V-FLO®

Specialist for Pumping Technology

GQL/GQW Series

HIGH SPEED PUMPS-API 610 OH6

GSY Series

HIGH SPEED COMPRESSORS-API 618

V-FLO PUMPS & SYSTEMS COMPANY LIMITED

V-FLO PUMPS & SYSTEMS COMPANY LIMITED

V-FLO Pumps & Systems Company Limited

Production Base in Dalian

President's Speech

Kingston Wen
Founder & President
Managing Director

V-FLO Group has been growing on the fast track with a momentum without limit since its foundation in 2002 under the guidance of corporate vision to Creating First Class Enterprise With Super Team Plus Reputed Fame & Brands. Developed on the basis of V-FLO Pumps & Systems, it has successfully grown into a multidisciplinary group focusing on international operations with businesses covering equipment packaging and supply chain management, Projects EPC, subcontracting and related consulting services as well as the development of new and renewable energy.

V-FLO is actively turning into an integration platform of technologies, products, services, markets and capitals in a way that China power and global resources meet each other without gap to generate infinite energy.

V-FLO has started a new journey to serve our customers in diversified industries for power, oil & gas, petrochemical and others. This can be translated into a wide scope of services from private basement to municipal sewage treatment, from the boiler room in a high rise building to a marine pier, in processing plants, power generating stations, paper mills, construction sites, operation and maintenance fleets and in farm fields, in solar and wind power generation as well LED lighting applications delivering our products and services to dozens of countries such as Saudi Arabia, Iraq, Iran, Syria, Jordan, Pakistan, Switzerland, Sweden, Russia and so on.

V-FLO Group, with the new workshop in operation in Dalian, China, is going to have an even more powerful team working at positions of R&D, manufacturing, contracting, marketing and management. We are dedicated to strive for a higher standard of service and products. Our investment in technology and research is second only to the support we give to our customers and employees. We approach the 21st century reaffirming our dedication to our customers, employees and vendors.

Why V-FLO?

- Experienced Management
- Win-win Cooperation
- Instant Response
- Professional Solutions
- High-quality Products

V-FLO Solution

- Optimal Solution
- Economic Cost
- Customer Service

V-FLO Products

- Latest Technologies
- Extensive Applications
- Better Customer Experience

V-FLO PUMPS & SYSTEMS COMPANY LIMITED

About Us

V-FLO Pumps & Systems, as the core business of V-FLO Group, covers wide markets and applications in the areas of oil & gas, chemical & petrochemical, power & energy, environment protection, metallurgy & mining, water supply and sewage treatment, sea water desalination, offshore platforms, underground coal gasification and so on.

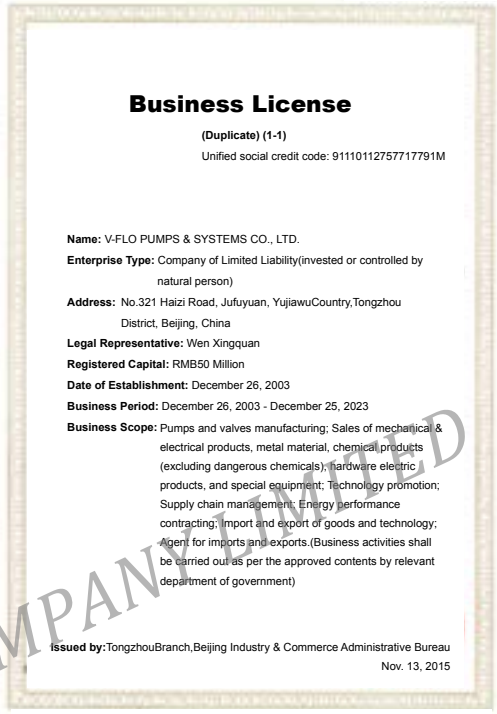
Adding to the strength of V-FLO Group, the completion and commissioning of V-FLO Dalian Production Base brings brilliance to V-FLO manufacturing capability and capacity for pumps and systems. The production capacity has been increased to 8000 units of different pump systems with casting of 40,000t per year, maxi. weight of single piece up to 25 tons, machining capacity of 2 million hours according to international codes and standards such as ASME, ANSI, HIS, ISO and API610. V-FLO attributes the pump quality to our total quality control philosophy from raw materials, fabrication and machining, NDT & dimensions, hydrotest & dynamic balance, assembling & performance test, painting and packaging strictly in accordance with procedures and standards.

V-FLO Pumps & Systems are guaranteed with reliable high quality due to the strict execution of APIQ1, ISO9000-01 and ISO14000 management systems through the whole manufacturing process from products R&D, engineering design, fabrication and production, inspection and file management. V-FLO customer confidence and satisfactions are ensured with careful and humble services.

Business Licenses

营业执照

(副本)



Business License

(Duplicate) (1-1)

Unified social credit code: 91110112757717791M

Name: V-FLO PUMPS & SYSTEMS CO., LTD.

Enterprise Type: Company of Limited Liability(invested or controlled by natural person)

Address: No.321 Haizi Road, Jufuyuan, YujiawuCountry,Tongzhou District, Beijing, China

Legal Representative: Wen Xingquan

Registered Capital: RMB50 Million

Date of Establishment: December 26, 2003

Business Period: December 26, 2003 - December 25, 2023

Business Scope: Pumps and valves manufacturing; Sales of mechanical & electrical products, metal material, chemical products (excluding dangerous chemicals), hardware electric products, and special equipment; Technology promotion; Supply chain management; Energy performance contracting; Import and export of goods and technology; Agent for imports and exports.(Business activities shall be carried out as per the approved contents by relevant department of government)

Issued by: TongzhouBranch,Beijing Industry & Commerce Administrative Bureau

Nov. 13, 2015

质量管理体系认证证书

CERTIFICATE OF CONFORMITY OF QUALITY MANAGEMENT SYSTEM CERTIFICATION

Certificate 03114Q20168R2M

This is to certify the quality management system of

V-FLO PUMPS&SYSTEMS CO.,LTD

is in conformity with

GB/T19001-2008/ISO9001:2008 标准

V-FLO PUMPS & SYSTEMS COMPANY LIMITED

营业执照

注册号

名称

类型

营业场所

负责人

成立日期

营业期限

经营范围

登记机关

Business License

Registration No.: 210200400074325

Name: V-FLO PUMP R & D INSTITUTION

Enterprise Type: Branch Company of Limited Liability(solely invested by legal person from Hongkang, Taiwan, Macao)

Address: No. 6 Kaiyang Road, Lvshun Economic &Technological Zone, Dalian, Liaoning, China

Legal Representative: OuyangChunbao

Date of Establishment: Sep.24, 2015

Business Period: Sep.24, 2015 - May12, 2024

Business Scope: Manufacturing, research, design and test ofpumps, valves and devices for solar power generation and other renewable power generation ;(Business activities shall be carried out as per the approved contents by relevant department of government)

Issued by: Dalian Industry & Commerce Administrative Bureau

Sep. 24, 2015

营业执照

名称

类型

住所

法定代表人

注册资本

成立日期

营业期限

经营范围

登记机关

Business License

Unified social credit code: 912102000995443734

Name: V-FLO （DALIAN）MACHINE CO., LTD.

