

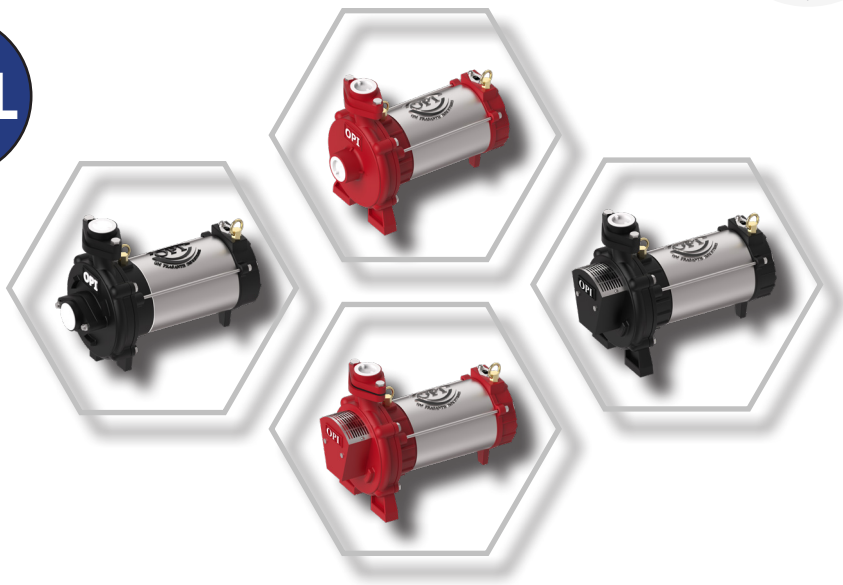
HORIZONTAL OPENWELL

LOAD
LOSS

COVERSION
CHART

TIPS &
FIX

DO'S AND
DON'TS



OPI TECHNICAL APPENDIX

TECHNICAL APPENDIX SUBMERSIBLE PUMP

OPI HORIZONTAL OPENWELL TECHNICAL DATA

TIPS AND TROUBLESHOOTING

Fault	Category	Possible Cause	Suggested Action	Priority
Pump does not start	⚡ Electrical	No power supply	Check power supply.	⚠
	⚡ Electrical	Very low voltage	Verify input supply wire capacity and check for loose connections. Consult power supplier for low voltage.	🔍
	⚡ Electrical	Fuse blown up	Replace fuse and recheck electrical wiring if the new fuse blows.	⚠
	⚡ Electrical	Capacitor failure	Replace capacitor.	⚠
	🔧 Maintenance	Motor protector open due to overheating	Check rotor rotation, supply voltage, and pump input current.	🔍
	🔧 Mechanical	Impeller stuck	Inspect and correct. Use a close-meshed strainer to prevent foreign particle entry.	⚠
	⚡ Electrical	Broken circuit in incoming leads	Inspect all circuits and fix faults.	⚠
	⚡ Electrical	Single phase preventer switched off	Check for phase issues or phase reversal and correct connections.	⚠
	⚡ Electrical	Dry run protector activated	Check water level and adjust discharge or wait for level to rise.	🔍
	⚡ Electrical	Faulty motor winding	Rewind the motor.	✅
Pump operates but delivers little or no water	💧 Water Flow	Pump may be air-locked	Stop and start pump several times, waiting a minute between cycles.	⚠
	⚡ Electrical	Low voltage	Verify voltage at control box with pump running. Upgrade wire size if necessary.	🔍
	💧 Water Flow	Water level in well too low	Restrict pump output flow and wait for well recovery. Lower pump if necessary.	⚠
	💧 Water Flow	Discharge line check valve installed backward	Ensure flow direction matches arrow on valve. Reverse valve if needed.	⚠
	💧 Water Flow	Leak in drop pipe	Raise pipe and inspect for leaks. Replace damaged sections.	✅
	💧 Water Flow	Pump intake screen blocked	Clean intake screen and position pump above well bottom.	✅

⚠ (Attention) : Requires immediate action 🔍 (Monitor) : Needs Monitoring ✅ (Routine) : For routine maintenance tasks.

