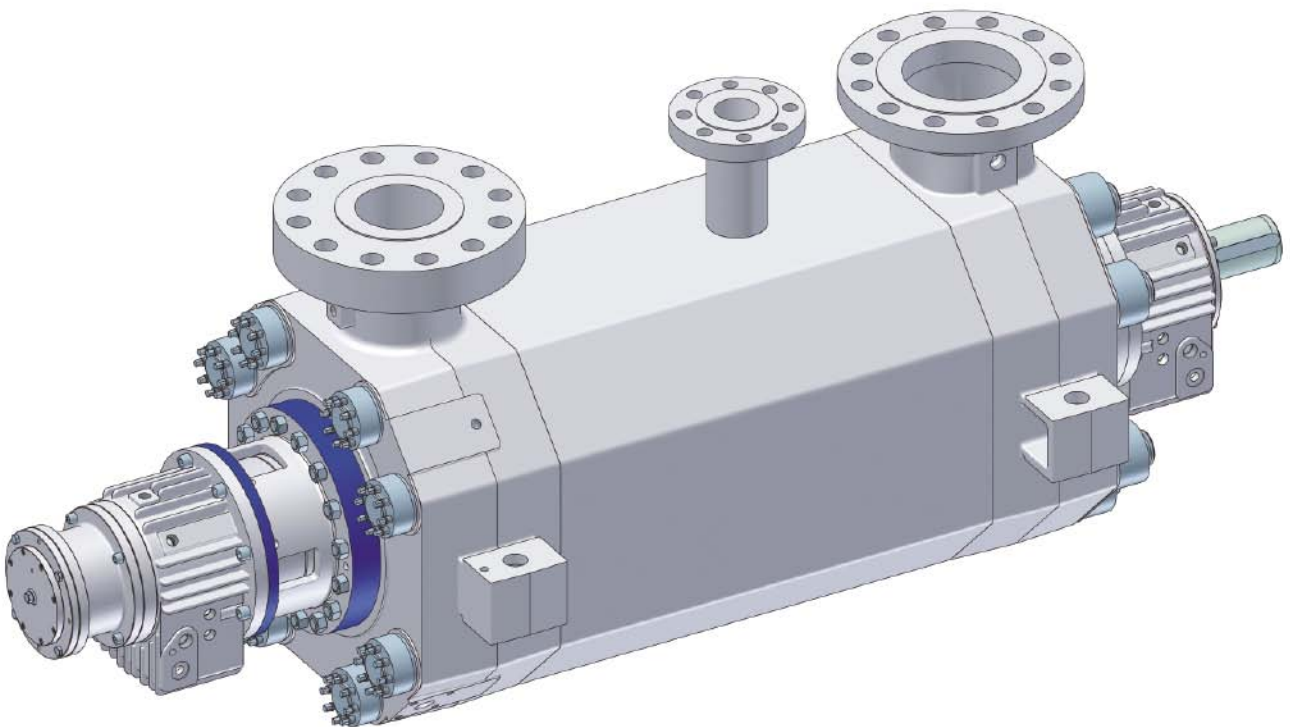


**MD 高压节段式多级泵**

**MD High Pressure Stage Casing Pump**



The Heart of Your Process

# 苏尔寿泵业

苏尔寿泵业在产品可靠性和提供创新的泵的方案方面是全球的领导者。我们领先的研发、详尽的制造工艺和丰富的应用经验与对市场需求的全面了解相结合，使之始终保持技术发展的领先优势。苏尔寿遍布全球的制造及组装工厂、销售办事处、服务中心和设在主要市场区域的销售代表所组成的网络，可对客户需求提供快速反应。

## Sulzer Pumps

Sulzer Pumps is a world leader in reliable products and innovative pumping solutions. Our advanced research and development, detailed process and application knowledge together with a comprehensive understanding of market demands keeps us consistently at the leading edge of technical development. Our global network of modern manufacturing and packaging facilities together with sales offices, service centers and representatives located close to major markets provide fast responses to customer needs.

