LENNOX®
Service Literature

UNIT INFORMATION
Corp. 9821-L12
Revised 08-2004

CompleteHeat™

CompleteHeat SYSTEM

The CompleteHeat™ system consists of the HM30 heating module and the AM30 air handling module. When used together, the CompleteHeat components offer high-efficiency space and hot water heating. The CompleteHeat system is available in space heating capacities of 40,000 to 120,000 Btuh and the heat module is available in inputs of 100,000 and150,000 Btuh. Refer to EHB for proper sizing.

The HM30 makes available hot water for both domestic water and space heating upon demand. The tank stores 30 U.S. gallons (114L) of hot water at adjustable temperatures ranging from 110°F to 160°F (43°C to 71°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 without the AM30, to provide hot water for radiant floor heating systems (refer to Application Manual). Units are factory equipped for either natural (-1, -3 and -5 units) or propane (-2P and -4 units) gas applications. HM30-4 and -5 models are equipped with an expansion tank and inlet water regulator valve.

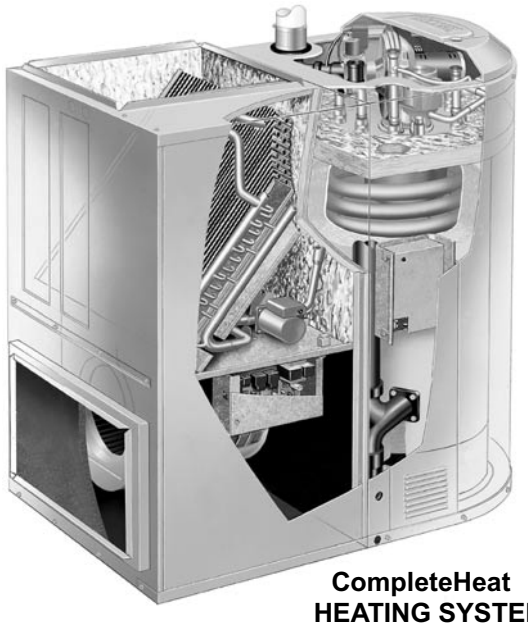
The AM30 is a multi-position air handling unit which may be installed in upflow, downflow or horizontal applications. The AM30 circulates hot water from the HM30 through its coil. The AM30 supply blower extracts the heat from the coil and distributes the heated air throughout the conditioned space.

Information contained in this manual is intended for use by Lennox service technicians only. All specifications are subject to change. Procedures outlined in this manual are presented as a recommendation only and do not supersede or replace local or state codes. In the absence of local or state codes, the guidelines and procedures outlined in this manual are recommended only.

ELECTROSTATIC DISCHARGE (ESD)
Precautions and Procedures

⚠ CAUTION

Electrostatic discharge can affect electronic components. Take precautions during unit installation and service to protect the furnace's electronic controls. Precautions will help to avoid control exposure to electrostatic discharge by putting the furnace, the control and the technician at the same electrostatic potential. Neutralize electrostatic charge by touching hand and all tools on an unpainted unit surface, such as the gas valve or blower deck, before performing any service procedure.



CompleteHeat HEATING SYSTEM

TABLE OF CONTENTS

SPECIFICATIONS - HM30 HEATING MODULE

Heat Module Model No.			HM30-100, 100P	HM30-150 150P
Input — Btuh (kW) high (Min Vent)			100,000 (29.3)	150,000 (44.0)
Output — Btuh (kW) high — space heating			90,000 (26.4)	135,000 (39.6)
Output — Btuh (kW) high — hot water heating			94,000 (27.5)	141,000 (41.3)
First Hour Rating — U.S. gals (L)			163 (617)	217 (821)
*CA_{ef} (Effective Water Heating Efficiency)			.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 — in. (mm)			1/2 (12.7)	NAT 3/4 (19) LP 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	
Optional Accessories (Must Be Ordered Extra)				
LPG/Propane Kit -1 Units only			**Not available**	**Not available**
Concentric Vent/Intake Air/Roof Termination Kit — 2 inch (51 mm) only			**60G77**	
†Vent/Intake Air Roof Termination Kit — vent size	2 inch (51 mm)		**15F75**	
	3 inch (76 mm)		**44J41**	
†Vent/Intake Air Wall Termination Kit — vent size	2 inch (51 mm)		**15F74** (ring kit) or **22G44** (close couple) **30G79** (close cpl. with ext. riser) or ✿**30G28** (close couple)	
	3 inch (76 mm)		**44J40**	
Intake/Exhaust Vent Adaptor Kit — 3 inch (76 mm) to 2 inch (51mm)			**78J39**	
Stand-alone Transformer Kit			**78J43**	
Magnesium Anode Rod Kit -1 Units only			**Not Available**	
Anti-Scald Water Mixing Valve Kits	Adjustable Range 85°F to 150°F (29°C to 66°C)	3/4 inch (19 mm)	**99L99**	
	Adjustable Range 85°F to 150°F (29°C to 66°C)	1 inch (25.4 mm)	**10M00**	
HM30 Zone Control Board			**90J02**	
HM30 Control Interface Kit			**90J03**	
Expansion Tank			**79J14**	
Air Bleed Valve		3/4 inch (19 mm)	**29K45**	
		1 inch (25.4 mm)	**29K50**	

*CA_{ef} (Effective Water Heating Capacity) = The effective efficiency of the combined appliance in performing the function of providing potable hot water.
NOTE — CA_{ef} is the same rating as the Energy Factor (EF) for water heaters as determined by U.S. Department of Energy test procedures.
†Determine from venting tables proper intake and exhaust pipe size and termination kit required.

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
		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 minute (L per minute)		6 (23)	6 (23)	6 (23)
Heating Coil	Heating capacity range	Btuh	21,600 - 55,300	27,500 - 90,000	43,800 - 109,400
		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
		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
		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		
Optional Accessories (Must Be Ordered Extra)					
Auxiliary Pump			**53J75** — 30 to 120 ft. (9.1 to 36.6 m)		
Anti-Thermal Siphon Kit			**73J84**		
Downflow/Horizontal Kit			**74J25**		

*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
		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 minute (L per minute)		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
		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			
		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
		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			
Optional Accessories (Must Be Ordered Extra)						
Auxiliary Pump			**53J76** — 30 to 120 ft. (19.1 to 36.6 m)			
Anti-Thermal Siphon Kit			**73J84**			
Downflow/Horizontal Kit			**74J25**			

†NOTE — If AM30Q3/4-90, AM30Q4/5-90 or AM30Q3/4-105 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.

ELECTRICAL

Unit	Minimum Circuit Ampacity
AM30Q2-40	5.6
AM30Q2/3-70	8.6
AM30Q3/4-70	12.2
AM30Q3/4-90	12.4
AM30Q3/4-105	12.4
AM30Q4/5-90	13.8
AM30Q4/5-120	13.8
HM30-100	5.0
HM30-150	5.0

Unit	Minimum Circuit Ampacity
AM30Q2-40 with HM30	6.9
AM30Q2/3-70 with HM30	9.9
AM30Q3/4-70 with HM30	13.5
AM30Q3/4-90 with HM30	13.7
AM30Q3/4-105 with HM30	13.7
AM30Q4/5-90 with HM30	15.0
AM30Q4/5-120 with HM30	15.0

Unit	Maximum Fuse or Circuit Breaker Size
AM30 only	15.0
HM30 only	15.0
AM30 with HM30	15.0

* Where current does not exceed 100 amps, HACR type circuit breaker may be used in place of fuse (U.S. only)

HEATING EFFICIENCY

SYSTEM RATINGS WITH HM30-100 HEATING MODULE

Heat Module Model No.	HM30-100					
Air Module Model No.	AM30Q2-40	AM30Q2/3-70	AM30Q3/4-70	AM30Q3/4-90	AM30Q4/5-90	AM30Q3/4-105
●CAE (Combined Annual Efficiency)	.90					
*CA_{afue} (Effective Space Heating Efficiency)	.90					

NOTE — Tested in accordance with ANSI/ASHRAE Standard 124 "Methods of Testing for Rating Combination Space-Heating and Water Heating Appliances".
●CAE (Combined Annual Efficiency) = The overall efficiency of the appliance in providing both space heating and water heating.
*CA_{afue} (Effective Space Heating Efficiency) = The effective efficiency of the combined appliance in performing the function of space heating.
NOTE — CA_{afue} is the same rating as the Annual Fuel Utilization Efficiency (A.F.U.E.) as determined by U.S. Department of Energy test procedures.

SYSTEM RATINGS WITH HM30-150 HEATING MODULE

Heat Module Model No.	HM30-150						
Air Module Model No.	AM30Q2-40	AM30Q2/3-70	AM30Q3/4-70	AM30Q3/4-90	AM30Q4/5-90	AM30Q3/4-105	AM30Q4/5-120
●CAE (Combined Annual Efficiency)	.90						
*CA_{afue} (Effective Space Heating Efficiency)	.90						

NOTE — Tested in accordance with ANSI/ASHRAE Standard 124 "Methods of Testing for Rating Combination Space-Heating and Water Heating Appliances".
●CAE (Combined Annual Efficiency) = The overall efficiency of the appliance in providing both space heating and water heating.
*CA_{afue} (Effective Space Heating Efficiency) = The effective efficiency of the combined appliance in performing the function of space heating.
NOTE — CA_{afue} is the same rating as the Annual Fuel Utilization Efficiency (A.F.U.E.) as determined by U.S. Department of Energy test procedures.

BLOWER PERFORMANCE DATA

AM30Q2-40 BLOWER PERFORMANCE

External Static Pressure		Air Volume at Specific Blower Taps					
		High		Medium		Low	
in. w.g.	Pa	cfm	L/s	cfm	L/s	cfm	L/s
0	0	1100	520	850	400	680	320
.10	25	1085	510	830	390	670	315
.20	50	1045	495	800	380	640	300
.30	75	1005	475	770	365	610	290
.40	100	950	450	730	345	580	275
.50	125	890	420	690	325	530	250
.60	150	810	380	630	295	480	225
.70	175	730	345	570	270	410	195
.80	200	640	300	490	230	330	155
.90	225	520	245	380	180	- - - -	- - - -

NOTE — All air data is measured external to unit and includes hot water coil air resistance with air filter in place.

BLOWER PERFORMANCE DATA

AM30Q2/3-70 BLOWER PERFORMANCE

External Static Pressure		Air Volume at Specific Blower Taps							
		High		Medium-High		Medium-Low		Low	
in. w.g.	Pa	cfm	L/s	cfm	L/s	cfm	L/s	cfm	L/s
0	0	1500	710	1310	620	1070	505	840	395
.10	25	1440	680	1270	600	1050	495	820	385
.20	50	1370	645	1220	575	1020	480	800	380
.30	75	1300	615	1180	555	980	460	770	365
.40	100	1240	585	1120	530	930	440	740	350
.50	125	1170	550	1050	495	870	410	700	330
.60	150	1090	515	960	455	800	380	650	305
.70	175	990	465	870	410	720	340	590	380
.80	200	880	415	770	365	630	295	500	235
.90	225	750	355	650	305	520	245	- - - -	- - - -

NOTE — All air data is measured external to unit and includes hot water coil air resistance with air filter in place.

AM30Q3/4-70 AND AM30Q3/4-90 BLOWER PERFORMANCE

External Static Pressure		Air Volume at Specific Blower Taps							
		High		Medium-High		Medium-Low		Low	
in. w.g.	Pa	cfm	L/s	cfm	L/s	cfm	L/s	cfm	L/s
0	0	2060	970	1640	775	1420	670	1110	525
.10	25	2000	945	1640	775	1430	675	1110	525
.20	50	1930	910	1630	770	1420	670	1120	530
.30	75	1850	875	1600	755	1410	665	1110	525
.40	100	1770	835	1550	730	1370	645	1090	515
.50	125	1670	790	1480	700	1300	615	1060	500
.60	150	1560	735	1390	655	1230	580	1010	475
.70	175	1420	670	1280	605	1130	535	930	440
.80	200	1280	605	1140	540	1020	480	830	390
.90	225	1100	520	980	460	880	415	700	330

NOTE — All air data is measured external to unit and includes hot water coil air resistance with air filter in place.

AM30Q4/5-90 BLOWER PERFORMANCE

External Static Pressure		Air Volume at Specific Blower Taps									
		High		Medium-High		Medium		Medium-Low		Low	
in. w.g.	Pa	cfm	L/s	cfm	L/s	cfm	L/s	cfm	L/s	cfm	L/s
0	0	2350	1110	2020	955	1830	865	1630	770	1430	675
.10	25	2330	1100	2020	955	1820	860	1620	765	1430	675
.20	50	2300	1085	2010	950	1810	855	1610	760	1420	670
.30	75	2260	1065	1990	940	1780	840	1590	750	1410	665
.40	100	2200	1040	1950	920	1750	825	1560	735	1400	660
.50	125	2140	1010	1900	895	1720	810	1530	720	1370	645
.60	150	2060	970	1860	875	1680	795	1500	710	1340	630
.70	175	1970	930	1780	840	1610	760	1460	690	1300	615
.80	200	1890	890	1700	800	1550	730	1400	660	1240	585
.90	225	1780	840	1610	760	1480	700	1330	630	1180	555

NOTE — All air data is measured external to unit and includes hot water coil air resistance with air filter in place.

BLOWER PERFORMANCE DATA

AM30Q3/4-105 BLOWER PERFORMANCE

External Static Pressure		Air Volume at Specific Blower Taps							
		High		Medium-High		Medium-Low		Low	
in. w.g.	Pa	cfm	L/s	cfm	L/s	cfm	L/s	cfm	L/s
0	0	2000	945	1640	775	1430	675	1110	525
.10	25	1930	910	1630	770	1430	675	1110	525
.20	50	1870	880	1610	760	1410	665	1110	525
.30	75	1790	845	1570	740	1380	650	1100	520
.40	100	1700	800	1500	710	1340	630	1080	510
.50	125	1600	755	1430	675	1260	595	1050	495
.60	150	1480	700	1340	630	1180	555	980	460
.70	175	1350	635	1200	565	1090	515	890	420
.80	200	1200	565	1060	500	970	460	780	370
.90	225	1050	495	900	425	810	380	650	305

NOTE — All air data is measured external to unit and includes hot water coil air resistance with air filter in place.

BLOWER PERFORMANCE DATA

AM30Q4/5-120 BLOWER PERFORMANCE

External Static Pressure		Air Volume at Specific Blower Taps									
		High		Medium-High		Medium		Medium-Low		Low	
in. w.g.	Pa	cfm	L/s	cfm	L/s	cfm	L/s	cfm	L/s	cfm	L/s
0	0	2400	1135	2100	990	1890	890	1700	800	1500	710
.10	25	2350	1110	2080	980	1880	885	1690	800	1500	710
.20	50	2300	1085	2050	965	1860	880	1680	795	1490	705
.30	75	2230	1050	2010	950	1830	865	1650	780	1470	695
.40	100	2160	1020	1970	930	1800	850	1620	765	1440	680
.50	125	2090	985	1920	905	1750	825	1590	750	1410	665
.60	150	2010	950	1860	880	1700	800	1540	725	1380	650
.70	175	1930	910	1800	850	1640	775	1500	710	1330	630
.80	200	1840	870	1710	805	1580	745	1430	675	1290	610
.90	225	1750	825	1650	780	1500	710	1350	635	1230	580

NOTE — All air data is measured external to unit and includes hot water coil air resistance with air filter in place.

HEATING PERFORMANCE

AM30Q2-40 HEATING OUTPUTS

Air Volume		Heating Outputs At Various Water Temperatures											
		120°F (49°C)		130°F (54°C)		140°F (60°C)		150°F (66°C)		160°F (71°C)		170°F (77°C)	
cfm	L/s	Btuh	kW	Btuh	kW	Btuh	kW	Btuh	kW	Btuh	kW	Btuh	kW
300	140	13,800	4.0	16,300	4.8	18,800	5.5	21,300	6.2	23,800	7.0	26,300	7.7
400	190	16,800	4.9	19,900	5.8	23,000	6.7	26,000	7.6	29,100	8.5	32,100	9.4
500	235	19,500	5.7	23,100	6.8	26,600	7.8	30,200	8.8	33,700	9.9	37,300	10.9
600	285	21,900	6.4	25,900	7.6	29,800	8.7	33,800	9.9	37,800	11.7	41,800	12.2
700	330	24,000	7.0	28,400	8.3	32,700	9.6	37,100	10.9	41,400	12.1	45,800	13.4
800	380	25,900	7.6	30,600	9.0	35,300	10.3	40,000	11.7	44,700	13.1	49,400	14.5
900	425	27,600	8.1	32,700	9.6	37,700	11.0	42,700	12.5	47,800	14.0	52,800	15.5
1000	470	29,300	8.6	34,600	10.1	39,900	11.7	45,200	13.2	50,500	14.8	55,800	16.3
1100	520	30,700	9.0	36,300	10.6	41,900	12.3	47,500	13.9	53,100	15.6	58,700	17.2
1200	565	32,100	9.4	37,900	11.1	43,800	12.8	49,600	14.5	55,500	16.3	61,300	18.0

HEATING PERFORMANCE

AM30Q2/3-70 HEATING OUTPUTS

Air Volume		Heating Outputs At Various Water Temperatures											
		120°F (49°C)		130°F (54°C)		140°F (60°C)		150°F (66°C)		160°F (71°C)		170°F (77°C)	
cfm	L/s	Btuh	kW	Btuh	kW	Btuh	kW	Btuh	kW	Btuh	kW	Btuh	kW
500	236	26,300	7.7	31,000	9.1	35,800	10.5	40,600	11.9	45,400	13.3	50,200	14.7
600	283	30,200	8.8	35,700	10.5	41,100	12.0	46,600	13.7	52,100	15.3	57,600	16.9
700	330	33,700	9.9	39,800	11.7	46,000	13.5	52,100	15.3	58,200	17.1	64,400	18.9
800	378	37,000	10.8	43,700	12.8	50,400	14.8	57,100	16.7	63,800	18.7	70,600	20.7
900	425	39,900	11.7	47,200	13.8	54,400	15.9	61,700	18.1	69,000	20.2	76,200	22.3
1000	472	42,700	12.5	50,400	14.8	58,200	17.1	66,000	19.3	73,700	21.6	81,500	23.9
1100	519	45,200	13.2	53,000	15.5	61,700	18.1	66,900	19.6	78,100	22.9	86,300	25.3
1200	566	47,600	13.9	56,200	16.5	64,900	19.0	73,500	21.5	82,200	24.1	90,800	26.6
1300	614	49,800	14.6	58,800	17.2	67,900	19.9	76,900	22.5	86,000	25.2	95,000	27.8
1400	661	51,800	15.2	61,300	18.0	70,700	20.7	80,100	23.5	89,500	26.2	99,000	29.0

AM30Q3/4-70 HEATING OUTPUTS

Air Volume		Heating Outputs At Various Water Temperatures											
		120°F (49°C)		130°F (54°C)		140°F (60°C)		150°F (66°C)		160°F (71°C)		170°F (77°C)	
cfm	L/s	Btuh	kW	Btuh	kW	Btuh	kW	Btuh	kW	Btuh	kW	Btuh	kW
650	305	32,700	9.6	38,600	11.3	44,600	13.1	50,500	14.8	56,500	16.6	62,400	18.3
800	380	37,900	11.1	44,800	13.1	51,600	15.1	58,500	17.1	65,400	19.2	72,300	21.2
950	450	42,400	12.4	50,200	14.7	57,900	17.0	65,600	19.2	73,300	21.5	81,000	23.7
1100	520	46,500	13.6	55,000	16.1	63,400	18.6	71,900	21.1	80,300	23.5	88,800	26.0
1250	590	50,100	14.7	59,200	17.3	68,400	20.0	77,500	22.7	86,600	24.4	95,700	28.0
1400	660	53,400	15.6	63,100	18.5	72,800	21.3	82,500	24.2	92,300	27.0	102,000	29.9
1550	730	56,400	16.5	66,600	19.5	76,900	22.5	87,100	25.5	97,400	28.5	107,600	31.5
1700	800	59,100	17.3	69,800	20.5	80,600	23.6	91,300	26.8	102,100	29.9	112,800	33.1
1850	875	60,600	17.8	72,800	21.3	84,000	24.6	95,200	27.9	106,400	31.2	117,600	34.5
2000	945	63,900	18.7	75,500	22.1	87,100	25.5	98,700	28.9	110,300	32.3	122,000	35.7

AM30Q3/4-90 HEATING OUTPUTS

Air Volume		Heating Outputs At Various Water Temperatures											
		120°F (49°C)		130°F (54°C)		140°F (60°C)		150°F (66°C)		160°F (71°C)		170°F (77°C)	
cfm	L/s	Btuh	kW	Btuh	kW	Btuh	kW	Btuh	kW	Btuh	kW	Btuh	kW
650	305	34,000	10.0	40,100	11.7	46,300	13.7	52,400	15.4	58,600	17.2	64,800	19.0
800	380	39,900	11.7	46,900	13.7	54,200	15.9	61,400	18.0	68,600	20.1	75,800	22.2
950	450	45,200	13.2	53,100	15.6	61,300	18.0	69,500	20.4	77,600	22.7	85,800	25.1
1100	520	50,000	14.7	58,700	17.2	67,800	19.9	76,800	22.5	85,800	25.1	94,900	27.8
1250	590	54,400	15.9	63,900	18.7	73,700	21.6	83,500	24.5	93,300	27.3	103,200	30.2
1400	660	58,400	17.1	68,600	20.1	79,100	23.2	89,700	26.3	100,200	29.4	110,800	32.5
1550	730	62,200	18.2	72,900	21.4	84,100	24.6	95,400	28.0	106,600	31.2	117,800	34.5
1700	800	65,700	19.3	77,000	22.6	88,800	26.0	100,600	29.5	112,500	33.0	124,300	36.4
1850	875	68,900	20.2	80,700	23.6	93,100	27.3	105,600	30.9	118,000	34.6	130,400	38.2
2000	945	72,000	21.1	84,200	24.7	97,200	28.5	110,100	32.3	123,100	36.1	136,100	39.9

HEATING PERFORMANCE

AM30Q4/5-90 HEATING OUTPUTS

Air Volume		Heating Outputs At Various Water Temperatures											
		120°F (49°C)		130°F (54°C)		140°F (60°C)		150°F (66°C)		160°F (71°C)		170°F (77°C)	
cfm	L/s	Btuh	kW	Btuh	kW	Btuh	kW	Btuh	kW	Btuh	kW	Btuh	kW
1100	520	50,000	14.7	58,700	17.2	67,800	19.9	76,800	22.5	85,800	25.1	94,900	27.8
1250	590	54,400	15.9	63,900	18.7	73,700	21.6	83,500	24.5	93,300	27.3	103,200	30.2
1400	660	58,400	17.1	68,600	20.1	79,100	23.2	89,700	26.3	100,200	29.4	110,800	32.5
1550	730	62,200	18.2	72,900	21.4	84,100	24.6	95,400	28.0	106,600	31.2	117,800	34.5
1700	800	65,700	19.3	77,000	22.6	88,800	26.0	100,600	29.5	112,500	33.0	124,300	36.4
1850	875	68,900	20.2	80,700	23.6	93,100	27.3	105,600	30.9	118,000	34.6	130,400	38.2
2000	945	71,200	20.9	84,200	24.7	97,200	28.5	110,100	32.3	123,100	36.1	136,100	40.0
2150	1015	74,100	21.7	87,500	25.6	101,100	29.6	114,400	33.5	127,900	37.5	141,400	41.4
2300	1085	76,700	22.5	90,600	26.5	104,500	30.6	118,500	34.7	132,400	38.8	146,400	42.9
2450	1155	79,100	23.2	93,500	27.4	107,900	31.6	122,300	35.8	136,700	40.1	151,100	44.3

AM30Q3/4-105 HEATING OUTPUTS

Air Volume		Heating Outputs At Various Water Temperatures											
		120°F (49°C)		130°F (54°C)		140°F (60°C)		150°F (66°C)		160°F (71°C)		170°F (77°C)	
cfm	L/s	Btuh	kW	Btuh	kW	Btuh	kW	Btuh	kW	Btuh	kW	Btuh	kW
650	305	37,500	11.0	44,400	13.0	51,200	15.0	58,000	17.0	64,900	19.0	71,700	21.0
800	380	44,700	13.1	52,900	15.5	61,000	17.9	66,200	19.4	77,300	22.6	85,400	25.0
950	450	51,400	15.1	60,700	17.8	70,000	20.5	79,400	23.3	88,700	26.0	98,100	28.7
1100	520	57,300	16.8	67,700	19.8	78,100	22.9	88,500	25.9	99,000	29.0	109,400	32.1
1250	590	62,900	18.4	74,300	21.8	85,700	25.1	97,200	28.5	108,600	31.8	120,000	35.2
1400	660	68,000	19.9	80,400	23.6	92,700	27.2	105,100	30.8	117,500	34.4	129,900	38.1
1550	730	72,800	21.3	86,000	25.2	99,300	29.1	112,500	33.0	125,700	36.8	139,000	40.7
1700	800	77,200	22.6	91,200	26.7	105,300	30.9	119,300	35.0	133,400	39.1	147,400	43.2
1850	875	81,300	23.8	96,100	28.2	110,900	32.5	125,700	36.8	140,500	41.1	155,300	15.5
2000	945	85,200	25.0	100,700	29.5	116,100	34.0	131,600	38.6	147,100	43.1	162,600	47.6

