Four Inch Borewell Submersible Pump Sets

Instruction & Operating Manual

Taro™ Pumps

Texmo Industries
Est. 1956

OMBW002A

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Table of Contents

1. Introduction

Thank you for choosing a quality product manufactured by Texmo Industries. We request you to read this manual carefully to ensure that the system you have purchased will be operated correctly.

This manual is intended to provide you with information on your product and information on installation and operation. You will also find information on how you could contact Texmo Industries, should you need further information or help and support.

2. Warranty information

Please refer to your warranty card or visit **www.taropumps.com** for more information on your warranty.

3. Complying with standards

IS 694: Polyvinyl Chloride insulated unsheathed / sheathed cables / cords with rigid and flexible conductor for rated voltages up to 450/750 V
IS 3043: Code of practice for earthing: specifications
IS 8034: Submersible pumpsets: specifications
IS 9283: Motors for Submersible pumpsets: specifications

4. Contents of the packing box

Based on the model you have purchased, your Borewell submersible is packed along with the instruction manual and warranty card in either a corrugated box or in a wooden crate.

5. Information about your pump

Taro Borewell Submersible pumpsets are manufactured using high quality raw materials and components using state-of-the-art manufacturing facilities. Taro Bore Well Submersible pumpsets will give trouble free performance if they are properly installed and maintained. Read this intruction manual carefully before the installation and follow instructions for installation and maintenance in order to ensure reliable operation.

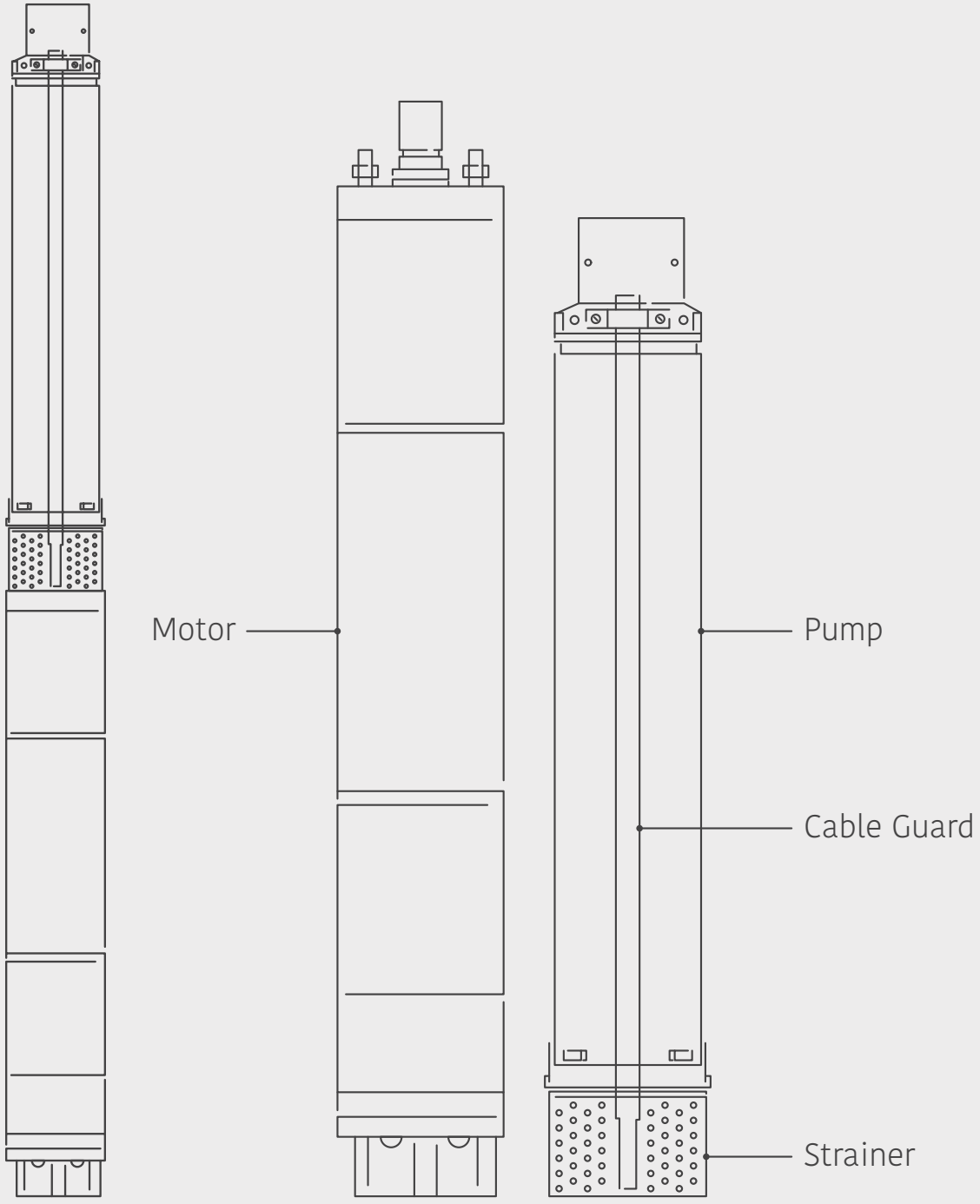
Applications include farm irrigation (Flood / Sprinkler / Drip), domestic and community water supply, water supply to high rise buildings, municipal water supply, industrial water supply, cooling water circulation systems, water treatment, firefighting and fountains.

The submersible pumpset should be installed by technically qualified personnel in compliance with national and local electrical codes and as per instructions in order to avoid electrical shocks, unsatisfactory performance and equipment failure.

6. Schematic drawing

View of a 4 inch Submersible pumpset is shown below in Fig. 1:

Fig. 1 View of 4 inch Submersible pumpset



7. Key specifications & features

Standard Specification of 4 inch Borewell submersible pumps is shown below in TABLE 1:

Phase and Power	Single Phase: 0.5 – 3.0 HP	
	Three Phase: 1 – 7.5 HP	
Motor Type	Wet type	
Starting Method	DOL	
Operating Voltage	Single phase Premium: 180 - 240 V Power: 160 - 220 V Prime: 160 - 220 V	Three phase Premium: 350 - 440 V
Frequency	50 Hz	
Speed	2850 rpm	
Duty	S1 Continuous	
Max. Fluid Temperature	33°C	
Impeller Type	Radial / Mixed	
Cable	3 Core PVC Insulated flat cable	

Product performance specification

Texmo Industries has a wide variety of 4 inch Borewell submersibles to meet your requirements. Please consult our Sales team / your nearest dealer to meet your specific requirements.