TIPS AND TROUBLESHOOTING

Fault	Category	Possible Cause	Suggested Action	Priority
	Mechanical	Pump parts worn	Pull pump and replace worn components.	✓
	Mechanical	Motor shaft uncoupled	Tighten connections and replace worn parts if necessary.	🔍
	Mechanical	Excessive wear of pump components	Replace worn impeller, wearing rings, or other affected parts.	✓
	Mechanical	Foreign bodies lodged in impellers	Lift the pump and clean impellers.	✓
	Water Flow	Valve in discharge pipe partly closed or blocked	Inspect and clean or replace the valve.	✓
Pump jam	Maintenance	Kept idle for long time	Rotate pump shaft manually or clean pump thoroughly. Run pump periodically.	🔍
Pump rotates but does not deliver water	Water Flow	Priming insufficient	Fill water completely and tighten priming plug.	✓
	Water Flow	Too many bends in suction/delivery pipeline	Minimize bends and elbows.	✓
	Water Flow	Suction lift too high	Install pump closer to water level, within recommended suction lift depth.	✓
	Water Flow	Faulty foot valve or check valve	Repair or replace valve.	✓
	Water Flow	Wrong direction of rotation	Correct direction according to pump arrow mark.	⚠️
	Water Flow	Total head higher than specified	Reduce total head or switch to a suitable pump.	🔍
	Water Flow	Air leaks in suction pipeline	Inspect and fix pipe leaks.	✓
	Water Flow	Leakage in air cock	Tighten or replace air cock.	✓
	Water Flow	Smaller size pipes used	Replace with recommended size pipes.	✓
	Mechanical	Mechanical seal leaking	Replace mechanical seal.	✓
Pump requires excessive power/heats/ceases	Mechanical	NRV of pump blocked	Pull out pump and clean or replace valve.	✓
	Electrical	Low voltage	Verify supply wire size and connections. Contact power supplier for low voltage.	🔍
	Mechanical	Defective rotor	Replace rotor.	⚠️

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TIPS AND TROUBLESHOOTING

Fault	Category	Possible Cause	Suggested Action	Priority
Pump requires excessive power/heats/ceases	Mechanical	Defective rotor	Replace rotor.	!
	Mechanical	Damaged thrust bearing	Replace bearings.	✓
	Electrical	Single phasing	Check line fuses and ensure proper phase supply.	!
Pump won't shut off	Water Flow	Water level in well too low	Restrict pump output flow and wait for recovery. Lower pump if depth allows.	!
	Water Flow	Leak in drop line	Inspect and replace damaged drop pipe.	✓
	Mechanical	Pump parts worn	Replace worn impeller, casing, or other components.	✓
Submersible pump starts too much	Electrical	Defective or improperly adjusted pressure switch	Inspect and adjust/replace pressure switch.	!
	Water Flow	Pressure tank leaks	Apply soapy mixture to detect leaks. Replace tank if necessary.	✓
	Water Flow	Plumbing system leaks	Inspect and repair leaks in service line.	✓
	Water Flow	Leak in discharge line check valve	Inspect and replace valve if needed.	✓
	Water Flow	Plugged air volume control	Remove and replace control.	✓
	Water Flow	Plugged snifter valve	Remove and replace valve.	✓
	Electrical	Incorrect voltage	Reset overloads or circuit breaker.	!
Motor will not start, but fuses do not blow	Electrical	No power	Check power supply and contact power company if needed.	!
	Electrical	Defective control box	Tighten loose contacts or correct faulty wiring.	!
	Mechanical	Mechanical seal damaged or improperly fitted	Replace or correct seal.	✓
Pump vibrates and is noisy	Mechanical	Worn or incorrectly fitted bearing	Replace bearing and grease.	✓
	Mechanical	Pipe vibration	Secure pipelines properly.	✓
	Mechanical	Impeller blocked	Clean impeller.	✓
	Mechanical	Bent shaft	Rectify or replace.	✓
	Water Flow	Malfunctioning check/foot valve	Rectify or replace valve.	✓
	Water Flow			✓

