



Specialist for Pumping Technology



V-FLO PUMPS & SYSTEMS COMPANY LIMITED

 **VTMC Series**
DOUBLE-CASING VERTICAL
DIFFUSER PUMP

API 610-VS6

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



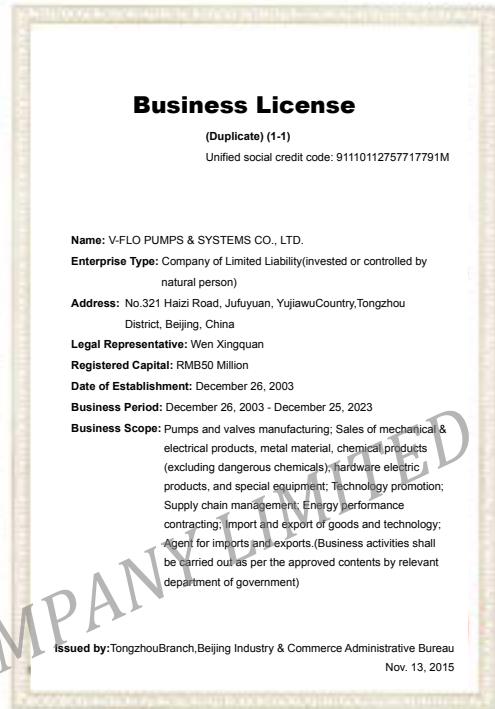
About Us

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

注册号 210200400074325

名称	大连威福机械制造有限公司水泵研究所
类型	有限责任公司(台湾港法人独资)分公司
营业场所	辽宁省大连市高新园区开兴街4号
负责人	刘阳坤安
成立日期	2015年09月28日
营业期限	2015年09月28日至2024年05月12日
经营范围	水泵、阀门、太阳能及再生能源发电设备的研发、设计、试验、销售及售后服务;太阳能热水器(限分支机构经营)。(依法须经批准的项目,经相关部门批准后方可开展经营活动)***



登记机关 2015年 月 日

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 of pumps, 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

统一社会信用代码 912102000995443734

名称	大连威福机械制造有限公司
类型	有限责任公司(台湾港法人独资)
住所	辽宁省大连市高新园区经济技术开发区开兴街4号
法定代表人	褚兴安
注册资本	美元壹仟柒佰万元整
成立日期	2014年05月13日
营业期限	自2014年05月13日至2024年05月12日
经营范围	水泵、阀门、太阳能及再生能源发电设备的研发、设计、生产、试验、销售及售后服务;太阳能热水器(限分支机构经营)。(依法须经批准的项目,经相关部门批准后方可开展经营活动)***



登记机关 2014年 月 日

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, Lvshun Economic & Technological Zone, Dalian, Liaoning, China
Legal Representative: Wei Xingquan
Registered Capital: USD17 Million
Date of Establishment: May13, 2014
Business Period: May13, 2014 - May12, 2024
Business Scope: Manufacturing, research, design and test of pumps, 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/HZLB(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	

Typical Pumps



VZ



VSD



VHGA



KY KDY



DSJH/GSJH



VTMC



VMC



LY



TD



GQL/GQW



PW/PL

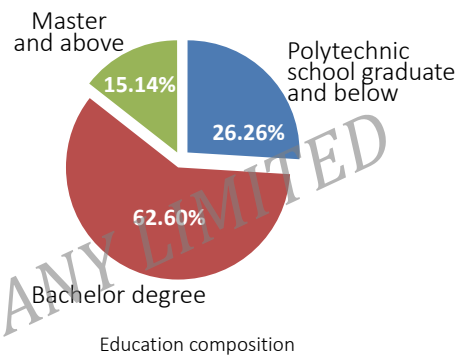
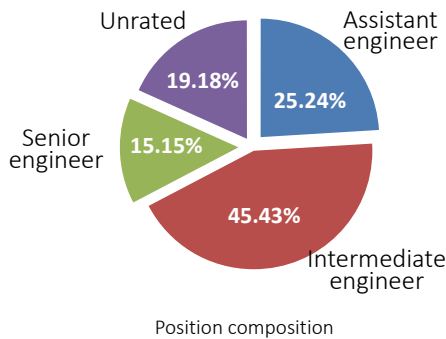


V-FLO PUMPS & SYSTEMS COMPANY LIMITED

Research & Design

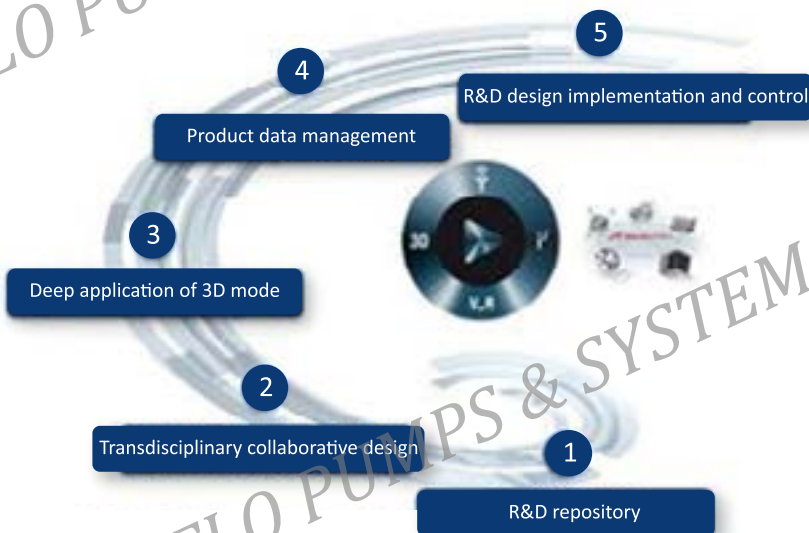
V-FLO Pumps & Systems in Beijing, V-FLO Shen Yang Branch and V-FLO Dalian Machine are responsible for development of all kinds of pumps & systems to meet any complicated and demanding requirements from customers. V-FLO R&Ds are carried out by ways of further improvements and upgrading of existing technologies, 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



> R&D Procedures

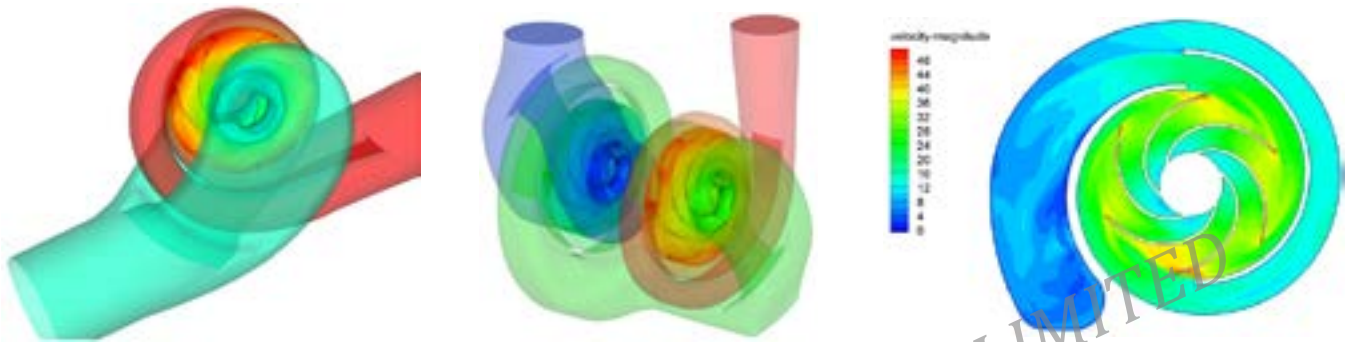
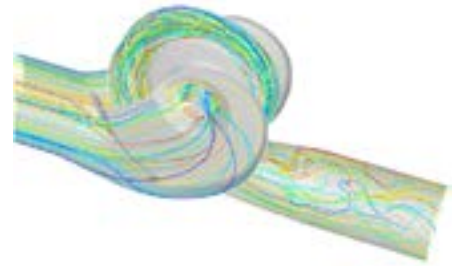
Perfect Combination of 3D Experience & Management Philosophy



- 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

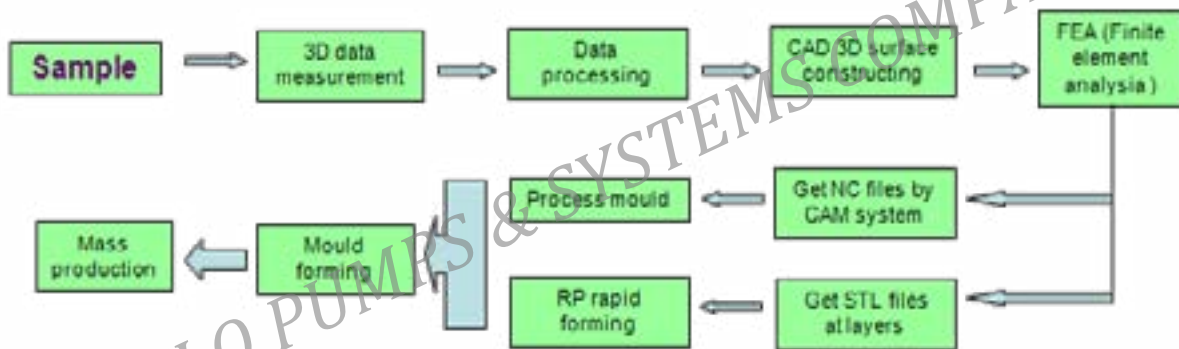
> CFD Simulation & Analysis

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

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



MR5000 Metallurgical Microscope



UTD9800 Ultrasonic Flaw Detector



CMT-300 Universal Electronic Testing Machine for Metal Materials



XL2-800 PMI Alloy Analyzer



AR930 Coating Thickness Gauge

➤ 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.	$e_{max} \leq 0.1g \cdot mm/kg$
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.	$e_{max} \leq 0.1g \cdot mm/kg$
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

Area

50mx15m

Flow Measurement System

Magnetic Flowmeters

Φ1600 mm, Φ1000 mm, Φ600 mm, Φ300 mm, Φ250 mm
Φ200 mm, Φ150 mm, Φ100 mm, Φ50 mm, Φ25mm

Water Pit

Volume of wet sump 3600 m³
Maximum depth 12 m

Power Supply

5000KVA/6KV
2000KVA/3.3KV

VFD Test Motor Range

160kw, 800 kW @ 20HZ~60HZ

Maximum Lifting Facilities

50T

Closed Test Loop

Area

Close loop system.

