SMART FAN CONTROLLER (SFC™)
TRAINING MANUAL

ENERGY MANAGEMENT EQUIPMENT ACCESSORY

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TABLE OF CONTENTS

1. Overview 1
1.1 Safety 1
1.2 Tools and Equipment 1
2. General Troubleshooting 2
2.1 Check Fan Operation 2
2.2 Check HVAC Fan Relay 2
2.3 Check Thermostat Wire Continuity or Install Common-wire Adaptor 3
2.4 Check Minor Cooling or Heating Issues 4
2.5 Check Contactors 4
2.6 Check Capacitors 4
2.7 Check Transformer 5
2.8 Check Fuses 6
2.9 Other Issues 6
3. Smart Fan Controller (SFC) 8
3.1 Tools and Equipment 8
3.2 Pre-Installation Checks 8
3.3 Installation for Cooling with Furnace, Hydronic or Electric Heat 9
3.4 Installation for Heat Pumps 10
3.5 Post-Installation – QUICK TEST – Fan Control 10
3.6 Post-Installation – 2-MINUTE TEST – Cool and Heat Fan-Off Delay 10
3.7 Troubleshooting Installation Issues 11
3.8 Troubleshooting Fan Operation Issues 11
3.9 Troubleshooting Cooling or Heating Issues 11
3.10 Troubleshooting Smart Thermostat Common-Wire Issues 11
3.11 Tracking Database for Warranty and Technical Support 12
3.12 Nonfeasibility 12

1. Overview

- ✓ Smart Fan Controller (SFC™) works with smart thermostats to improve energy efficiency for gas furnaces, air conditioners, heat pumps, and hydronic heating based on Intertek laboratory tests. www.greenfan.co/s/Intertek_DXGF.pdf. www.greenfan.co/s/Intertek_DXHP.pdf
- ✓ SWHC059-01 SFC is approved by the California Public Utilities Commission www.caetrm.com/measure/SWHC059/01/
- ✓ SFC is more dependable, uses 4 times less standby power (0.3 vs. 1.3W), and saves two times more energy than other fan-off delay controllers
- ✓ UL listed with 5-year warranty, lasts for life of HVAC equipment or longer
- ✓ Connects to low-voltage thermostat wires, installation takes 15 minutes, and more than 200,000 units have been installed since 2013
- ✓ Monitors heat, AC, fan, and heat pump reversing valve signals to work with smart thermostats and save more energy than other fan controllers that only monitor fan signals.
- ✓ Research studies indicate 9 to 31% of users select fan-on controls. Conventional fan controllers add fan-off delays to hourly fan-on durations which may increase energy use by 17 to 50%.
- ✓ US Patents 11460208, 10047969, 10119719, 9797405, 9410713 B2, 10281938, 10533768, 10712036, 9995493, 11187425. RE49383E.

1.1 Safety

1. Always wear safety glasses and gloves when connecting or disconnecting low-voltage electrical wires and troubleshooting.
2. Disconnect and turn OFF power before troubleshooting or working on electrical equipment and remove watch, rings, and jewelry to prevent shocks.
3. Read manufacturer's installation or service literature prior to installation or service.

1.2 Tools and Equipment

The following equipment is required to install the SFC.

- ☐ Safety glasses and gloves are required when installing SFC or troubleshooting.
- ☐ True RMS digital clamp-on multimeter to install SFC for troubleshooting and measuring current, voltage, continuity, microfarads (Fieldpiece SC260 https://trutechtools.com/SC260).
- ☐ Electrostatic Discharge (ESD) wrist strap with alligator clip to prevent ESD damage to SFC.
- ☐ Set of standard slotted and Philips head screwdrivers.
- ☐ ¼-inch and 5/16-inch socket drivers.
- ☐ Wire nuts (provided by GreenFan®), electrical connectors or electrical tape.
- ☐ Self-tapping screws to replace missing screws.
- ☐ Wire cutters and wire strippers to connect low-voltage wires.
- ☐ Optional capacitor discharge tool made from two jumper wires with alligator clips and one 20K Ohm 2-W resistor, and one screwdriver with insulated handle. Attach one alligator clip to unpainted metal frame and touch screwdriver to capacitor terminals to discharge for test.
- ☐ Optional miscellaneous electrical parts for minor electrical repairs to make non-working AC units operable including: fuses, fan relays, contactors, capacitors, and transformers.

