



process duct heaters

Introduction

Heatrex designs and manufactures commercial and industrial electric heating and control systems that set the industry standard for excellence. The company's heating solutions reflect more than 80 years of innovation, product quality and efficient service.

Heatrex Process Duct Heaters are your solution for heating forced air in industrial systems efficiently and economically. Our reputation has been built on custom designed heaters where we control the complete design and manufacturing process. This includes the manufacture of heating elements; complex metal framing; control enclosures and electronic controls. Whatever your application, Heatrex can design and provide a high quality process duct heater to meet your requirements.



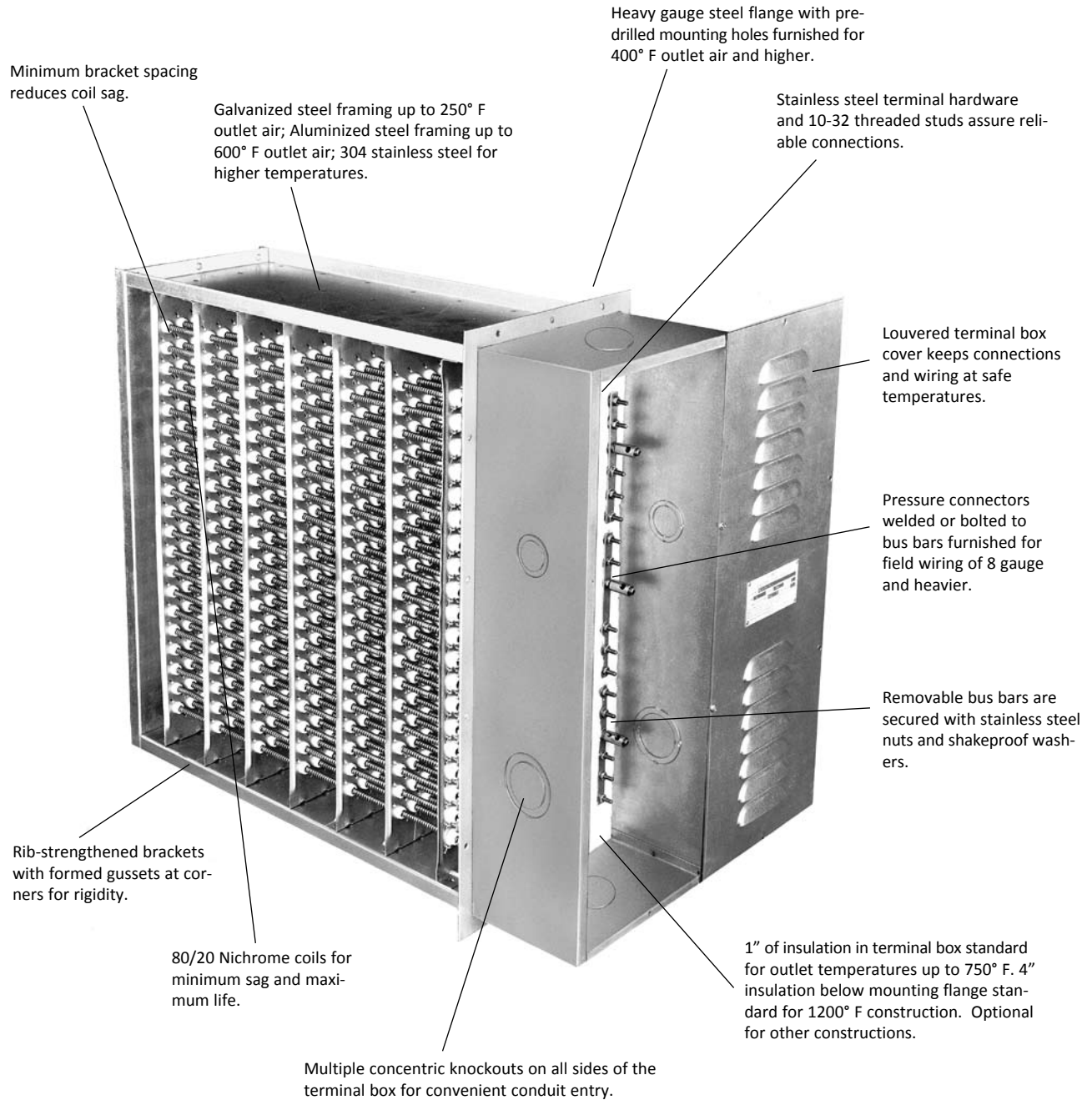
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Construction

All Heatrex process duct heaters are designed and built with the following construction features to assure the highest quality and long service life.

Open Coil Heaters



Finned Tubular Heaters

Aluminized steel support brackets with flared openings allow elements to expand and contract smoothly.

Heavy steel or stainless steel flange with pre-drilled mounting holes furnished for 400° F outlet air and higher.

Elements are .475" diameter, 304 stainless steel. Corrugated fins, 1-1/8" O.D. are the same material.

Multiple concentric knockouts on all sides of the terminal box for convenient conduit entry.

Stainless steel terminal hardware and 10-32 threaded studs assure reliable connections.

Open framework allows universal mounting. Use with horizontal or vertical airflow.

Terminal box may be side or top mounted.

1/2" diameter steel rods tie the assembly together in a rigid, yet expandable, mode.

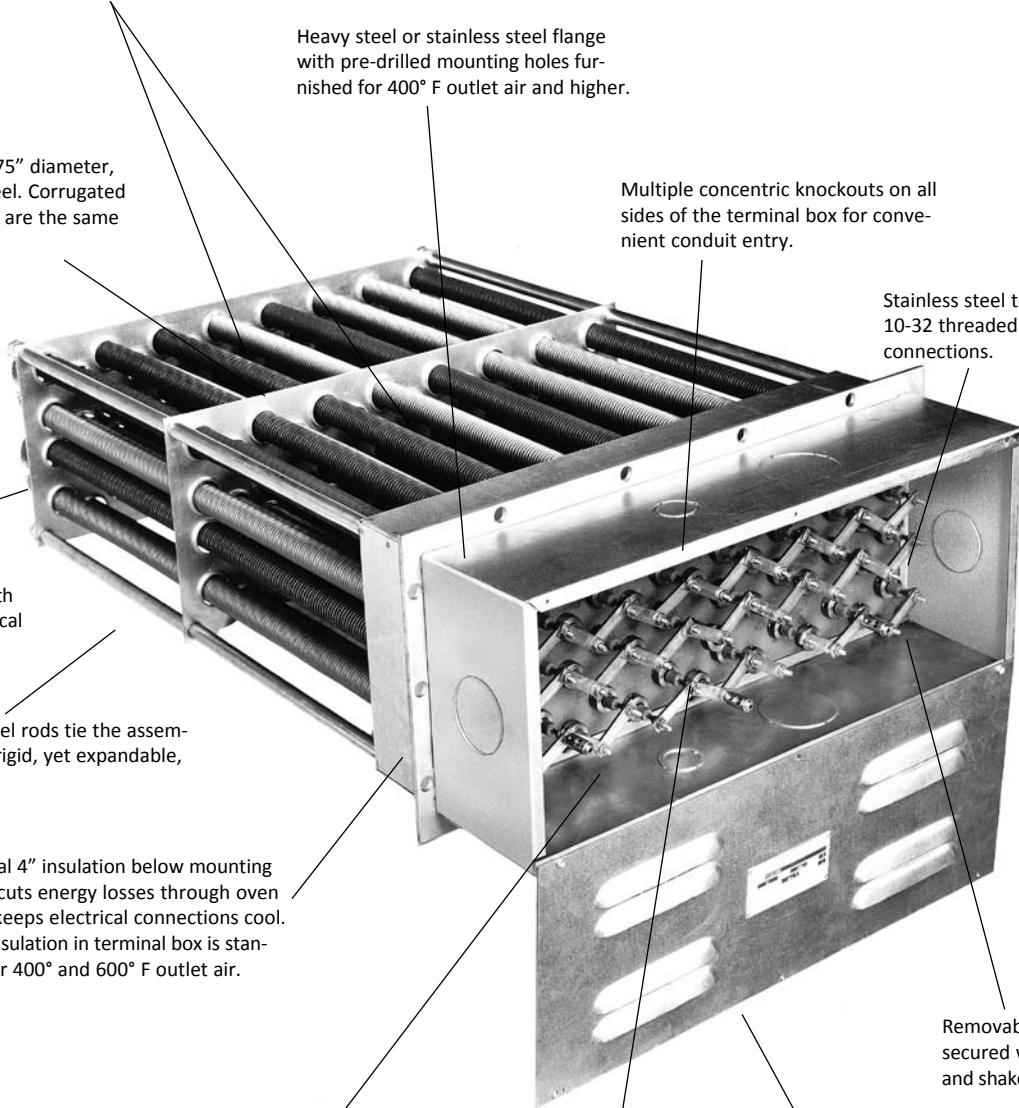
Optional 4" insulation below mounting flange cuts energy losses through oven walls, keeps electrical connections cool. 1" of insulation in terminal box is standard for 400° and 600° F outlet air.

Removable bus bars are secured with stainless steel nuts and shakeproof washers.

Pressure connectors welded or bolted to bus bars furnished for field wiring of 8 gauge and heavier.

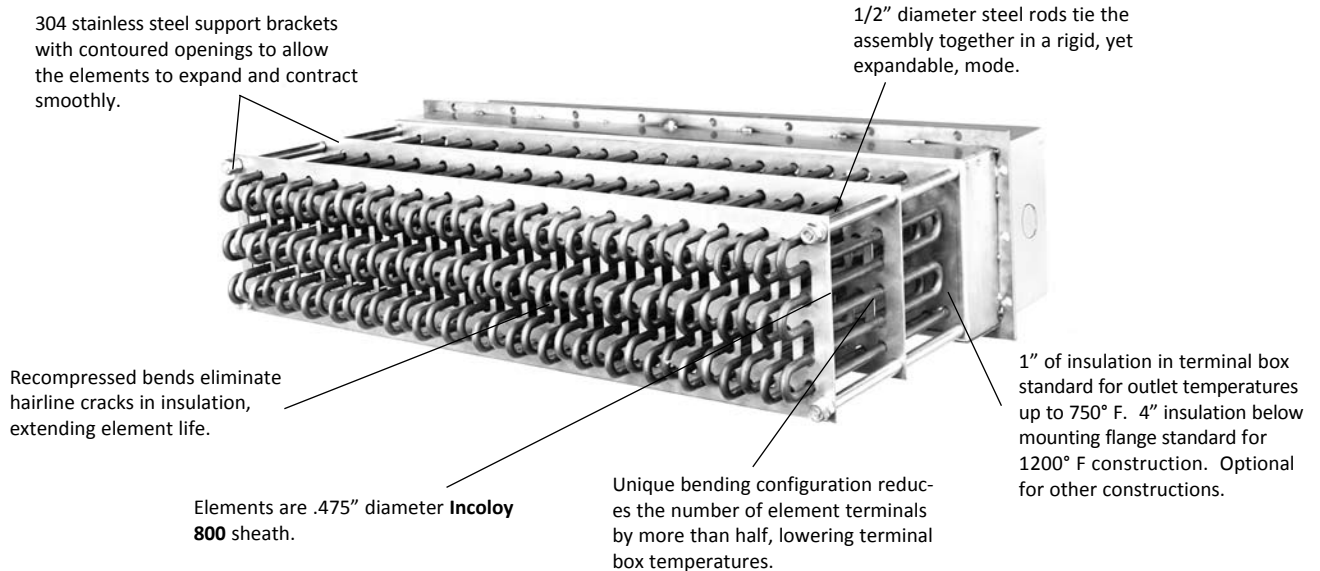
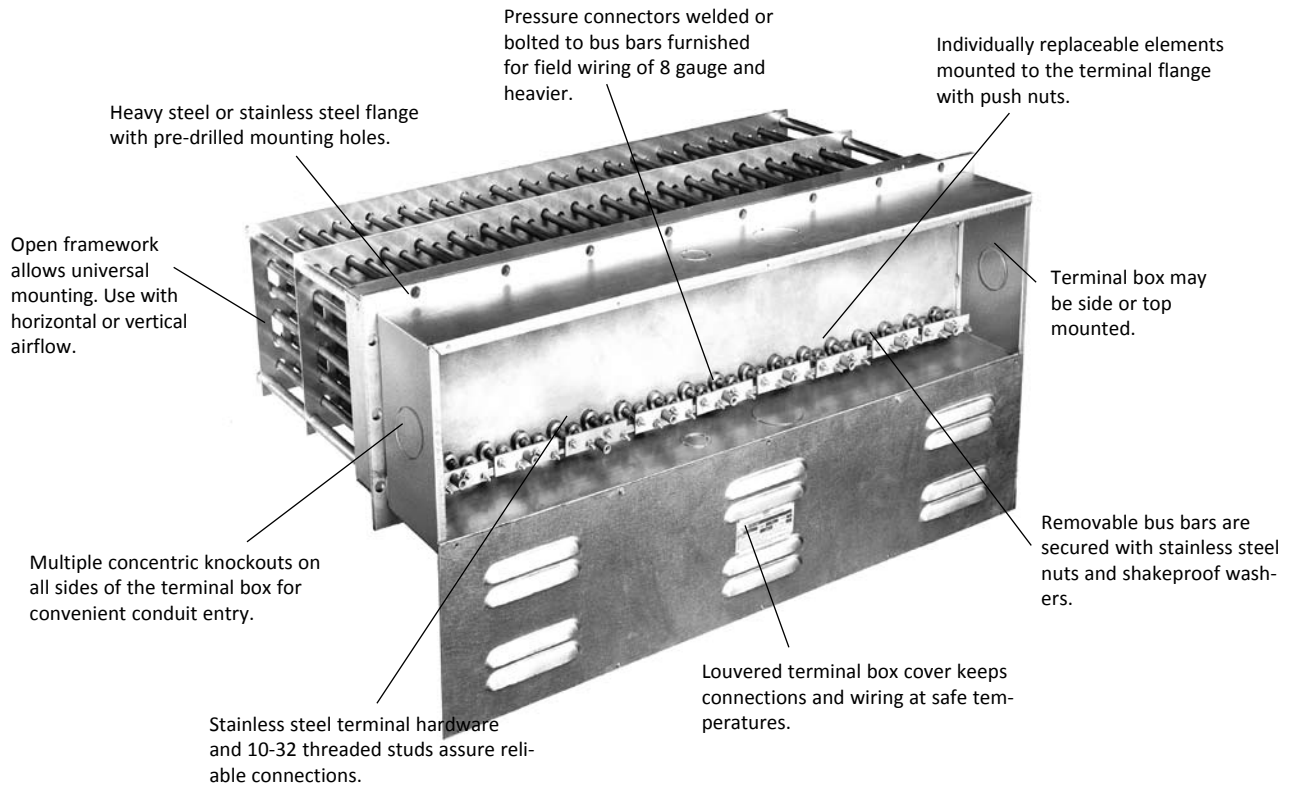
Louvered terminal box cover keeps connections and wiring at safe temperatures.

Individually replaceable elements mounted to the terminal flange with push nuts.



Construction

Tubular Heaters



Construction/Typical Applications

250° F Construction

Low temperature heaters, suitable for 250° F maximum outlet air, are available in both open coil and finned tubular constructions. They are identical to the heaters described on pages 2 and 3 except for the following features.

- The steel flange is omitted. The heater is attached to the oven or duct wall with sheet metal screws through the base of the terminal box.
- Individually replaceable finned tubular elements are flange mounted.
- The terminal box has 1" of insulation.
- A galvanized steel channel frame is provided on three sides, with the element support brackets welded to the frame.



Typical Applications

Heatrex Process Duct Heaters are installed in plenums, ducts or pipes to heat forced air in industrial equipment and systems. A wide variety of heater designs and sizes are available to provide outlet air temperatures up to 1200° F. The air can be either recirculated or fresh. Recirculated air is used to reduce power consumption and heater size.

