Installation, Start-Up and Service Instructions

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START-UP CHECKLIST CL-1

Manufacturer reserves the right to discontinue, or change at any time, specifications or designs without notice and without incurring obligations.
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SAFETY CONSIDERATIONS

Air-handling equipment is designed to provide safe and reliable service when 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

Failure to follow these warnings may result in personal injury or death.

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. Electric shock can cause personal injury or death.

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

⚠ WARNING

Failure to follow these warnings may result in personal injury or equipment damage.

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 attempt to handle access covers and removable panels on outdoor units when winds are strong or gusting until you have sufficient help to control them. Make sure panels are properly secured while repairs are being made to a unit.

DO NOT remove access panel fasteners until fan is completely stopped. Pressure developed by a moving fan can cause excessive force against the panel which can injure personnel.

DO NOT work on dampers until their operators are disconnected.

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

⚠ CAUTION

Failure to follow these warnings may result in personal injury or equipment damage.

SECURE drive sheaves with a rope or strap before working on a fan to ensure that rotor cannot free-wheel.

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. Use sheet metal or asbestos cloth to contain sparks. Have a fire extinguisher at hand and ready for immediate use.

INTRODUCTION

Unit Identification — The 39S units are identified by the 18-digit part number listed on the serial plate. The part number describes all component, coil, motor, drive, and control selections.

For further information on unit and component identification, contact your Carrier representative for the ***AHU*Builder**® program. Refer to the 39S Product Data catalog for more information on individual component sections. Refer to Tables 1-4 and Fig. 1-21 for component data.

Table 1 — Physical Data — 39SHK/SHC/SHF Coil and Filter Data

39SH UNIT SIZE	00	01	02	03	04	05	06†	07*	09*	13*	17*
CHILLED WATER											
Nominal Capacity at 400 fpm (cfm)	632	716	800	1224	1612	2000	2492	2916	3832	5500	7084
Face Area (sq ft)	1.58	1.79	2	3.06	4.03	5	6.23	7.29	9.58	13.75	17.71
Coil Connection Size (in. OD sweat)											
4 Row (Qty)	3/4	3/4	3/4	3/4	7/8	1 1/8	1 3/8	1 1/8	1 3/8	1 3/8	1 5/8 (2)
6 Row (Qty)	3/4	3/4	3/4	7/8	1 1/8	1 1/8	1 3/8	1 3/8	1 5/8	1 5/8	1 5/8 (2)
HOT WATER											
Nominal Capacity at 400 fpm (cfm)	632	716	624	956	1612	2000	2220	2688	3544	5348	6640
Face Area (sq ft)	1.58	1.79	1.56	2.39	4.03	5	5.55	6.72	8.86	13.37	16.6
Coil Connection Size (in. OD sweat)											
1 Row	5/8	5/8	5/8	5/8	7/8	7/8	1 1/8	N/A	N/A	N/A	N/A
2 Row (Qty)	7/8	7/8	7/8	7/8	7/8	1 1/8		1 1/8	1 3/8	1 3/8	1 5/8 (2)
4 Row ** **(Qty)**	3/4	3/4	3/4	3/4	7/8	1 1/8		1 1/8	1 3/8	1 3/8	1 5/8 (2)
6 Row ** **(Qty)**	3/4	3/4	3/4	7/8	1 1/8	1 1/8		1 3/8	1 5/8	1 5/8	1 5/8 (2)
DIRECT EXPANSION											
Nominal Capacity at 400 fpm (cfm)	476	716	800	1224	1612	2000	2432	2864	4088	5500	6640
Face Area (sq ft)	1.19	1.79	2.00	3.06	4.03	5	6.08	7.16	10.22	13.75	16.6
Connection Size (in. OD sweat) (Qty)											
Liquid Line	3/8	3/8	3/8	3/8	3/8	5/8	1/2	5/8††, 1/2*** (2)	5/8††, 1/2*** (2)	1/2***(2)	5/8*** (2)
Suction Line	5/8	5/8	3/4	3/4	3/4	1 1/8	7/8	1 1/8††, 7/8*** (2)	1 3/8††, 7/8*** (2)	1 1/8*** (2)	1 3/8*** (2)
STEAM											
Nominal Capacity at 400 fpm (cfm)	632	716	752	1144	1452	1800	N/A	2688	3640	5512	7000
Face Area (sq ft)	1.58	1.79	1.88	2.86	3.63	4.5		6.72	9.1	13.78	17.5
FILTER DATA											
2-in. Pleated MERV 8 Size (in.) (Qty)	12x25*/ 12x29†	12x25*/ 12x29†	16x32*/ 12x35†	16x32*/ 12x35†	20x20 (2)*/ 18x44†	20x20 (2)*/ 18x44†	18x44	16x32 (2) 20x32 (1)	16x32 (2) 20x32 (1)	20x25 (2) 20x20 (4)	16x20 (2) 16x25 (2) 20x20 (2) 20x25 (2)
Nominal Face Area (sq ft)	2.08/ 2.42	2.08/ 2.43	3.56/ 2.92	3.56/ 2.93	5.56/ 5.50	5.56/ 5.50	5.50	11.56	11.56	18.06	22.5
4-in. Pleated MERV 13 Size (in.) (Qty)†	12x29	12x29	12x35	12x35	18x44	18x44	18x44	N/A	N/A	N/A	N/A
Nominal Face Area (sq ft)	2.42	2.42	2.92	2.92	5.50	5.50	5.50	N/A	N/A	N/A	N/A
12-in. HEPA Type A, 99.975%lb.,.3µm Size (in.) (Qty)†	12.5x25x 11.5	12.5x25x 11.5	12.5x31x 11.5	12.5x31x 11.5	18x40 x11.5	18x40 x11.5	18x40 x11.5	N/A	N/A	N/A	N/A
Nominal Face Area (sq ft)	2.17	2.17	2.69	2.69	5.14	5.14	5.14	N/A	N/A	N/A	N/A

* Only 39SHK.
† Only 39SHC, SHF.
** 4 and 6 row hot water coils have the same face area as 4 and 6 row chilled water coils.
†† Single circuited coil.
*** Dual circuited coil.

Table 2 — Physical Data — 39SV Coil and Filter Data

39SV UNIT SIZE	02	03	04	05	07	09
CHILLED WATER						
Nominal Capacity at 400 fpm (cfm)	1200	1200	1600	2000	2932	3668
Face Area (sq ft)	3	3	4	5	7.33	9.17
Coil Connection Size (in. OD sweat)	3/4	3/4	7/8	1 1/8	1 1/8	1 3/8
HOT WATER						
Nominal Capacity at 400 fpm (cfm)	804	804	964	1276	2292	3124
Face Area (sq ft)	2.01	2.01	2.41	3.19	5.73	7.81
Coil Connection Size (in. OD sweat)	7/8	7/8	7/8	1 1/8	1 1/8	1 1/8
DIRECT EXPANSION						
Nominal Capacity at 400 fpm (cfm)	1200	1200	1600	2000	2932	3668
Face Area (sq ft)	3	3	4	5	7.33	9.17
Connection Size (in. OD sweat) (Qty)						
Liquid Line	3/8	3/8	1/2	1/2	5/8	1/2 (2)
Suction Line	3/4	3/4	7/8	1 1/8	1 1/8	7/8 (2)
STEAM						
Nominal Capacity at 400 fpm (cfm)	624	624	688	1268	1750	2452
Face Area (sq ft)	1.56	1.56	1.72	3.17	4.375	6.13
FILTER DATA						
Size (in.) (Qty)	20x20	20x20	22.5x22.5	16x25 (2)	20x25 (4)	20x25 (4)
Nominal Face Area (sq ft)	2.78	2.78	3.52	5.56	13.89	13.89

Table 3 — Physical Data — 39SM Coil and Filter Data

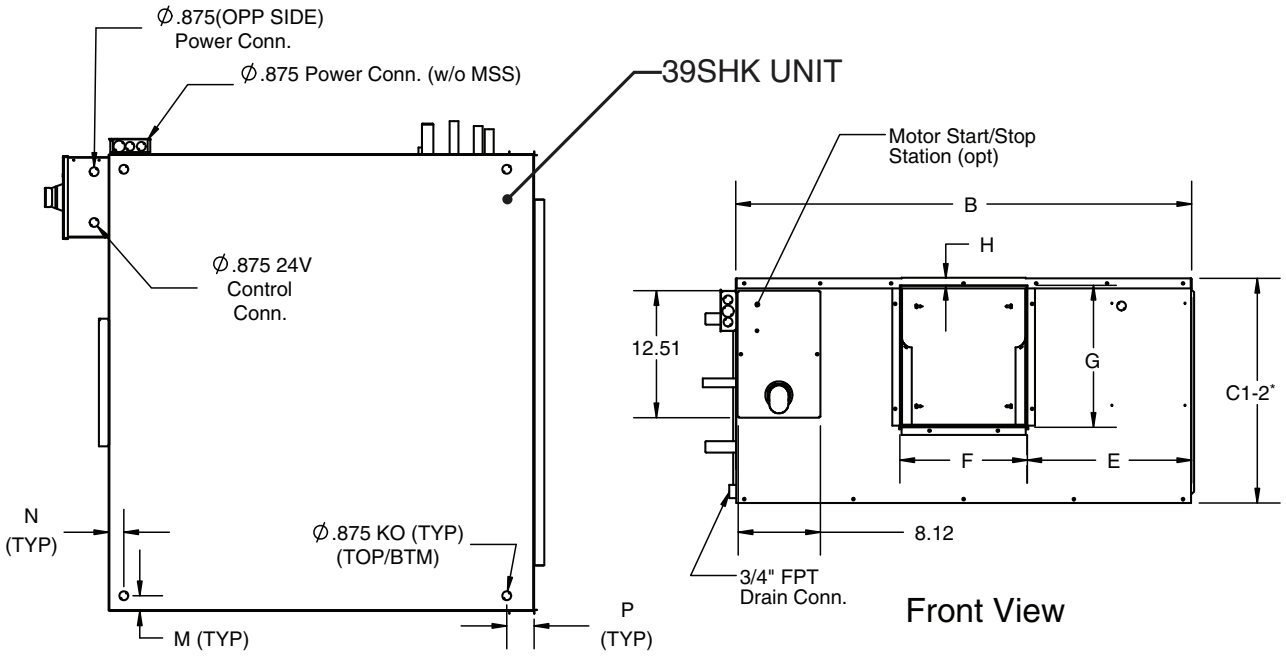
39SM UNIT SIZE	04	05	07	09	13	17
CHILLED WATER						
Nominal Capacity at 400 fpm (cfm)	1668	2084	2776	3332	5000	7084
Face Area (sq ft)	4.17	5.21	6.94	8.33	12.5	17.71
Coil Connection Size (in. OD sweat)						
4 Row (Qty)	7/8	1 1/8	1 1/8	1 3/8	1 3/8	1 5/8 (2)
6 Row (Qty)	1 1/8	1 1/8	1 3/8	1 5/8	1 5/8	1 5/8 (2)
HOT WATER						
Nominal Capacity at 400 fpm (cfm)	1668	2084	2776	3332	5000	7084
Face Area (sq ft)	4.17	5.21	6.94	8.33	12.5	17.71
Coil Connection Size (in. OD sweat)						
2 Row (Qty)	7/8	1 1/8	1 1/8	1 1/8	1 1/8	1 1/8 (2)
4 Row* (Qty)	7/8	1 1/8	1 1/8	1 3/8	1 3/8	1 5/8 (2)
6 Row* (Qty)	1 1/8	1 1/8	1 3/8	1 5/8	1 5/8	1 5/8 (2)
DIRECT EXPANSION						
Nominal Capacity at 400 fpm (cfm)	1668	2000	2668	3332	5000	7000
Face Area (sq ft)	4.17	5	6.67	8.33	12.5	17.5
Connection Size (in. OD sweat)						
Liquid Line	1/2	1/2	5/8	5/8	5/8	5/8 (2)
Suction Line	7/8	1 1/8	1 1/8	1 3/8	1 3/8	1 5/8 (2)
STEAM						
Nominal Capacity at 400 fpm (cfm)	1492	1960	2472	3028	4752	6700
Face Area (sq ft)	3.73	4.9	6.18	7.57	11.88	16.75
FILTER DATA						
Size (in.) (Qty)	20x25 (2)	20x25 (2)	16x25 (4)	16x25 (4)	16x20 (2) 20x20 (2) 16x25 (2) 20x25 (2)	16x20 (2) 20x20 (2) 16x25 (2) 20x25 (2)
Nominal Face Area (sq ft)	6.94	6.94	11.11	11.11	22.5	22.5

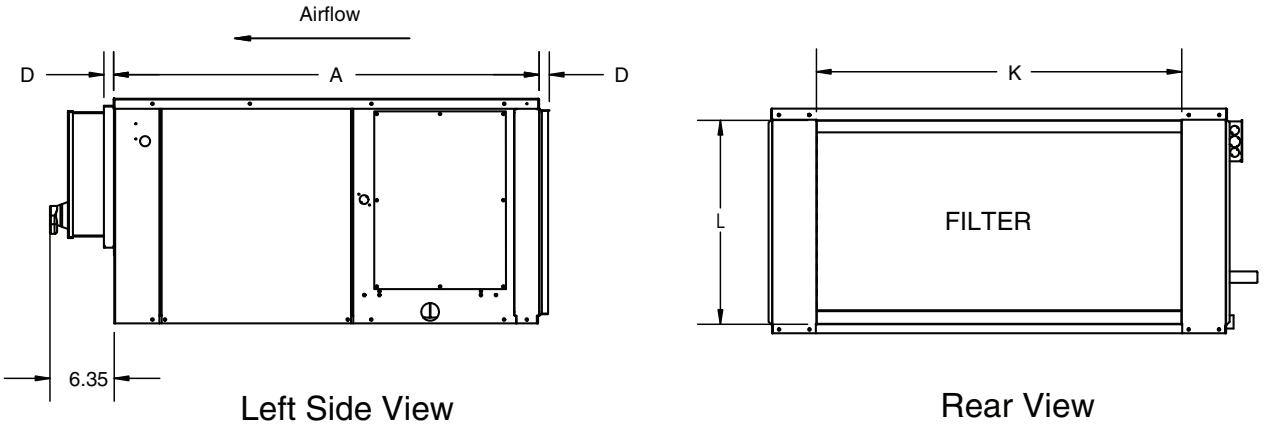
* 4 and 6 row hot water coils have the same face area as 4 and 6 row chilled water coils.

