LENNOX Service Literature®

INSTALLATION AND SERVICE PROCEDURE
Corp. 0906-L2
Revised January 30, 2015

CBX40UHV

Technical Publications

CBX40UHV (HFC-410A) SERIES UNITS (iComfort®-enabled)

iComfort®
So simple. So smart. So comfortable.

NOTICE

A thermostat is not included and must be ordered separately.

- The Lennox iComfort® thermostat must be used in communicating applications (CBX40UHV-XXX-230-6-02 and later).
- In non-communicating applications, the Lennox ComfortSense® 7000 thermostat may be used, as well as other non-communicating thermostats.

In all cases, setup is critical to ensure proper system operation.

⚠ WARNING

Improper installation, adjustment, alteration, service or maintenance can cause personal injury, loss of life, or damage to property.

Installation and service must be performed by a licensed professional installer (or equivalent) or a service agency.

⚠ CAUTION

Physical contact with metal edges and corners while applying excessive force or rapid motion can result in personal injury. Be aware of, and use caution when working near these areas during installation or while servicing this equipment.

⚠WARNING

The State of California has determined that this product may contain or produce a chemical or chemicals, in very low doses, which may cause serious illness or death. It may also cause cancer, birth defects, or reproductive harm.

TABLE OF CONTENTS

Model Number Identification 2
Specifications / Electrical Data 2
Blower Performance 3
Parts Arrangement 3
Application 9
Unit Components 9
Field Wiring 13
Air Handler Control Button, Display and Jumpers 17
Variable Speed ECM Blower Motor 20
Optional ECB40 Electric Heat 25
Optional Humidity Control 25
Unit Sequence of Operations 33
Unit Status and Alarm Codes 35
Application Configuration Modifications 38
Start-Up Operation 41
Operating Characteristics 41
Maintenance 42
Configuring Unit Flow Charts 43
Unit Diagram 52
Electric Heat Diagrams and Sequence of Operations 53

CBX40UHV series units are designed to be matched with Lennox two-stage or single-stage HFC-410A air conditioner units and heat pumps. Several models are available in sizes ranging from 2 through 5 tons. All units are equipped with factory installed HFC-410A check and expansion valve for cooling or heat pump applications.

This air handler is compatible with the ComfortSense® 7000 non-communicating thermostat and non-communicating outdoor units. In addition, this unit has the enhance capability of communicating with the iComfort® thermostat and compatible outdoor units using the Lennox RSBus protocols.

Optional ECB40 electric heat is available in several kW sizes, and can be field installed in the cabinets.

This document provides service information on the following model builds:

1. **Non-iComfort®-enabled** version (CBX40UHV-XXX-230-6-01)
2. **iComfort®-enabled** version (CBX40UHV-XXX-230-6-02) or later.

MODEL NUMBER IDENTIFICATION

CB X 40 UHV – 036 – 230 – 6 – 02

Unit Type
CB = Air Handler

Refrigerant Type
X = R-410A

Series

Configuration
UHV = Up-Flow/Horizontal, Variable Speed Blower Motor

Nominal Cooling Capacity
024 = 2 tons
030 = 2.5 tons
036 = 3 tons
042 = 3.5 tons
048 = 4 tons
060 = 5 tons

Voltage
230 = 208/230V-60hz-1ph

Refrigerant Metering Device
2 = Fixed Orifice
3 = TXV - Bleedport (indoor unit)
4 = TXV - Non-bleedport (indoor unit)
5 = TXV - Non-bleedport (outdoor unit)
6 = TXV - R-410A Non-bleedport (indoor unit)

Minor Revision Number

SPECIFICATIONS / ELECTRICAL DATA

Refer to the Unit Engineering Handbook or Lennox Price Book for optional accessories for this unit.

SPECIFICATIONS							
General Data	Model Number	CBX40UHV -024	CBX40UHV -030	CBX40UHV -036	CBX40UHV -042	CBX40UHV -048	CBX40UHV -060
	Nominal cooling capacity - tons	2	2.5	3	3.5	4	5
	Refrigerant	HFC-410A	HFC-410A	HFC-410A	HFC-410A	HFC-410A	HFC-410A
Connections in.	Suction (vapor) line - sweat	3/4	3/4	3/4	7/8	7/8	7/8
	Liquid line - sweat	3/8	3/8	3/8	3/8	3/8	3/8
	Condensate drain (fpt)	(2) 3/4	(2) 3/4	(2) 3/4	(2) 3/4	(2) 3/4	(2) 3/4
Indoor Coil	Net face area - ft.^{2}	5.0	5.0	5.0	7.22	7.22	7.22
	Tube outside diameter - in.	3/8	3/8	3/8	3/8	3/8	3/8
	Number of rows	3	3	3	3	3	3
	Fins per inch	12	12	12	12	12	12
Blower Data	Wheel nominal diameter x width - in.	11 X 8	11 X 8	11 X 8	11-1/2 X 9	11-1/2 X 9	11-1/2 X 9
	Motor output - hp	1/2	1/2	3/4	1	1	1
Filters (MERV16)	[1] Size - in.	20 X 20 X 5	20 X 20 X 5	20 X 20 X 5	20 X 25 X 5	20 X 25 X 5	20 X 25 X 5
Shipping Data - 1 Package - lbs.		165	167	172	214	216	216
ELECTRICAL DATA							
Voltage - phase - 60hz		208/230V-1PH					
[2] Maximum overcurrent protection (unit only)		15	15	15	20	20	20
Minimum circuit ampacity (unit only)		5	5	10	10	10	10

[1] Disposable frame type filter.
[2] HACR type circuit breaker or fuse.

BLOWER DATA

CBX40UHV-024 BLOWER PERFORMANCE

0 through 0.80 in. W.g. External Static Pressure Range

"AJUST" Jumper Setting	Jumper Speed Positions							
	"HEAT" Speed				"COOL" Speed			
	1 cfm	2 cfm	3 cfm	4 cfm	1 cfm	2 cfm	3 cfm	4 cfm
+	715	855	1000	1130	465	690	900	1050
NORM	670	770	900	1035	425	620	825	950
-	580	700	800	930	385	560	735	850

NOTES:

- The effect of static pressure, filter and electric heater resistance is included in the air volumes listed.
- First stage cooling air volume is 70% of COOL speed settings. Continuous fan speed is approximately 28%, 38%, 70% and 100% (Jumper selectable) of the same second-stage COOL speed selected, minimum 250 cfm.
- Lennox Harmony III™ Zone Control applications - minimum blower speed if 250 cfm.

CBX40UHV-024 BLOWER MOTOR WATTS AT "+" (Plus) AHC SETTING (Adjust Jumper at "+" Setting)

AHC Jumper Speed Positions		Motor Watts @ Various External Static Pressures - in. wg.								
		0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8
HEAT SPEED	TAP 1	53	68	89	113	143	163	191	214	232
	TAP 2	73	93	122	141	170	200	234	260	282
	TAP 3	105	141	168	179	217	248	275	306	348
	TAP 4	132	159	189	218	248	285	313	349	393
COOL SPEED	TAP 1	25	35	56	73	89	98	114	130	143
	TAP 2	45	64	79	101	130	151	180	211	216
	TAP 3	75	103	127	146	177	210	243	266	298
	TAP 4	114	142	175	200	219	258	280	332	363

CBX40UHV-024 BLOWER MOTOR WATTS AT "NORM" AHC SETTING (Adjust Jumper at NORM Setting)

AHC Jumper Speed Positions		Motor Watts @ Various External Static Pressures - in. wg.								
		0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8
HEAT SPEED	TAP 1	48	64	79	103	128	156	182	196	207
	TAP 2	61	80	98	123	149	175	206	233	254
	TAP 3	77	101	128	151	178	214	239	267	300
	TAP 4	109	142	171	193	223	245	286	325	359
COOL SPEED	TAP 1	23	38	52	68	80	91	111	128	135
	TAP 2	34	53	76	94	111	142	152	176	203
	TAP 3	64	87	113	130	158	190	226	247	270
	TAP 4	89	120	145	166	198	225	258	289	319

CBX40UHV-024 BLOWER MOTOR WATTS AT "-" (Minus) AHC SETTING (Adjust Jumper at "-" Setting)

AHC Jumper Speed Positions		Motor Watts @ Various External Static Pressures - in. wg.								
		0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8
HEAT SPEED	TAP 1	38	56	70	94	113	130	154	176	192
	TAP 2	53	68	88	110	138	163	195	207	234
	TAP 3	62	84	103	125	155	186	213	246	268
	TAP 4	89	116	141	165	192	220	250	278	314
COOL SPEED	TAP 1	22	33	47	61	71	83	98	110	123
	TAP 2	30	46	63	86	102	118	138	162	172
	TAP 3	54	71	91	116	138	171	191	221	247
	TAP 4	66	86	117	138	159	195	227	253	286

CBX40UHV-030 BLOWER PERFORMANCE

0 through 0.80 in. W.g. External Static Pressure Range

"AJUST" Jumper Setting	Jumper Speed Positions							
	"HEAT" Speed				"COOL" Speed			
	1	2	3	4	1	2	3	4
	cfm	cfm	cfm	cfm	cfm	cfm	cfm	cfm
+	800	935	1070	1210	660	880	1100	1320
NORM	725	850	975	1100	600	800	1000	1200
-	655	765	880	990	540	720	900	1080

NOTES:

- The effect of static pressure, filter and electric heater resistance is included in the air volumes listed.
- First stage cooling air volume is 70% of COOL speed settings. Continuous fan speed is approximately 28%, 38%, 70% and 100% (Jumper selectable) of the same second-stage COOL speed selected, minimum 250 cfm.
- Lennox Harmony III™ Zone Control applications - minimum blower speed if 250 cfm.

CBX40UHV-030 BLOWER MOTOR WATTS AT "+" (Plus) AHC SETTING (Adjust Jumper at "+" Setting)

AHC Jumper Speed Positions		Motor Watts @ Various External Static Pressures - in. wg.								
		0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8
HEAT SPEED	TAP 1	66	87	114	134	162	185	214	239	268
	TAP 2	101	124	151	175	192	224	243	273	325
	TAP 3	134	171	188	212	243	273	296	329	366
	TAP 4	182	211	245	285	319	353	375	405	444
COOL SPEED	TAP 1	47	63	82	101	121	151	175	193	206
	TAP 2	83	107	131	152	178	202	231	265	296
	TAP 3	142	170	196	220	251	282	315	345	367
	TAP 4	209	258	295	345	373	418	452	482	512

CBX40UHV-030 BLOWER MOTOR WATTS AT "NORM" AHC SETTING (Adjust Jumper at NORM Setting)

AHC Jumper Speed Positions		Motor Watts @ Various External Static Pressures - in. wg.								
		0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8
HEAT SPEED	TAP 1	57	77	94	115	146	172	195	219	232
	TAP 2	79	104	123	149	168	196	231	264	294
	TAP 3	111	139	164	186	209	233	261	298	334
	TAP 4	148	178	199	231	260	293	314	355	382
COOL SPEED	TAP 1	38	53	68	94	113	127	149	169	185
	TAP 2	67	84	105	131	152	178	207	240	257
	TAP 3	110	141	164	188	213	240	266	292	330
	TAP 4	168	197	226	260	302	338	366	400	434

CBX40UHV-030 BLOWER MOTOR WATTS AT "-" (Minus) AHC SETTING (Adjust Jumper at "-" Setting)

AHC Jumper Speed Positions		Motor Watts @ Various External Static Pressures - in. wg.								
		0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8
HEAT SPEED	TAP 1	48	66	83	107	127	149	171	199	217
	TAP 2	63	80	103	125	145	178	200	229	246
	TAP 3	86	113	135	155	179	203	244	270	305
	TAP 4	109	144	165	191	212	240	264	296	338
COOL SPEED	TAP 1	32	47	60	86	101	113	134	151	168
	TAP 2	54	70	88	107	132	157	188	210	225
	TAP 3	87	114	137	159	183	206	232	267	302
	TAP 4	130	165	184	207	245	270	300	326	363

CBX40UHV-036 BLOWER PERFORMANCE

0 through 0.80 in. W.g. External Static Pressure Range

"AJUST" Jumper Setting	Jumper Speed Positions							
	"HEAT" Speed				"COOL" Speed			
	1	2	3	4	1	2	3	4
	cfm	cfm	cfm	cfm	cfm	cfm	cfm	cfm
+	1230	1335	1445	1545	900	1225	1380	1545
NORM	1120	1215	1315	1400	810	1125	1275	1400
-	1010	1185	1200	1265	730	1000	1135	1265

NOTES:

- The effect of static pressure, filter and electric heater resistance is included in the air volumes listed.
- First stage cooling air volume is 70% of COOL speed settings. Continuous fan speed is approximately 28%, 38%, 70% and 100% (Jumper selectable) of the same second-stage COOL speed selected, minimum 380 cfm.
- Lennox Harmony III™ Zone Control applications - minimum blower speed if 380 cfm.

CBX40UHV-036 BLOWER MOTOR WATTS AT "+" (Plus) AHC SETTING (Adjust Jumper at "+" Setting)

AHC Jumper Speed Positions		Motor Watts @ Various External Static Pressures - in. wg.								
		0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8
HEAT SPEED	TAP 1	189	223	253	271	306	323	359	377	409
	TAP 2	238	273	295	316	349	375	417	439	473
	TAP 3	279	322	348	384	420	463	486	525	550
	TAP 4	327	387	427	451	489	537	566	600	643
COOL SPEED	TAP 1	130	157	184	212	237	263	284	307	346
	TAP 2	183	211	232	261	296	314	342	368	396
	TAP 3	248	284	315	349	366	407	441	473	509
	TAP 4	347	376	418	464	495	531	566	608	632

CBX40UHV-036 BLOWER MOTOR WATTS AT "NORM" AHC SETTING ("Adjust" Jumper at NORM Setting)

AHC Jumper Speed Positions		Motor Watts @ Various External Static Pressures - in. wg.								
		0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8
HEAT SPEED	TAP 1	146	173	199	225	257	279	304	330	364
	TAP 2	186	234	241	264	296	319	340	371	395
	TAP 3	226	263	281	304	341	371	393	435	456
	TAP 4	261	296	321	355	389	423	450	489	519
COOL SPEED	TAP 1	98	117	143	165	185	216	247	267	301
	TAP 2	144	168	197	223	250	272	299	332	356
	TAP 3	198	227	265	279	307	340	363	397	431
	TAP 4	255	285	313	346	386	418	454	483	527

CBX40UHV-036 BLOWER MOTOR WATTS AT "-" (Minus) AHC SETTING ("Adjust" Jumper at "-" Setting)

AHC Jumper Speed Positions		Motor Watts @ Various External Static Pressures - in. wg.								
		0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8
HEAT SPEED	TAP 1	110	139	161	185	213	234	263	291	312
	TAP 2	182	210	236	252	293	315	336	356	393
	TAP 3	175	193	224	257	294	312	330	350	382
	TAP 4	199	234	257	291	309	333	366	395	423
COOL SPEED	TAP 1	86	102	124	143	165	193	218	246	270
	TAP 2	103	130	148	172	192	219	248	277	309
	TAP 3	144	163	192	216	250	275	294	322	357
	TAP 4	196	224	255	287	306	339	371	395	429

CBX40UHV-042 BLOWER PERFORMANCE

0 through 0.80 in. W.g. External Static Pressure Range

"AJUST" Jumper Setting	Jumper Speed Positions							
	"HEAT" Speed				"COOL" Speed			
	1	2	3	4	1	2	3	4
	cfm	cfm	cfm	cfm	cfm	cfm	cfm	cfm
+	1100	1320	1540	1760	1100	1320	1540	1760
NORM	1000	1200	1400	1600	1000	1200	1400	1600
-	900	1080	1260	1440	900	1080	1260	1440

NOTES:

- The effect of static pressure, filter and electric heater resistance is included in the air volumes listed.
- First stage cooling air volume is 70% of COOL speed settings. Continuous fan speed is approximately 28%, 38%, 70% and 100% (Jumper selectable) of the same second-stage COOL speed selected, minimum 450 cfm.
- Lennox Harmony III™ Zone Control applications - minimum blower speed if 450 cfm.

CBX40UHV-042 BLOWER MOTOR WATTS AT "+" (Plus) AHC SETTING ("Adjust" Jumper at "+" Setting)

AHC Jumper Speed Positions		Motor Watts @ Various External Static Pressures - in. wg.								
		0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8
HEAT SPEED	TAP 1	124	154	177	204	240	260	296	326	363
	TAP 2	179	227	255	287	336	356	394	451	486
	TAP 3	294	339	387	425	463	489	518	550	600
	TAP 4	405	456	510	553	607	647	686	743	777
COOL SPEED	TAP 1	122	146	173	198	224	259	292	329	360
	TAP 2	186	230	254	289	332	361	404	438	477
	TAP 3	284	335	387	413	455	483	526	551	600
	TAP 4	413	475	517	570	632	569	715	750	782

CBX40UHV-042 BLOWER MOTOR WATTS AT "NORM" AHC SETTING ("Adjust" Jumper at NORM Setting)

AHC Jumper Speed Positions		Motor Watts @ Various External Static Pressures - in. wg.								
		0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8
"HEAT" SPEED	TAP 1	97	123	146	179	205	225	258	292	327
	TAP 2	144	180	209	230	266	295	334	375	410
	TAP 3	226	259	307	342	380	405	448	482	525
	TAP 4	323	369	401	449	491	516	563	593	640
COOL SPEED	TAP 1	93	118	142	166	197	225	247	280	314
	TAP 2	148	179	207	231	268	311	333	377	405
	TAP 3	229	263	298	332	386	408	446	484	534
	TAP 4	327	375	403	448	489	523	557	589	646

CBX40UHV-042 BLOWER MOTOR WATTS AT "-" (Minus) AHC SETTING ("Adjust" Jumper at "-" Setting)

AHC Jumper Speed Positions		Motor Watts @ Various External Static Pressures - in. wg.								
		0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8
HEAT SPEED	TAP 1	80	105	128	148	173	206	233	265	287
	TAP 2	113	144	172	193	219	265	286	312	349
	TAP 3	168	198	238	265	293	332	368	415	442
	TAP 4	239	285	315	362	398	428	465	503	544
COOL SPEED	TAP 1	76	100	123	148	169	203	230	260	279
	TAP 2	115	145	169	190	217	258	288	315	349
	TAP 3	166	199	236	263	296	330	380	415	449
	TAP 4	241	289	321	366	396	431	472	505	544

CBX40UHV-048 AND CBX40UHV-060 BLOWER PERFORMANCE

0 through 0.80 in. W.g. External Static Pressure Range

"AJUST" Jumper Setting	Jumper Speed Positions							
	"HEAT" Speed				"COOL" Speed			
	1	2	3	4	1	2	3	4
	cfm	cfm	cfm	cfm	cfm	cfm	cfm	cfm
+	1850	1960	2090	2150	1625	1820	2055	2145
NORM	1705	1800	1900	2005	1425	1625	1805	2005
-	1560	1625	1720	1770	1205	1375	1555	1725

NOTES:

- The effect of static pressure, filter and electric heater resistance is included in the air volumes listed.
- First stage cooling air volume is 70% of COOL speed settings. Continuous fan speed is approximately 28%, 38%, 70% and 100% (Jumper selectable) of the same second-stage COOL speed selected, minimum 450 cfm.
- Lennox Harmony III™ Zone Control applications - minimum blower speed if 450 cfm.

CBX40UHV-048 and CBX40UHV-060 BLOWER MOTOR WATTS AT "+" (Plus) AHC SETTING ("Adjust" Jumper at "+" Setting)

AHC Jumper Speed Positions		Motor Watts @ Various External Static Pressures - in. wg.								
		0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8
HEAT SPEED	TAP 1	418	478	539	551	599	646	675	704	748
	TAP 2	492	540	585	642	684	732	761	797	834
	TAP 3	594	645	721	762	811	863	874	918	976
	TAP 4	653	713	755	809	861	909	941	974	1028
COOL SPEED	TAP 1	312	342	373	414	443	475	512	558	587
	TAP 2	407	459	503	552	591	627	670	718	752
	TAP 3	581	646	691	737	792	826	863	900	942
	TAP 4	646	695	746	804	873	900	934	976	1032

CBX40UHV-048 and CBX40UHV-060 BLOWER MOTOR WATTS AT "NORM" AHC SETTING ("Adjust" Jumper at NORM Setting)

AHC Jumper Speed Positions		Motor Watts @ Various External Static Pressures - in. wg.								
		0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8
HEAT SPEED	TAP 1	325	366	404	444	475	520	566	598	636
	TAP 2	369	421	465	516	560	587	616	666	717
	TAP 3	436	488	540	586	621	671	710	743	789
	TAP 4	523	581	636	684	738	789	816	852	894
COOL SPEED	TAP 1	226	259	293	322	350	387	413	446	472
	TAP 2	312	355	382	423	450	492	520	570	615
	TAP 3	388	421	482	523	564	606	641	695	741
	TAP 4	538	599	647	686	718	792	820	853	888

CBX40UHV-048 and CBX40UHV-060 BLOWER MOTOR WATTS AT "-" (Minus) AHC SETTING ("Adjust" Jumper at "-" Setting)

AHC Jumper Speed Positions		Motor Watts @ Various External Static Pressures - in. wg.								
		0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8
HEAT SPEED	TAP 1	271	302	341	368	398	439	473	504	545
	TAP 2	286	329	356	393	423	462	504	550	572
	TAP 3	327	374	407	455	504	526	563	608	638
	TAP 4	355	404	442	496	539	560	602	643	684
COOL SPEED	TAP 1	124	163	180	209	231	271	300	322	357
	TAP 2	192	233	252	282	321	356	390	422	449
	TAP 3	268	311	336	367	393	432	469	523	538
	TAP 4	328	376	420	463	486	536	572	612	657

PARTS ARRANGEMENT

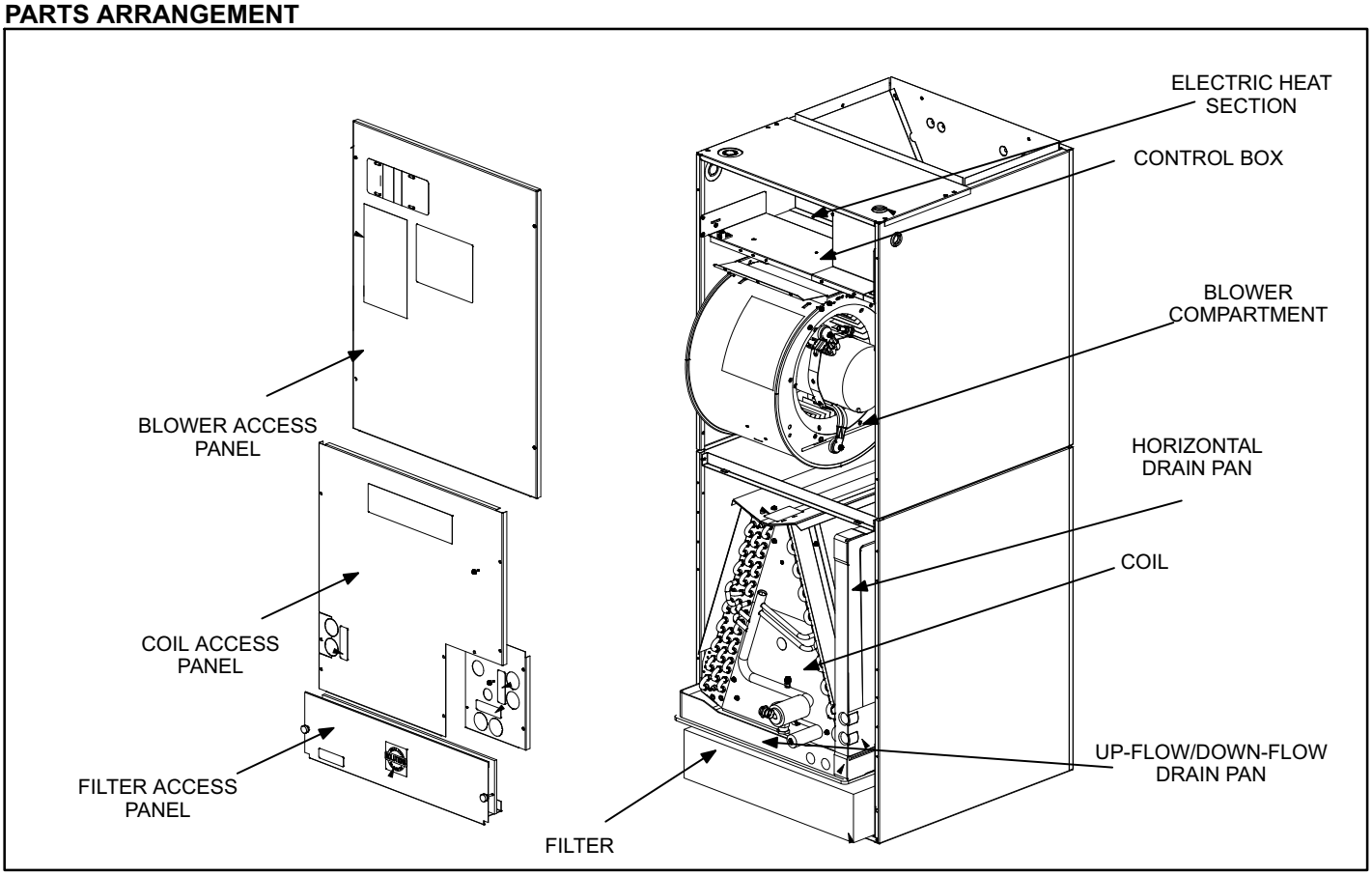


Figure 1. CBX40UHV Parts Arrangement

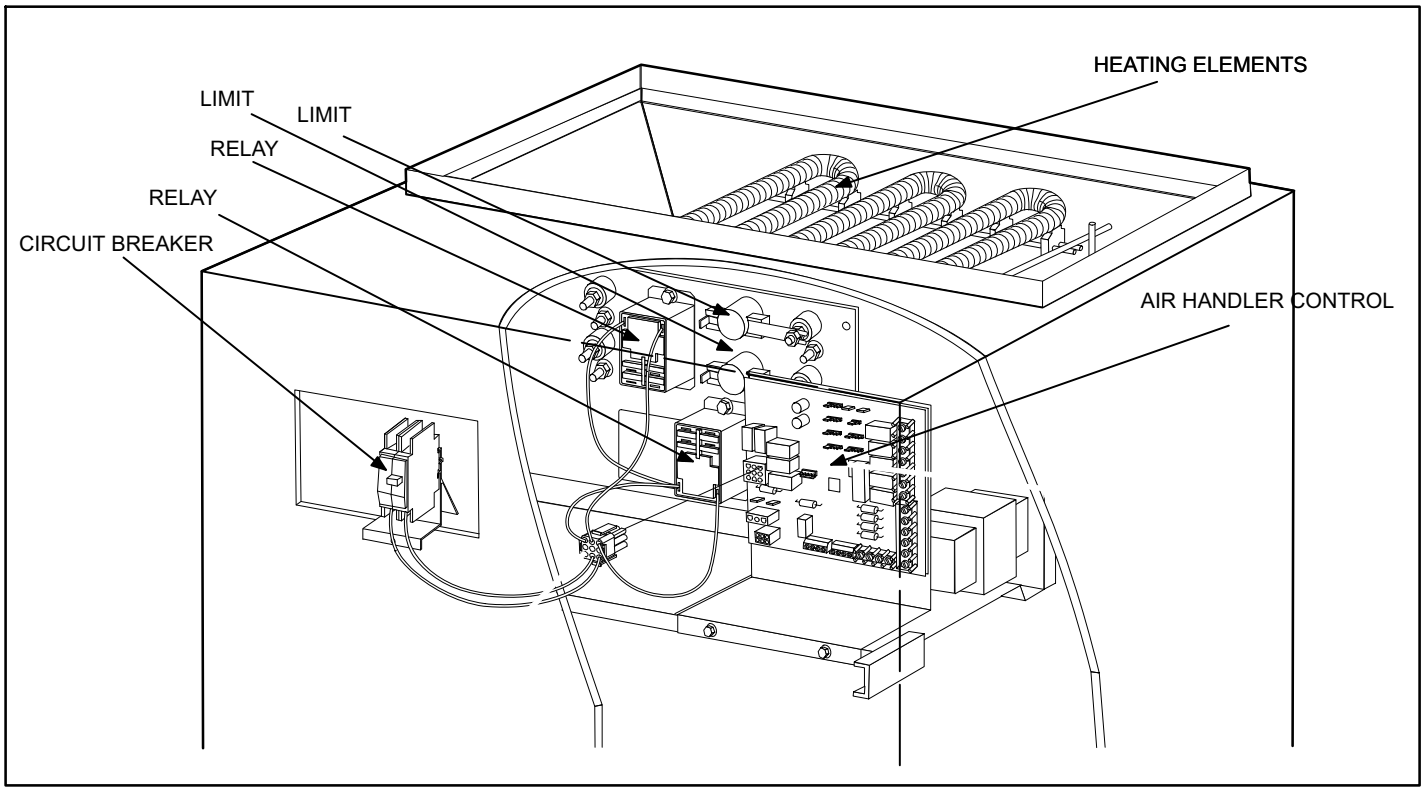


Figure 2. CBX40UHV Control Box

APPLICATION

CBX40UHV air handlers are designed for HFC-410A applications only. **All major air handler 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.

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.

UNIT COMPONENTS

Control Box

The CBX40UHV 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.

