

# 为核电行业提供前沿的泵技术解决方案 Cutting-Edge Pumping Solutions for the Nuclear Power Industry





# 苏尔寿的优势 The Sulzer Advantage

# 接受新的挑战

# Taking on new challenges

安全运行与电站可靠性是核能发电行业的关注焦点

凭借该领域多年的经验,苏尔寿可以为您提供最正确的泵的解决方案,助力更加安全、高效的运行 Safe operation and plant reliability are key focuses of the nuclear power generation industry. With years of experience in the field, Sulzer is able to provide the right pumping solutions contributing to safer and more efficient operations.



- 可靠与安全是核能发电过程中至 高无上的要求
- 核电站运营阶段的运营商在寻找 可靠的解决方案过程中,纷纷找 到苏尔寿,苏尔寿成为他们成功 的选择。合作包括提供新泵、服 务与维修。
- Reliability and safety are paramount of nuclear power generation processes
- In their search for reliable solutions, nuclear power operators have successfully turned to Sulzer, be it for new pumping equipment, servicing or repairs



# 经验与诀窍 Experience and know-how

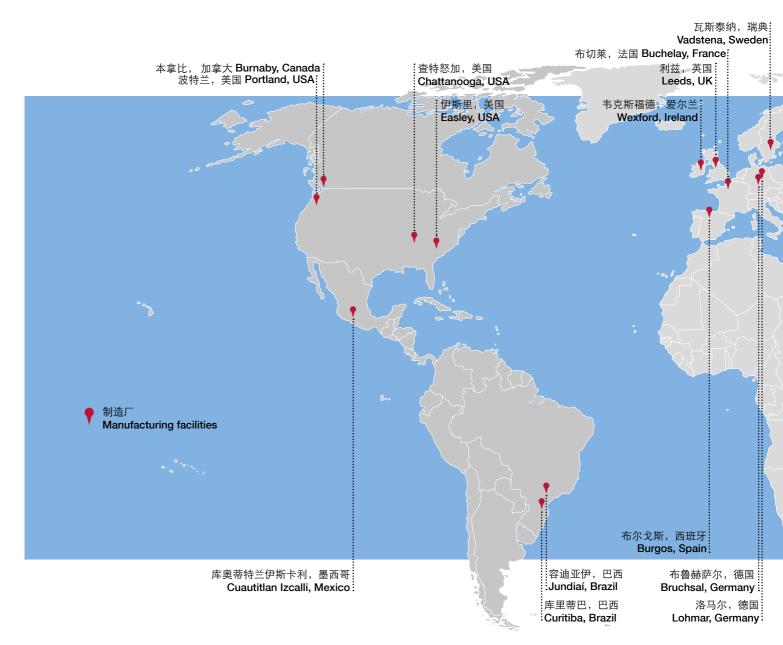
- 因为技术误差可以导颠覆性的后果,应用到核电上的设备依赖于经过验证的解决方案就至关重要。苏尔寿,经历 40 多年的发展,已经为全球范围核电站提供了有效的泵解决方案
- 从开发到实现、到服役,苏尔寿,因其完整的系统 解决方案,是您核电站用泵的唯一选择
- Because technical errors can have dramatic consequences, it is crucial to rely on proven solutions when it comes to nuclear. Sulzer, through more than 40 years, has equipped nuclear plants with efficient pumping solutions worldwide
- From development to implementation and servicing, Sulzer, thanks to its complete portfolio, is your single-source provider for nuclear power plants

# 效率 Efficiency

- 致力于为客户实现高效运行,节约成本。苏尔寿利用最先进的技术精心设计高度可靠的泵方案。
- 为了减少生命周期成本、优化性能,苏 尔寿公司按客户需求量身定做、制定 解决方案,达到完美拟合。
- Striving at making our customers more efficient and costs competitive, Sulzer utilizes the most advanced technology to elaborate a highly reliable pumping solution
- To minimize life cycle costs and optimize performance, Sulzer develops solutions tailored to the customers' needs and requirements for a perfect fit

# 我们的制造足迹遍布全球 Our Manufacturing Footprint Spans Across the Globe

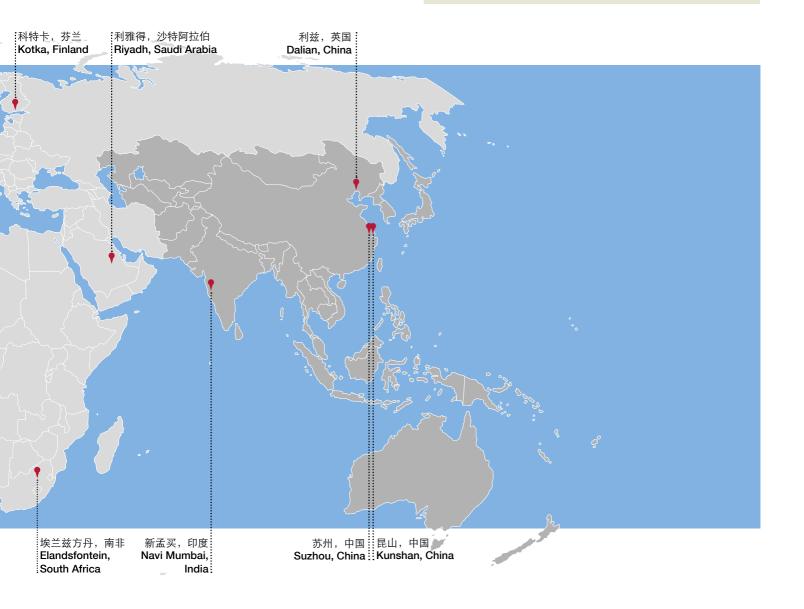
苏尔寿遍布全球的工厂,可以全方位的为核岛、常规岛提供立式泵、卧式泵的设计、制造与试验。 All Sulzer manufacturing plants design, produce and test vertical and horizontal pumps dedicated to nuclear and turbine island applications.



# 资质与许可

# Qualifications and certificates

- ASME Section III (Cl. 1, 2 & 3)
- ASME N & NPT 授权证明书 / certificate of authorization
- CSA B51
- CSA N285
- MIL-Q-9858-A
- NDT (MPI/LPI/RT/UT)
- EN 13445
- CSA Z299.1/2/3/4
- Standard KTA 1401
- IAEA 50-C-Q
- AVS D 100/50
- FRA/N/100/OL3
- RCC-M
- API 610, ISO 5199, ANSI/ASME B73.1



# 无论任何流程,我们都能为您提供泵解决方案

# Whatever the Process, We Have the Pumping Solutions

您给我们挑战机会,我们就可以提供解决方案。 You set out the challenge, we present the solutions.