Enterprise Type: Company of Limited Liability(solely invested by legal person from Hongkang, Taiwan, Macao)

Address: No. 6 Kaiyang Road, LvshunkouEconomic & Technological Zone, Dalian, Liaoning, China

Legal Representative: Wen Xingquan

Registered Capital: USD17 Million

Date of Establishment: May13, 2014

Business Period: May13, 2014 - May12, 2024

Business Scope: Manufacturing, research, design and test ofpumps, valves and devices for solar power generation and other renewable power generation ;(Business activities shall be carried out as per the approved contents by relevant department of government)

Issued by: Dalian Industry & Commerce Administrative Bureau

March 15, 2016

V-FLO Pump Series

V-FLO Pump Series							
Product types		Oil & Gas	Hydrocarbon Processing	Mining & Metallurgic Industries	Power Generation	Water	General Industry
Single Stage Pumps	VZA	Y	Y	Y	Y	Y	Y
	VZE	Y	Y	Y	Y	Y	Y
	IS/ISO			Y	Y	Y	Y
	HW			Y	Y	Y	Y
	WZ			Y	Y	Y	Y
	DSJH	Y	Y	Y	Y		
Two Stage Pumps	GSJH	Y	Y	Y	Y		
Barrel Pumps	TD	Y	Y	Y	Y		Y
Ring Section Pumps	D	Y		Y	Y	Y	Y
	DG	Y		Y	Y	Y	Y
Axial Split Pumps	VSD	Y	Y	Y	Y	Y	Y
	CPS			Y	Y	Y	Y
	SA			Y	Y	Y	Y
	KY	Y	Y	Y	Y	Y	Y
	KDY	Y	Y	Y	Y	Y	Y
Vertical Pumps	VHGA	Y	Y	Y	Y	Y	Y
	VMC	Y	Y		Y	Y	Y
	LY	Y	Y	Y	Y	Y	Y
	VTMC	Y	Y		Y	Y	Y
	ISG			Y	Y	Y	Y
	LUV				Y		
	HB/HK/H			Y	Y	Y	Y
	ZLB(Q)			Y	Y	Y	Y
	FYL	Y	Y	Y	Y		
	NLTD				Y		
Others	KWP			Y	Y	Y	Y
	XBD/XBC	Y	Y	Y			Y
	GQL/GQW	Y	Y	Y			Y
	KCB/YCB/2CY	Y	Y	Y			Y
	EH/2G/3G	Y	Y	Y			Y
	CQ	Y	Y	Y	Y		Y
	PW/PL	Y	Y	Y	Y		Y
	GQJ/SG			Y	Y	Y	Y
	QW			Y	Y	Y	Y
	QZ			Y	Y	Y	Y
	2DS/3DS	Y	Y	Y			Y
	ZX,ZZB,ZW	Y	Y	Y			Y
	J/JM	Y	Y	Y			Y
	ZD,ZG,ZX			Y	Y		Y
	2BE/2BV	Y	Y	Y	Y		Y

V-FLO PUMPS & SYSTEMS COMPANY LIMITED

Typical Pumps

VZ

VSD

VHGA

KY KDY

DSJH/GSJH

VTMC

VMC

LY

TD

GQL/GQW

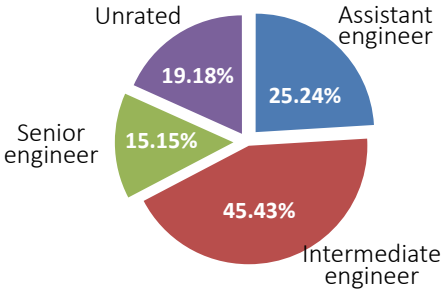
PW/PL

V-FLO PUMPS & SYSTEMS COMPANY LIMITED

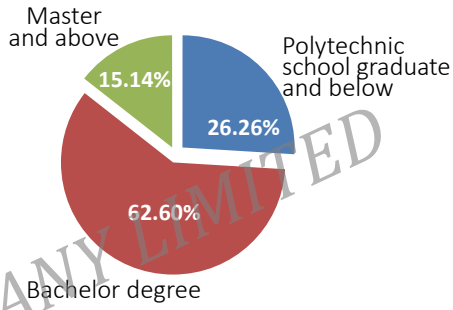
Research & Design

V-FLO Pumps & Systems in Beijing, V-FLO Shen Yang Branch and V-FLO Dalian Machine are responsible for development of all kinds of pumps & systems to meet any complicated and demanding requirements from customers. V-FLO R&Ds are carried out by ways of further improvements and upgrading of existing technologies, independent high-tech patents as well as reverse engineering design for special purposes. In addition, V-FLO also joint our hands working together with domestic and foreign leading institutes as well as colleges and universities to develop special pumps to meet demanding challenges from fields of various applications.

➢ V-FLO R&D Teams



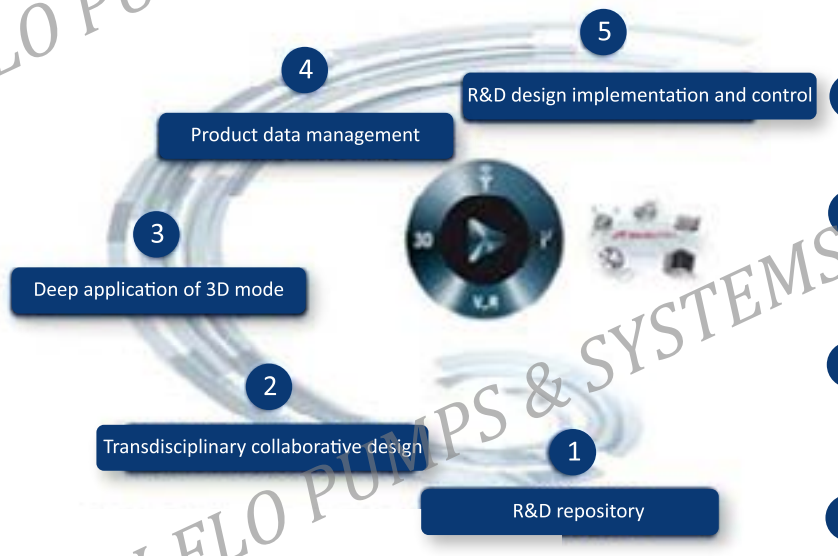
Position composition



Education composition

➢ R&D Procedures

Perfect Combination of 3D Experience & Management Philosophy



1
- Centralized management of engineering data
- 3D basic library management
- Data search and reusing
- Data security

2
- 3D based parallel collaboration
- Multiple professional design system
- Multi stations and mobile application

3
- Large-scale applied analysis
- Upstream and downstream based on reusing 3D mode
- 3D based configuration management

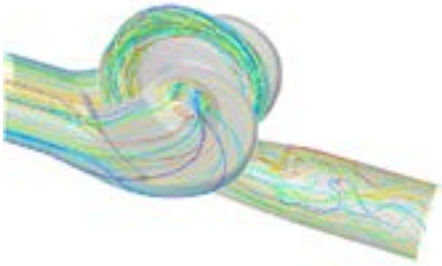
4
- Parts management
- BOM management and derivation
- Process resource and manufacturing process management
- Manufacturing system integration

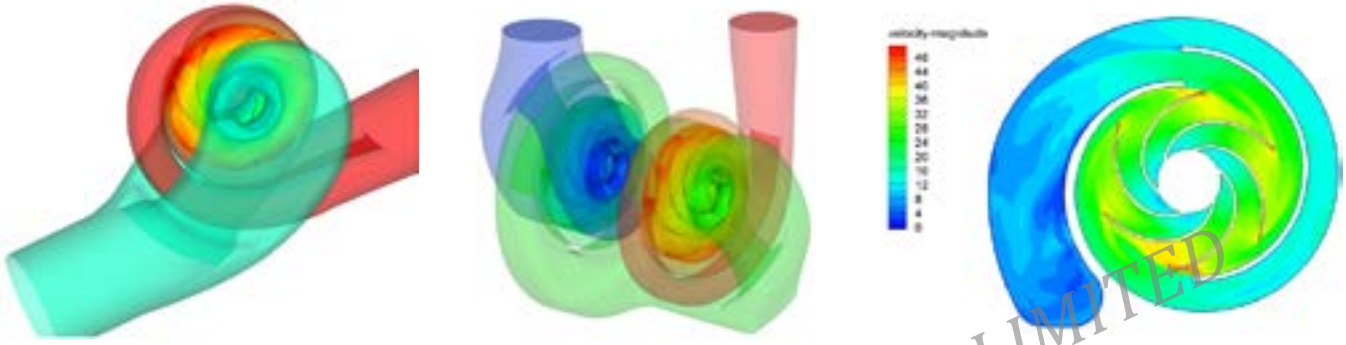
5
- Project template formulation
- Project planning and resource dividing
- Project implementation monitoring and controlling
- Report and analysis