Low voltage connections are made on the air handler control (AHC) also located in the control box. All AHC will have factory installed clippable links connecting DS to R, R to O and Y1 to Y2. These links will have to be removed in certain unit application. See table 1.

Table 1. Links

Application	Remove Links
Harmony III™	DS to R
Heat Pump	R to O
Two-Stage Cooling	Y1 to Y2

Transformer (T1)

All CBX40UHV 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. Transformers are rated at 70VA. 208/240VAC single-phase transformers use two primary voltage taps.

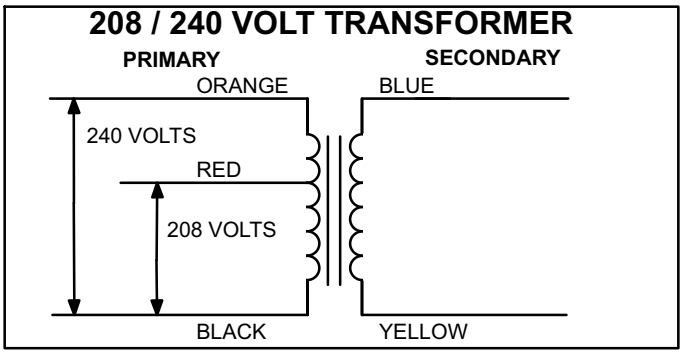


Figure 3 Transformer

Plastic Drain Pans

Both up-flow/down-flow and horizontal drain pans are provided and installed on the CBX40UHV 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. Each pan has a set of connections, one for a primary drain and one for an auxiliary drain.

Coil

All CBX40UHV 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 inlet screen feeds multiple parallel circuits through the coils. The coil is designed to easily slide out of the unit cabinet.

Air Handler Control (AHC)

The Air Handler Control manages electric heat, indoor blower and accessory controls. The Air Handler Control also provides system configuration and air-flow adjustments plus diagnostic capabilities.

Discharge Sensor (DAT)

The Air Handler Control has two screw terminals marked **Discharge Air Sensor**. The sensor is REQUIRED for EvenHeater® operation and is field mounted and ordered separately, use Lennox Catalog # 88K38.

In the EvenHeater mode, the discharge air sensor cycles the electric heating elements as needed to maintain the Air Handler control EvenHeater jumper selected discharge setpoint.

The discharge air sensor should be mounted downstream of the electric heat elements as illustrated in Figure 4, Detail A. It must be placed in a location with unobstructed airflow, where other accessories (such as humidifiers, UV lights, etc.) will not interfere with its accuracy.

Wiring distance between the Air Handler Control and the discharge air sensor should not exceed 10' (3m) when wired with 18-gauge thermostat wire.

Outdoor Air Sensor (OAS)

These terminals are for FUTURE USE. (DO NOT USE).

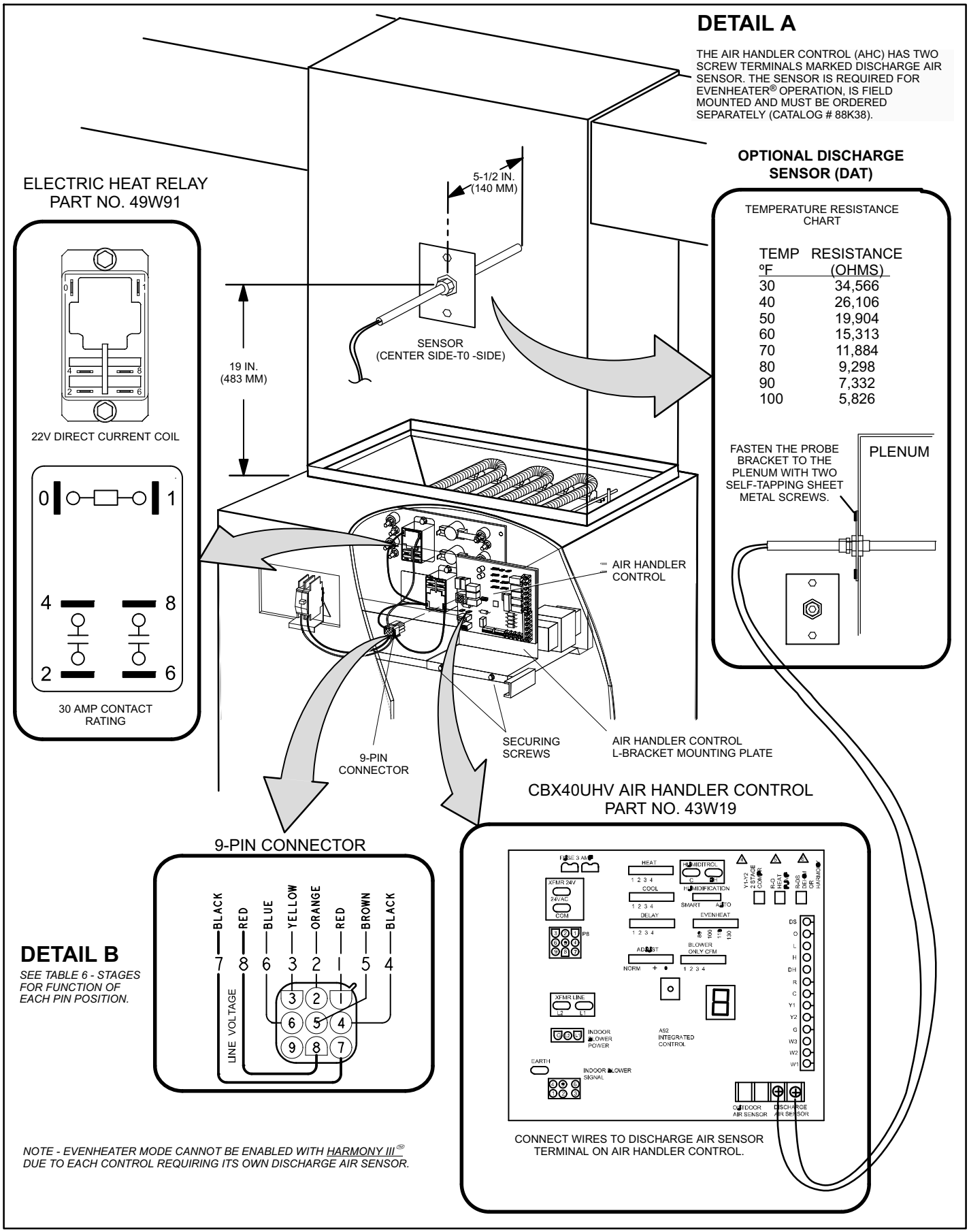


Figure 4. CBX40UHV-XXX-230-6-01

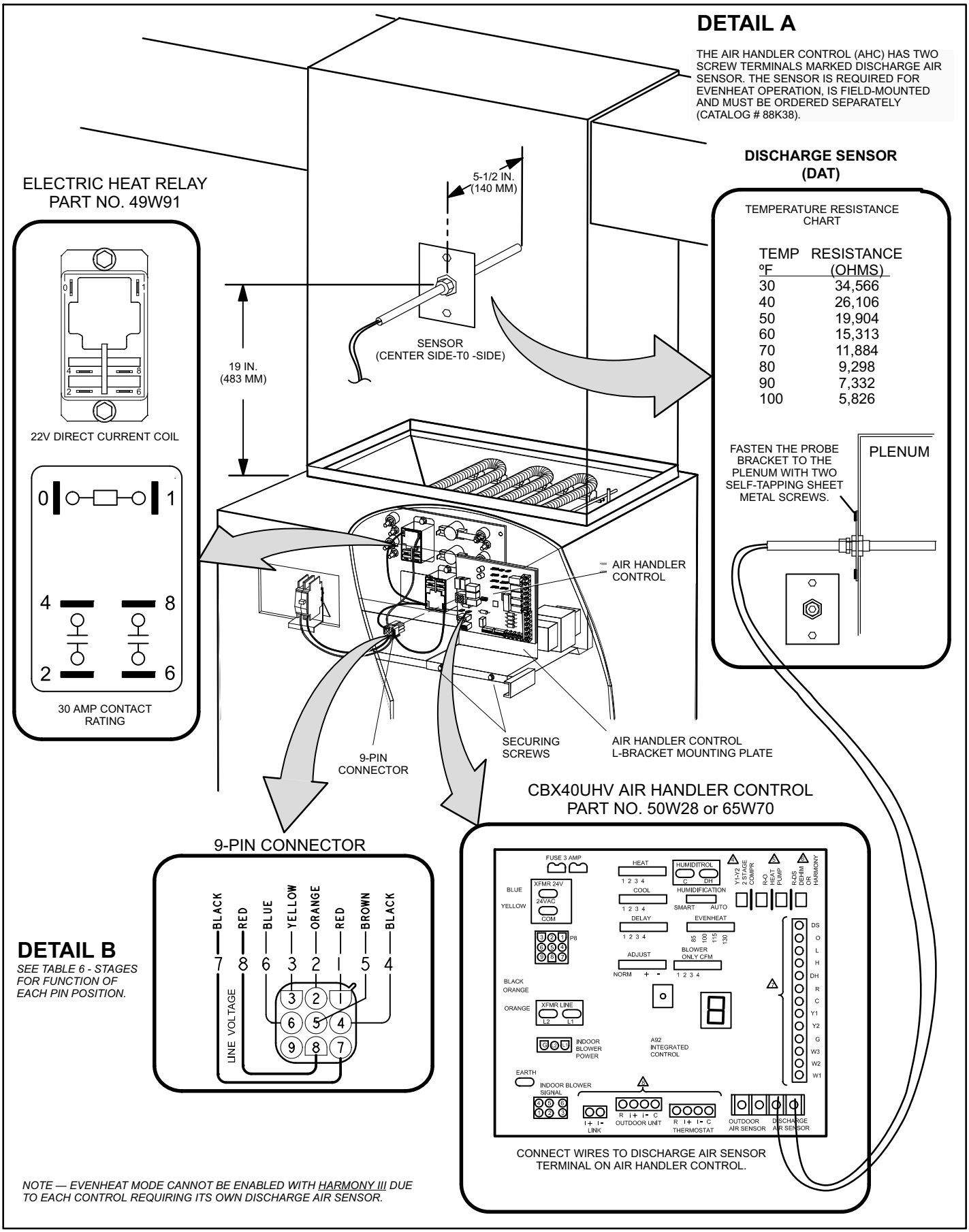


Figure 5. Component Connections (CBX40UHV-XXX-230-6-02)

FIELD WIRING

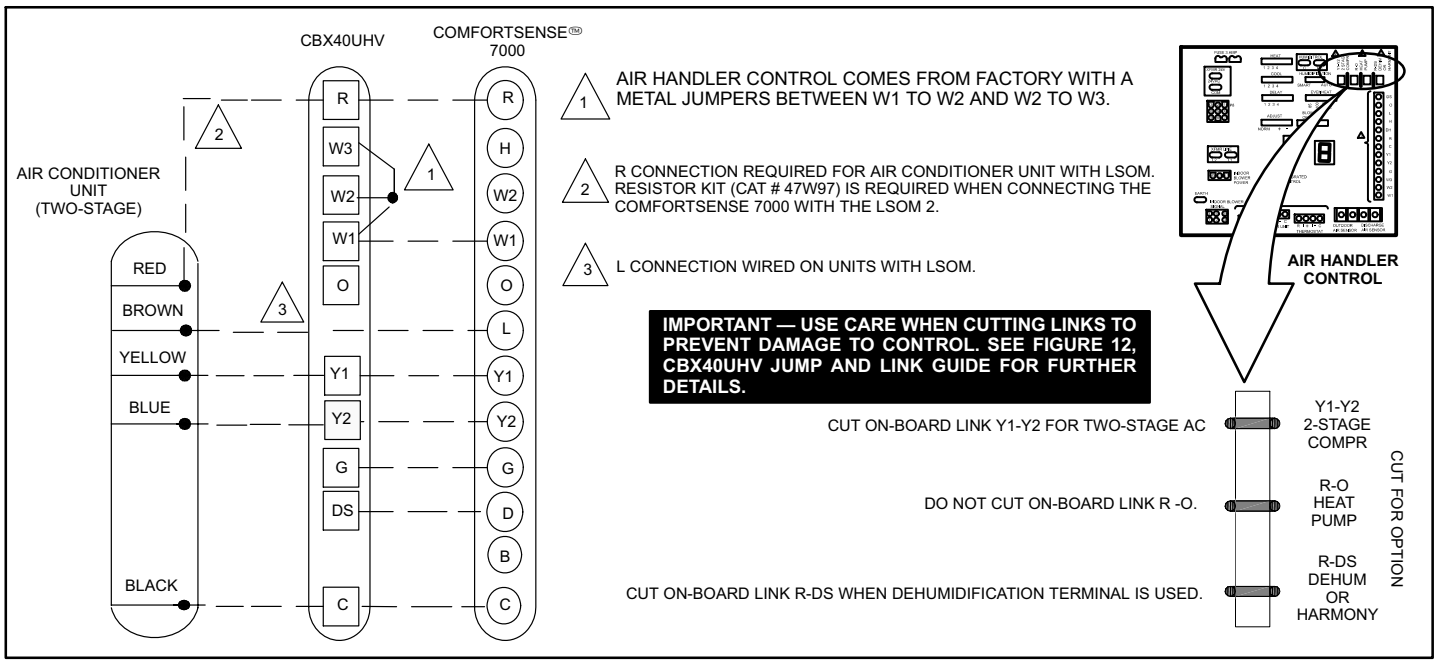


Figure 6. Field Wiring — Cooling Application (Non-Communicating)

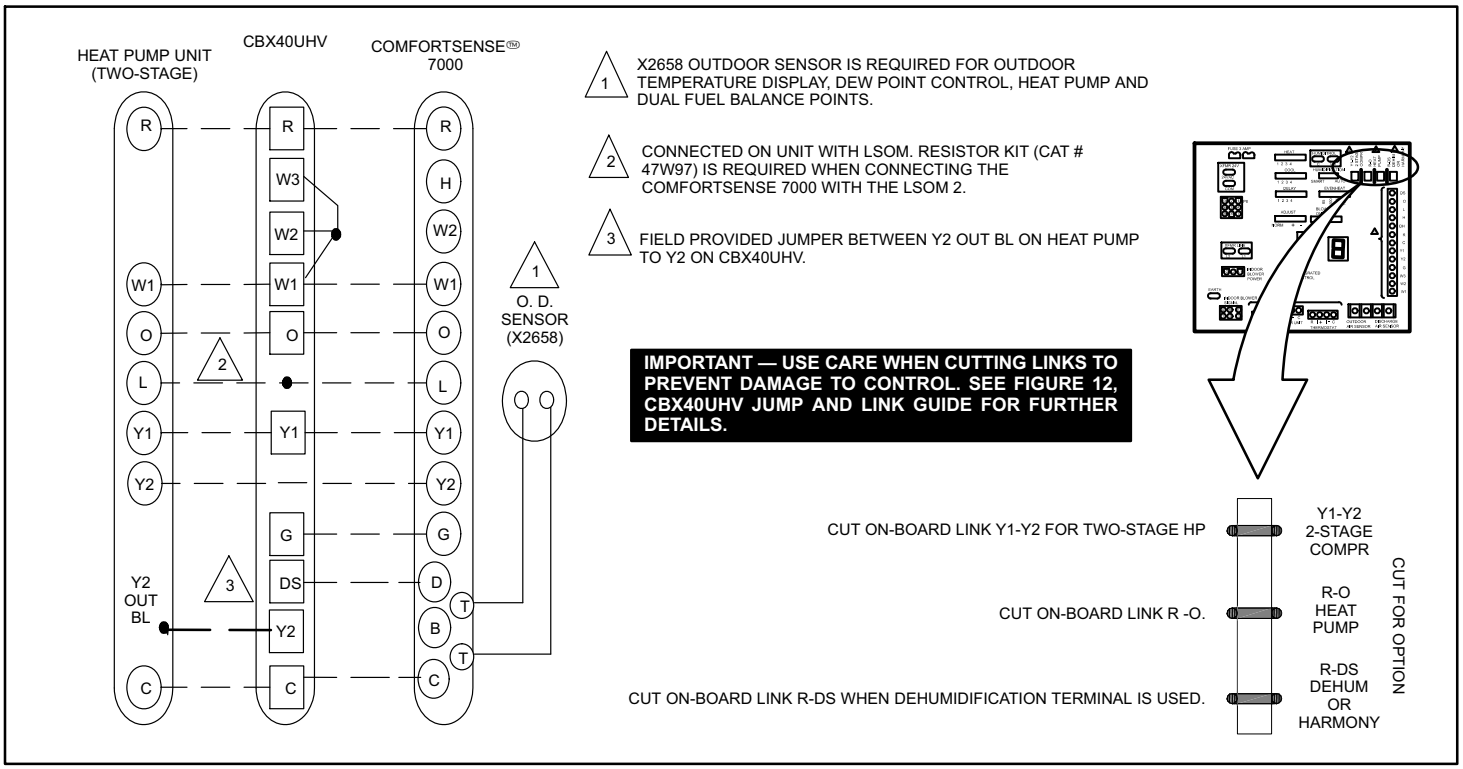


Figure 7. Field Wiring — Heat Pump (Non-Communicating)

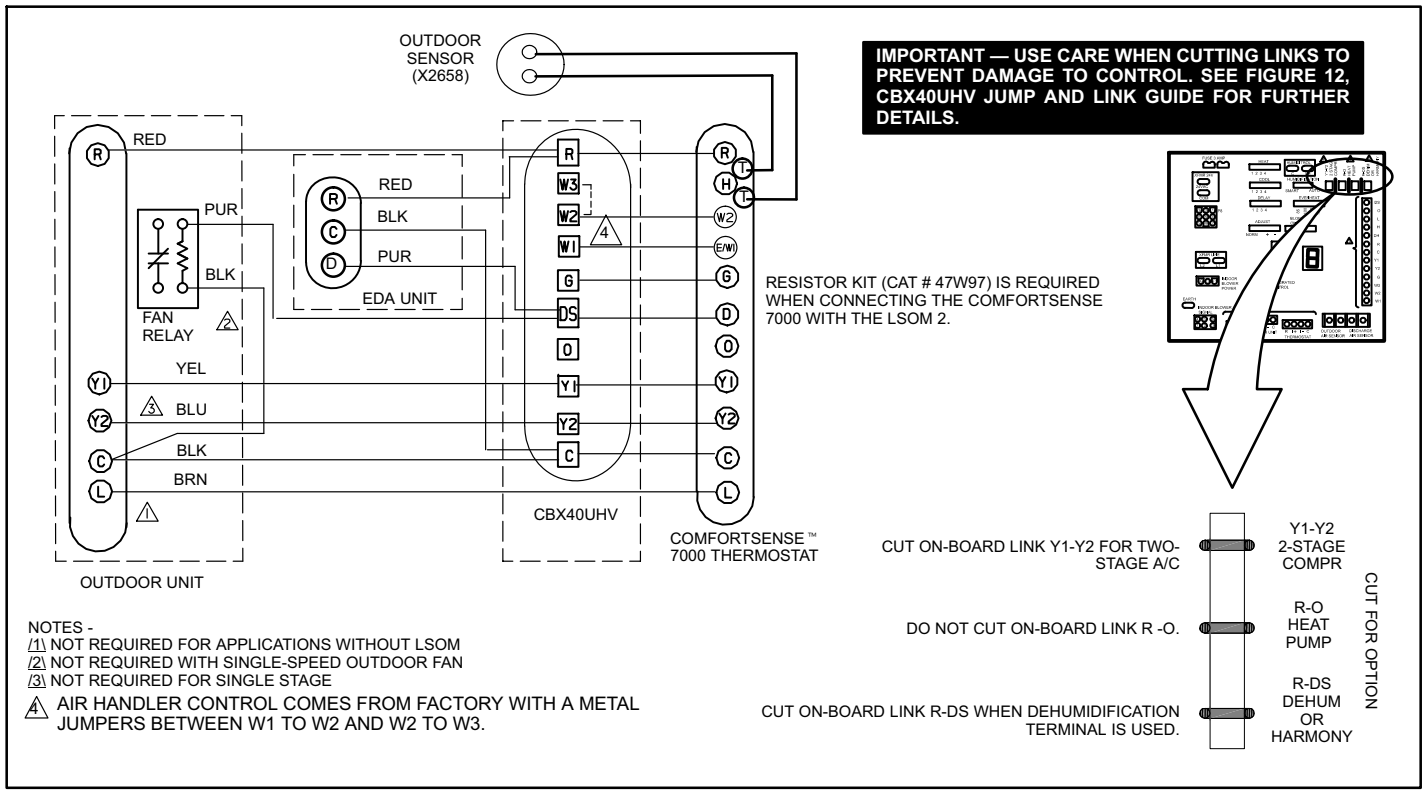


Figure 8. Cooling Application — Humiditrol ® and Second-Stage Outdoor Fan Relay Wiring (Non-Communicating)

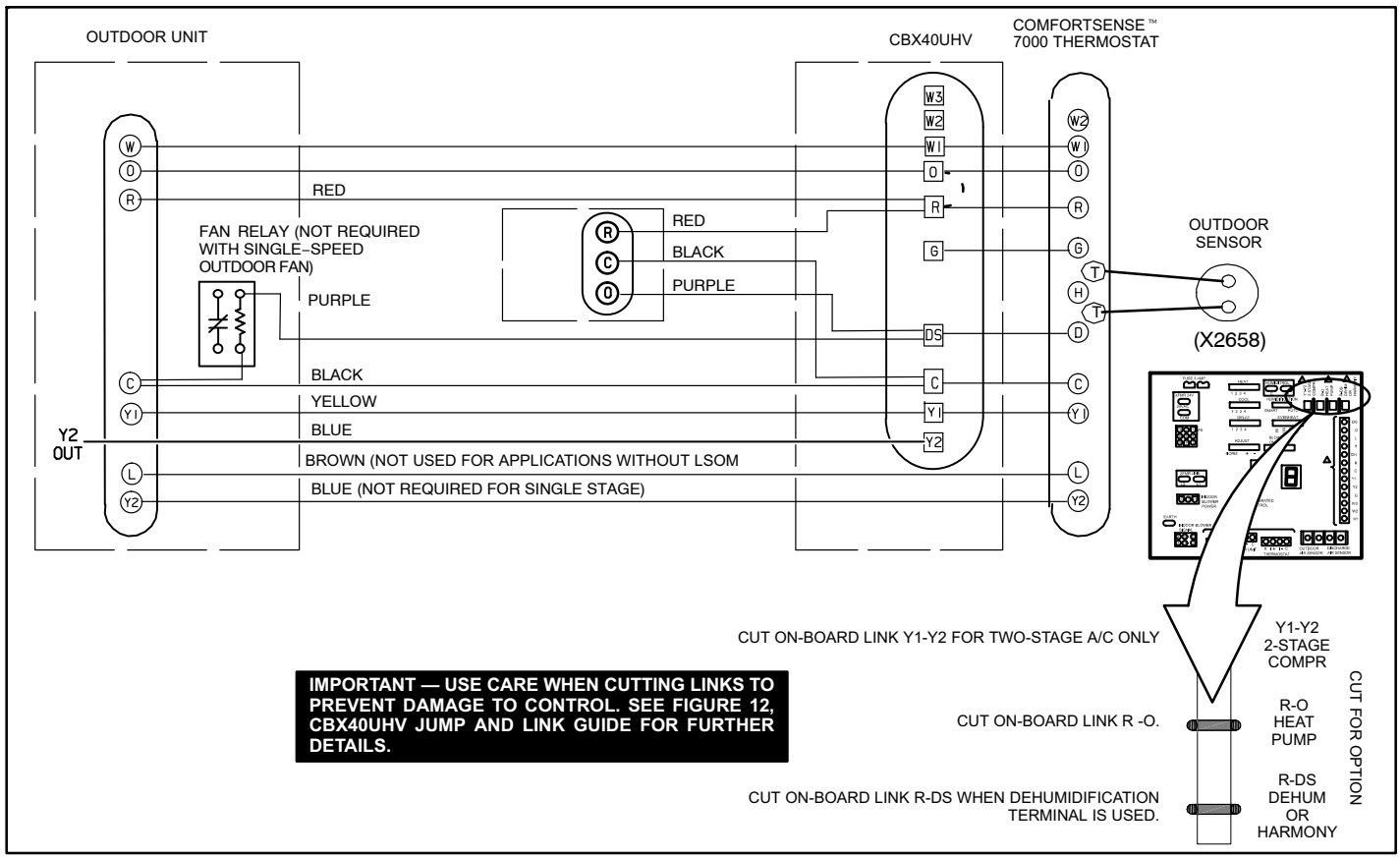


Figure 9. Heat Pump Application — Humiditrol ® and Second-Stage Outdoor Fan Relay Wiring (Non-Communicating)

Thermostat Connections

Table 2 (CBX40UHV-XXX-230-6-ALL)

Indoor Control Terminal Label	Function		
	Non-Communicating Room Thermostat (Indoor and Outdoor -24 volts)	**Indoor Communicating Outdoor Non-Communicating**	**Full Communication (Indoor & Outdoor)**
W1 (Input)	Indicates a first-stage heating demand. This input is an anticipator for the thermostat.	N/A	N/A
W2 (Input)	Indicates a second-stage heating demand. **W1** input must be active to recognize second-stage heat demand.	N/A	N/A
W3 (Input)	Indicates a third-stage heating demand. **W1** and **W2** inputs must be active to recognize third-stage heat demand.	N/A	N/A
Y1 & Y2 (Input/ Output)	Room thermostat **inputs** 24 volts to the **Y1** and **Y2** terminals on the indoor control. The 24 volt signal is then passed through to the outdoor unit. During a second-stage demand, both **Y1** and **Y2** are active. The **Y1** terminal is connected to **Y2** by link (Solid jumper on control that would be cut for 2 stage applications)	The room thermostat communicated with the indoor control. The indoor control **outputs** 24 volts on its **Y1** and **Y2** terminals which are hard wired to the non-communicating outdoor unit.	In a full communicating system, no wiring is required on **Y1** and **Y2** terminals.
G (Input)	Indicates a 24 volt indoor blower demand.	In a communicating system, "G" input to indoor control is used by non-communicating IAQ devices (such as LVCS, HRV or ERV) to ensure indoor blower demand.	In communicating system "G" input to indoor control is used by non-communicating IAQ devices (such as LVCS, HRV or ERV) to ensure indoor blower demand .
C	The C terminal shall interconnect the signal ground of the room thermostat with secondary transformer ground (TR) and chassis ground (GND)		
R	The R terminal shall be capable of providing the power to the thermostat and all the associated loads .		
O (Input/Output)	Room thermostat **inputs** 24 volts to the **O** terminal on the indoor control. The **O** terminal is connected to **R** by link (Solid jumper on control that would be cut if unit was a heat pump)	The room thermostat communicated with the indoor control. The indoor control **outputs** 24 volts on its **O** terminals which are hard wired to the non-communicating outdoor unit. If there is 24 volts on **O**, the reversing valve will be energized and the outdoor unit will run in the cooling mode. If **O** does not have 24 volts, the outdoor unit will run in heating mode.	In a full communicating system, **O** terminal is not wired.
DS (Input)	Used for Harmony III zoning systems, or thermostat with dehumidification capability. The **DS** terminal is connected to **R** by link (Solid jumper on control that would be cut if for the above applications). **Harmony III control** - This will allow the control to vary the voltage signal to the indoor blower motor to control required CFM. **Dehumidification** - Allow a 24 volt signal on the **DS** to turn off and on the dehumidification mode.	N/A	N/A
DH (Output)	The DH terminal provides a 24VAC **output** for dehumidification needs in communicating systems .		
H (Output)	The H terminal provides a 24VAC **output** for humidification needs in both communicating and non-communicating mode .		
L (Input)	The **L** terminal is provided for connection to devices with Lennox System Operation Monitor (LSOM) capabilities. The control interprets the fault signals and transmits them as an alarm message on the communication line. There are ten (10) identified LSOM fault codes. Each is mapped to the communication Alarm codes.		

⚠ IMPORTANT

Before changing any clippable links or jumper settings, make sure the motor has completely stopped. Any changes will not take place while the motor is running.

Table 3. Air Handler Control Connections — Communicating (CBX40UHV-XXX-230-6-ALL)

Label	Label	Function
Thermostat	R	24VAC
	i+	RSbus data high connection
	i-	RSbus data low connection
	C	24VAC command (ground)
Outdoor Unit	R	24VAC
	i+	RSbus data high connection
	i-	RSbus data low connection
	C	24VAC command (ground)
Link	i+	Not used.
	i-	

Thermostat Wire Length

Table 4. Run Length — Communicating (CBX40UHV-XXX-230-6-02)

Wire Run Length	AWG #	Insulation/Core Types
Maximum length of wiring for all connections on the RSBus is limited to 1500 feet (457 meters).	18	Color-coded, temperature rating 95°F (35°C) minimum, solid core. (Class II Rated Wiring)

Table 5. Run Length — Non-Communicating (CBX40UHV-XXX-230-6-01 and -02)

Wire Run Length	AWG #	Insulation/Core Types
Less than 100' (30m)	18	Color-coded, temperature rating 95°F (35°C) minimum, solid core. (Class II Rated Wiring)
More than 100' (30m)	16	

Air Handler Control 9-Pin Connector

1. Air Handler ONLY - 2-wire harness (Wired to points 7 and 8) from the factory provides 230 volt power to Air Handler Control.
2. Air Handler with ECB40 Electric Heat - 8-wire harness (Wired as noted in table 6)

NOTE - See Figure 4

Table 6. Stages

Position & Wire Color	Function / Description
1 red	Heat stage 1 relay coil
2 orange	Heat stage 2 relay coil
3 yellow	Relay coil return
4 black	Heat stage 3 relay coil
5 brown	Heat stage 4 relay coil
6 blue	Heat stage 5 relay coil
7 black	L1 230VAC supply from heater kit
8 red	L2 230 VAC supply from heater kit
9	Not Used

AIR HANDLER CONTROL BUTTON, DISPLAY AND JUMPERS

Use figure 10 as reference for jumper settings. If any of the reference jumpers are missing, the Air Handler Control will display Error Code **130** as per table 13, and the Air Handler Control will automatically use the **factory default** setting show in figure 11)

Push Button

An on-board push button is provided for the purpose of placing the Air Handler Control in different operation modes and can be used to recall stored error codes. When button is pushed and held, Air Handler Control will cycle through a menu of options depending on current operating mode. Every three seconds a new menu item will be displayed. If the button is released while that item is shown on the display, Air Handler Control will enter displayed operating mode, or execute defined operation sequence for that menu option. Once all items on menu have been displayed the menu resumes from the beginning (if button is still held).

