Giant®

TROUBLESHOOTING GUIDE

January 2025

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TROUBLESHOOTING GUIDE

Point-of-use Residential Water Heaters

CONDITION	CAUSE	REMEDY
No hot water.	Dry-fired element.	Replace with new element.
	Main power supply is “OFF”.	Turn “ON” main power supply.
	Burnt fuse.	Replace with new fuse.
	Circuit breaker has tripped.	Reset circuit breaker.
	High limit reset control has tripped.	Reset high limit control by pushing the red reset button.
	Circuit breaker is defective.	Replace with new circuit breaker.
	Defective thermostat.	Replace with new thermostat.
	Defective element.	Replace with new element.
Not enough hot water.	Water heater is undersized.	Install size of water heater that meets demand.
	High hot water demand.	Increase the temperature of the thermostat.
	Very cold water supply.	Increase the temperature of the thermostat.
	Wrong piping connections.	Correct piping.
	Sediment or lime accumulation at bottom of water heater.	Drain water heater. Check to see if water treatment is necessary.
	Hot water plumbing system leaks.	Check hot water plumbing system for leaks and repair.
	Thermostat adjusted too low.	Increase the temperature of the thermostat.
	Defective thermostat.	Replace with new thermostat.
	Defective element.	Replace with new element. In 90% of all cases, it is the bottom element.
	Long runs or exposed piping.	Insulate piping.
	Hot water piping on outside wall.	Insulate piping.
	Defective dip tube.	Replace with new dip tube.
Boiling hot water.	Thermostat temperature set too high.	Lower the temperature on the thermostat.
	Thermostat not in contact with water heater.	Position properly. Be sure insulation is not interfering with thermostat.
	Element attacked by CO_2.	Replace with new element.
	Defective thermostat.	Replace with new thermostat.
Continuous operation.	Water heater is undersized.	Install size of water heater that meets demand.
	Element wattage too small.	Replace with higher element wattage.
	Thermostat not in contact with water heater.	Position properly. Be sure insulation is not interfering with thermostat.
	Thermostat temperature set too low.	Increase the temperature of the thermostat.
	Defective thermostat.	Replace with new thermostat.
	Defective high limit reset control.	Replace with new high limit reset control.
Element failure.	Wiring connections are wrong.	**Refer to the installation manual** for correct wiring.
	Wiring connections are loose.	Locate, clean carefully, reconnect properly.
	Lightning/Power surge.	Inspect/replace fuse, element, and thermostat.
	High voltage.	Check with electrical utility and correct.
	Short circuit.	Locate short circuit and repair.
Thermostat failure.	No power.	Inspect fuse/circuit breaker, replace/reset.
	Loose wiring connection.	Locate, clean carefully, reconnect properly.
	Lightning/Power surge.	Inspect/replace fuse, element, and thermostat.
	Low/High voltage.	Check with electrical utility and correct.
	Short circuit.	Locate short circuit and repair.
Blown fuse/circuit breaker.	Wiring connections are wrong.	**Refer to the installation manual** for correct wiring.
	Wiring connections are loose.	Locate, clean carefully, reconnect properly.
	Lightning/Power surge.	Inspect/replace fuse, element, and thermostat.
	High voltage.	Check with electrical utility and correct.
	Short circuit.	Locate short circuit and repair.
	Power supply wiring undersized.	**Refer to the installation manual** for correct wiring size.
Fuse burns instantly.	Short-circuit.	Locate short circuit and repair.

January 2025

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Fuse burns often.	Fuse contacts oxidized or fuse not screwed in tight enough.	Clean contacts and tighten fuse.
	Power supply wiring is undersized.	**Refer to the installation manual** for correct wiring size.
Smoking wiring.	Lightning/Power surge.	Inspect/replace fuse, element, and thermostat.
	Low/High voltage.	Check with electrical utility and correct.
	Power supply wiring undersized.	**Refer to the installation manual** for correct wiring size.
Service wires charred or hot.	Wiring connections are wrong.	**Refer to the installation manual** for correct wiring.
	Water heater not properly grounded.	Properly ground the water heater.
	Lightning/Power surge.	Inspect/replace fuse, element, and thermostat.
	High voltage.	Check with electrical utility and correct.
	Short circuit.	Locate short circuit and repair.
	Power supply wiring undersized.	**Refer to the installation manual** for correct wiring size.
Drain valve leaks.	Drain valve is open.	Close the drain valve.
	Defective drain valve.	Replace with new drain valve.
Water drips from the relief valve.	Excessive water pressure.	Install a pressure reducing valve.
	Thermal expansion in a closed water system.	Install a suitable expansion tank on the cold water supply line.
	Improperly seated relief valve.	Check relief valve works properly and replace, if necessary.
	Defective thermostat.	Replace with new thermostat.
	Defective relief valve.	Replace with new relief valve.
Water on the floor/drain pan.	Water discharge from the relief valve.	**Refer to the installation manual.**
	Element leaks.	Replace with new element.
	Water heater leaks.	Replace with new water heater.
Condensation.	Water heater filled for the first time.	Let water heater warm up. Problem should go away. If it persists, check all plumbing connections for leaks.
	Heavy draws of hot water with very cold refill water.	Let water heater warm up. Problem should go away. If it persists, check all plumbing connections for leaks.
	Water heater is undersized.	Install size of water heater that meets demand.
Wet insulation.	Leaking plumbing connections.	Locate leak and repair.
	Leaking around heating element.	Tighten, clean, and smooth face of tank flange and element gasket.
	Water discharge from the relief valve.	**Refer to the installation manual.**
Singing element.	Build-up of mineral deposits on element.	Clean element, replace with new element, if necessary.
Singing thermostat.	Thermostat not flush with tank.	Install thermostat properly.
	Wiring connections are loose.	Locate, clean carefully, reconnect properly.
Traces of rust in the hot water.	Anode has been eaten away.	Replace with new anode.
Rusty water.	Water corrosion.	Replace with new water heater.
Rotten egg smell.	High sulfate or mineral content in water.	Change magnesium anode to an aluminum anode and bleach water heater.
Tank bulged.	No relief valve installed.	Install proper relief valve.
	Excessive water pressure.	Install a pressure reducing valve.
	Thermal expansion in a closed water system.	Install a suitable expansion tank on the cold water supply line.

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	Circuit breaker has tripped.	Reset circuit breaker.
	High limit reset control has tripped.	Reset high limit control by pushing the red reset button.
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	Thermostat not in contact with water heater.	Position properly. Be sure insulation is not interfering with thermostat.
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	Defective high limit reset control.	Replace with new high limit reset control.
Element failure.	Wiring connections are wrong.	**Refer to the installation manual** for correct wiring.
	Wiring connections are loose.	Locate, clean carefully, reconnect properly.
	Lightning/Power surge.	Inspect/replace fuse, element, and thermostat.
	High voltage.	Check with electrical utility and correct.
	Short circuit.	Locate short circuit and repair.
Thermostat failure.	No power.	Inspect fuse/circuit breaker, replace/reset.
	Loose wiring connection.	Locate, clean carefully, reconnect properly.
	Lightning/Power surge.	Inspect/replace fuse, element, and thermostat.
	Low/High voltage.	Check with electrical utility and correct.
	Short circuit.	Locate short circuit and repair.
Blown fuse/circuit breaker.	Wiring connections are wrong.	**Refer to the installation manual** for correct wiring.
	Wiring connections are loose.	Locate, clean carefully, reconnect properly.
	Lightning/Power surge.	Inspect/replace fuse, element, and thermostat.
	High voltage.	Check with electrical utility and correct.
	Short circuit.	Locate short circuit and repair.
	Power supply wiring undersized.	**Refer to the installation manual** for correct wiring size.
Fuse burns instantly.	Short-circuit.	Locate short circuit and repair.