V-FLO PUMPS & SYSTEMS COMPANY LIMITED

➢ CFD Simulation & Analysis

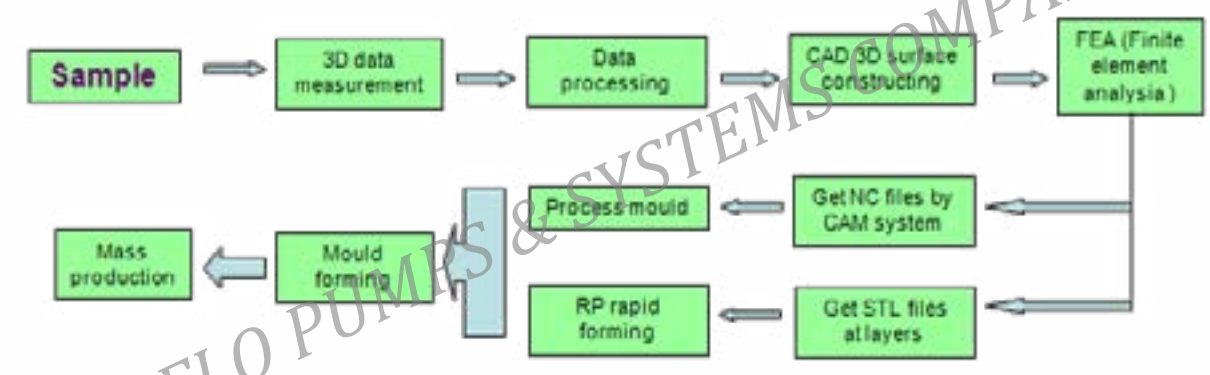
CFD flow field analysis helps to improve the pump efficiency and ensure pump reliability.





➢ Reverse Engineering

- Holographic imaging for sample, intuitive and accurate, reproduce the internal three-dimensional structure of object;
- Make non-destructive slices and cross-section imaging in any direction;
- Replace traditional destructive slice detection and analysis;
- Spatial resolution and density resolution is excellent.



Flowchart of Reverse Engineering

V-FLO PUMPS & SYSTEMS COMPANY LIMITED

R&D capability& achievements

V-FLO Pumps & Systems has 3 research centers located in Beijing, Dalian and Shenyang committed to pump R&D with many achievements, 22 patents have been awarded up till now. In addition, V-FLO has been conferred as the National High-tech Enterprises by Beijing Municipal Government and Beijing Municipal Science& Technology Commission.

Manufacturing

Enterprise Resource Planning (ERP) has been employed in V-FLO to improve the production and management efficiency as well as better satisfaction of customer needs.

Casting: 40,000t per year.
Forging: 60,000t
Machining: Working capability up to 2 million hours.
Pump testing capability: 5000KVA
Pump production capacity: 8000 units


Casting– Mould Machining


Forging Materials– Mould Forging Machine


Welding– Pipe Welding


Monitoring System Integration


Assembly Workshop


machining workshop


Paint Workshop

Performance Test Exhibition

➢ Chemical & Mechanical Lab

HIR-944 HF-IR Carbon-Sulfur Analyzer

HR-150 Manual Rockwell Hardness Tester

KH170 Portable Hardness Tester

TMR5000 Metallurgical Microscope

UTD9800 Ultrasonic Flaw Detector

CMT-300 Universal Electronic Testing Machine for Metal Materials

XL2-800 PMI Alloy Analyzer

AR930 Coating Thickness Gauge

V-FLO PUMPS & SYSTEMS COMPANY LIMITED

➢ Dynamic Balancing Test

HM40U Dynamic Balancing Machine

HM40U Dynamic Balancing Machine	
Model	HM40U
Trademark	SCHENCK
Max. rotor weight	3000 kg
Range of bearing journal	90mm - 5000mm
Max. shaft diameter of rotor support	Φ240 mm
Max. balance speed	3600 rpm
Allowable revolution diameter of rotor	Φ1600 mm
Drive power	15 KW
Minimum achievable residual unbal.	emax≤0.1g·mm/kg
Applicable standard	ISO2953

DH1000Q Belt Driven Hard Bearing Balancing Machine

DH1000Q Belt Driven Hard Bearing Balancing Machine	
Model	DH1000Q
Max. weight of workpiece	1000 kg
Max. diameter of workpiece	ϕ1500 mm
Bearing Distance	100-1800 mm
Shaft diameter range of roller bearing	ϕ10 mm-ϕ200 mm
Balance speed	approximately 1900 r/min （VF stepless speed regulation）
Drive power	VF motor 4KW
Minimum achievable residual unbal.	emax≤0.1g·mm/kg
Measuring instrumentation	with DYJ-S80 microcomputer digital electric measuring system

➢ Pump Performance Test Loop

Closed Pump Test Loop

Open Pump Test Loop- Installation Platform & Water Pool

10KV/6KV/5000KVA Transformer

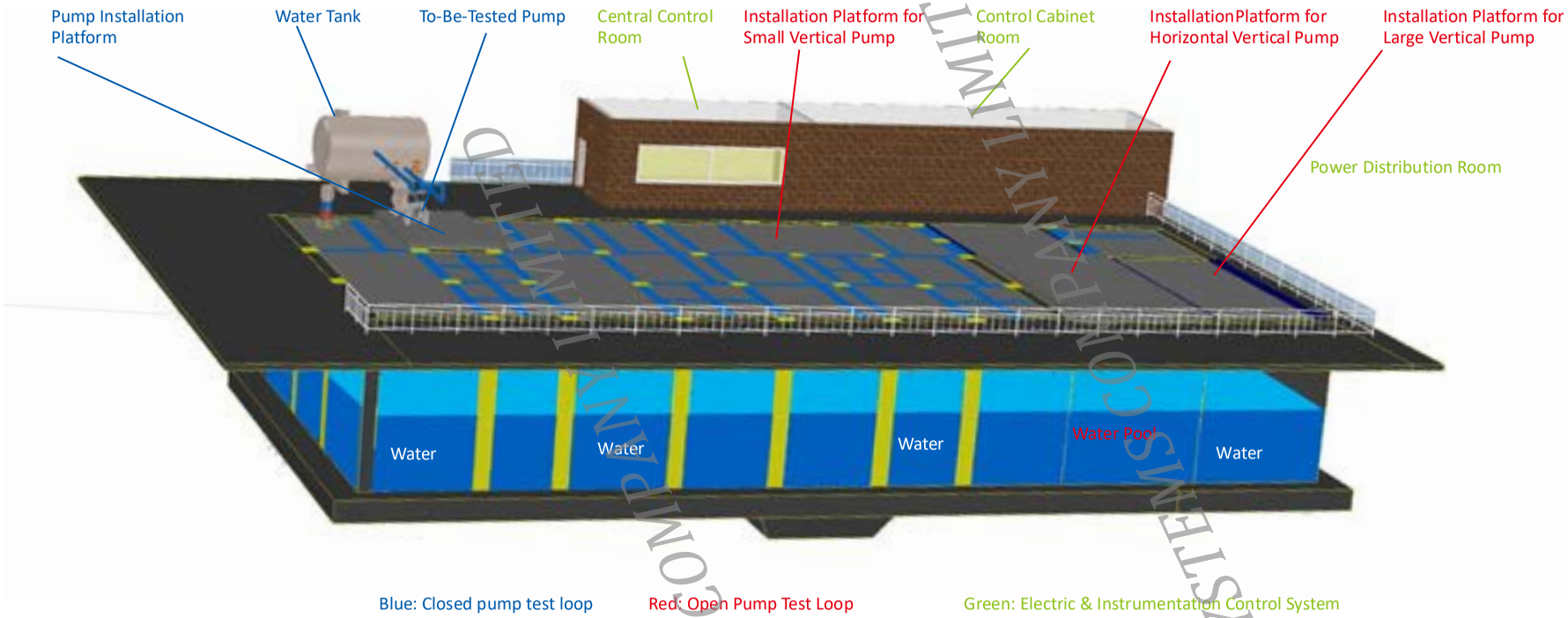
400KW/380V soft starter cabinet and control cabinet

