G71MPP SERIES UNITS

G71MPP series units are high-efficiency multi-position (upflow, downflow, horizontal right and left) gas furnaces equipped with variable capacity gas valve, variable speed combustion air inducer and variable speed indoor blower motor. All models are designed only for direct vent (dual pipe) venting system. G71MPP units are available in heating capacities from 66,000 to 132,000 Btuh (19.3 to 38.6 kW) and cooling applications from 2 to 5 tons (7.0 kW to 17.5 kW). Refer to Engineering Handbook for proper sizing.

Units are factory equipped for use with natural gas. Kits are available for conversion to LPG operation. G71MPP model units are equipped with the Lennox SureLight® variable capacity integrated control. All G71MPP units meet the California Nitrogen Oxides (NO_x) Standards and California Seasonal Efficiency requirements.

All specifications in this manual 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 (except where noted) are recommendations only and do not constitute code.

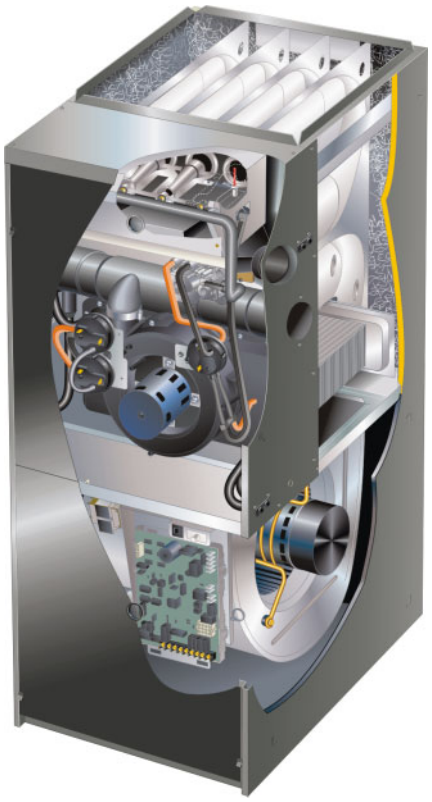

TABLE OF CONTENTS

Specifications . . . . . Page 2
Optional Accessories . . . . . Page 3
Blower Data . . . . . Page 4
I Unit Components . . . . . Page 16
Control Box 16
Blower Compartment 28
Heating Components 30
II Installation . . . . . Page 36
III Start Up . . . . . Page 47
IV Heating System Service Checks . . . . . Page 48
V Typical Operating Characteristics . . . . . Page 51
VI Maintenance . . . . . Page 52
VII Wiring and Sequence of Operation . . . . . Page 54
VIII Field Wiring . . . . . Page 61

⚠WARNING

Improper installation, adjustment, alteration, service or maintenance can cause property damage, personal injury or loss of life. Installation and service must be performed by a licensed professional installer (or equivalent), service agency or the gas supplier.

⚠WARNING

Electric shock hazard. Can cause injury or death. Before attempting to perform any service or maintenance, turn the electrical power to unit OFF at disconnect switch(es). Unit may have multiple power supplies.

⚠ WARNING

Sharp edges.
Be careful when servicing unit to avoid sharp edges which may result in personal injury.

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SPECIFICATIONS

		Model No.	G71MPP -36B-070	G71MPP -36C-090	G71MPP -60C-090	G71MPP -60C-110	G71MPP -60D-135
Gas Heating Performance	**Maximum**	Input - Btuh	66,000	88,000	88,000	110,000	132,000
		Output - Btuh	60,000	81,000	81,000	103,000	123,000
		Temperature rise range - °F	50 - 80	60 - 90	50 - 80	50 - 80	55 - 85
		Gas Manifold Pressure (in. w.g.) Natural Gas / LPG/Propane	3.5 / 10.0	3.5 / 10.0	3.5 / 10.0	3.5 / 10.0	3.5 / 10.0
	Minimum	Input - Btuh	26,000	35,000	35,000	44,000	53,000
		Output - Btuh	25,000	34,000	34,000	42,000	51,000
		Temperature rise range - °F	40 - 70	40 - 70	40 - 70	40 - 70	40 - 70
		Gas Manifold Pressure (in. w.g.) Natural Gas / LPG/Propane	0.7 / 2.0	0.7 / 2.0	0.7 / 2.0	0.7 / 2.0	0.7 / 2.0
		[1] AFUE	95.0%	95.0%	95.0%	95.0%	95.0%
		High static (CSA) - in. w.g.	.80	.80	.80	.80	.80
Connections in.		Intake / Exhaust Pipe (PVC)	2 / 2	2 / 2	2 / 2	2 / 2	3 / 3
		Condensate Drain Trap (PVC pipe) - i.d.	1/2	1/2	1/2	1/2	1/2
		with field supplied (PVC coupling) - o.d.	3/4	3/4	3/4	3/4	3/4
		hose with hose clamp - i.d. x o.d.	1 x 1-1/4	1 x 1 1/4	1 x 1 1/4	1 x 1 1/4	1 x 1 1/4
		Gas pipe size IPS	1/2	1/2	1/2	1/2	1/2
Indoor Blower		Wheel nominal diameter x width - in.	10 x 8	10 x 10	11-1/2 x 10	11-1/2 x 10	11-1/2 x 10
		Motor output - hp	1/2	1/2	1	1	1
		Tons of add-on cooling	2 - 3.5	2 - 3.5	3.5 - 5	3.5 - 5	3.5 - 5
		Air volume range - cfm	250 -1395	250 - 1395	450 - 2215	450 - 2210	450 - 2190
Shipping Data		lbs. - 1 package	149	160	171	184	206
Electrical characteristics			120 volts - 60 hertz - 1 phase (less than 12 amps)				

NOTE - Filters and provisions for mounting are not furnished and must be field provided.

[1] Annual Fuel Utilization Efficiency based on DOE test procedures and according to FTC labeling regulations. Isolated combustion system rating for non-weatherized furnaces.

OPTIONAL ACCESSORIES

			"B" Width Models	"C" Width Models	"D" Width Models
FILTER KITS					
[1] **Air Filter and Rack Kit**	Horizontal (end)	Size of filter - in.	**87L96 -** 18 x 25 x 1	**87L97 -** 20 x 25 x 1	**87L98 -** 25 x 25 x 1
	Side Return	Single	**44J22**	**44J22**	**44J22**
		Ten Pack	**66K63**	**66K63**	**66K63**
		Size of filter - in.	16 x 25 x 1	16 x 25 x 1	16 x 25 x 1
EZ Filter Base	Catalog No. - Ship. Wt. - lbs.		**73P56** - 7	**73P57** - 8	**73P58** - 10
	Size of field provided filter - in.		16 x 25 x 1	20 x 25 x 1	24 x 24 x 1
CABINET ACCESSORIES					
Down-Flow Additive Base			**11M60**	**11M61**	**11M62**
Horizontal Support Frame Kit			**56J18**	**56J18**	**56J18**
Return Air Base			**98M60**	**98M58**	**98M59**
CONDENSATE DRAIN KITS					
Condensate Drain Heat Cable		6 ft.	**26K68**	**26K68**	**26K68**
		24 ft.	**26K69**	**26K69**	**26K69**
		50 ft.	**26K70**	**26K70**	**26K70**
Heat Cable Tape	Fiberglass - 1/2 in. x 66 ft.		**36G53**	**36G53**	**36G53**
	Aluminum foil - 2 in. x 60 ft.		**16P89**	**16P89**	**16P89**
Condensate Trap Alternate Location Kit - Up-Flow Only			**76M20**	**76M20**	**76M20**
CONTROLS					
ComfortSense™ 7000 Thermostat			**Y0349**	**Y0349**	**Y0349**
TERMINATION KITS – See Installation Instructions for specific venting information.					
Termination Kits	**Concentric**	2 in.	**71M80**	**69M29**	**- - -**
		3 in.	**- - -**	**60L46**	**60L46**
	Wall - Close Couple	2 in.	**22G44**	**- - -**	**- - -**
		3 in.	**44J40**	**44J40**	**44J40**
	Close Couple	2 in.	**30G28**	**- - -**	**- - -**
		3 in.	**81J20**	**81J20**	**81J20**
	Wall - Wall Ring Kit	2 in.	**15F74**	**15F74**	**- - -**
	Roof	2 in.	**15F75**	**15F75**	**- - -**
Roof Termination Flashing Kit - Contains two flashings.			**44J41**	**44J41**	**44J41**

[1] Cleanable polyurethane frame type filter.

GAS HEAT ACCESSORIES

Input	High Altitude Pressure Switch Kit 7501-10,000 ft.	LPG/Propane Kit 0-10,000 ft.	LPG/Propane to Natural Gas Kit 0-10,000 ft.
-070	**36W77**	**33W41**	**33W42**
-090	**40W05**	**33W41**	**33W42**
-110	**40W06**	**33W41**	**33W42**
-135	**40W07**	**33W41**	**33W42**

TABLE 1
G71MPP-36B-070 BLOWER PERFORMANCE (less filter)
0 through 0.80 in. w.g. External Static Pressure Range

HEATING BLOWER PERFORMANCE

Heating Adjust CFM Selections	Heating Input Range and Blower Volume - CFM						
	40%	50%	60%	70%	80%	90%	100%
Increase (+15%) Heat CFM	535	610	690	770	870	975	1075
Increase (+7.5%) Heat CFM	505	575	645	720	810	905	1000
Default Heat CFM	480	545	610	675	760	845	930
Decrease (–7.5%) Heat CFM	460	520	580	640	715	790	870
Decrease (–15%) Heat CFM	440	490	540	590	655	715	780

COOLING BLOWER PERFORMANCE

Cooling Adjust CFM Selections	Blower Speed Selections							
	First Stage Cool Speed - cfm				Second Stage Cool Speed - cfm			
	Low	Medium-Low	Medium High	High (Default)	Low	Medium-Low	Medium High	High (Default)
Increase (+10%) Cool CFM	730	815	865	935	1015	1190	1280	1395
Default Cool CFM	680	755	795	855	930	1065	1155	1270
Decrease (–10%) Cool CFM	625	695	730	775	830	950	1010	1105

The effect of static pressure is included in air volumes shown.
Lennox Harmony III™ Zone Control Applications - Minimum blower speed is 250 cfm.
The following control board configurations are available. See Installation Instructions for details and DIP switch settings.
Heat Mode (Heating Blower Performance Table):
With a single-stage thermostat, furnace will operate at three, staged rates (40/70/100%) with a time delay between each stage (values in grey-shaded columns).
With two-stage thermostat there are two modes available.
Traditional two-stage mode - W1 demand results in 70% firing rate. W2 results in 100% firing rate. No delay between stages. (values shown in 70% and 100% grey-shaded columns only).
Variable Rate Capacity Mode - furnace automatically adjusts firing rate based on first- and second-stage cycle times. (all columns)
Cool Mode (Cooling Blower Performance table)**:**
First stage COOL (two-stage air conditioning units only) is approximately 70**%** of the same second stage COOL speed position.
Continuous Fan speeds are approximately 28%, 38%, 70% and 100% (DIP switch selectable) of the same second-stage COOL speed position minimum 250 cfm.

G71MPP-36B-070 BLOWER MOTOR WATTS - COOLING

Blower Speed Options	Motor Watts @ Various External Static Pressures - in. wg.																	
	First Stage									Second Stage								
	0	0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0	0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80
Increase (+10%) Cool CFM																		
Low	55	70	90	110	130	145	160	175	190	135	155	175	200	220	245	270	295	320
Medium-Low	75	90	110	130	150	170	190	205	220	185	215	250	285	315	345	370	395	420
Medium-High	85	100	120	145	165	185	205	225	250	235	265	300	335	370	400	425	455	480
High	105	125	150	170	190	210	235	255	280	315	340	370	395	440	480	510	540	570
Default Cool CFM																		
Low	45	60	80	95	115	130	145	160	175	100	120	140	165	190	215	235	255	275
Medium-Low	60	75	95	110	130	145	165	180	200	140	165	190	220	245	265	290	315	340
Medium-High	65	85	105	125	140	155	175	195	215	175	200	230	260	285	310	340	365	390
High	85	100	120	140	160	180	200	220	240	230	260	295	325	360	390	410	435	455
Decrease (–10%) Cool CFM																		
Low	40	55	70	85	100	120	130	145	160	75	90	110	125	150	175	190	210	225
Medium-Low	45	60	80	95	115	135	145	160	175	95	120	150	175	200	220	240	260	285
Medium-High	50	65	85	105	125	145	160	175	190	125	150	175	195	220	240	265	290	320
High	60	75	95	115	135	150	170	190	215	165	190	215	245	265	485	315	340	370

TABLE 2
G71MPP-36C-090 BLOWER PERFORMANCE (less filter)
0 through 0.80 in. w.g. External Static Pressure Range

HEATING BLOWER PERFORMANCE

Heating Adjust CFM Selections	Heating Input Range and Blower Volume - CFM						
	40%	50%	60%	70%	80%	90%	100%
Increase (+15%) Heat CFM	650	740	825	910	1005	1100	1200
Increase (+7.5%) Heat CFM	620	695	775	850	940	1025	1115
Default Heat CFM	590	655	725	790	870	950	1030
Decrease (–7.5%) Heat CFM	555	615	680	740	815	890	965
Decrease (–15%) Heat CFM	525	575	630	680	745	805	870

COOLING BLOWER PERFORMANCE

Cooling Adjust CFM Selections	Blower Speed Selections							
	First Stage Cool Speed - cfm				Second Stage Cool Speed - cfm			
	Low	Medium-Low	Medium High	High (Default)	Low	Medium-Low	Medium High	High (Default)
Increase (+10%) Cool CFM	705	790	845	920	1020	1185	1275	1395
Default Cool CFM	650	730	770	830	905	1060	1145	1270
Decrease (–10%) Cool CFM	600	670	705	750	800	925	1010	1100

The effect of static pressure is included in air volumes shown.
Lennox Harmony III™ Zone Control Applications - Minimum blower speed is 250 cfm.
The following control board configurations are available. See Installation Instructions for details and DIP switch settings.
Heat Mode (Heating Blower Performance Table):
With a single-stage thermostat, furnace will operate at three, staged rates (40/70/100%) with a time delay between each stage (values in grey-shaded columns).
With two-stage thermostat there are two modes available.
Traditional two-stage mode - W1 demand results in 70% firing rate. W2 results in 100% firing rate. No delay between stages. (values shown in 70% and 100% grey-shaded columns only).
Variable Rate Capacity Mode - furnace automatically adjusts firing rate based on first- and second-stage cycle times. (all columns)
Cool Mode (Cooling Blower Performance table)**:**

First stage COOL (two-stage air conditioning units only) is approximately 70**%** of the same second stage COOL speed position.
Continuous Fan speeds are approximately 28%, 38%, 70% and 100% (DIP switch selectable) of the same second-stage COOL speed position minimum 250 cfm.

G71MPP-36C-090 BLOWER MOTOR WATTS - COOLING

Blower Speed Options	Motor Watts @ Various External Static Pressures - in. wg.																
	First Stage									Second Stage							
	0	0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0	0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80
Increase (+10%) Cool CFM																		
Low	35	50	70	90	105	125	140	160	175	85	110	135	160	185	205	235	265	295
Medium-Low	45	60	80	100	125	150	170	185	205	125	155	185	220	245	275	305	330	360
Medium-High	60	75	95	110	135	160	180	200	220	165	195	230	265	300	330	355	380	410
High	65	85	110	135	160	180	205	225	245	210	245	285	325	360	390	425	460	495
Default Cool CFM																		
Low	35	45	60	75	95	115	130	145	160	60	80	110	135	155	175	195	215	235
Medium-Low	40	55	70	90	110	130	150	165	185	105	125	145	170	200	225	250	270	295
Medium-High	45	60	80	95	115	135	155	175	195	115	140	175	205	235	265	290	315	335
High	50	65	85	105	130	155	180	200	220	155	185	220	255	285	315	345	380	415
Decrease (–10%) Cool CFM																		
Low	30	40	55	75	90	105	120	135	150	55	65	85	105	125	150	170	190	210
Medium-Low	40	50	65	80	100	120	130	145	160	65	90	120	145	165	185	205	225	250
Medium-High	40	55	70	90	105	125	140	160	180	85	105	135	165	185	210	235	260	285
High	45	60	75	90	115	135	155	170	190	105	125	150	175	210	240	275	305	335

TABLE 3
G71MPP-60C-090 BLOWER PERFORMANCE (less filter)
Bottom Return Air, Return Air from Both Sides or Return Air from Bottom and One Side
0 through 0.80 in. w.g. External Static Pressure Range

HEATING BLOWER PERFORMANCE

Heating Adjust CFM Selections	Heating Input Range and Blower Volume - CFM						
	40%	50%	60%	70%	80%	90%	100%
Increase (+15%) Heat CFM	665	800	935	1070	1205	1335	1470
Increase (+7.5%) Heat CFM	600	730	860	990	1110	1235	1355
Default Heat CFM	615	715	820	920	1035	1150	1265
Decrease (–7.5%) Heat CFM	520	630	740	850	960	1070	1180
Decrease (–15%) Heat CFM	465	565	665	765	870	970	1075

COOLING BLOWER PERFORMANCE

Cooling Adjust CFM Selections	Blower Speed Selections							
	First Stage Cool Speed - cfm				Second Stage Cool Speed - cfm			
	Low	Medium-Low	Medium High	High (Default)	Low	Medium-Low	Medium High	High (Default)
Increase (+10%) Cool CFM	1105	1185	1355	1545	1605	1710	1925	2165
Default Cool CFM	995	1080	1205	1345	1440	1560	1755	1960
Decrease (–10%) Cool CFM	890	960	1090	1215	1275	1380	1590	1755

The effect of static pressure is included in air volumes shown.
Lennox Harmony III™ Zone Control Applications - Minimum blower speed is 450 cfm.
The following control board configurations are available. See Installation Instructions for details and DIP switch settings.
Heat Mode (Heating Blower Performance Table):
With a single-stage thermostat, furnace will operate at three, staged rates (40/70/100%) with a time delay between each stage (values in grey-shaded columns).
With two-stage thermostat there are two modes available.
Traditional two-stage mode - W1 demand results in 70% firing rate. W2 results in 100% firing rate. No delay between stages. (values shown in 70% and 100% grey-shaded columns only).
Variable Rate Capacity Mode - furnace automatically adjusts firing rate based on first- and second-stage cycle times. (all columns)
Cool Mode (Cooling Blower Performance table)**:**
First stage COOL (two-stage air conditioning units only) is approximately 70**%** of the same second stage COOL speed position.
Continuous Fan speeds are approximately 28%, 38%, 70% and 100% (DIP switch selectable) of the same second-stage COOL speed position minimum 450 cfm.

G71MPP-60C-090 BLOWER MOTOR WATTS - COOLING
Bottom Return Air, Return Air from Both Sides or Return Air from Bottom and One Side

Blower Speed Options	Motor Watts @ Various External Static Pressures - in. wg.																	
	First Stage									Second Stage								
	0	0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0	0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80
Increase (+10%) Cool CFM																		
Low	115	135	160	185	205	230	255	275	300	305	340	375	410	440	475	505	535	565
Medium-Low	145	165	190	215	240	265	285	305	325	355	390	430	470	510	550	580	610	635
Medium-High	170	200	240	275	305	335	370	400	430	510	555	600	645	690	730	765	795	830
High	265	295	330	365	400	435	465	500	535	725	780	835	895	935	975	1005	1035	1065
Default Cool CFM																		
Low	90	110	130	155	175	195	215	235	255	220	250	285	320	350	385	415	450	485
Medium-Low	110	130	155	180	200	220	245	265	285	270	305	345	385	420	455	485	515	545
Medium-High	145	165	190	215	245	270	295	320	340	390	425	465	500	540	580	610	640	670
High	180	205	240	270	300	330	365	395	430	540	580	625	670	710	755	795	830	870
Decrease (–10%) Cool CFM																		
Low	70	85	105	125	145	165	185	205	225	160	190	220	255	275	300	330	360	390
Medium-Low	80	100	120	140	165	190	210	225	245	195	225	260	295	325	350	385	415	450
Medium-High	110	130	160	185	205	225	250	275	300	295	330	365	400	430	460	495	535	570
High	155	175	195	220	245	270	295	315	340	400	435	470	510	545	585	610	640	665

TABLE 4
G71MPP-60C-090 BLOWER PERFORMANCE (less filter) **-- Single Side Return Air**
(Air volumes in bold require field fabricated transition to accommodate 20 x 25 x 1 in. cleanable air filter in order to maintain proper air velocity across the filter.)
0 through 0.80 in. w.g. External Static Pressure Range

HEATING BLOWER PERFORMANCE

Heating Adjust CFM Selections	Heating Input Range and Blower Volume - CFM						
	40%	50%	60%	70%	80%	90%	100%
Increase (+15%) Heat CFM	655	790	920	1050	1180	1310	1440
Increase (+7.5%) Heat CFM	605	725	850	970	1090	1205	1325
Default Heat CFM	555	675	790	905	1015	1125	1235
Decrease (–7.5%) Heat CFM	515	625	730	835	940	1045	1150
Decrease (–15%) Heat CFM	465	565	665	765	860	960	1055

COOLING BLOWER PERFORMANCE

Cooling Adjust CFM Selections	Blower Speed Selections							
	First Stage Cool Speed - cfm				Second Stage Cool Speed - cfm			
	Low	Medium-Low	Medium High	High (Default)	Low	Medium-Low	Medium High	High (Default)
Increase (+10%) Cool CFM	1080	1160	1315	1490	1575	1690	**1895**	**2135**
Default Cool CFM	985	1060	1185	1330	1405	1530	1735	**1935**
Decrease (–10%) Cool CFM	865	930	1065	1185	1250	1355	1560	1735

The effect of static pressure is included in air volumes shown.
Lennox Harmony III™ Zone Control Applications - Minimum blower speed is 450 cfm.
The following control board configurations are available. See Installation Instructions for details and DIP switch settings.
Heat Mode (Heating Blower Performance Table):
With a single-stage thermostat, furnace will operate at three, staged rates (40/70/100%) with a time delay between each stage (values in grey-shaded columns).
With two-stage thermostat there are two modes available.
Traditional two-stage mode - W1 demand results in 70% firing rate. W2 results in 100% firing rate. No delay between stages. (values shown in 70% and 100% grey-shaded columns only).
Variable Rate Capacity Mode - furnace automatically adjusts firing rate based on first- and second-stage cycle times. (all columns)
Cool Mode (Cooling Blower Performance table)**:**
First stage COOL (two-stage air conditioning units only) is approximately 70**%** of the same second stage COOL speed position.
Continuous Fan speeds are approximately 28%, 38%, 70% and 100% (DIP switch selectable) of the same second-stage COOL speed position minimum 450 cfm.

G71MPP-60C-090 BLOWER MOTOR WATTS - COOLING

Blower Speed Options	Motor Watts @ Various External Static Pressures - in. wg.																	
	First Stage									Second Stage								
	0	0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0	0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80
Increase (+10%) Cool CFM																		
Low	110	130	155	180	205	225	245	270	290	285	320	355	390	430	465	500	535	565
Medium-Low	125	150	175	205	225	250	275	300	325	355	390	430	470	500	530	570	605	645
Medium-High	170	195	230	260	290	325	355	385	415	515	550	590	625	670	710	750	795	840
High	240	275	315	355	380	405	445	485	525	740	785	835	885	920	955	990	1020	1050
Default Cool CFM																		
Low	85	100	125	145	170	200	215	235	255	200	230	270	310	340	370	400	430	460
Medium-Low	105	125	150	170	195	220	240	260	280	260	295	330	365	400	440	470	500	530
Medium-High	135	160	185	215	240	270	290	315	335	410	440	470	500	540	580	610	640	670
High	170	200	235	265	305	340	365	390	415	550	585	620	655	695	740	780	825	865
Decrease (–10%) Cool CFM																		
Low	65	80	100	120	140	160	180	205	225	180	215	245	265	290	320	345	375	445
Medium-Low	75	90	110	130	155	180	200	220	245	220	250	275	305	335	370	400	430	510
Medium-High	100	120	150	175	200	220	245	265	290	320	350	385	415	445	485	520	560	635
High	135	160	185	215	240	265	290	315	335	435	465	495	540	585	610	640	665	765

TABLE 5
G71MPP-60C-090 BLOWER PERFORMANCE (less filter) **-- Side Return Air with Optional RAB Return Air Base**
0 through 0.80 in. w.g. External Static Pressure Range

HEATING BLOWER PERFORMANCE

Heating Adjust CFM Selections	Heating Input Range and Blower Volume - CFM						
	40%	50%	60%	70%	80%	90%	100%
Increase (+15%) Heat CFM	645	770	895	1020	1155	1290	1425
Increase (+7.5%) Heat CFM	595	710	825	945	1070	1195	1315
Default Heat CFM	545	660	775	890	1005	1115	1225
Decrease (–7.5%) Heat CFM	505	605	710	810	920	1030	1140
Decrease (–15%) Heat CFM	455	555	650	750	845	945	1045

COOLING BLOWER PERFORMANCE

Cooling Adjust CFM Selections	Blower Speed Selections							
	First Stage Cool Speed - cfm				Second Stage Cool Speed - cfm			
	Low	Medium-Low	Medium High	High (Default)	Low	Medium-Low	Medium High	High (Default)
Increase (+10%) Cool CFM	1060	1135	1285	1455	1525	1655	**1860**	**2100**
Default Cool CFM	960	1035	1165	1310	1385	1500	1695	**1905**
Decrease (–10%) Cool CFM	865	920	1050	1165	1240	1320	1510	1695

The effect of static pressure is included in air volumes shown.
Lennox Harmony III™ Zone Control Applications - Minimum blower speed is 450 cfm.
The following control board configurations are available. See Installation Instructions for details and DIP switch settings.
Heat Mode (Heating Blower Performance Table):
With a single-stage thermostat, furnace will operate at three, staged rates (40/70/100%) with a time delay between each stage (values in grey-shaded columns).
With two-stage thermostat there are two modes available.
Traditional two-stage mode - W1 demand results in 70% firing rate. W2 results in 100% firing rate. No delay between stages. (values shown in 70% and 100% grey-shaded columns only).
Variable Rate Capacity Mode - furnace automatically adjusts firing rate based on first- and second-stage cycle times. (all columns)
Cool Mode (Cooling Blower Performance table)**:**
First stage COOL (two-stage air conditioning units only) is approximately 70**%** of the same second stage COOL speed position.
Continuous Fan speeds are approximately 28%, 38%, 70% and 100% (DIP switch selectable) of the same second-stage COOL speed position minimum 450 cfm.

G71MPP-60C-090 BLOWER MOTOR WATTS - COOLING
Side Return Air with Optional RAB Return Air Base

Blower Speed Options	Motor Watts @ Various External Static Pressures - in. wg.																	
	First Stage									Second Stage								
	0	0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0	0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80
Increase (+10%) Cool CFM																		
Low	110	130	150	175	195	215	240	265	290	275	305	340	380	410	440	470	505	540
Medium-Low	130	155	175	200	220	245	265	290	315	360	390	420	455	485	515	550	590	625
Medium-High	160	190	220	255	280	305	335	360	390	490	530	570	610	645	680	715	750	785
High	220	255	295	330	365	400	430	460	490	695	750	805	855	895	935	965	995	1025
Default Cool CFM																		
Low	80	95	120	140	165	190	210	235	255	190	225	265	305	330	355	390	420	455
Medium-Low	100	120	140	165	190	215	235	255	275	265	295	325	355	390	420	455	495	530
Medium-High	140	160	185	205	235	260	285	305	325	375	410	440	475	500	530	570	610	650
High	180	205	240	270	300	325	350	380	405	520	560	605	645	685	720	760	805	845
Decrease (–10%) Cool CFM																		
Low	70	85	105	125	140	160	180	200	220	155	175	200	225	255	290	315	340	365
Medium-Low	80	95	115	135	155	175	200	220	245	185	210	235	260	295	325	355	385	415
Medium-High	105	125	150	175	200	220	240	265	290	255	290	330	365	400	430	460	490	520
High	135	160	185	215	235	260	285	305	330	370	400	440	475	505	530	565	600	635

TABLE 6
G71MPP-60C-110 BLOWER PERFORMANCE (less filter)
Bottom Return Air, Return Air from Both Sides or Return Air from Bottom and One Side
0 through 0.80 in. w.g. External Static Pressure Range

HEATING BLOWER PERFORMANCE

Heating Adjust CFM Selections	Heating Input Range and Blower Volume - CFM						
	40%	50%	60%	70%	80%	90%	100%
Increase (+15%) Heat CFM	890	1050	1215	1375	1535	1695	1855
Increase (+7.5%) Heat CFM	845	975	1125	1275	1430	1585	1740
Default Heat CFM	800	960	1075	1190	1335	1480	1625
Decrease (–7.5%) Heat CFM	735	860	990	1120	1250	1380	1510
Decrease (–15%) Heat CFM	670	790	910	1030	1145	1260	1375

COOLING BLOWER PERFORMANCE

Cooling Adjust CFM Selections	Blower Speed Selections							
	First Stage Cool Speed - cfm				Second Stage Cool Speed - cfm			
	Low	Medium-Low	Medium High	High (Default)	Low	Medium-Low	Medium High	High (Default)
Increase (+10%) Cool CFM	945	1020	1160	1300	1625	1745	1990	2210
Default Cool CFM	840	910	1055	1180	1465	1580	1790	1995
Decrease (–10%) Cool CFM	740	800	920	1045	1290	1405	1605	1790

The effect of static pressure is included in air volumes shown.
Lennox Harmony III™ Zone Control Applications - Minimum blower speed is 450 cfm.
The following control board configurations are available. See Installation Instructions for details and DIP switch settings.
Heat Mode (Heating Blower Performance Table):
With a single-stage thermostat, furnace will operate at three, staged rates (40/70/100%) with a time delay between each stage (values in grey-shaded columns).
With two-stage thermostat there are two modes available.
Traditional two-stage mode - W1 demand results in 70% firing rate. W2 results in 100% firing rate. No delay between stages. (values shown in 70% and 100% grey-shaded columns only).
Variable Rate Capacity Mode - furnace automatically adjusts firing rate based on first- and second-stage cycle times. (all columns)
Cool Mode (Cooling Blower Performance table)**:**

First stage COOL (two-stage air conditioning units only) is approximately 70**%** of the same second stage COOL speed position.
Continuous Fan speeds are approximately 28%, 38%, 70% and 100% (DIP switch selectable) of the same second-stage COOL speed position minimum 450 cfm.