January 2025

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Fuse burns often.	Fuse contacts oxidized or fuse not screwed in tight enough.	Clean contacts and tighten fuse.
	Power supply wiring is undersized.	**Refer to the installation manual** for correct wiring size.
Smoking wiring.	Lightning/Power surge.	Inspect/replace fuse, element, and thermostat.
	Low/High voltage.	Check with electrical utility and correct.
	Power supply wiring undersized.	**Refer to the installation manual** for correct wiring size.
Service wires charred or hot.	Wiring connections are wrong.	**Refer to the installation manual** for correct wiring.
	Water heater not properly grounded.	Properly ground the water heater.
	Lightning/Power surge.	Inspect/replace fuse, element, and thermostat.
	High voltage.	Check with electrical utility and correct.
	Short circuit.	Locate short circuit and repair.
	Power supply wiring undersized.	**Refer to the installation manual** for correct wiring size.
Drain valve leaks.	Drain valve is open.	Close the drain valve.
	Defective drain valve.	Replace with new drain valve.
Water drips from the relief valve.	Excessive water pressure.	Install a pressure reducing valve.
	Thermal expansion in a closed water system.	Install a suitable expansion tank on the cold water supply line.
	Improperly seated relief valve.	Check relief valve works properly and replace, if necessary.
	Defective thermostat.	Replace with new thermostat.
	Defective relief valve.	Replace with new relief valve.
Water on the floor/drain pan.	Water discharge from the relief valve.	**Refer to the installation manual.**
	Element leaks.	Replace with new element.
	Water heater leaks.	Replace with new water heater.
Condensation.	Water heater filled for the first time.	Let water heater warm up. Problem should go away. If it persists, check all plumbing connections for leaks.
	Heavy draws of hot water with very cold refill water.	Let water heater warm up. Problem should go away. If it persists, check all plumbing connections for leaks.
	Water heater is undersized.	Install size of water heater that meets demand.
Wet insulation.	Leaking plumbing connections.	Locate leak and repair.
	Leaking around heating element.	Tighten, clean, and smooth face of tank flange and element gasket.
	Water discharge from the relief valve.	**Refer to the installation manual.**
Singing element.	Build-up of mineral deposits on element.	Clean element, replace with new element, if necessary.
Singing thermostat.	Thermostat not flush with tank.	Install thermostat properly.
	Wiring connections are loose.	Locate, clean carefully, reconnect properly.
Traces of rust in the hot water.	Anode has been eaten away.	Replace with new anode.
Rusty water.	Water corrosion.	Replace with new water heater.
Rotten egg smell.	High sulfate or mineral content in water.	Change magnesium anode to an aluminum anode and bleach water heater.
Tank bulged.	No relief valve installed.	Install proper relief valve.
	Excessive water pressure.	Install a pressure reducing valve.
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January 2025

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TROUBLESHOOTING GUIDE

Residential Gas-fired Water Heaters
Atmospheric Vent

Note: Troubleshooting must be done by a qualified service technician familiar with the start up and check out procedure.

1. Manifold gasket properly sealed.
2. Viewport not damaged or cracked.
3. Flame-arrestor free of debris and undamaged.
4. Two piece wire connector properly installed.
5. No leaks at pilot and manifold connection.
6. Manifold door screws securely tightened.
7. Depress the button on the thermal switch

TROUBLESHOOTING CHART

PROBLEM	POSSIBLE CAUSE(S)	CORRECTIVE ACTION
BURNER WILL NOT IGNITE	1. Pilot not lit 2. Thermostat set too low 3. No gas 4. Dirt in the gas lines 5. Pilot line clogged 6. Main burner line clogged 7. Non-functioning thermocouple 8. Non-functioning thermostat 9. Heater installed in a confined area	1. Light pilot 2. Turn temp. dial to desired temperature 3. Check with gas utility company 4. Notify utility-install trap in gas line 5. Clean, locate source and correct 6. Clean, locate source and correct 7. Replace thermocouple 8. Replace thermostat 9. Provide fresh air ventilation
SMELLY WATER	1. Sulfides in the water	1. Replace the anode with a special anode
BURNER FLAME YELLOW-LAZY	1. Insufficient secondary air 2. Low gas pressure 3. Water heater flue or vent system blocked 4. Main burner line clogged 5. Heater installed in a confined area 6. Obstruction in main burner orifice	1. Provide ventilation to water heater 2. Check with gas utility company 3. Clean, locate source and correct 4. Clean, locate source and correct 5. Proper fresh air ventilation 6. Clean or replace orifice
PILOT WILL NOT LIGHT OR REMAIN LIT	1. Non-functioning igniter 2. The thermal switch tripped 3. Wire lead connection at thermal switch loose 4. Thermocouple connection loose 5. Air in gas line 6. Low gas pressure 7. No gas 8. Dirt in gas lines 9. Cold drafts 10. Thermostat ECO switch open 11. Pilot line or orifice clogged 12. Non-functioning thermocouple 13. Air for combustion obstructed 14. Flammable vapours incident, FVIR function actuated	1. Replace igniter pilot assembly 2. See “Pilot Light Troubleshooting Flowchart section” 3. Remove and reconnect the wire leads at thermal switch, confirm connections are tight and not loose 4. Finger tighten; then 1/4 turn with wrench 5. Bleed the air from the gas line 6. Check with gas utility company 7. Check with gas utility company 8. Notify utility-install dirt trap in gas line 9. Locate source and correct 10. Replace thermostat 11. Clean, locate source and correct 12. Replace thermocouple 13. See maintenance section for inspection and cleaning of flame trap 14. Replace water heater, eliminate flammable vapours source. Contact a qualified service technician.
HIGH OPERATION COSTS	1. Thermostat set too high 2. Sediment or lime in tank 3. Water heater too small for job 4. Wrong piping connections 5. Leaking faucets 6. Gas leaks 7. Wasted hot water 8. Long runs of exposed piping 9. Hot water piping in exposed wall	1. Set temperature dial to lower setting 2. Drain/flush-provide water treatment if needed 3. Install adequate heater 4. Correct piping-dip tube must be in cold inlet 5. Repair faucets 6. Check with utility-repair at once 7. Advise customer 8. Insulate piping 9. Insulate piping
INSUFFICIENT HOT WATER	1. Thermostat set too low 2. Sediment or lime in tank 3. Water heater too small 4. Wrong piping connections 5. Leaking faucets 6. Wasted hot water 7. Long runs of exposed piping 8. Hot water piping in outside wall 9. Low gas pressure	1. Turn temperature dial to desired setting 2. Drain/flush-provide water treatment if needed 3. Install adequate heater 4. Correct piping-dip tube must be in cold inlet 5 Repair faucets 6. Advise customer 7. Insulate piping 8. Insulate piping 9. Check with gas utility company

January 2025

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TROUBLESHOOTING GUIDE

Residential Gas-fired Water Heaters
Atmospheric Vent

PROBLEM	POSSIBLE CAUSE(S)	CORRECTIVE ACTION
SLOW HOT WATER RECOVERY	1. Insufficient secondary air 2. Water heater flue or vent system blocked 3. Low gas pressure 4. Improper calibration 5. Thermostat set too low 6. Water heater too small 7. Wrong piping connections 8. Wasted hot water	1. Provide ventilation to water heater. Check flue way, flue baffle, and burner 2. Clean flue, locate source and correct 3. Check with gas utility company 4. Replace thermostat 5. Turn temperature dial to desired setting 6. Install adequate heater 7. Correct piping-dip tube must be in cold inlet 8. Advise customer
DRIP FROM RELIEF VALVE	1. Excessive water pressure 2. Heater stacking 3. Closed water system	1. Use a pressure reducing valve and relief valve 2. Lower the thermostat setting 3. See “Closed System/Thermal Expansion”
THERMOSTAT FAILS TO SHUT-OFF	1. Thermostat not functioning properly 2. Improper calibration	1. Replace thermostat 2. Replace thermostat
COMBUSTION ODOURS	1. Insufficient secondary air 2. Water heater flue or vent system blocked 3. Heater installed in a confined area	1. Provide ventilation to water heater. Check flueway, flue baffle, and burner 2. Clean, locate source and correct 3. Provide fresh air ventilation
SMOKING AND CARBON FORMATION (SOOTING)	1. Insufficient secondary air 2. Low gas pressure 3. Water heater flue or vent system blocked 4. Thermostat not functioning properly 5. Heater installed in a confined area 6. Burner flame yellow-lazy	1. Provide ventilation to water heater. Check flue way, flue baffle, burner 2. Check with gas utility company 3. Clean, locate source and correct 4. Replace thermostat 5. Provide fresh air ventilation 6. See “Burner Flame Yellow-Lazy”
CONDENSATION	1. Temperature setting too low	1. Increase the temperature setting
BURNER FLAME FLOATS AND LIFTS OFF PORTS	1. Orifice too large 2. High gas pressure 3. Water heater flue or vent system blocked 4. Cold drafts	1. Replace with correct orifice 2. Check with gas utility company 3. Clean flue and burner-locate source and correct 4. Locate source and correct
BURNER FLAME TOO HIGH	1. Orifice too large	1. Replace with correct orifice
FLAME BURNS AT ORIFICE	1. Thermostat not functioning properly 2. Low gas pressure	1. Replace thermostat 2. Check with gas utility company
PILOT FLAME TOO SMALL	1. Pilot line or orifice clogged 2. Low gas pressure	1. Clean, locate source and correct 2. Check with gas utility company

