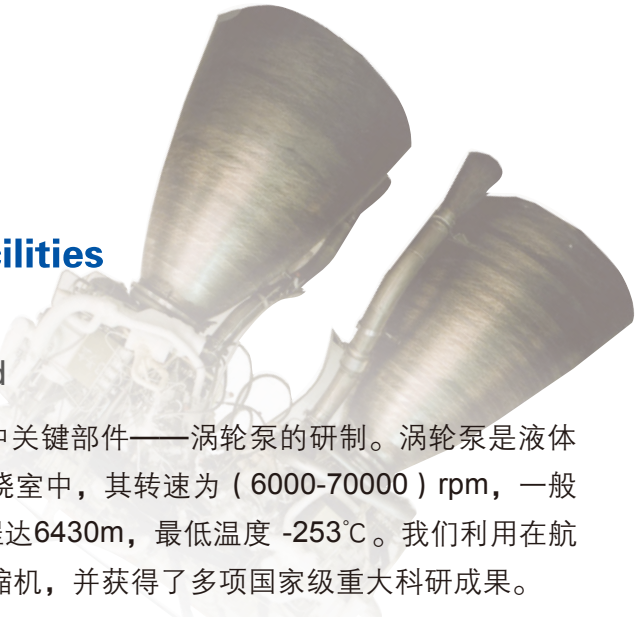


1. 能力与设施 Capabilities and Facilities

1.1 专业依托 Engineering Background

流体事业部在火箭发动机的研制中曾承担其中关键部件——涡轮泵的研制。涡轮泵是液体火箭发动机的心脏，用于输送氧化剂和燃料到燃烧室中，其转速为（6000-70000）rpm，一般泵的单级扬程为（1500-3000）m，液氢泵的扬程达6430m，最低温度 -253℃。我们利用在航天领域积累的技术优势，开发了高速泵和高速压缩机，并获得了多项国家级重大科研成果。

Liquid and Rotating Machinery Division was engaged in developing turbo-pumps. A turbo-pump is the heart of a liquid rocket engine, which delivers oxidizer and fuel to the combustion chamber, the speed is (6,000~70,000) rpm, the head is normally（1,500~3,000） m, for the hydrogen pump, the head can reach 6,430m, the temperature can be -253°C. Based on our technical advantages, we have developed high speed pumps and high speed compressors and gained several national level scientific research awards.

1.2 研发能力 Engineering Capability

流体事业部从事高速泵和压缩机研究设计的专业技术人员有50余人。他们在泵的流场计算、水力模型优化、汽蚀机理研究、诱导轮与离心轮的优化设计与匹配、泵机组振动、大负荷高速轴承设计、高PV值超低粘度动密封以及齿轮研究设计等领域，具有较高的学术造诣。

There are over 50 engineers engaged in high speed pump and compressor design. They are highly experienced in flow field calculation, hydraulic model optimization, cavitations mechanism study, matching and optimization of inducer and impeller, pump system vibration study, high head and high speed bearing design, high PV value dynamic seal for ultra low viscosity liquid, and gear design, etc.

1.3 制造能力 Manufacturing Capability

泵和压缩机的制造始终遵循ISO9001质量体系及航天产品生产规程进行，并对全过程跟踪控制，关键零部件使用高精度加工中心及专用设备进行生产和检测。

The quality of pumps and compressors is secured by ISO 9001 quality assurance system and aerospace product manufacturing regulations. Every step of manufacturing process is monitored and controlled. Key parts are processed by high precision machining center and/or special equipments, and are carefully inspected.

制造和装配　Manufacturing Facilities

1.4 测试装备 Test Facilities

公司具有以下试验台： 内置油泵试验台、高速轴承试验台、高速泵试验台、压缩机试验台。我公司生产的每一台泵和压缩机都进行严格的性能及运转考核，有力地保证了出厂产品的质量。

No good test facilities, No good products. We have diverse test stands, including: internal lube oil pump test stand, journal bearing test stand, high speed pump test stand, compressor test stand. Every product is strictly tested before delivery, thus quality is tightly secured.

高速泵试验台（立式及卧式工位）High Speed Pump Test Stand (Vertical and Horizontal)

1.5 服务 Service

公司的服务人员都是经过培训的专业人员，能够解决设备在从选型到安装调试过程中的技术问题。尤为重要的是，我公司泵按模块化设计，因而有足够的零部件库存，可以快捷地提供备件，使客户实现零库存。良好的服务、快速反应及物流配送能力确保客户可以放心使用我公司的产品，解决了后顾之忧。

All service staffs are well trained technicians. They are qualified to solve problems which may occur during equipment installation and commissioning, and also during normal production. Moreover, the modular design concept has enabled us to have adequate spare part stocks. Spares are delivered fast, which makes zero on-site spares storage possible.