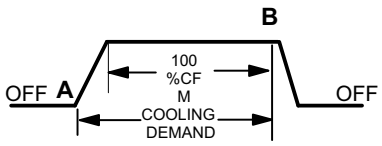
Delay Profile 1

Indoor blower cooling profile, delay for cooling and heat pump operations are selected by placing the jumper in appropriate position on five-pin header (four position options).

- For heat pump **heating** operation only delay profiles 1 and 2 are applicable. If profiles 3 or 4 have been selected, heat pump operation will use profile 1 only.
- For heat pump **cooling** operation all 4 profiles are operational.

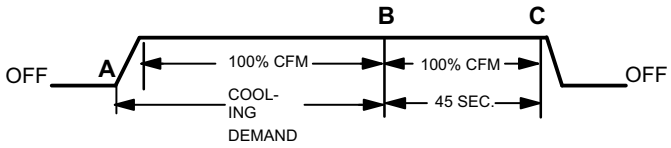
If the jumper is missing the AHC will activate the *Configuration Jumper is Missing* alarm and will automatically use the default factory setting. See figure 11 for jumper configurations.

A. When cool or heat demand is initiated, motor ramps up to 100% and runs at 100% until demand is satisfied.
B. Once demand is met, motor ramps down to stop.



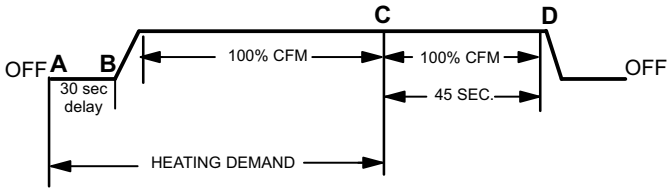
Delay Profile 2

Cooling — Air Conditioner and Heat Pump:



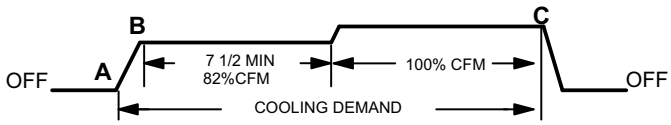
A. When cool demand is initiated, motor ramps up to 100% and runs at 100% until demand is satisfied.
B. Once demand is met, motor runs at 100% for 45 seconds.
C. Motor ramps down to stop.

Heating — Heat Pump only:



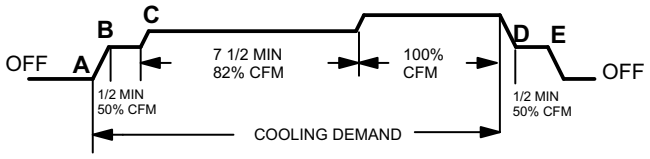
A. When heat demand is initiated, 30 seconds motor on delay starts
B. After the motor on delays expires, motor ramps up to 100% and runs at 100% until demand is satisfied.
C. Once demand is met, motor runs at 100% for 45 seconds.
D. Motor ramps down to stop.

Delay Profile 3



A. When cool demand is initiated, motor ramps up to 82%
B. Motor runs at 82% for approximately 7.5 minutes and then ramp up to 100% (unless the demand has been satisfied) and motor runs at 100% until demand is satisfied.
C. Once demand is met, motor ramps down to stop

Delay Profile 4



A. When cool demand is initiated, motor ramps up to 50%
B. Motor runs at 50% for 30 seconds and ramps up to 82%
C. Motor runs at 82% for approximately 7.5 minutes and then ramp up to 100% (unless the demand has been satisfied) and 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

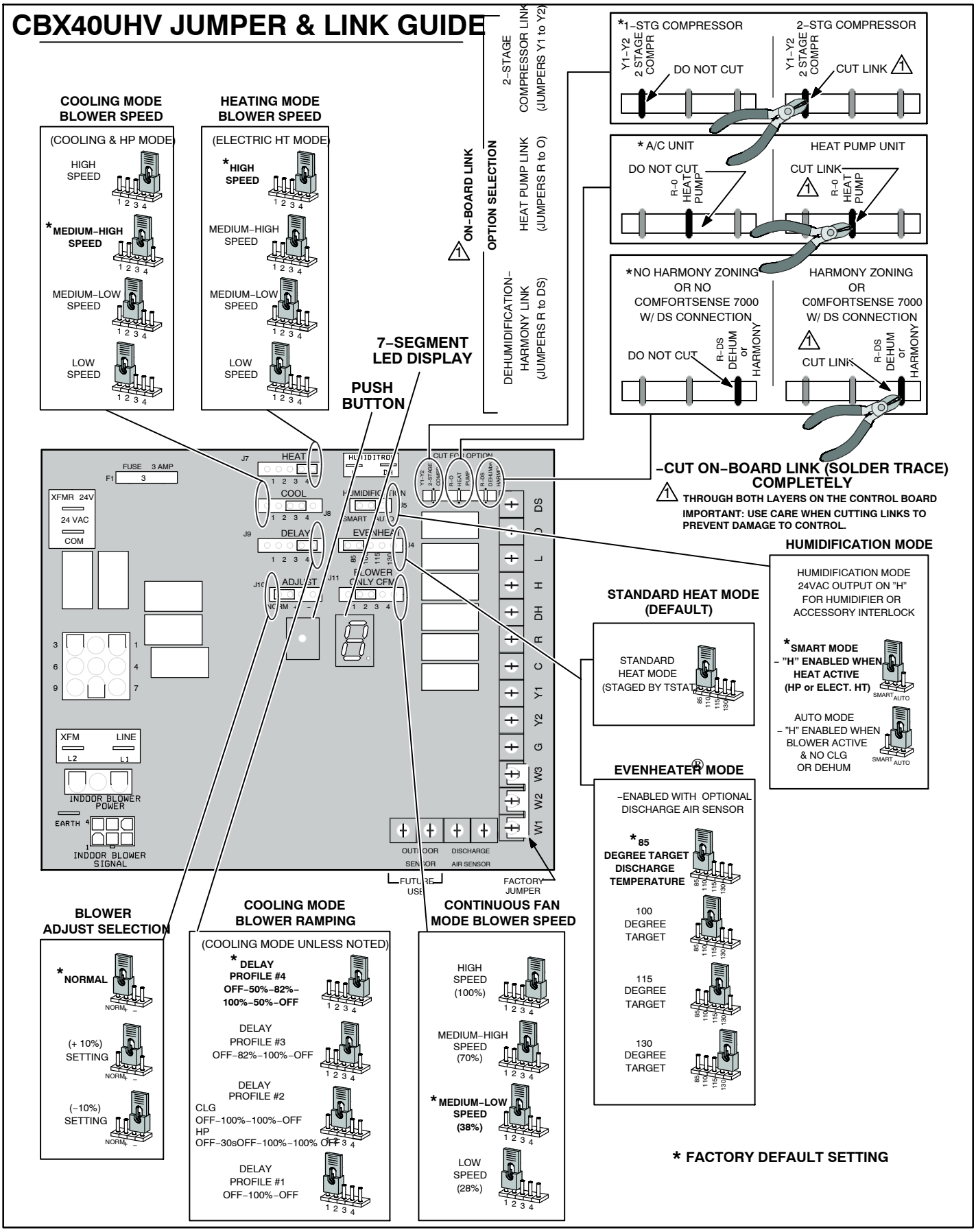


Figure 11. CBX40UHV-XXX-230-6-01

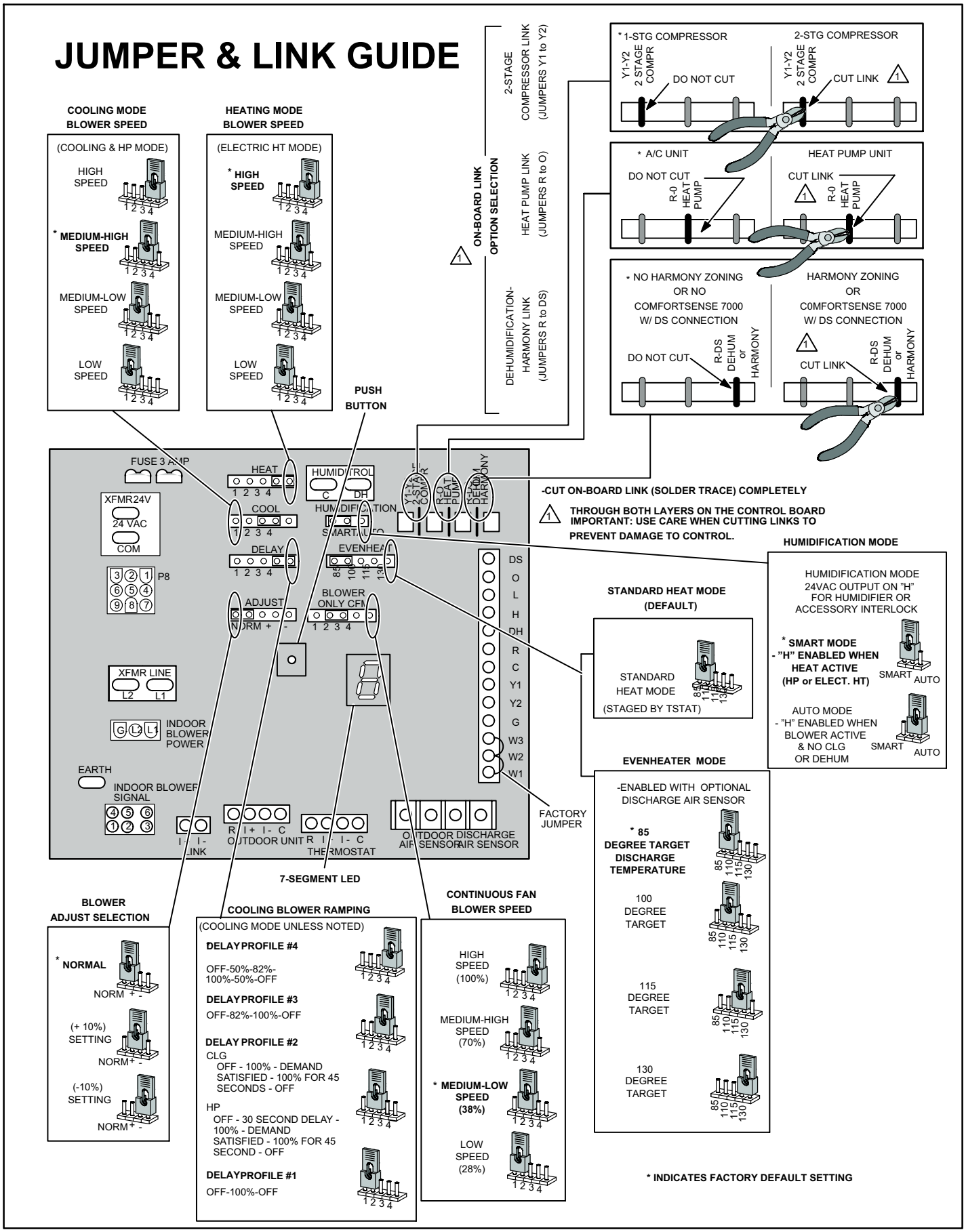
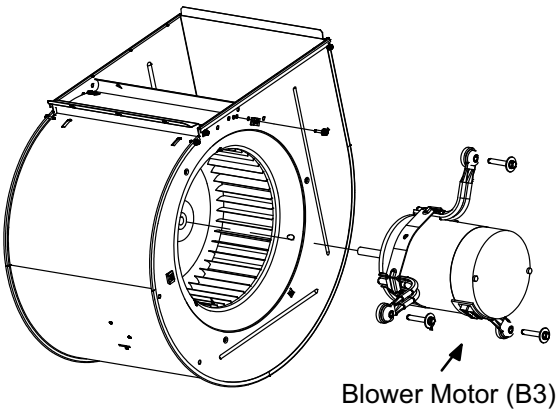


Figure 12. Air Handler Configuration (CBX40UHV-XXX-230-6-02 or higher)

VARIABLE SPEED ECM BLOWER MOTOR



To Remove Blower From Unit: Remove wiring jack plug and three screws and slide blower out.

Figure 13. Blower Motor (B3)

⚠WARNING

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

The ECM (electronically commutated motor) communicates with the air handler control via a 2-way serial connection. The motor receives all necessary functional parameters from the air handler control and does not rely on a factory program like traditional variable speed motors. The wiring harness connects the motor to the air handler control. See wiring diagram regarding wiring harness. A solid-state controller is permanently attached to the motor. The controller is primarily an AC to DC converter. Converted DC power is used to drive the motor. The controller contains a microprocessor which monitors varying conditions inside the motor (such as motor workload). Because this motor has a permanent magnet rotor it does not need brushes like conventional DC motors]

Internal components are shown in figure 14. The stator windings are split into three poles which are electrically connected to the controller. This arrangement allows motor windings to turn on and off in sequence by the controller.

⚠ IMPORTANT

Earlier ECM motors used on other Lennox air handler models are not interchangeable with motors used on the CBX40UHV line.

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

All CBX40UHV blower motors use single phase power. An external run capacitor is not used. The motor uses permanently lubricated ball-type bearings.

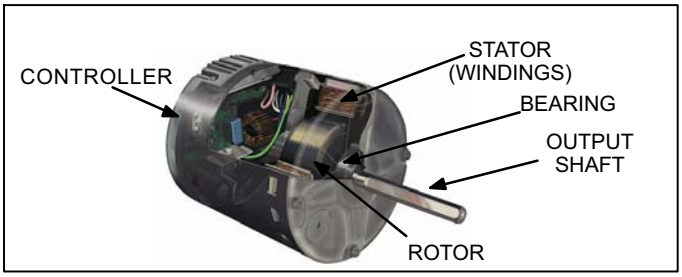


Figure 14. Blower Motor Components

Internal Operation

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

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

Initial Power Up

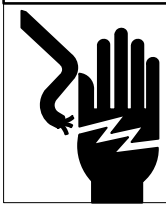
When line voltage is applied to B3, there will be a large inrush of power lasting less than 1/4 second. This inrush charges a bank of DC filter capacitors inside the controller. If the disconnect switch is bounced when the disconnect is closed, the disconnect contacts may become welded. Try not to bounce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

Motor Start-Up

When B3 begins start-up, the motor gently vibrates back and forth for a moment. This is normal. During this time the electronic controller is determining the exact position of the rotor. Once the motor begins turning, the controller slowly eases the motor up to speed (this is called “soft-start”). The motor may take as long as 60 seconds to reach full speed. If the motor does not reach 200RPM within 13 seconds, the motor shuts down. Then the motor will immediately attempt a restart. The shutdown feature provides protection in case of a frozen bearing or blocked blower wheel. The motor may attempt to start eight times. If the motor does not start after the eighth try, the controller locks out. Reset controller by momentarily turning off power to unit.

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

⚠ DANGER



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

Indoor Blower Motor (B3) Control Troubleshooting (Regal-Beloit)

To verify motor operation see steps below and figure 15.

***NOTE**: If the communication channel is disrupted (loss of communication and and 24VAC) to the air handler control, the motor will continue to operate at its current mode. This means, if the motor is currently in idle, it will stay in idle mode; if it is currently running, it will stay running at the current operating point.*

Check Power to Motor

1. Remove J48 (5-pin power plug) from P48 on the motor.
2. With the power on at the air handler, use a test meter to verify 240V between pins 4 and 5 on J48.
3. Reconnect J48 to P48 on the motor.

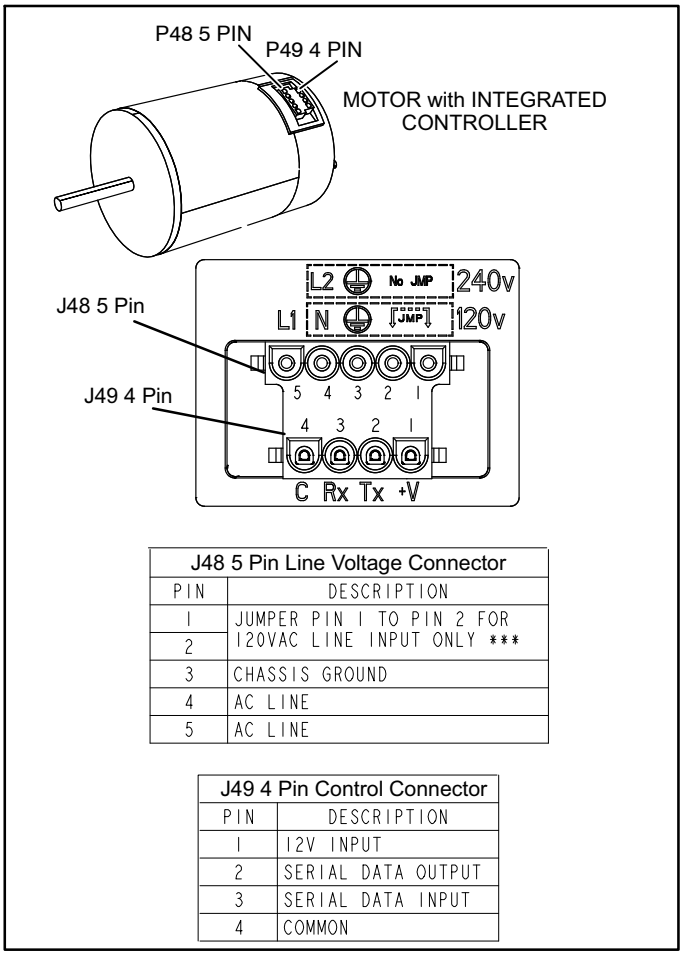
APPLY TEST SIGNAL FOR MOTOR OPERATION

1. Remove J49 (4-pin low voltage connector) from P49 on the motor.
2. Using test jumpers, apply 24V to pins 3 and 4 on P49 on the motor.

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

3. Motor should run at 75%.
4. Test is complete. Remove jumpers and reconnect plugs.

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



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

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

Figure 15. Regal-Beloit — Blower B3 Harness Connectors

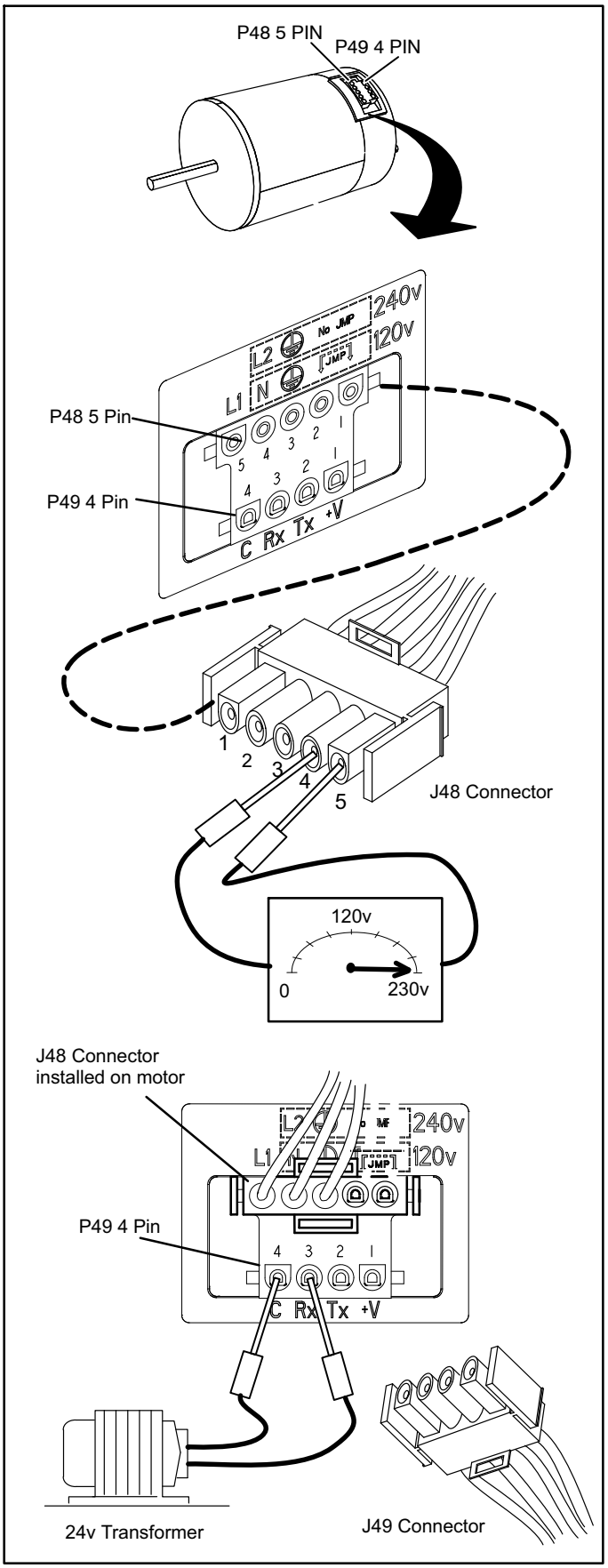


Figure 16. Regal-Beloit — Troubleshooting

Indoor Blower Motor (B3) Control Troubleshooting (Emerson)

***NOTE**: If the communication channel is disrupted (loss of communication and and 24VAC) to the air handler control, the motor will continue to operate at its current mode. This means, if the motor is currently in idle, it will stay in idle mode; if it is currently running, it will stay running at the current operating point.*

1. Disconnect three-wire harness from motor control module.
   - **A.** If the plug terminals inside the module are damaged.
   - **B.** If terminals are not damaged, proceed to next step.
2. Inspect the negative temperature coefficient (NTC) thermistor (see figure 18) for any cracks or breakage.
   - **A.** If damaged, replace control.
   - **B.** If no damage is detected, proceed to next step.
3. Check the capacitors for any damage. Inspect for:
   - **A.** Bulging or swelling caps. If caps are bulging or swollen, replace control.
   - **B.** If no damage is detected, proceed to next step.
4. Check resistance between each of the three pins on the control module jack (see figure 18). Resistance between any two terminals should be greater than 100 K ohms.
   - **A.** If resistance is less than 100 K ohms, replace control.
   - **B.** If no damage is detected, proceed to next step.

NOTE — *If your ohm meter is not an auto-ranging type, please set it to the highest ohm scale (100 K ohms or greater).*

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

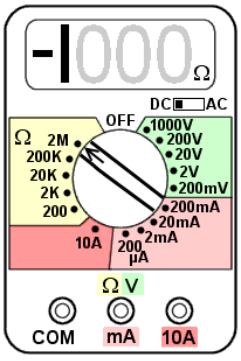


Figure 17. Typical Digital Multimeter

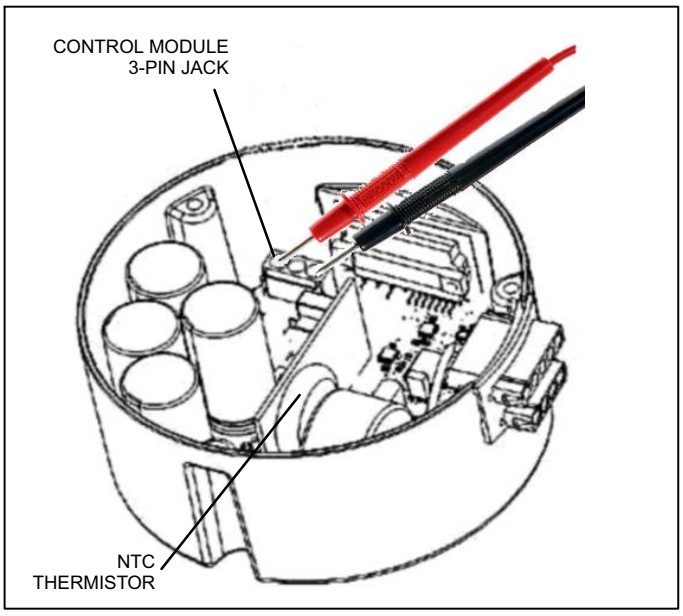


Figure 18. Module Test (Emerson)

Additional Indoor Blower Motor (B3) Troubleshooting

1. If motor shaft spins freely in both directions, proceed to next step. If not, replace motor.
2. Check the motor to control harness for any damage.
   A. If harness or terminals are damaged replace the motor.
   B. If there is no damage, proceed to next step.
3. Check resistance between each of the three-phase terminals in the motor harness as illustrated in figure 19. Resistance between any two contacts should be equal. If resistance between any two contacts are not equal, or if any resistance shows open or short-circuited, replace the motor.