2. General Troubleshooting

General troubleshooting is required to check fan operation and minor cooling or heating issues. For split-systems always make sure the cabinet door is squarely installed properly to engage the safety switch inside the cabinet. For packaged units make sure the "disconnect" is in the ON position or check for blown fuses. For all systems make sure all wire connections at thermostat are tight, thermostat has new batteries and terminals on thermostat are properly connected.

2.1 Check Fan Operation

- ☐ If blower runs continuously with SFC installed, then remove thermostat face plate, check connections, and check if blower turns OFF after three minutes. If thermostat connections are tight and blower continues to run with thermostat face plate removed, then go to forced air unit (FAU) or packaged unit where SFC is installed. Disconnect SFC green and black wires from fan relay connection to temporarily remove SFC fan control. Leave all other wires in place and reconnect thermostat fan wire (usually green) to fan relay terminal or wire nut connection. If blower continues operating with thermostat fan wire connected to fan relay, then fan relay is faulty or there is a short in thermostat fan "G" wire. Go to **Section 2.2 Check HVAC Fan Relay** or **2.3 Check Thermostat Wire Continuity or Install Common-wire Adaptor.**
- ☐ Before installing the SFC, turn on fan and measure current on fan G. If fan G current is greater than 0.25A, then fan relay or sequencer is failing and might need to be replaced. Model 1414 is UL-listed with a current capacity of 0.75A.
- ☐ If fan does not operate and system is hydronic make sure water valve is not stuck closed.
- ☐ For all other HVAC systems, if fan does not operate properly, then perform the following troubleshooting checks below.

2.2 Check HVAC Fan Relay

- ☐ Wearing insulated gloves and safety glasses turn OFF system power and remove cabinet or panel door. Locate fan relay and transformer low voltage hot "R" and common "C" terminals. Determine which fan relay spade connector is connected to transformer common "C" in order to determine which fan relay spade connector is for thermostat fan "G" wire. Typical HVAC fan relays are shown in **Figure 1**. Newer HVAC systems have fan relay on circuit board. On some newer circuit boards, a failed fan relay can be removed and a new fan relay can be plugged into circuit board socket as shown in **Figure 2**. On some newer units, fan relay is soldered to circuit board and board must be replaced if fan relay fails.
- ☐ **To check if relay works, system power must be turned ON with cabinet door open.** Before turning ON power for a split system, make sure cabinet door safety switch is engaged using tape or a clamp. Turn ON system power while cabinet door is open, and use digital Multimeter to make sure system transformer is providing 24 VAC. Then use jumper wire with alligator clips to connect system transformer low voltage hot "R" to relay spade connector where fan "G" wire is connected and listen for relay turn ON and click.
- ☐ **If relay does not click and blower fan does not turn ON, then replace fan relay.** After fan relay is replaced, energize relay again using jumper wire with alligator clips to check if blower fan turns ON. If blower fan turns ON, then relay is repaired and fan should operate

properly. If blower fan does not turn ON, then fan motor start capacitor might have failed. Go to **2.6 Check Capacitors**.

- ☐ **If relay clicks and blower fan turns ON, then relay and blower are working.** Remove jumper wire with alligator clips and reinstall cabinet or panel door and go to thermostat and turn ON Fan. If fan turns ON, then thermostat fan control, relay and blower are working.
- ☐ **If blower fan does not turn ON when thermostat fan switch is turned ON, then check thermostat batteries or check for short/open on thermostat fan "G" wire.** See **2.3 Check Thermostat Wire Continuity or Install Common-wire Adaptor**.
- ☐ After checking or replacing relay, replace all wires, reinstall cabinet doors or panels, and turn ON power to unit.

