Electric Heating Coils • Construction Features, Selection and Capacities

Nailor Electric Coils are tested with the fan terminal in accordance with UL Standard 1995 and meet all requirements of the National Electric Code and CSA. Units are listed and labeled by the ETL Testing Laboratory as a total package. All controls are enclosed in a NEMA 1 electrical enclosure on the side of the fan package for easy access.

All wiring for the motor and heater terminates in the enclosure for single point electrical connection in the field. Each unit is supplied with a wiring diagram. Note: NEC requires a means to disconnect the heater power supply within sight or on the terminal.

Standard Features Include:

- Automatic reset high limit thermal cut-outs.
- Nickel-chrome heating elements.
- Magnetic contactors per stage on terminals with DDC or analog electronic controls.
- P.E. switch per stage to carry load or pilot duty with magnetic contactors as required with pneumatic control.
- Positive pressure airflow safety switch or CT relay.
- Fan relay for DDC fan coils.
- Control voltage transformer (Class 2) for DDC or analog electronic fan coils.

Optional Accessories:

- Toggle disconnect switch.
- Door interlocking disconnect switch.
- Mercury contactors.
- Power circuit fusing.
- Dust tight control enclosure.
- Class 'A' 80/20 nickel/chrome element wire.
- Manual reset high limits.
- SCR Control.

Tested and approved to the following standards:

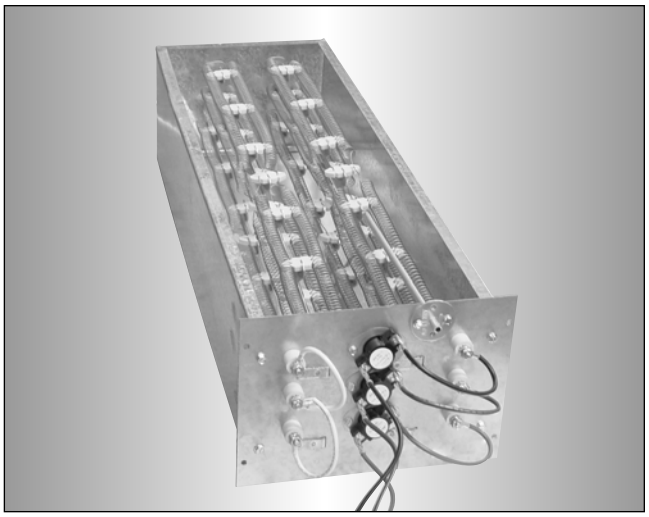
ANSI/UL 1996, 1st. ed.

CSA C22.2 No. 155-M1986.

UL 1995

SCR Control Option:

The SCR (Thyrister) option provides infinite solid state heater control using a proportional signal (0 – 10 Vdc or 4 – 20 mA). This option may be specified compatible with analog electronic or digital (DDC) controls.



Time proportional control of the electric heater provides superior comfort and energy savings. The SCR controller modulates the heater to supply the exact amount of heat based upon the zone requirement. Room set points are maintained more accurately, undershoot and overshoot as associated with staged heat are eliminated, reducing operation costs.

SCR controllers provide silent operation, as mechanical staged contactors are eliminated. Zero cross switching of the thyristor prevents electrical noise.

Recommended Selection:

The table below is a quick reference guide, to illustrate the relationship between electrical power supply, heater capacity in kilowatts and fan coil unit sizes that are available.

- Pneumatic and digital control terminals are available with up to 3 stages of heat. Analog electronic control terminals are available with 1 or 2 stages of heat only. A minimum of 0.5 kW per stage is required.
- Voltage and kilowatt ratings are sized so as not to exceed 48 amps, in order to avoid the NEC code requirement for circuit fusing.
- A minimum airflow of 70 cfm (33 l/s) per kW is required for any given fan coils in order to avoid possible nuisance tripping of the thermal cut-outs.
- Discharge air temperature should not exceed 120°F (49°C).

Model Series	Unit Size	Electric Heat Maximum Kilowatts												
		120V 1 Ph	208/220/240V 1 Ph	277V 1 Ph	347V 1Ph	480V 1 Ph	600V 1Ph (120V Fan)	600V 1Ph (240/277V Fan)	208V 3Ph	220/240V 3Ph	380V 3Ph	480V 3Ph	600V (120V Fan)	600V (240/277V Fan)
38F	1	4.8	5	5	5	5	5	5	—	—	—	—	—	—
	2	4.8	8	9	9	9	9	9	9	9.5	8	9	9	9
	3	4.8	8	11.5	13	14	14	14	9	9.5	8	10	12	12
	5	5.4	9.3	12.4	15.6	21.6	21.6	21.6	10.8	10.8	11.7	12.4	14.1	14.1
	6	5.4	9.3	12.4	15.6	23.2	23.2	23.2	12.6	13.3	14.5	16.6	19.3	19.3
	33	4.8	8	11.5	13	14	14	14	9	9.5	8	10	12	12

Electric Heating Coils • Application Guidelines

Discharge Air Temperature

When considering the capacity and airflow for the heater, discharge air temperature can be an important factor. Rooms use different types of diffusers, and they are intended to perform different functions. Slots that blend the air at the glass and set up air curtains within the room, must be able to blow the air very low in the room. Hot air will be too buoyant to be effective in this case. Discharge air temperatures for this application should be in the 85 – 90°F (29 – 32°C) maximum range.

Diffusers in the center of the room blend their discharge air as it crosses the ceiling. Discharge air temperatures in this application can be as high as 105°F (41°C) and still be effective. However, if the return air grilles are in the discharge air pattern, the warm air will be returned to the plenum before it heats the room. Again, the air temperature needs to be blended down to an acceptable temperature that can be forced down into the occupied space by the time the air gets to the walls. Discharging warm air into the room at temperatures above 105°F (41°C) usually will set up stratification layers and will not keep the occupants warm if there is a ceiling return because only the top 12" – 24" (300 – 600 mm) of the room will be heated.

The maximum approved discharge air temperature for any Nailor Fan Coil Units with supplemental heat is 120°F (49°C). No heater should be applied to exceed this temperature.

Electric Heater Selection

To properly select an electric heater, three things must be determined: the heat requirement for the room, the entering air temperature and the desired discharge air temperature. The heat requirement for the room is the sum of the heat loss calculation and the amount of heat required to raise the entering air temperature to the desired room temperature. Usually, the second item is small compared to the first for fan coil units in a return air plenum. MBH can be converted to kW by using the chart or by calculation. There are 3413 BTU's in 1 kW. If using the chart, find the MBH on the left scale, then move horizontally to the right and read kW.

Next, the desired discharge air temperature should be ascertained. This will depend on the type of diffusers that are in the room.

The desired heating airflow for the room can then be calculated using the following equation:

$$cfm = \frac{kW \times 3160}{\Delta T \text{ (discharge air temp} - \text{inlet air temp.) °F}}$$

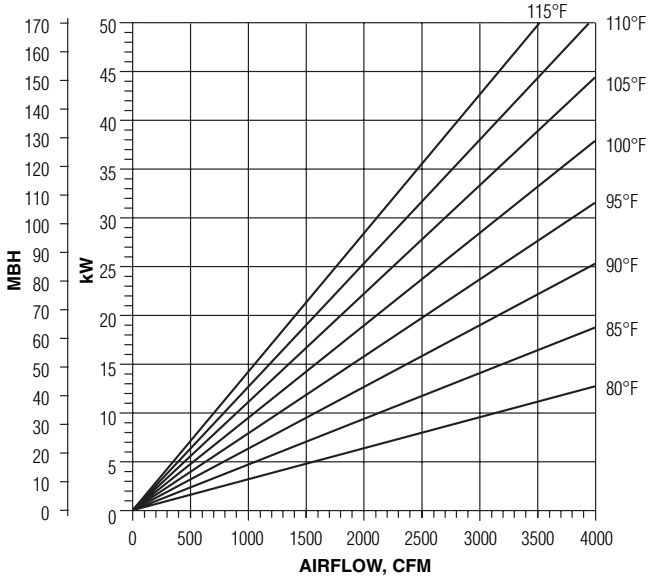
Assuming 70°F (21°C) supply air temperature to the heater, the room airflow can be selected directly from the chart. Start at the left at the design kW. Move horizontally to the desired discharge air temperature. Then, move vertically down to the cfm at the bottom of the chart.

The kW can be selected directly from the chart. Start at the bottom with the design cfm into the room. Move vertically up to the line that represents the desired discharge air temperature. Then, move left to the kW.

The discharge air temperature can also be selected directly from the chart. Start at the bottom with the design cfm into the room. Move to the left side of the chart and find the design kW. Move horizontally and vertically into the chart until the lines intersect. The intersection will be the desired discharge air temperature. Interpolation between the curves is linear.

Heater Selection Chart

Assuming 70°F inlet air temperature at heater.



Diagonal lines are constant output temperature.