Flow Measurement System

Magnetic Flowmeters

Φ300 mm, Φ250 mm, Φ200 mm, Φ150mm, Φ100 mm
Φ50mm, Φ25mm Maximum flow: 500 m³/h

Tank Dimensions

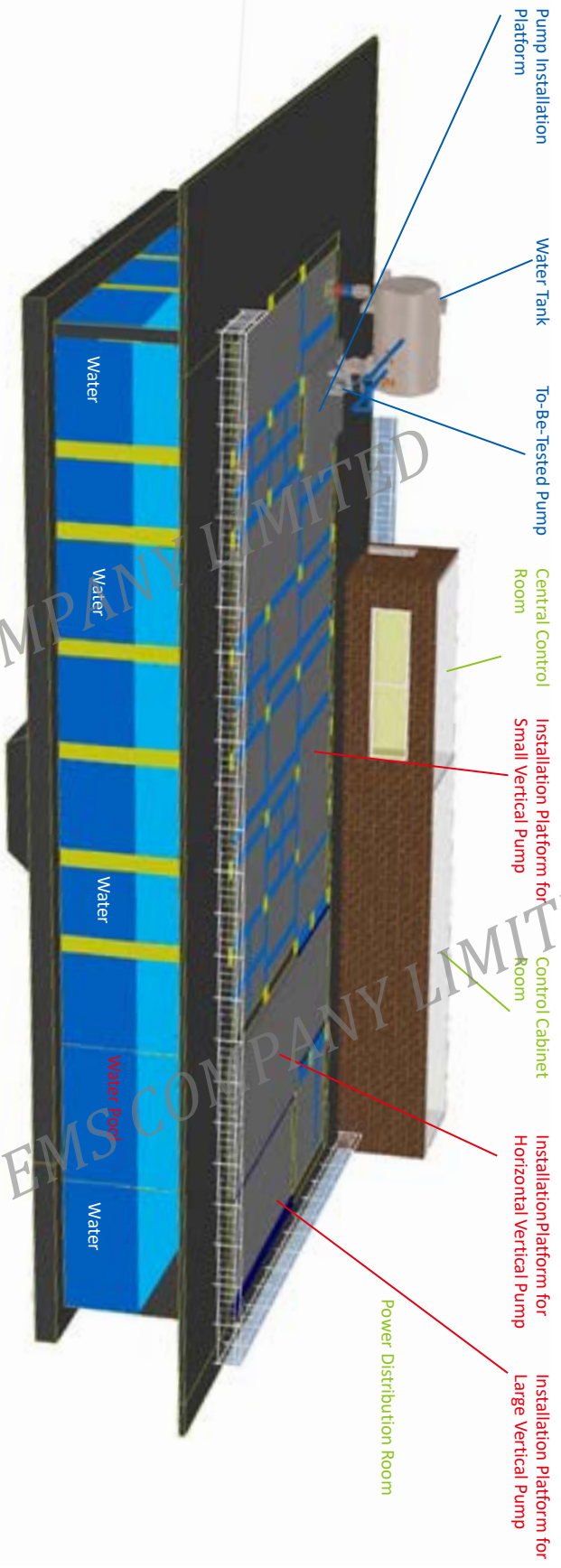
Tank capacity 60 m³

Power Supply

315KW/380V, 660V

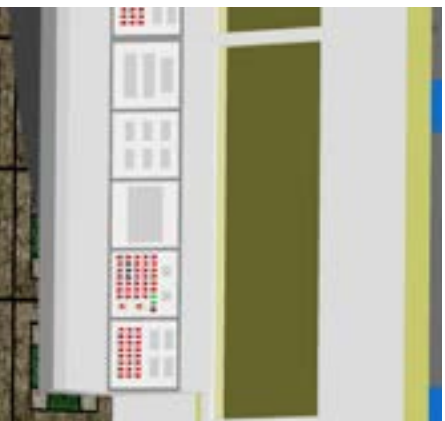
VFD Test Motor Range

160kw @ 20HZ~60HZ

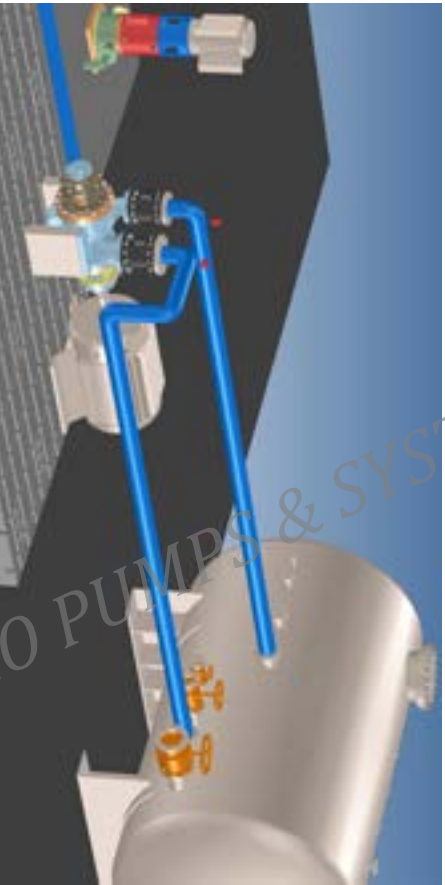


Blue: Closed pump test loop
 Red: Open Pump Test Loop
 Green: Electric & Instrumentation Control System

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								
No.	Designation	Form of Supply	Responsibility	Chemical Analysis		Tensile Properties	Impact Properties	IHardness	Corrosion Test	Heat Treatment	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	
				MS	ST																				
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					5															
			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.

Subject 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 held by Sulzer.

Form of Supply	Location of Test	Verification Documents
B Bar	MS Material Supplier	1 Certificate of Compliance (EN 10204 2.1)
C Casting	FW Fabrication Welding	2 Test Report (EN 102004 2.2)
F Forging	MA Manufacturer	3 Inspection Certificate (EN 10204 3.1)
P Plate and Sections		4 With Report
W Wrought		5 Without Report
		ST Product Marking

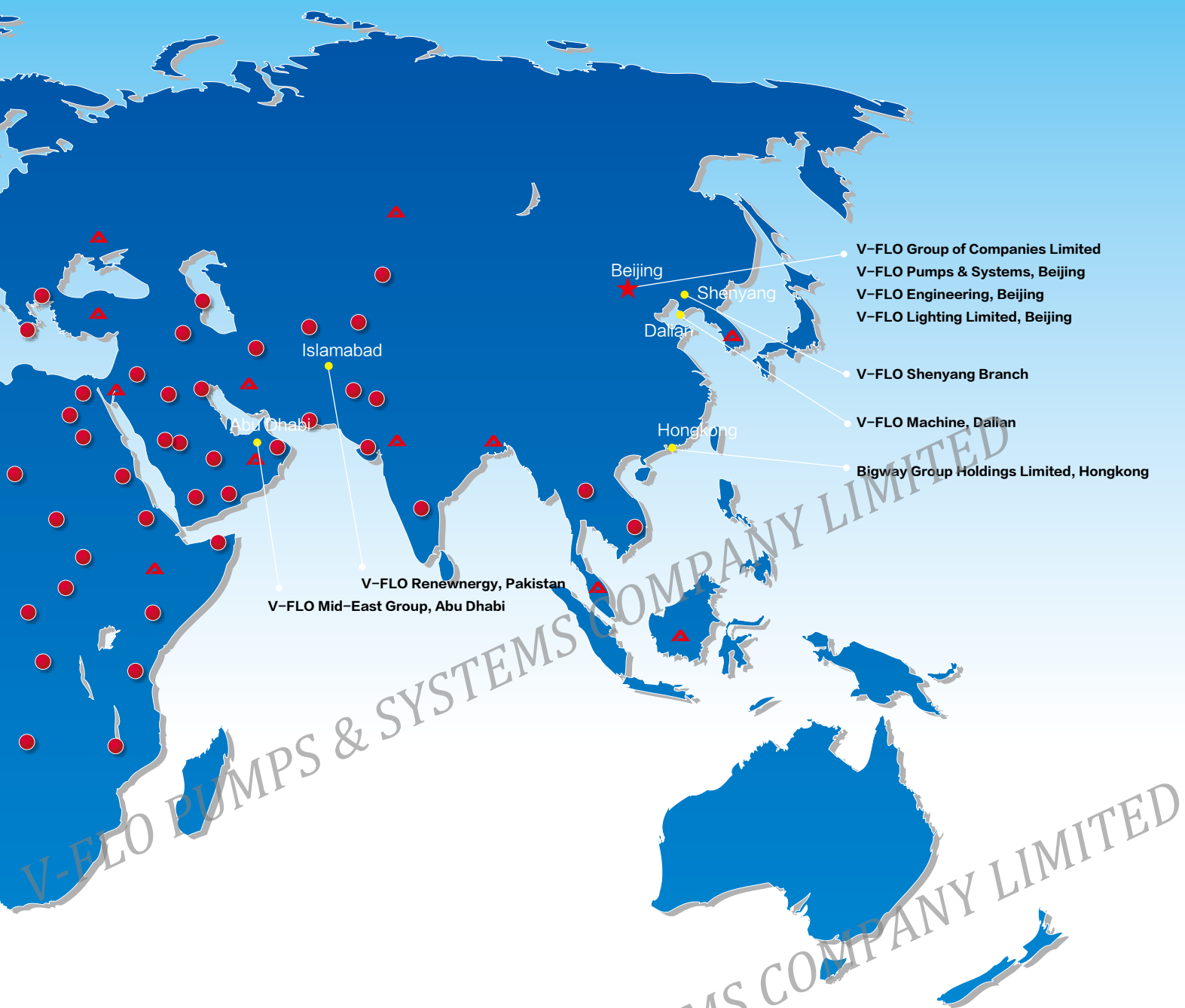
V-FLO Pumps & Systems, as per API Q1 management system, has QA and QC departments in the Headquarters, while QC teams with professional inspectors are working in branches and production workshops. More than 30 QA & QC engineers are directly involved in the pump quality control activities.

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.



Warranty

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



KINGDOM OF SAUDI ARABIA
ROYAL COMMISSION FOR
JUBAIL AND YANBU



GOVERNMENT OF PUNJAB
PUNJAB DEVELOPMENT
CORPORATION LIMITED



Fatima Group



Bharat Heavy Electricals Limited
HYDERABAD - INDIA



GE imagination at work

V-FLO PUMPS & SYSTEMS COMPANY LIMITED

Content

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- XII. VTMC Series Performance Curves
- XIII. VTMC Series Installation Drawings & Dimensions

I. Overview

VTMC series are double-casing vertical diffuser pumps designed and manufactured completely in accordance with VS6 API 610 11th Edition. It is designed for applications in industrial process, chemical industry, petrochemical industry, petroleum processing, petroleum & natural gas and petroleum refining where NPSH requirements are extremely demanding and important. It is also widely used in cryoengineering.

II. Applications

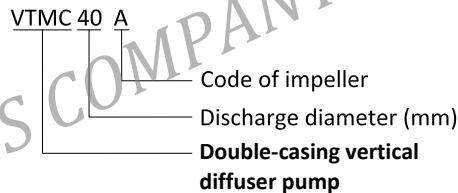
- Refinery
- Petrochemical plant
- Power plant
- Cryoengineering
- Light hydrocarbon
- Pipeline boosting
- Offshore production platform
- Liquefied gas engineering

It is applicable for pumping clean or slightly polluted, low or high temperature, neutral or corrosive liquid.

III. Performance Range

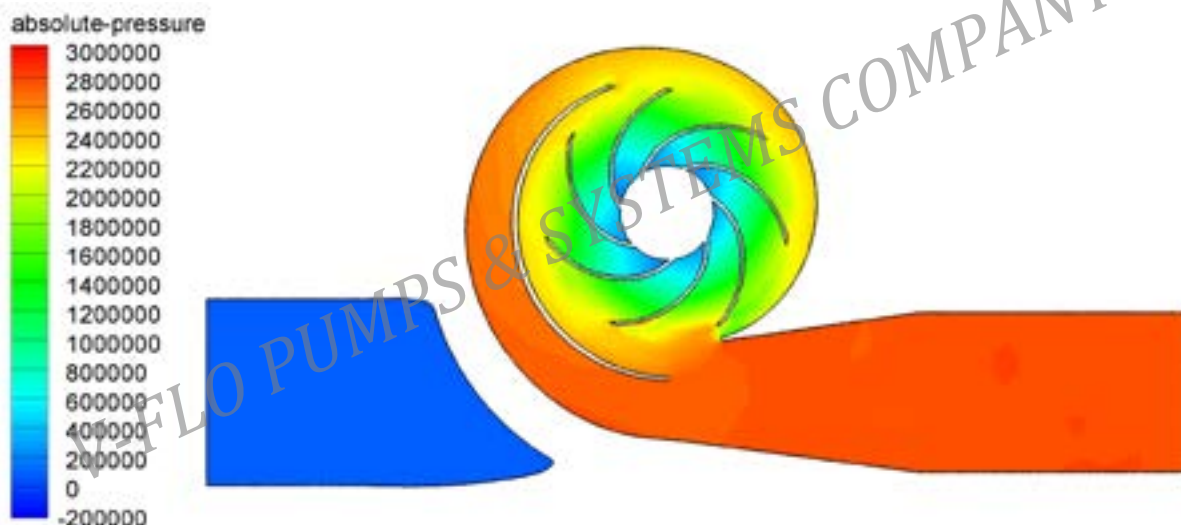
Discharge Size: DN = 40 ~ 200mm
 Flow rate: Q = 1700m³/h
 Head: H = 800m
 Working pressure: P = 10Mpa
 Working temperature: T = -180 °C ~ 180 °C

IV. Model Description



V. Hydraulic Design

Hydraulic models are divided into several groups so as to meet different requirements while achieving high efficiency and energy saving.



VI. Pump Structure

VTMC series double-casing vertical diffuser pumps are optimized output on the basis of extensive study and careful analysis on the structural features and performances of existing designs available in the markets, focusing on the applications for liquid transferring requirements in petrochemical engineering, sewage & effluent oil treatment.

The first stage is a suction impeller specially designed for low NPSH working condition.

Rotor is dynamically balanced for stable operation.

1. Pump Casing & Column Pipes

- VTMC series as a double-casing vertical diffuser pump, the pump length and installation depth can be designed according to the process and installation requirement for NPSH.
- It can be installed as submerged on top of the media pool without outer casing, or installed on open or pressurized vessel.
- Inline installation with standard horizontal arrangement. It is also possible to connect the pipeline with suction flange at bottom of the pump after removing outer casing.
- The design and structure of column pipes shall suit the need of pumped media and a guide bearing shall be equipped between two column pipes designed as per API 610 to guarantee the Max. allowable continuous speed within the limit of 1st critical speed of the rigid shaft so as to ensure stable operation with less vibration.

