



Installation, Start-Up and Service Instructions

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INTRODUCTION

The 39M series central station air handlers are usually installed with ductwork; they provide air conditioning at nominal capacities of 1500 to 30,500 cfm. The 39M air handler design allows hundreds of different configuration possibilities. Each unit is assembled to meet specific job requirements and can be shipped in sections or as a single assembly. These instructions describe how to install, start up, and service 39M air handlers.

SAFETY CONSIDERATIONS

39M air-handling equipment (see Fig. 1) is designed to provide safe and reliable service when installed and operated within design specifications. To avoid injury to personnel and damage to equipment or property when operating this equipment, use good judgment and follow safe practices as outlined below.

⚠ DANGER

NEVER enter an enclosed fan cabinet or reach into a unit while the fan is running.

LOCK OPEN AND TAG the fan motor power disconnect switch before working on a fan. Take fuses with you and note removal on tag.

LOCK OPEN AND TAG the electric heat coil power disconnect switch before working on or near heaters.

⚠ WARNING

CHECK the assembly and component weights to be sure that the rigging equipment can handle them safely. Note also the centers of gravity and any specific rigging instructions.

CHECK for adequate ventilation so that fumes will not migrate through ductwork to occupied spaces when welding or cutting inside air-handling unit cabinet or plenum.

WHEN STEAM CLEANING COILS be sure that the area is clear of personnel.

DO NOT remove access panel fasteners until fan is completely stopped.

Pressure developed by a moving fan can cause excessive force against the panel and toward personnel.

DO NOT work on dampers until their operators are disconnected.

BE SURE that fans are properly grounded before working on them.

⚠ CAUTION

SECURE fan drive sheave with a rope or strap before working on a fan to ensure that rotor cannot freewheel.

DO NOT restore power to unit until all temporary walkways inside components have been removed.

NEVER pressurize equipment in excess of specified test pressures.

PROTECT adjacent flammable material when welding or flame cutting. Have a fire extinguisher at hand and ready for immediate use.

PREVENT unauthorized entry into the unit; leave safety latches in place on access doors except during installation or service procedures. After accessing a section, replace and tighten the safety latch.

FIELD SUPPLIED MOTORS should be Underwriters' Laboratories (UL) or Canadian Standards Association (CSA) approved.

FIELD WIRING must comply with National Electrical Code (NEC) and all local requirements.

DO NOT ground equipment to fan assembly when welding. Damage to fan bearings could result.

UNIT AND COMPONENT IDENTIFICATION

The 39M air handler comes in two basic configurations; horizontal and vertical. Using appropriate sections, it is possible to design many unit variations, including blow-thru units and plenum fan units with multiple discharges. Fig. 2A-2F show an example of the model number used for 39M unit sections and components. Each unit's model number is listed on a label affixed to the fan section. Section and major component level part numbers are listed and affixed to each individual component section.

For further information on unit and component identification refer to Fig. 3A-3B and contact your Carrier representative for the **AHUBuilder**® program. Refer to the 39M Product Data catalog for more information on individual component sections.

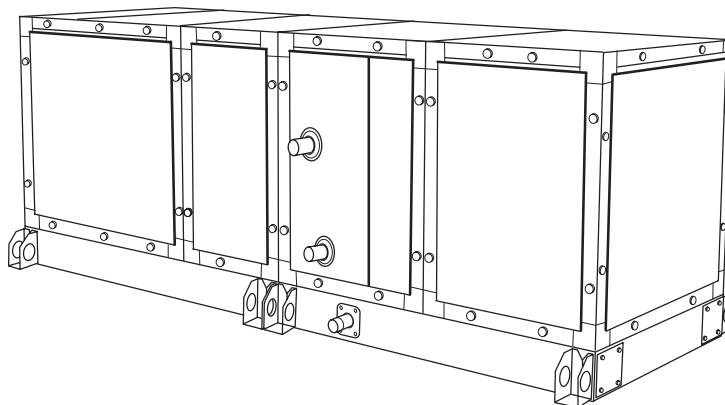


Fig. 1 — Typical 39M Air Handler (Indoor Unit Shown)

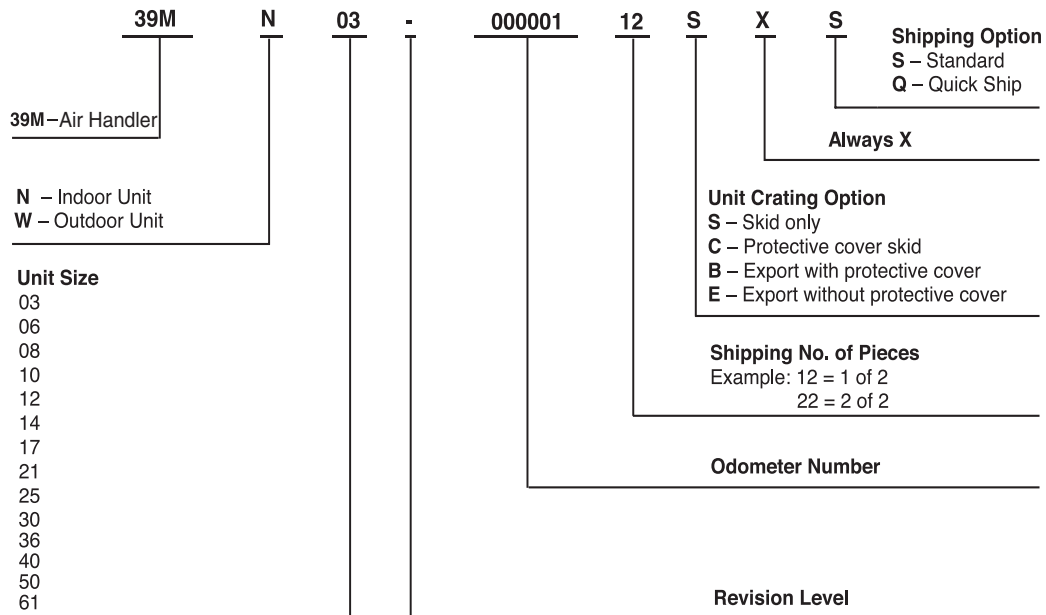
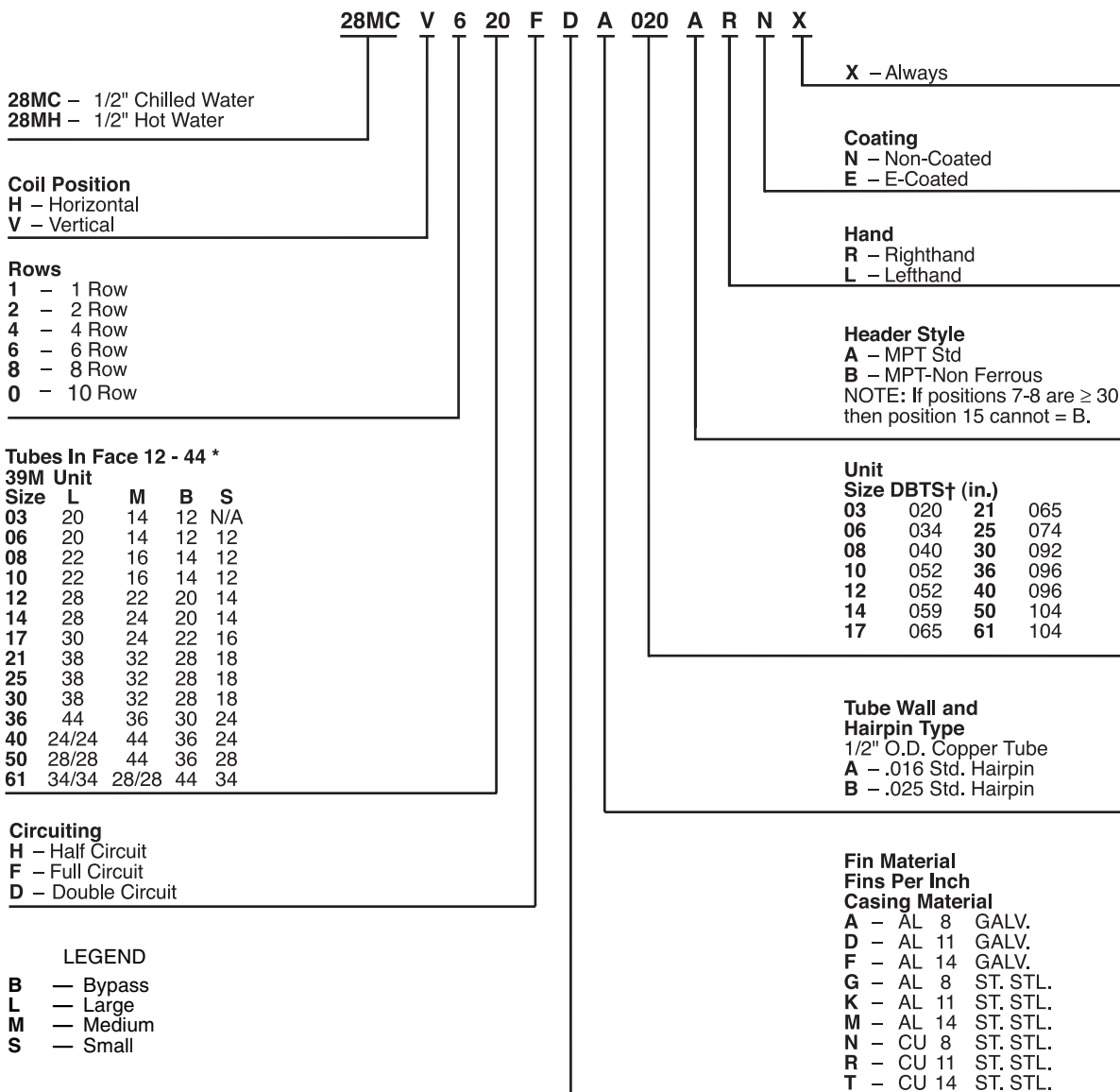


Fig. 2A — 39M Unit Nomenclature



*Multiple values indicate that two coils must be ordered.
 †Distance between tube sheets.

Fig. 2B — 28MC,28MH (1/2-in. Water Coil) Nomenclature

28MZ H 1 26 F B T 074 A X N -

28MZ – IDT Steam

Coil Position
H – Horizontal
V – Vertical

Rows
1 – 1 Row
2 – 2 Row

Tubes In Face*
If position 11 = S **If position 11 = T**
39M Unit **1 IN.** **5/8 IN.**

Size	L	M	B	S	L	M	B	S
03	08	05	05	N/A	16	10	10	N/A
06	08	05	05	05	16	10	10	10
08	09	06	05	05	18	12	11	10
10	09	06	05	05	18	12	11	10
12	11	09	08	05	22	18	16	10
14	11	10	08	05	22	20	16	10
17	12	10	09	06	24	20	19	12
21	15	13	11	07	30	26	22	14
25	15	13	11	07	30	26	22	14
30	15	13	11	07	30	26	22	14
36	18	15	12	10	36	30	24	20
40	10/10	18	15	10	20/20	36	30	20
50	12/11	18	15	11	24/22	36	30	22
61	14/14	12/11	18	14	28/28	24/22	36	28

Circuiting
F – Full

Fin Material
Fins Per Inch
Casing Material
B – AL 6 GALV.
E – AL 9 GALV.
C – AL 12 GALV.
H – AL 6 ST. STL.
L – AL 9 ST. STL.
J – AL 12 ST. STL.
P – CU 6 ST. STL.
S – CU 9 ST. STL.
Q – CU 12 ST. STL.

Coil Revision
(-)

Coating
N – Non-Coated
E – E-Coated

X – Always

Header Style
A – MPT Std

Header Note:
Pos. 11 (Type 'S')
Supply = 2 1/2" MPT
Condensate = 2 1/2" MPT
Pos. 11 (Type 'T')
(1) Row 10-28TF = 2" MPT (Supply & Return)
29-40 = 2 1/2" MPT (Supply)
= 2" MPT (Return)
(2) Row 10-28TF = 2 1/2" MPT (Supply & Return)
29-40TF = 3" MPT (Supply)
= 2 1/2" MPT (Return)

TF-Tubes in face

Unit

Size	DBTS† (in.)
03	020
06	034
08	040
10	052
12	052
14	059
17	065
21	065
25	074
30	092
36	096
40	096
50	104
61	104

Tube Size and Copper Wall

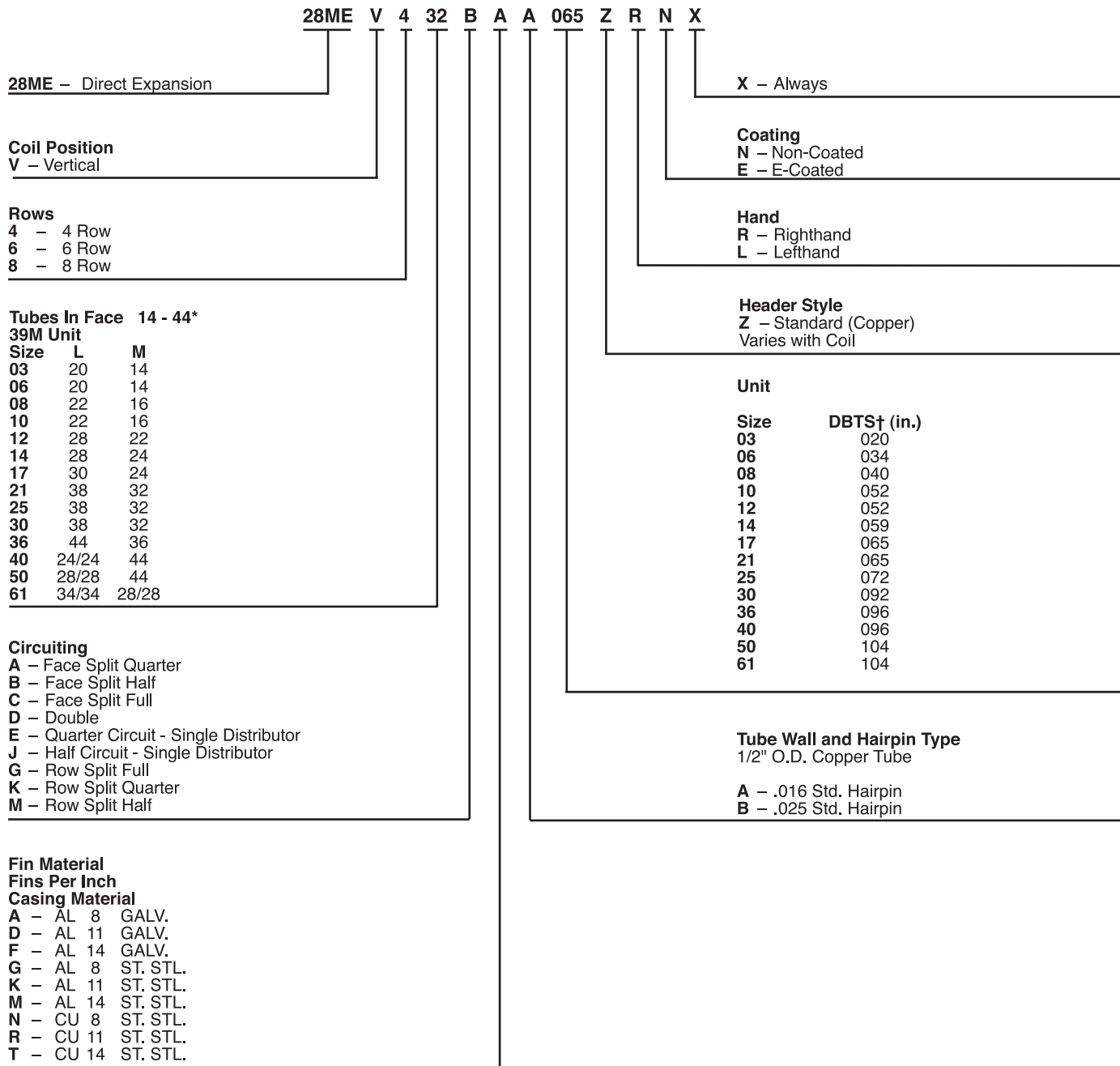
S – 1" O.D. x .030 Wall Outer Tube
5/8" O.D. x .020 Wall Inner Tube
(Aerofin HM)
T – 5/8" O.D. x .035 Wall Outer Tube
3/8" O.D. x .020 Wall Inner Tube
(Aerofin HD)

LEGEND

- B – Bypass
- L – Large
- M – Medium
- S – Small

*Multiple values indicated that two coils must be ordered.
†Distance between tube sheets.

Fig. 2C — 28MZ (Steam Coil) Nomenclature

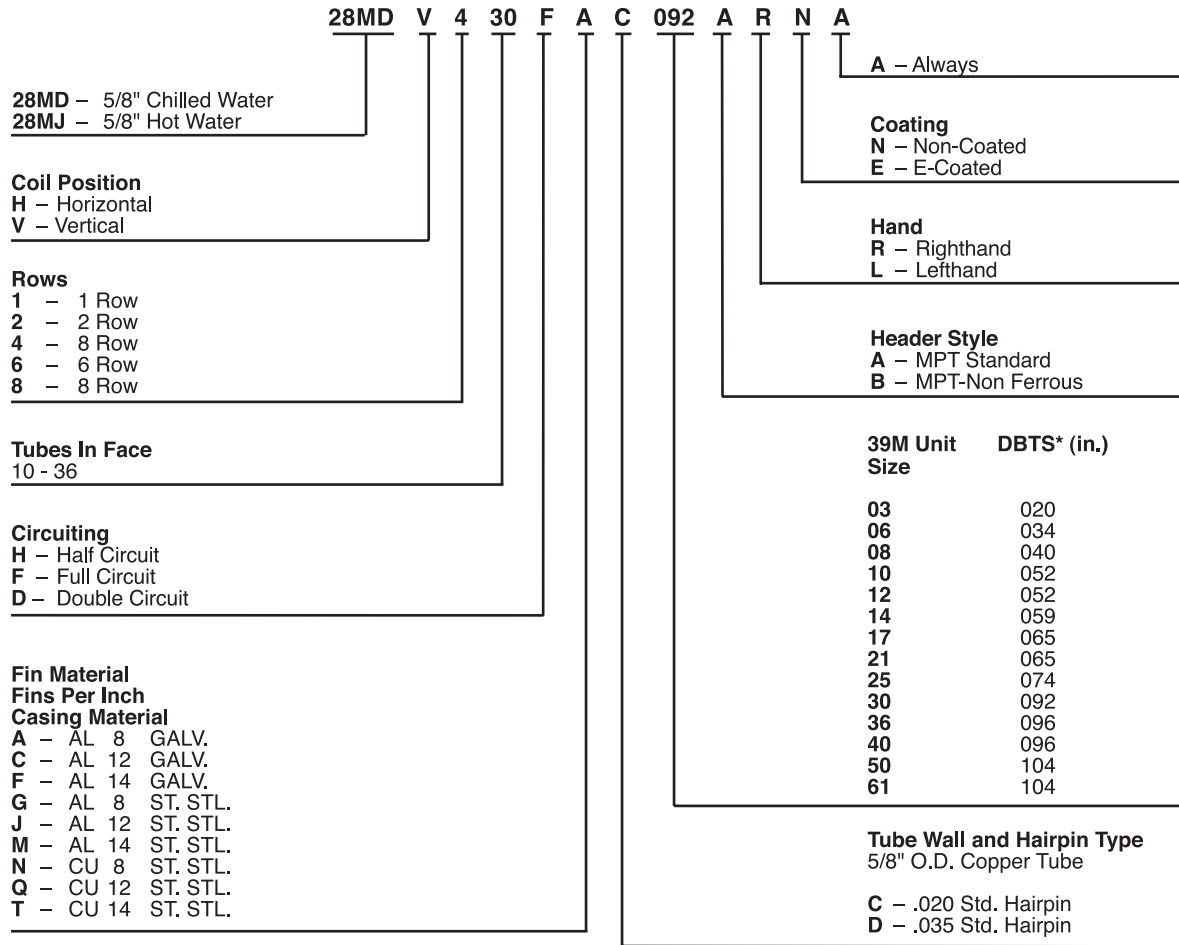


LEGEND

- L – Large
- M – Medium

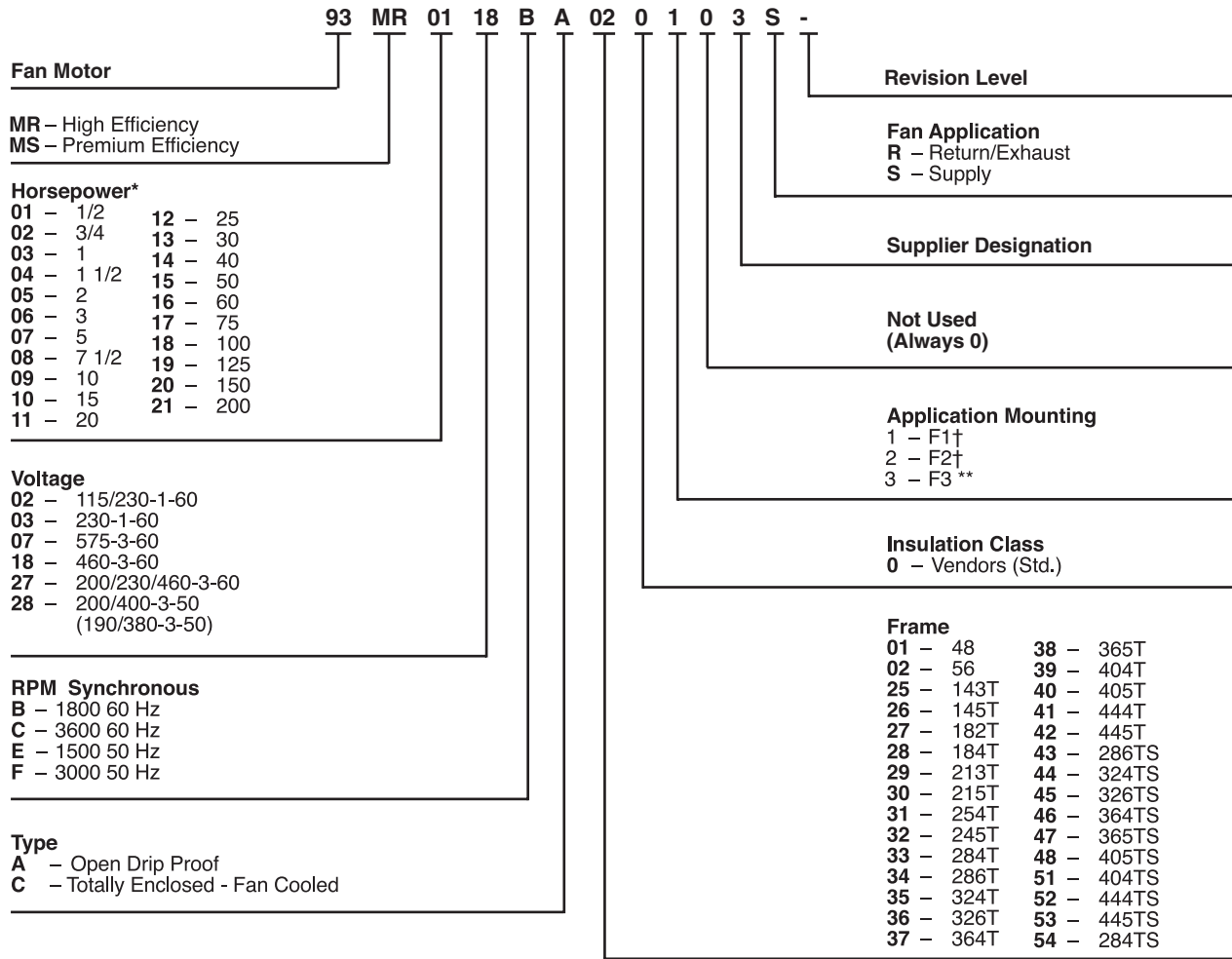
*Multiple values indicated that two coils must be ordered.
†Distance between tube sheets.

Fig. 2D — 28ME (Direct Expansion Coil) Nomenclature



*Distance between tube sheets.

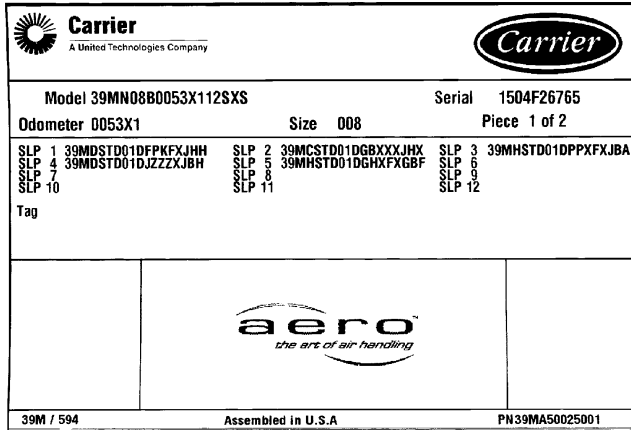
Fig. 2E — 28MD,28MJ (5/8-in. Water Coil) Nomenclature



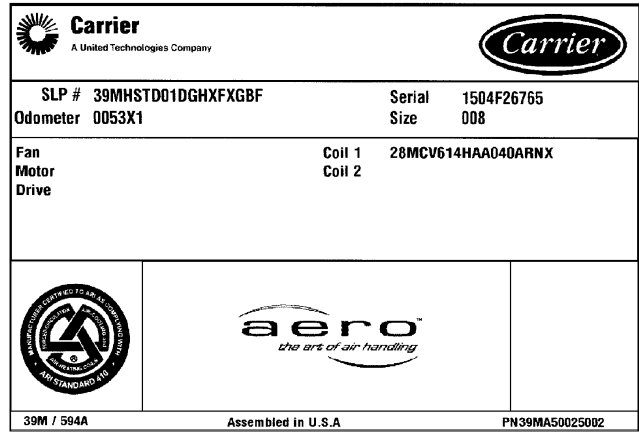
*Not all horsepower values shown are applicable to 39M units.
 † F3 Box location may be substituted for either F1 or F2.
 **F3 Mounting may only be available on ODP Motors.
 Mounting numbers apply when facing Motor Shaft end.



Fig. 2F — Motor Nomenclature



**Fig. 3A — Unit Nameplate Label
(Found on Each Component Section
Shipped Separately)**



**Fig. 3B — Section Nameplate Label
(Each Component Section will have
a Section Nameplate Label)**

PRE-INSTALLATION

Inspection — Inspect the unit; file a claim with the shipping company if the unit is damaged. Check the packing list to ensure that the correct items have been received and notify your Carrier representative of any discrepancy.

Rigging and Handling — To transfer the unit from the shipping platform to the storage or installation site, **refer to the rigging label** on the unit and these instructions.

CAUTION

You can use a forklift truck to move units or components only if they have full skids. Lift from the heavy end of the skid. Minimum recommended fork length is 48 inches.

Base units are shipped fully assembled, except when sections are separately ordered or when the unit height exceeds 108 in. or length exceeds 30 feet. All 39M units can be rigged

using the lifting brackets, as shown on the rigging label on the unit.

Aero connect latches or screws are provided at specified sections to separate component sections:

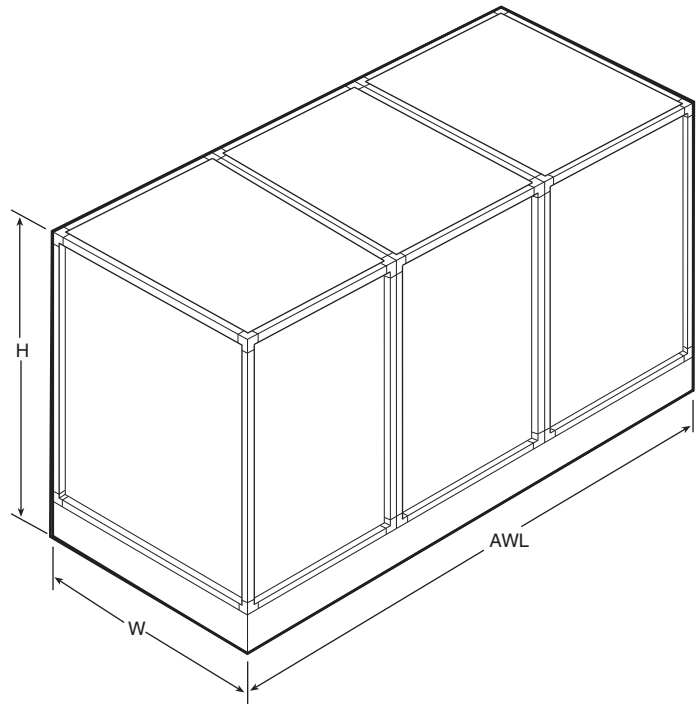
1. Undo all fasteners (with red hex heads) on vertical and horizontal (side and top) seams.
2. Remove the large through-bolts in adjacent lifting brackets and smaller bolts that hold lifting brackets together.
3. Lift the unit with slings and header bars, using clevises and pins in the large round holes in the unit's lifting brackets.

When the unit is in its final location, do not remove the caps from the coil connections until the coil is ready for piping. Do not remove grease from the fan shaft until the drive sheave is ready for installation.

Refer to Fig. 4 and 5 and Tables 1-15 for component data.

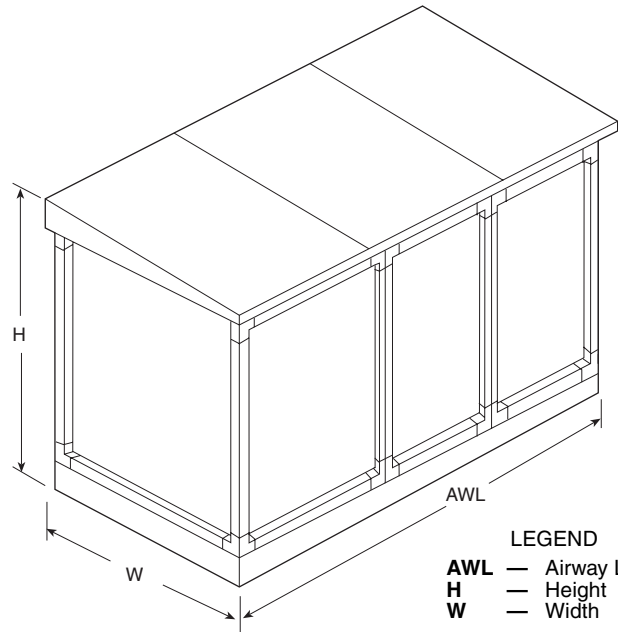
39MN Indoor Unit Dimensions

39MN UNIT SIZE	UNIT CASING	
	H (in.)	W (in.)
03	39	33
06	39	46
08	42	54
10	42	67
12	49	67
14	49	72
17	52	79
21	62	79
25	62	86
30	62	104
36	73	109
40	79	109
50	89	117
61	104	117



39MW Outdoor Unit Dimensions

39MN UNIT SIZE	UNIT CASING	
	H (in.)	W (in.)
03	43	36
06	43	49
08	46	57
10	46	70
12	53	70
14	53	75
17	56	82
21	66	82
25	66	89
30	66	107
36	77	112
40	83	112
50	93	120
61	108	120



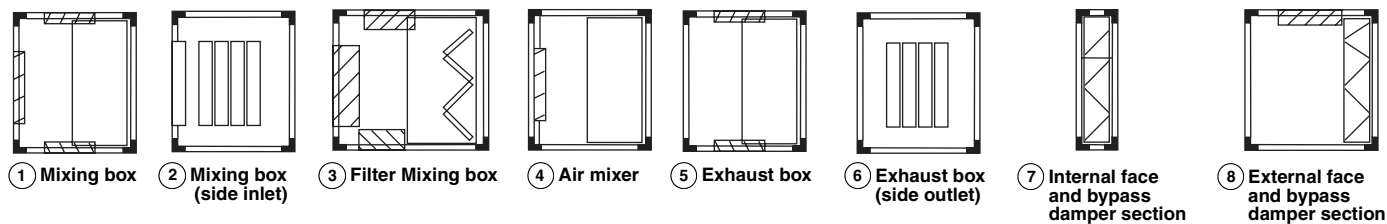
LEGEND
AWL — Airway Length
H — Height
W — Width

NOTES:

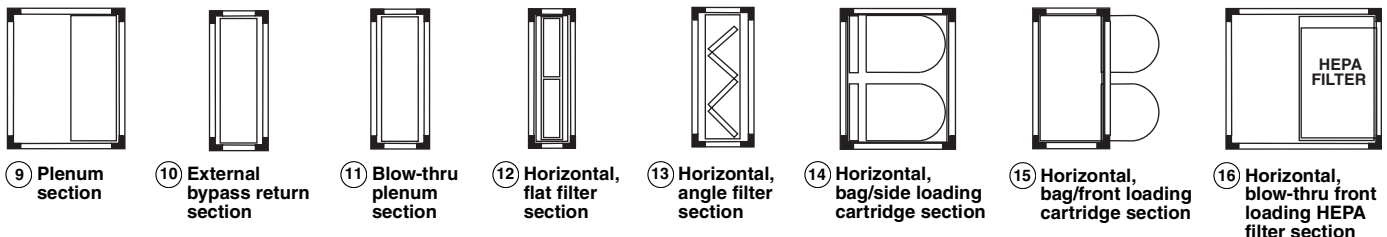
- Weights and dimensions are approximate. For more exact dimensions, consult with your local Carrier Sales Engineer or select your desired unit using **AHUBuilder®** software.
- All dimensions in inches unless otherwise noted.

Fig. 4 — Base Unit Dimensions

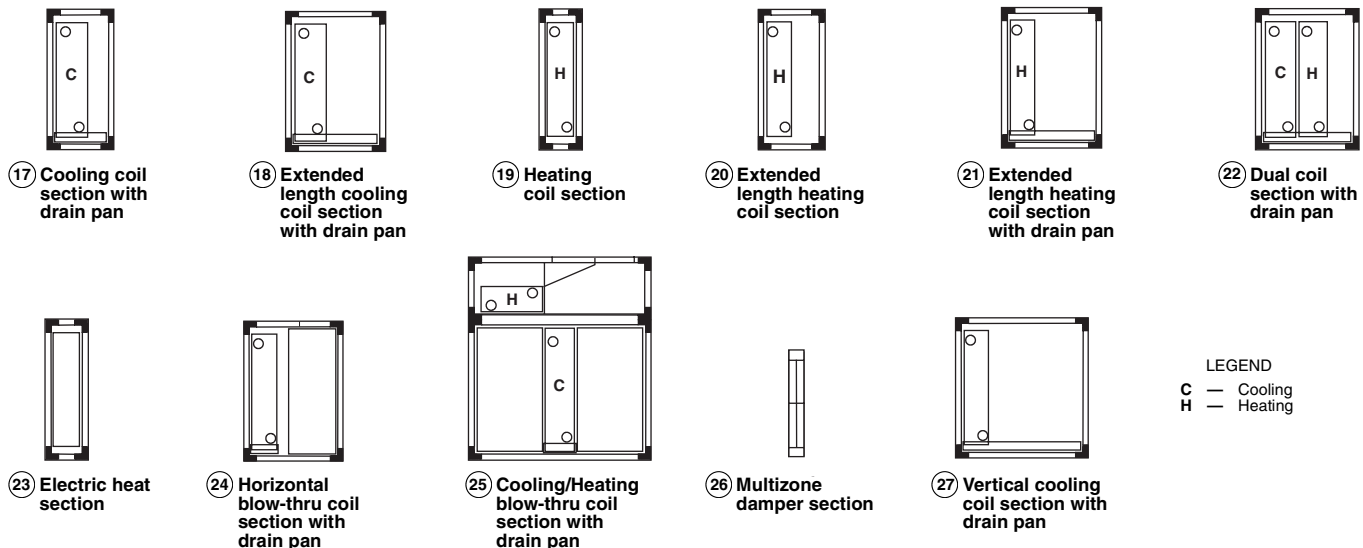
Air Distribution Components



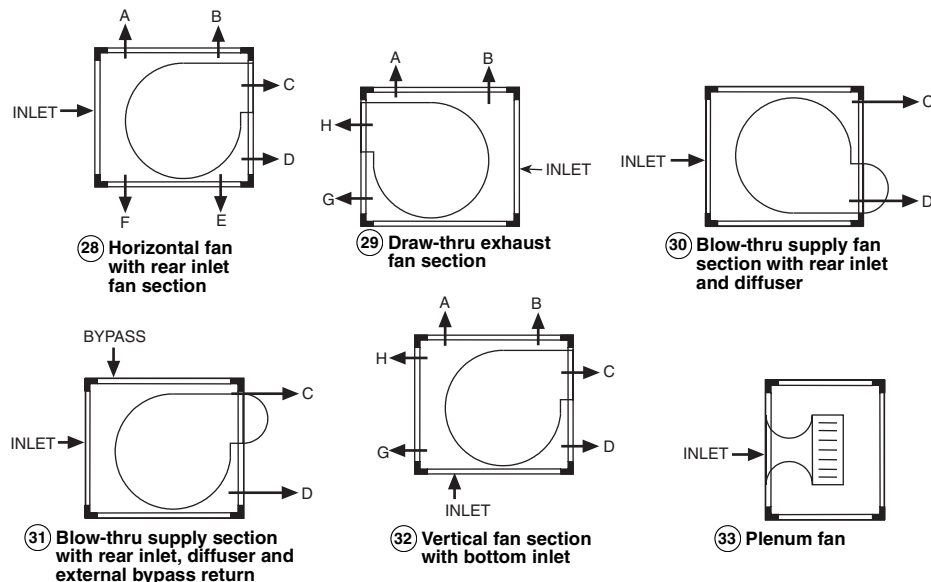
Plenum & Filtration Sections



Heat Transfer Sections



Fan Motor Sections



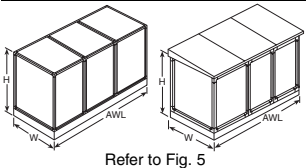
Fan Configurations

Available Configurations	Fan Component Section Number					
	28	29	30	31	32	33
A Upblast Rear Discharge	X	X				X
B Upblast Front Discharge	X	X				X
C Top Horizontal Front Discharge	X		X	X	X	
D Bottom Horizontal Front Discharge	X		X	X	X	
E Downblast Front Discharge	X					
F Downblast Rear Discharge	X					
G Bottom Horizontal Rear Discharge		X				X
H Top Horizontal Rear Discharge		X				X
Discharge may be field-fabricated						X
Fan Section Access						
Hinged Access on Both Sides	X	X	X	X	X	X
Hinged Door on Hand Side	X	X	X	X	X	X
Removable Panels	X	X	X	X	X	X

X = Standard configuration

Fig. 5 — Component Drawings (Refer to Table 1)

Table 1 — 39MN,MW Component Weights and Lengths



		SECTION DIMENSIONS (in.) AND WEIGHTS (lb)							
		Nominal cfm at 500 fpm	1500	3000	4000	5000	6000	7000	8500
		Unit Size	03	06	08	10	12	14	17
		H (in.) Indoor Outdoor	39 43	39 43	42 46	42 46	49 53	49 53	52 56
		W (in.) Indoor Outdoor	33 36	46 49	54 57	67 70	67 70	72 75	79 82
		AWL (in.) (Indoor/Outdoor) Weight (lb)	18 270 / 370	21 330 / 450	21 370 / 510	21 420 / 570	21 460 / 610	24 520 / 690	24 570 / 750
1	Mixing box								
2	Side inlet mixing box		21 300 / 410	27 360 / 490	27 390 / 540	33 470 / 650	33 510 / 690	39 580 / 780	39 640 / 860
3	Filter mixing box		36 320 / 450	36 380 / 530	36 430 / 590	36 490 / 680	36 540 / 730	36 570 / 770	36 630 / 840
4	Air mixer		18 170 / 270	18 190 / 310	18 210 / 340	24 270 / 430	24 290 / 450	24 300 / 470	30 380 / 570
5	Exhaust box		18 160 / 260	21 190 / 310	21 210 / 350	21 230 / 380	21 250 / 400	24 280 / 450	24 300 / 480
6	Side outlet exhaust box		21 300 / 410	27 360 / 490	27 390 / 540	33 470 / 650	33 510 / 690	39 580 / 780	39 640 / 860
7	Internal face and bypass damper section		18 130 / 230	18 150 / 270	18 170 / 300	18 190 / 340	18 200 / 350	18 210 / 360	18 230 / 390
8	External face and bypass damper section		18 140 / NA	21 160 / NA	21 180 / NA	21 190 / NA	21 200 / NA	24 220 / NA	24 240 / NA
9	Plenum section — 12"		12 120 / 210	12 140 / 250	12 150 / 270	12 170 / 300	12 180 / 310	12 190 / 330	12 200 / 350
	Plenum section — 24"		24 170 / 280	24 190 / 320	24 210 / 350	24 230 / 390	24 240 / 400	24 250 / 420	24 270 / 450
	Plenum section — 36"		36 210 / 340	36 240 / 390	36 260 / 420	36 280 / 470	36 300 / 490	36 310 / 510	36 340 / 550
	Plenum section — 48"		48 250 / 400	48 280 / 450	48 310 / 500	48 340 / 560	48 360 / 580	48 380 / 610	48 410 / 650
10	External bypass return section		18 140 / NA	18 160 / NA	18 170 / NA	18 180 / NA	18 190 / NA	24 220 / NA	24 240 / NA
11	Blow-thru plenum section		24 170 / 280	24 200 / 330	24 220 / 360	24 240 / 400	24 260 / 420	24 270 / 440	24 300 / 480
12	Horizontal flat filter section 2" or 4" side loading		12 190 / 280	12 230 / 340	12 260 / 380	12 300 / 430	12 330 / 460	12 340 / 480	12 380 / 530
13	Horizontal angle filter section 2" or 4" side loading		24 230 / 340	24 270 / 400	24 310 / 450	24 350 / 510	24 390 / 550	24 400 / 570	24 450 / 630
14	Horizontal bag/cartridge filter section, SL 6 or 12" media with 2" pre-filter track		24 230 / 340	24 270 / 400	24 310 / 450	24 350 / 510	24 390 / 550	24 400 / 570	24 450 / 630
	Horizontal bag/cartridge filter section, SL 15 or 30" media with 2" pre-filter track		42 300 / 440	42 350 / 510	42 390 / 570	42 440 / 640	42 480 / 680	42 500 / 710	42 560 / 780
15	Horizontal bag/cartridge filter section, FL Face loading media with or without header		48 320 / 470	48 370 / 540	48 420 / 610	48 470 / 690	48 510 / 730	48 540 / 770	48 590 / 830
16	Horizontal blow-thru HEPA filter section, FL		48 320 / 470	48 370 / 540	48 420 / 610	48 470 / 690	48 510 / 730	48 540 / 770	48 590 / 830
17	Cooling coil section with drain pan		24 170 / 280	24 190 / 320	24 210 / 350	24 230 / 390	24 240 / 400	24 250 / 420	24 270 / 450
18	Extended length cooling coil section with drain pan		42 230 / 370	42 260 / 420	42 290 / 470	42 310 / 510	42 340 / 540	42 350 / 560	42 380 / 600
19	Heating coil section		12 120 / 210	12 140 / 250	12 150 / 270	12 170 / 300	12 180 / 310	12 190 / 330	12 200 / 350
20	Extended length heating coil section and electric heat with remote box		24 170 / 280	24 190 / 320	24 210 / 350	24 230 / 390	24 240 / 400	24 250 / 420	24 270 / 450
21	Extended length heating coil section with EBR		36 200 / NA	36 230 / NA	36 250 / NA	36 270 / NA	42 310 / NA	42 320 / NA	42 350 / NA
22	Dual coil section with drain pan		36 210 / 340	36 240 / 390	36 260 / 420	36 280 / 470	36 300 / 490	36 310 / 510	36 340 / 550
23	Electric heat section with control box	Low Amp (in.) (Indoor / Outdoor) (lb)	24/30 180 / 300	30/36 240 / 390	30/36 280 / 440	30/36 320 / 510	30/36 350 / 540	30/36 370 / 570	30/36 410 / 620
		High Amp (in.) (Indoor / Outdoor) (lb)	36/42 180 / 320	36/42 220 / 380	42/48 290 / 480	42/48 340 / 560	42/48 380 / 600	42/48 400 / 630	42/48 450 / 690
24	Horizontal blow thru coil with ducted discharge		30 200 / 320	30 220 / 360	30 250 / 400	30 270 / 440	36 320 / 510	36 330 / 530	36 370 / 580
25	Multizone/dual duct heating/cooling coil section	H (in.)	—	61	64	64	71	71	74
		AWL (in.)	—	48	48	48	60	60	60
		(Indoor / Outdoor) Weight (lb)	— / —	570 / —	620 / —	690 / —	820 / —	850 / —	920 / —
26	Multizone damper section	AWL	—	11	11	11	11	11	11
		Number of Zones	—	6	7	10	10	10	12
27	Vertical coil section with drain pan		42 250 / —	42 290 / —	36 290 / —	36 320 / —	42 370 / —	48 420 / —	48 460 / —
		FC	24 480 / 590	30 550 / 690	36 640 / 800	36 700 / 890	42 810 / 1010	48 910 / 1140	48 990 / 1230
		AF	42 550 / 690	42 620 / 780	36 640 / 800	36 700 / 890	42 810 / 1010	48 900 / 1130	48 990 / 1230
		Downblast AF	42 550 / 690	42 620 / 780	42 670 / 850	42 740 / 940	48 850 / 1070	54 940 / 1180	54 1030 / 1290
		Vertical FC/AF	42 560 / —	42 630 / —	36 660 / —	36 720 / —	42 840 / —	48 940 / —	48 1030 / —
33	Plenum fan section		48 600 / 770	54 720 / 900	42 720 / 900	42 800 / 1000	48 940 / 1160	48 980 / 1210	48 1080 / 1320

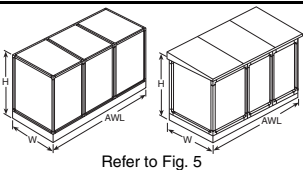
LEGEND

- AF — Airfoil
- AWL — Airway Length
- EBR — External Bypass Return
- FC — Forward Curved
- FL — Face Load
- H — Height
- SL — Side Load
- W — Width

NOTES:

1. Refer to the Aero Product Data Catalog for additional application information.
2. Section weights do not include coils or motors. Refer to the product data catalog for additional weights.
3. Section height is the same except as noted.
4. All bold numbers are inches, non-bold are pounds unless otherwise noted.

Table 1 — 39MN,MW Component Weights and Lengths (cont)

		SECTION DIMENSIONS (in.) AND WEIGHTS (lb)							
		Nominal cfm at 500 fpm	10,500	12,500	15,000	18,000	20,000	25,000	30,500
		Unit Size	21	25	30	36	40	50	61
H (in.)									
Indoor		62	62	62	73	79	89	104	
Outdoor		66	66	66	77	83	93	108	
W (in.)									
Indoor		79	86	104	109	109	117	117	
Outdoor		82	89	107	112	112	120	120	
AWL (in.)									
(Indoor/Outdoor) Weight (lb)		27	27	27	36	39	42	51	
1	Mixing box	710 / 900	760 / 960	870 / 1090	1320 / 1580	1520 / 1790	1920 / 2220	2650 / 2980	
2	Side inlet mixing box	39	45	51	57	57	63	63	
		710 / 930	830 / 1080	1050 / 1350	1360 / 1690	1460 / 1790	1870 / 2240	2140 / 2510	
3	Filter mixing box	36	36	36	45	48	51	60	
		720 / 930	760 / 980	880 / 1130	1260 / 1550	1430 / 1730	1790 / 2120	2390 / 2750	
4	Air mixer	30	30	36	36	42	42	48	
		430 / 620	460 / 660	600 / 850	720 / 980	870 / 1150	1030 / 1330	1330 / 1650	
5	Exhaust box	27	27	27	36	39	42	51	
		370 / 560	390 / 590	440 / 660	650 / 910	750 / 1020	930 / 1230	1270 / 1600	
6	Side outlet exhaust box	39	45	51	57	57	63	63	
		710 / 930	830 / 1080	1050 / 1350	1360 / 1690	1460 / 1790	1870 / 2240	2140 / 2510	
7	Internal face and bypass damper section	18	18	18	18	18	18	18	
		250 / 410	270 / 440	300 / 500	350 / 550	380 / 580	440 / 650	490 / 700	
8	External face and bypass damper section	27	27	27	33	33	39	45	
		280 / NA	300 / NA	330 / NA	450 / NA	470 / NA	630 / NA	810 / NA	
9	Plenum section — 12"	12	12	12	12	12	12	12	
		220 / 370	230 / 380	260 / NA	310 / 490	320 / 500	370 / 560	420 / 610	
	Plenum section — 24"	24	24	24	24	24	24	24	
		300 / 480	320 / 510	350 / NA	410 / 630	430 / 650	490 / 730	550 / 790	
9	Plenum section — 36"	36	36	36	36	36	36	36	
		380 / 590	400 / 620	440 / 690	510 / 770	540 / 800	620 / 900	700 / 980	
9	Plenum section — 48"	48	48	48	48	48	48	48	
		450 / 690	470 / 720	530 / 820	620 / 920	650 / 950	750 / 1070	850 / 1170	
10	External bypass return section	24	24	24	24	27	30	33	
		270 / NA	280 / NA	310 / NA	360 / NA	420 / NA	520 / NA	630 / NA	
11	Blow-thru plenum section	30	30	30	33	33	36	36	
		380 / 570	410 / 610	460 / 690	590 / 840	630 / 880	790 / 1070	900 / 1180	
12	Horizontal flat filter section 2" or 4" side loading	12	12	12	12	12	12	12	
		430 / 580	460 / 610	530 / 710	630 / 810	680 / 860	800 / 990	910 / 1100	
13	Horizontal angle filter section 2" or 4" side loading	24	24	24	24	24	24	24	
		510 / 690	540 / 730	620 / 830	740 / 960	790 / 1010	920 / 1160	1060 / 1300	
14	Horizontal bag/cartridge filter section, SL 6 or 12" media with 2" pre-filter track	24	24	24	24	24	24	24	
		510 / 690	540 / 730	620 / 830	740 / 960	790 / 1010	920 / 1160	1060 / 1300	
14	Horizontal bag/cartridge filter section, SL 15 or 30" media with 2" pre-filter track	42	42	42	42	42	42	42	
		630 / 850	670 / 910	760 / 1030	900 / 1180	960 / 1240	1120 / 1420	1270 / 1570	
15	Horizontal bag/cartridge filter section, FL Face loading media with or without header	48	48	48	48	48	48	48	
		670 / 910	710 / 960	810 / 1100	960 / 1260	1020 / 1320	1190 / 1510	1360 / 1680	
16	Horizontal blow-thru HEPA filter section, FL	48	48	48	48	48	48	48	
		670 / 910	710 / 960	810 / 1100	960 / 1260	1020 / 1320	1190 / 1510	1360 / 1680	
17	Cooling coil section with drain pan	24	24	24	24	24	24	24	
		300 / 480	320 / 510	350 / 560	410 / 630	430 / 650	490 / 730	550 / 790	
18	Extended length cooling coil section with drain pan	48	48	48	48	54	60	72	
		450 / 690	480 / 730	540 / 830	630 / 930	730 / 1050	930 / 1290	1230 / 1630	
19	Heating coil section	12	12	12	12	12	12	12	
		220 / 370	230 / 380	260 / 440	310 / 490	320 / 500	370 / 560	420 / 610	
20	Extended length heating coil section and electric heat with remote box	24	24	24	24	24	24	24	
		300 / 480	320 / 510	350 / 560	410 / 630	430 / 650	490 / 730	550 / 790	
21	Extended length heating coil section with EBR	48	48	48	48	54	60	72	
		430 / NA	450 / NA	510 / NA	600 / NA	700 / —	890 / —	1180 / —	
22	Dual coil section with drain pan	36	36	36	36	0	0	0	
		380 / 590	400 / 620	440 / 690	510 / 770	— / —	— / —	— / —	
23	Electric heat section with control box	Low Amp AWL (in.)	30/36	30/36	30/36	30 / 42	30 / 42	30 / 42	30 / 42
		(Indoor / Outdoor) Weight (lb)	470 / 680	500 / 720	580 / 830	700 / 980	740 / 1020	880 / 1180	1010 / 1310
		High Amp AWL (in.)	42/48	42/48	42/48	42 / 54	42 / 54	42 / 54	42 / 54
	(Indoor / Outdoor) Weight (lb)	530 / 770	560 / 810	660 / 950	800 / 1120	860 / 1180	1020 / 1360	1180 / 1520	
24	Horizontal blow thru coil with ducted discharge	42	42	42	48	54	60	72	
		460 / 680	490 / 730	550 / 820	740 / 1040	840 / 1160	1080 / 1440	1420 / 1820	
25	Multizone/dual duct heating/cooling coil section	H (in.)	90	90	90	101	107	119	140
		AWL (in.)	72	72	72	84	90	102	120
		(Indoor / Outdoor) Weight (lb)	1180 / —	1250 / —	1430 / —	1840 / —	2030 / —	2630 / —	3500 / —
26	Multizone damper section	AWL (in.)	11	11	11	11	11	11	
		Number of Zones	12	13	16	17	17	18	18
27	Vertical coil section with drain pan	48	60	60	60	66	72	78	
		510 / —	630 / —	722 / —	860 / —	980 / —	1240 / —	1520 / —	
28, 29, 30, 31, 32	Fan sections	FC	48	60	60	60	60	66	66
			1100 / 1340	1360 / 1650	1560 / 1890	1840 / 2180	1960 / 2300	2480 / 2860	2830 / 3210
		AF	48	60	60	60	66	72	78
			1100 / 1340	1360 / 1650	1560 / 1890	1840 / 2180	2120 / 2480	2670 / 3070	3270 / 3700
		Downblast AF	54	66	66	60	66	72	78
	1150 / 1410	1400 / 1700	1600 / 1950	1750 / 2090	2010 / 2370	2520 / 2920	3080 / 3510		
28, 29, 30, 31, 32	Fan sections	Vertical FC/AF	48	60	60	60	66	72	78
			1160 / —	1440 / —	1650 / —	1950 / —	2250 / —	2840 / —	3500 / —
33	Plenum fan section	54	54	54	66	72	72	78	
		1320 / 1580	1400 / 1670	1610 / 1920	2240 / 2600	2580 / 2960	3040 / 3440	3740 / 4170	

LEGEND

- AF — Airfoil
- AWL — Airway Length
- EBR — External Bypass Return
- FC — Forward Curved
- FL — Face Load
- H — Height
- SL — Side Load
- W — Width

NOTES:

1. Refer to the Aero Product Data Catalog for additional application information.
2. Section weights do not include coils or motors. Refer to the product data catalog for additional weights.
3. Section height is the same except as noted.
4. All bold numbers are inches, non-bold are pounds unless otherwise noted.

Table 2A — Physical Data — Airfoil Fans (Supply, Return and Exhaust)

39M UNIT SIZE	03	06	08	10	12	14	17	21	25	30
WHEEL TYPE...SIZE	All...Std	All...Std	All...Std	All...Std	All...Std	All...Std	All...Std	All...Std	All...Std	All...Std
WHEEL DIAMETER (in.)	10	12 ¹ / ₄	13 ¹ / ₂	13 ¹ / ₂	16 ¹ / ₂	16 ¹ / ₂	18 ¹ / ₄	20	22 ¹ / ₄	22 ¹ / ₄
MIN INLET CONE DIAMETER (in.)	6.13	7.5	8.38	8.38	10.13	10.13	11.00	12.44	13.88	13.88
MAX SPEED (rpm)										
Class I	N/A	N/A	N/A	N/A	N/A	N/A	2261	2019	1872	1872
Class II	4655	4560	4033	4033	3254	3254	2950	2598	2442	2442
FAN SHAFT DIAMETER (in.)										
Class I	N/A	N/A	N/A	N/A	N/A	N/A	1 ¹¹ / ₁₆	1 ¹¹ / ₁₆	1 ¹⁵ / ₁₆	1 ¹⁵ / ₁₆
Class II	1	1 ³ / ₁₆	1 ⁷ / ₁₆	1 ⁷ / ₁₆	1 ¹¹ / ₁₆	1 ¹¹ / ₁₆	1 ¹⁵ / ₁₆	1 ¹⁵ / ₁₆	2 ³ / ₁₆	2 ³ / ₁₆
FAN WHEEL WEIGHT (lb)										
Class I	N/A	N/A	N/A	N/A	N/A	N/A	51.7	59.6	73.0	73.0
Class II	7.5	10.50	15	15	36.5	36.5	51.7	59.6	73.0	73.0
No. Fan Blades	9	9	9	9	9	9	9	9	9	9
MOTOR FRAME SIZE										
Maximum (ODP/TEFC)	184T	184T	215T	254T	254T	256T	256T	284T	286T	324T
Minimum (ODP/TEFC)	56	56	143T	145T	145T	145T	145T	145T	145T	182T
MOTOR HP										
Maximum	5	7.5	10	15	15	20	20	25	30	40
Minimum	¹ / ₂	¹ / ₂	1	1 ¹ / ₂	1 ¹ / ₂	1 ¹ / ₂	1 ¹ / ₂	2	2	3

39M UNIT SIZE	36		40		50		61	
WHEEL TYPE...SIZE	Supply...Std	Ret/Exh...Std	Supply...Std	Ret/Exh...Std	Supply...Std	Ret/Exh...Std	Supply...Std	Ret/Exh...Std
WHEEL DIAMETER (in.)	24 ¹ / ₂	27	27	30	30	33	33	36 ¹ / ₂
MIN INLET CONE DIAMETER (in.)	15 ¹ / ₈	16 ¹³ / ₁₆	16 ¹³ / ₁₆	18 ¹³ / ₁₆	18 ¹³ / ₁₆	20 ⁹ / ₁₆	20 ⁹ / ₁₆	23 ¹ / ₈
MAX SPEED (rpm)								
Class I	1700	1463	1463	1316	1316	1202	1202	1055
Class II	2123	1910	1910	1715	1715	1568	1568	1378
FAN SHAFT DIAMETER (in.)								
Class I	2 ³ / ₁₆	2 ³ / ₁₆	2 ³ / ₁₆	2 ⁷ / ₁₆	2 ⁷ / ₁₆	2 ⁷ / ₁₆	2 ⁷ / ₁₆	2 ¹¹ / ₁₆
Class II	2 ⁷ / ₁₆	2 ⁷ / ₁₆	2 ⁷ / ₁₆	2 ¹¹ / ₁₆	2 ¹¹ / ₁₆	2 ³ / ₁₆	2 ³ / ₁₆	2 ³ / ₁₆
FAN WHEEL WEIGHT (lb)								
Class I	88	104	104	136	136	168	168	235
Class II	91	106	106	145	145	176	176	233
No. Fan Blades	18	18	18	18	18	18	18	18
MOTOR FRAME SIZE								
Maximum (ODP/TEFC)	324T	254T	324T	254T	326T	256T	365T	256T
Minimum (ODP/TEFC)	184T	182T	184T	182T	213T	184T	213T	184T
MOTOR HP								
Maximum	50	15	50	15	60	20	75	20
Minimum	5	3	3	3	7 ¹ / ₂	5	7 ¹ / ₂	5

LEGEND

- ODP** — Open Dripproof
- Ret/Exh** — Return Exhaust
- TEFC** — Totally Enclosed Fan Cooled

NOTE: Data is for 50 Hz and 60 Hz motors.

Table 2B — Physical Data — Plenum Fans (Supply, Return and Exhaust)

39M UNIT SIZE	03	06	08	10	12	14	17	21	25	30
WHEEL TYPE...SIZE	All...Std	All...Std	All...Std	All...Std	All...Std	All...Std	All...Std	All...Std	All...Std	All...Std
WHEEL DIAMETER (in.)	12 ¹ / ₄	15	16 ¹ / ₂	18 ¹ / ₄	22 ¹ / ₄	22 ¹ / ₄	24 ¹ / ₂	27	30	33
MIN INLET CONE DIAMETER (in.)	7.5	9.25	10.13	11.88	12.14	12.14	15.81	17.5	19.69	21.49
MAX SPEED (rpm)										
Class I	3567	2765	2465	2190	1872	1872	1701	1463	1316	1202
Class II	4655	3610	3216	2855	2442	2442	2218	1910	1718	1568
FAN SHAFT DIAMETER (in.)										
Class I	1	1	1	1	1 ⁷ / ₁₆	1 ⁷ / ₁₆	1 ⁷ / ₁₆	1 ⁷ / ₁₆	1 ⁷ / ₁₆	1 ¹¹ / ₁₆
Class II	1 ³ / ₁₆	1 ³ / ₁₆	1	1 ³ / ₁₆	1 ⁷ / ₁₆	1 ⁷ / ₁₆	1 ⁷ / ₁₆	1 ⁷ / ₁₆	1 ⁷ / ₁₆	1 ¹¹ / ₁₆
FAN WHEEL WEIGHT (lb)										
Class I	8	13	27	35	50	50	70	80	100	135
Class II	8	13	27	35	50	50	70	80	100	135
No. Fan Blades	9	9	9	12	12	12	12	12	12	12
MOTOR FRAME SIZE										
Maximum (ODP/TEFC)	184T	213T	215T	254T	254T	256T	256T	284T	284T	286T
Minimum (ODP/TEFC)	56	56	56	143T	143T	145T	145T	145T	145T	182T
MOTOR HP										
Maximum	5	7.5	10	15	15	20	20	25	25	30
Minimum	¹ / ₂	³ / ₄	³ / ₄	1	1	1 ¹ / ₂	1 ¹ / ₂	2	2	3

39M UNIT SIZE	36	40		50		61	
WHEEL TYPE...SIZE	All...Std	Supply...Std	Ret/Exh...Std	Supply...Std	Ret/Exh...Std	Supply...Std	Ret/Exh...Std
WHEEL DIAMETER (in.)	36 ¹ / ₂	36 ¹ / ₂	40 ¹ / ₄	40 ¹ / ₄	44 ¹ / ₂	44 ¹ / ₂	49
MIN INLET CONE DIAMETER (in.)	24	24	26 ⁵ / ₈	26 ⁵ / ₈	29 ¹ / ₂	29 ¹ / ₂	32 ¹ / ₂
MAX SPEED (rpm)							
Class I	1055	1055	955	955	865	865	808
Class II	1378	1378	1249	1249	1131	1131	1050
FAN SHAFT DIAMETER (in.)							
Class I	1 ¹¹ / ₁₆	1 ¹¹ / ₁₆	1 ¹⁵ / ₁₆	1 ¹⁵ / ₁₆	2 ³ / ₁₆	2 ³ / ₁₆	2 ¹¹ / ₁₆
Class II	1 ¹¹ / ₁₆	1 ¹¹ / ₁₆	1 ¹⁵ / ₁₆	1 ¹⁵ / ₁₆	2 ³ / ₁₆	2 ³ / ₁₆	2 ¹¹ / ₁₆
FAN WHEEL WEIGHT (lb)							
Class I	171	171	203	203	277	277	366
Class II	171	171	203	203	277	277	366
No. Fan Blades	12	12	12	12	12	12	12
MOTOR FRAME SIZE							
Maximum (ODP/TEFC)	324T	324T	256T	326T	284T	364T	286T
Minimum (ODP/TEFC)	182T	184T	182T	213T	184T	213T	184T
MOTOR HP							
Maximum	40	40	20	50	25	60	30
Minimum	3	5	3	7 ¹ / ₂	5	7 ¹ / ₂	5

LEGEND

- ODP — Open Dripproof
- Ret/Exh — Return Exhaust
- TEFC — Totally Enclosed Fan Cooled

NOTE: Data is for 50 Hz and 60 Hz motors.

Table 2C — Physical Data — Forward-Curved Fans (Supply)

39M UNIT SIZE	03		06		08		10		12		14		17		21	
WHEEL SIZE	Std	Std	Std	Small	Std	Small	Std	Small	Std	Small	Std	Small	Std	Small	Std	Small
WHEEL DIAMETER (in.)	9 ¹ / ₂	10 ⁵ / ₈	12 ⁵ / ₈	10 ⁵ / ₈	15	12 ⁵ / ₈	15	12 ⁵ / ₈	18	15	18	15	20	15		
MIN INLET CONE DIAMETER (in.)	7.81	8.81	10.38	8.81	12.12	10.38	12.62	10.38	15.5	12.62	15.5	12.62	16.25	12.62		
MAX SPEED (rpm)																
Class I	2132	1806	1533	1806	1262	1533	1262	1491	1097	1262	1097	1262	952	1262		
Class II	2749	2347	1986	2347	1639	1986	1639	1938	1378	1639	1378	1639	1239	1639		
FAN SHAFT DIAMETER (in.)																
Class I	1	1	1 ³ / ₁₆	1 ³ / ₁₆	1 ³ / ₁₆	1 ³ / ₁₆	1 ³ / ₁₆	1 ³ / ₁₆	1 ⁷ / ₁₆	1 ³ / ₁₆	1 ⁷ / ₁₆	1 ³ / ₁₆	1 ⁷ / ₁₆	1 ⁷ / ₁₆	1 ¹¹ / ₁₆	
Class II	1	1	1 ³ / ₁₆	1 ³ / ₁₆	1 ³ / ₁₆	1 ³ / ₁₆	1 ³ / ₁₆	1 ³ / ₁₆	1 ⁷ / ₁₆	1 ³ / ₁₆	1 ⁷ / ₁₆	1 ³ / ₁₆	1 ⁷ / ₁₆	1 ⁷ / ₁₆	1 ¹¹ / ₁₆	
Fan Shaft Weight (lb) Class II	1.9	4.2	7.7	5.9	8.7	7.7	8.7	10.5	14.9	12.8	14.9	12.8	15.2	12.8		
FAN WHEEL WEIGHT (lb)																
Class I	3.8	5.8	10.0	5.8	16.2	10.0	16.2	9.1	32.0	16.2	32.0	16.2	42.0	16.2		
Class II	3.8	5.8	10.4	5.8	16.9	10.4	16.9	9.5	34.2	16.9	34.2	16.9	44.9	16.9		
No. Fan Blades	43	48	43	48	51	43	51	43	48	51	48	51	51	51		
MOTOR FRAME SIZE																
Maximum (ODP/TEFC)	184T	184T	213T	213T	213T	215T	213T	254T	213T	254T	215T	254T	254T	284T		
Minimum (ODP/TEFC)	56	143T	143T	182T	145T	184T	145T	184T	145T	184T	182T	213T	182T	215T		
MOTOR HP																
Maximum	3	5	5	7 ¹ / ₂	5	10	7 ¹ / ₂	15	7 ¹ / ₂	15	10	15	15	25		
Minimum	3/4	1	1	3	1 ¹ / ₂	5	2	5	2	5	3	7 ¹ / ₂	3	10		

39M UNIT SIZE	25		30		36		40		50		61	
WHEEL SIZE	Std	Small	Std	Small	Std	Small	Std	Small	Std	Small	Std	Small
WHEEL DIAMETER (in.)	20	20	20	20	25	22 ³ / ₈	25	25	27 ⁵ / ₈	27 ⁵ / ₈	30 ¹ / ₄	27 ⁵ / ₈
MIN INLET CONE DIAMETER (in.)	16.25	16.25	16.25	16.25	21 ⁵ / ₁₆	18 ¹ / ₁₆	21 ⁵ / ₁₆	21 ⁵ / ₁₆	23 ¹⁵ / ₁₆	23 ¹⁵ / ₁₆	26 ³ / ₈	23 ¹⁵ / ₁₆
MAX SPEED (rpm)												
Class I	952	962	960	969	751	884	751	770	656	684	618	656
Class II	1237	1250	1217	1238	960	1119	960	980	865	873	793	865
FAN SHAFT DIAMETER (in.)												
Class I	1 ⁷ / ₁₆	1 ¹¹ / ₁₆	1 ¹¹ / ₁₆	1 ¹¹ / ₁₆	1 ¹¹ / ₁₆	1 ⁷ / ₁₆	1 ¹¹ / ₁₆	1 ¹¹ / ₁₆	1 ¹¹ / ₁₆	1 ¹¹ / ₁₆	1 ¹¹ / ₁₆	1 ¹¹ / ₁₆
Class II	1 ⁷ / ₁₆	1 ¹¹ / ₁₆	1 ¹¹ / ₁₆	1 ¹¹ / ₁₆	2 ⁷ / ₁₆	2 ³ / ₁₆	2 ⁷ / ₁₆	2 ⁷ / ₁₆	2 ⁷ / ₁₆	2 ⁷ / ₁₆	2 ¹¹ / ₁₆	2 ⁷ / ₁₆
Fan Shaft Weight (lb) Class II	15.2	19.1	23.5	22.2	61.1	42.4	60.3	53.3	71.8	64.5	90.1	71.8
FAN WHEEL WEIGHT (lb)												
Class I	42.0	37.5	53.0	51.0	81.0	63.0	81.0	73.0	111.0	101.0	128.0	111.0
Class II	44.9	40.1	53.0	51.0	81.0	63.0	81.0	73.0	111.0	101.0	128.0	111.0
No. Fan Blades	51	51	37	37	37	37	37	37	37	37	37	37
MOTOR FRAME SIZE												
Maximum (ODP/TEFC)	254T	284T	256T	286T	256T	286T	284T	286T	286T	324T	324T	326T
Minimum (ODP/TEFC)	184T	215T	184T	215T	182T	254T	184T	254T	184T	254T	184T	256T
MOTOR HP												
Maximum	15	25	20	30	20	30	25	30	30	40	40	50
Minimum	5	10	5	10	3	15	5	15	5	15	5	20

LEGEND

ODP — Open Dripproof
TEFC — Totally Enclosed Fan Cooled

NOTE: Data is for 50 Hz and 60 Hz motors.