AM30Q4/5-120 HEATING OUTPUTS

Air Volume		Heating Outputs At Various Water Temperatures											
		120°F (49°C)		130°F (54°C)		140°F (60°C)		150°F (66°C)		160°F (71°C)		170°F (77°C)	
cfm	L/s	Btuh	kW	Btuh	kW	Btuh	kW	Btuh	kW	Btuh	kW	Btuh	kW
1100	520	57,300	16.8	67,700	19.8	78,100	22.9	88,500	25.9	99,000	29.0	109,400	32.1
1250	590	62,900	18.4	74,300	21.8	85,700	25.1	97,200	28.4	108,600	31.8	120,000	35.2
1400	660	68,000	19.9	80,400	23.6	92,700	27.2	105,100	30.8	117,500	34.4	129,900	38.1
1550	730	72,800	21.3	86,000	25.2	99,300	29.1	112,500	33.0	125,700	36.8	139,000	40.7
1700	800	77,200	22.6	91,200	26.7	105,300	30.9	119,300	35.0	133,400	39.1	147,400	43.2
1850	875	81,300	23.8	96,100	28.2	110,900	32.5	125,700	36.8	140,500	41.2	155,300	45.5
2000	945	85,200	25.0	100,700	29.5	116,100	34.0	131,600	38.6	147,100	43.1	162,600	47.6
2150	1015	88,700	26.0	104,900	30.7	121,000	35.5	137,200	40.2	153,300	44.9	169,400	49.6
2300	1085	92,100	27.0	108,900	31.9	125,600	36.8	142,400	41.7	159,100	46.6	175,900	51.5
2450	1155	95,300	27.9	112,600	33.0	129,900	38.1	147,200	43.1	164,600	48.2	181,900	53.3

VENT PIPE SIZING FOR CompleteHeat SYSTEM
MINIMUM DIAMETER OF INTAKE/EXHAUST PIPE

Vent Pipe Equivalent Feet **Max Feet	HM30-100 Series Pipe Diameter Inches	HM30-150 Series Pipe Diameter Inches
10	2	2
20	2	2
30	2 or 3*	2 or 3*
40	2 or 3*	2 or 3*
50	2 or 3*	3*
60	3*	3*
70	3	3
80	3	3
90	3	3
100	3	3
110	3	3
120	3	3
130	3	3

**Requires the use of 2" (51 mm) termination kit instead of 3" (76 mm) kit.*
***Maximum feet must include vent termination (pipe and fittings) - See Table Below.*

EQUIVALENT FEET TABLE

Lennox Part No.	Description - Inches (mm)	HM30-100 Series Equivalent Ft. (m) use only with 2 in. pipe	HM30-150 Equivalent Ft. (m) use only with 2 in. pipe
60G77	2" (51) Concentric Vent/Intake Air Roof/Wall Termination Kit	13 (4)	17 (5.2)
15F75	2" (51) Vent/Intake Air Roof Termination Kit (w / two 2'' (51) 90 Degree Elbows & one 2" (51) Exhaust accelerator - Field Supplied	18 (5.5)	22 (7)
22G44	2" (51) Vent/Intake Air Wall Termination Kit (w / one 2" (51) 90 Degree Elbow (optional) & one 2" Exhaust Accelerator)	8 (2.4) 13 (10) w / optional elbow	12 (6) 17 (5.2) w/ optional elbow
30G28	2" (51) Vent/Intake Air Wall Termination Kit - Close Coupled (w / one 2" (51) 90 Degree Elbow & one 2" Exhaust Accelerator	13 (4)	17 (6)
30G79	2" Vent/Intake Air Wall Termination Kit - Close Coupled (w / 3 ft. Extension Riser WTKX 2" (51))	16 (5)	20 (6.1)
n/a	Standard Schedule 40 2" (51) 90 Degree Elbow	5 (1.5)	5 (1.5)
n/a	Standard Schedule 40 2" (51) 45 Degree Elbow	2.5 (.8)	2.5 (.8)
n/a	2" (51) Exhaust Accelerator - Schedule 40 2" x 1 1/2" (51 x 38) Reducer w / 12" (305) Long Pipe	8 (2.4)	12 (6)

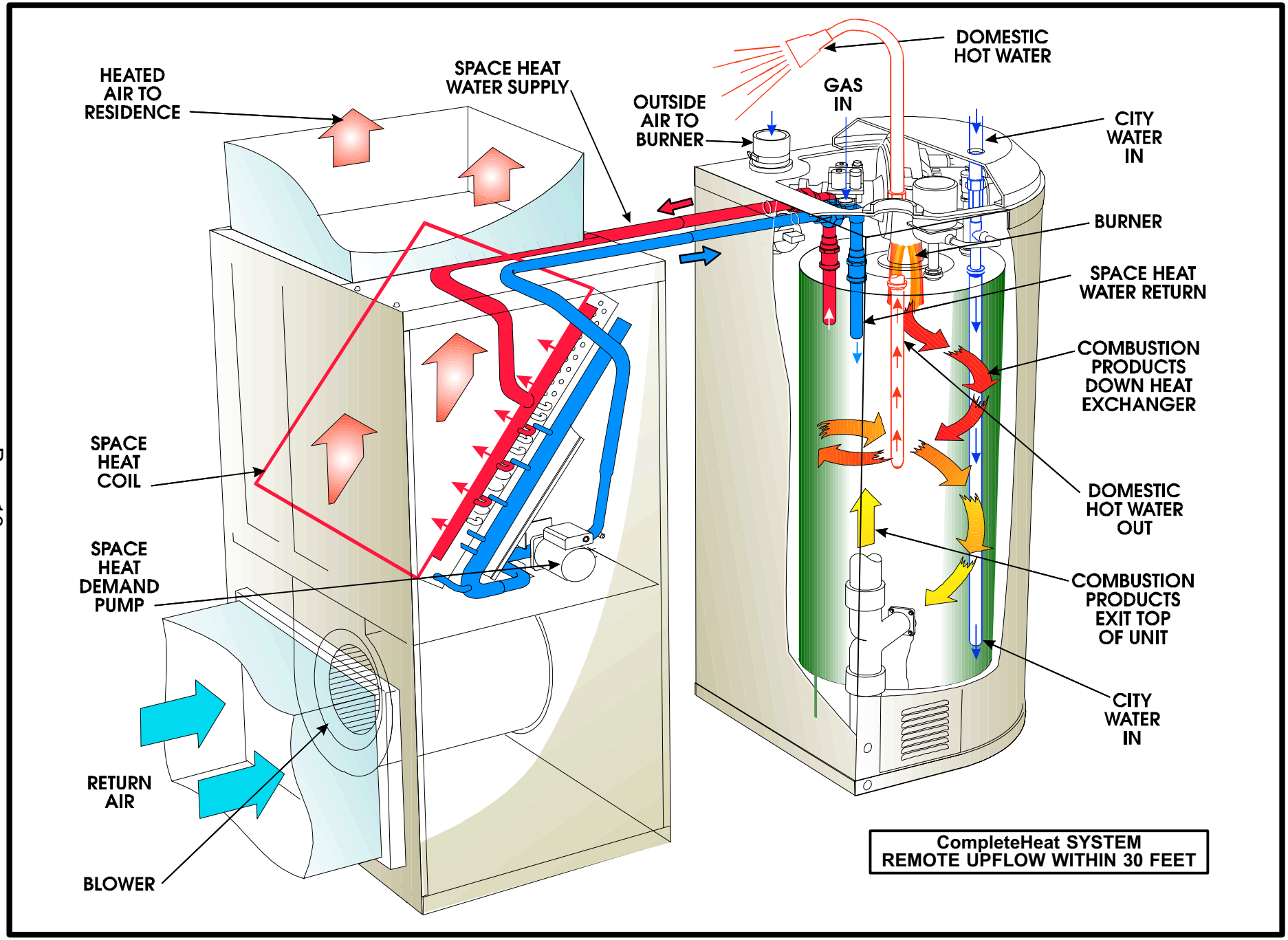

HEATED AIR TO RESIDENCE
SPACE HEAT WATER SUPPLY
OUTSIDE AIR TO BURNER
GAS IN
DOMESTIC HOT WATER
CITY WATER IN
BURNER
SPACE HEAT WATER RETURN
COMBUSTION PRODUCTS DOWN HEAT EXCHANGER
DOMESTIC HOT WATER OUT
COMBUSTION PRODUCTS EXIT TOP OF UNIT
CITY WATER IN
SPACE HEAT COIL
SPACE HEAT DEMAND PUMP
RETURN AIR
BLOWER
CompleteHeat SYSTEM
REMOTE UPFLOW WITHIN 30 FEET

FIGURE 1

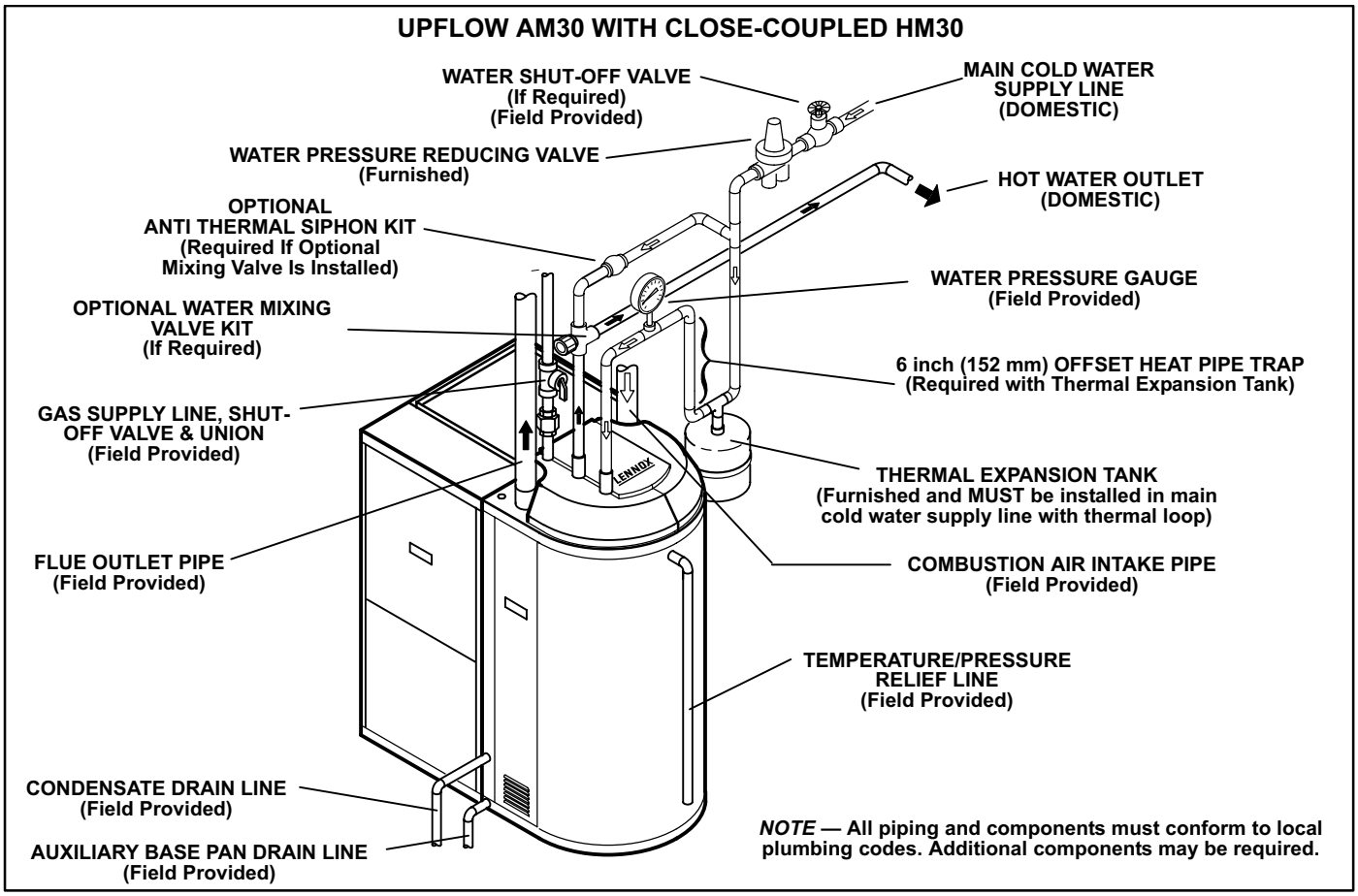


FIGURE 2

I-GENERAL INFORMATION

Lennox Industries implemented a mandatory quality upgrade program in 1996. This upgrade program included all HM30 and AM30 units with serial numbers prior to 5896J. Upgrade kit #68K98 is available for the HM30 and kit #68K99 is available for the AM30. HM30 and AM30 with these serial numbers must be upgraded if they have not been so. Complete-Heat system components are shown in figures 1 and 2. The gas valve, combustion air blower, pressure relief valve, and water tank circulating pump can be accessed by removing the HM30 top access cover. A separate access panel located on the side of the HM30 covers the control box and condensation trap. The AM30 also has two access panels. The hot water coil and circulating pump can be accessed by removing the top panel and the blower and control box can be accessed by removing the blower access door (lower panel).

AM30 units are designed for bottom, rear (field fabricated) or side return air. The panels are designed to be knocked-out (bottom return) or cut-out (side and rear return) as required for return air duct connection. Rear return filter is field provided.

II-HM30 COMPONENTS

If the HM30 unit is to be used as a stand alone high efficiency water heater, a transformer kit is needed for low voltage power. See page 22 for specifications on the stand-alone transformer kit.

A-TDSI-2 on -1 Units TDSI-3 on -2P LP and -3 Units TDSI-4 on - 2P L.P. Units

NOTE-TDSI-1 and -2 controls can be replaced with TDSI-3 controls.

The Tank Thermostat / Direct Spark Ignition control board (TDSI), which is manufactured by Heatcraft, is shown in figure 3. The TDSI control board is located in the control box which comes factory installed on the left side of the HM30. However, the control box assembly may be removed from the left side and installed on the right. See installation instructions for procedure.

The TDSI board is color coded for easy identification. TDSI-2 boards are green, TDSI-3 boards are black with early -3 boards green and TDSI-4 boards are red. The TDSI control has many functions. It monitors the tank water temperature (through the use of a thermistor) and provides the main burner ignition on each operating cycle. The TDSI control monitors and controls the gas valve, combustion air blower and the HM30 water circulation pump operation. It also shuts off the gas valve in case of abnormal operating conditions. The control is equipped with the Watchguard circuit which automatically resets the ignition control lockout after one hour of continuous tank thermostat demand. This feature eliminates nuisance service calls. The control also features a diagnostic connection to help in troubleshooting and service. Refer to the diagnostic module supplement.

HM30 TANK THERMOSTAT / DIRECT SPARK IGNITION CONTROL BOARD

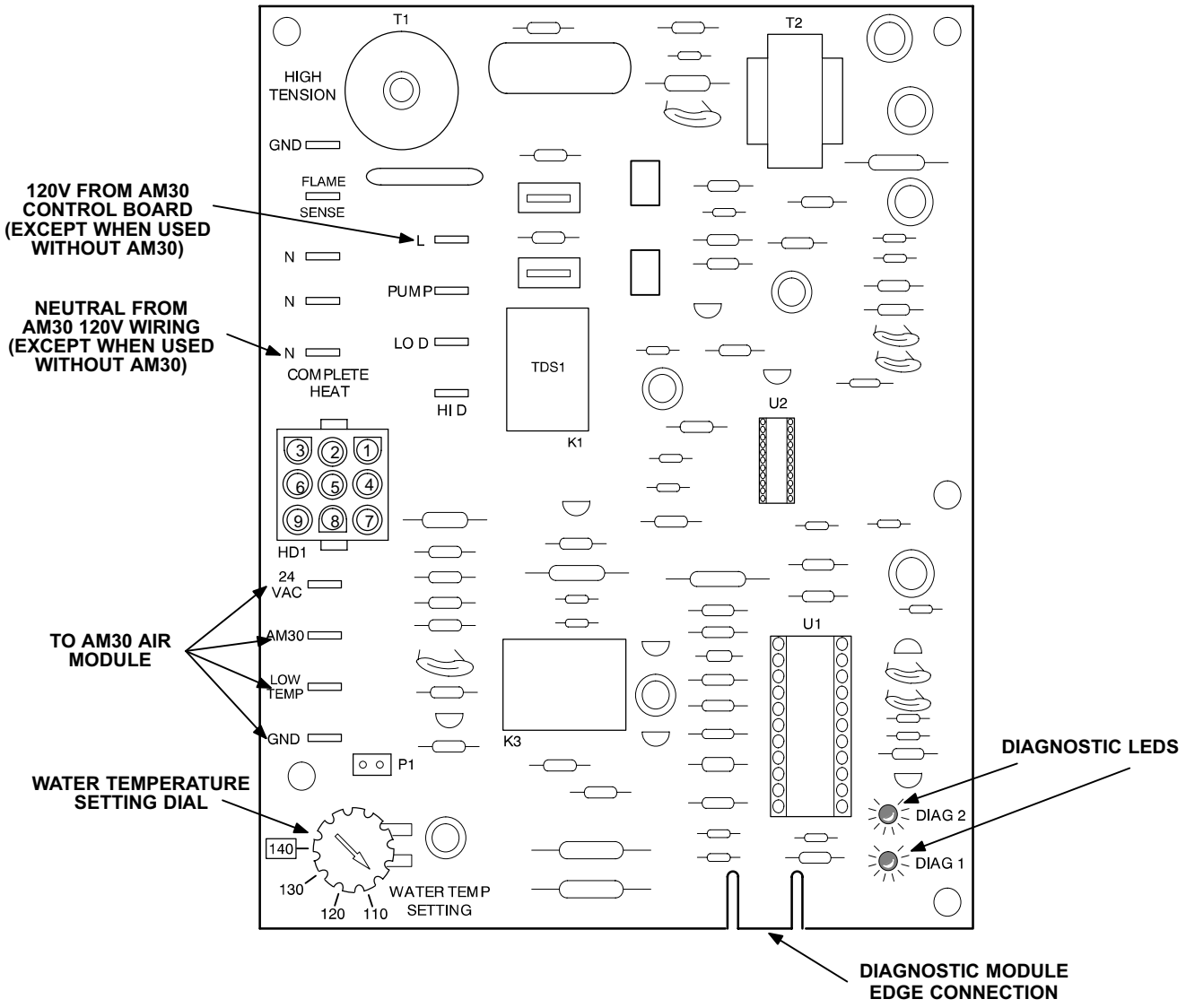


FIGURE 3

TABLE 1

TDSI CONTROL BOARD TERMINAL DESIGNATIONS		
Terminal	Size of Quick Connect	Voltage
Flame Sense Input	3/16" (4.8mm)	--
Line Input	1/4" (6.4mm)	120 VAC Power
Neutral Input	1/4" (6.4mm)	120 VAC Neutral
Pump Output	1/4" (6.4mm)	120 VAC
Lo Draft Output	1/4" (6.4mm)	120 VAC
Hi Draft Output	1/4" (6.4mm)	120 VAC
Neutral Output (2 places)	1/4" (6.4mm)	120 VAC Neutral
24 VAC Input	1/4" (6.4mm)	24 VAC Power
GND Input	1/4" (6.4mm)	24 VAC Common
AM30 Input	1/4" (6.4mm)	24 VAC
Low Temp Output	1/4" (6.4mm)	24 VAC

TABLE 2

TDSI NINE PIN QUICK CONNECT PIN DESIGNATION			
Pin #	Description	Label	Voltage
1	Limit Switch	LIM OUT	24 VAC
2	Pressure Switch	PSW IN	24 VAC
3	Pressure Switch	PSW OUT	24 VAC
4	Thermistor Input	THER	--
5	Thermistor Common	THER COM	--
6	Ground Terminal	GND	24 VAC Common
7	Valve Output	VALVE	24 VAC
8	Valve Common	VAL COM	24 VAC Common
9	Limit Switch	LIM IN	24 VAC

Hot Water Thermostat Adjustment

The water temperature dial is located at the lower left hand side of the HM30 control box. See figure 3. It is factory set at 120°F (48.9°C). Water temperature setting may be raised by turning dial clockwise to the desired setting. Temperatures up to 140°F (60°C) are marked on the control board.

Refer to local codes for highest temperature allowed for potable water supply at the point of use (shower heads, faucets, etc.). Some codes allow a maximum water temperature of 120°F (48.9°C).

If water temperatures above 140°F (60°C) are required, turn off power and remove jumper located on the heat module control board (see figure 4). Adjusting dial above the 140 mark will not raise water temperature unless the P1 jumper is removed. Diagnostic module must be used to check water temperature above 140°F (60°C)

⚠ WARNING

DO NOT REMOVE JUMPER unless an approved mixing valve has been installed. Removing jumper allows water temperatures to increase as high as 160°F (71°C). High water temperatures will scald, resulting in severe pain, injury or death.

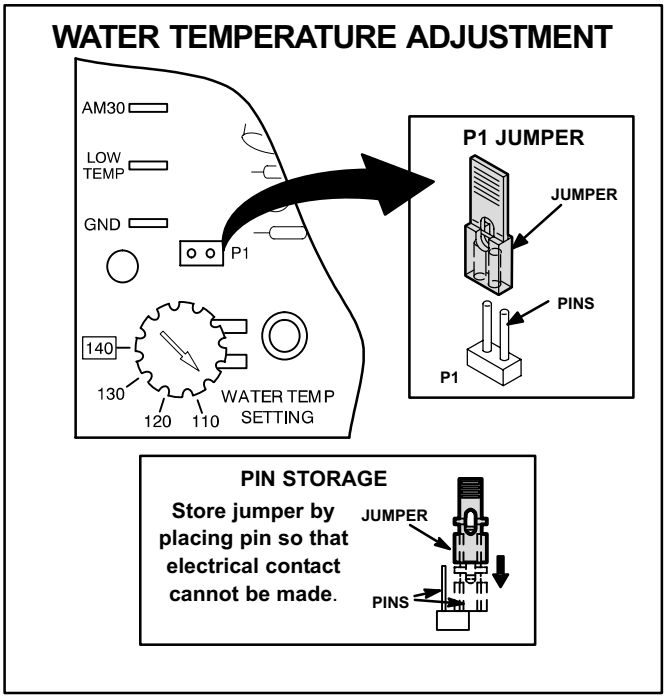


FIGURE 4

An approved mixing water mixing valve must be installed in the potable water piping to reduce the risk of scalding if temperature is adjusted above the maximum that code allows. Lennox recommends the use of the mixing water mixing valve in **ALL** applications. See section IV - A.

