



**A.Y. McDonald Mfg. Co.**

**Troubleshooting  
Submersible  
and  
Jet Pumps**

# Troubleshooting • Submersible Pumps

## *Fuse overload or circuit breaker trips when motor is started*

CAUSE OF TROUBLE	HOW TO CHECK	HOW TO CORRECT
1. Incorrect line voltage.	Check the line voltage terminals in the control box (or connection box in the case of the 2 wire models) with a voltmeter. Make sure that the voltage is within the minimum-maximum range prescribed by the manufacturer.	If the voltage is incorrect, contact the power company to have it corrected.
2. Defective control box:		
(a) Defective wiring.	Check out all motor and power-line wiring in the control box, following the wiring diagram found inside the box. See that all connections are tight and that no short circuits exist because of worn insulation, crossed wires, etc.	Rewire any incorrect circuits. Tighten loose connections. Replace worn wires.
(b) Incorrect components.	Check all control box components to see that they are the type and size specified for the pump in the manufacturers' literature. In previous service work, the wrong components may have been installed.	Replace any incorrect component with the size and type recommended by the manufacturer.
(c) Defective starting capacitor (skip for 2 wire models).	Using an ohmmeter, X1000 scale, determine the resistance across the disconnected starting capacitor. When contact is made, the ohmmeter needle should jump toward 0, and then drift back slowly toward infinity. No movement indicates an open capacitor, low resistance means that the capacitor is shorted.	Replace defective starting capacitor.
(d) Defective relay (skip for 2 wire models).	Using an ohmmeter, check the relay coil and contacts. Their resistance should be as shown in the manufacturer's literature.	If coil resistance is incorrect or contacts defective, replace relay.
3. Incorrectly wired pressure switch.	Check the wiring at the pressure switch.	Make sure all line, load and ground connections in the switch match the diagram.
4. Defective motor winding or cable:		
a. Shorted or open motor winding.	Check the resistance of the motor winding by using an ohmmeter on the proper terminals in the control box (see manufacturer's wiring diagram). The resistance should match the ohms specified in the manufacturer's data sheet. If it's too low, the motor winding may be shorted; if the ohmmeter needle doesn't move, indicating high or infinite resistance, there is an open circuit in the motor winding or cable.	If the motor winding is defective—shorted or open—the pump must be pulled and the motor repaired.
b. Grounded cable or winding.	Ground one lead of the ohmmeter onto the drop pipe or well casing, then touch the other lead to each motor wire terminal. If the ohmmeter needle moves appreciably when this is done, there is a ground in either the cable or the motor winding.	Pull the pump and inspect the cable for damage. Replace damaged cable. If cable checks OK, the motor winding is grounded.
5. Pump locked.	Check the line amps before the trip. If amps are twice normal, or higher, pump is probably locked.	Pull pump, disassemble from motor and check which one is locked. Replace one, or both, if defective.



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***Pump operates but delivers little or no water***

CAUSE OF TROUBLE	HOW TO CHECK	HOW TO CORRECT
1. Pump may be air locked.	Stop and start the pump several times, waiting about one minute between cycles. If the pump then resumes it's normal delivery, air lock was the trouble.	If this test fails to correct the trouble, proceed as below.
2. Water level in well too low.	Well production may be too low for pump capacity. Restrict the low of pump output, then wait for well to recover, and start pump.	If partial restriction corrects trouble, leave valve or cock at restricted setting. Otherwise, lower pump in well if depth is sufficient. Do not lower if sand clogging might occur.
3. Discharge line check valve installed backward.	Examine check valve on discharge line to make sure that the arrow indicating direction of flow points in the right direction.	Reverse the valve if necessary.
4. Leak in drop pipe.	Raise the pipe and examine for leaks.	Replace the damaged section of drop pipe.
5. Pump check valve jammed by drop pipe.	When pump is pulled after completing Step 4 above, examine connection of drop pipe to pump outlet. If threaded section of drop pipe has been screwed in too far, it may be jamming the pump's check valve in the closed position.	Unscrew the drop pipe and cut off the portion of threads.
6. Pump intake screen blocked.	The intake screen on the pump may be blocked by sand or mud. Examine the screen.	Clean the screen and when reinstalling the pump, make sure that it is located several feet above the well bottom— preferably 10 feet or more.
7. Pump parts worn.	The presence of abrasives in the water may result in excessive wear on the impeller, casing and other close-clearance parts. Before pulling the pump, reduce setting on pressure switch to see if the pump shuts off. If it does, worn parts are probably at fault.	Pull the pump and replace worn components.
8. Motor shaft uncoupled.	Coupling between motor and pump shaft may have worn out or worked loose. Inspect for this after pulling the pump and looking for worn components, as in Step 7 above.	Tighten all connections, setscrews, etc. Replace parts if worn out.