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TIPS AND TROUBLESHOOTING

Fault	Category	Possible Cause	Suggested Action	Priority
Submersible pump suddenly stops	Electrical	Defective pressure switch	Clean or replace switch.	⚠
	Water Flow	Drop line leak	Inspect and replace damaged sections.	✓
	Water Flow	Water level in well too low	Restrict flow and wait for recovery. Lower pump if depth permits.	🔍
Submersible pump delivers little/no water	Mechanical	Worn pump parts	Replace worn impeller, casing, or other components.	✓
	Water Flow	Pump air-locked	Start/stop pump repeatedly.	⚠
	Water Flow	Low water level in well	Restrict flow, wait for recovery, or lower pump if depth allows.	🔍
	Water Flow	Discharge line check valve installed backward	Correct valve orientation.	✓
	Water Flow	Blocked pump intake screen	Clean screen and adjust pump position.	✓
Submersible pump won't start	Mechanical	Loose motor shaft	Tighten connections and setscrews.	✓
	Electrical	Power not supplied	Verify power supply and consult power company if needed.	⚠
	Electrical	Pressure switch damaged	Clean or replace pressure switch.	⚠
Pump Overheating	Mechanical	Inadequate cooling due to submerged level being too low	Ensure pump is fully submerged or install a cooling sleeve	⚠
Frequent tripping of circuit breaker	Electrical	Short circuit in wiring or motor winding	Inspect wiring and motor for damage, repair or replace as needed	⚠
Irregular flow or pulsating discharge	Water Flow	Air leaks in suction line or malfunctioning pressure tank	Check for air leaks and fix, inspect and replace pressure tank if necessary	🔍
Increased noise without vibrations	Mechanical	Cavitation due to improper suction condition.	Check the blockages in the suction line, reduce suction lift or adjust pump location	🔍
Reduced efficiency over time	Maintenance	Scaling or sediment build-up inside pump or pipelines	Perform regular cleaning and descaling of pump and connected pipes.	🔍

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Do's AND Don'ts

Do's		Don'ts
✓	Prior to installation, check the water level in the submersible motor. Top up with clean drinking water if required. Replace water filling plugs after filling.	✗ Do not erect the pumpset at the very bottom of the borehole. Ensure at least 3 m clearance from the bottom.
✓	Check the direction of rotation of the motor before coupling it to the pump.	✗ Do not operate the pump with the Non-Return Valve (NRV) and strainer removed.
✓	Use proper-sized cables from the starter to the motor, considering operation at lower voltages.	✗ Do not use multiple joints for extending cable length. Use a single cable to reduce voltage drop.
✓	Connect the pump to a starter with single-phase, dry-run, and overload protectors.	✗ Do not operate the pump at shut-off conditions, as the water temperature may rise, causing overheating of components.
✓	Inspect for play and smooth rotation of the pump-motor shaft before installation.	✗ Do not test the pump outside the borehole in dry conditions, as seals and bearings may get damaged.
✓	Tighten all fasteners and bolts securely.	✗ Do not ground the unit to a gas supply or water line.
✓	Check for any leakages from the motor during installation.	✗ Do not lift or lower the pump using the cable; use proper lifting tools.
✓	Ensure splices or connections on the drop cable are watertight to prevent water ingress.	✗ Do not subject the pump to shock loads or sudden impacts.
✓	Ensure all wiring, connections, and system grounding comply with local regulations. Provide proper earthing using motor body screws.	✗ Do not attempt to repair the pump yourself. Always consult authorized service personnel.
✓	While coupling the pump and motor, ensure the coupling key is properly seated.	✗ Do not install the pump without checking the water level in the motor body.
✓	Confirm motor insulation resistance between phases and Earth is greater than 20MΩ.	✗ Do not operate the pump with very low or intermittent discharge, as it may damage the pump.
✓	Inspect pump and motor alignment to avoid vibrations.	✗ Do not use substandard or makeshift cables, as they can cause electrical hazards.
✓	Maintain a record of periodic maintenance schedules and servicing.	✗ Do not neglect periodic cleaning of the motor and pump to remove accumulated dirt and debris.
✓	Use strain relief clamps for cables to prevent stress and damage to the electrical connections.	✗ Do not let debris, sand, or foreign objects enter the pump inlet or borehole.

