

VERTICAL INLINE MULTISTAGE PUMP



INSTALLATION, OPERATION & MAINTENANCE

MANUAL

VERTICAL INLINE MULTISTAGE PUMP - NF-VLS SERIES



VERTICAL INLINE MULTISTAGE PUMP

INSTALLATION OPERATION AND MAINTENANCE INSTRUCTIONS

1. APPLICATIONS AND CONDITIONS

Pumps of NF-VL & NF-VLS model are non-self priming vertical multistage centrifugal pumps. The features are high efficient, low noise, a little corrosive liquid resistance, compact structure, good appearance, small volume , light weight, easy to service, good seal performance etc.

Applications

Pumped Liquids: Low Viscosity, Neutral, non-explosive liquids, not containing solid particles or fibres. The Liquid must not attack the pump materials chemically.

- Boiler water supply and condensing system
- Water Treatment, Filtration System
- Food and Beverage industries
- Pressure Boosting In High Rising Buildings
- Farmland Irrigation, Nursery Irrigation and Golf Court Irrigation
- Industry Cleaning System
- Liquid Conveying, circulation and Boosting
- Hot and Cool Water

Operation Conditions

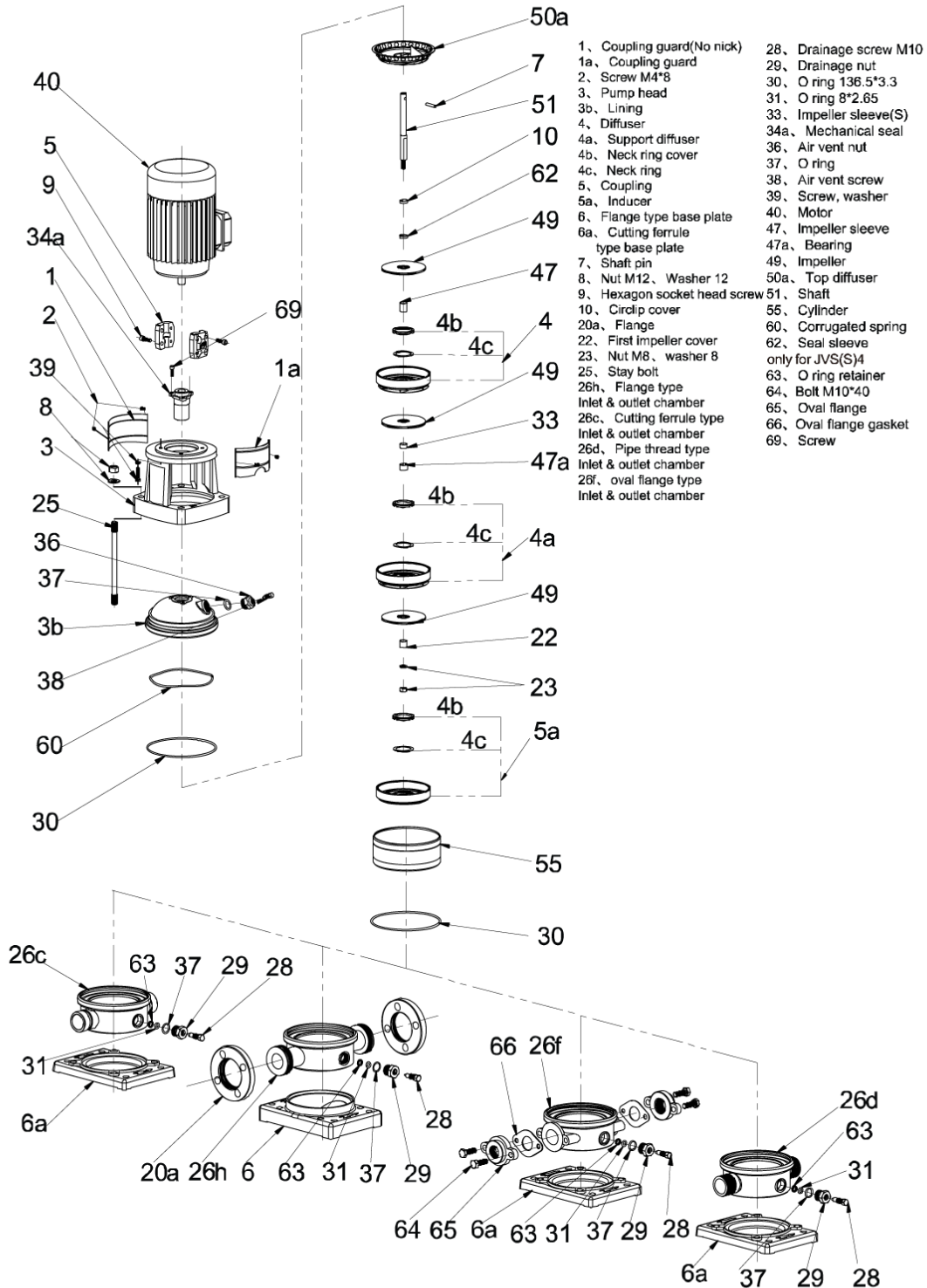
- Medium Temperature : Normal temperature type - 15°C ~+ 70°C , Hot water type- 15°C ~+ 120°C
- Flow: 0.4~180m³/h
- Medium pH range: pH 5 -9
- Maximum ambient temperature : +40°C
- Maximum altitude: 1000m
- **Caution:** When pumping liquids with a density and/or viscosity higher than that of water, use motors with a density and/or viscosity higher than that of water, use motors with correspondingly higher outputs, if required.

2. STRUCTURE

- The Pump is mainly composed of motor, pump head, diffuser, impeller, cylinder, inlet & outlet chamber , pump shaft, mechanical seal and so on.
- Key parts of the pump, diffuser, impeller, cylinder, shaft, are all made of stainless steel.
- Mechanical seal in a single face seal. Seal part is cemented carbides / carbon. Support part of support diffuser is made of tungsten carbide.
- Normally, pipes are connected by round flanges. Different types of connections are also available on demand of customer.