Table 4 — Physical Data — 39SR Coil and Filter Data

39SR UNIT SIZE	02	03	04	05	07	09	13	17
CHILLED WATER								
Nominal Capacity at 400 fpm (cfm)	800	1224	1612	2000	3252	3792	5124	7000
Face Area (sq ft)	2	3.06	4.03	5	8.13	9.48	12.81	17.5
Coil Connection Size (in. OD sweat)								
4 Row	3/4	3/4	7/8	1 1/8	1 3/8	1 3/8	1 3/8	1 3/8
6 Row	3/4	7/8	1 1/8	1 1/8	1 5/8	1 5/8	1 5/8	1 5/8
HOT WATER								
Nominal Capacity at 400 fpm (cfm)	624	956	1612	2000	3252	3792	5124	7000
Face Area (sq ft)	1.56	2.39	4.03	5	8.13	9.48	12.81	17.5
Coil Connection Size (in. OD sweat)								
2 Row	5/8	7/8	7/8	1 1/8	1 1/8	1 1/8	1 3/8	1 1/8
4 Row*	3/4	3/4	7/8	1 1/8	1 3/8	1 3/8	1 3/8	1 3/8
6 Row*	3/4	7/8	1 1/8	1 1/8	1 5/8	1 5/8	1 5/8	1 5/8
DIRECT EXPANSION								
Nominal Capacity at 400 fpm (cfm)	800	1224	1612	2000	3252	3792	5124	7000
Face Area (sq ft)	2	3.06	4.03	5	8.13	9.48	12.81	17.5
Connection Size (in. OD sweat) (Qty)								
Liquid Line	3/8	3/8	1/2	1/2	5/8	5/8	7/8 (2)	7/8 (2)
Suction Line	3/4	3/4	7/8	1 1/8	1 1/8	1 3/8	1 3/8 (2)	1 5/8 (2)
STEAM								
Nominal Capacity at 400 fpm (cfm)	752	1144	1452	1800	3088	3576	4956	6768
Face Area (sq ft)	1.88	2.86	3.63	4.5	7.72	8.94	12.39	16.92
FILTER DATA								
Single Wall Unit, Throwaway Filter Size (in.) (Qty)	16x32	16x32	20x20 (2)	20x20 (2)	16x25 (4)	16x25 (4)	16x20 (3) 16x25 (3)	16x20 (4) 16x25 (4)
Nominal Face Area (sq ft)	3.56	3.56	5.56	5.56	11.11	11.11	15	20
Single Wall Unit, Pleated Filter Size (in.) (Qty)	16x32	16x32	20x24 (1) 16x20 (1)	20x24 (1) 16x20 (1)	16x25 (4)	16x25 (4)	16x20 (3) 16x25 (3)	16x20 (4) 16x25 (4)
Nominal Face Area (sq ft)	3.56	3.56	5.56	5.56	11.11	11.11	15	20
Double Wall Unit, Pleated and Throwaway Filters Size (in.) (Qty)	16x32 (1) 10x10 (3)	16x32 (1) 10x10 (3)	12x25 (1) 12x20 (1) 16x20 (1) 16x25 (1)	12x25 (1) 12x20 (1) 16x20 (1) 16x25 (1)	25x25 (2) 20x25 (2)	25x25 (2) 20x25 (2)	16x24 (3) 29x48 (1)	16x20 (4) 16x32 (4)
Nominal Face Area (sq ft)	5.64	5.64	8.75	8.75	15.63	15.63	17.67	23.11

* 4 and 6 row hot water coils have the same face area as 4 and 6 row chilled water coils.





DIMENSIONS (in.)

39SHK UNIT SIZE	UNIT OUTLINE					BLOWER OPENING OUTLET				RETURN DUCT CONNECTION				
	A	B	C1*	C2*	D	E	F	G	H	K	L	M	N	P
00,01	38.0	28.0	14.1	15.1	1.0	9.6	8.6	10.6	1.0	22.0	12.3	1.6	2.6	3.3
02,03	37.1	36.6	18.1	19.0	1.0	14.1	8.4	10.6	1.0	27.6	16.4	1.5	1.5	2.9
04	42.0	45.0	22.1	23.0	1.0	17.9	9.1	13.8	1.0	36.0	20.0	1.5	1.5	2.7
05	42.0	45.0	22.1	23.0	1.0	14.3	12.5	13.8	1.0	36.0	20.0	1.5	1.5	2.7
07,09	52.5	57.0	34.8	34.8	1.0	21.8	13.4	16.2	9.1	48.0	32.2	2.8	2.8	2.8
13	57.5	67.2	43.0	43.0	N/A	11.4†	16.4† (2)	16.4† (2)	8.0	57.9	40.4	3.7	3.7	3.7
17	57.5	72.3	48.0	48.0	N/A	14.0†	16.4† (2)	16.4† (2)	13.0	66.0	45.7	3.7	3.7	3.7

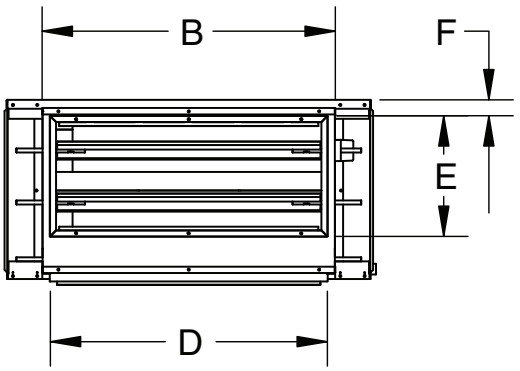
LEGEND

BTM — Bottom
KO — Knockout
w/o MSS — Without Motor Start/Stop Station

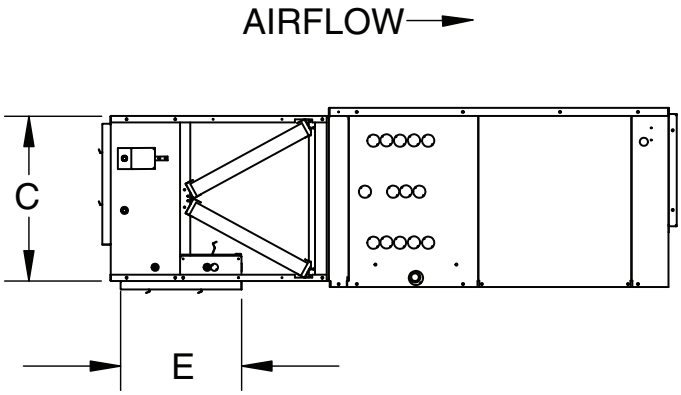
* C1 dimension is for standard unit. C2 dimension is for double-wall units.
† Sizes 13 and 17 are twin blowers. Dimension E is to closest blower. Dimensions F and G are typical for both fan outlets.

NOTES:
1. Dimensions shown in inches.
2. Unit hand is determined by looking into the filters in same direction as airflow. Right hand unit shown for reference.

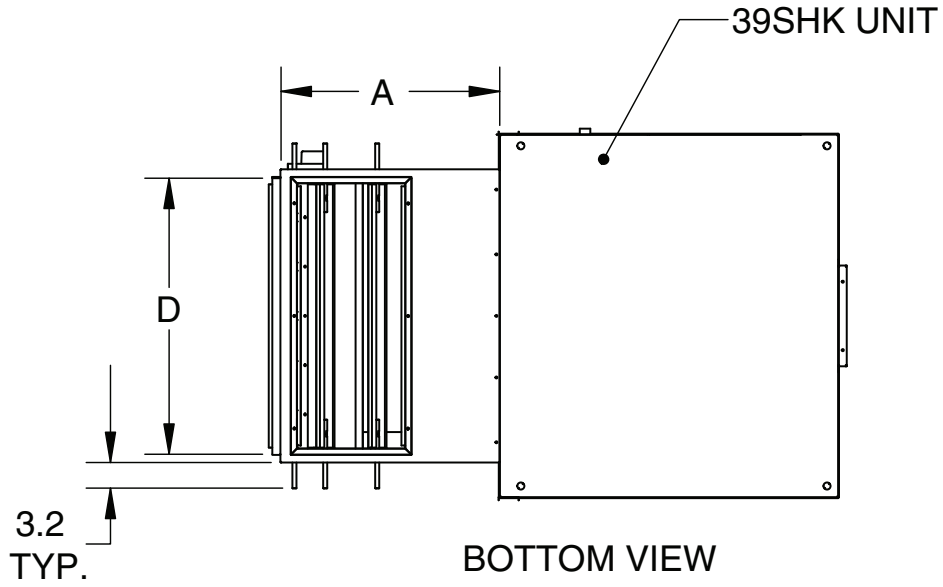
Fig. 1 — 39SHK Unit



REAR VIEW



RIGHT VIEW



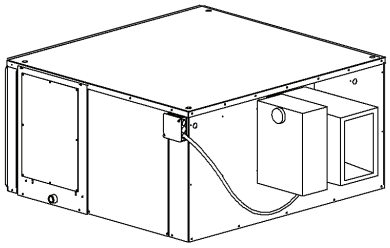
BOTTOM VIEW

DIMENSIONS (in.)

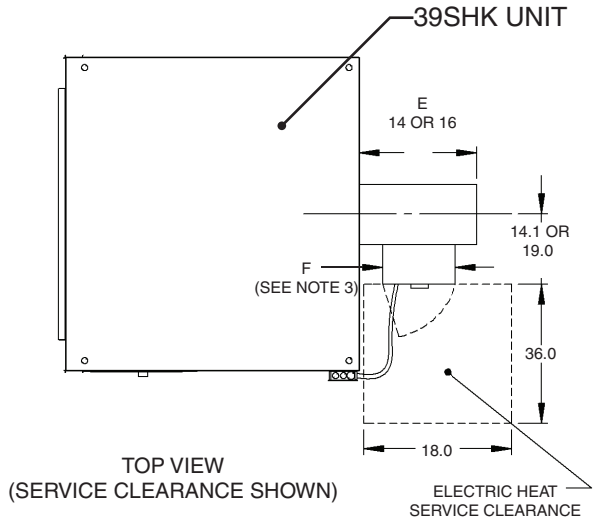
39SHK UNIT SIZE	LENGTH	WIDTH (CENTERED)	HEIGHT (CENTERED)	DUCT WIDTH	DUCT HEIGHT	TOP CLEARANCE	APPROX. SHIPPING WEIGHT	FILTERS	
	A	B	C	D	E	F	lb	Size	Qty
00,01	22.1	22.1	12.3	20.4	7.6	2.0	40	14x20x2	2
02,03	27.0	27.7	16.4	25.9	11.6	2.0	90	16x25x2	2
04,05	27.0	36.2	20.4	34.3	15.0	2.0	140	16x32x2	2
07,09	32.0	48.2	32.4	46.3	15.0	9.7	200	20x24x2	4
13	36.0	58.0	40.3	56.0	16.0	13.2	260	20x25x2 16x25x2	4 2
17	40.0	66.2	45.0	64.3	16.0	15.5	320	30x20x2	6

NOTES:
1. 39SHK unit shown for reference.
2. Not all components shown for clarity.
3. Optional actuator shown for reference.
4. Dimensions shown in inches.

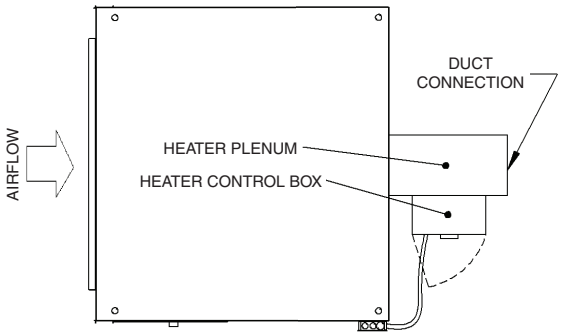
Fig. 2 — 39SHK Mixing Box



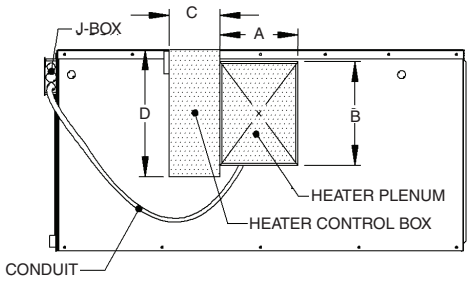
ISOMETRIC VIEW



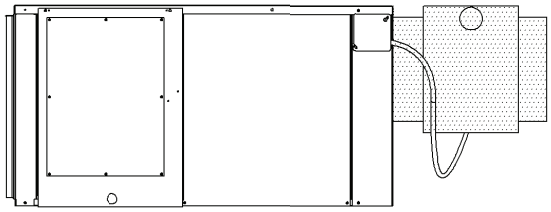
TOP VIEW
(SERVICE CLEARANCE SHOWN)



