TECHNICAL SERVICE DEPARTMENT
Technical Service Bulletin
1-800-432-8373

Fury Dampered Energy Star II Residential Gas Water Heater
Sequence of Operations

SEQUENCE OF OPERATIONS

This is a water heater with a powered damper control and gas valve that provides energy efficiencies rated for the Energy Star II standard. The word 'control' in this sequence will refer to the gas control valve.

This water heater is a spark to pilot to main burner system.
It does not have a standing pilot or a thermocouple.

Communication between the control and the damper is achieved through a communications port powered by a 24V transformer.

Tank is full of water. Gas supply is connected. Transformer is plugged into a 3-prong plug wall socket 120 VAC. Primary power to the control is 24 VAC between the black and white wires at the bottom of the gas control.	Fill tank. Connect gas at 7" w.c for natural; and 11" w.c. for LP. Electrical socket must be wired polarity correct with an earth ground. If damper blade is OPEN, the damper control attempts to close it.	
Turn slide switch on the gas valve to ON position. Each time the controls are powered up they test the random access memory (RAM), the program code and the non-volatile memory (EEPROM).	Gas valve slide switch controls all power inputs to damper motor, gas valve and display. At power ON and a demand for heat, the control performs a self-test diagnostic routine. If the self-check fails, the control locks out with indications on the control.	
Set the water temperature setting not to exceed 120^0F. See use and care manual.	Temperature is sensed electronically by the ***Thermistor*** in the sensing bulb.	

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Call for Heat – Control checks for two things: 1. The damper is physically CLOSED and…. 2. An OPEN switch position inside the motor housing. The control will attempt this sequence 3 times before entering into a soft lockout.	The damper blade is closed during stand by conditions to retain heat. On a demand for heat you will see the damper blade physically move from the closed to the open position. Contacts located inside the damper motor assembly tell the control if the damper is in the proper position; and the contacts have not been 'jumped out'.	
@12 VAC power is passed from the control to the damper motor on the red wire at the gas control. Primary power to the damper motor is 24 VAC on the yellow wire at gas control.		
Damper motor rotates the damper blade to the OPEN position.	Contacts make inside damper housing and allow power to pass back to the control on the blue wire. The control waits for this signal before attempting main burner.	

