

# Electric Duct Heaters DHB/DHC/E Series

## DHC & DC SERIES

### BASIC HEATER INCLUDES:

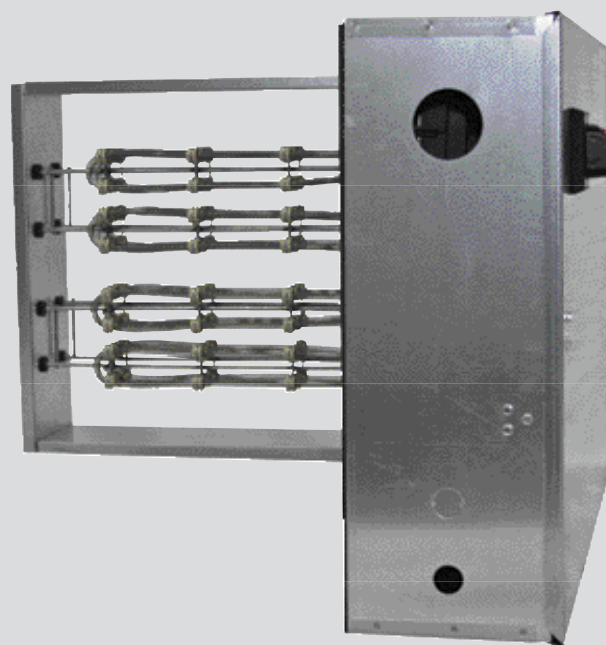
- A disconnecting magnetic control contactor per stage or each 48 AMP circuit within a stage
- 50 or 60 HZ design
- Fan interlock
- Power terminal board
- Control terminal board
- Grounding lugs
- Automatic limit switch for primary over temperature protection
- Manual reset limit switch for secondary over temperature protection
- Left hand offset control box

### OPTIONS:

- Standard supply voltages, 120 – 600
- Standard control voltages, 24 – 277
- Single or three phase
- Staging (balanced, unless otherwise specified)
- Slip in, flange mount, bottom mount
- Recessed control box
- Right hand offset control box
- 80/20 (Ni/Cr) resistance wire
- Stainless steel terminals
- Derated coils
- Vapor barrier
- Gasketed cover

### ACCESSORIES:

- See accessories page



### DESIGN LIMITATIONS – DHC & DC

Multiple stage heaters do not always provide full face coverage. For multizone or full face coverage requirements notify factory.

1. Maximum 500 KW
2. Maximum of (14) 48 AMP circuits
3. Maximum 10' wide and 12' high
4. Minimum 8" x 6". Three phase only – minimum height 8"
5. Recess box only – minimum width 8" plus recess

These limitations are general guidelines. Other limitations may be encountered due to KW, volts, phase, stage, and size relationship.

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## TECHNICAL DATA

### DETERMINING MAXIMUM HEATER KW

Duct Width (inches) x Duct Height (inches)

Total Square Inches x 156

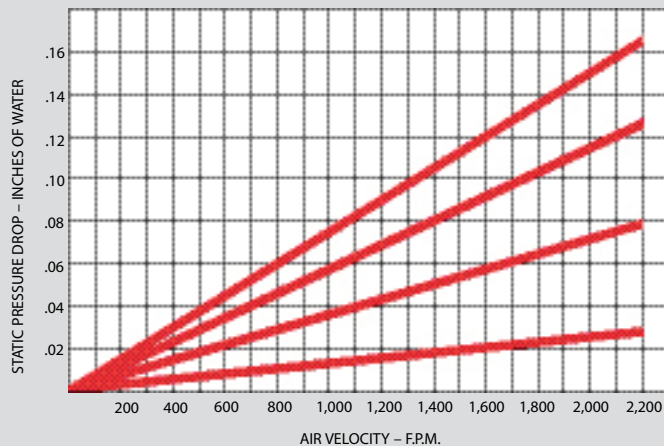
Maximum Watts per Square Inch of Duct Face Area

Duct Width (feet) x Duct Height (feet)