2. Impeller and Guide Vane

- The first stage impeller is generally a suction impeller to improve cavitation performance. Each type of pump has several groups of impellers and diffuser design applicable for different operating requirements with stable performance, high efficiency and low NPSHr.

3. Sealing System

- API682 cartridge mechanical seal can be single mechanical seal, tandem type double mechanical seal and parallel double mechanical seal. Throat bushing assembly is employed to reduce the pressure inside the mechanical seal chamber. Different bushing and cooling system can be equipped according to pumped media.

4. Bearing Housing and Lubrication

- Angular contact ball bearings are used to balance residual thrust force and rotor weight.
- Large oil storage in bearing housing is equipped with independent automatic circulating system to ensure effective lubrication.
- External water or air cooling shall be installed for high temperature pumped media.
- Oil chamber is designed with enhanced capacity.
- Constant level oiler is installed for online filing and indication of oil level at real time.
- Bearing assembly is designed for quick dismantling and easy maintenance.

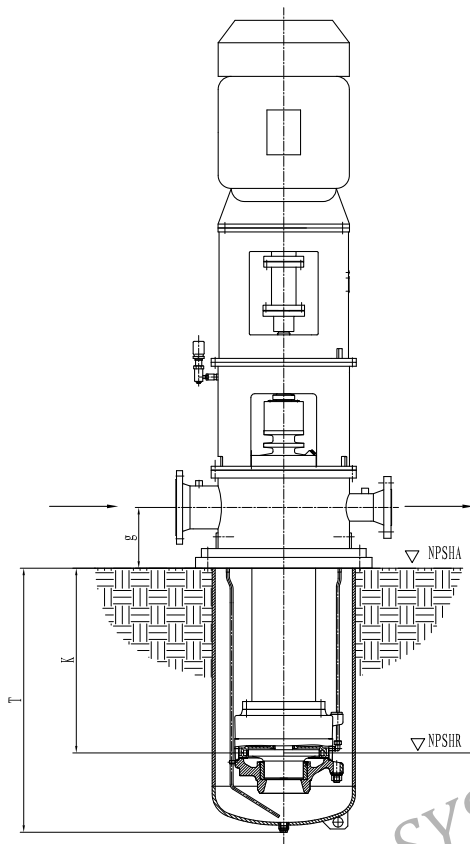
5. Balancing Device

- Balance drum is used to balance thrust force.
- A pipeline connected with back end of balancing drum further reduces the pressure of mechanical seal chamber.

6. Direction of Rotation

- Direction of rotation is counterclockwise when viewed from drive end.

VII. Notes



Due to the special features of VTMC series barrel structure, calculations are different from horizontal pumps. Attention shall be given to the following:

1. NPSH

NPSHa

$$X \text{ (m)} + K \text{ (m)} = Y \text{ (m)}$$

NPSHa provided by user Distance between installation level available NPSH & lowest point of 1st stage impeller

$$\text{NPSHr: Check performance curve} = Z \text{ (m)}$$

NPSHr calculation margin:

$$(Y - Z = \text{safe NPSHr}) \geq 0.5\text{m}$$

2. Pump head, efficiency and flow rate:

Outlet pressure Outlet flange center line

- Inlet pressure Inlet flange center line

$$= \text{Differential pressure} \quad \text{Rated head} \times \text{Media S.G.}$$

3. Submerged depth of barrel shall not be considered in determining rated head because the barrel will be full of liquid in normal operating condition.

4. Hydraulic loss inside the barrel and mechanical loss of the guide bearings are relatively low as compared with the depth, there is no substantial impact on rated head and efficiency.

5. Flow rate, head and efficiency of pump performance curves are in conformance with API 610 11th Edition.

6. It is not recommended to run the pump at or above the flow rate of 120% BEP, namely, [Qmax] ≤ 120%QN.

7. Min. flow shall be proper to guarantee a normal operation with acceptable noise and vibration limits.

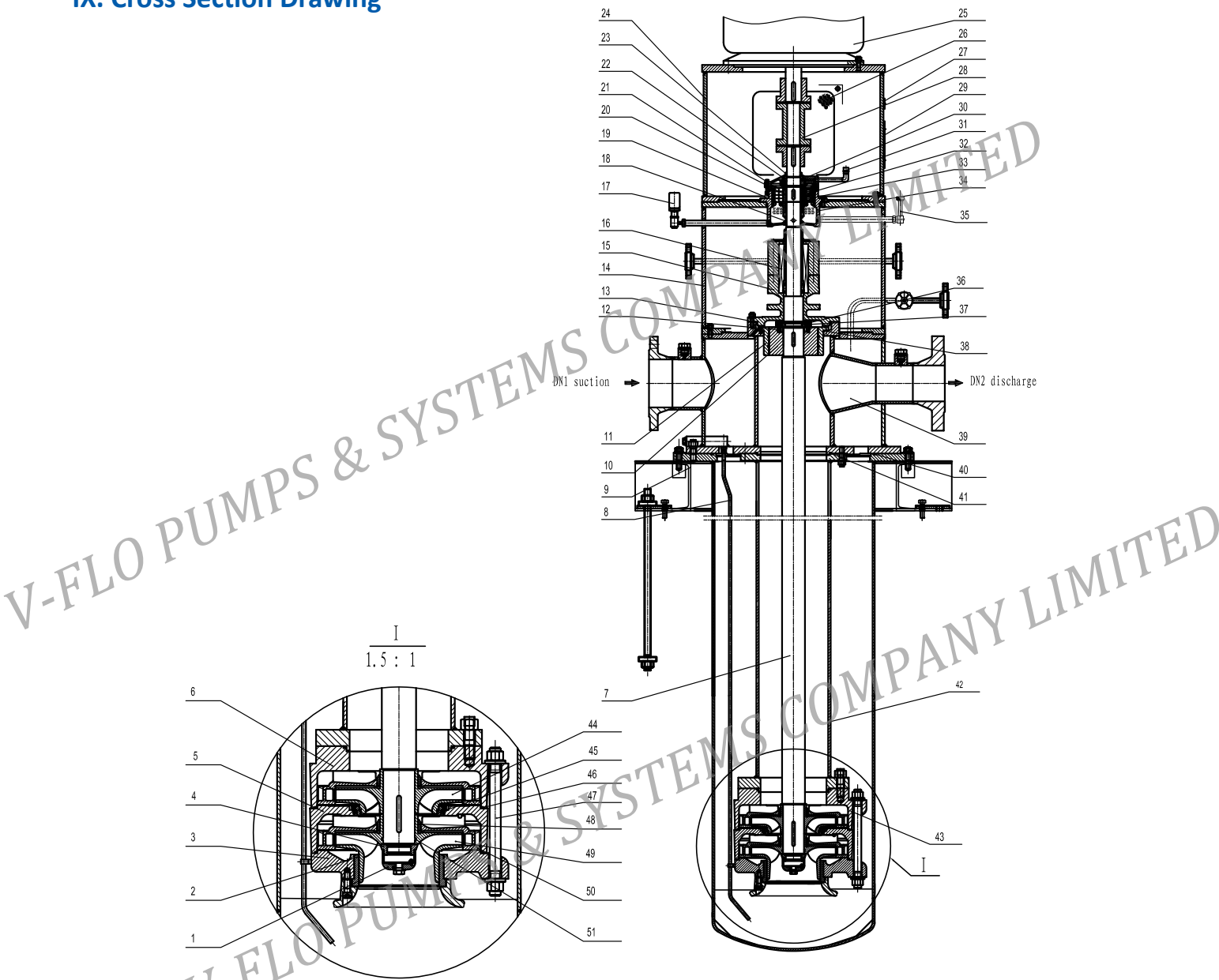
VIII. Material Table

Parts Name	Material Grade and Code Number				
	I-1	I-2	S-1	S-3	S-4
Pump casing	ASTM A278 Class 30	ASTM A278 Class 30	ASTM A216 Gr.WCB	ASTM A216 Gr.WCB	ASTM A216 Gr.WCB
Impeller	ASTM A278 Class30	ASTM C90700	ASTM A278 Class 30	ASTM UNS F41000	ASTM A216 Gr.WCB
Shaft	ASTM A576 Gr.1045	ASTM A576 Gr.1045	ASTM A576 Gr.1045	ASTM A576 Gr.1045	ASTM A576 Gr.1045
Casing wear ring	ASTM A48 Class 25/30/40 HF	UNS C90700	ASTM A48 Class 25/30/40 HF	UNS F41000 HF	ASTM A48 Class 25/30/40 HF
Impeller wear ring	ASTM A48 Class 25/30/40 HF	UNS C90700	ASTM A48 Class 25/30/40 HF	UNS F41000 HF	ASTM A48 Class 25/30/40 HF

Parts Name	Material Grade and Code Number				
	S-5	S-6	S-8	S-9	C-6
Pump casing	ASTM A216 Gr.WCB	ASTM A216 Gr.WCB	ASTM A216 Gr.WCB	ASTM A216 Gr.WCB	ASTM A217 Gr.CA15
Impeller	ASTM A216 Gr.WCB	ASTM A743 Gr.CA15	ASTM A743 Gr. CF8M	ASTM A494 M30C	ASTM A743 Gr.CA15
Shaft	ASTM A434 Class BB	ASTM A434 Class BB	ASTM A479 Gr. 316	ASTM B164 Class A	ASTM A276 Gr. 410
Casing wear ring	ASTM A473 Type 410 HF	ASTM A473 Type 410 HF	ASTM A182 Gr.F316 HF	UNS04400 HF	ASTM A473 Type 410 HF
Impeller wear ring	ASTM A473 Type 410 HF	ASTM A473 Type 410 HF	ASTM A182 Gr.F316 HF	UNS04400 HF	ASTM A473 Type 410 HF

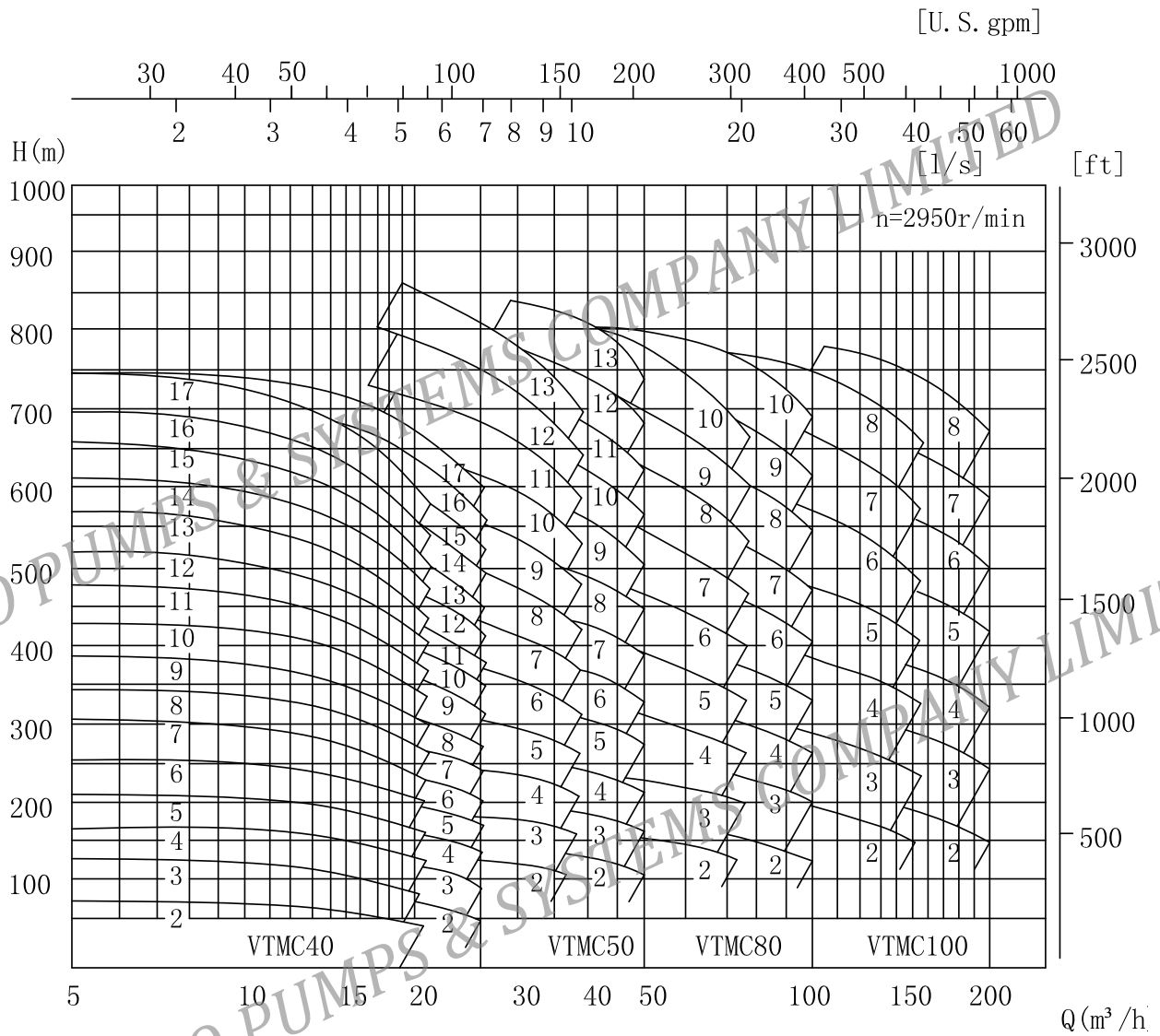
Parts Name	Material Grade and Code Number			
	A-7	A-8	D-1	D-2
Pump casing	ASTM A351 Gr. CF8	ASTM A351 Gr. CF8M	ASTM A890 Gr.1A	ASTM A890 Gr.5A
Impeller	ASTM A743 Gr. CF8	ASTM A743 Gr. CF8M	ASTM A890 Gr.1A	ASTM A890 Gr.5A
Shaft	ASTM A479 Gr. 304	ASTM A479 Gr. 316	ASTM A276-S31803	ASTM A276-S32760
Casing wear ring	ASTM A182 Gr.F304 HF	ASTM A182 Gr. F316.HF	ASTM A182 Gr. F51 HF	ASTM A182 Gr.55 HF
Impeller wear ring	ASTM A182 Gr.F304 HF	ASTM A182 Gr. F316.HF	ASTM A182 Gr. F51 HF	ASTM A182 Gr.55 HF

