ALLIED™ Air Enterprises

SERVICE MANUAL

A97DF2E & 97G2DFE

This is a safety alert symbol and should never be ignored. When you see this symbol on labels or in manuals, be alert to the potential for personal injury or death.

Table of Contents

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.

WARNING

Electric shock hazard.

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

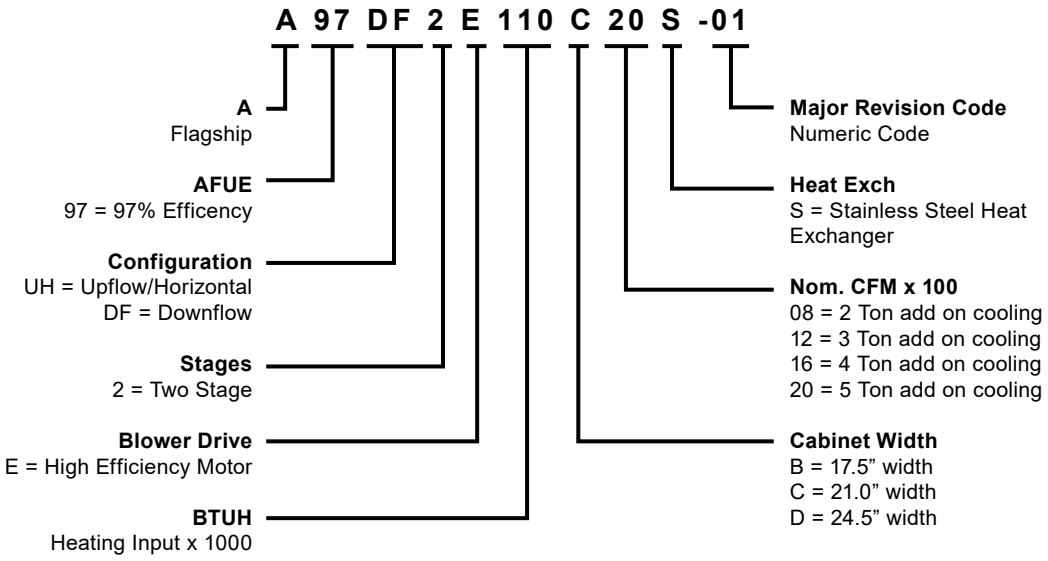
CAUTION

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.

(P) 508434-01

Technical Specifications - A97DF2E

MODEL NUMBER GUIDE



PHYSICAL AND ELECTRICAL DATA

	Model	1st Stage		2nd Stage		AFUE (ICUS)	Nom. Cooling Capacity (tons)	Gas Inlet (in.)	Volts / Hz / Phase	Min. Time Delay Breaker or Fuse	Nominal F.L.A.	Trans. (V.A.)	Approx. Weight (lbs.)
		Input (Btuh)	Output (Btuh)	Input (Btuh)	Output (Btuh)								
Downflow	A97DF2E045B12S	29,000	28,000	44,000	43,000	97.0	3	1/2	120-60-1	15	---	40	124
	A97DF2E070B16S	43,000	42,000	66,000	65,000	97.0	4	1/2	120-60-1	15	---	40	138
	A97DF2E090C16S	57,000	56,000	88,000	86,000	97.0	5	1/2	120-60-1	20	10.9	40	153
	A97DF2E110C20S	72,000	70,000	110,000	108,000	97.0	5	1/2	120-60-1	20	10.9	40	164

Note: For vent length and clearances to combustibles, please reference installation instructions.

FILTER REQUIREMENT DATA

Airflow Descriptor	Disposable Filters	Cleanable Filters
	Minimum Area (sq. in.)	Minimum Area (sq.in.)
12	576	288
16	768	384
20	960	480

1. The Airflow Descriptor is the two digits following the “B”, “C”, or “D” in the model number; e.g. “20” is the Airflow Descriptor.
2. Areas shown for permanent filters are based on filters rated at 600 feet per minute face velocity.

BLOWER DATA: DOWNFLOW

A97DF2E045B12S PERFORMANCE (Less Filter)												
External Static Pressure in. w.c.	Rise Range °F		Air Volume / Watts at Various Blower Speeds									
	1st Stage	2nd Stage	High		Medium-High		Medium		Medium-Low		Low	
			cfm	Watts	cfm	Watts	cfm	Watts	cfm	Watts	cfm	Watts
0.10	15-45	30-60	1434	383	1275	277	1169	217	921	126	860	106
0.20			1401	395	1237	288	1140	227	879	134	817	115
0.30			1363	398	1211	297	1101	238	833	140	773	122
0.40			1300	383	1179	308	1070	243	798	151	733	131
0.50			1228	367	1151	316	1036	256	755	156	692	136
0.60			1146	343	1105	319	1005	263	710	163	645	144
0.70			1058	318	1038	309	971	272	672	170	598	154
0.80			930	286	942	284	909	272	614	179	557	158
0.90			807	251	811	251	799	251	569	184	518	163
1.00			645	222	669	224	630	216	532	189	473	169

A97DF2E070B16S PERFORMANCE (Less Filter)												
External Static Pressure in. w.c.	Rise Range °F		Air Volume / Watts at Various Blower Speeds									
	1st Stage	2nd Stage	High		Medium-High		Medium		Medium-Low		Low	
			cfm	Watts	cfm	Watts	cfm	Watts	cfm	Watts	cfm	Watts
0.10	20-50	30-60	1709	485	1510	339	1336	240	1226	196	991	114
0.20			1675	501	1474	350	1294	249	1180	204	927	122
0.30			1638	513	1437	362	1244	261	1127	215	863	130
0.40			1601	529	1386	376	1187	270	1082	226	797	139
0.50			1563	541	1353	388	1139	282	1033	232	727	147
0.60			1511	539	1310	401	1100	293	979	245	661	155
0.70			1445	525	1272	410	1048	304	940	255	604	159
0.80			1339	499	1234	421	1013	313	862	264	531	174
0.90			1243	470	1161	424	952	326	811	272	481	182
1.00			1119	439	1092	414	907	330	763	281	435	192

A97DF2E090C16S PERFORMANCE (Less Filter)												
External Static Pressure in. w.c.	Rise Range °F		Air Volume / Watts at Various Blower Speeds									
	1st Stage	2nd Stage	High		Medium-High		Medium		Medium-Low		Low	
			cfm	Watts	cfm	Watts	cfm	Watts	cfm	Watts	cfm	Watts
0.10	25-55	35-65	1750	446	1520	308	1389	240	1306	206	1179	158
0.20			1708	463	1487	323	1359	254	1265	217	1130	171
0.30			1685	477	1456	339	1326	264	1228	230	1090	182
0.40			1630	478	1421	350	1274	281	1192	239	1046	192
0.50			1558	462	1394	363	1246	291	1157	251	989	202
0.60			1458	432	1354	373	1209	300	1114	264	952	210
0.70			1371	408	1312	381	1177	314	1079	271	913	220
0.80			1231	368	1234	366	1138	324	1038	282	861	230
0.90			1118	343	1093	336	1093	327	997	291	843	237
1.00			1008	315	976	309	987	306	952	292	794	242

BLOWER DATA: DOWNFLOW

A97DF2E110C20S PERFORMANCE (Less Filter)												
External Static Pressure in. w.c.	Rise Range °F		Air Volume / Watts at Various Blower Speeds									
	1st Stage	2nd Stage	High		Medium-High		Medium		Medium-Low		Low	
			cfm	Watts	cfm	Watts	cfm	Watts	cfm	Watts	cfm	Watts
0.10	30-60	40-70	2174	694	1920	474	1754	365	1631	312	1441	225
0.20			2136	706	1877	488	1709	379	1583	322	1387	237
0.30			2095	718	1832	500	1658	391	1530	332	1323	247
0.40			2058	734	1792	512	1617	403	1487	345	1276	256
0.50			2006	742	1745	525	1570	413	1433	354	1223	265
0.60			1940	727	1704	538	1523	426	1379	368	1168	276
0.70			1863	702	1665	550	1479	436	1340	377	1110	290
0.80			1765	669	1622	563	1439	445	1288	388	1061	293
0.90			1673	642	1582	572	1398	454	1254	397	1013	304
1.00			1559	599	1522	568	1354	466	1214	407	949	311

AC**CESSORY LIST**

Description	Catalog Number
Return Air Base	
Return Air Base 17.5 Inch	68W62
Return Air Base 21.0 Inch	68W63
Return Air Base 24.5 Inch	68W64
Downflow Combustible Flooring Base	
17.5" B Width	11M60
21.0" C Width	11M61
External Filter Rack kits	
1 pack (16 x 25)	1.841018
10 pack (16 x 25)	1.841039
Downflow Specific Air Filters	
17.5"	51W07
21.0"	51W08
24.5"	51W09
Horizontal Suspension Kit	
80% & 90% Kit	51W10
Concentric Vent Kit (90% Furnaces only) US Only	
1-1/2" Vent Version	71M80
2" Vent Version	69M29
3" Vent Version	60L46
Concentric Vent Kit (90% Furnaces only) Canada Only	
1-1/2" and 2" Vent Version	44W92
3" Vent Version	44W93
Flush Mount Termination (90% Furnaces only)	
2" & 3.0" Vent - US Version	51W11
2" & 3.0" Vent - ULC S636 Compliant (Canada)	51W12
High Altitude Orifice Kits (7500'+)	
2-Stage 97% UH/DF - Natural Gas	51W01
2-Stage 97% UH/DF - Propane Gas	78W97

For vent length and clearances to combustibles, please reference installation instructions.

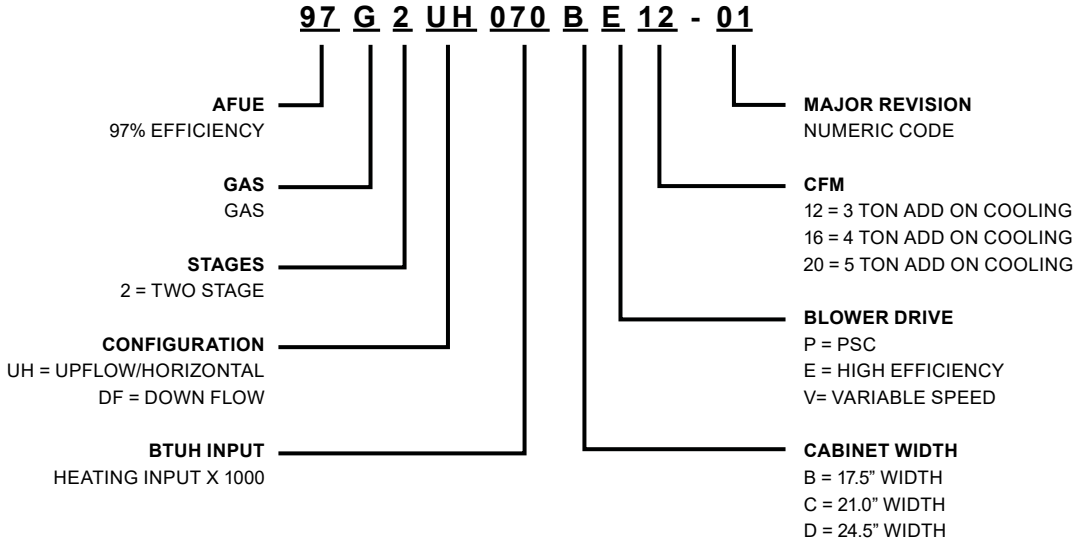
AC**CESSORY LIST**

Description	Catalog Number
High Altitude Pressure Swiches	
2-Stage 97% UH/DF (4,501 - 7,500 ft) [045]	14A51
2-Stage 97% UH/DF (4,501 - 7,500 ft) [070]	14A48
2-Stage 97% UH/DF (4,501 - 7,500 ft) [090]	14A54
2-Stage 97% UH/DF (4,501 - 7,500 ft) [110]	25B93
2-Stage 97% UH/DF (7,501 - 10,000 ft) [045]	14A53
2-Stage 97% UH/DF (7,501 - 10,000 ft) [070]	14A54
2-Stage 97% UH/DF (7,501 - 10,000 ft) [090]	14A53
2-Stage 97% UH/DF (7,501 - 10,000 ft) [110]	14A45
Natural to LP Kits	
2-Stage 90	11K48
2-Stage 90 High Altitude (>7500')	11K47
Low Input (30K Btuh)	17H64
LP to Natural Kits	
2-Stage - 90 (45K-110K Btuh)	77W10
Night Service Kits	
Two Stage	10U95
Safety Night Service Kit	68W83
Twinning Kit	
16W72	Constant Torque Gas Furnace Twinning Kit

For vent length and clearances to combustibles, please reference installation instructions.

Technical Specifications - 97G2DFE

MODEL NUMBER GUIDE



PHYSICAL AND ELECTRICAL DATA

	Model	1st Stage		2nd Stage		AFUE (ICUS)	Nom. Cooling Capacity (tons)	Gas Inlet (in.)	Volts / Hz / Phase	Min. Time Delay Breaker or Fuse	Nominal F.L.A.	Trans. (V.A.)	Approx. Weight (lbs.)
		Input (Btuh)	Output (Btuh)	Input (Btuh)	Output (Btuh)								
Downflow	97G2DF045BE12	29,000	28,000	44,000	43,000	97.0	3	1/2	120-60-1	15	---	40	123
	97G2DF070BE16	43,000	42,000	66,000	65,000	97.0	4	1/2	120-60-1	15	---	40	137
	97G2DF090CE16	57,000	56,000	88,000	86,000	97.0	5	1/2	120-60-1	20	10.9	40	147
	97G2DF110CE20	72,000	70,000	110,000	108,000	97.0	5	1/2	120-60-1	20	10.9	40	166

Note: For vent length and clearances to combustibles, please reference installation instructions.

FILTER REQUIREMENT DATA

Airflow Descriptor	Disposable Filters	Cleanable Filters
	Minimum Area (sq. in.)	Minimum Area (sq.in.)
12	576	288
16	768	384
20	960	480

1. The Airflow Descriptor is the two digits following the "B", "C", or "D" in the model number; e.g. "20" is the Airflow Descriptor.
2. Areas shown for permanent filters are based on filters rated at 600 feet per minute face velocity.

BLOWER DATA: DOWNFLOW

97G2DF045BE12 PERFORMANCE (Less Filter)												
External Static Pressure in. w.c.	Rise Range °F		Air Volume / Watts at Various Blower Speeds									
	1st Stage	2nd Stage	High		Medium-High		Medium		Medium-Low		Low	
			cfm	Watts	cfm	Watts	cfm	Watts	cfm	Watts	cfm	Watts
0.10	15-45	30-60	1434	383	1275	277	1169	217	921	126	860	106
0.20			1401	395	1237	288	1140	227	879	134	817	115
0.30			1363	398	1211	297	1101	238	833	140	773	122
0.40			1300	383	1179	308	1070	243	798	151	733	131
0.50			1228	367	1151	316	1036	256	755	156	692	136
0.60			1146	343	1105	319	1005	263	710	163	645	144
0.70			1058	318	1038	309	971	272	672	170	598	154
0.80			930	286	942	284	909	272	614	179	557	158
0.90			807	251	811	251	799	251	569	184	518	163
1.00			645	222	669	224	630	216	532	189	473	169

97G2DF070BE16 PERFORMANCE (Less Filter)												
External Static Pressure in. w.c.	Rise Range °F		Air Volume / Watts at Various Blower Speeds									
	1st Stage	2nd Stage	High		Medium-High		Medium		Medium-Low		Low	
			cfm	Watts	cfm	Watts	cfm	Watts	cfm	Watts	cfm	Watts
0.10	20-50	30-60	1709	485	1510	339	1336	240	1226	196	991	114
0.20			1675	501	1474	350	1294	249	1180	204	927	122
0.30			1638	513	1437	362	1244	261	1127	215	863	130
0.40			1601	529	1386	376	1187	270	1082	226	797	139
0.50			1563	541	1353	388	1139	282	1033	232	727	147
0.60			1511	539	1310	401	1100	293	979	245	661	155
0.70			1445	525	1272	410	1048	304	940	255	604	159
0.80			1339	499	1234	421	1013	313	862	264	531	174
0.90			1243	470	1161	424	952	326	811	272	481	182
1.00			1119	439	1092	414	907	330	763	281	435	192

97G2DF090CE16 PERFORMANCE (Less Filter)												
External Static Pressure in. w.c.	Rise Range °F		Air Volume / Watts at Various Blower Speeds									
	1st Stage	2nd Stage	High		Medium-High		Medium		Medium-Low		Low	
			cfm	Watts	cfm	Watts	cfm	Watts	cfm	Watts	cfm	Watts
0.10	25-55	35-65	1750	446	1520	308	1389	240	1306	206	1179	158
0.20			1708	463	1487	323	1359	254	1265	217	1130	171
0.30			1685	477	1456	339	1326	264	1228	230	1090	182
0.40			1630	478	1421	350	1274	281	1192	239	1046	192
0.50			1558	462	1394	363	1246	291	1157	251	989	202
0.60			1458	432	1354	373	1209	300	1114	264	952	210
0.70			1371	408	1312	381	1177	314	1079	271	913	220
0.80			1231	368	1234	366	1138	324	1038	282	861	230
0.90			1118	343	1093	336	1093	327	997	291	843	237
1.00			1008	315	976	309	987	306	952	292	794	242

BLOWER DATA: DOWNFLOW

97G2DF110CE20 PERFORMANCE (Less Filter)												
External Static Pressure in. w.c.	Rise Range °F		Air Volume / Watts at Various Blower Speeds									
	1st Stage	2nd Stage	High		Medium-High		Medium		Medium-Low		Low	
			cfm	Watts	cfm	Watts	cfm	Watts	cfm	Watts	cfm	Watts
0.10	30-60	40-70	2174	694	1920	474	1754	365	1631	312	1441	225
0.20			2136	706	1877	488	1709	379	1583	322	1387	237
0.30			2095	718	1832	500	1658	391	1530	332	1323	247
0.40			2058	734	1792	512	1617	403	1487	345	1276	256
0.50			2006	742	1745	525	1570	413	1433	354	1223	265
0.60			1940	727	1704	538	1523	426	1379	368	1168	276
0.70			1863	702	1665	550	1479	436	1340	377	1110	290
0.80			1765	669	1622	563	1439	445	1288	388	1061	293
0.90			1673	642	1582	572	1398	454	1254	397	1013	304
1.00			1559	599	1522	568	1354	466	1214	407	949	311

AC**CESSORY LIST**

Description	Catalog Number
Return Air Base	
Return Air Base 17.5 Inch	68W62
Return Air Base 21.0 Inch	68W63
Return Air Base 24.5 Inch	68W64
Downflow Combustible Flooring Base	
17.5" B Width	11M60
21.0" C Width	11M61
External Filter Rack kits	
1 pack (16 x 25)	1.841018
10 pack (16 x 25)	1.841039
Downflow Specific Air Filters	
17.5"	51W07
21.0"	51W08
24.5"	51W09
Horizontal Suspension Kit	
80% & 90% Kit	51W10
Concentric Vent Kit (90% Furnaces only) US Only	
1-1/2" Vent Version	71M80
2" Vent Version	69M29
3" Vent Version	60L46
Concentric Vent Kit (90% Furnaces only) Canada Only	
1-1/2" and 2" Vent Version	44W92
3" Vent Version	44W93
Flush Mount Termination (90% Furnaces only)	
2" & 3.0" Vent - US Version	51W11
2" & 3.0" Vent - ULC S636 Compliant (Canada)	51W12
High Altitude Orifice Kits (7500'+)	
2-Stage 97% UH/DF - Natural Gas	51W01
2-Stage 97% UH [030] - Natural Gas	14C92
2-Stage 97% UH/DF - Propane Gas	78W97
2-Stage 97% UH [030] - Propane Gas	14C93

For vent length and clearances to combustibles, please reference installation instructions.

AC**CESSORY LIST**

Description	Catalog Number
High Altitude Pressure Swiches	
2-Stage 97% UH (4,501 - 7,500 ft) [030]	14A47
2-Stage 97% UH/DF (4,501 - 7,500 ft) [045]	14A51
2-Stage 97% UH/DF (4,501 - 7,500 ft) [070]	14A48
2-Stage 97% UH/DF (4,501 - 7,500 ft) [090]	14A54
2-Stage 97% UH/DF (4,501 - 7,500 ft) [110]	25B93
2-Stage 97% UH (7,501 - 10,000 ft) [030]	14A50
2-Stage 97% UH/DF (7,501 - 10,000 ft) [045]	14A53
2-Stage 97% UH/DF (7,501 - 10,000 ft) [070]	14A54
2-Stage 97% UH/DF (7,501 - 10,000 ft) [090]	14A53
2-Stage 97% UH/DF (7,501 - 10,000 ft) [110]	14A45
Natural to LP Kits	
2-Stage 90	11K48
2-Stage 90 High Altitude (>7500')	11K47
Low Input (30K Btuh)	17H64
LP to Natural Kits	
2-Stage - 90 (45K-110K Btuh)	77W10
Night Service Kits	
Two Stage	10U95
Safety Night Service Kit	68W83
Twinning Kit	
16W72	Constant Torque Gas Furnace Twinning Kit

For vent length and clearances to combustibles, please reference installation instructions.

Parts Arrangement

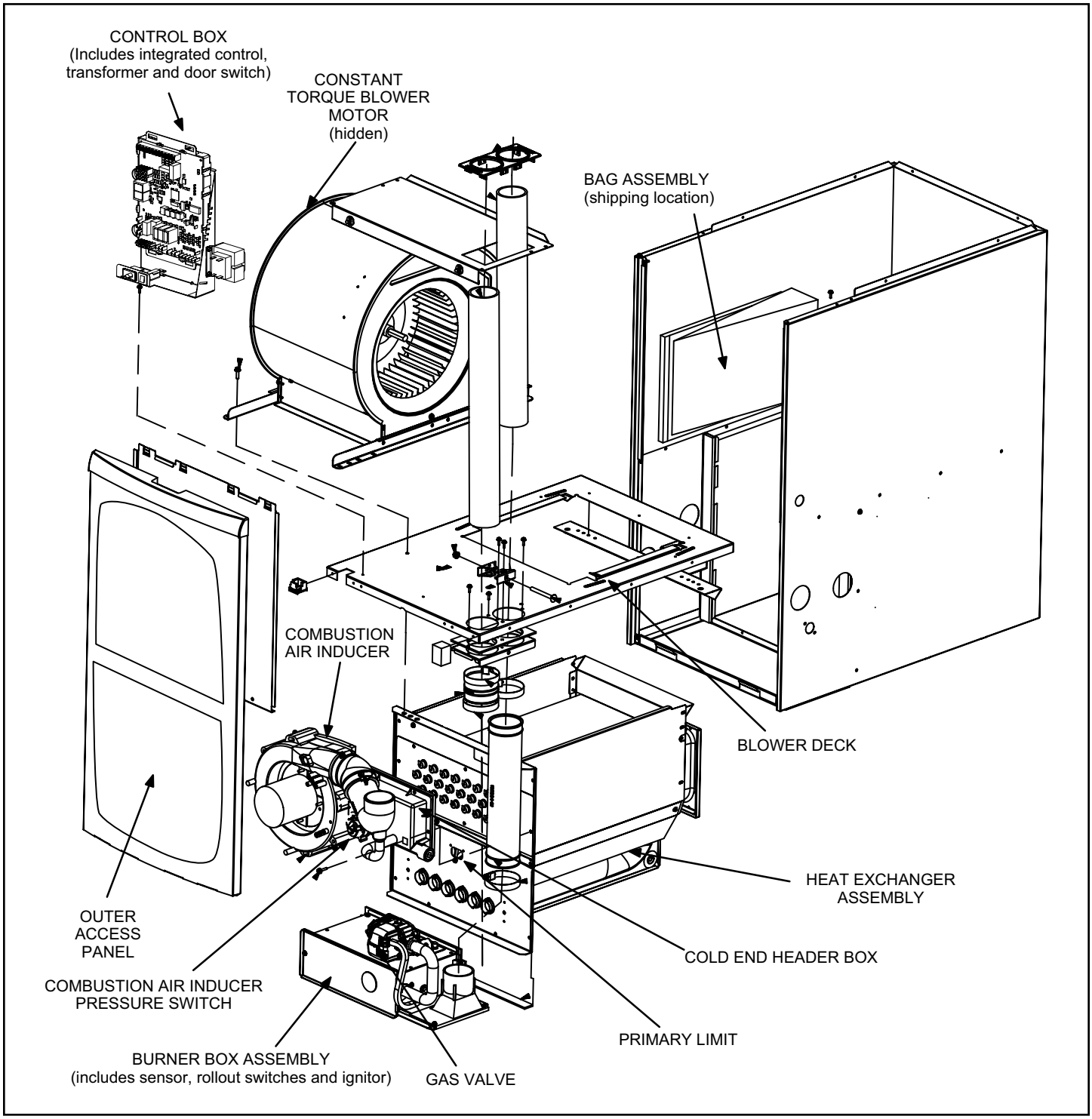


Figure 1.

Electrical

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.

A97DF2E / 97G2DFE 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.

Control Box Components (Figure 2)

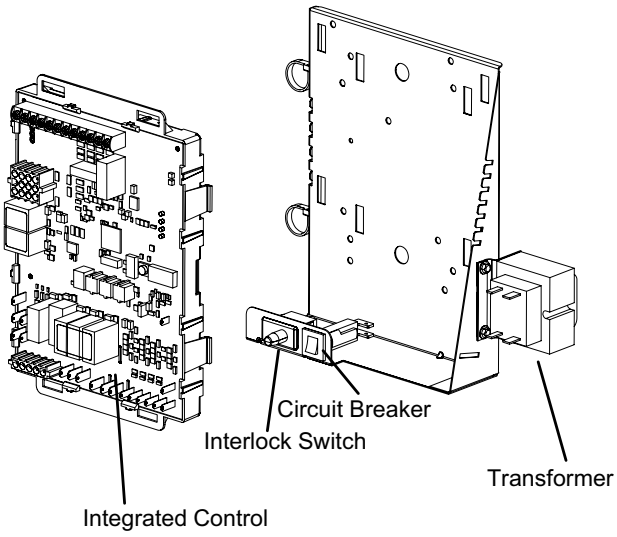


Figure 2. Control Box

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.

Door Interlock Switch (S51)

A door interlock switch is wired in series with line voltage. When the inner blower access panel is removed the unit will shut down.

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 at 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.

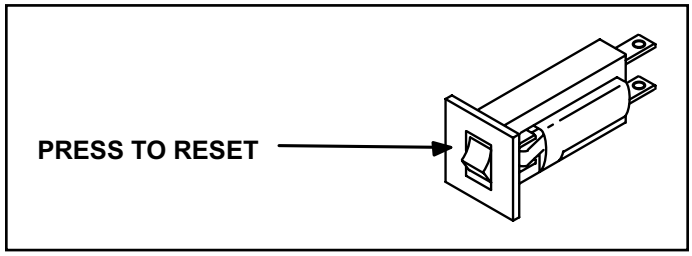


Figure 3. Circuit Breaker (CB8)

Integrated Ignition Control (A92)

⚠ WARNING

Shock hazard.

Disconnect power before servicing. 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.

Units are equipped with a two-stage, integrated control. The system consists of a ignition / blower control (Figure 4 and Figure 5) with control pin designations in Table 1 and Table 2 and ignitor (Figure 12). 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 and error codes. The LED flashes in single digits. For example, using Table 4 under LIMIT CODE, an “E” followed by “2” followed by “5” followed by “0”, the limit switch circuit is open. The control also has two unpowered (dry) 1/4” contacts for a humidifier and a 120 volt accessory terminal. Both rated at (1) one amp each.

Pin #	Function
1	Ignitor
2	Combustion Air Inducer High Speed
3	Combustion Air Inducer Low Speed
4	Combustion Air Inducer Neutral
5	Ignitor Neutral

Table 1. 5-Pin Terminal Designations

Pin #	Function
1	Gas Valve Second Stage
2	Second Stage Pressure Switch
3	Rollout Switch In
4	Ground
5	24V Hot
6	Primary Limit In
7	Gas Valve First Stage
8	Gas Valve Common
9	24V Neutral
10	Ground
11	Primary Limit Out
12	First Stage Pressure Switch

Table 2. 12-Pin Terminal Designations

⚠ WARNING

Electric Shock Hazard.

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

⚠ 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.

Electronic Ignition

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

After the 15-second pre-purge period, the 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.

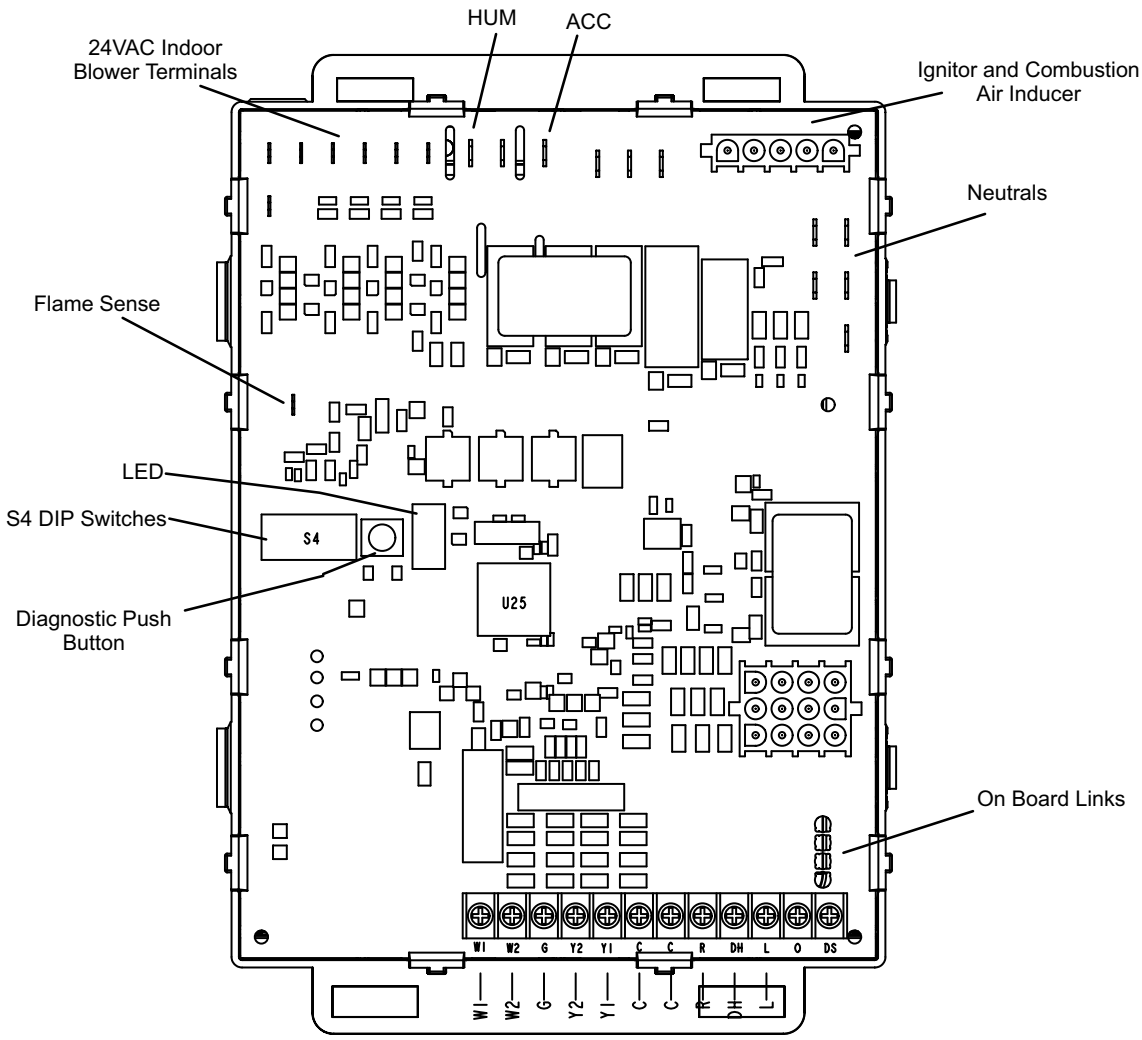
NOTE: *During abnormal conditions such as low supply voltage or low outdoor temperatures and the low fire pressure switch does not close, the combustion air inducer will switch to high speed. After the low & high pressure switch close, the unit will proceed with a 15 sec pre-purge, followed by a 20 sec ignitor warm up, then ignition on highfire. After 10 to 20 seconds of high fire operation the unit will switch to low fire.*

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 second-stage 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 on 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.



3/16" QUICK CONNECT TERMINALS
FLAME SENSE SIGNAL
HI COOL 24VAC
LO COOL 24VAC
LO HEAT 24VAC
PARK
PARK
COMMON 24VAC

1/4" QUICK CONNECT TERMINALS
NEUTRALS = 120 VAC NEUTRAL
HUM = UNPOWERED NORMALLY OPEN (DRY) CONTACTS
LI = 120VAC INPUT TO CONTROL
ACC = 120VAC OUTPUT TO OPTIONAL ACCESSORY

THERMOSTAT CONNECTIONS (TB1)
DS = DEHUMIDIFICATION SIGNAL
W2 = HEAT DEMAND FROM 2ND STAGE TSTAT
W1 = HEAT DEMAND FROM 1ST STAGE TSTAT
R = CLASS 2 VOLTAGE TO TSTAT
G = MANUAL FAN FROM TSTAT
C = TSTAT SIGNAL GROUND CONNECTED TO TRANSFORMER GRD (TR) & CHASSIS GROUND (GRD)
Y1 = TSTAT 1ST STAGE COOL SIGNAL
Y2 = TSTAT 2ND STAGE COOL SIGNAL
O = TSTAT SIGNAL TO HEAT PUMP REVERSING VALVE
DH = NOT USED
L = NOT USED

Figure 4. Integrated Control

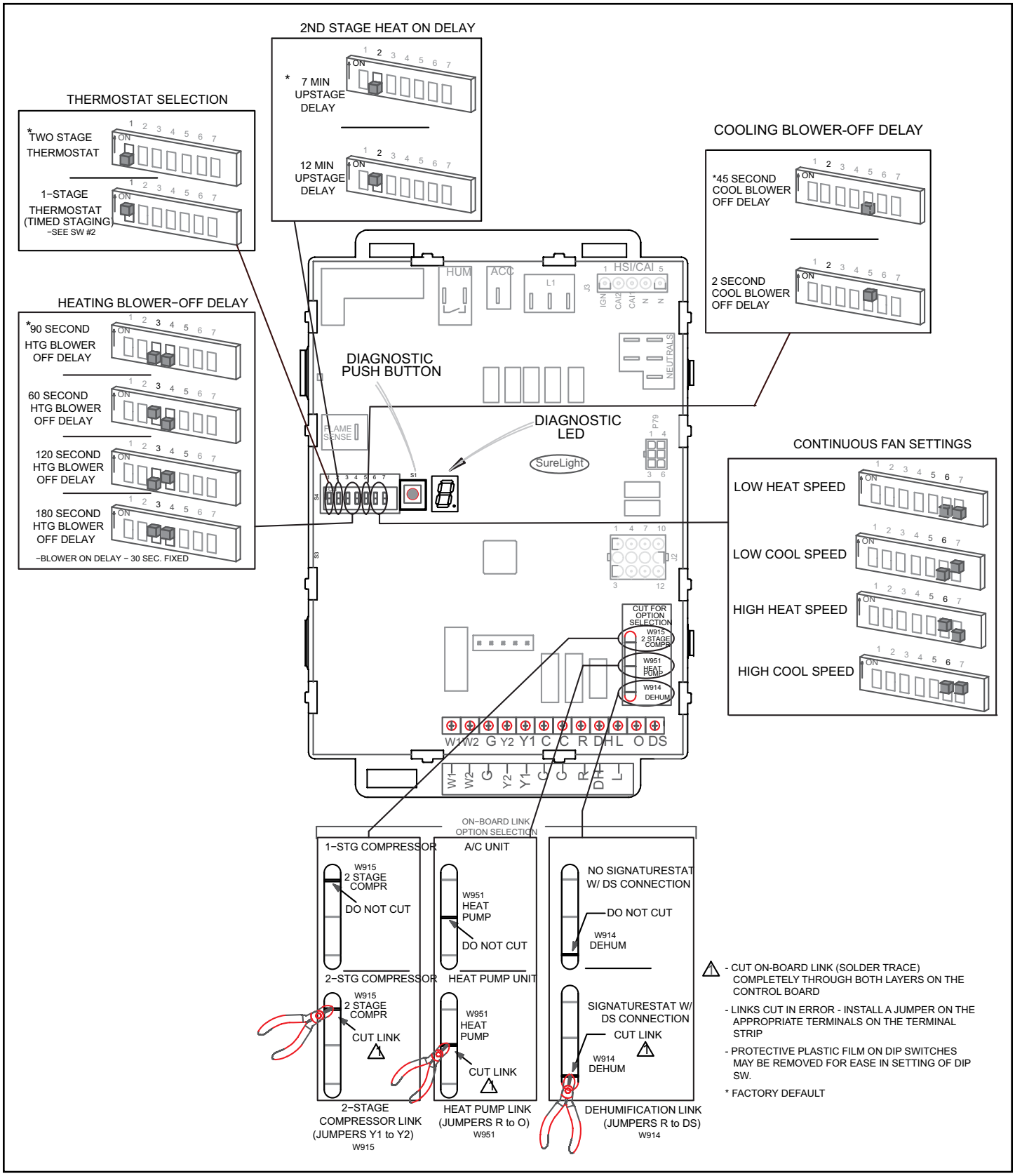


Figure 5. Integrated Control Configuration Guide

Display	Action (when button released)
No change (idle)*	Remain in idle mode
Solid “E”	Enter diagnostic recal mode
Solid “F”	Enter flame signal mode
* No change implies the display will continue to show whatever is currently being displayed for normal operation (blinking decimal, active error code, heat state, etc.)	

Table 3. Integrated Control Diagnostic Modes

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).	
C	Cooling stage (1 second ON, 0.5 second OFF) 1 or 2 displayed / Pause / Repeat codes.	
d	Dehumidification mode (1 second ON, 1 second OFF) / Pause / Repeat Codes).	
H	Gas Heat Stage (1 second ON, 0.5 second OFF) 1 or 2 displayed / Pause / Repeat codes. Blinking during ignition.	
h	Heat pump stage.	
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	Line voltage polarity reversed.	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.
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.
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.
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.
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.

Table 4. Integrated Diagnostic Codes / Status of Equipment

Code	Diagnostic Codes/Status of Equipment	Action Required to Clear and Recover
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.
E229	Ignition on High Fire - Information Only.	Code is displayed if 1) low pressure switch fails to close, then furnace will switch to high speed inducer to close both low and high pressure switches, then furnace lights on high fire, or 2) if continuous fan is active, furnace lights on high fire for 60 seconds to improve heat exchanger warm up time.
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.
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.
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.

Table 4. Integrated Diagnostic Codes / Status of Equipment

Diagnostic LED (Figure 4)

The seven-segment diagnostic LED displays operating status, error codes and other information. Table 4 lists diagnostic LED codes.

Diagnostic Push Button (Figure 4)

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

Error Code Recall Mode

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

Flame Signal Mode

Select ”F” from the menu to access the flame signal mode. The integrated control will display the flame current on seven-segment LED in in micro amps (uA).

Flame signal mode is exited after any of the following:

- Power is reset
- Pressing and holding push button until 3 horizontal lines “≡” are displayed
- 10 minutes after entering the flame sense mode. Integrated Control DIP Switches

Integrated Control DIP Switches

A97DF2E / 97G2DFE units are equipped with a two-stage 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. 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.

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 twostage thermostat. If a single-stage thermostat is to be used, the DIP switch must be repositioned.

a. Select “OFF” for two-stage heating operation controlled by a two-stage heating thermostat (factory setting);

b. 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 second-stage heat is initiated. If the switch is toggled to the ON position, it will provide a 12-minute delay before second-stage heat is initiated. This switch is only activated when the thermostat selector jumper is positioned for single-stage thermostat use.

Indoor Blower Operation DIP Switch Settings

Switches 3 and 4 -- Heating Mode 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 5 provides the blower off timings that will result from different switch settings.

Blower Off Delay (seconds)	Switch 3	Switch 4
60	On	Off
90 (Factory)	Off	Off
120	Off	On
180	On	On

Table 5. Blower Off Heating Mode Delay Switch Settings

Switch 5 -- Cooling Mode Blower-Off Delay -- The unit is shipped from the factory with the dip switch positioned OFF for a 45 second delay. Table 6 provides the cooling mode off delay settings.

Blower Off Delay (seconds)	Switch 5
45 (Factory)	Off
2	On

Table 6. Blower Off Cooling Mode Delay Switch Settings

Switches 6 and 7 -- Continuous Fan Mode -- Continuous fan speed can be controlled by changing DIP switch positions. Table 7 provides DIP switch settings for continuous fan mode.

Continuous Fan Mode	Switch 6	Switch 7
Low Heat Speed (Factory)	Off	Off
Low Cool Speed	Off	On
High Heat Speed	On	Off
High Cool Speed	On	On

Table 7. Continuous Fan Mode Settings

Onboard Links

W914 Dehum

Onboard 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 a thermostat which features humidity control. If the link is not cut, terminal “DS” will remain energized not allowing the blower to reduce to low cool speed upon a call for dehumidification.

W951 Heat Pump (R to O)

Onboard 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.

W915 2 Stage Compr (Y1 to Y2)

Onboard 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.

IMPORTANT

If any onboard link is cut by mistake, install a jumper across the corresponding terminals on the low voltage terminal strip. Do not replace control.

Blower Compartment

IMPORTANT

Each blower is statically and dynamically balanced as an assembly before installation in the unit.

A97DF2E / 97G2DFE units are equipped with a constant torque ECM motor. It has a DC motor coupled to an electronic control module both contained in the same motor housing. The motor is programmed to provide constant torque at each of the five selectable speed taps. Each tap requires 24 volts to energize.

Input Voltage Requirements

The circuit is designed to be operated with AC voltage. To enable a tap requires 12 to 33VAC. Expected current draw will be less than 20mA.

Troubleshooting the Motor

Troubleshooting the motor is an easy process. Follow steps below.

1. Shut off power to unit.
2. Remove input plugs P48 and P49 from motor. See Figure 10 for troubleshooting procedure.

If correct voltage is present in tests 1 and 2 and motor is not operating properly, replace motor. The motor is not field repairable.

If replacing the indoor blower motor or blower wheel is necessary, placement is critical. The blower wheel must be centered in the blower housing as shown in Figure 6. When replacing the indoor blower motor the set screw must be aligned and tightened with the motor shaft as shown in Figure 7.

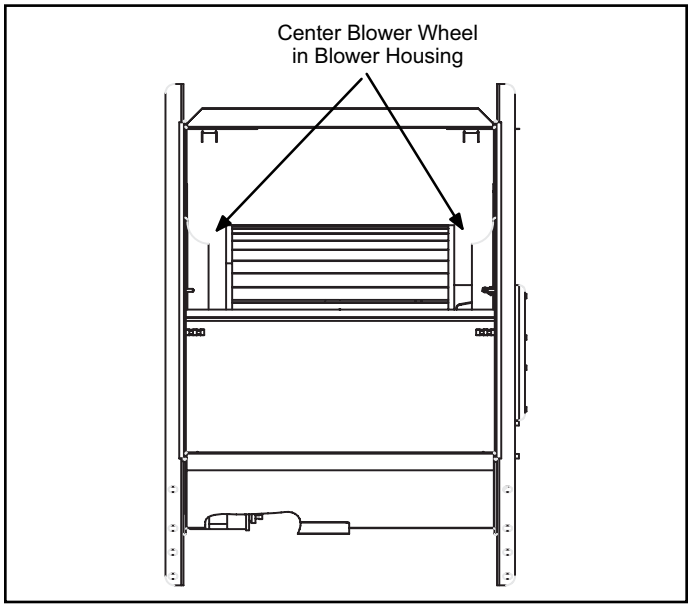


Figure 6. Blower Wheel Replacement

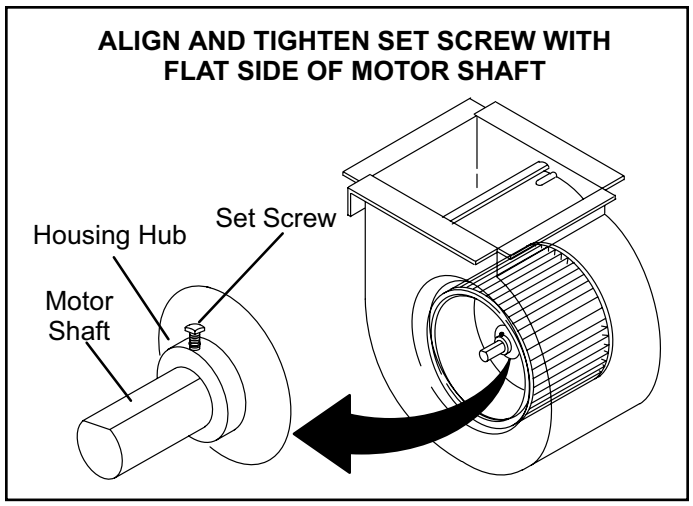


Figure 7.

Testing the Motor (Figure 8)

If any motor fails the below tests, do not install the new control module. The motor is defective and it also must be replaced. The new control can fail if placed on a defective motor.

1. Using an ohmmeter check the resistance from any one of the motor connector pins to the aluminum end plate of the motor. This resistance should be greater than 100k ohms.
2. Check the resistances between each of the three motor connector pins. These should all read approximately the same resistance within an ohm.
3. Check to see if the blower wheel spins freely.

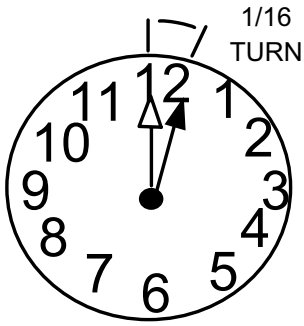
Figure 8. Motor Test

Scale	Measurement Range in Words	ohms
2 M	two megohms - two million ohms	0 - 2,000,000
200 K	two hundred kil-ohms - two hundred thousand ohms	0 - 200,000
20 K	twenty kilo-ohms - twenty thousand ohms	0 - 20,000
2 K	two kilo-ohms - two-thousand ohms	0 - 2,000
200	two hundred ohms	0 - 200

Motor Module Installation

All replacement motor control modules look similar; however, each module is designed for a specific motor size. It is very important to make sure that you are using the correct replacement motor control module. **USE OF THE WRONG MOTOR CONTROL MODULE MAY RESULT IN UNEXPECTED UNIT OPERATION.**

1. Verify electrical power to unit is disconnected.
2. Connect three-wire harness from motor to control module.
3. Mount new motor control module to motor using two hex head bolts. Torque bolts to 22 inch pounds or 1/16th clock turn as exampled to the right.



4. Reconnect the two harnesses to the motor control module.
5. The electrical connectors of the motor should be facing down to form a drip loop (Figure 9). This will directs moisture away from the motor and its electric connections on the motor.

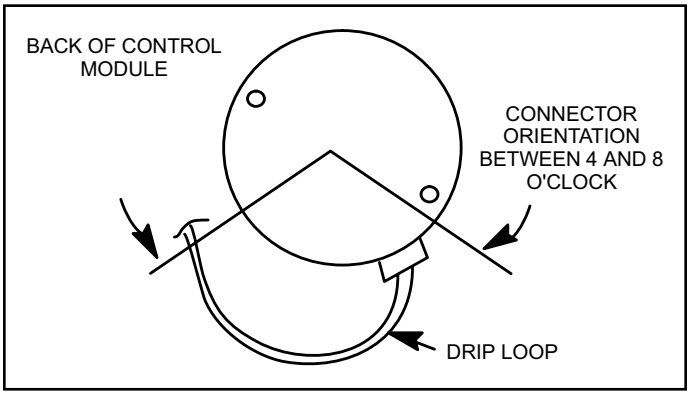
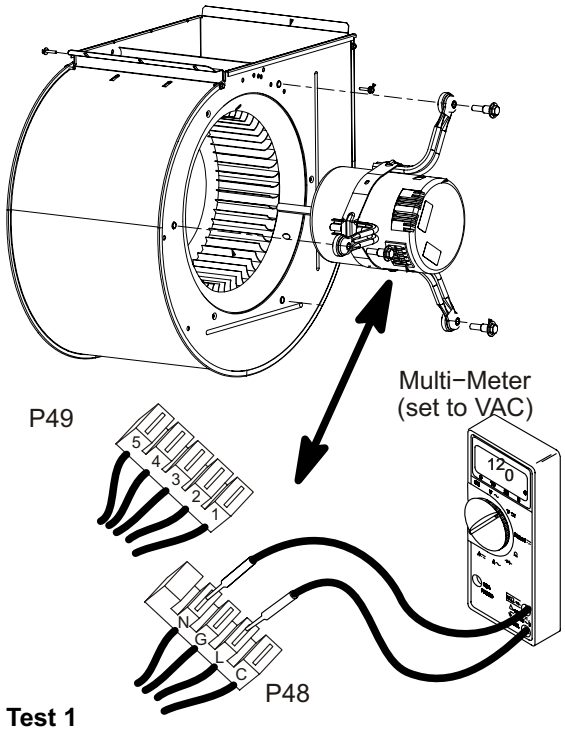
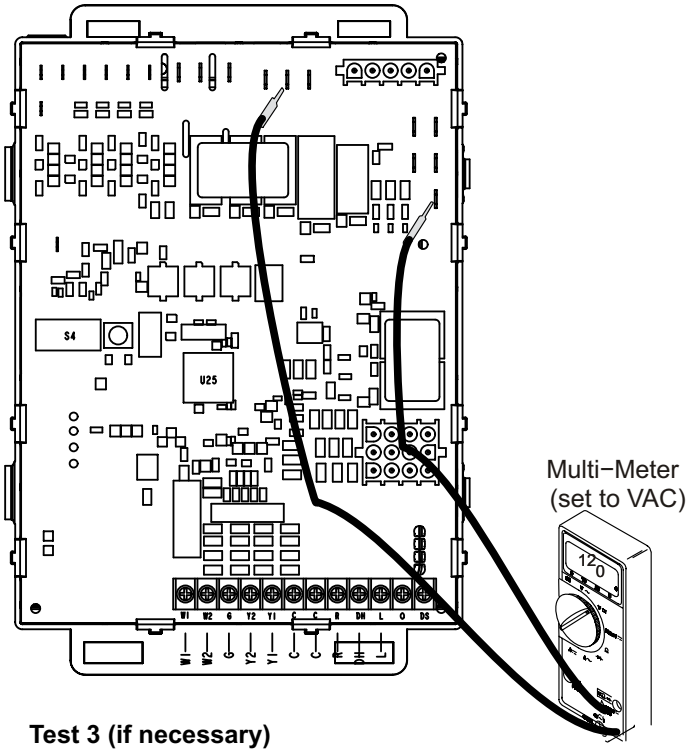


Figure 9. Drip Loop



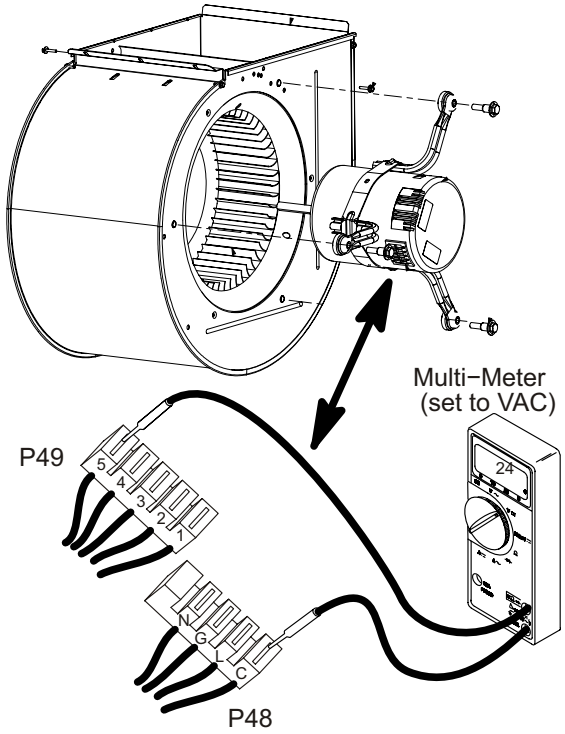
Test 1

Turn on power to unit. Check for 120 volts across terminals “L” and “N” on input plug P48. If voltage is present continue to test 2. If voltage is not present, problem may be upstream of plug P48 and proceed to test 3.



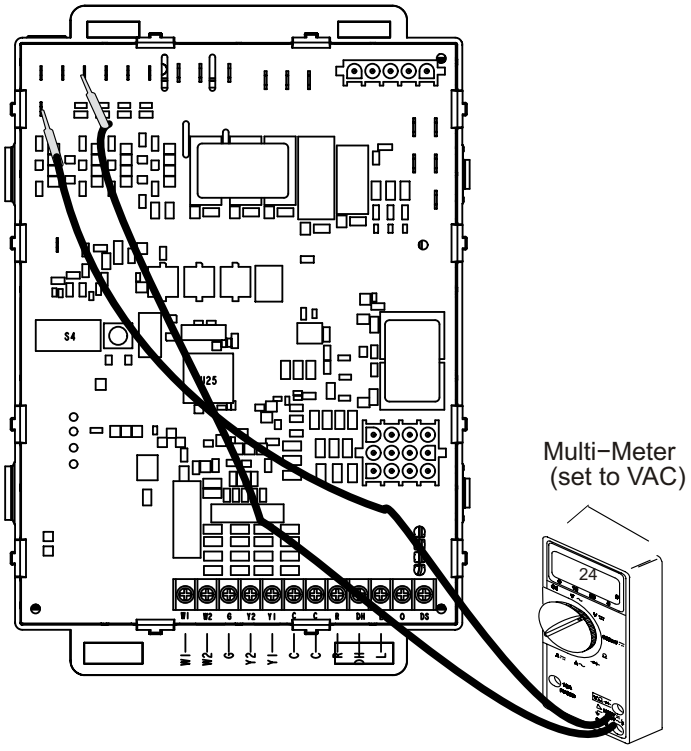
Test 3 (if necessary)

Check for 120 volts across terminals “L1” and “Neutrals” on the integrated control. If voltage is present, problem is with the harness. If voltage is not present problem may be may be with the integrated control.



Test 2

Switch thermostat to CONTINUOUS FAN MODE. Check for 24 volts across terminal “C” on input plug P48 and speed tap used for continuous fan (1, 2, 3, 4 or 5) on input plug P49. If 24 volts is not present, problem may be upstream of plug P49. Proceed to test 4.



Test 4 (if necessary)

Check for 24 volts across terminals “24 COM” and the “active speed trap” on the integrated control. If voltage is present, problem is with the harness. If voltage is not present, problem may be may be with the integrated control.

Figure 10.

Heating Components

Ignitor

The ignitor is made of durable silicon nitride. The integrated control provides 120 volts to the ignitor for a consistent ignition and long ignitor life. Ohm value should be 39 to 70. See Figure 12 for ignitor location and Figure 13 for ignitor check out.

NOTE: *The A97DF2E / 97G2DFE furnace contains electronic components that are polarity sensitive. Make sure that the furnace is wired correctly and is properly grounded.*

Flame Sensor

A flame sensor is located on the left side of the burner support. See Figure 12. 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 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 8 for flame signal.

Normal	Low	Drop Out
2.6 or greater	2.5 or less	0.6

Table 8. Flame Signal in Microamps

Gas Valve

The valve (Figure 45) 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 Allied. Kits include burner orifices and a gas valve.

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 12. 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 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.

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. See more detail in Section VI- MAINTENANCE.

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 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. When removing switch make note of orientation. When replacing switch make sure the three mounting holes are lined up with the screw holes in the vestibule for correct orientation.

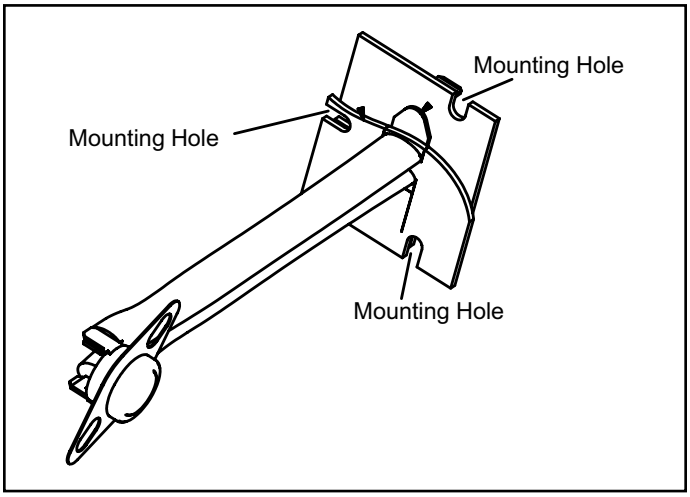


Figure 11. Primary Limit Control (S10)

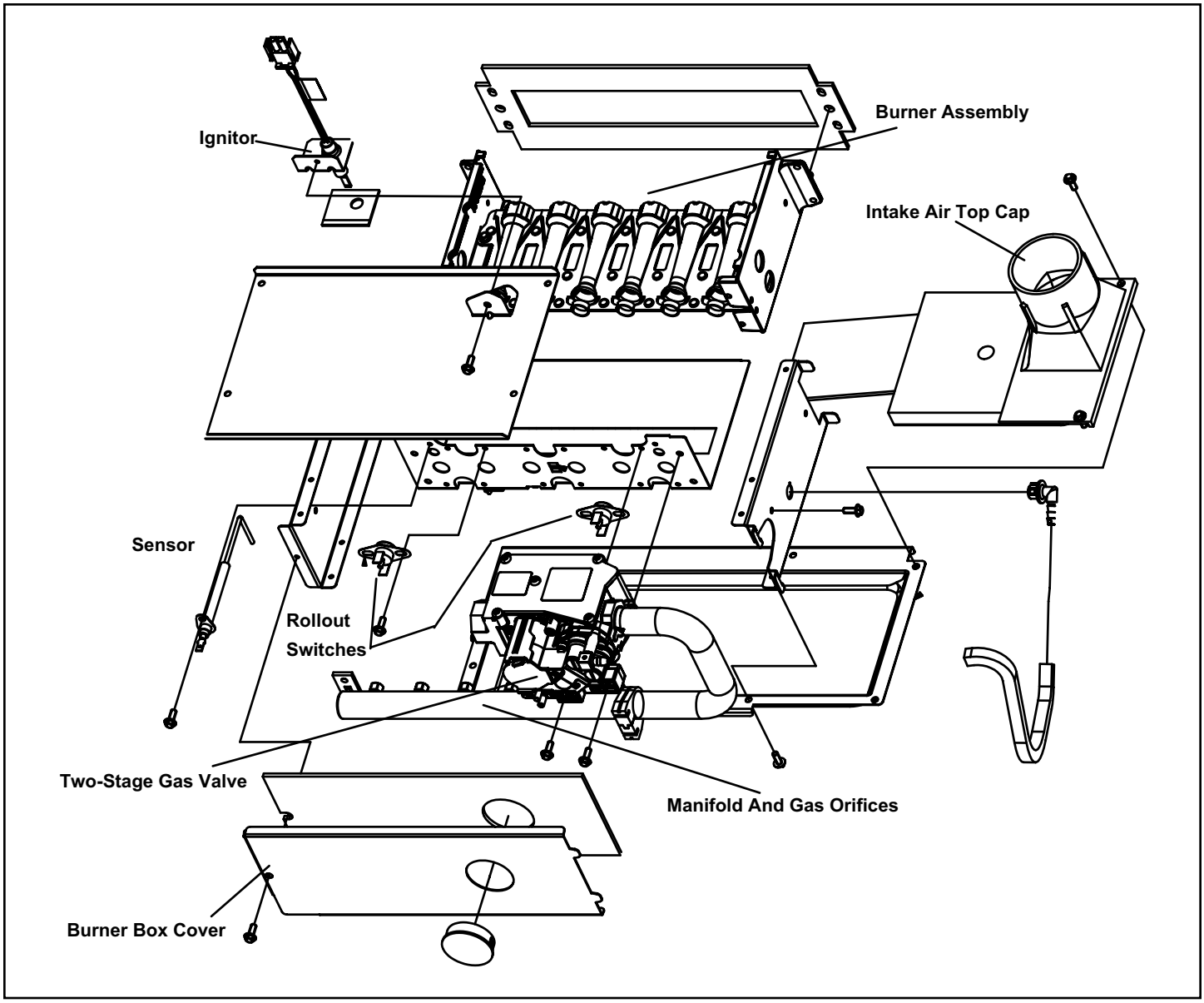
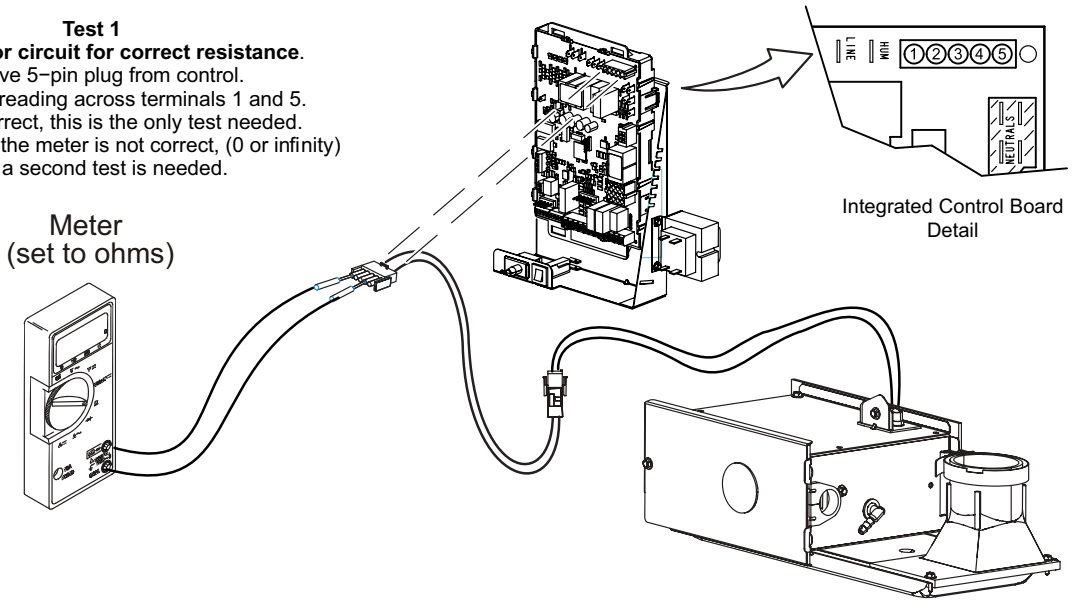
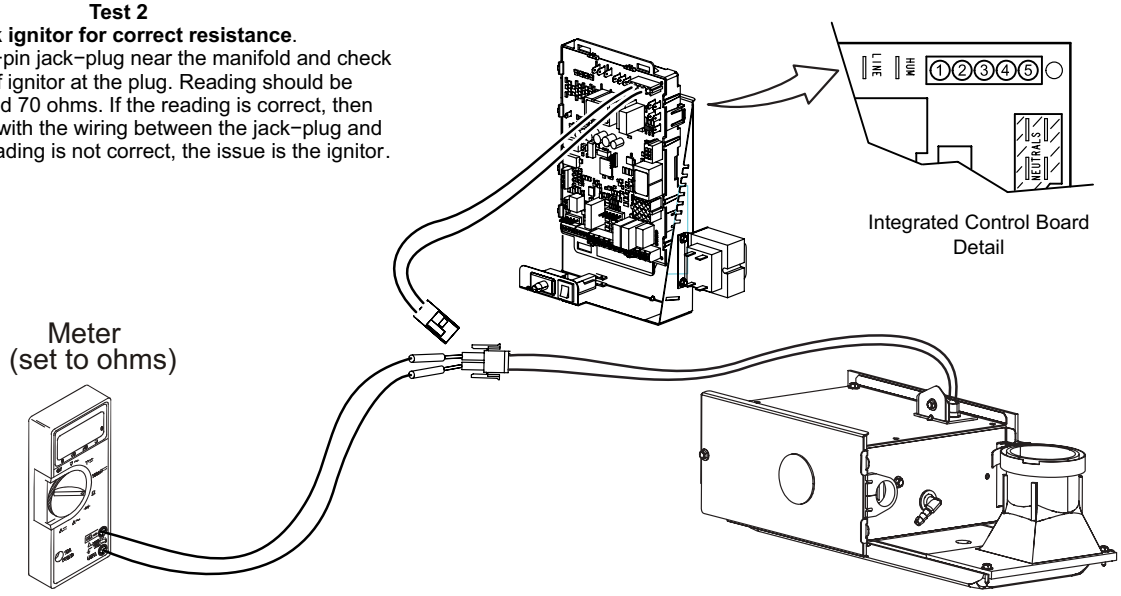


Figure 12. Heating Components

Test 1
Check ignitor circuit for correct resistance.
Remove 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.



Test 2
Check ignitor for correct resistance.
Seperate 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.



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 ± 10%. If voltage reads below these values, check for correct supply voltage to furnace.

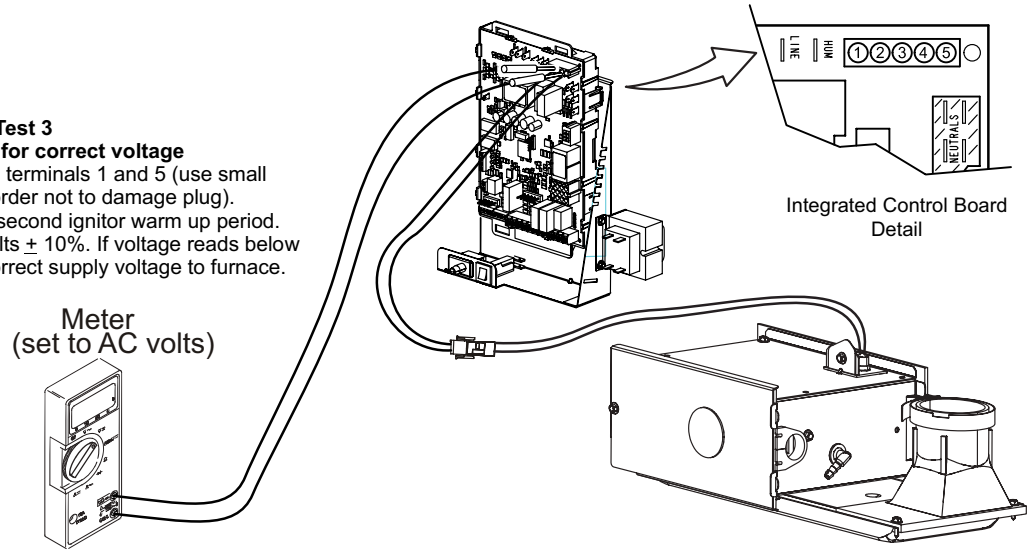


Figure 13. Ignitor Check

Combustion Air Inducer (B6) and Cold End Header Box

All A97DF2E / 97G2DFE units use a two-speed 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 control A92. The inducer also operates for 15 seconds before burner ignition (pre-purge) and for 5 seconds after the gas valve closes (post-purge). The inducer operates on low speed during first-stage heat, then switches to high speed for second stage heat.

The combustion air inducer is installed on the cold end header box (CEHB). 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 cold end header box 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 pressure switch measures the pressure differential across the CEHB orifice to prove inducer operation. The CEHB orifice will be different for each model. When the proving switch opens, the furnace control (A92) immediately closes the gas valve to prevent burner operation.

Combustion Air Inducer Pressure Switch (S18) (Figure 14)

A97DF2E / 97G2DFE series units are equipped with a dual combustion air pressure switch (first and second stage) located on the CEHB. The switch is connected to the cold end header box by means of flexible silicone hoses. It monitors negative differential pressure across the cold end header box orifice.

The switches are a single-pole single-throw pressure switches electrically connected to the integrated control. The purpose of the switches is to prevent burner operation if the combustion air inducer is not operating, the inlet or exhaust pipes or heat exchanger are restricted.

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 across the CEHB orifice becomes greater then the switch set point. Set points vary depending on unit size. See Table 9. Both pressures sensed by the switches are negative relative to atmospheric pressure. If the inlet or exhaust pipes, or the heat exchanger become obstructed, the switch senses the loss of differential pressure and opens the circuit to the furnace integrated 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.

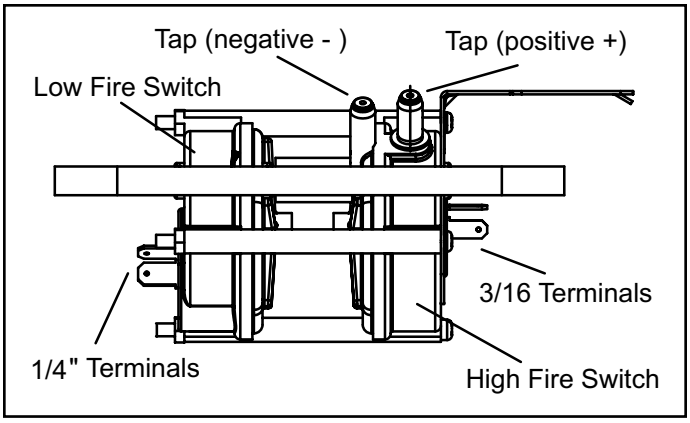


Figure 14. Combustion Air Inducer Pressure Switch

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.*

Unit	Set Point Low Heat	Set Point High Heat
045	0.41	0.74
070	0.50	0.90
090	0.45	0.90
110	0.55	1.00

Table 9. 0 - 4,500 ft.

Placement & Installation

Pipe & Fittings Specifications

All pipe, fittings, primer and solvent cement must conform with American National Standard Institute and the American Society for Testing and Materials (ANSI/ASTM) standards. The solvent shall be free flowing and contain no lumps, undissolved particles or any foreign matter that adversely affects the joint strength or chemical resistance of the cement. The cement shall show no gelation, stratification, or separation that cannot be removed by stirring. Refer to Table 10 for approved piping and fitting materials.

⚠ 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

A97DF2E / 97G2DFE 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 10. 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.

NOTE: ***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.*

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	ULC-S636
PolyPro® by Duravent	
InnoFlue® by Centrotherm	ULC-S636
ECCO Polypropylene Vent™	ULC-S636

Table 10.

Model	VENT PIPE DIA. (in.)	STANDARD			CONCENTRIC		
		Outdoor Exhaust Accelerator (Dia. X Length)	Outdoor Exhaust Accelerator (Dia. X Length)	Flush Mount Kit	1-1/2" Concentric Kit	2" Concentric Kit	3" Concentric Kit
		1-1/2" X 12"	2" X 12"	51W11**	71M80 or +44W92++	69M29 or +44W92++	60L46 or 44W93+
045	[1] 1-1/2			YES	YES		
	2	YES		YES	YES		
	2-1/2	YES		YES	YES		
	3	YES		YES	YES		
070	[1] 1-1/2			YES	YES		
	2	YES		YES	YES		
	2-1/2	YES		YES	YES		
	3	YES		YES	YES		
090	2		YES	YES		YES	YES
	2-1/2		YES	YES		YES	YES
	3		YES	YES		YES	YES
110	2		YES	YES		YES	YES
	2-1/2		YES	YES		YES	YES
	3		YES	YES		YES	YES

[1] 2 inch to 1-1/2 inch reducer required, must be field provided.

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

** Kit 51W11 is provided with a 1-1/2" accelerator, which must be for all 2 and 2-1/2" PVC installations. When using 1-1/2 in. piping, the pipe must be transitioned to 2 in. pipe when used with the Flush Mount Kit.

+ Termination kits 44W92 and 44W93, 30G28 and 81J20 are approved for use in Canadian installations to meet CSAB149 and ULC S636.

++ The 44W92 Concentric kit is provided with a 1-1/2" accelerator, which must be installed on the exhaust outlet when this kit is used with this furnace. When using 1-1/2 in. piping, the pipe must be transitioned to 2 in. pipe when used with the Concentric Kit.

Table 11. Outdoor Termination Kits Usage

Joint Cementing Procedure

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

NOTE: *A sheet metal screw may be used to secure the intake pipe to the connector, if desired. Use a drill or self tapping screw to make a pilot hole.*

⚠ 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.

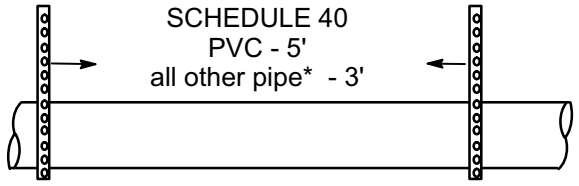
   NOTE: *Time is critical at this stage. Do not allow primer to dry before applying cement.*
6. Promptly apply solvent cement to end of pipe and inside socket surface of fitting. Cement should be applied lightly but uniformly to inside of socket. Take care to keep excess cement out of socket. Apply second 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 should not be used when inserting pipe.*

8. After assembly, wipe excess cement from pipe at end of fitting socket. A properly made joint will show a bead around its entire perimeter. Any gaps may indicate an improper assembly due to insufficient solvent.
9. Handle joints carefully until completely set.

Venting Practices



** See table 10 for allowable pipe.*

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

Wall Thickness Guidelines

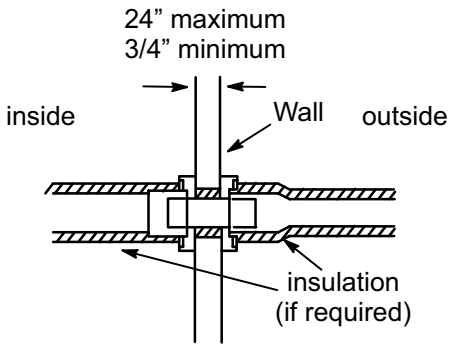


Figure 15. Piping Suspension Guidelines

- 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.
- 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.

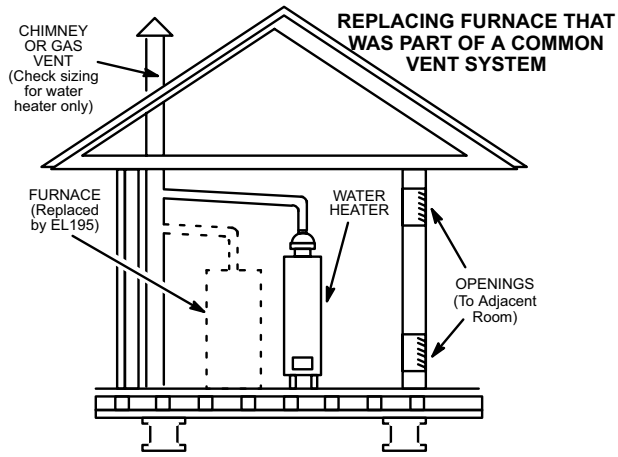
⚠ WARNING

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 asrange 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, widows, 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 of the National Fuel Gas Code ANSI Z223.1).



If the furnace replaces a furnace which was commonly vented with another gas appliance, the size of the existing vent pip for that gas appliance must be checked. Without the heat of the original furnace flue products, the existing vent pipe is probably oversized for the single water heater or other appliance. The vent should be checked for proper draw with the remaining appliance.

Figure 16.

Exhaust Piping (Figure 18)

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: *Allied 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 PoyPro 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 and unconditioned space criteria listed in Table 14.*

The A97DF2E / 97G2DFE 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 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 12 and Table 13A through Table 13C. Count all elbows in side and outside the home. Table 12 lists the minimum vent pipe lengths permitted. Table 13A through Table 13C lists the maximum pipe lengths permitted.

Regardless of the diameter of pipe used, the standard roof and wall terminations described in section Exhaust Piping Terminations should be used. Exhaust vent termination pipe is sized to optimize the velocity of the exhaust gas as it exits the termination. Refer to Table 15.

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

NOTE: *It is acceptable to use any pipe size which fits within the guidelines allowed in Table 13A through Table 13C.*

NOTE: *All horizontal runs of exhaust pipe must slope back toward unit. A minimum of 1/4" (6mm) drop for each 12" (305mm) of horizontal run is mandatory for drainage.*

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

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

NOTE: *If right side venting option is used, you must include the elbow at the furnace in the elbow count. If transitioning to 3" dia pipe, this elbow equates to 20' of equivalent vent length for all models.*

Capacity	Min. Vent Length*
045, 070, 090, 110	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.	

Table 12. Minimum Vent Pipe Lengths

IMPORTANT

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

Use the following steps to correctly size vent pipe diameter.

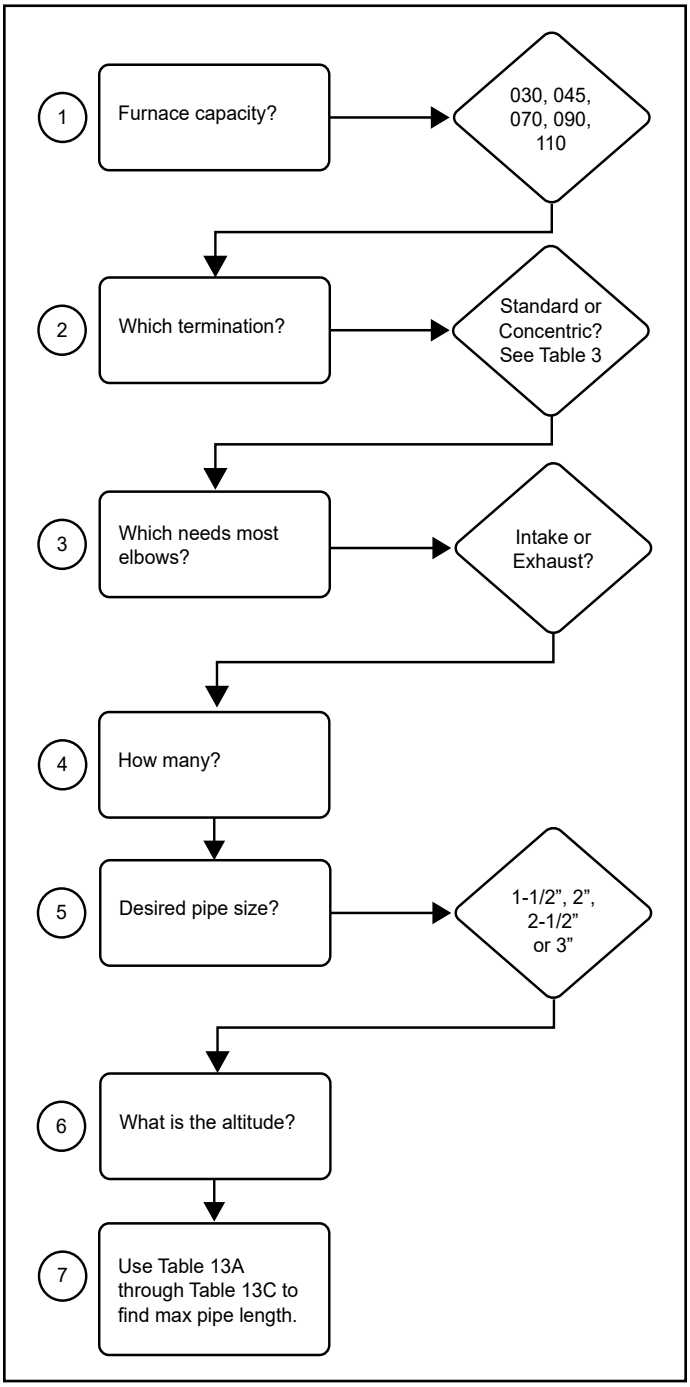


Figure 17. Vent Pipe Diameter Sizing

Maximum Allowable Intake or Exhaust Vent Length (feet)

Standard Termination at Elevation 0 - 4,500 ft																
Number of 90° Elbows Used	1-1/2" Pipe				2" Pipe				2-1/2" Pipe				3" Pipe			
	Model				Model				Model				Model			
	45	70	90	110	45	70	90	110	45	70	90	110	45	70	90	110
1	20	15	n/a	n/a	66	51	29	9	100	100	78	43	123	122	103	103
2	15	10			61	46	24	n/a	95	95	73	38	118	117	98	98
3	10	n/a			56	41	19		90	90	68	33	113	112	93	93
4	n/a				51	36	14		85	85	63	28	108	107	88	88
5					46	31	9		80	80	58	23	103	102	83	83
6					41	26	n/a		75	75	53	18	98	97	78	78
7					36	21			70	70	48	13	93	92	73	73
8					31	16			65	65	43	8	89	87	68	68
9					26	11			60	60	38	n/a	83	82	63	63
10					21	6			55	55	33		78	77	58	58
Standard Termination at Elevation 4,501 - 10,000 ft																
Number of 90° Elbows Used	1-1/2" Pipe				2" Pipe				2-1/2" Pipe				3" Pipe			
	Model				Model				Model				Model			
	45	70	90	110	45	70	90	110	45	70	90	110	45	70	90	110
1	20	15	n/a	n/a	66	51	29	n/a	100	100	78	43	123	122	103	103
2	15	10			61	46	24		95	95	73	38	118	117	98	98
3	10	n/a			56	41	19		90	90	68	33	113	112	93	93
4	n/a				51	36	14		85	85	63	28	108	107	88	88
5					46	31	9		80	80	58	23	103	102	83	83
6					41	26	n/a		75	75	53	18	98	97	78	78
7					36	21			70	70	48	13	93	92	73	73
8					31	16			65	65	43	8	89	87	68	68
9					26	11			60	60	38	n/a	83	82	63	63
10					21	n/a			55	55	33		78	77	58	58

*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.

Table 13A.

Maximum Allowable Intake or Exhaust Vent Length (feet)

Concentric Termination at Elevation 0 - 4,500 ft																
Number of 90° Elbows Used	1-1/2" Pipe				2" Pipe				2-1/2" Pipe				3" Pipe			
	Model				Model				Model				Model			
	45	70	90	110	45	70	90	110	45	70	90	110	45	70	90	110
1	15	10	n/a	n/a	58	43	27	7	90	90	74	39	106	106	99	99
2	10	n/a			53	38	22	n/a	85	85	69	34	101	101	94	94
3	n/a				48	33	17		80	80	64	29	96	96	89	89
4					43	28	12		75	75	59	24	91	91	84	84
5					38	23	7		70	70	54	19	86	86	79	79
6					33	18	n/a		65	65	49	14	81	81	74	74
7					28	13			60	60	44	9	76	76	69	69
8					23	n/a			55	55	39	n/a	71	71	64	64
9					18				50	50	34		66	66	59	59
10					13				45	45	29		61	61	54	54
Concentric Termination at Elevation 4,501 - 10,000 ft																
Number of 90° Elbows Used	1-1/2" Pipe				2" Pipe				2-1/2" Pipe				3" Pipe			
	Model				Model				Model				Model			
	45	70	90	110	45	70	90	110	45	70	90	110	45	70	90	110
1	15	10	n/a	n/a	58	43	27	n/a	90	90	74	39	106	106	99	99
2	10	n/a			53	38	22		85	85	69	34	101	101	94	94
3	n/a				48	33	17		80	80	64	29	96	96	89	89
4					43	28	12		75	75	59	24	91	91	84	84
5					38	23	7		70	70	54	19	86	86	79	79
6					33	18	n/a		65	65	49	14	81	81	74	74
7					28	13			60	60	44	9	76	76	69	69
8					23	8	n/a		55	55	39	n/a	71	71	64	64
9					18	n/a			50	50	34		66	66	59	59
10					13				45	45	29		61	61	54	54

*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.

Table 13B.

Maximum Allowable Exhaust Vent Lengths Using Ventilated Attic or Crawl Space for Intake Air in Feet

Standard Termination at Elevation 0 - 10,000 ft																
Number of 90° Elbows Used	**1-1/2" Pipe**				**2" Pipe**				**2-1/2" Pipe**				**3" Pipe**			
	Model				**Model**				**Model**				**Model**			
	45	**70**	**90**	**110**	**45**	**70**	**90**	**110**	**45**	**70**	**90**	**110**	**45**	**70**	**90**	**110**
1	15	10	n/a	n/a	56	41	24	n/a	85	85	63	28	103	102	83	83
2	10	n/a			51	36	19		80	80	58	23	98	97	78	78
3	n/a				46	31	14		75	75	53	18	93	92	73	73
4					41	26	9		70	70	48	13	88	87	68	68
5					36	21	4		65	65	43	8	83	82	63	63
6					31	16	n/a		60	60	38	3	78	77	58	58
7					26	11			55	55	33	n/a	73	72	53	53
8					21	6			50	50	28		68	67	48	48
9					16	1			45	45	23		63	62	43	43
10					11	n/a			40	40	18		58	57	38	38

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

Table 13C.

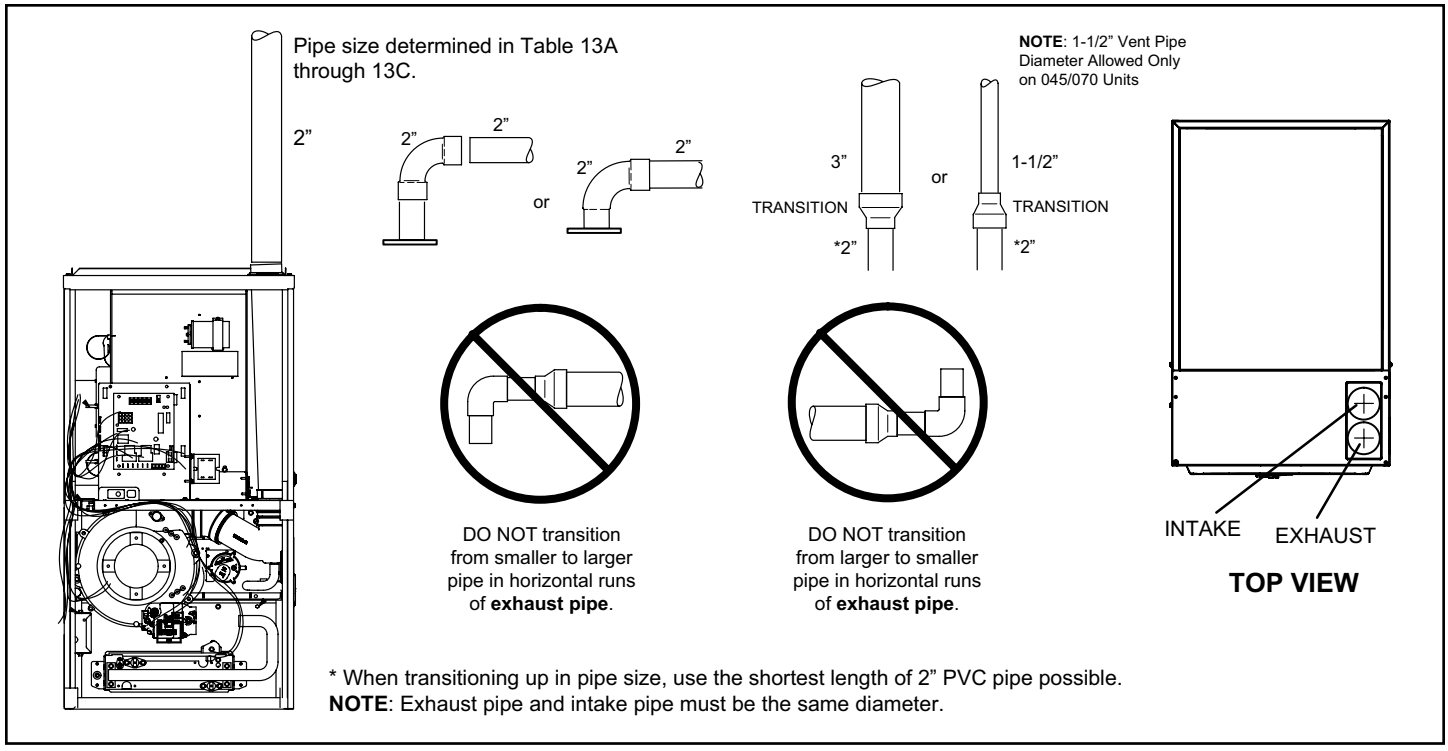


Figure 18. Typical Exhaust Pipe Connections

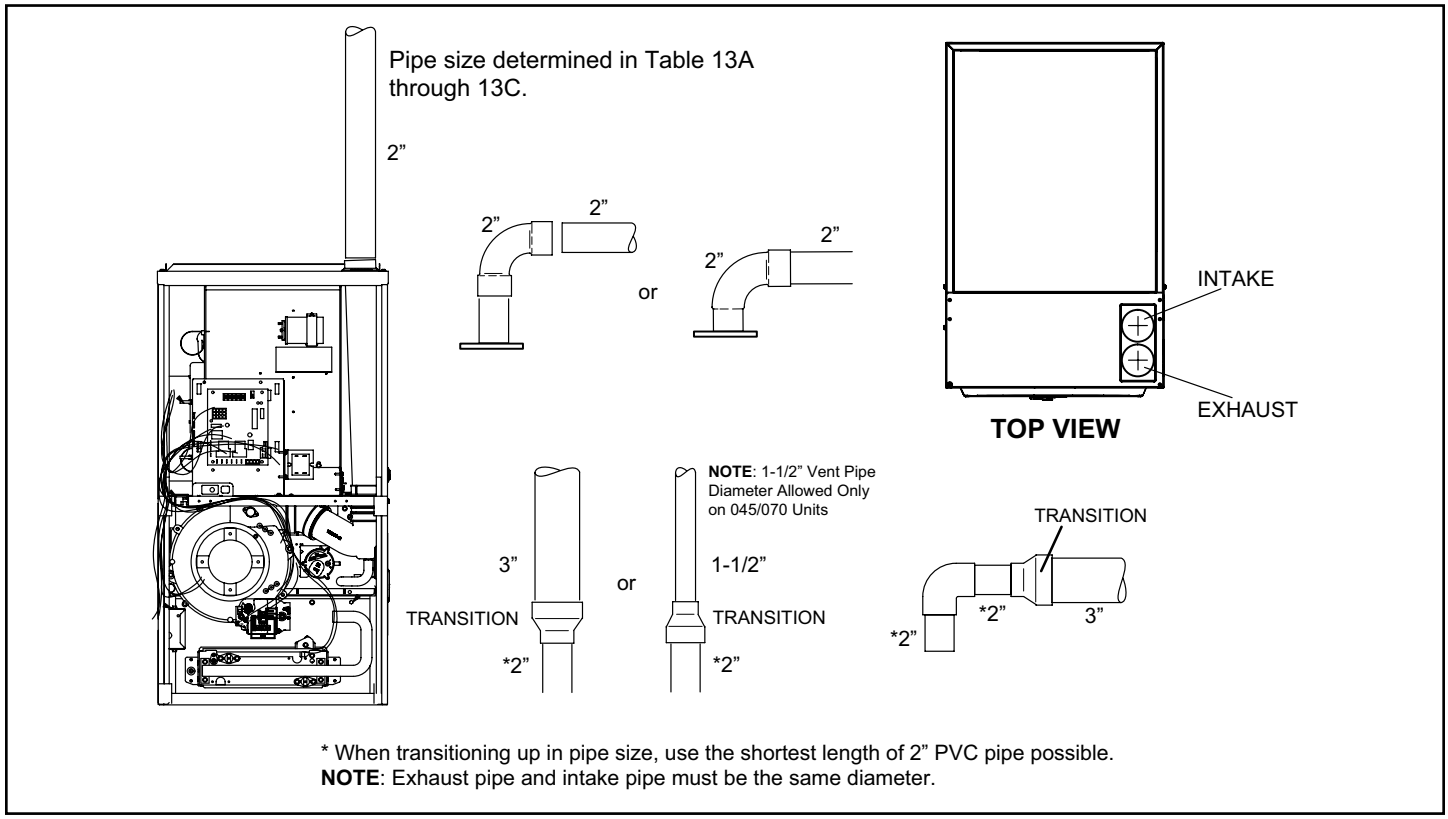


Figure 19. Typical Intake Pipe Connections (Direct Vent Applications)

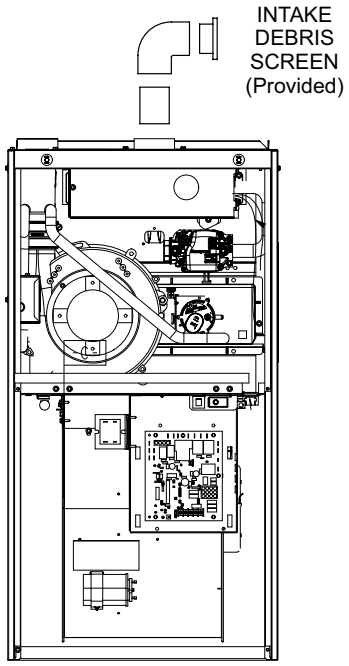
Intake Piping

The A97DF2E / 97G2DFE 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. If intake air is drawn from a ventilated crawlspace (Figure 22) or ventilated attic (Figure 21) the exhaust vent length must not exceed those listed in Table 13C. If 3” diameter pipe is used, reduce to 2” diameter pipe to accommodate the debris screen.
3. 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 13A through Table 13C for pipe sizes.

TYPICAL AIR INTAKE PIPE CONNECTIONS
UPFLOW NON−DIRECT
VENT APPLICATIONS



***NOTE** - Debris screen and elbow may be rotated, so that screen may be positioned to face forward or to either side.*

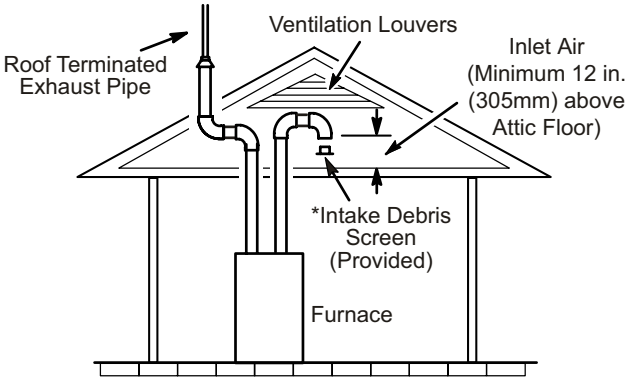
Figure 20.

Follow the next two steps when installing the unit in **Non-Direct Vent applications** where combustion air is taken from indoors 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 20. 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 sideways.
2. Use cement 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.



* See Maximum Vent Lengths table

NOTE-The inlet and outlet air openings shall each have a free area of at least one square inch per 4,000 Btu (645mm^2 per 1.17kW) per hour of the total input rating of all equipment in the enclosure.

Figure 21. Equipment in Confined Space (Inlet Air from Ventilated Attic and Outlet Air to Outside)

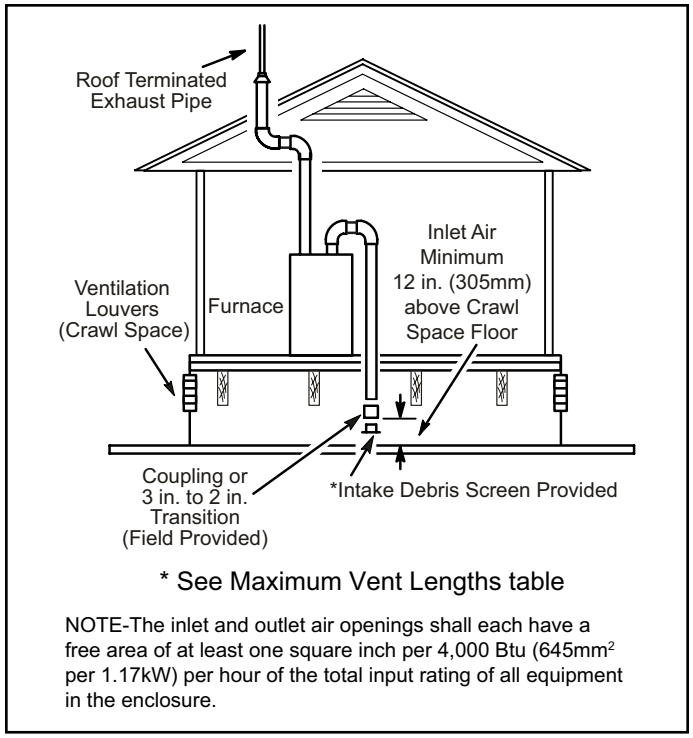


Figure 22. Equipment in Confined Space (Inlet Air from Ventilated Crawl Space and Outlet Air to Outside)

General Guidelines for Vent Terminations

In Non-Direct Vent applications, combustion air is taken from indoors and the flue gases are discharged to the outdoors. The A97DF2E / 97G2DFE 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 A97DF2E / 97G2DFE 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 24 or Figure 33. 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 a condensing unit because the condensate can damage the painted coating.

NOTE: *See Table 14 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 permissable. 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 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).

Maximum Allowable Exhaust Vent Pipe Length[3] (in ft.) without Insulation in Unconditioned Space for Winter Design Temperatures

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

[1] Refer 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. Each elbow is equivalent to 5ft. of straight pipe and should be included when measuring total 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 13A through Table 13C.

NOTE - If insulation is required in an unconditioned space, it must be located on the pipe closest to the furnace. See Figure 23.

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

Table 14.

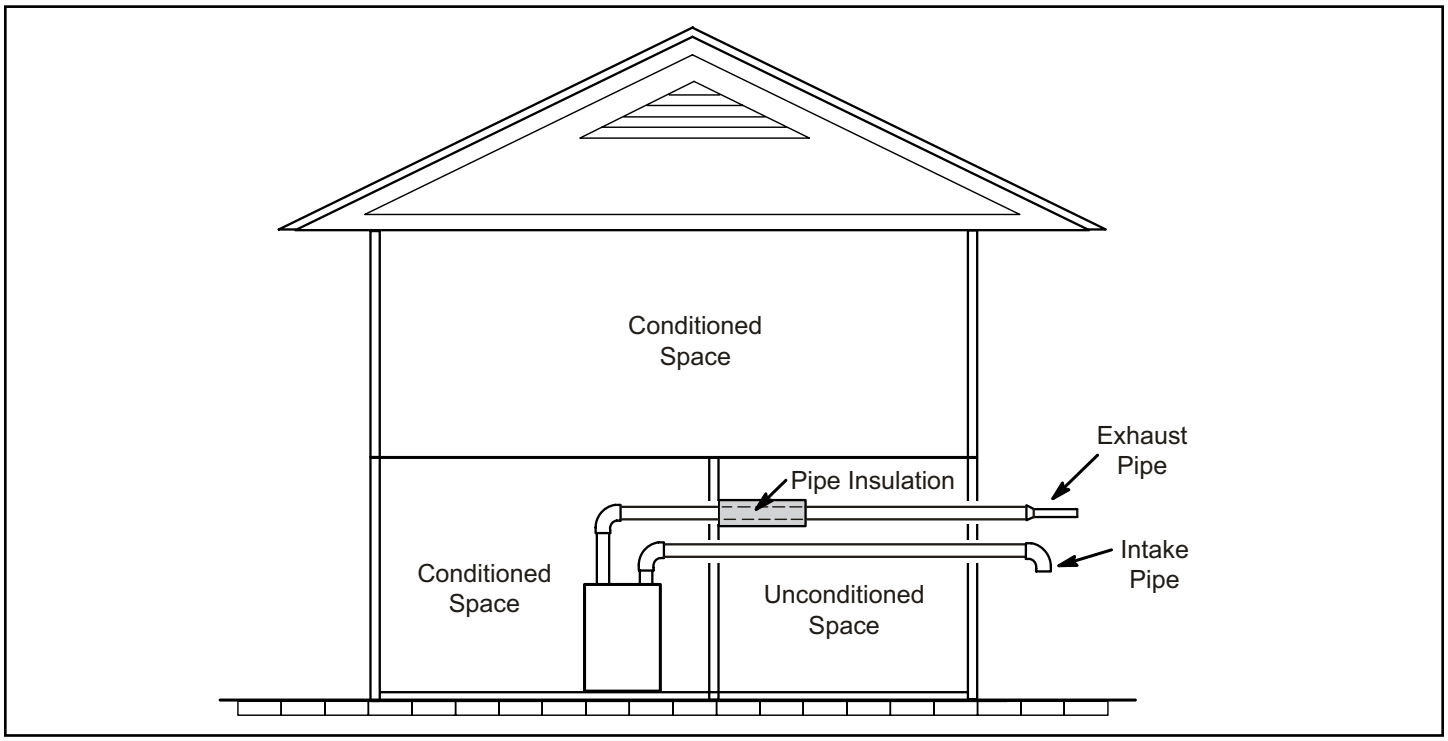
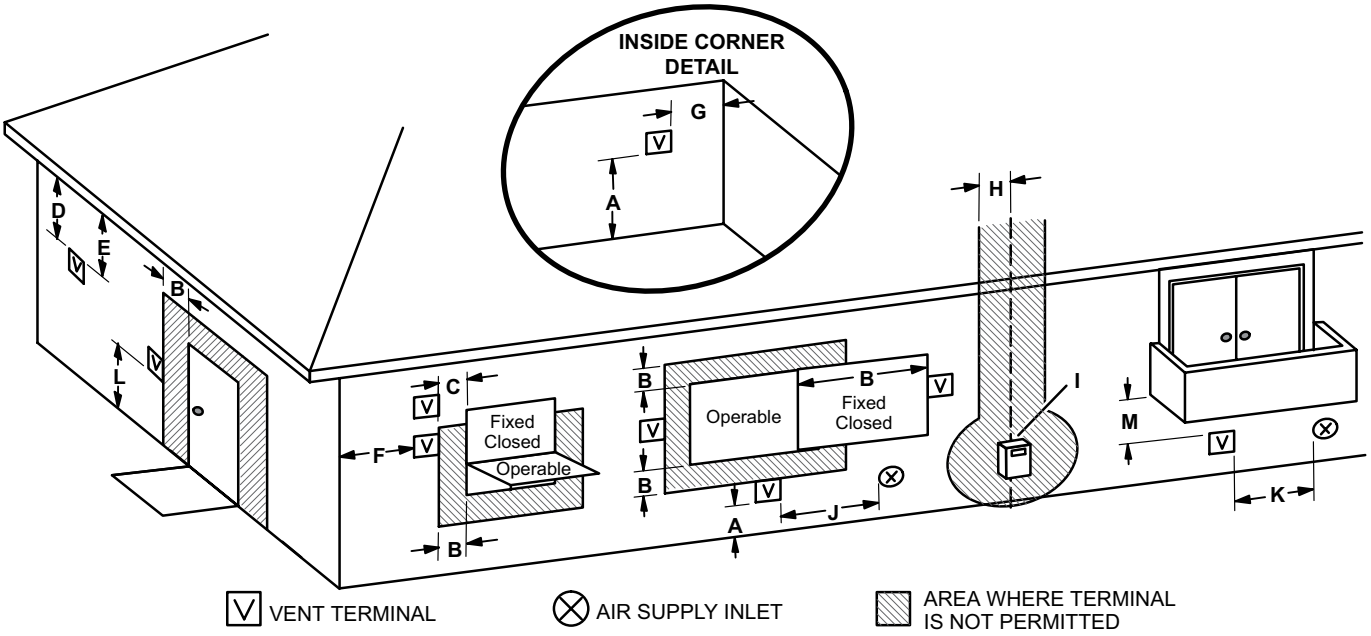


Figure 23. Insulating Exhaust Pipe in an Unconditioned Space

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



		US Installations[1]	Canadian Installations[2]
A =	Clearance above grade, veranda, porch, deck or balcony	12 inches (305mm) or 12 inches (305mm) above average snow accumulation.	12 inches (305mm) or 12 inches (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 (15kw), 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 (15kw), 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. Avoiding this location is recommended 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 24. Vent Termination Clearances for Direct Installations

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 gases may impinge on the building material, a corrosion-resistant shield (minimum 24 inches square) must be used to protect the wall surface. If the optional tee is used, the protective shield is required. 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 36.*

Intake and exhaust pipes may be routed either horizontally through and outside wall or vertically through the roof. In attic or closet installations, vertical termination through the roof is preferred. Figure 25 through Figure 32 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 26). You may exit the exhaust out the roof and the intake out the side of the structure (Figure 27).
2. Intake and exhaust pipes should be placed as close together as possible at termination end (refer to illustrations). Minimum separation is 3” (76 mm) on roof terminations and 6” (152 mm) on sidewall terminations.
3. On roof terminations, the intake piping should terminate straight down using two 90° elbows (see Figure 25).
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 15.

Capacity	Termination Pipe Size
045 & 070*	1-1/2” (38mm)
90*	2” (51mm)
110	
* -045, -070 and -090 units with the flush mount termination must use the 1-1/2” accelerator supplied with the kit.	

Table 15. Exhaust Pipe Termination Size Reduction

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

5. On field supplied terminations for sidewall exit, exhaust piping may extend a maximum of 12 inches (305 mm) for 2” PVC and 20 inches (508 mm) for 3” (76 mm) PVC beyond the outside wall. Intake piping should be as short as possible. See Figure 36.

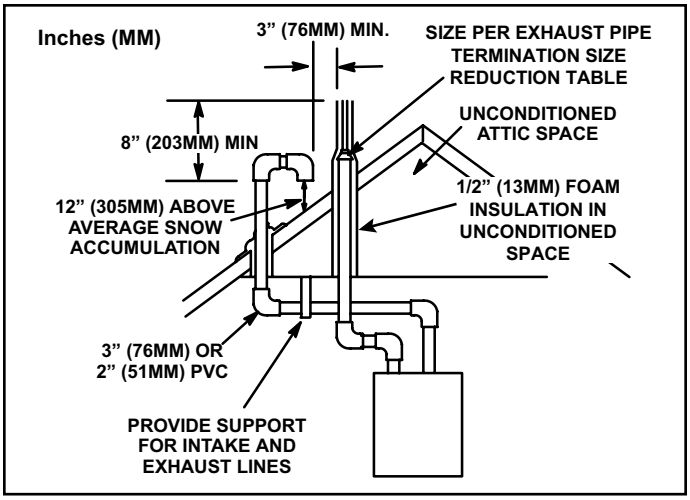


Figure 25. Direct Vent Roof Termination Kit

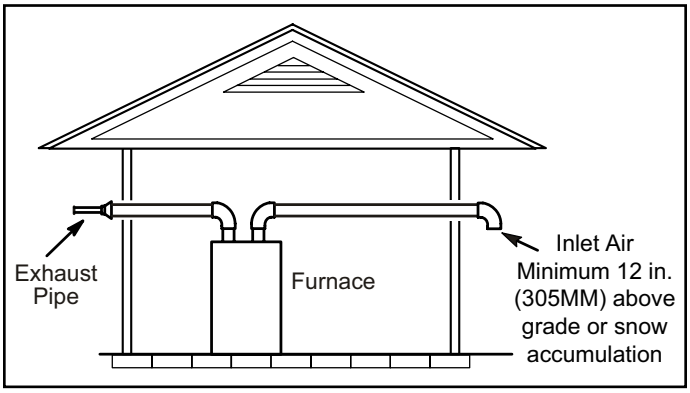


Figure 26. Exiting Exhaust and Intake Vent (no common pressure zone)

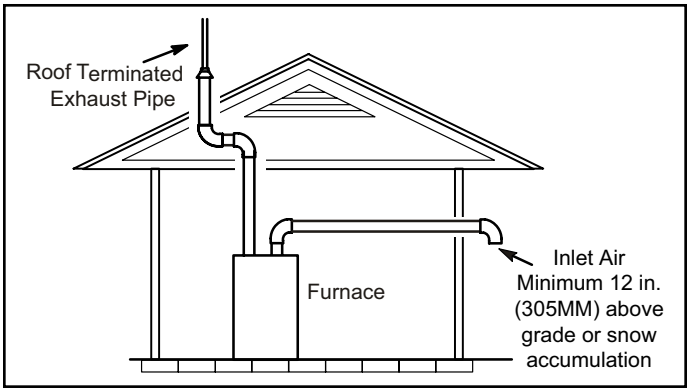


Figure 27. Exiting Exhaust and Intake Vent (no common pressure zone)

6. On field supplied terminations, a minimum distance between the end of the exhaust pipe and the end of the intake pipe without a termination elbow is 8” and a minimum distance of 6” with a termination elbow. See Figure 36.

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 36, 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 15.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 32.

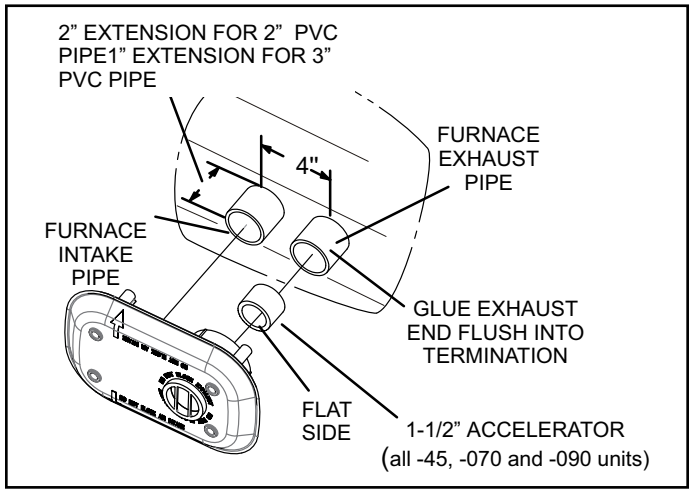
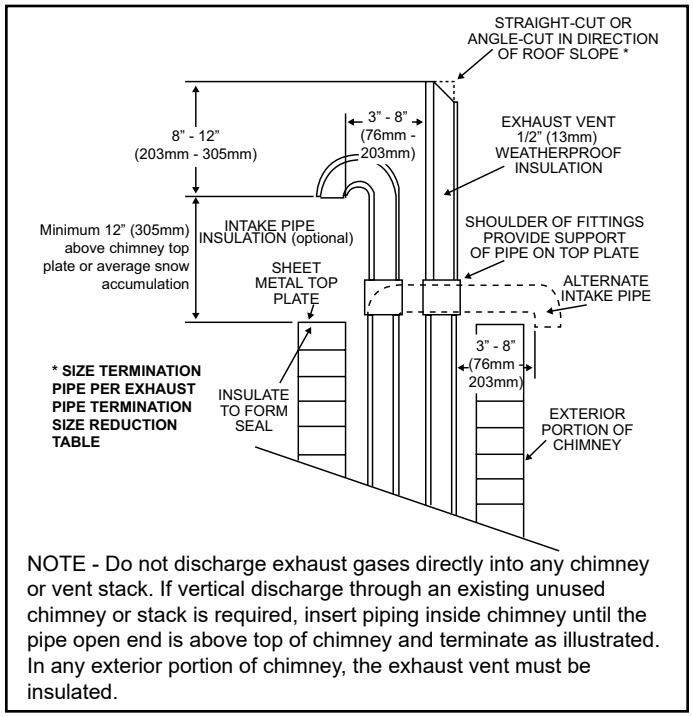


Figure 28. Flush-Mount Side Wall Termination 51W11 (US) or 51W12 (Canada)



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

Figure 29. Direct Vent Application Using Existing Chimney

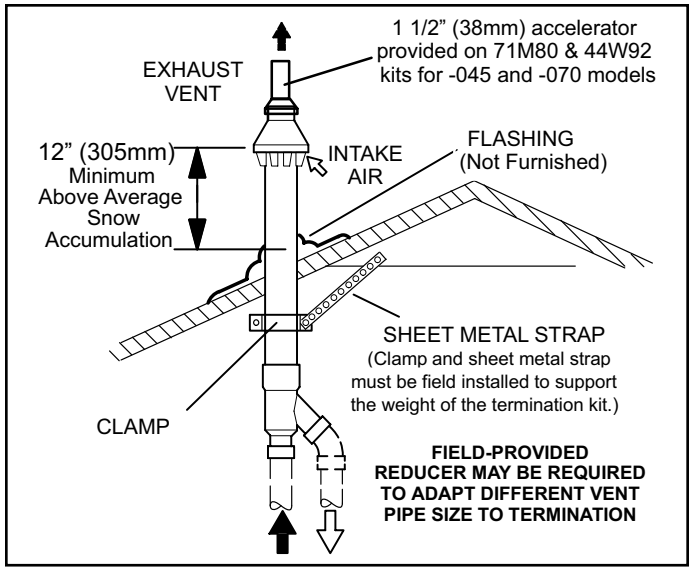


Figure 30. Direct Vent Concentric Wall Termination 71M80, 69M29 or 60L46 (US) 44W92 or 44W93 (Canada)

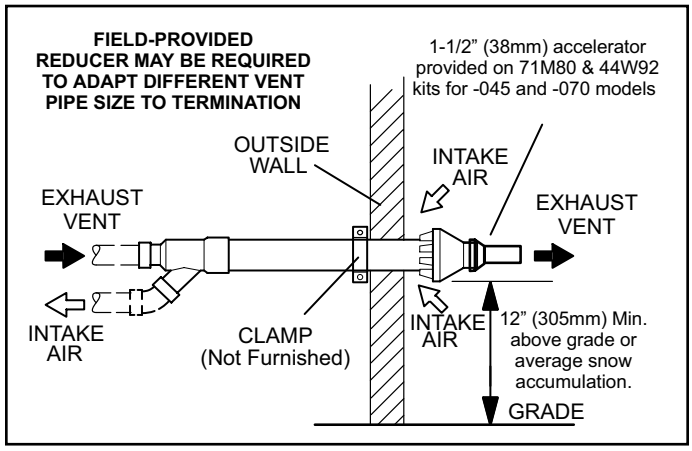


Figure 31. Direct Vent Concentric Wall Termination 71M80, 69M29 or 60L46 (US) 44W92 or 44W93 (Canada)

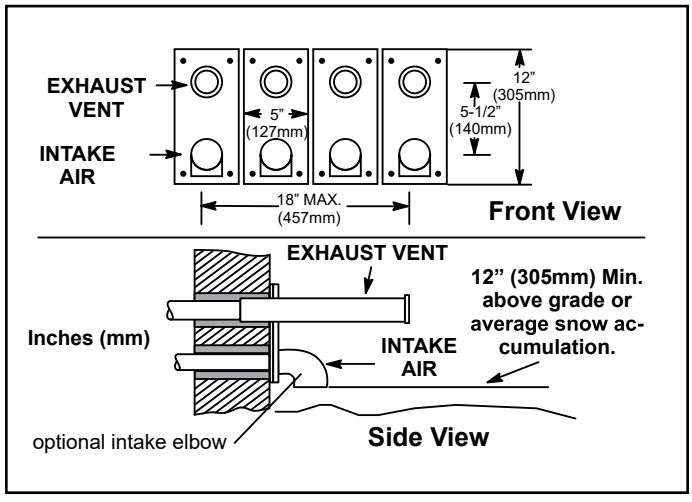
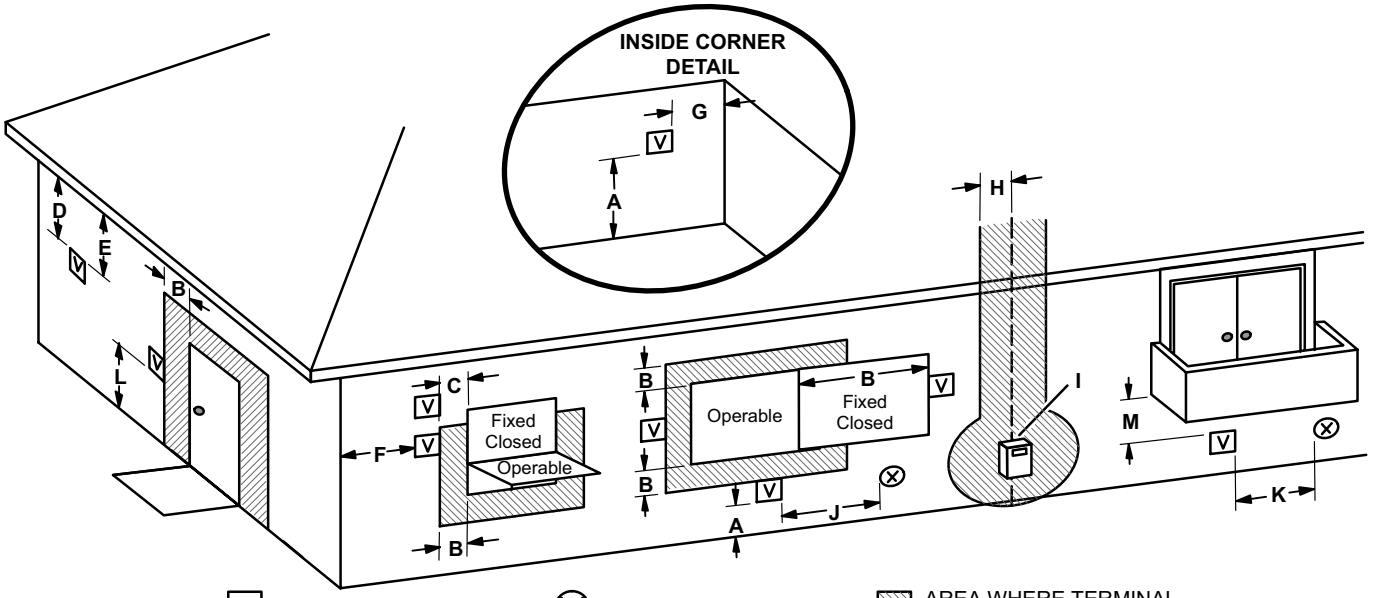


Figure 32. Optional Vent Termination for Multiple Unit Installation of Direct Vent Wall Termination Kit

VENT TERMINATION CLEARANCES
FOR NON-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 inches (305mm) above average snow accumulation.	12 inches (305mm) or 12 inches (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. Avoiding this location is recommended 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 33. Vent Termination Clearances for Non-Direct Installations

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 34 through Figure 35 show typical terminations.

1. Exhaust piping must terminate straight out or up as shown. The termination pipe must be sized as listed in Table 15. 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.

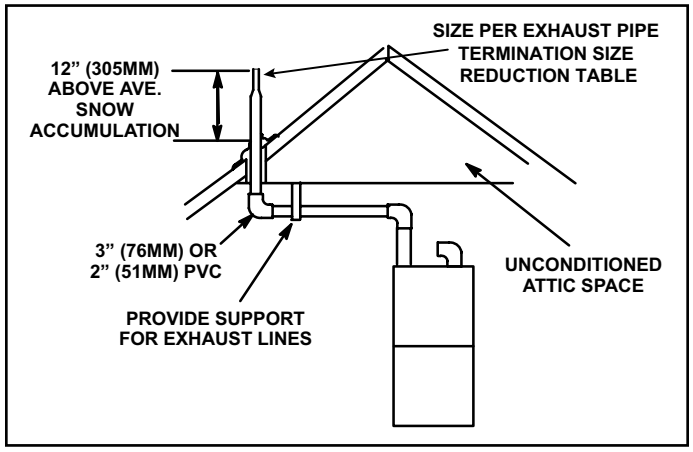


Figure 34. Non-Direct Vent Roof Termination Kit

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.

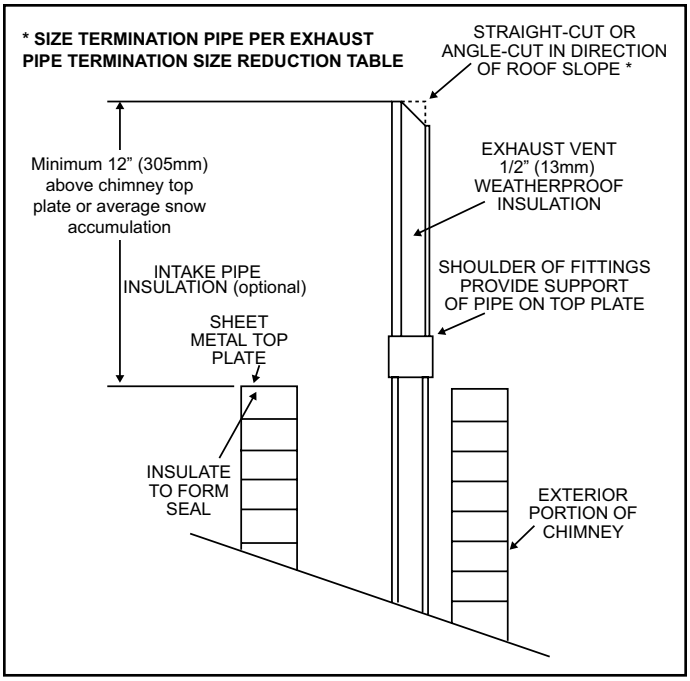
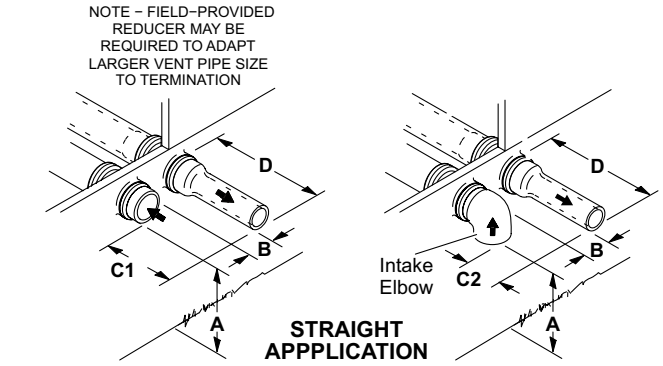
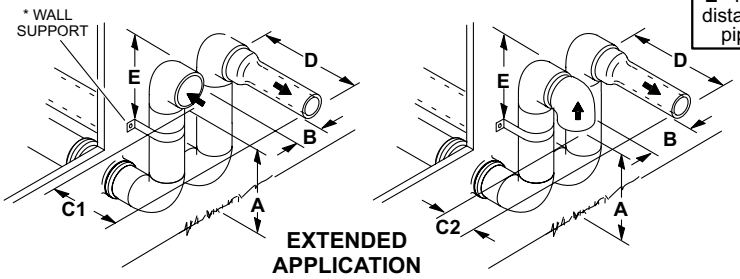


Figure 35. Non-Direct Vent Application Using Existing Chimney

FIELD FABRICATED WALL TERMINATION

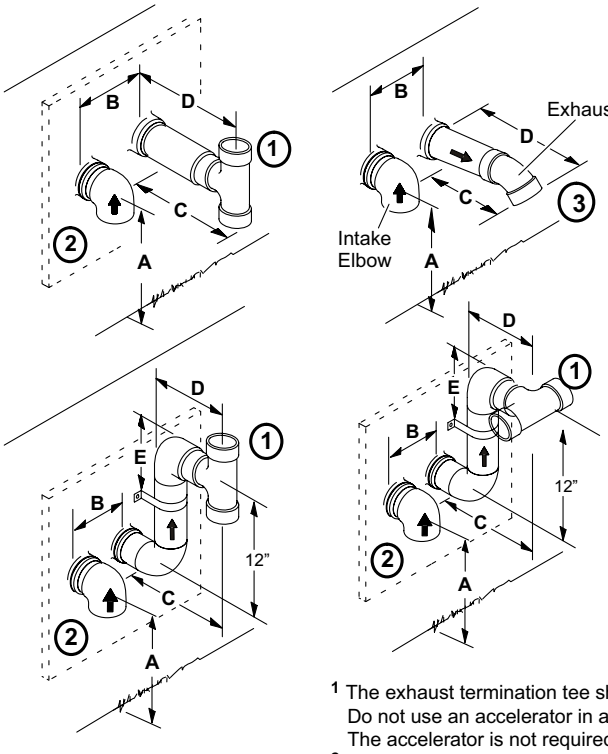


	2” (51mm) Vent Pipe	3” (76mm) Vent Pipe
A− Minimum clearance above grade or average snow accumulation	12” (305 mm)	12” (305 mm)
B− Maximum horizontal separation between intake and exhaust	6” (152 mm)	6” (152 mm)
C1 -Minimum from end of exhaust to inlet of intake	8” (203 mm)	8” (203 mm)
C2 -Minimum from end of exhaust to inlet of intake	6” (152 mm)	6” (152 mm)
D− Maximum exhaust pipe length	12” (305 mm)	20” (508 mm)
E− Maximum wall support distance from top of each pipe (intake/exhaust)	6” (152 mm)	6” (152 mm)

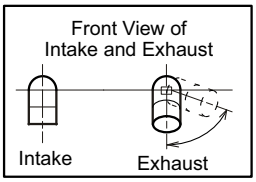


* Use wall support every 24” (610 mm). Use two wall supports if extension is greater than 24” (610 mm) but less than 48” (1219 mm).
NOTE − One wall support must be within 6” (152 mm) from top of each pipe (intake and exhaust) to prevent movement in any direction.

ALTERNATE TERMINATIONS (TEE & FORTY−FIVE DEGREE ELBOWS ONLY)



	2” (51MM) Vent Pipe	3” (76MM) Vent Pipe
A− Clearance above grade or average snow accumulation	12” (305 mm) Min.	12” (305 mm) Min.
B− Horizontal separation between intake and exhaust	6” (152 mm) Min. 24” (610 mm) Max.	6” (152 mm) Min. 24” (610 mm) Max.
C− Minimum from end of exhaust to inlet of intake	9” (227 mm) Min.	9” (227 mm) Min.
D− Exhaust pipe length	12” (305 mm) Min. 16” (405 mm) Max.	12” (305 mm) Min. 20” (508 mm) Max.
E− Wall support distance from top of each pipe (intake/exhaust)	6” (152 mm) Max.	6” (152 mm) Max.



[1] The exhaust termination tee should be connected to the 2” or 3” PVC flue pipe as shown in the illustration. Do not use an accelerator in applications that include an exhaust termination tee. The accelerator is not required.

[2] As required. Flue gas may be acidic and may adversely affect some building materials. If a side wall vent termination is used and flue gases will impinge on the building materials, a corrosion-resistant shield (24 inches square) should be used to protect the wall surface. If optional tee is used, the protective shield is recommended. The shield should be constructed using wood, sheet metal or other suitable material. All seams, joints, cracks, etc. in affected area, should be sealed using an appropriate sealant.

[3] Exhaust pipe 45° elbow can be rotated to the side away from the combustion air inlet to direct exhaust away from adjacent property. The exhaust must never be directed toward the combustion air inlet.

Figure 36.

Condensate Piping

This unit is designed for either right- or left-side exit of condensate piping. Refer to Figure 37 and Figure 39 for condensate trap locations.

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. For furnaces with a 1/2" drain connection use a 3/8 allen wrench and remove plug (Figure 37) from the cold end header box at the appropriate location on the side of the unit. Install field-provided 1/2 NPT male fitting into cold end header box. For furnaces with a 3/4" drain connection use a large flat head screw driver or a 1/2" drive socket extension and remove plug. 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 43 (3/4" drain connection) or Figure 44 (1/2" drain connection).
4. Install drain trap using appropriate PVC fittings, glue all joints. Glue the provided drain trap as shown in Figure 43 or Figure 44. Route the condensate line to an open drain. Condensate line must maintain a 1/4" downward slope from the furnace to the drain.
5. Figure 41 shows 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 42. The field provided vent must be a minimum 1" to a maximum 2" length above the condensate drain outlet connection.

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

   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 38.*

⚠ CAUTION

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

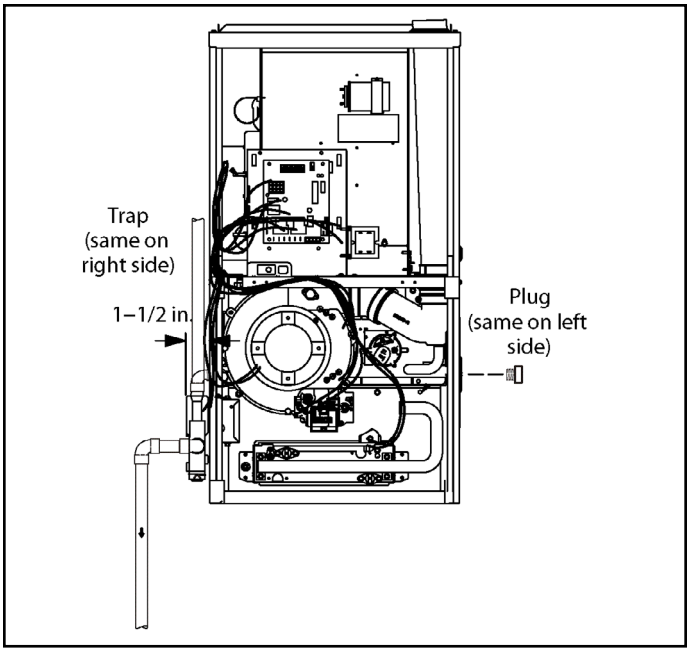


Figure 37. Condensate Trap and Plug Locations

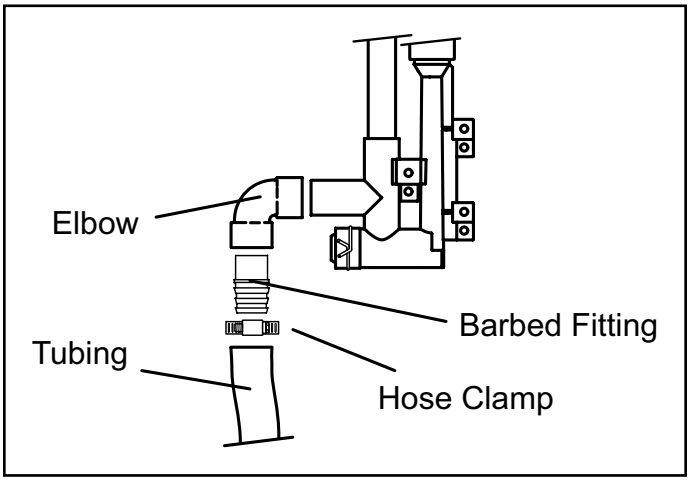


Figure 38. Field-Provided Drain Components

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 Allied in various lengths; 6 ft. (1.8m) - kit no. 26K68 and 24 ft. (7.3m) - kit no. 26K69.

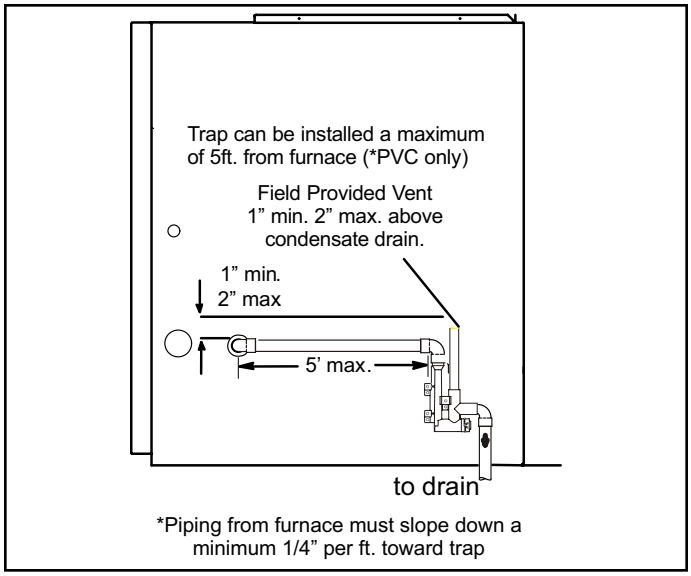


Figure 39. Condensate Trap Location (shown with right side exit of condensation)

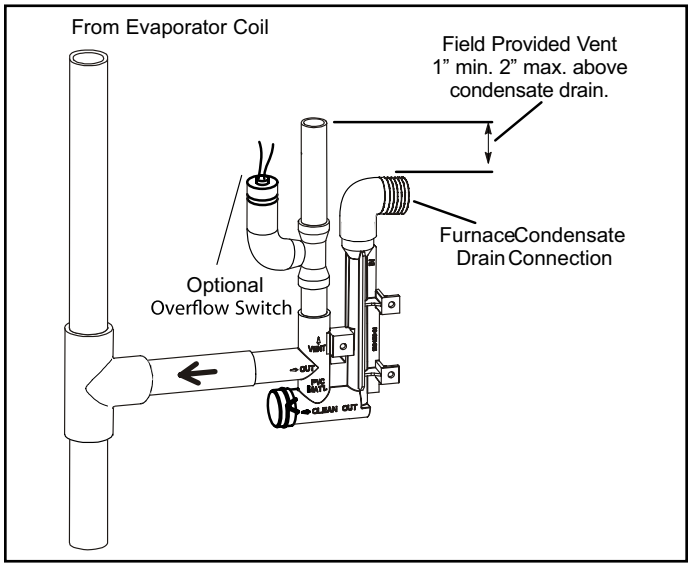


Figure 40. Condensate Trap with Optional Overflow Switch

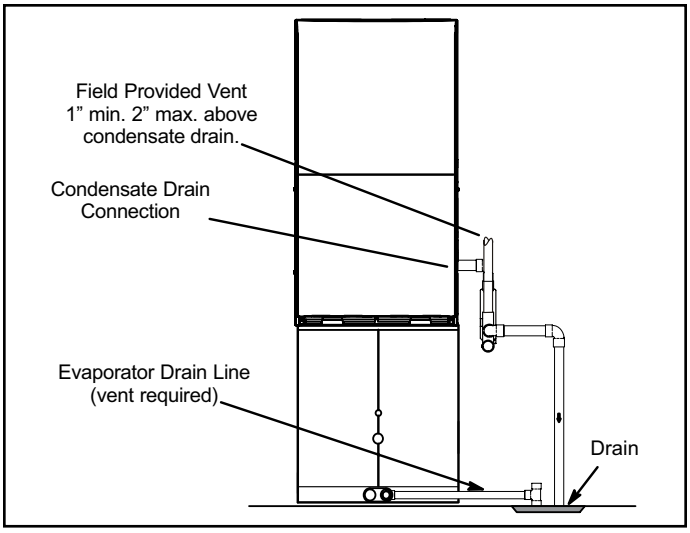


Figure 41. Unit with Cooling Coil Using Separate Drain

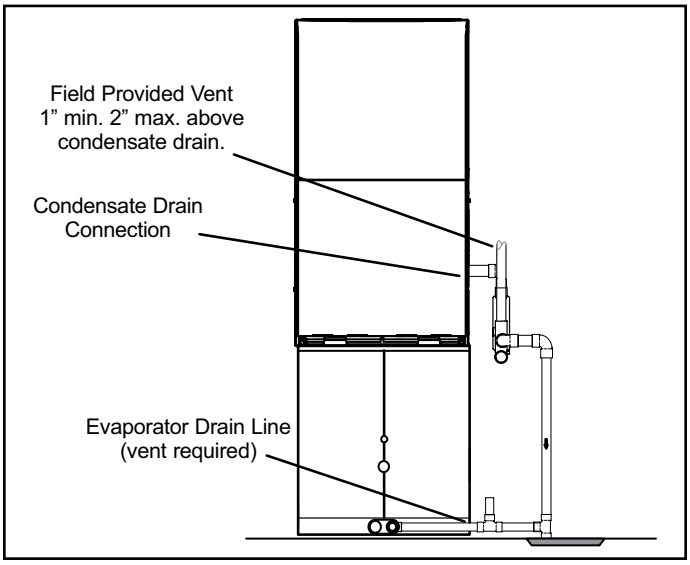


Figure 42. Evaporator Coil Using a Common Drain

⚠ IMPORTANT

When combining the furnace and evaporator coil drains together, the A/C condensate drain outlet must be vented to relieve pressure in order for the furnace pressure switch to operate properly.

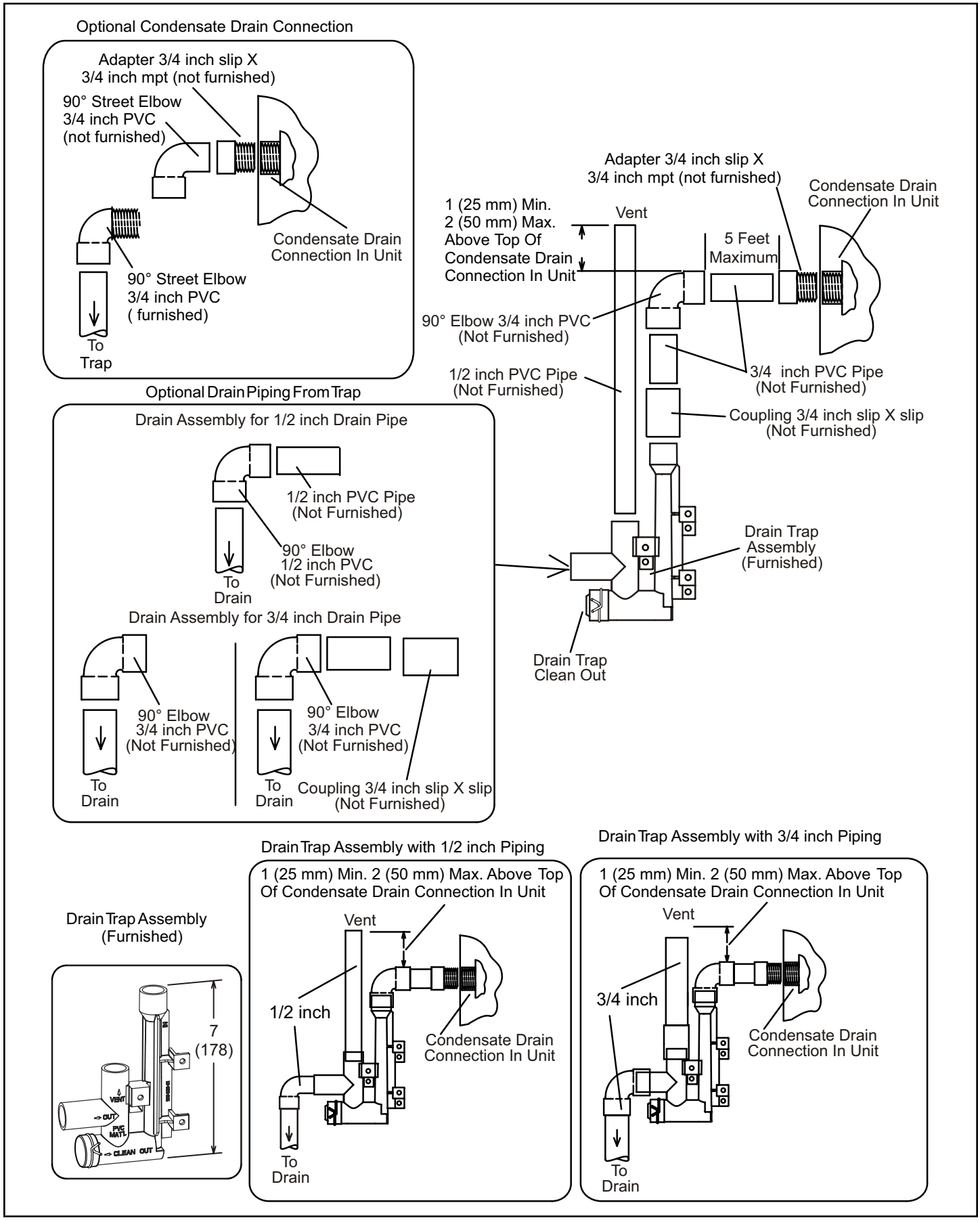


Figure 43. Trap / Drain Assembly Using 1/2" PVC or 3/4" PVC Cold End Header Box with 3/4" Drain Connection

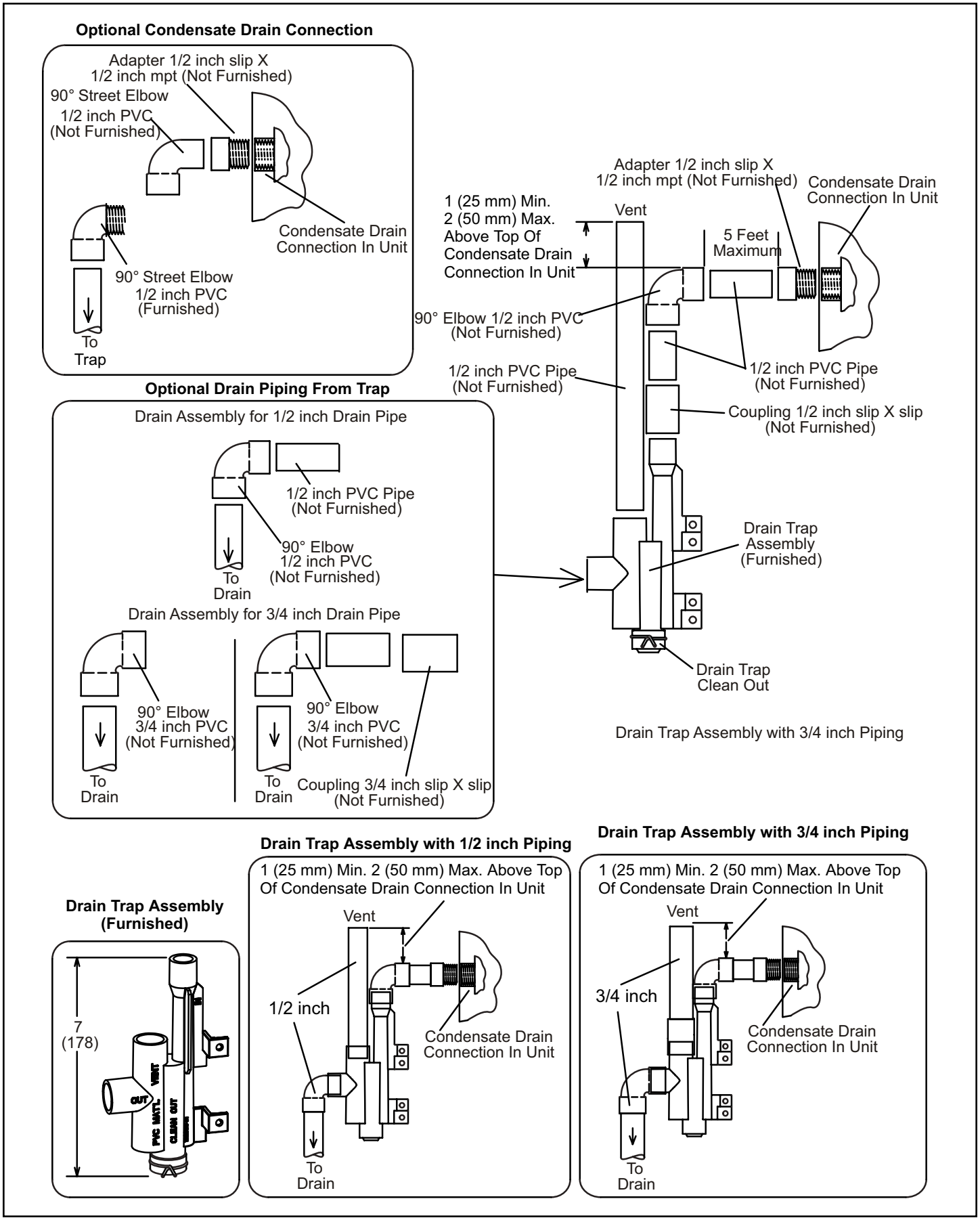


Figure 44. Trap / Drain Assembly Using 1/2" PVC or 3/4" PVC Cold End Header Box with 1/2" Drain Connection

Start-Up

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.

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 A97DF2E / 97G2DFE is equipped with a gas control switch. Use only your hand to move the switch. Never use tools. If the 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

A97DF2E / 97G2DFE units are equipped with an 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 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 45)

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 access panel.
6. Move gas valve switch to OFF. See Figure 45.
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 45.

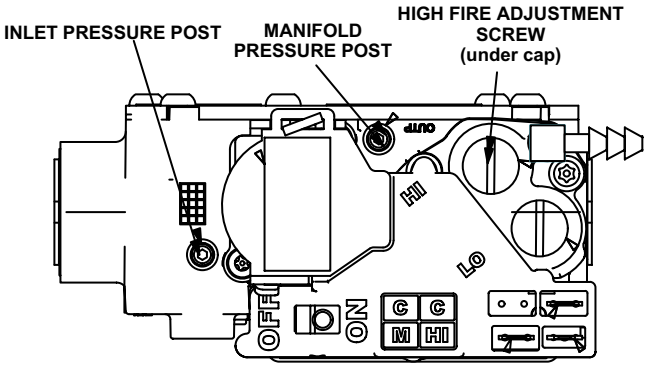


Figure 45. Gas Valve

9. Replace the access panel.
10. Turn on all electrical power to to the unit.
11. Set the thermostat to desired setting.

    NOTE: *When unit is initially started, steps 1 through 11 may need to be repeated to purge air from gas line.*
12. If the appliance will not operate, follow the instructions "Turning Off Gas to Unit" and call your service technician or gas supplier.

Turning Off Gas to Unit

1. Set the thermostat to the lowest setting.
2. Turn off all electrical power to the unit if service is to be performed.
3. Remove the access panel.

4. Move gas valve switch to OFF.
5. Replace the 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.

Heating System Service Checks

C.S.A. Certification

All units are C.S.A. design certified without modifications.

Refer to the A97DF2E / 97G2DFE Operation and Installation Instruction.

Gas Piping

⚠ CAUTION

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

⚠ WARNING

Do not 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.

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 46. 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.

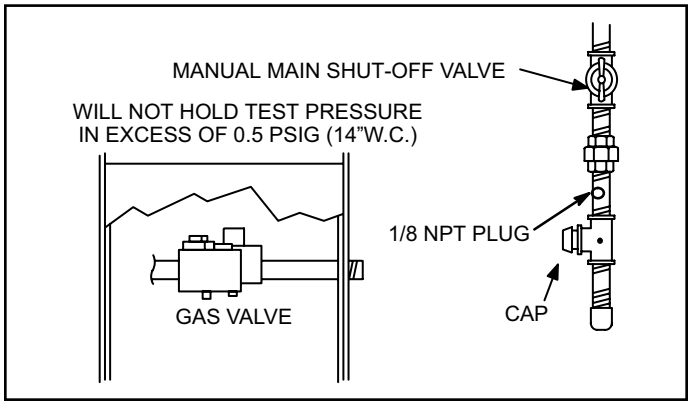


Figure 46.

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.

⚠ WARNING

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

Testing Gas Supply Pressure

An inlet post located on the gas valve provides access to the supply pressure. See Figure 45. 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 18 for supply line pressure.

Manifold Pressure Measurement

NOTE: *Pressure test adapter kit (10L34) is available from Allied to facilitate manifold pressure measurement.*

A manifold pressure post located on the gas valve provides access to the manifold pressure. See Figure 45. 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.

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 low fire manifold pressure and compare to value given in Table 18. If necessary, make adjustment. Figure 45 shows location of low fire adjustment screw.
5. Repeat on high fire and compare to value given in Table 18. If necessary, make adjustment. Figure 45 shows location of high fire adjustment screw.
6. Shut unit off and remove manometer as soon as an accurate reading has been obtained. Take care to replace pressure tap plug.
7. Start unit and perform leak check. Seal leaks if found.

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

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 16. If manifold pressure matches Table 18 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.*

Capacity	Seconds for One Revolution			
	Natural		LP	
	1 cu ft Dial	2 cu ft Dial	1 cu ft Dial	2 cu ft Dial
-45	80	160	200	400
-70	55	110	136	272
-90	41	82	102	204
-110	33	66	82	164
Natural-1000 btu/cu ft LP-2500 btu/cu ft				

Table 16. Gas Meter Clocking Chart

⚠ 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.

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 17 shows acceptable combustions. The maximum carbon monoxide reading should not exceed 100 ppm.

Unit	CO_2 % For Nat		CO_2 % For LP	
	Low Fire	High Fire	Low Fire	High Fire
045	5.6 - 6.6	7.8 - 8.8	6.6 - 7.6	9.1 - 10.1
070	5.6 - 6.5	7.3 - 8.3	6.5 - 7.5	8.6 - 9.6
090	5.9 - 6.9	7.8 - 8.8	6.9 - 7.9	9.1 - 10.1
110	6.63 - 7.3	8.2 - 9.2	7.3 - 8.3	9.5 - 10.5
The maximum carbon monoxide reading should not exceed 100 ppm.				

Table 17.

High Altitude

The manifold pressure, gas orifice and pressure switch may require adjustment or replacement to ensure proper operation at higher altitudes. See Table 18 for manifold pressures and Table 19 for gas conversion and pressure switch kits.

Unit	Gas	Manifold Pressure in w.g.										Supply Line Pressure in w.g.	
		0 - 4500 ft.		4501 - 5500 ft.		5501 - 6500ft.		6501 - 7500ft.		7501-10000ft.		0 - 10000 ft.	
		Low Fire	High Fire	Low Fire	High Fire	Low Fire	High Fire	Low Fire	High Fire	Low Fire	High Fire	Min.	Max.
All Models	Natural	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

Table 18. Manifold and Supply Line Pressure 0 - 10,000 ft.

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 (0 - 2286m)	7501 - 10000 ft (2286 - 3048m)	7501 - 10000 ft (2286 - 3048m)	4501 - 7500 ft (1371 - 2286m)	7501 - 10000 ft (2286 - 3048m)
045	11K48	*51W01	11K47	14A51	14A53
070				14A48	14A54
090				14A54	14A53
110				25B93	14A45
*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 (0-1371 m).					

Table 19. Conversion Kit Fan Pressure Switch Requirements at Varying Altitudes

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 47. 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 20. If the readings exceed the maximum shown in Table 20, 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 47. This voltage should be in the range of 97 to 132 VAC

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

Table 20.

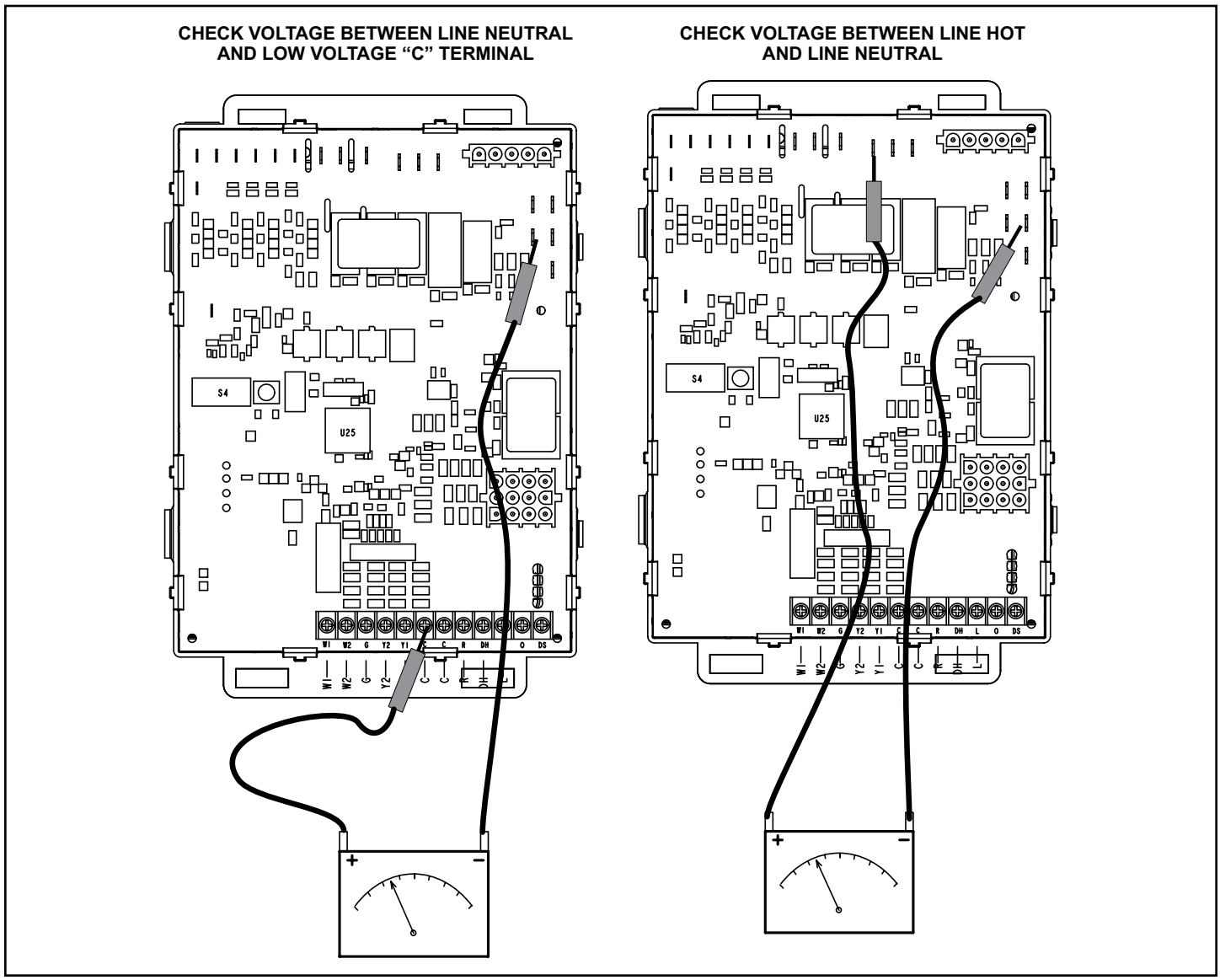


Figure 47.

Typical Operating Characteristics

Blower Operation and Adjustment

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

1. Blower operation is dependent on thermostat control system.
2. Generally, blower operation is set at thermostat subbase fan switch. With fan switch in ON position, blower operates 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.

Temperature Rise (Figure 48)

Temperature rise for A97DF2E / 97G2DFE 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.

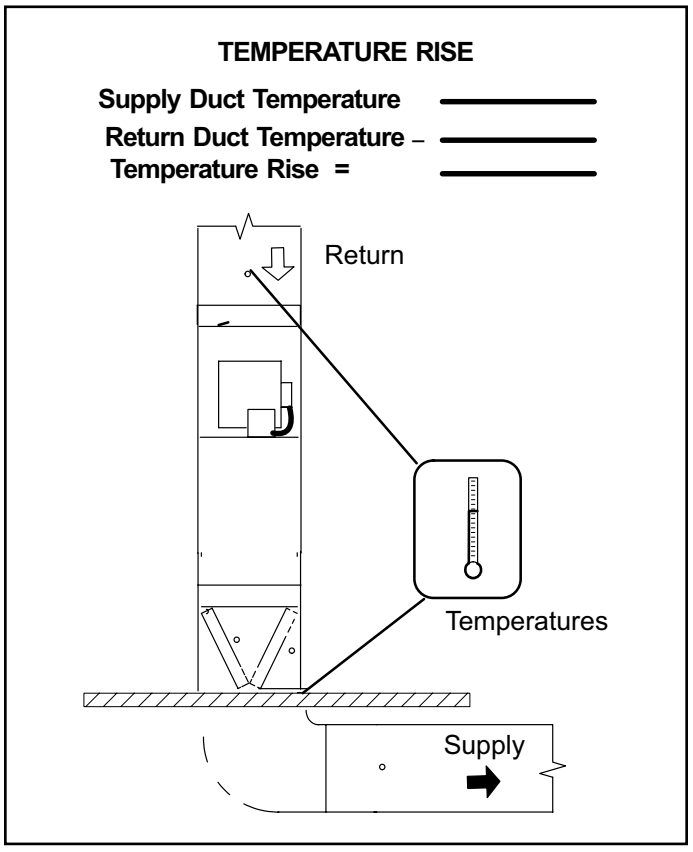


Figure 48.

External Static Pressure

1. Tap locations shown in Figure 49.
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. For heating speed (second stage heat speed) external static pressure drop must not be more than 0.5" W.C. For cooling speed (second stage cool speed) external static pressure drop must not be more than 0.5" W.C.
4. Seal the hole when the check is complete.

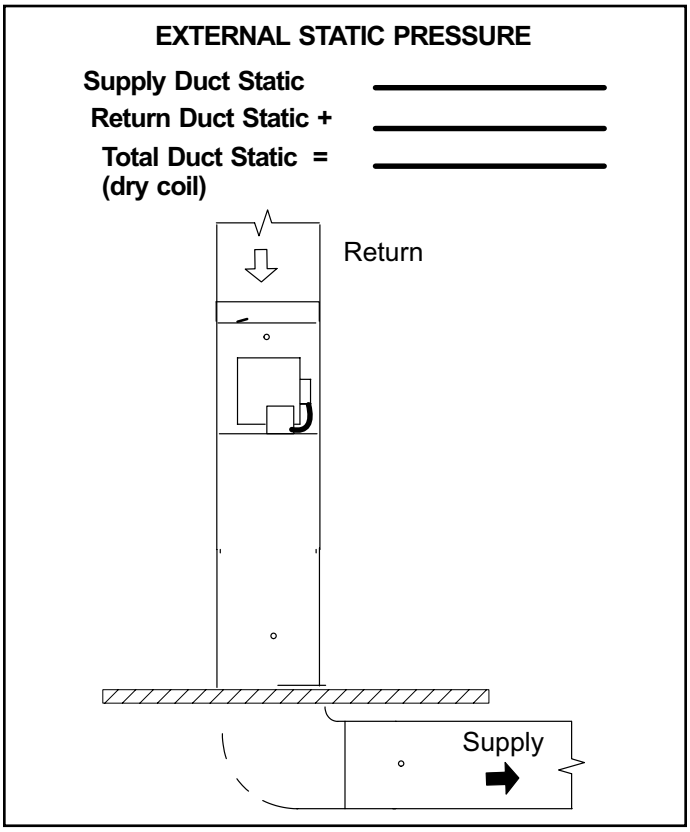


Figure 49.

Maintenance

⚠ WARNING

ELECTRICAL SHOCK, FIRE, OR EXPLOSION HAZARD.

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

Improper servicing could result in dangerous operation, serious injury, death, or property damage.

Before servicing, disconnect all electrical power to furnace.

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

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

Blower

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

⚠ WARNING

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

Filters

All 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 21 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

Cabinet Width	Filter Size
17-1/2”	16 x 25 x 1 (1)
21”	

Table 21.

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

⚠ 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.

⚠ CAUTION

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

1. Check all wiring for loose connections.
2. Check for the correct voltage at the furnace (furnace operating). Correct voltage is 120VAC + 10%.
3. Check amp-draw using a true RMS meter on the blower motor with blower access panel in place. See Figure 50.

   Unit Nameplate_____ Actual_____

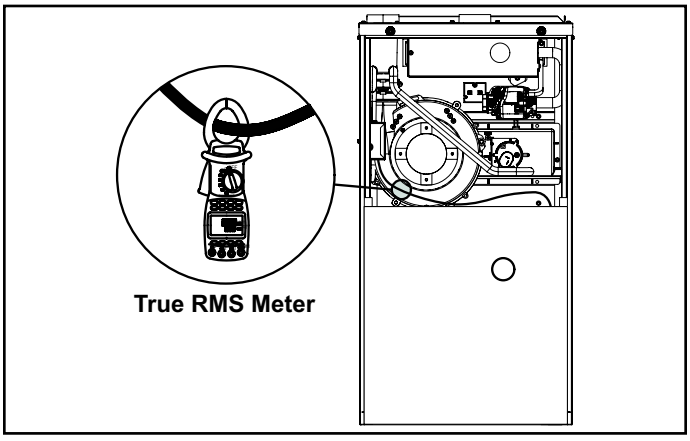


Figure 50. Check Motor Amp Draw

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 51)

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.

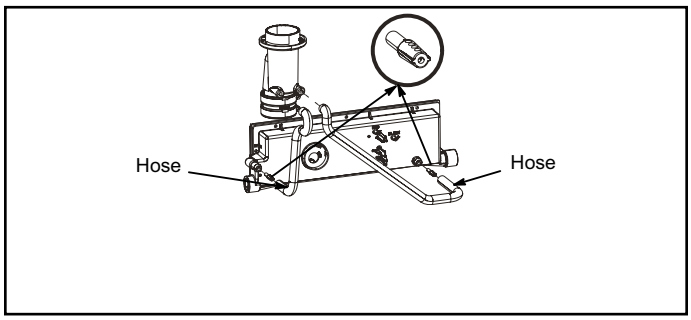


Figure 51. Condensate Hose Screens

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. Loosen clamps at vent elbow. Disconnect condensate drain tubing from flue collar. and remove the vent elbow.
8. Loosen clamps and remove combustion air intake flexible connector if equipped.
9. 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.*
10. Mark and disconnect all combustion air pressure tubing from cold end header collector box.
11. Mark and remove wires from pressure switch assembly. Remove pressure switch assembly. Keep tubing attached to pressure switch assembly.
12. 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.
13. Remove electrical junction box from the side of the furnace.
14. Disconnect condensate line from cold end header box. Remove cold end header box.
15. Loosen clamps on exhaust and air intake pipe seal plate. Slide exhaust and intake pipes up and out to clear blower deck. Remove exhaust and air intake pipe seal plate.
16. Mark and disconnect any remaining wiring to heating compartment components. Disengage strain relief bushing and pull wiring and bushing through the hole in the blower deck.
17. Remove the primary limit from the vestibule panel.
18. Remove two screws from the front cabinet flange at the blower deck. Spread cabinet sides slightly to allow clearance for removal of heat exchanger.
19. Remove screws along vestibule sides which secure vestibule panel and heat exchanger assembly to cabinet. Remove two screws from blower rail which secure top heat exchanger flange. Remove heat exchanger from furnace cabinet.
20. Back wash heat exchanger with soapy water solution or steam. If steam is used it must be below 275°F (135°C) .
21. Thoroughly rinse and drain the heat exchanger. Soap solutions can be corrosive. Take care to rinse entire assembly.
22. Reinstall heat exchanger into cabinet making sure that the clamshells of the heat exchanger assembly are engaged properly into the support bracket on the blower deck. Remove the indoor blower to view this area through the blower opening.
23. Re-secure the supporting screws along the vestibule sides and top to the cabinet.
24. Reinstall cabinet screws on front flange at blower deck.
25. Reinstall the primary limit on the vestibule panel.

26. Route heating component wiring through hole in blower deck and reinsert strain relief bushing.
27. Reinstall electrical junction box.
28. Reinstall exhaust and air intake pipe seal plate. Reinstall exhaust and air intake pipes and tighten clamps on pipe seal plate.
29. Reinstall the cold end header box.
30. Reinstall the combustion air inducer. Reconnect the combustion air inducer to the wire harness.
31. Reinstall pressure switch assembly and reconnect pressure switch wiring.
32. Carefully connect combustion air pressure switch tubing from pressure switches to proper ports on cold end header collector box.
33. Reinstall condensate trap.
34. Secure burner box assembly to vestibule panel using four existing screws. Make sure burners line up in center of burner ports.
35. Reconnect exhaust piping and exhaust drain tubing.
36. Reconnect flame roll-out switch wires.
37. Reconnect sensor wire and reconnect 2-pin plug from ignitor.
38. Reinstall gas valve manifold assembly. Reconnect gas supply line to gas valve.
39. Reinstall burner box cover if equipped.
40. Reconnect plug to gas valve.
41. Replace the blower compartment access panel.
42. Follow lighting instructions on unit nameplate to light and operate furnace for 5 minutes to ensure the furnace is operating properly.
43. Check all piping connections, factory and field, for gas leaks. Use a leak detecting solution or other preferred means.
44. Replace 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 2-pin plug 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. Loosen clamps and remove combustion air intake flexible connector (if equipped).
6. Mark and disconnect sensor wire from the sensor. Disconnect plug from the ignitor at the burner box.
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.
11. Reinstall combustion air intake flexible connector (if equipped), secure using existing clamps.
12. Reinstall the gas valve manifold assembly. Reconnect the gas supply line to the gas valve. Reinstall the burner box cover.
13. Reconnect plug to gas valve.
14. Replace the blower compartment access panel.
15. Refer to instruction on verifying gas and electrical connections when re-establishing supplies.
16. 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.
17. Replace access panel.

Wiring Diagram

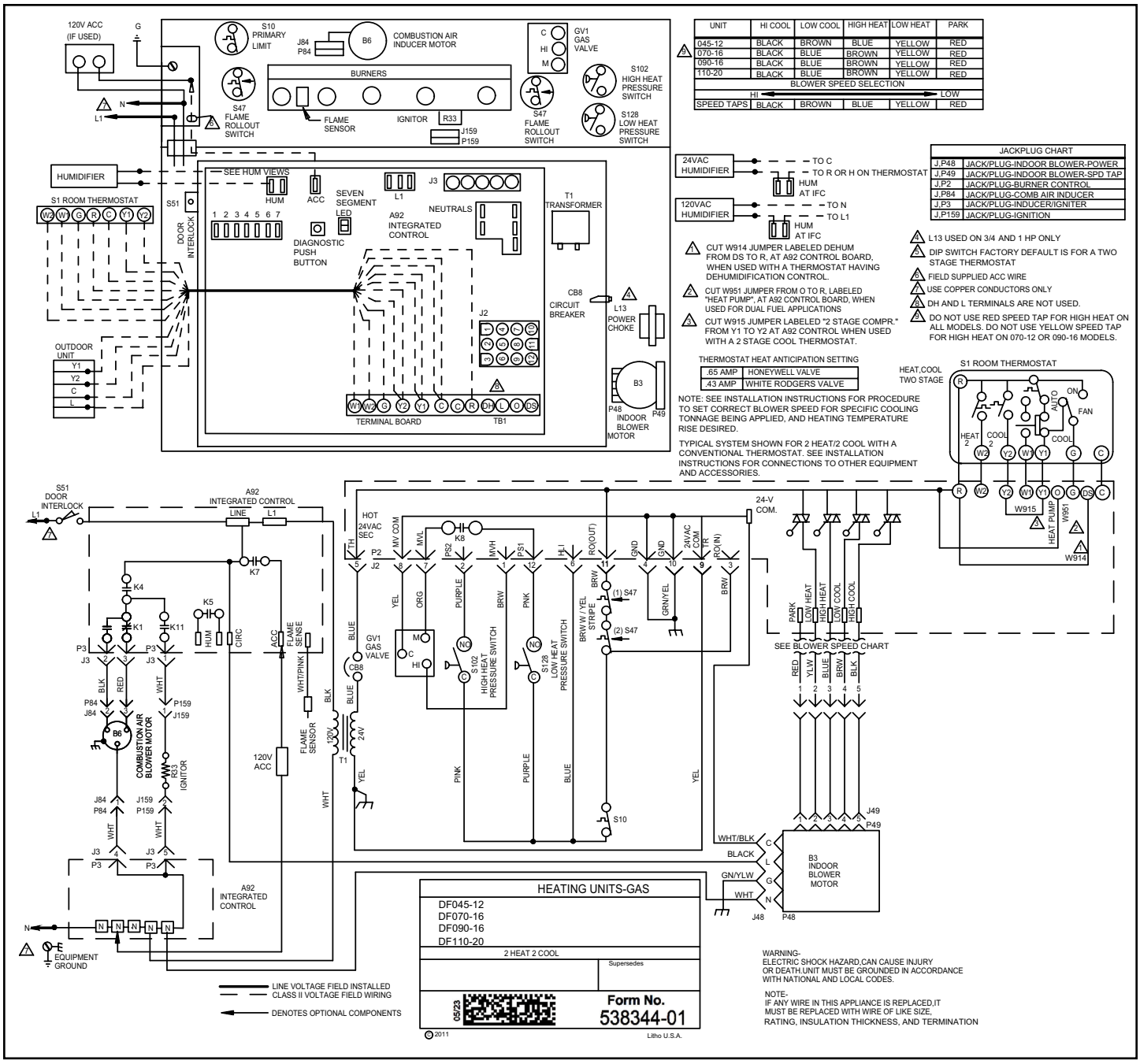


Figure 52. Typical Wiring Diagram

Electronic Ignition

The two-stage, variable speed integrated control used in A97DF2E / 97G2DFE 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 53 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.

   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).*
5. If second-stage heat is required, the thermostat second-stage heat contacts close and send a signal to the integrated control. The integrated control initiates a 30-second second-stage recognition delay.
6. At the end of the recognition delay, 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 and the HUM contacts are de-energized. The indoor blower is de-energized at the end of the off delay as well a s the 120V ACC terminal.

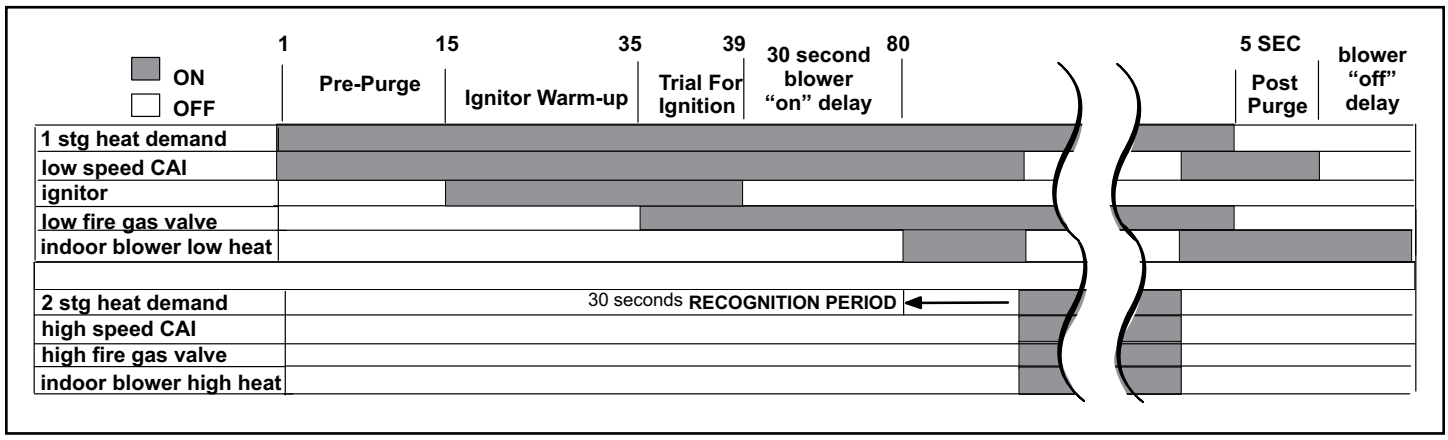


Figure 53. Heating Operation with Two-Stage Thermostat

Applications Using A Single-Stage Thermostat

See Figure 54 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 and the HUM contacts are de-energized. The indoor blower is de-energized at the end of the off delay as well as the 120V ACC terminal.

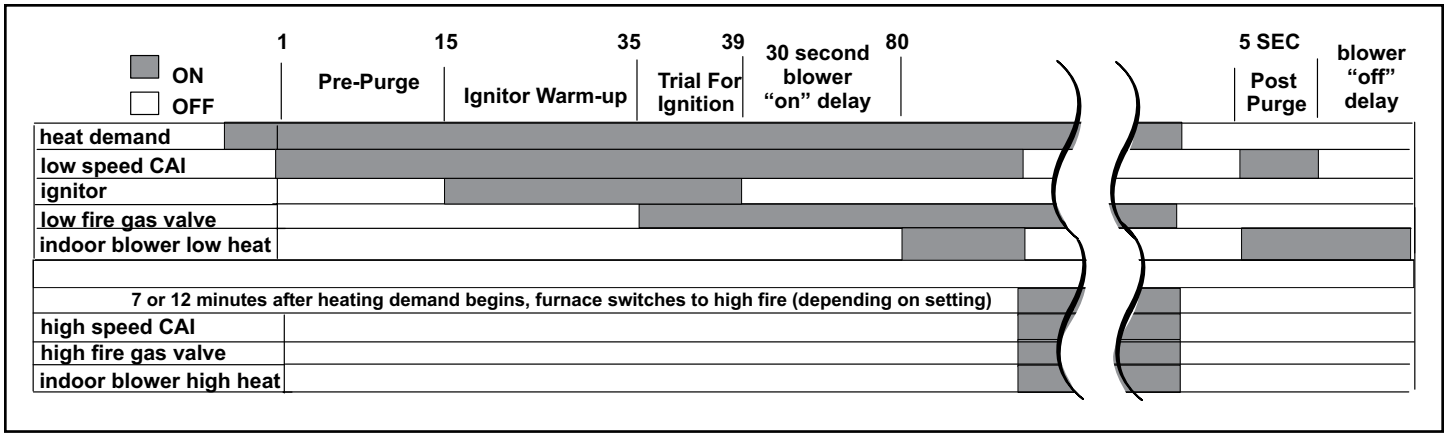
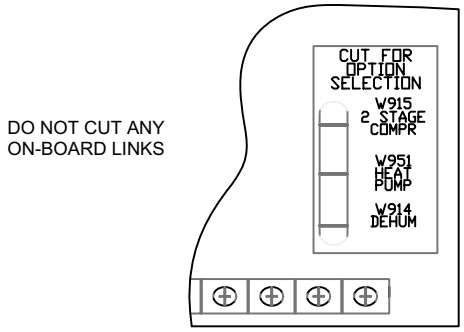
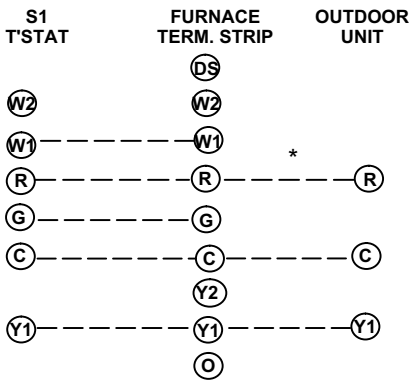
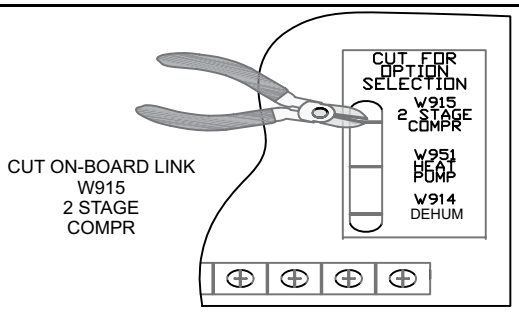
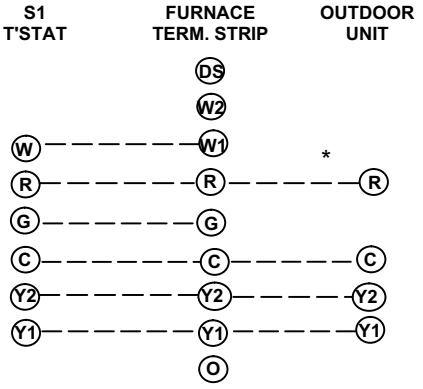
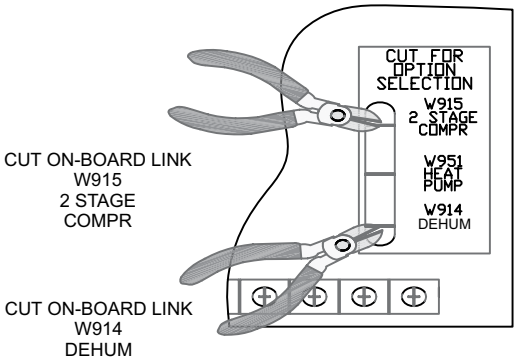
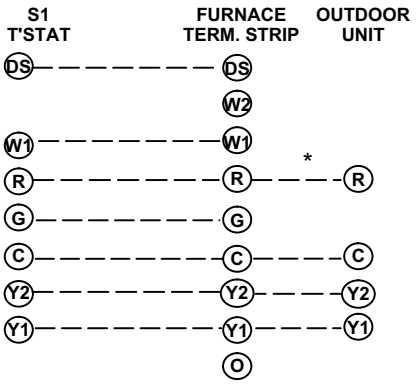


Figure 54. Heating Operation with Single-Stage Thermostat

Field Wiring Applications

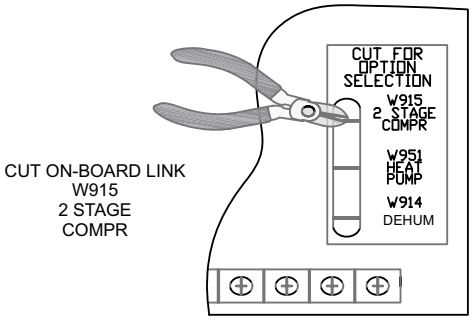
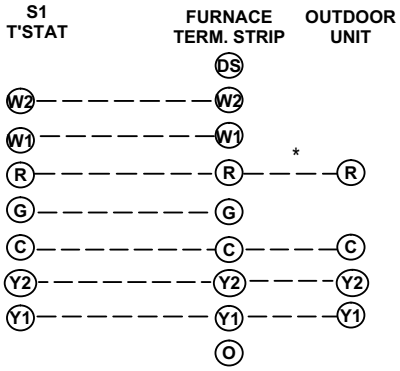
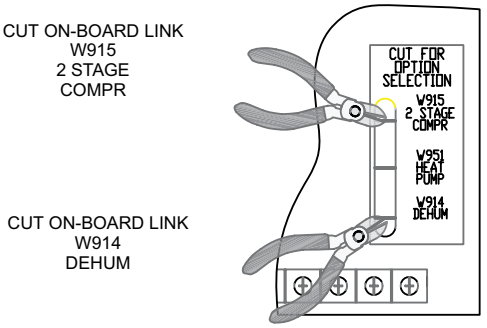
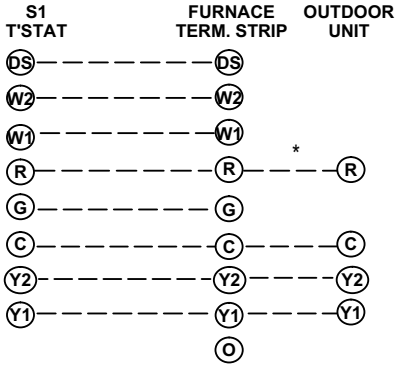
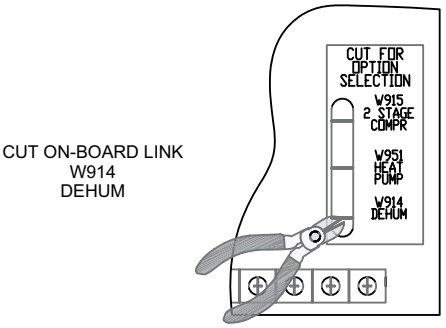
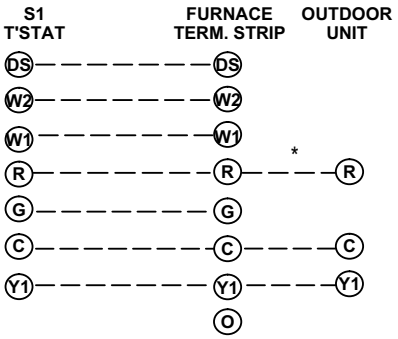
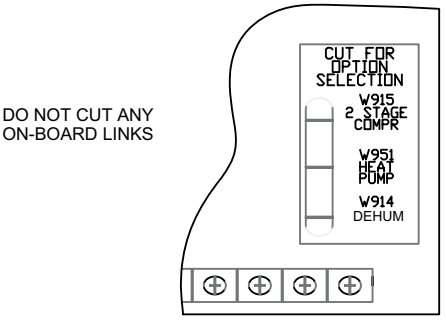
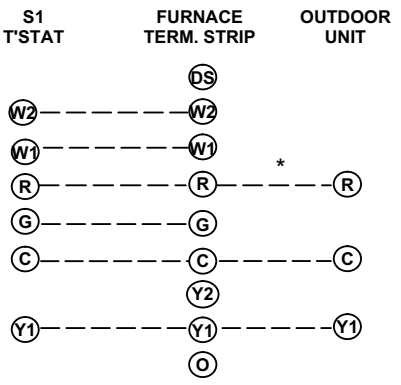
Field Wiring Applications With Conventional Thermostat

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 *NOTE - Use DIP switch 2 to set second-stage heat ON delay. OFF-7 minutes. ON-12 minutes.*	ON		
1 Heat / 2 Cool *NOTE - Use DIP switch 2 to set second-stage heat ON delay. OFF-7 minutes. ON-12 minutes.*	ON		
1 Heat / 2 Cool with t'stat with humidity control *NOTE - Use DIP switch 2 to set second-stage heat ON delay. OFF-7 minutes. ON-12 minutes.*	ON		

**Not required on all units*

Table 22A.

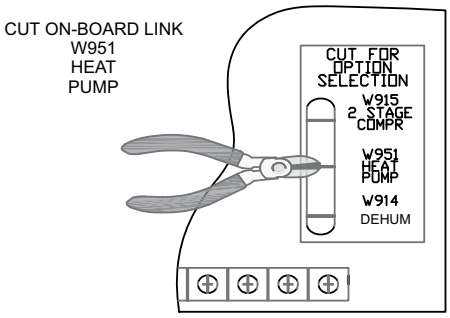
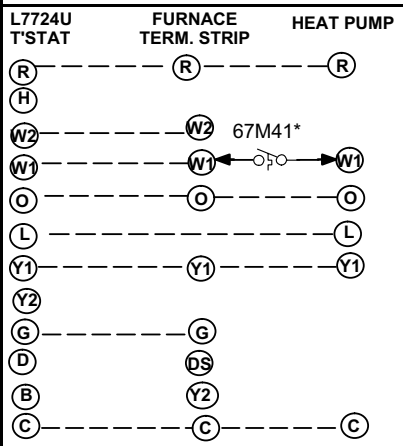
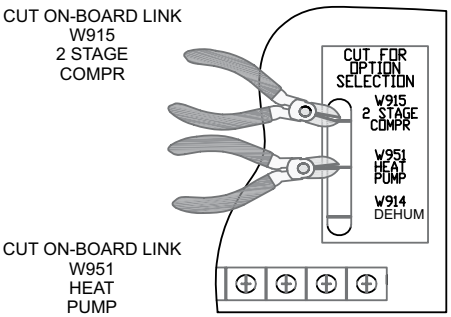
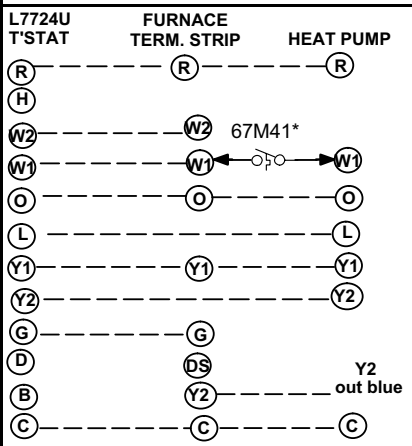
Field Wiring Applications with Conventional Thermostat (Continued)

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	OFF		
2 Heat / 2 Cool with t'stat with humidity control	OFF		
2 Heat / 1 Cool with t'stat with humidity control	OFF		
2 Heat / 1 Cool	OFF		

**Not required on all units*

Table 22B.

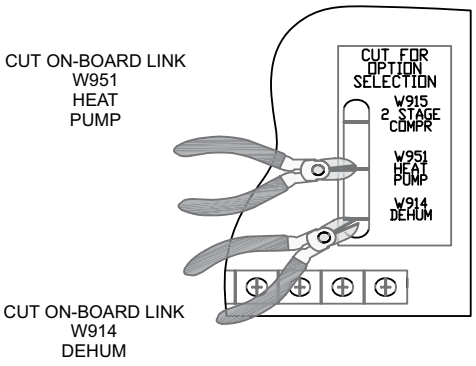
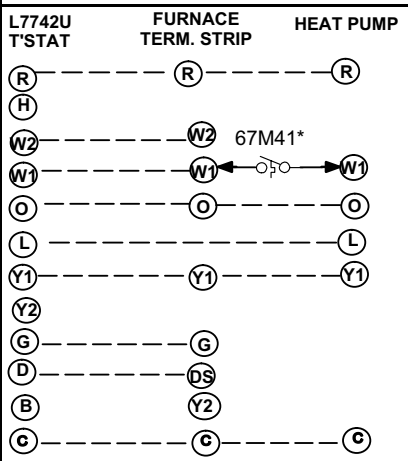
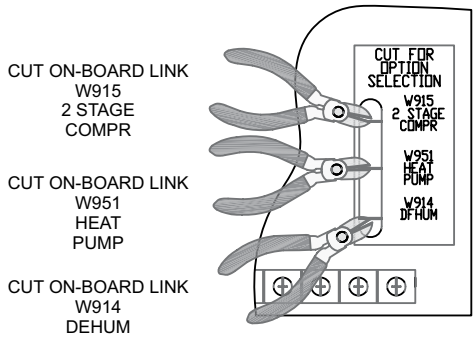
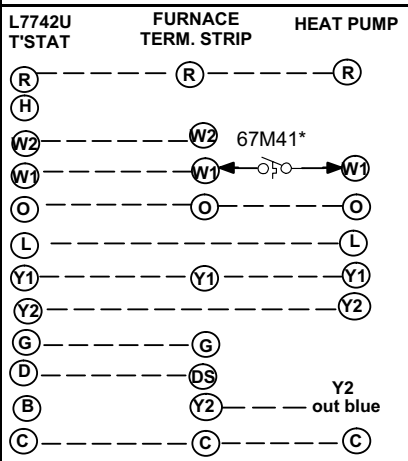
Field Wiring Applications with Conventional Thermostat (Continued)

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 Thermostat w/ dual fuel capabilities Capable of 2 stage gas heat control	OFF		
Dual Fuel Two Stage Heat Pump Thermostat w/ dual fuel capabilities Capable of 2 stage gas heat control	OFF		

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

Table 22C.

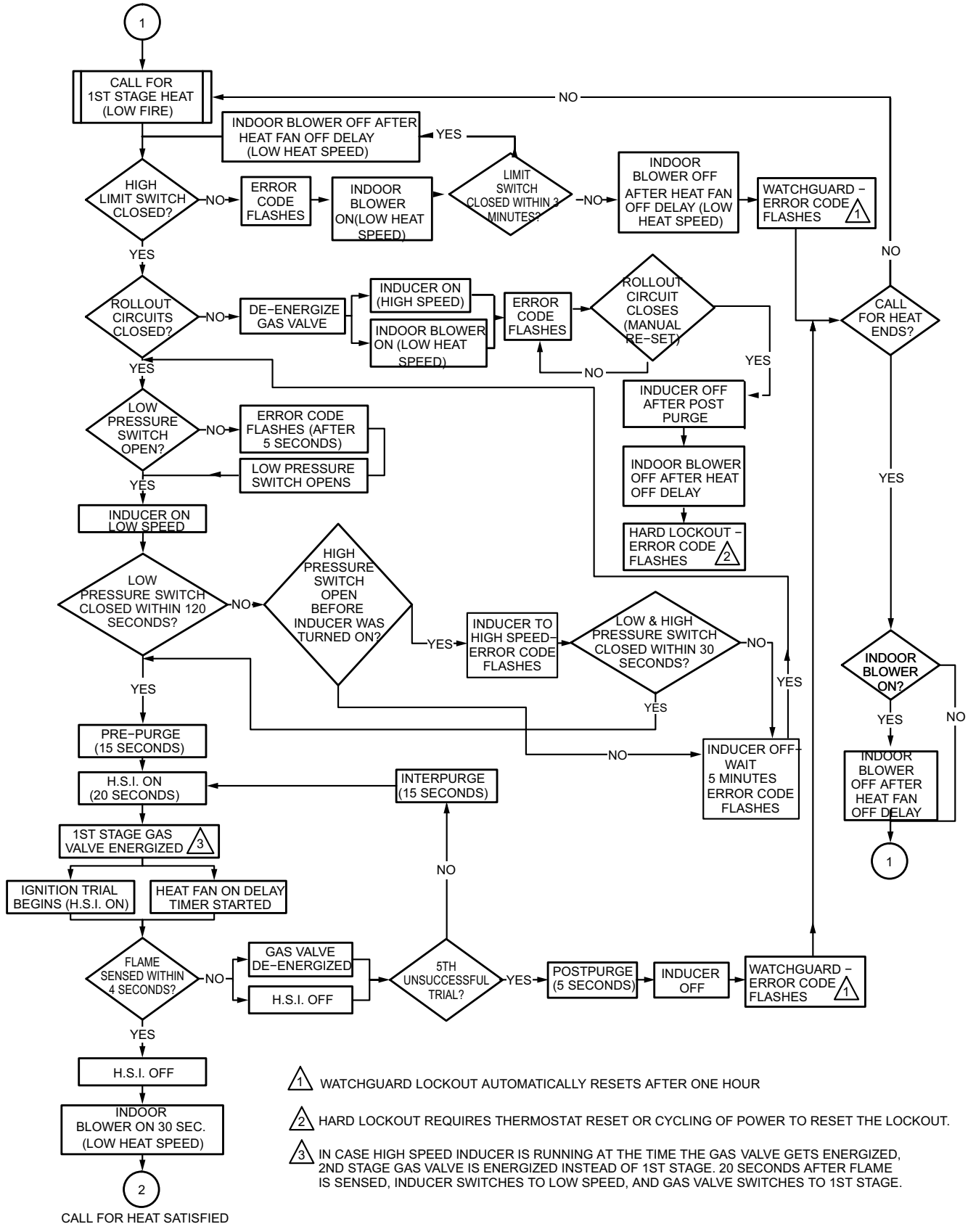
Field Wiring Applications with Conventional Thermostat (Continued)

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 Thermostat w/ dual fuel capabilities Capable of 2 stage gas heat control w/dehumidification control	OFF		
Dual Fuel Two Stage Heat Pump Thermostat w/ dual fuel capabilities Capable of 2 stage gas heat control w/dehumidification	OFF		

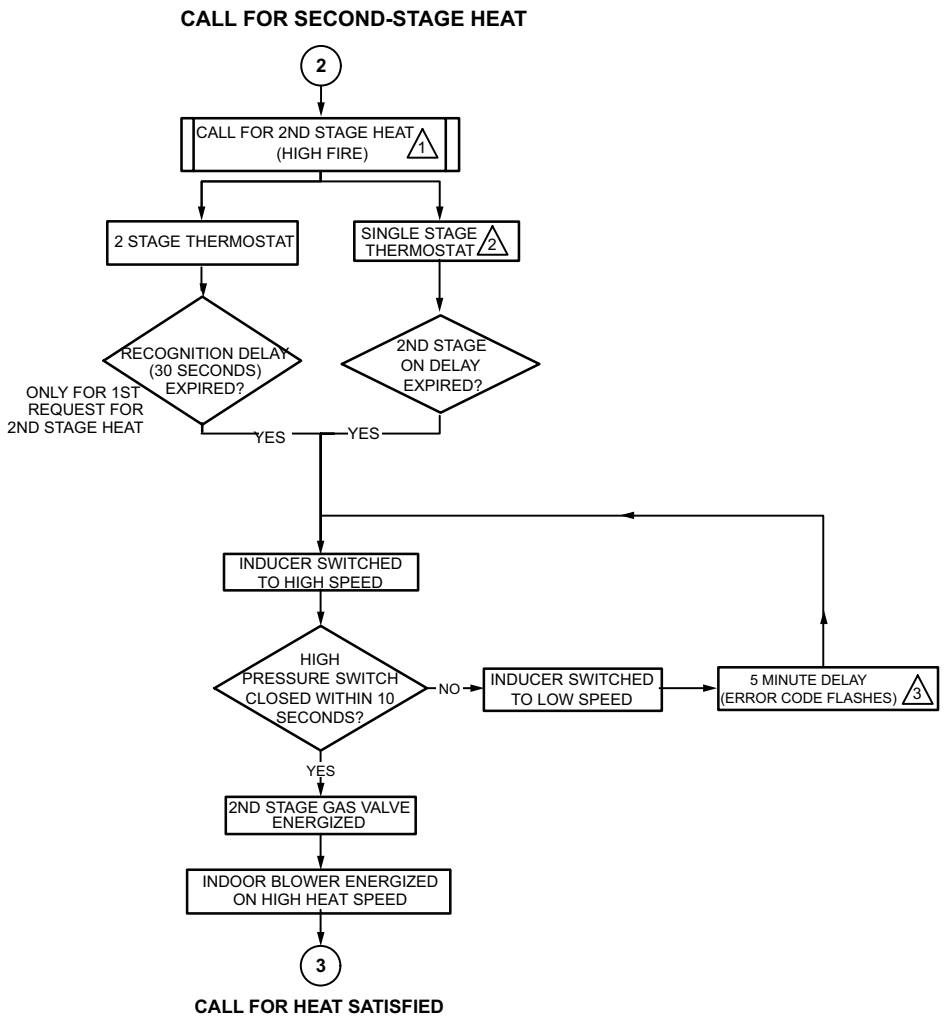
*NOTE - **DO NOT** make a wire connection between the room thermostat L terminal and the L terminal of the integrated control.*

Table 22D.

CALL FOR FIRST-STAGE HEAT



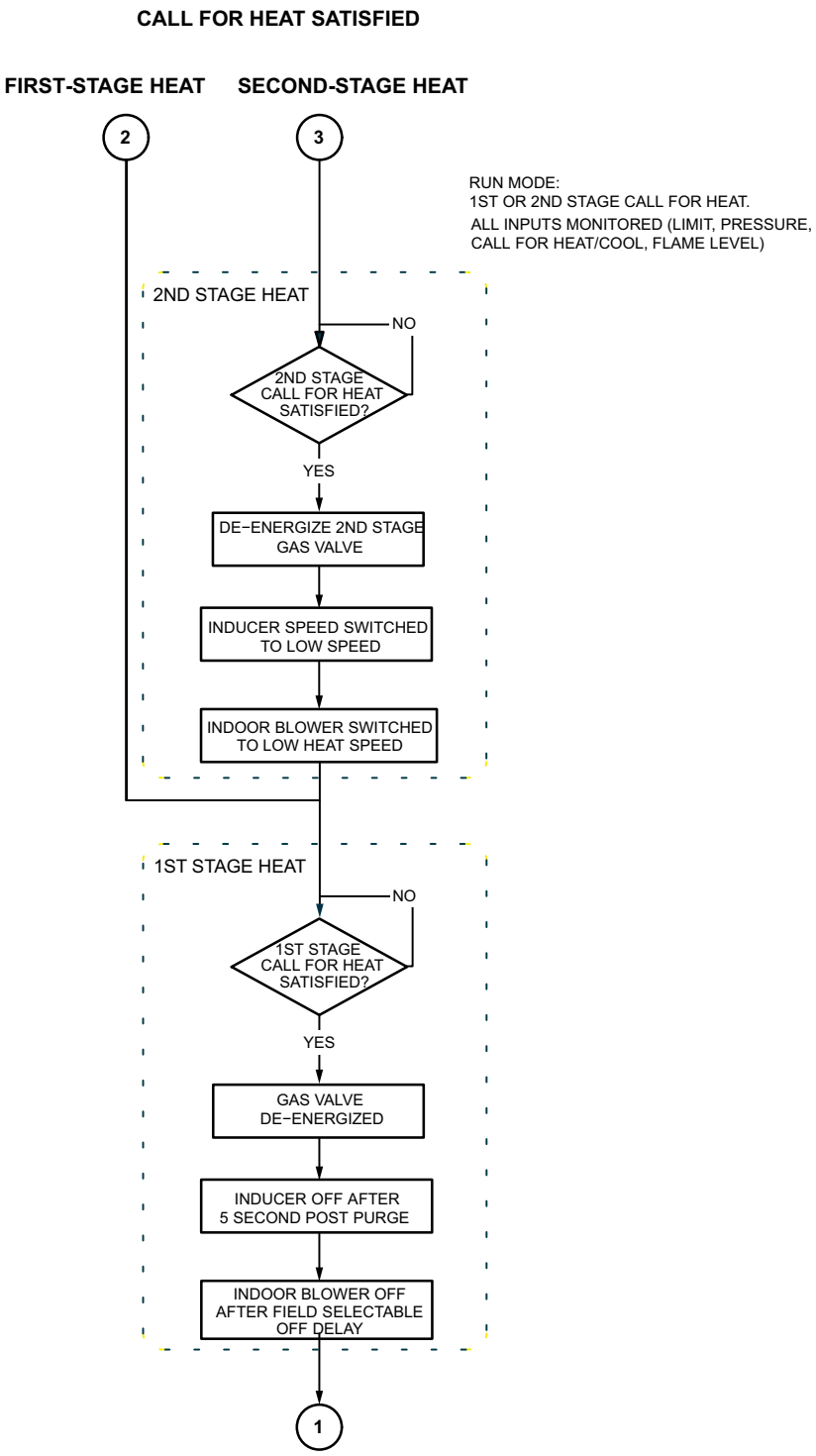
Troubleshooting: Heating Sequence of Operation (Continued)



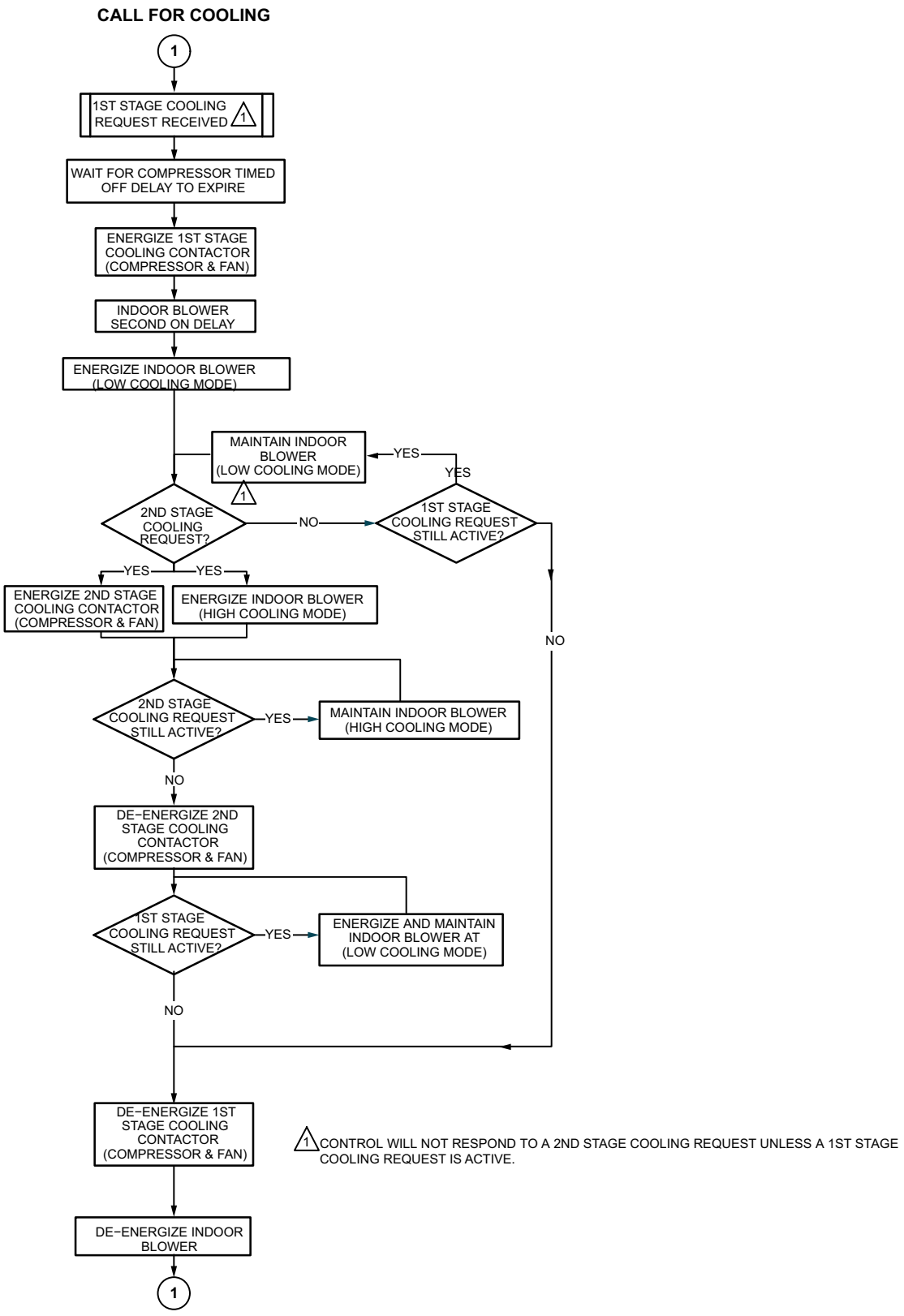
1 SYSTEM WILL ALWAYS LIGHT ON LOW FIIRE, EVEN IF 2ND STAGE HEAT IS IN PLACE.

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
2
3
RUN MODE:
1ST OR 2ND STAGE CALL FOR HEAT.
ALL INPUTS MONITORED (LIMIT, PRESSURE, CALL FOR HEAT/COOL, FLAME LEVEL)
2ND STAGE HEAT
NO
2ND STAGE CALL FOR HEAT SATISFIED?
YES
DE−ENERGIZE 2ND STAGE GAS VALVE
INDUCER SPEED SWITCHED TO LOW SPEED
INDOOR BLOWER SWITCHED TO LOW HEAT SPEED
1ST STAGE HEAT
NO
1ST STAGE CALL FOR HEAT SATISFIED?
YES
GAS VALVE DE−ENERGIZED
INDUCER OFF AFTER 5 SECOND POST PURGE
INDOOR BLOWER OFF AFTER FIELD SELECTABLE OFF DELAY
1

Troubleshooting: Cooling Sequence of Operation



Troubleshooting: Continuous Fan / Accessories Sequence of Operation