

3S SUBMERSIBLE MOTORS



vansan
WATER TECHNOLOGIES

6"/40 HP
(30kW - 3- 380V / 60Hz, 2 poles) SF 1.15
62.3A/3492 rpm cos ϕ 0.87 η :84%

Max. Axial Thrust Load Capacity 26,5 kN

Max. starts/hour : 15

Max. Ambient Temp 30 °C Protection IP 68
Max. Cooling Speed V=0.2 m/s

Made in TURKEY

SUBMERSIBLE MOTORS

General Features

- ▶ *Rewindable VSM motors up to 125 HP*
- ▶ *High efficiency provides operation cost savings*
- ▶ *Water lubricated thrust bearing*
- ▶ *Double flanged with NEMA standards*
- ▶ *Stainless steel shaft*
- ▶ *High corrosion resistant materials - AISI 304SS (Optional AISI 316SS)*
- ▶ *Max. ambient water temperature 30°C (50°C and 70°C is optional)*
- ▶ *Standard voltage 230-60Hz or 460V-60Hz (allowable voltage tolerance \pm %10.)*
- ▶ *Variable speed operation by frequency convertor (over 30Hz)*
- ▶ *Suitable to be operated with Soft-Starter*
- ▶ *CW & CCW direction of rotation.*
- ▶ *Rewindable Vansan Motors (PVC, PP & PE2+PA winding wire) provides long service life.*
- ▶ *Motors can be operated horizontally.*



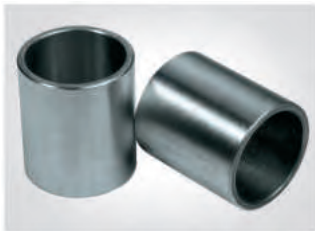
Heavy duty bearings with high thrust capacity

The heavy duty bearings are bi-directional and can carry a high thrust load.



Water lubricated radial carbon bearings

Radial carbon bearings, which have channels in its structure that makes it possible to get lubricated by water easily, provides precise bearing of rotor shaft at top and bottom



Chrome-plated bearing collet

Chrome-plated and precisely machined bearing collets which are located in the radial bearings operating area, have great importance for bearing the rotor.



Mechanical sealing system for high sand resistance and degree of protection: IP68

Although mechanical seal is optionally used by other companies, it is always used by Vansan as a standard, to prevent sand and other particles to get in motors to provide long bearing life.



Practical and easy-to-mount output power cable

Connection of the power cable to body is made practically by cable seal and seal cover. Power cables can be changed easily without any damage.



Pressure balancing check valve

Pressure balancing checkvalve controls the pressure changes inside the motor. When the pressure increases, it throw water out of the motor. When the pressure drops, it filtrates the water inside well and gets it inside the motor by the help of this check valve to balance the pressure inside. That's why pressure differences inside motor never causes membrane under motor to blow up.

PT100 Overheating protection

By connecting the PT100 thermal sensors to the slot that is standardly placed on upper bearing body, motor temperature values can be easily measured.



Up-Thrust ring

Provides safe operation conditions for motor by absorbing Up-Thrust loads with it's machined surface and water channels on it.



Cable connection

Preventing the water inside the motor to run through the cable and reach connection parts of power cables by specially designed cable seals.



Adjustment screw

Standard shaft height can be precisely adjusted by the adjustment screw on the thrust bearing base.



Membrane

Membrane minimizes the expansion pressure that is caused by heating of cooling water's inside the motor



Slinger (sand guard)

Slinger helps to prevent the sand inside the water of the well entering in mechanical seal and through mechanical seal to inside of the motor.



6" Submersible Motors

Type	Power		Thrust Load lb.	Voltage V	Speed RPM	Full Load A	Locked Rotor A	Efficiency (% Load)			PF (% load)		
	HP	kW						50	75	100	50	75	100
3S 6"/5.5	5	3.7	4500	230 / 460	3350	18.8 / 8.4	88 / 44	69	70	70	65	74	85
3S 6"/7.5	7.5	5.5	4500	230 / 460	3360	22.6 / 11.3	118 / 59	71	72	72	65	74	85
3S 6"/10	10	7.5	4500	230 / 460	3380	28.4 / 14.2	146 / 73	77	78	78	65	74	85
3S 6"/15	15	11	4500	230 / 460	3400	37.6 / 19.8	202 / 101	80	81	81	67	76	87
3S 6"/20	20	15	4500	230 / 460	3440	54.6 / 27.3	282 / 141	79	80	80	66	75	86
3S 6"/25	25	18.5	4500	230 / 460	3450	69.0 / 34.5	356 / 178	79	80	80	64	73	84
3S 6"/30	30	22	4500	230 / 460	3460	80.2 / 40.1	414 / 207	80	81	81	65	74	85
3S 6"/40	40	30	6000	460	3480	53.4	272	81	82	82	66	75	86