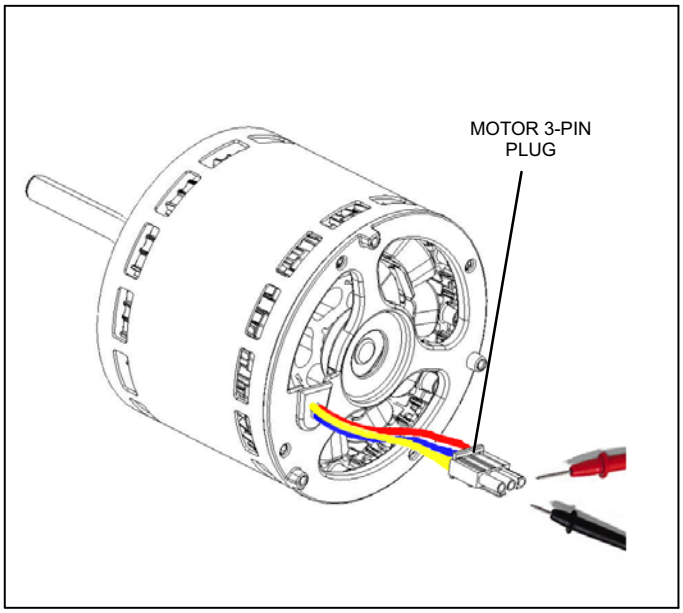
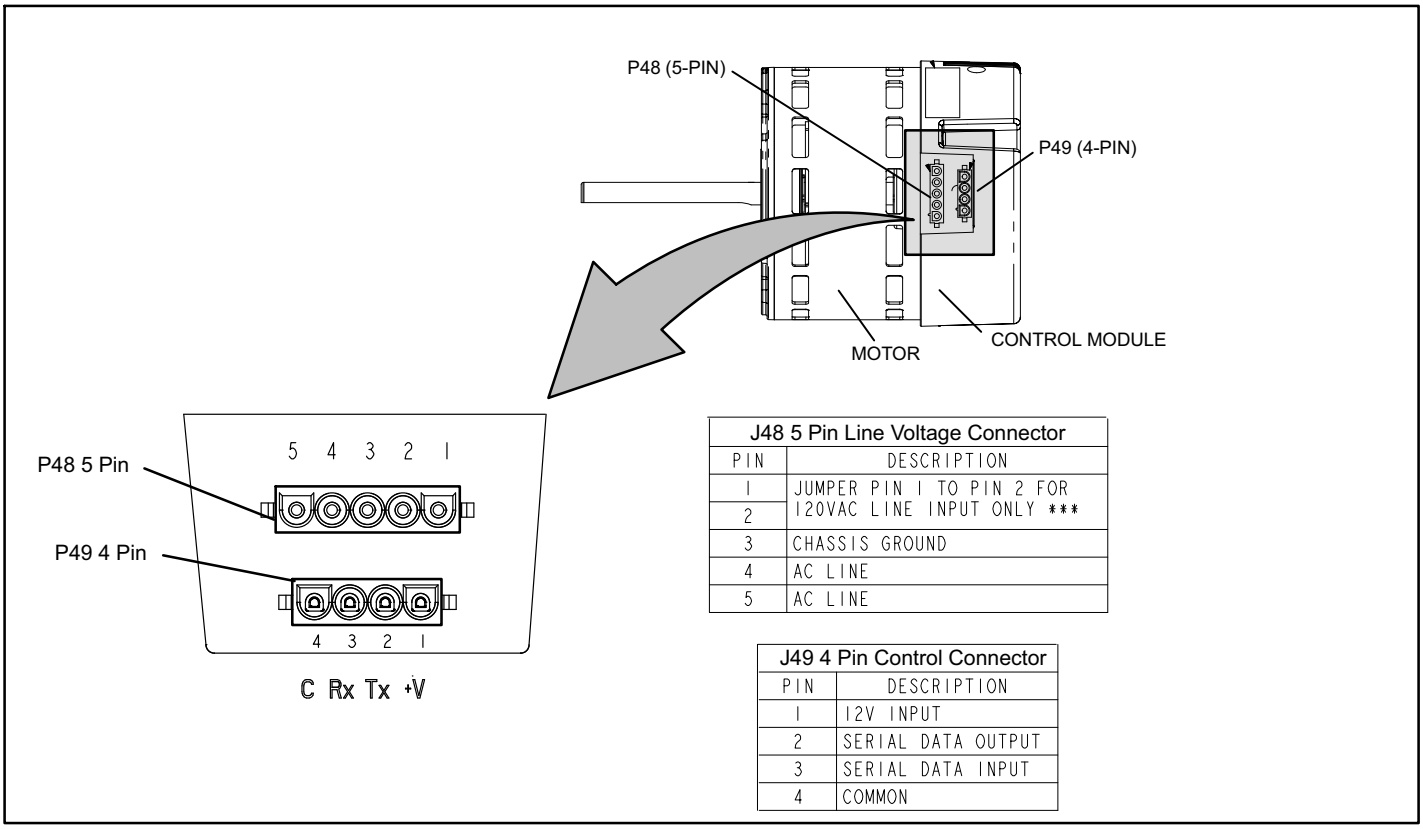


Figure 19. Motor Test (Emerson)



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

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

Figure 20. Indoor Blower Motor (B3) Control Connections (Emerson)

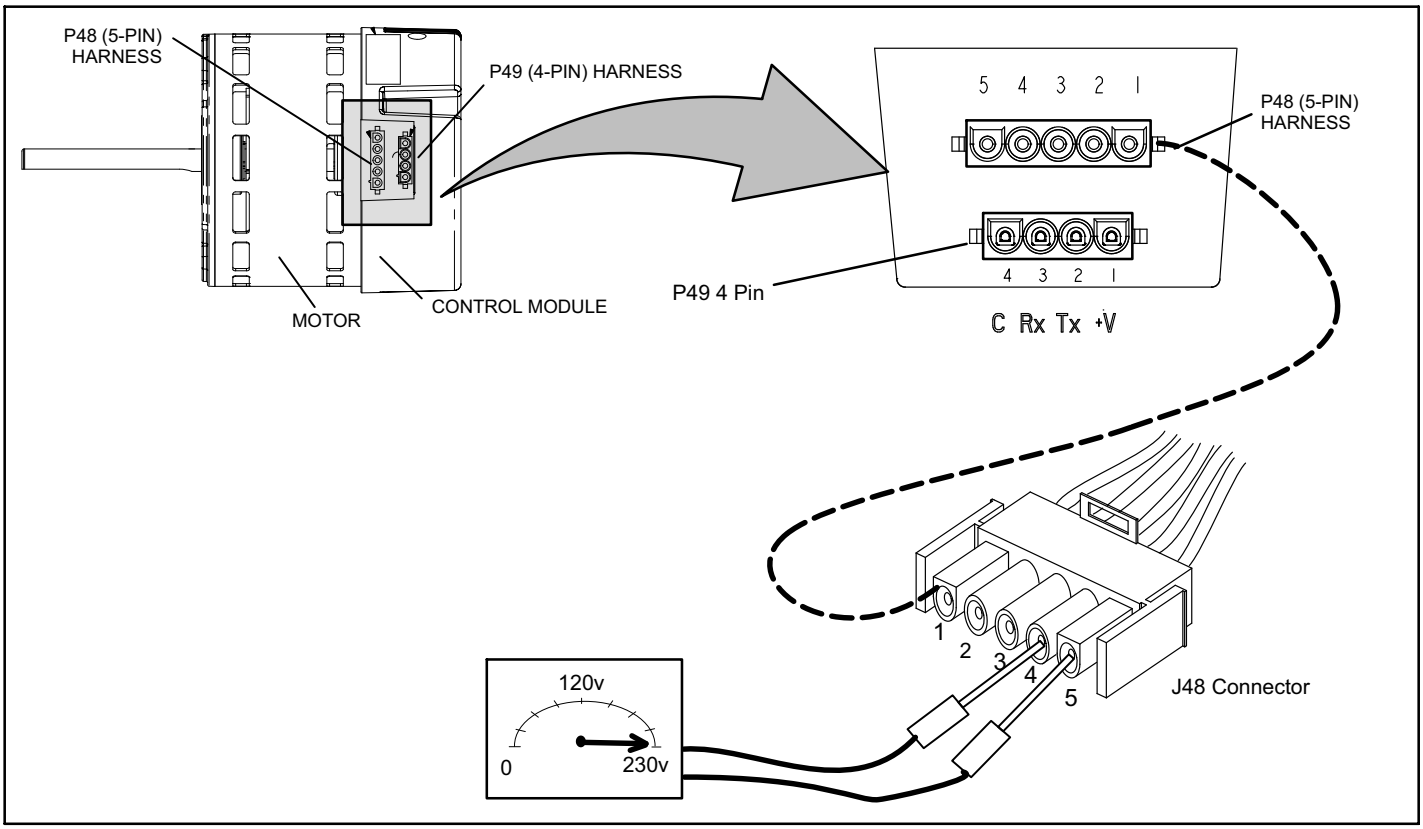


Figure 21. J48 Test (Emerson)

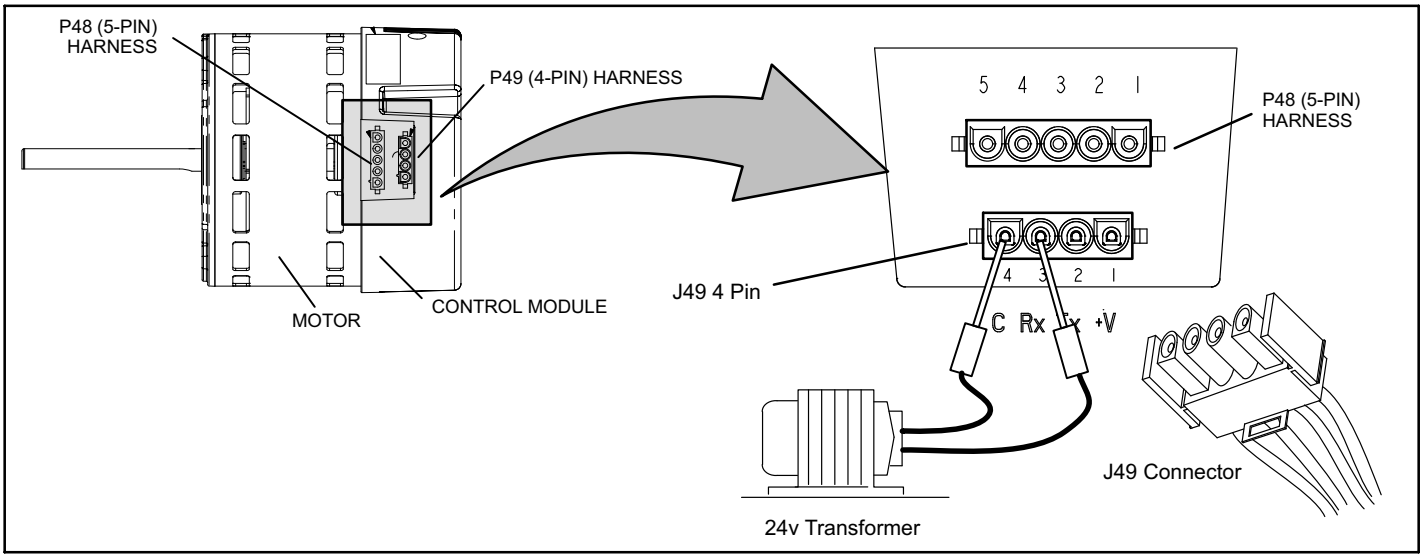


Figure 22. J49 Test (Emerson)

OPTIONAL ECB40 ELECTRIC HEAT

Match-ups and Ratings

The tables on the following pages show all approved CBX40UHV to ECB40 matchups and electrical ratings.

Electric Heat Components

ECB40 parts arrangement is shown in figure 23. All electric heat sections consist of components mounted to the electric heat vestibule panel and electric heating elements exposed directly to the air stream. ECB units are equipped with circuit breakers or a terminal blocks. The circuit breakers are designated by CB in the model number.

1. **Primary (S15) and Secondary (S20) Temperature Limits**

   Each stage of the 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 on a temperature rise and closes on a temperature fall. The secondary limit opens on a temperature rise but must be replaced. See table 7 for set points.

TABLE 7

Limit	Open°	Close°
S15	150°F ± 5	110 ± 9
S20	333°F ± 10°F	Replace limit

2. **Electric Heat Relays (K32, K33, K34, K35 and K36)**

   Relays K32, K33, K34, K35 and K36 are N.O. relays 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. The relays energize different stages of heat, as well as the blower. The blower is always first on and last off.

3. **Terminal Strip (TB2)**

   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.

4. **Circuit Breaker (CB1, CB2 and CB3)**

   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). Tables in the following pages show the amp 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.

Note: Electric Heat Circuit Breakers are sized for 240VAC operation. Electric heaters operating at voltages other than 240VAC may require the factory installed circuit breaker be replaced with a field installed circuit breaker. See Maximum Overcurrent Protection column in the Electric Heat Tables to determine if a circuit breaker change is required.

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

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.

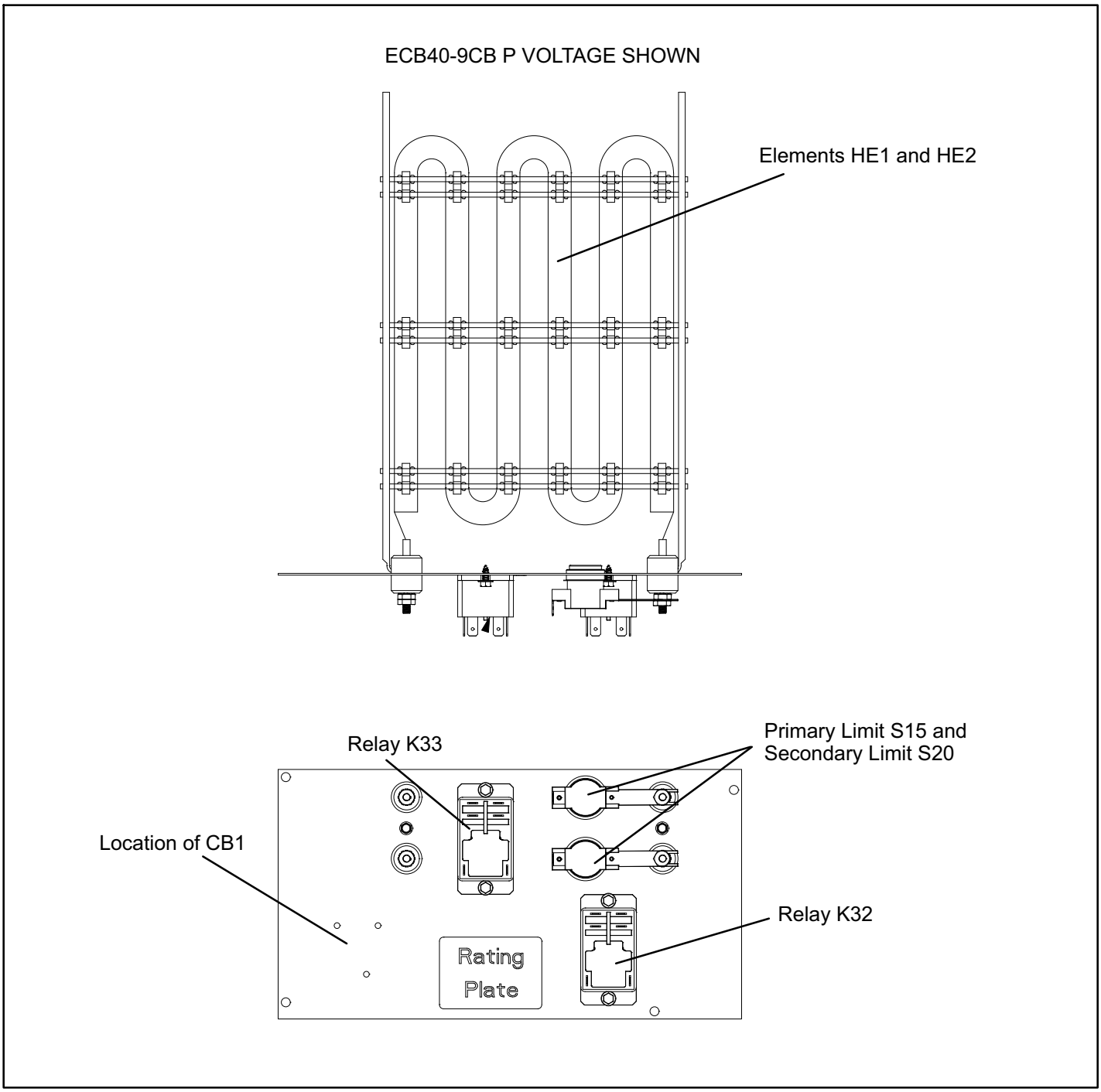


Figure 23. Electric Heat

ELECTRIC HEAT DATA - CBX40UHV-024 AND CBX40UHV-030

SINGLE PHASE ELECTRIC HEAT							CBX40UHV-024		CBX40UHV-030			
Model Number		No. of Stages	Volts Input	kW Input	[1] Btuh Input	[2] Blower Motor Full Load Amps	[3] Minimum Circuit Ampacity	[5] Maximum Overcurrent Protection	[3] Minimum Circuit Ampacity		[5] Maximum Overcurrent Protection	
									Circuit		Circuit	
									1	2	1	2
2.5 kW 4 lbs.	ECB40-2.5 (34W86) Terminal Block	1	208	1.9	6,400	4.0	17	20	- - -	- - -	- - -	- - -
			220	2.1	7,200	4.0	17	20	- - -	- - -	- - -	- - -
			230	2.3	7,800	4.0	18	20	- - -	- - -	- - -	- - -
			240	2.5	8,500	4.0	18	20	- - -	- - -	- - -	- - -
4 kW 4 lbs.	ECB40-4 (55W89) Terminal Block ECB40-4CB (55W90) 30A Circuit breaker	1	208	3.0	10,250	4.0	23	[4] 25	23	- - -	[4] 25	- - -
			220	3.4	11,450	4.0	24	[4] 25	24	- - -	[4] 25	- - -
			230	3.7	12,550	4.0	25	[4] 25	25	- - -	[4] 25	- - -
			240	4.0	13,650	4.0	26	30	26	- - -	30	- - -
5 kW 4 lbs.	ECB40-5 (34W87) Terminal Block ECB40-5CB (34W90) 35A Circuit breaker	1	208	3.8	12,800	4.0	28	[4] 30	28	- - -	[4] 30	- - -
			220	4.2	14,300	4.0	29	[4] 30	29	- - -	[4] 30	- - -
			230	4.6	15,700	4.0	30	[4] 30	30	- - -	[4] 30	- - -
			240	5.0	17,100	4.0	31	35	31	- - -	35	- - -
6 kW 4 lbs.	EB40-6 (34W88) Terminal Block ECB40-6CB (34W91) 40A Circuit breaker	1	208	4.5	15,400	4.0	32	[4] 35	32	- - -	[4] 35	- - -
			220	5.0	17,100	4.0	33	[4] 35	33	- - -	[4] 35	- - -
			230	5.5	18,800	4.0	35	[4] 35	35	- - -	[4] 35	- - -
			240	6.0	20,500	4.0	37	40	37	- - -	40	- - -
8 kW 5 lbs.	ECB40-8 (34W89) Terminal Block ECB40-8CB (34W92) 50A Circuit breaker	1	208	6.0	20,500	4.0	41	[4] 45	41	- - -	[4] 45	- - -
			220	6.7	22,900	4.0	43	[4] 45	43	- - -	[4] 45	- - -
			230	7.3	25,100	4.0	45	[4] 45	45	- - -	[4] 45	- - -
			240	8.0	27,300	4.0	47	50	47	- - -	50	- - -
9 kW 5 lbs.	ECB40-9CB (34W93) 60A Circuit breaker	2	208	6.8	23,100	4.0	46	[4] 50	46	- - -	[4] 50	- - -
			220	7.6	25,800	4.0	48	[4] 50	48	- - -	[4] 50	- - -
			230	8.3	28,200	4.0	50	60	50	- - -	60	- - -
			240	9.0	30,700	4.0	52	60	52	- - -	60	- - -
12.5 kW 10 lbs.	ECB40-12.5CB (34W94) (1) 30A & (1) 45A Circuit breaker	2	208	9.4	32,000	4.0	- - -	- - -	24	38	[4] 25	[4] 40
			220	10.5	35,800	4.0	- - -	- - -	25	40	[4] 25	[4] 40
			230	11.5	39,200	4.0	- - -	- - -	26	42	30	45
			240	12.5	42,600	4.0	- - -	- - -	27	44	30	45
15 kW 12 lbs.	ECB40-15CB (34W95) (1) 35A & (1) 60A Circuit breaker	2	208	11.3	38,400	4.0	- - -	- - -	28	45	[4] 30	[4] 45
			220	12.6	43,000	4.0	- - -	- - -	29	48	[4] 30	[4] 50
			230	13.8	47,000	4.0	- - -	- - -	30	50	[4] 30	[4] 50
			240	15.0	51,200	4.0	- - -	- - -	31	52	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.

[4] Bold text indicates that the circuit breaker on “CB” circuit breaker models must be replaced with size noted. See Table on Page 6.

[5] HACR type circuit breaker or fuse.

ELECTRIC HEAT DATA - CBX40UHV-036

SINGLE PHASE ELECTRIC HEAT						CBX40UHV-036				
Model Number		No. of Stages	Volts Input	kW Input	[1] Btuh Input	[2] Blower Motor Full Load Amps	[3] Minimum Circuit Ampacity		[5] Maximum Overcurrent Protection	
							Circuit		Circuit	
							1	2	1	2
4 kW 4 lbs.	ECB40-4 (55W89) Terminal Block ECB40-4CB (55W90) 35A Circuit breaker	1	208	3.0	10,250	5.6	25	- - -	[4] 25	- - -
			220	3.4	11,450	5.6	26	- - -	[4] 30	- - -
			230	3.7	12,550	5.6	27	- - -	[4] 30	- - -
			240	4.0	13,650	5.6	28	- - -	[4] 30	- - -
5 kW 4 lbs.	ECB40-5 (34W87) Terminal Block ECB40-5CB (34W90) 35A Circuit breaker	1	208	3.8	12,800	5.6	30	- - -	[4] 30	- - -
			220	4.2	14,300	5.6	31	- - -	35	- - -
			230	4.6	15,700	5.6	32	- - -	35	- - -
			240	5.0	17,100	5.6	34	- - -	35	- - -
6 kW 4 lbs.	ECB40-6 (34W88) Terminal Block ECB40-6CB (34W91) 40A Circuit breaker	1	208	4.5	15,400	5.6	35	- - -	[4] 35	- - -
			220	5.0	17,100	5.6	35	- - -	[4] 35	- - -
			230	5.5	18,800	5.6	37	- - -	40	- - -
			240	6.0	20,500	5.6	39	- - -	40	- - -
8 kW 5 lbs.	ECB40-8 (34W89) Terminal Block ECB40-8CB (34W92) 50A Circuit breaker	1	208	6.0	20,500	5.6	44	- - -	[4] 45	- - -
			220	6.7	22,900	5.6	45	- - -	[4] 45	- - -
			230	7.3	25,100	5.6	47	- - -	50	- - -
			240	8.0	27,300	5.6	49	- - -	50	- - -
9 kW 5 lbs.	ECB40-9CB (34W93) 60A Circuit breaker	2	208	6.8	23,100	5.6	48	- - -	[4] 50	- - -
			220	7.6	25,800	5.6	50	- - -	[4] 50	- - -
			230	8.3	28,200	5.6	52	- - -	60	- - -
			240	9.0	30,700	5.6	54	- - -	60	- - -
12.5 kW 10 lbs.	ECB40-12.5CB (34W94) (1) 30A & (1) 45A Circuit breaker	2	208	9.4	32,000	5.6	26	38	30	[4] 40
			220	10.5	35,800	5.6	27	40	30	[4] 40
			230	11.5	39,200	5.6	28	42	30	45
			240	12.5	42,600	5.6	29	44	30	45
15 kW 12 lbs.	ECB40-15CB (34W95) (1) 35A & (1) 60A Circuit breaker	2	208	11.3	38,400	5.6	30	45	[4] 30	[4] 45
			220	12.6	43,000	5.6	31	48	35	[4] 50
			230	13.8	47,000	5.6	32	50	35	[4] 50
			240	15.0	51,200	5.6	33	52	35	60
20 kW 19 lbs.	ECB40-20CB (34W96) (2) 60A Circuit breaker	2	208	15.0	51,200	5.6	48	50	[4] 50	[4] 50
			220	16.8	57,300	5.6	50	53	[4] 50	60
			230	18.4	62,700	5.6	52	55	60	60
			240	20.0	68,200	5.6	54	57	60	60
THREE PHASE ELECTRIC HEAT										
8 kW 5 lbs.	ECB40-8 (34W98) Terminal Block	1	208	6.0	20,500	5.6	28	- - -	30	- - -
			220	6.7	22,900	5.6	29	- - -	30	- - -
			230	7.3	25,100	5.6	30	- - -	30	- - -
			240	8.0	27,300	5.6	32	- - -	35	- - -
10 kW 6 lbs.	ECB40-10 (34W99) Terminal Block	1	208	7.5	25,600	5.6	34	- - -	35	- - -
			220	8.4	28,700	5.6	35	- - -	35	- - -
			230	9.2	31,400	5.6	36	- - -	40	- - -
			240	10.0	34,100	5.6	38	- - -	40	- - -
15 kW 12 lbs.	ECB40-15CB (35W00) 50A Circuit breaker	1	208	11.3	38,400	5.6	47	- - -	50	- - -
			220	12.6	43,000	5.6	48	- - -	50	- - -
			230	13.5	47,000	5.6	50	- - -	50	- - -
			240	15.0	51,200	5.6	53	- - -	[4] 60	- - -

ELECTRIC HEAT DATA - CBX40UHV-036 (Continued)

THREE PHASE ELECTRIC HEAT						CBX40UHV-036				
Model Number		No. of Stages	Volts Input	kW Input	[1] Btuh Input	[2] Blower Motor Full Load Amps	[3] Minimum Circuit Ampacity		[5] Maximum Overcurrent Protection	
20 kW 19 lbs.	ECB40-20CB (35W01) (2) 35A Circuit breaker	2	208	15.0	51,200	5.6	33	26	35	[4] 30
			220	16.8	57,300	5.6	35	28	35	[4] 30
			230	18.4	62,700	5.6	36	29	[4] 40	[4] 30
			240	20.0	68,200	5.6	37	30	[4] 40	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.
[4] Bold text indicates that the circuit breaker on "CB" circuit breaker models must be replaced with size noted. See Table on Page 6.
[5] HACR type circuit breaker or fuse.

ELECTRIC HEAT DATA - CBX40UHV-042, CBX40UHV-048, AND CBX40UHV-060

SINGLE PHASE ELECTRIC HEAT						CBX40UHV-042, CBX40UHV-048 and CBX40UHV-060						
Model Number		No. of Stages	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
4 kW 4 lbs.	ECB40-4 (55W89) Terminal Block ECB40-4CB (55W90) 35A Circuit breaker	1	208	3.0	10,250	7.4	27	- - -	- - -	[4] 30	- - -	- - -
5 kW 4 lbs.	ECB40-5 (34W87) Terminal Block ECB40-5CB (34W90) 35A Circuit breaker	1	208	3.8	12,800	7.4	32	- - -	- - -	35	- - -	- - -
6 kW 4 lbs.	ECB40-6 (34W88) Terminal Block ECB40-6CB (34W91) 40A Circuit breaker	1	208	4.5	15,400	7.4	37	- - -	- - -	40	- - -	- - -
8 kW 5 lbs.	ECB40-8 (34W89) Terminal Block ECB40-8CB (34W92) 50A Circuit breaker	1	208	6.0	20,500	7.4	46	- - -	- - -	50	- - -	- - -
9 kW 5 lbs.	ECB40-9CB (34W93) 60A Circuit breaker	2	208	6.8	23,100	7.4	51	- - -	- - -	60	- - -	- - -
12.5 kW 10 lbs.	ECB40-12.5CB (34W94) (1) 30A & (1) 45A Circuit breaker	2	208	9.4	32,000	7.4	29	38	- - -	30	[4] 40	- - -
15 kW 12 lbs.	ECB40-15CB (34W95) (1) 35A & (1) 60A Circuit breaker	2	208	11.3	38,400	7.4	32	45	- - -	35	[4] 45	- - -
20 kW 19 lbs.	ECB40-20CB (34W96) (2) 60A Circuit breaker	2	208	15.0	51,200	7.4	50	50	- - -	[4] 50	[4] 50	- - -
25 kW 19 lbs.	ECB40-25CB (34W97) (1) 60A & (2) 45A Circuit breaker	3	208	18.8	64,100	7.4	47	38	38	[4] 50	[4] 40	[4] 40

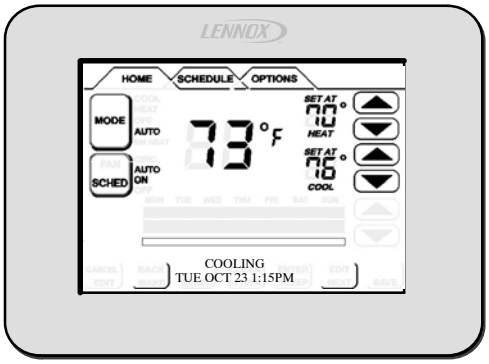
ELECTRIC HEAT DATA - CBX40UHV-042, CBX40UHV-048, AND CBX40UHV-060 (Continued)													
SINGLE PHASE ELECTRIC HEAT						CBX40UHV-042, CBX40UHV-048 and CBX40UHV-060							
Model Number		No. of Stages	Volts Input	kW Input	[1] Btuh Input	[2] Blower Motor Full Load Amps	[3] Minimum Circuit Ampacity			[5] Maximum Overcurrent Protection			
							Circuit 1	Circuit 2	Circuit 3	Circuit 1	Circuit 2	Circuit 3	
THREE PHASE ELECTRIC HEAT													
8 kW 5 lbs.	ECB40-8 (34W98) Terminal block	1	208	6.0	20,500	7.4	30	- - -	- - -	35	- - -	- - -	
			220	6.7	22,900	7.4	31	- - -	- - -	35	- - -	- - -	
			230	7.3	25,100	7.4	32	- - -	- - -	35	- - -	- - -	
			240	8.0	27,300	7.4	33	- - -	- - -	35	- - -	- - -	
10 kW 6 lbs.	ECB40-10 (34W99) Terminal block	1	208	7.5	25,600	7.4	36	- - -	- - -	40	- - -	- - -	
			220	8.4	28,700	7.4	37	- - -	- - -	40	- - -	- - -	
			230	9.2	31,400	7.4	38	- - -	- - -	40	- - -	- - -	
			240	10.0	34,100	7.4	40	- - -	- - -	40	- - -	- - -	
15 kW 12 lbs.	ECB40-15CB (35W00) 50A Circuit breaker	1	208	11.3	38,400	7.4	49	- - -	- - -	50	- - -	- - -	
			220	12.6	43,000	7.4	51	- - -	- - -	**[4] 60**	- - -	- - -	
			230	13.5	47,000	7.4	52	- - -	- - -	**[4] 60**	- - -	- - -	
			240	15.0	51,200	7.4	55	- - -	- - -	**[4] 60**	- - -	- - -	
20 kW 19 lbs.	ECB40-20CB (35W01) (2) 35A Circuit breaker	2	208	15.0	51,200	7.4	36	26	- - -	**[4] 40**	**[4] 30**	- - -	
			220	16.8	57,300	7.4	37	28	- - -	**[4] 40**	**[4] 30**	- - -	
			230	18.4	62,700	7.4	38	29	- - -	**[4] 40**	**[4] 30**	- - -	
			240	20.0	68,200	7.4	40	30	- - -	**[4] 40**	35	- - -	
25 kW 19 lbs.	ECB40-25CB (35W02) (1) 50A & (1) 40A Circuit breaker	2	208	18.8	64,100	7.4	42	33	- - -	**[4] 45**	**[4] 35**	- - -	
			220	21.0	71,700	7.4	44	34	- - -	**[4] 45**	**[4] 35**	- - -	
			230	23.0	78,300	7.4	45	36	- - -	50	40	- - -	
			240	25.0	85,300	7.4	47	38	- - -	50	40	- - -	

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.
[4] Bold text indicates that the circuit breaker on "CB" circuit breaker models must be replaced with size noted. See Table on Page 6.
[5] HACR type circuit breaker or fuse.

OPTIONAL HUMIDITY CONTROL (A20)

ComfortSense® 7000 Thermostat

The Lennox ComfortSense™ 7000 thermostat (shown below) 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. This thermostat 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 percent 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 75ºF (24ºC) and 50% RH is changed to 60%, 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 ComfortSense 7000 thermostat senses that the indoor humidity level is above the control setpoint, the control places the indoor fan and outdoor unit in a dehumidification mode. To produce drier air, the indoor fan 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 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 adversely affecting ComfortSense 7000 thermostat performance

Blower speed selection can adversely affect ComfortSense 7000 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 the air handler and 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	Outdoor Unit type	Compressor type	Jumpers required
OFF	Heat Pump	one-stage	DS to Y1 & Y1 to Y2
		two-stage	DS to Y1
	Condensing Unit	one-stage	DS to Y1 & Y1 to Y2 & O to R
		two-stage	DS to Y1 & O to R
ON	Heat Pump	one-stage	Y1 to Y2
		two-stage	None
	Condensing Unit	one-stage	Y1 to Y2 & O to R
		two-stage	O to R

Operation

Dehumidification is provided only when the thermostat is in cool mode and may be set in the range of 45% to 60% RH. 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 ComfortSense® 7000 thermostat is powered, EXCEPT when there is a dehumidification demand. This means that the D terminal has 24VAC 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 comes on (if not already on), Y1 and Y2 (if available) is on.