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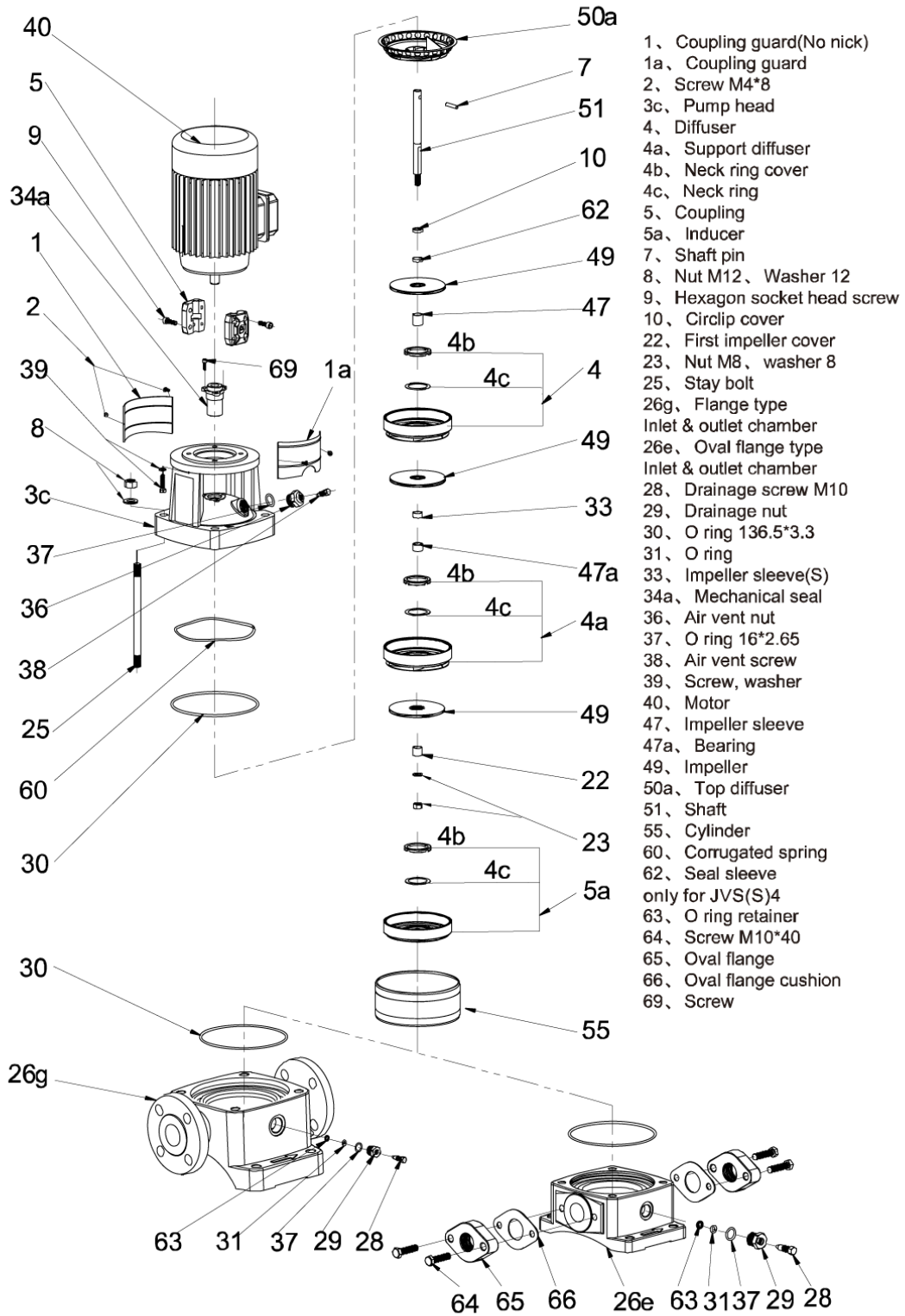


