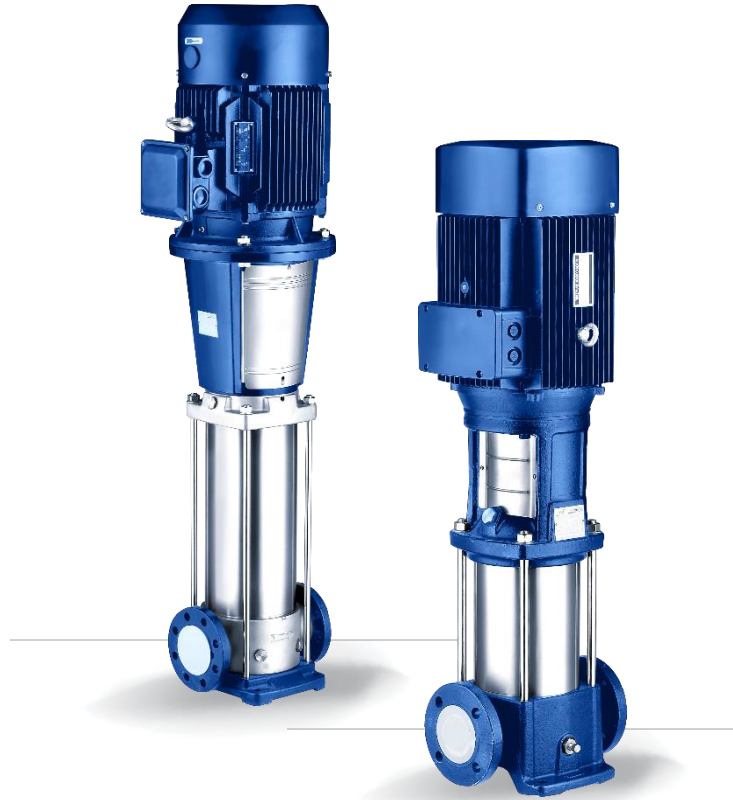


OPERATION AND MAINTENANCE INSTRUCTIONS

Vertical Multistage Centrifugal Pump

Series: MVA, MVS



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Table of Contents

1. NOTES	4
1.1 PREFACE	4
1.2 ICONS AND SYMBOLS	4
2. WARRANTY	4
2.1 WARRANTY CLAUSES.....	4
3. PRODUCT	5
3.1 PRODUCT INTRODUCTION	5
3.2 MODEL DESCRIPTION	5
3.3 MECHANICAL SEAL CODE	5
3.4 RATED CURRENT.....	6
4. SAFETY AND ENVIRONMENT	6
4.1 GENERAL	6
4.2 USER	6
4.3 SAFETY MEASURES	7
4.4 SAFETY PROTECTION MEASURES	7
4.5 ENVIRONMENTAL ASPECTS.....	8
5. PURPOSE AND APPLICATION SCOPE	8
5.1 PRODUCT FEATURES.....	8
5.2 PURPOSE	8
5.3 APPLICATION SCOPE.....	8
5.4 WORKING MEDIUM.....	8
6. TECHNICAL PARAMETERS	9
6.1 AMBIENT TEMPERATURE	9
6.2 LIQUID TEMPERATURE	9
6.3 CALCULATION METHOD FOR MINIMUM INLET PRESSURE	9
6.4 PRESSURE AND TEMPERATURE	10
6.5 ELECTRICAL PARAMETERS	10
6.6 MOTOR STARTUP/SHUTDOWN TIMES	10
6.7 SIZE AND WEIGHT.....	10
6.8 NOISE LEVEL	10
7. PRECAUTIONS BEFORE INSTALLATION AND OPERATION	11
7.1 PLEASE OPERATE AS FOLLOWS DURING INSTALLATION TO AVOID PUMP DAMAGE	11
7.2 CHECK BEFORE PUMP STARTUP	12
7.3 STARTUP STEPS	13
8. PERFORMANCE PARAMETERS	14
9. MAINTENANCE	15
10. TRANSPORTATION AND STORAGE	16
10.1 TRANSPORTATION	16
10.2 STORAGE	16
11. TROUBLE SHOOTING	16
12. SIZE DIAGRAMS	18

13. EXPLODED VIEWS.....27

1. NOTES

1.1 PREFACE

This manual contains important information for correct, reliable and effective operation and product application. Compliance with the operational instructions is crucial to assurance of product reliability, longer service life and avoidance of any risk. This chapter contains information about this manual and general safety. The following chapters provide information about normal operation, installation, maintenance and repair of products.

- Familiar with contents of the manual;
- Accurately abide by instructions and notes;
- Comply with the manual and never change the sequence required by operations;
- Put this manual or its duplicate copy at a fixed position near the product so that all operators can use it.

1.2 ICONS AND SYMBOLS

The following icons and symbols are used in this manual and all relevant documents.



Warning

Dangerous voltage: Comply with safety symbols of IEC 417 - 5036.



Warning

Operation or procedure: If you operate carelessly, it may cause personal injury or product damage. General hazard symbols comply with ISO7000 -0434.



Caution

Used to introduce safety instructions. Inobservance may result in product damage or dysfunction.



Environmental instructions

The product complies with environmental instructions.

2. WARRANTY

2.1 WARRANTY CLAUSES

The warranty period depends on your contract clauses or at least general clauses and conditions for sales.



Caution

Change to products can be made only after communication with and permit by the manufacturer. The original spare parts and fittings authorized by the manufacturer shall be used so as to assure safety. Utilization of other unauthorized parts and components shall exempt the manufacturer from any liability for relevant damage.



Caution

Any warranty for product reliability and safety is effective only when the user complies with this manual and uses products correctly. In no cases, shall the extent stated in the data sheets shall be exceeded.

In case that one or more of the following problems occur, this warranty becomes invalid:

- The buyer makes any change by himself.
- The buyer repairs the product by himself or asks a third party to repair it.
- The product is treated or maintained improperly.
- Non-original pump parts are installed on this product.

Defects to be rectified during the warranty period:

- Defects caused by design, material or manufacturing.
- They are reported during the warranty period.

Other warranty clauses included in general delivery clauses may be provided upon request.

3. PRODUCT

3.1 PRODUCT INTRODUCTION

MVA, MVS are vertical multistage series centrifugal pumps. They are characterized by low noise, high efficiency, compact structure, small volume and light weight, nice looking, convenient operation and maintenance, and specifically designed for conveying the cleaning medium. Pump suction and discharge connection is via flange or thread so that the pump can be installed easily. The pump is driven by motor and all pressure-bearing components are made of stainless steel or cast iron.

3.2 MODEL DESCRIPTION

MVA3-10-S-A

	MV	A	3	-10	-S	-A	
Sign	MV						Product ID, high-efficiency vertical multistage centrifugal pump series
Material code		A					Machine base and pump cover are made of cast iron
Parameter			3				Rated flow (m3/h)
				10			Pump stage quantity
Connection					-S		The stainless steel is AISI316 (AISI304 not indicated)
						-A	Pipe connection codes: A-Oval flange; B-Thread; K-Quick connection; DIN flange not indicated

MVS200-3-C-D

	MV	S	200	-3	-C	-D	
Sign	MV						Product ID, high-efficiency vertical multistage centrifugal pump series
Material code		S					All flow passage components are made of stainless steel
Parameter			200				Rated flow (m3/h)
				-3			Pump stage quantity
Connection					-C		One small impeller C
						-D	One small impeller D

3.3 MECHANICAL SEAL CODE

Materials of mechanical seal

Description	Material	Symbol	Notes
Dynamic ring configuration	Silicon carbide Hard alloy	SiC TuC	Normally configured silicon carbide Hard alloy is optional

Static ring configuration	Graphite Silicon carbide Hard alloy	C SiC TuC	Normally configured graphite, silicon carbide Hard alloy is optional
Rubber configuration	NBR EPDM Fluororubber	NBR EPDM FPM	Normally configured EPDM Others are optional
Spring	CrNiMo stainless steel	CrNiMo	-
Other metal parts	CrNiMo stainless steel	CrNiMo	-

3.4 RATED CURRENT

The allowed nominal current of motor for pump configuration is indicated on the motor nameplate. This shows the nominal working scope of motor and can be used to protect the motor.



Warning

When using, you must protect not only the motor but also the pump.

4. SAFETY AND ENVIRONMENT

4.1 GENERAL

MVA, MVS vertical multistage centrifugal pumps are developed with the most advanced technology. It is carefully manufactured and subject to continuous quality control. DESMI assumes no liability for any damage and injury caused by failure to comply with operational instructions described in this manual or by negligence during product installation, operation and maintenance. Failure to comply with safety instructions may endanger safety of personnel, environment and product itself, and will also result in forfeiture of right to claim compensation for damage.

Non-compliance will result in the following situations:

- Loss of important pump system functions
- Failure of specified maintenance and repair methods
- Injury to people caused by electrical, mechanical and chemical effects
- Danger to the environment caused by leakage of harmful substances
- Explosion

Depending on activities, additional safety measures may be required. In case of any potential danger during operation, please contact DESMI.



Caution

The product owner is obliged to abide by local safety regulations and the user's internal company guidelines.



Caution

Abide by not only general safety instructions in this chapter but also those under specific titles.

4.2 USER

All personnel engaged in product operation, maintenance, inspection and installation must be completely qualified to perform relevant operations, and clearly understand their own duties and authorized operations all the time. If any relevant person has not mastered necessary expertise, he/she must be given proper training and guidance. If necessary, the

service provider may entrust the manufacturer/supplier to organize relevant trainings. Besides, operators shall ensure that the responsible persons have completely understood the operating instructions.