Total Square Feet x 22.464

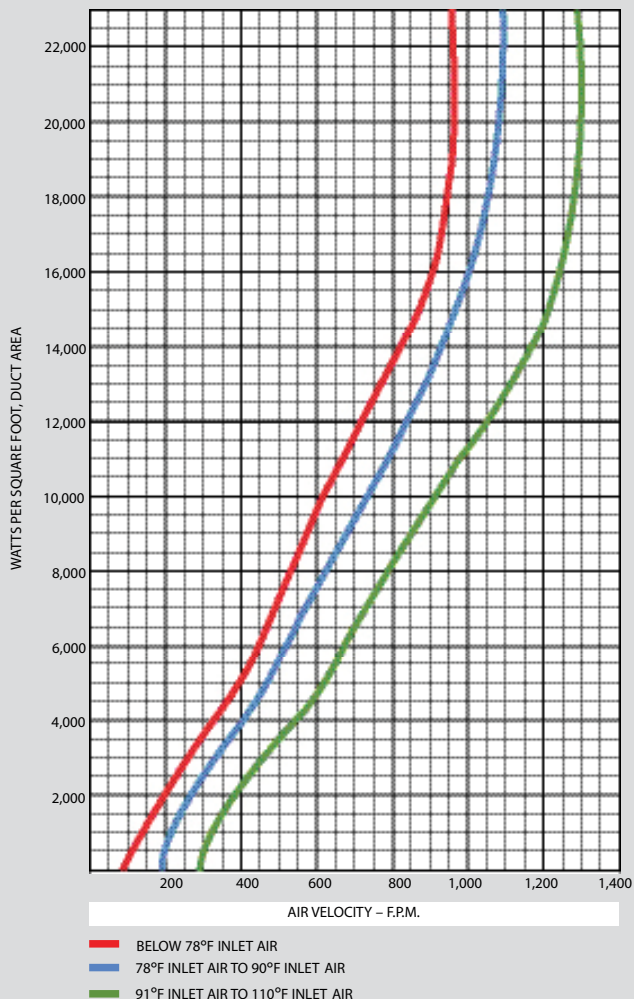
Maximum KW per Square Foot of Duct Face Area

## PRESSURE DROP THROUGH HEATER



1, 2, 3 and 4 – the number of rows of heater coils  
When the number of rows of heater coils is unknown, assume 4

## MINIMUM AIR VELOCITIES



### General

- A. The minimum airflow in a duct heater is directly related to the inlet air temperature. Consideration must be given to both airflow across the heater and the inlet temperature.
- B. To calculate the watts per sq. ft. of duct area, divide the total watts required by the duct area.

### Example

- C. Duct size equals 2 ft. x 3 ft., total watts equal 20,000 watts per square foot equals

$$\frac{20,000}{6} = 3333$$

- D. If the air handling equipment is expressed in F.P.M., then a direct cross reference can be made by comparing the temperature of the air (as it enters the duct heater) to the KW rating on the table at the rated air velocity.

1. Draw a line horizontally from the watts/sq. ft. required to the inlet air temperature being used.
2. From this point of intersection on the inlet temperature line, draw a line down vertically to establish the air velocity.
3. In cases where the velocity is less than that determined from the chart, then either the velocity must be increased, the KW required must be reduced or both must be done.

- E. In cases where the airflow is expressed in C.F.M., convert to F.P.M. by dividing the C.F.M. by the duct area.

$$\frac{\text{C.F.M.}}{\text{Duct Area}} = \text{F.P.M.}$$

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## TYPICAL CONTACTOR POWER CIRCUITRY (Only power circuit shown, safety devices etc., omitted)

**DISCONNECTING TYPE:**

**SINGLE LINE BREAK**

This type would be disconnecting for 120V and 277V, providing the contactor opens the ungrounded line.

Heating elements, namely those used in three phase, balanced, configurations are factory wired, as manufacturers standard in two basic configurations delta or WYE.

**DISCONNECTING TYPE:**

**TWO LINE BREAK**

Heating power is completely disconnected by breaking both sides of the power source. All ungrounded power conductors are disconnected.

**THREE PHASE**

WYE DELTA

All ungrounded conductors disconnected. Both WYE and Delta configurations shown.

## HEATING ELEMENT WIRING CONFIGURATIONS AND PROPERTIES

**SINGLE PHASE**

Element Voltage = Line Voltage

**THREE PHASE**

480V for illustration only

**THREE WIRE DELTA CONNECTION**

1. Element Voltage = Line Voltage
2. Phase Currents  $I_n = I_{L1} = I_{L2} = I_{L3}$
3. Voltage measured between any two power legs (L1 to L2 etc.) should be equal to the three phase line voltage.

**THREE WIRE WYE CONNECTION**

1. Element Voltage =  $\frac{\text{Line Voltage}}{1.73}$
2. Phase Currents  $I_n = I_{L1} = I_{L2} = I_{L3}$
3. Voltage measured between any two power legs (L1 to L2 etc.) should be equal to the three phase line voltage.

# Electric Duct Heaters DHB/DHC/E Series

## BTU/H-KW-AMPERES CHART

BTU/H	KW	AMPERES																		KW												
		120V			208V			220V			230V			240V			277V				440V			460V			480V			550V		
		10	10	30	10	30	10	30	10	30	10	30	10	30	10	30	10	30	10		30	10	30	10	30	10	30	10	30			
3,413	1	8.3	4.8	2.8	4.5	2.6	4.3	2.5	4.2	2.4	3.6	2.3	1.3	2.2	1.3	2.1	1.2	1.8	1.1	1												
6,826	2	16.7	9.6	5.5	9.1	5.2	8.7	5.0	8.3	4.8	7.2	4.5	2.6	4.3	2.5	4.2	2.4	3.6	2.1	2												
10,239	3	25.0	14.4	8.3	13.6	7.9	13.0	7.5	12.5	7.2	10.8	6.8	3.9	6.5	3.8	6.2	3.6	5.4	3.2	3												
13,652	4	33.3	19.2	11.1	18.2	10.5	17.4	10.0	16.6	9.6	14.4	9.1	5.2	8.7	5.0	8.3	4.8	7.2	4.2	4												
17,065	5	41.7	24.0	13.9	22.7	13.1	21.7	12.6	20.8	12.0	18.1	11.4	6.6	10.9	6.3	10.4	6.0	9.1	5.3	5												
20,478	6	50.0	28.9	16.6	27.2	15.7	26.0	15.1	25.0	14.4	21.7	13.6	7.9	13.0	7.5	12.5	7.2	10.9	6.3	6												
23,891	7	58.3	33.7	19.4	31.8	18.3	30.4	17.6	29.1	16.8	25.3	15.9	9.2	15.2	8.8	14.6	8.4	12.7	7.4	7												
27,304	8	66.6	38.5	22.2	36.3	21.0	34.7	20.1	33.3	19.2	28.9	18.2	10.5	17.4	10.0	16.6	9.6	14.5	8.4	8												
30,717	9	75.0	43.3	24.9	40.9	23.6	39.1	22.6	37.4	21.6	32.5	20.4	11.8	19.5	11.3	18.7	10.8	16.3	9.5	9												
34,130	10	83.3	48.1	27.7	45.4	26.2	43.4	25.1	41.6	24.0	36.1	22.7	13.1	21.7	12.5	20.8	12.0	18.1	10.5	10												
37,543	11	91.6	52.9	30.5	49.9	28.8	47.7	27.6	45.8	26.4	39.7	25.0	14.4	23.9	13.8	22.9	13.2	19.9	11.6	11												
40,956	12	100.0	57.7	33.2	54.5	31.4	52.1	30.1	49.9	28.8	43.3	27.2	15.7	26.0	15.0	25.0	14.4	21.7	12.6	12												
44,369	13	108.3	62.5	36.0	59.0	34.1	56.4	32.6	54.1	31.2	46.9	29.5	17.0	28.2	16.3	27.0	15.6	23.5	13.7	13												
47,782	14	116.6	67.3	38.8	63.6	36.7	60.8	35.1	58.2	33.6	50.5	31.8	18.3	30.4	17.5	29.1	16.8	25.3	14.7	14												
51,195	15	125.0	72.1	41.6	68.1	39.3	65.1	37.7	62.4	36.0	54.2	34.1	19.7	32.6	18.6	31.2	18.0	27.2	15.8	15												
54,608	16	133.3	76.9	44.3	72.6	41.9	69.4	40.2	66.6	38.4	57.8	36.3	21.0	34.7	20.0	33.3	19.2	29.0	16.8	16												
58,021	17	141.6	81.8	47.1	77.2	44.5	73.8	42.7	70.7	40.8	61.4	38.6	22.3	36.9	21.3	35.4	20.4	30.8	17.9	17												
61,434	18	150.0	86.5	49.9	81.7	47.2	78.1	45.2	74.9	43.2	65.0	40.9	23.6	39.1	22.5	37.4	21.6	32.6	18.9	18												
64,847	19	158.3	91.4	52.6	86.3	49.8	82.5	47.7	79.0	45.6	68.6	43.1	24.9	41.2	23.8	39.5	22.8	34.4	20.0	19												
68,260	20	166.6	96.2	55.4	90.8	52.4	86.8	50.2	83.2	48.0	72.2	45.4	26.2	43.4	25.0	41.6	24.0	36.2	21.0	20												
71,673	21	174.9	101.0	58.2	95.3	55.0	91.1	52.7	87.4	50.4	75.8	47.7	27.5	45.6	26.3	43.7	25.2	38.0	22.1	21												
75,086	22	183.3	105.8	60.9	99.9	57.6	95.5	55.2	91.5	52.8	79.4	49.9	28.8	47.7	27.5	45.8	26.4	39.8	23.1	22												
78,499	23	191.6	110.6	63.7	104.4	60.3	99.8	57.7	95.7	55.2	83.0	52.2	30.1	49.9	28.8	47.8	27.6	41.6	24.2	23												
81,912	24	200.0	115.4	66.5	109.0	62.9	104.2	60.2	99.8	57.6	86.6	54.5	31.4	52.1	30.0	49.9	28.8	43.4	25.2	24												
85,325	25	208.3	120.2	69.3	113.5	65.5	108.5	62.8	104.0	60.0	90.3	56.8	32.8	54.3	31.3	52.0	30.0	45.3	26.3	25												
88,738	26	218.6	125.1	72.0	118.0	68.1	112.8	65.3	108.2	62.4	93.9	59.0	34.1	56.4	32.5	54.1	31.2	47.1	27.3	26												
92,151	27	225.0	129.9	74.8	122.6	70.7	117.2	67.8	112.3	64.8	97.5	61.3	35.4	58.6	33.8	56.2	32.4	48.9	28.4	27												
95,564	28	233.3	134.7	77.6	127.1	73.4	121.5	70.3	116.5	67.2	101.1	63.6	36.7	60.2	35.0	58.2	33.6	50.7	29.4	28												
98,977	29	241.6	139.5	80.3	131.7	76.0	125.9	72.8	120.6	69.6	104.7	65.8	38.0	63.0	36.3	60.3	34.8	52.5	30.5	29												
102,390	30	250.0	144.3	83.1	136.2	78.6	130.2	75.3	124.8	72.0	108.3	68.1	39.3	65.1	37.5	62.4	36.0	54.3	31.5	30												
105,803	31	258.3	149.1	85.9	140.7	81.2	134.5	77.8	129.0	74.4	111.9	70.4	40.6	67.3	38.8	64.5	37.2	56.1	32.6	31												
109,216	32	266.6	153.9	88.6	145.3	83.8	138.9	80.3	133.1	76.8	115.5	72.6	41.9	69.4	40.0	66.6	38.4	57.9	33.6	32												
112,629	33	275.0	158.7	91.4	149.8	86.5	143.2	82.8	137.3	79.2	119.1	74.9	43.2	71.6	41.3	68.6	39.6	59.7	34.7	33												
116,042	34	283.3	163.5	94.2	154.4	89.1	147.6	85.3	141.4	81.6	122.7	77.2	44.5	73.8	42.5	70.7	40.8	61.5	35.7	34												
119,455	35	291.7	168.4	97.0	159.0	91.7	151.9	87.9	145.6	84.0	126.4	79.5	45.9	76.0	43.8	72.8	42.0	63.4	36.8	35												
122,868	36	300.0	173.2	99.7	163.4	94.3	156.2	90.4	149.8	86.4	130.0	81.7	47.2	78.1	45.0	74.9	43.2	65.2	37.8	36												
126,281	37	308.3	178.0	102.5	168.0	96.9	160.6	92.9	153.9	88.8	133.6	84.0	48.5	80.3	46.3	77.0	44.4	67.0	38.9	37												
129,694	38	316.7	182.8	105.3	172.5	99.6	164.9	95.4	158.1	91.2	137.2	86.3	49.8	82.5	47.5	79.0	45.6	68.8	39.9	38												
133,107	39	325.0	187.6	108.0	177.1	102.2	169.3	97.9	162.2	93.6	140.8	88.5	51.1	84.6	48.8	81.1	46.8	70.6	41.0	39												
136,520	40	333.3	192.4	110.8	181.6	104.8	173.6	100.4	166.4	96.0	144.4	90.8	52.4	86.8	50.0	83.2	48.0	72.4	42.0	40												
139,933	41	341.7	197.2	113.6	186.1	107.4	177.9	102.9	170.6	98.4	148.0	93.1	53.7	89.0	51.3	85.3	49.2	74.2	43.1	41												
143,346	42	350.0	202.0	116.3	190.7	110.0	182.3	105.4	174.7	100.8	151.6	95.3	55.0	91.1	52.5	87.4	50.4	76.0	44.1	42												
146,759	43	358.3	206.8	119.1	195.2	112.7	186.6	107.9	178.9	103.2	155.2	97.6	56.3	93.3	53.8	89.4	51.6	77.8	45.2	43												
150,172	44	366.7	211.7	121.9	199.8	115.3	191.0	110.4	183.0	105.6	158.8	100.0	57.6	95.5	55.0	91.5	52.8	79.6	46.2	44												
153,585	45	375.0	216.5	124.7	204.3	117.9	195.3	113.0	187.2	108.0	162.5	102.2	59.0	97.7	56.3	93.6	54.0	81.5	47.3	45												
156,998	46	383.3	221.3	127.4	208.8	120.5	199.6	115.5	191.4	110.4	166.1	104.4	60.3	99.8	57.5	95.7	55.2	83.3	48.3	46												
160,411	47	391.7	226.1	130.2	213.4	123.1	204.0	118.0	195.5	112.8	169.7	106.7	61.6	102.0	58.8	97.8	56.4	85.1	49.4	47												
163,824	48	400.0	230.9	133.0	217.9	125.8	208.3	120.5	199.7	115.2	173.3	109.0	62.9	104.2	60.0	99.8	57.6	86.9	50.4	48												
167,237	49	408.3	235.7	135.7	222.5	128.4	212.7	123.0	203.8	117.6	176.9	111.3	64.2	106.3	61.3	101.9	58.8	88.7	51.5	49												
170,650	50	416.6	240.5	138.5	227.0	131.0	217.0	125.5	208.0	120.0	180.5	113.5	65.5	108.5	62.5	104.0	60.0	90.5	52.5	50												

### FORMULA FOR CALCULATING LINE CURRENTS

SINGLE PHASE (1 PHASE)

$$\text{AMPERES} = \frac{\text{WATTS}}{\text{LINE VOLTAGE}}$$

THREE PHASE (3 PHASE)

$$\text{AMPERES} = \frac{\text{WATTS}}{\text{LINE VOLTAGE} \times 1.73}$$

TO CONVERT "KW" TO WATTS  
MULTIPLY "KW" BY 1,000

Line Voltage	x	Factor	=	Line Voltage x 1.73
208	x	1.73	=	359.8
220	x	1.73	=	380.6
230	x	1.73	=	397.9
240	x	1.73	=	415.2
440	x	1.73	=	761.2
460	x	1.73	=	795.8
480	x	1.73	=	830.4
550	x	1.73	=	951.5
600	x	1.73	=	1038.0