G71MPP-60C-110 BLOWER MOTOR WATTS - COOLING
Bottom Return Air, Return Air from Both Sides or Return Air from Bottom and One Side

Blower Speed Options	Motor Watts @ Various External Static Pressures - in. wg.																	
	First Stage									Second Stage								
	0	0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0	0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80
Increase (+10%) Cool CFM																		
Low	75	90	115	135	160	180	200	220	240	280	315	350	390	430	475	510	550	585
Medium-Low	90	105	130	150	175	200	220	245	270	340	380	425	465	505	545	575	610	645
Medium-High	120	140	170	195	225	250	275	300	330	510	545	585	620	675	735	770	805	840
High	160	185	210	235	265	290	325	360	395	710	755	805	855	905	950	980	1010	1035
Default Cool CFM																		
Low	55	70	90	110	135	155	175	195	215	205	235	275	310	345	380	415	450	485
Medium-Low	75	90	105	125	150	170	190	215	235	250	285	325	360	400	440	470	505	540
Medium-High	95	115	135	160	190	220	240	265	285	375	410	445	485	530	575	605	635	670
High	125	150	175	200	225	255	280	305	335	510	550	595	640	685	725	770	815	860
Decrease (–10%) Cool CFM																		
Low	45	60	80	100	115	125	145	160	180	155	180	210	240	270	295	325	355	385
Medium-Low	55	70	85	105	125	150	165	185	200	185	215	245	280	315	345	380	415	450
Medium-High	70	85	105	125	150	170	195	215	235	265	300	345	385	425	465	500	535	570
High	95	110	135	160	190	220	240	260	280	375	415	455	495	535	575	615	650	690

TABLE 7
G71MPP-60C-110 BLOWER PERFORMANCE (less filter) **-- Single Side Return Air**
(Air volumes in bold require field fabricated transition to accommodate 20 x 25 x 1 in. cleanable air filter in order to maintain proper air velocity across the filter.)
0 through 0.80 in. w.g. External Static Pressure Range

HEATING BLOWER PERFORMANCE

Heating Adjust CFM Selections	Heating Input Range and Blower Volume - CFM						
	40%	50%	60%	70%	80%	90%	100%
Increase (+15%) Heat CFM	870	1030	1185	1345	1490	1630	1775
Increase (+7.5%) Heat CFM	815	955	1095	1240	1380	1525	1670
Default Heat CFM	765	900	1035	1170	1305	1435	1570
Decrease (-7.5%) Heat CFM	715	840	965	1090	1210	1330	1450
Decrease (-15%) Heat CFM	650	765	880	995	1110	1225	1335

COOLING BLOWER PERFORMANCE

Cooling Adjust CFM Selections	Blower Speed Selections							
	First Stage Cool Speed - cfm				Second Stage Cool Speed - cfm			
	Low	Medium-Low	Medium High	High (Default)	Low	Medium-Low	Medium High	High (Default)
Increase (+10%) Cool CFM	935	1025	1155	1285	1585	1700	**1905**	**2135**
Default Cool CFM	840	915	1050	1175	1435	1535	1740	**1930**
Decrease (–10%) Cool CFM	750	800	925	1050	1280	1385	1570	1755

The effect of static pressure is included in air volumes shown.
Lennox Harmony III™ Zone Control Applications - Minimum blower speed is 450 cfm.
The following control board configurations are available. See Installation Instructions for details and DIP switch settings.
Heat Mode (Heating Blower Performance Table):
With a single-stage thermostat, furnace will operate at three, staged rates (40/70/100%) with a time delay between each stage (values in grey-shaded columns).
With two-stage thermostat there are two modes available.
Traditional two-stage mode - W1 demand results in 70% firing rate. W2 results in 100% firing rate. No delay between stages. (values shown in 70% and 100% grey-shaded columns only).
Variable Rate Capacity Mode - furnace automatically adjusts firing rate based on first- and second-stage cycle times. (all columns)
Cool Mode (Cooling Blower Performance table)**:**
First stage COOL (two-stage air conditioning units only) is approximately 70**%** of the same second stage COOL speed position.
Continuous Fan speeds are approximately 28%, 38%, 70% and 100% (DIP switch selectable) of the same second-stage COOL speed position minimum 450 cfm.

G71MPP-60C-110 BLOWER MOTOR WATTS - COOLING

Blower Speed Options	Motor Watts @ Various External Static Pressures - in. wg.																
	First Stage									Second Stage							
	0	0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0	0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80
Increase (+10%) Cool CFM																		
Low	70	90	110	130	150	165	185	210	230	255	295	345	390	430	470	510	545	585
Medium-Low	85	105	125	150	170	190	215	235	255	340	375	415	455	490	525	570	615	660
Medium-High	115	135	160	185	210	230	255	285	310	455	500	555	610	655	695	750	800	850
High	155	175	195	220	250	285	310	335	360	650	710	770	835	880	920	960	995	1035
Default Cool CFM																		
Low	60	75	90	110	125	145	165	185	205	195	230	270	305	345	380	415	455	490
Medium-Low	70	85	105	125	140	160	180	200	220	225	265	315	360	400	440	475	515	555
Medium-High	95	110	130	150	175	200	225	245	265	365	400	445	485	525	565	610	650	690
High	115	135	165	190	215	235	260	285	310	495	535	580	625	675	725	770	815	860
Decrease (–10%) Cool CFM																		
Low	45	60	80	100	110	125	140	155	170	155	180	205	235	270	305	340	370	400
Medium-Low	50	65	85	100	120	135	155	175	195	170	200	240	275	315	355	390	420	455
Medium-High	75	90	105	120	140	160	185	210	235	250	290	330	375	410	445	485	525	570
High	95	110	135	155	175	200	225	250	270	365	405	450	490	535	575	615	655	690

TABLE 8
G71MPP-60C-110 BLOWER PERFORMANCE (less filter) **-- Side Return Air with Optional RAB Return Air Base**
0 through 0.80 in. w.g. External Static Pressure Range

HEATING BLOWER PERFORMANCE

Heating Adjust CFM Selections	Heating Input Range and Blower Volume - CFM						
	40%	50%	60%	70%	80%	90%	100%
Increase (+15%) Heat CFM	865	1020	1175	1330	1485	1635	1785
Increase (+7.5%) Heat CFM	805	950	1095	1240	1385	1535	1680
Default Heat CFM	760	895	1030	1165	1300	1435	1570
Decrease (–7.5%) Heat CFM	710	835	960	1090	1210	1335	1460
Decrease (–15%) Heat CFM	645	765	880	1000	1110	1220	1335

COOLING BLOWER PERFORMANCE

Cooling Adjust CFM Selections	Blower Speed Selections							
	First Stage Cool Speed - cfm				Second Stage Cool Speed - cfm			
	Low	Medium-Low	Medium High	High (Default)	Low	Medium-Low	Medium High	High (Default)
Increase (+10%) Cool CFM	1085	1155	1310	1475	1555	1685	1895	2130
Default Cool CFM	955	1050	1185	1335	1415	1540	1735	1930
Decrease (–10%) Cool CFM	850	920	1070	1195	1245	1350	1545	1725

The effect of static pressure is included in air volumes shown.
Lennox Harmony III™ Zone Control Applications - Minimum blower speed is 450 cfm.
The following control board configurations are available. See Installation Instructions for details and DIP switch settings.
Heat Mode (Heating Blower Performance Table):
With a single-stage thermostat, furnace will operate at three, staged rates (40/70/100%) with a time delay between each stage (values in grey-shaded columns).
With two-stage thermostat there are two modes available.
Traditional two-stage mode - W1 demand results in 70% firing rate. W2 results in 100% firing rate. No delay between stages. (values shown in 70% and 100% grey-shaded columns only).
Variable Rate Capacity Mode - furnace automatically adjusts firing rate based on first- and second-stage cycle times. (all columns)
Cool Mode (Cooling Blower Performance table)**:**
First stage COOL (two-stage air conditioning units only) is approximately 70**%** of the same second stage COOL speed position.
Continuous Fan speeds are approximately 28%, 38%, 70% and 100% (DIP switch selectable) of the same second-stage COOL speed position minimum 450 cfm.

G71MPP-60C-110 BLOWER MOTOR WATTS - COOLING - Side Return Air with Optional RAB Return Air Base

Blower Speed Options	Motor Watts @ Various External Static Pressures - in. wg.																	
	First Stage									Second Stage								
	0	0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0	0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80
Increase (+10%) Cool CFM																		
Low	105	125	150	175	200	220	245	265	290	250	285	320	360	395	435	470	500	535
Medium-Low	130	150	175	200	220	240	270	295	320	335	365	405	445	480	515	550	590	630
Medium-High	165	190	220	250	275	305	335	370	400	470	505	545	585	630	670	710	755	800
High	205	240	285	330	360	390	420	450	485	655	695	745	790	840	885	925	965	1005
Default Cool CFM																		
Low	75	90	115	135	160	185	205	225	250	190	220	255	290	325	360	395	430	460
Medium-Low	100	120	145	165	185	205	230	255	280	250	285	325	360	390	420	455	485	520
Medium-High	135	155	175	200	230	260	280	305	330	355	395	435	475	510	545	580	620	660
High	170	195	225	255	290	320	350	375	405	475	515	565	610	655	705	745	785	825
Decrease (–10%) Cool CFM																		
Low	55	70	90	110	135	155	175	195	220	150	170	200	225	255	285	315	340	370
Medium-Low	65	80	105	130	150	170	195	215	240	165	195	230	265	300	330	360	390	420
Medium-High	100	125	150	180	200	220	240	260	280	240	280	320	360	400	435	470	505	540
High	140	160	180	200	230	260	285	305	330	350	385	420	455	500	540	575	610	645

TABLE 9
G71MPP-60D-135 BLOWER PERFORMANCE (less filter)
Bottom Return Air, Return Air from Both Sides or Return Air from Bottom and One Side
0 through 0.80 in. w.g. External Static Pressure Range

HEATING BLOWER PERFORMANCE

Heating Adjust CFM Selections	Heating Input Range and Blower Volume - CFM						
	40%	50%	60%	70%	80%	90%	100%
Increase (+15%) Heat CFM	1045	1220	1390	1565	1725	1885	2045
Increase (+7.5%) Heat CFM	975	1130	1290	1450	1600	1750	1900
Default Heat CFM	900	1045	1195	1340	1495	1650	1805
Decrease (–7.5%) Heat CFM	840	975	1110	1250	1390	1535	1675
Decrease (–15%) Heat CFM	760	890	1020	1145	1275	1405	1535

COOLING BLOWER PERFORMANCE

Cooling Adjust CFM Selections	Blower Speed Selections							
	First Stage Cool Speed - cfm				Second Stage Cool Speed - cfm			
	Low	Medium-Low	Medium High	High (Default)	Low	Medium-Low	Medium High	High (Default)
Increase (+10%) Cool CFM	1135	1205	1365	1540	1615	1730	1945	2190
Default Cool CFM	1025	1105	1235	1390	1455	1580	1780	1985
Decrease (–10%) Cool CFM	915	985	1115	1235	1305	1400	1600	1780

The effect of static pressure is included in air volumes shown.
Lennox Harmony III™ Zone Control Applications - Minimum blower speed is 450 cfm.
The following control board configurations are available. See Installation Instructions for details and DIP switch settings.
Heat Mode (Heating Blower Performance Table):
With a single-stage thermostat, furnace will operate at three, staged rates (40/70/100%) with a time delay between each stage (values in grey-shaded columns).
With two-stage thermostat there are two modes available.
Traditional two-stage mode - W1 demand results in 70% firing rate. W2 results in 100% firing rate. No delay between stages. (values shown in 70% and 100% grey-shaded columns only).
Variable Rate Capacity Mode - furnace automatically adjusts firing rate based on first- and second-stage cycle times. (all columns)
Cool Mode (Cooling Blower Performance table)**:**
First stage COOL (two-stage air conditioning units only) is approximately 70**%** of the same second stage COOL speed position.
Continuous Fan speeds are approximately 28%, 38%, 70% and 100% (DIP switch selectable) of the same second-stage COOL speed position minimum 450 cfm.

G71MPP-60D-135 BLOWER MOTOR WATTS - COOLING
Bottom Return Air, Return Air from Both Sides or Return Air from Bottom and One Side

Blower Speed Options	Motor Watts @ Various External Static Pressures - in. wg.																	
	First Stage									Second Stage								
	0	0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0	0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80
Increase (+10%) Cool CFM																		
Low	95	120	145	170	190	215	240	265	290	250	285	320	360	390	420	450	485	515
Medium-Low	115	135	160	185	210	235	260	290	315	290	330	375	420	455	490	525	565	605
Medium-High	145	175	215	250	275	300	330	355	385	425	465	505	550	590	635	670	710	750
High	205	240	280	320	350	380	410	445	480	615	655	700	745	800	855	900	940	980
Default Cool CFM																		
Low	80	95	115	135	160	190	210	230	255	185	215	245	280	310	335	370	400	430
Medium-Low	90	115	140	165	190	215	230	250	265	230	260	295	335	370	405	435	470	500
Medium-High	130	150	170	195	225	255	275	300	320	315	355	400	445	480	515	555	590	625
High	150	180	220	255	285	315	345	375	405	445	485	530	580	625	670	705	740	775
Decrease (–10%) Cool CFM																		
Low	65	80	100	120	140	160	180	195	215	145	170	195	225	250	280	305	330	355
Medium-Low	70	90	110	130	155	175	200	220	240	160	190	225	255	285	315	345	380	415
Medium-High	95	120	145	170	190	215	235	250	270	245	280	315	355	385	415	445	480	515
High	135	155	175	200	220	245	270	300	325	325	365	405	445	485	520	550	580	610

TABLE 10
G71MPP-60D-135 BLOWER PERFORMANCE (less filter) -- **Single Side Return Air**
(Air volumes in bold require field fabricated transition to accommodate 20 x 25 x 1 in. cleanable air filter in order to maintain proper air velocity across the filter.**)**
0 through 0.80 in. w.g. External Static Pressure Range

HEATING BLOWER PERFORMANCE

Heating Adjust CFM Selections	Heating Input Range and Blower Volume - CFM						
	40%	50%	60%	70%	80%	90%	100%
Increase (+15%) Heat CFM	995	1160	1325	1490	1640	1790	**1940**
Increase (+7.5%) Heat CFM	930	1075	1225	1370	1520	1670	**1825**
Default Heat CFM	865	1005	1145	1280	1425	1570	1715
Decrease (–7.5%) Heat CFM	805	930	1060	1185	1325	1470	1610
Decrease (–15%) Heat CFM	735	850	970	1090	1215	1345	1470

COOLING BLOWER PERFORMANCE

Cooling Adjust CFM Selections	Blower Speed Selections							
	First Stage Cool Speed - cfm				Second Stage Cool Speed - cfm			
	Low	Medium-Low	Medium High	High (Default)	Low	Medium-Low	Medium High	High (Default)
Increase (+10%) Cool CFM	1105	1180	1330	1500	1585	1705	**1905**	**2130**
Default Cool CFM	990	1075	1210	1355	1430	1545	1765	**1975**
Decrease (–10%) Cool CFM	890	950	1085	1210	1275	1370	1565	1755

The effect of static pressure is included in air volumes shown.
Lennox Harmony III™ Zone Control Applications - Minimum blower speed is 450 cfm.
The following control board configurations are available. See Installation Instructions for details and DIP switch settings.
Heat Mode (Heating Blower Performance Table):
With a single-stage thermostat, furnace will operate at three, staged rates (40/70/100%) with a time delay between each stage (values in grey-shaded columns).
With two-stage thermostat there are two modes available.
Traditional two-stage mode - W1 demand results in 70% firing rate. W2 results in 100% firing rate. No delay between stages. (values shown in 70% and 100% grey-shaded columns only).
Variable Rate Capacity Mode - furnace automatically adjusts firing rate based on first- and second-stage cycle times. (all columns)
Cool Mode (Cooling Blower Performance table)**:**
First stage COOL (two-stage air conditioning units only) is approximately 70**%** of the same second stage COOL speed position.
Continuous Fan speeds are approximately 28%, 38%, 70% and 100% (DIP switch selectable) of the same second-stage COOL speed position minimum 450 cfm.

G71MPP-60D-135 BLOWER MOTOR WATTS - COOLING

Blower Speed Options	Motor Watts @ Various External Static Pressures - in. wg.																	
	First Stage									Second Stage								
	0	0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0	0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80
Increase (+10%) Cool CFM																		
Low	90	110	140	170	195	220	240	265	290	230	265	310	355	390	425	460	490	525
Medium-Low	105	130	165	195	215	235	260	290	315	285	330	380	430	455	485	525	565	605
Medium-High	150	175	205	235	270	300	330	360	385	425	465	515	560	605	645	685	730	770
High	195	230	270	305	340	375	410	445	480	605	650	695	740	800	855	900	945	985
Default Cool CFM																		
Low	70	90	115	135	165	190	210	230	245	170	200	235	265	305	345	380	420	455
Medium-Low	80	100	130	160	185	210	230	255	275	245	270	305	335	370	410	440	470	505
Medium-High	120	140	170	195	225	255	280	305	330	350	385	420	455	495	530	570	610	645
High	145	175	215	250	280	315	345	375	410	455	500	555	605	645	680	725	770	810
Decrease (–10%) Cool CFM																		
Low	60	75	95	115	135	150	175	195	220	140	160	185	205	240	280	305	335	360
Medium-Low	60	75	100	125	150	175	195	215	235	145	180	215	250	290	325	355	385	420
Medium-High	90	110	140	165	190	215	235	255	270	230	265	305	345	380	420	450	480	510
High	120	140	170	195	225	255	275	300	325	330	365	405	445	485	525	560	595	635

TABLE 11
G71MPP-60D-135 BLOWER PERFORMANCE (less filter) -- **Side Return Air with Optional RAB Return Air Base**
0 through 0.80 in. w.g. External Static Pressure Range

HEATING BLOWER PERFORMANCE

Heating Adjust CFM Selections	Heating Input Range and Blower Volume - CFM						
	40%	50%	60%	70%	80%	90%	100%
Increase (+15%) Heat CFM	1020	1180	1340	1500	1650	1800	1955
Increase (+7.5%) Heat CFM	950	1095	1245	1395	1535	1680	1825
Default Heat CFM	885	1020	1160	1300	1435	1575	1715
Decrease (–7.5%) Heat CFM	820	945	1075	1200	1335	1475	1610
Decrease (–15%) Heat CFM	745	870	990	1110	1230	1350	1470

COOLING BLOWER PERFORMANCE

Cooling Adjust CFM Selections	Blower Speed Selections							
	First Stage Cool Speed - cfm				Second Stage Cool Speed - cfm			
	Low	Medium-Low	Medium High	High (Default)	Low	Medium-Low	Medium High	High (Default)
Increase (+10%) Cool CFM	1080	1155	1310	1480	1550	1660	1875	2105
Default Cool CFM	985	1055	1190	1325	1400	1510	1720	1920
Decrease (–10%) Cool CFM	875	945	1060	1190	1250	1345	1530	1715

The effect of static pressure is included in air volumes shown.
Lennox Harmony III™ Zone Control Applications - Minimum blower speed is 450 cfm.
The following control board configurations are available. See Installation Instructions for details and DIP switch settings.
Heat Mode (Heating Blower Performance Table):
With a single-stage thermostat, furnace will operate at three, staged rates (40/70/100%) with a time delay between each stage (values in grey-shaded columns).
With two-stage thermostat there are two modes available.
Traditional two-stage mode - W1 demand results in 70% firing rate. W2 results in 100% firing rate. No delay between stages. (values shown in 70% and 100% grey-shaded columns only).
Variable Rate Capacity Mode - furnace automatically adjusts firing rate based on first- and second-stage cycle times. (all columns)
Cool Mode (Cooling Blower Performance table)**:**
First stage COOL (two-stage air conditioning units only) is approximately 70**%** of the same second stage COOL speed position.
Continuous Fan speeds are approximately 28%, 38%, 70% and 100% (DIP switch selectable) of the same second-stage COOL speed position minimum 450 cfm.

G71MPP-60D-135 BLOWER MOTOR WATTS - COOLING - Side Return Air with Optional RAB Return Air Base

Blower Speed Options	Motor Watts @ Various External Static Pressures - in. wg.																	
	First Stage									Second Stage								
	0	0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0	0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80
Increase (+10%) Cool CFM																		
Low	90	110	140	165	190	210	235	260	285	235	265	305	340	380	415	450	480	515
Medium-Low	105	130	160	190	210	230	255	285	310	290	325	370	410	450	490	515	545	575
Medium-High	145	170	205	235	265	290	325	355	390	420	460	510	555	595	640	680	715	755
High	200	230	270	305	345	385	415	445	480	580	630	690	745	800	850	895	935	975
Default Cool CFM																		
Low	70	90	115	140	165	190	210	230	250	170	200	235	270	305	335	370	400	430
Medium-Low	90	105	125	150	175	200	225	250	270	200	230	270	310	355	400	435	465	495
Medium-High	115	140	170	195	225	250	275	300	325	330	365	400	440	485	525	555	585	615
High	145	175	205	240	270	295	330	365	395	435	480	530	580	625	675	715	750	790
Decrease (–10%) Cool CFM																		
Low	60	75	95	115	135	155	175	195	215	135	155	180	205	240	280	305	330	355
Medium-Low	70	90	110	130	150	170	195	215	235	160	185	215	240	275	310	345	375	410
Medium-High	85	105	130	155	180	205	230	250	270	220	255	295	335	370	410	440	475	510
High	120	140	170	195	220	240	270	295	325	330	365	400	440	480	525	555	585	615

G71MPP PARTS ARRANGEMENT

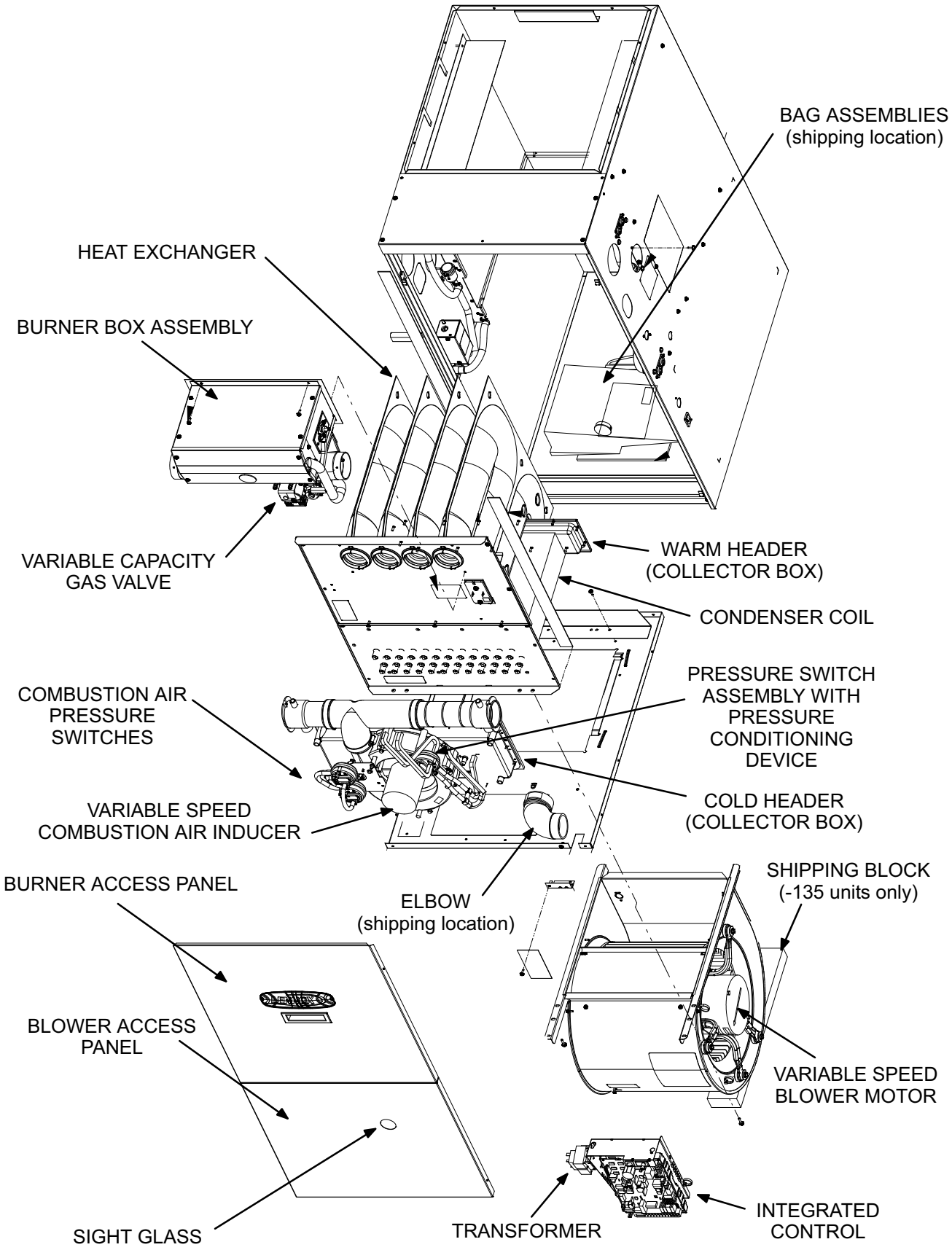


FIGURE 1

I-UNIT COMPONENTS

G71MPP unit components are shown in figure 1. The gas valve, combustion air inducer and burners can be accessed by removing the burner access panel. Electrical components are in the control box (figure 2) found in the blower compartment.

G71MPP units are factory equipped with a bottom return air panel in place. The panel is designed to be field removed as required for bottom air return. Markings are provided for side return air and may be cut out in the field.

ELECTROSTATIC DISCHARGE (ESD)
Precautions and Procedures

⚠ CAUTION

Electrostatic discharge can affect electronic components. Take precautions during furnace 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.

A-Control Box

1. Control Transformer (T1)

A transformer located in the control box provides power to the low voltage section of the unit. Transformers on all models are rated 40VA with a 120V primary and a 24V secondary.

2. Door Interlock Switch (S51)

A door interlock switch rated 14A at 125VAC is wired in series with line voltage. When the blower door is removed the unit will shut down.

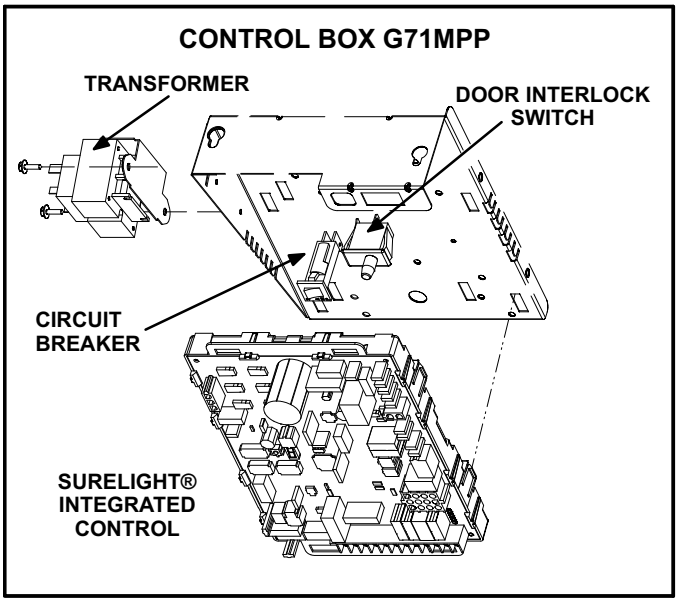


FIGURE 2

3. Circuit Breaker (CB8)

A 24V circuit breaker is also 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 shutdown. The breaker can be manually reset by pressing the button on the face. See figure 3.

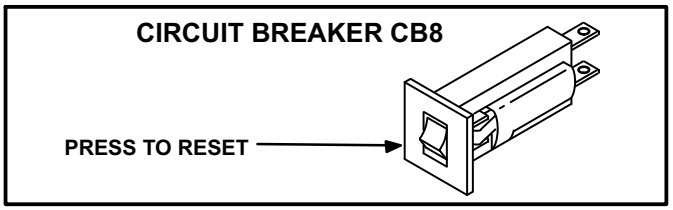


FIGURE 3

⚠ WARNING

Shock hazard.
Disconnect power before servicing. Integrated Control Board is not field repairable. If control is inoperable, simply replace entire control.
Can cause injury or death. Unsafe operation will result if repair is attempted.

4. Integrated Control Board(A92)

G71MPP units are equipped with the Lennox SureLight® variable capacity integrated control. The system consists of an ignition / blower control (figures 4 and 5) with control pin designations in tables 12 and 13 and ignitor (figure 12). The control provides gas ignition, safety checks and indoor blower control with variable capacity rate gas heating. The furnace combustion air inducer, gas valve and indoor blower are controlled in response to various system inputs such as thermostat signal, prove and limit switch signal and flame signal. The control operates with a conventional single or two-stage thermostat. The board features a seven segment LED display, indicating furnace status (including indoor blower) and error codes. The LED flashes in single digits. For example using table 25 under LIMIT CODE, a "2" followed by "5" followed by "0", the limit switch circuit is open. The board also has two 120 volt accessory terminals (used for a humidifier and electronic air cleaner) rated at (1) one amp each.

Electronic Ignition

At the beginning of the heat cycle the SureLight® integrated control monitors the low fire combustion air inducer pressure switch. The control will not begin the heating cycle if the low fire pressure switch is closed (by-passed). Likewise the control will not begin the high fire heating cycle if the high fire pressure switch is closed, and will remain in low fire heat. However, if the high fire pressure switch closes during the low fire heat pre-purge, the control will allow high fire heat. Once the low fire pressure switch is determined to be open, the combustion air inducer is energized on ignition speed. When the differential in the pressure switch is great enough, the pressure switch closes and a 15-second pre-purge begins. If the switch is not proven within 2-1/2 minutes, the inducer is de-energized and the control will initiate vent calibration. If the vent calibration is unsuccessful the control goes into a 5 minute delay. The control will attempt vent calibration 3 more times before going into a 1 hour soft lockout.