4.3 SAFETY MEASURES

This product is well designed. Original parts and fittings comply with safety rules. Any structural modification or utilization of non-original components may bring safety risks.



Caution

Make sure that the product is running within its working scope. Only in this way can the product performances be guaranteed.

4.3.1 PRODUCT LABEL

Icons, warnings and notes for products form a part of safety rules. Labels shall not be removed or covered, and shall be kept clear during the whole life cycle of the product. Please replace any damaged label immediately.

4.4 SAFETY PROTECTION MEASURES

4.4.1 DURING NORMAL OPERATION

- Please contact the local power supply company in case of any power supply problem.
- Please do not directly touch the covered part of the product since it will produce heat.
- Before the pump is put into use, an undeformed coupling protection cover shall be always used to protect the coupling, so that the protective plate of coupling will not touch the rotating coupling.
- The connection box of motor shall be always closed.

4.4.2 DURING INSTALLATION, OPERATION AND MAINTENANCE

Only the authorized personnel can install, maintain and check products, and repair electrical components. Abide by the local safety rules.



Warning

Before installation, maintenance and repair, be sure to shut off the product power supply safely.



Warning

The pump surface may be hot after continuous running.



Warning

When starting the pump, make sure that nobody can come close to the rotating component.



Warning

Carefully operate the pump filled with dangerous liquid. Avoid any danger to persons or the environment when repairing water leakage, draining water and discharging air. It is strongly suggested that an air leakage pan shall be placed under the pump.



Warning

Once work is done, immediately re-install and/or re-start all safety-related protective devices.



Warning

Before the product is put into operation, please abide by all notes stated in "Precautions before installation and operation".

4.5 ENVIRONMENTAL ASPECTS

4.5.1 GENERAL

This product is always friendly to the environment throughout its life cycle. Therefore, if applicable, biodegradable lubricant shall be used for maintenance.



Environmental instructions

Always comply with the laws, regulations and instructions relevant to health, safety and environment.

4.5.2 DISMANTLING

The Owner is obliged to dismantle and environmentally dispose of the product.



Environmental instructions

Consult the local government regarding reuse of waste materials or environment-friendly disposal.

5. PURPOSE AND APPLICATION SCOPE

5.1 PRODUCT FEATURES

Low noise, high efficiency, compact structure, small volume and light weight, nice looking, resistant to mild corrosion, high sealing reliability, convenient operation and maintenance, etc.

5.2 PURPOSE

- Boiler water supply & condensate system
- Water treatment, permeation and filtration system
- Food, beverage industry
- Water supply & drainage of high-rise buildings
- Agriculture, nursery, golf course irrigation
- Fire protection system
- Industrial cleaning system
- Liquid conveying, circulation and lifting

5.3 APPLICATION SCOPE

- Medium temperature: $-20^{\circ}\text{C} \sim +120^{\circ}\text{C}$
- Flow range: $0.7\sim 240\text{m}^3/\text{h}$
- Max pressure: 33bar
- Medium PH: 3 - 9
- Highest ambient temperature: $+40^{\circ}\text{C}$ (please refer to 6.1 or consult DESMI)
- Max altitude: $\leq 1000\text{m}$ (please refer to 6.1 or consult DESMI)

5.4 WORKING MEDIUM

A thin, nonflammable and non-explosive liquid, contains no solid particles or fiber. The liquid causes no chemical corrosion to pump materials.

If the density or viscosity of the conveyed liquid is greater than that of water, the motor with high power shall be considered.

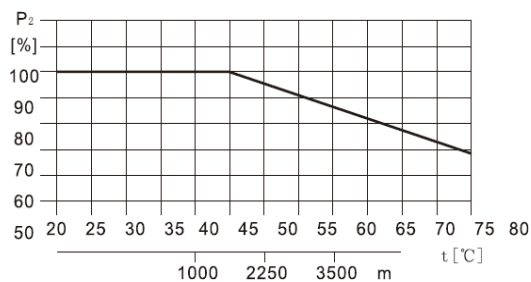
If all flow passage components required by the system are made of high-grade stainless steel, a special material is needed.

6. TECHNICAL PARAMETERS

6.1 AMBIENT TEMPERATURE

The product runs in the environment with a max temperature of +40°C. In case that ambient temperature exceeds +40°C or the motor is installed above 1,000m altitude, the motor rated output power (P2) will decrease due to the poor motor cooling effect caused by low air density, as shown in Chart 1. In this case, a motor with higher output power shall be used.

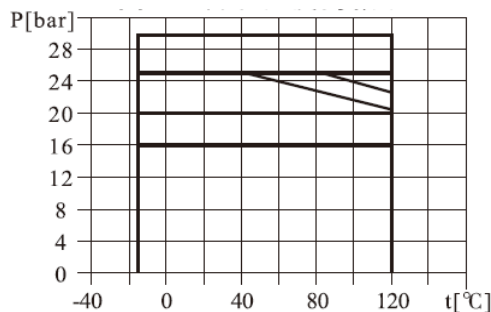
Relationship between motor output power (P2) and ambient temperature



6.2 LIQUID TEMPERATURE

The following chart shows the relationship between liquid temperature and maximum allowable working pressure.

Note: The maximum allowable working pressure and liquid temperature range are based on the pump's own bearing capacity.



6.3 CALCULATION METHOD FOR MINIMUM INLET PRESSURE

Minimum inlet pressure "H" (unit: meter water column) is calculated as below: $H = P_b \times 10.2 - \text{NPSH} - H_f - H_v - H_s$

P_b = Atmospheric pressure, in unit bar (atmospheric pressure regarded as 1bar), P_b in a closed system means the system pressure (unit: bar).

NPSH = Net positive suction head, in unit m (taken from NPSH performance curve).

H_f = Friction loss in pipeline at the suction side (in unit m)

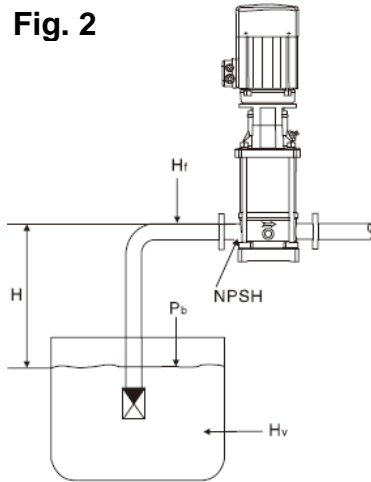
H_v = Vaporization pressure (in unit m)

H_s = Safety margin, take 0.5 at least

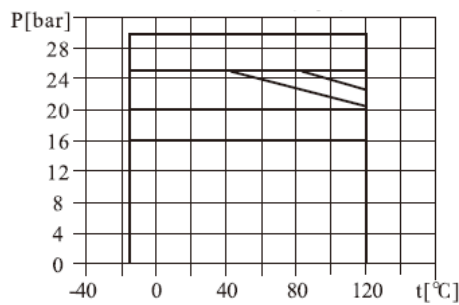
If the result of calculated H is positive, it means the suction height at the suction side equals to "H"m. If the result is negative, at least positive Hm pressure is required at the inlet to avoid

cavitation.

Fig. 2



6.4 PRESSURE AND TEMPERATURE



6.5 ELECTRICAL PARAMETERS

Refer to the motor nameplate.

6.6 MOTOR STARTUP/SHUTDOWN TIMES

Less than 4kW (inclusive): Max 100 times/hour
 More than 5.5kW (inclusive): Max 20 times/hour

6.7 SIZE AND WEIGHT

As for size, refer to size diagrams of all models
 As for weight, refer to package labels

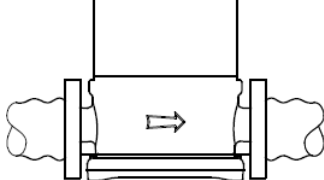
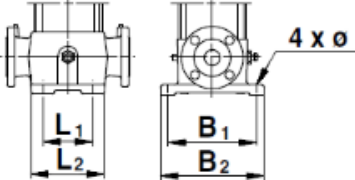
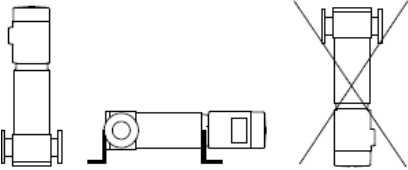
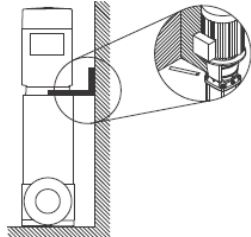
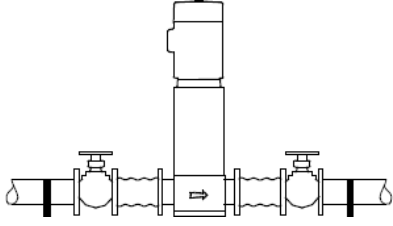
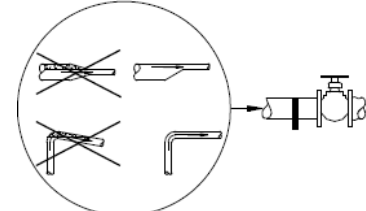
6.8 NOISE LEVEL

Electric pump noise

功率 [kW]	0.37	0.55	0.75	1.1	1.5	2.2	3.0	4.0	5.5	7.5	11	15	18.5	22	30	37	45	55	75	90	110
50Hz 噪音 [dB(A)]	53	53	53	55	58	58	59	66	73	73	75	70	70	69	73	73	73	73	75	77	77
60Hz 噪音 [dB(A)]	58	56	57	60	63	64	65	71	73	78	79	74	74	74	73	77	77	77	79	81	81