## 为电力行业提供广泛的技术服务

苏尔寿泵业能为各种类型电厂提供产品，包括核电厂、蒸汽发电厂、联合循环电厂、地热和太阳能发电厂等。我们能够提供所有类型的锅炉给水泵、循环水泵、凝结水泵及其他辅助系统用泵。我们的客户将从量身定制的解决方案中获益，解决方案覆盖了泵应用的大部分范围。我们一直致力于通过在效率和可靠性方面设置新标准来提高客户的收益。

在以下工业领域，苏尔寿长期为其商业伙伴提供创新的泵解决方案：

- 石油及天然气
- 石油化工
- 纸浆造纸
- 电力
- 通用工业
- 化工流程工业
- 水及污水处理

Sulzer Pumps has a long history of providing innovative pumping solutions to business partners in the following industries:

- Oil and Gas
- Hydrocarbon Processing
- Pulp and Paper
- Power Generation
- General Industry
- Chemical Process Industry
- Water and Wastewater

## Extensive Knowledge for the Power Industry

Sulzer Pumps offers products for all types of power plants: nuclear, steam, combined cycle, geothermal and solar power. We offer all types of boiler feed, cooling water, condensate extraction pumps and pumps for auxiliary services. Our customers benefit from customized solutions covering a broad spectrum of pumping applications. Our focus is on improving our customers' profitability by setting new standards in efficiency and reliability.

## MD 全球制造厂 MD Global Manufacturing Facilities



布鲁克萨，德国 / Bruchsal, Germany



容迪亚伊，巴西 / Jundiai, Brazil



孟买，印度 / Navi Mumbai, India



大连，中国 / Dalian, China



# MD 设计

## MD Design

MD 泵主要为电力行业而设计，特别是锅炉给水泵。苏尔寿的 MD 泵属于径向剖分、中心支撑、节段式、卧式多级泵。适合输送清洁或轻微污染的、热水或冷水。MD 泵设计的最大允许工作温度为 210 °C (410 ° F)。

The MD pump is primarily designed for power applications, especially boiler feed. Sulzer MD pumps are horizontal, radially split, centerline mounted, multistage ring section pumps. MD pumps are suitable for pumping clean or slightly polluted, hot or cold water. MD pumps are designed to operate up to 210 °C (410 °F).



MD 高压锅炉给水泵配电机  
MD high pressure boiler feed pump with moto

两种主要设计结构：

- 带自足轴承的平衡盘结构
- 带轴向推力轴承的平衡鼓结构

中心支撑形式适用于高温工况。中段靠外部的穿杠螺栓紧固，并且用特定的 O 型圈密封。

泵在减少轴承跨度和确保稳定的动力学性能方面进行了最优化的设计。对于锅炉给水泵的使用，12% 铬钢材料具有较高的耐腐蚀性。泵适用于冷启动，不需要暖泵。



带平衡盘和Permavor® 磁力保护装置 的MD泵  
MD pump with balance disk and Permavor®  
lift-off device

Two main designs are available:

- balance disk with self contained bearing
- balance drum with axial thrust bearing

Centerline mounting is used to allow operation at high temperatures. Stage casings are held together by external tie bolts and sealed by confined o-rings.

The pump is optimized to reduce the bearing span and to assure stable dynamic performance. The 12% chrome steel material allows high corrosion resistance for boiler feed pump services. The pump is suitable for cold start without pre-warming.

# MD 设计特点及优点 配置平衡盘/平衡板和自足轴承结构

## MD Design Features and Benefits Arrangement with Disk/Counter Disk and Self-Contained Bearing

### 耐磨环

- 进口段与中段耐磨环及级间衬套为标准配置
- 叶轮配可更换的耐磨环结构为可选择配置

### Wear Rings

- Stationary wear rings for casings and interstage bushings are standard
- Replaceable impeller wear rings are optional

### 平衡盘

- 平衡盘能够平衡掉所有的轴向力并且无需配置推力轴承
- 对于频繁启动 / 停车的运转工况，推荐使用 Permavor® 磁力保护装置，它能有效防止平衡盘与平衡板间的接触摩擦

### Balance Disk

- The balance disk balances all generated thrust and does not require a thrust bearing
- For frequent start/stop operations a Permavor® lift-off device is recommended preventing contact wear between the disk and counter disk

