

EL297UHVK(X) With R454B Series Units

EL297UHVK(X) series units are 90% efficiency gas furnaces used for upflow or horizontal applications only, manufactured with Lennox Duralok heat exchangers formed of aluminized steel. EL297UHVK(X) units are available in heating capacities of 44,000 to 132,000 Btuh and cooling applications up to 5 tons. Refer to Product Specifications Manual for proper sizing.

Units are factory equipped for use with natural gas. Kits are available for conversion to LPG operation. EL297UHVK(X) model units are equipped with the icomfort® enabled SureLight® two-stage variable speed integrated control. EL297UHVK(X) unit meets the California Nitrogen Oxides (NOx) Standards and California Seasonal Efficiency requirements. All units use a redundant gas valve to assure safety shut-off as required by C.S.A.

All specifications in this manual are subject to change. Procedures outlined in this manual are presented as a recommendation only and do not supersede or replace local or state codes. In the absence of local or state codes, the guidelines and procedures outlined in this manual (except where noted) are recommendations only and do not constitute code.

! WARNING

This furnace is equipped with an ignition control factory enabled for use with Lennox A2L refrigerant systems. Disabling the refrigerant detection functionality on A2L system is prohibited by safety codes. Refer to furnace installation instructions for non-A2L and non-Lennox refrigerant system setup.

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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 HVAC installer (or equivalent), service agency or the gas supplier.

! CAUTION

As with any mechanical equipment, contact with sharp sheet metal edges can result in personal injury. Take care while handling this equipment and wear gloves and protective clothing.

SPECIFICATIONS				
Gas Heating Performance	Model	EL297UH045XV36BK	EL297UH070XV36BK	EL297UH090XV36CK
	¹ AFUE	97%	97%	97%
	High Fire			
	Input - Btuh	44,000	66,000	88,000
	Output - Btuh	43,000	64,000	85,000
	Temperature rise range - °F	35 - 65	50 - 80	60 - 90
	Gas Manifold Pressure (in. w.g.)	3.5 / 10.0	3.5 / 10.0	3.5 / 10.0
	Nat. Gas / LPG/Propane			
	Low Fire			
	Input - Btuh	29,000	43,000	57,000
	Output - Btuh	28,000	42,000	56,000
	Temperature rise range - °F	20 - 50	25 - 55	30 - 60
Gas Manifold Pressure (in. w.g.)	1.7 / 4.5	1.7 / 4.5	1.7 / 4.5	
Nat. Gas / LPG/Propane				
High static - in. w.g.	Heating	0.8	0.8	0.8
	Cooling	1.0	1.0	1.0
Connections in.	Intake / Exhaust Pipe (PVC)	2 / 2	2 / 2	2 / 2
	Gas pipe size IPS	1/2	1/2	1/2
	Condensate Drain Trap (PVC pipe) - i.d.	3/4	3/4	3/4
	with furnished 90° street elbow	3/4 slip x 3/4 MIPT	3/4 slip x 3/4 MIPT	3/4 slip x 3/4 MIPT
	with field supplied (PVC coupling) - o.d.	3/4 slip x 3/4 MPT	3/4 slip x 3/4 MPT	3/4 slip x 3/4 MPT
Indoor Blower	Wheel nominal diameter x width - in.	10 x 9	10 x 9	10 x 9
	Motor output - hp	1/2	1/2	1/2
	Tons of add-on cooling	2 - 3	2 - 3	2 - 3
	Air Volume Range - cfm	465 - 1370	490 - 1365	520 - 1360
Electrical Data	Voltage	120 volts - 60 hertz - 1 phase		
	Blower motor full load amps	7.7	7.7	7.7
	Maximum overcurrent protection	15	15	15
Shipping Data	lbs. - 1 package	126	134	151

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					
Gas	Model	EL297UH090XV48CK	EL297UH090XV60CK	EL297UH110XV48CK	
Heating Performance	¹ AFUE	97%	97%	97%	
	High Fire	Input - Btuh	88,000	88,000	110,000
		Output - Btuh	86,000	86,000	106,000
		Temperature rise range - °F	45 - 75	40 - 70	60 - 90
		Gas Manifold Pressure (in. w.g.) Nat. Gas / LPG/Propane	3.5 / 10.0	3.5 / 10.0	3.5 / 10.0
	Low Fire	Input - Btuh	57,000	57,000	72,000
		Output - Btuh	56,000	56,000	70,000
		Temperature rise range - °F	30 - 60	25 - 55	35 - 65
		Gas Manifold Pressure (in. w.g.) Nat. Gas / LPG/Propane	1.7 / 4.5	1.7 / 4.5	1.7 / 4.5
	High static - in. w.g.	Heating	0.8	0.8	0.8
Cooling		1.0	1.0	1.0	
Connections in.	Intake / Exhaust Pipe (PVC)	2 / 2	2 / 2	2 / 2	
	Gas pipe size IPS	1/2	1/2	1/2	
	Condensate Drain Trap (PVC pipe) - i.d.	3/4	3/4	3/4	
	with furnished 90° street elbow	3/4 slip x 3/4 MIPT	3/4 slip x 3/4 MIPT	3/4 slip x 3/4 MIPT	
	with field supplied (PVC coupling) - o.d.	3/4 slip x 3/4 MPT	3/4 slip x 3/4 MPT	3/4 slip x 3/4 MPT	
Indoor Blower	Wheel nominal diameter x width - in.	11 x 11	11 x 11	11 x 11	
	Motor output - hp	3/4	1	3/4	
	Tons of add-on cooling	2.5 - 4	3 - 5	2.5 - 4	
	Air Volume Range - cfm	680 - 1770	840 - 2195	670 - 1760	
Electrical Data	Voltage	120 volts - 60 hertz - 1 phase			
	Blower motor full load amps	10.1	12.8	10.1	
	Maximum overcurrent protection	15	20	15	
Shipping Data	lbs. - 1 package	157	160	164	

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

Gas Heating Performance		Model	EL297UH110XV60CK	EL297UH135XV60DK
		¹ AFUE	97%	97%
High Fire	Input - Btuh		110,000	132,000
	Output - Btuh		107,000	127,000
	Temperature rise range - °F		45 - 75	55 - 85
	Gas Manifold Pressure (in. w.g.) Nat. Gas / LPG/Propane		3.5 / 10.0	3.5 / 10.0
Low Fire	Input - Btuh		72,000	86,000
	Output - Btuh		70,000	84,000
	Temperature rise range - °F		35 - 65	40 - 70
	Gas Manifold Pressure (in. w.g.) Nat. Gas / LPG/Propane		1.7 / 4.5	1.7 / 4.5
High static - in. w.g.	Heating		0.8	0.8
	Cooling		1.0	1.0
Connections	Intake / Exhaust Pipe (PVC)		2 / 2	2 / 2
	Gas pipe size IPS		1/2	1/2
	Condensate Drain Trap (PVC pipe) - i.d.		3/4	3/4
	with furnished 90° street elbow		3/4 slip x 3/4 MIPT	3/4 slip x 3/4 MIPT
	with field supplied (PVC coupling) - o.d.		3/4 slip x 3/4 MPT	3/4 slip x 3/4 MPT
Indoor Blower	Wheel diameter x width - in.		11 x 11	11 x 11
	Motor output - hp		1	1
	Tons of add-on cooling		3-5	3-5
	Air Volume Range - cfm		850 - 2125	950 - 2250
Electrical Data	Voltage		120 volts - 60 hertz - 1 phase	
	Blower motor full load amps		12.8	12.8
	Maximum overcurrent protection		20	20
Shipping Data	lbs. - 1 package		174	188

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 - ORDER SEPARATELY

NOTE - FURNACES CANNOT BE TWINNED!

		"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
High Performance Economizer (Commercial Only)		10U53	10U53	10U53
CONDENSATE DRAIN KITS				
Condensate Drain Heat Cable	6 ft.	26K68	26K68	26K68
	24 ft.	26K69	26K69	26K69
Crawl Space Vent Drain Kit	US	51W18	51W18	51W18
	Canada	15Z70	15Z70	15Z70
CONTROLS				
S40 Smart Wi-Fi Thermostat		22V24	22V24	22V24
¹ Discharge Air Temperature Sensor		88K38	88K38	88K38
E30 Wi-Fi Smart Thermostat		20A65	20A65	20A65
² Remote Outdoor Air Temperature Sensor Transformer (75VA)		X2658	X2658	X2658
		27J32	27J32	27J32
REFRIGERANT DETECTION SENSOR				
Refrigerant Detection System (RDS) Coil Sensor Kit (for indoor coil)		27V53	27V53	27V53
FILTER KITS				
³ Air Filter and Rack Kit	Horizontal (end)	87L96	87L97	87L98
	Size of filter - in.	18 x 25 x 1	20 x 25 x 1	25 x 25 x 1
	Side Return	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
VENTING				
Flue Coupling	2 in.	17H92	17H92	17H92

¹ Optional for service diagnostics.

² Remote Outdoor Temperature Sensor is used with conventional (non-Lennox® Communicating) outdoor units (sensor is furnished with Lennox® Communicating outdoor units). Allows the thermostat to display outdoor temperature. Required in dual-fuel and EDA applications.

³ Cleanable polyurethane, frame-type filter.

NOTE - Termination Kits (44W92, 44W93, 30G28, 51W12, 81J20) and Crawl Space Vent Drain Kit (15Z70) are certified to ULC S636 standard for use in Canada only.

BLOWER DATA

EL297UH045XV36BK BLOWER PERFORMANCE (less filter)

BOTTOM RETURN AIR

0 through 0.8 in. w.g. (Heating) and 0 through 1.0 in. w.g. (Cooling) External Static Pressure Range

HEATING								
¹ Heating Speed DIP Switch Settings	First Stage Heating Speed - cfm				Second Stage Heating Speed - cfm			
	+24%				1125			
	+18%				1085			
	+12%				1040			
	+6%				985			
	Factory Default				925			
	−6%				875			
	−12%				800			
	−18%				735			
COOLING								
¹ Cooling Speed DIP Switch Settings	First Stage Cooling Speed - cfm				Second Stage Cooling Speed - cfm			
	Low	Medium-Low	Medium-High	² High	Low	Medium-Low	Medium-High	² High
+	630	755	850	960	905	1055	1195	1335
Factory Default	580	695	780	870	830	965	1100	1225
−	505	635	715	795	755	885	1025	1125

EL297UH045XV36BK BLOWER PERFORMANCE (less filter)

SINGLE SIDE RETURN AIR

0 through 0.8 in. w.g. (Heating) and 0 through 1.0 in. w.g. (Cooling) External Static Pressure Range

HEATING									
¹ Heating Speed DIP Switch Settings	First Stage Heating Speed - cfm				Second Stage Heating Speed - cfm				
	+24%				1125				
	+18%				1080				
	+12%				1035				
	+6%				990				
	Factory Default				935				
	−6%				880				
	−12%				810				
	−18%				765				
COOLING									
¹ Cooling Speed DIP Switch Settings	First Stage Cooling Speed - cfm				Second Stage Cooling Speed - cfm				
	Low	Medium-Low	Medium-High	² High	Low	Medium-Low	Medium-High	² High	
	+	610	760	845	975	920	1065	1205	1340
	Factory Default	550	680	770	880	815	985	1110	1245
	−	465	610	720	775	745	890	1020	1130

¹ Cooling and heating speeds are based on a combination of DIP switch settings on the furnace control. Refer to Installation Instructions for specific DIP Switch Settings.

² Factory default setting.

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

First stage HEAT is approximately 91% of the same second stage HEAT.

First stage COOL (two-stage air conditioning units only) is approximately 70% of the same second stage COOL speed position.

Continuous Fan Only speed is selectable at 28% and 38% of the selected second stage cooling speed - minimum 250 cfm.

Lennox® Smart Zoning System Applications - Minimum blower speed is 250 cfm.

BLOWER DATA

EL297UH045XV36BK BLOWER PERFORMANCE (less filter)

SINGLE SIDE RETURN AIR WITH OPTIONAL RETURN AIR BASE

0 through 0.8 in. w.g. (Heating) and 0 through 1.0 in. w.g. (Cooling) External Static Pressure Range

HEATING

¹ Heating Speed DIP Switch Settings	First Stage Heating Speed - cfm	Second Stage Heating Speed - cfm
+24%	895	1115
+18%	850	1070
+12%	795	1030
+6%	755	980
Factory Default	715	920
-6%	665	850
-12%	645	805
-18%	595	740

COOLING

¹ Cooling Speed DIP Switch Settings	First Stage Cooling Speed - cfm				Second Stage Cooling Speed - cfm			
	Low	Medium-Low	Medium-High	² High	Low	Medium-Low	Medium-High	² High
+	605	730	845	965	895	1060	1185	1345
Factory Default	550	660	760	875	820	975	1105	1215
-	490	610	685	770	720	860	1015	1125

EL297UH070XV36BK BLOWER PERFORMANCE (less filter)

BOTTOM RETURN AIR

0 through 0.8 in. w.g. (Heating) and 0 through 1.0 in. w.g. (Cooling) External Static Pressure Range

HEATING

¹ Heating Speed DIP Switch Settings	First Stage Heating Speed - cfm	Second Stage Heating Speed - cfm
+24%	1095	1220
+18%	1035	1170
+12%	985	1120
+6%	915	1055
Factory Default	850	995
-6%	835	915
-12%	755	845
-18%	695	810

COOLING

¹ Cooling Speed DIP Switch Settings	First Stage Cooling Speed - cfm				Second Stage Cooling Speed - cfm			
	Low	Medium-Low	Medium-High	² High	Low	Medium-Low	Medium-High	² High
+	635	765	885	1005	920	1085	1240	1410
Factory Default	585	700	795	910	835	990	1135	1280
-	540	640	720	810	745	895	1030	1160

¹ Cooling and heating speeds are based on a combination of DIP switch settings on the furnace control. Refer to Installation Instructions for specific DIP Switch Settings.

² Factory default setting.

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

First stage HEAT is approximately 91% of the same second stage HEAT.

First stage COOL (two-stage air conditioning units only) is approximately 70% of the same second stage COOL speed position.

Continuous Fan Only speed is selectable at 28% and 38% of the selected second stage cooling speed - minimum 250 cfm.

Lennox® Smart Zoning System Applications - Minimum blower speed is 250 cfm.

BLOWER DATA

EL297UH070XV36BK BLOWER PERFORMANCE (less filter)

SINGLE SIDE RETURN AIR

0 through 0.8 in. w.g. (Heating) and 0 through 1.0 in. w.g. (Cooling) External Static Pressure Range

HEATING

¹ Heating Speed DIP Switch Settings	First Stage Heating Speed - cfm	Second Stage Heating Speed - cfm
+24%	1090	1205
+18%	1025	1165
+12%	960	1090
+6%	890	1045
Factory Default	815	975
-6%	755	895
-12%	720	810
-18%	675	750

COOLING

¹ Cooling Speed DIP Switch Settings	First Stage Cooling Speed - cfm				Second Stage Cooling Speed - cfm			
	Low	Medium-Low	Medium-High	² High	Low	Medium-Low	Medium-High	² High
+	590	705	805	955	840	1050	1205	1355
Factory Default	540	640	725	820	750	945	1130	1230
-	500	580	665	720	685	805	990	1110

EL297UH070XV36BK BLOWER PERFORMANCE (less filter)

SINGLE SIDE RETURN AIR WITH OPTIONAL RETURN AIR BASE

0 through 0.8 in. w.g. (Heating) and 0 through 1.0 in. w.g. (Cooling) External Static Pressure Range

HEATING

¹ Heating Speed DIP Switch Settings	First Stage Heating Speed - cfm	Second Stage Heating Speed - cfm
+24%	1070	1205
+18%	1020	1150
+12%	955	1100
+6%	895	1035
Factory Default	850	965
-6%	795	905
-12%	745	845
-18%	690	790

COOLING

¹ Cooling Speed DIP Switch Settings	First Stage Cooling Speed - cfm				Second Stage Cooling Speed - cfm			
	Low	Medium-Low	Medium-High	² High	Low	Medium-Low	Medium-High	² High
+	595	715	815	950	855	1045	1205	1350
Factory Default	520	655	755	840	790	945	1090	1255
-	490	595	670	745	720	845	985	1130

¹ Cooling and heating speeds are based on a combination of DIP switch settings on the furnace control. Refer to Installation Instructions for specific DIP Switch Settings.

² Factory default setting.

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

First stage HEAT is approximately 91% of the same second stage HEAT.

First stage COOL (two-stage air conditioning units only) is approximately 70% of the same second stage COOL speed position.

Continuous Fan Only speed is selectable at 28% and 38% of the selected second stage cooling speed - minimum 250 cfm.

Lennox® Smart Zoning System Applications - Minimum blower speed is 250 cfm.

BLOWER DATA

EL297UH090XV36CK BLOWER PERFORMANCE (less filter)

BOTTOM RETURN AIR

0 through 0.8 in. w.g. (Heating) and 0 through 1.0 in. w.g. (Cooling) External Static Pressure Range

HEATING

¹ Heating Speed DIP Switch Settings	First Stage Heating Speed - cfm	Second Stage Heating Speed - cfm
+24%	1215	1300
+18%	1140	1240
+12%	1100	1170
+6%	1020	1115
Factory Default	965	1070
-6%	915	970
-12%	850	925
-18%	805	855

COOLING

¹ Cooling Speed DIP Switch Settings	First Stage Cooling Speed - cfm				Second Stage Cooling Speed - cfm			
	Low	Medium-Low	Medium-High	² High	Low	Medium-Low	Medium-High	² High
+	660	775	865	975	910	1075	1230	1405
Factory Default	615	720	800	885	835	985	1125	1265
-	560	660	740	810	750	890	1015	1150

EL297UH090XV36CK BLOWER PERFORMANCE (less filter)

SINGLE SIDE RETURN AIR

0 through 0.8 in. w.g. (Heating) and 0 through 1.0 in. w.g. (Cooling) External Static Pressure Range

HEATING

¹ Heating Speed DIP Switch Settings	First Stage Heating Speed - cfm	Second Stage Heating Speed - cfm
+24%	1170	1245
+18%	1125	1190
+12%	1075	1145
+6%	1005	1075
Factory Default	935	1030
-6%	880	950
-12%	810	890
-18%	775	820

COOLING

¹ Cooling Speed DIP Switch Settings	First Stage Cooling Speed - cfm				Second Stage Cooling Speed - cfm			
	Low	Medium-Low	Medium-High	² High	Low	Medium-Low	Medium-High	² High
+	610	705	795	920	840	1015	1165	1300
Factory Default	560	640	715	810	770	910	1050	1190
-	525	605	665	725	695	795	945	1110

¹ Cooling and heating speeds are based on a combination of DIP switch settings on the furnace control. Refer to Installation Instructions for specific DIP Switch Settings.

² Factory default setting.

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

First stage HEAT is approximately 91% of the same second stage HEAT.

First stage COOL (two-stage air conditioning units only) is approximately 70% of the same second stage COOL speed position.

Continuous Fan Only speed is selectable at 28% and 38% of the selected second stage cooling speed - minimum 250 cfm.

Lennox® Smart Zoning System Applications - Minimum blower speed is 250 cfm.

BLOWER DATA

EL297UH090XV36CK BLOWER PERFORMANCE (less filter)

SINGLE SIDE RETURN AIR WITH OPTIONAL RETURN AIR BASE

0 through 0.8 in. w.g. (Heating) and 0 through 1.0 in. w.g. (Cooling) External Static Pressure Range

HEATING

¹ Heating Speed DIP Switch Settings	First Stage Heating Speed - cfm	Second Stage Heating Speed - cfm
+24%	1170	1250
+18%	1110	1200
+12%	1045	1145
+6%	995	1070
Factory Default	940	1010
-6%	880	950
-12%	815	895
-18%	775	825

COOLING

¹ Cooling Speed DIP Switch Settings	First Stage Cooling Speed - cfm				Second Stage Cooling Speed - cfm			
	Low	Medium-Low	Medium-High	² High	Low	Medium-Low	Medium-High	² High
+	605	715	810	930	850	995	1165	1305
Factory Default	570	660	735	820	775	905	1050	1205
-	530	600	670	725	710	800	945	1070

EL297UH090XV48CK BLOWER PERFORMANCE (less filter)

BOTTOM RETURN AIR

0 through 0.8 in. w.g. (Heating) and 0 through 1.0 in. w.g. (Cooling) External Static Pressure Range

HEATING

¹ Heating Speed DIP Switch Settings	First Stage Heating Speed - cfm	Second Stage Heating Speed - cfm
+24%	1490	1645
+18%	1415	1565
+12%	1330	1480
+6%	1295	1405
Factory Default	1220	1325
-6%	1150	1260
-12%	1065	1190
-18%	1010	1105

COOLING

¹ Cooling Speed DIP Switch Settings	First Stage Cooling Speed - cfm				Second Stage Cooling Speed - cfm			
	Low	Medium-Low	Medium-High	² High	Low	Medium-Low	Medium-High	² High
+	795	950	1080	1260	1115	1355	1550	1775
Factory Default	730	870	985	1140	1015	1220	1430	1605
-	650	790	890	1020	930	1105	1285	1470

¹ Cooling and heating speeds are based on a combination of DIP switch settings on the furnace control. Refer to Installation Instructions for specific DIP Switch Settings.

² Factory default setting.

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

First stage HEAT is approximately 91% of the same second stage HEAT.

First stage COOL (two-stage air conditioning units only) is approximately 70% of the same second stage COOL speed position.

Continuous Fan Only speed is selectable at 28% and 38% of the selected second stage cooling speed - minimum 380 cfm.

Lennox® Smart Zoning System Applications - Minimum blower speed is 380 cfm.

BLOWER DATA

EL297UH090XV48CK BLOWER PERFORMANCE (less filter)

SINGLE SIDE RETURN AIR

0 through 0.8 in. w.g. (Heating) and 0 through 1.0 in. w.g. (Cooling) External Static Pressure Range

HEATING

¹ Heating Speed DIP Switch Settings	First Stage Heating Speed - cfm	Second Stage Heating Speed - cfm
+24%	1400	1570
+18%	1380	1475
+12%	1310	1415
+6%	1255	1360
Factory Default	1210	1285
-6%	1125	1260
-12%	1080	1150
-18%	990	1115

COOLING

¹ Cooling Speed DIP Switch Settings	First Stage Cooling Speed - cfm				Second Stage Cooling Speed - cfm			
	Low	Medium-Low	Medium-High	² High	Low	Medium-Low	Medium-High	² High
+	820	1005	1135	1290	1140	1340	1525	1725
Factory Default	755	880	1025	1150	1040	1235	1395	1565
-	680	815	925	1065	910	1120	1275	1400

EL297UH090XV48CK BLOWER PERFORMANCE (less filter)

SINGLE SIDE RETURN AIR WITH OPTIONAL RETURN AIR BASE

0 through 0.8 in. w.g. (Heating) and 0 through 1.0 in. w.g. (Cooling) External Static Pressure Range

HEATING

¹ Heating Speed DIP Switch Settings	First Stage Heating Speed - cfm	Second Stage Heating Speed - cfm
+24%	1430	1565
+18%	1400	1500
+12%	1330	1410
+6%	1260	1380
Factory Default	1195	1305
-6%	1135	1275
-12%	1065	1180
-18%	990	1095

COOLING

¹ Cooling Speed DIP Switch Settings	First Stage Cooling Speed - cfm				Second Stage Cooling Speed - cfm			
	Low	Medium-Low	Medium-High	² High	Low	Medium-Low	Medium-High	² High
+	840	955	1120	1280	1160	1360	1530	1740
Factory Default	775	910	1010	1170	1060	1240	1400	1590
-	695	815	930	1045	925	1130	1295	1440

¹ Cooling and heating speeds are based on a combination of DIP switch settings on the furnace control. Refer to Installation Instructions for specific DIP Switch Settings.

² Factory default setting.

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

First stage HEAT is approximately 91% of the same second stage HEAT.

First stage COOL (two-stage air conditioning units only) is approximately 70% of the same second stage COOL speed position.

Continuous Fan Only speed is selectable at 28% and 38% of the selected second stage cooling speed - minimum 380 cfm.

Lennox® Smart Zoning System Applications - Minimum blower speed is 380 cfm.

BLOWER DATA

EL297UH090XV60CK BLOWER PERFORMANCE (less filter)

BOTTOM RETURN AIR

0 through 0.8 in. w.g. (Heating) and 0 through 1.0 in. w.g. (Cooling) External Static Pressure Range

HEATING								
¹ Heating Speed DIP Switch Settings	First Stage Heating Speed - cfm				Second Stage Heating Speed - cfm			
+24%	1490				1985			
+18%	1435				1915			
+12%	1335				1805			
+6%	1280				1645			
Factory Default	1185				1625			
-6%	1095				1530			
-12%	990				1450			
-18%	900				1345			

COOLING								
¹ Cooling Speed DIP Switch Settings	First Stage Cooling Speed - cfm				Second Stage Cooling Speed - cfm			
	Low	Medium-Low	Medium-High	² High	Low	Medium-Low	Medium-High	² High
+	1085	1240	1360	1540	1545	1770	1970	2210
Factory Default	1000	1135	1250	1385	1390	1605	1800	1980
-	895	1040	1135	1255	1250	1440	1620	1800

EL297UH090XV60CK BLOWER PERFORMANCE (less filter)

SINGLE SIDE RETURN AIR – Air volumes in **bold** (over 1800 cfm) require Optional Return Air Base and field fabricated transition to accommodate 20 x 25 x 1 in. air filter in order to maintain proper air velocity.

0 through 0.8 in. w.g. (Heating) and 0 through 1.0 in. w.g. (Cooling) External Static Pressure Range

HEATING								
¹ Heating Speed DIP Switch Settings	First Stage Heating Speed - cfm				Second Stage Heating Speed - cfm			
+24%	1445				1920			
+18%	1385				1875			
+12%	1275				1735			
+6%	1245				1600			
Factory Default	1155				1565			
-6%	1070				1480			
-12%	975				1400			
-18%	920				1275			

COOLING								
¹ Cooling Speed DIP Switch Settings	First Stage Cooling Speed - cfm				Second Stage Cooling Speed - cfm			
	Low	Medium-Low	Medium-High	² High	Low	Medium-Low	Medium-High	² High
+	1040	1225	1380	1550	1555	1715	1920	2135
Factory Default	960	1085	1225	1415	1430	1565	1790	1980
-	840	990	1085	1250	1280	1450	1580	1790

¹ Cooling and heating speeds are based on a combination of DIP switch settings on the furnace control. Refer to Installation Instructions for specific DIP Switch Settings.

² Factory default setting.

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

First stage HEAT is approximately 91% of the same second stage HEAT.

First stage COOL (two-stage air conditioning units only) is approximately 70% of the same second stage COOL speed position.

Continuous Fan Only speed is selectable at 28% and 38% of the selected second stage cooling speed - minimum 450 cfm.

Lennox® Smart Zoning System Applications - Minimum blower speed is 450 cfm.

BLOWER DATA

EL297UH110XV48CK BLOWER PERFORMANCE (less filter)

BOTTOM RETURN AIR

0 through 0.8 in. w.g. (Heating) and 0 through 1.0 in. w.g. (Cooling) External Static Pressure Range

HEATING

¹ Heating Speed DIP Switch Settings	First Stage Heating Speed - cfm	Second Stage Heating Speed - cfm
+24%	1470	1605
+18%	1450	1495
+12%	1385	1445
+6%	1295	1385
Factory Default	1225	1305
-6%	1160	1225
-12%	1090	1150
-18%	1035	1070

COOLING

¹ Cooling Speed DIP Switch Settings	First Stage Cooling Speed - cfm				Second Stage Cooling Speed - cfm			
	Low	Medium-Low	Medium-High	² High	Low	Medium-Low	Medium-High	² High
+	765	920	1040	1230	1085	1310	1515	1745
Factory Default	705	835	960	1100	985	1185	1395	1565
-	635	765	860	985	890	1070	1245	1425

EL297UH110XV48CK BLOWER PERFORMANCE (less filter)

SINGLE SIDE RETURN AIR

0 through 0.8 in. w.g. (Heating) and 0 through 1.0 in. w.g. (Cooling) External Static Pressure Range

HEATING

¹ Heating Speed DIP Switch Settings	First Stage Heating Speed - cfm	Second Stage Heating Speed - cfm
+24%	1480	1580
+18%	1410	1505
+12%	1330	1415
+6%	1255	1365
Factory Default	1190	1270
-6%	1130	1205
-12%	1070	1120
-18%	1020	1060

COOLING

¹ Cooling Speed DIP Switch Settings	First Stage Cooling Speed - cfm				Second Stage Cooling Speed - cfm			
	Low	Medium-Low	Medium-High	² High	Low	Medium-Low	Medium-High	² High
+	795	975	1065	1200	1085	1295	1515	1695
Factory Default	755	855	1000	1110	1015	1180	1375	1565
-	700	785	885	1025	920	1070	1235	1395

¹ Cooling and heating speeds are based on a combination of DIP switch settings on the furnace control. Refer to Installation Instructions for specific DIP Switch Settings.² Factory default setting.

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

First stage HEAT is approximately 91% of the same second stage HEAT.

First stage COOL (two-stage air conditioning units only) is approximately 70% of the same second stage COOL speed position.

Continuous Fan Only speed is selectable at 28% and 38% of the selected second stage cooling speed - minimum 380 cfm.

Lennox® Smart Zoning System Applications - Minimum blower speed is 380 cfm.

BLOWER DATA

EL297UH110XV48CK BLOWER PERFORMANCE (less filter)

SINGLE SIDE RETURN AIR WITH OPTIONAL RETURN AIR BASE

0 through 0.8 in. w.g. (Heating) and 0 through 1.0 in. w.g. (Cooling) External Static Pressure Range

HEATING

¹ Heating Speed DIP Switch Settings	First Stage Heating Speed - cfm	Second Stage Heating Speed - cfm
+24%	1465	1560
+18%	1370	1490
+12%	1310	1400
+6%	1235	1340
Factory Default	1185	1270
-6%	1120	1210
-12%	1060	1120
-18%	1015	1065

COOLING

¹ Cooling Speed DIP Switch Settings	First Stage Cooling Speed - cfm				Second Stage Cooling Speed - cfm			
	Low	Medium-Low	Medium-High	² High	Low	Medium-Low	Medium-High	² High
+	800	935	1055	1190	1085	1285	1500	1680
Factory Default	745	860	980	1100	1015	1185	1355	1550
-	670	790	890	1025	920	1075	1240	1385

¹ Cooling and heating speeds are based on a combination of DIP switch settings on the furnace control. Refer to Installation Instructions for specific DIP Switch Settings.

² Factory default setting.

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

First stage HEAT is approximately 91% of the same second stage HEAT.

First stage COOL (two-stage air conditioning units only) is approximately 70% of the same second stage COOL speed position.

Continuous Fan Only speed is selectable at 28% and 38% of the selected second stage cooling speed - minimum 380 cfm.

Lennox® Smart Zoning System Applications - Minimum blower speed is 380 cfm.

BLOWER DATA

EL297UH110XV60CK BLOWER PERFORMANCE (less filter)

BOTTOM RETURN AIR

0 through 0.8 in. w.g. (Heating) and 0 through 1.0 in. w.g. (Cooling) External Static Pressure Range

HEATING								
¹ Heating Speed DIP Switch Settings	First Stage Heating Speed - cfm				Second Stage Heating Speed - cfm			
+24%	1385				1965			
+18%	1475				1880			
+12%	1355				1790			
+6%	1370				1725			
Factory Default	1200				1630			
-6%	1140				1550			
-12%	1070				1460			
-18%	980				1345			

COOLING								
¹ Cooling Speed DIP Switch Settings	First Stage Cooling Speed - cfm				Second Stage Cooling Speed - cfm			
	Low	Medium-Low	Medium-High	² High	Low	Medium-Low	Medium-High	² High
+	1085	1235	1335	1525	1525	1745	1950	2185
Factory Default	990	1130	1240	1365	1375	1580	1780	1970
-	895	1025	1130	1250	1250	1415	1600	1780

EL297UH110XV60CK BLOWER PERFORMANCE (less filter)

SINGLE SIDE RETURN AIR – Air volumes in **bold** (over 1800 cfm) require Optional Return Air Base and field fabricated transition to accommodate 20 x 25 x 1 in. air filter in order to maintain proper air velocity.

0 through 0.8 in. w.g. (Heating) and 0 through 1.0 in. w.g. (Cooling) External Static Pressure Range

HEATING								
¹ Heating Speed DIP Switch Settings	First Stage Heating Speed - cfm				Second Stage Heating Speed - cfm			
+24%	1495				1910			
+18%	1425				1840			
+12%	1335				1785			
+6%	1210				1710			
Factory Default	1195				1555			
-6%	1140				1510			
-12%	1075				1410			
-18%	975				1300			

COOLING								
¹ Cooling Speed DIP Switch Settings	First Stage Cooling Speed - cfm				Second Stage Cooling Speed - cfm			
	Low	Medium-Low	Medium-High	² High	Low	Medium-Low	Medium-High	² High
+	1050	1195	1315	1495	1515	1710	1870	2065
Factory Default	960	1095	1220	1355	1360	1555	1755	1890
-	850	985	1095	1220	1215	1400	1555	1755

¹ Cooling and heating speeds are based on a combination of DIP switch settings on the furnace control. Refer to Installation Instructions for specific DIP Switch Settings.

² Factory default setting.

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

First stage HEAT is approximately 91% of the same second stage HEAT.

First stage COOL (two-stage air conditioning units only) is approximately 70% of the same second stage COOL speed position.

Continuous Fan Only speed is selectable at 28% and 38% of the selected second stage cooling speed - minimum 450 cfm.

Lennox® Smart Zoning System Applications - Minimum blower speed is 450 cfm.

BLOWER DATA

EL297UH135XV60DK BLOWER PERFORMANCE (less filter)

BOTTOM RETURN AIR

0 through 0.8 in. w.g. (Heating) and 0 through 1.0 in. w.g. (Cooling) External Static Pressure Range

HEATING								
¹ Heating Speed DIP Switch Settings	First Stage Heating Speed - cfm				Second Stage Heating Speed - cfm			
	+24%				2125			
	+18%				2015			
	+12%				1935			
	+6%				1855			
	Factory Default				1740			
	−6%				1650			
	−12%				1565			
	−18%				1460			
COOLING								
¹ Cooling Speed DIP Switch Settings	First Stage Cooling Speed - cfm				Second Stage Cooling Speed - cfm			
	Low	Medium-Low	Medium-High	² High	Low	Medium-Low	Medium-High	² High
+	1095	1260	1400	1590	1585	1805	2020	2275
Factory Default	1000	1145	1270	1435	1440	1635	1840	2030
−	905	1035	1145	1275	1290	1480	1660	1840

EL297UH135XV60DK BLOWER PERFORMANCE (less filter)

SINGLE SIDE RETURN AIR – Air volumes in **bold** (over 1800 cfm) require Optional Return Air Base and field fabricated transition to accommodate 20 x 25 x 1 in. air filter in order to maintain proper air velocity.

0 through 0.8 in. w.g. (Heating) and 0 through 1.0 in. w.g. (Cooling) External Static Pressure Range

HEATING								
¹ Heating Speed DIP Switch Settings	First Stage Heating Speed - cfm				Second Stage Heating Speed - cfm			
	+24%				2070			
	+18%				1975			
	+12%				1900			
	+6%				1815			
	Factory Default				1715			
	-6%				1610			
	-12%				1525			
	-18%				1420			
	COOLING							
¹ Cooling Speed DIP Switch Settings	First Stage Cooling Speed - cfm				Second Stage Cooling Speed - cfm			
	Low	Medium-Low	Medium-High	² High	Low	Medium-Low	Medium-High	² High
+	1130	1275	1405	1555	1595	1805	1975	2180
Factory Default	1040	1185	1280	1415	1450	1625	1840	2000
-	950	1080	1185	1300	1310	1480	1655	1840

¹ Cooling and heating speeds are based on a combination of DIP switch settings on the furnace control. Refer to Installation Instructions for specific DIP Switch Settings.

² Factory default setting.

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

First stage HEAT is approximately 91% of the same second stage HEAT.

First stage COOL (two-stage air conditioning units only) is approximately 70% of the same second stage COOL speed position.

Continuous Fan Only speed is selectable at 28% and 38% of the selected second stage cooling speed - minimum 450 cfm.

Lennox® Smart Zoning System Applications - Minimum blower speed is 450 cfm.

PARTS IDENTIFICATION

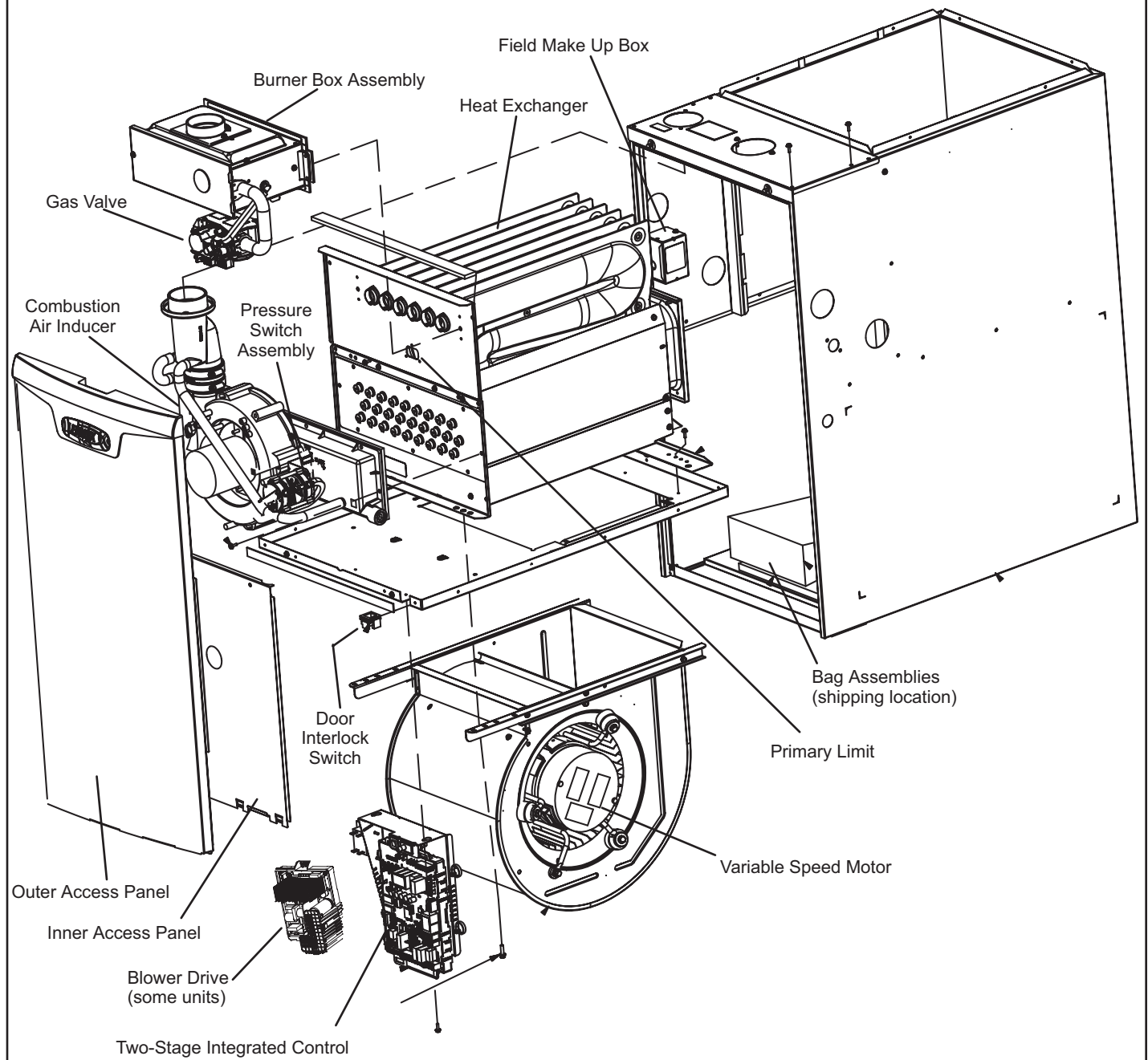



FIGURE 1

I-UNIT COMPONENTS

EL297UHVK(X) 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 section.