Figure 1. Typical HVAC Fan Relays

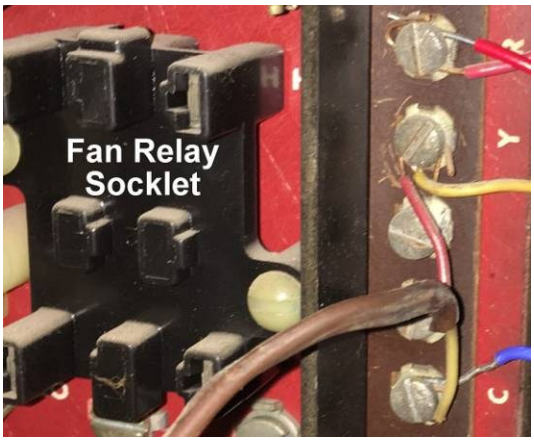


Figure 2. Circuit Board with Fan Relay Socket to Replace Fan Relay

2.3 Check Thermostat Wire Continuity or Install Common-wire Adaptor

- ☐ Check if there is short/open in the thermostat fan "G" (or other) wire, then use a digital clamp-on multimeter to check continuity (Fieldpiece SC460 or equivalent). Go to thermostat and jumper thermostat fan "G" wire to thermostat hot "R," go to FAU or packaged unit, and locate thermostat terminal block or thermostat wires. Use multimeter to check for 24 ± 4VAC signal on thermostat fan "G" wire. If 24 ± 4VAC is detected, then thermostat fan "G" wire is not shorted/open.
- ☐ If there is a short circuit or open circuit on the thermostat fan "G" (or other) wire install a UL-listed common-wire adaptor such as e-wire™ (www.greenfan.co/e-wire).

2.4 Check Minor Cooling or Heating Issues

- ☐ If insufficient cooling, then replace air filter, clean condenser, check compressor contactor, and/or check and correct refrigerant charge or install new thermostat batteries or check for common “C” wire at the thermostat.
- ☐ If insufficient heating, then replace air filter, check igniter, inducer fan, gas valve, or install new thermostat batteries or check for common “C” wire at the thermostat.
- ☐ If heat pump is not providing 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, then check pump, air filter, and check water heater or hot water supply temperature to make sure setpoint is at least 130°F.

2.5 Check Contactors

- ☐ When a contactor is damaged and needs replacement, it will not pull closed and connect power. If thermostat is ON, but AC unit is not starting, the contactor might have failed.
- ☐ Visually check for black marks and pitting on contactor connections. Excessive pitting can cause contactors to fail as shown in **Figure 3**.
- ☐ Replace pitted or failed contactors.