January 2025

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TROUBLESHOOTING GUIDE

Residential Gas-fired Water Heaters
Atmospheric Vent - Powered Damper

No Hot Water

Use the following step-by-step plan as a guide to help determine why you have no hot water.

1 Check the Status Light

The Status Light on the gas control valve flashes once every four seconds when there are no problems and there is no call for heat.

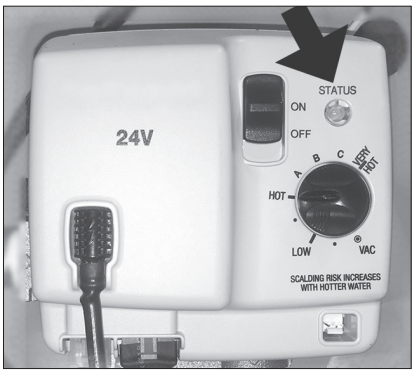

Figure 28 - Status Light

If the Status Light is flashing once every four seconds and you have no hot water, make sure the gas control knob is set to HOT.

If the Status Light flashes a different pattern than is described above, refer to “Gas Control Valve/Thermostat - Status Light Codes” starting on page 23.

If the Status Light is not flashing, go to Step 2.

2 Status Light is Not Flashing

If the Status Light on the gas control valve/thermostat does not flash, the system may be locked out. Refer to “Gas Control Valve/Thermostat - Status Light Codes” on page 23. Be sure to read the notes at the top of the flowchart.

Insufficient Hot Water or Slow Hot Water Recovery

⚠ WARNING! Because of the increased risk from scalding, if you set the water heater’s gas control knob higher than 120°F (49°C), install Thermostatic Mixing Valves. Due to the increased risk of scalding, do not set the temperature of the Thermostatic Mixing Valves above 120°F (49°C).

If the hot water is simply not warm enough, there are several possible causes:

- Faulty Thermostatic Mixing Valve in a faucet or shower control (check other faucets in the house for hot water).
- Water heater’s capacity too small (or usage too high).
- Reversed plumbing connections or melted dip tube (usually found soon after new installation).
- Plumbing leak.
- Sediment or lime buildup in the bottom of the tank.

Thermostatic Mixing Valves: If the hot water is simply not warm enough, make sure the faucet you are checking does not have a defective Thermostatic Mixing Valve. Many shower controls now have built-in mixing valves. If these devices fail, they can reduce the amount of hot water the shower or faucet delivers even though there is plenty of hot water in the tank. Always check the water temperature at several faucets to make sure the problem is not in a faucet or shower control.

Undersized Water Heater: If your water heater runs out of hot water quickly, it may be too small for your needs. If the water heater is old, consider replacing it with a larger model. If the water heater is in good condition, you may be able to meet your family’s hot water needs with the existing water heater by installing Thermostatic Mixing Valves and then turning the gas control knob to a higher setting.

You can also reduce your home’s hot water needs by washing clothes in cold water, installing flow restrictors on shower heads, repairing leaky faucets, and taking other conservation steps.

Reversed Connections or Melted Dip Tube: Check the hot and cold water connections and make sure your home’s hot water pipe is connected to the hot water outlet on the water heater. Usually, reversed connections are found soon after the installation of a new unit. If copper pipes were soldered while they were attached to the water heater, the dip tube may have melted. The dip tube is a long, plastic tube inside the tank attached to the cold water inlet. If the dip tube has melted, it can be replaced by removing the cold water inlet connection, removing the old dip tube and installing a new one.

Plumbing Leak: Even a small leak in the hot water side of the home’s plumbing system can make it appear that the water heater is producing little to no hot water. In this case, the burner will be on all or almost all the time, yet you will have very little hot water. Locate and repair the leak.

Sediment or Lime in Tank: With an existing water heater, if you have some hot water but not as much as you are used to, there may be a buildup of sediment or lime on the bottom of the tank. Sediment or lime

January 2025

buildup can reduce the efficiency of your water heater. Heavy deposits can damage the water heater. See the Maintenance section for steps on draining and flushing the water heater.

Temperature Too High

Adjust the thermostat on the water heater to a lower setting. Install or adjust Thermostatic Mixing Valves (see the valve manufacturer's instructions).

Low Water Pressure

Check both the cold and hot water at a sink to determine if the lower pressure is only on the hot water side. If both hot and cold faucets have low pressure, call your local water utility. If the low pressure is only on the hot water side, the primary causes are:

- Melted heat traps or dip tube. Soldering copper pipes while they are connected to the water heater can melt the heat traps inside the hot and cold water connections or the dip tube (cold water side). Melted heat traps or a melted dip tube can restrict the flow of hot water. If that is the case, replace the heat traps or dip tube.
- Partially closed supply valve. Open the water heater's supply valve fully.

Drips from T&P Relief Valve Discharge Pipe

A small amount of water dripping from the Temperature and Pressure (T&P) Relief Valve usually means the home's water pressure is too high and/or you need a Thermal Expansion Tank. See Step 1 (page 10) in the Installation section of this manual for more information.

A large amount of hot water coming from the T&P discharge pipe may be due to the tank overheating. If the T&P Relief Valve is discharging large amounts of very hot water, turn OFF the gas supply valve/thermostat and call a qualified person.

⚠ WARNING! Do not cap or plug the T&P Relief Valve or discharge pipe, and do not operate the water heater without a functioning T&P Relief Valve — this could cause an explosion.

Water Pressure Too High: High water pressure can cause the T&P Relief Valve to drip. Install a Pressure Reducing Valve (PRV) on the main cold water supply line.

Thermal Expansion Tank: Install a Thermal Expansion Tank. If a Thermal Expansion Tank is already installed and the T&P Relief Valve discharge pipe drips, the home's water pressure may be too high or the Thermal Expansion Tank may be defective. Refer to the instructions that came with the Thermal Expansion Tank for more information.

Debris: In rare cases, debris can stick inside the T&P Relief Valve preventing the valve from sealing fully. In that case, the T&P Relief Valve discharge pipe will drip. You may be able to clear debris from the T&P Relief Valve by manually operating the valve, allowing small quantities of water to flush out the debris. Refer to the T&P Relief Valve Maintenance section of this manual.

⚠ WARNING! When manually operating the Temperature Pressure Relief Valve, make sure that no one is in front of or around the discharge outlet. The water may be extremely hot and could cause severe burns.

Also ensure that the water discharge will not cause property damage.

If the water pressure is below 80 psi (551 kPa), a Thermal Expansion Tank is installed and properly pressurized, and the valve has been cleared of any debris, and it still drips, the valve may be broken — have a qualified person replace the T&P Relief Valve.

Water Odor

Harmless bacteria normally present in tap water can multiply in water heaters and give off a "rotten egg" smell. Although eliminating the bacteria that causes "smelly water" is the only sure treatment, in some cases, the standard anode rod that came with your water heater can be replaced with a special zinc anode rod which may help reduce or eliminate the odor. Contact a qualified person.

NOTICE: To protect the tank, an anode rod must be installed in the water heater at all times or the warranty is void.