Table 2D — Physical Data — Forward-Curved Fans (Return and Exhaust)

39M UNIT SIZE	03	06	08	10	12	14	17	21	25
WHEEL SIZE	Std	Std	Std	Std	Std	Std	Std	Std	Std
WHEEL DIAMETER (in.)	9 ¹ / ₂	10 ⁵ / ₈	12 ⁵ / ₈	15	15	18	18	20	20
MIN INLET CONE DIAMETER (in.)	7.81	8.81	10.38	12.62	12.62	15.50	15.50	16.25	16.25
MAX SPEED (rpm)									
Class I	2132	1806	1533	1262	1262	1097	1097	952	952
Class II	2749	2347	1986	1639	1639	1378	1378	1237	1237
FAN SHAFT DIAMETER (in.)									
Class I	1	1	1 ³ / ₁₆	1 ³ / ₁₆	1 ³ / ₁₆	1 ³ / ₁₆	1 ³ / ₁₆	1 ⁷ / ₁₆	1 ⁷ / ₁₆
Class II	1	1	1 ³ / ₁₆	1 ³ / ₁₆	1 ³ / ₁₆	1 ³ / ₁₆	1 ³ / ₁₆	1 ⁷ / ₁₆	1 ⁷ / ₁₆
Fan Shaft Weight (lb) Class II	1.9	4.2	7.7	8.7	8.7	14.9	14.9	15.2	15.2
FAN WHEEL WEIGHT (lb)									
Class I	3.8	5.8	10.0	16.2	16.2	32.0	32.0	42.0	42.0
Class II	3.8	5.8	10.4	16.9	16.9	34.2	34.2	44.9	44.9
No. Fan Blades	43	48	43	51	51	48	48	51	51
MOTOR FRAME SIZE									
Maximum (ODP/TEFC)	184T	184T	213T	213T	213T	213T	215T	254T	254T
Minimum (ODP/TEFC)	56	56	56	143T	145T	145T	145T	145T	145T
MOTOR HP									
Maximum	3	5	5	5	7 ¹ / ₂	7 ¹ / ₂	10	15	15
Minimum	¹ / ₂	³ / ₄	³ / ₄	1	1 ¹ / ₂	1 ¹ / ₂	1 ¹ / ₂	2	2

39M UNIT SIZE	30	36		40		50		61	
WHEEL SIZE	Std	Std	Small	Std	Small	Std	Small	Std	Small
WHEEL DIAMETER (in.)	20	25	22 ³ / ₈	25	25	27 ⁵ / ₈	27 ⁵ / ₈	30 ¹ / ₄	27 ⁵ / ₈
MIN INLET CONE DIAMETER (in.)	16.25	21 ⁵ / ₁₆	18 ¹ / ₁₆	21 ⁵ / ₁₆	21 ⁵ / ₁₆	23 ¹⁵ / ₁₆	23 ¹⁵ / ₁₆	26 ³ / ₈	23 ¹⁵ / ₁₆
MAX SPEED (rpm)									
Class I	960	751	884	751	770	656	684	618	656
Class II	1217	960	1119	960	980	865	873	793	865
FAN SHAFT DIAMETER (in.)									
Class I	1 ¹¹ / ₁₆	1 ¹¹ / ₁₆	1 ⁷ / ₁₆	1 ¹¹ / ₁₆	1 ¹¹ / ₁₆	1 ¹¹ / ₁₆	1 ¹¹ / ₁₆	1 ¹¹ / ₁₆	1 ¹¹ / ₁₆
Class II	1 ¹¹ / ₁₆	2 ⁷ / ₁₆	2 ³ / ₁₆	2 ⁷ / ₁₆	2 ⁷ / ₁₆	2 ⁷ / ₁₆	2 ⁷ / ₁₆	2 ¹¹ / ₁₆	2 ⁷ / ₁₆
Fan Shaft Weight (lb) Class II	23.5	61.1	42.4	60.3	53.3	71.8	64.5	90.1	71.8
FAN WHEEL WEIGHT (lb)									
Class I	53.0	81.0	63.0	81.0	73.0	111.0	101.0	128.0	111.0
Class II	53.0	81.0	63.0	81.0	73.0	111.0	101.0	128.0	111.0
No. Fan Blades	37	37	37	37	37	37	37	37	37
MOTOR FRAME SIZE									
Maximum (ODP/TEFC)	256T	256T	286T	284T	286T	286T	324T	324T	326T
Minimum (ODP/TEFC)	182T	182T	254T	184T	254T	184T	254T	184T	256T
MOTOR HP									
Maximum	20	20	30	25	30	30	40	40	50
Minimum	3	3	15	5	15	5	15	5	20

LEGEND

ODP — Open Dripproof
 TEFC — Totally Enclosed Fan Cooled

NOTE: Data is for 50 Hz and 60 Hz motors.

Table 3 — Coil Data

39M UNIT SIZE	03	06	08	10	12	14	17	21	25	30	36	40	50	61
1/2-IN. CHILLED WATER/DIRECT EXPANSION														
Large Face Area														
Nominal Capacity (cfm) at 500 fpm	1,736	2,951	3,819	4,965	6,319	7,170	8,464	10,720	12,205	15,174	18,333	20,000	25,278	30,694
Lower Coil Height (in.)	25	25	27.5	27.5	35	35	37.5	47.5	47.5	47.5	55	30	35	42.5
Upper Coil Height (in.)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	30	35	42.5
Length (in.)	20	34	40	52	52	59	65	65	74	92	96	96	104	104
Total Face Area (sq ft)	3.5	5.9	7.6	9.9	12.6	14.3	16.9	21.4	24.4	30.3	36.7	40.0	50.6	61.4
Medium Face Area														
Nominal Capacity (cfm) at 500 fpm	1,215	2,066	2,778	3,611	4,965	6,146	6,771	9,028	10,278	12,778	15,000	18,333	19,861	25,278
Lower Coil Height (in.)	17.5	17.5	20	20	27.5	30	30	40	40	40	45	55	55	35
Upper Coil Height (in.)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	35
Length (in.)	20	34	40	52	52	59	65	65	74	92	96	96	104	104
Total Face Area (sq ft)	2.4	4.1	5.6	7.2	9.9	12.3	13.5	18.1	20.6	25.6	30.0	36.7	39.7	50.6
Bypass Face Area (Internal Chilled Water Only)														
Nominal Capacity (cfm) at 500 fpm	1,042	1,771	2,431	3,160	4,514	5,122	6,207	7,899	8,993	11,181	12,500	15,000	16,250	19,861
Height (in.)	15	15	17.5	17.5	25	25	27.5	35	35	35	37.5	45	45	55
Length (in.)	20	34	40	52	52	59	65	65	74	92	96	96	104	104
Total Face Area (sq ft)	2.1	3.5	4.9	6.3	9.0	10.2	12.4	15.8	18.0	22.4	25.0	30.0	32.5	39.7
1/2-IN. HOT WATER HEATING														
Large Face Area														
Nominal Capacity (cfm) at 700 fpm	2,431	4,132	5,347	6,951	8,847	10,038	11,849	15,009	17,087	21,243	25,667	28,000	35,389	42,972
Lower Coil Height (in.)	25	25	27.5	27.5	35	35	37.5	47.5	47.5	47.5	55	30	35	42.5
Upper Coil Height (in.)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	30	35	42.5
Length (in.)	20	34	40	52	52	59	65	65	74	92	96	96	104	104
Total Face Area (sq ft)	3.5	5.9	7.6	9.9	12.6	14.3	16.9	21.4	24.4	30.3	36.7	40.0	50.6	61.4
Medium Face Area														
Nominal Capacity (cfm) at 700 fpm	1,701	2,892	3,889	5,056	6,951	8,604	9,479	12,639	14,389	17,889	21,000	25,667	27,806	35,389
Lower Coil Height (in.)	17.5	17.5	20	20	27.5	30	30	40	40	40	45	55	55	35
Upper Coil Height (in.)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	35
Length (in.)	20	34	40	52	52	59	65	65	74	92	96	96	104	104
Total Face Area (sq ft)	2.4	4.1	5.6	7.2	9.9	12.3	13.5	18.1	20.6	25.6	30.0	36.7	39.7	50.6
Small Face Area														
Nominal Capacity (cfm) at 700 fpm	—	2,479	2,917	3,792	4,424	5,019	6,319	7,109	8,094	10,063	14,000	14,000	17,694	21,486
Height (in.)	—	15	15	15	17.5	17.5	20	22.5	22.5	22.5	30	30	35	42.5
Length (in.)	—	34	40	52	52	59	65	65	74	92	96	96	104	104
Total Face Area (sq ft)	—	3.5	4.2	5.4	6.3	7.2	9.0	10.2	11.6	14.4	20.0	20.0	25.3	30.7
Bypass Face Area (Internal)														
Nominal Capacity (cfm) at 700 fpm	1,458	2,479	3,403	4,424	6,319	7,170	8,689	11,059	12,590	15,653	17,500	21,000	22,750	27,806
Height (in.)	15	15	17.5	17.5	25	25	27.5	35	35	35	37.5	45	45	55
Length (in.)	20	34	40	52	52	59	65	65	74	92	96	96	104	104
Total Face Area (sq ft)	2.1	3.5	4.9	6.3	9.0	10.2	12.4	15.8	18.0	22.4	25.0	30.0	32.5	39.7
5/8-IN. STEAM HEATING														
Large Face Area														
Nominal Capacity (cfm) at 700 fpm	2,333	3,967	5,250	6,825	8,342	9,465	11,375	14,219	16,188	—	—	—	—	—
Lower Coil Height (in.)	24	24	27	27	33	33	36	45	45	—	—	—	—	—
Upper Coil Height (in.)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	—	—	—	—	—
Length (in.)	20	34	40	52	52	59	65	65	74	—	—	—	—	—
Total Face Area (sq ft)	3.3	5.7	7.5	9.8	11.9	13.5	16.3	20.3	23.1	—	—	—	—	—
Medium Face Area														
Nominal Capacity (cfm) at 700 fpm	1,458	2,479	3,500	4,550	6,825	8,604	9,479	12,323	14,029	—	—	—	—	—
Lower Coil Height (in.)	15	15	18	18	27	30	30	39	39	—	—	—	—	—
Upper Coil Height (in.)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	—	—	—	—	—
Length (in.)	20	34	40	52	52	59	65	65	74	—	—	—	—	—
Total Face Area (sq ft)	2.1	3.5	5.0	6.5	9.8	12.3	13.5	17.6	20.0	—	—	—	—	—
Small Face Area														
Nominal Capacity (cfm) at 700 fpm	—	2,479	2,917	3,792	3,792	4,302	5,688	6,635	7,554	—	—	—	—	—
Height (in.)	—	15	15	15	15	15	18	21	21	—	—	—	—	—
Length (in.)	—	34	40	52	52	59	65	65	74	—	—	—	—	—
Total Face Area (sq ft)	—	3.5	4.2	5.4	5.4	6.1	8.1	9.5	10.8	—	—	—	—	—
Bypass Face Area (Internal)														
Nominal Capacity (cfm) at 700 fpm	1,458	2,479	2,917	3,792	6,067	6,883	8,531	10,427	11,871	—	—	—	—	—
Height (in.)	15	15	15	15	24	24	27	33	33	—	—	—	—	—
Length (in.)	20	34	40	52	52	59	65	65	74	—	—	—	—	—
Total Face Area (sq ft)	2.1	3.5	4.2	5.4	8.7	9.8	12.2	14.9	17.0	—	—	—	—	—

Table 3 — Coil Data (cont)

39M UNIT SIZE	03	06	08	10	12	14	17	21	25	30	36	40	50	61
5/8-IN. CHILLED WATER														
Large Face Area														
Nominal Capacity (cfm) at 500 fpm	1,667	2,833	3,750	4,875	5,958	6,760	8,125	10,156	11,563	14,375	18,000	20,000	24,917	30,333
Lower Coil Height (in.)	24	24	27	27	33	33	36	45	45	45	54	30	36	42
Upper Coil Height (in.)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	30	33	42
Length (in.)	20	34	40	52	52	59	65	65	74	92	96	96	104	104
Total Face Area (sq ft)	3.3	5.7	7.5	9.8	11.9	13.5	16.3	20.3	23.1	28.8	36.0	40.0	49.8	60.7
Medium Face Area														
Nominal Capacity (cfm) at 500 fpm	1,042	1,771	2,500	3,250	4,875	6,146	6,771	8,802	10,021	12,458	15,000	18,000	19,500	24,917
Lower Coil Height (in.)	15	15	18	18	27	30	30	39	39	39	45	54	54	36
Upper Coil Height (in.)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	33
Length (in.)	20	34	40	52	52	59	65	65	74	92	96	96	104	104
Total Face Area (sq ft)	2.1	3.5	5.0	6.5	9.8	12.3	13.5	17.6	20.0	24.9	30.0	36.0	39.0	49.8
Bypass Face Area (Internal Chilled Water Only)														
Nominal Capacity (cfm) at 500 fpm	1,042	1,771	2,083	2,708	4,333	4,917	6,094	7,448	8,479	10,542	12,000	15,000	16,250	19,500
Height (in.)	15	15	15	15	24	24	27	33	33	33	36	45	45	54
Length (in.)	20	34	40	52	52	59	65	65	74	92	96	96	104	104
Total Face Area (sq ft)	2.1	3.5	4.2	5.4	8.7	9.8	12.2	14.9	17.0	21.1	24.0	30.0	32.5	39.0
5/8-IN. HOT WATER HEATING														
Large Face Area														
Nominal Capacity (cfm) at 700 fpm	2,333	3,967	5,250	6,825	8,342	9,465	11,375	14,219	16,188	20,125	25,200	28,000	34,883	42,467
Lower Coil Height (in.)	24	24	27	27	33	33	36	45	45	45	54	30	36	42
Upper Coil Height (in.)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	30	33	42
Length (in.)	20	34	40	52	52	59	65	65	74	92	96	96	104	104
Total Face Area (sq ft)	3.3	5.7	7.5	9.8	11.9	13.5	16.3	20.3	23.1	28.8	36.0	40.0	49.8	60.7
Medium Face Area														
Nominal Capacity (cfm) at 700 fpm	1,458	2,479	3,500	4,550	6,825	8,604	9,479	12,323	14,029	17,442	21,000	25,200	27,300	34,883
Lower Coil Height (in.)	15	15	18	18	27	30	30	39	39	39	45	54	54	36
Upper Coil Height (in.)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	33
Length (in.)	20	34	40	52	52	59	65	65	74	92	96	96	104	104
Total Face Area (sq ft)	2.1	3.5	5.0	6.5	9.8	12.3	13.5	17.6	20.0	24.9	30.0	36.0	39.0	49.8
Small Face Area														
Nominal Capacity (cfm) at 700 fpm	—	2,479	2,917	3,792	3,792	4,302	5,688	6,635	7,554	9,392	14,000	14,000	16,683	21,233
Height (in.)	—	15	15	15	15	15	18	21	21	21	30	30	33	42
Length (in.)	—	34	40	52	52	59	65	65	74	92	96	96	104	104
Total Face Area (sq ft)	—	3.5	4.2	5.4	5.4	6.1	8.1	9.5	10.8	13.4	20.0	20.0	23.8	30.3
Bypass Face Area (Internal)														
Nominal Capacity (cfm) at 700 fpm	1,458	2,479	2,917	3,792	6,067	6,883	8,531	10,427	11,871	14,758	16,800	21,000	22,750	27,300
Height (in.)	15	15	15	15	24	24	27	33	33	33	36	45	45	54
Length (in.)	20	34	40	52	52	59	65	65	74	92	96	96	104	104
Total Face Area (sq ft)	2.1	3.5	4.2	5.4	8.7	9.8	12.2	14.9	17.0	21.1	24.0	30.0	32.5	39.0
1-IN. STEAM HEATING														
Large Face Area														
Nominal Capacity (cfm) at 700 fpm	2,333	3,967	5,250	6,825	8,342	9,465	11,375	14,219	16,188	20,125	25,200	28,000	34,883	42,467
Lower Coil Height (in.)	24	24	27	27	33	33	36	45	45	45	54	30	36	42
Upper Coil Height (in.)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	30	33	42
Length (in.)	20	34	40	52	52	59	65	65	74	92	96	96	104	104
Total Face Area (sq ft)	3.3	5.7	7.5	9.8	11.9	13.5	16.3	20.3	23.1	28.8	36.0	40.0	49.8	60.7
Medium Face Area														
Nominal Capacity (cfm) at 700 fpm	1,458	2,479	3,500	4,550	6,825	8,604	9,479	12,323	14,029	17,442	21,000	25,200	27,300	34,883
Lower Coil Height (in.)	15	15	18	18	27	30	30	39	39	39	45	54	54	36
Upper Coil Height (in.)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	33
Length (in.)	20	34	40	52	52	59	65	65	74	92	96	96	104	104
Total Face Area (sq ft)	2.1	3.5	5.0	6.5	9.8	12.3	13.5	17.6	20.0	24.9	30.0	36.0	39.0	49.8
Small Face Area														
Nominal Capacity (cfm) at 700 fpm	—	2,479	2,917	3,792	3,792	4,302	5,688	6,635	7,554	9,392	14,000	14,000	16,683	21,233
Height (in.)	—	15	15	15	15	15	18	21	21	21	30	30	33	42
Length (in.)	—	34	40	52	52	59	65	65	74	92	96	96	104	104
Total Face Area (sq ft)	—	3.5	4.2	5.4	5.4	6.1	8.1	9.5	10.8	13.4	20.0	20.0	23.8	30.3
Bypass Face Area (Internal)														
Nominal Capacity (cfm) at 700 fpm	1,458	2,479	2,917	3,792	6,067	6,883	8,531	10,427	11,871	14,758	16,800	21,000	22,750	27,300
Height (in.)	15	15	15	15	24	24	27	33	33	33	36	45	45	54
Length (in.)	20	34	40	52	52	59	65	65	74	92	96	96	104	104
Total Face Area (sq ft)	2.1	3.5	4.2	5.4	8.7	9.8	12.2	14.9	17.0	21.1	24.0	30.0	32.5	39.0

Table 4 — Direct-Expansion Circuiting Data
Medium Face Area Coils

39M UNIT SIZE	03			06			08			10			12			14		
	Quarter	Half	Full	Quarter	Half	Full	Quarter	Half	Full	Quarter	Half	Full	Quarter	Half	Full	Quarter	Half	Full
CIRCUITING TYPE																		
Airflow (cfm) at 500 fpm	1,215			2,066			2,778			3,611			4,965			6,146		
Total Face Area (sq ft)	2.4			4.1			5.6			7.2			9.9			12.3		
Tubes in Face	14	14	14	14	14	14	16	16	16	16	16	16	22	22	22	24	24	24
Tube Length (in.)	20	20	20	34	34	34	40	40	40	52	52	52	52	52	52	59	59	59
No. of Circuits - Total	4	7	14	4	7	14	4	8	16	4	8	16	6	11	22	6	12	24
4-Row Coil																		
Face Split Coils																		
No. of TXVs	2	2	—	2	2	—	2	2	—	2	2	—	2	2	2	2	2	2
Suction Connections (in. OD)	7/8	7/8	—	7/8	7/8	—	7/8	7/8	—	7/8	7/8	—	7/8	1 1/8	1 3/8	7/8	1 1/8	1 3/8
Distributor Connections (in. OD)	7/8	7/8	—	7/8	7/8	—	7/8	7/8	—	7/8	7/8	—	7/8	7/8	1 1/8	7/8	7/8	1 3/8
Distributor Nozzle Size*	G-1.5	G-2.5/G-2	—	G-1.5	G-2.5/G-2	—	G-1.5	G-2.5	—	G-1.5	G-2.5	—	G-2	G-4/G-3	E-12	G-2	G-4	C-12
Intertwined Row Split Coils																		
No. of TXVs	2	2	—	2	2	—	2	2	—	2	2	—	2	2	—	2	2	—
Suction Connections (in. OD)	7/8	7/8	—	7/8	7/8	—	7/8	7/8	—	7/8	7/8	—	7/8	1 1/8	—	7/8	1 1/8	—
Distributor Connections (in. OD)	7/8	7/8	—	7/8	7/8	—	7/8	7/8	—	7/8	7/8	—	7/8	7/8	—	7/8	7/8	—
Distributor Nozzle Size*	G-1.5	G-2.5/G-2	—	G-1.5	G-2.5/G-2	—	G-1.5	G-2.5	—	G-1.5	G-2.5	—	G-2	G-4/G-3	—	G-2	G-4	—
Single-Circuit Coils																		
No. of TXVs	1	1	—	1	1	—	1	1	—	1	1	—	1	1	—	1	1	—
Suction Connections (in. OD)	7/8	1 1/8	—	7/8	1 1/8	—	7/8	1 1/8	—	7/8	1 1/8	—	1 1/8	1 3/8	—	1 1/8	1 3/8	—
Distributor Connections (in. OD)	7/8	7/8	—	7/8	7/8	—	7/8	7/8	—	7/8	7/8	—	7/8	1 1/8	—	7/8	1 3/8	—
Distributor Nozzle Size	G-2.5	G-6	—	G-2.5	G-6	—	G-2.5	G-8	—	G-2.5	G-8	—	G-4	E-12	—	G-4	C-12	—
6-Row Coil																		
Face Split Coils																		
No. of TXVs	2	2	—	2	2	—	2	2	2	2	2	2	2	2	2	—	2	2
Suction Connections (in. OD)	7/8	7/8	—	7/8	7/8	—	7/8	7/8	1 1/8	7/8	7/8	1 1/8	7/8	1 1/8	1 3/8	—	1 1/8	1 3/8
Distributor Connections (in. OD)	7/8	7/8	—	7/8	7/8	—	7/8	7/8	7/8	7/8	7/8	7/8	7/8	7/8	1 1/8	—	7/8	1 3/8
Distributor Nozzle Size*	G-1.5	G-2.5/G-2	—	G-1.5	G-2.5/G-2	—	G-1.5	G-2.5	G-8	G-1.5	G-2.5	G-8	G-2	G-4/G-3	E-12	—	G-4	C-12
Intertwined Row Split Coils																		
No. of TXVs	2	2	—	2	2	—	2	2	—	2	2	—	2	2	2	—	2	2
Suction Connections (in. OD)	7/8	7/8	—	7/8	7/8	—	7/8	7/8	—	7/8	7/8	—	7/8	1 1/8	1 3/8	—	1 1/8	1 3/8
Distributor Connections (in. OD)	7/8	7/8	—	7/8	7/8	—	7/8	7/8	—	7/8	7/8	—	7/8	7/8	1 1/8	—	7/8	1 3/8
Distributor Nozzle Size*	G-1.5	G-2.5/G-2	—	G-1.5	G-2.5/G-2	—	G-1.5	G-2.5	—	G-1.5	G-2.5	—	G-2	G-4/G-3	E-12	—	G-4	C-12
Single-Circuit Coils																		
No. of TXVs	1	1	—	1	1	—	1	1	—	1	1	—	1	1	—	—	1	—
Suction Connections (in. OD)	7/8	1 1/8	—	7/8	1 1/8	—	7/8	1 1/8	—	7/8	1 1/8	—	1 1/8	1 3/8	—	—	1 3/8	—
Distributor Connections (in. OD)	7/8	7/8	—	7/8	7/8	—	7/8	7/8	—	7/8	7/8	—	7/8	1 1/8	—	—	1 3/8	—
Distributor Nozzle Size	G-2.5	G-6	—	G-2.5	G-6	—	G-2.5	G-8	—	G-2.5	G-8	—	G-4	E-12	—	—	C-12	—
8-Row Coil																		
Face Split Coils																		
No. of TXVs	—	2	2	—	2	2	—	2	2	—	2	2	—	2	2	—	2	2
Suction Connections (in. OD)	—	7/8	1 1/8	—	7/8	1 1/8	—	7/8	1 1/8	—	7/8	1 1/8	—	1 1/8	1 3/8	—	1 1/8	1 3/8
Distributor Connections (in. OD)	—	7/8	7/8	—	7/8	7/8	—	7/8	7/8	—	7/8	7/8	—	7/8	1 1/8	—	7/8	1 3/8
Distributor Nozzle Size*	—	G-2.5/G-2	G-6	—	G-2.5/G-2	G-6	—	G-2.5	G-8	—	G-2.5	G-8	—	G-4/G-3	E-12	—	G-4	C-12
Intertwined Row Split Coils																		
No. of TXVs	—	2	—	—	2	2	—	2	2	—	2	2	—	2	2	—	2	2
Suction Connections (in. OD)	—	7/8	—	—	7/8	1 1/8	—	7/8	1 1/8	—	7/8	1 1/8	—	1 1/8	1 3/8	—	1 1/8	1 3/8
Distributor Connections (in. OD)	—	7/8	—	—	7/8	7/8	—	7/8	7/8	—	7/8	7/8	—	7/8	1 1/8	—	7/8	1 3/8
Distributor Nozzle Size*	—	G-2.5/G-2	—	—	G-2.5/G-2	G-6	—	G-2.5	G-8	—	G-2.5	G-8	—	G-4/G-3	E-12	—	G-4	C-12
Single-Circuit Coils																		
No. of TXVs	1	1	—	—	1	—	—	1	—	—	1	—	—	1	—	—	1	—
Suction Connections (in. OD)	7/8	1 1/8	—	—	1 1/8	—	—	1 1/8	—	—	1 1/8	—	—	1 3/8	—	—	1 3/8	—
Distributor Connections (in. OD)	7/8	7/8	—	—	7/8	—	—	7/8	—	—	7/8	—	—	1 1/8	—	—	1 3/8	—
Distributor Nozzle Size	G-2.5	G-6	—	—	G-6	—	—	G-8	—	—	G-8	—	—	E-12	—	—	C-12	—

LEGEND

TXV — Thermostatic Expansion Valve (Field Supplied)

*When 2 nozzle sizes are listed, the smaller nozzle should be located on the upper distributor.

NOTE: Factory-supplied distributors have factory-selected nozzle sizes as shown. If necessary, replace factory-supplied nozzles with field-supplied and installed nozzles. Consult AHUBuilder® software selection program for correct nozzle selection.

Table 4 — Direct-Expansion Circuiting Data (cont)
Medium Face Area Coils (cont)

CIRCUITING TYPE	17		21			25			30			36		40		50		61				
	Half	Full	Half	Full	Double	Half	Full	Double	Half	Full	Double	Full	Double	Full	Double	Full	Double	Full	Double	Upper	Lower	Upper
Airflow (cfm) at 500 fpm	6,771		9,028			10,278			12,778			15,000		18,333		19,861		25,278				
Total Face Area (sq ft)	13.5		18.1			20.6			25.6			30.0		36.7		39.7		50.6				
Tubes in Face	24	24	32	32	32	32	32	32	32	32	32	36	36	44	44	44	44	28	28	28	28	
Tube Length (in.)	65	65	65	65	65	72	72	72	92	92	92	96	96	60	60	104	104	104	104	104	104	104
No. of Circuits - Total	12	24	16	32	64	16	32	64	16	32	64	36	72	44	88	44	88	28	28	56	56	
4-Row Coil																						
Face Split Coils																						
No. of TXVs	2	2	2	2	—	2	2	—	2	2	—	2	—	4	—	4	—	2	2	—	—	
Suction Connections (in. OD)	1 ¹ / ₈	1 ³ / ₈	1 ¹ / ₈	1 ⁵ / ₈	—	1 ¹ / ₈	1 ⁵ / ₈	—	1 ¹ / ₈	1 ⁵ / ₈	—	1 ⁵ / ₈	—	1 ³ / ₈	—	1 ³ / ₈	—	1 ⁵ / ₈	1 ⁵ / ₈	—	—	
Distributor Connections (in. OD)	7 ⁸ / ₈	1 ³ / ₈	7 ⁸ / ₈	1 ³ / ₈	—	7 ⁸ / ₈	1 ³ / ₈	—	7 ⁸ / ₈	1 ³ / ₈	—	1 ³ / ₈	—	1 ¹ / ₈	—	1 ¹ / ₈	—	1 ³ / ₈	1 ³ / ₈	—	—	
Distributor Nozzle Size*	G-4	C-12	G-8	C-17	—	G-8	C-17	—	G-8	C-17	—	C-17	—	E-12	—	E-12	—	C-15	C-15	—	—	
Intertwined Row Split Coils																						
No. of TXVs	2	2	2	2	—	2	2	—	2	2	—	2	—	4	—	4	—	2	2	—	—	
Suction Connections (in. OD)	1 ¹ / ₈	1 ³ / ₈	1 ¹ / ₈	1 ⁵ / ₈	—	1 ¹ / ₈	1 ⁵ / ₈	—	1 ¹ / ₈	1 ⁵ / ₈	—	1 ⁵ / ₈	—	1 ³ / ₈	—	1 ³ / ₈	—	1 ⁵ / ₈	1 ⁵ / ₈	—	—	
Distributor Connections (in. OD)	7 ⁸ / ₈	1 ³ / ₈	7 ⁸ / ₈	1 ³ / ₈	—	7 ⁸ / ₈	1 ³ / ₈	—	7 ⁸ / ₈	1 ³ / ₈	—	1 ³ / ₈	—	1 ¹ / ₈	—	1 ¹ / ₈	—	1 ³ / ₈	1 ³ / ₈	—	—	
Distributor Nozzle Size*	G-4	C-12	G-8	C-17	—	G-8	C-17	—	G-8	C-17	—	C-17	—	E-12	—	E-12	—	C-15	C-15	—	—	
Single-Circuit Coils																						
No. of TXVs	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
Suction Connections (in. OD)	1 ³ / ₈	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
Distributor Connections (in. OD)	1 ³ / ₈	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
Distributor Nozzle Size	C-12	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
6-Row Coil																						
Face Split Coils																						
No. of TXVs	2	2	2	2	—	2	2	—	2	2	—	2	—	4	—	4	—	2	2	—	—	
Suction Connections (in. OD)	1 ¹ / ₈	1 ³ / ₈	1 ¹ / ₈	1 ⁵ / ₈	—	1 ¹ / ₈	1 ⁵ / ₈	—	1 ¹ / ₈	1 ⁵ / ₈	—	1 ⁵ / ₈	—	1 ³ / ₈	—	1 ³ / ₈	—	1 ⁵ / ₈	1 ⁵ / ₈	—	—	
Distributor Connections (in. OD)	7 ⁸ / ₈	1 ³ / ₈	7 ⁸ / ₈	1 ³ / ₈	—	7 ⁸ / ₈	1 ³ / ₈	—	7 ⁸ / ₈	1 ³ / ₈	—	1 ³ / ₈	—	1 ¹ / ₈	—	1 ¹ / ₈	—	1 ³ / ₈	1 ³ / ₈	—	—	
Distributor Nozzle Size*	G-4	C-12	G-8	C-17	—	G-8	C-17	—	G-8	C-17	—	C-17	—	E-12	—	E-12	—	C-15	C-15	—	—	
Intertwined Row Split Coils																						
No. of TXVs	2	2	2	2	—	2	2	—	2	2	—	2	—	4	—	4	—	2	2	—	—	
Suction Connections (in. OD)	1 ¹ / ₈	1 ³ / ₈	1 ¹ / ₈	1 ⁵ / ₈	—	1 ¹ / ₈	1 ⁵ / ₈	—	1 ¹ / ₈	1 ⁵ / ₈	—	1 ⁵ / ₈	—	1 ³ / ₈	—	1 ³ / ₈	—	1 ⁵ / ₈	1 ⁵ / ₈	—	—	
Distributor Connections (in. OD)	7 ⁸ / ₈	1 ³ / ₈	7 ⁸ / ₈	1 ³ / ₈	—	7 ⁸ / ₈	1 ³ / ₈	—	7 ⁸ / ₈	1 ³ / ₈	—	1 ³ / ₈	—	1 ¹ / ₈	—	1 ¹ / ₈	—	1 ³ / ₈	1 ³ / ₈	—	—	
Distributor Nozzle Size*	G-4	C-12	G-8	C-17	—	G-8	C-17	—	G-8	C-17	—	C-17	—	E-12	—	E-12	—	C-15	C-15	—	—	
Single-Circuit Coils																						
No. of TXVs	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
Suction Connections (in. OD)	1 ³ / ₈	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
Distributor Connections (in. OD)	1 ³ / ₈	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
Distributor Nozzle Size	C-12	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
8-Row Coil																						
Face Split Coils																						
No. of TXVs	2	2	2	2	4	2	2	4	2	2	4	2	4	4	8	4	8	2	2	4	4	
Suction Connections (in. OD)	1 ¹ / ₈	1 ³ / ₈	1 ¹ / ₈	1 ⁵ / ₈	1 ⁵ / ₈	1 ¹ / ₈	1 ⁵ / ₈	1 ⁵ / ₈	1 ¹ / ₈	1 ⁵ / ₈	1 ⁵ / ₈	1 ⁵ / ₈	1 ⁵ / ₈	1 ³ / ₈	1 ³ / ₈	1 ³ / ₈	1 ³ / ₈	1 ⁵ / ₈	1 ⁵ / ₈	1 ⁵ / ₈	1 ⁵ / ₈	
Distributor Connections (in. OD)	7 ⁸ / ₈	1 ³ / ₈	7 ⁸ / ₈	1 ³ / ₈	1 ³ / ₈	7 ⁸ / ₈	1 ³ / ₈	1 ³ / ₈	7 ⁸ / ₈	1 ³ / ₈	1 ³ / ₈	1 ³ / ₈	1 ³ / ₈	1 ³ / ₈	1 ¹ / ₈	1 ¹ / ₈	1 ¹ / ₈	1 ³ / ₈	1 ³ / ₈	1 ³ / ₈	1 ³ / ₈	
Distributor Nozzle Size*	G-4	C-12	G-8	C-17	C-17	G-8	C-17	C-17	G-8	C-17	C-17	C-17	C-17	C-17	E-12	E-12	E-12	C-15	C-15	C-15	C-15	
Intertwined Row Split Coils																						
No. of TXVs	2	2	—	2	4	—	2	4	—	2	4	2	4	4	8	4	8	2	2	4	4	
Suction Connections (in. OD)	1 ¹ / ₈	1 ³ / ₈	—	1 ⁵ / ₈	1 ⁵ / ₈	—	1 ⁵ / ₈	1 ⁵ / ₈	—	1 ⁵ / ₈	1 ⁵ / ₈	1 ⁵ / ₈	1 ⁵ / ₈	1 ³ / ₈	1 ³ / ₈	1 ³ / ₈	1 ³ / ₈	1 ⁵ / ₈	1 ⁵ / ₈	1 ⁵ / ₈	1 ⁵ / ₈	
Distributor Connections (in. OD)	7 ⁸ / ₈	1 ³ / ₈	—	1 ³ / ₈	1 ³ / ₈	—	1 ³ / ₈	1 ³ / ₈	—	1 ³ / ₈	1 ³ / ₈	1 ³ / ₈	1 ³ / ₈	1 ¹ / ₈	1 ¹ / ₈	1 ¹ / ₈	1 ¹ / ₈	1 ³ / ₈	1 ³ / ₈	1 ³ / ₈	1 ³ / ₈	
Distributor Nozzle Size*	G-4	C-12	—	C-17	C-17	—	C-17	C-17	—	C-17	C-17	C-17	C-17	E-12	E-12	E-12	E-12	C-15	C-15	C-15	C-15	
Single-Circuit Coils																						
No. of TXVs	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
Suction Connections (in. OD)	1 ³ / ₈	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
Distributor Connections (in. OD)	1 ³ / ₈	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
Distributor Nozzle Size	C-12	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	

LEGEND

TXV — Thermostatic Expansion Valve (Field Supplied)

*When 2 nozzle sizes are listed, the smaller nozzle should be located on the upper distributor.

NOTE: Factory-supplied distributors have factory-selected nozzle sizes as shown. If necessary, replace factory-supplied nozzles with field-supplied and installed nozzles. Consult **AHUBuilder®** software selection program for correct nozzle selection.

Table 4 — Direct-Expansion Circuiting Data (cont)
Large Face Area Coil

39M UNIT SIZE	03			06			08			10			12			14		
	Quarter	Half	Full	Quarter	Half	Full	Quarter	Half	Full	Quarter	Half	Full	Quarter	Half	Full	Quarter	Half	Full
CIRCUITING TYPE																		
Airflow (cfm) at 500 fpm	1,736			2,951			3,819			4,965			6,319			7,170		
Total Face Area (sq ft)	3.5			5.9			7.6			9.9			12.6			14.3		
Tubes in Face	20	20	20	20	20	20	22	22	22	22	22	22	28	28	28	28	28	28
Tube Length (in.)	20	20	20	34	34	34	40	40	40	52	52	52	52	52	52	59	59	59
No. of Circuits - Total	4	10	20	4	10	20	6	11	22	6	11	22	7	14	28	7	14	28
4-Row Coil																		
Face Split Coils																		
No. of TXVs	2	2	—	2	2	—	2	2	—	2	2	—	2	2	2	2	2	2
Suction Connections (in. OD)	7/8	1 1/8	—	7/8	1 1/8	—	7/8	1 1/8	—	7/8	1 1/8	—	7/8	1 1/8	1 5/8	7/8	1 1/8	1 5/8
Distributor Connections (in. OD)	7/8	7/8	—	7/8	7/8	—	7/8	7/8	—	7/8	7/8	—	7/8	7/8	1 3/8	7/8	7/8	1 3/8
Distributor Nozzle Size*	G-1.5	G-3	—	G-1.5	G-3	—	G-2	G-4/G-3	—	G-2	G-4/G-3	—	G-2.5/G-2	G-6	C-15	G-2.5/G-2	G-6	C-15
Intertwined Row Split Coils																		
No. of TXVs	2	2	—	2	2	—	2	2	—	2	2	—	2	2	—	2	2	—
Suction Connections (in. OD)	7/8	1 1/8	—	7/8	1 1/8	—	7/8	1 1/8	—	7/8	1 1/8	—	7/8	1 1/8	—	7/8	1 1/8	—
Distributor Connections (in. OD)	7/8	7/8	—	7/8	7/8	—	7/8	7/8	—	7/8	7/8	—	7/8	7/8	—	7/8	7/8	—
Distributor Nozzle Size*	G-1.5	G-3	—	G-1.5	G-3	—	G-2	G-4/G-3	—	G-2	G-4/G-3	—	G-2.5/G-2	G-6	—	G-2.5/G-2	G-6	—
Single-Circuit Coils																		
No. of TXVs	1	1	—	1	1	—	1	1	—	1	1	—	1	1	—	1	1	—
Suction Connections (in. OD)	1 1/8	1 3/8	—	1 1/8	1 3/8	—	1 1/8	1 3/8	—	1 1/8	1 3/8	—	1 1/8	1 5/8	—	1 1/8	1 5/8	—
Distributor Connections (in. OD)	7/8	1 1/8	—	7/8	1 1/8	—	7/8	1 1/8	—	7/8	1 1/8	—	7/8	1 3/8	—	7/8	1 3/8	—
Distributor Nozzle Size	G-3	E-10	—	G-3	E-10	—	G-4	E-12	—	G-4	E-12	—	G-6	C-15	—	G-6	C-15	—
6-Row Coil																		
Face Split Coils																		
No. of TXVs	2	2	—	2	2	—	2	2	2	2	2	—	2	2	—	2	2	—
Suction Connections (in. OD)	7/8	1 1/8	—	7/8	1 1/8	—	7/8	1 1/8	1 3/8	7/8	1 1/8	1 3/8	—	1 1/8	1 5/8	—	1 1/8	1 5/8
Distributor Connections (in. OD)	7/8	7/8	—	7/8	7/8	—	7/8	7/8	1 1/8	7/8	1 1/8	—	7/8	1 3/8	—	7/8	1 3/8	—
Distributor Nozzle Size*	G-1.5	G-3	—	G-1.5	G-3	—	G-2	G-4/G-3	E-12	G-2	G-4/G-3	E-12	—	G-6	C-15	—	G-6	C-15
Intertwined Row Split Coils																		
No. of TXVs	2	2	—	2	2	—	2	2	2	2	2	—	2	2	—	2	2	—
Suction Connections (in. OD)	7/8	1 1/8	—	7/8	1 1/8	—	7/8	1 1/8	1 3/8	7/8	1 1/8	1 3/8	—	1 1/8	1 5/8	—	1 1/8	1 5/8
Distributor Connections (in. OD)	7/8	7/8	—	7/8	7/8	—	7/8	7/8	1 1/8	7/8	1 1/8	—	7/8	1 3/8	—	7/8	1 3/8	—
Distributor Nozzle Size*	G-1.5	G-3	—	G-1.5	G-3	—	G-2	G-4/G-3	E-12	G-2	G-4/G-3	E-12	—	G-6	C-15	—	G-6	C-15
Single-Circuit Coils																		
No. of TXVs	1	1	—	1	1	—	1	1	—	1	1	—	—	1	—	—	1	—
Suction Connections (in. OD)	1 1/8	1 3/8	—	1 1/8	1 3/8	—	1 1/8	1 3/8	—	1 1/8	1 3/8	—	—	1 5/8	—	—	1 5/8	—
Distributor Connections (in. OD)	7/8	1 1/8	—	7/8	1 1/8	—	7/8	1 1/8	—	7/8	1 1/8	—	—	1 3/8	—	—	1 3/8	—
Distributor Nozzle Size	G-3	E-10	—	G-3	E-10	—	G-4	E-12	—	G-4	E-12	—	—	C-15	—	—	C-15	—
8-Row Coil																		
Face Split Coils																		
No. of TXVs	—	2	2	—	2	2	—	2	2	—	2	2	—	2	2	—	2	2
Suction Connections (in. OD)	—	1 1/8	1 3/8	—	1 1/8	1 3/8	—	1 1/8	1 3/8	—	1 1/8	1 3/8	—	1 1/8	1 5/8	—	1 1/8	1 5/8
Distributor Connections (in. OD)	—	7/8	1 1/8	—	7/8	1 1/8	—	7/8	1 1/8	—	7/8	1 1/8	—	7/8	1 3/8	—	7/8	1 3/8
Distributor Nozzle Size*	—	G-3	E-10	—	G-3	E-10	—	G-4/G-3	E-12	—	G-4/G-3	E-12	—	G-6	C-15	—	G-6	C-15
Intertwined Row Split Coils																		
No. of TXVs	—	2	—	—	2	2	—	2	2	—	2	2	—	2	2	—	2	2
Suction Connections (in. OD)	—	1 1/8	—	—	1 1/8	1 3/8	—	1 1/8	1 3/8	—	1 1/8	1 3/8	—	1 1/8	1 5/8	—	1 1/8	1 5/8
Distributor Connections (in. OD)	—	7/8	—	—	7/8	1 1/8	—	7/8	1 1/8	—	7/8	1 1/8	—	7/8	1 3/8	—	7/8	1 3/8
Distributor Nozzle Size*	—	G-3	—	—	G-3	E-10	—	G-4/G-3	E-12	—	G-4/G-3	E-12	—	G-6	C-15	—	G-6	C-15
Single-Circuit Coils																		
No. of TXVs	—	1	—	—	1	—	—	1	—	—	1	—	—	1	—	—	1	—
Suction Connections (in. OD)	—	1 3/8	—	—	1 3/8	—	—	1 3/8	—	—	1 3/8	—	—	1 5/8	—	—	1 5/8	—
Distributor Connections (in. OD)	—	1 1/8	—	—	1 1/8	—	—	1 1/8	—	—	1 1/8	—	—	1 3/8	—	—	1 3/8	—
Distributor Nozzle Size	—	E-10	—	—	E-10	—	—	E-12	—	—	E-12	—	—	C-15	—	—	C-15	—

LEGEND

TXV — Thermostatic Expansion Valve (Field Supplied)

*When 2 nozzle sizes are listed, the smaller nozzle should be located on the upper distributor.

NOTE: Factory-supplied distributors have factory-selected nozzle sizes as shown. If necessary, replace factory-supplied nozzles with field-supplied and installed nozzles. Consult **AHUBuilder®** software selection program for correct nozzle selection.

Table 4 — Direct-Expansion Circuiting Data (cont)
Large Face Area Coil (cont)

39M UNIT SIZE	17			21			25			30			36		40				50				61					
	Half	Full	Double	Half	Full	Double	Half	Full	Double	Half	Full	Double	Full	Double	Full	Double	Full	Double	Full	Double	Full	Double	Full	Double	Full	Double		
CIRCUITING TYPE	8,464			10,720			12,205			15,174			18,333		20,000				25,278				30,694					
Airflow (cfm) at 500 fpm	16.9			21.4			24.4			30.3			36.7		40.0				50.6				61.4					
Total Face Area (sq ft)	30	30	30	38	38	38	38	38	38	38	38	38	44	44	24	24	24	24	28	28	28	28	34	34	34	34		
Tubes in Face	65	65	65	65	65	65	72	72	72	92	92	92	96	96	96	96	96	96	104	104	104	104	104	104	104	104		
Tube Length (in.)	15	30	60	19	38	76	19	38	76	19	38	76	44	88	24	24	48	48	28	28	56	56	34	34	68	68		
No. of Circuits - Total																												
4-Row Coil																												
Face Split Coils																												
No. of TXVs	2	2	—	2	2	—	2	2	—	2	2	—	4	—	2	2	—	—	—	2	2	—	—	—	2	2	—	
Suction Connections (in. OD)	1 ¹ / ₈	1 ⁵ / ₈	—	1 ³ / ₈	1 ⁵ / ₈	—	1 ³ / ₈	1 ⁵ / ₈	—	1 ³ / ₈	1 ⁵ / ₈	—	1 ³ / ₈	1 ⁵ / ₈	—	1 ³ / ₈	1 ³ / ₈	—	—	—	1 ⁵ / ₈	1 ⁵ / ₈	—	—	—	1 ⁵ / ₈	1 ⁵ / ₈	—
Distributor Connections (in. OD)	7 ⁷ / ₈	1 ³ / ₈	—	1 ¹ / ₈	1 ³ / ₈	—	1 ¹ / ₈	1 ³ / ₈	—	1 ¹ / ₈	1 ³ / ₈	—	1 ¹ / ₈	1 ³ / ₈	—	1 ¹ / ₈	1 ³ / ₈	—	—	—	1 ³ / ₈	1 ³ / ₈	—	—	—	1 ³ / ₈	1 ³ / ₈	—
Distributor Nozzle Size*	G-8/G-6	C-15	—	E-10/E-8	C-20	—	E-10/E-8	C-20	—	E-10/E-8	C-20	—	E-12	—	C-12	C-12	—	—	—	C-15	C-15	—	—	—	C-17	C-17	—	
Intertwined Row Split Coils																												
No. of TXVs	2	2	—	2	2	—	2	2	—	2	2	—	4	—	2	2	—	—	—	2	2	—	—	—	2	2	—	
Suction Connections (in. OD)	1 ¹ / ₈	1 ⁵ / ₈	—	1 ³ / ₈	1 ⁵ / ₈	—	1 ³ / ₈	1 ⁵ / ₈	—	1 ³ / ₈	1 ⁵ / ₈	—	1 ³ / ₈	1 ⁵ / ₈	—	1 ³ / ₈	1 ³ / ₈	—	—	—	1 ⁵ / ₈	1 ⁵ / ₈	—	—	—	1 ⁵ / ₈	1 ⁵ / ₈	—
Distributor Connections (in. OD)	7 ⁷ / ₈	1 ³ / ₈	—	1 ¹ / ₈	1 ³ / ₈	—	1 ¹ / ₈	1 ³ / ₈	—	1 ¹ / ₈	1 ³ / ₈	—	1 ¹ / ₈	1 ³ / ₈	—	1 ¹ / ₈	1 ³ / ₈	—	—	—	1 ³ / ₈	1 ³ / ₈	—	—	—	1 ³ / ₈	1 ³ / ₈	—
Distributor Nozzle Size*	G-8/G-6	C-15	—	E-10/E-8	C-20	—	E-10/E-8	C-20	—	E-10/E-8	C-20	—	E-12	—	C-12	C-12	—	—	—	C-15	C-15	—	—	—	C-17	C-17	—	
Single-Circuit Coils																												
No. of TXVs	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
Suction Connections (in. OD)	1 ⁵ / ₈	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
Distributor Connections (in. OD)	1 ³ / ₈	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
Distributor Nozzle Size	C-15	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
6-Row Coil																												
Face Split Coils																												
No. of TXVs	2	2	—	2	2	—	2	2	—	2	2	—	4	—	2	2	—	—	—	2	2	—	—	—	2	2	—	
Suction Connections (in. OD)	1 ¹ / ₈	1 ⁵ / ₈	—	1 ³ / ₈	1 ⁵ / ₈	—	1 ³ / ₈	1 ⁵ / ₈	—	1 ³ / ₈	1 ⁵ / ₈	—	1 ³ / ₈	1 ⁵ / ₈	—	1 ³ / ₈	1 ³ / ₈	—	—	—	1 ⁵ / ₈	1 ⁵ / ₈	—	—	—	1 ⁵ / ₈	1 ⁵ / ₈	—
Distributor Connections (in. OD)	7 ⁷ / ₈	1 ³ / ₈	—	1 ¹ / ₈	1 ³ / ₈	—	1 ¹ / ₈	1 ³ / ₈	—	1 ¹ / ₈	1 ³ / ₈	—	1 ¹ / ₈	1 ³ / ₈	—	1 ¹ / ₈	1 ³ / ₈	—	—	—	1 ³ / ₈	1 ³ / ₈	—	—	—	1 ³ / ₈	1 ³ / ₈	—
Distributor Nozzle Size*	G-8/G-6	C-15	—	E-10/E-8	C-20	—	E-10/E-8	C-20	—	E-10/E-8	C-20	—	E-12	—	C-12	C-12	—	—	—	C-15	C-15	—	—	—	C-17	C-17	—	
Intertwined Row Split Coils																												
No. of TXVs	2	2	—	2	2	—	2	2	—	2	2	—	4	—	2	2	—	—	—	2	2	—	—	—	2	2	—	
Suction Connections (in. OD)	1 ¹ / ₈	1 ⁵ / ₈	—	1 ³ / ₈	1 ⁵ / ₈	—	1 ³ / ₈	1 ⁵ / ₈	—	1 ³ / ₈	1 ⁵ / ₈	—	1 ³ / ₈	1 ⁵ / ₈	—	1 ³ / ₈	1 ³ / ₈	—	—	—	1 ⁵ / ₈	1 ⁵ / ₈	—	—	—	1 ⁵ / ₈	1 ⁵ / ₈	—
Distributor Connections (in. OD)	7 ⁷ / ₈	1 ³ / ₈	—	1 ¹ / ₈	1 ³ / ₈	—	1 ¹ / ₈	1 ³ / ₈	—	1 ¹ / ₈	1 ³ / ₈	—	1 ¹ / ₈	1 ³ / ₈	—	1 ¹ / ₈	1 ³ / ₈	—	—	—	1 ³ / ₈	1 ³ / ₈	—	—	—	1 ³ / ₈	1 ³ / ₈	—
Distributor Nozzle Size*	G-8/G-6	C-15	—	E-10/E-8	C-20	—	E-10/E-8	C-20	—	E-10/E-8	C-20	—	E-12	—	C-12	C-12	—	—	—	C-15	C-15	—	—	—	C-17	C-17	—	
Single-Circuit Coils																												
No. of TXVs	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
Suction Connections (in. OD)	1 ⁵ / ₈	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
Distributor Connections (in. OD)	1 ³ / ₈	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
Distributor Nozzle Size	C-15	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
8-Row Coil																												
Face Split Coils																												
No. of TXVs	2	2	4	2	2	4	2	2	4	2	2	4	4	8	2	2	4	4	4	2	2	4	4	4	2	2	4	
Suction Connections (in. OD)	1 ¹ / ₈	1 ⁵ / ₈	1 ⁵ / ₈	1 ³ / ₈	1 ⁵ / ₈	1 ⁵ / ₈	1 ³ / ₈	1 ⁵ / ₈	1 ⁵ / ₈	1 ³ / ₈	1 ⁵ / ₈	1 ⁵ / ₈	1 ³ / ₈	1 ⁵ / ₈	1 ³ / ₈	1 ³ / ₈	1 ³ / ₈	1 ³ / ₈	1 ³ / ₈	1 ³ / ₈	1 ⁵ / ₈	1 ⁵ / ₈	1 ⁵ / ₈	1 ⁵ / ₈	1 ⁵ / ₈	1 ⁵ / ₈	1 ⁵ / ₈	
Distributor Connections (in. OD)	7 ⁷ / ₈	1 ³ / ₈	1 ³ / ₈	1 ¹ / ₈	1 ³ / ₈	1 ³ / ₈	1 ¹ / ₈	1 ³ / ₈	1 ³ / ₈	1 ¹ / ₈	1 ³ / ₈	1 ³ / ₈	1 ¹ / ₈	1 ³ / ₈	1 ¹ / ₈	1 ³ / ₈	1 ¹ / ₈	1 ³ / ₈	1 ³ / ₈	1 ³ / ₈	1 ³ / ₈	1 ³ / ₈	1 ³ / ₈	1 ³ / ₈	1 ³ / ₈	1 ³ / ₈	1 ³ / ₈	
Distributor Nozzle Size*	G-8/G-6	C-15	C-15	E-10/E-8	C-20	C-20	E-10/E-8	C-20	C-20	E-10/E-8	C-20	C-20	E-12	E-12	C-12	C-12	C-12	C-12	C-12	C-12	C-15	C-15	C-15	C-15	C-17	C-17	C-17	
Intertwined Row Split Coils																												
No. of TXVs	2	2	4	2	2	4	2	2	4	2	2	4	4	8	2	2	4	4	4	2	2	4	4	4	2	2	4	
Suction Connections (in. OD)	1 ¹ / ₈	1 ⁵ / ₈	1 ⁵ / ₈	1 ³ / ₈	1 ⁵ / ₈	1 ⁵ / ₈	1 ³ / ₈	1 ⁵ / ₈	1 ⁵ / ₈	1 ³ / ₈	1 ⁵ / ₈	1 ⁵ / ₈	1 ³ / ₈	1 ⁵ / ₈	1 ³ / ₈	1 ³ / ₈	1 ³ / ₈	1 ³ / ₈	1 ³ / ₈	1 ³ / ₈	1 ⁵ / ₈	1 ⁵ / ₈	1 ⁵ / ₈	1 ⁵ / ₈	1 ⁵ / ₈	1 ⁵ / ₈	1 ⁵ / ₈	
Distributor Connections (in. OD)	7 ⁷ / ₈	1 ³ / ₈	1 ³ / ₈	1 ¹ / ₈	1 ³ / ₈	1 ³ / ₈	1 ¹ / ₈	1 ³ / ₈	1 ³ / ₈	1 ¹ / ₈	1 ³ / ₈	1 ³ / ₈	1 ¹ / ₈	1 ³ / ₈	1 ¹ / ₈	1 ³ / ₈	1 ¹ / ₈	1 ³ / ₈	1 ³ / ₈	1 ³ / ₈	1 ³ / ₈	1 ³ / ₈	1 ³ / ₈	1 ³ / ₈	1 ³ / ₈	1 ³ / ₈	1 ³ / ₈	
Distributor Nozzle Size*	G-8/G-6	C-15	C-15	E-10/E-8	C-20	C-20	E-10/E-8	C-20	C-20	E-10/E-8	C-20	C-20	E-12	E-12	C-12	C-12	C-12	C-12	C-12	C-12	C-15	C-15	C-15	C-15	C-17	C-17	C-17	
Single-Circuit Coils																												
No. of TXVs	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
Suction Connections (in. OD)	1 ⁵ / ₈	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
Distributor Connections (in. OD)	1 ³ / ₈	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
Distributor Nozzle Size	C-15	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	

LEGEND
 TXV — Thermostatic Expansion Valve (Field Supplied)
 *When 2 nozzle sizes are listed, the smaller nozzle should be located on the upper distributor.

NOTE: Factory-supplied distributors have factory-selected nozzle sizes as shown. If necessary, replace factory-supplied nozzles with field-supplied and installed nozzles. Consult AHUBuilder® software selection program for correct nozzle selection.

Table 5 — 1/2-in. Water Coil Connection Sizes

FACE AREA	ROWS	CIRCUIT TYPE	39M UNIT SIZE														
			03	06	08	10	12	14	17	21	25	30	36	40	50	61	
			Nozzle Size (in. MPT)														
LARGE	1, 2	HALF/FULL	1.5	1.5	1.5	1.5	1.5	1.5	1.5	2.5	2.5	2.5	2.5	2.5	1.5*	1.5*	2.5*
	4	HALF/FULL	1.5	1.5	1.5	1.5	1.5	1.5	1.5	2.5	2.5	2.5	2.5	2.5	1.5*	1.5*	2.5*
		DOUBLE	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5*	2.5*	2.5*
	6, 8, 10	HALF/FULL	1.5	1.5	1.5	1.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	3	1.5*	2.5*	2.5*
DOUBLE		2.5	2.5	2.5	2.5	2.5	2.5	3	3	3	3	3	3	2.5*	2.5*	3*	
MEDIUM	1, 2	HALF/FULL	1.5	1.5	1.5	1.5	1.5	1.5	1.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	1.5*
	4	HALF/FULL	1.5	1.5	1.5	1.5	1.5	1.5	1.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	1.5*
		DOUBLE	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5*
	6, 8, 10	HALF/FULL	1.5	1.5	1.5	1.5	1.5	1.5	1.5	2.5	2.5	2.5	2.5	3	3	3	2.5*
DOUBLE		2.5	2.5	2.5	2.5	2.5	2.5	2.5	3	3	3	3	3	3	3	2.5*	
BYPASS	1, 2	HALF/FULL	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	2.5	2.5	2.5	2.5	
	4	HALF/FULL	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	2.5	2.5	2.5	2.5	
		DOUBLE	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
	6, 8, 10	HALF/FULL	1.5	1.5	1.5	1.5	1.5	1.5	1.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
DOUBLE		2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	3	3	3	3	3	
SMALL	1, 2	HALF/FULL	—	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	2.5	
	4	HALF/FULL	—	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	2.5	
		DOUBLE	—	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5

*Large face area sizes 40, 50 and 61 and medium face area size 61 units have 2 sets of coil connections.

Table 6 — 5/8-in. Water Coil Connection Sizes

FACE AREA	ROWS	CIRCUIT TYPE	39M UNIT SIZE													
			03	06	08	10	12	14	17	21	25	30	36	40	50	61
			Nozzle Size (in. MPT)													
LARGE	1	HALF	1.5	1.5	1.5	1.5	1.5	1.5	1.5	2	2	2	2	1.5*	1.5*	1.5*
	2, 4	HALF	1.5	1.5	1.5	1.5	1.5	1.5	1.5	2	2	2	2	1.5*	1.5*	2*
		FULL	2	2	2	2	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2*	2.5*
	6, 8	FULL	2	2	2	2	2.5	2.5	2.5	3	3	3	3	2*	2.5*	2.5*
DOUBLE		2.5	2.5	2.5	2.5	2.5	2.5	2.5	3	3	3	3	2.5*	2.5*	2.5*	
MEDIUM	1	HALF	1.5	1.5	1.5	1.5	1.5	1.5	1.5	2	2	2	2	2	2	1.5*
	2, 4	HALF	1.5	1.5	1.5	1.5	1.5	1.5	1.5	2	2	2	2	2	2	1.5*
		FULL	1.5	1.5	2	2	2	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
	6, 8	FULL	1.5	1.5	2	2	2	2.5	2.5	2.5	2.5	2.5	3	3	3	3
DOUBLE		2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	3	3	3	3	2.5*
BYPASS	1	HALF	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
	2, 4	HALF	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	2	2	2
		FULL	1.5	1.5	1.5	1.5	2	2	2	2.5	2.5	2.5	2.5	2.5	2.5	2.5
	6, 8	FULL	1.5	1.5	1.5	1.5	2	2	2	2.5	2.5	2.5	2.5	3	3	3
DOUBLE		2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	3	3	3	3
SMALL	1	HALF	—	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
	2	HALF	—	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	2
		FULL	—	1.5	1.5	1.5	1.5	1.5	1.5	2	2	2	2	2	2	2

*Large face area sizes 40, 50 and 61 and medium face area size 61 units have 2 sets of coil connections.

Table 7 — 1-in. Steam Coil Connection Sizes

FACE AREA	ROWS	CONNECTION	39M UNIT SIZE														
			03	06	08	10	12	14	17	21	25	30	36	40	50	61	
			Nozzle Size (in. MPT)														
ALL*	ALL	INLET	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
		OUTLET	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5

*Large face area sizes 40, 50 and 61 and medium face area size 61 units have 2 sets of steam coil connections.

Table 8 — 5/8-in. Steam Coil Connection Sizes

ROWS	FACE AREA	CONNECTION	39M UNIT SIZE														
			03	06	08	10	12	14	17	21	25	30	36	40	50	61	
			Nozzle Size (in. MPT)														
1	LARGE	INLET	2	2	2	2	2	2	2	2.5	2.5	2.5	2.5	2*	2*	2*	
		OUTLET	2	2	2	2	2	2	2	2	2	2	2	2	2*	2*	2*
	MEDIUM	INLET	2	2	2	2	2	2	2	2	2	2	2	2.5	2.5	2.5	2*
		OUTLET	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2*
	BYPASS	INLET	2	2	2	2	2	2	2	2	2	2	2	2	2.5	2.5	2.5
		OUTLET	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
SMALL	INLET	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
	OUTLET	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
2	LARGE	INLET	2.5	2.5	2.5	2.5	2.5	2.5	2.5	3	3	3	3	2.5*	2.5*	2.5*	
		OUTLET	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5*	2.5*	2.5*
	MEDIUM	INLET	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	3	3	3	2.5*
		OUTLET	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5*
	BYPASS	INLET	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	3	3	3
		OUTLET	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
SMALL	INLET	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	
	OUTLET	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	

*Large face area sizes 40, 50 and 61 and medium face area size 61 units have 2 sets of steam coil connections.

Table 9 — Operating Charge (Approximate) — Direct-Expansion Coil

ROWS	CONNECTION	39M UNIT SIZE													
		03	06	08	10	12	14	17	21	25	30	36	40	50	61
		Refrigerant R-22 (lb)													
4	Large	1	3	4	4	5	6	7	9	11	13	16	18	22	27
	Medium	1	2	3	3	4	5	6	7	8	10	12	13	17	20
6	Large	2	4	6	7	9	10	12	15	18	22	26	29	37	45
	Medium	2	3	4	5	7	8	9	11	14	16	20	22	27	33
8	Large	3	6	8	10	12	15	18	22	26	31	37	42	52	63
	Medium	2	5	6	8	9	11	13	16	20	23	28	31	39	48

Table 10 — Coil Volume (Gal. Water)

39M UNIT SIZE	03	06	08	10	12	14	17	21	25	30	36	40	50	61
CHILLED WATER														
Large Face Area														
4-Row	1.4	2.2	2.8	3.7	4.7	5.3	6.2	7.8	8.9	11.0	13.3	14.5	18.3	22.2
6-Row	2.0	3.3	4.3	5.5	7.0	7.9	9.3	11.8	13.3	16.5	19.9	21.7	27.4	33.3
8-Row	2.7	4.4	5.7	7.3	9.3	10.5	12.4	15.7	17.8	22.0	26.5	29.0	36.5	44.4
10-Row	3.4	5.5	7.1	9.1	11.6	13.1	15.5	19.6	22.2	27.5	33.2	36.2	45.7	55.5
Medium Face Area														
4-Row	0.9	1.5	2.1	2.7	3.7	4.5	4.9	6.6	7.5	9.3	10.9	13.3	14.4	18.3
6-Row	1.4	2.3	3.1	4.0	5.5	6.8	7.4	9.9	11.2	13.9	16.3	19.9	21.5	27.4
8-Row	1.9	3.1	4.1	5.3	7.3	9.0	9.9	13.2	15.0	18.5	21.7	26.5	28.7	36.5
10-Row	2.4	3.9	5.2	6.6	9.1	11.3	12.4	16.5	18.7	23.1	27.1	33.2	35.9	45.7
Small Face Area														
4-Row	—	1.3	1.5	2.0	2.3	2.6	3.3	3.7	4.2	5.2	7.2	7.2	9.1	11.1
Bypass Face Area														
4-Row	0.8	1.3	1.8	2.3	3.3	3.8	4.5	5.8	6.5	8.1	9.0	10.9	11.7	14.4
6-Row	1.2	2.0	2.7	3.5	5.0	5.6	6.8	8.7	9.8	12.2	13.6	16.3	17.6	21.5
8-Row	1.6	2.7	3.6	4.7	6.6	7.5	9.1	11.5	13.1	16.2	18.1	21.7	23.5	28.7
10-Row	2.0	3.3	4.5	5.8	8.3	9.4	11.3	14.4	16.4	20.3	22.6	27.1	29.4	35.9
HOT WATER														
Large Face Area														
1-Row	0.3	0.6	0.7	0.9	1.2	1.3	1.5	2.0	2.2	2.7	3.3	3.6	4.6	5.5
2-Row	0.7	1.1	1.4	1.8	2.3	2.6	3.1	3.9	4.4	5.5	6.6	7.2	9.1	11.1
Medium Face Area														
1-Row	0.2	0.4	0.5	0.7	0.9	1.1	1.2	1.6	1.9	2.3	2.7	3.3	3.6	4.6
2-Row	0.5	0.8	1.0	1.3	1.8	2.3	2.5	3.3	3.7	4.6	5.4	6.6	7.2	9.1
Small Face Area														
1-Row	—	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.1	1.3	1.8	1.8	2.3	2.8
2-Row	—	0.7	0.8	1.0	1.2	1.3	1.6	1.9	2.1	2.6	3.6	3.6	4.6	5.5
Bypass Face Area														
1-Row	0.2	0.3	0.5	0.6	0.8	0.9	1.1	1.4	1.6	2.0	2.3	2.7	2.9	3.6
2-Row	0.4	0.7	0.9	1.2	1.7	1.9	2.3	2.9	3.3	4.1	4.5	5.4	5.9	7.2

NOTE: One gallon of water weighs 8.33 lb.

Table 11 — Dry Coil Weights (Lb)

COIL TYPE	FACE AREA	ROWS	FPI	39M UNIT SIZE														
				03	06	08	10	12	14	17	21	25	30	36	40	50	61	
CHILLED WATER OR DIRECT EXPANSION	LARGE	4	8 11 14	50 52 54	85 89 92	110 115 119	143 149 155	182 190 197	207 215 224	244 254 264	309 322 335	353 367 382	437 455 473	528 550 572	576 600 624	728 758 789	884 921 958	
		6	8 11 14	70 73 76	120 124 129	154 160 167	200 209 217	255 265 276	289 301 313	341 355 370	432 450 468	494 514 535	612 637 663	739 770 801	806 840 874	1019 1062 1104	1238 1289 1341	
		8	8 11 14	90 94 98	154 160 166	198 206 215	258 268 279	328 341 355	372 387 403	439 457 475	556 579 602	635 661 688	787 819 852	950 990 1030	1037 1080 1123	1310 1365 1420	1591 1658 1724	
		10	8 11 14	107 111 116	182 190 197	235 244 254	305 318 331	388 404 421	441 459 477	520 542 563	659 686 714	753 784 815	932 971 1010	1126 1173 1220	1229 1280 1331	1553 1618 1682	1886 1964 2043	
	MEDIUM	4	8 11 14	35 36 38	60 62 64	80 83 87	104 108 113	143 149 155	177 184 192	219 203 211	260 271 282	296 308 321	368 383 399	432 450 468	528 550 572	620 620 620	728 758 789	
		6	8 11 14	49 51 53	83 87 90	112 117 121	146 152 158	200 209 217	248 258 268	273 284 296	364 379 394	414 432 449	515 537 558	605 630 655	739 770 801	801 834 868	1019 1062 1104	
		8	8 11 14	63 66 68	107 112 116	144 150 156	187 195 203	257 268 279	319 332 345	351 366 380	468 488 507	533 555 577	662 690 718	778 810 842	950 990 1030	1030 1073 1115	1310 1365 1420	
		10	8 11 14	75 78 81	127 132 138	171 178 185	222 231 240	305 318 330	378 393 409	416 433 451	555 578 601	631 658 684	785 818 850	922 960 998	1126 1173 1220	1220 1271 1322	1553 1618 1682	
	CHILLED WATER	BYPASS	4	8 11 14	30 31 33	51 53 55	70 73 76	91 95 99	130 135 141	148 154 160	179 186 194	228 237 246	259 270 281	322 335 349	360 375 390	432 450 468	468 488 507	572 596 620
			6	8 11 14	42 44 46	71 74 77	98 102 106	127 133 138	182 190 197	207 215 224	250 261 271	319 332 345	363 378 393	451 470 488	504 525 546	605 630 655	655 683 710	801 834 868
			8	8 11 14	54 56 59	92 96 99	126 131 137	164 171 177	234 244 254	266 277 288	322 335 349	410 427 444	466 486 505	580 604 628	648 675 702	778 810 842	842 878 913	1030 1073 1115
			10	8 11 14	64 67 69	109 113 118	149 156 162	194 202 210	277 289 300	315 328 341	381 397 413	485 506 526	553 576 599	687 716 744	768 800 832	922 960 998	998 1040 1082	1220 1271 1322
HOT WATER	LARGE	1	8 11 14	17 17 18	28 30 31	37 40 42	48 50 52	61 63 66	69 72 75	81 85 88	103 107 112	118 122 127	146 152 158	176 183 191	192 200 208	243 253 263	295 307 319	
		2	8 11 14	23 24 25	40 41 43	51 53 56	67 70 72	85 88 92	96 100 104	114 118 123	144 150 156	165 171 178	204 212 221	246 257 267	269 280 291	340 354 368	413 430 447	
	MEDIUM	1	8 11 14	12 12 13	20 21 21	27 28 29	35 36 38	48 50 52	59 61 64	65 68 70	87 90 94	99 103 107	123 128 133	144 150 156	176 183 191	191 199 207	243 253 263	
		2	8 11 14	16 17 18	28 29 30	37 39 40	49 51 53	62 67 72	83 86 89	91 95 99	121 126 131	138 144 150	172 179 186	202 210 218	246 257 267	267 278 289	340 354 368	
	SMALL	1	8 11 14	— — —	17 18 18	20 21 22	26 27 28	30 32 33	34 36 37	43 45 47	53 58 63	60 65 70	72 75 75	86 90 94	96 100 104	121 126 131	147 153 160	
		2	8 11 14	— — —	24 25 26	28 29 30	36 38 39	42 44 46	48 50 52	55 63 66	61 63 66	78 81 84	87 91 94	97 101 105	134 140 146	146 177 184	206 215 223	
		4	8 11 14	— — —	51 53 55	60 63 65	78 81 85	91 95 99	103 108 112	130 135 141	146 152 158	167 173 180	207 216 224	288 300 312	288 300 312	364 379 394	442 460 479	
			1	8 11 14	10 10 11	17 18 18	23 24 25	30 32 33	43 45 47	49 51 53	60 62 65	76 79 82	86 90 94	107 112 116	120 125 130	144 150 156	156 163 169	191 199 207
	BYPASS	2	8 11 14	14 15 15	24 25 26	33 34 35	42 44 46	61 63 66	69 72 75	83 87 90	106 111 115	121 126 131	150 157 163	168 175 182	202 210 218	218 228 237	267 278 289	
		1	6 9 12	23 24 25	40 41 43	51 53 56	67 70 72	85 88 92	96 100 104	114 118 123	144 150 156	165 171 178	204 212 221	246 257 267	269 280 291	340 354 368	413 430 447	
	1-IN. IDT STEAM	LARGE	1	6 9 12	16 17 18	28 29 30	37 39 40	49 51 53	67 70 72	83 86 89	91 95 99	121 126 131	138 144 150	172 179 186	202 210 218	246 257 267	267 278 289	340 354 368
		MEDIUM		6 9 12	— — —	24 25 26	28 29 30	36 38 39	42 44 46	48 50 52	55 63 66	61 63 66	78 81 84	87 91 94	97 101 105	134 140 146	146 177 184	206 215 223
SMALL		6 9 12		14 15 15	24 25 26	33 34 35	42 44 46	61 63 66	69 72 75	83 87 90	106 111 115	121 126 131	150 157 163	168 175 182	202 210 218	218 228 237	267 278 289	
BYPASS		6 9 12		23 24 25	40 41 43	51 53 56	67 70 72	85 88 92	96 100 104	114 118 123	144 150 156	165 171 178	204 212 221	246 257 267	269 280 291	340 354 368	413 430 447	

NOTES:

- Weights shown include headers and are the sum of two coils where applicable.
- Coils are full length.
- Weights shown are for aluminum fin coils; for copper fin coils, multiply by 1.20.
- Weights shown are for 1/2-in., .016-in. wall tubes; for 1/2-in., .025-in. wall tubes, multiply by 1.15.
- Weights shown are for 1/2-in., .016-in. wall tubes; for 5/8-in., .020-in. wall tubes, multiply by 1.15.
- Weights shown are for 1/2-in., .016-in. wall tubes; for 5/8-in., .035-in. wall tubes, multiply by 1.50.