2. 产品简介Product Briefs

主要产品有：GSB型高速泵、GSY型高速压缩机。其特点如下：

Main line products: GSB high speed pumps and GSY high speed compressors. The following are the main features:

● 高性能的增速箱　High Performance Gearbox

箱体和齿轮轴是高速泵和压缩机的关键零部件，其热处理工艺复杂，精度要求高。经过多年的摸索，制订了一套完善的加工工艺。在加工中严格控制铸件的化学成分及热处理，初加工后再进行多次稳定化处理，确保箱体既有高强度又有高稳定性。其次，零部件加工完成后每件都必须经过严格的检验，且检测记录留存在质量跟踪袋中。

Mature manufacturing processes have been formed through years of experience. As of the key components of high speed pumps and compressors, the heat treatment processes are complicated and precision requirements are high for the gearbox casing and gear shaft. Chemical ingredients and heat treatments are strictly controlled for the casting parts. Multiple stabilizing treatments are carried out after the primary operation thus ensures the high strength and high stability of the gearbox casing. All finished parts are strictly inspected, and inspection records are kept in file.

● 配置可倾瓦轴承　Tilt Pad Bearing Applied

依据转子动力学的分析，确定高速轴的结构。针对客户的工况条件（高入口压力、大功率等），成功研制了轴向、径向以及集轴向、径向于一体的多种可倾瓦轴承，且按模块化设计，可灵活进行组配。

Structure of a high speed shaft is determined by rotor kinetics analysis. Various types of tilt pad bearings have been developed, which are good for axial direction, radial direction or axial/radial direction combined, according to customers' operating modes. Since all types of tilt pad bearings have the same installation dimensions, one type of tilt pad bearing can be easily replaced by another type according to actual needs.

● 优化设计　Fluid Section Optimized

过流部分主要由诱导轮（导风轮）、叶轮、导叶扩压器、壳体等组成。利用流场分析软件，对其进行优化。

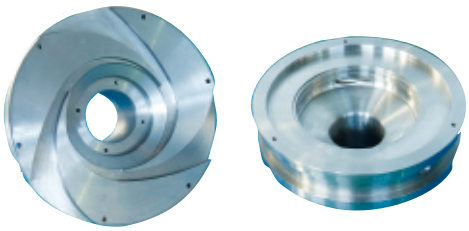
Inducers, impellers, diffusers and pump casings , which are the main components of the fluid section, are optimized with the aid of CFD software.

● 多种密封型式 Seals of Various Types Applicable

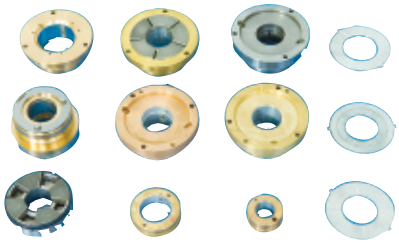
每台设备均可按照API标准选配密封，如单端面、串联、双端面密封、干气密封，满足用户的各种工况需求。

Single seals, tandem seals, double seals and dry gas seals are applicable according to API standards, as per actual operating modes.

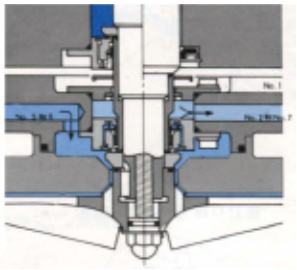
齿轮及轴 Gear & Shaft



扩压器 Diffuser

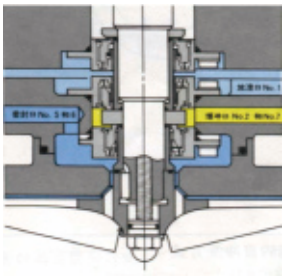


轴承 Bearing



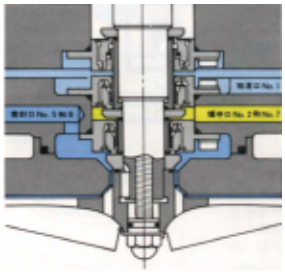
单密封 Single Seal

诱导轮 Inducer



双密封 Double Seal

叶轮 Impeller



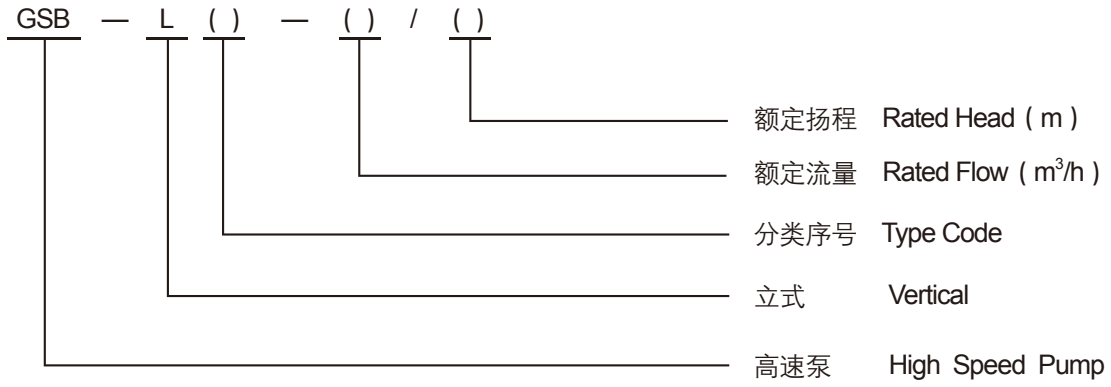
串联密封 Tandem Seal

2.1 GSB–L型立式高速泵 GSB–L Vertical High Speed Pump

GSB-L型立式高速泵的进出口法兰对称布置在一条水平线上，结构刚性强，抗热冲击性能好，其配管承载能力高。

Suction and discharge flanges of GSB-L vertical high speed pump have a common centerline, so that the pump has strong stiffness, good thermal-shock resistant feature, and the piping has high load-bearing capacity.