After the 15 second pre-purge period the SureLight ignitor warms up for 20 seconds after which the gas valve opens for a 4-second trial for ignition. The ignitor stays energized during this trial until flame is sensed. If ignition is not proven during the 4-second trial for ignition, the control will try four more times with an inter purge and warm-up time between trials of 35 seconds. After a total of five trials for ignition (including the initial trial), the control goes into Watchguard-Flame Failure mode. After a 60-minute reset period, the control will begin the ignition sequence again.

Thermostat Selection Modes

See table 14 for DIP switch settings

The control can be made to operate in three modes: variable capacity, three-stage timed or two-stage. The variable capacity and two-stage modes are only operational with a two-stage thermostat. The thermostat selection is made using dip switches one and / or two (figure 4) and must be positioned for the particular application.

Variable Capacity

Using a two-stage thermostat the system will operate in a variable capacity sequence mode. In this mode, the control will vary the firing rate anywhere between 40% and 100% of full capacity. The indoor blower will be automatically adjusted accordingly to provide the appropriate airflow at any rate. On the initial call for low fire, the furnace will operate at 40% and will remain there until the heat call is satisfied or a call for high fire is initiated. If there is a call for high fire the rate will increase **by** 10% if the current rate is above 60%. However if the current rate is below 60% the rate will increase **to** 70%. After this initial rate increase to 70% capacity, the furnace will increase rate by 10% every 5 minutes while a high fire heat call is present. If the high fire heat call is satisfied but the low fire heat call is still present, the furnace will remain at the current firing rate until the demand is satisfied or another call for high fire is initiated.

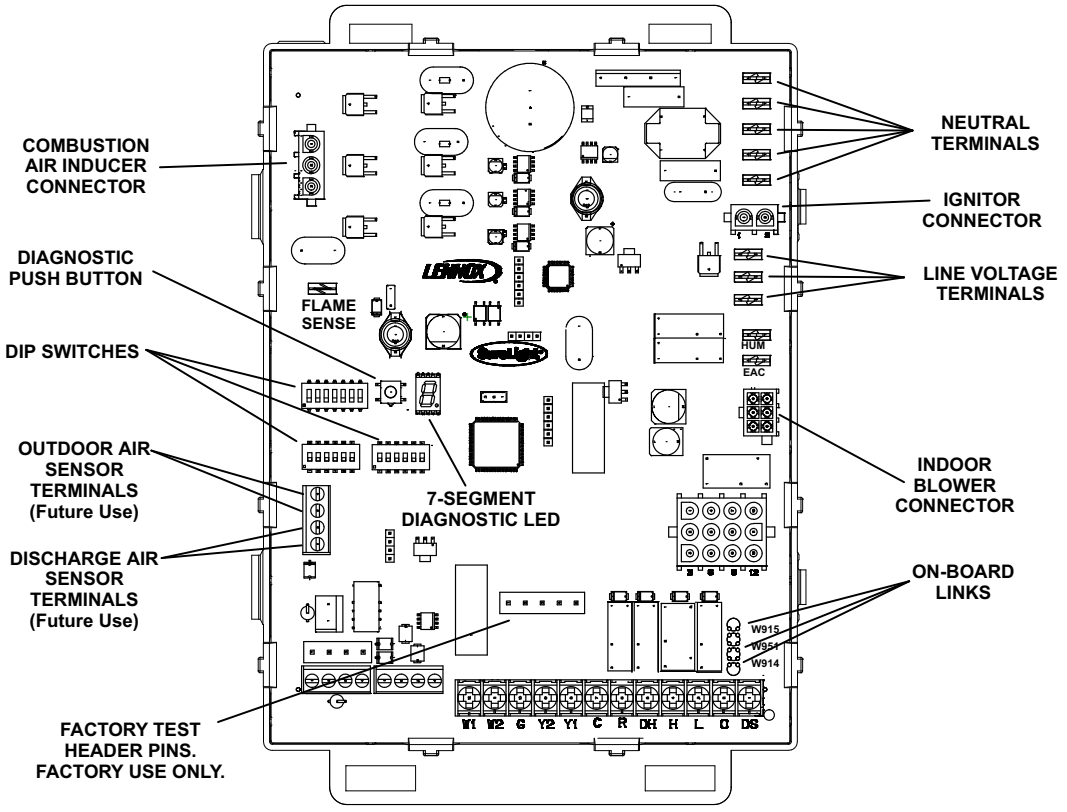
Three Stage Timed

Using a single-stage thermostat the system will operate in a three stage timed mode. Upon a call for heat and a successful ignition, the combustion air inducer will operate at 40% and the indoor blower will adjust to the appropriate cfm. After a field selectable 7 or 12 minute delay period, the inducer RPM will increase and the unit will operate at 70%. The indoor blower will adjust to the appropriate cfm. After a factory set non-adjustable 10 minute delay expires the furnace will increase rate to 100%. The indoor blower will adjust to the appropriate cfm.

Two-Stage

The system will also operate in conventional two-stage mode. While in two-stage mode, the furnace will fire on low fire (70% rate). The combustion air inducer will operate at 70% and the indoor blower will adjust to the appropriate cfm. The unit will switch to high fire on a W2 call from the thermostat. After a 30 second recognition period (during which the integrated control will recieve a continuous W2 call) expires the furnace will increase to 100% rate. The inducer will increase to 100% speed and the indoor blower will adjust to appropriate cfm. If there is a simultaneous call for first and second stage heat, the unit will fire on first stage heat and switch to second stage heat after 30 seconds of operation.

INTEGRATED CONTROL



1/4" QUICK CONNECT TERMINALS

HUM = 120 VAC OUTPUT TO HUMIDIFIER
XMFR = 120 VAC OUTPUT TO TRANSFORMER
LI = 120 VAC INPUT TO CONTROL
CIRC = 120 VAC OUTPUT TO CIRCULATING BLOWER
EAC = 120 VAC OUTPUT TO ELECTRONIC AIR CLEANER
NEUTRALS= 120 VAC NEUTRAL

THERMOSTAT CONNECTIONS (TB1)

DS= DEHUMIDIFICATION SIGNAL
W2= HEAT DEMAND FROM 2ND STAGE T'STAT
W1= HEAT DEMAND FROM 1ST STAGE T'STAT
R= CLASS 2 VOLTAGE TO THERMOSTAT
G= MANUAL FAN FROM T'STAT
C= THERMOSTAT SIGNAL GROUND CONNECTED TO TRANSFORMER GROUND (TR) & CHASIS GROUND (GRD)
Y1= THERMOSTAT 1st STAGE COOL SIGNAL
Y2= THERMOSTAT 2nd STAGE COOL SIGNAL
O= THERMOSTAT SIGNAL TO HEAT PUMP REVERSING VALVE
H= 24V HUMIDIFIER OUTPUT
L= LENNOX SYSTEM OPERATION MONITOR

FIGURE 4

TABLE 12

SureLight Board® 6 Pin Terminal Designation	
PIN #	**Function**
1	Data Input From Motor
2	Common
3	Furnace Size Resistor Input
4	Data Output To Motor
5	5 Volt Bias Supply
6	Furnace Size Resistor Input

TABLE 13

SureLight Board 12Pin Terminal Designation	
PIN #	**Function**
1	Not used
2	High Fire Pressure Switch
3	Rollout In
4	Ground
5	24V Hot
6	Primary Limit In
7	Gas Valve
8	Gas Valve Common
9	24V Neutral
10	Ground
11	Primary Limit Switch Out
12	Low Fire Pressure Switch

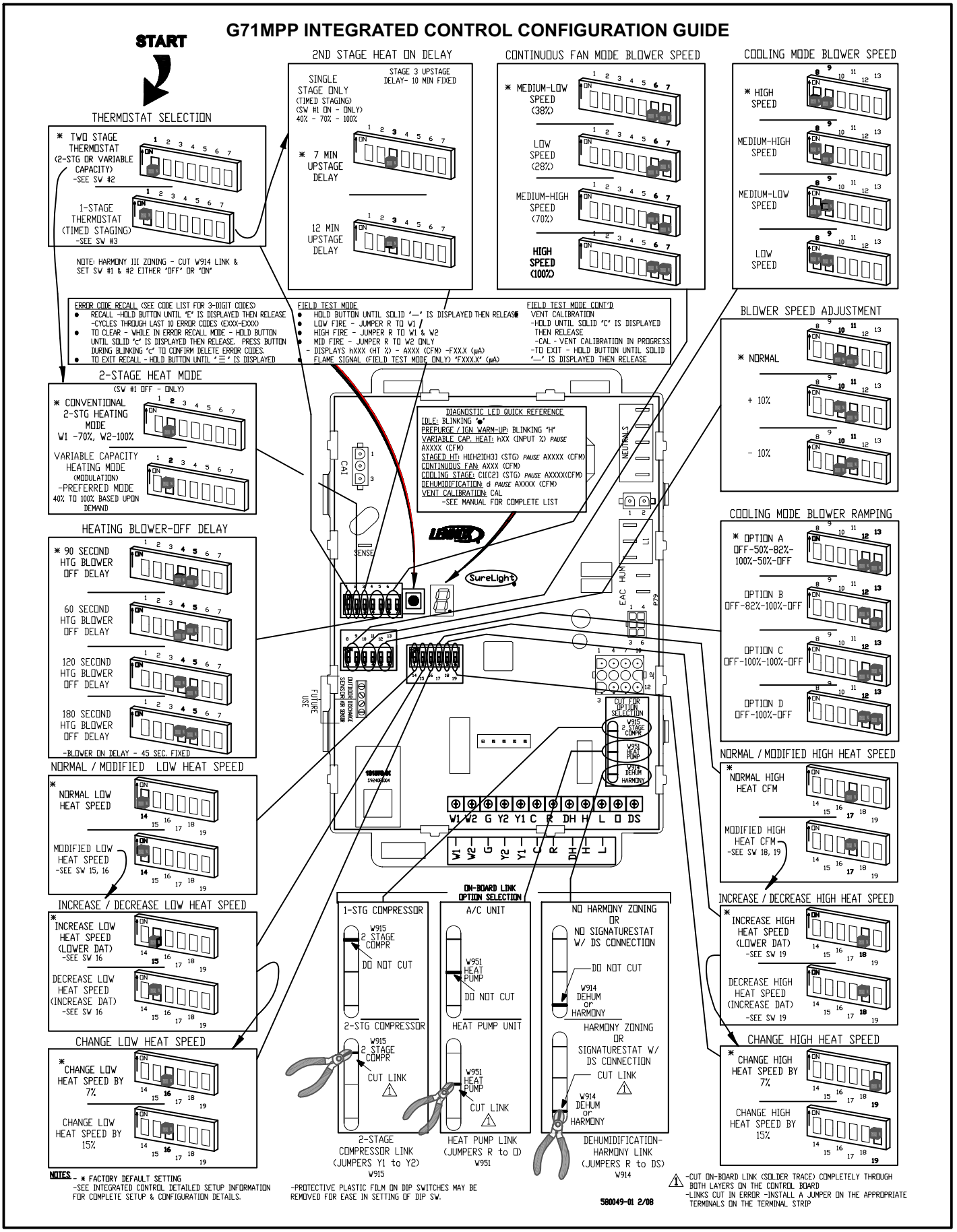

G71MPP INTEGRATED CONTROL CONFIGURATION GUIDE
START
THERMOSTAT SELECTION
* TWO STAGE THERMOSTAT (2-STG OR VARIABLE CAPACITY) -SEE SW #2
1-STAGE THERMOSTAT (TIMED STAGING) -SEE SW #3
NOTE: HARMONY III ZONING - CUT W914 LINK & SET SW #1 & #2 EITHER "OFF" OR "ON"
2ND STAGE HEAT ON DELAY
SINGLE STAGE ONLY (TIMED STAGING) (SW #1 ON - ONLY) 40% - 70% - 100%
STAGE 3 UPSTAGE DELAY- 10 MIN FIXED
* 7 MIN UPSTAGE DELAY
12 MIN UPSTAGE DELAY
CONTINUOUS FAN MODE BLOWER SPEED
* MEDIUM-LOW SPEED (38%)
LOW SPEED (28%)
MEDIUM-HIGH SPEED (70%)
HIGH SPEED (100%)
COOLING MODE BLOWER SPEED
* HIGH SPEED
MEDIUM-HIGH SPEED
MEDIUM-LOW SPEED
LOW SPEED
ERROR CODE RECALL (SEE CODE LIST FOR 3-DIGIT CODES)
• RECALL -HOLD BUTTON UNTIL "E" IS DISPLAYED THEN RELEASE -CYCLES THROUGH LAST 10 ERROR CODES (EXXX-EXXX)
• TO CLEAR - WHILE IN ERROR RECALL MODE - HOLD BUTTON UNTIL SOLID "c" IS DISPLAYED THEN RELEASE. PRESS BUTTON DURING BLINKING "c" TO CONFIRM DELETE ERROR CODES.
• TO EXIT RECALL - HOLD BUTTON UNTIL "☰" IS DISPLAYED
FIELD TEST MODE
• HOLD BUTTON UNTIL SOLID "—" IS DISPLAYED THEN RELEASE
• LOW FIRE - JUMPER R TO W1
• HIGH FIRE - JUMPER R TO W1 & W2
• MID FIRE - JUMPER R TO W2 ONLY
- DISPLAYS hXXX (HT %) - AXXX (CFM) -FXX.X (µA) FLAME SIGNAL (FIELD TEST MODE ONLY) "FXXX.X" (µA)
FIELD TEST MODE CONT'D
VENT CALIBRATION -HOLD UNTIL SOLID "C" IS DISPLAYED THEN RELEASE -CAL - VENT CALIBRATION IN PROGRESS -TO EXIT - HOLD BUTTON UNTIL SOLID "—" IS DISPLAYED THEN RELEASE
BLOWER SPEED ADJUSTMENT
* NORMAL
+ 10%
- 10%
2-STAGE HEAT MODE
(SW #1 OFF - ONLY)
* CONVENTIONAL 2-STG HEATING MODE W1 -70%, W2-100%
VARIABLE CAPACITY HEATING MODE (MODULATION) -PREFERRED MODE 40% TO 100% BASED UPON DEMAND
HEATING BLOWER-OFF DELAY
* 90 SECOND HTG BLOWER OFF DELAY
60 SECOND HTG BLOWER OFF DELAY
120 SECOND HTG BLOWER OFF DELAY
180 SECOND HTG BLOWER OFF DELAY
-BLOWER ON DELAY - 45 SEC. FIXED
DIAGNOSTIC LED QUICK REFERENCE
IDLE: BLINKING
PREPURGE / IGN WARM-UP: BLINKING "H"
VARIABLE CAP. HEAT: hXX (INPUT %) PAUSE AXXXX (CFM)
STAGED HT: H1(H2)(H3) (STG) PAUSE AXXXX (CFM)
CONTINUOUS FAN: AXXX (CFM)
COOLING STAGE: C1(C2) (STG) PAUSE AXXXX(CFM)
DEHUMIDIFICATION: d PAUSE AXXXX (CFM)
VENT CALIBRATION: CAL
-SEE MANUAL FOR COMPLETE LIST
COOLING MODE BLOWER RAMPING
* OPTION A OFF-50%-82%-100%-50%-OFF
OPTION B OFF-82%-100%-OFF
OPTION C OFF-100%-100%-OFF
OPTION D OFF-100%-OFF
NORMAL / MODIFIED LOW HEAT SPEED
* NORMAL LOW HEAT SPEED
MODIFIED LOW HEAT SPEED -SEE SW 15, 16
NORMAL / MODIFIED HIGH HEAT SPEED
* NORMAL HIGH HEAT CFM
MODIFIED HIGH HEAT CFM -SEE SW 18, 19
INCREASE / DECREASE LOW HEAT SPEED
* INCREASE LOW HEAT SPEED (LOWER DAT) -SEE SW 16
DECREASE LOW HEAT SPEED (INCREASE DAT) -SEE SW 16
INCREASE / DECREASE HIGH HEAT SPEED
* INCREASE HIGH HEAT SPEED (LOWER DAT) -SEE SW 19
DECREASE HIGH HEAT SPEED (INCREASE DAT) -SEE SW 19
CHANGE LOW HEAT SPEED
* CHANGE LOW HEAT SPEED BY 7%
CHANGE LOW HEAT SPEED BY 15%
CHANGE HIGH HEAT SPEED
* CHANGE HIGH HEAT SPEED BY 7%
CHANGE HIGH HEAT SPEED BY 15%
ON-BOARD LINK OPTION SELECTION
1-STG COMPRESSOR
W915 2 STAGE COMPR
DO NOT CUT
2-STG COMPRESSOR
CUT LINK
A/C UNIT
W951 HEAT PUMP
DO NOT CUT
HEAT PUMP UNIT
CUT LINK
NO HARMONY ZONING OR NO SIGNATURESTAT W/ DS CONNECTION
DO NOT CUT
W914 DEHUM or HARMONY
HARMONY ZONING OR SIGNATURESTAT W/ DS CONNECTION
CUT LINK
W914 DEHUM or HARMONY
2-STAGE COMPRESSOR LINK (JUMPERS Y1 to Y2) W915
HEAT PUMP LINK (JUMPERS R to O) W951
DEHUMIDIFICATION-HARMONY LINK (JUMPERS R to DS) W914
DIAGNOSTIC LED
SENSOR
CAT
SENSE
FUTURE USE
EAC
HUM
L1
P79
MED/MALS
CUT FOR OPTION SELECTION
W915 2 STAGE COMPR
W951 HEAT PUMP
W914 DEHUM HARMONY
W1 W2 G Y2 Y1 C R DH H L O DS
NOTES
- * FACTORY DEFAULT SETTING
-SEE INTEGRATED CONTROL DETAILED SETUP INFORMATION FOR COMPLETE SETUP & CONFIGURATION DETAILS.
-PROTECTIVE PLASTIC FILM ON DIP SWITCHES MAY BE REMOVED FOR EASE IN SETTING OF DIP SW.
-CUT ON-BOARD LINK (SOLDER TRACE) COMPLETELY THROUGH BOTH LAYERS ON THE CONTROL BOARD -LINKS CUT IN ERROR -INSTALL A JUMPER ON THE APPROPRIATE TERMINALS ON THE TERMINAL STRIP
580049-01 2/08

FIGURE 5

TABLE 14
Thermostat Selection Switch Settings

Operation	Thermostat	Switch 1	Switch 2	Switch 3
Variable Capacity Heat (40% to 100%)	Two-Stage	Off	On	Off
Three-Stage Heat (40%, 70%, 100%)	Single-Stage	On	Off	2nd stage delay OFF = 7 minutes ON = 12 minutes 3rd stage delay 10 minutes fixed
Two-Stage Heat (W1 70%, W2 100%)	Two-Stage	Off	Off	Off

Heating Operation DIP Switch Settings -- Figure 4

Switch 1 -- Thermostat Selection -- This unit may be used with either a single-stage or two-stage thermostat. The thermostat selection is made using a DIP switch which must be properly positioned for the particular application. The DIP switch is factory-positioned for use with a two-stage thermostat. If a single-stage thermostat is to be used, the DIP switch must be repositioned. See table 14.

Switch 2 -- Operating Mode with Two-Stage Thermostat -- If a two-stage thermostat is used, the furnace can operate in either variable-capacity or conventional two-stage mode. When variable-capacity mode is selected, the firing rate of the unit is varied to maximize comfort. Conventional two-stage mode is the factory default setting. See table 14.

Switch 3 -- Second-Stage Heat On Delay -- If a single-stage thermostat is used, the integrated control can be used to energize second-stage heat after either 7 minutes or 12 minutes of first-stage heat operation. See table 14.

Switches 4 and 5 -- Blower-Off Delay -- The blower-on delay of 45 seconds is not adjustable. The blower-off delay (time that the blower operates after the heating demand has been satisfied) can be adjusted by moving switches 4 and 5 on the integrated control. The unit is shipped from the factory with a blower-off delay of 90 seconds. The blower off delay affects comfort and is adjustable to satisfy individual applications. Adjust the blower off delay to achieve a supply air temperature between 90° and 110°F at the exact moment that the blower is de-energized. Longer off delay settings provide lower supply air temperatures; shorter settings provide higher supply air temperatures. Table 15 provides the blower off timings that will result from different switch settings.

TABLE 15
Blower Off Delay Switch Settings

Blower Off Delay (Seconds)	Switch 4	Switch 5
60	Off	On
90	Off	Off
120	On	Off
180	On	On

Indoor Blower Operation DIP Switch Settings

Switches 6 and 7 -- Continuous Indoor Fan Operation -- Blower Speed - Switches 6 and 7 are used to select blower motor speeds during continuous indoor blower operation. The unit is shipped from the factory with DIP switches positioned for medium low (2) speed during continuous indoor blower operation. The table below provides the continuous blower speeds that will result from various switch settings. Refer to tables 1 through 11 for corresponding cfm values.

TABLE 16
Continuous Indoor Fan

Speed	Switch 6	Switch 7
1 - Low (28%)	Off	On
2 - Medium Low (38%) (Factory)	Off	Off
3 - Medium High (70%)	On	Off
4 - High (100%)	On	On

Switches 8 and 9 -- Cooling Mode Blower Speed -- Switches 8 and 9 are used to select cooling blower motor speed. The unit is shipped from the factory with the DIP switches positioned for high speed (4) indoor blower motor operation during the cooling mode. The table below provides the cooling mode blower speeds that will result from different switch settings. Refer to tables 1 through 11 for corresponding cfm values.

TABLE 17
Cooling Mode Blower Speeds

Speed	Switch 8	Switch 9
1 - Low	On	On
2 - Medium Low	Off	On
3 - Medium High	On	Off
4 - High (Factory)	Off	Off

Switches 10 and 11 -- Cooling Mode Blower Speed Adjustment -- Switches 10 and 11 are used to select blower speed adjustment settings. The unit is shipped from the factory with the DIP switches positioned for NORMAL (no) adjustment. The DIP switches may be positioned to adjust the blower speed by +10% or -10% to better suit the application. The table below provides blower speed adjustments that will result from different switch settings. Refer to tables 1 through 11 for corresponding cfm values. With switches 10 and 11 set to ON, motor will bypass ramping profiles and all delays and immediately upon a call for cool, run at COOLING speed selected. LED will continue to operate as normal. This mode is used to check motor operation.

TABLE 18
Blower Speed Adjustment

Adjustment	Switch 10	Switch 11
+10% (approx.)	On	Off
NORMAL (Factory)	Off	Off
-10% (approx.)	Off	On
MOTOR TEST	On	On

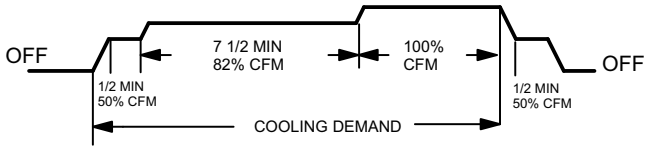
Switches 12 and 13 -- Cooling Mode Blower Speed Ramping -- Switches 12 and 13 are used to select cooling mode blower speed ramping options. Blower speed ramping may be used to enhance dehumidification performance. The switches are factory set at option A which has the greatest effect on blower motor performance. Table 19 provides the cooling mode blower speed ramping options that will result from different switch settings. The cooling mode blower speed ramping options are detailed below.

TABLE 19
Cooling Mode Blower Speed Ramping

Ramping Option	Switch 12	Switch 13
A (Factory)	Off	Off
B	On	Off
C	Off	On
D	On	On

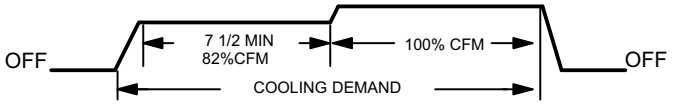
Ramping Option A (Factory Selection)

- Motor runs at 50% for 30 seconds.
- Motor then runs at 82% for approximately 7-1/2 minutes.
- If demand has not been satisfied after 7-1/2 minutes, motor runs at 100% until demand is satisfied.
- Once demand is met, motor runs at 50% for 30 seconds then ramps down to stop.



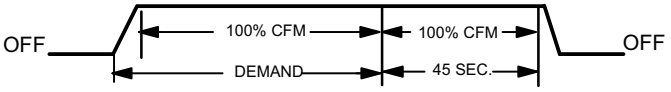
Ramping Option B

- Motor runs at 82% for approximately 7-1/2 minutes. If demand has not been satisfied after 7-1/2 minutes, motor runs at 100% until demand is satisfied.
- Once demand is met, motor ramps down to stop.



Ramping Option C

- Motor runs at 100% until demand is satisfied.
- Once demand is met, motor runs at 100% for 45 seconds then ramps down to stop.



Ramping Option D

- Motor runs at 100% until demand is satisfied.
- Once demand is met, motor ramps down to stop.

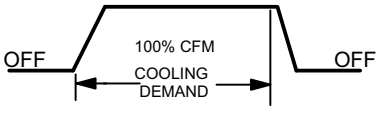


TABLE 20
Low Heat Blower Speeds

Thermostat Demand	Blower Speed Adjust-ments	DIP SWITCH SETTINGS		
		14	15	16
Low Heat (R to W1)	+15%	On	Off	On
	+7.5%	On	Off	Off
	Normal	Off	Off	Off
	-7.5%	On	On	Off
	-15%	On	On	On

TABLE 21
High Heat Blower Speeds

Thermostat Demand	Blower Speed Adjust-ments	DIP SWITCH SETTINGS		
		17	18	19
High Heat (R to W1 & W2)	+15%	On	Off	On
	+7.5%	On	Off	Off
	Normal	Off	Off	Off
	-7.5%	On	On	Off
	-15%	On	On	On

Switches 14 through19 -- Heating Mode Blower Speed -- Switches 14 through 19 are used to select heating mode blower motor speeds. These switches are factory set at the OFF position which provides 100 % of normal speed during HIGH HEAT demand, 70% of normal speed during MID-RANGE HEAT demand and 40% of normal speed during LOW HEAT demand. Switches 14, 15 and 16 are used to adjust the LOW FIRE blower motor speed. Switches 17, 18 and 19 are used to adjust the HIGH FIRE blower motor speed. Figure 6 and tables 20 and 21 provides the heating mode blower speeds that will result from different switch settings. Figure 6 indicates the effect the DIP switch settings (tables 20 &21 above) have upon the heating airflow at various furnace firing rates.
Refer to tables 1 through 11 for corresponding cfm values.

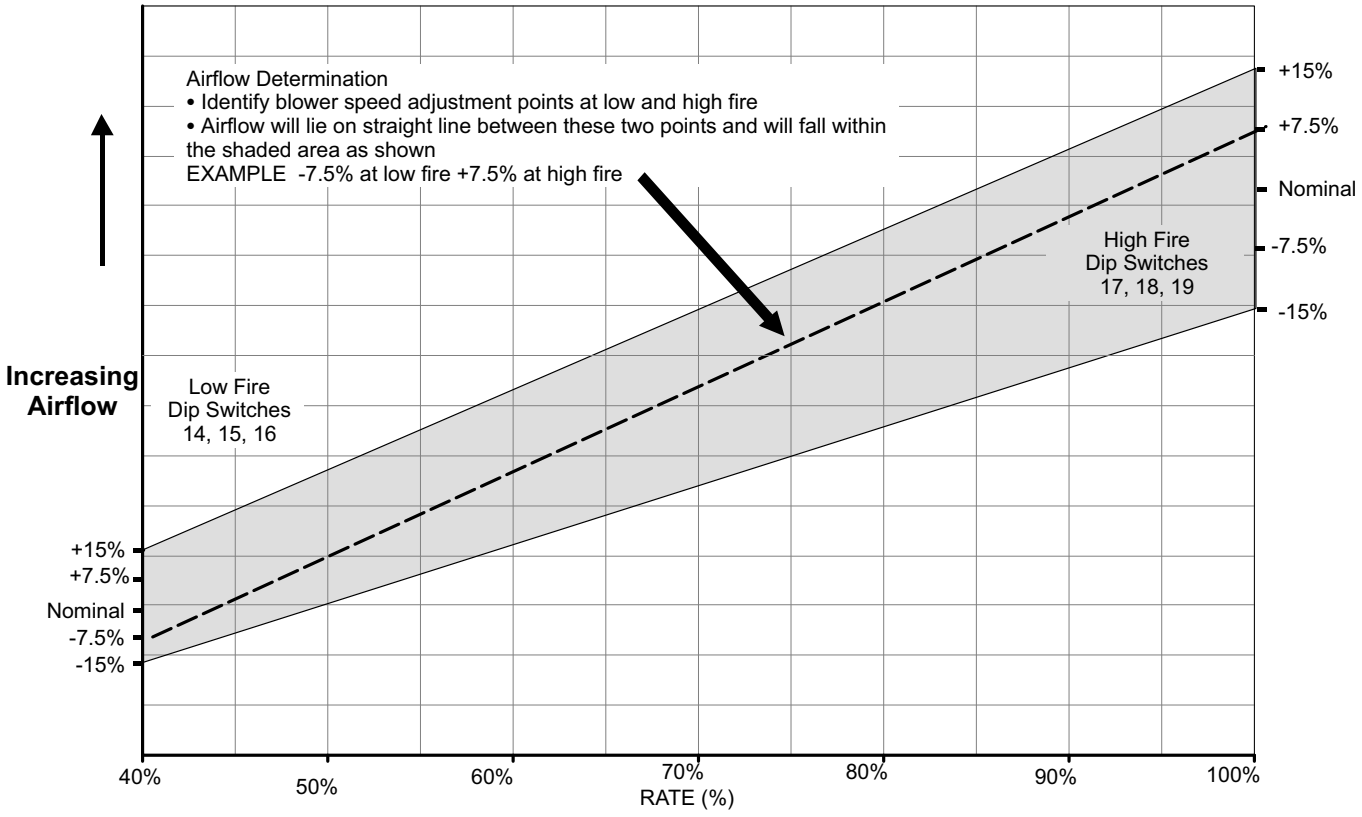


FIGURE 6

On-Board Link W914 -- Figure 4

On-board link W914, is a clippable connection between terminals DS and R on the integrated control. W914 must be cut when the furnace is installed with either the Harmony III™ zone control or a thermostat which features humidity control. If the link is left intact the PWM signal from the Harmony III control will be blocked and also lead to control damage. Refer to table 26 for operation sequence in applications including G71MPP, a thermostat which features humidity control and a single-speed outdoor unit. Table 27 gives the operation sequence in applications with a two-speed outdoor unit.

On-Board Link W951 -- Figure 4

On-board link W951 is a clippable connection between terminals R and O on the integrated control. W951 must be cut when the furnace is installed in applications which include a heat pump unit and a thermostat which features dual fuel use. If the link is left intact, terminal “O” will remain energized eliminating the HEAT MODE in the heat pump.