Table 11 — Dry Coil Weights (Lb) (cont)

COIL TYPE	FACE AREA	ROWS	FPI	39M UNIT SIZE															
				03	06	08	10	12	14	17	21	25	30	36	40	50	61		
5/8-IN. IDT STEAM	LARGE	1	6	19	32	41	53	68	77	91	115	132	163	197	215	272	330		
			9	19	33	43	56	71	80	95	120	137	170	205	224	283	344		
		2	12	20	35	44	58	74	84	99	125	143	177	214	233	294	358		
			6	23	40	51	67	85	96	114	144	165	204	246	269	340	413		
	MEDIUM	1	9	24	41	53	70	88	100	118	150	171	212	257	280	354	430		
			12	25	43	56	72	92	104	123	156	178	221	267	291	368	447		
		2	6	13	22	30	39	53	66	73	97	111	137	161	197	214	272		
			9	14	23	31	40	56	69	76	101	115	143	168	205	222	283		
	SMALL	1	12	14	24	32	42	58	72	79	105	120	149	175	214	231	294		
			6	16	28	37	49	67	83	91	121	138	172	202	246	267	340		
		2	9	17	29	39	51	70	86	95	126	144	179	210	257	278	354		
			12	18	30	40	53	72	89	99	131	150	186	218	267	289	368		
	BYPASS	1	6	—	19	22	29	34	39	49	55	62	77	108	108	136	165		
			9	—	20	23	30	35	40	51	57	65	81	112	112	142	172		
		2	12	—	21	24	32	37	42	53	59	67	84	116	116	147	179		
			6	—	24	28	36	42	48	61	68	78	97	134	134	170	206		
5/8-IN. IDT STEAM	1	9	—	25	29	38	44	50	63	71	81	101	140	140	177	215			
		12	—	26	30	39	46	52	66	74	84	105	146	146	184	223			
	2	6	11	19	26	34	49	55	67	85	97	120	134	161	175	214			
		9	12	20	27	35	51	57	70	88	101	125	140	168	182	222			
5/8-IN. IDT STEAM	1	12	12	21	28	37	53	60	72	92	105	130	146	175	189	231			
		6	14	24	33	42	61	69	83	106	121	150	168	202	218	267			
	2	9	15	25	34	44	63	72	87	111	126	157	175	210	228	278			
		12	15	26	35	46	66	75	90	115	131	163	182	218	237	289			

NOTES:

- Weights shown include headers and are the sum of two coils where applicable.
- Coils are full length.
- Weights shown are for aluminum fin coils; for copper fin coils, multiply by 1.20.
- Weights shown are for 1/2-in., .016 in. wall tubes; for 1/2-in., .025-in. wall tubes, multiply by 1.15.
- Weights shown are for 1/2-in., .016-in. wall tubes; for 5/8-in., .020-in. wall tubes, multiply by 1.15.
- Weights shown are for 1/2-in., .016-in. wall tubes; for 5/8-in., .035-in. wall tubes, multiply by 1.50.

Table 12 — Motor Weights (Lb)

HP	200-230,460-3-60				200/400-3-50*		575-3-60	
	ODP		TEFC		ODP	TEFC	ODP	TEFC
	E+	E+3	E+	E+3			E+	E+/E+3
1/2	36	40	60	68	29	34	37	60/ 68
3/4	36	40	60	68	29	34	37	60/ 68
1	36	40	60	68	29	34	37	60/ 68
1 1/2	42	46	60	66	36	41	48	60/ 66
2	42	54	65	66	41	47	50	65/ 66
3	67	87	81	92	73	62	70	87
5	78	94	89	99	102	72	88	89/ 99
7 1/2	106	130	142	158	121	105	89	142/158
10	118	126	154	200	139	128	119	154/200
15	170	217	250	259	170	210	170	250/259
20	212	250	287	290	205	254	212	287/290
25	240	309	394	358	273	363	240	394/368
30	283	300	436	436	283	414	284	436/436
40	372	415	661	661	416†	470†	370	661/661
50	440	414	686	686	403†	527†	440	686/686
60	591	652**	790	799	545	790†	591	799
75	620	706**	840	850**	651†	884†	670	850

LEGEND

- ODP — Open Drip Proof
- TEFC — Totally Enclosed Fan Cooled
- E+ — High Efficiency
- E+3 — Premium Efficiency

*Both ODP and TEFC 50 Hz motors available in standard models only.

†Availability unconfirmed.

**460 volt only.

NOTE: Multiply motor weight by 0.10 to estimate drive weight.

Table 13 — Forward-Curved Fan Drive Centerline Distances In Inches

39M UNIT SIZE	SUPPLY	RETURN/ EXHAUST	MOTOR FRAME	BHF/BHR		DBF/DBR		THF/THR		UBF/UBR	
				Min	Max	Min	Max	Min	Max	Min	Max
03 REAR MOUNT MOTOR	Std	N/A	56	19.0	20.6	N/A	N/A	17.6	19.4	15.5	17.2
			143T	19.0	20.6	N/A	N/A	17.6	19.4	15.5	17.2
			145T	19.0	20.6	N/A	N/A	17.6	19.4	15.5	17.2
			182T	18.6	20.3	N/A	N/A	17.5	19.2	15.2	17.0
			184T	18.6	20.3	N/A	N/A	17.5	19.2	15.2	17.0
03 SIDE MOUNT MOTOR	Std	Std	56	8.0	8.4	5.7	6.3	5.5	6.0	7.4	7.9
			143T	8.0	8.4	5.7	6.3	5.5	6.0	7.4	7.9
			145T	8.0	8.4	5.7	6.3	5.5	6.0	7.4	7.9
			182T	7.0	7.4	4.7	5.4	4.5	5.1	6.4	7.0
			184T	7.0	7.4	4.7	5.4	4.5	5.1	6.4	7.0
06 REAR MOUNT MOTOR	Std	N/A	56	18.9	20.4	N/A	N/A	17.1	18.8	14.8	16.4
			143T	18.9	20.4	N/A	N/A	17.1	18.8	14.8	16.4
			145T	18.9	20.4	N/A	N/A	17.1	18.8	14.8	16.4
			182T	18.4	20.0	N/A	N/A	16.9	18.6	14.4	16.1
			184T	18.4	20.0	N/A	N/A	16.9	18.6	14.4	16.1
06 SIDE MOUNT MOTOR	Std	Std	56	10.6	11.6	6.8	8.9	8.0	10.2	8.3	10.1
			143T	10.6	11.6	6.8	8.9	8.0	10.2	8.3	10.1
			145T	10.6	11.6	6.8	8.9	8.0	10.2	8.3	10.1
			182T	9.8	10.8	6.0	8.3	7.3	9.6	7.4	9.4
			184T	9.8	10.8	6.0	8.3	7.3	9.6	7.4	9.4
08	Std	Std	56	14.4	15.6	9.5	11.0	10.9	12.4	10.8	12.2
			143T	14.4	15.6	9.5	11.0	10.9	12.4	10.8	12.2
			145T	14.4	15.6	9.5	11.0	10.9	12.4	10.8	12.2
			182T	13.6	14.9	9.0	10.7	10.4	12.0	10.2	11.7
			184T	13.6	14.9	9.0	10.7	10.4	12.0	10.2	11.7
	Small	N/A	213T	13.1	14.4	8.8	10.5	10.1	11.8	9.8	11.4
			182T	13.3	14.7	9.8	11.5	11.0	12.7	10.4	12.1
			184T	13.3	14.7	9.8	11.5	11.0	12.7	10.4	12.1
10	Std	Std	213T	12.8	14.3	9.7	11.4	10.9	12.6	10.2	11.8
			143T	15.2	16.2	8.8	10.1	10.8	12.2	10.9	12.1
			145T	15.2	16.2	8.8	10.1	10.8	12.2	10.9	12.1
			182T	14.3	15.4	8.1	9.6	10.2	11.6	10.2	11.4
			184T	14.3	15.4	8.1	9.6	10.2	11.6	10.2	11.4
	Small	N/A	213T	13.7	14.8	7.7	9.3	9.7	11.2	9.6	10.9
			184T	13.6	14.9	9.0	10.7	10.4	12.0	10.2	11.7
			215T	13.1	14.4	8.8	10.5	10.1	11.8	9.8	11.4
12	Std	Std	215T	13.1	14.4	8.8	10.5	10.1	11.8	9.8	11.4
			145T	18.3	19.5	12.9	14.5	14.9	16.4	14.5	15.9
			182T	17.6	18.9	12.5	14.1	14.4	16.0	13.9	15.4
			184T	17.6	18.9	12.5	14.1	14.4	16.0	13.9	15.4
			213T	17.1	18.4	12.2	13.9	14.1	15.7	13.5	15.0
	Small	N/A	184T	17.4	18.9	13.8	15.5	15.1	16.8	14.6	16.2
			213T	17.0	18.5	13.6	15.3	14.9	16.6	14.3	16.0
			215T	17.0	18.5	13.6	15.3	14.9	16.6	14.3	16.0
14	Std	Std	254T	16.5	18.1	13.5	15.2	14.7	16.4	14.0	15.7
			145T	23.1	24.5	17.2	18.7	19.5	21.1	19.0	20.4
			182T	22.5	23.8	16.7	18.4	19.1	20.6	18.4	19.9
			184T	22.5	23.8	16.7	18.4	19.1	20.6	18.4	19.9
			213T	22.0	23.4	16.5	18.1	18.7	20.4	18.0	19.5
	Small	N/A	184T	22.4	23.9	18.2	19.9	20.0	21.7	19.2	20.8
			213T	22.0	23.5	18.0	19.7	19.8	21.5	18.9	20.5
			215T	22.0	23.5	18.0	19.7	19.8	21.5	18.9	20.5
17	Std	Std	254T	21.5	23.1	17.8	19.5	19.5	21.2	18.5	20.2
			145T	23.1	24.5	17.2	18.7	19.1	20.6	19.0	20.4
			182T	22.5	23.8	16.7	18.4	18.3	19.9	18.4	19.9
			184T	22.5	23.8	16.7	18.4	17.9	19.6	18.4	19.9
			213T	22.0	23.4	16.5	18.1	17.5	19.2	18.0	19.5
	Small	N/A	213T	22.0	23.4	16.5	18.1	17.5	19.2	18.0	19.5
			213T	22.0	23.5	18.0	19.7	19.8	21.5	18.9	20.5
			215T	22.0	23.5	18.0	19.7	19.8	21.5	18.9	20.5

LEGEND

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| BHF — Bottom Horizontal Front | THF — Top Horizontal Front |
| BHR — Bottom Horizontal Rear | THR — Top Horizontal Rear |
| DBF — Downblast Front | UBF — Upblast Front |
| DBR — Downblast Rear | UBR — Upblast Rear |

Table 13 — Forward-Curved Fan Drive Centerline Distances In Inches (cont)

39M UNIT SIZE	SUPPLY	RETURN/ EXHAUST	MOTOR FRAME	BHF/BHR		DBF/DBR		THF/THR		UBF/UBR	
				Min	Max	Min	Max	Min	Max	Min	Max
21	Std	Std	145T	24.7	26.0	14.6	16.4	17.4	19.1	18.6	20.0
			182T	23.9	25.1	14.0	15.8	16.7	18.5	17.8	19.2
			184T	23.9	25.1	14.0	15.8	16.7	18.5	17.8	19.2
			213T	23.2	24.6	13.5	15.4	16.2	18.1	17.2	18.7
	Small	N/A	215T	23.2	24.6	13.5	15.4	16.2	18.1	17.2	18.7
			254T	22.4	23.8	13.0	14.9	15.6	17.5	16.4	18.0
			215T	19.9	21.3	15.6	17.3	17.4	19.0	16.6	18.2
			254T	19.3	20.8	15.4	17.1	17.1	18.8	16.2	17.8
25	Std	Std	145T	32.4	34.1	24.1	26.2	27.4	29.5	26.6	28.5
			182T	31.7	33.5	23.7	25.9	27.0	29.1	26.1	28.0
			184T	31.7	33.5	23.7	25.9	27.0	29.1	26.1	28.0
			213T	31.3	33.1	23.5	25.6	26.7	28.8	25.7	27.7
	Small	N/A	215T	31.3	33.1	23.5	25.6	26.7	28.8	25.7	27.7
			254T	30.7	32.5	23.2	25.4	26.4	28.5	25.2	27.2
			215T	31.3	33.1	23.5	25.6	26.7	28.8	25.7	27.7
			254T	30.7	32.5	23.2	25.4	26.4	28.5	25.2	27.2
30	Std	Std	182T	31.7	33.5	23.7	25.9	27.0	29.1	26.6	28.5
			184T	31.7	33.5	23.7	25.9	27.0	29.1	26.1	28.0
			213T	31.3	33.1	23.5	25.6	26.7	28.8	26.1	28.0
			215T	31.3	33.1	23.5	25.6	26.7	28.8	25.7	27.7
	Small	N/A	254T	30.7	32.5	23.2	25.4	26.4	28.5	25.2	27.2
			215T	31.3	33.1	23.5	25.6	26.7	28.8	25.7	27.7
			254T	30.7	32.5	23.2	25.4	26.4	28.5	25.2	27.2
			284T	30.2	32.1	23.0	25.2	26.1	28.3	24.9	26.9
36	Std	Std	182T	31.1	33.3	23.0	25.7	25.6	28.2	27.0	29.4
			184T	31.1	33.3	23.0	25.7	25.6	28.2	27.0	29.4
			213T	30.4	32.6	22.5	25.3	25.0	27.7	26.4	28.8
			215T	30.4	32.6	22.5	25.3	25.0	27.7	26.4	28.8
	Small	N/A	254T	29.7	31.9	22.1	24.9	24.5	27.2	25.7	28.2
			256T	29.7	31.9	22.1	24.9	24.5	27.2	25.7	28.2
			254T	28.8	31.3	23.6	26.5	24.9	27.7	26.0	28.7
			256T	28.8	31.3	23.6	26.5	24.9	27.7	26.0	28.7
40	Std	Std	284T	28.4	30.9	23.3	26.3	24.6	27.4	25.7	28.4
			286T	28.4	30.9	23.3	26.3	24.6	27.4	25.7	28.4
			184T	31.1	33.3	23.0	25.7	25.6	28.2	27.0	29.4
			213T	30.4	32.6	22.5	25.3	25.0	27.7	26.4	28.8
	Small	N/A	215T	30.4	32.6	22.5	25.3	25.0	27.7	26.4	28.8
			254T	29.7	31.9	22.1	24.9	24.5	27.2	25.7	28.2
			256T	29.7	31.9	22.1	24.9	24.5	27.2	25.7	28.2
			284T	29.2	31.5	21.8	24.7	24.1	26.9	25.3	27.8
50	Std	Std	254T	29.7	31.9	22.1	24.9	24.5	27.2	25.7	28.2
			256T	29.7	31.9	22.1	24.9	24.5	27.2	25.7	28.2
			284T	29.2	31.5	21.8	24.7	24.1	26.9	25.3	27.8
			286T	29.2	31.5	21.8	24.7	24.1	26.9	25.3	27.8
	Small	N/A	184T	33.5	35.5	24.2	26.8	27.1	29.6	28.9	31.1
			213T	32.7	34.8	23.7	26.3	26.5	29.1	28.2	30.5
			215T	32.7	34.8	23.7	26.3	26.5	29.1	28.2	30.5
			254T	31.9	34.1	23.2	25.9	26.0	28.5	27.5	29.8
61	Std	Std	256T	31.9	34.1	23.2	25.9	26.0	28.5	27.5	29.8
			284T	31.4	33.6	22.8	25.6	25.5	28.2	27.0	29.4
			286T	31.4	33.6	22.8	25.6	25.5	28.2	27.0	29.4
			324T	30.7	32.9	22.4	25.2	25.0	27.7	26.3	28.8
	Small	N/A	213T	35.6	37.6	25.3	28.0	29.1	31.6	30.4	32.7
			215T	35.6	37.6	25.3	28.0	29.1	31.6	30.4	32.7
			254T	34.8	36.9	24.8	27.5	28.5	31.0	29.7	32.0
			256T	34.8	36.9	24.8	27.5	28.5	31.0	29.7	32.0
39M UNIT SIZE	Std	Std	284T	34.3	36.4	24.4	27.2	28.0	30.6	29.2	31.6
			286T	34.3	36.4	24.4	27.2	28.0	30.6	29.2	31.6
			324T	33.5	35.7	24.0	26.8	27.5	30.1	28.6	30.9
			326T	32.8	35.2	25.1	28.0	27.6	30.4	28.7	31.3
	Small	N/A	256T	34.0	36.3	25.8	28.6	28.5	31.2	29.8	32.2
			284T	33.5	35.8	25.5	28.4	28.1	30.8	29.3	31.8
			286T	33.5	35.8	25.5	28.4	28.1	30.8	29.3	31.8
			324T	32.8	35.2	25.1	28.0	27.6	30.4	28.7	31.3

LEGEND

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|--------------------------------------|-----------------------------------|
| BHF — Bottom Horizontal Front | THF — Top Horizontal Front |
| BHR — Bottom Horizontal Rear | THR — Top Horizontal Rear |
| DBF — Downblast Front | UBF — Upblast Front |
| DBR — Downblast Rear | UBR — Upblast Rear |

Table 14 — Airfoil Fan Drive Centerline Distances In Inches

39M UNIT SIZE	SUPPLY	RETURN/ EXHAUST	MOTOR FRAME	BHF/BHR		DBF/DBR		THF/THR		UBF/UBR	
				Min	Max	Min	Max	Min	Max	Min	Max
03	STD	STD	56	16.3	17.6	14.0	15.5	15.0	16.5	14.8	16.2
			143T	16.3	17.6	14.0	15.5	15.0	16.5	14.8	16.2
			145T	16.3	17.6	14.0	15.5	15.0	16.5	14.8	16.2
			182T	15.8	17.2	13.6	15.1	14.6	16.2	14.3	15.8
			184T	15.8	17.2	13.6	15.1	14.6	16.2	14.3	15.8
06	STD	STD	56	19.5	20.3	15.0	15.5	17.3	18.2	19.1	19.9
			143T	19.5	20.3	15.0	15.5	17.3	18.2	19.1	19.9
			145T	19.5	20.3	15.0	15.5	17.3	18.2	19.1	19.9
			182T	19.0	19.8	14.5	15.0	17.0	18.0	18.6	19.4
			184T	19.0	19.8	14.5	15.0	17.0	18.0	18.6	19.4
08	STD	STD	143T	11.1	12.4	8.5	9.8	8.2	9.5	10.3	11.6
			145T	11.1	12.4	8.5	9.8	8.2	9.5	10.3	11.6
			182T	10.0	11.5	7.6	9.1	7.2	8.7	9.3	10.8
			184T	10.0	11.5	7.6	9.1	7.2	8.7	9.3	10.8
			213T	9.4	11.0	7.0	8.6	6.7	8.3	8.6	10.2
10	STD	STD	215T	9.4	11.0	7.0	8.6	6.7	8.3	8.6	10.2
			145T	13.8	14.3	10.3	10.9	9.8	10.6	12.9	13.5
			182T	12.9	13.5	9.5	10.2	9.0	9.9	12.0	12.6
			184T	12.9	13.5	9.5	10.2	9.0	9.9	12.0	12.6
			213T	12.2	12.9	8.9	9.7	8.4	9.4	11.3	12.0
12	STD	STD	215T	12.2	12.9	8.9	9.7	8.4	9.4	11.3	12.0
			254T	11.3	12.0	8.1	9.0	7.7	8.7	10.4	11.1
			145T	17.2	17.8	14.1	14.9	13.4	14.4	17.2	17.8
			182T	16.4	17.0	13.3	14.1	12.7	13.7	16.4	17.0
			184T	16.4	17.0	13.3	14.1	12.7	13.7	16.4	17.0
14	STD	STD	213T	15.7	16.4	12.7	13.7	12.1	13.1	15.7	16.4
			215T	15.7	16.4	12.7	13.7	12.1	13.1	15.7	16.4
			254T	14.9	15.7	12.0	13.0	11.4	12.5	14.9	15.7
			145T	21.2	22.2	18.7	20.0	18.2	19.5	21.2	22.2
			182T	20.5	21.5	18.1	19.5	17.7	19.0	20.5	21.5
17	STD	STD	184T	20.5	21.5	18.1	19.5	17.7	19.0	20.5	21.5
			213T	20.0	21.0	17.7	19.1	17.3	18.7	20.0	21.0
			215T	20.0	21.0	17.7	19.1	17.3	18.7	20.0	21.0
			254T	19.3	20.5	17.2	18.7	16.8	18.2	19.3	20.5
			256T	19.3	20.5	17.2	18.7	16.8	18.2	19.3	20.5
21	STD	STD	145T	21.2	22.1	18.3	19.3	17.5	19.0	21.2	22.0
			182T	20.4	21.3	17.6	18.6	16.8	18.5	20.4	21.3
			184T	20.4	21.3	17.6	18.6	16.8	18.5	20.4	21.3
			213T	19.9	20.7	17.1	18.2	16.3	18.0	19.9	20.7
			215T	19.9	20.7	17.1	18.2	16.3	18.0	19.9	20.7
25	STD	STD	254T	19.1	20.1	16.4	17.6	15.7	17.5	19.1	20.1
			256T	19.1	20.1	16.4	17.6	15.7	17.5	19.1	20.1
			145T	22.3	22.9	18.8	19.7	18.7	19.6	22.3	22.9
			182T	21.5	22.2	18.0	18.9	17.9	18.8	21.5	22.2
			184T	21.5	22.2	18.0	18.9	17.9	18.8	21.5	22.2
25	STD	STD	213T	20.9	21.5	17.4	18.4	17.3	18.3	20.9	21.5
			215T	20.9	21.5	17.4	18.4	17.3	18.3	20.9	21.5
			254T	20.0	20.7	16.7	17.8	16.6	17.7	20.0	20.7
			256T	20.0	20.7	16.7	17.8	16.6	17.7	20.0	20.7
			284T	19.4	20.3	16.2	17.3	16.1	17.2	19.4	20.3
			145T	28.8	29.6	25.7	26.8	25.5	26.6	28.8	29.6
			182T	28.0	29.0	25.0	26.2	24.9	25.9	28.0	29.0
			184T	28.0	29.0	25.0	26.2	24.9	25.9	28.0	29.0

LEGEND

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| BHF — Bottom Horizontal Front | THF — Top Horizontal Front |
| BHR — Bottom Horizontal Rear | THR — Top Horizontal Rear |
| DBF — Downblast Front | UBF — Upblast Front |
| DBR — Downblast Rear | UBR — Upblast Rear |

Table 14 — Airfoil Fan Drive Centerline Distances In Inches (cont)

39M UNIT SIZE	SUPPLY	RETURN/ EXHAUST	MOTOR FRAME	BHF/BHR		DBF/DBR		THF/THR		UBF/UBR	
				Min	Max	Min	Max	Min	Max	Min	Max
30	STD	STD	182T	27.4	28.9	24.2	25.8	24.1	25.7	27.4	28.9
			184T	27.4	28.9	24.2	25.8	24.1	25.7	27.4	28.9
			213T	26.9	28.4	23.7	25.5	23.7	25.5	26.9	28.4
			215T	26.9	28.4	23.7	25.5	23.7	25.5	26.9	28.4
			254T	26.1	27.7	23.1	25.0	23.1	24.9	26.1	27.7
			256T	26.1	27.7	23.1	25.0	23.1	24.9	26.1	27.7
			284T	25.6	27.3	22.7	24.5	22.6	24.6	25.6	27.3
			286T	25.6	27.3	22.7	24.5	22.6	24.6	25.6	27.3
			324T	24.9	26.7	22.1	24.0	22.1	24.2	25.0	26.7
36	STD	N/A	184T	26.0	27.3	20.2	22.9	20.2	22.0	24.3	25.7
			213T	25.4	26.7	19.7	22.5	19.7	21.6	23.7	25.2
			215T	25.4	26.7	19.7	22.5	19.7	21.6	23.7	25.2
			254T	24.6	25.9	19.0	21.9	19.0	21.0	22.9	24.4
			256T	24.6	25.9	19.0	21.9	19.0	21.0	22.9	24.4
			284T	23.9	25.4	18.5	21.4	18.5	20.5	22.3	23.9
			286T	23.9	25.4	18.5	21.4	18.5	20.5	22.3	23.9
			324T	23.1	24.6	17.8	20.9	17.8	20.0	21.5	23.2
	326T	23.1	24.6	17.8	20.9	17.8	20.0	21.5	23.2		
	N/A	STD	182T	28.6	29.7	N/A	N/A	22.2	23.9	27.0	28.1
			184T	28.6	29.7	N/A	N/A	22.2	23.9	27.0	28.1
			213T	27.9	29.1	N/A	N/A	21.6	23.4	26.4	28.5
215T			27.9	29.1	N/A	N/A	21.6	23.4	26.4	28.5	
40	STD	N/A	184T	30.5	32.3	24.6	26.8	24.6	26.8	24.6	27.0
			213T	29.9	31.7	24.1	26.3	24.1	26.3	24.1	26.5
			215T	29.9	31.7	24.1	26.3	24.1	26.3	24.1	26.5
			254T	29.1	31.0	23.5	25.8	23.5	25.8	23.5	25.9
			256T	29.1	31.0	23.5	25.8	23.5	25.8	23.5	25.9
			284T	28.5	30.4	23.0	25.3	23.0	25.3	23.0	25.1
			286T	28.5	30.4	23.0	25.3	23.0	25.3	23.0	25.1
			324T	27.7	29.7	22.4	24.8	22.4	24.8	22.4	25.0
	326T	27.7	29.7	22.4	24.8	22.4	24.8	22.4	25.0		
	N/A	STD	182T	30.9	32.1	N/A	N/A	24.3	26.0	30.1	31.3
			184T	30.9	32.1	N/A	N/A	24.3	26.0	30.1	31.3
			213T	30.3	31.4	N/A	N/A	23.7	25.5	29.4	30.7
215T			30.3	31.4	N/A	N/A	23.7	25.5	29.4	30.7	
50	STD	N/A	254T	29.4	30.6	N/A	N/A	23.0	24.8	28.5	29.8
			213T	32.9	34.5	24.5	27.0	27.0	29.1	32.1	33.8
			215T	32.9	34.5	24.5	27.0	27.0	29.1	32.1	33.8
			254T	32.1	33.8	24.0	26.4	26.3	28.5	31.3	33.0
			256T	32.1	33.8	24.0	26.4	26.3	28.5	31.3	33.0
			284T	31.5	33.2	23.6	26.1	25.8	28.1	30.7	32.4
			286T	31.5	33.2	23.6	26.1	25.8	28.1	30.7	32.4
			324T	30.7	32.5	23.0	25.6	25.2	27.5	29.9	31.8
	326T	30.7	32.5	23.0	25.6	25.2	27.5	29.9	31.8		
	N/A	STD	364T	30.4	31.8	22.5	25.2	24.6	27.0	29.2	31.1
			184T	34.8	36.0	N/A	N/A	27.3	29.0	33.9	35.1
			213T	34.1	35.3	N/A	N/A	26.7	28.4	33.3	34.5
215T			34.1	35.3	N/A	N/A	26.7	28.4	33.3	34.5	
61	STD	N/A	254T	33.2	34.5	N/A	N/A	25.9	27.7	32.4	33.7
			256T	33.2	34.5	N/A	N/A	25.9	27.7	32.4	33.7
			213T	37.4	39.0	28.1	29.1	30.9	33.0	35.8	38.4
			215T	37.4	39.0	28.1	29.1	30.9	33.0	35.8	38.4
			254T	36.6	38.3	27.5	28.5	30.2	32.3	35.0	37.6
			256T	36.6	38.3	27.5	28.5	30.2	32.3	35.0	37.6
			284T	36.1	37.8	27.1	28.1	29.7	31.9	34.4	37.1
			286T	36.1	37.8	27.1	28.1	29.7	31.9	34.4	37.1
	STD	N/A	324T	35.3	37.0	26.5	27.6	29.0	31.3	33.6	36.3
			326T	35.3	37.0	26.5	27.6	29.0	31.3	33.6	36.3
			364T	34.5	36.3	26.0	27.1	28.4	30.8	32.9	35.6
			365T	34.5	36.3	26.0	27.1	28.4	30.8	32.9	35.6
STD	N/A	184T	40.0	41.4	N/A	N/A	31.0	33.2	38.3	39.5	
		213T	39.1	40.7	N/A	N/A	30.3	32.7	37.4	38.6	
		215T	39.1	40.7	N/A	N/A	30.3	32.7	37.4	38.6	
		254T	38.2	39.9	N/A	N/A	29.5	33.0	36.5	37.8	
256T	38.2	39.9	N/A	N/A	29.5	33.0	36.5	37.8			

LEGEND

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| BHF — Bottom Horizontal Front | THF — Top Horizontal Front |
| BHR — Bottom Horizontal Rear | THR — Top Horizontal Rear |
| DBF — Downblast Front | UBF — Upblast Front |
| DBR — Downblast Rear | UBR — Upblast Rear |

Table 15 — Plenum Fan Drive Centerline Distances In Inches

39M UNIT SIZE	SUPPLY	RETURN/ EXHAUST	MOTOR FRAME	MIN	MAX
03	STD	STD	56	6.7	7.5
			143T	6.7	7.5
			145T	6.7	7.5
			182T	5.5	6.5
			184T	5.5	6.5
06	STD	STD	56	12.0	13.2
			143T	12.0	13.2
			145T	12.0	13.2
			182T	11.3	12.6
			184T	11.3	12.6
08	STD	STD	213T	10.9	12.2
			56	21.2	22.4
			143T	21.2	22.4
			145T	21.2	22.4
			182T	20.8	22.0
10	STD	STD	184T	20.8	22.0
			213T	20.5	22.0
			215T	20.5	22.0
			143T	25.0	26.5
			145T	25.0	26.5
12	STD	STD	182T	24.6	26.0
			184T	24.6	26.0
			213T	24.3	25.8
			215T	24.3	25.8
			254T	23.9	25.5
14	STD	STD	143T	28.1	29.6
			145T	28.1	29.6
			182T	27.6	29.1
			184T	27.6	29.1
			213T	27.3	28.8
17	STD	STD	215T	27.3	28.8
			254T	26.8	28.5
			145T	28.1	29.6
			182T	27.6	29.1
			184T	27.6	29.1
21	STD	STD	213T	27.3	28.8
			215T	27.3	28.8
			254T	26.8	28.5
			145T	31.3	32.8
			182T	30.8	32.3
25	STD	STD	184T	30.8	32.3
			213T	30.5	32.0
			215T	30.5	32.0
			254T	30.1	31.8
			256T	30.1	31.8
03	STD	STD	182T	32.4	33.8
			184T	31.9	33.4
			213T	31.6	33.1
			215T	31.6	33.1
			254T	31.2	32.9
			256T	31.2	32.9
			284T	30.9	32.6
06	STD	STD	145T	35.3	36.8
			182T	34.8	36.3
			184T	34.8	36.3
			213T	34.4	36.0
			215T	34.4	36.0
			254T	34.0	35.6
			256T	34.0	35.6
08	STD	STD	284T	33.6	35.3
			145T	35.3	36.8
			182T	34.8	36.3
			184T	34.8	36.3
			213T	34.4	36.0
			215T	34.4	36.0
			254T	34.0	35.6

39M UNIT SIZE	SUPPLY	RETURN/ EXHAUST	MOTOR FRAME	MIN	MAX
30	STD	STD	182T	38.1	39.6
			184T	38.1	39.6
			213T	37.8	39.4
			215T	37.8	39.4
			254T	37.3	39.0
			256T	37.3	39.0
			284T	37.0	38.7
36	STD	STD	286T	37.0	38.7
			182T	42.8	47.2
			184T	42.8	47.2
			213T	42.5	46.9
			215T	42.5	46.9
			254T	42.0	46.5
			256T	42.0	46.5
40	STD	N/A	284T	41.7	46.2
			286T	41.7	46.2
			324T	41.2	45.8
			184T	42.9	47.2
			213T	42.5	46.9
			215T	42.5	46.9
			254T	42.0	46.5
40	N/A	STD	256T	42.0	46.5
			284T	41.7	46.2
			286T	41.7	46.2
			324T	41.3	45.8
			182T	52.0	56.5
			184T	52.0	56.5
			213T	51.7	56.2
50	STD	N/A	215T	51.7	56.2
			254T	51.3	55.8
			256T	51.3	55.8
			213T	51.7	56.2
			215T	51.7	56.2
			254T	51.3	55.8
			256T	51.3	55.8
50	N/A	STD	284T	51.0	55.5
			286T	51.0	55.5
			324T	50.5	55.1
			326T	50.5	55.1
			184T	49.2	53.3
			213T	48.8	51.9
			215T	48.8	51.9
61	STD	N/A	254T	48.3	52.4
			256T	48.3	52.4
			284T	47.9	52.1
			213T	48.7	51.9
			215T	48.7	51.9
			254T	48.2	52.5
			256T	48.2	52.5
61	N/A	STD	284T	47.9	52.1
			286T	47.9	52.1
			324T	47.4	51.7
			326T	47.4	51.7
			364T	46.9	51.2
			184T	51.9	55.9
			213T	51.5	55.5
61	N/A	STD	215T	51.5	55.5
			254T	50.9	55.0
			256T	50.9	55.0
			284T	50.5	54.6
			286T	50.5	54.6
			184T	51.9	55.9
			213T	51.5	55.5

Long-Term Storage — If storing the unit before installation, observe the following precautions:

1. The storage site should be level, rigid, and free of debris. If the site is in a heavy rain area, set the unit off of the ground.
2. Do not store the unit in a heavy traffic area or on a vibrating surface. Vibration can damage stationary bearings.
3. Ensure that all coil connections have shipping caps in place. Cover the entire unit with a waterproof tarpaulin or plastic coverall; if the unit is stored on the ground, extend the cover underneath the unit. Secure the cover with tiedowns. Do not remove cover or coil end caps until unit is ready for final installation.
4. Monthly — Move the coverall, enter the fan section through the access door or fan inlet, and slowly rotate the fan and motor by hand. This operation prevents bearing corrosion by redistributing the bearing grease.

Service Clearance — When planning the placement of the unit, ensure adequate space for service access. Typical service operations can require removing the coils and filters and accessing the motor and damper linkage. Refer to **AHUBuilder®** program for recommended clearances.

Drain Positioning — To prevent build-up of condensate in the drain pan and ensure proper operation of the drain system, position the unit so that condensate is properly trapped. Refer to the Condensate Drain section on page 63 in the Installation section.

Unit Suspension — Unit suspension methods are shown in Fig. 6. A field-supplied platform mount is recommended, especially for larger unit sizes. An inline twin-beam mount is also recommended. Units can also be supported by attaching suspension rods to all of the lifting brackets on all of the unit sections that have more than 15 in. of airway length, or by

suspending the unit from cross-beams at the joint between each unit component. Ensure that suspension rods are secured to adequately support the unit and that the rods extend entirely through their associated fasteners.

Internal Vibration Isolation — Units equipped with internal vibration isolation must be prepared as described in this section before they are installed.

For applications that do not require internal fan isolation, leave the holddown bracket screwed or bolted in place. Otherwise, the combination of internal and external unit isolation could lead to unwanted oscillation magnification.

REMOVING HOLDDOWN BRACKETS, AIRFOIL, PLENUM AND FORWARD-CURVED FANS — Remove the holddown brackets (Fig. 7) as follows:

1. Open the fan access door.
2. Remove the sheet metal screws that fasten the holddown bracket to the fan sled. (Fig. 8).
3. Repeat Steps 1 and 2 on the opposite side of the fan section. Fan sled assembly should float on isolator springs when done.

ADJUSTING ISOLATOR SPRINGS — Units with factory-supplied motors and drives are preset to $13/16 \pm 1/8$ -in. clearance between the base frame assembly and the bottom panels; field adjustment of the isolator springs is not normally required.

⚠ WARNING

When adjusting fan isolation components, **DO NOT** enter or reach into the fan cabinet while fan is running. Serious injury can result. Be sure to disconnect power and tag controls before making adjustments.

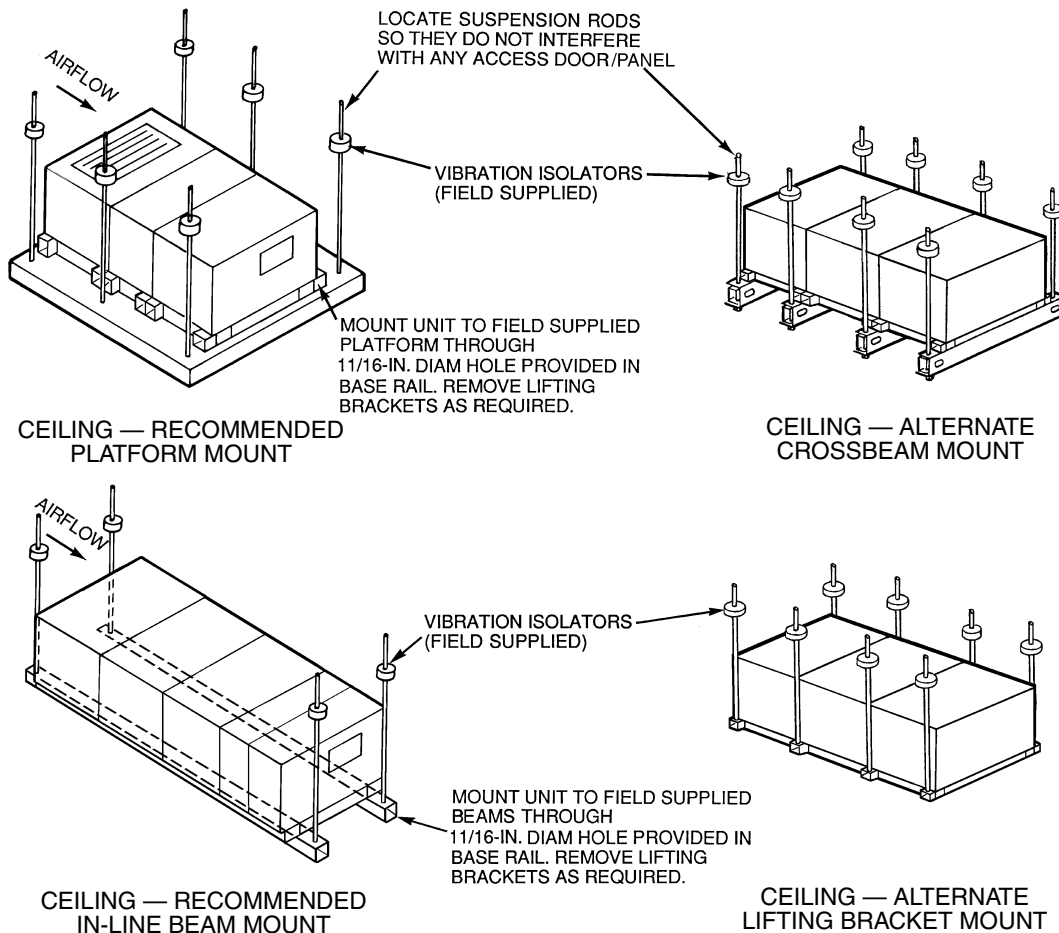


Fig. 6 — Unit Suspension

When field-supplied motors and drives have been installed, adjust the isolator springs as shown in Fig. 7 and described as follows:

1. Loosen the locknut.
2. Turn the adjusting stem until the specified clearance of $\frac{13}{16} \pm \frac{1}{8}$ -in. is obtained. (Turn clockwise to decrease clearance or counterclockwise to increase clearance.)
3. Tighten the locknut.
4. Repeat for each of the isolator springs and ensure that the fan sled is floating on the springs.

External Vibration Isolation — Install external vibration isolators per certified drawings, job specifications, and the instructions of the isolator manufacturer.

For applications that do not require internal fan isolation, leave the holddown bracket screwed or bolted in place. Otherwise, the combination of internal and external unit isolation could lead to unwanted oscillation magnification.

The coil piping must also be isolated or have flexible connectors to avoid coil header damage due to motion or vibration. Flexible connections should also be installed at the fan inlet (if ducted) and at the discharge.

Roof Curb — Roof curbs can be field supplied for 39MW units and should be installed according to the manufacturer's instructions.

Curbs are typically shipped knocked down and require field assembly as follows:

1. Curbs greater than 12 ft in airway length will be split and joined together by a splice plate. Butt the two sections and bolt together with the splice plate as shown in Fig. 8.

2. Arrange sides and ends together at right angles and bolt together using the corner bracket as shown in Fig. 9.
3. Fasten cross supports, when required, per the drawings with supplied screws as shown in Fig. 10.

Before installing roof curb, check overall unit length. Figure 11 shows AHU (air-handling unit) curb pocket dimensions.

IMPORTANT: Verify installed curb dimensions before attempting to rig the unit and install it on the curb.

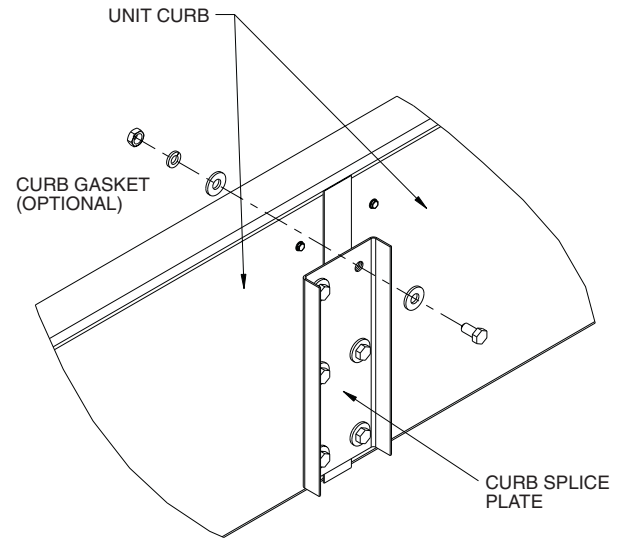


Fig. 8 — Splice Plate Usage

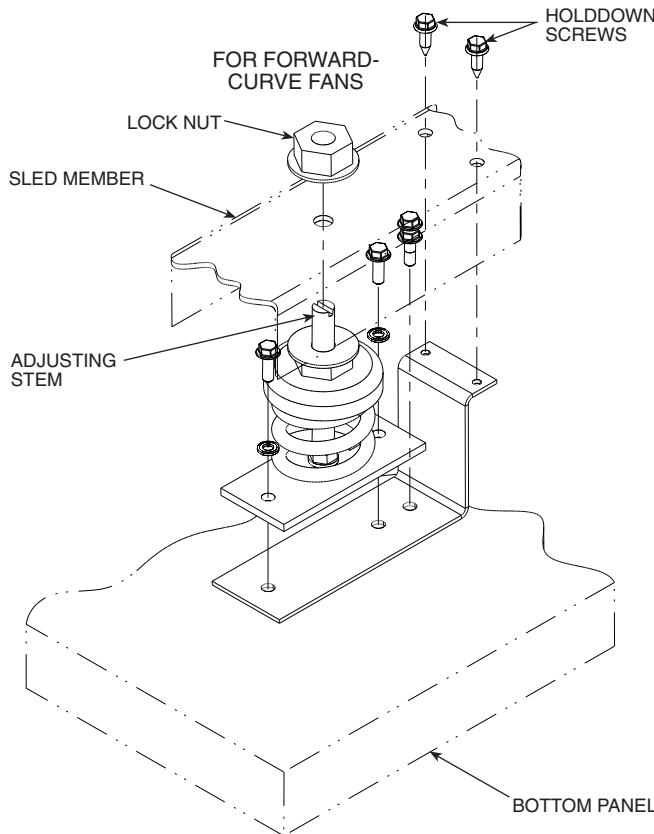
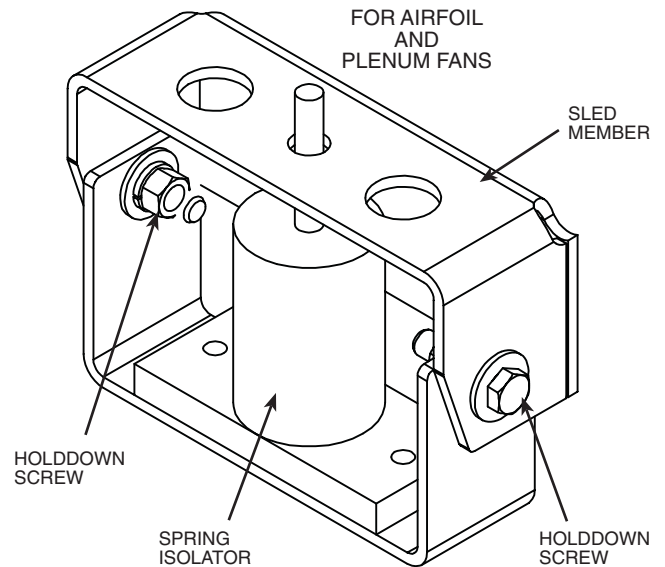


Fig. 7 — Isolator and Holddown Bracket



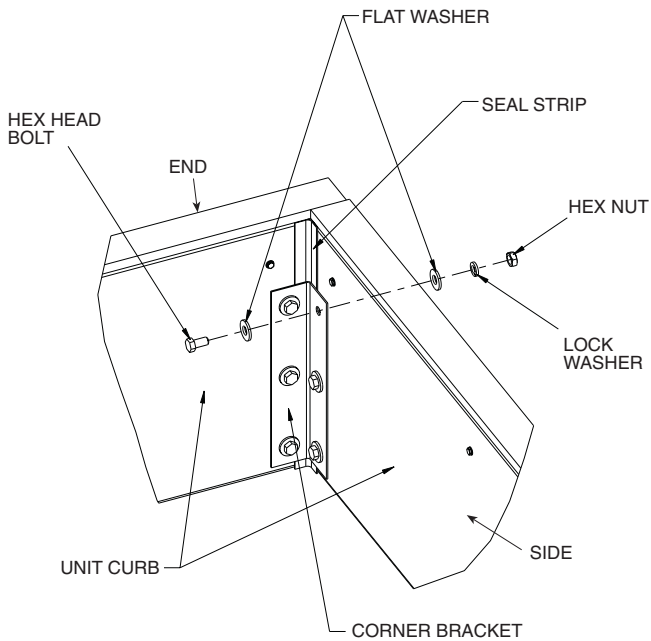


Fig. 9 — Corner Bracket

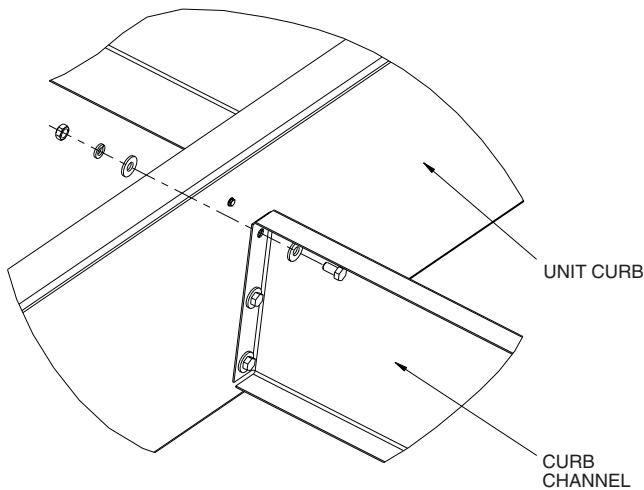


Fig. 10 — Fasten Cross Supports

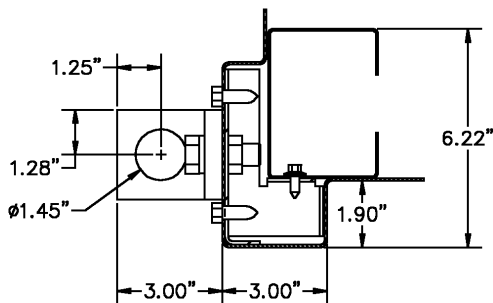


Fig. 11 — Curb Pocket Dimensions (Size 03-030 Typical)

Due to the pressure capabilities of the 39 series air handlers, duct connections must be gasketed and screwed to the unit to prevent leakage. No provisions have been made to attach the ductwork to the curb. Fabricate inlet and discharge according to the unit configuration. Dimensions for inlet and discharge locations are shown in drawings produced in *AHUBuilder®* program.

The return and supply ducts must be supported independently from the unit. Do not exert weight or downward force on the unit other than minimal force required to attach ductwork.

Before the unit is installed, gasketing must be installed between the curb and unit as shown in Fig. 12. This gasket material is supplied by the curb manufacturer. If gasket is not supplied with the curb, recommended field-supplied gasket material is 1/2-in. thick by 2-in. wide closed cell neoprene.

When curb is installed, place gasket on curb without stretching or overlapping the material, which can cause gaps or leaks. Butt all joints evenly and avoid creating gaps where water can leak into the curb. Make sure seams in gasket material overlap seams in the curb rail. See Fig. 12 for installation details.

After gasket is in place, rig unit into position as described in Rigging and Handling section. Locate unit on curb so it is correctly oriented with respect to curb inlet and discharge locations.

On curb installations, lower unit directly into place, ensuring that the roof curb gasket does not shift or curl.

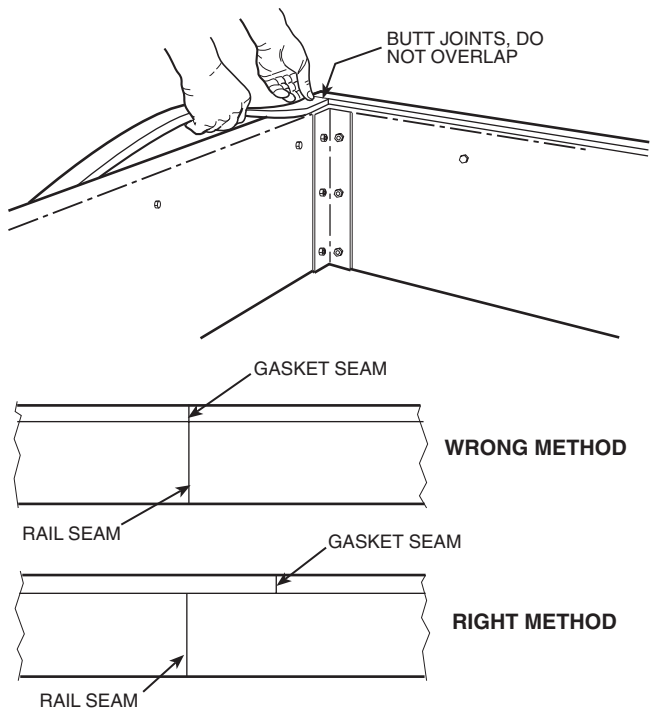


Fig. 12 — Install Gasketing

Pier or Beam Mount — As an alternative to curb mounting, units can also be mounted on I-beams or piers. For units mounted on I-beams, the beams must run the continuous length of the unit. If seismic criteria apply, crosspieces must be added between the beams according to seismic calculations. For pier-mounted units, one pier must be installed in each corner of the unit at the junction of the baserail corners. A minimum of 4 piers can be used for size 03-61 units up to 8 ft long.

For each additional 8 ft of length for size 03-61 units, install one additional pier on each side of the unit underneath the baserails. See Fig. 13 for a typical installation.

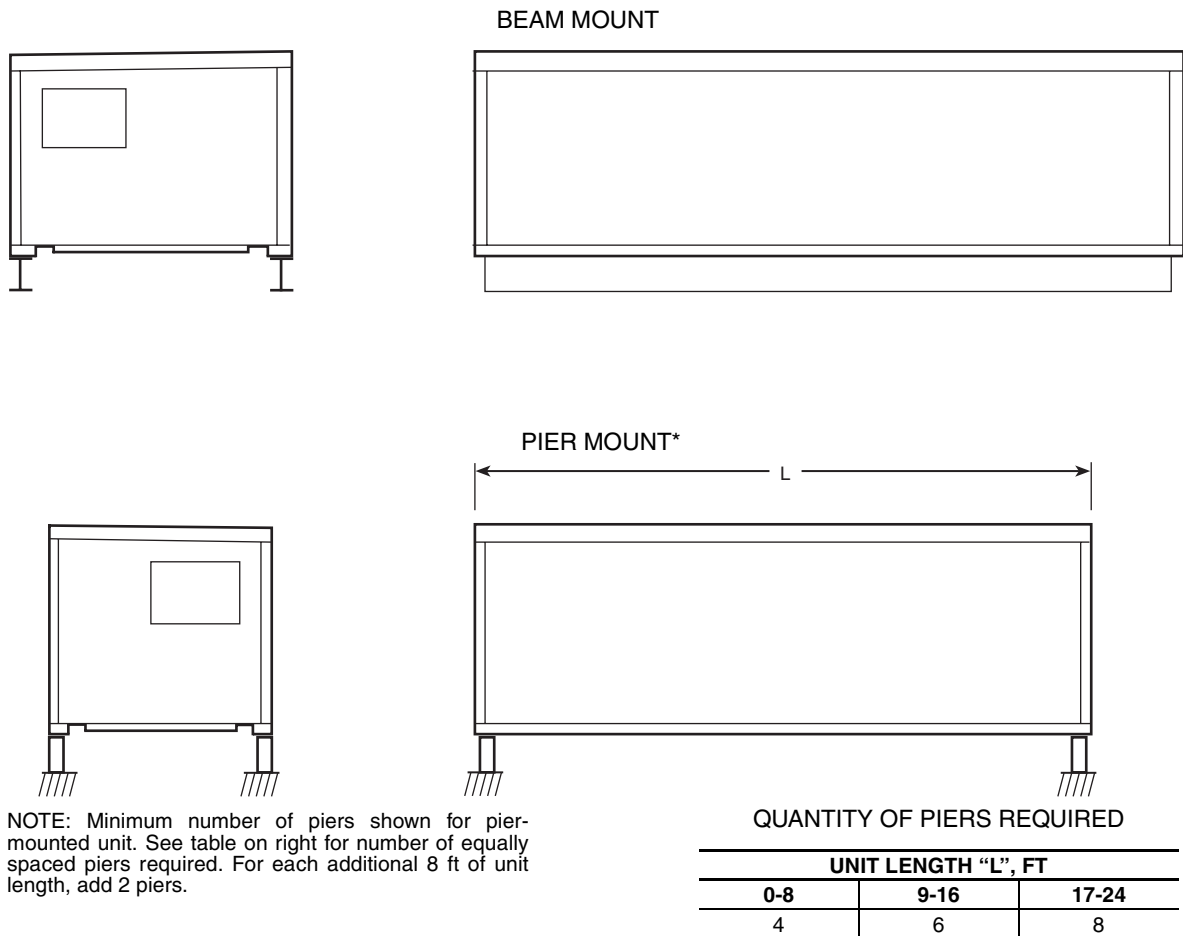


Fig. 13 — Pier or Beam Mounting

INSTALLATION

This section describes how to install 39M units, components, and component parts. Units specified on a single order are shipped with most components assembled in the specified airflow direction. The assembled unit is attached to a single shipping skid (30-ft maximum length). When an upper component exceeds the 108-in. maximum height limit, it is shipped out of its operating position on the unit skid or on a separate skid. Some component parts also require assembly or adjustment; see the section on each component type for specific instructions.

Indoor Unit/Section Connection — Indoor units are connected together using 2 different methods — screws and “T” latch cam latches. Refer to Fig. 14 and 15 for T-latch assembly details. Connect units as follows:

1. Remove shipping plates from entering and leaving face of sections. Replace 2 screws in baserail directly under corner feet only, otherwise 2 inboard screws will not allow a flush connection. See Fig. 16.
2. Rig and align units so that sides and tops are flush and holes are aligned.
3. Fasten base rails together at the lifting brackets using supplied hardware.

4. Indoor units secured with “T” latches: Turn “T” latch (indicated by red hex socket access) clockwise using a $\frac{5}{16}$ -in. hex wrench until latch fully engages. The latch rotates 270 degrees. The first 90 degrees of rotation positions the T-latch into a sealing position on the frame. The second 180 degree rotation pulls the T-latch tight, compressing the gasket which creates the frame seal.

⚠ CAUTION

Do not overtighten, damage to latch could occur. The latch is not intended to pull units together over a distance. Latch is designed for retention after units have been positioned properly and only after base rails have been secured.

NOTE: If T-latch becomes damaged or inoperable, fasten section frames using clearance and engagement holes located below latch.

5. Units secured with screws: Remove side and top panels from unit by turning panel latches (indicated by black hex socket access with arrow indicator). Fasten and secure base rails.

NOTE: Upstream sections have a 1-in. clearance hole on the inner surface of the frame member to provide access to the $\frac{5}{16}$ -in. fastening screw hole.

6. Insert screw through these holes to engage mating hole. Follow perimeter of unit and secure.
7. Re-install panels and secure panel latches. The panel latch incorporates cam action on each edge (top and bottom) to secure the panel. See Fig. 17. The panel latch assembly has a 90 degree rotation with a click detent feature that detents at 0 and 90 degrees. The arrow indicator displays the latch position.

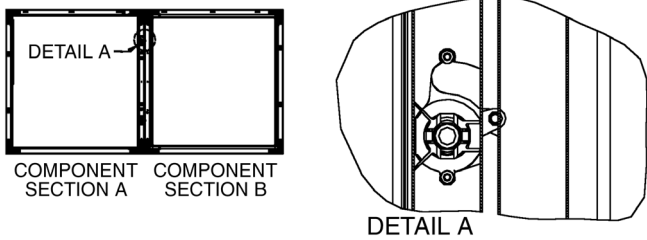


Fig. 14 — T-Latch Assembly

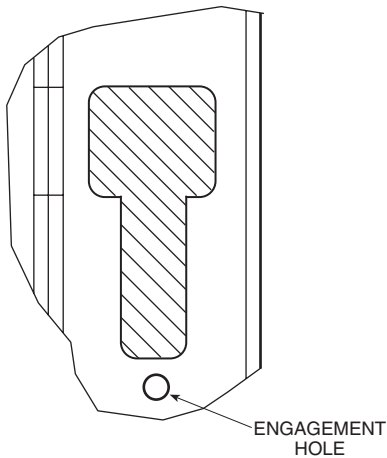


Fig. 15 — T-Latch Receptacle (End View)

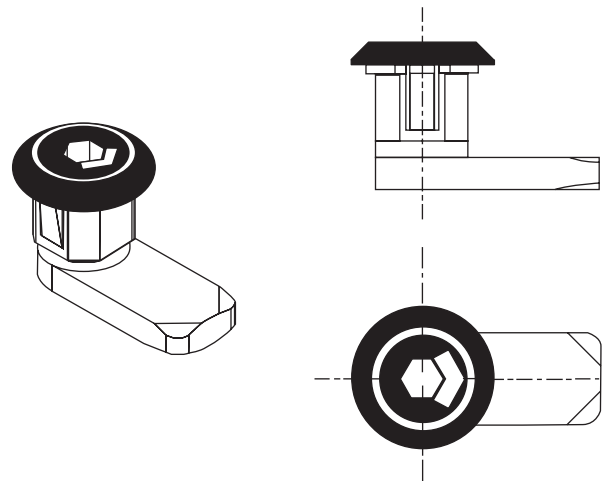


Fig. 17 — Panel Latch Assembly

NOTE: Panel latches have an indicator arrow highlighted in the face of the latch and that arrow must point toward the panel to assure that panel is fully secured. Ensure the latch arrow is in its proper position prior to unit start-up.

Outdoor Unit — Outdoor units are either shipped in one piece or with minimal shipping splits. Refer to the shipping split label attached to the unit.

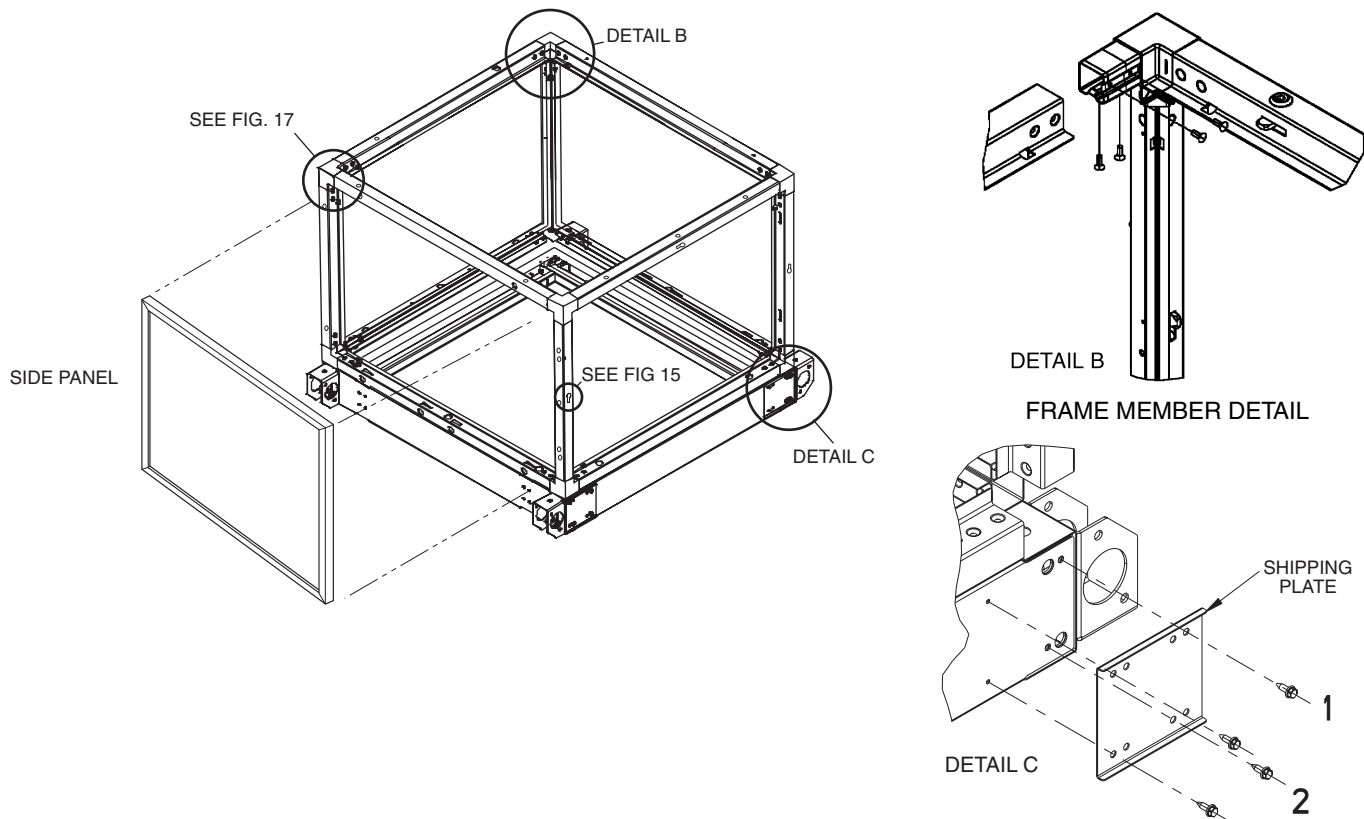


Fig. 16 — Section Frame Assembly

Duct Connections

MIXING BOX/INLET PLENUM/DISCHARGE PLENUM — Attach the ductwork to the box frame rails with sheet metal screws as shown in Fig. 18. Ductwork should be flanged out as close to the damper framed opening as possible. Screws with weatherproof washers and a bead of silicone around the duct flange must be used for outdoor applications. Do not remove the screws retaining the damper frame; the damper will fall out.

MIXING BOX/INLET PLENUM (Bottom) — Bottom damper equipped air-handling units have an insulated damper duct connection sleeve that extends to the bottom of the baserail on 39MN indoor units and to the curb pocket on 39MW outdoor units.

For indoor units, apply 1/2 in. thick by 1 1/2 in. wide closed cell neoprene gasketing or run a bead of silicone to the damper duct flange. Flange the ductwork out no more than 1 1/4 in. and screw the flanged ductwork to the damper duct flange under the unit.

For curb mounted outdoor units, refer to the curb submittal drawings. Return ductwork may be flanged outward and attached to the roof curb. Field-supplied stiffeners may be required to properly support the long edges of the duct. Apply 1/2 in. thick by 1 1/2 in. wide closed cell neoprene gasketing or run a bead of silicone to the damper duct flange.

FAN DISCHARGE CONNECTIONS — Discharge air ducts must be attached directly to the discharge side of the unit. **This applies to both indoor and outdoor units!** Use care when making turns and transitions in ductwork to avoid excessive air friction. Duct elbows should contain turning vanes. See Fig. 19.

Ductwork connected to the fan discharge should run in a straight line for at least 2.5 times the outlet diameter dimensions and should not be reduced in cross-section. See Fig. 20. Duct turns should be in the same direction as fan rotation to minimize any negative system effects.

BOTTOM RETURN FAN CONNECTIONS — Return air ducts must be attached directly to the return side of the unit. **This applies to both indoor and outdoor units!** Use care when making turns and transitions in ductwork to avoid excessive air friction. Duct elbows should contain turning vanes. See Fig. 19.

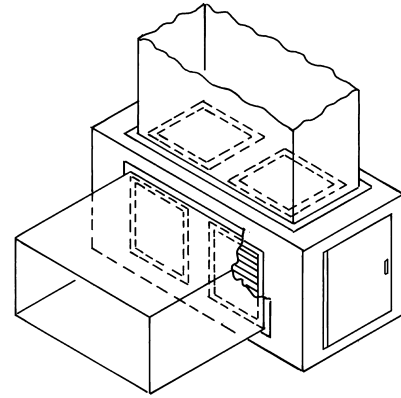
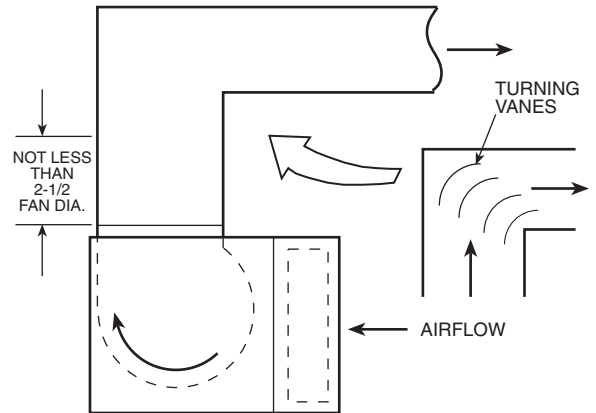


Fig. 18 — Mixing Box Ductwork Attachment



NOTE: Make turns in the same direction as fan rotation.

Fig. 19 — Recommended Discharge Duct Arrangement When Turns are Required

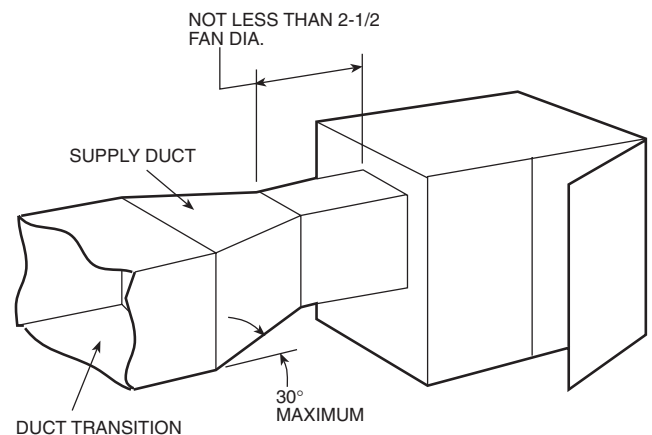


Fig. 20 — Duct Connections

PLENUM FAN DUCT CONNECTIONS — Plenum fans are designed for draw-thru or blow-thru operation. Draw-thru fan sections have closed panels on all sides except for the fan inlet side. On blow-thru fan sections, the panel on the end opposite the inlet is omitted so that components such as coil or filter sections can be added downstream from the plenum fan.

