SLP98UHV SERIES UNITS

SLP98UHV series units are high-efficiency upflow, 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. SLP98UHV 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. SLP98UHV models include a SureLight® variable capacity integrated control that can be used with Lennox icomfort Touch™ thermostat as part of a communicating comfort system. All SLP98UHV 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 recommendations 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.

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⚠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.	SLP98UH070V36B	SLP98UH090V36C	SLP98UH090V48C
Gas Heating Performance			[1] AFUE	97.0%	98.0%	97.5%
	Maximum		Input - Btuh	66,000	88,000	88,000
			Output - Btuh	64,000	85,000	85,000
			Temperature rise range - °F	50 - 80	60 - 90	50 - 80
			Gas Manifold Pressure (in. w.g.) Nat. Gas / LPG/Propane	3.5 / 10.0	3.5 / 10.0	3.5 / 10.0
	Minimum		Input - Btuh	23,000	31,000	31,000
			Output - Btuh	22,000	30,000	30,000
			Temperature rise range - °F	35 - 65	35 - 65	35 - 65
			Gas Manifold Pressure (in. w.g.) Nat. Gas / LPG/Propane	0.5 / 1.5	0.5 / 1.5	0.5 / 1.5
			High static - in. w.g.	0.8	0.8	0.8
Connections in.			Intake / Exhaust Pipe (PVC)	2 / 2	2 / 2	2 / 2
			Condensate Drain Trap (PVC pipe) - i.d.	1/2	1/2	1/2
			with field supplied (PVC coupling) - o.d.	1/2 slip x 1/2 NPT	1/2 slip x 1/2 NPT	1/2 slip x 1/2 NPT
			hose with hose clamp - i.d. x o.d.	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
Indoor Blower			Wheel nominal diameter x width - in.	10 x 9	10 x 9	11 x 11
			Motor output - hp	1/2	1/2	3/4
			Tons of add-on cooling	2 - 3	2 - 3.5	2.5 - 4
			Air Volume Range - cfm	339 - 1365	520 - 1360	528 - 1770
Electrical Data			Voltage (Maximum Amps)	120 volts - 60 hertz - 1 phase		
			Blower motor full load amps	7.7	7.7	10.1
			Maximum overcurrent protection	15	15	15
Shipping Data			lbs. - 1 package	138	155	165

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.

SPECIFICATIONS

			Model No.	SLP98UH090V60C	SLP98UH110V60C	SLP98UH135V60D
Gas Heating Performance			[1] AFUE	98.2%	97.5%	97.5%
	Maximum		Input - Btuh	88,000	110,000	132,000
			Output - Btuh	85,000	106,000	126,000
			Temperature rise range - °F	50 - 80	50 - 80	55 - 85
			Gas Manifold Pressure (in. w.g.) Nat. Gas / LPG/Propane	3.5 / 10.0	3.5 / 10.0	3.5 / 10.0
	Minimum		Input - Btuh	31,000	39,000	46,000
			Output - Btuh	30,000	38,000	45,000
			Temperature rise range - °F	35 - 65	35 - 65	35 - 65
			Gas Manifold Pressure (in. w.g.) Nat. Gas / LPG/Propane	0.5 / 1.5	0.5 / 1.5	0.5 / 1.5
			High static - in. w.g.	0.8	0.8	0.8
Connections in.			Intake / Exhaust Pipe (PVC)	2 / 2	2 / 2	2 / 2
			Condensate Drain Trap (PVC pipe) - i.d.	1/2	1/2	1/2
			with field supplied (PVC coupling) - o.d.	1/2 slip x 1/2 NPT	1/2 slip x 1/2 NPT	1/2 slip x 1/2 NPT
			hose with hose clamp - i.d. x o.d.	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
Indoor Blower			Wheel nominal diameter x width - in.	11 x 11	11 x 11	11 x 11
			Motor output - hp	1	1	1
			Tons of add-on cooling	3 - 5	3 - 5	3.5 - 5
			Air Volume Range - cfm	375 - 2195	554 - 2125	634 - 2190
Electrical Data			Voltage (Maximum Amps)	120 volts - 60 hertz - 1 phase		
			Blower motor full load amps	12.8	12.8	12.8
			Maximum overcurrent protection	20	20	20
Shipping Data			lbs. - 1 package	165	175	190

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 - MUST BE ORDERED EXTRA

			"B" Width Models	"C" Width Models	"D" Width Models
CABINET ACCESSORIES					
Horizontal Suspension Kit - Horizontal only			**51W10**	**51W10**	**51W10**
Return Air Base - Upflow only			**50W98**	**50W99**	**51W00**
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**
Crawl Space Vent Drain Kit			**51W18**	**51W18**	**51W18**
CONTROLS					
icomfort Touch™ Communicating Thermostat			**49W95**	**49W95**	**49W95**
[1] **Remote Outdoor Temperature Sensor** (for dual fuel and Humiditrol®)			**X2658**	**X2658**	**X2658**
[2] **Discharge Temperature Sensor**			**88K38**	**88K38**	**88K38**
ComfortSense® 7000 Thermostat			**Y2081**	**Y2081**	**Y2081**
[3] **Remote Outdoor Temperature Sensor** (for dual fuel and Humiditrol)			**X2658**	**X2658**	**X2658**
FILTER KITS					
[4] **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
NIGHT SERVICE KITS					
Night Service Kit			**65W78**	**65W78**	**65W78**
Safety Night Service Kit			**51W05**	**51W05**	**51W05**
TERMINATION KITS					
Direct Vent Applications Only. See Installation Instructions for specific venting information.					
Termination Kits	Concentric	US - 2 in.	**71M80**	**69M29**	**- - -**
		3 in.	**- - -**	**60L46**	**60L46**
		Canada - 2 in.	**44W92**	**44W92**	**- - -**
		3 in.	**- - -**	**44W93**	**44W93**
	Flush-Mount	2, 2-1/2 or 3 in.	**51W11**	**51W11**	**51W11**
	Wall - Close Couple	US - 2 in.	**22G44**	**- - -**	**- - -**
		3 in.	**44J40**	**44J40**	**44J40**
	Wall - Close Couple WTK	Canada - 2 in.	**30G28**	**- - -**	**- - -**
		3 in.	**81J20**	**81J20**	**81J20**
	Roof	2 in.	**15F75**	**15F75**	**- - -**
	Wall Ring Kit	2 in.	**15F74**	**15F74**	**- - -**
Roof Termination Flashing Kit (2 flashings)		2 in.	**44J41**	**44J41**	**44J41**

[1] Remote Outdoor Sensor may be used with an icomfort™-enabled outdoor unit for a secondary (alternate) sensor reading. Sensor may also be used with a conventional outdoor unit.

[2] Optional for service diagnostics.

[3] Remote Outdoor Temperature Sensor for ComfortSense 7000 Thermostat must be connected directly to the thermostat, Do not connect it to the icomfort™ control board.

[4] Cleanable polyurethane frame type filter.

NOTE - Termination Kits **44W92**, **44W93**, **30G28**, **81J20** are certified to ULC S636 standard for use in Canada only.

GAS HEAT ACCESSORIES

Input	High Altitude Pressure Switch Kit	Natural Gas to LPG/Propane Kit	LPG/Propane to Natural Gas Kit
	7501 - 10,000 ft.	**0 - 10,000 ft.**	**0 - 10,000 ft.**
All models	**73W89**	**65W77**	**70W87**

BLOWER DATA

SLP98UH070V36B BLOWER PERFORMANCE (less filter)

BOTTOM RETURN AIR

HEATING BLOWER PERFORMANCE

Heating Adjust CFM Selections	Heating Input Range and Blower Volume - CFM							
	35%	40%	50%	60%	70%	80%	90%	100%
Increase (+15%) Heat CFM	489	538	636	735	833	931	1030	1128
Increase (+7.5%) Heat CFM	450	496	588	680	772	864	956	1048
Default Heat CFM	410	453	539	624	710	796	881	967
Decrease (-7.5%) Heat CFM	380	419	498	578	657	736	815	895
Decrease (-15%) Heat CFM	349	385	458	531	604	676	749	822

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	600	740	840	970	860	1060	1215	1365
Default Cool CFM	555	665	770	855	810	960	1130	1265
Decrease (-10%) Cool CFM	500	600	680	790	705	840	1005	1140

SLP98UH070V36B BLOWER PERFORMANCE (less filter)

RIGHT SIDE RETURN AIR

HEATING BLOWER PERFORMANCE

Heating Adjust CFM Selections	Heating Input Range and Blower Volume - CFM							
	35%	40%	50%	60%	70%	80%	90%	100%
Increase (+15%) Heat CFM	484	531	625	718	812	906	999	1093
Increase (+7.5%) Heat CFM	446	490	579	667	756	845	933	1022
Default Heat CFM	407	449	533	616	700	784	867	951
Decrease (-7.5%) Heat CFM	377	413	487	561	635	709	783	857
Decrease (-15%) Heat CFM	346	378	442	506	571	635	699	763

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	590	705	805	955	840	1050	1205	1355
Default Cool CFM	540	640	725	820	750	945	1130	1230
Decrease (-10%) Cool CFM	500	580	665	720	685	805	990	1110

The effect of static pressure is included in air volumes shown.
The following control configurations are available. See Installation Instructions for details and DIP switch settings.

Heat Modes Available (Heating Blower Performance Table):

Single stage thermostat:
- 35%, 70%, 100% input (three-stage) with time delays in-between

Two-stage thermostat:
- Variable Rate Capacity Mode - furnace automatically adjusts firing rate based on first- and second-stage cycle times
- W1 demand at 70% input, W2 demand at 100% input. No delay between stages

icomfort Touch™ Communicating Thermostat:
- Variable Rate Capacity Mode - furnace automatically adjusts firing rate based on first- and second-stage cycle times
- 35%, 60%, 80%, 100% (four-stage) with time delays in-between

Cool Mode Available (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 300 cfm.

Lennox Harmony III™ Zoning System Applications - Minimum blower speed is 250 cfm.

BLOWER DATA

SLP98UH070V36B BLOWER PERFORMANCE (less filter)

RIGHT SIDE RETURN AIR WITH OPTIONAL RETURN AIR BASE

HEATING BLOWER PERFORMANCE

Heating Adjust CFM Selections	Heating Input Range and Blower Volume - CFM							
	35%	40%	50%	60%	70%	80%	90%	100%
Increase (+15%) Heat CFM	471	519	614	709	805	900	996	1091
Increase (+7.5%) Heat CFM	435	480	570	660	751	841	931	1021
Default Heat CFM	399	441	526	611	696	781	866	951
Decrease (-7.5%) Heat CFM	369	408	486	564	643	721	799	877
Decrease (-15%) Heat CFM	339	375	446	517	589	660	732	803

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	595	715	815	950	855	1045	1205	1350
Default Cool CFM	520	655	755	840	790	945	1090	1255
Decrease (-10%) Cool CFM	490	595	670	745	720	845	985	1130

SLP98UH090V36C BLOWER PERFORMANCE (less filter)

BOTTOM RETURN AIR

HEATING BLOWER PERFORMANCE

Heating Adjust CFM Selections	Heating Input Range and Blower Volume - CFM							
	35%	40%	50%	60%	70%	80%	90%	100%
Increase (+15%) Heat CFM	687	734	827	921	1014	1108	1201	1295
Increase (+7.5%) Heat CFM	654	697	782	867	953	1038	1123	1209
Default Heat CFM	621	660	737	814	891	968	1045	1122
Decrease (-7.5%) Heat CFM	581	616	687	757	828	899	970	1041
Decrease (-15%) Heat CFM	540	572	637	701	766	830	895	959

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	625	710	830	950	875	1040	1210	1360
Default Cool CFM	565	670	760	860	800	945	1100	1240
Decrease (-10%) Cool CFM	520	610	685	785	720	840	970	1115

The effect of static pressure is included in air volumes shown.

The following control configurations are available. See Installation Instructions for details and DIP switch settings.

Heat Modes Available (Heating Blower Performance Table):

Single stage thermostat:
- 35%, 70%, 100% input (three-stage) with time delays in-between

Two-stage thermostat:
- Variable Rate Capacity Mode - furnace automatically adjusts firing rate based on first- and second-stage cycle times
- W1 demand at 70% input, W2 demand at 100% input. No delay between stages

icomfort Touch™ Communicating Thermostat:
- Variable Rate Capacity Mode - furnace automatically adjusts firing rate based on first- and second-stage cycle times
- 35%, 60%, 80%, 100% (four-stage) with time delays in-between

Cool Mode Available (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 300 cfm.

Lennox Harmony III™ Zoning System Applications - Minimum blower speed is 250 cfm.

BLOWER DATA

SLP98UH090V36C BLOWER PERFORMANCE (less filter)

RIGHT SIDE RETURN AIR

HEATING BLOWER PERFORMANCE

Heating Adjust CFM Selections	Heating Input Range and Blower Volume - CFM							
	35%	40%	50%	60%	70%	80%	90%	100%
Increase (+15%) Heat CFM	657	702	792	881	971	1061	1150	1240
Increase (+7.5%) Heat CFM	631	673	757	841	926	1010	1094	1178
Default Heat CFM	605	644	723	802	880	959	1037	1116
Decrease (-7.5%) Heat CFM	574	608	676	745	814	882	951	1020
Decrease (-15%) Heat CFM	542	571	630	689	747	806	864	923

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	610	705	795	920	840	1015	1165	1300
Default Cool CFM	560	640	715	810	770	910	1050	1190
Decrease (-10%) Cool CFM	525	605	665	725	695	795	945	1110

SLP98UH090V36C BLOWER PERFORMANCE (less filter)

RIGHT SIDE RETURN AIR WITH OPTIONAL RETURN AIR BASE

HEATING BLOWER PERFORMANCE

Heating Adjust CFM Selections	Heating Input Range and Blower Volume - CFM							
	35%	40%	50%	60%	70%	80%	90%	100%
Increase (+15%) Heat CFM	677	721	810	899	988	1076	1165	1254
Increase (+7.5%) Heat CFM	639	679	760	842	923	1004	1085	1167
Default Heat CFM	600	637	711	784	858	932	1005	1079
Decrease (-7.5%) Heat CFM	573	606	673	740	806	873	939	1006
Decrease (-15%) Heat CFM	546	576	635	695	754	814	873	933

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	605	715	810	930	850	995	1165	1305
Default Cool CFM	570	660	735	820	775	905	1050	1205
Decrease (-10%) Cool CFM	530	600	670	725	710	800	945	1070

The effect of static pressure is included in air volumes shown.

The following control configurations are available. See Installation Instructions for details and DIP switch settings.

Heat Modes Available (Heating Blower Performance Table):

Single stage thermostat:
- 35%, 70%, 100% input (three-stage) with time delays in-between

Two-stage thermostat:
- Variable Rate Capacity Mode - furnace automatically adjusts firing rate based on first- and second-stage cycle times
- W1 demand at 70% input, W2 demand at 100% input. No delay between stages

icomfort Touch™ Communicating Thermostat:
- Variable Rate Capacity Mode - furnace automatically adjusts firing rate based on first- and second-stage cycle times
- 35%, 60%, 80%, 100% (four-stage) with time delays in-between

Cool Mode Available (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 300 cfm.

Lennox Harmony III™ Zoning System Applications - Minimum blower speed is 250 cfm.

BLOWER DATA

SLP98UH090V48C BLOWER PERFORMANCE (less filter)

BOTTOM RETURN AIR

HEATING BLOWER PERFORMANCE

Heating Adjust CFM Selections	Heating Input Range and Blower Volume - CFM							
	35%	40%	50%	60%	70%	80%	90%	100%
Increase (+15%) Heat CFM	769	835	968	1101	1234	1367	1500	1633
Increase (+7.5%) Heat CFM	713	776	902	1028	1155	1281	1407	1534
Default Heat CFM	656	716	836	955	1075	1195	1314	1434
Decrease (-7.5%) Heat CFM	595	652	767	882	997	1112	1227	1342
Decrease (-15%) Heat CFM	534	589	699	809	919	1029	1139	1249

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	840	1005	1155	1315	1165	1375	1580	1770
Default Cool CFM	780	915	1045	1190	1075	1265	1440	1645
Decrease (-10%) Cool CFM	690	835	955	1070	935	1145	1320	1465

SLP98UH090V48C BLOWER PERFORMANCE (less filter)

RIGHT SIDE RETURN AIR

HEATING BLOWER PERFORMANCE

Heating Adjust CFM Selections	Heating Input Range and Blower Volume - CFM							
	35%	40%	50%	60%	70%	80%	90%	100%
Increase (+15%) Heat CFM	747	812	943	1073	1204	1334	1465	1595
Increase (+7.5%) Heat CFM	698	759	882	1005	1127	1250	1372	1495
Default Heat CFM	649	706	821	936	1051	1165	1280	1395
Decrease (-7.5%) Heat CFM	589	644	755	867	978	1089	1200	1312
Decrease (-15%) Heat CFM	528	582	690	797	905	1013	1120	1228

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	820	1005	1135	1290	1140	1340	1525	1725
Default Cool CFM	755	880	1025	1150	1040	1235	1395	1565
Decrease (-10%) Cool CFM	680	815	925	1065	910	1120	1275	1400

The effect of static pressure is included in air volumes shown.

The following control configurations are available. See Installation Instructions for details and DIP switch settings.

Heat Modes Available (Heating Blower Performance Table):

Single stage thermostat:
- 35%, 70%, 100% input (three-stage) with time delays in-between

Two-stage thermostat:
- Variable Rate Capacity Mode - furnace automatically adjusts firing rate based on first- and second-stage cycle times
- W1 demand at 70% input, W2 demand at 100% input. No delay between stages

icomfort Touch™ Communicating Thermostat:
- Variable Rate Capacity Mode - furnace automatically adjusts firing rate based on first- and second-stage cycle times
- 35%, 60%, 80%, 100% (four-stage) with time delays in-between

Cool Mode Available (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 300 cfm.

Lennox Harmony III™ Zoning System Applications - Minimum blower speed is 380 cfm.

BLOWER DATA

SLP98UH090V48C BLOWER PERFORMANCE (less filter)

RIGHT SIDE RETURN AIR WITH OPTIONAL RETURN AIR BASE

HEATING BLOWER PERFORMANCE

Heating Adjust CFM Selections	Heating Input Range and Blower Volume - CFM							
	35%	40%	50%	60%	70%	80%	90%	100%
Increase (+15%) Heat CFM	764	828	956	1084	1213	1341	1469	1597
Increase (+7.5%) Heat CFM	705	766	888	1010	1132	1255	1377	1499
Default Heat CFM	645	703	819	936	1052	1168	1285	1401
Decrease (-7.5%) Heat CFM	594	650	762	874	986	1099	1211	1323
Decrease (-15%) Heat CFM	542	596	704	812	921	1029	1137	1245

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	840	955	1120	1280	1160	1360	1530	1740
Default Cool CFM	775	910	1010	1170	1060	1240	1400	1590
Decrease (-10%) Cool CFM	695	815	930	1045	925	1130	1295	1440

SLP98UH090V60C BLOWER PERFORMANCE (less filter)

BOTTOM RETURN AIR

HEATING BLOWER PERFORMANCE

Heating Adjust CFM Selections	Heating Input Range and Blower Volume - CFM							
	35%	40%	50%	60%	70%	80%	90%	100%
Increase (+15%) Heat CFM	583	665	830	995	1159	1324	1488	1653
Increase (+7.5%) Heat CFM	540	618	774	930	1085	1241	1397	1553
Default Heat CFM	497	571	718	865	1012	1159	1306	1453
Decrease (-7.5%) Heat CFM	439	507	644	781	917	1054	1191	1328
Decrease (-15%) Heat CFM	380	443	570	697	823	950	1076	1203

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	1050	1270	1445	1620	1590	1815	2010	2195
Default Cool CFM	975	1120	1295	1460	1460	1645	1845	2010
Decrease (-10%) Cool CFM	865	1010	1120	1290	1320	1500	1645	1860

The effect of static pressure is included in air volumes shown.

The following control configurations are available. See Installation Instructions for details and DIP switch settings.

Heat Modes Available (Heating Blower Performance Table):

Single stage thermostat:
- 35%, 70%, 100% input (three-stage) with time delays in-between

Two-stage thermostat:
- Variable Rate Capacity Mode - furnace automatically adjusts firing rate based on first- and second-stage cycle times
- W1 demand at 70% input, W2 demand at 100% input. No delay between stages

icomfort Touch™ Communicating Thermostat:
- Variable Rate Capacity Mode - furnace automatically adjusts firing rate based on first- and second-stage cycle times
- 35%, 60%, 80%, 100% (four-stage) with time delays in-between

Cool Mode Available (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 300 cfm.

Lennox Harmony III™ Zoning System Applications - Minimum blower speed is 380 cfm (SLP98UH090V48C) and 450 cfm (SLP98UH090V60C).

BLOWER DATA

SLP98UH090V60C BLOWER PERFORMANCE (less filter)

RIGHT SIDE RETURN AIR

HEATING BLOWER PERFORMANCE

Heating Adjust CFM Selections	Heating Input Range and Blower Volume - CFM							
	35%	40%	50%	60%	70%	80%	90%	100%
Increase (+15%) Heat CFM	609	684	835	986	1136	1287	1437	1588
Increase (+7.5%) Heat CFM	551	623	769	914	1059	1205	1350	1496
Default Heat CFM	492	562	702	842	983	1123	1263	1403
Decrease (-7.5%) Heat CFM	436	502	633	765	896	1028	1159	1291
Decrease (-15%) Heat CFM	380	441	564	687	810	932	1055	1178

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	1040	1225	1380	1550	1555	1715	1920	2135
Default Cool CFM	960	1085	1225	1415	1430	1565	1790	1980
Decrease (-10%) Cool CFM	840	990	1085	1250	1280	1450	1580	1790

SLP98UH090V60C BLOWER PERFORMANCE (less filter)

RIGHT SIDE RETURN AIR WITH OPTIONAL RETURN AIR BASE

HEATING BLOWER PERFORMANCE

Heating Adjust CFM Selections	Heating Input Range and Blower Volume - CFM							
	35%	40%	50%	60%	70%	80%	90%	100%
Increase (+15%) Heat CFM	611	686	837	987	1138	1288	1439	1589
Increase (+7.5%) Heat CFM	554	626	771	916	1060	1205	1349	1494
Default Heat CFM	497	566	705	844	983	1121	1260	1399
Decrease (-7.5%) Heat CFM	436	502	633	764	895	1026	1157	1288
Decrease (-15%) Heat CFM	375	437	560	683	806	930	1053	1176

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	1035	1230	1390	1565	1560	1740	1940	2145
Default Cool CFM	950	1085	1235	1405	1410	1585	1785	1975
Decrease (-10%) Cool CFM	855	995	1085	1235	1260	1430	1595	1785

The effect of static pressure is included in air volumes shown.

The following control configurations are available. See Installation Instructions for details and DIP switch settings.

Heat Modes Available (Heating Blower Performance Table):

Single stage thermostat:
- 35%, 70%, 100% input (three-stage) with time delays in-between

Two-stage thermostat:
- Variable Rate Capacity Mode - furnace automatically adjusts firing rate based on first- and second-stage cycle times
- W1 demand at 70% input, W2 demand at 100% input. No delay between stages

icomfort Touch™ Communicating Thermostat:
- Variable Rate Capacity Mode - furnace automatically adjusts firing rate based on first- and second-stage cycle times
- 35%, 60%, 80%, 100% (four-stage) with time delays in-between

Cool Mode Available (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 300 cfm.

Lennox Harmony III™ Zoning System Applications - Minimum blower speed is 450 cfm.

BLOWER DATA

SLP98UH110V60C BLOWER PERFORMANCE (less filter)

BOTTOM RETURN AIR

HEATING BLOWER PERFORMANCE

Heating Adjust CFM Selections	Heating Input Range and Blower Volume - CFM							
	35%	40%	50%	60%	70%	80%	90%	100%
Increase (+15%) Heat CFM	767	861	1049	1237	1424	1612	1800	1988
Increase (+7.5%) Heat CFM	738	825	1000	1174	1349	1524	1699	1874
Default Heat CFM	708	789	951	1112	1274	1436	1597	1759
Decrease (-7.5%) Heat CFM	655	731	883	1035	1187	1339	1491	1644
Decrease (-15%) Heat CFM	602	673	816	958	1101	1243	1386	1528

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	1245	1345	1545	1560	1740	1930	2125
Default Cool CFM	970	1145	1265	1395	1405	1565	1775	1945
Decrease (-10%) Cool CFM	885	1025	1110	1250	1270	1425	1610	1770

SLP98UH110V60C BLOWER PERFORMANCE (less filter)

RIGHT SIDE RETURN AIR

HEATING BLOWER PERFORMANCE

Heating Adjust CFM Selections	Heating Input Range and Blower Volume - CFM							
	35%	40%	50%	60%	70%	80%	90%	100%
Increase (+15%) Heat CFM	733	825	1009	1194	1378	1562	1747	1931
Increase (+7.5%) Heat CFM	708	794	967	1139	1312	1484	1657	1829
Default Heat CFM	683	763	924	1085	1245	1406	1566	1727
Decrease (-7.5%) Heat CFM	632	707	857	1007	1157	1307	1457	1608
Decrease (-15%) Heat CFM	580	650	790	929	1069	1209	1348	1488

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	1050	1195	1315	1495	1515	1710	1870	2065
Default Cool CFM	960	1095	1220	1355	1360	1555	1755	1890
Decrease (-10%) Cool CFM	850	985	1095	1220	1215	1400	1555	1755

The effect of static pressure is included in air volumes shown.