NF-VL (S) 1,2,3,4 - SS TYPE

Fig. No. 01

VERTICAL INLINE MULTISTAGE PUMP

INSTALLATION OPERATION AND MAINTENANCE INSTRUCTIONS

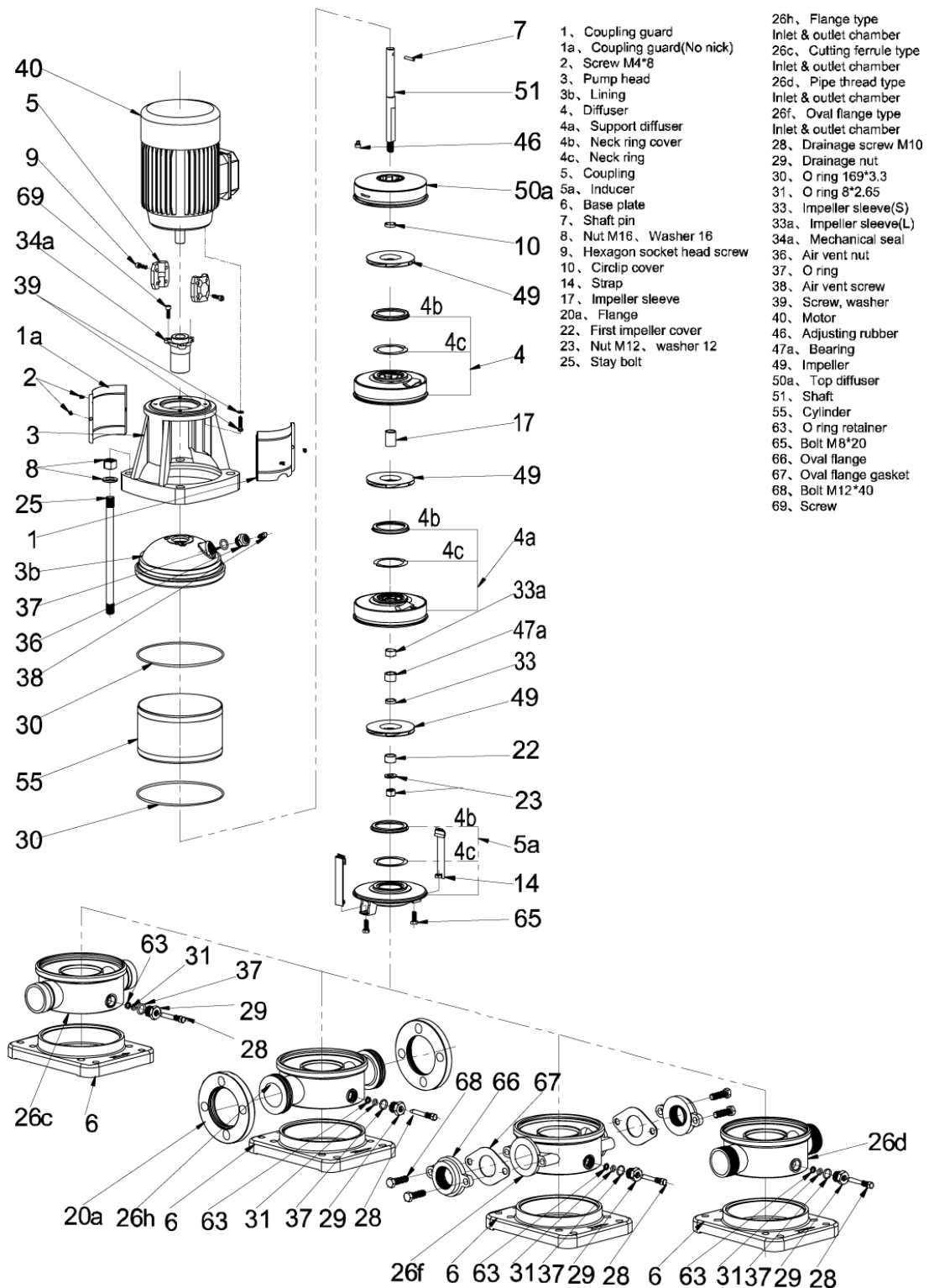


NF-VL (S) 1,2,3,4 - CI TYPE

Fig. No. 02

VERTICAL INLINE MULTISTAGE PUMP

INSTALLATION OPERATION AND MAINTENANCE INSTRUCTIONS

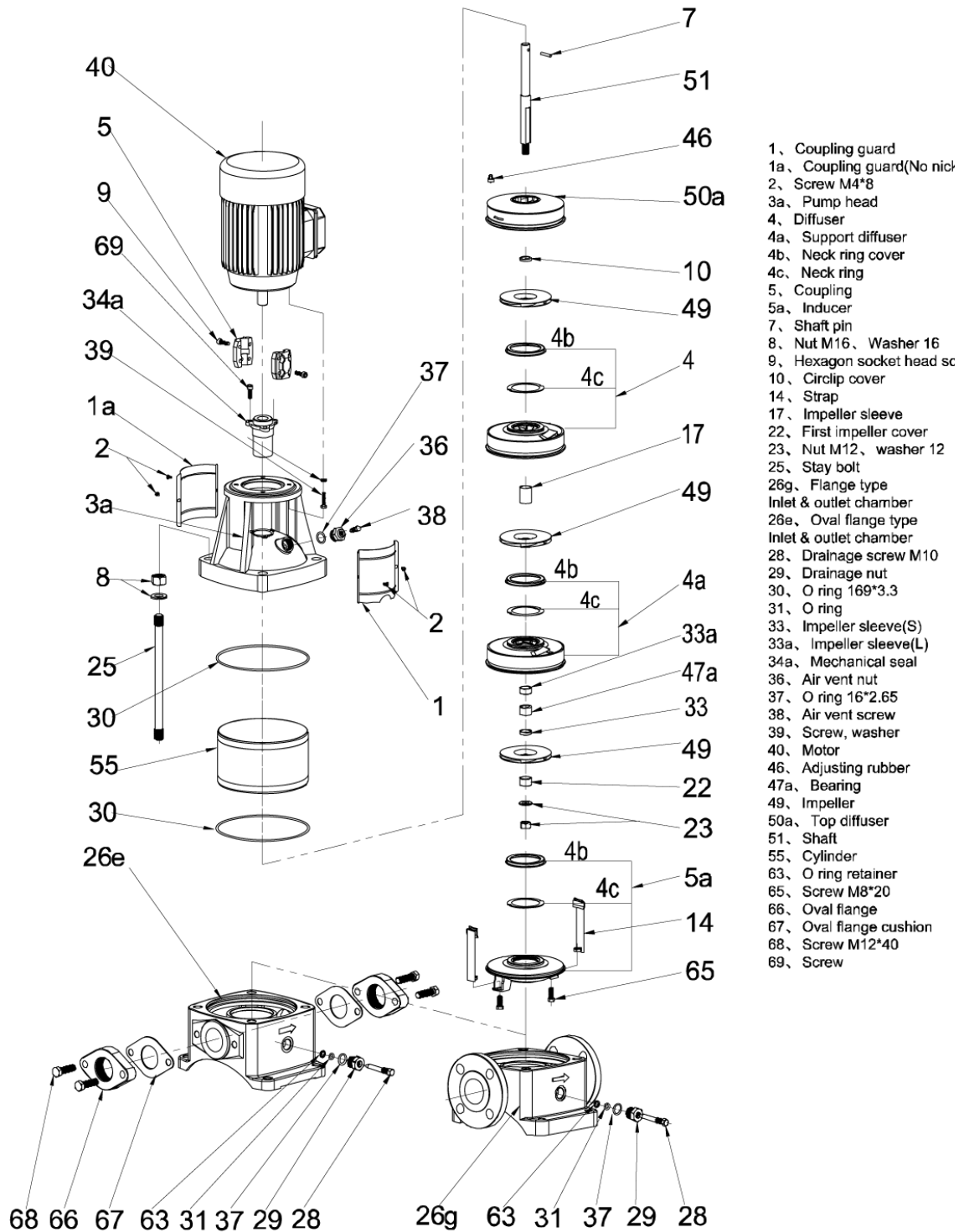


NF-VL (S) 8,12,16,20 - SS TYPE

Fig. No. 03

VERTICAL INLINE MULTISTAGE PUMP

INSTALLATION OPERATION AND MAINTENANCE INSTRUCTIONS

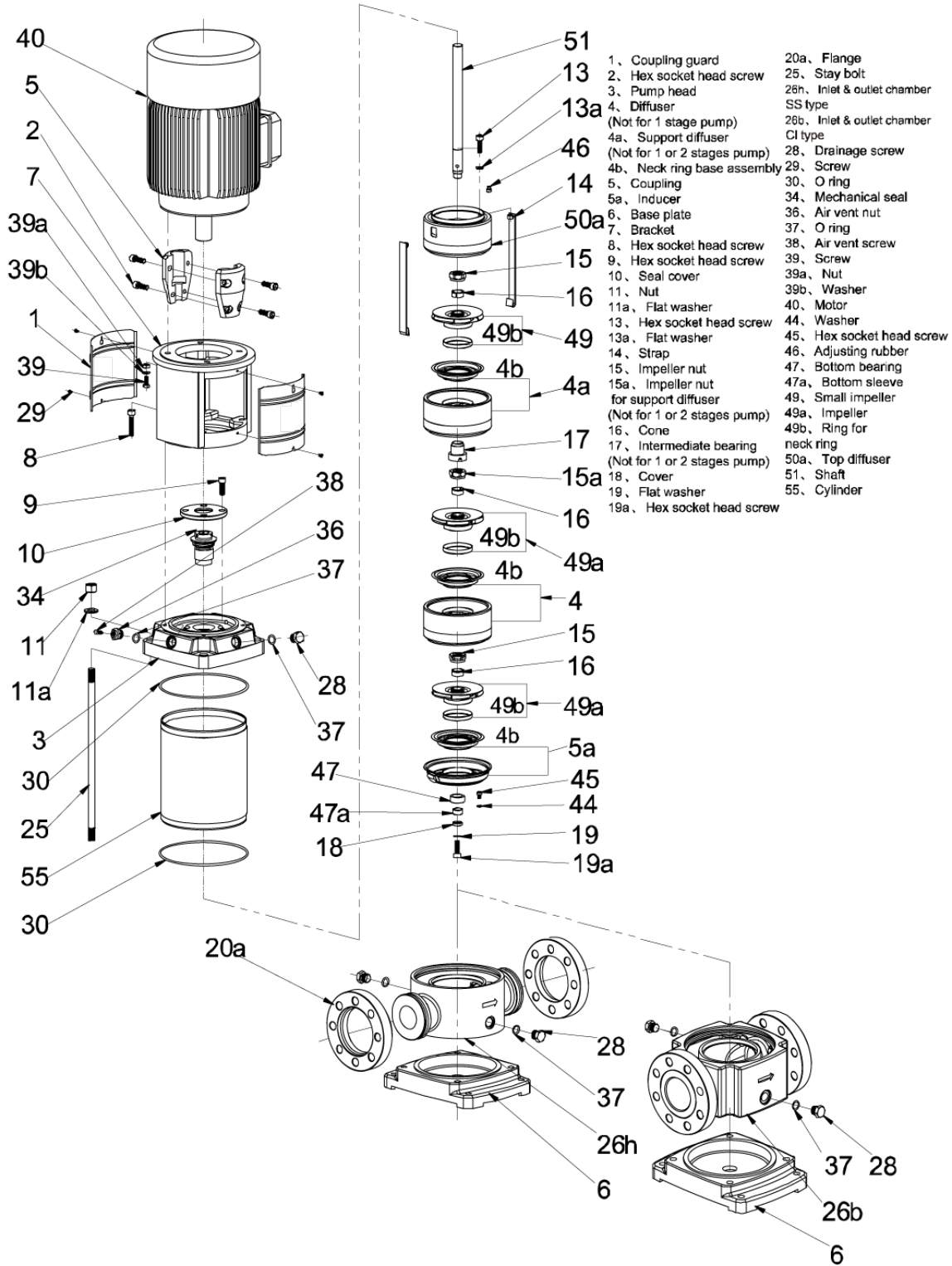


NF-VL (S) 8,12,16,20 - CI TYPE

Fig. No. 04

VERTICAL INLINE MULTISTAGE PUMP

INSTALLATION OPERATION AND MAINTENANCE INSTRUCTIONS