DRAW-THRU PLENUM FAN DISCHARGE FABRICATION — Duct openings for draw-thru plenum fans must be field fabricated. They should be located in the plenum fan section according to the following guidelines:

- Locate discharge openings in side or top panels; the end panel opposite the inlet will have a higher pressure drop per the explanation in the 39M Product Data manual.
- Locate discharge openings on the side or top panels between the fan wheel and end panel opposite the inlet. Do not locate discharges in the direct path of airflow from the wheel.
- Avoid locating the discharge opening on the motor side of the fan section. If a discharge on the motor side is necessary, locate the opening near the top of the cabinet.
- Sizes 36-61 include intermediate frame members. When cutting the discharge opening for the plenum fan, do not cut through any intermediate frame member.

Typical duct locations are shown in Fig. 21.

Once the discharge locations are selected and cut, the duct connections can be fabricated. Install field-supplied duct flanges and framing channels to smooth the airflow leaving the discharge opening. Two of the channels should extend the width or height of the cabinet to provide additional cabinet support.

Panel Cutting — The 39M unit's double-wall foam-filled panels require special attention when cutting and or penetrating.

1. Take care in planning before penetrating any panel with electrical conduit, hydronic piping, sensor pickups or wiring. Once these are routed through a panel, for all

practical purposes, it becomes a fixed panel that is not easily removed for service access.

2. In some cases it will be possible for smaller conduits ($\frac{1}{2}$ -in or $\frac{3}{4}$ -in.) to enter the cabinet where individual sections are joined together. Inspect the selected area carefully to be certain that you do not encounter panel latches, "T-latches," or section joining screws. Once the conduit is in place, it must be securely sealed, watertight and airtight, to prevent ANY infiltration.

Penetrations are typically located in one of the existing "fixed" panels, such as the fan discharge panel, or the coil connection panel to maximize the number of removable/service panels. When it is necessary to penetrate the panel for wiring or piping entry, make certain that the entry point will not interfere with future component servicing, block access doors, or obstruct airflow.

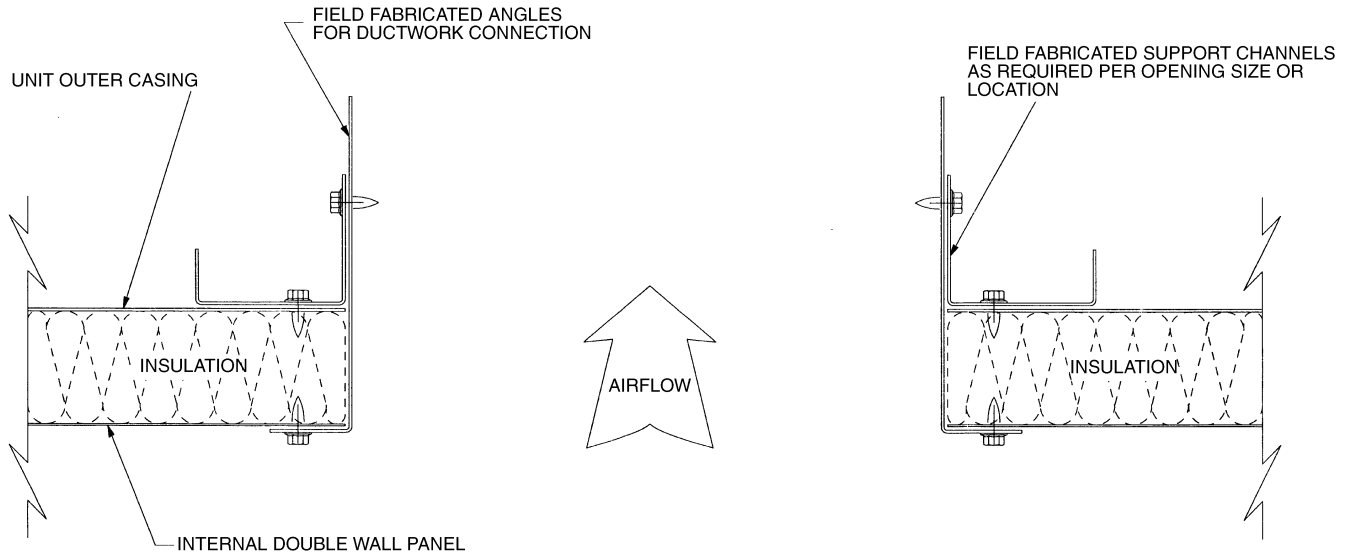
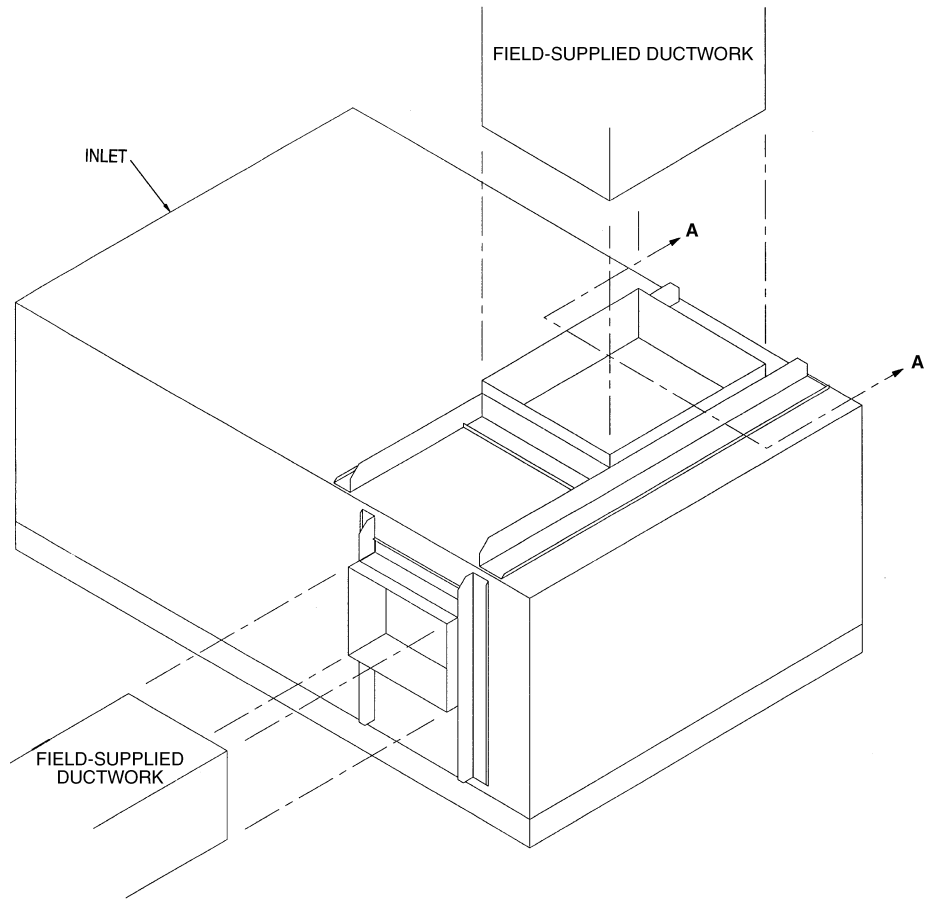
3. Drill a small pilot hole completely through the panel.
4. Use of a sharp hole saw or, if appropriate, a Unishear™ cutting tool or sheet metal nibbler to cut the hole or opening from each side.

CAUTION

Do not use a cutting torch or open flame on or near the fan. Damage to the panel may occur.

5. Carefully remove the foam. The hole should be lined or sleeved to confine the foam, and the penetration should be sealed, both inside and out, to eliminate all possibility of infiltration or leakage.

NOTE: Small quantities of locally available commercial canned foam may be used, if necessary, to complete minor repairs. Significant patching may justify ordering replacement panels instead.



SECTION A-A

Fig. 21 — Discharge Fabrication, Draw-Thru Plenum Fans

Zone Damper Section — Refer to Fig. 22 and install the section as follows:

1. Remove the screws holding the zone damper section to the heating coil section and remove the lag screws holding the damper to the shipping skid.
2. Place the supplied 1/4-in. thick x 1 1/2-in. grey foam gasket around the perimeter of the cooling and heating coil section discharges. Use two gasket strips on partition panels to obtain double width.
3. Rig the zone damper section and lift it into position on (vertical discharge) or next to (horizontal discharge) the gasketed cooling and heating coil sections.
4. Fasten the damper section to the coil sections using the supplied 1/4-14 x 3/4-in. sheet metal screws.
5. Install control shaft and bearing for each individual zone after cutting linkage (for the job specific zone application).

Control shaft extensions are bagged and wrapped to the inside of the zone damper blades. Additional field-supplied shaft extensions may be ordered from local Ruskin supplier, part no. 10-020569-00B.

Face and Bypass Dampers — All face and bypass damper sections are shipped fully assembled. Hat channels are necessary for damper support. DO NOT remove (see Fig. 23). Unit sizes 03-12 are built with a single damper assembly, sizes 14-61 have two damper assemblies linked via a jackshaft. Damper crankarms have 90 degrees of travel from fully open to fully closed positions and are adjustable to suit conditions. Refer to Fig. 24 and 25 for details.

Actuators must be mounted directly to the damper shaft. Removal of crankarms is necessary for direct connection actuator use. Refer to Table 16 for operating torque requirements.

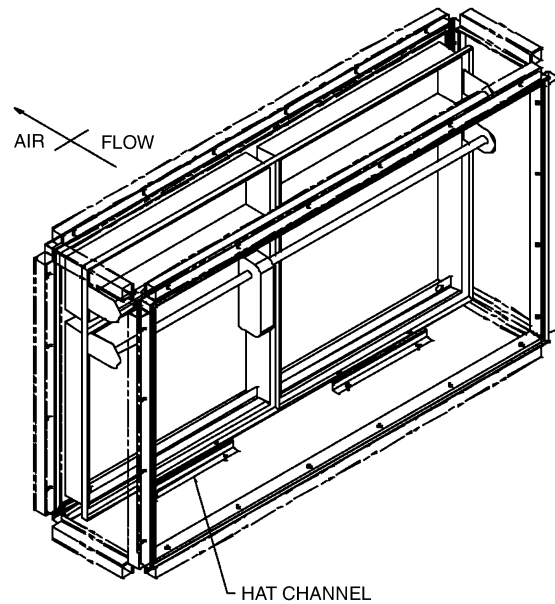


Fig. 23 — Face and Bypass Section Detail

CAUTION

Factory duct collars and damper assemblies are for attaching ductwork only and must NOT be used to support the duct's weight. Weight bearing deflection can increase torque necessary to operated dampers, or bind them preventing any movement.

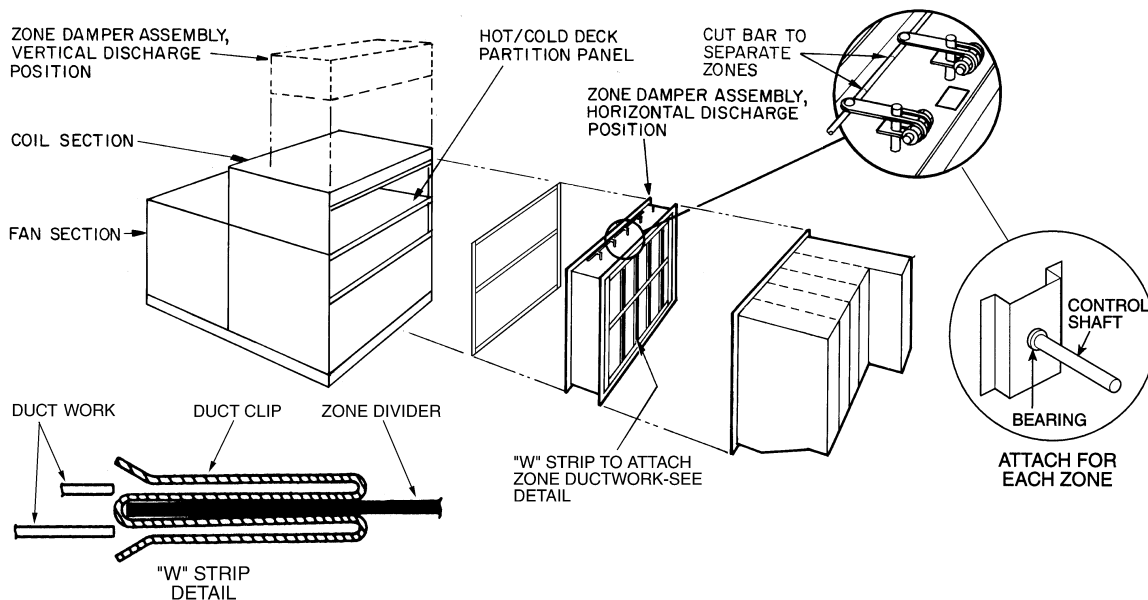


Fig. 22 — Zone Damper Assembly Details (Horizontal Discharge Shown)

ZONE DAMPER DETAILS

39M UNIT SIZE	DIMENSIONS (in.)			QTY OF ZONES	QTY OF EXTENSION SHAFT KITS
	A	B	C		
06	28.50	41.50	12	6	4
08	28.50	49.50	12	7	4
10	28.50	62.50	12	10	6
12	34.50	62.50	15	10	6
14	34.50	67.50	15	10	6
17	34.50	74.50	15	12	7
21	40.50	74.50	18	12	7
25	40.50	81.50	18	13	8
30	40.50	99.50	18	16	10
36	52.50	104.50	24	17	10
40	52.50	104.50	24	17	10
50	56.50	112.50	26	18	12
61	68.50	112.50	32	18	12

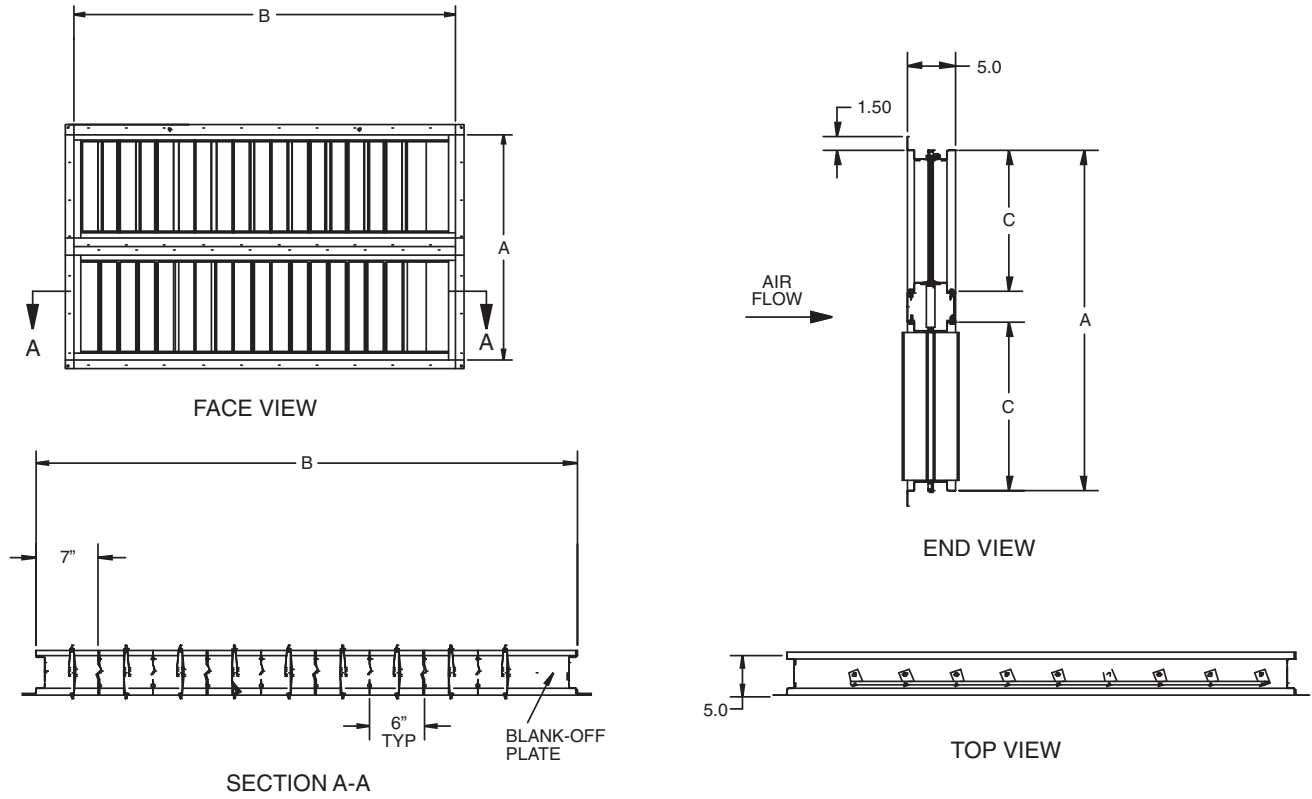


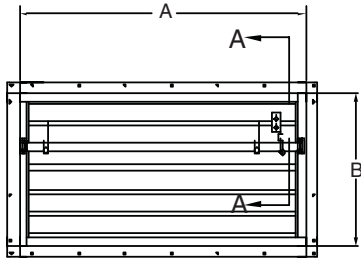
Fig. 24 — Zone Damper Section Details

MIXING BOX, EXHAUST BOX, AND EXTERNAL BYPASS DAMPER DETAILS

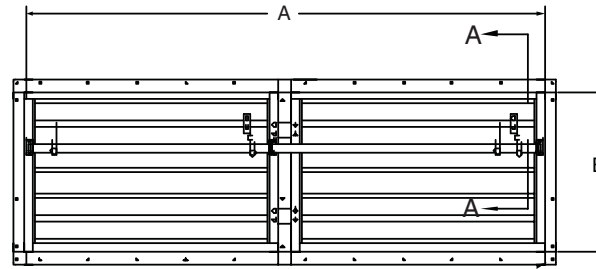
UNIT SIZE	DETAIL (SECTIONS)	A (WIDTH)	B (HEIGHT)	JACKSHAFT DIAMETER
03	1	25.75	10.75	1/2"
06	1	38.75	14	1/2"
08	1	46.75	14	1/2"
10	1	59.75	14	1"
12	1	59.75	14	1"
14	2	64.75	16.75	1"
17	2	71.75	16.75	1"
21	2	71.75	20	1"
25	2	78.75	20	1"
30	2	96.75	20	1"
36	3	101.75	29	1"
40	3	101.75	32	1"
50	3	109.75	35	1"
61	3	109.75	44	1"

SIDE DAMPER DETAILS

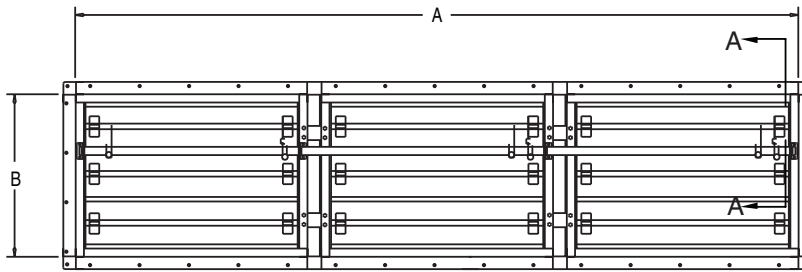
UNIT SIZE	DETAIL (SECTIONS)	A (WIDTH)	B (HEIGHT)	JACKSHAFT DIAMETER
03	1	14	18	1/2"
06	1	20	26	1/2"
08	1	20	29	1/2"
10	1	26	29	1"
12	1	26	36	1"
14	1	32	36	1"
17	2	32	39	1"
21	2	32	49	1"
25	2	38	49	1"
30	2	44	49	1"
36	2	50	60	1"
40	2	50	66	1"
50	2	56	76	1"
61	3	56	91	1"



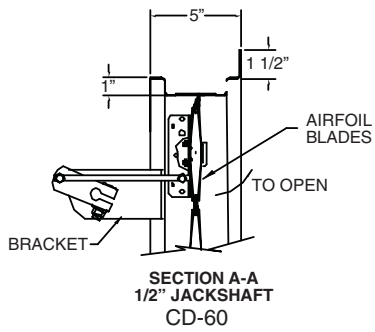
DETAIL 1
FACE VIEW



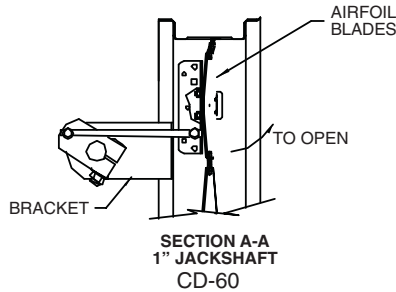
DETAIL 2
FACE VIEW



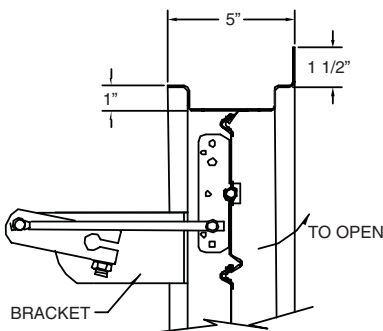
DETAIL 3
FACE VIEW



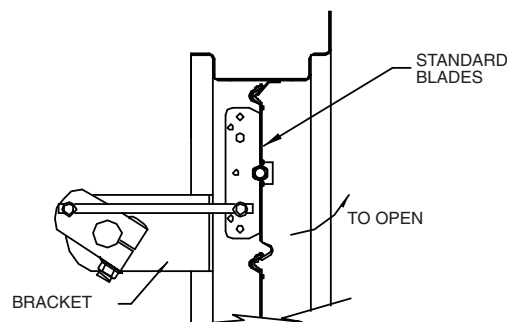
SECTION A-A
1/2" JACKSHAFT
CD-60



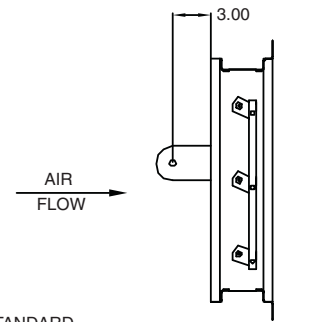
SECTION A-A
1" JACKSHAFT
CD-60



SECTION A-A
1/2" JACKSHAFT
CD-36



SECTION A-A
1" JACKSHAFT
CD-36



RIGHT SIDE VIEW

LEGEND

- CD-60 — Premium Damper
- CD-36 — Standard Damper

Fig. 25 — Mixing Box, Filter Mixing Box, Exhaust Box and External Bypass Damper Details

Mixing Box/Filter Mixing Box Damper Linkage

⚠ CAUTION

It is important to properly link the outdoor air and return air dampers. Failure to do so may cause mixing problems, stratification, or coil freezing under some conditions, especially in combination type filter mixing boxes.

Refer to Fig. 26 for typical damper arrangement and connecting rod position.

CONTROL DAMPERS — Control dampers may be operated with pneumatic or electric actuators. These items should be set up in accordance with the control manufacturers installation instructions.

DAMPER LINKAGE ADJUSTMENT — After the air-handling unit has been powered, the dampers should be checked to ensure they move freely and close tightly, adjustment of the linkage may be required.

LINKAGE ADJUSTMENT

1. With the damper actuator unpowered and the damper linkage disconnected, rotate the outdoor air damper so that it is fully closed. Make sure the spring return actuator has completed its stroke (with power disconnected this will be achieved). The return air damper should be fully open at this point.
2. Tighten the actuator on the damper jackshaft, ensure all linkage is connected, secure and moves freely.
3. With power applied to the actuator, check for a complete stroke and free movement in the dampers and damper linkage.

⚠ CAUTION

Dampers and linkage must be checked prior to applying power. Make certain that there are no obstructions that could interfere with the operation of the dampers.

NOTE: While adjusting linkage, one damper must be fully open and the other fully closed.

Top and rear dampers are shipped with both dampers in closed position. Loosen the swivel on the interconnecting linkage bar and fully open rear damper, leaving top damper closed. Retighten the swivel.

Certain damper combinations require that dual actuators or bellcrank linkages be field-provided when jack shafts are 90 degree opposed. This may occur when there is a combination of end dampers with either top or bottom dampers.

FIELD SUPPLIED AND INSTALLED ACTUATORS — If one or two actuators are used, they must be mounted to the outdoor-air damper jackshaft. To properly set the connecting

linkages, determine the rotation required to open the outdoor-air damper. Ensure the actuator spring return fully closes the outdoor-air damper.

If more than 2 actuators are used, they must be installed in equal numbers on each jackshaft. To properly set these dampers, determine the rotation required for each damper and mount the actuators so that the spring feature will open the return air damper and close the outdoor-air damper. Lock each damper actuator to the jackshaft. Remove any factory-supplied connecting linkage between the outdoor air and return-air dampers. Failure to do so will damage the actuators. No additional linkages are required for these applications.

Exhaust damper boxes are shipped with dampers in the closed position.

All damper crankarms have 90 degrees travel from open to closed. They may be adjusted to suit actuator location.

DO NOT mount damper actuators on the unit panels, actuators are shaft mount only. See Table 16 for operating torque requirements.

ZONE DAMPER LINKAGE (Fig. 22 and 24) — Note that damper control levers and a common operating bar are factory installed on upper end of damper shafts on top of zoning damper assembly. To facilitate the installation of field-supplied damper operators, the operating bar may be cut and the control levers repositioned as follows:

⚠ CAUTION

Damper operation may be impaired if ductwork is supported by the unit.

1. Check job prints to determine number and size of zones required and damper operator locations.
2. Cut and remove portion of operating bar between zones as required.
3. Install actuators on field-fabricated support brackets. Connect actuator linkage to the center axle of interconnecting zones.
4. Adjust actuator for correct damper operation. Be sure actuator, linkage, and dampers operate freely. See Table 16 for operating torque requirements.

Mixing Box Damper Actuators — The 39M mixing boxes can be supplied with direct mounted damper actuators. Refer to Fig. 27 for typical actuator mounting. Actuators are also available for field installation. See Field Supplied and Installed Actuators section for more information. Refer to Table 16 for damper operating torque.

To ensure torque is transmitted equally to both damper sections, actuator must be connected to the jackshaft that drives the interconnecting linkage bar. Connection to any other shaft is not recommended.

Table 16 — Damper Operating Torque (lb)

COMPONENT	39M UNIT SIZE														
	03	06	08	10	12	14	17	21	25	30	36	40	50	61	
Zone Damper	—	4	4	4	5	5	5	5	5	5	7	7	8	10	
Mixing or Exhaust Box	13	26	32	41	41	53	58	70	77	94	143	158	187	235	
Side Mixing or Exhaust Box	12	25	28	37	46	56	61	76	91	105	146	160	207	248	
Airflow Measuring Damper	5	9	9	9	16	16	16	29	29	29	N/A	N/A	N/A	N/A	
Internal Face and Bypass	21	32	45	57	78	85	103	129	142	174	195	232	251	304	
External Face and Bypass	29	44	59	76	96	104	126	161	176	217	282	312	390	470	

NOTES:

1. Damper shaft moves 90 degrees from open to close.
2. Operating torques is shown for one damper. Multiply the value shown by the number of dampers for total with one actuator.

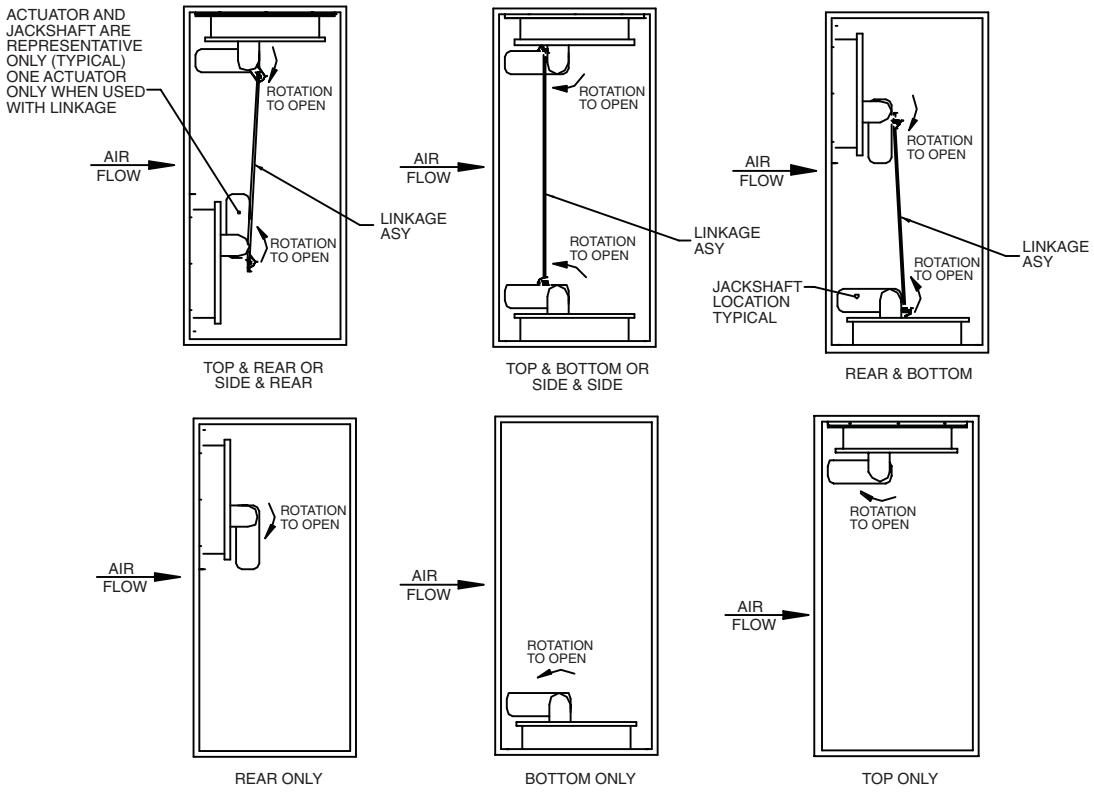
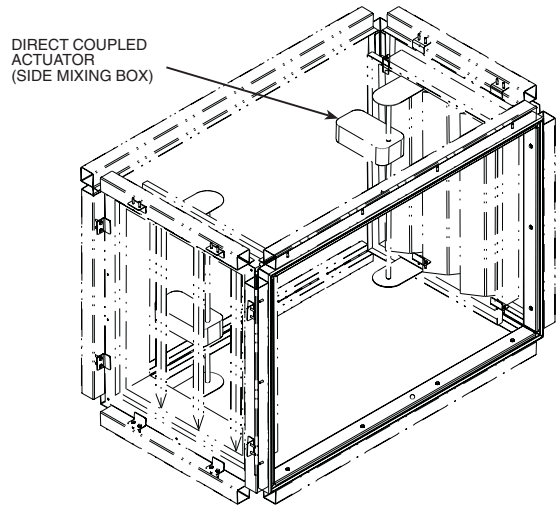


Fig. 26 — Mixing Box/Filter Mixing Box, Typical Damper Arrangements (Size 14 Shown)

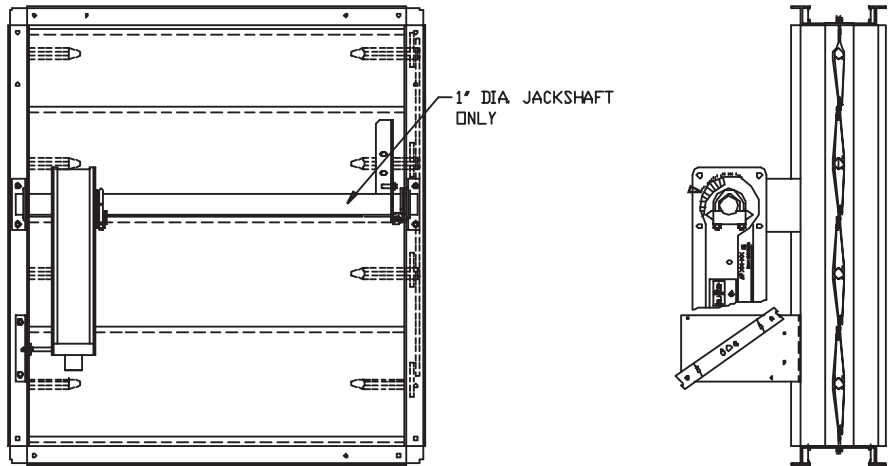


Fig. 27 — Typical Mixing Box Actuator Mounting

Vertical Draw-Thru Units

NOTE: Size 21-61 vertical units that exceed the 108-in. maximum height or units with a vertical fan shipping split are shipped with the fan out of its operating position, separate from the vertical coil section. See Fig. 28A and 28B.

The unit is secured to a wooden skid with lag screws. Remove screws before lifting the unit.

NOTE: Do not remove the fan hold-down brackets until the section is installed on the coil section.

1. For units with baserail, remove the 4 brackets securing the top panel of the cooling section and reposition them to the existing holes with the long flange in a vertical position flush with the outer panel.
2. Attach the $\frac{1}{8}$ -in. thick by $\frac{3}{4}$ -in. wide gray gasket supplied with the unit to the top perimeter of the vertical coil section.
3. For units with baserail, attach joining collar (supplied with unit) to top discharge opening using hardware included with unit.

4. Rig the fan section using the lifting brackets and place it on top of the coil section.

NOTE: For units with baserail, the 4 brackets that were repositioned earlier should be aligned with the appropriate slots in the base rail of the fan section. Before setting the fan section on the coil section, remove right and left side panels from coil section.

5. For units without baserail, locate 1-in. tool clearance hole in underside of top rail of coil section on each side.
6. Insert a pin or punch to assist alignment of corresponding holes of fan section while lowering fan section, if needed.
7. Secure the fan and coil sections together using the supplied $\frac{1}{4} \times \frac{3}{4}$ -in. long sheet metal screws. The securing points will be on the bottom of each side and front top rail of the coil section for units without baserail (Fig. 28B). For units with baserail, securing points are located in the side of the baserail (Fig. 28A).

NOTE: Do not remove the front panel of the coil section until the side panels are reinstalled. Secure brackets from top of coil section to fan section base rail using 2 screws each.

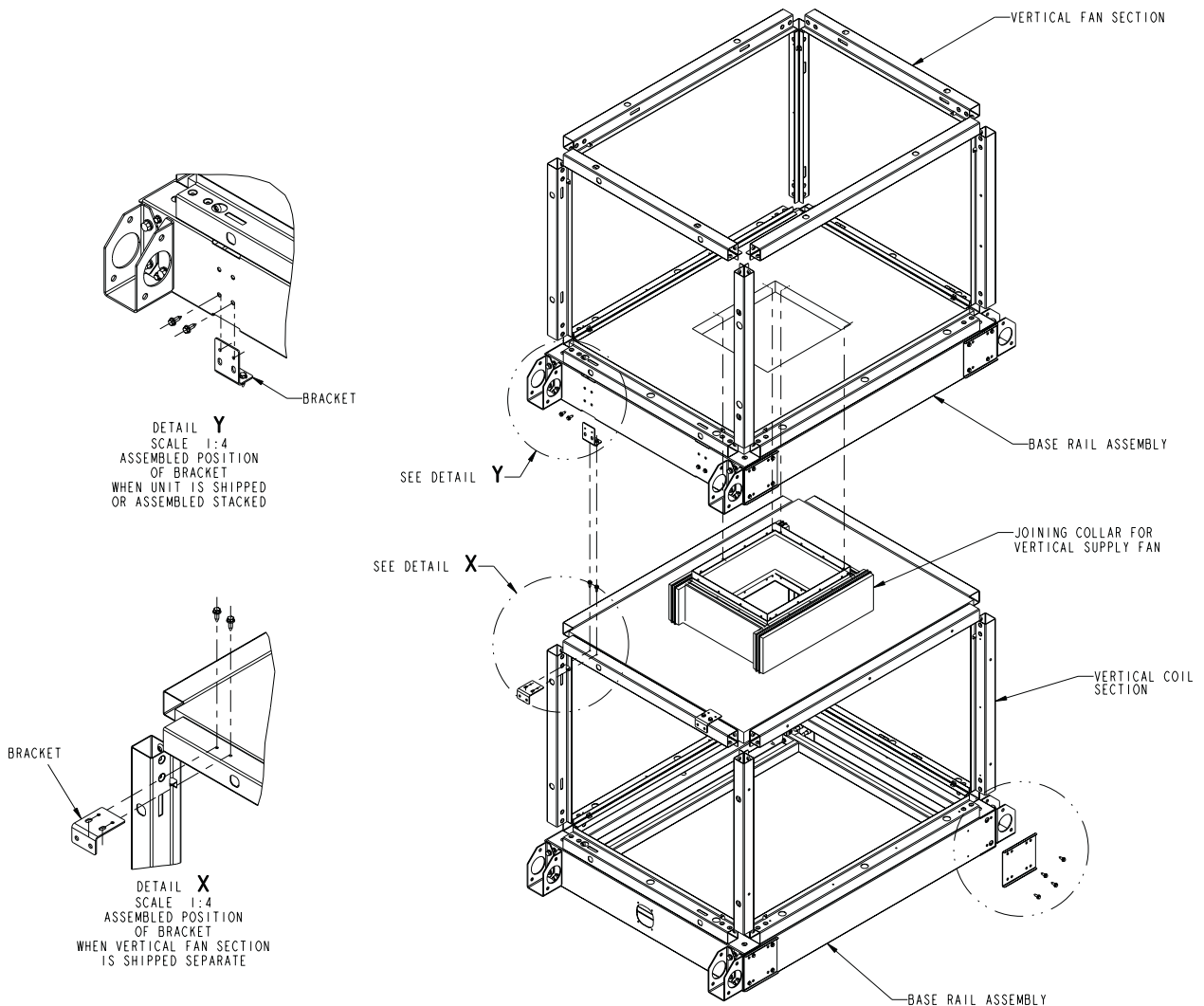
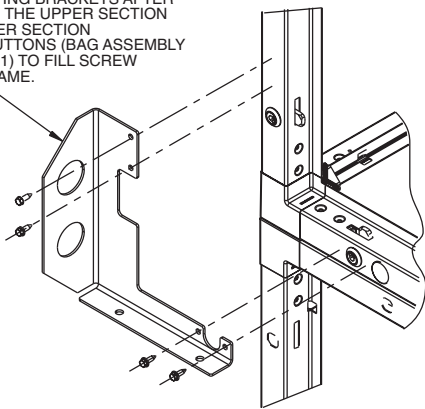


Fig. 28A — Vertical Fan Installation with Baserail

REMOVE LIFTING BRACKETS AFTER ASSEMBLING THE UPPER SECTION TO THE LOWER SECTION. USE PLUG BUTTONS (BAG ASSEMBLY 39MA42000901) TO FILL SCREW HOLES IN FRAME.



PLACE GASKET ON LOWER SECTION BEFORE SETTING UPPER SECTION UNTO LOWER SECTION

USE 1/4-14 X 3/4 LG SHEET METAL SCREWS TO FASTEN UPPER

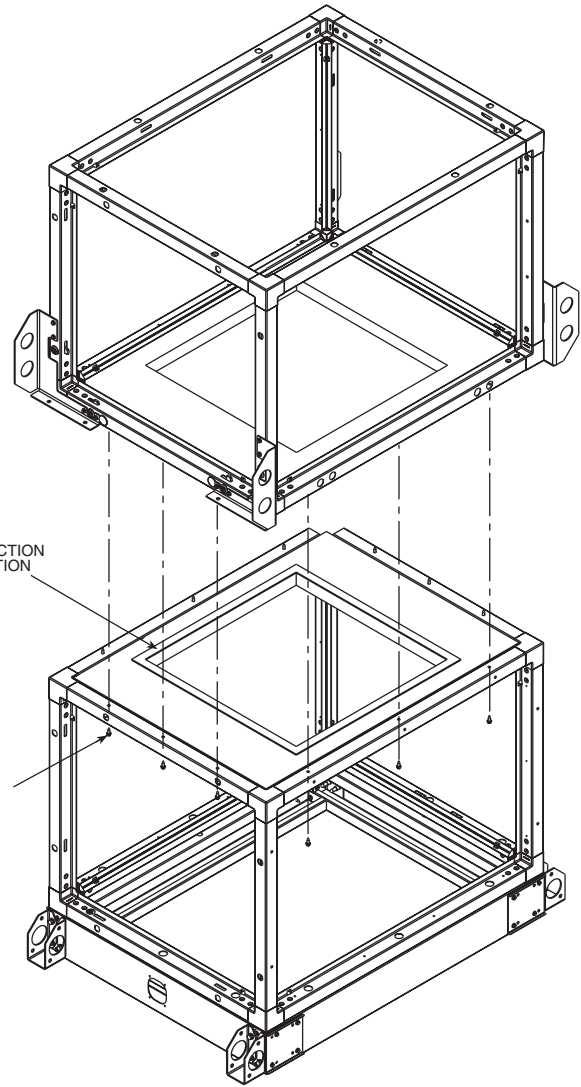


Fig. 28B — Vertical Fan Installation without Baserail

Fan Sled Disassembly — In some cases, it may be necessary to remove the fan sled from the unit and break it down into smaller components. See Tables 17-19 and Fig. 29 for maximum complete fan sled dimensions and housing only dimensions.

To remove the fan sled:

1. Remove all of the panels from the fan section except for the fan discharge panel.
2. Disconnect the vibration absorbent discharge seal by unscrewing the seal channels from the discharge of the fan housing. Remove the fan discharge panel.
3. On larger units, the fan sled may be extremely heavy. Remove the top and vertical frame members of the fan section by removing the 4 screws from each frame to corner piece connection.
4. If complete fan sled removal is required, unscrew bolts holding the isolator base to the bottom of the unit.

5. Disassemble fan and fan housing in place and/or affix appropriate rigging to remove the required components noting diagrammatically where each component is attached. Components should be removed in the following order:
 - a. Belts and sheaves
 - b. Motor
 - c. Fan shaft
 - d. Fan wheel (forward curved fan wheels are removed through the fan discharge opening, airfoil wheels are removed through the side of the housing after removal of the drive side inlet volute)
 - e. Fan housing

NOTE: Install the preceding components in the reverse order.

Table 17 — Airfoil Fan Dimensions (in.)

UNIT SIZE 39M	ARRANGEMENT	FAN SLED ASSEMBLY (See Fig. 29)			FRAMED BLOWER WITHOUT SLED		
		Length	Width	Height	Length	Width	Height
03	All	35.5	23.5	28.8	18.6	21.0	21.9
06	All	36.5	33.5	28.7	22.4	24.0	26.8
08	All	29.8	45.5	31.8	24.6	26.3	29.3
10	All	29.8	58.5	31.8	24.6	26.3	29.3
12	All	35.8	58.5	38.8	29.6	30.3	36.0
14	All	41.8	63.5	38.8	29.6	30.3	36.0
17	All	41.8	70.5	41.8	32.5	33.8	39.6
21	All	41.7	72.0	51.8	35.9	36.5	43.6
25	All	53.8	77.5	51.8	39.5	39.8	48.1
30	All	53.8	95.5	51.8	39.5	39.8	48.1
36	Supply Std	56.3	100.5	62.8	43.8	43.3	52.8
	Ret/Exh Std	56.3	100.5	62.8	47.8	48.5	58.1
40	Supply Std	62.3	100.5	68.8	47.8	48.5	58.1
	Ret/Exh Std	62.3	100.5	68.8	52.9	53.0	64.9
50	Supply Std	68.3	108.5	78.8	52.9	53.0	64.9
	Ret/Exh Std	68.3	108.5	78.8	57.9	57.5	71.0
61	Supply Std	74.3	108.5	93.8	57.9	57.5	71.0
	Ret/Exh Std	74.3	108.5	93.8	65.9	62.8	78.8

NOTE: Different fan discharge positions have different dimensions. The values shown are for the largest overall dimensions.

Table 19 — Plenum Fan Dimensions (in.)

UNIT SIZE 39M	ARRANGEMENT	FAN SLED ASSEMBLY (See Fig. 29)		
		Length	Width	Height
03	All	41.0	26.4	23.7
06	All	42.5	36.0	26.2
08	All	24.8	46.5	29.1
10	All	26.3	53.3	31.3
12	All	30.1	58.3	36.7
14	All	30.1	58.3	36.7
17	All	32.6	62.5	40.1
21	All	38.3	66.3	41.4
25	All	42.3	70.3	45.4
30	All	41.0	75.8	48.9
36	All	48.9	91.4	54.4
40	Supply Std	48.9	91.4	54.4
	Ret/Exh Std	48.9	91.4	58.3
50	Supply Std	57.4	99.4	58.4
	Ret/Exh Std	57.4	99.4	64.0
61	Supply Std	57.4	99.4	64.0
	Ret/Exh Std	57.4	99.4	70.0

Table 18 — Forward Curve Fan Dimensions (in.)

UNIT SIZE 39M	ARRANGEMENT	FAN SLED ASSEMBLY (See Fig. 29)			FRAMED BLOWER WITHOUT SLED		
		Length	Width	Height	Length	Width	Height
03	All - Horizontal	17.5	26.0	20.2	16.7	15.1	16.7
	All - Vertical	34.0	25.0	20.2	16.7	15.1	16.7
06	All - Horizontal	23.5	39.0	22.6	18.6	18.8	18.6
	All - Vertical	34.0	25.0	22.1	18.6	18.8	18.6
08	Sup/Ret Std	28.5	47.0	25.1	21.6	23.9	21.6
	Supply Small	28.5	47.0	20.6	18.6	18.8	18.6
10	Sup/Ret Std	28.5	60.0	29.0	25.5	27.9	25.5
	Supply Small	28.5	60.0	23.6	21.6	23.9	21.6
12	Sup/Ret Std	34.5	60.0	30.2	25.5	27.9	25.5
	Supply Small	34.5	60.0	25.8	21.6	22.9	21.6
14	Sup/Ret Std	40.5	65.0	35.1	30.4	32.5	30.4
	Supply Small	40.5	65.0	30.2	25.5	27.9	25.5
17	Sup/Ret Std	40.5	72.0	35.1	30.4	32.5	30.4
	Supply Small	40.5	72.0	30.2	25.5	27.9	25.5
21	Sup/Ret Std	40.5	72.0	42.7	38.0	33.3	38.0
	Supply Small	40.5	72.0	30.2	25.5	27.9	25.5
25	Sup/Ret Std	52.5	79.0	43.2	38.0	33.3	38.0
	Supply Small	52.5	79.0	43.2	38.0	30.3	38.0
30	Sup/Ret Std	52.5	97.0	43.2	38.0	37.3	38.0
	Supply Small	52.5	97.0	43.2	38.0	35.3	38.0
36	Sup/Ret Std	53.8	100.5	62.8	46.8	43.5	46.8
	Supply Small	53.8	100.5	62.8	41.5	39.8	41.5
40	Sup/Ret Std	53.8	100.5	68.8	46.8	43.5	46.8
	Supply Small	53.8	100.5	68.8	46.8	38.5	46.8
50	Sup/Ret Std	58.3	108.5	78.8	51.5	52.3	51.5
	Supply Small	58.3	108.5	78.8	51.5	46.8	51.5
61	Sup/Ret Std	56.8	108.5	93.8	55.5	54.3	55.5
	Supply Small	56.8	108.5	93.8	51.5	52.3	51.5

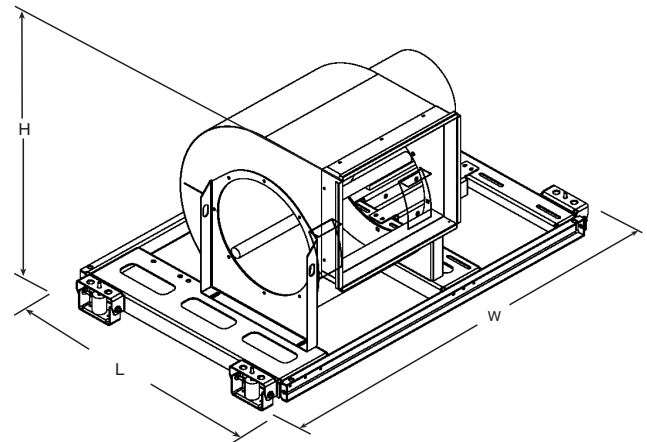


Fig. 29 — Fan Sled

Fan Motors and Drives — When installing motors in the field, locate the electrical junction box toward the center of the unit. This arrangement is required for correct belt tension. Use the smallest mounting holes in the mounting base that will accommodate the motor and provide minimum overhang.

Tighten the motor holddown bolts. Refer to Tables 2A-2D for fan scroll inlet cone dimensions.

JUNCTION BOX CONDENSATE PREVENTION — When air handlers are installed outdoors in a high humidity environment or indoors where the apparatus room is used as a fresh air plenum, precautions must be taken to prevent condensation from forming inside the junction box of the internally mounted motor.

Standard installation practice is to mount the motor starter or fused disconnect box adjacent to the air handler and enclose the power wiring to the motor in flexible conduit.

The sheet metal housing of the disconnect switch or motor starter is not airtight (even when a box meeting NEMA [National Electrical Manufacturers Association] IV standards is used). Thus, warm moist air can migrate through the flexible conduit to the junction box on the motor. With the motor located inside the unit, the motor temperature is that of the cool supply air; thus, condensate can form inside the junction box and, possibly, on the live terminal lugs.

To prevent the moist air from migrating through the conduit to the motor, seal the power wires inside the flexible conduit at the motor starter or fused disconnect (Fig. 30).

Use a nonconductive, non-hardening sealant. Permagum (manufactured by Schnee Morehead) or sealing compound, thumb grade (manufactured by Calgon), are acceptable materials. **MOTOR POWER WIRING** — The fan section is provided with a decal indicating the recommended location to drill or punch hole(s) to accommodate an electrical conduit for the fan-motor wiring. The decal is located on the motor side, approximately 4-in. in from the side and 4-in. down from the top of the corner above where the motor will be installed. Where possible, the conduit should be installed in a panel which will not be removed, such as the discharge panel.

MOTOR OVERLOAD PROTECTION — Fan-motor starters and overload protectors are field-supplied and installed. A label on the fan motor indicates the correct size of the overload protectors required to be installed in the motor starter.

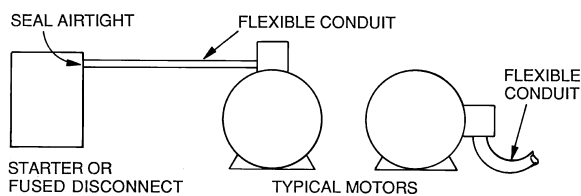


Fig. 30 — Sealing Power Wires in Flexible Conduit

Sheaves — Factory-supplied drives are pre-aligned and tensioned, however, Carrier recommends checking the belt tension and alignment before starting the unit. Always check the drive alignment after adjusting belt tension.

To install sheaves on the fan or motor shaft, remove any rust-preventive coating on the shaft. Make sure the shaft is clean and free of burrs. Add grease or lubricant to bore of sheave before installing. Mount sheave on the shaft; to prevent bearing damage, do not use excessive force (i.e., a hammer). Place sheaves for minimum overhang (see Fig. 31).

Each factory-assembled fan, shaft, and drive sheave assembly is precision aligned and balanced. If excessive unit vibration occurs after field replacement of sheaves, the unit should be rebalanced. To change the drive ratio, reselect and replace the motor sheave, not the fan sheave.

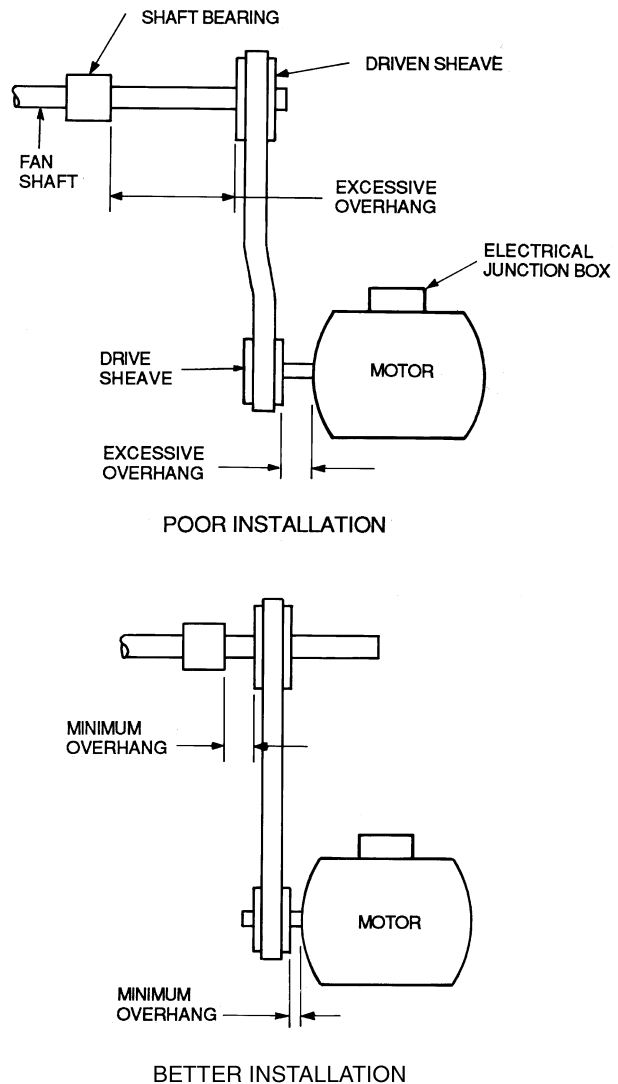


Fig. 31 — Determining Sheave-Shaft Overhang

After 24 hours of unit operation, the drive belts may stretch. Check the belt tension after 24 hours of operation and adjust if necessary. Periodically check belt tension throughout the run-in period, which is normally the initial 72 hours of operation.

ALIGNMENT — Make sure that fan shafts and motor shafts are parallel and level. The most common causes of misalignment are nonparallel shafts and improperly located sheaves. Where shafts are not parallel, belts on one side are drawn tighter and pull more than their share of the load. As a result, these belts wear out faster, requiring the entire set to be replaced before it has given maximum service. If misalignment is in the sheave, belts enter and leave the grooves at an angle, causing excessive belt and sheave wear.

1. Shaft alignment can be checked by measuring the distance between the shafts at 3 or more locations. If the distances are equal, then the shafts are parallel.
2. Sheave Alignment:

Fixed sheaves — To check the location of the fixed sheaves on the shafts, a straightedge or a piece of string can be used. If the sheaves are properly aligned, the string will touch them at the points indicated by the arrows in Fig. 32.

Adjustable sheaves — To check the location of adjustable sheave on shaft, make sure that the centerlines of both sheaves are in line and parallel with the bearing support channel. See Fig. 32. Adjustable pitch drives are installed on the motor shaft.

CAUTION

Do not exceed maximum fan speed rpm with adjustable sheave.

3. Rotate each sheave a half revolution to determine whether the sheave is wobbly or the drive shaft is bent. Correct any misalignment.
4. With sheaves aligned, tighten cap screws evenly and progressively.

NOTE: There should be a 1/8-in. to 1/4-in. gap between the mating part hub and the bushing flange. If gap is closed, the bushing is probably the wrong size.

5. With taper-lock bushed hubs, be sure the bushing bolts are tightened evenly to prevent side-to-side pulley wobble. Check by rotating sheaves and rechecking sheave alignment. When substituting field-supplied sheaves for factory-supplied sheaves, consider that fan shaft sheave has been factory balanced with fan and shaft as an assembly. For this reason, substitution of motor sheave is preferable for final speed adjustment.

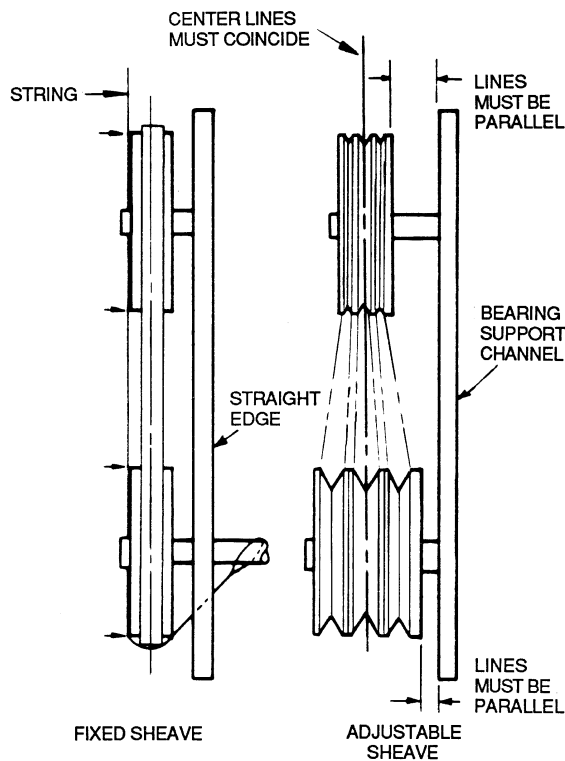


Fig. 32 — Sheave Alignment

V-Belts — When installing or replacing belts, always use a complete set of new belts. Mixing old and new belts will result in the premature wear or breakage of the newer belts.

Refer to label on inside of fan access door for information on factory-supplied drive.

1. Always adjust the motor position so that V-belts can be installed without stretching over grooves. Forcing belts can result in uneven stretching and a mismatched set of belts.
2. Do not allow belt to bottom out in sheave.

3. Tighten belts by turning motor-adjusting jackscrews. Turn each jackscrew an equal number of turns.
4. Equalize belt slack so that it is on the same side of belt for all belts. Failure to do so may result in uneven belt stretching.
5. Tension new drives at the maximum deflection force recommended (Fig. 33).
6. On current production, the correct tension information is listed on the fan drive label. For older equipment or for units with field-modified drives, use the deflection formula given in the example below and the tension data from Fig. 33.

EXAMPLE:

Given:

Belt Span 16 in.

Belt Cross-Section A, Super Belt

Small Sheave PD 5 in.

Deflection = Belt Span/64

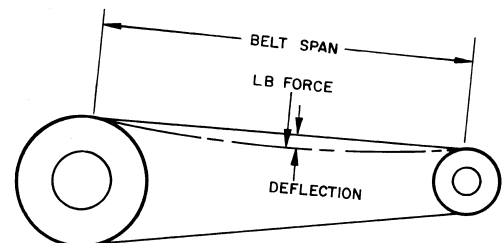
Solution:

- From Fig. 33 find that deflection force for type A, super belt with 5-in. small sheave PD is 4 to 5 1/2 lb.
- Deflection = 16/64 = 1/4-in.
- Increase or decrease belt tension until force required for 1/4-in. deflection is 5 lb.

Check belt tension at least twice during first operating day. Readjust as required to maintain belt tension within the recommended range.

With correct belt tension, belts may slip and squeal momentarily on start-up. This slippage is normal and disappears after unit reaches operating speed. Excessive belt tension shortens belt life and may cause bearing and shaft damage.

After run-in, set belt tension at lowest tension at which belts will not slip during operation.



BELT CROSS SECTION	SMALL SHEAVE PD RANGE (in.)	DEFLECTION FORCE (lb)					
		Super Belts		Notch Belts		Steel Cable Belts	
		Min	Max	Min	Max	Min	Max
A	3.0- 3.6	3	4 1/4	3 7/8	5 1/2	3 1/4	4
	3.8- 4.8	3 1/2	5	4 1/2	6 1/4	3 3/4	4 3/4
	5.0- 7.0	4	5 1/2	5	6 7/8	4 1/4	5 1/4
B	3.4- 4.2	4	5 1/2	5 3/4	8	4 1/2	5 1/2
	4.4- 5.6	5 1/8	7 1/8	6 1/2	9 1/8	5 3/4	7 1/4
	5.8- 8.6	6 3/8	8 3/4	7 3/8	10 1/8	7	8 3/4
C	7.0- 9.4	11 1/4	14 3/8	13 3/4	17 7/8	11 1/4	14
	9.6-16.0	14 1/8	18 1/2	15 1/4	20 1/4	14 1/4	17 3/4
5V	4.4- 6.7	—	—	10	15	—	—
	7.1-10.9	10 1/2	15 3/4	12 7/8	18 3/4	—	—
	11.8-16.0	13	19 1/2	15	22	—	—
8V	12.5-17.0	27	40 1/2	—	—	—	—
	18.0-22.4	30	45	—	—	—	—

LEGEND
PD — Pitch Diameter, inches

Fig. 33 — Fan Belt Tension Data

Outdoor Hoods and Louvers — There are three options available: fixed rear intake hoods, intake louvers, and collapsible exhaust box hoods. All hoods and louvers have an intake screen to prevent unwanted entry of birds and debris. The intake hoods have easily serviceable demisters via small hinged doors. Intake louvers are a wind driven rain design that will allow no more than .01 oz. per sq. ft of free area water penetration at 1250 fpm. This is the maximum velocity required by AMCA (Air Movement and Control Association) 511. Higher velocities are possible without significant water intrusion.

Fixed rear hoods (Fig. 34) and intake louvers (Fig. 35) ship installed and should require no further assembly.

Collapsible exhaust box hoods ship covering the exhaust outlet of the unit and require some basic assembly. Fasteners, washers and gasket material for installation of the hood come taped inside the exhaust section. Fig. 36 shows an exploded view of the assembly in its shipping position. Fig. 37 shows how the various parts assemble to form the hood and a view of the completed assembly.

IMPORTANT: Hoods for power exhaust fans must be field supplied based on local code requirements.

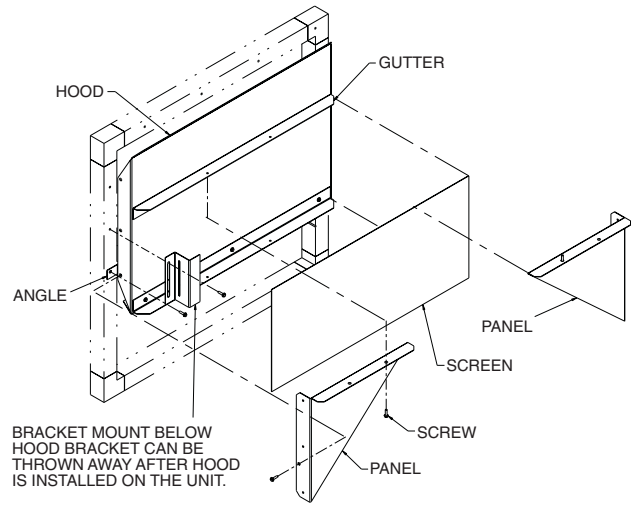


Fig. 36 — Collapsible Exhaust Box Hood (Shipping Position)

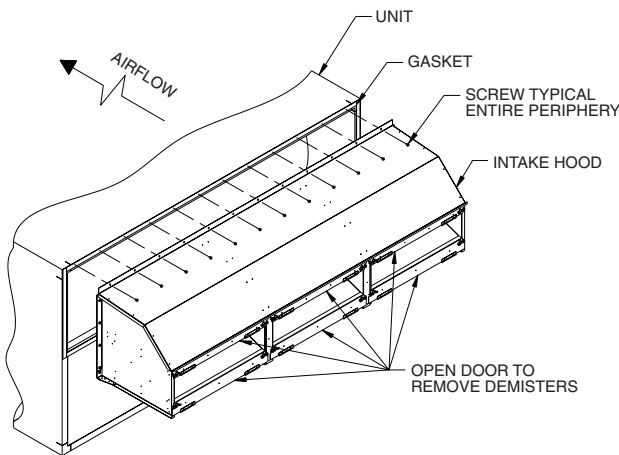


Fig. 34 — Rear Intake Hood (Size 30 Shown)

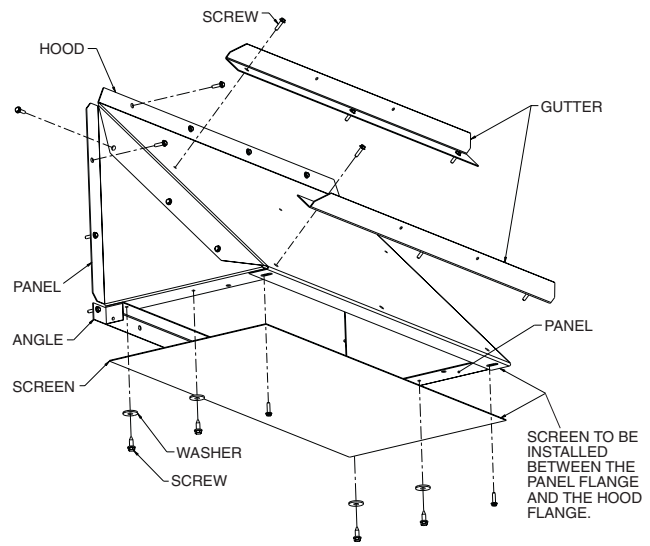


Fig. 37 — Collapsible Exhaust Box Hood (Assembly)

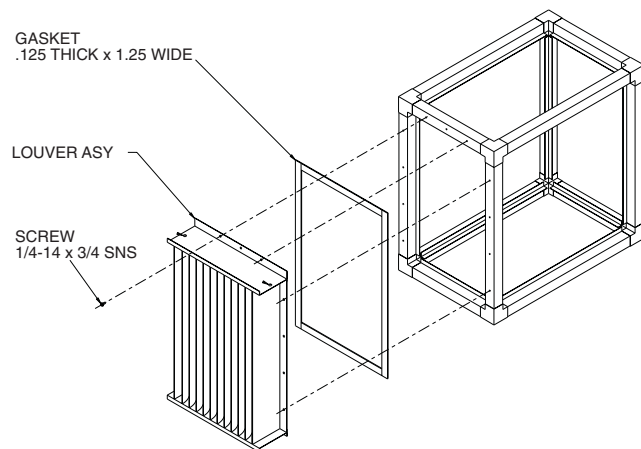


Fig. 35 — Louver Intake

Coil Connection Housing (Outdoor Unit Only)

Coil connection housings are used to house piping from inside the building to its connections to the coil on the unit. Piping must be insulated to building code standards or job specifications (whichever is greater) for the area that the unit is installed to prevent excessive condensation within the housing otherwise, water damage to floors below could result.

Install as follows:

1. Coil connection housing (CCH) will be shipped to the job site on its own skid, separate from the air-handling unit as shown in Fig. 38.
2. Before removing the coil connection housing from its skid, reposition shipping brackets/lifting lugs as shown in Fig. 39 and fill empty holes with screws.
3. After the coil connection housing has been repositioned to its upright position, remove the roof and panels as shown in Fig. 39.
4. Apply seal strip (Fig. 40) to roof as shown on the coil connection housing roof gasketing detail in Fig. 41 ensuring that all four roof corners are sealed.
5. Reassemble roof to coil connection housing frame. Leave roof mounting screws loose until the CCH is completely mounted to the air handler.

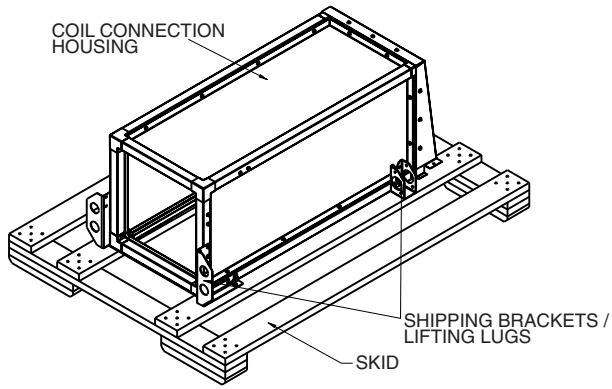


Fig. 38 — Coil Connection Housing

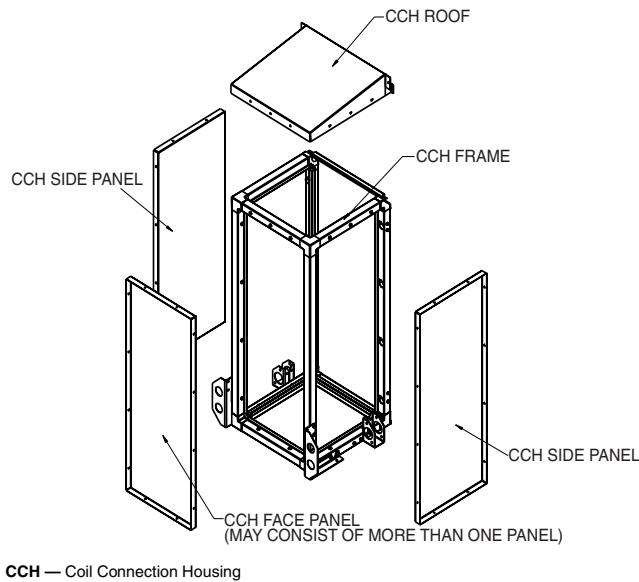


Fig. 39 — Reposition to Upright and Remove Panels

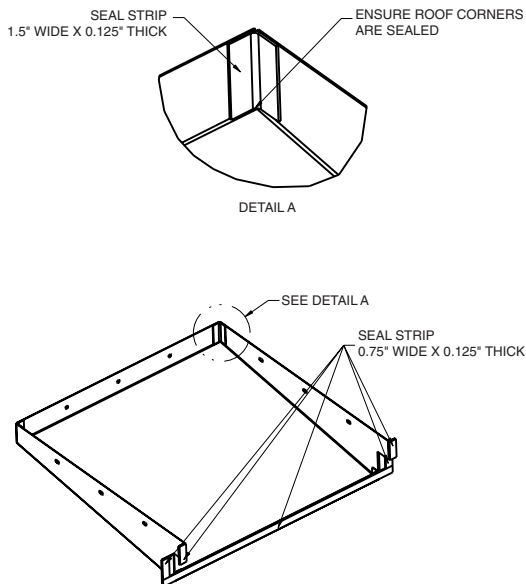


Fig. 40 — Apply Seal Strip

6. Assemble seal strip to back side of the coil connection housing frame as shown in Fig. 42.
7. Remove panel retainers from unit as shown in Fig. 43. If the coil connection housing spans more than one section DO NOT remove panel retainers that do not interfere with the coil connection housing mounting.

Apply 1/2-in. thick by 2-in. thick closed cell neoprene gasket to the top of the CCH curb. The CCH will sit directly on top of the curb.

8. Remove plastic tool clearance hole plugs and use panel retainer screws to mount the coil connection housing frame and roof to air-handling unit as shown in Fig. 42.
9. Replace plastic tool clearance hole plugs.
10. Secure the coil connection housing roof to air-handling unit roof using the panel retainers and retainer screws as shown in Fig. 44. Note that the view is from underneath the roof. The retainers are rotated 180 degrees and hold the coil connection housing roof to the side of the air-handling unit. These are the same style retainers used to hold the air-handling unit panel in place during shipment.

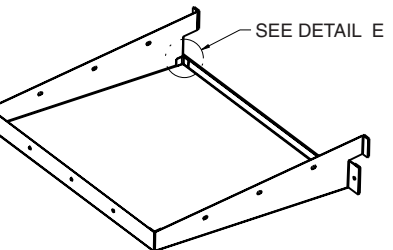
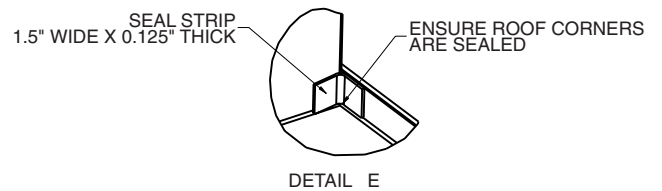


Fig. 41 — Seal All Corners

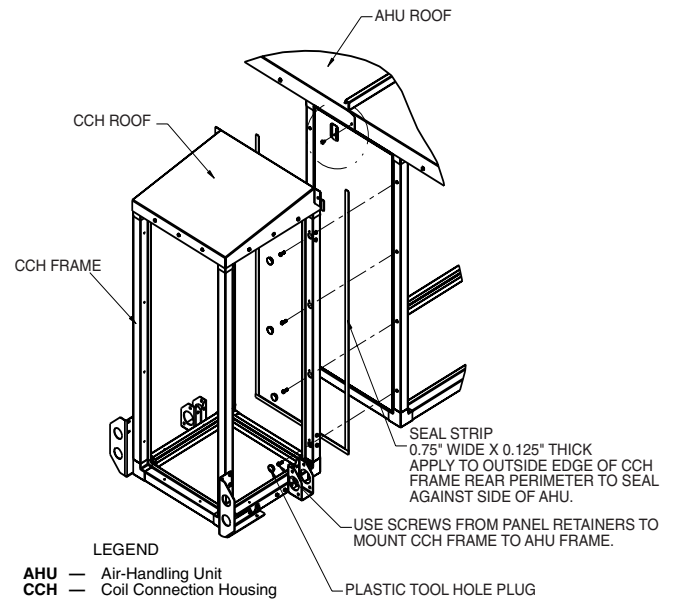


Fig. 42 — Assembly Seal Strip

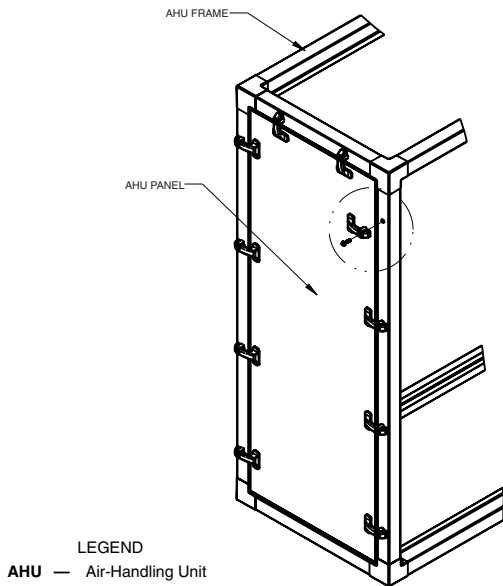


Fig. 43 — Remove Panel Retainers

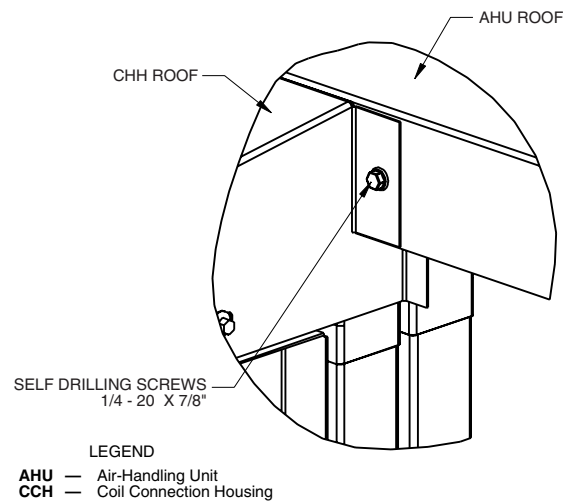


Fig. 45 — Secure Using Self-Drilling Screws

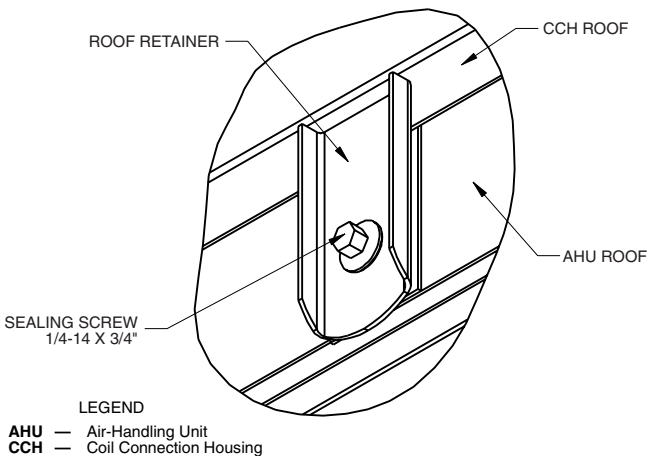


Fig. 44 — Secure the Coil Connection Roof to the Air Handler Roof

11. Also secure the coil connection housing roof to air-handling unit with self-drilling screws as shown in Fig. 45. Remove screws from the air-handling unit roof if they interfere with flush mounting of the coil connection housing to air-handling unit roof. When the coil connection housing is located on the low side roof, cut the seal strip at the slit and bend the tab in to create a better seal.
12. Remove shipping brackets and lifting lugs and fill the empty holes with screws.
13. Reassemble panels. If the coil connection housing has a 2 or more panel configuration, apply seal strip between panels before assembly. See Fig. 46 for view of assembled the coil connection housing.
14. Seal any gaps between the main unit base rail and the cut out in the CCH curb with field-supplied flashing and sealer.
15. Caulk the inside corners of the panels to eliminate any possibility of water intrusion. See Fig. 46.

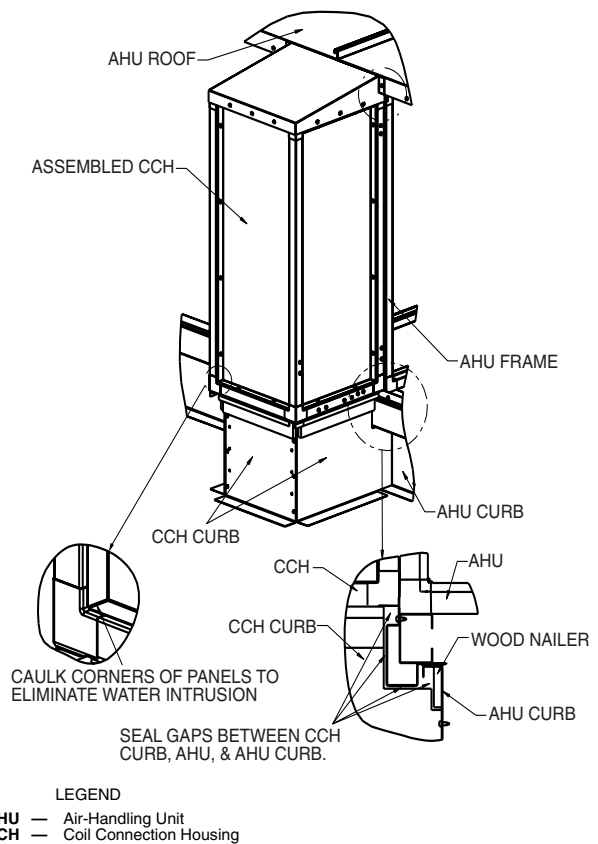


Fig. 46 — Reassembled Coil Connection Housing with Panels

Coil Installation

NOTE: If installing a replacement coil, refer to Coil Removal section, page 85 for instructions on removing existing coil.

INSTALLATION OF SINGLE HEIGHT COILS (sizes 03- 36)

1. Lock open and tag all power supplies to unit fan motor and electric heaters if present.
2. a. Identify the unit service panel latches and disengage them ($1/4$ turn) with a $5/16$ -in. or 8-mm hex wrench.
b. Remove service panel/coil connection panel and the upstream service panel and set aside in a safe place.
3. a. Remove the flat corner plug from each end piece of the top rail.
b. Extract the Torx T25 screw visible within the exposed cavity. (Do not mix these screws with others; they are specific for this location. Set screws aside for reinstallation of the top rail.)
c. Remove the top rail by pulling out at a 45 degree angle. Set top rail aside.

⚠ CAUTION

Do not handle the coil by the headers or connection nipples, as irreparable damage might occur that is NOT covered by warranty. Protect the finned surface from damage during all handling and shipping.

4. Slip the foam sealing sleeves on the connection nipples before installing the coil.
5. The coil may now be hoisted in through the top opening, or it may be slid in through either side, taking care to avoid tipping or dropping the coil. Some lower stacked unit sections may require slightly tipping the coil from the vertical position in order to clear the upper frame rail and seal, which is not readily removed.
6. Loosely secure the coil at the top using the $3/8$ -in. diameter hoisting holes located in the side channel/tube sheet juncture at each end.
7. Install the first coil in the section. Access the upstream face of the coil and install the screws holding the coil to the mounting baffles around the entire perimeter. This may require reaching through an opened damper assembly or through the filter track after filters are removed.
8. Replace the top rail by reinstalling the Torx T25 screws and flat corner plugs.
9. Replace all service panels and engage all $1/4$ turn panel latches.

INSTALLATION OF STACKED COILS (40, 50 and 61)

IMPORTANT: The lengths of the coil supports and intermediate pans and channels are designed to work with Carrier coils. Substitution of other manufacturer's coils may require that custom mounting components be field fabricated. *Coil sections ordered without coils will come with the referenced parts in kit form.*

NOTE: The length that the intermediate drain pan extends downstream from the coil face has been designed for use with Carrier manufactured coils, and may prove insufficient for other maker's coils.

1. Lock open and tag all power supplies to unit fan motor and electric heaters if present.
2. a. Identify the unit service panel latches and disengage them ($1/4$ turn) with a $5/16$ in. or 8-mm hex wrench.
b. Remove service panel/coil connection panel and the upstream service panel and set aside in a safe place.
3. a. Remove the flat corner plug from each end piece of the top rail.
b. Extract the Torx T25 screw visible within the exposed cavity. (Do not mix these screws with others; they are specific for this location. Set screws aside for reinstallation of the top rail.)
c. Remove the top rail by pulling out at a 45-degree angle. Set top rail aside.

⚠ CAUTION

Do not handle the coil by the headers or connection nipples, as irreparable damage might occur that is NOT covered by warranty. Protect the finned surface from damage during all handling and shipping.

4. Slip the foam sealing sleeves on the connection nipples before installing the coil.
5. Before placing the coils inside the unit, apply the adhesive backed gasket to the lower baffle, spanning the entire unit, on the surface that will contact the coil (see Fig. 47).
6. a. Place the lower coil on the coil supports, sliding the coil against the upstream baffle and aligning the mounting holes so that the connection nipple will extend approximately 3 in. outside the unit casing.
b. Place the heavy vertical angle (which is full height of the finished coil bank) along the upstream right and left side of the mounting baffles (see Fig. 47). Install screws through this angle first and then into the baffles, engaging the coil tube sheet mounting holes and securing the coil within the unit.
c. Secure the lower side casing of the coil to the lower horizontal baffle, sandwiching the gasket in between.
7. For coil sections that do not have a drain pan within the section, go to Step 10.
8. Secure the spacer (hat channel) to the top center of the lower coil casing (see Fig. 48).

⚠ CAUTION

Do not penetrate through the coil casing into the fin pack. Tube damage may occur.

9. Secure two spacers (hat channels) to each end of the bottom of the upper coil casing before placing the coil in position (refer to Fig. 47).
10. Place the intermediate condensate drain pan on the lower coil, centering the drain pan between the sides of the unit, with the condensate outlet holes along the downstream edge. (It may be helpful to temporarily secure the drain pan by a strip of double-stick tape on the center hat channel.)

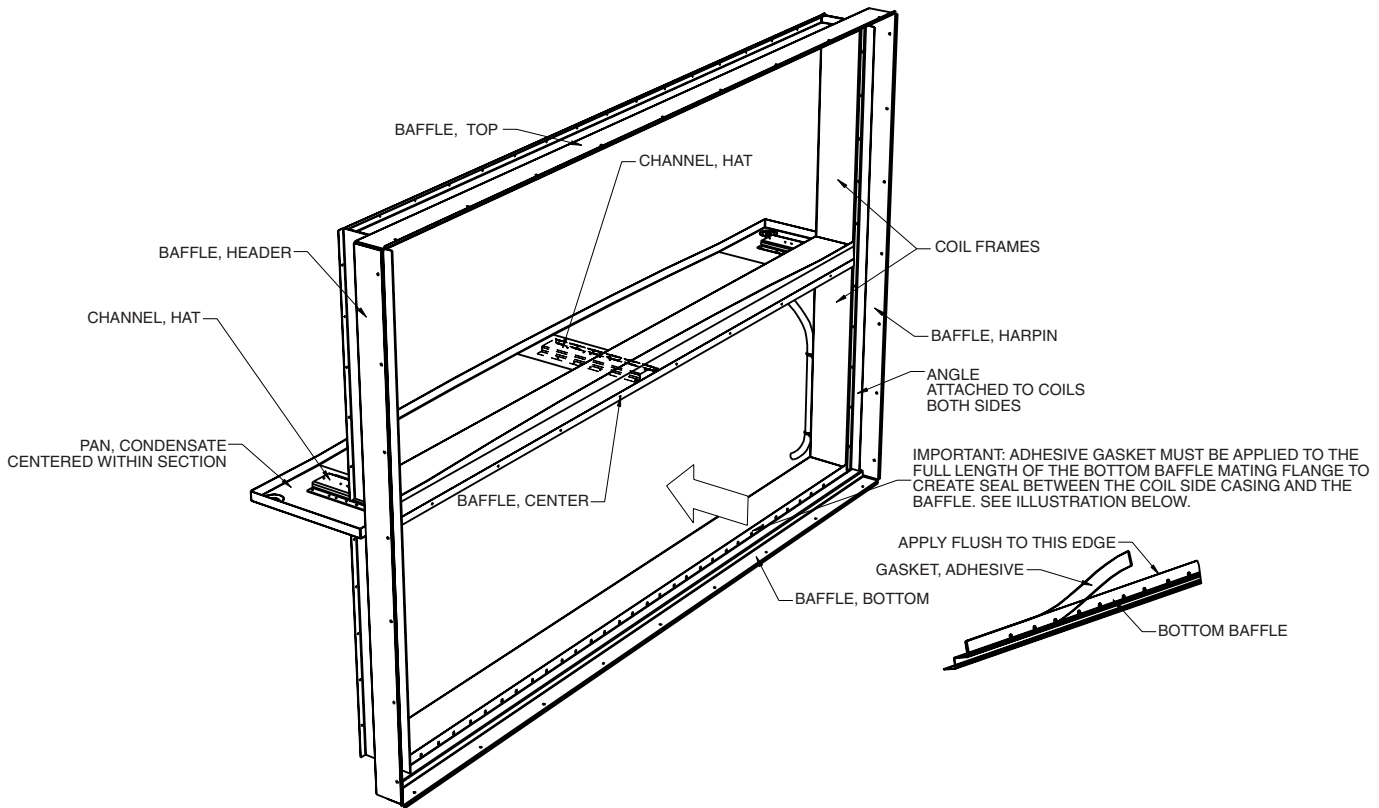


Fig. 47 — Apply Gasket

11. Lift the upper coil (with spacer hat channels on the bottom of each end) into place, aligning the upper coil with the lower coil. When the upper coil is lowered into place, it will deflect the intermediate condensate pan downward on each end, providing for positive drainage.
12. Install factory-supplied screws around the ends and top of the coil.
13. On the upstream side of the stacked coils, attach the center baffle (see Fig. 47), spanning the two coils with the crease in the baffle away from the coils, centering it between the side baffles, and aligning the baffle with the holes in the coil casings.
14. Install the drain fittings into the pan. Route and secure the hoses as shown in Fig. 49.
15. For sections that do not have a drain pan (heating only sections):
 - a. After the lower coil has been secured in position, fasten the three hat channel spacer supports to the top of the coil.
 - b. Place the upper coil into position directly above the lower coil, resting on these hat channels.
16. Secure the uppermost coil from the upstream side, so that the fastening screws provided pass through the vertical angle and the baffles and engage the coil casing. See Fig 47.

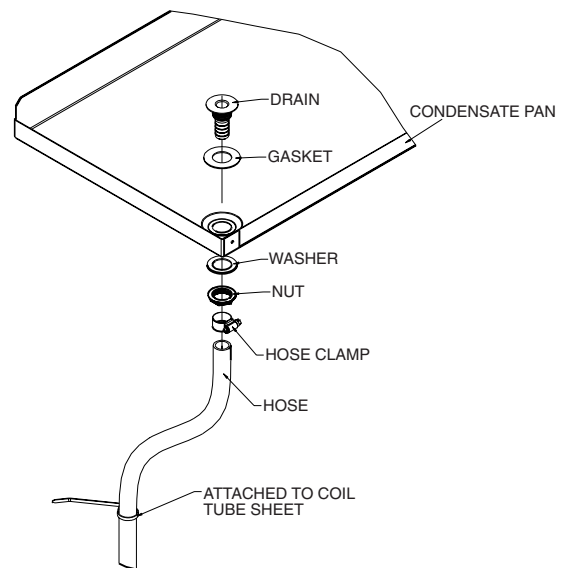


Fig. 49 — Install Drain Fittings

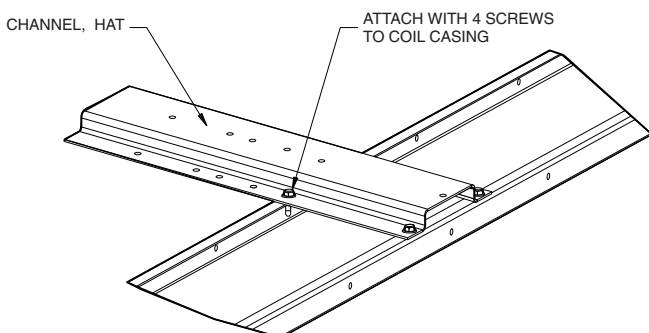


Fig. 48 — Secure Spacer

Water and Steam Coil Piping Recommendations

GENERAL — Use straps around the coil casing or the lifting holes (see Fig. 50) to lift and place the coil.

⚠ CAUTION

To prevent damage to the coil or coil headers: Do not use the headers to lift the coil. Support the piping and coil connections independently. Do not use the coil connections to support piping. When tightening coil connections, use a backup wrench on the nozzles.

Piping practices are outlined in the Carrier System Design Manual, Part 3, Piping Design.

WATER COILS — Typically, coils are piped by connecting the supply at the bottom and the return at the top. See Fig. 50. This is not always the case, especially if the coil hand has been changed in the field. Coils must be piped for counterflow; otherwise, a capacity reduction of 5% for each coil row will result. To ensure counterflow, chilled water coils are piped so that the coldest water meets the coldest air. Hot water coils are piped so that the warmest water meets the warmest air.

STEAM COILS — Position the steam supply connection at the top of the coil, and the return (condensate) connection at the bottom. The coil tubes must incline downwards toward the return header connection for condensate drainage. See Fig. 51-55.

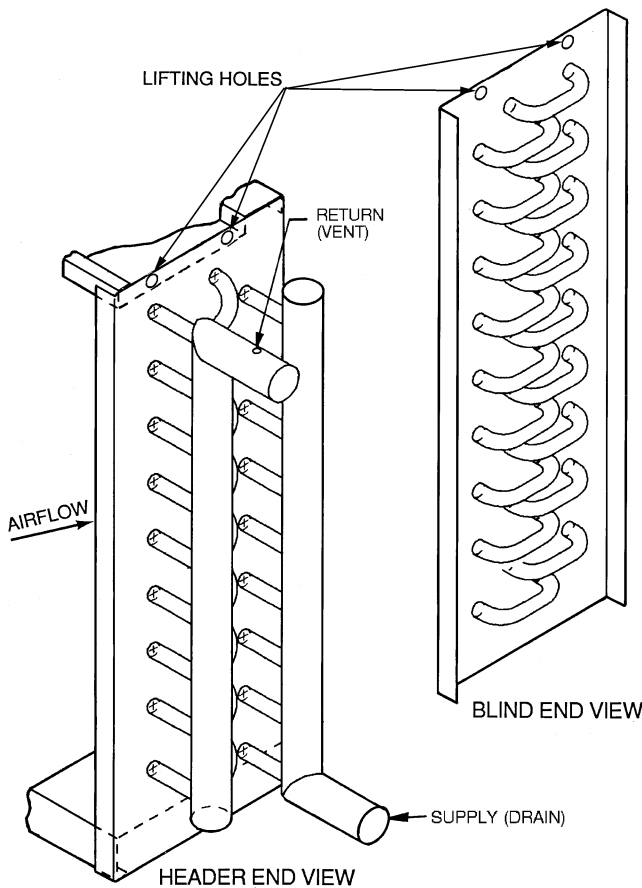


Fig. 50 — Coil Connections and Lifting Points

Figure 51 illustrates the normal piping components and the suggested locations for high, medium, or low-pressure steam coils. The low-pressure application (zero to 15 psig) can dispense with the 1/4-in. petcock for continuous venting located above the vacuum breaker (check valve).

Note the horizontal location of the 15-degree check valve, and the orientation of the gate/pivot. This valve is intended to relieve any vacuum forming in the condensate outlet of a condensing steam coil, and to seal this port when steam pressure is again supplied to the coil. It must not be installed in any other position, and should not be used in the supply line.

For coils used in tempering service, or to preheat outside air, install an immersion thermostat in the condensate line ahead of the trap. This will shut down the supply fan and close the outdoor damper whenever the condensate falls to a predetermined point, perhaps 120 F.

NOTE: Do NOT use an immersion thermostat to override a duct thermostat and open the steam supply valve.

For vacuum return systems, the vacuum breaking check valve would be piped into the condensate line between the trap and the gate valve instead of open to the atmosphere.

Figure 52 illustrates the typical piping at the end of every steam supply main. Omitting this causes many field problems and failed coils.

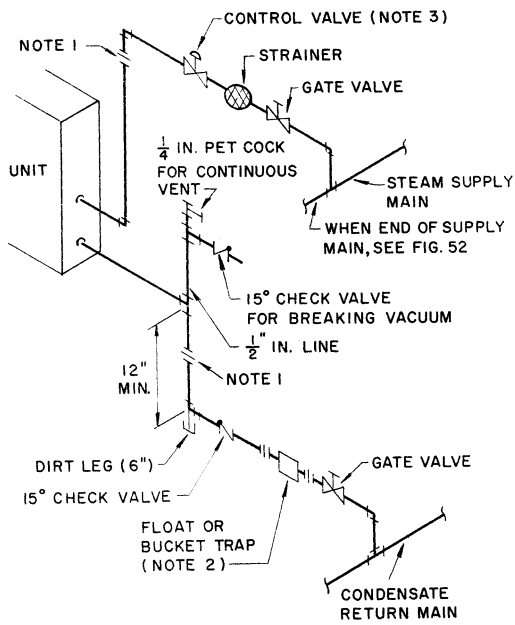
Figure 53 shows the typical field piping of multiple coils. Use this only if the coils are the same size and have the same pressure drop. If this is not the case, an individual trap must be provided for each coil.

Figure 54 shows a multiple coil arrangement applied to a gravity return, including the open air relief to the atmosphere, which DOES NOT replace the vacuum breakers.

Figure 55 illustrates the basic condensate lift piping.

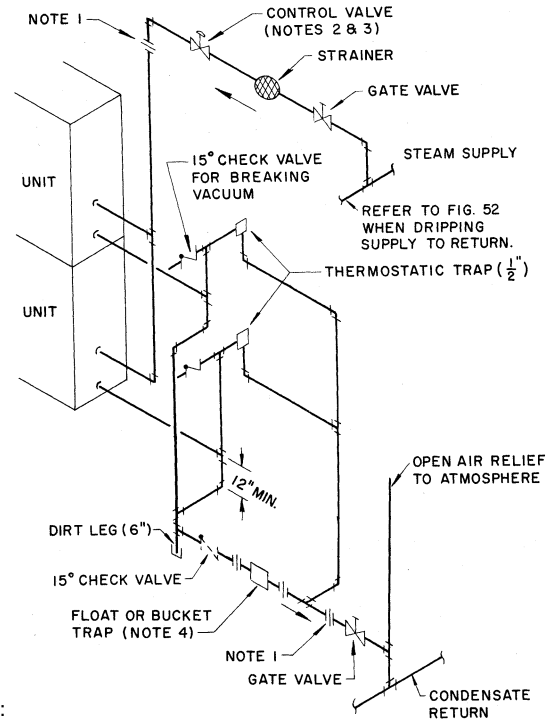
Following the piping diagrams in Fig. 51-55, make all connections while observing the following precautions:

- Install a drip line and trap on the pressure side of the inlet control valve. Connect the drip line to the return line downstream of the return line trap.
- To prevent scale or foreign matter from entering the control valve and coil, install a 3/32-in. mesh strainer in the steam supply line upstream from the control valve.
- Provide air vents for the coils to eliminate noncondensable gases.
- Select a control valve according to the steam load, not the coils supply connection size. Do not use an oversized control valve.
- Do not use bushings that reduce the size of the header return connection. The return connection should be the same size as the return line and reduced only at the downstream trap.
- To lift condensate above the coil return line into overhead steam mains, or pressurized mains, install a pump and receiver between the condensate trap and the pressurized main. Do not try to lift condensate with modulating or on-and-off steam control valves. Use only 15-degree check valves, as they open with a lower water head. Do not use 45-degree or vertical-lift check valves.
- Use float and thermostatic traps. Select the trap size according to the pressure difference between the steam supply main and the return main.
- Load variations can be caused by uneven inlet air distribution or temperature stratification.
- Drain condensate out of coils completely at the end of the heating season to prevent the formation of acid.



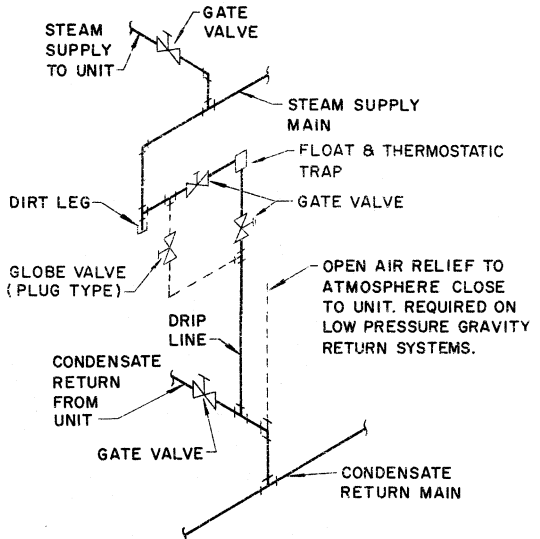
- NOTES:
1. Flange or union is located to facilitate coil removal.
 2. Flash trap may be used if pressure differential between steam and condensate return exceeds 5 psi.
 3. When a bypass with control is required.
 4. Dirt leg may be replaced with a strainer. If so, tee on drop can be replaced by a reducing ell.
 5. The petcock is not necessary with a bucket trap or any trap which has provision for passing air. The great majority of high or medium pressure returns end in hot wells or deaerators which vent the air.

Fig. 51 — Low, Medium or High Pressure Coil Piping



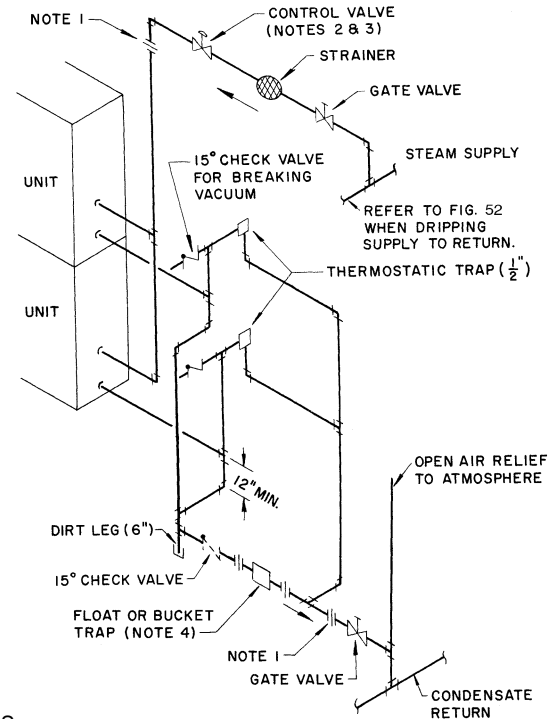
- NOTES:
1. Flange or union is located to facilitate coil removal.
 2. When a bypass with control is required.
 3. Flash trap can be used if pressure differential between supply and condensate return exceeds 5 psi.
 4. Coils with different pressure drops require individual traps. This is often caused by varying air velocities across the coil bank.
 5. Dirt leg may be replaced with a strainer. If so, tee on drop can be replaced by a reducing ell.
 6. The petcock is not necessary with a bucket trap or any trap which has provision for passing air. The great majority of high pressure return mains terminate in hot wells or deaerators which vent the air.

Fig. 53 — Multiple Coil High Pressure Piping



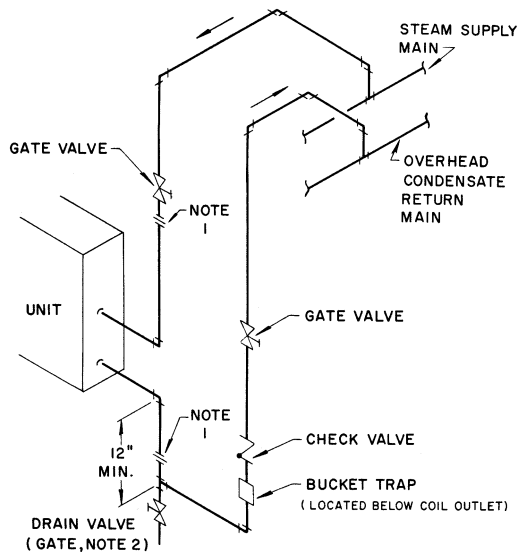
- NOTES:
1. A bypass is necessary around trap and valves when continuous operation is necessary.
 2. Bypass to be the same size as trap orifice but never less than 1/2 inch.

Fig. 52 — Dripping Steam Supply to Condensate Return



- NOTES:
1. Flange or union is located to facilitate coil removal.
 2. When control valve is omitted on multiple coils in parallel air flow.
 3. When a bypass with control is required.
 4. Coils with different pressure drops require individual traps. This is often caused by varying air velocities across the coil bank.

Fig. 54 — Multiple Coil Low Pressure Piping Gravity Return



NOTES:

1. Flange or union is located to facilitate coil removal.
2. To prevent water hammer, drain coil before admitting steam.
3. Do not exceed one foot of lift between trap discharge and return main for each pound of pressure differential.
4. Do not use this arrangement for units handling outside air.

Fig. 55 — Condensate Lift to Overhead Return

Coil Freeze-Up Protection

WATER COILS — If a chilled water coil is applied with outside air, provisions must be made to prevent coil freeze-up. Install a coil freeze-up thermostat to shut down the system if any air temperature below 36 F is encountered entering the water coil. Follow thermostat manufacturer’s instructions.

When a water coil is applied downstream of a direct-expansion (DX) coil, a freeze-up thermostat must be installed between the DX and water coil and electrically interlocked to turn off the cooling to prevent freeze-up of the water coil.

For outdoor-air application where intermittent chilled water coil operation is possible, one of the following steps should be taken:

- Install an auxiliary blower heater in cabinet to maintain above-freezing temperature around coil while unit is shut down.
- Drain coils and fill with an ethylene glycol solution suitable for the expected cold weather operation. Shut down the system and drain coils. See Service section, Winter Shutdown, page 85.

STEAM COILS — When used for preheating outdoor air in pressure or vacuum systems, an immersion thermostat to control outdoor-air damper and fan motor is recommended. This control is actuated when steam supply fails or condensate temperature drops below an established level, such as 120 to 150 F. A vacuum breaker should also be used to equalize coil pressure with the atmosphere when steam supply throttles close. Steam should not be modulated when outdoor air is below 40 F.

On low-pressure and vacuum steam-heating systems, the thermostat may be replaced by a condensate drain with a thermal element. This element opens and drains the coil when condensate temperature drops below 165 F. Note that condensate drains are limited to 5 psig pressure.

INNER DISTRIBUTING TUBE STEAM COILS — The inner distributing tube (IDT) steam coil used in the Carrier 39M air-handling units has an inner tube pierced to facilitate the distribution of the steam along the tube’s length. The outer tubes are expanded into plate fins. The completed assembly includes the supply and condensate header and side casings which are built to slant the fin/tube bundle back toward the

condensate header. The slanting of the assembly ensures that condensate will flow toward the drains. This condensate must be removed through the return piping to prevent premature failure of the coil. The fin/tube bundle is slanted vertically for horizontal airflow coils, and horizontally for vertical airflow coils.

IDT Steam Coil Piping — The following piping guidelines will contribute to efficient coil operation and long coil life:

1. Use full size coil outlets and return piping to the steam trap. Do not bush return outlet to the coil. Run full size to the trap, reduce at the trap.
 2. Use float and thermostatic (F & T) traps only for condensate removal. Trap size selection should be based on the difference in pressure between the steam supply main and the condensate return main. It is good practice to select a trap with 3 times the condensate rating of the coil to which it is connected.
 3. Use thermostatic traps for venting only.
 4. Use only 1/2-in., 15-degree swing check valves installed horizontally, piped open to atmosphere, and located at least 12 in. above the condensate outlet. Do not use 45-degree, vertical lift and ring check valves.
 5. The supply valve must be sized for the maximum anticipated steam load.
 6. Do not drip steam mains into coil sections. Drip them on the pressure side of the control valve and trap them into the return main beyond the trap for the coil.
 7. Do not use a single trap for two or more coils installed in series. Where two or more coils are installed in a single bank, in parallel, the use of a single trap is permissible, but only if the load on each coil is equal. Where loads in the same coil bank vary, best practice is to use a separate trap for each coil.
- Variation in load on different coils in the same bank may be caused by several factors. Two of the most common are uneven airflow distribution across the coil and stratification of inlet air across the coil.
8. Do not try to lift condensate above the coil return into an overhead main, or drain into a main under pressure with a modulating or on/off steam control valves. A pump and receiver should be installed between the coil condensate traps and overhead mains and return mains under pressure.
 9. Use a strainer (3/32-in. mesh) on the steam supply side, as shown in the piping diagrams, to avoid collection of scale or other foreign matter in the inner tube distributing orifices.

NOTE: IDT coils must be installed with the tubes draining toward the header end of the coil. Carrier’s IDT steam coils are pitched toward the header end as installed in the unit.

10. Ensure the AHU is installed level to maintain the inherent slope. Also ensure the unit is installed high enough to allow the piping to be installed correctly, especially the traps which require long drip legs.
11. Do not fail to provide all coils with the proper air vents to eliminate noncondensable gasses.
12. Do not support steam piping from the coil units. Both mains and coil sections should be supported separately.

IDT Steam Coil Installation — Refer to drawings to position the coils properly with regard to the location of the supply and return connections. Ensure that the IDT coil is pitched with the tubes draining toward the header. Carrier’s AHUs provide proper coil pitch when the AHU is installed level.

Refer to schematic piping diagrams and piping connection notes for the recommended piping methods.

Refrigerant Piping, Direct-Expansion Coils —

Direct-expansion (DX) coils are divided into 2 or 4 splits depending upon the unit size and coil circuiting. Each split requires its own distributor nozzle, expansion valve, and suction piping. Suction connections are on the air entering side when the coil is properly installed. Matching distributor connections for each coil split are on the air leaving side. See unit label or certified drawing to assure connection to matching suction and liquid connections.

NOTE: Distributor nozzles are factory selected and installed for adequate performance in many unit applications. For best performance, use Carrier's **AHUBuilder**® program to select nozzle sizes for each unit and replace the factory-installed nozzles as required. See the Thermostatic Expansion Valve Piping section below for further details.

⚠ CAUTION

To prevent damage to the coil or coil headers: Do not use the headers to lift the coil. Support the piping and coil connections independently. Do not use the coil connections to support piping. When tightening coil connections, use a backup wrench on the stub outs.

⚠ CAUTION

Direct-expansion coils are shipped pressurized with dry air. Release pressure from each coil split through valves in protective caps before removing caps.

Do not leave piping open to the atmosphere unnecessarily. Water and water vapor are detrimental to the refrigerant system. Until the piping is complete, recap the system and charge with nitrogen at the end of each workday. Clean all piping connections before soldering joints.

The lower split of face split coils should be *first-on, last-off*.

Row split coils utilize special intertwined circuits; either split of these row split coils can be *first-on, last-off*.

SUCTION PIPING — Connect suction piping as shown in Fig. 56 for face split coil or Fig. 57 for row split coil.

Suction line from coil connection to end of the 15-diameter-long riser should be same tube size as coil connection to ensure proper refrigerant velocity.

Refer to Carrier System Design Manual, Part 3, and size remaining suction line to compressor for a pressure drop equivalent to 2.0 F. This will provide a total suction line header pressure drop equivalent to approximately 2.7 F. Refer to Fig. 58 for piping risers to the compressor.

To minimize the possibility of flooded starts and compressor damage during prolonged light load operation, an accumulator can be used in the suction line of *first-on, last-off* circuit.

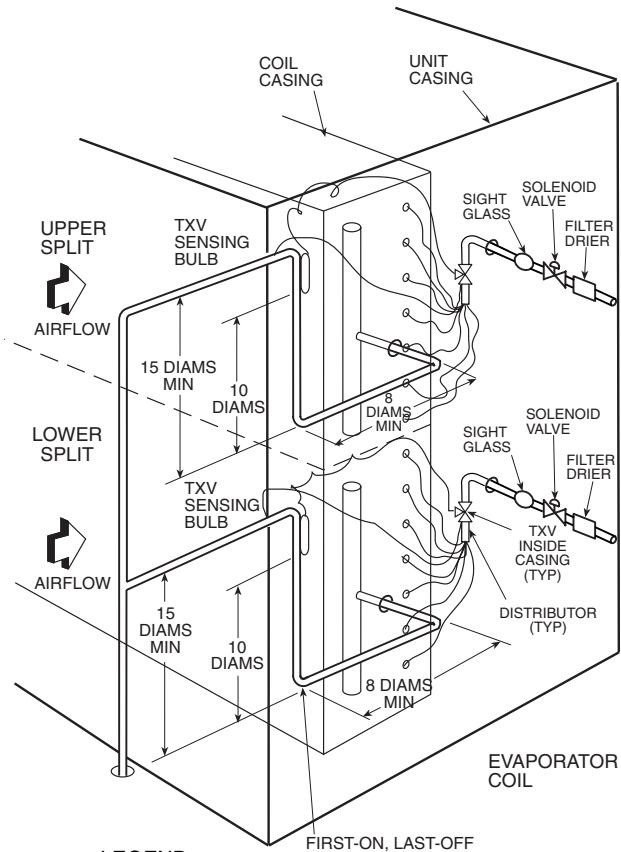
The *first-on, last-off* circuits shown in Fig. 56 and 57 assume a single condensing unit. Note that in both figures the last-on, first-off circuit is looped above the common return line to prevent oil entrapment in the non-operating coil at partial load.

THERMOSTATIC EXPANSION VALVE PIPING — Distributor nozzles are factory supplied. Thermostatic expansion valves (TXVs) are field supplied. Be sure that correct nozzle is installed in each distributor before installing expansion valve. See Table 4 for factory-installed distributor nozzle sizes. Use **AHUBuilder** program to select nozzles for best performance; replacement nozzles must be field installed.

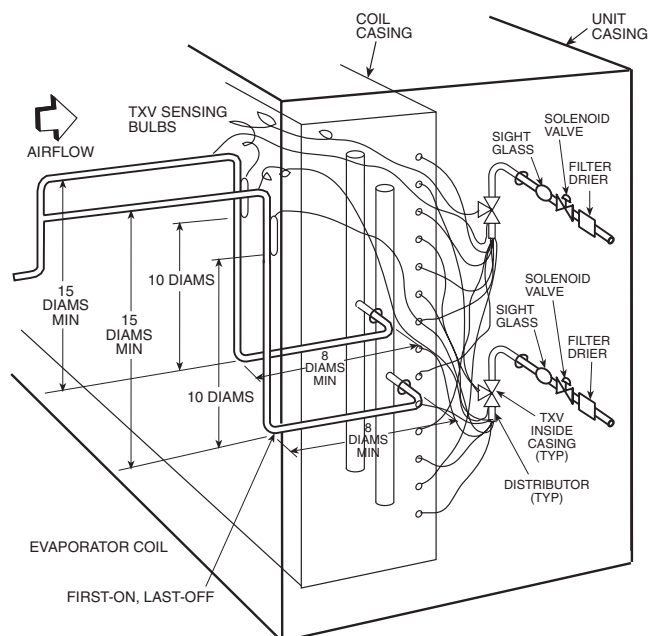
Perform nozzle change-out procedure (if necessary) as follows:

1. Unsweat distributor cap and Schrader valve. Do not over-heat distributor.

2. Clean off any remaining solder.
3. Remove nozzle retaining ring with screwdriver or needle-nosed pliers.
4. Remove nozzle from distributor by inserting 2 no. 6-32 threaded rods (at least 4-in. long) into the threaded holes provided in the nozzle. See Fig. 59.
5. Insert correct nozzle into distributor body.
6. Re-insert nozzle retainer ring into distributor.



LEGEND
TXV — Thermostatic Expansion Valve
Fig. 56 — Face-Split Coil Suction-Line Piping



LEGEND
TXV — Thermostatic Expansion Valve
Fig. 57 — Row-Split Coil Suction-Line Piping

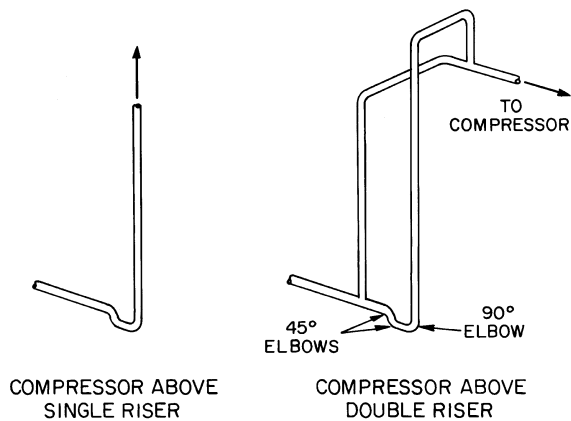


Fig. 58 — Suction-Line Riser Piping

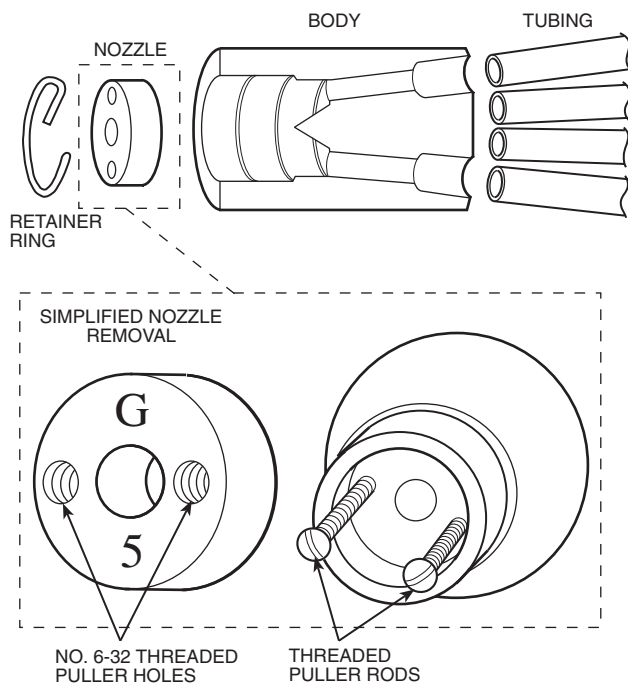


Fig. 59 — Nozzle Change-Out

Install expansion valve as follows:

1. Wrap wet cloths around valve body to prevent excessive heat from reaching diaphragm and internal parts. *Do not allow water to enter system.* Disassemble expansion valve before soldering, if accessible, for easy reassembly. Use 95-5 tin-antimony soft solder.
2. Solder expansion valve to distributor.
3. Solder expansion valve equalizer line to suction line and locate control bulb on suction line as in Fig. 56 or 57.
4. Insulate expansion valve body, diaphragm assembly, and control bulb area to prevent charge migration and excessive condensation.
5. Install filter drier ahead of expansion valve to ensure satisfactory valve operation.
6. If hot gas bypass is required, see the following Hot Gas Bypass section.

HOT GAS BYPASS — When low-load operation requires use of hot gas bypass, hot gas must be introduced between expansion valve and distributor.

Install auxiliary hot gas bypass side connector (field-supplied) in coil split that is *first-on, last-off*.

NOTE: See Table 20 for auxiliary side connector sizes. Do not attempt to use a valve that is smaller or larger than distributor size. Inserting a bushing at the outlet will defeat the purpose of the internal nozzle tube extension.

Install the side connector as follows:

1. Remove distributor nozzle and retainer ring (area A) from distributor and reinstall in inlet (area B) of side connector. See Fig. 60.
2. Solder field-supplied extension nipple to coupling on distributor, then to side connector outlet, using a silver solder or equivalent with a melting point of 1300 to 1500 F. Extension nipple should be as short as possible.
3. Solder expansion valve outlet to side connector using 95-5 tin-antimony soft solder, for easy removal.
4. If required, install field-supplied adapter bushing or coupling to connector inlet before soldering to expansion valve outlet.

SPECIAL PIPING WITH 4 SPLITS PER COIL

Manifolding for 2-Face Splits — Refer to Fig. 61 and externally manifold as follows:

1. Connect the 4 expansion valves to the 4 distributors on each coil and connect the 4 suction lines to the 15-diameter-long risers as outlined in previous piping instructions.
2. Install common liquid line for upper face split to first (upper) and second expansion valves. Also, install a common suction line from suction lines attached to first (upper) and second suction header connections.
3. Repeat step 2 for lower face split using third and fourth distributor and suction connections.

Manifolding for 2-Row Splits — Refer to Fig. 62 and externally manifold as outlined for the 2-face splits with the following exceptions:

1. Manifold in pairs, the first and third coil connections for one split.
2. Manifold the second and fourth pairs of coil connections for the other split.

NOTE: Split section using first and third pairs of coil connections should be *first-on, last-off*.

Hot Gas Bypass Connection with 4 Splits per Coil — For either face or row splits connect a hot gas bypass auxiliary side connector to each distributor of coil split that is *first-on, last-off*. Refer to installation instructions for Hot Gas Bypass.

SPECIAL PIPING FOR DOUBLE-CIRCUIT COILS — All 8-row coils that are double circuited require special piping to manifold suction and liquid lines. See Tables 3 and 4 for detailed coil data.

Manifolding for 2-Face Splits — Refer to Fig. 61 for coils with less than 34 tubes in face. Externally manifold as follows:

1. Coils with less than 34 tubes: Connect the 4 expansion valves to the 4 distributors on each coil and connect the 4 suction lines to the 15-diameter-long risers as outlined in previous piping instructions. Refer to Fig. 61.

2. Install common liquid line for upper face split to first (upper) and second expansion valves. Also, install a common suction line from suction lines attached to first (upper) and second suction header connections.
3. Repeat Step 2 for lower face split using third and fourth distributor and suction connections.
4. For units with two coils repeat procedures of steps 1, 2 and 3 for second coil.

2. Manifold the second and fourth pairs of coil connections for the other split.

NOTE: Split section using first and third pairs of coil connections should be *first-on, last-off*.

Hot Gas Bypass Connection for Double-Circuited Coils — For either face or row splits connect a hot gas bypass auxiliary side connector to each distributor of coil split that is first on, last off. Refer to installation instructions for Hot Gas Bypass.

Manifolding for 2-Row Splits — Refer to Fig. 61 for coils with less than 34 tubes in face. Externally manifold as outlined for the 2-face splits with the following exceptions:

1. Manifold in pairs, the first and third coil connections for one split.

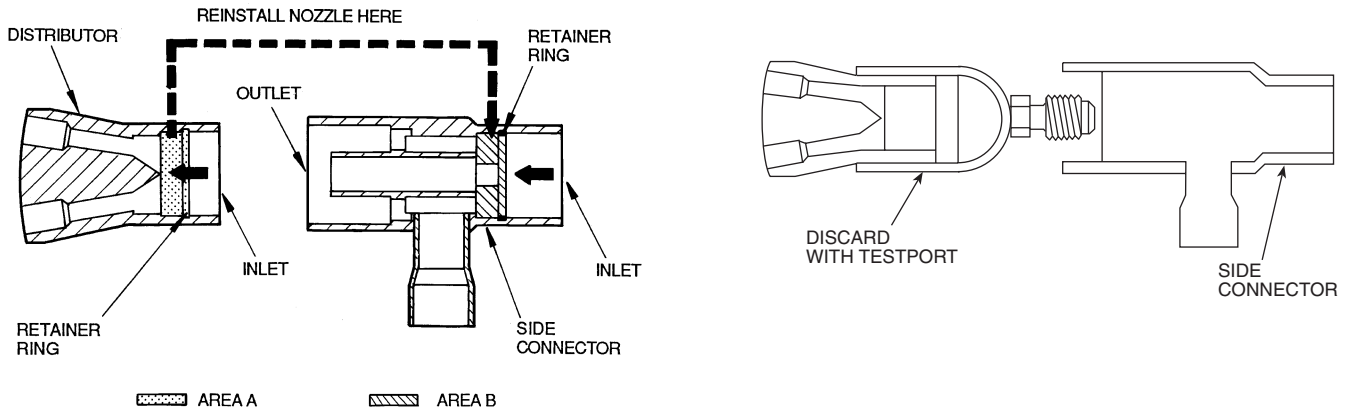


Fig. 60 — Distributor and Hot Gas Bypass Auxiliary Side Connector

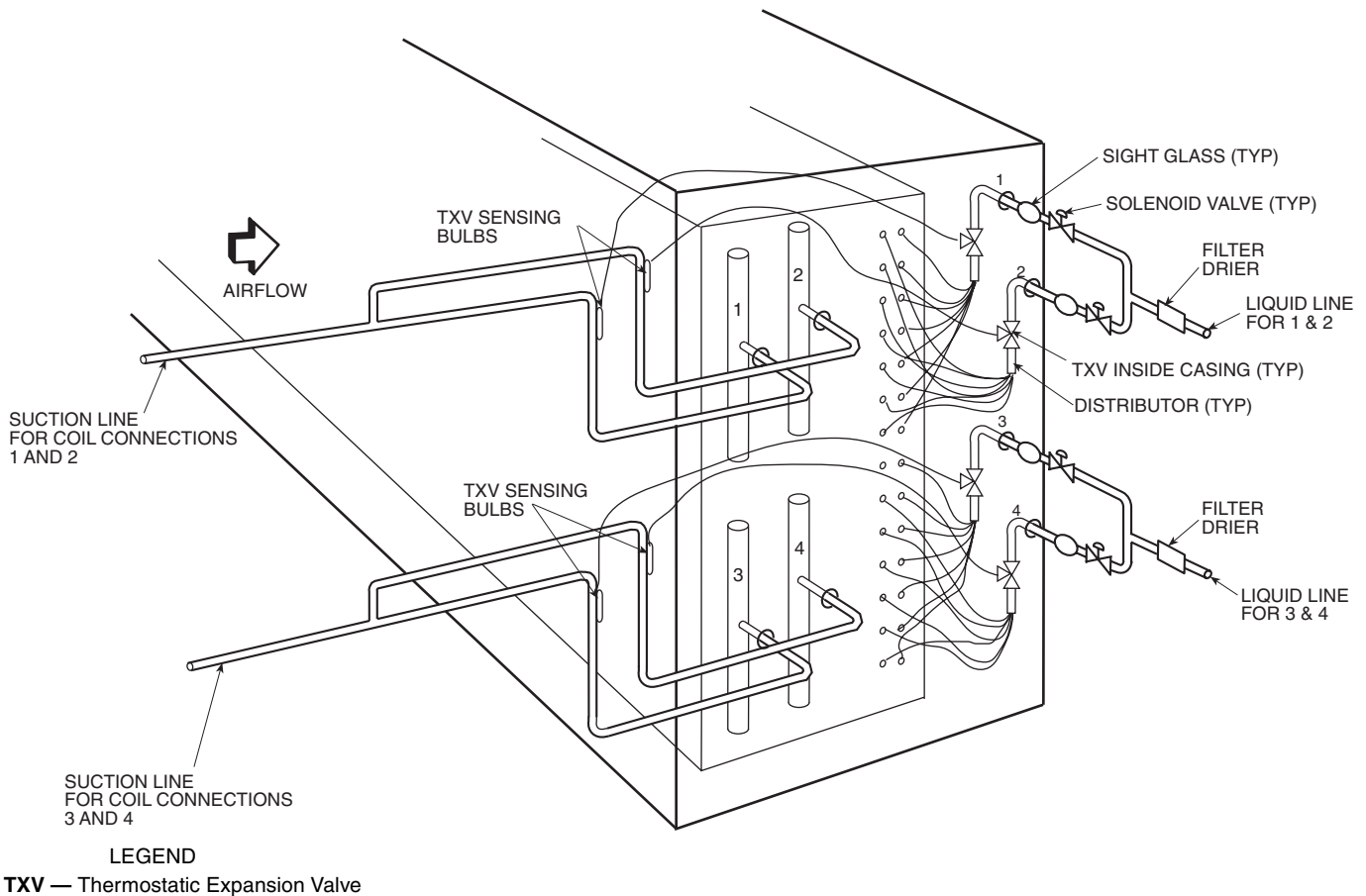


Fig. 61 — Face-Split Coil Manifolding (Typical)

Table 20 — Auxiliary Side Connector (Hot Gas Bypass) Data

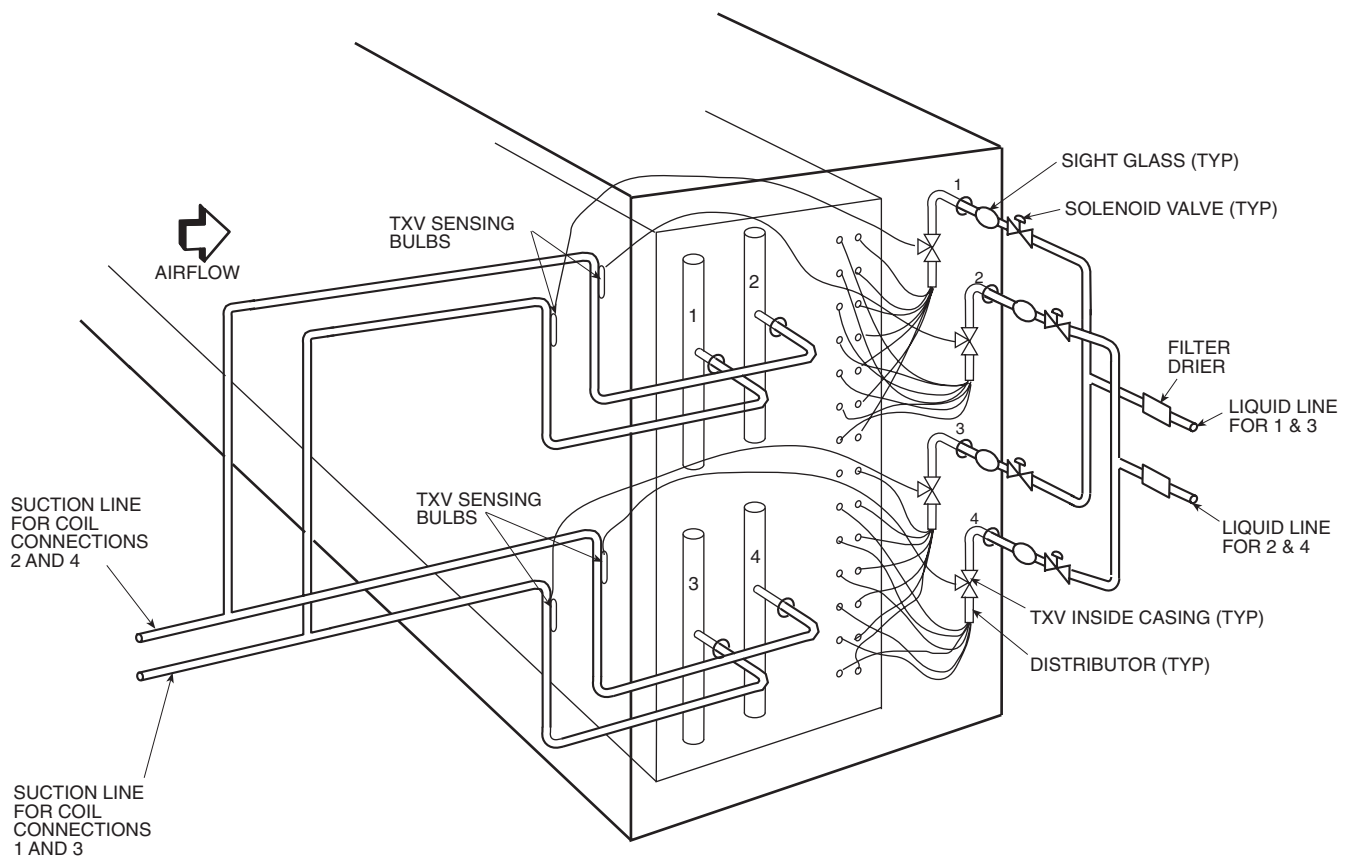
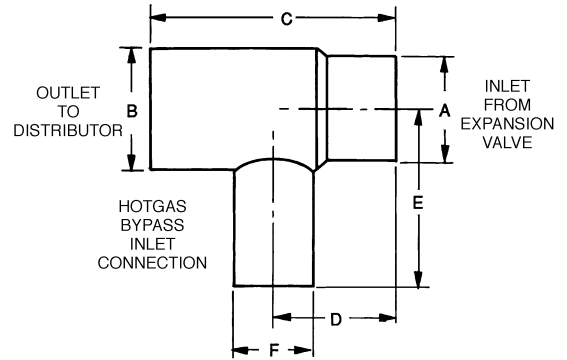
SPORLAN TYPE	CARRIER PART NO.	CONNECTION SIZES (in.)			USED WITH SPORLAN DISTRIBUTOR TYPE	NOZZLE SIZE
		Inlet — ODM Solder	Outlet — ODF Solder	Auxiliary — ODF Solder		
ASC-5-4	—	5/8	5/8	1/2	1620, 1622	J
ASC-7-4	EA19BA504	7/8	7/8	1/2	1112, 1113	G
ASC-9-5	EA19BA705	1 1/8	1 1/8	5/8	1115, 1116	E
ASC-11-7	EA19BA905	1 3/8	1 3/8	7/8	1117, 1126	C
ASC-13-9	—	1 5/8	1 5/8	1 1/8	1125, 1127, 1143	A

DIMENSIONS (in.)

SPORLAN TYPE	A	B	C	D	E	F
ASC-5-4	5/8 ODM	5/8 ODF	1.88	0.95	1.25	1/2 ODF
ASC-7-4	7/8 ODM	7/8 ODF	2.25	1.06	1.38	1/2 ODF
ASC-9-5	1 1/8 ODM	1 1/8 ODF	2.81	1.47	1.62	5/8 ODF
ASC-11-7	1 3/8 ODM	1 3/8 ODF	3.53	1.89	2.19	7/8 ODF
ASC-13-9	1 5/8 ODM	1 5/8 ODF	3.72	1.83	2.75	1 1/8 ODF

LEGEND

- ODF — Outside Diameter, Female
- ODM — Outside Diameter, Male



LEGEND

- TXV — Thermostatic Expansion Valve

Fig. 62 — Row-Split Coil Manifolding (Typical)

Hot Gas Piping and Wiring

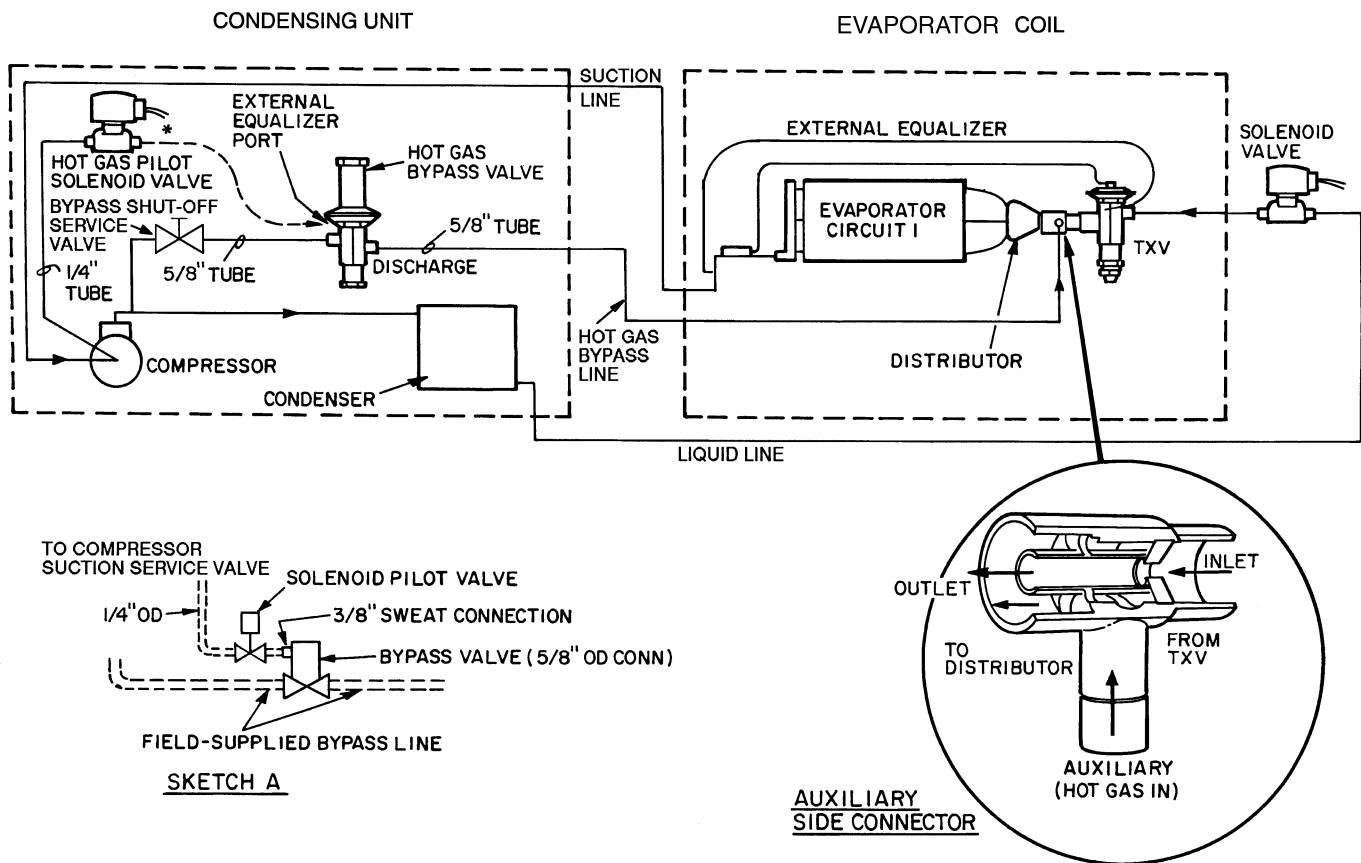
INSTALL PIPING (See Fig. 63)

⚠ WARNING

Shut off all power to the unit and remove refrigerant charge using an approved refrigerant recovery device before proceeding with installation.

1. In applications where the air handler refrigerant distributor is not equipped with a side outlet connection, it is recommended that a Sporlan in-line auxiliary side connector with standard distributor be used. Refer to the installation instructions for the indoor fan coil to obtain nozzle size and distributor connection size. Select the auxiliary side connector based on this information. The side connector must be installed on refrigerant circuit no. 1 (first stage of cooling) of the fan coil being used.
2. Install a field-supplied 1/4-in. NPT to 1/4-in. flare fitting on the gage connection port of the compressor suction service valve.

3. Sweat the pilot solenoid valve supplied in the hot gas accessory package **directly** to the hot gas bypass valve on the 3/8-in. ODF external equalizer port.
4. Install field-supplied 1/4-in. copper tube (flared with a nut on each end) between the compressor suction valve and the hot gas pilot solenoid valve.
5. Connect a field-supplied 5/8-in. OD copper tube between the discharge line process tube (hot gas stub) and a field-supplied manual shutoff service valve, avoiding any traps in piping.
6. Connect another field-supplied 5/8-in. OD copper tube between the manual shutoff valve outlet and the hot gas bypass valve inlet.
7. Connect a field-supplied 5/8-in. OD copper tube between the leaving side of the hot gas bypass valve and the Sporlan auxiliary side connector (distributor-side connector).
8. Refer to Hot Gas Bypass installation instructions for wiring information.



LEGEND

TXV — Thermostatic Expansion Valve

*Pilot valve connects directly to bypass valve per sketch A.

Fig. 63 — Hot Gas Bypass Piping

Condensate Drain — Install a condensate-trapping drain line at the units drain connection; use 1½-in. standard pipe. See Fig. 64A and 64B for correct drain layout.

The lowest point of the drain pan is a minimum of 7¾-in. higher than the bottom of the baserail.

When calculating trap depth on draw-thru or blow-thru applications, remember that it is not the total static pressure but the upstream or downstream static resistance that is trapped against. For instance, when calculating the trap depth for a cooling coil condensate pan on the draw-thru side, trap against the coil pressure drop in that coil section and any other pressure drops upstream of it.

Example:

- Return duct — 0.5 in. static
- Mixing box — 0.4 in. static
- Filters — 0.2 in. static
- Heating coil — 0.2 in. static
- Cooling coil — 1.2 in. static
- Fan — 2.3 in. external static

If calculating the trap depth for the cooling coil, the total trap static would be 2.5 in. plus 1 in. (P_1 = negative static pressure + 1 in.), as shown in Fig. 64A.

Traps on draw-thru units must store enough condensate to prevent losing the drain seal at start-up. The “minimum ½ P_1 ” dimension ensures that enough condensate is stored.

To determine the trap dimensions for blow-thru units, find the coils maximum positive pressure (P_1 in Fig. 64B) and add ½ inch. This figure is normally the fan total static pressure (P_1 = fan total static pressure).

NOTE: Trapping to 5 in. static pressure on blow-thru and 3 in. static pressure on draw-thru units is possible with the standard 6 in. baserail.

For all units, provide condensate freeze-up protection as required. On units with internal spring isolators, be sure the unit is mounted to allow sufficient clearance for the required drain trap depth.

Fan Motor Wiring Recommendations — Motors are rated for use with variable frequency drives. Full load amp (FLA) efficiency and power factors are listed in Tables 21A and 21B. Refer to Fig. 65 for fan type and application.

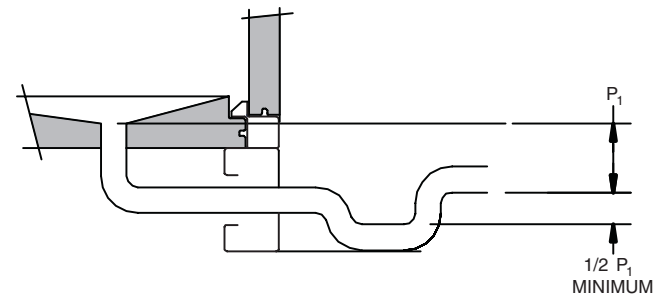


Fig. 64A — Condensate Drain, Draw-Thru Trapping

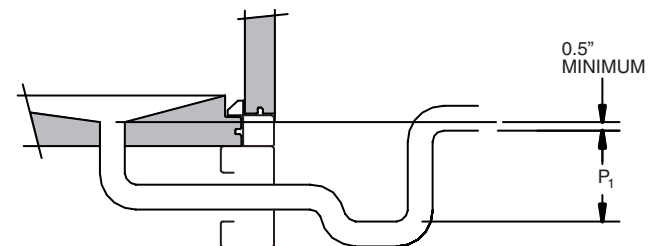


Fig. 64B — Condensate Drain, Blow-Thru Trapping

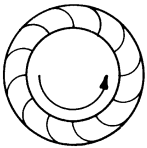
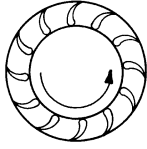
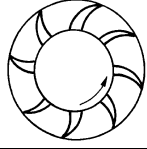
TYPE	CHARACTERISTICS	APPLICATION
Forward-Curved (FC) Side View 	<ul style="list-style-type: none"> • Double-width, double-inlet (DWDI) construction. • Best at low or medium pressure (approximately 0 to 5 in. wg). • Horsepower increases continuously with increase in air quantity (overloads) as static pressure decreases. • Less expensive than AF fans. • Runs at relatively low speed, typically 400 to 1200 rpm. • Blades curve toward direction of rotation. 	For low to medium pressure air-handling applications.
Airfoil (AF) Side View 	<ul style="list-style-type: none"> • Double-width, double-inlet (DWDI) construction. • Best in high capacity and high-pressure applications (4 to 8 in. wg). • Horsepower peaks at high capacities. • Most expensive of centrifugal fans. • Operates at high speeds, typically 1200 to 2800 rpm. About double the speed of FC fan for similar air quantity. • Blades have aerodynamic shape similar to airplane wing and are curved away from direction of rotation. 	For medium to high air capacity and pressure applications.
Plenum (PAF) End View 	<ul style="list-style-type: none"> • Single-width, single-inlet (SWSI) construction. • Characteristics similar to DWDI airfoil fan. • Blades have aerodynamic shape similar to airplane wing and are curved away from direction of rotation. Fewer blades and wider blade spacing than AF fans. 	Best in applications with limited space or multiple ducts.