7" Submersible Motors

Type	Power		Thrust Load lb.	Voltage V	Speed RPM	Full Load A	Locked Rotor A	Efficiency (% Load)			PF (% load)		
	HP	kW						50	75	100	50	75	100
3S 7"/50	50	37	10100	460	3480	61.4	311	84	85	85	79	86	89
3S 7"/60	60	45	10100	460	3470	74.7	379	84	85	85	77	85	89

8" Submersible Motors

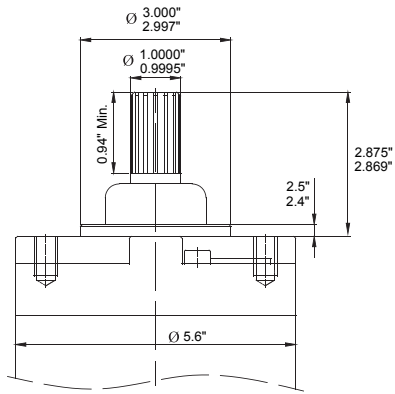
Type	Power		Thrust Load lb.	Voltage V	Speed RPM	Full Load A	Locked Rotor A	Efficiency (% Load)			PF (% load)		
	HP	kW						50	75	100	50	75	100
3S 8"/75	75	55	10100	460	3450	90.2	458	85	85	84	83	87	91
3S 8"/100	100	75	10100	460	3450	123.1	625	85	85	84	82	86	91
3S 8"/125	125	93	12500	460	3430	152.8	770	85	85	84	82	86	90

Motors Specifications

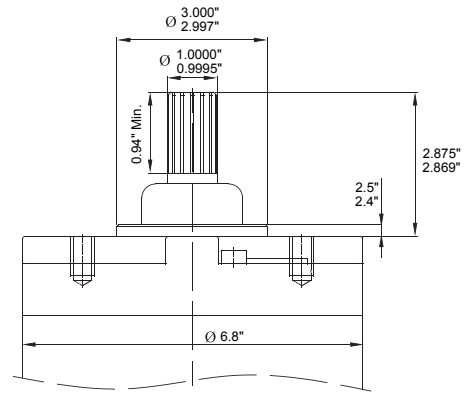
	VSM 6"	VSM 7"	VSM 8"
Motor Power Range	5HP to 40 HP	50HP & 60HP	75HP to 125 HP
Max Starts / Hour	5HP to 30HP - 20 Starts 40HP - 15 Starts	50HP & 60HP - 17 Starts	75HP & 100HP - 15 Starts 125HP - 10 Starts
Outside Diameter	5.6 Inches	6.8 Inches	7.6 Inches
Flange Standard	6" NEMA Standard	6" NEMA Standard	8" NEMA Standard

Due to continuous improvement in design we reserve the right to amend specifications or data without prior notice.