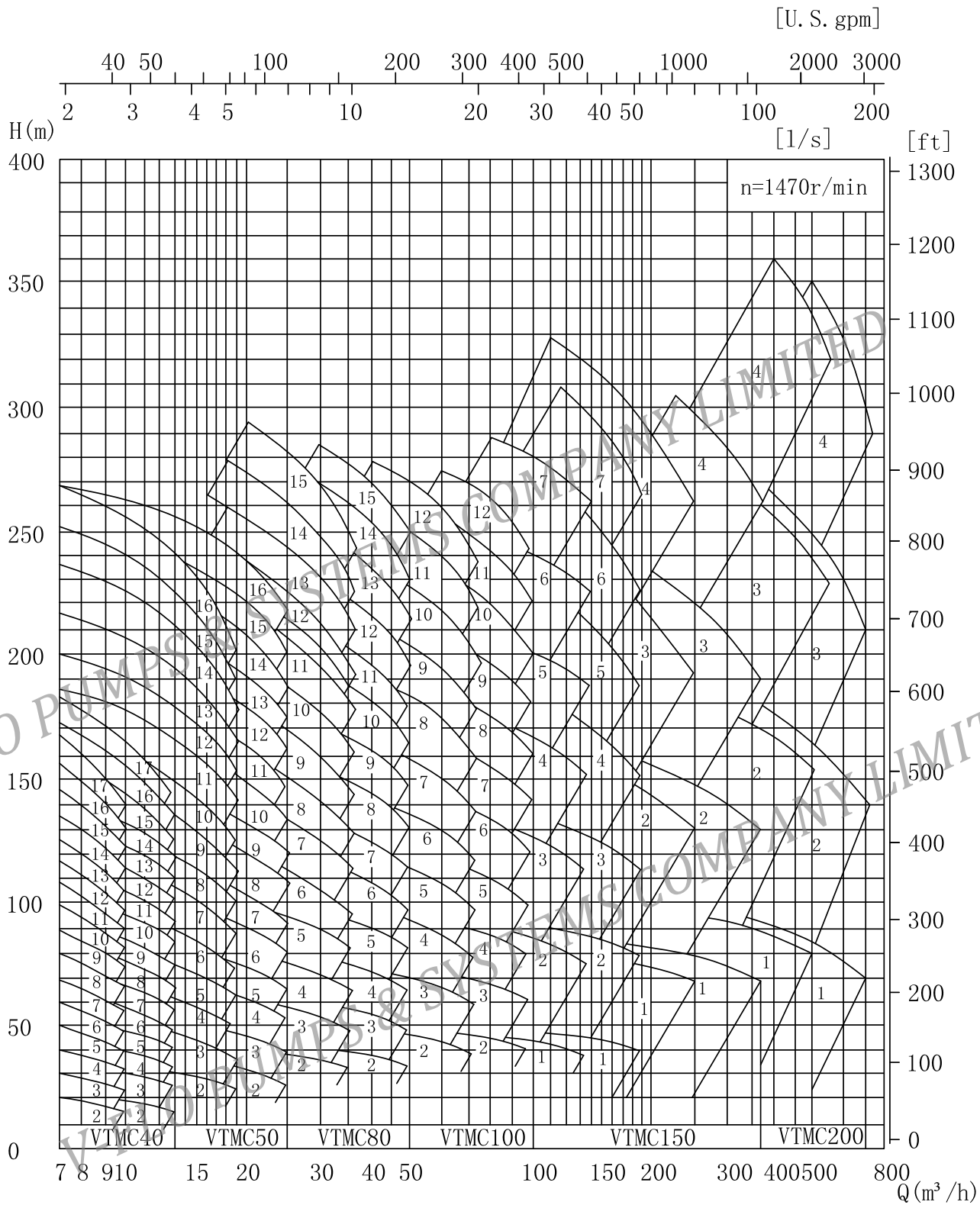
IX. Cross Section Drawing



- | | | | | | |
|------------------------------|-----------------------------|------------------|--------------------------|-------------------------|--------------------------|
| 1. Impeller fixing bushing | 2. Bearing bushing | 3. Suction cover | 4. Impeller fixing ring | 5. Inner casing | 6. Discharge cover |
| 7. Shaft | 8. Baseplate | 9. Balance drum | 10. Balance drum bushing | 11. Bearing bracket | 12. Stuffing box housing |
| 13. Mechanical seal assembly | 14. Constant level oiler | 15. Lock nut | 16. Bearing bushing | 17. Bearing cover | 18. Motor bracket |
| 19. Motor | 20. Coupling cover | 21. Coupling | 22. Oil separator | 23. Bearing | 24. Bearing housing |
| 25. Oil level indicator | 26. Balance drum lock block | | 27. Barrel | 28. Next stage impeller | 29. The first impeller |

X. VTMC Series Family Curves





XI. VTMC Series Performance Data Charts

Model	NO. of Stages	Flow Rate (m ³ /h)	Disch. Head (m)	Speed (r/min)	Eff. (%)	NPSHr (m)	Shaft Power (kW)	Motor Power (kW)
VTMC40A	2	29	68	2950	62.5	2.4	8.6	11
	3	29	102	2950	62.5	2.4	12.9	18.5
	4	29	136	2950	62.5	2.4	17.2	22
	5	29	170	2950	62.5	2.4	21.5	30
	6	29	204	2950	62.5	2.4	25.8	37
	7	29	238	2950	62.5	2.4	30.1	37
	8	29	272	2950	62.5	2.4	34.4	45
	9	29	306	2950	62.5	2.4	38.7	55
	10	29	340	2950	62.5	2.4	42.9	55
	11	29	374	2950	62.5	2.4	47.2	75
	12	29	408	2950	62.5	2.4	51.5	75
	13	29	442	2950	62.5	2.4	55.8	75
	14	29	476	2950	62.5	2.4	60.1	75
	15	29	510	2950	62.5	2.4	64.4	90
	16	29	544	2950	62.5	2.4	68.7	90
	17	29	578	2950	62.5	2.4	73.0	90
	VTMC40B	2	20	70	2950	56.5	1.3	6.7
3		20	105	2950	56.5	1.3	10.1	15
4		20	140	2950	56.5	1.3	13.5	18.5
5		20	175	2950	56.5	1.3	16.9	22
6		20	210	2950	56.5	1.3	20.2	30
7		20	245	2950	56.5	1.3	23.6	30
8		20	280	2950	56.5	1.3	27.0	37
9		20	315	2950	56.5	1.3	30.4	37
10		20	350	2950	56.5	1.3	33.7	45
11		20	385	2950	56.5	1.3	37.1	45
12		20	420	2950	56.5	1.3	40.5	55
13		20	455	2950	56.5	1.3	43.8	55
14		20	490	2950	56.5	1.3	47.2	55
15		20	525	2950	56.5	1.3	50.6	75
16		20	560	2950	56.5	1.3	54.0	75
17		20	595	2950	56.5	1.3	57.3	75
VTMC50A		2	54	104	2950	68	2.1	22.5
	3	54	156	2950	68	2.1	33.7	45
	4	54	208	2950	68	2.1	45.0	55
	5	54	260	2950	68	2.1	56.2	75
	6	54	312	2950	68	2.1	67.4	90
	7	54	364	2950	68	2.1	78.7	90
	8	54	416	2950	68	2.1	89.9	110
	9	54	468	2950	68	2.1	101.2	132
	10	54	520	2950	68	2.1	112.4	160
	11	54	572	2950	68	2.1	123.7	160
	12	54	624	2950	68	2.1	134.9	185
	13	54	676	2950	68	2.1	146.1	185