TOP VIEW



FRONT VIEW



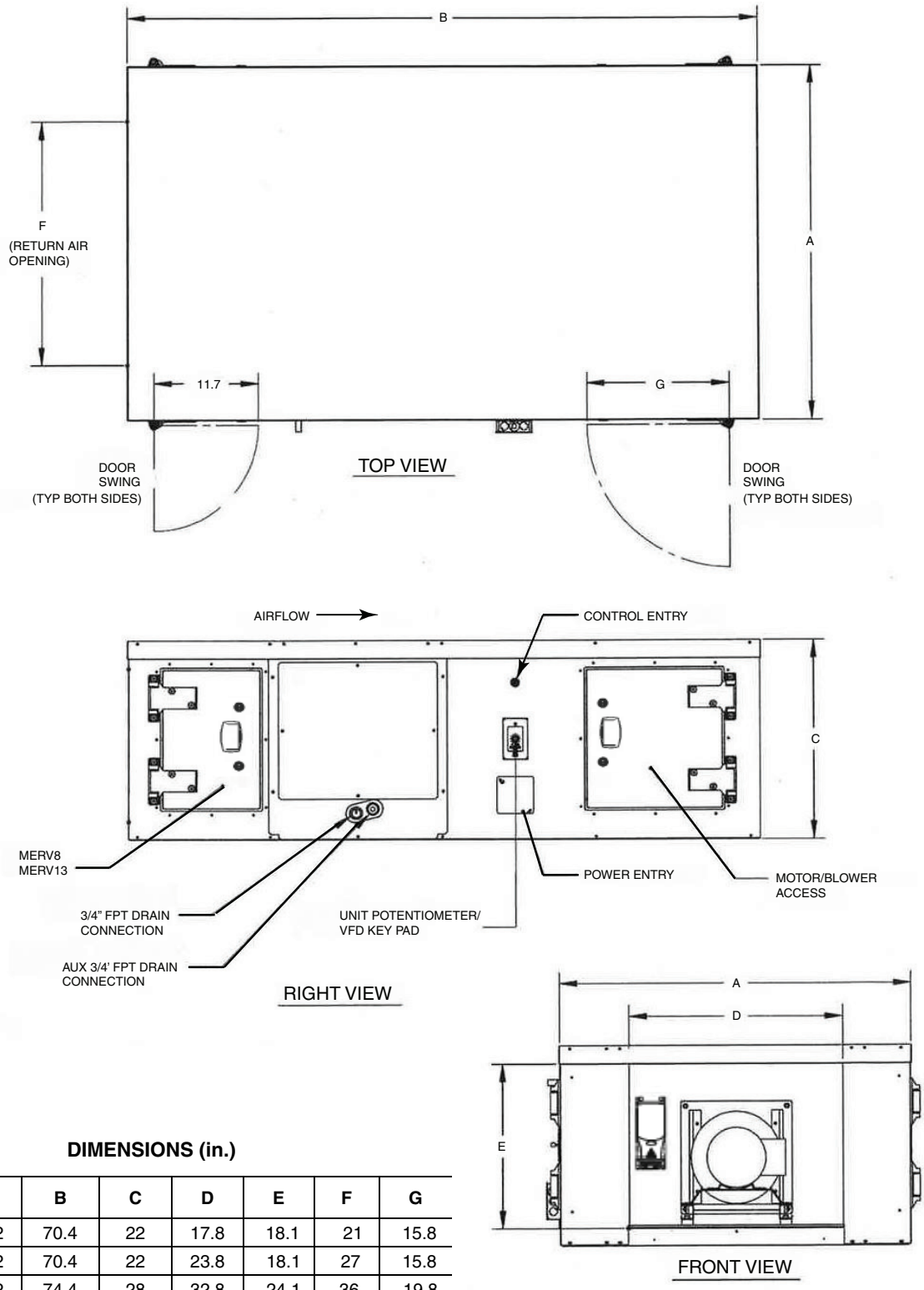
RIGHT VIEW

DIMENSIONS (in.)

39SHK UNIT SIZE	HEATER PLENUM		HEATER CONTROL BOX	
	A	B	C	D
00,01	8.6	10.6	5.5	14.0
02,03	8.6	10.6	5.5	17.0
04	9.3	13.9	5.5	17.0
05	12.6	13.9	5.5	21.0
07,09	13.4	16.2	5.5	23.0

NOTES:
1. Dimensions shown in inches.
2. Unit with right-hand electric heat is shown for reference. Left hand unit is similar, but with control box on opposite side.
3. Dimension F will be 11.5 in. if dimension E is 14 in., or 14 in. if dimension E is 16 in.

Fig. 3 — 39SHK Electric Heat

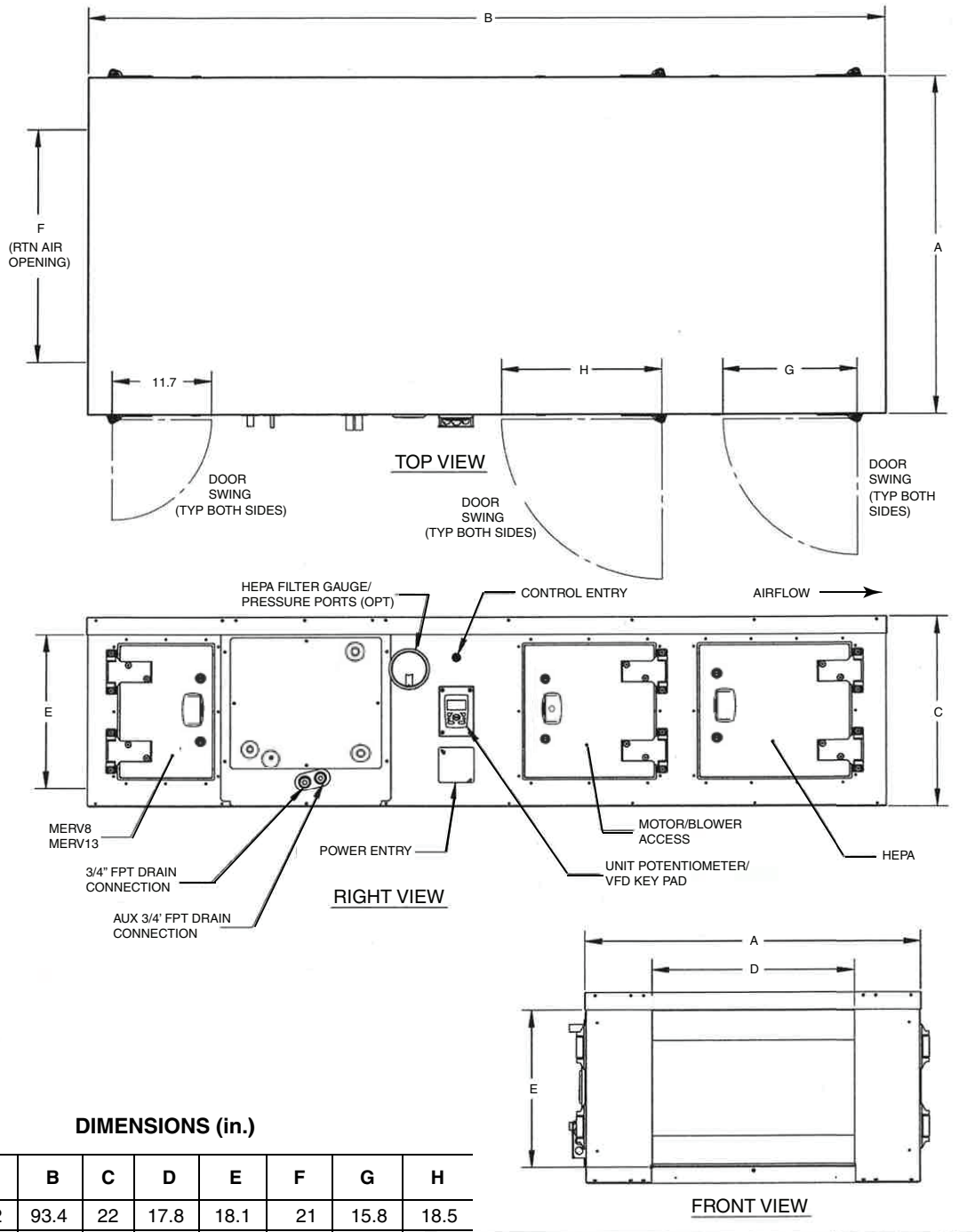


DIMENSIONS (in.)

39SHC UNIT SIZE	A	B	C	D	E	F	G
00, 01	33.2	70.4	22	17.8	18.1	21	15.8
02, 03	39.2	70.4	22	23.8	18.1	27	15.8
04, 05	48.2	74.4	28	32.8	24.1	36	19.8
06	48.2	74.4	28	32.8	24.1	36	19.8

NOTES:
1. Dimensions shown in inches.
2. Unit potentiometer may be relocated by others in field.
3. Coil connections shown for reference only.

Fig. 4 — 39SHC Unit

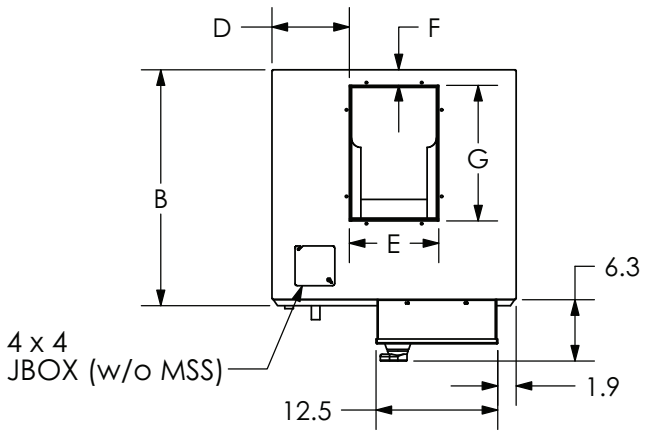


DIMENSIONS (in.)

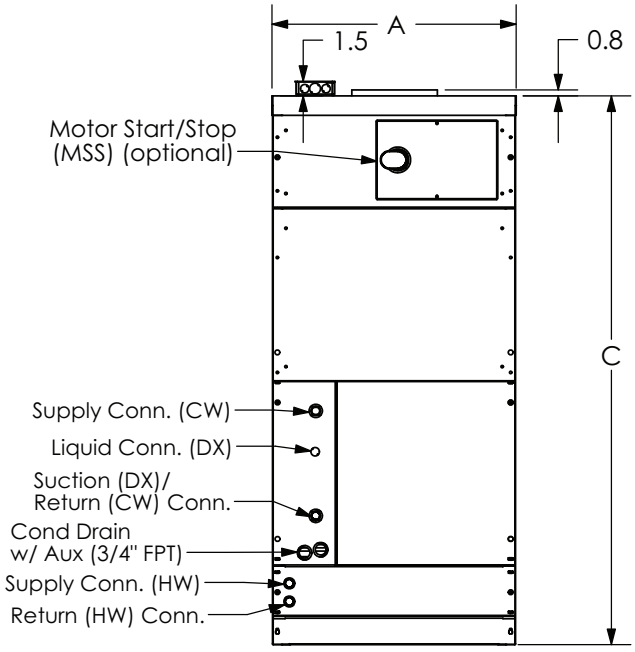
39SHF UNIT SIZE	A	B	C	D	E	F	G	H
00,01	33.2	93.4	22	17.8	18.1	21	15.8	18.5
02,03	39.2	93.4	22	23.8	18.1	27	15.8	18.5
04,05	48.2	97.5	28	32.8	24.1	36	19.8	18.6
06	48.2	97.5	28	32.8	24.1	36	19.8	18.6

NOTES:
1. Dimensions shown in inches.
2. Unit potentiometer may be relocated by others in field.
3. Coil connections shown for reference only.

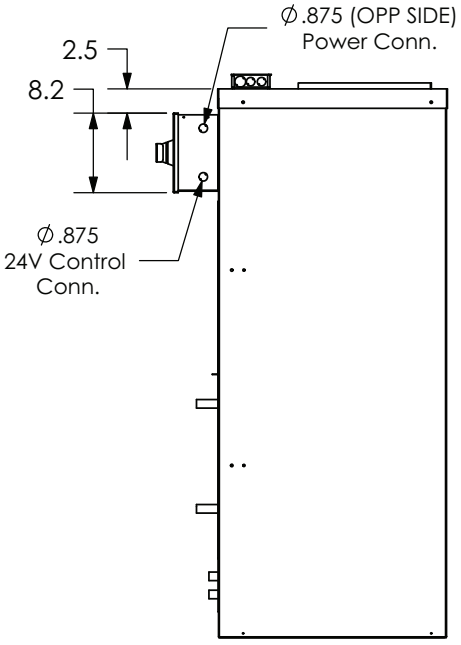
Fig. 5 — 39SHF Unit



Top View



Front View



Right View

DIMENSIONS (in.)

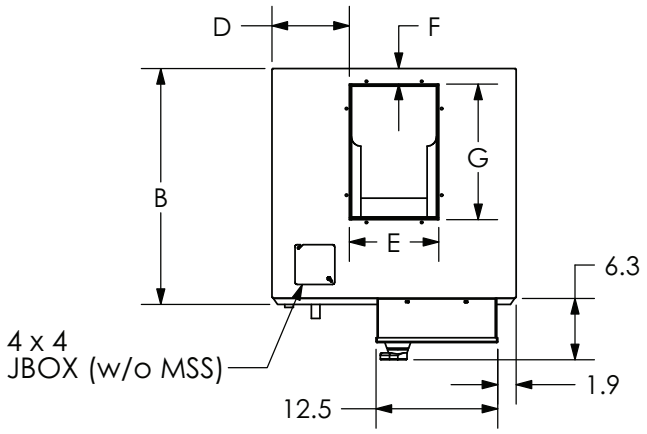
39SV UNIT SIZE	WIDTH	DEPTH	HEIGHT	SUPPLY DUCT				CONNECTION SIZES (OD)		
	A	B	C	D	E	F	G	CW SUPPLY-RETURN	HW SUPPLY-RETURN	DX LIQUID-SUCTION
02	22.3	24.0	50.0	6.9	8.5	3.0	11.8	3/4 - 3/4	7/8 - 7/8	3/8 - 3/4
03	22.3	24.0	50.0	6.9	8.5	3.0	11.8	3/4 - 3/4	7/8 - 7/8	3/8 - 3/4
04	25.1	24.3	56.5	8.0	9.1	1.6	13.9	7/8 - 7/8	7/8 - 7/8	1/2 - 7/8
05	29.5	26.0	59.5	8.4	12.6	1.3	13.9	1 1/8 - 1 1/8	1 1/8 - 1 1/8	1/2 - 1 1/8

LEGEND

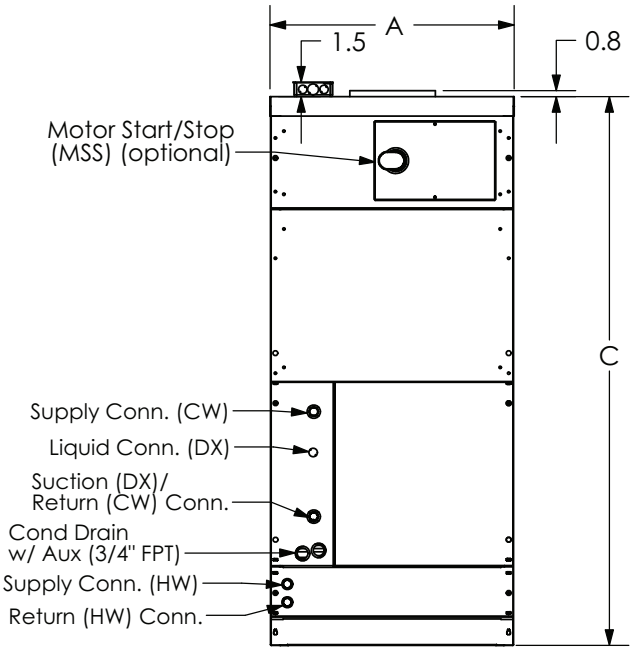
CW — Chilled Water
DX — Direct Expansion
HW — Hot Water
JBOX — Junction Box
MSS — Motor Start/Stop Station
w/o — Without

NOTE: Measurements shown in inches.