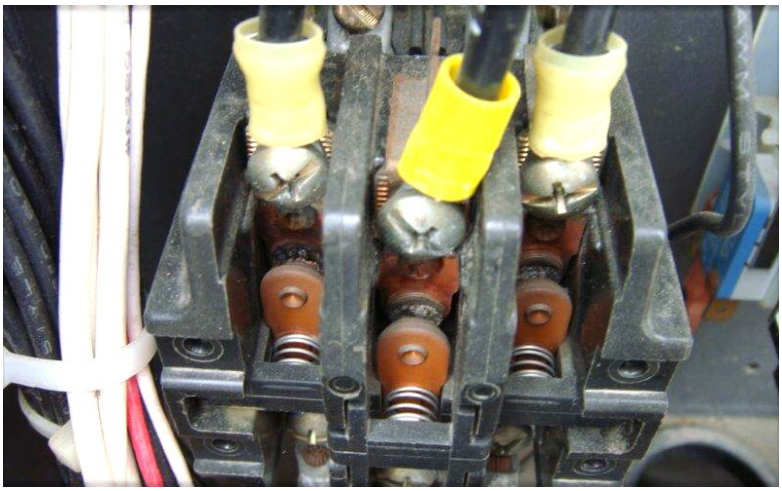


Figure 3. Example of pitted contactors indicating pending failure

2.6 Check Capacitors

- ☐ Start capacitors have a relief plug or disc on top that bulges or leaks if capacitor has overheated. Visually inspect and replace any bulged or leaking capacitors.
- ☐ Wearing insulated gloves and safety glasses, turn thermostat to OFF, remove disconnect, remove panel covering electrical components.
- ☐ Use capacitor discharge tool and screwdriver with insulated handle to touch both common “C” and compressor “HERM” connection tabs on top of capacitor to discharge capacitor.
- ☐ Use capacitor discharge tool and screwdriver to touch both fan “G” and common C tabs on top of capacitor to discharge fan side of capacitor.
- ☐ With digital Multimeter set to micro-farads, touch one lead to common “C” and other lead to either fan “G” or compressor “HERM” tab (Figure 4). If micro-farad reading is within 0% to +/-20% of operating range on capacitor, then capacitor is good. If not, replace capacitor.
- ☐ Replace electrical cover on unit, replace electrical disconnect, and turn thermostat to ON.

Figure 4. Checking 50 µF capacitor but only measuring 0.012 µF indicating failure

2.7 Check Transformer

- ☐ Wearing insulated gloves and safety glasses, turn OFF power to AC unit. Set up digital Multimeter to measure control voltage across secondary winding. Turn ON HVAC system and measure voltage across transformer which should be 24 ± 4VAC as shown in **Figure 5**.
- ☐ Wearing insulated gloves and safety glasses, turn OFF power to AC unit. Set up digital Multimeter to measure high voltage across primary winding. Turn ON power and measure voltage across secondary winding. If there is no voltage or low voltage (below 100Vac rms), measure single-phase equipment input voltage or three-phase equipment voltage. If transformer voltage is within 24 ± 4VAC and SFC is not working, then check SFC and thermostat wire connections, fuses, or fan relay.
- ☐ If zero voltage or < 20VAC, then check circuit breaker or replace transformer.