The following control configurations are available. See Installation Instructions for details and DIP switch settings.

Heat Modes Available (Heating Blower Performance Table):

Single stage thermostat:
- 35%, 70%, 100% input (three-stage) with time delays in-between

Two-stage thermostat:
- Variable Rate Capacity Mode - furnace automatically adjusts firing rate based on first- and second-stage cycle times
- W1 demand at 70% input, W2 demand at 100% input. No delay between stages

icomfort Touch™ Communicating Thermostat:
- Variable Rate Capacity Mode - furnace automatically adjusts firing rate based on first- and second-stage cycle times
- 35%, 60%, 80%, 100% (four-stage) with time delays in-between

Cool Mode Available (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 300 cfm.

Lennox Harmony III™ Zoning System Applications - Minimum blower speed is 450 cfm.

SLP98UH110V60C BLOWER PERFORMANCE (less filter)

RIGHT SIDE RETURN AIR WITH OPTIONAL RETURN AIR BASE

HEATING BLOWER PERFORMANCE

Heating Adjust CFM Selections	Heating Input Range and Blower Volume - CFM							
	35%	40%	50%	60%	70%	80%	90%	100%
Increase (+15%) Heat CFM	805	893	1068	1243	1419	1594	1770	1945
Increase (+7.5%) Heat CFM	729	814	986	1157	1329	1500	1672	1843
Default Heat CFM	652	736	903	1071	1238	1406	1573	1741
Decrease (-7.5%) Heat CFM	603	680	833	986	1139	1293	1446	1599
Decrease (-15%) Heat CFM	554	623	762	901	1040	1179	1318	1457

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	1020	1205	1305	1480	1485	1725	1885	2070
Default Cool CFM	955	1080	1205	1360	1365	1565	1720	1905
Decrease (-10%) Cool CFM	865	980	1080	1215	1220	1390	1545	1740

SLP98UH135V60D BLOWER PERFORMANCE (less filter)

BOTTOM RETURN AIR

HEATING BLOWER PERFORMANCE

Heating Adjust CFM Selections	Heating Input Range and Blower Volume - CFM							
	35%	40%	50%	60%	70%	80%	90%	100%
Increase (+15%) Heat CFM	949	1033	1200	1367	1534	1701	1868	2035
Increase (+7.5%) Heat CFM	879	957	1113	1269	1426	1582	1738	1895
Default Heat CFM	808	881	1026	1172	1317	1463	1608	1754
Decrease (-7.5%) Heat CFM	748	817	956	1095	1235	1374	1513	1652
Decrease (-15%) Heat CFM	687	753	886	1019	1152	1284	1417	1550

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	1070	1260	1410	1555	1565	1750	1970	2190
Default Cool CFM	980	1115	1255	1430	1445	1615	1805	1985
Decrease (-10%) Cool CFM	865	1020	1115	1280	1290	1470	1650	1805

The effect of static pressure is included in air volumes shown.

The following control configurations are available. See Installation Instructions for details and DIP switch settings.

Heat Modes Available (Heating Blower Performance Table):

Single stage thermostat:
- 35%, 70%, 100% input (three-stage) with time delays in-between

Two-stage thermostat:
- Variable Rate Capacity Mode - furnace automatically adjusts firing rate based on first- and second-stage cycle times
- W1 demand at 70% input, W2 demand at 100% input. No delay between stages

icomfort Touch™ Communicating Thermostat:
- Variable Rate Capacity Mode - furnace automatically adjusts firing rate based on first- and second-stage cycle times
- 35%, 60%, 80%, 100% (four-stage) with time delays in-between

Cool Mode Available (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 300 cfm.

Lennox Harmony III™ Zoning System Applications - Minimum blower speed is 450 cfm.

BLOWER DATA

SLP98UH135V60D BLOWER PERFORMANCE (less filter)

RIGHT SIDE RETURN AIR

HEATING BLOWER PERFORMANCE

Heating Adjust CFM Selections	Heating Input Range and Blower Volume - CFM							
	35%	40%	50%	60%	70%	80%	90%	100%
Increase (+15%) Heat CFM	927	1010	1175	1340	1505	1671	1836	2001
Increase (+7.5%) Heat CFM	844	923	1081	1239	1398	1556	1714	1873
Default Heat CFM	760	836	987	1138	1290	1441	1593	1744
Decrease (-7.5%) Heat CFM	703	775	919	1064	1208	1352	1496	1641
Decrease (-15%) Heat CFM	646	715	852	989	1126	1263	1400	1537

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	1070	1235	1385	1535	1550	1720	1925	2005
Default Cool CFM	985	1110	1245	1395	1415	1605	1755	1970
Decrease (-10%) Cool CFM	870	1010	1110	1260	1280	1435	1610	1755

SLP98UH135V60D BLOWER PERFORMANCE (less filter)

RIGHT SIDE RETURN AIR WITH OPTIONAL RETURN AIR BASE

HEATING BLOWER PERFORMANCE

Heating Adjust CFM Selections	Heating Input Range and Blower Volume - CFM							
	35%	40%	50%	60%	70%	80%	90%	100%
Increase (+15%) Heat CFM	909	992	1157	1322	1487	1653	1818	1983
Increase (+7.5%) Heat CFM	828	907	1065	1224	1382	1541	1699	1858
Default Heat CFM	746	822	974	1125	1277	1429	1580	1732
Decrease (-7.5%) Heat CFM	690	761	903	1046	1188	1330	1472	1615
Decrease (-15%) Heat CFM	634	700	833	966	1099	1231	1364	1497

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	1210	1350	1500	1535	1685	1900	2095
Default Cool CFM	960	1090	1210	1370	1380	1580	1740	1970
Decrease (-10%) Cool CFM	855	990	1090	1205	1250	1400	1585	1740

The effect of static pressure is included in air volumes shown.

The following control configurations are available. See Installation Instructions for details and DIP switch settings.

Heat Modes Available (Heating Blower Performance Table):

Single stage thermostat:
- 35%, 70%, 100% input (three-stage) with time delays in-between

Two-stage thermostat:
- Variable Rate Capacity Mode - furnace automatically adjusts firing rate based on first- and second-stage cycle times
- W1 demand at 70% input, W2 demand at 100% input. No delay between stages

icomfort Touch™ Communicating Thermostat:
- Variable Rate Capacity Mode - furnace automatically adjusts firing rate based on first- and second-stage cycle times
- 35%, 60%, 80%, 100% (four-stage) with time delays in-between

Cool Mode Available (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 300 cfm.

Lennox Harmony III™ Zoning System Applications - Minimum blower speed is 450 cfm.

SLP98UHV PARTS ARRANGEMENT

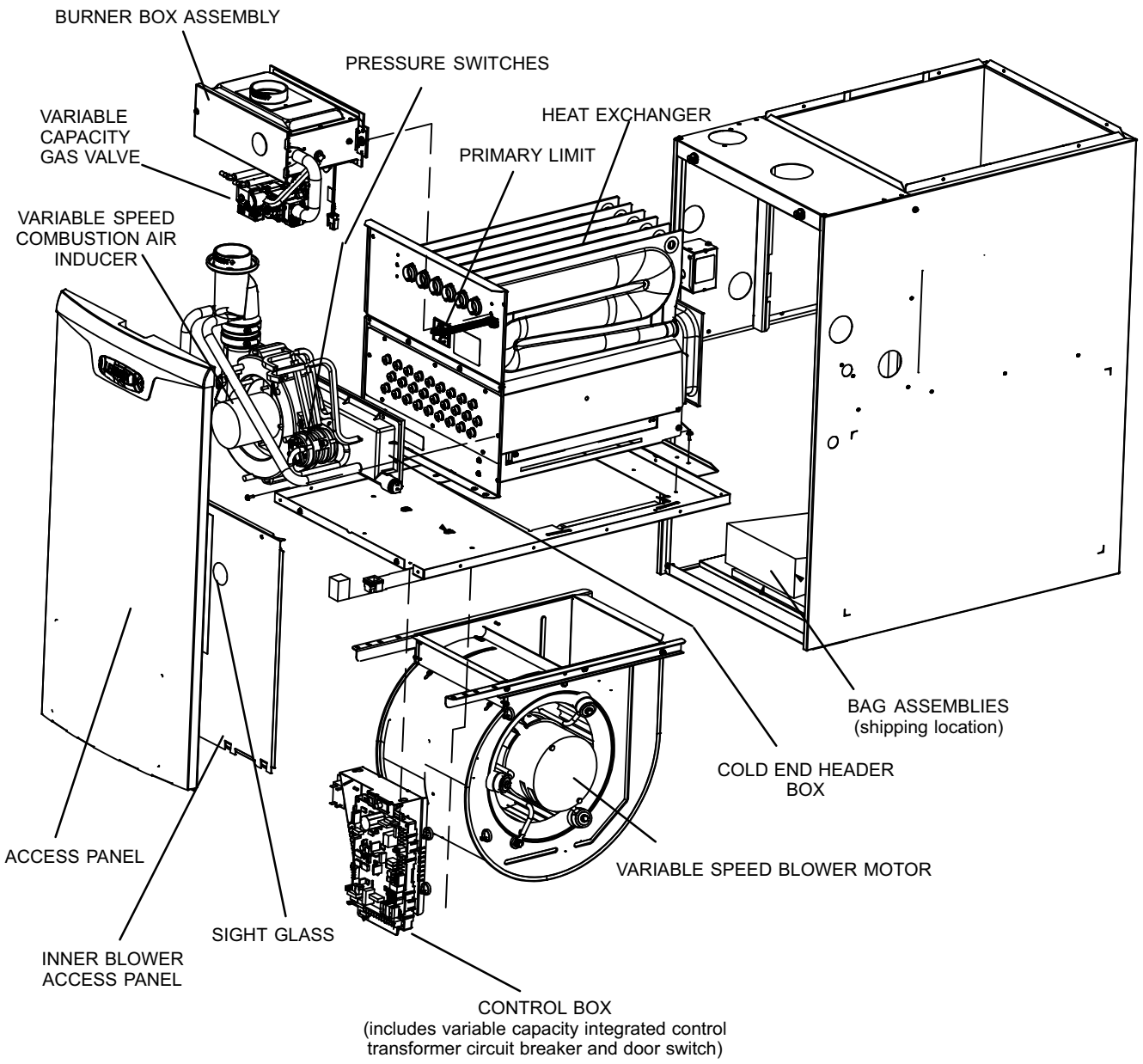


FIGURE 1

I-UNIT COMPONENTS

SLP98UHV unit components are shown in figure 1. The gas valve, combustion air inducer and burners can be accessed by removing the access panel. Electrical components are in the control box (figure 2) found in the blower compartment. SLP98UHV 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

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. Interlock Switch (S51)

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

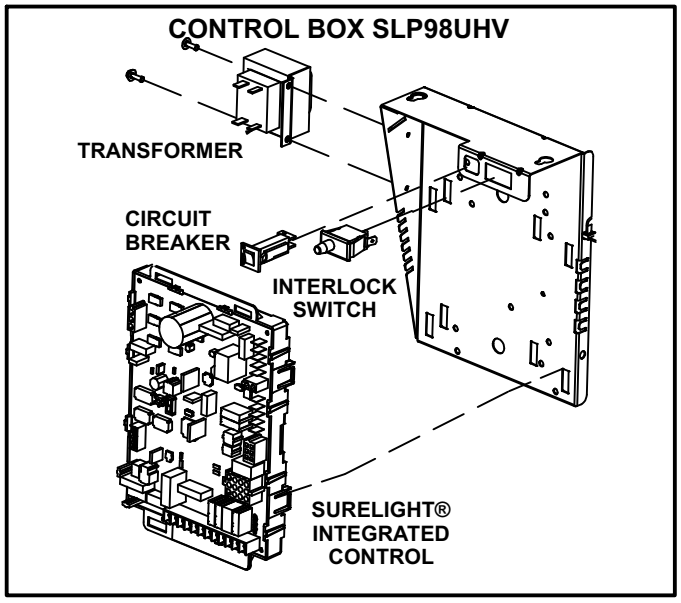


FIGURE 2

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 shut down. The breaker can be manually reset by pressing the button on the face. See figure 3.

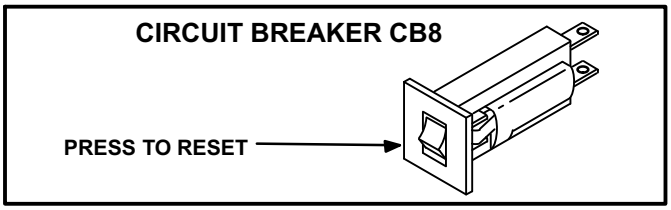


FIGURE 3

⚠ WARNING

Shock hazard.
Disconnect power before servicing.

Integrated control 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 (A92)

SLP98UHV units are equipped with the Lennox SureLight® variable-capacity integrated control. This control can be used with the icomfort Touch™ thermostat as part of a communicating comfort system. The control can also operate with a conventional single or two-stage thermostat. The system consists of an ignition / blower control (figures 4 and 5) with control pin designations in tables 1 and 2, and ignitor. 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, pressure and limit switch signal and flame signal. The control 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 14 under LIMIT CODE, an "E" followed by "2" followed by "5" followed by "0", the limit switch circuit is open. The control 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. The gas valve then 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 3 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 35% 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 35% 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 Operation

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 35% 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 Operation

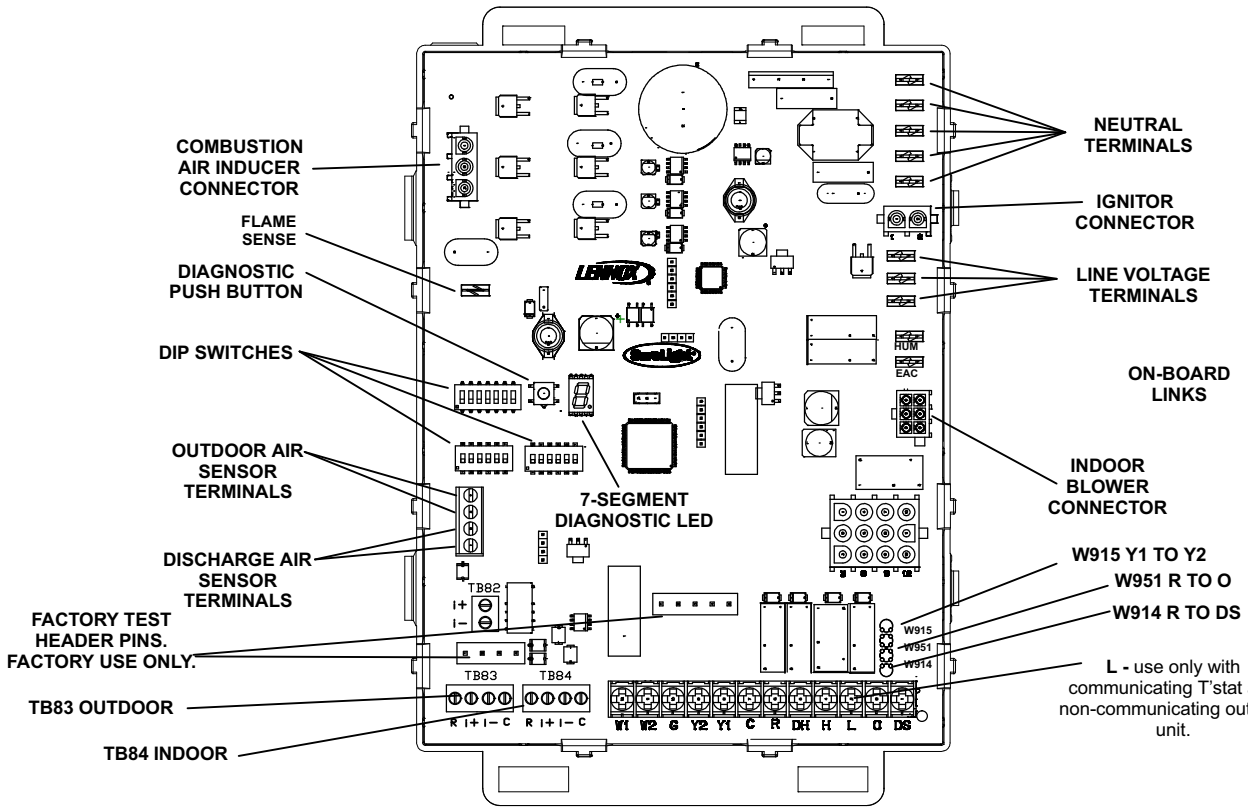
The system will also operate in conventional two-stage mode. While in two-stage mode, the furnace will fire on low fire (70% rate). The combustion air inducer will operate at 70% and the indoor blower will adjust to the appropriate cfm. The unit will switch to high fire on a W2 call from the thermostat. After a 30 second recognition period (during which the integrated control will receive 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.

TABLE 1

SureLight® Control 6 Pin Terminal Designation	
PIN #	**Function**
1	Data Input From Motor
2	Common
3	Not Used
4	Data Output To Motor
5	5 Volt Bias Supply
6	Not Used

TABLE 2

SureLight Control 12 Pin 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



RS-BUS LINK (TB82, future use)

I+ = DATA HIGH CONNECTION
I - = DATA LOW CONNECTION

RS-BUS OUTDOOR (TB83)

R = 24VAC
I + = DATA HIGH CONNECTION
I - = DATA LOW CONNECTION
C = 24VAXC COMMON

RS-BUS INDOOR (TB84)

R = 24VAC
I + = DATA HIGH CONNECTION
I - = DATA LOW CONNECTION
C = 24VAXC COMMON

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 ELECTRICAL 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 GRD (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. DO NOT CONNECT TO COMFORTSENSE® THERMOSTAT

L = USE ONLY WITH A COMMUNICATING THERMOSTAT AND A NON-COMMUNICATING OUTDOOR UNIT

DH = DEHUMIDIFICATION OUTPUT COMMUNICATING THERMOSTAT ONLY

FIGURE 4

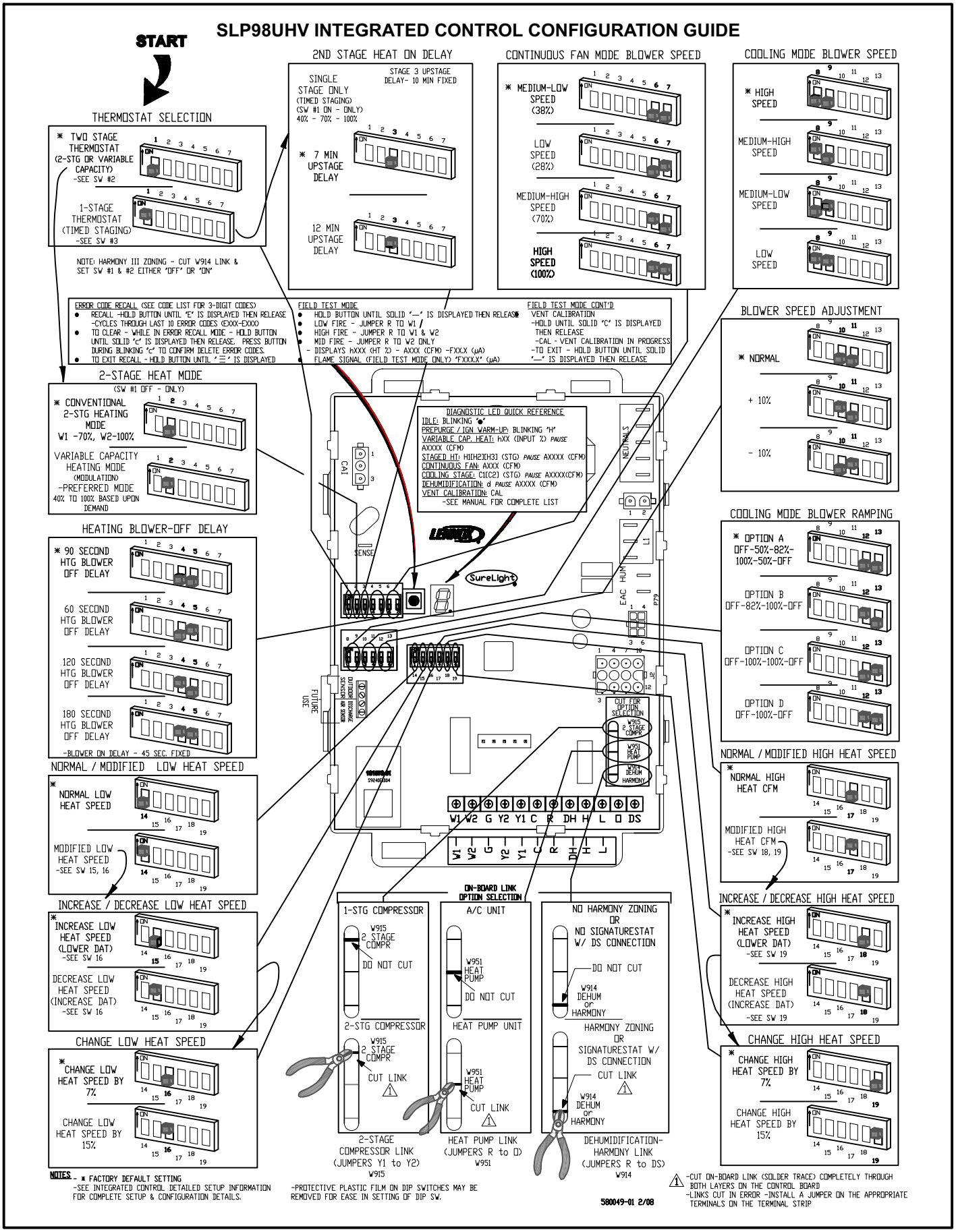

SLP98UHV INTEGRATED CONTROL CONFIGURATION GUIDE
START
THERMOSTAT SELECTION
* TWO STAGE THERMOSTAT (2-STG OR VARIABLE CAPACITY) -SEE SW #2
1-STAGE THERMOSTAT (TIMED STAGING) -SEE SW #3
NOTE: HARMONY III ZONING - CUT W914 LINK & SET SW #1 & #2 EITHER 'OFF' OR 'ON'
2ND STAGE HEAT ON DELAY
SINGLE STAGE ONLY (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
INCREASE / DECREASE LOW HEAT SPEED
* INCREASE LOW HEAT SPEED (LOWER DAT) -SEE SW 16
DECREASE LOW HEAT SPEED (INCREASE DAT) -SEE SW 16
CHANGE LOW HEAT SPEED
* CHANGE LOW HEAT SPEED BY 7%
CHANGE LOW HEAT SPEED BY 15%
NORMAL / MODIFIED HIGH HEAT SPEED
* NORMAL HIGH HEAT CFM
MODIFIED HIGH HEAT CFM -SEE SW 18, 19
INCREASE / DECREASE HIGH HEAT SPEED
* INCREASE HIGH HEAT SPEED (LOWER DAT) -SEE SW 19
DECREASE HIGH HEAT SPEED (INCREASE DAT) -SEE SW 19
CHANGE HIGH HEAT SPEED
* CHANGE HIGH HEAT SPEED BY 7%
CHANGE HIGH HEAT SPEED BY 15%
W1 W2 G Y2 Y1 C R DH H L D DS
ON-BOARD LINK OPTION SELECTION
1-STG COMPRESSOR
W915 2 STAGE COMPR
DO NOT CUT
2-STG COMPRESSOR
CUT LINK
2-STAGE COMPRESSOR LINK (JUMPERS Y1 to Y2) W915
A/C UNIT
W951 HEAT PUMP
DO NOT CUT
HEAT PUMP UNIT
CUT LINK
HEAT PUMP LINK (JUMPERS R to D) W951
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
DEHUMIDIFICATION-HARMONY LINK (JUMPERS R to DS) W914
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
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FIGURE 5

TABLE 3
Thermostat Selection Switch Settings

Operation	Thermostat	Switch 1	Switch 2	Switch 3
Variable Capacity Heat (35% to 100%)	Two-Stage	Off	On	Off
Three-Stage Heat (35%, 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

NOTE - *When the SLP98UHV is used with an icomfort Touch ™ communicating thermostat, all indoor blower speed selections and DIP switch settings are made by the communicating thermostat.*

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 3.