PRECISION mode

Dehumidification with or without a cooling demand. COOL is on, the 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.

HUMIDITROL® mode

Select this mode when Humiditrol® Enhanced Dehumidification Accessory is installed. Operation is same as PRECISION mode but requires an outdoor sensor.

AUX mode

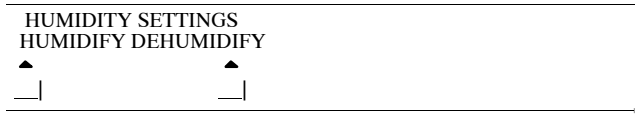
Select this mode when Whole Home Dehumidifier is used in in a central or central/zoned installation. Operation is same as PRECISION mode and can work with or without AC on but G will be energized.

Turning DEHUMIDIFY ON or OFF

NOTE - One of the dehumidify modes must be turned on in the INSTALLER SETTINGS before you can adjust the dehumidify level in the USER SETTINGS of the ComfortSense 7000 thermostat.

From the OPTIONS screen, scroll to INSTALLER SETTINGS and press ENTER twice.

Scroll to HUMIDITY SETTINGS; press ENTER. Press the box below DEHUMIDIFY.



Use up/down arrows to scroll to OFF, BASIC, PRECISION, HUMIDITROL, or AUX; press ENTER.

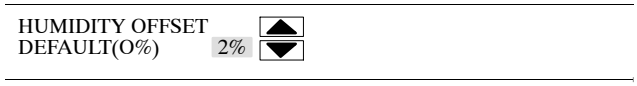
Default setting is 50% RH. Use up/down arrows to change the %RH; press SAVE.

Setting HUMIDITY OFFSET

The Default setting is 0%. This can be used to offset the displayed and controlled space relative humidity (RH) by up to +/- 10% RH.

1- From the OPTIONS screen, scroll to INSTALLER SETTINGS and press ENTER twice.

2- Scroll to HUMIDITY OFFSET; press ENTER. Use arrows to select a new offset. Press SAVE.



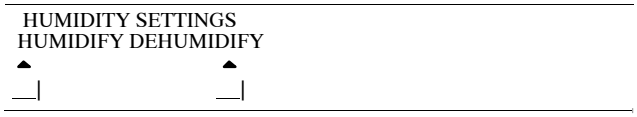
User Control of Humidification / Dehumidification

If set ON, Humidify and Dehumidify may be adjusted by the user through USER SETTINGS. If installer does not turn either ON, HUMIDITY MODES OFF appears when the USER'S “HUMIDITY SETTING” option is pressed. Humidify controls the relative humidity (RH) between 15 and 45%. Dehumidify controls relative humidity (RH) between 45 and 60%.

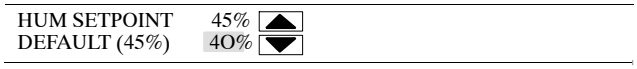
User Control of Humidification

1- From the OPTIONS screen, scroll to USER SETTINGS and press ENTER.

2- Scroll to HUMIDITY SETTINGS; press ENTER. (If both Humidify and Dehumidify are on, the following screen appears; otherwise go to the step 3). Press the box below HUMIDIFY.



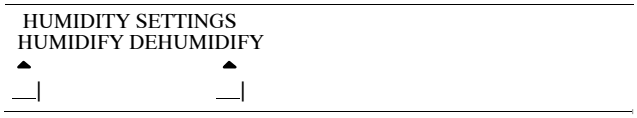
3- Use up/down arrows to change the humidity setpoint (between 15 and 45%); press SAVE.



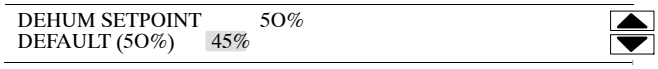
User Control of Dehumidification

1- From the OPTIONS screen, scroll to USER SETTINGS and press ENTER.

2- Scroll to HUMIDITY SETTINGS; press ENTER. (If both Humidify and Dehumidify are on, the following screen appears; otherwise go to the step 3). Press the box below DEHUMIDIFY.



3- Use up/down arrows to change the humidity setpoint (between 45 and 60%); press SAVE.



UNIT SEQUENCE OF OPERATIONS

Table 9. CBX40UV with ComfortSense® 7000 Thermostat and Single-Stage Outdoor Unit Operating Sequence

Operating Sequence		System Demand								System Response		
System Condition	Step	Thermostat Demand						Relative Humidity		Comp	Air Handler CFM (COOL)	Comments
		Y1	Y2	O	G	W1	W2	Status	D			
NO CALL FOR DEHUMIDIFICATION												
Normal Operation	1	On		On	On			Acceptable	24 VAC	High	100%	Compressor and indoor air handler follow thermostat demand
BASIC MODE (Only active on a Y1 thermostat demand)												
Normal Operation	1	On		On	On			Acceptable	24 VAC	High	100%	ComfortSense 7000 thermostat energizes Y1 and de-energizes D on a call for dehumidification. *Note: No over cooling.*
Dehumidification Call	2	On		On	On			Demand	0 VAC	High	70%	
PRECISION MODE (Operates independent of a Y1 thermostat demand)												
Normal Operation	1	On		On	On			Acceptable	24 VAC	High	100%	Dehumidification mode begins when humidity is greater than set point
Dehumidification call	2	On		On	On			Demand	0 VAC	High	70%	
Dehumidification call ONLY	1	On		On	On			Demand	0 VAC	High	70%	ComfortSense 7000 will keep outdoor unit energized after cooling temperature setpoint has been reach in order to maintain room humidity setpoint. *Note: Allow to over cool 2^0F from cooling set point.*

Table 10. CBX40UV, with ComfortSense® 7000 Thermostat and Two-Stage Outdoor Unit Operating Sequence

Operating Sequence		System Demand								System Response		
		Thermostat Demand						Relative Humidity				
System Condition	Step	Y1	Y2	O	G	W1	W2	Status	D	Compressor	Air Handler CFM (COOL)	Comments
No Call for Dehumidification												
Normal Operation - Y1	1	On		On	On			Acceptable	24 VAC	Low	70%	Compressor and indoor air handler follow thermostat demand
Normal Operation - Y2	2	On	On	On	On			Acceptable	24 VAC	High	100%	
Room Thermostat Calls for First-Stage Cooling												
BASIC MODE (Only active on a Y1 thermostat demand)												
Normal Operation	1	On		On	On			Acceptable	24 VAC	Low	70%	ComfortSense 7000 thermostat energizes Y2 and de-energizes D on a call for dehumidification *Note: No over cooling.*
Dehumidification Call	2	On	On	On	On			Demand	0 VAC	High	70%	
PRECISION MODE (Operates independent of a Y1 thermostat demand)												
Normal Operation	1	On		On	On			Acceptable	24 VAC	Low	70%	Dehumidification mode begins when humidity is greater than set point
Dehumidification call	2	On	On	On	On			Demand	0 VAC	High	70%	
Dehumidification call ONLY	1	On	On	On	On			Demand	0 VAC	High	70%	ComfortSense 7000 thermostat will keep outdoor unit energized after cooling temperature setpoint has been reached in order to maintain room humidity setpoint. *Note: Allow to over cool 2^0F from cooling set point.*
Room Thermostat Calls for First- and Second-Stage Cooling												
BASIC MODE (Only active on a Y1 thermostat demand)												
Normal Operation	1	On	On	On	On			Acceptable	24 VAC	High	100%	ComfortSense 7000 thermostat energizes Y2 and de-energizes D on a call for dehumidification *Note: No over cooling.*
Dehumidification Call	2	On	On	On	On			Demand	0 VAC	High	70%	
PRECISION MODE (Operates independent of a Y1 thermostat demand)												
Normal Operation	1	On	On	On	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	70%	
Dehumidification call ONLY	1	On	On	On	On			Demand	0 VAC	High	70%	ComfortSense 7000 thermostat will keep outdoor unit energized after cooling temperature setpoint has been reached in order to maintain room humidity setpoint. *Note: Allow to over cool 2^0F from cooling set point.*

UNIT STATUS AND ALARM CODES

Table 11. AHC System Status Codes

AHC Single Character Display	Action
Letter or Number	Unit Size Code (number or letter) displayed represents air handler model size and capacity.
☰	If three horizontal bars are displayed, AHC does not recognize air handler model size and capacity.
.	Idle mode (decimal point / no unit operation)
A	Delivered CFM. Example: A 1200
C	Stage Cooling (Shows active cooling stages) C 1 or C2
d	Dehumidification mode (Unit in dehumidification mode only)
d F	Shown only while in active defrost (Y, W and O call)
H	Stage heating (Shows number of active electric heat pilot relays) H 1 or H2 or H3
h	Stage heat pump (shows active heat pump stages) h 1 or h2
U	Discharge air sensor temperature (indoor blower must be operating) U 105

Table 12. AHC Configuration, Test and Error Recall (Fault and Lockout) Function

NOTE — AHC MUST BE IN IDLE MODE)		
Single Character LED Display		**Action**
Solid	-	Push and hold button until solid appears, release button. Display will blink.
Blinking	-	Push and hold button until required symbol displays. H A or P
CONFIGURING ELECTRIC HEAT SECTIONS		
Solid	H	Release push button - control will cycle the indoor blower motor **on** to the selected heat speed and stage the electric heat relays **on** and **off** to automatically detect number of electric heat sections. Control will store the number of electric heat sections. Control will automatically exit ***current active mode***.
INDOOR BLOWER TEST		
Solid	A	Release push button - control cycles indoor blower on for ten seconds at 70% of maximum air for selected capacity size unit. Control will automatically exit ***current active mode***.
CONFIGURING UNIT SIZE CODES		
Single Character LED Display		**Action**
Solid	P	**RELEASE** push button - This mode allows the field to select a unit size code (number or letter) that matches the air handler model size and capacity. **IMPORTANT — All field replacement controls may be manually configured to confirm air handler model size and capacity.**
Blinking	P	3-When the correct **Unit Sized Code** is displayed, **RELEASE** push button. Selected code will flash for 10 second period. 3-During ten second period, **HOLD** push button until code stops blinking (three seconds minimum). 3-Air Handler Control will store code in memory and exit ***current active mode.*** LED display will go blank and then the **Unit Size Code** will display for 2 to 5 seconds. **NOTE** - If ten second period expires, or push button is held less than 3 seconds, control will automatically exit ***current active mode*** and go into **IDLE Mode** without storing unit size code. If this occurs, then **Unit Size Code** configuring procedure must be repeated.
ERROR CODE RECALL MODE (NOTE — CONTROL MUST BE IN IDLE MODE)		
Solid	E	To enter ***Error Code Recall Mode*** — **PUSH** and **HOLD** button until solid **E** appears, then **RELEASE** button. Control will display up to ten error codes stored in memory. If **E000** is displayed, there are no stored error codes.
Solid	☰	To exit ***Error Code Recall Mode*** — **PUSH** and **HOLD** button until **solid three horizontal bars** appear, then **RELEASE** button. *NOTE - Error codes are not cleared*
Solid	c	To clear error codes stored in memory, continue to **HOLD** push button while the three horizontal bars are displayed. Release push button when solid **c** is displayed. Display will blink.
Blinking	c	Push button to confirm command to delete codes. Error codes are cleared.

Table 13. AHC Single Character Display — Error Codes (Communicating and Non-Communicating)

Alert Code	Priority	Alert	How to Clear
E 105	Critical	The air-handler has lost communication with the rest of the system.	Equipment is unable to communicate. This may indicate the existence of other alarms / codes. In most cases errors are related to electrical noise. Make sure high voltage power is separated from RSBus. Check for mis-wired and/or loose connections between the thermostat, indoor unit and outdoor unit. Check for a high voltage source of noise close to the system. Generally, this is a self-recoverable error.
E 114	Critical	There is a frequency/distortion problem with the power to the air-handler.	This alarm/code may indicate transformer overloading. Check the voltage and line power frequency. Check the generator operating frequency, if the system is running on back-up power. Correct voltage and frequency problems. System resumes normal operation 5 seconds after fault recovered.
E 115	Critical	The 24VAC to the air-handler control is lower than the required range of 18 to 30VAC.	24-volt power low (range is 18 to 30 volts). Check and correct voltage. Check for additional power-robbing equipment connected to system. This alarm / code may require the installation of an additional or larger VA transformer.
E 120	Moderate	There is a delay in the air-handler responding to the system.	Typically, this alarm/code does not cause any issues and will clear on its own. The alarm/code is usually caused by a delay in the outdoor unit responding to the thermostat. Check all wiring connections. Cleared after unresponsive device responds to any inquiry.
E 124	Critical	The iComfort™ thermostat has lost communication with the air-handler for more than 3 minutes.	Equipment lost communication with the iComfort™ thermostat. Check the wiring connections, ohm wires and cycle power. The alarm stops all associated HVAC operations and waits for a heartbeat message from the unit that's not communicating. The alarm/fault clears after communication is re-established.
E 125	Critical	There is a hardware problem with the air-handler control.	There is a control hardware problem. Replace the control if the problem prevents operation and is persistent. The alarm/fault is cleared 300 seconds after the fault recovers.
E 130	Moderate	An air-handler configuration jumper is missing.	Configuration jumper(s) missing on control (applicable in non-communicating applications only). Replace the jumper or put wire between terminals on control. Cleared after jumper is connected.
E 131	Critical	The air-handler control parameters are corrupted.	Reconfigure the system. Replace the control if heating or cooling is not available.
E 132	Critical	The air-handler control software is corrupted.	Recycle power. If failure re-occurs, replace the control. System reset is required to recover.
E 180	Critical	The iComfort™ thermostat has found a problem with the air-handler outdoor sensor.	In normal operation after control recognizes sensors, the alarm will be sent if valid temperature reading is lost. Compare outdoor sensor resistance to temperature/resistance charts in unit installation instructions. Replace sensor pack if necessary. At the beginning of (any) configuration, the air-handler control will detect the presence of the sensor(s). If detected (reading in range), appropriate feature will be set as installed and shown in the 'About' screen. The alarm / fault will clear upon configuration, or sensing normal values.
E201	Critical	The system has lost communication with the or air-handler indoor blower motor.	Lost communication with indoor blower motor. Possible causes include power outage, brown-out, motor not powered, loose wiring, condensation on air handler control without cover on breaker. Problem may be on control or motor side. Cleared after communication is restored.
E202	Critical	The unit size code for the air-handler and the size of blower motor do not match.	Incorrect appliance unit size code selected. Check for proper configuring under unit size codes for air handler on configuration guide or in installation instructions. The alarm / fault clears after the correct match is detected following a reset. Remove the thermostat from the system while applying power and reprogramming.
E203	Critical	The unit size code for the air-handler has not been selected.	No appliance unit size code selected. Check for proper configuring under: Unit size codes for air handler on configuration guide or in installation instructions. Critical Alert. The alarm/fault clears after the correct match is detected following a reset. Remove the thermostat from the system while applying power and reprogramming.
E292	Critical	The air-handler's blower motor will not start.	The system will go into watchguard mode. Indoor blower motor unable to start. This could be due to seized bearing, stuck wheel, obstruction etc. Replace motor or wheel if assembly does not operate or meet performance standards. The alarm/fault clears after the indoor blower motor starts successfully.
E295	Minor	The indoor blower motor is over heating.	Indoor blower motor over temperature (motor tripped on internal protector). Check motor bearings and amps. Replace if necessary. The alarm / fault clears after blower demand is satisfied.
E310	Critical	There is a problem with air-handle) discharge air sensor.	Compare outdoor sensor resistance to temperature/resistance charts in installation instructions. Replace sensor if necessary. The alarm/fault is cleared 30 seconds after fault is detected as recovered.
E312	Minor	The blower cannot provide the requested CFM due to high static.	Warning Only. Restricted airflow - Indoor blower is running at a reduced CFM (cutback mode). The variable-speed motor has pre-set speed and torque limiters to protect the motor from damage caused by operating outside of design parameters (0 to 0.8” e.g.. total external static pressure). Check filter and duct system. To clear, replace filter if needed or repair/add duct. The alarm/fault is cleared after the current service demand is satisfied.
E313	Minor	The indoor and outdoor unit capacities do not match.	Check for proper configuring in installation instructions. Alarm is just a warning. The system will operate, but might not meet efficiency and capacity parameters. The alarm will clear after commissioning is complete.

Table 13. AHC Single Character Display Alert Codes (Communicating and Non-Communicating) *(continued)*

Alert Code	Priority	Alert	How to Clear
E345	Critical	The **O** relay on the air-handler has failed. Either the pilot relay contacts did not close or the relay coil did not energize	**O** relay failed. Pilot relay contacts did not close or the relay coil did not energize. Replace control. The alarm clears after a reset.
E346	Critical	The **R** to **O** jumper was not removed on the air-handler control board	Configuration link(s) not removed on control. Cut / remove **R** to **O** jumper. Applicable with non communicating outdoor unit with communicating indoor unit. The fault clears after the **R** to **O** jumper is cut/removed.
E347	Critical	The **Y1** relay on the air-handler has failed. Either the pilot relay contacts did not close or the relay coil did not energize.	Operation stopped. Y1 relay failed. Pilot relay contacts did not close or the relay coil did not energize. The indoor unit cannot verify that the relay is closed. The alarm clears after a reset and Y1 input sensed.
E348	Critical	The **Y2** relay on the air-handler has failed. Either the pilot relay contacts did not close or the relay coil did not energize.	Operation stopped. Y2 relay failed. Pilot relay contacts did not close or the relay coil did not energize. The indoor unit cannot verify that the relay is closed. The alarm clears after a reset and Y2 input sensed.
E350	Critical	The air-handler's electric heat is not configured.	Heat call with no configured or mis-configured electric heat. Configure electric heat in the air-handler. The fault clears electrical heat is successfully detected.
E351	Critical	There is a problem with the air-handler's first stage electric heat. Either the pilot relay contacts did not close, or the relay coil in the electric heat section did not energize.	Heat section / stage 1 failed. Pilot relay contacts did not close, or the relay coil in the electric heat section did not energize. The alarm clears after stage 1 relay is detected.
E352	Critical	There is a problem with the air-handler's second stage electric heat. Either the pilot relay contacts did not close, or the relay coil in the electric heat section did not energize. The air-handler will operate on first stage electric heat until the issue is resolved.	Heat section / stage 2 failed (same as code 351). Pilot relay contacts did not close, or the relay coil in the electric heat section did not energize. The air-handler will operate on stage 1 heat only. The alarm clears after stage 2 relay is detected.
E353	Critical	There is a problem with the air-handler's third stage electric heat. Either the pilot relay contacts did not close, or the relay coil in the electric heat section did not energize. The air-handler will operate on first stage electric heat until the issue is resolved.	Heat section / stage 3 failed (same as code 351). Pilot relay contacts did not close, or the relay coil in the electric heat section did not energize. The air-handler will operate on stage 1 heat only. The alarm clears after sage 2 relay is detected.
E354	Critical	There is a problem with the air-handler's fourth stage electric heat. Either the pilot relay contacts did not close, or the relay coil in the electric heat section did not energize. The air-handler will operate on first stage electric heat until the issue is resolved.	Heat section / stage 4 failed (same as code 351). Pilot relay contacts did not close, or the relay coil in the electric heat section did not energize. The air-handler will operate on stage 1 heat only. The alarm clears after stage 2 relay is detected.
E355	Critical	There is a problem with the air-handler's fifth stage electric heat. Either the pilot relay contacts did not close, or the relay coil in the electric heat section did not energize. The air-handler will operate on first stage electric heat until the issue is resolved.	Heat section / stage 5 failed (same as code 351). Pilot relay contacts did not close, or the relay coil in the electric heat section did not energize. The air-handler will operate on stage 1 heat only. The alarm clears after stage 2 relay is detected.
E409	Moderate	The secondary voltage for the air-handler has fallen below 18VAC. If this continues for 10 minutes, the iComfort™ thermostat will turn off the air-handler.	Secondary voltage is below 18VAC. After 10 minutes, operation is discontinued. Check the indoor line voltage, transformer output voltage. The alarm clears after the voltage is higher than 20VAC for 2 seconds or after a power reset.

APPLICATION CONFIGURATION MODIFICATIONS

CBX40UHV units are factory-configured for installation in upflow or horizontal applications with right-hand air discharge. For downflow or horizontal left-hand air discharge, certain field modifications are required.

CBX40UHV Cabinet

To disassemble:

1. Remove access panels.
2. Remove both blower and coil assemblies. This will lighten the cabinet for lifting.
3. Remove one screw from the left and right posts inside the unit. Remove one screw from each side on the back of the unit. Unit sections will now separate.

To reassemble:

1. Align cabinet sections together.
2. Reinstall screws.
3. Replace blower and coil assemblies.
4. Replace access panel.

Up-Flow Application

Use the following procedures to configure the unit for upflow operations:

1. The horizontal drain pan must be removed when the air handler is installed in the upflow position. Removing horizontal drain pan will improve airflow.
2. After removing horizontal drain pan, place the unit in desired location. Set unit so that it is level. Connect return and supply air plenums as required using sheet metal screws.
3. Install units that have no return air plenum on a stand that is at least 14” (356 mm) from the floor to allow for proper air return. Lennox offers an optional upflow unit stand as listed in table 14.

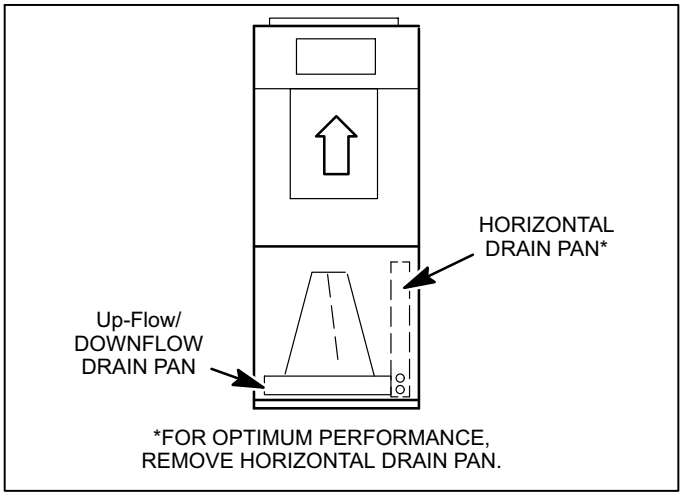


Figure 24. Upflow Configuration

Table 14. Optional Side Return Stand (Upflow Only)

Model/Size	Kit Number
CBX40UHV-All Sizes	45K32

Down-flow Application

See the installation instructions provided with the downflow kit.

Table 15. Optional Downflow Conversion Kits (Downflow Only)

Model/Size	Kit Numbers
CBX40UHV-024, -030, and -036	83M57
CBX40UHV-042, -048, and -060	43W10

In downflow applications when used with a ECB40 heat section, a Downflow Additive Base Kit (44K15) will be required. Installation instructions are included with the reference kit.

Horizontal Right-Hand Discharge Application

Use the following procedures to configure the unit for horizontal right-hand air discharge operations:

NOTE - When a coil is located above a finished space, a 3/4” (19.1MM) overflow drain line must be installed and connected to a safety pan or to the secondary drain outlet of the coil. Refer to local codes.

1. No further adjustment is necessary. Set unit so that it is sloped 1/4” (6.35 mm) towards the drain pan end of the unit.

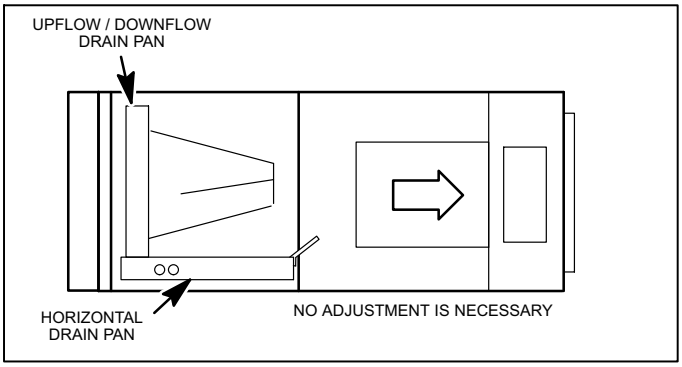


Figure 25. Right-Hand Air Discharge Configuration

2. If the unit is suspended, the entire length of the cabinet must be supported. If you use a chain or strap, use a piece of angle iron or sheet metal attached to the unit (either above or below) to support the length of the cabinet. Use securing screws no longer than 1/2” (12.7mm) to avoid damaging the coil or filter. Use sheet metal screws to connect the return and supply air plenums as required.

Horizontal Right-Hand Air Discharge Application in High Humidity Areas

For horizontal applications in high humidity areas, seal around the drain pan connections plus liquid and suction lines, to prevent humid air from infiltrating into the unit.

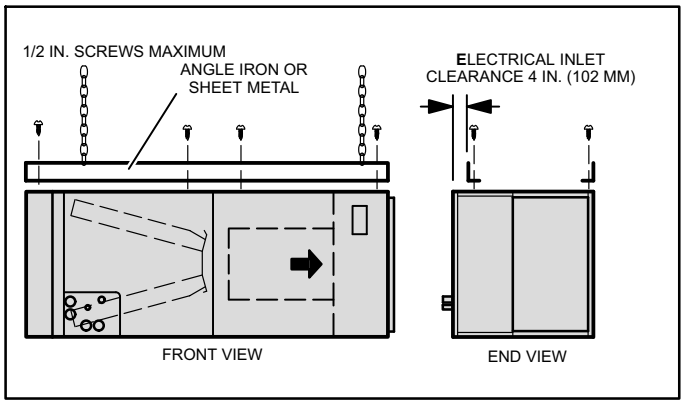


Figure 26. Suspending Horizontal Unit

⚠ IMPORTANT

When removing the coil, there is possible danger of equipment damage and personal injury. Be careful when removing the coil assembly from a unit installed in right- or left-hand applications. The coil may tip into the drain pan once it is clear of the cabinet. Support the coil when removing it.

Horizontal Left-Hand Discharge Application

Use the following procedures to configure the unit for horizontal left-hand air discharge operations:

1. Pull the coil assembly from unit. Remove the horizontal drain pan.
2. Remove the drain plugs from back drain holes on horizontal drain pan and reinstall them on front holes.

⚠ IMPORTANT

After removal of drain pan plug(s), check drain hole(s) to verify that drain opening is fully open and free of any debris. Also check to make sure that no debris has fallen into the drain pan during installation that may plug up the drain opening.

3. Rotate drain pan 180º front-to-back and install it on the opposite side of the coil.
4. Remove screws from top cap. Remove horizontal drip shield screw located in the center of the back coil end seal.
5. Rotate horizontal drip shield 180º front to back.
6. Remove plastic plug from left hole on coil front end seal and reinstall plug in back hole. Reinstall horizontal drip shield screw in front coil end seal. Drip shield should drain downward into horizontal drain pan inside coil.
7. Rotate top cap 180º front-to-back and align with unused screw holes. Holes must align with front and back coil end plates. The top cap has a 45º bend on one side and a 90º bend on the other. The 90º bend must be on the same side as the horizontal drain pan.

NOTE - Be very careful when you reinstall the screws into coil end plate engaging holes. Misaligned screws may damage the coil.

8. From the upflow position, flip cabinet 90º to the left and set into place. Replace coil assembly. Secure coil in place by bending down the tab on the cabinet support rail as illustrated in figure 27.

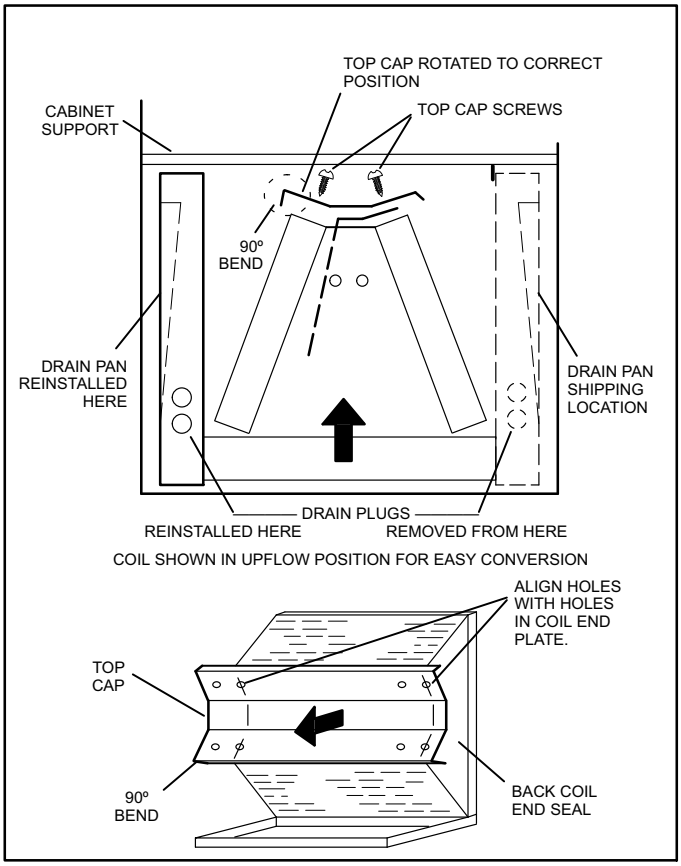


Figure 27. Field Modification for Left-Hand Air Discharge

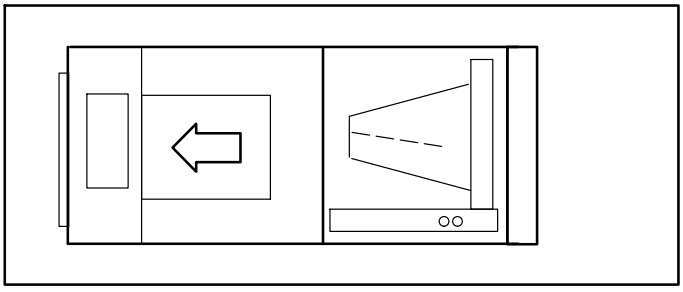


Figure 28. Left-Hand Discharge Configuration

9. Knock out drain seal plate from access door. Secure plate to cabinet front flange with screw provided.
10. Flip access door and replace it on the unit.
11. Set unit so that it is sloped 1/4 inch toward the drain pan end of the unit. Connect return and supply air plenums as required using sheet metal screws.
12. If suspending 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” (12.7mm) to avoid damage to coil or filter as illustrated in figure 27. Connect return and supply air plenums as required using sheet metal screws.

