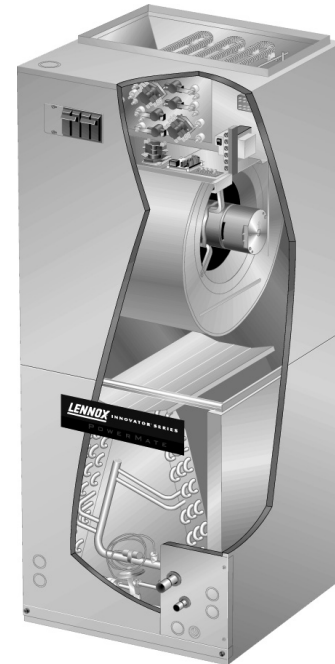


CBX32MV (HFC-410A) SERIES UNITS

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Introduction

The CBX32MV is a high efficiency residential split system blower/coil featuring a variable speed motor controlled by an electronic blower drive control (BDC).

CBX32MV series units are designed to be matched with Lennox two-speed or single-speed HFC-410A condensing units and heat pumps. Several models are available in sizes ranging from 1.5 through 5 tons. All units are equipped with factory installed check and expansion valve for cooling or heat pump applications.

Electric heat is available in several voltages and KW sizes, and can be field installed in the cabinet.

Some CBX32MV applications may include the optional Lennox ComfortSense® 7000, SignatureStat™ or Efficiency Plus Comfort Management Control (CCB1). The purpose of both controls is to vary indoor blower speed in response to indoor dehumidification demand. When a two-speed outdoor unit is used, compressor speed can also be controlled by the SignatureStat or CCB1 in response to indoor dehumidification demand.

Information contained in this manual is intended for use by experienced HVAC service technicians only. All specifications are subject to change. Procedures outlined in this manual are presented as a recommendation only and do not supersede or replace local or state codes.

⚠ WARNING



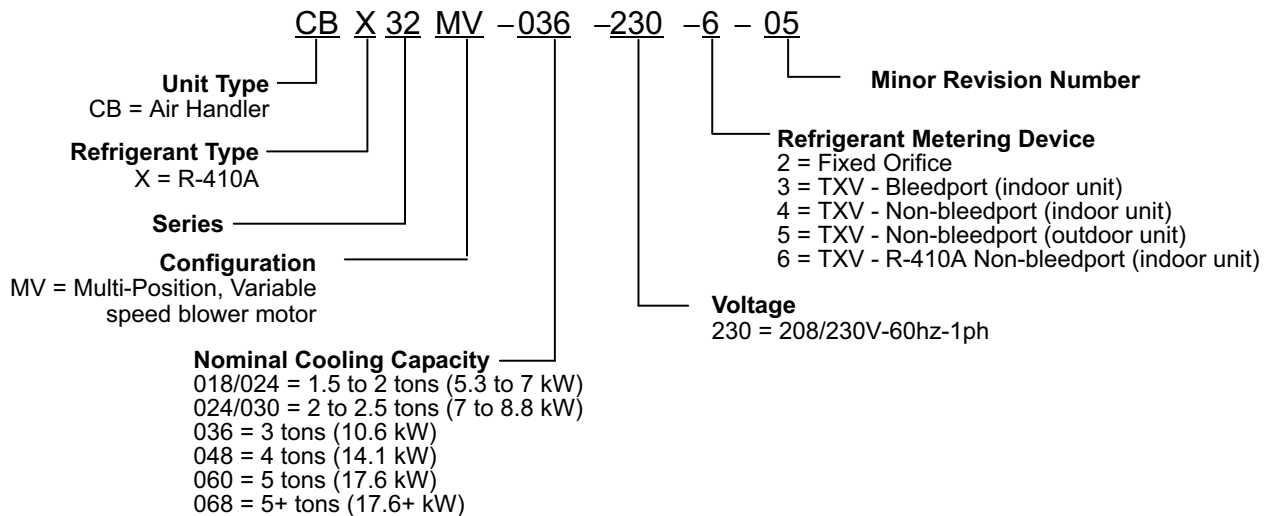
Electric shock hazard. Can cause injury or death. Before attempting to perform any service or maintenance, turn the electrical power to unit OFF at disconnect switch(es). Unit may have multiple power supplies.

**ELECTROSTATIC DISCHARGE (ESD)
Precautions and Procedures**

⚠ CAUTION

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

Model Number Identification



Specifications

General Data		Model Number	CBX32MV-018/024	CBX32MV-024/030	CBX32MV-036
Nominal cooling capacity - tons (kW)			1.5 - 2 (5.3 - 7)	2 - 2.5 (7 - 8.8)	3 (10.6)
Refrigerant			R-410A	R-410A	R-410A
Connections in. (mm)	Suction (vapor) line - sweat		5/8 (15.8)	3/4 (19)	3/4 (19)
	Liquid line - sweat		3/8 (9.5)	3/8 (9.5)	3/8 (9.5)
	Condensate drain (fpt)		(2) 3/4 (19)	(2) 3/4 (19)	(2) 3/4 (19)
Indoor Coil	Net face area - ft. ² (m ²)		3.56 (0.33)	4.44 (0.41)	5.0 (0.46)
	Tube outside diameter - in. (mm)		3/8 (9.5)	3/8 (9.5)	3/8 (9.5)
	Number of rows		3	3	3
	Fins per inch (fins per m)		12 (472)	12 (472)	12 (472)
Blower Data	Wheel nominal diameter x width - in. (mm)		10 x 7 (279 x 178)	10 x 8 (279 x 203)	10 x 8 (279 x 203)
	Motor output - hp (W)		1/2 (373)	1/2 (373)	1/2 (373)
Filters	¹ Number and size - in.		(1) 15 x 20 x 1	(1) 20 x 20 x 1	(1) 20 x 22 x 1
	mm		381 x 508 x 25	508 x 508 x 25	508 x 559 x 25
Shipping Data - 1 Package lbs. (kg)			126 (57)	152 (69)	183 (83)
ELECTRICAL DATA					
Voltage - phase - 60hz			208/230V-1ph	208/230V-1ph	208/230V-1ph
² Maximum overcurrent protection (unit only)			15	15	15
Minimum circuit ampacity (unit only)			5	5	5

Specifications

General Data		Model Number	CBX32MV-048	CBX32MV-060	CBX32MV-068
	Nominal cooling capacity - tons (kW)		4 (14.1)	5 (17.6)	5+ (17.6+)
	Refrigerant		R-410A	R-410A	R-410A
Connections in. (mm)	Suction (vapor) line - sweat		7/8 (22.2)	1-1/8 (28)	1-1/8 (28)
	Liquid line - sweat		3/8 (9.5)	3/8 (9.5)	3/8 (9.5)
	Condensate drain (fpt)		(2) 3/4 (19)	(2) 3/4 (19)	(2) 3/4 (19)
Indoor Coil	Net face area - ft. ² (m ²)		7.22 (0.67)	7.22 (0.67)	7.77 (0.72)
	Tube outside diameter - in. (mm)		3/8 (9.5)	3/8 (9.5)	3/8 (9.5)
	Number of rows		3	3	3
	Fins per inch (fins per m)		12 (472)	12 (472)	12 (472)
Blower Data	Wheel nominal diameter x width - in. (mm)		12 x 9 (305 x 229)	12 x 9 (305 x 229)	15 x 9 (381 x 229)
	Motor output - hp (W)		1 (746)	1 (746)	1 (746)
Filters	¹ Number and size - in.		(1) 20 x 24 x 1	(1) 20 x 24 x 1	(1) 20 x 25 x 1
	mm		508 x 610 x 25	508 x 610 x 25	508 x 635 x 25
Shipping Data - 1 Package - lbs. (kg)			212 (96)	212 (96)	244 (111)
ELECTRICAL DATA					
Voltage - phase - 60hz			208/230V-1ph	208/230V-1ph	208/230V-1ph
² Maximum overcurrent protection (unit only)			20	20	20
Minimum circuit ampacity (unit only)			11	11	11

Optional CIRCUIT BREAKER KITS - Must Be Ordered Extra

Amperage	25	30	35	40	45	50	60
Single Phase	23M58	23M59	23M60	23M61	23M62	23M63	23M64
Three Phase	---	23M65	---	23M66	23M67	23M68	23M69

Blower Data

CBX32MV-018/024 BLOWER PERFORMANCE

0 through 0.80 in. w.g. (0 through 200 Pa) External Static Pressure Range

"ADJUST" Jumper Setting	BDC3 Jumper Speed Positions															
	"HEAT" Speed								"COOL" Speed							
	1		2		3		4		1		2		3		4	
	cfm	L/s	cfm	L/s	cfm	L/s	cfm	L/s	cfm	L/s	cfm	L/s	cfm	L/s	cfm	L/s
+	715	337	855	405	1000	470	1130	535	465	220	690	325	900	425	1050	495
NORM	670	315	770	365	900	425	1035	490	425	200	620	290	825	390	950	450
-	580	275	700	330	800	375	930	440	385	180	560	265	735	345	850	400

NOTES - The effect of static pressure, filter and electric heater resistance is included in the air volumes listed.
 Low speed cooling air volume is 70% of COOL speed setting. Production units September 2005 and later; continuous blower speed for is approximately 38% of COOL speed setting. Earlier production units continuous blower speed is approximately 50% of COOL speed setting.
 Harmony Zone Control applications - Low speed cooling is approximately 250 cfm (118 L/s).
 Lennox Harmony III™ Zone Control applications - Low speed cooling is 300 cfm (145 L/s)

CBX32MV-018/024 BLOWER MOTOR WATTS AT "+" (Plus) BDC3 SETTING ("Adjust" Jumper at "+" Setting)

BDC3 Jumper Speed Positions	Motor Watts @ Various External Static Pressures - in. wg. (Pa)									
	0 (0)	0.1 (25)	0.2 (50)	0.3 (75)	0.4 (100)	0.5 (125)	0.6 (150)	0.7 (175)	0.8 (200)	
"HEAT" Speed	Tap 1	100	113	126	142	154	172	190	206	230
	Tap 2	155	176	197	221	237	260	278	295	310
	Tap 3	237	260	289	305	314	337	356	373	390
	Tap 4	338	361	379	409	433	457	447	426	406
"COOL" Speed	Tap 1	36	47	61	71	81	95	106	118	135
	Tap 2	89	103	118	129	143	163	177	197	207
	Tap 3	183	198	229	248	266	290	307	327	343
	Tap 4	266	294	315	330	349	373	390	411	401

CBX32MV-018/024 BLOWER MOTOR WATTS AT "NORM" BDC3 SETTING ("Adjust" Jumper at NORM Setting)

BDC3 Jumper Speed Positions	Motor Watts @ Various External Static Pressures - in. wg. (Pa)									
	0 (0)	0.1 (25)	0.2 (50)	0.3 (75)	0.4 (100)	0.5 (125)	0.6 (150)	0.7 (175)	0.8 (200)	
"HEAT" Speed	Tap 1	77	96	106	123	130	150	165	178	201
	Tap 2	118	136	154	177	189	212	224	247	265
	Tap 3	183	198	224	248	264	284	307	321	343
	Tap 4	264	284	300	326	343	367	385	406	390
"COOL" Speed	Tap 1	30	41	55	62	76	86	94	106	114
	Tap 2	71	83	101	113	125	138	156	166	185
	Tap 3	137	158	176	199	219	238	254	273	296
	Tap 4	211	225	249	272	295	318	331	342	367

CBX32MV-018/024 BLOWER MOTOR WATTS AT "-" (Minus) BDC3 SETTING ("Adjust" Jumper at "-" Setting)

BDC3 Jumper Speed Positions	Motor Watts @ Various External Static Pressures - in. wg. (Pa)									
	0 (0)	0.1 (25)	0.2 (50)	0.3 (75)	0.4 (100)	0.5 (125)	0.6 (150)	0.7 (175)	0.8 (200)	
"HEAT" Speed	Tap 1	59	73	89	106	113	130	142	156	173
	Tap 2	95	106	118	136	152	171	183	200	215
	Tap 3	132	148	171	186	211	225	248	266	284
	Tap 4	195	217	242	259	283	302	314	336	349
"COOL" Speed	Tap 1	27	35	47	59	71	77	88	92	106
	Tap 2	57	65	83	94	110	119	134	148	166
	Tap 3	110	124	141	157	176	188	213	231	242
	Tap 4	148	170	195	207	230	248	272	282	306

CBX32MV-024/030 BLOWER PERFORMANCE
0 through 0.80 in. w.g. (0 through 200 Pa) External Static Pressure Range

"ADJUST" Jumper Setting	BDC3 Jumper Speed Positions															
	"HEAT" Speed								"COOL" Speed							
	1		2		3		4		1		2		3		4	
	cfm	L/s	cfm	L/s	cfm	L/s	cfm	L/s	cfm	L/s	cfm	L/s	cfm	L/s	cfm	L/s
+	800	380	935	440	1070	505	1210	570	660	310	880	415	1100	520	1320	625
NORM	725	340	850	400	975	460	1100	520	600	285	800	380	1000	470	1200	565
-	655	310	765	360	880	415	990	470	540	255	720	340	900	425	1080	510

NOTES - The effect of static pressure, filter and electric heater resistance is included in the air volumes listed.
 Low speed cooling air volume is 70% of COOL speed setting. Production units September 2005 and later; continuous blower speed for is approximately 38% of COOL speed setting. Earlier production units continuous blower speed is approximately 50% of COOL speed setting.
 Harmony Zone III Control applications - Low speed cooling is approximately 300 cfm (145 L/s).

CBX32MV-024/030 BLOWER MOTOR WATTS AT "+" (Plus) BDC3 SETTING ("Adjust" Jumper at "+" Setting)

BDC3 Jumper Speed Positions		Motor Watts @ Various External Static Pressures - in. wg. (Pa)								
		0 (0)	0.1 (25)	0.2 (50)	0.3 (75)	0.4 (100)	0.5 (125)	0.6 (150)	0.7 (175)	0.8 (200)
"HEAT" Speed	Tap 1	65	90	120	145	185	210	240	250	275
	Tap 2	95	125	150	185	230	265	310	345	365
	Tap 3	140	190	225	250	290	320	350	405	450
	Tap 4	215	250	285	315	350	390	440	480	505
"COOL" Speed	Tap 1	45	60	90	120	140	155	165	185	200
	Tap 2	80	110	135	165	205	250	285	315	335
	Tap 3	150	195	225	260	295	320	370	425	465
	Tap 4	265	315	350	400	440	485	525	555	605

CBX32MV-024/030 BLOWER MOTOR WATTS AT "NORM" BDC3 SETTING ("Adjust" Jumper at NORM Setting)

BDC3 Jumper Speed Positions		Motor Watts @ Various External Static Pressures - in. wg. (Pa)								
		0 (0)	0.1 (25)	0.2 (50)	0.3 (75)	0.4 (100)	0.5 (125)	0.6 (150)	0.7 (175)	0.8 (200)
"HEAT" Speed	Tap 1	50	75	100	135	155	180	195	215	230
	Tap 2	80	105	130	155	200	245	265	295	310
	Tap 3	110	150	175	200	235	275	320	350	390
	Tap 4	155	205	230	270	290	325	360	405	460
"COOL" Speed	Tap 1	40	55	80	105	120	130	150	165	180
	Tap 2	65	90	120	145	190	210	240	260	285
	Tap 3	105	145	175	220	250	285	335	370	405
	Tap 4	200	245	275	300	335	385	420	470	515

CBX32MV-024/030 BLOWER MOTOR WATTS AT "-" (Minus) BDC3 SETTING ("Adjust" Jumper at "-" Setting)

BDC3 Jumper Speed Positions		Motor Watts @ Various External Static Pressures - in. wg. (Pa)								
		0 (0)	0.1 (25)	0.2 (50)	0.3 (75)	0.4 (100)	0.5 (125)	0.6 (150)	0.7 (175)	0.8 (200)
"HEAT" Speed	Tap 1	45	65	90	110	130	150	165	190	195
	Tap 2	60	85	110	145	175	200	215	235	240
	Tap 3	85	105	130	165	210	245	280	305	330
	Tap 4	115	145	175	205	230	280	325	370	390
"COOL" Speed	Tap 1	30	50	70	90	100	115	125	140	165
	Tap 2	55	75	100	135	155	185	190	210	225
	Tap 3	85	115	135	175	210	255	295	320	345
	Tap 4	145	175	215	245	280	325	355	410	450

CBX32MV-036 BLOWER PERFORMANCE

0 through 0.80 in. w.g. (0 through 200 Pa) External Static Pressure Range

"ADJUST" Jumper Setting	BDC3 Jumper Speed Positions															
	"HEAT" Speed								"COOL" Speed							
	1		2		3		4		1		2		3		4	
	cfm	L/s	cfm	L/s	cfm	L/s	cfm	L/s	cfm	L/s	cfm	L/s	cfm	L/s	cfm	L/s
+	1230	580	1335	630	1445	680	1545	730	1090	515	1225	580	1380	650	1545	730
NORM	1120	530	1215	575	1315	620	1400	660	975	460	1125	530	1275	600	1400	660
-	1010	475	1185	560	1200	565	1265	595	900	425	1000	470	1135	535	1265	595

NOTES - The effect of static pressure, filter and electric heater resistance is included in the air volumes listed.
 Low speed cooling air volume is 70% of COOL speed setting (65% COOL speed for production prior to August 2002). Production units September 2005 and later; continuous blower speed for is approximately 38% of COOL speed setting. Earlier production units continuous blower speed is approximately 50% of COOL speed setting.
 Harmony Zone Control applications - Low speed cooling is approximately 380 cfm (178 L/s).
 Lennox Harmony III™ Zone Control applications - minimum blower speed is 442 cfm (210 L/s).

CBX32MV-036 BLOWER MOTOR WATTS AT "+" (Plus) BDC3 SETTING ("Adjust" Jumper at "+" Setting)

BDC3 Jumper Speed Positions		Motor Watts @ Various External Static Pressures - in. wg. (Pa)								
		0 (0)	0.1 (25)	0.2 (50)	0.3 (75)	0.4 (100)	0.5 (125)	0.6 (150)	0.7 (175)	0.8 (200)
"HEAT" Speed	Tap 1	220	235	265	290	310	335	360	385	465
	Tap 2	285	305	330	355	380	405	430	450	475
	Tap 3	345	365	405	430	455	485	515	545	570
	Tap 4	470	495	515	530	545	560	575	595	610
"COOL" Speed	Tap 1	145	165	200	225	250	275	300	325	350
	Tap 2	225	245	265	290	320	350	370	395	410
	Tap 3	305	325	350	390	420	445	475	505	535
	Tap 4	470	495	515	530	545	560	575	595	610

CBX32MV-036 BLOWER MOTOR WATTS AT "NORM" BDC3 SETTING ("Adjust" Jumper at NORM Setting)

BDC3 Jumper Speed Positions		Motor Watts @ Various External Static Pressures - in. wg. (Pa)								
		0 (0)	0.1 (25)	0.2 (50)	0.3 (75)	0.4 (100)	0.5 (125)	0.6 (150)	0.7 (175)	0.8 (200)
"HEAT" Speed	Tap 1	155	185	215	240	265	285	300	335	355
	Tap 2	225	245	270	295	325	345	370	390	415
	Tap 3	275	290	315	340	375	400	420	445	465
	Tap 4	320	345	375	405	435	460	485	515	540
"COOL" Speed	Tap 1	120	140	160	190	210	230	255	275	300
	Tap 2	160	190	220	240	265	290	320	340	365
	Tap 3	255	270	295	320	345	375	400	420	445
	Tap 4	320	345	375	405	435	460	485	515	540

CBX32MV-036 BLOWER MOTOR WATTS AT "-" (Minus) BDC3 SETTING ("Adjust" Jumper at "-" Setting)

BDC3 Jumper Speed Positions		Motor Watts @ Various External Static Pressures - in. wg. (Pa)								
		0 (0)	0.1 (25)	0.2 (50)	0.3 (75)	0.4 (100)	0.5 (125)	0.6 (150)	0.7 (175)	0.8 (200)
"HEAT" Speed	Tap 1	120	135	165	185	205	225	245	265	300
	Tap 2	140	165	195	215	245	270	300	315	335
	Tap 3	185	210	240	265	285	310	330	360	385
	Tap 4	245	255	290	310	335	355	380	405	430
"COOL" Speed	Tap 1	90	110	135	155	180	195	210	230	250
	Tap 2	120	140	160	185	215	235	255	275	295
	Tap 3	160	190	225	240	275	295	320	350	380
	Tap 4	245	255	290	310	335	355	380	405	430

CBX32MV-048 AND CBX32MV-060 BLOWER PERFORMANCE
0 through 0.80 in. w.g. (0 Through 200 Pa) External Static Pressure Range

"ADJUST" Jumper Setting	BDC3 Jumper Speed Positions															
	"HEAT" Speed								"COOL" Speed							
	1		2		3		4		1		2		3		4	
	cfm	L/s	cfm	L/s	cfm	L/s	cfm	L/s	cfm	L/s	cfm	L/s	cfm	L/s	cfm	L/s
+	1850	875	1960	925	2090	985	2150	1015	1625	765	1820	860	2055	970	2145	1010
NORM	1705	805	1800	850	1900	895	2005	945	1425	670	1625	765	1805	850	2005	945
-	1560	735	1625	765	1720	810	1770	835	1205	570	1375	650	1555	735	1725	815

NOTES - The effect of static pressure, filter and electric heater resistance is included in the air volumes listed.
 Low speed cooling air volume is 70% of COOL speed setting (60% of COOL speed for production prior to August 2002). Production units September 2005 and later; continuous blower speed for is approximately 38% of COOL speed setting. Earlier production units continuous blower speed is approximately 50% of COOL speed setting.
 Harmony Zone Control applications - Low speed cooling is approximately 400 cfm (190 L/s).
 Lennox Harmony III™ Zone Control applications - minimum blower speed is 442 cfm (210 L/s)

CBX32MV-048 AND CBX32MV-060 BLOWER MOTOR WATTS AT "+" (Plus) BDC3 SETTING ("Adjust" Jumper at "+" Setting)

BDC3 Jumper Speed Positions		Motor Watts @ Various External Static Pressures - in. wg. (Pa)								
		0 (0)	0.1 (25)	0.2 (50)	0.3 (75)	0.4 (100)	0.5 (125)	0.6 (150)	0.7 (175)	0.8 (200)
"HEAT" Speed	Tap 1	455	505	540	585	630	665	710	745	780
	Tap 2	555	595	645	675	730	780	820	865	895
	Tap 3	680	720	770	820	865	900	945	985	1030
	Tap 4	730	780	825	870	920	970	1020	1055	1110
"COOL" Speed	Tap 1	300	335	370	360	435	465	500	535	575
	Tap 2	425	475	500	545	585	635	670	710	745
	Tap 3	625	660	705	755	810	850	885	940	970
	Tap 4	700	750	800	845	895	940	990	1030	1080

