

**SERVICEMAN'S TROUBLESHOOTING INFORMATION**  
*for the*  
**RINNAI "Free Standing Flame Fire" FS35-ETR**

**IMPORTANT SAFETY NOTES:**

There are a number of (live) tests that are required when fault finding this product. Extreme care should be used at all times to avoid contact with energized components inside the water heater. **Only trained and qualified service agencies should attempt to repair this product.** Remember, before checking for resistance readings, you should disconnect the power source to the unit and isolate item the to be checked from the circuit (unplug it).

**Power Supply to P.C. Board:**

Black ~ White	110 ~ 130 VAC	n/a	CN1	1 ~ 2
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**Power Supply to Transformer:**

Black ~ White	110 ~ 130 VAC	63 ~ 70 ohms	CN3	1 ~ 3
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**(TR) Transformer:**

Wire color	Voltage	Resistance	Connector #	Pin #'s
Red ~ Yellow	200 ~ 220 VAC	320 ~ 340 ohms	CN4	2 ~ 6
Red ~ Blue	12 ~ 16 VAC	1 ~ 3 ohms	CN4	3 ~ 6
Orange ~ Grey	100 ~ 110 VAC	64 ~ 72 ohms	CN4	1 ~ 4

**(SV1, SV2, SV3, SV4, SV5, and SV6) Gas valve solenoids: Pins 2 and 4 are the neutrals for gas solenoids**

SV1 – Purple ~ Blue	80 ~ 100 VDC	1.7K ~ 2.0K ohms	CN5	3 ~ 2
SV2 – White ~ Blue	80 ~ 100 VDC	1.7K ~ 2.0K ohms	CN5	1 ~ 2
SV3 – Red ~ Blue	80 ~ 100 VDC	1.7K ~ 2.0K ohms	CN5	8 ~ 4
SV4 – Yellow ~ Blue	80 ~ 100 VDC	1.7K ~ 2.0K ohms	CN5 see note below	4 ~ 11
SV5 – DK.Blue ~ Blue	80 ~ 100 VDC	1.7K ~ 2.0K ohms	CN5	4 ~ 12
SV6 – Brown ~ Blue	80 ~ 100 VDC	1.7K ~ 2.0K ohms	CN5 see note below	4 ~ 7

**NOTE; on some units Pin #7 on the unit's P.C. board is brown and on the wiring diagram it is yellow, and pin #11 is yellow on the wiring diagram and on the unit it is brown. Explanation of the gas solenoid valve, SV1 is considered to be a redundant or safety shut off solenoid valve, SV2 is the Pilot solenoid valve, SV3 is the front burner solenoid valve, SV4 back burner solenoid valve, SV5 is the middle burner high fire solenoid, SV6 is the middle burner low fire solenoid.**

**IG) Ignition System:**

Yellow ~ Yellow	70 ~ 100 VDC	>1M ohms	CN5	5 ~ 6
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**(FM) Combustion Fan Motor:**

Blue ~ White	120 -160 VAC	13 ~ 17 ohms	CN2	2 ~ 3 Low Speed
Red ~ White	90 – 120 VAC	7 ~ 11 ohms	CN2	1 ~ 3 High Speed

The combustion motor operates on a timer which brings the motor on after the unit has been turned. If you are checking the voltage to this motor you must wait until the timer calls for the motor to start. If you check the motor outputs before the timer has timed out; you will not get a reading. The unit must be in operation at least four minutes before voltage is allowed to the motor.

**Thermal Fuse:**

Black ~ Black	Less than 1 ohm	<1 ohm (Black ~ Black)	CN8	1~ 3
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Thermal fuse activates at 302°F on both the IB and FS model.

**Flame Rod:**

Place one meter lead to flame rod and the other to an earth or ground. With the unit running, you should read between 65 ~ 75 VAC. Set your meter to the  $\mu$  amp scale, series your meter in line with the flame rod. You should record 1 $\mu$  or greater for proper flame circuit. In the event of low flame circuit remove the flame rod and check for carbon and/or damage.

**Flue Block Thermistor:**

Black ~ Black	Less than 1 ohm	See example below	CN6	5 ~ 6
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Flue block thermistor activates at 284°F on the IB, it activates at 203°F on the FS.

**Overheat Thermistor:**

Black ~ Black	Less than 1 ohm	See example below	CN6	3 ~ 4
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Overheat thermistor activates at 266°F on the IB, it activates at 266°F on the FS.

**Room Temperature Thermistor:**

Black ~ Black	Less than 1 ohm	See example below	CN6	1 ~ 2
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**Example:**      57°F = 58 ~ 74k  
                      68°F = 37 ~ 45K

Check thermistor by inserting meter leads into each end of the thermistor plug. Set your meter to the 200K scale and read resistance. You should be able to apply heat to the thermistor bulb and see the resistance decrease. Then apply some ice to the thermistor and the resistance should increase.

**(3) Amp Fuses:**

This unit has one (3) amp glass fuse on the P.C. Board. Remove fuse and check continuity through it. If you have continuity through the fuse, it's good. If you can not read continuity, the fuse is blown and must be replaced. The above fuse is rated at (3) amps, 250 volt. It is ¾" in length. This is a stock item at your local hardware store. Do not use fuses rated at higher amperages.

# Wiring Diagram for the FS35-ETR:

