

Technical Bulletin

Subject: Installation Troubleshooting and Solutions

Models Affected: Atmospherically Vented Flammable Vapor Ignition Resistant (FVIR) Gas Water Heaters

With the new safety standards that have mandated FVIR (Flammable Vapor Ignition Resistant) water heaters, it is important for you (our customers and service technicians) to be able to easily diagnose and implement solutions that will take care of operational problems with these types of water heaters. This bulletin is intended to help you avoid typical installation issues with the water heater or the environment in which it's installed, and to help you understand what to do when you are trying to solve a problem.

The pilot thermocouple used in FVIR water heaters includes a TCO (temperature cutoff) switch. The TCO is an automatically resettable temperature switch that opens the thermocouple circuit if the water heater is not receiving adequate combustion air or the combustion chamber temperature exceeds the cutoff limit of the TCO switch. Let's examine the reasons the TCO switch in your thermocouple is being activated:

- 1. The installation environment may be dirty.** The flame arrestor (ceramic plate) in the bottom of the combustion chamber is designed to allow combustion air to flow into the chamber and prevent the burner or pilot flame from igniting flammable vapors that may be present outside your water heater. In some cases, the flame arrestor can become restricted. When this happens, the burner flame will become lazy and overheat the combustion chamber causing the TCO switch to trip. To correct this and improve the environmental condition:

Check the external lint/dust filter screen at the bottom of the heater. If it has a build up of dust, lint, etc., remove the screen and clean with a vacuum or clear water. Next, check the flame arrestor (ceramic plate) in the bottom of the combustion chamber for any dust, lint, etc., that may have accumulated on the flame arrestor. Clean the flame arrestor using a vacuum, Swiffer® or soft brush to clean the holes in the flame arrestor. After cleaning, reinsert the external lint/dust filter screen (noting directional arrows ↑ imprinted on the outside tabs) with the arrows pointing up towards the top of the heater. If you have questions and for detailed cleaning instructions, contact Residential Technical Assistance referencing the number in your manual.

NOTE: If the original filter screen is missing or damaged, or you have an installation that frequently gets lint or dust buildup, we recommend the installation of a larger capacity filter screen. If you have questions, contact Residential Technical Assistance referencing the number in your manual.

- 2. Temperature conditions exceed the TCO switch cutoff limit.** Water heaters installed in unconditioned spaces (such as garage or attic) can be subjected to exceedingly high ambient temperatures. These conditions can create operational conditions concerning the draft and pilot burner oxygen availability that may cause the TCO switch to activate or the pilot flame to fall off the thermocouple or extinguish. If your water heater is in an area where ambient temperatures exceed 115° F (e.g. attic, garage that is kept closed, unconditioned space, etc.) contact Residential Technical Assistance. Refer to the phone number found in your installation manual.
- 3. The water heater may be starved for combustion air.** This causes the burner flame to get lazy and waver around in the combustion chamber, causing the TCO switch to trip. Here are the things to check for and correct:
 - a. The water heater may be located in a closet or space that does not have openings for combustion air to get to the water heater. Openings in the closet must be provided per the installation instructions, which tell you how much open area you need. **IMPORTANT:** The instructions only cover the needs of the water heater. The air requirements of all gas-fired or air-consuming appliances in the closet or space must also be considered. Don't forget an electric dryer, it also consumes air.
 - b. The openings in the closet are smaller than what is needed to supply adequate combustion air. Review the installation instructions and information as noted in (a) above.
 - c. The water heater may be installed in a utility room or closet along with a furnace or air handler, with a return air duct that has not been attached, or it may have leaks that are not sealed. When this condition exists, the return air system creates a significant negative pressure on the installed

space and significant down draft of the flue occurs at the water heater. Even if the utility room or closet has a door with louvers in it, a negative pressure may still exist. (When checking, be sure the furnace or air handler is ON and the doors are closed). When a down draft is created, the combustion products from the water heater can no longer exit up through the vent system. The flame inside the water heater will become lazy and wander around, causing the TCO switch to trip. If you can't fix the problem, notify a water heater service organization. **THIS IS A SAFETY ISSUE AND THIS CONDITION MUST BE FIXED** by having the return air duct system corrected immediately. Failure to do so could result in property damage, serious personal injury or death due to fire or carbon monoxide poisoning.

4. **There may not be a draft at the water heater draft hood.** With the water heater operating for 3 to 5 minutes, check for draft at the inlet to the draft hood with a match or a small amount of smoke. Remember, when checking, be sure all appliances in the installed space are on and the doors are closed. If there is no draft, and you have ruled out or corrected items a, b and c above, check the vent system for restrictions or obstructions. Correct and recheck for draft. You should also check the vent termination to be sure it is the correct height when it exits the home or structure. Refer to local code or the National Fuel Gas Code (ANSI Z223.1/NFPA 54 current edition) for how to evaluate this. Correct the vent height if needed and re-check the draft.
5. **A flammable vapor incident has occurred.** Of course, our desire to reduce the likelihood of a flammable vapor incident is the main reason that the new technology has entered the marketplace. If a Flammable Vapor Incident occurs, immediately have the water heater inspected by a licensed service technician. We will request that the unit be returned to us.