7. PRECAUTIONS BEFORE INSTALLATION AND OPERATION

7.1 PLEASE OPERATE AS FOLLOWS DURING INSTALLATION TO AVOID PUMP DAMAGE

No.	Diagram	Information
1		<p>The arrow on the pump base plate indicates the direction of liquid going through the pump.</p>
2		<p>This information is indicated in Chapter 12 (size diagrams):</p> <ul style="list-style-type: none"> • End-to-end length • Base plate size • Pipe connection • Diameter and location of foot bolt
3		<p>The pump can be installed vertically or horizontally. However, the motor shall be installed neither below the horizontal plane nor upside down. Make sure that the motor cooling fan provides sufficient cool air circulation. It is suggested that supports shall be added to a motor above 4KW.</p>
3A		<p>Additional support. Since the pump center is relatively high, we suggest that one additional support bracket is provided for the pump installed on the boat, in an area with earthquake danger or in the movable system. The bracket can be installed on motor base, ship wall, building rigid wall or rigid component.</p>
4		<p>In order to minimize any noise made by the pump, we suggest that you install expansion joints at both sides of the pump. Install isolating valves at both ends of the pump so as to avoid system discharge when it is necessary for pump cleaning, maintenance and replacement. Use a check valve to prevent backflow of medium and to protect the pump.</p>
5		<p>Install pipes to avoid air lock, especially at the inlet side of the pump.</p>

6		<p>If your installation is characterized by one of following features, please install one vacuum valve near the pump.</p> <ul style="list-style-type: none"> • The discharge pipe is sloped downwards in the direction of leaving the pump. • Siphonage may occur. • It is necessary to stop backflow of unclean water.
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- | | |
|--|---|
| | Please carefully read warning signs on the pump motor base before startup. |
| | Caution: Do not start the pump before water is filled and air is discharged. In case of dry running, pump bearing and shaft seal will be damaged. When discharging air, pay attention that water drained shall not injure people or damage objects, especially avoid scalding by sprayed hot water when it is used to convey hot water. |

Electrical connection

	<p>The motor shall be provided with reliable earthing. Before dismantling the motor connection box or the pump, make sure that the power supply is disconnected.</p> <p>One-phase motor is provided with a heat protector inside while three-phase motor shall be provided with a three-phase protector before installation.</p>
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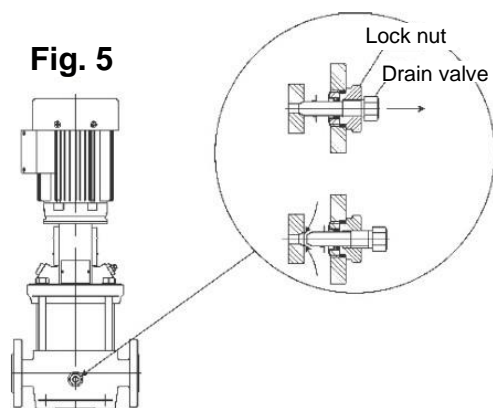
7.2 CHECK BEFORE PUMP STARTUP

- Check if foot bolts are tightened.
- If the pump is full of water or not.
- If the voltage of power grid is correct or not.
- If the rotating direction is correct or not.
- If all pipes are tightly connected or not, if pipes can provide water normally or not.
- If valves on inlet pipes are completely opened or not. The outlet valve shall be opened slowly after the pump is started up.
- Check working pressure if a pressure meter is installed.
- All controls required by normal running.

If the pump is controlled by the pressure switch, check, adjust, start and disconnect the pressure. Check if the full-load current of the motor exceeds the maximum allowable current via the pressure switch.

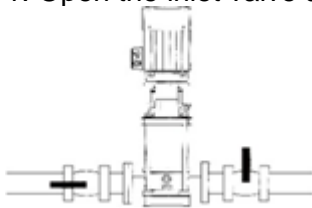
Please carefully read warning signs on the pump motor base before startup.

Caution
 Do not start the pump before water is filled and air is discharged. In case of dry running, pump bearing and shaft seal will be damaged. When discharging air, pay attention that water drained shall not injure people or damage objects, especially avoid damage to materials at the outlet caused by the liquid flowing at a high speed when it is used to convey hot water.

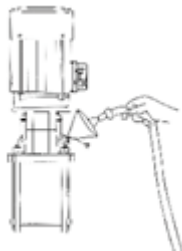


7.3 STARTUP STEPS

1. Open the inlet valve and close the outlet valve.



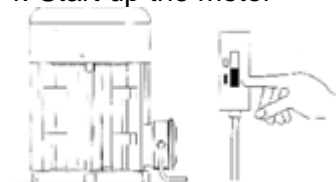
2. Screw off the water injection plug and start filling water



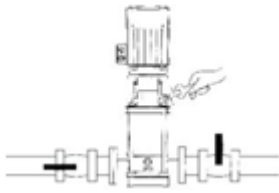
3. Check rotating direction of the motor



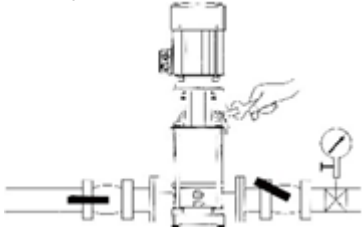
4. Start up the motor



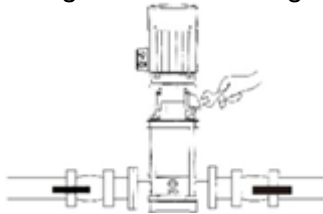
5. Loosen the discharge valve and slowly open the outlet valve



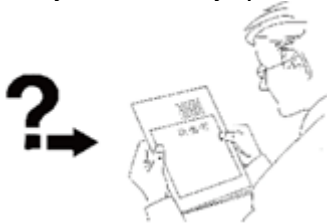
6. Adjust the outlet valve to the required pressure



7. Tighten the discharge valve



8. If you have any question, please read the instructions or call DESMI.



8. PERFORMANCE PARAMETERS

Model	Flow M3/h 50Hz		
	Minimum flow	Maximum flow	Rated flow
1	0.7	2.4	1
2	1.0	3.5	2
3	1.2	4.5	3
4	1.5	8	4
5	2.5	8.5	5
10	5	13	10
15	8	23	15

20	10.5	29	20
32	15	40	32
45	22	58	45
64	30	85	64
90	45	120	90
120	60	150	120
150	80	180	150
200	100	240	200

The pump may run with 60hz motor. The flow, head and power of the pump running at 60hz will be changed. As for running at 60hz, please consult DESMI.

9. MAINTENANCE



Before maintenance, confirm that the pump is shut off so as to avoid accident. Pump bearing and shaft seal require no maintenance.

Motor bearing

The motor without a nozzle requires no maintenance. The motor with a nozzle (including motor above 11kW) shall be lubricated with lubricant or similar high-temperature lithium base grease. For more details, refer to instructions on the windscreen. In case of seasonal running (motor shutdown for over 6 months), lubricate before starting the motor.

The pump installed as per this manual will work effectively without much maintenance.

The mechanical seal is adjusted automatically. The contact surface of dynamic ring and static ring in the seal will be lubricated and cooled down by the liquid conveyed by the pump. The sliding bearing in the pump will be lubricated by the liquid conveyed by the pump.



If the pump is installed at a place where it is likely to freeze, proper quantity of antifreezing agent must be added so as to avoid damage to the pump due to freezing of the liquid conveyed by the pump.

If the pump is out of service during a frost period, you should drain the liquid inside it so as to avoid any damage to the pump. The liquid inside the pump may be drained via the water injection hole at the pump head and the drainage hole at bottom. Pay attention to safety of persons and objects during water drainage (cold or hot). When using the pump once again, firstly tighten the vent plug and drainage valve. When it is necessary to replace the drainage valve, you must loosen the bypass valve, then unscrew the drain plug (refer to Fig. 5). If you want to install the drainage valve, firstly tighten the drain plug, then tighten the bypass valve.

10. TRANSPORTATION AND STORAGE

10.1 TRANSPORTATION

1. Transport the pump to the tray or the position specified on the package.
2. Make sure that the pump is stable.
3. If any, please follow the instructions on the package.



Warning
The pump must be lifted as per the current lifting guideline. Only qualified personnel are allowed to lift the pump.



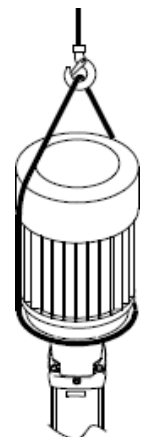
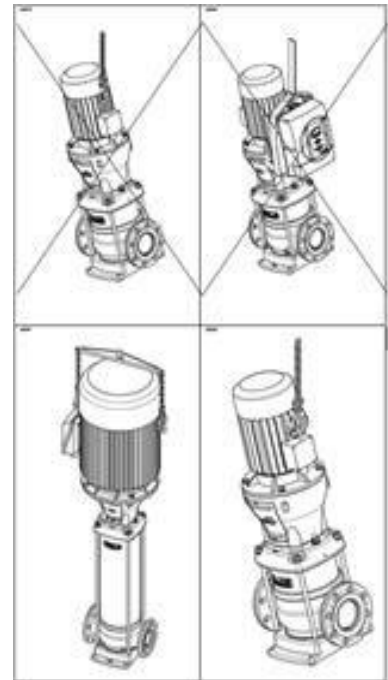
Warning
Do not lift the pump with the frequency converter (if provided with a frequency converter), electric appliance parts or motor cover. Make sure that the pump keeps balanced when it is lifted.