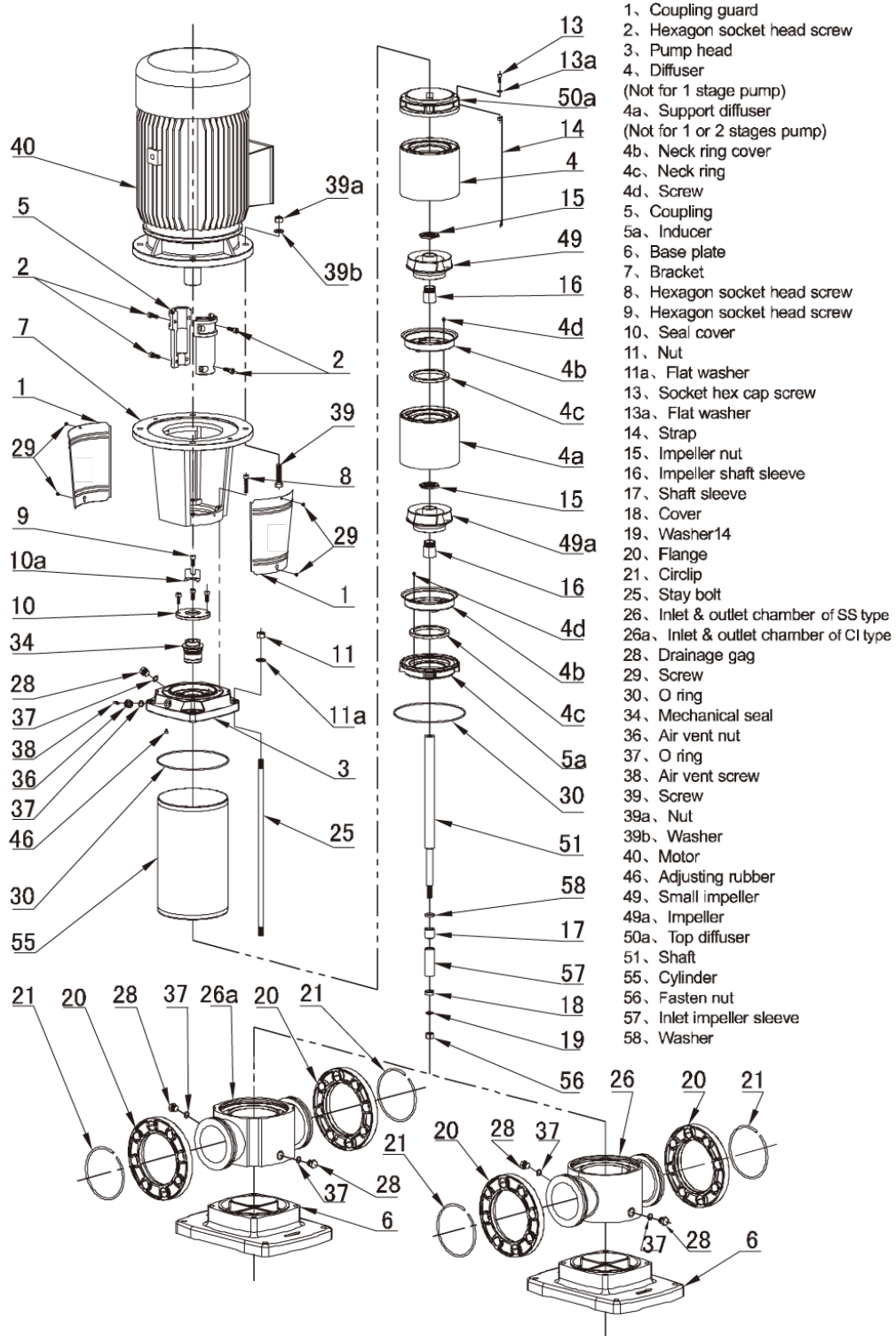


NF-VL (S) 2,42,65,85 - 120702

Fig. No. 05

VERTICAL INLINE MULTISTAGE PUMP

INSTALLATION OPERATION AND MAINTENANCE INSTRUCTIONS



NF-VL (S) 120,150 - 081101

Fig. No. 06

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INSTALLATION OPERATION AND MAINTENANCE INSTRUCTIONS

3. INSTALLATION AND CONNECTION

Handling

When lifting the entire pump with motor, follow these instructions:

- Pump with motor sizes 0,37 - 7,5kW:
Lift the pump in the motor flange by means of straps or the like.
- Pump with motor sizes 11 - 75kW:
Lift the pump by means of the motor eyebolts

