



5" SUBMERSIBLE PUMPSET

MANUAL FOR INSTALLATION & OPERATION



AQUASUB ENGINEERING UNIT - IV

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Dear Customer,

Please follow the instructions given in this manual to install and maintain our submersible pumpset to get reliable operation.

When you order spare parts in future, please inform the nameplate details, viz., Serial Number, Motor type and other data. spare parts list of the pumpset is given at the end of this manual for your reference.

1. PUMP

The pump is designed for pumping clear cold water with maximum permissible sand content of 50 grams / cubic metre. It is of Multistage construction with radial or mixed flow impellers and diffusers. A strainer is wrapped around the inlet bracket to restrict the entry of stones and pebbles.

2. MOTOR

The water filled cage induction motor has water lubricated bush bearings and thrust bearing. The plastic coated winding is cooled by water surrounding it. A sand guard and lip seals prevent the entry of well water and sand into the motor. Power supply cable goes into the motor through a gland provided at the bearing housing.

The pump and motor shafts are coupled by a rigid coupling . The power supply cable is taken through the cable guard provided on the pump outer side.

3. WATER - FILLING OF THE MOTOR AT SITE (Fig-1)

WATER - FILLING OF THE MOTOR

Only clear cold drinking water is to be used

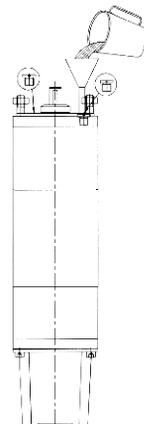


Fig - 1

The motor is to filled with clear cold water. Position the motor vertically and unscrew the two plug nuts provided over the top bearing housing, Fill the motor with water using the funnel. Allow the motor to stand for 30 minutes. Now gently rock the motor to and fro to allow any air bubbles trapped in side the motor to escape. After that the motor should be topped up with little more water. Now screw the two plug nuts tightly.

4. CONNECTING THE MOTOR TO POWER SUPPLY

The motor is supplied with a 3 metre cable. After the water filling of motor, check the insulation resistance value by a 500 V meggar. It should be more than 20 Mega Ohms

Please check that the power supply voltage and frequency corresponds to the motor nameplate specifications. Observe the relevant regulations while giving power supply to the motor.

5. TERMINAL CONNECTION

The terminal connection designation for 3 phase motors are R.Y.B. with lead wires of Red, Yellow and Blue colours.

The terminal connection designation for 1 phase motors are as follows :

Main Winding lead	-	R	Red colour
Auxillary winding lead	-	Y	Yellow colour
Common lead	-	B	Blue colour

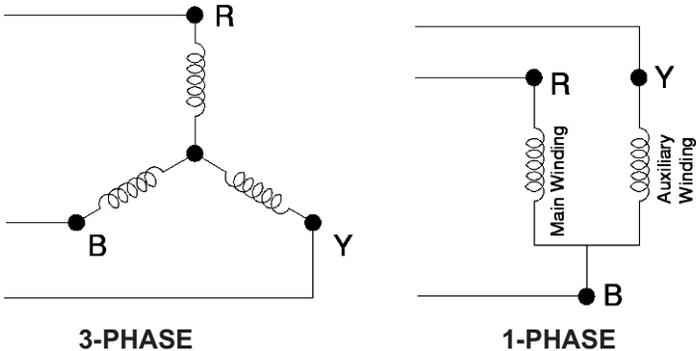


Fig - 2

6. SWITCH GEAR FOR 3 PHASE MOTORS

We recommend the use of contactors of sufficient current ratings with no-volt coil and a temperature compensated over current relay. The use of ammeter and a voltmeter is also recommended. The instructions provided by the manufacturer for the operation and maintenance of the control panel must be strictly followed.

Our submersible motors are suitable for DOL starting; if this method is unacceptable, auto transformer type starter with required specifications is to be used.

Phase failure protection can be provided by a *PHASE FAILURE RELAY*, or an enclosed temperature compensated air break contactor with a thermal over current relay with integral differential trip.

7. SWITCH GEAR FOR SINGLE PHASE MOTORS

Use only a control panel which incorporates a contactor and over load relay. Connect the power supply in accordance with the wiring diagram shown in the control panel.