EL297UHVK(X) 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 to neutralize electrostatic charge by touching your hand and tools to metal prior to handling the control.

A- Control Box

1. Control Transformer (T1)

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

⚠ IMPORTANT
When matching this gas furnace with zoning, defrost tempering stat or other 24V accessories, It is recommended to replace the factory installed transformer with kit 27J32. Kit 27J32 contains a 75VA transformer, so you do not overload the original 40VA transformer.

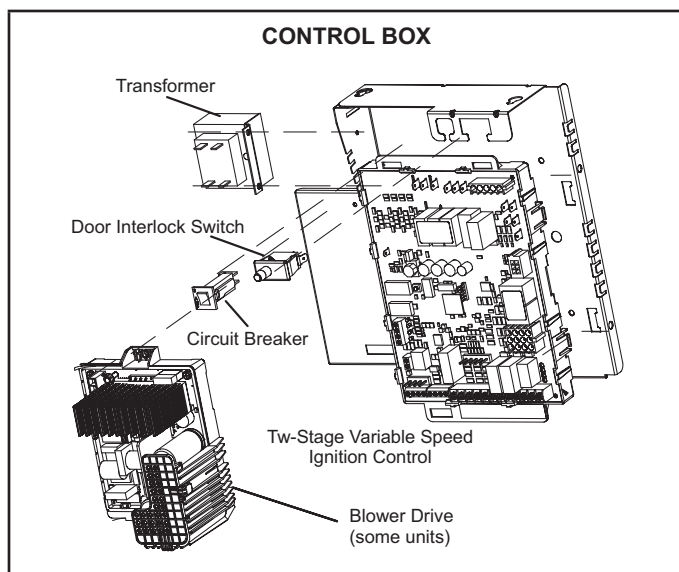


FIGURE 2

2. Door Interlock Switch (S51)

A door 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.

3. Circuit Breaker (CB8)

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

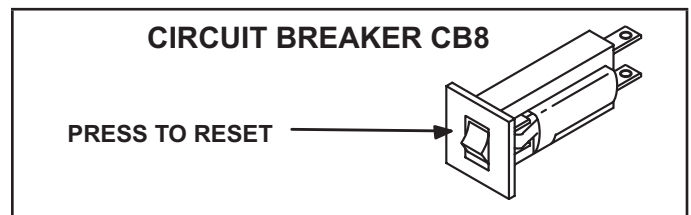


FIGURE 3

⚠ WARNING
Shock hazard. Disconnect power before servicing. Integrated control 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.

Blower Drive (See Indoor Blower Section)

4. Integrated Control (A92)

Units are equipped with a communicating enabled two-stage, variable speed integrated control. This control is used with a communicating thermostat as part of a communicating comfort system. The control can also operate with a non-communicating conventional single or two-stage thermostat. The system consists of a ignition / blower control (FIGURE 4) with control pin designations in TABLE 1, TABLE 2, TABLE 3 and TABLE 4 and ignitor. The control and ignitor work in combination to ensure furnace ignition and ignitor durability. The control provides gas ignition, safety checks and indoor blower control with two-stage 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. The control also has two unpowered (dry) 1/4" contacts for a humidifier and a 120 volt accessory terminal. Both rated at (1) one amp each.

Electronic Ignition

At the beginning of the heat cycle the integrated control monitors the first stage and second stage combustion air inducer prove switch. The control will not begin the heating cycle if the first stage prove switch is closed (by-passed). Likewise the integrated control will not begin the second stage heating cycle if the second stage prove switch is closed, and will remain in first stage heat. However, if the second stage prove switch closes during the first stage heat pre-purge, the control will allow second stage heat. Once the first stage prove switch is determined to be open, the combustion air inducer is energized on low (first stage) heat speed. When the differential in the prove switch is great enough, the prove switch closes and a 15-second pre-purge begins.

NOTE - During abnormal conditions such as low supply voltage or low outdoor temperatures and the low fire pressure switch does not close, the combustion air inducer will switch to high fire. After a 15 second pre-purge the high fire pressure switch will close and the unit will begin operation on high fire. After 10 to 20 seconds of high fire operation the unit will switch to low fire.

After the 15-second pre-purge period, the SureLight ignitor warms up for 20 seconds after which the gas valve opens for a 4-second trial for ignition. The ignitor remains energized during the trial until flame is sensed. If ignition is not proved during the 4-second period, 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.

Two Stage Operation / Thermostat Selection DIP Switch

The control can be utilized in two modes: SINGLE-STAGE thermostat or TWO-STAGE thermostat. The thermostat selection is made using a DIP switch and must be positioned for the particular application. DIP switch 1, labeled T*STAT HEAT STAGE is factory-set in the OFF position for use with a two-stage thermostat. Move the DIP switch to ON for use with a single stage thermostat. While in the single-stage thermostat mode, the burners will always fire on first-stage heat. The combustion air inducer will operate on low speed and indoor blower will operate on low heat speed. The unit will switch to second stage heat after a "recognition period". DIP switch 2, labeled SECOND STAGE DELAY, is factory set in the OFF position for a 7 minute recognition period. The switch can be moved to the ON position for a 12 minute recognition period, after which time the unit will switch to secondstage heat. While in the two-stage thermostat mode, the burners will fire on first-stage heat. The combustion air inducer will operate on low speed and indoor blower will operate on low heat speed. The unit will switch to second-stage heat on call from the indoor thermostat. If there is a simultaneous call for first and second stage heat, the unit will fire an first stage heat and switch to second stage heat after 30 seconds of operation. See Sequence of Operation flow charts in the back of this manual for more detail.

TABLE 1

1/4" QUICK CONNECT TERMINALS	
HUM	120 VAC OUTPUT TO HUMIDIFIER
XMFR	120 VAC OUTPUT TO TRANSFORMER
L1	120 VAC INPUT TO CONTROL
CIRC	120 VAC OUTPUT TO CIRCULATING BLOWER
ACC	120 VAC TO ELECTRICAL AIR CLEANER
NEUTRALS (5)	120 VAC NEUTRAL

TABLE 2

12 PIN MAIN HARNESS	
1	MAIN VALVE HIGH
2	HIGH PRESSURE SWITCH
3	ROLLOUT INPUT
4	GROUND
5	24VAC HOT
6	HIGH LIMIT SWITCH
7	MAIN VALVE LOW
8	MAIN VALVE COMMON
9	24VAC RETURN
10	GROUND
11	ROLLOUT SWITCH OUTPUT
12	LOW PRESSURE SWITCH

TABLE 3

THERMOSTAT INPUT TERMINALS	
W1	LOW STAGE HEAT
W2	HIGH STAGE HEAT
G	FAN
Y1	LOW STAGE COOL
Y2	HIGH STAGE COOL24
C	THERMOSTAT COMMON / GROUND
R	24VAC POWER TO THE THERMOSTAT
DH	DEHUMIDIFICATION (COMM ONLY)
H	24V HUMIDIFIER OUTPUT
L	LSOM (COMM ONLY)
O	HEAT PUMP REVERSING VALVE
DS	DEHUMIDIFICATION (NON-COMM ONLY)

TABLE 4

LOW GWP INTERFACE	
LGWP1	LOW GWP SENSOR #1 INTERFACE
LGWP2	LOW GWP SENSOR # 2 INTERFACE
ALARM	INTERFACE TO LOW GWP LEAK AUDIBLE ALARM (DRY CONTACT)
ZONE	INTERFACE TO ZONING CONTROL (DRY CONTACT)
LGWP TEST	PUSH BUTTON TO TEST LOW GWP FUNCTIONALITY

**TWO STAGE, VARIABLE SPEED, COMMUNICATING
107899-XX**

Diagram illustrating the wiring connections for the control board, showing various interfaces and components:

- FLAME SENSOR INTERFACE
- LOW GWP ALARM/ZONE INTERFACE
- AUXILIARY TEMPERATURE SENSOR CONNECTOR
- LOW GWP SENSORS INTERFACE
- DIP SWITCHES LGWP SENSORS ENABLE/DISABLE
- DIP SWITCHES (S4) HEAT, COOL, ADJUST CFM, COOL OFF DELAY SELECTION
- DIAGNOSTIC RECALL PUSH BUTTON
- DIP SWITCH CONSTANT TORQUE ECM MOTOR TAPS
- OUTDOOR & DISCHARGE AIR TEMPERATURE SENSOR CONNECTOR
- FACTORY POSITION RS BUS CONNECTIONS
- HUMIDIFIER INTERFACE
- ACCESSORY INTERFACE
- 120V POWER INTERFACE
- CAI/HSI INTERFACE
- NEUTRAL INTERFACE
- ECM INDOOR BLOWER MOTOR INTERFACE
- 7 SEGMENT LED
- MAIN HARNESS INTERFACE
- FIELD CLIPABLE TRACES
W915 2 STAGE COMPR
W951 HEAT PUMP
W914 DEHUM/DS
- THERMOSTAT TERMINAL BLOCK

Diagnostic LED (FIGURE 4)

Diagnostic Push Button (FIGURE 4)

Error Code Recall Mode

Flame Signal Mode

- Flame signal mode is exited after the following:
- Power is reset
- Pressing and holding push button until 3 horizontal
- lines “≡” are displayed
- 10 minutes of entering the flame sense mode.

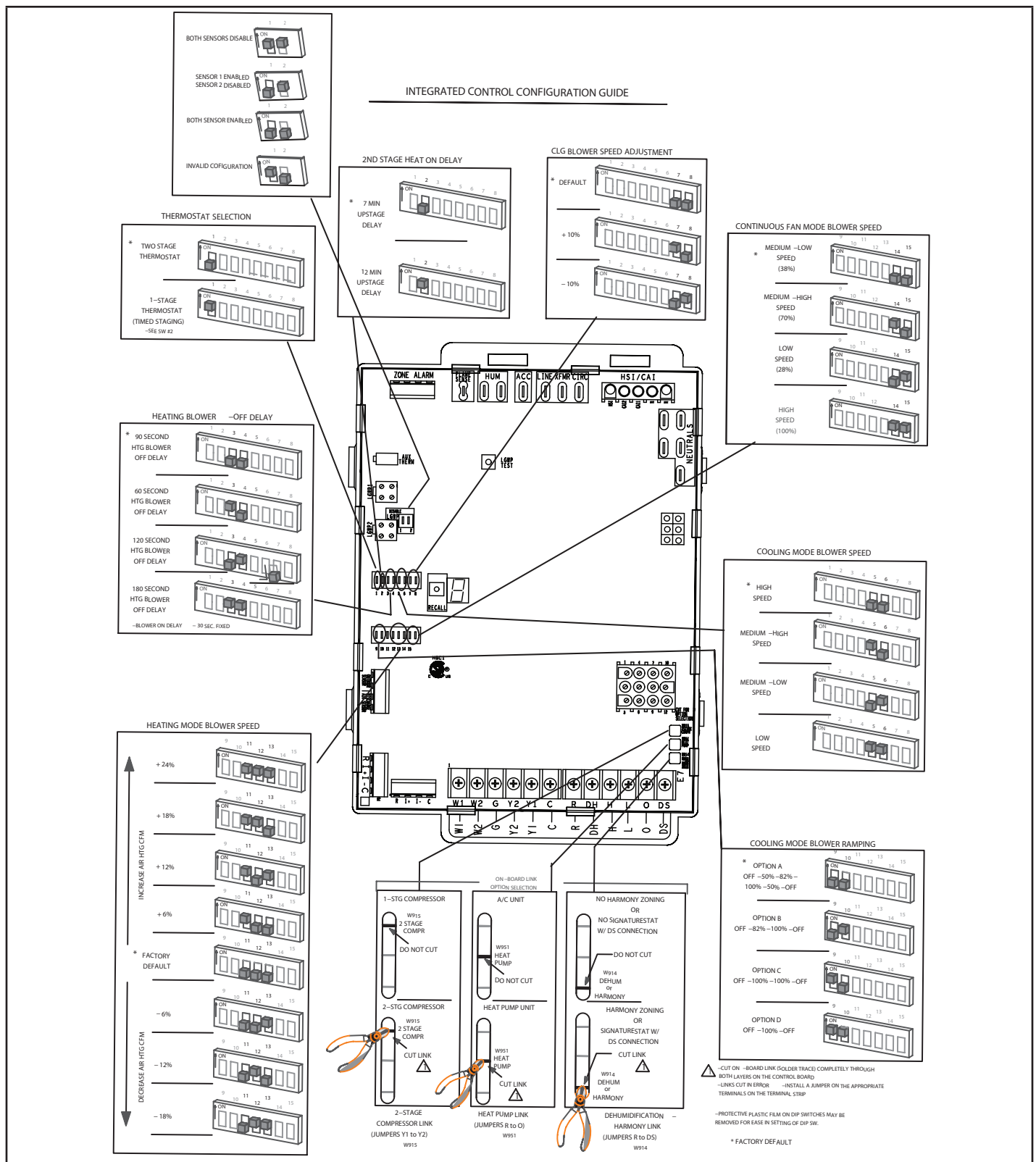


FIGURE 5

TABLE 5

Ignition Control Diagnostic Codes	
DIAGNOSTIC CODES / STATUS OF FURNACE	CODE
IDLE MODE (DECIMALBLINKS AT 1 HERTZ -- 0.5 SECONDS ON, 0.5 SECONDS OFF)	.
INDOOR BLOWER OPERATION: CONTINUOUS FAN MODE (COSTANT TORQUE ONLY)	A
INDOOR BLOWER OPERATION: FOLLOWED BY CFM SETTING FOR INDOOR BLOWER (1 SECOND ON, 0.5 SECOND OFF) / CFM SETTING FOR MODE DISPLAYED (VARIALBE SPEED ONLY)	
COOLING STAGE (1 SECOND ON, 0.5 SECOND OFF) 1 OR 2 DISPLAYED / PAUSE / REPEAT CODES. VARIABLE SPEED ONLY	C
GAS HEAT (1 SECOND ON, 0.5 SECOND OFF) PAUSE / CFM DISPLAYED / PAUSE / REPEAT CODES BLINKING - IGNITION	H
HEAT PUMP STAGE (1 SECOND ON, 0.5 SECOND OFF) 1 OR 2 DISPLAYED / PAUSE / CFM SETTING DISPLAYED / PAUSE / REPEAT CODES	h
DEFROST MODE	dF
ERROR/FAULT CONDTION	CODE
NO ERROR IN THE MEMORY	E000
ELECTRICAL FAULTS (WAIT FOR RECOVERY)	
AC LINE VOLTAGE LOW	E110
LINE VOLTAGE POLARITY REVERSED	E111
EARTH GROUND NOT DETECTED	E112
AC LINE VOLTAGE HIGH	E113
LINE VOLTAGE FREQUENCY UOT OF RANGE	E114
LOW 24V - CONTROLWILL RESTART IF THE ERROR RECOVERS	E115
HARDWARE FAULT (5 MINUTES LOCKOUT)	
CONTROL HARDWARE (INCLUDE A/D ELECTRONICS AND FLAME TEST) FAILURE	E125
HARD LOCKOUT FAULT	
ROLLOUT OPEN OR PREVIOUSLY OPENED	E200
GAS VALVE/PRESSURE SWITCH/LIMT FAULTS (wait for recovery)	
GAS VALVE RELAY (1ST OR 2ND STAGE) PROBLEM	E204
GAS VALVE 2ND STAGE BRELAY PROBLEM	E206
LOW PRESSURE SW FAILED TO CLOSE (STUCK OPEN)	E223
LOW PRESSURE SW FAILED TO OPEN (STUCK CLOSED)	E224
HIGH PRESSURE SW FAILED TO CLOSE (STUCK OPEN)	E225
HIGH PRESSURE SW FAILED TO OPEN (STUCK CLOSED)	E226
LOW PRESSURE SWITCH OPENED IN RUN OR TFI	E227
FLAME SENSE OUT OF SEQUENCE-STILL PRESENT	E241
PRIMARY LIMIT SWITCH OPENED	E250
RSBUS COMMUNICATION CODES	
DEVICE COMMUNIATION PROBLEM - NO OTHER DEVICES ON BUS	E105
UNRESPONSIVE DEVICE	E120
ACTIVE SUBNETCONTROLLER MISSING FOR MORE THAN 3 MINUTES	E124
OUTDOOR UNITS CODES	
RELAY Y1 STUCK	E344
RELAY O FAILURE	E345
OUTDOOR AIR TEMPOERATURE SENSOR FAILURE	E180
RELAY Y1 FAILURE - RELAY ENERGIZED BUT NO INPUT SENSED	E347
RELAY Y2 FAILURE - RELAY ENERGIZED BUT NO INPUT SENSED	E348
INTERLOCK SWITCH (DS TERMINAL) SENSED OPEN (COMMUNCATING MODE ONLY)	E370

TABLE 5 Continued

Ignition Control Diagnostic Codes (Continued)	
SOFT LOCKOUT FAULTS (60 MINUTES)	
UNABLE TO COMMUNICATE WITH CIRCULAR MOTOR	E201
GAS VALVE RELAY (1ST OR 2ND STAGE) CONTACT SHORTED	E205
HOT SURFACE IGNITOR (HSI) SENSED OPEN	E207
SOFT LOCKOUT-FLAME FAILURE ON IGNITION, IGNITION RETRY>MAX, LAST FAILED RETRY DUE TO FLAME FAILURE	E270
SOFT LOCKOUT-PRESSURE SWITCH OPEN, IGNITION RETRY>MAX, LAST FAILED RETRY DUE TO LPSW OPEN	E271
SOFT LOCKOUT-PRESSURE SWITCH OPEN, IN RUN MODE HEATING RECYCLES>MAX, LAST FAILED RETRY DUE TO LPSW OPEN	E272
SOFT LOCKOUT-FLAME FAILURE IN RUN MODE, HEATING RECYCLES>MAX, LAST FAILED RETRY DUE TO LOSS OF FLAME	E273
SOFT LOCKOUT-LIMIT OPEN > 3 MINUTES	E274
SOFT LOCKOUT-FLAME OUT OF SEQUENCE AND IS GONE	E275
IGNITOR CIRCUIT FAULT-FAILED IGNITOR OR TRIGGERING CIRCUITRY.	E290
INDOOR BLOWER UNABLE TO START	E292
PERFORMANCE WARNING	
POOR GROUND DETECTED	E117
IGNITION ON HIGH FIRE	E229
LOW FLAME CURRENT IN HEATING MODE	E240
NON-VOLATILE DATA CORRUPTION	E131
LOW FLAME CURRENT IN HEATING MODE	E240
INDOOR BLOWER MOTOR TEMPERATURE TOO HIGH	E295
DISCHARGE AIR SENSOR FAILURE - NO ERROR IF JUST DISCONNECTED, ONLY SHOW IF SHORTED OR OUT OF RANGE	E310
RESTRICTED AIRFLOW HEATING, HEAT FIRING RATE REDUCED TO MATCH CFM	E311
RESTRICTED AIRFLOW COOLING OR CONTINUOUS FAN MODE - INFORMATION ONLY	E312
INDOOR OUTDOOR UNIT CAPACITY MISMATCH	E313
LOW GWP REFRIGERANT FAULTS	
REFRIGERANT LEAK DETECTED, THERMOSTAT LOCKOUT	E150
REFRIGERANT LEAK DETECTOR SENSOR #1 FAULT	E151
REFRIGERANT LEAK DETECTOR SENSOR #2 FAULT	E152
REFRIGERANT LEAK DETECTOR SENSOR #1 COMM. LOST	E154
REFRIGERANT LEAK DETECTOR SENSOR #2 COMM. LOST	E155
REFRIGERANT LEAK DETECTOR SENSOR #1 TYPE INCORRECT	E160
REFRIGERANT LEAK DETECTOR SENSOR #2 TYPE INCORRECT	E161
REFRIGERANT LEAK DETECTOR CONTROL FAILURE	E163
LOW GWP TEST	E164
LOW GWP RELAY STUCK	E390

Ignition Control Diagnostic Codes

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	Heat pump stage (1 second ON, 0.5 second OFF) / % of input rate displayed / Pause / cfm setting / Pause / Repeat codes.	
H	Gas Heat Stage (1 second ON, 0.5 second OFF) / 1 or 2 displayed / Pause / cfm setting displayed / Pause / Repeat codes. Blinking during ignition.	
dF	Defrost mode.	
U	Discharge Air Temperature	
E000	No error in memory	
E105	Device communication problem - No other devices on RS BUS (Communication system).	Equipment is unable to communicate. Indicates numerous message errors. In most cases errors are related to electrical noise. Make sure high voltage power is separated from RSBus. Check for miswired and/or loose connections between the stat, indoor unit and outdoor unit. Check for a high voltage source of noise close to the system. Fault clears after communication is restored.
E110	Low line voltage.	Line Voltage Low (Voltage lower than nameplate rating). Check power line voltage and correct. Alarm clears 5 seconds after fault recovered.
E111	Low line voltage.	Reverse line power voltage wiring. System resumes normal operation 5 seconds after fault recovered.
E112	Ground not detected	System shuts down. Provide proper earth ground. System resumes normal operation 5 seconds after fault recovered.
E113	High line voltage.	Line Voltage High (Voltage higher than nameplate rating). Provide power voltage within proper range. System resumes normal operation 5 seconds after fault recovered.
E114	Line voltage frequency out-of-range.	No 60 Hertz Power. Check voltage and line power frequency. Correct voltage and frequency problems. System resumes normal operation 5 seconds after fault recovered.
E115	Low 24V - Control will restart if the error recovers.	24-Volt Power Low (Range is 18 to 30 volts). Check and correct voltage. Check for additional power-robbing equipment connected to system. May require installation of larger VA transformer to be installed in furnace / air handler. Clears after fault recovered.
E117	Poor ground detected (Warning only)	Provide proper grounding for unit. Check for proper earth ground to the system. Warning only will clear 30 seconds after fault recovered.
E120	Unresponsive device. Communication only.	Usually caused by delay in outdoor unit responding to indoor unit polling. Recycle power. Check all wiring connections. Cleared after unresponsive device responds to any inquiry.

Ignition Control Diagnostic Codes Continued

Code	Diagnostic Codes/Status of Equipment	Action Required to Clear and Recover
E124	Active communicating thermostat signal missing for more than 3 minutes.	Equipment lost communication with the thermostat. Check four wiring connections, ohm wires and cycle power at the thermostat. Alert stops all services and waits for heartbeat message from thermostat (subnet controller). Cleared after valid thermostat (subnet controller) message is received.
E125	Control failed self-check, internal error, failed hardware. Will restart if error recovers. Integrated control not communicating. Covers hardware errors (flame sense circuit faults, pin shorts, etc.).	Hardware problem on the control. Cycle power on control. Replace if problem prevents service and is persistent. Critical alert. Cleared 300 seconds after fault recovered.
E131	Corrupted control parameters (Verify configuration of system). Communicating only.	Reconfigure the system. Replace control if heating or cooling is not available. Only applicable in the communicating mode, not in startup. Exit from Commissioning and Execute 'Set Factory Default mode Control will still operate on default parameter settings
E150	A2L Refrigerant leak alarm	This may indicate the presence of a leak at or in the indoor unit coil of the equipment, that will need to be repaired for proper and safe operation. Additionally, it may indicate that proper refrigerant charge will need to be verified. The fault cannot be cleared while the refrigerant detection system sensor is reporting the presence of a leak.
E151	Refrigerant Leak Detector Sensor #1 fault	The refrigerant detection sensor #1 in the unit is reporting an issue that prevents it from functioning properly and replacement of the sensor may be necessary. This fault clears when the sensor no longer reports the presence of a fault condition
E152	Refrigerant Leak Detector #2 Fault	The refrigerant detection sensor #1 in the unit is reporting an issue that prevents it from functioning properly and replacement of the sensor may be necessary. This fault clears when the sensor no longer reports the presence of a fault condition
E154	Refrigerant Leak Detector #1 Communication lost or invalid sensor dip switch configuration (ON/OFF)	There may be an issue with the wiring harness connecting the sensor #1 to the furnace control board, either with the wiring itself or with the connector. Check the wiring and connector for damage or improper connectivity. Check the sensor for damage or obstruction on the harness plug. This fault clears when communications with the sensor has been reestablished, but blower latches for a minimum 5 minutes. Retest of the presence of fault can be effected by pressing the LOW GWP test button on the furnace unit control board. This may also indicate incorrect LOW GWP dip switch settings. See installation instructions
E155	Refrigerant Leak Detector #2 Communication lost	There may be an issue with the wiring harness connecting the sensor #1 to the furnace control board, either with the wiring itself or with the connector. Check the wiring and connector for damage or improper connectivity. Check the sensor for damage or obstruction on the harness plug. This fault clears when communications with the sensor has been reestablished, but blower latches for a minimum 5 minutes. Retest of the presence of fault can be effected by pressing the LOW GWP test button on the furnace unit control board.
E160	Refrigerant Leak Detector Sensor #1 type incorrect	The sensor #1 is of a type not suitable for use in the application. Replace the sensor with a Lennox approved replacement part. This fault clears when a sensor suitable for the application is detected by the furnace control board, but blower will latch for a minimum of 5 minutes. Retest of the presence of the fault can be effected by pressing the LOW GWP test button on the furnace unit control board

Ignition Control Diagnostic Codes Continued

E161	Refrigerant Leak Detector Sensor #2 type incorrect	The sensor #2 is of a type not suitable for use in the application. Replace the sensor with a Lennox approved replacement part. This fault clears when a sensor suitable for the application is detected by the furnace control board, but blower will latch for a minimum of 5 minutes. Retest of the presence of the fault can be effected by pressing the LOW GWP test button on the furnace unit control board
E163	Furnace Control Board Failure	There is an issue with the furnace control board, preventing the furnace from operating properly. This may require the replacement of the indoor unit control board. This fault clears when the furnace controller operates normally.
E164	Low GWP Test	Low GWP Test mode activates by manually engaging Low GWP test button. Normal operations resumes and codes clear automatically after 1-minute
E180	Outdoor air temperature sensor failure. Only shown if shorted or out-of range.	Compare outdoor sensor resistance to temperature/ resistance charts in unit installation instructions. Replace sensor pack if necessary. At beginning of (any) configuration, furnace or air handler control will sense outdoor air and discharge air temperature sensor(s). If detected (reading in range), appropriate feature will be set as 'installed' and that could be seen in 'About' screen. In normal operation after control recognizes sensors, alarm will be sent if valid temperature reading is lost. To get rid of setting and alarm, redo configuration and make sure that temperature sensor is marked as 'not installed' in Indoor Unit 'About' screen. When Indoor unit control is replaced, thermostat will 'tell' new control if temperature sensor is in system or not. Clears 30 seconds after fault recovered.
E200	Hard lockout - Rollout circuit open or previously open.	Correct cause of rollout trip, or replace flame rollout switch. Test furnace operation. Cleared after fault recovered.
E201	Indoor blower communication failure - Unable to communicate with blower motor.	Indoor blower communication failure (including power outage). Lost communication with indoor blower motor. Possible causes: motor not powered, loose wiring. Problem may be on control or motor side. Cleared after fault recovered.
E202	Indoor blower motor mis-match - Indoor motor horsepower does not match unit capacity.	Incorrect appliance capacity code selected. Check for proper configuring under: Unit Size Codes for Furnace/Air Handler on configuration guide or in installation instructions. Cleared after the correct match is detected following a reset. (Remove thermostat from system while applying power and reprogramming.)
E203	Appliance capacity / size is NOT programmed. Invalid unit codes refer to configuration flow chart.	No appliance capacity code selected. Check for proper configuring under: Unit Size Codes for Furnace on configuration guide or in installation instructions. Critical Alert. Cleared after valid unit code is read following a reset. (Remove thermostat from system while applying power and reprogramming.)
E204	Gas valve mis-wired.	Check gas valve operation and wiring. Clears when repaired.
E205	Gas valve control relay contact shorted.	Check wiring on control and gas valve. If wiring is correct, replace control.

Ignition Control Diagnostic Codes Continued

Code	Diagnostic Codes/Status of Equipment	Action Required to Clear and Recover
E206	Gas valve second-stage relay failure	Furnace will operate on 1st stage for remainder of the heating demand. Will clear after fault recovered. If unable to operate 2nd stage, replace control.
E207	Hot surface ignitor sensed open.	Measure resistance of hot surface ignitor. Replace if open or not within specified range found in IOM. Resumes normal operation after fault is cleared.
E223	Low pressure switch failed open.	Check pressure (inches w.c.) of low pressure switch closing on heat call. Measure operating pressure (inches w.c.). Inspect vent and combustion air inducer for correct operation and restriction. Resumes normal operation after fault is cleared.
E224	Low pressure switch failed closed.	Check operation of low pressure switch to see if it is stuck closed on heat call longer than 150 seconds. Measure operating pressure (inches w.c.). Inspect vent and combustion air inducer for correct operation and restriction. Resumes normal operation after fault is cleared.
E225	High pressure switch failed open.	Check pressure (inches w.c.) of high pressure switch closing on heat call. Measure operating pressure (inches w.c.). Inspect vent and combustion air inducer for correct operation and restriction. Resumes normal operation after fault is cleared.
E226	High pressure switch failed closed	Check operation of high pressure switch closing on heat call. Measure operating pressure (inches w.c.). Inspect vent and combustion air inducer for correct operation and restriction. Resumes normal operation after fault is cleared.
E227	Low pressure switch open during trial for ignition or run mode.	Check pressure (inches w.c.) of low pressure switch closing on heat call. Measure operating pressure (inches w.c.). Inspect vent and combustion air inducer for correct operation and restriction. Resumes normal operation after fault is cleared.
E228	Combustion air inducer calibration failure	Unable to perform pressure switch calibration. Check vent system and pressure switch wiring connections. Resumes normal operation after fault is cleared.
E229	Ignition on high fire	IFC switched to high fire ignition because low fire pressure switch did not close in allowed time. No action is needed.
E240	Low flame current - Run mode.	Check micro-amperes of flame sensor using control diagnostics or field-installed mode. Clean or replace sensor. Measure voltage of neutral to ground to ensure good unit ground. Alert clears after current heat call has been completed.
E241	Flame sensed out of sequence - Flame still present.	Shut off gas. Check for gas valve leak. Replace, if necessary. Alert clears when fault is recovered.
E250	Limit switch circuit open.	Check for proper firing rate on furnace. Ensure there is no blockage in heater. Check for proper air flow. If limit not closed within 3 minutes, unit will go into 1-hour soft lockout. Resumes normal operation after fault is cleared.
E252	Discharge air temperature too high (gas heat only).	Check temperature rise, air flow and input rate. Cleared when heat call is finished.
E270	Soft lockout - Exceeded maximum number of retries. No flame current sensed.	Check for proper gas flow. Ensure that ignitor is lighting burner. Check flame sensor current. Clears when heat call finishes successfully.

Ignition Control Diagnostic Codes Continued

Code	Diagnostic Codes/Status of Equipment	Action Required to Clear and Recover
E271	Soft lockout - Exceeded maximum number of retries. Last retry failed due to the pressure switch opening.	Check pressure (inches w.c.) of low pressure switch closing on heat call. Measure operating pressure (inches w.c.). Inspect vent and combustion air inducer for correct operation and restriction. Clears when heat call finishes successfully.
E272	Soft lockout - Exceeded maximum number of recycles. Last recycle due to the pressure switch opening.	Check operation of low pressure switch to see if it is stuck closed on heat call. Check pressure (inches w.c.) of high pressure switch closing on heat call. Measure operating pressure (inches w.c.). Inspect vent and combustion air inducer for correct operation and restriction. Clears when heat call finishes successfully.
E273	Soft lockout - Exceeded maximum number of recycles. Last recycle due to flame failure.	Check micro-amperes of flame sensor using control diagnostics or field-installed mode. Clean or replace sensor. Measure voltage of neutral to ground to ensure good unit ground. Clears when heat call finishes successfully.
E274	Soft lockout - Exceeded maximum number of recycles. Last recycle failed due to the limit circuit opening or limit remained open longer than 3 minutes	Shut down system. 1-hour soft lockout. Check firing rate and air flow. Check for blockage. Clears when heat call finishes successfully.
E275	Soft lockout - Flame sensed out of sequence. Flame signal is gone.	Shut off gas. Check for gas valve leak. 1-hour soft lockout. Clears when flame has been proven stable.
E290	Ignitor circuit fault - Failed ignitor or triggering circuitry.	Measure resistance of hot surface ignitor. Replace if open or not within specifications. 1-hour soft lockout. Clears when flame has been proven stable.
E292	Indoor blower motor unable to start due to obstructed wheel, seized bearings.	Indoor blower motor unable to start (seized bearing, stuck wheel, etc.). Replace motor or wheel if assembly does not operate or meet performance standards. 1-hour soft lockout. Clears after circulator successfully starts.
E295	Indoor blower motor temperature is too high.	Indoor blower motor over temperature (motor tripped on internal protector). Check motor bearings and amps. Replace if necessary. Cleared after blower demand is satisfied.
E310	Discharge error temperature sensor failure. Only shown if shorted or out of range.	Compare outdoor sensor resistance to temperature/ resistance charts in installation instructions. Replace sensor if necessary. Cleared in Communicating mode: 30 seconds after fault recovered. In Non-Communicating mode: Cleared after the current heat call is completed.
E311	Heat rate reduced to match indoor blower air flow.	Warning Only. Furnace blower in cutback mode due to restricted airflow. Reduce firing rate every 60 seconds to match available CFM. Check filter and duct system. To clear, replace filter if needed or repair/ add duct. 2-stage controls will reduce firing rate to 1st stage. Clears when heat call finishes successfully.

Ignition Control Diagnostic Codes

Code	Diagnostic Codes/Status of Equipment	Action Required to Clear and Recover
E312	Restricted air flow in cooling or continuous fan mode is lower than cfm setting.	Warning Only. Restricted airflow - Indoor blower is running at a reduced CFM (Cutback Mode - The variable speed motor has pre-set speed and torque limiters to protect the motor from damage caused by operating outside of design parameters (0 to 0.8" W.C.. total external static pressure). Check filter and duct system. To clear, replace filter if needed or repair/add duct. Cleared after the current service demand is satisfied.
E313	Indoor or outdoor unit capacity mismatch. Communication only.	Incorrect indoor/outdoor capacity code selected. Check for proper configuring in installation instructions. Alarm is just a warning. The system will operate, but might not meet efficiency and capacity parameters. Alarm will clear when commissioning is exited. Cleared after commissioning is complete.
E334	Relay "Y1" stuck on interated control.	Replace integrated control.
E345	Relay O Failure	
E347	No 24 Volt output on Y1 of "integrated control" with non communicating outdoor unit.	Operation stopped. Y1 relay / Stage 1 failed. (Pilot relay contacts did not close or the relay coil did not energize; no input back to IFC chip). Critical Alert. Cleared after reset and Y1 input sensed.
E348	No 24 Volt output on Y2 of "integrated control" with non?communicating outdoor unit.	Y2 relay / Stage 2 failed. (Pilot relay contacts did not close or the relay coil did not energize; no input back to IFC chip). Critical Alert. Cleared after reset and Y1 input sensed.
E370	Interlock switch sensed open for 2 minutes.	Control sees the loss of 24VAC for 2 minutes. Terminate all services and wait for interlock switch to close. The alarm will clear when 24VAC is continuously sensed on DS terminal for a minimum of 10 seconds or on a power reset.
E390	LOW GWP Relay Stuck	This indicates an issue with the LOW GWP relay in the furnace control. This may require the replacement of the indoor control board. This fault clears when the relay operates normally.

Integrated Conventional Thermostat (non-communicating)	Control	DIP	Switch	Settings
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EL297UHVK units are equipped with a two-stage, variable speed integrated control. This control manages ignition timing, heating mode fan off delays and indoor blower speeds based on selections made using the control dip switches and jumpers. See FIGURE 5. The control includes an internal watchguard feature which automatically resets the ignition control when it has been locked out. After one hour of continuous thermostat demand for heat, the watchguard will break and remake thermostat demand to the furnace and automatically reset the control to relight the furnace.

Note: All communicating settings are set at the communicating thermostat. See thermostat installation instruction. In a communication system all DIP switch and clippable link settings are ignored. For conventional thermostats proceed with DIP switch and clippable link settings as outlined in the following.

Heating Operation DIP Switch Settings

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.

- Select "OFF" for two-stage heating operation controlled by a two-stage heating thermostat (factory setting);
- Select "ON" for two-stage heating operation controlled by a single-stage heating thermostat. This setting provides a timed delay before second-stage heat is initiated.

Switch 2 -- Second Stage Delay (Used with Single-Stage Thermostat Only) -- This switch is used to determine the second stage on delay when a single-stage thermostat is being used. The switch is factory-set in the OFF position, which provides a 7-minute delay before secondstage heat is initiated. If the switch is toggled to the ON position, it will provide a 12-minute delay before secondstage heat is initiated. This switch is only activated when the thermostat selector jumper is positioned for single stage thermostat use.

Switches 3 and 4 -- Blower-Off Delay -- The blower-on delay of 30 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 3 and 4 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 6 provides the blower off timings that will result from different switch settings.

TABLE 6
Blower Off Delay Switch Settings

Blower Off Delay Seconds	Switch 3	Switch 4
60	On	Off
90 (factory)	Off	Off
120	Off	On
180	On	On

Indoor Blower Operation DIP Switch Settings

Switches 5 and 6 -- Cooling Mode Blower 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. TABLE 7 provides the cooling mode blower speeds that will result from different switch settings. Switches 5 and 6 set the blower cfm for second-stage cool. The integrated control automatically ramps down to 70% of the second-stage cfm for first-stage cfm. Refer to tables for corresponding cfm values.