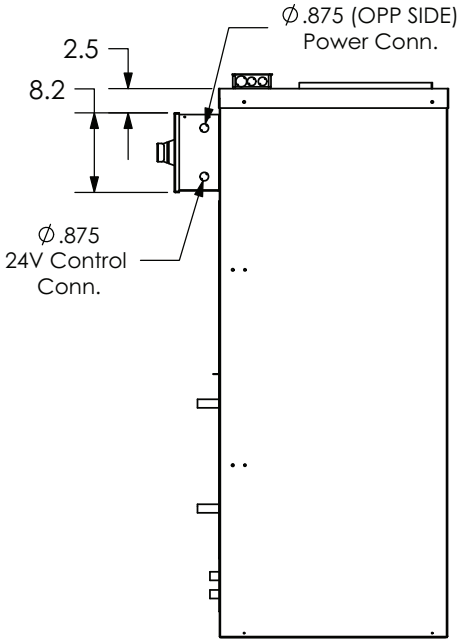
Fig. 6 — 39SV Unit Sizes 02-05 — Pre-Heat



Top View



Front View



Right View

DIMENSIONS (in.)

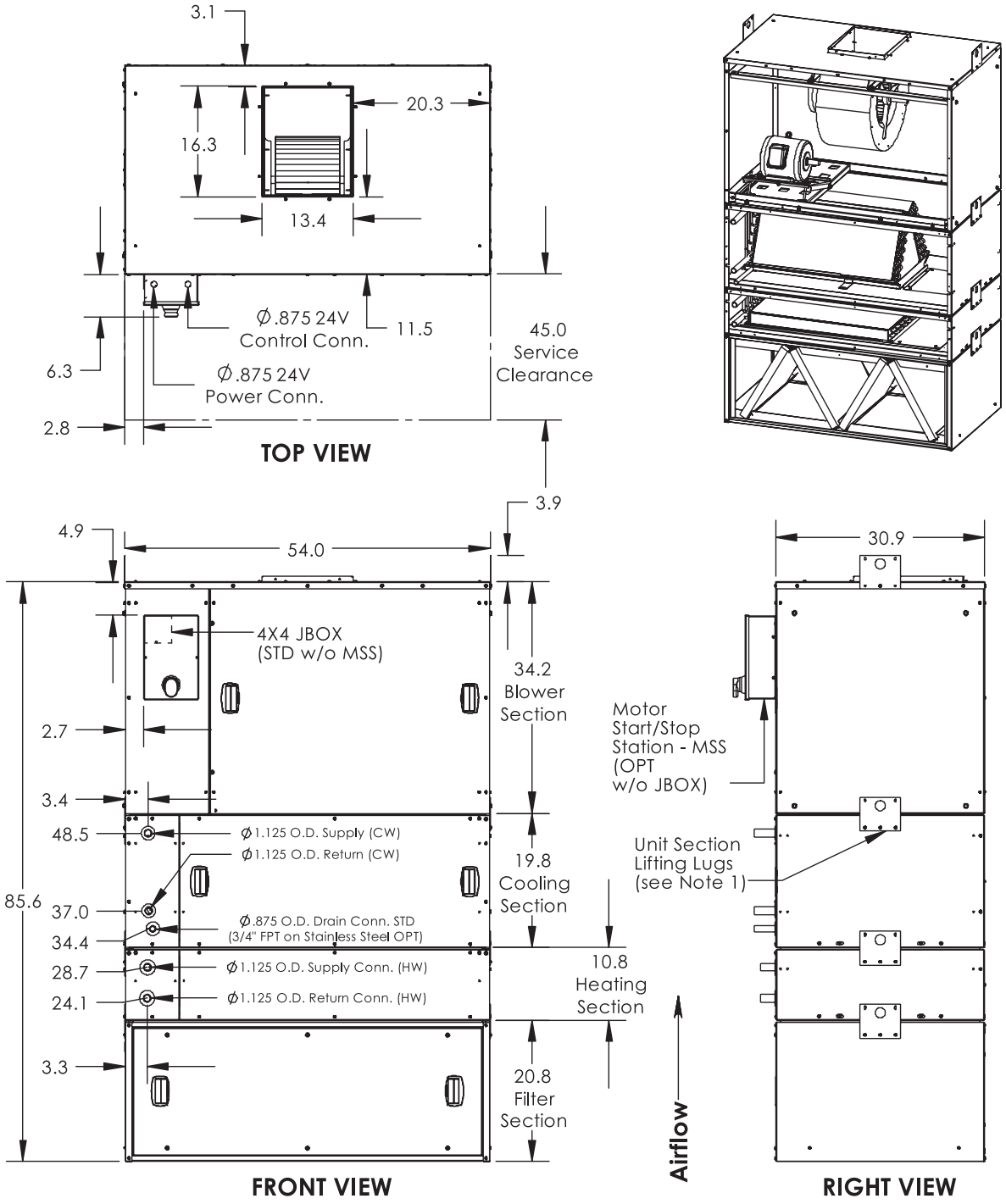
39SV UNIT SIZE	WIDTH	DEPTH	HEIGHT	SUPPLY DUCT				CONNECTION SIZES (OD)		
	A	B	C	D	E	F	G	CW Supply-Return	HW Supply-Return	DX Supply-Return
02	22.3	24.0	50.0	6.9	8.5	3.0	11.8	3/4 - 3/4	7/8 - 7/8	3/8 - 3/4
03	22.3	24.0	50.0	6.9	8.5	3.0	11.8	3/4 - 3/4	7/8 - 7/8	3/8 - 3/4
04	25.1	24.3	56.5	8.0	9.1	1.6	13.9	7/8 - 7/8	7/8 - 7/8	1/2 - 7/8
05	29.5	26.0	59.5	8.4	12.6	1.3	13.9	1 1/8 - 1 1/8	1 1/8 - 1 1/8	1/2 - 1 1/8

LEGEND

CW — Chilled Water
DX — Direct Expansion
HW — Hot Water
MSS — Motor Start/Stop Station
w/o — Without

NOTE: Dimensions shown in inches.

Fig. 7 — 39SV Unit Size 02-05 — Pre-Heat

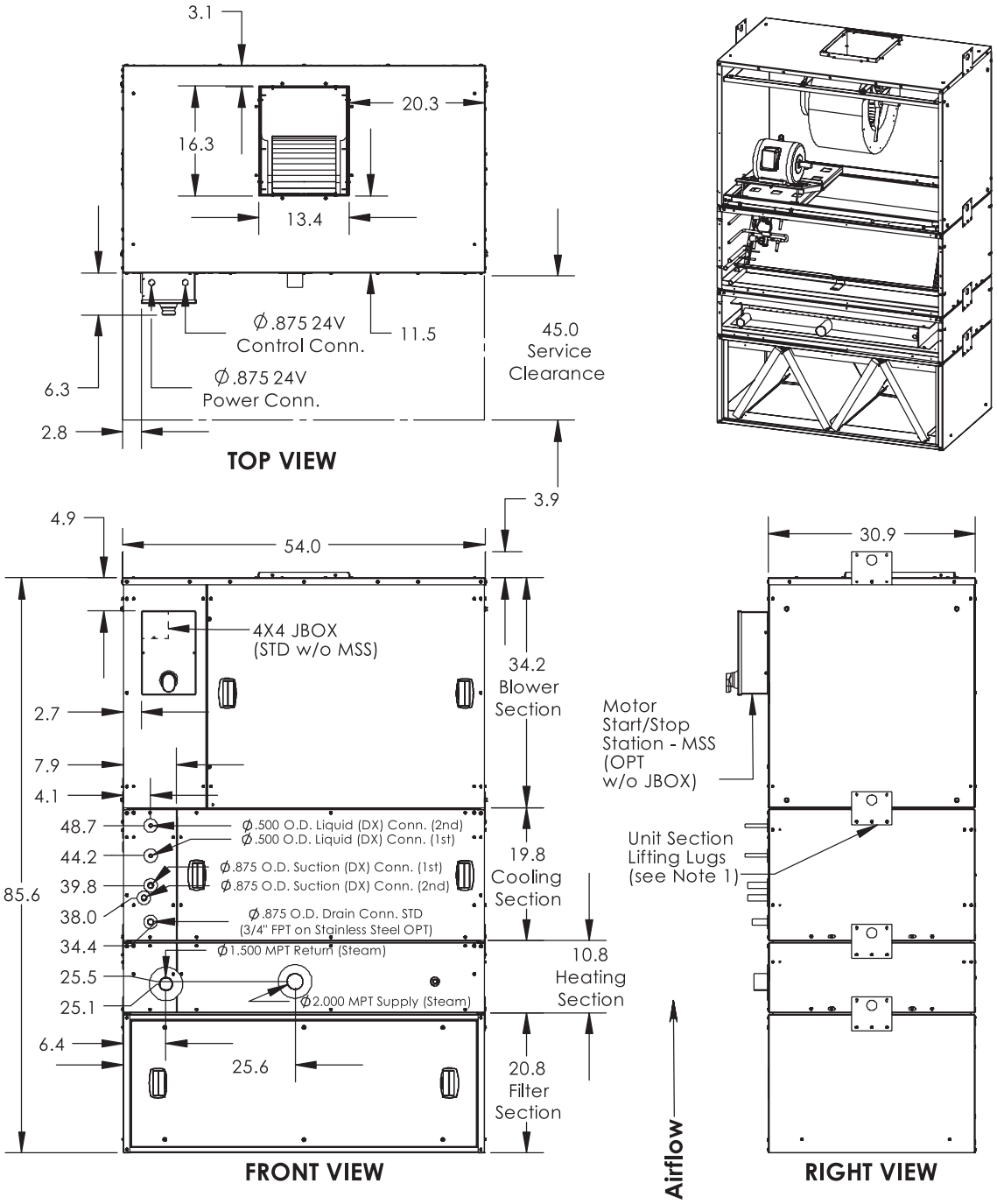


LEGEND

CW	— Chilled Water	**MSS**	— Motor Start/Stop Station
HW	— Hot Water	**w/o**	— Without
JBOX	— Junction Box		

NOTES:
1. Unit section lifting lugs (shipped loose) for lifting sections only. Do not use lifting lugs for lifting unit assembly. Top lifting lugs may be removed after unit is secured at job site.
2. All sections shall be shipped loose and field installed by customer.
3. Dimensions shown in inches.

Fig. 8 — 39SV Unit Size 07 — Pre-Heat

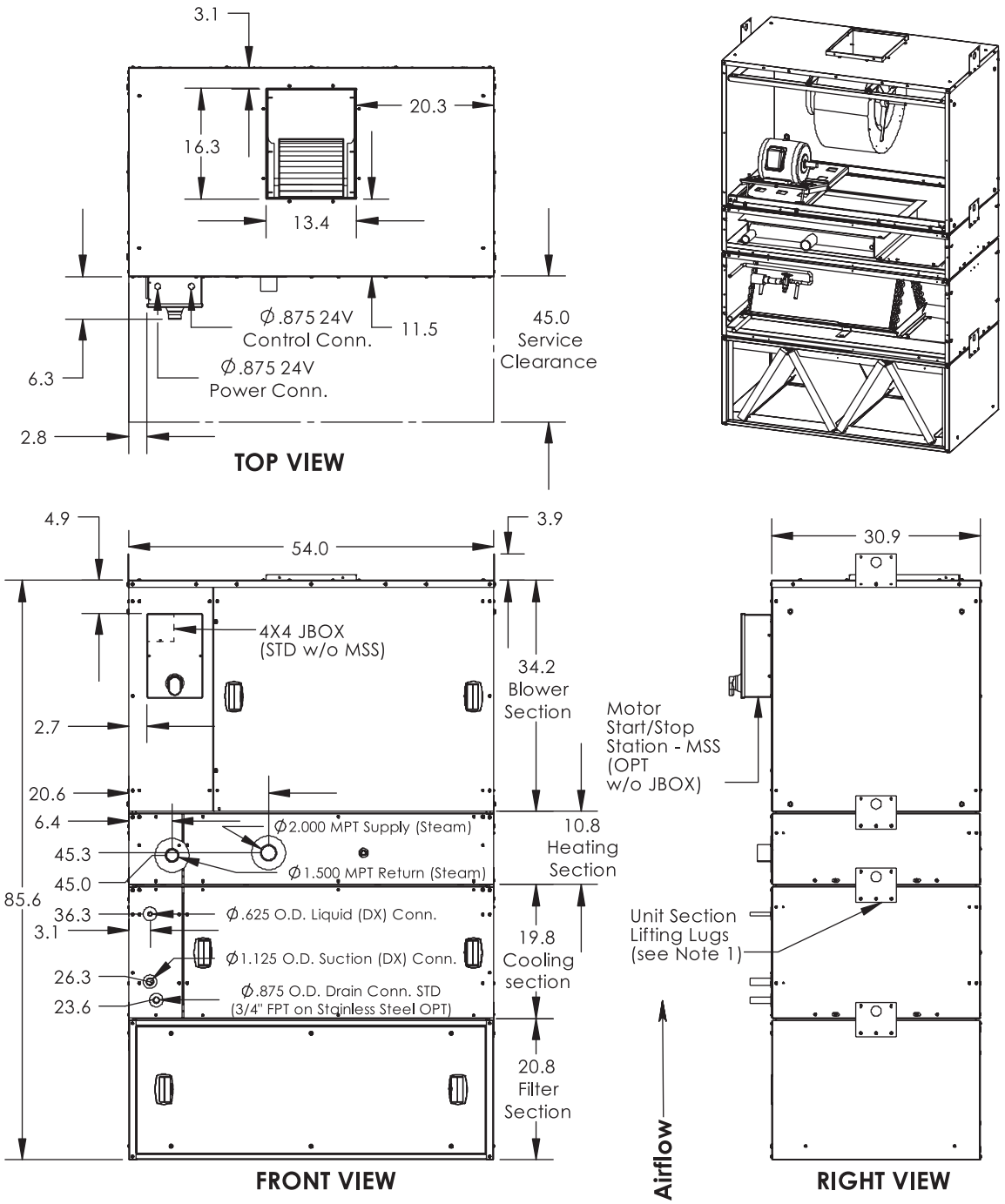


LEGEND

DX — Direct Expansion
JBOX — Junction Box
MSS — Motor Start/Stop Station
w/o — Without

NOTES:
1. Unit section lifting lugs (shipped loose) for lifting sections only. Do not use lifting lugs for lifting unit assembly. Top lifting lugs may be removed after unit is secured at job site.
2. All sections shall be shipped loose and field installed by customer.
3. Dimensions shown in inches.