Warning
The pump may be inclined when it is lifted. Before correct placement and installation, do not dismantle the lifting device on the pump.



Warning
All pump motors are provided with lifting-eye bolts. If such bolts cannot withstand the weight of the whole pump, the water pump with a standard motor shall be lifted at the pump head via steel belts or in a similar method.



10.2 STORAGE

It is suggested that ethylene glycol is filled into the pump chamber during pump storage so as to avoid frost.

Storage	
Ambient temperature (°C)	-10 / +40
Maximum humidity	Less than 80% and no condensation occurs to the pump at 20°C

11. TROUBLE SHOOTING



Warning

Before installation, maintenance or restoration, please abide by general safety measures.

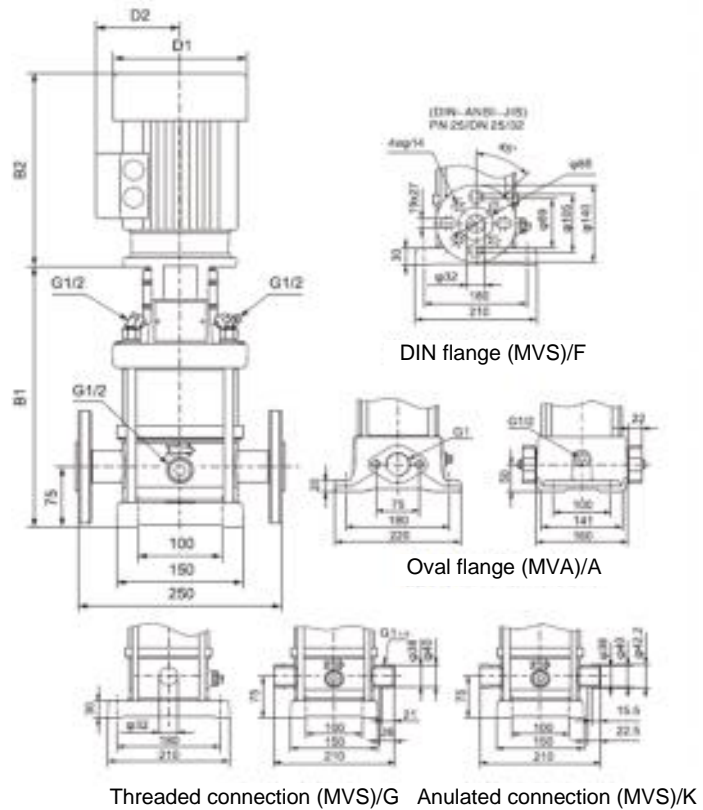
Problem description	Possible reason	Solution	Check point
Leakage along the shaft	Running surface of the mechanical seal is damaged	Replace the mechanical seal	Check dust/grinding part of the pump
	New pump: The mechanical seal is blocked during assembling	When the pump is running, rapidly open and close the outlet valve	
	The mechanical seal is installed incorrectly	Install the mechanical seal correctly, use water and soap as a lubricant during installation	
	The elastomer is damaged due to impact of the medium	Choose correct mechanical seal elastomer	
	The pressure is too high	Use mechanical seal of correct type and pressure range	
	The shaft is worn	Replace the shaft and mechanical seal	
	The pump runs without water, it is a dry running	Replace the mechanical seal	
Leakage at pump bracket top or pump bottom	The O-ring is damaged	Replace the O-ring	
	The O-ring does not withstand the pumping medium	Replace with an O-ring suitable for the pumping medium	
	The pump is deformed due to too much stress at the pump foot	Reduce the pressure on the pipe There is no pressure when installing the pump foot The pump and the pipeline connecting part are supported additionally	
Pump vibration and noise	The coupling is installed incorrectly	Check and re-install the coupling	
	There is no medium in the pump	Fill the pump and discharge air	
	There is no medium input	Make sure that there is sufficient medium at the inlet	
	The pump bearing or motor bearing is damaged	Replace the bearing	
	There is very little usable NPSH, and the pump has suffered cavitation	Increase pressure at the inlet	
	The pump fails to run within the specified operating range	Choose other pumps Adjust the system so that the pump runs within the specified range	
	The pump is installed on an uneven surface	Adjust installation	

Pump malfunction	The pump interior is blocked	Check the pump interior	
Pump startup failure	No power	Check the power supply	<ul style="list-style-type: none"> ● Current ● Main switch ● Fuse
		Check the safety setting of the motor	<ul style="list-style-type: none"> ● Leakage switch ● Heat protection switch
	The heat protection switch of the motor is triggered	The heat protection switch of the motor. If this problem often occurs, please contact the supplier.	Check if the set value is correct
Motor started but pump failure to work	The coupling between the pump and the motor is loose	Check and tighten the coupling bolt	
	The pump shaft is damaged	Contact the manufacturer to replace it	
Insufficient flow or/and pressure of pump	The outlet or inlet valve is closed	Open the valve	
	There is air in the pump	Discharge air in the pump	
	Pressure at the pump suction end is low	Increase pressure at the pump suction end	
	The pump rotating direction is wrong	Replace two phases of three-phase wiring	
	There is no air discharge in the suction pipe	Discharge air in the suction pipe.	
	There is air leakage at the suction end	Check the air leakage position.	
	Water flow is very low, the bubble pump is blocked	Make sure that flow is increased or a smaller pump is used	
	The diameter of suction pipe is small	Increase the pipe diameter	
	The bottom valve is blocked	Clean the bottom valve	
	The impeller or pump chamber is blocked	Clean the pump interior	
	The O-ring of the diffuser is damaged	Replace the O-ring	
	The O-ring is not suitable for the pumping medium	Replace with an O-ring suitable for the pumping medium.	

12. SIZE DIAGRAMS

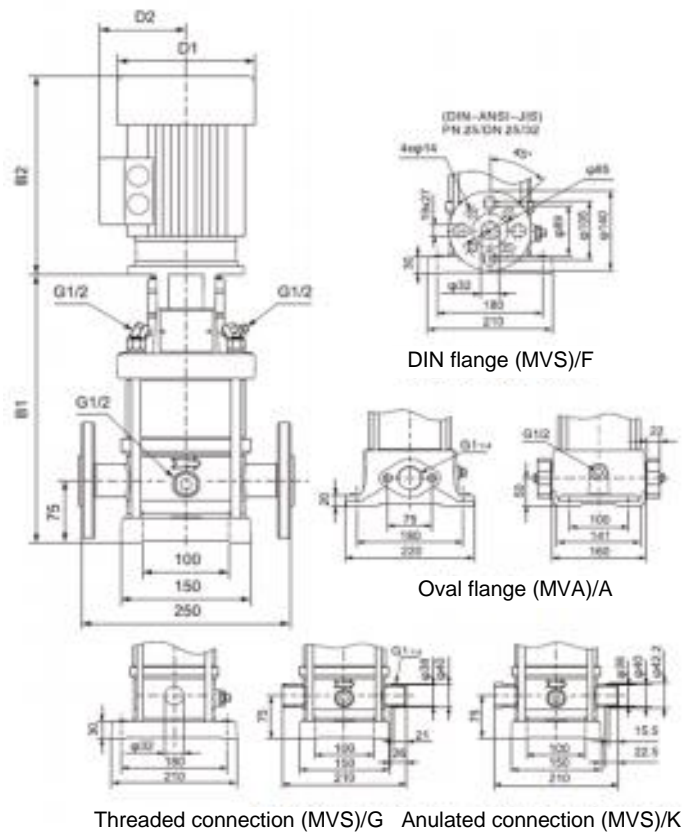
Sizes of Models MVA3, MVS3

Pump model	Size					
	Oval flange (MVA)		DIN flange (MVS)		D1	D2
	B1	B1+B2	B1	B1+B2		
3-2	238	468	264	494	136	109
3-3	256	486	282	512	136	109
3-4	274	504	300	530	136	109
3-5	292	522	318	548	136	109
3-6	310	540	336	566	136	109
3-7	328	558	354	584	136	109
3-8	350	600	376	626	155	124
3-9	368	618	394	644	155	124
3-10	386	636	412	662	155	124
3-11	404	654	430	680	155	124
3-12	422	672	448	698	155	124
3-13	440	690	466	716	155	124
3-15	476	726	502	752	155	124
3-17	528	838	554	864	175	137
3-19	564	874	590	900	175	137
3-21	600	910	626	936	175	137
3-23	636	946	662	972	175	137
3-25	672	982	698	1008	175	137
3-27	708	1018	734	1044	175	137
3-29	744	1054	770	1080	175	137
3-31	784	1114	810	1140	195	151
3-33	820	1150	846	1176	195	151
3-36	874	1204	900	1230	195	151