Key features: Motor

- The wet type submersible motor is a squirrel cage induction motor completely filled with a mixture of pure clean water mixed with anti-corrosive liquid for improved motor life
- The motor houses water lubricated journal and thrust bearings
- Low watt loss stampings used in motors
- As sand and other foreign particles can damage the motor, the motor is protected by the use of high quality oil seals and sand guard
- As the motor is sealed, during operation, excessive pressure can build up inside the motor due to thermal expansion of water. Rubber diaphragm is provided to compensate for pressure increase due to heating up of water in the motor
- Winding over-hang protector is provided to ensure the coil life
- Carbon thrust bearing - High graded carbon material with investment cast steel combination enables reliable operation
- Carbon journal bearing bushes for longer life of motor
- Motor fitted with copper rotor for single and Three phase Premium and URC series, aluminum die cast rotor for R and UR series motors.
- Easily re-windable squirrel cage motor designed for wide operating voltage band
- Top and bottom intermediate housings are stainless steel clad for improved corrosion resistance
- The motor body is provided with two eye bolts for lifting / lowering of the pumpset

Key features: Pump

- Optimized hydraulic performance for high reliability
- Intermediate housing with Rubber Bush for Pump shaft to increase the pump stability
- SS inlet bracket for corrosion resistance (For higher stage pump)
- SS pump shell to prevent corrosion
- The corrosion resistant SS cladded housing prevents rust formation in saline water applications

- Special nitrile rubber bearing bushes for high wear resistance
- Built-in NRV with low head loss design
- Pumps fitted with high quality engineering polymer NORYL GF 30% impellers and diffuser housings / bowls
- Stainless steel pump shell for enhanced corrosion resistance. TBRF pumps are provided with stainless steel cups on the diffuser housings
- Stainless steel shaft for enhanced corrosion protection
- Counter thrust collar to limit up-thrust

Key features: Strainer

- A stainless steel strainer wrapped around the inlet bracket prevents the ingress of pebbles into the intake during pumping

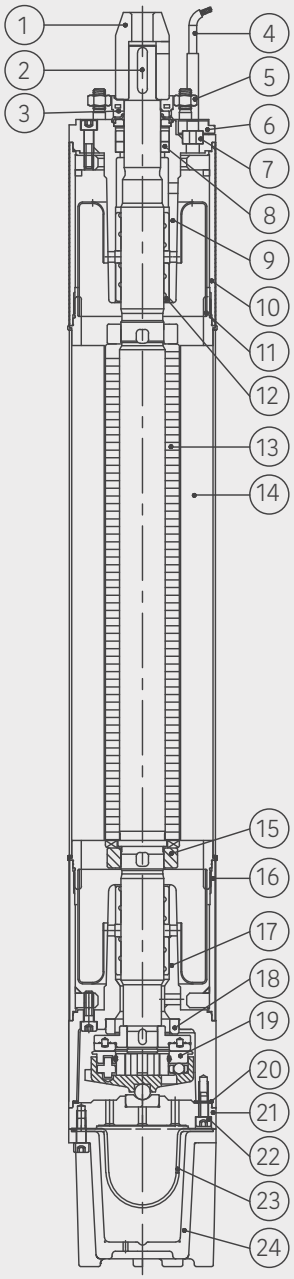
Key features: Wiring Harness

- All submersible motors are provided with 3 core PVC insulated flat cable of length 3 meters

8. Cross-section view

Cross-section view of 4 inch Submersible motor is shown below in Fig. 2:

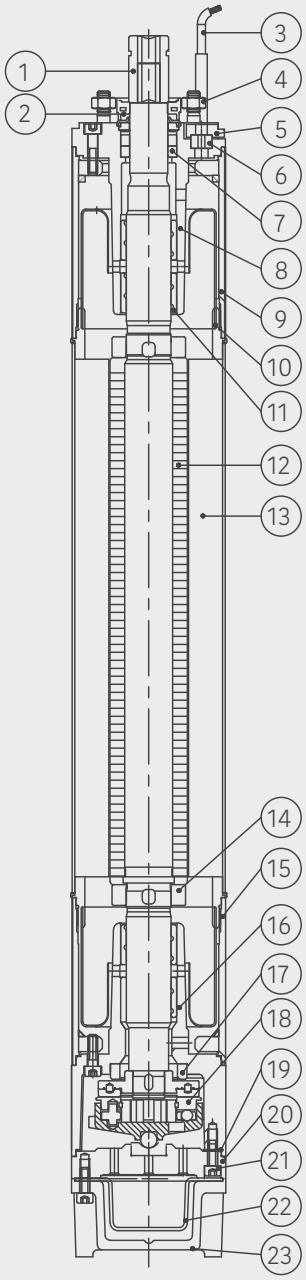
Fig. 2 Cross-section view of 4 inch Submersible motor: 6 and 7.5 HP



PART No.	PART NAME
1	STEPPED COUPLING - GSS014
2	PARALLEL KEY
3	SAND GUARD ASSY
4	CABLE
5	STUD WITH NUT
6	CABLE GLAND
7	CABLE GLAND BUSH
8	OIL SEAL
9	TOP HOUSING
10	INTERMEDIATE SHELL - TOP
11	OVERHANG PROTECTOR
12	BUSH
13	ROTOR WITH SHAFT
14	STATOR
15	BALANCING COLLAR
16	INTERMEDIATE SHELL - BOTTOM
17	BOTTOM HOUSING
18	BEARING HOUSING RING
19	CARBON THRUST UNIT ASSY
20	GASKET CIRCULAR
21	THRUST INSERT
22	HEX SOCKET HEAD CAP SCREW
23	DIAPHRAGM
24	MOTOR BASE

Cross-section view of 4 inch Submersible motor is shown below in Fig. 3:

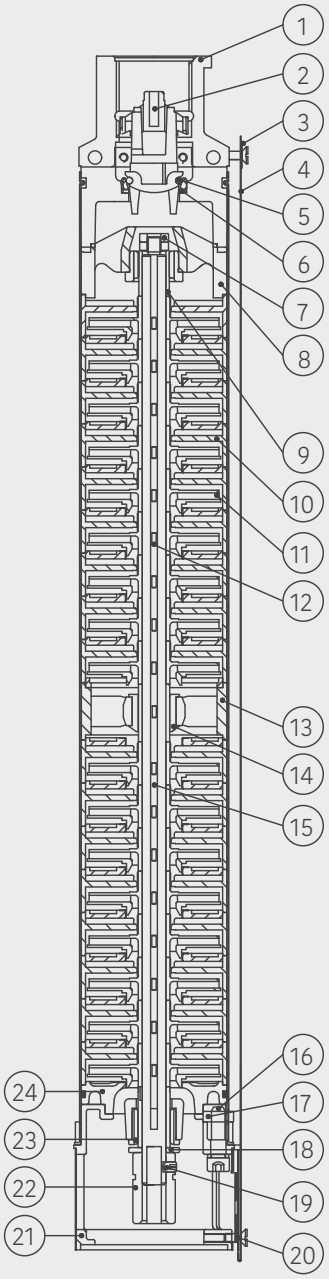
Fig. 3 Cross-section view of 4 inch Submersible Motor: 1 – 5 HP