Please strictly follow the 'Starting Instructions' specified in the control panel.

8. RATINGS OF COMPONENTS RECOMMENDED FOR SINGLE PHASE CONTROL PANEL OF SUBMERSIBLE PUMPSET

COMPONENT NAME	HP					
	0.75	1.1	1.5	2.0	3.0	5.0
START CAPACITOR (230-275V) (MFD)	80/100	80/100	100/120	100/120	200/250	200/250
RUNNING CAPACITOR (440V) (MFD)	25	36	50	36-2 Nos	50 - 2 Nos.	50-3Nos.
CONTRACTOR (AMPS)	16	16	16	16	25	40
OVER LOAD RELAY RANGE (AMPS)	3.8 - 6.0	6.0 - 9.3	8.9 - 13.5	13.2-20.0	17.2-24.0	25.0-30.0
MAX.CURRENT (NAME PLATE) (AMPS)	5.2	6.5	9.5	12.5	19.8	27.0

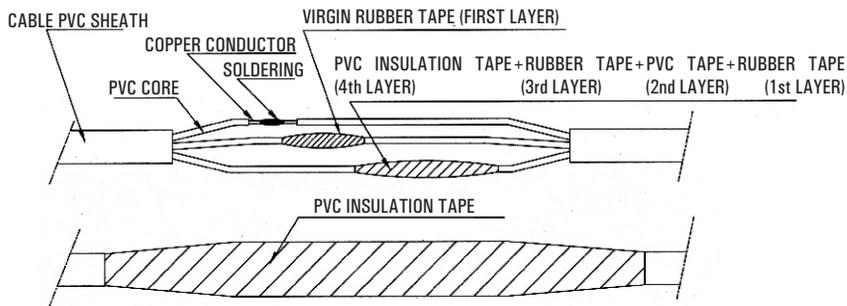


Fig - 3

9. CABLE SELECTION FOR 3 PHASE MOTORS

Please refer the CHART - 1 for the selection of cables from panel to motor.

10. CABLE SELECTION FOR SINGLE PHASE MOTORS

Please refer the CHART - 2 for the selection of cables from panel to motor.

Important Note : For all single phase motors use 7/20 or 7/18 wires for power supply to panel. Care should be taken to see that ,the earthing is done in a proper way as poor earthing may cause high voltage drop.

11. EARTHING

It is essential to ground the unit to prevent electrical shock. The Most convenient point is the delivery pipe at the top of the borewell. If this is insufficient then the motor casing itself has to be earthed and an extra wire is required for this purpose.

12. CABLE JOINTS (Fig-3)

The motor is normally provided with only 3 meter length of cable. For joining the additional cable length, the following method is recommended to get water-tight cable joint.

The copper conductors of the red wires of the motor cable and the additional length cable are to be spliced with knife. They are to be soldered together and the joint is to be filed to smooth surface without projections. The joint should be wrapped tightly with Rubber cushion compound (Virgin rubber compound available in automotive tube & tyre shop) The PVC insulation tape is to be wrapped tightly on the rubber compound. This process is to be repeated twice to give two layers of rubber compound and PVC insulation tape.

The same procedure is to be used for joining the other two wires, yellow and Blue. After that the three wire joints are to be taped together neatly.

13. CABLE SELECTION CHART -1

SUBMERSIBLE PUMPSET CABLE SELECTION CHART FOR 415V - THREE PHASE - 50Hz

(Cable Size in mm²)

HP	LENGTH IN METRES																					
	10	20	30	40	50	60	70	80	90	100	120	140	160	180	200	250	300	350	400	450	500	
1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	2.5	2.5	2.5	4	
2	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	2.5	2.5	2.5	4	4	4	4	
3	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	2.5	2.5	2.5	2.5	4	4	4	6	6	6	6
4	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	2.5	2.5	2.5	4	4	4	6	6	6	10	10	10
5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	2.5	2.5	2.5	2.5	4	4	4	6	6	10	10	10	10	10
6	1.5	1.5	1.5	1.5	1.5	1.5	2.5	2.5	2.5	2.5	4	4	4	4	6	6	10	10	10	10	16	16
7.5S	2.5	2.5	2.5	2.5	2.5	2.5	2.5	4	4	4	4	4	6	6	6	10	10	10	16	16	16	16
7.5D	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	2.5	2.5	2.5	4	4	4	6	6	10	10	10	10
10	1.5	1.5	1.5	1.5	1.5	1.5	2.5	2.5	2.5	2.5	4	4	4	4	6	6	10	10	10	10	16	16

Note : 1. HP 7.5 D and above are STAR / DELTA motors.