CBX32MV-048 AND CBX32MV-060 BLOWER MOTOR WATTS AT "NORM" BDC3 SETTING ("Adjust" Jumper at NORM Setting)

BDC3 Jumper Speed Positions		Motor Watts @ Various External Static Pressures - in. wg. (Pa)								
		0 (0)	0.1 (25)	0.2 (50)	0.3 (75)	0.4 (100)	0.5 (125)	0.6 (150)	0.7 (175)	0.8 (200)
"HEAT" Speed	Tap 1	360	385	425	465	495	525	565	600	635
	Tap 2	400	440	485	520	555	595	640	670	705
	Tap 3	480	520	560	605	640	685	765	785	805
	Tap 4	580	625	665	710	760	800	835	875	925
"COOL" Speed	Tap 1	215	235	275	295	330	360	400	430	465
	Tap 2	310	335	375	405	440	465	500	530	565
	Tap 3	415	445	490	535	565	605	650	675	715
	Tap 4	580	610	655	695	740	785	830	870	910

CBX32MV-048 AND CBX32MV-060 BLOWER MOTOR WATTS AT "-" (Minus) BDC3 SETTING ("Adjust" Jumper at "-" Setting)

BDC3 Jumper Speed Positions		Motor Watts @ Various External Static Pressures - in. wg. (Pa)								
		0 (0)	0.1 (25)	0.2 (50)	0.3 (75)	0.4 (100)	0.5 (125)	0.6 (150)	0.7 (175)	0.8 (200)
"HEAT" Speed	Tap 1	265	305	340	370	410	440	460	505	540
	Tap 2	320	350	395	420	450	475	515	545	580
	Tap 3	375	410	435	470	515	545	575	610	645
	Tap 4	400	435	480	525	555	595	640	670	700
"COOL" Speed	Tap 1	140	170	195	215	250	275	300	335	360
	Tap 2	200	230	260	285	315	355	385	415	450
	Tap 3	280	315	340	380	415	445	465	505	540
	Tap 4	375	420	440	475	515	550	575	610	645

CBX32MV-068 BLOWER PERFORMANCE
0 through 0.80 in. w.g. (0 Through 200 Pa) External Static Pressure Range

"ADJUST" Jumper Setting	BDC3 Jumper Speed Positions															
	"HEAT" Speed								"COOL" Speed							
	1		2		3		4		1		2		3		4	
	cfm	L/s	cfm	L/s	cfm	L/s	cfm	L/s	cfm	L/s	cfm	L/s	cfm	L/s	cfm	L/s
+	1875	885	1975	930	2090	985	2150	1015	1640	775	1840	870	2075	980	2150	1015
NORM	1760	830	1825	860	1920	905	2030	960	1465	690	1625	765	1800	850	2000	945
-	1550	730	1650	780	1725	815	1800	850	1250	590	1390	655	1560	735	1720	810

NOTES - The effect of static pressure, filter and electric heater resistance is included in the air volumes listed.
 First stage cooling air volume is 60% of COOL speed setting. Production units September 2005 and later; continuous blower speed for is approximately 38% of COOL speed setting. Earlier production units continuous blower speed is approximately 50% of COOL speed setting.
 Lennox Harmony III™ Zone Control applications - minimum blower speed is 442 cfm (210 L/s).

CBX32MV-068 BLOWER MOTOR WATTS AT "+" (Plus) BDC3 SETTING ("Adjust" Jumper at "+" Setting)

BDC3 Jumper Speed Positions		Motor Watts @ Various External Static Pressures - in. wg. (Pa)								
		0 (0)	0.1 (25)	0.2 (50)	0.3 (75)	0.4 (100)	0.5 (125)	0.6 (150)	0.7 (175)	0.8 (200)
"HEAT" Speed	Tap 1	365	410	455	495	545	610	660	725	790
	Tap 2	430	485	540	590	640	690	765	835	865
	Tap 3	540	585	635	695	750	800	815	840	865
	Tap 4	665	710	755	770	790	810	830	845	870
"COOL" Speed	Tap 1	255	290	320	365	415	455	505	550	590
	Tap 2	355	390	425	475	515	580	630	695	750
	Tap 3	505	565	610	70	715	790	815	845	865
	Tap 4	725	745	755	770	790	810	830	850	870

CBX32MV-068 BLOWER MOTOR WATTS AT "NORM" BDC3 SETTING ("Adjust" Jumper at NORM Setting)

BDC3 Jumper Speed Positions		Motor Watts @ Various External Static Pressures - in. wg. (Pa)								
		0 (0)	0.1 (25)	0.2 (50)	0.3 (75)	0.4 (100)	0.5 (125)	0.6 (150)	0.7 (175)	0.8 (200)
"HEAT" Speed	Tap 1	310	345	385	425	465	510	560	610	665
	Tap 2	345	385	420	460	500	620	615	680	735
	Tap 3	385	430	480	525	580	640	695	750	815
	Tap 4	475	525	560	615	660	720	785	845	810
"COOL" Speed	Tap 1	180	205	240	285	325	365	405	435	480
	Tap 2	250	285	320	355	410	455	505	535	585
	Tap 3	345	375	415	460	505	560	610	670	735
	Tap 4	445	510	560	595	665	725	790	845	865

CBX32MV-068 BLOWER MOTOR WATTS AT "-" (Minus) BDC3 SETTING ("Adjust" Jumper at "-" Setting)

BDC3 Jumper Speed Positions		Motor Watts @ Various External Static Pressures - in. wg. (Pa)								
		0 (0)	0.1 (25)	0.2 (50)	0.3 (75)	0.4 (100)	0.5 (125)	0.6 (150)	0.7 (175)	0.8 (200)
"HEAT" Speed	Tap 1	215	245	285	325	375	415	460	495	540
	Tap 2	255	295	325	370	410	460	510	545	580
	Tap 3	295	330	375	395	445	495	555	600	660
	Tap 4	335	370	400	445	505	550	600	660	705
"COOL" Speed	Tap 1	125	150	170	210	245	270	300	340	370
	Tap 2	160	185	225	255	300	335	365	415	450
	Tap 3	225	245	280	320	370	420	460	510	545
	Tap 4	290	325	355	400	445	490	545	595	650

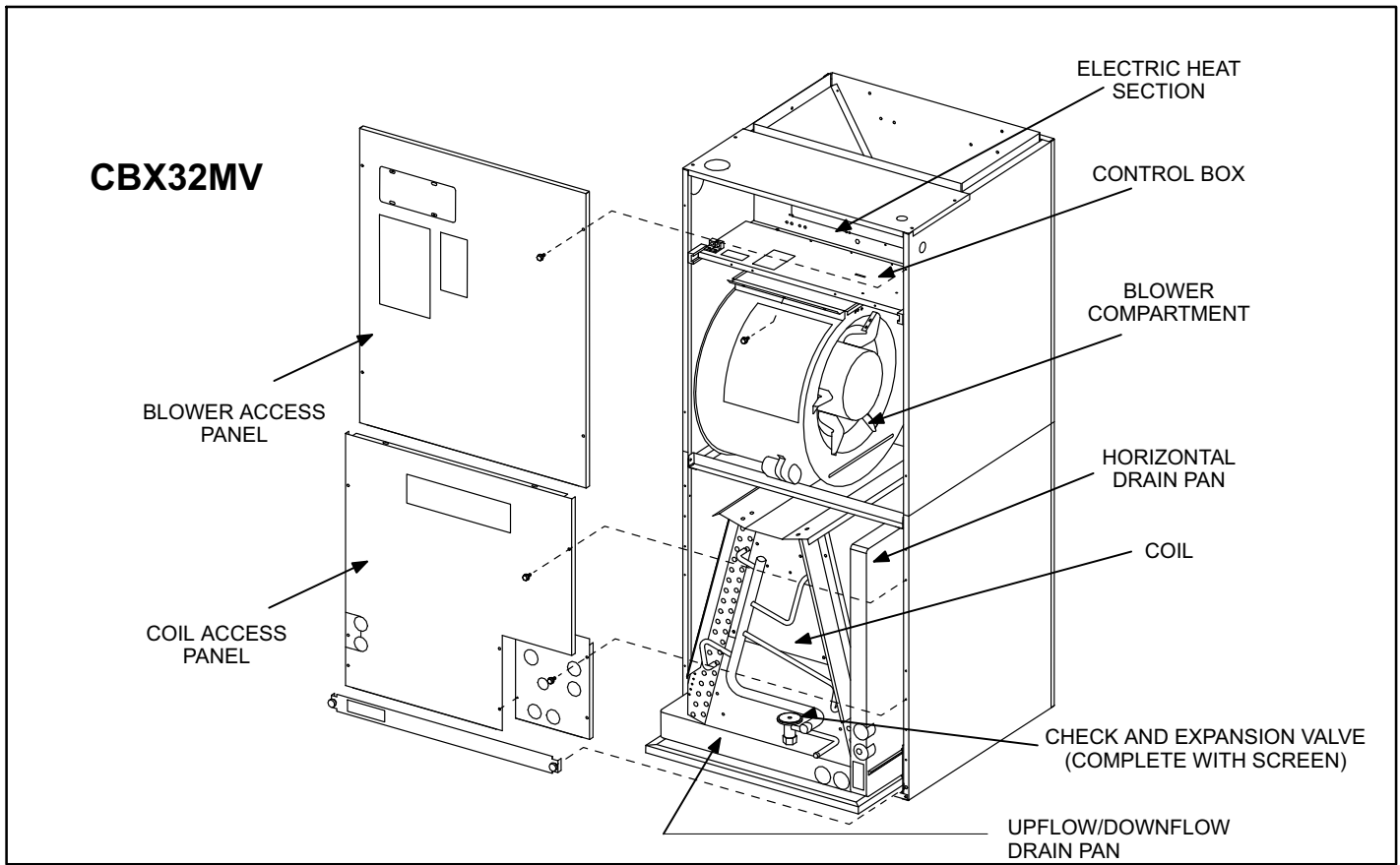


FIGURE 1

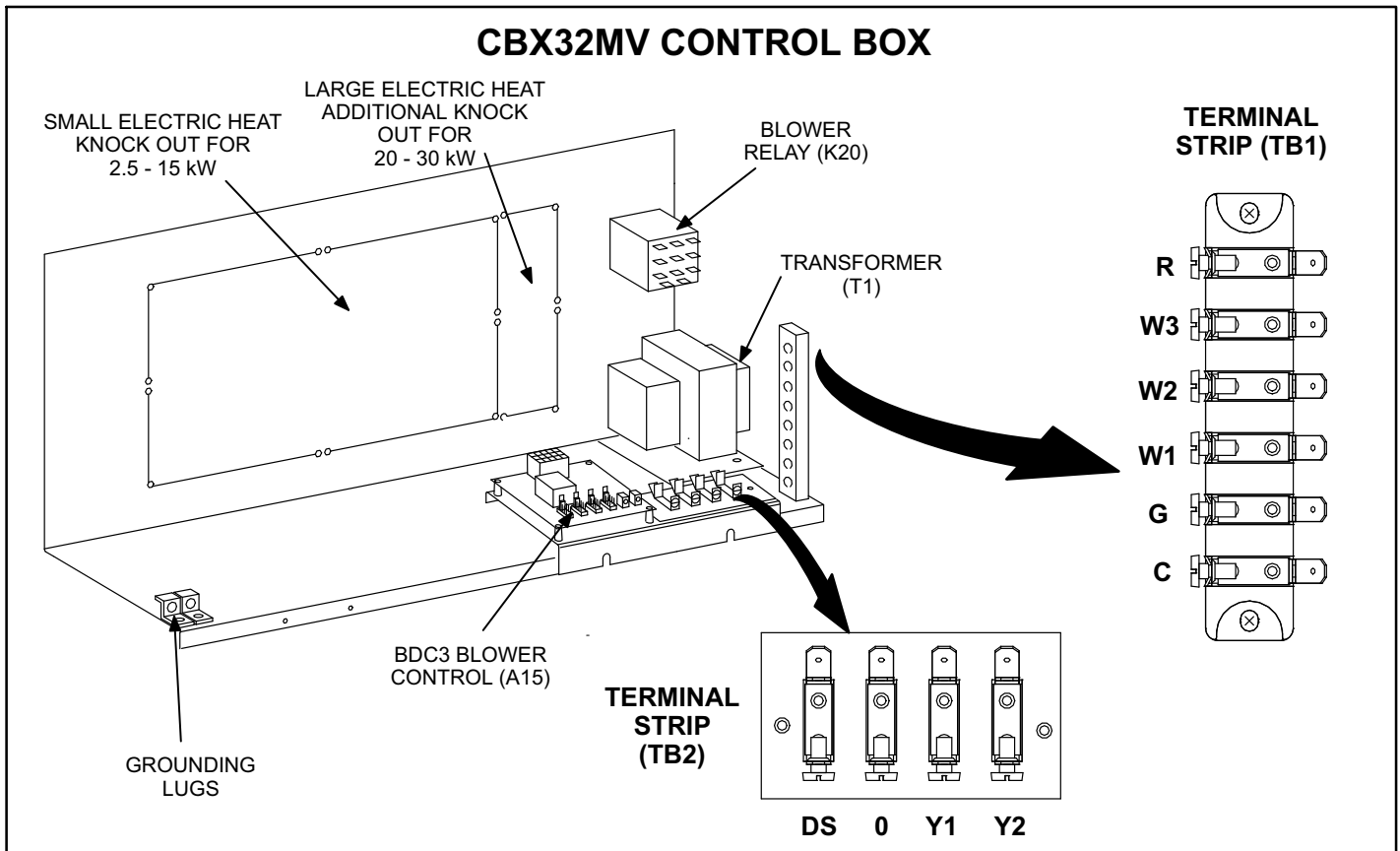


FIGURE 2

I-APPLICATION

CBX32MV blower coils are designed for R410A applications only. **All major blower coil components must be matched according to Lennox recommendations for the unit to be covered under warranty.** Refer to the Engineering Handbook for approved system matchups. A misapplied system will cause erratic operation and can result in early unit failure. The units come with factory installed check and expansion valve for all applications. It has been installed internally and is accessible if required.

II-UNIT COMPONENTS

A-Control Box

The CBX32MV control box is shown in figure 2. Line voltage and electric heat connections are made in the control box. Optional electric heat fits through an opening located in the center of the control box. When electric heat is not used, knockout plates cover the opening. The electric heat control arrangement is detailed in the electric heat section of this manual.

B-Terminal Strips (TB1 and TB2)

All CBX32MV units are equipped with two low voltage terminal strips (TB1 and TB2) located in the control box. See figure 2. The strips are used for making up all indoor thermostat wires.

All CBX32MV units have factory installed jumpers connecting DS to Y1, R to O and Y1 to Y2. These jumpers will have to be removed in certain unit application. See table 1.

TABLE 1

Application	Remove Jumpers
Harmony II, CCB1, SignatureStat™	DS to Y1
Heat Pump	R to O
Two-Stage Cooling	Y1 to Y2

C-Transformer (T1)

All CBX32MV series units use a single line voltage to 24VAC transformer mounted in the control box. The transformer supplies power to the control circuits in the indoor and outdoor unit.

D-Blower Relay (K20)

All units use SPDT relay to energize the blower motor in response to heating demand. The relay coil is energized when the 1st stage electric heat relay closes. When K20 is energized, its N.O. contacts close to energize jack plug JP46 pin 2 (located on blower drive control A15). When JP46-2 is energized, the blower drive control immediately energizes the blower on heating speed. Heating speed will override cooling speed. K20-2 will energize the economizer if used (refer to wiring diagram.)

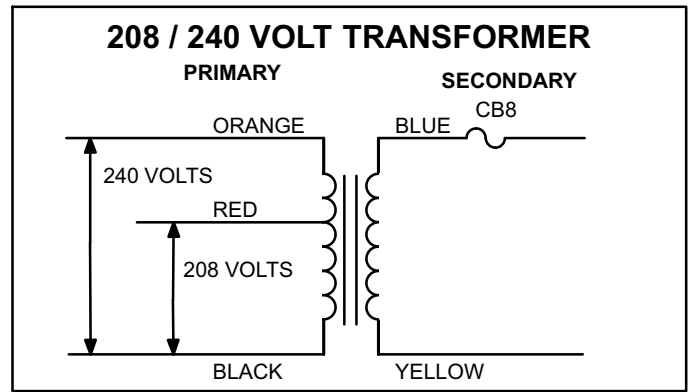


FIGURE 3

E-Circuit Breaker (CB8)-1 units & Fuse (F1)

All transformers used in the CBX32MV-1 series units are equipped with internal secondary voltage overcurrent protection. Each transformer uses a manual re-set circuit breaker (CB8) located on the transformer. The circuit breaker is connected in series with the blue secondary voltage wire and is rated at 3.5 Amps. CBX23MV-2 units and later are equipped with a fuse (F1) rated at 3 amps. F1 is connected in series with the blue secondary voltage wire and like CB8 provides overcurrent protection.

F-Plastic Drain Pans

Both upflow/downflow and horizontal drain pans are provided and installed on the CBX32MV units. The drain pans are made from fiberglass-filled plastic. The drain hole is used for right-hand air discharge only, and must be plugged when the unit is configured for left-hand air discharge (see page 24 for horizontal left-hand application). Each pan has a set of connections, one for a primary drain and one for an auxiliary drain.

G-Coil

All CBX32MV series units have dual slab coils arranged in an "A" configuration. Each coil has two or three rows of copper tubes fitted with ripple-edge aluminum fins. A check and expansion valve complete with screen feeds multiple parallel circuits through the coils. The coil is designed to easily slide out of the unit cabinet.

Optional electric heating elements are sequenced so blower relay K20 operates on a first on/last off basis.

H-Variable Speed Blower Motor (B3)

CBX32MV series units use a single-phase variable-speed motor. See figure 4. A solid-state controller is attached to the motor.

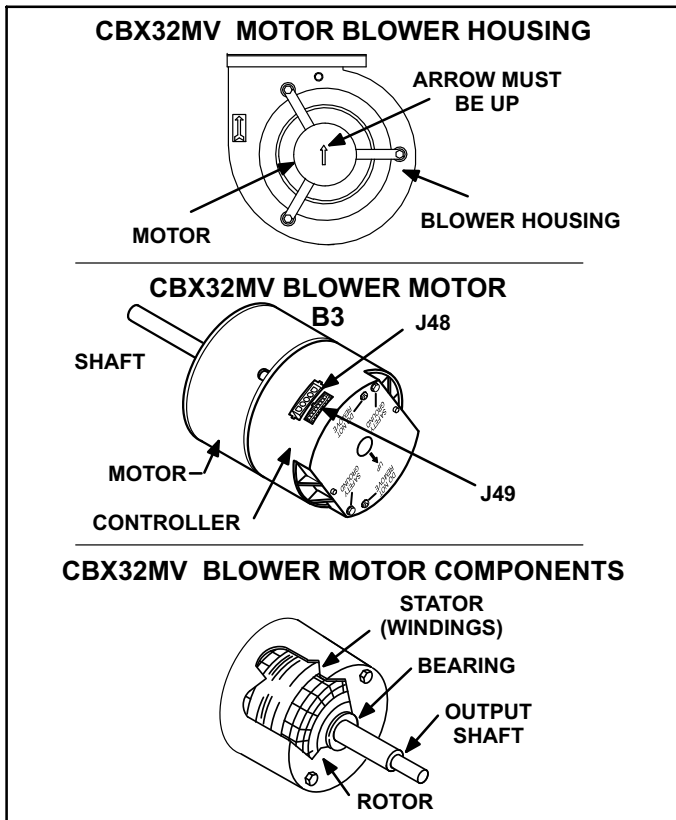


FIGURE 4

I-BDC3 Blower Control Board (A15)

CFM on the CBX32MV unit is controlled by the BDC3 board (A15) located in the control box. CFM can be obtained by positioning jumpers (**COOL**, **HEAT** and **ADJUST**) on the BDC3 board. The jumpers are labeled 1,2,3, and 4. Each enables a different air volume. Diagnostic LEDs are provided as an aid in identifying the unit's mode of operation. The LEDs are labeled **RUN** and **CFM**. See figure 5.

BLOWER SPEED ADJUSTMENTS

Diagnostic LEDs

“RUN”

RUN indicates there is a demand for the blower motor to run.

“CFM”

CFM LED indicates the CFM the unit is operating according to the jumper settings. The light flashes once for approximately every 100 CFM. For example, if the unit is operating at 1000 CFM, **CFM** LED will flash 10 times. If the CFM is 1150, **CFM** LED will flash 11 full times plus one fast or half flash.

At times the light may appear to flicker or glow. This takes place when the control is communicating with the motor between cycles. This is normal operation.

The appropriate speed according to application and CFM need is selected by moving jumper pins.

Jumper Settings

▲ IMPORTANT

Before changing jumper setting, make sure the motor has completely stopped. Any jumper setting change will not take place while the motor is running.

Table 2 shows the recommended factory blower speed tap selections for CBX32MV series units. These settings are for nominal tonnage match-ups with the CBX32MV. When matched with other sizes, it is recommended that the CFM be adjusted to approximately 400 CFM per ton.

TABLE 2
FACTORY BLOWER SPEED TAP SELECTION

UNIT	SPEED TAP SELECTION			
	“COOL”		“HEAT”	
	Condensing Unit	Heat Pump	*Condensing Unit with Electric Heat Only	*Heat Pump with Electric Heat
-018/ 024	COOL PIN #3	COOL PIN #3	HEAT PIN #4	HEAT PIN #4
-024/ -030	COOL PIN #3	COOL PIN #3	HEAT PIN #4	HEAT PIN #4
-036	COOL PIN #3	COOL PIN #3	HEAT PIN #4	HEAT PIN #4
-048	COOL PIN #2	COOL PIN #2	HEAT PIN #1	HEAT PIN #1
-060	COOL PIN #3	COOL PIN #3	HEAT PIN #1	HEAT PIN #1
-068	COOL PIN #3	COOL PIN #3	HEAT PIN #4	HEAT PIN #4

*Minimum setting for heat.

To change jumper positions, gently pull the jumper off the pins and place it on the desired set of pins. The following section outlines the different jumper selections available and conditions associated with each one. Refer to figure 5 for identification.