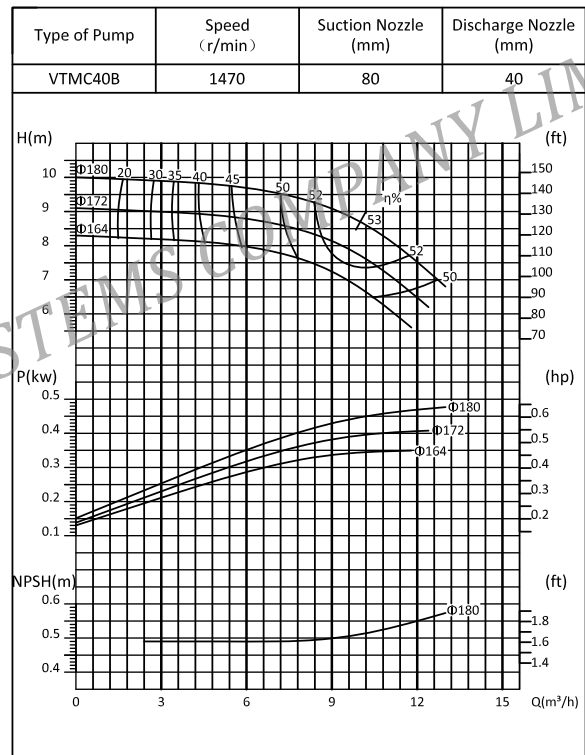
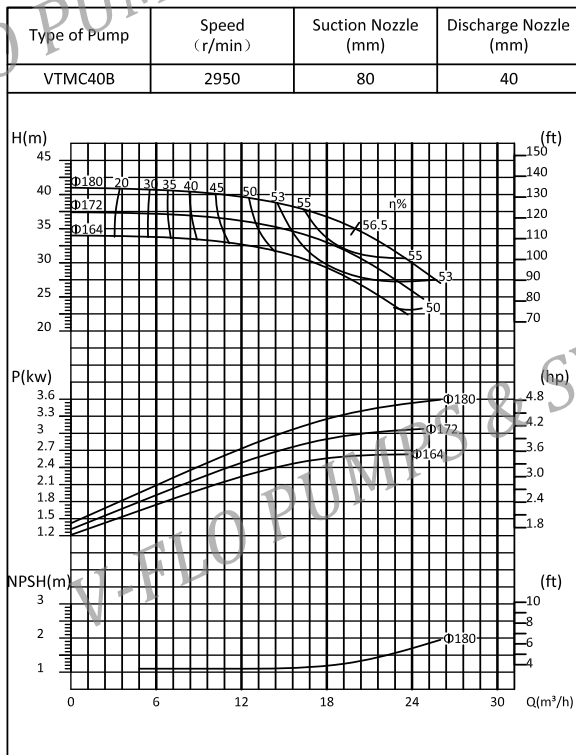
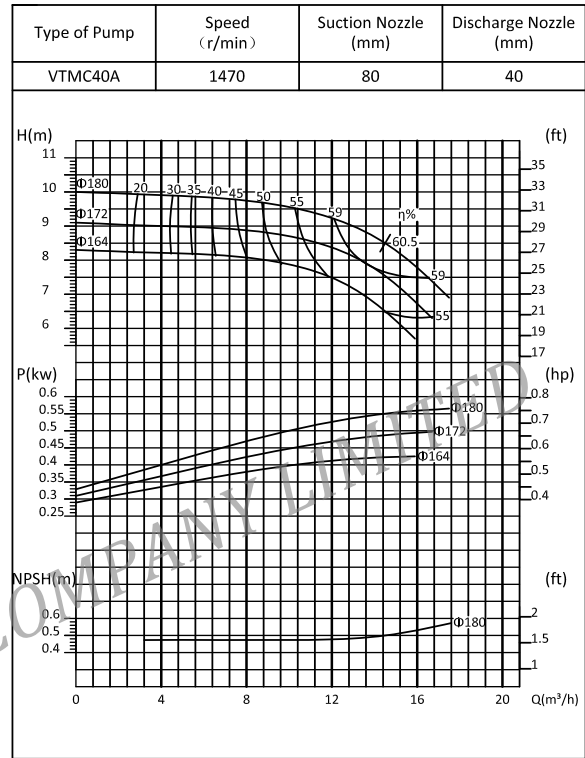
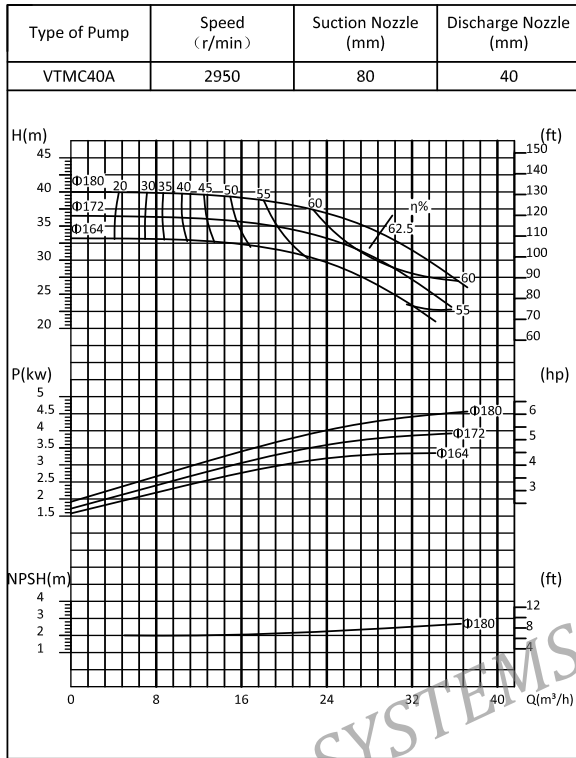
Model	NO.of Stages	Flow Rate (m ³ /h)	Disch. Head (m)	Speed (r/min)	Eff. (%)	NPSHr (m)	Shaft Power (kW)	Motor Power (kW)
VTMC50B	2	42	102	2950	62	1.8	18.8	30
	3	42	153	2950	62	1.8	28.2	37
	4	42	204	2950	62	1.8	37.6	45
	5	42	255	2950	62	1.8	47.0	75
	6	42	306	2950	62	1.8	56.4	75
	7	42	357	2950	62	1.8	65.8	90
	8	42	408	2950	62	1.8	75.2	90
	9	42	459	2950	62	1.8	84.6	110
	10	42	510	2950	62	1.8	94.0	110
	11	42	561	2950	62	1.8	103.5	132
	12	42	612	2950	62	1.8	112.9	160
	13	42	663	2950	62	1.8	122.3	160
	VTMC80A	2	108	130	2950	75	3.2	51.0
3		108	195	2950	75	3.2	76.4	110
4		108	260	2950	75	3.2	101.9	132
5		108	325	2950	75	3.2	127.4	160
6		108	390	2950	75	3.2	152.9	185
7		108	455	2950	75	3.2	178.4	220
8		108	520	2950	75	3.2	203.8	250
9		108	585	2950	75	3.2	229.3	280
10		108	650	2950	75	3.2	254.8	315
VTMC80B		2	78	136	2950	72	2.8	40.1
	3	78	204	2950	72	2.8	60.2	75
	4	78	272	2950	72	2.8	80.2	110
	5	78	340	2950	72	2.8	100.3	132
	6	78	408	2950	72	2.8	120.3	160
	7	78	476	2950	72	2.8	140.4	185
	8	78	544	2950	72	2.8	160.4	200
	9	78	612	2950	72	2.8	180.5	250
	10	78	680	2950	72	2.8	200.5	250
	VTMC100A	2	203	166	2950	78.5	5.1	116.9
3		203	249	2950	78.5	5.1	175.3	220
4		203	332	2950	78.5	5.1	233.7	280
5		203	415	2950	78.5	5.1	292.1	355
6		203	498	2950	78.5	5.1	350.6	450
7		203	581	2950	78.5	5.1	409.0	500
8		203	664	2950	78.5	5.1	467.4	560
VTMC100B		2	163	166	2950	76.5	4.5	96.3
	3	163	249	2950	76.5	4.5	144.4	185
	4	163	332	2950	76.5	4.5	192.6	220
	5	163	415	2950	76.5	4.5	240.7	280
	6	163	498	2950	76.5	4.5	288.9	355
	7	163	581	2950	76.5	4.5	337.0	400
	8	163	664	2950	76.5	4.5	385.1	450

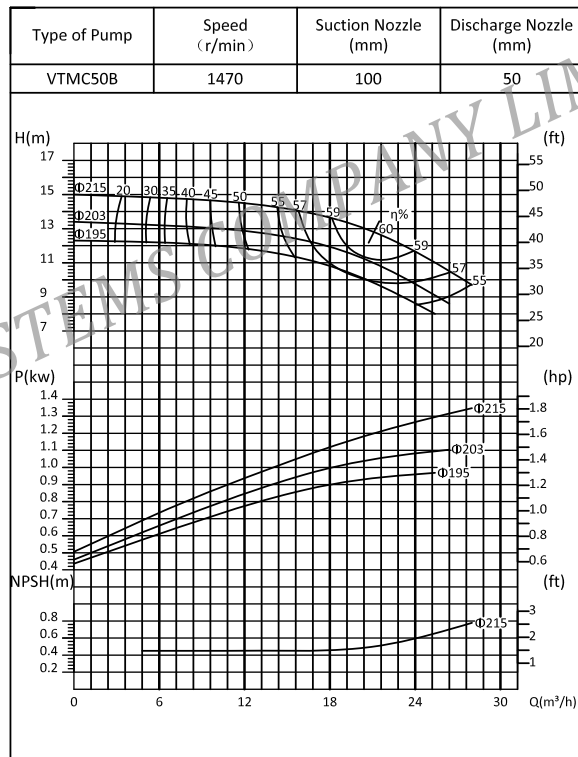
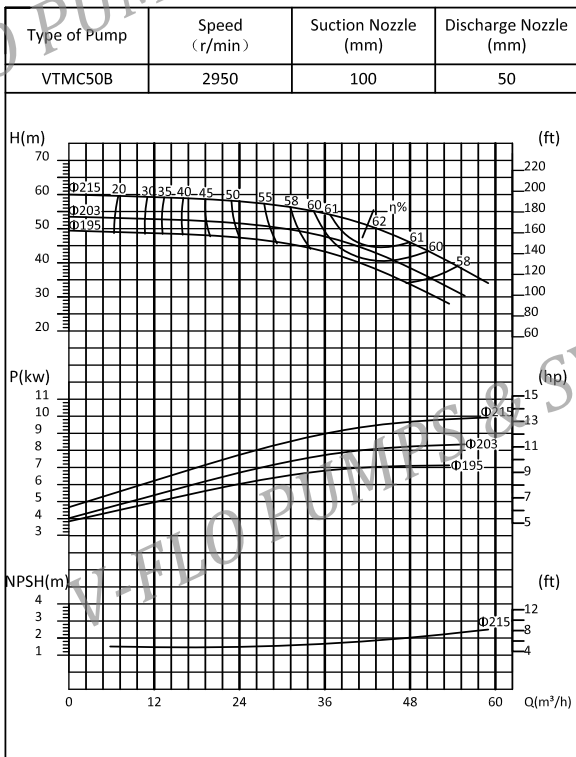
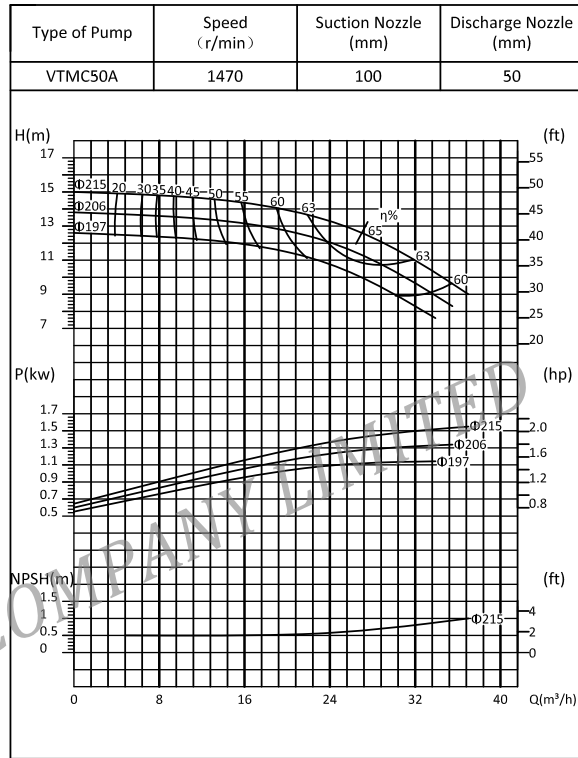
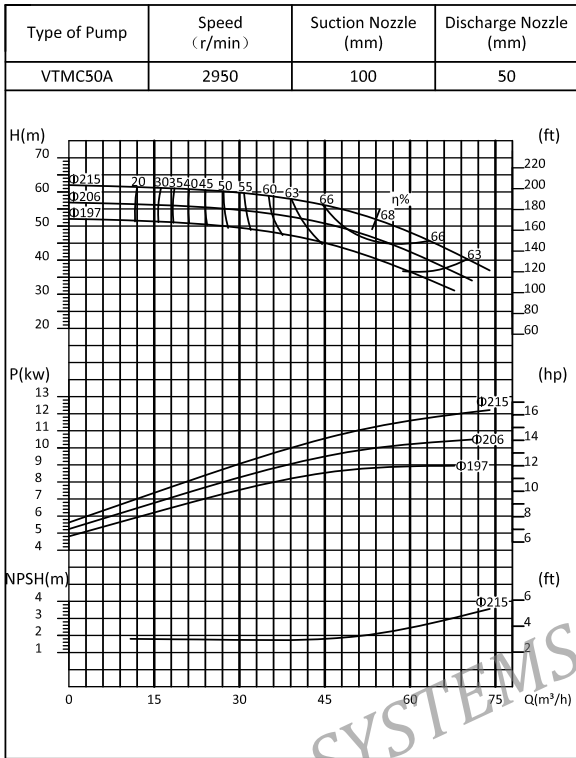
Model	NO.of Stages	Flow Rate (m ³ /h)	Disch. Head (m)	Speed (r/min)	Eff. (%)	NPSHr (m)	Shaft Power (kW)	Motor Power (kW)
VTMC40A	2	14.5	17	1470	60.5	0.5	1.1	1.5
	3	14.5	25.5	1470	60.5	0.5	1.7	3
	4	14.5	34	1470	60.5	0.5	2.2	3
	5	14.5	42.5	1470	60.5	0.5	2.8	4
	6	14.5	51	1470	60.5	0.5	3.3	5.5
	7	14.5	59.5	1470	60.5	0.5	3.9	5.5
	8	14.5	68	1470	60.5	0.5	4.4	7.5
	9	14.5	76.5	1470	60.5	0.5	5.0	7.5
	10	14.5	85	1470	60.5	0.5	5.5	7.5
	11	14.5	93.5	1470	60.5	0.5	6.1	11
	12	14.5	102	1470	60.5	0.5	6.7	11
	13	14.5	110.5	1470	60.5	0.5	7.2	11
	14	14.5	119	1470	60.5	0.5	7.8	11
	15	14.5	127.5	1470	60.5	0.5	8.3	15
	16	14.5	136	1470	60.5	0.5	8.9	15
	17	14.5	144.5	1470	60.5	0.5	9.4	15
	VTMC40B	2	10	17.4	1470	53	0.51	0.9
3		10	26.1	1470	53	0.51	1.3	2.2
4		10	34.8	1470	53	0.51	1.8	3
5		10	43.5	1470	53	0.51	2.2	3
6		10	52.2	1470	53	0.51	2.7	4
7		10	60.9	1470	53	0.51	3.1	4
8		10	69.6	1470	53	0.51	3.6	5.5
9		10	78.3	1470	53	0.51	4.0	5.5
10		10	87	1470	53	0.51	4.5	7.5
11		10	95.7	1470	53	0.51	4.9	7.5
12		10	104.4	1470	53	0.51	5.4	7.5
13		10	113.1	1470	53	0.51	5.8	7.5
14		10	121.8	1470	53	0.51	6.3	11
15		10	130.5	1470	53	0.51	6.7	11
16		10	139.2	1470	53	0.51	7.1	11
17		10	147.9	1470	53	0.51	7.6	11
VTMC50A		2	27	25.2	1470	65	0.65	2.8
	3	27	37.8	1470	65	0.65	4.3	5.5
	4	27	50.4	1470	65	0.65	5.7	7.5
	5	27	63	1470	65	0.65	7.1	11
	6	27	75.6	1470	65	0.65	8.5	11
	7	27	88.2	1470	65	0.65	10.0	15
	8	27	100.8	1470	65	0.65	11.4	15
	9	27	113.4	1470	65	0.65	12.8	18.5
	10	27	126	1470	65	0.65	14.2	18.5
	11	27	138.6	1470	65	0.65	15.7	22
	12	27	151.2	1470	65	0.65	17.1	22
	13	27	163.8	1470	65	0.65	18.5	30
	14	27	176.4	1470	65	0.65	19.9	30
	15	27	189	1470	65	0.65	21.4	30
	16	27	201.6	1470	65	0.65	22.8	30