# 能动先进压水堆

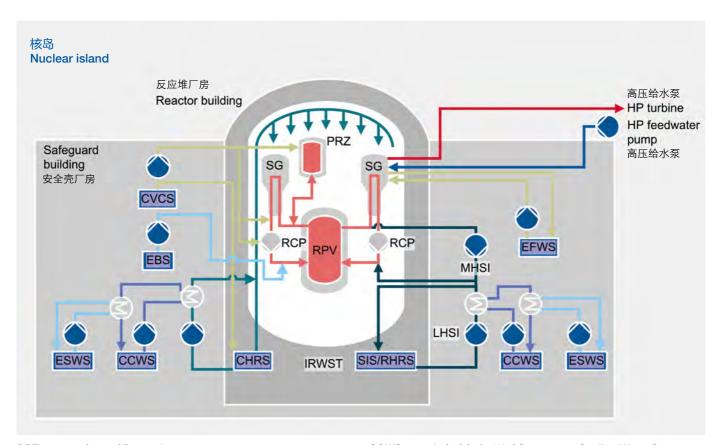
# **Advanced Pressurized Water Reactor with Active Safety**

在一个先进压水堆里,主冷却剂在高压下被泵送到反应堆;过热的水然后将热能传输到蒸汽发生器。压水堆核电站二回路与一回路完全分开,所以二回路中的水是没有被放射性物质污染的作为以前模型堆的直系后代,先进压水堆被归类为三代技术,因其安全等级高以及相比于略早的堆型燃料效率更高。

能动安全先进压水堆具备几个能动与非能动保护措施 应对事故和冗余独立应急冷却系统,每项措施能够在停堆后冷却反应堆

In an advanced pressurized water reactor, the primary coolant is pumped under high pressure to the reactor core; the superheated water then transfers thermal energy to a steam generator. The pressurized water reactor turbine cycle loop is separated from the primary loop, so the water in the secondary loop is not contaminated by radioactive materials. Direct descendants of previous models, advanced pressurized water reactors are classified as generation III+ due to the level of safety and greater fuel efficiency they achieve in relation to earlier models.

The active safety advanced pressurized water reactors have several active and passive protection measures against accidents and redundant independent emergency cooling systems, each capable of cooling down the reactor after shutdown.



= 设备冷却水系统 / Component Cooling Water System PRZ = 稳压器 / Pressurizer **CCWS** SG = 蒸汽发生器 / Steam Generator **EFWS** = 应急给水系统 / Emergency Feedwater System = 反应堆冷却剂泵 / Reactor Coolant Pump RCP LHSI = 低压安注 / Low Head Safety Injection = 反应堆压力容器 / Reactor Pressure Vessel **RPV CHRS** = 安全壳热量排出系统 / Containment Heat Removal System = 化学和容积控制系统 / Chemical Volume & Control System IRWST **CVCS** = 安全壳内换料水贮存箱 MHSI = 中压安注 / Medium Head Safety Injection In-Containment Refueling Water Storage Tanks **EBS** = 额外加硼系统 / Extra Borating System SIS/RHRS = 安注系统/余热排出系统 **ESWS** = 重要厂用水系统 / Essential Service Water System Safety Injection System/Residual Heat Removal System

# 非能动型先进压水堆

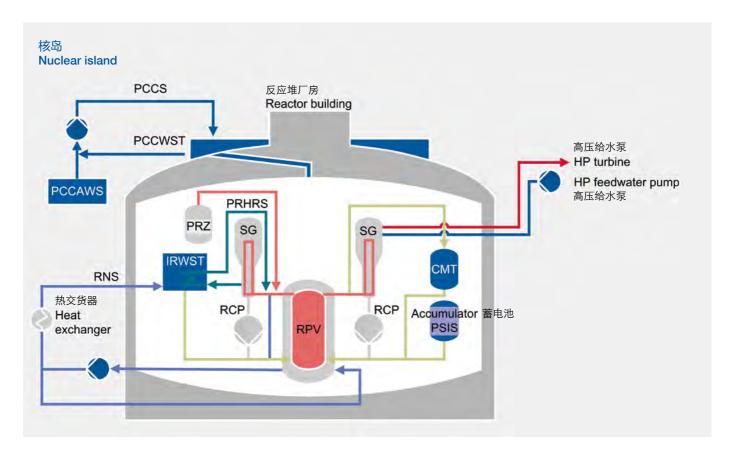
# **Advanced Pressurized Water Reactor with Passive Safety**

与能动型压水堆设计的主要区别是它的泵很少,因为非能 动(重力)安全系统的作用

非能动堆芯冷却系统 (PCCS) 同时使用了爆破阀与直流 阀两种,阀门必须在30分钟内启动

这个设计的目的是为了核安全事故发生后 72 小时内排出 反应堆余热,为尽可能长时间的冷却需要非能动堆芯补水 箱重力排水箱必须充满水

The major difference compared with the active safety pressurized water reactor design is that it has fewer safety pumps due to its passive (gravity) safety system. The Passive Core Cooling System (PCCS) uses both explosively operated and direct current valves which must activate within the first 30 minutes. The design is intended to passively remove heat for 72 hours after which the Passive Core Cooling Water System Tank (PCCWST) gravity drain water tank with active safety must be topped up for as long as cooling is required.



**RNS** 

**CMT** 

**IRWST** 

HP = 高压 / High Pressure = 稳压器 / Pressurizer PRZ

SG = 蒸汽发生器 / Steam Generator

= 反应堆冷却剂泵 / Reactor Coolant Pump **RCP** 

**RPV** = 反应堆压力容器 / Reactor Pressure Vessel

**PCCS** = 非能动堆芯冷却系统

Passive Core Cooling System

PCCWST = 非能动堆芯冷却水系统水箱 / Passive Core Cooling Water System Tank

PCCAWS = 非能动堆芯冷却辅助水系统 / Passive Core Cooling Auxiliary Water System

**PRHRS** = 稳压器排热系统 / Pressurizer Heat Removal System

= 正常余热排出系统 / Normal Residual Heat Removal System

= 安全壳内换料水贮存箱 / In-Containment Refueling Water Storage Tank

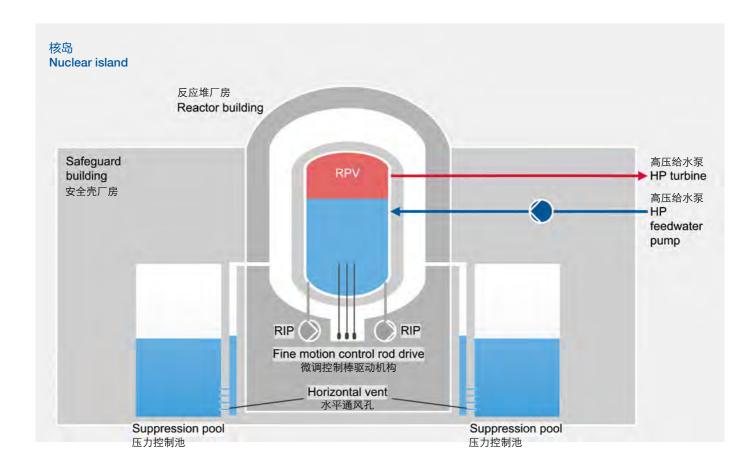
= 堆芯补给箱 / Core Make-up Tank

# 先进沸水堆

# **Advanced Boiling Water Reactor**

先进沸水堆是当前沸水反应堆中最先进的。相比于先进压水堆(大约 158 bar),反应堆压力容器和相关组件运行压力大幅度降低(约 75 bar) 它也在较低的核燃料温度下运行,可以在降低堆芯功率密度水平下使用自然循环运行,无需强制循环。 先进沸水堆可以设计成仅用自然循环运行,所以循环水泵可以完全取消

The advanced boiling water reactor is the current state-of-theart in boiling water reactors. The reactor vessel and associated components operate at a substantially lower pressure (about 75 bar) compared to an advanced pressurized water reactor (about 158 bar). It also operates at a lower nuclear fuel temperature and can operate at lower core power density levels using natural circulation without forced flow. An advanced boiling water reactor may be designed to operate using only natural circulation so that recirculation pumps are eliminated entirely.



HP= 高压给水泵 / High Pressure Feedwater PumpRIP= 反应堆内部再循环泵 / Reactor Internal PumpRPV= 反应堆压力容器 / Reactor Pressure Vessel

# 俄罗斯压水堆

# **Russian Pressurized Water Reactor**

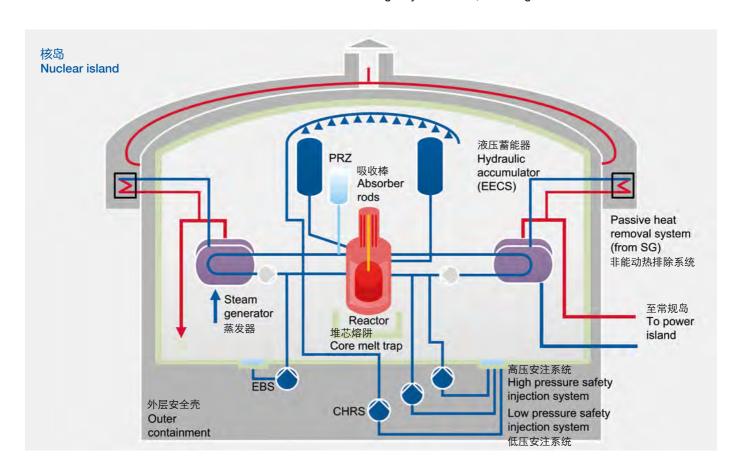
在俄罗斯压水堆中,一回路水保持在恒压下,经过堆 芯循环。

加热了的水通过蒸汽发生器把热能传输到二回路;二回路是不带放射性的。

核电站的安全是基于"纵深防御"的原则。由于延长寿命、能动与非被动安全系统设计的组合特点,这种反应堆类型的核电站满足最新的核与辐射安全方面的需求。反应堆设计和安全系统允许在所有运行工况、紧急工况、包括严重事故工况下达到高安全级别。

In Russian pressurized water reactors, water in the primary circuit is kept under constant pressure and circulates through the reactor core. Heated water transfers thermal energy to the secondary circuit via steam generators; secondary circuit is non-radioactive.

Safety of the nuclear power plant is based on "defense in depth" principle. Due to a combination of the design features, extended lifetime and active and passive safety systems, nuclear power plants with this type of reactor meet the latest requirements in terms of nuclear and radiation safety. Reactor design and safety systems allow achieving high safety level in all operation and emergency conditions, including severe accidents.



CHRS = 安全壳热量排出系统 / Containment Heat Removal System

EBS = 额外加硼系统 / Extra Borating System

EECS = 应急堆芯冷却 / Emergency Core Cooling System

PRZ = 稳压器 / Pressurizer

SG = 蒸汽发生器 / Steam Generator

# 加压重水反应堆

# **Pressurized Heavy Water Reactor**

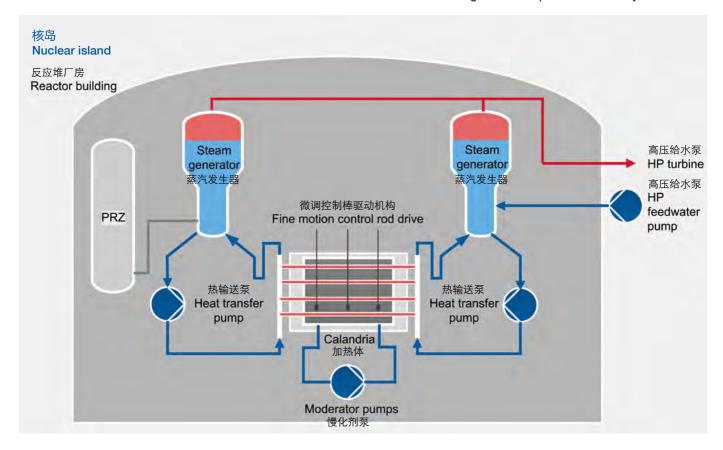
加压重水反应堆是三代重水慢化和重水冷却压力管反应堆。它是最高效的慢化剂之一,能使用天然铀作为燃料。利用天然铀提高了一个国家的能源自主性,燃料可以国产化。

随着最新技术的发展,一些反应堆现在可以使用替代燃料,比如回收铀,从而不仅更好地管理铀资源利用,也利于燃料成本节省。

重水冷却剂经过堆芯,带走链式裂变反应产生的热量。 热冷却剂加热轻水(普通水),把它转化成蒸汽,推 动汽轮发电机发电。 The pressurized heavy water reactor is a generation III heavy-water moderated and heavy-water cooled pressure tube reactor. It is one of the most efficient moderators and enables the use of natural uranium as fuel. The use of natural uranium increases a country's energy independence as fuel can be manufactured locally.

With latest technological advances, some reactors are now able to use alternative fuels such as recycled uranium, resulting in a better management of uranium resources usage as well as fuel costs savings for the utility.

Heavy water coolant passes through the reactor core and removes the heat generated by the fission chain reactions. This heated reactor coolant heats light (ordinary) water and converts it to steam, which drives a turbine-generator to produce electricity.



HP = 高压给水泵 / High Pressure Feedwater Pump

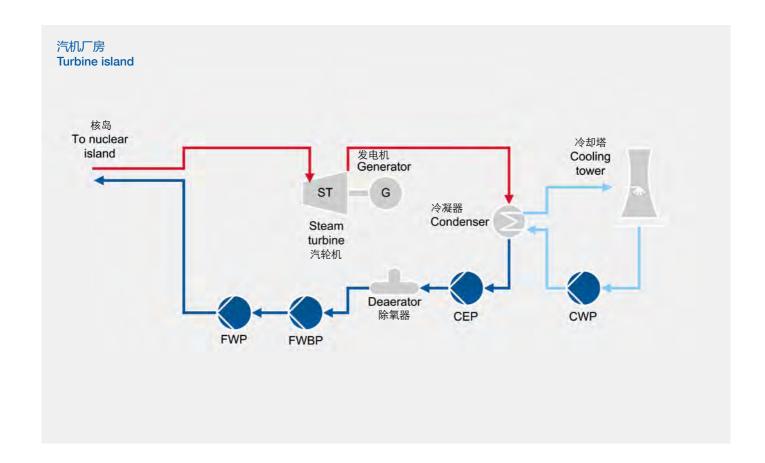
PRZ = 稳压器 / Pressurizer

# 汽机厂房

# **Turbine Island**

与常规电力相似,在核电站的常规岛里,反应堆浓缩铀裂变产生的热用于产生蒸汽,驱动汽轮机连接发电机产生电能。

Similar to conventional power stations, in the turbine island of a nuclear power plant, the heat generated by fission of enriched uranium in the nuclear reactor is used to generate steam which drives a steam turbine connected to a generator which produces electricity.



FWP = 给水泵 / Feedwater Pump

FWBP= 给水前置泵 / Feedwater Booster Pump CEP = 凝结水泵 / Condensate Extraction Pump

CWP = 循环水泵 / Cooling Water Pump



# 您理想的服务伙伴 Your Ideal Service Partner

专业、负责,苏尔寿持续为您提供可靠的服务,及时的响应,快速的周转和创新的方案 Our expertise and commitment always deliver reliability, responsiveness, rapid turn-around and innovative solutions.



# 我们全面的产品系列

# **Our Comprehensive Product Portfolio**

40多年来,苏尔寿已经成为核电领域始不可或缺的参与者,为世界范围内诸多项目成功提供了关键的泵设备。我们泵的设计与制造执行国际通用标准和设计规范。苏尔寿在核泵供货方面,具备深入的技术累积和丰富的ASME 第三卷(1、2、3级和非核级,包括N钢印),CSA N.285.0, RCC-M和EN等标准规范的经验。非核级泵设计主要根据API 610或者是超过ISO 5199 和 ANSI/ASME B73.1标准要求设计的。

For more than 40 years, Sulzer has been a major player in the nuclear industry and successfully supplied critical pumps for many projects worldwide. The design and manufacturing of our pumps are carried out according to commonly used international standard and design codes. Sulzer has in-depth knowledge and experience of ASME Sec III (Class 1,2, 3, and NC incl. N-stamp), CSA N.285.0, RCC-M and EN codes for the supply of nuclear pumps. Pumps for non-safety related applications are designed according to API 610 or exceeding requirements of ISO 5199 and ANSI/ASME B73.1.

	核反应堆堆型 Nuclear reactor type	可用于核岛应用的泵型 Pump types available for the nuclear island applications						
		筒袋泵 Barrel pumps	轴向剖分泵 Axially split pumps	单级泵 Single stage pumps	立式泵 Vertical pumps	筒式泵 Canned pumps		
		泵型 Pump type						
		GVG GSG CP	MSD HSA/HSB	HZB CD ZFn REL OHH	SJT/SJM	VCR		
	能动先进压水堆 Advanced pressurized water reactor with active safety	<b>✓</b>	<b>✓</b>	<b>✓</b>	<b>✓</b>	<b>✓</b>		
	非能动型先进压水堆 Advanced pressurized water reactor with passive safety	$\checkmark$	$\checkmark$		$\checkmark$			
核岛 Nuclear island	先进沸水堆 Advanced boiler water reactor		$\checkmark$		$\checkmark$	$\checkmark$		
	俄罗斯压水堆 Russian pressurized water reactor	<b>✓</b>	<b>✓</b>	<b>✓</b>	<b>✓</b>	<b>✓</b>		
	加压重水反应堆 Pressurized heavy water reactor		$\checkmark$	<b>✓</b>	$\checkmark$			

	汽机房设备 Applications in the turbine island							
	给水前置泵 Feedwater Booster Pumps (FWBP)	主给水泵 Feedwater Pumps (FWP)	凝结水泵 Condensate Extraction Pumps (CEP)	循环水泵 Cooling Water Pumps (CWP)	辅助泵 Auxiliary pumps			
	Pump type							
	нzв	HPTd CD	SJD (CEP)	SJT/SJM CWP SJT/SJM	AHLSTAR CPT OHH SMD SMN CZ/ZA/ZE/ZF SJT/SJM			
汽机厂房 Turbine island	$\checkmark$	$\checkmark$	<b>✓</b>	$\checkmark$	<b>✓</b>			

# 产品综述

# **Product Overview**

# 核岛

# **Nuclear island**

# 筒袋泵

# **Barrel pumps**

GVG 导叶式筒袋泵 GVG DIFFUSOR STYLE BARREL PUMP

### 设计特点及优点 / FEATURES AND BENEFITS

- 背靠背叶轮布置降低推力轴承承受的载荷(即使有磨损间隙)
- 中间衬套结构设计使之具有卓越的转子动力学性能
- 铬钢或奥氏体不锈钢材料的锻造筒体
- 芯包式的转子设计有效的降低了设备维护期间的设备停工时间
- 首级叶轮可以选择设计成双吸结构
- Low thrust bearing loads due to opposed impellers (even with worn clearances)
- Excellent rotordynamic behavior because of center bushing
- · Forged barrel in chromium steel/austenic stainless steel
- Full cartridge design to reduce downtime during maintenance
- Double suction impeller at first stage (optional)

### 主要参数 / KEY CHARACTERISTICS

Capacities up to  $65 \, \text{m}^3/\text{h} / 285 \, \text{USgpm}$ Heads up to  $1,900 \, \text{m} / 6,230 \, \text{ft}$ Pressures up to  $200 \, \text{bar} / 2,900 \, \text{psi}$ Temperatures up to  $100^{\circ}\text{C} / 212^{\circ}\text{F}$ 

#### 应用 / APPLICATIONS

- 控制棒驱动泵
- 上充泵
- 补给水泵
- Control rod drive pump
- High pressure charging pump

Make up water pump



### GSG 导叶式筒袋泵 ISO 13709 / API 610 BB5 GSG DIFFUSER STYLE BARREL PUMP ISO 13709 / API 610 BB5

### 设计特点及优点 / FEATURES AND BENEFITS

- 最具成本竞争力的 ISO 13709 / API 610 BB5 结构的高压筒袋泵
- 同向与背靠背叶轮布置设计都有
- 可以直接驱动, 功率达 6 MW
- 背靠背叶轮设计允许 16 级之多
- 众多的泵尺寸可覆盖广泛的水利性能
- 低压,高压和高温设计可以适用于很多工况和行业
- Most cost-efficient form of ISO 13709 / API 610 type BB5 high-pressure barrel pumps
- In-line and opposed impeller (back-to-back) design available
- Direct drive options up to 6 MW
- Back-to-back rotor stack allows up to 16 stages
- Multiple sizes cover a broad hydraulic range
- Low-pressure, high-pressure, and high-temperature designs suit many applications

# 应用 / APPLICATIONS

- 与安全相关的服务应急给水泵
- 低压安注泵
- Safety related services
- Emergency feedwater pump
- Low head safety injection pump
- Medium head safety injection pumps



# 主要参数 / KEY CHARACTERISTICS

Capacities up to 900 m $^3$ /h / 4,600 USgpm Heads up to 2,600 m / 10,000 ft Pressures up to 300 bar / 4,500 psi Temperatures up to 425 $^{\circ}$ C / 800 $^{\circ}$ F

### CP 蜗壳式筒袋泵 CP VOLUTE STYLE BARREL PUMP

# 设计特点及优点 / FEATURES AND BENEFITS

- 背靠背的叶 轮 i 布置平衡 轴向力,小 规格泵 不需要润 滑系统
- 内壳体轴 向剖 分,安 装泵的 时候,内 部转 子平衡不会 受 到影 响
- 双蜗壳 的内壳 体平衡 径向 载荷,获得 更长的 使用周 期
- 自锁筒式结构,缩短了低温应用维护时间
- 大规格的泵 采用芯包设 计能够 加快泵的 检修 速度
- 磨蚀工况 下, 蜗壳内 壳体 采用低 硬度口环
- Opposed impellers balance axial thrust, without need of lube system on smaller pumps
- Axially split inner case means rotor balance is not disturbed when installed in the pump
- Dual volute inner case balances radial loads for longer service life
- Twistlock barrel closure reduces maintenance time on lower temperature services
- Cartridge design on larger pumps can speed up pump repair time
- · Volute inner case with lower erosion wear on abrasive services



#### 主要参数 / KEY CHARACTERISTICS

Capacities up to 1,000 m $^3$ /h / 4,400 USgpm Heads up to 4,000 m / 13,120 ft Pressures up to 425 bar / 6,250 psi Temperatures up to 425°C / 800°F

### 应用 / APPLICATIONS

- 与安全相关的服务
- Safety related services

# 轴向剖分泵 Axially split pumps

MSD 轴向剖分多级泵 MSD AXIALLY SPLIT MULTISTAGE PUMP

### 设计特点及优点 / FEATURES AND BENEFITS

- 宽泛的水利性能区域和众多的的机械设计选项使之满足客户的工况要求
- Broad range of standard hydraulics and mechanical design options to ensure optimum fit to customers' duty requirements



# 主要参数 / KEY CHARACTERISTICS

Capacities up to 3,200 m<sup>3</sup>/h / 14,000 USgpm

Heads up to 2,900 m / 9,500 ft
Pressures up to 300 bar / 4,400 psi
Temperatures up to 200°C / 400°F

- 与安全相关的服务
- Safety related services

#### HSA/HSB 卧式轴向剖分单级两端支撑泵 HSA/HSB HORIZONTAL AXIALLY SPLIT SINGLE STAGE BETWEEN BEARING PUMP

### 设计特点及优点 / FEATURES AND BENEFITS

- 交错的叶片, 大规格 的泵使 用双吸叶 轮减小振 动
- 定制的水 力可以通过 简单 的转子 / 蜗壳 的改变 来满足 当前和 将来的要求
- 球轴承 / 球 轴承 , 滑动轴 承 / 球 轴承 , 滑动轴 承 / 可 倾瓦都是可 以选 择的
- Staggered vane, double suction impeller on larger sizes for reduced vibration
- Custom hydraulics to meet both current and future requirements with a simple rotor / volute changes
- Ball-ball, sleeve-ball and sleeve-pivot shoe bearings are available



#### 主要参数 / KEY CHARACTERISTICS

流量 达 10,000 m³/h / 45,000 USgpm

Capacities up to 10,000 m³/h / 45,000 USgpm

 $\begin{array}{lll} \mbox{Heads} & \mbox{up to } 550 \ \mbox{m/1,800 ft} \\ \mbox{Pressures} & \mbox{up to } 150 \ \mbox{bar/2,200 psi} \\ \mbox{Temperatures} & \mbox{up to } 205^{\circ}\mbox{C/400}^{\circ}\mbox{F} \end{array}$ 

#### 应用 / APPLICATIONS

- 与安全相关的服务
- Safety related services

#### 单级泵

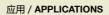
# Single stage pumps

HZB 双吸涡壳式泵

HZB DOUBLE SUCTION VOLUTE PUMP

# 设计特点及优点 / FEATURES AND BENEFITS

- 中心线支撑的设计使泵不受热膨胀影响,而且能够承受较大的管口载荷
- 最小的轴承间隙来实现最小的轴挠度变形
- 单壳体的设计用以减少大修时间
- 铬钢泵体具有良好的抗腐蚀性能和极佳的机械力学性能
- 单断面机械密封提供更高的效率
- Centerline mounting to allow free thermal expansion and high nozzle loads
- Minimum bearing span to minimize shaft deflection
- Single cover casing design to reduce overhaul times
- Chrome steel casing with good corrosion resistance and excellent mechanical properties is standard
- Single mechanical seal provides higher efficiency



- 给水加压
- 与安全相关的服务
- Feedwater booster
- Safety related services



# 主要参数 / KEY CHARACTERISTICS

Capacities up to  $5,500 \text{ m}^3/\text{h} / 29,000 \text{ USgpm}$ 

Heads up to 340 m / 1,115 ft Pressures up to 48 bar / 700 psi Temperatures up to 220°C / 428°F

### CD 两端支撑单级泵 ISO 13709 / API 610 BB2

# CD BETWEEN BEARINGS SINGLE STAGE PUMP ISO 13709 / API 610 BB2

### 设计特点及优点 / FEATURES AND BENEFITS

- 中心支撑减少 泵体因 受热 而引起的 偏心
- 双吸叶轮 可以满足 低汽蚀余 量 (NPSHR) 的 要求
- 泵第一临界转速远高于运行转速的范围,以保证平稳的运行
- 为避免因 主管路变形 带 来 的影响 ,泵 体 的设计可 以承受 2 倍 于 API 610 规定 的管口 载荷
- 为减少安装 成 本,可以提 供灌 浆 或 非灌浆、1 倍 或者2倍 API 610 管口载荷的 底座
- Centerline support for reduced thermally induced misalignment
- · Double suction impeller for low low Net Positive Suction Head Required (NPSHR)
- First critical speed is well above operating speed range for smooth operation
- Casing designed for 2 times API 610 nozzle loads for freedom from piping distortions
- Grouted or ungrouted, 1x or 2x nozzle load baseplates for reduced installation cost



#### 主要参数 / KEY CHARACTERISTICS

Capacities up to 4,200 m<sup>3</sup>/h / 22,000 USgpm

Heads up to 350 m / 1,500 ft
Pressures up to 152 bar / 2,200 psi
Temperatures up to 425°C / 800°F

#### 应用 / APPLICATIONS

- 给水
- 给水前置泵
- Feedwater
- · Feedwater booster

#### ZFn 卧式蜗壳式流程 ZFn HORIZONTAL VOLUTE TYPE PROCESS PUMP

# 设计特点及优点 / FEATURES AND BENEFITS

- 基本设计根据 API 610 最新版
- 根据核电要求,泵壳的设计能够承受较高的载荷
- 验证的水力设计来自 API 610 标准的 ZE/ZF 泵
- 相比较 API 610 标准,泵轴的直径增加,以符合核电相关要求
- 低转子挠度
- 干运转临界转速高
- 相关设计符合 RCC-M 规范
- · Basic design according API 610 latest edition
- Casing designed for higher nozzle loads to comply with nuclear requirements
- Proven hydraulic design from our API 610 pump range ZE/ZF
- Enlarged shaft diameter compared to API 610 to match nuclear requirements
- · Low rotor bending
- High dry running critical speed
- · Designs according to RCC-M available

# 主要参数 / KEY CHARACTERISTICS

Capacities up to 2,600 m<sup>3</sup>/h / 11,440 USgpm

Heads up to 300 m / 1,000 ft
Pressures up to 100 bar / 1,450 psi
Temperatures up to 425°C / 800°F

- 与安全相关的服务
- Safety related services



#### REL 水平导叶式单级泵 REL HORIZONTAL DIFFUSER STYLE SINGLE STAGE PUMP

# 设计特点及优点 / FEATURES AND BENEFITS

- 根据核电要求,泵壳的设计能够承受更高的载荷
- 验证的水力设计来自 API 610 标准的 ZE/ZF 泵
- 相比较 API 610 标准, 泵轴的直径增加, 以符合核电相关要求
- 低转子挠度
- 干运转临界转速高
- 相关设计符合 RCC-M 规范
- Casing designed for higher nozzle loads to comply with nuclear requirements
- Proven hydraulic design from our API 610 pump range ZE/ZF
- Enlarged shaft diameter compared to API 610 to match nuclear requirements
- · Low rotor bending

温度

- High dry running critical speed
- Designs according to RCC-M available



Capacities up to 2,600 m³/h / 11,440 USgpm

达 425°C / 800°F

 $\begin{array}{lll} \mbox{Heads} & \mbox{up to } 300 \ \mbox{m/1,000 ft} \\ \mbox{Pressures} & \mbox{up to } 100 \ \mbox{bar/1,450 psi} \\ \mbox{Temperatures} & \mbox{up to } 425^{\circ}\mbox{C/800}^{\circ}\mbox{F} \end{array}$ 

# 应用 / APPLICATIONS

- 与安全相关的服务
- · Safety related services



#### OHH 悬臂式单级泵 ISO 13709 / API 610 OH2 OHH OVERHUNG SINGLE STAGE PUMP ISO 13709 / API 610 OH2

# 设计特点及优点 / FEATURES AND BENEFITS

- 带散热片 的轴承箱 体和风扇 冷却 可以 延长轴承 寿 命
- 适用于 ISO 13709 (API 610) OH2 型, 广泛的工业领域应用范围
- 可以设计 成 2 倍于 ISO 13709 (API 610) 标准 载荷的 重工 位底座
- 符合 ISO 21049 (API 682) 标准 的集装 式机械密封可 以减 少泄 露
- 电机, 可变频驱动 (VFD), 发动机和汽轮机驱动
- Finned bearing housing and fan cooling for long bearing life
- Broadest range map in the industry for ISO 13709 (API 610) type OH2 pumps
- Heavy duty baseplates with 2x ISO 13709 (API 610) nozzle load option
- ISO 21049 (API 682) cartridge type mechanical seals for reduced emissions
- Electric motor, Variable Frequency Drive (VFD), engine and steam turbine drivers