After the CFM for each application has been determined, the jumper settings must be adjusted to reflect those given in the blower data tables at the front of this manual. From the tables determine which row of CFM volumes most closely matches the desired CFM. Once a specific row has been chosen (+, NORMAL, or -), CFM volumes from other rows cannot be used. Below are the descriptions of each of the jumper selections.

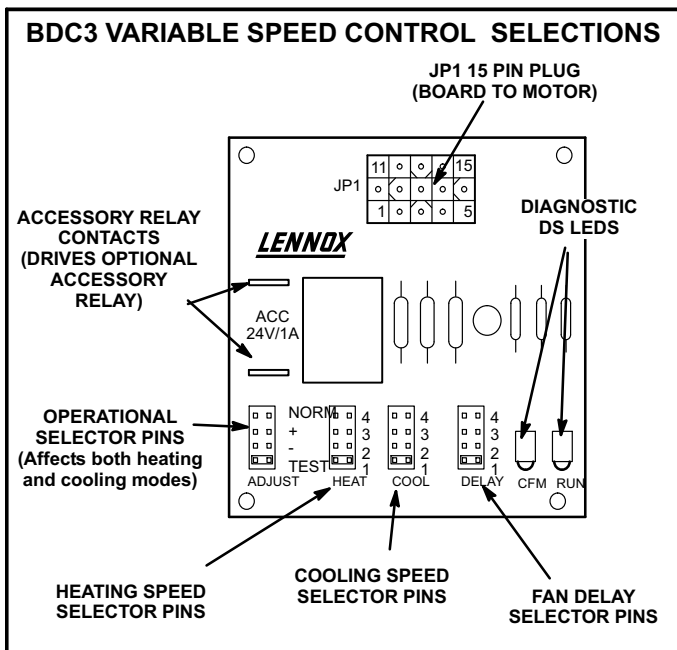


FIGURE 5

“ADJUST”

The **ADJUST** pins allow the motor to run at normal speed, approximately 10% higher, or approximately 10% lower than normal speed. The blower tables give three rows (+, NORMAL, and -) with their respective CFM volumes. Notice that the normal adjustment setting for heat speed position #3 is 1315 CFM. The + adjustment setting for that position is 1445 CFM and for the - adjustment setting is 1185 CFM. After the adjustment setting has been determined, chose the remainder speed jumper settings from those offered in the table in that row.

The TEST pin is available to bypass the BDC3 control and run the motor at approximately 70% to test that the motor is operational. This is beneficial primarily in troubleshooting. G must be energized for motor to run.

“COOL”

The **COOL** jumper is used to determine the CFM during either 1) cooling or 2) heat pump operation without a call for electric heat. These jumper selections are activated for cooling when Y2 and DS terminals in the CBX32MV are energized and for heating when Y2 is energized.

Applications **without** the Lennox SignatureStat™ or EfficiencyPlus™ CCB1 humidity control will provide 70% of the **COOL** CFM during first-stage cooling for two-speed outdoor units. Units built prior to August 2002, will provide either 60% (-048, -060 series units) or 65% (-036 series units) of the **COOL** CFM during first stage cooling for two stage outdoor units. 100% of **COOL** speed is provided for systems with a single-speed outdoor units.

*NOTE - For two speed heat pump units blower will operate at 60%, 65% or 70% of **COOL** CFM. For single speed heat pump units blower will operate at 100% **COOL** CFM until supplemental electric heat is demanded. At that time, the blower will operate at **HEAT** speed selected. This arrangement provides for warmer supply air during heat pump operation only.*

“HEAT”

The **HEAT** jumper is used to determine CFM during a W1 demand for electric heat operation. These jumper selections are activated when W1 is energized with or without a Y1 demand for heat pump compressor.

“DELAY”

The **DELAY** jumper is used to set the specific motor fan mode of operation during cooling. Depending on the application, one of four fan options may be chosen by moving the jumper pins to the appropriate set of pins. Options 1, 2, 3, or 4 will have an increased dehumidification effect on the system. Option 1 will have the least effect and option 4 will have the greatest effect.

Applications **with** the EfficiencyPlus CCB1 humidity control create different CFM volumes. For example, during a first-stage cooling call (two-speed outdoor unit) with no demand from the CCB1, the air volume is 40% of the **COOL** jumper selection. For a normal **COOL** (Pin #2 setting for CBX32MV-036), the CFM is 1125; the reduced speed is 450 CFM (1125 x 40% = 450). This arrangement provides for additional dehumidification during standard first stage cooling. See tables 10 and 11 for various scenarios concerning use of the CCB1 humidity control and the CBX32MV series unit.

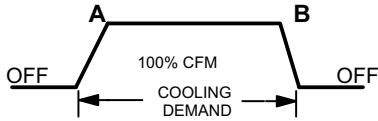
Applications **with** the Lennox SignatureStat but no demand for de-humidification will operate as follows: during a first-stage cooling call (two-stage outdoor unit), the air volume is 70% of the **COOL** jumper selection. For a normal **COOL** (Pin #2 setting for CBX32MV-036), the CFM is 1125; the reduced speed is 788 CFM (1125 x 70% = 788). This arrangement provides for additional dehumidification during standard first stage cooling. See tables 12 and 13 for various scenarios concerning use of the SignatureStat and the CBX32MV series unit.

For applications with Harmony® zone control, the blower CFM volume is determined by the Harmony control center. This speed is not adjustable. See footnotes in the blower tables (table of contents).

CBX32MV units built prior to February 2003

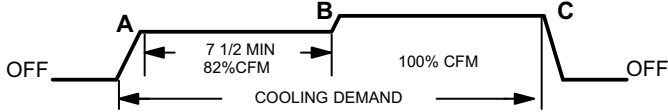
#1 PIN JUMPERED

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



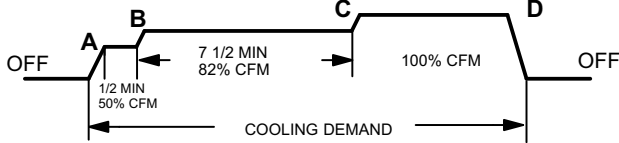
#2 PIN JUMPERED

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



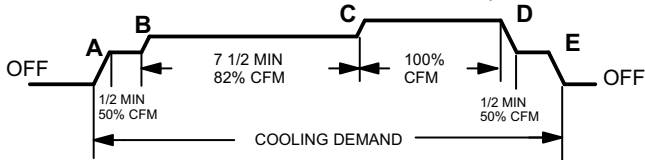
#3 PIN JUMPERED

- A- Motor runs at 50% for 1/2 minute. B- Motor then runs at 82% for approximately 7-1/2 minutes. If demand has not been satisfied after 7-1/2 minutes. C- Motor runs at 100% until demand is satisfied. D- Once demand is met, motor ramps down to off.



#4 PIN JUMPERED

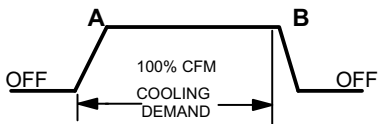
- A- Motor runs at 50% for 1/2 minute. B- Motor then runs at 82% for approximately 7-1/2 minutes. If demand has not been satisfied after 7-1/2 minutes. C- Motor runs at 100% until demand is satisfied. D- Once demand is met, motor runs at 50% for 1/2 minute then E- Motor ramps down to off.



CBX32MV units built February 2003 and later

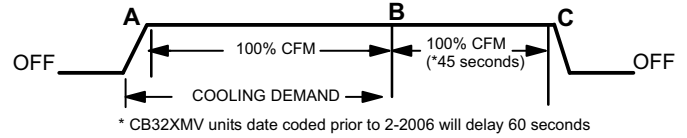
#1 Pins Jumpered

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



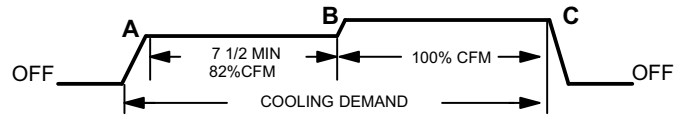
#2 Pins Jumpered

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



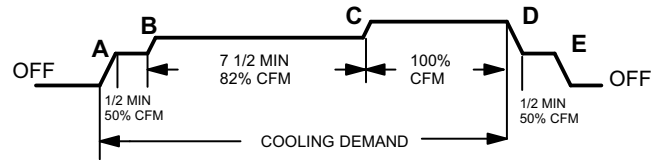
#3 Pins Jumpered

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



#4 Pins Jumpered

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



III-VARIABLE SPEED MOTOR TROUBLESHOOTING

DO

- Check motor, controls, wiring and connections thoroughly before replacing.
- Use proper replacement parts for motor and control model numbers.
- Keep duct static to a minimum.
- Size equipment properly.
- Check orientation before inserting motor connector.

DON'T

- Automatically assume the motor is bad.
- Locate connectors above 7 and 4 o'clock positions.
- Replace a control or motor number with an unauthorized replacement.
- Use high pressure drop filters.
- Use restricted returns.
- Oversize systems then compensate with low airflow.

MOISTURE CHECK

- Connectors should point downward.
- Arrange harness with drip loop under motor.
- Check condensate drain plug.
- Check for airflow (too much latent capacity).
- Check for undercharged condition.
- Check for plug leaks in return ducts, cabinet.

MOTOR CHECK

Kit #70J11 can be used to check the motor. The kit is available at the Lennox parts center. If not using the kit, follow the procedure below. These settings and jumper placements will bypass the BDC3 control board and confirm correct motor operation.

Symptom	Cause/Procedure
Motor rocks slightly when starting	This is normal start-up for the variable speed motor
Motor will not start, no movement	<ul style="list-style-type: none"> Check power at motor Check low voltage (24vac R to C) at motor Check low voltage connection (G, Y, R, C) at motor. Check for unseated pins on motor harness. Test with temporary jumper between R-G. Check motor for tight shaft. Run moisture check.
Motor rocks, but won't start	<ul style="list-style-type: none"> Check for loose or compliant motor mount. Make sure blower wheel is tight on shaft.
Motor starts, but varies up and down or intermittent	<ul style="list-style-type: none"> Check line voltage for variation or "sag." Check low voltage connections (G, Y, R, C) at motor Check for unseated pins in motor harness. Check "DS" on terminal strip for CFM command Check system controls thermostat. Perform moisture check.
Motor "Hunts" or "Puffs" at high CFM	If removing panel or filter reduces "Puffing" reduce restriction or reduce max airflow.
Stays at low CFM despite system call for cool or heat CFM	<ul style="list-style-type: none"> Check low voltage thermostat wires and connections. Verify fan is not in delay mode. Check "R" missing/not connected to motor. Perform motor check.
Stays at high CFM	<ul style="list-style-type: none"> Check "R" connection at motor. Check fan delay, wait until complete. Perform motor check.
Blower will not shut off	<ul style="list-style-type: none"> Current leakage from controls into G, Y or W? Check for Triac switched thermostat or solid state relay.
Air noise	<ul style="list-style-type: none"> Check for proper airflow setting. Check/replace filter. Use low pressure drop filter. Check/correct duct restrictions.
Noisy Blower or cabinet	<ul style="list-style-type: none"> Check for loose blower housing, panels, etc If high static causing noise, check for air whistling through seams in ducts, cabinets or panels. Check cabinet/duct for deformation.
Motor failure has occurred and moisture is present	Replace motor and perform moisture check.

***60/65/70% OF COOL SPEED**

- Disconnect power to the unit.
- Change delay pin setting on the BDC3 board to #1
- Remove wires from terminal strips in control box.
- Install jumpers between "R" and "Y1" and "R" and "G"
- Turn on power to unit. Blower should operate on 60%, 65% or 70% of cool speed.
- When check is complete disconnect power and replace delay setting to original position.

**Reduced blower speed for production August 2002 and later is 70% of COOL speed for ALL model units. Reduced blower speed for production prior to August 2002 is 65% of COOL for the -036 units and 60% of COOL for -048 and -060 series units.*

COOL SPEED

- Disconnect power to unit.
- Change delay pin setting on the BDC3 board to #1
- Remove wires from terminal strips in control box.
- Install jumpers between "R" and "Y1", "R" and "Y2", "R" and "DS" and "R" and "G".
- Turn on power to unit. Blower should operate on cool speed.
- When check is complete disconnect power and replace delay setting to original position.

HEAT SPEED

- Disconnect power to the unit.
- Change delay pin setting on the BDC3 board to #1
- Remove wires from terminal strips in control box.
- Install jumper between "R" and "W1".
- Turn on power to unit. Blower should operate on heat speed.
- When check is complete disconnect power and replace delay setting to original position.

Notes on 5 Pin AC Line Connection (See Figure 6)

- The motor connects directly to the line.
- Pins 1 & 2 are jumpered in the harness for 115V operation.
- Make sure power is off before inserting power connector.
- Plug is polarized.

Notes on 16 Pin Control Connection (See Figure 6)

- Control functions (G, Y1, Y2) may be active at greater than .5 x control transformer voltage.
- Do not apply 24vac to either "Out" pin (8 or 16).
- High voltage on control pins will destroy motor.
- Make sure pins are fully seated in connector and housing.
- Verify common connection from transformer (C or B) to C1, C2 (Pin 1 and Pin 3).
- Once common is verified, test motor by applying 24vac (R) to control pins.

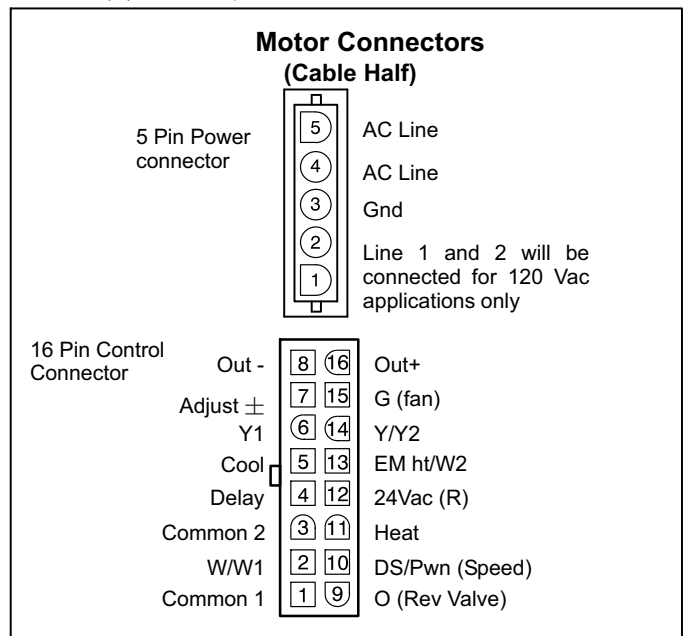


FIGURE 6

IV-OPTIONAL ECB29/31 ELECTRIC HEAT

A-Matchups and Ratings

Tables 4, 5 and 6 show all approved CBX32MV to ECB29 matchups and electrical ratings.

B-Electric Heat Components

ECB29 parts arrangement is shown in figures 7 through 10. All electric heat sections consist of components mounted to the electric heat vestibule panel and electric heating elements exposed directly to the air stream. 208/230V electric heat sections may be equipped with circuit breakers. The circuit breakers are designated by CB in the model number.

1-Primary(S15) & Secondary(S20) Temperature Limits

Both the primary (S15) and secondary (S20) limits are located on the electric heat vestibule panel and are exposed directly to the air stream through an opening in the panel. The high temperature limits are SPST N.C. limits with the primary limit being an auto-reset limit and the secondary limit being a "one-time" limit. One-time limits must be replaced when opened. The limits are factory set and are not adjustable.

208/230 Volt Electric Heat Sections

Each stage of the 208/230 electric heat is protected by a primary (S15) and secondary (S20) high temperature limit. Both S15 and S20 are located in the same housing. Each stage uses the same style of limits. Both the primary and secondary limits are wired in series with a heat element. When either S15 or S20 opens, the corresponding heat element is de-energized. All other heating elements remain energized. The primary high temperature limit opens at $150^{\circ}\text{F} \pm 5^{\circ}\text{F}$ ($65.5^{\circ}\text{C} \pm 2.8^{\circ}\text{C}$) on a temperature rise and automatically resets at $110^{\circ}\text{F} \pm 9^{\circ}\text{F}$ ($43.3^{\circ}\text{C} \pm 5.0^{\circ}\text{C}$) on a temperature fall. The secondary high temperature limit opens at $333^{\circ}\text{F} \pm 10^{\circ}\text{F}$ ($167.2^{\circ}\text{C} \pm 5.6^{\circ}\text{C}$) on a temperature rise. If the secondary limit opens it must be replaced.

2-Electric Heat Sequencer Relays

(K32, K33, K34, K35, and K116) (208/230 volt only)

Relays K32, K33, K34, K35 and K116 are N.O. sequencer relays with a resistive element for a coil and a bi-metal disk which actuates the contacts. The relays are located on the electric heat vestibule panel and are energized by a 24V heating demand (W1, W2, and W3) via jack/plug 2 (J2), which is used to connect electric heat to the blower coil control circuit. When energized, the internal resistance heats the bi-metal disk causing the

contacts to close. When the relay is de-energized, the disk cools and the contacts open. The relays energize different stages of heat, as well as the blower. The blower is always first on and last off.

3-Circuit Breaker (CB1, CB2, and CB3) (208/230 volt only)

Line voltage connections are made to circuit breakers CB1, CB2, and CB3 in the electric heat sections with circuit breakers (designated by CB in the model numbers). Table 3 shows the amperage rating for each circuit breaker used. Single-phase electric heat uses two pole circuit breakers; while three-phase electric heat uses three pole circuit breakers.

TABLE 3

ECB29 CIRCUIT BREAKERS			
UNIT	CB1 AMPS	CB2 AMPS	CB3 AMPS
ECB29-5CB-1 (P)	30 AMP	---	---
ECB29-8CB-1 (P)	50 AMP	---	---
ECB29-12.5CB-1 (P)	25 AMP	50 AMP	---
ECB29-15CB-1 (P)	30 AMP	60 AMP	---
ECB29-25CB-1 (P)	50 AMP	50 AMP	50 AMP
ECB29-30CB-1 (P)	60 AMP	60 AMP	60 AMP
ECB29-15CB-1 (Y)	60 AMP	---	---
ECB29-20CB-1 (Y)	40 AMP	35 AMP	---
ECB29-25CB-1 (Y)	50 AMP	35 AMP	---

Note: Do not remove patch plate or insulation on units without circuit breakers!!

4-Terminal Strip (TB2) 208/230 volt only)

For the electric heat sections without circuit breakers or fuses, line voltage connections are made to terminal strip TB2. The terminal strip is located in the lower left corner of the electric heat vestibule panel. Single-phase electric heat uses two pole terminal strips; while three-phase electric heat uses three pole terminal strips.

5-Heating Elements (HE1 through HE6)

Heating elements are composed of helix wound bare nichrome wire exposed directly to the air stream. The elements are supported by insulators mounted to the wire frame. For single phase applications, one element is used per stage. Each stage is energized independently by the corresponding relay located on the electric heat vestibule arranged in a three phase delta. Once energized, heat transfer is instantaneous. High temperature protection is provided by primary and secondary high temperature limits.

TABLE 4 - ELECTRIC HEAT DATA

SINGLE PHASE ELECTRIC HEAT					CBX32MV-018/024			CBX32MV-024/030				
Model Number	No. of Steps	Volts Input	kW Input	1 Btuh Input	² Blower Motor Full Load Amps	³ Minimum Circuit Ampacity	⁵ Maximum Overcurrent Protection	² Blower Motor Full Load Amps	³ Minimum Circuit Ampacity		⁵ Maximum Overcurrent Protection	
									Circuit 1	Circuit 2	Circuit 1	Circuit 2
2.5 kW 4 lbs. ECB29-2.5 (28K30) Terminal Block	1	208	1.9	6,400	4.3	17	15	---	---	---	---	---
		220	2.1	7,200	4.3	17	20	---	---	---	---	---
		230	2.3	7,800	4.3	18	20	---	---	---	---	---
		240	2.5	8,500	4.3	18	20	---	---	---	---	---
5 kW 4 lbs. ECB29-5 (28K31) Terminal Block ECB29-5CB (28K32) 30A Circuit breaker	1	208	3.8	12,800	4.3	28	30	4.3	28	---	30	---
		220	4.2	14,300	4.3	31	35	4.3	31	---	35	---
		230	4.6	15,700	4.3	31	35	4.3	31	---	35	---
		240	5.0	17,100	4.3	31	35	4.3	31	---	35	---
6 kW 4 lbs. ECB29-6 (47L22) Terminal Block ECB29-6CB (47L23) 35A Circuit breaker	1	208	4.5	15,400	4.3	32	35	4.3	32	---	35	---
		220	5.0	17,100	4.3	37	40	4.3	37	---	40	---
		230	5.5	18,800	4.3	37	40	4.3	37	---	40	---
		240	6.0	20,500	4.3	37	40	4.3	37	---	40	---
8 kW 5 lbs. ECB29-8 (28K33) Terminal Block ECB29-8CB (28K34) 45A Circuit breaker	2	208	6.0	20,500	4.3	41	45	4.3	41	---	45	---
		220	6.7	22,900	4.3	47	50	4.3	47	---	50	---
		230	7.3	25,100	4.3	47	50	4.3	47	---	50	---
		240	8.0	27,300	4.3	47	50	4.3	47	---	50	---
9 kW 5 lbs. ECB29-9CB (10L11) 50A Circuit breaker ECB29EH-9CB (91K67) 50A Circuit breaker	2	208	6.8	23,100	4.3	46	50	4.3	46	---	50	---
		220	7.6	25,800	4.3	52	60	4.3	52	---	60	---
		230	8.3	28,200	4.3	52	60	4.3	52	---	60	---
		240	9.0	30,700	4.3	52	60	4.3	52	---	60	---
10 kW 6 lbs. ECB29-10 (28K35) Terminal Block ECB29-10CB (28K36) 60A Circuit breaker	2	208	7.5	25,600	4.3	51	60	---	---	---	---	---
		220	8.4	28,700	4.3	53	60	---	---	---	---	---
		230	9.2	31,400	4.3	55	60	---	---	---	---	---
		240	10.0	34,100	4.3	58	60	---	---	---	---	---
12.5 kW 10 lbs. ECB29-12.5CB (28K37) (1) 25A & (1) 50A Circuitbreaker ECB29EH-12.5CB (91K68) (1) 25A & (1) 50A Circuitbreaker	3	208	9.4	32,000	---	---	---	4.3	24	31	25	4 45
		220	10.5	35,800	---	---	---	4.3	27	35	30	50
		230	11.5	39,200	---	---	---	4.3	27	35	30	50
		240	12.5	42,600	---	---	---	4.3	27	35	30	50
15 kW 12 lbs. ECB29-15CB (28K38) (1) 30A & (1) 60A Circuit breaker ECB29EH-15CB (91K69) (1) 30A & (1) 60A Circuit breaker	3	208	11.3	38,400	---	---	---	4.3	28	37	30	4 50
		220	12.6	43,000	---	---	---	4.3	31	42	35	60
		230	13.8	47,000	---	---	---	4.3	31	42	35	60
		240	15.0	51,200	---	---	---	4.3	31	42	35	60

NOTE - Circuit 1 Minimum Circuit Ampacity includes the Blower Motor Full Load Amps.