Fig. 9 — 39SV Unit Size 09 — Pre-Heat

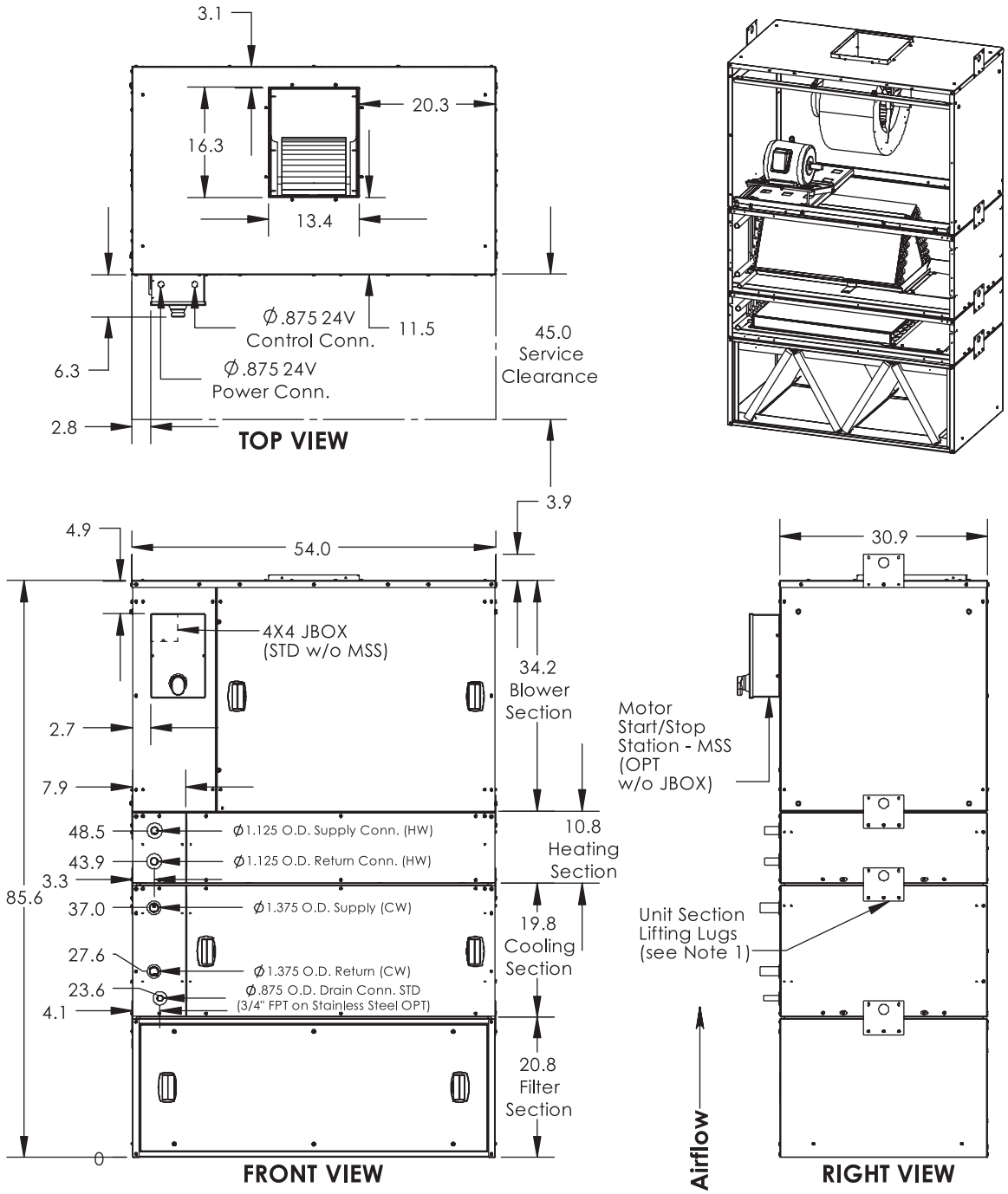


LEGEND

DX — Direct Expansion
JBOX — Junction Box
MSS — Motor Start/Stop Station
w/o — Without

NOTES:
1. Unit section lifting lugs (shipped loose) for lifting sections only. Do not use lifting lugs for lifting unit assembly. Top lifting lugs may be removed after unit is secured at job site.
2. All sections shall be shipped loose and field installed by customer.
3. Dimensions shown in inches.

Fig. 10 — 39SV Unit Size 07 — Re-Heat

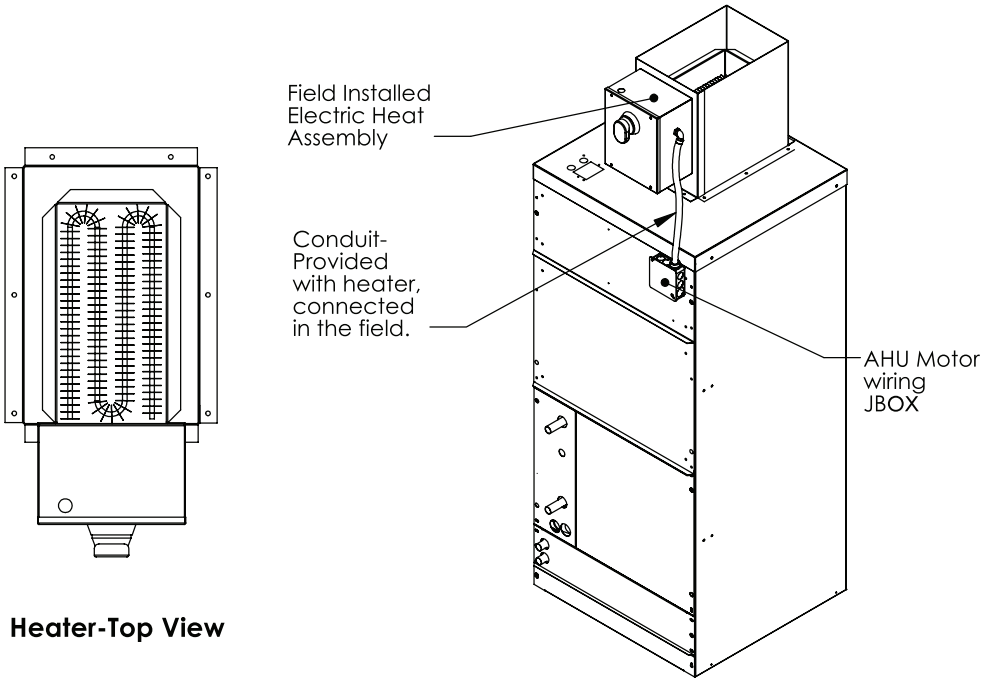


LEGEND

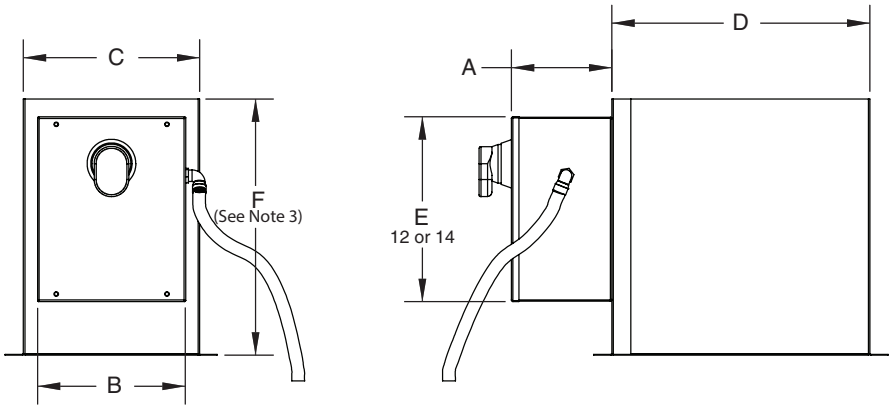
CW	— Chilled Water	**MSS**	— Motor Start/Stop Station
HW	— Hot Water	**w/o**	— Without
JBOX	— Junction Box		

NOTES:
1. Unit section lifting lugs (shipped loose) for lifting sections only. Do not use lifting lugs for lifting unit assembly. Top lifting lugs may be removed after unit is secured at job site.
2. All sections shall be shipped loose and field installed by customer.
3. Dimensions shown in inches.

Fig. 11 — 39SV Unit Size 09 — Re-Heat



Heater-Top View



Heater-Front View

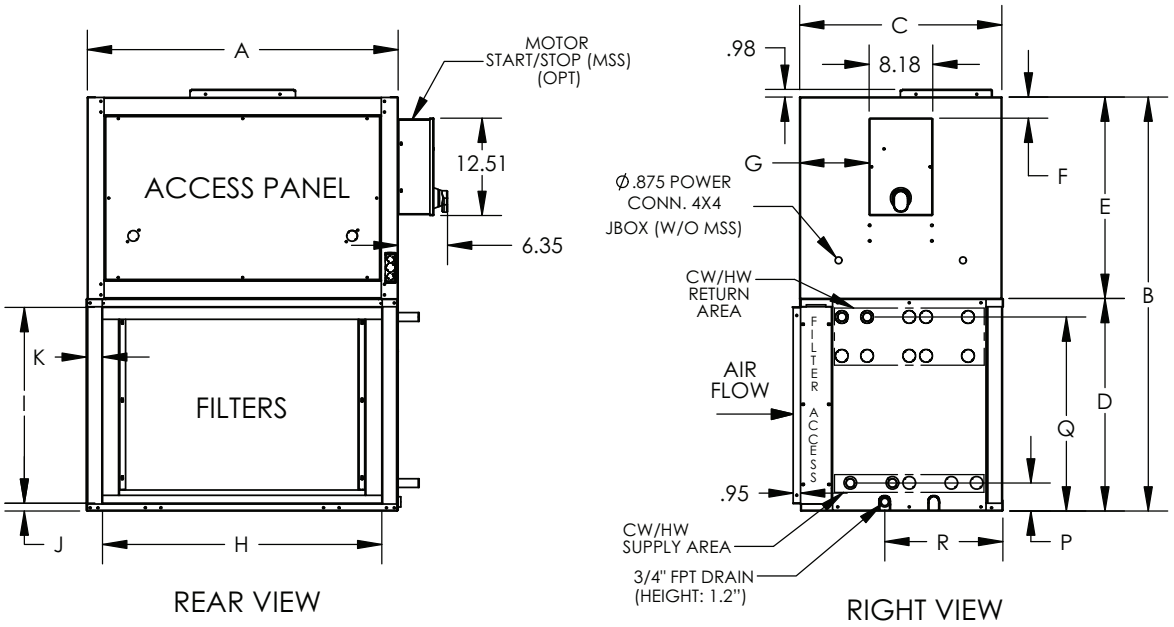
Heater-Right View

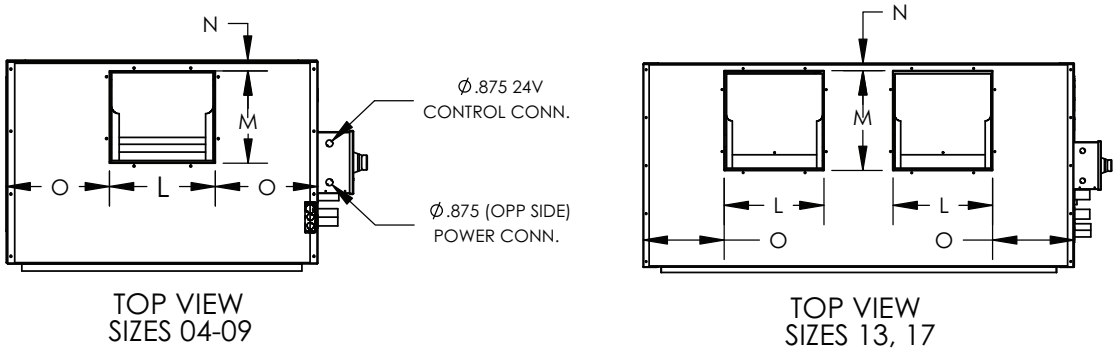
DIMENSIONS (in.)

39SV UNIT SIZE	HEATER CONTROL BOX		HEATER PLENUM	
	A	B	C	D
02,03	5.5	20.0	8.8	12.1
04	5.5	22.0	9.3	14.1
05	5.5	24.0	13.1	14.4
07,09	5.5	24.0	13.6	16.5

NOTES:
1. Dimensions shown in inches.
2. Heater footprint is totally contained within the 39SV unit footprint.
3. Dimension F will be 14 in. if dimension E is 12 in., or 16 in. if dimension E is 14 in.

Fig. 12 — 39SV Field-Installed Electric Heat





DIMENSIONS (in.)