Fresh air is used when ventilation of the process is necessary. Process duct heaters are installed in ovens, furnaces, autoclaves, dryers, conveyor systems, pressure vessels, and other equipment to supply the precise amount of clean heat for:

- Aircraft Manufacturing
- Air Curtains
- Air Drying
- Annealing
- Booster Heating
- Baking
- Batch Heating
- Chemical Processing
- Cooking
- Core Drying
- Cryogenic Exhaust Gas Heating
- Curing
- Dehumidification
- Dehydrating
- Drying
- Exhaust Gas Heating
- Film Drying
- Finishing Systems
- Food Processing
- Fruit Ripening
- Heat Recovery Supplement
- Heat Treating
- Hopper Heating
- Ink Drying
- Laboratory Testing
- Make-up Air Heating
- Metal Finishing
- Motor Winding Burnoff
- Paint Baking/Drying
- Pharmaceutical Manufacturing
- Plastic Curing
- Preheating
- Reheating
- Roasting (nut, coffee, corn, etc.)
- Semi-Conductor Manufacturing
- Sterilizing
- Standby Heating
- Textile Drying
- Varnish Drying
- Wire Manufacturing



Selection Guide

Table I

Factor	Open Coil	Finned Tubular	Tubular
Outlet Air Temperature	1200° F maximum	600° F maximum	1200° F maximum
Weight	The lightest of all three types.	Heavier than open coil. Additional support required for horizontally mounted units, especially for extra long heaters.	Heavier than open coil. Additional support required for horizontally mounted units, especially for extra long heaters.
Coil Temperature	Resistance coils, exposed directly to airstream, run cooler than coils imbedded in sheathed elements.	Coils run hotter than open coil, but cooler than tubular due to heat transfer effect of fins.	Coils run hotter than open coil or finned tubular. Temperatures are kept within safe limits by reducing watt densities.
Pressure Drop	Lowest pressure drop due to large percentage of open space.	Lower pressure drop than tubular, but higher than open coil.	Highest pressure drop because of high percentage of space occupied by tubes.
Electrical Clearance	Large clearances between live parts and ground enable open coil heaters to withstand severe applications.	Clearances between live parts and sheath are small, but filled with compacted insulation.	Clearances between live parts and sheath are small, but filled with compacted insulation.
Safety	Since element is electrically live, do not use if element may be touched by conductive material or personnel.	Because the coil is enclosed in a metal sheath, shock hazard due to contact is eliminated.	Because the coil is enclosed in a metal sheath, shock hazard due to contact is eliminated.
Air Quality	Use only with clean air free of conductive particles or water spray.	Can be used with air containing water droplets or conductive particles unless particles are likely to build up between fins.	Can be used with virtually any type of air quality.
Mechanical Stability	Open coil heaters are most susceptible to damage due to physical abuse.	Finned tubular heaters can withstand more physical abuse than open coil.	Tubular heaters are least susceptible to damage due to physical abuse.
Airflow Uniformity	Airflow must be uniformly distributed to prevent hot spots. Pressure plates can help even out airflow.	Finned tubular heaters are most tolerant of nonuniform airflow. Hot spots tend to be dissipated by sheath and fins.	Less susceptible to hot spots than open coil, but more susceptible than finned tubular.
Velocity	Maximum air velocity of 2500 SFPM	Maximum air velocity of 5000 SFPM	Maximum air velocity of 8000 SFPM
Controllability	Open coil heaters respond quickly to step control because of low thermal inertia. This can produce temperature fluctuations if control system does not compensate.	High thermal inertia makes finned tubular heaters slower to respond, but can produce more uniform temperatures if control system is properly designed.	Thermal inertia is greater than open coil, but less than finned tubular.
Cost	For most applications, open coil heaters are more economical because manufacturing operations are simpler.	Generally more expensive than open coil, but less expensive than tubular because watt densities are higher.	Generally most expensive of the three because of conservative, high temperature design.

Choosing the Correct Watt Density

Watt density (watts/sq. in. of element surface area) is a critical factor in heater selection. If the watt density is too high for the application, the heater will fail prematurely. If the watt density is too low, the heater cost will be high. Proper watt density is a function of three variables: Heater construction, maximum outlet air temperature and air velocity. Having chosen the construction, watt density can be determined from Table II below, based on temperature and velocity.

The heater listings are labeled for various outlet air temperatures. The assumed minimum velocity and design watt density are shown at the top of each table. If the velocity in your application is lower than indicated in the heater listing, choose a lower watt density from Table II. If your velocity is substantially higher than shown in the heater listing, check it against the values in the table. You may be able to use a higher watt density at a lower price.

Table II

Maximum Watt Densities At Outlet Temperatures And Velocities Shown											
Minimum Velocity In Standard FPM	Open Coil Construction							Finned Tubular Construction			
	Outlet Temperature							Outlet Temperature			
	250° F	400° F	500° F	600° F	750° F	1000° F	1200° F	250° F	400° F	500° F	600° F
300	55	45	35	30	25	15	10	45	40	35	30
600	60	55	50	45	30	20	10	55	50	40	35
900	65	65	60	55	35	25	15	65	65	55	45
1200	65	65	65	65	40	30	20	65	65	60	55
1600	65	65	65	65	55	40	25	65	65	65	65
2000	65	65	65	65	65	50	30	65	65	65	65

Maximum Watt Densities At Outlet Temperatures And Velocities Shown							
Minimum Velocity In Standard FPM	Tubular Construction						
	Outlet Temperature						
	250° F	400° F	500° F	600° F	750° F	1000° F	1200° F
300	22	20	18	16	13	6	3
600	28	24	22	22	22	12	7
900	32	28	25	25	25	18	12
1200	35	30	30	30	30	22	16
1600	45	40	40	40	40	30	22
2000	45	45	45	45	45	35	25

Circuit Sizing

All standard heaters in the listings have circuits that draw a maximum of 48 amps. This enables the use of 50 amp contactors and 60 amp fuses which are generally less expensive than higher rated devices.

For certain applications, however, it may be desirable to have larger circuits – e.g. for use with large SCR controls or to reduce the number of incoming power conductors. In these cases, larger circuits up to approximately 300 amps can be provided. However, in the tubular and finned tubular constructions, circuiting must be consistent with the number of elements shown in the listings.

Pressure Drop Curves

Static pressure drop as a function of air velocity is shown below. Open coil heaters have the lowest pressure drop. Smaller fan motors can often be used with this design. Pressure drop values provided in Charts A through C are based on the airflow being

parallel to the heater C dimension.

For tubular design only, consult factory for pressure drop when airflow is parallel to the H dimension.

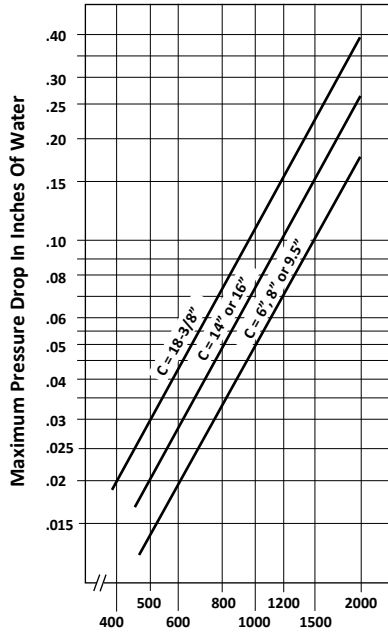


Chart A
Open Coil Design

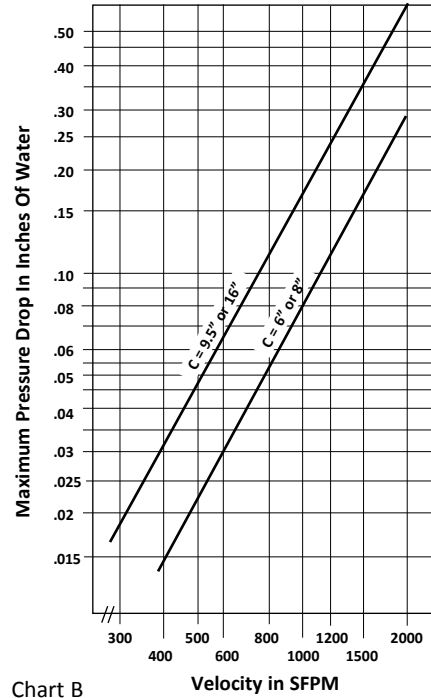


Chart B
Finned Tubular Design

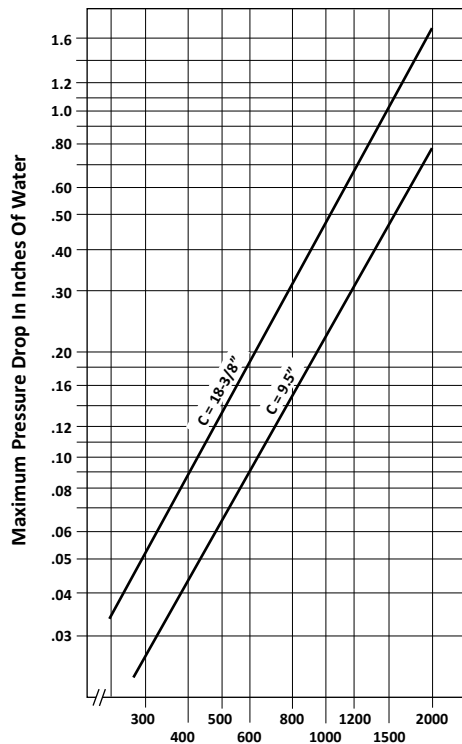


Chart C
Tubular Design

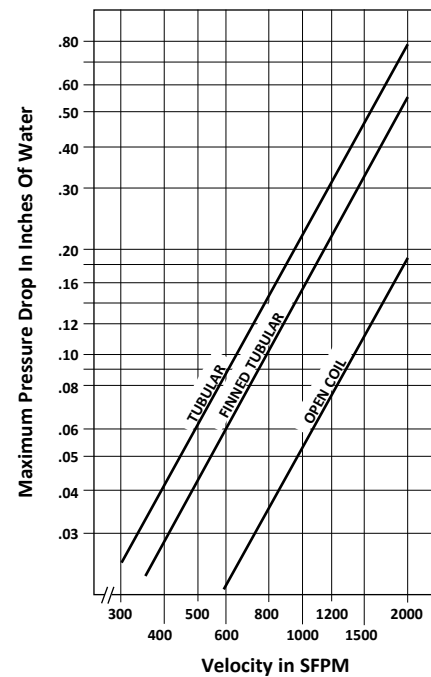


Chart D
Comparative Pressure Drop Through All Three Designs at 9.5" C Dimension

Calculating KW Requirements

Once the volume of air in standard cubic feet per minute (SCFM) and the required temperature rise in °F (ΔT) are known, the required kilowatt rating (KW) of the heater can be determined from the following formula:

$$KW = \frac{SCFM \times \Delta T}{3193}$$

Note that CFM is given at standard conditions (SCFM): 80°F and normal atmospheric pressure of 15 psi. The CFM at a higher pressure (P) and inlet air temperature (T) may be calculated as follows:

$$SCFM = CFM \times \frac{P}{15} \times \frac{540}{(T+460)}$$

Example:

A drying oven, operating at 25 psia (10 psi gauge pressure), recirculates 3000 cubic feet of air per minute through a heater which raises its temperature from 350 to 400° F.

To select an appropriate heater:

Step 1: Convert 3000 CFM at 25 psia and 350° F to CFM at standard conditions using the above formula:

$$SCFM = 3000 \times \frac{25 \text{ psia}}{15} \times \frac{540}{(350^\circ \text{ F} + 460)} = 3333 \text{ SCFM}$$

Step 2: Calculate the required KW:

$$KW = \frac{3333 \times (400^\circ \text{ F} - 350^\circ \text{ F})}{3193} = 52 \text{ KW}$$

Step 3: Calculate the maximum heater face area (WxH) that will result in an air velocity above the minimum required for standard heater listings:

The 400° F listing on pages 25 through 28 are based on 900 SFPM velocity. Thus, the

$$\text{Maximum Face Area} = \frac{3333 \text{ SCFM}}{900 \text{ SFPM}} = 3.7 \text{ sq. ft.}$$

Step 4: Select a heater rated for at least 52 KW with a face area of 3.7 sq. ft. or less.

On page 26 is a group of 54 KW heaters, the first of which has an area of 12" x 30" = 1.0' x 2.5' = 2.5 sq. ft. This item is therefore appropriate. Select either Catalog No. HX-166N-635-401U (finned tubular) or HX-165N-335-401U (open coil). Both are rated 65 watts/sq. in.

Note: If a larger face area is required, a lower watt density must be selected. For example, if the heater face is 24" wide x 30" high, the velocity will be:

$$\frac{3333 \text{ SCFM}}{24" \times 30"} = \frac{3333 \text{ SCFM}}{2.0' \times 2.5'} = 667 \text{ SFPM}$$

Per Table II, 400° F outlet air and 600 SFPM velocity require maximum watt densities of 55 watts/sq. in. for open coil and 50 watts/sq. in. for finned tubular. Since the 600° F listings on pages 29 through 32 are based upon watt densities of 55 and 45 for open coil and finned tubular respectively, a heater may be selected from this table. The 54 KW item, Catalog No. HX-166N-848-601U (finned tubular) or Catalog No. HX-165N-148-601U (open coil) may be used.

Special Features

A wide variety of special features can be incorporated into Heatrex process duct heaters. Please contact us if you have other requirements.

Built-in Controls

(Available for heaters operating up to 150° F outlet air temperature.)

Built-in contactors, fuses, control transformers, and disconnect switches save installation labor and provide single source responsibility for the heater-control package.



Built-in Thermostat

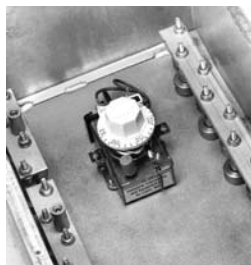
(Available for heaters operating up to 150° F outlet air temperature.)



For automatic control of outlet air temperature. Adjustable over a range of 60-250° F. Outlet temperature will be lower than set point as the thermostat senses heat from elements as well as outlet air. Do not use where outlet air temperature will exceed 150° F. May also be used as an automatic high temperature thermal cutout.

Built-in Combination Thermostat/Thermal Cutout

(Available for heaters operating up to 150° F outlet air temperature.)



Control normally cycles the heater on and off, but shuts the heater down until reset button is pressed if temperature rise is more than 50° F above the control set point. (60-250° F range).

Remote Mounted Thermostats

For air temperature control or high temperature thermal cutout protection, a bulb and capillary type thermostat can be mounted in a cool location up to 8' away from the heater. A well is provided to mount the thermostat bulb into the airstream. Two models are available:

DA1-6E96: 200-550° F
DA1-6F96: 300-700° F



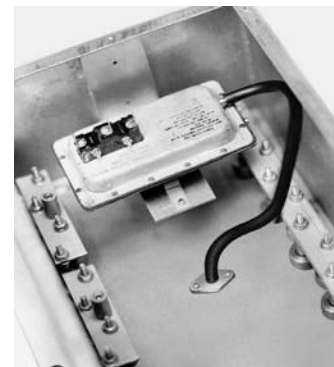
Built-in Thermocouple

Built-in sheathed thermocouple available for high temperature limit. This can be mounted in the airstream or clamped to a tubular/finned tubular element to prevent overheating.

Built-in Airflow Switch

(Available for heaters operating up to 150° F outlet air temperature.)

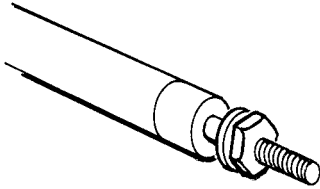
A diaphragm-operated differential pressure switch normally prevents the heater from operating unless the air is flowing. It senses pressure between process air and the terminal housing.



Special Features

Moisture-Resistant Element Seal

RTV or epoxy seals are inserted into each end of tubular or finned tubular elements. Recommended when heater may be stored in high humidity or where terminals are exposed to high humidity during operation.



Angle Iron Frame

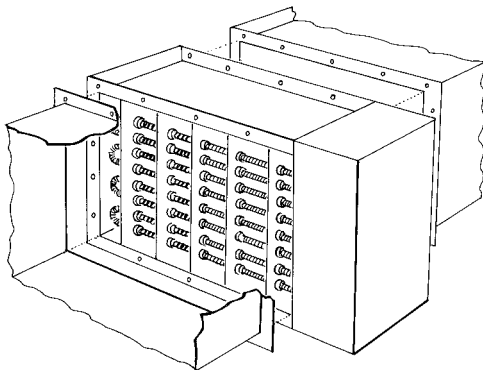
(Available for all tubular and finned tubular heaters except those with 250° F Construction.)

Support rods are replaced by heavy angle iron welded to element supports and terminal box. May increase C and H dimensions. Specify steel or stainless steel angle iron.



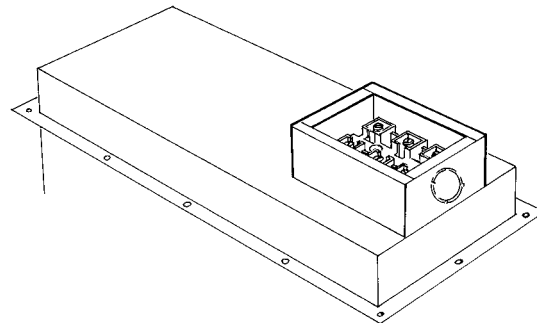
Flanged Duct Mounting

For attaching heater to external duct flanges. No internal support required. Note that heater face dimensions W and H match the inside dimensions of the duct. While integral flange design is a standard option on the 250° F Construction, other heaters can be supplied with separate flange mounted plenum sections where required.



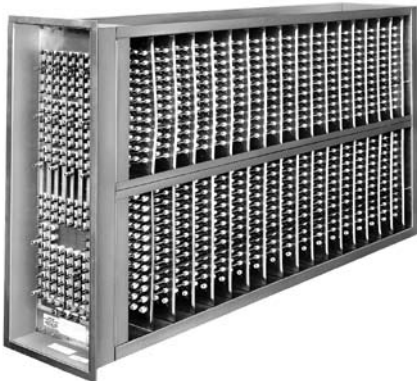
Isolated Junction Box

Power connections are housed in a separate isolated junction box, factory connected to heating element terminals. Used where field wiring is not suitable for high ambient temperatures.



Flanged Terminal Box

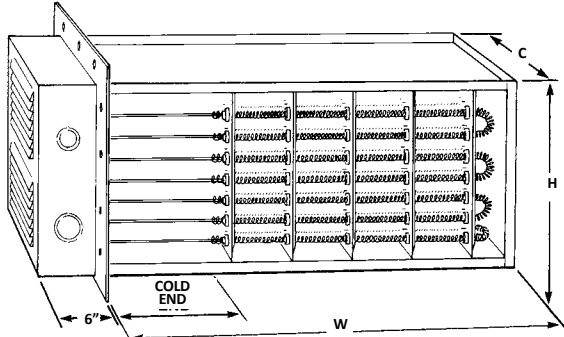
A 1" full flange at end of terminal box is available for mounting heater. Especially useful when heater is mounted inside an oven, where ready access to electrical connections and minimum terminal box size are desirable. No terminal box cover is supplied.



