

APPLICATION MANUAL

INTRODUCTION

The CompleteHeat system combines high efficiency space heating with high efficiency water heating. The CompleteHeat system consists of the HM30 heating module and the AM30 air handling module.

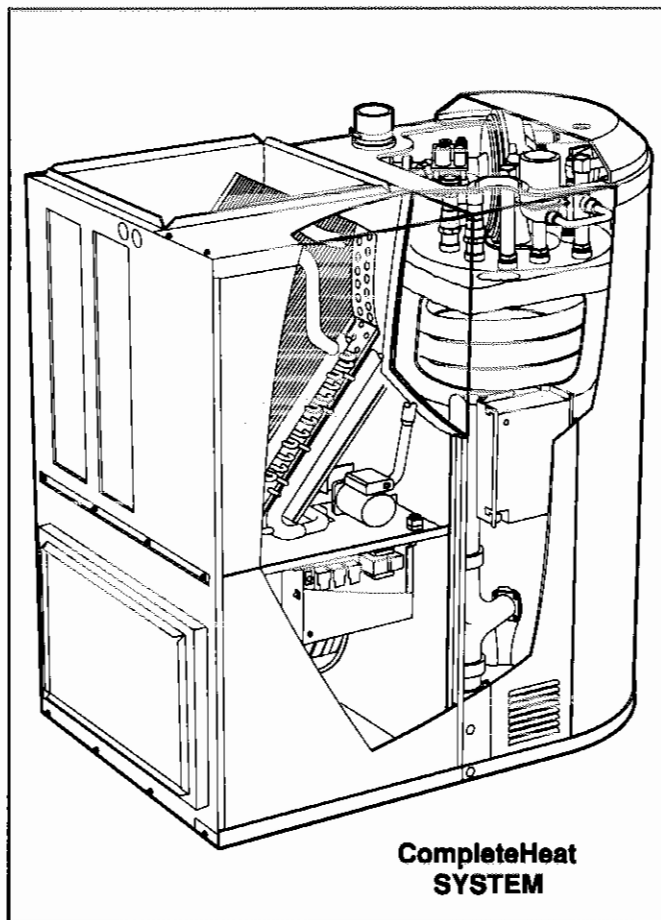
The HM30 makes available hot water for both domestic water and space heating upon demand. The tank stores 30 nominal gallons (114L) of hot water at adjustable temperatures ranging from 110°F to 170°F (43.3° to 76.6°C). The HM30 is capable of operating as a stand-alone water heater as well as part of the CompleteHeat system. The HM30 may also be used to provide hot water for radiant floor heating systems. The unit is shipped for use with natural gas; however, an L.P. conversion kit is available.

The AM30 circulates hot water from the HM30 through its coil. The AM30 supply blower extracts the heat from the coil and distributes the heated air throughout the conditioned space. The AM30 is a multi-position air handling unit which may be installed in upflow, downflow or horizontal applications.

When used together, the CompleteHeat components offer high-efficiency space and hot water heating. This manual details capacities, sizing, typical applications and remote placement of the two components of the CompleteHeat system. Information is given which outlines how the system can be zoned using up to four AM30 air modules with a single HM30. In addition, this manual covers the use of the HM30 heating module as a high efficiency water heater or a heat source, supplying hot water for radiant floor heating systems. The application of the CompleteHeat system used together with an indirect domestic hot water heater is also outlined in this manual.

This manual represents generally accepted safe engineering practices. Specifications and limits outlined in this manual are subject to change. System design should conform to all codes, laws and regulations apply-

ing at the site at the time of installation. The procedures and limits outlined in this manual do not supersede local, state or national codes under any circumstances. If you have questions or comments about any of this information, contact the Lennox Application Department (Technical Support) in Dallas, Texas.



**CompleteHeat
SYSTEM**

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SPECIFICATIONS — AM30 AIR MODULE

Air Module Model No.			AM30Q2-40	AM30Q2/3-70	AM30Q3/4-70	
*Nominal heating capacity — Btuh (kW)			40,000 (11.7)	70,000 (20.5)	70,000 (20.5)	
**Temperature rise range — °F (°C)			32 — 73 (18 — 41)	35 — 78 (19 — 43)	39 — 71 (22 — 39)	
Blower wheel nominal diameter x width		in.	10 x 7	10 x 8	10 x 10	
Blower wheel nominal diameter x width		mm	254 x 178	254 x 203	254 x 254	
Blower motor output — hp (W)			1/5 (149)	1/3 (224)	1/2 (373)	
Circulating pump	Motor output — hp (W)		1/40 (19)	1/40 (19)	1/40 (19)	
	†Capacity — U.S. Gals per hour (L per hour)		6 (23)	6 (23)	6 (23)	
Heating Coil	Heating capacity range		Btuh	21,600 – 55,300	27,500 – 90,000	43,800 – 109,400
	Heating capacity range		kW	6.3 – 16.2	8.1 – 26.4	12.8 – 32.1
	Net face area — sq. ft. (m ²)			3.83 (.36)	3.83 (.36)	4.33 (.40)
	Tube diameter — in. (mm) no. of rows			3/8 (9.5) – 1	3/8 (9.5) – 2	3/8 (9.5) – 2
	Fins per inch (m)			16 (630)	16 (630)	16 (630)
	Water line connections (sweat) — in. (mm) I.D.		inlet	3/4 (19)	3/4 (19)	1 (25.4)
			outlet	3/4 (19)	3/4 (19)	1 (25.4)
★Number and size of filters		in.	(1) 14 x 25 x 1		(1) 20 x 25 x 1	
★Number and size of filters		mm	(1) 356 x 635 x 25		(1) 508 x 635 x 25	
Nominal cooling that can be added		Tons	1 thru 2	1 thru 3	2 thru 4	
Nominal cooling that can be added		kW	3.5 thru 7.0	3.5 thru 10.6	7.0 thru 14.1	
Shipping weight — lbs. (kg) 1 package			127 (58)	144 (65)	157 (71)	
Electrical characteristics			120 volts — 60 hertz — 1 phase			

*At 140°F (60°C) entering water temperature, 65°F (18°C) entering air temperature.

**120°F (49°C) High Speed or 170°F (77°C) Low Speed.

★Polyurethane frame type filter.

†140°F (60°C) water temperature.

SPECIFICATIONS — AM30 AIR MODULE

Air Module Model No.			AM30Q3/4-90	AM30Q4/5-90	AM30Q3/4-105	AM30Q4/5-120	
*Nominal heating capacity — Btuh (kW)			90,000 (26.4)	†90,000 (26.4)	†105,000 (30.8)	†120,000 (35.2)	
Temperature rise range — °F (°C)			35 — 76 (19 — 42)	31 — 68 (17 — 38)	41 — 88 (23 — 49)	38 — 80 (21 — 44)	
Blower wheel nominal diameter x width		in.	10 x 10	12 x 9	10 x 10	12 x 9	
Blower wheel nominal diameter x width		mm	254 x 254	305 x 229	254 x 254	305 x 229	
Blower motor output — hp (W)			1/2 (373)	3/4 (560)	1/2 (373)	3/4 (560)	
Circulating pump	Motor output — hp (W)		1/25 (30)	1/25 (30)	1/25 (30)	1/25 (30)	
	†Capacity — U.S. Gals per hour (L per hour)		9.5 (36)	9.5 (36)	9.5 (36)	9.5 (36)	
Heating Coil	Heating capacity range		Btuh	46,600 — 120,000	58,000 — 136,000	53,500 — 142,600	68,000 — 163,700
	Heating capacity range		kW	13.7 — 35.2	17.0 — 39.8	15.7 — 41.8	19.9 — 48.0
	Net face area — sq. ft. (m ²)			4.33 (.40)	4.33 (.40)	4.33 (.40)	4.33 (.40)
	Tube diameter — in. (mm) no. of rows			3/8 (9.5) — 2	3/8 (9.5) — 2	3/8 (9.5) — 3	3/8 (9.5) — 3
	Fins per inch (m)			16 (630)	16 (630)	16 (630)	16 (630)
	Water line connections (sweat) — in. (mm) I.D.		inlet	1 (25.4)	1 (25.4)	1 (25.4)	1 (25.4)
		outlet	1 (25.4)	1 (25.4)	1 (25.4)	1 (25.4)	
★Number and size of filters		in.	(1) 20 x 25 x 1				
★Number and size of filters		mm	(1) 508 x 635 x 25				
Nominal cooling that can be added		Tons	2 thru 4	3.5 thru 5	2 thru 4	3.5 thru 5	
Nominal cooling that can be added		kW	7.0 thru 14.1	12.3 thru 17.6	7.0 thru 14.1	12.3 thru 17.6	
Shipping weight — lbs. (kg) 1 package			157 (71)	165 (75)	170 (77)	175 (79)	
Electrical characteristics			120 volts — 60 hertz — 1 phase				

†NOTE — If AM30Q4/5-90, AM30Q3/4-105 or AM30Q4/5-120 Air Module is matched with HM30-100 Heat Module, maximum output is only 90% of rated HM30 heating capacity.

