Single Phase Capacitor Start and Run High Speed Centrifugal Monoblocks

Instructions,Operation Mannual & Performance Data

S·PRO PUMPS®

S PRO PUMPS
EST. 2012

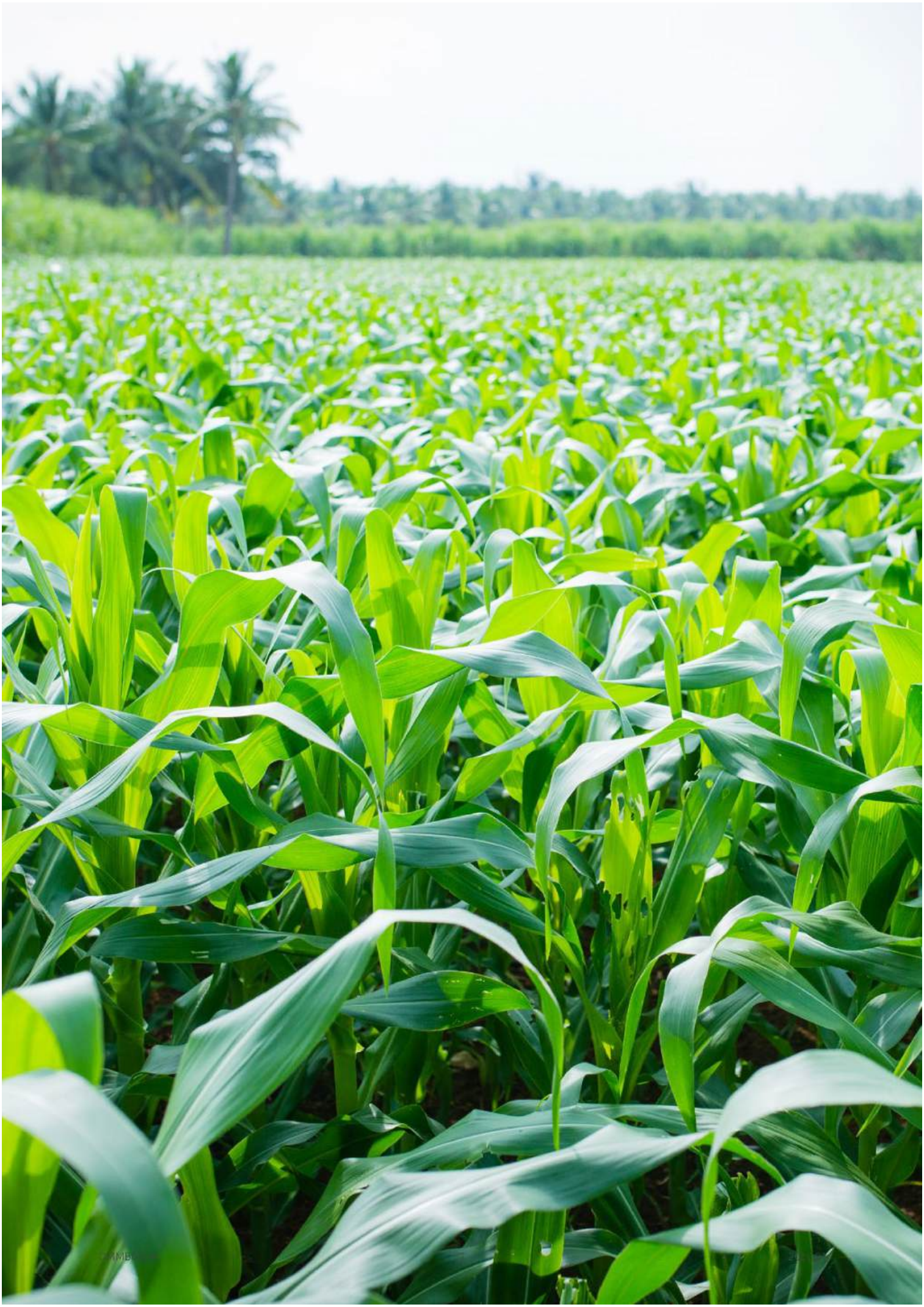


Table of Contents

1. Introduction

Thank you for choosing a quality product manufactured by **S Pro Pumps**.We request you to read this manual carefully to ensure that the systemyou 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 **S Pro Pumps**, should you need further information or help and support.

2. Warranty information

Please refer to your Warranty card or Visit **www.spropumps.com** for More Information on Your Warranty.

3. Complying with standards

IS 996 : Single Pace AC Induction Motor For General Purpose.

IS 3043: Code of Practice for earthing:Specification

IS 9079: Specification for electrical monoset pumps for clear,cold water:for agricultural and water supply purposes

IS13730: Specifications for particular types of winding wires.

4. Contents of the packing box

Your Single Phase Capacitor Start and Run High Speed Monoblock, a premium product from **S Pro Pumps**, is packaged in a sturdy corrugated box for safe transportation. Inside, you'll find the unit itself, along with a detailed instruction manual and warranty card.

5. Information about your pump

S Pro Single Phase Capacitor Start and Run High Speed Monoblocks are expertly crafted using premium materials and cutting-edge manufacturing techniques. When installed and maintained correctly, these reliable pumps offer exceptional performance.

Designed for compactness and efficiency, our monoblocks feature a pump and motor mounted on a shared shaft. As a coupling is not required, alignment of the pump and motor is assured. Installation therefore is quick.

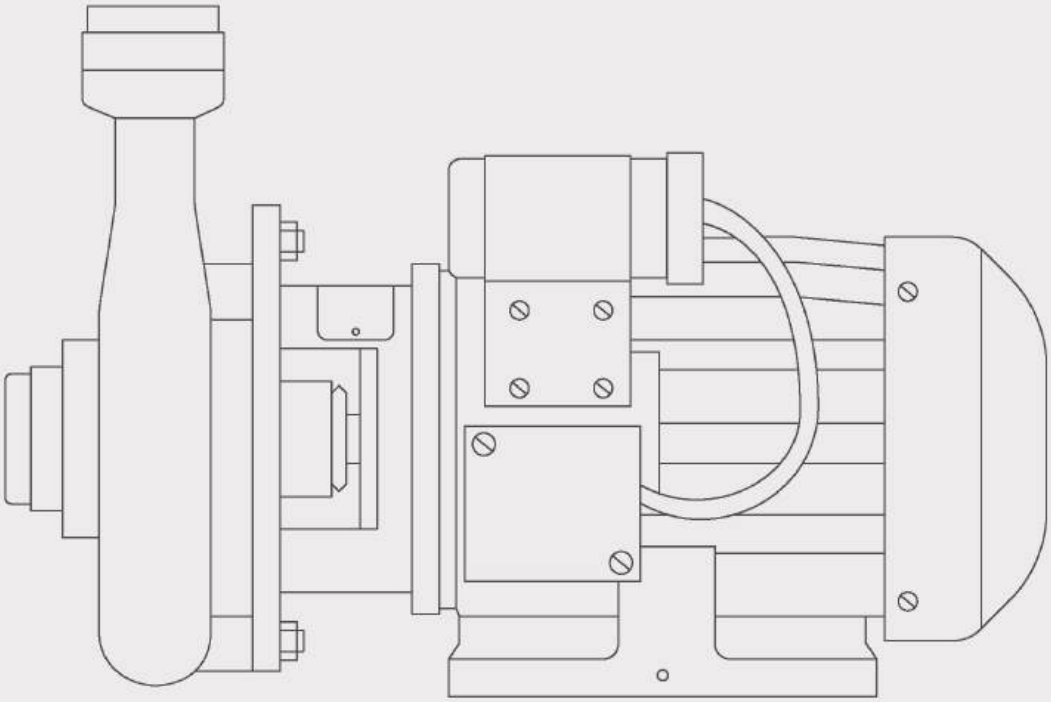
Ideal for a wide range of applications, including irrigation, domestic water supply, cooling systems, fountains, dairies, and high-rise buildings, S Pro Monoblocks deliver dependable performance.