Central Control Desk

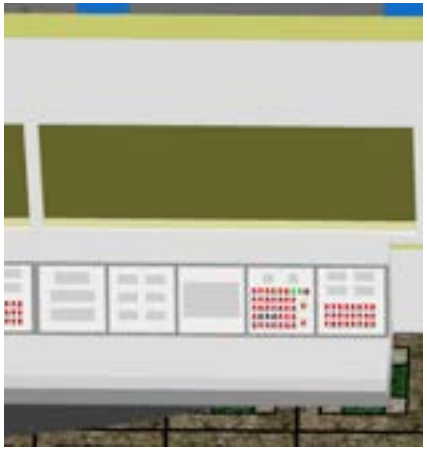
10KV Power Distribution Cabinet

Open Test Loop	**Closed Test Loop**
Area	**Area**
50mx15m	Close loop system.
Flow Measurement System	**Flow Measurement System**
Magnetic Flowmeters	**Magnetic Flowmeters**
Φ1600 mm, Φ1000 mm, Φ600 mm, Φ300 mm, Φ250 mm Φ200 mm, Φ150 mm, Φ100 mm, Φ50 mm, Φ25mm	Φ300 mm, Φ250 mm, Φ200 mm, Φ150mm, Φ100 mm Φ50mm, Φ25mm Maximum flow: 500 m^3/h
Water Pit	**Tank Dimensions**
Volume of wet sump 3600 m^3 Maximum depth 12 m	Tank capacity 60 m^3
Power Supply	**Power Supply**
5000KVA/6KV 2000KVA/3.3KV	315KW/380V, 660V
VFD Test Motor Range	**VFD Test Motor Range**
160kw, 800 kW @ 20HZ~60HZ	160kw @ 20HZ~60HZ
Maximum Lifting Facilities	
50T	

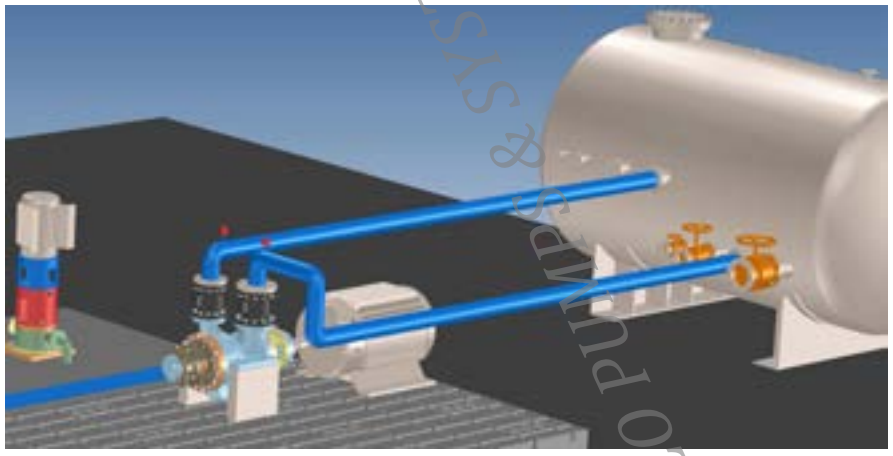
V-FLO PUMPS & SYSTEMS COMPANY LIMITED



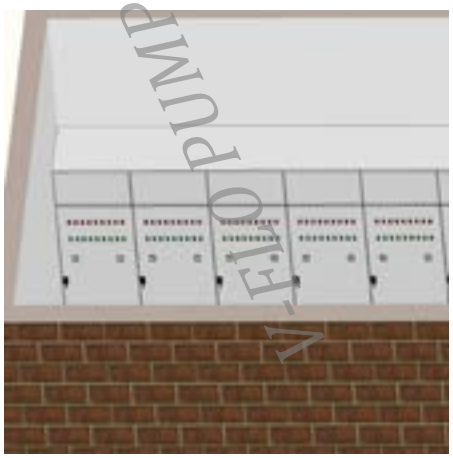
3D Model of Pump Test Loops



Central Control Table



Pump in test



Soft starter cabinet and control cabinet

After sale & Maintenance

Installation and Commissioning

V-FLO after sales service not only covers supervision for site installation and commissioning, but also offers training for operation, maintenance and even a lot more as customers may require.

Quality Control

Quality Plan Overview																									
Designation				Material						NDE					Welding			Function						
		Form of Supply	Responsibility	Chemical Analysis	Tensile Properties	Impact Properties	IHardness	Corrosion Test	Heat Treament	Visual	Liquid Penetice MT	Magnetic Particle MT	Ultrasonic UT	Radiographic RT	Procedure Qualification	Procedure Specification	Casting Repair	Hydrostatic Pressure Test	Dimension Check	Balancing	Performance Test	Final Inspection	Notes
1	Volute Casing	C	MS	3	3				3	5	4	4			4	4	5						Note
			MA															4	5				
2	Casing Covers	C	MS	3	3				3	5	4	4			4	4	5						Note
			MA															4	5				
3	Impellers	C	MS	3	3				3	5	4	4			4	4	5						Note
			MA																5	4			
4	Pump Shaft	B	MS	3	3				3	5			4										
			MA																5				
5	Wear Rings	CW	MS	1						5													
			MA																5				
6	Bearing Housing	C	MS	1						5													
			MA																5				
7	Pressure Retaining Fasteners	B	MS	ST						5													
			MA																5				
8	Auxiliary & Process Pipework	W	MS	ST																			
			FW							5					4	4			5				
			MA															4					
9	Baseplate	P	MS	1																			
			FW							5					4	4			5				
			MA																5				
10	Pump Complete		MA																5		4	4	

Note:MT can be applied when material is carbon steel.

Subiect to legislation, verification documentation detailed above may be held at Sulzer or supplier premises. When required, Manufacturing Record Dossiers shall be compiled in accordance with project requirements and hela by Sulzer.

Form of Supply

- B Bar
- C Casting
- F Forging
- P Plate and Sections
- W Wrought

Location of Test

- MS Material Supplier
- FW Fabrication Welding
- MA Manufacturer

Verification Documents

- 1 Certificate of Compliance (EN 10204 2.1)
- 2 Test Report (EN 102004 2.2)
- 3 Inspection Certificate (EN 10204 3.1)
- 4 With Report
- 5 Without Report
- ST Product Marking

V-FLO Pumps & Systems, as per API Q1 management system, has QA and QC departments in the Headquarters, while QC teams with professional inspectors are working in branches and production workshops. More than 30 QA & QC engineers are directly involved in the pump quality control activities.

In the meantime, TPI has been a normal practice in V-FLO production activities. TUV, BV, LR, SGS, IKA, DNV, GL and other international parties have been working with us for the last 14 years.

V-FLO PUMPS & SYSTEMS COMPANY LIMITED

PIDEC N.I.O.C N.I.O.E.C N.I.S.O.C PEDEC ICOFC POF Schneider Electric ODCC

Warranty

18 months after delivery or 12 months after commissioning shall be guaranteed for trouble free operation under normal working conditions.