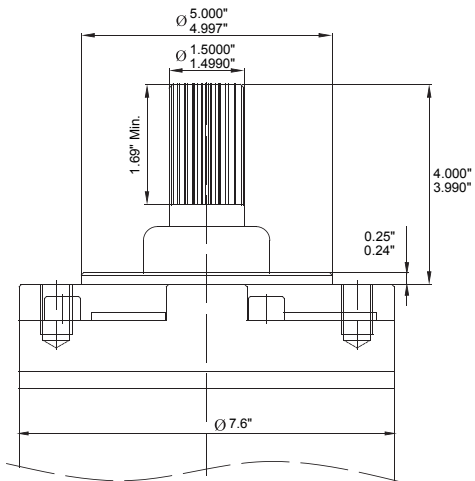
Motors Dimensions



6" Motor

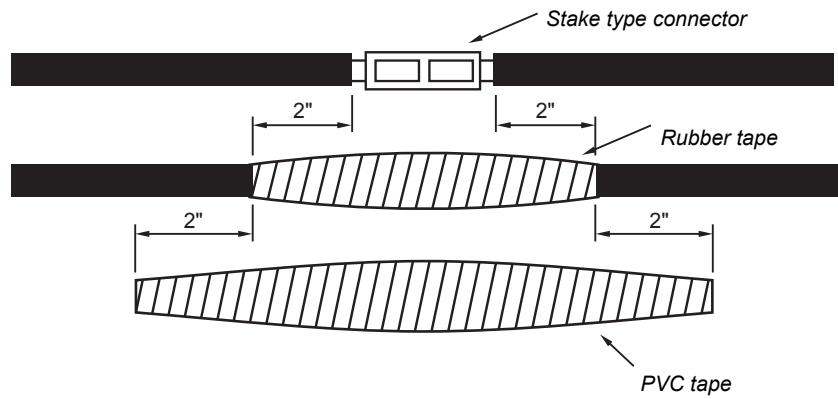


7" Motor



8" Motor

Other Features



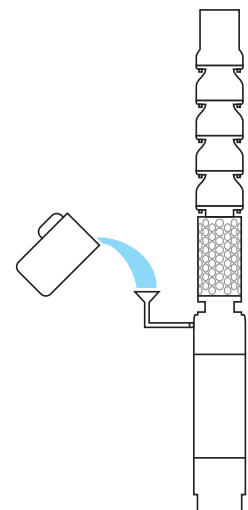
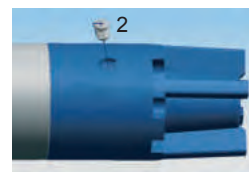
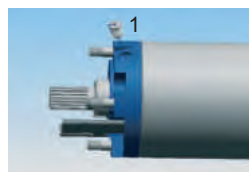
Power Cable Connection

Connection of the power cable that will be used along the well and until the control panel with the power cable on the motor must be done very carefully and by the professionals only. Unless the insulation after the connection is well done, short circuit might happen when the connection area is in the water.

Insulation of each cable should be stripped only as far as necessary to provide room for a stake type connector. Each individual splice should be taped with pvc tape, using two layers by wrapping tightly for eliminating airspaces as much as possible. Total thickness of tape should be no less than the thickness of the cable insulation in order to prevent the smashing of the cables when the pump is lowered in the well.

Motor Water Filling

During the storage and delivery period, antifreeze is used to prevent any freezing. VANSAN submersible motors are filled with water+antifreeze mix before shipment to protect motor to -10°C freezing temperature.



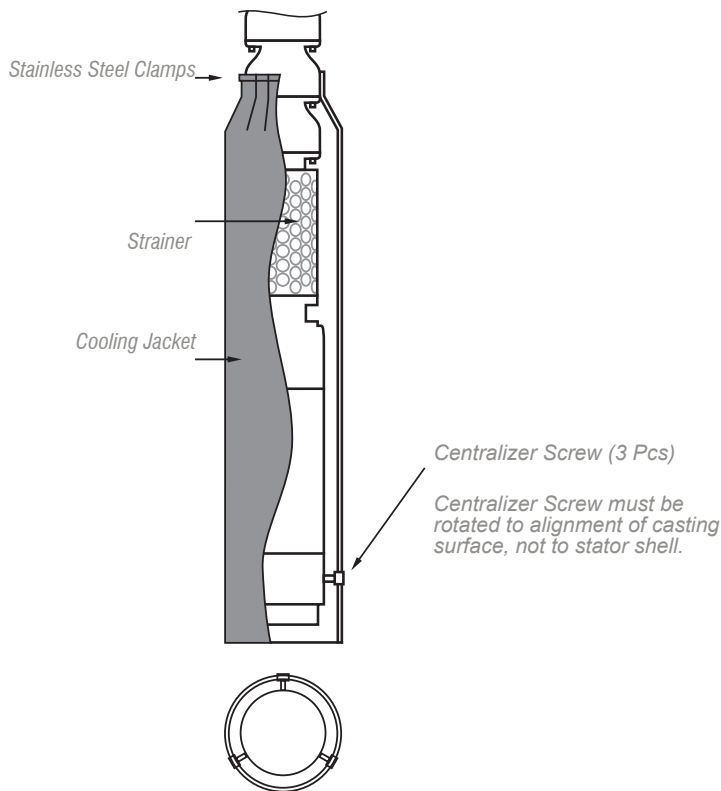
Before the installation of the motor to the well, water level inside the motor should be checked. Position the motor horizontally and remove the screw 1 and 2, fill the motor with clean water if it is not full. After waiting 30 minutes with the filling screw open, fill the water completely again and close the screw providing no leakage.

