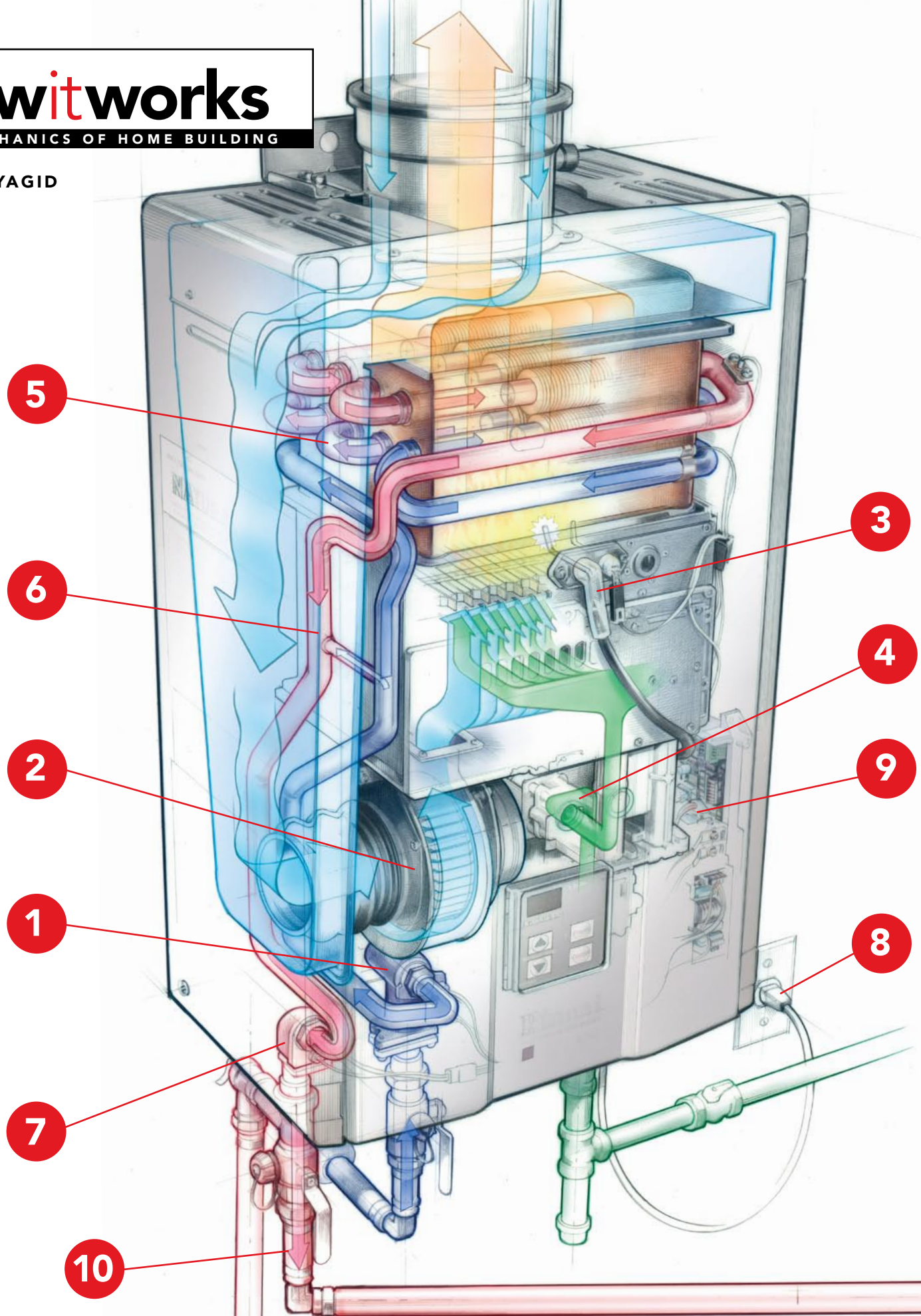


BY ROB YAGID



Tankless water heater

Unlike tank-style water heaters that keep a barrel of hot water ready to go 24 hours a day, tankless water heaters can help you to save energy and money by heating only the amount of water you need, and only when you need it. Manufacturers say that by heating water on demand, tankless water heaters provide a 30% savings in water-heating costs and a 50% decrease in energy consumption.

On pp. 54-59, electrician Brian Walo and plumber Shannon Neff show how to install a gas-fired Rinnai tankless water heater (drawing left). However, several manufacturers, such as Bosch and Takagi, make tankless water heaters that work in similar ways. Regardless of the manufacturer, a tankless water heater is one of the smarter pieces of equipment that you can install in your home. Here's how it works.

Rob Yagid, associate editor

- 1. A water-flow sensor triggers the heating sequence.** The water heater fires when it detects a flow rate of approximately 0.6 gallons per minute (gpm), which is just a trickle of water at the hot-water tap.
- 2. The combustion fan forces air into the burner.** In this particular unit, the air is drawn from outside through a concentric venting system, which provides sealed combustion.
- 3. The igniter sparks** until the flame rod—which is really just a sensor—detects proper combustion. Then it shuts off.
- 4. The modulating gas valve supplies fuel to the burner.** When a flame is detected, the valve opens and closes based on the amount of heat required.
- 5. The water supply line passes through the copper heat exchanger multiple times.** Metal fins in the heat exchanger help to concentrate heat around the pipes, transferring heat from the burner into the water quickly.
- 6. A bypass introduces cold water to the hot water,** which can be much hotter than it needs to be (upwards of 140°F). This brings the water down to the set-point temperature, which is controlled by the thermostat on the front of the unit, before being supplied to the tap. This allows the unit to heat a smaller amount of water while still delivering a high flow rate.

- 7. A temperature sensor,** also called a thermistor, and the water-control valve (which is located under the blower near the water-flow sensor) work in sync to ensure that the water leaving the unit is at the temperature being requested.
- 8. The electrical demands of the unit are met with a standard 120v power plug.** The power consumption for this particular tankless unit is less than 100w under normal operation.
- 9. The printed circuit board (PCB) is the brain of the unit.** It monitors the flame rod, the fan-motor frequency, the outlet water temperature, the set-point temperature, and the water-flow rate. When the water-flow sensor and the PCB sense a water flow of less than 0.5 gpm, the unit enters standby mode. The PCB monitors all the components and fires the unit as needed to prevent water from freezing inside the heater, which can be an issue with outdoor models or with models installed in unheated areas of a house.
- 10. The hot-water supply flows to the tap at a capacity of roughly 7.5 gpm,** depending on the tankless-heater model and the incoming water temperature. Tankless water heaters tied to colder incoming water supplies demand a longer heating time, which can reduce a unit's flow rate.