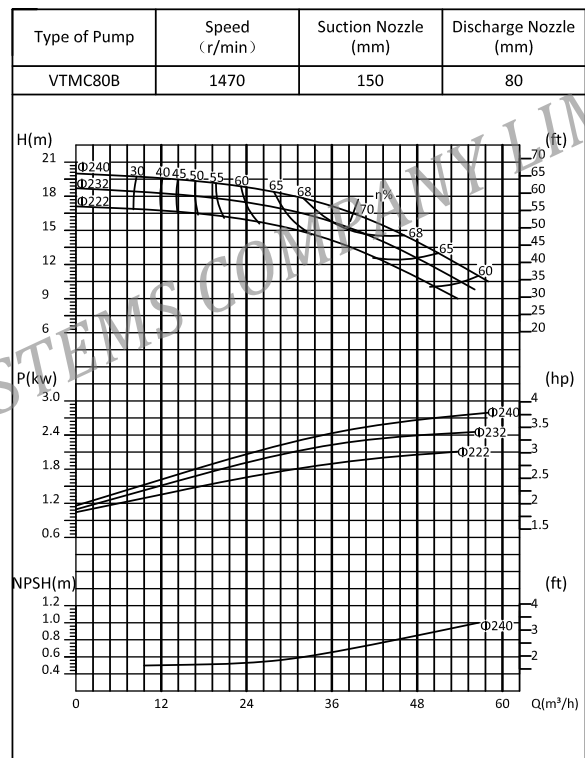
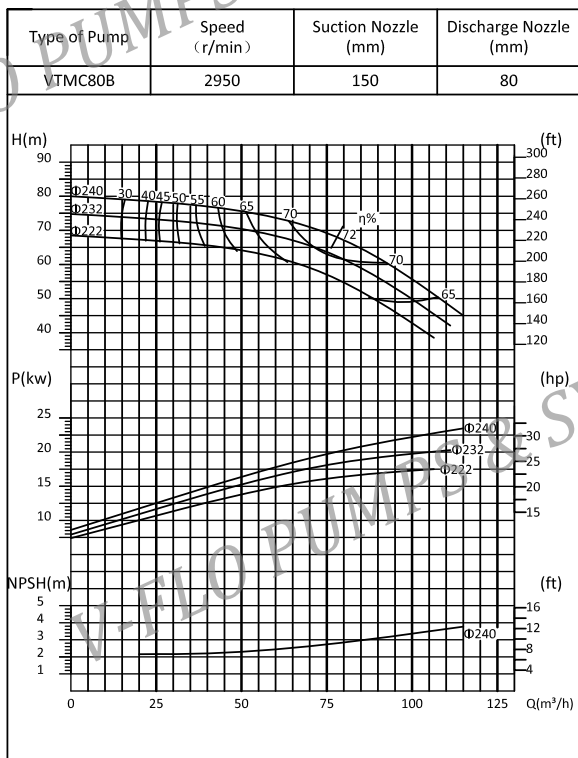
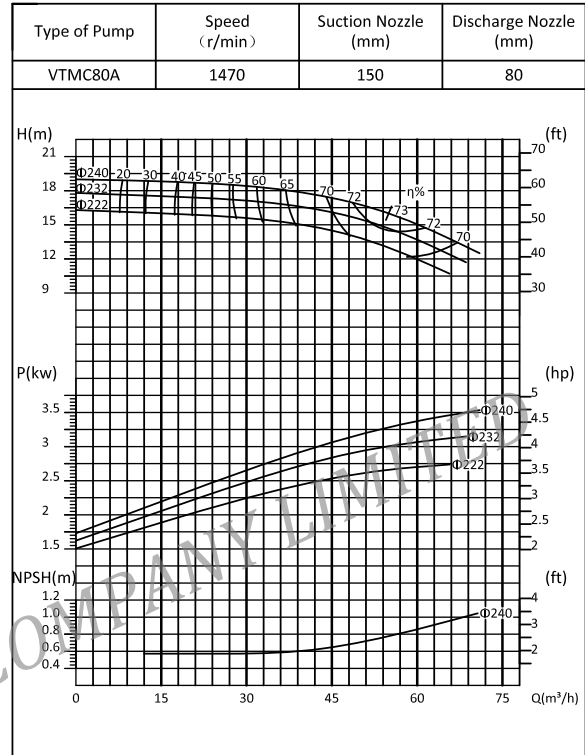
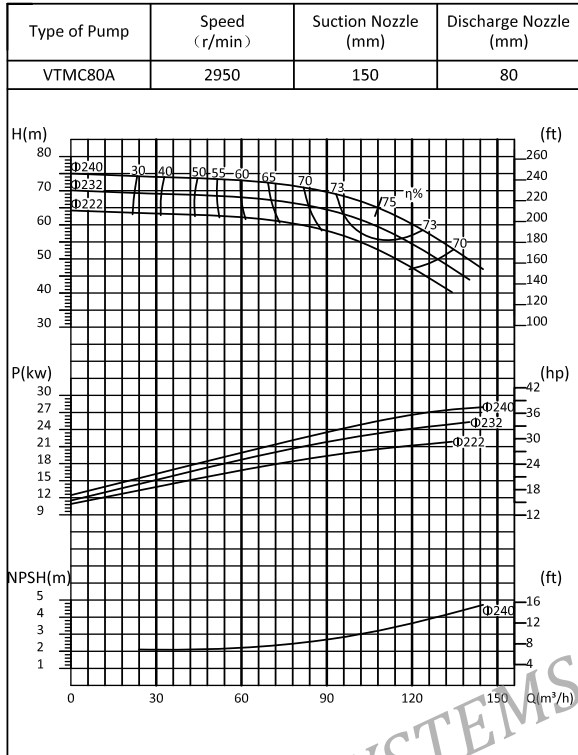
Model	NO.of Stages	Flow Rate (m ³ /h)	Disch. Head (m)	Speed (r/min)	Eff. (%)	NPSHr (m)	Shaft Power (kW)	Motor Power (kW)
VTMC50B	2	21	25.6	1470	60	0.5	2.4	4
	3	21	38.4	1470	60	0.5	3.7	5.5
	4	21	51.2	1470	60	0.5	4.9	7.5
	5	21	64	1470	60	0.5	6.1	11
	6	21	76.8	1470	60	0.5	7.3	11
	7	21	89.6	1470	60	0.5	8.5	11
	8	21	102.4	1470	60	0.5	9.8	15
	9	21	115.2	1470	60	0.5	11.0	15
	10	21	128	1470	60	0.5	12.2	18.5
	11	21	140.8	1470	60	0.5	13.4	18.5
	12	21	153.6	1470	60	0.5	14.6	18.5
	13	21	166.4	1470	60	0.5	15.9	22
	14	21	179.2	1470	60	0.5	17.1	22
	15	21	192	1470	60	0.5	18.3	30
	16	21	204.8	1470	60	0.5	19.5	30
	VTMC80A	2	55	32	1470	73	0.8	6.6
3		55	48	1470	73	0.8	9.8	15
4		55	64	1470	73	0.8	13.1	18.5
5		55	80	1470	73	0.8	16.4	22
6		55	96	1470	73	0.8	19.7	30
7		55	112	1470	73	0.8	23.0	30
8		55	128	1470	73	0.8	26.3	37
9		55	144	1470	73	0.8	29.5	45
10		55	160	1470	73	0.8	32.8	45
11		55	176	1470	73	0.8	36.1	55
12		55	192	1470	73	0.8	39.4	55
13		55	208	1470	73	0.8	42.7	55
14		55	224	1470	73	0.8	45.9	75
15		55	240	1470	73	0.8	49.2	75
VTMC80B		2	39	33	1470	70	0.7	5.0
	3	39	49.5	1470	70	0.7	7.5	11
	4	39	66	1470	70	0.7	10.0	15
	5	39	82.5	1470	70	0.7	12.5	18.5
	6	39	99	1470	70	0.7	15.0	22
	7	39	115.5	1470	70	0.7	17.5	30
	8	39	132	1470	70	0.7	20.0	30
	9	39	148.5	1470	70	0.7	22.5	30
	10	39	165	1470	70	0.7	25.0	37
	11	39	181.5	1470	70	0.7	27.5	37
	12	39	198	1470	70	0.7	30.0	45
	13	39	214.5	1470	70	0.7	32.5	45
	14	39	231	1470	70	0.7	35.0	45
	15	39	247.5	1470	70	0.7	37.5	55