Before installation, please carefully read this manual and follow the provided instructions. This will help ensure optimal operation and prevent electrical shocks or equipment malfunctions. We recommend that installation be carried out by qualified professionals in accordance with local electrical codes and our guidelines.

6. Schematic drawing

View of a Single Phase Monoblock is shown below in Fig. 1:

Fig. 1 View of Single Phase Monoblock



7. Key specifications & features

Standard specifications of Monoblock are shown below in TABLE 1:

Phase	Single
Power	0.5 to 1.0 HP
Motor Type	Squirrel Cage Induction Motor - Capacitor Start Run
Starting method	DOL
Operating Voltage	180 - 240v
Frequency	50 Hz
Speed	2900 rpm
Duty	S1 Continuous
Insulation Class	Refer name Plate
Type of Enclosure	TEFC
Impeller Type	Radial
Max. Fluid Temperature	33°C
Thermal Overload Protection (TOP)	Yes

Product performance specification

S Pro Pumps has a wide variety of Single Phase Monoblocks to meet your requirements.

Models	Power		Pipe Size(mm)		Total Head in Meters/Feet and Discharge in LPH											
	Kw	Hp	Suc	Del	M	6	9	12	15	18	21	24	27	30	33	36
					F	20	30	40	50	60	70	80	90	100	110	120
SPM05H	0.37	0.5	25	25		*	6600	5520	5040	3600	*	*	*	*	*	*
SPM05HH	0.37	0.5	25	25		*	*	6300	5400	3600	2160	*	*	*	*	*
SPM75	0.55	0.75	25	25	LPH	*	*	6000	5580	4800	3300	2400	1800	*	*	*
SPM01	0.75	1	32	25		*	*	*	8400	8160	7560	6960	*	*	*	*
SPM01H	0.75	1	25	25		*	*	8700	7200	5400	4200	3960	3300	3300	*	*

Key features

- Low watt loss stampings used in motors
- Designed for wide voltage operation
- Motors are capacitor start and run type
- The motor houses shielded type deep groove ball bearings, pre-filled with grease, to take up the radial and axial thrust loads
- The rotors are dynamically balanced
- Adequate motor surface area is provided for effective cooling
- Automated Machine winding process ensures consistent quality
- To protect the motor from overload, Thermal Overload Protector (TOP) is provided
- The impeller is dynamically balanced for longer life
- Water slinger provided to prevent water entry into the front bearing
- To reduce friction, the stuffing box - gland-assembly is replaced with a mechanical seal

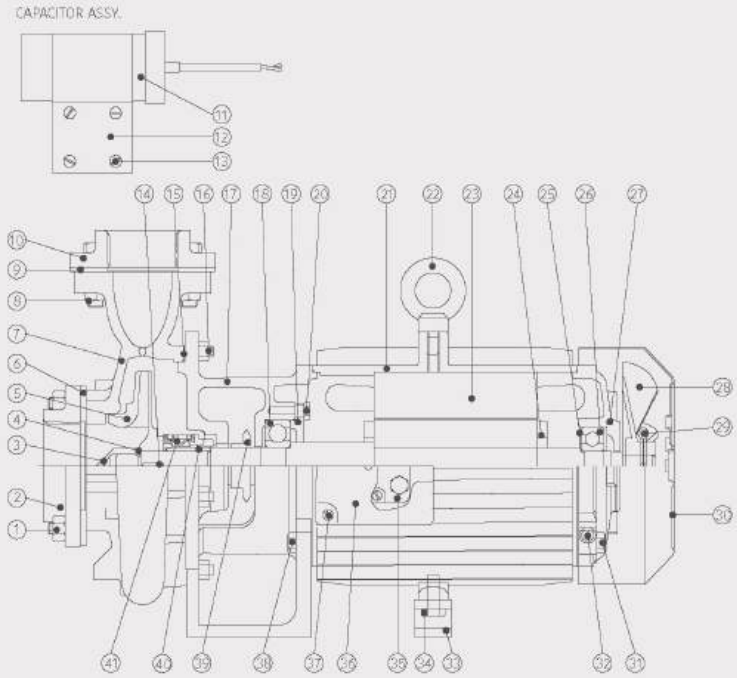
Electrical Connection

- The motors are internally wired and pre-connected with the capacitor leads
- Only phase and neutral to be connected to the two wires emerging out from the terminal box cover

8. Cross-section view

Cross-section view of Single Phase Capacitor Start and Run High Speed Monoblock is shown below in Fig. 2:

Fig. 2 Cross-section view of single phase capacitor start and run high speed monoblock – cover dome mounting



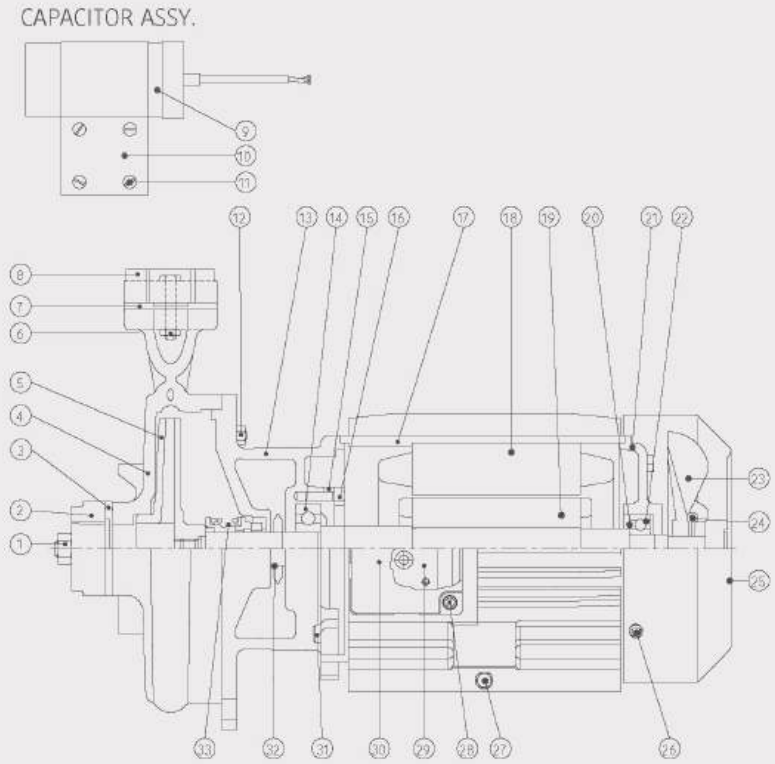
No.	PART NAME
1	Stud With Hex.Nut
2	Flange
3	Gasket
4	Casing
5	Impeller
6	Hex. Bolt With Nut
7	Gasket
8	Flange
9	Capacitor
10	Capacitor Clamp
11	C.H Screw
12	Stud With Nut
13	Cover Dome
14	Ball Bearing - Double Shield

No.	PART NAME
15	Bearing Cap - Front Inner
16	Hex. Bolt
17	Motor Body
18	Stator Stack
19	Rotor With Shaft
20	Bearing Shield
21	Rear Cover
22	Ball Bearing - Double Shield
23	Cooling Fan
24	Split Cotter Pin
25	Fan Shield
26	C.H Screw + Spring Washer
27	Hex. Head Bolt With Washer

No.	PART NAME
28	C.H Screw
29	Terminal Board
30	Terminal Box Cover
31	Hex. Head Bolt
32	Slinger
33	Mechanical Seal
34	Hex. Head Bolt
35	Terminal Board
36	Terminal Box Cover
37	C.H Screw
38	Hex. Head Bolt
39	Slinger
40	Sleeve
41	Mechanical Seal

Cross-section view of Single Phase Capacitor Start and Run High Speed Monoblock is shown below in Fig. 3:

Fig. 3 Cross-section view of single phase capacitor start and run high speed monoblock – motor body mounting



No.	PART NAME
1	Stud With Hex.Nut
2	Flange
3	Gasket
4	Casing
5	Impeller
6	Hex. Bolt With Nut
7	Gasket
8	Flange
9	Capacitor
10	Capacitor Clamp
11	C.H Screw
12	Stud With Nut

No.	PART NAME
13	Cover Dome
14	Ball Bearing - Double Shield
15	Bearing Cap - Front Inner
16	Hex. Bolt
17	Motor Body
18	Stator Stack
19	Rotor With Shaft
20	Bearing Shield
21	Rear Cover
22	Ball Bearing - Double Shield

No.	PART NAME
23	Cooling Fan
24	Split Cotter Pin
25	Fan Shield
26	C.H Screw + Spring Washer
27	Hex. Head Bolt With Washer
28	C.H Screw
29	Terminal Board
30	Terminal Box Cover
31	Hex. Head Bolt
32	Slinger
33	Mechanical Seal

9. Pre-installation requirements

Arrangement for Installation

- Use the services of a professional and trained mechanic with experience in erecting monoblocks
- Ensure proper safety during installation
- Ensure that a level foundation is ready before erection of the monoblock. Contact the dealer from whom the monoblock was purchased for the motor mounting details for preparing the foundation.

