VERTICAL SUBMERSIBLE PUMPS

NAFFCO
PASSION TO PROTECT

INSTALLATION, OPERATION & MAINTENANCE

I N S T R U C T I O N S

VERTICAL INLINE SUBMERSIBLE PUMP - NF-SL SERIES

1. General

Inspect pumpset for the following after receiving and that the pumpset recieved is as per order. Also check for any damages in the pumpset / motor cable / control box (if any) which may be caused during transit / shipping.

Note: Do not use lead wires to lift, pull or handle the motor.

2. Pre - Installation

Before installation make sure of the following points :

- Check the inside diameter of the borehole
- The borehole must be flushed well so that it is free from sand, silt and other foreign particles
- The pumpset must be never run dry and make sure the pumpset is always submerged in water
- The pumpset is designed to handle clean, cold, fresh water without abrasives
- Make sure that the voltage fluctuations lies within ±10 % of the motor rated voltage
- It is mandatory to install motors with complete protection control system for both 1 ph. & 3ph. such like 1 ph preventor, dry run preventor, phase failure, phase reversal and lightning protection etc.
- It is recommended to use a flow inducer sleeve over the pumpset to give better cooling effects to the motor, if the pumpset is installed in a larger diameter borehole.

3. Installation

- Do not keep the bottom end of the motor in mud or dirt area. As this may block the diaphragm opening
- Check the freeness of the motor shaft and free endplay.
- Fill the motor with clean, cold, drinking water through the water-filling plug (see fig-1).
- Check the motor for any water leakage, if noticed tighten all water filling plugs and drain plug.
- Measure the insulation resistance of the motor and resistance value should not be less than 20-mega ohms
- A proper waterproof cable splicing must be done between the motor lead and drop cable.
- Couple the pump and motor until it butts completely to the top surface of the motor. Then tighten the nuts in a cross pattern uniformly
- Check the axial movement of the pump shaft assembly by lifting it vertically up a minimum lift of 1 -1.5mm will indicate that coupling is done properly.
- Position the motor cable on the pump and fix it with cable guard then fasten the suction strainer.
- Now set the pumpset inside the borehole above the main point of water inflow (yield point). In case, if the yield point is not ascertain use the flow inducer sleeve along with the pumpset.
- The pumpset must be installed 3 meters above the bottom level of the borehole (see fig.2).
- Do not reduce the pipe size, use specified pipe size as per pump outlet size to get actual discharge.
- Install a good quality non-return valve to prevent water hammer and backspin.

- All electrical works must be carried out by a technically qualified personnel complied with local electrical code & practice.
- Connect the earth cable to the pumpset to avoid fatal electrical shock.

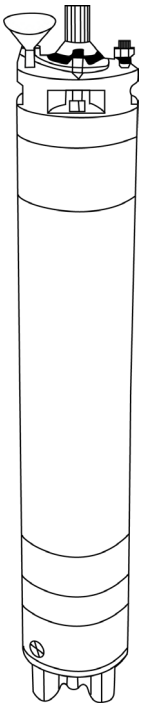
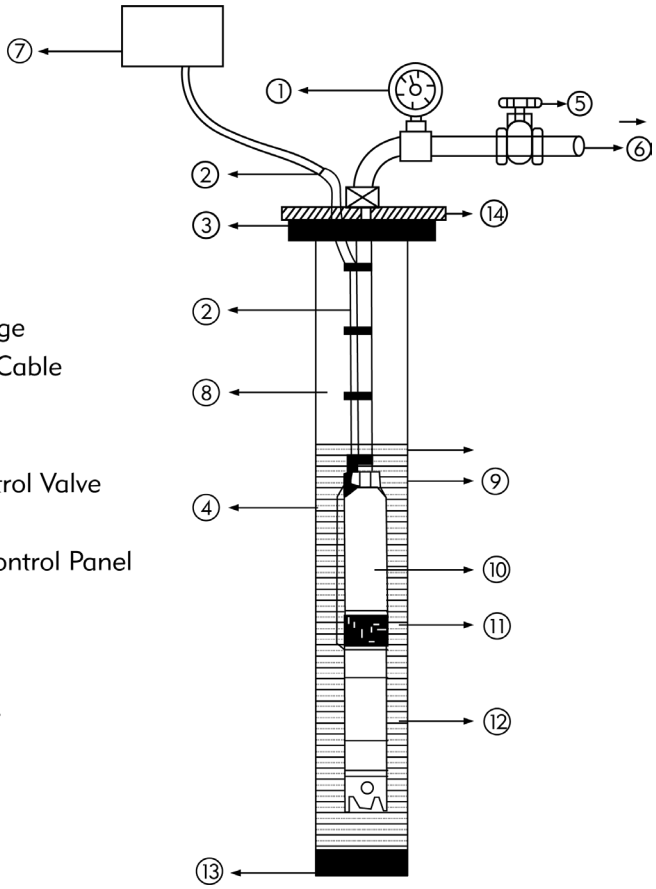