### Permavor® 磁力保护装置

- 在低速运转工况条件下，苏尔寿的 Permavor® 磁力保护装置能有效阻止平衡盘和平衡板的接触摩擦
- 在低速运转工况条件下，苏尔寿 Permavor® 磁力保护装置能起到一个额外的推力轴承的作用，而且无需润滑及冷却

### Permavor® Lift-Off Device

- Sulzer's Permavor® lift-off device prevents contact and wear of the disk and counter disk during operation at low speed
- It provides an extra thrust bearing for operation at low speed without any requirements for extra lubrication or cooling

### 中间抽头

- 泵可以配置最多两个中间抽头
- 对于特定的泵型，优化设计的中间抽头可以降低扬程损失 / 增大中间抽头流量

### Intermediate Take Off

- Up to two interstage bleed-off connections are possible
- An optimized design for reduced head losses/large take-off flows is available on certain sizes

### 轴承

- 径向轴承既可以是飞溅润滑的单列圆柱滚子轴承，也可以是甩油环润滑或强制润滑的滑动轴承
- 优化设计的轴承箱体具有一个较大的油池和相匹配的冷却方式（外部带散热片）
- 如果需要，可以选择轴承箱体水冷结构

### Bearings

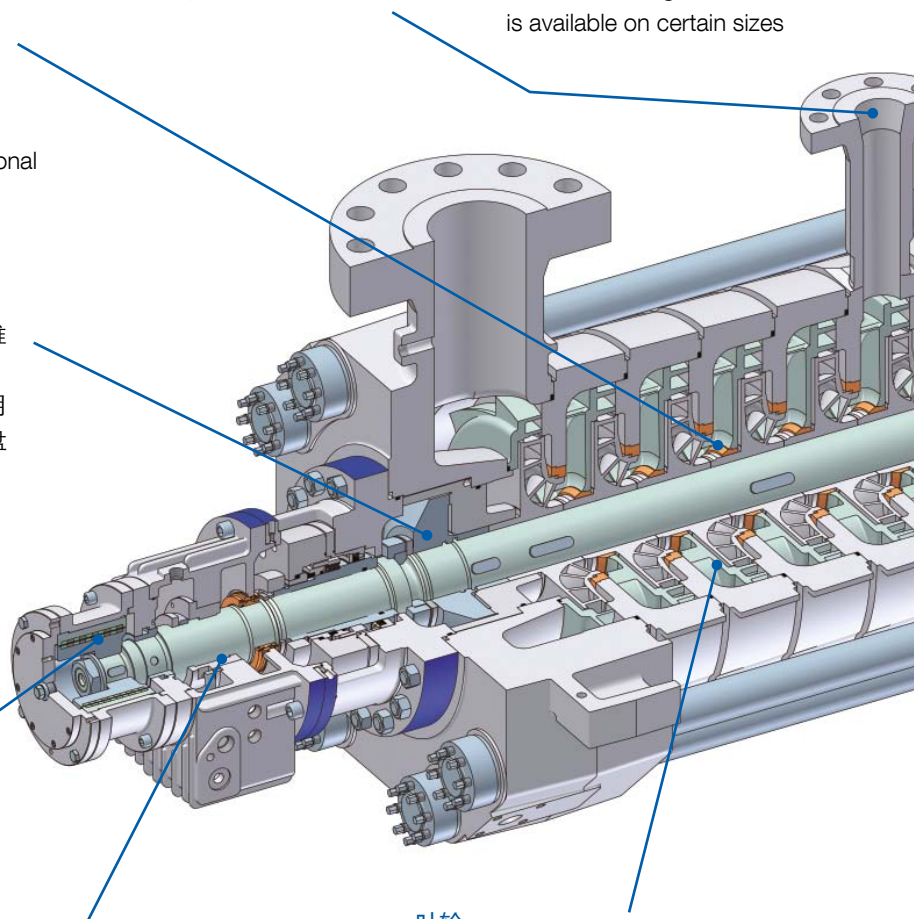
- Radial bearings are either single row roller anti-friction with splash oil lubrication or sleeve type with ring oil or forced feed lubrication
- The design of the bearing housing is optimized to allow a large oil sump with optimum cooling (external ribs)
- Water cooling is available, if required