TABLE 7
Cooling Mode Blower Speeds

Speed	Switch 5	Switch 6
Low	On	On
Medium Low	Off	On
Medium High	On	Off
High (factory)	Off	Off

Switches 7 and 8 -- Cooling Blower Speed Adjustment

-- 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. TABLE 8 below provides blower speed adjustments that will result from different switch settings. Refer to tables for corresponding cfm values.

TABLE 8
Cooling Blower Speed Adjustment

Adjustment	Switch 7	Switch 8
+10% (approx)	On	Off
Factory Default	Off	Off
-10% (approx)	Off	On

Switches 9 and 10 -- Cooling Mode Blower Speed

Ramping -- Blower speed ramping may be used to enhance dehumidification performance. The switches are factory set at option A which has the greatest effect on dehumidification performance. TABLE 9 provides the cooling mode blower speed ramping options that will result from different switch settings. The cooling mode blower speed ramping options are detailed on the next page.

NOTE - The off portion of the selected ramp profile also applies during heat pump operation in dual fuel applications.

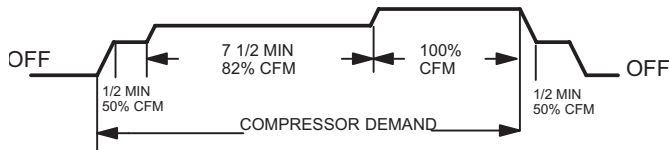
TABLE 9

Cooling Mode Blower Speed Ramping

Ramping	Switch 9	Switch 10
A (Factory)	Off	Off
B	Off	On
C	On	Off
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.



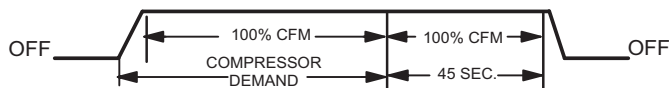
Ramping Option B

- 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.



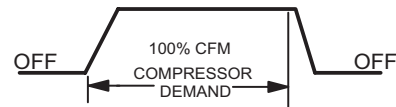
Ramping Option C

- 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.



Switches 11, 12 and 13 -- Heating Mode Blower Speed

--The switches are factory set to the OFF position which provides factory default heat speed. Refer to TABLE 10 for switches 11, 12 and 13 that provided the corresponding increases or decrease to both high and low heat demand.

TABLE 10

Heating Mode Blower Speeds

Heat Speed	Switch 11	Switch 12	Switch 13
Increase 24%	On	On	On
Increase 18%	On	On	Off
Increase 12%	On	Off	On
Increase 6%	On	Off	Off
Factory Default	Off	Off	Off
Decrease 6%	Off	Off	On
Decrease 12%	Off	On	Off
Decrease 18%	Off	On	On

See TABLE 12 for allowable sheating speeds.

Switches 14 and 15 -- Continuous Blower Speed --

TABLE 11 provides continuous blower speed adjustments that will result from different switch settings.

TABLE 11

Continuous Blower Speed

Coninuous Blower Speed	Switch 14	Switch 15
28% of High Cool Speed	Off	On
38% of High Cool Speed (Factory Setting)	Off	Off

See TABLE 13 for allowable circulatuion speeds.

Switch 16 - Not Used

TABLE 12

Allowable Heating Speeds								
EL297UH Model	-18%	-12%	-6%	Default	+6%	+12%	+18%	+24%
045XV36BK	Allowed	Allowed	Allowed	Factory Setting	Allowed	Allowed	Allowed	Allowed
070XV36BK								
090XV36CK								
090XV48CK								
090XV60CK								
110XV48CK							Not Allowed	Not Allowed
110XV60CK							Allowed	Allowed
135XV60DK							Not Allowed	Not Allowed

TABLE 13

Allowable Circulation Speeds		
EL297UHVK Model Number	28% (second stage cool)	38% (second stage cool)
All Models	Allowed	Factory Setting

On Board Links

Note: In communicating systems with a conventional outdoor unit (non-communicating), the on-board clippable links must be set to properly configure the system.

On-Board Link W914 Dehum or Harmony (R to DS)

On-Board Link W914 Dehum or Harmony (R to DS) On-board link W914, is a clippable connection between terminals R and DS on the integrated control. W914 must be cut when the furnace is installed with either the ZSV variable zoning system control or a thermostat which features humidity control. If the link is left intact the PMW signal from the ZSV control will be blocked and also lead to control damage

Refer to TABLE 14 for operation sequence in applications including EL297UHVK, a thermostat which features humidity control and a single-speed outdoor unit. TABLE 15 gives the operation sequence in applications with a two-speed outdoor unit.

On-Board Link W951 Heat Pump (R to O)

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 2 Stage Compr (Y1 to Y2)

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 Y1 to Y2 link is not cut the outdoor unit will operate in second-stage cooling only.

**TABLE 14
OPERATING SEQUENCE**

Non-Communicating Thermostat with Humidity Control Feature and Single-Speed Outdoor Unit

OPERATING SEQUENCE		SYSTEM DEMAND				SYSTEM RESPONSE				
System Condition	Step	Thermostat Demand				Relative Humidity		Compressor	Blower CFM (cool)	Comments
		Y1	O	G	W1	Status	D			
NO CALL FOR DEHUMIDIFICATION										
Normal Operation	1	On	On	On		Acceptable	24 VAC	High	100%	Compressor and indoor blower follow thermostat demand
BASIC MODE (only active on a Y1 thermostat demand)										
Normal Operation	1	On	On	On		Acceptable	24 VAC	High	100%	CS7500 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 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%	CS7500 thermostat will try to maintain room humidity setpoint by allowing the room space to maintain a cooler room thermostat setpoint**
	Jumpers 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									
CS7000 thermostat to use for this application - Y2081 4 heat / 2 cool										
*Dehumidification blower speed is 70% of COOL speed for all units .										
**In Precision mode, CS7000 thermostat will maintain room temperature up to 2 °F (1.2°C) cooler than room setting.										

**TABLE 15
OPERATING SEQUENCE**

Non-Communicating Thermostat with Humidity Control Feature and Two-Speed Outdoor Unit

OPERATING SEQUENCE		SYSTEM DEMAND						SYSTEM RESPONSE					
System Condition	Step	Thermostat Demand						Relative Humidity		Compressor	Blower CFM (cool)	Comments	
		Y1	Y2	O	G	W1	W2	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%	CS7500 thermostat energizes Y1 and de-energizes D on a call for de-humidification	
Dehumidification call	2	On	On	On	On			Demand	0 VAC	High	70%		
PRECISION MODE (operates independent of a Y1 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%	CS 7500 thermostat will try to maintain room humidity setpoint by allowing the room space to maintain a cooler room thermostat 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%	CS7500 thermostat energizes Y2 and de-energizes D on a call for de-humidification	
Dehumidification Call	2	On	On	On	On			Demand	0 VAC	High	70%		
PRECISION MODE (operates independent of a Y1 thermostat demand)													
Normal Operation	1	On		On	On			Acceptable	24 VAC	Low	70%	Dehumidification mode begins when humidity is greater than set point	
Dehumidification Call	2	On	On	On	On			Demand	0 VAC	High	70%		
Dehumidification Call ONLY	1	On	On	On	On			Demand	0 VAC	High	70%	CS7500 thermostat will try to maintain room humidity setpoint by allowing the room space to maintain a cooler room thermostat setpoint***	
	Jumpers at indoor unit with a two stage outdoor unit Cut factory jumper from Y1 to Y2 or cut W915 (Y1 to Y2) 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												
Dave Lennox CS7000 thermostat to use for this application - Y2081 4 heat / 2 cool													
*Normal operation first stage cooling blower speed is 70% COOL speed.													
**Dehumidification blower speed is, reduced to 70% of COOL.													
***In Precision mode, CS 7000 thermostat will maintain room temperature up to 2 °F (1.2°C) cooler than room setting.													

B- Indoor Blower Motor

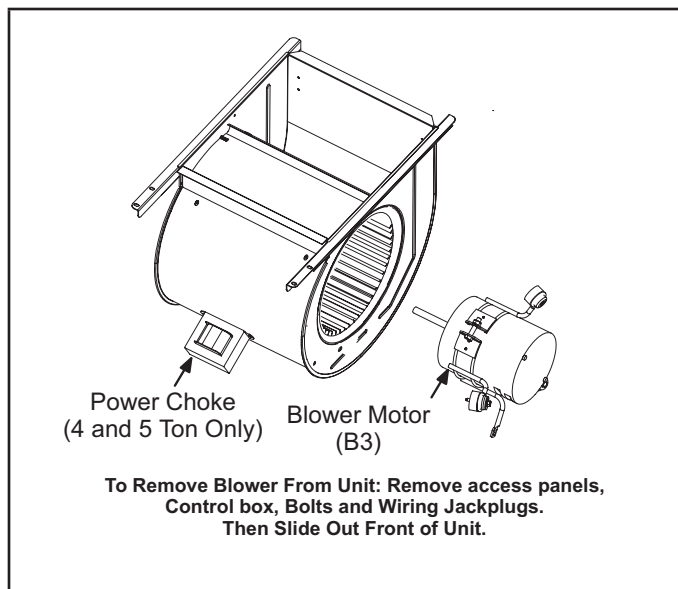


FIGURE 6

Blower Drive

Some EL297UHVK units will be equipped with a blower drive shown in FIGURE 7 with LED codes for operation in TABLE 16. The blower drive is not repairable. If it fails replace the drive.

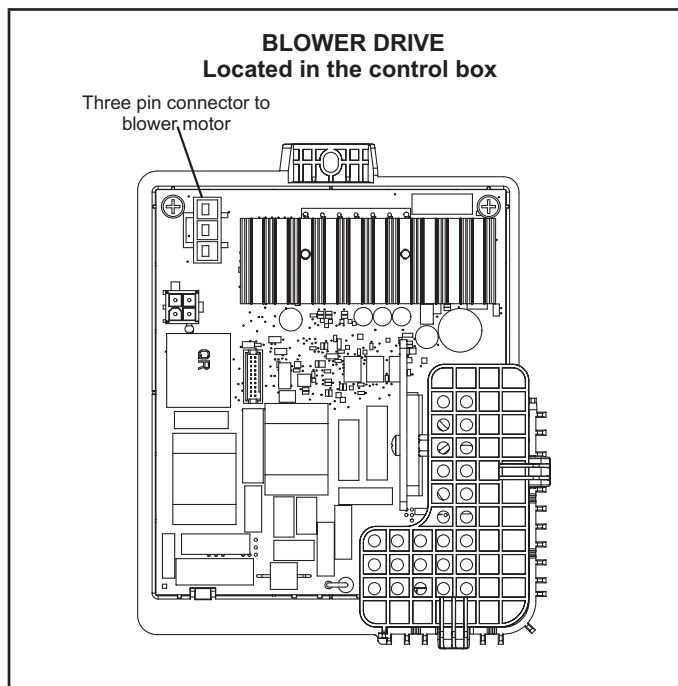


FIGURE 7

! IMPORTANT

Earlier ECM motors used on other Lennox furnace models are not interchangeable with motors used on the EL297UHVK furnace line.

TABLE 16

Led*	Meaning
1 short blink	Normal heartbeat
2 short blinks	Drive fault replace drive
3 short blinks	
4 short blinks	
5 short blinks	Temporary fault (see troubleshooting page 52)
1 long blink + 1 short blink	
1 long blink + 2 short blinks	
1 long blink + 3 short blinks	

* Do not touch or remove drive for replacement until all blinking lights are off. Blinking light(s) indicates drive still has power.

! 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 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. EL297UHVK 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.

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.

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).

BLOWER MOTOR COMPONENTS

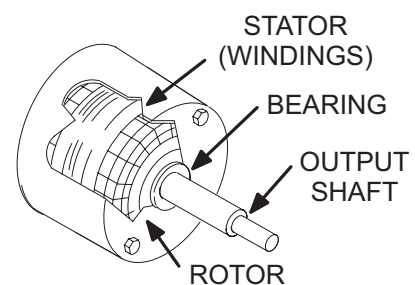


FIGURE 8

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 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 ampdraw 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.

WARNING



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 4 and 5 ton units equipped with 1 hp motors. The choke is located on the blower housing and is used to suppress transient current spikes.

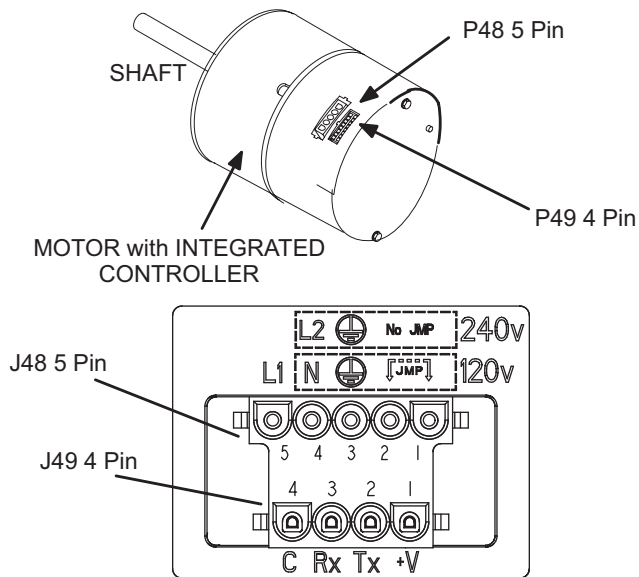
Troubleshooting Motor Operation

To verify motor operation see steps below and FIGURE 9 and FIGURE 10.

- 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.

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	CHASSIS GROUND
3	AC LINE
4	AC LINE
5	AC LINE

FIGURE 9

BLOWER B3 HARNESS CONNECTORS

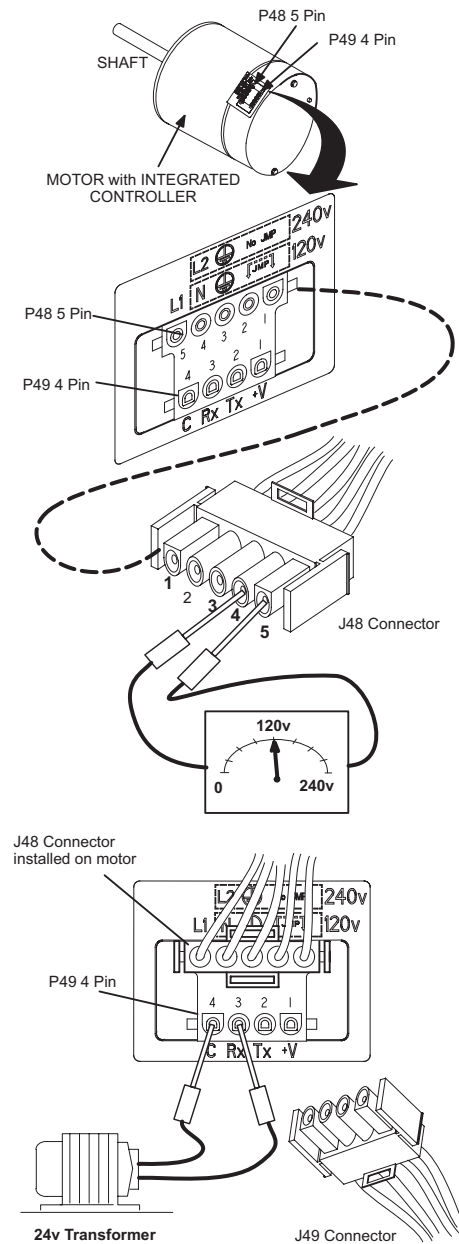


FIGURE 10

Troubleshooting Motor Windings

Ensure that motor windings are not damaged by performing the following tests:

NOTE - If your ohm meter is not an auto-ranging type, set it to the highest ohm scale (100k ohms or greater) before performing tests.

TABLE 17
Ohm Meter Range

Scale	Measurement Range	
	in words	ohms
2M	two megohm -- two million ohms	0-2,000,000
200K	two hundred kilohm -- two hundred thousand ohms	0-200,000
20K	twenty kilohm -- twenty thousand ohms	0-20,000
2K	two kilohm -- two thousand ohms	0-2,000
200	two hundred ohm	0-200

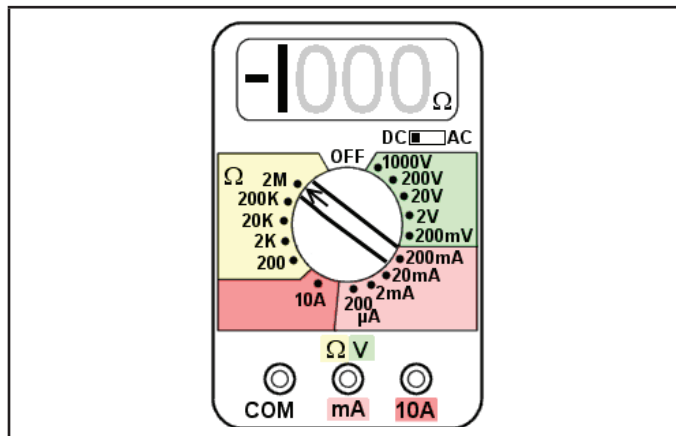


FIGURE 11
TEST A

Measure the resistance between each of the three motor leads (3-pin plug) and the unpainted part of the end shield.

If the winding resistance to ground is <100k ohms, replace the motor and control module. If the resistance to ground is >100k, the motor windings are fine. Proceed to Test B.

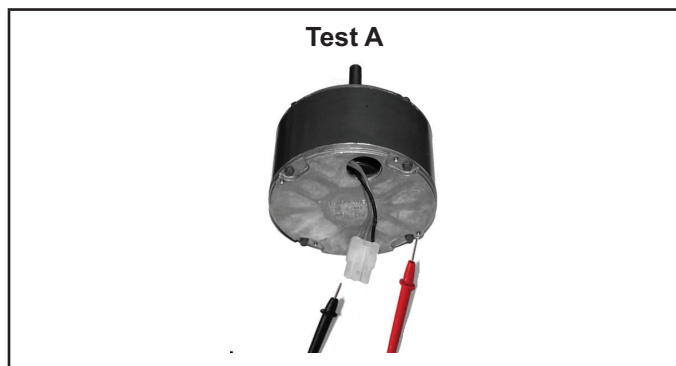


FIGURE 12

TEST B

Use an ohmmeter to measure the motor phase-to-phase resistance by checking these combinations of the 3-pin motor plug. For the purpose of this test, start at either end of the connector as lead 1.

- 1 - The lead-to-lead resistance across any two leads should be less than 20 ohms.
- 2 - Each lead-to-lead resistance should be the same. If the measured resistance is greater than 20 ohms, replace the motor and control module.

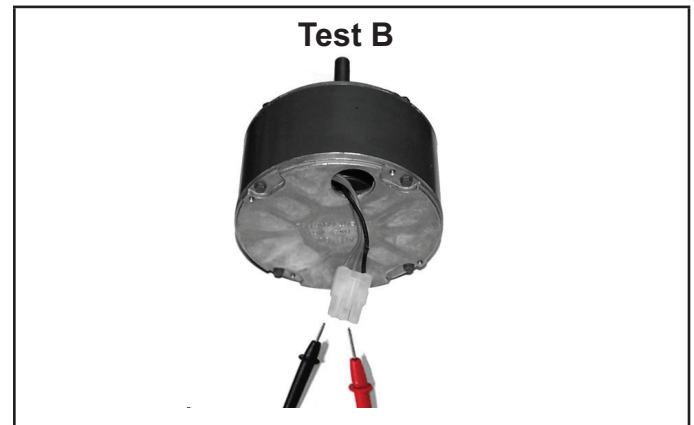


FIGURE 13

C- Heating Components

1. Ignitor

The ignitor is made of durable silicon nitride. Longevity is enhanced by controlling voltage to the ignitor. The integrated control provides a regulated 120 volts to the ignitor for a consistent ignition and long ignitor life.

Ohm value should be 39 to 70. See FIGURE 14 for ignitor location and FIGURE 15 for ignitor check out.

NOTE - The EL297UHVK(X) furnace contains electronic components that are polarity sensitive. Make sure that the furnace is wired correctly and is properly grounded.

2. Flame Sensor

A flame sensor is located on the left side of the burner support. See FIGURE 14. The sensor 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. See TABLE 18 for flame signal.

TABLE 18
Flame Signal in Microamps

Normal	Low	Drop Out
2.6 or greater	2.5 or less	1.1

3. Gas Valve

The valve is internally redundant to assure safety shut-off. If the gas valve must be replaced, the same type valve must be used.

24VAC terminals and gas control knob are located on the valve. A wire harness connects the terminals from the gas valve to the electronic ignition control. 24V applied to the terminals energizes the valve. Inlet and outlet pressure taps are located on the valve. A regulator adjustment screw is located on the valve.

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

4. Flame Rollout Switches (S47)

Flame rollout switch is a high temperature limit located on top of the burner box, one on each side. See FIGURE 14. The limit is a N.C. SPST manual-reset limit. When S47 senses rollout, the circuit breaks and the ignition control immediately stops ignition and closes the gas valve. 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 control.

5. Burners

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 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.

6. Primary Limit Control (S10)

The primary limit (S10) is located in the heating vestibule panel. When excess heat is sensed in the heat exchanger, the limit will open. If the limit is open, the furnace control energizes the supply air blower and closes the gas valve. The limit automatically resets when unit temperature returns to normal. The switch must reset within three minutes or the SureLight control will go into Watch guard for one hour. The switch is factory set and cannot be adjusted. The switch may have a different set point for each unit model number. See Lennox Repair Parts Handbook if limit switch must be replaced.

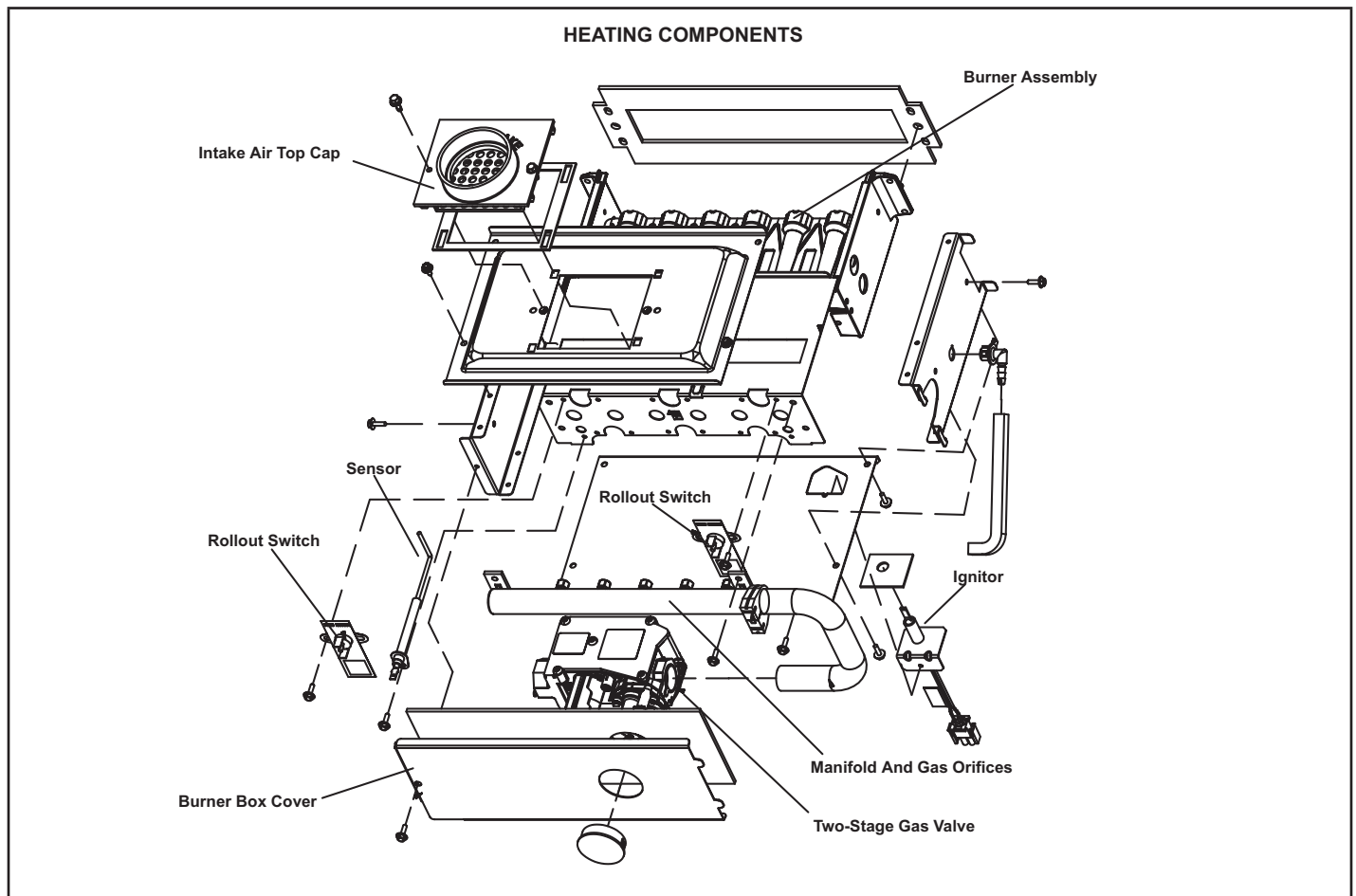


FIGURE 14

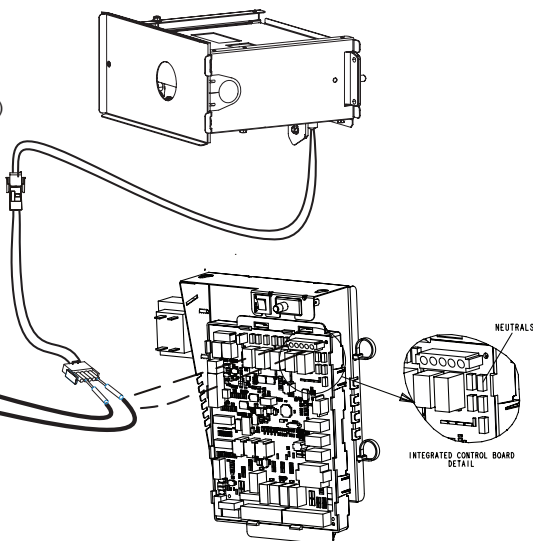
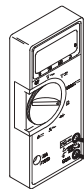
Ignitor Check

Test 1

Check ignitor circuit for correct resistance.

Remove HSI/CAI 5-pin plug from control.
Check ohms reading across terminals 1 and 5.
If value is correct, this is the only test needed.
If the reading on the meter is not correct, (0 or infinity) then a second test is needed.

Meter
(set to ohms)

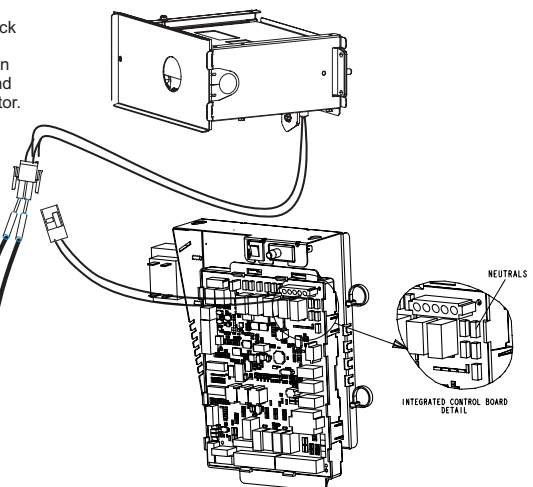
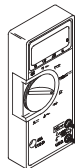


Test 2

Check ignitor for correct resistance.

Separate the 2-pin jack-plug near the manifold and check resistance of ignitor at the plug. Reading should be between 39 and 70 ohms. If the reading is correct, then the problem is with the wiring between the jack-plug and the control. If reading is not correct, the issue is the ignitor.

Meter
(set to ohms)



Test 3

Check ignitor for correct voltage

Insert meter probes into terminals 1 and 5 (use small diameter probes in order not to damage plug).
Check voltage during 20 second ignitor warm up period.
Voltage should read 120 volts \pm 10%. If voltage reads below these values, check for correct supply voltage to furnace.

Meter
(set to AC volts)

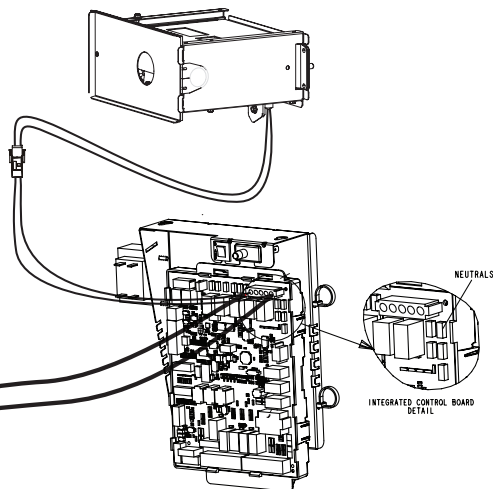
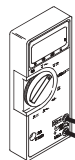


FIGURE 15

7. Combustion Air Inducer (B6) and

Cold End Header Box

All units use a two-stage combustion air inducer to move air through the burners and heat exchanger during heating operation. The blower uses a 120VAC motor. The motor operates during all heating operation and is controlled by integrated control A92. The inducer also operates for 15 seconds before burner ignition (prepurge) and for 5 seconds after the gas valve closes (postpurge). The inducer operates on low speed during first stage heat, then switches to high speed for second stage heat.

NOTE - Each furnace model uses a unique CAI. Refer to Lennox Repair Parts listing for correct inducer for replacement.

The combustion air inducer 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 combustion air inducer.

The box has pressure taps for the combustion air inducer pressure switch hoses. The pressure switch measures the pressure differential across the combustion air inducer orifice or difference in the channel and the box. **If replacement is necessary the gaskets used to seal the box to the vestibule panel and the combustion air inducer to the box, must also be replaced.**

A proving switch connected to the combustion air inducer orifice plate is used to prove inducer operation. The combustion air inducer orifice will be different for each model. See TABLE 19 for orifice sizes. The pressure switch measures the pressure differential across the combustion air inducer orifice. When the proving switch opens, the furnace control (A92) immediately closes the gas valve to prevent burner operation.

TABLE 19

Unit	C.A.I. Orifice Size
-045	0.650
-070	0.810
-090	0.920
-110	1.070
-135	1.300

8. Combustion Air Inducer Pressure Switch (S18)

EL297UHV(X) series units are equipped with a dual combustion air pressure switch (first and second stage) located on the combustion air inducer orifice bracket. See FIGURE 16. The switch is connected to the combustion air inducer housing by means of a flexible silicone hose. It monitors negative air pressure in the combustion air inducer housing.

The switches are a single-pole single-throw pressure switch electrically connected to the integrated control. The purpose of the switch is to prevent burner operation if the combustion air inducer is not operating or if the flue becomes obstructed.

On heat demand (first or second stage) the switch senses that the combustion air inducer is operating. It closes a circuit to the integrated control when pressure inside the combustion air inducer decreases to a certain set point. Set points vary depending on unit size. See TABLE 20 0 - 4500'. The pressure sensed by the switch is negative relative to atmospheric pressure. If the flue becomes obstructed during operation, the switch senses a loss of negative pressure becomes more equal with atmospheric pressure) and opens the circuit to the furnace control and gas valve. A bleed port on the switch allows relatively dry air in the vestibule to purge switch tubing, to prevent condensate build up.

NOTE - The switch is factory set and is not field adjustable. It is a safety shut-down control in the furnace and must not be by-passed for any reason. If switch is closed or bypassed, the control will not initiate ignition at start up.

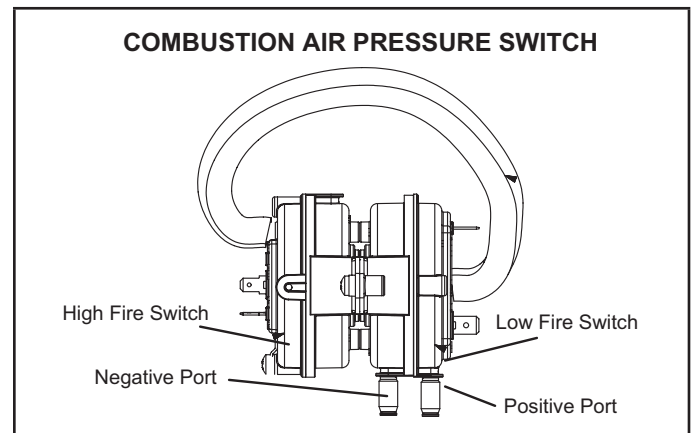


FIGURE 16

TABLE 20 0 - 4500'

Unit	Set Point High Heat	Set Point Low Heat
-045	0.80	0.50
-070	0.95	0.55
-090	0.90	0.50
-110	1.00	0.55
-135	0.85	0.45

TABLE 21 4501 - 7500'

Unit	Set Point High Heat	Set Point Low Heat
-045	0.74	0.41
-070	0.85	0.50
-090	0.75	0.45
-110	0.95	0.55
-135	0.80	0.40

TABLE 22 7500 - 10,000'

Unit	Set Point High Heat	Set Point Low Heat
-045	0.70	0.40
-070	0.75	0.45
-090	0.70	0.40
-110	0.90	0.50
-135	0.75	0.35

Pressure Switch Check

To check pressure switch differential, refer to FIGURE 18 and use the provided fittings and tubing to follow the steps below.

- 1 - Remove thermostat demand and allow unit to cycle off.
- 2 - Remove the tubing from the negative side (red and black or red) and positive side (black) of the pressure switch (leave both connected to cold end header box).
- 3 - Take the 2" length square tubing and connect to the positive (+) side of the pressure switch. Take the 10" length square tubing and tee into the tubing from the positive side of the cold end header box and the other side of the 2" square tubing. Connect the other end of the 10" square tubing the positive (+) side of the measuring device.

- 4 - Take a second piece the 2" length square tubing and connect to the negative (-) side of the pressure switch. Take a second piece of 10" length square tubing and tee into the tubing from the negative (-) side of the cold end header box and the other side of the 2" square tubing. Connect the other end of the 10" square tubing to the negative (-) side of the measuring device.

- 5 - 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 at least 0.15" greater than those listed in TABLE 20, TABLE 21 and TABLE 22. Readings in table are the set points or "break points".

- 6 - Remove thermostat demand and allow to cycle off.
- 7 - Replace original pressure switch tubing.

NOTE - Pressure differential values (set point) in table are the "break", or "open" specifications. "Make", or "close" pressure differentials are 0.15" greater than the set points listed in table

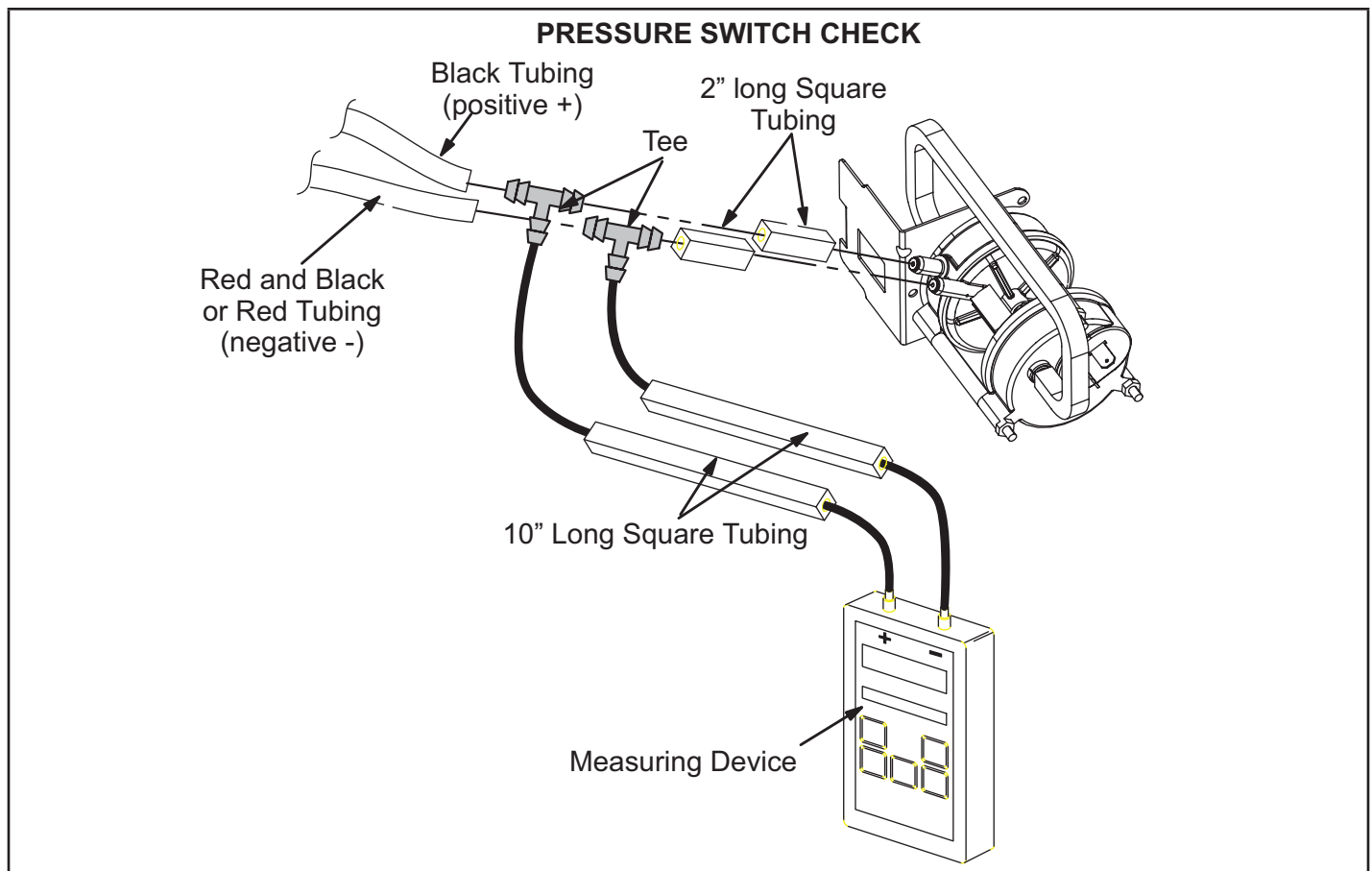


FIGURE 17

II-Placement and Installation

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 23 below for approved piping and fittings.