2.1.1 型号说明Type Designation



注：GSB-L1： 二级增速的立式高速泵

Double-stage speed-up vertical high speed pump.

GSB-L2： 一级增速的立式高速泵

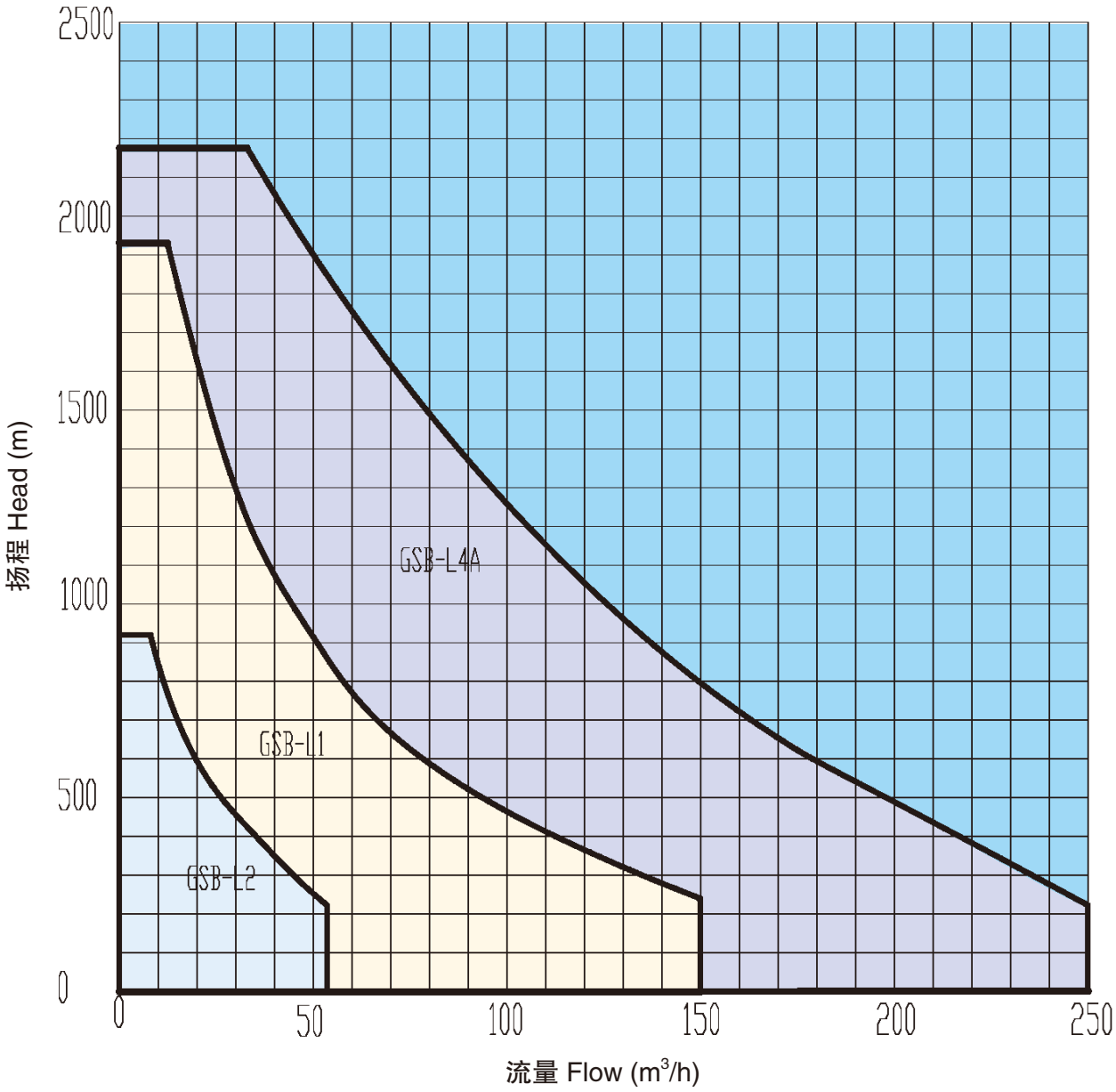
Single-stage speed-up vertical high speed pump.

GSB-L4A： 二级增速的立式大功率高速泵

Double-stage speed-up large power vertical high speed pump.