2. For STAR DELTA Starting reduce current by $1/\sqrt{3}$ for selecting suitable cable.

For other Voltages the cable size is to be selected as follows :

Calculated length = $(415 \div \text{volt}) \times \text{actual length}$

Conversion Table:

1 m = 3.28 ft

1 ft = 0.305 m

Example : For a 5 HP motor at 350 volts and 100 metres actual cable length, calculated length = $(415 \div 350) \times 100 = 119$ m. The size of the cable to be selected for 107m from the chart is 2.5mm².

14. CABLE SELECTION CHART-2

SUBMERSIBLE PUMPSET CABLE SELECTION CHART FOR 220V - SINGLE PHASE - 50HZ

(Cable Size in mm²)

HP	LENGTH IN METRES																				
	10	20	30	40	50	60	70	80	90	100	120	140	160	180	200	250	300	350	400	450	500
0.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	2.5	2.5	2.5	4	4	4	6	6	6	10	10
1	1.5	1.5	1.5	1.5	1.5	1.5	2.5	2.5	2.5	2.5	4	4	4	6	6	6	10	10	10	16	16
1.5	1.5	1.5	1.5	2.5	2.5	2.5	4	4	4	6	6	10	10	10	10	16	16	16	25	25	25
2	1.5	1.5	2.5	2.5	4	4	4	6	6	6	10	10	10	16	16	16	25	25	25	35	35
3	1.5	1.5	2.5	2.5	4	4	6	6	6	10	10	10	16	16	16	25	25	25	35	35	35
4	1.5	2.5	2.5	4	4	6	6	10	10	10	16	16	16	16	16	25	25	25	35	35	35
5	2.5	2.5	4	4	6	6	10	10	10	16	16	16	16	25	25	25	35	35	50	50	50
7.5	2.5	4	4	6	6	10	10	10	10	16	16	16	25	25	25	35	35	35	70	70	70

For Over Voltages the cable size is to be selected as follows:

Calculated length = $(220 \div \text{Volt}) \times \text{actual length}$

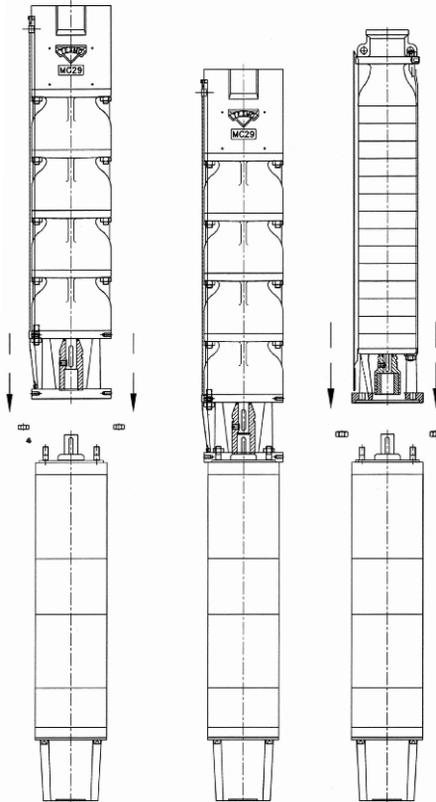
Conversion Table : 1m = 3.28 ft - 1 ft = 0.305 m

Example : For a 3 HP 180 volts motor and 100 metres actual cable length,
 calculated length = $(220 / 180) \times 100 = 122\text{m}$. The size of the cable to be
 selected for 122 m from the chart is 10 mm².

15. COUPLING THE PUMP WITH MOTOR (Fig-4)

The coupling is provided with pump shaft. Position the motor vertically. The pump is lifted and lowered carefully on the motor ensuring that the motor shaft is inserted in the coupling. The studs on the motor side should pass through holes in the bottom of the inlet bracket.

