



INSTALLATION AND MAINTENANCE



**Electric Unit Heater
KFUH EC02S Series**



**DANGER**

ELECTRIC SHOCK OR FIRE HAZARD

READ ALL WIRE SIZING, VOLTAGE REQUIREMENTS AND SAFETY DATA TO AVOID PROPERTY DAMAGE AND PERSONAL INJURY











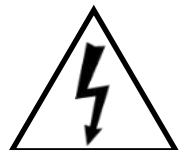
WARNING



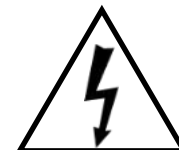
READ CAREFULLY - Use the heater only as described in this manual. Any other use is not recommended and could result in fire, electric shock, and personal injury. Following these instructions will prevent difficulties that might occur during the installation and use of the heater. Please study the instructions first, as they may save considerable time and trouble during use addition to providing important safety information. Make sure to save these instructions for future use.

NEVER LEAVE HEATER UNATTENDED WHILE CONNECTED TO A POWER SOURCE

-  **WARNING** To prevent a possible electrical shock, disconnect all power coming to heater at main service panel before wiring or servicing.
-  **WARNING** All wiring must be in accordance with the National Electrical Code (Canadian Electrical Code in Canada) and all applicable local codes. The heater must be grounded as a precaution against electrical shock. Supply wiring must be copper and suitable for at least 75° C.
-  **WARNING** Verify power supply and control voltages coming to the heater match the ratings printed on the heater nameplate before energizing.
-  **WARNING** Heater must be installed so the minimum clearances shown in Specifications table are maintained.
-  **WARNING** This heater is NOT suitable for use in hazardous locations as described by the National Fire Protection Association (NFPA). this heater has hot and arcing or sparking parts inside. DO NOT use in areas where gasoline, paint or other flammable liquids are used or stored.
-  **WARNING** The mounting structure and anchoring hardware MUST BE capable of reliably supporting the weight of the heater plus mounting bracket if used. Refer to specifications table for heater weight.
-  **WARNING** Heater air flow MUST be directed parallel to or away from adjacent walls.
-  **WARNING** To prevent a possible fire, DO NOT block air intakes or exhaust openings in any manner. DO NOT allow foreign objects to enter grille openings as this may cause electric shock, fire or damage to heater.



**CAUTION—RISK OF ELECTRIC SHOCK
DO NOT OPEN HEATER SHELL
NO USER—SERVICEABLE PARTS INSIDE**



KFUH Series INSTALLATION INSTRUCTIONS

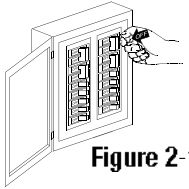


Figure 2-1

CAUTION!

Turn OFF all electrical power to install heater

It is **extremely important** you verify the electrical power supply is the same voltage as the heater being installed. 240 and 480 Volt heaters are not interchangeable. Powering a 480 Volt unit with 240 Volt supply wires will reduce the heater output by approximately 75% and is never recommended. Powering a 240 Volt unit with 480 Volt supply wires will destroy the heater and voids all warranties.



CHECK: Ensure blower wheel is free-turning and that element assemblies are in place. Be sure filter is in proper position and not torn or damaged. Check that blower housing and motor have not separated from element compartment during shipment and inspect terminals & wiring to ensure nothing came loose during shipping.

FIELD WIRING

208 Volt and 240 Volt heaters are equipped with circuit breakers over 48 Amps to provide internal circuit protection and a field disconnect on the unit. A terminal block provides a single strike for field wiring.

480 Volt units do not have circuit breakers but are fused when internal protection is required and are also supplied with terminal blocks for field wiring. Consult the National Electric Code for proper wire size and service circuit breaker protection.