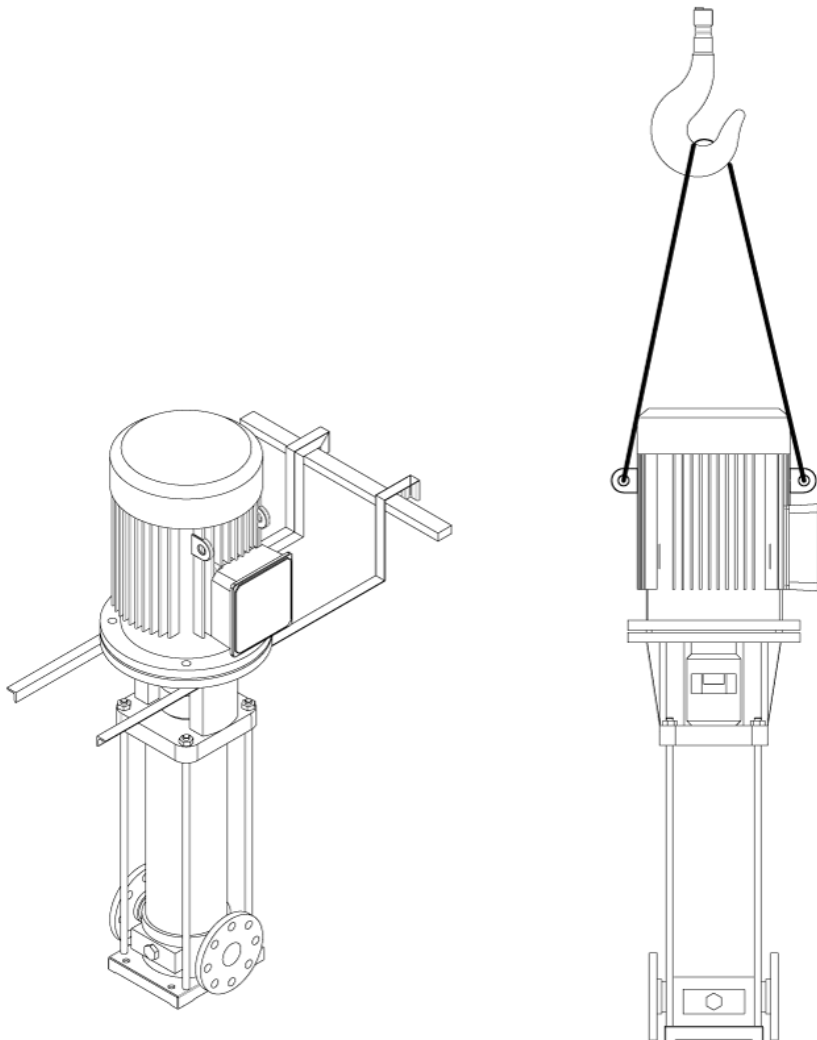


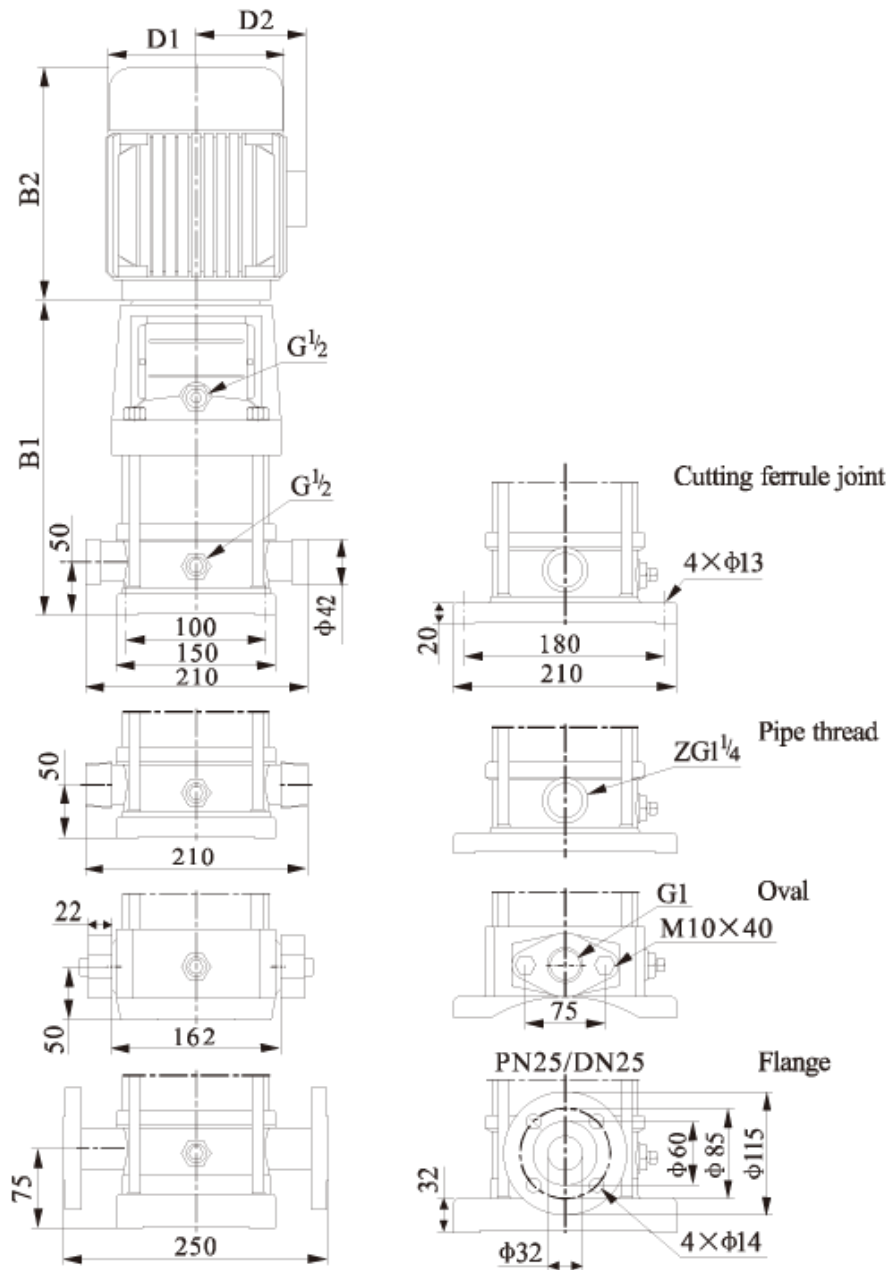
Fig. No. 07

VERTICAL INLINE MULTISTAGE PUMP

INSTALLATION OPERATION AND MAINTENANCE INSTRUCTIONS

Pump Installation

Pump Installation sketch is as follows



Installation Sketch

Fig. No. 08

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INSTALLATION OPERATION AND MAINTENANCE INSTRUCTIONS

Installation Size

Pump Installation Dimensions is as follows

Model Size		NF-VL NF-VLS														
		1	2	3	4	8	12	16	20	32	42	65	85	120	150	200
Round flange connecting	DN	25		32	40	50			65	80	100		125		150	
	P1	60			80				107	120	150		175	203		
	P	85		100	110	125			145	160	180		220	250		
	P2	115		140	150	165			185	200	220		270	300		
	n-d1	4-φ 14			4-φ 18				8-φ 18			8-φ 28				
	C	250			280	300			320	365	380		380	490		
	E	75			80	90			105	140		180	200			
	h	32			25	35			30	45		40	40			
Nominal pressure	PN25						PN25-40			PN16		PN25-40				
Cutting Ferrule Joint connecting	D	42			60											
	C	210			260											
	E	50		80	90											
	h	20		25	35											
Pipe thread connection.	D	ZG1 $\frac{1}{4}$			ZG2											
	C	210			260											
	E	50		80	90											
	h	20		25	35											
Oval flange connection	D	G1		G1 $\frac{1}{4}$	G1 $\frac{1}{2}$											
	C	162			200											
	E	50		80												
	h	20		25												
	P	75		100												
	n-d1	2-M10× 40				2-M12× 45										
	k	22														
Footer size	G	100			130				170	190	199	275	385			
	G1	150			199				225	245	255	340	460			
	M	180			215				240	266	280	380	500			
	M1	210			247				298	330	348	472	600			
	d2	13				14				18			20			

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The pump should be sited in a well ventilated and frost-free position. The distance between pump - motor and other objects should be atleast 150mm, in order to cool the motor by fan with enough air.

- To reduce the head loss of inlet as least as possible, the inlet pipe shall be as short as possible.
- Ensure the check valve is installed in pipe line system before the pump installation. If pump is used for boiler water supply, a check valve must be installed in the piping between pump and boiler.
- Pump shall be installed in cement base or other similar base with suitable height. It can also be installed in fixed grounds or fixed brackets on wall. Pay attention not to let the weight of pipe system on pump to prevent pump from damage.

Caution : During Installation, Motor should not be hung upside down.

- Arrow on the inlet and outlet chamber shows the direction of flow of liquid through the pump. Check whether the liquid can flow easily before starting the pump.
- Before pump installation, The inlet pipe line shall be cleaned. If there is impurities in the pipe, it is necessary to install a strainer at 0.5 - 1 m in front of the pump inlet (particularly recommended for pump with flow less than 8m³/h).