Special Features

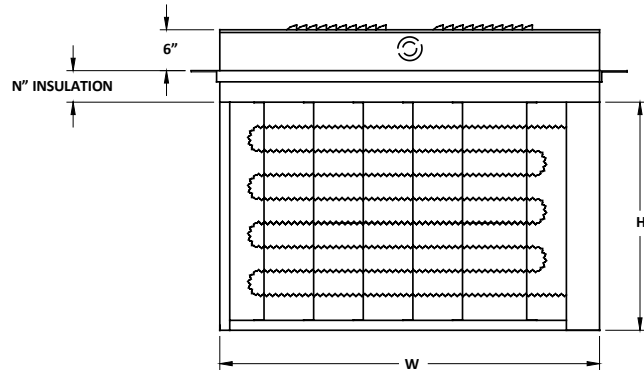
Special Cold Ends

To clear oven wall or to place active portion of heating element well into airstream, long cold ends may be provided. All heaters have 2" cold ends as standard.



Top Mounted Heater Construction

A special top mounted design is available on open coil heaters. This feature allows easier installation when there are space restrictions on the sides of the heater but access is available from the top. In these applications, the coils are strung horizontally for proper heating of the airflow.



Front View

Pressure Plate

A 40% open pressure plate on the inlet side of the heater evens out the airflow pattern where it is not normally uniform. A pressure plate significantly increases the pressure drop across the heater, as shown in the chart.

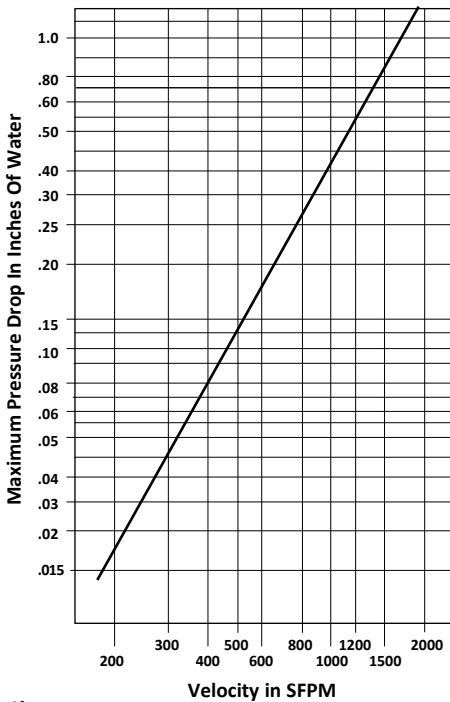
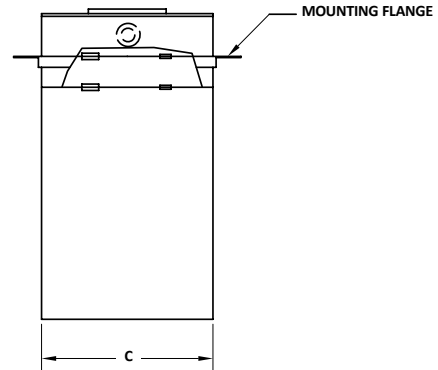


Chart E
Pressure Drop



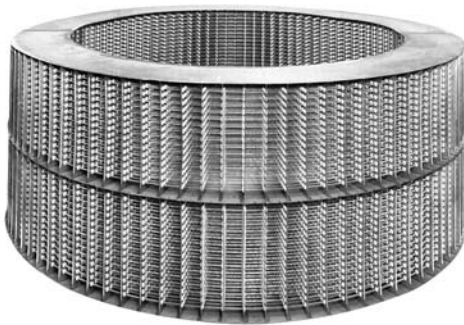
Side View

Custom Designs

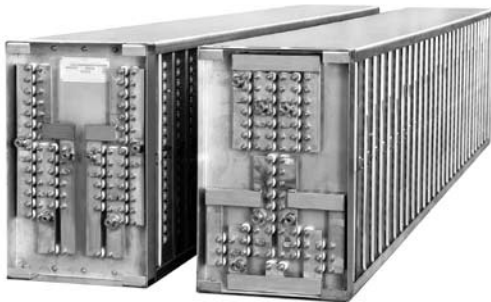
Heatrex has the ability to customize heaters for unusual or special applications. The following are a few examples of our construction and design capabilities.

Autoclave Heater

This 1500 KW heater accommodates a fan in the center that can either draw or blow air through the open coils. The assembly is typically mounted on the door of an airtight batch oven, eliminating duct work. The design assures uniform air distribution over the coils without a pressure plate or other air straightening device. Units can be built to customer-specified KW ratings, inside and outside diameters, and for outlet temperatures up to 750° F. Field power connections are made to terminals inside the donut.



Two of 15 modules, each rated 624 KW, producing a total of 9360 KW in an autoclave installed in an aircraft facility. Structural components of the aircraft are made from lightweight composites such as boron or graphite fibers bonded with epoxy. Thin sheets of the metal are cut with computerized cutting equipment, layered in a crisscross pattern, then bonded together in the autoclave at pressures up to 300 psi and temperatures up to 1300° F. A nitrogen atmosphere prevents combustion of volatile vapors given off as the epoxy cures. Severe space limitations dictated a unique bus bar pattern, resulting in terminals at both ends of each module.



Crucible Preheater

Four flanged tubular heaters are mounted into an insulated cap and factory wired to a common junction box (not shown) in the center. The heaters preheat the air in a crucible to 1000° F before molten aluminum is poured into it. This energy saving design replaced an open gas flame which was shot into the crucible before pouring. The low watt density elements generate no heat in the U-bent portions so as to concentrate the heat in the crucible's vertical walls. Terminal boxes are ventilated to prevent overheating of internal wiring. One set of incoming power lines feeds the entire 60 KW load.



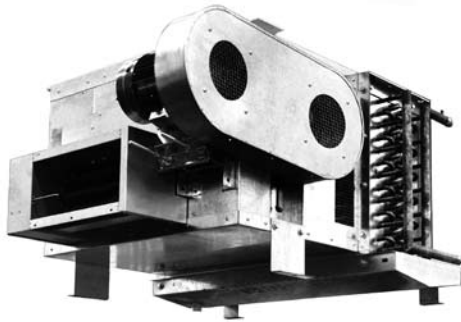
Processing Agricultural Products

This assembly of heaters, angle iron rack frame and panelboards is typical of systems built to process agricultural products. Applications include drying barley for malt production and dehydrating alfalfa for animal feed. Ratings up to 4300 KW in a single assembly and multi-heater installations up to 72,000 KW have been furnished. The finned tubular design is usually recommended because of environmental job conditions. Heatrex designs and builds all components of the system, giving the owner a turn-key installation. Electric heat is normally preferred over gas since there are no products of combustion, making the end product suitable for human consumption.



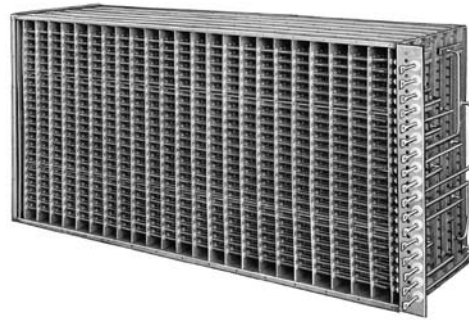
Ripening Room Heater

Heater installed in a package unit that maintains proper temperature and humidity in produce storage rooms. Typical applications include banana ripening and potato or apple storage. Stainless steel finned tubular elements, complete with moisture-proof seals, withstand corrosion caused by water carry-over from the cooling coil and gases released in the ripening process. Heater has built-in controls.



Environmental Test Chamber Heater

This 543 KW heater operates in an environmental chamber where aircraft components are tested at temperatures up to 1475° F. Stainless steel rods are welded to the bus bars linking the elements together to form circuits of various KW ratings. The rods are bent at 90° and project through the wall of the test chamber so that incoming power connections can be made in a cool location. The entire unit is made from stainless steel.



Ink Drying

Filtered room air passes over this open coil heater (terminal box only shown) through a high speed blower. The 250° F pressurized air is then piped to a printing press where it bombards the web at a high velocity to evaporate and scrub off ink solvents. Solvent laden air is vacuumed away from the press and back to the dryer by a second high speed blower, then exhausted through a vent.



Paint Curing System

Part of a shipment of 26 identical tubular oven heaters, rated 240 KW each, to dry paint at temperatures ranging from 300° F to 700° F. Eighteen heaters are installed in a 4320 KW electro-coat cure oven and the remaining eight in a 1920 KW flow-coat cure oven at a tractor fabrication plant. Factory furnished vertical bus bars connect directly to bus duct feeding the entire system. Heating elements are individually replaceable and are secured to the insulated terminal box with compression fittings to prevent air leakage. Each heater slides into the oven on roller bearings to facilitate maintenance. Each oven is divided into several zones and the entire load is SCR controlled.



Custom Designs

Bonding Oven

This 13 foot long, 550 KW heater is installed in a batch oven for drying sealants and curing adhesives on parts wrapped in fiberglass for the aerospace industry. This unit replaced a series of open coil heaters, whose coils shorted out due to fiberglass filings in the airstream. It heats 39,000 SCFM of air to 610° F.



High Temperature Core Construction

This unit produces 1400° F air for hot forming titanium used in aircraft components. Open coil elements are wound on grooved, ceramic cores, resulting in an extremely compact design: The heated chamber produces 60 KW, but measures only 18" cubed. The heater slips through the top of the furnace, with an insulation plug under the mounting flange that matches the thickness of the furnace wall. Electrical connections are made externally to stainless steel lugs, factory welded to stainless bus bars that interconnect the elements below.



Load Bank

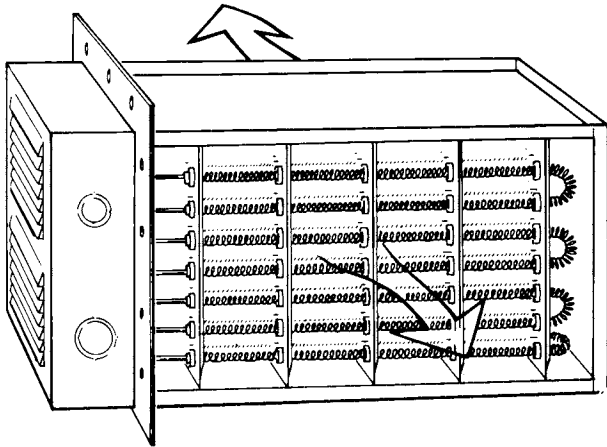
This 126 KW open coil load bank was built to test large stand-by generators. With the use of a separate control panel, the 22 circuit design allows for testing of variable resistance loads at different RPM levels. Routine testing with load banks confirms that generators are functioning properly and are ready for use when needed. This is critical for facilities that cannot be without power, such as hospitals, police stations, fire stations or prisons. Load banks are also used in the testing of main or stand-by generators found on commercial or military aircraft and nuclear submarines.



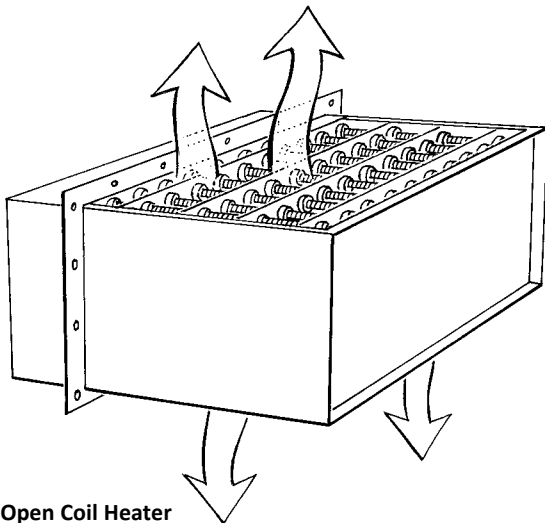
Installation Guidelines

Mounting

Open Coil Heaters must be mounted horizontally for either horizontal or vertical airflow.

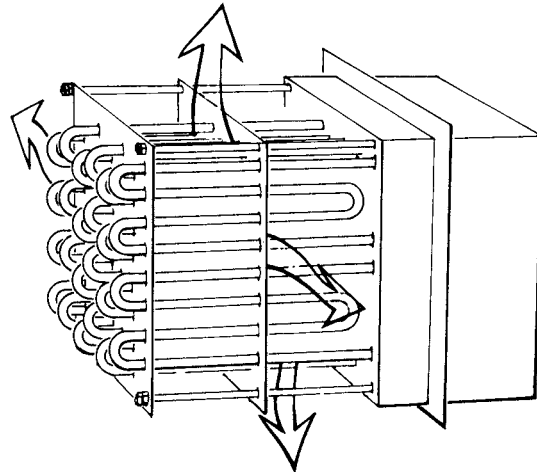


Open Coil Heater Mounted For Horizontal Airflow

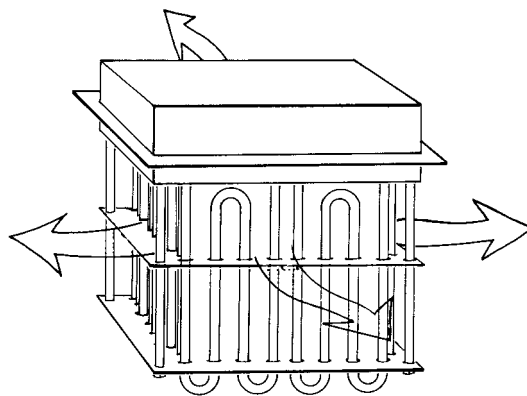


Open Coil Heater Mounted For Vertical Airflow

Tubular and Finned Tubular Heaters may be mounted either horizontally or vertically. When mounted horizontally, the airflow may be either horizontal or vertical. When mounted vertically, the airflow must be horizontal. All tubular and finned tubular heaters, except those rated for 250° F air, may be rotated 90° about a horizontal axis to fit the available space. For example, a heater 16" high (H dimension) and 9.5" deep (C dimension) may be mounted with either the 9.5" dimension or the 16" dimension parallel to the airflow.



Horizontally Mounted Tubular Or Finned Tubular Heater

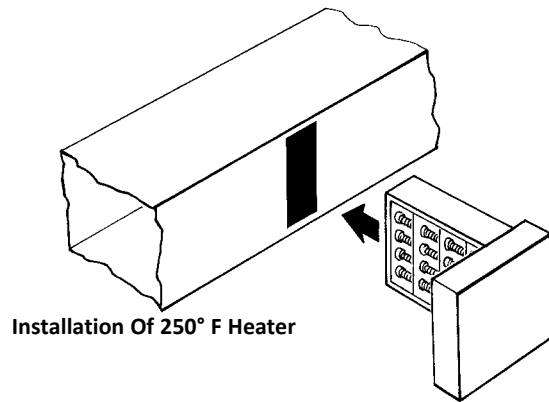


Vertically Mounted Tubular Or Finned Tubular Heater

Installation Guidelines

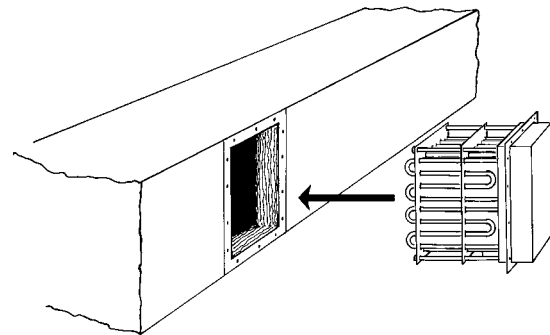
Support

Low Temperature Heaters, suitable for 250° F maximum outlet air, are attached to the ductwork or oven wall with sheet metal screws through the base of the terminal box, as shown.



Installation Of 250° F Heater

Higher Temperature Heaters, those rated for 400° F air and higher, must be bolted to the duct or oven wall using the bolt holes provided in the steel flange at the base of the terminal box. Weld nuts or captive nuts may be provided in the wall or a mating flange can be provided in the field.



Installation Of Heater
Rated For 400° F And Higher

All Horizontally Mounted Heaters, except those weighing less than 25 lbs., should be supported inside the oven or duct with rails or hangers. Heaters mounted vertically through the top of the oven or duct need not be supported internally. However, the structure should be adequate to carry the entire heater weight.

Insulation

If the heater is mounted through an opening in an insulated wall, special precautions must be taken to insure that the entire heated length is in the airstream. Otherwise, the elements shadowed by the insulation will overheat and burn out.

Open Coil heaters designed for 1200° F air are provided with 4" of insulation under the mounting plate. If the insulated oven wall is thicker than 4", additional insulation should be provided in the heater. Heaters rated for lower outlet air temperatures may also be provided with insulation under the mounting plate or with extended terminal cold sections to clear the oven wall. The standard open coil construction will clear up to 2" of insulation without modification.

Finned Tubular heaters may also be provided with insulation under the mounting plate or extended cold sections. Heaters will clear 2" of insulation without modification.

Tubular heaters rated for 1200° F outlet air are provided with 4" of insulation under the mounting flange, which should be extended for heavier oven walls. Heaters rated for 750° F outlet air may also be provided with 4" of insulation under the mounting plate, or may safely be installed through a wall up to 2" thick without modification.

Installation Guidelines

Overtemperature Protection

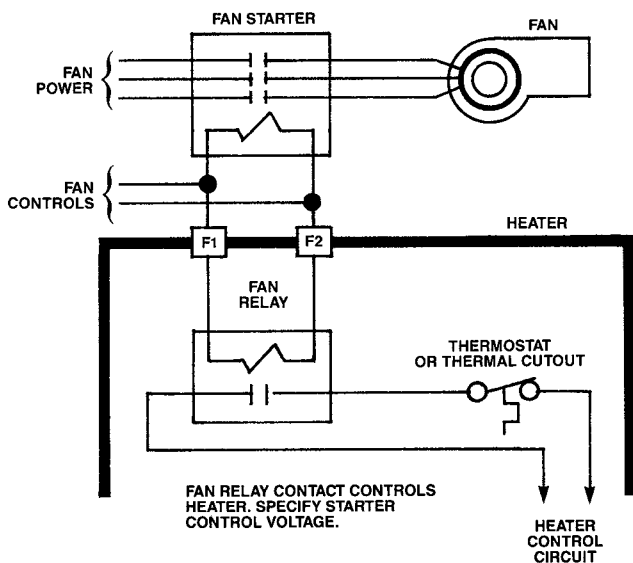
To prevent overheating under adverse conditions, overtemperature protection is recommended. Four types of protective devices are available:

Thermal Cutout – A thermostat, set approximately 50° higher than normal operating temperature, can be built into heaters rated for 250° F maximum outlet air. The built-in thermostat or built-in combination thermostat/thermal cutout can be used for this purpose. For higher temperature heaters, a remote thermostat may be used as a thermal cutout.