General installation precautions

- Open the packaging and note down the serial number and model for future reference
- Ensure all fasteners are tightened properly
- Use prescribed pipe sizes as mentioned on the product name plate
- Use a quality foot valve with strainer
- After installation, prime the set before starting the pump
- Do not install the monoblock with high static suction lift
- It is recommended to install the monoblock on a level base with foundation bolts to prevent the pump and piping from getting stressed
- Use an check valve fitted on the delivery line when the monoblock has high delivery heads
- As the monoblock is air cooled, ensure that air flow to the cooling fan, located at the rear side of the motor, is not blocked
- Use a single power cable from the power source to the monoblock. Do not use a power cable with large number of joints as this can result in a significant voltage drop
- While installing the monoblock, ensure the monoblock is not subject to shock loads which can damage the monoblock parts

 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, toxic, corrosive and flammable liquids. Pumping flammable liquids could cause explosion
 Caution	Ensure suitable precautions are taken while lifting and lowering the product
 Caution	Use trained professionals to install the monoblock
 Warning	Use a power supply cable that has sufficient rating. Factor in low voltage operation
 Warning	Provide proper earthing. Improper earthing can cause electrical shock
 Caution	Use a megger to verify the insulation resistance of the motor. Insulation resistance should be 20MΩ minimum
 Caution	Do not place the monoblock in a location subject to flooding as water can enter the motor and damage the windings and bearings
 Warning	Mount the pump with its axis horizontal

Operation Precautions

 Caution	The volute casing houses a mechanical seal. Do not attempt to run the pump dry as the Mechanical Seal can get damaged during dry operation. Ensure the pump is primed and then run it
 Warning	Switch OFF the power before working on electrical lines
 Caution	Do not use this pump for pumping liquid exceeding 33°C 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

10. Installation procedure

Please follow the below procedure to install the monoblock.

Caution	The supply voltage should be within the specified voltage range. Water temperature for operation of the pump should not exceed 33°C Failure to observe the precautions given above could cause the pump to malfunction and may lead to current leakage or electrical shock
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 where this pump was purchased

Installation

The following steps are executed prior to installation

- ✔ 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 phase terminal
- ✔ Ensure that the insulation resistance, as shown on the megger, is a minimum of 20MΩ
- ✔ Prepare a level concrete foundation for mounting the monoblock and tighten the motor base using the foundation bolts as shown in Fig. 4 below:

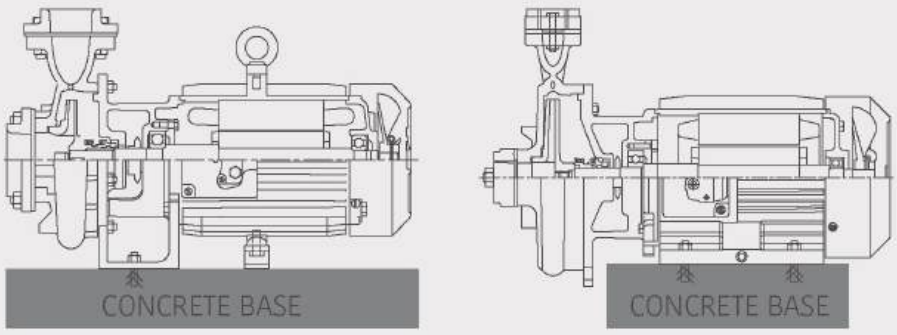


Fig. 4 Monoblock on a concrete foundation - installation

- Use prescribed pipe sizes as mentioned on the product name plate
- Place the pump centre line as close as possible to the water surface and with the foot valve fixed above the bottom of the well. Refer Fig. 5, shown below, for recommendations:

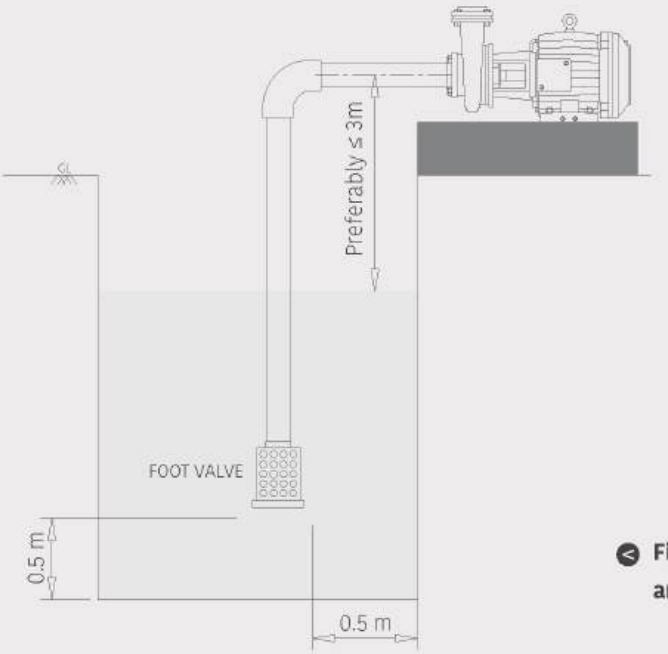
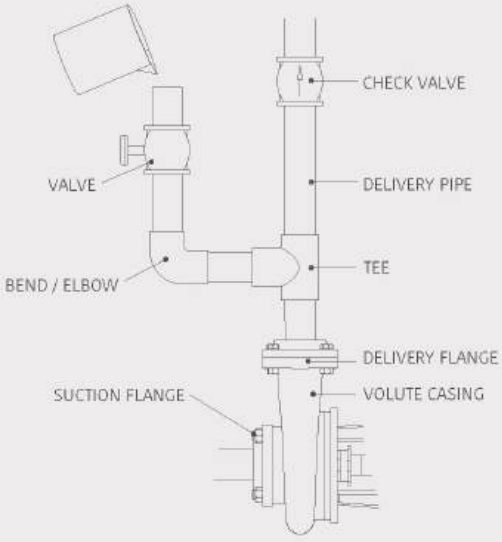


Fig. 5 Recommendations for locating the pump and foot valve

- Use as few pipe fittings as possible in the suction line
- Use a good quality foot valve to reduce suction losses
- Provide a priming facility in the pipe line adjacent to the pump discharge flange as shown in Fig. 6 below:

Fig. 6 Priming arrangement for monoblocks



- During priming, check the pump suction pipe for leakages
- Ensure that the suction pipe connected to the pump suction flange is horizontal or sloping upwards towards the pump suction flange to prevent air lock. A pipe sloping downwards towards the pump suction flange will result in air lock. Refer Fig. 7, shown below, for the preferred suction pipe orientation.

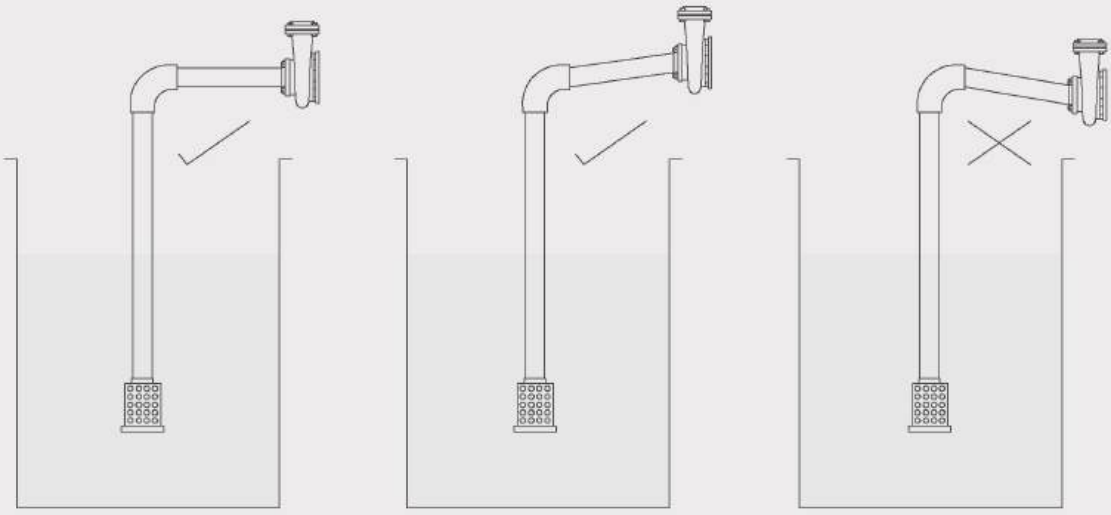


Fig. 7 Preferred orientation of suction pipe for monoblocks

- In case the installation has a high static delivery head, mount a good quality check valve in the delivery line as close as possible to the pump delivery flange

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
- As far as possible, do not use multiple joints in the electrical cabling while connecting the starter to the monoblock
- Ground the monoblock using the earth screws provided on the leg of the motor body / on the motor body
- Ensure electrical joints, if any, are properly and adequately insulated
- Connect the cable properly to an MCB
- Factor in low voltage operation while selecting cable size

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

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 cause 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 pumpset
 Warning	Before 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

Power cable connection to monoblock

- The motors are internally wired and pre-connected with the capacitor leads with two leads emerging out from the Terminal Box Cover
- Only Phase and Neutral need to be connected to these two leads
- In case of clarification, please refer to the Connection Diagram displayed in the inner side of the Terminal Box Cover

Checking direction of rotation of Single phase monoblock

Danger

Hazardous voltage will cause death, serious injury, electrocution.
All electrical work must be performed by an authorised electrician, in compliance with local electrical equipment standards and internal wiring codes.

- Ensure pump is primed
- Power up the monoblock and check the direction of rotation of the motor shaft
- If the direction of rotation is in the same direction as that marked on the volute casing, the connections are right
- In case the direction of rotation of the motor shaft does not match the marking on the volute casing, bring this to the notice of the dealer from whom the purchase was made and get the set repaired

11. Basic troubleshooting

Warning

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

Read this Operation manual carefully before requesting repair. Contact the dealer where this equipment was purchased. Servicing and troubleshooting must be handled by qualified persons with proper tools and equipment. Common faults, root cause for these and suggested actions are provided in TABLE 2 below:

Fault	Possible causes	Suggested actions
Pump does not run	No power supply	Check incoming power supply and rectify
	Very low voltage	Operate in the recommended voltage range
	Impeller stuck	Remove the fan cover and rotate fan by hand
	Defective Capacitor	Replace Capacitor
	Loose connections	Check the connections
	Fuse blown	Replace fuse
Pump does not discharge water	Motor tripping by T.O.P	Allow the motor to cool
	Pump has been kept for long time	Ensure free rotation of shaft by running the pump idle for a few minutes at least every alternate day
	Air leakage on the suction side	Check and correct for leakages
	Suction lift too high	Reduce the suction lift
	Foot valve not sufficiently submerged	Lower the foot valve and ensure that the foot valve is submerged at least 1 metre below the free surface of water
	Check valve is jammed	Check and replace
	Motor coil burnt	Rewind the motor
	Low voltage operation	Operate in the recommended voltage range

Fault	Possible causes	Suggested actions
Less discharge from pump	Low voltage operation	Operate in the recommended voltage range
	Wrong direction of rotation	Repair in the nearest authorised service center
	Static suction lift high	Position the pump within recommended suction lift
	Total head higher than specified head	Ensure delivery head within specified value
	Leaky pipes	Check the piping system and rectify the faults
	Smaller pipe size used when compared to name plate recommendations	Use recommended size of pipes
	Discharge pipe internally coated with depositions	Clean the pipe
	Foreign bodies lodged in impellers	Check the impellers and remove the foreign bodies
	The valve in the discharge pipe is partly closed / blocked	Check and clean / replace the valves, if necessary
	The Check valve of the pump is partly blocked.	Check and clean Check valve. Replace if necessary
	Impeller is worn out	Check and replace
Excessive current / Fuse blows off frequently	Low voltage	Check the voltage
	Gate valve is partially closed	Check and open the delivery side valve fully
	Defective fuse	Check and replace / rectify the fuse
	Defective motor winding	Change the winding
	Bearing worn-out	Replace bearings
	Decreased system head	Throttle the discharge slightly
	Excessive wear and tear due to rubbing of parts	Service the pump replacing the worn out parts

Fault	Possible causes	Suggested actions
Pump runs rough and noisy	Bearings worn out	Dismantle and replace worn out bearings
	Pump cavitating due to high suction lift	Reduce static suction lift
	Pump not grouted	Grout the pump
	Rotor shaft is bent resulting in rotor rubbing against stator bore	Replace rotor shaft
	Excessive wear and tear	Check impeller if required replace the impeller. Check rotor run out at location of impeller. If excessive, replace rotor
Pump leaks excessively	Mechanical seal damaged	Replace mechanical seal
	Pipe line damaged	Check and replace piping

 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 monoblock as it may lead to severe damage to the pump or injury to personnel. Contact the dealer where this pump was purchased

12. Preventive maintenance checks

Precautions to be taken

 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.

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 monoblock.

 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

It is good practice to monitor the conditions and performance of the monoblock. Diagnosis may be carried out by checking the following:

- Close the delivery valve for a few seconds and check the shut-off head generated by the pump. Do not run at shut-off conditions for a prolonged period of time as the water in the volute casing will get hot
- Check the current 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
- Measure the insulation resistance of the winding to check the condition of the motor
- Check for leakage from the mechanical seal location
- Check the capacitance of the capacitor

13. Do's and don'ts

Do's	Don'ts
Use a quality foot valve	Do not install the pump with high static suction lift
Ensure leak proof joints on the suction side to prevent air entry and therefore loss of priming	Do not use piping smaller than what is mentioned on the name plate
Use as few joints as possible on the suction line	Provide sufficient space around the monoblock so as to ensure proper airflow
After installation, prime the pump	Restrict the number of joints on the cable. More the cable joints, more will be the voltage drop
Rotate the shaft to ensure that pump is not jammed	Do not place the foot valve right near the bottom of the well / tank / river as there is possibility for solids to be entrained with water
Ensure proper earthing is provided	Do not restrict the space behind the cooling cover as this will obstruct the flow of air required for cooling of the motor
Mount the monoblock on a level foundation	Do not use to pump corrosive and flammable liquids
Check the direction of rotation of the monoblock matches the arrow mark cast on the volute casing	Do not earth to a water line or gas line
Rubber gaskets assembled on the suction and delivery casing do not have a central hole. Cut out the central hole and re-install	Do not use undersized electric cables between Pump and Starter Panel. Factor in low voltage usage
Check all fasteners are tight	Do not cover the product as this will prevent effective cooling of the motor
Motor portion of monoblock is IP44 protected. Provide protection from rain	Do not keep the pump suction tapering down towards the pump suction to prevent air lock

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 Single Phase capacitor start and run high speed monoblocks 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 the product is not subjected to shock loads
- If the product has been stored for a very long period, check the condition of the rubber components like suction and delivery flange gaskets and those with the mechanical seal

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 before use
Caution	After a long period of storage, the pump should be inspected before it is put in operation. Ensure the impeller can rotate freely when turned by hand
Caution	The volute casing houses a mechanical seal. Do not attempt to run the pump dry as the mechanical seal can get damaged. Ensure the pump is primed and then only run it

Single Phase Openwell Submersible Pumpset

Instructions,Operation Mannual & Performance Data

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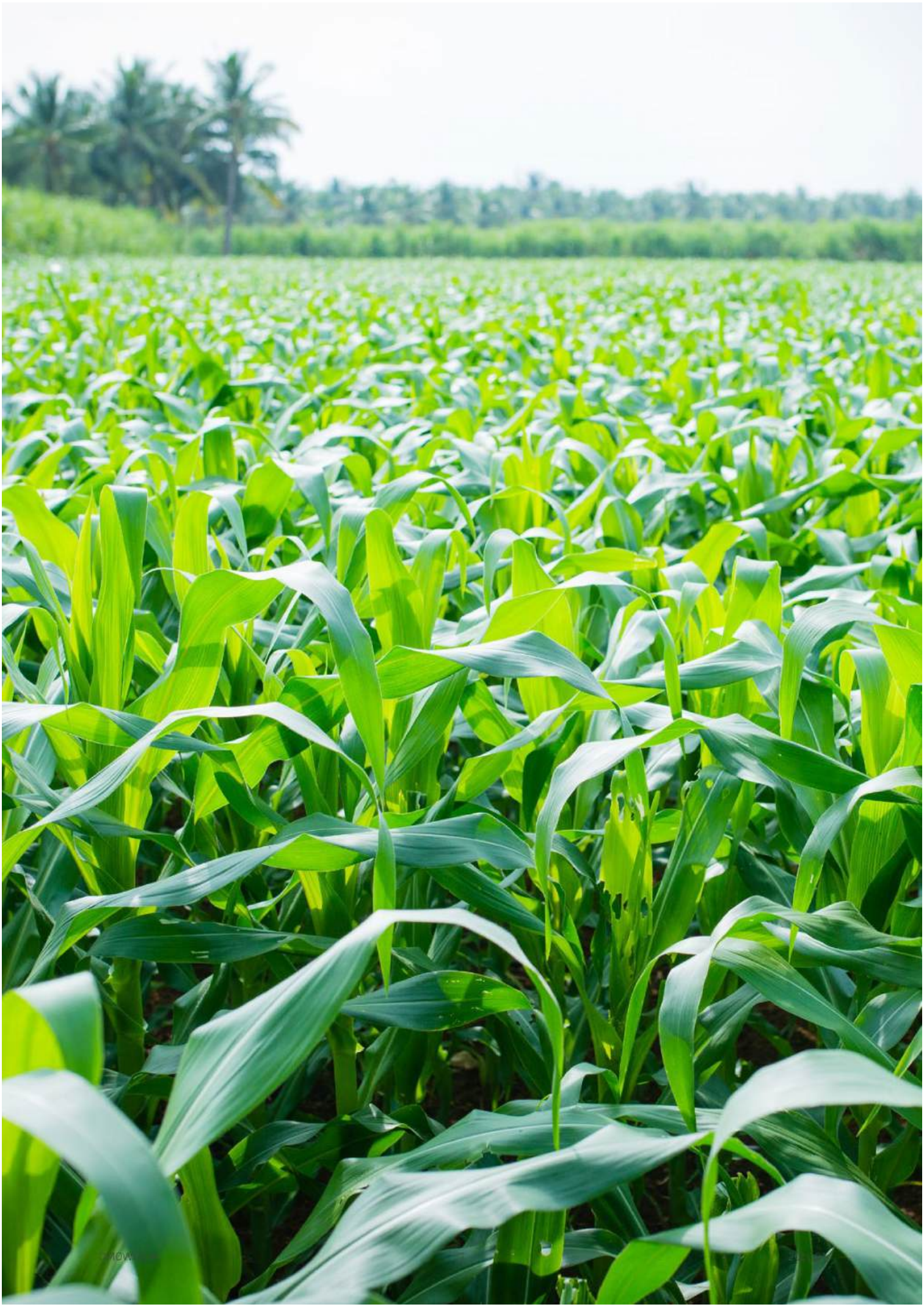

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This manual is intended to provide you with information on your product and information on installation and operation.You will also find information on how you could contact **S Pro Pumps**, should you need further information or help and support.

2. Warranty information

Please refer to your Warranty card or Visit **www.spropumps.com** for More Information on Your Warranty.

3. Complying standards

IS 3043: Code of Practice for earthing:Specification

IS 9283 : Motor for Submersible Pumpsets: Specification

IS13730: Specifications for particular types of winding wires.

IS14220: Openwell Submersible Pumpsets : Specification

4. Contents of the packing box

Based on the model you have purchased,your Single Phase Openwell Submersible is packed along with the instruction manual and warranty card in either a Corrugated box.

5. Information about your pump

The discharge of a pump depends on the static suction lift. During summer, the static suction lift increases due to drop in water levels,and this result in reduced discharge. This will require frequent lowering of the pump to reduce the static suctionlift.during monsoons,water levels can be significantly rise.under such conditions, resulting in the motor getting damaged. such issues are overcome by the usal of openwell submersible pump as it operates submerged in water.

The two types of series Submersible pumps available:

✔	SPO-55
✔	SPO-75

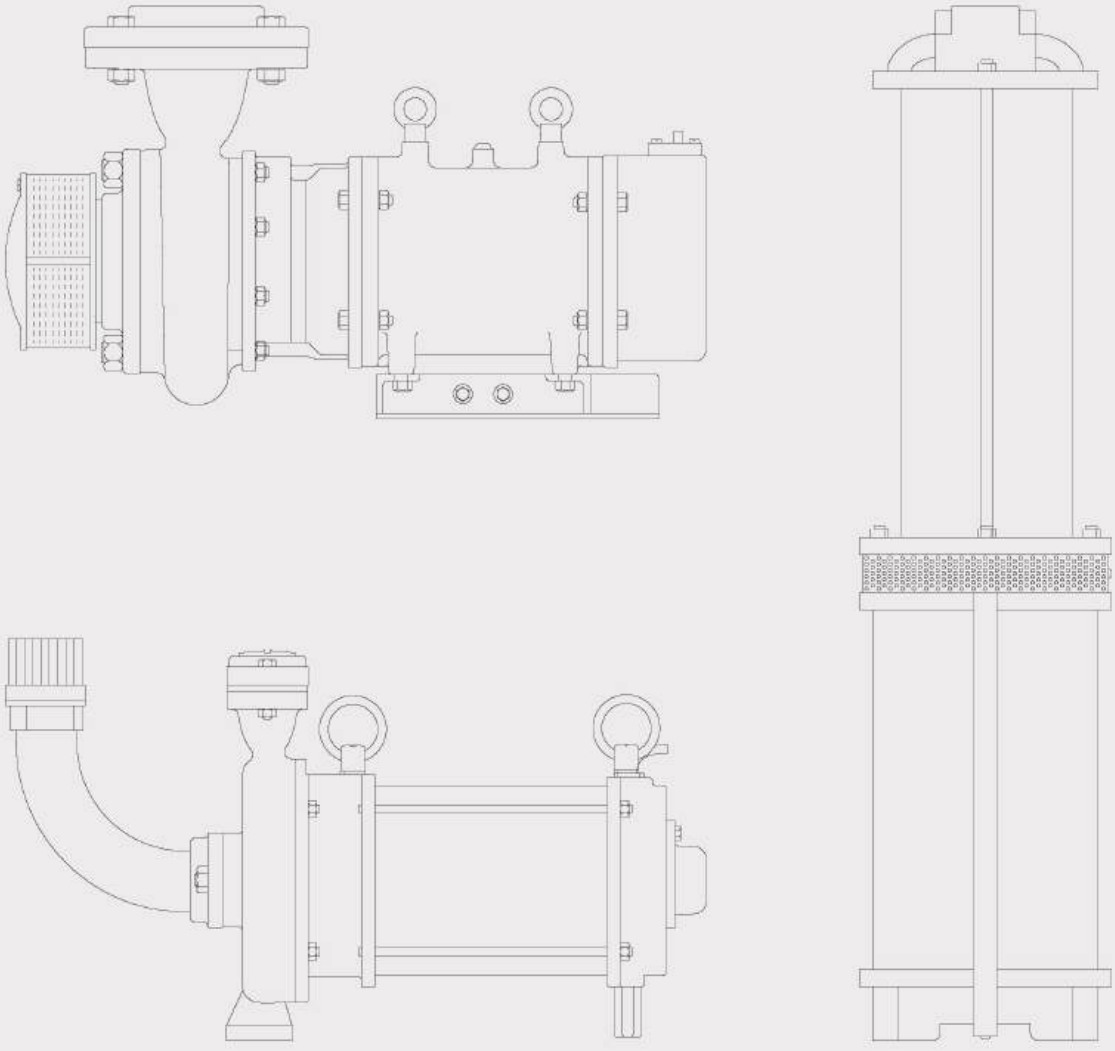
S Pro Single Phase Openwell Submersible are manufactured using high quality raw materials and components using state-of-the-art manufacturing facilities and will give trouble-fre performance. if properly installed and maintained. These are compact pumping systems with the pump and motor mounted on a comman shaft. As a coupling is not required,alignment of the pump and motor is assured. installation therefore quick and easy.They do not require frequent maintenance as the packing rope and grease-lubricated deep groove ball bearings are replaced by oil-seals and water-lubricated journal bearings respectiveley.such products find application for irrigation of farms, domestic water supply,cooling water circulating systems, fountains, dairies, water supply to high rise buildings, housing complexes, bungalow,cattle and poultry farms.