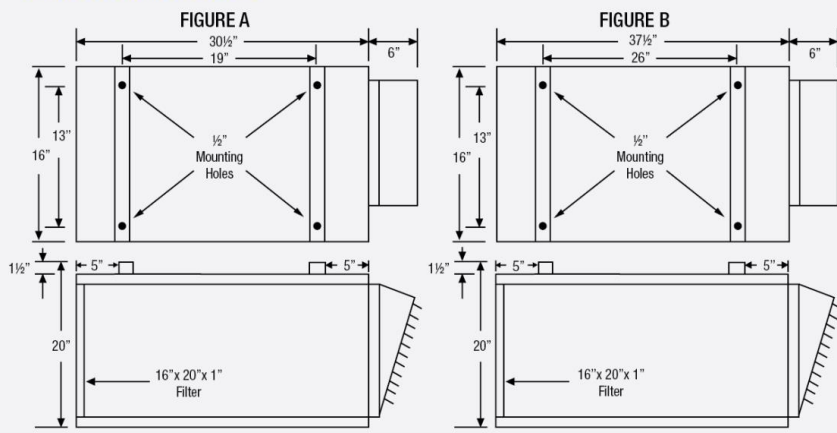
GENERAL REQUIREMENTS

MOUNTING POSITIONS – The KFUH can be installed for vertical, horizontal or downflow operation. When installed horizontally, the unit should be positioned such as the door will not end up being on the top. The door should be on the top or bottom of the unit heater, to ensure that the motor bearings are in their designed horizontal position.

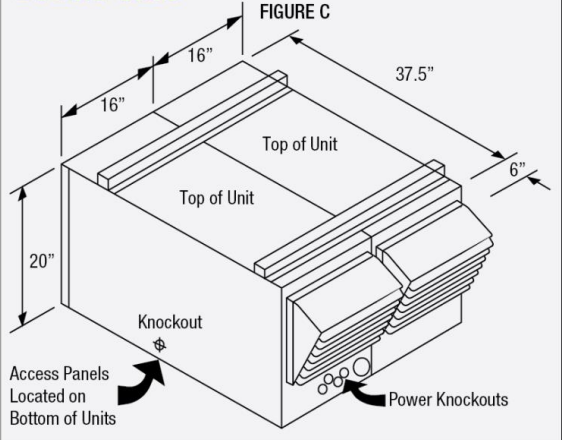
SERVICE CLEARANCE – KFUH units are serviced from the FRONT door. Leave at least 24" (610 mm) clearance in front of the door for service access.

DIMENSIONAL DRAWINGS

Dimensional Data



Double Case



KFUH Series INSTALLATION INSTRUCTIONS

MOUNTING:

KFUH heaters can be mounted vertically or horizontally as shown. 3/8" weld nuts are welded into brackets and will accept 3/8" threaded rod. A minimum of 6 inches clearance to vertical and horizontal surfaces and 6 feet minimum above floor are required. Louvers can be adjusted for desired airflow.

APPLICATION TIPS:

First, calculate the heating loads in the conventional way using the N.E.M.A. handbook or ASHRAE guide.

Next, determine quantity and size of heaters to be used. In instances where large groups of people are normally settled in the same location, use a large number of smaller kW unit heaters. (Example: people on a production line)

By utilizing heaters in this manner one can best distribute uniform heat, prevent hot drafts, reduce potential noise levels and balance the electrical operating demand.

When considering warehouse areas or storage rooms (where heat distribution and constant temperatures are less important) use fewer heaters of higher capacity.

To maintain uniform heat and reduce stratified air it's recommended that the total CFM of all units turn the air over approx. 3 times per hour.

HORIZONTAL MOUNTING:

Smaller rooms can be heated by one unit heater.

Where two walls are exposed, heaters should be mounted as shown (Fig 1).

In larger rooms, units should be located so their air streams wipe exposed walls without blowing at them (Fig. 2).

Units should be located so that the air stream of one supports that of another thus setting up a circulatory air movement. (Distance between units to be approximately 1½ times published air throw). Units should not be mounted horizontally in areas having ceiling heights in excess of 10 to 12 feet.