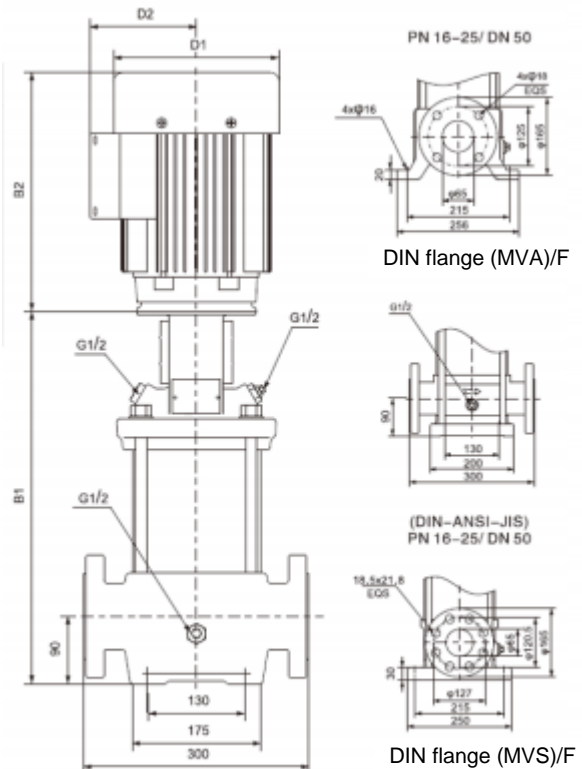
Sizes of Models MVA4, MVS4

Pump model	Size					
	Oval flange (MVA)		DIN flange (MVS)		D1	D2
	B1	B1+B2	B1	B1+B2		
4-2	238	458	263	483	140	110
4-3	265	485	290	510	140	110
4-4	297	547	322	572	160	125
4-5	324	574	349	599	160	125
4-6	351	601	376	626	160	125
4-7	395	685	420	710	180	125
4-8	422	712	447	737	180	125
4-9	449	739	474	764	180	125
4-10	476	766	501	791	180	125
4-11	503	793	528	818	180	125
4-12	530	820	555	845	180	125
4-13	565	895	590	920	190	140
4-14	592	922	617	947	190	140
4-15	619	949	644	974	190	140
4-16	646	976	671	1001	190	140
4-17	673	1003	698	1028	220	150
4-18	700	1030	725	1055	220	150
4-19	727	1057	752	1085	220	150
4-20	754	1084	779	1109	220	150
4-21	781	1111	806	1136	220	150
4-22	808	1138	833	1163	220	150



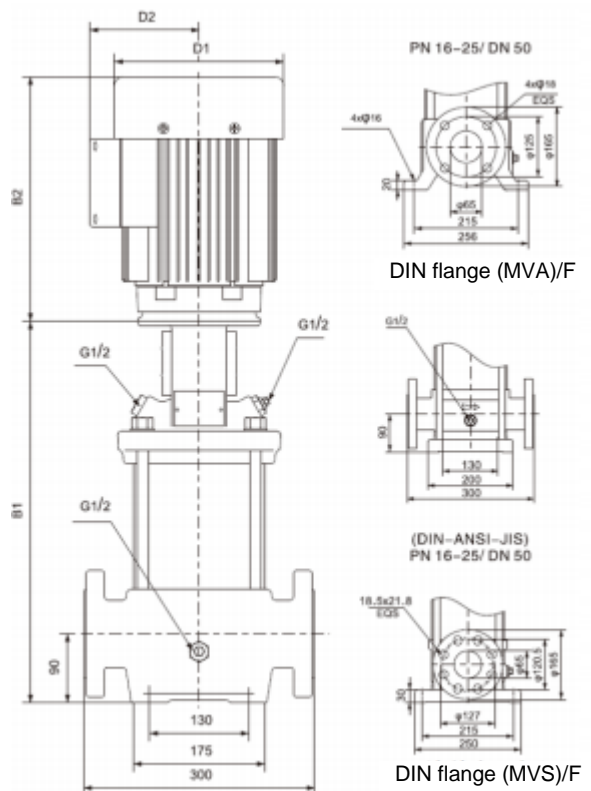
Sizes of Models MVA15, MVS15

Pump model	Size					
	DIN flange (MVA)		DIN flange (MVS)		D1	D2
	B1	B1+B2	B1	B1+B2		
15-1	354	604	352	602	155	124
15-2	415	725	413	723	175	137
15-3	465	795	463	793	195	151
15-4	510	867	508	865	219	169
15-5	555	912	553	910	219	169
15-6	632	1030	630	1028	258	188
15-7	677	1075	675	1073	258	188
15-8	722	1120	720	1118	258	188
15-9	767	1165	765	1163	258	188
15-10	889	1388	887	1386	315	242
15-12	979	1478	977	1476	315	242
15-14	1071	1570	1067	1566	315	242
15-17	1204	1703	1202	1701	315	242



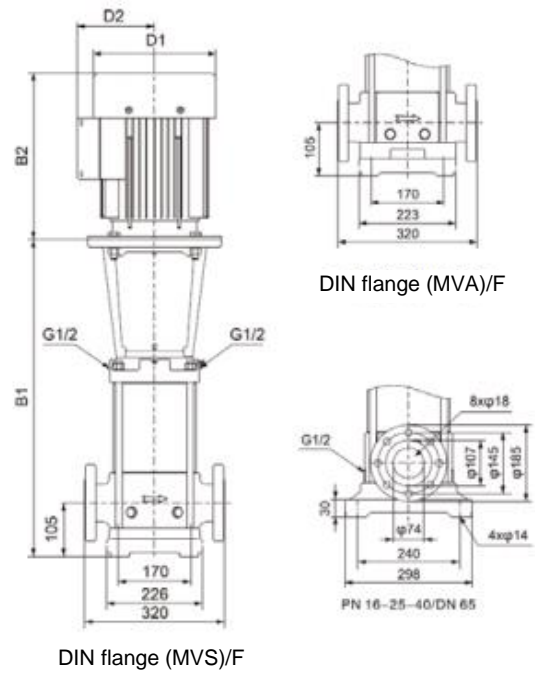
Sizes of Models MVA20, MVS20

Pump model	Size					
	DIN flange (MVA)		DIN flange (MVS)		D1	D2
	B1	B1+B2	B1	B1+B2		
20-1	354	604	352	602	155	124
20-2	415	725	413	723	175	137
20-3	465	822	463	820	219	169
20-4	542	940	540	938	258	188
20-5	587	985	585	983	258	188
20-6	632	1030	630	1028	258	188
20-7	677	1075	675	1073	258	188
20-8	799	1298	797	1296	315	242
20-10	889	1388	887	1386	315	242
20-12	979	1478	977	1476	315	242
20-14	1069	1568	1067	1566	315	242
20-17	1204	1747	1202	1745	315	242



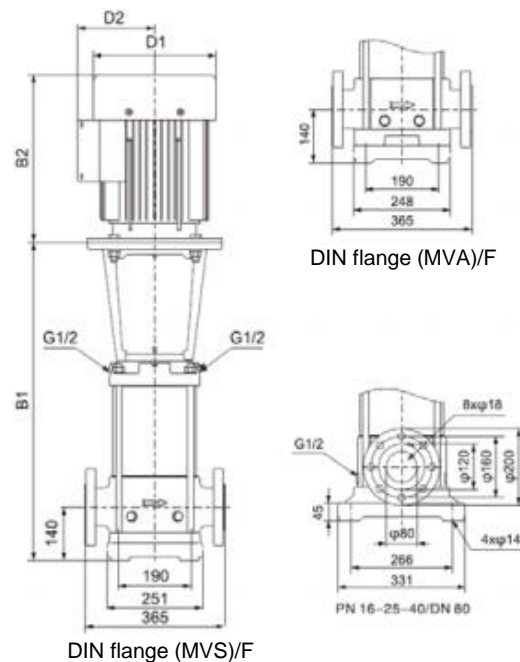
Sizes of Models MVA32, MVS32

Pump model	Size			
	DIN flange (MVA, MVS)		D1	D2
	B1	B1+B2		
32-1-1	505	786	178	110
32-1	505	826	178	110
32-2-2	575	910	198	120
32-2	575	947	220	134
32-3-2	645	1036	220	134
32-3	645	1036	220	134
32-4-2	715	1106	220	134
32-4	715	1106	220	134
32-5-2	895	1393	334	263
32-5	895	1393	334	263
32-6-2	965	1463	334	263
32-6	965	1463	334	263
32-7-2	1035	1533	334	263
32-7	1035	1533	334	263
32-8-2	1105	1603	334	263
32-8	1105	1603	334	263
32-9-2	1175	1673	334	263
32-9	1175	1673	334	263
32-10-2	1245	1743	334	263
32-10	1245	1743	334	263
32-11-2	1315	1877	382	305
32-11	1315	1877	382	305
32-12-2	1385	1947	382	305
32-12	1385	1947	382	305
32-13-2	1455	2115	420	372
32-13	1455	2115	420	372
32-14-2	1525	2185	420	372
32-14	1525	2185	420	372



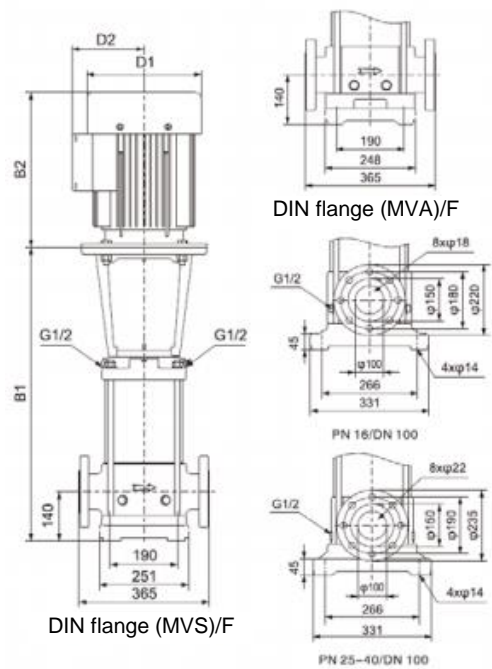
Sizes of Models MVA45, MVS45

Pump model	Size			
	DIN flange (MVA, MVS)		D1	D2
	B1	B1+B2		
45-1-1	559	894	198	120
45-1	559	931	220	134
45-2-2	639	1030	220	134
45-2	639	1030	220	134
45-3-2	829	1327	334	263
45-3	829	1327	334	263
45-4-2	909	1407	334	263
45-4	909	1407	334	263
45-5-2	989	1487	334	263
32-5	989	1487	334	263
45-6-2	1069	1631	382	305
45-6	1069	1631	382	305
45-7-2	1149	1809	420	372
45-7	1149	1809	420	372
45-8-2	1229	1889	420	372
45-8	1229	1889	420	372
45-9-2	1309	1969	420	372
45-9	1309	1969	420	372
45-10-2	1389	2049	420	372
45-10	1389	2049	420	372
45-11-2	1469	2145	458	427
45-11	1469	2145	458	427
45-12-2	1549	2225	458	427
45-12	1549	2225	458	427
45-13-2	1629	2305	458	427