***Pump starts too frequently***

CAUSE OF TROUBLE	HOW TO CHECK	HOW TO CORRECT
1. Pressure switch defective or out of adjustment.	Check the setting on the pressure switch and examine for defects.	Adjust the pressure setting or replace switch.
2. Leak in pressure tank above water level.	For discharge or bladder captive air tanks, drain the tank and check the precharge pressure. It should be equal to or 2 psig below pump cut-in pressure. If lower, check welds, braze joints, mechanical joints and valve core with a soap solution. If defective, replace. DO NOT ATTEMPT TO REPAIR BY WELDING.	Replace tank.
3. Leak in plumbing system.	Examine the service line to the house and distribution branches for leaks.	Repair leaks.
4. Discharge line check valve leaking.	Remove and examine.	Replace if defective.



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***Pump starts too frequently (continued)***

CAUSE OF TROUBLE	HOW TO CHECK	HOW TO CORRECT
5. Air volume control plugged.	Remove and inspect the air volume control.	Clean or replace.
6. Snifter valve plugged.	Remove and inspect the snifter valve.	Clean or replace.
7. Captive air tank has lost charge.	Check tank.	Recharge or replace tank.

***Fuse, overload or circuit breaker trips when motor is running***

CAUSE OF TROUBLE	HOW TO CHECK	HOW TO CORRECT
1. Incorrect voltage.	Check the line voltage terminals in the control box (or connection box in the case of 2 wire models) with a voltmeter. Make sure that the voltage is within the minimum-maximum range prescribed by the manufacturer.	If voltage is incorrect, contact the power company for service.
2. Overheated control or starter.	If sunlight or other sources of heat makes the box too hot, overload may trip or fuses may blow. If box is hot to the touch, this may be the problem.	Ventilate or shade the box, or remove it from the source of heat.
3. Detective control box components (skip this for 2 wire models).	Using an ohmmeter, X1000 scale, determine the resistance across the disconnected running capacitor. When contact is made, the ohmmeter needle should jump toward 0, and then drift back slowly toward infinity. No movement indicates an open capacitor; low resistance means the capacitor is shorted.  Using an ohmmeter, check the relay coil. its resistance should be shown in the manufacturer's literature. Check amps in red motor lead with motor running. If amps are much higher than the manufacturer specifies, start relay contacts are failing to open. If amps are much lower, run capacitor is defective or motor is overloaded.	Replace defective components.
4. Defective motor winding or cable.	Check the resistance of the motor winding by using an ohmmeter on the proper terminals in the control box (see manufacturer's wiring diagram). The resistance should match the ohms specified in the manufacturer's data sheet. If it's too low the motor winding may be shorted; if the ohmmeter needle doesn't move, indicating high or infinite resistance, there is an open circuit in the motor winding. Ground one lead of the ohmmeter onto the drop line or well casing, then touch the other lead to each motor wire terminal. If the ohmmeter needle moves appreciably when this is done, there is a ground in either the cable or the motor winding.	If neither cable or winding is defective—shorted, grounded, or open—the pump must be pulled and serviced.
5. Pump is overloading.	If the fuses blow or overloads trip while the pump is operating, check the line amps. If it's more than 5 percent above the manufacturer's nameplate value, the pump is overloading, which indicates a defective pump and/or motor.	Pull pump, disassemble from motor and replace one or both, if defective.



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***Pump won't shut off***

CAUSE OF TROUBLE	HOW TO CHECK	HOW TO CORRECT
1. Defective pressure switch.	Check the pressure switch to insure contacts are open at the correct pressure.	Adjust or replace switch.
2. Water level in well too low.	Well production may be too low for the pump capacity. Restrict the flow of pump output, wait for the well to recover, and then start pump.	If partial restriction corrects trouble, leave the valve or cock at restricted setting. Otherwise, lower pump into the well if depth is sufficient. Do not lower if sand clogging might occur.
3. Leak in drop line.	Raise the pipe and examine it for leaks.	Replace the damaged section of the drop pipe.
4. Pump parts worn.	The presence of abrasives in the water may result in excessive wear on the impeller, casing and other close-clearance parts. Before pulling pump, reduce setting on pressure switch to see if the pump shuts off. If it does, worn parts are probably at fault.	Pull pump and replace worn components.

