

FURNACE TWINNING KIT

INSTALLATION INSTRUCTIONS

**NOTE: NOT FOR USE WITH TWO-STAGE VARIABLE SPEED FURNACES OR WITH 2-STAGE CONDENSING UNITS.
NOT FOR USE WITH FURNACES UTILIZING IGNITION CONTROL 50A55-289 (PCBBF112(S)).**



WARNING

EACH FURNACE MUST BE EQUIPPED WITH ITS OWN GAS SHUTOFF VALVE AS REQUIRED BY THE NATIONAL FUEL GAS CODE.

The Furnace Twinning Kit (FTK) provides the means for two gas furnaces containing an Integrated Ignition control to operate at the same time from a single thermostat. The two furnaces to be "twinned" must be exactly the same model with their circulating air blowers set to deliver the same air flow at the same time. The furnaces may deliver different CFMs in the cooling mode, if appropriate. **THIS KIT CANNOT BE USED TO CONTROL MORE THAN TWO (2) FURNACES.** When properly installed, these furnaces will achieve the operational and performance specifications described in the installation instructions. For items not covered in this manual, follow the installation instructions shipped with the furnaces.

This Twinning Kit Installation Instruction is divided into five sections. Section I deals with furnace opening sizes, recommended filter sizes and maximum CFM per furnace. Section II details the installation of the twinning kit. Section III details the sequence of operation. Section IV provides checks and possible repair procedures. Section V provides a point-to-point wiring diagram.

SECTION 1 GENERAL INFORMATION

It is very important to properly size ductwork and to supply appropriate filters for your furnaces. There are four possible ductwork configurations for twinning your furnaces:

- Bottom Return
- Side Return - One Return per Furnace
- Two Side Returns
- Top Return

IMPORTANT NOTE: Back return duct installations to furnaces are NOT permitted. Back return installations constrict airflow which leads to poor performance and equipment damage. Back return installations are considered improper installation and will void warranty coverage.

GENERAL NOTES

- Maximum CFMs are limited by a maximum filter velocity of 600 feet per minute, or by circulator high speed at 0.5 inches External Static Pressure (ESP) (whichever CFM is lower). **THIS REQUIRES A HIGH VELOCITY FILTER. THROWAWAY FILTERS MUST NOT BE USED.** If using anything other than a permanent high velocity filter, consult filter manufacturer recommendations for maximum allowable velocity.
- Actual CFM at the job should be established by carefully setting the furnace input and measuring the temperature rise. The ESP/CFM Tables in the furnace specification sheets and installation manuals are based on side return(s) for a single furnace. For twinned installations - especially those with bottom return - the relationship between ESP and CFM may be different. The most accurate way to estimate airflow on twinned installations is to use temperature rise:

$$\text{CFM} = \frac{\text{BTUH Input}}{1.085 \times (\text{Supply Air Temperature} - \text{Return Air Temperature})}$$

- Cooling CFM should be 350 to 450 CFM per nominal ton of cooling capacity. Heating CFM must produce a temperature rise within the range(s) specified on the furnace nameplate.

Bottom Return

In most cases, bottom return air to both upflow furnaces will be more practical. When bottom return air is used, the furnaces should be set as close together (0 to 3 inches) as is practical. This separation distance is variable, depending upon the needs of the particular job.

See furnace specification sheet for furnace opening sizes, recommended filter sizes, and maximum CFM per furnace.

Side Return (One Return per Furnace)

This is applicable only for the upflow models with less than five tons of airflow.

PREFERRED METHOD

Place the furnaces close together and install a return air drop to the outside of each furnace (Figure 1).

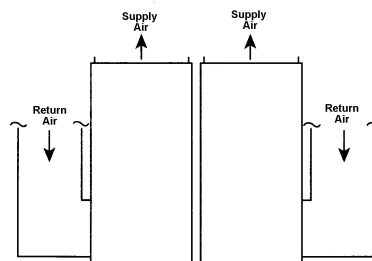


Figure 1 - [Preferred Method] Single-Side Return Per Furnace Side Cutouts are 14" x 23" (All Furnaces)

ALTERNATE METHOD

The alternate method is used when the installer is forced to use one return for two furnaces (Figure 2). The maximum required spacing between the furnaces is 30 inches apart (approximately 28 x 24 return trunk duct).