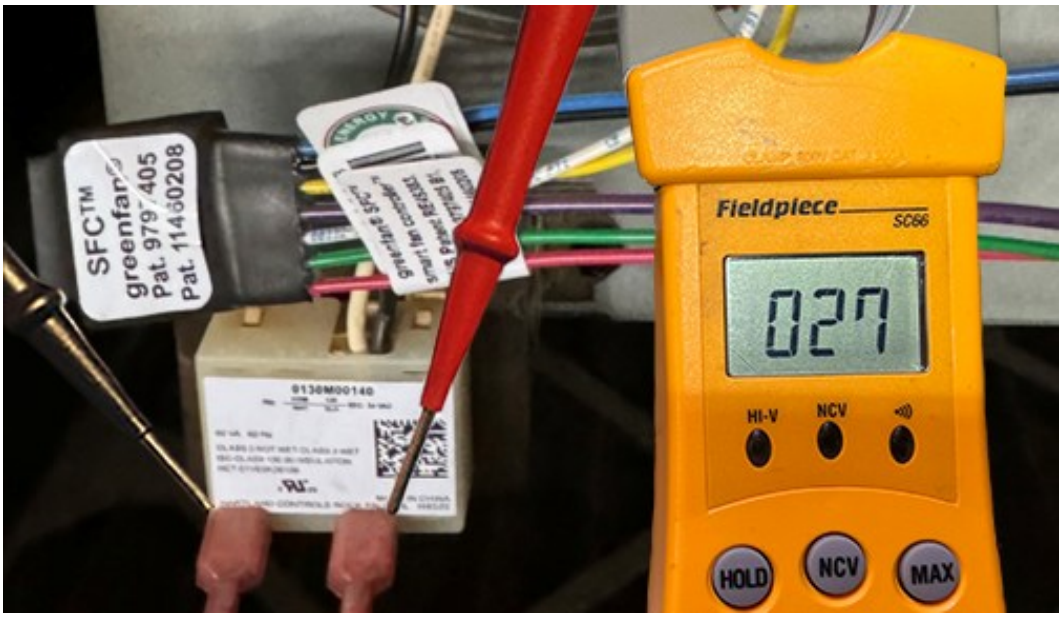


Figure 5. Check Transformer Voltage at HVAC Equipment

2.8 Check Fuses

- ☐ Wearing insulated gloves and safety glasses, remove disconnect to turn OFF power and remove panel covering fuses.
- ☐ Using an insulated fuse puller remove fuse(s) from disconnect switch.
- ☐ Set up digital Multimeter to measure continuity. If fuse is good, digital Multimeter will measure ZERO Ohms and beep. Fuse fails if digital Multimeter reads open or measures a resistance. Fuses can fail due to poor contact. Check disconnect switch for loose connections, discolored or hot clips or blades. Replace failed fuse(s).

2.9 Other Issues

- ☐ For an older packaged or roof top unit (RTU) without a wiring terminal block, use wire nuts to connect SFC wires to thermostat wire connections. SFC blue wire requires 24VAC common wire connection to common side of 24VAC transformer in the FAU. For an RTU, connect the SFC common wire to the 24VAC common side of the RTU contactor.
- ☐ For thermostats without a common wire a Greenfan® e-wire must be installed. (www.greenfan.co/e-wire).
- ☐ Old fan relays or sequencers at forced air unit or RTU might need to be replaced (**Figure 1**).
- ☐ **Before installing the SFC, turn on fan and measure current on fan G. If fan G current is greater than 0.25A, then fan relay or sequencer is failing and needs to be replaced.**
- ☐ Double-Pole Double Throw (DPDT) relays may include Jard or Mars DPDT 24V Power-Power Relay, Model 92340. Recommend having at least one relay for replacement, if fan relay is failing. https://www.supplyhouse.com/Jard-92340-DPDT-24V-Power-Power-Relay.
- ☐ Terminal blocks should not have more than 2 wires. If there are more than 2 wires, install separate wire to keep 2 wires at terminal and use wire nut for multiple wires hot R, AC Y, C.
- ☐ Install SFC at HVAC unit not at add-a-wire or other locations.
- ☐ If Ecobee smart thermostat, install SFC downstream of Ecobee PEK adaptor.
- ☐ If SFC operates fan continuously, test SFC between red and green wires for short circuit (should be open circuit unless damaged by connecting without common wire).
- ☐ If no common wire, then go to transformer and check voltage between ground and transformer terminals. Common to ground is 0VAC. Common to hot R is 24VAC. SFC blue wire must be connected to Common and SFC red wire must be connected to 24VAC hot R. SFC black wire to fan G from thermostat and downstream of Ecobee PEK adaptor (if Ecobee). SFC yellow wire to AC Y. SFC white wire to heat W. SFC green wire to fan G terminal on HVAC unit.
- ☐ Okay to replace old fan controllers (EFC) with no yellow AC Y wire to monitor the cooling cycle or 2020 date code or older. Date code is on UL-listed label (see yellow highlighted MM/YYYY date code in **Figure 6**).

Figure 6. Old EFC UL label date code "04/2020" MM/YYYY (yellow highlight)

3. Smart Fan Controller (SFC)

The SFC training manual provides equipment, installation, and troubleshooting instructions. For warranty and support see greenfan.co/sfc.

3.1 Tools and Equipment

The following equipment is required to install the SFC.