In cases where the "rotten egg" smell is very strong, you could increase the tank temperature to 140°F (60°C) in order to reduce bacterial growth in the tank.

⚠ WARNING! Because higher temperatures increase the risk of scalding, if you set the thermostat(s) higher than 120°F (49°C), Thermostatic Mixing Valves are particularly important.

January 2025

TROUBLESHOOTING GUIDE

Residential Gas-fired Water Heaters
Atmospheric Vent - Powered Damper

Gas Control Valve/Thermostat - Status Light Codes

NOTICE:

- These codes apply to the gas control valve/thermostat. The location of the gas control valve/thermostat is shown on page 2.
- Refer to the following pages for detailed troubleshooting procedures.

EXAMPLE: An "Eight-Four Flash" will show eight flashes, then four flashes, followed by a three second pause. The pattern will then repeat.

LED FLASH SEQUENCE	GAS CONTROL VALVE/ THERMOSTAT STATUS	CORRECTIVE ACTION
Short Flash once every four seconds	IDLE (no call for heat, no fault conditions)	
"Heartbeat", alternates bright/dim	Call for Heat (no fault conditions)	
One Flash, three second pause	Low Flame Signal (control continues to operate)	Turn the power switch on the gas control valve/thermostat to the "OFF" position and unplug the power cord from the power outlet. 1. Check the incoming gas line pressure to ensure adequate supply to the water heater. If incoming gas supply pressure is adequate, proceed to Step 2. 2. Check all wiring connections and ensure all harness and wire connections are seated firmly and provide proper electrical contact. If no connection problems are found, proceed to Step 3. Firmly seat any loose connections found. If any connections are found to be damaged, consult the replacement parts list for the appropriate replacement. After any connection problems are fixed, restart the water heater by following the lighting instructions on page 18. If the problem persists, proceed to Step 3. 3. Check the condition of the base ring filter and flame arrestor. If they are clogged, follow the instructions for cleaning on page 30. If parts are not clogged, proceed to Step 4. After cleaning, follow the instructions for lighting on page 18. If problem persists, proceed to Step 4. 4. Follow the instructions on page 29 to remove the burner assembly. Once the burner assembly has been removed, inspect the manifold tube and burner for any obstructions. If any clogs or obstructions are present, clear them. Inspect the pilot assembly's electrode/flame sense rod for corrosion buildup, degradation, or damage. If there is evidence of any damage to the electrode/flame sense rod, replace the igniter/pilot assembly. Follow the directions on page 29 to re-install the burner assembly into the combustion chamber. Follow the instructions for lighting on page 18. If the problem persists, contact a qualified service representative.
Two Flash, three second pause	End Switch Failed Closed	Look at the top of the water heater to see if the damper is open (Figure 21 on page 16). If the damper is open, ensure there is no obstruction that would prevent the damper from closing. If there are any obstructions, turn the power switch on the gas control valve/thermostat to the "OFF" position, then remove the obstruction. If the damper closes, turn the power switch on the gas control valve/thermostat to the "ON" position. If there are no obstructions present, turn the power switch on the gas control valve/ thermostat to the "OFF" position. Observe the damper to see if the damper closes. If the damper does not close, unplug the power cord from the power outlet and proceed to Step 1. If the damper closes, turn the power switch on the gas control valve/thermostat to the "ON" position. 1. Check all wiring connections to ensure all harness and wire connections are seated firmly and provide proper electrical contact. If no connection problems are found, replace the damper. Firmly seat any loose connections found. If any connections are found to be damaged, consult the replacement parts list on pages 32-33 for the appropriate replacement. After any connection problems are fixed, restart the water heater by following the lighting instructions on pages 18. If the problem persists, replace the damper.
Three Flash, three second pause	End Switch Failed Open or TCO (Thermal Cutoff) Limit Lockout	Turn the power switch on the gas control valve/thermostat to the "OFF" position and unplug the power cord from the power outlet. 1. Attempt to depress the TCO door switch button (see "Completed Installation" illustration on page 2). If the TCO door switch button depresses, follow the instructions for cleaning the filter and flame arrestor on page 30. After cleaning is completed, follow the lighting instructions on pages 18. If the TCO door switch button does not depress, proceed to Step 2. 2. Follow the lighting instructions on pages 18. Observe the damper during initial startup. If there is a call for heat and the damper opens, allow the unit to continue to perform and monitor any change in status. If there is a call for heat and the damper does not open, proceed to Step 3. 3. Check all wiring connections and ensure all harness and wire connections are seated firmly and provide proper electrical contact. If no connection problems are found, replace the damper. Firmly seat any loose connections found. If any connections are found to be damaged, consult the replacement parts list on pages 32-33. After any connection problems are fixed, restart the water heater by following the lighting instructions on pages 18. If the problem persists, replace the damper.
Four Flash, three second pause	ECO Limit Lockout	Turn the power switch on the gas control valve/thermostat to the "OFF" position, wait 10-20 seconds, then turn the power switch on the gas control valve/thermostat to the "ON" position. If the problem persists, replace the gas control valve/thermostat (see page 28).
Five Flash, three second pause	Flame Out Sequence	Turn the power switch on the gas control valve/thermostat to the "OFF" position. Wait 10 minutes, then follow the lighting instructions on pages 18. If the problem persists, replace the gas control valve/ thermostat (see page 28).