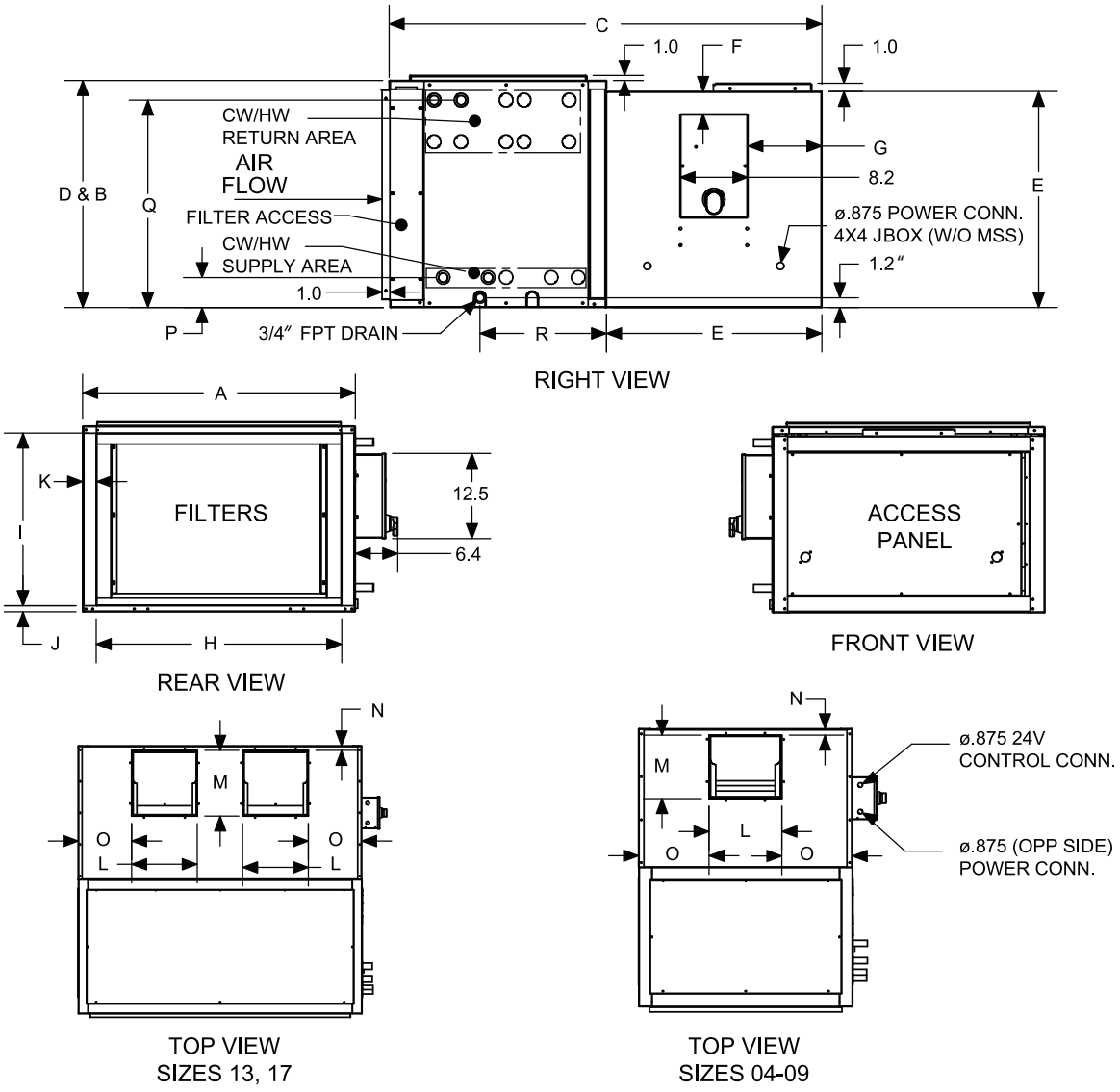
39SM UNIT SIZE	WIDTH	HEIGHT	DEPTH	COIL SECTION	BLOWER SECTION	MOTOR START/STOP (OPT.)		RETURN DUCT				SUPPLY DUCT (BLOWER OPENING)				SUPPLY CONN.	RETURN CONN.	DRAIN
	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
04	40.0	53.5	26.0	27.5	26.0	2.8	9.0	36.0	25.5	1.0	2.0	13.6	11.9	1.1	13.1	3.6	20.0	15.2
05	40.0	53.5	26.0	27.5	26.0	2.8	9.0	36.0	25.5	1.0	2.0	13.6	11.9	1.1	13.1	3.6	25.0	15.2
07	50.0	68.5	34.0	34.5	34.0	6.8	13.0	48.0	32.0	1.0	1.0	13.4	16.2	1.2	18.3	3.6	25.0	22.5
09	50.0	68.5	34.0	34.5	34.0	6.8	13.0	48.0	32.0	1.0	1.0	13.4	16.2	1.2	18.3	3.6	30.0	22.5
13	72.0	81.5	34.0	47.5	34.0	6.7	13.0	66.0	45.0	2.0	6.0	16.4	16.4	1.1	14.0	3.6	30.0	23.0
17	72.0	81.5	34.0	47.5	34.0	6.7	13.0	66.0	45.0	2.0	6.0	16.4	16.4	1.1	14.0	3.6	42.6	23.0

LEGEND

CW — Chilled Water
HW — Hot Water
JBOX — Junction Box
w/o MSS — Without Motor Start/Stop Station

NOTES:
1. Dimensions shown in inches.
2. Hand connections are defined by looking at the filters in the direction of airflow.
3. Coil section and blower ship separately and are installed by others.
4. Blower section may be rotated 180 degrees to relocate supply duct.
5. See Fig. 24 for 39SM modular configurations.

Fig. 13 — 39SM Unit Sizes 04-17 (Vertical Configuration)



DIMENSIONS (in.)

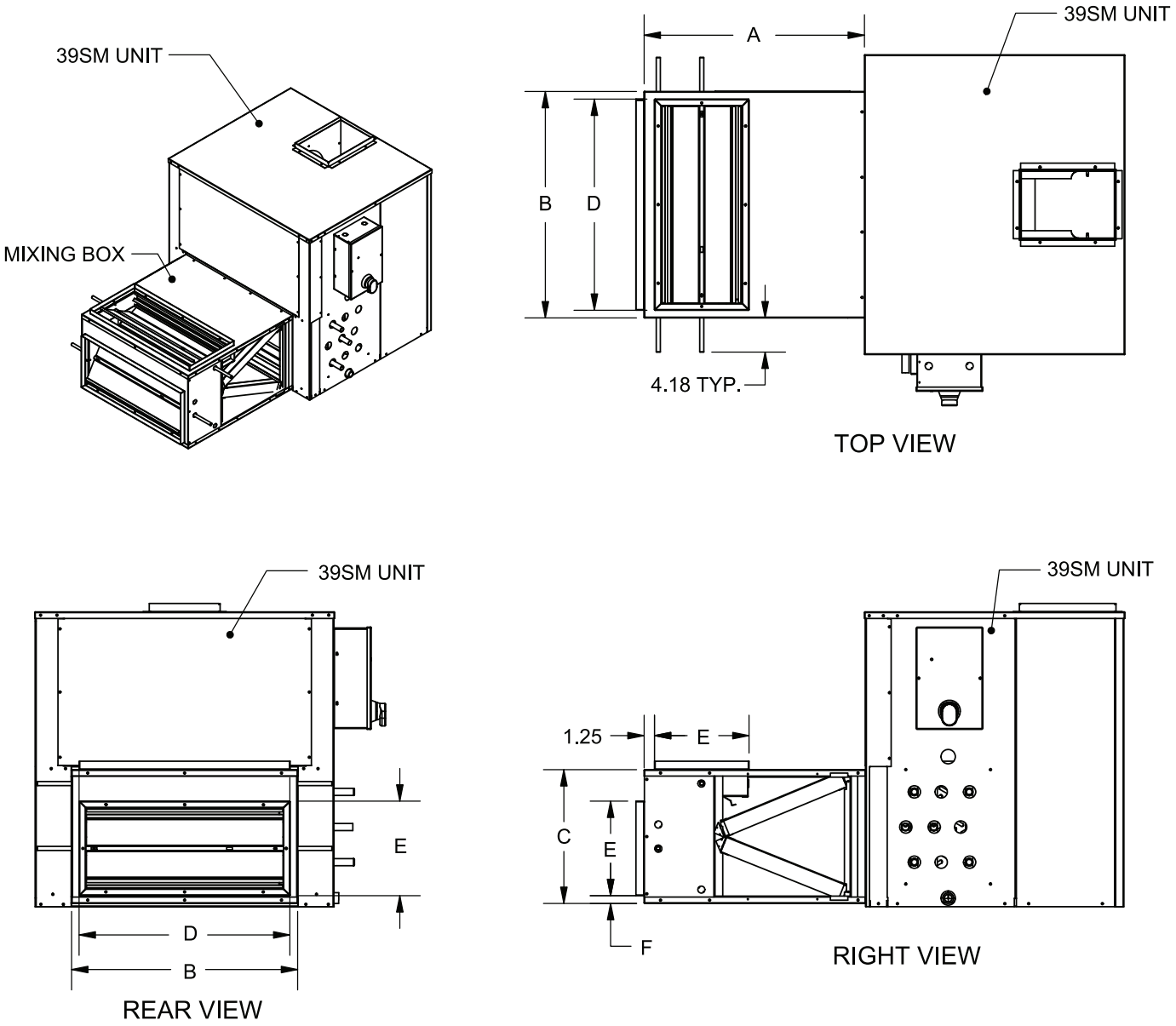
39SM UNIT SIZE	WIDTH	HEIGHT	DEPTH	COIL SECTION	BLOWER SECTION	MOTOR START/STOP (OPT.)		RETURN DUCT				SUPPLY DUCT (BLOWER OPENING)				SUPPLY CONN.	RETURN CONN.	DRAIN
	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
04	40.0	27.5	52.0	27.5	26.0	2.7	8.9	36.0	25.5	1.0	2.0	13.6	11.9	1.1	13.1	3.6	20.0	15.2
05	40.0	27.5	52.0	27.5	26.0	2.7	8.9	36.0	25.5	1.0	2.0	13.6	11.9	1.1	13.1	3.6	25.0	15.2
07	50.0	34.5	68.0	34.5	34.0	6.8	12.9	48.0	32.0	1.0	1.0	13.4	16.2	1.2	18.3	3.6	25.0	22.5
09	50.0	34.5	68.0	34.5	34.0	6.8	12.9	48.0	32.0	1.0	1.0	13.4	16.2	1.2	18.3	3.6	30.0	22.5
13	72.0	47.5	68.0	47.5	34.0	6.7	12.9	66.0	45.0	1.0	2.9	16.4	16.4	1.1	14.0	3.6	30.0	23.0
17	72.0	47.5	68.0	47.5	34.0	6.7	12.9	66.0	45.0	1.0	2.9	16.4	16.4	1.1	14.0	3.6	42.6	23.0

LEGEND

CW — Chilled Water
HW — Hot Water
JBOX — Junction Box
w/o MSS — Without Motor Start/Stop Station

NOTES:
1. Dimensions shown in inches.
2. Hand connections are defined by looking at the filters in the direction of airflow.
3. Coil section and blower ship separately and are installed by others.
4. Blower section may be rotated 180 degrees to relocate supply duct.
5. See Fig. 24 for 39SM modular configurations.

Fig. 14 — 39SM Unit Sizes 04-17 (Horizontal Configuration)

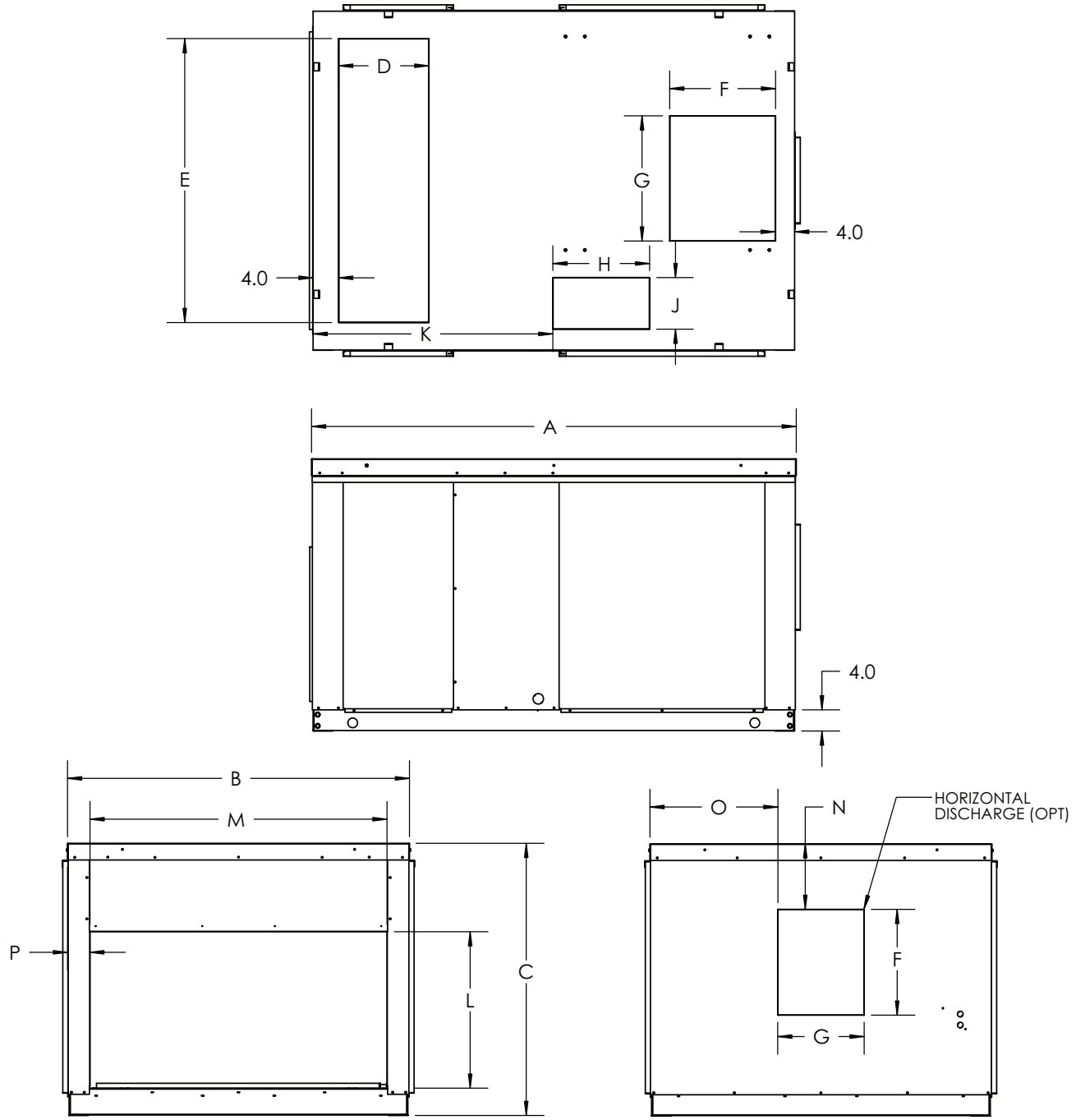


DIMENSIONS (in.)

