

Installation Instructions

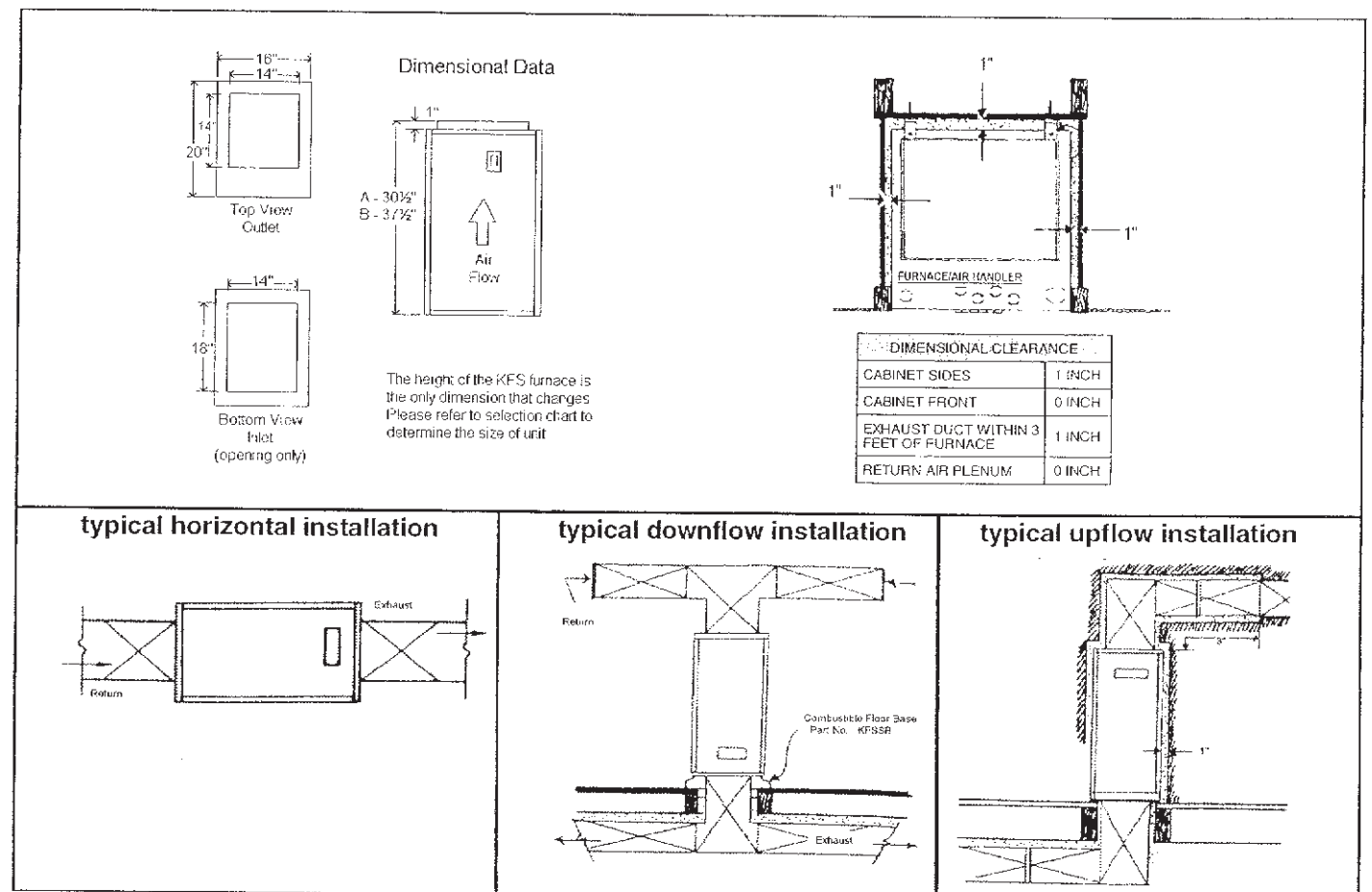
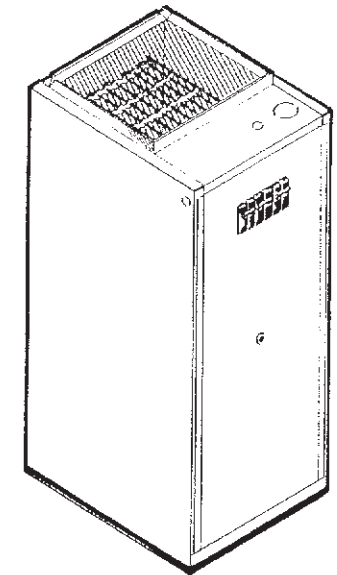
KF and KFS Series

KING furnaces can be installed with a minimum of 1 inch clearance for compact, space saving installations in either vertical upflow, downflow or horizontal position.

When installed in the downflow position, the Combustible Floor Base Accessory must be used.

CHECK: furnace to be sure blower wheel is free-turning, and that element assemblies are in place. Be sure filter is in proper position and not torn or damaged.

NOTE: the attached Underwriters Laboratories' label pertains to the furnace only. It does not cover any air cooler, condensing unit or air cleaner, which may be used with the furnace. The optional QOU cabinets are designed for slip-in addition of an evaporator coil at a later date. Approval of the complete system of air conditioning requires compliance with local codes.



FIELD WIRING: King furnaces come equipped with 60 amp circuit breakers installed for protection of the furnace internal wiring only. They also serve as a disconnection means when required. A 240 volt single phase circuit must be brought to each circuit breaker in the furnace as shown in the wiring diagram. The terminals are identified as L1-L2, L3-L4, L5-L6 and L7-L8. The KW size of the furnace determines how many circuits are required. The furnace power and electrical rating table indicates how many circuits each model furnace requires, the size of the branch circuit protection at the distribution panel and the wire size required from distribution panel to the furnace. If there is any questions consult your local and national electric codes. All wiring used must be approved for 75°C. **NOTE:** no wire may have more than 120 VAC potential to ground. This must be checked on installation to avoid motor damage. Unit must be grounded by connection of grounding wire from the distribution panel to the terminal provided in furnace. When the line voltage terminal block option is specified for single strike, see wiring diagram for wire size and circuit protection requirements.

KING ELECTRIC FURNACE

- 1. Your King electric furnace has been designed to distribute heated air to your living quarters when connected to appropriate ducting.
- 2. On models KF5 & larger, your furnace operates under command of a low voltage wall thermostat.
- 3. Models KFS5 through KFS18 employ one sequencer relay and thus the thermostat heat anticipator should be set at 0.4.
- 4. Models KFS20 thru KFS35 employ two thermal relays, thus the thermostat heat anticipator should be set at 0.8.

SEQUENCE OF OPERATION

- 5. With the thermostat set at 70°F and the temperature drops to about 69°F, the thermostat's internal switch closes its contacts. About 30 seconds later the first heating element and the blower turn"ON". After another 30 seconds the second heating element is turned "ON" continuing in 30 second intervals until all the heating elements in the furnace are "ON".
- 6. When the thermostat is satisfied the "ON" process is reversed with the last element & blower turning "OFF" simultaneously.
- 7. Because of the many variable affecting heat loss (cold wall, sun rays, drafts, etc.) you may be more comfortable with the thermostat set higher or lower than 70°F. It will take some experience to find your comfortable setting.
- 8. Your King electric furnace may be equipped with a cooling coil to accomplish summer cooling. It may also be equipped with an electronic air cleaner to reduce dust, pollen and other household respiratory irritabilities.
- 9. If your furnace does not have an electronic air cleaner you will need to replace the furnace filter, several times during the year or whenever it becomes dirt clogged.
- 10. The furnace cannot deliver warm air unless,
 - (a) all electric circuit breakers are turned "ON".
 - (b) your furnace filters are clogged with dirt and dust. Air is the vehicle for heat transfer, thus in order to deliver warm air an equal amount of cold air must be draw back to the furnace.
 - (c) your thermostat heat anticipator is set wrong - see paragraph three and four above.
 - (d) your cold air return registers are blocked with furniture, throw rugs, etc.
 - (e) your warm air registers are blocked with furniture, throw rugs, etc.
- 11. If your furnace is equipped with a cooling coil your "Outdoor Condensing Unit" must be turned "ON" when summer cooling is required; and your thermostat must be switched to the "Cooling" position and the thermostat temperature setting should be set at about 76°F, then if too cold, raise temperature, if too hot, lower temperature setting.
 - (a) The heat cool thermostat, on furnaces with cooling provisions, has a HEAT/OFF & COOL position. The fan section as an AUTOMATIC and ON position.
 - (b) For heating, the system switch must be moved to HEAT position and the fan section should be set to AUTOMATIC.
 - (c) For cooling set the system to COOL and the fan section to ON. Thus the fan will run constantly with the outdoor condensing unit running only when your thermostat calls for cooling.
 - (e) You may want the fan to run continuously in either HEAT or COOLING. If so, set fan system to ON.
 - (f) The OFF position shuts down both heat and cooling and also shuts off the fan.
 - (g) In winter don't leave home with the furnace turned OFF. Instead set your thermostat at about 40°F and leave the furnace system in the HEAT position to reduce the possibility of freezing of the indoor plumbing.
- 12. If your furnace is equipped with an electronic air cleaner it must be cleaned several times during the year. You will want to study the HOME OWNER'S MANUAL supplied with the electronic air cleaner.

MANUFACTURED HOUSING

DOWNFLOW INSTALLATION

- 1. Select a suitable, centralized location of the furnace: A closet, alcove or utility room.
- 2. The site selection must have adequate return air capability, and must be located directly above existing or planned location of the charge plenum.
- 3. Cut a 15" x 15" opening in the floor exposing discharge plenum (or its location).
- 4. Place the base for combustible floor application into the floor opening. Secure it to the floor with screws (at least one on each side).
- 5. Put the duct connector into the base opening and mark plenum for cutting where the duct connector rests on it.
- 6. Remove the duct connector and cut to the outside of marking on plenum, and remove cut metal.
- 7. Replace duct connector back down through floor base. Bend alternate pre-cut tabs of duct connector 90° outward. Press duct connector into plenum, and bend remaining tabs into the plenum so that it is firmly attached.
- 8. If necessary, cut the top of duct connector so that it is below the top of floor base, approximately 1".
- 9. Make the air duct tight by applying 2" duct tape to the tabbed in portion of duct connector at the plenum opening and around the top of duct connected inside the floor base.
- 10. Attach the duct connector to floor base using four (4) #8 hex head 1/2" self tapping screws.
- 11. Remove air filter from furnace. Set the furnace onto the combustible floor base with the filter end of the furnace facing upward. Replace filter in furnace.
- 12. Make sure power is off on electrical circuits.
- 13. Remove door of furnace and bring proper electrical wiring into an appropriate opening provided and connect wiring per instructions on wiring diagram.
- 14. If needed, make sure any return air grill has a free air area of not less than 196 square inches.

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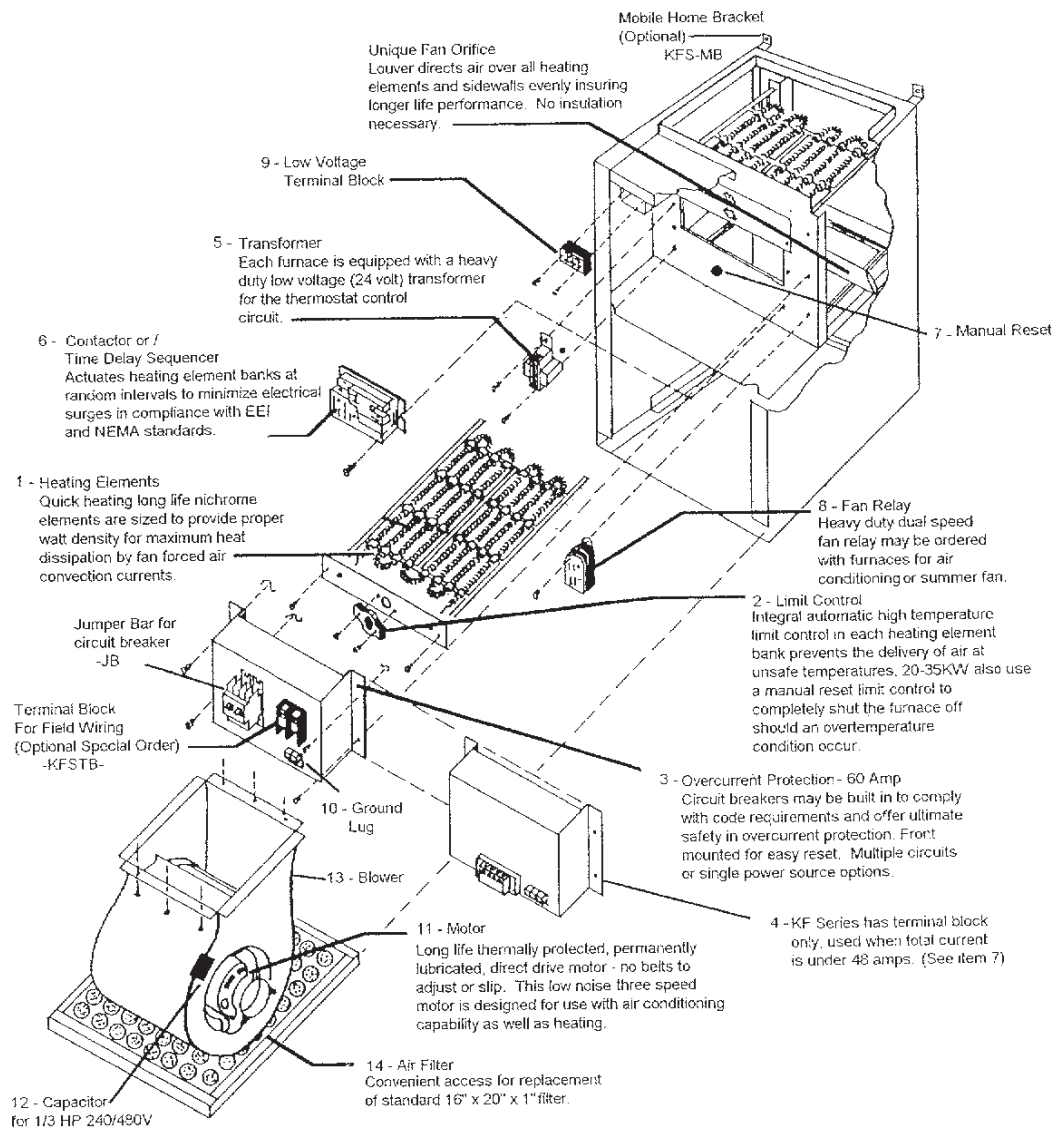


KFS Furnace Airflow Delivery Chart

Case Size	HP	Speed	CFM (Static)							
			(0.1)	(0.2)	(0.3)	(0.4)	(0.5)	(0.6)	(0.7)	(0.8)
Small Case 30.5" tall	1/5	Low	1090	980	940	890	840	820	800	760
		Med	1260	1090	1040	980	930	890	810	780
		High	1370	1260	1220	1170	1120	1090	1080	990
	1/3	Low	1700	1680	1670	1660	1650	1640	1630	1620
		Med	1810	1800	1790	1750	1740	1730	1720	1710
		High	1960	1940	1930	1910	1870	1860	1850	1830
Large Case 30.5" tall	1/5	Low	1160	1120	1090	1050	1020	990	960	850
		Med	1310	1230	1200	1150	1120	1050	990	910
		High	1480	1410	1390	1270	1240	1180	1120	1040
	1/3	Low	1860	1850	1840	1830	1820	1810	1790	1740
		Med	2000	1980	1960	1940	1930	1920	1910	1900
		High	2120	2100	2070	2050	2030	2020	2010	2000

Airflow delivery chart notes:

- 1. CFM = cubic feet per minute.
- 2. Static = water column inches.
- 3. Performance based on air properties at sea level.
- 4. Includes factory provided air filter installed.
- 5. Includes electric heating coils installed, no power applied, no heat resistance.
- 6. Based on 230V, 3 speed motor.
- 7. 480V motors are single speed only, use high speed for airflow delivery.



ITEM	PART NUMBER	DESCRIPTION
1	KFP-1000	Heating Element 5KW / 240V
	KFP-1000A	Heating Element 5KW / 208V
	KFP-1000B	Heating Element 5KW / 480V
	KFP-1000C	Heating Element 5.75KW / 240V
	KFP-1000D	Heating Element 5.75KW / 240V
	KFP-1000E	Heating Element 4KW / 240V
2	KFP-1001	Auto. Limit Control - 60T11
	KFP-1002	Circuit Breaker 60 Amp 1Ø (specify GE or SQ D)
3	KFP-1002A	Circuit Breaker 3 Pole 60 Amp 3Ø
	KFP-1003	Input Terminal Block 1Ø KF5-KF18
4	KFP-1003A	Input Terminal Block 1Ø KF20-KF35
	KFP-1003B	Input Terminal Block - 3Ø
5	KFP-1004	Low Voltage Transformer 240/24
	KFP-1004A	Low Voltage Transformer 208/24
	KFP-1004B	Low Voltage Transformer 277/24
	KFP-1004C	Low Voltage Transformer 480/24

Please refer to options & accessory tables for information on floor base or cooling coil cabinets for air conditioning.

6	KFP-1005	Sequencer R8330 Series
	KFP-1005A	Sequencer 15SH Series
	KFP-1005B	Relay 28 Amp R8229A
	KFP-1005C	Relay 46 Amp R8246A
7	KFP-1006	Manual Reset Limit
	KFP-1006A	Manual Reset Button
8	KFP-1007	Dual Speed Fan Relay R8222F
9	KFP-1008	Low Voltage Terminal Block
10	KFP-1009	Ground Lug
11	KFP-1010	1/5 HP 240V Motor
	KFP-1010A	1/5 HP 480V Motor
	KFP-1010B	1/3 HP 240V Motor
	KFP-1010C	1/3 HP 480V Motor
	KFP-1010D	1/2 HP 240V Motor
12	KFP-1011	Capacitor for 1/3 HP 240V/480V
	KFP-1012	Blower Small (6KW - 20AKW)
13	KFP-1012A	Blower Large (20KW - 35KW)
	KFP-1013	Air Filter 1" x 16" x 20"

KF/KFS 1-PHASE

CATALOG NO.	KW	BTU (000)	VOLTS	Amps*	Circuit Protection				75° Wire Size				Number of Elements	Motor		Temperature Rise			Cabinet Size	Wt (lbs.)
					L1/ L2	L3/ L4	L5/ L6	L7/ L8	L1/ L2	L3/ L4	L5/ L6	L7/ L8		Volts	HP	Low	Med	High		
KFS2603-1	3	10.2	208	14.4	20				#10				1	208	1/5	12°	11°	9°	Dim. A	57
KFS2404-1	4	13.6	240	16.7	20				#10				1	240	1/5	16°	15°	13°	Dim. A	57
KFS2005-1	5	17.1	208	24.0	40				#8				1	208	1/5	20°	18°	16°	Dim. A	57
KFS2405-1			240	20.8	30				#10			240								
KF4805-1			480	10.4	15				#14			480								
KFS2006-1	6	20.5	208	25	40				#8				2	208	1/5	24°	22°	19°	Dim. A	57
KFS2010-1	10	34.1	208	48.0	60				#6				2	208	1/5	41°	37°	32°	Dim. A	65
KFS2410-1			240	41.7	60				#6			240								
KF4810-1			480	20.8	30				#10			480								
KFS2412-1	11.5	39.2	240	47.9	30				#8	#10			2	240	1/5	47°	42°	36°	Dim. A	65
KF4812-1			480	23.9	40				#8			480								
KFS2015-1	15	51.2	208	72.1	40	60			#8	#6			3	208	1/5	61°	55°	47°	Dim. A	74
KFS2415-1			240	62.5	30	60			#10	#6		240								
KF4815-1			480	31.2	50				#6			480								
KFS2418-1	17.25	58.8	240	82.9	40	60			#8	#6			3	240	1/5	70°	63°	55°	Dim. A	74
KF4818-1			480	35.9	50				#6			480								
KFS2020A-1	20	68.3	208	96.2	60	60			#6	#6			4	208	1/5	81°	73°	63°	Dim. B	76
KFS2420A-1			240	83.3	60	60			#6	#6		240								
KF4820A-1			480	41.7	60				#6			480								
KFS2020-1	20	68.3	208	96.2	60	60			#6	#6			4	208	1/3	57°	51°	41°	Dim. B	76
KFS2420-1			240	83.3	60	60			#6	#6		240								
KF4820-1			480	41.7	60				#6			480								
KFS2422-1	22.5	76.8	240	93.8	60	60			#6	#6			4	240	1/3	57°	51°	41°	Dim. B	76
KF4822-1			480	46.9	60				#6	#6		480								
KFS2025-1	25	85.3	208	120.2	30	60	60		#10	#6	#6		5	208	1/3	72°	63°	51°	Dim. B	81
KFS2425-1			240	104.2	30	60	60		#10	#6	#6	240								
KF4825-1			480	52.1	20	60			#12	#6		480								
KFS2030-1	30	102.4	208	144.2	60	60	60		#6	#6	#6		6	208	1/3	86°	76°	62°	Dim. B	85
KFS2430-1			240	125.0	60	60	60		#6	#6	#6	240								
KF4830-1			480	62.5	30	60			#10	#6		480								
KFS2435-1	34.5	117.7	240	143.7	15	60	60	60	#14	#6	#6	#6	6	240	1/3	99°	87°	71°	Dim. B	85
KF4835-1			480	71.6	40	60			#8	#6		480								

KF/KFS 3-PHASE

Catalog Number	KW	BTU (000)	VOLTS	Amps*	Circuit Protection	75° Wire Size	Number of Elements	Motor		Temperature Rise			Cabinet Size	Wt (lbs.)
					L1 / L2 / L3	L1 / L2 / L3		Volts	HP	Low	Med	High		
KF2009-3 KFS2009-3	9	30.7	208	24.9	40 40	#8 #8	3	208	1/5	37°	33°	28°	Dim. A	74
KF2012-3 KFS2012-3	11.25	38.4	208	31.2	40 40	#8 #8	3	208	1/5	46°	41°	35°	Dim. A	74
KFS2412-3 KF4812-3	12	40.9	240 480	28.9 14.4	40 20	#8 #10	3	240 480	1/5	49°	44°	36°	Dim. A	74
KFS2015-3 KFS2415-3 KF4815-3	15	51.2	208 240 480	41.6 36.1 18.1	60 50 30	#6 #6 #10	3	208 240 480	1/5	61°	55°	47°	Dim. A	74
KFS2418-3 KF4818-3	17.25	58.8	240 480	43.3 20.7	60 40	#6 #10	3	240 480	1/5	70°	63°	55°	Dim. A	74
KFS2022-3	22.5	76.8	208	62.5	80	#4	6	208	1/3	64°	56°	46°	Dim. B	85
KFS2424-3 KF4824-3	24	81.6	240 480	57.7 28.8	75 50	#4 #6	6	240 480	1/3	69°	61°	49°	Dim. B	85
KFS2030-3 KFS2430-3 KF4830-3	30	102.4	208 240 480	83.3 72.2 36.1	110 100 50	#2 #3 #6	6	208 240 480	1/3	86°	76°	62°	Dim. B	85
KFS2435-3 KF4835-3	34.5	117.7	240 480	82.9 41.5	110 60	#2 #6	6	240 480	1/3	99°	87°	71°	Dim. B	85

CONVERSION OF TORQUE TO HORSEPOWER

The power requirements for the Direct Drive curves in this section are stated in torque units of ounce-inches and ounce to feet.

The formula listed below may be used to convert torque to horsepower.

TORQUE IN OZ-IN

$$HP = \frac{\text{Torque (oz-in)} \times \text{RPM}}{1,008,400}$$

TORQUE IN OZ-FT

$$HP = \frac{\text{Torque (oz-ft)} \times \text{RPM}}{84,033}$$

These tables show horsepower as calculated from the above formula. The torque and RPM values used for the calculations are the same as those used in the curves in the catalog.

AIR DELIVERY CHART								
MOTOR SPEED								
Motor HP	Motor Load		Low		Med		High	
	Voltage	Amps	CFM	FPM	CFM	FPM	CFM	FPM
1/5	230	3.4	775	570	860	630	1000	735
	380/460	1.7						
1/3	230	3.2	1100	810	1250	920	1540	1130
	380/460	1.7						
1/2	230	3.8	1250	920	1540	1130	1750	1285
	380/460	1.9						
Wire Color			Red		Blue		Black	
Air Volume=Cubic Feet Per Minute (CFM) Air Velocity=Feet Per Minute (FPM)								

HORSEPOWER FOR DIRECT DRIVE
BLOWER WHEELS

RPM	TORQUE:								
	(Upper Value in Oz-In) (Lower Value in Oz-Ft)								
	60	120	180	240	300	360	420	480	
	5	10	15	20	25	30	35	40	
1200	0.04	0.07	0.14	0.21	0.29	0.36	0.43	0.50	0.57
1100	0.03	0.07	0.13	0.20	0.26	0.33	0.39	0.46	0.52
1000	0.03	0.06	0.12	0.18	0.24	0.3	0.36	0.42	0.48
900	0.03	0.05	0.11	0.16	0.21	0.27	0.32	0.38	0.43
800	0.02	0.05	0.10	0.14	0.19	0.24	0.29	0.33	0.38

RPM	TORQUE:								
	(Upper Value in Oz-In) (Lower Value in Oz-Ft)								
	600	720	840	960	1080	1200	1320	1440	1560
	50	60	70	80	90	100	110	120	130
1200	0.71	0.86	1.00	1.14	1.29	1.43	1.57	1.71	1.86
1100	0.66	0.79	0.92	1.05	1.31	1.31	1.44	1.57	1.70
1000	0.59	0.71	0.83	0.95	1.19	1.19	1.31	1.43	1.55
900	0.54	0.64	0.75	0.86	1.07	1.07	1.18	1.29	1.39
800	0.48	0.57	0.67	0.76	0.95	0.95	1.05	1.14	1.24

CONTROL WIRING: Connect thermostat to terminals R and W for heating, and to R and G for cool air only. This can be done with a single stage heat-cool thermostat or a single stage heat only thermostat and a separate fan-only switch to control the fan-relay (optional) installed on furnaces. Some models of furnace have two stage operation (optional) and are provided with terminals W1 and W2. If a single stage thermostat is used it should be connected to terminals R and W1 and a jumper wire installed form terminals W1 to W2; see enclosed control circuit wiring diagram. Some models of furnace have the 24 VAC power available between terminal C and R for use with external air conditioning blower relay option.

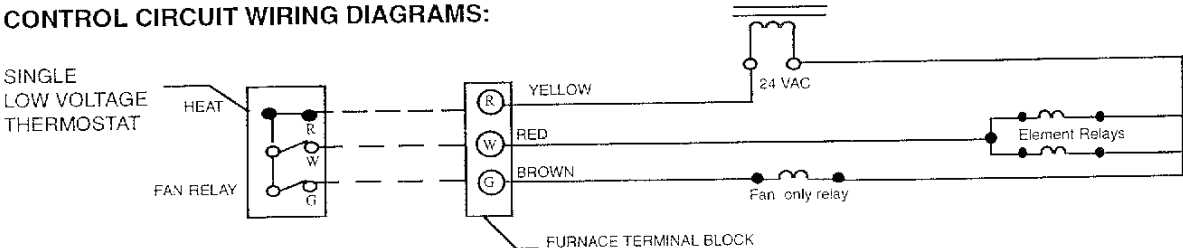
OPERATION: When control thermostat is turned up to demand heat the blower and heating elements should be energized. Furnaces with sequences installed will have up to 30 seconds delay in start-up. Heat-cool thermostats when turned to cool position should bring on the blower only for cooling air.

TROUBLE SHOOTER

TROUBLE	POSSIBLE CAUSE	REMEDY
Runs too often, Blows cold air	<ul style="list-style-type: none">Thermostat heat anticipator set too lowCFM of motor set too high	<ul style="list-style-type: none">Replace with adjustable anticipated thermostatLower CFM of motor:<ul style="list-style-type: none">Red Wire - Low SpeedBlue Wire - Medium SpeedBlack Wire - High SpeedKFS5 - 18 should have 1/5HP motor, KFS18-35 should have a 1/3HP motor; 1/2 & 3/4 HP motors are optional
Furnace short cycles before thermostat calls for off	<ul style="list-style-type: none">Thermostat anticipator set too lowIntermittent opening of thermostat or its wiresHeat element burned outCircuit breaker offMotor overheating	<ul style="list-style-type: none">Adjust to .04 amps for each sequencer in furnaceRepair or replace thermostatReplaceRe-setReplace
Furnace will not start	<ul style="list-style-type: none">Stat wire not connectedCircuit breaker off24 Volt transformer burned outWire connection off or broken wiresReset button trippedWrong Voltage	<ul style="list-style-type: none">RepairRe-setReplaceRepair or ReplaceRe-setCheck your power source
Motor will not stop	<ul style="list-style-type: none">Defective sequencer or contactor	<ul style="list-style-type: none">Replace
Furnace goes off on high limit	<ul style="list-style-type: none">Dirty ductsDirty air filterDefective sequencerDefective limit controlPower failure	<ul style="list-style-type: none">CleanReplaceReplaceReplaceReset manual limit push button (KFS20-35)
Furnace blower making too much air noise	<ul style="list-style-type: none">Air filter dirtyToo small of ductToo small plenum chamberNot enough cold air	<ul style="list-style-type: none">ReplaceEnlarge or replaceReplaceEnlarge
Vibration noise	<ul style="list-style-type: none">Blower assembly looseLack of insulation	<ul style="list-style-type: none">Secure motor and blower cageWrap furnace & ducts with insulation
Furnace has a buzzing sound when not in use	<ul style="list-style-type: none">Low voltage transformer defective or loose	<ul style="list-style-type: none">Replace or tighten
Furnace continues to heat after room is up to set temperature - does not shut off	<ul style="list-style-type: none">Defective sequencerDefective thermostatStat wires to groundMotor wires to groundThermostat accidentally shorted & contacts are welded	<ul style="list-style-type: none">ReplaceReplaceRepairRepairReplace- - Make sure all connections are tight

NOTE: When converting from oil, gas, etc., to electric, replace your old low voltage thermostat that has a fixed-heat anticipator with one that has an adjustable heat anticipator.

CONTROL CIRCUIT WIRING DIAGRAMS:



Heat Anticipatory Setting:
Model KF or KFS 5 thru 18 = .4 amps
Model KFS 20 thr 35 = .8 amps