Prior to installation,readd this manual thoroughly and follow the instructions for installation and maintenance of our Single Phase Openwell Submersible to ensure reliable operation.The product should be installed by technically qualified personnel in compliance with national and local electrical codes and as per our instructions in odrer to avoid electrical shocks, unsatisfactory performance,and / or equipment failure.

6. Schematic drawing

View of an Single Phase Openwell Submersible Monoblock is shown below in Fig. 1:

Fig. 1 View of Single Phase Openwell Submersible Monoblock



7. Key specifications & features

Standard Specifications of Single Phase Openwell Submersible are shown below in TABLE 1:

Power	OW2AS - 1 HP
	OW2BS - 1 HP
Phase	1
Motor Type	Squirrel Cage Induction Motor - Wet Type
Operating Voltage	180 - 240v
Frequency	50 Hz
Speed	2850 rpm
Duty	S1 Continuous
Max.Fluid Temperature	33°C
Impeller type	Radial

Key features

- Wide voltage band operation
- The motor houses water-lubricated journal bearings to take up the radial loads
- A water-lubricated thrust bearing is provided to take up the thrust load generated by the rotating impeller
- A water-lubricated counter thrust bearing is provided to limit the movement of the shaft when the Single Phase Openwell Submersible is switched OFF
- The rotors are dynamically balanced
- Adequate motor surface area is provided for effective cooling

- The water-filled motor is provided with single-lip oilseals to prevent the pumped medium from entering the motor
- To prevent sand / small stones from entering the seal chamber, a sand guard is provided

Electrical connection

- All Products are Supplied with a 10-m long 3-core PVC-insulated flat cable
- Control panel is offered with some of our products

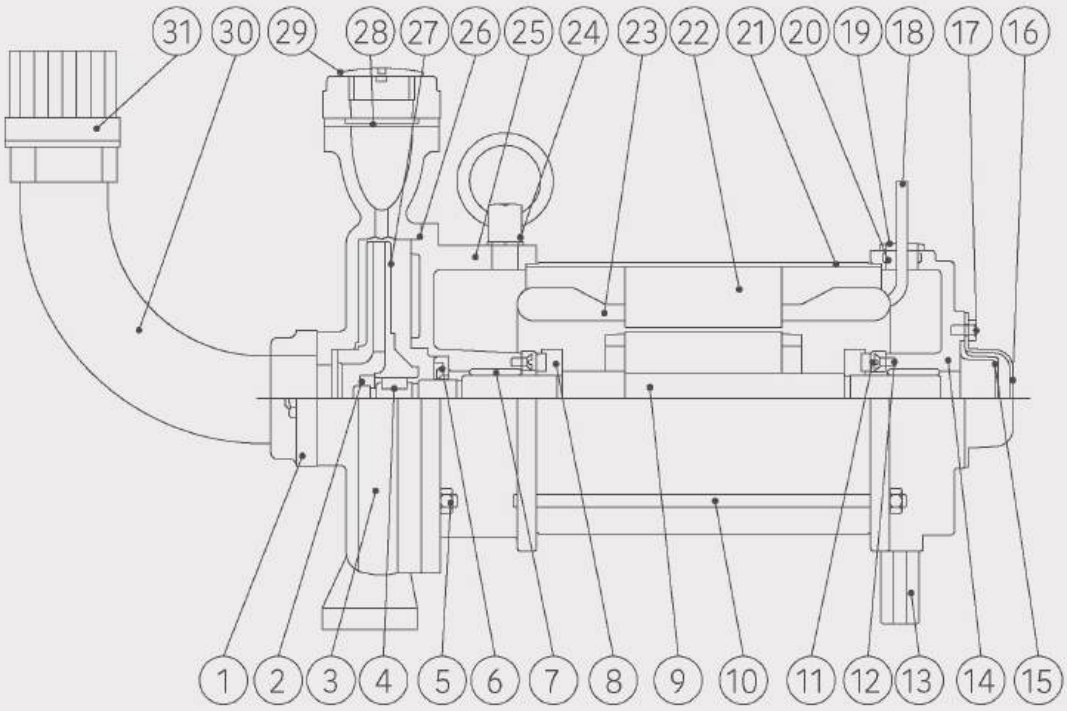
Approximate Performance Data

MODELS	POWER		Pipe Size(mm)		Total Head in Meters/Feet and Discharge in LPH											
	Kw	Hp	Suc	Del	M	6	9	12	15	18	21	24	27	30	33	36
					F	20	30	40	50	60	70	80	90	100	110	120
SPO-55	0.75	1	32	25		*	18000	14400	10800	9000	7200	4500	2000	*	*	*
SPO-75	0.75	1	32	25	LPH	*	*	*	16200	14400	10800	8100	4600	1800	*	*

8. Cross-section view

Cross-section view of Openwel Submersible is shown below in Fig. 2:

Fig. 2 Cross-section view of single phase openwell submersible monoblock "TSSM" series



No.	PART NAME
1	Flange Oval
2	Lock Nut
3	Casing
4	Parallel Key
5	Hex Nut
6	Oil Seal
7	Bush
8	Thrust Collar
9	Rotor With Shaft
10	Stud
11	Thrust Pad

No.	PART NAME
12	Csk Head Hex Socket Set Screw
13	Support - Rear Cover
14	Rear Cover
15	Diaphragm
16	Diaphragm Cap
17	Hexagon Head Bolt
18	Pvc Insulated Cable
19	Cable Gland
20	Cable Gland Bush
21	Stator Housing Shell

No.	PART NAME
22	Stator Stack
23	Coil
24	Eye Bolt (Collapsable Ring) & Washer
25	Front Cover
26	O-Ring
27	Impeller
28	Gasket Oval
29	Plug
30	Bend
31	Strainer

9. Pre-installation requirements

Arrangement for Installation

- Use the services of a professional and trained mechanic with experience in erecting Openwell submersible
- Ensure proper safety precautions during installation
- Use the eye bolts / lifting lugs for lifting / lowering the Single Phase Openwell submersible using appropriate equipment