***Motor does not start, but fuses don't blow***

CAUSE OF TROUBLE	HOW TO CHECK	HOW TO CORRECT
1. Overload protection tripped.	Check overloads and circuit breaker to see if they are operable.	Reset overloads or circuit breaker.
2. No power.	Check power supply to control box (or overload protection box) by placing a voltmeter across the incoming power lines. Voltage should approximate nominal line voltage.	If no power is reaching the box, contact power company for service.
3. Defective pressure switch.	Check whether contacts are closed and the same voltage is present between load terminals as line terminals.	If the line voltage is not on the line terminals, replace the switch.
4. Defective control box.	Examine the winding in the control box to make sure all of the contacts are tight. With a voltmeter, check voltage at line and motor terminals. If no voltage is shown at terminals, wiring is defective from pressure switch or in control box.  With a voltmeter, check the voltage across the pressure switch while the switch is closed. If the voltage drop is equal to the line voltage, the switch is not making contact.	Correct faulty wiring or tighten loose contacts.  Clean the contacts or replace the switch.



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# Troubleshooting • Jet Pumps

## *Pump won't start or run*

CAUSE OF TROUBLE	HOW TO CHECK	HOW TO CORRECT
1. Blown fuse.	Check to see if the fuse is OK.	If blown, replace with a fuse of proper size.
2. Low line voltage.	Use voltmeter to check pressure switch or the terminals nearest pump.	If voltage is under the recommended minimum, check the size of wiring from the main switch on the property. If OK, contact the power company.
3. Loose, broken or incorrect wiring.	Check the wiring circuit against diagram. See that all of the connections are tight and that no short circuits exist because of worn insulation, crossed wires, etc.	Rewire any incorrect circuits and tighten connections, replace defective wires.
4. Defective motor.	Check to see that the switch is closed.	Repair or take it to the motor service station.
5. Defective pressure switch.	Check the switch setting. Examine the switch contacts for dirt or excessive wear.	Adjust the switch settings. Clean contacts with an emery cloth if it's dirty.
6. Tubing to pressure switch plugged.	Remove the tubing and blow through it.	Clean or replace if it's plugged.
7. Impeller or seal	Turn off the power, then use a screwdriver to try to turn the impeller or motor.	If the impeller won't turn, remove housing and locate the source of binding.
8. Defective start capacitor.	Use an ohmmeter to check the resistance across a capacitor. The needle should jump when contact is made. No movement means an open capacitor; no resistance means the capacitor is shorted.	Replace the capacitor or take the motor to the service station.
9. Motor shorted out.	If the fuse blows when the pump is started (and external wiring is OK), the motor is shorted.	Replace the motor.

## *Motor overheats and overload trips out*

CAUSE OF TROUBLE	HOW TO CHECK	HOW TO CORRECT
1. Incorrect line voltage.	Use a voltmeter to check at pressure switch or terminals nearest pump.	If voltage is under the recommended minimum, check size of wiring from main switch on property. If OK, contact power the company.
2. Motor wired incorrectly.	Check the motor wiring diagram.	Reconnect for proper voltage as per wiring diagram.
3. Inadequate ventilation.	Check the air temperature where the pump is located. If over 100° F, overload may be tripping on external heat.	Provide adequate ventilation or move the pump.
4. Prolonged low pressure delivery.	Continuous operation at very low pressure places heavy overload on pump. This can cause overload protection to trip.	Install the globe valve on the discharge line and throttle it to reduce flow and to increase the pressure.



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***Pump starts and stops too often***