Condensate Drain

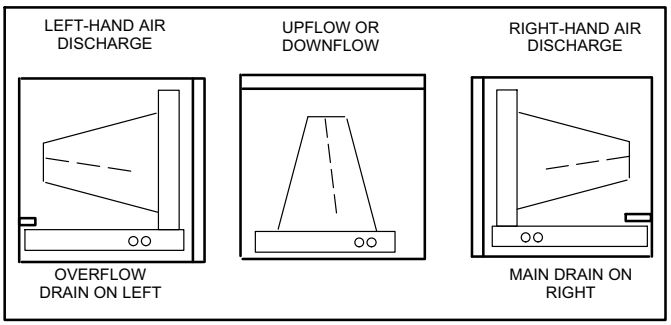


Figure 29. Main and Overflow Drain Locations based on Main Drain

Connect the main drain and route downward to drain line or sump. Do not connect drain to a closed waste system. See Figure 30 for typical drain trap configuration.

Overflow Drain

It is recommended that the overflow drain is connected to a overflow drain line for all units. If overflow drain is not connected, it must be plugged with provided cap.

For downflow orientation, the overflow drain **MUST** be connected and routed to a overflow drain line. See Figure 30 for main and overflow drain locations based on coil orientation.

Best Practices

The following best practices are recommended to ensure better condensate removal:

- Main and overflow drain lines should **NOT** be smaller than both drain connections at drain pan.
- Overflow drain line should run to an area where homeowner will notice drainage.
- It is recommended that the overflow drain line be vented and a trap installed. Refer to local codes.

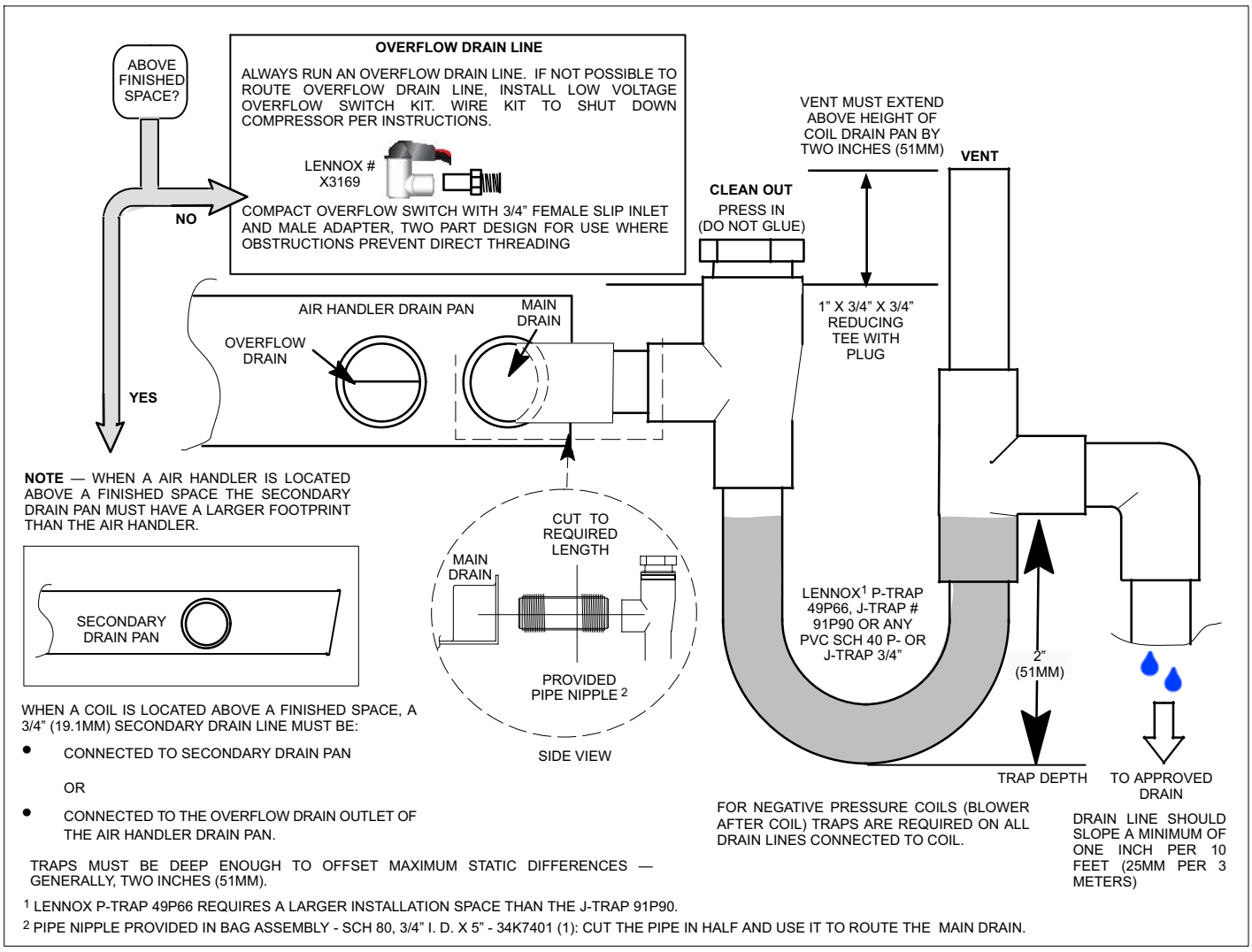


Figure 30. Main Drain

START-UP - OPERATION

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.

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 HFC-410A refrigerant. See condensing unit rating plate for correct charge amount.
3. Refer to the correct condensing unit service manual for more information.

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.

Safety or Emergency Shutdown

Turn off unit power at circuit breaker.

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.

OPERATING CHARACTERISTICS

Blower Operation and Adjustment

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

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

External Static Pressure

Measure tap locations as shown in figure 31.

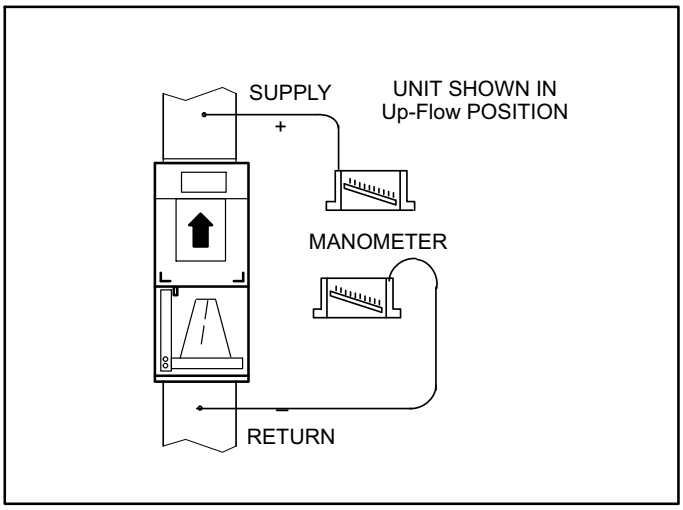


Figure 31. Static Pressure Test

4. 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.
5. With only the blower motor running and the evaporator coil dry, observe and take note of the manometer reading.
6. 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.
7. Repeat step 3.
8. 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.
9. Seal around the holes when the check is complete.

⚠ WARNING

Improper installation of the air handler can result in personal injury or death.

Do not allow external combustion products or other contaminants to enter the return air system or to be mixed with air that will be supplied to the living space. Use sheet metal screws and joint tape or duct mastic to seal return air system to air handler. In platform installations, the air handler should be sealed airtight to the return air plenum. A door must never be used as a portion of the return air duct system. The base must provide a stable support and an airtight seal to the air handler. Allow absolutely no sagging, cracks, gaps. etc.

For no reason should return and supply air duct systems ever be connected to or from other heating devices such as a fireplace or stove. etc. Fire, explosion, carbon monoxide poisoning, personal injury and/or property damage could result.

⚠ 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:

Filters

⚠ IMPORTANT

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

Filters may be duct-mounted or installed in the cabinet. A filter is installed at the factory. Note that filter access door fits over access panel. Air will leak if the access panel is placed over the filter door.

Filters should be inspected monthly and must be cleaned or replaced when dirty to assure proper furnace operation.

To replace filter:

1. Loosen the thumbscrews holding the filter panel in place.
2. Slide the filter out of the guides on either side of cabinet.
3. Insert new filter.
4. Replace panel.

See the tables below for replacement filter sizes.

Table 16. MERV16 Disposable Filter (five inch)

Unit Model No.	Filter Size Inches (mm)	Catalog #
CBX40UHV-024, -030 and -036	20 x 20 x 5 (508 x 508 x 127)	X7935
-CBX40UHV-048, -042, and -060	20 x 25 x 5 (508 x 635 x 127)	X6675

Table 17. Disposable Filter (one inch))

Unit Model No.	Filter Size Inches (mm)	Catalog #
CBX40UHV-024, -030 and -036	20 x 20 x 1 (508 x 508 x 25)	X1963
-CBX40UHV-048, -042, and -060	20 x 25 x 1 (508 x 635 x 25)	X1970

NOTE — To use one inch filter bend tabs up as illustrated in figure 32.

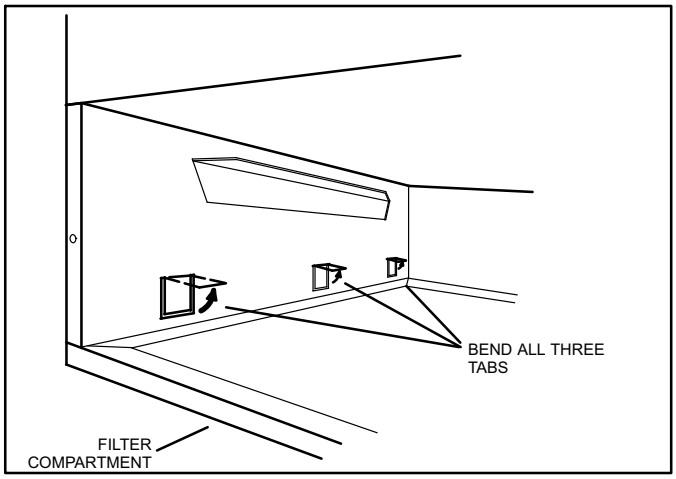


Figure 32. Tabs

Supply Air Blower

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

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 RMS amp meter. Typical clamp-on ammeters do not read current accurately.
5. Check to see that heat (if applicable) is operating.

Insulation

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

CONFIGURING UNIT FLOW CHARTS

1. Air Handler Control (AHC) Checkout

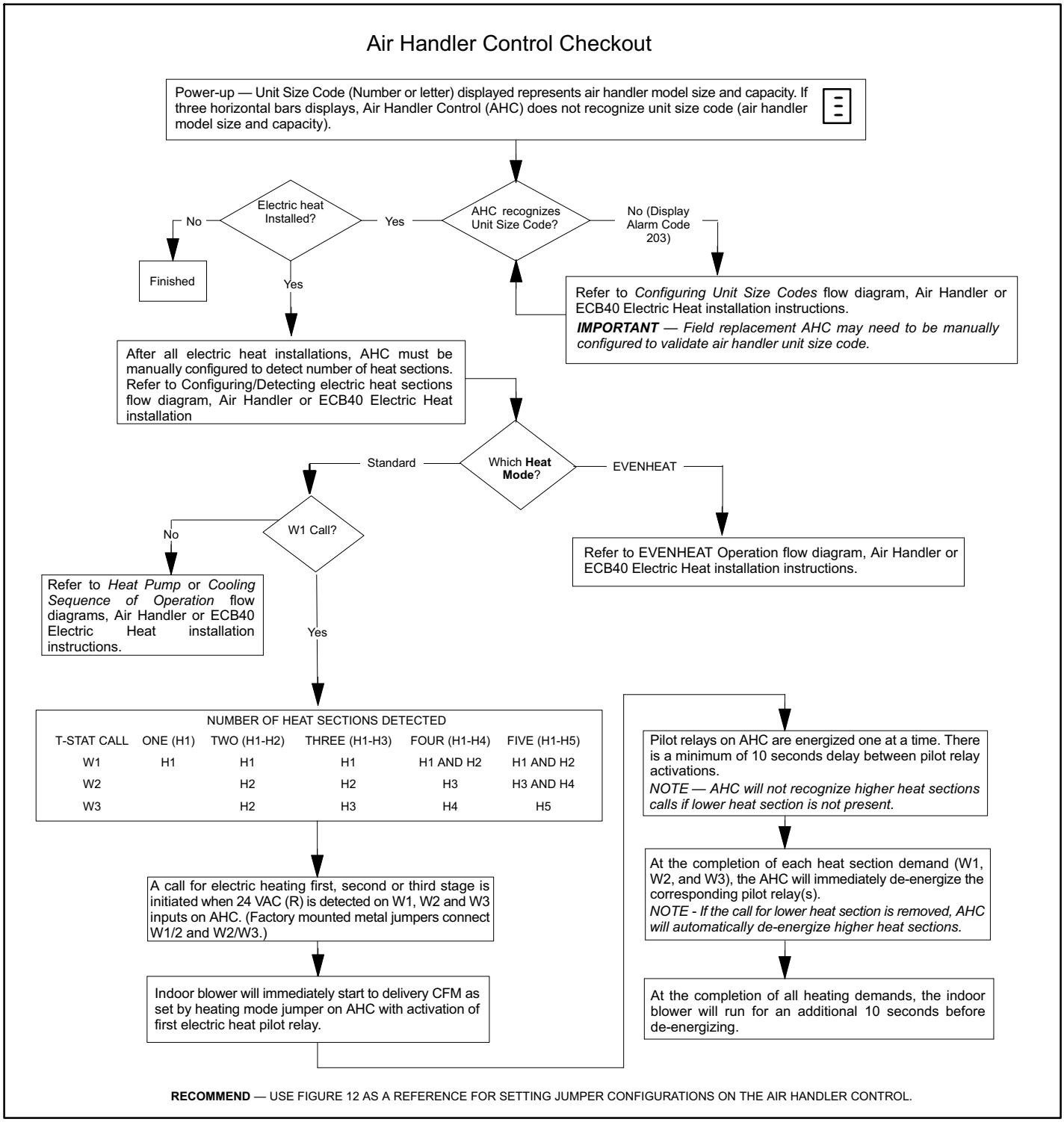


Figure 33. Air Handler Control Checkout

2. Configuring Unit Size Codes

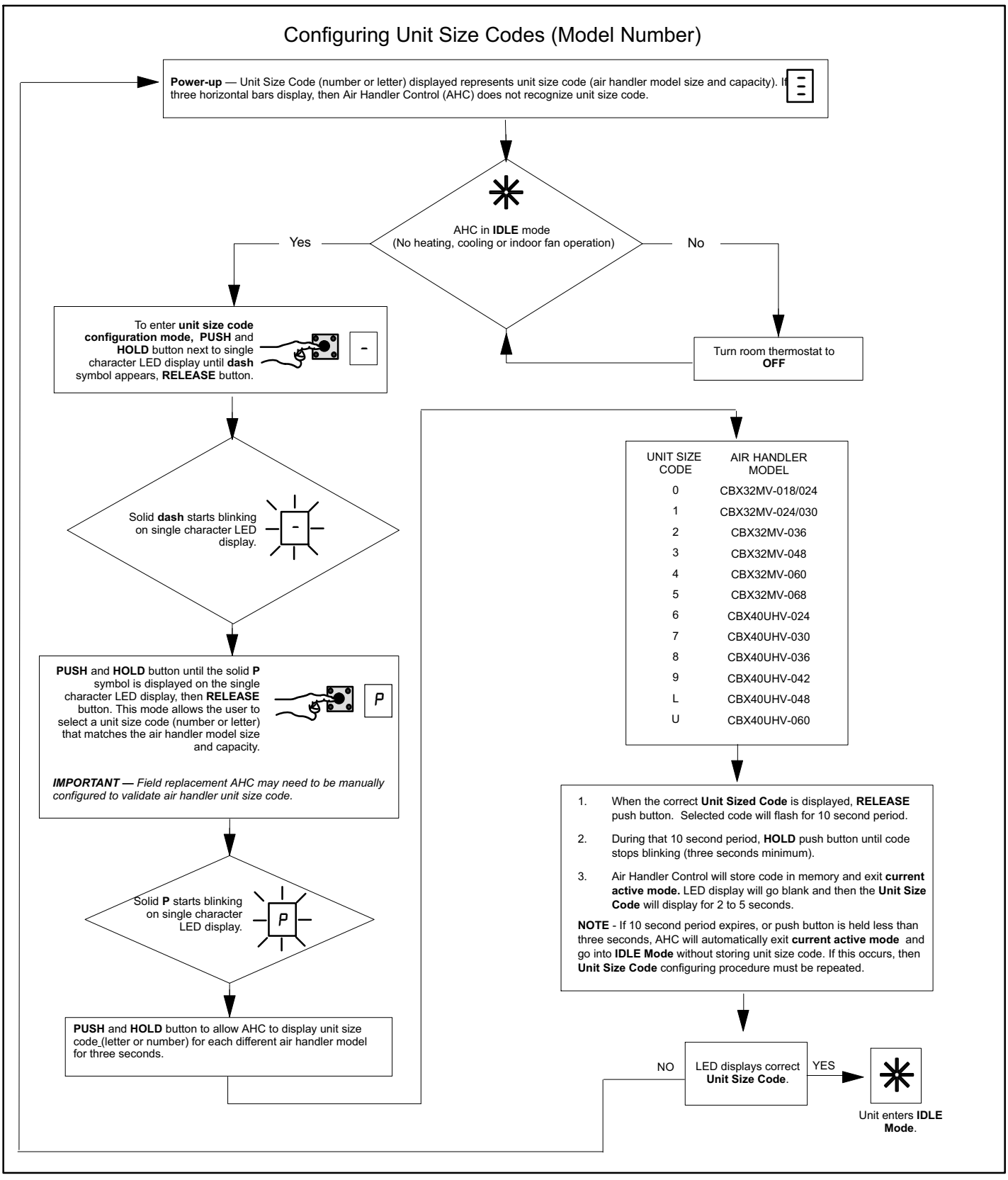


Figure 34. Configuring Unit Size Codes

3. Configuring / Detecting Electric Heat Elements

Configuring/Detecting Electric Heat Sections

IMPORTANT — All electric heat installations require the Air Handler Control (AHC) to be manually configured to detect number of heat sections.

NOTE — All field replacement AHC will require configuring/detecting electric heat sections.

RECOMMEND — USE FIGURE 12 AS A REFERENCE FOR SETTING JUMPER CONFIGURATIONS ON THE AIR HANDLER CONTROL.

Which Heat Mode?

Standard

- Set desired **Heating Mode Blower Speed** jumper pin.
- Electric heat is stages by room thermostat. (AHC comes with factory jumper between W1 to W2 and W2 to W3)
- Refer to Air Handler Control Checkout flow diagram for operation.

EVENHEAT

- Set desired **Heating Mode Blower Speed** jumper pin.
- Install and wire discharge air temperature sensor.
- Set desired **Target Discharge Temperature** jumper pin. If jumper pin is missing or discharge air temperature sensor is not detected, AHC defaults to **Standard Heat Mode**. Target settings are 85, 100, 115 and 130ºF) .
- Refer to **EVENHEAT Operation** flow diagram for operation.

Configuration

AHC in **Idle Mode** (No heating cooling or indoor fan operation)

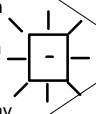
Yes

To enter **electric heat configuration mode**, push and hold button next to single character LED display until **dash** symbol (solid bar) appears, then release button.

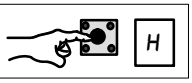
No

Turn room thermostat to **OFF**.

Solid **dash** starts blinking on single character LED display



Push and hold button until the solid **H** symbol is displayed on the single character LED display, then release button.



1. AHC will start the indoor blower motor to the selected heat jumper speed setting and cycle the electric heat relays ON to automatically detect number of electric heat sections. (Electric heat section may be wired to energize more than one element)
2. AHC waits for maximum of ten seconds to detect electric heat 22 volt DC relay coils are energizing:
   - A. If relay coil current is detected within ten seconds, AHC will show a **1** on the single character LED display indicating that the first stage has been detected. As each additional heat section is detected, single character LED display on the AHC will display that electric element number. (Example: Last number displayed by the single character LED display is 3, the AHC is configured to operate three electric heat sections.)
   - B. If relay coil current is not detected within ten seconds, the AHC will exit the current active mode and resume operation with electric heat disabled.
3. AHC will automatically exit **current active mode** when configuration is completed. To verify that the number of electric sections detected matches the installed electric heat package, the field MUST CONFIRM that the last number the single character LED display before exiting the Configuring/Detection Mode matches the number of installed electric heat sections. AHC stores the number of electric heat stages in non-volatile memory.
4. After the detection is finished, unit will continue to operate for an additional 30 seconds.

NOTE — If AHC push button is pushed or power is cycled on AHC is unable to verify all 22 volt DC electric heat relay(s) were energized using electric heater detection, configuration will be stopped. Configuration function must be repeated.

Finished

Figure 35. Configuring / Detecting Electric Heat Elements

5. EvenHeater® Operation

INPUTS	OUTPUTS		
Room Thermostat Demand	**Target Discharge Air Temperature Set at 85ºF**	**Target Discharge Air Temperature Set at 100ºF**	**Target Discharge Air Temperature Set at 115ºF/130ºF**
Y1	Heat Pump First Stage	Heat Pump First Stage	Heat Pump First + First Electric Heat Section (H1)
Y1 + Y2	Heat Pump First and Second Stage	Heat Pump First and Second Stage + First Electric Heat Section (H1)	Heat Pump First and Second Stage + First Electric Heat Section (H1) + Second Electric Heat Section (H2) if number of electric heater sections detected is more than two.
Y1 + W1 and/or W2	Heat Pump First Stage + First Electric Heat Section (H1)	Heat Pump First Stage + First Electric Heat Section + Second Electric Heat Section (H2) if number of electric heater sections detected is more than two.	Heat Pump First Stage + First Electric Heat Section (H1) Second Electric Heat Section (H2) if number of electric heater sections detected is more than two.
Y1 and Y2 + W1 and/or W2	Heat Pump First and Second Stage+ First Electric Heat Section (H1)	Heat Pump First and Second Stage + First Electric Heat Section + Second Electric Heat Section (H2) if number of electric heater sections detected is more than two.	Heat Pump First and Second Stage + First Electric Heat Section (H1) Second Electric Heat Section (H2) if number of electric heater sections detected is more than two.
W1 and/or W2	First Electric Heat Section (H1)	First Electric Heat Section (H1) + Second Electric Heat Section (H2) if number of electric heater sections detected is more than two.	First Electric Heat Section (H1) + Second Electric Heat Section (H2) if number of electric heater sections detected is more than two.