### 叶轮

- 叶轮设计为单吸闭式叶轮，靠键连接传动
- 对于大规格的泵，首级叶轮可以设计为满足低汽蚀余量要求的双吸叶轮
- 每个规格的泵都设计了几组不同的水力模型，用以保证泵在较宽的运行范围内获得较高的效率和较低运营成本

### Impeller

- Impellers are enclosed, single suction design, keyed to the shaft
- Double suction first stage for low NPSHr is available for larger sizes
- Several hydraulic sets per pump size guarantee high efficiencies and low operating costs over a wide operating range

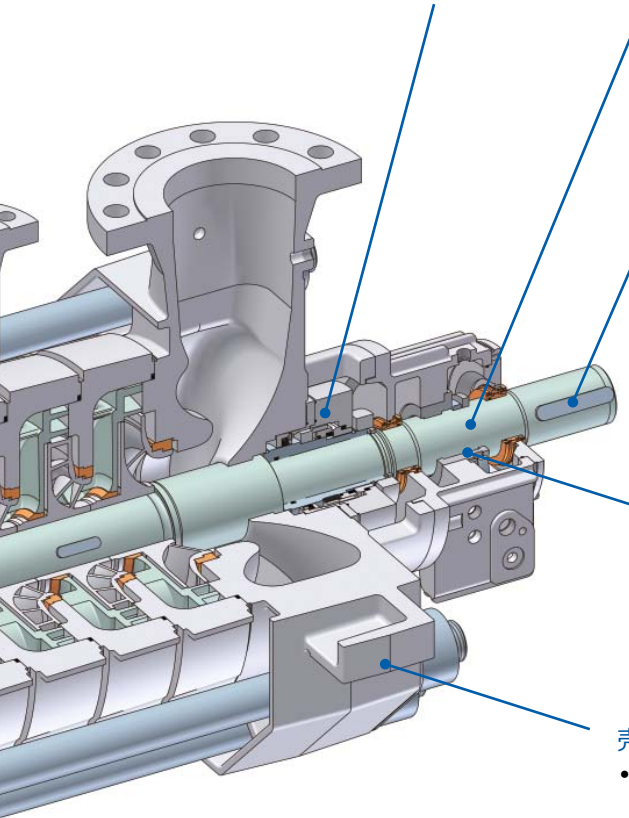


## 密封腔体

- 密封腔体的设计适应主要密封厂商生产的单端面机械密封

## Seal Chamber

- Seal chamber is designed for single mechanical seals from major manufacturers



## 轴

- 足够的轴径用于传递扭矩和降低轴挠度
- 所有轴表面都进行了适合的加工，并且采用较大的圆角来降低轴肩处的应力

## Shaft

- Ample diameter to transmit the required torque and minimize deflection
- It is fully machined over its length with large radii for lower stress

## 轴伸端

- 直孔轴伸配膜片联轴器
- 对于轴径 > 60 mm ( 2.5 英寸 )，可采用锥孔轴伸

## Shaft Extension

- Straight bore shaft extension for spacer couplings
- Taper bore shaft ends are available for shaft diameters > 60 mm (2.5 inches)

## 润滑

- 采用甩油环润滑和大油池设计（用于自足轴承）
- 不需要提供额外的润滑油

## Lubrication

- Lubrication with oil ring and large oil sump (self-contained bearing)
- No external lube oil supply required