¹ Electric heater capacity only — does not include additional blower motor heat capacity.

² Amps shown are for blower motor only.

³ Refer to National or Canadian Electrical Code manual to determine wire, fuse and disconnect size requirements. Use wires suitable for at least 167°F (75°C).

⁴ **Bold text indicates that the circuit breaker on "CB" circuit breaker models must be replaced with size noted.**

⁵ HACR type circuit breaker or fuse.

TABLE 5 - ELECTRIC HEAT DATA

SINGLE PHASE ELECTRIC HEAT						CBX32MV-036				
kW lbs.	Model Number	No. of Steps	Volts Input	kW Input	1 Btuh Input	2 Blower Motor Full Load Amps	3 Minimum Circuit Ampacity		5 Maximum Overcurrent Protection	
							1	2	1	2
5 kW 4 lbs.	ECB29-5 (28K31) Terminal Block ECB29-5CB (28K32) 30A Circuit breaker	1	208	3.8	12,800	4.3	28	---	30	---
			220	4.2	14,300	4.3	31	---	35	---
			230	4.6	15,700	4.3	31	---	35	---
			240	5.0	17,100	4.3	31	---	35	---
6 kW 4 lbs.	ECB29-6 (47L22) Terminal Block ECB29-6CB (47L23) 35A Circuit breaker	1	208	4.5	15,400	4.3	32	---	35	---
			220	5.0	17,100	4.3	37	---	40	---
			230	5.5	18,800	4.3	37	---	40	---
			240	6.0	20,500	4.3	37	---	40	---
8 kW 5 lbs.	ECB29-8 (28K33) Terminal Block ECB29-8CB (28K34) 45A Circuit breaker	2	208	6.0	20,500	4.3	41	---	45	---
			220	6.7	22,900	4.3	47	---	50	---
			230	7.3	25,100	4.3	47	---	50	---
			240	8.0	27,300	4.3	47	---	50	---
9 kW 5 lbs.	ECB299CB (10L11) 50A Circuit breaker ECB29EH-9CB (91K67) 50A Circuit breaker	2	208	6.8	23,100	4.3	46	---	50	---
			220	7.6	25,800	4.3	52	---	60	---
			230	8.3	28,200	4.3	52	---	60	---
			240	9.0	30,700	4.3	52	---	60	---
12.5 kW 10 lbs.	ECB29-12.5CB (28K37) (1) 25A & (1) 50A Circuitbreaker ECB29EH-12.5CB (91K68) (1) 25A & (1) 50A Circuitbreaker	3	208	9.4	32,000	4.3	24	31	25	4 45
			220	10.5	35,800	4.3	27	35	30	50
			230	11.5	39,200	4.3	27	35	30	50
			240	12.5	42,600	4.3	27	35	30	50
15 kW 12 lbs.	ECB29-15CB (28K38) (1) 30A & (1) 60A Circuit breaker ECB29EH-15CB (91K69) (1) 30A & (1) 60A Circuit breaker	3	208	11.3	38,400	4.3	28	37	30	4 50
			220	12.6	43,000	4.3	31	42	35	60
			230	13.8	47,000	4.3	31	42	35	60
			240	15.0	51,200	4.3	31	42	35	60
20 kW 19 lbs.	ECB29-20CB (11L31) (1) 50A & (1) 60A Circuit breaker ECB29EH-20CB (91K70) (1) 50A & (1) 60A Circuit breaker	4	208	15.0	51,200	4.3	47	41	50	60
			220	16.8	57,300	4.3	52	46	60	60
			230	18.4	62,700	4.3	52	46	60	60
			240	20.0	68,200	4.3	52	46	60	60
THREE PHASE ELECTRIC HEAT										
8 kW 5 lbs.	ECB29-8 (28K42) Terminal Block	3	208	6.0	20,500	4.3	26	---	30	---
			220	6.7	22,900	4.3	29	---	30	---
			230	7.3	25,100	4.3	29	---	30	---
			240	8.0	27,300	4.3	29	---	30	---
10 kW 6 lbs.	ECB29-10 (28K43) Terminal Block	3	208	7.5	25,600	4.3	31	---	35	---
			220	8.4	28,700	4.3	35	---	35	---
			230	9.2	31,400	4.3	35	---	35	---
			240	10.0	34,100	4.3	35	---	35	---
15 kW 12 lbs.	ECB29-15CB (28K44) 50A Circuit breaker	3	208	11.3	38,400	4.3	44	---	4 45	---
			220	12.6	43,000	4.3	50	---	50	---
			230	13.5	47,000	4.3	50	---	50	---
			240	15.0	51,200	4.3	50	---	50	---
20 kW 19 lbs.	ECB29-20CB (28K45) (2) 35A Circuit breaker	6	208	15.0	51,200	4.3	31	21	35	4 30
			220	16.8	57,300	4.3	35	24	35	35
			230	18.4	62,700	4.3	35	24	35	35
			240	20.0	68,200	4.3	35	24	35	35

NOTE - Circuit 1 Minimum Circuit Ampacity includes the Blower Motor Full Load Amps.

¹ Electric heater capacity only — does not include additional blower motor heat capacity.

² Amps shown are for blower motor only.

³ Refer to National or Canadian Electrical Code manual to determine wire, fuse and disconnect size requirements. Use wires suitable for at least 167°F (75°C).

⁴ **Bold text indicates that the circuit breaker on "CB" circuit breaker models must be replaced with size noted.**

⁵ HACR type circuit breaker or fuse.

TABLE 6 - ELECTRIC HEAT DATA

SINGLE PHASE ELECTRIC HEAT					CBX32MV-048, CBX32MV-060 and CBX32MV-068							
Model Number	No. of Steps	Volts Input	kW Input	1 Btuh Input	2 Blower Motor Full Load Amps	3 Minimum Circuit Ampacity			5 Maximum Overcurrent Protection			
						Circuit 1	Circuit 2	Circuit 3	Circuit 1	Circuit 2	Circuit 3	
5 kW 4 lbs. ECB29-5 (28K31) Terminal Block ECB29-5CB (28K32) 30A Circuit breaker	1	208	3.8	12,800	9.1	34	---	---	40	---	---	
		220	4.2	14,300	9.1	37	---	---	45	---	---	
		230	4.6	15,700	9.1	37	---	---	45	---	---	
		240	5.0	17,100	9.1	37	---	---	45	---	---	
6 kW 4 lbs. ECB29-6 (47L22) Terminal Block ECB29-6CB (47L23) 35A Circuit breaker	1	208	4.5	15,400	9.1	36	---	---	45	---	---	
		220	5.0	17,100	9.1	43	---	---	50	---	---	
		230	5.5	18,800	9.1	43	---	---	50	---	---	
8 kW 5 lbs. ECB29-8 (28K33) Terminal Block ECB29-8CB (28K34) 45A Circuit breaker	2	208	6.0	20,500	9.1	47	---	---	50	---	---	
		220	6.7	22,900	9.1	53	---	---	60	---	---	
		230	7.3	25,100	9.1	53	---	---	60	---	---	
9 kW 5 lbs. ECB29-9CB (10L11) 50A Circuit breaker ECB29EH-9CB (91K67) 50A Circuit breaker	2	208	6.8	23,100	9.1	52	---	---	60	---	---	
		220	7.6	25,800	9.1	58	---	---	60	---	---	
		230	8.3	28,200	9.1	58	---	---	60	---	---	
12.5 kW 10 lbs. ECB29-12.5CB (28K37) (1) 25A & (1) 50A Circuit breaker ECB29EH-12.5CB (91K68) (1) 25A & (1) 50A Circuit breaker	3	208	9.4	32,000	9.1	30	31	---	4 40	4 45	---	
		220	10.5	35,800	9.1	33	35	---	4 45	50	---	
		230	11.5	39,200	9.1	33	35	---	4 45	50	---	
		240	12.5	42,600	9.1	33	35	---	4 45	50	---	
15 kW 12 lbs. ECB29-15CB (28K38) (1) 30A & (1) 60A Circuit breaker ECB29EH-15CB (91K69) (1) 30A & (1) 60A Circuit breaker	3	208	11.3	38,400	9.1	34	37	---	4 40	4 50	---	
		220	12.6	43,000	9.1	37	42	---	4 45	60	---	
		230	13.5	47,000	9.1	37	42	---	4 45	60	---	
		240	15.0	51,200	9.1	37	42	---	4 45	60	---	
20 kW 19 lbs. ECB29-20CB (11L31) (1) 50A & (1) 60A Circuit breaker ECB29EH-20CB (91K70) (1) 50A & (1) 60A Circuit breaker	4	208	15.0	51,200	9.1	53	41	---	60	60	---	
		220	16.8	57,300	9.1	58	46	---	60	60	---	
		230	18.4	62,700	9.1	58	46	---	60	60	---	
		240	20.0	68,200	9.1	58	46	---	60	60	---	
25 kW 19 lbs. ECB29-25CB (28K40) (3) 50A Breakers	6	208	18.8	64,100	9.1	49	31	31	50	4 45	4 45	
		220	21.0	71,700	9.1	54	35	35	60	50	50	
		230	23.0	78,300	9.1	54	35	35	60	50	50	
		240	25.0	85,300	9.1	54	35	35	60	50	50	
THREE PHASE ELECTRIC HEAT												
8 kW 5 lbs. ECB29-8 (28K42) Terminal block	3	208	6.0	20,500	9.1	32	---	---	40	---	---	
		220	6.7	22,900	9.1	35	---	---	40	---	---	
		230	7.3	25,100	9.1	35	---	---	40	---	---	
		240	8.0	27,300	9.1	35	---	---	40	---	---	
10 kW 6 lbs. ECB29-10 (28K43) Terminal block	3	208	7.5	25,600	9.1	37	---	---	45	---	---	
		220	8.4	28,700	9.1	41	---	---	50	---	---	
		230	9.2	31,400	9.1	41	---	---	50	---	---	
		240	10.0	34,100	9.1	41	---	---	50	---	---	
15 kW 12 lbs. ECB29-15CB (28K44) 50A Circuit breaker	3	208	11.3	38,400	9.1	50	---	---	60	---	---	
		220	12.6	43,000	9.1	56	---	---	60	---	---	
		230	13.5	47,000	9.1	56	---	---	60	---	---	
		240	15.0	51,200	9.1	56	---	---	60	---	---	
20 kW 19 lbs. ECB29-20CB (28K45) (2) 35A Circuit breakers	6	208	15.0	51,200	9.1	37	21	---	4 45	4 30	---	
		220	16.8	57,300	9.1	41	24	---	4 50	35	---	
		230	18.4	62,700	9.1	41	24	---	4 50	35	---	
		240	20.0	68,200	9.1	41	24	---	4 50	35	---	
25 kW 19 lbs. ECB29-25CB (28K46) (2) 45A Circuit breakers	6	208	18.8	64,100	9.1	44	27	---	50	4 40	---	
		220	21.0	71,700	9.1	49	30	---	4 60	45	---	
		230	23.0	78,300	9.1	49	30	---	4 60	45	---	
		240	25.0	85,300	9.1	49	30	---	4 60	45	---	

NOTE - Circuit 1 Minimum Circuit Ampacity includes the Blower Motor Full Load Amps.

¹ Electric heater capacity only — does not include additional blower motor heat capacity.

² Amps shown are for blower motor only.

³ Refer to National or Canadian Electrical Code manual to determine wire, fuse and disconnect size requirements. Use wires suitable for at least 167°F (75°C).

⁴ Bold text indicates that the circuit breaker on "CB" circuit breaker models must be replaced with size noted.

⁵ HACR type circuit breaker or fuse.

**ECB29-5, -5CB 208/230 SINGLE-PHASE
ELECTRIC HEAT VESTIBULE PARTS ARRANGEMENT**

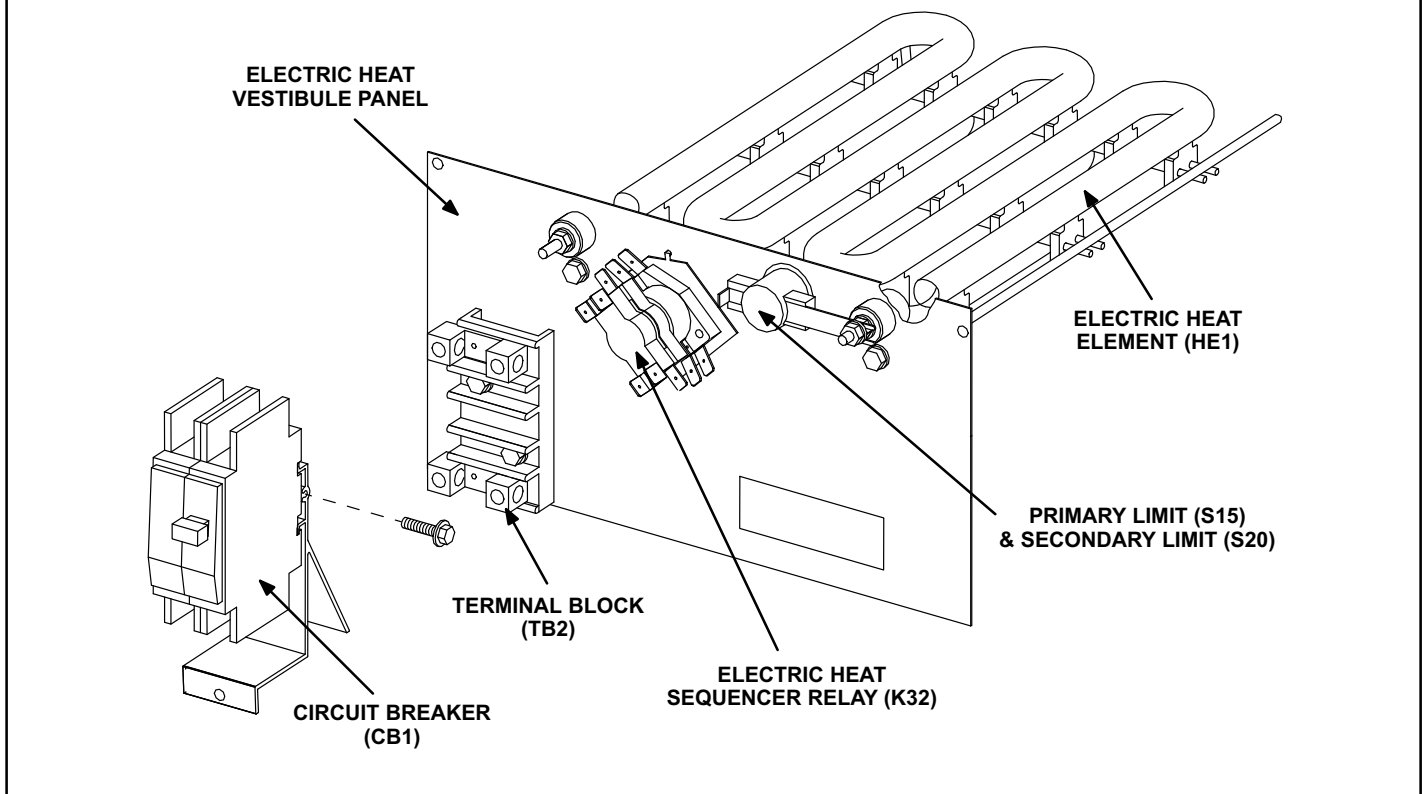


FIGURE 7

**ECB29-8 AND -8CB 208/230 SINGLE-PHASE
ELECTRIC HEAT VESTIBULE PARTS ARRANGEMENT**

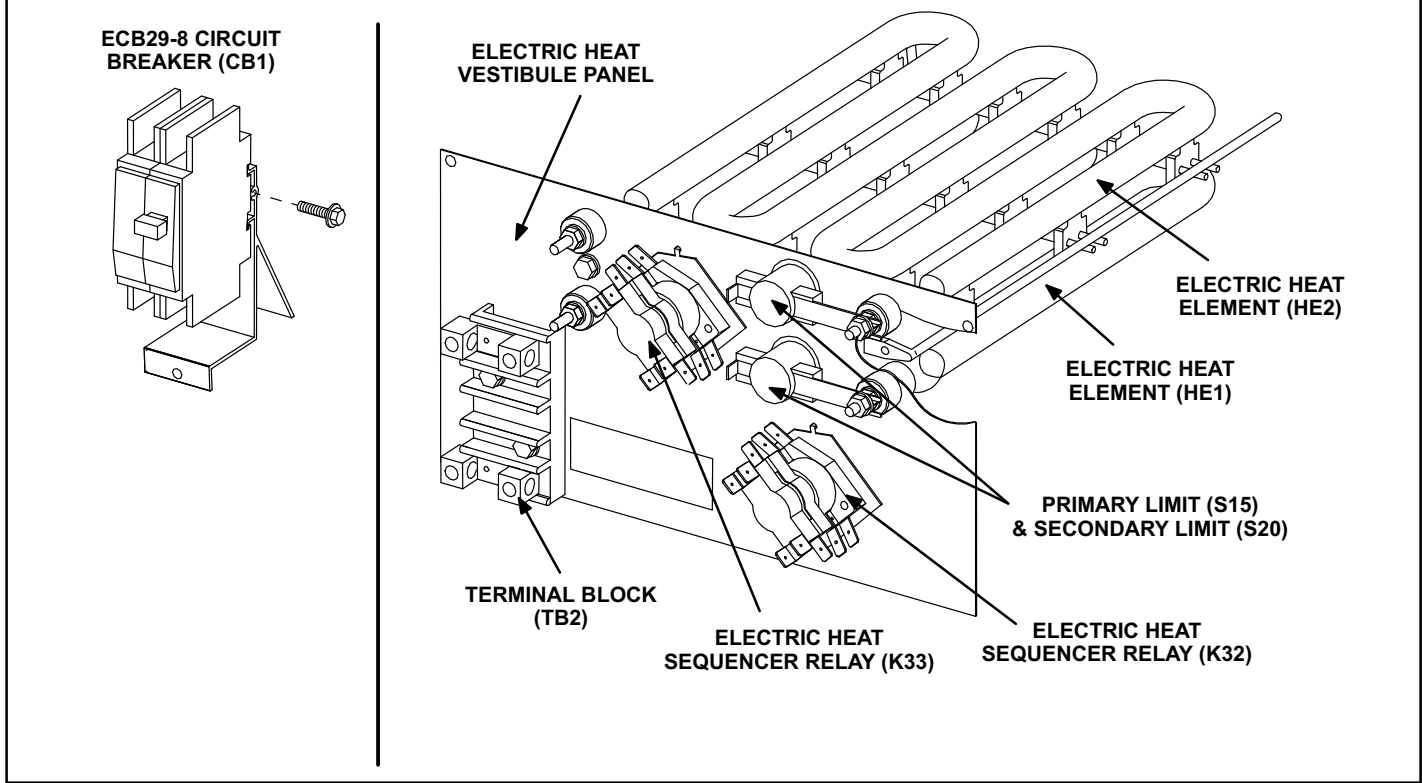


FIGURE 8

**ECB29-8,-10 208/230 THREE-PHASE
ECB29-12.5CB, -15CB 208/230 SINGLE & THREE-PHASE
ELECTRIC HEAT VESTIBULE PARTS ARRANGEMENT**