V-FLO PUMPS & SYSTEMS COMPANY LIMITED

KINGDOM OF SAUDI ARABIA
ROYAL COMMISSION FOR
JUBAIL AND YANBU

Fatima Group

Bharat Heavy Electricals Limited

GE imagination at work

Content

V-FLO PUMPS & SYSTEMS COMPANY LIMITED

I. Overview

1. Relying on Proficiency

V-FLO high speed pumps and compressors are developed on the basis of proven technology for space rocket engine turbo pumps running at 6000-70000rpm with a single stage discharge head up to 1500-2000m and it goes to 6430m for liquid at a working temperature of -253℃. Relying on space technology development of the past 50 years plus the continuous efforts and investments, numerous of achievements have been made in the fields of flow calculation, fluid model optimization, cavitation research, optimization design of inducer and impeller, pump vibration control system, material development, bearing design for heavy load and higher speed, mechanical seal systems with high PV value and ultra low viscosity, gearbox research, fabrication and manufacturing technologies, etc.

2. Advanced Design With Proven Experiences

V-FLO high speed pumps and compressors are of international advanced level in terms of higher efficiency and reliability, lower NPSHr and noise.

For instance, the NSS - suction specific speed of our high speed pump can easily reach 5000 while 2500 is almost the limit for other manufacturers and competitors of similar products.

3. Quality Control System

V-FLO high speed pumps and compressors comply with ISO9001, ISO14001, API610,API617, ASME Standards and codes for design, manufacturing and test in addition to the requirements of aerospace and military specifications.

4. Advantages With Improved Design

V-FLO GQ-L1 high-speed pumps are compatible and interchangeable with Sundyne LMV311, GQ-L2 with LMV322 while GQ-W5 is alternative option for LMV343 and LMV331 high-power vertical high-speed pumps.

V-FLO high-speed pumps have a lot of improvements as well. For instance, the oil pump pins were a frequent failure for our competitors, which is now no more any issue for us due to the structural design improvements.

Much faster delivery time, more humble service at much lower cost for equally high quality and performances.

Competitor Pin

V-FLO Pin

5. Engineering Capability

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.

6. Manufacturing Capability

The quality of pumps and compressors is ensured due to the strict implementation of ISO 9001 and API Q1 quality assurance systems besides manufacturing and quality control procedures for aerospace equipment. Every step of manufacturing process is monitored and controlled. Key parts are machined by high precision machining center and / or special equipments, and are carefully inspected according to procedures.

7. Test Facilities

Good test facilities guarantee Hi quality products. All types of test benches and loops are developed for performance and function tests of different assemblies including internal lube oil pump test bench, journal bearing test bench, high speed pump assembly test loop, compressor test loop. Each of the high speed pumps and compressors shall be tested and qualified as per procedures before delivery.

8. Services

All service staffs are specially well trained technicians. They are qualified to solve problems which may occur during installation, commissioning and even normal production. Moreover, the modular design concept has enabled us to have adequate spare part stocks. Thus spares are able to be delivered in a very short time and there is no need for end users to store spares in advance.

Hi Speed Pump Test Loop (Vertical & Horizontal)

9. Introduction

Hi-speed pumps and compressors feature a very high efficiency as compared with multi-stage centrifugal pumps especially when operating at small flow rates and high discharge heads, widely used in industries of petroleum, chemical, aviation, metallurgy and so on.

a. High Performance Gearbox

Proven manufacturing processes have been formed through decades of experience. As one 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. So chemicals and heat treatments are strictly controlled. Multiple stabilizing treatments are carried out after the primary operation thus ensuring the high strength and high stability of the gearbox casing. All finished parts are strictly inspected and inspections are properly filed.

b. Tilting Pad Bearing

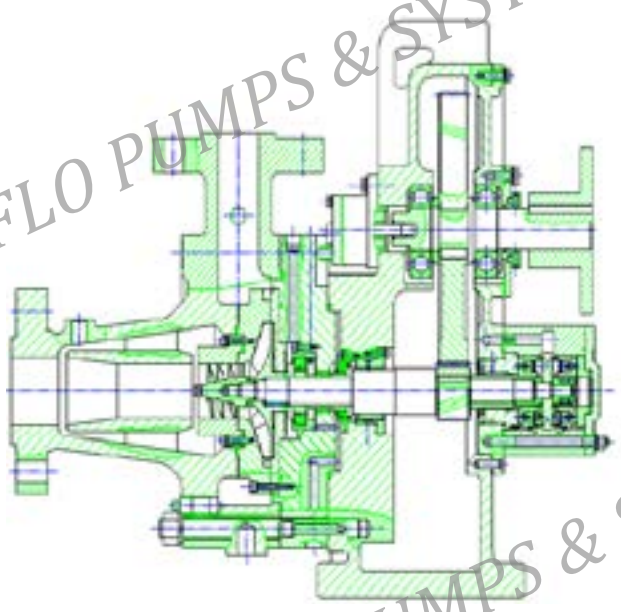
The structure of a high speed shaft is determined by rotor kinetics analysis. Various types of tilting pad bearings have been developed, which are good for axial direction, radial direction or axial and radial direction combined, according to customers' operating modes. Since all types of tilt pad bearings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

c. Hydraulic Section Optimized

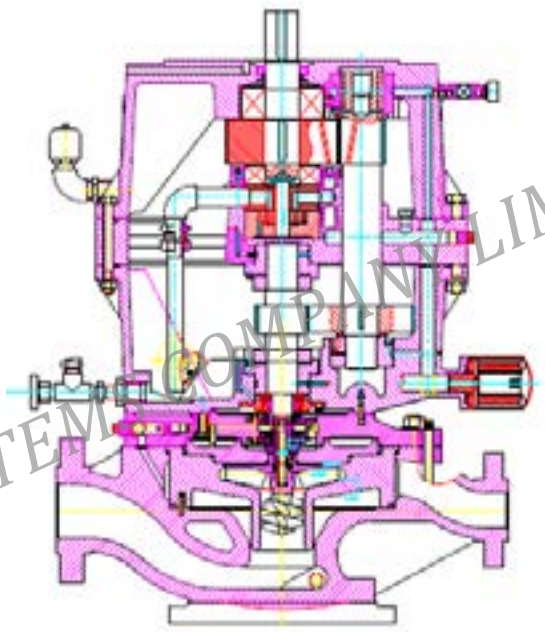
Inducers, impellers, diffusers and pump casings are optimized with CFD analysis as well as prototype test before put into production.

d. Various Types of Seals

Single seals, tandem seals, double seals and dry gas seals are available and as per API 682.



GQ–W Cross Sectional Drawing



GQ–L Cross Sectional Drawing

e. Key Components

Gear & Shaft

Bearing

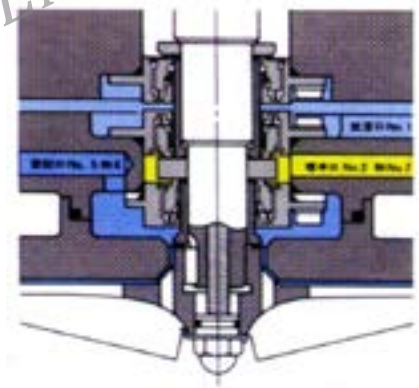
Inducer

Impeller

Diffuser

Gear Box 1

Gear Box 2

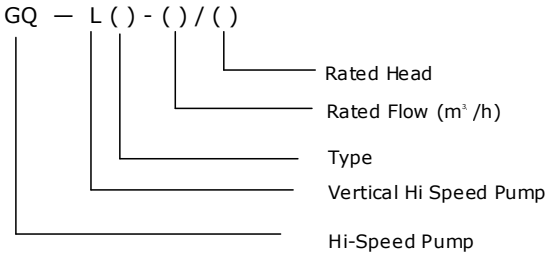


Seal

II. GQ-L Vertical Hi-Speed Pump

Suction and discharge flanges of GQ-L vertical high speed pumps are designed on the same centerline to enhance the stiffness and thermal-shock resistant capability. Besides, the piping load capacity is also increased.