Fig. 65 — Fan Type and Application

Table 21A — ODP 60 Hz Motor Data

HIGH EFFICIENCY						
MOTOR HP	FLA				EFF. (%)	P.F. (%)
	200v	230v	460v	575v		
1/2	2.2	1.8	1.1	0.9	N/A	N/A
3/4	2.6	2.5	1.3	1.0	N/A	N/A
1	3.2	3.0	1.5	1.1	82.5	84
1 1/2	4.5	3.9	1.9	1.6	84.0	85.7
2	6.0	5.2	2.6	2.1	84.0	85.7
3	9.4	8.6	4.3	3.4	86.5	76.0
5	15.3	12.8	6.4	5.1	87.5	83.3
7 1/2	25.0	19.2	9.6	7.8	88.5	81.5
10	29.3	26.8	13.4	10.3	89.5	80.0
15	43.2	38.6	19.3	15.4	91.0	83.1
20	56.0	49.6	24.8	19.8	91.0	84.0
25	70.5	60.6	30.3	24.3	91.7	81.0
30	85.0	75.0	37.5	30.0	92.4	79.0
40	110.0	95.0	47.5	41.0	93.0	84.0
50	138.0	120.0	60.0	48.0	93.0	90.0
60	154.0	134.0	67.0	53.5	93.6	90.0
75	189.0	164.0	82.0	65.5	94.1	91.0

PREMIUM EFFICIENCY						
MOTOR HP	FLA				EFF. (%)	P.F. (%)
	200v	230v	460v	575v		
1/2	N/A				N/A	N/A
3/4	N/A				N/A	N/A
1	N/A				N/A	N/A
1 1/2	N/A				N/A	N/A
2	N/A				N/A	N/A
3	9.0	8.0	4.0	N/A	88.5	79.5
5	14.5	13.6	6.8	N/A	89.5	76.8
7 1/2	21.5	19.4	9.7	N/A	91.7	79.0
10	28.0	25.2	12.6	N/A	91.7	81.0
15	42.5	37.8	18.9	N/A	93.0	80.0
20	56.0	49.0	24.5	N/A	93.6	81.5
25	69.5	61.0	30.5	N/A	93.6	82.3
30	82.5	72.4	36.2	N/A	93.6	82.8
40	105.0	96.0	48.0	N/A	94.5	83.5
50	137.0	120.0	60.0	N/A	94.5	83.0
60	154.0	134.0	67.0	N/A	95.4	87.7
75	191.0	166.0	83.0	N/A	95.4	87.0

LEGEND

- EFF. — Efficiency
- FLA — Full Load Amps
- ODP — Open Dripproof
- P.F. — Power Factor

Table 21B — TEFC 60 Hz Motor Data

HIGH EFFICIENCY						
MOTOR HP	FLA				EFF. (%)	P.F. (%)
	208v	230v	460v	575v		
1/2	1.8	1.6	0.9	0.7	N/A	N/A
3/4	2.4	2.4	1.2	0.8	N/A	N/A
1	4.0	3.2	1.6	1.3	82.5	72.0
1 1/2	5.5	4.4	2.2	1.6	84.0	72.0
2	7.0	5.8	2.9	2.1	84.0	76.0
3	10.0	8.2	4.1	3.3	87.5	78.0
5	17.0	13.2	6.6	5.2	87.5	81.5
7 1/2	24.0	19.2	9.6	7.6	89.5	83.0
10	31.0	24.4	12.2	9.6	89.5	85.5
15	47.0	35.0	17.5	14.5	91.0	85.0
20	61.0	47.0	23.5	18.8	91.0	87.0
25	74.0	57.0	28.5	22.8	92.4	88.0
30	82.0	69.0	34.5	27.6	92.4	88.0
40	115.0	95.0	47.5	37.6	93.0	85.0
50	142.0	118.0	59.0	47.2	93.0	85.0
60	N/A	140.0	70.0	N/A	93.6	85.5
75	N/A	170.0	85.0	N/A	94.1	86.5

PREMIUM EFFICIENCY						
MOTOR HP	FLA				EFF. (%)	P.F. (%)
	208v	230v	460v	575v		
1/2	N/A				N/A	N/A
3/4	N/A				N/A	N/A
1	4.0	3.0	1.5	1.2	84.5	72.0
1 1/2	5.5	4.2	2.1	N/A	85.5	72.0
2	7.0	5.6	2.8	2.2	86.5	77.5
3	10.0	8.2	4.1	3.3	88.5	78.0
5	17.0	13.0	6.5	5.2	88.5	84.5
7 1/2	24.0	19.2	9.6	7.6	90.2	81.5
10	31.0	24.0	12.0	9.6	90.2	85.0
15	47.0	35.0	17.5	14.0	91.7	86.0
20	61.0	47.0	23.5	18.8	92.4	87.0
25	74.0	57.0	28.5	22.8	93.0	88.0
30	82.0	69.0	34.5	27.6	93.0	88.0
40	115.0	90.0	45.0	37.0	94.1	88.5
50	147.0	115.0	57.5	46.0	94.1	86.4
60	N/A	140.0	70.0	56.0	94.1	89.0
75	N/A	172.0	86.0	69.0	95.4	86.0

LEGEND

- EFF. — Efficiency
- FLA — Full Load Amps
- P.F. — Power Factor
- TEFC — Totally Enclosed Fan Cooled

FAN MOTOR STARTER — The starter is factory installed, wired to the motor, and fully tested before shipping. Before proceeding, open the starter cover and fan section access door to check for any damage.

Wiring

1. Select a suitable location for the field power supply source; top is preferred.
2. Before drilling any hole, be sure the hole and any field-supplied conduit fittings will not interfere with the door or components inside the enclosure.
3. Drill the appropriate size hole and connect the field-supplied conduit to the enclosure.
4. Refer to the wiring diagram supplied with the starter and connect the line voltage power source to the line voltage terminals (L1, L2, L3) as shown.
5. Refer to the factory-supplied voltage warning label and verify that the power source is correct.
6. Connect the grounding wire to the grounding lug provided on the bottom of the starter.

NOTE: For remote control operation (AUTO position), fire/smoke shutdown, or shutdown on coil freeze protection, a second conduit should be used to connect these control functions.

IMPORTANT: This starter is designed to stop the equipment in both HAND and AUTO positions if either a fire/smoke or coil freeze condition is detected.

7. Select a location at the bottom of the starter near the control terminal block.
8. Before drilling any hole, be sure the hole and any field-supplied conduit fittings will not interfere with the door or components inside the enclosure.
9. Drill the appropriate size hole and connect the field-supplied conduit to the enclosure.
10. If a smoke detector or remote fire shut down is provided (field-supplied), remove the factory-supplied jumper between terminals 1 and 2 in the starter. Connect the normally closed, isolated dry contact from the smoke detector or fire system to these terminals.
11. If a coil freeze detection thermostat is provided, remove the factory-supplied jumper between terminals 1 and 2 in the starter. Connect the normally closed contact from the low temperature thermostat to these terminals.
12. For remote start/stop operation (when the HOA [hand/auto/off] switch is placed in the AUTO position), connect a field-supplied, normally open isolated dry contact between terminals 3 and 4. This contact must be suitable for at least 3 amps at 120 vac.

Start-Up and Test — Before applying power to the starter, verify that the motor overload inside the starter is set to the full load amperage (FLA or RLA) specified on the motor nameplate.

IMPORTANT: Many starters contain a multi-tap control transformer. The line voltage tap on the control transformer must be set in the field. For starters operating at 200/230-50 Hz, 208/230-60 Hz, or 380/400/415-50 Hz, the line voltage tap on the control transformer must be set to the appropriate line input voltage.

1. Set the HOA switch on the front of the starter to the OFF position.
2. Verify that the fan can freely rotate and remove any loose items inside the fan section.
3. Close and secure the fan access door or panel and the starter door cover.

4. Apply power to the starter.
5. Set the HOA switch in the HAND position and verify that the fan operates.

For 3-phase motors:

Place the switch back in the OFF position and carefully open the fan access door.

Verify that the fan wheel is rotating in the proper direction. If it is not, remove power and reverse any two of the line voltage connections at the starter terminals (L1, L2, L3).

6. With the fan operating and the starter in the HAND position, verify that each safety or limit switch functions properly.
7. Repeat Step 6 with the switch in the AUTO position and the remote contact energized.

DISCONNECT — The disconnect is factory installed, wired to the motor, and fully tested before shipped. Open the disconnect cover and fan section access door to check for damage before proceeding.

Disconnect Wiring

1. Connect the field line voltage power source to the top of the disconnect (knockouts are provided).
2. Remove the knockouts as required to accommodate the field-supplied conduit.
3. Refer to the wiring diagram supplied with the unit and connect the line voltage power source to the line voltage terminals (L1, L2, L3) as shown.
4. Refer to the factory-supplied voltage warning label and verify that the power source is correct.
5. Connect the ground wire to the grounding lug provided in the disconnect.

Start-Up and Test

1. Set the disconnect switch to the OFF position.
2. Verify that the fan can freely rotate and remove any loose items inside the fan section.
3. Close and secure the fan access door and the disconnect door cover.
4. Apply power.
5. Set the disconnect switch to the ON position and verify that the fan operates.

For 3-phase motors:

Place the switch back in the OFF position and carefully open the fan access door.

Verify that the fan wheel is rotating in the proper direction. If it is not, remove power and reverse any two of the line voltage connections at the starter terminals (L1, L2, L3).

NOTE: For fused type disconnects, blown fuses MUST be replaced with the same type and size originally supplied.

VFD — The variable frequency drive (VFD) is factory-installed, wired to the motor and fully tested before shipment. Drive programming is also done at the factory, including electronic overload, which is programmed for the motor FLA. Refer to Tables 22 and 23.

Open the VFD front cover and the fan section access door to check for any damage before proceeding.

Wiring

1. Select a suitable location in the bottom of the VFD to connect field-supplied power source.
2. Remove the appropriate size knockout using a suitable knockout punch tool. Do NOT use a drill; metal shavings will damage the drive.
3. Connect the field-supplied conduit to the VFD enclosure.

- Refer to the wiring diagram supplied with the VFD connect the line voltage power source to the line voltage terminals (U1, V1, W1) as shown.
- Refer to the factory-supplied voltage warning label and verify that the power source is correct.
- Connect the ground wire to the grounding lug provided on the bottom of the VFD.
- Select another suitable location on the bottom of the VFD to connect the field-supplied control wiring.
- Locate and use one of the unused knockouts on the VFD housing and connect the control wiring conduit. Refer to Fig. 66-69 for field control wiring connections.

NOTE: If a 0 to 10 or 2 to 10 vdc signal is used to control the drive speed, refer to the ABB ACH-550 manual shipped with the drive to reset the dipswitch to the voltage or V position (page 16). Verify that the AI switch is set to the voltage position. DO NOT reprogram the drive.

Start-Up and Test

- Close and secure the fan access door and the VFD cover.
- Apply power and allow drive to initialize.
- Press the HAND button and verify that the drive operates at 8 Hz.
- Press Up arrow to increase speed and Down arrow to decrease speed.
- Press the Off button and verify that the fan stops.
- Press the Auto button to operate the drive from the Energy Management System (EMS) interface. Verify that all VFD interface functions are working (start/stop, speed controls, fire/smoke, shutdown, etc.) between the VFD and the EMS.

Refer to Tables 22 and 23 for additional VFD information.

VFD WITH BYPASS — The VFD and bypass are factory installed, wired to the motor and fully tested before shipped. The VFD is programmed at the factory as ordered, including electronic overload, which is programmed for the motor FLA (full load amps) as supplied.

Open the bypass box cover and the fan section access door to check for any damage before proceeding.

Wiring

- Select a suitable location in the bottom panel of the bypass box to connect field-supplied power source.
- Before drilling any hole, be sure the hole and any field-supplied conduit fittings will not interfere with the door or components inside the enclosure.

- Drill the appropriate size hole and connect the field-supplied conduit to the enclosure.
- Refer to the wiring diagram supplied with the bypass and connect the line voltage power source to the line voltage terminals (L1, L2, L3) as shown.
- Refer to the factory-supplied voltage warning label and verify that the power source is correct.
- Connect the ground wire to the grounding lug provided on the bottom of the Bypass box.
- Refer to the VFD Steps 7 and 8 to connect VFD control wiring.

Start-Up and Test — Before applying power to the VFD Bypass and VFD, verify that the motor overload inside the bypass has been set to the full load amperage (FLA or RLA) as specified on the motor nameplate.

IMPORTANT: Some bypass assemblies (208/230-60, 200/230-50, 380/400/415-50) contain a multi-tap control transformer. The line voltage tap on the control transformer must be adjusted to the appropriate line voltage.

- Set the switch on the front of the bypass to the OFF position.
- Verify that the fan freely rotates and remove and loose items inside the fan section.
- Close and secure the fan access door and the bypass and VFD covers.
- Apply power.
- Set the switch to the LINE position and verify that the fan operates.

For 3-phase motors:

Place the switch back in the OFF position and carefully open the fan access door.

Verify that the fan wheel is rotating in the proper direction. If it is not, remove power and reverse any two of the line voltage connections in the bypass box (L1, L2, L3). DO NOT swap the motor leads; this will cause the fan to rotate in the reverse direction when operating from the VFD.

- Make sure the bypass cover is closed then apply power.
- Set the switch to the DRIVE position and verify that the VFD operates.
- Press the Hand button and verify that the fan operates.
- Press the Auto button and verify that the drive operates from the EMS interface. Verify that all VFD interface functions between the VFD and the EMS system are working.

Table 22 — VFD Data

39M MOTOR HP	ABB PART NO. ACH550-UH-	MAX. CONTINUOUS OUTPUT AMPS	FUSE AMPS	MCCB RATED AMPS	PROGRAMMED SETTINGS	
					Overload Trip Amps 4 pole / 2 pole	Max. Output Amps 4 pole / 2 pole
208-230 Volt / 3 Phase / 60 Hz (Programmed to Operate at 208 volts)						
1/2	04A6-2	4.6	10	15	1.8/ 1.7	3.0/ 2.2
3/4	04A6-2	4.6	10	15	2.6/ 2.5	3.2/ 3.0
1	04A6-2	4.6	10	15	3.5/ 3.2	3.8/ 3.8
1 1/2	06A6-2	6.6	10	15	5.2/ 4.2	5.8/ 5.8
2	07A5-2	7.5	10	15	6.7/ 5.9	7.2/ 7.0
3	012A-2	11.8	15	15	9.0/ 8.5	10.0/ 9.5
5	017A-2	16.7	25	25	14.5/ 13.6	16.7/ 16.0
7 1/2	024A-2	24.2	30	30	21.4/ 20.7	24.0/ 23.0
10	031A-2	30.8	40	40	27.4/ 27.4	30.8/ 30.0
15	046A-2	46.2	60	60	40.5/ 40.5	46.2/ 43.0
20	059A-2	59.4	80	80	53.0/ 52.2	59.4/ 57.0
25	075A-2	74.8	100	100	67.0/ 66.0	74.0/ 71.0
30	088A-2	88.0	110	110	82.0/ 78.0	85.0/ 82.0
40	114A-2	114.0	150	150	92.0/107.0	114.0/110.0

LEGEND

MCCB — Molded-Case Circuit Breaker

NOTE: Two-pole motors operate at a nominal 3600 rpm for 60 Hz and 3000 rpm for 50 Hz; 4-pole motors operate at a nominal 1800 rpm for 60 Hz and 1500 rpm for 50 Hz.

Table 22 — VFD Data (cont)

39M MOTOR HP	ABB PART NO. ACH550-UH-	MAX. CONTINUOUS OUTPUT AMPS	FUSE AMPS	MCCB RATED AMPS	PROGRAMMED SETTINGS	
					Overload Trip Amps 4 pole / 2 pole	Max. Output Amps 4 pole / 2 pole
208-230 Volt / 3 Phase / 60 Hz (Programmed to Operate at 230 volts)						
50	143A-2	143	200	200	125.0/130.0	142.0/130.0
60	178A-2	178	250	250	154.0/135.0	172.0/145.0
75	221A-2	221	300	300	186.0/166.0	221.0/172.0
460 Volt / 3 Phase / 60 Hz (Programmed to Operate at 460 volts)						
1/2	03A3-4	3.3	10	15	0.9/ 1.0	1.5/ 1.2
3/4	03A3-4	3.3	10	15	1.3/ 1.2	1.7/ 1.5
1	03A3-4	3.3	10	15	1.6/ 1.5	1.9/ 1.7
1 1/2	03A3-4	3.3	10	15	2.2/ 2.0	2.8/ 2.3
2	03A3-4	3.3	10	15	2.7/ 2.7	3.0/ 3.0
3	05A4-4	5.4	10	15	4.0/ 3.8	4.5/ 4.2
5	06A9-4	6.9	10	15	6.2/ 6.0	6.9/ 6.5
7 1/2	012A-4	11.9	15	15	9.0/ 8.8	10.0/ 9.5
10	015A-4	15.4	20	20	12.0/ 11.6	13.6/ 12.8
15	023A-4	23	30	30	17.6/ 16.5	19.3/ 19.0
20	031A-4	31	40	40	23.0/ 23.0	25.0/ 25.0
25	031A-4	31	40	40	29.0/ 28.0	31.0/ 30.0
30	038A-4	38	50	50	34.5/ 34.0	38.0/ 38.0
40	059A-4	59	80	80	46.0/ 44.0	48.0/ 50.0
50	072A-4	72	90	90	58.0/ 55.0	60.0/ 60.0
60	077A-4	77	100	100	73.0/ 68.0	77.0/ 72.0
75	096A-4	96	125	125	90.0/ 85.0	94.0/ 90.0
100	124A-4	124	175	175	118.0/110.0	124.0/114.0
200-230 Volt / 3 Phase / 50 Hz (Programmed to Operate at 200 volts)						
1	04A6-2	4.6	10	15	3.3/ 3.3	3.9/ 3.9
1 1/2	06A6-2	6.6	10	15	4.9/ 4.9	5.8/ 5.8
2	07A5-2	7.5	10	15	6.3/ 6.3	7.1/ 7.1
3	012A-2	11.8	15	15	8.7/ 8.7	10.0/ 10.0
5	017A-2	16.7	25	25	14.0/ 14.0	16.7/ 16.7
7 1/2	024A-2	24.2	30	30	21.2/ 20.2	24.2/ 24.2
10	031A-2	30.8	40	40	27.2/ 27.4	30.8/ 30.8
15	046A-2	46.2	60	60	41.4/ 40.5	46.2/ 46.2
20	059A-2	59.4	80	80	53.4/ 49.0	59.4/ 56.0
25	075A-2	74.8	100	100	65.4/ 66.0	74.0/ 74.8
30	088A-2	88	110	110	78.0/ 78.0	86.0/ 86.0
40	114A-2	114	150	150	107.0/107.0	114.0/114.0
50	143A-2	143	200	200	135.0/135.0	135.0/135.0
60	178A-2	178	250	250	169.0/169.0	169.0/169.0
75	221A-2	221	300	300	210.0/210.0	210.0/210.0
380 Volts / 3 Phase / 50 Hz (Programmed to Operate at 400 volts)						
1	03A3-4	3.3	10	15	1.7/ 1.7	2.3/ 2.3
1 1/2	03A3-4	3.3	10	15	2.5/ 2.5	3.3/ 3.3
2	04A1-4	4.1	10	15	3.2/ 3.2	3.8/ 3.6
3	05A4-4	5.4	10	15	4.5/ 4.5	5.4/ 5.3
5	08A8-4	8.8	15	15	7.0/ 7.0	8.5/ 8.0
7 1/2	012A-4	11.9	15	15	10.6/ 8.9	11.9/ 11.0
10	015A-4	15.4	20	20	13.6/ 11.6	15.4/ 14.6
15	023A-4	23	30	30	20.7/ 17.0	22.6/ 21.0
20	031A-4	31	40	40	26.7/ 24.5	29.3/ 29.0
25	038A-4	38	50	50	32.7/ 29.5	37.0/ 36.0
30	044A-4	44	60	60	39.0/ 39.0	44.0/ 44.0
40	059A-4	59	80	80	53.5/ 45.5	57.0/ 55.0
50	077A-4	77	100	100	67.5/ 67.5	70.0/ 70.0
60	096A-4	96	125	125	84.5/ 84.5	88.0/ 88.0
75	124A-4	124	175	175	105.0/105.0	105.0/105.0
100	157A-4	157	200	200	134.0/134.0	134.0/134.0

LEGEND

MCCB — Molded-Case Circuit Breaker

NOTE: Two-pole motors operate at a nominal 3600 rpm for 60 Hz and 3000 rpm for 50 Hz;
4-pole motors operate at a nominal 1800 rpm for 60 Hz and 1500 rpm for 50 Hz.

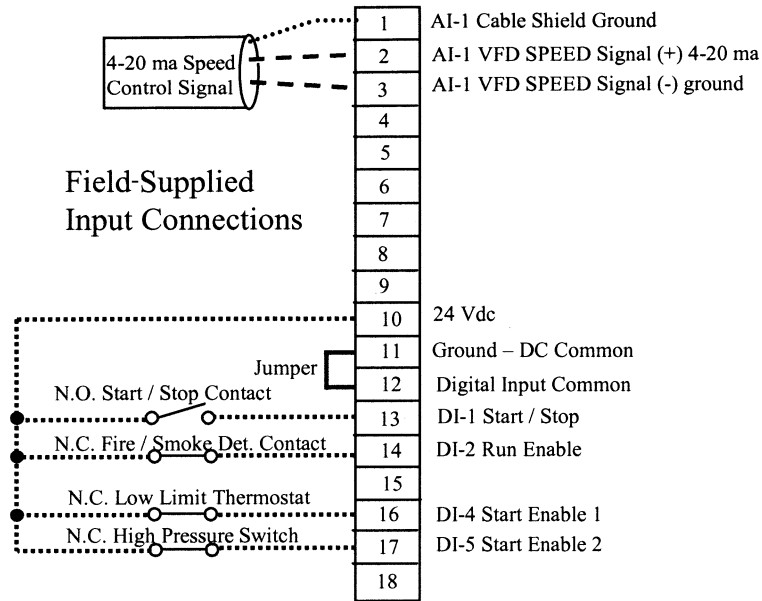
Table 23 — Air Handler Factory-Set Parameters

GROUP NUMBER	PARAMETER NUMBER	DESCRIPTION	VALUE
99	9902	Application Macro	Supply Fan
	9904	Motor Control Mode	Scalar
	9905	Motor Nominal Voltage	*
	9906	Motor Nominal Current	†
	9907	Motor Nominal Frequency	60 Hz or 50 Hz
	9908	Motor Nominal Speed	Nameplate rpm at Load
	9909	Motor Nominal Power	Nameplate Hp
10	1001	EXT1 Commands	DI-1 Start / Stop
	1002	EXT2 Commands	(0) N/A
	1003	Direction	Forward
11	1104	REF1 Minimum	9.33 Hz at 60 Hz / 7.78 Hz at 50 Hz
	1105	REF1 Maximum	62.7 Hz at 60 Hz / 52.2 Hz at 50 Hz
12	1201	Constant Speed Select	DI-3
	1202	Constant Speed Value	Field Program (8 Hz – Motor Nominal Freq.)
13	1301	Minimum AI-1	0%
	1302	Maximum AI-1	100%
	1303	Filter AI-1	1 sec
	1304	Minimum AI-2	0%
	1305	Maximum AI-2	100%
	1306	Filter AI-2	1 sec
14	1401	Relay Output 1	Started
	1402	Relay Output 2	Run
	1403	Relay Output 3	Fault (Inverted)
16	1601	Run Enable	DI-2
	1608	Start Enable 1	DI-4
	1609	Start Enable 2	DI-5
20	2003	Maximum Current	**
	2007	Minimum Frequency	8 Hz
	2008	Maximum Frequency	60 Hz / 50 Hz
21	2101	Start Function	FlyStart
	2102	Stop Function	Coast
22	2202	Accelerate Time	60 Seconds
	2203	Decelerate Time	60 Seconds
26	2605	Volt/Freq Ratio	Linear
	2606	Switching Frequency	8 KHz
	2607	Switching Frequency Control	ON
30	3006	Motor Thermal Time	1050
	3007	Motor Load Curve	105%
	3008	Zero Speed Load	70%
	3009	Break Point Frequency	35 Hz
	3010	Stall Function	Fault
	3011	Stall Frequency	20 Hz
	3012	Stall Time	20 sec
31	3017	Earth Fault	Fault
	3101	Number of Retries	2
	3102	Trial Time	600 sec
	3103	Delay Time	5 sec
	3104	AR Overcurrent	Enable
	3105	AR Overvoltage	Enable
	3106	AR Undervoltage	Enable
	3107	AR AI< Minimum	Disable
3108	AR External Fault	(0) Disable	
34	3415	Signal Parameter 3	SPEED
	3416	Signal 3 Minimum	0
	3417	Signal 3 Maximum	30000
	3418	Output 3 DSP Form	0
	3419	Output 3 DSP units	rpm
	3420	Output 3 Minimum	0
	3421	Output 3 Maximum	30000
40	4001	Gain	0.7
	4002	Integration Time	30 sec
	4005	Error Value Invert	NO
	4006	Units	Volts
	4007	Display Format	x.xxx
	4010	Setpoint Select	Internal
	4011	Internal Setpoint	Field Program (0.0 v – 10.0 v)
	4012	Setpoint Minimum	0.0 v
	4013	Setpoint Maximum	10.0 v
	4016	ACT 1 Input	AI-2
4027	PID 1 Parameter Set	SET 1	

*Factory Programmed as follows: For 208-230v / 60 Hz = 208, 460v / 60 Hz = 460, 200-230v / 50 Hz = 200, 380 / 50 Hz = 400.

†Motor Nameplate Amps. Factory programmed per Table 22. This value should always be compared to the actual motor nameplate value before start-up.

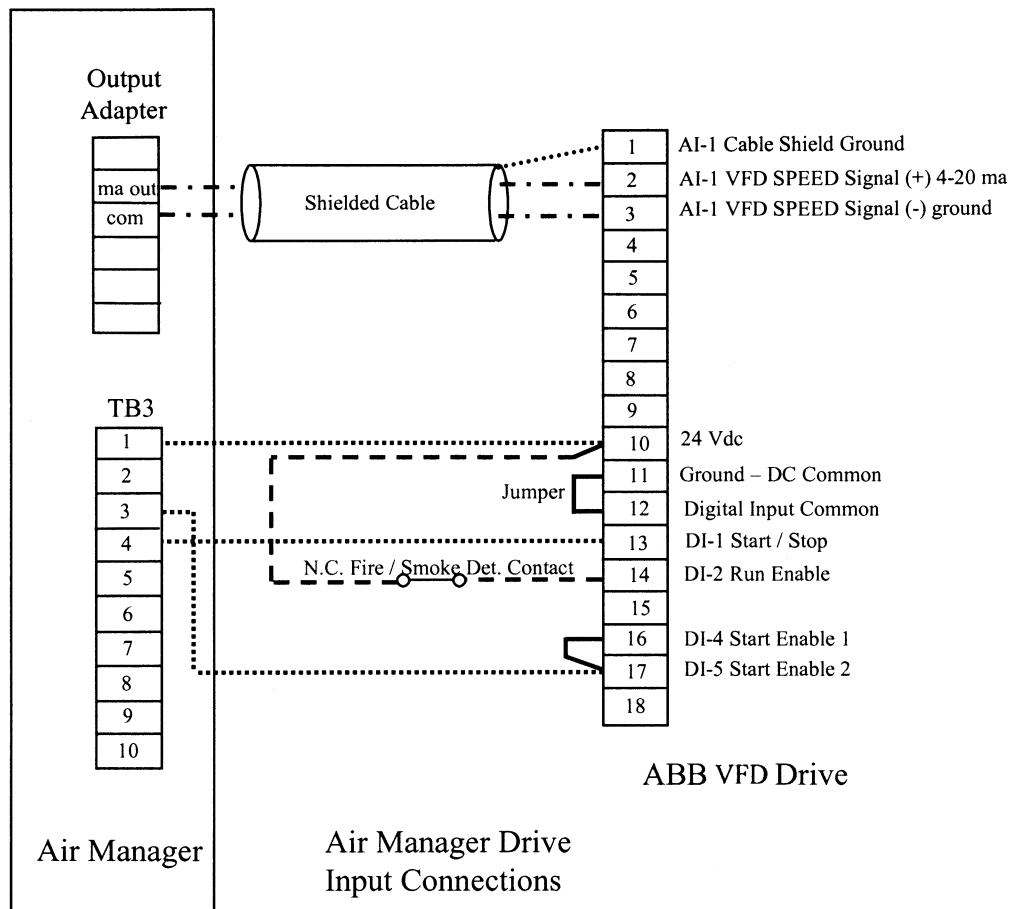
**Maximum Output Amps — Factory programmed per Table 22.



NOTES:

1. All conductors are no. 18 AWG (American Wire Gage) minimum.
2. Install jumpers if fire/smoke detector, low limit thermostat, or high pressure switch are not required.

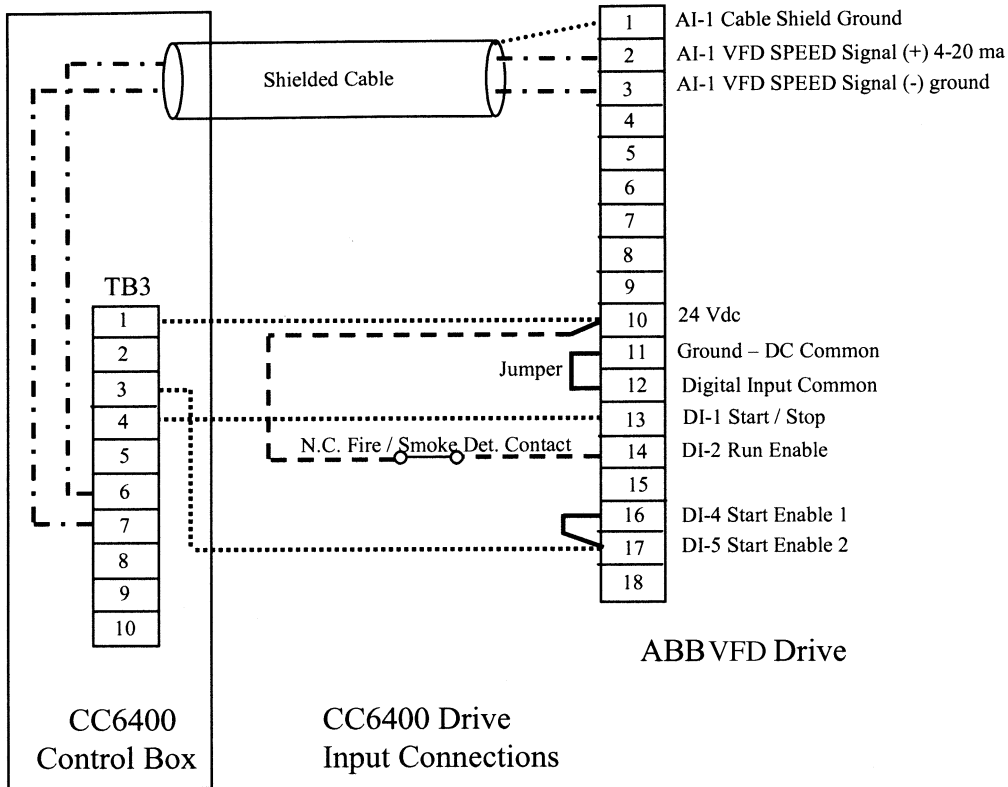
Fig. 66 — Field-Supplied Control Wiring for VFD



NOTES:

1. All conductors are no. 18 AWG (American Wire Gage) minimum.
2. Install jumper wire if fire/smoke detector, is not required.

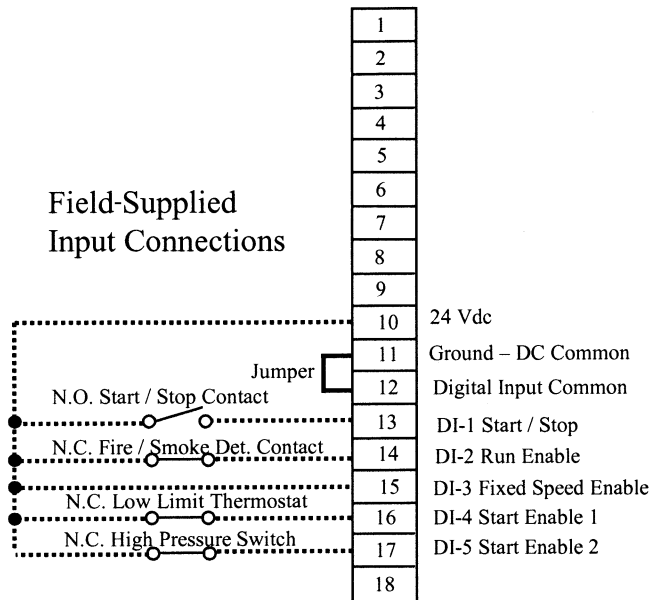
Fig. 67 — Field Wiring the VFD to the Air Manager Control



NOTES:

1. All conductors are no. 18 AWG (American Wire Gage) minimum.
2. Install jumper wire if fire/smoke detector, is not required.

Fig. 68 — Field Wiring the VFD to the CC6400 Comfort Control



NOTES:

1. All conductors are no. 18 AWG (American Wire Gage) minimum.
2. Install jumpers if fire/smoke detector, low limit thermostat, or high pressure switch are not required.
3. Program desired speed setpoint in Hz using parameter 1202.

Fig. 69 — Field Wiring for High Inertia/Low Horsepower Applications Using VFD as a Starter

VFD Configuration — The VFD keypad is shown in Fig. 70. The function of SOFT KEYS 1 and 2 change depending on what is displayed on the screen. The function of SOFT KEY 1 matches the word in the lower left-hand box on the display screen. The function of SOFT KEY 2 matches the word in the lower right-hand box on the display screen. If the box is empty, then the SOFT KEY does not have a function on that specific screen. The UP and DOWN keys are used to navigate through the menus. The OFF key is used to turn off the VFD. The AUTO key is used to change control of the drive to automatic control. The HAND key is used to change control of the drive to local (hand held) control. The HELP button is used to access the help screens.

START UP WITH ASSISTANT — The initial start-up has been performed at the factory. To start up the VFD with the Start-Up Assistant, perform the following procedure:

1. Select MENU (SOFT KEY 2). The Main menu will be displayed.
2. Use the UP or DOWN keys to highlight ASSISTANTS on the display screen and press ENTER (SOFT KEY 2).
3. Use the UP or DOWN keys to highlight Commission Drive and press SEL (SOFT KEY 2).
4. The Start-Up Assistant will display the parameters that need to be configured. Select the desired values and press SAVE (SOFT KEY 2) after every change. The process will continue until all the parameters are set.

START UP BY CHANGING PARAMETSEERS INDIVIDUALLY — Initial start-up is performed at the factory. To start up the VFD with by changing individual parameters, perform the following procedure:

1. Select MENU (SOFT KEY 2). The Main menu will be displayed.
2. Use the UP or DOWN keys to highlight PARAMETERS on the display screen and press ENTER (SOFT KEY 2).
3. Use the UP and DOWN keys to highlight the desired parameter group and press SEL (SOFT KEY 2).
4. Use the UP or DOWN keys to highlight the desired parameter and press EDIT (SOFT KEY 2).
5. Use the UP or DOWN keys to change the value of the parameter.
6. Press SAVE (SOFT KEY 2) to store the modified value. Press CANCEL (SOFT KEY 1) to keep the previous value. Any modifications that are not saved will not be changed.
7. Choose another parameter or press EXIT (SOFT KEY 1) to return to the listing of parameter groups. Continue until all the parameters have been configured and then press EXIT (SOFT KEY 1) to return to the main menu.

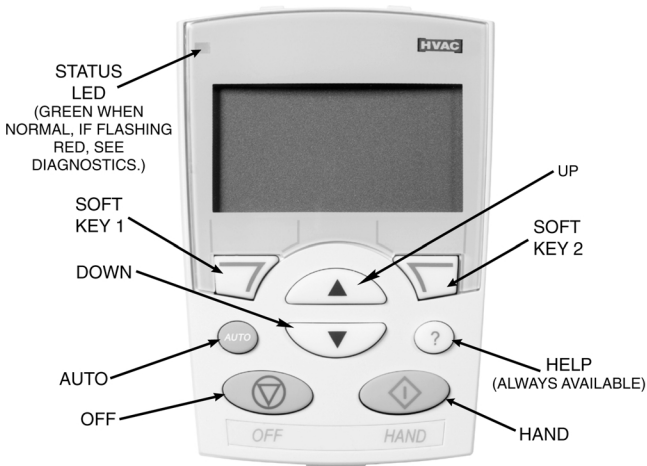


Fig. 70 — VFD Keypad

NOTE: The current parameter value appears above the highlight parameter. To view the default parameter value, press the UP and DOWN keys simultaneously. To restore the default factory settings, select the application macro “HVAC Default.”

VFD Modes — The VFD has several different modes for configuring, operating, and diagnosing the VFD. The modes are:

- standard display mode — shows drive status information and operates the drive
- parameters mode — edits parameter values individually
- start-up assistant mode — guides the start up and configuration
- changed parameters mode — shows all changed parameters
- drive parameter backup mode — stores or uploads the parameters
- clock set mode — sets the time and date for the drive
- I/O settings mode — checks and edits the I/O settings

Standard Display Mode — Use the standard display mode to read information on the drive status and operate the drive. To reach the standard display mode, press EXIT until the LCD display shows status information as described below. See Fig. 71.

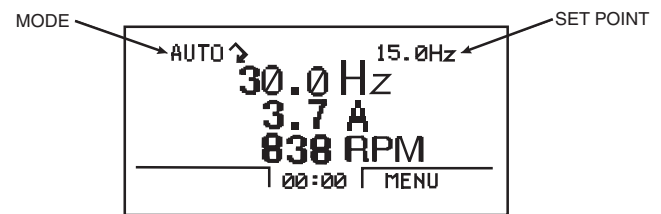


Fig. 71 — Standard Display Example

The top line of the LCD display shows the basic status information of the drive. The HAND icon indicates that the drive control is local from the control panel. The AUTO icon indicates that the drive control is in remote control mode through the I/O.

The arrow icon indicates the drive and motor rotation status. A rotating arrow (clockwise or counterclockwise) indicates that the drive is running. A rotating blinking arrow indicates that the drive is running but not at set point. A stationary arrow indicates that the drive is stopped. For Carrier air handler units, the rotation is always forward.

Using parameter group 34, the middle of the LCD display can be configured to display 3 parameter values. The default display shows parameters 0103 (OUTPUT FREQ) in Hz, 0104 (CURRENT) in amperes, and (AII) in revolutions per minute.

The upper right hand corner shows the frequency set point that the drive will maintain.

The bottom corners of the LCD display show the functions currently assigned to the two soft keys. The lower middle displays the current time (if configured to show the time).

The first time the drive is powered up, it is in the OFF mode. To switch to local hand-held control and control the drive using the control pane, press the HAND or AUTO buttons. Pressing the HAND button switches the drive to hand control while keeping the drive running. Pressing the AUTO button switches the drive to remote input control. The OFF button stops the drive. To return to auto control, press the AUTO button. To start the drive press the HAND or AUTO button, to stop the drive press the OFF button.

To adjust the speed set pint while in HAND mode, press the UP or DOWN buttons (the reference changes immediately). The reference can be modified in the local control (HAND) mode, and can be parameterized (using Group 11 reference select) to also allow modification in the remote control mode.

Parameters Mode — The Parameters mode is used to change the parameters on the drive. To change parameters, perform the following procedure:

1. Select MENU (SOFT KEY 2). The Main menu will be displayed.
2. Use the UP or DOWN keys to highlight PARAMETERS on the display screen and press ENTER (SOFT KEY 2).
3. Use the UP or DOWN keys to highlight the desired parameter group and press SEL (SOFT KEY 2).
4. Use the UP or DOWN keys to highlight the desired parameters and press EDIT (SOFT KEY 2).
5. Use the UP or DOWN keys to change the value of the parameters.
6. Press SAVE (SOFT KEY 2) to store the modified value. Press CANCEL (SOFT KEY 1) to keep the previous value. Any modifications that are not saved will not be changed.
7. Choose another parameter or press EXIT (SOFT KEY 1) to return to the listing of parameter groups. Continue until all the parameters have been configured and then press EXIT (SOFT KEY 1) to return to the main menu.

NOTE: The current parameter value appears above the high-light parameter. To view the default parameter value, press the UP and DOWN keys simultaneously. To restore the default factory settings if a drive fails, download the parameters to the VFD from the control panel. Parameters can also be changed individually.

Changed Parameters Mode — The Changed Parameters mode is used to view and edit recently changed parameters on the drive. To view the changed parameters, perform the following procedure:

1. Select MENU (SOFT KEY 2). The Main menu will be displayed.
2. Use the UP or DOWN keys to highlight CHANGED PAR on the display screen and press ENTER (SOFT KEY 2). A list of the recently changed parameters will be displayed.
3. Use the UP or DOWN keys to highlight the desired parameter group and press EDIT (SOFT KEY 2) to change the parameters if desired.
4. Press EXIT (SOFT KEY 1) to exit the Changed Parameters mode.

Drive Parameter Backup Mode — The drive parameter backup mode is used to store the drive parameters. The parameters can be uploaded from a VFD to the removable control panel. If a drive failure occurs, the control panel can then be transferred to the new drive and the parameters downloaded into memory.

Each drive is custom programmed at the factory. The first option is to download all parameters. This copies both application and motor parameters to the drive from the control panel. This is recommended to create a backup of the parameters group for the drive.

The second option downloads only the application parameters to the drive. Parameters 9905, 9906, 9907, 9908, 9909, 1605, 1607, 5201, and group 51 parameters and internal motor parameters are not copied.

Upload All Parameters — To upload and store all parameters to the control panel from the VFD, perform the following procedure:

1. Select MENU (SOFT KEY 2). The Main menu will be displayed.
2. Use the UP or DOWN keys to highlight PAR BACKUP on the display screen and press ENTER (SOFT KEY 2).

3. Use the UP or DOWN keys to highlight UPLOAD TO PANEL and press SEL (SOFT KEY 2).
4. The text “Copying Parameters” will be displayed with a progress indicator. To stop the process, select ABORT (SOFT KEY 1).
5. When the upload is complete, the text “Parameter upload successful” will be displayed.
6. The display will then return to the PAR BACKUP menu. Select EXIT (SOFT KEY 1) to return to the main menu.
7. The control panel can now be disconnected from the drive.

Download All Parameters — To download all parameters from the control panel to the VFD, perform the following procedure:

1. Install the control panel with the correct parameters onto the replacement VFD.
2. Select MENU (SOFT KEY 2). The Main menu will be displayed.
3. Use the UP or DOWN keys to highlight PAR BACKUP on the display screen and press ENTER (SOFT KEY 2).
4. Use the UP or DOWN keys to highlight DOWNLOAD TO DRIVE ALL and press SEL (SOFT KEY 2).
5. The text “Restoring Parameters” will be displayed with a progress indicator. To stop the process, select ABORT (SOFT KEY 1).
6. When the download is complete, the text “Parameter download successful” will be displayed.
7. The display will then return to the PAR BACKUP menu. Select EXIT (SOFT KEY 1) to return to the main menu.
8. The control panel can now be disconnected from the drive.

Clock Set Mode — The clock set mode is used for setting the date and time for the internal clock of the VFD. In order to use the timer functions of the VFD control, the internal clock must be set. The date is used to determine weekdays and is visible in the fault logs.

To set the clock, perform the following procedure:

1. Select MENU (SOFT KEY 2). The Main menu will be displayed.
2. Use the UP or DOWN keys to highlight CLOCK SET on the display screen and press ENTER (SOFT KEY 2). The clock set parameter list will be displayed.
3. Use the UP or DOWN keys to highlight CLOCK VISIBILITY and press SEL (SOFT KEY 2). This parameter is used to display or hide the clock on the screen. Use the UP or DOWN keys to change the parameter setting. Press OK (SOFT KEY 2) to save the configuration and return to the Clock Set menu.
4. Use the UP or DOWN keys to highlight SET TIME and press SEL (SOFT KEY 2). Use the UP or DOWN keys to change the hours and minutes. Press OK (SOFT KEY 2) to save the configuration and return to the Clock Set menu.
5. Use the UP or DOWN keys to highlight TIME FORMAT and press SEL (SOFT KEY 2). Use the UP and DOWN keys to change the parameter setting. Press OK (SOFT KEY 2) to save the configuration and return to the Clock Set menu.
6. Use the UP or DOWN keys to highlight SET DATE and press SEL (SOFT KEY 2). Use the UP or DOWN keys to change the day, month, and year. Press OK (SOFT KEY 2) to save the configuration and return to the Clock Set menu.

7. Use the UP or DOWN keys to highlight DATE FORMAT and press SEL (SOFT KEY 2). Use the UP or DOWN keys to change the parameter setting. Press OK (SOFT KEY 2) to save the configuration and return to the Clock Set menu.
8. Press EXIT (SOFT KEY 1) twice to return to the main menu.

I/O Settings Mode — The I/O Settings mode is used for viewing and editing the I/O settings.

To configure the I/O settings, perform the following procedure:

1. Select MENU (SOFT KEY 2). The Main menu will be displayed.
2. Use the UP or DOWN keys to highlight I/O SETTINGS on the display screen and press ENTER (SOFT KEY 2). The I/O Settings parameter list will be displayed.
3. Use the UP or DOWN keys to highlight the desired I/O setting and press SEL (SOFT KEY 2).
4. Use the UP or DOWN keys to select the parameter to view. Press OK (SOFT KEY 2).
5. Use the UP or DOWN keys to change the parameter setting. Press SAVE (SOFT KEY 2) to save the configuration. Press CANCEL (SOFT KEY 1) to keep the previous value. Any modifications that are not saved will not be changed.
6. Press EXIT (SOFT KEY 1) twice to return to the main menu.

Electric Heaters — Electric heaters are factory installed. If circumstances require field installation of an electric heater, it can only be installed in a factory-supplied EHS (Electric Heat section). Installation of electric heat in a section other than an EHS section will void the UL listing of the product.

1. Identify ALL electrical power supplies serving the unit, lock off and tag each before working on the unit.
2. Locate the electric heat section mounted on the unit and remove the protective shipping cover.
3. Identify the electric heater and verify the heater matches the unit. Unit hand and heater hand must also agree.
4. Properly sized power wiring and control wiring entry holes are provided in the upstream sidewall of the heater control box.

A narrow, fixed upstream panel is provided for electrical power entry from the outside. Power may also enter the unit from below, penetrating the floor of the unit. Carefully seal all entries, weathertight where necessary. Control wiring may enter the same way as electrical wiring.

Take future service requirements into account when locating field power entry holes in the unit casing.

5. Sleeve these holes and seal around the conduit to preserve the integrity of the casing. In some cases, it might be preferable for the power to actually enter the cabinet through an adjacent section, or enter the control box from another angle, which is acceptable.
6. If the original holes are not used, they must be appropriately plugged.
7. Insert the electric heater into the section (the heater element rack will be located along the leaving air side of the section).

NOTE: If the heater must be hoisted into position, once the top panel has been removed to a safe place, the horizontal top rail may be removed by carefully removing the flat corner plug from the end corner pieces and extracting the screw visible within the exposed cavity. (Do not mix these screws with

others, as they are specific for this location.) The corners may then be separated, lifting the rail and corner segments away from the unit at approximately a 45 degree angle, taking care not to damage the double bulb seal.

8. The heater has lifting hook openings on each end. When the heater is within 3 in. of its final position, reinstall the crossrail, with the box-seal facing down, and panel seal toward the top.
9. Secure the heater to the section posts and rails with the furnished screws, drawing it the last $\frac{3}{8}$ in. into final sealed position against the framework, by alternately cross tightening the screws. The opposite end of the heater rests on lateral spacers provided on the floor panel, and is retained by a screw through an angle clip on the last one or by an upright corner flange.
10. Replace the top panel, and proceed to complete the wiring in accord with all applicable codes and ordinances. The wiring diagram is fastened inside the control box, with a spare, loose copy provided as a convenience for maintenance manual preparation. Do not mix the wiring diagrams, as they are specific for each unit.
11. Connect power and control wiring according to the wiring diagram supplied (see Fig. 72 for typical wiring details).

CONNECT POWER AND CONTROL WIRES — Heater wiring schematic is located on control box panel. Verify minimum airflow requirement (minimum coil face velocity, fpm) will be met, especially on applications where variable air volume is supplied.

Use copper power supply wires rated for 75 C minimum. On 250 v or greater applications, use 600 v rated wiring. Size wires to carry 125% of current load on each set of terminals. Use the following formulas as required:

$$\text{Single-phase line current} = \frac{(\text{kW per set of terminals}) (1000)}{\text{voltage}}$$

$$\text{Three-phase line current} = \frac{(\text{kW per set of terminals}) (1000)}{(\text{voltage}) (1.73)}$$

Note that if the heater is rated at 50 kW (or more) and is controlled by a cycling device such as a multi-stage thermostat, or a step controller, conductors may be sized at 100% of load amperes (see Table 24) per NEC Section 424-22. Heater construction and application information are based upon Space Heating Standard UL No. 1096 and the requirements of the NEC. Installer is responsible for observing local code requirements.

Install a disconnect switch or main circuit breaker in accordance with NEC and other applicable codes. Locate so that it is easily accessible and within sight of heater control box (per NEC Article 424-19 and 424-65).

Weatherproof junction boxes have no knockouts for wire entrance. Provide knockouts for all wiring using field-supplied grommets of correct size and type of conduit as required.

Where field-supplied thermostats are used, isolate circuits to prevent possible interconnection of control circuit wiring.

Where field-supplied step controller is used, connect steps to terminals as marked on wiring schematic. When connecting multi-stage heaters, wire stage no. 1 so that it is first stage on, last stage off.

Provide sufficient clearance for convection cooling of heaters with solid-state controllers. Provide at least 5-in. of free air space above and below cooling fins extending from heater terminal box. Be sure to connect interlock terminals F1 and F2 to auxiliary contacts on fan starter.

Each heater has 2 different types of factory-installed thermal cutouts for over temperature protection; an automatic reset thermal cutout for primary protection and a manual reset thermal cutout to protect against failure of the primary system. Also provided is an airflow pressure differential switch to prevent the heater from operating when the fan is not in operation or airflow is restricted or insufficient. The primary automatic reset cutout is a bi-metal disk-type cutout. It is wired into the control circuit which operates the magnetic disconnecting contactors (the same contactors which also switch on and off the various steps of the coil). The secondary manual reset cutout is a bi-metal disk-type cutout. This secondary thermal cutout is load carrying and is installed in each heater subcircuit. The primary and secondary overtemperature protection systems are independent of each other. The secondary system is designed to protect against possible failure of the primary system to deenergize the heater.

Subcircuits in the heaters are designed in compliance with paragraph 424-22 of the NEC. The coil is subdivided into circuits that draw no more than 48 amps each and is fused for at least 125% of the circuit rating.

Pilot tube is to be positioned so that the airflow switch is actuated by a minimum negative pressure of 0.07 in. wg.

Refer to Table 25 for heater electrical data.

Table 24 — Field Wiring for Incoming Conductors Sized for 125% of Heater Load

WIRE SIZE (AWG or kcmil)	LOAD AMPS*	WIRE SIZE (AWG or kcmil)	LOAD AMPS*
	Copper		Copper
14	12	1/0	120
12	16	2/0	140
10	24	3/0	160
8	40	4/0	184
6	52	250	204
4	68	300	228
3	80	350	248
2	92	400	268
1	104	500	304

LEGEND

- AWG** — American Wire Gage
- kcmil** — Thousand Circular Mills
- NEC** — National Electrical Code

*Values are based on Table 310-16 of the NEC for 75 C insulated copper wire. Not more than 3 conductors in a raceway.

NOTES:

1. Be sure to consider length of wiring run and possible voltage drops when sizing wires.
2. Field power wiring — Heaters are furnished with a terminal block sized for incoming copper conductors with 75 C insulation rated to carry at least 125% of the heater load. However, conductors can be sized to carry 100% of the heater load if the heater is rated at 50 kW or more, and the heater is controlled by a cycling device such as a multi-stage thermostat, step controller, or SCR (silicon control rectifier) power controller. Terminal blocks and knockouts are sized to handle either 100% or 125% conductors.

Table 25 — Electric Heater Data

39M UNIT SIZE	HEATER AREA (sq ft)	NO. OF CONTROL STEPS*	HEATER COIL kW	NOMINAL COIL FACE VELOCITY (fpm)	TEMP RISE (°F)	208/3/60 VOLTS			240/3/60 VOLTS			480/3/60 VOLTS			600/3/60 VOLTS			380/3/50 VOLTS								
						Total FLA	MCA†	No. Sub Ckt	MOCPP	Total FLA	MCA†	No. Sub Ckt	MOCPP	Total FLA	MCA†	No. Sub Ckt	MOCPP	Total FLA	MCA†	No. Sub Ckt	MOCPP	Total FLA	MCA†	No. Sub Ckt	MOCPP	
03	3	3	5	500	11	14	17	1	20	12	15	1	20	6	8	1	20	5	6	1	20	8	10	1	20	
			10	500	21	28	35	1	35	24	30	1	35	12	15	1	20	10	12	1	20	15	19	1	20	
			15	500	32	42	52	1	60	36	45	1	50	18	23	1	25	14	18	1	25	23	29	1	30	
			20	500	43	56	69	2	70	48	60	2	70	24	30	1	35	19	24	1	40	24	30	38	1	40
			25	500	53	69	87	2	90	60	75	2	80	30	38	1	40	24	30	1	40	24	30	38	1	50
			30	500	64	83	104	2	110	72	90	2	100	36	45	1	50	29	36	1	40	24	30	38	1	60
06	5.2	3	35	500	75	97	122	3	125	84	105	2	110	42	53	1	60	34	42	1	45	53	67	2	70	
			10	500	12	28	35	1	35	24	30	1	35	12	15	1	20	10	12	1	20	15	19	1	20	
			15	500	18	42	52	1	60	36	45	1	50	18	23	1	25	14	18	1	20	23	29	1	30	
			20	500	25	56	69	2	70	48	60	2	70	24	30	1	35	19	24	1	25	30	38	1	40	
			30	500	37	83	104	2	110	72	90	2	100	36	45	1	50	29	36	1	40	24	30	38	1	60
			40	500	49	111	139	3	150	96	120	3	125	48	60	2	70	39	48	1	50	61	76	2	80	
08	7.4	3	50	500	61	139	174	3	175	120	151	3	175	60	75	2	80	48	58	2	70	76	95	2	100	
			60	500	74	167	208	4	225	145	181	4	200	72	90	2	100	58	72	2	80	91	114	2	125	
			20	500	17	56	69	2	70	48	60	2	70	24	30	1	35	19	24	1	25	30	38	1	40	
			30	500	26	83	104	2	110	72	90	2	100	36	45	1	50	29	36	1	40	24	30	38	1	60
			40	500	35	111	139	3	150	96	120	3	125	48	60	2	70	39	48	1	50	61	76	2	80	
			50	500	43	139	174	3	175	120	151	3	175	60	75	2	80	48	58	2	70	76	95	2	100	
10	9.9	3	60	500	52	167	208	4	225	145	181	4	200	72	90	2	100	58	72	2	80	91	114	2	125	
			70	500	60	195	243	5	250	169	211	4	225	84	105	2	110	67	84	2	90	106	133	3	150	
			80	500	69	222	278	5	300	193	241	5	250	96	120	3	125	77	96	2	100	122	152	3	175	
			20	500	13	56	69	2	70	48	60	2	70	24	30	1	35	19	24	1	25	30	38	1	40	
			30	500	19	83	104	2	110	72	90	2	100	36	45	1	50	29	36	1	40	24	30	38	1	60
			40	500	26	111	139	3	150	96	120	3	125	48	60	2	70	39	48	1	50	61	76	2	80	
12	12.4	6	50	500	32	139	174	3	175	120	151	3	175	60	75	2	80	48	58	2	70	76	95	2	100	
			60	500	39	167	208	4	225	145	181	4	200	72	90	2	100	58	72	2	80	91	114	2	125	
			75	500	48	208	261	5	300	181	226	4	250	90	113	2	125	72	90	2	100	114	143	3	150	
			90	500	58	250	313	6	350	217	271	5	300	108	135	3	150	87	108	2	110	137	171	3	175	
			100	500	65	278	347	6	350	241	301	6	350	120	151	3	175	96	120	3	125	152	190	4	200	
			20	500	10	56	69	2	70	48	60	2	70	24	30	1	35	19	24	1	25	30	38	1	40	
14	13.6	6	30	500	15	83	104	2	110	72	90	2	100	36	45	1	50	29	36	1	40	46	57	1	60	
			40	500	21	111	139	3	150	96	120	3	125	48	60	2	70	39	48	1	50	61	76	2	80	
			50	500	26	139	174	3	175	120	151	3	175	60	75	2	80	48	58	2	70	76	95	2	100	
			60	500	31	167	208	4	225	145	181	4	200	72	90	2	100	58	72	2	80	91	114	2	125	
			80	500	41	222	278	5	300	193	241	5	250	96	120	3	125	77	96	2	100	122	152	3	175	
			100	500	52	278	347	6	350	241	301	6	350	120	151	3	175	96	120	3	125	152	190	4	200	
14	13.6	6	115	500	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—		
			130	500	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—		
			30	500	14	83	104	2	110	72	90	2	100	36	45	1	50	29	36	1	40	46	57	1	60	
			45	500	21	125	156	3	175	108	135	3	150	54	68	2	70	43	54	1	60	68	86	2	90	
			60	500	28	167	208	4	225	145	181	4	200	72	90	2	100	58	72	2	80	91	114	2	125	
			80	500	38	222	278	5	300	193	241	5	250	96	120	3	125	77	96	2	100	122	152	3	175	
14	13.6	6	100	500	47	278	347	6	350	241	301	6	350	120	151	3	175	96	120	3	125	152	190	4	200	
			115	500	54	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—		
			130	500	61	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—		
			150	500	70	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—		
			200	500	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—		
			228	500	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—		

LEGEND

ARI — Air Conditioning and Refrigeration Institute FLA — Full Load Amps MCA — Minimum Circuit Amps
 AWG — American Wire Gauge kW — Kilowatts MOCPP — Maximum Overcurrent Protection
 *Standard control steps are listed under the Control Step heading. "Free" additional steps of control are optionally available when the number of subcircuits exceeds the standard number of control steps.
 †MCA = 1.25 x FLA; for proper wire sizing, refer to Table 310-16 of the NEC (National Electrical Code).

NOTES:
 1. Subcircuits are internal heater circuits of 48 amps or less.
 2. Electric heat performance is not within the scope of ARI standard 430 certification.
 3. To avoid damage due to overheating, minimum face velocity cannot fall below 350 fpm.
 4. Heaters up to (and including) 60 kW have 3 control steps; beyond 60 kW, 6 steps are standard.

Table 25 — Electric Heater Data (cont)

39M UNIT SIZE	HEATER AREA (sq ft)	NO. OF CONTROL STEPS*	HEATER COIL kW	NOMINAL COIL FACE VELOCITY (fpm)	TEMP RISE (F)	208/3/60 VOLTS			240/3/60 VOLTS			480/3/60 VOLTS			600/3/60 VOLTS			380/3/50 VOLTS								
						Total FLA	MCA†	No. Sub Ckt	Total FLA	MCA†	No. Sub Ckt	Total FLA	MCA†	No. Sub Ckt	Total FLA	MCA†	No. Sub Ckt	Total FLA	MCA†	No. Sub Ckt						
17	16.6	3	30	500	12	83	104	90	2	110	72	90	36	45	1	50	29	36	1	40	46	57	1	60		
			45	500	17	125	156	135	3	150	54	68	2	70	43	54	1	60	43	1	60	68	86	2	90	
			60	500	23	167	208	181	4	225	145	181	4	200	72	90	2	100	58	72	2	80	91	114	2	125
			75	500	29	208	261	226	4	300	181	226	4	250	90	113	2	125	72	90	2	100	114	143	3	150
			80	500	31	222	278	241	5	300	193	241	5	250	96	120	3	125	77	96	2	100	122	152	3	175
			100	500	38	278	347	301	6	350	241	301	6	350	120	151	3	175	96	120	3	125	152	190	4	200
			125	500	48	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
			150	500	58	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
			175	500	67	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
			40	500	12	111	139	139	3	150	96	120	3	125	48	60	2	70	39	48	1	50	61	76	2	80
50	500	15	139	174	174	3	175	120	151	3	175	60	75	2	80	48	60	2	70	76	95	2	100			
60	500	18	167	208	208	4	225	145	181	4	200	72	90	2	100	58	72	2	80	91	114	2	125			
80	500	24	222	278	278	5	300	193	241	5	250	96	120	3	125	77	96	2	100	122	152	3	175			
100	500	30	278	347	347	6	350	241	301	6	350	120	151	3	175	96	120	3	125	152	190	4	200			
125	500	38	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—			
150	500	46	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—			
175	500	53	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—			
200	500	61	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—			
220	500	67	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—			
40	500	11	111	139	139	3	150	96	120	3	125	48	60	2	70	39	48	1	50	61	76	2	80			
50	500	14	139	174	174	3	175	120	151	3	175	60	75	2	80	48	60	2	70	76	95	2	100			
60	500	16	167	208	208	4	225	145	181	4	200	72	90	2	100	58	72	2	80	91	114	2	125			
80	500	22	222	278	278	5	300	193	241	5	250	96	120	3	125	77	96	2	100	122	152	3	175			
100	500	27	278	347	347	6	350	241	301	6	350	120	151	3	175	96	120	3	125	152	190	4	200			
125	500	34	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—			
150	500	41	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—			
175	500	48	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—			
200	500	55	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—			
225	500	62	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—			
250	500	69	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—			
40	500	9	111	139	139	3	150	96	120	3	125	48	60	2	70	39	48	1	50	61	76	2	80			
50	500	11	139	174	174	3	175	120	151	3	175	60	75	2	80	48	60	2	70	76	95	2	100			
60	500	13	167	208	208	4	225	145	181	4	200	72	90	2	100	58	72	2	80	91	114	2	125			
80	500	17	222	278	278	5	300	193	241	5	250	96	120	3	125	77	96	2	100	122	152	3	175			
100	500	22	278	347	347	6	350	241	301	6	350	120	151	3	175	96	120	3	125	152	190	4	200			
125	500	27	347	434	434	8	450	301	376	7	400	151	188	4	200	120	151	3	175	190	238	4	250			
150	500	33	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—			
175	500	38	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—			
200	500	44	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—			
225	500	49	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—			
250	500	54	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—			
275	500	60	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—			

LEGEND

ARI — Air Conditioning and Refrigeration Institute
 AWG — American Wire Gauge
 FLA — Full Load Amps
 kW — Kilowatts
 MCA — Minimum Circuit Amps
 MOCIP — Maximum Overcurrent Protection

*Standard control steps are listed under the Control Step heading. "Free" additional steps of control are optionally available when the number of subcircuits exceeds the standard number of control steps.
 †MCA = 1.25 x FLA; for proper wire sizing, refer to Table 310-16 of the NEC (National Electrical Code).

NOTES:

- Subcircuits are internal heater circuits of 48 amps or less.
- Electric heat performance is not within the scope of ARI standard 430 certification.
- To avoid damage due to overheating, minimum face velocity cannot fall below 350 fpm.
- Heaters up to (and including) 60 kW have 3 control steps; beyond 60 kW, 6 steps are standard.

Table 25 — Electric Heater Data (cont)

39M UNIT SIZE	HEATER AREA (sq ft)	NO. OF CONTROL STEPS*	HEATER COIL KW	NOMINAL COIL FACE VELOCITY (fpm)	TEMP RISE (°F)	208/3/60 VOLTS			240/3/60 VOLTS			480/3/60 VOLTS			600/3/60 VOLTS			380/3/50 VOLTS									
						Total FLA	MCA†	No. Sub Ckt	MOCp	Total FLA	MCA†	No. Sub Ckt	MOCp	Total FLA	MCA†	No. Sub Ckt	MOCp	Total FLA	MCA†	No. Sub Ckt	MOCp	Total FLA	MCA†	No. Sub Ckt	MOCp		
36	38	6	60	500	10	167	208	4	225	145	181	4	200	72	90	2	100	58	72	2	80	91	114	2	125		
			80	500	13	222	278	5	300	193	241	5	250	96	120	120	3	125	77	96	2	100	122	152	3	175	
			100	500	17	278	347	6	350	241	301	6	350	120	151	151	3	175	96	120	3	125	152	190	4	200	
			125	500	21	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
			150	500	25	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
			175	500	29	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
			200	500	34	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
			225	500	38	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
			250	500	42	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
			300	500	50	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
40	41.9	6	350	500	59	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—		
			60	500	9	167	208	4	225	145	181	4	200	72	90	2	100	58	72	2	80	91	114	2	125		
			80	500	12	222	278	5	300	193	241	5	250	96	120	120	3	125	77	96	2	100	122	152	3	175	
			100	500	15	278	347	6	350	241	301	6	350	120	151	151	3	175	96	120	3	125	152	190	4	200	
			125	500	19	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
			150	500	23	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
			175	500	27	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
			200	500	30	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
			250	500	38	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
			300	500	46	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
50	52.6	6	350	500	53	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—		
			400	500	61	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—		
			60	500	7	167	208	4	225	145	181	4	200	72	90	2	100	58	72	2	80	91	114	2	125		
			80	500	10	222	278	5	300	193	241	5	250	96	120	120	3	125	77	96	2	100	122	152	3	175	
			100	500	12	278	347	6	350	241	301	6	350	120	151	151	3	175	96	120	3	125	152	190	4	200	
			125	500	15	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
			150	500	18	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
			175	500	21	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
			200	500	24	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
			250	500	30	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
61	63.1	6	300	500	36	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—		
			350	500	42	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—		
			400	500	49	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
			450	500	55	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
			500	500	61	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
			60	500	6	167	208	4	225	145	181	4	200	72	90	2	100	58	72	2	80	91	114	2	125		
			80	500	8	222	278	5	300	193	241	5	250	96	120	120	3	125	77	96	2	100	122	152	3	175	
			100	500	10	278	347	6	350	241	301	6	350	120	151	151	3	175	96	120	3	125	152	190	4	200	
			125	500	13	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
			150	500	15	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
175	500	18	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—			
200	500	20	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—			
250	500	25	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—			
300	500	30	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—			
350	500	35	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—			
400	500	40	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—			
450	500	46	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—			
500	500	51	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—			

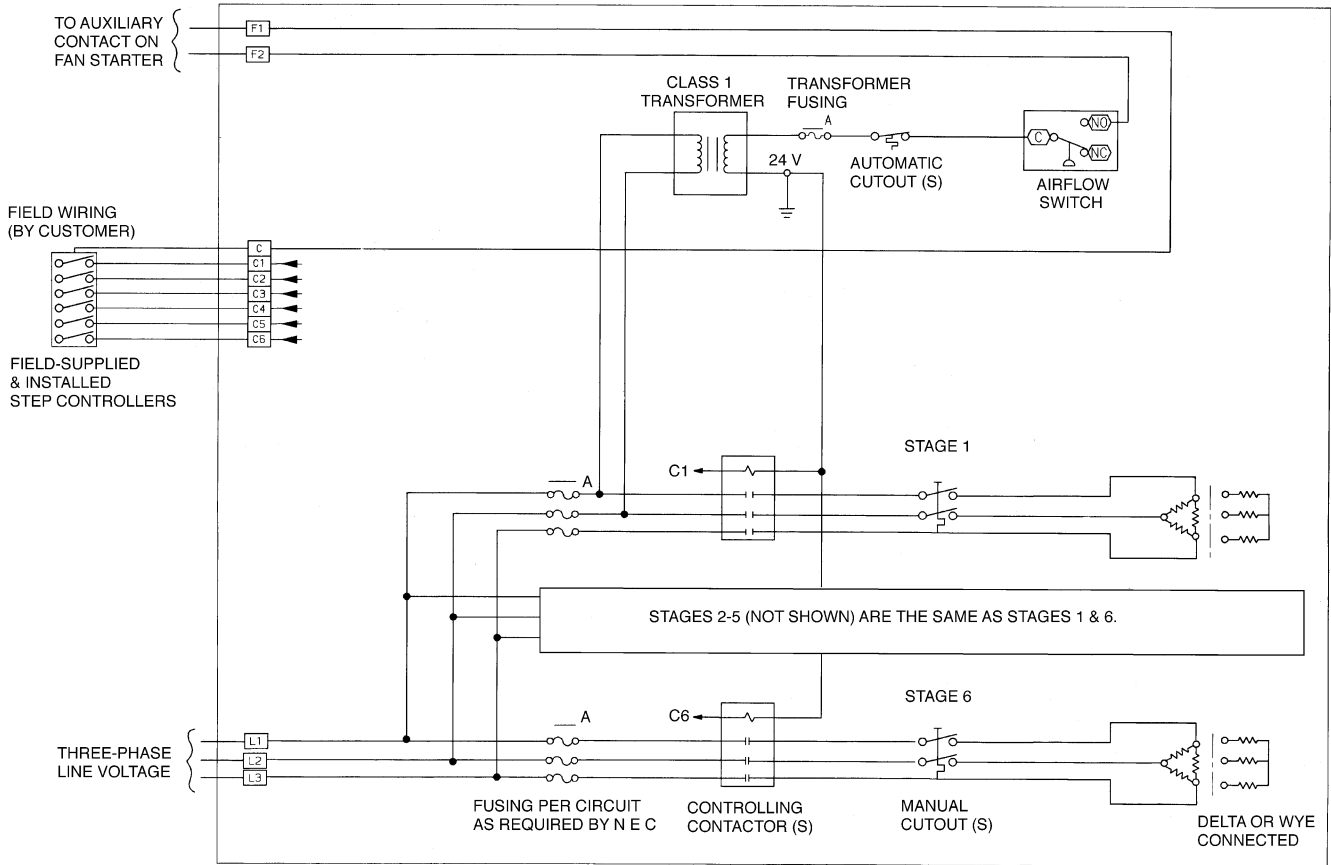
LEGEND

ARI — Air Conditioning and Refrigeration Institute
 AWG — American Wire Gauge
 FLA — Full Load Amps
 KW — Kilowatts
 MCA — Minimum Circuit Amps
 MOCp — Maximum Overcurrent Protection

*Standard control steps are listed under the Control Step heading. "Free" additional steps of control are optionally available when the number of subcircuits exceeds the standard number of control steps.