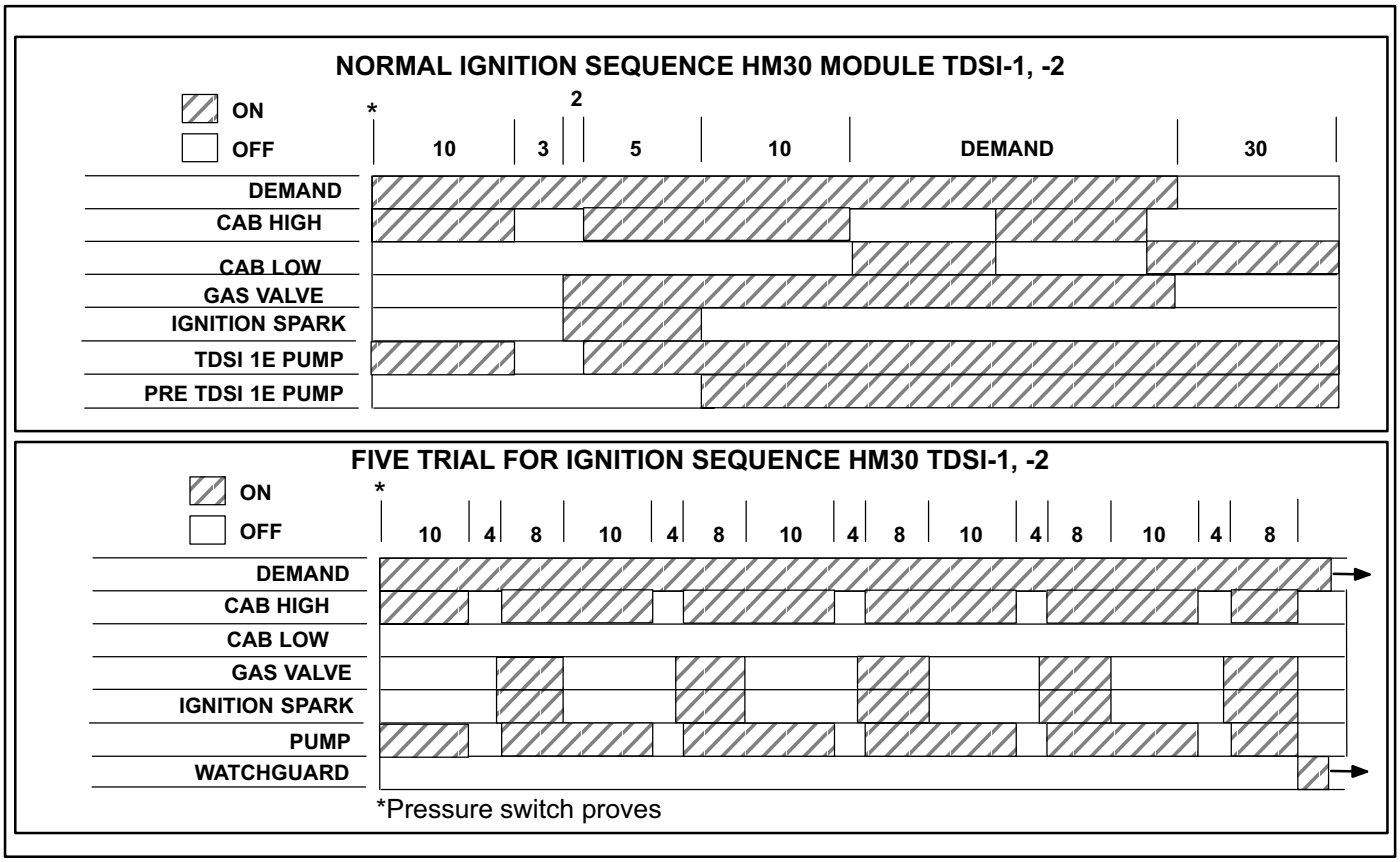


FIGURE 5

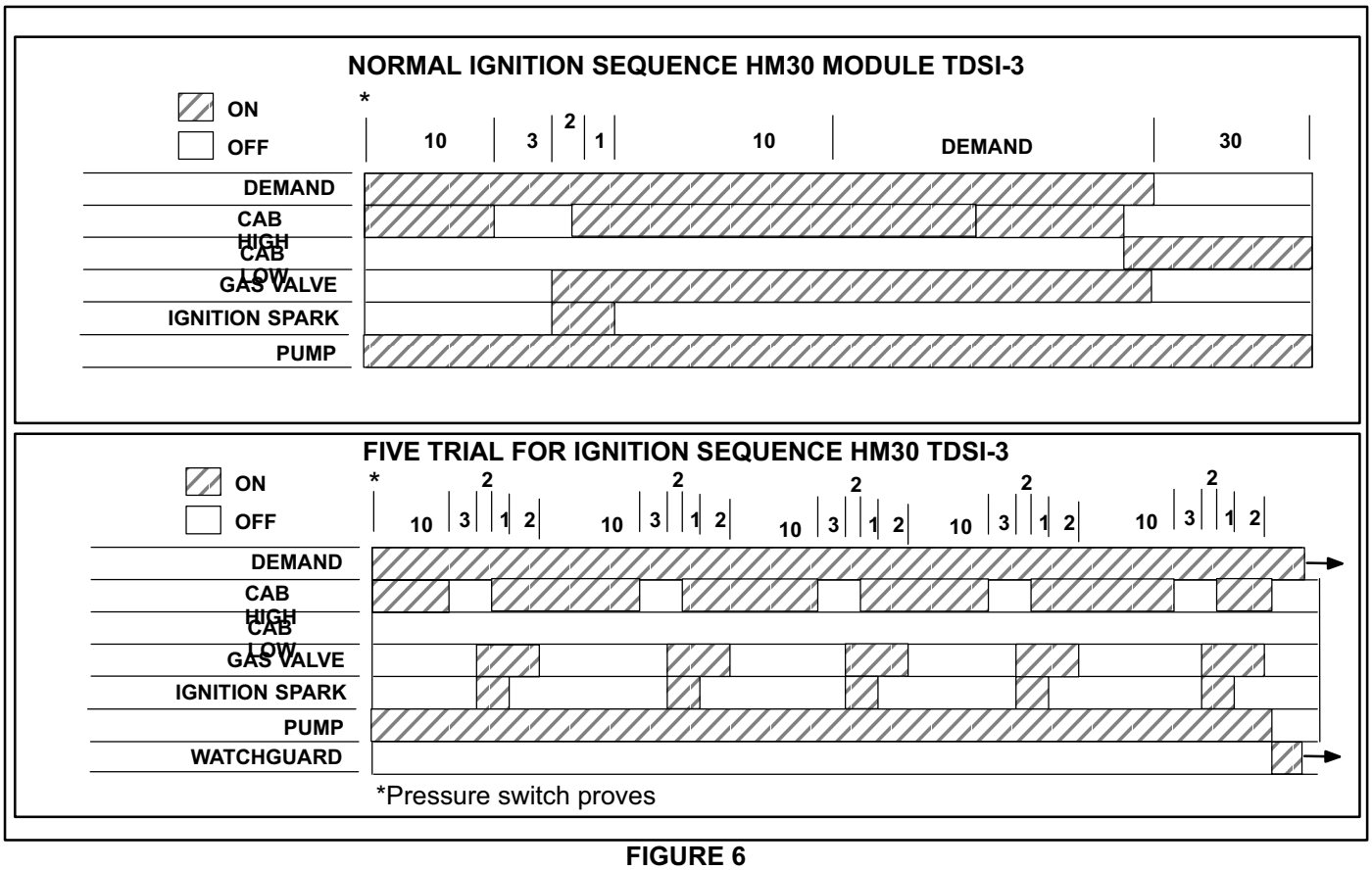


FIGURE 6

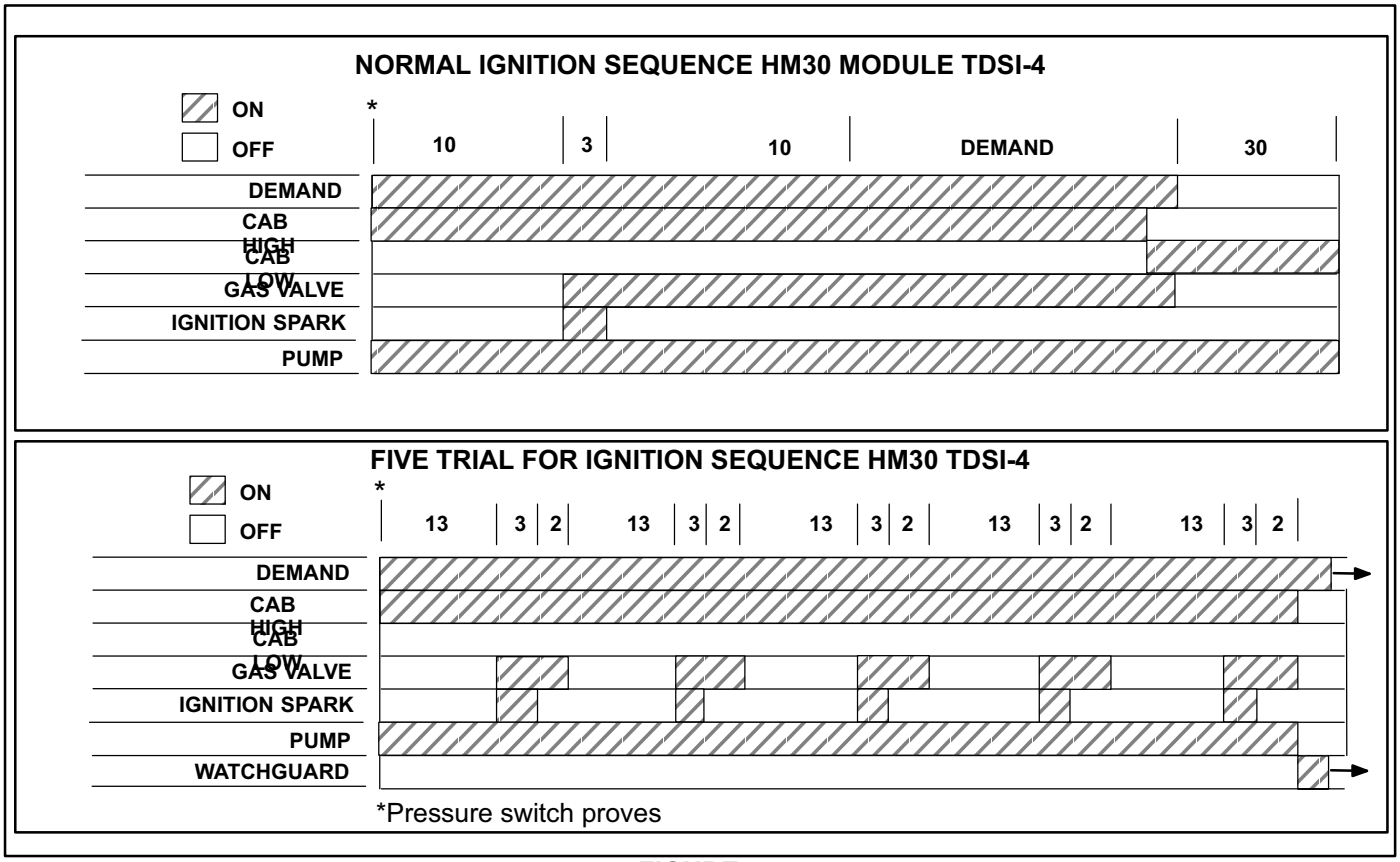


FIGURE 7

Unit Operation

See figures 5, 6 and 7 for the unit operation in a bar graph. When there is a call for heat, the TDSI control checks the normally open pressure switch, and the normally closed high limit switches, and that no flame is present. If all conditions are normal, the control will energize the combustion air blower at high speed. The HM30 circulating pump operates when the combustion air blower is energized. Once the control detects the pressure switch is closed, the prepurge period begins and the combustion air blower runs for ten seconds allowing the combustion chamber to purge itself.

After prepurge, the combustion air blower will shut off for a period of three seconds. (The TDSI-4 will continue to run). With the pressure switch remaining closed, the gas valve and ignitor are energized. After two seconds, the combustion air blower will restart. If flame is not established after 8 seconds (-1 and -2 controls), or 5 seconds (-3 and -4 controls) the valve will close and the combustion air blower will continue for the interpurge period. The spark ignitor will try to relight the burner (for a maximum of four retries).

Once flame is sensed, the control initiates a ten-second flame stabilization period. If there is a flame failure for a full two seconds, the control will de-energize the gas valve and will enter a retry mode. Each time the control goes into retry mode, a retry counter is incremented. On the fifth count the control goes into Watchguard.

If flame remains detected after the ten-second flame stabilization period, the retry counter is cleared and the controller establishes a 600-millisecond flame failure response time. If flame is not present for a full 600-milliseconds, the control will de-energize the gas valve and go into a retry mode. The retry counter will be incremented. After the flame stabilization period, the combustion air blower will reduce to low speed; assuming the tank temperature is within 8°F (4.4°C) of setpoint. Any time other than during ignition, the combustion air blower will run at high speed only if the tank is more than 10°F (5.6°C) lower than setpoint.

When the water temperature reaches the set point, the gas valve is de-energized. The combustion air blower will continue to operate (post-purge) at low speed for thirty seconds.

The controller goes into retry mode upon flame failure during the flame stabilization. In this mode, the controller will interpurge for ten seconds before it will try to re-ignite. After five consecutive unsuccessful attempts to ignite, (see figures 5, 6 and 7) the control goes into postpurge for thirty seconds, then to Watchguard. In the Watchguard mode, the control will de-energize the entire HM30 unit for one hour.

The controller goes into the retry mode upon flame failure during burner supervision. In this mode the burner will start over with prepurge for ten seconds, then it will retry ignition. After five retries in one heat demand, the control goes into postpurge for thirty seconds, then to Watchguard for one hour.

⚠ DANGER

Shock hazard. Spark related components contain high voltage. Disconnect power before servicing. Control is not field repairable. If control is inoperable, simply replace entire control.
Unsafe operation will result if repair is attempted.

Diagnostic LED

The TDSI control board is equipped with two diagnostic LED's used for troubleshooting the HM30 and the control board. LED functions are shown in table 3.

TABLE 3

TDSI CONTROL BOARD DIAGNOSTIC LED		
MODE	**DIAG 1**	**DIAG 2**
Normal Operation	Flash together with Diag 2	Flash together with Diag 1
Watchguard	On	Flash
*Thermistor Fail	Flash	Off
*Limit Switch Open	Flash	On
**Pressure Switch abnormal	Off	Flash
*Flame Failure	Flash Alternate with Diag 2	Flash Alternate with Diag 1
Board Fail (Replace Board)	Continuous On or Off	Continuous On or Off

*This LED pattern will only exist during the postpurge prior to Watchguard. During Watchguard the LED pattern will indicate the "On Flash."
**Pattern will also occur during prepurge.
Flash indicates heartbeat at the rate of 1Hz.

B-Tank Assembly

The HM30 tank is made of stainless steel and is fully insulated. All gas, water and vent connections are made at the top of the tank. See figure 8. Access to the tank is through the removable top cover. Cold water enters the tank through a dip tube. Drain valves are provided at the bottom of the tank on either side and have standard garden hose connections. The HM30 cabinet base serves as an auxiliary drain pan, when the fittings, which are provided, are installed.

C-HM30 Circulating Pump

A 120 volt 1/40 HP (18.7 W) circulating pump is factory installed in the HM30 tank assembly to prevent hot water stratification and sediment build-up. See figure 8. The pump operates anytime the combustion air blower is energized. If pump does not operate with combustion air blower, check for proper control. TDSI-1 controls should be replaced with a TDSI-2.

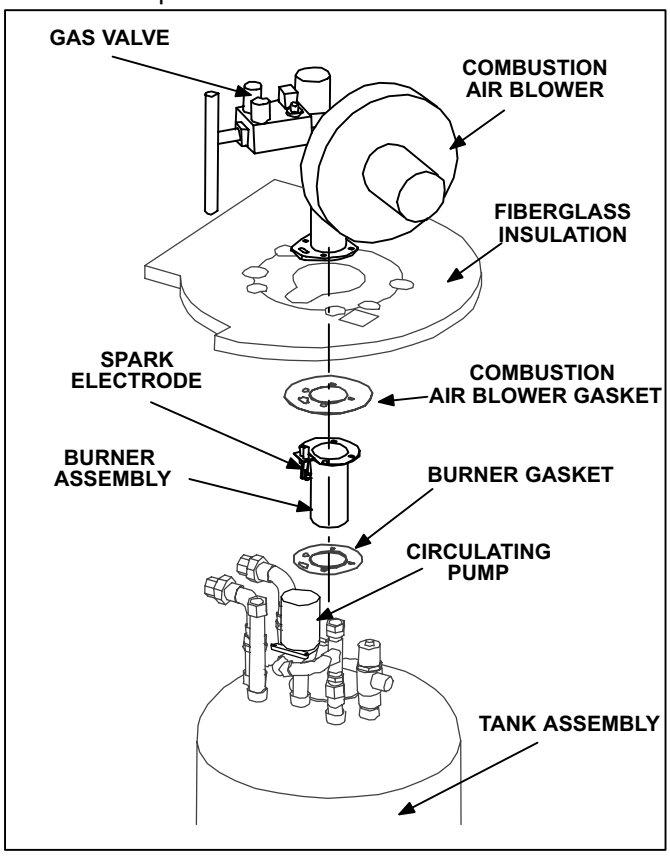


FIGURE 8

D-Gas Valve

The HM30 is equipped with a low pressure gas valve (see figures 9 and 10). The valve is internally redundant to assure safety shut-off. If the gas valve must be replaced, the same type valve must be used.

⚠ IMPORTANT

Do not attempt to adjust manifold pressure on Honeywell gas valve. Honeywell gas valve is not adjustable.

⚠ WARNING

If the gas valve must be replaced, the same type valve MUST be used. Contact Lennox Repair Parts for valve.Use of an improper valve can lead to dangerous operating conditions.

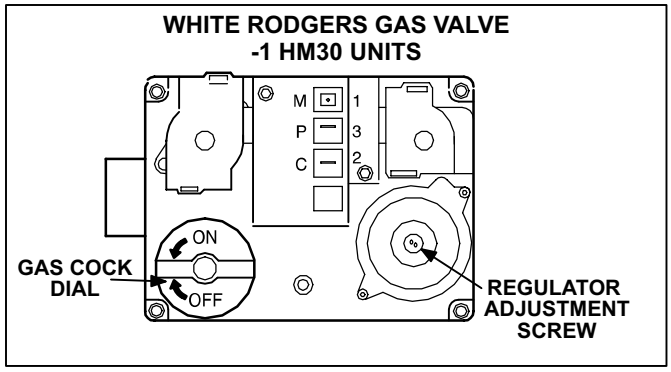


FIGURE 9

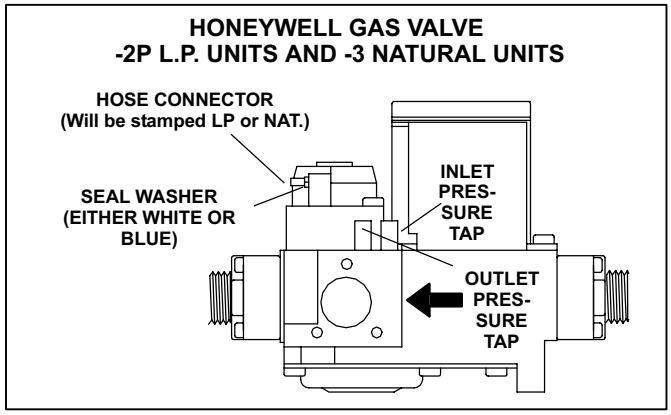


FIGURE 10

24VAC terminals and gas control knob are located on top of the White Rogers valve. The Honeywell valve (-2P propane and -3 natural units only) has an external manual shut-off knob. For identification purposes the brass hose nipple will either be stamped LP with a white seal washer, or NAT with a blue seal washer. All terminals on the gas valve are connected to wires from the TDSI control board. 24V applied to the terminals energizes the valve.

Inlet and outlet pressure taps are located on the valve. Do not use taps to compare opening characteristics of Honeywell valve. Opening characteristics may vary from valve to valve. Taps are used for resulting pressures only.

E-Combustion Air Blower

The combustion air blower is located on top of the water tank (see figure 11) and operates when there is a heat demand. The HM30-100-1, -2P and -3 units and HM30-150-1 units use a 120VAC combustion air blower, with a 3400 rpm high speed and a 1700 rpm low speed. The HM30-150-2P and -3 units use a 120 VAC combustion air blower with a 3400 high speed and a 2600 low speed. If replacement of combustion air blower is necessary, replace with like kind except the HM30-150-1 which can use the 3400/2600 motor. The RPM 's vary depending upon the vent length. If the pressure switch trips (due to blockage in the combustion air intake, flue outlet, or condensate drain) the gas valve will close and the blower will continue to operate.

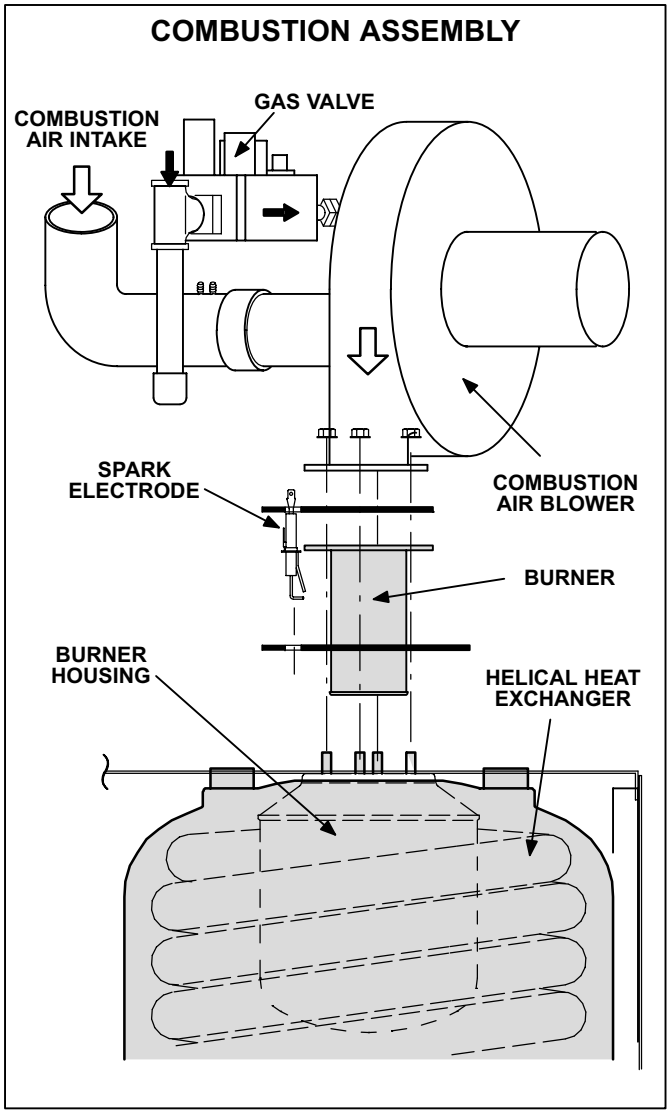


FIGURE 11

F-Burner Assembly

The burner is enclosed in a housing connected to the heat exchanger inside the HM30 tank (see figure 11). To access the burner follow the steps in section IX - J. The burner uses 100% outside combustion air supplied by the combustion air blower.

G-Helical Heat Exchanger

The tubular heat exchanger is of a single helix design on the HM30-100 unit and a double helix design on the HM30-150 unit. Both the single and double helix heat exchangers are made of stainless steel. The heat exchanger cannot be removed from the tank. See figure 11.

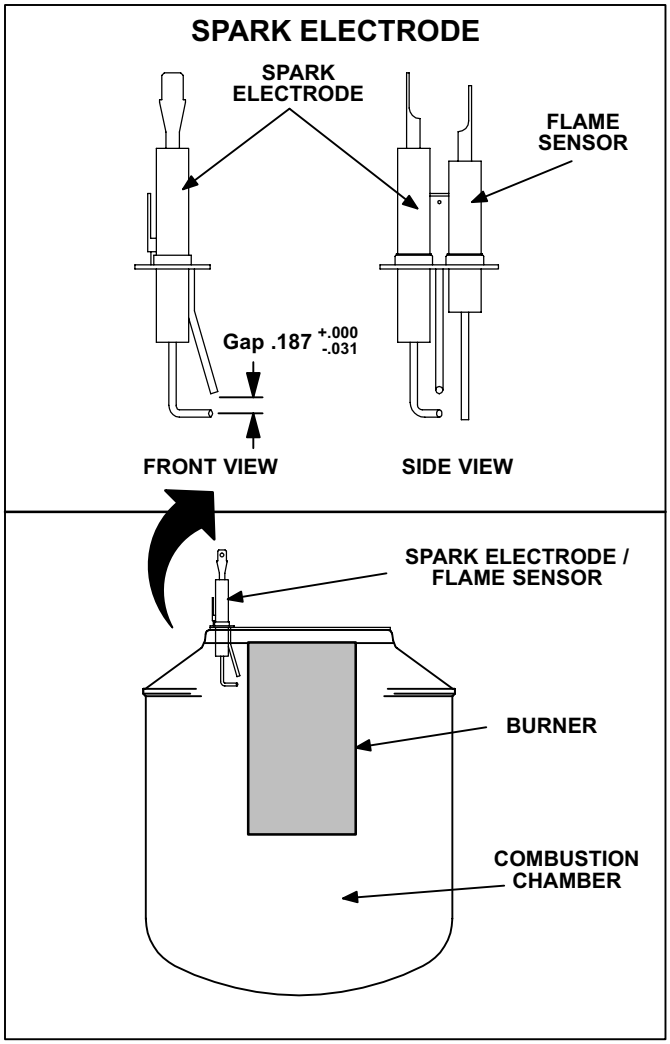


FIGURE 12

H-Spark Electrode

Figure 12 shows the arrangement of flame sensor, spark electrode and burner. The TDSI control uses direct spark to ignite the electrode. The flame sensor, located on the side of the spark electrode, uses flame rectification to sense combustion.