TABLE 23
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	
POLYPROPYLENE VENTING SYSTEM	
PolyPro® by Duravent	
InnoFlue® by Centrotherm	
UL 1738 CERTIFIED GAS VENTING SYSTEM	UL1738
IPEX System1738 Schedule 40 PVC Pipes and Fittings	
IPEX System1738 PVC FGV Cement & Primer	

* Not approved as of 12-1-2022

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

EL297UHVK 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 23. 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 during cooler weather. Metal or plastic strapping may be used for vent pipe hangers. 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.

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 24
OUTDOOR TERMINATION USAGE*

Input Size	Vent Pipe Dia. in.	STANDARD				CONCENTRIC		
		Flush Mount Kit	Wall Kit		Field Fabricated	1-1.2 inch	2 inch	3 inch
			2 inch	3 inch		71M80 (US) 444W92 (CA)	69M29 (US) 444W92 (CA)	60L46 (US) 444W93 (CA)
		51W11 (US) 51W12 (CA)	22G44 (US) 430G28 (CA)	44J40 (US) 481J20 (CA)				
045	⁶ 1-1/2	³ YES	YES	¹ YES	⁵ YES	² YES		
	2	³ YES	YES	¹ YES	⁵ YES	² YES		
	2-1/2	³ YES	YES	¹ YES	⁵ YES	² YES		
	3	³ YES	YES	¹ YES	⁵ YES	² YES		
070	⁶ 1-1/2	³ YES	YES	¹ YES	⁵ YES	² YES		
	2	³ YES	YES	¹ YES	⁵ YES	² YES		
	2-1/2	³ YES	YES	¹ YES	⁵ YES	² YES		
	3	³ YES	YES	¹ YES	⁵ YES	² YES		
090	2	³ YES		YES	⁵ YES		YES	YES
	2-1/2	³ YES		YES	⁵ YES		YES	YES
	3	³ YES		YES	⁵ YES		YES	YES
110	2	YES		YES	⁵ YES		YES	YES
	2-1/2	YES		YES	⁵ YES		YES	YES
	3	YES		YES	⁵ YES		YES	YES
135	3	YES		YES	⁵ YES			YES

NOTE - Standard Terminations do not include any vent pipe or elbows external to the structure. Any vent pipe or elbows external to the structure must be included in total vent length calculations. See vent length tables.

* Kits must be properly installed according to kit instructions.

1 Requires field-provided outdoor 1-1/2" exhaust accelerator.

2 Concentric kits 71M80 and 44W92 include 1-1/2" outdoor accelerator, when used with 045 and 070 input models. 1-1/2 in. pipe must be transitioned to 2 in. when used with a concentric kit,

3 Flush mount kits 51W11 and 51W12 includes 1-1/2 in. outdoor exhaust accelerator, required when used with 045, 070 and 090 input models. 1-1/2 in. pipe must be transitioned to 2 in. pipe when used with the flushmount kit.

4 Termination kits 30G28, 44W92, 44W93 and 81J20 are certified to ULC S636 for use in Canada only.

5 See TABLE 29 for vent accelerator requirements.

6 2 in. pipe to 1-1/2 in. reducer required and must be field provided.

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.

NOTE - Check the inside of vent pipe thoroughly for any obstruction that may alter furnace operation.

- 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.

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

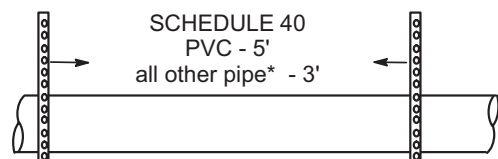
- 6 - Promptly apply solvent cement to end of pipe and inside socket surface of fitting. Cement should be applied lightly but uniformly to inside of socket. Take care to keep excess cement out of socket. Apply second coat to end of pipe.
- 7 - Immediately after applying last coat of cement to pipe, and 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 uld 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 an improper assembly due to insufficient solvent.
- 9 - Handle joints carefully until completely set.

Venting Practices

HORIZONTAL PIPING SUPPORT GUIDELINES



* See Piping and Fittings Specifications table

NOTE - Vertical support guidelines: Recommend following the guidelines in the International Plumbing code for PVC.

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

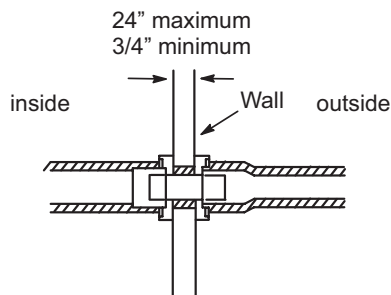


FIGURE 18

- 1 - 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.
- 2 - 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.

Removal of the Furnace from Common Vent

In the event that an existing furnace is removed from a venting system commonly run with separate gas appliances, the venting system is likely to be too large to properly vent the remaining attached appliances.

Conduct the following test while each appliance is operating and the other appliances (which are not operating) remain connected to the common venting system. If the venting system has been installed improperly, you must correct the system as indicated in the general venting requirements section.

! WARNING

CARBON MONOXIDE POISONING HAZARD

Failure to follow the steps outlined below for each appliance connected to the venting system being placed into operation could result in carbon monoxide poisoning or death.

The following steps shall be followed for each appliance connected to the venting system being placed into operation, while all other appliances connected to the venting system are not in operation:

- 1 - Seal any unused openings in the common venting system.
- 2 - Inspect the venting system for proper size and horizontal pitch. Determine that there is no blockage, restriction, leakage, corrosion, or other deficiencies which could cause an unsafe condition.
- 3 - Close all building doors and windows and all doors between the space in which the appliances remaining connected to the common venting system are located and other spaces of the building. Turn on clothes dryers and any appliances not connected to the common venting system. Turn on any exhaust fans, such as range hoods and bathroom exhausts, so they will operate at maximum speed. Do not operate a summer exhaust fan. Close fireplace dampers.
- 4 - Follow the lighting instructions. Turn on the appliance that is being inspected. Adjust the thermostat so that the appliance operates continuously.
- 5 - After the main burner has operated for 5 minutes, test for leaks of flue gases at the draft hood relief opening. Use the flame of a match or candle.
- 6 - After determining that each appliance connected to the common venting system is venting properly, (step 3 return all doors, windows, exhaust fans, fireplace dampers, and any other gas-burning appliances to their previous mode of operation.
- 7 - If a venting problem is found during any of the preceding tests, the common venting system must be modified to correct the problem.

Resize the common venting system to the minimum vent pipe size determined by using the appropriate tables in Appendix G. (These are in the current standards).

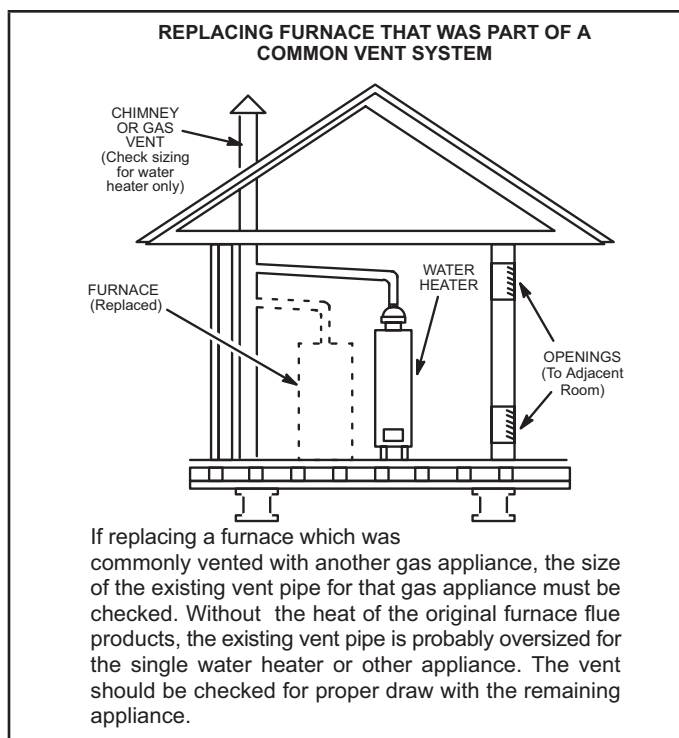


FIGURE 19

Exhaust Piping (FIGURE 20, FIGURE 22 and FIGURE 23)

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

NOTE - Lennox has approved the use of DuraVent® and Centrotherm manufactured vent pipe and terminations as an option to PVC. When using the PolyPro® by DuraVent or InnoFlue® by Centrotherm venting system the vent pipe requirements stated in the unit installation instruction – minimum & maximum vent lengths, termination clearances, etc. – apply and must be followed. Follow the instructions provided with PolyPro by DuraVent and InnoFlue by Centrotherm venting system for assembly or if requirements are more restrictive. The PolyPro by DuraVent and InnoFlue by Centrotherm venting system must also follow the uninsulated.

The EL297UHV can be installed as either a Non-Direct Vent or a Direct Vent gas central furnace.

NOTE - In Non-Direct Vent installations, combustion air is taken from indoors or ventilated attic or crawlspace and flue gases are discharged outdoors. 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 TABLE 25 (minimum) and TABLE 26 (maximum). Count all elbows inside and outside the home.

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 29. 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.

NOTE - The exhaust collar on all models is sized to accommodate 2" Schedule 40 vent pipe. In horizontal applications, any transition to exhaust pipe larger than 2" must be made in vertical runs of the pipe. Therefore a 2" elbow must be added before the pipe is transitioned to any size larger than 2". 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.

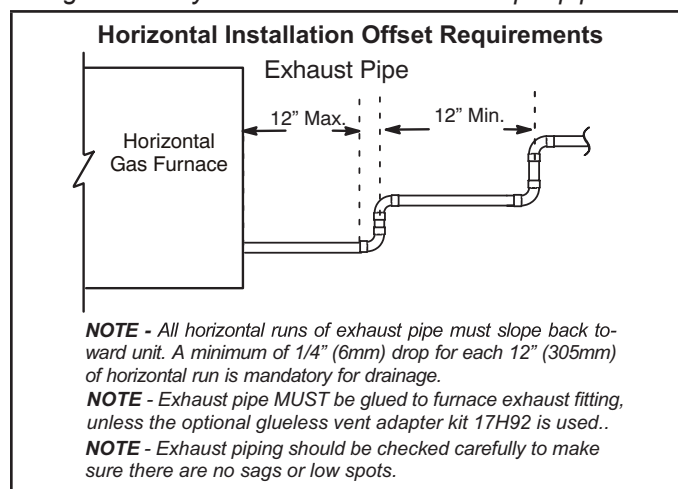


FIGURE 20

**TABLE 25
MINIMUM VENT PIPE LENGTHS**

EL297UHV MODEL	MIN. VENT LENGTH*
045, 070, 090, 110, 135	15 ft. or 5 ft plus 2 elbows or 10 ft plus 1 elbow

*Any approved termination may be added to the minimum length listed. Two 45 degree elbows are the equivalent to one 90 degree elbow.

NOTE - Lennox offers a glueless vent adapter kit 17H92 as an option for exhaust exiting at the furnace top cap coupling. If the kit is not used, then the exhaust pipe **MUST** be glued to the furnace exhaust fitting.

Use the following steps to correctly size vent pipe diameter.

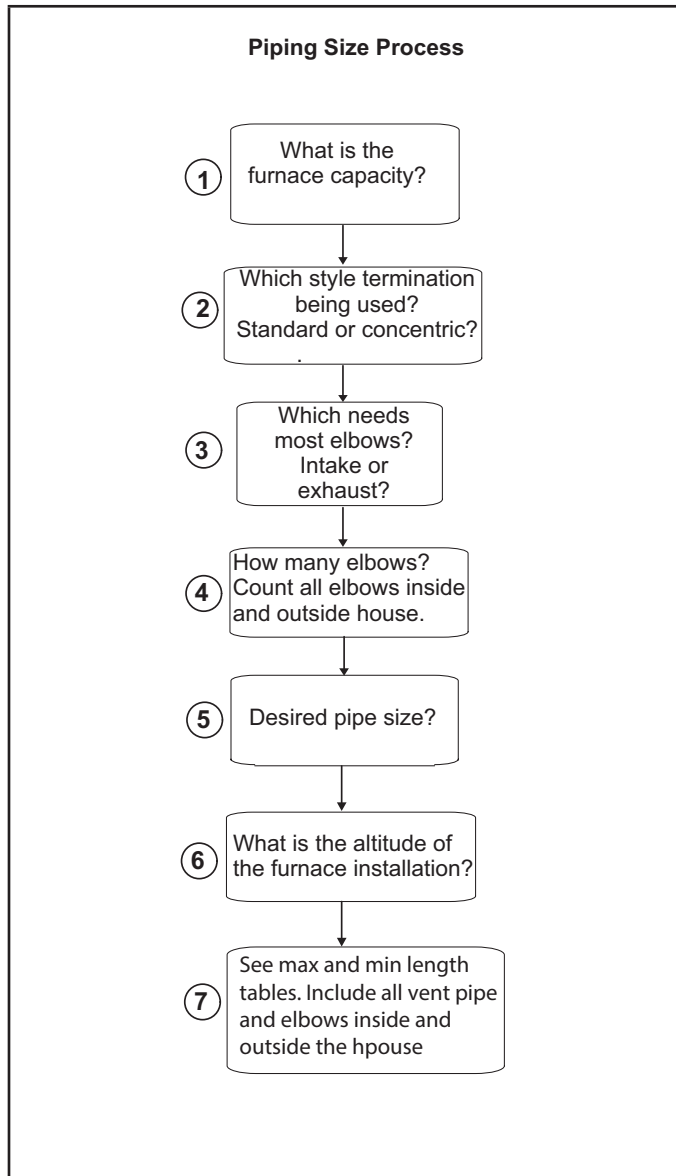


FIGURE 21



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 26

Maximum Allowable Intake or Exhaust Vent Length in Feet

NOTE - Size intake and exhaust pipe length separately. Values in table are for Intake OR Exhaust, not combined total. Both Intake and Exhaust must be same pipe size.

Standard Termination at Elevation 0 - 4500 ft																				
No Of 90° Elbows Used	1-1/2" Pipe					2" Pipe					2-1/2" Pipe					3" Pipe				
	Model					Model					Model					Model				
	045	070	090	110	135	045	070	090	110	135	045	070	090	110	135	045	070	090	110	135
1	25	20	n/a	n/a	n/a	81	66	44	22	n/a	115	115	93	58	n/a	138	137	118	118	114
2	20	15				76	61	39	19		110	110	88	53		133	132	113	113	109
3	15	10				71	56	34	14		105	105	83	48		128	127	108	108	104
4	10	n/a				66	51	29	n/a		100	100	78	43		123	122	103	103	99
5	n/a					61	46	24			95	95	73	38		118	117	98	98	94
6						56	41	19			90	90	68	33		113	112	93	93	89
7						51	36	14			85	85	63	28		108	107	88	88	84
8						46	31	n/a			80	80	58	23		103	102	83	83	79
9						41	26				75	75	53	18		98	97	78	78	74
10						36	21				70	70	48	13		93	92	73	73	69
Standard Termination Elevation 4500 - 10,000 ft																				
No Of 90° Elbows Used	1-1/2" Pipe					2" Pipe					2-1/2" Pipe					3" Pipe				
	Model					Model					Model					Model				
	045	070	090	110	135	045	070	090	110	135	045	070	090	110	135	045	070	090	110	135
1	25	20	n/a	n/a	n/a	81	66	44	n/a	n/a	115	115	93	58	n/a	138	137	118	118	114
2	20	15				76	61	39			110	110	88	53		133	132	113	113	109
3	15	10				71	56	34			105	105	83	48		128	127	108	108	104
4	10	n/a				66	51	29			100	100	78	43		123	122	103	103	99
5	n/a					61	46	24			95	96	73	38		118	117	98	98	94
6						56	41	19			90	90	68	33		113	112	93	93	89
7						51	36	14			85	85	63	28		108	107	88	88	84
8						46	31	n/a			80	80	58	23		103	102	83	83	79
9						41	26				75	75	53	18		98	97	78	78	74
10						36	21				70	70	48	13		93	92	73	73	69

TABLE 26 Continued

Maximum Allowable Intake or Exhaust Vent Length in Feet

NOTE - Size intake and exhaust pipe length separately. Values in table are for Intake OR Exhaust, not combined total. Both Intake and Exhaust must be same pipe size.

Concentric Termination at Elevation 0 - 4500 ft																					
No Of 90° Elbows Used	1-1/2" Pipe					2" Pipe					2-1/2" Pipe					3" Pipe					
	Model					Model					Model					Model					
	045	070	090	110	135	045	070	090	110	135	045	070	090	110	135	045	070	090	110	135	
1	20	15	n/a	n/a	n/a	73	58	42	22	n/a	105	105	89	54	n/a	121	121	114	114	105	
2	15	10				68	53	37	17		100	100	84	49		116	116	109	109	100	
3	10	n/a				63	48	32	12		95	95	79	44		111	111	104	104	95	
4	n/a					58	43	27	n/a		90	90	74	39		106	106	99	99	90	
5						53	38	22			85	85	69	34		101	101	94	94	85	
6						48	33	17			80	80	64	29		96	96	89	89	80	
7						43	28	12			75	75	59	24		91	91	84	84	75	
8						38	23	n/a			70	70	54	19		86	86	79	79	70	
9						33	18				65	65	49	14		81	81	74	74	65	
10						28	13				60	60	44	n/a		76	76	69	69	60	
Concentric Termination Elevation 4500 - 10,000 ft																					
No Of 90° Elbows Used	1-1/2" Pipe					2" Pipe					2-1/2" Pipe					3" Pipe					
	Model					Model					Model					Model					
	045	070	090	110	135	045	070	090	110	135	045	070	090	110	135	045	070	090	110	135	
1	20	15	n/a	n/a	n/a	73	58	42	n/a	n/a	105	105	89	54	n/a	121	121	114	114	105	
2	15	10				68	53	37			100	100	84	49		116	116	109	109	100	
3	10	n/a				63	48	32			95	95	79	44		111	111	104	104	95	
4	n/a					58	43	27			n/a	90	90	74		39	106	106	99	99	90
5						53	38	22				85	85	69		34	101	101	94	94	85
6						48	33	17				80	80	64		29	96	96	89	89	80
7						43	28	12				75	75	59		24	91	91	84	84	75
8						38	23	n/a				70	70	54		19	86	86	79	79	70
9						33	18					65	65	49		14	81	81	74	74	65
10						28	13					60	60	44		n/a	76	76	69	69	60

TABLE 27

Maximum Allowable Exhaust Vent Lengths With Furnace Installed in a Closet or Basement Using Ventilated Attic or Crawl Space For Intake Air in Feet

NOTE - Size intake and exhaust pipe length separately. Values in table are for Intake OR Exhaust, not combined total. Both Intake and Exhaust must be same pipe size.

NOTE - Additional vent pipe and elbows used to terminate the vent pipe outside the structure must be included in the total vent length calculation

Standard Termination at Elevation 0 - 4500 ft																				
No Of 90° Elbows Used	1-1/2" Pipe					2" Pipe					2-1/2" Pipe					3" Pipe				
	Model					Model					Model					Model				
	045	070	090	110	135	045	070	090	110	135	045	070	090	110	135	045	070	090	110	135
1	20	15	n/a	n/a	n/a	71	56	34	14	n/a	100	100	78	43	n/a	118	117	98	98	94
2	15	10				66	51	29	9		95	95	73	38		113	112	93	93	89
3	10	n/a				61	46	24	4		90	90	68	33		108	107	88	88	84
4	n/a					56	41	19	n/a		85	85	63	28		103	102	83	83	79
5						51	36	14			80	80	58	23		98	97	78	78	74
6						46	31	9			75	75	53	18		93	92	73	73	69
7						41	26	4			70	70	48	13		88	87	68	68	64
8						36	21	n/a			65	65	43	8		83	82	63	63	59
9						31	16				60	60	38	3		78	77	58	58	54
10						26	11				55	55	33	n/a		73	72	53	53	49
Standard Termination Elevation 4500 - 10,000 ft																				
No Of 90° Elbows Usedl	1-1/2" Pipe					2" Pipe					2-1/2" Pipe					3" Pipe				
	Model					Model					Model					Model				
	045	070	090	110	135	045	070	090	110	135	045	070	090	110	135	045	070	090	110	135
1	20	15	n/a	n/a	n/a	71	56	34	n/a	n/a	100	100	78	43	n/a	118	117	98	98	94
2	15	10				66	51	29			95	95	73	38		113	112	93	93	89
3	10	n/a				61	46	24			90	90	68	33		108	107	88	88	84
4	n/a					56	41	19			85	85	63	28		103	102	83	83	79
5						51	36	14			80	80	58	23		98	97	78	78	74
6						46	31	9			75	75	53	18		93	92	73	73	69
7						41	26	4			70	70	48	13		88	87	68	68	64
8						36	21	n/a			65	65	43	8		83	82	63	63	59
9						31	16				60	60	38	3		78	77	58	58	54
10						26	11				55	55	33	n/a		73	72	53	53	49

**TYPICAL EXHAUST AND INTAKE PIPE CONNECTIONS IN UPFLOW
DIRECT OR NON-DIRECT VENT APPLICATIONS**

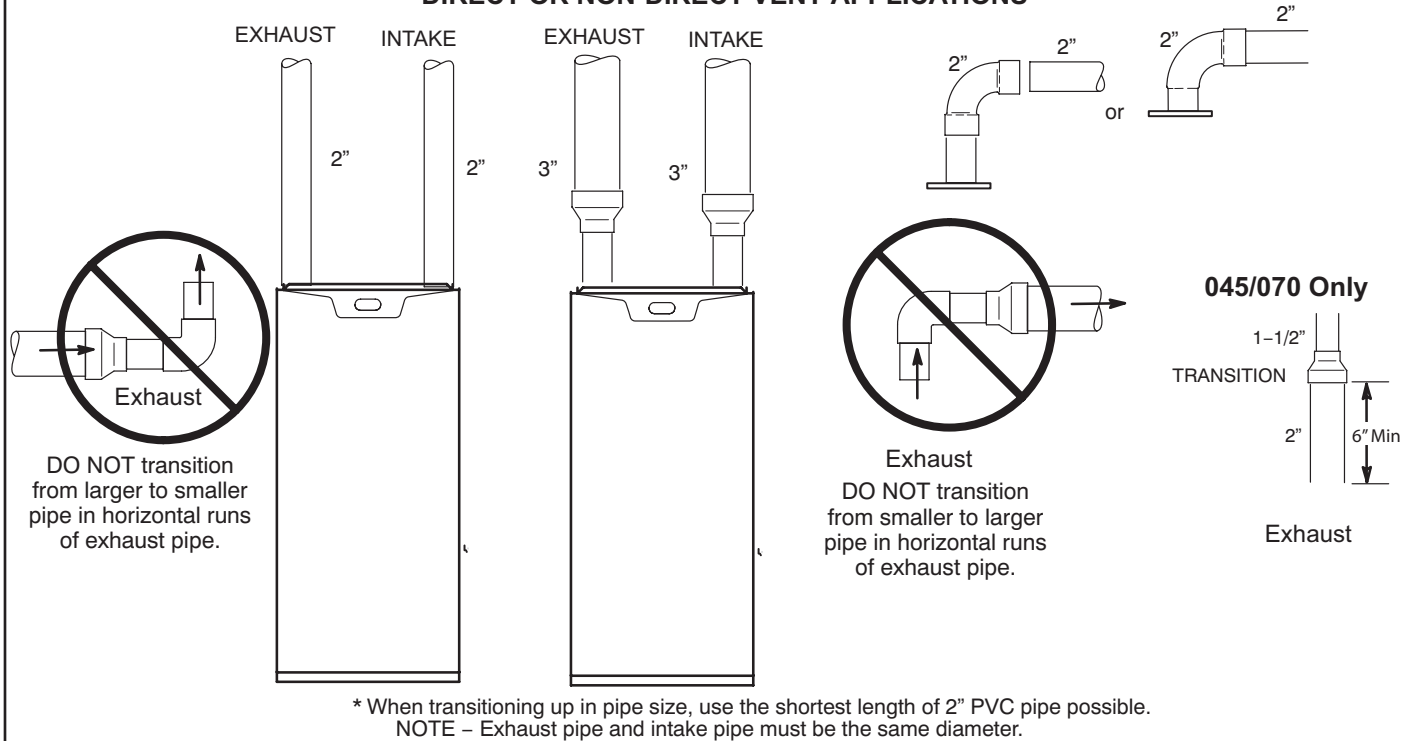


FIGURE 22

**TYPICAL EXHAUST AND INTAKE PIPE CONNECTIONS IN HORIZONTAL DIRECT OR
NON-DIRECT VENT APPLICATIONS (RIGHT HAND DISCHARGE SHOWN)**

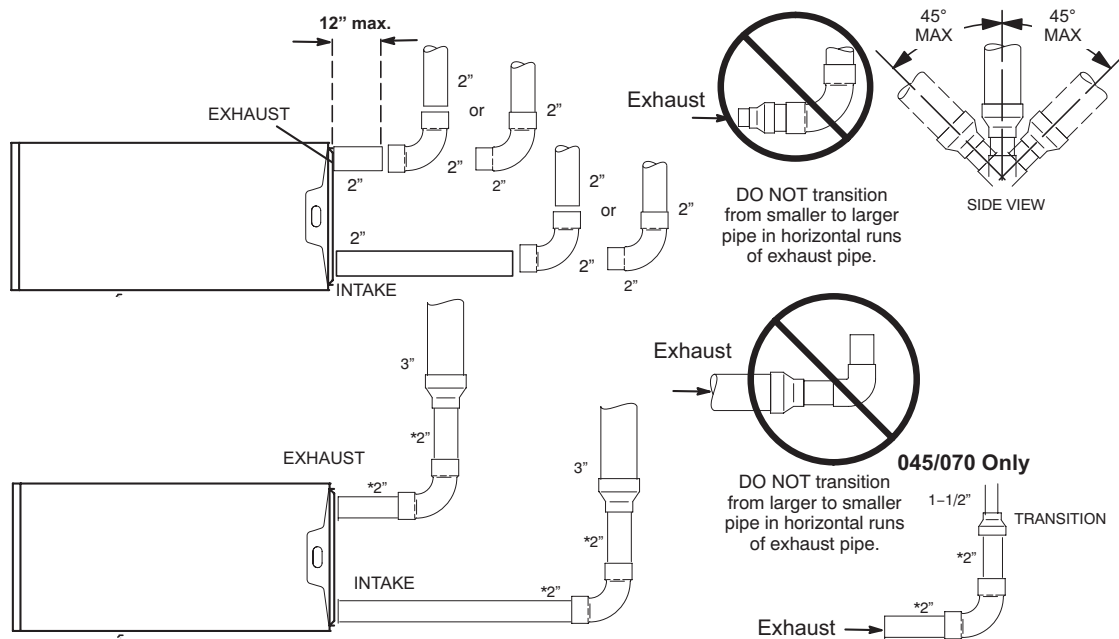


FIGURE 23

Intake Piping

The EL297UHVK furnace may be installed in either **direct vent** or **non-direct vent** applications. In non-direct vent applications, when intake air will be drawn into the furnace from the surrounding space, the indoor air quality must be considered and guidelines listed in Combustion, Dilution and Ventilation Air section must be followed.

Follow the next two steps when installing the unit in **Direct Vent applications**, where combustion air is taken from outdoors and flue gases are discharged outdoors. **The provided air intake screen must not be used in direct vent applications (outdoors).**

- 1 - Use transition solvent cement or a sheet metal screw to secure the intake pipe to the inlet air connector.
- 2 - Route piping to outside of structure. Continue with installation following instructions given in general guidelines for piping terminations and intake and exhaust piping terminations for direct vent sections. Refer to TABLE 26 for pipe sizes.

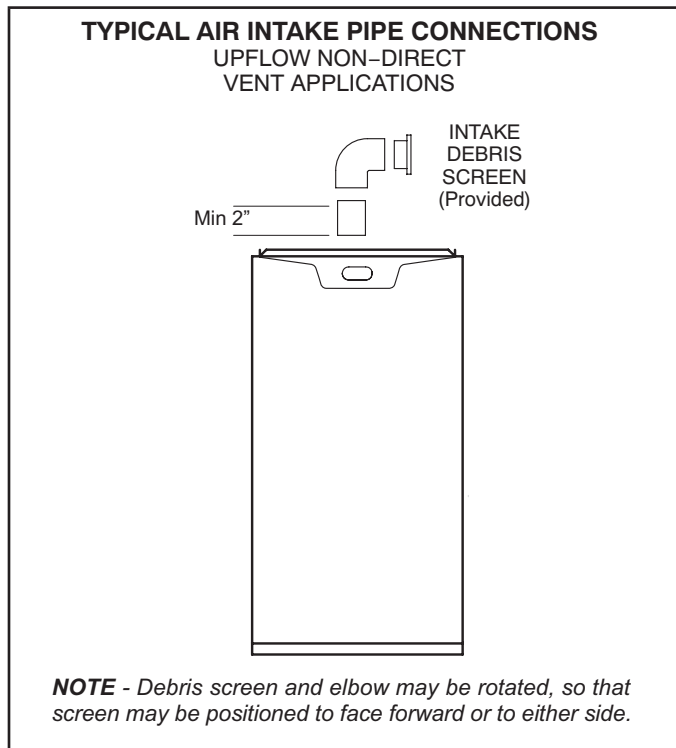


FIGURE 24

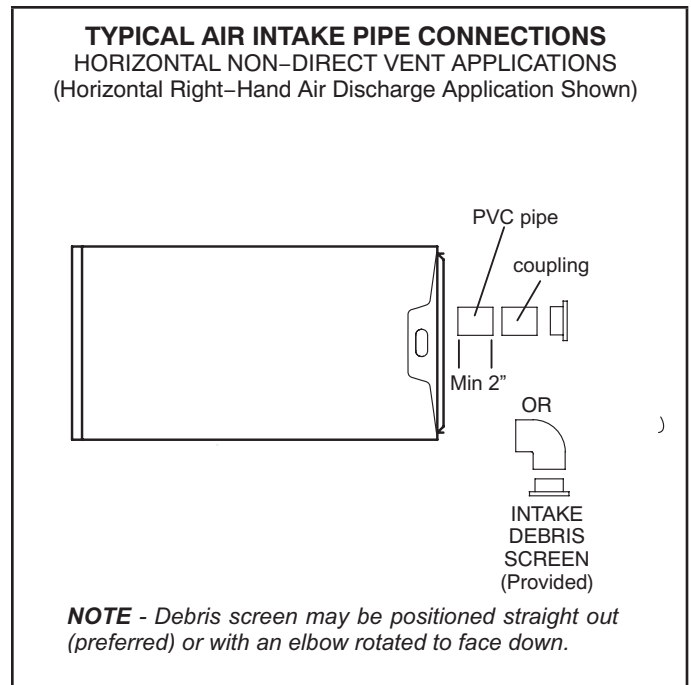


FIGURE 25

Follow the next two steps when installing the unit in **Non-Direct Vent applications** where combustion air is taken from indoors or ventilated attic or crawlspace and flue gases are discharged outdoors.

- 1 - Use field-provided materials and the factory-provided air intake screen to route the intake piping as shown in FIGURE 24 and FIGURE 25. Maintain a minimum clearance of 3" (76mm) around the air intake opening. The air intake opening (with the protective screen) should always be directed forward or to either side in the upflow position, and either straight out or downward in the horizontal position.

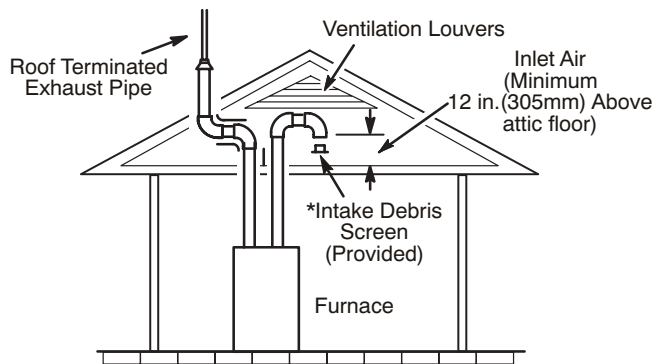
The air intake piping must not terminate too close to the flooring or a platform. Ensure that the intake air inlet will not be obstructed by loose insulation or other items that may clog the debris screen.

- 2 - If intake air is drawn from a ventilated attic (FIGURE 26) or ventilated crawlspace (FIGURE 27) the exhaust vent length must not exceed those listed in TABLE 26. If 3" diameter pipe is used, reduce to 2" diameter pipe at the termination point to accommodate the debris screen.
- 3 - Use a sheet metal screw to secure the intake pipe to the connector, if desired.

⚠ CAUTION

If this unit is being installed in an application with combustion air coming in from a space serviced by an exhaust fan, power exhaust fan, or other device which may create a negative pressure in the space, take care when sizing the inlet air opening. The inlet air opening must be sized to accommodate the maximum volume of exhausted air as well as the maximum volume of combustion air required for all gas appliances serviced by this space.

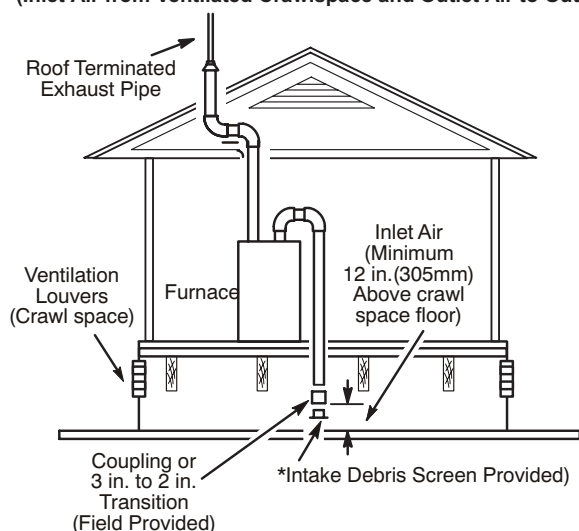
EQUIPMENT IN CONFINED SPACE (Inlet Air from Ventilated Attic and Outlet Air to Outside)



NOTE-The inlet and outlet air openings shall each have a free area of at least one square inch per 4,000 Btu (645mm² per 1.17kW) per hour of the total input rating of all equipment in the enclosure.

FIGURE 26

EQUIPMENT IN CONFINED SPACE (Inlet Air from Ventilated Crawlspace and Outlet Air to Outside)



NOTE-The inlet and outlet air openings shall each have a free area of at least one square inch per 4,000 Btu (645mm² per 1.17kW) per hour of the total input rating of all equipment in the enclosure.

FIGURE 27

General Guidelines for Vent Terminations

In Non-Direct Vent applications, combustion air is taken from indoors or ventilated attic or crawlspace and the flue gases are discharged to the outdoors. The EL297UHKVK is then classified as a non-direct vent, Category IV gas furnace.

In Direct Vent applications, combustion air is taken from outdoors and the flue gases are discharged to the outdoors. The EL297UHKVK is then classified as a direct vent, Category IV gas furnace.

In both Non-Direct Vent and Direct Vent applications, the vent termination is limited by local building codes. In the absence of local codes, refer to the current National Fuel Gas Code ANSI Z223-1/NFPA 54 in U.S.A., and current CSA-B149 Natural Gas and Propane Installation Codes in Canada for details.

Position termination according to location given in FIGURE 29 or FIGURE 30. In addition, position termination so it is free from any obstructions and 12" above the average snow accumulation.

At vent termination, care must be taken to maintain protective coatings over building materials (prolonged exposure to exhaust condensate can destroy protective coatings). It is recommended that the exhaust outlet not be located within 6 feet (1.8m) of an outdoor AC unit because the condensate can damage the painted coating.

NOTE - See TABLE 28 for maximum allowed exhaust pipe length without insulation in unconditioned space during winter design temperatures below 32°F (0°C). If required exhaust pipe should be insulated with 1/2" (13mm) Armaflex or equivalent. In extreme cold climate areas, 3/4" (19mm) Armaflex or equivalent may be necessary. Insulation must be protected from deterioration. Armaflex with UV protection is permissible. Basements or other enclosed areas that are not exposed to the outdoor ambient temperature and are above 32 degrees F (0°C) are to be considered conditioned spaces.

⚠ IMPORTANT

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

⚠ IMPORTANT

For Canadian Installations Only:

In accordance to CSA International B149 installation codes, the minimum allowed distance between the combustion air intake inlet and the exhaust outlet of other appliances shall not be less than 12 inches (305mm).

TABLE 28

Maximum Allowable Exhaust Vent Pipe Length (in ft.³) Without Insulation In Unconditioned Space For Winter Design Temperatures Two - Stage High Efficiency Furnace

Winter Design Temperatures ¹ °F (°C)	Vent Pipe Diameter	Unit Input Size									
		045		070		090		110		135	
32 to 21 (0 to -6)		PVC	² PP	PVC	² PP	PVC	² PP	PVC	² PP	PVC	² PP
	1-1/2	22	n/a	25	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	2 in	21	18	33	30	46	42	30	30	n/a	n/a
	2-1/2 in	16	n/a	26	n/a	37	n/a	36	n/a	n/a	n/a
	3 in	12	12	21	21	30	30	29	29	42	42
20 to 1 (-7 to -17)	1-1/2	12	n/a	20	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	2 in	11	9	19	17	28	25	27	24	n/a	n/a
	2-1/2 in	7	n/a	14	n/a	21	n/a	20	n/a	n/a	n/a
	3 in	2	2	9	9	16	16	14	14	23	23
0 to -20 (-18 to -29)	1-1/2	8	n/a	13	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	2 in	6	4	12	10	19	16	18	15	n/a	n/a
	2-1/2 in	1	n/a	7	n/a	13	n/a	12	n/a	n/a	n/a
	3 in	1	1	2	2	8	8	7	7	13	13

¹Refer to 99% Minimum Design Temperature table provided in the current edition of the ASHRAE Fundamentals Handbook.

² Poly-Propylene vent pipe (PP) by Duravent and Centrotherm.

³ Vent length in table is equivalent length. Consider each elbow as 5ft. of linear length

NOTE - Concentric terminations are the equivalent of 5' and should be considered when measuring pipe length.

NOTE - Maximum uninsulated vent lengths listed may include the termination(vent pipe exterior to the structure) and cannot exceed 5 linear feet or the maximum allowable intake or exhaust vent length listed in TABLE 26 or TABLE 28 which ever is less.

NOTE - If insulation is required in an unconditioned space, it must be located on the pipe closest to the furnace. See FIGURE 28..