2.1.2 GSB–L型立式高速泵性能参数型谱图：

Performance Envelopes Of GSB-L Vertical High Speed Pump



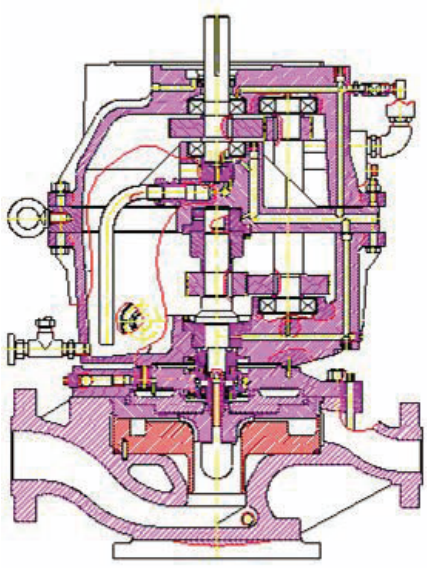
2.1.3 GSB–L型高速泵性能参数表

Parameters of GSB–L Vertical High Speed Pump

型 号 Pump Type	GSB-L1	GSB-L2	GSB-L4A
最大流量 Max. Flow (m^3/h)	150	52	250
最高扬程 Max. Head (m)	1920	915	2180
最大吸入压力 Max. Suction Pressure(MPa)	6.8	4.0	6.8
最大使用压力 Max. Working Pressure (MPa)	20.0	10.0	20.0
最大电机功率 Max. Motor Power(kW)	132	37	315
使用温度 Temperature Range (℃)	-130~+340	-130~+340	-130~+340
转速 Speed Range (rpm)	4950~23700	4900~14179	4950~23700