CAUSE OF TROUBLE	HOW TO CHECK	HOW TO CORRECT
1. Leak in pressure tank.	For discharge or bladder captive air tanks, drain the tank and check the precharge pressure. It should be equal to or 2 psig below pump cut-in pressure. If it's lower, check welds, braze joints, mechanical joints, and valve core with a soap solution. If it's defective, replace. <b>DO NOT ATTEMPT TO REPAIR BY WELDING.</b>	Replace the tank.
2. Defective air volume control.	This will lead to a water-logged tank. Make sure the control is operating properly. If it's not, remove and examine for plugging.	Clean or replace the defective control.
3. Faulty pressure switch.	Check the switch setting. Examine the switch contacts for dirt or excessive wear.	Adjust the switch settings. Clean the contacts with an emery cloth if dirty.
4. Leak on discharge side of system.	Make sure all of the fixtures in the plumbing system are shut off. Then check all of the units (especially ballcocks) for leaks. Listen for the noise of water running.	Repair leaks as necessary.
5. Leak on suction side of system.	On shallow well units install the pressure gauge on suction side. On the deep well systems, attach a pressure gauge to the pump. Close the discharge line valve. Then, using a bicycle pump or air compressor, apply about 30 psi pressure to the system. If the system will not hold this pressure when the compressor is shut off, there is a leak on the suction side.	Make sure above ground connections are tight. Then repeat the test. If necessary, pull the piping and repair the leak.
6. Leak in foot valve.	Pull the piping and then examine foot valve.	Repair or replace the defective valve.

***Pump won't shut off***

CAUSE OF TROUBLE	HOW TO CHECK	HOW TO CORRECT
1. Wrong pressure switch setting or setting "drift."	Lower the switch setting. If the pump shuts off, this was the trouble.	Adjust the switch to the proper setting.
2. Defective pressure switch.	Arcing may have caused the switch contacts to "weld" together in a closed position. Examine the points and other parts of the switch for defects.	Replace the switch if it's defective.
3. Tubing of pressure switch plugged.	Remove the tubing and blow through it.	Clean or replace the tubing if it's plugged.
4. Loss of prime.	When no water is being delivered, check the prime of the pump and well piping.	Reprime if necessary.
5. Low well level.	Check the well depth against the pump performance table to make sure the pump and the ejector are properly sized.	If undersized, replace pump or ejector.
6. Plugged ejector.	Remove the ejector and inspect it.	Clean and reinstall if dirty.



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***Pump operates but delivers little or no water***

<b>CAUSE OF TROUBLE</b>	<b>HOW TO CHECK</b>	<b>HOW TO CORRECT</b>
1. Low line voltage.	Use a voltmeter to check at the pressure switch or the terminals nearest pump.	If the voltage is under the recommended minimum, check the size of wiring from the main switch on the property. If OK, contact the power company.
2. System incompletely primed.	When no water is being delivered, check prime of pump and the well piping.	Reprime if necessary.
3. Air lock in suction line.	Check the horizontal piping between the well and pump. If it does not pitch upward from the well to the pump, an air lock may form.	Rearrange the piping to eliminate an air lock.
4. Undersized piping.	If the system delivery is low, the discharge piping and/or plumbing lines may be undersized. Refigure the friction loss.	Replace the undersized piping or install a pump with higher capacity.
5. Leak in air volume control or tubing.	Disconnect the air volume control tubing at the pump and plug hole. If the capacity increases, a leak exists in the tubing of control.	Tighten all the fittings and replace control if necessary.
6. Pressure regulating valve stuck or incorrectly set; (deep well only).	Check the valve setting. Inspect the valve for defects.	Reset, clean, or replace the valve as needed.
7. Leak on suction side of system.	On shallow well units, install a pressure gauge on suction side. On deep well systems, attach a pressure gauge to the pump. Close the discharge line valve. Then, using a bicycle pump or air compressor, apply about 30 psi pressure to the system. If the system will not hold this pressure when the compressor is shut off, there is a leak on the suction side.	Make sure above ground connections are tight. Then repeat the test. If necessary, pull the piping and repair the leak.
8. Low well level.	Check well depth against pump performance table to make sure the pump and ejector are properly sized.	If undersized, replace the pump or ejector.
9. Wrong pump-ejector combination.	Check the pump and ejector models against the manufacturer's performance tables.	Replace ejector if wrong model is being used.
10. Low water level in well.	Shut off the pump and allow the well to recover. Restart the pump and note whether delivery drops after continuous operation.	If well is "weak," lower the ejector (deep well pumps), use a tail pipe (deep well pumps), or switch from shallow well to deep well equipment.
11. Plugged ejector.	Remove the ejector and inspect.	Clean and reinstall if it's dirty.
12. Defective or plugged foot valve and/or strainer.	Pull the foot valve and inspect. Partial clogging will reduce delivery. Complete clogging will result in no water flow. A defective foot valve may cause pump to lose prime, resulting in no delivery.	Clean, repair or replace as needed.
13. Worn or defective pump parts or plugged impeller.	Low delivery may result from wear on the impeller or other pump parts. Disassemble and inspect.	Replace worn parts or the entire pump. Clean parts if required.



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