NOTE - *All DIP switches are factory shipped in the "OFF" position.*

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 3.

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 3.

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 4 provides the blower off timings that will result from different switch settings.

TABLE 4
Blower Off Delay Switch Settings

Blower Off Delay (Seconds)	Switch 4	Switch 5
60	Off	On
90 (factory)	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 blower tables at the front of this manual for corresponding cfm values.

TABLE 5
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 blower tables at the front of this manual for corresponding cfm values.

TABLE 6
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 blower tables at the front of this manual 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 7
Blower Speed Adjustment

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

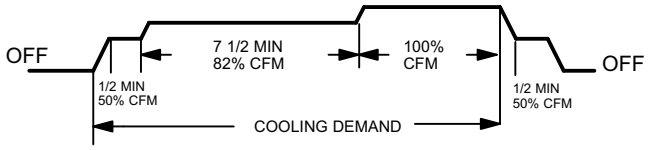
Switches 12 and 13 -- Cooling Mode Blower Speed Ramping -- Switches 12 and 13 are used to select cooling mode blower speed ramping options. Blower speed ramping may be used to enhance dehumidification performance. The switches are factory set at option A which has the greatest effect on blower motor performance. Table 8 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 8
Cooling Mode Blower Speed Ramping

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

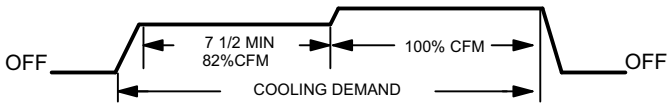
Ramping Option A (Factory Selection)

- 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.



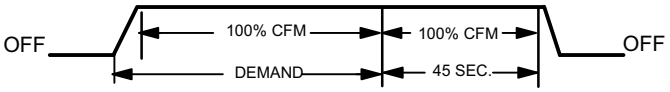
Ramping Option B

- 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.

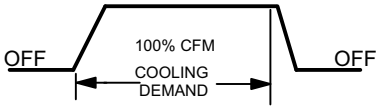


TABLE 9
Low Heat Blower Speeds

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 10
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 9 and 10 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 blower tables at the front of this manual for corresponding cfm values.

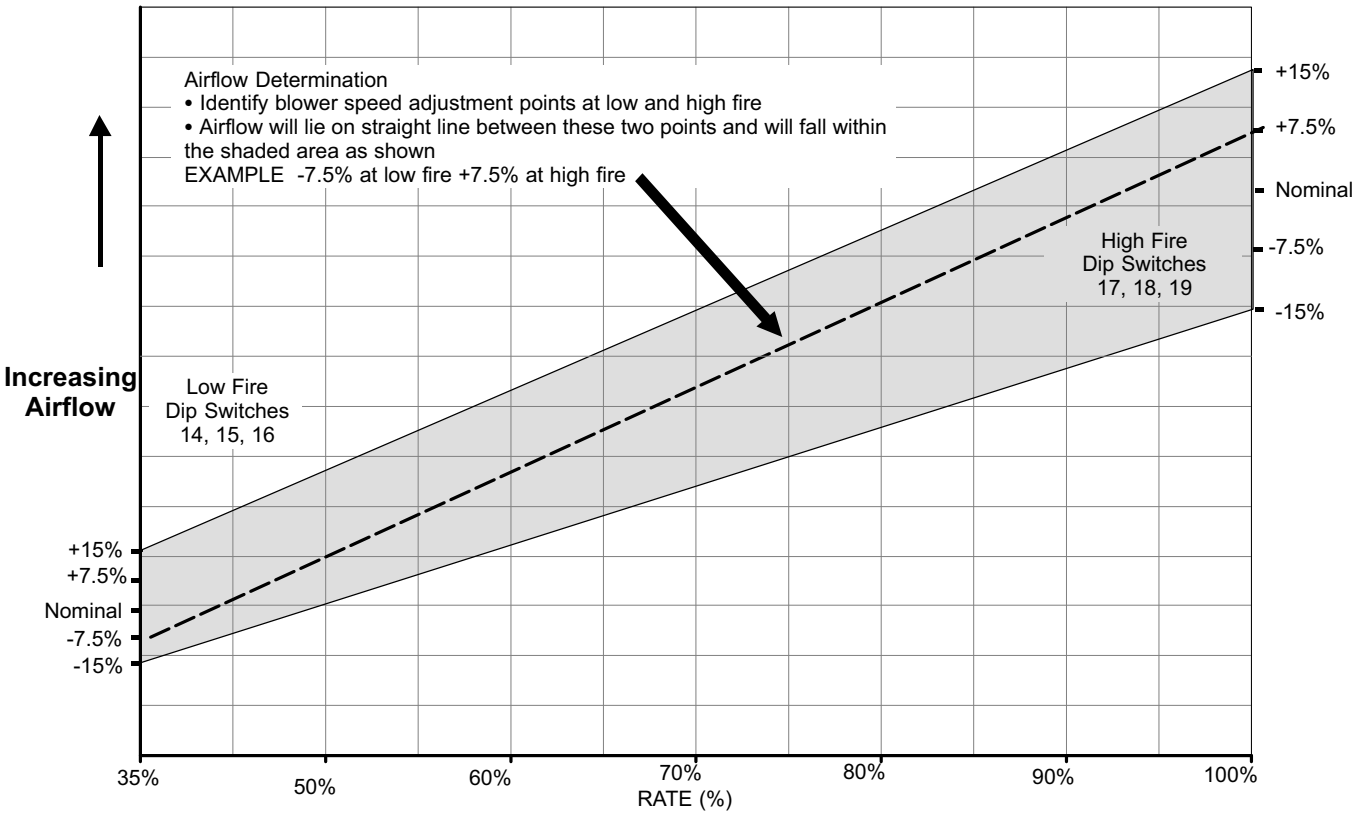


FIGURE 6

On-Board Link W914 DS to R (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 15 for operation sequence in applications including SLP98UHV, a thermostat which features humidity control and a single-speed outdoor unit. Table 16 gives the operation sequence in applications with a two-speed outdoor unit.

On-Board Link W951 R to O (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 Y1 to Y2 (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. Table 14 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 11
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 12
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 13
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.

Configuring Unit Size Codes

Power-Up - Number displayed represents by integrated control unit size code (furnace model and capacity). If three horizontal bars are displayed followed by continuous E203, furnace control does not recognize **unit size code.** Configure per the following:

Furnace control in **IDLE** mode No heating, cooling or indoor fan operation)

Yes

No

Turn room thermostat to **OFF**

To enter **Field Test Mode:** push and hold button next to 7-segment LED display until **solid dash** symbol appears. Release button.

If alarm is present, furnace control will display error code. If alarm is not present solid **dash** starts blinking on 7-segment LED display.

Push and hold button until the solid **P** symbol is displayed on the 7-segment LED. Release button. This mode allows the user to select a unit size code number that matches the furnace model size and capacity.

***IMPORTANT**: Field replacement controls may need to be manually configured to validate furnace unit size code.*

Solid **P** starts blinking on 7-Segment LED

Push and hold button. Integrated control will display unit size code number for each furnace model for five seconds.

UNIT SIZE CODE	FURNACE MODEL
A	SLP98UHV-070-36B
b	SLP98UHV-090-36C
c	SLP98UHV-090-48C
d	SLP98UHV-090-60C
E	SLP98UHV-110-60C
F	SLP98UHV-135-60D

When the correct unit size code is displayed, release button. Selected code will flash for 10-second period. During that period, hold push button until code stops blinking (disappear for 2 seconds). Integrated control will store code in memory and will automatically exit **Field Test Mode** and reset. (If second period expires or push button is held less than five seconds, control will automatically exit **Field Test Mode** and go into **IDLE** mode without storing unit size code. If this happens, programming function must be repeated).

Verify that the selected unit size code is correct and stored in non-volatile memory by cycling the 24 volt power to the furnace control. (At 24 volt power-up of the furnace control, the 7-segment LED will display a unit size code. If three horizontal bars display, board does not recognize unit size code. Programming function must be repeated)

FINISHED

TABLE 14
LED 7 Segment Status / Error Code

Integrated Control Diagnostic Codes

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 a solid "P" is displayed, the furnace capacity/ size is programmed.
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 "b" 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.

Code	Diagnostic Codes/Status of Equipment	Action Required to Clear and Recover
-	Idle mode (Decimal blinks at 1 Hertz -- 0.5 second ON, 0.5 second OFF).	
A	Cubic feet per minute (cfm) setting for indoor blower (1 second ON, 0.5 second OFF) / cfm setting for current mode displayed.	
C	Cooling stage (1 second ON, 0.5 second OFF) / 1 or 2 displayed / Pause / cfm setting displayed / Pause / Repeat codes).	
d	Dehumidification mode (1 second ON) / 1 second OFF) / cfm setting displayed / Pause / Repeat Codes).	
h	Variable Capacity Heat (1 second ON, 0.5 second OFF) / % of input rate displayed / Pause/ cfm setting / Pause/ Repeat codes.	
H	Heat Stage (1 second ON, 0.5 second OFF) / 1 or 2 displayed / Pause / cfm setting displayed / Pause / Repeat codes.	
dF	Defrost mode.	
E 105	Device communication problem - No other devices on BUS (Communication system).	Equipment is unable to communicate. Check for mis wire and loose connections and check for a high voltage source of noise close to the system. (welder etc.).
E 110	Low line voltage.	Line Voltage low (Voltage lower than nameplate rating) Check voltage.
E 113	High line voltage.	Line Voltage High (Voltage higher than nameplate rating) Check voltage.
E 114	Line voltage frequency out-of-range.	No 60 hertz power (Check voltage and frequency).
E 115	Low 24V - Control will restart if the error recovers.	24 voltage low (Range is 18 to 30 volts) Check voltage.
E 120	Unresponsive device.	Usually caused by delay in outdoor unit responding to indoor unit poling recycle power, check wiring.
E 124	Active communicating thermostat signal missing for more than 3 minutes.	Equipment lost communication with the thermostat. Check connections and cycle power on the thermostat.
E 125	Control failed self-check, internal error, failed hardware. Will restart if error recovers. Integrated furnace control not communicating. Covers hardware errors (flame sense circuit faults, pin shorts, etc.).	Hardware problem on the control board. Cycle power on control. Replace if problem prevents service and is persistent.
E 126	Failed internal control communication between microcontrollers.	Hardware problem on the control board. Cycle power on control. Replace if problem prevents service and is persistent.
E 131	Corrupted control parameters (Verify configuration of system).	Reconfigure the system. Replace board if service (heating /cooling) is unavailable.
E 180	Outdoor air sensor failure - NO error if disconnected. Only shown if shorted or out-of-range.	Compare outdoor sensor resistance to temperature resistance charts in installation instructions. Replace if necessary.
E 200	Hard lockout - Rollout circuit open or previously open.	Correct unit cause of rollout trip or replace flame rollout switch and test furnace operation.
E 201	Indoor blower communication failure - Unable to communicate with blower motor.	Indoor blower communication failure including power outage.
E 202	Indoor blower motor mis-match - Indoor motor horsepower does not match unit capacity.	Incorrect furnace size code selected. Check unit size codes on configuration guide or in installation instructions.
E 203	Appliance capacity / size is NOT programmed. Invalid unit codes refer to configuration flow chart in installation instructions.	No furnace size code selected. Check unit size codes on configuration guide or in installation instructions.
E 204	Gas valve mis-wired.	Check operation of gas valve.
E 205	Gas valve control relay contact shorted.	Check operation of gas valve.
E 207	Hot surface ignitor sensed open - Refer to troubleshooting in installation instruction.	Measure resistance of Hot Surface Ignitor, replace if open or not within specification.

Integrated Control Diagnostic Codes (continued)

Code	Diagnostic Codes/Status of Equipment	Action Required to Clear and Recover
E 223	Low pressure switch failed open - Refer to troubleshooting in installation instruction.	Check inches of water column pressure during operation of low pressure switch on heat call, measure inches of water column of operating pressure, inspect vent and combustion air inducer for correct operation and restriction.
E 224	Low pressure switch failed closed - Refer to troubleshooting in installation instruction.	Check low pressure switch for closed contacts, measure inches of water column of operating pressure, inspect vent and combustion air inducer for correct operation and restriction.
E 225	High pressure switch failed open - Refer to troubleshooting in installation instruction.	Check inches of water column pressure of high pressure switch on heat call, measure inches of water column of operating pressure, inspect vent and combustion air inducer for correct operation and restriction.
E 226	High pressure switch failed closed - Refer to troubleshooting in installation instruction.	Check high pressure switch for closed contacts, measure inches of water column of operating pressure, inspect vent and combustion air inducer for correct operation and restriction.
E 227	Low pressure switch open during trial for ignition or run mode. Refer to troubleshooting in installation instruction.	Check inches of water column pressure during operation of low pressure switch on heat call, measure inches of water column of operating pressure, inspect vent and combustion air inducer for correct operation and restriction.
E 228	Unable to perform successful pressure switch calibration.	Retry after 300 seconds. Error counter cleared when exiting lockout, unable to perform pressure switch calibration. Check vent system and pressure switch wiring connections.
E 240	Low flame current - Run mode - Refer to troubleshooting in installation instruction.	Check micro amperes of flame sensor, clean or replace sensor. Measure voltage of neutral to ground for good unit ground.
E 241	Flame sensed out of sequence - Flame still present.	Shut off gas, check for gas valve leak.
E 250	Limit switch circuit open - Refer to troubleshooting in installation instruction.	Check why limit is tripping, overfired, low air flow.
E 252	Discharge air temperature too high (gas heat only).	Check temperature rise, air flow and input rate.
E 270	Soft lockout - Exceeded maximum number of retries. No flame current sensed.	Check for gas flow, ignitor lighting burner, flame sensor current.
E 271	Soft lockout - Exceeded maximum number of retries. Last retry failed due to the pressure switch opening.	See E 223.
E 272	Soft lockout - Exceeded maximum number of recycles. Last recycle due to the pressure switch opening.	See E 223 and E 225.
E 273	Soft lockout - Exceeded maximum number of recycles. Last recycle due to flame failure.	See E 240.
E 274	Soft lockout - Exceeded maximum number of recycles. Last recycle failed due to the limit circuit opening or limit remained open longer than 3 minutes.	See E 250.
E 275	Soft lockout - Flame sensed out of sequence from code 241 fault. Flame signal is gone.	See E 241.
E 276	Soft lockout - Exceeded maximum number of calibration retries.	See E 228.
E 290	Ignitor circuit fault - Failed ignitor or triggering circuitry.	See E 207.
E 291	Restricted air flow - Cubic feet per minute is lower than what is needed for minimum firing rate.	Check for dirty filter, unit air flow restriction, blower performance.
E 292	Indoor blower motor unable to start - Seized bearings, stuck wheel, etc.	Indoor blower motor unable to start (seized bearing, stuck wheel, etc), replace motor or wheel if assembly does not operate or meet performance.
E 294	Combustion air inducer motor amp draw is too high.	Check combustion blower bearings, wiring , amperes, replace if it does not operate or meet performance.

Integrated Control Diagnostic Codes (continued)

Code	Diagnostic Codes/Status of Equipment	Action Required to Clear and Recover
E 295	Indoor blower motor temperature is too high.	Indoor blower motor over temperature (motor tripped on internal protector), Check motor bearings, amperes. Replace if necessary.
E 310	Discharge error sensor failure - No error if disconnected. Only shown if shorted or out-of-range.	Discharge air temperature(DATS) out of range, code is activated during ”Field test mode”.
E 311	Heat rate reduced to match indoor blower air flow. Replace filter or repair duct restriction.	Furnace blower in cutback mode due to restricted airflow. Check filter and ductwork. To clear replace filter if needed or repair/ add ductwork.
E 312	Restricted air flow in cooling or continuous fan mode is lower than cfm setting.	Restricted airflow - Indoor blower is running at a reduced cubic feet per minute (Cutback Mode) - The variable speed motor has pre-set speed and torque limiters to protect the motor from damage caused by operating out of its designed parameters (0 to 0.8 inches water column total external static pressure). Check filter and ductwork. To clear replace filter if needed or repair/ add ductwork.
E 313	Indoor or outdoor unit capacity mismatch.	Incorrect Indoor /outdoor capacity code selected. Check for proper configuration in installation instructions. Alarm is just a warning. The system operation is not impacted at all and alarm would clear when Commissioning is exited.
E 331	Global network connection - Communication link problem.	For Future Use.
E 347	No 24 Volt output on Y1 to C with non-communicating outdoor unit.	Y1 relay / Stage 1 failed (Pilot relay contacts did not close or the relay coil did not energize).
E 348	No 24 Volt output on Y2 to C with non-communicating outdoor unit.	Y2 relay / Stage 2 failed (Pilot relay contacts did not close or the relay coil did not energize).
E 349	No 24 Volts between R & O with non-communicating outdoor unit (Dual fuel module required for heat pump application).	Configuration link R to O needs to be cut on control board.
E 401	LSOM - Compressor ran more than 18 hours in air conditioning mode.	Compressor protector is open. Check for high head pressure, check compressor supply voltage. Outdoor unit power disconnect is open , compressor circuit breaker or fuse(s) is open, broken wire or connector is not making contact. Low or high pressure switch open if present in the system. Compressor contactor has failed to close.
E 402	LSOM - Outdoor unit system pressure trip.	Compressor ran over 18 hours in air conditioning mode.
E 403	LSOM - Compressor short-cycling (Running less than 4 minutes).	Outdoor unit pressure trip. Check dirty coil, fan motor, refrigerant charge.
E 404	LSOM - Compressor rotor locked.	Compressor short cycling (Running less than 4 minutes).
E 405	LSOM - Compressor open circuit.	Check capacitor, wiring, hard start kit , replace compressor.
E 406	LSOM - Compressor open start circuit.	Check compressor for hot (cool down) , check pressures, fan motor etc. Replace compressor if unable to get circuit to close and compressor to operate.
E 407	LSOM - Compressor open run circuit.	
E 408	LSOM - Compressor contactor is welded.	
E 409	LSOM - Compressor low voltage.	Replace contactor.

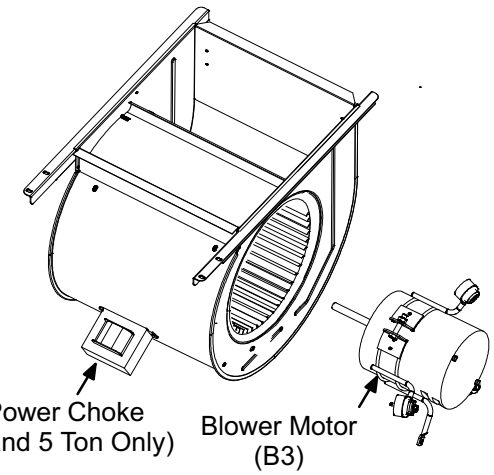
TABLE 15
OPERATING SEQUENCE
SLP98UHV and Single-Stage Outdoor Unit

OPERATING SEQUENCE		SYSTEM DEMAND					SYSTEM RESPONSE		
System Condition	Step	Demand			Relative Humidity		Compressor	Blower CFM (COOL)	Comments
		1st stage	O	G	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%	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%	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® control; With Heat Pump - Cut W914 (R to DS) & W951(R to O) on SureLight® control. *ComfortSense® 7000 thermostat only								

TABLE 16
OPERATING SEQUENCE
SLP98UHV and Two-Stage Outdoor Unit

OPERATING SEQUENCE		SYSTEM DEMAND						SYSTEM RESPONSE		
System Condition	Step	Demand				Relative Humidity		Compressor	Blower CFM (COOL)	Comments
		1st stage	2nd stage	O	G	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%	Thermostat energizes 2nd stage and de-energizes D on a call for dehumidification
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%	Thermostat will keep outdoor unit energized after cooling temperature setpoint 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%	Thermostat energizes 2nd stage and de-energizes D on a call for dehumidification
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%	Thermostat will keep outdoor unit energized after cooling temperature setpoint 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. *ComfortSense® 7000 thermostat only									

B-Blower Compartment (Figure 7)



To Remove Blower From Unit: Remove access panels, Control box, Bolts and Wiring Jackplugs. Then Slide Out Front of Unit.

FIGURE 7

1. 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 SLP98UHV line uses three different motor sizes; 1/2 hp, 3/4 hp and 1hp. 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. SLP98UHV 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 SLP98UHV 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).

SLP98UHV BLOWER MOTOR COMPONENTS

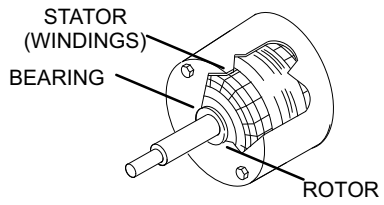


FIGURE 8

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 SLP98UHV 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 integrated 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

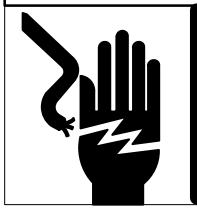
When line voltage is applied to B3, there will be a large inrush of power lasting less than 1/4 second. This inrush charges a bank of DC filter capacitors inside the controller. If the disconnect switch is bounced when the disconnect is closed, the disconnect contacts may become welded. Try not to bounce 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 200 rpm within 13 seconds, the motor shuts down. Then the motor will immediately attempt a restart. 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

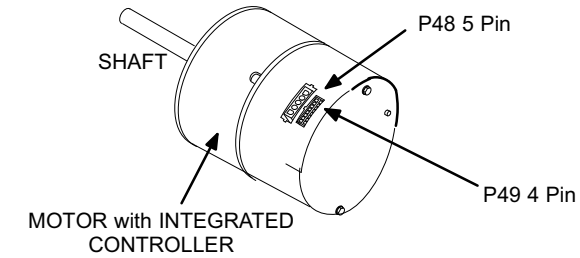


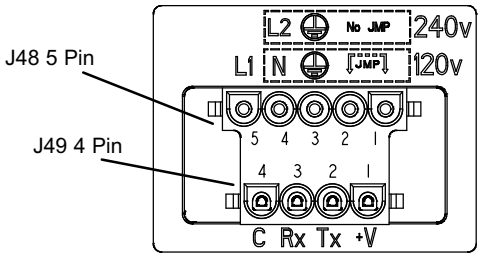
Disconnect power from unit and wait at least five minutes to allow capacitors to discharge before attempting to service motor. Failure to wait may cause personal injury or death.

Power Choke (L13)

A choke coil is used on SLP98UHV 4 and 5 ton units equipped with 3/4 hp and 1 hp motors.The choke is located on the blower housing and is used to suppress 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 motor tester 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.

C-Heating Components

1. Ignitor (Figure 11)

The SureLight® ignitor is made of durable silicon nitride. Ignitor longevity is enhanced by controlling voltage to the ignitor. The integrated control provides 120 volts to the ignitor for a consistent ignition. Due to this feature of the control, voltage measured with a digital meter will be slightly lower. To measure correct voltage use a true RMS meter or ignitor can be ohmed. Ohm value should be 39 to 70.

2. Flame Sensor (Figure 11)

A flame sensor (figure 11) is located on the left side of the burner support. 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 17 shows the flame signal for the SLP98UHV unit.

TABLE 17
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.

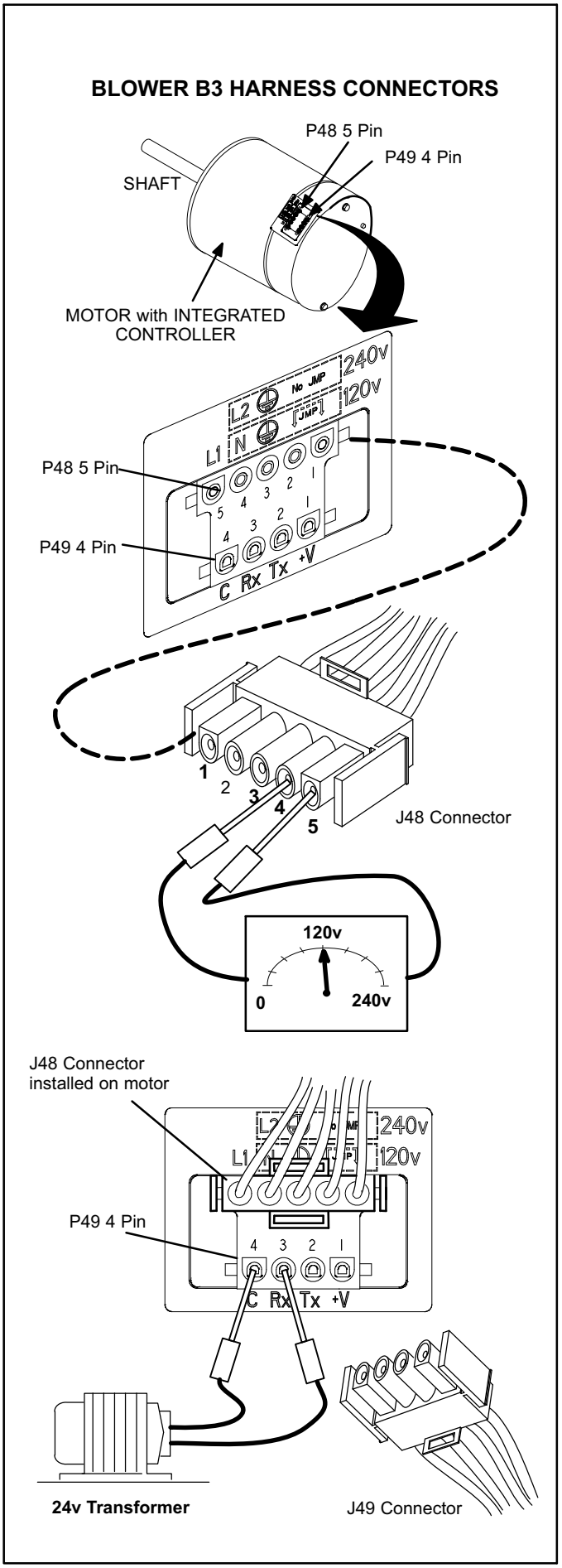


FIGURE 10

3. Flame Rollout Switches (Figure 11)

Flame rollout switch S47 is a high temperature limit located inside 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 integrated control immediately stops ignition and closes the gas valve. If unit is running and flame rollout is detected, the gas valve will close and integrated 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 210°F and cannot be adjusted. The switch can be manually reset. To manually reset a tripped switch, push the reset button located on the center of the switch.

4. Burners (Figure 11)

All units use inshot burners. Burners are factory set and require no adjustment. Always operate the unit with the burner box front panel in place. Each burner uses an orifice (see table 29 for orifice size) that is precisely matched to the burner input. Burners can be removed as a one piece assembly for service. If burner assembly has been removed, it is critical to align center of each burner to the center of the clamshell when re-installing. See more detail in Section VII- MAINTENANCE..

5. Duralock Plus™ Heat Exchanger (Figure 12)

SLP98UHV 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 burners. 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.

Burner Box Assembly

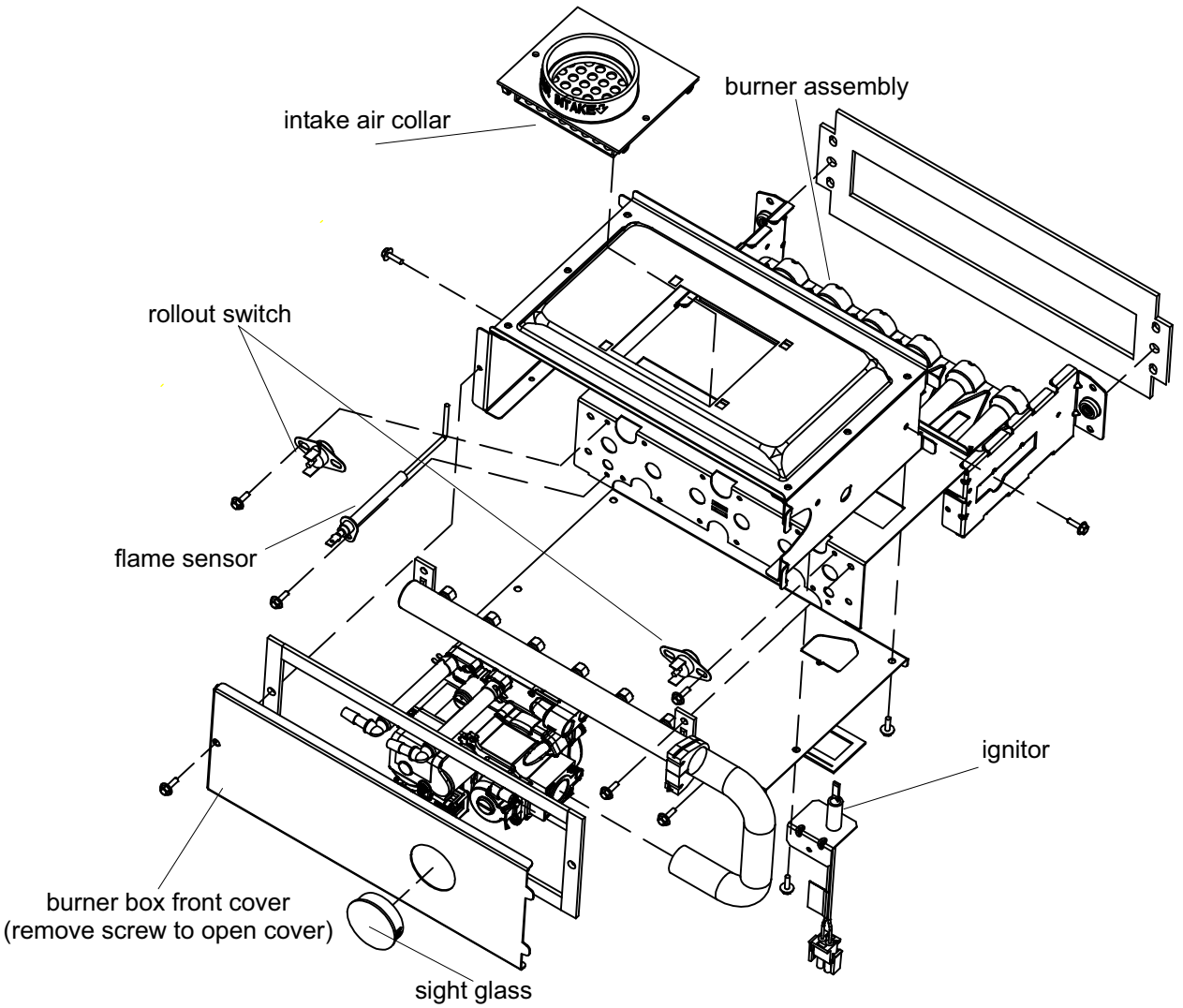


FIGURE 11

6. Primary Limit Control (S10)

Figure 12 shows the primary limit (S10) used on SLP98UHV units located in the heating vestibule panel. 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 integrated control will reduce firing rate and indoor blower airflow in 10% increments until a sustainable air flow is reached. If the furnace reaches 35% firing rate, and adequate air flow is not available, the furnace will shutdown and enter one hour watchguard. For limit replacement remove wires from limit terminals and rotate limit switch 90 degrees. Slowly remove from the vestibule panel.

Primary Limit Location and Heat Exchanger

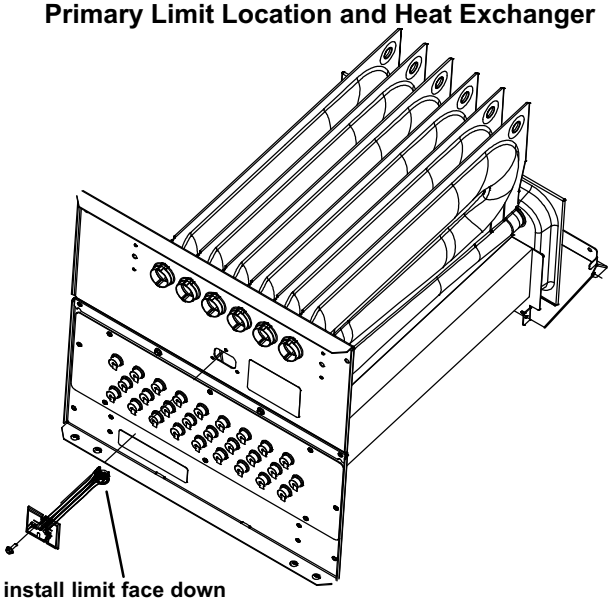


FIGURE 12

7. Gas Valve (GV1)

The SLP98UHV uses a variable capacity gas valve (figure 44) and is applicable for two-stage or variable capacity settings. See “Thermostat selection modes” in the integrated 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.

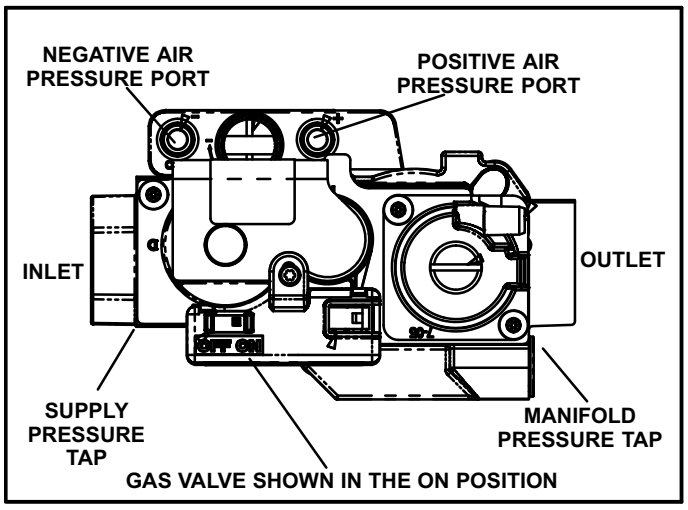


FIGURE 13

8. Combustion Air Inducer (B6) & Pressure Switch (S18)

All SLP98UHV units are equipped with a combustion air inducer (B6) and *dual* pressure switch assembly (high fire and low fire). The pressure switch (figure 14) serves four functions. First it establishes 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 resistance. 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 setting for low-fire switch on the assembly is such that it does not normally enter into the vent calibration routine.

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

Third, the switch interrupts the combustion process in the event vent outlet or combustion air intake blockage.

Finally, the switch interrupts 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.

If the switch assembly is to be replaced, replace the entire assembly. Individual switch components cannot 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 switch, add a temporary jumper. The unit will not fire with the switch jumpered. Therefore, the pressure switch must be bypassed after the combustion air inducer is activated. This will determine if the pressure switch and furnace are operating properly. However, this may not indicate if the sealed combustion system is operating properly.

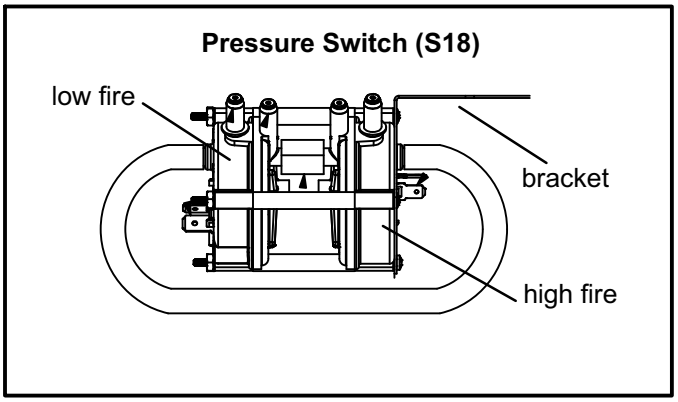


FIGURE 14

Vent Calibration

The vent calibration sequence establishes furnace operating parameters in a specific installation. The integrated control 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 prepurge state and go straight into ignitor warm up.

After calibration, the integrated control stores the RPM1 and RPM2 values. The low fire (35%) 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 35% 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.

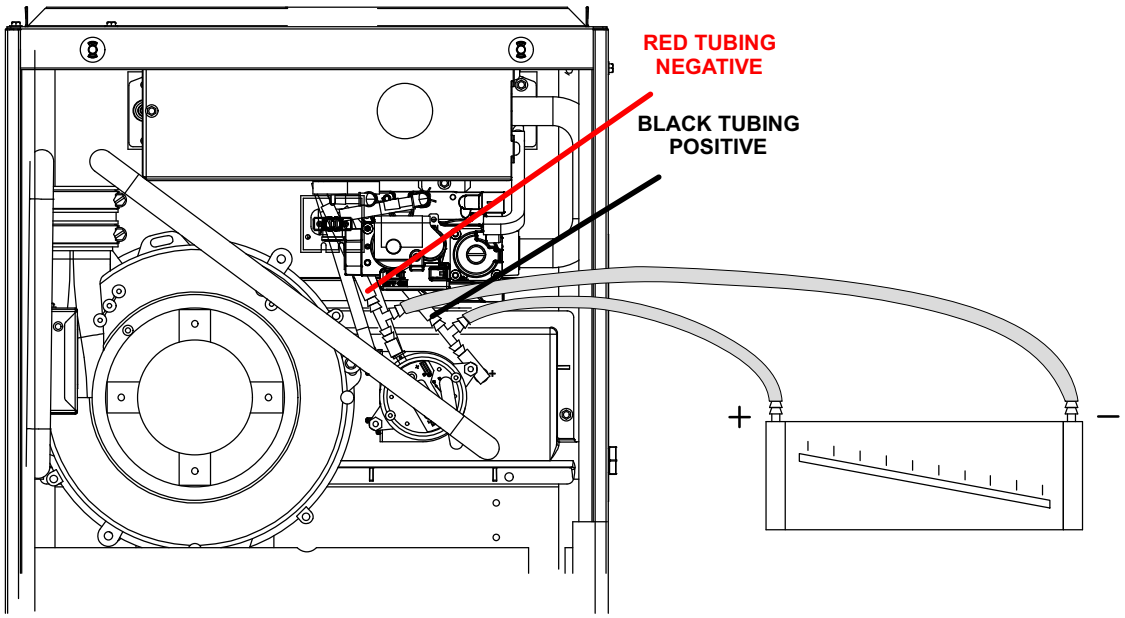
8- If low pressure switch is still closed, set flag for calibration on next call for heat and turn off inducer.

Measuring pressure differential Figure 15

Checks of pressure differential can aid in troubleshooting. Lennox provides a kit (10L34) if necessary. 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.

Measuring Pressure Differential



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

2 - Install a tee in the negative (-) line (red tubing) and a tee in the positive (+) line (black tubing) running from the 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 table 19.

5 - Remove thermostat demand and allow to cycle off.

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

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 pressure switch measures the pressure differential across the CAI orifice (difference in the channel and cold end header box). See table 18 for orifice size per unit. **If replacement is necessary the gaskets used to seal the box to the vestibule panel and the CAI to the box, must also be replaced.**

TABLE 18

SLP98UHV Unit	C.A.I. Orifice Size
-070	0.780
-090	0.920
-110	1.030
-135	1.170

TABLE 19
Pressure Switch
0' to 7500'

SLP98UHV Unit	Set Point High Fire	Set Point Low Fire
-070	1.00 ± 0.05	0.25 ± 0.05
-090		
-110		
-135		

**Units over 7500 ft will require a conversion kit. See table 29.*

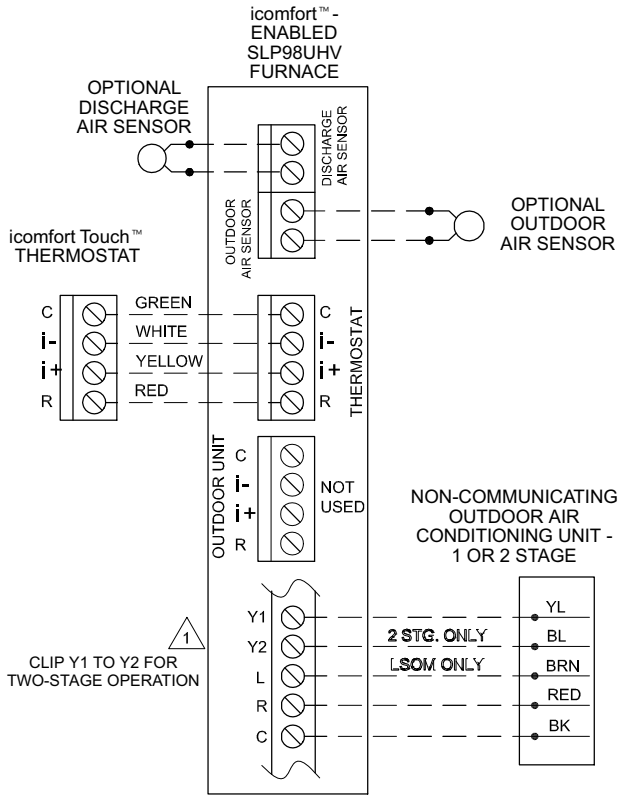
II-icomfort Touch™ thermostat (if applicable)

In communicating applications the Lennox icomfort Touch™ thermostat must be used. In these applications the icomfort Touch™ thermostat overrides the DIP switch settings on the integrated control. Refer to the illustrations provided with the thermostat for installation, set-up and operation.

See figures 16 and 17 for icomfort Touch™ thermostat wiring in communicating applications.

icomfort Touch™ Thermostat with SLP98UHV and Non-Communicating Outdoor Unit

icomfort Touch™ Thermostat
icomfort™-Enabled SLP98UHV Indoor Furnace
Non-Communicating Outdoor Air Conditioner



icomfort Touch™ Thermostat with SLP98UHV and icomfort™-ENABLED Outdoor Unit

icomfort Touch™ Thermostat
icomfort™-Enabled SLP98UHV Indoor Furnace
icomfort™-Enabled Outdoor Air Conditioner or Heat Pump

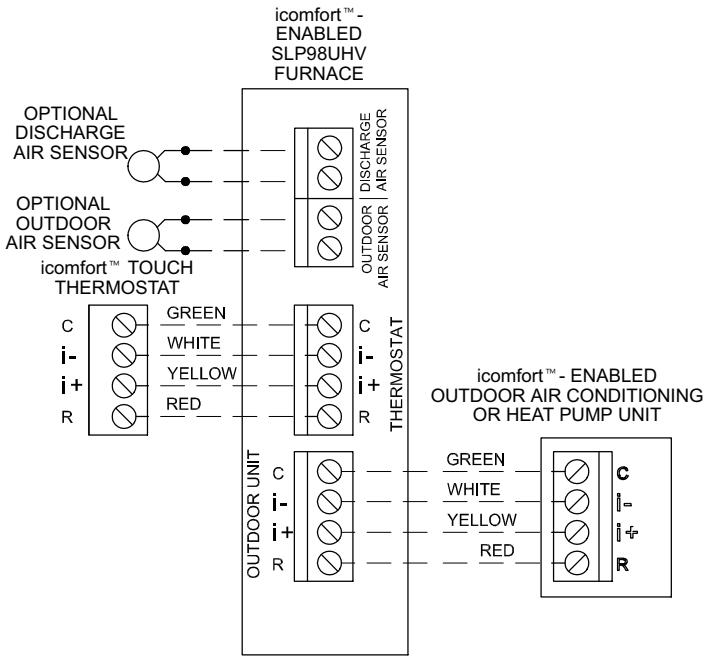
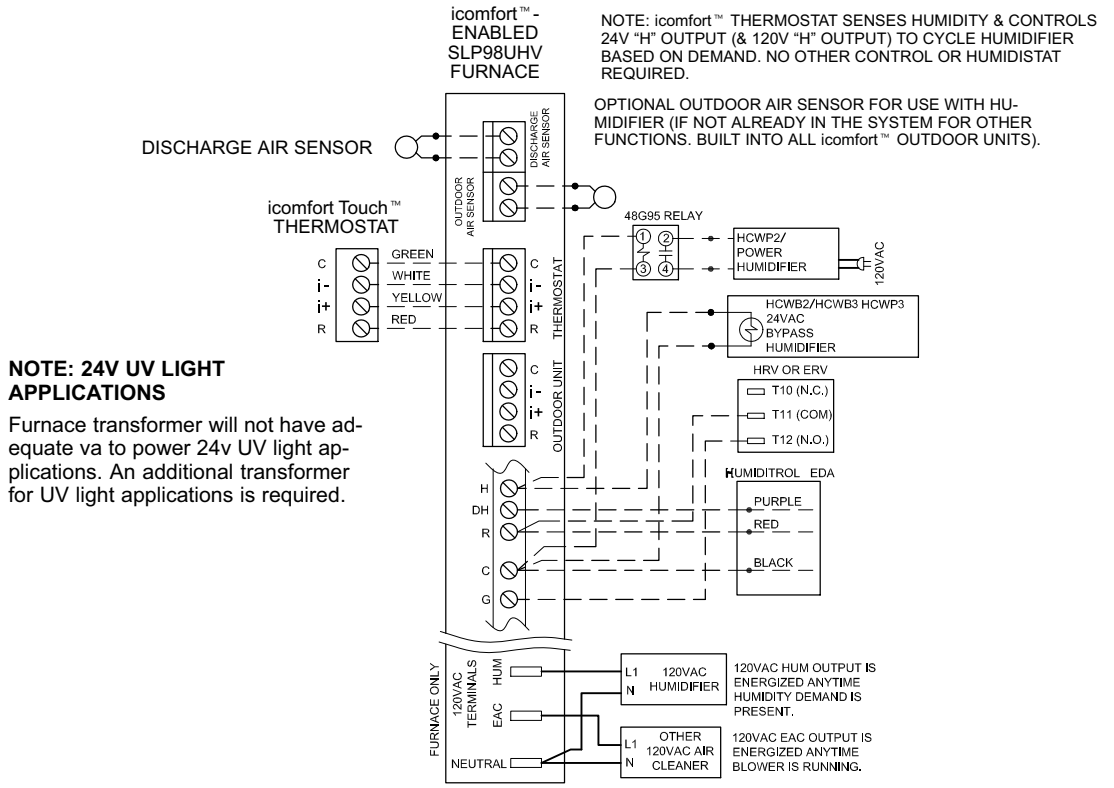


FIGURE 16

Optional Accessories for use with any icomfort™ System

Optional Accessories for use with any icomfort Touch™ System



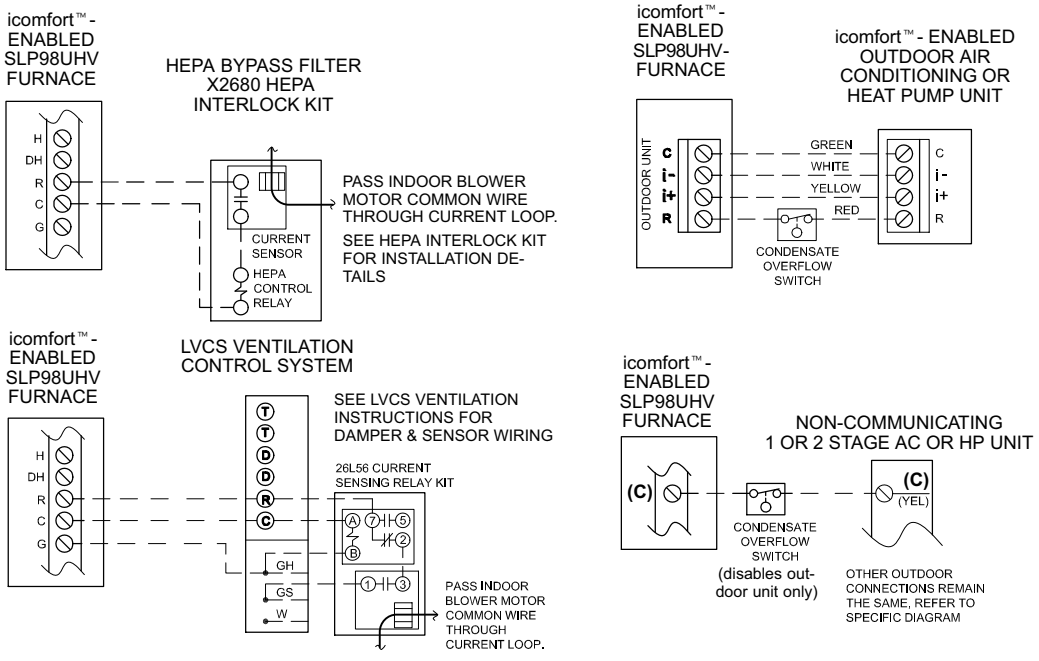


FIGURE 17

III-PLACEMENT AND INSTALLATION

Pipe & Fittings Specifications

All pipe, fittings, primer and solvent cement must conform with American National Standard Institute and the American Society for Testing and Materials (ANSI/ASTM) standards. The solvent shall be free-flowing and contain no lumps, undissolved particles or any foreign matter that adversely affects the joint strength or chemical resistance of the cement. The cement shall show no gelation, stratification, or separation that cannot be removed by stirring. Refer to table 20 for approved piping and fitting materials.