● GSB–L1型立式高速泵 GSB–L1 Vertical High Speed Pump

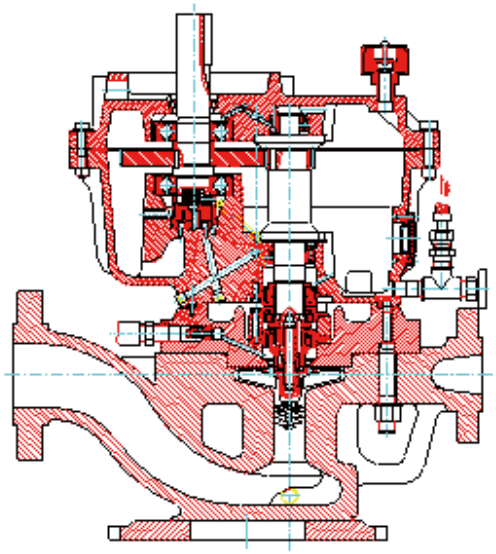
GSB–L1



剖面图 Cross Sectional Drawing

● GSB–L2型立式高速泵　GSB–L2 Vertical High Speed Pump

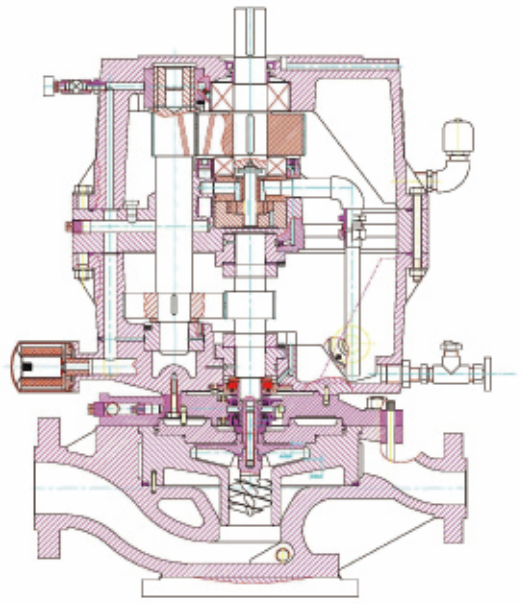
GSB–L2



剖面图　Cross Sectional Drawing

● GSB–L4A型立式高速泵　GSB–L4A Vertical High Speed Pump

GSB–L4A



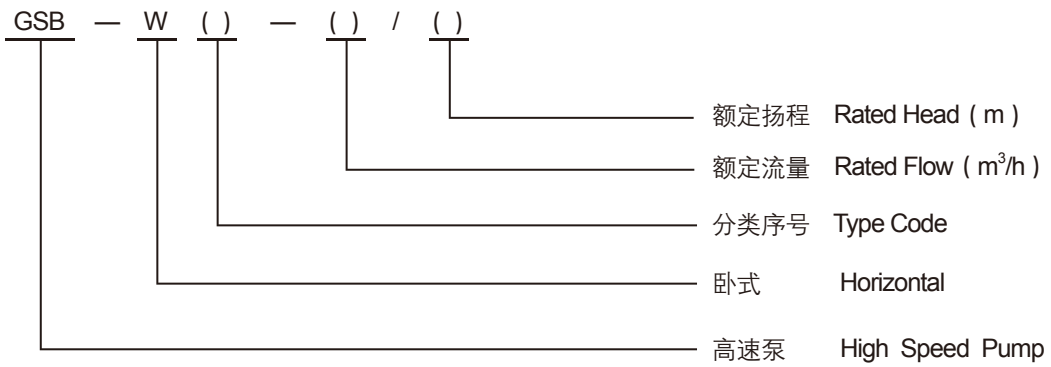
剖面图　Cross Sectional Drawing

2.2 GSB–W型卧式高速泵 GSB–W Horizontal High Speed Pump

GSB—W型系列泵是单级、单吸、悬臂、卧式高速泵，主要由电动机、增速箱、泵、润滑系统和机座等组成。该系列泵具有特性参数稳定，结构简单、维修方便、可靠性高、使用寿命长等优点。GSB-W5/W7泵机组内设有回流稳定器，从而改善了泵在小流量区的特性，使泵的流量调节范围变大。采用先进的高速推力轴承设计，使泵入口压力可达到10.0Mpa。

GSB-W are single stage, single-suction and overhung horizontal high speed pump series, which are mainly composed of motor, gearbox, pump unit, lubrication system and baseplate. GSB-W series pumps have stable characteristic parameters, simple structures, high reliability and long serve life, and are easy to maintain. A backflow stabilizer is integrated into the GSB-W5/W7 pump unit, which improves the pump performances at the low flow section and broadens the flow regulating ranges. High speed thrust bearings are adopted, which enables the suction pressure to reach 10.0 MPa.

2.2.1 型号说明Type Designation



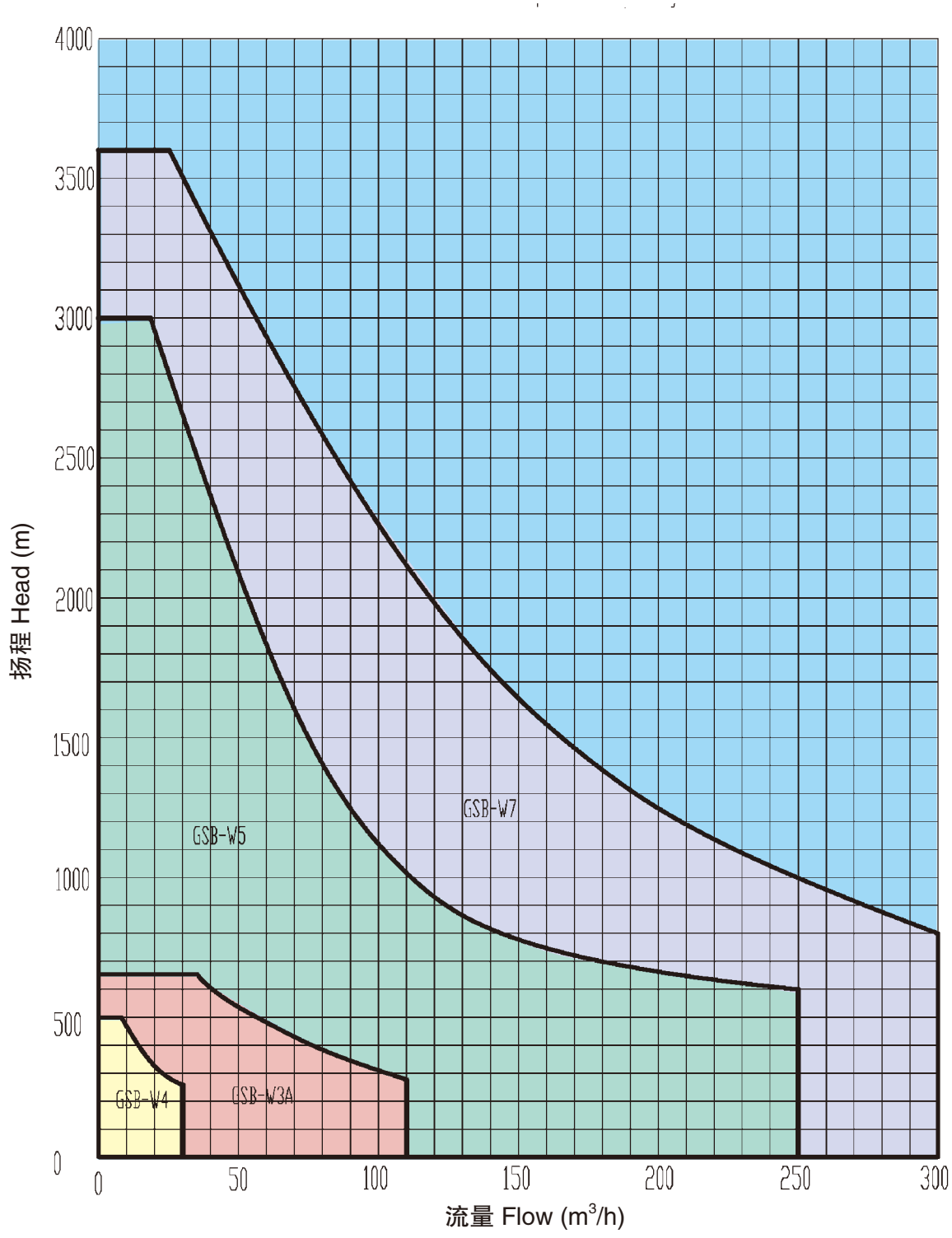
注：Note

①GSB-W3A：电动机与增速箱之间由弹性膜片联轴器相连。齿轮、轴承采用强迫润滑方式。
Motor connects with the gearbox by elastic diaphragm coupling. Forced lubricating is used for gears and bearings.