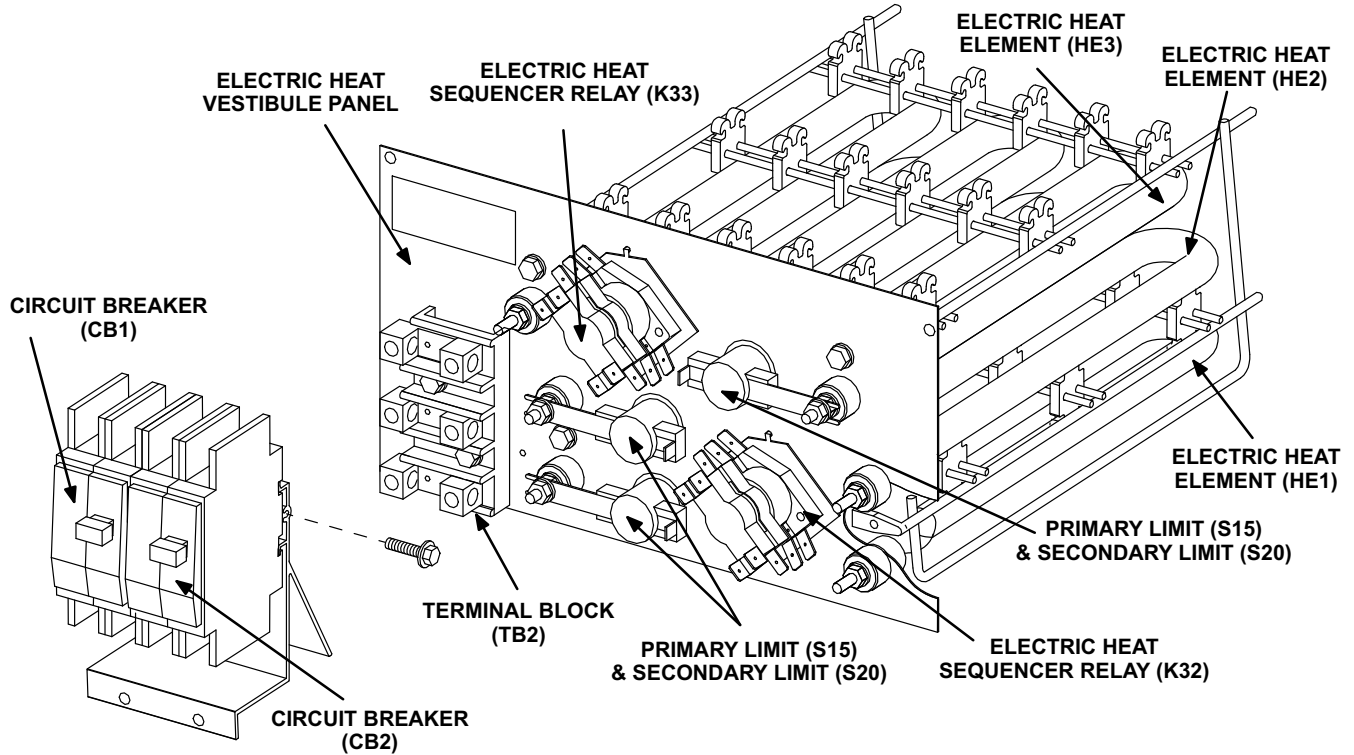


FIGURE 9

**ECB29-20CB,-25CB 208/230 THREE-PHASE
ECB29-25CB, -208/230 SINGLE-PHASE
ELECTRIC HEAT VESTIBULE PARTS ARRANGEMENT**

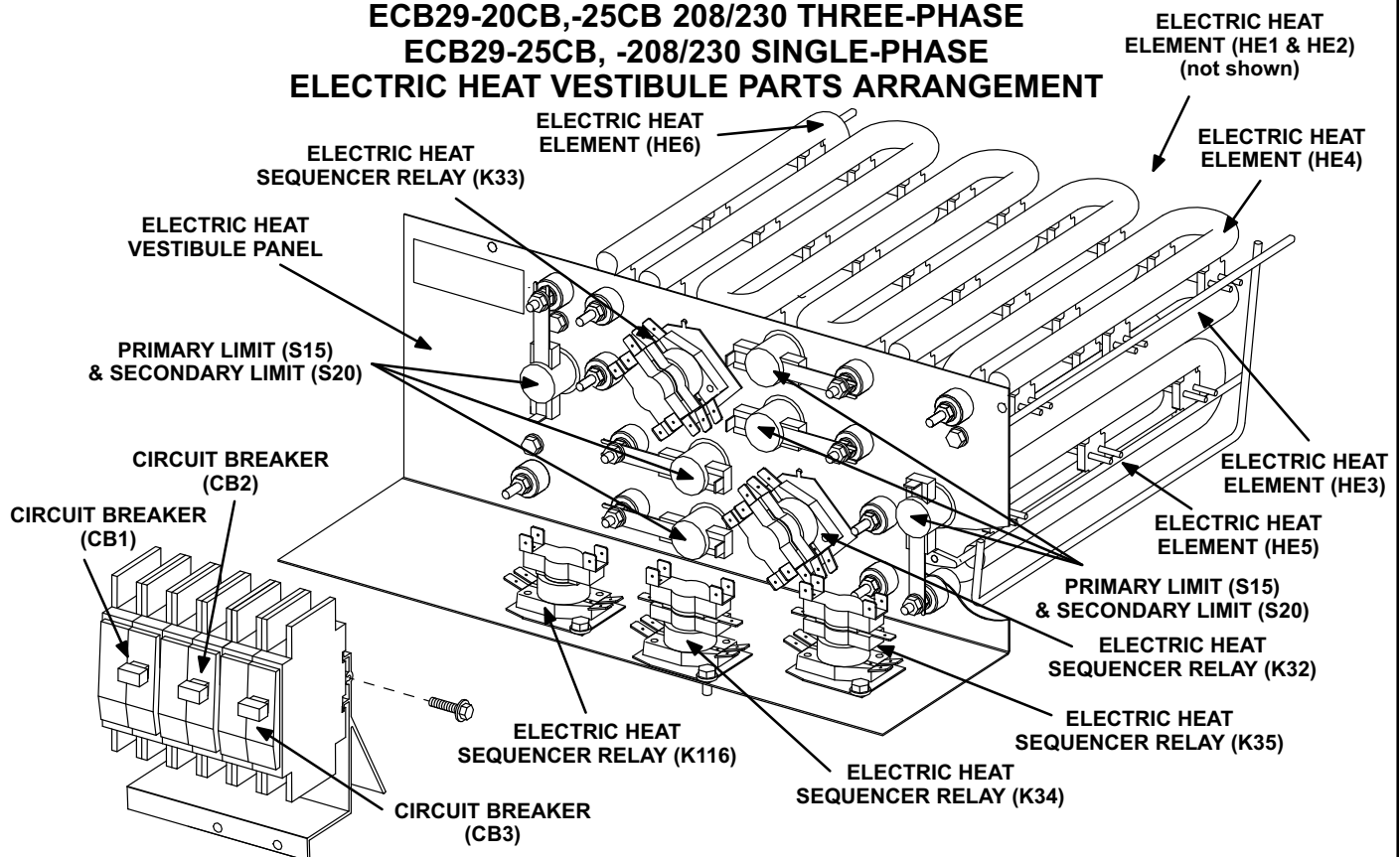


FIGURE 10

V- OPTIONAL HUMIDITY CONTROL (A20)

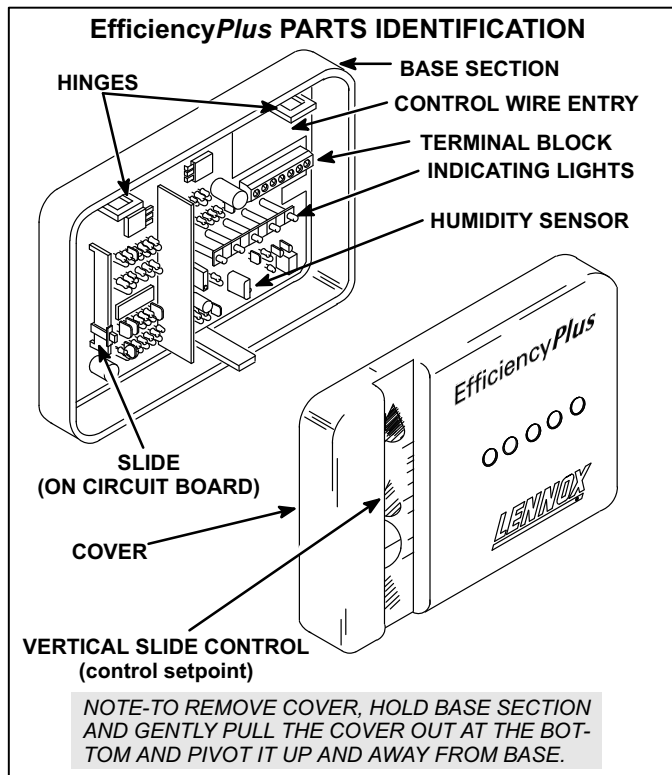


FIGURE 11

A-CCB1

Optional Comfort Control Board (CCB1) A20 may be installed adjacent to the indoor thermostat (figure 11). The control monitors indoor humidity conditions and creates a dehumidification demand in response to indoor humidity just as the thermostat creates a cooling demand in response to indoor temperature. The CCB1 works in combination with the indoor thermostat to adjust compressor speed and indoor blower speed. Although the control provides a dehumidification demand, only the thermostat can directly control compressor operation. The CCB1 cannot call for a compressor cycle by itself.

Principles of Cooling with Drier Air

The humidity comfort range for humans is between 40% and 60% relative humidity (RH). A vertical slide on the control allows the humidity setpoint to be adjusted within that comfort range. 50% RH is the recommended initial setpoint until personal comfort level is established. The personal comfort level will vary with humidity as with temperature. For example, if air at 75°F and 50% RH is changed to 60% RH, the air will “feel” much warmer. Likewise, if the air is reduced to 40% RH, it will “feel” much cooler.

Even when inactive, the body evaporates a large amount of moisture away from the skin. This evaporation produces a cooling effect (during wintertime this phenomenon is called “wind-chill”). Dry air is capable of absorbing more moisture away from the skin thereby increasing the cooling effect.

When the CCB1 senses that the indoor humidity level is above the control setpoint, the control places the CBX32MV and outdoor unit in a dehumidification mode .

To produce drier air, the CBX32MV will slow down the speed of the air crossing the indoor coil. Because the air is moving much slower than normal, the indoor coil is allowed more time to remove moisture from the air (a higher percentage of the air passing over the coil is cooled to its dew point removing more moisture). At the same time the two-speed outdoor unit will switch to high-speed to produce a colder indoor coil. The colder indoor coil and slower moving air combine to produce drier supply air.

NOTE-The indoor blower speed is reduced in order to slow the air speed across the indoor coil. The supply air exiting the unit may not feel as forceful. This is normal. Remember that when the unit is in dehumidification mode, the comfort level is increased because the unit is producing cooler, drier air.

The exact sequence of operation to produce cooler, drier air is described in the following section.

Operation

The CCB1 operates only during cooling mode. During normal cooling operation, when there is no indoor humidity demand, the unit operates as a straight two-speed cooling system. First stage thermostat demand energizes the compressor and indoor blower on low speed. Increased cooling demand energizes the compressor and indoor blower on high speed.

The control is equipped with a row of orange LED lights on its face which indicate the amount of relative humidity demand present. When one or more LEDs are lit, the control signals the CBX32MV to begin dehumidification mode. Tables 10 and 11 shows system response to thermostat and CCB1 demand.

Calibration Precautions

Extreme care should be taken to avoid exposing the CCB1 to fumes from household chemicals. The humidity sensing element in the CCB1 is a precise component which can be damaged or the calibration changed by household chemicals and cleaning agents. Make sure all household chemicals are stored in a different room in the building. Also, use only mild diluted soapy water when cleaning the CCB1 cover or the area surrounding the CCB1. The sensing element cannot be field calibrated. The CCB1 contains no field repairable parts and must be replaced when damaged in this manner.

Agents which can damage the CCB1 include alcohol, benzene, chlorine and chlorine based solutions, acetone (nail polish remover), bug sprays and other household cleaners.

Calibration can also be adversely affected by the placement of the CCB1 with respect to the indoor thermostat, exterior doors and windows and supply air registers. Most thermostats have anticipation resistors

which give off heat. If the CCB1 is installed directly above the indoor thermostat, the humidity sensor calibration will be thrown off. If the CCB1 is installed directly above the indoor thermostat, it should be relocated to the side of the thermostat. Refer to CCB1 installation instructions.

Other Conditions Which Adversely Affect CCB1 Performance

Blower speed selection can adversely affect CCB1 performance. Higher blower speeds should be selected to provide maximum sensible cooling, while lower blower speeds should be selected to provide maximum humidity removal. Refer to CBX32MV and CCB1 installation instructions.

It is recommended that the indoor blower be left in AUTO mode at all times. During dehumidification mode, the indoor coil and drain pan may become saturated with moisture. If the indoor blower is left in ON mode, much of that moisture can be re-evaporated into the living space between thermostat demands. This can create a constant demand for humidity removal and may cause extended compressor run times. Refer to table 7 for jumpers per application. CBX32MV units manufactured January 2002 and later, will have factory installed jumpers. Remove jumpers not used.

TABLE 7

JUMPERS REQUIRED			
Without CCB1 Humidity Control	Heat Pump	Single Speed	DS to Y1 and Y1 to Y2
		Two Speed	DS to Y1
	Condensing Unit	Single Speed	DS to Y1 and Y1 to Y2 and O to R
		Two Speed	DS to Y1 and O to R
With CCB1 Humidity Control	Heat Pump	Single Speed	Y1 to Y2
		Two Speed	None
	Condensing Unit	Single Speed	Y1 to Y2 and O to R
		Two Speed	O to R

The CCB1 may become indefinitely latched in the dehumidification mode when power to the unit is turned off. This condition can be caused by turning off power while dehumidification demand is present, then turning on power when dehumidification demand is satisfied. If the CCB1 becomes stuck in this manner, it can be reset by removing thermostat demand then moving the CCB1 slide switch all the way down and back up to its setpoint.

How to unlatch CCB1

- 1- Force a cooling demand by setting thermostat to COOL mode and by moving thermostat lever to lowest position.
- 2- Move CCB1 slide control down to 40% relative humidity. CCB1 lights should come on.
- 3- Now, move CCB1 slide control back up to 60% relative humidity. The lights should go off.
- 4- Remove thermostat demand by moving thermostat lever to cycle unit off.

Applications with the EfficiencyPlus CCB1 humidity control create different CFM volumes. For example, during a first-stage cooling call (two-speed outdoor unit) with no demand from the CCB1, the air volume is 40% of the COOL jumper selection. For a normal COOL (Pin #2 setting for CBX32MV-036), the CFM is 1125; the reduced speed is 450 CFM (1125 x 40% = 450). This arrangement provides for additional dehumidification during first stage cooling. See tables 10 and 11 for various scenarios concerning use of the CCB1 humidity control and the CBX32MV series unit.

B-SignatureStat™ or ComfortSense® 7000

The reference thermostats can be installed in place of the indoor thermostat. The thermostat monitors indoor humidity conditions and creates a dehumidification demand in response to indoor humidity just as it creates a cooling demand in response to indoor temperature. The SignatureStat adjusts compressor speed and indoor blower speed to maintain humidity at a comfortable level.

Principles of Cooling with Drier Air

The humidity comfort range for humans is between 40% and 60% relative humidity (RH). 50% RH is the recommended initial setpoint until personal comfort level is established. The personal comfort level will vary with humidity as with temperature. For example, if air at 75°F and 50% RH is changed to 60% RH, the air will “feel” much warmer. Likewise, if the air is reduced to 40% RH, it will “feel” much cooler.

Even when inactive, the body evaporates a large amount of moisture away from the skin. This evaporation produces a cooling effect (during wintertime this phenomenon is called “wind-chill”). Dry air is capable of absorbing more moisture away from the skin thereby increasing the cooling effect.

When the thermostat senses that the indoor humidity level is above the control setpoint, the control places the CBX32MV and outdoor unit in a dehumidification mode.

To produce drier air, the CBX32MV will slow down the speed of the air crossing the indoor coil. Because the air is moving much slower than normal, the indoor coil is allowed more time to remove moisture from the air (a higher percentage of the air passing over the coil is cooled to its dew point removing more moisture). At the same time the two-stage outdoor unit will switch to high-speed to produce a colder indoor coil. The colder indoor coil and slower moving air combine to produce drier supply air.

NOTE-The indoor blower speed is reduced in order to slow the air speed across the indoor coil. The supply air exiting the unit may not feel as forceful. This is normal. Remember that when the unit is in dehumidification mode, the comfort level is increased because the unit is producing cooler, drier air.

The exact sequence of operation to produce cooler, drier air is described in the following section.

Other Conditions Which Adversely Affect Thermostat Performance

Blower speed selection can adversely affect thermostat performance. Higher blower speeds should be selected to provide maximum sensible cooling, while lower blower speeds should be selected to provide maximum humidity removal. Refer to CBX32MV and applicable thermostat installation instructions.

It is recommended that the indoor blower be left in AUTO mode at all times. During dehumidification mode, the indoor coil and drain pan may become saturated with moisture. If the indoor blower is left in ON mode, much of that moisture can be re-evaporated into the living space between thermostat demands. This can create a constant demand for humidity removal and may cause extended compressor run times. Refer to table 8 for jumpers per application.

TABLE 8

JUMPERS REQUIRED			
Humidity Control OFF	Heat Pump	Single Speed	DS to Y1 and Y1 to Y2
		Two Speed	DS to Y1
	Condensing Unit	Single Speed	DS to Y1 and Y1 to Y2 and O to R
		Two Speed	DS to Y1 and O to R
Humidity Control ON	Heat Pump	Single Speed	Y1 to Y2
		Two Speed	None
	Condensing Unit	Single Speed	Y1 to Y2 and O to R
		Two Speed	O to R

Operation

Dehumidification is provided only when the thermostat is in cool mode. Dehumidification D terminal wires to variable-speed blower (reverse logic/active on low signal 24VAC). When the unit is in heating mode, the dehumidification function is off. The default mode for dehumidification is OFF and needs to be activated during installation.

The D terminal is active whenever the thermostat is powered, EXCEPT when there is a dehumidification demand. This means that the D terminal has 24V on it even in HEAT and OFF modes.

Basic Mode: Dehumidification only with a cooling demand. COOL is on, then D is active (reverse logic, off), and G is on (if not already on), Y1 and Y2 (if available) is on.

Precision Mode: Dehumidification with or without Cooling demand. D is active (reverse logic, off), and G, Y1, and Y2 (if available) are on. Note that H is inactive (off) during dehumidification. The D terminal controls dehumidification. When a dehumidification demand is present, the D terminal becomes de-energized. Otherwise, 24VAC is present in off mode and heating mode unless there is a call for dehumidification. Tables 12 and 13 show system response to thermostat demand.

Dehumidify Mode Screen (SignatureStat Only)

NOTE - See the ComfortSense 7000 user guide for interface instructions for dehumidify mode operations.

NOTE - Basic or Precision mode must be turned on before you can adjust the dehumidify level on the thermostat .

- 1 - From the home screen press MENU.
- 2 - Use the UP or DOWN button to highlight DEHUMIDIFY. See figure 12.

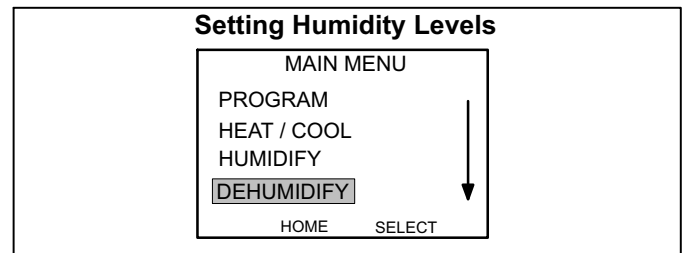


FIGURE 12

- 3 - Press SELECT to choose MODE.

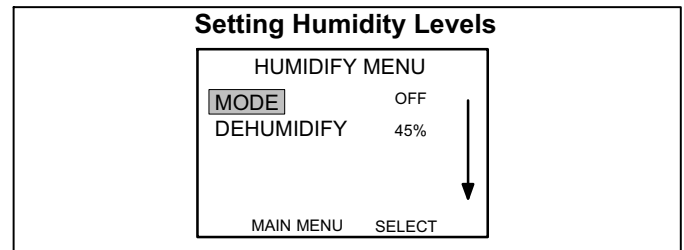


FIGURE 13

- 4 - To turn off dehumidification control entirely, select OFF. (The default setting for dehumidification is OFF.) To turn on basic dehumidification mode, select BASIC. To turn on precision dehumidification mode, select PRECISION. See figure 14.

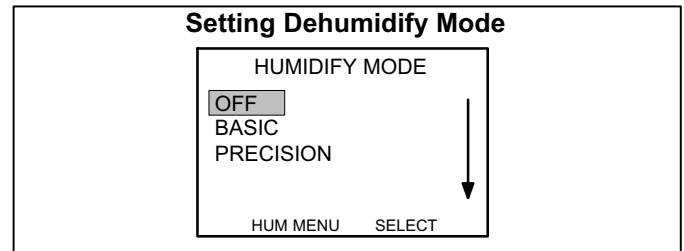


FIGURE 14

- 5 - The Humidity Menu appears. Basic (BAS) is displayed on the right hand of the screen. Now you can program the dehumidity percentage that you want.

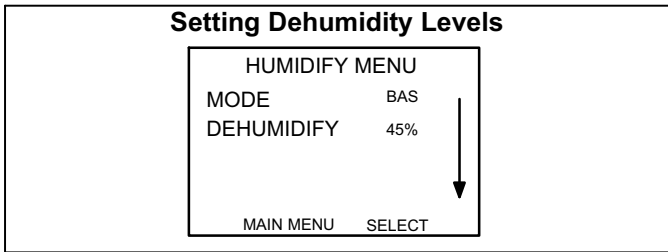


FIGURE 15

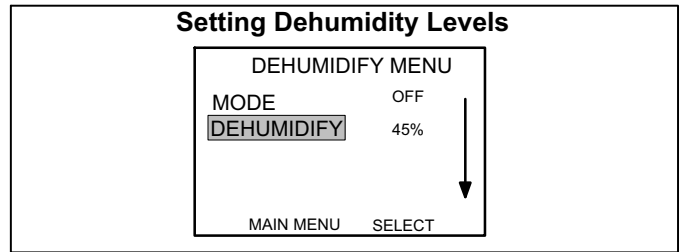


Figure 16

Dehumidity Sensor Settings

The dehumidity sensor settings have minimum and maximum settings. The sensor settings can be adjusted in 1% increments. See table 9.

TABLE 9

Dehumidity Setpoint Range	
Minimum setting	45%
Maximum setting	60%

1 - On the humidity menu press the up or down button to again highlight DEHUMIDIFY. See figure 16.

2 - Use the up and down button to adjust the humidity level. See figure 17.

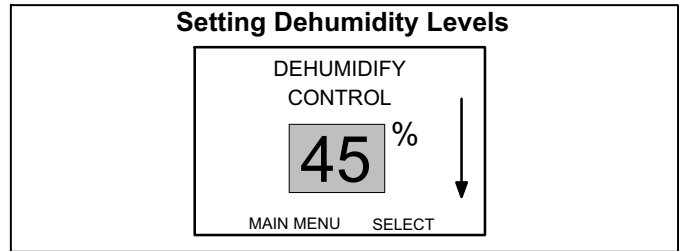


Figure 17

**TABLE 10
TYPICAL CBX32MV, CCB1 and TWO-SPEED OUTDOOR UNIT OPERATING SEQUENCE**

OPERATING SEQUENCE		SYSTEM DEMAND		SYSTEM RESPONSE		
System Condition	Step	Thermostat Demand	*Relative Humidity (EfficiencyPlus Lights)	*** Compressor Speed	Blower CFM (COOL)	Comments
Normal operation	1	Y1	Acceptable (None)	Low	40% of COOL	Compressor demand and indoor blower speed follow thermostat demand.
	2	Y2	Acceptable (None)	High	COOL	
Call for humidity removal during 1st stage thermostat demand.	1	Y1	Acceptable (None)	Low	40% of COOL	Dehumidification mode begins with next thermostat demand after initial thermostat demand is satisfied.
	2	Y1	Change to Slightly over setpoint (1)	Low	40% of COOL	
	3	Demand Satisfied	Slightly over setpoint (1)	Off	Off	
	4	Y1	Slightly over setpoint (1)	High	**60%/65%/70% of COOL	
Significant increase in humidity during thermostat demand.	1	Y1	Acceptable (None)	Low	40% of COOL	If humidity increases significantly over setpoint or if slide switch is moved significantly, unit will immediately go into dehumidification mode (in presence of thermostat demand).
	2	Y1	Change to Significantly over setpoint (2 or more)	High	**60%/65%/70% of COOL	
Humidity demand satisfied during thermostat demand.	1	Y1	Over Setpoint	High	**60%/65%/70% of COOL	When humidity demand is satisfied, blower immediately shifts to the COOL CFM in order to hasten the end of the cycle. Unit can only shift out of high speed compressor operation at beginning of next cycle.
	2	Y1	Change to Acceptable (None)	High	COOL	
	3	None	Acceptable (None)	Off	Off	
	4	Y1	Acceptable (None)	Low	40% of COOL	
Call for humidity removal during 2nd stage thermostat demand.	1	Y2	Acceptable (None)	High	COOL	Blower immediately changes speed in response to thermostat demand.
	2	Y2	Change to Slightly over setpoint (1)	High	**60%/65%/70% of COOL	
	3	Y2	Acceptable (None)	High	COOL	
*Call for 1st stage cooling after call for humidity removal.	1	None	Slightly over setpoint (1)	Off	Off	Dehumidification mode (high speed compressor) begins with next thermostat demand after initial demand is satisfied.
	2	Y1	Slightly over setpoint (1)	Low	40% of COOL	
Call for 2nd stage cooling after call for humidity removal.	1	None	Slightly over setpoint (1)	Off	Off	Reduced blower speed (dehumidification speed) begins immediately with thermostat demand.
	2	Y2	Slightly over setpoint (1)	High	**60%/65%/70% of COOL	
Call for cooling after significant increase in humidity.	1	None	Significantly over setpoint (2 or more)	Off	Off	If humidity increases significantly over setpoint or if slide switch is moved, unit immediately goes into dehumidification mode (in presence of thermostat demand).
	2	Y1 or Y2	Significantly over setpoint (2 or more)	High	**60%/65%/70% of COOL	
Humidity demand satisfied between thermostat demands (unit off cycle).	1	None	Over setpoint (1 or more)	Off	Off	While unit is not operating (no thermostat demand) slide switch is moved down and back up. Blower and compressor operate at high speed until next thermostat demand.
	2	Y1 or Y2	Change to Acceptable (None)	High	COOL	

Note-When changing unit mode of operation from cooling to heating, indicating lights that are on will stay on until the first thermostat heating demand.