TABLE 20
PIPING AND FITTINGS SPECIFICATIONS

Schedule 40 PVC (Pipe)	D1785
Schedule 40 PVC (Cellular Core Pipe)	F891
Schedule 40 PVC (Fittings)	D2466
Schedule 40 CPVC (Pipe)	F441
Schedule 40 CPVC (Fittings)	F438
SDR-21 PVC or SDR-26 PVC (Pipe)	D2241
SDR-21 CPVC or SDR-26 CPVC (Pipe)	F442
Schedule 40 ABS Cellular Core DWV (Pipe)	F628
Schedule 40 ABS (Pipe)	D1527
Schedule 40 ABS (Fittings)	D2468
ABS-DWV (Drain Waste & Vent) (Pipe & Fittings)	D2661
PVC-DWV (Drain Waste & Vent) Pipe & Fittings)	D2665
PRIMER & SOLVENT CEMENT	**ASTM SPECIFICATION**
PVC & CPVC Primer	F656
PVC Solvent Cement	D2564
CPVC Solvent Cement	F493
ABS Solvent Cement	D2235
PVC/CPVC/ABS All Purpose Cement For Fittings & Pipe of the same material	D2564, D2235, F493
ABS to PVC or CPVC Transition Solvent Cement	D3138
CANADA PIPE & FITTING & SOLVENT CEMENT	**MARKING**
PVC & CPVC Pipe and Fittings	ULCS636
PVC & CPVC Solvent Cement	
ABS to PVC or CPVC Transition Cement	

⚠ CAUTION

Solvent cements for plastic pipe are flammable liquids and should be kept away from all sources of ignition. Do not use excessive amounts of solvent cement when making joints. Good ventilation should be maintained to reduce fire hazard and to minimize breathing of solvent vapors. Avoid contact of cement with skin and eyes.

⚠ IMPORTANT

SLP98UHV exhaust and intake connections are made of PVC. Use PVC primer and solvent cement when using PVC vent pipe. When using ABS vent pipe, use transitional solvent cement to make connections to the PVC fittings in the unit.

Use PVC primer and solvent cement or ABS solvent cement meeting ASTM specifications, refer to Table 20. As an alternate, use all purpose cement, to bond ABS, PVC, or CPVC pipe when using fittings and pipe made of the same materials. Use transition solvent cement when bonding ABS to either PVC or CPVC.

Low temperature solvent cement is recommended. Metal or plastic strapping may be used for vent pipe hangers. Uniformly apply a liberal coat of PVC primer for PVC

Canadian Applications Only *- Pipe, fittings, primer and solvent cement used to vent (exhaust) this appliance must be certified to ULC S636 and supplied by a single manufacturer as part of an approved vent (exhaust) system. In addition, the first three feet of vent pipe from the furnace flue collar must be accessible for inspection.*

Table 21 lists the available exhaust termination kits.

TABLE 21
OUTDOOR TERMINATION KITS USAGE

SLP98UH UNIT	VENT PIPE DIA. (in.)	STANDARD						CONCENTRIC		
		Outdoor Exhaust Accelerator (Dia. X Length)	Outdoor Exhaust Accelerator (Dia. X Length)	2" Wall Plate Kit	3" Wall Plate Kit	2" Wall Ring Kit	Flush-Mount Kit	1-1/2" Concentric Kit	2" Concentric Kit	3" Concentric Kit
		1-1/2" X 12"	2" X 12"	22G44 or 30G28†	44J40 or 81J20†	15F74	51W11**	71M80 or †44W92††	69M29 or †44W92††	60L46 or 44W93†
070	2	YES		YES	YES*	YES	YES	YES		
	2-1/2	YES		YES	YES*	YES	YES	YES		
	3	YES		YES	YES*	YES	YES	YES		
090	2		YES		YES	YES	YES		YES	YES
	2-1/2		YES		YES	YES	YES		YES	YES
	3		YES		YES	YES	YES		YES	YES
110	2-1/2		YES		YES		YES		YES	YES
	3		YES		YES		YES		YES	YES
135	3		YES		YES		YES			YES

**Requires field-provided and installed 1-1/2" exhaust accelerator.*
*** Kit 51W11 is provided with a 1-1/2" accelerator which must be used with all SLP98UH-070 and SLP98UH-090.*
† Termination kits 44W92, 44W93, 30G28 and 81J20 are approved for use in Canadian installations.
†† The 44W92 concentric kit includes a 1-1/2" accelerator which must be installed on the exhaust outlet when this kit is used with the SLP98UH070V36B furnaces.

Joint Cementing Procedure

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

⚠ DANGER

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 a 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.
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.*

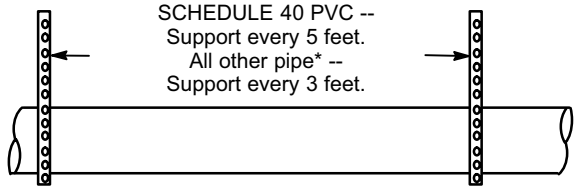
7 - Immediately after applying last coat of cement to pipe, and while both inside socket surface and end of pipe are wet with cement, forcefully insert end of pipe into socket until it bottoms out. Turn PVC pipe 1/4 turn during assembly (but not after pipe is fully inserted) to distribute cement evenly.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

Venting Practices

Piping Suspension Guidelines



** See table20 for allowable pipe.*

***NOTE** - Isolate piping at the point where it exits the outside wall or roof in order to prevent transmission of vibration to the structure.*

Wall Thickness Guidelines

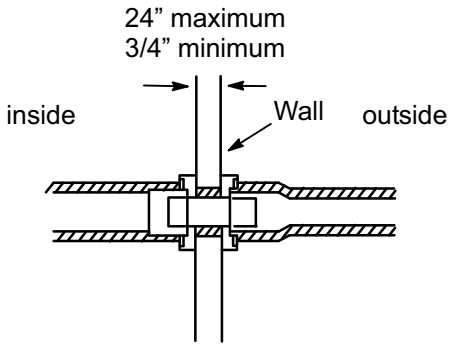
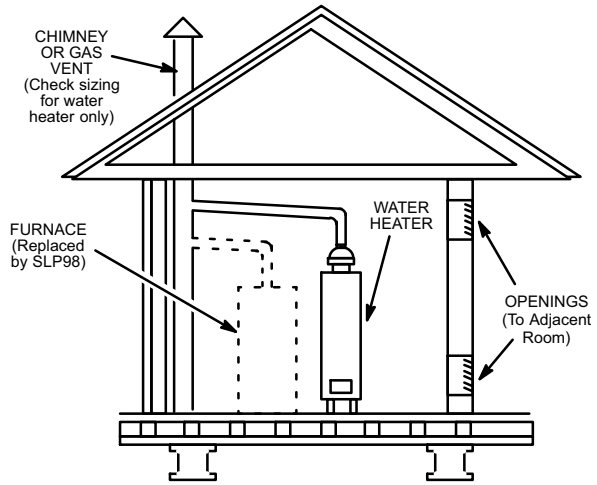


FIGURE 18

REPLACING FURNACE THAT WAS PART OF A COMMON VENT SYSTEM



If an SLP98UHV 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.

FIGURE 19

9. 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.
10. 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 22 and 23)

11. 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.

Vent Piping Guidelines

The SLP98UHV is installed only as a Direct Vent gas central furnace.

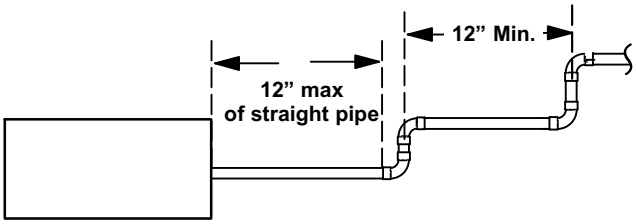
***NOTE** - In Direct Vent installations, combustion air is taken from outdoors and flue gases are discharged outdoors.*

Intake and exhaust pipe sizing -- Size pipe according to tables 22 and 23. Table 22 lists the *minimum* vent pipe lengths permitted. Table 23 lists the *maximum* pipe lengths permitted.

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 24.

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.

Use the steps in figure 21 to correctly size vent pipe diameter.



NOTE - *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.*

NOTE *- Exhaust pipe MUST be glued to furnace exhaust fittings.*

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

FIGURE 20

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

⚠ 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 22
MINIMUM VENT PIPE LENGTHS

SLP98UHV 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.*

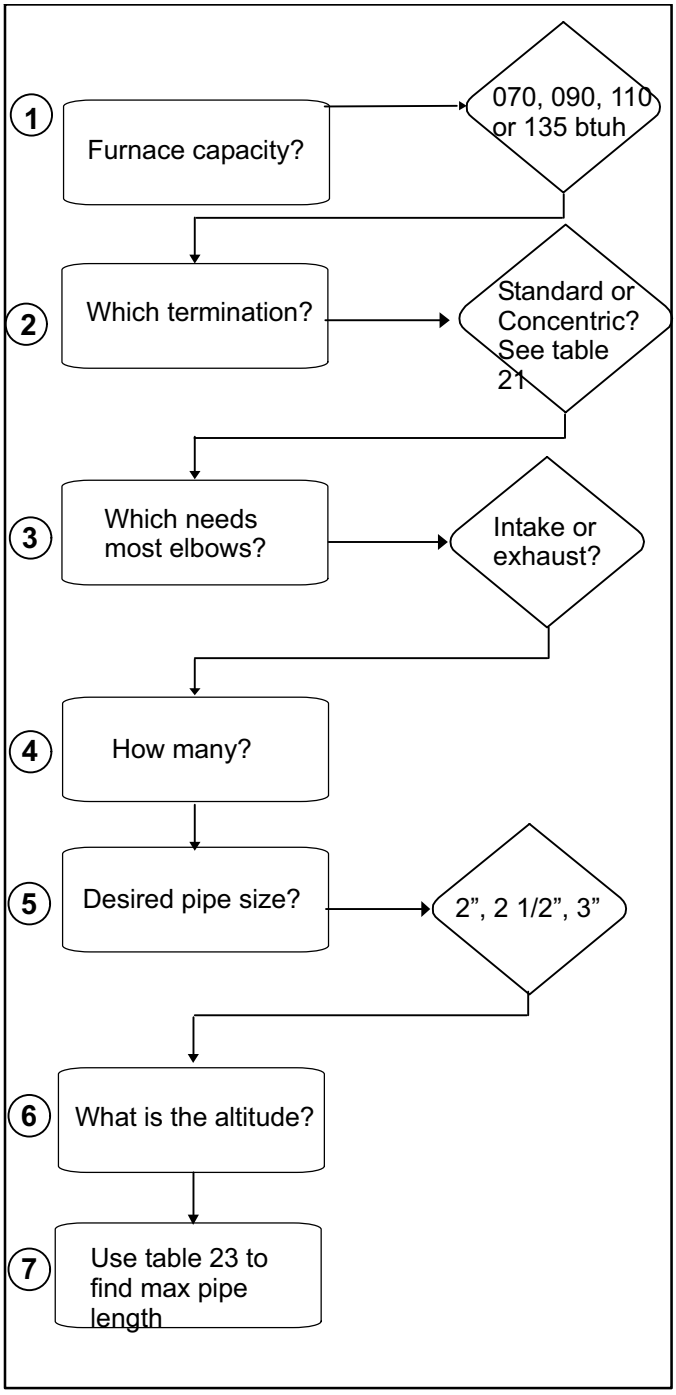


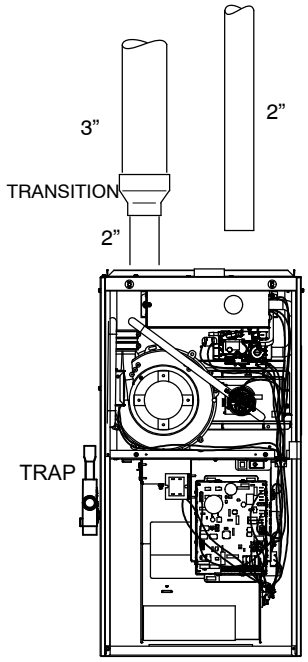
FIGURE 21

TABLE 23
Maximum Allowable Vent Length in Feet

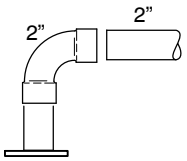
Standard Termination at Elevation 0 - 7500'													
Number Of 90° Elbows Used	Pipe Size	2"				2-1/2"				3"			
	Model	070	090	110	135	070	090	110	135	070	090	110	135
	1	91	69	n/a	n/a	140	93	43	n/a	162	143	118	114
	2	86	64			135	88	38		157	138	113	109
	3	81	59			130	83	33		152	133	108	104
	4	76	54			125	78	28		147	128	103	99
	5	71	49			120	73	23		142	123	98	94
	6	66	44			115	68	18		137	118	93	89
	7	61	39			110	63	13		132	113	88	84
	8	56	34			105	58	n/a		127	108	83	79
	9	51	29			100	53			122	103	78	74
	10	46	24			95	48			117	98	73	69
Standard Termination at Elevation 7501' - 10,000'													
Number Of 90° Elbows Used	Pipe Size	2"				2-1/2"				3"			
	Model	070	090	110	135	070	090	110	135	070	090	110	135
	1	66	44	n/a	n/a	115	68	n/a	n/a	137	118	93	89
	2	61	39			110	63			132	113	88	84
	3	56	34			105	58			127	108	83	79
	4	51	29			100	53			122	103	78	74
	5	46	24			95	48			117	98	73	69
	6	41	19			90	43			112	93	68	64
	7	36	14			85	38			107	88	63	59
	8	31	n/a			80	33			102	83	58	54
	9	26				75	28			97	78	53	49
	10	21				70	23			92	73	48	44

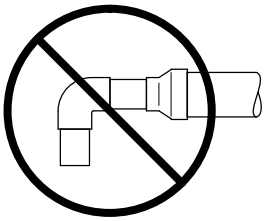
Concentric Termination at Elevation 0 - 7500'													
Number Of 90° Ebows Used	Pipe Size	2"				2-1/2"				3"			
	Model	070	090	110	135	070	090	110	135	070	090	110	135
	1	83	67	n/a	n/a	130	89	39	n/a	146	139	114	105
	2	78	62			125	84	34		141	134	109	100
	3	73	57			120	79	29		136	129	104	95
	4	68	52			115	74	24		131	124	99	90
	5	63	47			110	69	19		126	119	94	85
	6	58	42			105	64	14		121	114	89	80
	7	53	37			100	59	n/a		116	109	84	75
	8	48	32			95	54			111	104	79	70
	9	43	27			90	49			106	99	74	65
	10	38	22			85	44			101	94	69	60
Concentric Termination at Elevation 7501' - 10,000'													
Number Of 90° Elbows Used	Pipe Size	2"				2-1/2"				3"			
	Model	070	090	110	135	070	090	110	135	070	090	110	135
	1	58	42	n/a	n/a	105	64	n/a	n/a	121	114	89	80
	2	53	37			100	59			116	109	84	75
	3	48	32			95	54			111	104	79	70
	4	43	27			90	49			106	99	74	65
	5	38	22			85	44			101	94	69	60
	6	33	17			80	39			96	89	64	55
	7	28	12			75	34			91	84	59	50
	8	23	n/a			70	29			86	79	54	45
	9	18				65	24			81	74	49	40
	10	13				60	19			76	69	44	35

TYPICAL EXHAUST PIPE CONNECTIONS AND CONDENSATE TRAP INSTALLATION IN UPFLOW APPLICATIONS



Use only the factory- supplied trap. Trap can be installed on either side of cabinet within 5 ft of the furnace

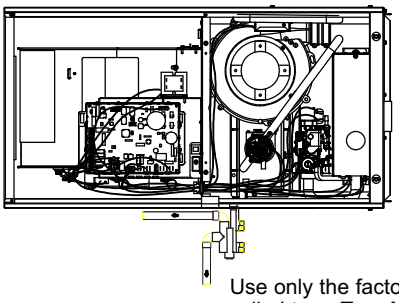


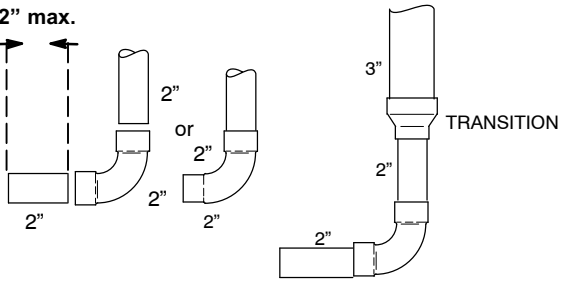


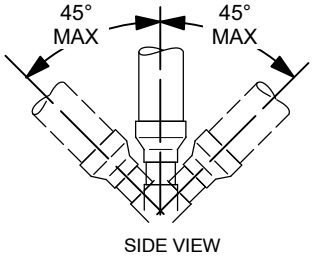
DO NOT transition from smaller to larger pipe size in horizontal runs of exhaust pipe.

FIGURE 22

TYPICAL EXHAUST PIPE CONNECTIONS AND CONDENSATE TRAP INSTALLATION IN HORIZONTAL AIR APPLICATIONS
(RIGHT HAND DISCHARGE SHOWN)







Use only the factory-supplied trap. Trap MUST be installed on left side for left hand discharge within 5 ft of the furnace.

DO NOT transition from smaller to larger pipe size in horizontal runs of exhaust pipe.

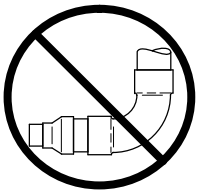


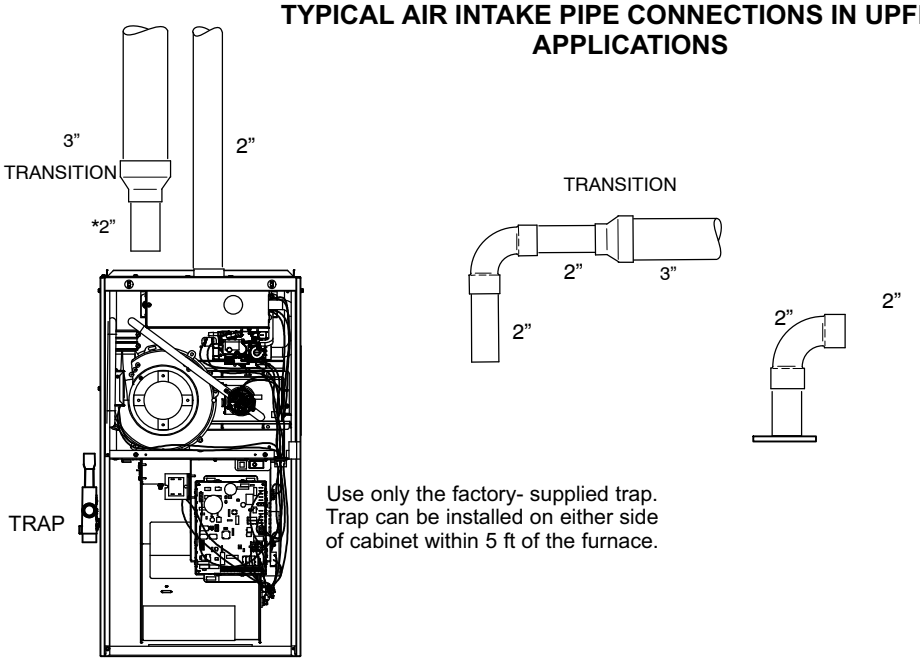
FIGURE 23

Intake Piping

The SLP98UHV furnace may be installed only in **direct vent** applications.

The SLP98UHV is designed for combustion air intake through an inlet in the unit's top cap. Intake air piping is independent of exhaust piping.

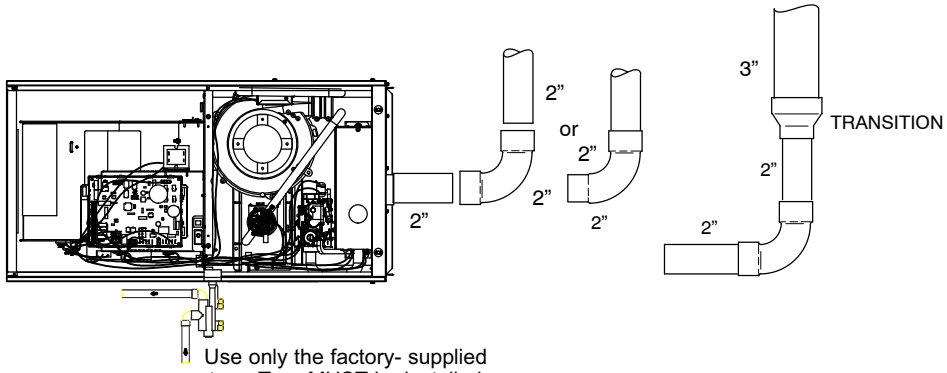
TYPICAL AIR INTAKE PIPE CONNECTIONS IN UPFLOW APPLICATIONS



Use only the factory- supplied trap. Trap can be installed on either side of cabinet within 5 ft of the furnace.

FIGURE 24

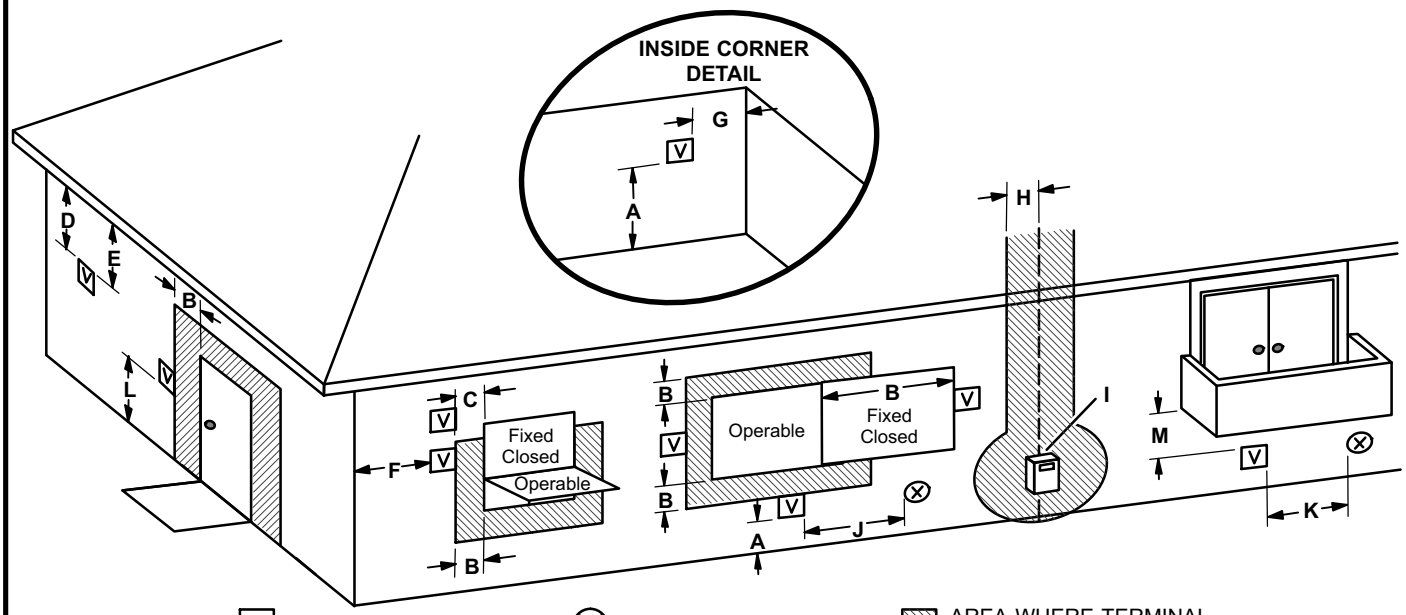
TYPICAL AIR INTAKE PIPE CONNECTIONS IN HORIZONTAL DISCHARGE AIR APPLICATIONS
(RIGHT HAND DISCHARGE SHOWN)



Use only the factory- supplied trap. Trap MUST be installed left side for left hand discharge within 5 ft of the furnace.