# 主要参数 / KEY CHARACTERISTICS

Capacities up to 2,250  $\,\mathrm{m}^3/\mathrm{h}$  / 10,000 USgpm

Heads up to 400 m / 1,500 ft
Pressures up to 76.5 bar / 1,110 psi
Temperatures up to 425°C / 800°F

- 辅助服务
- Auxiliary services

# 立式泵

# **Vertical pumps**

#### SJT 和 SJM 立式透平泵 SJT AND SJM VERTICAL TURBINE PUMP

#### 设计特点及优点 / FEATURES AND BENEFITS

- 经过优化设计的水力,效率更高
- 填料密封箱的设计是为了保证密封的可靠性和易维护性;机械密封为可选项
- 球面与圆柱面衬橡胶滑动轴承可以延长设备免维护期,其他轴承材料也可以
- 中间带加长段的联轴器方便机封与推力轴承维修
- · Optimized hydraulics for high efficiency
- Packed stuffing box for reliable sealing and simple maintenance; mechanical seal available as an option
- Rubber-lined product-lubricated bearing in bowls and columns for long maintenance-free periods; other bearing materials are also available
- · Spacer coupling allows servicing of seal and thrust bearing as required



# 主要参数 / KEY CHARACTERISTICS

Capacities up to 62,000 m³/h / 270,000 USgpm

Heads up to 110 m per stage /

350 ft per stage

Pressures up to 64 bar / 930 psi Temperatures up to 50°C / 122°F

#### 应用 / APPLICATIONS

- 冷却水泵
- 与安全相关的服务
- 核电服务用水
- 辅助服务
- Cooling water pumps
- Safety related servicesNuclear service water
- Auxiliary services

# 筒式泵

# **Canned pumps**

VCR 高压筒式泵 VCR HIGH PRESSURE CANNED PUMP

# 设计特点及优点 / FEATURES AND BENEFITS

- 易于维护
- 通用性强
- 不需要诱导轮
- 泵与电机效率高
- 已经验证的可靠性
- Ease of maintenance
- Accessibility
- No inducer required
- High pump and motor efficiency
- Proven reliability

# 主要参数 / KEY CHARACTERISTICS

Capacities up to 1,130 m $^3$ /h / 5,000 USgpm Heads up to 2,450 m / 8,000 ft Pressures up to 100 bar / 1,440 psi Temperatures up to 200 $^{\circ}$ C / 400 $^{\circ}$ F

- 加热器疏水泵
- 凝结水泵
- Heater drain
- Condensate extraction



# 汽机厂房 Turbine island

# 给水前置泵

# Feedwater booster pumps

HZB 双吸涡壳式泵 HZB DOUBLE SUCTION VOLUTE PUMP

#### 设计特点及优点 / FEATURES AND BENEFITS

- 中心线支撑的设计使泵不受热膨胀影响,而且能够承受较大的管口载荷
- 最小的轴承间隙来实现最小的轴挠度变形
- 单壳体的设计用以减少大修时间
- 铬钢泵体具有良好的抗腐蚀性能和极佳的机械力学性能
- 单断面机械密封提供更高的效率
- Centerline mounting to allow free thermal expansion and high nozzle loads
- Minimum bearing span to minimize shaft deflection
- Single cover casing design to reduce overhaul times
- Chrome steel casing with good corrosion resistance and excellent mechanical properties is standard
- Single mechanical seal provides higher efficiency



### 主要参数 / KEY CHARACTERISTICS

Capacities up to 5,500 m³/h / 29,000 USgpm

Heads up to 340 m / 1,115 ft
Pressures up to 48 bar / 700 psi
Temperatures up to 220°C / 428°F

# 应用 / APPLICATIONS

- 给水加压
- 与安全相关的服务
- · Feedwater booster
- · Safety related services

### 主给水泵

# Feedwater pumps

HPTd 单级双吸式泵 HPTd SINGLE STAGE DOUBLE SUCTION PUMP

#### 设计特点及优点 / FEATURES AND BENEFITS

- 坚固的设计可以承受很高的管口载荷
- 单壳体的设计用以减少大修时间
- 径向剖分设计可以取消暖泵系统
- 分体的轴承箱体设计使在轴承检修时无需拆解泵体
- 单断面机械密封提供更高的效率
- Robust design to accept high piping loads
- Single cover design to reduce overhaul times
- Radial split design eliminates need for pre-warming
- Split bearing housings for bearing inspection without pump disassembly
- Single mechanical seal for higher efficiency

# 应用 / APPLICATIONS

- 给水
- Feedwater

# 主要参数 / KEY CHARACTERISTICS

Capacities up to 4,000 m<sup>3</sup>/h / 17,600 USgpm

Heads up to 1,000 m / 3,280 ft
Pressures up to 140 bar / 2,030 psi
Temperatures up to 230°C / 450°F



#### CD 两端支撑单级泵 ISO 13709 / API 610 BB2

# CD BETWEEN BEARINGS SINGLE STAGE PUMP ISO 13709 / API 610 BB2

#### 设计特点及优点 / FEATURES AND BENEFITS

- 中心支撑减少 泵体因 受热 而引起的 偏心
- 双吸叶轮 可以满足 低汽蚀余 量 (NPSHR) 的 要求
- 泵第一临界转速远高于运行转速的范围,以保证平稳的运行
- 为避免因 主管路变形 带来 的影响 ,泵 体 的设计可 以承受 2 倍 于 API 610 规定 的管口 载荷
- 为减少安装 成 本,可以提 供灌 浆 或 非灌浆、1 倍 或者2倍 API 610 管口载荷的 底座
- Centerline support for reduced thermally induced misalignment
- Double suction impeller for low low Net Positive Suction Head Required (NPSHR)
- First critical speed is well above operating speed range for smooth operation
- Casing designed for 2 times API 610 nozzle loads for freedom from piping distortions
- Grouted or ungrouted, 1x or 2x nozzle load baseplates for reduced installation cost



#### 主要参数 / KEY CHARACTERISTICS

流量 达 4,200 m³/h / 22,000 USgpm

Capacities up to 4,200 m<sup>3</sup>/h / 22,000 USgpm

Heads up to 350 m / 1,500 ft
Pressures up to 152 bar / 2,200 psi
Temperatures up to 425°C / 800°F

#### 应用 / APPLICATIONS

- 给水
- 给水前置泵
- Feedwater
- · Feedwater booster

# 凝结水泵

# Condensate extraction pumps

SJD ( 凝结水泵 ) 多级筒袋透平式泵 SJD (CEP) VERTICAL CAN MOUNTED TURBINE TYPE PUMP

# 设计特点及优点 / FEATURES AND BENEFITS

- 球面或圆柱面的碳石墨滑动轴承可以延长设备的免维护期
- 可拆卸的密封箱体允许在不拆解泵头的情况下维修节流衬套
- 独立的电机支架允许泵的吸入口和出水口在同一高度
- 中间带加长段的联轴器方便机封与推力轴承维修
- 筒袋带有侧面和防旋转筋板以保证沿筒袋方向的进口流速
- Carbon graphite product lubricated bearing in bowls and columns for long maintenance-free periods
- Removable seal housing allows servicing throttle bushing without removing the head
- Separate fabricated driver stand allows using one suction and discharge head per pump size
- Spacer coupling allows servicing the mechanical seal and thrust bearing as needed
- Can is provided with lateral and anti-rotational ribs uniform inlet velocity along the can length

# 主要参数 / KEY CHARACTERISTICS

Capacities up to 4,900 m<sup>3</sup>/h / 21,560 USgpm

Heads up to 400 m / 1,300 ft
Pressures up to 94 bar / 1,360 psi
Temperatures up to 100°C / 212°F

- 凝结水泵
- Condensate extraction



# 循环水泵

# Cooling water pumps

# SJT/SJM 立式循环水泵 SJT/SJM CWP VERTICAL PUMP

### 设计特点及优点 / FEATURES AND BENEFITS

- 采用先进的焊接喇叭口及导叶 防止漩涡保证水泵更稳定的性能曲线
- 先进的半开式叶轮设计, 以获取 最佳的水力和效率
- 分段弯头减少内部损失
- 全抽芯结构选择可以降低吊车吨位且易于维修
- Modern fabricated suction bell and bowl casing incorporating swirl break for stable pump performance curve
- · Semi-open cast impeller design for best fitting and optimum efficiency
- Segmented elbow to reduce the internal losses
- · Optional full pull-out construction to reduce lifting crane capacity and ease maintenance

#### 主要参数 / KEY CHARACTERISTICS

Capacities up to 80,000 m<sup>3</sup>/h/ 349,000 USgpm

Heads up to 38 m / 125 ft
Pressures up to 6 bar / 125 psi
Temperatures up to 50°C / 122°F

#### 应用 / APPLICATIONS

- 凝汽器冷却水泵
- · Condenser cooling water pumps



#### SJT 和 SJM 立式透平泵 SJT AND SJM VERTICAL TURBINE PUMP

# 设计特点及优点 / FEATURES AND BENEFITS

- 经过优化设计的水力,效率更高
- 填料密封箱的设计是为了保证密封的可靠性和易维护性;机械密封为可选项
- 球面与圆柱面衬橡胶滑动轴承可以延长设备免维护期,其他轴承材料也可以
- 中间带加长段的联轴器方便机封与推力轴承维修
- Optimized hydraulics for high efficiency
- Packed stuffing box for reliable sealing and simple maintenance; mechanical seal available as an option
- Rubber-lined product-lubricated bearing in bowls and columns for long maintenance-free periods; other bearing materials are also available
- Spacer coupling allows servicing of seal and thrust bearing as required

# 主要参数 / KEY CHARACTERISTICS

Capacities up to 62,000 m<sup>3</sup>/h / 270,000 USgpm

Heads up to 110 m per stage /

350 ft per stage

Pressures up to 64 bar / 930 psi Temperatures up to 50°C / 122°F

- 冷却水泵
- 与安全相关的服务
- 核电服务用水
- 辅助服务
- Cooling water pumps
- Safety related services
- Nuclear service water
- Auxiliary services



# 辅助泵

# **Auxiliary pumps**

### AHLSTAR 端吸单级长耦合离心泵 AHLSTAR END SUCTION SINGLE STAGE LONG COUPLED CENTRIFUGAL PUMP

### 设计特点及优点 / FEATURES AND BENEFITS

- 超过国际标准 ISO 5199 and ISO 2858 的要求
- 适用于大多数工业应用要求
- 独特的专利和优越的设计特性减少泵的寿期成本
- 快速和简单的安装,可靠性运行,易维护
- Exceeds standard requirements of international ISO 5199 and ISO 2858 standards
- Suitable for the most demanding industrial applications
- Unique, patented and superior design features minimize life cycle costs
- Quick and easy installation, reliable operation, easy maintenance and service



#### 主要参数 / KEY CHARACTERISTICS

流量 达 11,000 m³/h / 48,400 USgpm

扬程 达 160 m / 525 ft

压力 达 16-25 bar / 230-360 psi

温度 达 180°C / 356°F

Capacities up to  $11,000 \text{ m}^3/\text{h} / 48,400 \text{ USgpm}$ 

Heads up to 160 m / 525 ft

Pressures up to 16-25 bar / 230-360 psi

Temperatures up to 180°C / 356°F

#### 应用 / APPLICATIONS

- 辅助服务
- · Auxiliary services

CPT 端吸单级离心泵,符合 ANSI B73.1 规范 CPT END SUCTION SINGLE STAGE CENTRIFUGAL PUMP ANSI B73.1

### 设计特点及优点 / FEATURES AND BENEFITS

- 超过 ANSI/ASME B73.1 标准要求
- 适用于大多数工业应用要求
- 独特的专利和优越的设计特性减少泵的寿期成本
- 快速和简单的安装,可靠性运行,易维护
- Exceeds standard requirements of ANSI/ASME B73.1 standards
- Suitable for the most demanding industrial applications
- Unique, patented and superior design features minimize life cycle costs
- Quick and easy installation, reliable operation, easy maintenance and service

# 主要参数 / KEY CHARACTERISTICS

流量 达 1,600 m³/h / 7,000 USgpm 扬程 达 220 m / 720 ft

Capacities up to 1,600 m<sup>3</sup>/h / 7,000 USgpm

 $\begin{array}{lll} \mbox{Heads} & \mbox{up to 220 m} \ / \ 720 \ \mbox{ft} \\ \mbox{Pressures} & \mbox{up to 26 bar} \ / \ 375 \ \mbox{psi} \\ \mbox{Temperatures} & \mbox{up to 260°C} \ / \ 500°F \end{array}$ 

- 辅助服务
- · Auxiliary services



#### OHH 悬臂式单级泵 ISO 13709 / API 610 OH2 OHH OVERHUNG SINGLE STAGE PUMP ISO 13709 / API 610 OH2

### 设计特点及优点 / FEATURES AND BENEFITS

- 带散热片 的轴承箱 体和风扇 冷却 可以 延长轴承 寿 命
- 适用于 ISO 13709 (API 610) OH2 型, 广泛的工业领域应用范围
- 可以设计 成 2 倍于 ISO 13709 (API 610) 标准 载荷的 重工 位底座
- 符合 ISO 21049 (API 682) 标准 的集装 式机械密封可 以减 少泄 露
- 电机,可变频驱动(VFD),发动机和汽轮机驱动
- Finned bearing housing and fan cooling for long bearing life
- Broadest range map in the industry for ISO 13709 (API 610) type OH2 pumps
- Heavy duty baseplates with 2x ISO 13709 (API 610) nozzle load option
- ISO 21049 (API 682) cartridge type mechanical seals for reduced emissions
- Electric motor, Variable Frequency Drive (VFD), engine and steam turbine drivers



#### 主要参数 / KEY CHARACTERISTICS

温度

达 2,250 m³/h / 10,000 USgpm 流量 扬程 达 400 m / 1,500 ft 达 76.5 bar / 1,110 psi 压力

达 425°C / 800°F Capacities up to 2,250 m<sup>3</sup>/h / 10,000 USgpm

Heads up to 400 m / 1,500 ft up to 76.5 bar / 1,110 psi Pressures **Temperatures** up to 425°C / 800°F

#### 应用 / APPLICATIONS

- 辅助服务
- Auxiliary services

#### SMD 轴向剖分壳体双吸泵 SMD AXIALLY SPLIT CASING DOUBLE SUCTION PUMP

### 设计特点及优点 / FEATURES AND BENEFITS

- 经过优化的水力使泵在高效区的流量范围很广
- 不仅最佳效率点必须汽蚀余量特别低,大流量时 NPSHR 也特别低
- 维护方便,零部件良好的互换性
- 水平和立式结构
- Optimum hydraulic fit with high efficiency maintained over a wider flow range
- · Exceptionally low Net Positive Suction Head Required (NPSHR) value not only at the best efficiency point but also on overload
- · Maintenance-friendly features; excellent interchangeability of parts
- · Horizontal and vertical constructions

# 应用 / APPLICATIONS

- 辅助服务
- Auxiliary services



达 16,000 m³/h / 70,000 USgpm 流量 达 260 m / 850 ft 扬程

达 34 bar / 490 psi 压力 达 140°C / 280°F 温度

Capacities up to  $16,000 \text{ m}^3/\text{h} / 70,000 \text{ USgpm}$ 

Heads up to 260 m / 850 ft up to 34 bar / 490 psi Pressures **Temperatures** up to 140°C / 280°F



#### SMN 轴向剖分壳体双吸泵

### SMN AXIALLY SPLIT CASING DOUBLE SUCTION PUMP

### 设计特点及优点 / FEATURES AND BENEFITS

- 广泛的水力覆盖了 50 多个大小不同型号尺寸泵
- 效率高

温度

- 稳健的设计确保长时间使用寿命
- 容易维护保养
- 顺时针和逆时针的旋转方向,以及垂直和水平方向的结构设计,确保泵具有灵活的布局
- Broad hydraulic coverage through over 50 different sizes
- · High efficiency
- Robust design for long service life
- · Easy maintenance
- Flexible layout enabled by clockwise and counterclockwise rotation as well as vertical and horizontal arrangements

#### 主要参数 / KEY CHARACTERISTICS

达 50°C / 120°F

Capacities up to 10,000 m<sup>3</sup>/h / 44,000 USgpm

Heads up to 200 m / 650 ft
Pressures up to 30 bar / 435 psi
Temperatures up to 50°C / 120°F

### 应用 / APPLICATIONS

- 辅助服务
- · Auxiliary services



# CZ/ZA/ZE/ZF 端吸泵

# CZ/ZA/ZE/ZF END SUCTION PUMPS

# 设计特点及优点 / FEATURES AND BENEFITS

- 泵的设计用于输送介质为热水或冷水,运行压力为中压以及低汽蚀余量要求的工况条件
- 模块化的结构设计确保设备之间零部件的最大互换性
- Designed for hot or cold water medium design pressure applications with relatively low Net Positive Suction Head (NPSH) available
- Modular construction to provide maximum interchangeability of spares

# 主要参数 / KEY CHARACTERISTICS

流量 达 2,600 m³/h / 11,440 USgpm

Capacities up to 2,600 m³/h / 11,440 USgpm

Heads up to 300 m / 1,000 ft
Pressures up to 100 bar / 1,450 psi
Temperatures up to 425°C / 800°F

### 应用 / APPLICATIONS

- 辅助服务
- Auxiliary services



# SJT 和 SJM 立式透平泵

# SJT AND SJM VERTICAL TURBINE PUMP

# 设计特点及优点 / FEATURES AND BENEFITS

- 经过优化设计的水力,效率更高
- 填料密封箱的设计是为了保证密封的可靠性和易维护性; 机械密封为可选项
- 球面与圆柱面衬橡胶滑动轴承可以延长设备免维护期, 其他轴承材料也可以
- 中间带加长段的联轴器方便机封与推力轴承维修
- · Optimized hydraulics for high efficiency
- Packed stuffing box for reliable sealing and simple maintenance; mechanical seal is optional
- Rubber-lined product-lubricated bearing in bowls and columns for long maintenance-free periods; other bearing materials are also available
- Spacer coupling allows servicing of the seal and thrust bearing as required

# 主要参数 / KEY CHARACTERISTICS

Capacities up to 62,000 m<sup>3</sup>/h / 270,000 USgpm

Heads up to 110 m per stage /

350 ft per stage up to 64 bar / 930 psi up to 50°C / 122°F

# 应用 / APPLICATIONS

- 冷却水泵
- 与安全相关的服务
- 核电服务用水
- 辅助服务
- Cooling water pumps
- Safety related services
- Nuclear service water
- Auxiliary services



Pressures

Temperatures

苏州苏尔寿泵业有限公司 苏州新区建林路 433 号 总机 +86 (0) 512 8187 3888 传真 +86 (0) 512 8187 3591 邮编 215151

Sulzer Pumps Suzhou Ltd.

Suizer Purings suzhou Ltd.
No.433, Jianlin Road, Suzhou New District,
Suzhou 215151
Tel. +86 (0) 512 8187 3888
Fax +86 (0) 512 8187 3591

北京分公司 北京市建国门内大街 7 号光华长安大厦 2 座 1618 室 由话 +86 (0) 10 6510 1777/1781 传真 +86 (0) 10 6518 5011 邮编 100005

Beijing Branch
Room 1618, Tower 2,
No.7, Bright China Chang An Building,
Jian Guo Men Nei Dajie,
Beijing, China 100005
Tel. +86 (0) 10 6510 1777/1781
Fax +86 (0) 10 6518 5011

广州技术服务中心 广州市花都区新华街新华工业区 红棉大道 48 号 2 号厂房 电话 +86 (0) 20 8687 9558 传真 +86 (0) 20 8687 9558 邮编 510800

**Guangzhou Service Center** 

No.48,Hongmian Road, Xinhua Industrial Area, Xinhua Street, Huadu District, Guangzhou, China 510800 Tel. +86(0)20 8687 9058 Fax +86 (0)20 8687 9558

大连苏尔寿泉及压缩机有限公司 大连市双 D 港双 D7 街 6 号 总机 +86 (0) 411 8758 1888 传真 +86 (0) 411 8758 1878-8738 邮编 116600

Sulzer (Dalian) Pumps & Compressors Ltd.

Sulzer (Dalian) Pumps & Compresso No.6 DD 7th Street, DD Port Dalian 116600 Tel. +86 (0) 411 8758 1888 Fax +86 (0) 411 8758 1878-8738

上海分公司 上海市浦东新区福山路 388 号宏嘉 大厦 2102-2014 室 电话 +86 (0) 21 6888 2900 传真 +86 (0) 21 5882 6708 邮编 200122

Shanghai Branch
Room 02-04, Hong Jia Tower,
No.388 Fu Shan Road,
Pu Dong New District,
Shanghai, PRC 200122
Tel. +86 (0) 21 6888 2900
Fax +86 (0) 21 5882 6708

成都技术服务中心 四川省彭州市石化基地炼厂南路 与经一路交汇处 电话 +86 (0)28 8385 9009 邮编 611930

Chengdu Service Center

The Intersection of Refinery South Road and Jingyi Road, Petrochemical Base, Pengzhou, Sichuan, China 611930 Tel. +86 (0)28 8385 9009

广州办事处 广州市天河区华庭路 4 号富力天河商务 大厦 1006 室 电话 +86 (0) 20 8310 7466 传真 +86 (0) 20 8310 5626 邮编 510610

 Guangzhou Office

 Room 1006, Fuli Tianhe Business Macsion,

 No. 4 Huating Road, Tianhe District,

 Guangzhou, PRC 510610

 Tel. +86 (0) 20 3810 7466

 Fax +86 (0) 20 3810 5626

想要了解更多的信息,请联系 For more information, please contact nuclear.power@sulzer.com www.sulzer.com