January 2025

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TROUBLESHOOTING GUIDE

Residential Gas-fired Water Heaters
Atmospheric Vent - Powered Damper

LED FLASH SEQUENCE	GAS CONTROL VALVE/ THERMOSTAT STATUS	CORRECTIVE ACTION
Six-One Flash, three second pause	Soft Lockout* - Retry Limit - Failed TFI (Trial for Ignition)	Turn the power switch on the gas control valve/thermostat to the “OFF” position. Unplug the water heater from the wall outlet. Plug the power cord back in, then follow the lighting instructions on page 18. If that does not work, turn the power switch on the gas control valve/thermostat to the “OFF” position, unplug the power cord from the power outlet, then follow the steps below. 1. Check the incoming gas line pressure to ensure adequate supply to the water heater. If incoming gas supply pressure is adequate, proceed to Step 2. 2. Check all wiring connections and ensure all harness and wire connections are seated firmly and provide proper electrical contact. If no connection problems are found, proceed to Step 3. Firmly seat any loose connections found. If any connections are found to be damaged, consult the replacement parts list for the appropriate replacement. After any connection problems are fixed, restart the water heater by following the lighting instructions on page 18. If the problem persists, proceed to Step 3. 3. Check the condition of the base ring filter and flame arrestor. If they are clogged, follow the instructions for cleaning on page 30. If parts are not clogged, proceed to Step 4. After cleaning, follow the instructions for lighting on page 18. If problem persists, proceed to Step 4. 4. Follow the instructions on page 29 to remove the burner assembly. Once the burner assembly has been removed, inspect the manifold tube and burner for any obstructions. If any clogs or obstructions are present, clear them. Inspect the pilot assembly’s electrode/flame sense rod for corrosion buildup, degradation, or damage. If there is evidence of any damage to the electrode/flame sense rod, replace the igniter/pilot assembly. Follow the directions on page 29 to re-install the burner assembly into the combustion chamber. Follow the instructions for lighting on page 18. If the problem persists, contact a qualified service representative.
Six-Two Flash, three second pause	Soft Lockout* - Recycle Limit - Flame Lost - END Switch Fails	Turn the power switch on the gas control valve/thermostat to the “OFF” position and unplug the power cord from the power outlet. 1. Check all wiring connections to ensure all harness and wire connections are seated firmly and provide proper electrical contact. If no connection problems are found, replace the damper. Firmly seat any loose connections found. If any connections are found to be damaged, consult the replacement parts list on pages 32-33 for the appropriate replacement. After any connection problems are fixed, restart the water heater by following the lighting instructions on page 18. If the problem persists, replace the damper.
Six-Three Flash, three second pause	Soft Lockout* - Recycle Limit - Flame Lost	Turn the power switch on the gas control valve/thermostat to the “OFF” position and unplug the power cord from the power outlet. 1. Check the incoming gas line pressure to ensure adequate supply to the water heater. If incoming gas supply pressure is adequate, proceed to Step 2. 2. Check all wiring connections and ensure all harness and wire connections are seated firmly and provide proper electrical contact. If no connection problems are found, proceed to Step 3. Firmly seat any loose connections found. If any connections are found to be damaged, consult the replacement parts list for the appropriate replacement. After any connection problems are fixed, restart the water heater by following the lighting instructions on page 18. If the problem persists, proceed to Step 3. 3. Check the condition of the base ring filter and flame arrestor. If they are clogged, follow the instructions for cleaning on page 30. If parts are not clogged, proceed to Step 4. After cleaning, follow the instructions for lighting on page 18. If problem persists, proceed to Step 4. 4. Follow the instructions on page 29 to remove the burner assembly. Once the burner assembly has been removed, inspect the manifold tube and burner for any obstructions. If any clogs or obstructions are present, clear them. Inspect the pilot assembly’s electrode/flame sense rod for corrosion buildup, degradation, or damage. If there is evidence of any damage to the electrode/flame sense rod, replace the igniter/pilot assembly. Follow the directions on page 29 to re-install the burner assembly into the combustion chamber. Follow the instructions for lighting on page 18. If the problem persists, contact a qualified service representative.
Six-Four Flash, three second pause	Soft Lockout* - Flame Out of Sequence Sensed	Turn the power switch on the gas control valve/thermostat to the “OFF” position and unplug the power cord from the power outlet. Wait 10 minutes, then follow the lighting instructions on page 18. If the problem persists, replace the gas control valve/thermostat (see page 28).
Seven Flash, three second pause	Flammable Vapor Sensor (FVS) Lockout	1. Do not touch any electrical switch, do not use any phone in the building, and do not try to light any appliance. 2. Smell around the water heater to ensure there are no gas leaks at the gas control valve/thermostat or in the supply gas line or for any other type of flammable vapors in the area. 3. Carefully inspect the area surrounding the water heater for any substances such as gasoline, paint, paint thinners, varnish, or cleaners that could emit flammable vapors. Remove anything that can potentially emit flammable vapors from the area and store it properly in a different location. 4. Contact a qualified service representative for inspection and/or replacement of the FV sensor.
Eight-One Flash, three second pause	Flammable Vapor Sensor (FVS) Fault Detected	Turn the power switch on the gas control valve/thermostat to the “OFF” position, wait 10-20 seconds, then turn the power switch on the gas control valve/thermostat to the “ON” position. If the problem persists, replace the gas control valve/thermostat.
Eight-Two Flash, three second pause	Temperature Sensor Fault Detected	Turn the power switch on the gas control valve/thermostat to the “OFF” position, wait 10-20 seconds, then turn the power switch on the gas control valve/thermostat to the “ON” position. If the problem persists, replace the gas control valve/thermostat.
Eight-Three Flash, three second pause	Electronic Fault Detected	Turn the power switch on the gas control valve/thermostat to the “OFF” position, wait 10-20 seconds, then turn the power switch on the gas control valve/thermostat to the “ON” position. If the problem persists, replace the gas control valve/thermostat.
Eight-Four Flash, three second pause	Gas Control Valve/Thermostat Fault Detected	Turn the power switch on the gas control valve/thermostat to the “OFF” position, wait 10-20 seconds, then turn the power switch on the gas control valve/thermostat to the “ON” position. If the problem persists, replace the gas control valve/thermostat.

*Soft Lockout - 20 minute wait before returning to normal operating mode.

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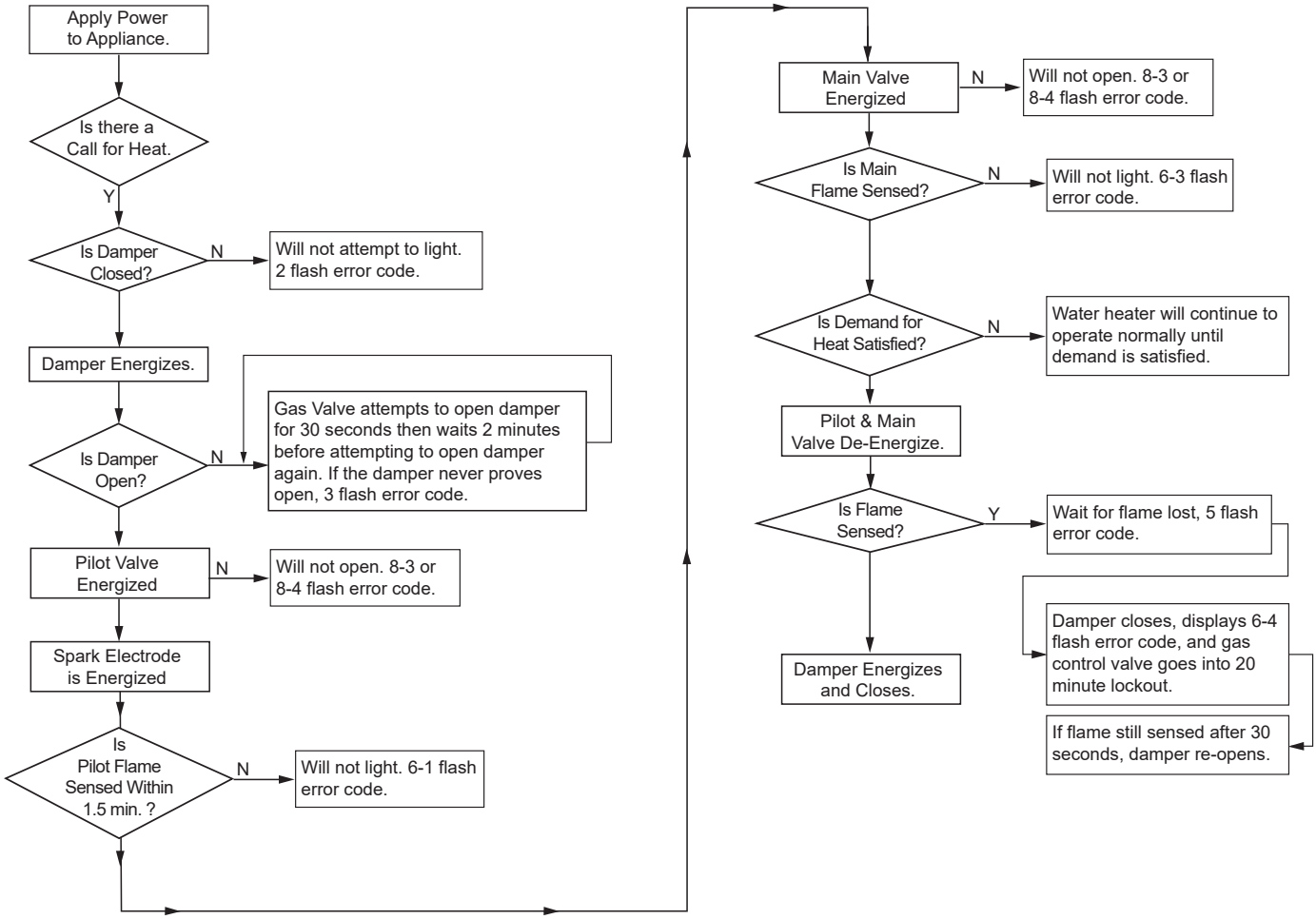
Residential Gas-fired Water Heaters
Atmospheric Vent - Powered Damper

Sequence of Operations Chart



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TROUBLESHOOTING GUIDE

Residential Gas-fired Water Heaters
Power Vent

These guidelines should be utilized by a qualified service technician or agent.