*IMPORTANT-If power to unit is turned on with CCB1 calling for humidity removal, outdoor unit may be locked into high speed indefinitely. To reset, move humidity slide switch all the way down then back up to desired setpoint (with unit running)

** Reduced blower speed is 70% of cool for 018/024 and 024/030 units, 65% of COOL for the -036 units; 60% of COOL for -048 and -060 units.

***If the two-speed control on a two-speed outdoor unit is set for LATCH 2 (15 minutes) or LATCH 3 (30 minutes), the compressor will latch into high speed after a Y1 demand has occurred for that period of time.

**TABLE 11
TYPICAL CBX32MV, CCB1 and SINGLE SPEED OUTDOOR UNIT OPERATING SEQUENCE**

OPERATING SEQUENCE		SYSTEM DEMAND			SYSTEM RESPONSE	
System Condition	Step	Thermostat Demand	Relative Humidity (EfficiencyPlus Lights)		Blower CFM (COOL)	Comments
Normal operation	1	Y1	Acceptable (None)		COOL	Compressor demand and indoor blower speed follow thermostat demand.
Call for humidity removal during call for cooling.	1	Y1	Acceptable (None)		COOL	Dehumidification mode begins when relative humidity is greater than setpoint.
	2	Y1	Change over setpoint		*60%/65%/70% of COOL	
Humidity demand satisfied during thermostat demand.	1	Y1	Over Setpoint		*60%/65%/70% of COOL	When humidity demand is satisfied, blower immediately shifts to the COOL CFM in order to hasten the end of the cycle.
	2	Y1	Change to Acceptable (None)		COOL	
*Call for cooling after call for humidity removal.	1	None	Over setpoint		Off	Dehumidification mode begins when relative humidity is greater than setpoint.
	2	Y1	Over setpoint		*60%/65%/70% of COOL	
Humidity demand satisfied between thermostat demands (unit off cycle).	1	None	Over setpoint (1 or more)		Off	While unit is not operating (no thermostat demand) slide switch is moved down and back up. Blower operates at COOL CFM.
	2	Y1	Change to Acceptable (None)		COOL	

Note-When changing unit mode of operation from cooling to heating, indicating lights that are on will stay on until the first thermostat heating demand.

* Reduced blower speed is 70% of COOL for 018/024 and 024/030, 65% of COOL for the -036 units; 60% of COOL for -048 and -060 series units.

**TABLE 12
CBX32MV, SignatureStat or ComfortSense 7000 and SINGLE STAGE OUTDOOR UNIT**

OPERATING SEQUENCE		SYSTEM DEMAND							SYSTEM RESPONSE			
System Condition	Step	Thermostat Demand					Relative Humidity		Compressor	Blower CFM (COOL)	Comments	
		Y1		O	G	W1	Status	D				
NO CALL FOR DEHUMIDIFICATION												
Normal Operation	1	On		On	On			Acceptable	24 VAC	High	100%	Compressor and indoor blower follow thermostat demand
BASIC MODE (only active on a Y1 thermostat demand)												
Normal Operation	1	On		On	On			Acceptable	24 VAC	High	100%	SignatureStat energizes Y1 and de-energizes D on a call for dehumidification
Dehumidification Call	2	On		On	On			Demand	0 VAC	High	60%/65 70%*	
PRECISION MODE (operates independent of a Y1 thermostat demand)												
Normal Operation	1	On		On	On			Acceptable	24 VAC	High	100%	Dehumidification mode begins when humidity is greater than set point
Dehumidification call	2	On		On	On			Demand	0 VAC	High	60%/65 70%*	
Dehumidification call ONLY	1	On		On	On			Demand	0 VAC	High	60%/65 70%*	SignatureStat will try to maintain room humidity setpoint by allowing the room space to maintain a cooler room thermostat setpoint**
Jumpers at indoor unit with a single stage outdoor unit With Condensing unit - Y1 to Y2 and R to O With Heat Pump - Y1 to Y2												

*During dehumidification, cooling blower speed is as follows: 70% of COOL cfm for 018/024, 024/030 & 068 65% for 036, 60% for 048 & 060 units.

** In Precision mode, Signature thermostat built BEFORE October 2003 will maintain the room temperature up to 3°F (1.8°C) cooler than room thermostat setting. Precision thermostat built AFTER October 2003 will maintain the room temperature up to 2°F (1.2°C) cooler than the room thermostat setting.

TABLE 13
CBX32MV, SignatureStat or ComfortSense 7000 and TWO STAGE OUTDOOR UNIT

OPERATING SEQUENCE		SYSTEM DEMAND								SYSTEM RESPONSE		
System Condition	Step	Thermostat Demand						Relative Humidity		Compressor	Blower CFM (COOL)	Comments
		Y1	Y2	O	G	W 1	W 2	Status	D			
NO CALL FOR DEHUMIDIFICATION												
Normal Operation - Y1	1	On		On	On			Acceptable	24 VAC	Low	70%	Compressor and indoor blower follow thermostat demand
Normal Operation - Y2	2	On	On	On	On			Acceptable	24 VAC	High	100%	
ROOM THERMOSTAT CALLS FOR FIRST STAGE COOLING												
<i>BASIC MODE (only active on a Y1 thermostat demand)</i>												
Normal Operation	1	On		On	On			Acceptable	24 VAC	Low	70%	SignatureStat energizes Y2 and de-energizes D on a call for dehumidification
Dehumidification Call	2	On	On	On	On			Demand	24 VAC	High	60%/65% 70%*	
<i>PRECISION MODE (operates independent of a Y1 thermostat demand)</i>												
Normal Operation	1	On		On	On			Acceptable	24 VAC	Low	70%	Dehumidification mode begins when humidity is greater than set point
Dehumidification call	2	On	On	On	On			Demand	0 VAC	High	60%/65% 70%*	
Dehumidification call ONLY	1	On	On	On	On			Demand	0 VAC	High	60%/65% 70%*	SignatureStat will try to maintain room humidity setpoint by allowing the room space to maintain a cooler room thermostat setpoint**
ROOM THERMOSTAT CALLS FOR FIRST AND SECOND STAGE COOLING												
<i>BASIC MODE (only active on a Y1 thermostat demand)</i>												
Normal Operation	1	On	On	On	On			Acceptable	24 VAC	High	100%	SignatureStat energizes Y2 and de-energizes D on a call for dehumidification
Dehumidification Call	2	On	On	On	On			Demand	0 VAC	High	60%/65% 70%*	
<i>PRECISION MODE (operates independent of a Y1 thermostat demand)</i>												
Normal Operation	1	On	On	On	On			Acceptable	24 VAC	High	100%	Dehumidification mode begins when humidity is greater than set point
Dehumidification call	2	On	On	On	On			Demand	0 VAC	High	60%/65% 70%*	
Dehumidification call ONLY	1	On	On	On	On			Demand	0 VAC	High	60%/65% 70%*	SignatureStat will try to maintain room humidity setpoint by allowing the room space to maintain a cooler room thermostat setpoint**
	Jumpers at indoor unit with a two stage outdoor unit With Condensing unit - Y2 and R to O With Heat Pump - none											

*During dehumidification, cooling blower speed is as follows: 70% of COOL cfm for 018/024, 024/030 & 068 65% for 036, 60% for 048 & 060 units.

** In Precision mode, Signature thermostat built BEFORE October 2003 will maintain the room temperature up to 3°F (1.8°C) cooler than room thermostat setting. Precision thermostats built AFTER October 2003 will maintain the room temperature up to 2°F (1.2°C) cooler than the room thermostat setting.

VI-CONFIGURATION MODIFICATIONS

CBX32MV unit may be installed in the upflow, downflow, horizontal right-hand discharge or horizontal left-hand discharge orientation.

The units come from the factory ready for upflow or horizontal right-hand discharge installation. If the unit needs to be modified from its original configuration, use the following procedures. All procedures assume the unit has not been modified from the factory.

A-Disassembly of CBX32MV Cabinet

For tight applications where a modular design is an advantage, the CBX32MV unit can be easily disassembled and reassembled. By removing four screws, the top blower section lifts off so the unit is in two parts. To disassemble the CBX32MV, use the following procedure.

- 1- Remove the two black screws located just above the seam in the top half of the unit.
- 2- Remove the front access panel and remove the two screws on the inside of the top half of the cabinet on both sides.
- 3- Lift the top section apart from the bottom section.
- 4- To lighten the cabinet for lifting, the blower and coil assemblies can also be removed.
- 5- Reassemble once the cabinet is in place.

B-Upflow Application

- 1- Discard drip shields, if applicable. The shields are used for downflow applications only and are located with the foam pads on top of unit.
- 2- For best efficiency and air flow, the horizontal drain pan should be removed from units in upflow configurations.
- 3- After removing horizontal drain pan, place unit in desired location. Set unit so that it is level. Connect return and supply air plenums as required using sheet metal screws. See figure 18.

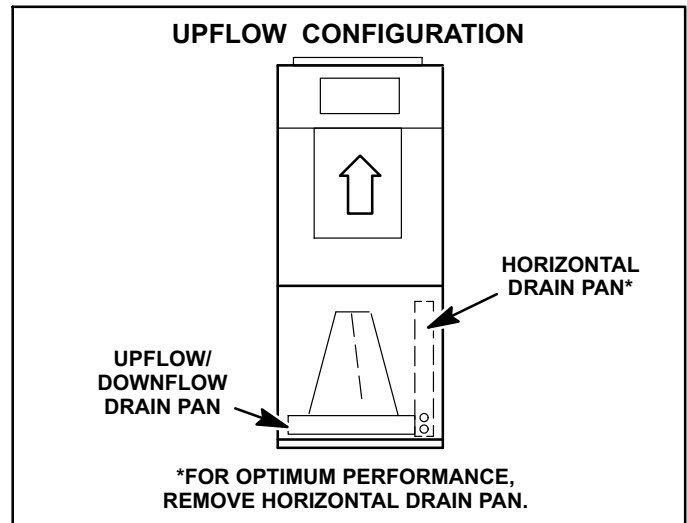


FIGURE 18

C-Downflow Application

⚠ WARNING

If electric heat section with circuit breakers (ECB29) is applied to downflow CBX32MV unit, the circuit breakers must be rotated 180° to the UP position. See ECB29 installation instructions for more details.

- 1- Remove drip shields shipped with the foam pads from top of unit. The shields are used for downflow applications only and may need to be field fabricated if no longer with unit. See table 14 for drip shields used.
- 2- Remove coil assembly from unit.
- 3- Remove horizontal drain pan. See figure 19.

TABLE 14

Unit	Part No.	Length	Width
CBX32MV-018/024	Not Required	N/A	N/A
CBX32MV-024/030	LB-74274	15.875	4.6718
CBX32MV-036	LB-74272	17.875	4.6718
CBX32MV-048, -060, -068	LB-89864	19.875	4.6718

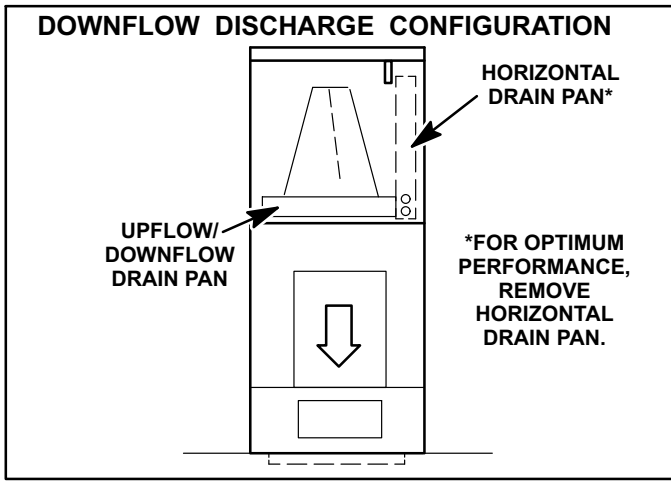


FIGURE 19

- 4- Rotate cabinet 180° from upright. It may be necessary to first remove the blower assembly to lighten the cabinet for lifting.
- 5- Install downflow drip shield firmly in place on inside of coil slab from under drain pan. See figures 20 and 21.

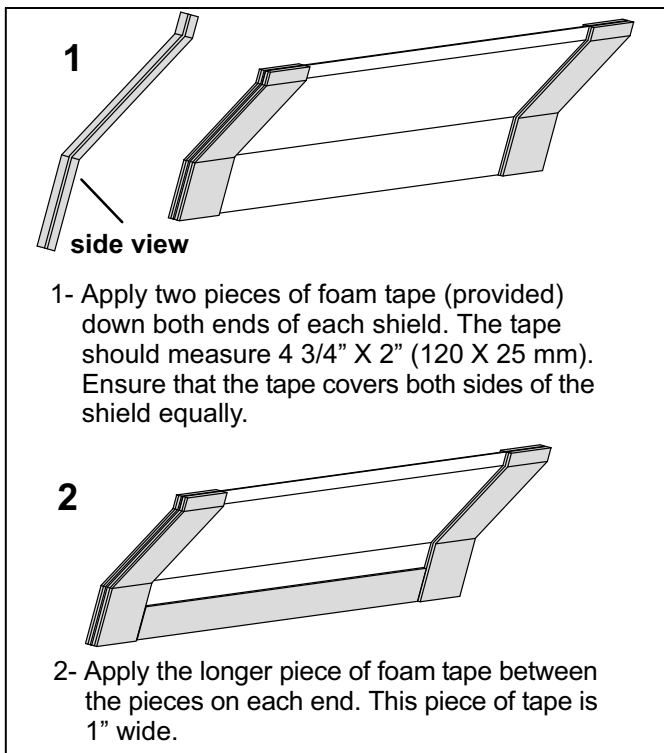


FIGURE 20

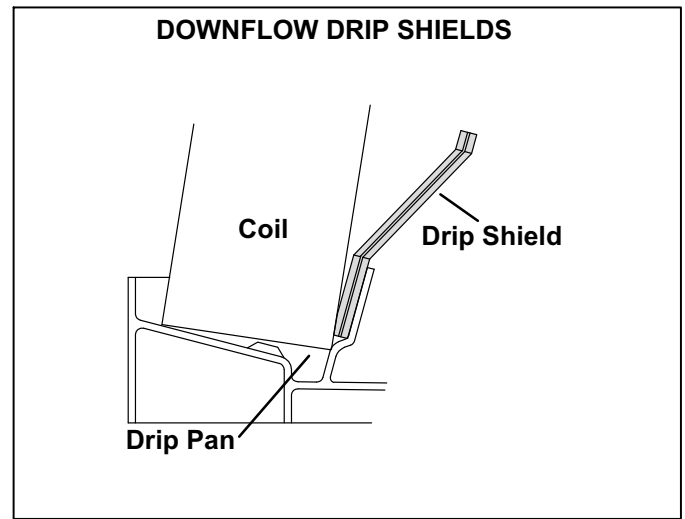


FIGURE 21

- 6- Replace coil assembly and blower if removed. Replace coil access panel. If horizontal drain pan is not removed, depress tab in cabinet support rail to hold horizontal drain pan in place. See figure 19.

- 7- Set unit so that it is level. Connect return and supply air plenums as required using sheet metal screws.

NOTE-For downflow application, metal or class I supply and return air plenums must be used.

For downflow installation on combustible flooring, an additive base must be used. See figure 22.

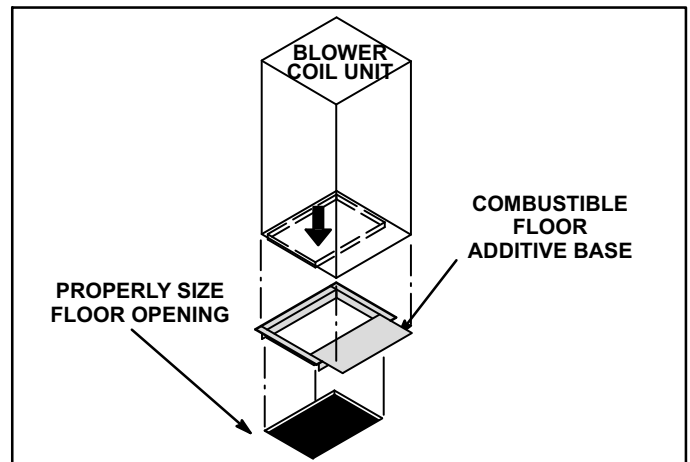


FIGURE 22

Cut an opening appropriately sized for combustible base. Base dimensions are shown in figure 23. After opening has been cut, set the additive base into opening. Connect outlet air plenum to the additive base. Set the unit on the additive base so flanges of the unit drop into the base opening and seal against the insulation strips. Seal around the insulation strips with permagum. The unit is now locked in place. Install return air plenum and secure with sheet metal screws.

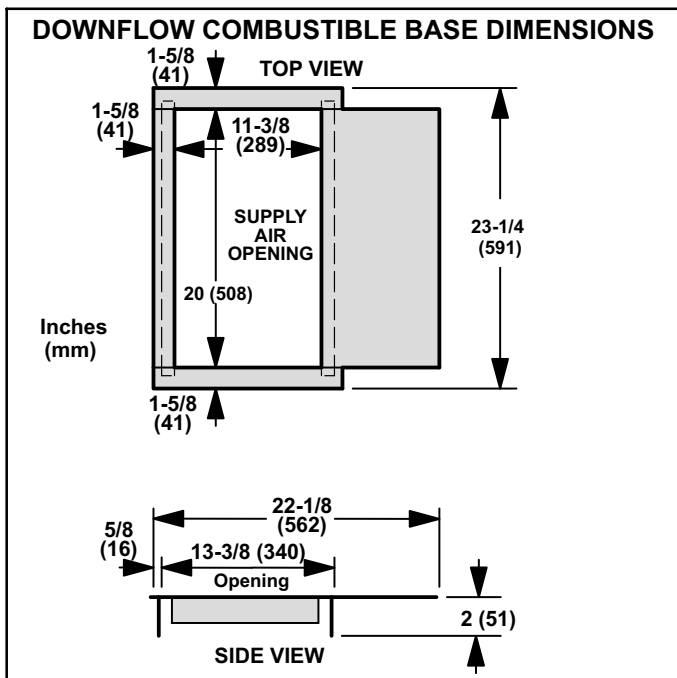


FIGURE 23

D-Horizontal Right-Hand Discharge Application

NOTE-For horizontal applications, a secondary drain pan is recommended. Refer to local codes.

- 1- Before operating the unit, remove access panels and the horizontal drip shield (-068 model) and the corrugated padding between the blower and coil assembly. Discard the corrugated padding and the downflow drip shields from the foam pads on top of the unit.
- 2- Install the horizontal shield on the front edge of the horizontal drain pan as shown in figure 24.
- 3- No further adjustment is necessary. Set unit so it is sloped toward the drain pan (1/4" [6mm]). See figure 24.
- 4- If hanging the unit, it must be supported along the entire length of the cabinet. If using chain or strap, use a piece of angle iron or sheet metal attached to the unit (either above or below) so that the full length of the cabinet is supported. Use securing screws no longer than 1/2" (13mm) to avoid damage to coil or filter. See figure 25. Connect return and supply air plenums as required using sheet metal screws.

*NOTE-For horizontal applications in **high humidity areas**, remove the downflow rail closest to the drain pan. Removal of downflow rail will prevent sweating in high humidity areas. To remove rail, remove screw from rail at back of unit and at cabinet support rail. Remove downflow rail then replace screws. Also, seal around the exiting drain pipe, liquid and suction lines to prevent infiltration of humid air.*

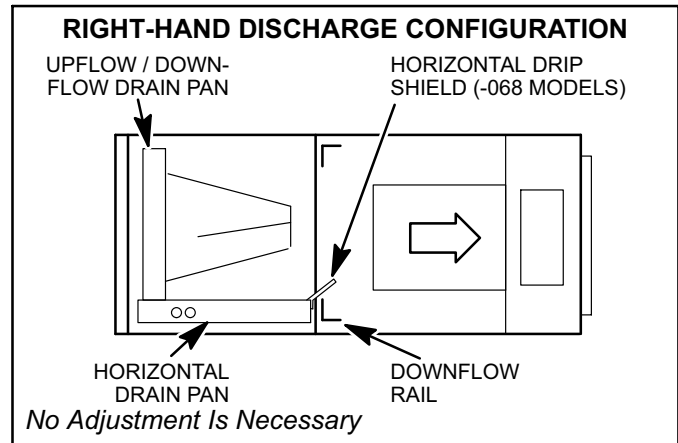


FIGURE 24

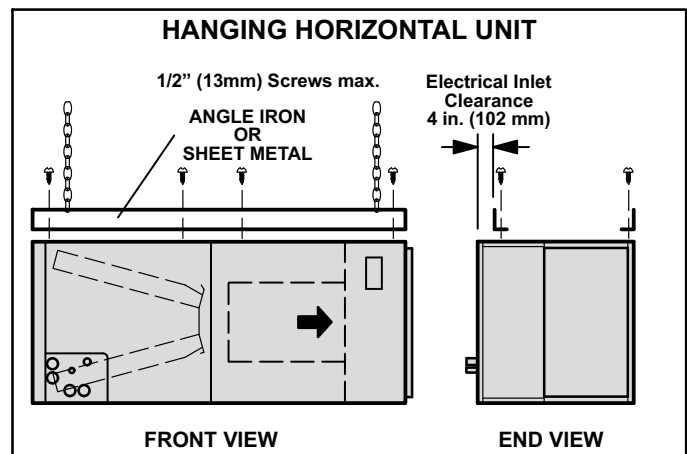


FIGURE 25

⚠ CAUTION

Danger of equipment damage and personal injury. Take care when removing coil assembly from unit installed in right or left-hand applications. Coil may tip into drain pan once clear of cabinet. Support coil when removing.