FIGURE 25

VENT TERMINATION CLEARANCES
FOR DIRECT VENT INSTALLATIONS IN THE USA AND CANADA



		US Installations[1]	Canadian Installations[2]
A =	Clearance above grade, veranda, porch, deck or balcony	12 inches (305mm) or 12 in. 305mm) above average snow accumulation.	12 inches (305mm) or 12 in. 305mm) above average snow accumulation.
B =	Clearance to window or door that may be opened	6 inches (152mm) for appliances <10,000 Btuh (3kw), 9 inches (mm) for appliances > 10,000 Btuh (3kw) and <50,000 Btuh (15 kw), 12 inches (305mm) for appliances > 50,000 Btuh (15kw)	6 inches (152mm) for appliances <10,000 Btuh (3kw), 12 inches (305mm) for appliances > 10,000 Btuh (3kw) and <100,000 Btuh (30kw), 36 inches (.9m) for appliances > 100,000 Btuh (30kw)
C =	Clearance to permanently closed window	* 12”	* 12”
D =	Vertical clearance to ventilated soffit located above the terminal within a horizontal distance of 2 feet (mm) from the center line of the terminal	* Equal to or greater than soffit depth	* Equal to or greater than soffit depth
E =	Clearance to unventilated soffit	* Equal to or greater than soffit depth	* Equal to or greater than soffit depth
F =	Clearance to outside corner	* No minimum to outside corner	* No minimum to outside corner
G =	Clearance to inside corner	* 3 feet (.9m)	* 3 feet (.9m)
H =	Clearance to each side of center line extended above meter / regulator assembly	3 feet (.9m) within a height 15 feet (4.5m) above the meter / regulator assembly	3 feet (.9m) within a height 15 feet (4.5m) above the meter / regulator assembly
I =	Clearance to service regulator vent outlet	* 3 feet (.9m)	3 feet (.9m)
J =	Clearance to non-mechanical air supply inlet to building or the combustion air inlet to any other appliance	6 inches (152mm) for appliances <10,000 Btuh (3kw), 9 inches (mm) for appliances > 10,000 Btuh (3kw) and <50,000 Btuh (15 kw), 12 inches (305mm) for appliances > 50,000 Btuh (15kw)	6 inches (152mm) for appliances <10,000 Btuh (3kw), 12 inches (305mm) for appliances > 10,000 Btuh (3kw) and <100,000 Btuh (30kw), 36 inches (.9m) for appliances > 100,000 Btuh (30kw)
K =	Clearance to mechanical air supply inlet	3 feet (.9m) above if within 10 feet (3m) horizontally	6 feet (1.8m)
L =	Clearance above paved sidewalk or paved driveway located on public property	* 7 feet (2.1m)	7 feet (2.1m)†
M =	Clearance under veranda, porch, deck or balcony	*12 inches (305mm)‡	12 inches (305mm)‡

[1] In accordance with the current ANSI Z223.1/NFPA 54 Natural Fuel Gas Code

[2] In accordance with the current CSA B149.1, Natural Gas and Propane Installation Code

† A vent shall not terminate directly above a sidewalk or paved driveway that is located between two single family dwellings and serves both dwellings.

‡ Permitted only if veranda, porch, deck or balcony is fully open on a minimum of two sides beneath the floor. Lennox recommends avoiding this location if possible.

*For clearances not specified in ANSI Z223.1/NFPA 54 or CSA B149.1, clearance will be in accordance with local installation codes and the requirements of the gas supplier and these installation instructions.”

FIGURE 26

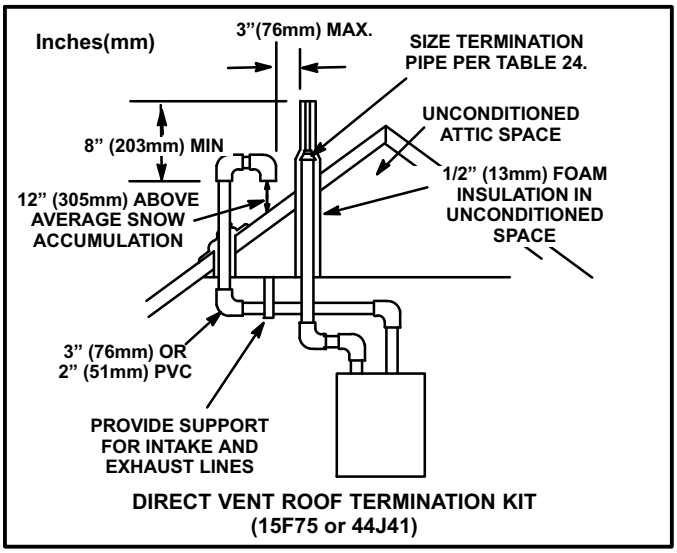
Details of Intake and Exhaust Piping Terminations for Direct Vent Installations

***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 27 through 38 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. On roof terminations, the intake piping should terminate straight down using two 90° elbows (See figure 27).
4. Exhaust piping must terminate straight out or up as shown. 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 24.

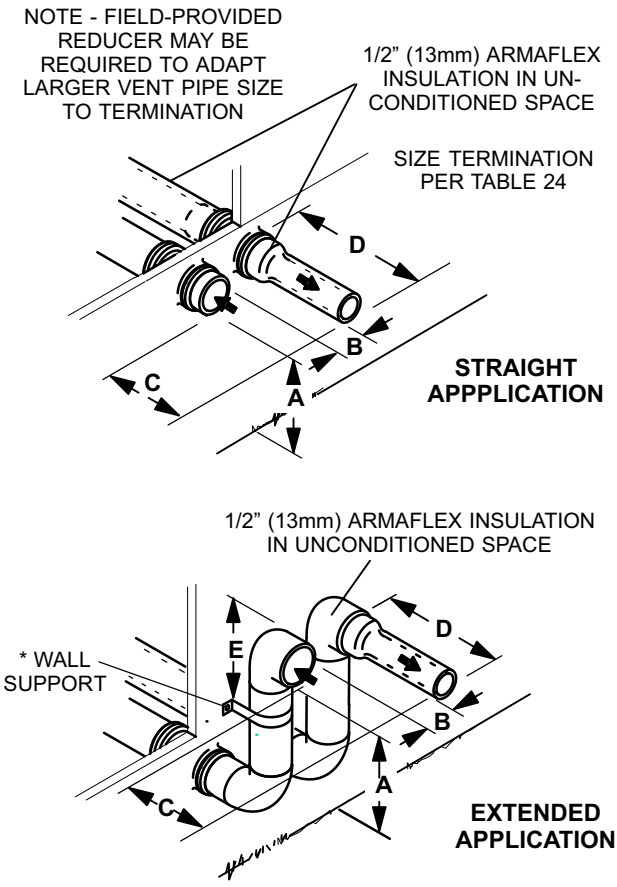
   ***NOTE** - Care must be taken to avoid recirculation of exhaust back into intake pipe.*



DIRECT VENT ROOF TERMINATION KIT (15F75 or 44J41)

FIGURE 27

FIELD-SUPPLIED WALL TERMINATION OR (15F74) WALL RING TERMINATION KIT



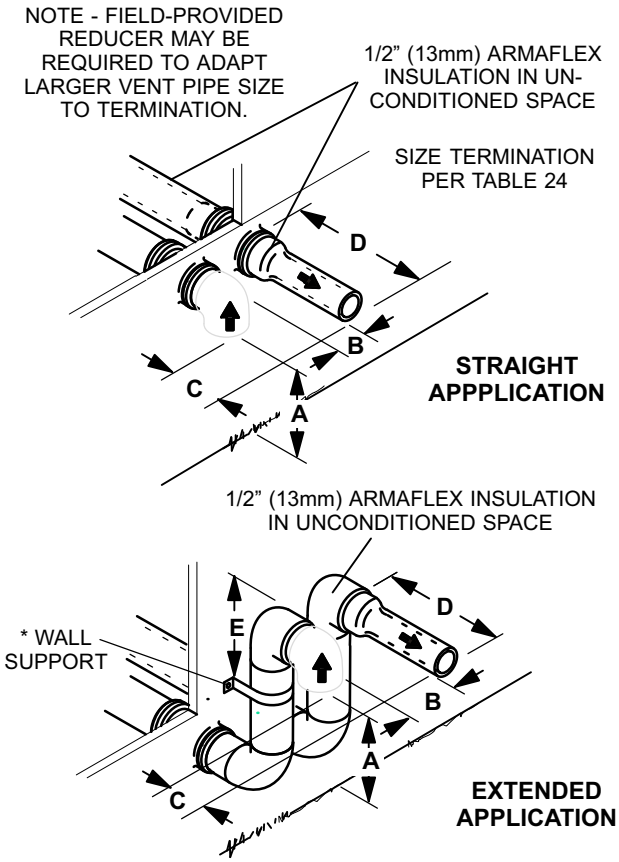
See venting table 23 for maximum venting lengths with this arrangement.

* Use wall support every 24" (610 mm). Use two wall supports if extension is greater than 24" (610 mm) but less than 48" (1219 mm). NOTE - One wall support must be 6" (152 mm) from top of each pipe (intake and exhaust).

	2" (51mm) Vent Pipe	3" (76mm) Vent Pipe
A-Minimum clearance above grade or average snow accumulation	12" (508MM)	12" (508MM)
B-Maximum horizontal separation between intake and exhaust	6" (152MM)	6" (152MM)
C-Minimum from end of exhaust to inlet of intake	8" (203MM)	8" (203MM)
D-Maximum exhaust pipe length	12" (305MM)	20" (508MM)
E-Maximum wall support distance from top of each pipe (intake/exhaust)	6" (152MM)	6" (152MM)

FIGURE 28

FIELD-SUPPLIED WALL TERMINATION OR (15F74) WALL RING TERMINATION KIT With INTAKE ELBOW



See venting table 23 for maximum venting lengths with this arrangement.

* Use wall support every 24" (610 mm). Use two wall supports if extension is greater than 24" (610 mm) but less than 48" (1219 mm). NOTE - One wall support must be 6" (152 mm) from top of each pipe (intake and exhaust).

	2" (51mm) Vent Pipe	3" (76mm) Vent Pipe
A-Minimum clearance above grade or average snow accumulation	12" (508MM)	12" (508MM)
B-Maximum horizontal separation between intake and exhaust	6" (152MM)	6" (152MM)
C-Minimum from end of exhaust to inlet of intake	6" (152MM)	6" (152MM)
D-Maximum exhaust pipe length	12" (305MM)	20" (508MM)
E-Maximum wall support distance from top of each pipe (intake/exhaust)	6" (152MM)	6" (152MM)

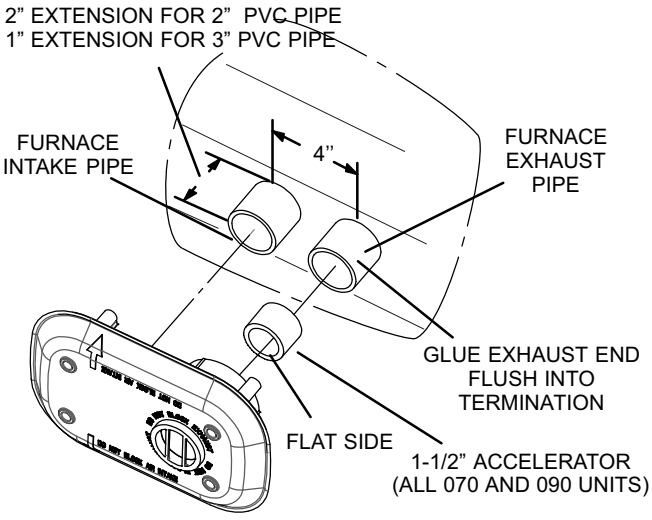
FIGURE 29

TABLE 24
EXHAUST PIPE TERMINATION SIZE REDUCTION

SLP98UHV MODEL	Exhaust Pipe Size	Termination Pipe Size
*070	2", 2-1/2" or 3"	1-1/2"
*090	2", 2-1/2" or 3"	2"
110	2-1/2" or 3"	2"
135	3"	2"

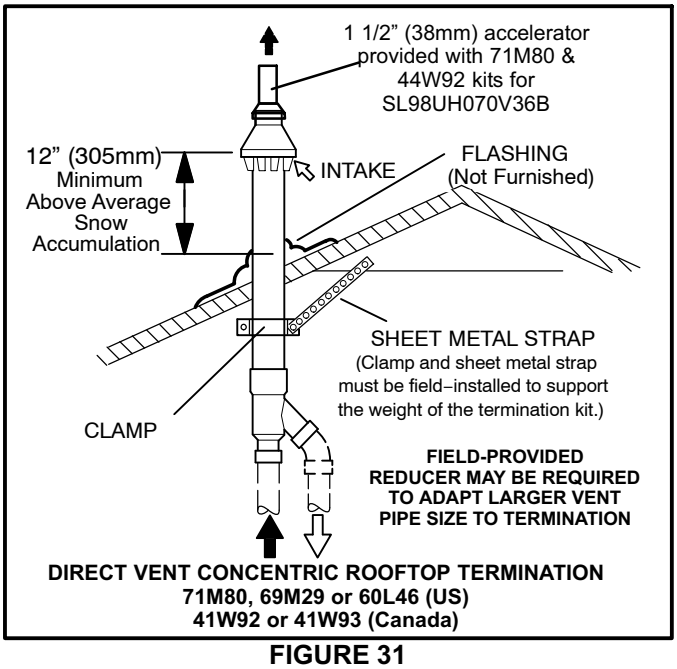
**SLP98UH-070 and -090 units with the flush-mount termination must use the 1-1/2"accelerator supplied with the kit.*

5. On field-supplied terminations for side wall exit, exhaust piping may extend a maximum of 12 inches (305mm) for 2" PVC and 20 inches (508mm) for 3" (76mm) PVC beyond the outside wall. Intake piping should be as short as possible. See figures 28 and 29.
6. On field-supplied terminations, a minimum distance between the end of the exhaust pipe and the end of the intake pipe without a termination elbow is 8" and a minimum distance of 6" with a termination elbow. See figures 28 and 29.
7. 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 24" (610mm) as shown in figures 28 and 29. In addition, close coupled wall termination kits must be extended for use in this application. See figures 36 and 37. When exhaust and intake piping must be run up an outside wall, the exhaust piping must be terminated with pipe sized per table 24.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.
8. Based on the recommendation of the manufacturer, a multiple furnace installation may use a group of up to four terminations assembled together horizontally, as shown in figure 33.



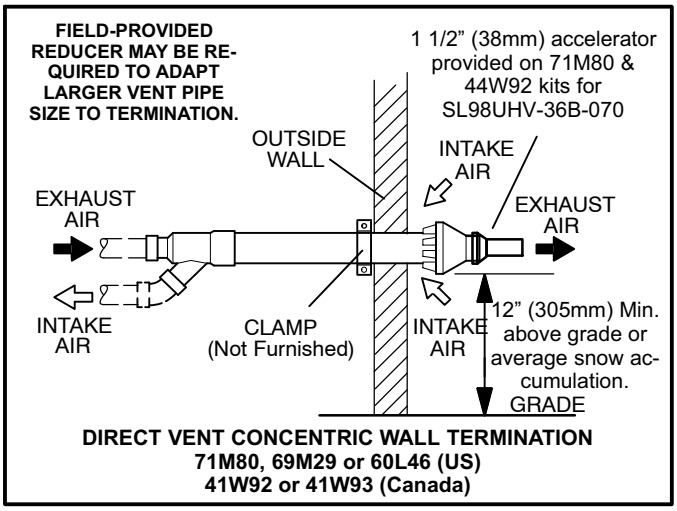
FLUSH-MOUNT SIDE WALL TERMINATION
51W11

FIGURE 30



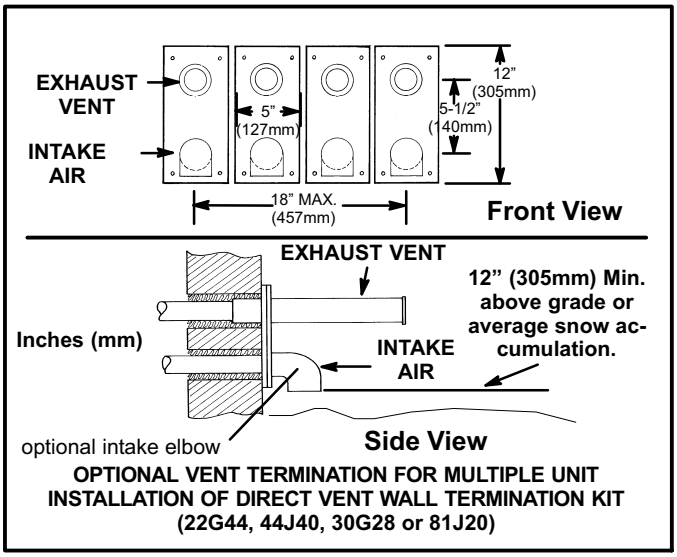
DIRECT VENT CONCENTRIC ROOFTOP TERMINATION
71M80, 69M29 or 60L46 (US)
41W92 or 41W93 (Canada)

FIGURE 31



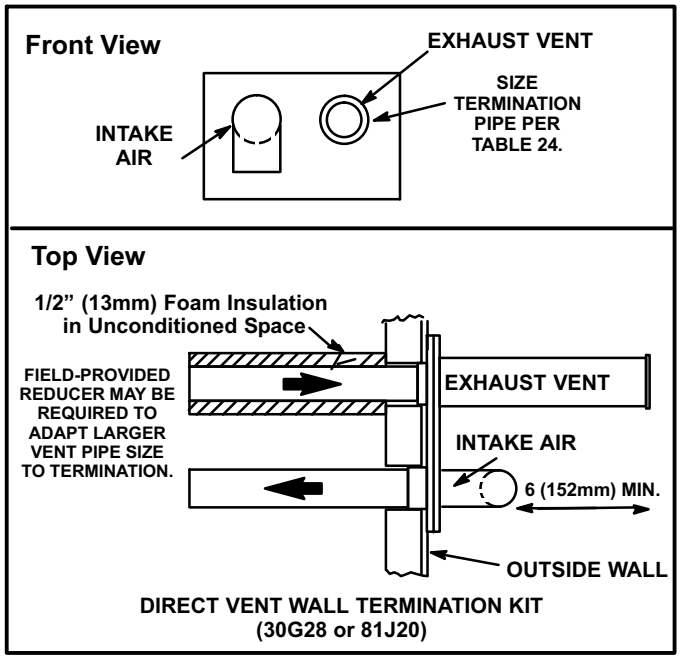
DIRECT VENT CONCENTRIC WALL TERMINATION
71M80, 69M29 or 60L46 (US)
41W92 or 41W93 (Canada)

FIGURE 32



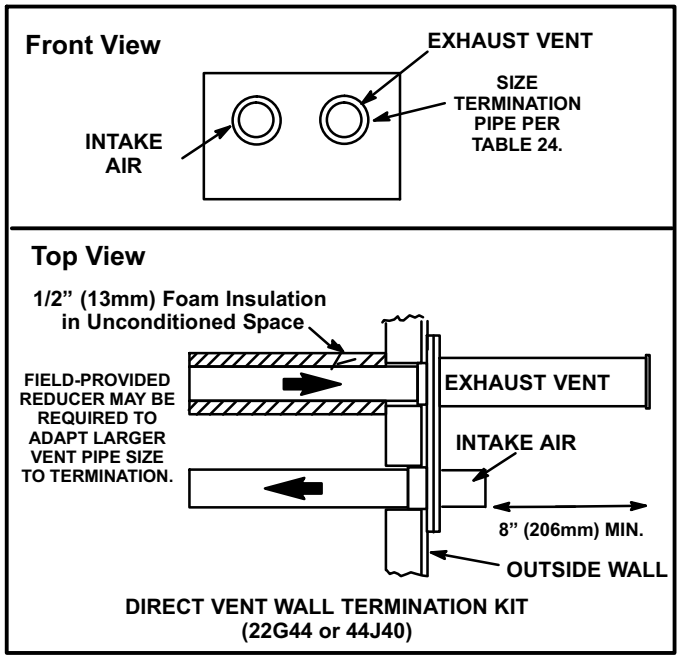
OPTIONAL VENT TERMINATION FOR MULTIPLE UNIT INSTALLATION OF DIRECT VENT WALL TERMINATION KIT
(22G44, 44J40, 30G28 or 81J20)

FIGURE 33



DIRECT VENT WALL TERMINATION KIT
(30G28 or 81J20)

FIGURE 34



DIRECT VENT WALL TERMINATION KIT
(22G44 or 44J40)

FIGURE 35

WALL TERMINATION KITS (CLOSE−COUPLE)
EXTENDED VENT FOR GRADE CLEARANCE
2 inch (51 mm) 22G44 (US)
3 inch (76 mm) 44J40 (US)

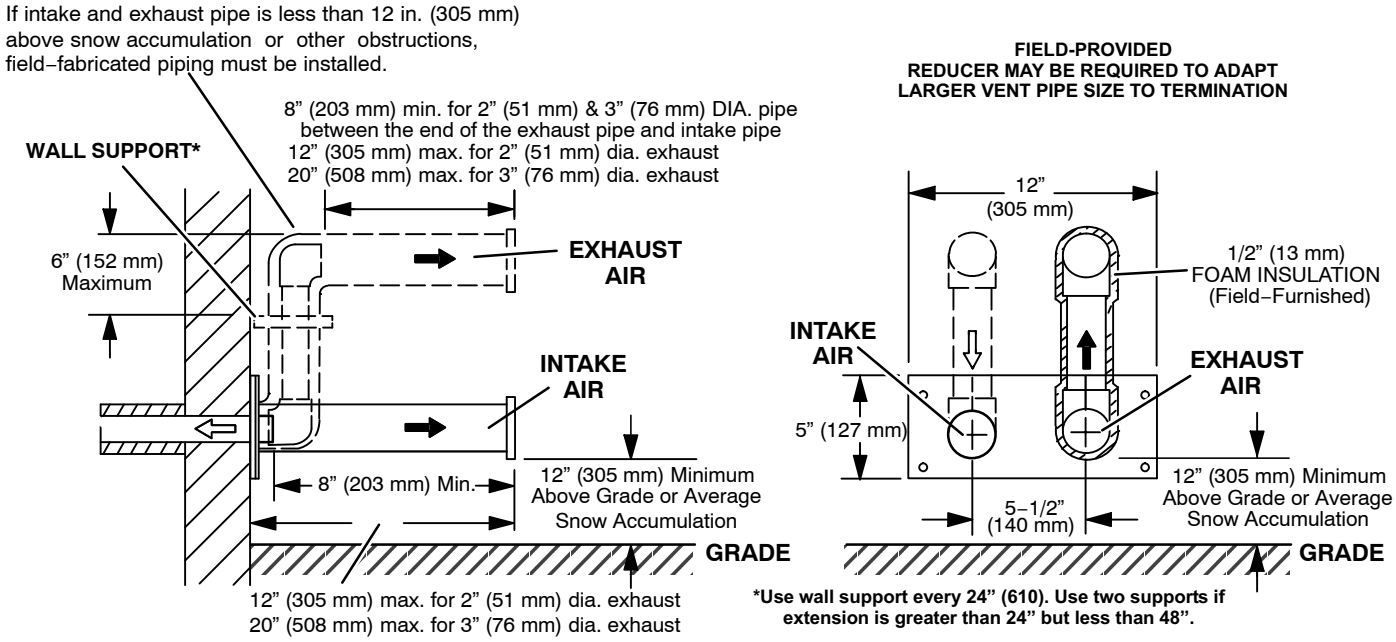


FIGURE 36

WALL TERMINATION KITS (CLOSE−COUPLE)
EXTENDED VENT FOR GRADE CLEARANCE
2 inch (51 mm) 30G28 (WTK Canada)
3 inch (76 mm) 81J20 (WTK Canada)
See Installation Instructions for additional information.