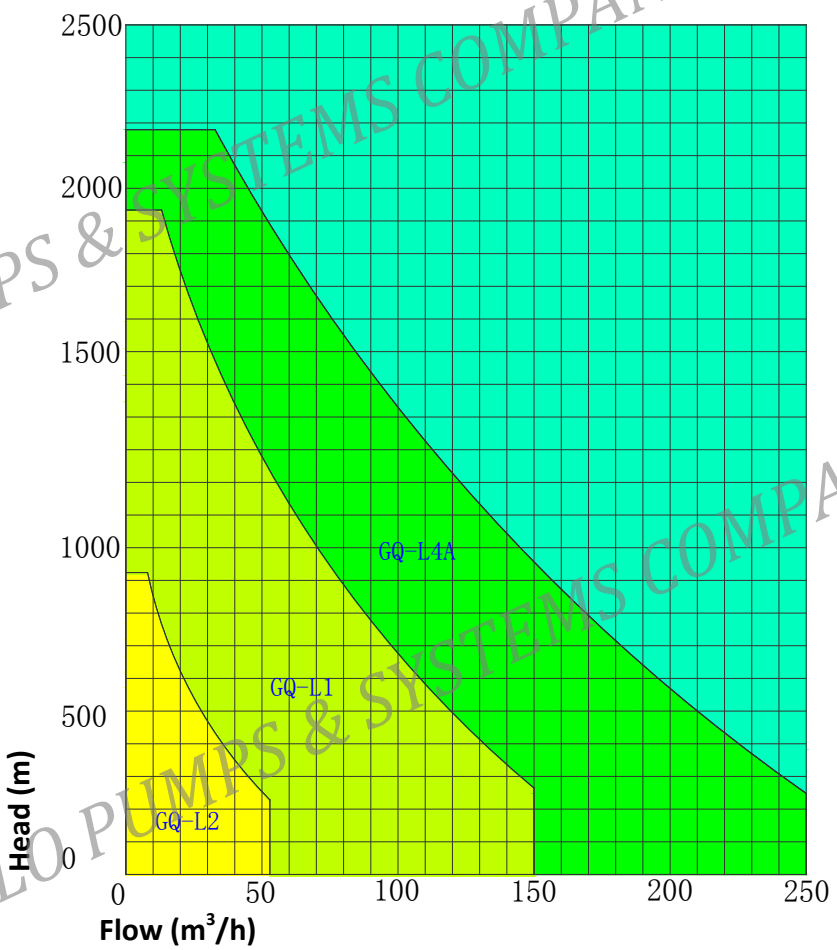
1. Model Nomenclature



Type Code:

1. GQ—LI: Double-stage speed-up vertical high speed pump.
2. GQ—L2: Single-stage speed-up vertical high speed pump.
3. GQ-L4A: Double-stage speed-up large power vertical high speed pump.

2. Family Curves



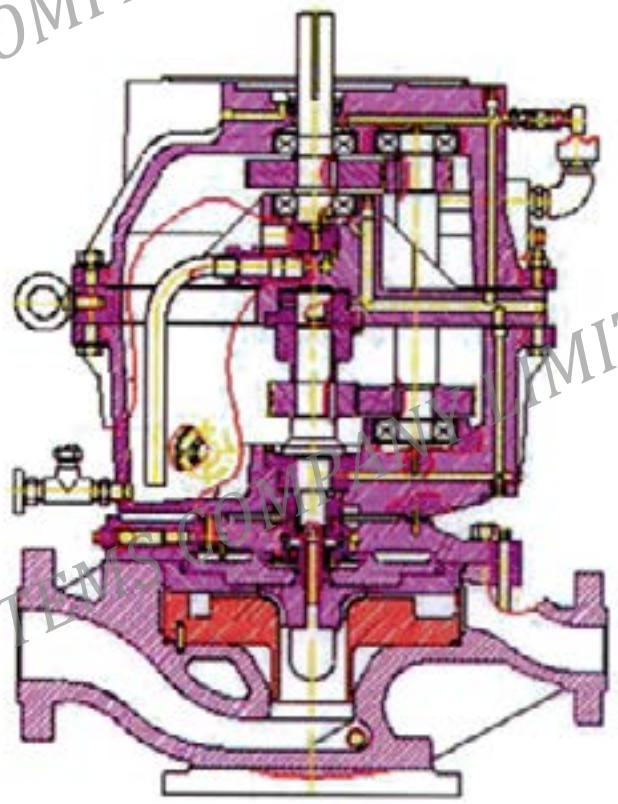
Performance Envelopes of GQ-L Vertical High Speed Pump

3. Parameters of GQ - L

Pump Model	GQ-L1	GQ-L2	GQ-L4A
Max. Flow (m^3/h)	150	52	250
Max. Head (m)	1920	915	2180
Max. Suction Pressure (MPa)	6.8	4	6.8
Max. Working Pressure (MPa)	20	10	20
Max. Motor Power (Kw)	132	37	315
Temp. Range (℃)	-130~+340	-130~+340	-130~+340
Speed Range (rpm)	4950~23700	4900~23700	4950~23700

● **GQ-L1 Vertical Hi-Speed Pump**

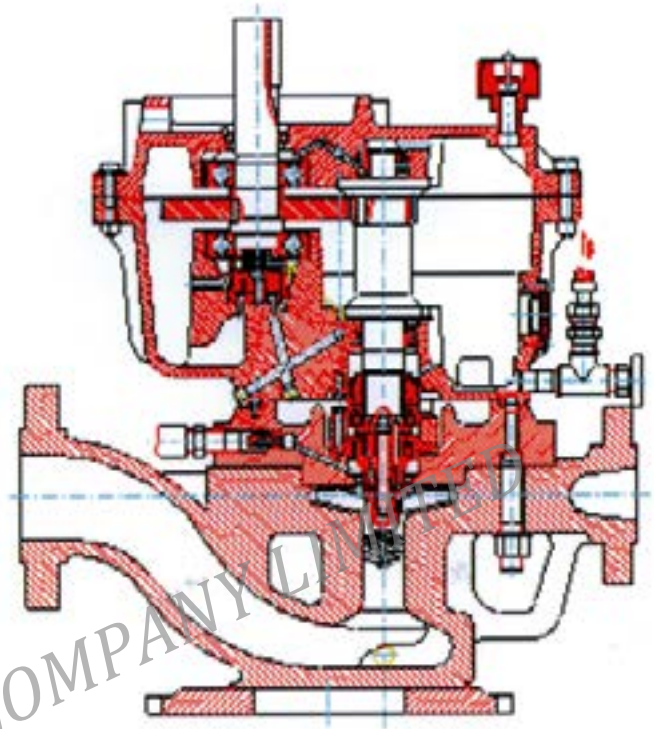
GQ—L1



Cross Sectional Drawing

● **GQ-L2 Vertical Hi-Speed Pump**

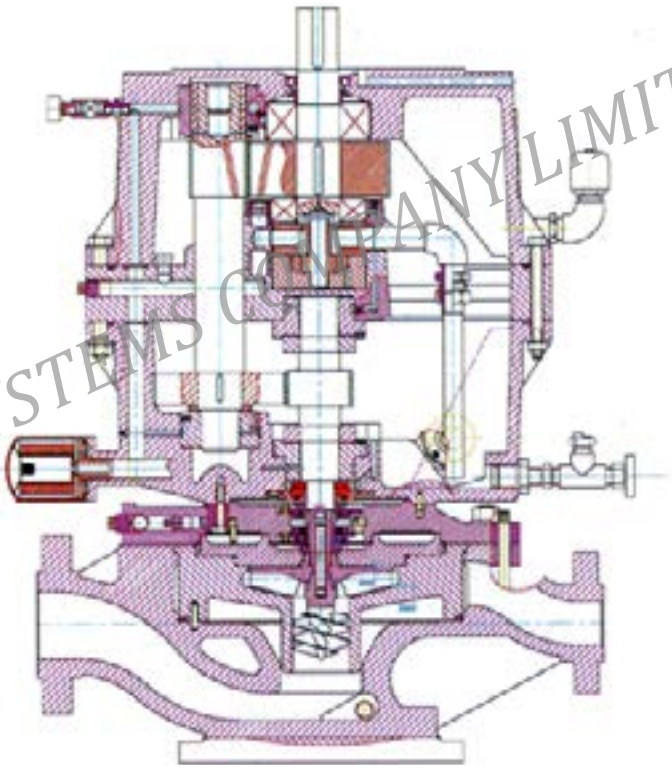
GQ—L2



Cross Sectional Drawing

● **GQ-L4A Vertical Hi-Speed Pump**

GQ—L4A



Cross Sectional Drawing

III. GQ-W Horizontal Hi-Speed Pump

GQ-W are single stage, single-suction and overhung horizontal high speed pump series, which are mainly composed of electric motor, gearbox, pump assembly, lubrication system and baseplate. GQ-W series pumps have stable characteristic parameters, simple structures, high reliability and long serve life with easy maintenance. A backflow stabilizer is integrated into the GQ-WS/W7 pump system to improve the performances at low flow section and extend the flow regulating ranges. High speed thrust bearings are employed to bear suction pressure as high as 10MPa.