Fig.1 Water Filling Method



1. Pressure Guage
2. 3-Core Flate Cable
3. Bore Cap
4. Cable Guard
5. Pressure Control Valve
6. Delivery Pipe
7. Starter (or) Control Panel
8. Cable Clips
9. NRV (Outlet)
10. Pump
11. S.S. Strainer
12. Motor
13. Silt / Sand
14. Clamp

Fig.2 Vertical Installation

3. Cable Selection Chart

FOR THREE PHASE 6 WIRE (S.D) MOTORS MAXIMUM LENGTH OF COPPER CABLE
For supply Voltage Condition with Variation of ± 3% - 50 Hz

MOTOR RATING			CABLE SIZE SQUARE MILLIMETRES														
VOLTS	kW	HP	1.5	2.5	4	6	10	16	25	35	50	70	95	120	150	185	240
380 / 415 VOLT 50Hz	5.5	7.5	100	165	255	390	660	1035	1590	2170	3040	4120					
	7.5	10	70	120	190	300	510	800	1210	1765	2340	3180					
	9.3	12.5		90	165	240	460	660	1000	1380	1930	2670					
	11	15		80	130	200	350	540	820	1130	1590	2160	2730				
	13	17.5		70	120	165	300	465	720	970	1380	1870	2370				
	15	20		60	100	150	250	400	610	855	1200	1620	2050				
	18.5	25			80	120	210	310	490	670	945	1290	1630	2030			
	22	30			70	105	180	270	420	570	810	1110	1395	1740			
	26	35					150	225	340	460	660	910	1160	1310			
	30	40					135	190	315	420	600	810	1020	1260	1480	1760	
	37	50					100	160	250	345	480	660	825	1050	1200	1430	
	45	60						140	210	290	400	550	690	850	1000	1200	1460
	56	75						110	170	240	340	460	580	720	840	1010	1230
	75	100						90	130	180	260	350	440	550	650	780	950
	93	125								140	190	260	330	400	470	560	680
	112	150								120	160	220	280	350	400	480	580
	132	175									140	190	250	300	360	430	520
	150	200									130	170	220	270	320	380	460

MAXIMUM LENGTH IN METRES

These are maximum length of cable in METERS from POWER SOURCE to MOTOR exceeding these length will void warranty

4. Troubleshooting

Troubleshooting Chart	
Problems / Probable Causes	**Possible Solutions**
PUMP DOES NOT START	
No power supply voltage	Check power supply
Fuses blown (inadequate fuses)	Replace the fuses with suitable wire gauge

Troubleshooting Chart	
Problems / Probable Causes	**Possible Solutions**
Motor or power supply cable are defective / damaged	Repair the motor or replace the cable
Over load protections relay cut off the starter	Reset the protection
Wrong connections	Correct the connection
Insulation resistance down	Check & Correct it
Defective capacitor (1ph)	Replace the defective capacitor
Controller Tripping	Check the electrical parameters
PUMP DOSENT DELIVER WATER	
Low input voltage	Contact electricity service to improve the voltage
Pump jam	Dismantle and correct it
Impellers and bowls occluded by sand or any other solids	Remove the pump set and overhaul it
The dynamic level descends below the strainer	Reduce the capacity by closing the gate-valve
The strainer is fully clogged	Remove the pump set and clean the bore well
PUMP DELIVERS INSUFFICIENT FLOW OF WATER	
Rotational speed is too low	Check the supply frequency and increase the voltage, if possible
Abnormal drop in water level during operation	Check the draw down level if possible lower the pump-set
Clogged riser pipe	Replace defective length of riser pipe with a new gasket
The motor is running on 2 phases (Single phasing)	Rectify the defective phases and check the cable connection
Motor is running in reverse rotation (3 Phase motor)	Inter change any two phases from the supply line
Pump total head is too high	Install the pump with in pump recommended head

Troubleshooting Chart	
Problems / Probable Causes	**Possible Solutions**
PUMP VIBRATES AND IS NOISY	
The dynamic level descends below the strainer	Reduce the capacity by closing the gate-valve
Water with high gas content	Increase the water level on the pump
Pump bushes and bearings worn out	Remove the pump set and over haul the pump
Foreign bodies entered and placed between fixed and rotating parts.	Remove the pump set and clean the pump

Procedure for spare part order

To order the spare parts, it's necessary to:

- Specify the pump model and serial number of the motor and respective pump
- Specify the required spare part name
- Specify the required quantity
- Any orders must be addressed to the authorized distributor or dealer.