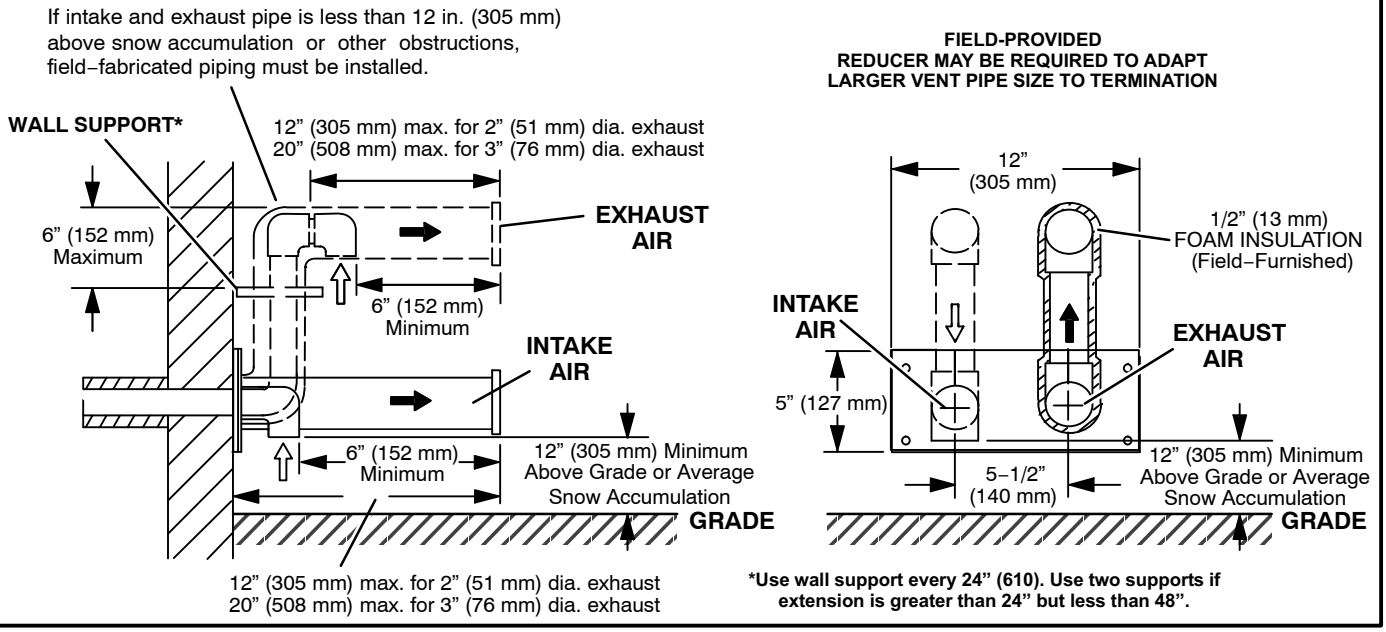
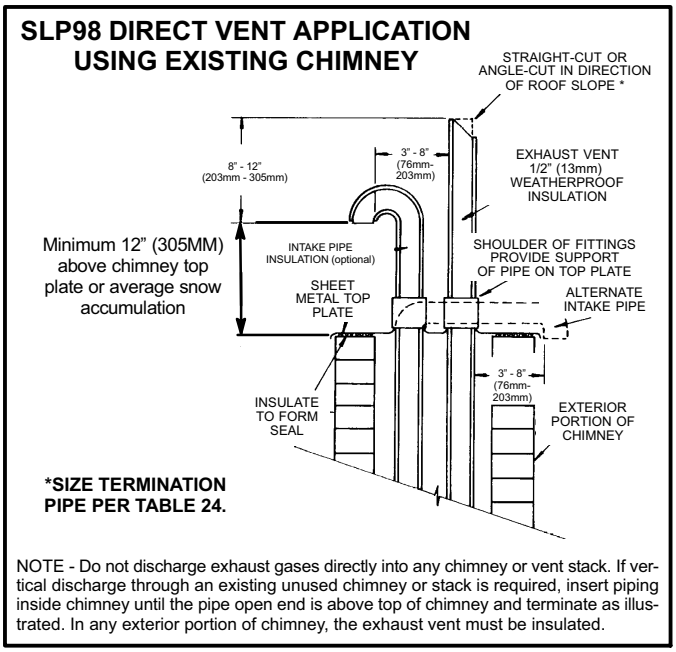


FIGURE 37



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.

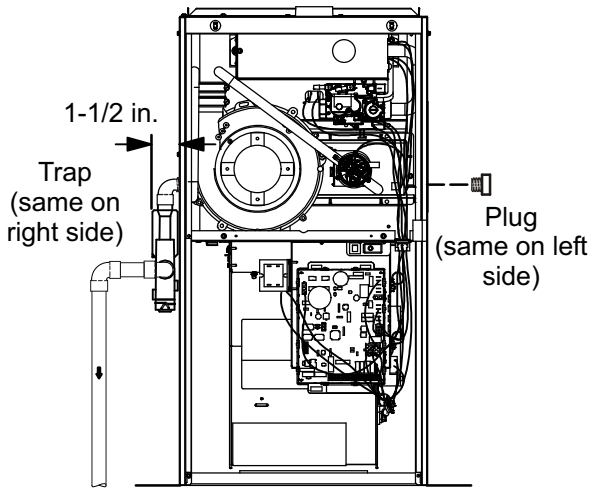
FIGURE 38

Condensate Piping

This unit is designed for either right- or left-side exit of condensate piping in upflow applications. In horizontal applications, the condensate trap must extend below the unit. An 8" service clearance is required for the condensate trap. Refer to figure 39 for condensate trap locations.

***NOTE** - If necessary the condensate trap may be installed up to 5 feet away from the furnace. Piping from furnace must slope down a minimum of 1/4" per ft. toward trap.*

CONDENSATE TRAP AND PLUG LOCATIONS
(Unit shown in upflow position)



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 or trap must be relocated to avoid interference.

FIGURE 39

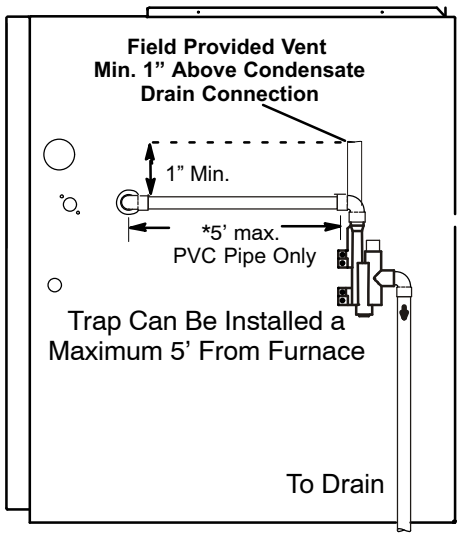
1 - Determine which side condensate piping will exit the unit, location of trap, field-provided fittings and length of PVC pipe required to reach available drain.

2 - Remove plug (figure 39) from the cold end header box at the appropriate location on the side of the unit. Install field-provided 1/2 NPT male fitting into cold end header box. Use teflon tape or appropriate pipe dope.

3 - Install drain trap using appropriate PVC fittings, glue all joints. Glue the provided drain trap as shown in figure 41. Route the condensate line to an open drain.

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

CONDENSATE TRAP LOCATIONS
(Unit shown in upflow position with remote trap)



**Piping from furnace must slope down a minimum of 1/4" per ft. toward trap.*

FIGURE 40

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.

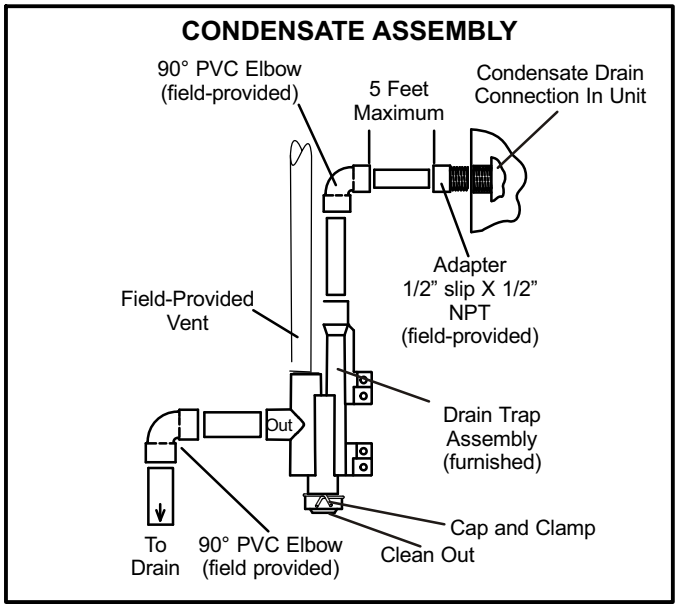


FIGURE 41

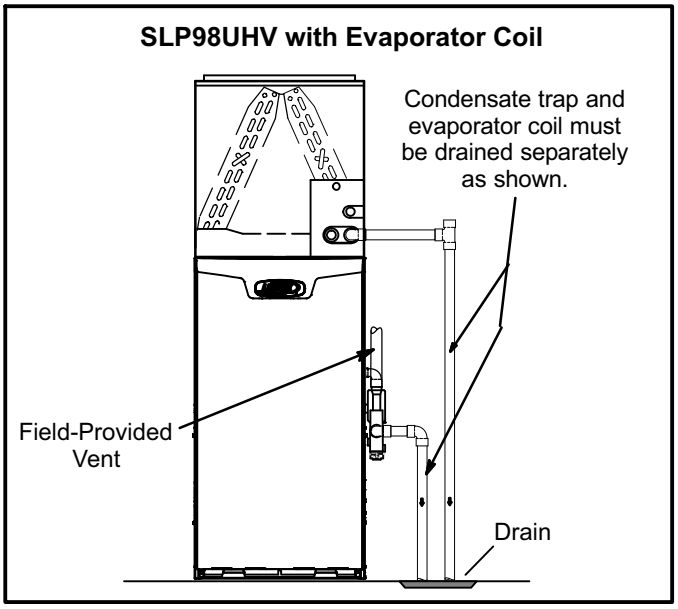


FIGURE 42

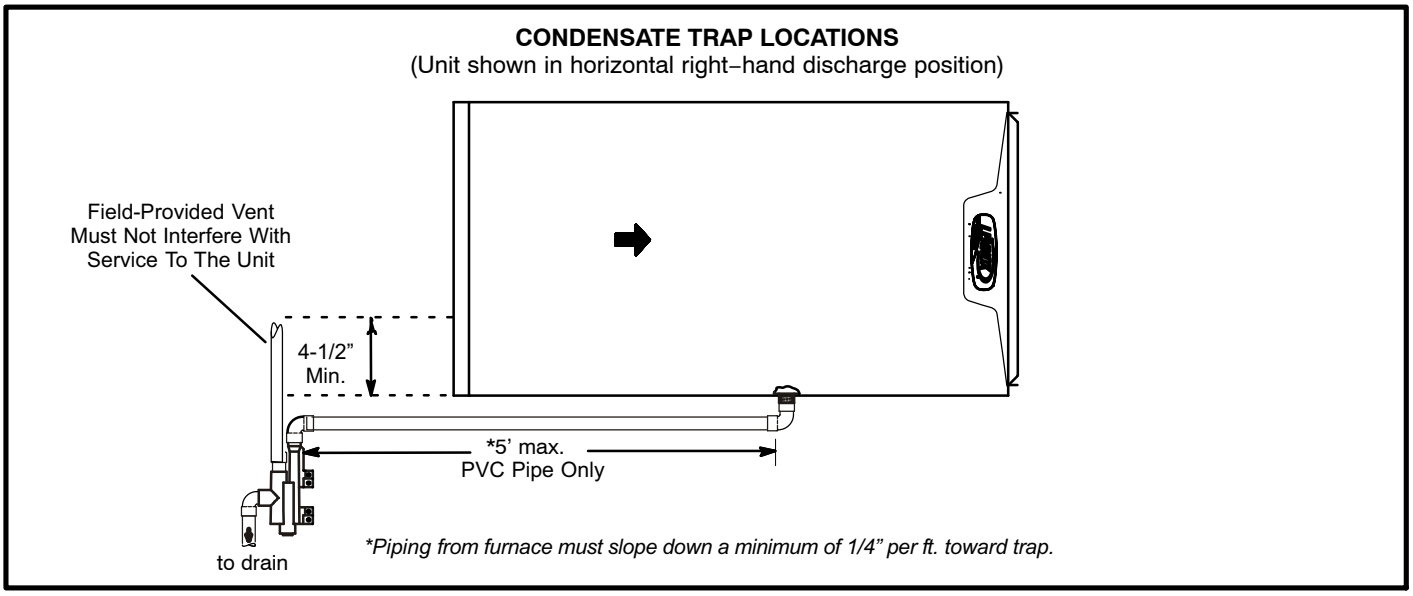


FIGURE 43

⚠ CAUTION

A separate drain line must be run to the drain from the condensate trap. DO NOT connect the condensate trap drain into the drain line from the evaporator coil.

IV-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 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 SLP98UHV 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. Force or attempted repair may result in a fire or explosion.

Placing the furnace into operation:

SLP98UHV 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 44)

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 44.

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.

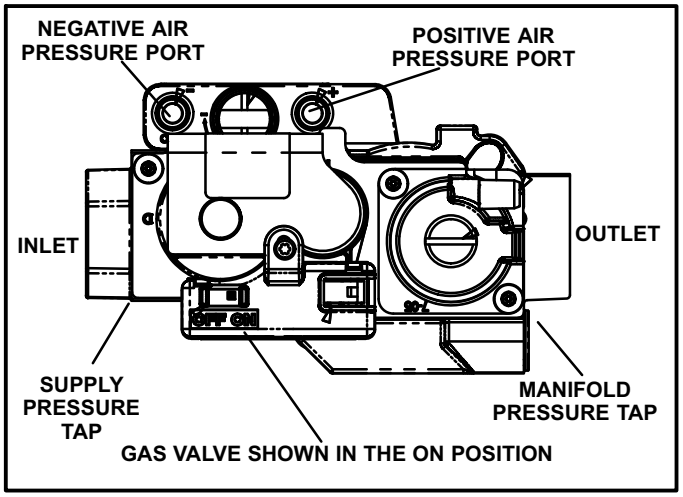


FIGURE 44

8 - Move gas valve switch to the **ON** position. See figure 44. 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.

Failure To Operate

If the unit fails to operate, check the following:

1 - Is the thermostat calling for heat?

2 - Are access panels securely in place?

3 - Is the main disconnect switch closed?

4 - Is there a blown fuse?

5 - Is the filter dirty or plugged? Dirty or plugged filters will cause the limit control to shut the unit off.

6 - Is gas turned on at the meter?

7 - Is the manual main shut-off valve open?

8 - Is the gas valve turned on?

9 - Is the unit ignition system in lock out? If the unit locks out again, inspect the unit for blockages.

10 - Is blower harness connected to integrated control? Furnace will not operate unless harness is connected.

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.

V-HEATING SYSTEM SERVICE CHECKS

A-CSA Certification

All units are CSA design certified without modifications. Refer to the SLP98UHV 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. The flexible connector can then be added between the black iron pipe and the gas supply line.

⚠ 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 45.

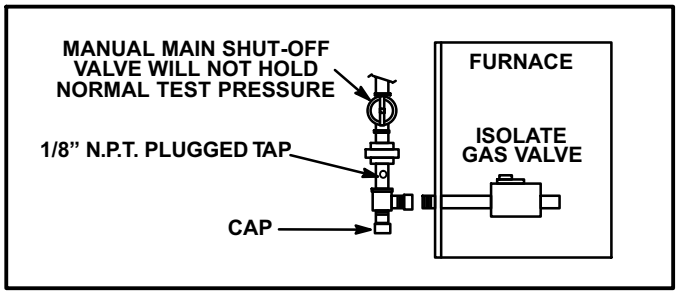


FIGURE 45

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 44. 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 25 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 25.

TABLE 25

All SLP98UHV Units	Natural	LP
Line Pressure WC"	4.5 - 10.5	11.0 - 13.0

E-Check Manifold Pressure

To correctly measure manifold pressure, 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 valve.

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

3 - Start unit on low heat (35% 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 burner. Natural gas should burn blue.

5 - After allowing unit to run for 5 minutes, record manifold pressure and compare to value given in table 29.

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

⚠CAUTION

Do not attempt to make adjustments to the gas valve.

F- Proper Gas Flow (Approximate)

TABLE 26

GAS METER CLOCKING CHART				
SLP98 Unit	Seconds for One Revolution			
	Natural		LP	
	1 cu ft Dial	2 cu ft Dial	1 cu ft Dial	2 cu ft DIAL
-70	55	110	136	272
-90	41	82	102	204
-110	33	66	82	164
-135	27	54	68	136
Natural-1000 btu/cu ft LP-2500 btu/cu ft				

Furnace should operate at least 5 minutes before checking gas flow. Determine time in seconds for **two** revolutions of gas through the meter. (Two revolutions assures a more accurate time.) **Divide by two** and compare to time in table 26 below. If manifold pressure matches table 29 and rate is incorrect, check gas orifices for proper size and restriction.

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

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 50 ppm.**

H- High Altitude

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

SLP98UHV 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 29. Table 29 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 27
High Fire

SLP98UHV Unit	CO_2% For Nat	CO_2% For L.P.
36B-070	7.5 - 8.5	9.0 - 10.0
36C-090		
60C-090		
60C-110		
60D-135		
The maximum carbon monoxide reading should not exceed 50 ppm.		

TABLE 28
Low Fire

SLP98UHV Unit	CO_2% For Nat	CO_2% For L.P.
36B-070	5.2 - 6.2	6.7 - 7.7
36C-090		
60C-090		
60C-110		
60D-135		
The maximum carbon monoxide reading should not exceed 50 ppm.		

TABLE 29
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.)				Gas Orifice Size	
	0 - 10,000 (0 - 3048 m)	0 - 7,500 (0 - 2286 m)	7,501 - 10,000 (2287 - 3048m)	Low Fire (35% rate)		High Fire (100% rate)			
				Natural Gas	LP/Propane	Natural Gas	LP/Propane	Nat	LP
-070	65W77	Not required	70W90	0.4 - 0.6	1.2 - 1.8	3.2 - 3.8	9.5 - 10.5	0.0625	0.034
-090									
-110									
-135									

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

VI-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 SLP98UHV 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 46.

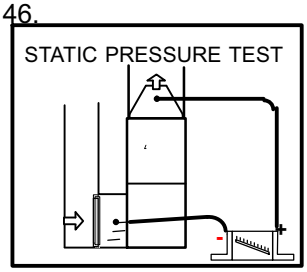


FIGURE 46

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.

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. in the heating mode and must not exceed 1.0" W.C in the cooling mode.

5 - Seal the hole when the check is complete.

VII-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 SLP98UHV filters are installed external to the unit. Filters should be inspected monthly. Clean or replace the filters when necessary to ensure proper furnace operation. All SLP98UHV units use a 16 x 25 x1 filter.

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.

NOTE - After any heavy snow, ice or frozen fog event the furnace vent pipes may become restricted. Always check the vent system and remove any snow or ice that may be obstructing the plastic intake or exhaust pipes.

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 furnace access panels.
3 - Disconnect the 2-pin plug from the gas valve.
4 - Remove gas supply line connected to gas valve. Remove the burner box cover and 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 four burner box screws at the vestibule panel and remove burner box. Set burner box assembly aside.
***NOTE** - If necessary, clean burners at this time. Follow procedures outlined in Burner Cleaning section.*
8 - Loosen the clamps to the flexible exhaust coupling.
9 - Disconnect condensate drain line from the cold end header box.
10 - Disconnect condensate drain tubing from flue collar. Remove screws that secures the flue collar into place. Remove flue collar. It may be necessary to cut the exiting exhaust pipe for removal of the fitting.
11 - Mark and disconnect all combustion air pressure tubing from cold end header collector box.
12 - Mark and remove wires from pressure switches. Remove pressure switches. Keep tubing attached to pressure switches.
13 - Disconnect the 4-pin plug from the combustion air inducer. Remove two screws which secure combustion air inducer to collector box. Remove combustion air inducer assembly. Remove ground wire from vest panel.
14 - Remove cold end header box.
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.
18 - 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.
19 - Back wash heat exchanger with soapy water solution or steam. **If steam is used it must be below 275°F (135°C) .**
20 - Thoroughly rinse and drain the heat exchanger. Soap solutions can be corrosive. Take care to rinse entire assembly.

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

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

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

24 - Reinstall the primary limit on the vestibule panel.

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

26 - Reinstall electrical junction box.

27 - Reinstall the cold end header box.

28 - Reinstall the combustion air inducer. Reconnect the 4-pin plug to the wire harness.

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 - Reconnect condensate drain line to the cold end header box.

32 - Use securing screws to reinstall flue collar to the top cap on the furnace. Reconnect exhaust piping and exhaust drain tubing.

33 - Replace flexible exhaust adapter on combustion air inducer and flue collar. Secure using two existing hose clamps.

34 - Reinstall burner box assembly in vestibule area.

35 - Reconnect flame roll-out switch wires.

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

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

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

39 - Reinstall burner box cover.

40 - Reconnect 2-pin plug to gas valve.

41 - Replace the blower compartment access panel.

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

43 - 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.

44 - 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 - Remove the burner box cover.

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

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

6 - Remove four screws which secure burner box assembly to vest panel. Remove burner box from the unit.

7 - 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.

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

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

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

11 - Reconnect 2-pin plug to gas valve.

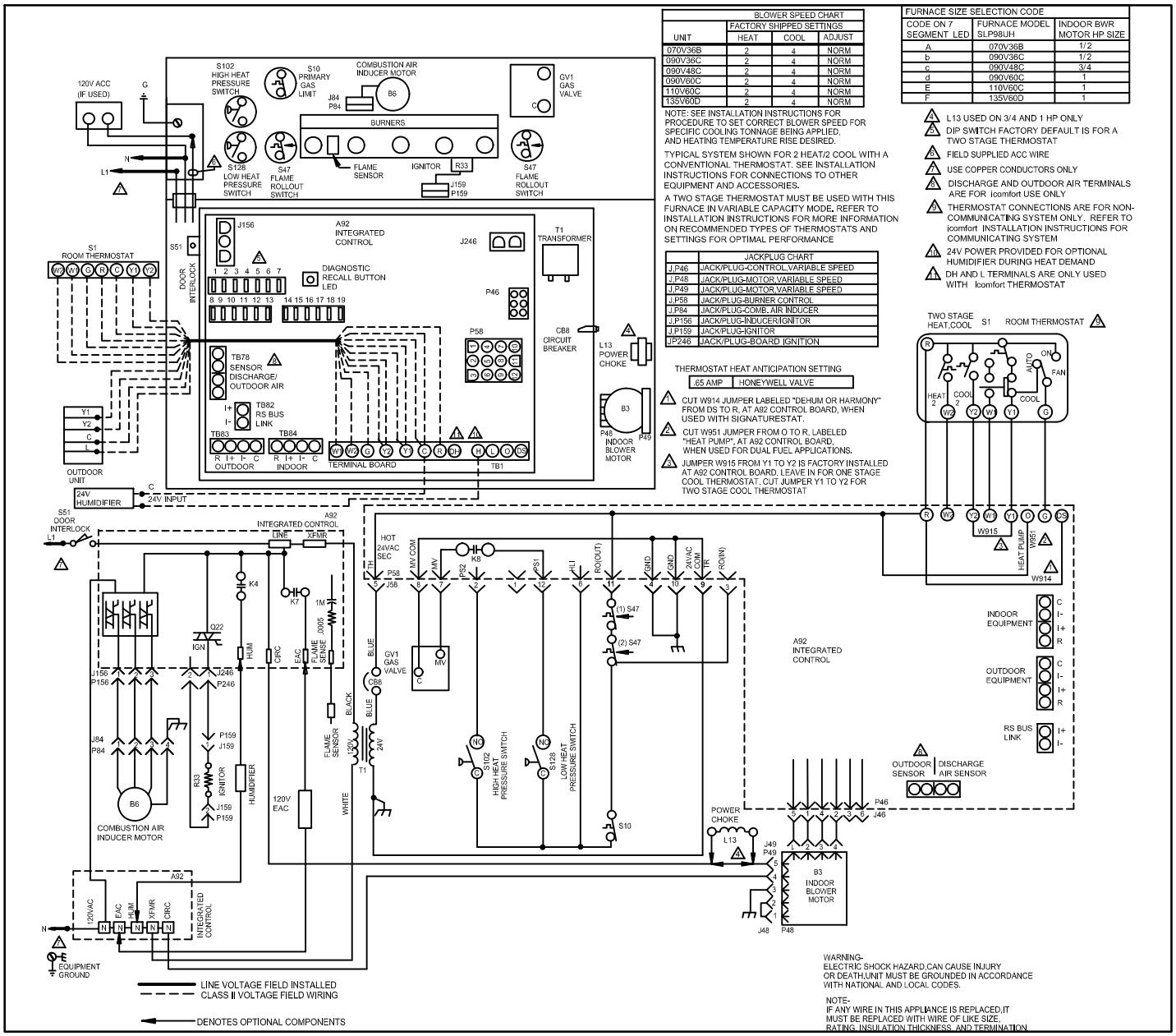
12 - Replace the blower compartment access panel.

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

14 - 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.

15 - Replace heating compartment access panel.

VIII- Wiring and Sequence of Operation



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

Applications Using a Two-Stage Thermostat

A - Heating Sequence -- Control 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 appropriate target rate. If the furnace is operating in the initial heating cycle after power-up, the initial firing rate will be approximately 35 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 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 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.