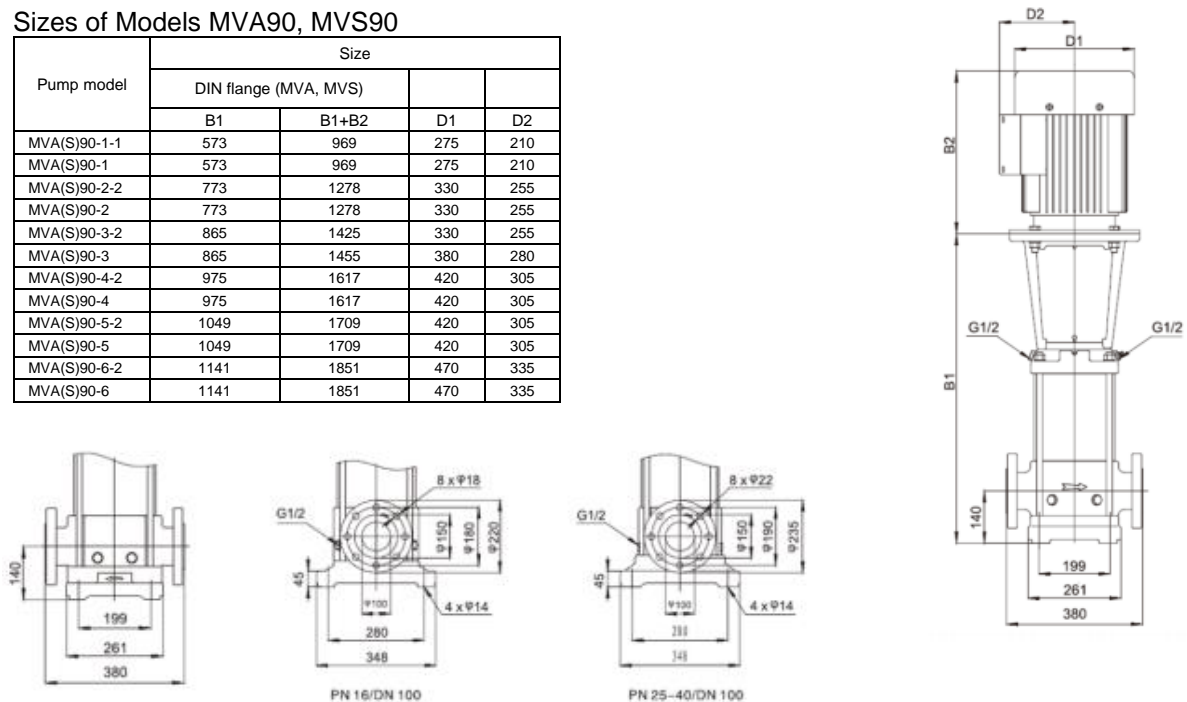
Sizes of Models MVA64, MVS64

Pump model	Size			
	DIN flange (MVA, MVS)			
	B1	B1+B2	D1	D2
64-1-1	561	933	220	134
64-1	561	952	220	134
64-2-2	644	1035	220	134
64-2-1	754	1252	334	263
64-2	754	1252	334	263
64-3-2	836	1334	334	263
64-3-1	836	1334	334	263
64-3	836	1334	334	263
64-4-2	919	1417	334	263
64-4-1	919	1481	382	305
64-4	919	1481	382	305
64-5-2	1001	1661	420	372
64-5-1	1001	1661	420	372
64-5	1001	1661	420	372
64-6-2	1084	1744	420	372
64-6-1	1084	1744	420	372
64-6	1084	1744	420	372
64-7-2	1166	1826	420	372
64-7-1	1166	1826	420	372
64-7	1166	1826	458	427
64-8-2	1249	1925	458	427
64-8-1	1249	1925	458	427

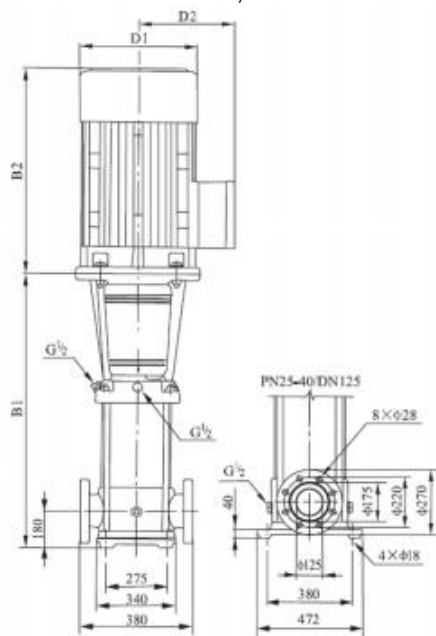


Sizes of Models MVA90, MVS90

Pump model	Size			
	DIN flange (MVA, MVS)			
	B1	B1+B2	D1	D2
MVA(S)90-1-1	573	969	275	210
MVA(S)90-1	573	969	275	210
MVA(S)90-2-2	773	1278	330	255
MVA(S)90-2	773	1278	330	255
MVA(S)90-3-2	865	1425	330	255
MVA(S)90-3	865	1455	380	280
MVA(S)90-4-2	975	1617	420	305
MVA(S)90-4	975	1617	420	305
MVA(S)90-5-2	1049	1709	420	305
MVA(S)90-5	1049	1709	420	305
MVA(S)90-6-2	1141	1851	470	335
MVA(S)90-6	1141	1851	470	335

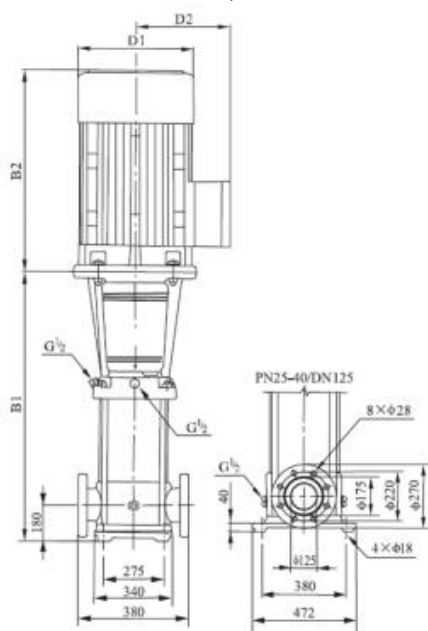


Sizes of Models MVA120, MVS120



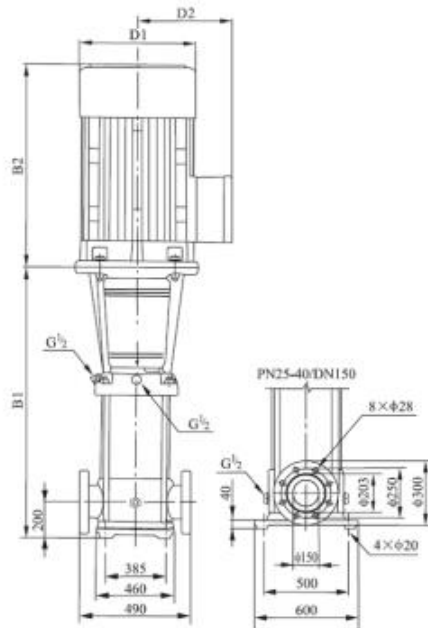
Model	Size (mm)			
	B1	B1+B2	D1	D2
MVA(S)120-1	840	1333	254	175
MVA(S)120-2-2	1000	1493	254	175
MVA(S)120-2-1	1000	1560	330	250
MVA(S)120-2	1000	1600	380	280
MVA(S)120-3-2	1160	1840	420	305
MVA(S)120-3-1	1160	1840	420	305
MVA(S)120-3	1160	1840	420	305
MVA(S)120-4-2	1320	2000	420	305
MVA(S)120-4-1	1320	2000	420	305
MVA(S)120-4	1320	2035	470	335
MVA(S)120-5-2	1480	2195	470	335
MVA(S)120-5-1	1480	2195	470	335
MVA(S)120-5	1480	2295	510	370
MVA(S)120-6-2	1670	2455	510	370
MVA(S)120-6-1	1670	2455	510	370
MVA(S)120-6	1670	2515	580	410
MVA(S)120-7-2	1830	2675	580	410
MVA(S)120-7-1	1830	2675	580	410
MVA(S)120-7	1830	2675	580	410

Sizes of Models MVA150, MVS150



Model	Size (mm)			
	B1	B1+B2	D1	D2
MVA(S)150-1-1	840	1333	254	175
MVA(S)150-1	840	1333	254	175
MVA(S)150-2-2	1000	1560	330	250
MVA(S)150-2-1	1000	1600	380	280
MVA(S)150-2	1000	1680	420	305
MVA(S)150-3-2	1160	1840	420	305
MVA(S)150-3-1	1160	1840	420	305
MVA(S)150-3	1160	1840	420	305
MVA(S)150-4-2	1320	2035	470	335
MVA(S)150-4-1	1320	2035	470	335
MVA(S)150-4	1350	2135	510	370
MVA(S)150-5-2	1510	2295	510	370
MVA(S)150-5-1	1510	2355	580	410
MVA(S)150-5	1510	2355	580	410
MVA(S)150-6-2	1670	2515	580	410
MVA(S)150-6-1	1670	2515	580	410
MVA(S)150-6	1670	2515	580	410