On-Board Link W915 -- Figure 4

On-board link W915 is a clippable connection between terminals Y1 and Y2 on the integrated control. W915 must be cut if two-stage cooling will be used. If the link is not cut the outdoor unit will operate in second-stage cooling only.

Diagnostic LED -- Figure 4

The seven-segment diagnostic LED displays operating status, target airflow, error codes and other information. The table on page 58 lists diagnostic LED codes.

Diagnostic Push Button -- Figure 4

The diagnostic push button is located adjacent to the seven-segment diagnostic LED. This button is used to enable the Error Code Recall mode and the Field Test mode. Press the button and hold it to cycle through a menu of options. Every five seconds a new menu item will be displayed. When the button is released, the displayed item will be selected. Once all items in the menu have been displayed, the menu resumes from the beginning until the button is released.

Error Code Recall Mode

Select ”E” from the menu to access the most recent 10 error codes. Select “c” from the Error Code Recall menu to clear all error codes. Button must be pressed a second time while “c” is flashing to confirm command to delete codes. Press the button until a solid “≡” is displayed to exit the Error Code Recall mode.

Field Test Mode

Use the diagnostic push button to scroll through the menu as described above. Release the button when the LED flashes “-” to select the Field Test mode.

While in the Field Test mode the technician can:

- Initiate furnace ignition and move to and hold low-fire rate by applying a R to W1 jumper.
- Initiate furnace ignition sequence and move to and hold high-fire rate by applying a jumper from R to W1 and W2.
- Initiate furnace ignition sequence and move to and hold mid-fire rate by applying a jumper to R and W2.
- Apply then remove the jumper from R to W1 and W2 to change the firing rate from low fire to mid fire and high fire.
- A vent calibration sequence can be initiated even if a thermostat signal is not present. Press and hold the push button until a solid “C” is displayed. Release the button and calibration will begin. The furnace will perform the high-fire and low-fire pressure switch calibrations and display “CAL”. After calibration, the LED will return to the flashing “-” display.

During Field Test mode operation, all safety switches are still in the circuit (they are not by-passed) and indoor blower performance and timings will match DIP switch selections. Current furnace firing rate, indoor blower CFM and flame signal will be displayed. To exit the Field Test mode, press and hold the button. The menu will resume from the beginning. Also, cycle the main power to exit the Field Test mode. The integrated control will automatically exit the Field Test mode after 45 minutes of operation.

TABLE 22
Idle Menu Options

These options are displayed on the menu when the button is pressed during normal operation

DISPLAY	ACTION (when button released)
No change (idle)	remain in idle mode
Solid “E”	enter diagnostic mode
Solid “-”	enter field test mode

NOTE - No change implies the display will continue to show whatever is currently being displayed for normal operation

TABLE 23
Field Test Menu Options

These options are displayed when the button is used in Field Test Mode

DISPLAY	ACTION (when button released)
No change (blinking “-”)	remain in field test mode
Solid “-”	exit field test mode
Solid “c”	start pressure switch calibration

TABLE 24
Field Test Menu Options

These options are displayed when the button is used in diagnostic recall mode

DISPLAY	ACTION (when button released)
No change (displaying error history)	remain in diagnostic recall mode
Solid (3 horizontal bars)	exit diagnostic recall mode
Solid “c”	clear error history

Once the button is released to clear the error history a blinking “c” will be shown on the display for up to 10 seconds. During this time the user must press and release the button one additional time to confirm the action of deleting the error history. Once the error history is deleted it cannot be recovered.

TABLE 25

LED 7 Segment Status / Error Code

Press the diagnostic push button and hold it to cycle through a menu of options. Every five seconds a new menu item will be displayed. Release the button when the desired mode is displayed.

When the solid “E” is displayed, the control enters the Error Code Recall mode. Error Code Recall mode menu options: No change (displaying error history) remains in Error Code Recall mode; solid “≡” exits Error Code Recall mode; and solid “c” clears the error history. Must press button while flashing “c” is displayed to clear error codes.

When the solid “-” is displayed, the control enters the Field Test mode. Field Test mode menu options: Solid “C” starts pressure switch calibration; blinking “-” exits Field Test mode.

Flash Code	Diagnostic Code / Status of Furnace
•	Idle mode (Decimal blinks at 1 Hz 1/2 sec. On and 1/2 sec. Off
A	CFM Display (1 sec. On 1/2 sec Off, CFM value)
C	Staged Cooling (1 sec. On 1/2 sec. Off *or* 2 Stage 1 sec. pause CFM pause, Repeat codes)
d	Dehumidification Mode (1 sec. On 1 sec Off, CFM, Pause Repeat Codes)
h	Variable Capacity Heat (1 sec On 1/2 sec Off % of input rate Pause CFM Pause Repeat Codes)
H	Staged Heat (1 sec On 1/2 sec Off *or* 2 Stage 1 sec, CFM Pause Repeat Codes)
110	Low Line Voltage
113	High Line Voltage
115	Low 24V (control will restart if the error recovers)
125	Control failed self check, internal error, failed hardware. Control will restart if error recovers
180	Outdoor Air Sensor Failure - no error if just disconnected, only show if shorted or out of range
200	Rollout circuit open or previously opened
201	Circulator / COM failure - unable to communicate w / circulating motor (blower)
202	Circulating motor / resistor mis-match or resistor missing
204	Gas Valve Miswired - Resume normal operation after error corrected
223	Low Pressure Switch Failed Open
224	Low Pressure Switch Failed Closed
225	High Pressure Switch Failed Open
226	High Pressure Switch Failed Closed
227	Low Pressure Switch Opened during TFI or Run mode
228	Unable to perform successful pressure switch calibration mode
240	Low Flame Mode - Run Mode
241	Flame sense out of sequence - flame still present
250	Limit switch circuit open
270	Watchguard - Exceed maximum number of retries. No flame current sensed
271	Watchguard - Exceed maximum number ignition retries where the last retry was due to pressure switch opening
272	Watchguard - Exceed maximum number of recycles where the last recycle was due to pressure switch opening
273	Watchguard - Exceed maximum number of recycles where the last retry was due to flame failure
274	Watchguard - The limit remained open longer than 3 minutes
275	Watchguard - Flame sensed out of sequence; flame signal gone
290	Ignitor circuit Fault - failed ignitor or triggering circuitry
291	Restricted airflow - available CFM below min. firing rate
292	Circulator motor unable to start (seized bearings, stuck wheel, etc)
294	Inducer motor amp draw too high
310	Discharge air sensor failure - no error if just disconnected, only show if shorted or out of range
311	Restricted airflow heating mode - target input rate reduced to match available circulator CFM
312	Restricted airflow cooling or continuous fan mode - information only

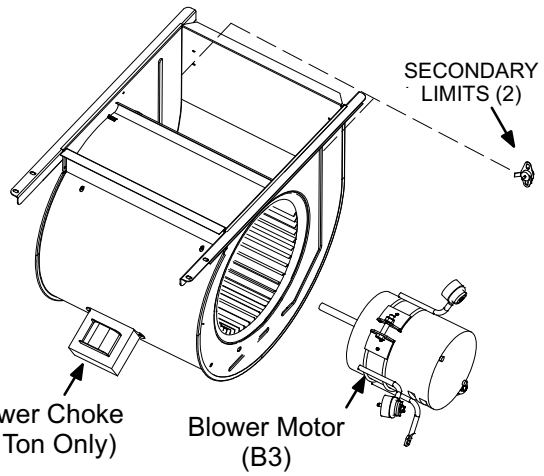
TABLE 26
OPERATING SEQUENCE
G71MPP, ComfortSense™ 7000 Thermostat and Single-Stage Outdoor Unit

OPERATING SEQUENCE		SYSTEM DEMAND								SYSTEM RESPONSE		
System Condition	Step	Thermostat Demand						Relative Humidity		Compressor	Blower CFM (COOL)	Comments
		Y1		O	G	W1		Status	D			
NO CALL FOR DEHUMIDIFICATION												
Normal Operation	1	On		On	On			Acceptable	24 VAC	High	100%	Compressor and indoor blower follow thermostat demand
BASIC MODE (only active on a Y1 thermostat demand)												
Normal Operation	1	On		On	On			Acceptable	24 VAC	High	100%	ComfortSense™ 7000 thermostat energizes Y1 and de-energizes D on a call for de-humidification
Dehumidification Call	2	On		On	On			Demand	0 VAC	High	70%	
PRECISION MODE (operates independent of a Y1 thermostat demand)												
Normal Operation	1	On		On	On			Acceptable	24 VAC	High	100%	Dehumidification mode begins when humidity is greater than set point
Dehumidification call	2	On		On	On			Demand	0 VAC	High	70%	
Dehumidification call ONLY	1	On		On	On			Demand	0 VAC	High	70%	ComfortSense™ 7000 thermostat will keep outdoor unit energized after cooling temperature set-point has been reached in order to maintain room humidity setpoint.
	On-board links at indoor unit with a single-stage outdoor unit: With Condensing unit - Cut W914 (R to DS) on SureLight® integrated control; With Heat Pump - Cut W914 (R to DS) & W951 (R to O) on SureLight® integrated control.											

TABLE 27
OPERATING SEQUENCE
G71MPP, ComfortSense™ 7000 Thermostat and Two-Stage Outdoor Unit

OPERATING SEQUENCE		SYSTEM DEMAND								SYSTEM RESPONSE		
System Condition	Step	Thermostat Demand						Relative Humidity		Compressor	Blower CFM (COOL)	Comments
		Y1	Y2	O	G	W 1	W 2	Status	D			
NO CALL FOR DEHUMIDIFICATION												
Normal Operation - Y1	1	On		On	On			Acceptable	24 VAC	Low	70%	Compressor and indoor blower follow thermostat demand
Normal Operation - Y2	2	On	On	On	On			Acceptable	24 VAC	High	100%	
ROOM THERMOSTAT CALLS FOR FIRST STAGE COOLING												
BASIC MODE (only active on a Y1 thermostat demand)												
Normal Operation	1	On		On	On			Acceptable	24 VAC	Low	70%	ComfortSense™ 7000 thermostat energizes Y2 and de-energizes D on a call for de-humidification
Dehumidification Call	2	On	On	On	On			Demand	0 VAC	High	70%	
PRECISION MODE (operates independent of a Y1 thermostat demand)												
Normal Operation	1	On		On	On			Acceptable	24 VAC	Low	70%	Dehumidification mode begins when humidity is greater than set point
Dehumidification call	2	On	On	On	On			Demand	0 VAC	High	70%	
Dehumidification call ONLY	1	On	On	On	On			Demand	0 VAC	High	70%	ComfortSense™ 7000 thermostat will keep outdoor unit energized after cooling temperature set-point has been reached in order to maintain room humidity setpoint.*
ROOM THERMOSTAT CALLS FOR FIRST AND SECOND STAGE COOLING												
BASIC MODE (only active on a Y1 thermostat demand)												
Normal Operation	1	On	On	On	On			Acceptable	24 VAC	High	100%	ComfortSense™ 7000 thermostat energizes Y2 and de-energizes D on a call for de-humidification
Dehumidification Call	2	On	On	On	On			Demand	0 VAC	High	70%	
PRECISION MODE (operates independent of a Y1 thermostat demand)												
Normal Operation	1	On		On	On			Acceptable	24 VAC	Low	70%	Dehumidification mode begins when humidity is greater than set point
Dehumidification call	2	On	On	On	On			Demand	0 VAC	High	70%	
Dehumidification call ONLY	1	On	On	On	On			Demand	0 VAC	High	70%	ComfortSense™ 7000 thermostat will keep outdoor unit energized after cooling temperature set-point has been reached in order to maintain room humidity setpoint.
	On-board links at indoor unit with a two-stage outdoor unit: Cut factory link from Y1 to Y2 or cut W915 (Y1 to Y2) on SureLight® integrated control. With Condensing unit - Cut W914 (R to DS) on SureLight® integrated control; With Heat Pump - Cut W914 (R to DS) & W951 (R to O) on SureLight® integrated control.											

B-Blower Compartment Figure 7



To Remove Blower From Unit: Remove Integrated Control, Door Interlock Switch, Bolts and Wiring Jackplugs. Then Slide Out Front of Unit.

FIGURE 7

1. Secondary Limit (S21)

The secondary limits (S21) on G71MPP units are located in the blower compartment on the back side of the blower housing. See figure 7. All G71MPP units are equipped with two secondary limits. When excess heat is sensed in the blower compartment, the limit will open. If the limit is open, the furnace control energizes the supply air blower and closes the gas valve. The limit automatically resets when unit temperature returns to normal. The switch is factory set to open at 125°F and cannot be adjusted.

2. Blower Motor (B3)

⚠WARNING

During blower operation, the ECM motor emits energy that may interfere with pacemaker operation. Interference is reduced by both the sheet metal cabinet and distance.

The G71MPP line uses two different motor sizes, a 1/2 HP and 1 HP. The motor communicates with the integrated control via a 2-way serial connection. The motor receives all necessary functional parameters from the integrated control and does not rely on a factory program like traditional variable speed motors. The wiring harness connecting the motor to the integrated control includes a resistor which sets the motor parameters the integrated control will use. See wiring diagram regarding wiring harness. G71MPP units use a three-phase, electronically controlled D.C. brushless motor (controller converts single phase a.c. to three phase D.C.), with a permanent-magnet-type rotor (figure 8). Because this motor has a permanent magnet rotor it does not need brushes like conventional D.C. motors.

Internal components are shown in figure 8. The stator windings are split into three poles which are electrically connected to the controller. This arrangement allows motor windings to turn on and off in sequence by the controller.

⚠ IMPORTANT

Earlier ECM motors used on other Lennox furnace models are not interchangeable with motors used on the G71MPP furnace line.

A solid-state controller is permanently attached to the motor. The controller is primarily an A.C. to D.C. converter. Converted D.C. power is used to drive the motor. The controller contains a microprocessor which monitors varying conditions inside the motor (such as motor workload).

G71MPP BLOWER MOTOR COMPONENTS

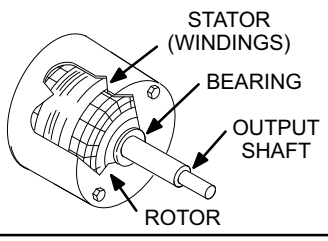


FIGURE 8

The controller uses sensing devices to sense what position the rotor is in at any given time. By sensing the position of the rotor and then switching the motor windings on and off in sequence, the rotor shaft turns the blower.

All G71MPP blower motors use single phase power. An external run capacitor is not used. The motor uses permanently lubricated ball-type bearings..

Internal Operation

The motor is controlled via serial communication between the ignition control on the furnace and the controller attached to the motor shell. The messages sent back and forth between the two controls serve to communicate rotational direction, demand, motor size, current draw, torque, and rpm, among other variables.

Motor rpm is continually adjusted internally to maintain constant static pressure against the blower wheel. The controller monitors the static work load on the motor and motor amp-draw to determine the amount of rpm adjustment. Blower rpm may be adjusted any amount in order to maintain a constant cfm as shown in Blower Ratings Tables. The cfm remains relatively stable over a broad range of static pressure. Since the blower constantly adjusts rpm to maintain a specified cfm, motor rpm is not rated. Hence, the terms “cool speed” , “heat speed ” or “speed tap” in this manual, on the unit wiring diagram and on blower B3, refer to blower cfm regardless of motor rpm.

Initial Power Up

When line voltage is applied to B3, there will be a large inrush of power lasting less than 1/4 second. This inrush charges a bank of DC filter capacitors inside the controller. If the disconnect switch is bounced when the disconnect is closed, the disconnect contacts may become welded. Try not to bounce the disconnect switch when applying power to the unit.

Motor Start-Up

When B3 begins start-up, the motor gently vibrates back and forth for a moment. This is normal. During this time the electronic controller is determining the exact position of the rotor. Once the motor begins turning, the controller slowly eases the motor up to speed (this is called “soft-start”). The motor may take as long as 10-15 seconds to reach full speed. If the motor does not reach 200rpm within 13 seconds, the motor shuts down. Then the motor will immediately attempt a re-start. The shutdown feature provides protection in case of a frozen bearing or blocked blower wheel. The motor may attempt to start eight times. If the motor does not start after the eighth try, the controller locks out. Reset controller by momentarily turning off power to unit.

The DC filter capacitors inside the controller are connected electrically to the motor supply wires. The capacitors take approximately 5 minutes to discharge when the disconnect is opened. For this reason it is necessary to wait at least 5 minutes after turning off power to the unit before attempting to service motor.

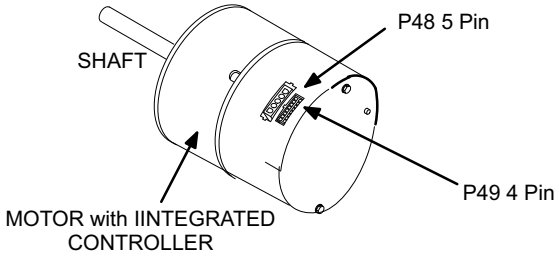
⚠ DANGER

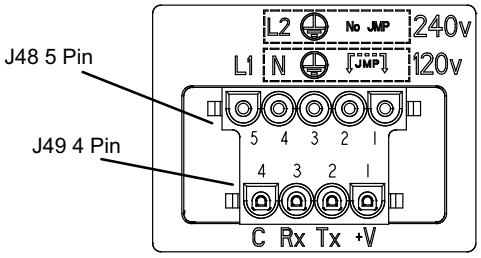
Disconnect power from unit and wait at least five minutes to allow capacitors to discharge before attempting to service motor. Failure to wait may cause personal injury or death.

Power Choke (L13)

A choke coil is used on G71MPP 5 ton 1 hp units. The choke is located on the blower housing and is used to supress transient current spikes.

BLOWER B3 HARNESS CONNECTORS





J49 4 Pin Control Connector	
PIN	DESCRIPTION
1	12V INPUT
2	SERIAL DATA OUTPUT
3	SERIAL DATA INPUT
4	COMMON

J48 5 Pin Line Voltage Connector	
PIN	DESCRIPTION
1	JUMPER PIN 1 TO PIN 2 FOR 120VAC LINE INPUT ONLY ***
2	
3	CHASSIS GROUND
4	AC LINE
5	AC LINE

FIGURE 9

Troubleshooting

To verify motor operation see steps below:

1- Remove J48 (5 pin power plug) from P48 on the motor.

2- With the power on at the furnace and door switch depressed, use a test meter to verify 120V between pins 4 and 5 on J48.

3- Reconnect J48 to P48 on the motor.

4- Remove J49 (4 pin low voltage connector) from P49 on the motor.

5- Using test jumpers, apply 24V to pins 3 and 4 on P49 on the motor.

Note: Do not apply 24V to pins 2 and 4 on P49. Doing so will cause permanent damage to the motor.

6- Motor should run at 75%.

7- Test is complete. Remove jumpers and reconnect plugs.

Another option is to use the TECMate PRO with the 16 to 4 pin adaptor. The use of the TECMate PRO isolates the motor from the integrated control. Follow the instructions provided with the kit. If the motor runs do not replace.

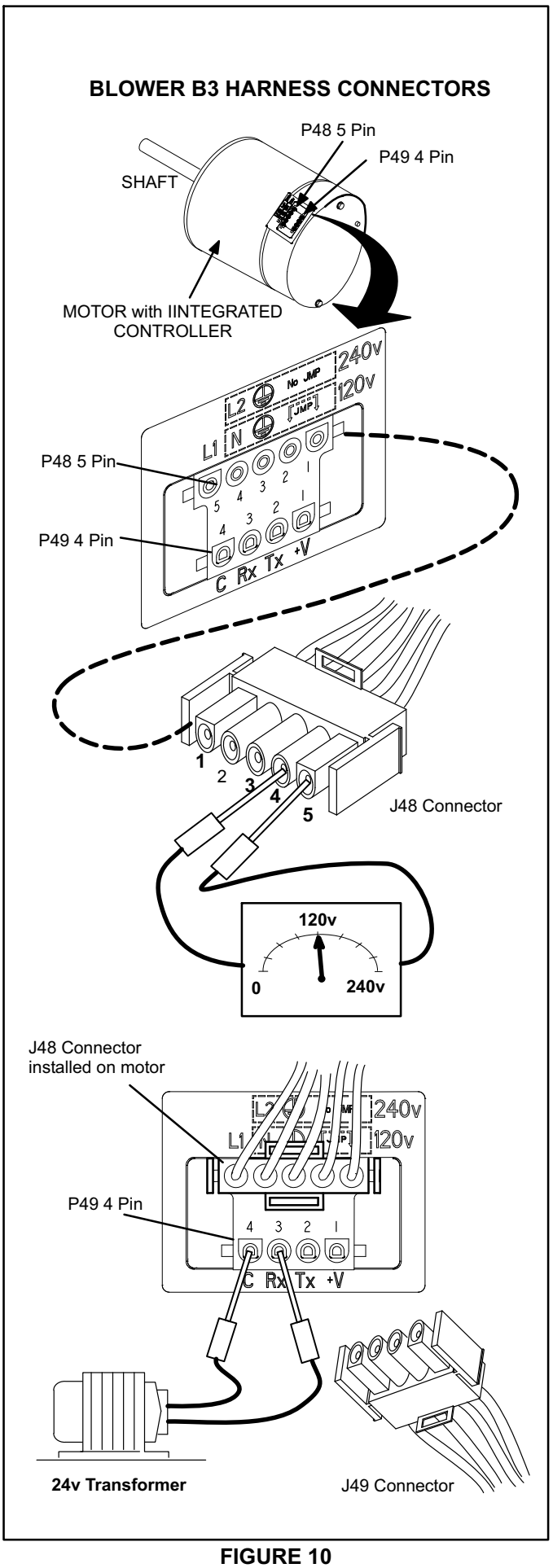


FIGURE 10

Harmony III™

When the G71MPP is installed in Harmony III applications, the Harmony III signal is connected to the DS terminals on the integrated control (figure 4). In this application dip switch one and dip switch two (which configures to various thermostats), is overridden. The discharge air temperature (if used) is also ignored. In order for proper operation on board jumper W914 must be clipped.

The PWM signal (70-90 Hz with a 3-97% duty cycle) controls the indoor blower motor linearly between the minimum (shown in table 28) and the maximum CFM set by *COOLING* dip switches eight through 13. (3% duty cycle = MIN, 97% duty cycle = MAX).

TABLE 28
Minimum CFM

Cool Speed	1/2HP	1HP
High	250	450
Medium-High	250	450
Medium-Low	250	450
Low	250	450

If there is a W1 heat call while the indoor blower is controlled by Harmony III PWM signal, the integrated control will after a successful ignition sequence and stabilization period, modulate the correct firing rate.

Note - All on / off heating and cooling indoor blower delays are still present with Harmony III.

PWM signal is present at all times with a default value of 3% duty cycle. Upon the need for a higher duty cycle (more CFM), the duty cycle will step up at a rate of 1% per second. Upon a need for less duty cycle, (less or no CFM) the duty cycle will immediately step down to the demanded % or default 3% (off).

Along with the PWM signal is a 24VAC Enable signal that is connected on the integrated control terminal “G”. The integrated control will not obey the PWM signal unless the enable signal is present.

C-Heating Components

1. Ignitor

The ignitor is made of durable silicon nitride. Ignitor longevity is enhanced by controlling voltage to the ignitor. The SureLight® control provides a regulated 95 volts to the ignitor for consistent ignition and long ignitor life. Ohm value should be 25 to 47. See figure 12 for ignitor location.

2. Flame Sensor

A flame sensor is located on the left side of the burner support. See figure 11. The sensor is mounted on the flame rollout plate and the tip protrudes into the flame envelope of the left-most burner. The sensor can be removed for service without removing any part of the burners. During operation, flame is sensed by current passed through the flame and sensing electrode. The SureLight control allows the gas valve to remain open as long as flame signal is sensed. To check flame sense signal use the push-button found on the integrated control and go to Field Test Mode. The menu will display the flame signal. Table 29 shows the flame signal for the G71MPP unit.

TABLE 29
Flame Signal in Microamps

Normal	Low	Drop Out
2.6 or greater	2.5 or less	1.1

NOTE - A much higher than normal micro amp reading (15 for example) may appear when checking flame signal.

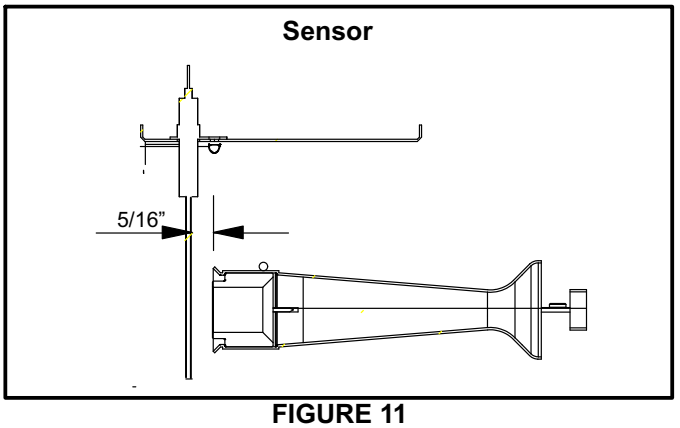


FIGURE 11

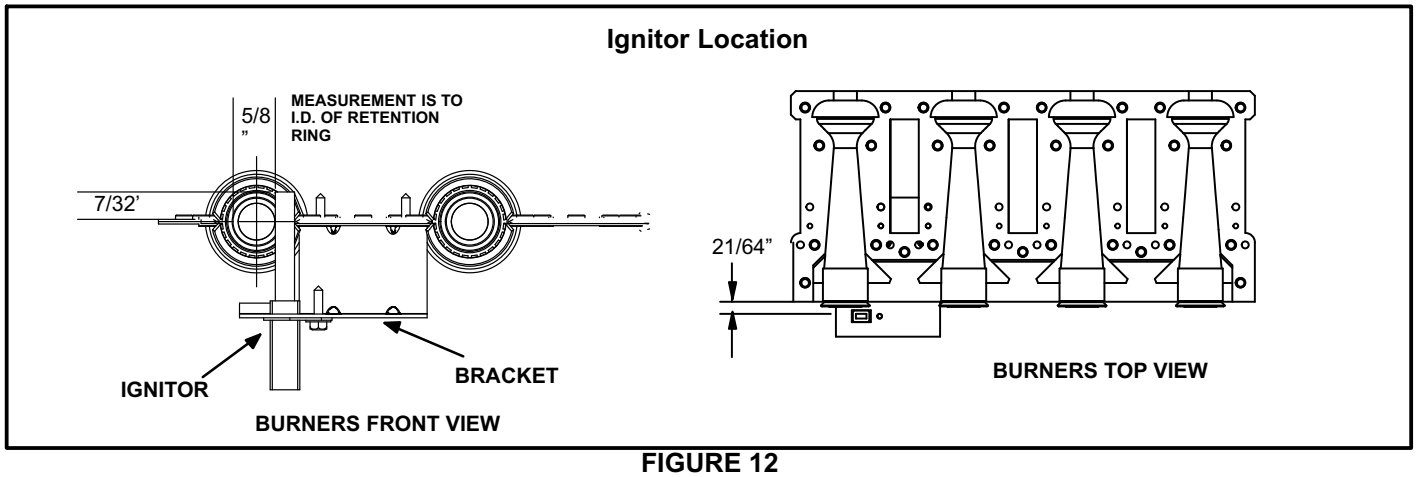


FIGURE 12

3. Duralock Heat Exchanger

G71MPP units use an aluminized steel primary and stainless steel secondary heat exchanger assembly. Heat is transferred to the air stream from all surfaces of the heat exchanger. The shape of the heat exchanger ensures maximum efficiency.

The combustion air inducer pulls fresh air through the burner box. This air is mixed with gas in the burner venturi and at the corbel orifices. The gas / air mixture is then burned at the entrance of each clamshell. Combustion gases are then pulled through the primary and secondary heat exchangers and exhausted out the exhaust vent pipe.

4. Flame Rollout Switches (S47)

Flame rollout switch S47 is a high temperature limit located on each side of the burner box. Each furnace is equipped with two identical switches. The limit is a N.C. SPST manual-reset limit connected in series with the primary limit S10. When S47 senses rollout, the circuit breaks and the ignition control immediately stops ignition and closes the gas valve. If unit is running and flame rollout is detected, the gas valve will close and ignition control will be disabled. Rollout can be caused by a blocked heat exchanger, flue or lack of combustion air. The switch is factory set to trip (open) at 250°F and cannot be adjusted. The switch can be manually reset. To manually reset a tripped switch, push the reset button located on the control.

5. Primary Limit Control (S10)

Figure 13 shows the primary limit (S10) used on G71MPP units located in the heating vestibule panel. S10 is provided with a shield on some models (figure 13) and must not be removed. Note orientation of shield and limit if limit is replaced. When excess heat is sensed in the heat exchanger, the limit will open. Once the limit opens, the furnace control energizes the supply air blower and de-energizes the gas valve. The limit automatically resets when unit temperature returns to normal. The switch is factory set and cannot be adjusted. In the event of restricted air flow, the ignition control board will reduce firing rate and indoor blower airflow in 10% increments until a sustainable air flow is reached. If the furnace reaches 40% firing rate, and adequate air flow is not available, the furnace will shutdown and enter one hour watchguard.

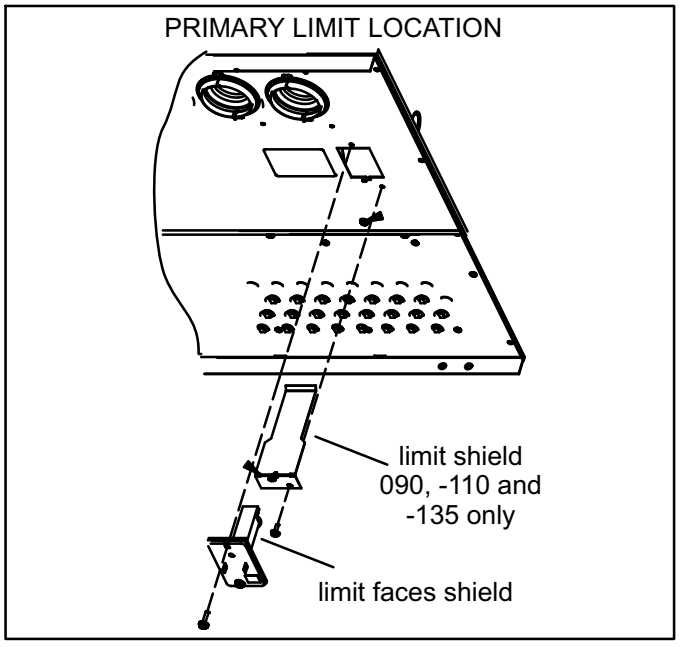


FIGURE 13

6. Backup Secondary Limit Control (S113) (G71MPP-090, 110, 135 only)

Backup secondary limit control S113 is a N.C. auto-reset switch located on the combustion air inducer. S113 acts as a backup to primary limit S10 in the event of an indoor blower failure. S113 contacts open when temperature on the CAI reaches 142°.