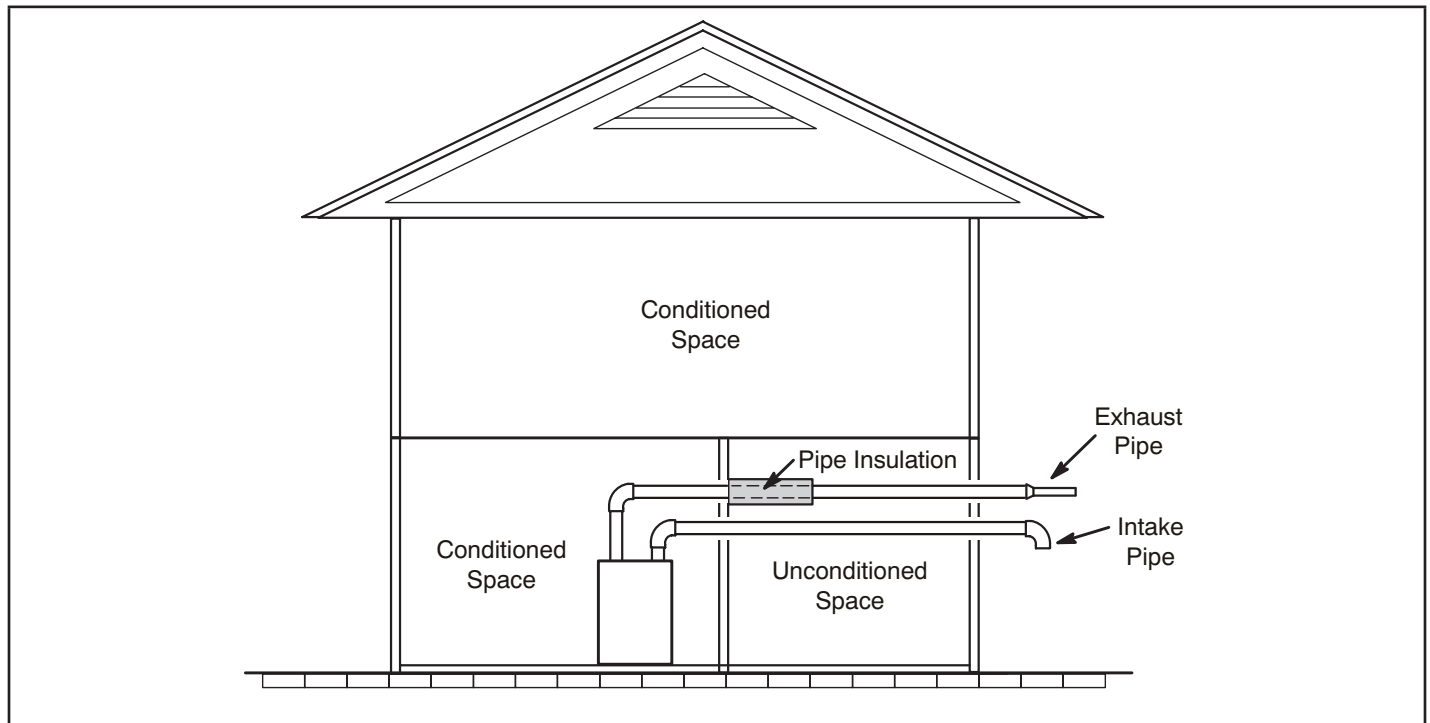
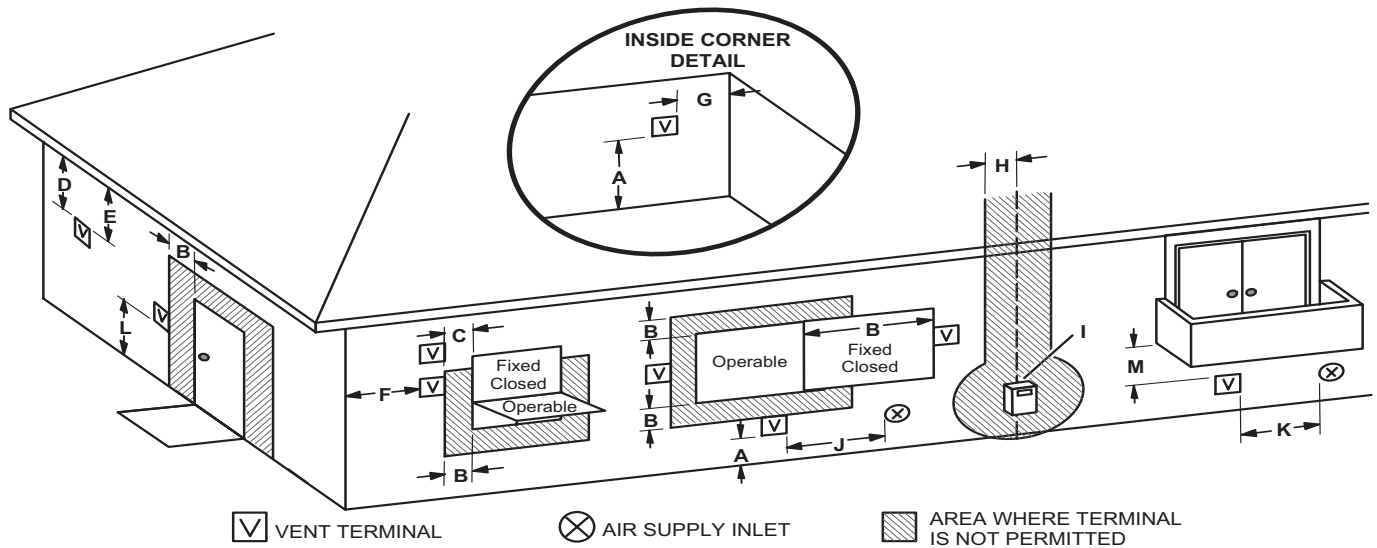


FIGURE 28

VENT TERMINATION CLEARANCES FOR NON-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	4 feet (1.2 m) below or to side of opening; 1 foot (30cm) above opening	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 (610 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	*	*
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	4 feet (1.2 m) below or to side of opening; 1 foot (30 cm) above opening	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.

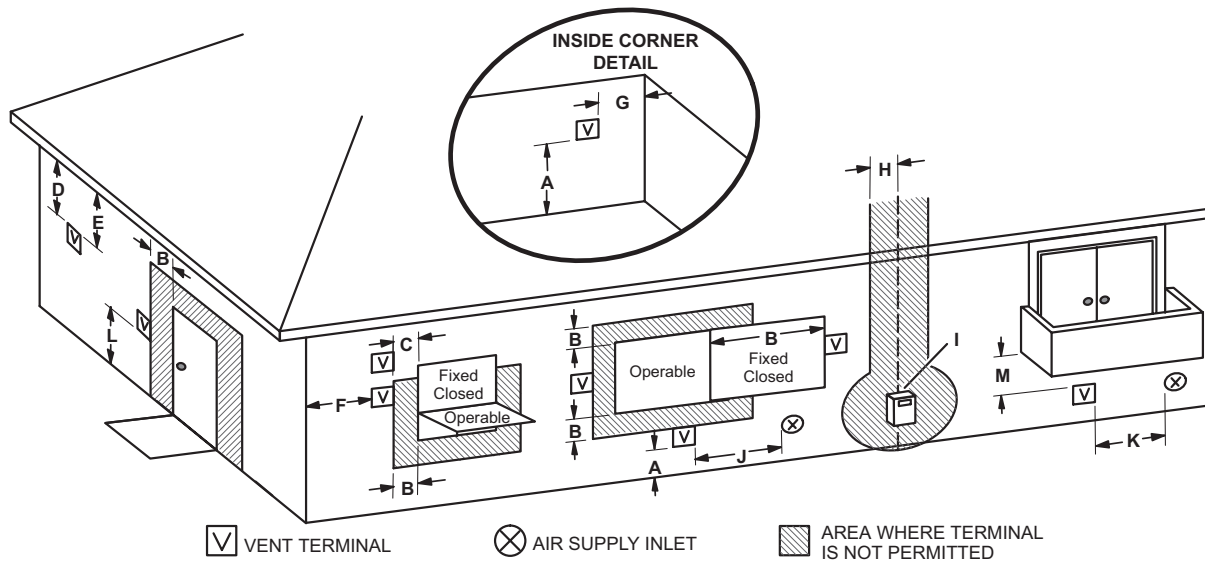
‡ Permitted only if veranda, porch, deck or balcony is fully open on a minimum of two sides beneath the floor. Lennox recommends avoiding this location if possible.

*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.

NOTE - This figure is intended to illustrate clearance requirement and does not serve as a substitute for locally adopted installation codes.

FIGURE 29

VENT TERMINATION CLEARANCES FOR DIRECT VENT INSTALLATIONS IN THE US 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 (228mm) 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 (610mm) 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	*	*
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 (228mm) 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."

NOTE - This figure is intended to illustrate clearance requirements and does not serve as a substitute for locally adopted installation codes.

FIGURE 30

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.

NOTE - Flue gas may be slightly acidic and may adversely affect some building materials. If any vent termination is used and the flue gasses may impinge on the building material, a corrosion-resistant shield (minimum 24 inches square) should be used to protect the wall surface. If the optional tee is used, the protective shield is recommended. The shield should be constructed using wood, plastic, sheet metal or other suitable material. All seams, joints, cracks, etc. in the affected area should be sealed using an appropriate sealant. See FIGURE 34.

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. FIGURE 31 through FIGURE 39 show typical terminations.

- 1 - Intake and exhaust terminations are not required to be in the same pressure zone. You may exit the intake on one side of the structure and the exhaust on another side (FIGURE 32). You may exit the exhaust out the roof and the intake out the side of the structure (FIGURE 33).
- 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.

NOTE - When venting in different pressure zones, the maximum separation requirement of intake and exhaust pipe DOES NOT apply.

- 3 - On roof terminations, the intake piping should terminate straight down using two 90° elbows (FIGURE 31).
 - 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 29.
- NOTE** - Care must be taken to avoid recirculation of exhaust back into intake pipe.
- 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 FIGURE 34.
 - 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..
 - 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. At least one bracket must be used within 6" from the top of the elbow and then every 24" (610mm) as shown in FIGURE 34, to prevent any movement in any direction. When exhaust and intake piping must be run up an outside wall, the exhaust piping must be terminated with pipe sized per TABLE 29 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 - A multiple furnace installation may use a group of up to four terminations assembled together horizontally, as shown in FIGURE 39.

TABLE 29

EXHAUST PIPE TERMINATION SIZE REDUCTION

EL297UHVK MODEL	Termination Pipe Size
*045 and 070	1-1/2" (38MM)
*090	2" (51MM)
110	2" (51MM)
135	2" (51MM)

*EL297UHV-045, -070 and -090 units with the flush mount termination must use the 1-1/2" accelerator supplied with the kit.

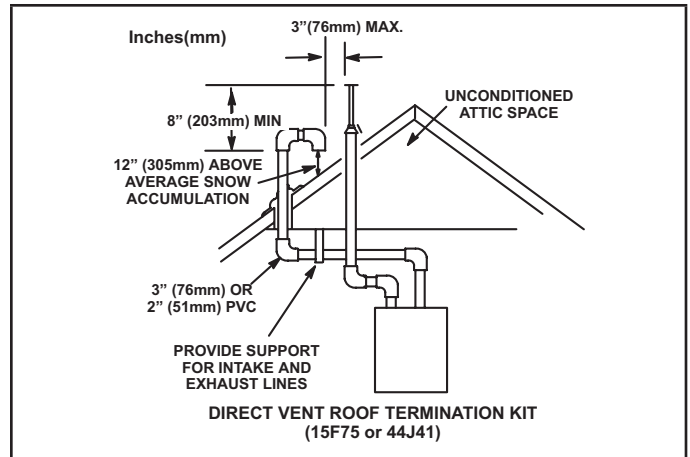


FIGURE 31

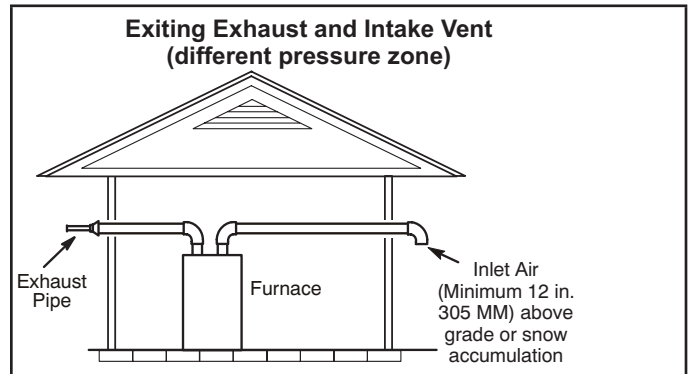


FIGURE 32

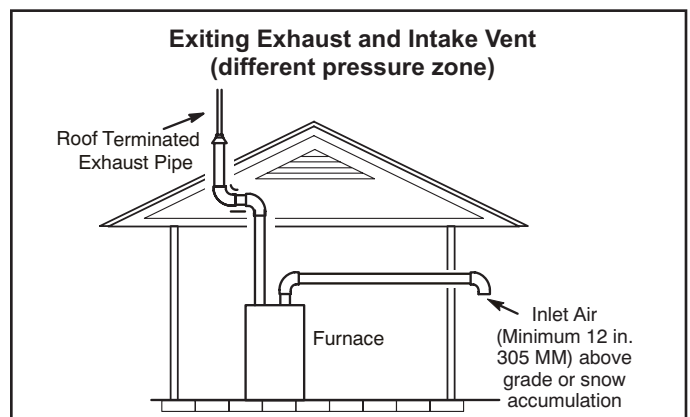


FIGURE 33

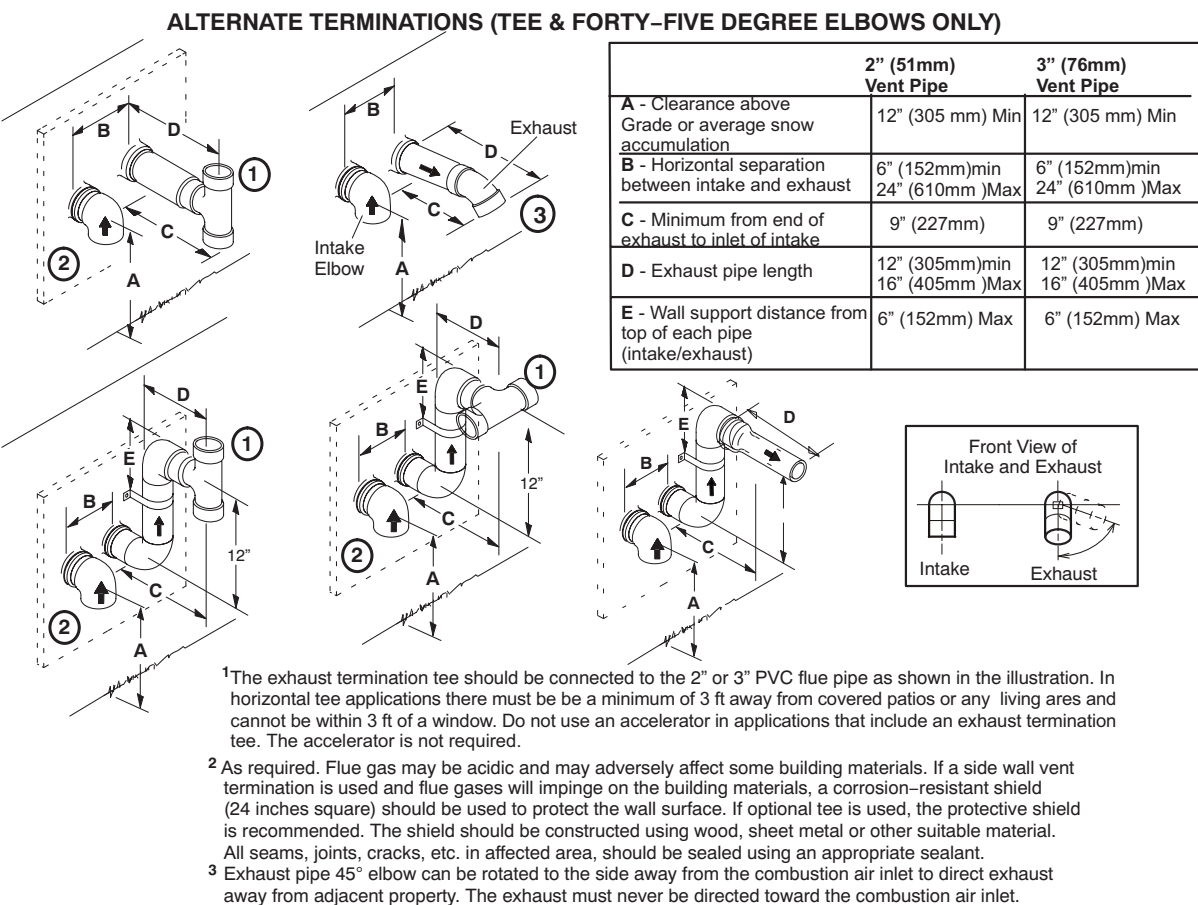
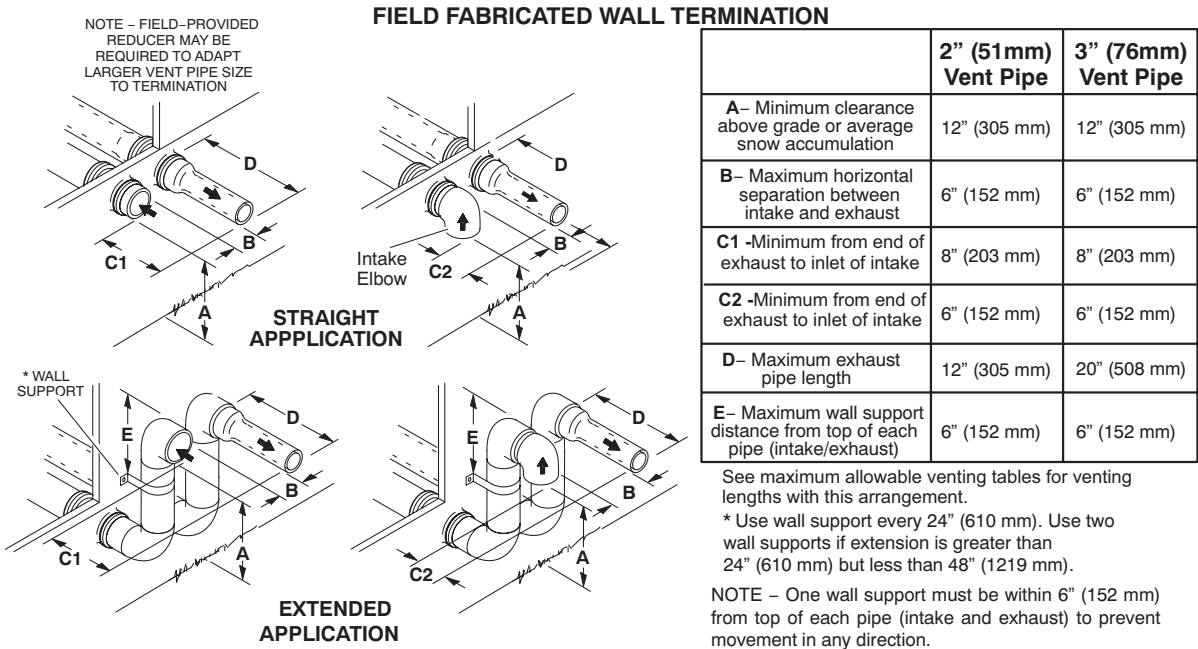


FIGURE 34

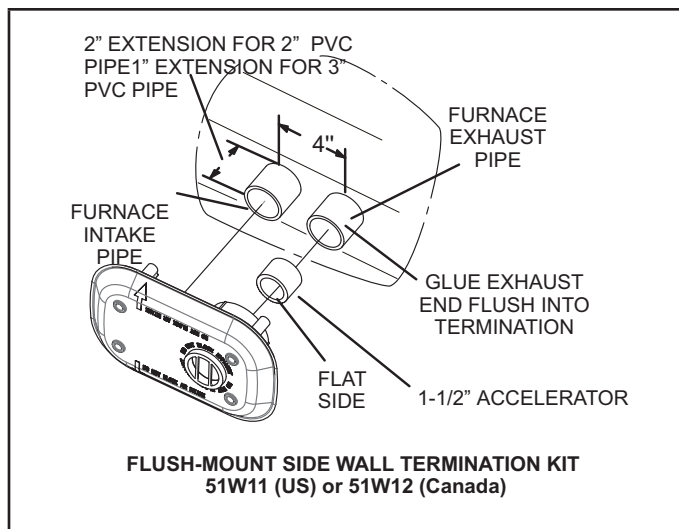


FIGURE 35

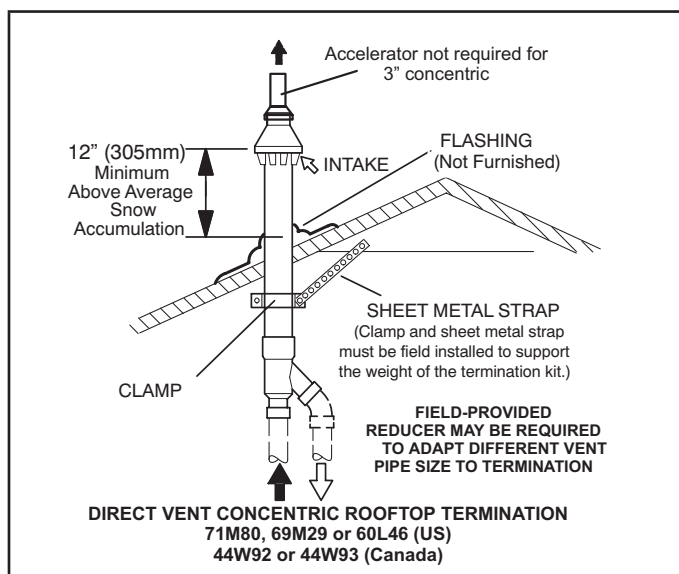


FIGURE 36

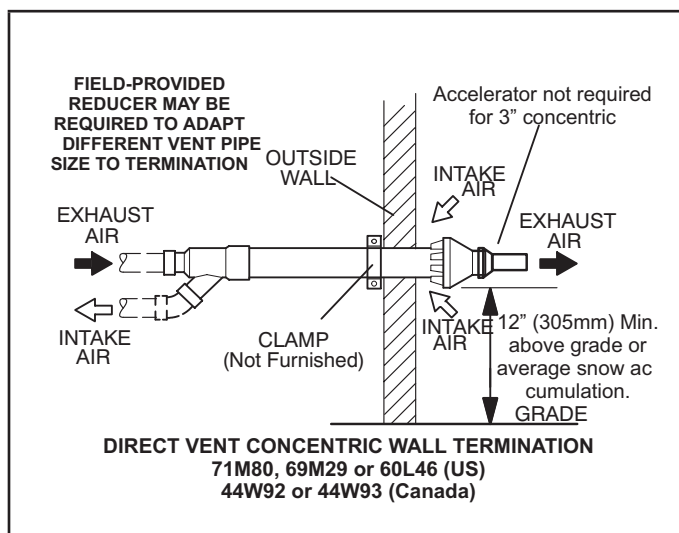


FIGURE 37

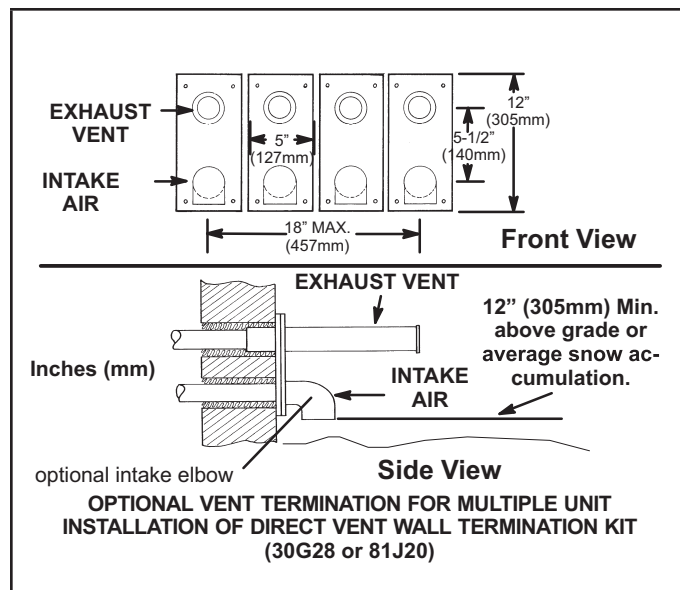


FIGURE 38

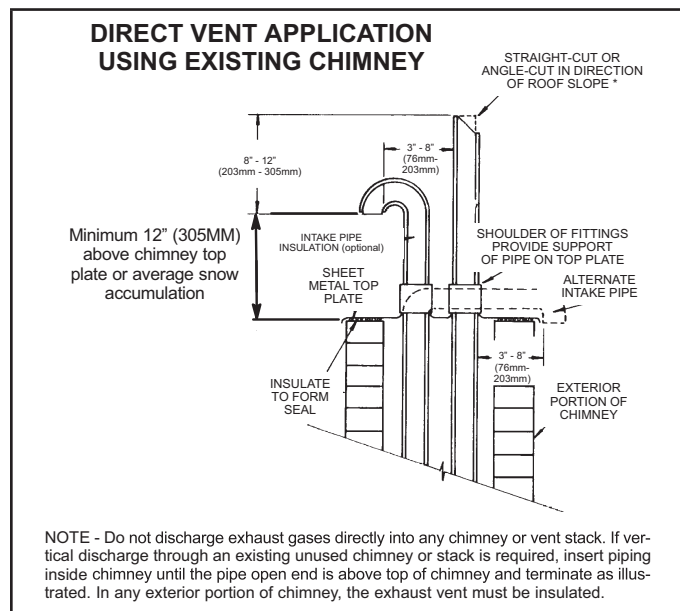


FIGURE 39

Details of Exhaust Piping Terminations for Non-Direct Vent Applications

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. FIGURE 40 and FIGURE 41 show typical terminations.

- 1 - Exhaust piping must terminate straight out or up as shown. The termination pipe must be sized as listed in TABLE 29. The specified pipe size ensures proper velocity required to move the exhaust gases away from the building.

- 2 - 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.
- 3 - If exhaust piping must be run up a side wall to position above snow accumulation or other obstructions, piping must be supported every 24 inches (610MM). When exhaust piping must be run up an outside wall, any reduction in exhaust pipe size must be done after the final elbow.
- 4 - Distance between exhaust pipe terminations on multiple furnaces must meet local codes.

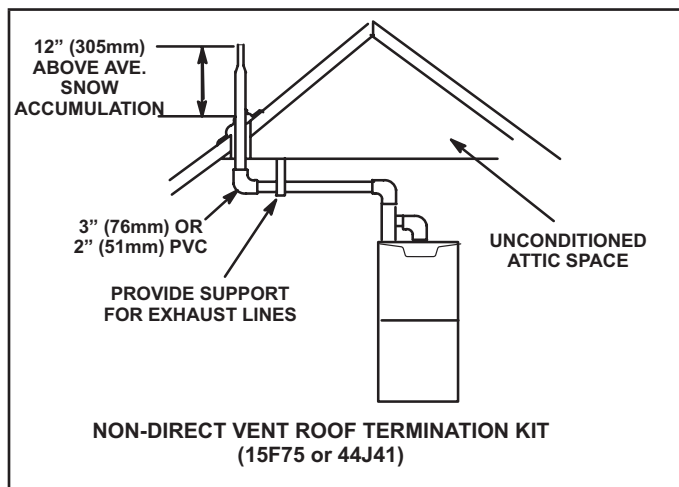


FIGURE 40

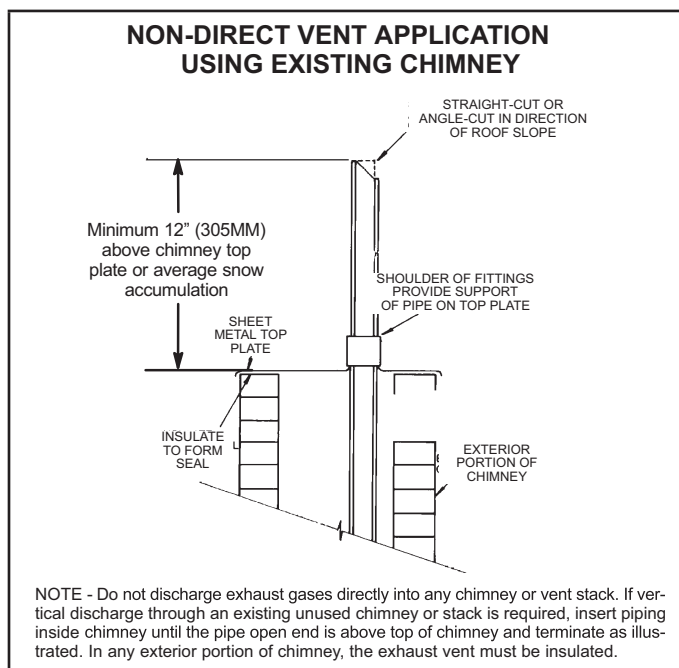


FIGURE 41

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 42 for condensate trap locations. FIGURE 50 shows trap assembly

NOTE - If necessary the condensate trap may be installed up to 5' away from the furnace. Use PVC pipe to connect trap to furnace condensate outlet. Piping from furnace must slope down a minimum of 1/4" per ft. toward trap.

- 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 - Use a large flat head screw driver or a 1/2" drive socket extension and remove plug (FIGURE 42) from the cold end header box at the appropriate location on the side of the unit. Install provided 3/4 NPT street elbow fitting into cold end header box. Use Teflon tape or appropriate pipe dope.
- NOTE** - Cold end header box drain plugs are factory installed. Check the unused plug for tightness to prevent leakage.
- 3 - Install the cap over the clean out opening at the base of the trap. Secure with clamp. See FIGURE 50.
 - 4 - Install drain trap using appropriate PVC fittings, glue all joints. Glue the provided drain trap as shown in FIGURE 50. Route the condensate line to an open drain. Condensate line must maintain a 1/4" downward slope from the furnace to the drain.

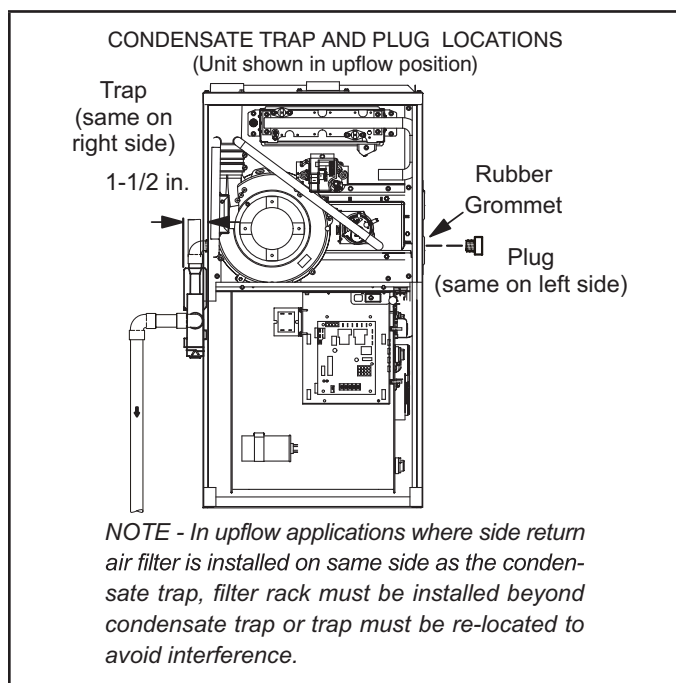


FIGURE 42

- 5 - FIGURE 45 and FIGURE 47 show the furnace and evaporator coil using a separate drain. If necessary the condensate line from the furnace and evaporator coil can drain together. See FIGURE 48 and FIGURE 49.

Upflow furnace (FIGURE 48) - In upflow furnace applications the field provided vent must be a minimum 1" to a maximum 2" length above the condensate drain outlet connection. Any length above 2" may result in a flooded heat exchanger if the combined primary drain line were to become restricted.

NOTE - Appropriately sized tubing and barbed fitting may be used for condensate drain. Attach to the drain on the trap using a hose clamp. See FIGURE 43.

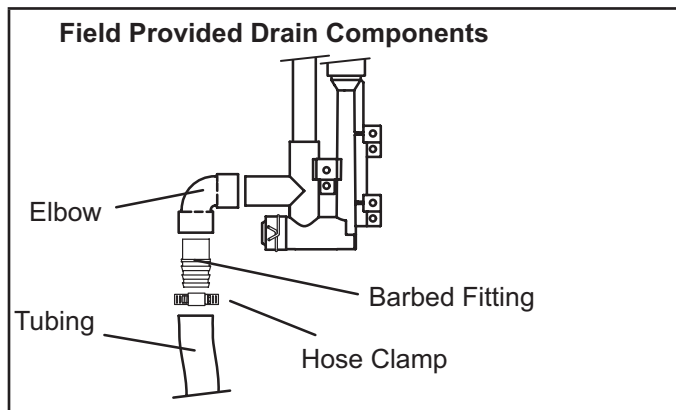


FIGURE 43

⚠ CAUTION

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

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

Condensate line must slope downward away from the 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.

