

## M SERIES HEATING MODULE

### Packing List

Carton contains:

- 1 – Cabinet
- 1 – Hook Flange
- 2 – Latch keepers
- 2 – Latches
- 1 – Hot water heating coil (*Optional*)
- Gasket as needed.

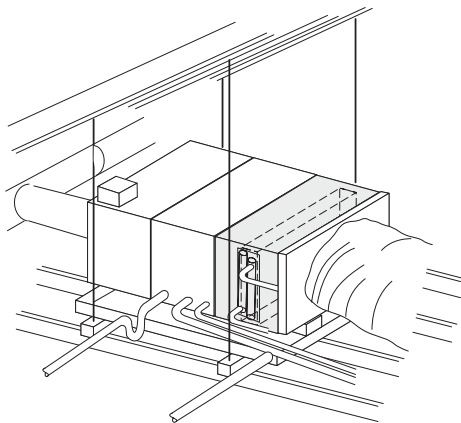
### Applications

Unico System designed and built heating units can be easily installed with the matching blower and cooling modules. For matchups see table below. The heating module can be matched to a blower module for a heating only system or it can be matched with both a blower and a cooling module for a system that heats and cools. The slide-in hot water/glycol heating coil is supplied separately. If potable water is used, refer to Technote 112 for disinfection procedures.

*Note: The MH2430 replaces the MH2436 and the MH3660 replaces the MH4260. Add HW to Part Number to include the coil, Example MH2430HW (coil included).*

**Table 1. Compatible Modules**

Heating Module	Matching Unit	
	Blower Module	Cooling Module
MH2430	MB2430L	MC2430(C,H,W)
MH3660	MB3642L MB4860L	MC3642(C,H,W) MC4860(C,H,W)



Typical Horizontal Installation with Unico System Blower Module and Cooling Module



Figure 1. Heating Module

### Cabinet Construction

The cabinet is constructed of 22 gauge galvanized steel. It has a removable panel to insert a hot water coil. The cabinet is fully lined with closed cell insulation. Easy snap latches are included for quick field assembly with the matching modules.

### Coil Construction

Unico designed and fabricated hot water coils are constructed of evenly spaced corrugated aluminum fins mechanically bonded to copper tubes. The tubes are 1/2-in. diameter on staggered centers. The fins have full collars to provide greater tube-fin contact for excellent heat transfer. The coil is pressure tested at the factory. Bleed and drain valves are provided on the headers outside the cabinet. The coil is sold separately or with the cabinet.

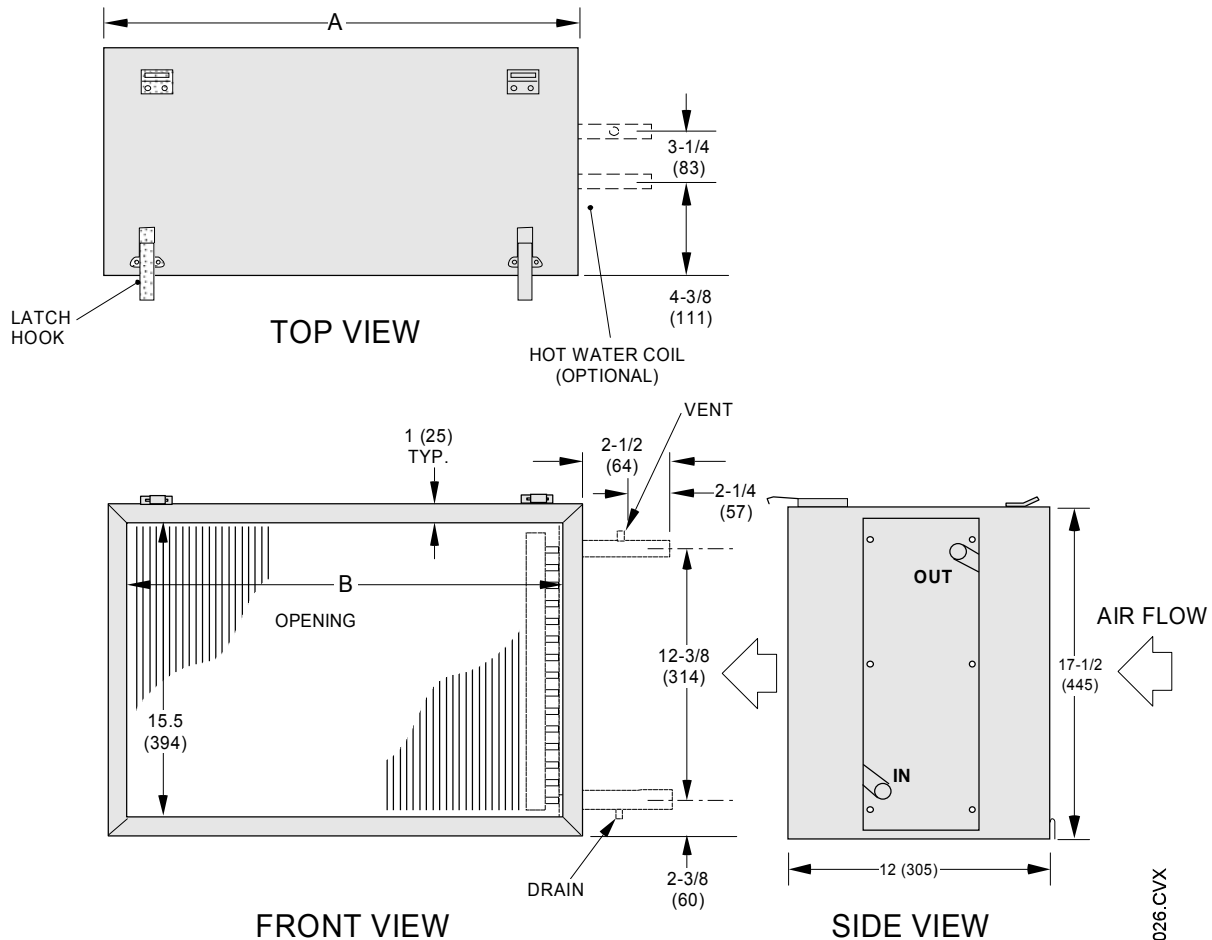
Certified to UL Standard 1995  
Conforms to CAN/CSA Standard C22.2 NO. 236



Unico products comply with the European regulations that guarantee the safety of the product.

Model No.		MH2430	MH3660
Heating Coil	Coil Model	HW-2430	HW-3660
	Net Face Area, sq. ft. (m <sup>2</sup> )	2.08 (0.20)	3.43 (0.32)
	Tube Diameter, in. (mm)	1/2 (12.7)	1/2 (12.7)
	Number of Rows	4	4
	Fins per inch (m)	12 (472)	12 (472)
	Connection Size, in. (mm) sweat	7/8 (22.2)	7/8 (22.2)
	Coil-only Shipping weight, lb. (kg)	33 (15)	47 (21)
Design Pressure, psi (kPa)		150 (1034)	150 (1034)
Dimensions, in. (mm)		A	25 (635)
		B	23 (584)
Shipping weight (without coil), lb. (kg)		20 (9)	28 (13)
Coil Water Volume, gal. (liters)		0.4 (1.8)	0.7 (3.2)

### Module Dimensions



ALL DIMENSIONS IN INCHES (mm)

IL00026.CVX

# Hot Water Coil Performance

## Capacity\*, MBH (kW)

### HW-2430

#### 600 CFM (0.28 m<sup>3</sup>/s) — 18 Outlets minimum

Water Flow, GPM (L/s)	Entering Water Temperature, °F (°C)			
	120 (49)	140 (60)	160 (71)	180 (82)
4 (0.25)	26.7 (7.8)	37.5 (11.0)	48.4 (14.2)	59.4 (17.4)
6 (0.38)	27.7 (8.1)	38.9 (11.4)	50.1 (14.7)	61.4 (18.0)
8 (0.50)	28.2 (8.3)	39.5 (11.6)	50.9 (14.9)	62.4 (18.3)

#### 500 CFM (0.24 m<sup>3</sup>/s) — 15 Outlets minimum

Water Flow, GPM (L/s)	Entering Water Temperature, °F (°C)			
	120 (49)	140 (60)	160 (71)	180 (82)
4 (0.25)	23.0 (6.7)	32.4 (9.5)	41.8 (12.2)	51.2 (15.0)
6 (0.38)	23.8 (7.0)	33.4 (9.8)	43.0 (12.6)	52.7 (15.4)
8 (0.50)	24.1 (7.1)	33.8 (9.9)	43.6 (12.8)	53.4 (15.6)

#### 400 CFM (0.19 m<sup>3</sup>/s) — 12 Outlets minimum

Water Flow, GPM (L/s)	Entering Water Temperature, °F (°C)			
	120 (49)	140 (60)	160 (71)	180 (82)
4 (0.25)	19.3 (5.7)	27.1 (7.9)	34.9 (10.2)	42.8 (12.5)
6 (0.38)	19.7 (5.8)	27.7 (8.1)	35.6 (10.4)	43.6 (12.8)
8 (0.50)	19.9 (5.8)	27.9 (8.2)	36.0 (10.5)	44.0 (12.9)

**WARNING**

To prevent injury or damage from high temperatures, do not install floor outlets when operating in the shaded area. Discharge temperatures in this range can exceed 160°F (71°C)

### EQUATIONS

The general equation of the sensible heat capacity,  $q$ , is:

$$q = \rho \dot{Q} c_p (\Delta T) \quad (1)$$

where  $\rho$  is density,

$\dot{Q}$  is the volumetric flow rate,

$c_p$  is the specific heat capacity constant,

and  $\Delta T$  is temperature difference through the coil.

The temperature difference is expressed differently depending on whether the fluid is being heated or cooled.

It is expressed in the following way

$$\text{Heated fluid: } \Delta T = T_{out} - T_{in} \quad (2)$$

$$\text{Cooled fluid: } \Delta T = T_{in} - T_{out} \quad (3)$$

where  $T_{in}$  is the inlet temperature of the fluid,  
and  $T_{out}$  is the outlet temperature of the fluid.  
The fluid is either air or water.

### HW-3660

#### 1250 CFM (0.59 m<sup>3</sup>/s) — 37 Outlets minimum

Water Flow, GPM (l/s)	Entering Water Temperature, °F (°C)			
	120 (49)	140 (60)	160 (71)	180 (82)
4 (0.25)	45.0 13.2	63.4 18.6	81.8 24.0	100.4 29.4
6 (0.38)	49.9 14.6	70.2 20.6	90.5 26.5	111 32.6
8 (0.50)	52.5 15.4	73.8 21.6	95.2 27.9	117 34.3
10 (0.63)	54.1 15.9	76.0 22.3	98.0 28.7	120 35.2

#### 1100 CFM (0.52 m<sup>3</sup>/s) — 33 Outlets minimum

Water Flow, GPM (l/s)	Entering Water Temperature, °F (°C)			
	120 (49)	140 (60)	160 (71)	180 (82)
4 (0.25)	42.1 12.3	59.2 17.4	76.5 22.4	93.8 27.5
6 (0.38)	46.1 13.5	64.8 19.0	83.6 24.5	102.5 30.1
8 (0.50)	48.2 14.1	67.7 19.9	87.3 25.6	107 31.4
10 (0.63)	49.5 14.5	69.5 20.4	90.0 26.4	110 32.3

#### 1000 CFM (0.47 m<sup>3</sup>/s) — 30 Outlets minimum

Water Flow, GPM (l/s)	Entering Water Temperature, °F (°C)			
	120 (49)	140 (60)	160 (71)	180 (82)
4 (0.25)	39.9 11.7	56.2 16.5	72.5 21.3	88.9 26.1
6 (0.38)	43.4 12.7	61 17.9	78.6 23.1	96.3 28.2
8 (0.50)	45.2 13.3	63.4 18.6	81.8 24.0	100 29.3
10 (0.63)	46.2 13.6	64.9 19.0	83.6 24.5	102.3 30.0

#### 900 CFM (0.42 m<sup>3</sup>/s) — 27 Outlets minimum

Water Flow, GPM (l/s)	Entering Water Temperature, °F (°C)			
	120 (49)	140 (60)	160 (71)	180 (82)
4 (0.25)	37.6 11.0	52.9 15.5	68.3 20.0	83.7 24.5
6 (0.38)	40.5 11.9	56.9 16.7	73.4 21.5	90 26.4
8 (0.50)	42 12.3	58.9 17.3	76 22.3	93 27.3
10 (0.63)	42.8 12.6	60.1 17.6	77.5 22.7	94.8 27.8

#### 800 CFM (0.38 m<sup>3</sup>/s) — 24 Outlets minimum

Water Flow, GPM (l/s)	Entering Water Temperature, °F (°C)			
	120 (49)	140 (60)	160 (71)	180 (82)
4 (0.25)	35 10.3	49.3 14.5	63.5 18.6	77.9 22.8
6 (0.38)	37.3 10.9	52.5 15.4	67.6 19.8	82.8 24.3
8 (0.50)	38.5 11.3	54.1 15.9	69.6 20.4	85.3 25.0
10 (0.63)	39.2 11.5	55.0 16.1	70.8 20.8	86.7 25.4

#### 700 CFM (0.33 m<sup>3</sup>/s) — 21 Outlets minimum

Water Flow, GPM (l/s)	Entering Water Temperature, °F (°C)			
	120 (49)	140 (60)	160 (71)	180 (82)
4 (0.25)	32.1 9.4	45.1 13.2	58.2 17.1	71.3 20.9
6 (0.38)	33.9 9.9	48.8 14.3	61.3 18.0	75.1 22.0
8 (0.50)	34.8 10.2	49.5 14.5	62.8 18.4	76.9 22.6
10 (0.63)	35.3 10.4	45.1 13.2	63.7 18.7	77.9 22.8

#### 600 CFM (0.28 m<sup>3</sup>/s) — 18 Outlets minimum

Water Flow, GPM (l/s)	Entering Water Temperature, °F (°C)			
	120 (49)	140 (60)	160 (71)	180 (82)
4 (0.25)	28.8 8.4	40.5 11.9	52.2 15.3	63.9 18.7
6 (0.38)	30.1 8.8	42.2 12.4	54.4 16.0	66.6 19.5
8 (0.50)	30.7 9.0	43.1 12.6	55.4 16.2	67.8 19.9
10 (0.63)	31 9.1	43.5 12.8	56 16.4	68.5 20.1

\* Capacity is based on 70°F (21°C) return air temperature ( $T_{in}$ )  
Conversion Factors: MBH = 1000 Btu/hr, 1 kW = 3413 Btu/hr

Equation 1 can be simplified by using standard density and specific heat. If you are at a high altitude please refer to Tech Note 103, *High Altitude Applications*, for more detailed information about effects of air density. Otherwise, use the following equations to find the leaving fluid temperature.

For air:

$$q = 1.08 \text{ (CFM)} \Delta T \text{ Btu/hr } (\Delta T \text{ is in } ^\circ\text{F}) \quad (4)$$

$$q = 1.21 \text{ (L/s)} \Delta T \text{ Watts } (\Delta T \text{ is in } ^\circ\text{C}) \quad (5)$$

For water:

$$q = 500 \text{ (GPM)} \Delta T \text{ Btu/hr } (\Delta T \text{ is in } ^\circ\text{F}) \quad (4)$$

$$q = 4.15 \text{ (L/s)} \Delta T \text{ kW } (\Delta T \text{ is in } ^\circ\text{C}) \quad (5)$$

**Example.** Consider a MH2430 with 6 GPM (38 L/s) at 140 °F (60 °C) and 600 CFM (280 L/s). The capacity from the table is 38.9 MBH (11.6 kW). Therefore, the leaving air temperature (LAT) is as follows:

$$\text{LAT} = 70 + \frac{38.9 \times 1000}{1.08 \times 600} = 130 \text{ } ^\circ\text{F}$$

$$\text{LAT} = 21 + \frac{11.4 \times 1000}{1.21 \times 280} = 54.6 \text{ } ^\circ\text{C}$$

Likewise, determine the Leaving Water Temperature (LWT) by using one of the following equations:

$$\text{LWT} = 140 - \frac{38.9 \times 1000}{500 \times 6} = 127 \text{ } ^\circ\text{F}$$

$$\text{LWT} = 60 - \frac{11.4}{4.15 \times .38} = 52.8 \text{ } ^\circ\text{C}$$

## Coil Pressure Drop

### Air Pressure Drop

Air Flow rate, CFM (m <sup>3</sup> /s)	ΔP, in. water (kPa)	
	HW2430	HW3660
400 (0.19)	0.07 (0.017)	-
500 (0.24)	0.10 (0.025)	-
600 (0.28)	0.12 (0.030)	0.06 (0.015)
700 (0.33)	-	0.08 (0.020)
800 (0.38)	-	0.09 (0.022)
900 (0.42)	-	0.11 (0.027)
1000 (0.47)	-	0.13 (0.032)
1100 (0.52)	-	0.15 (0.037)
1250 (0.59)	-	0.19 (0.047)

### Water Pressure Drop

Water Flow rate, GPM (L/s)	ΔP <sub>w</sub> , ft. water (kPa)	
	HW2430	HW3660
4 (0.25)	4.3 (12.9)	2.6 (7.8)
6 (0.38)	9.3 (27.8)	5.5 (16.4)
8 (0.50)	16.1 (48.1)	9.6 (28.7)
10 (0.63)	-	14.6 (43.6)

Entering Water Temperature, °F (°C)	120 (49)	140 (60)	160 (71)	180 (82)	200 (93)
F1	1.046	1.000	0.959	0.921	0.888

$$\text{Water Pressure drop} = \Delta P_w \times F1$$