## 壳体支撑

- 壳体采用中心支撑形式，能够承受较大的力及力矩

## Casing Support

- Centerline mounting absorbs high forces and moments

## Permavor® 永久磁力保护装置

在低速条件下运行，享有专利技术的 Permavor® 磁力保护装置可以有效防止平衡盘与平衡板之间的接触摩擦，例如在泵的启动和停车阶段。

## Permanent Magnetic Lift-Off Device Permavor®

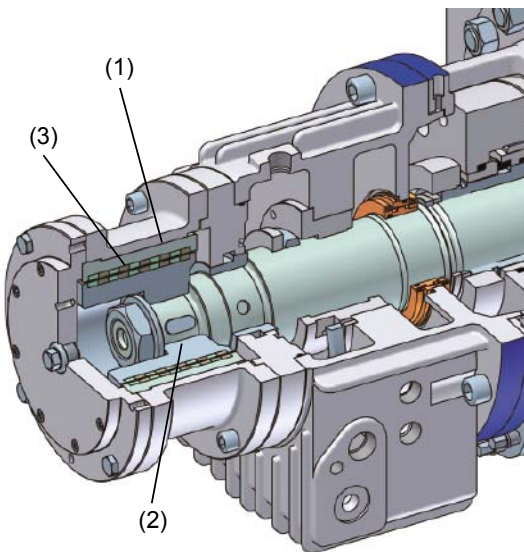
The exclusive Permavor® lift-off device prevents touching and wear of the disk/counter disk during operation at low speed, such as start up and shut down.

该装置在运转期间，不产生涡流、热量和机械摩擦。Permavor® 磁力保护装置在低速运转条件下起到了一个额外的推力轴承的作用，而且无需润滑和冷却。由于运行期间没有接触摩擦，该设备使用寿命实际上是无限的。

No eddy currents, no heat generation and mechanical contact during operation will occur. Permavor® provides an extra thrust bearing for operation at low speed without the requirement for extra lubrication or cooling normally associated with mechanical lift-off designs. Due to the contact-free operation, the service life is virtually unlimited.

Permavor® 磁力保护装置安装于轴和轴承箱体的非驱动端。内环磁套 (2) 和外环磁套 (1) 安装有永久磁性环 (3)。磁力环产生了轴向力。

The Permavor® device is located at the non-driven end of the bearing housing and shaft. The inner magnet carrier (2) and outer magnet carrier (1) are equipped with permanent magnet rings (3). The magnetic rings generate the axial lift-off force.



# MD 设计特点及优点 配置平衡鼓结构

## MD Design Features and Benefits Arrangement with Balance Drum

### 轴承

- 泵配置平衡鼓结构时，径向轴承可采用飞溅润滑的单列圆柱滚子轴承，或采用强制润滑的径向滑动轴承
- 推力轴承可采用飞溅润滑的圆锥滚子轴承，或采用强制润滑的、可承受前后两个方向推力的可倾瓦滑动轴承