7. Gas Valve (GV1)

The G71MPP uses a variable capacity gas valve (figure 35) and is applicable for single stage, two-stage or varaiable capacity settings. See “Thermostat selection modes” in the ignition control section (section A- subsection 4.) for more details The valve is internally redundant to assure safety shut-off. If the gas valve must be replaced, the same type valve must be used.

A 24VAC 2-pin plug and gas control switch are located on the valve. 24V applied to the pins enables valve operation.

Inlet and outlet pressure taps are located on the valve.

LPG change over kits are available from Lennox. Kits include burner orifices and an LP gas valve.

⚠ DANGER

Danger of explosion.

There are circumstances in which odorant used with LP/propane gas can lose its scent. In case of a leak, LP/propane gas will settle close to the floor and may be difficult to smell. An LP/propane leak detector should be installed in all LP applications.

The burner box is sealed and operates under a negative pressure. A pressure hose is connected from the burner box to the gas valve. The gas valve senses the pressure in the burner box and uses that to set the maximum manifold pressure while the pressure switch with pressure conditioning device adjusts the gas flow. This will compensate for different vent configurations which can greatly affect the rate of the unit.

8. Variable Speed Combustion Air Inducer Pressure Switch (S18)

All G71MPP units are equipped with two pressure switch assemblies (one dual switch and one single switch see figure 14) to allow for multiple unit installations without any hose routing changes. The pressure switches serve four functions. First they establish calibration points for the vent calibration routine. The combustion air inducer’s speed at a given firing rate is a function of the vent system restriction. The calibration routine establishes the inducer speed required to make low and high fire switches for a given vent pipe installation and interpolates the speeds required to achieve all intermediate rates between these two points. The pressure conditioning device (low fire) and the high fire switch are utilized for this function. The setting for low-fire switch on dual assembly is such that it does not normally enter into the vent calibration routine.

Second, the switches prove combustion air inducer operation by sensing a vacuum energizing the control circuit and allowing ignition. The low fire pressure switch provides this function.

Thirdly the switches interrupt the combustion process in the event vent outlet or combustion air intake blockage. Both switches provide this function.

Finally the switches interrupt the combustion process if the condensate drainage system becomes blocked to the point the condensate level builds up in the cold end header box/ secondary coil or vent system. Both switches serve this function.

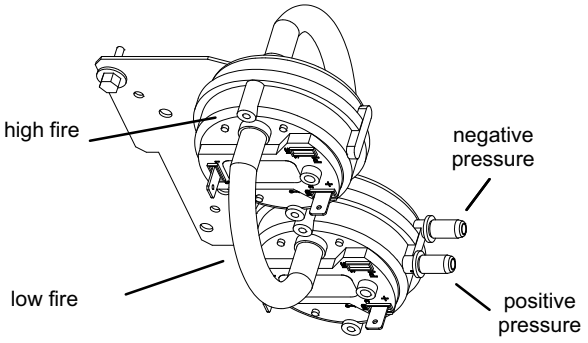
If either switch assembly (dual or single) is to be replaced, replace the entire assembly. Individual switch components can not be replaced.

⚠ WARNING

The pressure switch is a safety shut-down control in the furnace and must not be jumpered for any reason other than troubleshooting.

To troubleshoot the pressure switches, temporarily jumper them. The unit will not fire with the switches jumpered. Therefore, the pressure switches must be bypassed after the combustion air inducer is activated. This will determine if the pressure switches and furnace are operating properly. However, this may not indicate if the sealed combustion system is operating properly.

DUAL COMBUSTION AIR PRESSURE SWITCH



SINGLE COMBUSTION AIR PRESSURE SWITCH

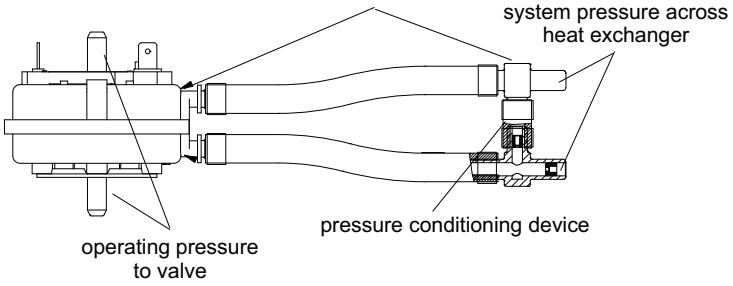


FIGURE 14

Vent Calibration

The vent calibration sequence establishes furnace operating parameters in a specific installation. The integrated control board runs the calibration and may be repeated as necessary to maintain proper furnace operation. Prior to calibration, all duct work (and returns) vent pipe and condensate trap (primed) must be connected.

If calibration is successful the data is stored in memory and will be used to determine furnace operation and maintain parameters during heat call. If calibration is not successful, the integrated control will proceed to a 5 minute delay and signal the appropriate code. After the 5 minute delay the calibration will be repeated 4 more times with a 5 minute delay in between. If still unsuccessful after the 4 trials (total 5) the integrated control will go into a 1 hour soft lockout.

Calibration may be initiated by:

- Initial call for heat
- Cycling main power off / on and then call for heat
- Venting conditions change (affecting high and low pressure switch operation)
- Ramp down low fire switch check failed (calibration will follow next call for heat)
- The service technician (by pressing the push button found on the integrated control until the control cycles through to “Field Test Mode”)

The integrated control will do the following during calibration:

1- Verify both low pressure switch and high pressure switch are open. If either are closed log error and end calibration.

2- Start inducer at a predetermined low RPM (1600).

3- After a 7.5 second delay and if the low pressure switch is still open, increase the RPM by 250. If after a 5 second delay the low pressure switch is still open, repeat steps 1, 2 and 3.

4- Decrease RPM by 50, wait 5 seconds and look for the low pressure switch to open. Repeat this step until it is closed.

5- Keep this RPM as RPM1.

6- Increase RPM to 1250. Wait 5 seconds.

7- Check high pressure switch, if open, increase RPM by 250. Repeat this step until closed.

8- Decrease RPM by 50, check after 5 seconds. Repeat this step until switch is open.

9- Keep this RPM as RPM2.

10- Set RPM to 0. End calibration.

NOTE - If after a successful calibration and a heat call is present the integrated control will by-pass the pre-purge state and go straight into ignitor warm up.

After calibration, the integrated control stores the RPM1 and RPM2 values. The low fire (40%) and high fire (100%) RPM points are calculated by adding margin values to the RPM1 and RPM2 values.

The integrated control also initiates a low fire switch check at the end of a normal heating cycle described below. If this check fails the pressure switch calibration will follow on the next call for heat.

1- The inducer runs 15 seconds at the last firing rate before the heat call ended.

2- Inducer runs at 40% firing rate RPM (RPM1 + low pressure switch open RPM margin value).

3- If low pressure switch is open, set flag for calibration on next call for heat. Turn inducer off until next call for heat.

4- If low pressure switch is closed move inducer speed to RPM1. Allow 5 seconds for stabilization.

5- If low pressure switch opens turn off inducer. No further action.

6- If low pressure switch is still closed, decrease inducer speed 1/2 of the low pressure switch open RPM margin. Allow 5 seconds to stabilize.

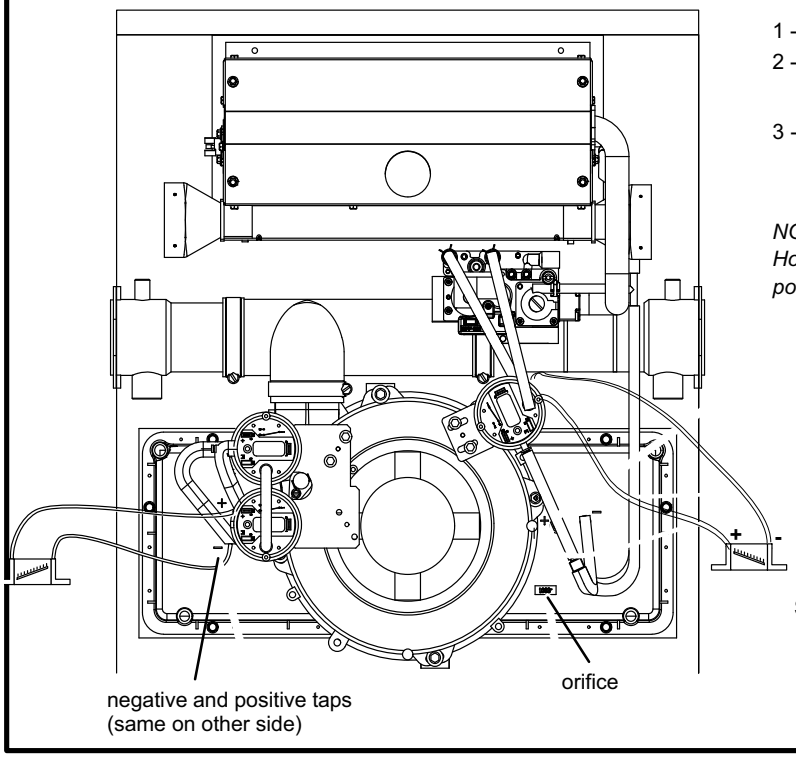
7- If low pressure switch is open turn off inducer. No further action.

8- If low pressure switch is still closed, set flag for calibration on next call for heat and turn off inducer.

Measuring pressure differential Figure 15

Checks of pressure differential can aid in troubleshooting. When measuring the pressure differential, readings should be taken at the pressure switch. Lack of differential usually indicates problems in the intake or exhaust piping, but may indicate problems in the heat exchanger, condensing coil, header boxes, combustion inducer or other components.

The differential pressure is the difference in pressure measured across the cold end header box orifice.



Duel Pressure Switch

1 - Remove thermostat demand and allow unit to cycle off.

2 - Install a tee in the negative (-) line and a tee in the positive (+) line running from the lower pressure switch to the cold end header box.

3 - Install a manometer with hose from the negative (-) side of the manometer to the tee installed in the negative (-) line and with hose from the positive (+) side of the manometer to the tee in the positive (+) line.

NOTE - Both sides of the cold end header box are negative. However the (+) port reads less negative pressure than the (-) port.

4 - Operate unit and observe manometer reading. *Readings will change as heat exchanger warms.*
a. Take one reading immediately after start-up.
b. Take a second reading after unit has reached steady state (approximately 5 minutes). This will be the pressure differential.

The pressure differential should be greater than those listed in tables 31 and 32.

5 - Remove thermostat demand and allow to cycle off.

6 - Remove manometer and tee's. Reinstall combustion air sensing hoses to the pressure switch.

Single Pressure Switch with Pressure Conditioning Device

7 - Repeat steps 1 through 6 for the single pressure switch with pressure conditioning device. Tee into both hoses from the pressure switch to the gas valve and install manometer. Readings should be greater than those shown in table 33.

FIGURE 15

The CAI is installed on the cold end header box. The cold end header box is a single piece made of hard plastic. The box has an internal channel where the combustion air inducer creates negative pressure at unit start up. The channel contains an orifice used to regulate flow created by the CAI. The box has pressure taps for the CAI pressure switch hoses.

The dual pressure switches measure the pressure differential across the CAI orifice (difference in the channel and cold end header box). The single pressure switch measures differential across the burner box and channel. A window is provided on the bottom right hand side of the cold end header box to indicate orifice size. See figure 15. See table 30 for orifice size per unit. **If replacement is necessary the gaskets used to seal the box to the vestbule panel and the CAI to the box, must also be replaced.**

TABLE 30

G71MPP Unit	C.A.I. Orifice Size
-070	0.938"
-090	1.063"
-110	1.250"
-135	1.625"

TABLE 31
Dual Pressure Switch
0' to 7500'

G71MPP Unit	Set Point High Fire	Set Point Low Fire
-070	1.37"	0.30"
-090	1.22"	0.25"
-110	1.32"	0.20"
-135	0.83"	0.15"

TABLE 32*
Dual Pressure Switch
7501' to 10,000'

G71MPP Unit	Set Point High Fire	Set Point Low Fire
-070	1.22"	0.30"
-090	1.02"	0.25"
-110	1.12"	0.20"
-135	0.63"	0.15"

**Unit may require conversion kit at this altitude. See High Altitude table.*

TABLE 33
Single Pressure Switch

G71MPP Unit	Set Point High Fire
-070	.27"
-090	
-110	
-135	

TABLE 34
OUTDOOR TERMINATION KITS AND CORRESPONDING EQUIVALENCIES

UNIT MODEL	VENT PIPE DIA. (in.)	Vent Pipe Length Equivalency (feet)							
		Outdoor Exhaust Accelerator (Dia. X Length)	Outdoor Exhaust Accelerator (Dia. X Length)	1-1/2" Concentric Kit	2" Concentric Kit	3" Concentric Kit	2" Wall Plate Kit	3" Wall Plate Kit	2" Wall Ring Kit
		1-1/2" X 12"	2" X 12"	71M80	69M29	60L46	22G44 30G28	44J40 81J20	15F74
36B-070	2	4	Not Allowed	12	Not Allowed	Not Allowed	4	4*	4
	2-1/2	5	Not Allowed	15	Not Allowed	Not Allowed	5	5*	5
	3	8	Not Allowed	24	Not Allowed	Not Allowed	8	8*	8
	4	14	Not Allowed	42	Not Allowed	Not Allowed	14	14*	14
60C-090	2	Not Allowed	1	Not Allowed	3	3	Not Allowed	1	1**
	2-1/2	Not Allowed	2	Not Allowed	6	6	Not Allowed	2	2**
	3	Not Allowed	2	Not Allowed	6	6	Not Allowed	2	2**
	4	Not Allowed	4	Not Allowed	12	12	Not Allowed	4	4**
60C-110	2-1/2	Not Allowed	2	Not Allowed	6	6	Not Allowed	2	2
	3	Not Allowed	2	Not Allowed	6	6	Not Allowed	2	2
	4	Not Allowed	4	Not Allowed	12	12	Not Allowed	4	4
60D-135	3	Not Allowed	6	Not Allowed	Not Allowed	15	Not Allowed	6	Not Allowed
	4	Not Allowed	10	Not Allowed	Not Allowed	25	Not Allowed	10	Not Allowed

**Requires field-provided and installed 1-1/2" exhaust accelerator.*

Step 1	**Proposed vent pipe size : _____**	**Equivalent Feet**
Step 2	**Termination kit catalog number : _____** **Vent pipe equivalency value from table 34: _____**	
Step 3	**Total number of 90° elbows required (indoors and outdoors)** **_____ X 5 = _____ equivalent feet of pipe**	
Step 4	**Total number of 45° elbows required (indoors and outdoors)** **_____ X 2.5 = _____ equivalent feet of pipe**	
Step 5	**Linear feet of straight pipe required : _____**	
Step 6	**Add equivalent feet of vent pipe listed in steps 2 through 5.**	**TOTAL**

If the total is equal to, or less than, the allowable maximum given in table 36, the proposed pipe size is acceptable. If the total exceeds the maximum allowed vent pipe length, repeat the process above using the next larger diameter pipe until an acceptable total is achieved.

NOTE - In Direct Vent systems, total the equivalent length of either the exhaust OR intake piping run, depending upon which will be LONGER. Intake and exhaust pipe diameter must be the same size and must be terminated in the same pressure zone. Intake and exhaust pipe should be roughly the same length.

FIGURE 16

A-Vent Piping Guidelines

The G71MPP can be installed only as a Direct Vent gas central furnace.

NOTE - In Direct Vent installations, combustion air is taken from outdoors and flue gases are discharged outdoors.

Intake and exhaust pipe sizing -- Size pipe according to tables 35 and 36. Table 35 lists the *minimum* equivalent vent pipe lengths permitted. Table 36 lists the *maximum* equivalent pipe lengths permitted.

Maximum vent length is defined as:

Total length (linear feet) of pipe,
Plus Equivalent length (feet) of fittings,
Plus Equivalent length (feet) of termination.
NOTE *- Include ALL pipe and ALL fittings, both indoors and outdoors. Measure equivalent length of intake and exhaust pipe separately. Use the greater of the two lengths to determine vent pipe diameter to be used for both intake and exhaust.*

Regardless of the diameter of pipe used, the standard roof and wall terminations described in section *Exhaust Piping Terminations* should be used. Exhaust vent termination pipe is sized to optimize the velocity of the exhaust gas as it exits the termination. Refer to table 37.

NOTE - The exhaust pipe should be offset a minimum of 12 inches to avoid the possibility of water droplets being released from the exhaust termination. The minimum exhaust vent length is 15 ft. Shorter exhaust vent lengths may result in the discharge of water droplets from the exhaust termination, in spite of the 12-inch vertical offset. See figure 17.

Each 90° elbow (including those provided with the furnace) of any diameter is equivalent to 5 feet (1.52m) of vent pipe of the same diameter. Two 45° elbows are equivalent to one 90° elbow of the same diameter. One 45° elbow is equal to 2.5 feet (.76m) of vent pipe of the same diameter.

In some applications which permit the use of several different sizes of vent pipe, a combination vent pipe may be used. Contact Lennox' Application Department for assistance in sizing vent pipe in these applications.

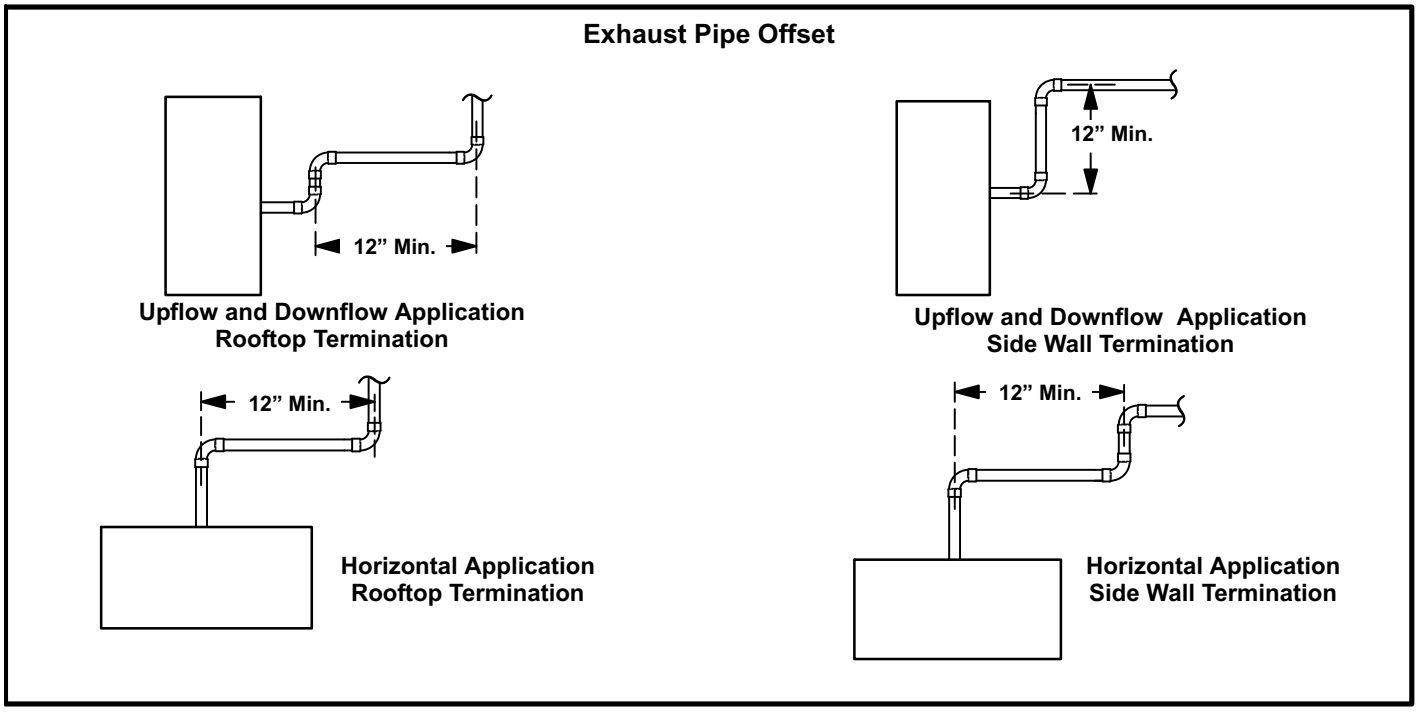


FIGURE 17

NOTE - The flue collar on all models is sized to accommodate 2" Schedule 40 flue pipe. When vent pipe which is larger than 2" must be used in an upflow application, a 2" elbow must be applied at the flue collar in order to properly transition to the larger diameter flue pipe. This elbow must be added to the elbow count used to determine acceptable vent lengths. Assign an equivalent feet value to this elbow according to the larger size pipe being used. Contact the Application Department for more information concerning sizing of vent systems which include multiple pipe sizes.

Use the following steps to correctly size vent pipe diameter. ***Refer to Vent Pipe Size Determination Worksheet Figure 16.***

1 - Determine the vent termination and its corresponding equivalent feet value according to table 34.

2 - Determine the number of 90° elbows required for both indoor and outdoor (e.g. snow riser) use. Calculate the corresponding equivalent feet of vent pipe.

3 - Determine the number of 45° elbows required for both indoor and outdoor use. Calculate the corresponding equivalent feet of vent pipe.

4 - Determine the length of straight pipe required.

5 - Add the total equivalent feet calculated in steps 1 through 4 and compare that length to the maximum values given in table 36 for the proposed vent pipe diameter. If the total equivalent length required exceeds the maximum equivalent length listed in the appropriate table, evaluate the next larger size pipe.

⚠ IMPORTANT

Do not use screens or perforated metal in exhaust or intake terminations. Doing so will cause freeze-ups and may block the terminations.

TABLE 35
MINIMUM VENT PIPE LENGTHS

G71MPP MODEL	MIN. EQUIV. VENT LENGTH	EXAMPLE
070, 090	15 ft.*	5 ft. plus 2 elbows of 2", 2-1/2", 3" or 4" diameter pipe
110**		5 ft. plus 2 elbows of 2-1/2" 3" or 4" diameter pipe
135***		5 ft. plus 2 elbows of 3" or 4" diameter pipe

**Any approved termination may be added to the minimum equivalent length listed.*

***G71MPP-60C-110 must have 90° street ell (supplied) installed directly into unit flue collar.*

****G71MPP-60D-135 must have 3" to 2" reducing ell (supplied) installed directly into unit flue collar.*

TABLE 36
MAXIMUM VENT PIPE LENGTHS

ALTITUDE	G71MPP MODEL	MAXIMUM EQUIVALENT VENT LENGTH FEET			
		2" PIPE	2-1/2" PIPE	3" PIPE	4" PIPE
0 - 7500 (0 - 2286 m)	070	75	135	150	250
	090	50	100	125	225
	110*	20	60	125	200
	135**	n/a	n/a	125	180
7501 - 10000 (2287 - 3048 m)	070	60	125	150	250
	090	25	60	125	225
	110*	n/a	40	90	200
	135**	n/a	n/a	70	180

n/a -- Not allowed.

**G71MPP-60C-110 must have 90° street ell (supplied) installed directly into unit flue collar.*

***G71MPP-60D-135 must have 3" to 2" reducing ell (supplied) installed directly into unit flue collar.*

NOTE - Elbows and pipe required for vent terminations must be added when calculating equivalent vent length.

B-Joint Cementing Procedure

All cementing of joints should be done according to the specifications outlined in ASTM D 2855.

⚠ WARNING

DANGER OF EXPLOSION!

Fumes from PVC glue may ignite during system check. Allow fumes to dissipate for at least 5 minutes before placing unit into operation.

1 - Measure and cut vent pipe to desired length.

2 - Debur and chamfer end of pipe, removing any ridges or rough edges. If end is not chamfered, edge of pipe may remove cement from fitting socket and result in a leaking joint.

3 - Clean and dry surfaces to be joined.

4 - Test fit joint and mark depth of fitting on outside of pipe.

5 - Uniformly apply liberal coat of PVC primer for PVC or use a clean dry cloth for ABS to clean inside socket surface of fitting and male end of pipe to depth of fitting socket.

NOTE - Furnace flue collar and air inlet fitting are both ABS pipe. Use transition solvent cement when joining ABS pipe to PVC pipe.

6 - Promptly apply solvent cement to end of pipe and inside socket surface of fitting. Cement should be applied lightly but uniformly to inside of socket. Take care to keep excess cement out of socket. Apply second coat to end of pipe.

NOTE - Time is critical at this stage. Do not allow primer to dry before applying cement.

7 - Immediately after applying last coat of cement to pipe, and while both inside socket surface and end of pipe are wet with cement, forcefully insert end of pipe into socket until it bottoms out. Turn PVC pipe 1/4 turn during assembly (but not after pipe is fully inserted) to distribute cement evenly. DO NOT turn ABS or cellular core pipe.

NOTE - Assembly should be completed within 20 seconds after last application of cement. Hammer blows should not be used when inserting pipe.

8 - After assembly, wipe excess cement from pipe at end of fitting socket. A properly made joint will show a bead around its entire perimeter. Any gaps may indicate a defective assembly due to insufficient solvent.

9 - Handle joints carefully until completely set.

C-Venting Practices

The thickness of construction through which vent pipes may be installed is 24" (610mm) maximum and 3/4" (19mm) minimum. If a G71MPP furnace replaces a furnace which was commonly vented with another gas appliance, the size of the existing vent pipe for that gas appliance must be checked. Without the heat of the original furnace flue products, the existing vent pipe is probably oversized for the single water heater or other appliance. The vent should be checked for proper draw with the remaining appliance.

1. Use recommended piping materials for exhaust piping.
2. Secure all joints so that they are gas-tight using approved cement.

   Suspend piping using hangers at a minimum of every 5 feet (1.52m) for schedule 40 PVC and every 3 feet (.91m) for ABS-DWV, PVC-DWV, SPR-21 PVC, and SDR-26 PVC piping. A suitable hanger can be fabricated by using metal or plastic strapping or a large wire tie.

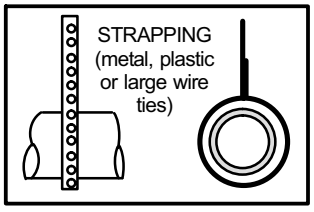


FIGURE 18

3. In areas where piping penetrates joists or interior walls, hole must be large enough to allow clearance on all sides of pipe through center of hole using a hanger.
4. Isolate piping at the point where it exits the outside wall or roof in order to prevent transmission of vibration to the structure.
5. When furnace is installed in a residence where unit is shut down for an extended period of time, such as a vacation home, make provisions for draining condensate collection trap and lines.

Exhaust Piping (Figures 19 and 20)

NOTE - A 2" diameter street ell is located on the blower deck of 60C-110 units. Street ell ***must be*** *glued with ABS solvent cement directly into the unit flue collar. See figure 19. A 3" to 2" reducing ell is located on the blower deck of the 60D-135 units.* ***In upflow or downflow applications,*** *the reducing ell* ***must be*** *glued with ABS solvent cement directly into the unit flue collar.*

1. Choose the appropriate side for venting in upflow or downflow positions. Exhaust piping exits from the top of the unit in horizontal air discharge applications. Glue the field-provided exhaust vent pipe (or provided street ell or reducing ell in upflow or downflow applications) to the flue collar. All PVC cement joints should be made according to the specifications outlined in ASTM D 2855. Refer to pipe and fittings specifications and gluing procedures.

⚠ IMPORTANT

Exhaust piping and condensate trap must be installed on the same side of the unit in upflow and dowflow applications or use alternate drain kit 76M20.

2. All horizontal runs of exhaust pipe must slope back toward unit. A minimum of 1/4" (6mm) drop for each 12" (305mm) of horizontal run is mandatory for drainage. Horizontal runs of exhaust piping must be supported every 5 feet (1.52m) using hangers.

   NOTE - Exhaust piping should be checked carefully to make sure there are no sags or low spots.

3. On the opposite side of the cabinet, glue the provided 2" vent plug into the unused flue collar.
4. Route piping to outside of structure. Continue with installation following instructions given in piping termination section.

⚠ CAUTION

Do not discharge exhaust into an existing stack or stack that also serves another gas appliance. If vertical discharge through an existing unused stack is required, insert PVC pipe inside the stack until the end is even with the top or outlet end of the metal stack.

⚠ CAUTION

The exhaust vent pipe operates under positive pressure and must be completely sealed to prevent leakage of combustion products into the living space.