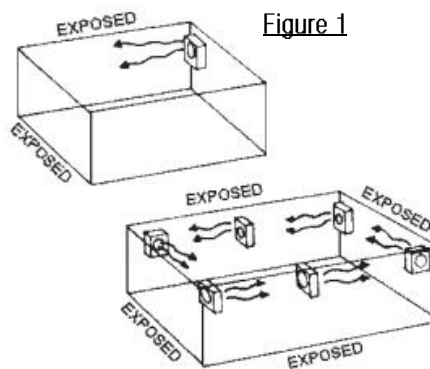


Figure 1

Figure 2

VERTICAL MOUNTING:

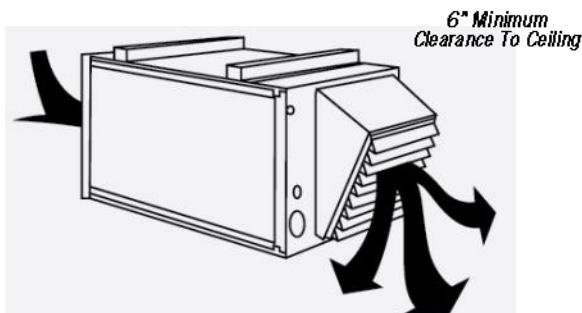
Units should be mounted vertically where they may otherwise interfere with assorted material, handling equipment and in high bay areas. Heaters should be situated to provide free air circulation. Size and selection of units should be based on recommended mounting height.

Unit heaters are frequently used to combat cold air inrush when loading dock doors are opened. For such applications, one or more units should be arranged to blow warm air vertically in front of opening.

Horizontal Mount Diagram

Ceilings under 12 feet

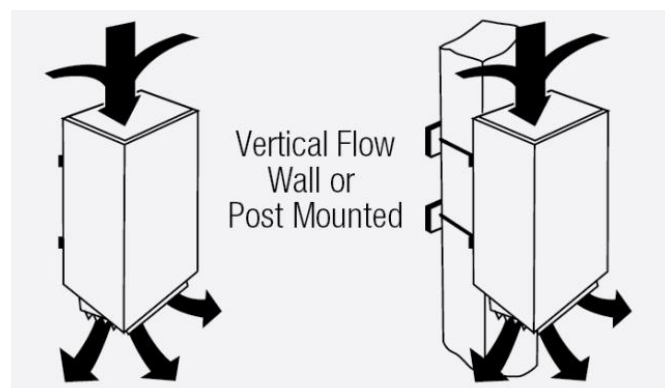
HORIZONTAL FLOW CEILING MOUNTED



Vertical Mount Diagram

Ceilings over 12 feet

VERTICAL FLOW OR POST MOUNTED



KFUH Series INSTALLATION INSTRUCTIONS

DUAL MOUNTING:

Where square footage is large and comfort essential, both horizontal and vertical installations may best serve your requirements. (Fig. 3)

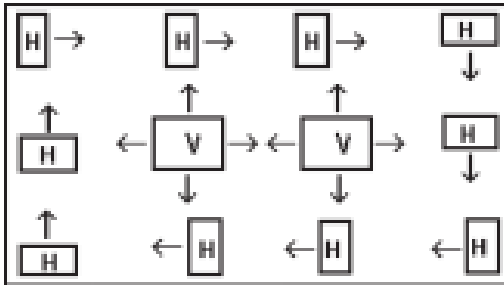


Figure 3

MOUNTING LIMITATIONS:

1. KFUH unit heaters should not be used in potentially explosive atmospheres.
2. The finish is not intended for direct salt spray exposure in marine applications or the highly corrosive atmospheres of swimming pools, chemical storage bins, etc.
3. Please refer to the factory for explosion proof or marine application heater information.
4. Do not install unit heaters above recommended maximum mounting height.
5. Obstructions must not block unit heater air inlet or discharge.
6. To prevent possible injury heaters must be mounted at least 6 feet above the floor to prevent accidental contact with the heating element or fan blade.

OPERATION:

When control thermostat is turned up to demand heat, the blower and heating elements should be energized. Unit heaters with sequencers installed will have up to 30 seconds delay in start-up. When turned to cool position heat-cool thermostats should bring on the blower only for air only.

MAINTANANCE:

"CAUTION" Disconnect power at the main service panel before inspecting or cleaning this heater. Lock or Tag breaker to prevent accidental shock.