Built-in Thermocouple – A thermocouple, sensing sheath or air temperature, can be wired to a remotely mounted thermocouple controller, set approximately 50° F above normal operating temperature. The controller then acts as a thermal cutout.

Built-in Airflow Switch – A differential pressure type airflow switch may be built into 150° F heaters. By sensing the difference in pressure between the process air and the outside atmosphere, it will shut down the heater when there is a sudden drop in process pressure.

Fan Interlock Relay – A relay interlocking the fan motor with the heater control circuit will shut down the heater if there is no power to the fan. Note, however, that this device does not protect against a stalled motor nor against a blockage in the airstream that would result in little or no airflow, even though the fan is running.



Field Wiring

All heaters in the listings are designed for 480 volts, three phase. Therefore, three power leads must be brought into the heater for each circuit through the knockouts provided in the terminal box. The number of circuits is shown in the listings. The current drawn by each circuit is calculated as follows:

$$\text{Line Current} = \frac{\text{Circuit KW} \times 1000}{\text{Voltage} \times 1.73}$$

All wiring should be per the National Electrical Code and any special provisions in local codes. Wiring insulation must be suitable for the terminal box ambient temperature as determined from Chart F. Note that lower temperature wiring insulation may be used on heaters with insulation under the mounting flange.

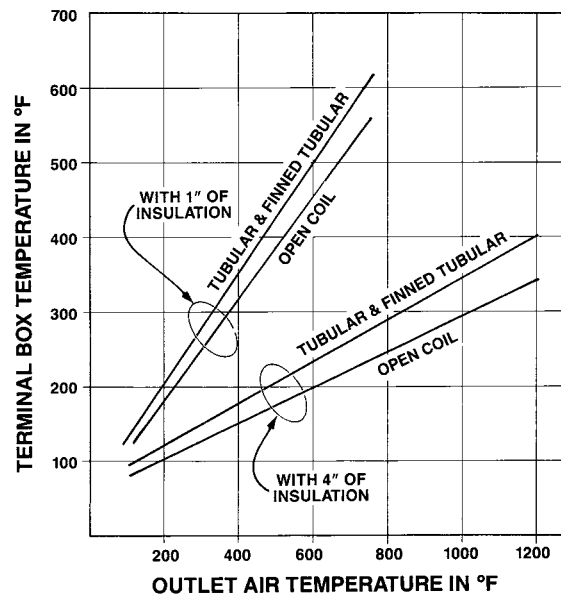
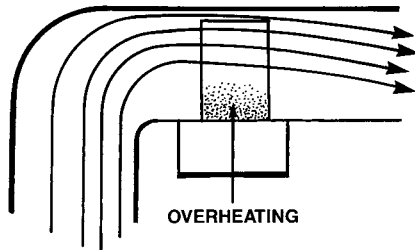


Chart F
Terminal Box Temperature

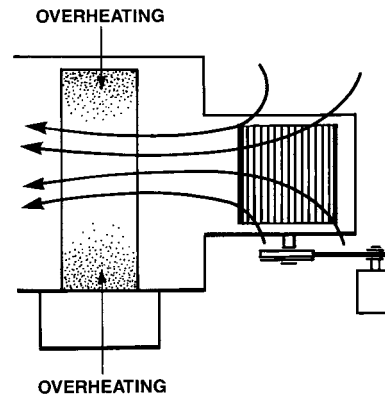
Installation Guidelines

Airflow Uniformity

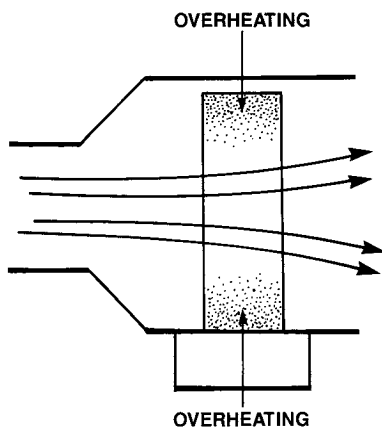
To prevent hot spots, airflow must be uniformly distributed across the heater face. These drawings illustrate typical heater misapplications which result in nonuniform airflow. If one or more of these conditions cannot be avoided, consult Heatrex for assistance. In most cases we can provide a pressure plate or nonheated zones in the heater to overcome these problems.



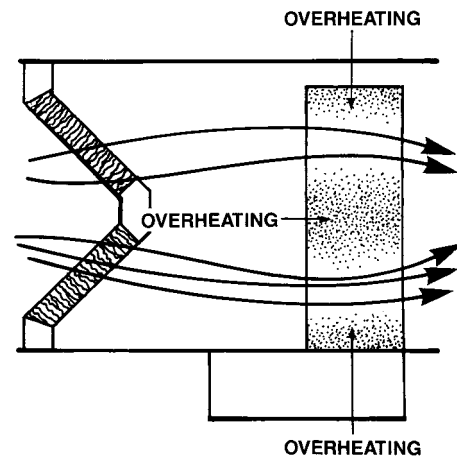
Heater Too Close To Elbow



Heater Adjacent To Transition



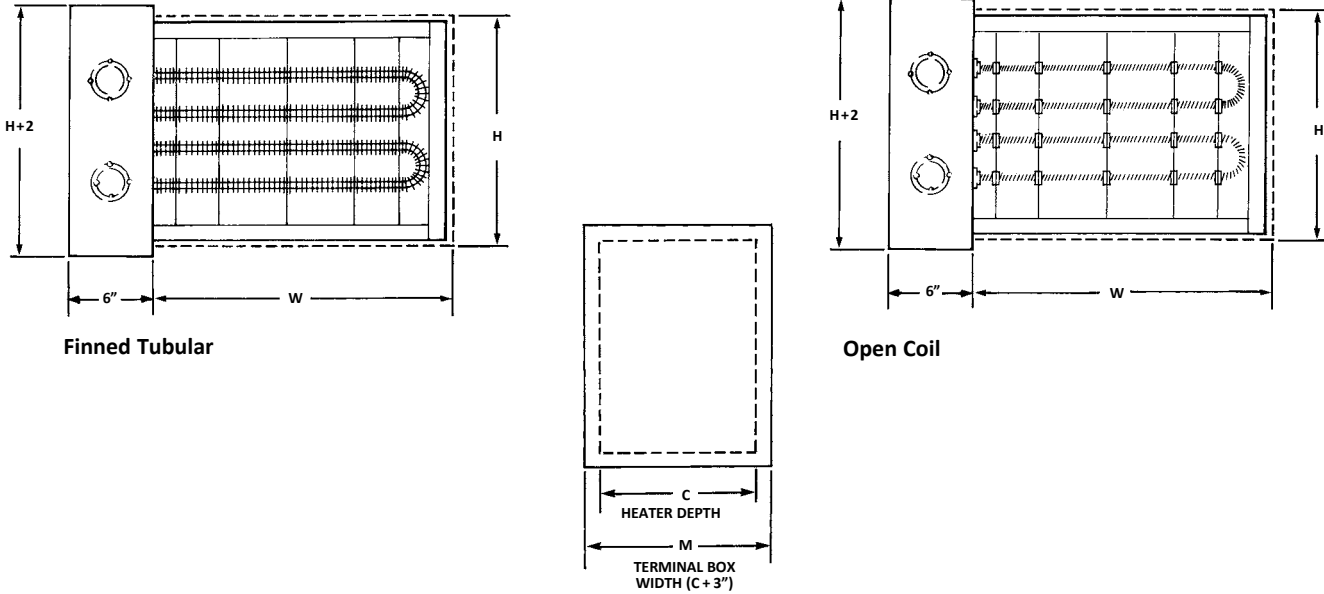
Heater Too Close To Fan



Heater Partially Blocked By Filter Or Frame Member

Heater Listings

250° F Maximum Outlet Air Temperature



Heater Listings - 250° F at 900 SFPM Minimum Airflow										
KW	Dimensions (Inches)			Finned Tubular Construction 65 Watts/Sq. In.				Open Coil Construction 65 Watts/Sq. In.		
	W	H	C	Catalog Number	No. Of Elements	No. Of Circuits	Weight (Lbs.)	Catalog Number	No. Of Circuits	Weight (Lbs.)
4.5	12	8	8	HX-166N-401-201U	3	1	10	HX-165N-501-201U	1	10
6	16	8	8	HX-166N-402-201U	3	1	15	HX-165N-502-201U	1	10
9	12	12	8	HX-166N-403-201U	6	1	20	HX-165N-503-201U	1	10
9	20	8	8	HX-166N-404-201U	3	1	15	HX-165N-504-201U	1	10
9	24	8	8	HX-166N-405-201U	3	1	15	HX-165N-505-201U	1	10
12	16	12	8	HX-166N-406-201U	6	1	20	HX-165N-506-201U	1	10
13	12	16	8	HX-166N-407-201U	9	1	25	HX-165N-507-201U	1	15
13	30	8	8	HX-166N-408-201U	3	1	20	HX-165N-508-201U	1	10
18	12	20	8	HX-166N-409-201U	12	1	30	HX-165N-509-201U	1	15
18	16	16	8	HX-166N-410-201U	9	1	30	HX-165N-510-201U	1	15
18	20	12	8	HX-166N-411-201U	6	1	25	HX-165N-511-201U	1	15
18	24	12	8	HX-166N-412-201U	6	1	25	HX-165N-512-201U	1	15
18	36	8	8	HX-166N-413-201U	3	1	25	HX-165N-513-201U	1	15
22	12	24	8	HX-166N-414-201U	15	1	35	HX-165N-514-201U	1	20
24	16	20	8	HX-166N-415-201U	12	1	35	HX-165N-515-201U	1	20
27	12	30	8	HX-166N-416-201U	18	1	45	HX-165N-516-201U	1	25
27	20	16	8	HX-166N-417-201U	9	1	35	HX-165N-517-201U	1	20

Heaters are rated at 480 volts, 3 phase.



Heater Listings

250° F Maximum Outlet Air Temperature

Heater Listings - 250° F at 900 SFPM Minimum Airflow										
KW	Dimensions (Inches)			Finned Tubular Construction 65 Watts/Sq. In.				Open Coil Construction 65 Watts/Sq. In.		
	W	H	C	Catalog Number	No. Of Elements	No. Of Circuits	Weight (Lbs.)	Catalog Number	No. Of Circuits	Weight (Lbs.)
27	24	16	8	HX-166N-418-201U	9	1	35	HX-165N-518-201U	1	20
27	30	12	8	HX-166N-419-201U	6	1	35	HX-165N-519-201U	1	15
30	16	24	8	HX-166N-420-201U	15	1	40	HX-165N-520-201U	1	20
31	12	34	8	HX-166N-421-201U	21	1	50	HX-165N-521-201U	1	25
36	12	38	8	HX-166N-422-201U	24	1	55	HX-165N-522-201U	1	30
36	16	30	8	HX-166N-423-201U	18	1	50	HX-165N-523-201U	1	25
36	20	20	8	HX-166N-424-201U	12	1	40	HX-165N-524-201U	1	20
36	24	20	8	HX-166N-425-201U	12	1	45	HX-165N-525-201U	1	25
36	36	12	8	HX-166N-426-201U	6	1	40	HX-165N-526-201U	1	20
40	12	42	8	HX-166N-427-201U	27	2	60	HX-165N-527-201U	2	35
40	30	16	8	HX-166N-428-201U	9	2	45	HX-165N-528-201U	2	25
42	16	34	8	HX-166N-429-201U	21	2	55	HX-165N-529-201U	2	30
45	12	24	16	HX-166N-430-201U	30	2	65	HX-165N-530-201U	2	25
45	20	24	8	HX-166N-431-201U	15	2	50	HX-165N-531-201U	2	25
45	24	24	8	HX-166N-432-201U	15	2	50	HX-165N-532-201U	2	30
48	16	38	8	HX-166N-433-201U	24	2	65	HX-165N-533-201U	2	35
50	12	30	16	HX-166N-434-201U	33	2	70	HX-165N-534-201U	2	35
54	12	30	16	HX-166N-435-201U	36	2	75	HX-165N-535-201U	2	35
54	16	42	8	HX-166N-436-201U	27	2	70	HX-165N-536-201U	2	40
54	20	30	8	HX-166N-437-201U	18	2	60	HX-165N-537-201U	2	30
54	24	30	8	HX-166N-438-201U	18	2	60	HX-165N-538-201U	2	35
54	30	20	8	HX-166N-439-201U	12	2	55	HX-165N-539-201U	2	30
54	36	16	8	HX-166N-440-201U	9	2	55	HX-165N-540-201U	2	25
58	12	34	16	HX-166N-441-201U	39	2	85	HX-165N-541-201U	2	35
60	16	24	16	HX-166N-442-201U	30	2	75	HX-165N-542-201U	2	30
63	12	34	16	HX-166N-443-201U	42	2	90	HX-165N-543-201U	2	35
63	20	34	8	HX-166N-444-201U	21	2	70	HX-165N-544-201U	2	35
63	24	34	8	HX-166N-445-201U	21	2	70	HX-165N-545-201U	2	40
66	16	30	16	HX-166N-446-201U	33	2	80	HX-165N-546-201U	2	40
67	12	38	16	HX-166N-447-201U	45	2	95	HX-165N-547-201U	2	40
67	30	24	8	HX-166N-448-201U	15	3	65	HX-165N-548-201U	2	35
72	12	38	16	HX-166N-449-201U	48	2	100	HX-165N-549-201U	2	40
72	16	30	16	HX-166N-450-201U	36	2	90	HX-165N-550-201U	2	40
72	20	38	8	HX-166N-451-201U	24	2	80	HX-165N-551-201U	2	40
72	24	38	8	HX-166N-452-201U	24	2	80	HX-165N-552-201U	2	45
72	36	20	8	HX-166N-453-201U	12	2	65	HX-165N-553-201U	2	30
76	12	42	16	HX-166N-454-201U	51	3	65	HX-165N-554-201U	2	45
78	16	34	16	HX-166N-455-201U	39	3	105	HX-165N-555-201U	2	45

Heaters are rated at 480 volts, 3 phase.

Heater Listings

250° F Maximum Outlet Air Temperature

Heater Listings - 250° F at 900 SFPM Minimum Airflow										
KW	Dimensions (Inches)			Finned Tubular Construction 65 Watts/Sq. In.				Open Coil Construction 65 Watts/Sq. In.		
	W	H	C	Catalog Number	No. Of Elements	No. Of Circuits	Weight (Lbs.)	Catalog Number	No. Of Circuits	Weight (Lbs.)
81	12	42	16	HX-166N-456-201U	54	3	110	HX-165N-556-201U	3	45
81	20	42	8	HX-166N-457-201U	27	3	85	HX-165N-557-201U	3	45
81	24	42	8	HX-166N-458-201U	27	3	85	HX-165N-558-201U	3	50
81	30	30	8	HX-166N-459-201U	18	3	80	HX-165N-559-201U	3	45
84	16	34	16	HX-166N-460-201U	42	3	100	HX-165N-560-201U	3	45
90	16	38	16	HX-166N-461-201U	45	3	110	HX-165N-561-201U	3	50
90	20	24	16	HX-166N-462-201U	30	3	95	HX-165N-562-201U	3	40
90	24	24	16	HX-166N-463-201U	30	3	95	HX-165N-563-201U	3	45
90	36	24	8	HX-166N-464-201U	15	3	80	HX-165N-564-201U	3	40
95	30	34	8	HX-166N-465-201U	21	4	90	HX-165N-565-201U	3	50
95	16	38	16	HX-166N-466-201U	48	3	115	HX-165N-566-201U	3	50
100	20	30	16	HX-166N-467-201U	33	3	105	HX-165N-567-201U	3	45
100	24	30	16	HX-166N-468-201U	33	3	105	HX-165N-568-201U	3	55
102	16	42	16	HX-166N-469-201U	51	3	120	HX-165N-569-201U	3	55
108	16	42	16	HX-166N-470-201U	54	3	130	HX-165N-570-201U	3	55
108	20	30	16	HX-166N-471-201U	36	3	110	HX-165N-571-201U	3	45
108	24	30	16	HX-166N-472-201U	36	3	110	HX-165N-572-201U	3	55
108	30	38	8	HX-166N-473-201U	24	4	100	HX-165N-573-201U	3	55
108	36	30	8	HX-166N-474-201U	18	3	95	HX-165N-574-201U	3	50
117	20	34	16	HX-166N-475-201U	39	4	120	HX-165N-575-201U	3	50
117	24	34	16	HX-166N-476-201U	39	4	120	HX-165N-576-201U	3	60
122	30	42	8	HX-166N-477-201U	27	5	110	HX-165N-577-201U	4	60
126	20	34	16	HX-166N-478-201U	42	4	125	HX-165N-578-201U	4	55
126	24	34	16	HX-166N-479-201U	42	4	130	HX-165N-579-201U	4	60
126	36	34	8	HX-166N-480-201U	21	4	110	HX-165N-580-201U	4	55
135	20	38	16	HX-166N-481-201U	45	4	135	HX-165N-581-201U	4	60
135	20	38	16	HX-166N-482-201U	45	4	135	HX-165N-582-201U	4	55
135	24	38	16	HX-166N-483-201U	45	4	135	HX-165N-583-201U	4	65
135	30	24	16	HX-166N-484-201U	30	5	125	HX-165N-584-201U	4	55
144	20	38	16	HX-166N-485-201U	48	4	145	HX-165N-585-201U	4	55
144	24	38	16	HX-166N-486-201U	48	4	145	HX-165N-586-201U	4	65
144	36	38	8	HX-166N-487-201U	24	4	125	HX-165N-587-201U	4	60
150	30	30	16	HX-166N-488-201U	33	6	135	HX-165N-588-201U	4	65
153	20	42	16	HX-166N-489-201U	51	5	155	HX-165N-589-201U	4	60
153	24	42	16	HX-166N-490-201U	51	5	155	HX-165N-590-201U	4	70
162	20	42	16	HX-166N-491-201U	54	5	160	HX-165N-591-201U	5	60
162	24	42	16	HX-166N-492-201U	54	5	160	HX-165N-592-201U	5	70
162	30	30	16	HX-166N-493-201U	36	6	145	HX-165N-593-201U	5	65
162	36	42	8	HX-166N-494-201U	27	5	135	HX-165N-594-201U	5	65

Heaters are rated at 480 volts, 3 phase.