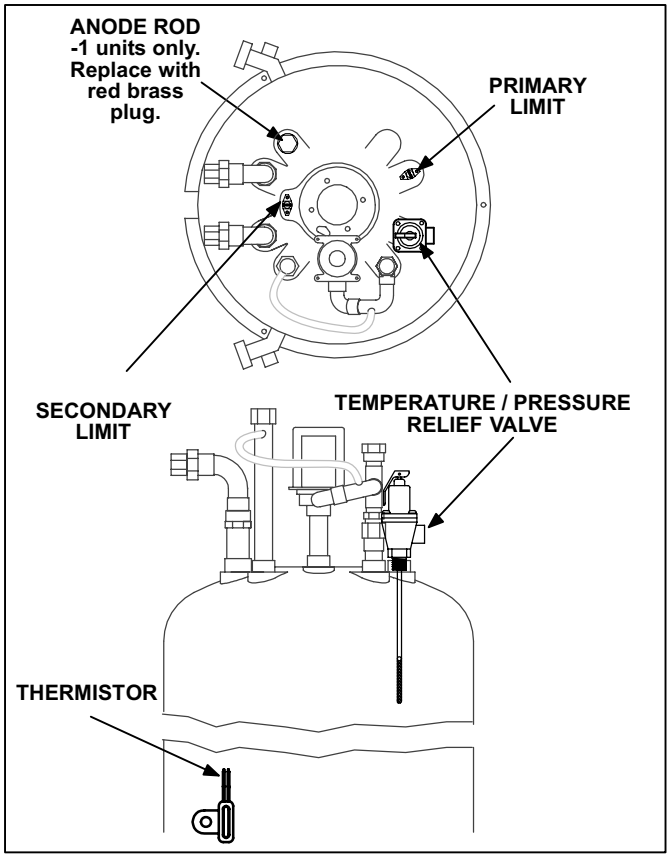


FIGURE 13

I-Temperature / Pressure Relief Valve

The temperature / pressure relief valve provides temperature and pressure relief in case of abnormal operating conditions. The valve is located on top of the water tank. See figure 13. The valve should be tested once a year and removed for a thorough check every three years. The valve opens at either 210°F (99°C) or 150 psig (1034 kPa). The valve resets once temperature and pressure return to normal.

J-Anode Rod -1 Units only

Lennox no longer equips HM30 units with an anode rod, however some -1 units may still have one. The rod should be taken out and replaced with a red brass plug, Lennox part #41K7701.

K-Reducing Valve HM30-4 and -5 Models

Due to water distribution variations, a pressure regulator valve will be installed down stream of the cold water inlet. The valve will maintain 55 psi ± 10 (379 kPa ± 68 kPa). The valve can be serviced without removing it from the line. If service is necessary order Lennox part no. 56L48 for the reducing valve or part no. 56L49 for replacement parts (diaphram and O ring).

L-Expansion Tank HM30-4 and -5 Models

HM30-4 and-5 model units will be equipped with an expansion tank. Thermal expansion occurs while supply water is being heated during periods of non-use. As water heats up it expands and has nowhere to go. This could lead to possible component failure such as combustion chamber collapse before the temperature and releif valve has a chance to open. Once the valve does open releaseing hot water, BTU loss will occur. The expansion tank will relieve the pressure during these periods. If the tank must be replace order Lennox part no. 79J14.

M-Primary Limit

The primary limit (see figure 13) is a 24V SPST N.C. manual reset switch which opens in case of excessive heat exchanger temperatures. The limit will trip on a temperature rise of 210°F (99°C). The limit can only be reset after temperatures have dropped below 120°F (49°C).

N-Secondary Limit

The secondary limit (see figure 13) is a 24V SPST N.C. auto reset switch which actuates if the water supply is interrupted or if there is a pocket of air which requires purging. The limit will trip on a temperature rise of 350°F ±12°F (177°C ± 6.7°C). The limit resets when temperatures drop to 310°F (154°C)

O-Thermistor

The HM30 thermistor (see figure 13) monitors the tank temperature for the TDSI control board. The thermistor is factory-installed on the left side of the HM30. However, if the thermistor needs to be replaced and the left side is unaccessible, a factory-installed mounting bracket for the thermistor can be accessed on the right side through the insulation. A perforated circle located on the insulation marks the location of the mounting bracket. A square of insulation covers the thermistor. Cut the perforated circle to expose the mounting bracket.

P-Energy Cut-Off Switch
-2P Propane Units only

The energy cut-off switch (S70) senses pressures at the combustion air blower inlet. If the switch senses abnormally high pressures at the combustion air inlet, its normally closed contacts open the gas valve circuit, stopping the flow of gas to the burners. **If the energy cut-off switch has shut down unit operation due to abnormally high pressures, the unit must be checked by a qualified service technician before it is returned to service.** The service technician must verify the integrity of the combustion air blower assembly and gaskets, the gas valve and the vent system. Defective system components must be repaired and/or the vent system must be repaired before the energy cut-off switch is re-set. The energy cut-off switch is factory set at 4 psi ± .25 and is manual re-set.

Q-Pressure Switch

The pressure switch (see figure 14 or figure 15) interrupts gas flow under abnormal vent conditions. The HM30 will be equipped with one of two switches. Early HM30 model units will have 6000series switch. The 6000 series switch is N.O. and actuates at 0.4" w.c. (99.5 Pa) on a pressure fall, and will reset (auto) at 0.26" (64.6 Pa). Late HM30 model units will have the 4000 series switch. The 4000 series switch is N.O. and actuates at .49" w.c. (122 Pa), and will reset (auto) at 0.27 (67.13 Pa).

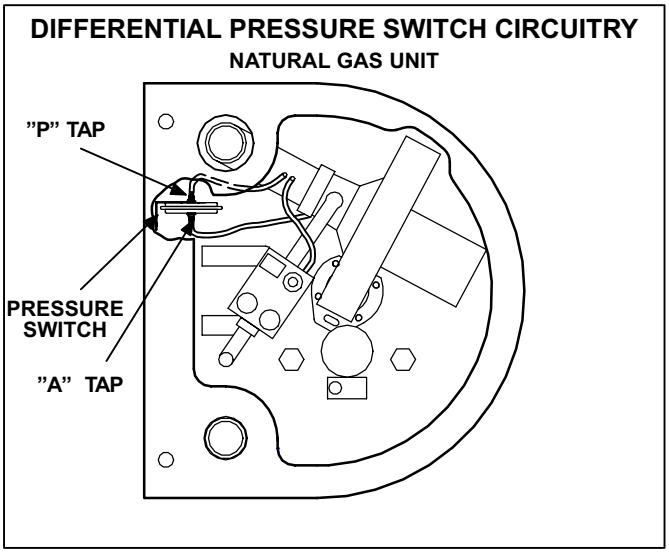


FIGURE 14

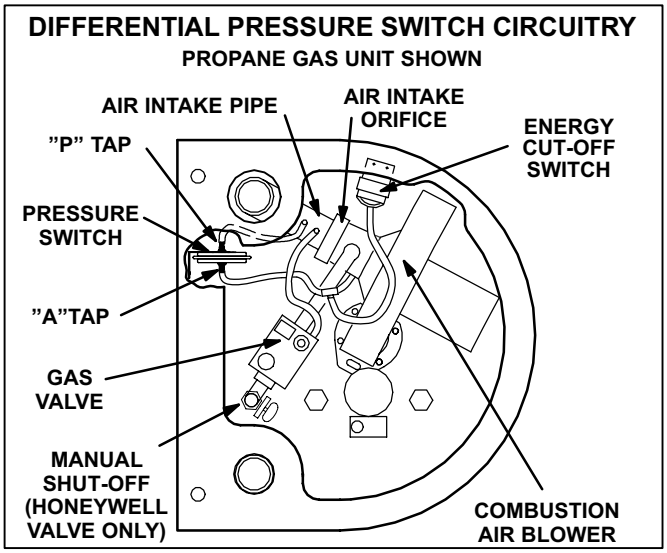


FIGURE 15

R-Flue / Condensate Trap

The flue / condensate trap assembly vents flue products and provides an internal condensate trap. The condensate trap is equipped with a removable boot to aid in servicing and cleaning. The trap should be checked and cleaned, if necessary. See figure 16. The condensate line may exit either side of the HM30 unit.

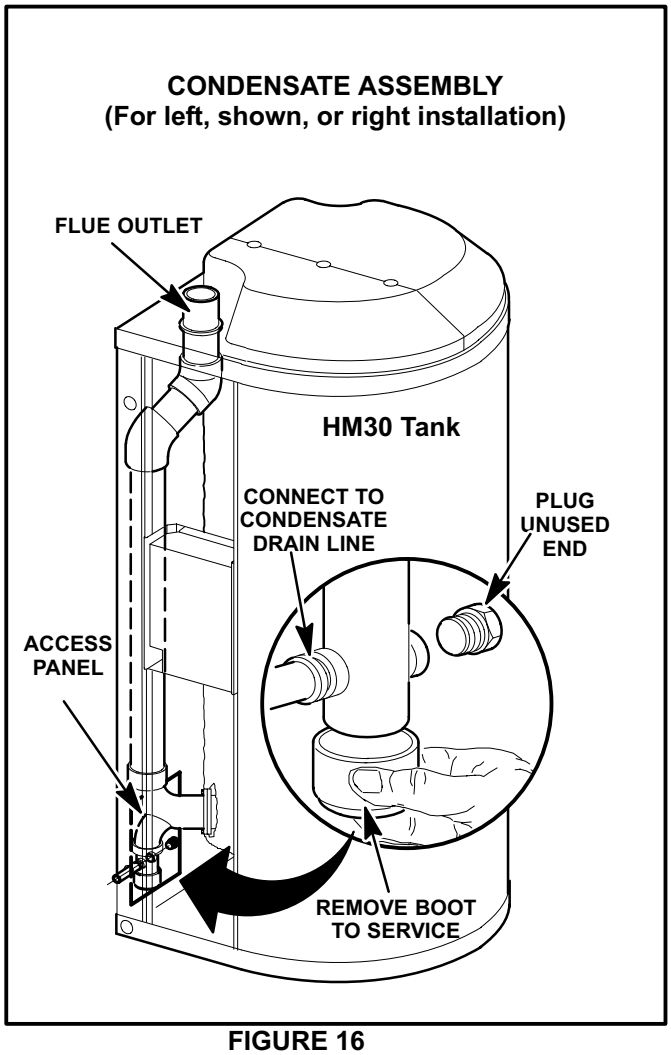


FIGURE 16

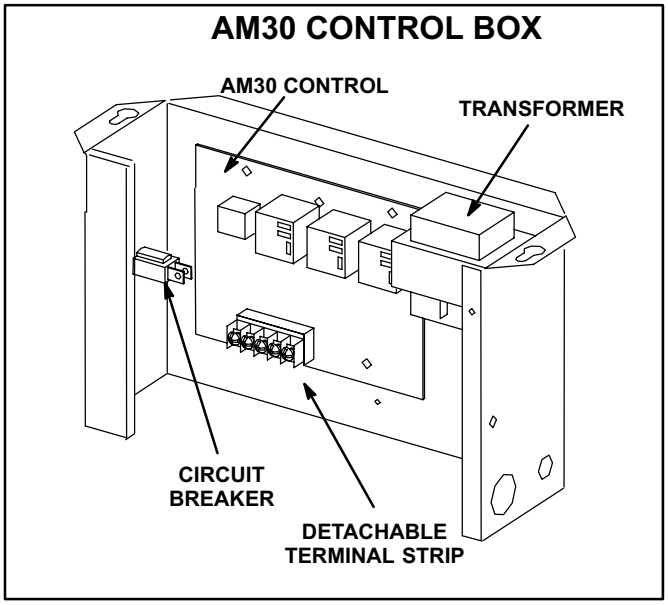


FIGURE 17

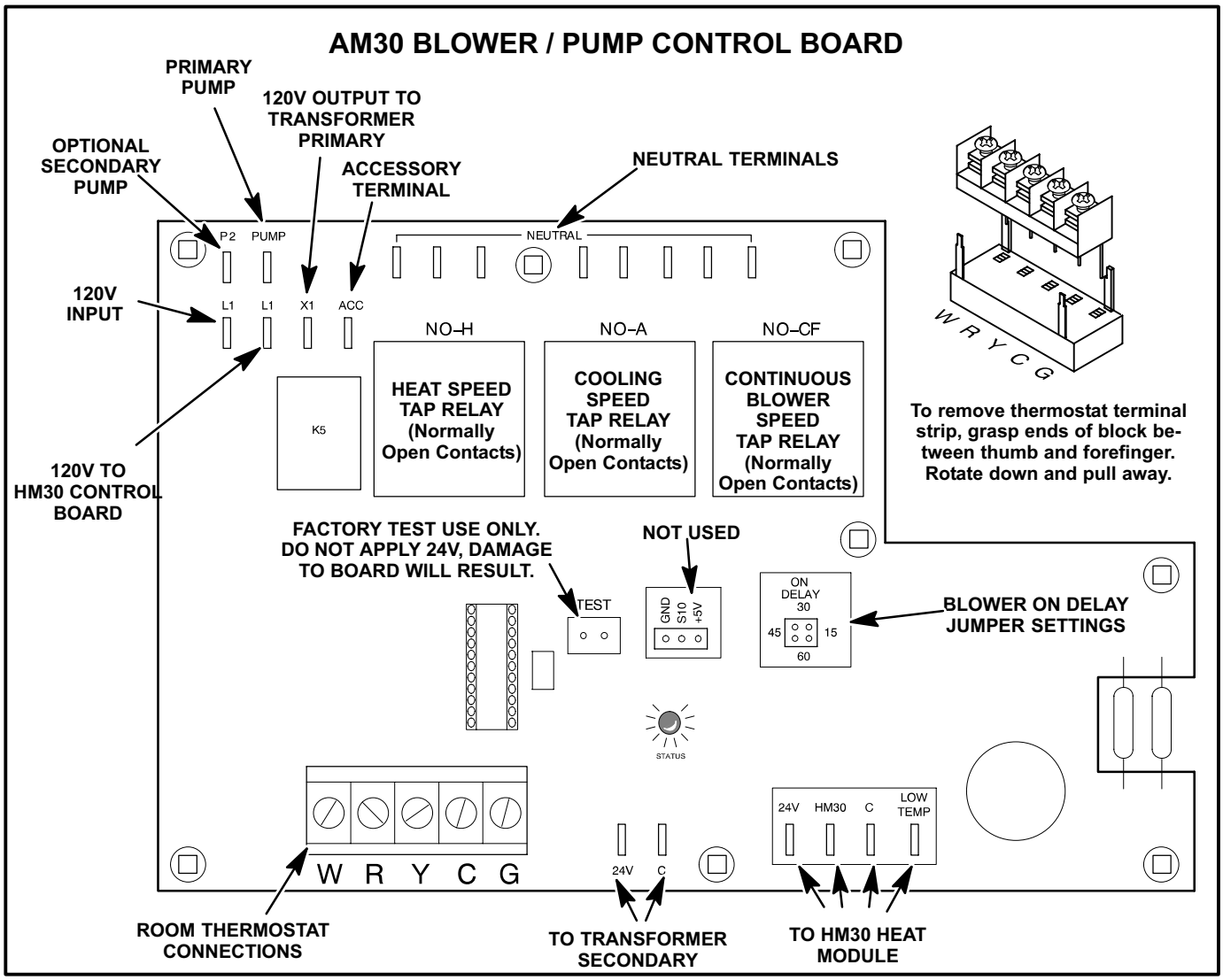


FIGURE 18

III-AM30 COMPONENTS

The AM30 air module can be installed in the upflow or horizontal position without requiring any internal modifications. If the AM30 is to be used in the downflow configuration the blower motor must be reinstalled so the oil port is at the top. No additional oiling should be needed, however the blower motor is position sensitive.

A-Control Box Components

AM30 control box is shown in figure 17. The control box is located in the top section of the AM30 directly behind the blower access panel.

1- Blower / Pump Control

The blower / pump control board is shown in figure 18. This printed circuit board controls the supply air blower "timed-on" delay and "timed-off" delay. The "timed-on" delay is adjustable from 15 to 60 seconds (factory set at 15 seconds), while the "timed-off" delay is non-adjustable and factory set at 30 seconds. The board is equipped with a diagnostic LED. During non-heating periods, the control sends a signal to the pump to circulate water through the hot water coil every six hours for 30 seconds (except when unit is operating in cooling mode). The thermostat connections are made to a five-pin removable terminal strip located on this board. The control board contains an isolation relay to avoid problems with power robbing thermostats. All other connections are made to 1/4" (6.4 mm) quick connect.See figure 20. See figure 18 for the location of the quick connect.

The board is divided into two sections, 120 and 24VAC. Line voltage comes into the board on the 120VAC side.

⚠ DANGER

Shock hazard. Avoid personal injury. Make sure to disconnect power before changing blower "on" timing.

On-Delay

The blower “timed-on” delay setting is the amount of time the blower is delayed before energizing after a heating demand is received. Blower “timed-on” delay setting is determined by the arrangement of a jumper across pins on the blower / pump control board. Figure 19 shows the various blower “timed-on” delay settings and jumper positions. Unit is shipped with a factory “timed-on” delay setting of 15 seconds. If the jumper is left off the “timed-on” delay defaults to 15 seconds and the diagnostic LED goes into error mode (LED continuously on to indicate error). To adjust blower “timed-on” delay setting, gently disconnect jumper and reposition across pins corresponding with new setting.

NOTE—If blower “timed-on” delay is set too low, cool air may be blown into conditioned space before the coil is warmed up. If this occurs, adjust blower to longer delay setting.

Blower “timed-on” delay setting will affect comfort and is adjustable to satisfy individual applications. The blower “timed-on” delay setting is initiated only after a heating demand. There is no delay when the indoor thermostat switch is changed from ON to AUTO if a heating demand is not present.

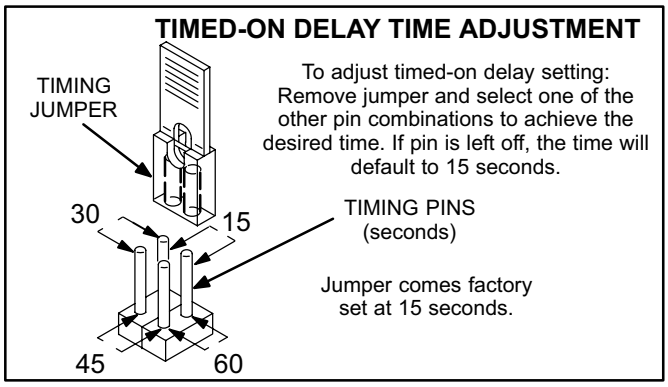


FIGURE 19

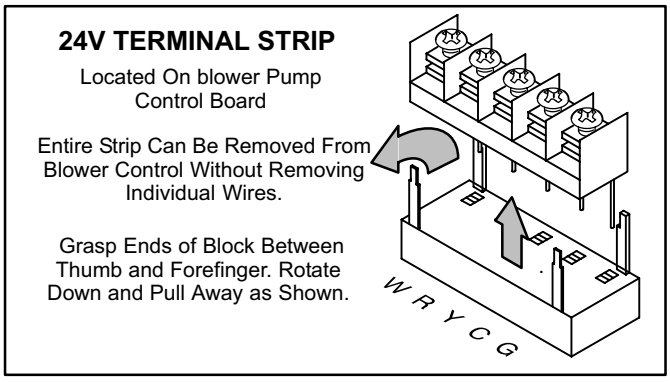


FIGURE 20

Diagnostic LED

The blower / pump control board is equipped with a diagnostic LED used for troubleshooting the board. Normal operation is indicated by a blinking light and error mode is indicated by a continuous light. If the control board can not read the “timed-on” delay (bad connection, jumper missing, etc.), or if the control board receives a heating demand and cooling demand simultaneously, the LED will go into error mode (continuous light). The error mode is erased once the problem is fixed.

2- Control Transformer (T1)

T1 provides power to the low voltage (24 volt) sections of both the AM30 and HM30 controls. The transformer is located in the AM30 unit. If HM30 and AM30 are remotely installed and power wiring is supplied to each separately, an additional transformer (T12) will be field installed in the HM30 unit. See section IV - D. Transformers on all models are rated 40VA with a 120V primary and a 24V secondary.

3- Circuit Breaker (CB8)

A 24V circuit breaker is located in the control box. The switch provides overcurrent protection to the transformer (T1). The breaker is rated 3A at 32V. If the current exceeds this limit, the breaker will trip and all unit operation will shut down. The breaker can be manually reset by pressing the button on the face (figure 21).

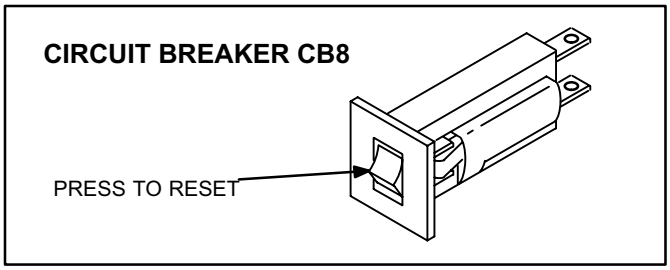


FIGURE 21

B-Blower Motors and Capacitors

All AM30 units use direct drive blower motors. All motors used are 120V permanent split capacitor motors. Motors are pre-lubricated for extended life and no further lubrication is required. The blower circulates air through the hot water coil. See table 4 for ratings.

TABLE 4

AM30 BLOWER RATINGS 120V 1PH		
BLOWER MOTOR	HP (W)	CAP
AM30Q2-40	1/5 (149)	5MFD 370V
AM30Q2/3-70	1/3 (246)	5MFD 370V
AM30Q3/4-70	1/2 (373)	7.5MFD 370V
AM30Q3/4-90	1/2 (373)	7.5MFD 370V
AM30Q4/5-90	3/4 (560)	40MFD 370V
AM30Q3/4-105	1/2 (373)	7.5MFD 370V
AM30Q4/5-120	3/4 (560	40MFD 370V

C-Hot Water Coil

The hot water coil is made of copper tubes and aluminum fins which provide excellent heat transfer. Manual air bleed ports are located in the copper tubing to release trapped air in the water circuit. See section IX - I.

D-Freezestat

The freezestat (figure 2) protects the system from freezing temperatures by using a thermostat to sense the temperature in the AM30. If the temperature in the AM30 coil is below 45°F (7°C) the circulating pump is activated, sending hot water through the system. The pump will de-activate when water temperature rises to 75°F (24°C). Early AM30 units without freezestat should be upgraded.

E-AM30 Circulating Pump

A 120 volt 1/40 HP (18.7 W) circulating pump is factory installed in the AM30Q2-40, Q2/3-70, and Q3/4-70, while a 120 volt 1/25 HP (29.8 W) circulating pump is factory installed in the AM30Q3/4-90, Q4/5-90, Q3/4-105 and Q4/5-120. The AM30 circulating pump moves the potable hot water through the system. See figure 2.

F-Make-Up Box

The make-up box may be installed outside the AM30 unit on either the left or right side. If the make-up box is installed on the inside, it must be installed on the right side only. For safety and proper installation use furnished blunt screws and and star washers. Ground wire should be installed under green cabinet ground screw.

An accessory (brown) output wire is provided with the make-up box. The wire provides a 120V connection for optional accessories such as electronic air cleaner or humidifier. If used, the wire is field installed in J69 jack plug by inserting the pin of the brown wire into the open socket of the jack. See figure 22. 120V accessories rated up to 4 amps total may be connected to this wire. The neutral leg of the accessory is connected to the neutral white wire in the make-up box. The accessory terminal is energized whenever the blower is in operation.

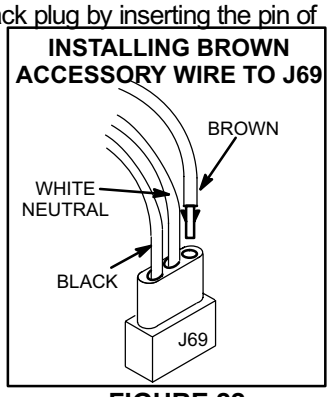


FIGURE 22

IV-OPTIONAL EQUIPMENT

The CompleteHeat system has several optional accessories which can be ordered separately and field installed.

A-Water Mixing Valve Kit

A mixing valve is recommended for any temperature setting, but is required if water temperatures in the tank are going to exceed 140°F (60°C) or the maximum water temperature code allows. For tempered water temperatures of 90°F to 145°F (32°C to 63°C), use part number 99L99 for 3/4"(19.1 mm) piping . For water temperatures of 110°F to 145°F (43°C to 63°C), use part number 10M00 for 1"(25.4 mm) piping. The valve is installed in the domestic hot water outlet where hot water is mixed with cold water coming from the cold water inlet.

B-Anti-Thermal Siphon Kit

If the AM30 coil is installed above the HM30 or in a zone, thermal siphoning may occur. To prevent thermal siphoning in this application, a check valve is required (part number 73J84). The check valve should be installed in the hot water supply line to the AM30.

C-Heat Traps

Heat traps are used to prevent thermal siphoning from occurring in the domestic water lines. Heat traps are readily available at plumbing supply stores and some dealer service centers. Heat trap devices are not to be installed in conjunction with mixing valves.

D-Stand-Alone Transformer Kit

If the HM30 is used as a stand alone high efficiency hot water heater, a transformer kit (part number 78J43) must be added to provide 24V power. The kit includes the 120/24 volt transformer, plugs to fill the holes for AM30 inlet and outlet (must be soldered in place), wiring, and a junction box which can be mounted on top of the HM30. The kit connects directly to the TDSI control board.

E-Auxiliary Pump

If the HM30 and AM30 are installed over 30 feet (9.1 m) from each other, an auxiliary pump must be added to the return line near the AM30. The maximum distance the two units can be installed from one another is 120 equivalent feet (36.6 m). Equivalent feet takes into consideration the friction loss when traveling through different types of fittings, such as an elbow. Refer to standard uniform plumbing codes when figuring equivalent feet. See table 5 for the correct auxiliary pump to be used. The auxiliary pump is connected to terminal "P2" on the AM30 control board.