Because of its rugged design, superior engineering and quality craftsmanship the King KFUH Unit Heater requires little maintenance. With minimum care your electric heater should last a lifetime. King recommends changing the air intake filter at least twice a year and checking the motor and blower for excessive dust / lint accumulation to maintain the efficiency of the heater. While King recommends the filter be changed twice a year, your environment may require more frequent changes.

CONTROL WIRING:

Connect thermostat to terminals R and W1 for heating, R and G for 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 installed on KFUH.

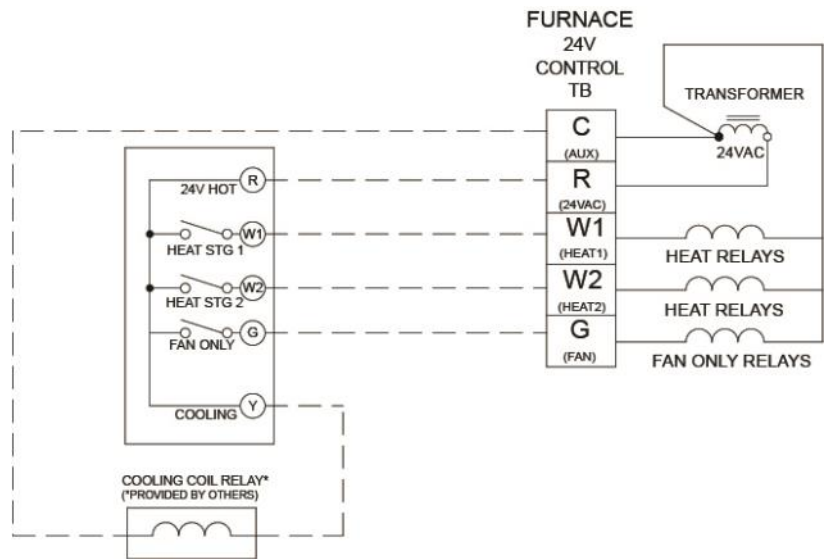
Most models have two stage operation and are provided with terminals W1 and W2. If a single stage thermostat is used it should be connected to terminals R and W1 and a jumper wire installed from terminals W1 to W2 (**see enclosed control circuit wiring diagram**). Some models of furnace have the 24 VAC power available between terminal C and R for use with external air conditioning relay option. Never short or cross these two terminals! The transformer will fail.