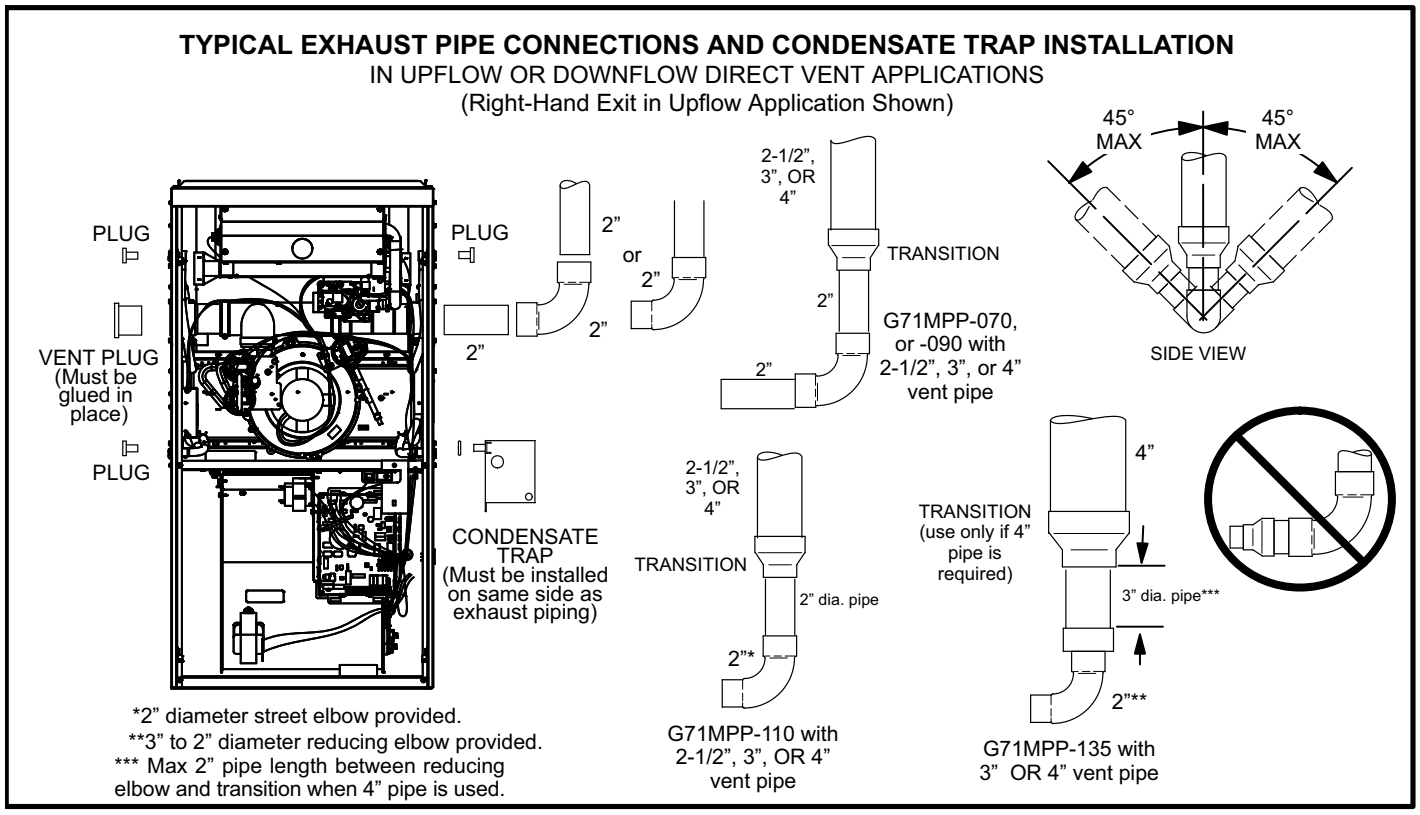


FIGURE 19

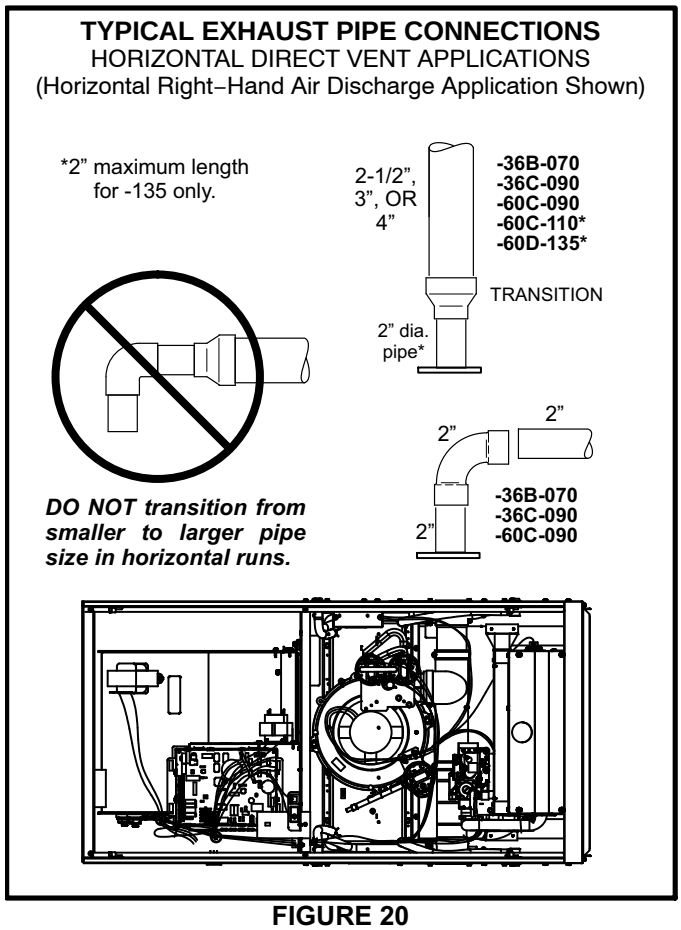


FIGURE 20

Intake Piping

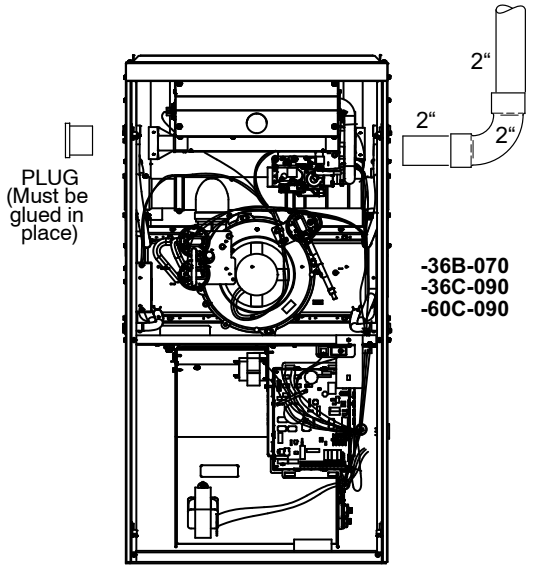
The G71MPP furnace may be installed only in **direct vent** applications.

The G71MPP unit is designed for either left-side or right-side air intake connections in either upflow or downflow applications. In horizontal applications, air intake must be brought in through the top. Intake air piping is independent of exhaust piping.

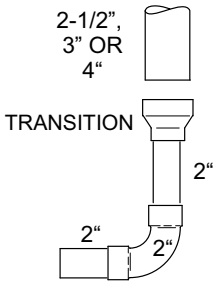
TYPICAL AIR INTAKE PIPE CONNECTIONS

UPFLOW OR DOWNFLOW DIRECT VENT APPLICATIONS

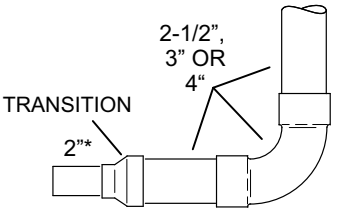
(Right−Hand Exit in Upflow Application Shown)



-36B-070
-36C-090
-60C-090



-36B-070
-36C-090
-60C-090
-60C-110



-36B-070
-36C-090
-60C-090
-60C-110
-60D-135*

**Limit pipe length to 4” in G71MPP-135 applications.*

FIGURE 21

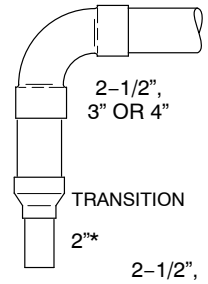
TYPICAL AIR INTAKE PIPE CONNECTIONS

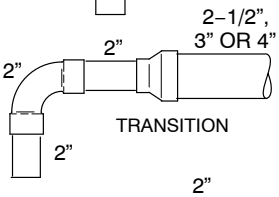
HORIZONTAL DIRECT VENT APPLICATIONS

(Horizontal Right−Hand Air Discharge Application Shown)

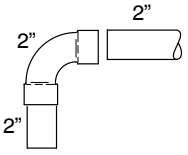
**Limit pipe length to 4” in -135 applications.*

-36B-070
-36C-090
-60C-090
-60C-110
-60D-135*





-36B-070
-36C-090
-60C-110



-36B-070
-36C-090
-60C-090

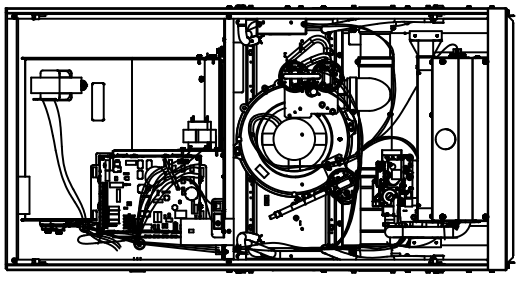
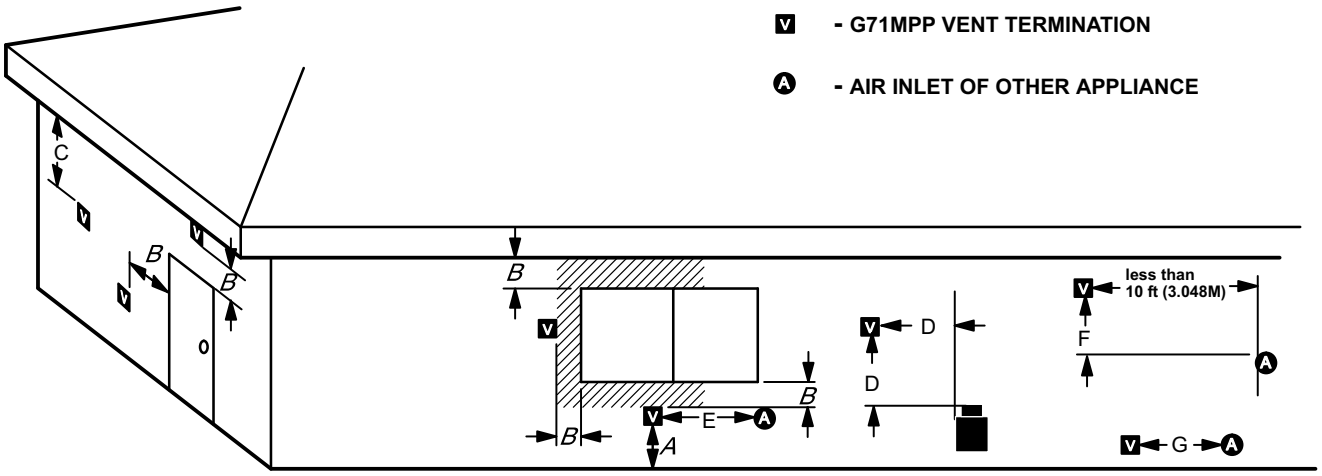


FIGURE 22

VENT TERMINATION CLEARANCES
FOR INSTALLATIONS IN THE USA AND CANADA*



A - *Clearance above grade* - 12 in. (305mm) minimum.

B - *Clearance to window or door* that may be opened -
for vent installations in USA - 12 in. (305mm) minimum.
for vent installations in Canada - 12 in. (305mm) minimum for appliances $\leq$ 100,000 Btuh (30 kW);
36 in. (0.9m) minimum for appliances > 100,000 Btuh (30 kW).

C - *Do not position terminations directly under roof eaves.*

D - *Clearance to electric meters, gas meters, regulators, and relief equipment* -
for vent installations in USA - 48 in (1219mm) minimum.
for vent installations in Canada - see current edition of CSA B149 Code.

E - *Clearance to non-mechanical air supply inlet or outlet*
for vent installations in USA - 48 in. (1219mm) minimum horizontal and below, 12 in. (305mm) minimum above.
for vent installations in Canada - 12 in. (305mm) minimum for appliances $\leq$ 100,000 Btuh (30 kW);
36 in. (0.9m) minimum for appliances > 100,000 Btuh (30 kW).

F - *Clearance to mechanical air supply inlet* --
for vent installations in USA - 36 in. minimum (914mm**).**

G - *Clearance to mechanical air supply inlet* --
for vent installations in Canada - 72 in. (1829mm) minimum.

H - *Do not point terminations into recessed areas such as window wells, stairwells or alcoves.*

J - *Do not position terminations directly above a public walkway.*

* Note -
(I) Dimensions are from the current edition of The National Fuel Gas Code - ANSI-Z223.1/NFPA 54 for USA installations. In Canada, refer to current edition of CSA B149 installation codes. Local codes or regulations may require different clearances.

(II) In Non-Direct Vent installations, combustion air is taken from indoors and the flue gases are discharged to the outdoors.

FIGURE 23

Details of Intake and Exhaust Piping Terminations for Direct Vent Installations

NOTE - In Direct Vent installations, combustion air is taken from outdoors and flue gases are discharged to outdoors.

Intake and exhaust pipes may be routed either horizontally through an outside wall or vertically through the roof. In attic or closet installations, vertical termination through the roof is preferred. Figures 24 through 32 show typical terminations.

1. Exhaust and intake exits must be in same pressure zone. Do not exit one through the roof and one on the side. Also, do not exit the intake on one side and the exhaust on another side of the house or structure.
2. Intake and exhaust pipes should be placed as close together as possible at termination end (refer to illustrations). Maximum separation is 3" (76mm) on roof terminations and 6" (152mm) on side wall terminations.
3. If necessary, install a field-provided transition to adapt larger vent pipe size to termination pipe size.
4. On roof terminations, the intake piping should terminate straight down using two 90° elbows (See figure 24).
5. Exhaust piping must terminate straight out or up as shown. In rooftop applications, a reducer may be required on the exhaust piping at the point where it exits the structure to improve the velocity of exhaust away from the intake piping. See table 37.

   NOTE - Care must be taken to avoid recirculation of exhaust back into intake pipe.
6. On field supplied terminations for side wall exits, exhaust piping should extend a maximum of 12 inches (305mm) beyond the outside wall unless supported. Intake piping should be as short as possible. See figure 25.
7. On field supplied terminations, the end of the exhaust pipe must extend a minimum of 8" (203mm) beyond the end of the intake pipe.
8. If intake and exhaust piping must be run up a side wall to position above snow accumulation or other obstructions, piping must be supported every 3 ft. (.9m) as shown in figure 18. Refer to figure 28 for proper piping method. In addition, wall termination kit must be extended for use in this application. See figure 31. When exhaust and intake piping must be run up an outside wall, the exhaust piping must be terminated with pipe sized per table 37. The intake piping may be equipped with a 90° elbow turndown. Using turndown will add 5 feet (1.5m) to the equivalent length of the pipe.
9. Based on the recommendation of the manufacturer, a multiple furnace installation may use a group of up to four termination kits assembled together horizontally, as shown in figure 30.

TABLE 37
EXHAUST PIPE TERMINATION SIZE REDUCTION

G71MPP MODEL	Exhaust Pipe Size	Termination Pipe Size
070	2", 2-1/2", 3" or 4"	1-1/2"
090	2", 2-1/2", 3" or 4"	2"
110	2-1/2", 3" or 4"	2"*
135	3" or 4"	2"*

**Approved 3" concentric termination kit terminates with 2-5/8" ID pipe.*

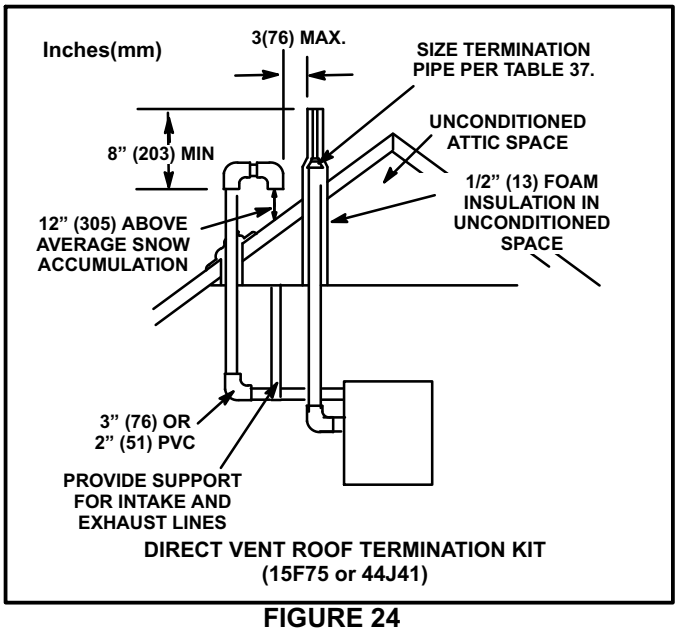


FIGURE 24

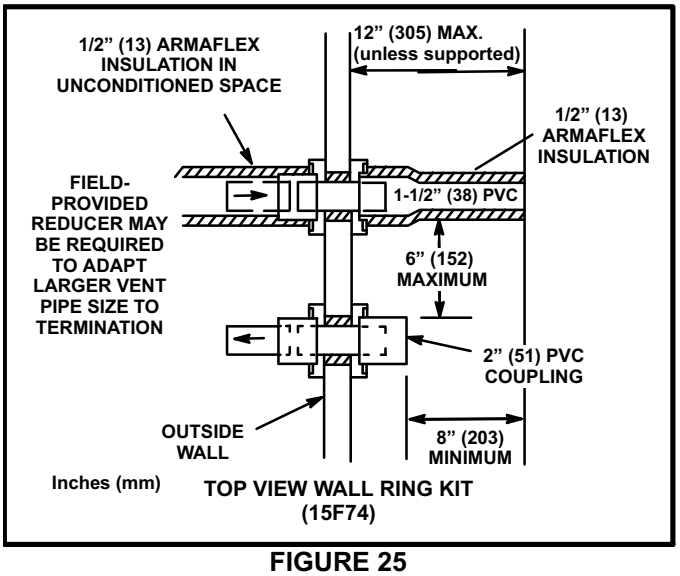
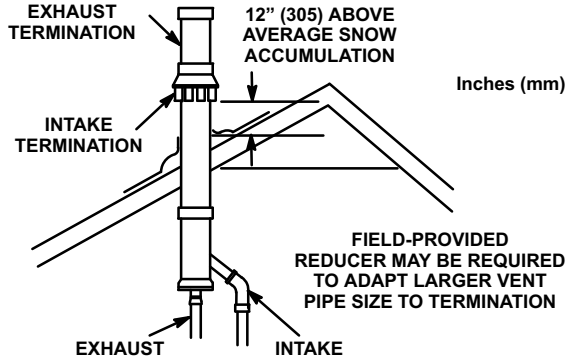
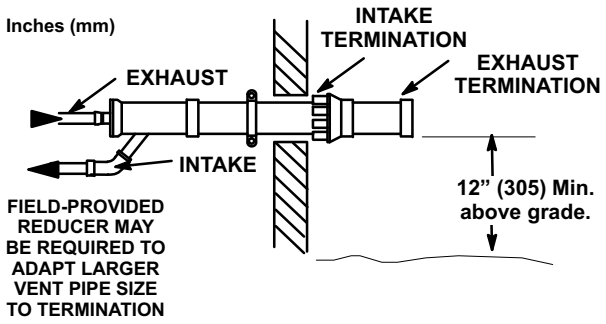


FIGURE 25



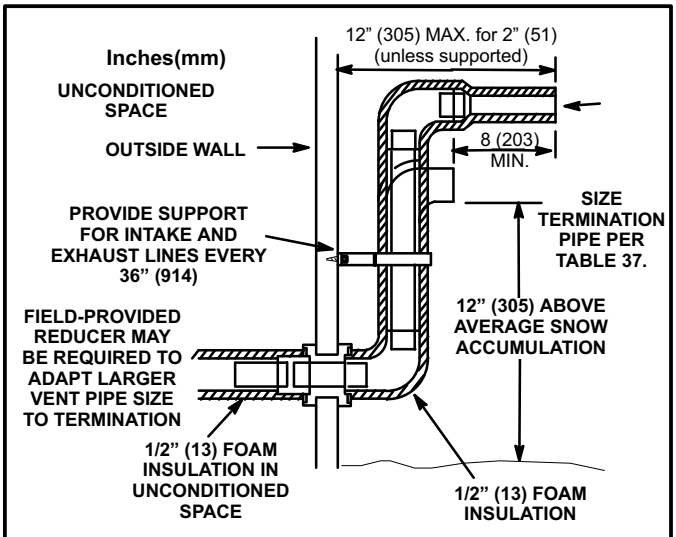
DIRECT VENT CONCENTRIC ROOFTOP TERMINATION
(71M80, 69M29 or 60L46)

FIGURE 26



DIRECT VENT CONCENTRIC WALL TERMINATION
(71M80, 69M29 or 60L46)

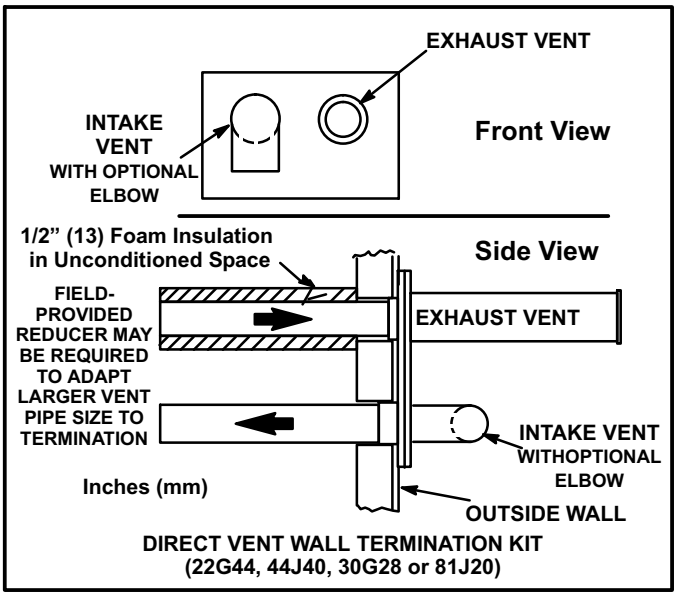
FIGURE 27



SIDE VIEW
DIRECT VENT WALL RING TERMINATION
(15F74)

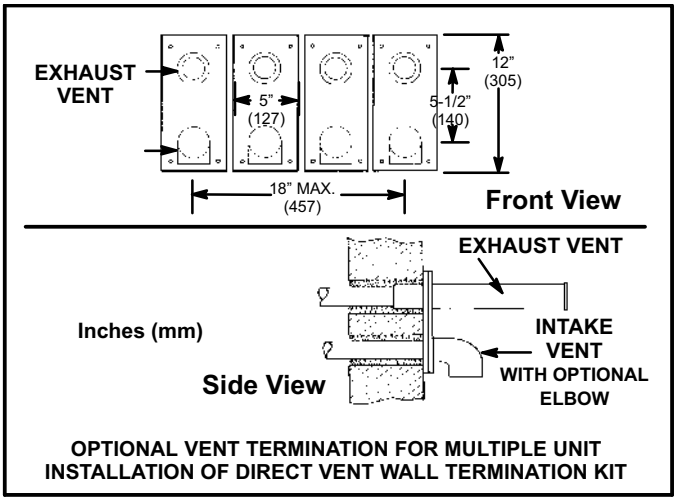
See venting table 36 for maximum venting lengths with this arrangement.

FIGURE 28



DIRECT VENT WALL TERMINATION KIT
(22G44, 44J40, 30G28 or 81J20)

FIGURE 29



OPTIONAL VENT TERMINATION FOR MULTIPLE UNIT INSTALLATION OF DIRECT VENT WALL TERMINATION KIT

FIGURE 30

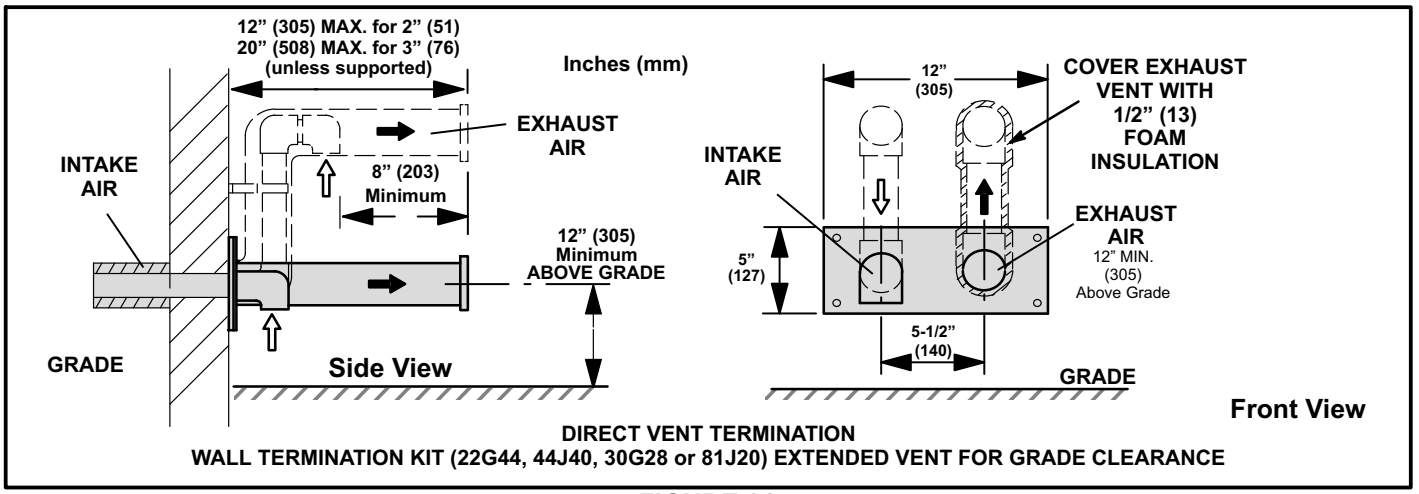
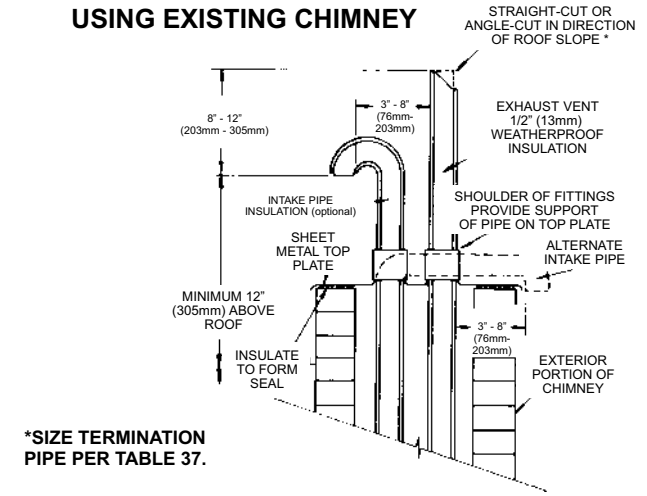
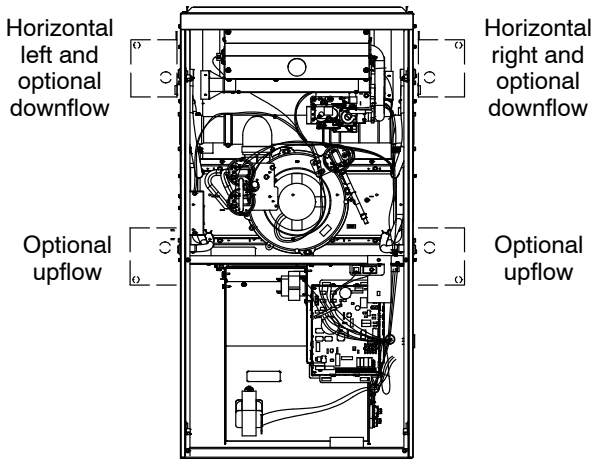


FIGURE 31



NOTE - Do not discharge exhaust gases directly into any chimney or vent stack. If vertical discharge through an existing unused chimney or stack is required, insert piping inside chimney until the pipe open end is above top of chimney and terminate as illustrated. In any exterior portion of chimney, the exhaust vent must be insulated.

FIGURE 32



NOTE - In upflow applications where side return air filter is installed on same side as the condensate trap, filter rack must be installed beyond condensate trap to avoid interference.

FIGURE 33

Condensate Piping

This unit is designed for either right- or left-side exit of condensate piping in either upflow or downflow applications; however, it must be installed on the same side of the unit as the exhaust piping. In horizontal applications, the condensate trap should extend below the unit. A 5-1/2" service clearance is required for the condensate trap. Refer to figure 33 for condensate trap locations.

NOTE - If necessary the condensate trap may be installed in an alternate location in upflow applications using kit number 76M20.

1 - Determine which side condensate piping will exit the unit. Remove plugs from the condensate collar at the appropriate location on the side of the unit.

NOTE - The condensate trap is factory-shipped with two rubber O-rings and two rubber clean-out caps installed. Check to make sure that these items are in place before installing the trap assembly.

2 - Install condensate trap onto the condensate collar. Use provided HI/LO screws to secure two upper flanges of the trap to the collar. Use provided sheet metal screw to secure bottom trap flange to side of unit. See figure 34.

NOTE - In upflow and downflow applications, condensate trap must be installed on the same side as exhaust piping.

⚠ CAUTION

DO NOT use a power driver to tighten screws which secure condensate trap to cabinet. Screws should be hand-tightened using a screw driver to avoid the possibility of damage to the trap assembly.

3 - The grey-colored condensate trap (101661-01) provided with the unit is manufactured using ABS material. This is the only trap that is to be used with this unit. Use ABS to PVC transition solvent cement to glue a field-provided PVC coupling or PVC pipe to the trap. Install a tee and vent pipe near the trap.

NOTE - The condensate trap drain stubs (both sides) have an outer diameter which will accept a standard 3/4" PVC coupling. The inner diameter of each stub will accept standard 1/2" diameter PVC pipe.

NOTE - Vinyl tubing may be used for condensate drain. Tubing must be 1-1/4" OD X 1" ID and should be attached to the drain stubs on the trap using a hose clamp.

4 - Glue the field-provided drain line to the tee. Route the drain line to an open drain. As an alternate, clear vinyl tubing may be used to drain condensate away from the trap. Secure the vinyl tubing to the drain stubs on the trap using a hose clamp. Do not overtighten the hose clamp.

Condensate line must be sloped downward away from condensate trap to drain. If drain level is above condensate trap, condensate pump must be used. Condensate drain line should be routed within the conditioned space to avoid freezing of condensate and blockage of drain line. If this is not possible, a heat cable kit may be used on the condensate trap and line. Heating cable kit is available from Lennox in various lengths; 6 ft. (1.8m) - kit no. 26K68; 24 ft. (7.3m) - kit no. 26K69; and 50 ft. (15.2m) - kit no. 26K70.

⚠ CAUTION

Do not use copper tubing or existing copper condensate lines for drain line.

5 - If unit will be started immediately upon completion of installation, prime trap per procedure outlined in Unit Start-Up section.

6 - Glue the provided cap onto the unused condensate drain line stub.