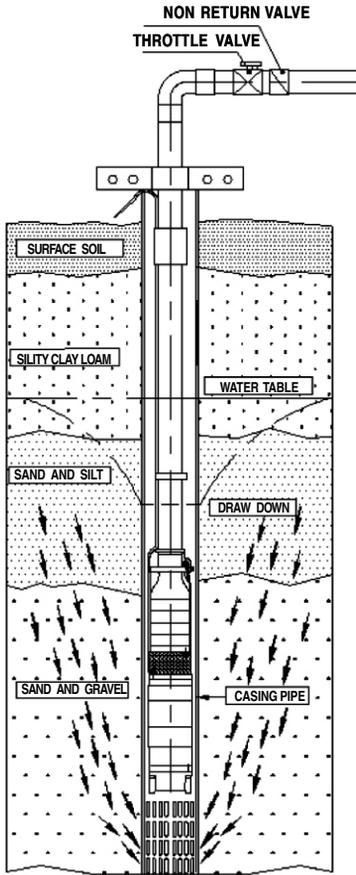
Ensure that the coupling rests on the top of the sand guard in the motor. Now check the play by lifting the pump shaft which should be 1mm. The cable guard and the strainer are now fitted. Fixing the strainer is a must to prevent the sand entry.



(Fig-4)

16. INSTALLATION IN SANDY AREA TUBE WELLS (Fig-5)

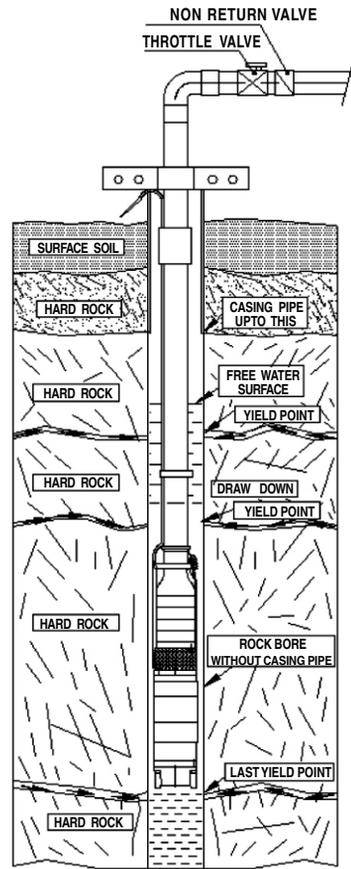
In sandy area, water table exists at certain depth. Bore well is lined with casing pipes and a slotted strainer pipe at the bottom. In these type of tube wells normally pumpsets are erected at the bottom of the tube well so that pumps operate well below the drawn down level.



TUBE WELL IN SANDY AREA

NOTE : PUMPSET TO BE ERRECTED ABOVE THE MUD AREA

Fig - 5



BORE WELL IN HARD ROCK AREA

NOTE : PUMPSET TO BE ERRECTED ABOVE THE LAST YIELD POINT

Fig - 6

The set should be installed in such a way that no silt or mud settlement can occur in the region of the motor as this would seriously impair the heat dissipation from the motor and result in winding failure.

17. INSTALLATION IN HARD ROCK AREA BOREWELLS (Fig-6)

In hard rock area borewells, normally water is collected from one or more yield points. The set should be installed just above the last yield point so that the water coming from the last yield point cools the motor surface and enters the pump suction.

18. OPERATION

1. DIRECTION OF ROTATION

With 3 phase motors: Start the pumpset and the discharge is to be noted. Interchange any two supply leads in the starter and the discharge is to be noted. The higher discharge indicates the connection with the correct direction of rotation of the pumpset.

With 1 Phase motors : The correct direction of rotation is set in the winding connection at the factory itself. So, irrespective of the mode connection to the power supply, the motor will run in the correct direction.

2. SWITCHING FREQUENCY

The stand - still time of the pumpset between switching an again shall be atleast five minutes.

3. EXCESSIVE SAND IN NEW BOREWELLS

In a newly bored well the pumpset must be run at first with the gate valve partially opened. The water is then examined for sand content. If there is a noticeable quantity of sand in the water, the pumpset should be run with the gate valve partially opened until the sand content in the water falls to an un-noticeable level. **It is important that the pump is not stopped until clear water flows**, i.e., it must not be switched off while pumping sandy water. If the pumpset is stopped in between, the sand particles settles in all the close running clearances of the pump and damages the bearings in the next run.