②GSB- W4：电动机与增速箱直联，无联轴器。轴承和齿轮采用油雾润滑。
Motor connects with the gearbox directly without coupling. Bearings and gears are lubricated by oil- mist.

③GSB-W5/W7：大功率高速泵，电动机与增速箱之间由弹性膜片联轴器相连。齿轮、轴承采用强迫润滑方式。
Single-stage speed-up large power horizontal high speed pump. Motor connects with the gearbox by elastic diaphragm coupling. Forced lubricating is used for gear and bearing.

2.2.2 GSB–W型卧式高速泵性能型谱图
Performance Envelopes of GSB–W Horizontal High Speed Pump

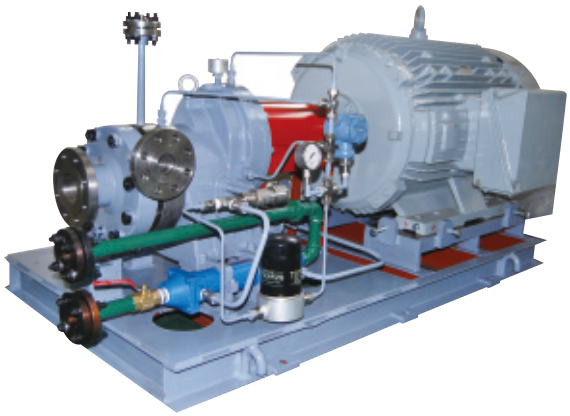


2.2.3 GSB–W型卧式高速泵性能参数表

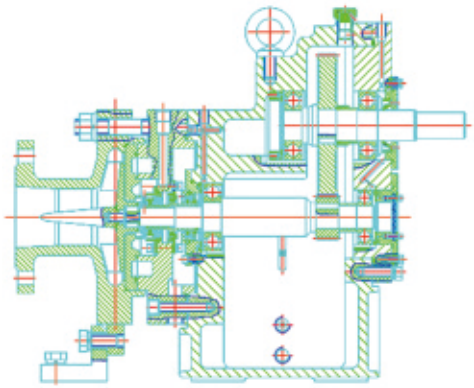
Parameters of GSB–W Horizontal High Speed Pump

型 号 Pump Type	GSB-W3A	GSB-W4	GSB-W5	GSB-W7
最大流量 Max. Flow (m^3/h)	110	30	250	300
最高扬程 Max. Head (m)	650	500	3000	3600
最大吸入压力 Max. Suction Pressure(MPa)	2.5	2.0	10.0	10.0
最大使用压力 Max. Working Pressure (MPa)	10.0	6.0	25.0	30.0
最大电机功率 Max. Motor Power(kW)	132	37	400	600
使用温度 Temperature Range (℃)	-100~+250	-100~+250	-130~+340	-130~+340
转速 Speed Range (rpm)	6700~9800	6100~30000	7000~16000	7000~19000