*At 140°F (60°C) entering water temperature, 65°F (18°C) entering air temperature.

★Polyurethane frame type filter.

†140°F (60°C) water temperature.

SPECIFICATIONS — HM30 HEATING MODULE

Heat Module Model No.		HM30-100	HM30-150
Input — Btuh (kW) high		100,000 (29.3)	150,000 (44.0)
Input — Btuh (kW) low		85,000 (24.9)	130,000 (38.1)
Output — Btuh (kW) high — space heating / water heating		90,000 (26.4) / 94,000 (27.5)	135,000 (39.6) / 141,000 (41.3)
Output — Btuh (kW) low — space heating / water heating		76,500 (22.4) / 79,900 (23.4)	117,000 (34.3) / 122,200 (35.8)
First Hour Rating — U.S. gals (L)		163 (617)	217 (821)
CA _{ef} (energy factor)		.86	.86
Recovery Efficiency		94%	94%
Rated storage volume — U.S. Gallons (L)		32 (121)	30 (114)
Recovery rate at 90°F (32°C) temperature rise— U.S. gals/hr. (L/hr.)		125 (473)	188 (712)
Intake pipe size connection (PVC) — in. (mm)		2 (51)	2 (51)
Exhaust pipe size connection (PVC) — in. (mm)		2 (51)	2 (51)
Water connections — inlet/outlet I.D. — in. (mm)	Connections to water supply (fpt)	3/4 (19.1)	3/4 (19.1)
	Connections to AM30 Air Module (sweat)	1 (25.4)	1 (25.4)
Condensate trap drain connection (mpt) — in. (mm)		1/2 (12.7)	1/2 (12.7)
Tank drain connection (standard garden hose connection) (12 tpi) — in. (mm)		1-1/16 (27)	1-1/16 (27)
Gas Piping Size I.P.S. Natural or LPG/propane		1/2 (12.7)	1/2 (12.7)
Temperature/Pressure Relief Valve (furnished)	Opening specifications	210°F or 150 psig (99°C or 1034 kPa)	
	Connection size — in. (mm)	3/4 (19.1)	3/4 (19.1)
Shipping weight — lbs. (kg) 1 package		174 (79)	198 (90)
Electrical characteristics		120 volts — 60 hertz — 1 phase	

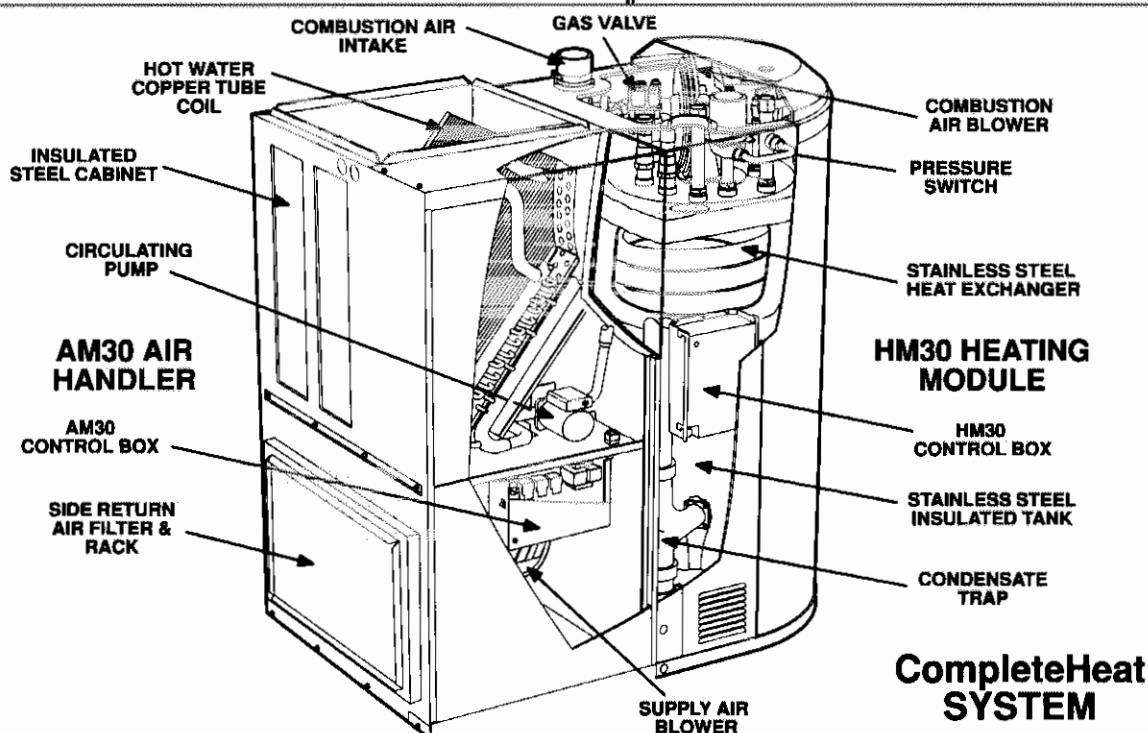


FIGURE 1

II—GENERAL INFORMATION

CompleteHeat system components are shown in figure 1 in a close-coupled application.

The HM30 heats potable tap water in its tank to a predetermined temperature using a gas power burner and helical heat exchanger. A thermistor controls burner operation to keep the water at a preselected temperature. The HM30's stainless steel tank stores 30 gallons (114L) of hot water until a demand is received for domestic hot water or space heating. A circulating pump keeps the heated water moving throughout the storage tank. The HM30 control box is factory-installed on the left side of the unit; however, it can easily be moved to the right side, so that the unit can be installed on either side of the AM30. The HM30 is also equipped with a metal base which serves as an auxiliary drain pan.

The AM30 air module includes a blower, pump, hot water coil and controls. When the room thermostat signals a demand for space heating, the combination blower/pump control simultaneously activates the circulating pump and sends the heating demand signal to the HM30 control. After an adjustable delay, the blower energizes at heating speed. This delay allows time for heated water to reach the coil. The delay is variable to compensate for the distance between the HM30 and the AM30. When heating demand is satisfied, the circulating pump shuts off. The blower shuts off after a fixed 30-second delay. When there is no demand for space heating or cooling, the pump runs for 30 seconds every 6 hours to circulate water through the system.

Refer to installation instructions for general maintenance procedures for the CompleteHeat system.

III—CORROSION AND WATER QUALITY

Water conductivity and hardness levels vary from location to location. Water which is highly conductive and water which is considered hard each pose their own set of problems for any water heating system.

Galvanic corrosion occurs when two dissimilar metals are immersed in an electrically conductive solution, such as water. To protect the CompleteHeat system from this corrosion, the HM30 tank, heat exchanger and weld materials are all constructed of a special grade of stainless steel which minimizes the corrosive effects of water. The construction significantly reduces the presence of corrosion-producing crevices. In certain extreme conditions, galvanic corrosion can occur even when a single type of metal is present. Because of this, additional protection is provided by a re-

placeable aluminum alloy anode rod, which is sacrificed to protect the tank and heat exchanger.

Water hardness due to the presence of dissolved minerals (such as sodium, calcium and magnesium compounds) is not entirely remedied by filtering. Water is considered hard when these minerals reach levels over 120 ppm (7 grains per gallon). Water with mineral levels over 180 ppm (10.6 grains per gallon) is considered to be very hard.

When hard water is heated, it deposits a hard, rock-like scale in water heaters. Significant scale deposits can result in loss of heat transfer and lower efficiencies, increased temperatures of heated metal surfaces and loss of capacity due to displacement of water volume.

The CompleteHeat system can tolerate higher levels of water hardness due to its unique design and application. Due to the increased amount of water circulation in the combination water heating / space heating system, scale is held in suspension, increasing the amount that is removed from the tank during domestic water usage. The CompleteHeat system circulates as much as 40 times the amount of water a standard heater sees on an average heating load day. During the summer, the system circulates five times as much as the standard water heater due to the tank pump and the four daily recirculation cycles. The CompleteHeat heat exchanger surfaces are smooth and self-cleaning. Deposits that are formed generally drop off of the combustion chamber or helical tailpipe and do not insulate the heating surfaces. The small amount of deposit which does cling to the tank serves to line the tank and slow down any galvanic corrosion.