E-Horizontal Left-Hand Discharge Application

NOTE-For horizontal applications above the ceiling, a secondary drain pan is recommended. Refer to local codes.

- 1- Remove access panels and horizontal drip shield (-068 model) from the corrugated padding between the blower and coil assembly. Discard the corrugated padding and the downflow drip shields from the foam pads on top of the unit. (The shields are used for downflow applications only.)
- 2- Pull the coil assembly from unit. Pull off the horizontal drain pan.
- 3- Remove drain plugs from back drain holes on horizontal drain pan and re-install them on front holes.
- 4- Rotate drain pan 180° front to back and install it on the opposite side of coil.
- 5- Remove screws from top cap. Remove horizontal drip shield screw located in the center of the back coil end seal. See figure 26.
- 6- Rotate horizontal drip shield 180° front to back.
- 7- Remove plastic plug from left hole on coil front end seal and re-install plug in back hole. Re-install horizontal drip shield screw in front coil end seal. Drip shield should drain downward into horizontal drain pan inside coil.
- 8- Rotate top cap 180° front to back and align with unused screw holes. Holes must align with front and back coil end plates. Note that top cap has a 45° bend on one side and 90° bend on the other. **The 90° bend must be on the same side as the horizontal drain pan.** See figures 26 and 27.

NOTE-Use extreme care when re-installing screws into coil end plate engaging holes. Coil damage could result by misalignment.

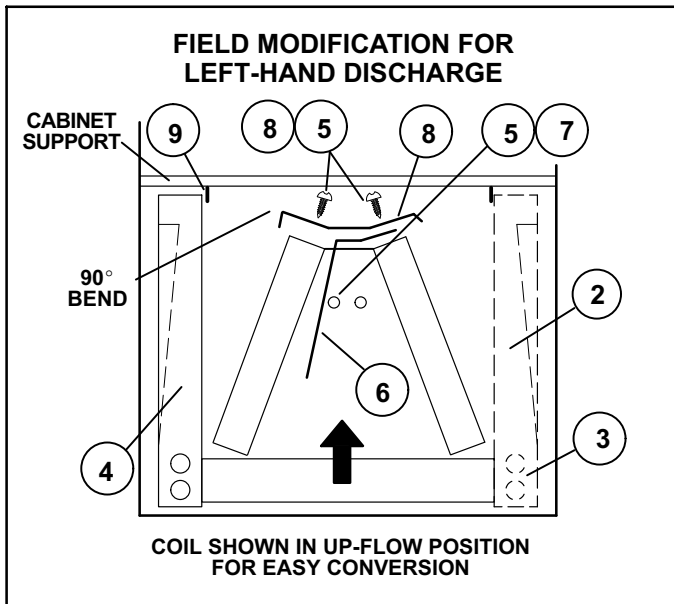


FIGURE 26

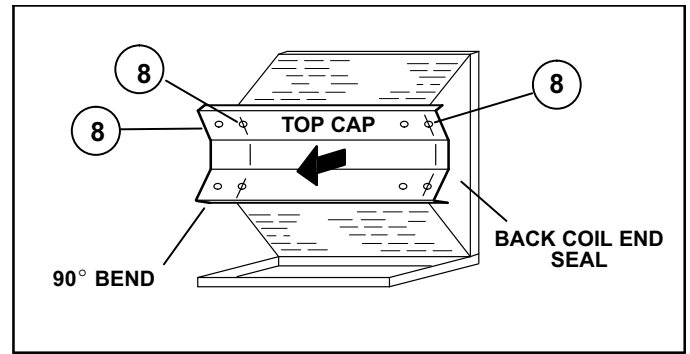


FIGURE 27

- 9- From the upflow position, replace coil assembly. Then flip cabinet 90° to the left and set into place. Replace coil assembly. Secure coil in place by bending down tab on cabinet support rail. See figures 26 and 28.

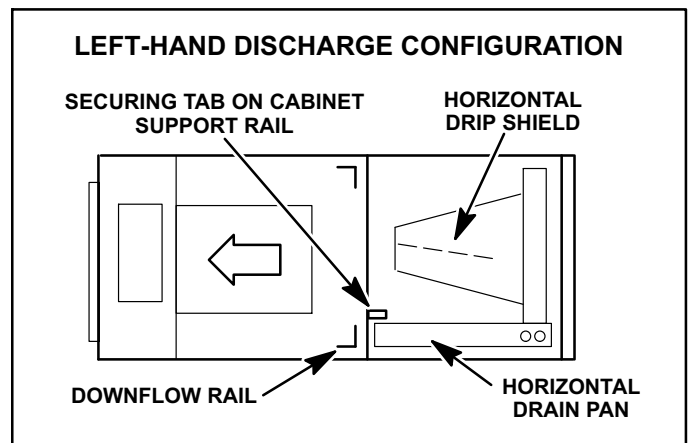


FIGURE 28

- 10- Install the horizontal shield (-068 model) on the front edge of the horizontal drain pan as shown in figure 29.

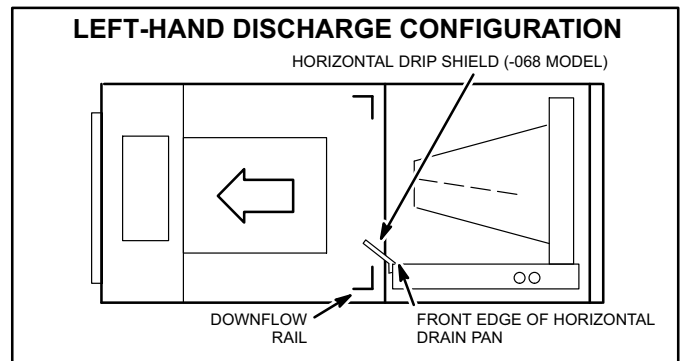


FIGURE 29

*NOTE-For horizontal applications in **high humidity areas**, remove the downflow rail closest to the drain pan. To remove rail, remove screw from rail at back of unit and at cabinet support rail. Remove downflow rail then replace screws. Also, seal around the exiting drain pipe, liquid and suction lines to prevent infiltration of humid air.*

- 11- Flip access door. Knock out the portion of door for the drain pipes and attach to the cabinet with screw provided. Replace access door on the unit.

- 12- Set unit so it is sloped toward the drain pan (1/4" [6mm]). Connect return and supply air plenums as required using sheet metal screws.
- 13- If hanging the unit, it must be supported along the entire length of the cabinet. If using chain or strap, use a piece of angle iron or sheet metal attached to the unit (either above or below) so that the full length of the cabinet is supported. Use securing screws no longer than 1/2" (13mm) to avoid damage to coil or filter. See figure 25. Connect return and supply air plenums as required using sheet metal screws.

F-Condensate Drain

A 5" (127mm) section of PVC pipe is provided with the unit. Cut the pipe in half and use to route the auxiliary and main drains. Connect main condensate drain and route downward to an open drain or sump. Do not connect drain to a closed waste system. Refer to figure 30 for typical condensate trap configuration.

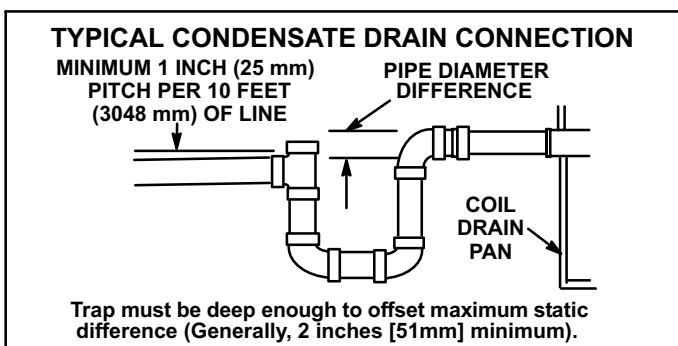


FIGURE 30

It is recommended that the auxiliary drain be connected to a drain line for all units. If auxiliary drain is not connected, it must be plugged with provided cap. **For downflow units, the auxiliary drain MUST be connected and routed to a drain.** See figure 31 for auxiliary and main drain locations.

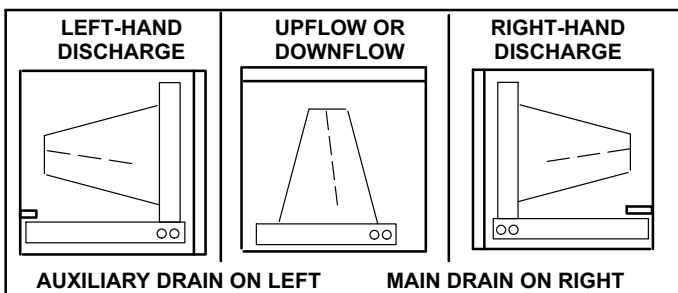


FIGURE 31

The following practices are recommended to ensure condensate removal:

- 1- Drain piping should not be smaller than the drain connections at drain pan.
- 2- A trap must be installed in the main drain line.
- 3- The trap must be deep enough to offset the difference in static pressure between drain pan and atmosphere. Generally, two inches is satisfactory for medium static applications.

- 4- Horizontal runs must be sloped 1" (25mm) per 10 feet (3.1m) of drain line to offset friction.
- 5- An open vent in drain line will sometimes be required due to line length, friction and static pressure.
- 6- Drains should be constructed in a manner to facilitate future cleaning and not to interfere with filter access. See figure 30.
- 7- Auxiliary drain should run to an area where homeowner will notice it draining. Refer to local codes.

VII-START-UP - OPERATION

A-Preliminary and Seasonal Checks

- 1- Make sure the unit is installed in accordance with the installation instructions.
- 2- Inspect electrical wiring, both field and factory installed for loose connections. Tighten as required.
- 3- 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.
- 4- Check to ensure that refrigerant lines are in good condition and pipe insulation is intact.
- 5- Inspect condition of condensate drain pan and piping assembly. Disassemble and clean seasonally.

B-Cooling Start-Up

NOTE-The following is a generalized procedure and does not apply to all thermostat control systems. Electronic thermostat control systems may operate differently.

- 1- Set fan switch to AUTO or ON and move the system selection switch to COOL. Adjust the thermostat to a setting far enough below room temperature to bring on the compressor. Compressor will start and cycle on demand from the thermostat.
- 2- The refrigerant circuit is charged with R410A refrigerant. See condensing unit rating plate for correct charge amount.
- 3- Refer to the correct condensing unit service manual for more information.

C-Heating Start-Up

- 1- Set the fan switch to AUTO or ON and move the system selection switch to HEAT. Adjust the thermostat setting above room temperature.
- 2- The indoor blower immediately starts and the electric heat will stage on based on sequence timing.

D-Safety or Emergency Shutdown

Turn off unit power at circuit breaker.

E-Extended Period Shutdown

Turn off thermostat or set to "UNOCCUPIED" mode. Turn off power to unit. All access panels and covers must be in place and secured. The condensate assembly should be clean and dry for extended period shutdown.

VIII-TYPICAL OPERATING CHARACTERISTICS

A-Blower Operation and Adjustment

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

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

B-External Static Pressure

1. Measure tap locations as shown in figure 32.

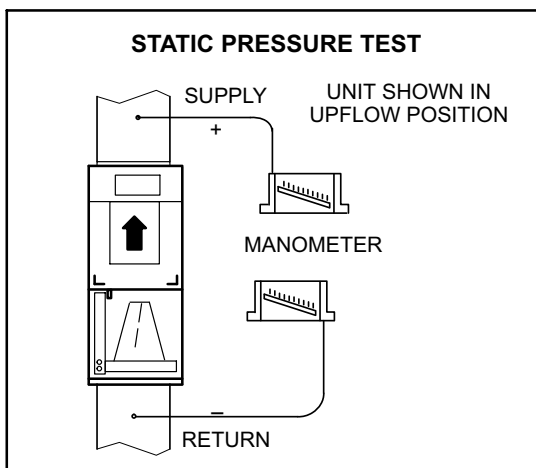


FIGURE 32

2. Punch a 1/4" (6mm) diameter hole in supply and return air plenums. Insert manometer hose flush with inside edge of hole or insulation in the supply plenum only. Seal around the hose with permagum. Connect the other end of the hose to the zero end of the manometer. Leave the other end of the manometer open to the atmosphere.
3. With only the blower motor running and the evaporator coil dry, observe and take note of the manometer reading.
4. Repeat step 2 for the return air plenum. Insert manometer hose to the opposite end of the zero side of the manometer. Leave the zero side of the manometer open to atmosphere.
5. Repeat step 3.
- 6- Add the **absolute** values of the supply air reading and the return air reading to get the external static pressure of the unit. For example -.20 in.wg. on the return and +.30 in.wg. on the supply result in external static pressure of .50 in.wg. External static should not exceed .80" w.g. (200Pa) Adjust blower motor speed to deliver the air desired according to job requirements.
- 7- Seal around the holes when the check is complete.

IX-MAINTENANCE

⚠ 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.

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

A-Filters

⚠ IMPORTANT

Filter access panel must be in place during unit operation. Excessive warm air entering the unit may result in water blow-off problems.

To remove filter, loosen the thumb screws holding the filter panel in place. Slide filter out of the guides on either side of cabinet, insert new filter and replace panel. Some models come with a spacer so standard size filters can be used. Filters should be inspected monthly and must be replaced when dirty to ensure proper blower coil operation. See table 15 for replacement filter sizes or see the sticker located on the filter access door specifying the size of the standard throw-away filter which is used with the unit.

TABLE 15

CBX32MV FILTER SIZES

Unit	Filter Size
CBX32MV018/024	15" X 20" (381mm X 508mm)
CBX32MV-024/030	20" X 20" (508mm X 508mm)
CBX32MV-036	20" X 22" (508mm X 599mm)
CBX32MV-048, -060	20" X 24" (508mm X 610mm)
CBX32MV-068	20" X 25" (508mm X 635mm)

B-Supply Air Blower

- 1- Check and clean blower wheel.
- 2- Motors are pre-lubricated for extended life; no further lubrication is required.

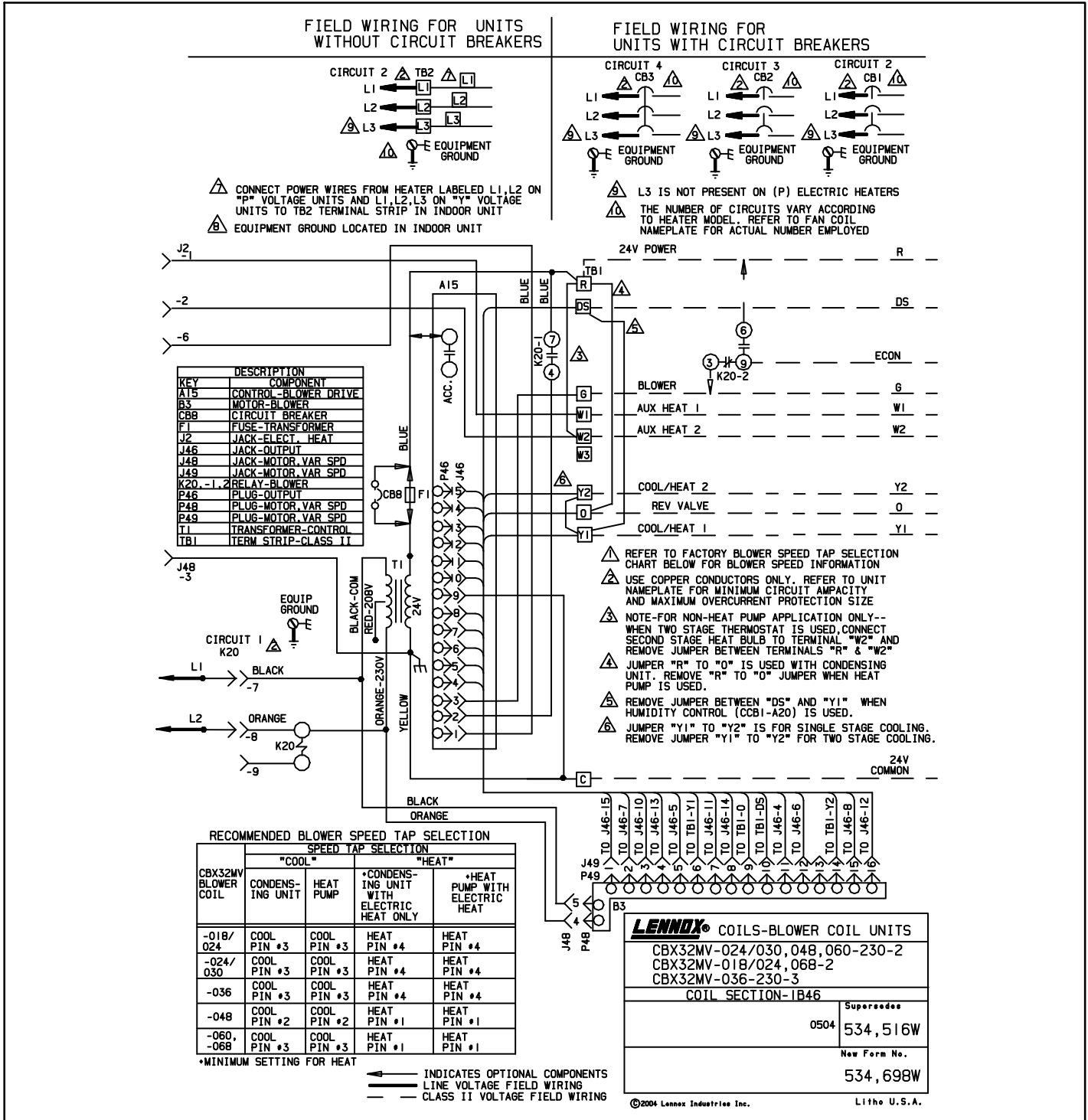
C-Electrical

- 1- Check all wiring for loose connections.
- 2- Check circuit breaker located in unit control box.
- 3- Check for correct voltage at unit (unit operating).
- 4- Check amp-draw using a True root mean square (RMS) amperage meter. Typical clamp-on ammeters do not read current accurately.
- 5- Check to see that heat (if applicable) is operating.

D-Insulation

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

X-WIRING SCHEMATIC AND OPERATION SEQUENCE



A-CBX32MV - 208/230V SINGLE PHASE - SEQUENCE OF OPERATION

- Line voltage is routed to transformer T1 and blower motor B3.
- T1 supplies 24VAC to terminal strip TB1, which supplies 24VAC to the indoor thermostat and electric heat, if used.
- When there is a call for heat, W1 of the thermostat energizes the electric heat relay K32 (covered in the electric heat section). After K32 closes, blower relay K20-1 is energized.
- Blower motor B3 is energized on heating speed after K20-1 closes (see electric heat).
- Economizer relay K20-2 (if used) is energized after K32-1 closes (see electric heat section).
- K20-2 closes energizing the economizer with 24VAC.

HEATING

- When there is a call for heat, W1 of the thermostat energizes the electric heat relay K32 (covered in the electric heat section). After K32 closes, blower relay K20-1 is energized.

COOLING

- See Table 16 for cooling sequence of operation.