19. TROUBLES AND THEIR CAUSES

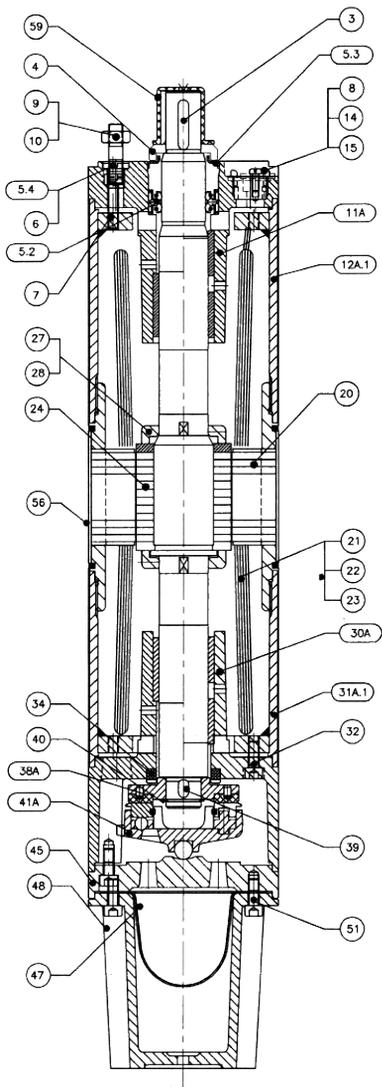
TROUBLES

- A. Pump does not start
Refer Cause Nos. 1,2,3,4
- B. Pump delivers lower quantity of water
Refer Cause Nos. 5,6,7,8
- C. Input current / power is excessive
Refer Cause Nos. 9,10,11,12,13
- D. Excessive Vibration
Refer Cause Nos. 9,14,15,16

CAUSES

1. Failure of power supply.
2. Blown fuse.
3. Failure of protection devices
4. Failure of cables and cable joints.
5. Yield of borewell not adequate.
6. Choking of strainer / impeller / pipelines.
7. Improper direction of rotation due to change in phase sequence of power supply.
8. Excessive abrasive wear out of pump components.
9. Bearing worn out.
10. One defective fuse, single phasing.
11. Change in the actual static head, ie low head operation.
12. Low voltage.
13. Loose connection of input supply.
14. Improper Alignment.
15. Foreign bodies logged in impellers
16. Abrasive wear of pump bearings after prolonged operation or due to operation in water of higher sand content or corrosiveness.