When water is softened for cleaning purposes, you should be aware that this generally increases its electrical conductivity. This, in turn, will cause a more rapid deterioration of the HM30's sacrificial anode rod. In areas with hard water, or when a water softener is used, it will be necessary to periodically inspect and perhaps replace the anode rod.

IV—SIZING THE SYSTEM FOR DOMESTIC WATER AND SPACE HEATING (Figure 2)

HM30 Sizing

Calculate system heat load according to ACCA Manual J. Match the heat load to the capacities outlined in table 1. Reserve heating capacity required for domestic hot water demand and night setback recovery (if applicable) is included in the table. Use of the HM30-150 is recommended in applications which include three or more bathrooms or other high domestic hot water demands.

When twinning or zoning AM30s, size the HM30 based on total space heating load applied to one of the tables.

TABLE 1

APPLICATIONS WITH UP TO 2-1/2 BATHROOMS		
Unit	Maximum Allowable Space Heating Load Without Night Setback	Maximum Allowable Space Heating Load With Night Setback
HM30-105	71,500 (20.9kW)	55,000 (16.1kW)
HM30-150	109,000 (31.9kW)	84,000 (24.6kW)
APPLICATIONS WITH 3 OR MORE BATHROOMS		
Unit	Maximum Allowable Space Heating Load Without Night Setback	Maximum Allowable Space Heating Load With Night Setback
HM30-150	91,000 (26.7kW)	74,000 (21.7kW)

AM30 Sizing

- 1- Add 20 percent to heat load calculated using ACCA Manual J. This allows for a small reserve heating capacity required for night setback recovery and space heating during simultaneous space and water heating.
- 2- Determine cooling load using ACCA Manual J.
- 3- Select AM30 module based on adjusted heat load calculated in step 1 and cooling requirements determined in step 2.

NOTE - HM30 water temperature setting and AM30 blower speed will affect the space heating capacity of the CompleteHeat system. Both must be considered during AM30 selection. Also keep in mind that water

delivered to AM30 coil will be 10° to 15° F (5.6° - 8.3°C) hotter than HM30 water temperature setting.

LOAD DESCRIPTION: Three bedroom, two bathroom home, moderate water usage, no night setback required.

Heating Load: 50,000 Btuh (14.7kW)

Cooling Load: 30,000 Btuh (8.8kW)

Modified Heating Load (required for AM30 sizing only): 50,000 X 1.20 = 60,000 (17.6kW)

UNIT SELECTION:

HM30-100 heating module

AM30Q2/3-70 air module

FIGURE 2

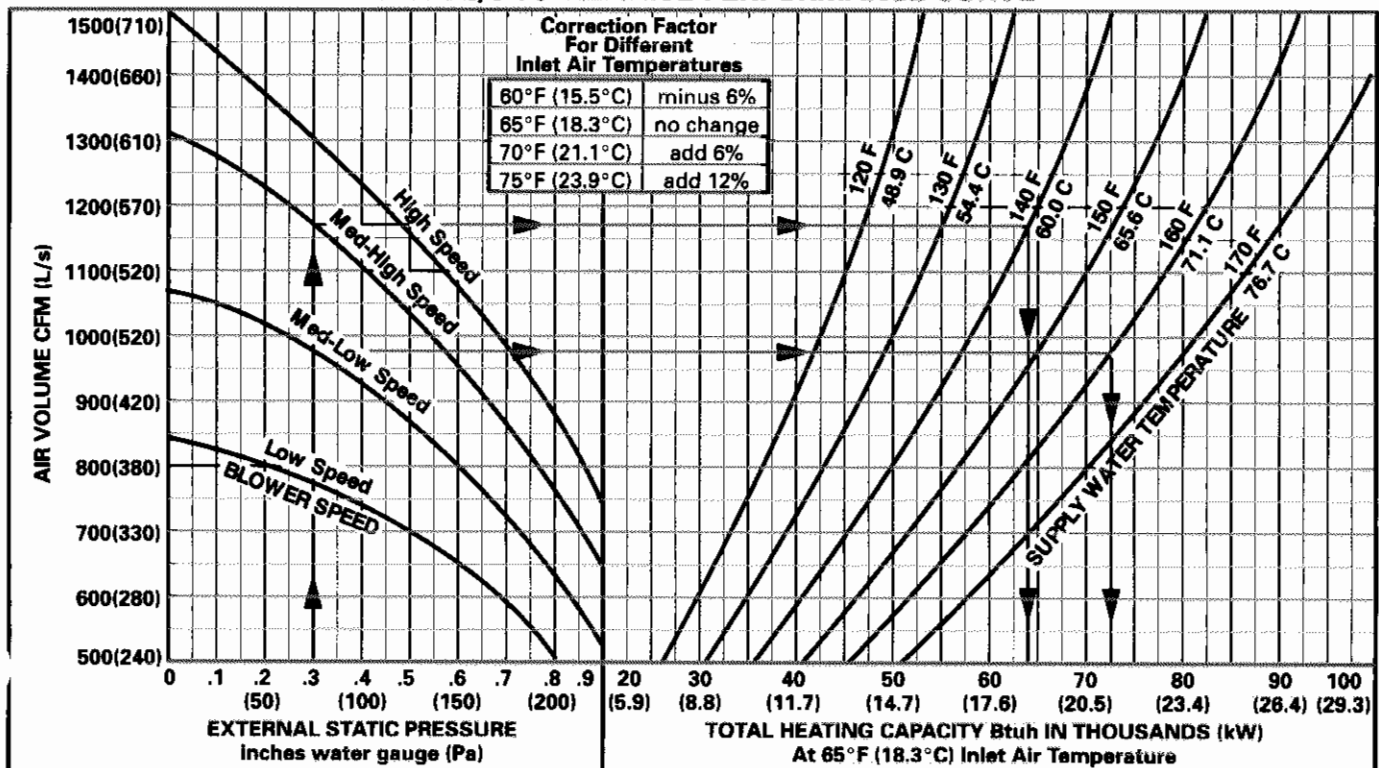
Using Heating Performance Curves in Sizing

The engineering handbook provides heating performance curves for each AM30 air module. These curves show graphically how varying blower speed and water temperature will affect system space heating capacities. *Note also that the water temperature delivered to the AM30 coil from the HM30 heat module will be 10 to 15°F (5.6 to 8.3°C) higher than that given on the HM30 temperature selection dial.*

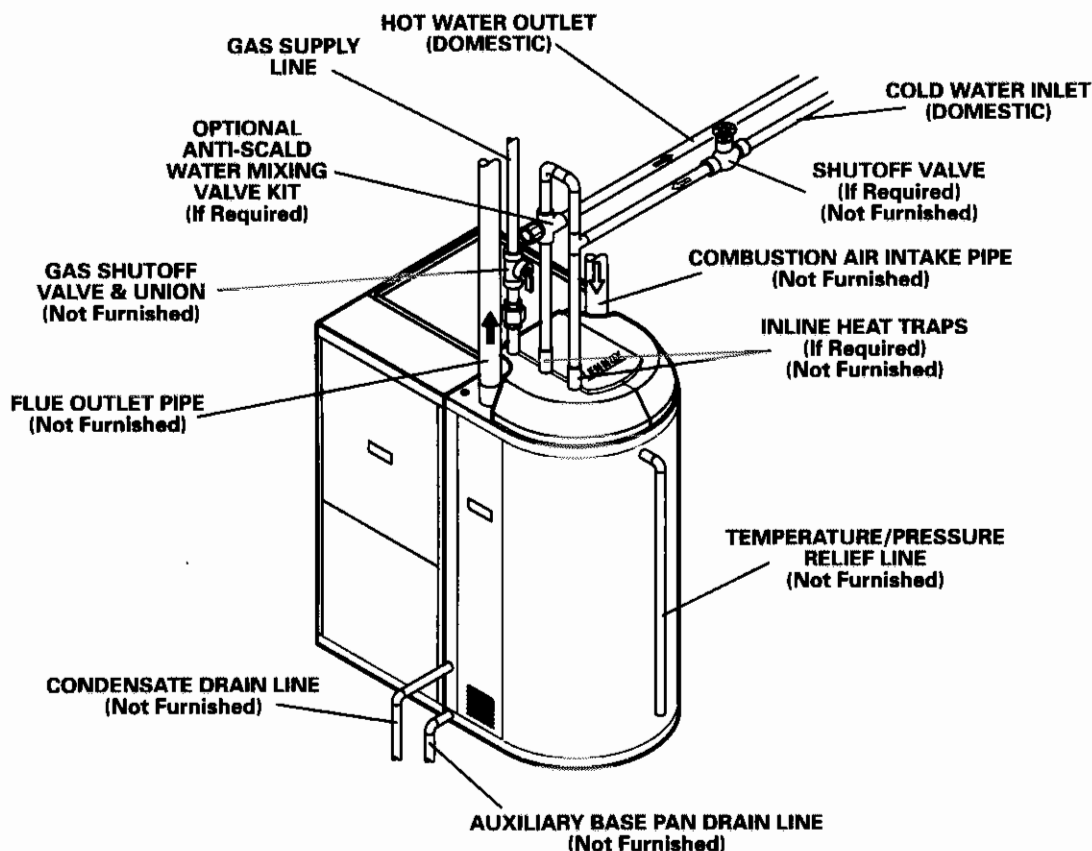
The chart below includes the AM30Q2/3-70 heating performance curve. At .3" w.c. static pressure, with a medium-high heating speed and a water temperature of 140°F (60°C), the heating capacity will be 64,000 Btuh (18.8kW).