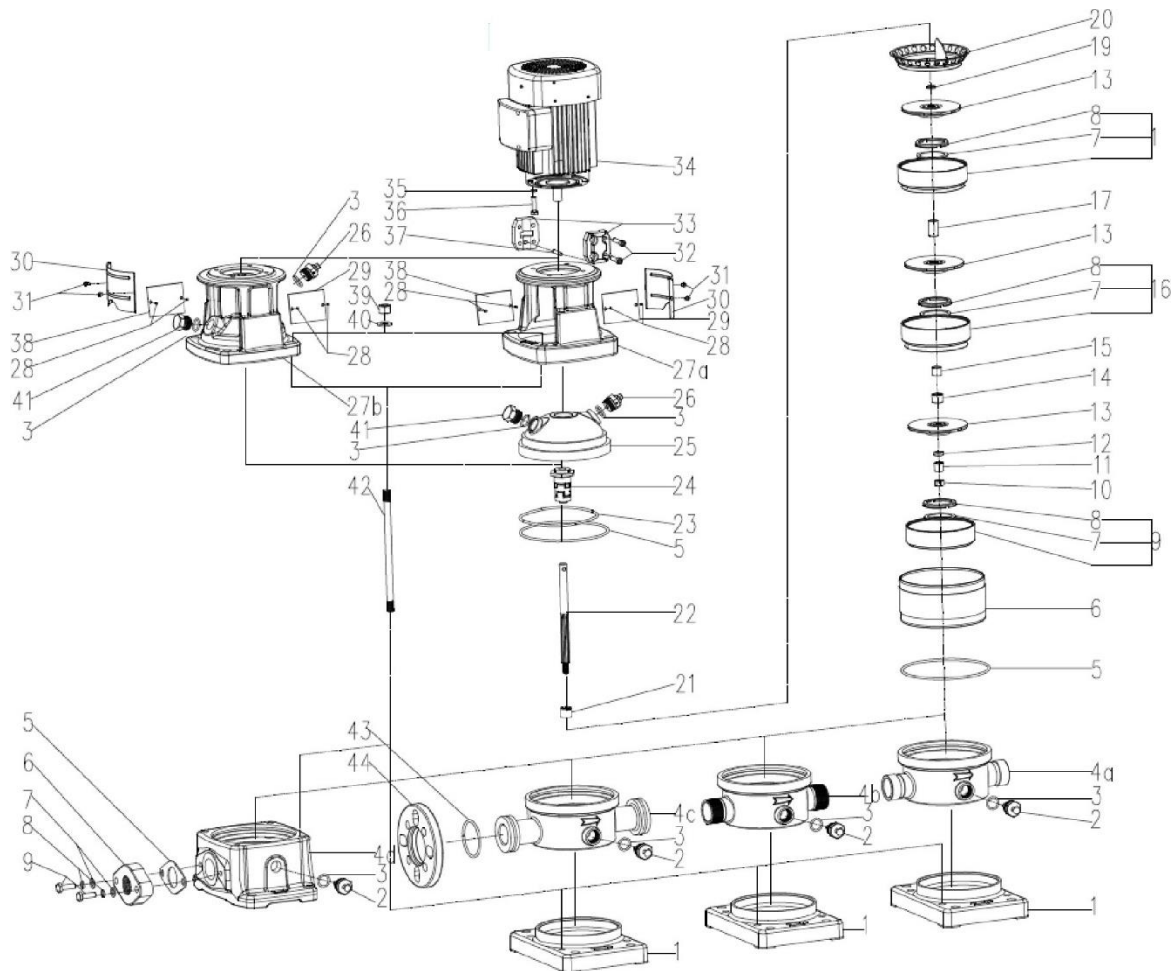
Sizes of Models MVA200, MVS200



Model	Size (mm)			
	B1	B1+B2	D1	D2
MVA(S)200-1-D	907	1467	330	250
MVA(S)200-1-C	907	1507	380	280
MVA(S)200-1	907	1587	420	305
MVA(S)200-2-2D	1101	1781	420	305
MVA(S)200-2-2C	1101	1816	470	335
MVA(S)200-2-C	1131	1916	510	370
MVA(S)200-2	1131	1916	510	370
MVA(S)200-3-2D	1325	2170	580	410
MVA(S)200-3-C-D	1325	2170	580	410
MVA(S)200-3-2C	1325	2170	580	410
MVA(S)200-3-D	1325	2170	580	410
MVA(S)200-3-C	1325	2170	580	410
MVA(S)200-3	1325	2220	580	410
MVA(S)200-4-2D	1519	2414	580	410
MVA(S)200-4-2C	1519	2619	645	530
MVA(S)200-4-C	1519	2619	645	530
MVA(S)200-4	1519	2619	645	530

13. EXPLODED VIEWS

Exploded views of MVA, MVS1, 2



No.	Designation
1	Bottom plate
2	Drain plug
3	O-ring
4a	Base (anulated connection)
4b	Base (threaded connection)
4c	Base (flanged connection)
4d	Bottom base
5	O-ring
6	Pump barrel
7	Choma
8	Choma cap
9	First-grade guide vane
10	Self-lock nut
11	Shaft-end sleeve
12	Shaft sleeve a
13	Impeller
14	Guide shaft sleeve
15	Shaft sleeve b

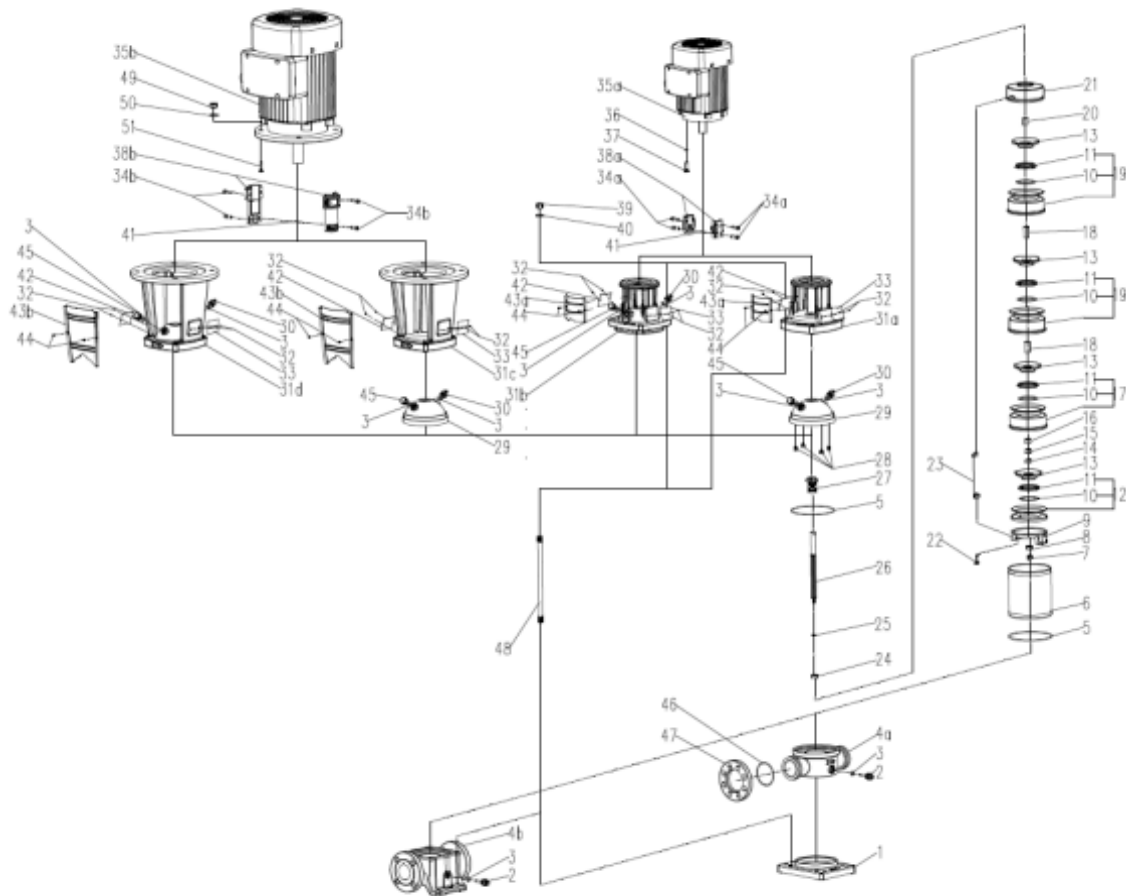
No.	Designation
23	Wave-shaped spring
24	Cartridge mechanical seal
25	Pump cover
26	Vent plug
27a	Motor base
27b	Motor base
28	Rivet
29	Nameplate
30	Protective plate
31	Cross-recessed pan head screw
32	Hexagon socket head cap screw
33	Half coupling
34	Motor (B14)
35	Spring washer
36	Hexagon head bolt
37	Cylindrical pin
38	Warning nameplate
39	Hexagon nut

No.	Designation
47	Flat washer
48	Spring washer
49	Hexagon head bolt

16	Guide vane with bearing
17	Shaft sleeve c
18	Medium guide vane
19	Shaft sleeve d
20	Final guide vane
21	Positioning sleeve used for shaft
22	Pump shaft