SPARE PARTS LIST FOR 5" MOTOR

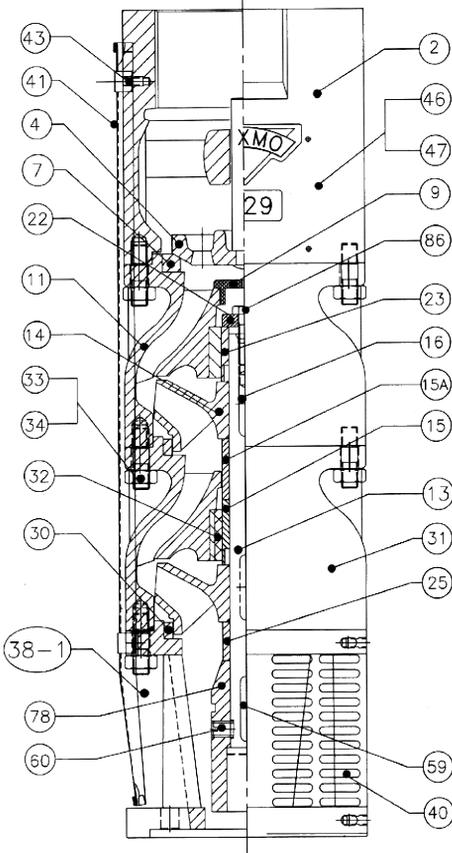


P. NO.	PART NAME	QTY
3	KEY	1
4	SAND GUARD	1
5.2	LIP SEAL	2
5.3	LIP SEAL RING	1
5.4	DRAIN PLUG	2
6	"O" RING	2
7	HEX. SOCKET HEAD CAP SCREW (TBH)	3
8	CABLE GLAND	ST=1,SD=2
9	STUD (TBH)	4
10	NUT (TBH)	4
11A	TOP BRG. HOUSING ASSY.	1
12A.1	TOP BRG. BODY	1
14	TERMINAL LOCK WASHER	ST=1,SD=2
15	OVAL WASHER	ST=1,SD=2
20	STATOR ASSY	1
21	WINDING WIRE	-
22	WEDGE	24
23	CABLE	-
24	ROTOR SHAFT ASSY.	1
27	BALANCING COLLAR	2
28	HEX. SOCKET HEAD GRUB SCREW	2
30A	BOT. BEARING HOUSING ASSY.	1
31A.1	BOT. BEARING BODY	1
32	HEX. SOCKET HEAD CAP SCREW(BBH)	6
34	THRUST RING	1
38A	THRUST COUPLING ASSY.	1
39	KEY (T.COUPLING)	1
40	CIRCUP	1
41A	THRUST BRG. ASSY.	1
45	BASE PLATE	1
47	DIAPHRAGM	1
48	BASE (BOT.)	1
51	HEX. SOC. HEAD CAP SCREW(BASE)	3
56	NAME PLATE	1
59	CAP	1

ST - STAR

SD - STAR / DELTA

SPARE PARTS LIST FOR MC PUMPS



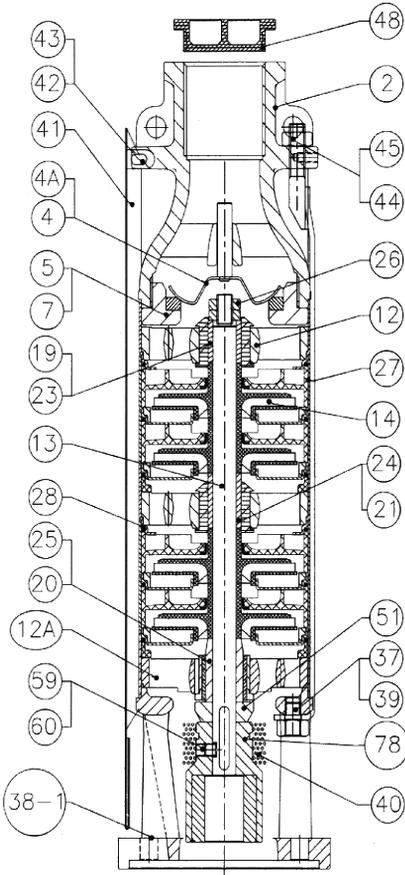
P. NO.	PART NAME	QTY
2	VALVE CASING	1
4	NON RETURN VALVE ASSY.	1
7	VALVE METAL SEAT	1
9	DUMMY	1
11	TOP BOWL ASSY.	1
13	PUMP SHAFT	1
14	IMPELLER	X
15	DISTANCE PIECE	X-1
15 A	DISTANCE PIECE TOP	1
16	KEY (IMP)	X
22	COLLAR	1
23	SLEEVE (TOP)	1
25	SPACER	1
30	WEAR RING	X
31	STAGE BOWL	X-1
32	BRG. BUSH (M.S&RUBBER)	X-1
33	STUD (BOWL)	8X+8
34	NUT (BOWL)	8X+8
38-1	INLET BRACKET	1
40	STRAINER	1
41	CABLE GUARD	ST=1,SD=2
43	CHEESE HEAD CAP SCREW	ST=4,SD=6
46	NAME PLATE	1
47	RIVET (NAME PLATE)	4
59	KEY (COUPLING)	1
60	GRUB SCREW	1
78	COUPLING	1
86	HEX. BOLT (SHAFT TOP)	1