1. Model Nomenclature

GQ - W 3A - HO / 650

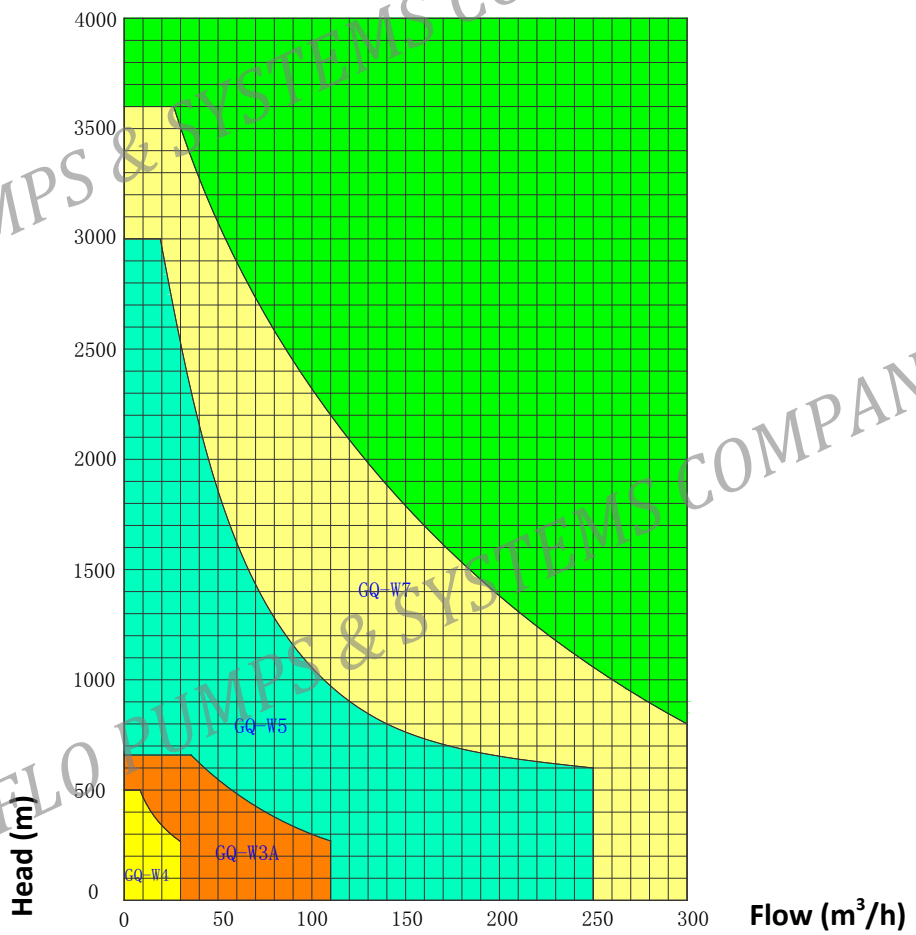
- 650 — Rated Head
- HO — Rated Flow(m^3/h)
- 3A — Type Code
- W — Horizontal
- GQ — Hi-Speed Pump

Notes:

GQ—W3A/W5/W7: Flexible diaphragm coupling plus forced lubrication

GQ—W4: Direct coupling and oil – mist lubrication

2. Family curves for GQ-W Horizontal Hi-Speed Pump

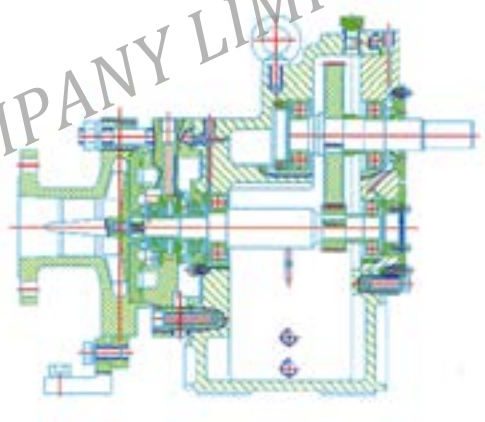


3. Parameters of GQ-W Horizontal Hi-Speed Pumps

Pump Model	GQ-W3A	GQ-W4	GQ-W5	GQ-W7
Max. Flow (m3/h)	110	30	250	300
Max. Head (m)	650	500	3000	3600
Max. Suction Pressure (MPa)	2.5	2	10	10
Max. Working Pressure (MPa)	10	6	25	30
Max. Motor Power (Kw)	132	37	400	600
Temp. Range (℃)	-100~+250	-100~+250	-130~+340	-130~+340
Speed Range (rpm)	6700~9800	6100~3000	7000~16000	7000~17900