CONTROL WIRING DIAGRAMS

TWO STAGE FURNACE

2-Stage Low Voltage

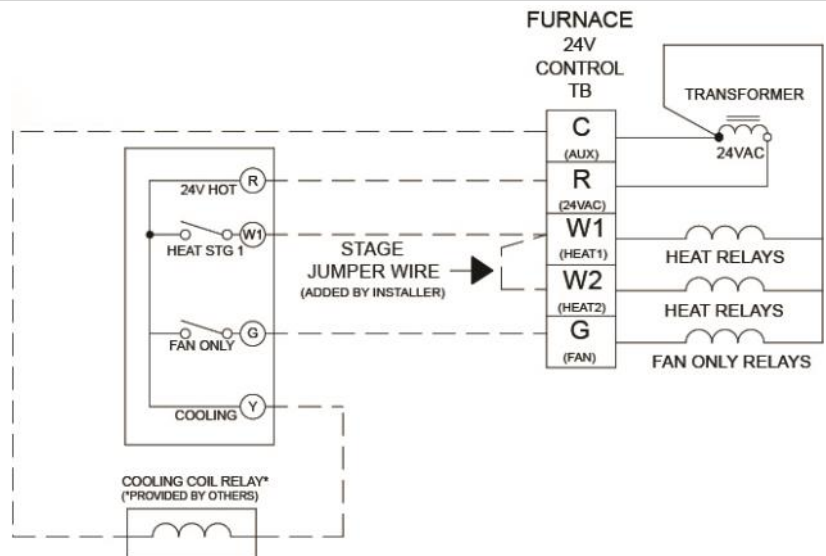
External Thermostat Wiring



TWO STAGE FURNACE

Single Stage Low Voltage

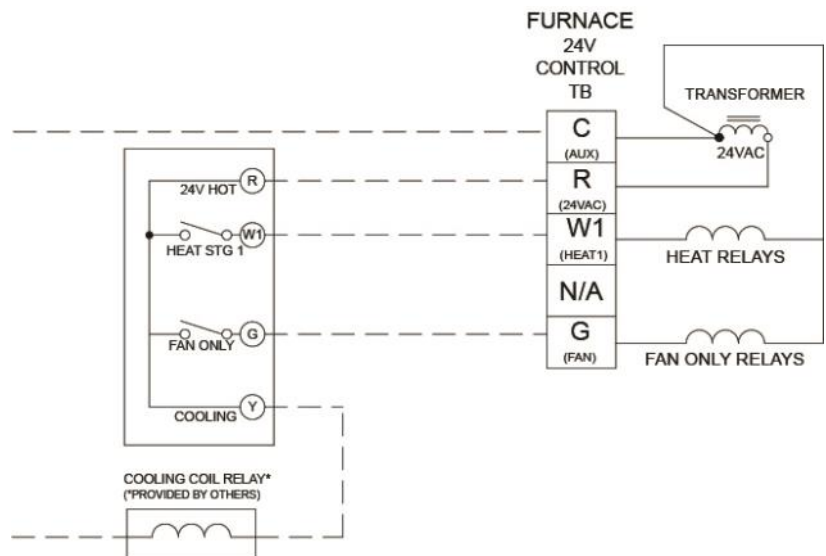
External Thermostat Wiring



ONE STAGE FURNACE

Single Stage Low Voltage

External Thermostat Wiring



AIRFLOW CHART



Electric Unit Heater
KFUH ECO2S Series



Air Flow Chart

(For 4 to 17.3kW Units with 1/3HP ECM Motor)

MODEL	KW	TORQUE	CFM	RISE (F)
KFUH**04	4	(2) 6.8	708	18
		9.4	919	14
		12.0	1,085	12
		17.0	1,320	10
		20.0	1,536	8
KFUH**05	5	(2) 6.8	708	22
		9.4	919	17
		12.0	1,085	15
		17.0	1,320	12
		20.0	1,536	10
KFUH**08	8	(1) 6.8	708	36
		(2) 9.4	919	27
		12.0	1,085	23
		17.0	1,320	19
		20.0	1,536	16
KFUH**10	10	(1) 6.8	708	45
		(2) 9.4	919	34
		12.0	1,085	29
		17.0	1,320	24
		20.0	1,536	21
KFUH**12	12	6.8	708	54
		(1) 9.4	919	41
		(2) 12.0	1,085	35
		17.0	1,320	29
		20.0	1,536	25
KFUH**15	15	6.8	708	67
		(1) 9.4	919	52
		(2) 12.0	1,085	44
		17.0	1,320	36
		20.0	1,536	31
KFUH**18	17.3	6.8	708	77
		(1) 9.4	919	59
		12.0	1,085	50
		(2) 17.0	1,320	41
		20.0	1,536	35

Air Flow Chart

(For 20 to 50kW Units with 1/2HP ECM Motor)

MODEL	KW	TORQUE	CFM	RISE (F)
KFUH**20	20	(1) 15.5	1,258	50
		(2) 19.0	1,466	43
		22.5	1,575	40
		26.0	1,690	37
		30.0	1,771	36
KFUH**25	25	15.5	1,258	63
		19.0	1,466	54
		(1) 22.5	1,575	50
		(2) 26.0	1,690	47
		30.0	1,771	45
KFUH**40	40	(1) 15.5	2,516	50
		(2) 19.0	2,932	43
		22.5	3,150	40
		26.0	3,380	37
		30.0	3,542	36
KFUH**50	50	15.5	2,516	63
		19.0	2,932	54
		(1) 22.5	3,150	50
		(2) 26.0	3,380	47
		30.0	3,542	45

Air Flow Chart

(For 20 to 70kW Units with 3/4HP ECM Motor)