Do's AND Don'ts

Do's		Don'ts	
✓	Always install the pump in a borehole with clean water, free from excessive sand or silt.	✗	Do not run the pump continuously for long hours without monitoring water flow or temperature.
✓	Use only manufacturer-recommended spare parts and accessories for repairs and replacements.	✗	Do not use unapproved spare parts, as they may compromise the efficiency and safety of the pump.
✓	Periodically check the performance of the pump, such as flow rate and pressure.	✗	Do not allow sand, silt, or abrasive particles to accumulate in the borehole, as it may damage the impellers.
✓	Install a control panel equipped with advanced features like overload protection, dry-run protection, and phase failure detection.	✗	Do not allow unauthorized personnel to operate or tamper with the pump system.
✓	Use a properly calibrated pressure gauge and ammeter to monitor the pump's performance.	✗	Do not ignore unusual noises, vibrations, or changes in performance, as they may indicate a potential issue.
✓	Ensure the pump is adequately ventilated and free from external blockages.	✗	Do not expose the motor to extreme temperatures or direct sunlight without protection.
✓	Use stainless steel fasteners in areas prone to corrosion to extend the pump's lifespan.	✗	Do not use the pump for fluids other than clean water unless specified by the manufacturer.
✓	Ensure the electrical cables are protected from rodents, physical damage, and environmental conditions.	✗	Do not use damaged or worn-out cables, as they may result in electrical hazards or malfunctions.
✓	Perform insulation resistance tests periodically to ensure electrical safety.	✗	Do not restart the pump immediately after shutting it down; allow sufficient time for cooling.
✓	Ensure proper alignment of the pump-motor shaft to reduce wear and vibration.	✗	Do not exceed the recommended operating pressure or flow rate, as it may overstrain the pump.
✓	Install a filter at the borehole's opening to prevent entry of large particles into the pump.	✗	Do not leave exposed wiring connections open to moisture or dust.
✓	Keep the area around the borehole clean and free from contaminants that may enter the water.	✗	Do not operate the pump with air pockets in the suction line, as it may damage the impellers.
✓	Train all operators on the safe operation and maintenance of the pump system.	✗	Do not delay repairs if any issue is detected, as minor problems can lead to major failures.
✓	Lubricate moving parts as recommended by the manufacturer to ensure smooth operation.	✗	Do not allow the pump to operate in extremely low water levels, as it may cause dry running.

Do's AND Don'ts

Do's		Don'ts	
✓	Install a backup system or a standby pump for critical applications to avoid downtime.	✗	Do not leave the pump exposed to harsh weather conditions without a proper enclosure.
✓	Periodically clean the NRV and strainer to maintain efficient water flow.	✗	Do not tighten or loosen components under load or while the pump is operating.
✓	Follow the manufacturer's guidelines for the maximum depth of installation.	✗	Do not store the pump in a wet or humid environment when not in use.
✓	Ensure the pump is submerged to the proper depth to avoid cavitation and air locking.	✗	Do not exceed the maximum allowable submergence depth specified by the manufacturer.
✓	Check the voltage and phase supply regularly to ensure proper operation of the pump.	✗	Do not allow the pump to operate with a damaged or clogged impeller.
✓	Keep spare parts, such as seals and bearings, readily available to reduce downtime.	✗	Do not use PVC or other non-recommended pipes for high-pressure applications.
✓	Use cable clips or ties to secure electrical cables properly to prevent tangling or damage.	✗	Do not connect the pump directly to the power supply without using a control panel.
✓	Conduct regular borehole water quality tests to check for sedimentation or contamination.	✗	Do not operate the pump continuously beyond its rated capacity to avoid overheating.
✓	Always test the pump's performance under normal operating conditions before commissioning.	✗	Do not mix different cable types or materials when connecting the pump to the control panel.
✓	Always use a properly rated capacitor for starting and running the motor efficiently.	✗	Do not allow debris or sand to accumulate near the borehole or pump inlet to avoid clogging.
✓	Inspect the cable insulation for any damage or wear before installation to prevent electrical fault.	✗	Do not connect a submersible pump to an undersized pipe-line, as it may increase pressure and damage components.
✓	Maintain a record of operating parameters like voltage, current and discharge rate for troubleshooting.	✗	Do not makeshift tools for tightening or loosening pump components, as this can cause damage.
✓	Periodically inspect the pump system for unusual noises or vibrations, which may indicate mechanical issue.	✗	Do not install the pump system without consulting the user manual for proper installation guidelines.
✓	Ensure all electrical connections are done properly to avoid loose connections and overheating.	✗	Do not allow the pump to operate with the air in the suction line, as this can cause cavitation and damage.
✓	Use Voltage protection device to safeguard the motor against voltage fluctuations.	✗	Do not exceed the recommended voltage range of the motor to avoid electrical damage.