PART No.	PART NAME
1	COUPLING - GSS005
2	SAND GUARD ASSY
3	CABLE
4	STUD WITH NUT
5	CABLE GLAND
6	CABLE GLAND BUSH
7	OIL SEAL
8	TOP HOUSING
9	INTERMEDIATE SHELL - TOP
10	OVERHANG PROTECTOR
11	BUSH
12	ROTOR WITH SHAFT
13	STATOR
14	BALANCING COLLAR
15	INTERMEDIATE SHELL - BOTTOM
16	BOTTOM HOUSING
17	BEARING HOUSING RING
18	CARBON THRUST UNIT ASSY
19	GASKET CIRCULAR
20	THRUST INSERT
21	HEX SOCKET HEAD CAP SCREW
22	DIAPHRAGM
23	MOTOR BASE

Cross-section view of a Submersible radial flow pump is shown below in Fig. 4:

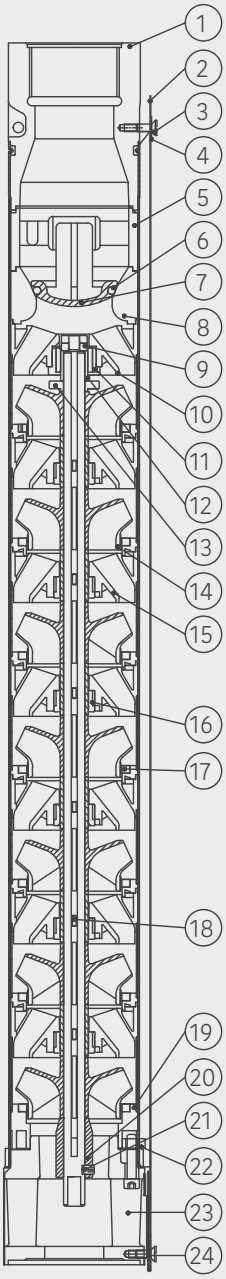
Fig. 4 Cross-section view of 4 inch submersible radial flow pump



PART No.	PART NAME
1	DELIVERY CASING
2	NON - RETURN VALVE
3	CABLE CLAMP
4	CABLE GUARD
5	O-RING
6	NRV SEAT
7	LOCK NUT
8	PUMP HOUSING WITH BUSH
9	SLEEVE
10	DIFFUSER HOUSING
11	IMPELLER
12	LOCK PIN
13	INTERMEDIATE HOUSING
14	BUSH - INTERMEDIATE
15	PUMP SHAFT
16	HEX BOLT WITH SPRING WASHER
17	SQUARE NUT
18	THRUST COLLAR
19	HEX SOCKET HEAD CAP SCREW
20	STRAINER WITH SCREW
21	INLET BRACKET
22	COUPLING
23	INLET HOUSING BUSH
24	INLET SEALING RING

Cross-section view of Submersible mixed flow pump is shown below in Fig. 5:

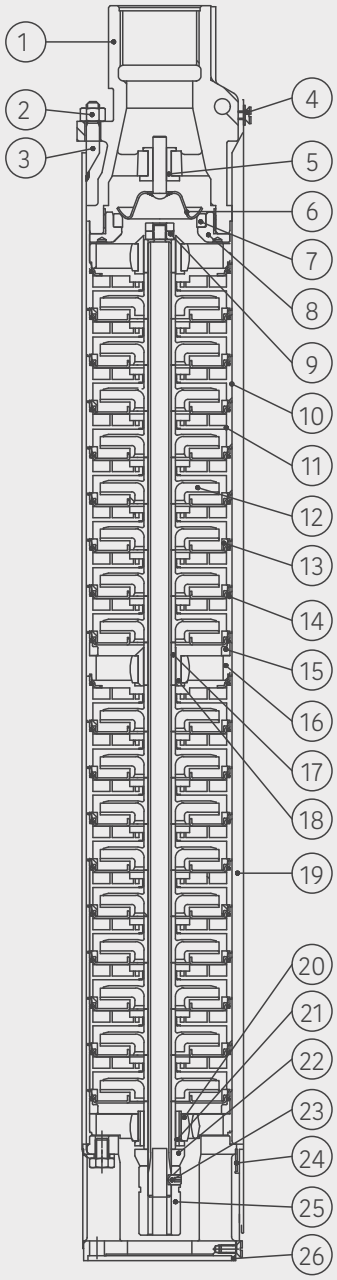
Fig. 5 Cross-section view of 4 inch Submersible mixed flow pump



PART No.	PART NAME
1	DELIVERY CASING
2	CABLE GUARD
3	CH SCREW
4	CABLE CLAMP
5	NRV HOUSING
6	O-RING
7	NON - RETURN VALVE
8	NRV SEAT
9	LOCK NUT
10	BOWL - TOP
11	BUSH - PUMP HOUSING
12	SLEEVE
13	THRUST COLLAR
14	IMPELLER
15	BOWL - STAGE
16	BOWL BUSH
17	BOWL RING
18	LOCK PIN
19	INLET RING
20	DISTANCE SLEEVE
21	HEX SOCKET HEAD CAP SCREW
22	SQUARE NUT
23	INLET BRACKET
24	STRAINER WITH SCREW

Cross-section view of Submersible radial flow pump, TBRF Series, is shown below in Fig. 6:

Fig. 6 Cross-section view of 4 inch submersible radial flow pump - TBRF



PART No.	PART NAME
1	DELIVERY CASING
2	HEXGONAL NUT
3	TIE BAR
4	CABLE CLAMP WITH SCREW
5	BUSH - NRV GUIDE
6	NON-RETURN VALVE
7	NRV SEAT
8	NRV SEAT HOLDER
9	LOCK NUT
10	HOUSING CUP
11	DIFFUSER
12	IMPELLER
13	DIFFUSER RING
14	O-RING
15	SPACER RING
16	PUMP HOUSING
17	SLEEVE - 14 x 18.5 x 34
18	BUSH - INTERMEDIATE
19	CABLE GUARD
20	PUMP HOUSING INLET
21	INLET HOUSING BUSH
22	INLET THRUST RING
23	HEX SOCKET HEAD CAP SCREW
24	STRAINER WITH SCREW
25	COUPLING
26	INLET BRACKET