Problem	Possible Cause(s)	Corrective Action
BURNER FLAME TOO HIGH	1. Air inlets blocked 2. Insufficient secondary air 3. Orifice too large	1. Unblock inlet air openings 2. Provide ventilation to water heater 3. Replace with correct orifice
FLAME BURNS AT ORIFICE	1. Low gas pressure 2. Defective gas control/thermostat	1. Check with gas utility company 2. Replace gas control/thermostat
INSUFFICIENT HOT WATER	1. Low gas pressure 2. Orifice too small 3. Thermostat set too low 4. Gas control error codes 5. Sediment or lime in tank 6. Water heater too small 7. Wrong piping connections 8. Leaking faucets 9. Wasted hot water 10. Long runs of exposed piping 11. Hot-water piping in outside wall	1. Check with gas utility company 2. Replace with correct orifice 3. Turn temperature knob to higher setting 4. Refer to gas control error codes 5. Drain/flush-provide water treatment if needed 6. Install adequate heater 7. Correct piping: dip tube must be in cold inlet 8. Repair faucets 9. Advise customer 10. Insulate piping 11. Insulate piping
WATER IS TOO HOT	1. Thermostat is too high 2. Defective gas control/thermostat	1. Turn temperature knob to lower setting 2. Replace the gas control/thermostat
SLOW HOT WATER RECOVERY	1. Insufficient secondary air 2. Low gas pressure 3. Orifice too small 4. Thermostat set too low 5. Heater too small 6. Wrong piping connection 7. Wasted hot water 8. Flue clogged 9. Air inlets blocked	1. Provide ventilation to water heater. Check flue way, flue baffle and burner 2. Check with gas utility company 3. Replace with correct orifice 4. Turn temperature knob to higher setting 5. Install adequate heater 6. Correct piping-dip tube must be in cold inlet 7. Advise customer 8. Clean flue, locate source and correct 9. Unblock inlet air openings
DRIP FROM RELIEF VALVE	1. Pressure build-up 2. Heater stacking 3. Closed water system 4. Improperly seated valve	1. Use a pressure-reducing valve and relief valve 2. Lower the thermostat setting 3. See thermal expansion section 4. Check Relief valve for proper operation (Do Not plug T&P valve)
GAS CONTROL VALVE/ THERMOSTAT FAILS TO SHUT OFF	1. Defective gas control/thermostat	1. Replace gas control/thermostat
SMELLY WATER	1. Sulfides in water supply 2. Bacteria in water supply 3. Standard anode incompatible with water composition	1. Chlorination procedure 2. Chlorination procedure 3. Install special anode
CONDENSATION	1. Filling the new water heater for the first time 2. Moisture from the products of combustion 3. Water dripping from blower assembly 4. Undersized water heater	1. Normal operation: the condensation should disappear after heater warms up 2. Normal operation: the condensation should disappear in time 3. Install condensate hose to drain port on the rubber coupling 4. Install adequate heater

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TROUBLESHOOTING GUIDE

Residential Gas-fired Water Heaters
Power Vent

Problem	Possible Cause(s)	Corrective Action
COMBUSTION ODOURS	1. Air inlets blocked 2. Insufficient secondary air 3. Flue clogged 4. Heater installed in a confined area 5. House too tight	1. Unblock inlet air openings 2. Provide fresh air ventilation to the water heater 3. Clean, locate source and correct 4. Provide fresh air ventilation to the water heater 5. Provide fresh air ventilation to the water heater
SMOKING AND CARBON FORMATION	1. Air inlets blocked 2. Insufficient secondary air 3. Low gas pressure 4. Orifice too large 5. Flue clogged 6. Defective gas control/thermostat 7. Heater installed in a confined area	1. Unblock inlet air openings 2. Provide ventilation to water heater. Check flue way, flue baffle and burner 3. Check with gas utility company 4. Replace with correct orifice 5. Clean, locate source and correct 6. Replace gas control/thermostat 7. Provide fresh air ventilation
UNABLE TO LIGHT THE BURNER	1. Air in gas line 2. Pressure switch 3. Blocked exhaust 4. Wire connection 5. Defective gas control/thermostat 6. Defective igniter	1. Purge the air from gas line 2. Check the pressure switch, make sure the pressure switch hose is not kinked 3. Check vent pipe for blockage 4. Check wire connections 5. Replace the gas control/thermostat 6. Replace igniter
SIZZLING, RUMBLING NOISE	1. Scale and sediment 2. Condensation dripping on burner	1. Drain/flush-provide water treatment if needed 2. Refer to “Condensate” section
WATER LEAKAGE	1. Condensation 2. Dripping Temperature & Pressure Relief Valve 3. Thermostat does not shut-off 4. Drain valve dripping/leaking 5. Tank Leak	1. Refer to “Condensate” section 2. Refer to “Temperature & Pressure Relief Valve” section 3. Check the Thermostat 4. Back flush to clean-out sediment, replace if necessary. 5. Check “Leakage Checkpoints”
BLOWER WILL NOT START	1. No power to unit 2. Thermostat set too low 3. Defective air pressure switch 4. Defective blower 5. Disconnected or loose wire 6. Control locked out 7. Incorrect polarity	1. Plug in power cord, check fuses and/or supply voltage 2. Turn temperature knob to higher setting 3. Replace air pressure switch 4. Replace blower 5. Repair and reconnect wires 6. Reset – determine cause of lockout 7. Repair polarity
BLOWER RUNS CONTINUOUSLY	1. Air pressure switch not closing due to insufficient draft – check for: 2. Vent piping blocked 3. Piping length too long 4. Clogged/dirty blower 5. Disconnected, torn or blocked pressure switch hose from air pressure switch to blower housing 6. Defective pressure switch 7. High limit switch open due to excessive vent temperature or defective switch	1. Determine cause of insufficient draft. Check draft with manometer at pressure switch 2. Remove blockage 3. Reduce vent length/increase vent size 4. Clean blower wheel 5. Reconnect or replace pressure switch hose 6. Replace defective pressure switch 7. Determine cause of overheating check for: overfiring, insufficient air supply, high ambient air temperature (once high limit switch activated, must be replaced)

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TROUBLESHOOTING GUIDE

Residential Gas-fired Water Heaters
Power Vent

Problem	Possible Cause(s)	Corrective Action
HOT SURFACE IGNITER NOT GLOWING FOLLOWING WARM-UP PERIOD	1. 120VAC polarity reversed at 120VAC outlet receptacle 2. Defective hot surface igniter 3. Defective gas control/thermostat	1. Reverse polarity at 120VAC outlet receptacle 2. Replace igniter 3. Replace gas control/thermostat
VENT PIPE TOO HOT (ABOVE 149°F)	1. Blower does not run when heater fired 2. Not enough dilution air to mix with flue gases 3. Air in room too hot for mixing with flue gases 4. Wrong burner orifice 5. Baffle incorrect or missing	1. Refer to “BLOWER WILL NOT START” problem 2. Proper air circulation must be provided for combustion and dilution of flue temp 3. Room air to be used for dilution with combustion products in flue should be less than 90°F 4. Install correct orifice. 5. Contact a qualified service technician

White-Rodgers

Ignition State	Timing
Pre-purge	5 seconds
Igniter Warmup	10 seconds
Trial For Ignition	4 seconds
Inter-purge	5 seconds
Flame Failure Response Time	2 seconds
Post-purge	30 seconds
Ignition Retries	2 retries, 3 trials before Lockout
Ignition Recycles	2 recycles, 3 losses of flame before lockout
Soft Lockout	20 minutes
Automatic Restart Time	60 minutes

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TROUBLESHOOTING GUIDE

Residential Gas-fired Water Heaters
Power Vent

Sytem Error Codes (White-Rodgers)

The computer inside the gas control monitors the ignition sequence, temperature settings and overall operation of the heater. If any of these parameters does not operate properly the computer will shut down the water heater and flash an error code. See the "Intelli-Vent™ System Error Codes" and "Troubleshooting Guide" to diagnose the problem before attempting corrective action.