- The air locks shall be avoided when installing the inlet pipe line.

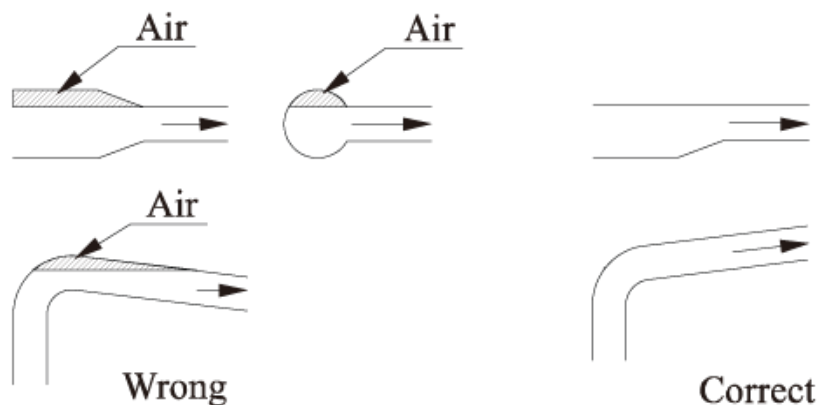


Fig. No. 09

If the outlet globe valve might be closed (or the flow is decreased to be zero), a bypass shall be installed in outlet pipe-line to ensure adequate lubricant and cooling water to pass the pump.

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Electrical Connection

- The electrical connections should be carried out by an authorized electrician.
- To make sure the motor is suitable for the power supply, cables of the motor must be connected to power supply according to the Fig. on the terminal box and the motor nameplate.
- Motor shall be connected with a fast and effective motor starter to ensure that the motor will not be damaged by lack of phase, unstable voltage or overload. The motor shall be earthed reliably.

Caution: Before take apart the terminal box cover or dismantle pump make sure the power supply is switched off.

Warning - Electrical Connection and safety devices

- The pump units should be connected to the power supply by the appropriate rated power cables according to the motor ratings.
- The pump units should always be equipped with safety devices as required in the standards (EN809 and /or EN60204-1) as well as by the national rules of the country where the pump is used.
- Despite the rules of any country, the power supply to the pump unit must be equipped with at least following electrical safety device with appropriate ratings:
 - Emergency Switch
 - Circuit Breaker (as a supply disconnecting (isolating) device as well as an overcurrent protective device)
 - Motor Overload Protection

Recommendation for Electrical Connection and Safety devices

380 V (50 Hz/ 60 Hz)						
No	Power Input (kW)	Cable Connection	Input Current (A)	Cable Spec (mm ²)	Circuit Breaker (A)	Thermal Protector (A)
1	0.37	Y	1	0.75	5	1.2
2	0.55	Y	1.4	0.75	5	1.7
3	0.75	Y	1.8	0.75	5	2.2
4	1.1	Y	2.6	1	5	3.1
5	1.5	Y	3.5	1	10	4.2
6	2.2	Y	4.9	1.5	10	5.9

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INSTALLATION OPERATION AND MAINTENANCE INSTRUCTIONS

380 V (50 Hz/ 60 Hz)						
No	Power Input (kW)	Cable Connection	Input Current (A)	Cable Spec (mn2)	Circuit Breaker (A)	Thermal Protector (A)
7	3	Y	6.3	1.5	10	7.6
8	4	△	8.2	2.5	20	9.8
9	5.5	△	11	25	20	13.2
10	7.5	△	15	4	20	18.0
11	11	△	21	4	25	25.2
12	15	△	29	6	32	34.8
13	18.5	△	35	10	40	42.0
14	22	△	41	16	60	49.2
15	30	△	55	16	60	66.0
16	37	△	68	25	80	81.6
17	45	△	82	35	100	98.4
18	55	△	100	70	160	120.0
19	75	△	134	70	160	160.8
20	90	△	160	90	200	192.0

The acoustic noise emission is around 85 db (A).

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INSTALLATION OPERATION AND MAINTENANCE INSTRUCTIONS

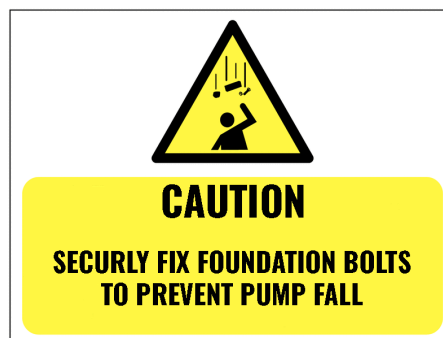
A. Before opening the terminal box, please shut off the power supply to prevent from power shock.