Note : The company reserves the right to modify the technical specification and illustrations without prior notice.

5. Cable Selection Chart

FOR SINGLE PHASE MOTOR MAXIMUM LENGTH OF COPPER CABLE
For supply Voltage Condition with Variation of ± 3% - 50 Hz

MOTOR RATING			CABLE SIZE SQUARE MILLIMETRES											MAXIMUM LENGTH IN METRES
VOLTS	kW	HP	1.5	2.5	4	6	10	16	25	35	50	70	95	
230 VOLT 50Hz	0.37	0.5	120	200	320	480	810	1260	1900	2590	3580	4770	5920	
	0.55	0.75	80	130	220	320	550	850	1290	1760	2430	3230	4000	
	0.75	1.0	60	100	170	250	430	670	1010	1380	1910	2550	3460	
	1.10	1.5	40	70	120	180	300	470	710	980	1360	1850	2320	
	1.50	2.0	30	60	90	130	230	360	550	760	1060	1440	1820	
	2.20	3.0		40	60	90	150	230	350	490	680	920	1160	

FOR HREE PHASE MOTOR MAXIMUM LENGTH OF COPPER CABLE
For supply Voltage Condition with Variation of ± 3% - 50 Hz

MOTOR RATING			CABLE SIZE SQUARE MILLIMETRES												MAXIMUM LENGTH IN METRES
VOLTS	kW	HP	1.5	2.5	4	6	10	16	25	35	50	70	95	120	
380 / 415 VOLT 50Hz	0.37	0.50	810	1350	2160	3240	5500	8530							
	0.55	0.75	550	920	1480	2230	3780	5860	8890						
	0.75	1.0	410	680	1090	1640	2780	4330	6570	9010					
	1.1	1.5	300	500	810	1210	2060	3200	4850	6640	9220				
	1.5	2.0	220	370	590	880	1500	2340	3560	4890	6830	9230			
	2.2	3.0	150	250	400	600	1030	1600	2440	3350	4680	6340	7990		
	3	4.0	110	190	310	460	790	1230	1880	2590	3630	4930	6230		
	3.7	5.0	90	150	240	370	630	980	1490	2050	2870	3900	4920		
	4	5.5	80	140	230	340	590	920	1390	1910	2670	3600	4520		
	4.5	6.0	70	130	220	320	550	860	1310	1790	2510	3390	4260		
	5.5	7.5	60	110	170	260	440	690	1060	1450	2030	2750	3460		
	7.5	10.0	50	80	130	200	340	530	810	1110	1560	2120	2680		
	9.3	12.5		60	110	160	280	440	670	920	1310	1780	2250		
	11	15.0		50	90	130	230	360	550	750	1060	1440	1820		
	13	17.5			80	110	200	310	480	650	920	1250	1580		
	15	20.0			70	100	170	270	410	570	800	1080	1370		
	18.5	25.0				80	140	210	330	450	630	860	1090		
	22	30.0				70	120	180	280	380	540	740	930		
	26	35.0					100	150	230	310	440	610	770	870	
	30	40.0					90	130	210	280	400	540	680	780	
	37	50.0						110	170	230	320	440	550	700	
	45	60.0							140	190	260	360	460	560	
	55	75.0								160	220	290	380	480	
	75	100.0									160	220	300	370	
	93	125.0										170	220	260	

These are maximum length of cable in METERS from POWER SOURCE to MOTOR exceeding these length will void warranty

6. Periodical Maintenance

- For preventive maintenance measures record periodically the input voltage, current and insulation resistance value.
- Should not let the pumpset remain idle for more than a week, as this may cause jamming of rotating ports. To avoid, run the pumpset once in a week.
- Periodically check the whole pumping system. If any abnormality is observed refer the trouble shooting chart and rectify it.

7. Operation

- Install a temporary pipe along with a gate valve in pump delivery pipe.
- Before switching the pump on, make sure all the electrical connections were properly done.
- The first start must be carried out with half open gate valve in order to inspect the water for sand. If sand appears, then continue to run the pumpset till the water clears up.
- Never run the pumpset against closed valve condition. As this may cause serious damages to the pumpset.
- After starting the motor, check the flow and pressure of the pump to make sure that the motor is running in correct direction. To correct the wrong rotation interchange any two of the three leads in incoming supply connections
- Measure the input voltage and current observed by the pumpset, if any unbalanced is noticed do not operate the pumpset until it has been rectified.
- To prevent the overheating of the winding wire in the motor and increase the life of the control components, the pumpset should be operated within the maximum startup frequency level per hour.
- Allow a standstill time of atleast five minutes between each start and stop.

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NOTES

Project Name	:.....
Location	:.....
Commissioned By	:.....
Date of Commissioning	:.....
Signature of Commissioning Engineer	:.....

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