TABLE 5

AM30 MODELS	PUMP CATALOG NUMBER 31 to 120 FEET (9.4 m to 36.6 m)
Q2-40	53J75
Q2/3-70	
Q3/4-70	
Q3/4-90	53J76
Q4/5-90	
Q3/4-105	
Q4/5-120	

*Equivalent feet - based on 1" nominal copper piping. (Refer to the plumbing code or, in the absence of local codes, in accordance with governing plumbing codes and practices).

F-HM30 Control Interface Kit

If the HM30 is to be used with another source of heat transfer in a potable domestic loop, such as radiant floor, a control interface kit (part number 90J03) must be used. The kit takes the place of the AM30 control board and can read the hydronic thermostat demand, and can control an auxiliary supply air blower. The kit includes a control with a boxed enclosure which can be mounted on top of the HM30 and connects directly to the TDSI control board.

G-Downflow / Horizontal Kit

If the AM30 is installed in a downflow or horizontal application, additional piping must be used to connect the AM30 to the HM30. The downflow / horizontal kit (part number 74J25) includes all required elbows and labels. Straight piping is not included.

H-Natural to LPG/Change over Kit -1 Units

Some HM30 -1 units may have been converted to propane using an obsoleted propane kit. If the propane unit has a WhiteRodgers gas valve and an aluminum gas orifice, it **must** be upgraded using Propane Kit #89K22 for HM30-100 units or Kit #89K81 for HM30-150 units.

I-Expansion Tank

A thermal expansion tank (part number 79J14) is required when the water system is in a closed loop. A closed loop system is any water system which has a back flow preventer installed in the supply line. The tank is installed in the cold water supply line. The expansion tank provides space for expansion and maintains a balanced pressure throughout the potable water supply system. Therefore, the tank prevents plumbing and water tank damage. The tank also prevents unnecessary pressure relief valve discharge by absorbing pressure caused from thermal expansion.

J-Water Pressure Gauge/ Pressure Regulator

A water pressure gauge must be installed in the cold water supply line. Cold water supply should never exceed 60 psi. A water pressure gauge (0 to 150 psi), approved for use with potable water is available at most hardware stores. If the cold water supply pressure is greater than 60 psi, a water pressure regulator Lennox part #67K57 must be installed. The addition of the pressure regulator will create a ”closed system” requiring the installation of a thermal expansion tank, Lennox part #79J14.

K-HM30 Zone Control Board Kit

An additional control board is needed in zone applications including two to four AM30 air modules which are zoned with one HM30 heat module. The zone control board kit (part number 90J02) allows for communication between the AM30 blower / pump control boards and the HM30 TDSI control board. The zone control board has its own enclosure and receives its power from the zone 1 AM30.

V-START-UP

⚠ IMPORTANT

It is very important that all air is removed from the system. The limit switches will not work properly if air is present at the top of the HM30 tank.

A-Preliminary and Seasonal Checks

1- Inspect electrical wiring, both field and factory installed for loose connections. Tighten as required.

2- Check voltage at disconnect switch. Voltage must be within range listed on the AM30 nameplate. If not, consult the power company and have voltage condition corrected before starting unit.

3- Inspect condition of condensate traps and drain assembly. Disassemble and clean seasonally.

B-Heating Start-Up

FOR YOUR SAFETY READ BEFORE LIGHTING

⚠ WARNING

Do not use this furnace if any part has been underwater. Inspect the furnace and replace any part of the control system and any gas control which has been under water.

⚠ WARNING

Shock and burn hazard.

HM30 units are equipped with a direct spark ignition system. Do not attempt to light manually.

⚠ CAUTION

Check for more than one disconnects switch. Before attempting to perform any service or maintenance, turn the electrical power to unit OFF at disconnect switch(s).

BEFORE LIGHTING smell all around the appliance area for gas. Be sure to smell next to the floor because some gas is heavier than air and will settle on the floor.

Use only your hand to push in or turn the gas control knob. Never use tools.

HM30 units are equipped with a direct spark ignition system. Do not attempt to manually light these furnaces. Each time the HM30 tank thermostat calls for heat, the burner will be automatically lit.

HM30 -1 Models

1- Turn off all electrical power to the heat module. Remove top cover of HM30 and close manual knob on gas valve. Check for more than one power source.

2- Wait 5 minutes. If you smell gas STOP! Call your gas supplier immediately from a neighbor's phone. If you do not smell gas go to the next step.

3- Open manual knob on gas valve, replace top panel and turn on unit electrical supply.

4- Set blower switch to AUTO or ON and move system selection switch to HEAT. Adjust thermostat to desired setting.

5- If unit does not light the first time, it will attempt four more ignitions before locking out.

6- If lockout occurs, repeat steps 1, 2, 3 and 4. If lockout repeatedly occurs see troubleshooting charts.

HM30 -2P LP Models and -3 Models

1 - **STOP**! Read the safety information at the beginning of this section.

2 - Set both room thermostat and water temperature dial to lowest settings.

3 - Turn off all electrical power to the CompleteHeat system (AM30 & HM30 unit). Check for more than one power source.

4 - The HM30 unit is equipped with an ignition device which automatically lights the burner. Do **not** try to light the burner by hand.

5 - Turn knob on main manual shut-off valve (figure 23) 90° counterclockwise to **ON**. Do not force.

6 - Turn on all electrical power to system.

7 - Set room thermostat and water temperature dial to desired settings.

NOTE - When unit is initially started, steps 1 through 9 may need to be repeated to purge air from gas line. The AM30 will not supply warm air until the water temperature in the HM30 tank is within 15°F (8.33°C) of the desired temperature set point.

NOTE - Monitor cold water supply pressure. If pressure is higher than normal, the water system is a closed system and the installation of an expansion tank is required.

8- If the HM30 module will not operate, follow the instructions "To Turn Off Gas To Unit" and call your service technician or gas supplier.

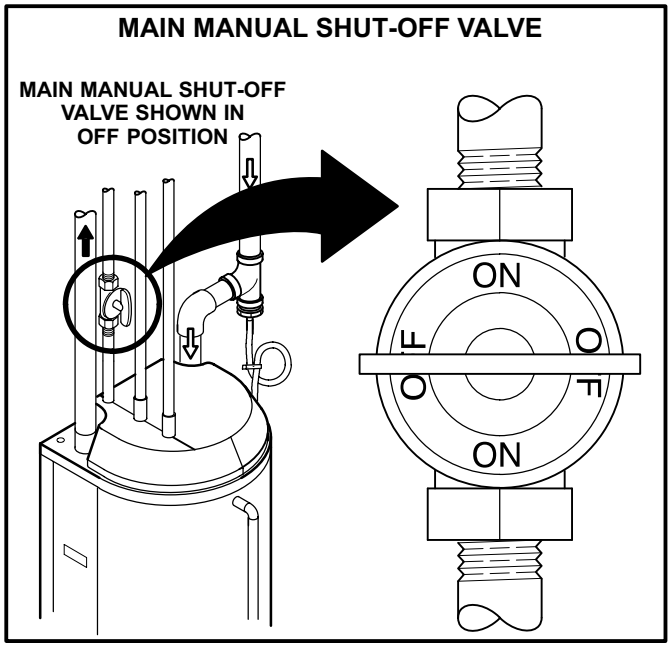


FIGURE 23

To Turn Off Gas To Unit

1 - Set room thermostat and water temperature dial to lowest settings.

2 - Turn off all electrical power to CompleteHeat system (AM30 and HM30).

3 - Turn knob on main manual shut-off valve 90° clockwise to **OFF**. Do not force.

C-Safety or Emergency Shutdown

Close manual and main gas valves. Turn off unit power.

D-Extended Period Shutdown

Turn off thermostat or set to "UNOCCUPIED" mode. Close all gas valves (both internal and external to the HM30 unit) to guarantee no gas leak into combustion chamber. Turn off power to AM30 unit or HM30 if used without the AM30 unit. Drain the HM30 tank if subjected to freezing temperatures. Follow instructions in section IX - H. All access panels, covers and vent caps must be in place and secured.

VI-SERVICING PUMP

All three Taco pumps used in the CompleteHeat system (HM30 circulating pump, AM30 circulating pump, and auxiliary pump) can be serviced the same way. Table 6 lists part numbers for replacement pumps and pump parts.

TABLE 6

PART	HM30 MODULE	AM30 -40 & -70	AM30 -90, -105 & -120
PUMP	99K68	99K69	53J76
CASING KIT	91J46	73J79	73J81
CAPACITOR	73J96	73J96	73J96
"O" RING KIT	73J82	73J82	73J82
CARTRIDGE KIT	99K70	99K70	73J77

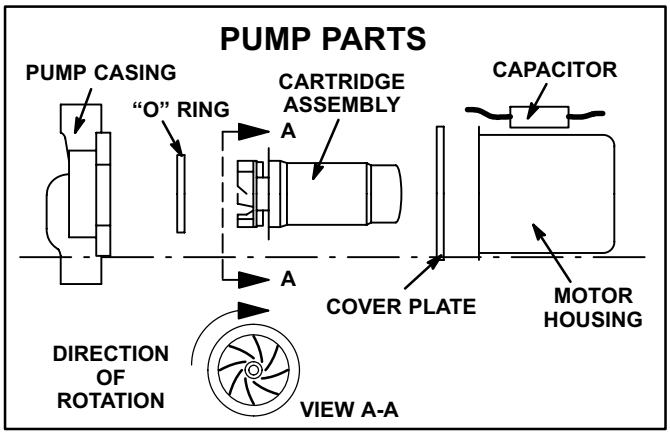


FIGURE 24

Electrical

If pump failure occurs, check line voltage and capacitor connections. With the power on and a demand on the pump, a voltage check at terminals PUMP and N on the control boards should read 120 volts.

Removal

If voltage proves correct, service the pump as follows:

1- Disconnect electrical power to AM30 and / or HM30.

2- Turn off water supply and allow system to cool briefly.

3- Drain all water above the location of the pump being removed, or close pump isolation valves, if installed. The water can be drained using the drain valve located at the bottom of the HM30 tank or by using a refrigerant hose connected to the closest air bleed on the AM30 unit. If a relief is required for the water to drain properly, depress the highest air bleed while the drain valve is open at the bottom of the HM30. Use best judgement in determining when water level is low enough to service pump.

4- Remove the four bolts at each corner of the pump cover plate and carefully remove the motor housing, cover plate, and cartridge assembly.

NOTE-A small amount of water will drain when the pump cartridge is removed. Take precautions to make sure this water does not come in contact with electrical components. Place a pan under the pump to collect this water.

Casing Kit

If casing is leaking from any point, check for cracks or holes in the casing. The "O" ring may be bad or the casing may be damaged. If casing is damaged, replace with an identical casing.

Capacitor

If the pump hums but does not work, test the capacitor by using an ohm meter. If capacitor is shorted or open, replace with like capacitor.

"O" Ring Kit

The casing and cartridge kits include the "O" ring kit. However, if the pump is disassembled without replacing either the casing or cartridge a new "O" ring is still needed.

Cartridge Kit

Some water conditions and other variables, may cause the cartridge to stick. With power off, disassemble pump and turn blades by hand to free cartridge. If cartridge does not rotate freely, replace the cartridge with an identical cartridge.

The cartridge may also develop a leak. Check for discoloration in the windings, caused by water leaking from the cartridge. If in doubt, replace the cartridge.

Reassemble

1- Replace motor using new "O" ring and bolts provided.

2- Fill the system before starting pump. Bearings are water lubricated and should not be operated dry.

3- Make all electrical connections.

4- Allow pump to run for five minutes after system is filled.

5- Purge all air from the system (see Air System Purging section IX - I).

VII-SYSTEM SERVICE CHECKS

A-A.G.A./C.G.A. Certification

All units are A.G.A. and C.G.A. design certified without modifications. Refer to the CompleteHeat system installation instruction manual for information.

B-Gas Piping

Gas supply piping should not allow more than 0.5"w.c. (.12 kPa) drop in pressure between gas meter and unit. Supply gas pipe must not be smaller than unit gas connection.

Compounds used on gas piping threaded joints should be resistant to action of liquefied petroleum gases.

C-Testing Gas Piping

⚠ IMPORTANT

In case emergency shutdown is required, turn off the main shut-off valve and disconnect the main power to unit. These controls should be properly labeled by the installer.

When pressure testing gas lines, the gas valve must be disconnected and isolated. Gas valves can be damaged if subjected to more than 0.5psig (14" w.c.). See figure 25.

If the pressure is equal to or less than 0.5psig (14"w.c.), use the manual shut-off valve before pressure testing to isolate furnace from gas supply.

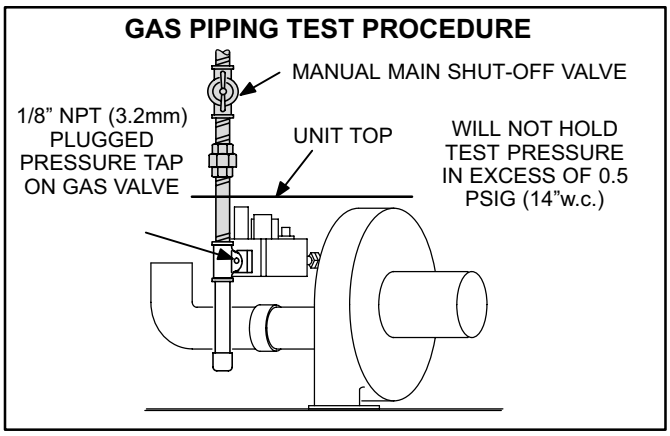


FIGURE 25

When checking piping connections for gas leaks, use preferred means. Kitchen detergents can cause harmful corrosion on various metals used in gas piping. Use of a specialty Gas Leak Detector is strongly recommended. It is available through Lennox under part number 31B20.

⚠ CAUTION

Potential for gas leaks, fire or explosion.
Some soaps used for leak detection are corrosive to certain metals. Clean piping thoroughly after leak detection has been completed.
Can cause damage to piping resulting in gas leaks, fire or explosion.

Do not use matches, candles, flame or any other source of ignition to check for gas leaks.

D-Testing Gas Supply Pressure

When testing supply gas pressure, connect test gauge to inlet pressure tap tap on gas valve. See figure 25. Check gas line pressure with unit firing at maximum rate. Low pressure may result in erratic operation or underfire. High pressure can result in permanent damage to gas valve or overfire. For natural gas units, operating pressure at unit gas connection must be between 3.5" w.c. and 10.5" w.c. (0.9 kPa and 2.6 kPa) For L.P.G. units, operating pressure at unit gas connection must be between 8" w.c. and 13.0" w.c. (2 kPa and 3.2 kPa).

E-Gas Manifold Pressure

After line pressure has been checked and adjusted, check the gas manifold pressure. Normal gas manifold pressure for the HM30 unit is 0.3" w.c. (74.6 Pa). This reading is taken by performing the procedure below. See figure 26 for natural gas or figure 27 for propane differential pressure switch hose circuitry.

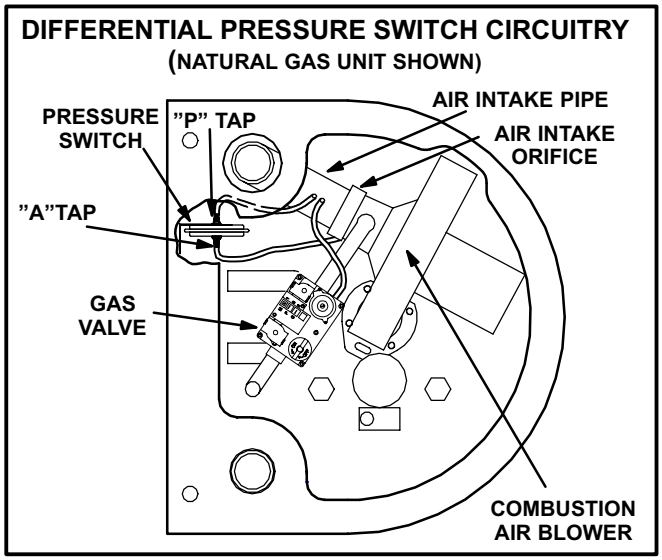


FIGURE 26

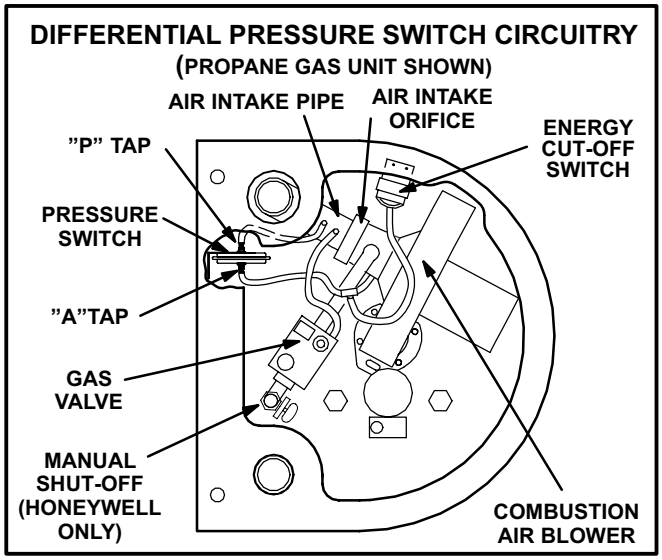


FIGURE 27

Manifold Pressure Measurement

To check for correct manifold pressure, the HM30 unit will need to be operating at high burner. This occurs when the thermistor senses that the tank water temperature has fallen at least 8°F (4.5°C) below setpoint and a demand for hot water is initiated. See figure 28 for natural gas units or figure 29 for propane units. Lennox provides a Sampling Test Kit #10L34 if needed or follow the procedure below.

1 - Connect positive (high) side of test gauge to outlet tap on gas valve.
2 - Use field provided tee and hose to connect other gas valve vent to the negative (low) side of the test gauge.
3 - While unit is running at high burner (only when there is a demand for heating water), measure the pressure between these two points. Manifold pressure should be around 0.3"w.c. (74.6 Pa).
4 - When measurement is completed, disconnect hose and reconnect as shown in figures 26 or 27.

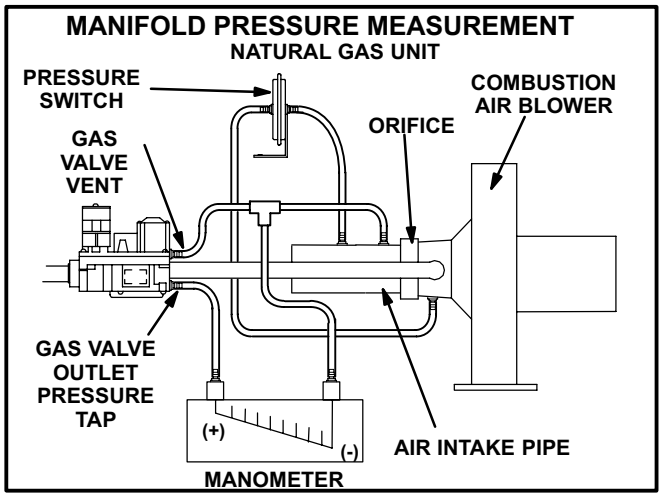


FIGURE 28

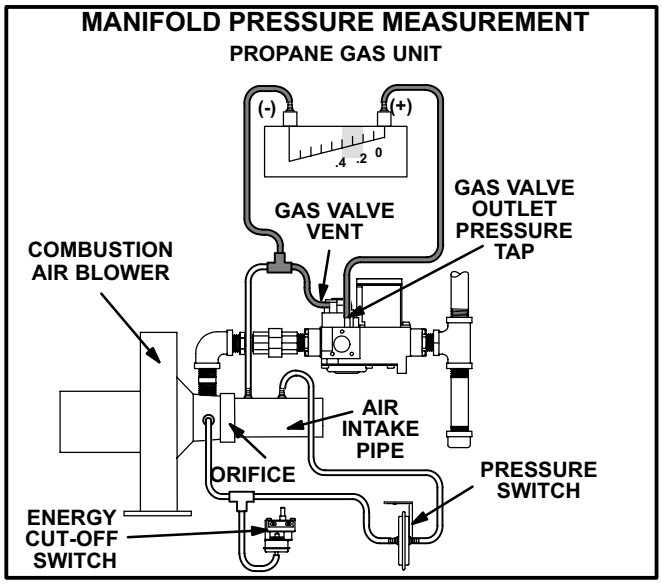


FIGURE 29

NOTE-DO NOT ATTEMPT TO ADJUST THE HM30-3 OR HM30-2P MANIFOLD PRESSURE. MANIFOLD PRESSURE ON HONEYWELL VALVE IS NOT ADJUSTABLE.

Manifold Pressure Adjustment
White Rodgers Valve Only

⚠ CAUTION

Damage to appliance may occur if not properly adjusted.
Only a Lennox dealer or other qualified technician may adjust gas valve. The control is extremely sensitive and requires special considerations.

The White Rodgers gas valve **only** may be adjusted to the normal operation of 0.3" ± 0.1" w.c. (0.075 ± 0.025 kPa). If unit is running rough, check all other symptoms before adjusting gas valve. A pair of snap ring pliers (size .07"(1.8 mm) tip) can be used to remove the protective cap on the gas valve. The adjustment screw is located under the cap. Do not attempt to adjust the HM30-3 natural or HM30 propane units. **Manifold pressure on Honeywell gas valves are not adjustable.**

To increase manifold pressure and rate, turn the adjustment screw clockwise 1/8th of a turn or less. Wait at least 30 seconds for unit to stabilize. **Check manifold pressure before making any additional adjustment.**

To decrease manifold pressure and rate, turn the adjustment screw counterclockwise 1/8th of a turn or less. Wait at least 30 seconds for unit to stabilize. **Check manifold pressure before making any additional adjustment.**

After adjustment is completed, replace protective cap over adjustment screw and recheck manifold pressure and rate.

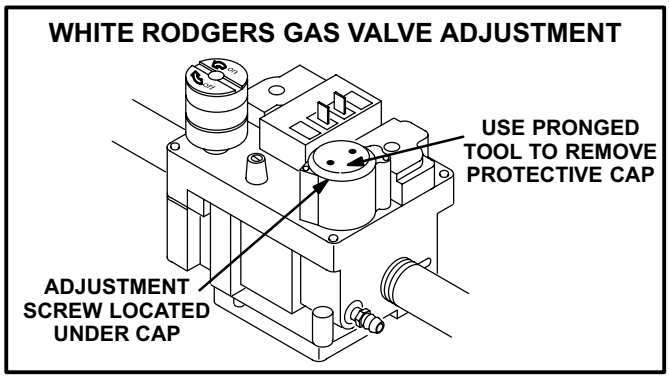


FIGURE 30

F- Proper Gas Flow (Approximate)

Furnace must operate on high speed while checking gas flow. Determine time in seconds for **two** revolutions of gas through the meter. (Two revolutions assures a more accurate time.) Divide by two and compare to time in table 7 below. Seconds in table 7 are based on a 1 cu.ft. dial and gas value of 1000 btu's for natural and 2500 btu's for LP.

NOTE- To obtain accurate reading, shut off all other gas appliances connected to meter.

TABLE 7

Unit	Seconds for Natural	Seconds for Propane
HM30-100	36	90
HM30-150	24	60

G-High Altitude Information

The HM30-1 natural gas unit is approved for altitudes of 0 to 4,500 ft. (0 to 1,372 m) above sea level in both the U.S.A. and Canada. No adjustment is necessary. HM30-2P and HM30-4 propane units and HM30-3 and HM30-5 natural units, are approved for altitudes up to 7,500 ft. above sea level in both the U.S.A. and Canada. No adjustment is necessary.

The brass barb fitting (with bleed hole) on the gas valve on HM30-1 units installed above 4,500 to 7,500 feet, must be replaced. With electrical power and gas supply disconnected, use a wrench to remove brass barb fitting from the gas valve. Replace with new barb fitting (without bleed hole-98G50). Reconnect hose to new barb fitting and restore power and gas supply.

H-Flame Signal

Flame signal can be measured using a micro-amp meter or a voltmeter able to read micro-amps.

Flame (microamp) signal is an electrical current which passes from the furnace control through the sensor electrode during unit operation. Current passes from the sensor through the flame to ground to complete a safety circuit. If the flame signal is ever at or below 1.5 microamps, the TDSI control board will shut the unit down.

A microamp DC meter is needed to check flame signal on the primary ignition control.

If using a volt meter that can not read micro-amps, a transducer (Part # 78H54 available from Lennox Repair Parts) is required to measure flame signal. See figure 31. The transducer converts microamps to volts on a 1:1 conversion. The flame signal should be 3 - 9 microamps, therefore a reading of 3 - 9 volts should be read on the meter. A digital readout meter must be used. The transducer plugs into most meters.