B. Before opening the coupling guards, please stop pump firstly to prevent injuries.



C. When installing the pump, please fix the foundation bolts vertically to prevent from any pump falls that may lead to injury



D. Please fill grease to the pump when required. For motor power less than 5.5kW, it is free of filling grease, For motor power is equal or bigger than 5.5kW, please fill grease every 5000 running hours.



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4. START-UP, OPERATION AND MAINTENANCE

Caution: Read the label on the cylinder carefully before start-up.

1. Do not start the pump until it has been filled with water or liquid fully.

- Fill water in pump in inverse pouring system.

Close the pump outlet valve, release air vent screw on the pump head and open the inlet valve slowly until stable water flows from the air vent screw. Then fasten the screw. Open the check valve completely in the inlet pipeline.

- In open system, fill water in pump when liquid surface is lower than pump.

Notice: A check valve shall be installed in the inlet pipe.

Close the pump outlet valve, release air vent screw and fill the liquid in pump through the air vent screw hole until the pump and the inlet pipe line are filled with water fully. Fasten the air vent screw again.

Caution: Do not start the pump until it has been filled with liquid fully and air vented. Be careful of the direction of the air vent screw hole. Make sure the flowing water will not cause injuries or damage the pump. Especially, prevent from injuries caused by hot water application.

2. Check the rotary direction

Switch on the power supply and view the rotary direction by viewing the motor fan. Arrow on the pump head indicates the correct direction of rotation. That is, from the motor end, pump shall run counter-clockwise.

3. Check before pump start-up

- Check whether the foundation bolt is fasten
- Check whether pump is filled with water fully
- Check whether the voltage of power supply is correct.
- Check whether it turns correctly

To make sure all pipe lines are connected tightly and can supply water normally.

The valves in the inlet pipe line are completely opened and outlet valve shall be opened slowly after the pump is started up.

- Check the operation pressure whether the pressure meter is installed properly.
- Check all the controls for normal operation. If the pump is controlled by pressure switch, check and adjust the starting pressure and stopping pressure.
- Check the full load current to make sure it does not surpass the maximum current.

4. Frequency of pump starts

Pump should not be started too frequently. It is suggested pump shall not be started more than 100 times per hour if the motor power is less or equal to 4kW. When motor power is big than 4kW, pump shall not be started more than 20 times in one hour.

If pump starts and stops too frequently, control devices must be checked and adjusted to make pump not start and stop too frequently. Also it is necessary to check the installation.

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5. Suggestion

When pump is under run condition , flow should be controlled at the range of 0.5 - 1.3 times of rated flow.

6. Pump which is install according to this installation manual will work effectively and require a little maintenance

- Mechanical seal will be adjusted automatically, the moving part and stationary part is lubricated and cooled by by the transferring liquid. When replacing the mechanical seal, the user need not deassemble the motor for power bigger than 7.5kW.
- The bearing in the pump is lubricated by the transferring liquid.

7. Frost Protecting

Pump can be used in the system with anti-freeze measures to water. If the pump is installed in place with freezing temperature, suitable anti-freeze shall be added to the transferring liquid to prevent pump from being damaged. If antifreeze is not used, pump shall be stopped when its frozen. When pumps are notin used they must be drained.

8. The following should be regularly be checked for pump

- Pump Working and Operating Pressure
- Possible Leakage
- Possible Motor Overheat
- Cleaning / Replacement of all strainers
- The switch off time of motor during overload
- Frequency of starts and stops
- All control Operations

If malfunction is found, check system according to “Fault findings and solution chart”

9. Pump should be cleaned and kept appropriately when its not being used for a long period of time.

10. Pump should be avoided from being damaged in storage.

5. ASSEMBLE AND DISASSEMBLE

1. NF-VL and NF-VLS 1,2,3,4

- Put the circlip cover on the shaft, and then fit the sleeve, impleeler, impeller sleeve, diffuser, support diffuser. Continue the assemble order till the last impeller is fitted. Then fit the impleeler cover, washer, screw and nut. Pay attention to the position of the support diffuser, for less stages pump, the last one must be support diffuser. For

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more stages pump, support diffuser should be increased accordingly, the distance of each support diffuser should be even , and put on the support sleeve and bearing with support diffuser.

- Put the inducer on the inlet & outlet chamber, and then fit the finished parts as above on the inducer.
- Fit the O-ring on the inlet & outlet chamber, put on the cylinder and the top diffuser.
- Put the pump head installed with o-ring, linning and corrugated spring on the cylinder. Screw the four nuts of the stay bolts on the base plate. Do not tighten one nut completely at one time, but thighten them symmetrically in turn.
- Fit the mechanical seal and tighten it, then install motor and coupling. Screw the bolts in coupling (but not tightly), press the coupling and shaft down to the direction of the base plate. Then lift it about **1mm** in reverse direction, tighten the screws. Note that the space between the two couplings should be equal.
- Tighten fixing bolts in mechanical seal, rotate the coupling to ensure that the shaft can rotate freely and not be choked.

Reverse the process above inoder to disassemble the pump.

2. NF-VL and NF-VLS 8,16,16,20

- Place the circlip cover on the shaft, and then fit the sleeve, impleeler, impeller sleeve, diffuser, support diffuser, bearing, support sleeve. Continue the assemble order till the last impeller is fitted, and then install the ipeller cover, washer, tighten the nuts.
- Place the inlet & outlet chamber on the base plate, then place the O-ring, clamp plate, inducer on inlet & outlet chamber, then place the finished parts on the inducerand put the top diffuser on the top, tighten nuts of starps. At last, place on the cylinder.
- Place the pump head installed with O-ring, lining and adjusting rubber on the cylinder, then tighten the four stay bolts symmetrically in turn.
- Fit the mechanical seal and tighten it, then install motor and coupling, screw the bolts in coupling (but not tightly), press the coupling and shaft down to the direction of the base plate. Then lift it about 1mm in reverse dirction, tighten the screws. Note that the spacebetween the two couplings must be equal
- Tighten fixing bolts in mechanical se, rotate the coupling to ensure the shaft can rotate freely and not be choked.

Reverse the process above inoder to disassemble the pump.