● **GQ-W3A Horizontal Hi-Speed Pump**

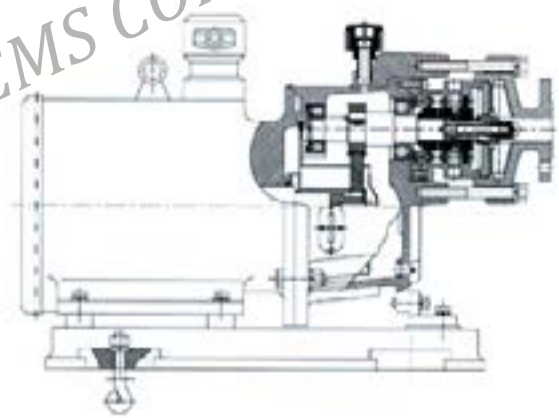
GQ-W3A



Cross Sectional Drawing

● **GQ-W4 Horizontal Hi-Speed Pump**

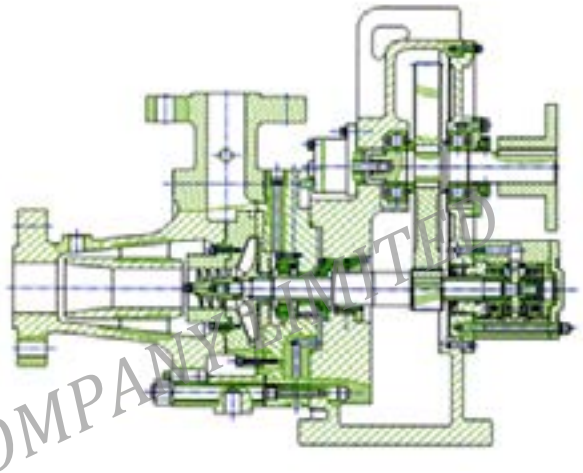
GQ-W4



Cross Sectional Drawing

● **GQ-W5 Horizontal Hi-Speed Pump**

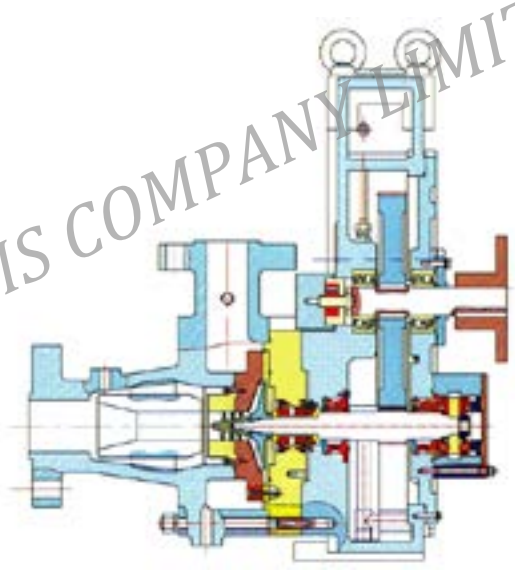
GQ—W5



Cross Sectional Drawing

● **GQ-W7 Horizontal Hi-Speed Pump**

GQ—W7



Cross Sectional Drawing

IV. GSY Hi-Speed Compressor

GSY high speed compressor are developed for the extended application to gases from the acceleration theory of high speed pumps. Compressor has a very high adiabatic efficiency and similar to high speed pumps, various types of sealing systems, such as single seal, tandem seal; double seal and dry gas seal, are available for selection.

1. Model Nomenclature

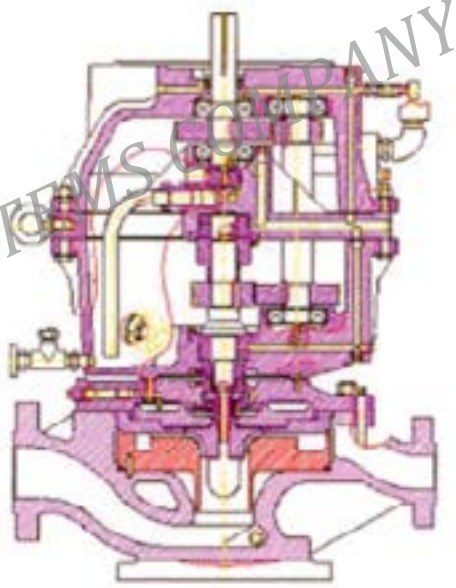
GYS - L 5 - 100 / 29.8

- n(rpm)/100
- Motor Power(kw)
- Type Code
- L(vertical) W(horizontal)
- Hi-Speed Compressor

Model	Flow Rate (m^3/h)	Compress ratio	Max. Working Pressure (Mpa)	Temperature Range (℃)	Speed (rpm)	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

2. GSY-L Vertical High Speed Compressor

GSY-L



Cross Sectional Drawing

V. Typical Applications

Project Name: South Pars Gas Field Development, Phase13/14 and Phase2224
Project Owner: NIOC-POGC
Purchaser: MANPA Group
Total 9 high-speed pumps are provided for the project, details are as follows:

1. TAG NO.: 13-121-P-105A/B
Model: GQLI 32/370
Fluid type: Boiler feed water
Flow rate: 32.1m3/h
Diff. Head: 368.2m
Motor Power: 90Kw
Speed: 10273rpm

2. TAG NO.: 13-146-P-107, 14-146-P-107
Model: GQL1-40/330
Fluid type: Fresh caustic soda
Flow rate: 40m3/h
Diff. Head: 329.39m
Motor Power: 132Kw
Speed: 8527 rpm

3. TAG NO.: 14-121-P-105A/B
Model: GQLI 30/395
Fluid type: Boiler feed water
Flow rate: 30.5m3/h
Diff. Head: 394.8m
Motor Power: 90Kw
Speed: 10273 rpm

4. TAG NO.: 2224-121-P-105A/B
Model: GQLI 30/401
Fluid type: Boiler feed water
Flow rate: 30.5m3/h
Diff. Head: 401.54m
Motor Power: 90Kw
Speed: 10273 rpm

5. TAG NO.: 2224-146-P-107
Model: GQLI 30/330
Fluid type: Fresh caustic soda
Flow rate: 40m3/h
Diff. Head: 329.39m
Motor Power: 132Kw
Speed: 8527 rpm

V-FLO PUMPS & SYSTEMS COMPANY LIMITED

Project Name: South Pars Gas Field Development, Phase 14and Phase 1718
Project Owner: NIOC-POGC
Purchaser: Industrial Projects Management of Iran
Total 2 high-speed pumps are provided for the project, details are as follows:

1. TAG NO.: 14-145-P-102
Model: GQLI 11/343-86
Fluid type: Propane
Flow rate: 11m3/h
Diff. Head: 343m
Motor Power: 30Kw.
Speed: 8600 rpm

2. TAG NO.: 1718-145-P-102
Model: GQLI 11/322-22
Fluid type: Propane
Flow rate: 11m3/h
Diff. Head: 297.7m
Motor Power: 22Kw.
Speed: 10237rpm

VI. Part of References for High Speed Pumps

Seq.	Client	Pump Type	Head (m)	Capacity (m^3/h)	Medium	Material	Motor Power (KW)	Qty	Country	Year
1	Sonatrach	GQL2A-3/200	200	3	Crude Oil	S-6	30	3	Algeria	2006
2	NRC	GQL1-3.5/771	771	3.5	Demineralized water	A-8	45	2	Chad	2010
3	NRC	GQL2A-7.8/200	200	7.8	Propylene	S-6	22	3	Chad	2010
4	NRC	GQL2-10/100	100	10	Propylene	A-8	15	1	Chad	2010
5	IPMI	GQL1-11/343	343	11	Propane	A-8	30	3	Iran	2010
6	PKSK .CO	GQLI 11/343	343	11	Propane	A-8	30	1	Iran	2010
7	PKSK .CO	GQLI 11/343	343	11	Propane	A-8	30	1	Iran	2010
8	PKSK .CO	GQLI 11/343	343	11	Propane	A-8	30	1	Iran	2010
9	Neyrperse	GQL1-32/370	368	32	Boiler Feed Water	S-5	90	2	Iran	2011
10	Neyrperse	GQL1-40/330	329	40	Fresh Caustic Soda	A-8	132	1	Iran	2011
11	Neyrperse	GQL1-32/370	368	32	Boiler Feed Water	S-5	90	2	Iran	2011
12	Neyrperse	GQL1-40/330	329	40	Fresh Caustic Soda	A-8	132	2	Iran	2011
13	Neyrperse	GQL1-32/370	368	32	Boiler Feed Water	S-5	90	2	Iran	2011
14	Neyrperse	GQL1-40/330	329	40	Fresh Caustic Soda	A-8	132	1	Iran	2011
15	Neyrperse	GQL1-40/330	329	40	FRESH CAUSTIC SODA	A-8	132	3	Iran	2011
16	Neyrperse	GQL1-40/330	394.8	30.5	BOILER FEED WATER	S-6	90	2	Iran	2011
17	PKSK	GQL1-11/343	343	11	Propane	A-8	30	3	Iran	2011
18	Mapna	GQL2	392	16	Gas Oil	S-5	45	2	Iran	2011
19	IPMI	GQLI 11/343	343	11	Propane	A-8	30	1	Iran	2011
20	C.P.T.	GQL2	350	40	OILY WATER	D-2	132	1	Iran	2011
21	IPMI	GQLI 11/298	297.7	11	Propane	A-8	22	1	Iran	2012
22	PIDEC	GQW4	280	28	Propane	A-8	90	2	Iran	2012
23	PIDEC	GQW4	277	26.5	Hydrocabons and water	A-8	90	2	Iran	2012
24	Neyrperse	GQL1-30/370	368.2	32.1	BOILER FEED WATER	S-5	90	2	Iran	2012
25	Xingzhonghe LTD	GQW5-46/832	832	46	CTWS1	A-7	280	2	Turkey	2012
26	OPTC	GQW5-94/780	780	94	Water	S-5	315	2	Taiwan	2013

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