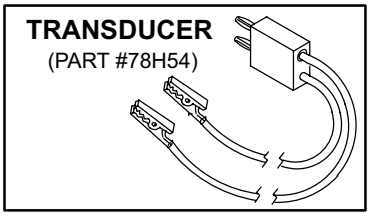


FIGURE 31

To Measure Flame Signal-Using Volt Meter:

1- Set the volt meter to the DC voltage scale. Insert transducer into the VDC and common inputs. Observe correct polarities. Failure to do so results in negative (-) values.
2- Turn off supply voltage to control.
3- Disconnect flame sensor lead from terminal of ignition control.
4- Connect (+) lead of meter to ignition control sensor connection. See figure 32.
5- Connect (-) lead of the meter to sensor wire. See figure 32.
6- Turn supply voltage on and close thermostat contacts to cycle system.
7- When unit lights read voltage on meter display. A reading of 3 - 9 volts DC should be observed during normal operation.

⚠ WARNING

Fire and explosion hazard.
These instructions MUST be followed exactly.
Can cause a fire or explosion resulting in property damage, personal injury or loss of life.

Flame signal may rise above normal microamps for the first few seconds after ignition and then level off within the range.

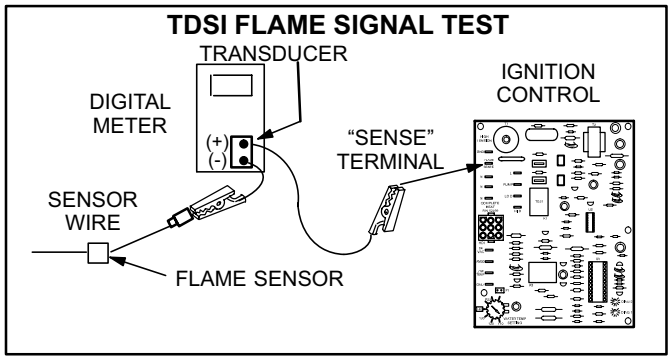


FIGURE 32

VIII-AM30 OPERATING CHARACTERISTICS

A-Blower Operation and Adjustment

NOTE- The following is a generalized procedure and does not apply to all thermostat controls.

1- Blower operation is dependent on thermostat control system.
2- Generally, blower operation is set at thermostat subbase fan switch. With fan switch in ON position, blower operates on the continuous speed tap. With fan switch in AUTO position, blower cycles with demand.
3- In all cases, blower and entire unit will be off when the system switch is in OFF position.

B-Temperature Rise

Temperature rise for CompleteHeat system depends on water temperature, blower speed and static pressure.

To Measure Temperature Rise:

1- Place plenum thermometers in the supply and return air plenums. Locate supply air thermometer in the first horizontal run of the plenum.

2- Set thermostat to highest setting.

3- Air volume to heating output at water temperature will vary. In order to properly check rise, Heating Performance tables on pages 6 and 7 must be consulted. To change blower speed taps see the Blower Speed Taps section in this manual.

C-External Static Pressure

1- Measure tap locations as shown in figure 33.

2- Punch a 1/4" (6.4 mm) diameter hole in supply (upstream of evaporator) and return air plenums. Insert manometer hose flush with inside edge of hole or insulation. Seal around the hose with permagum. Connect the zero end of the manometer to the discharge (supply) side of the system. On ducted systems, connect the other end of manometer to the return duct as above. For systems with non-ducted returns, leave the other end of the manometer open to the atmosphere.

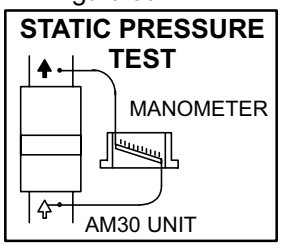


FIGURE 33

3- With only the blower motor running with the filter in place and evaporator coil dry, observe the manometer reading. Adjust blower motor speed to deliver the air desired according to the job requirements.

4- External static pressure drop must not be more than 0.5" w.c. (.12 kPa).

5- Seal the hole when the check is complete.

D-Blower Speed Taps Leadless Motors

Blower speed tap selection is accomplished by changing the taps at the blower motor harness connector. Disconnect harness connector from motor to expose speed selectors. Blower speed selections are listed in table 8.

Systems using a cooling thermostat subbase may operate continuous blower (see AM30 wiring diagram for continuous fan speed taps) through the ON switch of the thermostat. For continuous low blower with a system without a cooling subbase, a SPST toggle switch must be installed and connected between R and G of the AM30 unit thermostat connections. See AM30 unit wiring diagram. The toggle switch should be mounted so it is easily accessible.

Heating or cooling demand will cause blower to go to respective speed.

To Change Blower Speed:

1- Turn off electric power to furnace.

2- Remove front panel and blower access door.

3- Disconnect blower motor harness from motor.

4- Select desired speeds for heating, cooling, or continuous blower. (Red = heating, Black = cooling, Brown = continuous blower, White = common). See table 8.

5- Depress harness connector tab to release wire terminal. Select connector location for new speed (refer to unit wiring diagram). Insert wire terminal until it is securely in place. See figure 34.

6- Replace harness connector to motor.

TABLE 8

BLOWER SPEED SELECTION				
Unit	Factory Connected Speed Taps			Speeds Available
	Cool (Black)	Heat (Red)	Low (Continuous Blower; Brown)	
AM30Q2-40	2	3	4	3
AM30Q2/3-70	2	3	5	4
AM30Q3/4-70	2	3	5	4
AM30Q3/4-90	2	3	5	4
AM30Q4/5-90	2	3	6	5
AM30Q3/4-105	2	3	5	4
AM30Q4/5-120	2	3	6	5

TABLE 9

BLOWER SPEED SELECTION HI ◄——► LOW	TAPS AVAILABLE
◊ 2 3 4 5	4
◊ 2 3 4 5 6	5
◊ MOTOR PLUG SPEED TAP DESIGNATION	

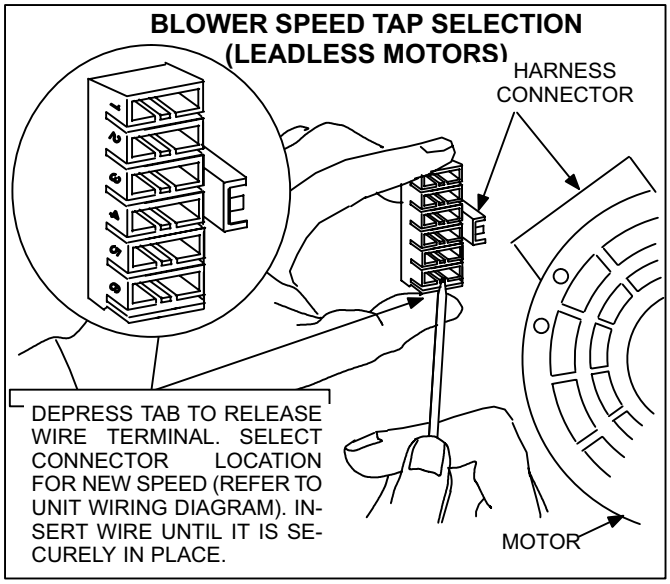


FIGURE 34

E-Blower Speed Taps leaded Motors

Late model AM 30 units will be equipped with leaded motors. Blower speed tap selection on leaded motors is accomplished by changing speed taps. Simply disconnect current tap, then rewire tap selected. See table 10 for color coded speed taps.

TABLE 10

BLOWER SPEED CHART							
UNIT	FACTORY CONNECTED SPEED TAPS						MOTOR SPEEDS AVAILABLE
	COOL	HEAT	ACB LOW	TERMINAL COVER			
Q2-40	BLACK	YELLOW	RED	----	----		3
Q2/3-70 Q3/470,90,105		BROWN	RED	YELLOW	----		4
Q4/5-90,120		BROWN	RED	BLUE	BLUE		5
BLOWER SPEED SELECTION HI ◄——► LO							
SPEED TAPS	BLACK		YELLOW			RED	3
	BLACK	BROWN		YELLOW		RED	4
	BLACK	BROWN	BLUE		YELLOW	RED	5

IX-MAINTENANCE

At the beginning of each heating season, the system should be checked as follows:

A-Filters

Bottom and side return air filters are supplied with the units. Rear return filters are field provided. A filter must be used in order to ensure long life and proper operation. The filter is located in the return air duct or return air register. Filters must be cleaned or replaced when dirty to assure proper unit operation.

B-Supply Air Blower

1- Check and clean blower wheel.

2- Motors are prelubricated for extended life; no further lubrication is required.

C-Anode Rod HM30-1 Units only

The anode rod is accessed by removing a 1-1/16" hex head (see figure 13) and pulling the rod out of the tank. Lennox recommends the rod be replaced with a red brass plug Lennox part # 41K7701.

D-Electrical

1- Check all wiring for loose connections.

2- Check circuit breaker located in unit control box.

3- Check for correct voltage at unit (unit operating).

4- Check amp-draw on blower motor.
Motor Nameplate_____Actual_____

5- Check to see that heat (if applicable) is operating.

E-Intake and Exhaust Lines

Check intake and exhaust lines and all connections for tightness and make sure there is no blockage. Also check condensate line for free flow during operation.

F-Insulation

Piping insulation should be inspected yearly for deterioration. If necessary, replace with same materials.

G-Draining Tank

⚠ IMPORTANT

Flush 5 to 10 gallons (18.9 L to 37.9) from the HM30 tank at 6-month intervals to remove any sediment. This may need to be done more often in areas of poor water conditions.

1- Turn off power to unit.
2- Remove HM30 access panel.
3- Connect hose to drain valve and route to open drain.
4- After flushing, close drain valve and disconnect hose. Fill tank with water and re-apply power to the unit.
5- Replace access panel.

⚠ WARNING

Never turn power on and fire burner unless tank is full. Damage to the HM30 unit will occur.

H-Filling Tank

After all plumbing connections have been made, leak tested and flushed, the HM30 tank is ready to be filled with water. With electrical power and gas supply OFF, open the cold water supply line and fill the tank. This should take 3 to 8 minutes.

I-Air System Purging

After filling the tank, the system must be purged of air trapped in the water line.

⚠ IMPORTANT

It is very important that all air is removed from the system. The limit switches will not work properly if air is present at the top of the HM30 tank.

Initial Air System Purging:

1 - Make sure electrical power and gas supply to system is turned off. Unit should not operate before initial purge is complete.
2 - Open hot water tap in the house.
3 - Open cold water supply to HM30 unit.
4 - Allow water to flow freely from the house tap.
5 - Remove AM30 coil section access panel.
6 - Remove cap from highest air bleed valve and depress valve stem until water is released. This may be done with a refrigerant style hose. See figure 35.
7 - Replace cap on valve and access panel.
8 - Turn off house tap and apply electrical power and gas supply to the system.
9 - Follow System Start-Up section to operate the system. Complete purging of air after unit has gone through initial start-up.

Final Air Purging:

1- Set room thermostat to a point where thermostat is initiated. Turn the hot water tap on to allow remaining air to escape from the system (up to 10 minutes).
2- Close the hot water tap and set the room thermostat to the desired set point.

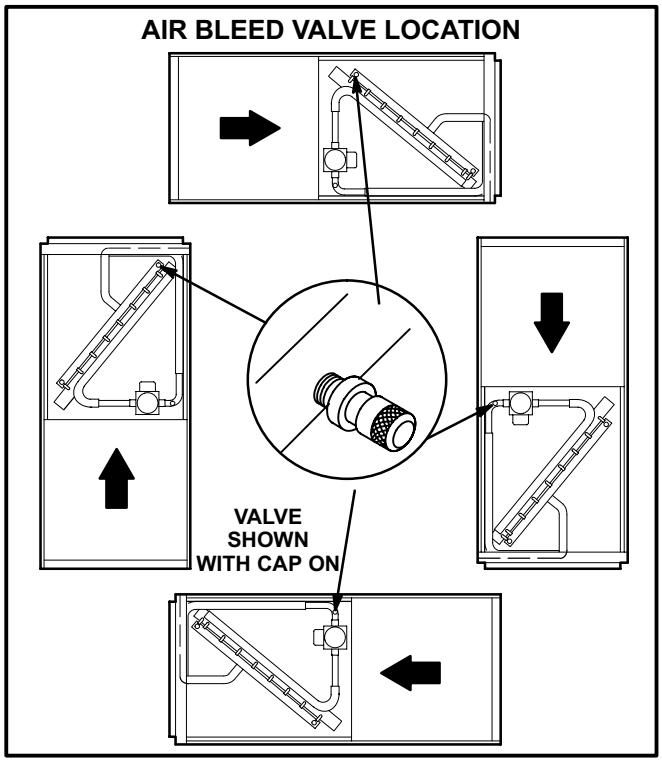


FIGURE 35

J-Cleaning Burner and Heat Exchanger

NOTE-Use papers or protective covering in front of HM30 while cleaning.

To clean burner:

⚠ IMPORTANT

When reinstalling burner, make sure new gaskets are used. NEVER USE THE OLD GASKETS. Make sure to check for gas leaks.

The burner is virtually maintenance free. However, if unit is running rough, abnormal build up is found in the condensate trap, or a build-up of soot is found around the burner, the burner may need to be removed and cleaned. Anytime the burner is removed, new gaskets are required (part numbers 84K49 and (LB-91393A).

1- Turn off both electrical and gas power supplies to furnace. Refer to figure 11 during disassembly and reassembly procedures.
2- Remove top access panel from the HM30.
3- Remove combustion air intake.
4- Disconnect gas piping at the union and move piping out of way so the gas valve and combustion air blower can be lifted up and away from the tank.
5- Disconnect wires leading to burner and heat exchanger assembly.
6- Locate four nuts which hold the combustion air blower in place. See figure 11. Remove nuts.
7- Lift combustion air blower, along with gas valve, off the four studs to expose the burner. Set the combustion air blower and gas valve off to the side.
8- Lift burner, along with spark electrode and flame sensor, out of the burner housing.
9- Gently clean burner using a brass wire brush. L.P. 150,000 Btu burner should be cleaned with compressed air.
10- With a shop vacuum or rags, clean out soot and scale deposits from burner and the spark electrode and flame sensor.
11- Check the gap in the spark electrode and regap if necessary. See figure 12.
12- Replace burner, along with spark electrode and flame sensor, **making sure to use new gaskets**. Resecure combustion air blower, along with gas valve, using the four nuts. The nuts need to be torqued to 7 ft. lbs.
13- Re-secure combustion air intake pipe, gas piping and access panel.
14- Carefully check all piping connections (factory and field) for gas leaks and burner gaskets for gas/air leaks. Use a leak detecting solution or other preferred means.
15- Turn on gas and electrical supply.

To clean heat exchanger:

The heat exchanger should rarely need cleaning. However, if an abnormal amount of soot is found, when cleaning the burner, the heat exchanger may need to be cleaned. Before reinstalling the burner assembly, clean the heat exchanger, as follows:

1- Connect a flexible plastic hose (approximately 30 feet (9.1 m)) to a shop vacuum.
2- With vacuum cleaner turned on, guide hose through heat exchanger opening found in wall of burner enclosure. Continue until you reach the bottom of the heat exchanger.

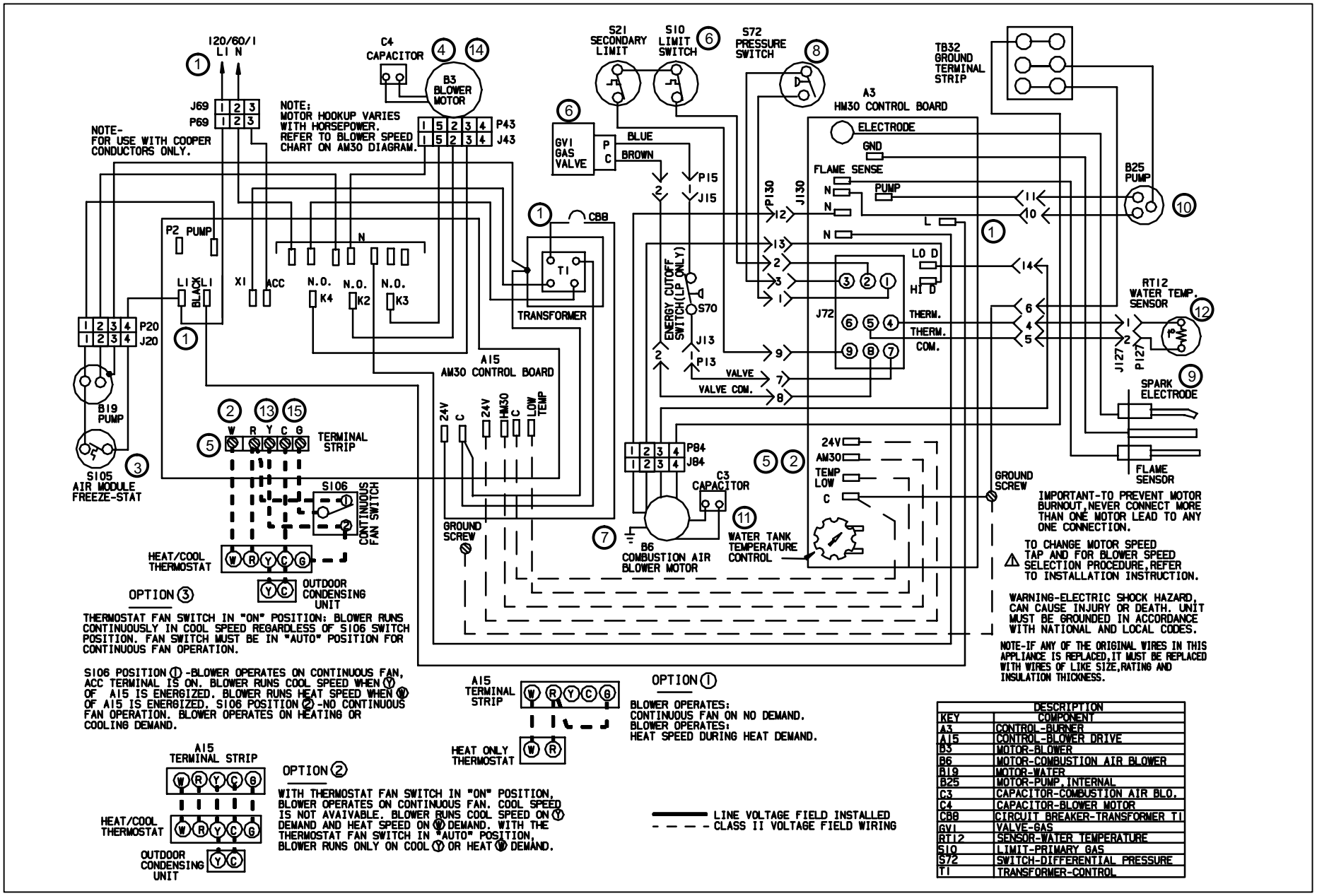
NOTE-HM30-150 heat exchanger has double-helix design. Repeat procedure in second heat exchanger tube.

3- Reassemble as outlined above.

K-Air Filters

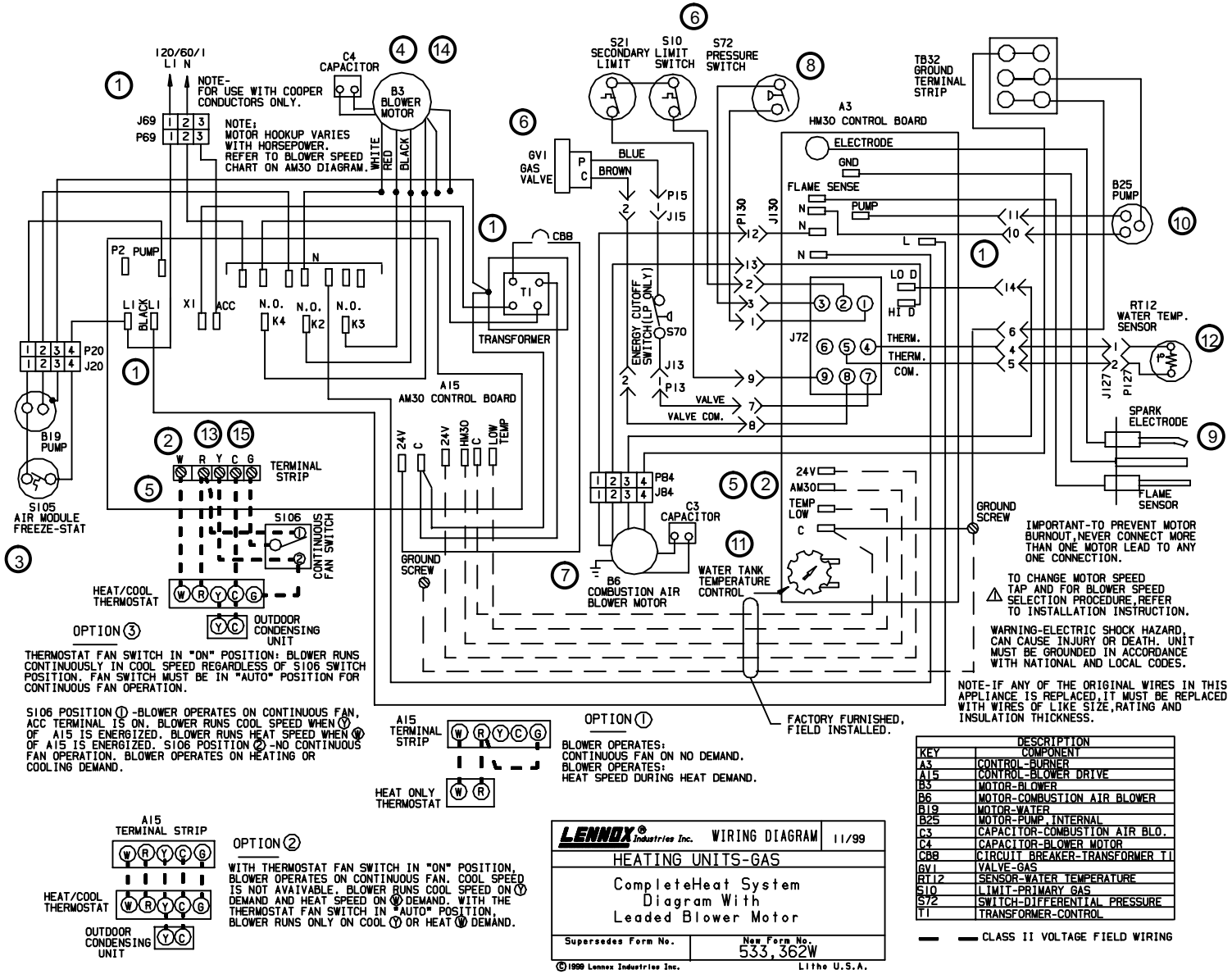
Filters should be checked and cleaned periodically. Filters are reusable and can cleaned with mild soap and water. If replacement is necessary, order Lennox part no. 28L90 for the filter or 28L82 for filter assembly.

X OPERATION SEQUENCE-CompleteHeat SYSTEM With Leadless Motor



KEY	DESCRIPTION COMPONENT
A3	CONTROL-BURNER
A15	CONTROL-BLOWER DRIVE
B3	MOTOR-BLOWER
B6	MOTOR-COMBUSTION AIR BLOWER
B19	MOTOR-WATER
B25	MOTOR-PUMP, INTERNAL
C3	CAPACITOR-COMBUSTION AIR BLO.
C4	CAPACITOR-BLOWER MOTOR
C88	CIRCUIT BREAKER-TRANSFORMER TI
GV1	VALVE-GAS
RT12	SENSOR-WATER TEMPERATURE
S10	LIMIT-PRIMARY GAS
S72	SWITCH-DIFFERENTIAL PRESSURE
T1	TRANSFORMER-CONTROL

CompleteHeat SYSTEM With Leaded Motor



CompleteHeat SYSTEM

This point to point diagram shows the step-by-step sequence of operation when thermostat demand is sent to the CompleteHeat system. The sequence describes the actions of devices in the unit which control blowers, pumps and other components in the system. The sequence is outlined by numbered steps which correspond to circled numbers on the adjacent diagram.

POWER:

1- When the unit disconnect closes, 120V is routed through the line voltage side of the AM30. The 120VAC provides power to the AM30 and HM30 control boards and the transformer T1. Transformer T1 in the AM30 provides 24VAC power to both the AM30 blower / pump control board (A15) and HM30 TDSI control board (A3) as well as the thermostat.

HEATING DEMAND:

2- When there is a call for heat, W1 of the thermostat energizes W of the AM30 control with 24VAC. The AM30 energizes the HM30, increasing the temperature setpoint by 5°F (8.3°C) (causing burner cycle to start) to ensure adequate hot water during space heating demand. If water temperature in the HM30 is below 20°F (11.1°C) of setpoint, the AM30 will delay operation until the water temperature is within 15°F (8.3°C) of setpoint.

Pump / Blower Operation:

3- When demand is routed through pump relay (K1) in the blower / pump control board, AM30 water pump (B19) is energized.

4- The blower (B3) is energized at heating speed by the blower relay (K4) after a “timed-on” delay, adjustable from 15 to 60 seconds.

5- When heating demand is satisfied, W1 of the thermostat de-energizes W of the AM30 control and the pump immediately de-energizes. The blower de-energizes or goes to continuous speed (K3) after a fixed 30-second “timed-off” delay.