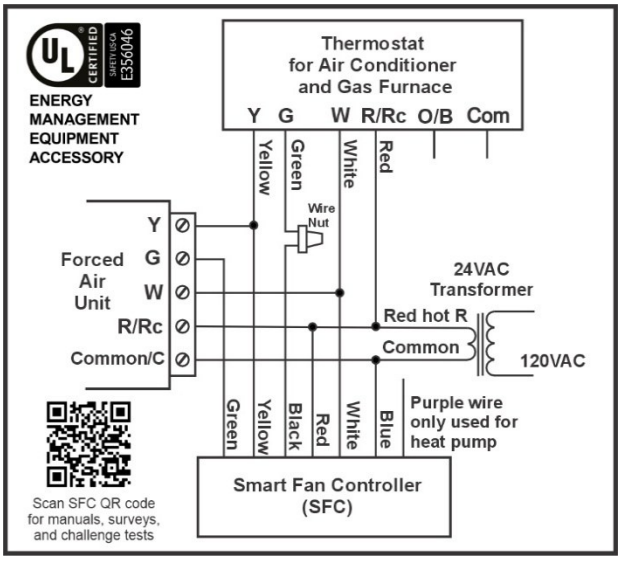
- ☐ Safety glasses and gloves are required when installing SFC or troubleshooting.
- ☐ True RMS digital clamp-on multimeter to install SFC for troubleshooting and measuring current, voltage, continuity, microfarads (Fieldpiece SC260 https://trutechtools.com/SC260).
- ☐ Set of standard slotted and Philips head screwdrivers.
- ☐ ¼-inch and 5/16-inch socket drivers.
- ☐ Wire nuts (provided by GreenFan®), electrical connectors or electrical tape.
- ☐ Self-tapping screws to replace missing screws.
- ☐ Wire cutters and wire strippers to connect low-voltage wires.
- ☐ Optional capacitor discharge tool made from two jumper wires with alligator clips and one 20,000 Ohm 2-Watt resistor, and one screwdriver with insulated handle. Attach one alligator clip to metal frame and touch screwdriver to capacitor terminals to discharge for testing.
- ☐ Optional miscellaneous electrical parts for minor electrical repairs to make non-working AC units operable including: fuses, fan relays, contactors, capacitors, and transformers.

3.2 Pre-Installation Checks

- ☐ **Nonfeasibility: 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 furnace, heat pump, hydronic, and electric heating with different wiring for each system. Heat pump reversing valve is energized for cooling (orange wire) or energized for heating (brown wire).
- ☐ 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.
- ☐ Do not install SFC if HVAC system is not an FAU, HVAC system needs service or repair, or if furnace is on US Consumer Product Safety Commission (CPSC) recall list. See https://www.cpsc.gov/Newsroom/News-Releases/2000/cpsc-warns-about-defective-furnaces-in-california. See **3.12 Nonfeasibility**.
- ☐ Before installing SFC, turn on fan and measure current on fan G. If fan G current is greater than 0.25A, then fan relay or sequencer is failing and might need to be replaced. Model 1414 is UL-listed with a current capacity of 0.75A.

3.3 Installation for Cooling with Furnace, Hydronic or Electric Heat

- ☐ **For 2-stage HVAC systems install SFC on the 1st stage.**
- ☐ Verify system works in heating and cooling. **Connect ESD wrist strap to FAU metal frame to prevent static discharge. Wear safety glasses and gloves when installing SFC.**
- ☐ **Turn off power to FAU before installing SFC** either at disconnect or wall plug/switch. Mount SFC at FAU terminal block next to thermostat wire connections. See **Figure 7**.
- ☐ 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 a stub wire and a 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. If unit is a heat pump, leave white wire disconnected. 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, purple wire can be capped with a wire nut or cut off. Secure body of SFC using cable or zip ties to reduce vibration from FAU. Double-check wire connections are tight.
- ☐ **Turn ON power after installing SFC.** For hydronic or electric forced-air heating set smart thermostat to electric heating to energize fan G with heat W.
- ☐ Perform the **QUICK TEST** to verify fan operation and the **2-MINUTE TEST** to verify the variable fan-off delays per **Figure 7**.



WARNING

(1) **Required tools:** AC clamp meter; ESD wrist strap; safety gear; screw drivers; wire nuts; elec. tape; wire stripper/cutters.