General Installation Precautions

- Open the packaging and note down the serial number and model for future reference
- Ensure all fasteners are tightened properly
- Use prescribed pipe sizes as mentioned on the product nameplate
- Use a check valve fitted on the delivery line when the Single Phase Openwell submersible has high delivery heads
- Use a power cable without joints from the Single Phase Openwell submersible to the control panel. It is not recommended to use a power cable with large number of joints as this can result in a significant voltage drop
- If used in a well, check the level of silt at the bottom of the well. De-silt if necessary
- Check the availability of Single Phase power
- Check if the motor is completely filled with water. Top up if required with pure drinking water
- It is recommended to assemble the Single Phase Openwell submersible on a fairly level base to prevent the pump and piping from getting stressed
- To prevent the motor from getting exposed during pumping, ensure the suction strainer is fitted above the level of the motor. This is done by fitting one end of a bend to the pump suction flange and the strainer to the other end of the bend, thereby ensuring that the level does not fall below the strainer
- While installing the Openwell Submersible, ensure the Openwell Submersible is not subject to shock loads which can damage the Openwell Submersible parts

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, acidic, corrosive, and flammable liquids. Pumping flammable liquids could cause explosion
Caution	Use the eye bolt for lifting/lowering the Single Phase Openwell submersible. Ensure suitable precautions are taken while lifting and lowering the product
Caution	Use trained professionals to install the Single Phase Openwell Submersible
Warning	Use a power supply cable that has sufficient rating. Factor in low-voltage operation
Warning	Provide proper Earthing. Improper Earthing can cause electrical shock
Caution	Use a Megger to verify the insulation resistance of the motor. Insulation resistance should be 20MΩ minimum
Caution	Do not run the Single Phase Openwell Submersible dry as it contains water-lubricated bearings and oilseals

 Note	Check the bottom of the well. In case there is mud accumulated at the well bottom, de-silt the well
 Note	Periodically de-silt the bottom of the well so that the Openwell Submersibles rests on the rocky bottom

Operation Precautions

 Warning	Switch OFF the power before working on electrical lines
 Caution	Do not use this pump for pumping liquid exceeding 33°C 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
 Caution	The Single Phase Openwell Submersible has water-lubricated journal and thrust bearings and therefore shall not be run dry. Starting of the Single Phase Openwell Submersible without water must be strictly avoided as it will cause damage to the bearings
 Caution	Ensure proper direction of rotation of the pump on powering up

10. Installation procedure

Please follow the below procedure to install the Single Phase Openwell Submersible monoblock

Caution	The supply voltage should be within the specified voltage range. Water temperature for operation of the pump should not exceed 33°C. Failure to observe the precautions given above could cause the pump to malfunction and may lead to current leakage or electrical shock.
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.

Installation:

The following steps are executed prior to installation:

- ✔ Open the filling plugs and top up, if necessary, the motor with pure drinking water
- ✔ 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
- ✔ Check the direction of the rotation
- ✔ Use prescribed pipe sizes as mentioned on the product nameplate
- ✔ Refer Fig. 5, shown below, for locating the Single Phase Openwell Submersible for operation with flooded suction

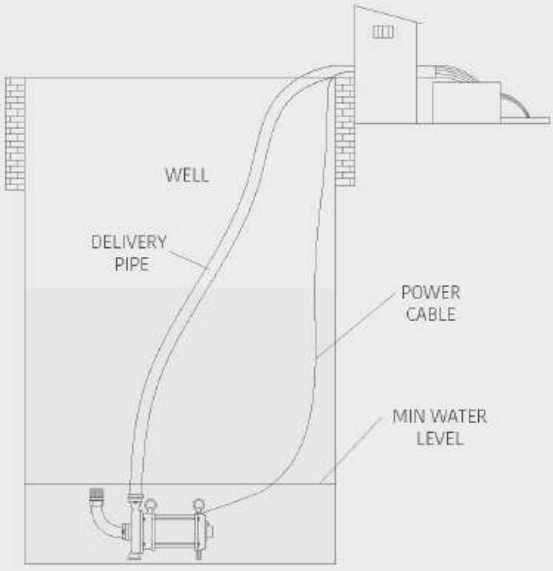


Fig. 5 Single phase openwell submersible monoblock with flooded suction

Prior to installation, unscrew the Brass Plugs 1 and 2, fitted on top of the motor as shown in Fig. 5 below, and fill the motor with pure drinking water till water overflows from the other filling hole. Gently rock the motor to release air bubbles and further top up if necessary. Then replace the two plugs.

In case the installation has a high delivery head, mount a good quality check valve in the delivery line.

Fig. 6 Filling the motor of single phase openwell submersible monoblock with pure drinking water

SPO-5 and SPO-75 products shall be filled with pure drinking water before installation. For SPO-75 and SPO-55 products (Fig. 6a and b), unscrew plug 1 and 2,fitted on top of the motor and fil up the motor with pure drinking water. Gently rock the motor to release air bubbles and further top if necessary. Then replace the two plugs.

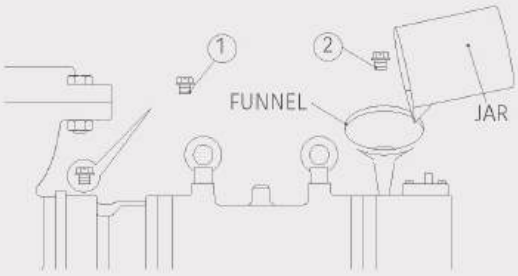


Fig. 6(a)

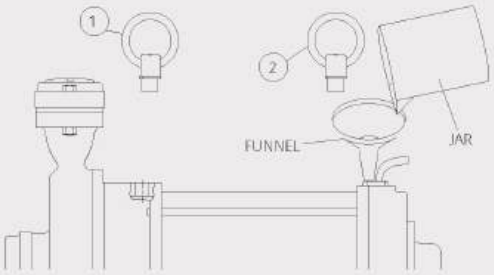


Fig. 6(b)

Waterproofing the Submersible Motor Cable - Supply Cable Joint

Danger

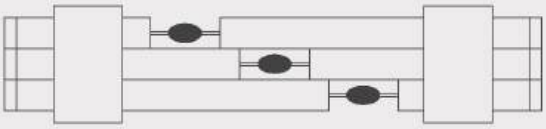
Hazardous voltage will cause death, serious injury, electrocution
Disconnect all power before working on this equipment and that it cannot be accidentally switched ON.

- All Products are Supplied with a 10-m long 3-core PVC-insulated flat cable
- 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 waterproof

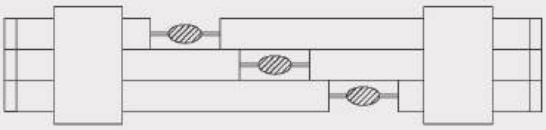
Refer the sequence shown in Fig. 9 below for insulating the cable joint for under water application:

Procedure for joining and insulating the 3 core conductors

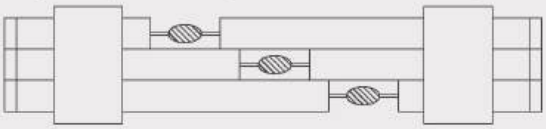
Step 1: Soldering / knot the copper strands



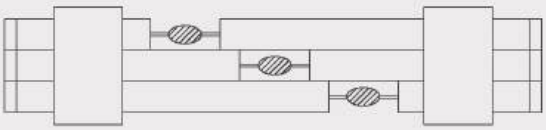
Step 2: Layer 1 - 1st layer of virgin rubber insulation



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

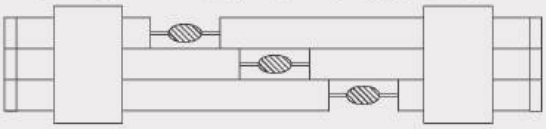
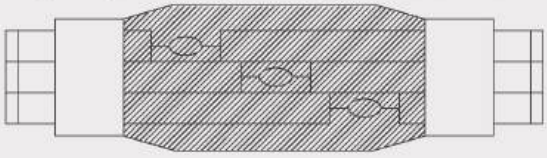


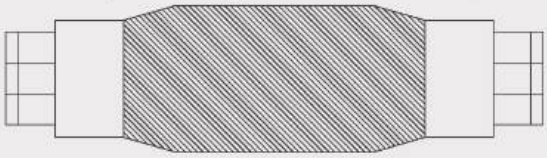
Fig. 9 Cable Joint for Under Water Application

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

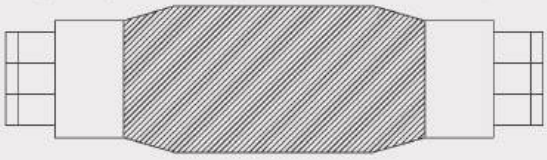
Step 6: Layer 1 - 1st layer of virgin rubber insulation



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



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



Cable Lead Wire Connection to Control Panel

Cable	Terminal
Red	R
Yellow	Y
Blue	B

Cable Selection

Refer TABLE 2 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

Checking direction of rotation of Single Phase Openwell Submersible Monoblock

Danger

Hazardous voltage will cause death, serious injury, electrocution.
All electrical work must be performed by an authorised electrician, in compliance with local electrical equipment standards and internal wiring codes.