Use Cooling Jacket

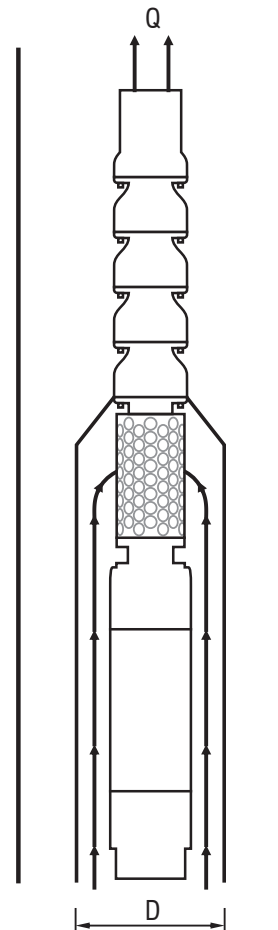
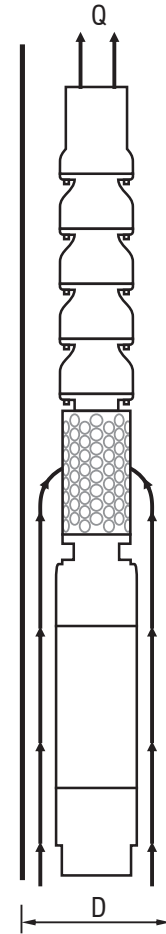
Cooling of submersible motors is provided with the flow of the water around it. That's why water flow around motors has vital importance during submersible pump installation. This flow rate depends on diameter and power of motor.

Most important factor of submersible motors' long service life is that the motor has to be cooled well. Required flow velocity around the motor is given in the table below for motors being cooled well enough.

If the motor will be installed in an open body of water (i.e pool) or diameter of the well is much bigger than the diameter of the motor, Flow Inducer Sleeve must be used to provide the flow velocities that are given in the table below, around the motor.



Motor Size	Motor Rating	Min. Water Flow (Ft/Second)
6"	7.5 - 25 HP	0.7
	30 - 50 HP	1.6
7"	30 - 75HP	0.7
8"	40 - 75 HP	0.7
	100 - 125 HP	1.6
10"	125 - 150 HP	1.6



Other Features

Insulation Resistance Test

All Vansan motors are applied insulation test under 3,000 V before shipment. Motors which have at least 2,000 megaohm test result are shipped. Insulation test results should be controlled before the installation and after connecting power cables as it is explained below. Megger tester's one probe should be touched to motor body and other probe should be touched to tip of each power cable to measure the insulation of each phase. If there is any short circuit in a phase, insulation value is 0 megaohm.

Under the normal operating conditions, a motor inside the well should have 2 megaohm insulation resistance. When the insulation resistance drops under 0.5 megaohm, there might be a insulation problem in winding. Test voltage should be at least 500 V DC. After extending power cables with a splice, same test procedures should be also applied for insulation control while power cables are inside water. If insulation test result for any winding is lower than 100 megaohm, cable splice should be done again.



Use Frequency Converter and Soft Starter

These points listed below should be taken into consideration while operating submersible motors with frequency converter and soft starter.

- ▶ Needed precautions should have been taken to protect your frequency converter from voltage fluctuations.
- ▶ Flow rate around motor must be at least 0.5 ft/s. If flow rate is not enough, flow inducer sleeve must be used to provide the needed flow rate
- ▶ In systems which are operated by frequency converter and soft starter, motor selection should be done as choosing next higher motor rate for pumps will provide long service life for motors.
- ▶ Motors should be operated between 30-60 Hz with frequency converters. As the protective water layer can't be formed on thrust bearing at the lower frequencies, motor would get damaged.
- ▶ Dual slope frequency converters should be used while using soft starter too.



Voltage Drop and Cable Power Loss

To determine the cable section it should be considered that the voltage drop must not exceed 3%. The formulas used for voltage drop calculation are given below.

Direct starter

$$1 \text{ cable} \left| \begin{array}{l} U_v = \frac{3,1 \times L \times I \times \cos\phi}{q \times U} \\ q = \frac{3,1 \times L \times I \times \cos\phi}{U_v \% \times U} \end{array} \right.$$

$$2 \text{ cables in parallel} \left| \begin{array}{l} U_v = \frac{1,55 \times L \times I \times \cos\phi}{q \times U} \\ q = \frac{1,55 \times L \times I \times \cos\phi}{U_v \% \times U} \end{array} \right.$$