MODEL	KW	TORQUE	CFM	RISE (F)
KFUH**20 (Optional) 3/4 HP	20	(1) 26.0	1,592	40
		30.0	1,789	35
		(2) 35.0	1,814	35
		40.5	2,080	30
		45.0	2,142	30
KFUH**25 (Optional) 3/4 HP	25	(1) 26.0	1,592	50
		30.0	1,789	44
		(2) 35.0	1,814	44
		40.5	2,080	38
		45.0	2,142	37
KFUH**30	30	(1) 26.0	1,592	60
		30.0	1,789	53
		35.0	1,814	52
		(2) 40.5	2,080	46
		45.0	2,142	44
KFUH**35	35	26.0	1,592	69
		(1) 30.0	1,789	62
		35.0	1,814	61
		(2) 40.5	2,080	53
		45.0	2,142	52
KFUH**60	60	(1) 26.0	3,184	60
		30.0	3,578	53
		35.0	3,628	52
		(2) 40.5	4,160	46
		45.0	4,284	44
KFUH**70	70	26.0	3,184	69
		(1) 30.0	3,578	62
		35.0	3,628	61
		(2) 40.5	4,160	53
		45.0	4,284	52



(A) ** Represents the voltage, 20=208V, 24=240V, 48=480V.
Voltage of the KF/KFS unit does not affect the data in this table.

(B) NR= Not Recommended, Temperature Rise is above maximum design parameter.

(C) The highlighted cells are the factory default torque setting for each model.
The ECM motor has 5 field adjustable torque settings, allowing for a wide range of design choices.

(D) (1)= Stage 1 Torque Settings (2) = Stage 2 Torque Settings
/ (2) = Default for Single Stage KFUH

(E) Blower: 10" diameter, 8" wide

KFUH Series INSTRUCTIONS

WARRANTY:

The King KFUH unit heater is warranted against defects in workmanship and materials for five years from date of installation. Extended warranty applies to heating element only; all other components are covered for two years. This warranty does not apply to damage from accident, misuse or alteration; nor where the connected voltage is more than 5% above the nameplate voltage; nor to equipment improperly installed, wired or maintained in violation of this instruction sheet. All claims for warranty work must be accompanied by proof of the date of installation. The customer shall be responsible for all costs incurred in the removal or reinstallation of products, including labor costs, and shipping costs incurred to return products to King Manufacturing. King, will repair or replace, at our option, at no charge to you with return freight paid by King. King shall not be liable for consequential damages arising with respect to the product, whether based upon negligence, tort, strict liability or contract. No other written or oral warranty applies, nor any warranties by Representatives, Dealers, Employees of King or any other person.

King Manufacturing can be contacted in Seattle, Washington U.S.A. by phone at (206) 762-0400, fax (206) 763-7738 or website www.king-electric.com.

TROUBLESHOOTING GUIDE

ISSUE	POSSIBLE CAUSE	REMEDY
Unit Will Not Start	<ul style="list-style-type: none"> -Thermostat wire is not connected -Circuit breaker is off -24 Volt transformer burned out -Wire connection off or there are broken wires -Reset button tripped -Wrong voltage 	<ul style="list-style-type: none"> -Repair -Reset -Replace -Repair or replace -Reset -Check the power source
Motor will not stop	-Defective sequencer or contactor	-Replace
Unit goes off on high limit	<ul style="list-style-type: none"> -Dirty air filter -Defective sequencer -Defective limit control -Power failure 	<ul style="list-style-type: none"> -Replace -Replace -Replace -Reset manual limit push button 20-35kW units
Vibration Noise	-Blower assembly loose	-Secure blower & motor cage
Unit has a buzzing sound when not in use	-Low voltage transformer or defective or loose	-Replace or tighten
Unit continues to heat after room is up to set temperature -does not shut off	<ul style="list-style-type: none"> -Defective sequencer -Defective thermostat -Thermostat wires to ground -Motor wires to ground -Thermostat accidentally shorted & contacts were welded 	<ul style="list-style-type: none"> -Replace -Replace -Repair -Repair -Replace -Make sure all connections are tight
Unit Blows Cold Air	- Single stage thermostat on a 2 stage unit	-Jump stage 2 to stage 1