Using the same table, it is easy to see that by simply varying the heating speed to medium-low and adjusting the water temperature to 160°F (71.1°C), the same system will have a heating capacity of 72,500 Btuh (21.2kW).

AM30Q2/3-70 HEATING PERFORMANCE CURVE



TYPICAL CompleteHeat SYSTEM PLUMBING (AM30 and HM30 in close-coupled application)



NOTE — All piping and components must conform to local plumbing codes. Additional components may be required.

FIGURE 3

V-CompleteHeat SYSTEM APPLICATIONS

The CompleteHeat system can be installed in a wide variety of configurations, offering much-needed flexibility to the installer. The HM30 control box can easily be switched from one side of the unit to the other, so the HM30 may be installed on either the right or left side of the AM30. The most common CompleteHeat applications are illustrated in figure 4. Piping and field wiring of these applications are shown in figures 5 and 6.

Close-Coupled Installation

The AM30 air module is shipped with two piping sections necessary for close-coupled installation of the CompleteHeat system components. An interconnecting wiring harness is shipped with the HM30 heating module. Figure 3 shows typical plumbing of this system.

Remotely Positioned Installation

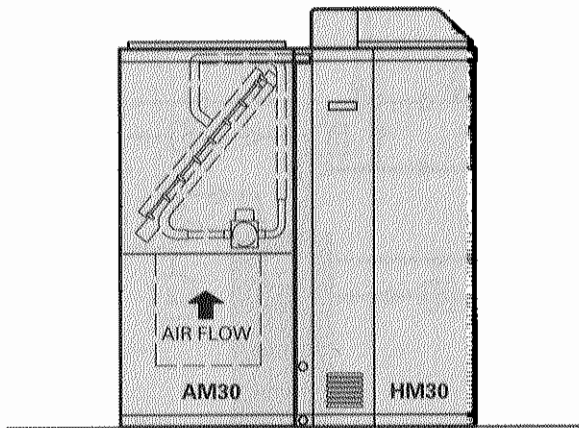
The HM30 and AM30 can be installed up to 30 feet away from each other without requiring an additional circulating pump or larger pipe diameter. In these applications, wiring and plumbing connections must be

field fabricated. 120V power wiring may be run through a conduit from the AM30 to the HM30 or it can be brought directly to the HM30 from another power source. Since the HM30 is not equipped with a transformer, low voltage wiring must either be run between the two units or a transformer (cat. no. 78J43) must be added to the HM30. In addition, if the piping is run so that a potential for air pockets exists, air bleed ports should be added to the piping to facilitate air removal.

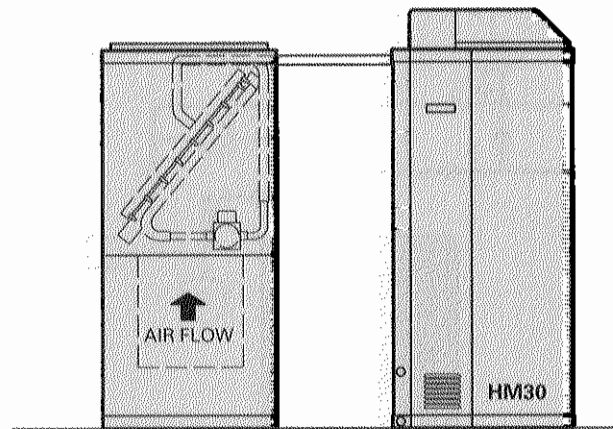
AM30 Multi-Position Air Module

The AM30 air module can be installed in the upflow or horizontal position without requiring any internal modification. If the AM30 is installed in the downflow position, the blower motor must be removed and reinstalled, so that the oiling port is in the upright position. This simple change takes minutes to perform. A downflow/horizontal kit (cat. no. 74J25) is available to facilitate plumbing between the AM30 and HM30 when the units are close-coupled in a downflow or horizontal application. An anti thermal siphon kit (cat. no. 79J84) is required in the return piping anytime the AM30 coil is installed above the HM30. See figure 4 for typical AM30 positions.

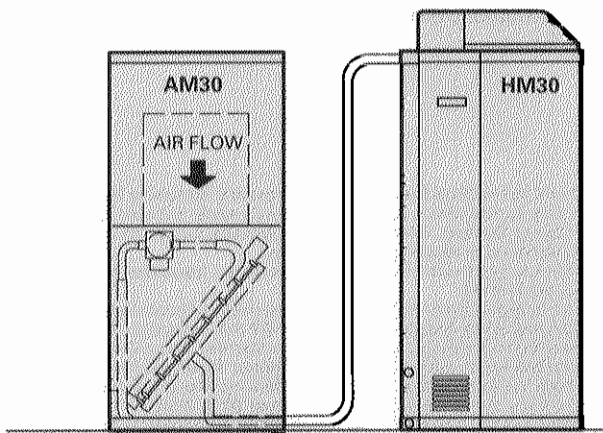
CompleteHeat System Applications



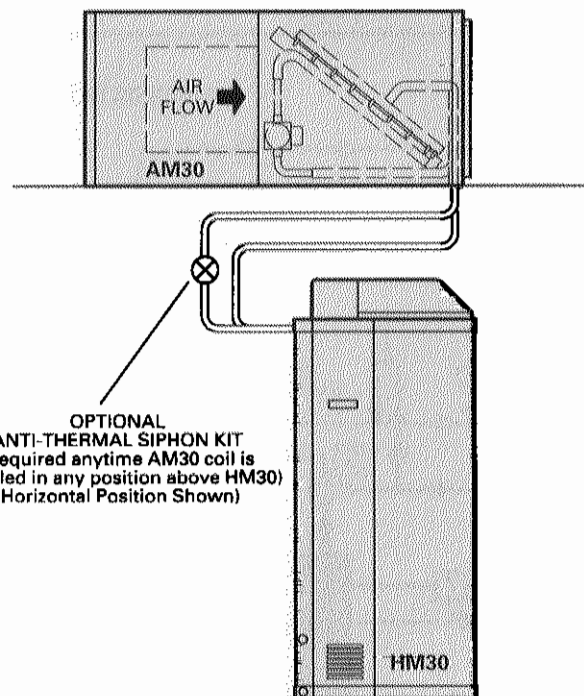
UPFLOW CLOSE COUPLED



UPFLOW REMOTELY POSITIONED



DOWNFLOW REMOTELY POSITIONED

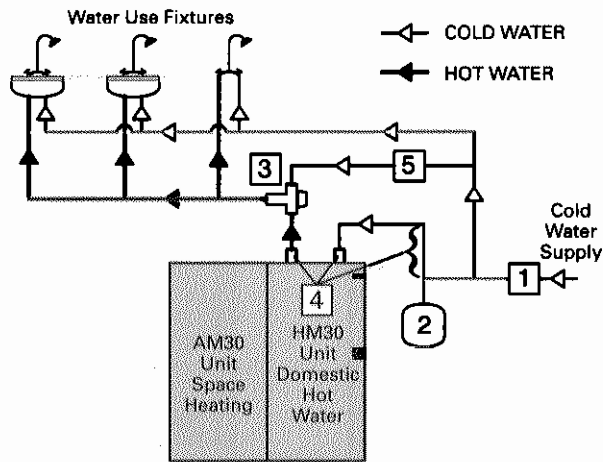


HORIZONTAL REMOTELY POSITIONED

FIGURE 4

PIPING SCHEMATICS TYPICAL CompleteHeat Applications

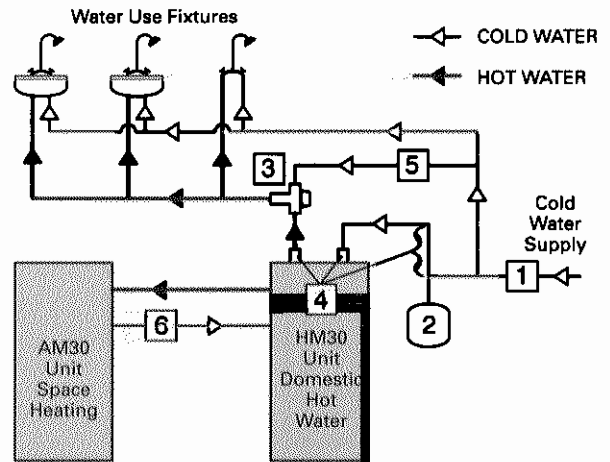
DOMESTIC HOT WATER and SPACE HEATING (Close Coupled)