### Bearings

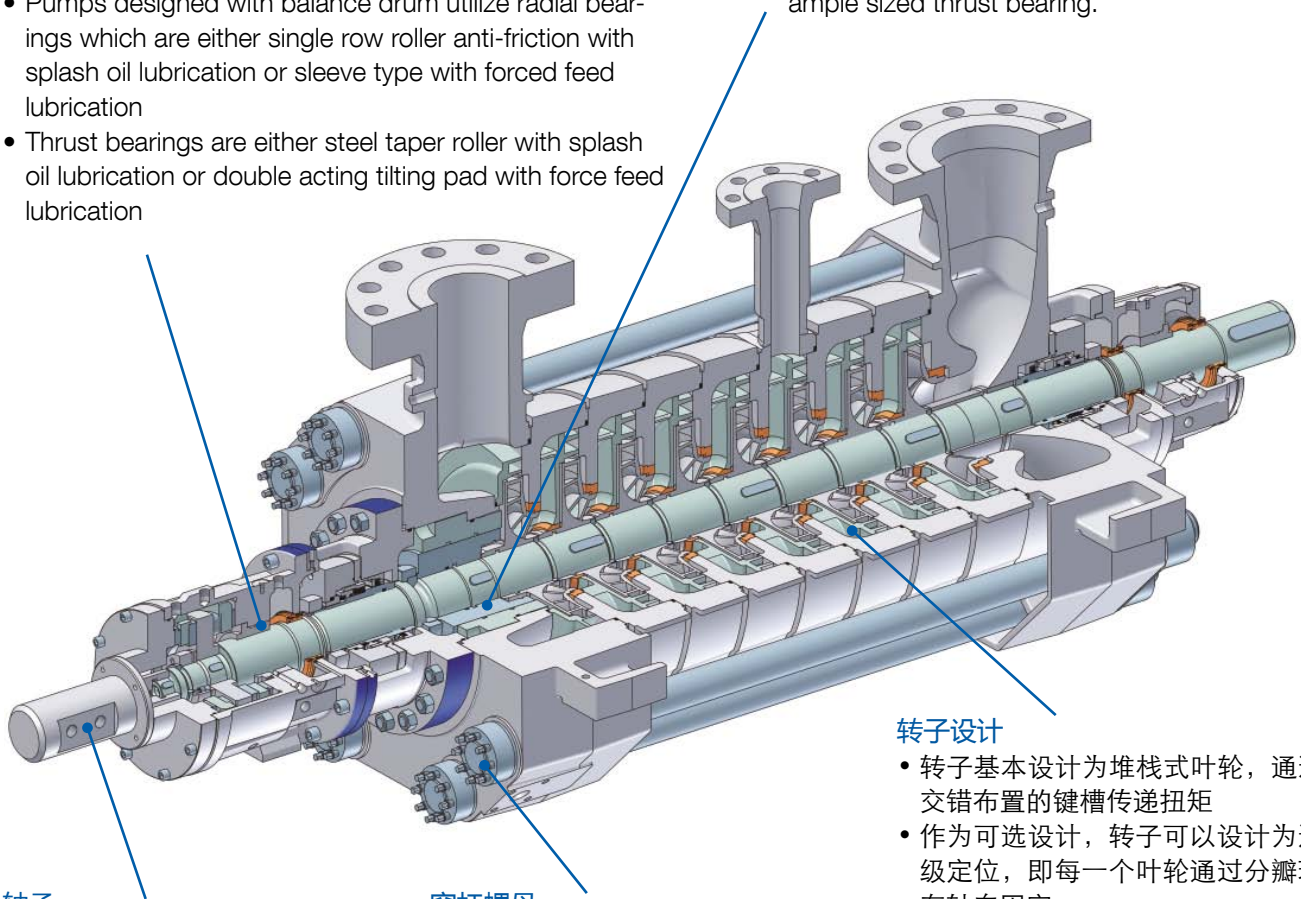
- Pumps designed with balance drum utilize radial bearings which are either single row roller anti-friction with splash oil lubrication or sleeve type with forced feed lubrication
- Thrust bearings are either steel taper roller with splash oil lubrication or double acting tilting pad with force feed lubrication

### 平衡鼓

- 通过平衡鼓用于平衡轴向力，而残余轴向力靠适合型号的推力轴承抵消

### Balance Drum

- Axial thrust compensated by balance drum, residual axial thrust taken by ample sized thrust bearing.



### 轴承

- 对于可倾瓦滑动轴承，需配置轴头油泵
- 根据具体工况的需求，可以配置不同形式的润滑油系统

### Bearings

- For sleeve/tilting pad (pivot shoe) bearings a shaft driven oil pump can be supplied
- Lube systems with various options are available where needed

### 穿杠螺母

- 对于大规格的泵可采用多螺钉的超级螺母
- 该结构通过多个螺钉的简单的拧紧与松脱来实现紧固穿杠螺母，是具有高安全性的防松措施（不需要专用工具）

### Nuts

- Multiple screw mechanical tensioners are used on larger pumps
- Mechanical tensioners allow simple tightening and loosening and provide high security against loosening (no specific tooling is required)

### 转子设计

- 转子基本设计为堆栈式叶轮，通过交错布置的键槽传递扭矩
- 作为可选设计，转子可以设计为逐级定位，即每一个叶轮通过分瓣环在轴向固定
- 叶轮和轴为过盈配合，为了便于转子的安装与拆卸，轴在叶轮安装处采用阶梯形状设计