39SM UNIT SIZE	LENGTH	WIDTH	HEIGHT	DUCT WIDTH	DUCT HEIGHT	TOP CLEARANCE	FILTERS	
	A	B	C	D	E	F	SIZE	QTY
04, 05	27.0	36.2	25.5	34.3	15.0	2.0	16 x 32 x 2	2
07, 09	32.0	48.2	32.4	46.3	15.0	9.7	20 x 24 x 2	4
13, 17	40.0	66.2	45.0	64.3	16.0	15.5	30 x 20 x 2	6

NOTES:
1. Dimensions shown in inches.
2. 39SM unit shown for reference only.
3. Not all components shown for clarity.
4. Optional actuator not shown.
5. Top and rear inlets shown. Bottom and rear inlets are also available.
6. See Fig. 24 for 39SM modular configurations.

Fig. 15 — 39SM Unit — Mixing Box

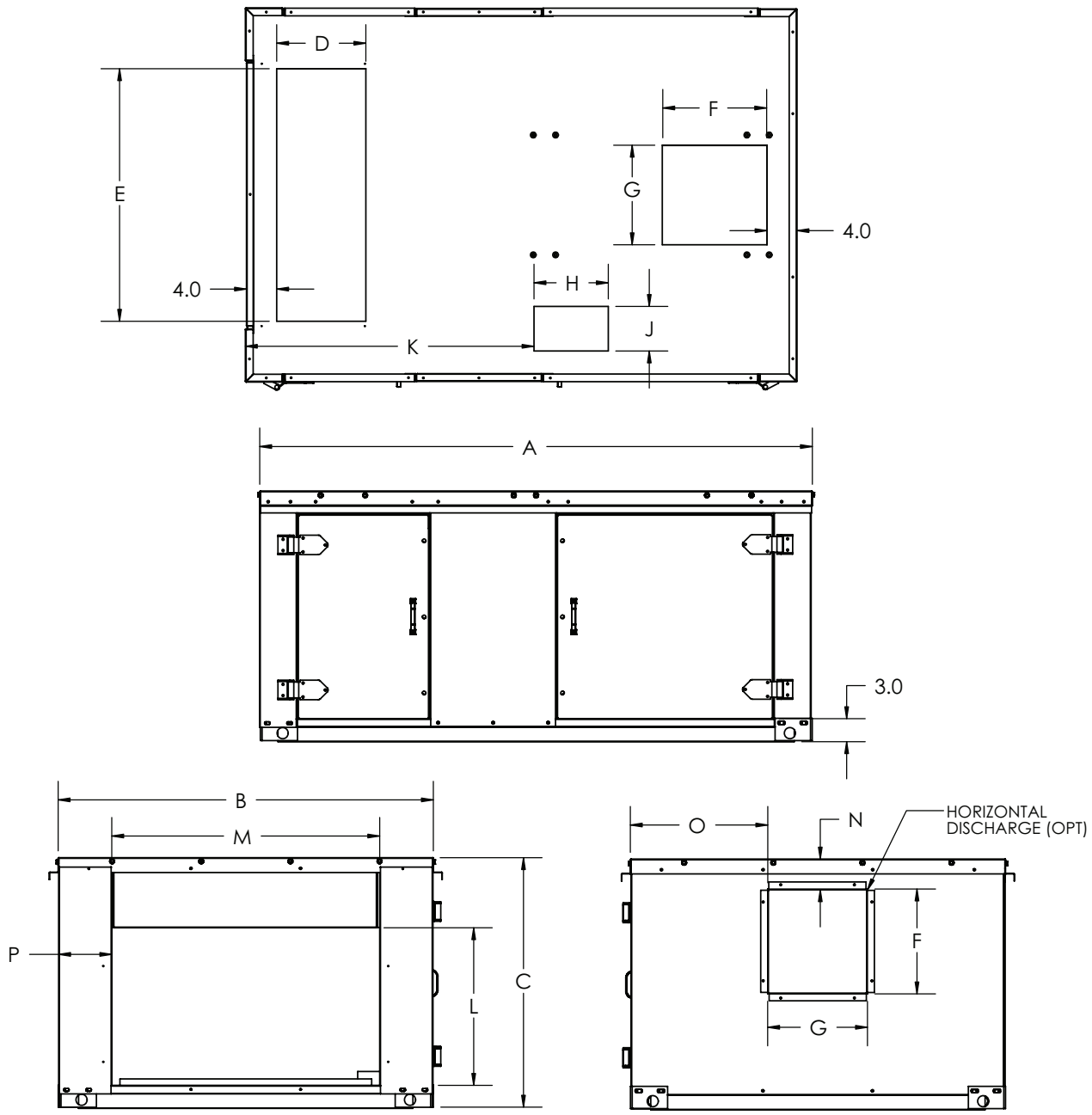


DIMENSIONS (in.)

39SR UNIT SIZE	A	B	C	D	E	F	G	H	J	K	L	M	N	O	P
02, 03	67.4	39.6	22.5	12.0	25.8	11.9	8.9	11.0	8.0	35.4	14.2	28.4	2.5	15.3	5.6
04, 05	72.1	48.1	28.5	12.0	34.0	14.1	13.1	11.0	8.0	35.6	18.2	35.8	5.1	17.5	6.2
07, 09	75.0	53.0	42.2	14.0	44.0	16.4	12.1	15.0	8.0	37.2	24.3	46.0	10.1	20.5	3.5
13	75.1	53.0	55.7	14.0	44.0	16.4	19.4	15.0	8.0	37.3	32.7	46.0	23.5	16.8	3.5
17	96.0	76.3	53.3	15.0	62.0	19.6	22.0	15.0	8.0	50.3	47.0	68.2	17.4	27.1	4.1

NOTE: Dimensions shown in inches.

Fig. 16 — 39SR Unit — Single Wall

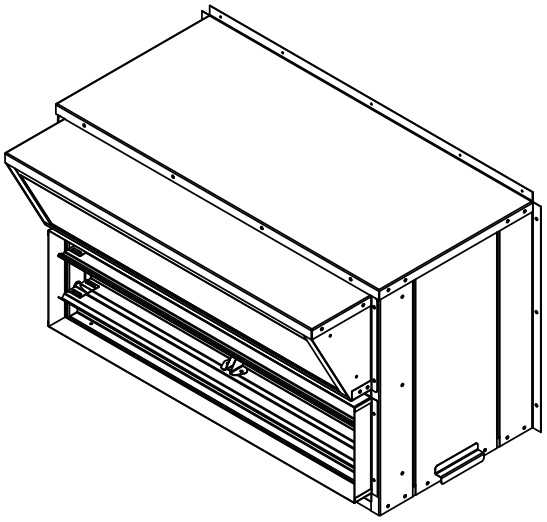


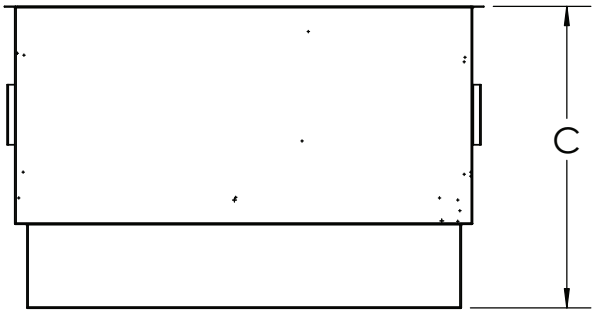
DIMENSIONS (in.)

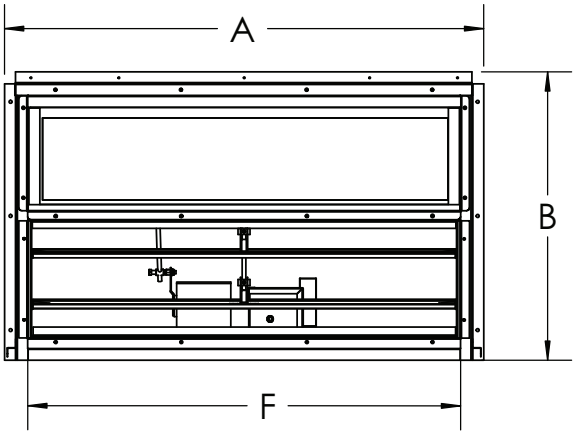
39SR UNIT SIZE	A	B	C	D	E	F	G	H	J	K	L1	L2	M	N	O	P
02, 03	70.0	42.0	30.5	12.0	26.0	11.9	8.9	10.0	6.0	33.7	17.2	14.2	28.1	8.5	16.6	7.0
04, 05	70.4	50.5	33.6	12.0	34.0	14.1	13.4	10.0	6.0	38.9	21.2	18.2	36.1	4.2	18.6	7.2
07, 09	77.4	55.5	50.9	14.0	44.0	16.4	13.1	15.0	8.0	38.0	35.1	24.3	45.9	19.9	21.2	4.8
13	77.4	55.5	60.6	14.0	44.0	16.4	18.9	15.0	8.0	38.0	48.9	32.8	45.9	29.7	18.3	4.8
17	96.5	76.5	64.1	14.0	62.0	19.0	22.0	15.0	8.0	51.9	48.2	46.9	65.8	24.0	27.3	5.4

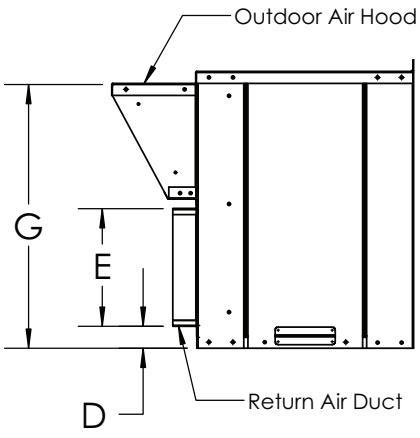
NOTES:
1. Dimensions shown in inches.
2. L1 dimension is for horizontal or bottom return economizer package option.
3. L2 dimension is for fixed air or motorized outside air damper package option.

Fig. 17 — 39SR Unit — Double Wall





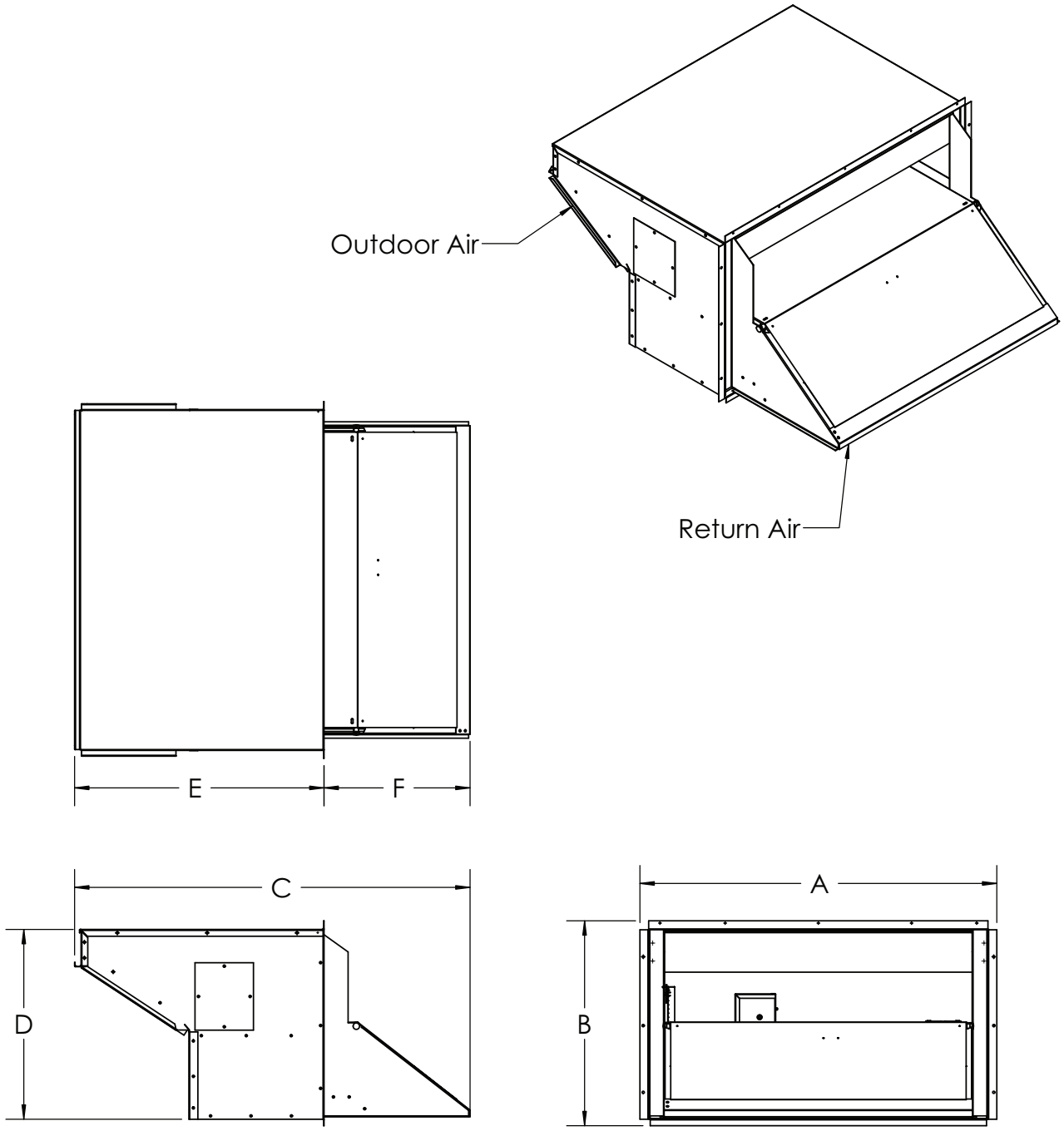




DIMENSIONS (in.)