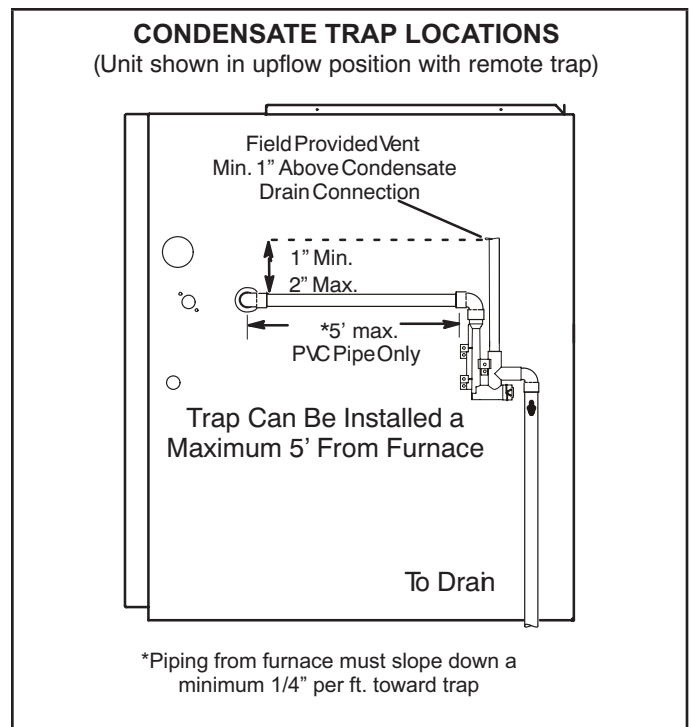


FIGURE 44

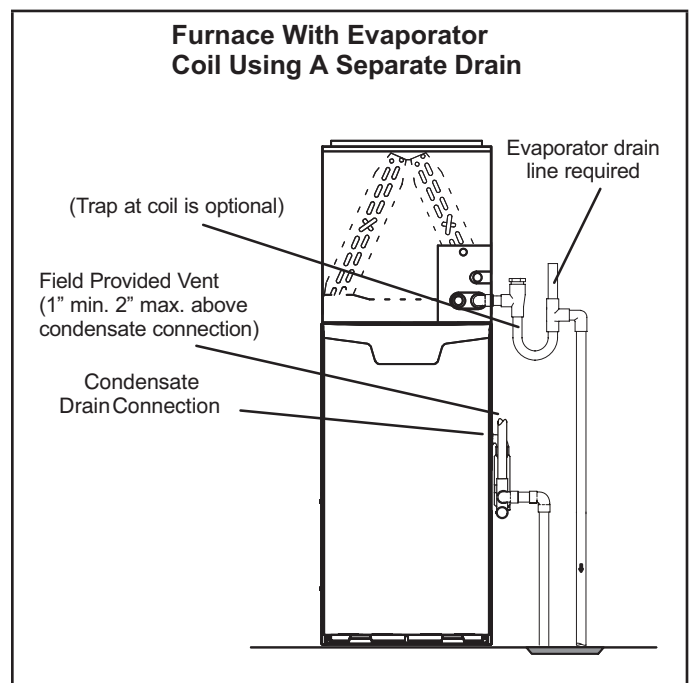


FIGURE 45

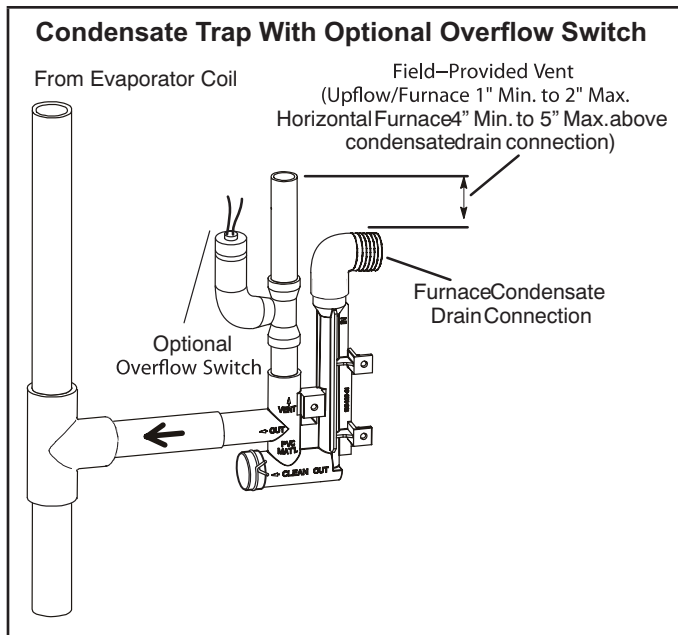


FIGURE 46

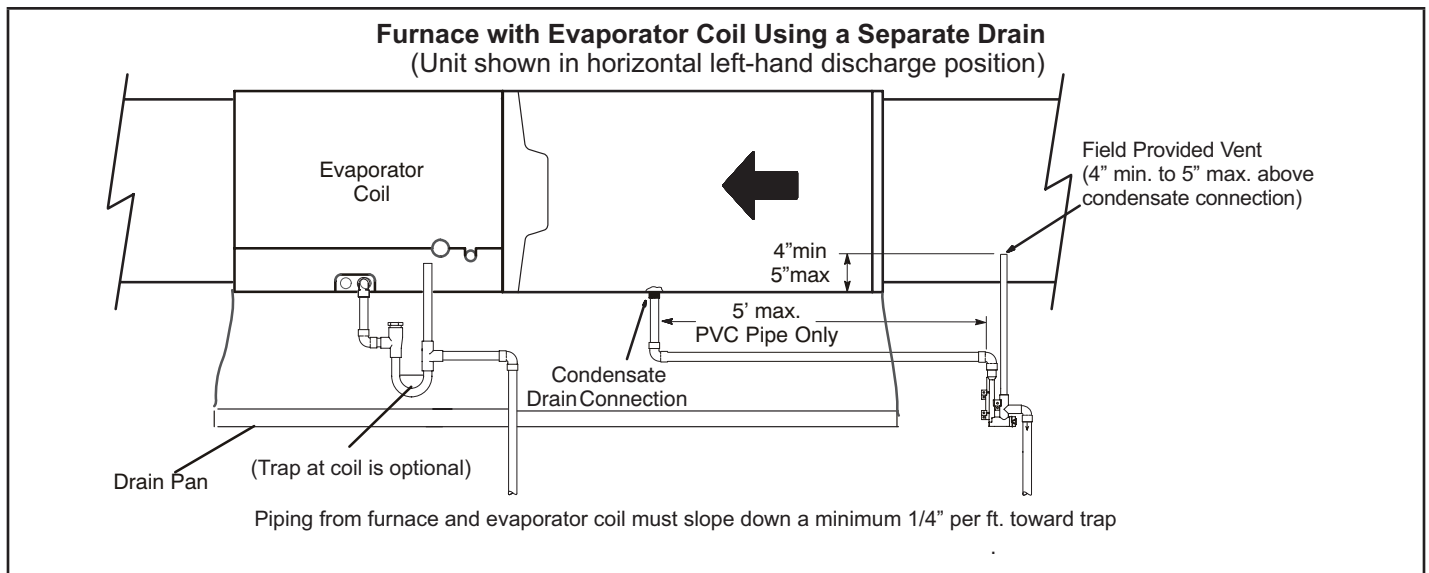


FIGURE 47

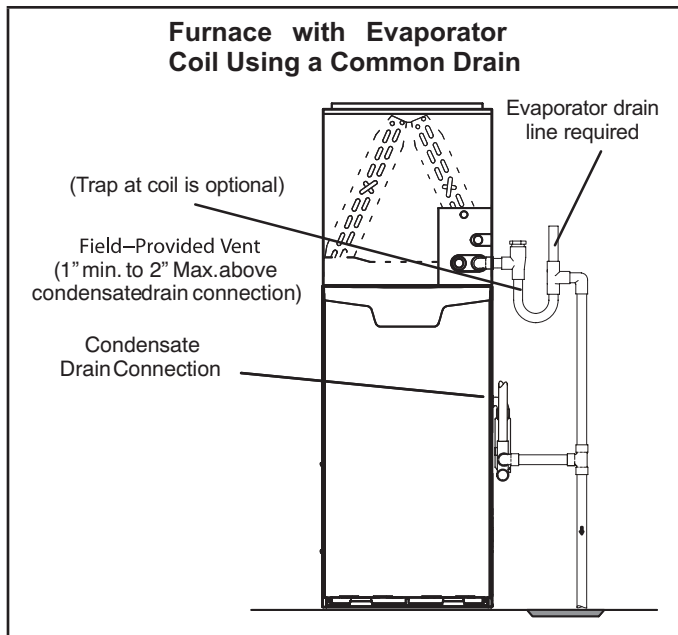


FIGURE 48

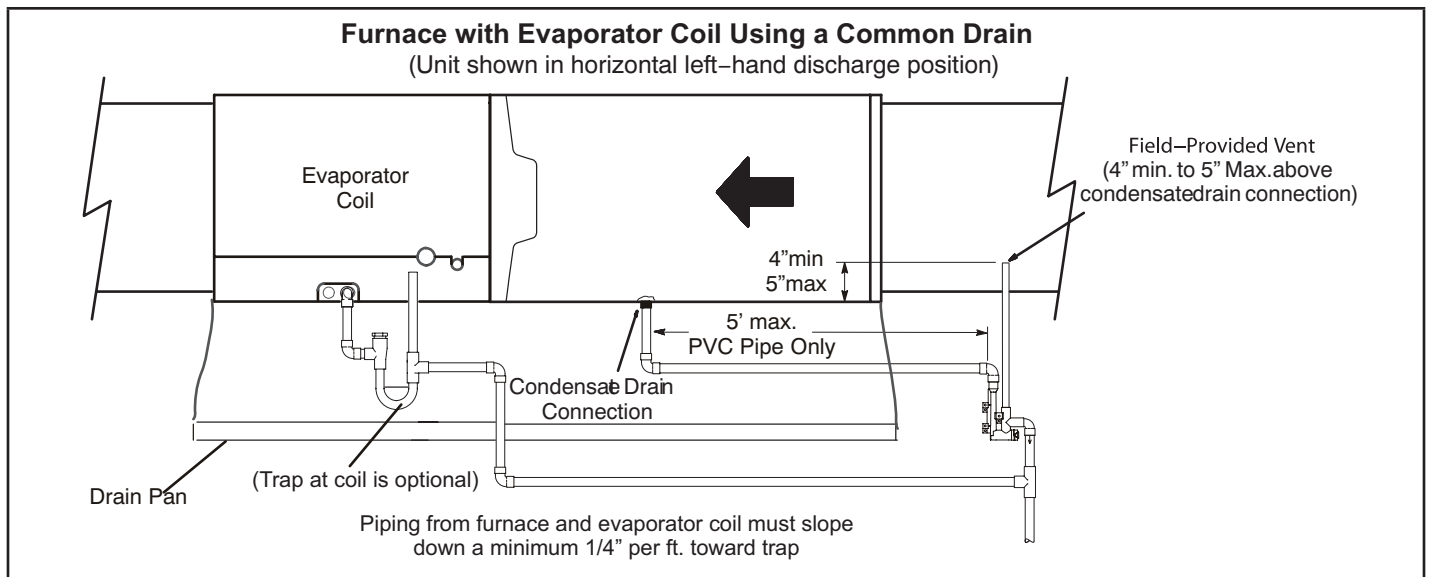
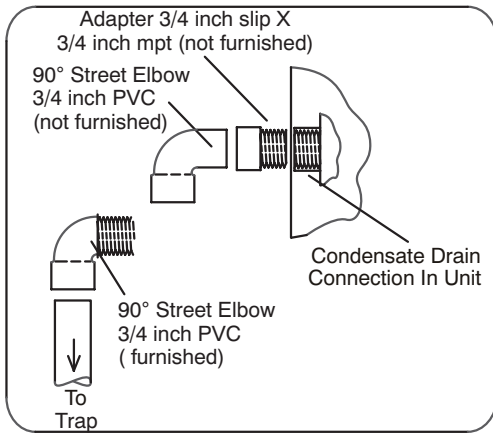


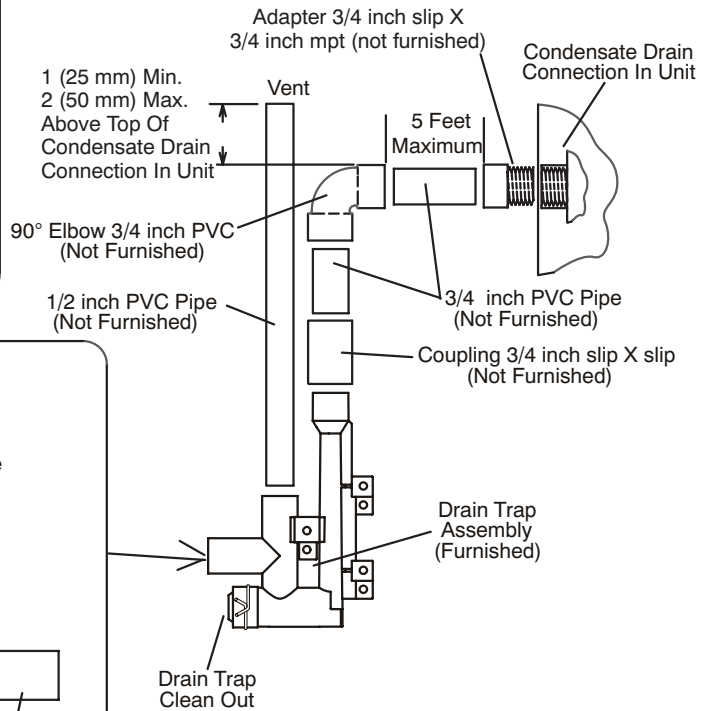
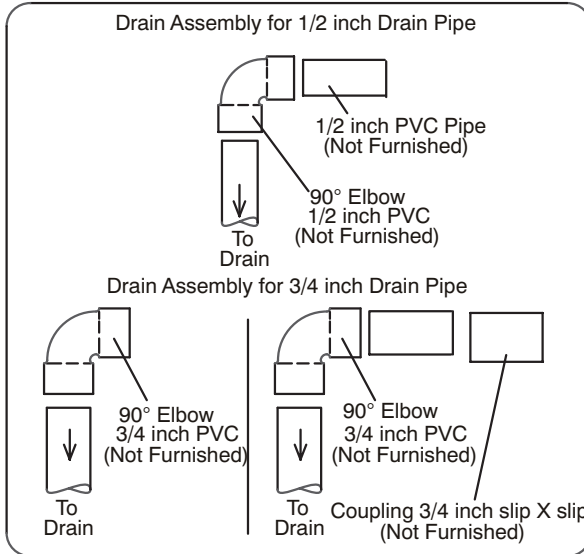
FIGURE 49

TRAP / DRAIN ASSEMBLY USING 1/2" PVC OR 3/4" PVC

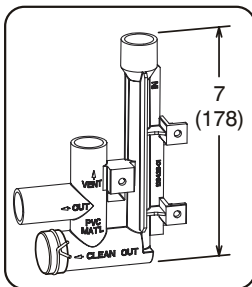
Optional Condensate Drain Connection



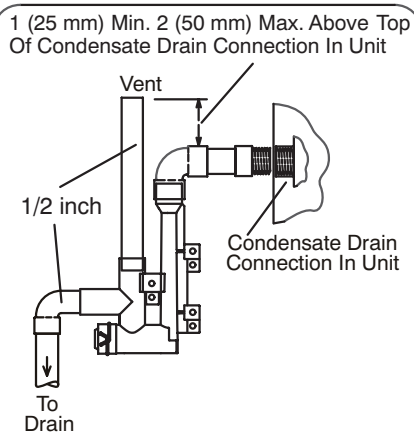
Optional Drain Piping From Trap



Drain Trap Assembly (Furnished)



Drain Trap Assembly with 1/2 inch Piping



Drain Trap Assembly with 3/4 inch Piping

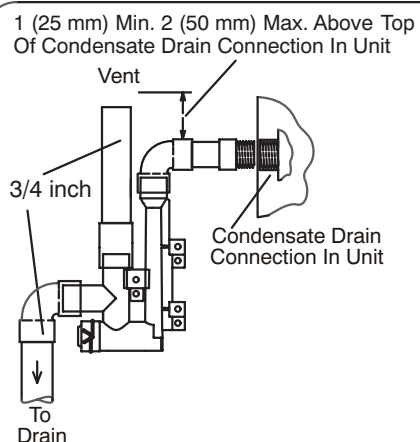


FIGURE 50

III-START-UP

A-Preliminary and Seasonal Checks

- 1 - Inspect electrical wiring, both field and factory installed for loose connections. Tighten as required.
- 2 - Check voltage at disconnect switch. Voltage must be within range listed on the nameplate. If not, consult the power company and have voltage condition corrected before starting unit.
- 3 - Inspect condition of condensate traps and drain assembly. Disassemble and clean seasonally.

B-Heating Start-Up

BEFORE LIGHTING 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 EL297UHVK is equipped with a gas control switch. Use only your hand to move the switch. Never use tools. If the switch will not move by hand, replace the valve. Do not try to repair it. Force or attempted repair may result in a fire or explosion.

Placing the furnace into operation:

EL297UHVK units are equipped with a SureLight® 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 SureLight ignition system.

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.

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 51)

- 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 gas valve switch to **OFF**. See FIGURE 51.
- 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.
- 8 - Move gas valve switch to ON. See FIGURE 51.

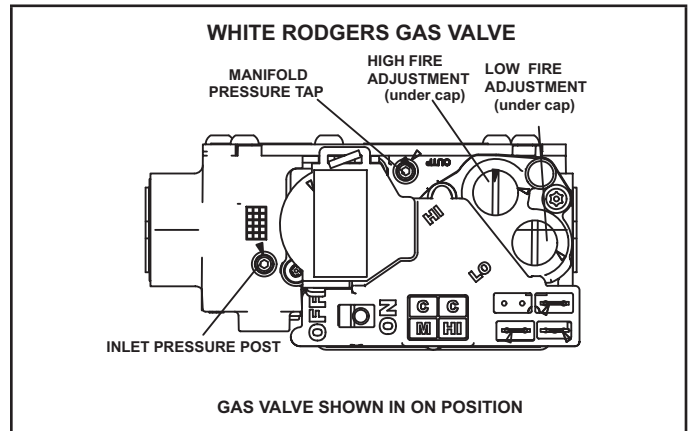


FIGURE 51

- 9 - Replace the upper access panel.
 - 10 - Turn on all electrical power 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 gas valve switch to OFF.
- 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 or tripped breaker?
- 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 internal manual shut-off valve open?
- 9 - Is the unit ignition system in lockout? If the unit locks out again, inspect the unit for blockages.

IV-HEATING SYSTEM SERVICE CHECKS

A-CSA Certification

All units are CSA design certified without modifications. Refer to the EL297UHVK Installation Instruction.

B-Gas Piping

⚠ CAUTION

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

⚠ WARNING

Do not over torque (800 in-lbs) or under torque (350 in-lbs) 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 0.5 psig (14" W.C.). See FIGURE 52. If the pressure is greater than 0.5psig (14"W.C.), use the manual shut-off valve before pressure testing to isolate furnace from gas supply.

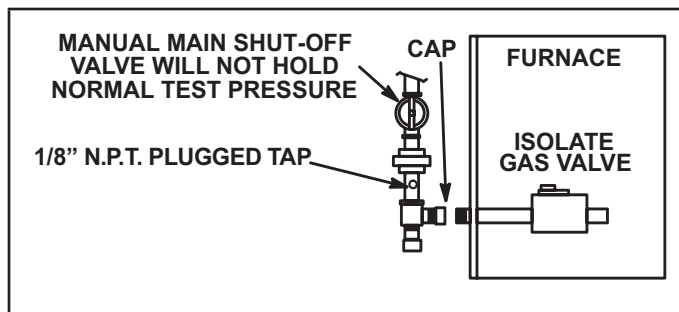


FIGURE 52

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

An inlet post located on the gas valve provides access to the supply pressure. See FIGURE 51. Back out the 3/32 hex screw one turn, connect a piece of 5/16 tubing and connect to a manometer to measure supply pressure. See TABLE 32 for supply line pressure.

E-Check Manifold Pressure

A manifold pressure post located on the gas valve provides access to the manifold pressure. See FIGURE 51. Back out the 3/32 hex screw one turn, connect a piece of 5/16 tubing and connect to a manometer to measure manifold pressure.

To correctly measure manifold pressure, the differential pressure between the positive gas manifold and the negative burner box must be considered.

⚠ IMPORTANT

For safety, connect a shut-off valve between the manometer and the gas tap to permit shut off of gas pressure to the manometer.

The gas valve is factory set and should not require adjustment. All gas valves are factory regulated.

- 1 - Connect the test gauge positive side "+" to manifold pressure tap on gas valve as noted above.
- 2 - Tee into the gas valve regulator vent hose and connect to test gauge negative "-".
- 3 - Ignite unit on low fire and let run for 5 minutes to allow for steady state conditions.
- 4 - After allowing unit to stabilize for 5 minutes, record manifold pressure and compare to value given in TABLE 32.
- 5 - If necessary, make adjustments. FIGURE 51 shows location of high fire and low fire adjustment screws.
- 6 - Repeat steps 3, 4 and 5 on high fire. See values in TABLE 32.
- 7 - Shut unit off and remove manometer as soon as an accurate reading has been obtained.
- 8 - Start unit and perform leak check. Seal leaks if found.

F- Proper Gas Flow (Approximate)

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 30. If manifold pressure matches TABLE 32 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.

TABLE 30

GAS METER CLOCKING CHART				
EL297 Unit	Seconds for One Revolution			
	Natural		LP	
	1 cu ft Dial	2 cu ft Dial	1 cu ft Dial	2 cu ft Dial
-045	80	160	200	400
-070	55	110	136	272
-090	41	82	102	204
-110	33	66	82	164
-135	27	54	68	136
Natural-1000 btu/cu ft LP-2500 btu/cu ft				

IMPORTANT

For safety, shut unit off and remove manometer as soon as an accurate reading has been obtained. Take care to replace pressure tap plug.

G- Proper Combustion

Furnace should operate minimum 15 minutes with correct manifold pressure and gas flow rate before checking combustion. See sections E- and F-. Take combustion sample beyond the flue outlet. TABLE 31 shows acceptable combustions. **The maximum carbon monoxide reading should not exceed 100 ppm.**

TABLE 31

EL297 Unit	CO ₂ % For Nat		CO ₂ % For L.P	
	Low Fire	High Fire	Low Fire	High Fire
045	5.4 - 6.4	7.5 - 8.5	6.4 - 7.4	8.8 - 9.8
070	5.3 - 6.3	7.4 - 8.4	6.3 - 7.3	8.7 - 9.7
090	5.8 - 6.8	7.6 - 8.6	6.8 - 7.8	8.9 - 9.9
110	6.1 - 7.1	8.0 - 9.0	7.1 - 8.1	9.3 - 10.3
135	6.1 - 7.1	7.8 - 8.8	7.1 - 8.2	9.1 - 10.1
The maximum carbon monoxide reading should not exceed 100ppm.				

H- High Altitude

The manifold pressure, gas orifice and pressure switch may require adjustment or replacement to ensure proper operation at higher altitudes. See TABLE 32 for manifold pressures. See TABLE 33 for gas conversion and pressure switch kits

TABLE 32

Manifold and Supply Line Pressure 0-10,000ft.

Unit	Gas	Manifold Pressure in. wg.										Supply Line Pressure in. w.g 0 - 10,000 ft.	
		0 - 4500 ft		4501 - 5500 ft.		5501 - 6500 ft		6501 - 7500 ft		7501 - 10,000 ft			
		Low Fire	High Fire	Low Fire	High Fire	Low Fire	High Fire	Low Fire	High Fire	Low Fire	High Fire	Min	Max
All Sizes	Natuarl	1.7	3.5	1.6	3.3	1.5	3.2	1.5	3.1	1.7	3.5	4.5	13.0
	LP/ Propane	4.5	10.0	4.2	9.4	4.0	9.1	3.9	8.9	4.5	10.0	11.0	13.0

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 33

LP/Propane Conversion Kit and Pressure Switch Requirements at Varying Altitudes

Unit	Natural to LP/Propane	High Altitude Natural Burner Orifice Kit	High Altitude LP/ Propane Burner Orifice Kit	High Altitude Pressure Switch	
	0 - 7500 ft	7501 - 10,000 ft	7501 - 10,000 ft	4501 - 7500 ft	7501 - 10,000 ft
045	*11K51	73W37	*11K46	14A51	14A53
070				14A48	14A54
090				14A54	14A53
110				25B93	14A45
135				25B94	25B95

* Conversion requires installation of a gas valve manifold spring which is provided with the gas conversion kit. Pressure switch is factory set. No adjustment necessary. All models use the factory-installed pressure switch from 0-4500 feet (0-1370 m).

I- Proper Ground and Voltage

A poorly grounded furnace can contribute to premature ignitor failure. Use the following procedure to check for ground and voltage to the integrated control.

- 1 - Measure the AC voltage between Line Neutral (spade terminals) and "C" terminal (low voltage terminal block) on the integrated control. See FIGURE 53. A wide variation in the voltage between Line Neutral and "C" as a function of load indicates a poor or partial ground. Compare the readings to TABLE 34. If the readings exceed the maximum shown in table 1, make repairs before operating the furnace..

- 2 - In addition, measure the AC voltage from Line Hot to Line Neutral (spade terminals) on the integrated control. See FIGURE 53. This voltage should be in the range of 97 to 132 Vac.

TABLE 34

Furnace Status	Measurement VAC	
	Expected	Maximum
Power On Furnace Idle	0.3	2
CAI / Ignitor Energized	0.75	5
Indoor Blower Energized	Less than 2	10

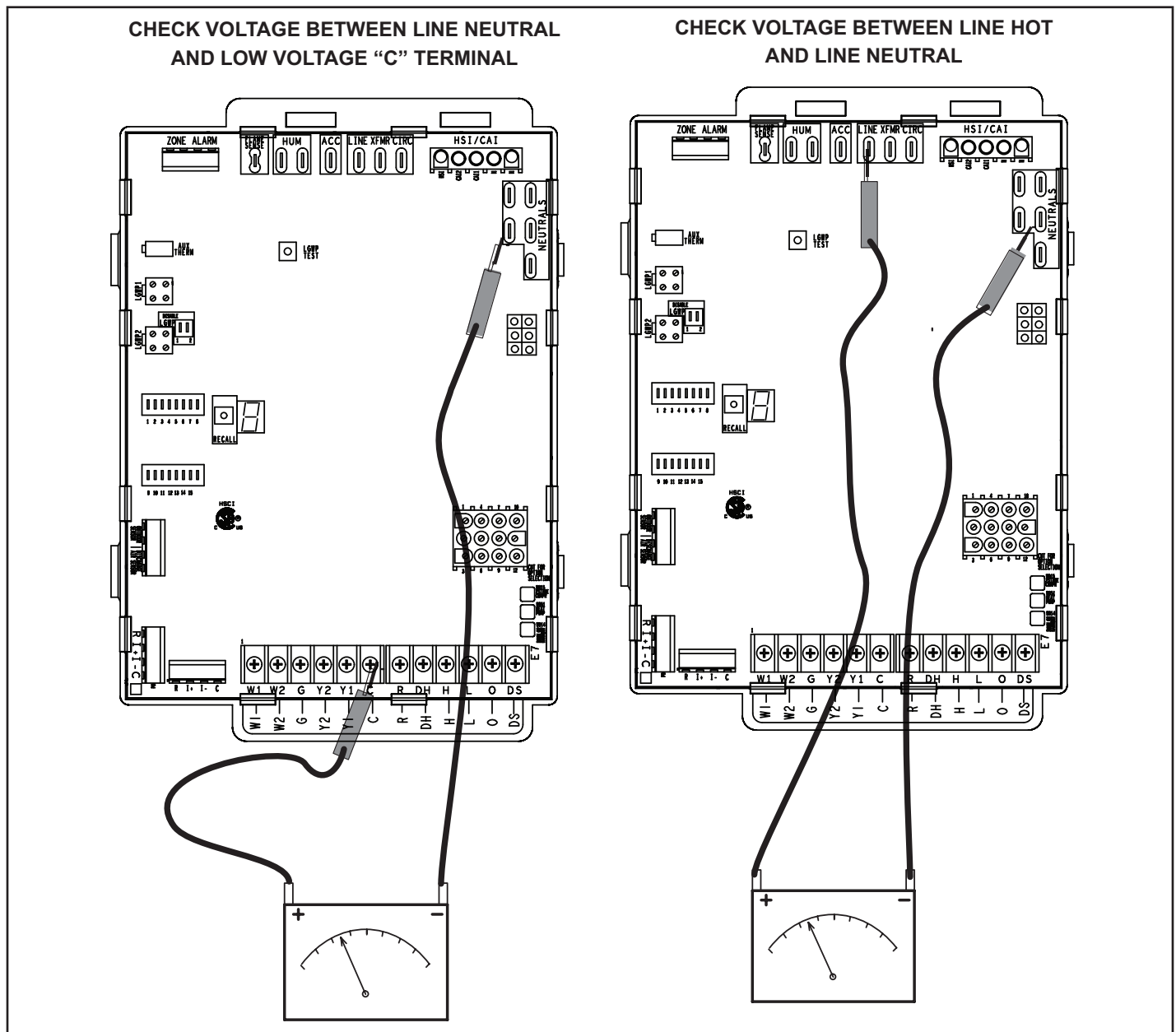


FIGURE 53

V-TYPICAL OPERATING CHARACTERISTICS

A-Blower Operation and Adjustment

- 1 - Blower operation is dependent on thermostat control system.
- 2 - Generally, blower operation is set at thermostat subbase fan switch. With fan switch in ON position, blower operates continuously. With fan switch in AUTO position, blower cycles with demand or runs continuously while heating or cooling circuit cycles.
- 3 - Depending on the type of indoor thermostat, blower and entire unit will be off when the system switch is in OFF position.

B-Temperature Rise (FIGURE 54)

Temperature rise for EL297UHVK 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.

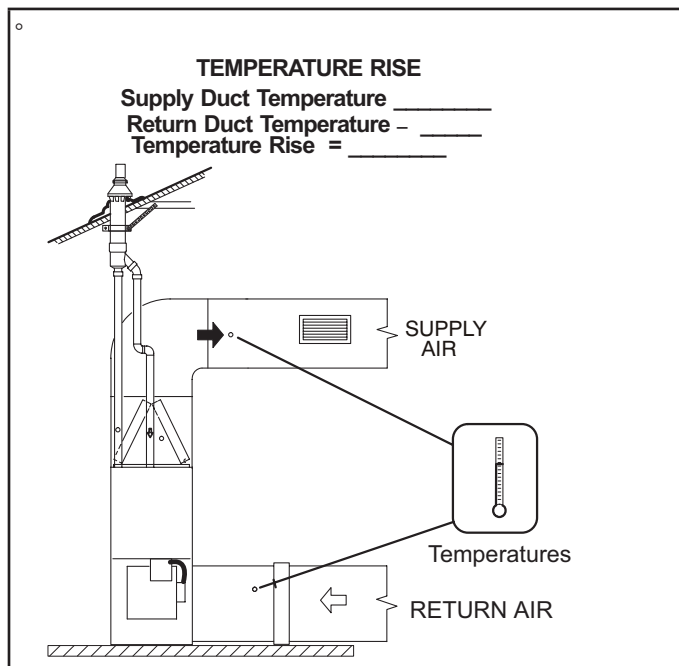


FIGURE 54

C-External Static Pressure

- 1 - Tap locations shown in FIGURE 55.
- 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 - Seal the hole when the check is complete.

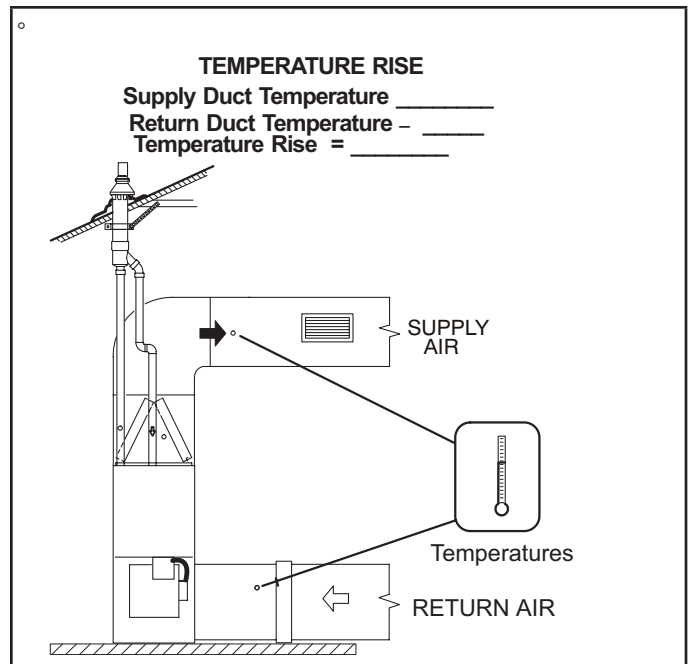


FIGURE 55

VI-MAINTENANCE

⚠ WARNING

**ELECTRICAL SHOCK, FIRE,
OR EXPLOSION HAZARD.**

Failure to follow safety warnings exactly could result in dangerous operation, serious injury, death or property damage.

Improper servicing could result in dangerous operation, serious injury, death, or property damage. Before servicing, disconnect all electrical power to furnace.

When servicing controls, label all wires prior to disconnecting. Take care to reconnect wires correctly. Verify proper operation after servicing.

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

Blower

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

⚠ WARNING

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

Low GWP Sensor

Inspect sensors and rubber sleeve.

Filters

All air filters are installed external to the unit. Filters should be inspected monthly. Clean or replace the filters when necessary to ensure proper furnace operation. TABLE 35 lists recommended filter sizes.

⚠ IMPORTANT

If a high efficiency filter is being installed as part of this system to ensure better indoor air quality, the filter must be properly sized. High efficiency filters have a higher static pressure drop than standard efficiency glass/foam filters. If the pressure drop is too great, system capacity and performance may be reduced. The pressure drop may also cause the limit to trip more frequently during the winter and the indoor coil to freeze in the summer, resulting in an increase in the number of service calls.

Before using any filter with this system, check the specifications provided by the filter manufacturer against the data given in the appropriate Lennox Product Specifications bulletin. Additional information is provided in Service and Application Note ACC002 (August 2000).

TABLE 35

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

Exhaust and air intake pipes

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

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 furnace.
- 2 - Have a shallow pan ready to empty condensate water.
- 3 - Remove the clean out cap from the condensate trap and empty water. Inspect the trap then reinstall the clean out cap.

Condensate Hose Screens (FIGURE 56)

Check the condensate hose screens for blockage and clean if necessary.

- 1 - Turn off power to the unit.
- 2 - Remove hoses from cold end header box. Twist and pull screens to remove.

- 3 - Inspect screens and rinse with tap water if needed.
- 4 - Reinstall screens, reconnect hoses and turn on power to unit.

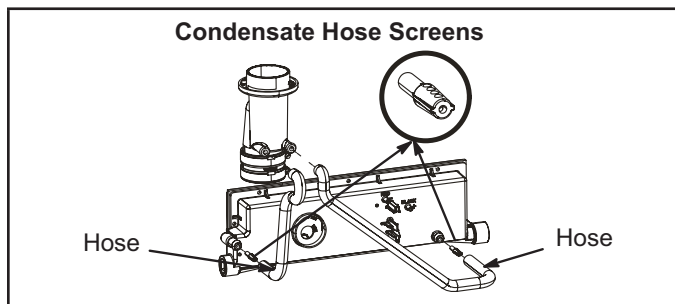


FIGURE 56

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 wires from the gas valve.
- 4 - Remove gas supply line connected to gas valve. Remove the burner box cover (if equipped) 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 - Disconnect combustion air intake pipe. It may be necessary to cut the existing pipe to remove burner box assembly.
- 8 - 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.

- 9 - Loosen the clamps to the flexible exhaust coupling.
- 10 - Disconnect condensate drain line from the cold end header box.
- 11 - 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.
- 12 - Mark and disconnect all combustion air pressure tubing from cold end header collector box.
- 13 - Mark and remove wires from pressure switch assembly. Remove the assembly. Keep tubing attached to pressure switches.
- 14 - Disconnect the 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.
- 15 - Disconnect the condensate drain line.
- 16 - Remove cold end header box.

- 17 - Remove electrical junction box from the side of the furnace.
- 18 - 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.
- 19 - Remove the primary limit from the vestibule panel.
- 20 - Remove two screws from the front cabinet flange at the blower deck. Spread cabinet sides slightly to allow clearance for removal of heat exchanger.
- 21 - 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.
- 22 - Back wash heat exchanger with soapy water solution or steam. ***If steam is used it must be below 275°F (135°C) .***
- 23 - Thoroughly rinse and drain the heat exchanger. Soap solutions can be corrosive. Take care to rinse entire assembly.
- 24 - Reinstall heat exchanger into cabinet making sure that the clamshells of the heat exchanger assembly is engaged properly into the support bracket on the blower deck. Remove the indoor blower to view this area through the blower opening.
- 25 - Re-secure the supporting screws along the vestibule sides and bottom to the cabinet.
- 26 - Reinstall cabinet screws on front flange at blower deck.
- 27 - Reinstall the primary limit on the vestibule panel.
- 28 - Route heating component wiring through hole in blower deck and reinsert strain relief bushing.
- 29 - Reinstall electrical junction box.
- 30 - Reinstall the cold end header box.
- 31 - Reinstall the combustion air inducer. Reconnect the plug to the wire harness.
- 32 - Reinstall pressure switches and reconnect pressure switch wiring.
- 33 - Carefully connect combustion air pressure switch tubing from pressure switches to proper ports on cold end header collector box.
- 34 - Reconnect condensate drain line to the cold end header box.
- 35 - Use securing screws to reinstall flue collar to the top cap on the furnace. Reconnect exhaust piping and exhaust drain tubing.
- 36 - Replace flexible exhaust adapter on combustion air inducer and flue collar. Secure using two existing hose clamps.
- 37 - Reinstall burner box assembly in vestibule area. Secure burner box assembly to vestibule panel using four existing screws. **Make sure burners line up in center of burner ports.**
- 38 - Reconnect flame roll-out switch wires.
- 39 - Reconnect sensor wire and reconnect 2-pin plug from ignitor.
- 40 - Reinstall gas valve manifold assembly. Reconnect gas supply line to gas valve.

- 41 - Reconnect the combustion air intake pipe.
- 42 - Reinstall burner box cover.
- 43 - Reconnect wires to gas valve.
- 44 - Replace the blower compartment access panel.
- 45 - Reconnect gas supply piping. Turn on power and gas supply to unit.
- 46 - Follow lighting instructions on unit nameplate to light and operate furnace for 5 minutes to ensure the furnace is operating properly.
- 47 - Check all piping connections, factory and field, for gas leaks. Use a leak detecting solution or other preferred means.
- 48 - Replace heating compartment access panel.

CAUTION

Some soaps used for leak detection are corrosive to certain metals. Carefully rinse piping thoroughly after leak test has been completed. Do not use matches, candles, flame or other sources of ignition to check for gas leaks.

Cleaning the Burner Assembly (if needed)

- 1 - Turn off electrical and gas power supplies to furnace. Remove upper and lower furnace access panels.
- 2 - Disconnect the wires from the gas valve.
- 3 - Remove the burner box cover (if equipped).
- 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 wires from flame rollout switches.
- 6 - Disconnect combustion air intake pipe. It may be necessary to cut the existing pipe to remove burner box assembly.
- 7 - Remove four screws which secure burner box assembly to vest panel. Remove burner box from the unit.
- 8 - 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.
- 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 - Reconnect the sensor wire and reconnect the 2-pin plug to the ignitor wiring harness. Reconnect wires to flame rollout switches.
- 11 - Reinstall the gas valve manifold assembly. Reconnect the gas supply line to the gas valve. Reinstall the burner box cover.
- 12 - Reconnect wires to gas valve.
- 13 - Replace the blower compartment access panel.
- 14 - Refer to instruction on verifying gas and electrical connections when re-establishing supplies.
- 15 - 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.
- 16 - Replace heating compartment access panel.



WARNING

For use with Lennox approved evaporator coil and LGWP sensors only. Use original manufacturer recommended LGWP sensors if using non Lennox approved evaporator coil.

CONNECTING THE FURNACE CONTROL BOARD SENSOR.

See FIGURE 59 and follow steps below:

- 1 - Route sensor wire #1 through provided grommet. Form a drip loop below the control board on upflow installations to prevent condensate dripping on the control board.
- 2 - Avoid sharp edges when routing sensor wire during installation.
- 3 - Sensor wire must not block view of 7 segment LED .
- Ensure the cable is properly seated into the SENSOR 1 plug (LGWP1). The Molex plug clip should lock into the Molex connection point for a secured connection, as shown below in FIGURE 57. Verify the connection is free of dust, debris, and moisture.

NOTE - In confined space applications, connect the second sensor to the SENSOR 2 plug (LGWP2). Refer to evaporator coil installation instructions for more detail.

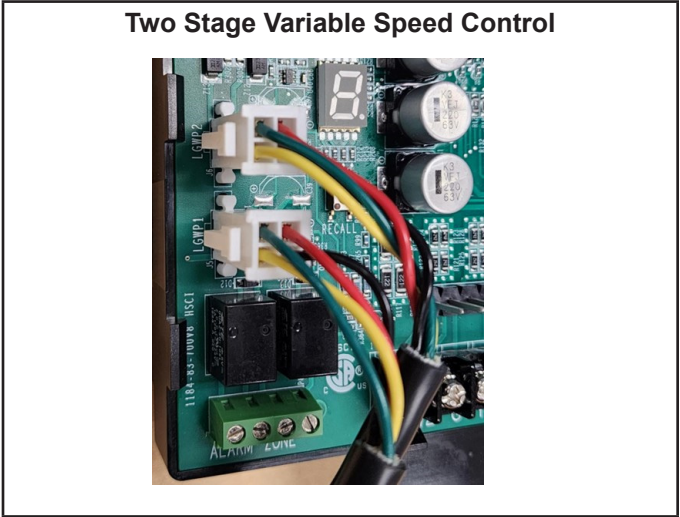


FIGURE 57

LOW GWP DIP SWITCH SETTINGS

Adjust the DIP switch settings to the sensor configuration. Failure to do so will cause faults on power-up. See FIGURE 58 and TABLE 36.



FIGURE 58

TABLE 36

DIP Switch Settings

Configuration	Switch 1	Switch 2
One (1) sensor, connected to SENSOR 1 plug	OFF (enable)	ON (disable)
Two (2) sensors, connected to SENSOR 1 plug and SENSOR 2 plug	OFF (enable)	OFF (enable)
No sensor R410A or heat only applications	ON (Disabled)	ON (Disabled)

In single sensor configurations, the sensor must be connected to the SENSOR 1 plug (LGWP1). Configurations other than the ones shown in TABLE 36 will cause a servicing fault.

Each DIP switch corresponds to a sensor position (i.e., DIP switch 1 to sensor 1; DIP switch 2 to sensor 2). The default factory switch positions are set to OFF (ENABLED)


The furnace control board software reads the OFF position as an active sensor. A sensor should be present for the corresponding sensor connector. Setting the DIP switch to ON disables the sensor position.

SECONDARY SENSOR REQUIREMENTS

Additional Line Sets

If additional refrigerant line joints are present outside of the line set sleeve and a secondary refrigerant detection sensor is required, its installation must comply with the requirement listed in Refrigeration Detection Sensor kit (27V53). See FIGURE 59 for routing the secondary sensor cable through the furnace cabinet.

Non-Low GWP Applications



WARNING

For Furnace only applications or Furnace replacement in a Non-Low GWP applications, the LOW GWP sensors should be disabled, otherwise the blower will operate continuously. To do this, the Low GWP Dip switches setting for both – Sensor 1 and the Sensor 2 must be moved to the ON position.

FURNACE CONTROL BOARD LOW GWP MODES OF OPERATION

The modes of operation for the furnace control board are Initializing, Normal, Leak Detected, and Fault.

Initializing

The furnace control board is establishing connection with the refrigerant detection sensor and is completing an initial five-minute purge sequence.

Normal

The HVAC system is functioning normally. The furnace control board has not detected a refrigerant leak.

Leak Detected

When the furnace control board detects a refrigerant leak:

1. The furnace control board shuts off the (R) input (24VAC power) to the thermostat, which de-energizes the outdoor unit compressor and heat sources, such as gas and/or electric strip heat. No heating or cooling demands will be met.

2. The furnace control board activates the blower (high speed). The blower purges refrigerant from the cabinet, plenum, and ductwork.
3. After the furnace control board determines the refrigerant levels are below the safety threshold, the blower will continue to operate for the remainder of the seven (7) -minute cycle.
4. After the blower sequence is complete, the HVAC system resumes normal operation.