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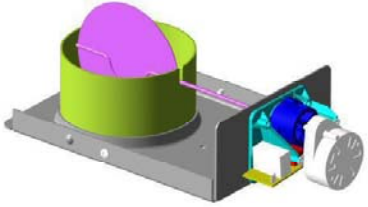
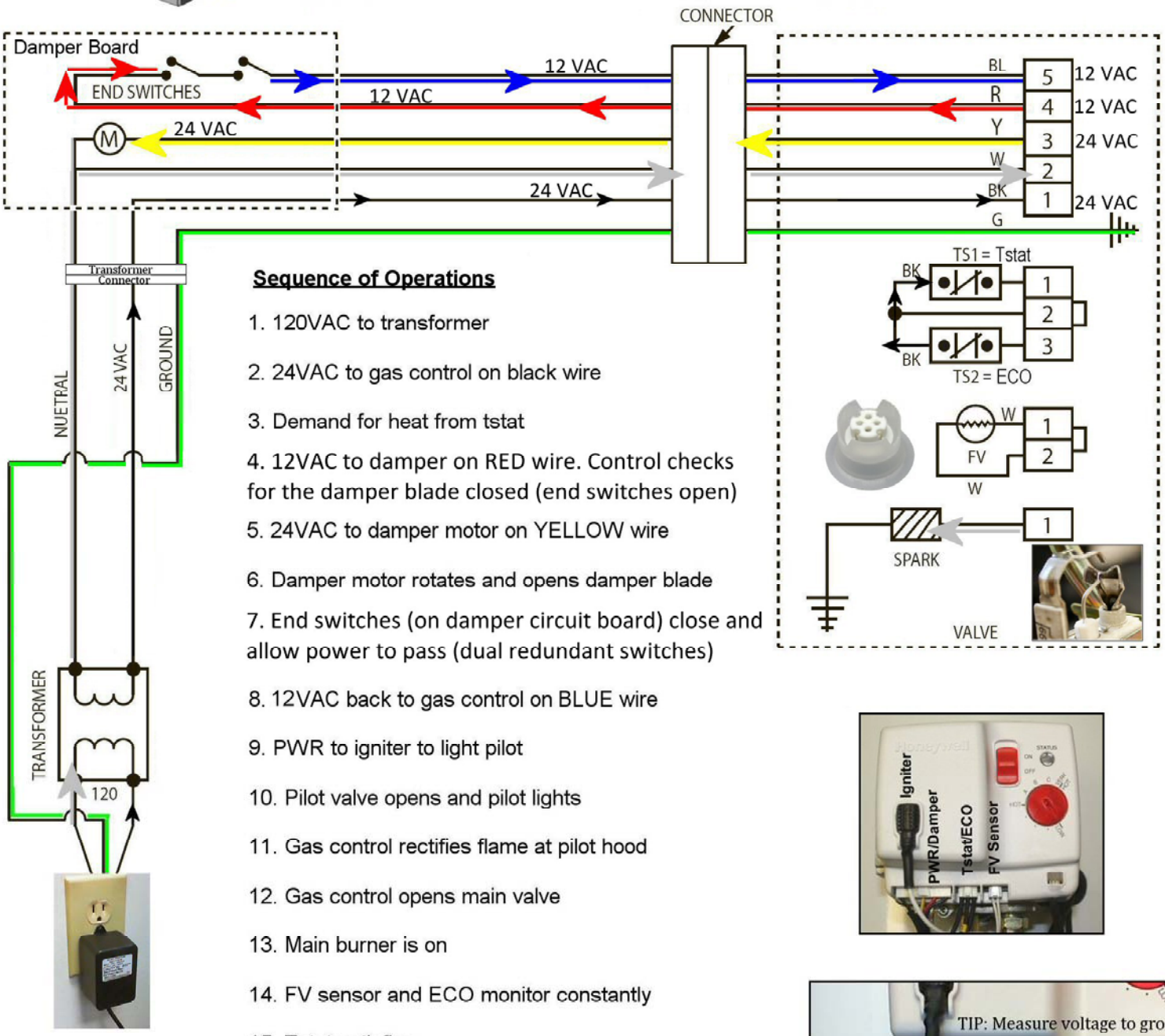
Ignition attempt begins. With the damper blade open, the control knows it can safely go to pilot burner and main burner.	Visually verify the igniter is sparking inside the combustion chamber. You may also be able to hear the unit sparking. Pilot flame and main burner immediately follow.	
Flame is rectified. There is always a flame rectification circuit check while the main burner is operating. If flame is not sensed during the trial period, the control turns off the pilot valve, cycles the heater and reattempts ignition.	After flame has been recognized (rectified), the igniter will turn off. IF the main burner fails during heating, the unit will recycle and attempt ignition. After three failed attempts, the control goes into soft lockout.	
Water heats to thermostat setting. TRD is monitoring a flammable vapor event inside combustion chamber	ECO is monitoring water temperature. Trips at 199°F. Flammable Vapor (FV) sensor is monitoring. Safeties monitors control health, other fault conditions and the local environment for flammable vapors.	
Water is heated. Control shuts off all power to the gas valve. Damper blade closes to assist in heat retention and high ER ratings. Unit is in stand-by mode.	In stand-by mode, the gas control constantly monitors the water temperature via the thermistor to ensure the water inside the tank is within the user-selected range.	



CONNECTION DIAGRAM

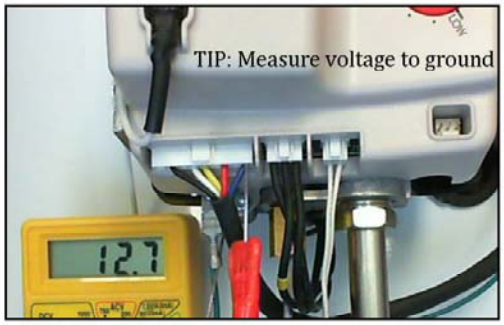
Energy Star II dampered residential gas

R = RED
W = WHITE
Y = YELLOW
M = Motor
BK = BLACK
BL = BLUE
G = GREEN



Sequence of Operations

1. 120VAC to transformer
2. 24VAC to gas control on black wire
3. Demand for heat from tstat
4. 12VAC to damper on RED wire. Control checks for the damper blade closed (end switches open)
5. 24VAC to damper motor on YELLOW wire
6. Damper motor rotates and opens damper blade
7. End switches (on damper circuit board) close and allow power to pass (dual redundant switches)
8. 12VAC back to gas control on BLUE wire
9. PWR to igniter to light pilot
10. Pilot valve opens and pilot lights
11. Gas control rectifies flame at pilot hood
12. Gas control opens main valve
13. Main burner is on
14. FV sensor and ECO monitor constantly
15. Tstat satisfies
16. Gas control closes gas valve and damper blade; end switches open
17. Unit in standby mode



My Notes: