

smart fan controller™ (SFC™) model 1414-XX installation for smart thermostats

Fig. 1 Gas Furnace/Hydraulic/Electric Installation

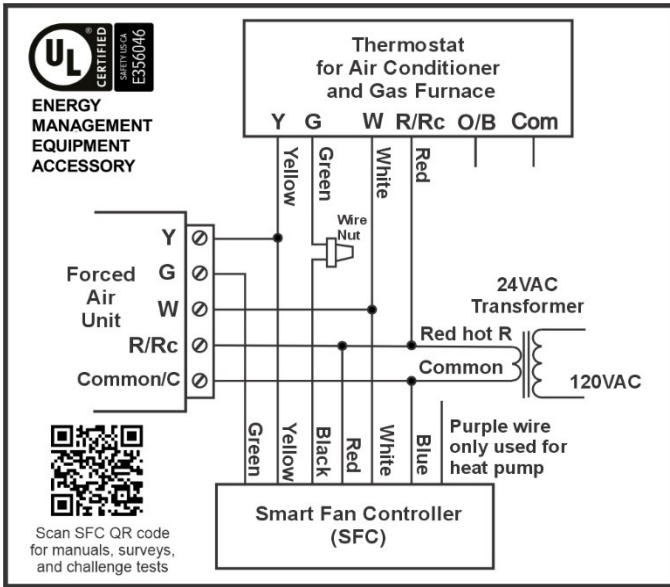


Fig. 2 Orange Reversing Valve Heat Pump Install

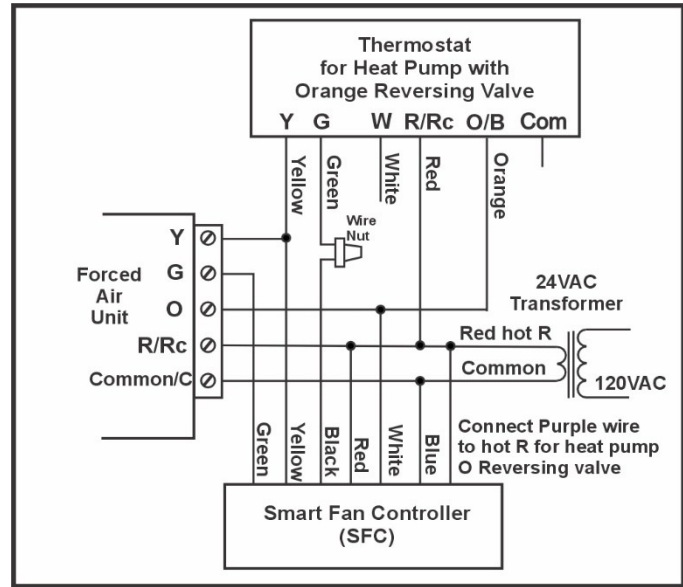


Fig. 3 Brown Reversing Valve Heat Pump Install

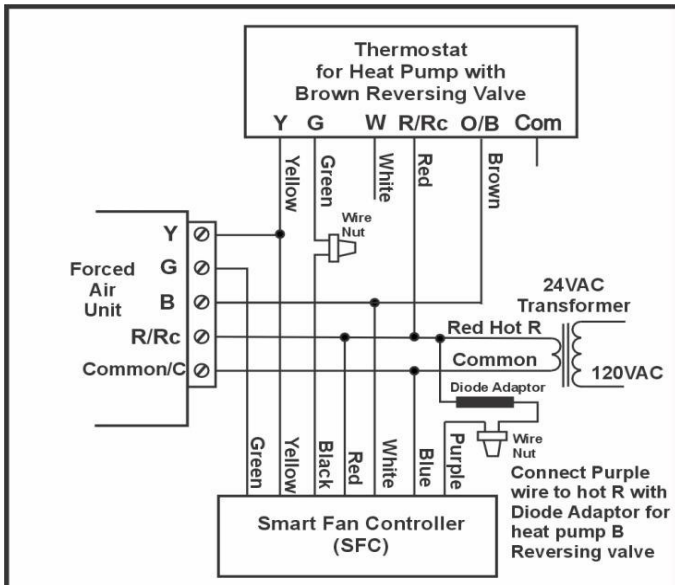



Fig. 4 Requirements for SFC Installation and Testing

WARNING

- Required tools:** AC clamp meter; ESD wrist strap; safety gear; screw drivers; wire nuts; elec. tape; wire stripper/cutters.
- SFC red and blue wires** must be connected to Hot R and common on FAU transformer terminals for SFC to function.
- SFC yellow wire** must be connected in parallel to AC Y to save cooling energy and **SFC white wire** must be connected in parallel to heat W to save heating energy.
- Connect **SFC black wire** to thermostat green wire. Connect **SFC green wire** to FAU "G" terminal (or wire nut). SFC purple wire is for HP.
- Fan quick test:** Switch fan control from AUTO to ON and back to AUTO to verify fan turns on and off without a fan-off delay.
- AC fan-off delay test:** Turn on AC for **2 minutes** lower and raise setpoint to verify 1.7 to 2.5 minute AC fan-off delay.
- Gas furnace heat fan-off delay test:** Turn on gas furnace heat for **2 minutes** by raising and lowering setpoint to verify 2.3 to 2.8 minute gas furnace heat fan-off delay.
- Heat pump heat fan-off delay test:** Turn on HP heat for **2 minutes** to verify 20 to 50 seconds HP fan-off delay.
- Hydronic heat fan-off delay test:** Turn on hydronic heat for **2 minutes** to verify 1.5 to 2 minute hydronic heat fan-off delay.

1. PRE-INSTALLATION CHECKS (Wear safety glasses and gloves when installing SFC or troubleshooting)

- Non-feasibility:** Fan controller has already been installed and is less than 5 years old.
- Customer must agree to install SFC.** Technicians must have true RMS digital clamp-on multimeter  to install SFC and measure current, voltage, continuity, microfarads, and troubleshoot HVAC issues.
- Furnace must be operational with no gas leaks, platform in good condition, all ducts connected, panel doors secure, and air filter clean. Furnace and thermostat controls must be 24VAC with fan switch or G connection at FAU.
- SFC works with smart thermostats on gas, heat pump, hydronic, and electric heating with different wiring for each system. Heat pump reversing valve is energized for cooling (O) or energized for heating (B).
- For installations without labels on controller boards check wiring colors. Follow wires to thermostat or verify function by connecting a jumper wire from transformer hot R (usually red) to green (fan), yellow (AC), white (heat), etc.
- Before installing SFC, turn on fan and measure current on fan G. If fan G current is greater than 0.25A, fan relay or sequencer are failing and might need to be replaced. Model 1414 is UL-listed with a capacity of 0.75A.

2. INSTALLATION (For 2-stage HVAC systems install SFC on the 1st stage.)

- Verify system works in heating and cooling. Smart thermostats have default delays of 150 seconds or more between compressor cycles for cooling or heating. **Connect ESD wrist strap to FAU metal frame to prevent static discharge.**
- Turn off power to FAU before installing the SFC** either at disconnect or wall plug/switch. Mount SFC at FAU terminal block next to thermostat wire connections. Secure SFC using cable or zip ties to reduce vibration.

Smart Efficient Fan Controller (EFC) Model 1414-XX Installation for Smart Thermostats

- When installing SFC wires on the FAU, loosen the screw (or wire nut) holding existing wire, insert appropriate SFC wire with existing wire and tighten the screw (or wire nut) (**FIG. 1**). Use stub wire and wire nut to connect more than 2 wires.
- Step 1:** Connect SFC red wire to FAU “R/Rc” terminal (red)
- Step 2:** Connect SFC white wire to FAU “W” terminal. For heat pump, leave white wire disconnected and see section 3. If FAU has separate “Rh” (red heat) do not connect white wire.
- Step 3:** Connect SFC yellow wire to FAU “Y” terminal.
- Step 4:** Disconnect green wire from FAU “G” terminal and connect SFC black to thermostat green wire.
- Step 5:** Connect SFC green wire to FAU “G” terminal (or wire nut).
- Step 6:** Connect SFC blue wire to C terminal (common). This is return from 24VAC transformer and colors vary.
- Enter SFC serial number.** If system is not a heat pump, cap purple wire with a wire nut. Ensure wire connections are tight. For hydronic or electric heat set smart thermostat to electric heating to energize fan G with heat W.
- Turn ON power after installing SFC.** Test fan operation as well as cool and heat fan-off delays (**Quick test**)

3. INSTALLATION FOR HEAT PUMP ORANGE REVERSING VALVE (ENERGIZED FOR COOLING)

- Connect SFC white wire to orange wire (**FIG. 2**). Connect SFC purple and red wires to FAU “R/Rc” terminal (red).

INSTALLATION FOR HEAT PUMP BROWN REVERSING VALVE (ENERGIZED FOR HEATING)

- Connect SFC white wire to brown reversing valve wire (**FIG. 3**). Connect SFC purple wire to one end of brown HP diode adapter (**FIG. 3**). Connect other end of brown HP adapter to FAU “R/Rc” terminal (red) and SFC red wire.
- For smart thermostats go to equipment settings > heat pump and select B or O.

INSTALLATION FOR WATER SOURCE HEAT PUMP (REVERSING VALVE ENERGIZED FOR COOLING)

- Please refer to **FIG. 2** for orange wire (energized for cooling) or **FIG. 3** for brown wire (energized for heating).

4. POST-INSTALLATION – QUICK TEST – FAN CONTROL

- Switch fan control from AUTO to ON and verify fan turns on and stays on for more than 10 seconds.
- Switch fan control from ON to AUTO and verify fan turns off without a fan-off delay. See step 4 in **Fig. 4**.

5. POST-INSTALLATION – 2-MINUTE QUICK TEST – COOL AND HEAT FAN-OFF DELAY

- **Ecobee Only – 2-minute test** - Main Menu>Settings>Installation Settings>Test Equipment>OK. Enable cool 2 minutes, verify 1.7 to 2.5 min. fan-off delay. Enable heat 2 min., verify 2.3 to 2.8 min. fan-off delay. **Fig. 4** fan, cool, heat tests.
- **Cool fan-off delay 2-minute test:** Set thermostat to COOL. Lower setpoint enable cooling 2 minutes, raise setpoint turn off cooling, verify 1.7 to 2-minute fan-off delay. See **Fig. 4** fan, cool, and heat fan-off delay tests.
- **Heat fan-off delay 2-minute test:** Set thermostat to HEAT. Raise setpoint enable gas heating 2 minutes, lower setpoint turn off heat, verify 2.3 to 2.8-minutes fan-off delay. See **Fig. 4** fan, cool, and heat fan-off delay tests.

6. TROUBLESHOOTING

- For dual transformers with a jumper between “Rc” (red cool) and “Rh” (red heat), connect SFC red wire to “Rc” and connect SFC white wire to thermostat “W.” For dual transformers with no jumper between “Rc” and “Rh” do not connect SFC white wire to thermostat “W” and insulate SFC white wire with a wire nut.
- Double-check wiring connections from thermostat to HVAC system. **Ensure all wire connections are tight and secure.**
- If SFC does not produce fan delay at end of cooling cycle, ensure SFC yellow wire is connected to FAU Y terminal.
- If unit is a heat pump do not connect SFC white wire to “W”. Connect white wire as outlined in section 3.
- Installation is not complete until system operates properly. If system does not work, go to Troubleshooting section 7 & 8.

7. TROUBLESHOOTING FOR FAN OPERATION ISSUES

- If blower runs continuously with SFC installed, remove thermostat face plate.
- If blower continues to run with face of thermostat removed, disconnect SFC green and black wires from fan relay connection to temporarily remove SFC fan control. Leave all other wires in place, reconnect thermostat fan wire (usually green) to fan relay terminal, or wire nut connection. If blower continues to run with thermostat faceplate removed and thermostat fan wire connected to fan relay, fan relay is faulty, or there is a short in thermostat fan wire.
- Make sure all connections are tight** and thermostat has new batteries and terminals on thermostat are good.
- If fan does not operate and system is hydronic make sure water valve is not stuck closed.

8. TROUBLESHOOTING FOR COOLING OR HEATING ISSUES

- If insufficient cooling, install new thermostat batteries, replace air filter, clean condenser, or check compressor contactor.
- If there is insufficient heating, install new thermostat batteries, replace air filter, check igniter, inducer fan, and gas valve. If heat pump does not provide sufficient heating replace air filter and clean condenser, check compressor contactor, reversing valve, and/or check and correct refrigerant charge. If hydronic system is not providing sufficient heating, check pump, air filter, and water heater to ensure a minimum 130°F hot water supply temperature.