● GSB–W3A型卧式高速泵 GSB–W3A Horizontal High Speed Pump

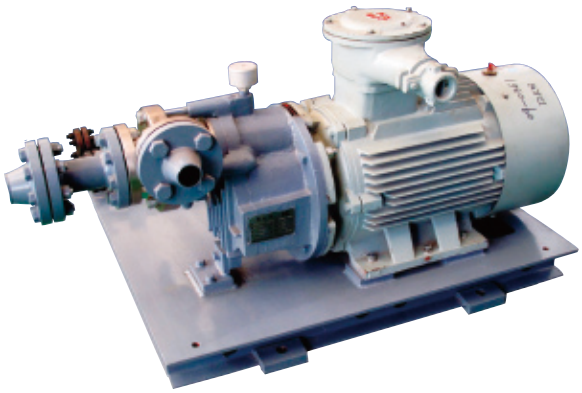


GSB–W3A

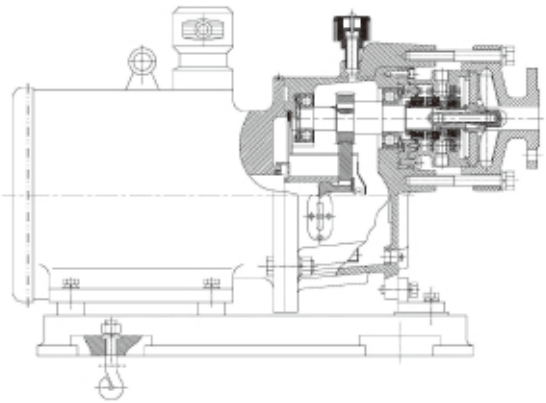


剖面图 Cross Sectional Drawing

● GSB–W4型卧式高速泵 GSB– W4 Horizontal High Speed Pump



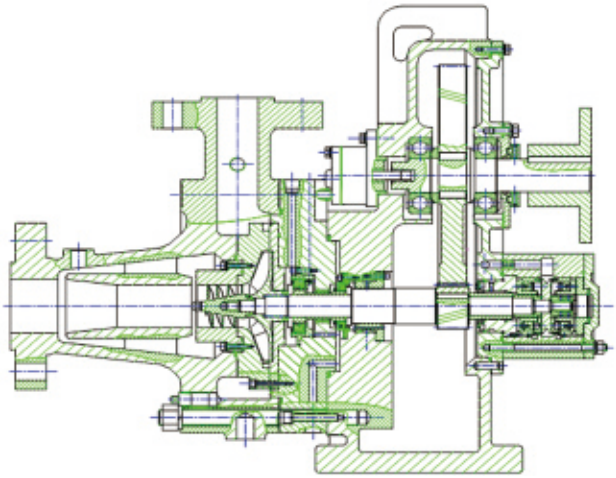
GSB—W4



剖面图　Cross Sectional Drawing

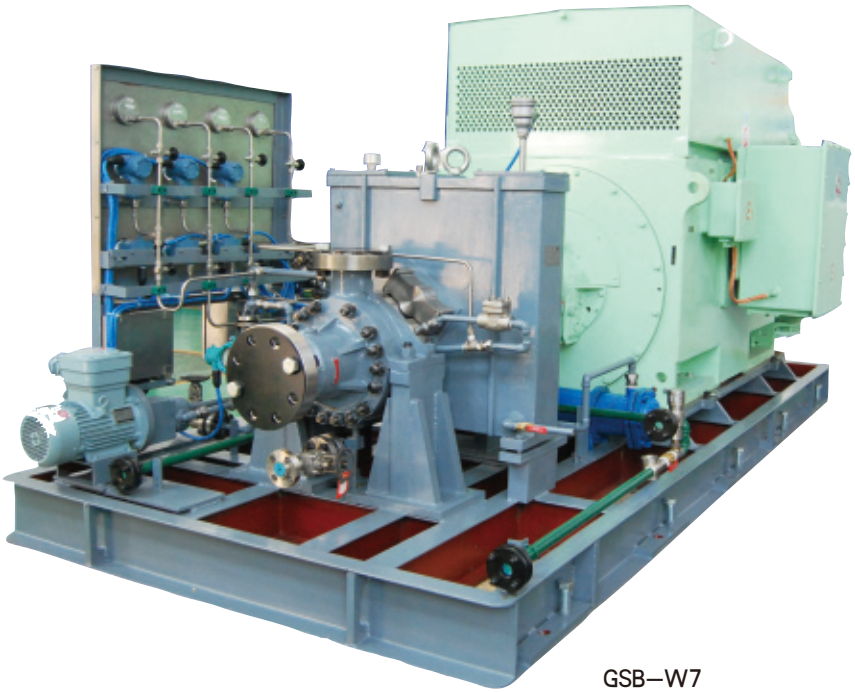
● GSB–W5型卧式高速泵 GSB– W5 Horizontal High Speed Pump

GSB—W5

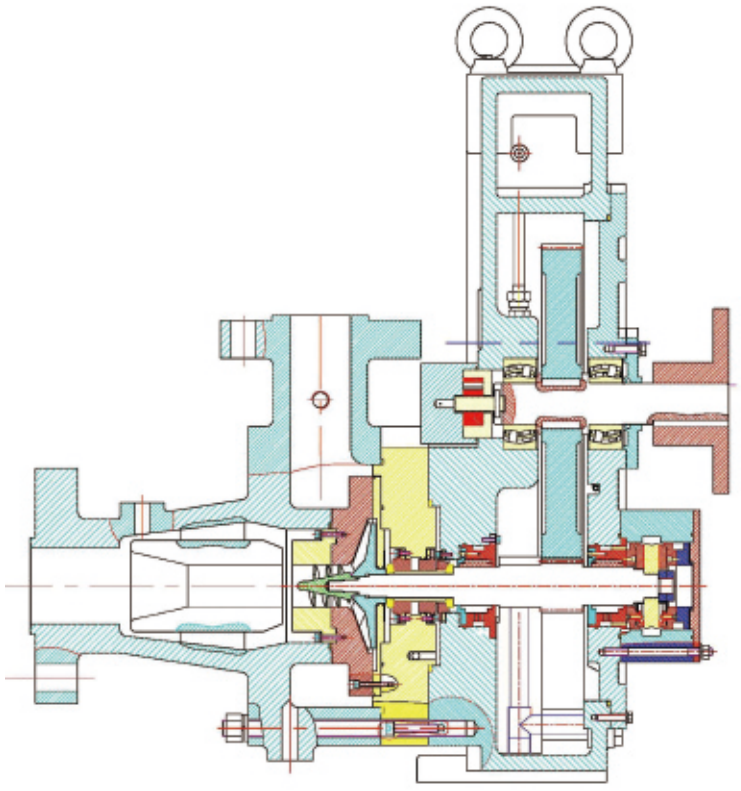


剖面图　Cross Sectional Drawing

● GSB–W7型卧式高速泵 GSB–W7 Horizontal High Speed Pump



GSB–W7



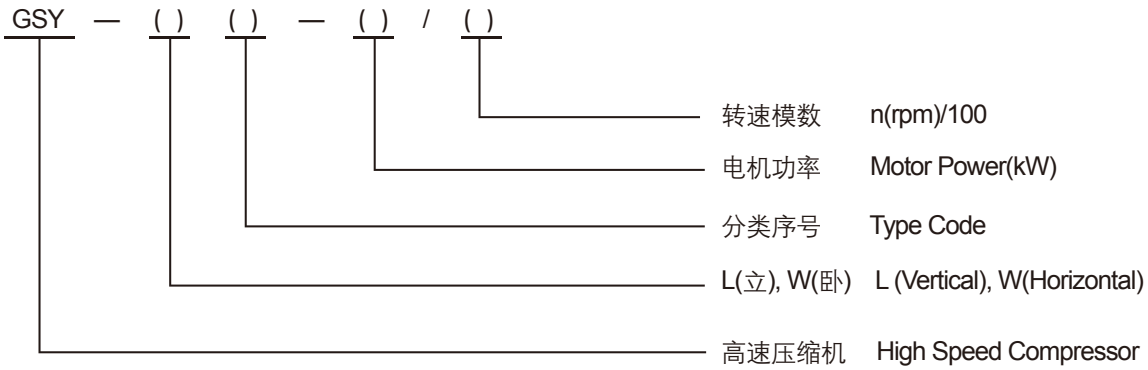
剖面图 Cross Sectional Drawing

2.3 GSY型压缩机 GSY High Speed Compressor

GSY型压缩机是适应市场需求，利用高速泵增速原理，研制开发出来的一个新产品,通过CAD软件进行优化设计，使压缩机具有较高的绝热效率和优良的使用性能。GSY型高速压缩机可按照API标准方便地配置多种密封型式，如单端面、串联、双端面密封、干气密封，满足用户的各种工况需求。

GSY high speed compressor was developed to meet the market needs, by applying the acceleration theory which is rooted from high speed pumps. Compressor designs were optimized by 3D CAD software, therefore the compressor has high adiabatic efficiency and good performance features. Various types of seals, such as single seal, tandem seal, double seal and dry gas seal, can be used in accordance with the API Standard, as per end user's operating mode.

2.3.1 型号说明Type Designation

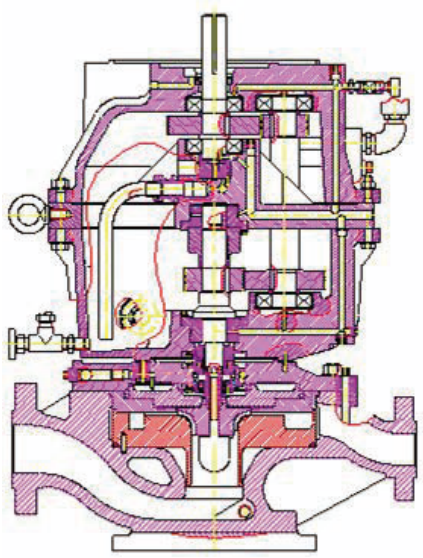


2.3.2 高速压缩机主要参数 Main Parameters Of High Speed Compressor

型 号 Model	流 量 Flow (m^3/h)	压 比 Pressure ratio	最大使用压力 Max. Working Pressure (MPa)	使用温度 Temperature Range (℃)	转速 Speed (rpm)	电机功率 Power (kW)
GSY-L	30~22000	1 ~ 3	20	-130~+340	4800~33600	7.5 ~ 315
GSY-W	10~30000	1 ~ 5	30	-130~+340	4800~30000	7.5 ~ 600

● GSY-L型立式高速压缩机 GSY-L Vertical High Speed Compressor

GSY—L



剖面图　Cross Sectional Drawing

—— 订货须知和选型方法　How to Select and Order ——

客户可以按需求的流量、扬程和介质比重，参照性能型谱图，初选设备型号，然后将下面的《数据单》填好后传真给我们，我们将计算后确定设备的最终型号、密封形式和要求、配带电机型号与功率、冷却水流量与压力、预期性能曲线、外形及安装尺寸、总重量及单价等，并将这些资料及时传给需方。

Dear clients may primarily select a model according to our performance envelopes which best suited for the required flow, head and liquid specific weight, then kindly fill out the Data Sheet attached hereafter, and then send us the finished Data Sheet by fax or by other means. After careful calculations, we will send to the clients, for their reference or decision making, the suggested model, type of seal, motor type and power, flow and pressure of cooling water, expected performance curves, layout and installation dimensions, weight, necessary requirements and unit price, etc.