Intelli-Vent™ System Error Codes

Symptom	Possible Cause(s)	Corrective Action
Error 1 	An open earth ground circuit to the ignition system.	1. Check that the earth ground conductor is properly connected at the fuse box or breaker panel and the water heater. 2. Check that the grounding conductors on the water heater are properly connected and secure.
Error 2 	The self diagnostic test detected a wiring error, reversed polarity or a high resistance to earth ground.	1. Check for proper connection of the line neutral and line hot wires. 2. Check that the appliance is securely connected to earth ground.
Error 3 	The pressure switch remained closed longer than 5 seconds after the call for heat began. Blower does not start.	1. The pressure switch wiring is incorrect. 2. The pressure switch is defective and must be replaced.
Error 4 	The pressure switch remained open longer than 5 seconds after the combustion blower was energized.	1. The pressure switch wiring is incorrect. 2. The pressure switch tubing is not connected correctly. 3. Obstructions or restrictions in the water heater air intake or exhaust flue. 4. Check the high temperature limit switch.
Error 5 	The self diagnostic test has detected an error in the hot surface igniter circuit.	1. Check that all wiring is correct and secure. 2. Disconnect the igniter connector and measure the igniter resistance with an accurate ohmmeter between pins 1 and 2. Resistance should be between 11.5 and 18.8 ohms. If the reading is incorrect, replace the hot-surface igniter. 3. If the above checks are good, replace the control.
Error 6 	The maximum number of ignition retries or recycles has been reached and the system is in lockout for an hour. Cycle the power to the water heater off and on to reset.	1. Ensure the igniter is positioned correctly. 2. Ensure the voltage to the water heater is 115-125 VAC. 3. Clear any obstructions or restrictions in the water heater air intake or exhaust flue.
Error 7 	The self-diagnostic test found a problem with the gas valve driver circuit.	1. Cycle power to the water heater “OFF” for 10 seconds and then back “ON”. 2. If the above step did not clear the error, the control must be replaced.
Error 8 	The self-diagnostic test has detected a problem with the internal microcomputer.	1. Cycle the external power “OFF” for 10 seconds and then back “ON”. 2. If the above step does not clear the error, the control must be replaced
Error 9 	The self-diagnostic test has detected a problem with the internal circuit.	1. Cycle the external power “OFF” for 10 seconds and then back “ON”. 2. If the above step does not clear the error, the control must be replaced.
Error 10 	Flame signal sensed out of proper sequence.	1. Ensure flame sensor ceramic insulator is not cracked. 2. Turn power off for 10-20 seconds, and then on again to clear the error code. 3. Replace the control.

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TROUBLESHOOTING GUIDE

Residential Gas-fired Water Heaters
Power Vent

Symptom	Possible Cause(s)	Corrective Action
Error 11 	The high temperature thermal cutoff is open.	1. Turn the power off for 10-20 seconds then on again to clear the error code. 2. Replace the control.
Error 12 	The self-diagnostic test has detected one of the temperature adjust buttons stuck closed.	1. Make sure that there are no objects leaning against the front of the control. 2. Lightly press and release each of the buttons once. 3. If the above actions do not clear the error, the control will continue to regulate water temperature at the last setting, but you will not be able to change settings unless you replace the control.
Error 13 	The self-diagnostic test has detected that the water temperature sensor is either open or short circuited.	1. Turn the power off for 10-20 seconds then on again to clear this error code. 2. If no wiring problems are found the control must be replaced.

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TROUBLESHOOTING GUIDE

Residential Gas-fired Water Heaters
Power Direct Vent

These guidelines should be utilized by a qualified service agent.

LOCKOUTS

Soft Lockout

- Occurs when a system safety device trips to break the sequence of operation. The control will try to start the system in a timed basis but will not reinstate operation until the failure is corrected.

Hard Lockout

- Occurs when the main controller fails and must be replaced.

RESETTING THE HEATER CONTROL

- Soft lockouts as diagnosed by the system error codes require the gas control to be reset.
- To reset the control, slide the “ON/OFF” switch to the “OFF” position. Wait for 10 seconds and move the switch back to the “ON” position.
- If the problem that caused the control to lock out has not been corrected, the control will remain or again go back into lockout.

White-Rodgers

Ignition State	Timing
Pre-purge	5 seconds
Igniter Warmup	10 seconds
Trial For Ignition	4 seconds
Inter-purge	5 seconds
Flame Failure Response Time	2 seconds
Post-purge	30 seconds
Ignition Retries	2 retries, 3 trials before Lockout
Ignition Recycles	2 recycles, 3 losses of flame before lockout
Soft Lockout	20 minutes
Automatic Restart Time	60 minutes

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TROUBLESHOOTING GUIDE

Residential Gas-fired Water Heaters
Power Direct Vent

Sytem Error Codes (White-Rodgers)

The computer inside the gas control monitors the ignition sequence, temperature settings and overall operation of the heater. If any of these parameters does not operate properly the computer will shut down the water heater and flash an error code. See the "Intelli-Vent™ System Error Codes" and Troubleshooting Guide to diagnose the problem before attempting corrective action.

Intelli-Vent™ System Error Codes

Symptom	Possible Cause(s)	Corrective Action
Error 1 	An open earth ground circuit to the ignition system.	1. Check that the earth ground conductor is properly connected at the fuse box or breaker panel and the water heater. 2. Check that the grounding conductors on the water heater are properly connected and secure.
Error 2 	The self diagnostic test detected a wiring error, reversed polarity or a high resistance to earth ground.	1. Check for proper connection of the line neutral and line hot wires. 2. Check that the appliance is securely connected to earth ground.
Error 3 	The pressure switch remained closed longer than 5 seconds after the call for heat began. Blower does not start.	1. The pressure switch wiring is incorrect. 2. The pressure switch is defective and must be replaced.
Error 4 	The pressure switch remained open longer than 5 seconds after the combustion blower was energized.	1. The pressure switch wiring is incorrect. 2. The pressure switch tubing is not connected correctly. 3. Obstructions or restrictions in the water heater air intake or exhaust flue. 4. Check the high temperature limit switch.
Error 5 	The self diagnostic test has detected an error in the hot surface igniter circuit.	1. Check that all wiring is correct and secure. 2. Disconnect the igniter connector and measure the igniter resistance with an accurate ohmmeter between pins 1 and 2. Resistance should be between 11.5 and 18.8 ohms. If the reading is incorrect, replace the hot-surface igniter. 3. If the above checks are good, replace the control.
Error 6 	The maximum number of ignition retries or recycles has been reached and the system is in lockout for an hour. Cycle the power to the water heater off and on to reset.	1. Ensure the igniter is positioned correctly. 2. Ensure the voltage to the water heater is 115-125 VAC. 3. Clear any obstructions or restrictions in the water heater air intake or exhaust flue.
Error 7 	The self-diagnostic test found a problem with the gas valve driver circuit.	1. Cycle power to the water heater "OFF" for 10 seconds and then back "ON". 2. If the above step did not clear the error, the control must be replaced.
Error 8 	The self-diagnostic test has detected a problem with the internal microcomputer.	1. Cycle the external power "OFF" for 10 seconds and then back "ON". 2. If the above step does not clear the error, the control must be replaced
Error 9 	The self-diagnostic test has detected a problem with the internal circuit.	1. Cycle the external power "OFF" for 10 seconds and then back "ON". 2. If the above step does not clear the error, the control must be replaced.

January 2025

TROUBLESHOOTING GUIDE

Residential Gas-fired Water Heaters
Power Direct Vent

Symptom	Possible Cause(s)	Corrective Action
Error 10 	Flame signal sensed out of proper sequence.	1. Ensure flame sensor ceramic insulator is not cracked. 2. Turn power off for 10-20 seconds, and then on again to clear the error code. 3. Replace the control.
Error 11 	The high temperature thermal cutoff is open.	1. Turn the power off for 10-20 seconds then on again to clear the error code. 2. Replace the control.
Error 12 	The self-diagnostic test has detected one of the temperature adjust buttons stuck closed.	1. Make sure that there are no objects leaning against the front of the control. 2. Lightly press and release each of the buttons once. 3. If the above actions do not clear the error, the control will continue to regulate water temperature at the last setting, but you will not be able to change settings unless you replace the control.
Error 13 	The self-diagnostic test has detected that the water temperature sensor is either open or short circuited.	1. Turn the power off for 10-20 seconds then on again to clear this error code. 2. If no wiring problems are found the control must be replaced.