9. Pre-installation requirements

Arrangement for Installation

- Use the services of a professional and trained mechanic with experience in erecting borewell submersibles
- Ensure proper safety during installation
- Ensure the availability of electrical power as indicated in TABLE 1

General Installation Precautions

- Open the packaging and note down the Serial number and Model for future reference
- Inspect the purchased pump for damage / leakage
- Ensure all fasteners are tightened properly
- Check the inside diameter of the well casing to ensure that it is not smaller than the size of the submersible
- Check depth of bore well to determine the length of piping and power cable required

 Note	If you detect damage or discrepancy in the product, contact the dealer from whom the pump was purchased
 Warning	Do not use this pump for oil or toxic, acetic, corrosive and flammable liquids. Pumping flammable liquids could cause explosion
 Caution	Do not use the pump cable for lifting / lowering the pump

 Caution	Use trained professionals to install the submersible pump. Improper fitment can cause the pump to fall into the bottom of the bore
 Warning	Use a power supply cable that has sufficient rating and has been exclusively provided for the pump
 Warning	Provide proper earthing as improper earthing can cause electrical shock
 Caution	Use a megger to verify the insulation resistance of the motor. Insulation resistance of the motor should be 20MΩ minimum
 Caution	Do not place the submersible pump with its base resting at the bottom of the borewell. There is a possibility for the motor and pump to be buried in the silt which collects at the bottom of the borewell
 Warning	Mount the pump vertically. Never inclined or horizontal

Operation Precautions

 Caution	Do not run the pump dry. It could lead to product damage
 Warning	Switch OFF the power supply and ensure that the impeller completely stops before changing rotation or making any adjustments
 Caution	Do not use this pump for pumping liquid exceeding 33^0C as this may lead to product failure
 Warning	Do not switch ON the pump if there is any human contact with the pumped medium. If any electrical leakage occurs, this could be fatal
 Note	For three phase models, it is recommended to use a Control Panel with Single Phase Preventer, Overload Relay and Dry Run Protection

10. Installation procedure

Please follow the below procedure to install the pump and motor.

Caution

The supply voltage should be within -15% to +6% of rated voltage.
Water temperature for operation of the pump should not exceed 33^{0}C.
Failure to observe the precautions given above could cause the pump to malfunction, which may lead to current leakage or electrical shock.

Installation

The submersible motor is supplied pre-filled with a mixture of clear cold drinking water and anti-corrosive liquid. The following steps are executed prior to installation:

- ✔ Position the motor vertically on its base
- ✔ Check if all fasteners are tight. Tighten if required
- ✔ The two threaded plugs provided at the top are removed as shown in Fig. 7 below.

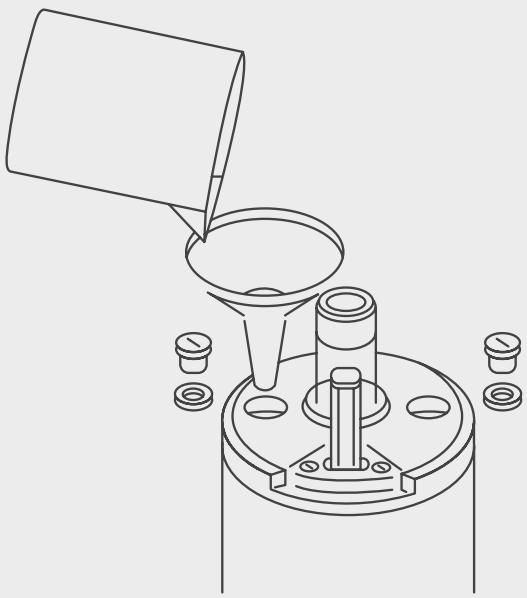


Fig. 7 Topping up the 4 inch Submersible motor with pure drinking water

Check the motor and if required, top up the motor with pure drinking water.
Air bubbles, if any, can be removed by gently rocking the motor to and fro.
Check water level in the motor and if required, top up with cold clear water.

- The two threaded plugs are then re-assembled, ensuring the motor is encapsulated
- Dry the exterior of the motor and check thoroughly for water leakage
- If there is no leakage, the motor is now ready for coupling with the pump and then installation

Checking Insulation Resistance

- Before submerging the unit, measure the Insulation Resistance using a megger of 500 VDC
- Ensure contact points are clean
- Connect the measuring cable to the ground conductor
- Connect the other measuring cable to every core of the motor cable in succession
- Ensure that the insulation resistance, as shown on the megger, is a minimum of 20MΩ

Waterproofing the Submersible Motor Cable - Supply Cable Joint

Danger

Hazardous voltage will cause death, serious injury, electrocution.

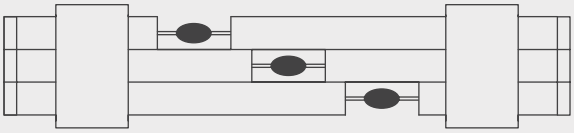
Disconnect all power before working on this equipment and that it cannot be accidentally switched ON.

- Submersible Motors are supplied with a 3 core PVC insulated flat cable of length 3 meters
- The free end of the 3 core cable of the motor needs to be connected to the supply cable from the control panel
- As this joint is always nearly submerged in water, the joint needs to be water proof

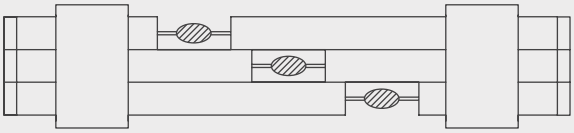
Refer the sequence shown in Fig. 8 below for insulating the cable joint for under water application (following page):

Procedure for joining and insulating the 3 core conductors

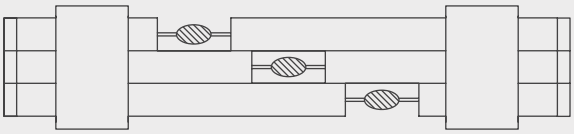
Step 1: Soldering / knot the copper strands



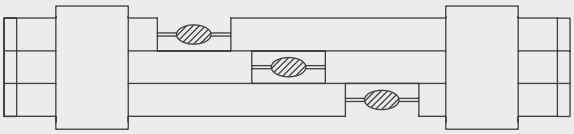
Step 2: Layer 1 - 1st layer of virgin rubber insulation