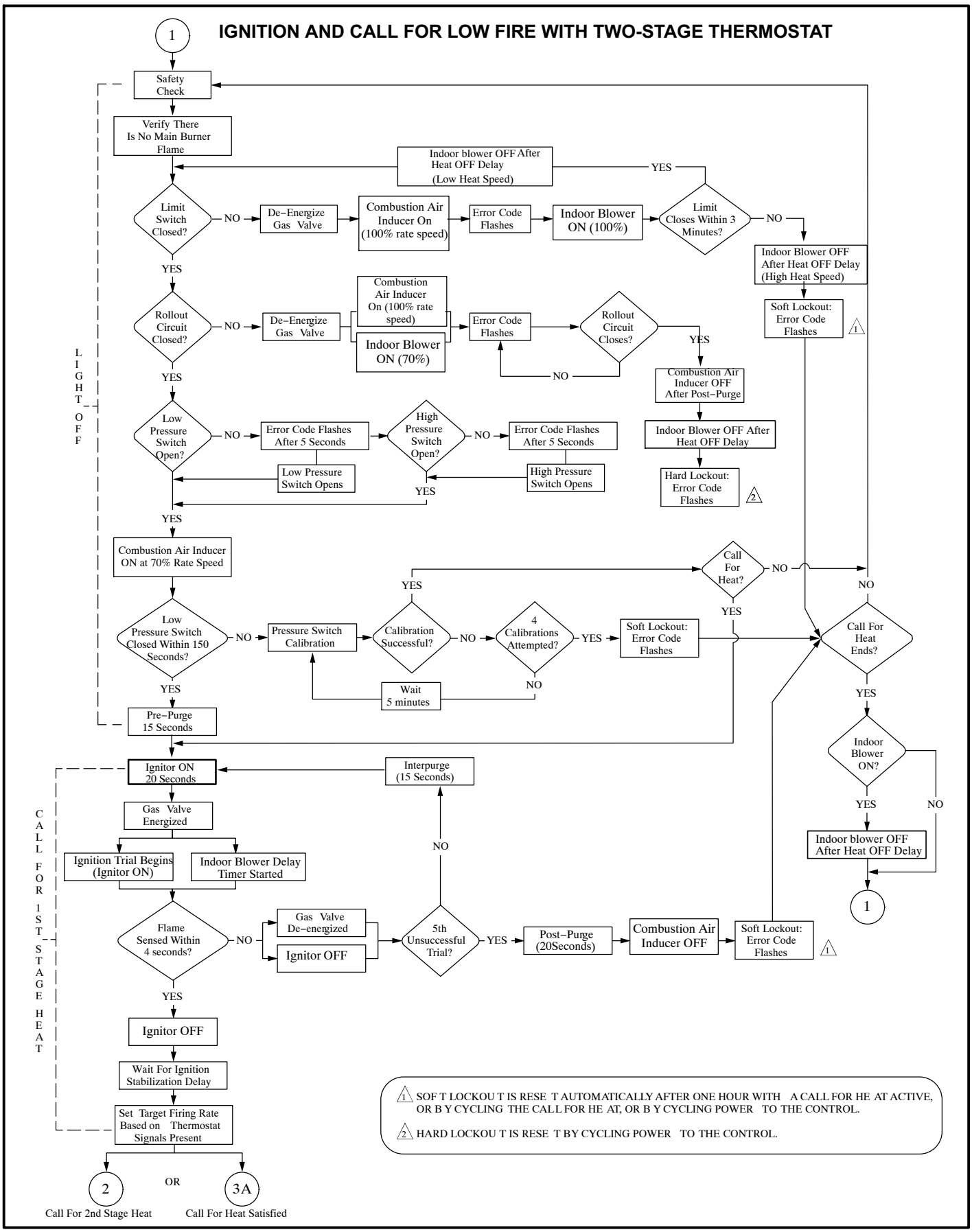
5 - If second-stage heat is required, the thermostat second-stage heat contacts close and send a signal to the integrated control. The integrated control initiates a 30-second second-stage recognition delay.

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.

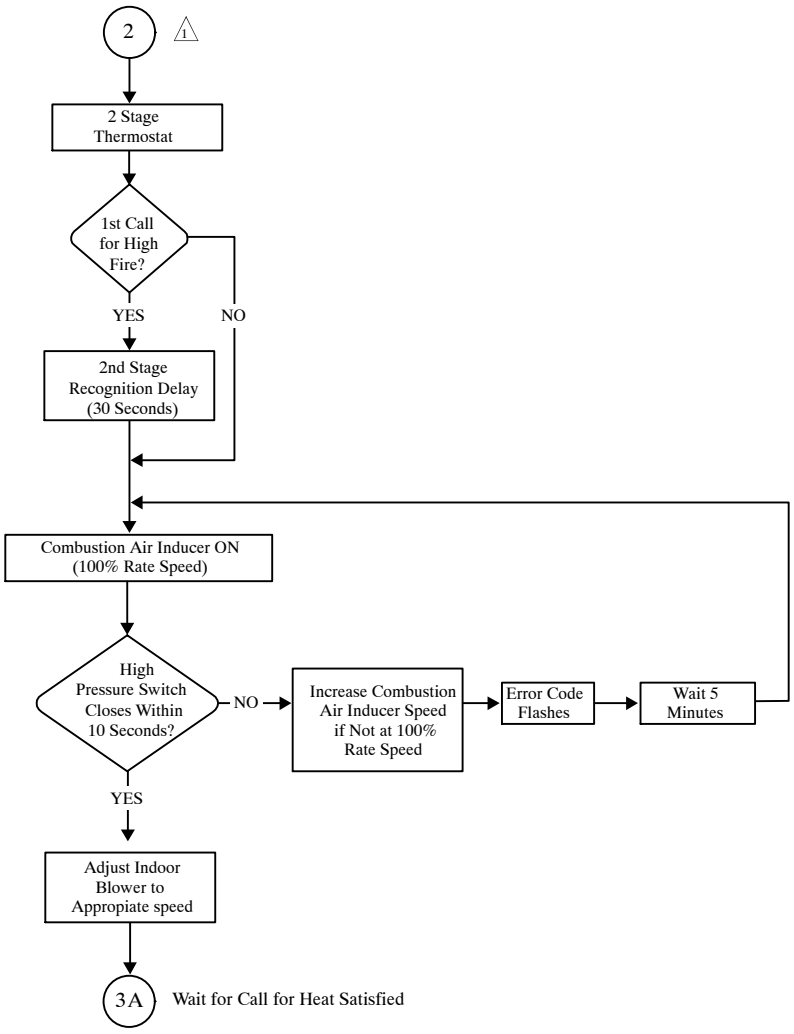
7 - When the demand for high-fire (second stage) heat is satisfied, the gas valve is de-energized and the field-selected indoor blower off delay begins. The combustion air inducer begins a 20-second post-purge period.

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



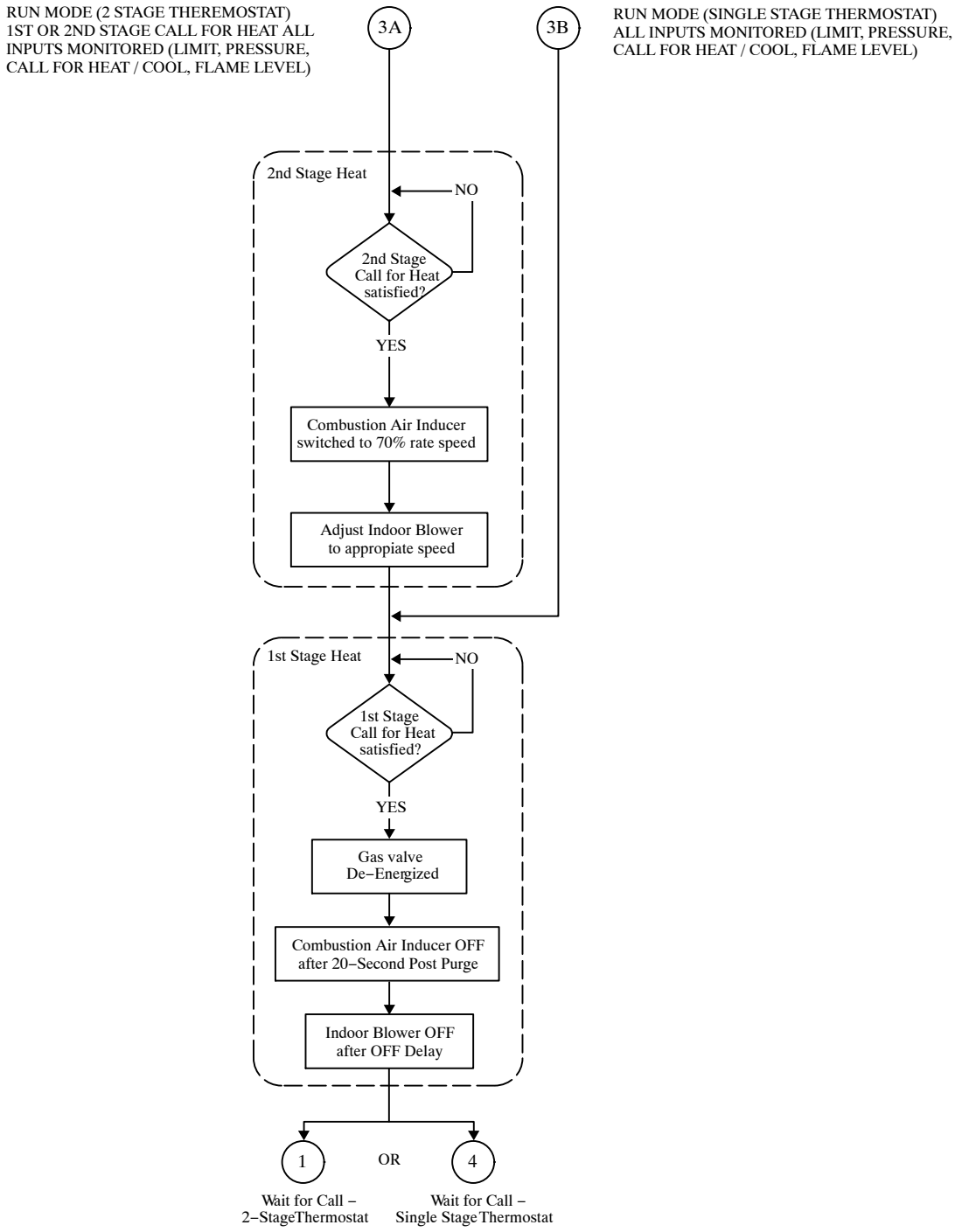
CALL FOR HIGH FIRE WITH TWO-STAGE THERMOSTAT



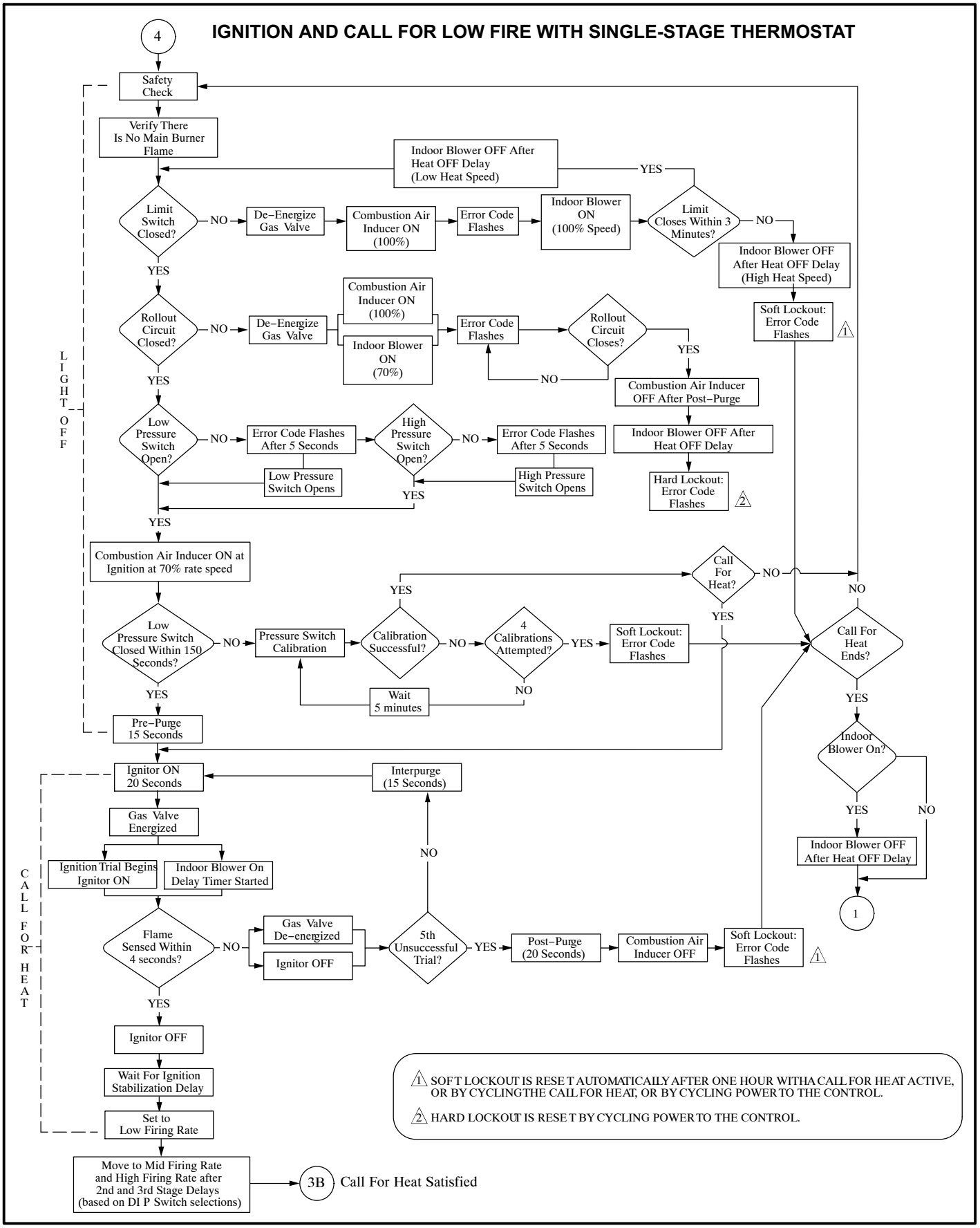
1 System will always light at 70% even if 2nd stage call for heat is in place

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

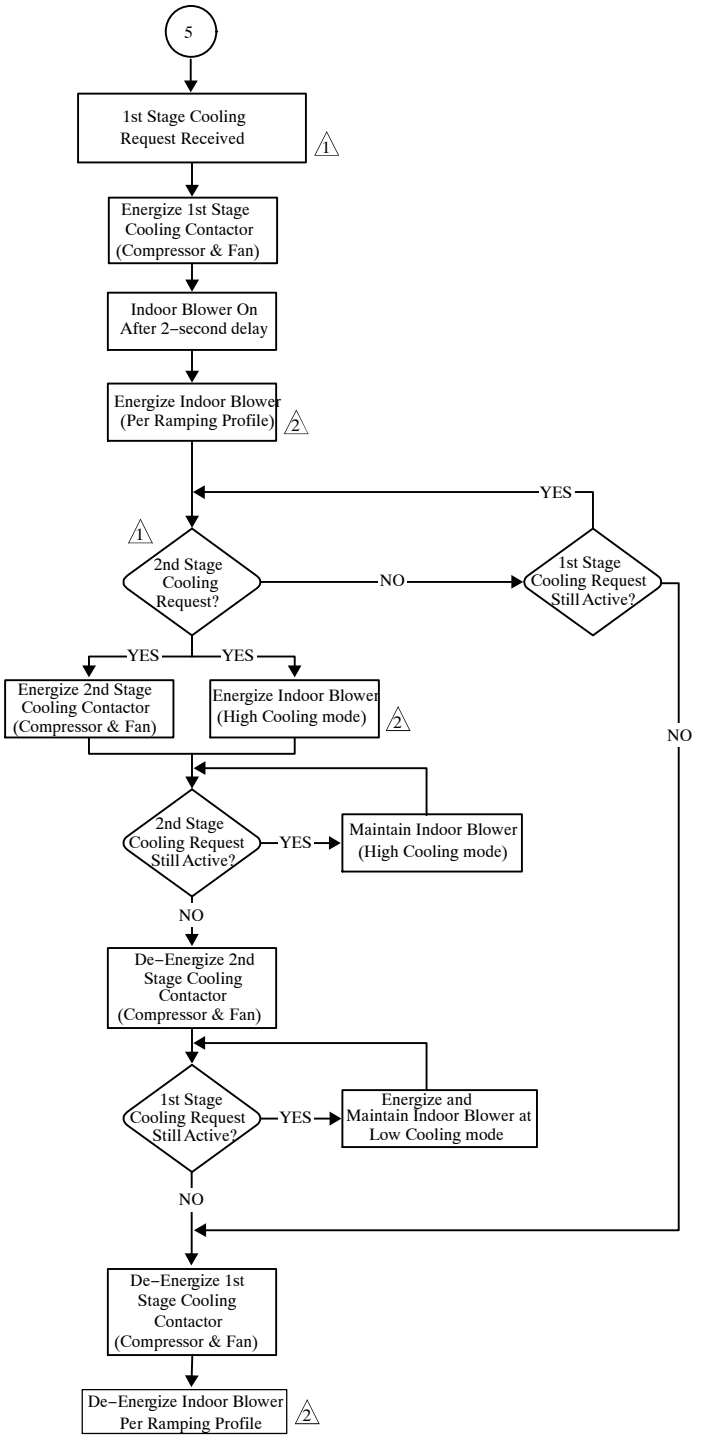
CALL FOR HEAT SATISFIED



IGNITION AND CALL FOR LOW FIRE WITH SINGLE-STAGE THERMOSTAT



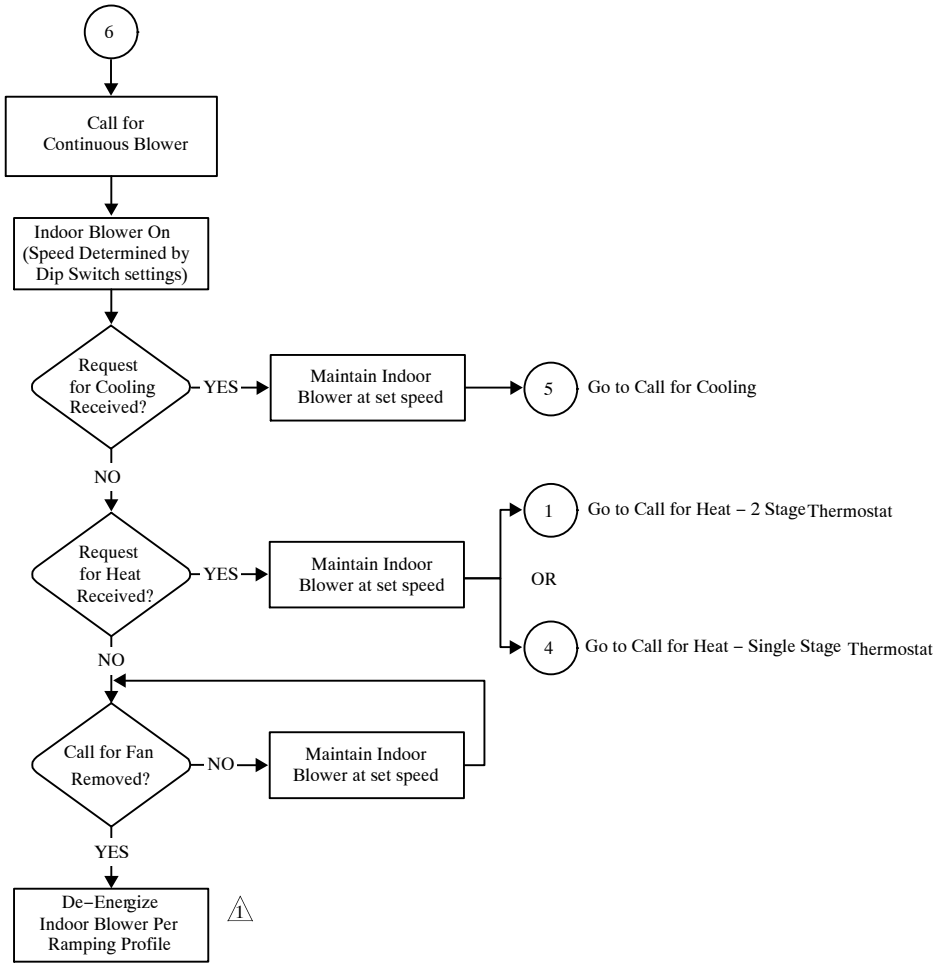
CALL FOR COOLING



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.

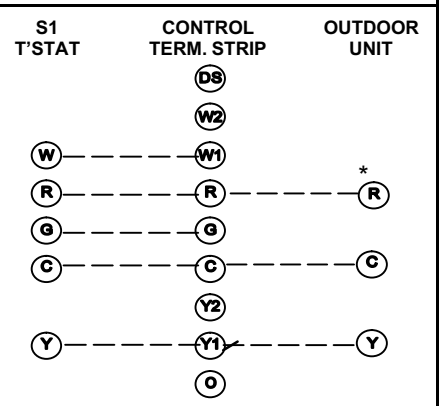
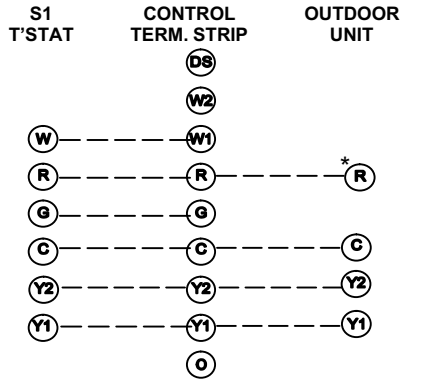
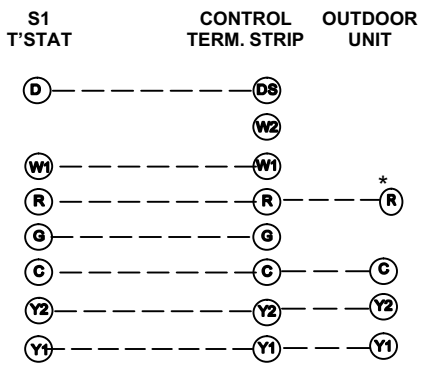
CONTINUOUS LOW SPEED INDOOR BLOWER SEQUENCE OF OPERATION



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.

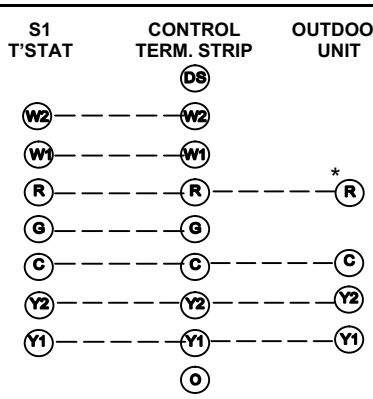
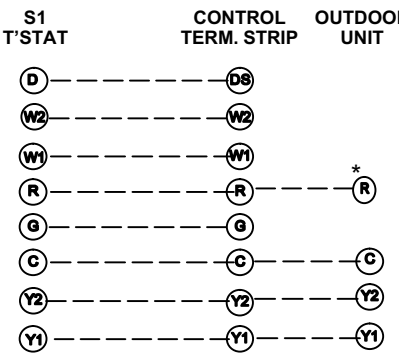
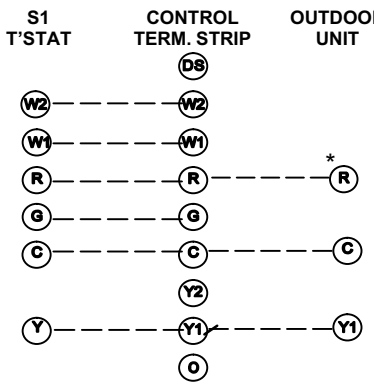
IX- Field Wiring

TABLE 30
Field Wiring for Non-Communicating Thermostat 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) Dehumidifi-cation 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	

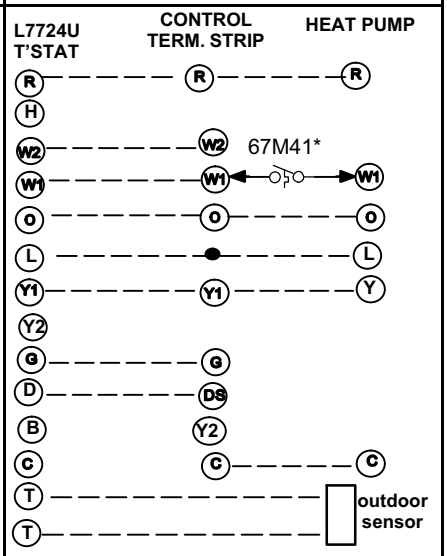
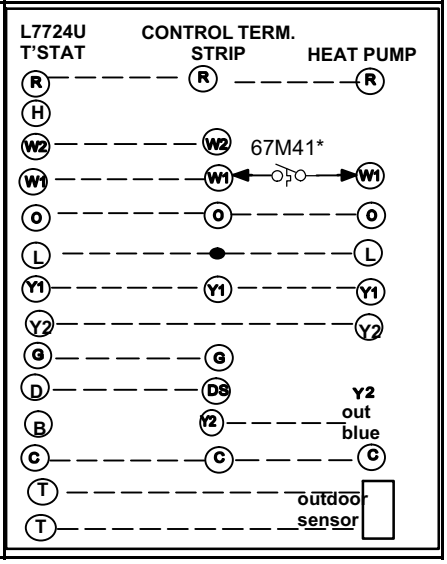
** "R" required on some units.*

TABLE 44
Field Wiring for Non-Communicating Thermostat 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 30
Field Wiring for Non-Communicating Thermostat 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*