Burner Operation:

6- The TDSI control checks the N.O. pressure switch (S72), N.C. primary limit (S10), N.C. secondary limit (S21), N.C. energy cut-off switch (S72) (L.P. units only) and that no flame is present.

7- If all the conditions are normal, the control will energize the combustion air blower (B6) at high speed. HM30 circulating pump (B25) run when combustion air blower is energized.

8- When the combustion air blower provides enough air to close the pressure switch, a 10-second prepurge period begins allowing the combustion chamber to vent itself.

9- After prepurge, the combustion air blower will shut off for a period of three seconds(TDSI 1,2 ,3). With the pressure switch remaining closed, the TDSI control simultaneously opens the gas valve and sends high voltage to the spark electrode to light the burner. After two seconds, the combustion air blower will restart. **TDSI-1 and -2** controls: If flame still does not exist after six seconds the gas valve closes, the spark electrode is de-energized and the combustion blower continues on for a 10-second inner-purge cycle. **TDSI-3 and -4** controls: If flame does not exist after 3 seconds the spark is de-energized followed by the gas valve 2 seconds later. The combustion air blower continues on for a 10 second inner-purge cycle.

10- When flame is sensed, the TDSI control initiates a 10-second flame stabilization period. If flame is present after 10 seconds, the controller establishes a 600-millisecond flame failure response time.

11- After flame stabilization period, the combustion air blower will reduce to low speed; assuming the tank temperature is within eight degrees of setpoint. If tank temperature is not within eight degrees of setpoint, the blower will remain on high speed.

12- When the HM30 tank temperature setpoint + 5°F (2.8°C) is satisfied, the gas valve is de-energized. The combustion air blower will continue to operate (post-purge) at low speed for 30 seconds.

COOLING DEMAND:

13- When there is a call for cooling, Y1 of the thermostat energizes Y of the AM30 control along with the condenser.

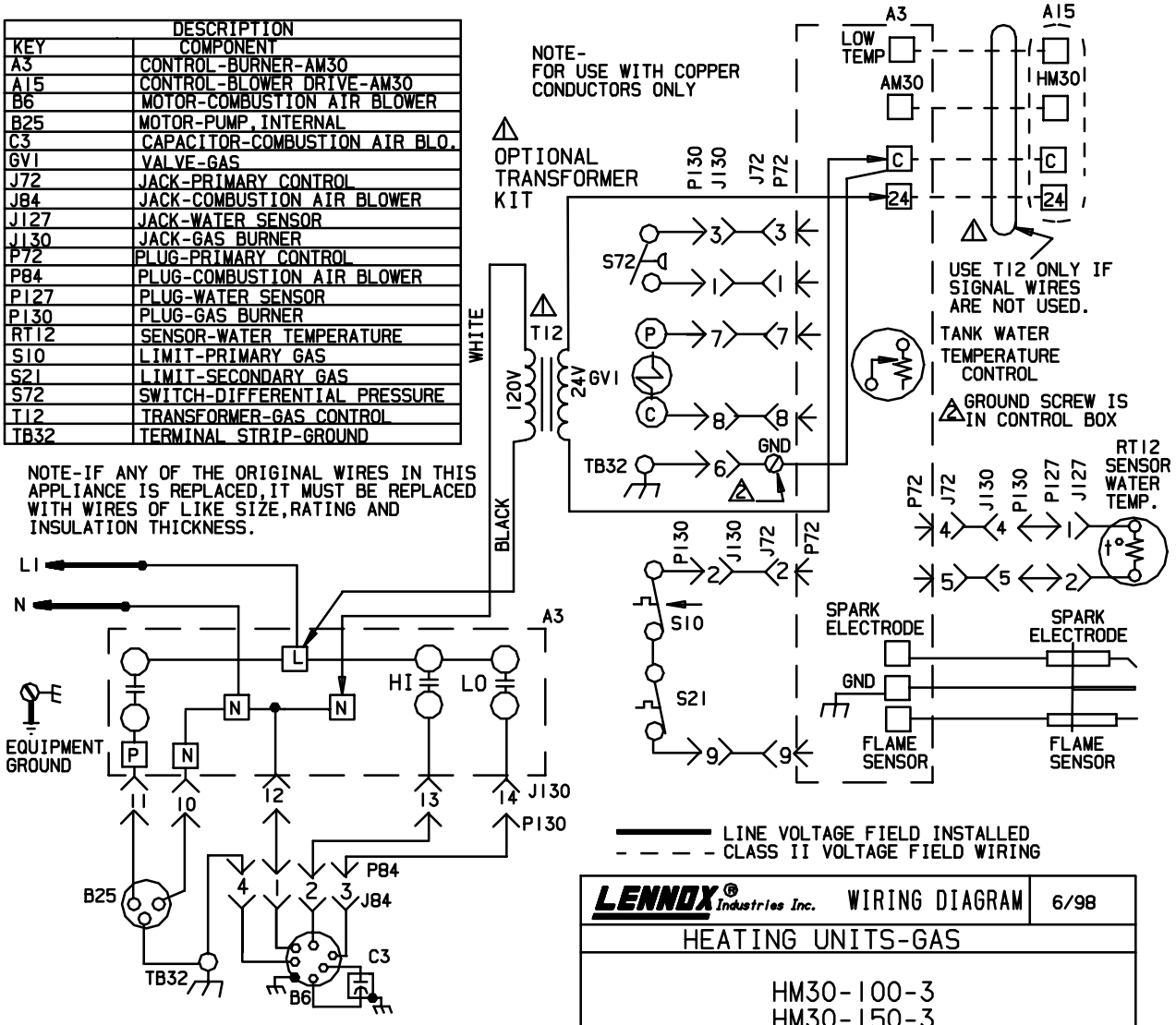
14- The blower (B3) is energized at cooling speed by the blower relay (K2).

15- When cooling demand is satisfied, Y1 of the thermostat de-energizes the condenser and Y of the AM30 control. The blower immediately de-energizes or switches to continuous speed (K3).

Note:

The blower / pump control board circulates water through the AM30 coil for 30 seconds every six hours. The six-hour timer resets after each 30-second run or after each heating demand is satisfied. When in cooling mode, the control will wait until a cooling demand is satisfied before energizing the pump.

DESCRIPTION	
KEY	COMPONENT
A3	CONTROL-BURNER-AM30
A15	CONTROL-BLOWER DRIVE-AM30
B6	MOTOR-COMBUSTION AIR BLOWER
B25	MOTOR-PUMP, INTERNAL
C3	CAPACITOR-COMBUSTION AIR BLO.
GV1	VALVE-GAS
J72	JACK-PRIMARY CONTROL
J84	JACK-COMBUSTION AIR BLOWER
J127	JACK-WATER SENSOR
J130	JACK-GAS BURNER
P72	PLUG-PRIMARY CONTROL
P84	PLUG-COMBUSTION AIR BLOWER
P127	PLUG-WATER SENSOR
P130	PLUG-GAS BURNER
RT12	SENSOR-WATER TEMPERATURE
S10	LIMIT-PRIMARY GAS
S21	LIMIT-SECONDARY GAS
S72	SWITCH-DIFFERENTIAL PRESSURE
T12	TRANSFORMER-GAS CONTROL
TB32	TERMINAL STRIP-GROUND



WARNING-
ELECTRIC SHOCK HAZARD, CAN CAUSE INJURY OR DEATH. UNIT MUST BE GROUNDED IN ACCORDANCE WITH NATIONAL AND LOCAL CODES.

LENNOX® Industries Inc. | WIRING DIAGRAM | 6/98

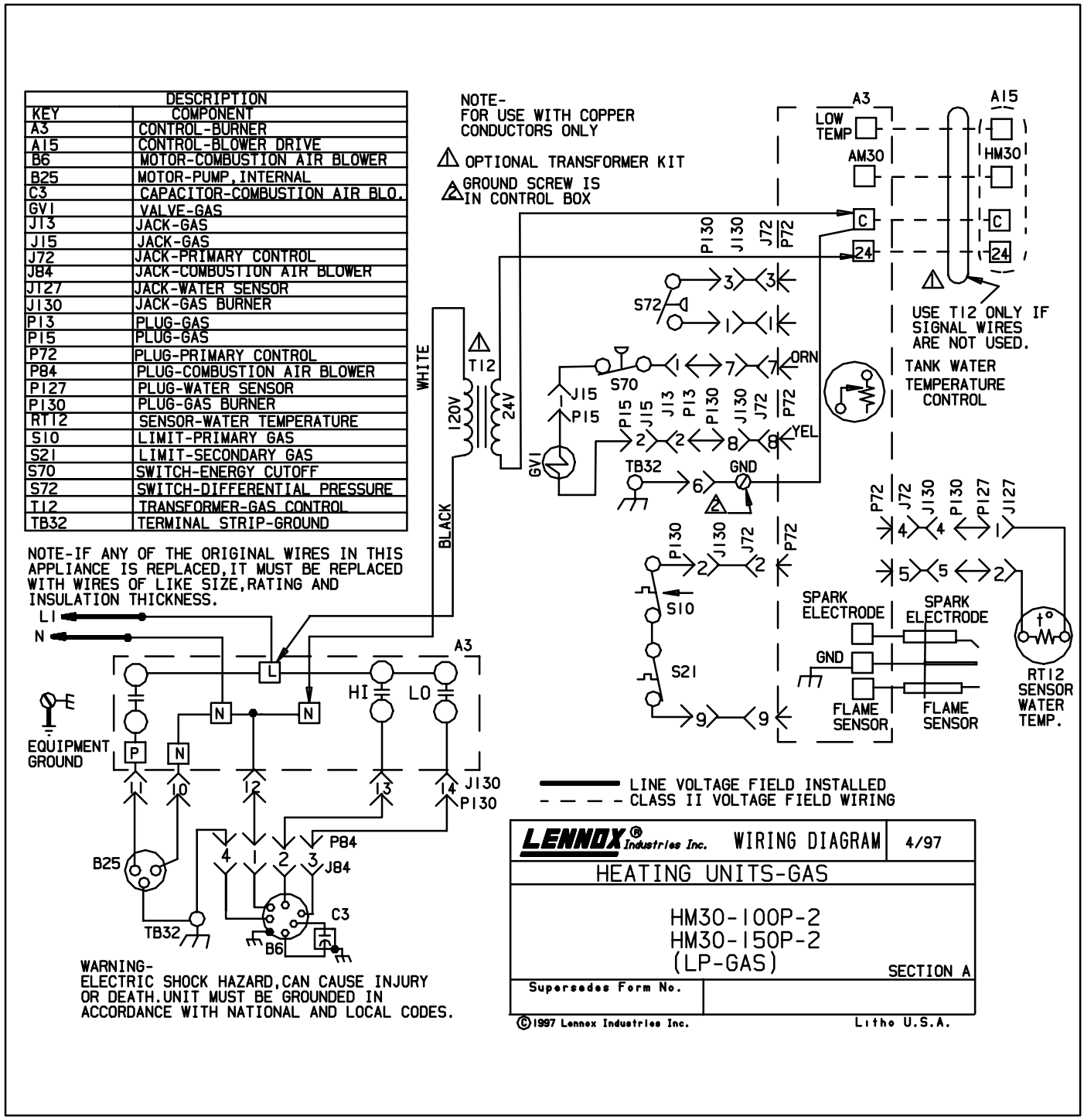
HEATING UNITS-GAS

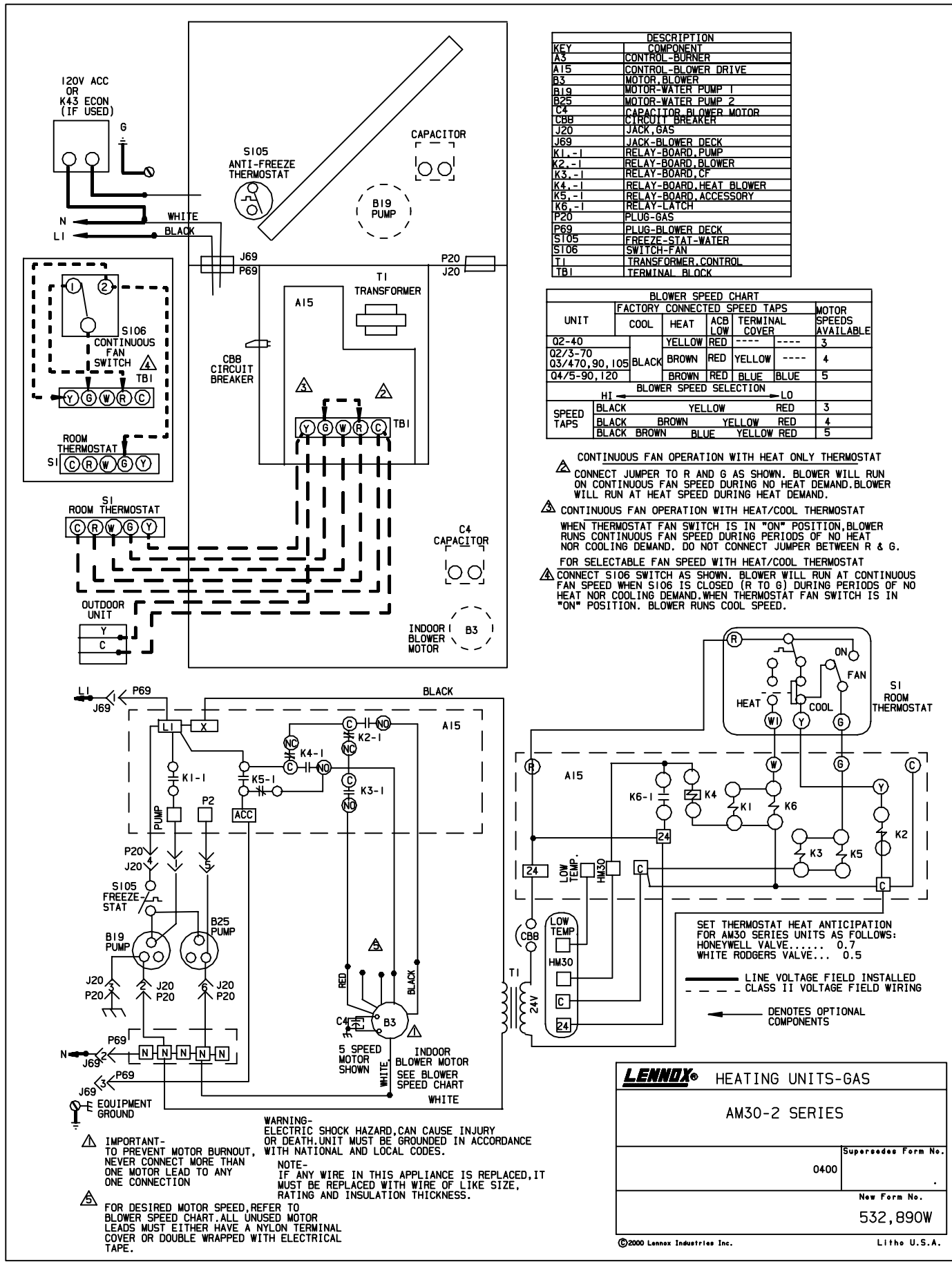
HM30-100-3
HM30-150-3

SECTION A

Supersedes Form No.

Litho U.S.A.


DESCRIPTION
KEY COMPONENT
A3 CONTROL-BURNER
A15 CONTROL-BLOWER DRIVE
B6 MOTOR-COMBUSTION AIR BLOWER
B25 MOTOR-PUMP, INTERNAL
C3 CAPACITOR-COMBUSTION AIR BLO.
GV1 VALVE-GAS
J13 JACK-GAS
J15 JACK-GAS
J72 JACK-PRIMARY CONTROL
J84 JACK-COMBUSTION AIR BLOWER
J127 JACK-WATER SENSOR
J130 JACK-GAS BURNER
P13 PLUG-GAS
P15 PLUG-GAS
P72 PLUG-PRIMARY CONTROL
P84 PLUG-COMBUSTION AIR BLOWER
P127 PLUG-WATER SENSOR
P130 PLUG-GAS BURNER
RT12 SENSOR-WATER TEMPERATURE
S10 LIMIT-PRIMARY GAS
S21 LIMIT-SECONDARY GAS
S70 SWITCH-ENERGY CUTOFF
S72 SWITCH-DIFFERENTIAL PRESSURE
T12 TRANSFORMER-GAS CONTROL
TB32 TERMINAL STRIP-GROUND
NOTE-
FOR USE WITH COPPER CONDUCTORS ONLY
1 OPTIONAL TRANSFORMER KIT
2 GROUND SCREW IS IN CONTROL BOX
NOTE-IF ANY OF THE ORIGINAL WIRES IN THIS APPLIANCE IS REPLACED, IT MUST BE REPLACED WITH WIRES OF LIKE SIZE, RATING AND INSULATION THICKNESS.
WARNING-
ELECTRIC SHOCK HAZARD, CAN CAUSE INJURY OR DEATH. UNIT MUST BE GROUNDED IN ACCORDANCE WITH NATIONAL AND LOCAL CODES.
LINE VOLTAGE FIELD INSTALLED
CLASS II VOLTAGE FIELD WIRING
LENNOX Industries Inc.
WIRING DIAGRAM
4/97
HEATING UNITS-GAS
HM30-100P-2
HM30-150P-2
(LP-GAS)
SECTION A
Supersedes Form No.
©1997 Lennox Industries Inc.
Litho U.S.A.



DESCRIPTION	
KEY	COMPONENT
A3	CONTROL-BURNER
A15	CONTROL-BLOWER DRIVE
B3	MOTOR,BLOWER
B19	MOTOR-WATER PUMP 1
B25	MOTOR-WATER PUMP 2
C4	CAPACITOR BLOWER MOTOR
CB8	CIRCUIT BREAKER
J20	JACK,GAS
J69	JACK-BLOWER DECK
K1.-1	RELAY-BOARD,PUMP
K2.-1	RELAY-BOARD,BLOWER
K3.-1	RELAY-BOARD,CF
K4.-1	RELAY-BOARD,HEAT BLOWER
K5.-1	RELAY-BOARD,ACCESSORY
K6.-1	RELAY-LATCH
P20	PLUG-GAS
P69	PLUG-BLOWER DECK
S105	FREEZE-STAT-WATER
S106	SWITCH-FAN
T1	TRANSFORMER,CONTROL
TB1	TERMINAL BLOCK

BLOWER SPEED CHART						
UNIT	FACTORY CONNECTED SPEED TAPS					MOTOR SPEEDS AVAILABLE
	COOL	HEAT	ACB LOW	TERMINAL COVER		
Q2-40	BLACK	YELLOW	RED	----	----	3
Q2/3-70 Q3/470,90,105		BROWN	RED	YELLOW	----	4
Q4/5-90,120		BROWN	RED	BLUE	BLUE	5
BLOWER SPEED SELECTION HI ◄ ► LO						
SPEED TAPS	BLACK	YELLOW			RED	3
	BLACK	BROWN		YELLOW	RED	4
	BLACK	BROWN	BLUE	YELLOW	RED	5

⚠4 CONTINUOUS FAN OPERATION WITH HEAT ONLY THERMOSTAT

CONNECT JUMPER TO R AND G AS SHOWN. BLOWER WILL RUN ON CONTINUOUS FAN SPEED DURING NO HEAT DEMAND.BLOWER WILL RUN AT HEAT SPEED DURING HEAT DEMAND.

⚠3 CONTINUOUS FAN OPERATION WITH HEAT/COOL THERMOSTAT

WHEN THERMOSTAT FAN SWITCH IS IN "ON" POSITION,BLOWER RUNS CONTINUOUS FAN SPEED DURING PERIODS OF NO HEAT NOR COOLING DEMAND. DO NOT CONNECT JUMPER BETWEEN R & G.

FOR SELECTABLE FAN SPEED WITH HEAT/COOL THERMOSTAT

⚠4 CONNECT S106 SWITCH AS SHOWN. BLOWER WILL RUN AT CONTINUOUS FAN SPEED WHEN S106 IS CLOSED (R TO G) DURING PERIODS OF NO HEAT NOR COOLING DEMAND.WHEN THERMOSTAT FAN SWITCH IS IN "ON" POSITION. BLOWER RUNS COOL SPEED.

SET THERMOSTAT HEAT ANTICIPATION FOR AM30 SERIES UNITS AS FOLLOWS:
HONEYWELL VALVE..... 0.7
WHITE RODGERS VALVE... 0.5

LINE VOLTAGE FIELD INSTALLED
CLASS II VOLTAGE FIELD WIRING

DENOTES OPTIONAL COMPONENTS

⚠ IMPORTANT-
TO PREVENT MOTOR BURNOUT, NEVER CONNECT MORE THAN ONE MOTOR LEAD TO ANY ONE CONNECTION

⚠5 FOR DESIRED MOTOR SPEED,REFER TO BLOWER SPEED CHART.ALL UNUSED MOTOR LEADS MUST EITHER HAVE A NYLON TERMINAL COVER OR DOUBLE WRAPPED WITH ELECTRICAL TAPE.

WARNING-
ELECTRIC SHOCK HAZARD,CAN CAUSE INJURY OR DEATH.UNIT MUST BE GROUNDED IN ACCORDANCE WITH NATIONAL AND LOCAL CODES.

NOTE-
IF ANY WIRE IN THIS APPLIANCE IS REPLACED,IT MUST BE REPLACED WITH WIRE OF LIKE SIZE, RATING AND INSULATION THICKNESS.

LENNOX® HEATING UNITS-GAS

AM30-2 SERIES

0400

Supersedes Form No.

New Form No.
532,890W

Litho U.S.A.

COMPLETEHEAT SYSTEM SEQUENCE OF OPERATION

AM30 Air Module

Unit disconnect closes and provides 120V to the transformer T1 and AM30 control board. Transformer T1 provides 24VAC power to both the AM30 blower / pump control board (A15) and room thermostat.

HM30 Heat Module

120V is routed to HM30 TDSI control board through two-wire line voltage harness. 24VAC is sent from the AM30 to the HM30 through the interconnecting harness.

Cooling Demand

Thermostat terminal Y1 energizes AM30 control terminal Y and the condenser.

The indoor blower (B3) is energized at cooling speed by the blower relay (K2).

When cooling demand is satisfied, thermostat terminal Y1 de-energizes the condenser and AM30 control terminal Y. The blower immediately de-energizes or switches to continuous speed (K3).

Space Heating Demand

Room thermostat terminal W1 sends 24VAC to W located on the AM30 control.

During a call for space heat, the temperature setpoint increases by 5°F (2.75°C) causing burner cycle to start. This insures adequate hot water during space heating demand.

If HM30 water temperature is more than 20°F (11.10°C) below setpoint, the AM30 will wait for the water temperature to rise within 15°F (8.33°C) of setpoint before continuing with pump/blower operation.

HM30 Burner Operation

The TDSI control checks the N.O. pressure switch (S72), N.C. primary limit (S10), N.C. secondary limit (S21), and that no flame is present.

If all conditions are satisfied, the control energizes the combustion air blower (B6) at high speed. The HM30 circulating pump (B25) runs anytime the combustion air blower is energized until post-purge is finished. When enough air is provided to close the pressure switch, a ten-second prepurge period begins allowing the combustion chamber to vent itself.

After prepurge, the combustion air blower will shut off for three seconds(TDSI 1,2, and 3). With the pressure switch remaining closed, the TDSI control simultaneously opens the gas valve and sends high voltage to the spark electrode to light the burner. After two seconds, the combustion air blower begins to run at high speed. TDSI-1, -2 controls: If flame still does not exist six seconds after prepurge, the gas valve closes, spark electrode de-energizes and the combustion blower turns on for a ten-second inner-purge cycle. TDSI-3, -4 control: If flame does not exist 3 seconds after prepurge, spark electrode de-energizes followed by the gas valve 2 seconds later.

When flame is sensed, the TDSI control initiates a 10-second flame stabilization period. If flame is present after 10 seconds, the controller establishes a 600-millisecond flame failure response time.

After flame stabilization period, the combustion air blower will reduce to low speed; assuming the tank temperature is within eight degrees of setpoint. If tank temperature is not within eight degrees of set point the blower will remain on high speed.

When the temperature setpoint + 5°F (2.75°C) is satisfied, the gas valve de-energizes. The combustion air blower will continue to operate (post-purge) at low speed for 30 seconds.

AM30 Pump / Blower Operation

When demand is routed through pump relay (K1) in the blower / pump control board, AM30 water pump (B19) is energized. Water pumped from HM30 to AM30 is hotter than water for domestic use.