Step 3: Layer 2 - 1st layer of PVC insulation tape



Step 4: Layer 3 - 2nd layer of virgin rubber insulation



Step 5: Layer 4 - 2nd layer of PVC insulation tape

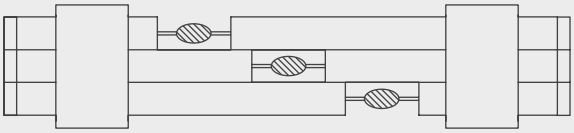
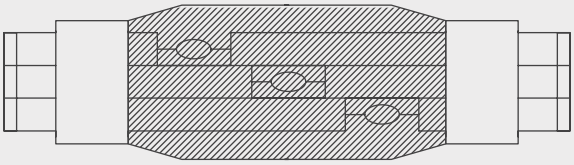


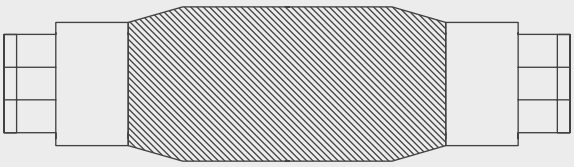
Fig. 8 Cable joint for underwater application

Proedure for joining and insulating the cable joint for under-water cable

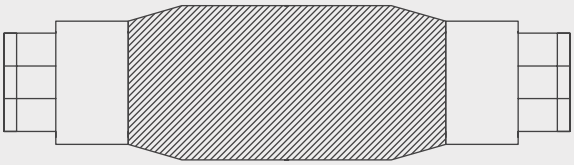
Step 6: Layer 1 - 1st layer of virgin rubber insulation



Step 7: Layer 2 - 1st layer of PVC insulation tape



Step 8: Layer 3 - 2nd layer of PVC insulation tape



Checking direction of rotation of Motor

Danger

Hazardous voltage will cause death, serious injury, electrocution.

All electrical work must be performed by an authorized electrician in compliance with local electrical equipment standards & internal wiring codes.

- ✔ After water-proofing the joint connecting the submersible motor cable and supply cable, check if the direction of rotation of the motor shaft matches the direction marked on the visible cable box top face.
- ✔ The direction of rotation is counter-clockwise looking from the motor shaft end, as marked on the cable box.
- ✔ Connect the free ends of the cable to the control panel and energize the motor for a second or two.
- ✔ For added protection, continuously pour clean water over the sand guard to remove heat generated.
- ✔ Check the direction of rotation of the motor shaft.
- ✔ If the direction of rotation is in the same direction as that marked on the Top Housing exposed face, the connections are right.
- ✔ In case the direction of rotation of the motor shaft does not match the marking on the top housing, interchange, for three phase connections, any two lead wires at the control panel and confirm as before.
- ✔ For single phase models, in case the direction of rotation does not match the marking on the Top Housing, return the set to the dealer from where it was purchased.

Coupling submersible motor to pump

Danger

Hazardous voltage will cause death, serious injury, electrocution.

Disconnect all power before working on this equipment and that it cannot be accidentally switched ON.

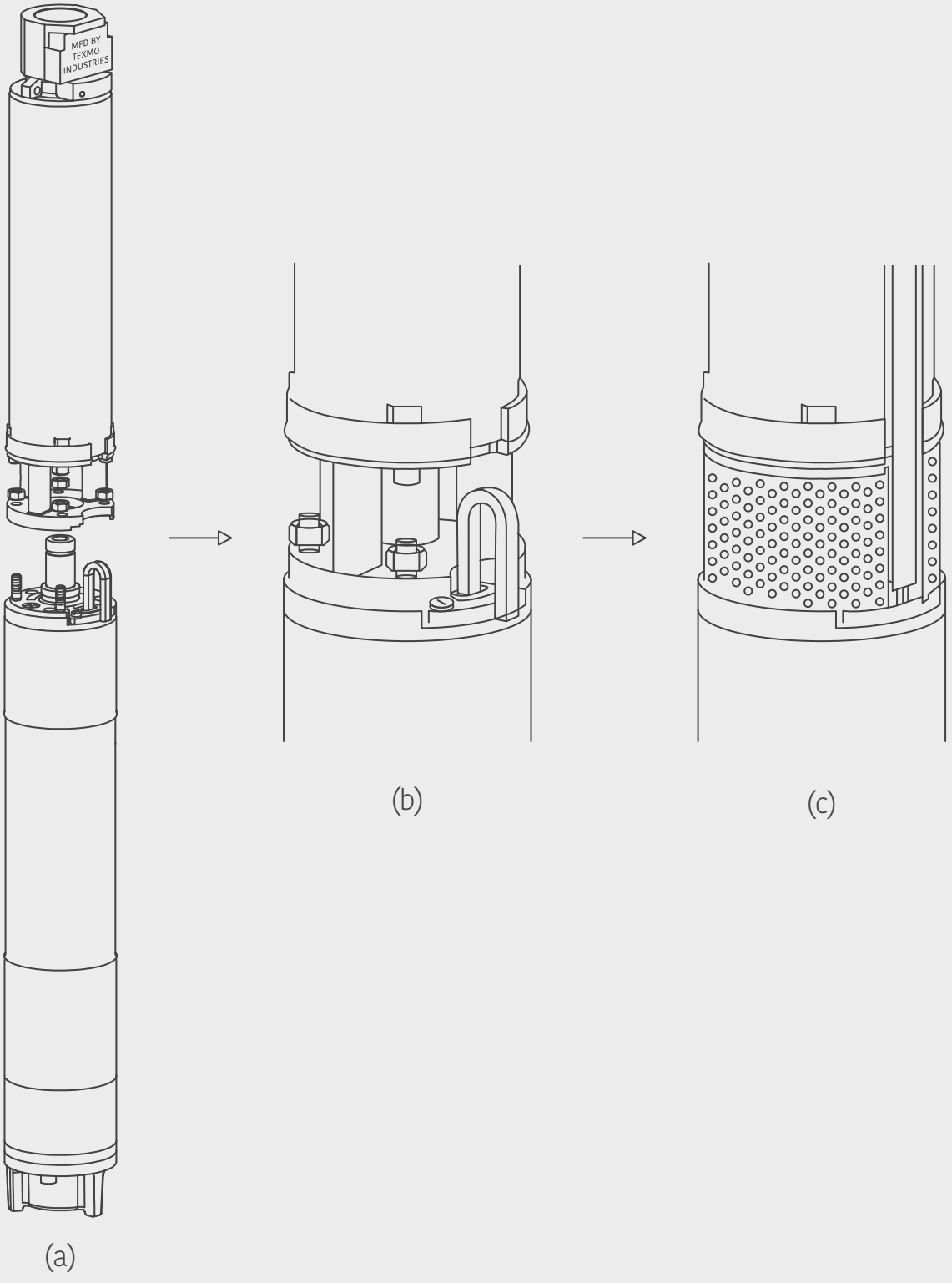
To couple the submersible motor and pump, follow the following procedure:

- The tripod with chain block is erected
- Unpack the submersible pump and remove the cable guard and strainer
- Keep the submersible motor vertical
- Couplings are supplied mounted on the motor shaft / pump shaft
- Couplings with grub screw are supplied assembled on the pump shaft
- Apply threading compound to the internal thread on the delivery casing and the external threaded portion of the short length delivery pipe to be fitted to the delivery casing
- Screw the short length of delivery pipe to the delivery casing

Refer Fig. 9 below for coupling the submersible motor to the pump:

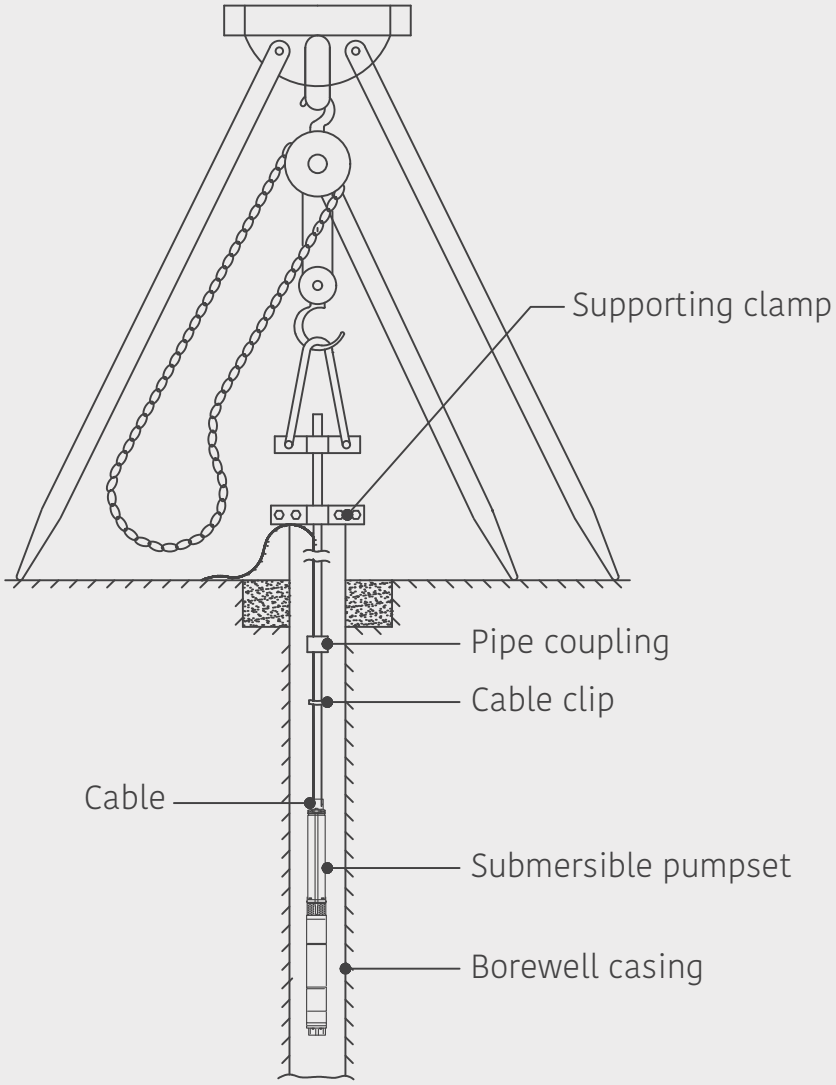
- For certain products, the coupling is mounted on the motor shaft while for the remaining products, the coupling is fixed to the pump shaft using a grub screw
- For pumps with the coupling mounted on its shaft, carefully lower the pump while ensuring the motor shaft is aligned with the coupling till the inlet bracket bottom face sits on the top housing
- Ensure that studs on the motor top housing should pass through the holes in the bottom portion of the inlet bracket and that the face of inlet bracket rests on motor top housing
- Using hexagonal nuts, tighten the inlet bracket to top housing of the motor
- Check the play by lifting the coupling with pump shaft
- Lastly fit the cable guard and strainer back in position, ensuring that the cable is covered by the cable guard

Fig. 9 Assembling submersible motor with coupling and pump



Fit the supporting clamp to the delivery pipe and suspend the submersible pump from the chain block (Refer Fig. 10)

Fig. 10 Typical tripod stand for lowering / lifting submersible pumpsets



Arrangement for installation

- Use the services of a professional and trained mechanic with experience when erecting borewell submersible
- While lowering the pumpset, ensure the cable does not get damaged
- Use cable clips to keep the cable as close as possible to the pipe
- Ensure the suspended submersible pump has a secondary support to prevent the set from falling to the bottom of the borewell

Electrical installation

Check the power supply voltage and frequency and compare with the product requirements specified on the name plate.

- ✔ Observe relevant EB regulations while giving power supply to the motor
- ✔ Use a single cable from the Control Panel right up to the Submersible Motor
- ✔ Ground the Submersible Motor
- ✔ Ensure the joint is water proof as the cable joint is submerged in water
- ✔ The cable must not be coiled if it is of extra length. Any excess should be cut off before the connections are made
- ✔ Connect the cable properly to the starter terminals

Control panel

Warning

Failure to use correct starting equipment and overloads may damage your submersible motor. This damage may not be covered by warranty.

It is recommended that the Control Panel should incorporate the following:

- ✔ Contactors of sufficient current ratings with overload relay
- ✔ Over voltage and under voltage protection
- ✔ Phase failure protection
- ✔ Dry run preventer
- ✔ Ammeter and Voltmeter to display the current and voltage

Cable lead wire connection to starter

Direct online starter

Cable	Terminal
Red	U
Yellow	V
Blue	W

Control panel

Cable	Terminal
Red	R
Yellow	Y
Blue	B

Cable selection

The pumpset is provided with a 3-m long 3-core PVC-insulated flat cable emerging from the motor, one cable for DOL versions and two cables for SD versions. See TABLE 2 below for the selection of cables from starter to submersible motor.

Submersible cable selection chart (For 415 V, 50 Hz AC power supply)

FL Current (Amps)	Motor Rating		Cable size in Sq.mm								
			1.5	2.5	4.0	6.0	10.0	16.0	25.0	35.0	50.0
	kW	HP	Maximum length of cable in metres								
2.75	0.75	1	262	437	705						
3.25	1.1	1.5	222	370	596	895					
4.5	1.5	2	160	267	430	646					
6.5	2.2	3	111	185	298	447	773				
8.5	3	4	84	141	228	342	590	933			
10	3.7	5	72	120	193	290	502	793			
12	4.5	6	60	100	161	242	426	661			
14.5	5.5	7.5 DOL		82	133	200	346	547			
14.5	5.5	7.5 SD	86	143	231	347	600	947			
18	6.7	9	89	115	186	279	483	763			
19.5	7.5	10	69	106	172	258	446	704			
25	9.3	12.5	64	83	134	201	348	549	852		
29	11	15		71	155	173	300	473	735		
34	13	17.5			98	148	256	404	626	822	
39	15	20			87	129	223	352	546	769	
43	18.5	25			78	117	202	319	495	697	
52	22.5	30				96	167	264	409	577	828
60	26	35					145	229	355	500	717
65	30	40					133	211	327	461	662

Notes:

- Table shows maximum allowable length of submersible cable for the given full load current where site voltage is normal ie 415 V
- For other voltages, the cable size is to be selected for the length which is calculated as follows.
- Calculated length = (415 / Actual voltage) x Actual length
- 7.5 HP and above are SD motors. For these motors, the actual current is $1/\sqrt{3}$ the FL current
- The cable size and maximum allowable length are arrived at accordingly

Cable Selection

Refer TABLE 3 for the selection of cables from Control Panel to Submersible Motor:

Submersible Cable Selection Chart (For 220 V, 50 Hz Ac power supply)

FL Current (Amps)	Motor Rating		Cable size in Sq.mm								
			1.5	2.5	4.0	6.0	10.0	16.0	25.0	35.0	50.0
	KW	HP	Maximum Length of Cable in Metres								
4.5	0.37	0.5	160	267	430	646					
5.4	0.55	0.75	133	222	359	538					
6	0.75	1	120	200	323	484	837				
9.5	1.1	1.5	75	126	204	306	529	835			
13	1.5	2	55	92	149	223	386	610	946		
20	2.2	3		60	96	145	251	396	615	866	
28	3.7	5			69	103	179	283	439	618	888

Notes:

- Table shows maximum allowable length of submersible cable for the given full load current where site voltage is normal ie 220 V.
- For other voltages, the cable size is to be selected for the length which is calculated as follows.
- Calculated length = (220 / Actual voltage) x Actual length

Electrical wiring work

 Warning	All electrical work must be performed by an authorised electrician in compliance with local electrical equipment standards and internal wiring codes. Improper wiring can lead to current leakage, electrical shock, or fire. Provide a dedicated earth leakage circuit breaker, single phase preventer, dry run preventer and overload preventer for the submersible pump. Failure to follow this warning can cause electrical shock.

Operate well within the capacity of the power supply and wiring.

Earthing

 Warning	Be sure to install the ground wire securely. Failure to observe this precaution could damage the pump and cause current leakage, which may lead to electrical shock
 Caution	Do not connect the ground wire to a gas pipe, water pipe, lightning rod, or telephone ground wire. Improper grounding could cause electrical shock

Connecting the power supply

 Caution	Observe relevant Electricity Board regulations while powering up the pump set
 Warning	Before inserting the power plug or connecting the wires to the terminal board, make sure the power supply is properly disconnected. Failure to do so may lead to electrical shock, short, or injury caused by the unintended starting of the pump
 Caution	Do not use damaged cables, power plugs, or loose power outlets. Failure to observe this precaution could lead to electrical shock, short circuit or fire

Precautions during installation

 Warning	When installing the pump assembly, ensure that it is suspended properly from the tripod stand or else the pump will fall into the bottom of the bore and which is difficult to retrieve. Provide backup suspension while lowering the pump.
 Caution	When installing or moving the pump, never suspend the pump by the cable. Doing so will damage the cable, which may cause current leakage, electrical shock, or fire.

Start-up

- When the pump has been connected correctly, direction of rotation confirmed and is submerged in water, it should be started with the gate valve closed off to approximately 1/3 of its maximum volume of water
- If there are impurities in the water, the valve should be opened gradually as the water becomes clearer
- The pump should not be stopped until the water is clean, as otherwise the pump parts and the non-return valve may choke up
- As the valve is being opened, the drawdown of the water level should be checked to ensure that the pump always remains submerged
- The dynamic water level should always be above the inlet bracket
- If the borewell yield is less than the discharge of the pump it is recommended to have a dry run protection device
- If the water level approaches the inlet bracket, there is likelihood of air being drawn into the pump along with water. This can reduce the life of hydraulic components and damage the pump

 Warning	If you find any abnormalities like vibration, noise, smell, etc. from the pump during trial operation, switch OFF the pump and contact the dealer from whom this pump was purchased.

11. Basic troubleshooting

Warning

To prevent serious accidents, disconnect the power supply before inspecting the pump.

Read this Operation Manual thoroughly before requesting repair. Contact the dealer from whom the pump was purchased. Servicing and troubleshooting must be handled by qualified persons with proper tools and equipment. Common faults, root causes for these, and suggested actions are provided in TABLE 4 below:

Fault	Possible causes	Suggested actions
The pump does not run	No electricity supply	Check the line. Contact the local EB authorities
	Single phase preventer mounted in the control panel switches OFF due to absence of one phase / phase reversal	Check the line and wait for electricity to be restored. If phase has been reversed, interchange any two power cables
	Blown fuse	Check and replace / rectify the fuse
	Defective motor winding	Rewind the motor
	The motor starter device is defective	Repair / replace the starter device
	Damaged coupling	Take out the pump set to check for coupling damage, replace coupling if necessary
	The dry run protector has cut-off the electricity supply to the pump, due to low water level	Check the borewell yield, if the yield is less, reduce the discharge using a gate valve or wait for the water level to rise
	Faults in cable joints / Loose connections	Check the connections and make proper joints
	The motor starter overload has tripped	Reset the motor starter overload. If it trips again, check the voltage. If the voltage is OK, replace overload relay
	The ELCB has tripped out	Reset the ELCB, If trips again check the insulation resistance of the motor
	The control panel defective	Check the control panel and replace if necessary

Fault	Possible causes	Suggested actions
Less discharge from pump	Available voltage is less	Check for loose connections or contact EB authorities. If needed, replace the cable
	Wrong direction of rotation	For three phase, Interchange the supply connections of any two phases
	Increase in draw-down	Lower the pump set or wait for water level to rise
	Leakage in pipes	Change the pipes which have leakages
	Excessive wear of pump components mainly Impeller, wearing ring, etc. due to high sand content and prolonged operation	Replace the worn-out parts
	Discharge pipe coated with depositions	Clean the pipe and remove depositions
	Foreign bodies lodged in impellers	Lift the pump and clean the impellers
	The draw down is larger than anticipated	Lower the pump if specification meet the required head. If not, change the pump as per the required head
	The valve in the discharge pipe is partly closed / blocked	Check and clean / replace the valves, if necessary
	The discharge pipe is partly choked by impurities	Check / replace the discharge pipe
	The NRV of the pump is partly blocked	Pull out the pump and check / replace the valve
	The pump and the riser pipe are partly choked by impurities	Pull out the pump Check and clean or replace the pump, if necessary. Clean the pipes
	The pump is defective	Repair / replace the pump
Total head developed is too low	Excessive wear of pump components mainly Impeller, wearing ring, etc. due to high sand content and prolonged operation	Replace the worn-out pump parts
	Discharge pipe coated with deposits	Clean the pipe and remove the deposits