40	Flat washer
41	Water injection plug
42	Draw rod
43	Clamp
44	Multi-use flange
45	Flange washer
46	Oval flange

Exploded views of MVA, MVS10, 15, 20

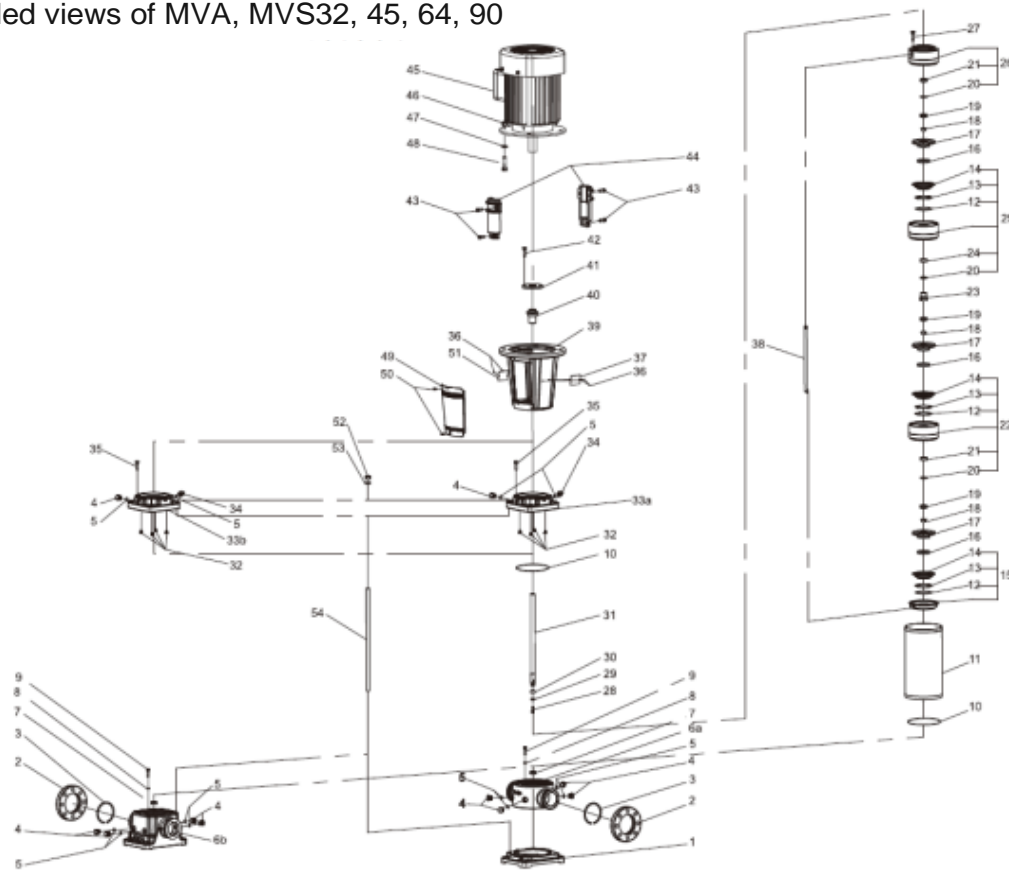


No.	Designation
1	Bottom plate
2	Drain plug
3	O-ring
4a	Base
4b	Bottom base
5	O-ring
6	Pump barrel
7	Self-lock nut
8	Shaft-end sleeve
9	Inlet cap
10	Choma
11	Choma cap
12	First-grade guide vane
13	Impeller
14	Shaft sleeve a
15	Guide shaft sleeve
16	Shaft sleeve b
17	Guide vane with bearing
18	Shaft sleeve c
19	Medium guide vane
20	Shaft sleeve d
21	Final guide vane
22	Hexagon head bolt
23	Tightening strip
24	Positioning sleeve used for shaft

No.	Designation
25	Retaining ring
26	Pump shaft
27	Mechanical seal
28	Adjusting pad
29	Pump cover
30	Vent plug
31a	Motor base
31b	Motor base
31c	Motor base
31d	Motor base
32	Rivet
33	Nameplate
34a	Hexagon socket head cap screw
34b	Hexagon socket head cap screw
35a	Motor (B14)
35b	Motor (B5)
36	Spring washer
37	Hexagon head bolt
38a	Half coupling
38b	Half coupling
39	Hexagon nut
40	Flat washer
41	Cylindrical pin
42	Warning nameplate
43a	Protective plate

No.	Designation
43b	Protective plate
44	Cross-recessed pan head screw
45	Water injection plug
46	Clamp
47	Multi-use flange
48	Draw rod
49	Hexagon nut
50	Flat washer
51	Hexagon head bolt

Exploded views of MVA, MVS32, 45, 64, 90

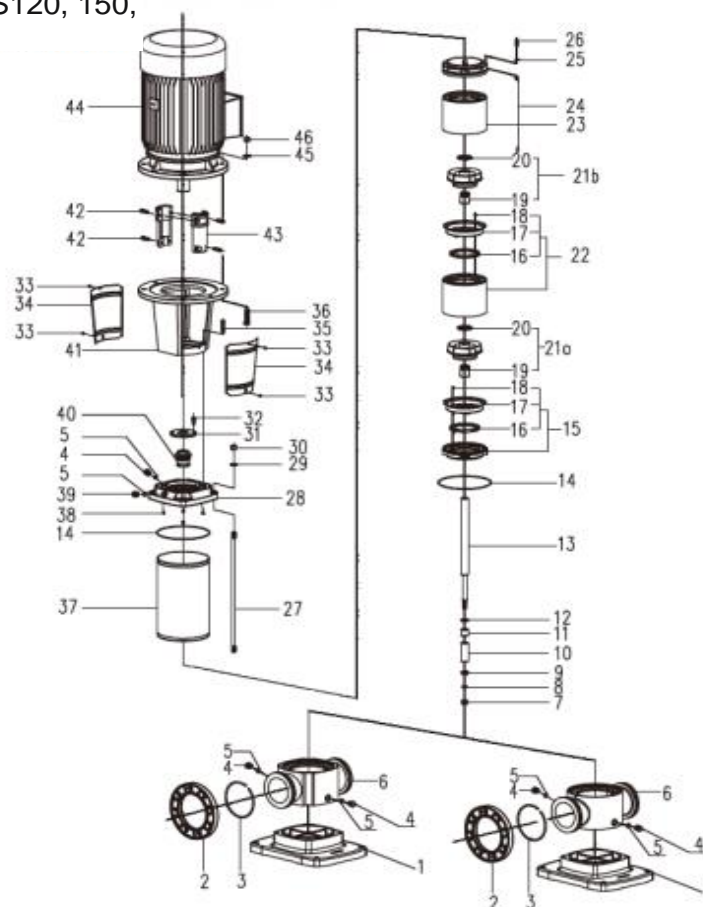


No.	Designation
1	Bottom plate
2	Loose flange
3	Clamp
4	Water injection plug
5	O-ring
6a	Base (ZG304)
6b	Bottom base (HT200)
7	Alloy bearing (22)
8	Spring washer
9	Hexagon socket head cap screw
10	O-ring
11	Pump barrel
12	Choma
13	Choma cap
14	Guide disk
15	First-grade guide vane
16	Wear ring
17	Impeller
18	Taper sleeve
19	Locking cap
20	Retaining ring
21	Guide bearing
22	Medium guide vane
23	Shaft sleeve assembly
24	Alloy bearing (30)

No.	Designation
25	Guide vane with bearing
26	Final guide vane
27	Hexagon socket head cap screw
28	Hexagon socket head cap screw
29	Shaft-end sleeve
30	Alloy bearing (22)
31	Pump shaft
32	Adjusting pad
33a	Pump head (ZG304)
33b	Pump head (HT200)
34	Vent plug
35	Hexagon socket head cap screw
36	Rivet
37	Warning sign
38	Tightening strip
39	Motor base
40	Mechanical seal
41	Mechanical-seal pressing plate
42	Hexagon socket head cap screw
43	Hexagon socket head cap screw
44	Coupling
45	Motor
46	Hexagon nut
47	Flat washer
48	Cylindrical head bolt

No.	Designation
49	Protective plate
50	Hexagon socket head cap screw
51	Nameplate
52	Hexagon nut
53	Flat washer
54	Draw rod

Exploded views of MVA, MVS120, 150, 200



No.	Designation
1	Bottom plate
2	Loose flange
3	Clamp
4	Water injection plug
5	O-shaped sealing ring
6	Bottom base/base
7	Lock nut
8	Flat washer
9	Shaft-end sleeve
10	Impeller spacer
11	Shaft sleeve
12	Spring washer
13	Pump shaft
14	O-shaped sealing ring
15	First-grade guide vane
16	Choma
17	Choma cap
18	Screw
19	Taper sleeve
20	Locking cap
21a	Impeller
21b	Small impeller
22	Medium guide vane
23	Guide vane with bearing
24	Tightening strip

No.	Designation
25	Flat washer
26	Hexagon socket head cap screw
27	Draw rod
28	Pump head
29	Flat washer
30	Hexagon nut
31	Mechanical-seal pressing plate
32	Hexagon socket head cap screw
33	Cross-recessed pan head screw
34	Protective plate
35	Hexagon socket head cap screw
36	Hexagon head bolt
37	Pump barrel
38	Adjusting pad
39	Vent plug assembly
40	Cartridge mechanical seal
41	Motor base
42	Hexagon socket head cap screw
43	Half coupling
44	Y2 series motor
45	Flat washer
46	Hexagon nut