohol, salt solutions. Not resistant to aromatic and chlorine hydrocarbons, acids and alkaline solutions.
适用水蒸气，矿物，植物油脂（脂肪）油，酒精，盐溶液，不适用芳香化合物，含氯的碳氢化合物（氢烃）酸碱性溶液			
	2. EPDM 乙丙橡胶	- 50 up to + 150°C	Good thermal properties, can be used for alcoholic solutions, diluted acids and concentrated alkaline solutions. Not resistant to mineral and vegetable shortening (fat) and oils, and hydrocarbons.
优良的热性能，适用于酒精溶液，稀酸，溶碱液，不适用矿物，植物油脂（脂肪）油，碳氢化合物			
	3. Viton (FKM)	- 25 up to + 200°C	Good thermal resistivity, water resistant, vapour resistant, resistance to mineral and vegetable fat and oils, to alcohol, to acids and alkaline solutions, salt solutions. Not resistant to ketones such as acetone and ester.
优良的耐热性，耐水性，耐蒸气性，适用于矿物植物脂肪，油，酒精，酸碱溶液，盐溶液，不适用酮类，如丙酮，酯类			
	4. PTFE	- 20 up to + 200°C	Best chemical and thermal resistivity to all aggressive liquids, elasticity ensured through use of Viton-caoutchouc or EP- core material.
对于所有活跃流体来说都是最好的耐热性，化学稳定性为了确保弹性，可用氟橡胶，乙丙橡胶作为内核			