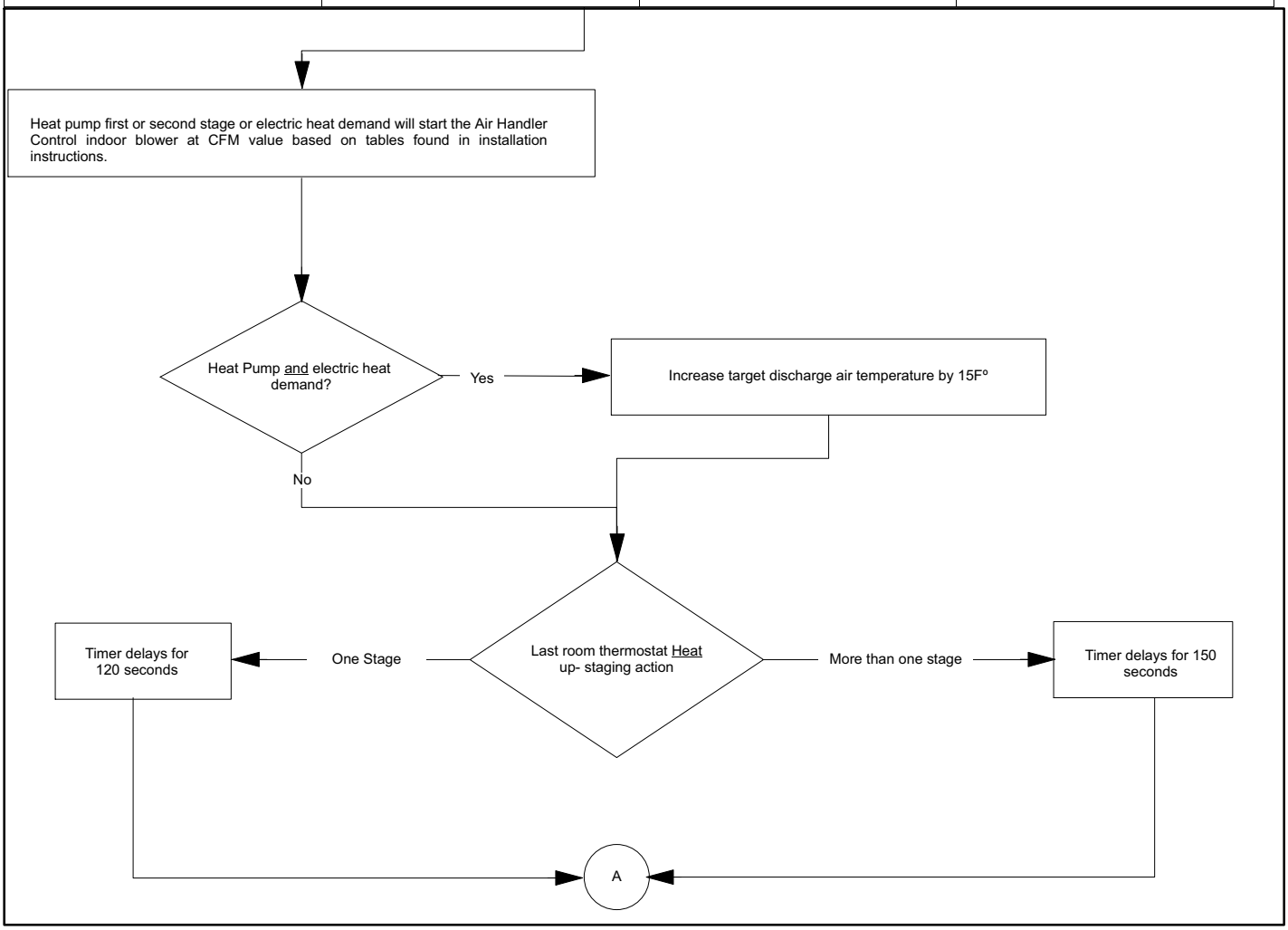


Figure 36. EvenHeater® Operation

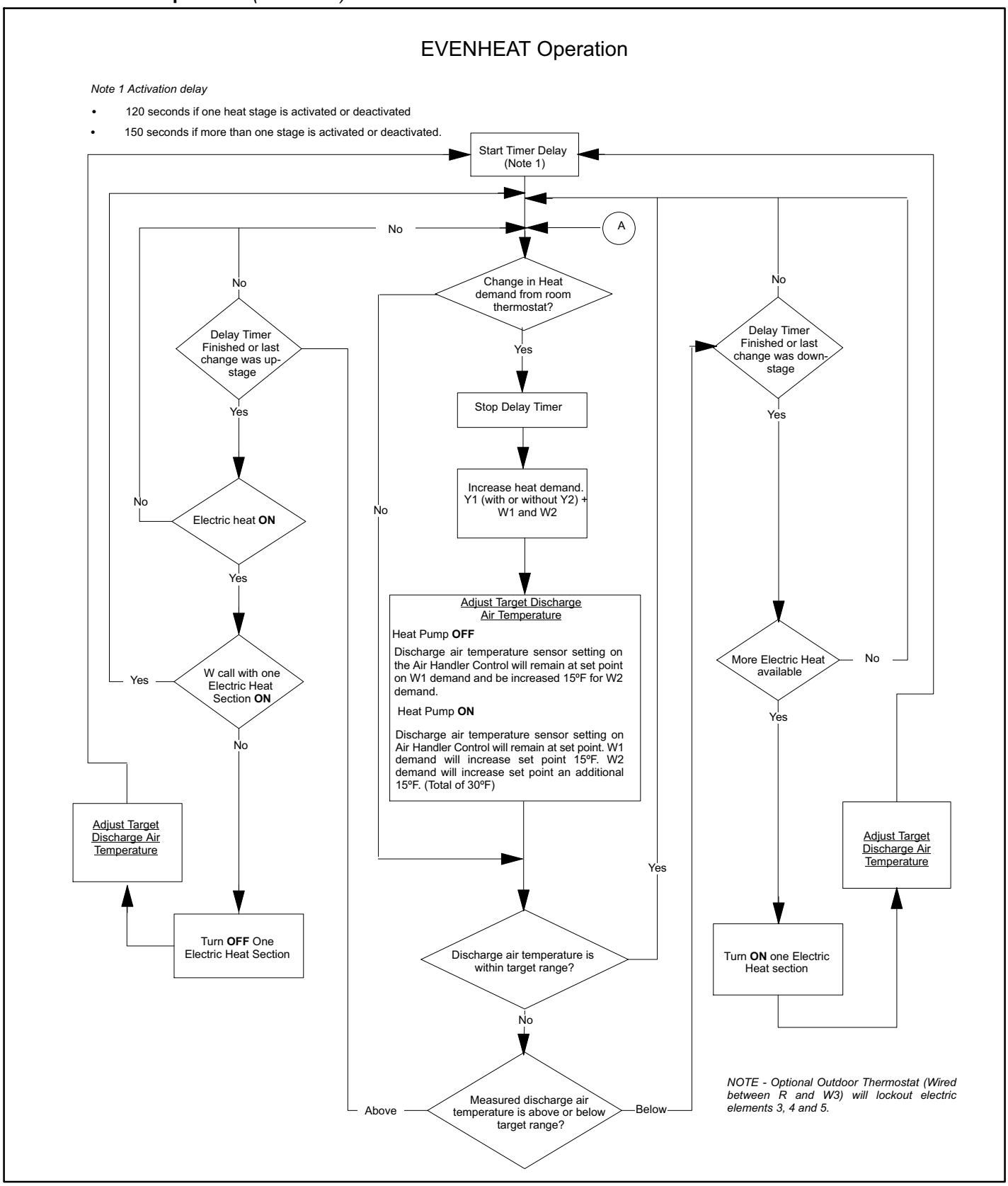


Figure 37. EvenHeater® Operation *(continued)*

7. Heat Pump Operation

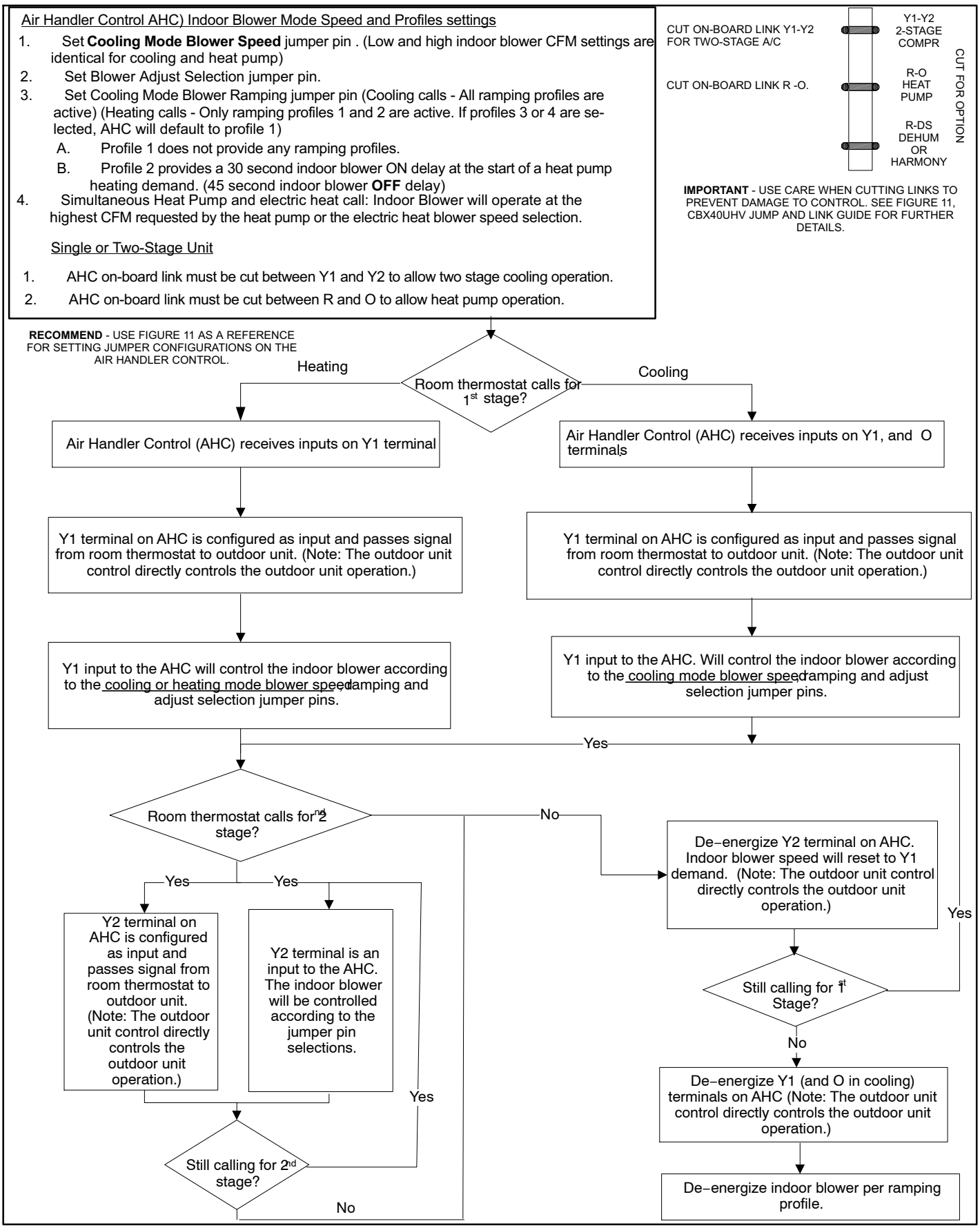


Figure 38. Heat Pump Operation

3. **Cooling Operation**

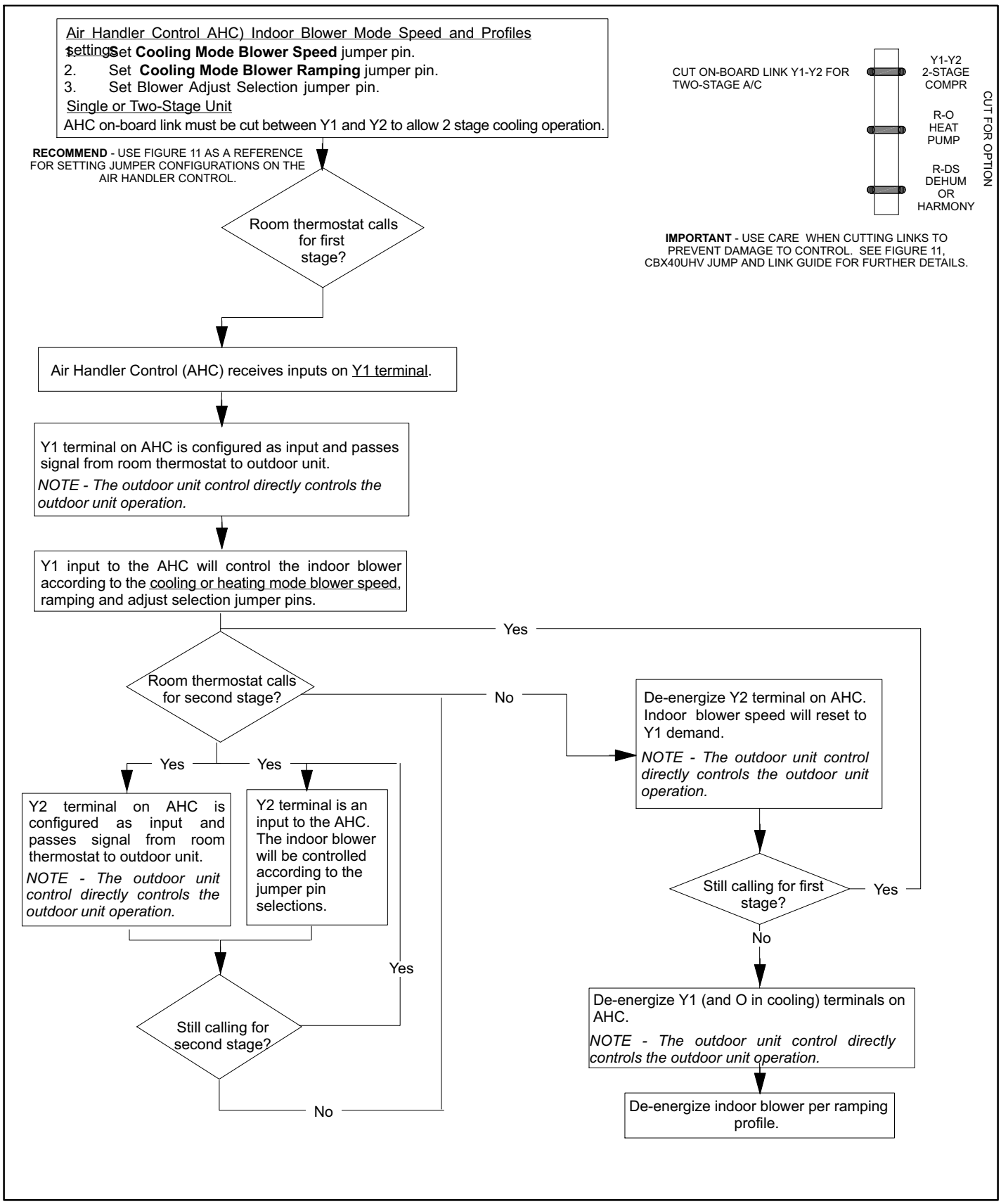


Figure 39. Cooling Operation

4. Error Code / Recall Mode

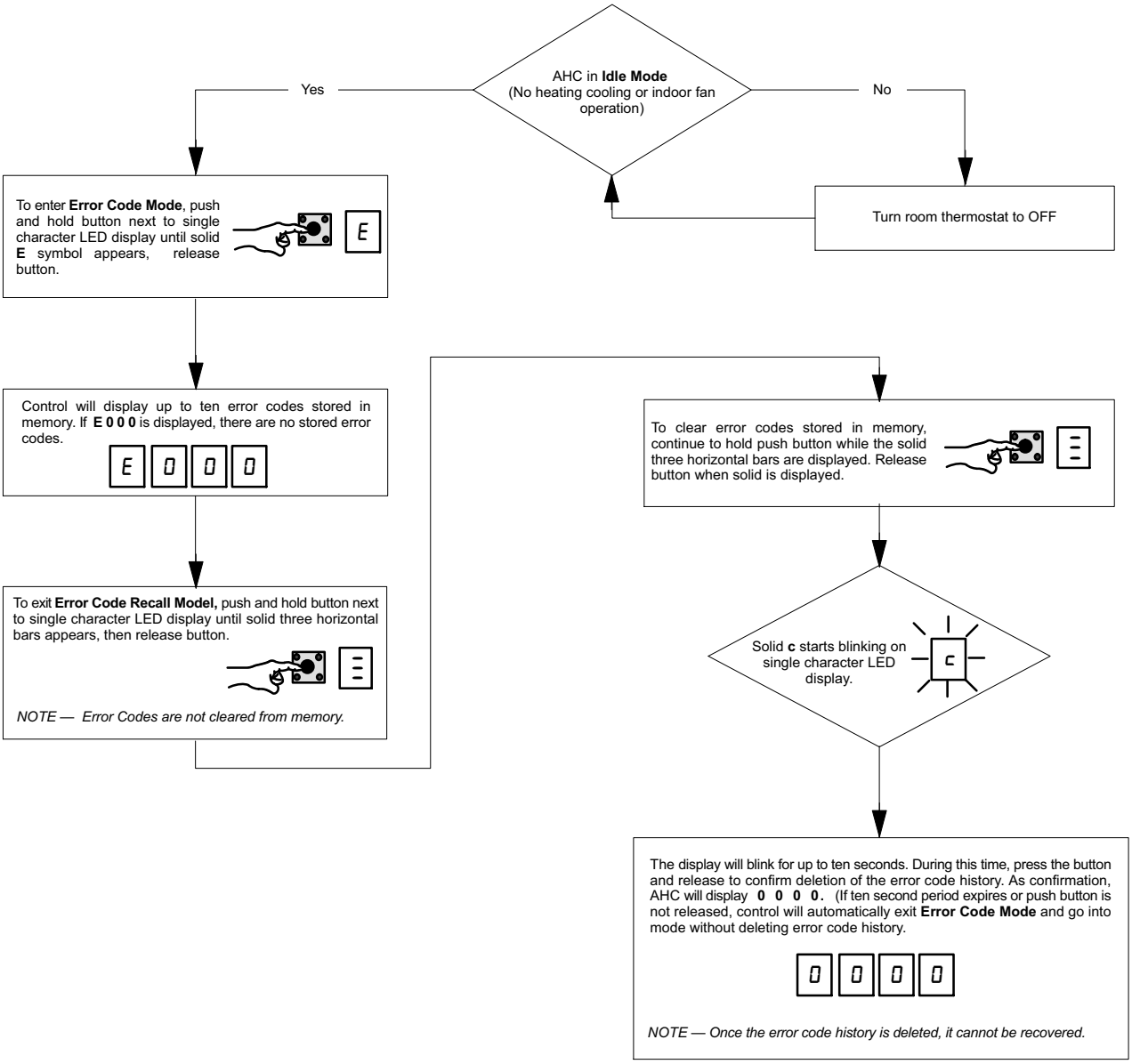


Figure 40. Error Code / Recall Mode

5. **Indoor Blower Test**

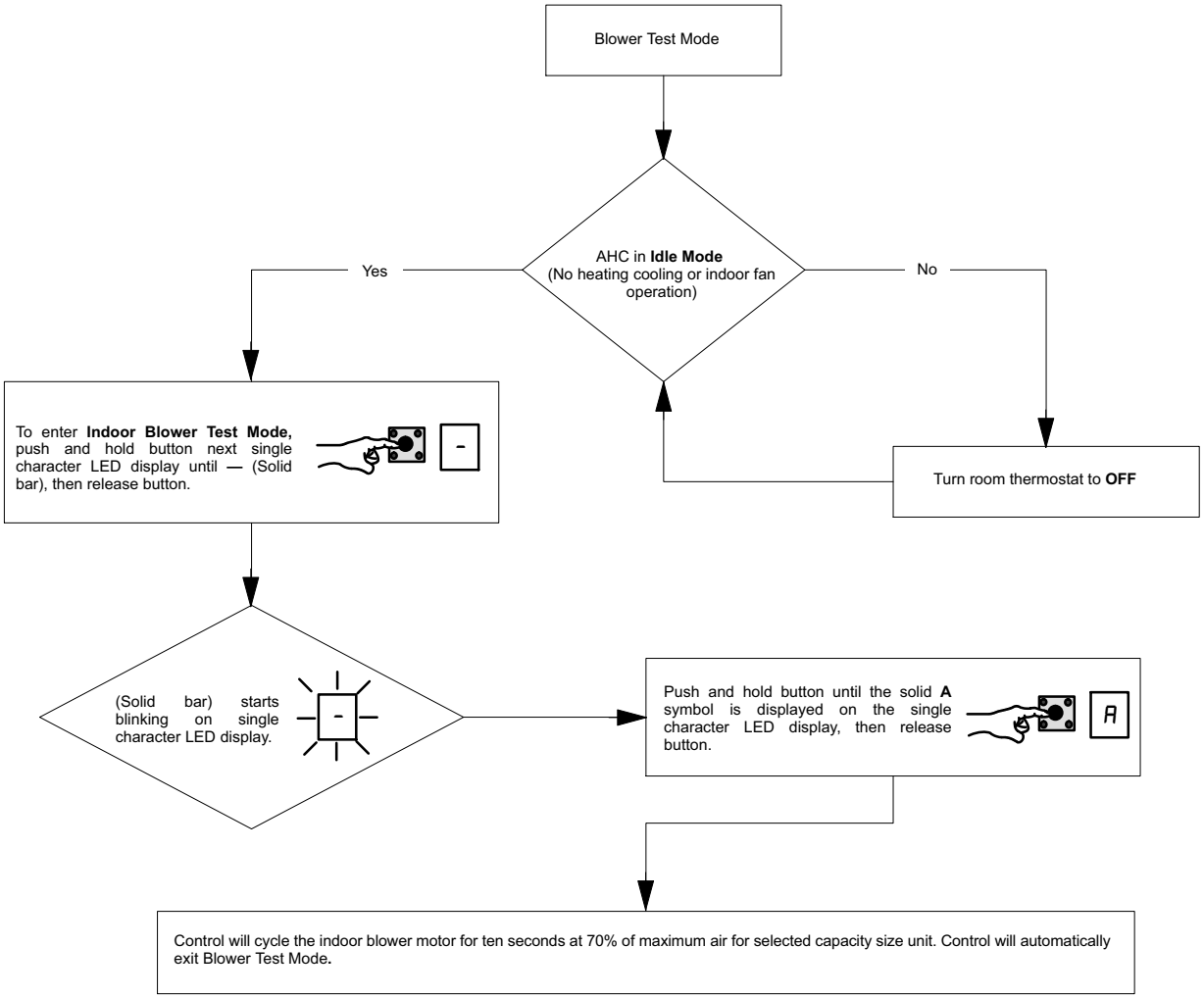


Figure 41. Indoor Blower Test

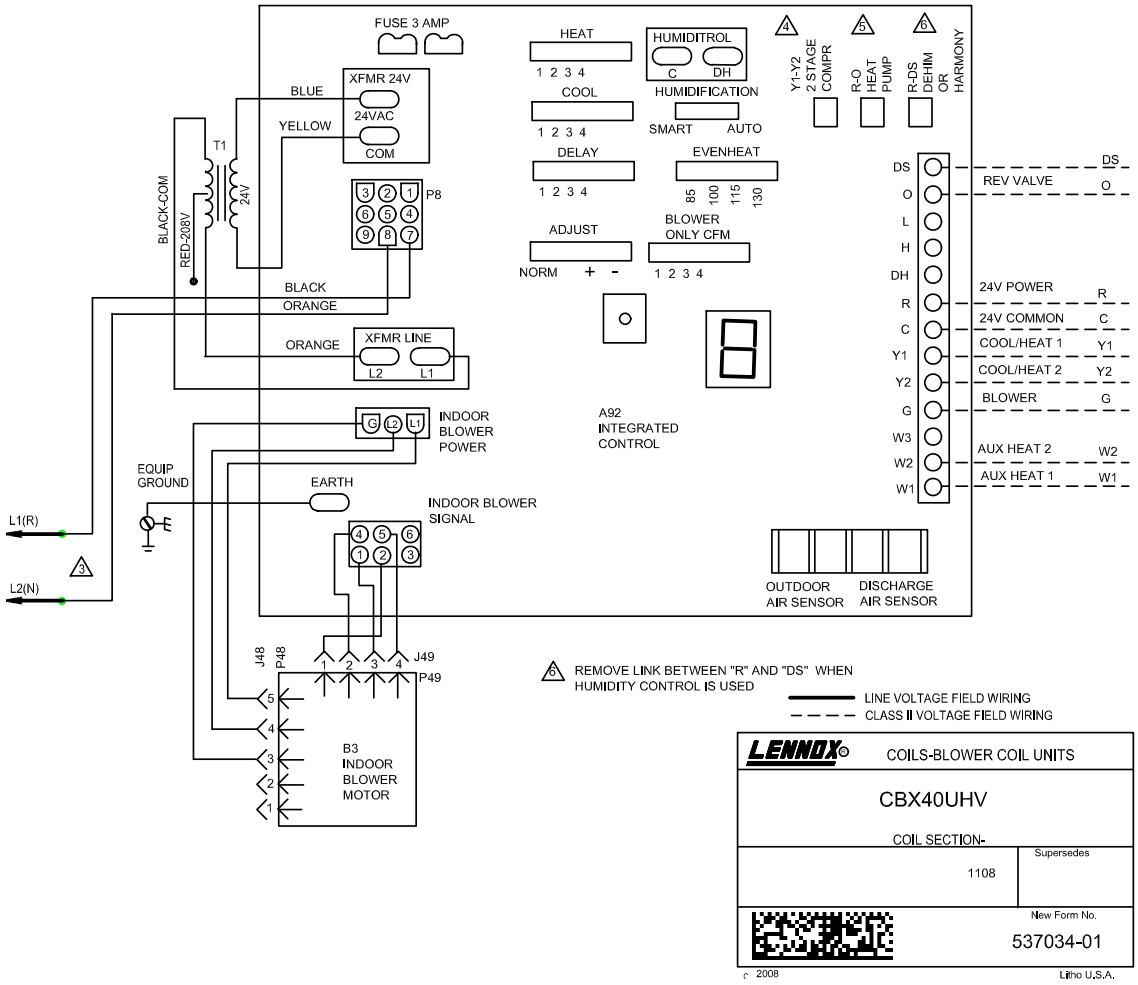
UNIT DIAGRAM

DESCRIPTION	
KEY	COMPONENT
A92	CONTROL-INTEGRATED
B3	MOTOR-BLOWER
J48	JACK-MOTOR,VARIABLE SPEED
J49	JACK-MOTOR,VARIABLE SPEED
P2	PLUG-ELECTRIC HEAT
P48	PLUG-MOTOR,VARIABLE SPEED
P49	PLUG-MOTOR,VARIABLE SPEED
T1	TRANSFORMER-CONTROL

1. REFER TO FACTORY BLOWER SPEED TAP SELECTION CHART ON UNIT FOR BLOWER SPEED INFORMATION.
2. NEC/CEC CLASS 2 3VA
3. USE COPPER CONDUCTORS ONLY. REFER TO UNIT RATING PLATE FOR MINIMUM CIRCUIT AMPACITY AND MAXIMUM OVERCURRENT PROTECTION SIZE
4. LINK "Y1" TO "Y2" FOR SINGLE STAGE COOLING. REMOVE LINK "Y1" TO "Y2" FOR TWO STAGE COOLING
5. LINK "R" TO "O" IS USED WITH CONDENSING UNIT. REMOVE LINK "R" TO "O" WHEN HEAT PUMP IS USED

1. RECOMMENDED BLOWER SPEED TAP SELECTION

SPEED TAP SELECTION				
	COOL		HEAT	
BLOWER COIL	CONDENSING UNIT	HEAT PUMP	CONDENSING UNIT WITH ELECTRIC HEAT ONLY	HEAT PUMP WITH ELECTRIC HEAT
-024 -030 -036	COOL PIN #3	COOL PIN #3	HEAT PIN #4	HEAT PIN #4
-042	COOL PIN #3	COOL PIN #3	HEAT PIN #3	HEAT PIN #3
-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



CBX40UHV - 208/230V SINGLE PHASE - SEQUENCE OF OPERATION

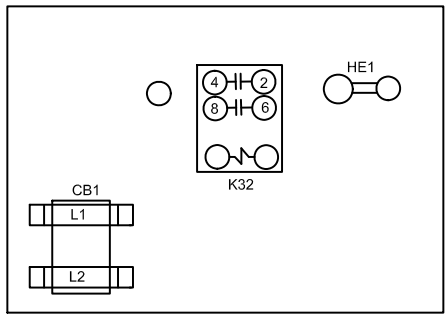
1. Line voltage is routed to transformer T1 and blower motor B3.
2. T1 supplies 24VAC to terminal strip TB2, which supplies 24VAC to the indoor thermostat and electric heat, if used.

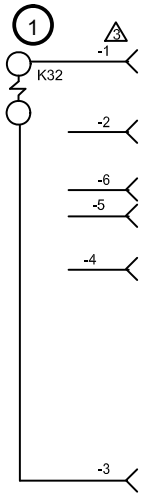
HEATING

3. W1 of the thermostat provides a W1 demand to the AHC. The AHC outputs a 22VDC signal to the K32 relay contained in the ECB40 heat section. (See electric heat diagrams for operation).
4. AHC energizes blower motor B3 on heating speed.

ECB40-2.5, -4, -5 and ECB40-4CB, -5CB 208/230V Single-Phase - Sequence of Operation

1. W1 of the thermostat provides a W1 demand to the AHC. The AHC outputs a 22VDC signal to the K32 relay. K32-1 closes.
2. Assuming the N.C. primary (S15) and secondary (S20) limit switches are closed, electric heat element HE1 is energized.

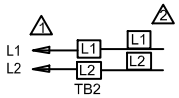




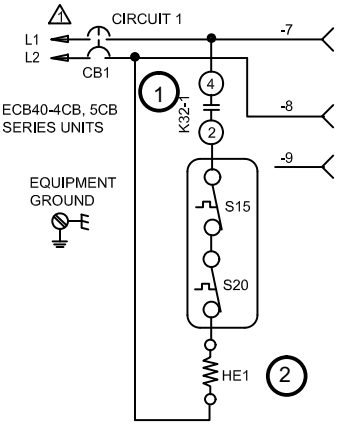
DESCRIPTION	
KEY	COMPONENT
CB1	CIRCUIT BREAKER-ELECT HEAT
HE1	ELEMENT-ELECTRIC HEAT 1
K32,-1	RELAY-ELECTRIC HEAT
S15	SWITCH-LIMIT,PRIMARY,ELECT HEAT
S20	SWITCH-LIMIT,SECONDARY,ELECT HEAT
TB2	TERMINAL STRIP-UNIT

NOTE: USE COPPER CONDUCTORS ONLY

1. REFER TO UNIT NAMEPLATE FOR MINIMUM CIRCUIT AMPACITY AND MAXIMUM OVERCURRENT PROTECTION SIZE.
2. CONNECT POWER WIRES FROM UNT LABELED L1 AND L2, TO TB2 TERMINAL STRIP ON HEATER PLATE.
3. CONNECT WIRES 1 THRU 9 TO P8 (9 PIN CONNECTOR) ON AHC CONTROL



ECB40-2.5, 4, 5KW UNITS

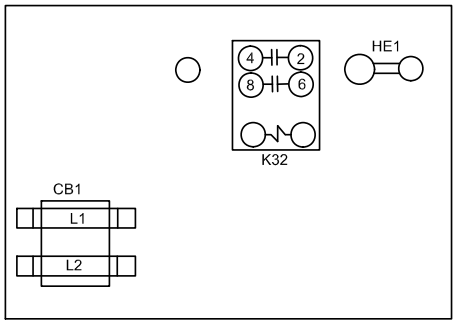


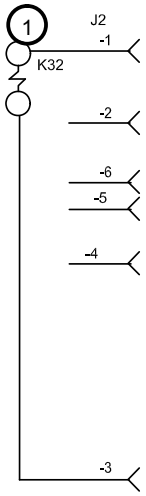
ECB40-4CB, 5CB SERIES UNITS

HEATING-ELECTRIC	
ECB40-2.5, 4, 5-P ECB40-4CB, 5CB-P	
1009	Supersedes
	New Form No. 537276-01

ECB40-6 and ECB40-6CB 208/230V Single-Phase Sequence of Operation

1. W1 of the thermostat provides a W1 demand to the AHC. The AHC outputs a 22VDC signal to the K32 relay. K32-1 closes.
2. Assuming the N.C. primary (S15) and secondary (S20) limit switches are closed, electric heat element HE1 is energized.



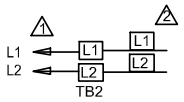


DESCRIPTION	
KEY	COMPONENT
CB1	CIRCUIT BREAKER-ELECT HEAT
HE1	ELEMENT-ELECTRIC HEAT 1
J2	JACK-ELECTRIC HEAT
K32,-1	RELAY-ELECTRIC HEAT
S15	SWITCH-LIMIT,PRIMARY,ELECT HEAT
S20	SWITCH-LIMIT,SECONDARY,ELECT HEAT
TB2	TERMINAL STRIP-UNIT

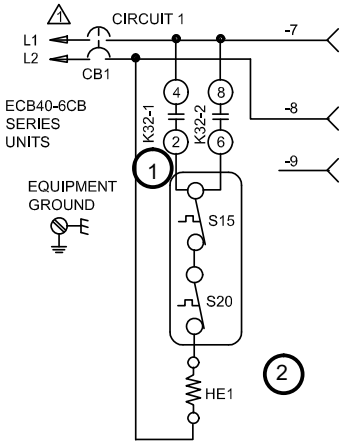
NOTE: USE COPPER CONDUCTORS ONLY

⚠1 REFER TO UNIT NAMEPLATE FOR MINIMUM CIRCUIT AMPACITY AND MAXIMUM OVERCURRENT PROTECTION SIZE.

⚠2 CONNECT POWER WIRES FROM UNT LABELED L1 AND L2, TO TB2 TERMINAL STRIP ON HEATER PLATE.



ECB40-6KW UNITS



ECB40-6CB SERIES UNITS

LENNOX® HEATING-ELECTRIC	
ECB40-6-P ECB40-6CB-P	
0808	Supersedes Form No.
	New Form No. 537055-01

 Litho U.S.A.