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Residential Gas-fired Water Heaters
Power Direct Vent

OTHER SYMPTOMS

Problem	Possible Cause(S)	Corrective Action
Insufficient Hot Water	1. Thermostat set too low 2. Leaking faucets/Wasted hot water 3. Wrong piping connections 4. Water heater too small 5. Sediment or lime in tank 6. Long runs of exposed piping 7. Hot-water piping in outside wall	1. Turn temperature knob to higher setting 2. Repair faucets 3. Correct piping: dip tube must be in cold inlet 4. Install adequate heater 5. Drain/flush-provide water treatment if needed 6. Insulate piping 7. Insulate piping
Water Is Too Hot	1. Thermostat setting is too high 2. Heater stacking (Failure to install the proper vent screens)	1. Turn temperature knob to lower setting 2. Ensure correct size of exhaust and air intake pipes were used per the instruction manual for vent length. Ensure proper vent screens were used.
Slow Hot Water Recovery	1. Thermostat set too low 2. Wrong piping connection 3. Wasted hot water 4. Heater too small	1. Turn temperature knob to higher setting 2. Correct piping-dip tube must be in cold inlet 3. Advise customer 4. Install adequate heater
Drip From Relief Valve	1. Heater stacking (Failure to install the proper vent screens) 2. Closed water system 3. Pressure build-up 4. Improperly seated valve	1. Ensure the correct size of exhaust and air intake pipes were used per the instruction manual for vent length. Ensure the proper vent screens were used. 2. See thermal expansion section 3. Use a pressure-reducing valve and relief valve 4. Check Relief valve for proper operation (Do Not plug T&P valve)
Smelly Water	1. Sulfides in water supply 2. Bacteria in water supply 3. Incompatible anode	1. Chlorination procedure 2. Chlorination procedure 3. Replace with anode appropriate for water conditions
Condensation	1. Filling the new water heater for the first time 2. Water dripping from blower assembly	1. Normal operation: the condensation should disappear after heater warms up 2. Install condensate hose to drain port on the rubber coupling
Water Leakage		1. Check “Leakage Checkpoints”
Exhaust Pipe Too Hot	1. Failure to use correct size of exhaust and air intake pipes; 2. Failure to install the vent screens; 3. Blower high limit switch fails to open - switch defective	1. Ensure the correct size of exhaust and air intake pipes were used per the instruction manual for vent length. Ensure maximum number of elbows or equivalent feet of both pipes was not exceeded. 2. Ensure that the proper vent screens were used. 3. Replace blower high limit switch

January 2025

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TROUBLESHOOTING GUIDE

Commercial Electric Water Heaters

CONDITION	CAUSE	REMEDY
No hot water.	Dry-fired element.	Replace with new element.
	Main power supply is “OFF”.	Turn the main power supply “ON”.
	Burnt fuse.	Replace with new fuse.
	Circuit breaker has tripped.	Reset circuit breaker.
	High limit reset control has tripped.	Reset high limit control by pushing the red reset button.
	Circuit breaker is defective.	Replace with new circuit breaker.
	Defective thermostat.	Replace with new thermostat.
	Defective element.	Replace with new element.
Not enough hot water.	Water heater is undersized.	Install size of water heater that meets demand.
	High hot water demand.	Increase the temperature of the thermostat.
	Very cold water supply.	Increase the temperature of the thermostat.
	Wrong piping connections.	Correct piping.
	Sediment or lime accumulation at bottom of water heater.	Drain water heater. Check to see if water treatment is necessary.
	Hot water plumbing system leaks.	Check hot water plumbing system for leaks and repair.
	Thermostat adjusted too low.	Increase the temperature of the thermostat.
	Defective thermostat.	Replace with new thermostat.
	Defective element.	Replace with new element. In 90% of all cases, it is the bottom element.
	Long runs or exposed piping.	Insulate piping.
	Hot water piping on outside wall.	Insulate piping.
Boiling hot water.	Thermostat temperature set too high.	Lower the temperature on the thermostat.
	Thermostat not in contact with water heater.	Position properly. Be sure insulation is not interfering with thermostat.
	Element attacked by CO_2.	Replace with new element.
	Defective thermostat.	Replace with new thermostat.
Continuous operation.	Water heater is undersized.	Install size of water heater that meets demand.
	Element wattage too small.	See ***Conversion Guide***.
	Thermostat not in contact with water heater.	Position properly. Be sure insulation is not interfering with thermostat.
	Thermostat temperature set too low.	Increase the temperature of the thermostat.
	Defective thermostat.	Replace with new thermostat.
	Defective high limit reset control.	Replace with new high limit reset control.
Element failure.	Wiring connections are wrong.	See the installation manual for correct wiring.
	Wiring connections are loose.	Locate, clean carefully, reconnect properly.
	Lightning/Power surge.	Inspect/replace fuse, element, and thermostat.
	High voltage.	Check with electrical utility and correct.
	Short circuit.	Locate short circuit and repair.
Thermostat failure.	No power.	Inspect fuse/circuit breaker, replace/reset.
	Loose wiring connection.	Locate, clean carefully, reconnect properly.
	Lightning/Power surge.	Inspect/replace fuse, element, and thermostat.
	Low/High voltage.	Check with electrical utility and correct.
	Short circuit.	Locate short circuit and repair.
Blown fuse/circuit breaker.	Wiring connections are wrong.	See the installation manual for correct wiring.
	Wiring connections are loose.	Locate, clean carefully, reconnect properly.
	Lightning/Power surge.	Inspect/replace fuse, element, and thermostat.
	High voltage.	Check with electrical utility and correct.
	Short circuit.	Locate short circuit and repair.
	Power supply wiring undersized.	See the installation manual for correct wiring size.
Fuse burns instantly.	Short circuit.	Locate short circuit and repair.

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CONDITION	CAUSE	REMEDY
Fuse burns often.	Fuse contacts oxidized or fuse not screwed-in tight enough.	Clean contacts and tighten fuse.
	Power supply wiring is undersized.	See the installation manual for correct wiring size.
Smoking wiring.	Lightning/Power surge.	Inspect/replace fuse, element, and thermostat.
	Low/High voltage.	Check with electrical utility and correct.
	Power supply wiring undersized.	See the installation manual for correct wiring size.
Service wires charred or hot.	Wiring connections are wrong.	See the installation manual for correct wiring.
	Water heater not properly grounded.	Properly ground the water heater.
	Lightning/Power surge.	Inspect/replace fuse, element, and thermostat.
	High voltage.	Check with electrical utility and correct.
	Short circuit.	Locate short circuit and repair.
	Power supply wiring undersized.	See the installation manual for correct wiring size.
Drain valve leaks.	Drain valve is open.	Close the drain valve.
	Defective drain valve.	Replace with new drain valve.
Water drips from the relief valve.	Excessive water pressure.	Install a pressure-reducing valve.
	Thermal expansion in a closed water system.	Install a suitable expansion tank on the cold water supply line.
	Improperly seated relief valve.	Check if relief valve works properly and replace, if necessary.
	Defective thermostat.	Replace with new thermostat.
	Defective relief valve.	Replace with new relief valve.
Water on the floor/drain pan.	Water discharge from the relief valve.	See ***Pressure build-up in a water system*** in the installation manual.
	Element leaks.	Replace with new element and gasket.
	Water heater leaks.	Replace with new water heater.
Wet insulation.	Leaking plumbing connections.	Locate leak and repair.
	Leaking around heating element.	Tighten, clean, and smooth face of tank flange and element gasket.
	Water discharge from the relief valve.	See ***Pressure build-up in a water system*** in the installation manual.
Singing element.	Build-up of mineral deposits on element.	Clean element, replace with new element, if necessary.
Singing thermostat.	Thermostat not flush with tank.	Install thermostat properly.
	Wiring connections are loose.	Locate, clean carefully, reconnect properly.
Traces of rust in the hot water.	Anodes have been eaten away.	Replace with new anodes.
Rusty water.	Water corrosion.	Replace with new water heater.
Rotten egg smell.	High sulphate or mineral content in water.	Change magnesium anodes to aluminum anodes and bleach water heater.
Tank bulged.	No relief valve installed.	Install proper relief valve.
	Excessive water pressure.	Install a pressure-reducing valve.
	Thermal expansion in a closed water system.	Install a suitable expansion tank on the cold water supply line.

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