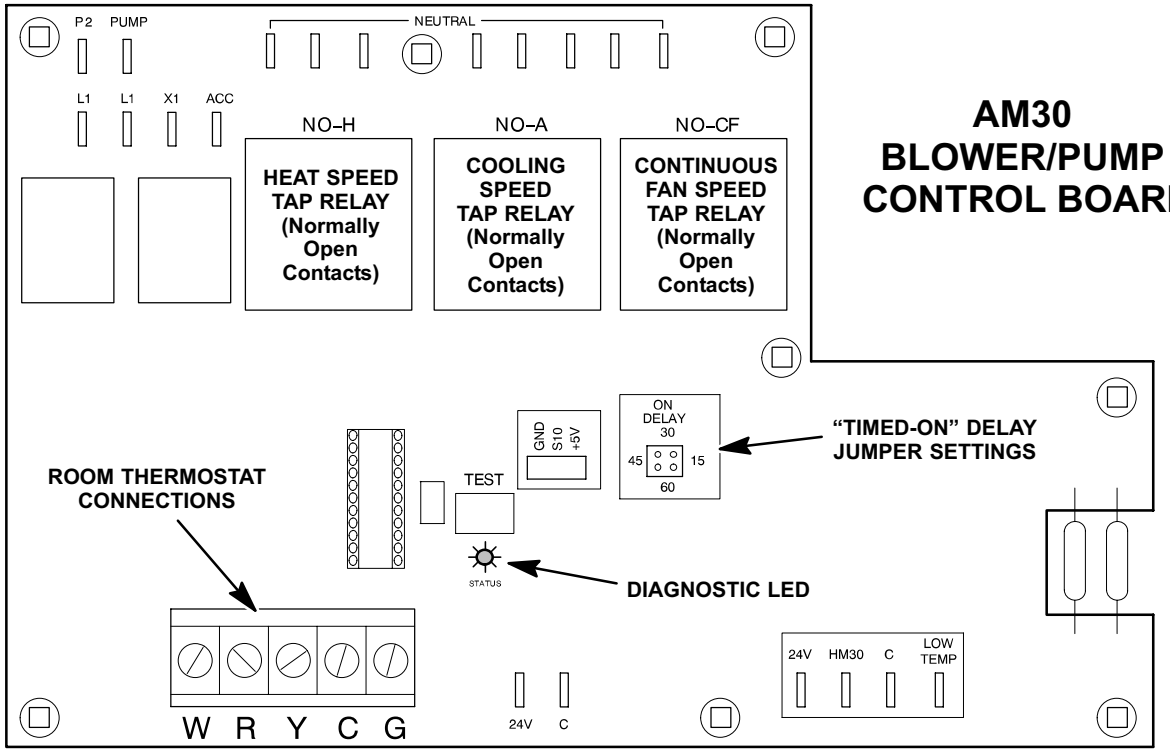
The blower (B3) is energized at heating speed by the blower relay (K4) after a “timed-on” delay, adjustable from 15 to 60 seconds.

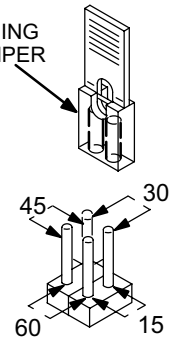
When heating demand is satisfied, thermostat terminal W1 de-energizes AM30 control terminal W and the circulating pump. After a fixed 30-second “timed-off” delay, the blower either de-energizes or goes to continuous speed (K3). The six-hour circulating timer resets.

Six-Hour Circulation Timer

The blower / pump control board circulates water through the AM30 coil for 30 seconds every six hours. The six-hour circulation timer resets after each 30-second run or after each heating demand is satisfied. When in cooling mode, the control will wait until a cooling demand is satisfied before energizing the pump.

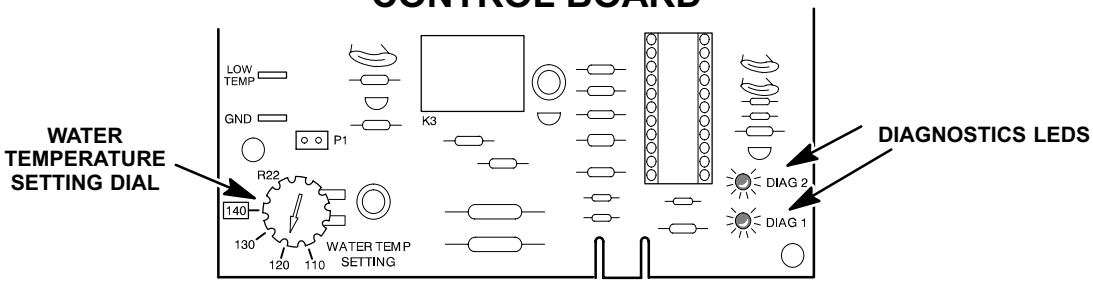
AM30 BLOWER / PUMP CONTROL BOARD TROUBLESHOOTING CHART



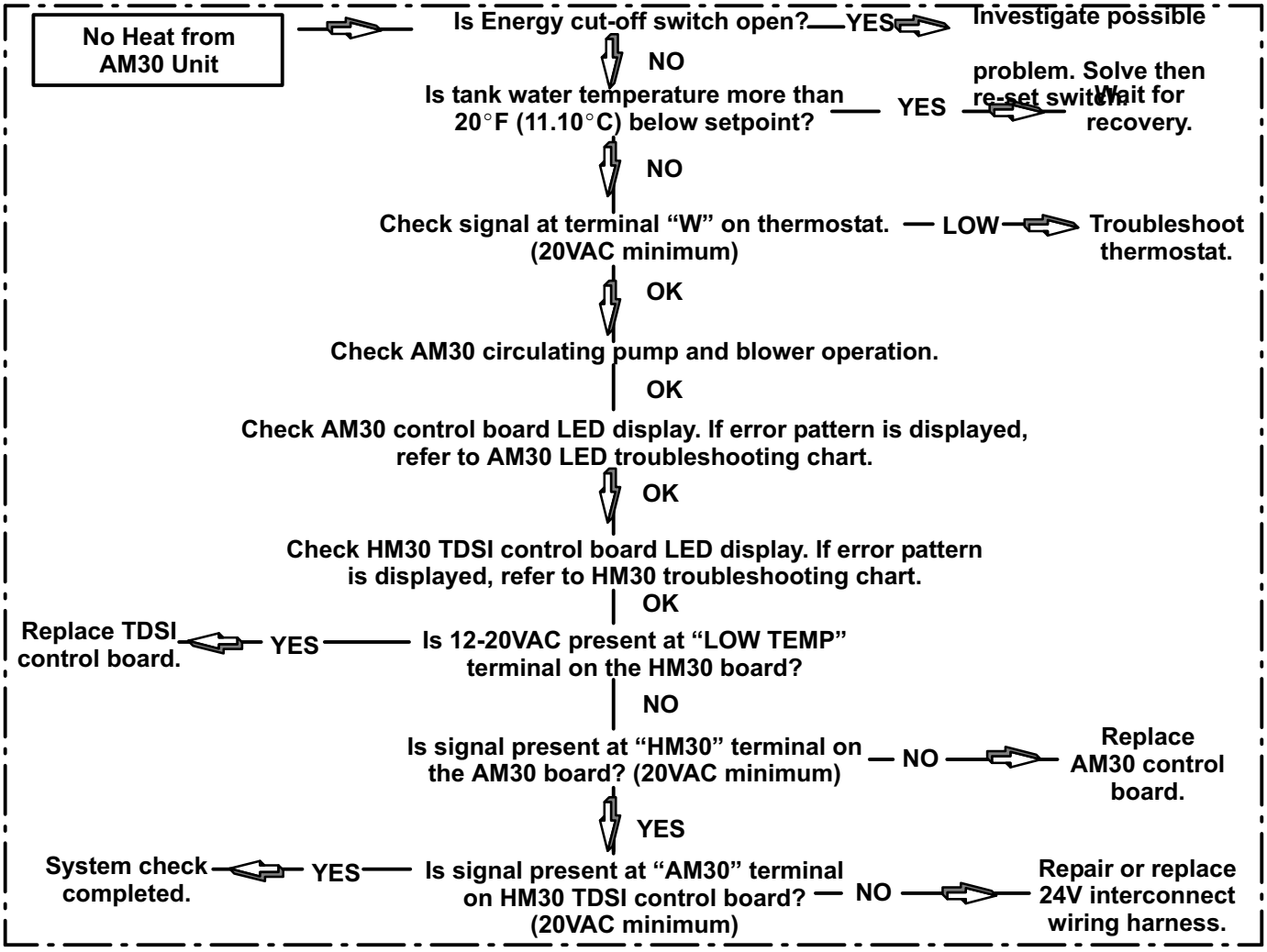
AM30 BOARD DIAGNOSTIC LED	MODE INDICATION	REMEDY
☼ Flashing	Normal Operation	None. Flashing LED signifies normal operation.
● On	"Timed-On" Delay Jumper Setting Defaulting to 15 Seconds	Control cannot read the ON DELAY jumper setting and has defaulted to 15 seconds. Remove jumper and reposition on pins corresponding with the desired "timed-on" period. If control still cannot read delay, replace AM30 control board. 
● On	Simultaneous Demand from W and Y	Control reads a signal from both W and Y (heating and cooling). Check wiring at thermostat and thermostat connections on the AM30 board.
Continuously ● On or ○ Off	Board Failure	Replace the AM30 control board.

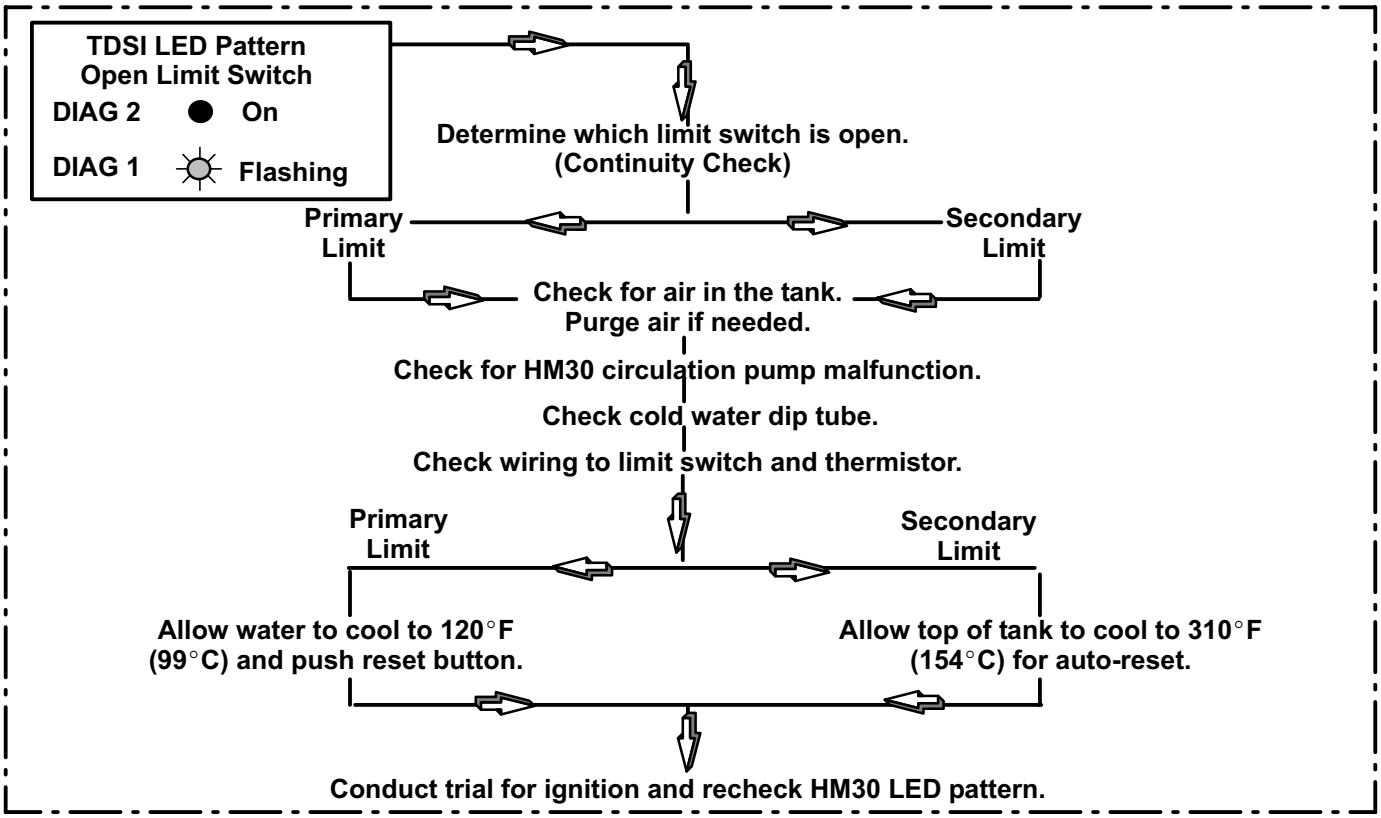
HM30 TDSI CONTROL BOARD TROUBLESHOOTING CHART

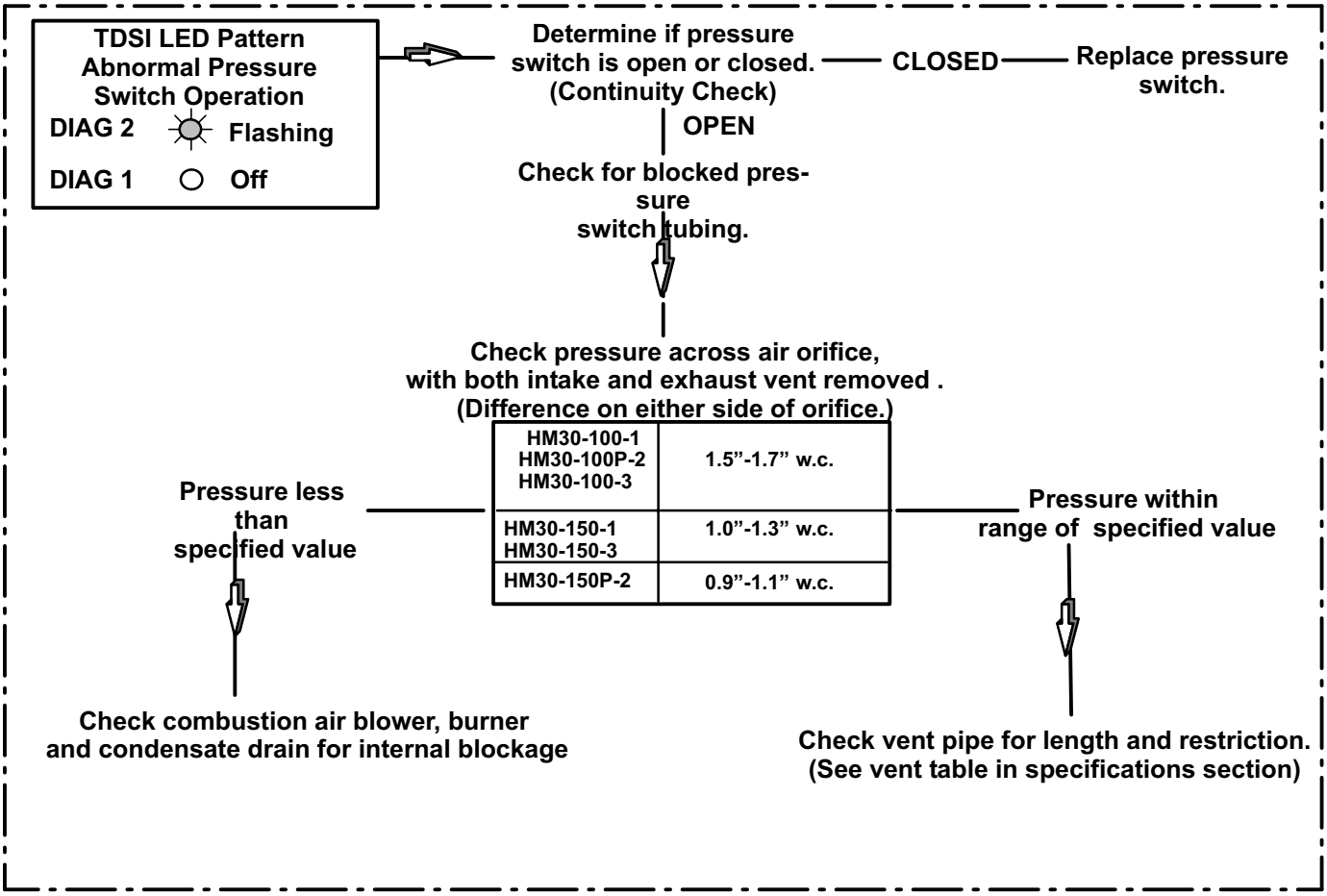
HM30 TDSI BURNER/IGNITION/TEMPERATURE CONTROL BOARD

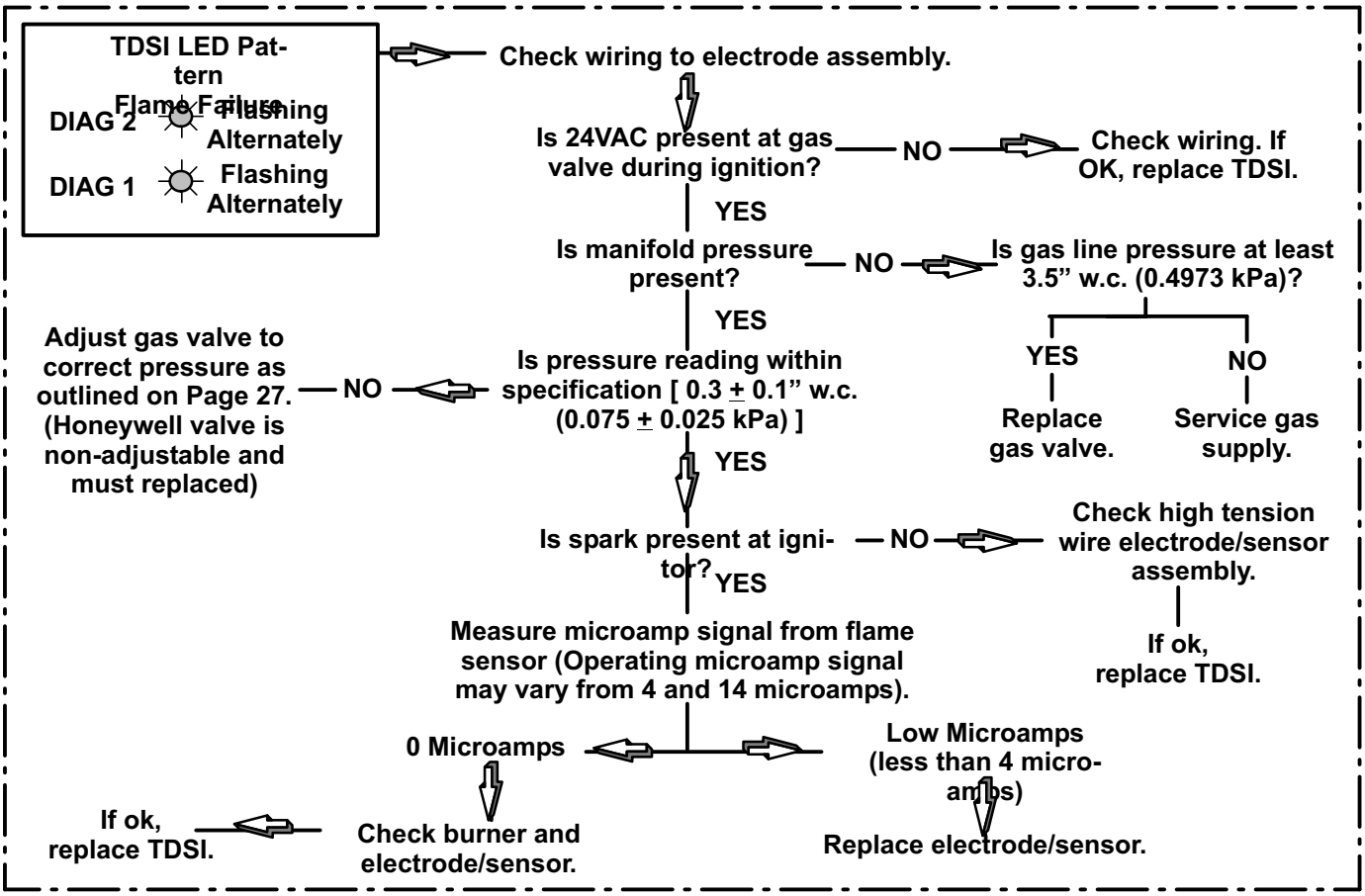


TDSI BOARD DIAGNOSTIC PATTERNS	MODE INDICATION	REMEDY
DIAG 2 ☼ Flashing Together DIAG 1 ☼ Flashing Together	Normal Operation	None. Flashing LED signifies normal operation.
DIAG 2 ☼ Flashing DIAG 1 ● On	Watchguard	The system is in Watchguard mode. Other error conditions may have occurred during the postpurge period before the system went into Watchguard. Reset power to the system and observe diagnostic LEDs for any other error conditions.
DIAG 2 ○ Off DIAG 1 ☼ Flashing	Thermistor Fail	This LED pattern will only exist during the postpurge prior to Watchguard. If this condition occurs, check wiring and replace thermistor if necessary.
DIAG 2 ● On DIAG 1 ☼ Flashing	Limit Switch Open	This LED pattern will only exist during the postpurge prior to Watchguard. If this condition occurs, proceed with limit switch open troubleshooting flowchart.
DIAG 2 ☼ Flashing DIAG 1 ○ Off	Abnormal Pressure Switch Operation	This LED pattern will exist during prepurge and postpurge prior to Watchguard. If this condition occurs, proceed with abnormal pressure switch operation troubleshooting flowchart.
DIAG 2 ☼ Flashing Alternately DIAG 1 ☼ Flashing Alternately	Flame Failure	This LED pattern will only exist during the postpurge prior to Watchguard. If this condition occurs, proceed with flame failure troubleshooting flowchart.
DIAG 2 ● On or ○ Off Continuously DIAG 1 ● On or ○ Off Continuously	TDSI Board Failure	Replace the TDSI control board.


No Heat from AM30 Unit
Is Energy cut-off switch open?
YES
Investigate possible problem. Solve then re-set switch. Wait for recovery.
NO
Is tank water temperature more than 20°F (11.10°C) below setpoint?
YES
NO
Check signal at terminal "W" on thermostat. (20VAC minimum)
LOW
Troubleshoot thermostat.
OK
Check AM30 circulating pump and blower operation.
OK
Check AM30 control board LED display. If error pattern is displayed, refer to AM30 LED troubleshooting chart.
OK
Check HM30 TDSI control board LED display. If error pattern is displayed, refer to HM30 troubleshooting chart.
OK
Replace TDSI control board.
YES
Is 12-20VAC present at "LOW TEMP" terminal on the HM30 board?
NO
Is signal present at "HM30" terminal on the AM30 board? (20VAC minimum)
NO
Replace AM30 control board.
YES
System check completed.
YES
Is signal present at "AM30" terminal on HM30 TDSI control board? (20VAC minimum)
NO
Repair or replace 24V interconnect wiring harness.


TDSI LED Pattern
Open Limit Switch
DIAG 2
On
DIAG 1
Flashing
Determine which limit switch is open. (Continuity Check)
Primary Limit
Secondary Limit
Check for air in the tank. Purge air if needed.
Check for HM30 circulation pump malfunction.
Check cold water dip tube.
Check wiring to limit switch and thermistor.
Primary Limit
Secondary Limit
Allow water to cool to 120°F (99°C) and push reset button.
Allow top of tank to cool to 310°F (154°C) for auto-reset.
Conduct trial for ignition and recheck HM30 LED pattern.


TDSI LED Pattern
Abnormal Pressure Switch Operation
DIAG 2 Flashing
DIAG 1 Off
Determine if pressure switch is open or closed. (Continuity Check)
CLOSED
Replace pressure switch.
OPEN
Check for blocked pressure switch tubing.
Check pressure across air orifice, with both intake and exhaust vent removed . (Difference on either side of orifice.)
HM30-100-1 HM30-100P-2 HM30-100-3 | 1.5”-1.7” w.c.
HM30-150-1 HM30-150-3 | 1.0”-1.3” w.c.
HM30-150P-2 | 0.9”-1.1” w.c.
Pressure less than specified value
Pressure within range of specified value
Check combustion air blower, burner and condensate drain for internal blockage
Check vent pipe for length and restriction. (See vent table in specifications section)


TDSI LED Pattern
Flame Failure
DIAG 2 Flashing Alternately
DIAG 1 Flashing Alternately
Check wiring to electrode assembly.
Is 24VAC present at gas valve during ignition?
NO
Check wiring. If OK, replace TDSI.
YES
Is manifold pressure present?
NO
Is gas line pressure at least 3.5” w.c. (0.4973 kPa)?
YES
NO
Replace gas valve.
Service gas supply.
YES
Adjust gas valve to correct pressure as outlined on Page 27. (Honeywell valve is non-adjustable and must replaced)
NO
Is pressure reading within specification [0.3 ± 0.1” w.c. (0.075 ± 0.025 kPa)]
YES
Is spark present at ignitor?
NO
Check high tension wire electrode/sensor assembly.
If ok, replace TDSI.
YES
Measure microamp signal from flame sensor (Operating microamp signal may vary from 4 and 14 microamps).
0 Microamps
Low Microamps (less than 4 microamps)
If ok, replace TDSI.
Check burner and electrode/sensor.
Replace electrode/sensor.

SERVICE NOTES