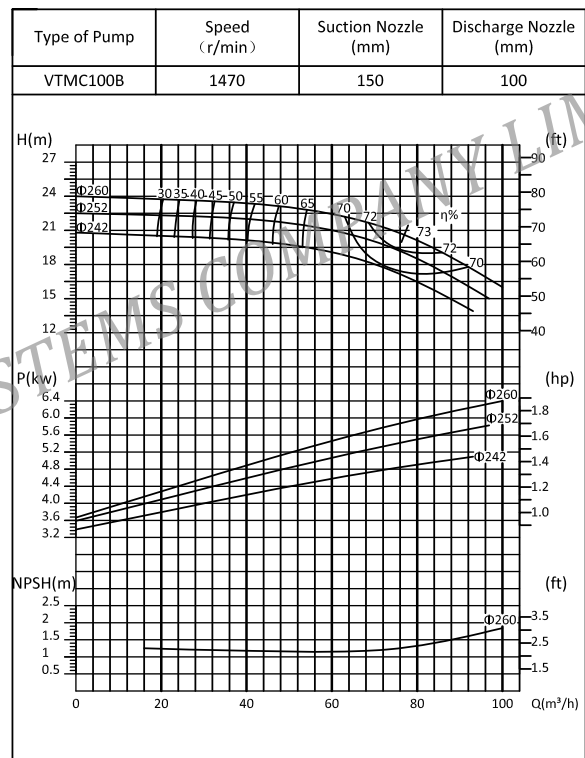
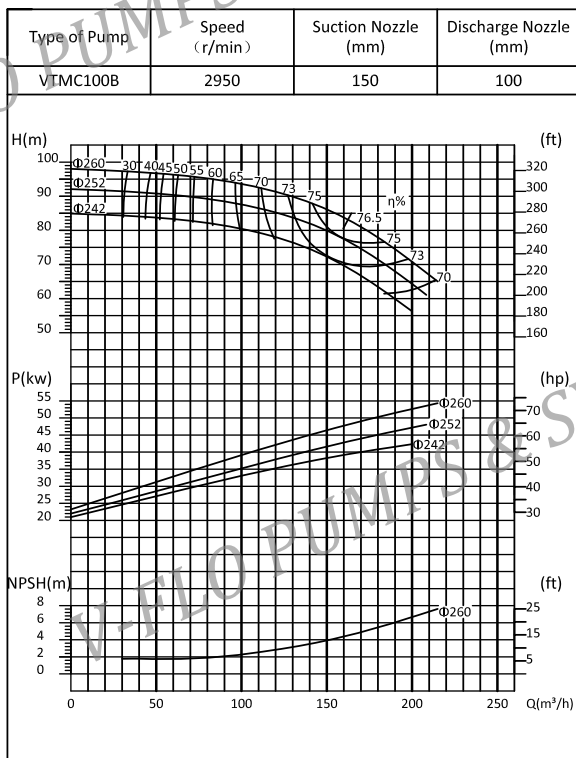
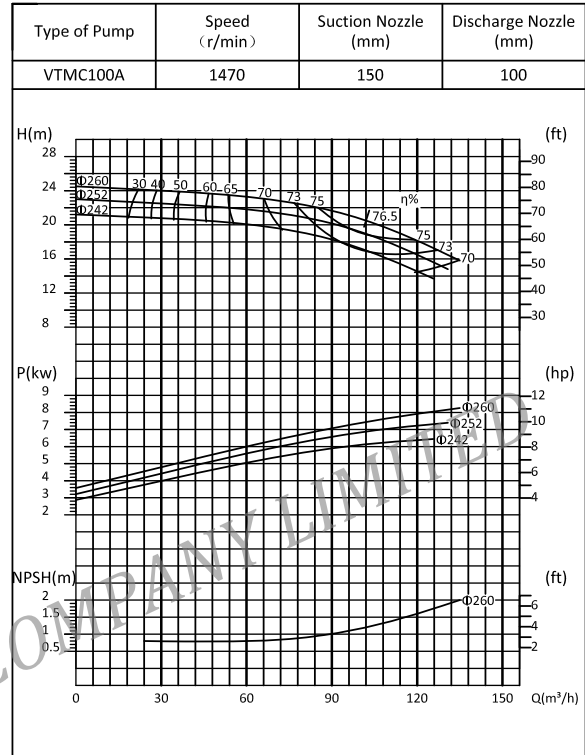
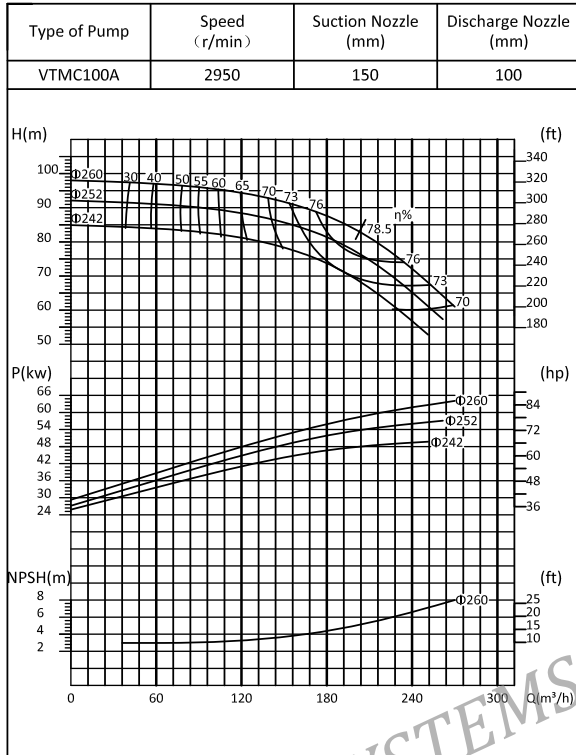
Model	NO.of stages	Flow rate (m ³ /h)	Disch. Head (m)	Speed (r/min)	Eff. (%)	NPSHr (m)	Shaft power (kW)	Motor power (kW)
VTMC100A	2	102	41	1470	76.5	1.2	14.9	22
	3	102	61.5	1470	76.5	1.2	22.3	30
	4	102	82	1470	76.5	1.2	29.8	45
	5	102	102.5	1470	76.5	1.2	37.2	55
	6	102	123	1470	76.5	1.2	44.6	55
	7	102	143.5	1470	76.5	1.2	52.1	75
	8	102	164	1470	76.5	1.2	59.5	75
	9	102	184.5	1470	76.5	1.2	67.0	90
	10	102	205	1470	76.5	1.2	74.4	90
	11	102	225.5	1470	76.5	1.2	81.8	110
	12	102	246	1470	76.5	1.2	89.3	132
VTMC100B	2	77	41.2	1470	73	1.3	11.8	15
	3	77	61.8	1470	73	1.3	17.7	22
	4	77	82.4	1470	73	1.3	23.7	30
	5	77	103	1470	73	1.3	29.6	37
	6	77	123.6	1470	73	1.3	35.5	45
	7	77	144.2	1470	73	1.3	41.4	55
	8	77	164.8	1470	73	1.3	47.3	75
	9	77	185.4	1470	73	1.3	53.2	75
	10	77	206	1470	73	1.3	59.2	75
	11	77	226.6	1470	73	1.3	65.1	90
	12	77	247.2	1470	73	1.3	71.0	90
VTMC150A	1	196	41.5	1470	78	2	28.4	37
	2	196	83	1470	78	2	56.8	75
	3	196	124.5	1470	78	2	85.2	110
	4	196	166	1470	78	2	113.6	160
	5	196	207.5	1470	78	2	141.9	185
	6	196	249	1470	78	2	170.3	220
	7	196	290.5	1470	78	2	198.7	250
VTMC150B	1	140	40	1470	73	1.9	20.9	30
	2	140	80	1470	73	1.9	41.8	55
	3	140	120	1470	73	1.9	62.6	90
	4	140	160	1470	73	1.9	83.5	110
	5	140	200	1470	73	1.9	104.4	132
	6	140	240	1470	73	1.9	125.3	160
	7	140	280	1470	73	1.9	146.2	185
VTMC150C	1	365	63	1470	78	3.1	80.3	110
	2	365	126	1470	78	3.1	160.5	220
	3	365	189	1470	78	3.1	240.8	315
	4	365	252	1470	78	3.1	321.0	400
VTMC150D	1	260	65	1470	75	3	61.3	75
	2	260	130	1470	75	3	122.7	160
	3	260	195	1470	75	3	184.0	250
	4	260	260	1470	75	3	245.4	315
VTMC200A	1	720	70	1470	82	4.5	167.3	220
	2	720	140	1470	82	4.5	334.6	450
	3	720	210	1470	82	4.5	502.0	630
	4	720	280	1470	82	4.5	669.3	900
VTMC200B	1	520	77	1470	78	3.8	139.7	185
	2	520	154	1470	78	3.8	279.5	355
	3	520	231	1470	78	3.8	419.2	560
	4	520	308	1470	78	3.8	559.0	710

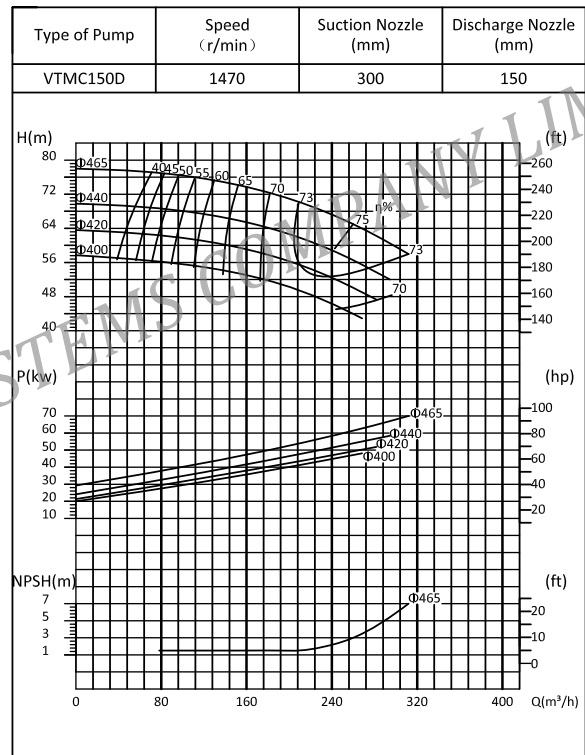
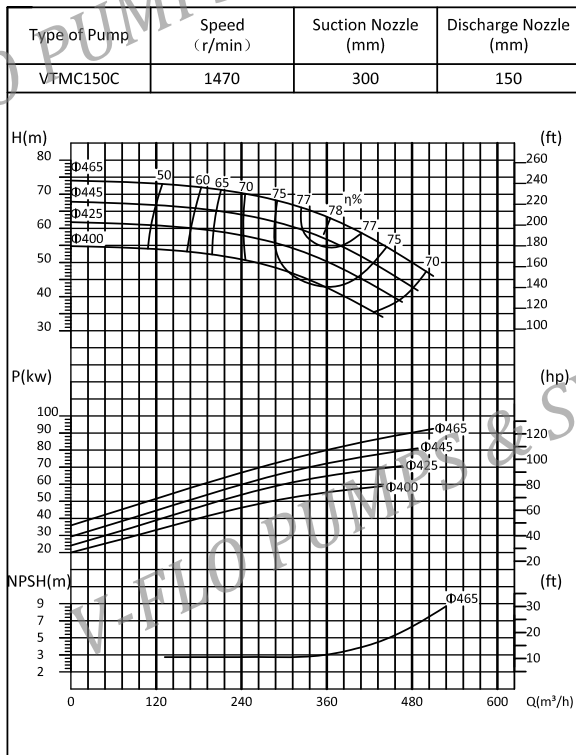
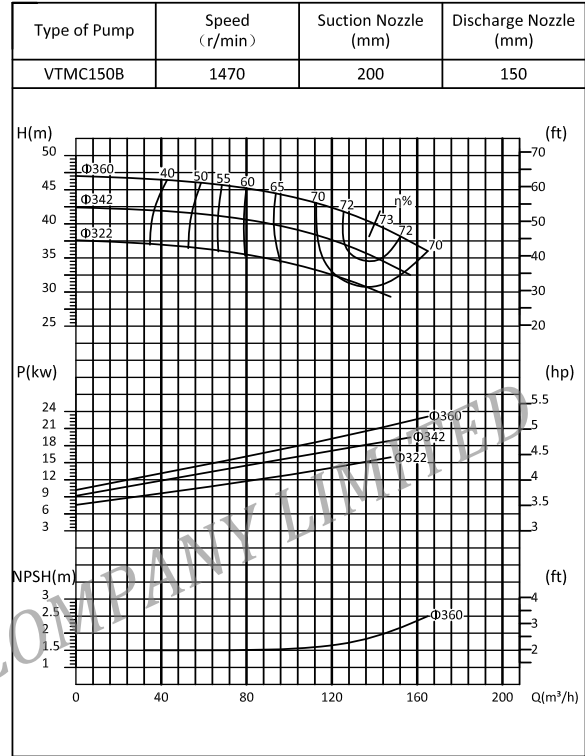
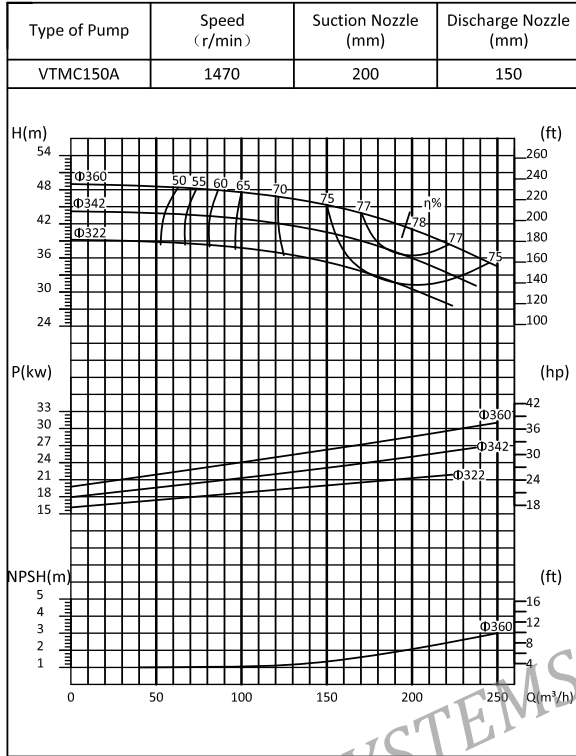
XII. VTMC Series Performance Curves