- Connect the Single Phase Openwell Submersible to the control panel, power up the Openwell Submersible, and observe if the direction of rotation of the impeller matches the arrow mark on the volute casing / suction chamber
- In case the direction does not match the arrow mark, please take the product to the dealer from whom the purchase was made for rectification

Electrical Installation

- Check the power supply voltage and frequency and compare with the product requirements specified on the nameplate
- Observe relevant EB regulations while giving power supply to the motor
- As far as possible, do not use multiple joints in the electrical cabling while connecting the Control Panel to the Single Phase Openwell Submersible
- Ensure electrical joints, if any, are properly and adequately insulated
- Connect the cable properly to the starter terminals to avoid loose connections
- Factor in low-voltage operation while selecting cable size

Connecting the Power Supply

 Caution	Observe relevant Electricity Board regulations while powering up the pumpset
 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

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 2 below:

Fault	Possible Causes	Suggested Actions
Pump does not run	No power supply to the motor	Check for availability of power
	Burnt motor coil	Rewind the motor
	Low-voltage operation	Operate in the recommended voltage range
	The motor starter overload has tripped	Reset the motor starter overload. If it trips again, check the voltage
	Pump is jammed	Dismantle the pump and clear the jammed parts
	Fuse has blown	Replace fuse
	Loose connections	Tighten the electrical connections
	Pump has been kept idle for a long time	Ensure free rotation of shaft by running the pump for a few minutes at least every alternate day
Less discharge from pump	Low-voltage operation	Check the supply voltage, Operate in the recommended voltage range
	Wrong direction of rotation	Send the pump to authorised service centre
	Increased delivery head	Ensure delivery head within specified value
	Smaller pipe size used when compared to nameplate recommendations	Replace with suggested pipe size

Fault	Possible causes	Suggested actions
Less discharge from pump	Discharge pipe internally coated with depositions	Clean the pipe
	Foreign bodies lodged in impellers	Check the impellers and remove the foreign bodies
	The valve in the discharge pipe is partly closed / blocked	Check and clean / replace the valves, if necessary
	Discharge pipe internally coated with depositions	Check and clean NRV. Replace if necessary
	Foreign bodies lodged in impellers	Check and replace
	Leakage in the pipework	Check and repair / replace piping
Total head developed is too low	Abrasive wear of pump hydraulics due to operation in water of higher sand content or corrosiveness	Change the worn-out pump parts
	Running at low-voltage	Wait for voltage to increase or contact local EB representative
	Low system head and therefore higher discharge	Throttle the discharge
Pump runs rough and noisy	Dry running of pump	Keep pump idle for sometime/reduce the discharge by throttling
	Shaft is bent	Replace the shaft
	Excessive wear and tear	Service the pump replacing the worn out parts
Pump leaks excessively	Gaskets / O-rings damaged	Check and replace gaskets / O- rings
	Pipeline damaged	Check and replace piping
	Gaskets / O-rings damaged	Check and replace gaskets / O- rings
	Pipeline damaged	Check and replace piping

 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 Single Phase OWS as it may lead to severe damage to the pump or injury to personnel. Contact the dealer from whom this pump was purchased
 Caution	If the Single Phase Openwell Submersible runs with unusual noise, stop it immediately. Check (a) the journal bearings for wear (b) rotor outside diameter rubbing against stator inner diameter.

12. Preventive maintenance checks

Precautions to be taken

 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.

A definite schedule of preventive maintenance inspections should be established to avoid breakdown, serious damage, and / or extensive downtime. The schedule will depend on operating conditions and experience with similar equipment. The below checklist does not represent an exhaustive survey of maintenance steps necessary to ensure safe operation of the Single Phase Openwell submersible.

 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

It is good practice to monitor the conditions and performance of the Single Phase Openwell Submersible. Diagnosis may be carried out by checking the following:

- Closing the delivery valve for a few seconds only and check the shut-off head generated by the pump. Do not run at shut-off conditions for a prolonged period of time as the water in the volute casing will get hot
- Checking the current 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
- Measure the insulation resistance of the winding to check the condition of the motor
- Open the filling plugs and check the level of water inside the motor. Top up, if required, with pure drinking water
- Check the level of silt at the bottom of the well and de-silt if necessary
- Check the direction of rotation of the Openwell Submersible
- Check all electrical connections are proper

13. Do's and don'ts

Do's	Don'ts
Before installation, rotate the shaft to ensure that pump is not jammed	Do not use piping smaller than what is mentioned on the nameplate
Ensure proper earthing is provided	Do not place the pump at the bottom of the well as it can sink in the mud at the well bottom. De-silt the well and ensure the pump rests on a firm surface
Mount the Openwell Submersible on a level surface	Do not have multiple joints on the cable. More the cable joints, more will be the voltage drop
Check the direction of rotation of the openwell submerisible monoblock matches the arrow mark cast on the volute casing	Do not remove the strainer as debris can get sucked into the pump and jam it
Rubber gaskets assembled on the openwell submersible monoblock do not have a central hole. Cut out the central hole and re-install	Do not use to pump corrosive and flammable liquids
Check all fasteners are tight	
In case of high delivery head, use a check valve in the discharge line	Do not use undersized electric cables between Pump and control panel. Factor in low-voltage usage
In case of flooded suction, ensure that the pump suction is kept above the motor body to prevent the motor from getting exposed during running and resulting in poor heat dissipation	Do not use the power cable for lifting / lowering the pump. Use the eye bolts provided on the motor body
Water levels rise significantly during monsoons. Under such conditions, pumps will operate with higher discharges and therefore higher current. It is advisable to install a flow control valve in the delivery pipeline and throttle the discharge till the current is less than that specified on the product nameplate	Do not keep the pump idle for a long time to prevent jamming of the rotating components. Run the pump for a few minutes every week
Ensure the position of pump strainer (SPO-55 AND SPO-75) is located above the motor to prevent water level from dropping below the motor body	Do not operate the pump at shut-off conditions to prevent the pumpset from getting overheated

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 Single Phase Openwell Submersibles 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 under 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 while handling the pump to ensure that the product is not subjected to shock loads
- 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 motor

 Caution	If the pumpset is stored, the shaft must be turned by hand at least once a month
 Caution	If the pumpset has been stored for more than one year before installation, dismantle the pumpset and check the rotating parts before use. After re-assembly, ensure the impeller can rotate freely when turned by hand
 Caution	Oil seals, in back to back configuration, are provided to prevent water from inside the motor from escaping. Do not attempt to run the pump dry. If used to lift water from bore wells, ensure the pump is primed and then only run it

16. Company contact information

For most up to date information on S PRO PUMPS,please visit www.spropumps.com

Shankaran Nambidi Lane,
Opp : HSS, Arimpur,
Thrissur - 680620, India

+91 9544218437
www.spropumps.com
info@spropumps.com , spropumps@gmail.com

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