NOTE - The HVAC system may not maintain a cooling or heating set point if a significant leak exists. Any refrigerant leaks that remain unaddressed for an extended time may cause the HVAC system to shut down on a low refrigerant pressure limit condition.

Fault

When a Low GWP fault is detected by the furnace control board, the indoor unit blower engages and remains engaged at a constant air flow output until the fault is cleared.

NOTE - See TABLE 5 diagnostic error codes.

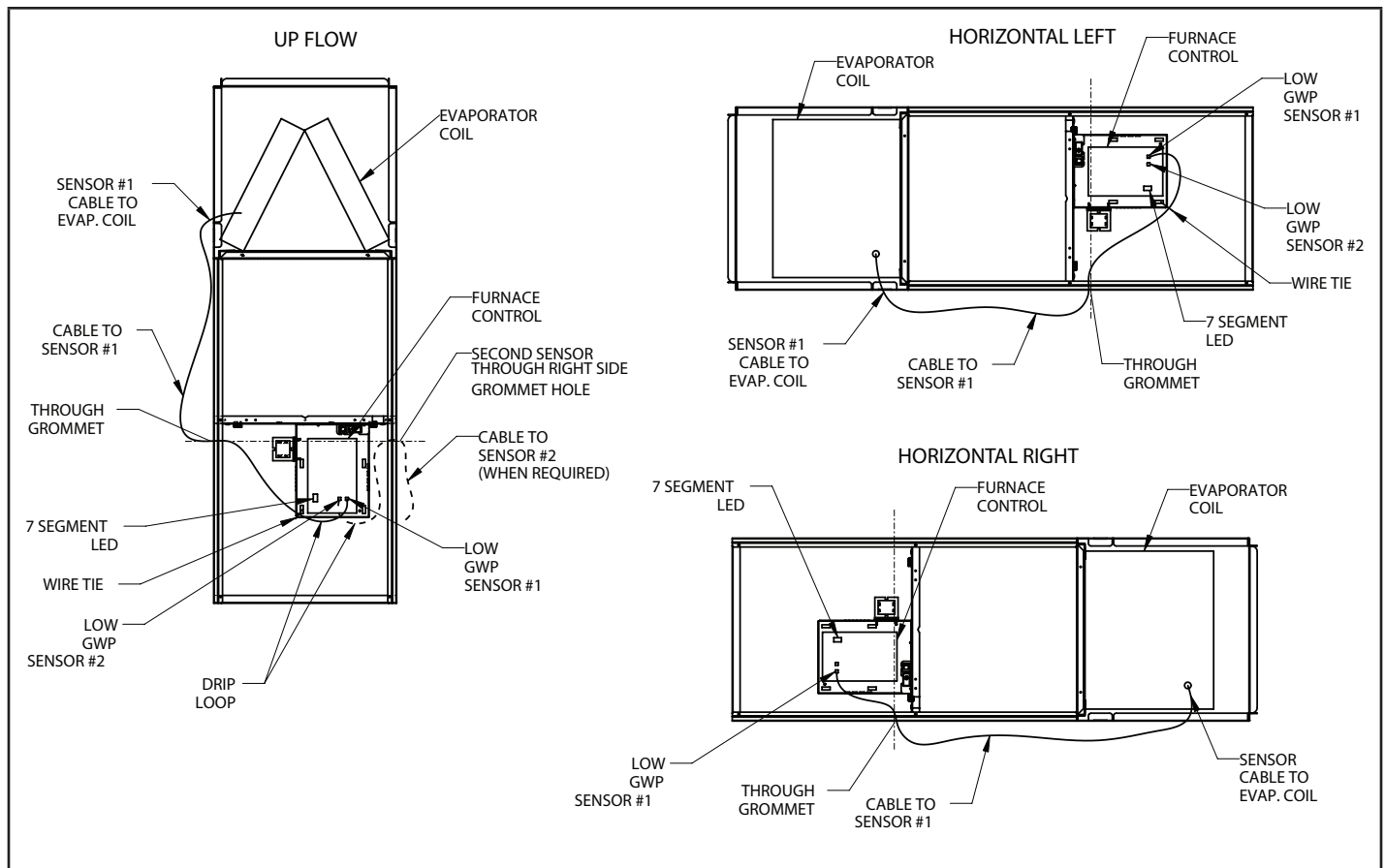


FIGURE 59

LGWP TEST BUTTON FUNCTIONALITY

The furnace control board is equipped with a Test/Reset push button. The Test button can be used to perform several functions, depending on the mode of operation of the furnace control board.

TABLE 37 lists the functions of the Test button during each mode of operation.

TABLE 37
LGWP Test Button Function

Mode of Operation	Press the Test Button to:
Normal	Trigger a leak detection response. Verify all equipment is wired correctly into the furnace blower control board (after installation).
Leak Detected	Reset the furnace control board to a normal mode of operation after a previous leak has been detected and purged from the HVAC system
Fault	Reset the furnace control board after troubleshooting and resolving a fault condition. If the fault is not resolved, the furnace control board will enter the Fault mode again.

LGWP Test Button - Additional Functions

TABLE 38 lists the additional functions of the Test Button while the furnace control board is functioning within the states of Initializing, Monitoring, Leak Detection, Servicing and Fault.

TABLE 38
Additional Button Functions

State	Press	Action
Initializing	Short	Skips remaining pre-purge after sensors are recognized by the furnace control board
Initializing	Long	Reset control
Monitoring	Short	Clear purge-counter if prior mitigation has occurred; Test mitigation
Monitoring	Long	Reset control
Mitigating	Short	If testing mitigation, end test
Servicing	Short	Reevaluate fault condition - if cleared return to monitoring, otherwise update indicator
Servicing	Long	Reset control
Fault	Short	Reevaluate fault condition - if cleared return to monitoring, otherwise update indicator
Fault	Long	Reset control

External Alarm

(For applications with external alarms wired directly to the furnace control board)

The furnace control board triggers the external alarm system when it enters Leak Detected mode. For alarm notifications, the furnace control board provides a dry relay contact that is rated 3A at 30 VAC/DC.

THERMOSTAT COMPATIBILITY

Thermostats that preserve memory settings are compatible with the furnace control board. Examples include:

- Battery-powered thermostats
- Analog Thermostat
- Late-model programmable thermostats

NOTE - Early-generation digital and programmable thermostats may not retain the operation mode and temperature setpoints after a power outage.

The following scenarios are likely to occur when home occupants are not available to adjust the thermostat setpoints as the system is recovering from leak detection and resuming normal operation:

- Heating could be lost during a cold night
- Cooling could be lost during a hot day
- The thermostat could reset to an incorrect temperature setpoint

START UP PROCEDURE

The furnace control board is equipped with a LGWP Test/Reset button, see Test Button Functionality. After the furnace control board has been mounted and wired, restore power to the HVAC system. The system will then run through a purge sequence for five minutes. After the purge sequence is complete, proceed to testing cooling demand and heating demand.

Cooling Demand

1. Prompt a cooling demand at the thermostat.
2. Press the LGWP Test button on the furnace control board.
The system then executes a leak detection response.
3. Observe the following sequence:
 - a. The LED indicator for leak detection. See TABLE 5 for diagnostic error codes..
 - b. The blower powers up.
 - c. The outdoor compressor powers down.
4. Press the LGWP Test button to terminate the simulated Leak Detected mode upon test completion

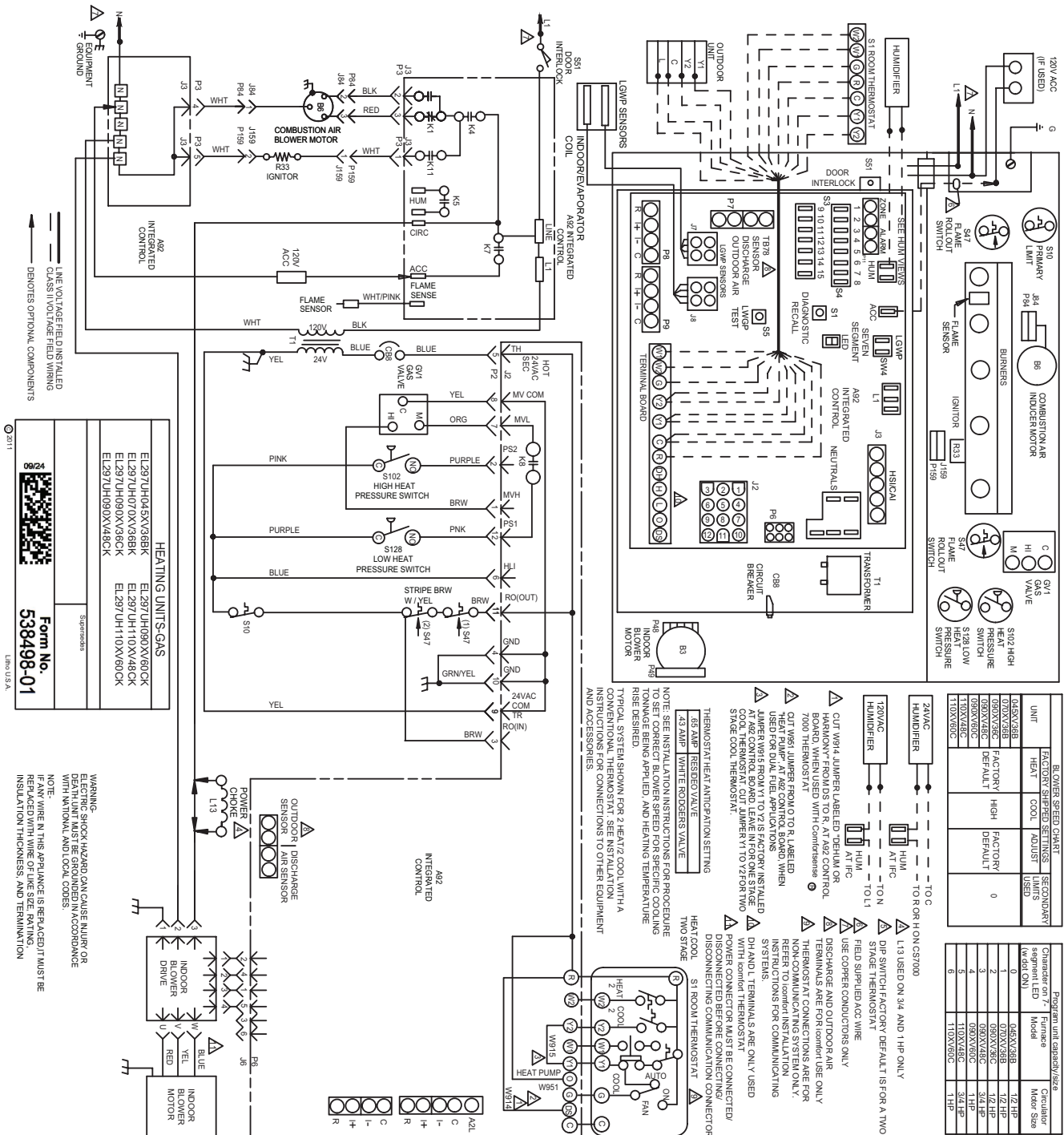
Heating Demand

1. Prompt a heating demand at the thermostat.
2. Observe the following sequence:
 - a. The LED indicator for leak detection. See TABLE 5 diagnostic error codes..
 - b. The blower powers up.
 - c. The gas burners power down.
 - d. The outdoor compressor powers down.
3. Press the LGWP Test button to terminate the simulated Leak Detected mode upon test completion.

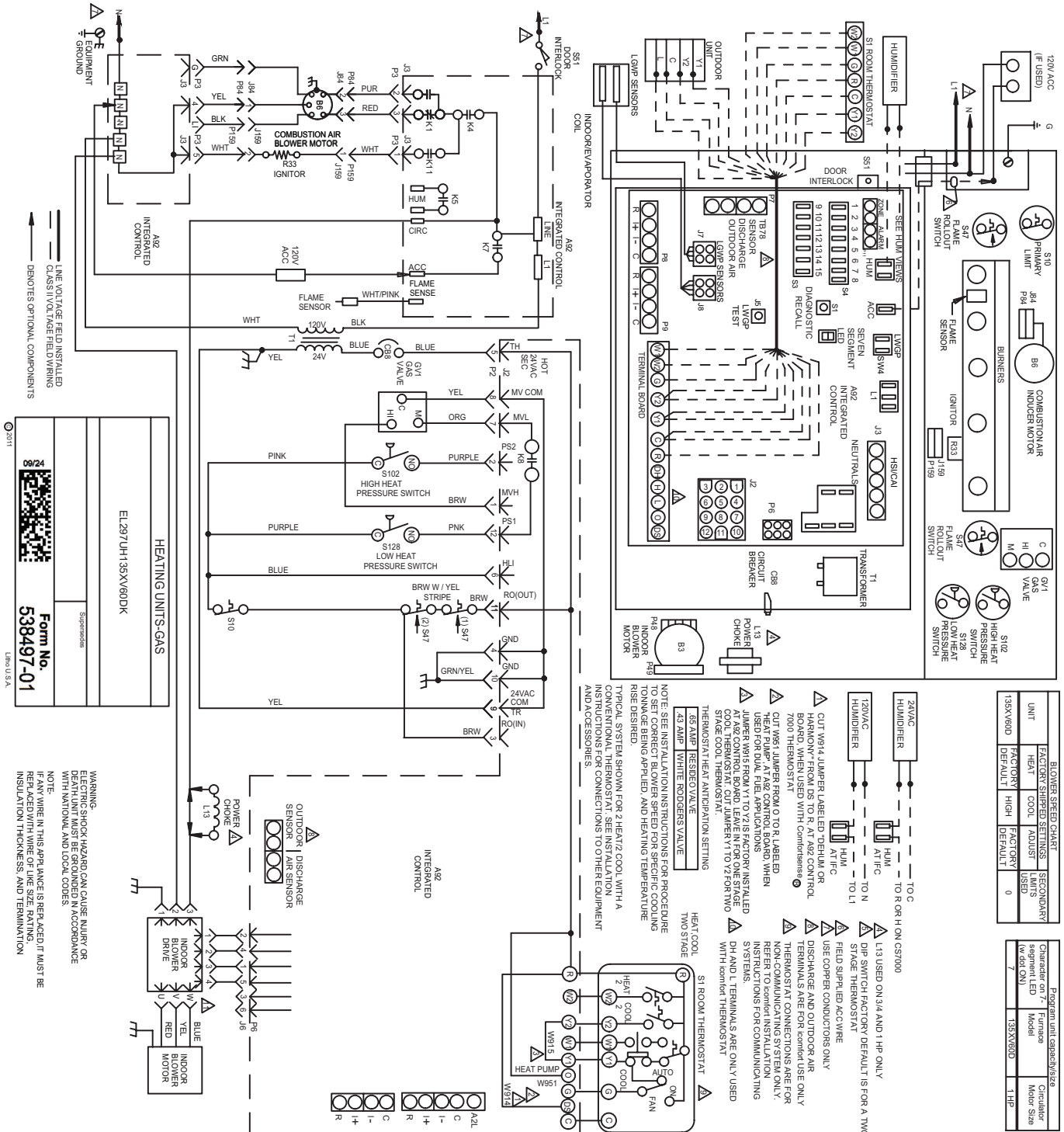
Installation of control is complete after both sequences are successful.

VIII- Wiring and Sequence of Operation

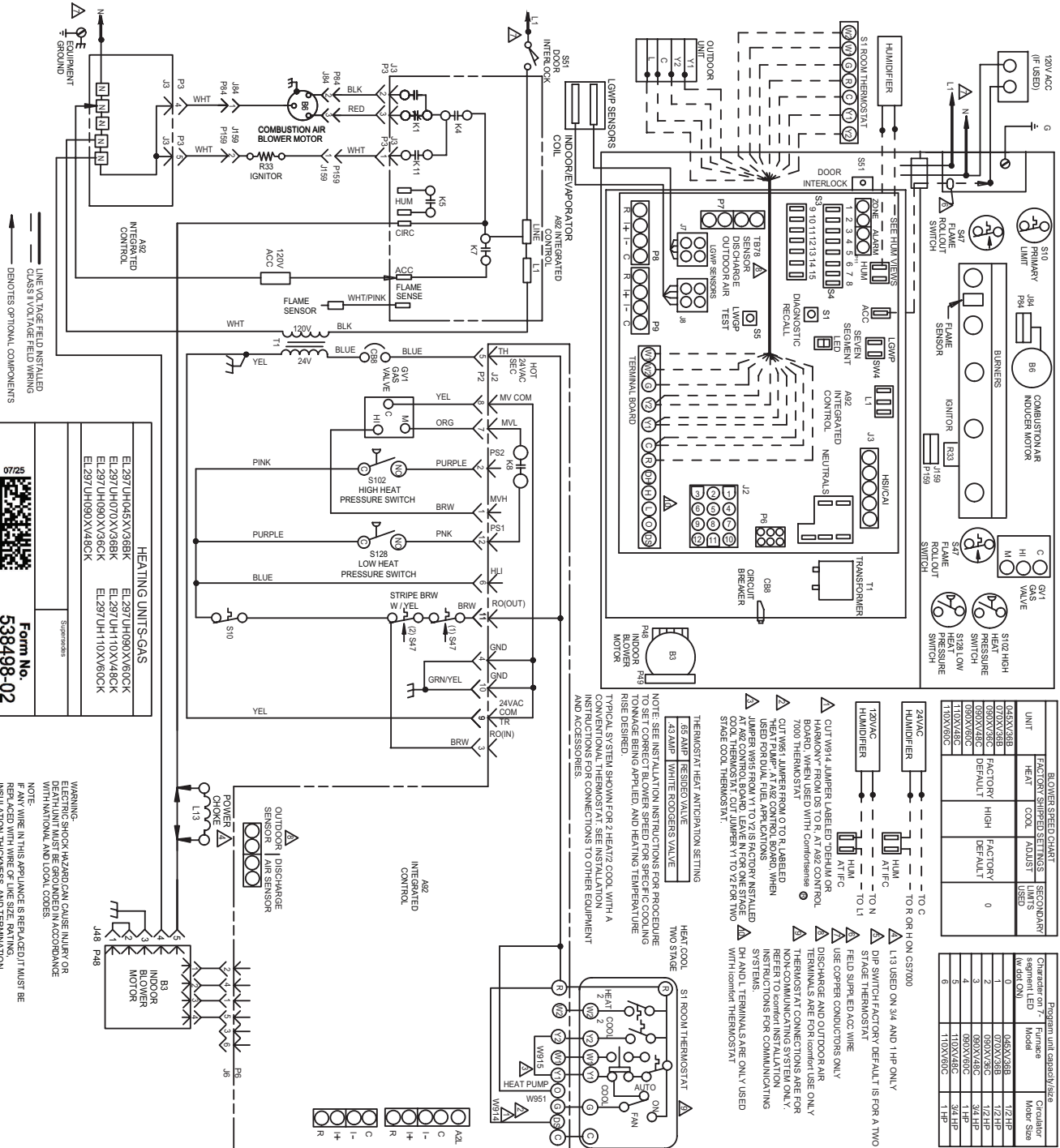
EL297UHVK-045, 070, 090, 110 With Blower Drive



EL297UHVK-135 With Blower Drive



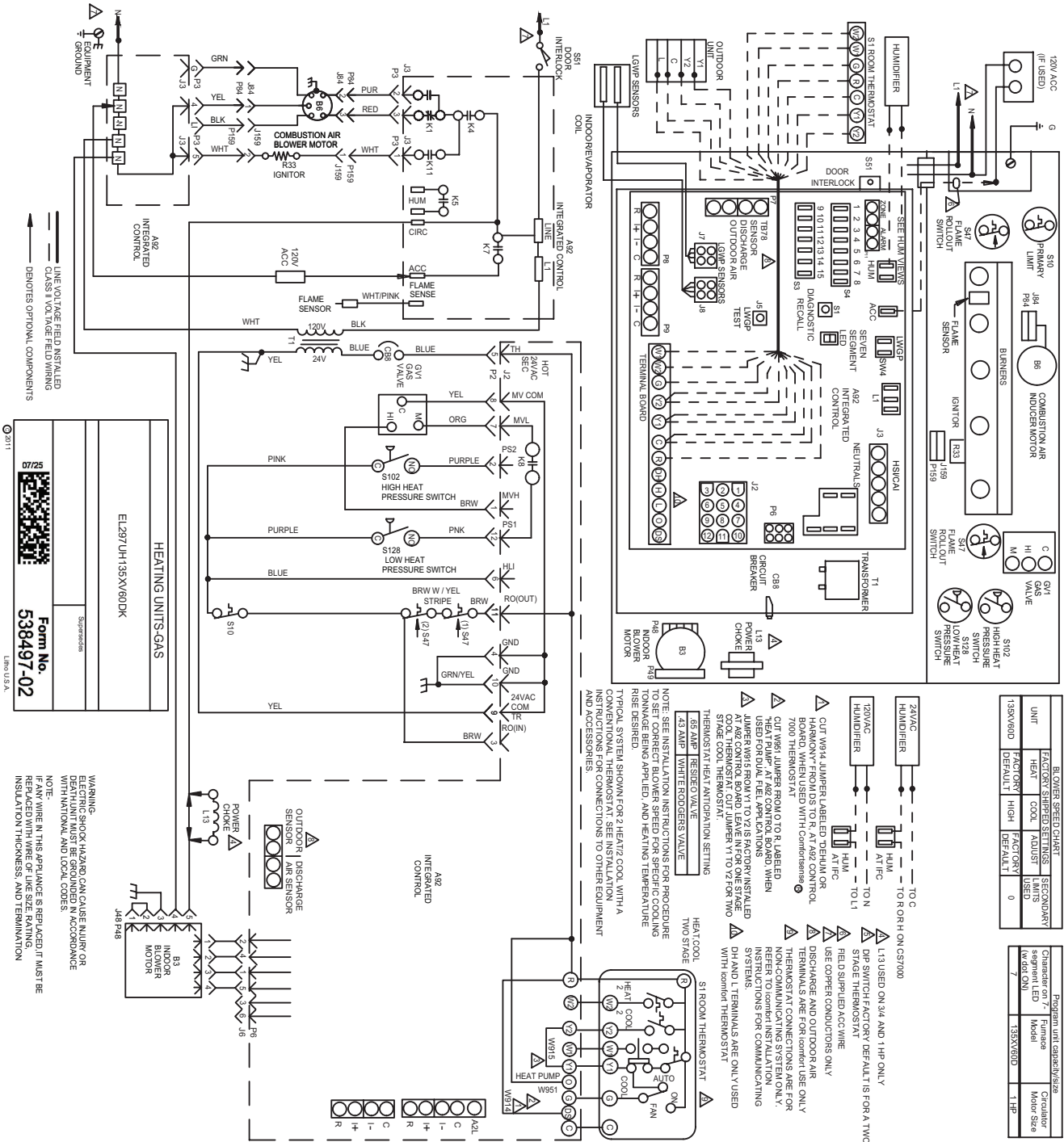
EL297UHVK-045, 070, 090, 110 With Out Blower Drive



BLOWER SPEED CHART			
UNIT	HEAT	COOL	ADJUST
045X36BK	070X36BK	090X36BK	110X48CK
070X36BK	090X36BK	110X48CK	
090X36BK	110X48CK		
110X48CK			

Program unit capacity/size			
Character on 7- Furnace	Model	Motor Size	Capacity
045X36BK	070X36BK	12 HP	12 HP
070X36BK	090X36BK	12 HP	12 HP
090X36BK	110X48CK	34 HP	34 HP
110X48CK		34 HP	34 HP
		11 HP	11 HP

EL297UHVK-135 With Out Blower Drive



CAUTION

Failure to use properly sized wiring and circuit breaker may result in property damage. Size wiring and circuit breaker(s) per Product Specifications bulletin (EHB) and unit rating plate.

WARNING

Fire Hazard. Use of aluminum wire with this product may result in a fire, causing property damage, severe injury or death. Use copper wire only with this product.

WARNING



Electric Shock Hazard. Can cause injury or death. Unit must be properly grounded in accordance with national and local codes.

Electronic Ignition

The two-stage, variable speed integrated control used in EL297UHVK units has an added feature of an internal Watchguard control. The feature serves as an automatic reset device for ignition control lockout caused by ignition failure. After one hour of continuous thermostat demand for heat, the Watchguard will break and remake thermostat demand to the furnace and automatically reset the control to begin the ignition sequence.

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

Applications Using a Two-Stage Thermostat

See FIGURE 60 for ignition control sequence

A - Heating Sequence - Integrated Control Thermostat Selection DIP Switch 1 OFF 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 low speed.
- 2 - Once the control receives a signal that the low pressure switch has closed, the combustion air inducer begins a 15-second pre-purge in low speed.

NOTE - If the low fire pressure switch does not close the combustion air inducer will switch to high fire. After a 15 second pre-purge the high fire pressure switch will close and the unit will begin operation on high fire. After 10 to 20 seconds of high fire operation the unit will switch to low fire.

- 3 - After the pre-purge is complete, a 20-second initial ignitor warm-up period begins. The combustion air inducer continues to operate at low speed.
- 4 - After the 20-second warm-up period has ended, the gas valve is energized on low fire (first stage) and ignition occurs. At the same time, the control module sends a signal to begin an indoor blower 30-second ON-delay. When the delay ends, the indoor blower motor is energized on the low fire heating speed, the HUM contacts close energizing the humidifier and 120V ACC terminal is energized. 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 initiates a 30-second second-stage recognition delay.

NOTE - If the indoor thermostat is set on CONTINUOUS FAN ON mode, the furnace will light on high fire (second-stage) for 60 seconds to improve heat exchanger warm up. After 60 second warm-up period, furnace will switch to low fire (first-stage).

- 6 - At the end of the recognition delay, the integrated control energizes the combustion air inducer at high speed. The control also checks the high fire (second stage) pressure switch to make sure it is closed. The high fire (second stage) gas valve is energized and the indoor blower motor is energized for operation at the high fire heating speed.
- 7 - When the demand for high fire (second stage) heat is satisfied, the combustion air inducer is switched to the low-fire heating speed and the high-fire (second stage) gas valve is de-energized. The low-fire (first stage) gas valve continues operation. The indoor blower motor is switched to the low-fire heating speed.
- 8 - When the thermostat demand for low-fire (first 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 5-second post-purge period.
- 9 - When the combustion air post-purge period is complete, the inducer, the HUM contacts as well as the 120V ACC terminals are de-energized. The indoor blower is de-energized at the end of the off delay.

Applications Using A Single-Stage Thermostat See FIGURE 61 for ignition control sequence

B - Heating Sequence -- Integrated Control Thermostat Selection DIP Switch 1 ON in "Single-Stage" Position

NOTE - In these applications, two-stage heat will be initiated by the integrated control if heating demand has not been satisfied after the field adjustable period (7 or 12 minutes).

- 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 low speed
- 2 - Once the control receives a signal that the low pressure switch has closed, the combustion air inducer begins a 15-second pre-purge in low speed.

NOTE - If the low fire pressure switch does not close the combustion air inducer will switch to high fire. After a 15 second pre-purge the high fire pressure switch will close and the unit will begin operation on high fire. After 10 to 20 seconds of high fire operation the unit will switch to low fire.

- 3 - After the pre-purge is complete, a 20-second initial ignitor warm-up period begins. The combustion air inducer continues to operate at low speed.

- 4 - After the 20-second warm-up period has ended, the gas valve is energized on low fire (first stage) and ignition occurs. At the same time, the control module sends a signal to begin an indoor blower 30-second ON-delay. When the delay ends, the indoor blower motor is energized on the low fire heating speed and the HUM contacts are energized. 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 high speed. The control also checks the high fire (second stage) pressure switch to make sure it is closed. The high fire (second stage) gas valve is energized and the indoor blower motor is energized for operation at the high fire heating speed.
- 6 - When the thermostat heating demand is satisfied, the combustion air inducer begins a 5-second low speed post-purge. The field-selected indoor blower off delay begins. The indoor blower operates at the low-fire heating speed.
- 7 - When the combustion air post-purge period is complete, the inducer, the HUM contacts as well as the 120V ACC terminals are de-energized. The indoor blower is de-energized at the end of the off delay.

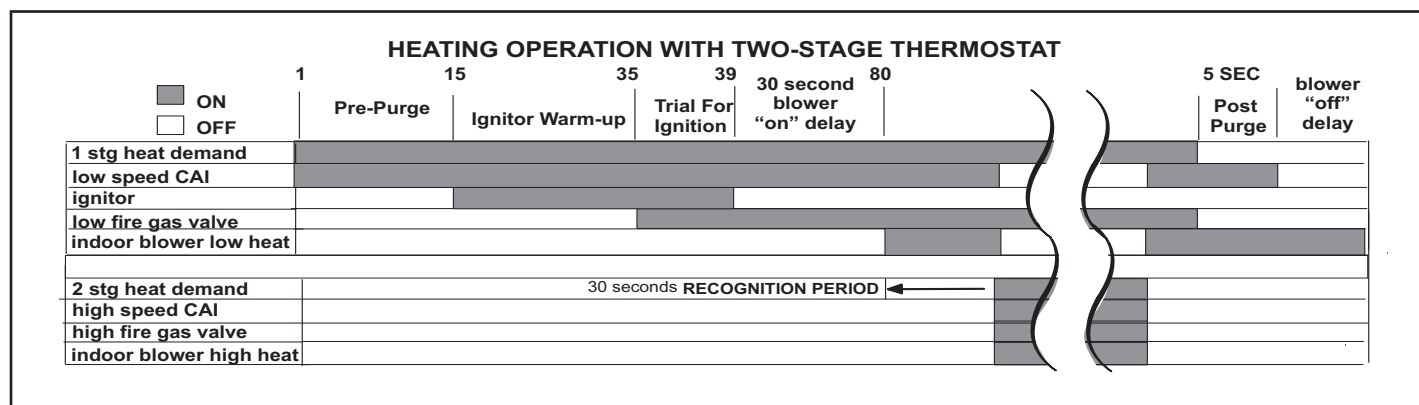


FIGURE 60

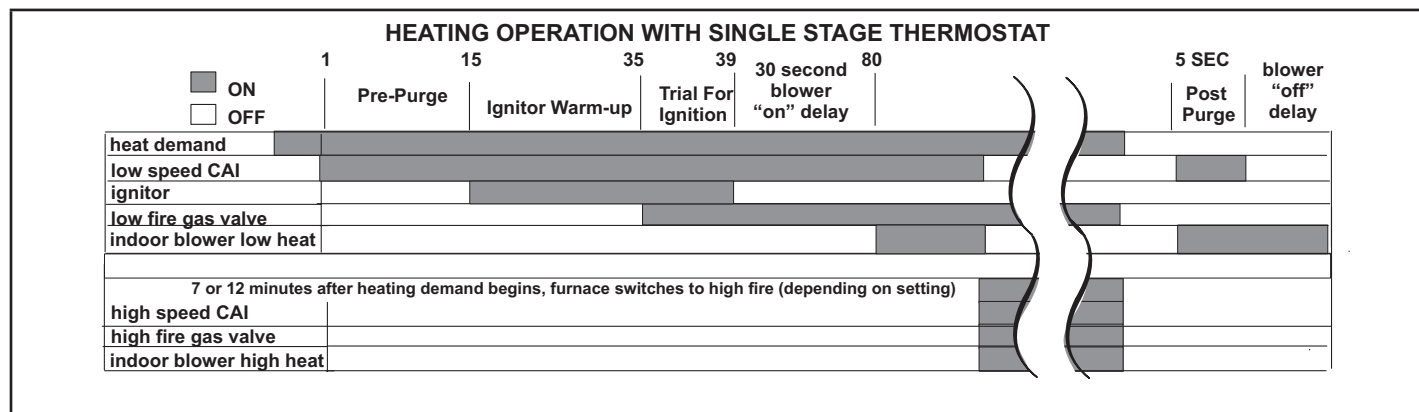
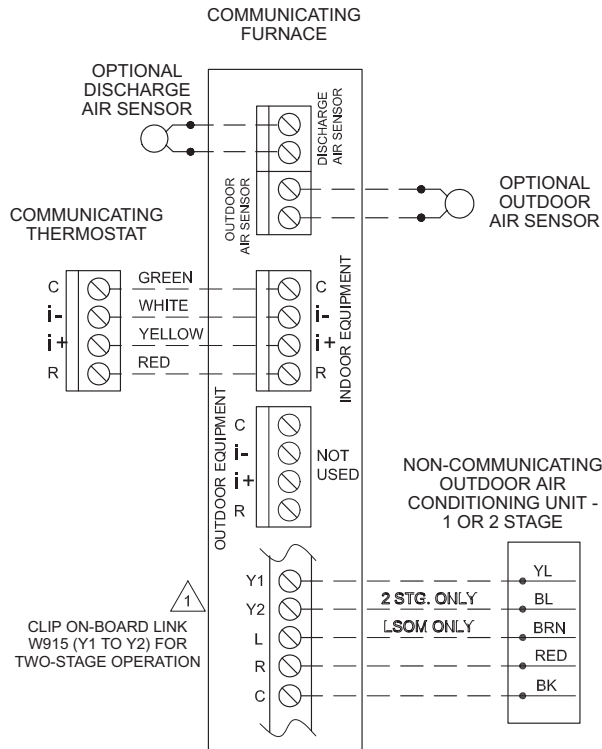


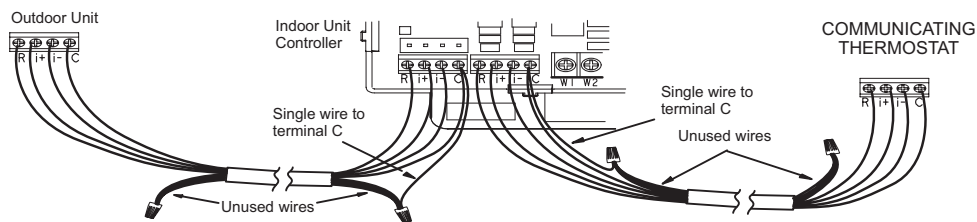
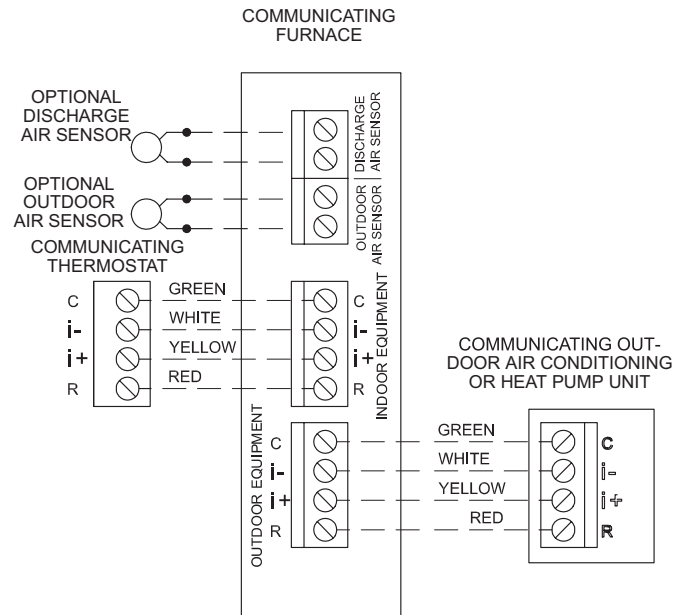
FIGURE 61

IX FIELD WIRING WITH CONVENTIONAL AND COMMUNICATING ENABLED THERMOSTAT

Communicating Enabled Furnace with a Non-Communicating Outdoor Unit



Communicating Enabled Furnace with a Communicating Enabled Outdoor Unit



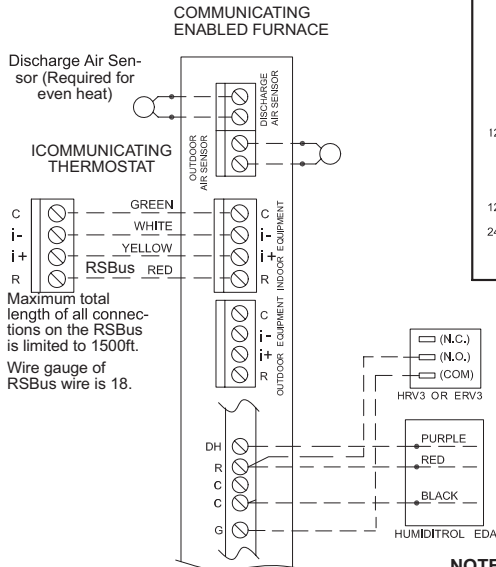
Communicating systems using the Communicating thermostat require four thermostat wires between the thermostat and the furnace/air handler control and four wires between the outdoor unit and the furnace/air handler control. When a thermostat cable with more than four wires is used, the extra wires must be properly connected to avoid electrical noise. The wires must not be left disconnected.

Use wire nuts to bundle the four unused wires at each end of the cable. A single wire should then be connected to the indoor unit end of the wire bundle and attached to the "C" terminals as shown above.

Optional Accessories for use with any Communicating System

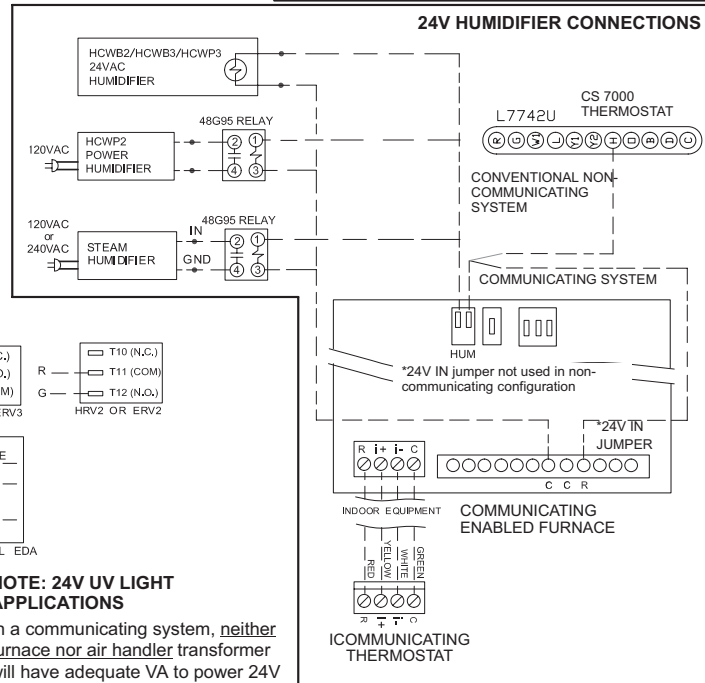
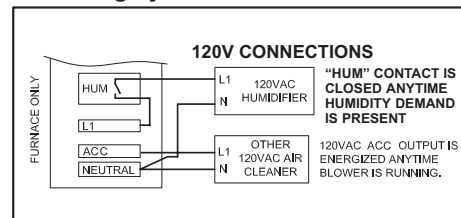
NOTE: ICOMMUNICATING THERMOSTAT SENSES HUMIDITY & CONTROLS HUM CONTACTS TO CYCLE HUMIDIFIER BASED ON DEMAND. NO OTHER CONTROL OR HUMIDISTAT REQUIRED.