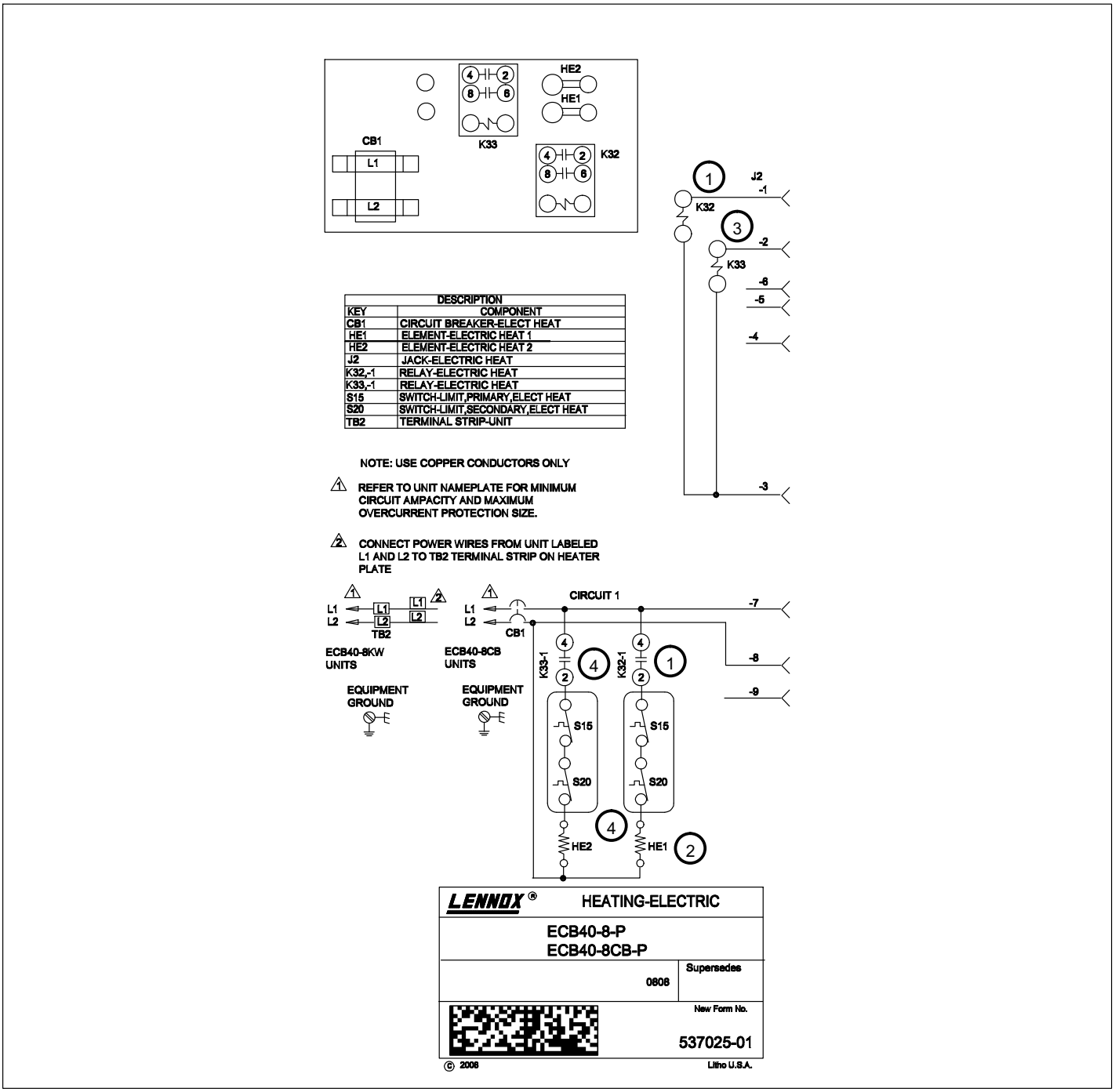
ECB40-8 and ECB40-8CB - 208/230V Single-Phase Sequence of Operation

FIRST-STAGE HEAT

1. W1 of the thermostat provides a W1 demand to the AHC. The AHC outputs a 22VDC signal to the K32 relay. K32-1 closes.
2. 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)

3. When K32-1 closes, the unit is ready for a second stage heat demand. W2 of the thermostat provides a W2 demand to the AHC. The AHC outputs a 22VDC signal to the K33 relay.
4. When K33-1 closes, assuming the N.C. primary (S15) and secondary (S20) limit switches are closed, electric heat element HE2 is energized.



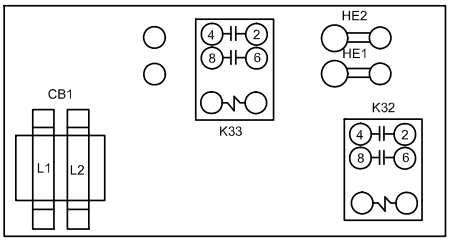
ECB40-9CB - 208/230V Single-Phase Sequence of Operation

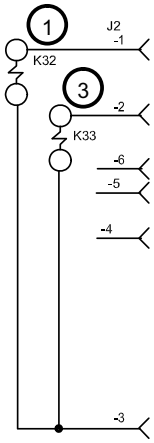
First-Stage Heat

1. W1 of the thermostat provides a W1 demand to the AHC. The AHC outputs a 22VDC signal to the K32 relay. K32-1 closes.
2. 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)

3. When K32-1 closes, the unit is ready for a second stage heat demand. W2 of the thermostat provides a W2 demand to the AHC. The AHC outputs a 22VDC signal to the K33 relay.
4. When K33-1 closes, assuming the N.C. primary (S15) and secondary (S20) limit switches are closed, electric heat element HE2 is energized.

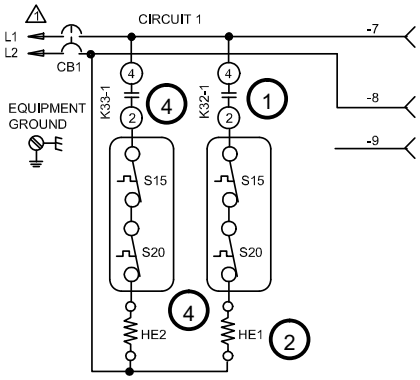




DESCRIPTION	
KEY	COMPONENT
CB1	CIRCUIT BREAKER-ELECT HEAT
HE1	ELEMENT-ELECTRIC HEAT 1
HE2	ELEMENT-ELECTRIC HEAT 2
J2	JACK-ELECTRIC HEAT
K32,-1	RELAY-ELECTRIC HEAT
K33,-1	RELAY-ELECTRIC HEAT
S15	SWITCH-LIMIT,PRIMARY,ELECT HEAT
S20	SWITCH-LIMIT,SECONDARY,ELECT HEAT

NOTE: USE COPPER CONDUCTORS ONLY

⚠ REFER TO UNIT NAMEPLATE FOR MINIMUM CIRCUIT AMPACITY AND MAXIMUM OVERCURRENT PROTECTION SIZE.



LENNOX®	HEATING-ELECTRIC
ECB40-9CB-P	
0808	Supersedes
New Form No.	537026-01

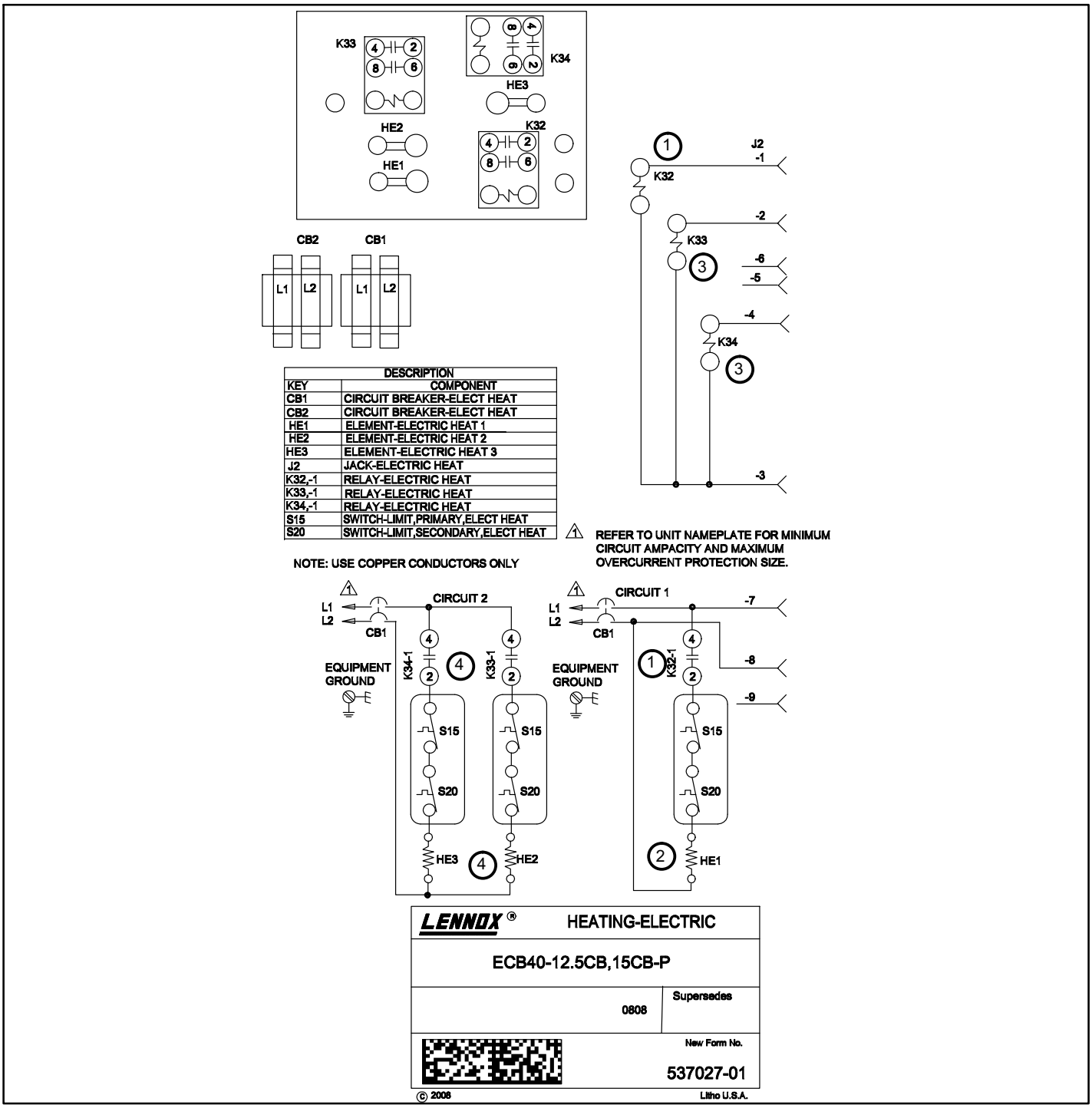
ECB40-12.5CB, -15CB - 208/230V Single-Phase Sequence of Operation

FIRST-STAGE HEAT

1. W1 of the thermostat provides a W1 demand to the AHC. The AHC outputs a 22VDC signal to the K32 relay. K32-1 closes.
2. Assuming the N.C. primary (S15) and secondary (S20) limit switches are closed, electric heat element HE1 is energized.
3. When K33-1 and K34-1 close, assuming the N.C. primary (S15) and secondary (S20) limit switches are closed, electric heat elements HE2 and HE3 are energized.

SECOND-STAGE HEAT (remove jumper between W2 and R)

4. When K32-1 closes, the unit is ready for a second stage heat demand. W2 of the thermostat provides a W2 demand to the AHC. The AHC outputs a 22VDC signal to the K33 and K34 relays.



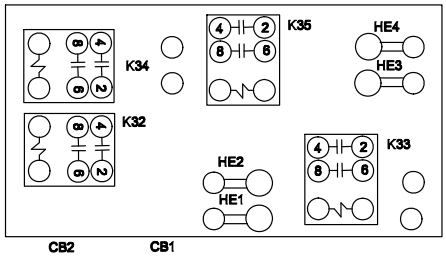
ECB40-20CB - 208/230V Single-Phase Sequence of Operation

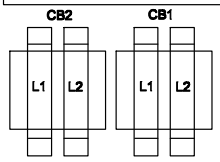
First-Stage Heat

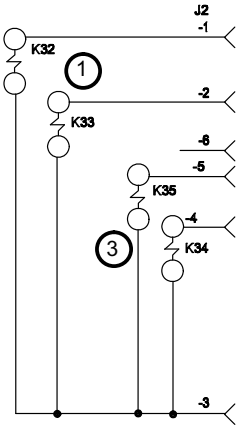
1. W1 of the thermostat provides a W1 demand to the AHC. The AHC outputs a 22VDC signal to the K32 and K33 relays. K32-1 and K33-1 closes.
2. Assuming the N.C. primary (S15) and secondary (S20) limit switches are closed, electric heat elements HE1 and HE3 are energized.

Second-Stage Heat (remove jumper between W2 and R)

3. When K32-1 and K33-1 closes, the unit is ready for a second stage heat demand. W2 of the thermostat provides a W2 demand to the AHC. The AHC outputs a 22VDC signal to the K34 and K35 relays.
4. When K34-1 and K35-1 closes, assuming the N.C. primary (S15) and secondary (S20) limit switches are closed, electric heat elements HE2 and HE4 are energized.



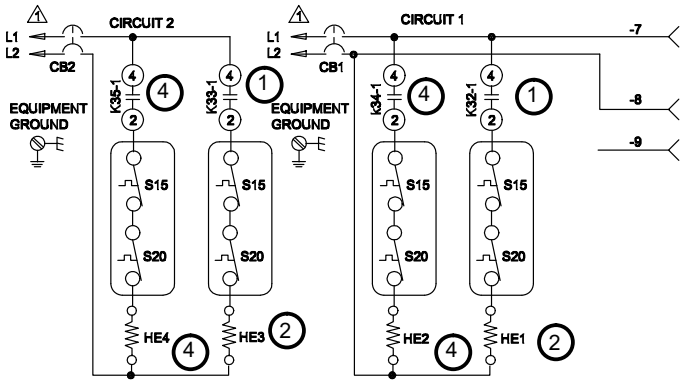




DESCRIPTION	
KEY	COMPONENT
CB1	CIRCUIT BREAKER-ELECT HEAT
CB2	CIRCUIT BREAKER-ELECT HEAT
HE1	ELEMENT-ELECTRIC HEAT 1
HE2	ELEMENT-ELECTRIC HEAT 2
HE3	ELEMENT-ELECTRIC HEAT 3
HE4	ELEMENT-ELECTRIC HEAT 4
J2	JACK-ELECTRIC HEAT
K32,-1	RELAY-ELECTRIC HEAT
K33,-1	RELAY-ELECTRIC HEAT
K34,-1	RELAY-ELECTRIC HEAT
K35,-1	RELAY-ELECTRIC HEAT
S15	SWITCH-LIMIT,PRIMARY,ELECT HEAT
S20	SWITCH-LIMIT,SECONDARY,ELECT HEAT

⚠ REFER TO UNIT NAMEPLATE FOR MINIMUM CIRCUIT AMPACITY AND MAXIMUM OVERCURRENT PROTECTION SIZE.

NOTE: USE COPPER CONDUCTORS ONLY



LENNOX® HEATING-ELECTRIC

ECB40-20CB-P

0808 | Supersedes

New Form No. 537028-01

 Litho U.S.A.

ECB40-25CB - 208/230V Single-Phase Sequence of Operation

First-Stage Heat

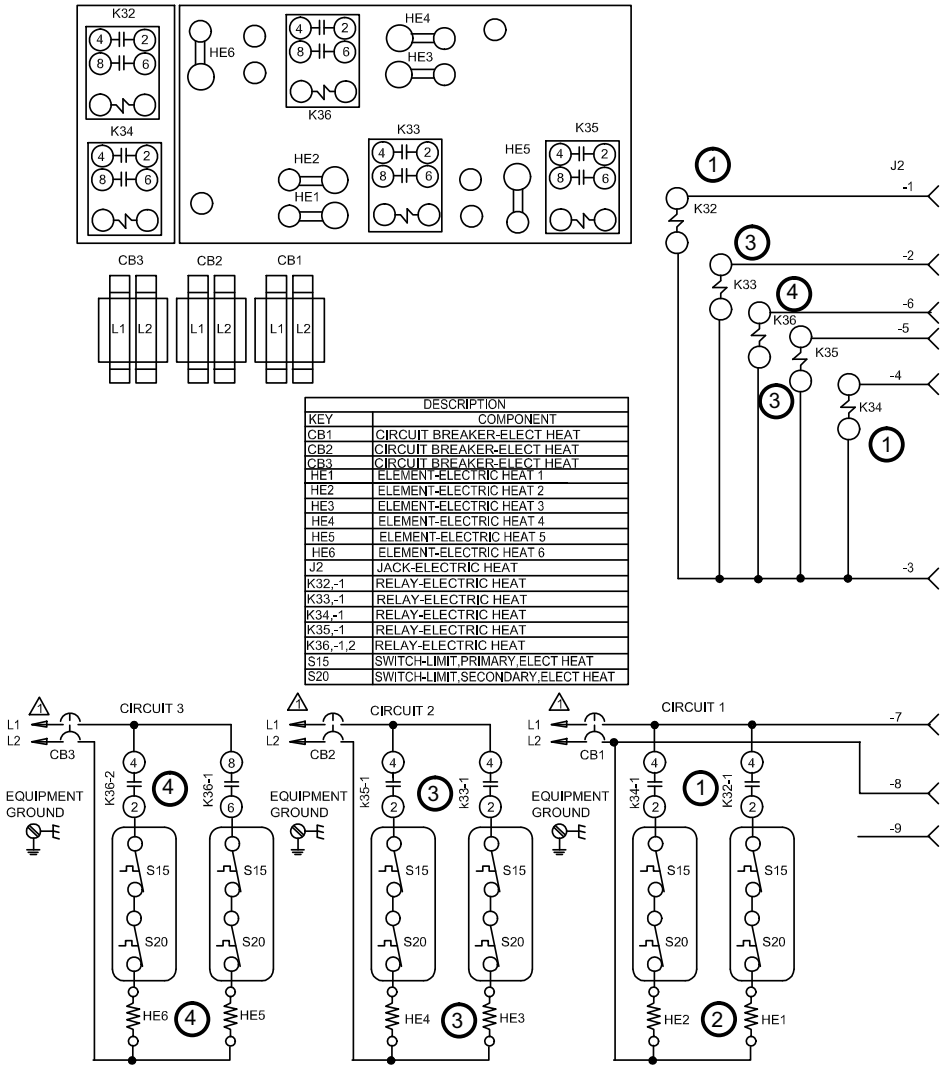
1. W1 of the thermostat provides a W1 demand to the AHC. The AHC outputs a 22VDC signal to the K32 and K34 relays. K32-1 and K34-1 closes.
2. Assuming the N.C. primary (S15) and secondary (S20) limit switches are closed, electric heat elements HE1 and HE2 are energized.

Second-Stage Heat (remove jumper between W2 and R)

3. When K34 closes, the unit is ready for a second stage heat demand. W2 of the thermostat provides a W2 demand to the AHC. The AHC outputs a 22VDC signal to the K33 and K35 relays. When K33-1 and K35-1 closes and assuming the N.C. primary (S15) and secondary (S20) limit switches are closed, electric heat elements HE3 and HE4 are energized.

Third-Stage Heat (remove jumper between W3 and R, if using third stage)

4. When K35 closes, the unit is ready for a third stage heat demand. W3 of the thermostat, if available, provides a W3 demand to the AHC. The AHC outputs a 22VDC signal to the K36 relay. When K36-1 and K36-2 closes and assuming the N.C. primary (S15) and secondary (S20) limit switches are closed, electric heat elements HE5 and HE6 are energized.



DESCRIPTION	
KEY	COMPONENT
CB1	CIRCUIT BREAKER-ELECT HEAT
CB2	CIRCUIT BREAKER-ELECT HEAT
CB3	CIRCUIT BREAKER-ELECT HEAT
HE1	ELEMENT-ELECTRIC HEAT 1
HE2	ELEMENT-ELECTRIC HEAT 2
HE3	ELEMENT-ELECTRIC HEAT 3
HE4	ELEMENT-ELECTRIC HEAT 4
HE5	ELEMENT-ELECTRIC HEAT 5
HE6	ELEMENT-ELECTRIC HEAT 6
J2	JACK-ELECTRIC HEAT
K32,-1	RELAY-ELECTRIC HEAT
K33,-1	RELAY-ELECTRIC HEAT
K34,-1	RELAY-ELECTRIC HEAT
K35,-1	RELAY-ELECTRIC HEAT
K36,-1,2	RELAY-ELECTRIC HEAT
S15	SWITCH-LIMIT,PRIMARY,ELECT HEAT
S20	SWITCH-LIMIT,SECONDARY,ELECT HEAT

NOTE: USE COPPER CONDUCTORS ONLY

⚠1 REFER TO UNIT NAMEPLATE FOR MINIMUM CIRCUIT AMPACITY AND MAXIMUM OVERCURRENT PROTECTION SIZE.

LENNOX® HEATING-ELECTRIC

ECB40-25CB-P

0808 | Supersedes

New Form No. 537029-01

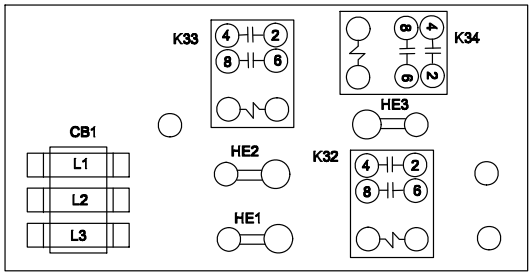
G-ECB40-8, 10 and ECB40-15CB - 208/230V Single-Phase Sequence of Operation

First-Stage Heat

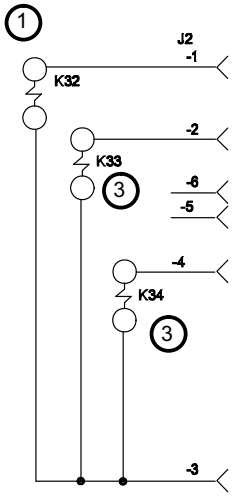
1. W1 of the thermostat provides a W1 demand to the AHC. The AHC outputs a 22VDC signal to the K32 relay. K32-1 closes.
2. Assuming the N.C. primary (S15) and secondary (S20) limit switches are closed, electric heat element HE1 is energized.

Second-Stage (remove jumper between W2 and R)

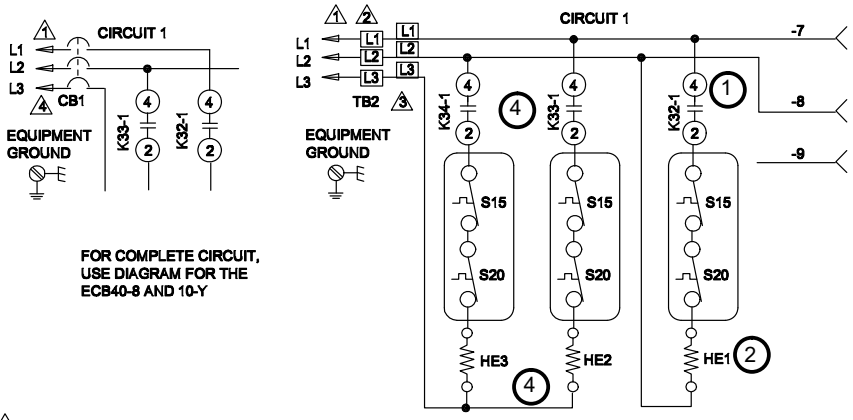
3. When K32-1 closes, the unit is ready for a second stage heat demand. W2 of the thermostat provides a W2 demand to the AHC. The AHC outputs a 22VDC signal to the K33 and K34 relays.
4. When K33-1 and K34-1 close, assuming the N.C. primary (S15) and secondary (S20) limit switches are closed, electric heat elements HE2 and HE3 are energized.



DESCRIPTION	
KEY	COMPONENT
CB1	CIRCUIT BREAKER-ELECT HEAT
HE1	ELEMENT-ELECTRIC HEAT 1
HE2	ELEMENT-ELECTRIC HEAT 2
HE3	ELEMENT-ELECTRIC HEAT 3
J2	JACK-ELECTRIC HEAT
K32,-1	RELAY-ELECTRIC HEAT
K33,-1	RELAY-ELECTRIC HEAT
K34,-1	RELAY-ELECTRIC HEAT
S15	SWITCH-LIMIT,PRIMARY,ELECT HEAT
S20	SWITCH-LIMIT,SECONDARY,ELECT HEAT
TB2	TERMINAL STRIP-UNIT



NOTE: USE COPPER CONDUCTORS ONLY



FOR COMPLETE CIRCUIT, USE DIAGRAM FOR THE ECB40-8 AND 10-Y

1. REFER TO UNIT NAMEPLATE FOR MINIMUM CIRCUIT AMPACITY AND MAXIMUM OVERCURRENT PROTECTION SIZE.
2. CONNECT POWER WIRES FROM HEATER,LABELED L1, L2, L3 TO TB2 TERMINAL STRIP INSIDE INDOOR UNIT.
3. TB2 USED ON 8 AND 10KW HEATERS ONLY
4. CB1 USED ON 15KW HEATER ONLY

LENNOX® HEATING-ELECTRIC

ECB40-8,10-Y
ECB40-15CB-Y

0808 | Supersedes

New Form No. 537022-01

ECB40-20CB, ECB25CB - 208/230V Three-Phase Sequence of Operation

First-Stage Heat

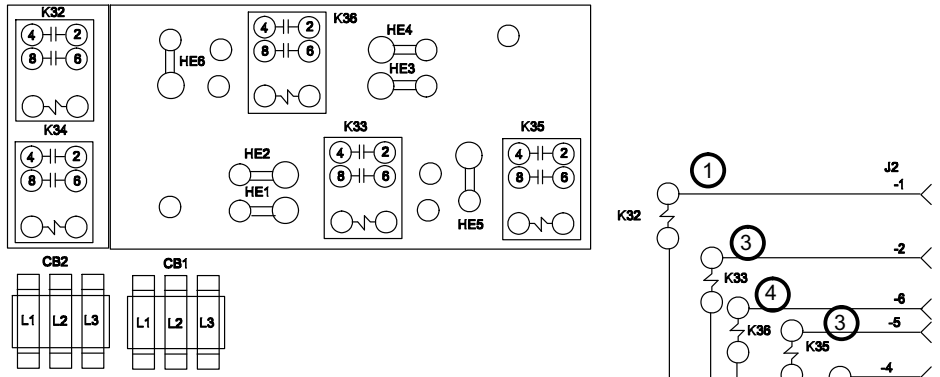
1. W1 of the thermostat provides a W1 demand to the AHC. The AHC outputs a 22VDC signal to the K32 and K34 relays. K32-1 and K34-1 closes.
2. Assuming the N.C. primary (S15) and secondary (S20) limit switches are closed, electric heat elements HE1 and HE2 are energized.

Second-Stage Heat (remove jumper between W2 and R)

3. When K34 closes, the unit is ready for a second stage heat demand. W2 of the thermostat provides a W2 demand to the AHC. The AHC outputs a 22VDC signal to the K33 and K35 relays. When K33-1 and K35-1 closes and assuming the N.C. primary (S15) and secondary (S20) limit switches are closed, electric heat elements HE3 and HE4 are energized.

Third-Stage Heat (remove jumper between W3 and R, if using third stage)

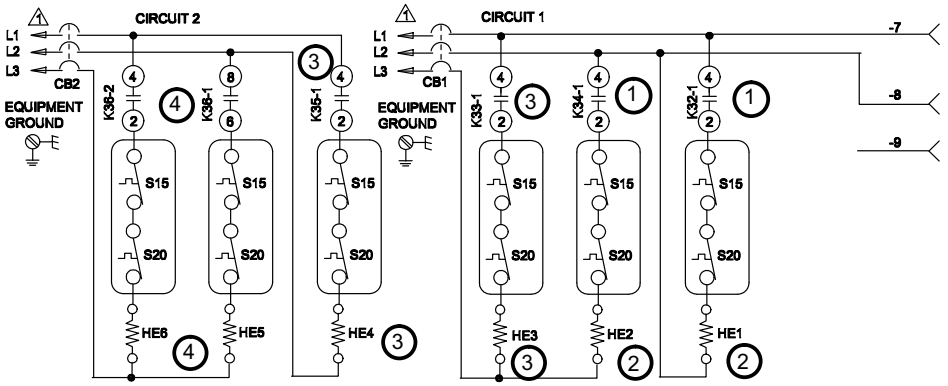
4. When K35 closes, the unit is ready for a third stage heat demand. W3 of the thermostat, if available, provides a W3 demand to the AHC. The AHC outputs a 22VDC signal to the K36 relay. When K36-1 and K36-2 closes and assuming the N.C. primary (S15) and secondary (S20) limit switches are closed, electric heat elements HE5 and HE6 are energized.



DESCRIPTION	
KEY	COMPONENT
CB1	CIRCUIT BREAKER-ELECT HEAT
CB2	CIRCUIT BREAKER-ELECT HEAT
HE1	ELEMENT-ELECTRIC HEAT 1
HE2	ELEMENT-ELECTRIC HEAT 2
HE3	ELEMENT-ELECTRIC HEAT 3
HE4	ELEMENT-ELECTRIC HEAT 4
HE5	ELEMENT-ELECTRIC HEAT 5
HE6	ELEMENT-ELECTRIC HEAT 6
J2	JACK-ELECTRIC HEAT
K32,-1	RELAY-ELECTRIC HEAT
K33,-1	RELAY-ELECTRIC HEAT
K34,-1	RELAY-ELECTRIC HEAT
K35,-1	RELAY-ELECTRIC HEAT
K36,-1,2	RELAY-ELECTRIC HEAT
S15	SWITCH-LIMIT,PRIMARY,ELECT HEAT
S20	SWITCH-LIMIT,SECONDARY,ELECT HEAT

NOTE: USE COPPER CONDUCTORS ONLY

⚠ REFER TO UNIT NAMEPLATE FOR MINIMUM CIRCUIT AMPACITY AND MAXIMUM OVERCURRENT PROTECTION SIZE.



LENNOX® HEATING-ELECTRIC	
ECB40-20CB,25CB-Y	
0808	Supersedes
	New Form No. 537023-01