Fault	Possible causes	Suggested actions
Current consumption in excess	Single phasing	Check line fuses / availability of three phase supply
	Voltage too low	Check the voltage
	Defective rotor	Change the rotor
	Defective motor winding	Change the winding
	Damaged thrust bearing	Change the worn-out bearings
The pump runs but no discharge	The discharge valve is closed	Open the valve
	No water or too low water level in the borehole	Lower the pump if head is within the specification
	The NRV is stuck in its shut position	Pull out then pump and clean / replace the valve
	The inlet strainer is choked up	Pull out the pump and clean the strainer
	The pump is defective	Repair/replace the pump

 Note	Conduct trial operation after maintenance
 Note	Dispose replaced components with appropriate care so as to protect the environment
 Warning	Do not try to solve unspecified troubles of pump as it may lead to severe damage to the pump or injury to personnel. Contact the dealer where this pump was purchased
 Caution	If the pumpset runs with unusual noise, stop it immediately. Check (a) the journal bearings for wear (b) rotor outer diameter rubbing against stator inner diameter

12. Preventive maintenance checks

A definite schedule of preventive maintenance inspections should be established to avoid breakdown, serious damage and extensive downtime. The schedule will depend on operating conditions and experience with similar equipment. Below check list does not represent an exhaustive survey of maintenance steps necessary to ensure safe operation of the submersible pump.

 Warning	The pump must not be operated with the delivery valve shut-off for more than a few seconds; otherwise the motor will overheat, possibly causing permanent damage
 Warning	Utilise the services of an electrician to carry out electrical measurements / checking the functioning of the control panel

- Taro Submersible Pumps do not require frequent maintenance
- However, it is good practice to monitor the conditions and performance of the pump and motor

Diagnosis may be carried out by checking the following:

- Closing the delivery valve and checking the shut-off head generated by the pump
- Checking the electricity drawn by the pump at the duty flow rate
- Both these data should be compared to corresponding data recorded when the unit was initially installed
- Any reduction in shut-off head may indicate wear of the pump hydraulics
- Any increase in motor current at duty flow rate indicates a possible overload condition
- Under running conditions, intentionally disconnect any one phase and check if Single Phase Preventer works

Maintenance precaution

 Warning	Disconnect the power supply before starting maintenance or inspection of the pump to avoid electrical shock
 Note	If you find any damages or abnormalities, switch OFF the pump and report the problem to the dealer from whom the set was purchased

NOTE: The manufacturer assumes no responsibility for damage or injury due to disassembly in the field.

13. Do’s and don’ts

Do’s	Don’ts
Prior to installation, check the water level in the submersible motor. If required, top up with clear and clean drinking water. Do not forget to replace the water filling plugs after filling	Do not erect the pump set at the very bottom of the bore hole. Keep at least 3m bottom clearance
Check the direction of rotation of motor before coupling to the pump	Do not operate with the NRV and Strainer removed
Use proper size of cable from control panel to motor. Factor in operation at lower voltages	Do not permit use of multiple joints for making up the length of cable. Instead use a single cable from control panel to the submersible motor cable free end to reduce voltage drop
Connect the pump to a control panel with dry run and overload protectors	Do not operate the pump at shut-off conditions as the temperature of water will rise resulting in overheating of the components
Check the play and freeness of rotation of pump-motor shaft before installation	Do not test the pump outside the bore in dry condition as the seals and bearings will get damaged
Check for looseness of fasteners	Do not ground to a gas supply / water line
Check for leakages from motor	Do not lift / lower the product using the cable harness
When the drop cable must be spliced or connected to the motor leads, ensure that the splice is water tight	Do not subject the product to shock loads
All wiring, electrical connections and system grounding must comply with local Electricity Board regulations. It is essential to ground the unit to prevent electrical shock. Provide earthing through the screws provided on the motor body	Do not attempt to repair the set. Approach the dealer from whom the set was purchased
For motors provided with a key, ensure the key is in place while coupling the pump and motor	Do not install the pump without checking the water level in the motor body
Ensure motor insulation resistance between phases and earth is greater than 20MΩ	Do not operate the pump with very low / intermittent discharge. In such cases throttle the discharge to avoid dry running

Do's	Don'ts
If a plastic well casing is used in your installation, ground the metal well cap or well seal	Do not perform frequent megger tests on the winding as the winding insulation can weaken
When not in use, run the pump at least a few minutes a day.	Do not use oversized fuse wires as this can cause the motor winding to be damaged due to starter failure / short circuiting

14. Important safety instructions

Only qualified personnel should be involved for inspection, maintenance and repairs. The successful and safe operation of such a product depends on proper handling, installation and maintenance. It is suggested that in case of non-functioning of the product, the customer is requested to contact the dealer through whom the purchase was made.

Danger

Hazardous voltage will cause death, serious injury, electrocution.
Disconnect all power before working on this equipment.
Maintenance should be performed by only qualified personnel.

15. Storage & handling

- The submersible pumps are supplied from the factory in proper packing in which they should remain until they are to be installed
- The product should be stored in a closed, dry and well ventilated room
- Do not store the products in direct sunlight
- Handle the pumps with care and do not expose the product to unnecessary impact and shocks
- During unpacking and prior to installation, care must be taken when handling the pump to ensure that misalignment does not occur due to bending
- If the product has been stored for a very long period, check the condition of the rubber gaskets, free rotation of the shaft, and level of water inside the motort

 Caution	If the motors are stored, the shaft must be turned by hand at least once a month
 Caution	If the motor has been stored for more than one year before installation, dismantle the motor and check the rotating parts and rubber components before use
 Caution	After a long period of storage, the pump should be inspected before it is put in operation. Ensure the pump shafts rotate freely
 Caution	The unit has water lubricated journal and thrust bearings and must never be run dry. Starting the pump set for a short period without water must be avoided entirely as operation under such conditions will damage the bearings

16. Company contact information

For most up to date information on Texmo Industries, please visit www.taropumps.com

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