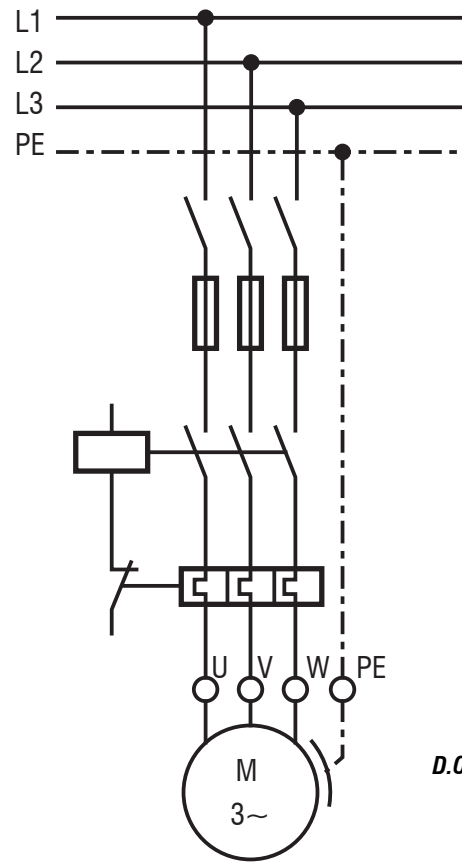
Star-delta starter

$$U_v = \frac{2,1 \times L \times I \times \cos\phi}{q \times U} \quad q = \frac{2,1 \times L \times I \times \cos\phi}{U_v \% \times U}$$

L / Cable length (m)
 I / Current at nominal voltage (A)
 q / Conductor section (mm²)
 cosφ / Power factor
 P_v / Power loss (%)
 U_v / Voltage drop (%)
 U / Nominal voltage (V)

The power loss along the feeling cable has to be calculated adjacent to

$$P_v = \frac{U_v^2}{\cos^2\phi}$$



D.O.I Connection

Trouble Shooting

Motor Does Not Start

No power or incorrect voltage	Check voltage at lines. Contact power company if voltage is incorrect
Fuses blown or circuit breakers tripped	Replace with proper fuse or reset circuit breakers
Control box malfunction	Repair or replace
Defective wiring	Correct faulty wiring or connections
Bound pump	Pull pump and correct problem. Run new installation until the water cleans
Defective cable or motor	Repair or replace

Motor Starts Too Often

	Remedy
Check valve stuck open	Replace if defective
Waterlogged tank	Repair or replace
Leak in system	Replace damaged pipes or repair leaks

Motor Runs Continuously

Low water level in well	Throttle pump or set to lower level. Do not lower if sand may clog pump
Worn pump	Pull pump and replace worn parts
Loose coupling or broken motor shaft	Replace worn or damaged parts
Pump screen blocked	Clean screen and rest pump depth
Check valve stuck closed	Replace if defective
Control box malfunction	Repair or replace

Motor Runs But Overload Protector Trips

Incorrect voltage	Contact power company if voltage is incorrect
Overheated protectors	Shade box, provide ventilation or move box away from source
Defective control box	Repair or replace
Defective motor or cable	Repair or replace
Worn pump or motor	Replace pump and/or motor

Cable Selction

HP	230 Volt 3 Phase - 75 Degree Celsius - AWG Copper Wire Size										
	12	10	8	6	4	2	1	0	00	000	0000
5	230	370	590	920	1430	2190	2690	3290	4030	4850	5870
7.5		260	420	650	1020	1560	1920	2340	2870	3440	4160
10			310	490	760	1170	1440	1760	2160	2610	3160
15				330	520	800	980	1200	1470	1780	2150
20					400	610	760	930	1140	1380	1680
25					320	500	610	750	920	1120	1360
30						410	510	620	760	930	1130

HP	460 Volt 3 Phase - 75 Degree Celsius - AWG Copper Wire Size										
	12	10	8	6	4	2	1	0	00	000	0000
5	950	1500	2360	3700	5750						
7.5	680	1070	1690	2640	4100	6260	7680				
10	500	790	1250	1960	3050	4680	5750	7050			
15		540	850	1340	2090	3200	3930	4810	5900	7110	
20		410	650	1030	1610	2470	3040	3730	4580	5530	
25			530	830	1300	1990	2450	3010	3700	4470	5430
30			430	680	1070	1640	2030	2490	3060	3700	4500
40					790	1210	1490	1830	2250	2710	3290
50					640	980	1210	1480	1810	2190	2650
60						830	1020	1250	1540	1850	2240
75							840	1030	1260	1520	1850
100									940	1130	1380
125											1000