- 1 = Check Valve, Backflow Preventer, Pressure Reducing Valve or any device which turns the domestic water system into a Closed System. (May be required by local codes. May already be installed in existing water system)
- 2 = Thermal Expansion Tank for potable water. (required in closed system)
- 3 = Anti-Scald Mixing Water Valve (if required by local code)
- 4 = Optional inline heat trap OR 6 inch (152 mm) offset pipe trap may be used to help reduce heat loss due to thermal siphoning. Pipe trap is required when optional Anti-Scald Water Mixing Valve is installed.
- 5 = Check Valve (if optional Anti-Scald Mixing Water Valve is required)

NOTE — All plumbing must conform to local codes.

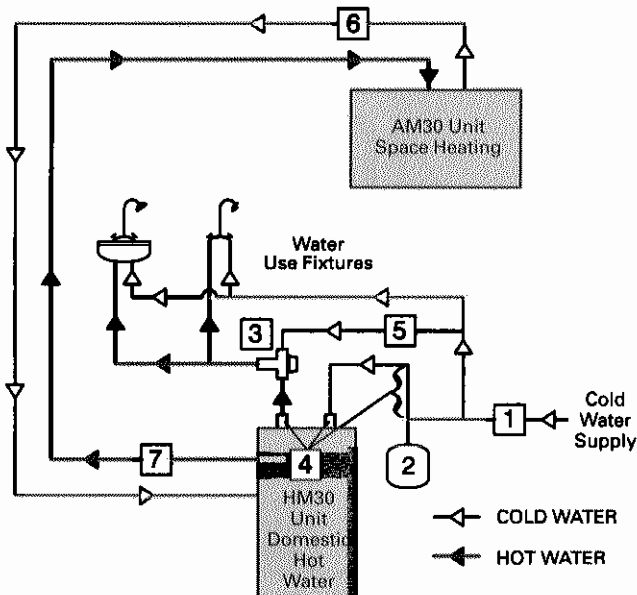
DOMESTIC HOT WATER and SPACE HEATING (Remote)



- 1 = Check Valve, Backflow Preventer, Pressure Reducing Valve or any device which turns the domestic water system into a Closed System. (May be required by local codes. May already be installed in existing water system)
- 2 = Thermal Expansion Tank for potable water. (required in closed system)
- 3 = Anti-Scald Mixing Water Valve (if required by local code)
- 4 = Optional inline heat trap OR 6 inch (152 mm) offset pipe trap may be used to help reduce heat loss due to thermal siphoning. Pipe trap is required when optional Anti-Scald Water Mixing Valve is installed.
- 5 = Check Valve (if optional Anti-Scald Mixing Water Valve is required)
- 6 = Auxiliary Pump (required for runs over 30 ft. (9 m))

NOTE — All plumbing must conform to local codes.

DOMESTIC HOT WATER and SPACE HEATING (Horizontal)



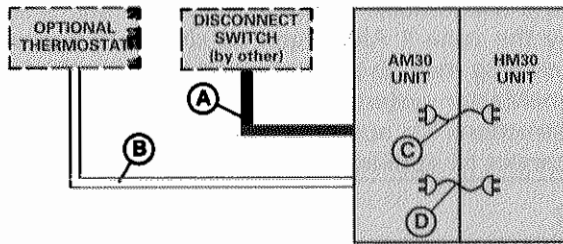
- 1 = Check Valve, Backflow Preventer, Pressure Reducing Valve or any device which turns the domestic water system into a Closed System. (May be required by local codes. May already be installed in existing water system)
- 2 = Thermal Expansion Tank for potable water. (required in closed system)
- 3 = Anti-Scald Mixing Water Valve (if required by local code)
- 4 = Optional inline heat trap OR 6 inch (152 mm) offset pipe trap may be used to help reduce heat loss due to thermal siphoning. Pipe trap is required when optional Anti-Scald Water Mixing Valve is installed.
- 5 = Check Valve (if optional Anti-Scald Mixing Water Valve is required)
- 6 = Auxiliary Pump (required for runs over 30 ft. (9 m))
- 7 = Anti-Thermal Siphon Kit (required when AM30 coil is located above HM30)

NOTE — All plumbing must conform to local codes.

FIGURE 5

FIELD WIRING

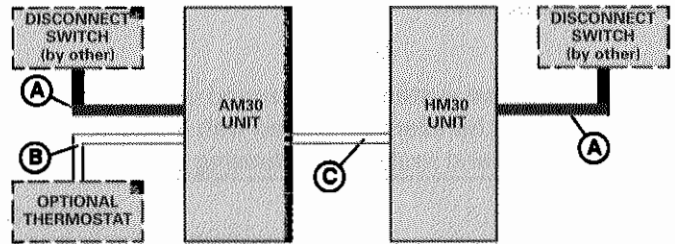
CLOSE-COUPLED APPLICATION



- A — Two wire power with ground
- B — Three wire low voltage (Heating Only)
Four wire low voltage (Cooling)
- C — Four wire low voltage (Harness furnished with AM30)
- D — Two wire power (Harness furnished with AM30)
- Field wiring not furnished —

All wiring must conform to NEC or CEC and local electrical codes.

REMOTE APPLICATION



- A — Two wire power with ground
- B — Three wire low voltage (Heating Only)
Four wire low voltage (Cooling)
- C — Four wire low voltage
- Field wiring not furnished —

All wiring must conform to NEC or CEC and local electrical codes.

FIGURE 6

VI-OPTIONAL ACCESSORIES

The following field-provided accessories may be required in some CompleteHeat applications.

- ☐ **ANTI-SCALD WATER MIXING VALVE** — Required in domestic hot water outlet when HM30 water temperature is above 140°F (60°C) or when required by local codes. Valve is recommended when tank temperature setting is over 120°F (32°C). Six valves are available in three pipe sizes and two temperature ranges.
- ☐ **DOWNFLOW/HORIZONTAL PLUMBING KIT** — Includes water piping elbows required when AM30 and HM30 are remotely installed.
- ☐ **INLINE HEAT TRAPS OR OFFSET PIPE TRAP** — Either inline heat trap or 6 inch (152 mm) offset pipe trap may be used to minimize heat loss due to thermal siphoning. Offset pipe trap is required when optional anti-scald water mixing valve is installed.
- ☐ **STAND-ALONE TRANSFORMER KIT** — 120/24 volt transformer provides 24 volt power to HM30. Allows stand-alone application of HM30 unit as a high efficiency water heater or heat source for radiant floor system.
- ☐ **HM30 CONTROL INTERFACE KIT** — Required when HM30 is used as a heat source for radiant floor system or other hydronic system. Provides thermostat demand for hydronic system and controls hydronic pump operation and auxiliary supply air operation.

- ☐ **HM30 ZONE CONTROL BOARD** — Provides communication link between a single HM30 and up to four AM30 units.
- ☐ **ANTI-THERMAL SIPHON KIT** — Inline check valve prevents thermal siphoning when AM30 coil is located above HM30.
- ☐ **FREEZESTAT KIT** — Required when AM30 is installed in unconditioned space. Thermostat activates circulating pump when AM30 coil temperature drops below 45°F (7°C).
- ☐ **AUXILIARY PUMP** — Required in return line between AM30 and HM30 when units are installed more than 30 feet (9.1m) apart. Auxiliary relay contacts are provided on AM30 control board for electrical connections. See table 2 for pump usage.

TABLE 2
PUMPS NEEDED FOR RUNS OVER 30 FEET (9.1m)

AM30 MODELS	PUMP CATALOG NUMBER
	31 – 120 FEET (9.4m TO 36.6m)
Q2-50	53J75
Q3-70	
Q4-70	
Q4-90	53J76
Q5-90	
Q4-105	
Q5-120	

VII-OTHER APPLICATIONS

The AM30 and HM30 units can be used in a variety of applications. When using the HM30 without the AM30, however, an HM30 stand-alone transformer kit (cat. no. 78J43) must be used.

Zoning

The CompleteHeat system can be zoned using as many as four AM30 air handlers combined with a single HM30 heating module and multiple condensing units. In these

applications, the HM30 must be sized for the entire heating load. AM30s are individually sized according to zone heating and cooling loads. An HM30 Zone Control Board (90J02) is required for use in this application. Figure 7 details piping of a zoned space heating system using one HM30 and two AM30s. Power to the HM30 unit is supplied by the zone 1 AM30 unit as shown in figure 8. Zoned cooling may also be achieved by using the Lennox ZoneMaster system. Refer to ZoneMaster installation instructions for specifics. The Harmony II control board cannot be applied to the CompleteHeat system.

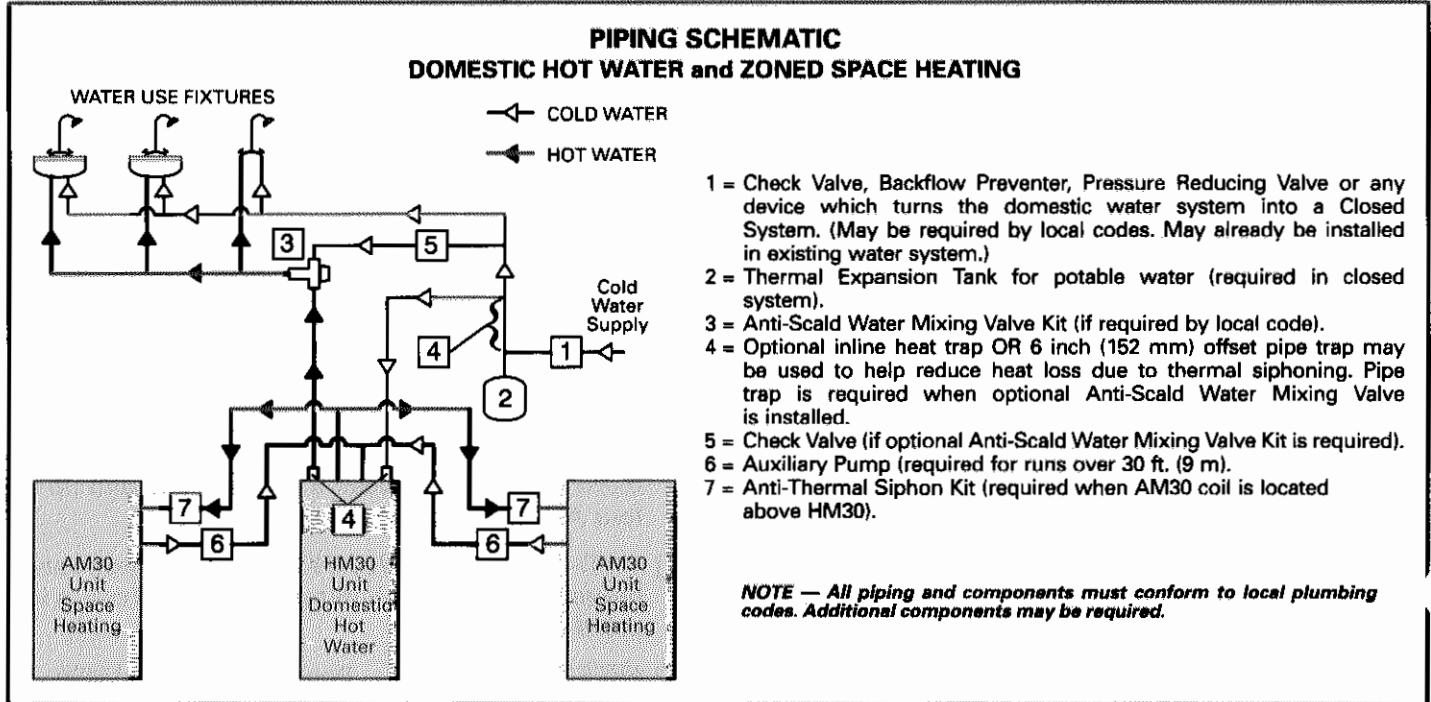


FIGURE 7

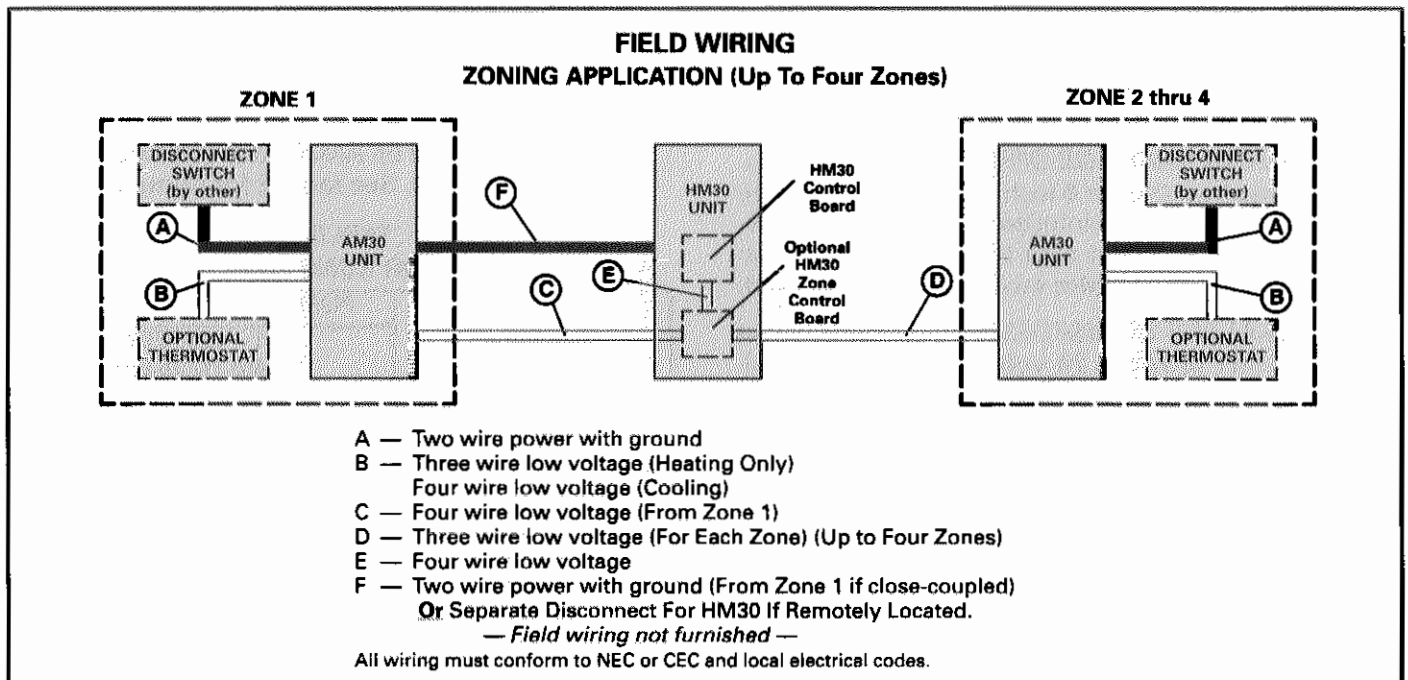


FIGURE 8

HM30 Used as High-Efficiency Hot Water Heater

The HM30 can be used as a stand-alone high-efficiency hot water heater. Due to its exceptional recovery rate, the HM30 is ideal for commercial (or residential) applications which require large volumes of domestic hot water. The 30-gallon (114L) tank has a heating capacity of up to four times that of most conventional water heaters. In these applications, the HM30 stand-alone transformer kit (78J43) is required.

The HM30, when used as a high-efficiency, stand-alone water heater should be sized to meet peak hour demands for hot water.

To estimate your peak hour demand, determine the hour during a typical day when hot water usage is highest. Use the information in figure 9 to determine typical hot water usage during that hour. As the table and examples illustrate, the HM30 water temperature setting will affect the water usage calculations.

DETERMINING PEAK HOUR HOT WATER USAGE

ACTIVITY	AVERAGE GALLONS (L) PER USAGE AT A GIVEN THERMOSTAT SETTING				NUMBER OF TIMES USED DURING HOUR OF HIGHEST DEMAND		GALLONS (L) USED DURING HOUR OF PEAK DEMAND
	140°F (60°C)	130°F (54.4°C)	120°F (48.9°C)				
*BATH OR SHOWER	15(56.8L)	17(64.4L)	19(71.9L)	X		=	
SHAVE	3 (11.4L)	4 (15.1L)	5 (18.9L)	X		=	
WASH HANDS OR FACE	4 (15.1L)	5 (18.9L)	6 (22.7L)	X		=	
SHAMPOO HAIR	4 (15.1L)	5 (18.9L)	6 (22.7L)	X		=	
HANDWASH DISHES	4 (15.1L)	5 (18.9L)	6 (22.7L)	X		=	
AUTOMATIC DISHWASHER	15(56.8L)	15(56.8L)	15(56.8L)	X		=	
AUTOMATIC CLOTHES WASHER	28(106L)	28(106L)	28(106L)	X		=	

*Based on 3 GPM shower flow and standard-sized bathtub.

TOTAL (Peak Hour Demand) _____

EXAMPLE:

[HM30 setting — 130°F (54.4°C)]

On a typical morning from 6:15 a.m. to 7:15 a.m. hot water usage is as follows:

- 2 showers — 2 X 17 gals. (64.4L) = 34 gals. (128.7L)
- 1 shave — 4 gals. (15.1L)
- 1 face wash — 5 gals. (18.9L)
- 1 handwash dishes — 5 gals. (18.9L)
- 1 automatic clothes washer — 28 gals. (106L)

TOTAL PEAK HOUR DEMAND: 76 gals. (L)

RECOMMENDATION: With first hour recovery rating of 163 gallons (617L), the HM30-100 will easily handle the 76 gallon (287.7L) peak hour demand.

EXAMPLE:

[HM30 setting — 120°F (48.9°C)]

On a typical morning from 6:45 a.m. to 7:45 a.m. hot water usage is as follows:

- 4 showers — 4 X 19 gals. = 76 gals. (287.7L)
- 1 shave — 5 gals. (18.9L)
- 2 shampoo — 2 X 6 gals. = 12 gals. (45.4L)
- 1 face wash — 6 gals. (22.7L)
- 1 handwash dishes — 6 gals. (22.7L)
- 1 automatic clothes washer — 28 gals. (106L)

TOTAL PEAK HOUR DEMAND: 125 gals. (473.2L)

RECOMMENDATION: With first hour recovery rating of 163 gallons (617L), the HM30-100 will easily handle the 125 gallon (473.2L) peak hour demand.

FIGURE 9

Indirect Heat Transfer Domestic Water Heating

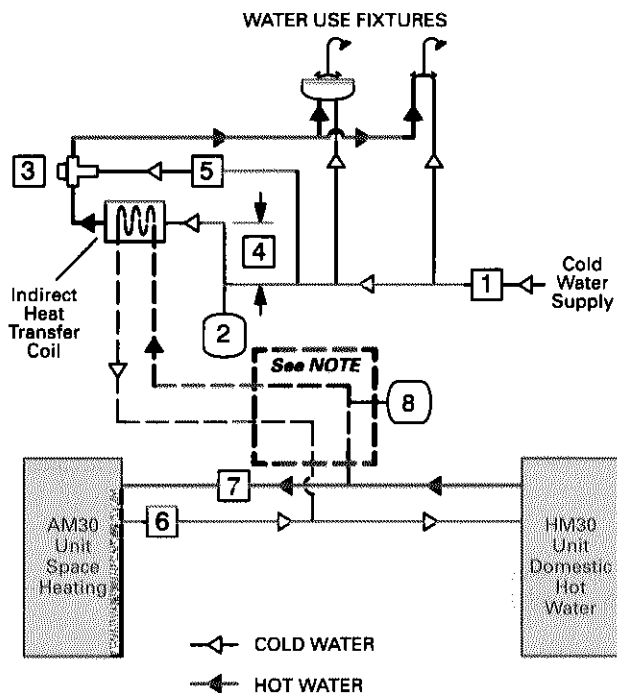
When local codes do not permit use of a single heat source for both space heating and domestic hot water supply, the HM30 may be used to indirectly heat water in a separate hot water storage tank.

In this application, hot water from the HM30 is routed through a heat exchanger loop in the indirect heat transfer tank. Domestic hot water is supplied by this tank forming a closed loop between the HM30 and the

indirect heat transfer tank.

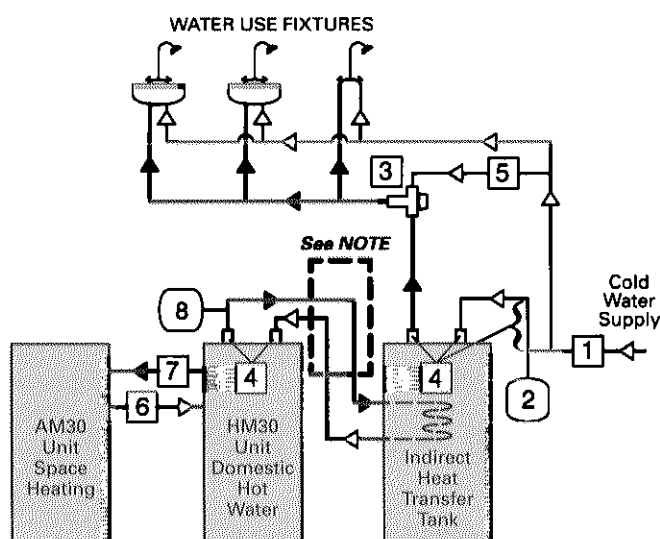
Figure 10 shows two possible piping schematics for using the CompleteHeat system with an indirect heat transfer tank. The first schematic shows piping to the indirect tank heat exchanger coming from the AM30 supply and return lines. This piping configuration provides 10 to 15°F (5.6 to 8.3°C) hotter water to the indirect heat transfer tank heat exchanger when compared with the second piping configuration.

INDIRECT HEAT TRANSFER FOR DOMESTIC HOT WATER AND SPACE HEATING



- 1 = Check Valve, Backflow Preventer, Pressure Reducing Valve or any device which turns the domestic water system into a closed system. (May be required by local codes. May already be installed in existing water system.)
- 2 = Thermal Expansion Tank for potable water (required in closed system).
- 3 = Anti-Scald Water Mixing Valve Kit (if required by local code).
- 4 = Optional inline heat trap OR 6 inch (152 mm) offset pipe trap may be used to help reduce heat loss due to thermal siphoning. Pipe trap is required when optional Anti-Scald Water Mixing Valve is installed.
- 5 = Check Valve (if optional Anti-Scald Water Mixing Valve Kit is required).
- 6 = Auxiliary Pump (required for runs over 30 ft. (9 m)).
- 7 = Anti-Thermal Siphon Kit (required when AM30 coil is located above HM30).
- 8 = Thermal Expansion Tank (required in closed system).

NOTE — Refer to manufacturer of Indirect Water Heater for specifications and sizing of components. All piping and components must conform to local plumbing codes. Additional components may be required.



- 1 = Check Valve, Backflow Preventer, Pressure Reducing Valve or any device which turns the domestic water system into a closed system. (May be required by local codes. May already be installed in existing water system.)
- 2 = Thermal Expansion Tank for potable water (required in closed system).
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- 5 = Check Valve (if optional Anti-Scald Water Mixing Valve Kit is required).
- 6 = Auxiliary Pump (required for runs over 30 ft. (9 m)).
- 7 = Anti-Thermal Siphon Kit (required when AM30 coil is located above HM30).
- 8 = Thermal Expansion Tank (required in closed system).

NOTE — Refer to manufacturer of Indirect Water Heater for specifications and sizing of components. All piping and components must conform to local plumbing codes. Additional components may be required.

FIGURE 10

Radiant Floor Systems

The HM30 can also be used to provide hot water for a radiant floor or other hydronic system. See figure 11. These applications require the addition of the HM30 control interface kit (90J03) and an HM30 stand-alone transformer (cat. no. 78J43) to facilitate wiring to the HM30 unit. The HM30 control interface kit provides control functions of the AM30 control board. Figure 12 shows a typical piping schematic.

An auxiliary pump, expansion tank, reducer valve and air purger may also be required for this closed-loop application. Refer to manufacturer's instructions provided with radiant floor system for sizing and installation instructions.

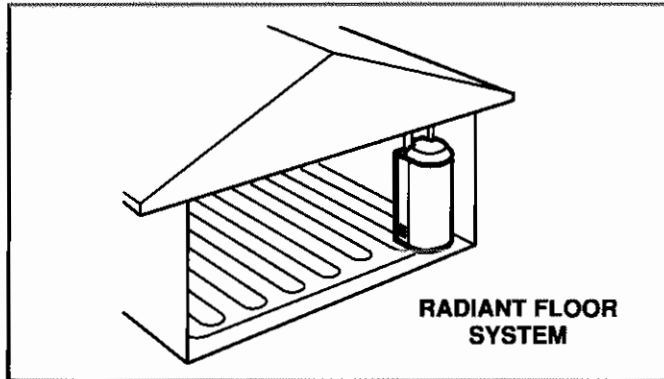


FIGURE 11

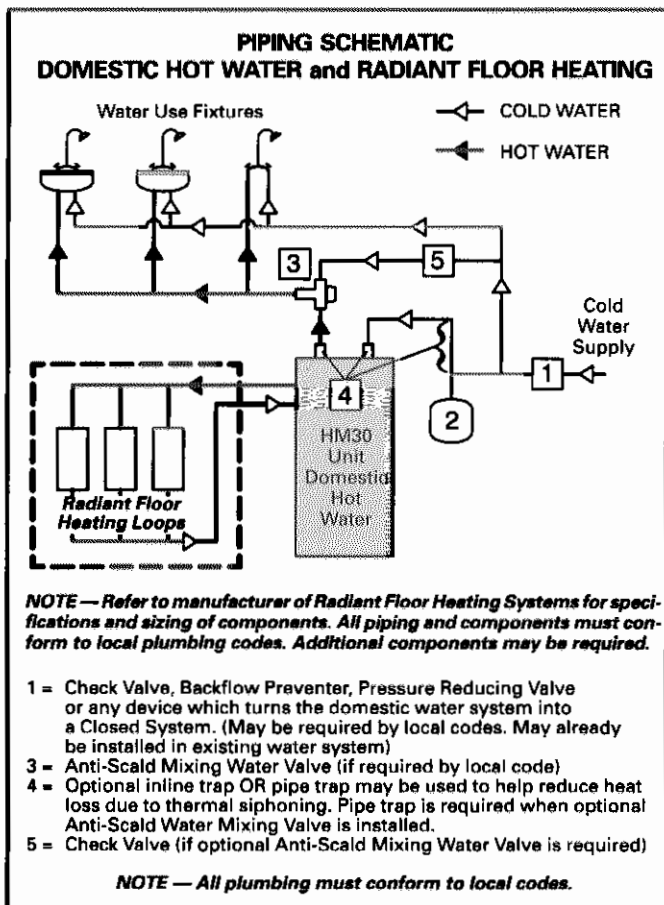


FIGURE 12

VIII-INSTALLATION CONSIDERATIONS

The following items must be considered when installing the CompleteHeat system:

- ☐ The CompleteHeat system **MUST NEVER** be connected to existing boiler piping, or other piping that was not previously used for potable water. Use clean, new plumbing piping and flush piping before it is used as domestic water source.
- ☐ Use only copper tubing approved for potable water plumbing.
- ☐ Do not use lead solder.
- ☐ When water piping is run through unconditioned areas, it must be protected to prevent freezing. Refer to the CompleteHeat installation instructions for details. Three freeze-protection options are available:
 - 1 Freeze thermostat (preferred) — Thermostat closes on lower temperature to activate the circulation pump. This method protects the coil as well as the plumbing.
 - 2 Heating cable kits — The cable is installed along the piping and is energized when the temperature drops below a setpoint.
 - 3 Pipe insulation — Insulation wrapped around the piping protecting from freezing.
- ☐ If water temperatures above 140°F are required, a jumper located on the heat module control board must be removed (see figure 13). An anti-scald valve must be installed in the domestic water piping if temperature is adjusted above 140°F.

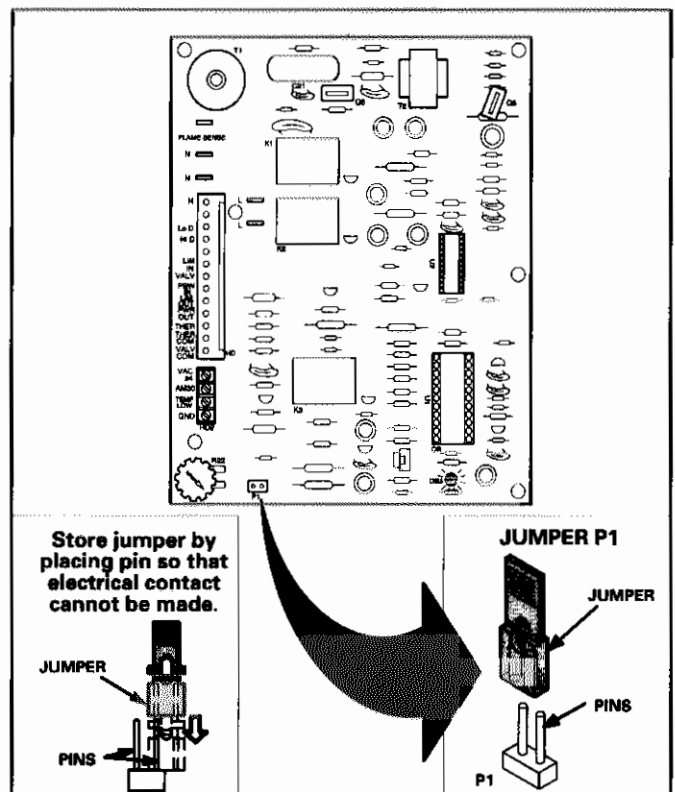


FIGURE 13

- ☐ For best results, configure plumbing to avoid air traps. If air traps cannot be avoided, air bleed ports are recommended. Pressure test plumbing lines using compressed air to check for leaks.
- ☐ Heat traps minimize energy loss due thermal siphoning. Either inline heat traps or a 6-inch (152mm) offset pipe trap may be used for this purpose. The 6-inch (152mm) offset pipe trap is required when the optional anti-scald water mixing valve is used. See figure 14.

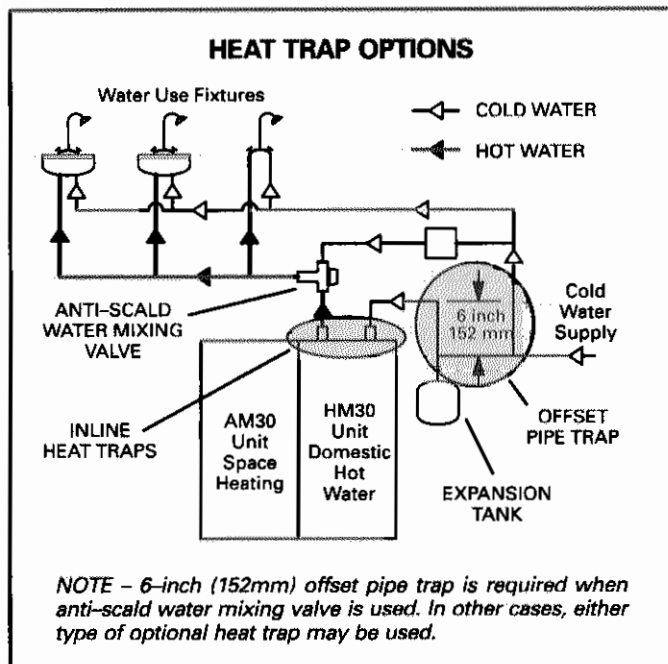


FIGURE 14

- ☐ A potable water expansion tank (79J14) is available for use in closed-loop potable water systems or if re-

quired by local codes. An unlined expansion tank may be used in closed-loop systems such as the indirect heat transfer system outlined on page 12. Figure 15 outlines components required in this application. When used together, a circulating pump must always be installed on the downstream side of the expansion tank.

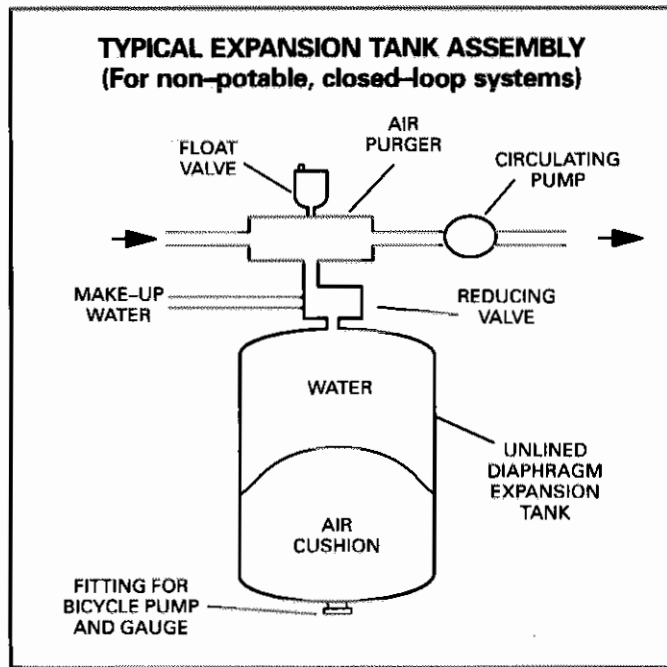


FIGURE 15