†MCA = 1.25 x FLA; for proper wire sizing, refer to Table 310-16 of the NEC (National Electrical Code).

NOTES:
 1. Subcircuits are internal heater circuits of 48 amps or less.
 2. Electric heat performance is not within the scope of ARI standard 430 certification.
 3. To avoid damage due to overheating, minimum face velocity cannot fall below 350 fpm.
 4. Heaters up to (and including) 60 kW have 3 control steps; beyond 60 kW, 6 steps are standard.



NOTE: All wiring must be copper and must conform to the NEC (National Electrical Code).

Fig. 72 — Electrical Heater Wiring Schematic (Typical)

Energy Recovery Ventilation (ERV) Sections

⚠ CAUTION

The assembled sections will result in a unit center of gravity (CG) higher than the horizontal centerline. Exercise proper care when rigging, lifting and transporting. Units with a high CG will tip over more easily during installation than those with a lower CG.

RECEIVING AND INSPECTION — Inspect the section for freight damage upon receipt. Inspect the cassette that is mounted inside the section. The cassette consists of a frame, wheel assembly and segments. Verify that the wheel turns freely by hand (clockwise when viewed from the pulley side). Report any damage immediately to the freight company.

RIGGING AND STACKING — The ERV section sizes 03-17 are shipped fully assembled. These units can be stacked and unstacked, as required, during installation by following the same procedure as for larger units described below.

NOTE: If an ERV section (size 08-17) does not fit through a doorway, it may be taken apart by removing the top of the section frame. This will expose the ERV wheel; take precautions not to damage the wheel while moving the section. Once the section is in place, put the top of the section frame back on.

The ERV section sizes 21-30 are shipped unstacked due to shipping height limitations. The lower sections are all assembled on baserails and all fastened together on a single skid. The upper sections are on a separate skid and fastened together (all fasteners are T-latches). Rigging and setting the lower sections is the same as for a standard 39M indoor base unit. Refer to Fig. 73.

⚠ CAUTION

The upper sections **MUST** be rigged and lifted one at a time or injury or unit damage may occur.

Rigging and lifting upper sections:

1. Use the 4 lifting/holddown brackets (Fig. 74) holding the row of sections to the skid, and/or a second set of brackets shipped loose with the unit. For 12-in. airway length sections, use the bracket shown in Fig. 75.
2. Separate each section one at a time (T-latches) and install brackets at each corner using the screws provided. Be careful not to strip out the holes in the section frame. Lift and set the section on top of the lower sections.

For sizes 21-30, upper sections should be stacked onto the lower sections starting with the upper wheel section, and then moving outward to each end of the unit.

3. Once the upper wheel section is in place and fastened down to the lower section, subsequent sections should be placed close to the side of the upper wheel section. Lifting brackets may make it difficult to butt sections tight together at this point.

With rigging still in place, but strap/chain tension relieved, remove the 2 lifting brackets interfering with the installed section, then place tension back onto the rigging to assist in sliding sections together. Fasten upper sections together tightly first, then tighten screws downward into the lower section frame.

Repeat this process for the remaining ERV sections.

RIGGING INFORMATION

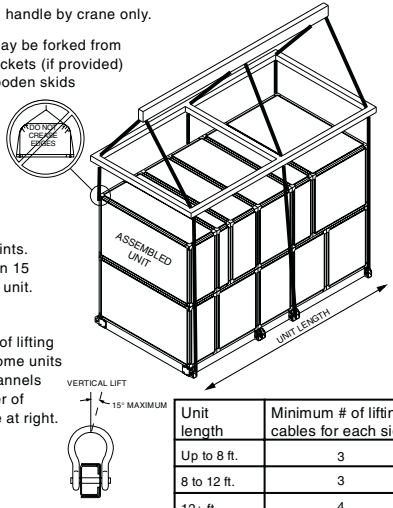
CAUTION: Stacked units have a high CG (center of gravity). Rig and lift carefully to prevent unit from tipping over.
For units 8 feet or longer, handle by crane only.

Units under 8 feet long may be forked from sides and ends in fork pockets (if provided) in base rails, or under wooden skids when available.

All panels must be in place before rigging unit.

Use spreader bars to prevent damaging top panels and to insure a vertical lift at all lifting points. Lifting angles greater than 15° from vertical will damage unit. See view at right.

Rig unit with the number of lifting cables shown in table. Some units may have more lifting channels than the minimum number of cables shown in the table at right.



Unit length	Minimum # of lifting cables for each side
Up to 8 ft.	3
8 to 12 ft.	3
12+ ft.	4

S1MMS2000033

Fig. 73 — Rigging Information

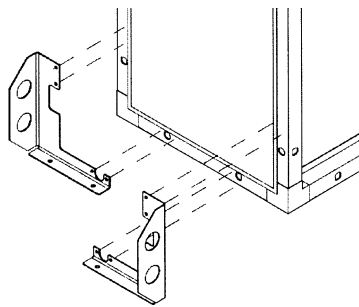


Fig. 74 — Lifting/Holddown Brackets

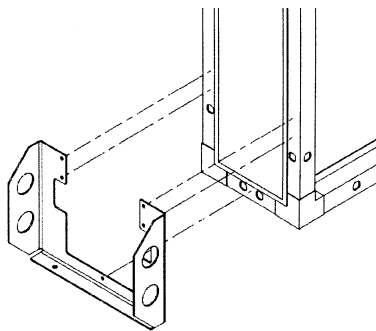


Fig. 75 — 12-in. Airway Bracket

ERV WHEEL MOTOR WIRING — All ERV wheel motors have stripped back power leads. For units with 3-phase wheel motors, install and route the proper wire type and size directly to the motor junction box provided.

For units with single-phase wheel motors connections must be made in a separate, field-installed junction box. This junction box must be installed in the ERV section close to the motor.

Refer to Table 26 for motor electrical data.

Table 26 — Electrical Requirements for Energy Wheel Motor

MOTR VOLTS-PHASE-Hz	39M UNIT SIZES	MOTOR HP	MOTOR AMPS (a)
115-1-50/60	03, 06	80 w	0.7
	08, 10	1/6	1.03-1.04/0.52
200-230/460-3-60	12, 14, 17, 21	1/6	0.80-0.75/0.38
	25, 30	1/4	2.3-2.5/1.2
200/400-3-50	08, 10	1/6	1.04/0.52
	12, 14, 17, 21	1/6	0.80/0.40
	25, 30	1/3	3.4/1.8
575-3-60	08, 10, 12, 14, 17, 21	1/6	0.3
	25, 30	1/3	1.4

START-UP

Checklist — Remove all construction debris from unit interior. Verify that all drains are free of debris. Prime all condensate traps.

FILTERS — Install unit filters in all filter sections.

AIRFOIL AND FORWARD-CURVED FANS

1. Release the holddown that fastens the fan sled to the section base on isolated units.
2. Check lubrication of fan, motor bearings, and linkages.
 - a. Note that bearings are shipped completely full of grease for corrosion protection and may run warm temporarily on start-up until excess grease has discharged.
 - b. Hand operate all linkages, such as damper and guide vanes, to check for freedom of movement.
3. Check tightness of bearing setscrews or locking collars (Fig. 76). Also, check tightness of setscrews on fan wheels and sheaves.
4. Check tightness of fan-shaft bearing mounting. See Fig. 76.
5. Recheck sheave alignment and belt tension. (Refer to Fig. 32 and 33.)
6. Hand turn fan to make certain fan wheel does not rub in housing.
7. Check fan speed with a strobe-type tachometer or use the following formula:

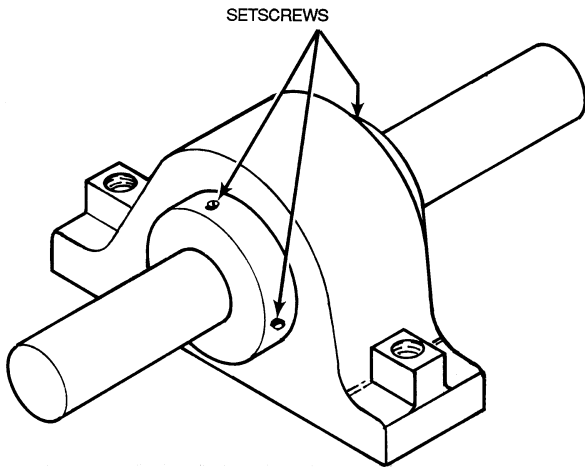
Obtain the motor rpm from the fan motor nameplate and read sheave pitch diameters marked on the fan and motor pulleys, or approximate the pitch diameters by using the pulley ODs.

Then:

$$\text{Fan RPM} = \frac{\text{Motor Rpm} \times \text{Motor Sheave Pitch Diameter (in.)}}{\text{Fan Sheave Pitch Diameter (in.)}}$$

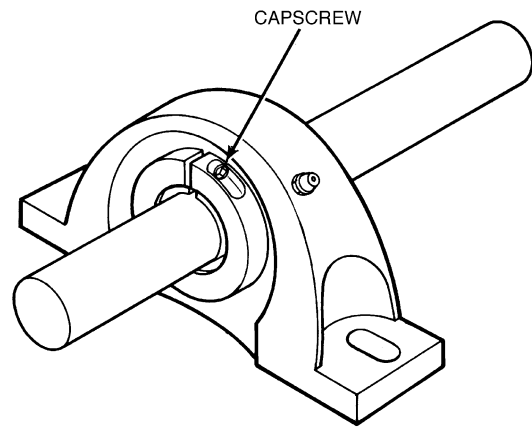
Example:	Actual	Approximate
Nameplate Motor RPM =	1760	1760
Motor Sheave Pitch Diameter =	8.9	9.0 (OD)
Fan Sheave Pitch Diameter =	12.4	12.5 (OD)
Fan RPM =	1760 x 8.9 = 1263 RPM	1760 x 9.0 = 1267 RPM

Refer to Tables 2A-2D for maximum allowable fan speeds for fan wheels. Excessive fan speed may result in condensate carryover from cooling coil or fan motor overload and wheel failure.



ROLLER — EXTENDED RACE, ONE OR BOTH SIDES

DRIVE PULLEY	
NOMINAL SCREW SIZE	TORQUE (in.-lb)
No. 6	9
No. 8	16
No. 10	30
1/4	70
5/16	140
3/8	216



SQUEEZE-TYPE LOCKING COLLAR

TORQUE TABLE

CAPSCREW AND SETSCREW SIZE (No./in.)	HEX HEAD ACROSS FLATS (in.)	SQUARE HD ACROSS FLATS (in.)	TORQUE
10	3/32	—	25 in.-lb
1/4	1/8	—	60 in.-lb
5/16	5/32	—	10 ft-lb
3/8	3/16	—	17 ft-lb
7/16	7/32	—	25 ft-lb
1/2	1/4	1/2	40 ft-lb
5/8	5/16	—	90 ft-lb
3/4	3/8	—	125 ft-lb

BEARING HOLDDOWN BOLT TORQUE

BOLT SIZE (in.)	TORQUE (ft-lb)
3/8 - 16	30
1/2 - 13	63
5/8 - 11	100
3/4 - 10	165

Fig. 76 — Fan, Shaft and Bearing Details

8. Check direction of rotation (see Fig. 65). Arrow on drive side of fan housing indicates correct direction of rotation.

CAUTION

Drive ratios of 1:1 may cause excessive vibration. Avoid if possible.

9. Check vibration. If excessive vibration occurs, check for the following:
 - a. Variable sheave (if air balance of system has been accomplished; replace sheave with fixed sheave for continuous application).
 - b. Drive misalignment.
 - c. Mismatched, worn, or loose belts.
 - d. Wheel or sheaves loose on shaft.
 - e. Loose bearings.
 - f. Loose mounting bolts.
 - g. Motor out of balance.
 - h. Sheaves eccentric or out of balance.
 - i. Vibration isolators improperly adjusted.
 - j. Out-of-balance or corroded wheel (rebalance or replace if necessary).
 - k. Accumulation of material on wheel (remove excess material).

PLENUM FANS — Start-up procedures for plenum fans are similar to those for airfoil or forward-curved fans described in the preceding section. Also refer to the fan manufacturer's

Installation, Operation, and Maintenance instructions shipped with the plenum fan section for further details.

COILS

Chilled Water Coil — Typical coil vents, drains, and lifting points are shown in Fig. 50. Open the vent plug, partially turn on the water supply until air is exhausted, and replace the vent plug. Fully turn on the water supply.

Direct Expansion Coil — Charge with refrigerant. Refer to Condensing Unit instructions. Refrigerant operating charge is shown in Table 9, page 24.

Steam Coil

1. Generate steam in the steam main and open the supply (gate) valve to the coil.
2. Thoroughly preheat the coil with steam before starting fans, especially when inlet air temperature is below freezing. If water hammer occurs, turn off fans until condensate trapped in coils is reduced by heat and steam pressure.
3. Ensure continuous-vent petcock is open; also check operation of gate valves, control valve, and check valves.
4. After operating coil for 50 hours, check strainer and remove any foreign matter. Check traps and drip lines for correct condensate removal. Where necessary, increase the pitch of lines to increase condensate drainage. (Re-check operation after 50 hours and repeat if necessary.)

ELECTRIC HEATERS

1. Check tightness of all electrical connections.
2. Remove heater circuit fuses.
3. Turn on power to activate transformer.
4. Start up base unit fans. Check airflow and switches. Refer to base unit instructions as required.
5. Set thermostats so that heater contactors will operate.
6. Shut off unit power.
7. Reinstall fuses.
8. Turn on unit power and heater power.

Energy Recovery Wheel

⚠ CAUTION

Keep hands away from rotating wheel. Contact with rotating wheel can cause physical injury.

1. By hand, turn the wheel clockwise (as viewed from the pulley side), to verify that the wheel turns freely through a full 360-degree rotation.
2. Before applying power to the drive motor, confirm that the wheel segments are fully engaged in the wheel frame and that the segment retainers are completely fastened. (See Fig. 77).
3. With hands and objects away from moving parts, activate the unit and confirm wheel rotation. The wheel rotates clockwise (as viewed from the pulley side).
4. If the wheel has difficulty starting, turn the power off and inspect for excessive interference between the wheel surface and each of the four (4) diameter seals. To correct, loosen the diameter seal adjusting screws and back adjustable diameter seals away from the surface of the wheel, apply power to confirm that the wheel is free to rotate, then re-adjust and tighten the hub and diameter seals according to the instructions in the Service section.
5. Start and stop the wheel several times to confirm seal adjustment and to confirm that the belt is tracking properly on the wheel rim (approximately 1/4-in. from outer edge of rim).

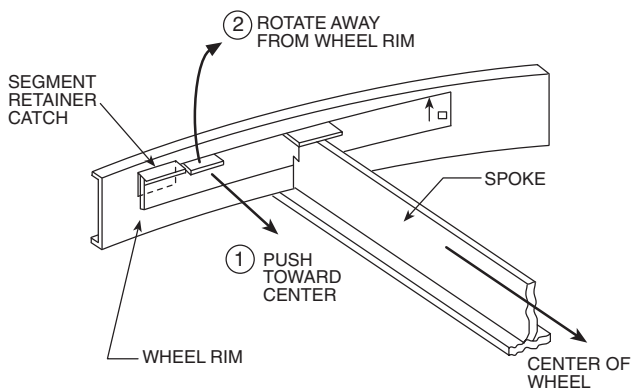


Fig. 77 — Segment Retainer

SERVICE

⚠ CAUTION

Electric shock hazard. Disconnect power before entering or servicing.

More than one disconnect switch may be required to deenergize the equipment.

General

1. Review Safety Considerations at beginning of these instructions. Good safety habits are important tools when performing service procedures.
2. To make speed measurements, use a strobe-style tachometer or calculate per Step 7 of Start-Up, Checklist.

Electric Heaters — At least once a year at start of operating season or whenever unit is serviced, check field and factory-made electrical connections for tightness. Also periodically clean filters, fan, airways, ductwork, grilles, and registers as required. Differential air pressure switch is factory set to open at 0.07 in. wg, close at 0.05 in. wg and requires no adjustment.

Refer to the Troubleshooting section for more information. Heater electrical data is shown in Table 25.

Fan Motor Replacement

1. Shut off motor power.
2. Disconnect and tag power wires at motor terminals.
3. Loosen motor brace-to-mounting-rail attaching bolts. Loosen belt tensioning bolts to adjust the motor position so V-belts can be removed without stretching over grooves.
4. Mark belt as to position. Remove and set aside belts.
5. Remove motor to motor bracket holddown bolts.
6. Remove motor pulley and set aside.
7. Remove motor.

NOTE: It may be necessary to remove the end panel to remove larger motors for some unit sizes.

8. Install new motor. Reassemble by reversing Steps 3-7. Be sure to reinstall multiple belts in their original positions. Use a complete new set if required. Do not stretch belts over sheaves. Review the sections on motor and sheave installation, sheave alignment, and belt tensioning on pages 48 and 49.
9. Reconnect motor leads, remove tags, and restore power. Check fan for proper rotation as described in Start-Up, Checklist.

Energy Recovery Ventilation — Routine maintenance of the Energy Recovery Cassettes includes inspection and cleaning. On occasion, a part may need to be completely replaced.

IMPORTANT: This unit contains an Energy Recovery Wheel heat transfer device. Proper service and maintenance must be conducted as outlined below, or loss of heat transfer and overall system performance will occur.

1. Remove and clean or replace filters in adjoining section to the ERV wheel every 6 months or sooner, as required.
2. Remove and wash ERV wheel (or individual segments, if so equipped) every 6 months, or every 3 months max. for smoky or polluted environments. See instructions for removal and cleaning details.

CLEANING — Periodic cleaning of the energy recovery wheel will depend on operating schedule, climate and contaminants in the indoor air exhausted and the outdoor air supplied to the building.

The wheel is “self-cleaning” with respect to dry particles due to its laminar flow characteristics. Smaller particles pass through; larger particles land on the surface and are blown clear as the flow direction is reversed. Any material that builds up on the face of the wheel can be removed with a brush or vacuum. All sizes can be vacuumed.

Cleaning the removable segments (size 08-30) or the entire wheel (size 03-06) will remove oil-based aerosols that have condensed on energy transfer surfaces.

To clean removable segments (size 08-30):

1. Access the wheel from the exhaust fan side. This may be easiest from the adjoining section, depending on the type of section installed. If it is necessary to access from the side of the wheel section, remove side baffle as shown in Fig. 78. This requires removing the screws (1) and (2) shown.
2. Unlock two segment retainers, one on each side of the selected segment opening.
3. Use the tip of a flat screw driver to pop the segment out of the wheel. Repeat for each segment.
4. Brush foreign material from the face of the wheel. Wash the segments (or small wheels) in a 5% solution of non-acid based coil cleaner (such as Acti-Klean) or an alkaline detergent and warm water.
5. Soak the segments in the solution until grease and tar deposits are loosened. (NOTE: some staining of the desiccant may remain and is not harmful to performance.) For better cleaning action, rapidly run a finger across the segment's surface to separate polymer strips.
6. Rinse dirty solution from segments and remove excess water before reinstalling the segments in the wheel.
7. Replace the segments using the Segment Installation and Replacement procedure on page 78.

To clean wheels (size 03-06) use the procedure and refer to Fig. 79:

1. Remove the ERV section side access panel.
2. Remove wheel center partition holddown bracket (1).
3. Lift and Remove wheel center partition (2).
4. Remove the upper (3) and lower (4) wheel retainer angles, being careful wheel does not tip and fall out.
5. Slide wheel cassette out of frame (toward main AHU), and out the side of the unit (5).
6. Follow steps 2 through 4 of the cleaning procedure for removable segments.
7. Reinstall the wheel into the section by reversing Steps 1-5.

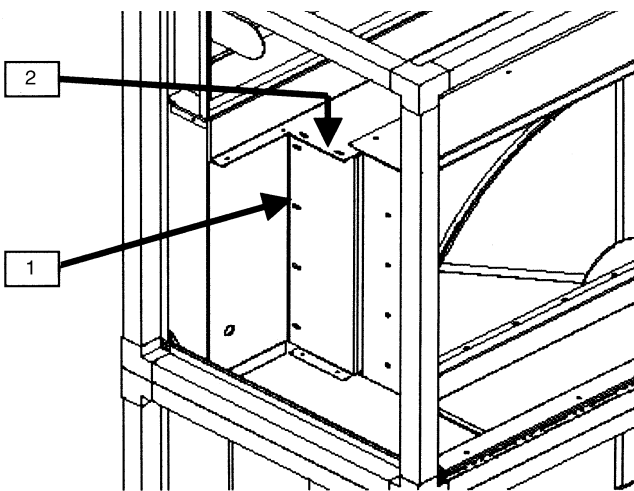


Fig. 78 — Remove Side Baffles

CASSETTE REPLACEMENT

1. Inspect the replacement cassette for freight damage upon receipt. Inspect the cassette frame, wheel assembly and segments for damage and verify that the wheel turns freely by hand (clockwise when viewed from pulley side). Report any damage immediately to the freight company.
2. Handle ERV cassettes with care. Lift by the bearing support beam. Holes are provided on both sides of the bearing support beams to facilitate rigging (Fig. 80).
3. Remove the ERV section side access panel.
4. Refer to Fig. 79. Remove wheel center partition hold-down bracket (1).
5. Lift and Remove wheel center partition (2).

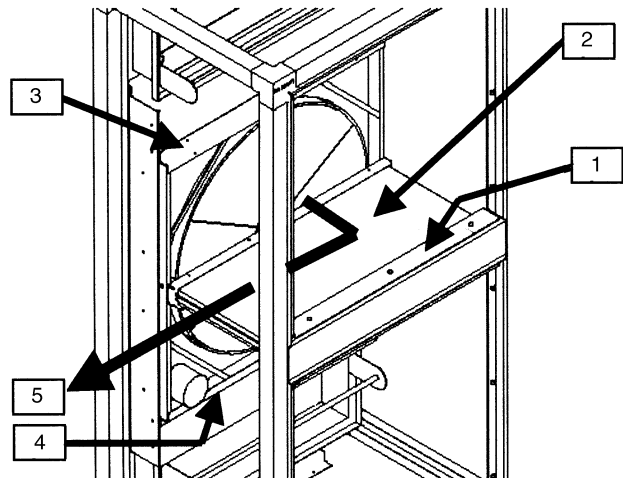


Fig. 79 — Remove Wheel for Cleaning (Sizes 03-06 Only)

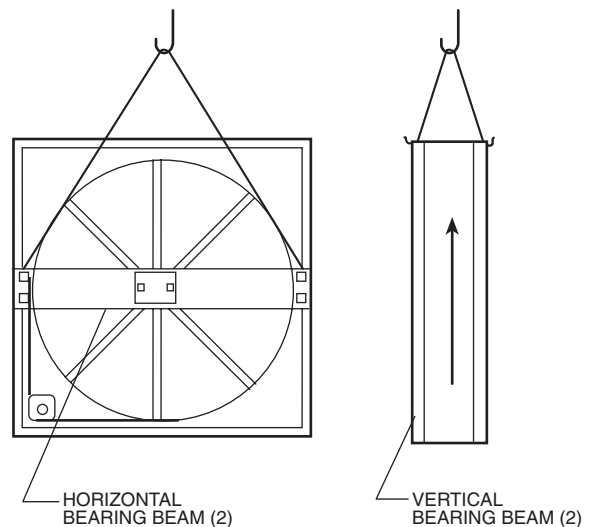


Fig. 80 — Lifting Hole Locations

6. Remove the upper (3) and lower (4) wheel retainer angles, being careful wheel does not tip and fall out.
7. Slide wheel cassette out of frame (toward main AHU), and out side of unit (5).
8. The new ERV section may be mounted in any orientation. However, *make certain that the frame remains flat and the bearing beams are not racked as shown in Fig. 81.*
9. To ensure that the beams are not racked, check that the distance between the wheel rim and bearing beam is the same at each end of the bearing beam, to within $\frac{1}{4}$ of an inch (dimension A and B in Fig. 81). Bearing beam racking of as little as .040 inches (Dim C in Fig. 81) will cause the wheel to tilt $\frac{3}{16}$ in. at the rim. Adjusting the diameter seals (Fig. 82) will compensate for up to $\frac{1}{4}$ in. of racking.

NOTE: If racking is greater than $\frac{1}{4}$ in., it must be corrected to ensure that the drive belt will not disengage from the wheel.
10. Wheel sections installed at angles greater than 30 degrees from vertical will require seal adjustment (Fig. 82). Adjust the diameter seals to avoid excessive wheel drag. A final check of seal adjustment is recommended for all designs.

ADJUSTING AIR SEALS — Four adjustable diameter seals are provided on each cassette to minimize air transfer between the counterflowing airstreams.

To adjust diameter seals:

1. Loosen the diameter seal adjusting screws and back seals away from wheel surface (Fig. 82).
2. Rotate the wheel clockwise until two opposing spokes are hidden behind the bearing support beam.
3. Using a folded piece of paper as a feeler gauge, position the paper between the wheel surface and the diameter seals.
4. Adjust the seals towards the wheel surface until a slight friction on the feeler gauge (paper) is detected when the gauge is moved along the length of the spoke.
5. Retighten the adjusting screws and recheck clearance with the feeler gauge.

SEGMENT INSTALLATION AND REPLACEMENT — Wheel segments are secured to the wheel frame by a segment retainer, which pivots on the wheel rim and is held in place by a segment retaining catch (Fig. 83).

To install wheel segments follow the steps below and refer to Fig. 83.

1. Unlock two segment retainers, one on each side of the selected segment opening.
2. With the embedded stiffener facing the motor side, insert the nose of the segment between the hub plates.
3. Holding segment by the two outer corners, press the segment towards the center of the wheel and inwards against the spoke flanges. If hand pressure does not fully seat the segment, insert the flat tip of a screw driver between the wheel rim and the outer corners of the segment and apply downward force while guiding the segment into place.
4. Close and latch each segment retainer under the segment retaining catch.
5. Slowly rotate the wheel 180 degrees. Install the second segment opposite the first for counterbalance. Rotate the two installed segments 90 degrees to balance the wheel while the third segment is installed. Rotate the wheel

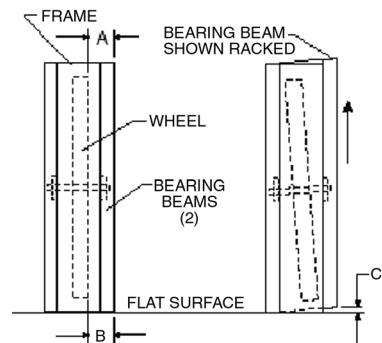


Fig. 81 — Avoid Racking of Frame

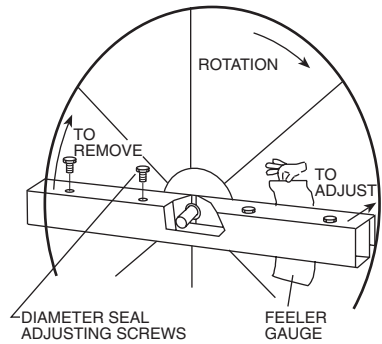


Fig. 82 — Diameter Seal Adjustment

180 degrees again to install the fourth segment opposite the third. Repeat this sequence with the remaining four segments.

WHEEL DRIVE MOTOR AND PULLEY REPLACEMENT

1. Disconnect power to the wheel drive motor.
2. Remove the belt from the pulley and position it temporarily around the wheel rim.
3. Loosen the set screw in the wheel drive pulley using an Allen wrench and remove the pulley from the motor drive shaft.
4. While supporting the drive motor's weight in one hand, loosen and remove the four mounting bolts.
5. Install the replacement motor using the hardware kit supplied.
6. Install the pulley to the dimension shown in Fig. 84 and secure the set screw to the drive shaft.
7. Stretch the belt over the pulley and engage it in the groove.
8. Follow the start-up procedure on page 79.

BELT REPLACEMENT (Fig. 85)

1. Obtain access to the pulley side bearing access plate. Bearing access plates are not provided on 25 to 36-in. cassettes. Remove the two bearing access plate retaining screws and the access plate.
2. Using a hex wrench, loosen the set screw in the bearing locking collar. Using a light hammer and drift (in drift pin hole), tap the collar in the direction of wheel rotation to unlock the collar. Remove the collar.

- Using a socket wrench with extension, remove the two nuts that secure the bearing housing to the bearing support beam. Slide the bearing from the shaft.

NOTE: Slight hand pressure against wheel rim will lift the wheel's weight from the inner race of the bearing to assist bearing removal and installation. If not removable by hand, use a bearing puller.

- Using a wrench, remove the diameter seal retaining screws (25 to 68-in. cassettes). Remove diameter seals (25 to 68-in. cassettes) from the bearing beam.

CAUTION

Protect hands and belt from possible sharp edges of hole in Bearing Support Beam.

- Form a small loop of belt and pass it through the hole in the bearing support beam. Grasp the belt at the wheel hub and pull the entire belt down. Loop the trailing end of the belt over the shaft (Fig. 85 shows the belt partially through the opening).
- Reinstall the bearing onto the wheel shaft, being careful to engage the two locating pins into the holes in the bearing support beam. Secure the bearing with the two self locking nuts.
- Install the belts around the wheel and pulley according to the instructions provided with the belt.
- Reinstall the diameter seals and tighten the retaining screws (see page 83 for seal adjustment). Rotate the wheel clockwise to determine that it rotates freely with slight drag on the seals.
- Reinstall the bearing locking collar. Rotate the collar by hand in the direction the wheel rotates (see label provided on each cassette for wheel rotation). Lock the collar in position by tapping the drift pin hole with a hammer and drift. Secure in position by tightening the set screw.
- Reinstall the bearing access cover.
- Apply power to the wheel motor and ensure that the wheel rotates freely without interference.

OTHER MAINTENANCE

Wheel Drive Motor Bearings are pre-lubricated and no further lubrication is necessary.

The Wheel Drive Pulley is secured to the drive motor shaft by a combination of either a key or D-slot and set screw. The set screw is secured with removable locktite to prevent loosening. Annually confirm that the set screw is secure.

The Wheel Drive Belt is a urethane stretch belt designed to provide constant tension through the life of the belt. No adjustment is required. Inspect the drive belt annually for proper tracking and tension. A properly tensioned belt will turn the wheel immediately after power is applied with no visible slippage during start-up.

Cleaning Unit Interior/Exterior — Unit interior/exterior panels should be wiped down using a damp soft cloth or sponge with a mixture of warm water and a mild detergent. Avoid using an abrasive cleaner, as damage to the paint could occur resulting in rust and corrosion. Chemicals such as paint thinners can damage the painted panels and should be avoided.

CAUTION

Avoid washing unit electrical devices such as motors, starters, electric heater control boxes, damper/valve actuators, sensors, switches, relays, etc. as serious personal injury or damage to the device could result.

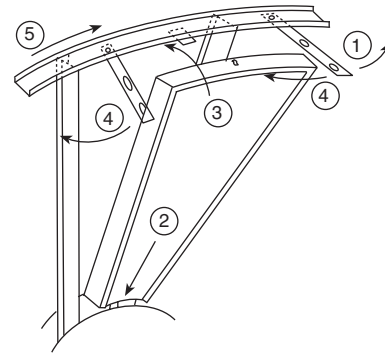


Fig. 83 — Segment Installation

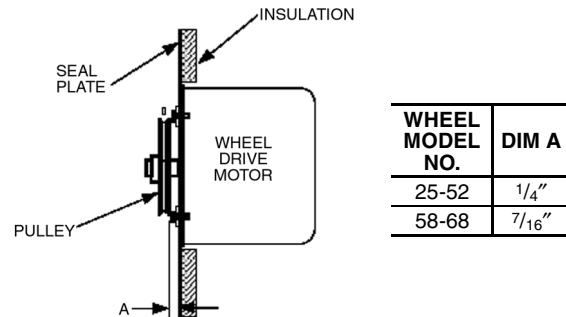


Fig. 84 — Pulley Location

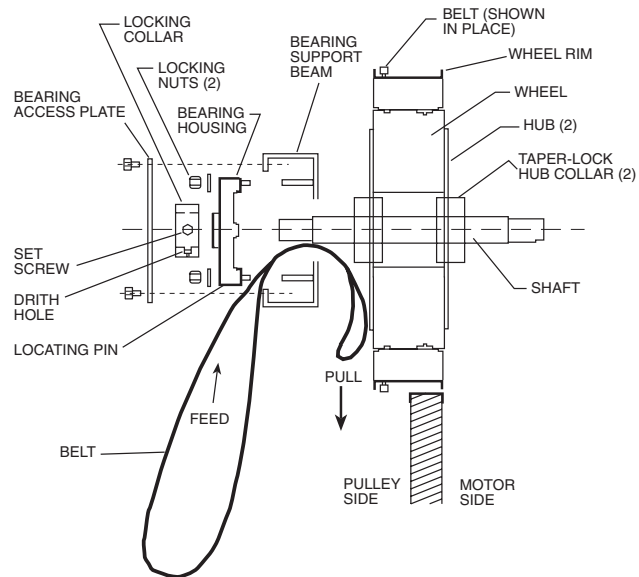


Fig. 85 — Belt Replacement

Coil Cleaning — Chilled water, hot water, steam, and direct expansion coils must be cleaned regularly to maintain peak performance. Dirty coils can contribute to loss of cooling or heating capacity and efficiency, increased operating costs, and compressor problems on direct expansion systems. Dirt, grease, and other oils can also reduce the wettability of the coil surfaces, which can result in moisture blow-off from cooling coils and resulting water leakage problems. If the grime on the surface of the coils becomes wet, which commonly occurs with cooling coils, microbial growth (mold) can result, causing foul odors and health related indoor air quality problems.

Coils can become dirty over a period of time, especially if air filter maintenance is neglected. Coils should be inspected regularly and cleaned when necessary. If coil fins become dirty, pressure clean with hot water and detergent or a commercial coil cleaner. Ensure to rinse coils thoroughly after cleaning with chemical cleaners.

▲ CAUTION

Follow all directions provided with the chemical cleaners to avoid personal injury, injury to others, and/or coil damage. Chemical coil cleaners may contain corrosive or harmful agents.

1. Disconnect all electrical power to the air-handling unit, including any separate power supplies for unit mounted controls (actuators, sensors, etc. ...).
2. Wear the appropriate protective clothing (eyewear, gloves, etc. ...).
3. Ensure there is sufficient access to the coil.
4. Use a vacuum with a soft tip brush to remove any dust and loose debris from both sides of the coil.
5. Clean the leaving airside of the coil first, then the entering airside, starting from the top of the coil and working downward. Apply a mild non-foaming commercial coil cleaner or detergent using a garden type sprayer. Rinse coil gently with clean warm water, avoiding high-pressure sprays, which can cause damage to coil fins. Use a block-off plate to prevent the water or chemical cleaner from blowing through the coil and into a clean, dry section of the unit. Confirm that the condensate drain line is free of debris during and following the coil cleaning process. Excess water from cleaning may result in flooding the unit as well as causing damage to the building if drain is plugged. If coil section does not have a drain pan, it is recommended that the coil be removed prior to cleaning.
6. Repeat steps 1 through 5 as necessary.
7. Allow the coil to dry thoroughly before placing the system back into operation. A clean dry cloth may be used to wipe down the interior panels before placing the unit in operation.
8. Straighten any coil fins that may have been bent or damaged during the cleaning process with a fin rake.
9. Replace all panels and parts that may have been removed prior to cleaning and restore electrical power to the unit.
10. Use caution to assure that no contaminated materials contact other areas of the unit or building. Properly dispose of any polluted materials and cleaning fluids.

Winter Shutdown — It is recommended that auxiliary drain piping be added to coil piping if yearly winterizing of coils is anticipated. This auxiliary piping should be located at the highest and lowest point on the respective header connection for each coil.

ANTIFREEZE METHODS OF COIL PROTECTION

1. Close coil water supply and return valves.
2. Drain coil as follows:
Method I — ‘Break’ flange of coupling at each header location. Separate flange or coupling connection to facilitate coil draining.
Method II — Open both valves to auxiliary drain piping.
3. After coil is drained, Method I, connect line with a service valve and union from upper nozzle to an antifreeze reservoir. Connect a self-priming reversible pump between the low header connection and the reservoir. Method II, make connection to auxiliary drain valves.
4. Fill reservoir with any inhibited antifreeze acceptable to code and underwriter authority.

5. Open service valve and circulate solution for 15 minutes; then check its strength.
6. If solution is too weak, add more antifreeze until desired strength is reached, then circulate solution through coil for 15 minutes or until concentration is satisfactory.
7. Remove upper line from reservoir to reversible pump. Drain coil to reservoir and then close service valve.
8. Break union and remove reservoir and its lines.
9. Leave coil flanges or coupling open and auxiliary drain valves open until spring.

AIR-DRYING METHOD OF COIL PROTECTION (Unit and coil must be level for this method.)

1. Close coil water supply and return main valves.
2. Drain coil as described in procedures for Antifreeze Methods of Coil Protection, preceding.
3. Connect air supply or air blower to inlet header connection and close its drain connection.
4. Circulate air and check for air-dryness by holding mirror in front of open vent in outlet header drain connection. Mirror will fog if water is still present.
5. Allow coil to stand for a few minutes; repeat Step 4 until coil is dry.

Coil Removal

NOTE: To reinstall coils, refer to Coil Installation section on page 53.

REMOVAL OF SINGLE HEIGHT COILS (sizes 03-36) — The coils in horizontal coil sections may be removed from the top of the unit or either end. Once the external panels are removed from the unit, the horizontal upper coil section frame members are easily removable from the framework, to allow hoisting the coil up and out of the unit.

NOTE: Refer to Table 11 (Dry Coil Weights) in the front of this manual before attempting to remove a coil from the unit.

1. Lock open and tag all power supplies to unit fan motor and electric heaters if present.
2. Identify the unit service panel latches and disengage them ($1/4$ turn) with a $5/16$ in. or 8-mm hex wrench. Remove service panel/coil connection panel and the upstream service panel and set aside in a safe place.
3. a. On horizontal coil sections without another unit section stacked on top, remove the flat corner plug from each end piece of the top rail.
b. Extract the Torx T25 screw visible within the exposed cavity. (Do not mix these screws with others; they are specific for this location. Set screws aside for reinstallation of top rail.)
c. Remove the top rail by pulling out at a 45 degree angle. Set top rail aside.

IMPORTANT: Properly support the coil to assure its stability before continuing with this procedure.

4. Remove the fastening screws from the upstream perimeter face of the coil that attach the coil to the coil baffles. This may require reaching through an opened damper assembly, reaching through a filter track after filters are removed, or removing a coil immediately upstream.

▲ CAUTION

Do not handle the coil by the headers or connection nipples, as irreparable damage might occur that is NOT covered by warranty. Protect the finned surface from damage during all handling and shipping.

5. Slip the foam sealing sleeves off the connection nipples before removing the coil and set the sleeves aside.
6. The coil may now be hoisted out through the top opening or carefully slid out either side of the cabinet. Sections where the top frame rail cannot be removed may require slightly tipping of the coil from the vertical position, to clear the upper frame rail and seal.

REMOVAL OF STACKED COILS (sizes 40, 50 and 61) — The coils in horizontal coil sections may be removed from the top of the unit or either end. Once the external panels are removed from the unit, the horizontal upper coil section frame members are easily removable from the framework, to allow hoisting the coil up and out of the unit.

1. Lock open, and tag all power supplies to unit fan motor and electric heaters if present.
2.
 - a. Identify the unit service panel latches and disengage them ($1/4$ turn) with a $5/16$ in. or 8-mm hex wrench.
 - b. Remove service panel/coil connection panel and the upstream service panel and set aside in a safe place.
 - c. Remove the top rail by pulling out at a 45 degree angle. Set top rail aside.
3.
 - a. On horizontal coil sections without another unit section stacked on top, remove the flat corner plug from each end piece of the top rail.
 - b. Extract the Torx T25 screw visible within the exposed cavity. (Do not mix these screws with others; they are specific for this location. Set screws aside for reinstallation of top rail.)
 - c. Remove the top rail by pulling out at a 45 degree angle. Set top rail aside.

IMPORTANT: Properly support the coil to assure its stability before continuing with this procedure.

4. Remove the fastening screws of the uppermost coil from the upstream side. Note that the fastening screws pass through the vertical angle, baffles, and coil casing. See Fig 86. Removal of the fastening screws may require reaching through an opened damper assembly, reaching through a filter track after filters are removed, or removing a coil immediately upstream.

⚠ CAUTION

Do not handle the coil by the headers or connection nipples, as irreparable damage might occur that is NOT covered by warranty. Protect the finned surface from damage during all handling and shipping.

5. Slip the foam sealing sleeves off the connection nipples before removing the coil and set the sleeves aside.
6. The upper coil may now be hoisted out through the top opening, or carefully slid out either side of the cabinet. Sections where the top frame rail cannot be removed may require slightly tipping of the coil from the vertical position, to clear the upper frame rail and seal.
7. On the upstream side of the stacked coils, remove and set aside the center baffle spanning the two coils (see Fig.86).
8. For sections that do not have a drain pan (heating only sections), remove the three hat channel spacer supports fastened to the top of the lower coil, and set aside.
9. For sections that do have a drain pan, remove the two hat channel spacer supports from the bottom of the coil section and set aside.
10. Remove the intermediate condensate drain pan.
11. Remove the spacer (hat channel) secured to the top center of the lower coil casing (see Fig. 87) and set aside.

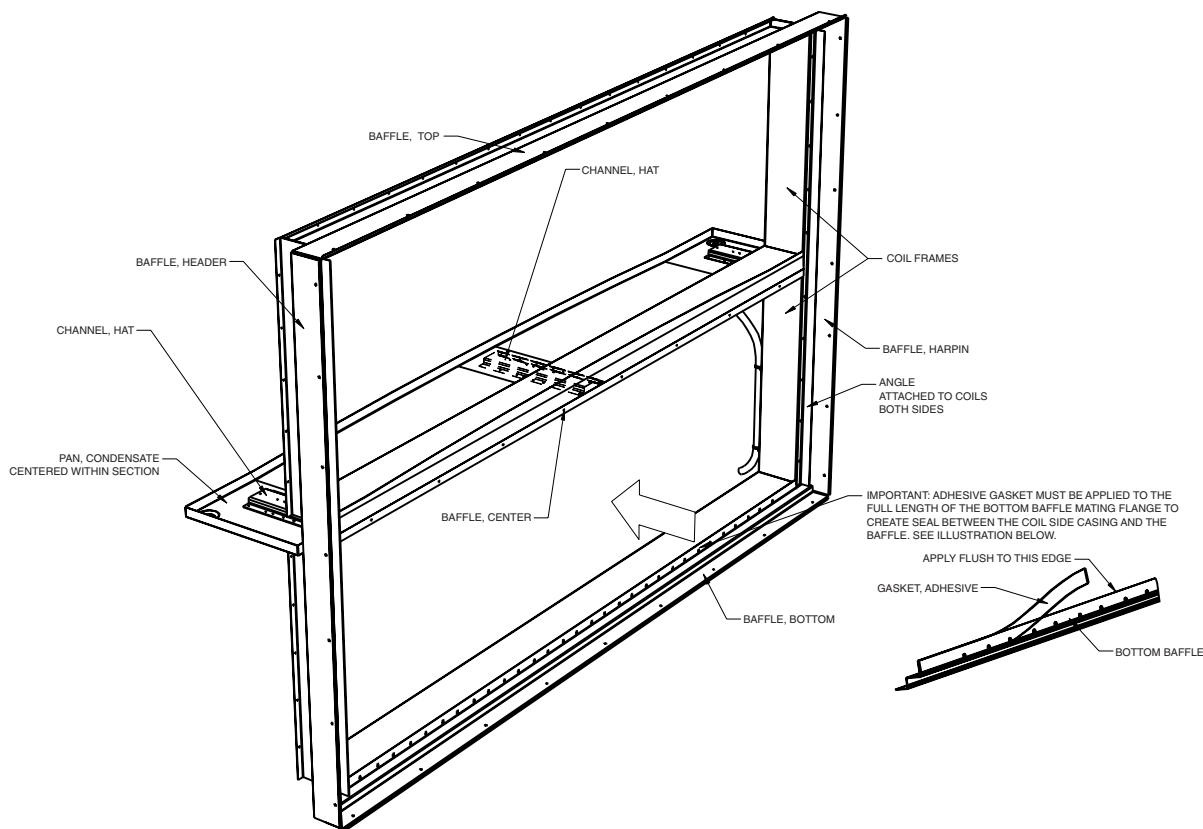


Fig. 86 — Apply Gasket

12. Remove the fastening screws of the lowermost coil from the upstream side. Note that the fastening screws pass through the vertical angle, baffles, and coil casing. See Fig. 86. Removal of the fastening screws may require reaching through an opened damper assembly, reaching through a filter track after filters are removed, or removing a coil immediately upstream.

▲ CAUTION

Do not handle the coil by the headers or connection nipples, as irreparable damage might occur that is NOT covered by warranty. Protect the finned surface from damage during all handling and shipping.

13. Slip the foam sealing sleeves off the connection nipples before removing the coil and set the sleeves aside.
14. The lower coil may now be hoisted out through the top opening, or carefully slid out either side of the cabinet.
15. Inspect the adhesive backed gasket applied to the lower baffle, spanning the entire unit, on the surface that contacts the coil (see Fig. 86). If damaged, remove the remainder of the old gasket and replace.

Changing Coil Hand

NOTE: Electric heat coil hand cannot be changed.

NOTE: The coil cover panel is not part of the coil. Remove cover panel from end of unit. New holes must be cut in coil cover panel. Original holes must be plugged and insulated. New side panels may be necessary when changing coil hand.

NU-FIN COILS — The NuFin coil is airflow direction sensitive, especially when used in dehumidifying applications. Hydronic versions are counterflow circuited for full gravity draining when installed level.

Correct installation will result in the typical bottom inlet on leaving air face and top outlet on entering air face of coil, a self-venting design. This will ensure cold air contact with cold water, and warm air with hot water.

Coil repositioning for opposite hand application will compromise one or more of these characteristics. However, there will be those situations where this may prove acceptable.

As a general rule, a change from counterflow circuiting to parallel flow for sensible heating and cooling applications will result in a 5% drop in net capacity per row of coil. In one and two row heating coils, the actual drop may not be measurable, thus of insignificant consequence.

It is important that the airflow direction of the NuFin coil be adhered to when latent cooling is possible. Significant moisture carryover from the face of the dehumidifying coil will result if this rule is violated, even at very low face velocities. The same result is often experienced if after-market fin coatings are applied.

If a NuFin hydronic coil is installed with correct airflow, but opposite piping hand, and counterflow is maintained, steps

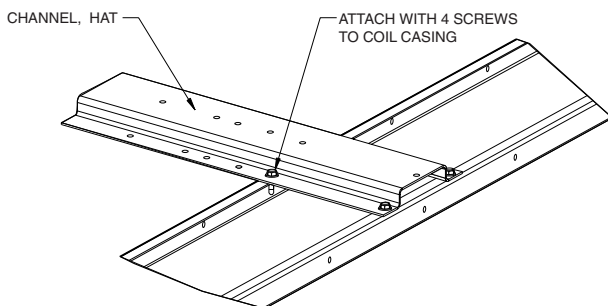


Fig. 87 — Secure Spacer

must be taken to ensure that the coil is continuously vented, and that the water velocity is maintained to prevent the coil from air-binding.

Hot or cold areas of the coil face (or otherwise broad temperature differences and stratification) are usually indications that one or more circuits are air-locked internally. This can result in coil freeze-up (a condition NOT covered by warranty).

Refrigerant coils may be rotated for opposite hand applications, maintaining the proper airflow direction.

Do not reposition the distributor(s), they will perform equally well in upflow or downflow positions. When soldering expansion valves to up-feed distributors, use the minimum satisfactory amount of solder to prevent damaging the valve or plugging passages.

DIRECT EXPANSION COILS — Rotate the coil in vertical plane and reinstall. Distributor must be on downstream side of coil. (Refer to Fig. 88).

CHILLED WATER AND HOT WATER COILS — These coils can be rotated. If coil is rotated in vertical plane and reinstalled with counterflow maintained, supply will be at the top of the coil and return will be at the bottom. Ensure coil is continuously vented and water velocity is maintained to prevent air binding.

▲ CAUTION

Chilled and hot water coils must not be rotated horizontally. If coils are rotated horizontally, severe water blow-off will result.

STEAM INNER DISTRIBUTING TUBE COILS — Rotate in horizontal plane and reinstall. See Fig. 88.

PIPING — Direct expansion, chilled water, and hot water coils should always be piped for counterflow. (Fluid should enter the coil at the leaving-air side.) Steam coils must have the condensate connection at bottom of coil.

To determine intervals for cleaning coils in contaminated air operations, pressure taps should be installed across the coils and checked periodically. Abnormal air pressure drop will indicate a need for cleaning the coils.

Annual maintenance should include:

1. Clean the line strainers.
2. Blow down the dirt leg.
3. Clean and check operation of steam traps.
4. Check operation of control valves.
5. Check the operation of check valves to prevent condensate flowback.
6. Check operation of thermostatic air vents, if used. A float and thermostatic trap will contain a thermostatic air vent. When the bellows is ruptured, it will fail closed.
7. Check operation of vacuum breakers.
8. Check operation of the thermal protection devices used for freeze-up protection.
9. Steam or condensate should not be allowed to remain in the coil during the off season. This will prevent the formation and build up of acids.

There are additional precautions and control strategies, as found in various catalogues and in the ASHRAE Fundamentals Handbook and in the Carrier System Design Guide — Piping Section, when the entering-air temperature to the coil falls below 35 F. These conditions occur when IDT coils are used for pre-heat and/or face and bypass applications.

Freeze up protection:

1. Use a strainer in the supply line and the dirt leg ahead of the trap.
2. Use a vacuum breaker in the return.

3. Do not use overhead returns from the coil. A floodback can occur.
4. An immersion thermostat to control outdoor-air dampers and the fan motor is recommended. This control is activated when the steam supply fails or the condensate temperature drops below a predetermined temperature, usually 120 F.
5. On low pressure and vacuum systems, the immersion thermostat may be replaced by a condensate drain with a thermal element. This element opens and drains the coil when the condensate temperature drops below 165 F. Note the thermal condensate drain is limited to 5 psig pressure. At greater coil pressures they will not open.

In spite of the precautions listed above, a coil may still freeze up. An oversize capacity coil, at partial load, with a modulating steam control valve will occasionally freeze. Freezing occurs in the 20 F to 35 F range of entering-air temperatures. A better installation would be an undersize coil, with an on/off control valve with thermostatic control in the outside air, set at 35 F air temperature, installed downstream of the first coil; or setting the minimum steam pressure at 5 psig.

Filters — See Table 27 for filter data for flat filter section, angle filter section, bag-cartridge filter section, and filter mixing box section. Filters are field supplied.

Air filters should be inspected regularly and changed when dirty. Filter life can vary greatly from one unit to another, depending upon the application and the amount of contaminants in the return and ventilation air entering the air handler. Each job should be evaluated and maintenance schedules established accordingly. At a minimum, the filters should be changed at the beginning of the cooling and heating seasons.

Although not a direct part of the air handler, outdoor air inlet screens and/or grilles that may be present should also be checked regularly and cleaned as necessary. They can easily become plugged with debris, grease, or other contaminants, depending upon their location. This reduces the availability of ventilation air, which can contribute to indoor air quality problems.

All filter sections use adjustable blank-off plates to close off any airway area not filled with filter media. Check blank-off plates to prevent unfiltered air from bypassing the filters. Blank-off plates must be on door side of unit.

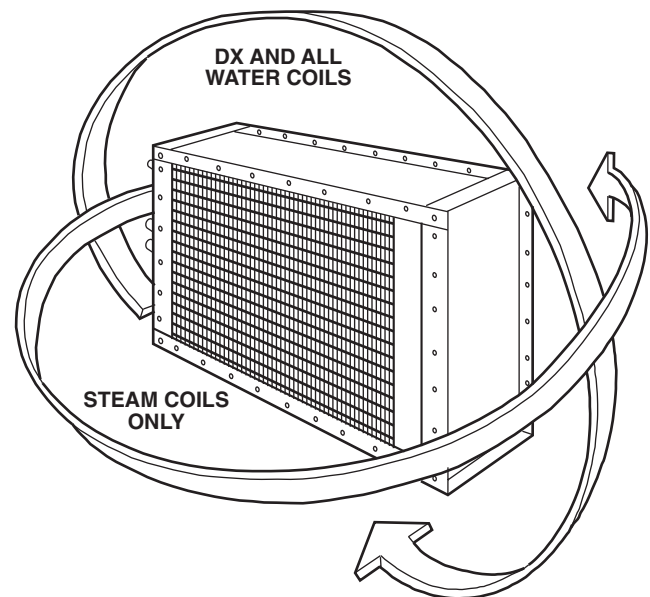


Fig. 88 — Coil Rotation

BAG-CARTRIDGE FILTERS — Side loading bag-cartridge filter section can use either bag or rigid filters, 6-in. to 30-in. deep, with 7/8-in. header. They will not accept headerless rigid filters.

Face loading bag-cartridge filter sections can use either bag or rigid filters and are loaded from the front of the section. These sections use Purolator holding frames located at the downstream edge of the filter section for prefilters and bag/cartridge filters. Cartridge filters without headers can extend upstream of the holding frame by 24 inches. Cartridge and bag filters with 7/8-in. header extend downstream of the filter section with filter length limited only by the length of the plenum following the filter section. Filter elements are retained in frames by wire fastener clips. To replace filter elements, remove clips, insert elements with bag or cartridge downstream and reinstall clips. See Fig. 89.

See Fig. 90 for typical track for bag-cartridge filter section used on draw-thru unit.

IN-TRACK BAFFLES — Filter sections are shipped with adjustable in-track baffles. When installed properly as shown in Fig. 91, the baffles close off empty space in the track preventing air from bypassing the filters. Remove the baffles to install filter elements, and replace the adjustable baffles after the filters are in place. The adjustable baffles should be spread far enough apart to ensure slight compression in the foam gasket when closing the section door.

FLAT AND ANGLE FILTERS — Flat filter and angle filter sections accommodate 2-in. or 4-in. thick filters. The section as shipped accepts 2-in. filters. Remove angle spacer in each track to provide the space required to accommodate 4-in. filters.

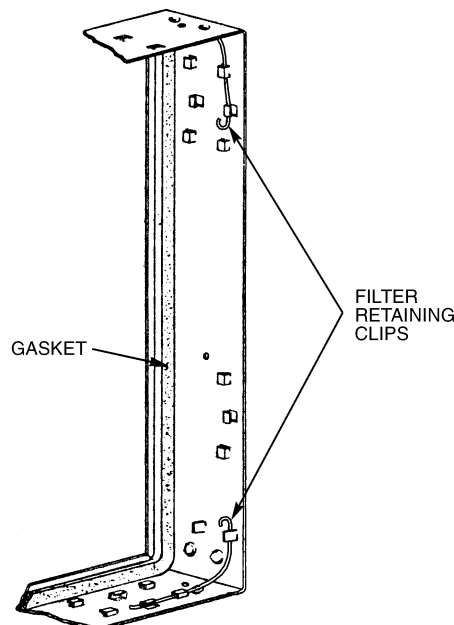


Fig. 89 — Puro-Frame Holding Frame and Filter Retaining Clips

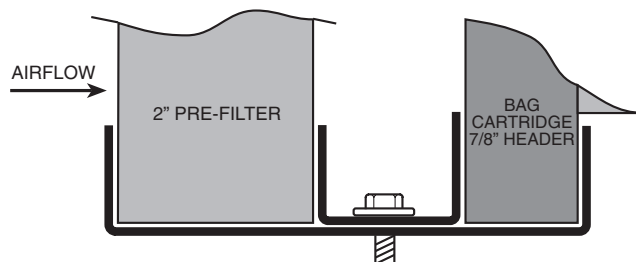


Fig. 90 — Track for Draw-Thru Bag Cartridge Filter Section

HEPA FILTERS — The Puro-Frame, HEPA holding frame will accommodate 12-in. deep filters. HEPA filter sections used in blow-thru applications are loaded from the front, through the access door or removable panel. The HEPA filters are retained in the frame with retaining brackets. RTV sealant

should be used to seal between the filter frame and the filter media's neoprene gasket to ensure a leaktight installation. Refer to Fig. 92 for details. Downstream edge of frame to frame and frame to baffle shall be sealed with RTV sealant. Filter arrangements are shown in Fig. 93-97.

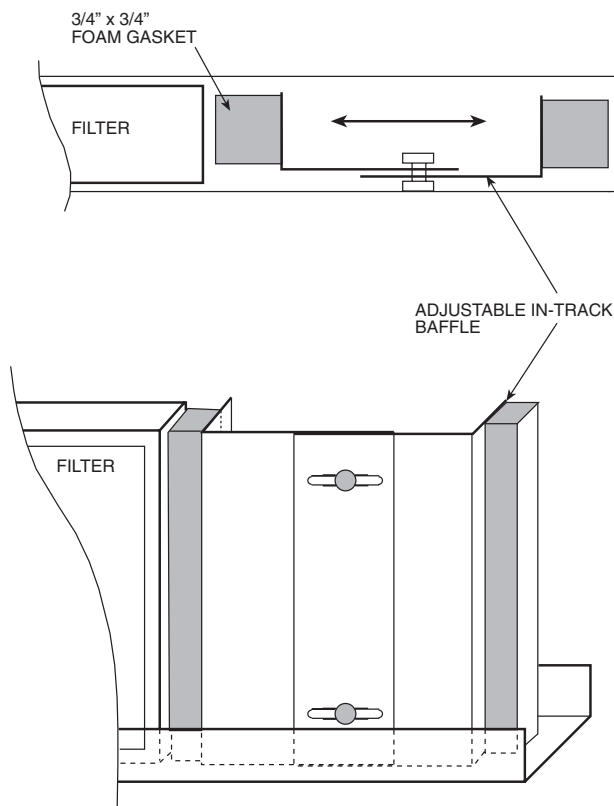


Fig. 91 — In-Track Baffle for Flat, Angle and Sideloading Bag/Cartridge Filter Sections

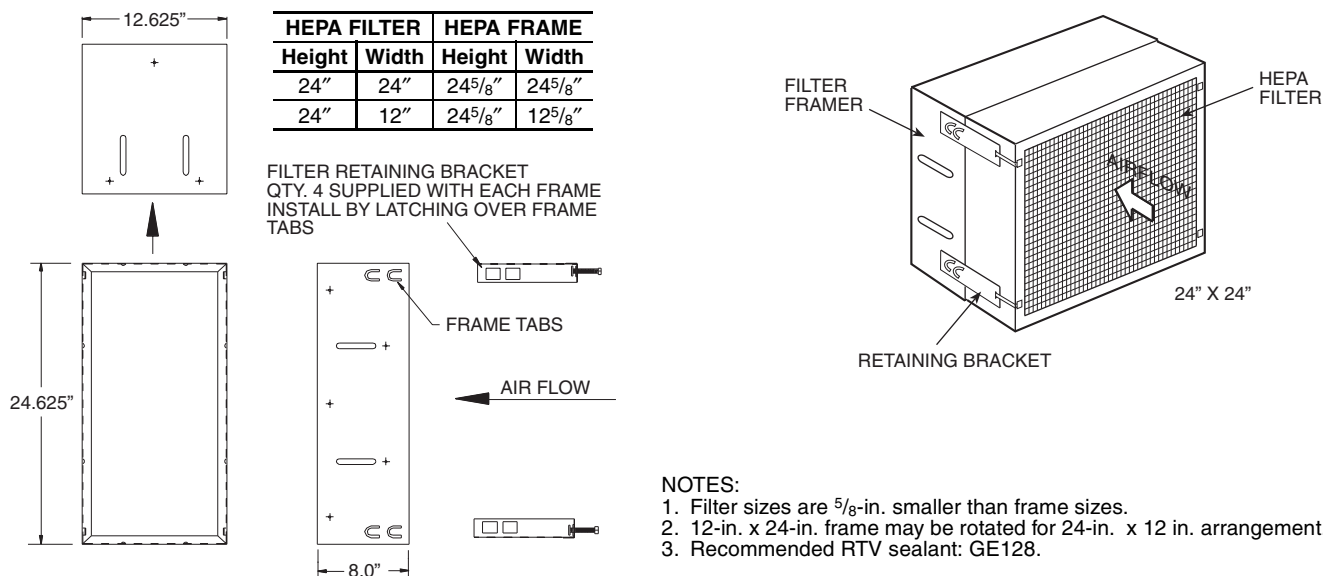


Fig. 92 — Puro-Frame, HEPA Holding Frame

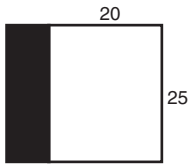
Table 27 — Filter Data

FILTER SIZE	39M UNIT SIZE													
	Flat Filter Arrangement (2-in. or 4-in.)													
	03	06	08	10	12	14	17	21	25	30	36	40	50	61
16x20	—	—	—	—	6	3	—	—	—	—	—	—	—	14
16x25	—	—	3	—	—	—	—	—	—	—	—	—	—	14
20x20	—	—	—	—	—	3	6	—	—	—	—	—	—	—
20x24	—	—	—	—	—	—	—	—	8	10	—	—	—	—
20x25	1	2	—	3	—	—	—	6	—	—	12	13	15	—
Face Area (sq. ft)	3.5	6.9	8.3	10.4	13.3	15.0	16.7	20.8	26.7	33.3	41.7	45.1	52.1	70.0
Angle Filter Arrangement (2-in. or 4-in.)														
	03	06	08	10	12	14	17	21	25	30	36	40	50	61
16x20	—	4	—	6	—	—	—	—	—	—	—	—	18	21
16x25	2	—	4	—	—	—	9	12	12	16	20	20	12	14
20x20	—	—	—	—	6	2	—	—	—	—	—	—	—	—
20x24	—	—	—	—	—	4	—	—	—	—	—	—	—	—
20x25	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Face Area (sq. ft)	5.6	8.9	11.1	13.3	16.7	18.9	25.0	33.3	33.3	44.4	55.6	55.6	73.3	85.6
Filter Mixing Box Arrangement (2-in. or 4-in.)														
	03	06	08	10	12	14	17	21	25	30	36	40	50	61
12x24	—	—	—	—	—	—	12	—	—	—	—	—	—	—
16x20	—	4	—	6	—	—	—	—	—	—	—	—	18	24
16x25	2	—	4	—	—	—	—	12	12	16	—	24	12	16
20x20	—	—	—	—	6	2	—	—	—	—	—	—	—	—
20x24	—	—	—	—	—	4	—	—	—	—	—	—	—	—
20x25	—	—	—	—	—	—	—	—	—	—	16	—	—	—
Face Area (sq. ft)	5.6	8.9	11.1	13.3	16.7	18.9	24.0	33.3	33.3	44.4	55.5	66.7	73.3	97.8
Short Side Load Bag/Cartridge Filter Arrangement														
	03	06	08	10	12	14	17	21	25	30	36	40	50	61
12x24	—	1	—	1	3	3	3	—	—	—	4	4	3	7
24x24	1	1	2	2	2	2	3	6	6	8	8	8	12	12
Face Area (sq. ft)	4	6	8	10	14	14	18	24	24	32	40	40	54	62
Long Side Load Bag/Cartridge Filter Arrangement														
	03	06	08	10	12	14	17	21	25	30	36	40	50	61
12x24	—	1	—	1	3	3	3	—	—	—	4	4	3	7
24x24	1	1	2	2	2	2	3	6	6	8	8	8	12	12
Face Area (sq. ft)	4	6	8	10	14	14	18	24	24	32	40	40	54	62
Face Load Bag/Cartridge/HEPA Filter Arrangement														
	03	06	08	10	12	14	17	21	25	30	36	40	50	61
12x24	—	1	—	1	2	3	3	—	—	—	4	4	3	7
24x24	1	1	2	2	2	2	3	6	6	8	8	8	12	12
Face Area (sq. ft)	4	6	8	10	12	14	18	24	24	32	40	40	54	62

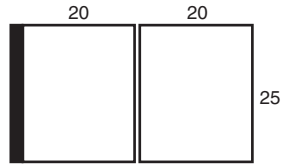
NOTES:

1. Do not exceed filter manufacturer's velocity limits when selecting filters.
2. There are two dedicated filter sections for 2 in. or 4 in. flat filters.
3. Angle filter or filter mixing box sections can be configured to accept either 2 in. or 4 in. filters.
4. Draw-thru bag/cartridge filter sections accept 2 in. pre-filters. Filters must be a combination of bag filters in the sizes shown or 6 in. or 12 in. deep rigid media with 7/8 in. header.

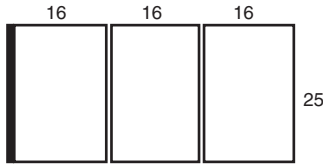
5. The draw-thru bag/cartridge filter section is designed for side loading of filter media with a header for a 1 in. slide in track. The blow-thru bag/cartridge/HEPA filter section is designed for face loading of filters ONLY (no side loading). The blow-thru filter section requires filter media with spring clips, wire brackets, or retainers for use in a Puro-Frame holding frame.



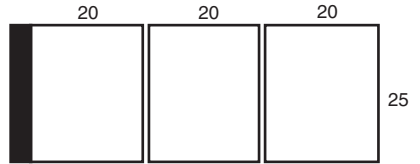
Unit Size 03
Flat Filter Section
(1) 25 x 20



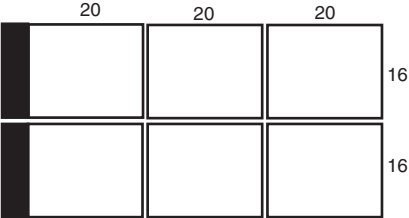
Unit Size 06
Flat Filter Section
(2) 25 x 20



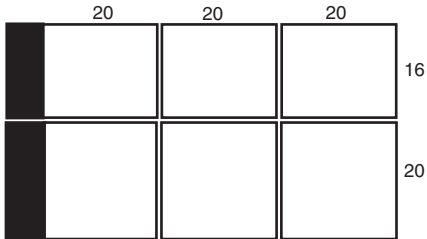
Unit Size 08
Flat Filter Section
(3) 25 x 16



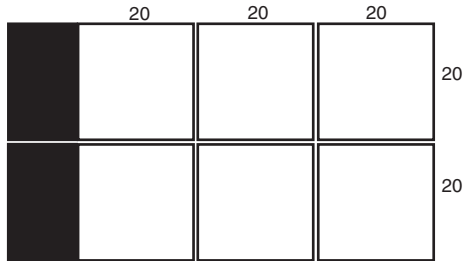
Unit Size 10
Flat Filter Section
(3) 25 x 20



Unit Size 12
Flat Filter Section
(6) 16 x 20



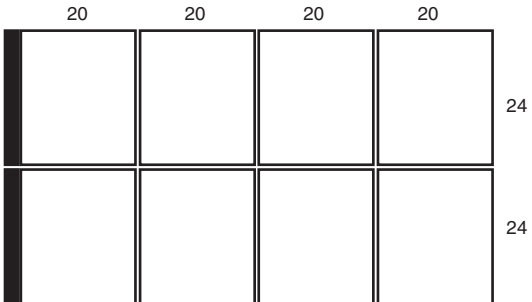
Unit Size 14
Flat Filter Section
(3) 16 x 20, (3) 20 x 20



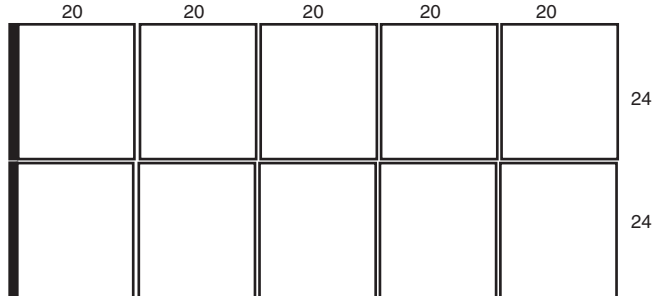
Unit Size 17
Flat Filter Section
(6) 20 x 20



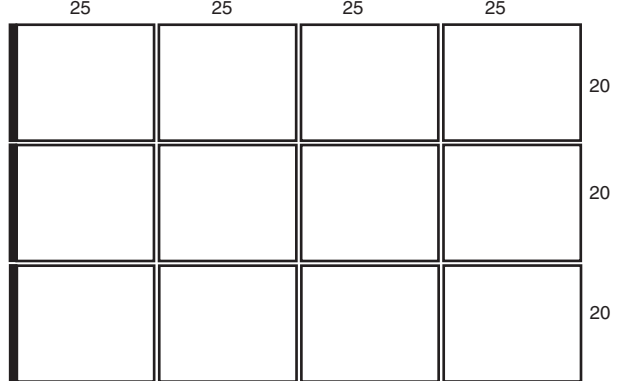
Unit Size 21
Flat Filter Section
(6) 20 x 25



Unit Size 25
Flat Filter Section
(8) 24 x 20



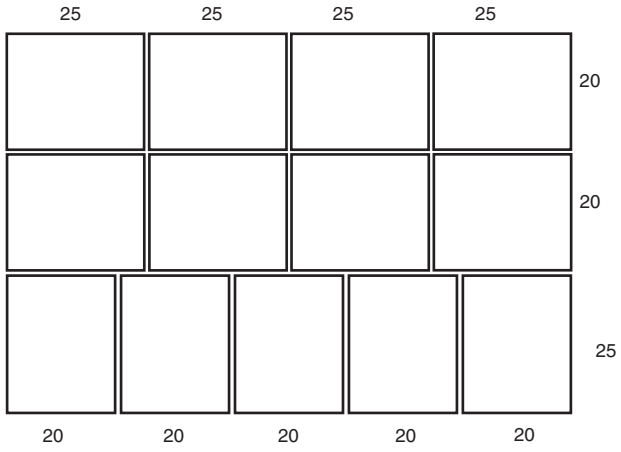
Unit Size 30
Flat Filter Section
(10) 24 x 20



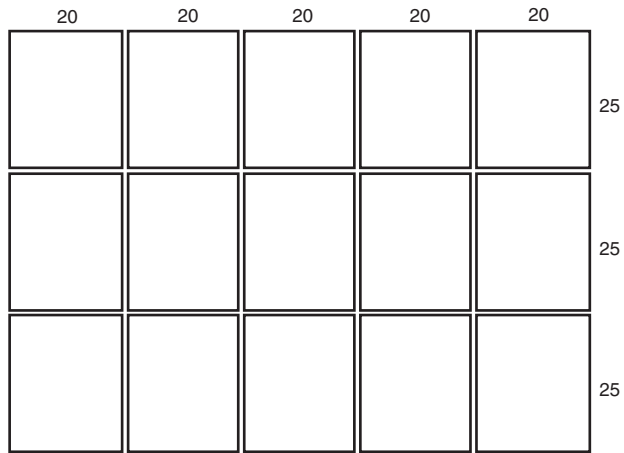
Unit Size 36
Flat Filter Section
(12) 20 x 25

Shaded area represents filter section blankoff.