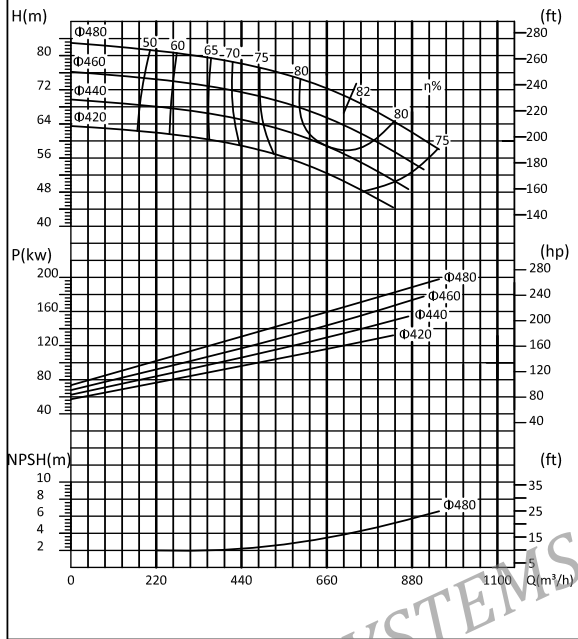




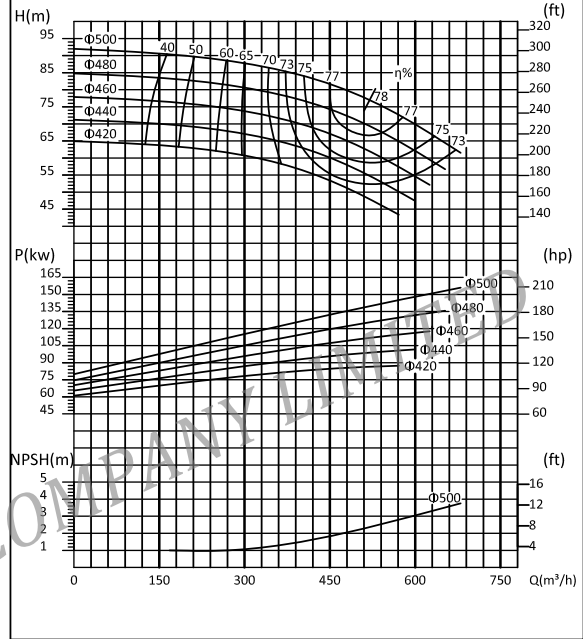




Type of Pump	Speed (r/min)	Suction Nozzle (mm)	Discharge Nozzle (mm)
VMC200A	1470	400	200

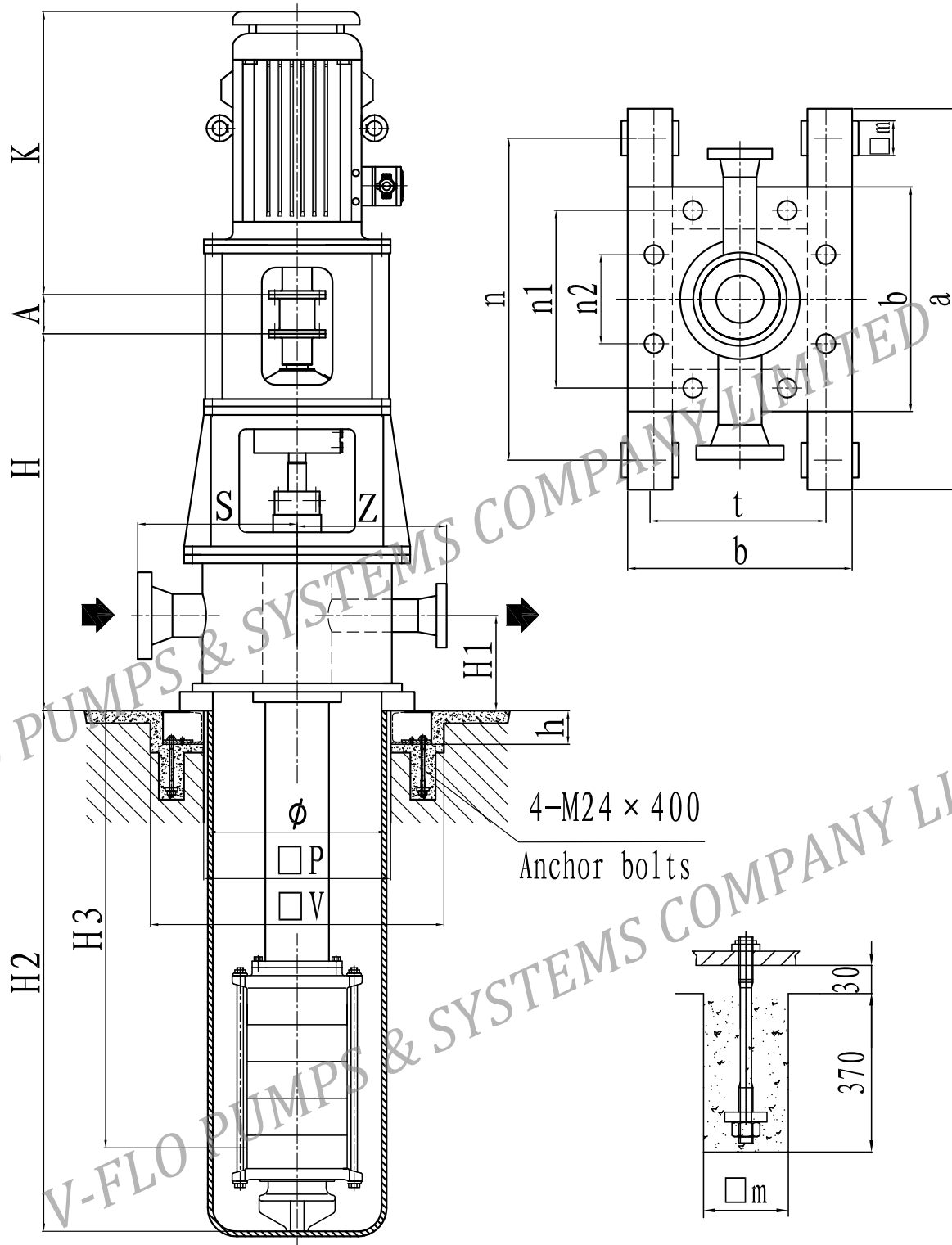


Type of Pump	Speed (r/min)	Suction Nozzle (mm)	Discharge Nozzle (mm)
VMC200B	1470	400	200



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XIII. VTMC Series Installation Drawings & Dimensions



VTMC40

Pump Dimensions								Number of Stage	
A	S	Z	Φ	H	H1	H2	H3	①	②
180	325	325	426	834	190	755	535	2-9	2-9
						980	760		
						1205	985	2-17	2-17
						1430	1210		
						1655	1435		
						1880	1660		
						2105	1885		
						2330	2110		
						2555	2335		
2780	2560								

Basic Dimensions											
	□P	□V	□m	a	b	n	n1	n2	h	t	
T≤0°	630	1100	100	1000	750	900	680	450	160	680	
T>0°	470	900	100	800	560	700	500	360	140	500	

Motor Model and Motor Size							
model	YB3-90L	YB3-100L	YB3-112M	YB3-132S	YB3-132M	YB3-160M	YB3-160L
K	427	500	512	587	622	752	782
model	YB3-180M	YB3-200L	YB3-200L	YB3-225M	YB3-250M	YB3-280S	YB3-280M
K	797	906	906	947	1055	1110	1165

REMARK: ①:N=1750R/MIN ②:N=2950R/MIN

VTMC50

Pump Dimensions								Number of Stage	
A	S	Z	Φ	H	H1	H2	H3	①	②
180	375	375	457	900	207	858	608	2-8	2-8
						1078	828		
						1298	1048	2-13	2-13
						1518	1268		
						1738	1488		
						1958	1708	2-16	2-16
						2178	1928		
						2398	2148		
						2618	2368		

Basic Dimensions											
	□P	□V	□m	a	b	n	n1	n2	h	t	
T≤0°	790	1250	100	1150	900	1050	840	500	200	840	
T>0°	520	950	100	850	620	750	560	380	140	560	

Motor Model and Motor Size									
model	YB3-112M	YB3-132S	YB3-132M	YB3-160M	YB3-160L	YB3-180M	YB3-180L	YB3-200L	
K	512	587	622	752	782	797	817	906	
model	YB3-225M	YB3-250M	YB3-280S	YB3-280M	YB3-315S	YB3-315M	YB3-315L		
K	947	1055	1110	1165	1330	1330	1430		

REMARK: ①:N=1750R/MIN ②:N=2950R/MIN

VTMC80

Pump Dimensions								Number of Stage	
A	S	Z	Φ	H	H1	H2	H3	①	②
250	400	400	508	1020	250	785	515	2-15	2-6
						1045	775		2-10
						1305	1035		2-14
						1565	1295		2-10
						1825	1555		
						2085	1815		
						2345	2075		
						2605	2335		

Basic Dimensions											
	□P	□V	□m	a	b	n	n1	n2	h	t	
T≤0°	900	1400	100	1300	1000	1200	940	500	200	940	
T>0°	580	1020	100	920	700	820	640	400	160	640	

Motor Model and Motor Size							
model	YB3-160M	YB3-160L	YB3-180M	YB3-180L	YB3-200L	YB3-225S	YB3-225M
K	752	782	797	817	906	947	977
model	YB3-250M	YB3-280S	YB3-280M	YB3-315M	YB3-315L	YB3-355M	YB3-355L
K	1055	1110	1165	1330	1430	1550	1690

REMARK: ①:N=1750R/MIN ②:N=2950R/MIN

VTMC100

Pump Dimensions								Number of Stage	
A	S	Z	Φ	H	H1	H2	H3	①	②
250	450	450	558	1040	250	820	555	2-5	2-5
						1095	795	2-8	2-8
						1335	1035	2-11	
						1575	1275	2-12	
						1815	1515		
						2055	1755		
						2295	1995		
						2535	2235		
2775	2475								

Basic Dimensions										
	□P	□V	□m	a	b	n	n1	n2	h	t
T≤0°	1000	1500	100	1400	1100	1300	1040	600	200	1040
T>0°	630	1100	100	1000	750	900	680	450	160	680

Motor Model and Motor Size						
model	YB3-180L	YB3-200L	YB3-225S	YB3-225M	YB3-250M	YB3-280S
K	817	906	947	977	1055	1110
model	YB3-280M	YB3-315S	YB3-315M	YB3-355S	YB3-355L	
K	1165	1380	1330	1470	1690	

REMARK: ①:N=1750R/MIN ②:N=2950R/MIN

VTMC150AB

Pump Dimensions								Number of Stage	
A	S	Z	Φ	H	H1	H2	H3	①	
250	550	550	711	1260	310	1000	650	1-4	1-7
						1330	980		
						1660	1310		
						1990	1640		
						2320	1970		
						2650	2300		
						2980	2630		
						3310	2960		

Basic Dimensions										
	□P	□V	□m	a	b	n	n1	n2	h	t
T≤0°	1100	1600	100	1500	1200	1400	1140	700	200	1140
T>0°	790	1250	100	1150	900	1050	840	500	200	840

Motor Model and Motor Size						
model	YB3-225S	YB3-280S	YB3-315S	YB3-315M	YB3-315L	YB3-355M
K	947	1110	1380	1380	1500	1610

REMARK: ①:N=1750R/MIN

VTMC150CD

Pump Dimensions								Number of Stage	
A	S	Z	Φ	H	H1	H2	H3	①	
300	300	600	813	1440	365	1240	815	1-4	
						1520	1095		
						1800	1375		
						2080	1655		

Basic Dimensions										
	□P	□V	□m	a	b	n	n1	n2	h	t
T≤0°	1200	1700	100	1600	1300	1500	1240	800	200	1240
T>0°	900	1400	100	1300	1000	1200	940	500	200	940

Motor Model and Motor Size					
model	YB3-315M	YB3-355L			
K	1380	1720			

REMARK: ①:N=1750R/MIN

VTMC200

Pump Dimensions								Number of Stage	
A	S	Z	Φ	H	H1	H2	H3	①	
300	650	650	914	1685	445	1275	725	1-4	
						1615	1115		
						1955	1455		
						2295	1795		

Basic Dimensions										
	□P	□V	□m	a	b	n	n1	n2	h	t
T≤0°	1300	1800	100	1700	1400	1600	1340	900	200	1340
T>0°	1000	1500	100	1400	1100	1300	1040	600	200	1040

Motor Model and Motor Size					
model	YB3-400S	YB3-400M			
K	2500	2500			

REMARK: ①:N=1750R/MIN



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