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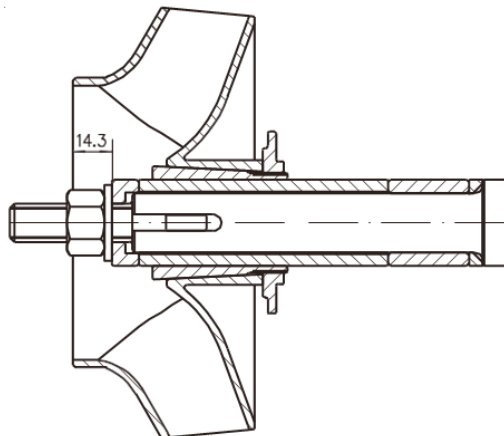
3. NF-VL and NF-VLS 32,42,65,85

- Place the inlet & outlet chamber on the base plate, fit flanges on inlet & outlet chamber at two sides and fit the inducer.
- Place the first impeller on the shaft, tighten the nuts and place the impeller on the neck ring base of inducer, then place on the diffuser, impeller, support diffuser, until the top diffuser, then fix all the diffuser with the straps.
- Shaft Parts: Fit the bottom sleeve, cover, washer on the shaft, tighten the bolts, fit bottom bearing on the inlet & outlet chamber, fit washer. Then place the shaft parts on the inlet & outlet chamber, fit on O-ring, lubricate the O-ring and then put on the cylinder.
- Fit stay bolts on the base plate, then fit the O-ring, adjusting rubber, air vent gag on the pump head and then place the pump head on the stay bolts, then put on the washer and tighten all the nuts.
- Fit the mechanical seal on the pump head, then fit the seal cover, tighten the bolts in the seal and lift the shaft, later insert the adjusting slice
- Fit the bracket and motor on the pump head
- Finally, fit the coupling, tighten the bolts and take out the adjusting slice. Rotate the coupling to ensure that the shaft can rotate freely and not be chocked.

Reverse the above process to disassemble the pump

4. NF-VL and NF-VLS 120, 150

- Place the inlet & outlet chamber on the base plate, fit flanges on inlet & outlet chamber at two sides and fit the inducer.



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INSTALLATION OPERATION AND MAINTENANCE INSTRUCTIONS

- Fit washer (PN58), shaft sleeve (PN16), impeller, fasten impeller nut (PN15), ensure the size is 14.3 as shown on figure 4.
- Place the shaft parts on the inducer, fit support diffuser, impeller sleeve, impeller, fasten the impeller nut then fit the diffuser, impeller etc. till the last diffuser.
- Fit the top diffuser, use straps to fasten all diffusers. Fit O-ring on the inlet and outlet chamber, lubricate them and place on the cylinder.
- Fit stay bolts on the base plate, fit O-ring on the pump head, adjusting rubber, air vent screw etc. Then place pump head on the stay bolts, fit washer and fasten nut.
- Fit the mechanical seal on the pump head, then fit the seal cover, tighten the bolts in the seal. Lift the shaft and insert the adjusting slice.
- Fit the bracket and motor on the pump head. Finally fit the coupling, tighten the bolts and take out the adjusting slice. Rotate the coupling to ensure that the shaft can rotate freely and not be choked and loose.

Reverse the above process to disassemble the pump.

6. FAULT FINDING AND SOLUTION CHART

Caution: Before removing the terminal box cover and before any removal/dismantling of the pump, make sure that the power supply has been switched off.

Fault and Solution Chart			
Fault	Cause	Solution	Remark
Motor does not run when started	a) Power Supply failure	a) Check Power Supply	
	b) Fuses are blown	b) Replace Fuses	
	c) Motor is overloaded	c) Check System	
	d) Main contacts of starter are not connected well or the coil is defective.	d) Replace Motor Starter	

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Fault and Solution Chart			
Fault	Cause	Solution	Remark
Motor does not run when started	e) Control circuit is defective	e) Check Control Circuit	
	f) Motor is Defective	f) Repair	
Overload device of motor starter trips out immediately when power supply is switched on.	a) Fuses are Blown	a) Replace Fuses	In the case of d) and e), user shall not disassemble the pump by themselves.
	b) Contacts of overload device is faulty	b) Check motor starter	
	c) Cable connection is loose or faulty	c) Check cables and power supply	
	d) Motor Windings is defective	d) Replace Motor	
	e) Pump Mechanically Blocked	e) Check and Repair pump	
Overload Device trips out occasionally.	a) The setting of overload is too low	a) Reset Overload Setting	
	b) Periodic power supply-faults	b) Check power supply	
	c) Low voltage at peak times	c) Add regulator	
Motor starter has not tripped out but the pump does not run.	a) Contacts of starter are not contacted well or the coil is faulty	a) Change Motor Starter	
	b) Control Circuit are defective	b) Check Control Circuit	
Pump water does not flow constantly	a) Suction Pipe is too Small	a) Enlarge inlet pipeline	
	b) There is not sufficient water in pump water inlet	b) Improve system and increase coming water	
	c) liquid level is low.	c) Try to lift liquid level.	
	d) Pump inlet pressure is too low compared with water temperature, pipeline loss and flow.	d) Improve System and tryto increase the inlet pressure.	

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Fault and Solution Chart			
Fault	Cause	Solution	Remark
Pump runs but gives no water	a) Suction pipe is blocked by impurities	a) Check and clean suction pipe	
	b) Foot valve or Check if valve is closed	b) Check and repair foot valve or check valve	
	c) Leakage in suction pipe	c) Check and repair suction pipe	
	d) There is air in suction pipe or pump.	d) Refill liquid, Release Air.	
Pump runs backwards when switched off.	a) Leakage in suction pipe	a) Check Suction Pipe	
	b) Foot valve or check valve is defective	b) Check and Repair foot valve or check valve	
	c) Foot valve is blocked while opened or partially opened position	c) Check and Repair foot valve	
	d) There is air in suction pipe	d) Check and repair suction pipe and release air	
Abnormal vibration or noise from pump	a) Leakage in suction pipe	a) Check and repair suction pipe.	In the case of e), users shall not disassemble the pump by themselves
	b) Suction Pipe is too small or suction pipe is partly blocked by ipurities	b) Enlarge or check suction pipe	
	c) There is air in suction pipe or pump.	c) Refill liquid to the pump nad vent air	
	d) The comparison of the delivery head of device with delivery head of pump is very low.	d) Improve system or choose another pump moodel	
	e) Pump mechanically blocked	e) Check and repair pump	

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7. IMPORTANCE NOTICE

- Customer will not be advised if this manual is updated.
- Pump will be guaranteed for one year under normal operation with the correct model. Wearing part is not included.
- Users shall be responsible for the damage if they disassemble the pumps by themselves in guaranteed period.

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INSTALLATION OPERATION AND MAINTENANCE INSTRUCTIONS

NOTES

VERTICAL INLINE MULTISTAGE PUMP

INSTALLATION OPERATION AND MAINTENANCE INSTRUCTIONS

NOTES

Project Name :

Location :

Commissioned By :

Date of Commissioning :

Signature of Commissioning Engineer :



NAFFCO
Email: info@naffco.com
www.naffco.com

In line with NAFFCO policy for continuous product development, NAFFCO has the right to change specifications without prior notice.

NF-VLS-IOM/2018/V.01

FOR ANY ASSISTANCE, PLEASE CONTACT

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