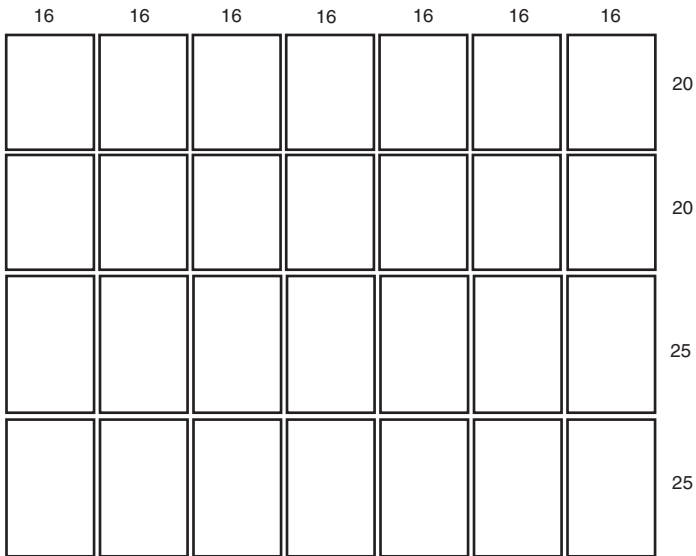
Fig. 93 — Flat Filter Arrangement — 2-in. or 4-in.



Unit Size 40
Flat Filter Section
(8) 20 x 25, (5) 25 x 20

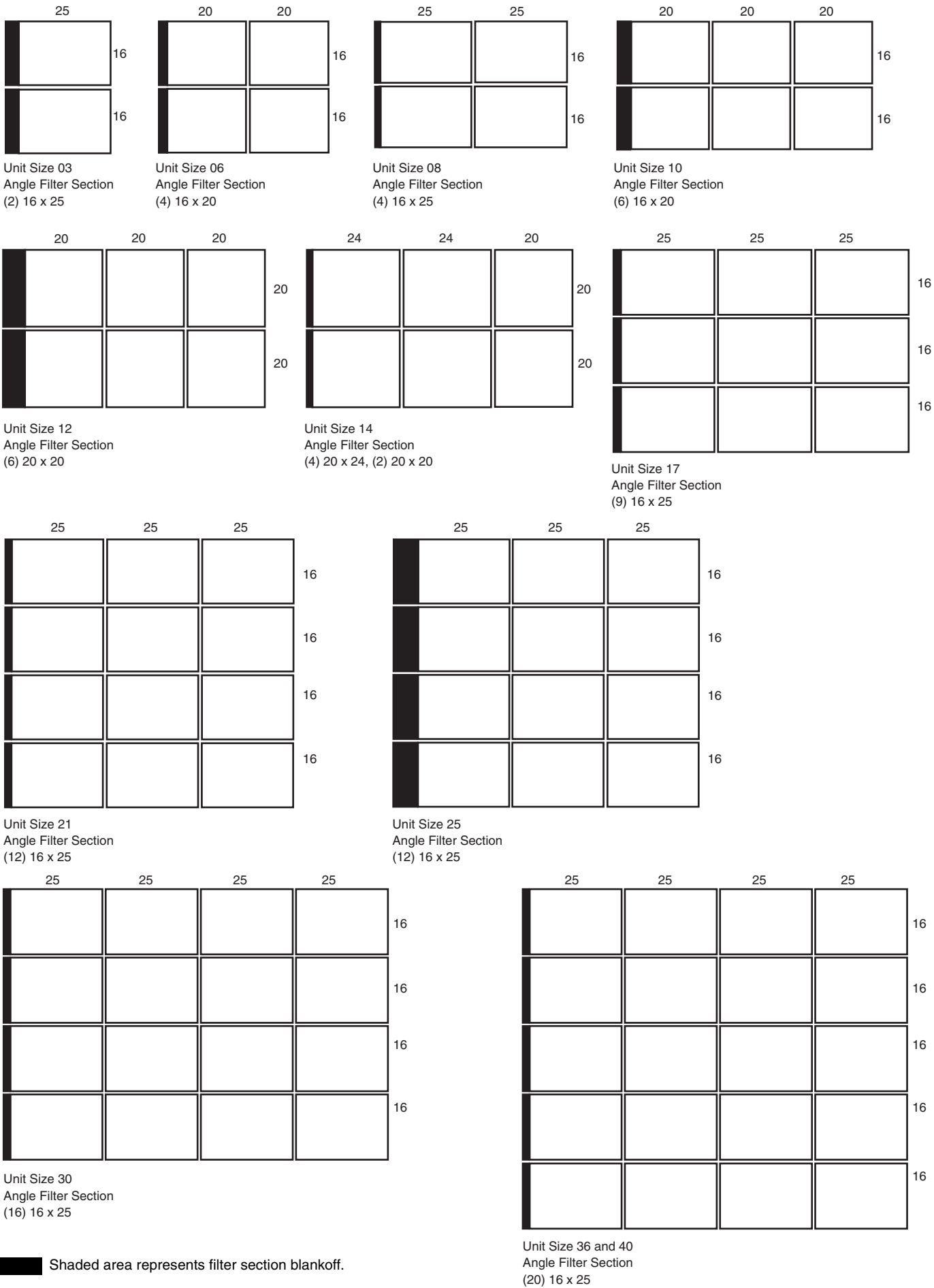


Unit Size 50
Flat Filter Section
(15) 25 x 20



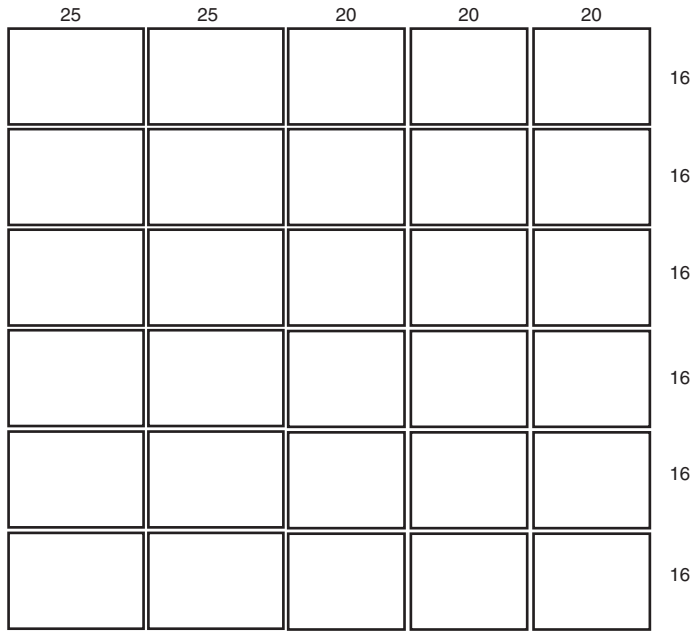
Unit Size 61
Flat Filter Section
(14) 20 x 16, (14) 25 x 16

Fig. 93 — Flat Filter Arrangement — 2-in. or 4-in. (cont)

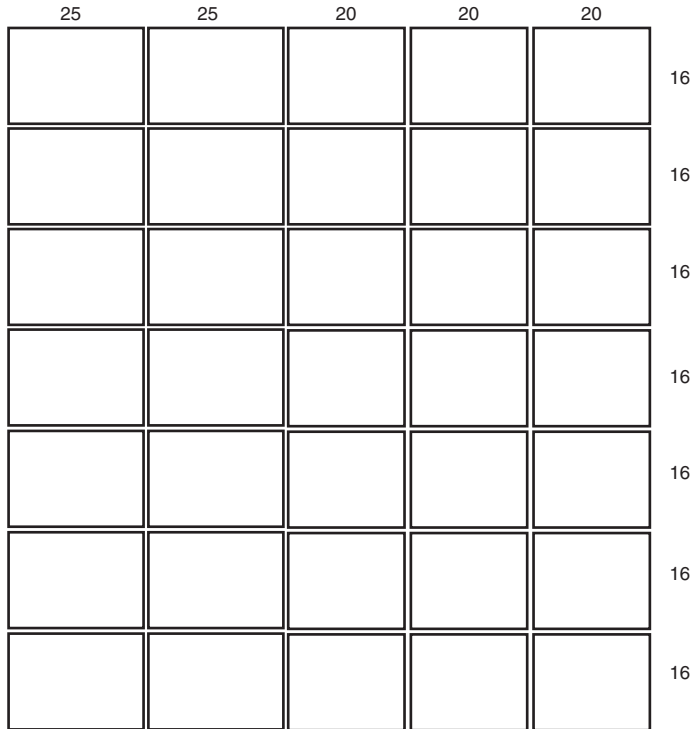


Shaded area represents filter section blankoff.

Fig. 94 — Angle Filter Arrangement — 2-in. or 4-in.

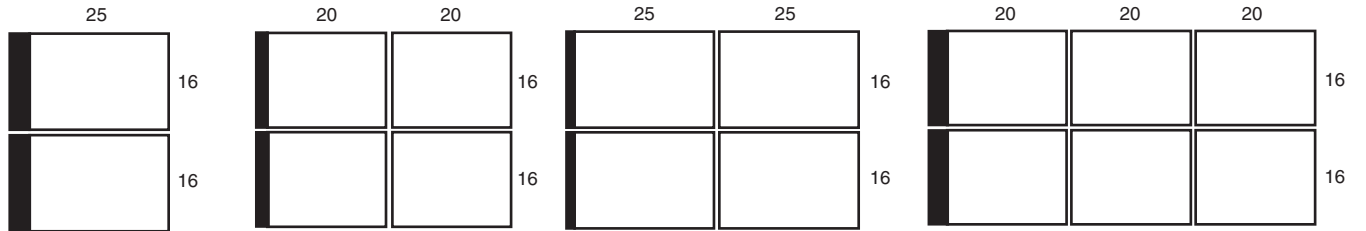


Unit Size 50
 Angle Filter Section
 (12) 16 x 25, (18) 16 x 20



Unit Size 61
 Angle Filter Section
 (14) 16 x 25, (21) 16 x 20

Fig. 94 — Angle Filter Arrangement — 2-in. or 4-in. (cont)

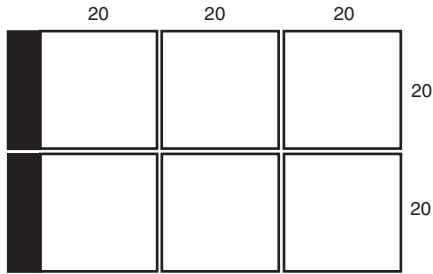


Unit Size 03
Filter Mixing Box Section
(2) 16 x 25

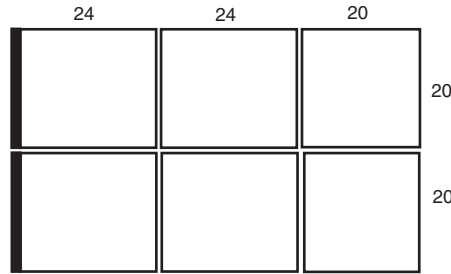
Unit Size 06
Filter Mixing Box Section
(4) 16 x 20

Unit Size 08
Filter Mixing Box Section
(4) 16 x 25

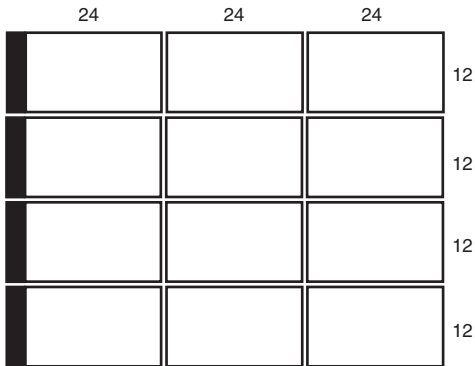
Unit Size 10
Filter Mixing Box Section
(6) 16 x 20



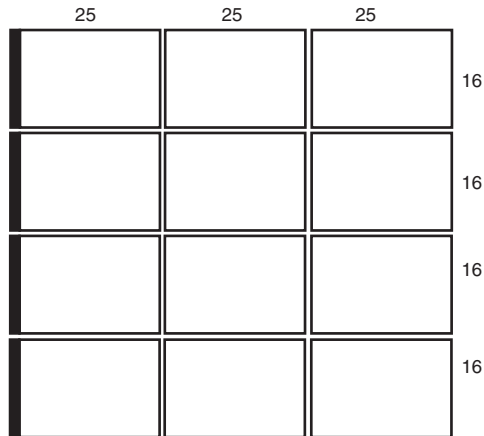
Unit Size 12
Filter Mixing Box Section
(6) 20 x 20



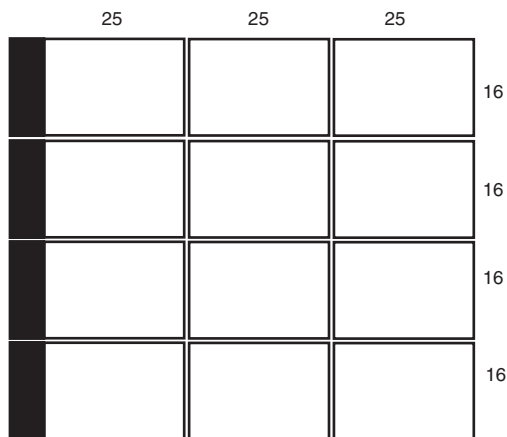
Unit Size 14
Filter Mixing Box Section
(4) 20 x 24, (2) 20 x 20



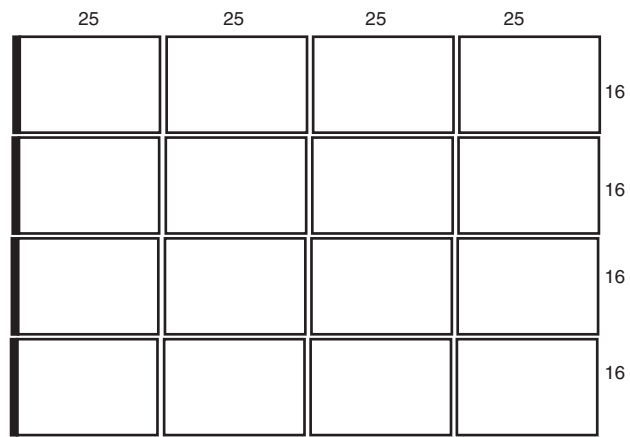
Unit Size 17
Filter Mixing Box Section
(12) 12 x 24



Unit Size 21
Filter Mixing Box Section
(12) 16 x 25



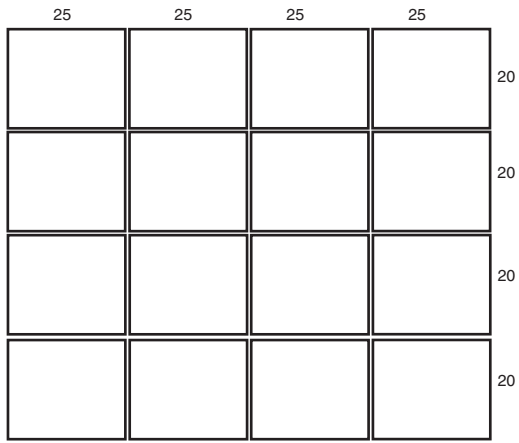
Unit Size 25
Filter Mixing Box Section
(12) 16 x 25



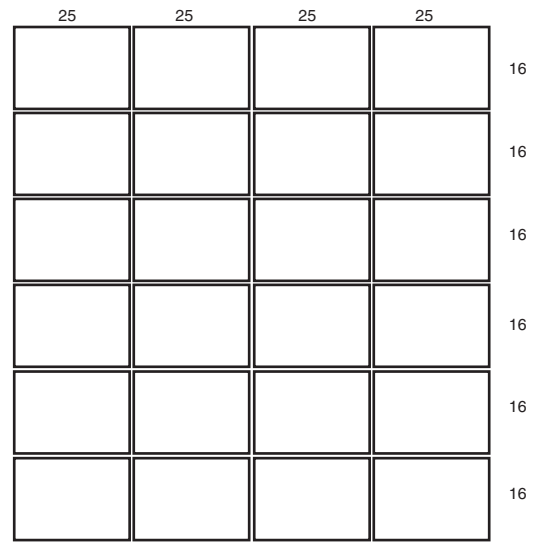
Unit Size 30
Filter Mixing Box Section
(16) 16 x 25

Shaded area represents filter section blankoff.

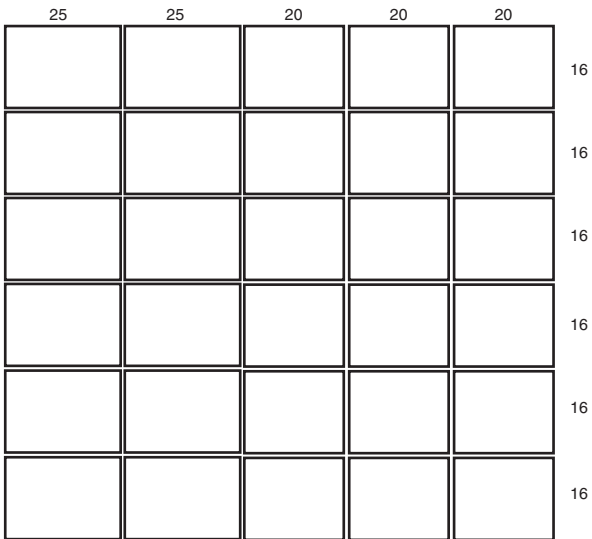
Fig. 95 — Filter Mixing Box Arrangement — 2-in. or 4-in.



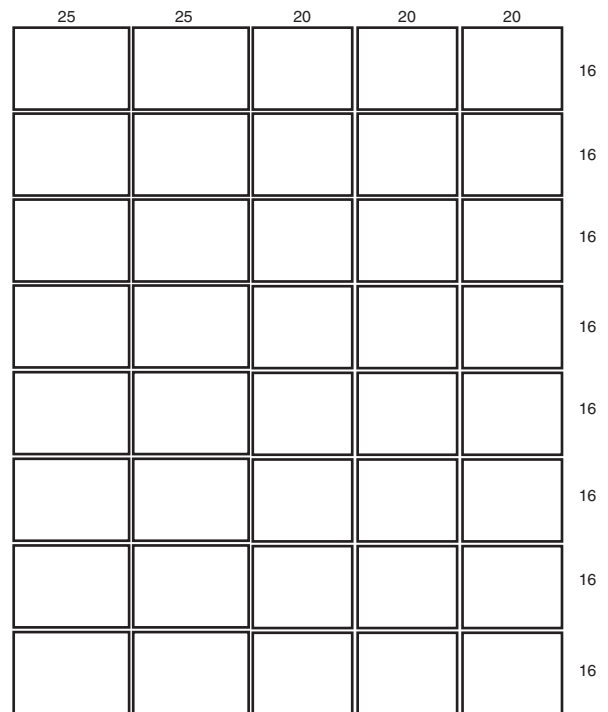
Unit Size 36
Filter Mixing Box Section
(16) 20 x 25



Unit Size 40
Filter Mixing Box Section
(24) 16 x 25

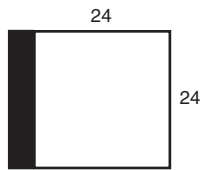


Unit Size 50
Filter Mixing Box Section
(12) 16 x 25, (18) 16 x 20

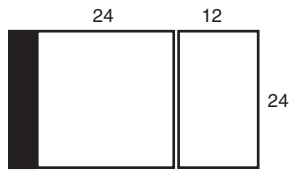


Unit Size 61
Filter Mixing Box Section
(16) 16 x 25, (24) 16 x 20

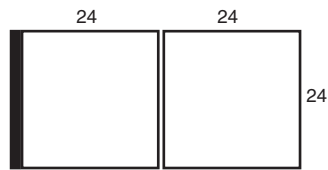
Fig. 95 — Filter Mixing Box Arrangement — 2-in. or 4-in. (cont)



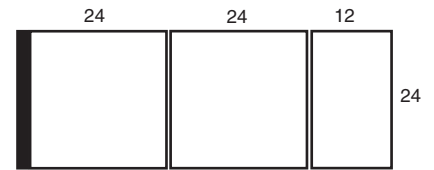
Unit Size 03
Bag/Cartridge
Pre-filter Section
(1) 24 x 24



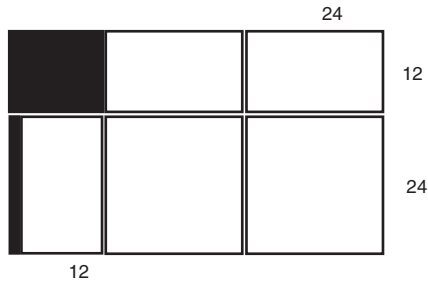
Unit Size 06
Bag/Cartridge
Pre-filter Section
(1) 24 x 24, (1) 24 x 12



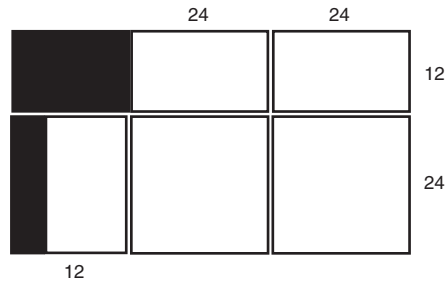
Unit Size 08
Bag/Cartridge
Pre-filter Section
(2) 24 x 24



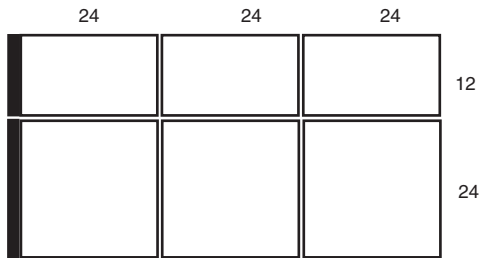
Unit Size 10
Bag/Cartridge
Pre-filter Section
(2) 24 x 24, (1) 24 x 12



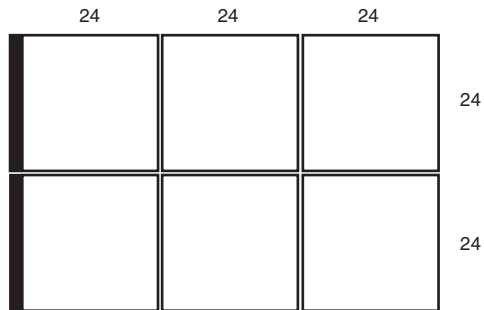
Unit Size 12
Bag/Cartridge
Pre-filter Section
(3) 12 x 24, (2) 24 x 24



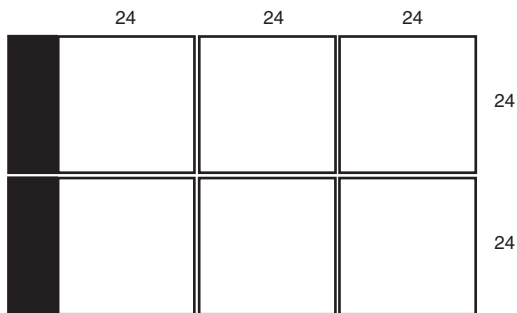
Unit Size 14
Bag/Cartridge
Pre-filter Section
(3) 12 x 24, (2) 24 x 24



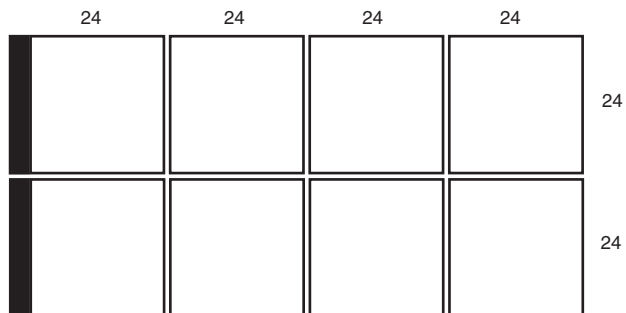
Unit Size 17
Bag/Cartridge
Pre-filter Section
(3) 12 x 24, (3) 24 x 24



Unit Size 21
Bag/Cartridge
Pre-filter Section
(6) 24 x 24



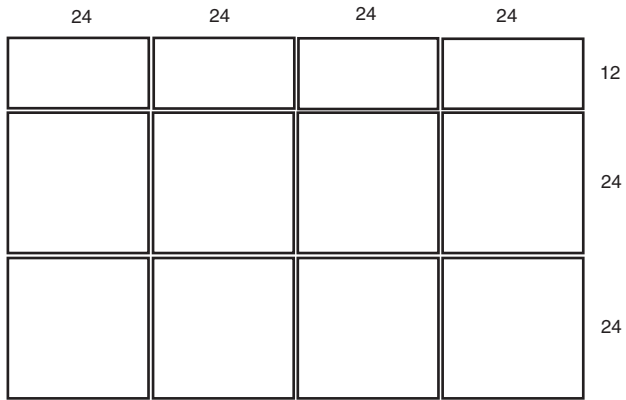
Unit Size 25
Bag/Cartridge
Pre-filter Section
(6) 24 x 24



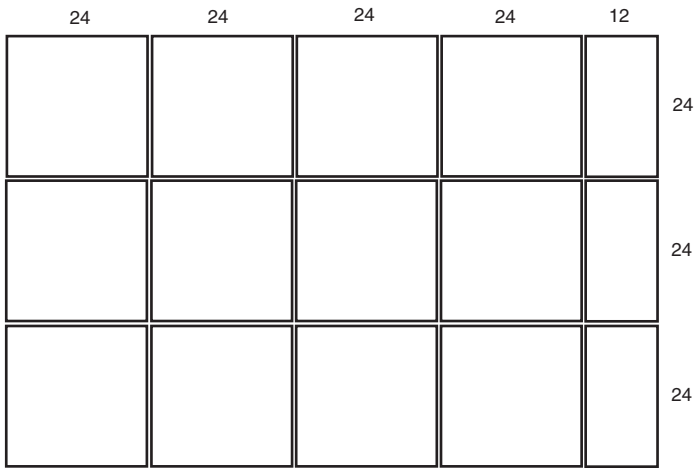
Unit Size 30
Bag/Cartridge
Pre-filter Section
(8) 24 x 24

Shaded area represents filter section blankoff.

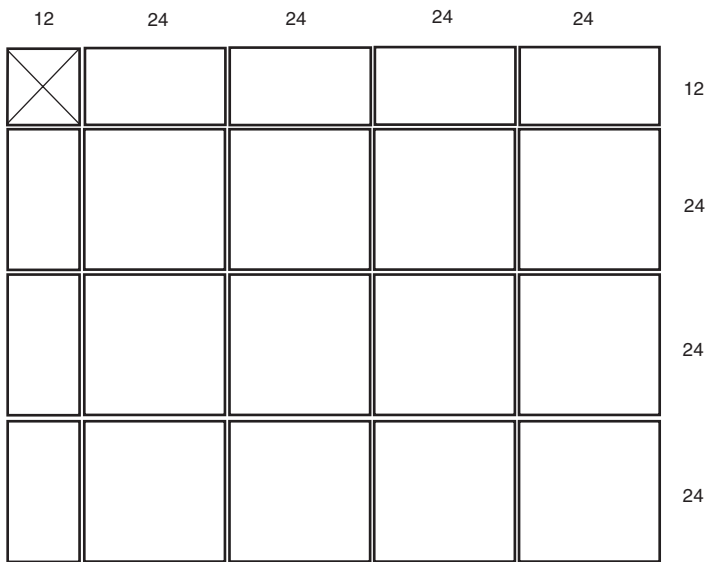
Fig. 96 — Side Load Bag/Cartridge Filter Arrangement



Unit Size 36 and 40
 Bag/Cartridge Pre-filter Section
 (4) 12 x 24, (8) 24 x 24

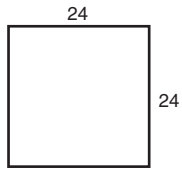


Unit Size 50
 Bag/Cartridge Pre-filter Section
 (12) 24 x 24, (3) 24 x 12

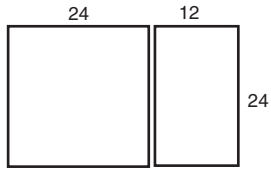


Unit Size 60
 Bag/Cartridge Pre-filter Section
 (12) 24 x 24, (7) 24 x 12

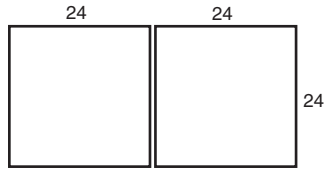
Fig. 96 — Side Load Bag/Cartridge Filter Arrangement (cont)



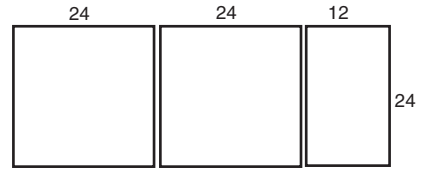
Unit Size 03
Bag/Cartridge/HEPA
Pre-filter Section
(1) 24 x 24



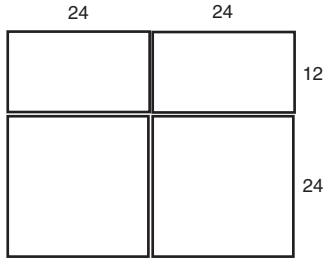
Unit Size 06
Bag/Cartridge/HEPA
Pre-filter Section
(1) 24 x 24, (1) 24 x 12



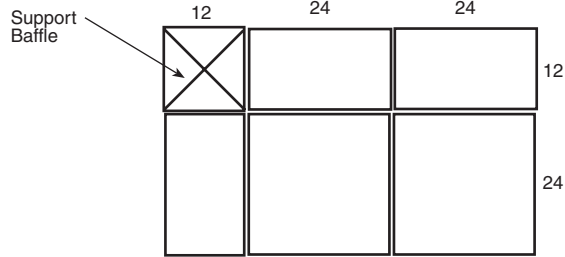
Unit Size 08
Bag/Cartridge/HEPA
Pre-filter Section
(2) 24 x 24



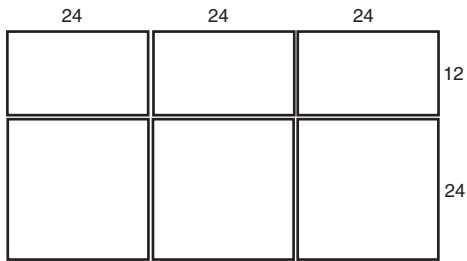
Unit Size 10
Bag/Cartridge/HEPA
Pre-filter Section
(2) 24 x 24, (1) 24 x 12



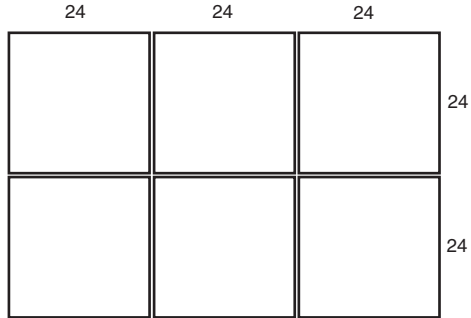
Unit Size 12
Bag/Cartridge/HEPA
Pre-filter Section
(2) 12 x 24, (2) 24 x 24



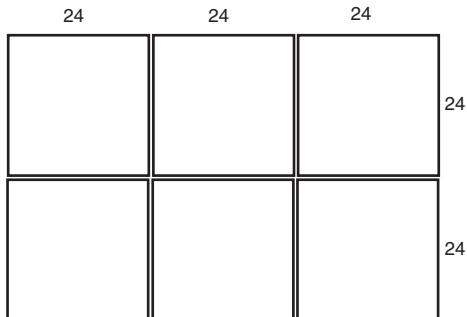
Unit Size 14
Bag/Cartridge/HEPA
Pre-filter Section
(3) 12 x 24, (2) 24 x 24



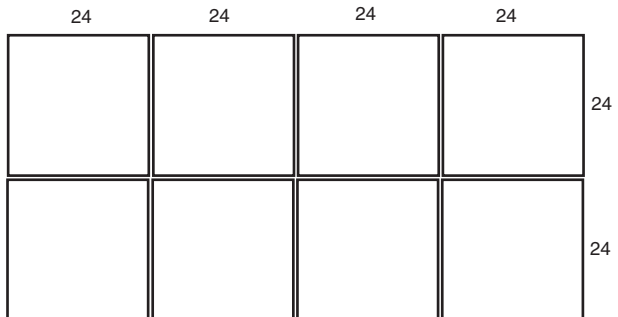
Unit Size 17
Bag/Cartridge/HEPA
Pre-filter Section
(3) 12 x 24, (3) 24 x 24



Unit Size 21
Bag/Cartridge/HEPA
Pre-filter Section
(6) 24 x 24

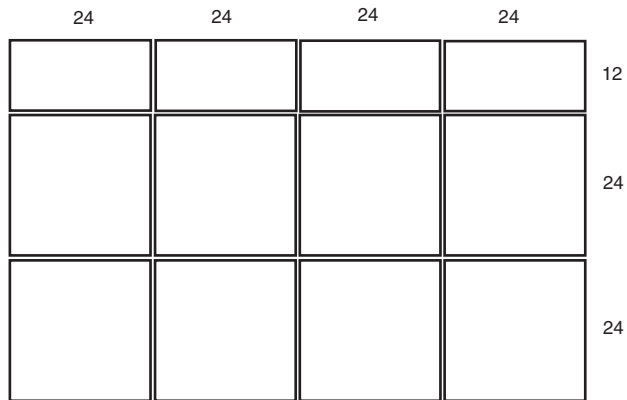


Unit Size 25
Bag/Cartridge/HEPA
Pre-filter Section
(6) 24 x 24

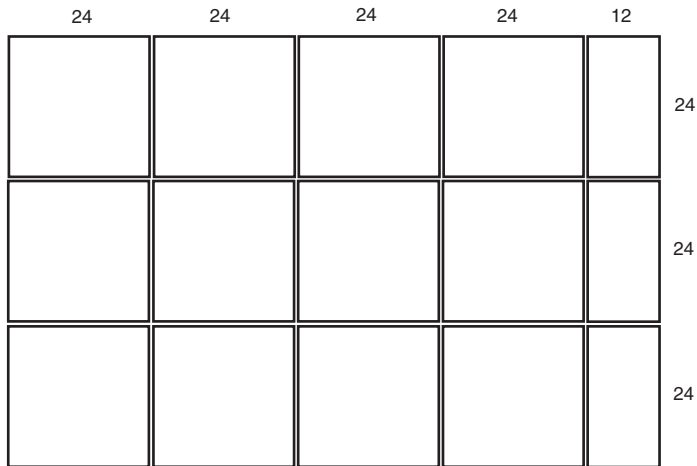


Unit Size 30
Bag/Cartridge/HEPA
Pre-filter Section
(8) 24 x 24

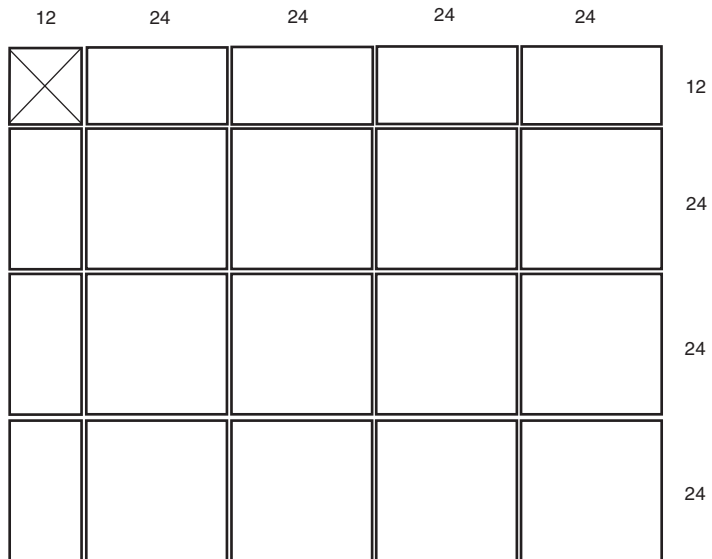
Fig. 97 — Face Load Bag/Cartridge/HEPA Filter Arrangement



Unit Size 36 and 40
 Bag/Cartridge/HEPA
 Pre-filter Section
 (4) 12 x 24, (8) 24 x 24



Unit Size 50
 Bag/Cartridge/HEPA
 Pre-filter Section
 (12) 24 x 24, (3) 24 x 12



Unit Size 60
 Bag/Cartridge/HEPA
 Pre-filter Section
 (12) 24 x 24, (7) 24 x 12

Fig. 97 — Face Load Bag/Cartridge/HEPA Filter Arrangement (cont)

Fan Shaft Bearing Removal

1. Isolate the unit from the system by closing dampers to prevent “pin wheeling.” Tie off the fan wheel to prevent rotation.
2. Lock open and tag electrical disconnect.
3. Enter through fan section access door or remove panels as required.
4. Loosen motor base to frame bolts. Adjust motor to release belt tension and remove belts. *Do not stretch belts over sheaves.* Damage to belts can result.
5. Remove bolts on bushing of fan shaft sheave, insert bolts in jacking hole provided on bushing and slowly jack bushing from sheave. Remove bushing and sheave.
6. Loosen bearing holddown bolts, block shaft up.
7. Loosen bearing setscrews and locking collar, and remove holddown bolts.

NOTE: To facilitate easy removal of setscrew fastened wheels, sheaves, or bearings, remove the setscrew completely. Taking care not to damage threads, insert a flat ended drift or punch, tap lightly and carefully return the material displaced on the shaft by the setscrew to its original place.

8. Remove bearing while observing the following precautions:
 - a. Make certain fan shaft surface is not rough or scored. If so, clean up surface with fine emery cloth.
 - b. Add a few drops of oil after cleanup of shaft end.

⚠ CAUTION

It should not be necessary to drive a new bearing onto shaft. If light tapping is needed, do not tap against outer race.

9. Check fan shaft diameter at bearing mount. If worn by more than 0.001-in. below nominal, shaft should be replaced.
10. Install new bearing, tighten holddown bolts, and then tighten bearing locking collar or setscrews.
11. Make certain fan wheel does not rub sides of fan housing after installing new bearings.
12. Recoat fan shaft with a rust inhibitor or grease.
13. Replace sheave and belts. Adjust and align as described in Installation, Sheaves and V-Belts sections.
14. Replace access panels.
15. Restore electrical power.

Fan and Shaft Removal — On airfoil fans, the fan wheel and shaft may be removed through inlet side of fan housing. See Fig. 98. On plenum fans, remove side, top, or end panel opposite inlet, wherever ductwork is not connected. After removing panel, proceed as follows.

1. Remove drive belts as described in Fan Shaft Bearing Removal section above.
2. Block up fan wheel within housing to prevent dropping when bearing bolts are removed.
3. Loosen bearing holddown bolts, block shaft up.
4. Loosen bearing setscrews and locking collar, and remove holddown bolts. On forward-curved fans, remove cutoff plate. Remove fan wheel through discharge opening.

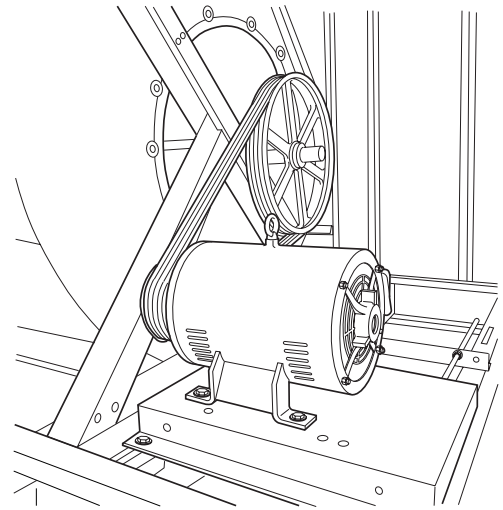


Fig. 98 — Fan Shaft and Bearing Removal

NOTE: To facilitate easy removal of setscrew fastened wheels, sheaves or bearings, remove the setscrew completely. Taking care not to damage threads, insert a flat ended drift or punch, tap lightly and carefully return the material displaced on the shaft by the setscrew to its original place.

5. Remove bearing support channels and inlet ring from one side.
6. Remove fan shaft and fan wheel from unit.
7. Remove fan shaft from fan wheel.
8. Replace shaft and wheel into fan in the reverse order of their removal.
9. Inspect bearings and if serviceable, replace on shaft.
10. For airfoil and forward-curved fans, align fan wheel and shaft assembly in fan scroll. Check cutoff location if wheel failure damaged cutoff plate. For plenum fan, align wheel and shaft assembly per manufacturer’s directions supplied with fan.
11. Tighten bearing holddown bolts, bearing setscrews, and shaft setscrews.
12. Field balancing of shaft and wheel is recommended.

IMPORTANT: Replacement shafts must have a diameter tolerance at bearing mount of +.0000 in./-.001 in. nominal. Carrier specified parts are recommended.

Motor Location — The motor and motor base must be moved to place the motor at the front or rear of unit. The proper location is the one that results in the longest drive centerline distance. The motor may need to be replaced since the conduit box may need to be reversed: The conduit box (if not on top) should always be under the fan shaft for maximum centerline distance and motor adjustment.

INTERNALLY ISOLATED UNIT — When fan discharge is altered the motor is moved, then all isolators must be readjusted to assure proper unit isolation.

Rebalancing of the unit is recommended.

Lubrication

MOTORS — Lubricate in accordance with nameplate attached to motor or with manufacturer's recommendations included with motor.

BEARINGS

Fan Bearings — Lubricate fan bearings every 3 months with suitable bearing grease. Typical lubricants are given in Table 28.

Porous Bronze Bearings — These bearings are oil impregnated. Annually lubricate with a few drops of non-detergent SAE 20 oil.

Table 28 — Lubrication Guide

OPERATING CONDITIONS	BEARING TEMPERATURES (F)	GREASE INTERVAL	RECOMMENDED LUBRICANT
Clean	32 to 120	6 to 10 months	Shell Alvanina #2 Texaco Multifak #2 Mobil Mobilus #2
	120 to 150	1 to 3 months	
150 to 200	1 to 4 weeks		
Dirty	32 to 150	1 to 4 weeks	

Motor and Drive Package Data — Tables 2A-2D give motor data for forward-curved, airfoil, and plenum fans.

Variable Frequency Drive — If installed in an appropriate environment, the VFD requires very little maintenance. Table 29 lists the routine maintenance intervals recommended by Carrier.

Table 29 — Maintenance Intervals

MAINTENANCE	INTERVAL
Heat sink temperature check and cleaning	Every 12 months (more often if operating in a dusty environment)
Main cooling fan replacement	Every five years
Capacitor change (frame size R5 and R6)	Every ten years
HVAC Control panel battery change	Every ten years.

HEAT SINK — The heat sink fins accumulate dust from the cooling air. Since a dusty heat sink is less efficient at cooling the drive, over temperature faults become more likely. In a normal environment check the heat sink annually, in a dusty environment check more often.

Check the heat sink as follows (when necessary):

1. Remove power from drive.
2. Remove the cooling fan.
3. Blow clean compressed air (not humid) from bottom to top and simultaneously use a vacuum cleaner at the air outlet to trap the dust. If there is a risk of the dust entering adjoining equipment, perform the cleaning in another room.
4. Replace the cooling fan.
5. Restore power.

MAIN FAN REPLACEMENT — The main cooling fan of the VFD has a life span of about 60,000 operating hours at maximum rated operating temperature and drive load. The expected life span doubles for each 18 F drop in the fan temperature (fan temperature is a function of ambient temperatures and drive loads).

Fan failure can be predicted by the increasing noise from fan bearings and the gradual rise in the heat sink temperature in spite of heat sink cleaning. If the drive is operated in a critical part of a process, fan replacement is recommended once these symptoms start appearing. Replacement fans are available from Carrier.

To replace the main fan for frame sizes R1 through R4, perform the following (see Fig. 99):

1. Remove power from drive.
2. Remove drive cover.
3. For frame sizes R1 and R2, press together the retaining clips on the fan cover and lift. For frame sizes R3 and R4, press in on the lever located on the left side of the fan mount, and rotate the fan up and out.
4. Disconnect the fan cable.
5. Install the new fan by reversing Steps 2 to 4.
6. Restore power.

To replace the main fan for frame sizes R5 and R6, perform the following (see Fig. 100):

1. Remove power from drive.
2. Remove the screws attaching the fan.
3. Disconnect the fan cable.
4. Install the fan in reverse order.
5. Restore power.

CONTROL PANEL CLEANING — Use a soft damp cloth to clean the control panel. Avoid harsh cleaners which could scratch the display window.

BATTERY REPLACEMENT — A battery is only used in assistant control panels that have the clock function available and enabled. The battery keeps the clock operating in memory during power interruptions. The expected life for the battery is greater than ten years. To remove the battery, use a coin to rotate the battery holder on the back of the control panel. Replace the battery with type CR2032.

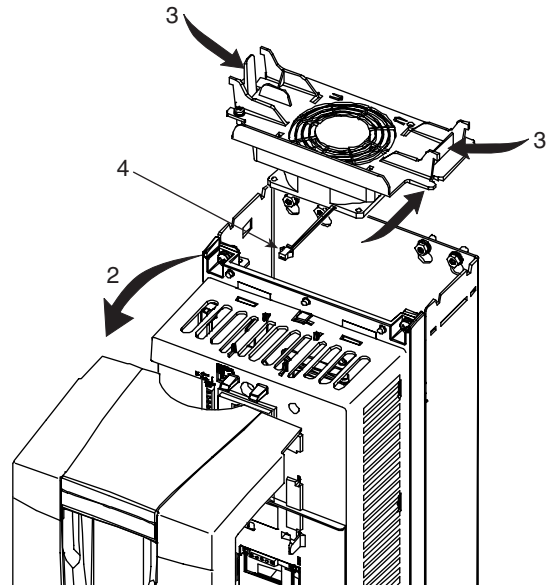
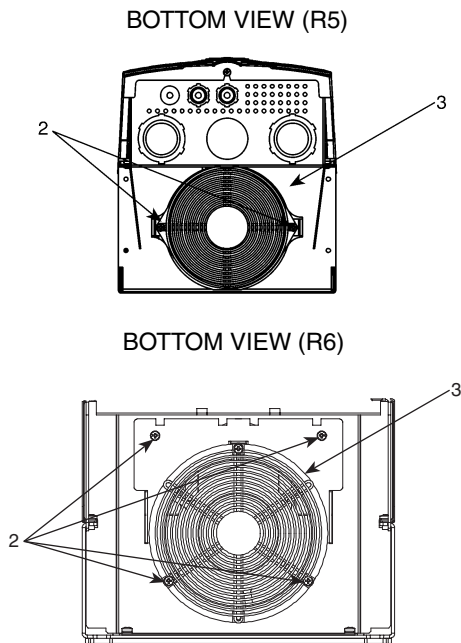


Fig. 99 — Main Fan Replacement (Frame Sizes R1 - R4)



**Fig. 100 — Main Fan Replacement
(Frame Sizes R5 and R6)**

TROUBLESHOOTING

Steam Coil Performance Problems — Coil capacity is normally not a problem with steam coils. Low capacity can result from blocked or plugged air side surface, an air bound coil, or a coil which is filled with condensate because of a non-functioning steam trap. The Carrier steam coils with the 1-in. OD outer tube have at least twice the condensate loading capacity of a coil with $\frac{5}{8}$ -in. OD outer tubes.

Water hammer can damage the coil and cause leaks. It is typically caused by improper piping of the steam supply, allowing condensate to enter the coil with the steam supply; or by accumulation of condensate in the coil which can occur with the coils operating at partial load without a vacuum breaking device.

Problems with temperature control can occur when a thermostatic controller or steam control valve is not functioning properly. Temperature control problems will also occur when the steam controls valve is oversized. Consider $\frac{1}{3}$ to $\frac{2}{3}$ valve arrangements for full range control.

Problems with “water logging” of the condensate tubes can occur when a coil with over 6 foot tubes is selected at high air velocities, low steam pressures (below 5 psig) and high density fin spacing (9 fins per inch or more). This high density fin spacing, while producing high levels of heating capacity, also promotes excessive condensate. Given the length of the tubes and the low steam supply pressure, condensate can build up faster than the drain system can carry it away. Considerations should be given for using two coils in series for this application.

Steam Failure Modes — The following failure modes could take as little as a weekend to damage a coil, or much longer.

Problems occur quickly in coils using low pressure steam (<3 psig). Water hammer can develop inside the coil at the header end because the steam has already condensed and the low steam pressure does not adequately clear it from the coil. This condensate re-boils and starts up water hammer inside the tubes. The action of this type of water hammer, which sounds like crackling inside the coil, is many tiny bubbles impinging on the inner and outer tubes. One result is the inner tube gets work hardened and eventually shatters. Another result is the eventual erosion of the outer tube causing pinhole leaks.

Coils which are not properly vented will eventually load up with noncondensable gases. Coil performance (temperature rise) drops off as the noncondensables act as insulation inside the tubes.

The coils may also fill with condensate. The collapsing steam causes a vacuum inside the coil when the supply valve closes. The trapped condensate will then freeze causing the tubes to rupture after it melts. The use of a vacuum breaker at the condensate discharge will aid in relieving the vacuum in the coil and promote condensate drainage.

Refer to Table 30 for 39M troubleshooting information.

⚠ WARNING

Disconnect power and allow all rotating equipment to stop before servicing unit. Physically secure all fans before performing unit service. Failure to do so may result in serious personal injury or death.

Water coil performance (when piped in parallel flow), will be reduced by approximately 5% for each coil row on coils 2 rows deep and deeper. Coils should always be piped with the water inlet on the leaving air side of the coil, regardless of water connection vertical position.

Table 30 — Troubleshooting

SYMPTOM	CAUSE	REMEDY
Motor Fails to Start	Power line open Improper wiring or loose connections Overload trip Mechanical failure Improper current supply	Reset circuit breaker. Check wiring and connections. Check and reset overload. Inspect motor and drive for operation and/or damage. Check rating plate against actual supply voltage. Contact power provider for adjustments if needed.
Motor Stalls	Open Phase Overloaded motor Low line voltage	Check line for open phase. Reduce motor load or replace with larger motor. Check supply line, correct voltage.
Excessive Vibration	Bearing/shaft misalignment Shipping blocks/spacers not removed Excessive belt tension Drive misaligned	Check and align bearing set screws. Remove shipping blocks/spacers. Adjust belt tension. Align drive.
Bearing(s) is Hot	Grease not evenly distributed after lubrication Over-lubrication No lubricant Misaligned bearing	Allow unit to cool down and restart. Clean and purge excess grease. Check bearings for damage and apply lubricant. Check shaft level and reset alignment.
Motor Does Not Run at Full Speed	Low voltage at motor terminals Supply wiring to motor too small	Check supply voltage and correct voltage loss. Rewire with properly sized wire.
Motor Overheats	Overloaded motor Motor fan is clogged, preventing motor cooling	Reduce motor load or replace with larger motor. Clean motor fan.
Excessive Motor Noise	Mounting bolts loose Rigid coupling connectors Worn motor bearings Fan rubbing on housing	Tighten bolts. Replace with flexible connectors. Replace bearings and seals. Adjust housing.
Motor Runs and Then Slows	Partial supply voltage loss	Check for loose/dirty connections. Verify supply voltage.
Excessive Motor Bearing Wear	High load due to over-tensioned drive Excessive overhung load caused by a small diameter motor sheave	Check belt tension and load. Replace with larger sheave.
Loose Fan Belt	Improper motor position Worn sheaves Worn or damaged belt	Adjust tension. Replace sheaves. Check sheave alignment and replace belt(s).
Drive Noise	Sheave(s) not tight on fan/motor shaft(s) Belts contacting guard(s) Belts too loose or too tight Belts and sheaves mismatched Belts not length matched (multiple belt set-up) Misaligned sheaves Belts worn Belts dirty or oily	Tighten sheaves. Adjust or tighten belt guard mounts. Adjust belt tension. Install proper belts. Install matched belts. Align sheaves. Replace belts. Replace belts.
Bearing Noise	Defective bearing Lack of lubrication Loose bearing Bearing misaligned Foreign material/dirt inside bearing Corrosion between bearing and shaft	Repair/replace bearing. Lubricate bearing. Adjust bearing support or bearing on shaft. Align bearing properly. Inspect and clean bearing. Clean or replace bearing as required.
High Velocity Air Noise	Fan speed too high Ductwork too restrictive Low static pressure Registers and grilles too restrictive	Check fan speed. Increase duct size for proper air velocity. Decrease fan speed to obtain proper pressure. Replace with correctly sized registers and grilles.
Rattling or Whistling Noise in Airstream	Loose dampers, grilles, or splitters Obstructed dampers or grilles Sharp elbows in ductwork Sudden expansion /contraction of ductwork Turning vanes loose or not properly installed	Adjust as needed. Remove obstruction(s). Install larger radius elbows. Install proper ductwork transitions. Tighten or adjust as needed.
CFM Lower than System Requirements	Fan rotating backwards Fan speed too slow Duct system has more resistance than designed Diffusers closed	Reverse any two power leads to the fan motor. Check fan RPM. Enlarge ductwork to match system requirements. Open diffusers.
High Current Draw (Motor)	Motor overload Low line voltage	Reduce system load or use larger motor. Consult power company about increasing line voltage.
Electric Heat Inoperative	Electric heater manual reset tripped Broken heating element Electric heater fuses blown Inoperative electric heating circuit contactor Airflow switch interlock not closed	Determine cause of cutout and reset switch. Replace element. Replace fuses. Repair/replace as needed. Check airflow sensing tube location and operation in airstream. Repair/replace as needed.
Heater Cycles	Airflow marginally insufficient	Airflow switch may chatter and cycle heater circuits off and on. Or, automatic reset may open and close, causing a similar situation. Check unit airflow requirements and clean the system.
Improper Temperature Regulation	Intermittent power supply due to improper installation Erratic thermostat operation due to improper location or frequent resetting Air system characteristics are not in accordance with the job requirements	Recheck installation procedure. Check contactor operation and safety cutout switches. Refer to heater wiring diagram. Check thermostat installation instructions. Be certain that the thermostat location is not subjected to adverse temperature changes, such as those caused by opening doors or windows. Check for thermostat tampering. Check the supply-air fan is delivering adequate volume and velocity. Check air system balance. Be certain that heating coils are operating.
No Hot Water or Steam Heat	Defective hot water or steam valve actuator motor Broken control linkage from actuator to valve assembly Defective hot water or steam control valve	Repair/replace as needed. Repair/replace as needed. Repair/replace as needed.

VFD Diagnostics — The drive detects error situations and reports them using:

- the green and red LEDs on the body of the drive (located under the keypad)
- the status LED on the control panel
- the control panel display
- The Fault Word and Alarm Word parameters bits (parameters 0305 to 0309)

The form of the display depends on the severity of the error. The user can specify the severity for many errors by directing the drive to ignore the error situation, report the situation as an alarm, or report the situation as a fault.

FAULTS (RED LED LIT) — The VFD signals that it has detected a severe error, or fault, by:

- enabling the red LED on the drive (LED is either steady or flashing)
- setting an appropriate bit in a Fault Word parameter (0305 to 0307)
- overriding the control panel display with the display of a fault code
- stopping the motor (if it was on)
- sets an appropriate bit in Fault Word parameter 0305-0307

The fault code on the control panel display is temporary. Pressing the MENU, ENTER, UP button or DOWN buttons removes the fault message. The message reappears after a few seconds if the control panel is not touched and the fault is still active.

ALARMS (GREEN LED FLASHING) — For less severe errors, called alarms, the diagnostic display is advisory. For these situations, the drive is simply reporting that it had detected something unusual. In these situations, the drive:

- flashes the green LED on the drive (does not apply to alarms that arise from control panel operation errors)
- sets an appropriate bit in an Alarm Word parameters (0308 or 0309)

- overrides the control panel display with the display of an alarm code and/or name

Alarm messages disappear from the control panel display after a few seconds. The message returns periodically as long as the alarm condition exists.

CORRECTING FAULTS — The recommended corrective action for faults is shown in the Fault Listing Table 31. The VFD can also be reset to remove the fault. If an external source for a start command is selected and is active, the VFD may start immediately after fault reset.

To reset a fault indicated by a flashing red LED, turn off the power for 5 minutes. To reset a fault indicated by a red LED (not flashing), press RESET from the control panel or turn off the power for 5 minutes. Depending on the value of parameter 1604 (FAULT RESET SELECT), digital input or serial communication could also be used to reset the drive. When the fault has been corrected, the motor can be started.

HISTORY — For reference, the last three fault codes are stored into parameters 0401, 0412, 0413. For the most recent fault (identified by parameter 0401), the drive stores additional data (in parameters 0402 through 0411) to aid in troubleshooting a problem. For example, a parameter 0404 stores the motor speed at the time of the fault. To clear the fault history (all of Group 04, Fault History parameters), follow these steps:

1. In the control panel, Parameters mode, select parameter 0401.
2. Press EDIT.
3. Press the UP and DOWN button simultaneously.
4. Press SAVE.

CORRECTING ALARMS — To correct alarms, first determine if the Alarm requires any corrective action (action is not always required). Use Table 32 to find and address the root cause of the problem.

Table 31 — Fault Codes

FAULT CODE	FAULT NAME IN PANEL	DESCRIPTION AND RECOMMENDED CORRECTIVE ACTION
1	OVERCURRENT	Output current is excessive. Check for excessive motor load, insufficient acceleration time (parameters 2202 ACCELER TIME 1, default 30 seconds), or faulty motor, motor cables or connections.
2	DC OVERVOLT	Intermediate circuit DC voltage is excessive. Check for static or transient over voltages in the input power supply, insufficient deceleration time (parameters 2203 DECELER TIME 1, default 30 seconds), or undersized brake chopper (if present).
3	DEV OVERTEMP	Drive heat sink is overheated. Temperature is at or above 115 C (239 F). Check for fan failure, obstructions in the airflow, dirt or dust coating on the heat sink, excessive ambient temperature, or excessive motor load.
4	SHORT CIRC	Fault current. Check for short-circuit in the motor cable(s) or motor or supply disturbances.
5	OVERLOAD	Inverter overload condition. The drive output current exceeds the ratings.
6	DC UNDERVOLT	Intermediate circuit DC voltage is not sufficient. Check for missing phase in the input power supply, blown fuse, or under voltage on main circuit.
7	AI1 LOSS	Analog input 1 loss. Analog input value is less than AI1 FLT LIMIT (3021). Check source and connection for analog input and parameter settings for AI1 FLT LIMIT (3021) and 3001 AI<MIN FUNCTION.
8	AI2 LOSS	Analog input 2 loss. Analog input value is less than AI2 FLT LIMIT (3022). Check source and connection for analog input and parameter settings for AI2 FLT LIMIT (3022) and 3001 AI<MIN FUNCTION.
9	MOT OVERTEMP	Motor is too hot, as estimated by the drive. Check for overloaded motor. Adjust the parameters used for the estimate (3005 through 3009). Check the temperature sensors and Group 35 parameters.
10	PANEL LOSS	Panel communication is lost and either drive is in local control mode (the control panel displays LOC), or drive is in remote control mode (REM) and is parameterized to accept start/stop, direction or reference from the control panel. To correct, check the communication lines and connections. Check parameter 3002 PANEL COMM ERROR, parameters in Group 10: Command Inputs and Group 11: Reference Select (if drive operation is REM).
11	ID RUN FAIL	The motor ID run was not completed successfully. Check motor connections.
12	MOTOR STALL	Motor or process stall. Motor is operating in the stall region. Check for excessive load or insufficient motor power. Check parameters 3010 through 3012.
13	RESERVED	Not used.
14	EXT FAULT 1	Digital input defined to report first external fault is active. See parameter 3003 EXTERNAL FAULT 1.
15	EXT FAULT 2	Digital input defined to report second external fault is active. See parameter 3004 EXTERNAL FAULT 1.
16	EARTH FAULT	The load on the input power system is out of balance. Check for faults in the motor or motor cable. Verify that motor cable does not exceed maximum specified length.
17	UNDERLOAD	Motor load is lower than expected. Check for disconnected load. Check parameters 3013 UNDERLOAD FUNCTION through 3015 UNDERLOAD CURVE.
18	THERM FAIL	Internal fault. The thermistor measuring the internal temperature of the drive is open or shorted. Contact Carrier.
19	OPEX LINK	Internal fault. A communication-related problem has been detected between the OMIO and OINT boards. Contact Carrier.
20	OPEX PWR	Internal fault. Low voltage condition detected on the OINT board. Contact Carrier.
21	CURR MEAS	Internal fault. Current measurement is out of range. Contact Carrier.
22	SUPPLY PHASE	Ripple voltage in the DC link is too high. Check for missing main phase or blown fuse.
23	RESERVED	Not used.
24	OVERSPEED	Motor speed is greater than 120% of the larger (in magnitude) of 2001 MINIMUM SPEED or 2002 MAXIMUM SPEED parameters. Check parameter settings for 2001 and 2002. Check adequacy of motor braking torque. Check applicability of torque control. Check brake chopper and resistor.
25	RESERVED	Not used.
26	DRIVE ID	Internal fault. Configuration block drive ID is not valid.
27	CONFIG FILE	Internal configuration file has an error. Contact Carrier.

Table 31 — Fault Codes (cont)

FAULT CODE	FAULT NAME IN PANEL	DESCRIPTION AND RECOMMENDED CORRECTIVE ACTION
28	SERIAL 1 ERR	Field bus communication has timed out. Check fault setup (3018 COMM FAULT FUNC and 3019 COMM FAULT TIME). Check communication settings (Group 51 or 53 as appropriate). Check for poor connections and/or noise on line.
29	EFB CON FILE	Error in reading the configuration file for the field bus adapter.
30	FORCE TRIP	Fault trip forced by the field bus. See the field bus reference literature.
31	EFB1	Fault code reserved for the EFB (Embedded Field Bus) protocol application. The meaning is protocol dependent.
32	EFB2	Fault code reserved for the EFB protocol application. The meaning is protocol dependent.
33	EFB3	Fault code reserved for the EFB protocol application. The meaning is protocol dependent.
34	MOTOR PHASE	Fault in the motor circuit. One of the motor phases is lost. Check for motor fault, motor cable fault, thermal relay fault (if used), or internal fault.
35	OUTP WIRING	Error in power wiring suspected. Check that input power wired to drive output. Check for ground faults.
101-105	SYSTEM ERROR	Error internal to the drive. Contact Carrier and report the error number.
201-206	SYSTEM ERROR	Error internal to the drive. Contact Carrier and report the error number.
1000	PAR HZRPM	Parameter values are inconsistent. Check for any of the following: 2001 MINIMUM SPEED > 2002 MAXIMUM SPEED 2007 MINIMUM FREQ > 2008 MAXIMUM FREQ 2001 MINIMUM SPEED / 9908 MOTOR NOM SPEED is outside of the range: -128 to +128 2002 MAXIMUM SPEED / 9908 MOTOR NOM SPEED is outside of the range: -128 to +128 2007 MINIMUM FREQ / 9907 MOTOR NOM FREQ is outside of the range: -128 to +128 2008 MAXIMUM FREQ / 9907 MOTOR NOM FREQ is outside of the range: -128 to +128
1001	PAR PFA REFNG	Parameter values are inconsistent. Check that 2007 MINIMUM FREQ is negative, when 8123 PFA ENABLE is active.
1002	PAR PFA IOCNF	Parameter values are inconsistent. The number of programmed PFA relays does not match with Interlock configuration, when 8123 PFA ENABLE is active. Check consistency of RELAY OUTPUT parameters 1401 through 1403, and 1410 through 1412. Check 8117 NR OF AUX MOTORS, 8118 AUTOCHANGE INTERV, and 8120 INTERLOCKS.
1003	PAR AI SCALE	Parameter values are inconsistent. Check that parameter 1301 AI MIN > 1302 AI 1 MAX and that parameter 1304 AI 2 MIN > 1305 AI 2 MAX.
1004	PAR AO SCALE	Parameter values are inconsistent. Check that parameter 1504 AO 1 MIN > 1505 AO 1 MAX and that parameter 1510 AO 2 MIN > 1511 AO 2 MAX.
1005	PAR PCU 2	Parameter values for power control are inconsistent: Improper motor nominal kVA or motor nominal power. Check the following parameters: $1.1 < (9906 \text{ MOTOR NOM CURR} * 9905 \text{ MOTOR NOM VOLT} * 1.73 / \text{PN}) < 2.6$ Where: PN = 1000 * 9909 MOTOR NOM POWER (if units are kW) or PN = 746 * 9909 MOTOR NOM POWER (if units are HP, e.g., in US)
1006	PAR EXT RO	Parameter values are inconsistent. Check the extension relay module for connection and 1410 through 1412 RELAY OUTPUTS 4 through 6 have non-zero values.
1007	PAR FBUS	Parameter values are inconsistent. Check that a parameter is set for field bus control (e.g. 1001 EXT1 COMMANDS = 10 (COMM)), but 9802 COMM PROT SEL = 0.
1008	PAR PFA MODE	Parameter values are inconsistent. The 9904 MOTOR CTRL MODE must be = 3 (SCALAR SPEED), when 8123 PFA ENABLE is activated.
1009	PAR PCU 1	Parameter values for power control are inconsistent or improper motor nominal frequency or speed. Check for both of the following: $1 < (60 * 9907 \text{ MOTOR NOM FREQ} / 9908 \text{ MOTOR NOM SPEED} < 16 \text{ } 0.8 < 9908 \text{ MOTOR NOM SPEED} / (120 * 9907 \text{ MOTOR NOM FREQ} / \text{Motor poles}) < 0.992$
1010	OVERRIDE/PFA CONFLICT	Override mode is enabled and PFA is activated at the same time. This cannot be done because PFA interlocks cannot be observed in the override mode.

Table 32 — Alarm Codes

ALARM CODE	ALARM NAME IN PANEL	DESCRIPTION AND RECOMMENDED CORRECTIVE ACTION
2001	—	Reserved
2002	—	Reserved
2003	—	Reserved
2004	DIR LOCK	The change in direct being attempted is not allowed. Do not attempt to change the direction of motor rotation, or Change parameter 1003 DIRECTION to allow direction change (if reverse operation is safe).
2005	I/O COMM	Field bus communication has timed out. Check fault setup (3018 COMM FAULT FUNC and 3019 COMM FAULT TIME). Check communication settings (Group 51 or 53 as appropriate). Check for poor connections and/or noise on line.
2006	AI1 LOSS	Analog input 1 is lost, or value is less than the minimum setting. Check input source and connections. Check the parameter that sets the minimum (3021) and the parameter that sets the Alarm/Fault operation (3001).
2007	AI2 LOSS	Analog input 2 is lost, or value is less than the minimum setting. Check input source and connections. Check the parameter that sets the minimum (3022) and the parameter that sets the Alarm/Fault operation (3001).
2008	PANEL LOSS	Panel communication is lost and either the VFD is in local control mode (the control panel displays HAND), or the VFD is in remote control mode (AUTO) and is parametrized to accept start/stop, direction or reference from the control panel. To correct, check the communication lines and connections, Parameter 3002 PANEL LOSS, and parameters in groups 10 COMMAND INPUTS and 11 REFERENCE SELECT (if drive operation is REM).
2009	—	Reserved
2010	MOT OVERTEMP	Motor is hot, based on either the VFD estimate or on temperature feedback. This alarm warns that a Motor Overload fault trip may be near. Check for overloaded motor. Adjust the parameters used for the estimate (3005 through 3009). Check the temperature sensors and Group 35 parameters.
2011	UNDERLOAD	Motor load is lower than expected. This alarm warns that a Motor Underload fault trip may be near. Check that the motor and drive ratings match (motor is NOT undersized for the drive). Check the settings on parameters 3013 to 3015.
2012	MOTOR STALL	Motor is operating in the stall region. This alarm warns that a Motor Stall fault trip may be near.
2013*	AUTORESET	This alarm warns that the drive is about to perform an automatic fault reset, which may start the motor. To control automatic reset, use parameter group 31 (AUTOMATIC RESET).
2014*	AUTOCHANGE	This alarm warns that the PFA autochange function is active. To control PFA, use parameter group 81 (PFA) and the Pump Alternation macro.
2015	PFA INTERLOCK	This alarm warns that the PFA interlocks are active, which means that the drive cannot start any motor (when Autochange is used), or a speed regulated motor (when Autochange is not used).
2016	—	Reserved
2017*	OFF BUTTON	This alarm indicates that the OFF button has been pressed.
2018*	PID SLEEP	This alarm warns that the PID sleep function is active, which means that the motor could accelerate when the PID sleep function ends. To control PID sleep, use parameters 4022 through 4026 or 4122 through 4126.
2019	ID RUN	The VFD is performing an ID run.
2020	OVERRIDE	Override mode is activated.
2021	START ENABLE 1 MISSING	This alarm warns that the Start Enable 1 signal is missing. To control Start Enable 1 function, use parameter 1608. To correct, check the digital input configuration and the communication settings.
2022	START ENABLE 2 MISSING	This alarm warns that the Start Enable 2 signal is missing. To control Start Enable 2 function, use parameter 1609. To correct, check the digital input configuration and the communication settings.
2023	EMERGENCY STOP	Emergency stop is activated.

*This alarm is not indicated by a relay output, even when the relay output is configured to indicate alarm conditions (parameter 1401 RELAY OUTPUT = 5 [ALARM] or 16 [FLT/ALARM]).