OPTIONAL OUTDOOR AIR SENSOR FOR USE WITH HUMIDIFIER (IF NOT ALREADY IN THE SYSTEM FOR OTHER FUNCTIONS, BUILT INTO ALL COMMUNICATING ENABLED OUT DOOR UNITS).

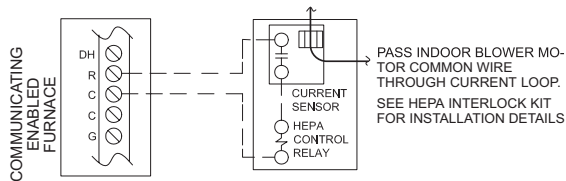


NOTE: 24V UV LIGHT APPLICATIONS

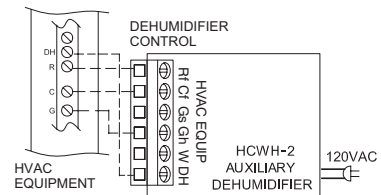
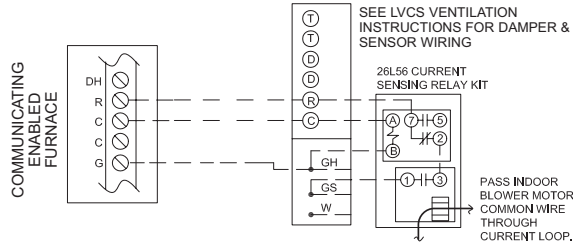
In a communicating system, neither furnace nor air handler transformer will have adequate VA to power 24V UV light applications. An additional transformer for UV light applications is required.

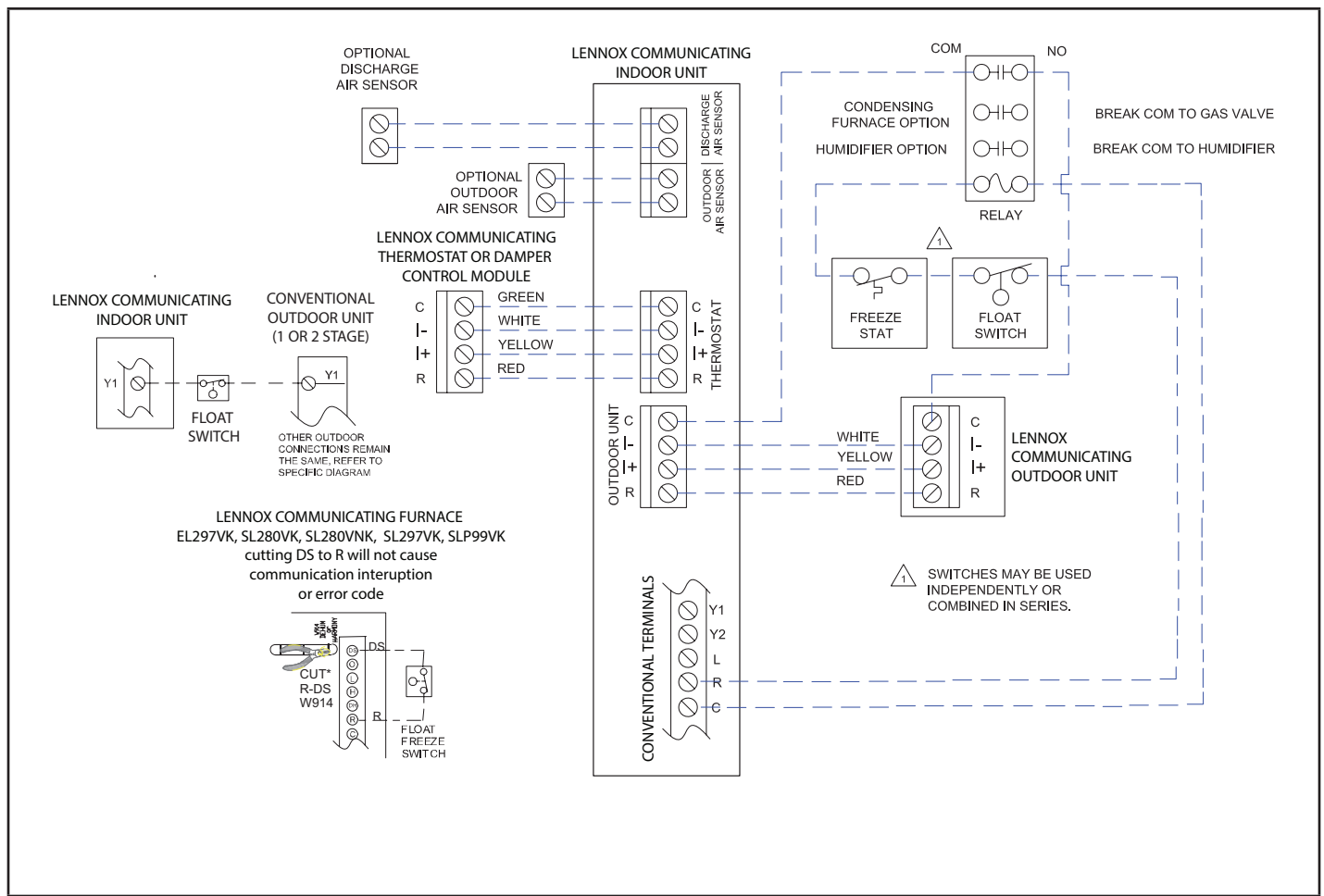


HEPA BYPASS FILTER X2680 HEPA INTERLOCK KIT

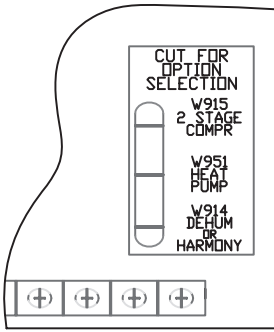
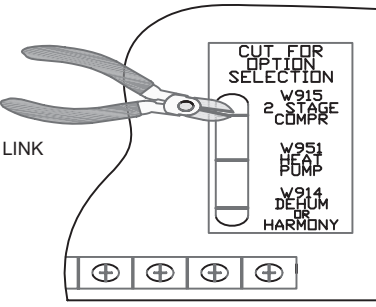
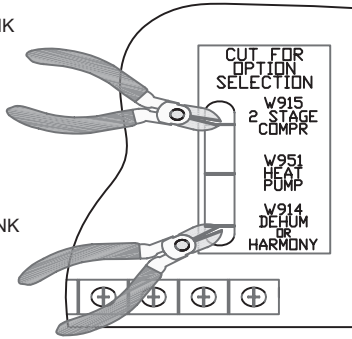


LVCS VENTILATION CONTROL SYSTEM

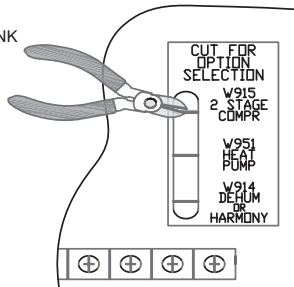
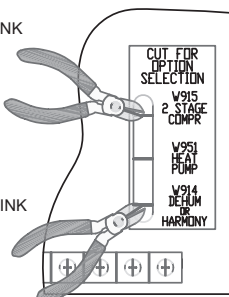
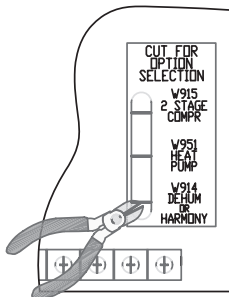
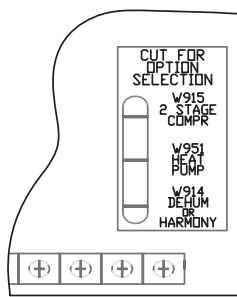




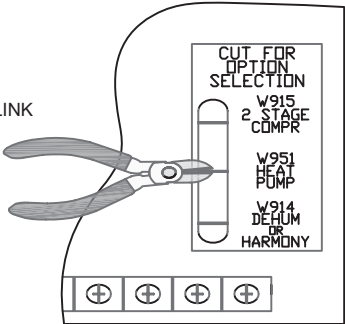
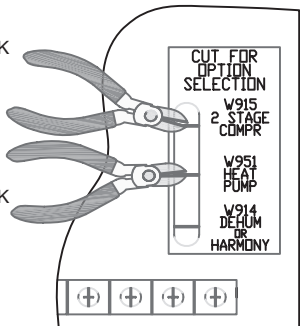
DIP Switch Settings and Field Wiring

Thermostat	DIP Switch Settings and On-Board Links		Wiring Connections
	DIP Switch 1 Thermostat Heating Stages	On Board Links Must Be Cut To Select System Options	
1 Heat / 1 Cool <i>NOTE - Use DIP switch 2 to set second-stage heat ON delay. OFF-7 minutes. ON-12 minutes. (L40 T-stat)</i>	ON	DO NOT CUT ANY ON-BOARD LINKS 	<div>S1 T'STAT</div> <div>FURNACE TERM. STRIP</div> <div>OUTDOOR UNIT</div> <div> <div>W2</div> <div>W1</div> <div>R</div> <div>G</div> <div>C</div> <div>Y</div> </div> <div> <div>W2</div> <div>W1</div> <div>R</div> <div>G</div> <div>C</div> <div>Y1</div> <div>O</div> </div> <div> <div></div> <div>*</div> <div>R</div> <div></div> <div>C</div> <div>Y</div> </div>
1 Heat / 2 Cool <i>NOTE - Use DIP switch 2 to set second-stage heat ON delay. OFF-7 minutes. ON-12 minutes. (M30 T-stat)</i>	ON	CUT ON-BOARD LINK W915 2 STAGE COMPR 	<div>S1 T'STAT</div> <div>FURNACE TERM. STRIP</div> <div>OUTDOOR UNIT</div> <div> <div>W</div> <div>R</div> <div>G</div> <div>C</div> <div>Y2</div> <div>Y1</div> </div> <div> <div>W2</div> <div>W1</div> <div>R</div> <div>G</div> <div>C</div> <div>Y2</div> <div>Y1</div> <div>O</div> </div> <div> <div></div> <div>*</div> <div>R</div> <div></div> <div>C</div> <div>Y2</div> <div>Y1</div> </div>
1 Heat / 2 Cool with t'stat with humidity control <i>NOTE - Use DIP switch 2 to set second-stage heat ON delay. OFF-7 minutes. ON-12 minutes. (M30 T-stat)</i>	ON	CUT ON-BOARD LINK W915 2 STAGE COMPR CUT ON-BOARD LINK W914 DEHUM OR HARMONY 	<div>S1 T'STAT</div> <div>FURNACE TERM. STRIP</div> <div>OUTDOOR UNIT</div> <div> <div>DS</div> <div>W1</div> <div>R</div> <div>G</div> <div>C</div> <div>Y2</div> <div>Y1</div> </div> <div> <div>DS</div> <div>W2</div> <div>W1</div> <div>R</div> <div>G</div> <div>C</div> <div>Y2</div> <div>Y1</div> <div>O</div> </div> <div> <div></div> <div>*</div> <div>R</div> <div></div> <div>C</div> <div>Y2</div> <div>Y1</div> </div>

* Not required on all units.

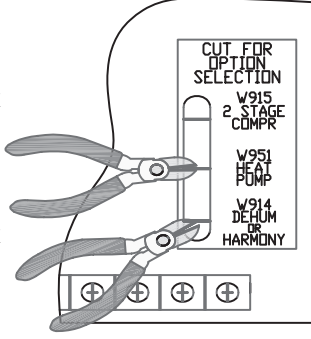
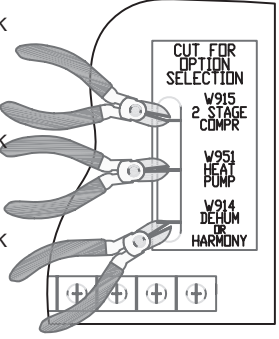
Thermostat	DIP Switch Settings and On-Board Links		Wiring Connections																														
	DIP Switch 1 Thermostat Heating Stages	On Board Links Must Be Cut To Select System Options																															
2 Heat / 2 Cool (M30 T-stat)	OFF	<div>CUT ON-BOARD LINK W915 2 STAGE COMPR</div> <div></div>	<table><tr><th>S1 T'STAT</th><th>FURNACE TERM. STRIP</th><th>OUTDOOR UNIT</th></tr><tr><td></td><td>DH/DS</td><td></td></tr><tr><td>W2</td><td>W2</td><td></td></tr><tr><td>W1</td><td>W1</td><td></td></tr><tr><td>R</td><td>R</td><td>* R</td></tr><tr><td>G</td><td>G</td><td></td></tr><tr><td>C</td><td>C</td><td>C</td></tr><tr><td>Y2</td><td>Y2</td><td>Y2</td></tr><tr><td>Y1</td><td>Y1</td><td>Y1</td></tr><tr><td></td><td>O</td><td></td></tr></table>	S1 T'STAT	FURNACE TERM. STRIP	OUTDOOR UNIT		DH/DS		W2	W2		W1	W1		R	R	* R	G	G		C	C	C	Y2	Y2	Y2	Y1	Y1	Y1		O	
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Thermostat	DIP Switch Settings and On-Board Links		Wiring Connections																																							
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Dual Fuel Single Stage Heat Pump (M30 T-stat) thermostat w/ dual fuel capabilities Capable of 2 stage gas heat control	OFF	<div>CUT ON-BOARD LINK W951 HEAT PUMP</div> <div></div>	<table><thead><tr><th>T'STAT</th><th>FURNACE TERM. STRIP</th><th>HEAT PUMP</th></tr></thead><tbody><tr><td>(R) ---</td><td>(R) ---</td><td>(R)</td></tr><tr><td>(H) ---</td><td></td><td></td></tr><tr><td>(W2) ---</td><td>(W2) ---</td><td></td></tr><tr><td>(W1) ---</td><td>(W1) ---</td><td>67M41* (W)</td></tr><tr><td>(O) ---</td><td>(O) ---</td><td>(O)</td></tr><tr><td>(Y1) ---</td><td>(Y1) ---</td><td>(Y)</td></tr><tr><td>(Y2) ---</td><td></td><td></td></tr><tr><td>(G) ---</td><td>(G) ---</td><td></td></tr><tr><td>(D) ---</td><td>(DH/DS) ---</td><td></td></tr><tr><td>(B) ---</td><td>(Y2) ---</td><td></td></tr><tr><td>(C) ---</td><td>(C) ---</td><td>(C)</td></tr></tbody></table>	T'STAT	FURNACE TERM. STRIP	HEAT PUMP	(R) ---	(R) ---	(R)	(H) ---			(W2) ---	(W2) ---		(W1) ---	(W1) ---	67M41* (W)	(O) ---	(O) ---	(O)	(Y1) ---	(Y1) ---	(Y)	(Y2) ---			(G) ---	(G) ---		(D) ---	(DH/DS) ---		(B) ---	(Y2) ---		(C) ---	(C) ---	(C)			
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Dual Fuel Two Stage Heat Pump (M30 T-stat) thermostat w/ dual fuel capabilities Capable of 2 stage gas heat control	OFF	<div>CUT ON-BOARD LINK W915 2 STAGE COMPR</div> <div>CUT ON-BOARD LINK W951 HEAT PUMP</div> <div></div>	<table><thead><tr><th>T'STAT</th><th>FURNACE TERM. STRIP</th><th>HEAT PUMP</th></tr></thead><tbody><tr><td>(R) ---</td><td>(R) ---</td><td>(R)</td></tr><tr><td>(H) ---</td><td></td><td></td></tr><tr><td>(W2) ---</td><td>(W2) ---</td><td></td></tr><tr><td>(W1) ---</td><td>(W1) ---</td><td>67M41* (W)</td></tr><tr><td>(O) ---</td><td>(O) ---</td><td>(O)</td></tr><tr><td>(L) ---</td><td></td><td>(L)</td></tr><tr><td>(Y1) ---</td><td>(Y1) ---</td><td>(Y1)</td></tr><tr><td>(Y2) ---</td><td></td><td>(Y2)</td></tr><tr><td>(G) ---</td><td>(G) ---</td><td></td></tr><tr><td>(D) ---</td><td>(DH/DS) ---</td><td></td></tr><tr><td>(B) ---</td><td>(Y2) ---</td><td>Y2 out blue</td></tr><tr><td>(C) ---</td><td>(C) ---</td><td>(C)</td></tr></tbody></table>	T'STAT	FURNACE TERM. STRIP	HEAT PUMP	(R) ---	(R) ---	(R)	(H) ---			(W2) ---	(W2) ---		(W1) ---	(W1) ---	67M41* (W)	(O) ---	(O) ---	(O)	(L) ---		(L)	(Y1) ---	(Y1) ---	(Y1)	(Y2) ---		(Y2)	(G) ---	(G) ---		(D) ---	(DH/DS) ---		(B) ---	(Y2) ---	Y2 out blue	(C) ---	(C) ---	(C)
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(C) ---	(C) ---	(C)																																								

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

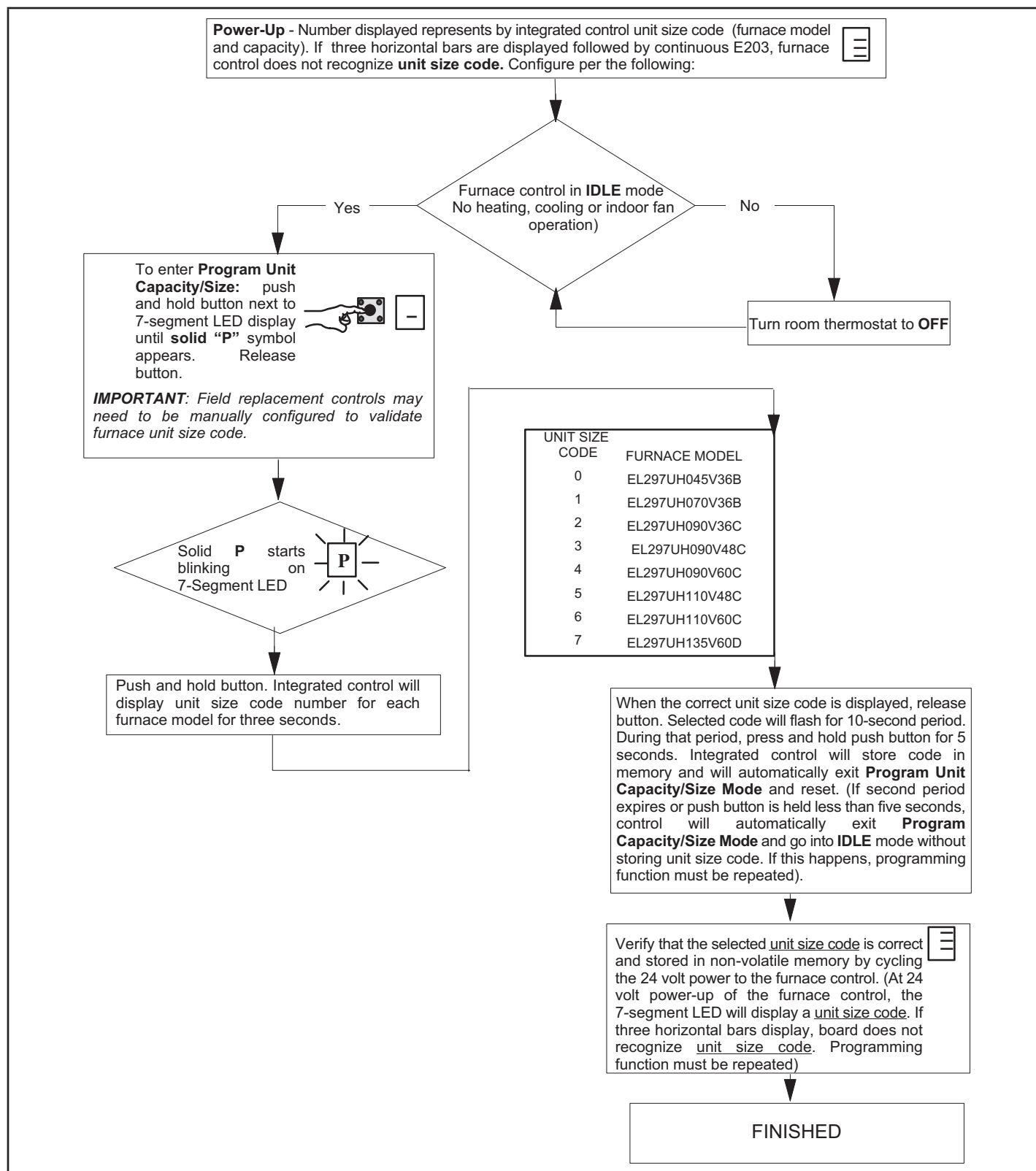
NOTE - **Do NOT** make a wire connection between the room thermostat L terminal and the L terminal of the furnace integrated control.

Thermostat	DIP Switch Settings and On-Board Links		Wiring Connections
	DIP Switch 1 Thermostat Heating Stages	On Board Links Must Be Cut To Select System Options	
Dual Fuel Single Stage Heat Pump (M30 T-stat) thermostat w/ dual fuel capabilities Capable of 2 stage gas heat control w/dehumidification control	OFF	<div> <p>CUT ON-BOARD LINK W951 HEAT PUMP</p> <p>CUT ON-BOARD LINK W914 DEHUM OR HARMONY</p>  </div>	<div> <p>T'STAT FURNACE TERM. STRIP HEAT PUMP</p> <p>(R) --- (R) --- (R)</p> <p>(H) ---</p> <p>(W2) --- (W2) --- 67M41* --- (W)</p> <p>(W1) --- (W1) --- (W)</p> <p>(O) --- (O) --- (O)</p> <p>(L) --- (L) --- (L)</p> <p>(Y1) --- (Y1) --- (Y)</p> <p>(Y2) ---</p> <p>(G) --- (G)</p> <p>(D) --- (DH/DS)</p> <p>(B) --- (Y2)</p> <p>(C) --- (C) --- (C)</p> </div>
Dual Fuel Two Stage Heat Pump (M30 T-stat) thermostat w/ dual fuel capabilities Capable of 2 stage gas heat control w/dehumidification	OFF	<div> <p>CUT ON-BOARD LINK W915 2 STAGE COMPR</p> <p>CUT ON-BOARD LINK W951 HEAT PUMP</p> <p>CUT ON-BOARD LINK W914 DEHUM OR HARMONY</p>  </div>	<div> <p>T'STAT FURNACE TERM. STRIP HEAT PUMP</p> <p>(R) --- (R) --- (R)</p> <p>(H) ---</p> <p>(W2) --- (W2) --- 67M41* --- (W)</p> <p>(W1) --- (W1) --- (W)</p> <p>(O) --- (O) --- (O)</p> <p>(L) --- (L) --- (L)</p> <p>(Y1) --- (Y1) --- (Y1)</p> <p>(Y2) --- (Y2) --- (Y2)</p> <p>(G) --- (G)</p> <p>(D) --- (DH/DS)</p> <p>(B) --- (Y2) --- out blue</p> <p>(C) --- (C) --- (C)</p> </div>

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

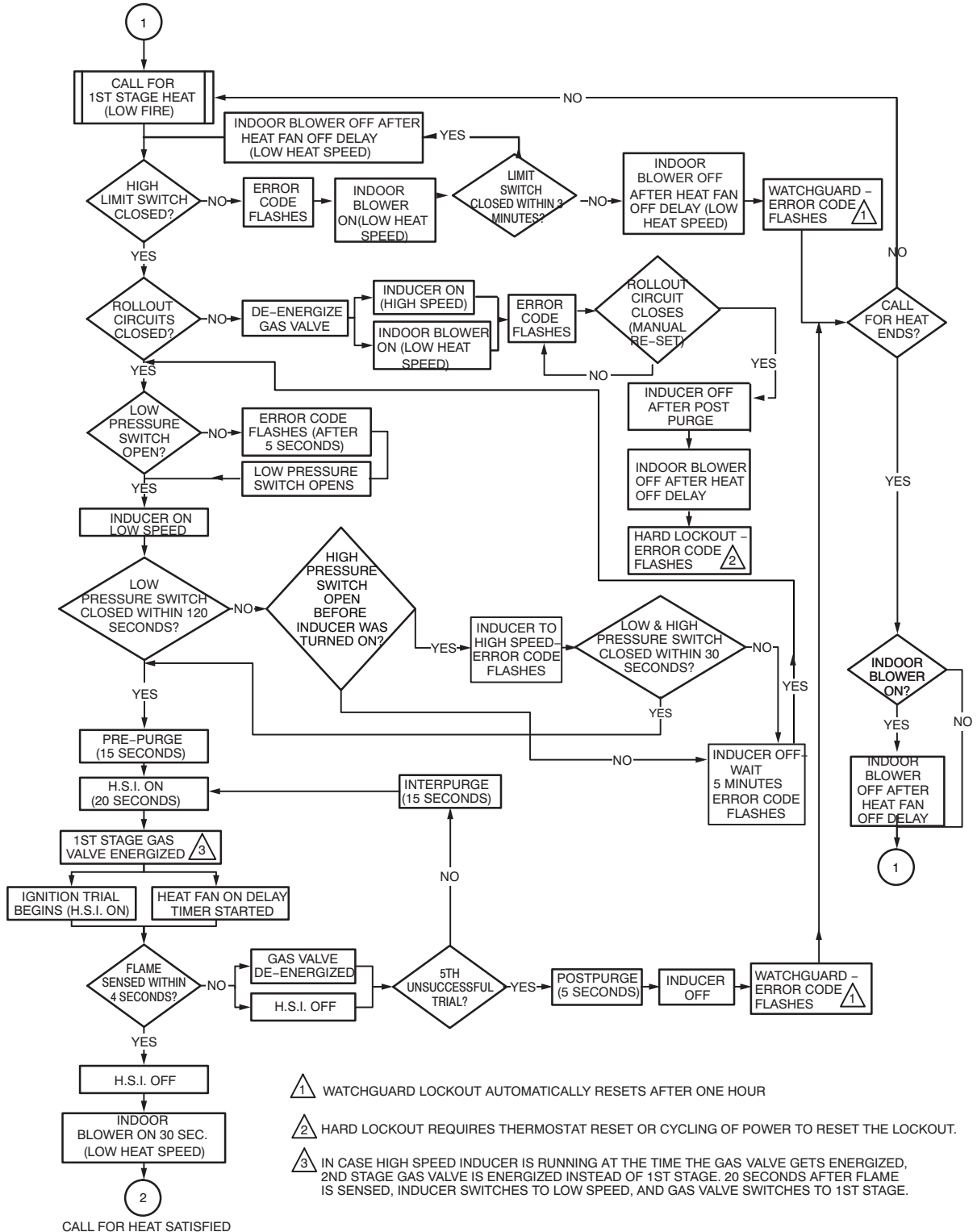
NOTE - **Do NOT** make a wire connection between the room thermostat L terminal and the L terminal of the furnace integrated control.

X- Program Unit Capacity Size Modes

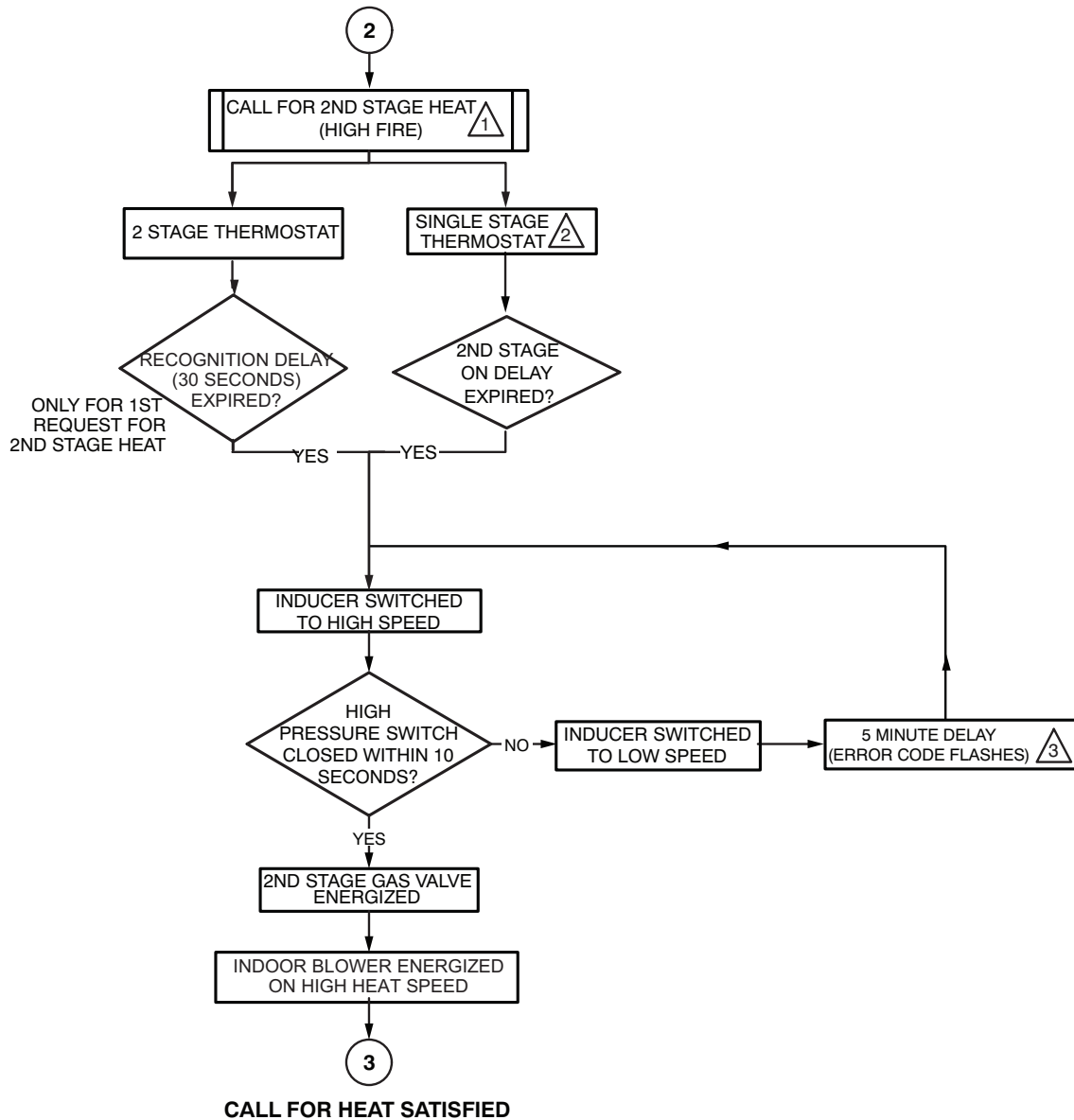


XI- Troubleshooting

CALL FOR FIRST-STAGE HEAT



CALL FOR SECOND-STAGE HEAT



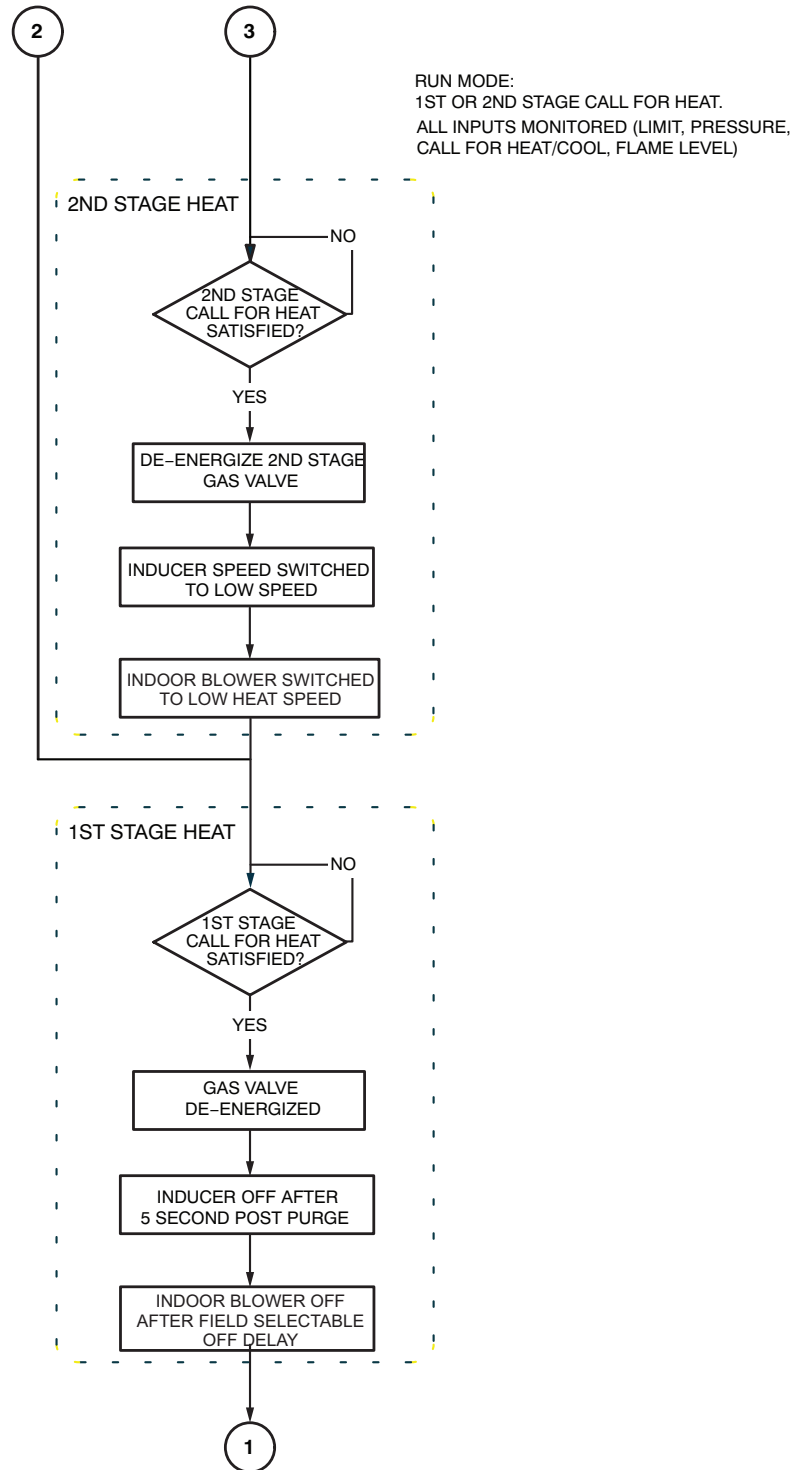
⚠️1 SYSTEM WILL ALWAYS LIGHT ON LOW FIRE, EVEN IF 2ND STAGE HEAT IS IN PLACE.

⚠️2 WHEN USED WITH A SINGLE STAGE THERMOSTAT, SET SW1 TO THE ON POSITION IN DIP SWITCH S4.

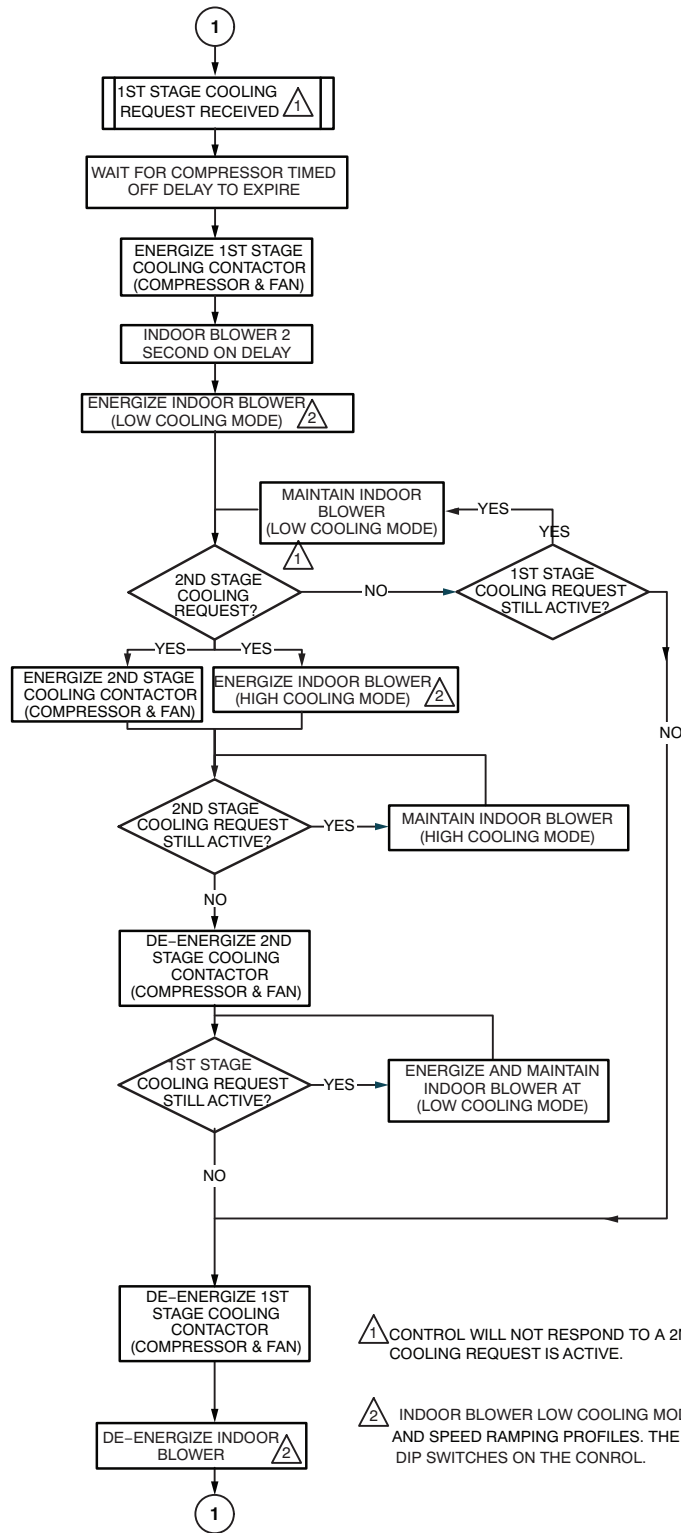
⚠️3 IF THE HIGH FIRE PRESSURE SWITCH DOES NOT CLOSE WITHIN 5 ATTEMPTS, THE SYSTEM WILL OPERATE AT LOW FIRE FOR THE REMAINDER OF THE CALL FOR HEAT REQUEST.

CALL FOR HEAT SATISFIED

FIRST-STAGE HEAT SECOND-STAGE HEAT



CALL FOR COOLING



CALL FOR FAN