(2) **SFC red and blue wires** must be connected to Hot R and common on FAU transformer terminals for SFC to function.

(3) **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.

(4) 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.

(5) **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.

(6) **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.

(7) **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.

(8) **Heat pump heat fan-off delay test:** Turn on HP heat for **2 minutes** to verify 20 to 50 seconds HP fan-off delay.

(9) **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.

Figure 7. SFC™ Installation on AC, Gas Furnace, Hydronic, or Electric Heating Systems

3.4 Installation for Heat Pumps

- ☐ **Installation for Heat Pump Orange Reversing Valve energized for cooling.** Connect SFC white wire to orange wire (**Figure 8**). Connect SFC™ purple and red wires to FAU "R/Rc" terminal (red).
- ☐ **Heat Pump brown "BR" wire reversing energized for heating.** Connect SFC™ white wire to brown reversing valve wire (**Figure 8**). Connect SFC purple wire to one end of brown HP diode adapter (**Figure 8**). 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** See heat pump orange wire energized for cooling or brown wire energized for heating.

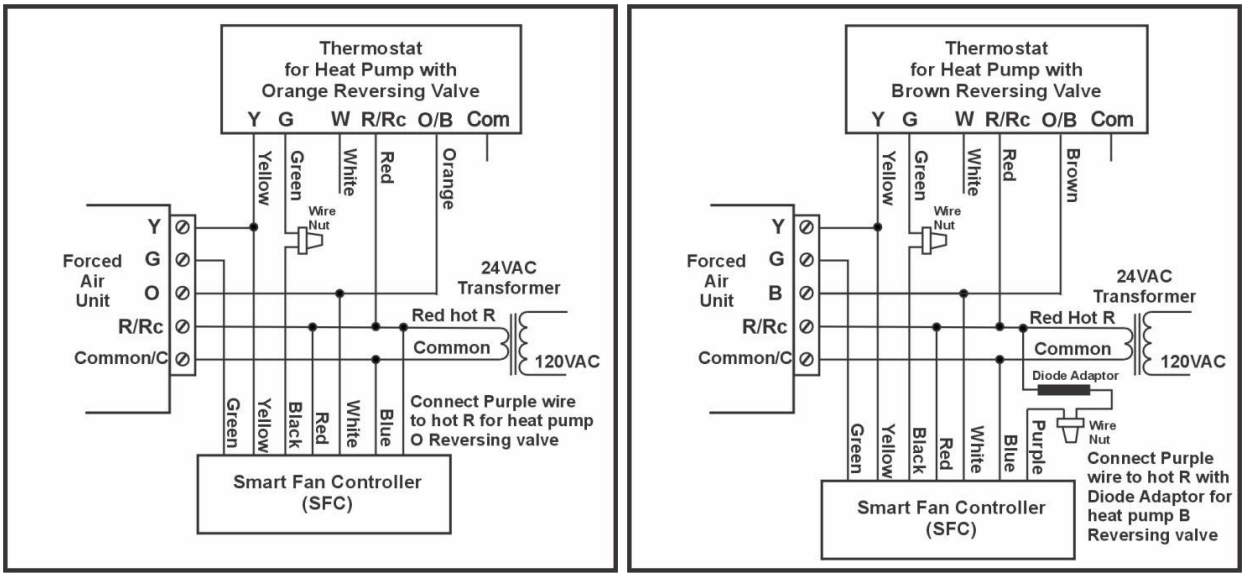


Figure 8. SFC™ Installation on Heat Pump with Orange or Brown Wire Reversing Valve

3.5 Post-Installation – QUICK TEST – Fan Control

- ☐ Switch fan control from AUTO to ON and verify fan turns on for more than 10 seconds.
- ☐ Switch fan control from ON to AUTO and verify fan turns off without a fan-off delay.