X - No. of stages

ST - STAR

SD - STAR / DELTA

SPARE PARTS LIST FOR CRF PUMPS



P. NO.	PART NAME	QTY
2	VALVE CASING	1
4	N.R.V. ASSY. (3 PH ONLY)	1
4A	N.R.V. ASSY. (1 PH ONLY)	1
5	VALVE SEAT	1
7	VALVE METAL SEAT	1
12	PUMP BRG. HOUSING ASSY. (INT.)	N=1
12A	PUMP BRG. HOUSING ASSY. (BOT.)	1
13	PUMP SHAFT	1
14	IMPELLER	X
19	KEY (SLEEVE TOP)	2
20	KEY (SPACER)	2
21	KEY (SLEEVE. INT)	N-4
23	SLEEVE (TOP)	1
24	SLEEVE (INT.)	N-2
25	SPACER	1
26	LOCK NUT	2
27	DIFFUSER HOUSING ASSY.	X
28	"O" RING	X
37	STUD (IB)	4
38-1	INLET BRACKET	1
39	NUT (IB)	1
40	STRAINER	1
41	CABLE GRARD	1
42	CABLE GUARD CLIP	1
43	CSK SCREW	2
44	THE BOLT ASSY	4
45	NUT (TIE BOLT)	4
48	DUMMY (V.CASING)	1
51	THRUST RING	1
59	KEY (COUPLING)	1
60	GRUB SCREW (COUPLING)	1
78	COUPLING	1

X - No. of stages

ST - STAR

SD - STAR / DELTA

WARRANTY FOR SUBMERSIBLE PUMPSET

Aquasub Engineering warrants to the purchaser of this TEXMO product, that for a period of 12 months commencing from the date of purchase of the product, Aquasub Engineering will repair or replace free of charge any part or parts of the product, should Aquasub Engineering be fully satisfied in its sole discretion, that the defect/s is / are due to faulty material or workmanship only. The warranty will be governed by the following clauses:

1. Aquasub Engineering or their Authorised Service Agent / Dealer will repair / replace all parts that are failing due to faulty material or defective workmanship pertaining to the above product.
2. Only Aquasub Engineering or its Authorised Service Agent / Dealer can service / repair or attend to install / reinstall the above product.
3. All expenses incurred in collecting the units or parts thereof from the Authorised Service Centre or the Dealer of Aquasub Engineering as well as expenses incurred in connection with deputing of service personnel / technicians towards to and fro travel conveyance and other incidentals etc., will be borne by the customer.
4. The warranty extended therein is in lieu of all implied conditions and warranties under the law and is confined to the repair or replacement of defective parts and does not cover any consequential or resulting liability, damage or loss arising from such defects. Further more, the warranty in no case, shall extend to the payment or any monetary consideration whatsoever, of the replacement or return of the product as a whole.
5. The warranty is issued subject to jurisdiction of Coimbatore Court of Law.
6. The warranty is covered by Force Majeure clause. In the event if the above product is struck by any natural calamity, this warranty stands null and void.

This Warranty is not valid in case of any of the following events.

- a. This Pumpset is not used according to the instructions given in this Installation and Operation manual.
- b. If the electrical power supply voltage is not within the stipulated norms.
- c. Any repair work / installation carried out by a person other than Aquasub Engineering Service Centre / Service Agent.
- d. The serial Number is deleted, defaced or altered.

WARRANTY CARD

(Please retain this for your personal record)

Product Name & Model No. Serial No.

Name and Address of Dealer

Bill No. Date of Purchase



PUMPS YOU CAN RELY ON



4" 6" 6" 8" 10"
"TEXMO"
SUBMERSIBLE PUMPSETS



"TEXMO"
VERTICAL JET PUMPSET



"TEXMO"
SINGLE PHASE DOMESTIC PUMPSET



"TEXMO"
SUBMERSIBLE MONOBLOCK
PUMPSET



"TEXMO"
SINGLE PHASE SELF PRIMING
MINI MONOBLOCK



"TEXMO"
DOMESTIC PRESSURE
BOOSTING SYSTEM



"AQUATEX"
HYDRO PNEUMATIC SYSTEM



"AQUATEX"
HORIZONTAL MULTISTAGE
STAINLESS STEEL
CENTRIFUGAL MONOBLOCK



"AQUATEX"
OPEN-WELL SUBMERSIBLE
MONOBLOCK



"AQUATEX"
VERTICAL OPEN-WELL
SUBMERSIBLE PUMPSET



"AQUATEX"
AGRICULTURAL / ENDSUCTION
MONOBLOCK



"AQUATEX"
ELECTRIC MOTOR