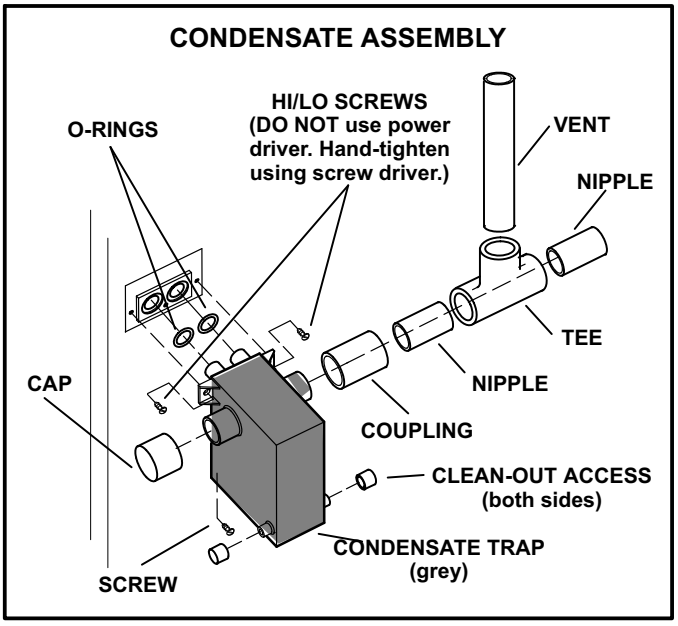


FIGURE 34

III-START-UP

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 nameplate. If not, consult the power company and have voltage condition corrected before starting unit.

B-Heating Start-Up

FOR YOUR SAFETY READ BEFORE OPERATING

⚠WARNING

Do not use this furnace if any part has been underwater. A flood-damaged furnace is extremely dangerous. Attempts to use the furnace can result in fire or explosion. Immediately call a qualified service technician to inspect the furnace and to replace all gas controls, control system parts, and electrical parts that have been wet or to replace the furnace, if deemed necessary.

⚠WARNING

Danger of explosion. Can cause injury or product or property damage. Should the gas supply fail to shut off or if overheating occurs, shut off the gas valve to the furnace before shutting off the electrical supply.

⚠CAUTION

Before attempting to perform any service or maintenance, turn the electrical power to unit OFF at disconnect switch.

Priming Condensate Trap

The condensate trap should be primed with water prior to start-up to ensure proper condensate drainage. Either pour 10 fl. oz. (300 ml) of water into the trap, or follow these steps to prime the trap:

1 - Follow the lighting instructions to place the unit into operation.

2 - Set the thermostat to initiate a heating demand.

3 - Allow the burners to fire for approximately 3 minutes.

4 - Adjust the thermostat to deactivate the heating demand.

5 - Wait for the combustion air inducer to stop. Set the thermostat to initiate a heating demand and again allow the burners to fire for approximately 3 minutes.

6 - Adjust the thermostat to deactivate the heating demand and again wait for the combustion air inducer to stop. At this point, the trap should be primed with sufficient water to ensure proper condensate drain operation.

BEFORE BEFORE PLACING THE UNIT INTO OPERATION, the unit, smell all around the furnace area for gas. Be sure to smell next to the floor because some gas is heavier than air and will settle on the floor.

The gas valve on the G71MPP is equipped with a gas control switch. Use only your hand to move the control switch. Never use tools. If the switch will not move by hand, do not try to repair it. Call a licensed professional service technician (or equivalent). Force or attempted repair may result in a fire or explosion.

Placing the furnace into operation:

G71MPP units are equipped with an automatic ignition system. Do not attempt to manually light burners on this furnace. Each time the thermostat calls for heat, the burners will automatically light. The ignitor does not get hot when there is no call for heat on units with this ignition system.

⚠WARNING

If you do not follow these instructions exactly, a fire or explosion may result causing property damage, personal injury or death.

Gas Valve Operation (Figure 35)

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

2 - Set the thermostat to the lowest setting.

3 - Turn off all electrical power to the unit.

4 - This furnace is equipped with an ignition device which automatically lights the burners. Do **not** try to light the burners by hand.

5 - Remove the upper access panel.

6 - Move the gas valve switch to the **OFF** position. See figure 35.

7 - Wait five minutes to clear out any gas. If you then smell gas, STOP! Immediately call your gas supplier from a neighbor's phone. Follow the gas supplier's instructions. If you do not smell gas go to next step.

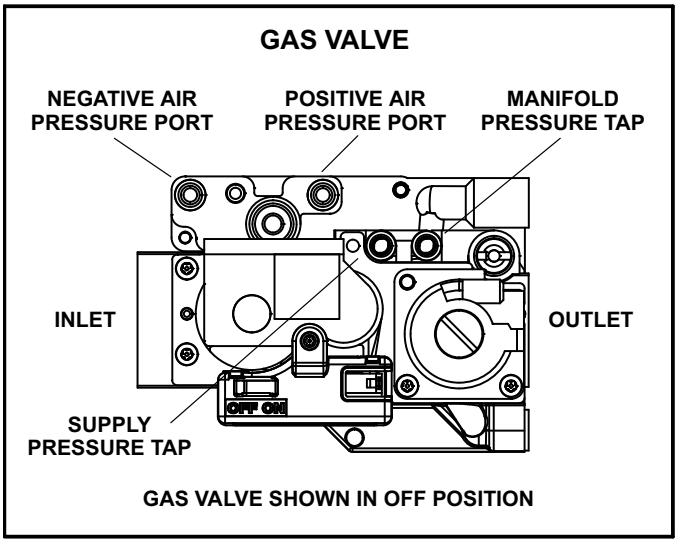


FIGURE 35

8 - Move gas valve switch to the **ON** position. See figure 35. Do not force.

9 - Replace the upper access panel.

10- Turn on all electrical power to to the unit.

11- Set the thermostat to desired setting.

***NOTE** - When unit is initially started, steps 1 through 11 may need to be repeated to purge air from gas line.*

12- If the appliance will not operate, follow the instructions "Turning Off Gas to Unit" and call your service technician or gas supplier.

Turning Off Gas to Unit

1 - Set the thermostat to the lowest setting.

2 - Turn off all electrical power to the unit if service is to be performed.

3 - Remove the upper access panel.

4 - Move the gas valve switch to the **OFF** position.

5 - Replace the upper access panel.

C-Safety or Emergency Shutdown

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

D-Extended Period Shutdown

Turn off thermostat or set to "UNOCCUPIED" mode. Close all gas valves (both internal and external to unit) to guarantee no gas leak into combustion chamber. Turn off power to unit. All access panels and covers must be in place and secured.

IV-HEATING SYSTEM SERVICE CHECKS

A-C.S.A. Certification

All units are C.S.A. (formally A.G.A. and C.G.A. combined) design certified without modifications. Refer to the G71MPP Installation Instruction.

B-Gas Piping

⚠ CAUTION

If a flexible gas connector is required or allowed by the authority that has jurisdiction, black iron pipe shall be installed at the gas valve and extend outside the furnace cabinet.

⚠ WARNING

Do not exceed 600 in-lbs (50 ft-lbs) torque when attaching the gas piping to the gas valve.

Gas supply piping should not allow more than 0.5"W.C. 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 36.

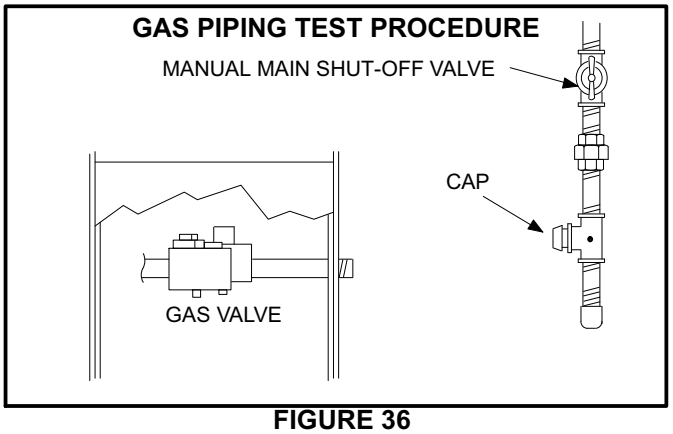


FIGURE 36

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 31B2001. See Corp. 8411-L10, for further details.

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 supply pressure tap on the gas valve. See figure 35. 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. See table 38 for operating pressure at unit gas connection (line).

On multiple unit installations, each unit should be checked separately, with and without units operating. Supply pressure must fall within range listed in table 38.

TABLE 38

All G71MPP Units	Natural	LP
Line Pressure WC"	4.5 - 10.5	11.0 - 13.0

E-Check Manifold Pressure

To correctly measure manifold prressure, the differential pressure between the positive gas manifold and the negative burner box must be considered. Use pressure test adapter kit (available as Lennox part 10L34) to assist in measurement.

1 - Connect test gauge "+" connection to manifold pres sure tap on the gas vavle.

2 - Tee into the gas valve regulator vent hose and connect test gauge "-" connection.

3 - Start unit on low heat (40%) rate) and allow 5 minutes for unit to reach steady state.

4 - While waiting for the unit to stabilize, notice the flame. Flame should be stable and should not lift from burnere. Natural gas should burn blue.

5 - After allowing unit to stablize for 5 minutes, record manifold pressure and compare to value given in table 42.

6 - Repeat stpes 3, 4 and 5 on high fire.

⚠CAUTION

Do not attempt to make adjustments to the gas valve.

F- Proper Gas Flow (Approximate)

1 - Operate unit at least 15 minutes before checking gas flow. Determine the time in seconds for one revolutions of gas through the meter. A portable LP gas meter (17Y44) is available for LP applications.

2 - Compare the number of seconds and the gas meter size in table 39 to determine the gas flow rate. Multiply the gas flow rate by the heating value to determine the unit input rate. If manifold pressure is correct and the unit input rate is incorrect, check gas orifices for proper size and restriction.

3 - Remove temporary gas meter if installed.

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

TABLE 39

Gas Flow Rate (Ft.^{3}/Hr.)		
Seconds for 1 Revolution	Gas Meter Size	
	1/2 cu ft Dial	1 cu ft Dial
10	180	360
12	150	300
14	129	257
16	113	225
18	100	200
20	90	180
22	82	164
24	75	150
26	69	138
28	64	129
30	60	120
32	56	113
34	53	106
36	50	100
38	47	95
40	45	90
42	43	86
44	41	82
46	39	78
48	38	75
50	36	72
52	35	69
54	33	67
56	32	64
58	31	62
60	30	60

G- Proper Combustion

Furnace should operate minimum 15 minutes with correct manifold pressure and gas flow rate before checking combustion. Take combustion sample beyond the flue outlet and compare to the tables below. The maximum carbon monoxide reading should not exceed 100 ppm.

TABLE 40
High Fire

Unit	CO_2% For Nat	CO_2% For L.P.
G71MPP-36B-070	6.8 - 7.8	8.5 - 9.5
G71MPP-36C-090	7.2 - 8.2	8.5 - 9.5
G71MPP-60C-090	7.2 - 8.2	7.2 - 8.2
G71MPP-60C-110	7.6 - 8.6	7.6 - 8.6
G71MPP-60D-135	7.5 - 8.5	7.5 - 8.5

TABLE 41
Low Fire

Unit	CO_2% For Nat	CO_2% For L.P.
G71MPP-36B-070	5.0 - 6.0	5.8 - 6.8
G71MPP-36C-090	4.9 - 5.9	5.7 - 6.7
G71MPP-60C-090	4.9 - 5.9	5.7 - 6.7
G71MPP-60C-110	5.0 - 6.0	6.2 - 7.2
G71MPP-60D-135	5.0 - 6.0	5.7 - 6.7

H- High Altitude

NOTE - In Canada, certification for installations at elevations over 4500 feet (1372 m) is the jurisdiction of local authorities.

G71MPP units require no manifold pressure adjustments for operation at altitudes up to 10,000 feet (3048m) above sea level. Units installed at altitude of 7,501 to 10,000 feet (2287 to 3048m) require a pressure switch change per table 42. Table 42 lists conversion kit requirements, pressure switch requirements and manifold pressures at all altitudes.

NOTE - The values given in table are measurements only. The gas valve should not be adjusted.

The combustion air pressure switch is factory-set and requires no adjustment.

NOTE - A natural to L.P. propane gas changeover kit is necessary to convert this unit. Refer to the changeover kit installation instruction for the conversion procedure.

TABLE 42
Conversion Kit Requirements and Manifold Test Pressures

Model Input Size	LP/Propane Kit	High Altitude Pressure Switch Kit		Manifold Pressure at All Altitudes (in. w.g.)			
	0 - 10,000 (0 - 3048 m)	0 - 7,500 (0 - 2286 m)	7,501 - 10,000 (2287 - 3048m)	Low Fire (40% rate)		High Fire (100% rate)	
				Natural Gas	LP/Propane	Natural Gas	LP/Propane
-070	33W41	Not required	33W27	0.7	2.0	3.5	10.0
-090			40W05				
-110			40W06				
-135			40W07				

NOTE - Pressure switch is factory set. No adjustment necessary. All models use the factory installed pressure switch from 0-7,500 feet (0- 2286m).

NOTE - See previous page for manifold pressure measurement procedure.

V-TYPICAL OPERATING CHARACTERISTICS

A-Blower Operation and Adjustment

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 continuously. With fan switch in AUTO position, blower cycles with demand or runs continuously while heating or cooling circuit cycles.

3 - Depending on the type of indoor thermostat, blower and entire unit will be off when the system switch is in OFF position.

B-Temperature Rise

Temperature rise for G71MPP units depends on unit input, blower speed, blower horsepower and static pressure as marked on the unit rating plate. The blower speed must be set for unit operation within the range of "TEMP. RISE °F" listed on the unit rating plate.

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 where it will not pick up radiant heat from the heat exchanger.

2 - Set thermostat for heat call. Unit must operate on second-stage heat. *If using a single-stage thermostat furnace must fire at least 10 minutes before switching to second-stage heat.*

3 - After plenum thermometers have reached their highest and steadiest readings, subtract the two readings. The difference should be in the range listed on the unit rating plate. If the temperature is too low, decrease blower speed. If temperature is too high, first check the firing rate. Provided the firing rate is acceptable, increase blower speed to reduce temperature.

C-External Static Pressure

1 - Tap locations shown in figure 37.

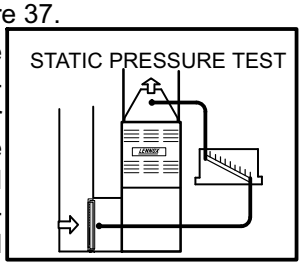


FIGURE 37

2 - Punch a 1/4" diameter hole in supply 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.

3 - With only the blower motor running and the 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 0.8" W.C.

5 - Seal around the hole when the check is complete.

VI-MAINTENANCE

⚠WARNING

ELECTRICAL SHOCK, FIRE, OR EXPLOSION HAZARD.

Failure to follow safety warnings exactly could result in dangerous operation, serious injury, death or property damage.
Improper servicing could result in dangerous operation, serious injury, death, or property damage.
Before servicing, disconnect all electrical power to furnace.
When servicing controls, label all wires prior to disconnecting. Take care to reconnect wires correctly.
Verify proper operation after servicing.

At the beginning of each heating season, system should be checked as follows by a qualified service technician:

Blower

Check the blower wheel for debris and clean if necessary. The blower motors are prelubricated for extended bearing life. No further lubrication is needed.

⚠WARNING

The blower access panel must be securely in place when the blower and burners are operating. Gas fumes, which could contain carbon monoxide, can be drawn into living space resulting in personal injury or death.

Filters

All G71MPP filters are installed external to the unit. Filters should be inspected monthly. Clean or replace the filters when necessary to ensure proper furnace operation. Table 43 lists recommended filter sizes.

TABLE 43

Furnace Cabinet Size	Filter Size	
	Side Return	Bottom Return
B Cabinet (17-1/2")	16 X 25 X 1 (1)	16 X 25 X 1 (1)
C Cabinet (21")	16 X 25 X 1 (1)	20 X 25 X 1 (1)
D Cabinet (24-1/2")	16 X 25 X 1 (2)	24 X 25 X 1 (1)

Exhaust and air intake pipes

Check the exhaust and air intake pipes and all connections for tightness and to make sure there is no blockage.

Electrical

1 - Check all wiring for loose connections.
2 - Check for the correct voltage at the furnace (furnace operating).
3 - Check amp-draw on the blower motor.
Motor Nameplate_____Actual_____

Winterizing and Condensate Trap Care

1 - Turn off power to the unit.
2 - Have a shallow pan ready to empty condensate water.
3 - Remove the drain plug from the condensate trap and empty water. Inspect the trap then reinstall the drain plug and refill trap with water.

Cleaning Heat Exchanger

If cleaning the heat exchanger becomes necessary, follow the below procedures and refer to figure 1 when disassembling unit. Use papers or protective covering in front of furnace while removing heat exchanger assembly.

1 - Turn off electrical and gas supplies to the furnace.
2 - Remove the upper and lower furnace access panels.
3 - Disconnect the 2-pin plug from the gas valve.
4 - Remove gas supply line connected to gas valve. Remove gas valve/manifold assembly.
5 - Remove sensor wire from sensor. Disconnect 2-pin plug from the ignitor.
6 - Disconnect wires from flame roll-out switches.
7 - Remove burner box cover and remove four burner box screws at the vestibule panel and remove burner box. Set burner box assembly aside.
NOTE - G71MPP-135 units are secured to the vestibule panel by two additional screws. These screws must be removed for servicing; however it is not necessary to replace the screws.
NOTE - If necessary, clean burners at this time. Follow procedures outlined in Burner Cleaning section.
8 - Loosen three clamps and remove flexible exhaust tee.
9 - Remove 3/8 inch rubber cap from condensate drain plug and drain. Replace cap after draining.
10 - Disconnect condensate drain line from the condensate trap. Remove condensate trap (it may be necessary to cut drain pipe). Remove screws that secure condensate collars to either side of the furnace and remove collars. Remove drain tubes from cold end header collector box.
11 - Disconnect condensate drain tubing from flue collar. Remove screws that secure both flue collars into place. Remove flue collars. It may be necessary to cut the exiting exhaust pipe for removal of the fittings.
12 - Mark and disconnect all combustion air pressure tubing from cold end header collector box.
13 - Mark and remove wires from pressure switches. Remove pressure switches. Keep tubing attached to pressure switches.
14 - Disconnect the 4-pin plug from the combustion air inducer. Disconnect the two wires to the backup secondary limit, if applicable. Remove four screws which secure combustion air inducer to collector box. Remove combustion air inducer assembly. Remove ground wire from vest panel.
15 - Remove electrical junction box from the side of the furnace.
16 - Mark and disconnect any remaining wiring to heating compartment components. Disengage strain relief bushing and pull wiring and bushing through the hole in the blower deck.
17 - Remove the primary limit from the vestibule panel.

18 - Remove two screws from the front cabinet flange at the blower deck. Spread cabinet sides slightly to allow clearance for removal of heat exchanger.

19 - Remove screws along vestibule sides and bottom which secure vestibule panel and heat exchanger assembly to cabinet. Remove two screws from blower rail which secure bottom heat exchanger flange. Remove heat exchanger from furnace cabinet.

20 - Back wash heat exchanger with soapy water solution or steam. **If steam is used it must be below 275°F (135°C) .**

21 - Thoroughly rinse and drain the heat exchanger. Soap solutions can be corrosive. Take care to rinse entire assembly.

22 - Reinstall heat exchanger into cabinet making sure that the clamshells of the heat exchanger assembly are resting on the support located at the rear of the cabinet. Remove the indoor blower to view this area through the blower opening.

23 - Re-secure the supporting screws along the vestibule sides and bottom to the cabinet.

24 - Reinstall cabinet screws on front flange at blower deck.

25 - Reinstall the primary limit on the vestibule panel.

26 - Route heating component wiring through hole in blower deck and reinsert strain relief bushing.

27 - Reinstall electrical junction box.

28 - Reinstall the combustion air inducer. Reconnect the 4-pin plug to the wire harness. Reconnect the two wires to the backup secondary limit, if applicable.

29 - Reinstall pressure switches and reconnect pressure switch wiring.

30 - Carefully connect combustion air pressure switch hosing from pressure switches to proper stubs on cold end header collector box.

31 - Reinstall condensate collars on each side of the furnace. Reconnect drain tubing to collector box.

32 - Reinstall condensate trap on same side as exhaust pipe. Reconnect condensate drain line to the condensate trap.

33 - Use securing screws to reinstall flue collars to either side of the furnace. Reconnect exhaust piping and exhaust drain tubing.

34 - Replace flexible exhaust tee on combustion air inducer and flue collars. Secure using three existing hose clamps.

35 - Reinstall burner box assembly in vestibule area.

36 - Reconnect flame roll-out switch wires.

37 - Reconnect sensor wire and reconnect 2-pin plug from ignitor.

38 - Secure burner box assembly to vestibule panel using four existing screws. **Make sure burners line up in center of burner ports.**

39 - Reinstall gas valve manifold assembly. Reconnect gas supply line to gas valve.

40 - Reinstall burner box cover.

41 - Reconnect 2-pin plug to gas valve.

42 - Replace the blower compartment access panel.

43 - Refer to instruction on verifying gas and electrical connections when re-establishing supplies.

44 - Follow lighting instructions to light and operate furnace for 5 minutes to ensure that heat exchanger is clean and dry and that furnace is operating properly.

45 - Replace heating compartment access panel.

Cleaning the Burner Assembly

1 - Turn off electrical and gas power supplies to furnace. Remove upper and lower furnace access panels.

2 - Disconnect the 2-pin plug from the gas valve.

3 - Disconnect the gas supply line from the gas valve. Remove gas valve/manifold assembly.

4 - Mark and disconnect sensor wire from the sensor. Disconnect 2-pin plug from the ignitor at the burner box.

5 - Remove burner box cover and remove four screws which secure burner box assembly to vest panel. Remove burner box from the unit.
NOTE - G71MPP-135 units are secured to the vestibule panel by two additional screws. These screws must be removed for servicing; however it is not necessary to replace the screws.

6 - Use the soft brush attachment on a vacuum cleaner to gently clean the face of the burners. Visually inspect the inside of the burners and crossovers for any blockage caused by foreign matter. Remove any blockage.

7 - Reconnect the sensor wire and reconnect the 2-pin plug to the ignitor wiring harness.

8 - Reinstall the burner box assembly using the existing four screws. Make sure that the burners line up in the center of the burner ports.

9 - Reinstall the gas valve manifold assembly. Reconnect the gas supply line to the gas valve. Reinstall the burner box cover.

10 - Reconnect 2-pin plug to gas valve.

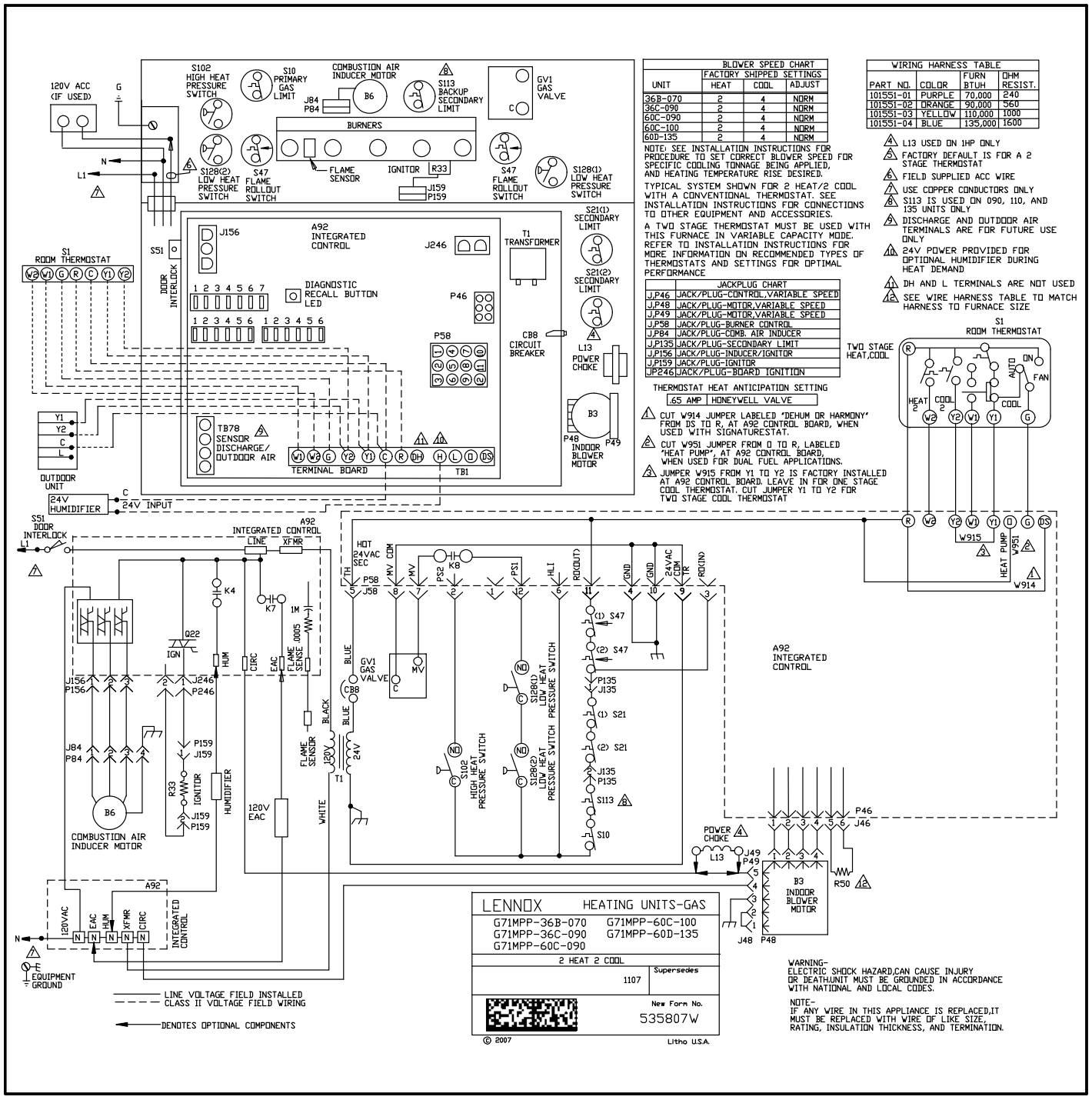
11 - Replace the blower compartment access panel.

12 - Refer to instruction on verifying gas and electrical connections when re-establishing supplies.

13 - Follow lighting instructions to light and operate furnace for 5 minutes to ensure that heat exchanger is clean and dry and that furnace is operating properly.

14 - Replace heating compartment access panel.

VII- Wiring and Sequence of Operation



NOTE - The thermostat selection DIP switch on the control board is factory-set in the "TWO-STAGE" position.

Applications Using a Two-Stage Thermostat

A - Heating Sequence -- Control Board Thermostat Selection DIP switch in "Variable Capacity" Position

1. On a call for heat, thermostat first-stage contacts close sending a signal to the integrated control. The integrated control runs a self-diagnostic program and checks high temperature limit switches for normally closed contacts and pressure switches for normally open contacts.The combustion air inducer is energized at ignition speed, which is approximately the same as the inducer speed at 70 percent firing rate.
2. Once the control receives a signal that the low-fire pressure switch has closed, the combustion air inducer begins a 15-second pre-purge in ignition speed.
3. After the pre-purge is complete, a 20-second initial ignitor warm-up period begins. The combustion air inducer continues to operate at the ignition speed.

4 - After the 20-second warm-up period has ended, the gas valve is energized and ignition occurs. At the same time, the control module begins an indoor blower 45-second ON-delay. When the delay ends, the indoor blower motor is energized at a speed that matches the firing rate. After the 10-second ignition stabilization delay expires, the inducer speed is adjusted to the appropri-

ate target rate. If the furnace is operating in the initial heating cycle after power-up, the initial firing rate will be approximately 40 percent. The firing rate on subsequent cycles will be automatically adjusted by the integrated control based on thermostat cycles. The firing rate will vary and will range from 40 percent to 90 percent. The furnace will continue this operation as long as the thermostat has a first-stage heating demand.

5 - If second-stage heat is required, the thermostat second-stage heat contacts close and send a signal to the integrated control. The integrated control either increases the firing rate to 70 percent (if the current rate is at or below 60 percent) or increases the firing rate by 10 percent (if the current rate is above 60 percent). If the call for heat continues 5 minutes beyond this initial upstage, the rate will be increased by 10 percent every 5 minutes until the call for heat is satisfied or the furnace reaches 100 percent rate. As the firing rate increases, the indoor blower motor is adjusted to a speed which is appropriate for the target rate.

6 - If second-stage heat demand is satisfied, but first stage is still present, the furnace will continue to operate at the present firing rate until the heat cycle ends.

7 - When the demand for first- and second-stage heat is satisfied, the gas valve is de-energized and the field-selected indoor blower off delay begins. The combustion air inducer begins a 20-second post-purge period.

8 - When the combustion air post-purge period is complete, the inducer is de-energized. The indoor blower is de-energized at the end of the off delay.

Applications Using A Single-Stage Thermostat

B - Heating Sequence -- Control Board Thermostat Selection DIP switch in "Single-Stage" Position

1. On a call for heat, thermostat first-stage contacts close sending a signal to the integrated control. The integrated control runs a self-diagnostic program and checks high temperature limit switches for normally closed contacts and pressure switches for normally open contacts.The combustion air inducer is energized at the ignition speed, which is approximately the same as the inducer speed at 70 percent firing rate.
2. Once the control receives a signal that the low-fire pressure switch has closed, the combustion air inducer begins a 15-second pre-purge at the ignition speed.
3. After the pre-purge is complete, a 20-second initial ignitor warm-up period begins. The combustion air inducer continues to operate at the ignition speed.

4 - After the 20-second warm-up period has ended, the gas valve is energized and ignition occurs, which initiates a 10-second ignition stabilization delay. At the same time, the control module sends a signal to begin an indoor blower 45-second ON-delay. When the delay ends, the indoor blower motor is energized at a speed which is appropriate for the firing rate. After the 10-second ignition stabilization delay expires, the inducer speed is adjusted to 40 percent speed.The integrated control also initiates a second-stage on delay (factory-set at 7 minutes; adjustable to 12 minutes).

5 - If the heating demand continues beyond the second-stage on delay, the integrated control energizes the combustion air inducer at 70 percent speed. The indoor blower motor is adjusted to a speed which matches the target rate. A fixed, 10-minute third-stage on delay is initiated.