3.6 Post-Installation – 2-MINUTE 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. See **Figure 7** fan, cool, and heat fan-off delay 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 **Figure 7** fan, cool, and heat fan-off delay tests.
- ☐ **Heat fan-off delay 2-minute test:** Set thermostat to HEAT. Raise setpoint to enable gas heating for 2 minutes, lower setpoint to turn off heat, verify 2.3 to 2.8-minutes fan-off delay. See **Figure 7** fan, cool, and heat fan-off delay tests.

3.7 Troubleshooting Installation Issues

- ☐ 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 connection from thermostat to furnace, condenser, reversing valve, and water valve for hydronic systems. **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 **3.4 Installation for Heat Pumps**.
- ☐ Installation is not complete until system operates properly.
- ☐ If system does not function, then continue to **3.8 Troubleshooting Fan Operation Issues**.

3.8 Troubleshooting 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.
- ☐ **Ensure all connections are tight** and thermostat has new batteries and terminals on thermostat are good.
- ☐ Before installing SFC, turn on fan and measure current on fan G. If fan G current is greater than 0.25A, then fan relay or sequencer is failing and might need to be replaced. Model 1414 is UL-listed with a capacity of 0.75A.
- ☐ If fan does not operate and system is hydronic make sure water valve is not stuck closed.

3.9 Troubleshooting Cooling or Heating Issues

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

3.10 Troubleshooting Smart Thermostat Common-Wire Issues

- ☐ Smart thermostats or battery-powered thermostats without a common-wire will steal power from heat W, AC Y, or fan G wires to operate. Power stealing causes stray voltage signals on heat W, AC Y, or fan G wires which can energize fan or heating and cooling systems.
- ☐ Some smart thermostats turn ON fan without AC which can be disabled in settings. Choose Nest Sense. Select Airwave OFF shows check mark (✓) when ON and dash (–) when OFF.

- ☐ Prior to installing SFC, verify thermostat has common wire and use multimeter to measure voltage on heat W, AC Y, or fan G wires. If stray voltages are present, install common-wire adaptor such as UL-listed e-wire™ (www.greenfan.co/e-wire). The e-wire is easy to install and saves 0.5 to 2W or 4 to 17 kWh/yr or 10 therm/yr compared to other adapters.
- ☐ US EIA indicates 85% of 144 million US households have thermostats to control central heating equipment and less than half of thermostats are programmable.[1] For households with central cooling equipment, 60% have a central thermostat and about half of those are programmable. At least 60 million U.S. homes do not have a common wire at thermostat to provide reliable power to smart thermostats.

3.11 Tracking Database for Warranty and Technical Support

- ☐ SFC installations can be tracked in an online database for warranty and technical support to ensure persistence of energy savings.
- ☐ The following information can be collected in a tracking database: 1) technician name, 2) technician phone, 3) SFC installation date, 4) SFC model, serial number, SFC verification test, 5) contractor business name, 6) contractor phone, 7) contractor email, 8) site name or ID to register warranty, 9) site address (number and street, city, state, ZIP code), 10) HVAC system make, model and serial number, 11) HVAC system cooling capacity (tons), 12) HVAC system heating capacity (kBtuh), 13) If HVAC system has a pre-existing fan controller (EFC or Enhanced Time delay) older than 5 years or no yellow AC Y wire to monitor the cooling cycle, install a new SFC and enter pre-existing fan controller age from UL or product label (MM/YYYY). See **Figure 6**.

3.12 Nonfeasibility

- ☐ Fuel used by the existing unit is not supplied by the utility providing program services.
- ☐ Space conditioning appliance is not a forced air unit (FAU).
- ☐ A fan controller has already been installed and is less than 5 years old.
- ☐ The HVAC unit needs service or repair, or on a recall list.
- ☐ A safety hazard is present which cannot be repaired.
- ☐ A suitable mounting location is not available.
- ☐ Customer refuses.

[1] US Energy Information Agency (EIA). 2014. Most homes have central thermostats on heating and cooling equipment. https://www.eia.gov/todayinenergy/detail.php?id=14771