Heater Listings

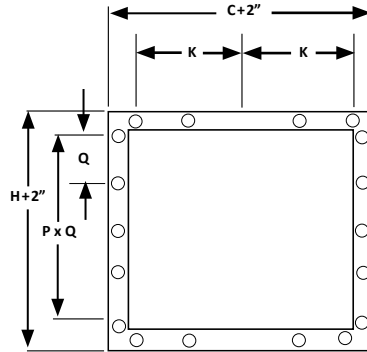
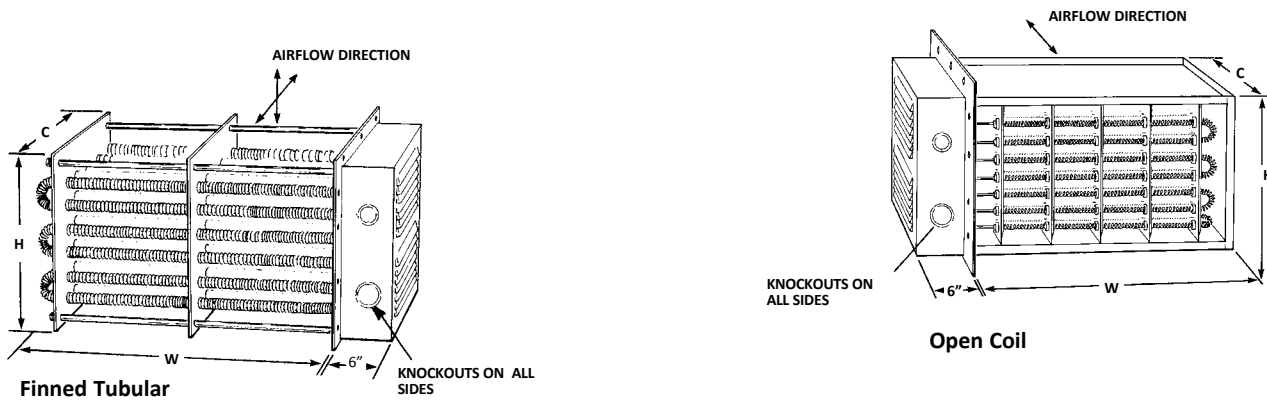
250° F Maximum Outlet Air Temperature

Heater Listings - 250° F at 900 SFPM Minimum Airflow										
KW	Dimensions (Inches)			Finned Tubular Construction 65 Watts/Sq. In.				Open Coil Construction 65 Watts/Sq. In.		
	W	H	C	Catalog Number	No. Of Elements	No. Of Circuits	Weight (Lbs.)	Catalog Number	No. Of Circuits	Weight (Lbs.)
175	30	34	16	HX-166N-495-201U	39	7	155	HX-165N-595-201U	5	70
180	36	24	16	HX-166N-496-201U	30	5	150	HX-165N-596-201U	5	60
189	30	34	16	HX-166N-497-201U	42	7	165	HX-165N-597-201U	5	70
198	36	30	16	HX-166N-498-201U	33	6	165	HX-165N-598-201U	5	75
202	30	38	16	HX-166N-499-201U	45	8	180	HX-165N-599-201U	6	80
216	30	38	16	HX-166N-500-201U	48	8	190	HX-165N-600-201U	6	80
216	36	30	16	HX-166N-501-201U	36	6	180	HX-165N-601-201U	6	75
230	30	42	16	HX-166N-502-201U	51	9	200	HX-165N-602-201U	6	85
234	36	34	16	HX-166N-503-201U	39	7	195	HX-165N-603-201U	6	85
243	30	42	16	HX-166N-504-201U	54	9	210	HX-165N-604-201U	7	85
252	36	34	16	HX-166N-505-201U	42	7	205	HX-165N-605-201U	7	85
270	36	38	16	HX-166N-506-201U	45	8	220	HX-165N-606-201U	7	90
288	36	38	16	HX-166N-507-201U	48	8	235	HX-165N-607-201U	8	95
306	36	42	16	HX-166N-508-201U	51	9	245	HX-165N-608-201U	8	100
324	36	42	16	HX-166N-509-201U	54	9	260	HX-165N-609-201U	9	100

Heaters are rated at 480 volts, 3 phase.

Heater Listings

400° F Maximum Outlet Air Temperature



Heater Depth C	6"	9.5"								
Mtg. Hole Centers K	2"	3.5"								
Heater Height H	8"	12"	16"	20"	24"	30"	34"	38"	42"	
No. of Spaces P	2	3	3	3	3	5	7	7	7	
Mtg. Hole Centers Q	3"	3.75"	4.25"	5.25"	5.75"	4.88"	4.38"	4.88"	5.25"	

Mounting Hole Details – Mounting hole patterns depend on heater C and H dimensions. Mounting holes are 9/32" diameter, centered 3/8" from the outside edge of the plate.

Heater Listings - 400° F at 900 SFPM Minimum Airflow										
KW	Dimensions (Inches)			Finned Tubular Construction 65 Watts/Sq. In.				Open Coil Construction 65 Watts/Sq. In.		
	W	H	C	Catalog Number	No. Of Elements	No. Of Circuits	Weight (Lbs.)	Catalog Number	No. Of Circuits	Weight (Lbs.)
4.5	12	8	6	HX-166N-601-401U	3	1	15	HX-165N-301-401U	1	10
6	16	8	6	HX-166N-602-401U	3	1	15	HX-165N-302-401U	1	10
9	12	12	6	HX-166N-603-401U	6	1	20	HX-165N-303-401U	1	10
9	20	8	6	HX-166N-604-401U	3	1	15	HX-165N-304-401U	1	15
9	24	8	6	HX-166N-605-401U	3	1	15	HX-165N-305-401U	1	15
12	16	12	6	HX-166N-606-401U	6	1	25	HX-165N-306-401U	1	15
13	12	16	6	HX-166N-607-401U	9	1	30	HX-165N-307-401U	1	15
13	30	8	6	HX-166N-608-401U	3	1	20	HX-165N-308-401U	1	15
18	12	20	6	HX-166N-609-401U	12	1	35	HX-165N-309-401U	1	15
18	16	16	6	HX-166N-610-401U	9	1	30	HX-165N-310-401U	1	15
18	20	12	6	HX-166N-611-401U	6	1	25	HX-165N-311-401U	1	15
18	24	12	6	HX-166N-612-401U	6	1	25	HX-165N-312-401U	1	20
18	36	8	6	HX-166N-613-401U	3	1	20	HX-165N-313-401U	1	20

Heaters are rated at 480 volts, 3 phase.

Heater Listings

400° F Maximum Outlet Air Temperature

Heater Listings - 400° F at 900 SFPM Minimum Airflow										
KW	Dimensions (Inches)			Finned Tubular Construction 65 Watts/Sq. In.				Open Coil Construction 65 Watts/Sq. In.		
	W	H	C	Catalog Number	No. Of Elements	No. Of Circuits	Weight (Lbs.)	Catalog Number	No. Of Circuits	Weight (Lbs.)
22	12	24	6	HX-166N-614-401U	15	1	45	HX-165N-314-401U	1	15
24	16	20	6	HX-166N-615-401U	12	1	40	HX-165N-315-401U	1	20
27	12	30	6	HX-166N-616-401U	18	1	55	HX-165N-316-401U	1	20
27	20	16	6	HX-166N-617-401U	9	1	35	HX-165N-317-401U	1	20
27	24	16	6	HX-166N-618-401U	9	1	35	HX-165N-318-401U	1	20
27	30	12	6	HX-166N-619-401U	6	1	30	HX-165N-319-401U	1	20
30	16	24	6	HX-166N-620-401U	15	1	50	HX-165N-320-401U	1	20
31	12	34	6	HX-166N-621-401U	21	1	60	HX-165N-321-401U	1	20
36	12	38	6	HX-166N-622-401U	24	1	70	HX-165N-322-401U	1	25
36	16	30	6	HX-166N-623-401U	18	1	60	HX-165N-323-401U	1	25
36	20	20	6	HX-166N-624-401U	12	1	45	HX-165N-324-401U	1	20
36	24	20	6	HX-166N-625-401U	12	1	45	HX-165N-325-401U	1	25
36	36	12	6	HX-166N-626-401U	6	1	35	HX-165N-326-401U	1	25
40	12	42	6	HX-166N-627-401U	27	2	75	HX-165N-327-401U	2	25
40	30	16	6	HX-166N-628-401U	9	2	45	HX-165N-328-401U	2	25
42	16	34	6	HX-166N-629-401U	21	2	65	HX-165N-329-401U	2	30
45	12	24	9.5	HX-166N-630-401U	30	2	75	HX-165N-330-401U	2	25
45	20	24	6	HX-166N-631-401U	15	2	55	HX-165N-331-401U	2	25
45	24	24	6	HX-166N-632-401U	15	2	55	HX-165N-332-401U	2	30
48	16	38	6	HX-166N-633-401U	24	2	75	HX-165N-333-401U	2	30
50	12	30	9.5	HX-166N-634-401U	33	2	90	HX-165N-334-401U	2	30
54	12	30	9.5	HX-166N-635-401U	36	2	95	HX-165N-335-401U	2	30
54	16	42	6	HX-166N-636-401U	27	2	85	HX-165N-336-401U	2	35
54	20	30	6	HX-166N-637-401U	18	2	70	HX-165N-337-401U	2	30
54	24	30	6	HX-166N-638-401U	18	2	70	HX-165N-338-401U	2	35
54	30	20	6	HX-166N-639-401U	12	2	55	HX-165N-339-401U	2	30
54	36	16	6	HX-166N-640-401U	9	2	50	HX-165N-340-401U	2	30
58	12	34	9.5	HX-166N-641-401U	39	2	100	HX-165N-341-401U	2	30
60	16	24	9.5	HX-166N-642-401U	30	2	85	HX-165N-342-401U	2	30
63	12	34	9.5	HX-166N-643-401U	42	2	105	HX-165N-343-401U	2	30
63	20	34	6	HX-166N-644-401U	21	2	80	HX-165N-344-401U	2	35
63	24	34	6	HX-166N-645-401U	21	2	80	HX-165N-345-401U	2	40
66	16	30	9.5	HX-166N-646-401U	33	2	95	HX-165N-346-401U	2	35
67	12	38	9.5	HX-166N-647-401U	45	2	115	HX-165N-347-401U	2	35
67	30	24	6	HX-166N-648-401U	15	3	70	HX-165N-348-401U	2	35
72	12	38	9.5	HX-166N-649-401U	48	2	120	HX-165N-349-401U	2	35
72	16	30	9.5	HX-166N-650-401U	36	2	105	HX-165N-350-401U	2	35
72	20	38	6	HX-166N-651-401U	24	2	90	HX-165N-351-401U	2	35
72	24	38	6	HX-166N-652-401U	24	2	90	HX-165N-352-401U	2	40
72	36	20	6	HX-166N-653-401U	12	2	65	HX-165N-353-401U	2	35

Heaters are rated at 480 volts, 3 phase.

Heater Listings

400° F Maximum Outlet Air Temperature

Heater Listings - 400° F at 900 SFPM Minimum Airflow										
KW	Dimensions (Inches)			Finned Tubular Construction 65 Watts/Sq. In.				Open Coil Construction 65 Watts/Sq. In.		
	W	H	C	Catalog Number	No. Of Elements	No. Of Circuits	Weight (Lbs.)	Catalog Number	No. Of Circuits	Weight (Lbs.)
76	12	42	9.5	HX-166N-654-401U	51	3	130	HX-165N-354-401U	2	35
78	16	34	9.5	HX-166N-655-401U	39	3	110	HX-165N-355-401U	2	40
81	12	42	9.5	HX-166N-656-401U	54	3	135	HX-165N-356-401U	3	35
81	20	42	6	HX-166N-657-401U	27	3	100	HX-165N-357-401U	3	40
81	24	42	6	HX-166N-658-401U	27	3	100	HX-165N-358-401U	3	45
81	30	30	6	HX-166N-659-401U	18	3	85	HX-165N-359-401U	3	45
84	16	34	9.5	HX-166N-660-401U	42	3	120	HX-165N-360-401U	3	40
90	16	38	9.5	HX-166N-661-401U	45	3	130	HX-165N-361-401U	3	45
90	20	24	9.5	HX-166N-662-401U	30	3	100	HX-165N-362-401U	3	35
90	24	24	9.5	HX-166N-663-401U	30	3	100	HX-165N-363-401U	3	45
90	36	24	6	HX-166N-664-401U	15	3	80	HX-165N-364-401U	3	40
95	30	34	6	HX-166N-665-401U	21	4	95	HX-165N-365-401U	3	45
95	16	38	9.5	HX-166N-666-401U	48	3	135	HX-165N-366-401U	3	45
100	20	30	9.5	HX-166N-667-401U	33	3	115	HX-165N-367-401U	3	45
100	24	30	9.5	HX-166N-668-401U	33	3	115	HX-165N-368-401U	3	50
102	16	42	9.5	HX-166N-669-401U	51	3	145	HX-165N-369-401U	3	45
108	16	42	9.5	HX-166N-670-401U	54	3	150	HX-165N-370-401U	3	45
108	20	30	9.5	HX-166N-671-401U	36	3	120	HX-165N-371-401U	3	45
108	24	30	9.5	HX-166N-672-401U	36	3	120	HX-165N-372-401U	3	50
108	30	38	6	HX-166N-673-401U	24	4	110	HX-165N-373-401U	3	50
108	36	30	6	HX-166N-674-401U	18	3	100	HX-165N-374-401U	3	50
117	20	34	9.5	HX-166N-675-401U	39	4	135	HX-165N-375-401U	3	50
117	24	34	9.5	HX-166N-676-401U	39	4	135	HX-165N-376-401U	4	55
122	30	42	6	HX-166N-677-401U	27	5	120	HX-165N-377-401U	4	55
126	20	34	9.5	HX-166N-678-401U	42	4	140	HX-165N-378-401U	4	50
126	24	34	9.5	HX-166N-679-401U	42	4	140	HX-165N-379-401U	4	55
126	36	34	6	HX-166N-680-401U	21	4	115	HX-165N-380-401U	4	55
135	20	38	9.5	HX-166N-681-401U	45	4	150	HX-165N-381-401U	4	55
135	20	38	9.5	HX-166N-682-401U	45	4	150	HX-165N-382-401U	4	55
135	24	38	9.5	HX-166N-683-401U	45	4	150	HX-165N-383-401U	4	65
135	30	24	9.5	HX-166N-684-401U	30	4	125	HX-165N-384-401U	4	55
144	20	38	9.5	HX-166N-685-401U	48	4	160	HX-165N-385-401U	4	55
144	24	38	9.5	HX-166N-686-401U	48	4	160	HX-165N-386-401U	4	65
144	36	38	6	HX-166N-687-401U	24	4	130	HX-165N-387-401U	4	60
150	30	30	9.5	HX-166N-688-401U	33	4	140	HX-165N-388-401U	4	65
153	20	42	9.5	HX-166N-689-401U	51	5	170	HX-165N-389-401U	4	60
153	24	42	9.5	HX-166N-690-401U	51	5	170	HX-165N-390-401U	4	70
162	20	42	9.5	HX-166N-691-401U	54	5	180	HX-165N-391-401U	5	60
162	24	42	9.5	HX-166N-692-401U	54	5	180	HX-165N-392-401U	5	70
162	30	30	9.5	HX-166N-693-401U	36	4	150	HX-165N-393-401U	5	65

Heaters are rated at 480 volts, 3 phase.



Heater Listings

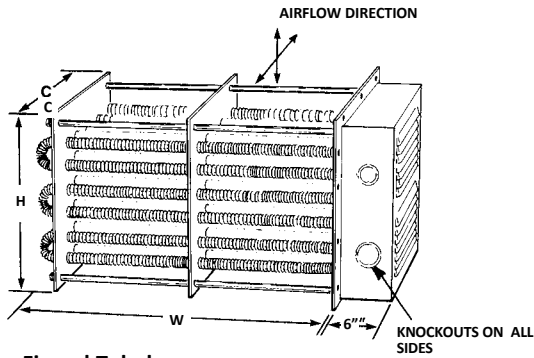
400° F Maximum Outlet Air Temperature

Heater Listings - 400° F at 900 SFPM Minimum Airflow										
KW	Dimensions (Inches)			Finned Tubular Construction 65 Watts/Sq. In.				Open Coil Construction 65 Watts/Sq. In.		
	W	H	C	Catalog Number	No. Of Elements	No. Of Circuits	Weight (Lbs.)	Catalog Number	No. Of Circuits	Weight (Lbs.)
162	36	42	6	HX-166N-694-401U	27	5	145	HX-165N-394-401U	5	65
175	30	34	9.5	HX-166N-695-401U	39	7	165	HX-165N-395-401U	5	70
180	36	24	9.5	HX-166N-696-401U	30	5	150	HX-165N-396-401U	5	60
189	30	34	9.5	HX-166N-697-401U	42	5	175	HX-165N-397-401U	5	70
198	36	30	9.5	HX-166N-698-401U	33	6	170	HX-165N-398-401U	5	75
202	30	38	9.5	HX-166N-699-401U	45	5	190	HX-165N-399-401U	6	80
216	30	38	9.5	HX-166N-700-401U	48	6	200	HX-165N-400-401U	6	80
216	36	30	9.5	HX-166N-701-401U	36	6	180	HX-165N-401-401U	6	75
230	30	42	9.5	HX-166N-702-401U	51	6	215	HX-165N-402-401U	6	85
234	36	34	9.5	HX-166N-703-401U	39	7	195	HX-165N-403-401U	6	85
243	30	42	9.5	HX-166N-704-401U	54	7	220	HX-165N-404-401U	7	85
252	36	34	9.5	HX-166N-705-401U	42	7	210	HX-165N-405-401U	7	85
270	36	38	9.5	HX-166N-706-401U	45	8	225	HX-165N-406-401U	7	90
288	36	38	9.5	HX-166N-707-401U	48	8	240	HX-165N-407-401U	8	95
306	36	42	9.5	HX-166N-708-401U	51	9	255	HX-165N-408-401U	8	100
324	36	42	9.5	HX-166N-709-401U	54	9	265	HX-165N-409-401U	9	100

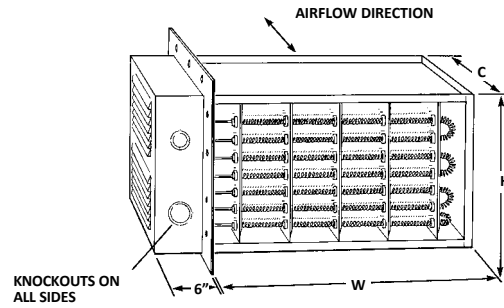
Heaters are rated at 480 volts, 3 phase.

Heater Listings

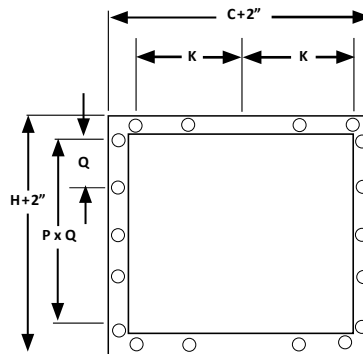
600° F Maximum Outlet Air Temperature



Finned Tubular



Open Coil



Heater Depth C	6"	9.5"							
Mtg. Hole Centers K	2"	3.5"							
Heater Height H	8"	12"	16"	20"	24"	30"	34"	38"	42"
No. of Spaces P	2	3	3	3	3	5	7	7	7
Mtg. Hole Centers Q	3"	3.75"	4.25"	5.25"	5.75"	4.88"	4.38"	4.88"	5.25"

Mounting Hole Details – Mounting hole patterns depend on heater C and H dimensions. Mounting holes are 9/32" diameter, centered 3/8" from the outside edge of the plate.

Heater Listings - 600° F at 900 SFPM Minimum Airflow										
KW	Dimensions (Inches)			Finned Tubular Construction 45 Watts/Sq. In.				Open Coil Construction 55 Watts/Sq. In.		
	W	H	C	Catalog Number	No. Of Elements	No. Of Circuits	Weight (Lbs.)	Catalog Number	No. Of Circuits	Weight (Lbs.)
4	12	8	6	HX-166N-801-601U	3	1	15	HX-165N-101-601U	1	10
5	16	8	6	HX-166N-802-601U	3	1	20	HX-165N-102-601U	1	10
7.5	20	8	6	HX-166N-803-601U	3	1	20	HX-165N-103-601U	1	15
8	12	12	6	HX-166N-804-601U	6	1	25	HX-165N-104-601U	1	10
9	24	8	6	HX-166N-805-601U	3	1	20	HX-165N-105-601U	1	15
10	16	12	6	HX-166N-806-601U	6	1	30	HX-165N-106-601U	1	15
10	26	8	6	HX-166N-807-601U	3	1	20	HX-165N-107-601U	1	15
12	12	16	6	HX-166N-808-601U	9	1	35	HX-165N-108-601U	1	15
12	32	8	6	HX-166N-809-601U	3	1	25	HX-165N-109-601U	1	15
15	16	16	6	HX-166N-810-601U	9	1	40	HX-165N-110-601U	1	15
15	20	12	6	HX-166N-811-601U	6	1	35	HX-165N-111-601U	1	15

Heaters are rated at 480 volts, 3 phase.



Heater Listings

600° F Maximum Outlet Air Temperature

Heater Listings - 600° F at 900 SFPM Minimum Airflow										
KW	Dimensions (Inches)			Finned Tubular Construction 45 Watts/Sq. In.				Open Coil Construction 55 Watts/Sq. In.		
	W	H	C	Catalog Number	No. Of Elements	No. Of Circuits	Weight (Lbs.)	Catalog Number	No. Of Circuits	Weight (Lbs.)
15	40	8	6	HX-166N-812-601U	3	1	25	HX-165N-112-601U	1	20
16	12	20	6	HX-166N-813-601U	12	1	45	HX-165N-113-601U	1	15
18	24	12	6	HX-166N-814-601U	6	1	35	HX-165N-114-601U	1	20
20	12	24	6	HX-166N-815-601U	15	1	55	HX-165N-115-601U	1	15
20	16	20	6	HX-166N-816-601U	12	1	50	HX-165N-116-601U	1	20
20	26	12	6	HX-166N-817-601U	6	1	35	HX-165N-117-601U	1	20
22	20	16	6	HX-166N-818-601U	9	1	45	HX-165N-118-601U	1	20
24	12	30	6	HX-166N-819-601U	18	1	70	HX-165N-119-601U	1	20
24	32	12	6	HX-166N-820-601U	6	1	40	HX-165N-120-601U	1	20
25	16	24	6	HX-166N-821-601U	15	1	60	HX-165N-121-601U	1	20
27	24	16	6	HX-166N-822-601U	9	1	50	HX-165N-122-601U	1	20
28	12	34	6	HX-166N-823-601U	21	1	80	HX-165N-123-601U	1	20
30	16	30	6	HX-166N-824-601U	18	1	75	HX-165N-124-601U	1	25
30	20	20	6	HX-166N-825-601U	12	1	60	HX-165N-125-601U	1	20
30	26	16	6	HX-166N-826-601U	9	1	50	HX-165N-126-601U	1	25
30	40	12	6	HX-166N-827-601U	6	1	45	HX-165N-127-601U	1	25
32	12	38	6	HX-166N-828-601U	24	1	85	HX-165N-128-601U	1	25
35	16	34	6	HX-166N-829-601U	21	1	85	HX-165N-129-601U	1	25
36	12	42	6	HX-166N-830-601U	27	1	95	HX-165N-130-601U	1	25
36	24	20	6	HX-166N-831-601U	12	1	65	HX-165N-131-601U	1	25
36	32	16	6	HX-166N-832-601U	9	1	55	HX-165N-132-601U	1	25
37	20	24	6	HX-166N-833-601U	15	1	70	HX-165N-133-601U	1	25
40	12	24	9.5	HX-166N-834-601U	30	1	95	HX-165N-134-601U	1	25
40	16	38	6	HX-166N-835-601U	24	1	95	HX-165N-135-601U	1	30
40	26	26	6	HX-166N-836-601U	12	1	65	HX-165N-136-601U	1	25
45	12	30	9.5	HX-166N-837-601U	33	2	110	HX-165N-137-601U	2	30
45	16	42	6	HX-166N-838-601U	27	2	105	HX-165N-138-601U	2	35
45	20	30	6	HX-166N-839-601U	18	2	85	HX-165N-139-601U	2	30
45	24	24	6	HX-166N-840-601U	15	2	75	HX-165N-140-601U	2	30
45	40	16	6	HX-166N-841-601U	9	2	65	HX-165N-141-601U	2	35
48	12	30	9.5	HX-166N-842-601U	36	2	115	HX-165N-142-601U	2	30
48	32	20	6	HX-166N-843-601U	12	2	75	HX-165N-143-601U	2	30
50	16	24	9.5	HX-166N-844-601U	30	2	105	HX-165N-144-601U	2	30
50	26	24	6	HX-166N-845-601U	15	2	80	HX-165N-145-601U	2	30
52	12	34	9.5	HX-166N-846-601U	39	2	130	HX-165N-146-601U	2	30
52	20	34	6	HX-166N-847-601U	21	2	100	HX-165N-147-601U	2	35
54	24	30	6	HX-166N-848-601U	18	2	95	HX-165N-148-601U	2	35
55	16	30	9.5	HX-166N-849-601U	33	2	120	HX-165N-149-601U	2	35
56	12	34	9.5	HX-166N-850-601U	42	2	135	HX-165N-150-601U	2	30

Heaters are rated at 480 volts, 3 phase.

Heater Listings

600° F Maximum Outlet Air Temperature

Heater Listings - 600° F at 900 SFPM Minimum Airflow										
KW	Dimensions (Inches)			Finned Tubular Construction 45 Watts/Sq. In.				Open Coil Construction 55 Watts/Sq. In.		
	W	H	C	Catalog Number	No. Of Elements	No. Of Circuits	Weight (Lbs.)	Catalog Number	No. Of Circuits	Weight (Lbs.)
60	12	38	9.5	HX-166N-851-601U	45	2	145	HX-165N-151-601U	2	35
60	16	30	9.5	HX-166N-852-601U	36	2	125	HX-165N-152-601U	2	35
60	20	38	6	HX-166N-853-601U	24	2	110	HX-165N-153-601U	2	35
60	26	30	6	HX-166N-854-601U	18	2	100	HX-165N-154-601U	2	35
60	32	24	6	HX-166N-855-601U	15	2	90	HX-165N-155-601U	2	35
60	40	20	6	HX-166N-856-601U	12	2	85	HX-165N-156-601U	2	40
64	24	34	6	HX-166N-857-601U	21	2	105	HX-165N-157-601U	2	40
64	12	38	9.5	HX-166N-858-601U	48	2	150	HX-165N-158-601U	2	35
64	16	34	9.5	HX-166N-859-601U	39	2	140	HX-165N-159-601U	2	40
68	20	42	6	HX-166N-860-601U	27	2	125	HX-165N-160-601U	2	40
68	12	42	9.5	HX-166N-861-601U	51	2	160	HX-165N-161-601U	2	35
70	16	34	9.5	HX-166N-862-601U	42	2	145	HX-165N-162-601U	2	40
70	26	34	6	HX-166N-863-601U	21	3	115	HX-165N-163-601U	2	40
72	12	42	9.5	HX-166N-864-601U	54	3	170	HX-165N-164-601U	2	35
72	24	38	6	HX-166N-865-601U	24	2	120	HX-165N-165-601U	2	40
72	32	30	6	HX-166N-866-601U	18	2	110	HX-165N-166-601U	2	45
75	16	38	9.5	HX-166N-867-601U	45	5	160	HX-165N-167-601U	2	45
75	20	24	9.5	HX-166N-868-601U	30	5	125	HX-165N-168-601U	2	35
75	40	24	6	HX-166N-869-601U	15	5	105	HX-165N-169-601U	2	45
80	16	38	9.5	HX-166N-870-601U	48	2	165	HX-165N-170-601U	2	45
80	26	38	6	HX-166N-871-601U	24	2	130	HX-165N-171-601U	2	45
80	24	42	9.5	HX-166N-872-601U	27	3	155	HX-165N-172-601U	2	70
82	20	30	9.5	HX-166N-873-601U	33	11	145	HX-165N-173-601U	3	45
85	32	34	6	HX-166N-874-601U	21	3	125	HX-165N-174-601U	3	50
85	16	42	9.5	HX-166N-875-601U	54	3	175	HX-165N-175-601U	3	45
90	16	42	9.5	HX-166N-876-601U	54	3	185	HX-165N-176-601U	3	45
90	20	30	9.5	HX-166N-877-601U	36	3	150	HX-165N-177-601U	3	45
90	24	24	9.5	HX-166N-878-601U	30	5	140	HX-165N-178-601U	3	45
90	26	42	6	HX-166N-879-601U	27	3	145	HX-165N-179-601U	3	50
90	40	30	6	HX-166N-880-601U	18	3	125	HX-165N-180-601U	3	55
96	20	34	9.5	HX-166N-881-601U	24	4	140	HX-165N-181-601U	3	55
98	20	34	9.5	HX-166N-882-601U	42	7	165	HX-165N-182-601U	3	50
100	24	30	9.5	HX-166N-883-601U	33	11	155	HX-165N-183-601U	3	50
100	26	24	9.5	HX-166N-884-601U	30	5	145	HX-165N-184-601U	3	45
105	20	34	9.5	HX-166N-885-601U	42	7	175	HX-165N-185-601U	3	50
105	40	34	6	HX-166N-886-601U	21	7	145	HX-165N-186-601U	3	60
108	24	30	9.5	HX-166N-887-601U	36	3	165	HX-165N-187-601U	3	50
108	32	42	9.5	HX-166N-888-601U	27	3	175	HX-165N-188-601U	3	90
110	26	30	9.5	HX-166N-889-601U	33	11	165	HX-165N-189-601U	3	55

Heaters are rated at 480 volts, 3 phase.



Heater Listings

600° F Maximum Outlet Air Temperature

Heater Listings - 600° F at 900 SFPM Minimum Airflow										
KW	Dimensions (Inches)			Finned Tubular Construction 45 Watts/Sq. In.				Open Coil Construction 55 Watts/Sq. In.		
	W	H	C	Catalog Number	No. Of Elements	No. Of Circuits	Weight (Lbs.)	Catalog Number	No. Of Circuits	Weight (Lbs.)
112	20	38	9.5	HX-166N-890-601U	45	5	190	HX-165N-190-601U	3	55
117	24	34	9.5	HX-166N-891-601U	42	7	185	HX-165N-191-601U	3	55
120	20	38	9.5	HX-166N-892-601U	48	4	200	HX-165N-192-601U	3	55
120	26	30	9.5	HX-166N-893-601U	36	3	175	HX-165N-193-601U	3	55
120	32	24	9.5	HX-166N-894-601U	30	5	165	HX-165N-194-601U	3	55
120	40	38	6	HX-166N-895-601U	24	4	160	HX-165N-195-601U	3	65
125	24	34	9.5	HX-166N-896-601U	42	7	195	HX-165N-196-601U	4	55
127	20	42	9.5	HX-166N-897-601U	54	6	215	HX-165N-197-601U	4	60
130	26	34	9.5	HX-166N-898-601U	42	7	195	HX-165N-198-601U	4	60
132	32	30	9.5	HX-166N-899-601U	33	11	185	HX-165N-199-601U	4	65
135	20	42	9.5	HX-166N-900-601U	54	6	220	HX-165N-201-601U	4	60
135	24	38	9.5	HX-166N-901-601U	45	5	210	HX-165N-202-601U	4	65
135	40	42	6	HX-166N-902-601U	27	9	180	HX-165N-203-601U	4	75
140	26	34	9.5	HX-166N-903-601U	42	7	205	HX-165N-204-601U	4	60
145	24	38	9.5	HX-166N-904-601U	48	4	220	HX-165N-205-601U	4	65
145	32	30	9.5	HX-166N-905-601U	36	4	200	HX-165N-206-601U	4	65
150	26	38	9.5	HX-166N-906-601U	45	5	220	HX-165N-207-601U	4	70
150	40	24	9.5	HX-166N-907-601U	30	5	190	HX-165N-208-601U	4	70
155	24	42	9.5	HX-166N-908-601U	54	5	235	HX-165N-209-601U	4	70
155	32	34	9.5	HX-166N-909-601U	42	7	215	HX-165N-210-601U	4	75
160	26	38	9.5	HX-166N-910-601U	48	4	230	HX-165N-211-601U	4	70
160	24	42	9.5	HX-166N-911-601U	54	5	245	HX-165N-212-601U	5	70
165	40	30	9.5	HX-166N-912-601U	33	11	215	HX-165N-213-601U	5	85
170	32	34	9.5	HX-166N-913-601U	42	7	230	HX-165N-214-601U	5	75
170	26	42	9.5	HX-166N-914-601U	54	6	250	HX-165N-215-601U	5	75
180	26	42	9.5	HX-166N-915-601U	54	6	260	HX-165N-216-601U	5	75
180	32	38	9.5	HX-166N-916-601U	45	5	245	HX-165N-217-601U	5	80
180	40	30	9.5	HX-166N-917-601U	36	6	230	HX-165N-218-601U	5	85
190	32	38	9.5	HX-166N-918-601U	48	8	260	HX-165N-219-601U	5	80
195	40	34	9.5	HX-166N-919-601U	42	7	250	HX-165N-220-601U	5	90
205	32	42	9.5	HX-166N-920-601U	51	6	280	HX-165N-221-601U	6	90
210	40	34	9.5	HX-166N-921-601U	42	7	265	HX-165N-222-601U	6	95
215	32	42	9.5	HX-166N-922-601U	54	6	290	HX-165N-223-601U	6	90
225	40	38	9.5	HX-166N-923-601U	48	8	285	HX-165N-224-601U	6	100
240	40	38	9.5	HX-166N-924-601U	48	8	300	HX-165N-225-601U	7	100
255	40	42	9.5	HX-166N-925-601U	54	9	320	HX-165N-226-601U	7	110
270	40	42	9.5	HX-166N-926-601U	54	9	335	HX-165N-227-601U	7	110

Heaters are rated at 480 volts, 3 phase.

Heater Listings

750° F Maximum Outlet Air Temperature

Heater Listings - 750° F at 1200 SFPM Minimum Airflow										
KW	Dimensions (Inches)			Tubular Construction 30 Watts/Sq. In.				Open Coil Construction 40 Watts/Sq. In.		
	W	H	C	Catalog Number	No. Of Elements	No. Of Circuits	Weight (Lbs.)	Catalog Number	No. Of Circuits	Weight (Lbs.)
40	35	8	9.5*	HX-164N-312-701U	6	2	45	HX-165N-712-701U	2	30
45	20-3/8	20	9.5	HX-164N-313-701U	9	3	65	HX-165N-713-701U	2	35
45	44	8	9.5	HX-164N-314-701U	6	2	45	HX-165N-714-701U	2	35
45	60	6	9.5	HX-164N-315-701U	9	3	45	HX-165N-715-701U	2	40
50	20-3/8	22	9.5	HX-164N-316-701U	15	5	75	HX-165N-716-701U	2	40
60	20-3/8	26	9.5	HX-164N-317-701U	12	2	85	HX-165N-717-701U	2	45
60	35	14	9.5	HX-164N-318-701U	9	3	65	HX-165N-718-701U	2	45
60	60	8	9.5	HX-164N-319-701U	12	2	60	HX-165N-719-701U	2	50
67	44	14	9.5	HX-164N-320-701U	9	3	70	HX-165N-720-701U	2	55
70	20-3/8	26	9.5	HX-164N-321-701U	21	3	95	HX-165N-721-701U	2	45
75	20-3/8	26	9.5	HX-164N-322-701U	15	5	95	HX-165N-722-701U	2	45
75	60	8	9.5*	HX-164N-323-701U	15	5	70	HX-165N-723-701U	2	50
80	20-3/8	34	9.5	HX-164N-324-701U	24	4	115	HX-165N-724-701U	3	55
80	35	18	9.5	HX-164N-325-701U	12	3	85	HX-165N-725-701U	2	50
90	20-3/8	38	9.5	HX-164N-326-701U	18	3	125	HX-165N-726-701U	3	60
90	44	18	9.5	HX-164N-327-701U	12	4	95	HX-165N-727-701U	3	65
90	60	10	9.5	HX-164N-328-701U	18	3	85	HX-165N-728-701U	3	55
100	20-3/8	42	9.5	HX-164N-329-701U	30	5	140	HX-165N-729-701U	3	65
100	39	22	9.5	HX-164N-330-701U	15	3	105	HX-165N-730-701U	3	60
105	60	10	9.5*	HX-164N-331-701U	21	3	95	HX-165N-731-701U	3	55
110	20-3/8	42	9.5	HX-164N-332-701U	33	11	150	HX-165N-732-701U	3	65
112	44	22	9.5	HX-164N-333-701U	15	5	115	HX-165N-733-701U	3	75
120	35	22	9.5	HX-164N-334-701U	18	6	120	HX-165N-734-701U	4	60
120	39	26	9.5	HX-164N-335-701U	18	6	125	HX-165N-735-701U	4	70
120	60	12	9.5	HX-164N-336-701U	24	4	110	HX-165N-736-701U	4	65
135	44	22	9.5	HX-164N-337-701U	18	6	130	HX-165N-737-701U	4	75
135	60	14	9.5	HX-164N-338-701U	27	3	125	HX-165N-738-701U	4	70
140	35	26	9.5	HX-164N-339-701U	21	3	140	HX-165N-739-701U	4	70
140	35	34	9.5	HX-164N-340-701U	21	3	150	HX-165N-740-701U	4	85
150	60	14	9.5	HX-164N-341-701U	30	5	135	HX-165N-741-701U	4	70
157	44	22	9.5	HX-164N-342-701U	21	7	145	HX-165N-742-701U	4	75
160	35	26	9.5	HX-164N-343-701U	24	6	155	HX-165N-743-701U	5	70
160	35	34	9.5	HX-164N-344-701U	33	6	150	HX-165N-744-701U	5	85
165	60	16	9.5*	HX-164N-345-701U	27	11	180	HX-165N-745-701U	5	80
180	35	34	9.5	HX-164N-346-701U	27	9	180	HX-165N-746-701U	5	85
180	44	22	9.5	HX-164N-347-701U	24	8	160	HX-165N-747-701U	5	75
180	60	18	9.5	HX-164N-348-701U	36	6	165	HX-165N-748-701U	5	85
195	60	18	9.5	HX-164N-349-701U	42	7	175	HX-165N-749-701U	5	85
200	35	34	9.5	HX-164N-350-701U	30	5	195	HX-165N-750-701U	6	85

Heaters are rated at 480 volts, 3 phase.

* On this item the C dimension is 14 inches for open coil.

Heater Listings

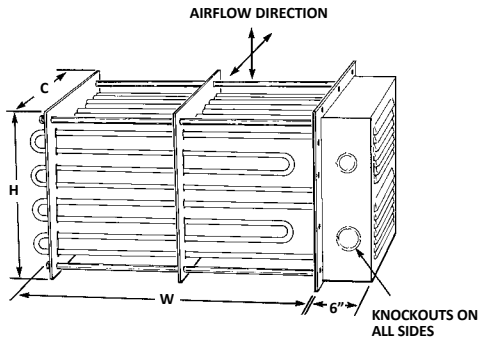
750° F Maximum Outlet Air Temperature

Heater Listings - 750° F at 1200 SFPM Minimum Airflow										
KW	Dimensions (Inches)			Tubular Construction 30 Watts/Sq. In.				Open Coil Construction 40 Watts/Sq. In.		
	W	H	C	Catalog Number	No. Of Elements	No. Of Circuits	Weight (Lbs.)	Catalog Number	No. Of Circuits	Weight (Lbs.)
200	44	26	9.5	HX-164N-351-701U	27	9	185	HX-165N-751-701U	6	85
210	60	20	9.5	HX-164N-352-701U	42	7	190	HX-165N-752-701U	6	90
220	35	26	18-3/8	HX-164N-353-701U	33	11	230	HX-165N-753-701U	6	125
225	44	26	9.5	HX-164N-354-701U	30	10	200	HX-165N-754-701U	6	85
225	60	22	9.5	HX-164N-355-701U	45	5	205	HX-165N-755-701U	6	100
240	35	26	18-3/8	HX-164N-356-701U	36	6	240	HX-165N-756-701U	7	125
240	60	22	9.5	HX-164N-357-701U	48	8	215	HX-165N-757-701U	7	100
250	44	34	9.5	HX-164N-358-701U	33	11	225	HX-165N-758-701U	7	105
255	60	24	9.5	HX-164N-359-701U	54	9	230	HX-165N-759-701U	7	105
260	35	32	18-3/8	HX-164N-360-701U	39	7	270	HX-165N-760-701U	7	150
270	44	34	9.5	HX-164N-361-701U	36	12	245	HX-165N-761-701U	7	105
270	60	24	9.5	HX-164N-362-701U	54	9	240	HX-165N-762-701U	7	105
280	35	32	18-3/8	HX-164N-363-701U	42	7	285	HX-165N-763-701U	8	150
285	60	26	9.5	HX-164N-364-701U	60	10	255	HX-165N-764-701U	8	115
290	44	22	18-3/8	HX-164N-365-701U	39	13	270	HX-165N-765-701U	8	135
300	35	32	18-3/8	HX-164N-366-701U	45	5	300	HX-165N-766-701U	8	150
300	60	28	9.5	HX-164N-367-701U	60	10	270	HX-165N-767-701U	8	120
315	44	22	18-3/8	HX-164N-368-701U	42	14	285	HX-165N-768-701U	8	135
315	60	30	9.5	HX-164N-369-701U	63	7	285	HX-165N-769-701U	8	130
320	35	32	18-3/8	HX-164N-370-701U	48	8	315	HX-165N-770-701U	9	150
330	60	30	9.5	HX-164N-371-701U	66	11	295	HX-165N-771-701U	9	130
335	44	22	18-3/8	HX-164N-372-701U	45	15	300	HX-165N-772-701U	9	135
340	35	38	18-3/8	HX-164N-373-701U	54	9	340	HX-165N-773-701U	9	175
345	60	32	9.5	HX-164N-374-701U	72	12	310	HX-165N-774-701U	9	135
360	35	38	18-3/8	HX-164N-375-701U	54	9	355	HX-165N-775-701U	10	175
360	44	22	18-3/8	HX-164N-376-701U	48	16	315	HX-165N-776-701U	10	135
360	60	32	9.5	HX-164N-377-701U	72	12	320	HX-165N-777-701U	10	135
375	60	34	9.5	HX-164N-378-701U	75	13	335	HX-165N-778-701U	10	145
380	35	38	18-3/8	HX-164N-379-701U	57	19	370	HX-165N-779-701U	10	175
380	44	26	18-3/8	HX-164N-380-701U	51	17	340	HX-165N-780-701U	10	155
390	60	36	9.5	HX-164N-381-701U	81	9	350	HX-165N-781-701U	10	150
400	35	38	18-3/8	HX-164N-382-701U	60	10	385	HX-165N-782-701U	11	175
405	44	26	18-3/8	HX-164N-383-701U	54	18	360	HX-165N-783-701U	11	155
405	60	38	9.5	HX-164N-384-701U	81	9	360	HX-165N-784-701U	11	160
420	60	38	9.5	HX-164N-385-701U	84	14	375	HX-165N-785-701U	11	160
425	44	26	18-3/8	HX-164N-386-701U	57	19	375	HX-165N-786-701U	11	155
435	60	40	9.5	HX-164N-387-701U	90	15	390	HX-165N-787-701U	11	165
450	44	26	18-3/8	HX-164N-388-701U	60	20	390	HX-165N-788-701U	12	155
450	60	40	9.5	HX-164N-389-701U	90	15	400	HX-165N-789-701U	12	165

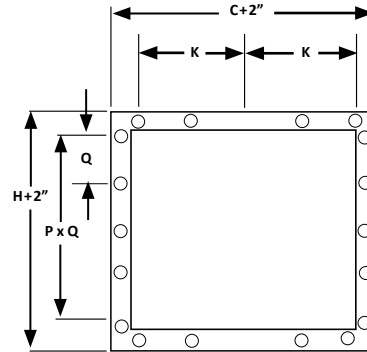
Heaters are rated at 480 volts, 3 phase.

Heater Listings

750° F Maximum Outlet Air Temperature Low Velocity Heater



Tubular



Heater Height H	4"	6"	8"	10"	12"	14"	16"	18"	20"	22"
No. of Spaces P	1	1	2	3	3	3	3	3	3	3
Mtg. Hole Centers Q	2.5"	3.5"	3"	2.75"	3.25"	3.75"	4.25"	4.75"	5.25"	5.75"

Mounting Hole Details – Mounting hole patterns depend on H dimensions. Mounting holes are 9/32" diameter, centered 3/8" from the outside edge of the plate.

Heater Listings - 750° F at 900 SFPM Minimum Airflow							
KW	Dimensions (Inches)			Tubular Construction 22 Watts/Sq. In.			
	W	H	C	Catalog Number	No. Of Elements	No. Of Circuits	Weight (Lbs.)
6	20-3/8	4	8-11/16	HX-164N-901-701U	3	1	15
12	20-3/8	6	8-11/16	HX-164N-902-701U	6	1	25
18	20-3/8	8	8-11/16	HX-164N-903-701U	9	1	35
24	20-3/8	10	8-11/16	HX-164N-904-701U	12	1	45
30	20-3/8	12	8-11/16	HX-164N-905-701U	9	1	50
36	20-3/8	14	8-11/16	HX-164N-906-701U	18	1	65
42	20-3/8	16	8-11/16	HX-164N-907-701U	15	1	70
48	20-3/8	18	8-11/16	HX-164N-908-701U	18	1	80
54	20-3/8	20	8-11/16	HX-164N-909-701U	18	1	90
60	20-3/8	22	8-11/16	HX-164N-910-701U	18	1	95

Heaters are rated at 480 volts, 3 phase.

Heater Listings

1200° F Maximum Outlet Air Temperature

Heater Listings - 1200° F at 1600 SFPM Minimum Airflow										
KW	Dimensions (Inches)			Tubular Construction 22 Watts/Sq. In.				Open Coil Construction 25 Watts/Sq. In.		
	W	H	C	Catalog Number	No. Of Elements	No. Of Circuits	Weight (Lbs.)	Catalog Number	No. Of Circuits	Weight (Lbs.)
40	20-3/8	18	9.5*	HX-164N-116-101U	12	2	85	HX-165N-816-101U	2	35
40	56	8	9.5*	HX-164N-117-101U	12	2	65	HX-165N-817-101U	2	50
45	20-3/8	20	9.5	HX-164N-118-101U	15	5	95	HX-165N-818-101U	2	40
45	44	14	9.5	HX-164N-119-101U	9	3	80	HX-165N-819-101U	2	55
48	35	18	9.5	HX-164N-120-101U	12	2	95	HX-165N-820-101U	2	55
50	20-3/8	22	9.5	HX-164N-121-101U	15	5	105	HX-165N-821-101U	2	40
50	56	8	9.5*	HX-164N-122-101U	15	5	75	HX-165N-822-101U	2	50
60	20-3/8	26	9.5	HX-164N-123-101U	18	2	125	HX-165N-823-101U	2	45
60	35	22	9.5	HX-164N-124-101U	15	5	115	HX-165N-824-101U	2	65
60	44	18	9.5	HX-164N-125-101U	12	2	105	HX-165N-825-101U	2	65
60	56	10	9.5	HX-164N-126-101U	18	2	90	HX-165N-826-101U	2	55
70	20-3/8	26	9.5*	HX-164N-127-101U	24	4	135	HX-165N-827-101U	2	45
70	56	10	9.5*	HX-164N-128-101U	24	4	100	HX-165N-828-101U	2	55
72	35	22	9.5	HX-164N-129-101U	18	2	125	HX-165N-829-101U	2	65
75	44	22	9.5	HX-164N-130-101U	15	5	130	HX-165N-830-101U	3	80
80	20-3/8	34	9.5	HX-164N-131-101U	24	4	160	HX-165N-831-101U	3	55
80	56	12	9.5	HX-164N-132-101U	24	4	115	HX-165N-832-101U	3	65
85	35	22	9.5	HX-164N-133-101U	24	4	140	HX-165N-833-101U	3	65
90	20-3/8	38	9.5	HX-164N-134-101U	27	3	180	HX-165N-834-101U	3	60
90	44	22	9.5	HX-164N-135-101U	18	3	140	HX-165N-835-101U	3	80
90	56	14	9.5	HX-164N-136-101U	27	3	130	HX-165N-836-101U	3	70
95	35	22	9.5	HX-164N-137-101U	24	4	150	HX-165N-837-101U	3	65
100	20-3/8	42	9.5	HX-164N-138-101U	30	5	200	HX-165N-838-101U	3	65
100	56	14	9.5*	HX-164N-139-101U	30	5	140	HX-165N-839-101U	3	70
105	44	22	9.5	HX-164N-140-101U	24	4	155	HX-165N-840-101U	3	80
108	35	26	9.5	HX-164N-141-101U	27	3	170	HX-165N-841-101U	3	75
110	20-3/8	42	9.5*	HX-164N-142-101U	33	11	210	HX-165N-842-101U	3	65
110	56	16	9.5	HX-164N-143-101U	33	11	155	HX-165N-843-101U	4	75
120	35	26	9.5	HX-164N-144-101U	30	5	180	HX-165N-844-101U	4	75
120	44	22	9.5	HX-164N-145-101U	24	4	170	HX-165N-845-101U	4	80
120	56	18	9.5	HX-164N-146-101U	24	4	170	HX-165N-846-101U	4	85
130	56	18	9.5	HX-164N-147-101U	42	7	180	HX-165N-847-101U	4	85
130	35	34	9.5	HX-164N-148-101U	36	4	210	HX-165N-848-101U	4	90
135	44	26	9.5	HX-164N-149-101U	27	3	195	HX-165N-849-101U	4	90
140	56	20	9.5	HX-164N-150-101U	42	7	195	HX-165N-850-101U	4	90
150	56	22	9.5	HX-164N-151-101U	45	5	205	HX-165N-851-101U	4	100
155	35	38	9.5	HX-164N-152-101U	42	7	245	HX-165N-852-101U	4	100
160	56	22	9.5*	HX-164N-153-101U	48	8	220	HX-165N-853-101U	5	100
165	44	34	9.5	HX-164N-154-101U	36	6	240	HX-165N-854-101U	5	110
170	35	38	9.5	HX-164N-155-101U	42	7	255	HX-165N-855-101U	5	100
170	56	24	18-3/8	HX-164N-156-101U	54	6	230	HX-165N-856-101U	5	105
180	35	42	9.5	HX-164N-157-101U	45	5	275	HX-165N-857-101U	5	110

Heaters are rated at 480 volts, 3 phase.

*On this item the C dimension is 14 inches for open coil.

Heater Listings

1200° F Maximum Outlet Air Temperature

Heater Listings - 1200° F at 1600 SFPM Minimum Airflow										
KW	Dimensions (Inches)			Tubular Construction 22 Watts/Sq. In.				Open Coil Construction 25 Watts/Sq. In.		
	W	H	C	Catalog Number	No. Of Elements	No. Of Circuits	Weight (Lbs.)	Catalog Number	No. Of Circuits	Weight (Lbs.)
180	56	24	9.5	HX-164N-158-101U	54	5	240	HX-165N-858-101U	5	105
190	56	26	9.5	HX-164N-159-101U	60	5	255	HX-165N-859-101U	5	110
190	35	42	9.5	HX-164N-160-101U	48	8	290	HX-165N-860-101U	5	110
195	44	38	9.5	HX-164N-161-101U	42	7	280	HX-165N-861-101U	5	120
200	56	28	9.5	HX-164N-162-101U	60	5	270	HX-165N-862-101U	6	120
205	35	26	18-3/8	HX-164N-163-101U	54	6	310	HX-165N-863-101U	6	135
210	44	38	9.5	HX-164N-164-101U	42	7	295	HX-165N-864-101U	6	125
210	56	30	9.5	HX-164N-165-101U	63	7	285	HX-165N-865-101U	6	125
215	35	26	18-3/8	HX-164N-166-101U	54	6	325	HX-165N-866-101U	6	135
220	56	30	9.5	HX-164N-167-101U	66	11	295	HX-165N-867-101U	6	125
225	44	42	9.5	HX-164N-168-101U	45	9	315	HX-165N-868-101U	6	135
230	35	26	18-3/8	HX-164N-172-101U	60	5	335	HX-165N-872-101U	6	130
230	56	32	9.5	HX-164N-173-101U	72	6	310	HX-165N-873-101U	6	130
240	35	26	18-3/8	HX-164N-174-101U	60	5	345	HX-165N-874-101U	7	135
240	44	42	9.5	HX-164N-175-101U	48	8	330	HX-165N-875-101U	7	135
240	56	32	9.5	HX-164N-176-101U	72	6	320	HX-165N-876-101U	7	135
250	56	34	9.5	HX-164N-177-101U	81	9	335	HX-165N-877-101U	7	140
250	35	32	18-3/8	HX-164N-178-101U	63	7	380	HX-165N-878-101U	7	155
255	44	26	18-3/8	HX-164N-179-101U	54	9	355	HX-165N-879-101U	7	165
260	56	36	9.5	HX-164N-180-101U	78	7	350	HX-165N-880-101U	7	145
265	35	32	18-3/8	HX-164N-181-101U	66	11	395	HX-165N-881-101U	7	155
270	44	26	18-3/8	HX-164N-182-101U	54	9	370	HX-165N-882-101U	7	165
270	56	38	9.5	HX-164N-183-101U	81	9	365	HX-165N-883-101U	7	155
275	35	32	18-3/8	HX-164N-184-101U	72	8	405	HX-165N-884-101U	7	155
280	56	38	9.5	HX-164N-185-101U	84	7	375	HX-165N-885-101U	7	155
285	44	26	18-3/8	HX-164N-186-101U	60	5	385	HX-165N-886-101U	8	165
290	35	32	18-3/8	HX-164N-187-101U	72	8	415	HX-165N-887-101U	8	155
290	56	40	9.5	HX-164N-188-101U	90	10	390	HX-165N-888-101U	8	160
300	35	38	18-3/8	HX-164N-189-101U	81	9	450	HX-165N-889-101U	8	180
300	44	26	18-3/8	HX-164N-190-101U	60	10	400	HX-165N-890-101U	8	165
300	56	40	9.5	HX-164N-191-101U	90	10	400	HX-165N-891-101U	8	160
315	35	38	18-3/8	HX-164N-192-101U	81	9	465	HX-165N-892-101U	8	180
315	44	32	18-3/8	HX-164N-193-101U	63	7	435	HX-165N-893-101U	8	195
325	35	38	18-3/8	HX-164N-194-101U	81	9	475	HX-165N-894-101U	9	180
330	44	32	18-3/8	HX-164N-195-101U	66	11	450	HX-165N-895-101U	9	195
335	35	38	18-3/8	HX-164N-196-101U	84	7	485	HX-165N-896-101U	9	180
345	44	32	18-3/8	HX-164N-197-101U	72	12	480	HX-165N-897-101U	9	195
360	44	32	18-3/8	HX-164N-198-101U	72	12	480	HX-165N-898-101U	10	195
375	44	38	18-3/8	HX-164N-199-101U	78	13	515	HX-165N-899-101U	10	225
390	44	38	18-3/8	HX-164N-200-101U	78	13	530	HX-165N-900-101U	10	225
405	44	38	18-3/8	HX-164N-201-101U	84	14	545	HX-165N-901-101U	11	225
420	44	38	18-3/8	HX-164N-202-101U	84	14	560	HX-165N-902-101U	11	225

Heaters are rated at 480 volts, 3 phase.

Control Panels

Heatrex can provide a control system for any electric process air heating application. Our experienced engineering staff can design control systems ranging from ON/OFF to full SCR with PID logic. Optional features include ramp/soak, computer interface capability and various control schemes as required.

Heatrex offers two standard control panel designs: Full SCR PID control and ON/OFF contactor control. All components are factory mounted and wired in compliance with the National Electrical Code.

These charts provide a sample of standard control panel designs. Custom control panels, designed specifically for your application, are available.

A Vernier control panel can also be supplied. Vernier control utilizes contactors, one SCR controller, and a microprocessor-based sequencer. The sequencer controls the staging of the contactors and the SCR controller. The SCR controller serves to fill in the gaps between the step-controlled stages. Vernier control is not quite as accurate as full SCR control, but more accurate than contactor (step) control.

Contactor Control Panels

This contactor-based system with ON/OFF process temperature control is recommended for less demanding applications. Systems with two or more heating stages utilize an electronic sequencer (step controller), driven by an analog output PID temperature controller to minimize the amount of load cycling while providing good outlet temperature control.

Standard Features:

- Microprocessor-based sequencer (for panels with two or more heating stages)
- Indicating PID temperature controller (adjustable process temperature with thermocouple input)
- NEMA 12 painted steel enclosure, wall mount unless otherwise noted
- Overtemperature controller (adjustable temperature limit with thermocouple input)
- Door interlock disconnect switch
- Manual reset pushbutton with built-in pilot light (red) for visual "OVERTEMPERATURE" alarm
- Selector switch – ON/OFF with built-in pilot light (green) for "POWER ON" indication
- Control power transformer
- Disconnecting magnetic contactors
- Circuit fusing

Amps	Number Of Circuits	Amps Per Circuit	Maximum KW		Approximate Dimensions (Inches)			Estimated Weight (Lbs.)
			240V/3PH	480V/3PH	Height	Width	Depth	
48	1	48	19	39	24	24	8	85
96	2	48	39	79	30	24	8	105
144	3	48	59	119	36	30	8	160
192	4	48	79	159	42	30	8	175
240	5	48	99	199	48	36	8	260
288	6	48	119	239	48	36	8	265
336	7	48	139	279	60	36	8	320
384	8	48	159	319	60	36	8	330
432*	9	48	179	359	60	48	12	585
480*	10	48	199	399	60	48	12	600
528*	11	48	219	438	60	60	12	680
576*	12	48	239	478	60	60	12	685
624*	13	48	259	518	72	60	12	800
672*	14	48	279	558	72	60	12	805
720*	15	48	299	598	72	60	12	815
768*	16	48	319	638	72	72	12	930
816*	17	48	339	678	72	72	12	945
864*	18	48	359	718	72	72	12	950
912*	19	48	379	758	72	72	12	960
960*	20	48	399	798	72	72	12	965

*These panels have double doors and 12" high floor stands.

SCR Control Panels

A full SCR control system with PID temperature control is recommended for industrial heating applications which must accommodate material flow changes and provide the highest degree of accuracy for outlet temperature control.

Standard Features:

- PID self-tuning temperature controller (adjustable process temperature, with thermocouple input)
- Three-phase, zero cross-fired, SCR power controllers
- NEMA 12 painted steel enclosure, wall mount unless otherwise noted
- Overtemperature controller (adjustable temperature limit with thermocouple input)
- Door interlock disconnect switch
- Manual reset pushbutton with built-in pilot light (red) for visual "OVERTEMPERATURE" alarm
- Selector switch – ON/OFF with built-in pilot light (green) for "POWER ON" indication
- Control power transformer
- Safety contactors
- Circuit fusing
- Ventilating fan and filter when required

Amps	Number Of Circuits	Amps Per Circuit	Maximum KW		Approximate Dimensions (Inches)			Estimated Weight (Lbs.)
			240V/3PH	480V/3PH	Height	Width	Depth	
SCR panels with externally mounted heat sinks								
48	1	48	19	39	24	24**	8	95
70	1	70	29	58	30	24**	8	115
96	2	48	39	79	30	24**	8	125
140	2	70	58	116	42	30**	8	205
144	3	48	59	119	36	30**	8	195
210	3	70	87	174	48	36**	8	310
192	4	48	79	159	42	30**	8	225
280	4	70	116	232	60	36**	8	385
240	5	48	99	199	48	36**	8	320
350	5	70	145	290	60	36**	8	415
SCR panels with internally mounted heat sinks, fan and filter								
295	6	48	119	239	60	36	16	405
425*	9	47	175	351	60	48	16	660
590*	12	48	239	478	60	60	16	750
850*	18	47	351	703	72	72	16	1090

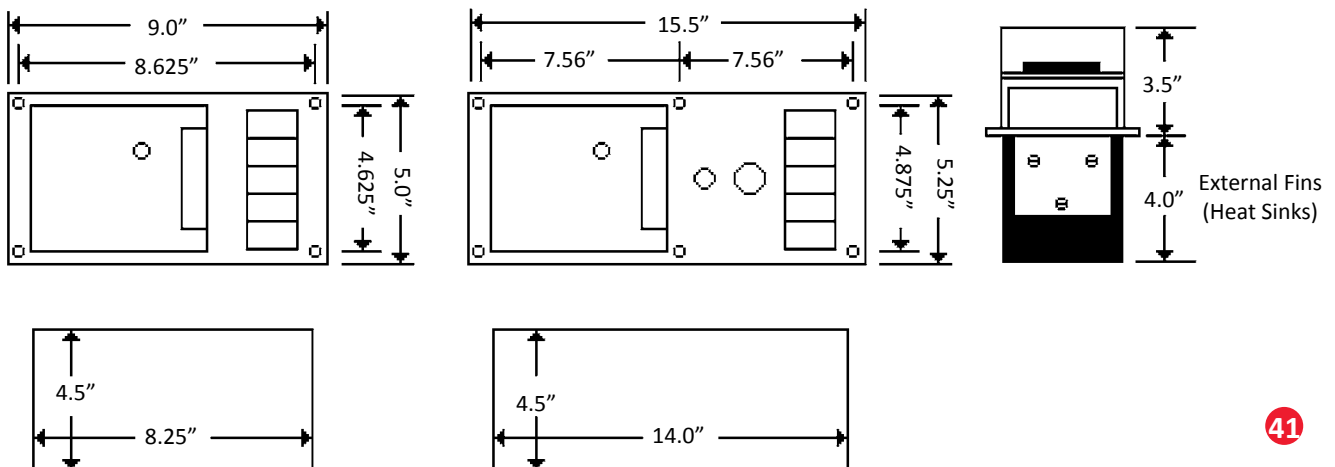
*These panels have double doors and 12" high floor stands.

**Additional 9" clearance required for externally mounted heat sinks which may be mounted on one or both sides of the enclosure for proper convection cooling.

SCR Power Controllers modulate the entire heater load directly, varying the heater output from 0 to 100% of the total heater KW. Working on a four second time base, the heater will be energized only for the number of AC cycles necessary to produce the exact amount of heat required. The resulting precision control and rapid response make the SCR the choice for many heating applications. For example, multi-stage discharge temperature control of a heater can produce unacceptable temperature swings, resulting in inefficient energy use.

The same heater with SCR control will produce stable, even heat for maximum performance and efficiency.

The SCR's power switching devices are mounted on a large finned heat sink which extends outside the heater terminal box or control panel. The conservative SCR rating and the generous heat sink insure against overheating and SCR failure.



Control Panels

Special Features

Control Relays – These relays are activated by safety devices, such as a flow switch or remote shutoff.

Remote Interlock Terminals – Control circuit terminals are supplied so the heater can be de-energized from remote contacts.

Indicator Lights – Additional indicator lights may be specified for visual indication of system status, such as “LOW TEMPERATURE”.

Audible Alarm Package – This package includes a horn, pilot light, latching relay and a push button for silencing the horn.

Low Liquid Cutoff – The relay is mounted and wired with sensing probe shipped loose for field installation.

Special Controllers – The customer may specify the use of special process or overtemperature controllers for a different temperature range, sensor input, control mode, etc.

Panel Heater – A heater and thermostat are provided to prevent condensation and maintain minimum ambient temperature for electrical components.

Wire Markers – Identification markers are attached to both ends of all control and power wires.

Tagging of Internal Parts – Permanent tags are attached to the

subpanel near internal parts and marked with component titles as noted on the wiring diagram.

UL Listing – Available on most designs.

Special Coatings – Epoxy or other paints may be specified.

12” High Floor Stand – This construction allows the control panel to be floor mounted.

NEMA 4 Panel Enclosure – Features a gasketed weatherproof construction.

NEMA 4 Instrument Window – This feature allows for access to a control instrument without opening the control panel door.

Stainless Steel Panel Enclosure (NEMA 4X) – This construction provides extra corrosion resistance for harsh environments.

How To Order

Standard Heater Construction

Specify:

Element Type	Catalog No. Prefix
Open Coil	HX-165N
Finned Tubular	HX-166N
Tubular	HX-164N

For complete Heatrex catalog number see pages 21-39.

Custom Designs

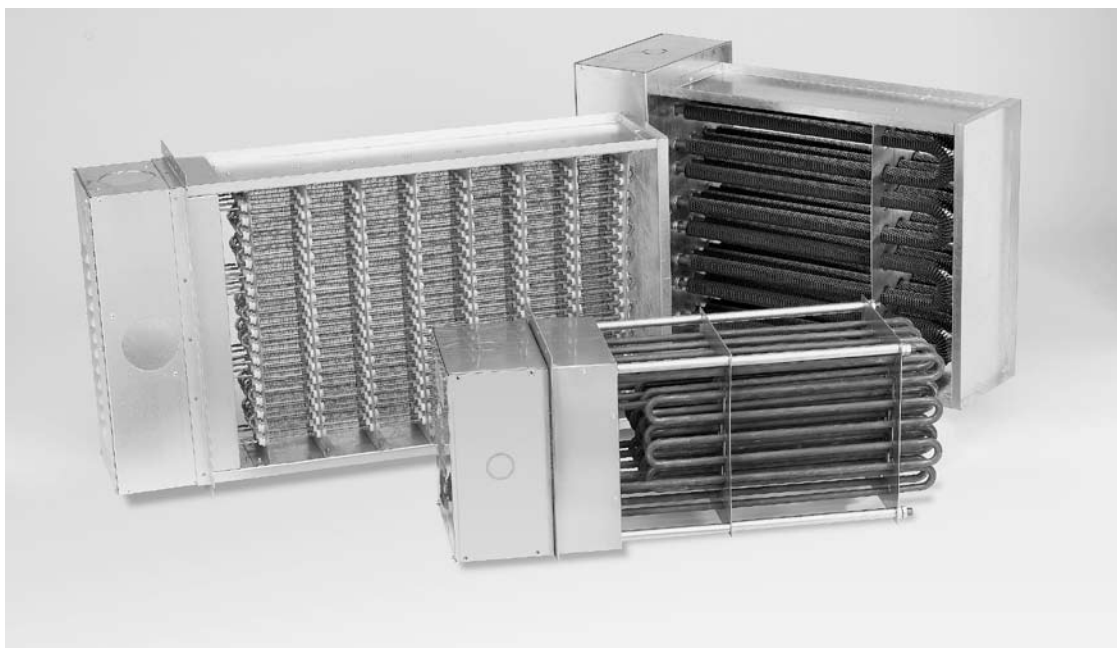
Required application information:

- Required temperature rise (ΔT)° F through the heater
- Maximum outlet air temperature
- Minimum air velocity through heater (SFPM)
- Flow rates (minimum and maximum SCFM)
- Duct or plenum size (width x height)
- Method of mounting/installation
- Maximum allowable pressure drop through the heater
- Heater environment (hazardous, corrosive, wet, dusty, etc.)
- Temperature control requirements

Specify*

- KW
- Voltage and phase
- Element type (open coil, finned tubular, tubular)
- Number of heater circuits
- Element watt density
- Inches of insulation
- Mounting configuration (horizontal or vertical)
- Airflow direction
- Method of temperature/power control
- Special features – pages 10-13

*Heatrex can help determine custom design specifications or may advise a better choice to reduce cost and delivery time.



Limited Warranty

Heatrex products are warranted against defects in workmanship, material, design, labeling and packaging. No other warranty, expressed or implied, written or oral, applies. No person other than an officer or the general manager of Heatrex is authorized to give any other warranty or assume any liability.

Warranty Period: This warranty is effective for eighteen months from the date of shipment of the product from Heatrex's factory, or for twelve months from the date the product is first placed in service, whichever period lapses first.

Conditions of Warranty: Heatrex products must be installed, operated and maintained in accordance with Heatrex's instructions. Heatrex is not liable for damage or unsatisfactory performance of the product resulting from accident, negligence, alteration, unauthorized repair, improper application or installation of the product, improper specifications or corrosion. Heatrex IS NOT LIABLE FOR ANY INCIDENTAL OR CONSEQUENTIAL DAMAGES. Claims against carriers for damage in transit must be filed by the purchaser with the carrier.

Remedy: The part or product in question should be returned, freight prepaid, to:

Heatrex

Attention: Return Goods Manager

If after receipt of the product and the claim, Heatrex finds to its reasonable satisfaction that the product is defective in workmanship, material, design, labeling or packaging, the product will be repaired or replaced or the purchase price refunded at Heatrex's option. There will be no charge to the purchaser for parts or labor. Removal and reinstallation of the product, and shipment of the product to Heatrex for repair or inspection shall be at the purchaser's risk and expense.

THE REPAIR, REPLACEMENT OR REFUND PROVIDED FOR IN THIS LIMITED WARRANTY IS THE EXCLUSIVE REMEDY OF THE PURCHASER. THIS WARRANTY IS EXPRESSLY IN LIEU OF ANY OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. THERE ARE NO WARRANTIES WHICH EXTEND BEYOND THE TERMS OF THIS LIMITED WARRANTY.



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