6 - If the heating demand continues beyond the third-stage on delay, the integrated control energizes the inducer at high speed. The indoor blower motor is adjusted to a speed which is appropriate for the target rate.

7 -When the thermostat heating demand is satisfied, the gas valve is de-energized and the combustion air inducer begins a 20-second post-purge. The field-selected indoor blower off delay begins.

8 - When the combustion air post-purge period is complete, the inducer is de-energized. The indoor blower is de-energized at the end of the off delay.

Applications Using a Two-Stage Thermostat

C - Heating Sequence -- Control Board Thermostat Selection DIP switch in "Two-Stage" Position (Factory Setting)

1. On a call for heat, thermostat first-stage contacts close sending a signal to the integrated control. The integrated control runs a self-diagnostic program and checks high temperature limit switches for normally closed contacts and pressure switches for normally open contacts.The combustion air inducer is energized at ignition speed, which is approximately the same as the inducer speed at 70 percent firing rate.
2. Once the control receives a signal that the low-fire pressure switch has closed, the combustion air inducer begins a 15-second pre-purge at the ignition speed.
3. After the pre-purge is complete, a 20-second initial ignitor warm-up period begins. The combustion air inducer continues to operate at the ignition speed.

4 - After the 20-second warm-up period has ended, the gas valve is energized and ignition occurs. At the same time, the control module sends a signal to begin an indoor blower 45-second ON-delay. When the delay ends, the indoor blower motor is energized at a speed that matches the firing rate. After the 10-second ignition stabilization delay expires, the inducer speed is adjusted to the appropriate target rate. The inducer will remain at the 70 percent speed as long as the thermostat has a first-stage heating demand.

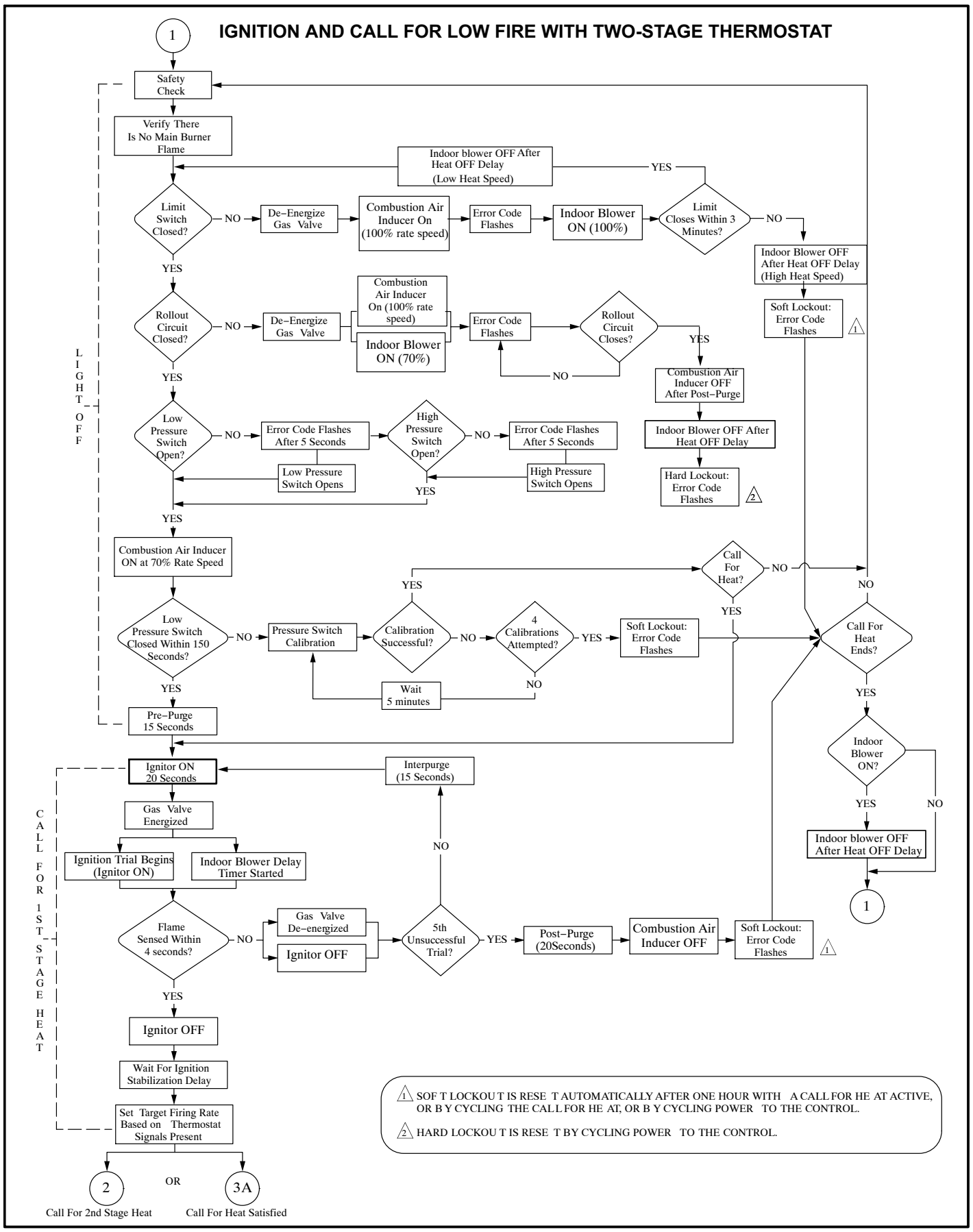
5 - If second-stage heat is required, the thermostat second-stage heat contacts close and send a signal to the integrated control. The integrated control initiates a 30-second second-stage recognition delay.

6 - At the end of the recognition delay and on all subsequent calls for heat in the same heating cycle, the integrated control energizes the combustion air inducer at high speed. The control also checks the high-fire pressure switch to make sure it is closed. As the inducer speed is increased to high, the indoor blower motor is adjusted to a speed which is appropriate for the target rate.

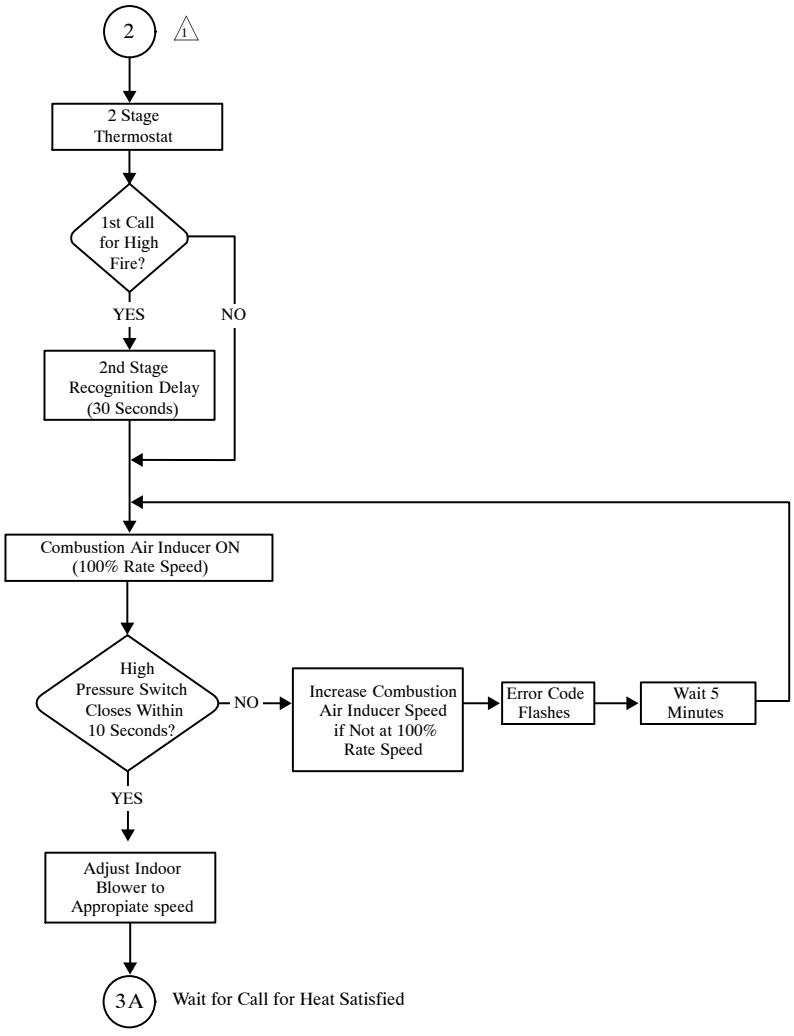
7 - When the demand for high-fire (second stage) heat is satisfied, the gas valve is de-energized and the field-selected indoor blower off delay begins. The combustion air inducer begins a 20-second post-purge period.

8 - When the combustion air post-purge period is complete, the inducer is de-energized. The indoor blower is de-energized at the end of the off delay.

A - Sequence of Operation and Troubleshooting Flow Chart



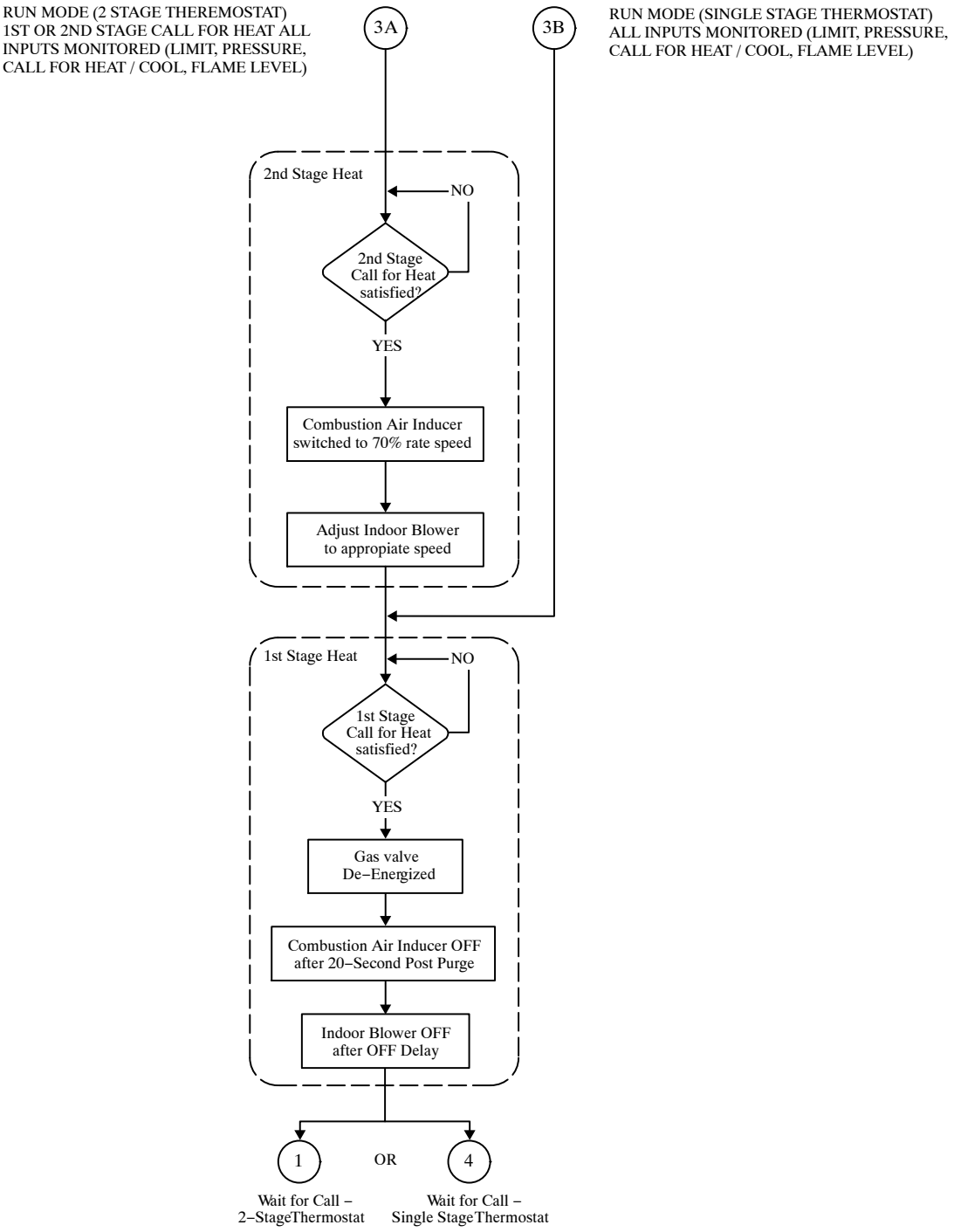
CALL FOR HIGH FIRE WITH TWO-STAGE THERMOSTAT



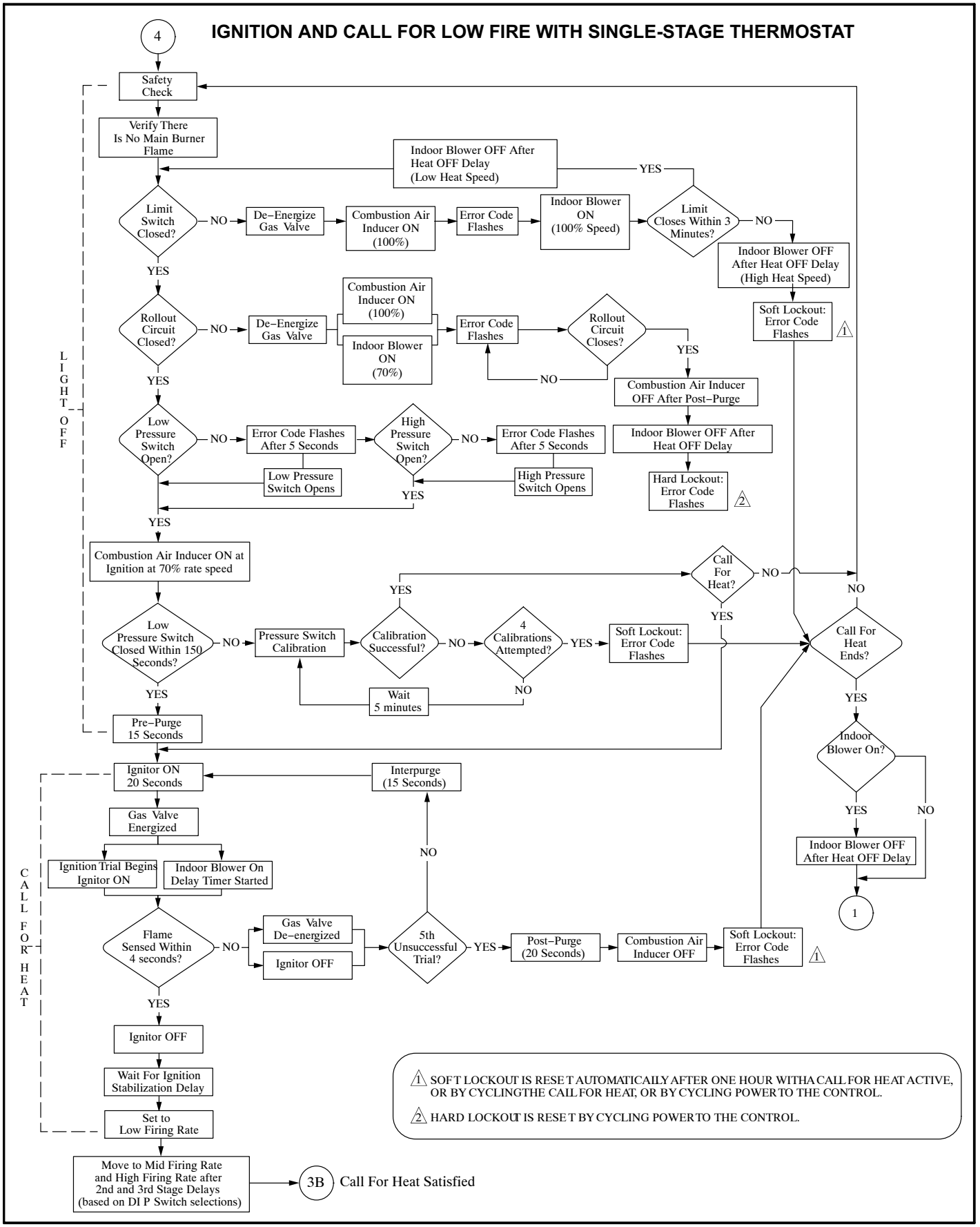
1 System will always light at 70% even if 2nd stage call for heat is in place

2 If the high pressure switch does not close within 5 attempts, the system will operate at low fire for the remainder of the call for heat at request

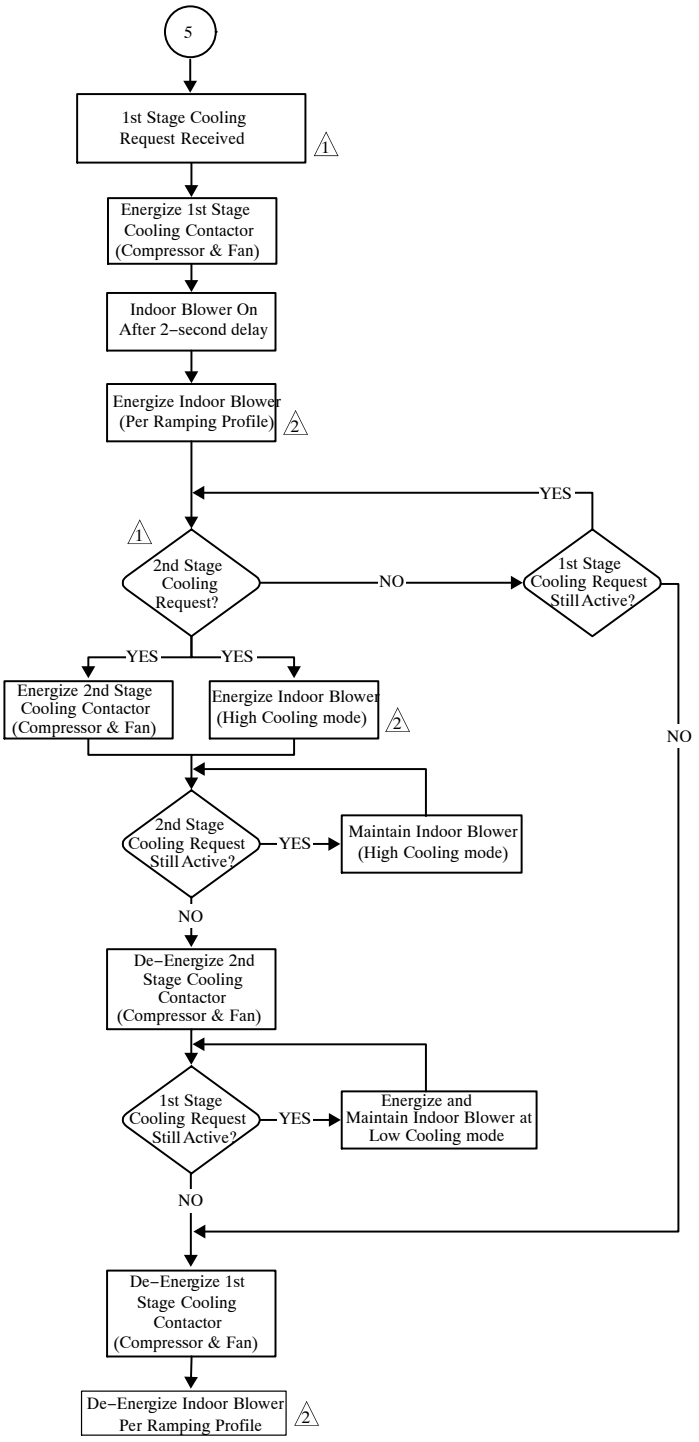
CALL FOR HEAT SATISFIED



IGNITION AND CALL FOR LOW FIRE WITH SINGLE-STAGE THERMOSTAT



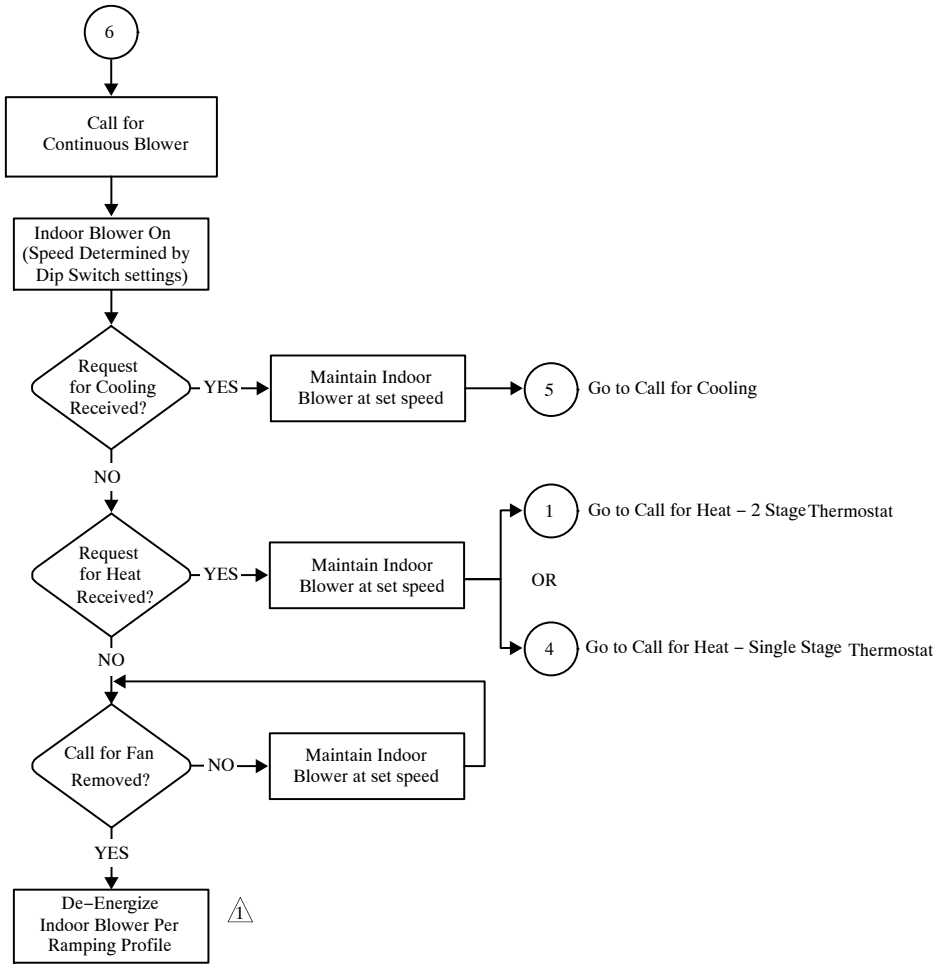
CALL FOR COOLING



1 2nd stage cooling operation requires a 2−stage thermostat, a 2−stage cooling system and jumpers W915 must be be cut. The control will not respond to a 2nd stage cooling request unless a 1st stage cooling request is active

2 Indoor blower cooling mode and high cooling mode have a specific ON, OFF and speed ramping profiles. The specific profile is selected using the DIP switches on the control.

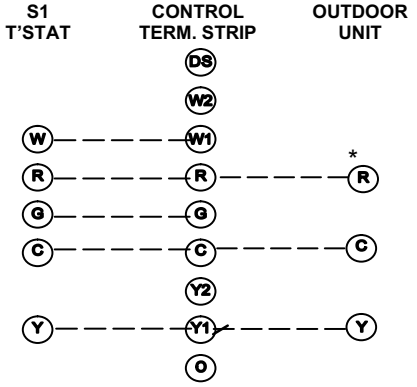
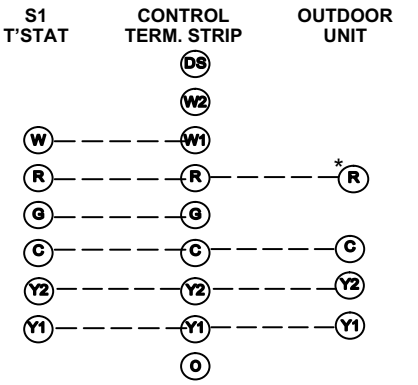
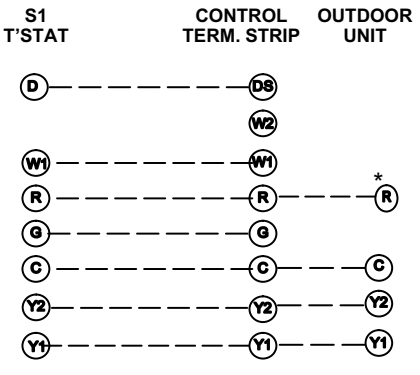
CONTINUOUS LOW SPEED INDOOR BLOWER SEQUENCE OF OPERATION



1 Indoor blower low cooling mode and high cooling mode, have specific ON – OFF and speed ramping profiles. The specific profile is selected using the dip switches on the control.

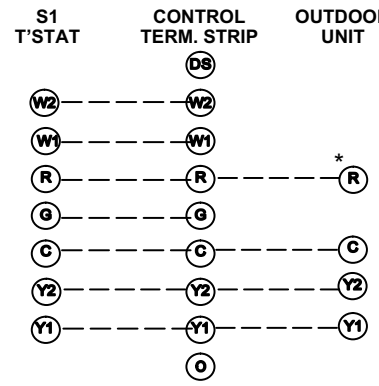
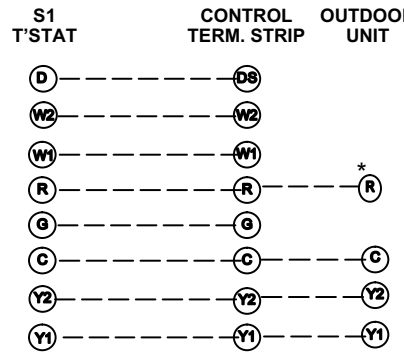
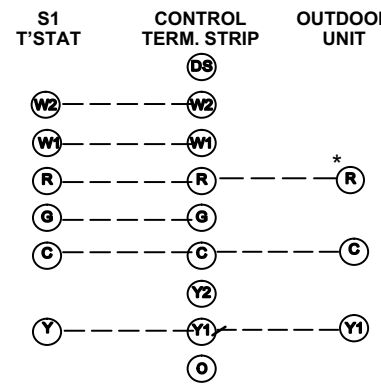
VIII- Field Wiring

TABLE 44
Field Wiring Applications

Thermostat	DIP Switch Settings and On-Board Links (figure 4)				Wiring Connections
	DIP Switch 1	W915 (Y1 to Y2) Two-Stage Cooling	W914 (DS to R) Dehumidification or Harmony III™	W951 (O to R) Heat Pumps	
1Heat / 1 Cool *NOTE - Use DIP switch 3 to set second-stage heat ON delay. OFF-7 minutes. ON-12 minutes.*	ON	Intact	Intact	Intact	
1 Heat / 2 Cool *NOTE - Use DIP switch 3 to set second-stage heat ON delay. OFF-7 minutes. ON-12 minutes.*	ON	Cut	Intact	Intact	
1 Heat / 2 Cool with t'stat with dehumidification mode *NOTE - Use DIP switch 3 to set second-stage heat ON delay. OFF-7 minutes. ON-12 minutes.*	ON	Cut	Cut	Intact	

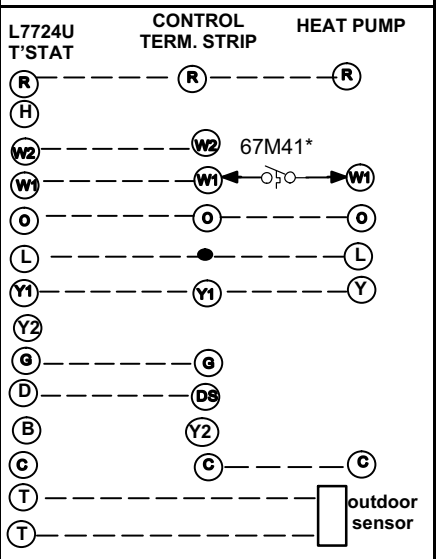
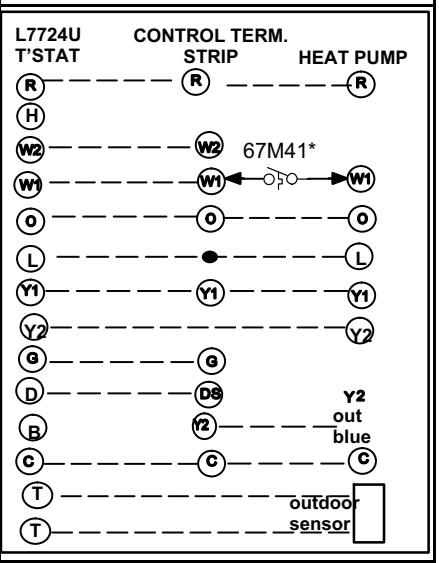
** "R" required on some units.*

TABLE 44
Field Wiring Applications

Thermostat	DIP Switch Settings and On-Board Links (figure 4)				Wiring Connections
	DIP Switch 1	W915 (Y1 to Y2) Two-Stage Cooling	W914 (DS to R) Dehumidification or Harmony III™	W951 (O to R) Heat Pumps	
2 Heat / 2 Cool	OFF	Cut	Intact	Intact	
2 Heat / 2 Cool with t'stat with dehumidification mode	OFF	Cut	Cut	Intact	
2 Heat / 1 Cool	OFF	Intact	Intact	Intact	

* *"R" required on some units.*

TABLE 44
Field Wiring Applications (Continued)

Thermostat	DIP Switch Settings and On-Board Link (figure 4)				Wiring Connections
	DIP Switch	W915 (Y1 to Y2) Two-Stage Cooling	W914 (DS to R) Dehumidification or Harmony III™	W951 (O to R) Heat Pumps	
Dual Fuel Single Stage Heat Pump ComfortSense 7000 L7724U thermostat w/ dual fuel capabilities Capable of 2 stage gas heat control	DIP Switch 1 OFF	Intact	Intact	Cut	
Dual Fuel Two Stage Heat Pump ComfortSense 7000 L7724U thermostat w/ dual fuel capabilities Capable of 2 stage gas heat control	DIP Switch 1 OFF	Cut	Intact	Cut	

** Connect W1 to W1 ONLY if using defrost tempering kit 67M41*