

SELF PRIMING PUMPS

LOAD
LOSS

COVERSION
CHART

TIPS &
FIX

DO'S AND
DON'TS



OPI TECHNICAL APPENDIX

TECHNICAL APPENDIX REGENERATIVE PUMPS

OPI SHALLOW WELL JET PUMP 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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SHALLOW WELL JET PUMPS - SINGLE PHASE



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.	✓
Motor will not start, but fuses do not blow	Electrical	Incorrect voltage	Reset overloads or circuit breaker.	!
	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			✓

! (Attention) : Requires immediate action (Monitor) : Needs Monitoring ✓ (Routine) : For routine maintenance tasks.

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.

SHALLOW WELL JET PUMPS - SINGLE PHASE



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.

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