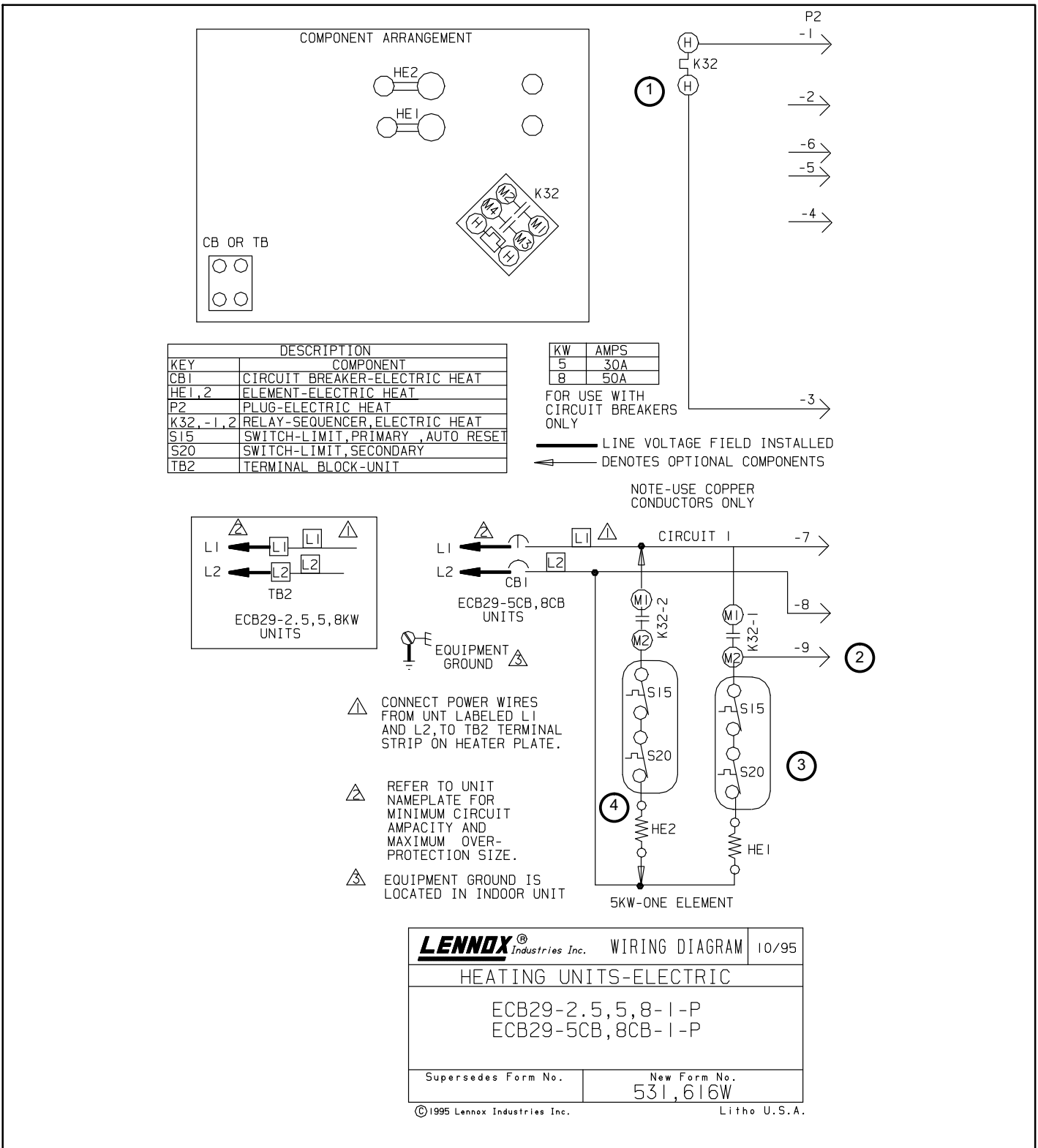
TABLE 16

CBX32MV COOLING OPERATION AND JUMPER SUMMARY (OPTIONAL ACCESSORIES) WITHOUT SignatureStat OR CCB1 WITHOUT HARMONY			
UNIT	JUMPERS	THERMOSTAT DEMAND	BLOWER SPEED
Single Speed Condensing Unit	DS to Y1 Y1 to Y2 O to R	Y1	COOL
Two Speed Condensing Unit	DS to Y1 O to R	Y1	*60%/65%/70% of COOL
		Y2	COOL
Single Speed Heat Pump	DS to Y1 Y1 to Y2	Y1	COOL
Two Speed Heat Pump	DS to Y1	Y1	*60%/65%/70% of COOL
		Y2	COOL
CBX32MV COOLING OPERATION AND JUMPER SUMMARY (OPTIONAL ACCESSORIES) WITH CCB1 WITHOUT HARMONY			
UNIT	JUMPERS	THERMOSTAT DEMAND & BLOWER SPEED	
Single Speed Condensing Unit	Y1 to Y2 O to R	See table 11	
Two Speed Condensing Unit	O to R	See table 10	
Single Speed Heat Pump	Y1 to Y2	See table 11	
Two Speed Heat Pump	NONE	See table 10	
CBX32MV COOLING OPERATION AND JUMPER SUMMARY (OPTIONAL ACCESSORIES) WITH SignatureStat WITHOUT HARMONY			
UNIT	JUMPERS	THERMOSTAT DEMAND & BLOWER SPEED	
Single Speed Condensing Unit	Y1 to Y2 O to R	See table 12	
Two Speed Condensing Unit	O to R	See table 13	
Single Speed Heat Pump	Y1 to Y2	See table 12	
Two Speed Heat Pump	NONE	See table 13	
CBX32MV COOLING OPERATION AND JUMPER SUMMARY (OPTIONAL ACCESSORIES) WITHOUT SignatureStat OR CCB1 WITH HARMONY			
UNIT	JUMPERS	SEQUENCE OF OPERATION	
Single or Two Speed Condensing Unit	O to R	Harmony controls blower speed according to size of demand, through pulse width modulated signal to DS	
Single or Two Speed Heat Pump	NONE	Harmony controls blower speed according to size of demand, through pulse width modulated signal to DS	

NOTE: CAUTION HIGH VOLTAGE If using Harmony kit, locate blower relay K20 and remove and tape off any one of four wires.

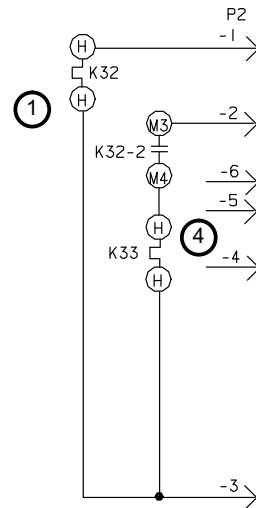
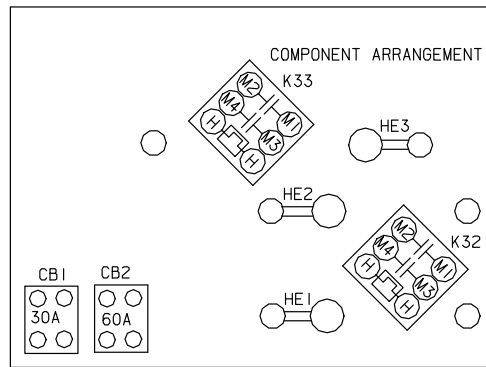
NOTE: Continuous fan CFM will be 50% of COOL speed. Blower will run on HEAT speed during Heat operation.

*Production August 2002 and later - Reduced blower speed is 70% of COOL for ALL model units. Production prior to August 2002 - Reduced blower speed is 65% of COOL for the -036 units and 60% of COOL for -048 and -060 units.



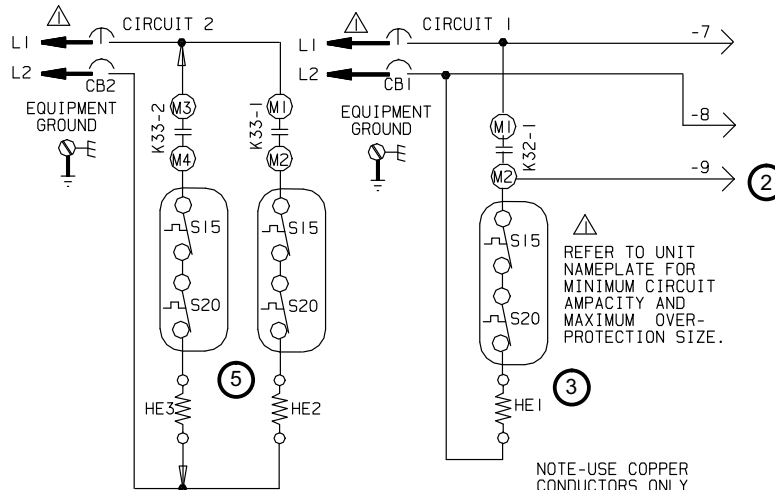
B-ECB29-5, -5CB, -8, -8CB - 208/230V SINGLE PHASE - SEQUENCE OF OPERATION

1. When there is a call for heat, W1 of the thermostat energizes the electric heat relay K32 with 24VAC.
2. When K32-1 closes, the blower is energized on heating speed and economizer heat relay (K20-2) is energized (see unit schematic, figure 26).
3. Assuming the N.C. primary (S15) and secondary (S20) limit switches are closed, electric heat element HE1 is energized.
4. When K32-2 closes, assuming the N.C. primary (S15) and secondary (S20) limit switches are closed, electric heat element HE2 is energized.



DESCRIPTION	
KEY	COMPONENT
CB1	CIRCUIT BREAKER-ELECTRIC HEAT
CB2	CIRCUIT-BREAKER-ELECTRIC HEAT
HE1, 2	ELEMENT-ELECTRIC HEAT
HE3, 4	ELEMENT-ELECTRIC HEAT
P2	PLUG-ELECTRIC HEAT
K32, -1, 2	RELAY-SEQUENCER, ELECTRIC HEAT
K33, -1, 2	RELAY-SEQUENCER, ELECTRIC HEAT
S15	SWITCH-LIMIT, PRIMARY, AUTO RESET
S20	SWITCH-LIMIT, SECONDARY

— LINE VOLTAGE FIELD INSTALLED
 ◀ DENOTES OPTIONAL COMPONENTS



NOTE-USE COPPER CONDUCTORS ONLY

LENNOX [®] Industries Inc.	WIRING DIAGRAM	10/95
HEATING UNITS-ELECTRIC		
ECB29-12.5CB, 15CB-1-P		
Supersedes Form No.	New Form No.	
	531,614W	
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D-ECB29-12.5CB, -15CB - 208/230V SINGLE PHASE - SEQUENCE OF OPERATION

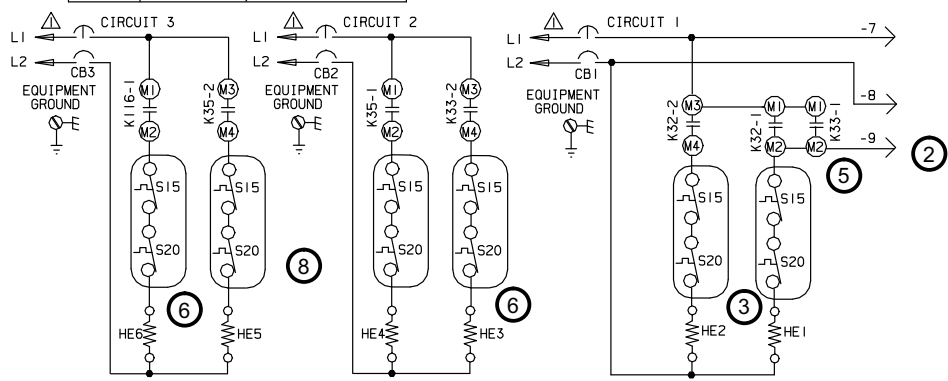
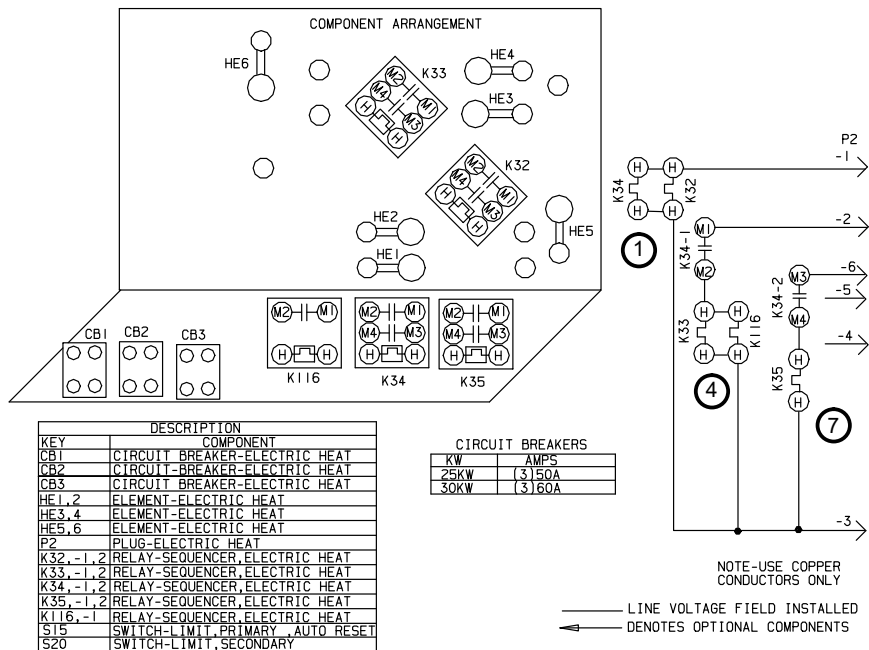
FIRST-STAGE HEAT

1. When there is a call for heat, W1 of the thermostat energizes the electric heat relay K32 with 24VAC.
2. When K32-1 closes, the blower is energized on heating speed and economizer heat relay (K20-2) is energized (see unit schematic figure 26).
3. Assuming the N.C. primary (S15) and secondary (S20) limit switches are closed, electric heat element HE1 is energized.

SECOND-STAGE HEAT

(remove jumper between W2 and R)

4. When K32-2 closes, the unit is ready for a second stage heat demand. W2 of the thermostat sends a second stage heat demand, energizing the electric heat relay K33 with 24VAC.
5. When K33-1 and K33-2 close, assuming the N.C. primary (S15) and secondary (S20) limit switches are closed, electric heat elements HE2 and HE3 are energized.



REFER TO UNIT NAMEPLATE FOR MINIMUM CIRCUIT AMPACITY AND MAXIMUM OVER-PROTECTION SIZE.

LENNOX Industries Inc. WIRING DIAGRAM 10/95	
HEATING UNITS-ELECTRIC	
ECB29-25CB, 30CB-1-P	
Supersedes Form No.	New Form No.
	531,618W
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F-ECB29-25CB - 208/230V SINGLE PHASE - SEQUENCE OF OPERATION

FIRST-STAGE HEAT

- When there is a call for heat, W1 of the thermostat energizes the electric heat relays K32 and K34 with 24VAC.
- When K32-1 closes, the blower is energized on heating speed and economizer heat relay (K20-2) is energized (see unit schematic 26).
- When K32-1 and K32-2 closes, assuming the N.C. primary (S15) and secondary (S20) limit switches are closed, electric heat elements HE1 and HE2 are energized.

SECOND-STAGE HEAT

(remove jumper between W2 and R)

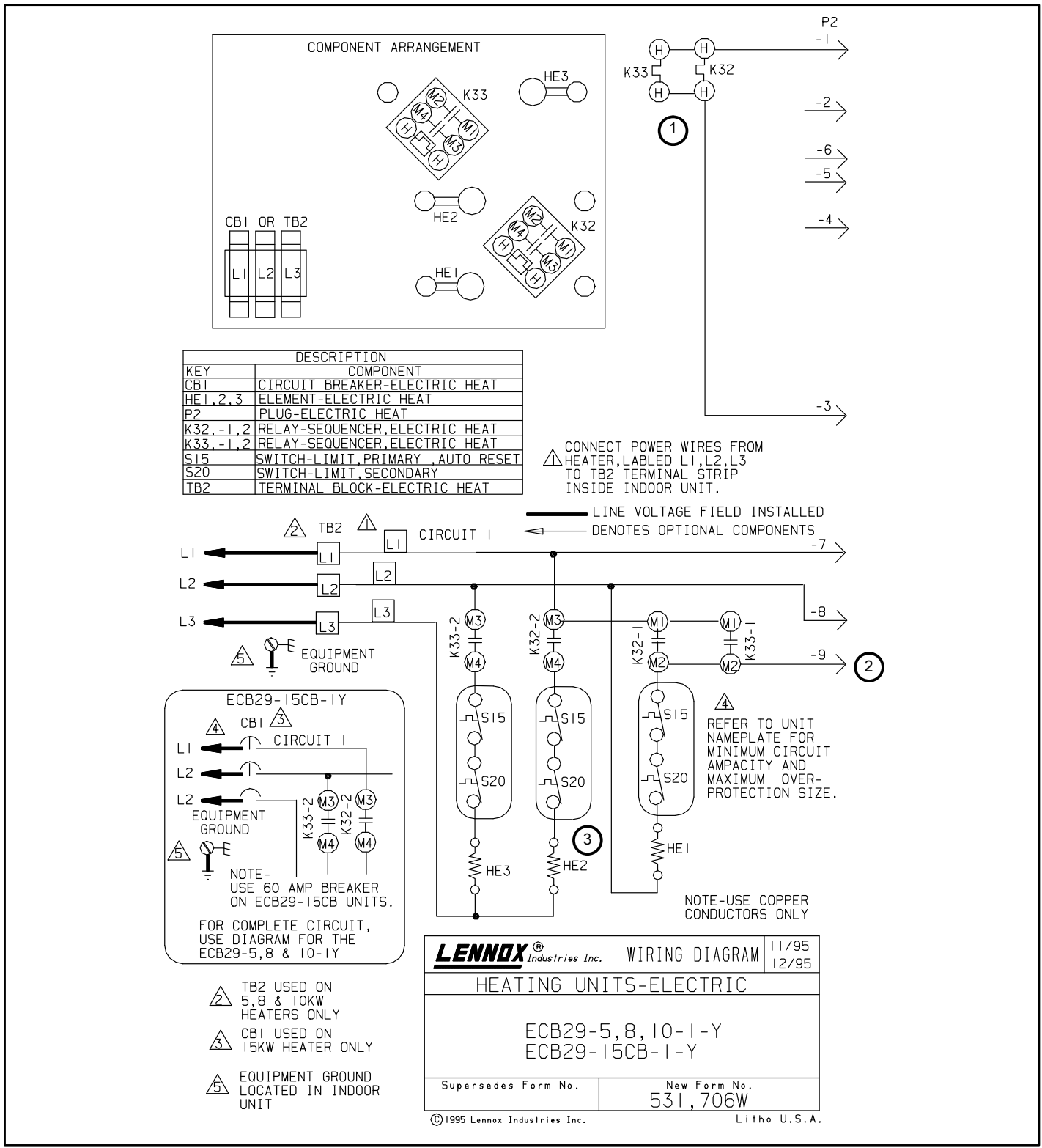
- When K34-1 closes, the unit is ready for a second stage heat demand. W2 of the thermostat sends a second stage heat demand, energizing the electric heat relays K33 and K116 with 24VAC.

- When K33-1 closes, the blower (if not energized) is energized on heating speed and economizer heat relay K43 is energized (see 208/230VAC CB schematic).
- When K33-2 and K116-1 close, assuming the N.C. primary (S15) and secondary (S20) limit switches are closed, electric heat elements HE3 and HE6 are energized.

THIRD-STAGE HEAT

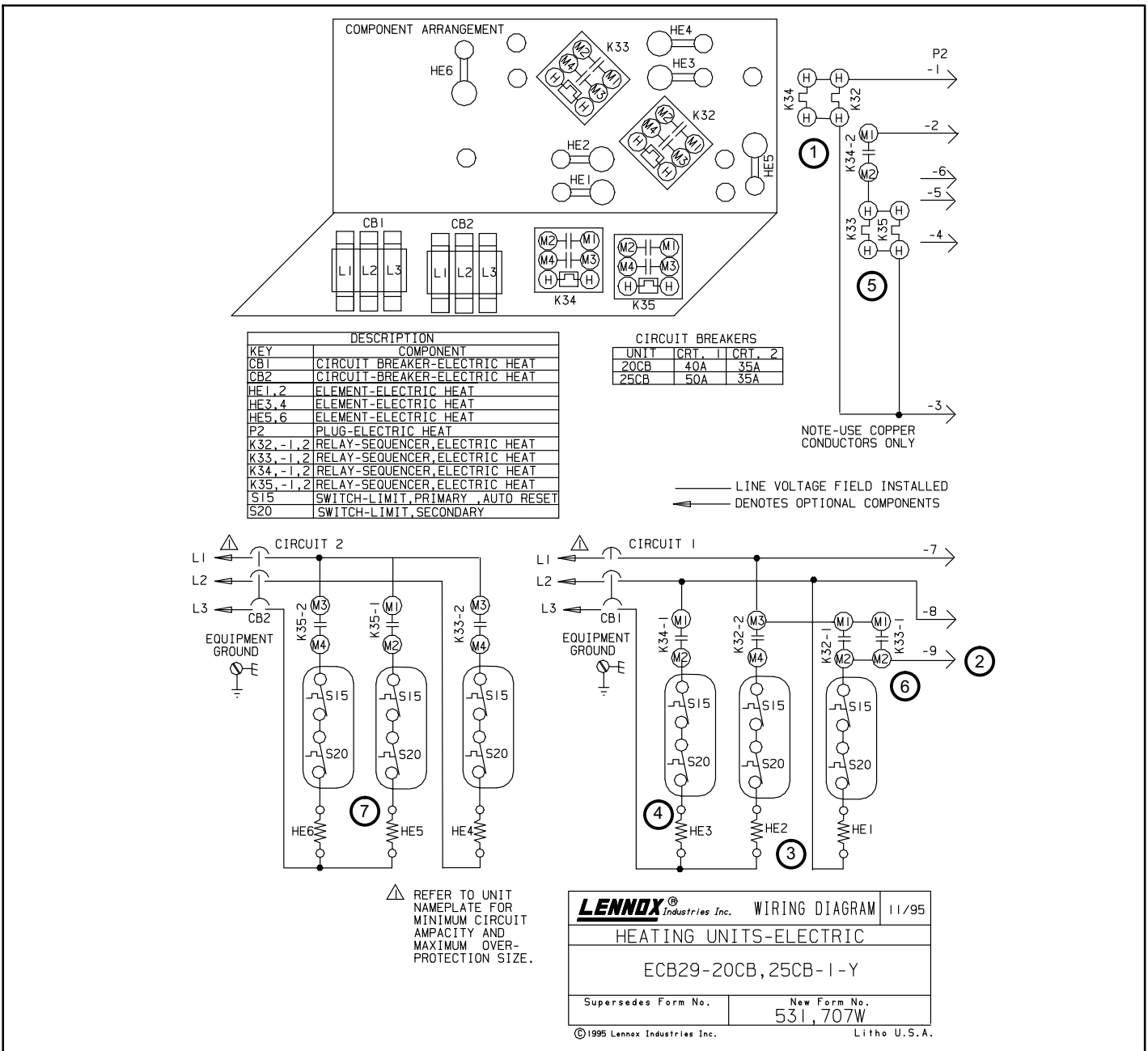
(remove jumper between W3 and R, if using third stage)

- When K34-2 closes, the unit is ready for a third stage heat demand. W3, if available, of the thermostat sends a third stage heat demand, energizing the electric heat relay K35 with 24VAC.
- When K35-1 and K35-2 close, assuming the N.C. primary (S15) and secondary (S20) limit switches are closed, electric heat elements HE4 and HE5 are energized.



G-ECB29-8, -10,-15CB - 208/230V THREE PHASE - SEQUENCE OF OPERATION

1. When there is a call for heat, W1 of the thermostat energizes the electric heat relays K32 and K33 with 24VAC.
2. When K32-1 and/or K33-1 closes, the blower is energized on heating speed and economizer heat relay (K20-2) is energized (see unit schematic figure 26).
3. When K32-1, K32-2, and K33-2 closes, assuming the N.C. primary (S15) and secondary (S20) limit switches are closed, electric heat elements HE1, HE2, and HE3 are energized.



H-ECB29-20CB, -25CB - 208/230V THREE PHASE - SEQUENCE OF OPERATION

FIRST-STAGE HEAT

1. When there is a call for heat, W1 of the thermostat energizes the electric heat relays K32 and K34 with 24VAC.
2. When K32-1 closes, the blower is energized on heating speed and economizer heat relay (K20-2) is energized (see unit schematic figure 26).
3. When K32-1 and K32-2 closes, assuming the N.C. primary (S15) and secondary (S20) limit switches are closed, electric heat elements HE1 and HE2 are energized.
4. When K34-1 closes, assuming the N.C. primary (S15) and secondary (S20) limit switches are closed, electric heat element HE3 is energized.

SECOND-STAGE HEAT

(remove jumper between W2 and R)

5. When K34-2 closes, the unit is ready for a second stage heat demand. W2 of the thermostat sends a second stage heat demand, energizing the electric heat relays K33 and K35 with 24VAC.
6. When K33-1 closes, the blower (if not energized) is energized on heating speed and economizer heat relay K43 is energized (see 208/230VAC CB schematic).
7. When K33-1, K35-1, and K35-2 contacts close, assuming the N.C. primary (S15) and secondary (S20) limit switches are closed, electric heat elements HE4, HE5, and HE6 are energized.