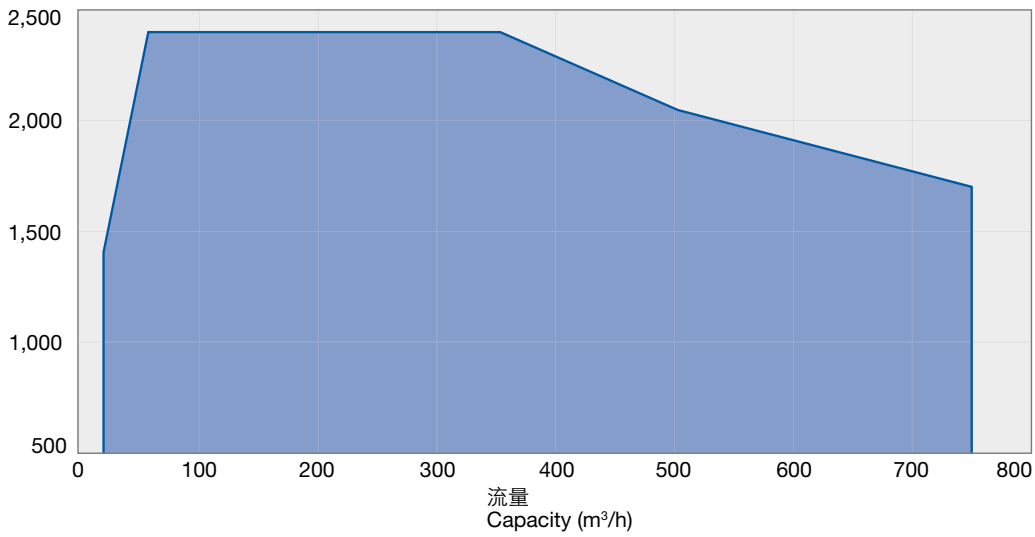
### Rotor Design

- Basic rotor design is a stacked rotor with staggered keyways to transmit torque
- Alternatively, the rotor design can be single stage fixation where each impeller is axially secured by split rings
- Impellers have a light interference fit and the shaft is stepped at each stage for ease of assembly/disassembly

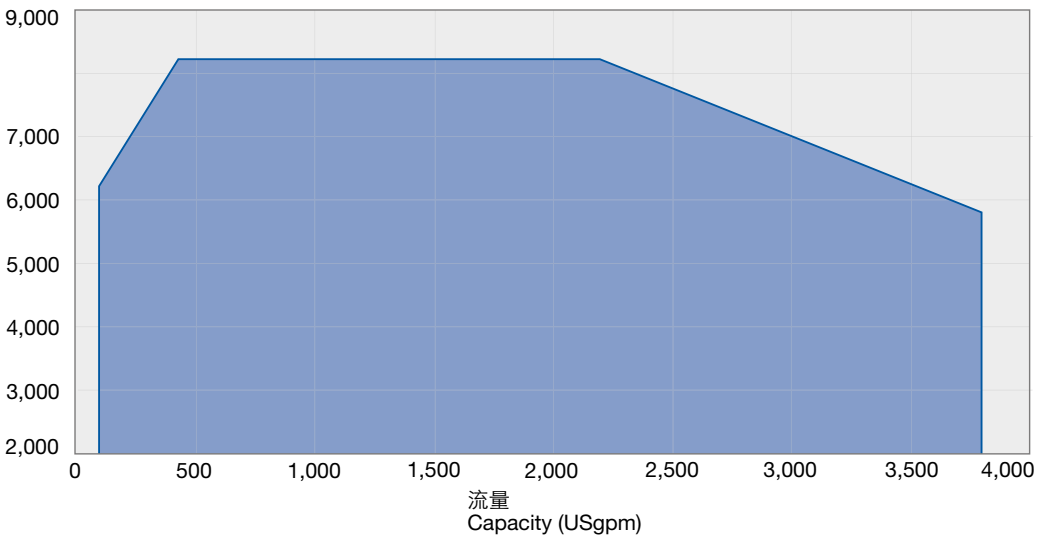
# MD 性能范围

## MD Performance Ranges

扬程  
Head (m)



扬程  
Head (ft)



# 性能参数

## Operating Data

	50 Hz	60 Hz
口径 Pump sizes	50 to 200 mm	2 to 8 inches
流量 Capacities	30 to 750 m³/h	160 to 3,800 USgpm
扬程 Heads	up to 2,400 m	up to 8,200 ft
压力 Pressures	up to 270 bar	up to 3,900 psi
温度 Temperatures	up to 210 °C	up to 410 °F

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