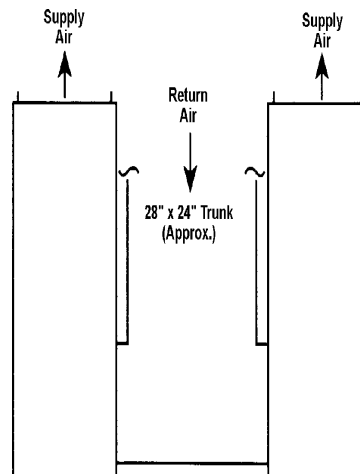


Figure 2 - [Alternate Method] Single-Side Return per Furnace Side Cutouts are 14" x 23" Furnaces are 30" Apart



Two Side Returns

Two side returns per furnace is ordinarily used when only 8 or 10 tons of cooling are required and where a bottom return is not practical. The furnaces should be from 24 to 30 inches apart. Two side returns are applicable only for upflow models with five tons of airflow.

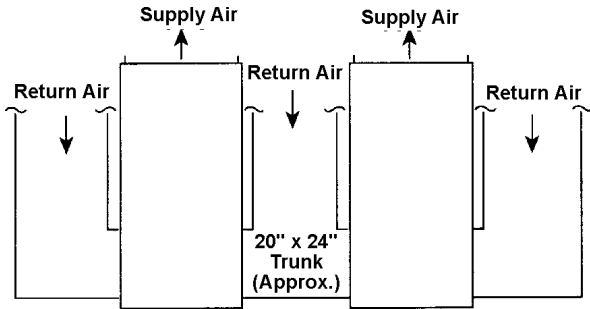


Figure 3 - Two Side Returns Per Furnace Side
Cutouts are 14" x 23" (All Furnaces)

Top Return

When counterflow furnaces are twinned, the return air must enter through the top of the furnace.

See the furnace specification sheet for minimum plenum height and maximum CFMs per furnace.

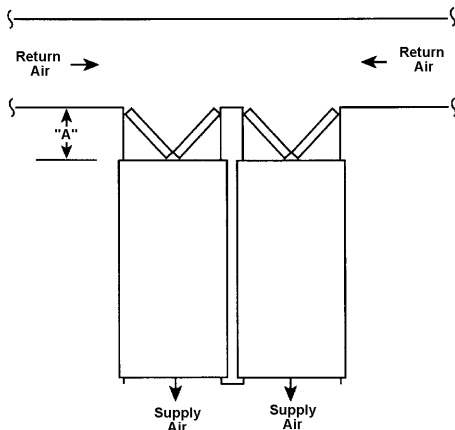


Figure 4 - Twinned Counterflow Furnaces
"A" = Minimum Plenum Height Furnaces from 0 to 30" Apart

SECTION II TWINNING KIT INSTALLATION

CAUTION

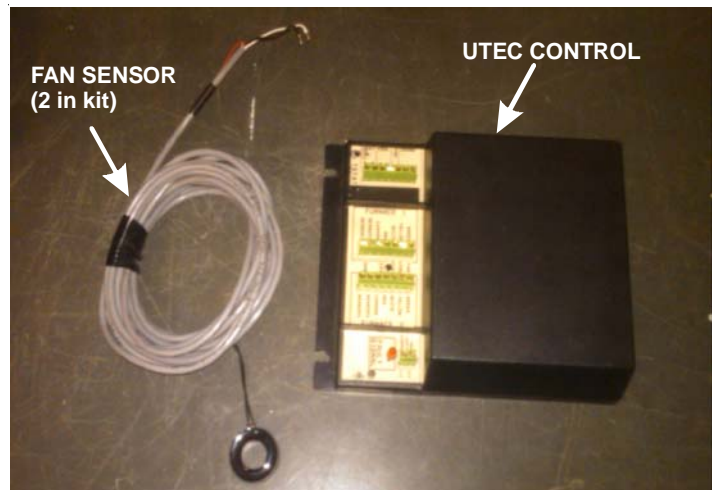
TO AVOID THE RISK OF PERSONAL INJURY OR DEATH DUE TO ELECTRICAL SHOCK, WIRING TO FURNACE MUST BE PROPERLY POLARIZED AND GROUNDED.

WARNING

HIGH VOLTAGE
DISCONNECT ALL POWER BEFORE SERVICING, INSTALLING OR CHANGING ANY ELECTRICAL WIRING. MULTIPLE POWER SOURCES MAY BE PRESENT. FAILURE TO DO SO MAY CAUSE PROPERTY DAMAGE, PERSONAL INJURY OR DEATH.



This Installation Kit includes:



TWINNING KIT	
Quantity	Item
1	UTEK Control 1196-100
2	Fan Sensors

FIELD SUPPLIED MATERIAL	
Quantity	Item
3	#6 Screws, 3/4" long
---	18 Gauge 5-Wire Conductor

TOOLS REQUIRED

1/4" Nut Driver
Drill
3/32" Drill Bit
Small, Regular (Common) Screwdriver

Before Installing the Twinning Kit

There are important items which must be determined before installing the twinning kit. Read all of these instructions before you begin installing either furnace.

Continuous Fan Operation

Furnaces that are twinned using this kit **cannot** be setup for heating-cooling-continuous fan speed operation. Furnace will operate at the same continuous fan speed selected in the furnace control.

Condensate Disposal

When installing condensing furnaces, be sure to plan for adequate condensate drainage. This is especially important on counterflow installations. Follow the condensate disposal piping directions shipped with the furnace.

Unit Wiring

This kit allows the furnaces to be placed a maximum of five feet apart. Wire routing between furnaces is the same for any type furnace being installed.

IMPORTANT NOTE: Any excess wires must be routed and secured to prevent becoming entangled in either blower or damaged by either set of burners.

Kit Installation

1. Disconnect all electrical power to unit.
2. Find a location for mounting the twinning control. The side of the return section of the furnace cabinet or on the return air duct would be adequate locations.
NOTE: The control should be mounted in a location that allows access to the terminals for wiring and servicing and keeps wire lengths to a minimum.
3. Drill three holes according to the following illustration (Figure 5).

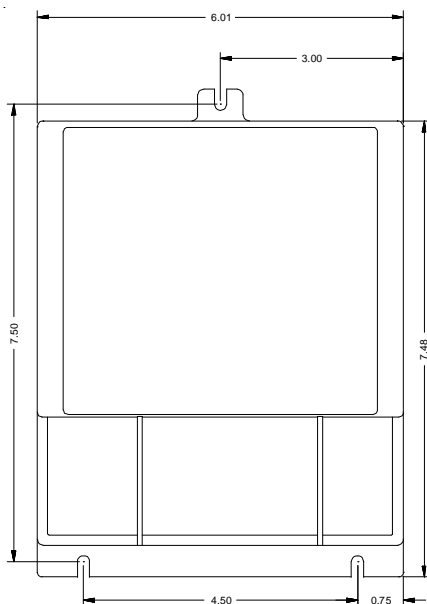


Figure 5

Mounting Hole Locations

4. Using three #6 3/4-inch long screws (field-supplied), mount the twinning control vertically with the connectors at the bottom as shown in Figure 5. Do not over tighten the screws. **DO NOT** expose the control to water or temperatures below -40°F or above 120°F.
5. Designate one of the furnaces as furnace #1 and the other as furnace #2.
6. Connect furnace #1's ignition control thermostat connectors: C, R, W, Y, and G to an 18 gauge 5-wire thermostat cable.
7. Route the cable up through the blower deck and out the thermostat wire hole on the side of the cabinet. Connect the wires to the corresponding terminals on the furnace #1 section of the twinning control.
8. Repeat steps 6 and 7 for furnace #2.

Fan Sensor Wiring Installation

1. Route the two wire cable along the same path as the thermostat wiring to the twinning control.
2. Connect the two wires to the corresponding FAN/LED SENSOR INPUTS on the furnace #1 section of the twinning control. The cable can be cut to a convenient length.
3. Locate the white neutral fan motor lead.
4. Remove the white neutral fan motor lead from the furnace board and pass the wire through the hole in fan sensor #1.
5. Reconnect the white neutral fan motor lead to the furnace board in the same location as it was removed.
6. Repeat steps 1 through 5 for furnace #2.

Thermostat Wiring Installation

Important Note: The system thermostat that controls the conditioned space should not have a current draw higher than 25 milliamps.

1. The control allows the use of a two stage heating and cooling thermostat. If a single stage heating or cooling thermostat is used the W1 and W2 (1 stage heating) or Y1 and Y2 (1 stage cooling) must be jumped together. For thermostats that require a "common" connection a "C" terminal is provided.
2. The heat anticipator in the room thermostat must be correctly adjusted to obtain the proper number of heating cycles per hour and to prevent the room temperature from "overshooting" the room thermostat setting.
Heat anticipator must be set at 0.16 amps.

SECTION III SEQUENCE OF OPERATION

Single Stage Thermostat

On a system call for heat a relay closes both blower (R-G) circuits, powering the blowers of both furnaces (continuous fan speed). One second later, relays close the heating (R-W) circuits of both furnaces. In 30 or 45 seconds after the furnaces fire, the blowers will switch to the heating speed. When the call for heat is satisfied at the thermostat, both (R-W) circuits will immediately open. Following approximately a 155 second delay, the fan (R-G) circuits will open. For cooling operation, the sequence is identical but with the R-Y circuits activated.

NOTE: In the heating mode, if the furnace control module blower off timing is longer than the Twinning Control's 155 seconds, the blower(s) will continue to operate in the heating speed until the furnace control module blower off delay is satisfied.

Two-Stage Thermostat

On a first stage call for heat, a relay will close both blower (R-G) circuits as in the single stage operation. One second later, a relay will close the heating circuit (R-W) of furnace #2 only. In 30 or 45 seconds after the furnaces light, the blower of furnace #2 will switch to the heating speed. When the call for heat is satisfied, the (R-W) circuit will open and the 155 second Twinning Control fan off delay begins. The furnace #2 blower will operate in the heating speed until the furnace control module blower off delay is satisfied, then the blower will switch to the continuous fan speed.

NOTE: If the furnace control blower off delay is longer than the 155 second Twinning Control off delay, the Twinning Control will turn off the blowers. The blower for furnace #1 will shut off, and since the blower on furnace #2 is still running, the blower for furnace #1 will reenergize in the continuous fan speed. This process will continue until the furnace control blower off timing is satisfied and both blowers are running in the continuous fan speed. The Twinning Control will then simultaneously turn off both blowers. To prevent this operation, set both furnace's heat off delay time to 150 seconds or less, provided both are set to the same time.

On the next stage 1 call for heat, furnace #1 is signaled to heat. This sequence alternates on successive cycles balancing run times on the furnaces.

If a stage 2 (W2) call for heat is received at any time W1 is activated the R-W circuit of the non-firing furnace closes.

If both stages energize or deenergize simultaneously, operation is identical to single stage operation above.

Two stage cooling is analogous to staged heating but activates the R-Y circuits. The blowers will have a 65 second off delay in the cooling speed.

Hybrid Furnaces

When twinning hybrid furnaces, set the dip switch settings for both furnaces to the same setting.

Abnormal Conditions

If only one blower is sensed "ON" for more than four seconds while a thermostat input is present, both furnaces will deenergize and the on-board LEDs are activated. This lockout condition can be reset by turning the thermostat to the OFF position or by turning the power OFF then back ON for both furnaces for at least one second and returning to the desired function. If, when no thermostat input is present, only a single blower is sensed, the blower circuits (R-G) close to both furnaces for 155 seconds and then open. If the unbalanced condition (one blower sensed), still exists, the sequence repeats.

Diagnostic LED Flash Sequence

The on-board LED activates with a blower failure on furnace 1, 2, or both. If the furnace blower failure is on furnace 1, the LED will flash once with a two-second off interval between flashes.

If the furnace blower failure is on furnace 2, the LED will flash twice with a two-second off interval between flash sequences.

If the furnace blower failure is on both furnaces, the LED will flash three times with a two-second off interval between flash sequences.

The REM FAULT SIGNAL output will flash continually in all fault code conditions. The REM FAULT SIGNAL does not flash separate fault codes.

SECTION IV CHECKOUT AND REPAIRS

Startup Procedure

Refer to the Installation Instructions provided with the furnace for proper operation and startup procedures after installing the twinning control. If that information is not available, follow these instructions to ensure all components function properly:

1. With the gas and thermostat off, turn ON power to the furnaces.
2. Turn the thermostat to a high setting and verify that both ignition controls go through the operating sequence to a shutoff condition.

Note: The burners will not light because the gas is off.

3. Turn OFF the thermostat.
4. Turn ON the gas and purge gas lines of all air.
5. Check for gas leaks with a soap solution.
6. Turn the thermostat to a high setting and verify successful ignition and a normal run condition for at least three minutes.
7. Do a leak check on all pipe joints downstream of the gas valve with a soap solution.
8. Turn the thermostat down for at least 30 seconds and then back up again. Verify successful ignition at least three times before leaving the installation.

Repairs and Replacement

Do not attempt field repairs. Use only an exact or factory recommended replacement control.

SECTION V POINT-TO-POINT WIRING DIAGRAM

WARNING

HIGH VOLTAGE
DISCONNECT ALL ELECTRICAL POWER AND SHUT OFF GAS SUPPLY TO BOTH FURNACES BEFORE INSTALLING THIS KIT. MULTIPLE POWER SOURCES MAY BE PRESENT. WIRING TO BOTH FURNACES MUST BE PROPERLY POLARIZED AND GROUNDED AND BOTH TRANSFORMERS MUST BE IN PHASE. FAILURE TO DO SO MAY CAUSE PROPERTY DAMAGE, PERSONAL INJURY OR DEATH.

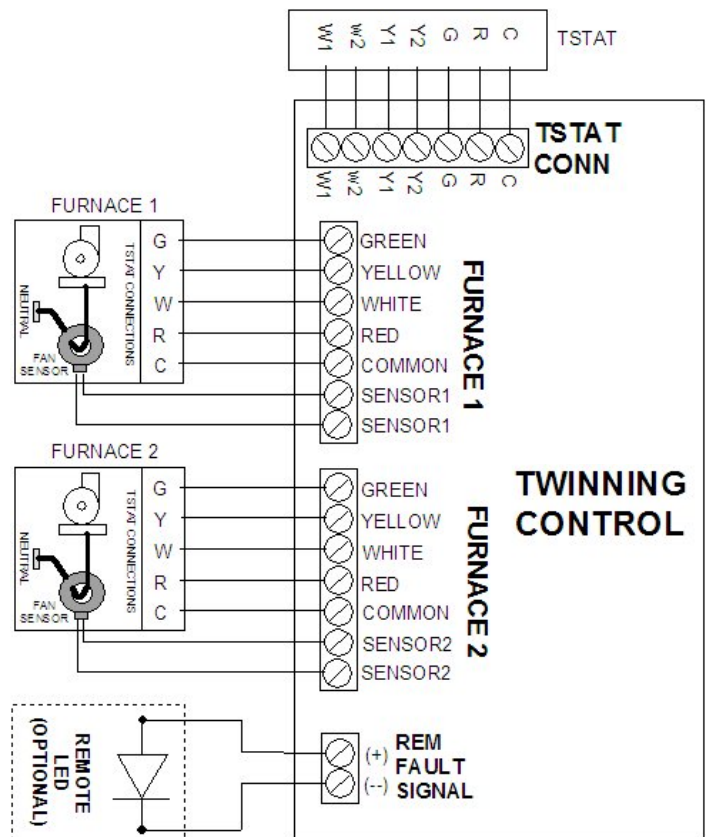


Figure 6
Twinning Controls

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