39SR UNIT SIZE	A	B	C	D	E	F	G
02, 03	30.6	19.9	26.1	2.0	7.7	26.2	17.9
04, 05	39.9	18.0	25.0	1.8	9.9	35.9	22.1

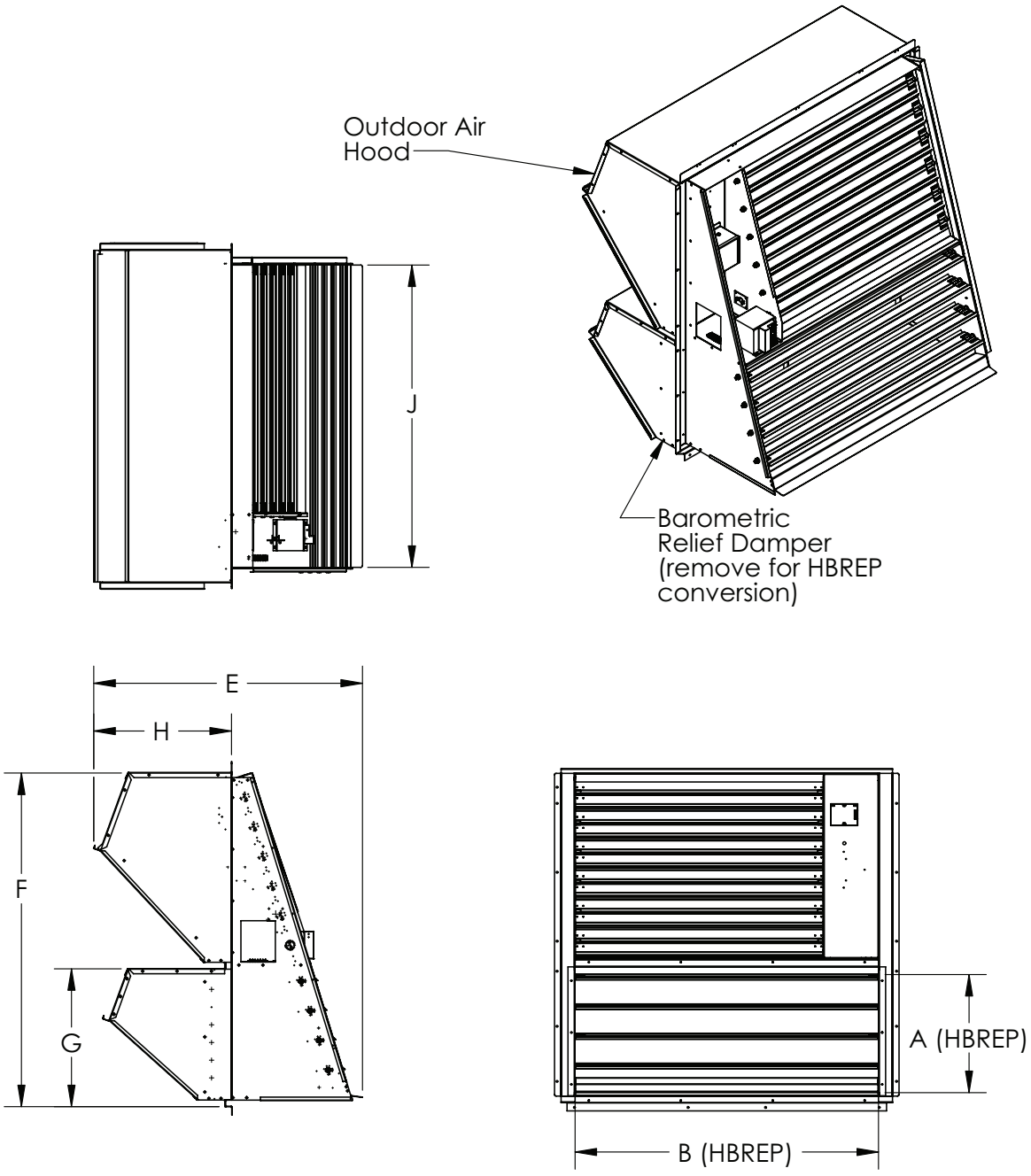
Fig. 18 — 39SR Unit Sizes 02-05 — Horizontal Return Economizer Package



DIMENSIONS (in.)

39SR UNIT SIZE	A	B	C	D	E	F
02, 03	32.100	18.940	42.075	17.260	25.950	16.150
04, 05	39.725	22.825	44.025	21.125	27.750	16.250

Fig. 19 — 39SR Unit Sizes 02-05 — Bottom Return Economizer Package



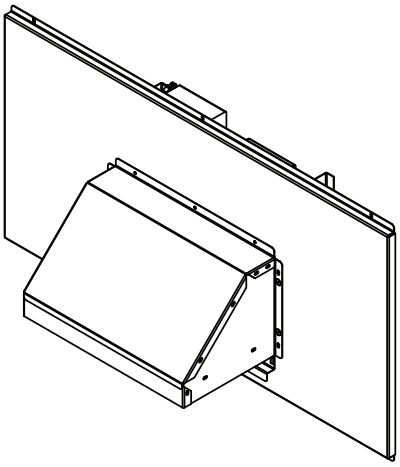
DIMENSIONS (in.)

39SR UNIT SIZE	A	B	E	F	G	H	J
07, 09	13.8	44.1	35.2	34.9	15.4	16.5	48.3
13	18.8	44.1	39.0	48.6	20.1	20.0	48.3
17	19.0	62.9	43.4	45.1	20.1	20.0	66.1

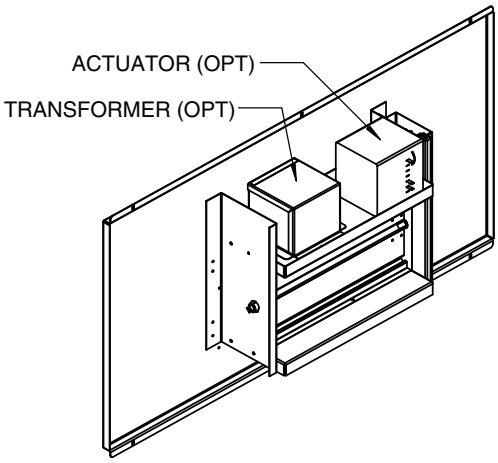
LEGEND

HBREP—Horizontal Return Economizer Package

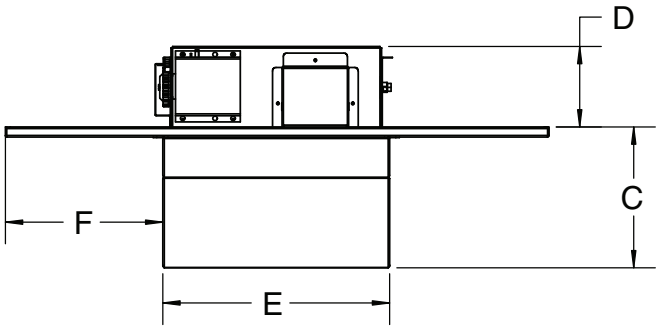
Fig. 20 — 39SR Unit Sizes 07-17 — Bottom and Horizontal Return Economizer Package

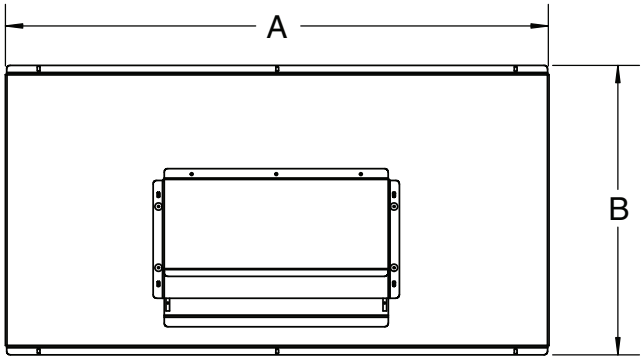


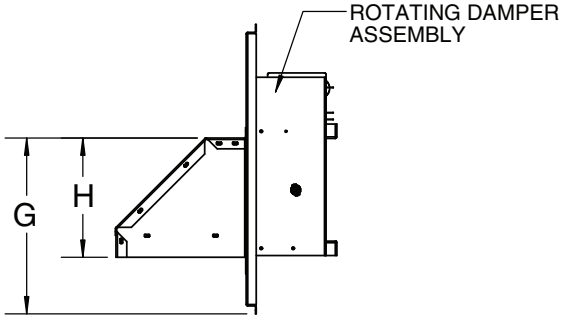
REAR ISOMETRIC VIEW



FRONT ISOMETRIC VIEW







LEGEND

MOAD — Motorized Outside Air Damper

MOAD DIMENSIONS (in.)

39SR UNIT SIZE	A	B	C	D	E	F	G	H
02, 03	29.9	19.1	8.7	5.6	24.1	2.9	13.4	10.4
04, 05	37.8	23.5	14.6	5.6	25.3	6.3	17.3	13.8
07, 09	48.8	28.4	17.4	5.6	44.4	2.2	21.8	19.6
13	48.8	34.9	22.3	5.6	40.5	4.1	28.3	25.8
17	30.3	46.8	25.0	5.6	25.2	2.5	38.9	31.8

Fig. 21 — 39SR Unit Sizes 02-17 — Motorized Outside Air Damper

PRE-INSTALLATION

1. Check items received against packing list.
2. Do not stack unit components or accessories during storage. Stacking can cause damage or deformation.
3. If unit is to be stored for more than 2 weeks prior to installation, observe the following precautions:
   a. Choose a dry storage site that is reasonably level and sturdy to prevent undue stress or permanent damage to the unit structure or components. Do not store unit on vibrating surface. Damage to stationary bearings can occur. Set unit off ground if in heavy rain area.
   b. Remove all fasteners and other small parts from jobsite to minimize theft. Tag and store parts in a safe place until needed.
   c. Cover entire unit with a tarp or plastic coverall. Extend cover under unit if stored on ground. Secure cover with adequate tiedowns or store indoors. Be sure all coil connections have protective shipping caps.
   d. Monthly — Remove tarp from unit, enter fan section through access door or through fan inlet, and rotate fan and motor slowly by hand to redistribute the bearing grease and to prevent bearing corrosion.

Rigging — Do not remove shipping skids or protective covering until unit is ready for final placement. Use slings and spreader bars as applicable to lift unit. *Do not lift unit by coil connections or headers.*

Do not remove protective caps from coil piping connections until ready to connect piping.

Do not remove protective cover or grease from fan shaft until ready to install sheave.

Lay rigid temporary protection such as plywood walkways in unit to prevent damage to insulation or bottom panel during installation.

Unit Weight Calculation Procedure — Calculate coil water weight for each water coil using the following formula:

Water Weight = Coil Volume (gal) x 8.345 lb/gal (volume is from Physical Data table)

Calculate Total Weight:

Total Unit Installed Weight = Unit Dry Weight (see Table 5) + Water Weight (coil 1) + Water Weight (coil 2)

Table 5 — 39SHC/SHF Unit Dry Weight

UNIT WEIGHTS		
Size	**Cabinet**	**Dry Weight (lbs)**
00/01	39SHC	503
	39SHF	772
02/03	39SHC	516
	39SHF	785
04-06	39SHC	880
	39SHF	1085

Shipping Bolt and Screw Removal (39SHK Units) — On 39SHK units ensure that all red shipping bolts and screws are removed and all other bolts and screws are tight. The red hold-down shipping bolts are located on both sides of the blower/motor mounting rails and are accessible through the side access panels. The red sheet metal screws are located on the discharge duct collar. All red bolts and screws must be removed for the blower assembly to be isolated from the cabinet. See Fig. 22.

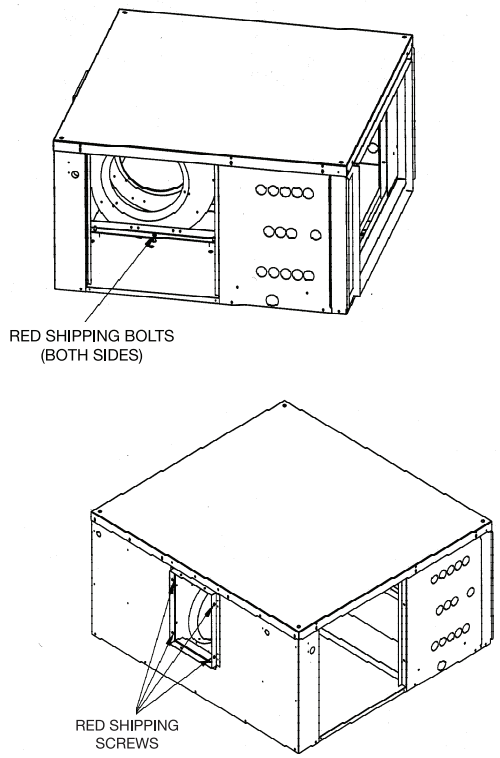


Fig. 22 — Shipping Bolt and Screw Removal

Unit Suspension (39SHC/SHF/SHK and 39SM Units) — Acceptable forms of unit suspension are shown in Fig. 23. A field-supplied platform mount is recommended, especially for larger unit sizes. Units can also be supported by suspending the unit from crossbeams at the joint between each unit component. Since the 39SM units lack a baserail, support members should also be placed along the airway length of the unit in order to prevent buckling. Ensure that suspension rods are secured to adequately support the unit and that the rods extend entirely through their associated fasteners.

All 39SH units have $^{7}/_{8}$ in. knockouts in each corner of their top and base panels for suspension rods to pass through, located $3^{1}/_{2}$ in. in from the corners on the center line. It is recommended that an angle iron or Unistrut* framing system be used under the unit for support (these support pieces should extend approximately 1 in. beyond each end of the unit width).

NOTE: Hanging brackets (shipped loose) are recommended for 39SHK and 39SM unit sizes 07 and above. To install brackets, place in approximate location and use self-drilling screws to attach to mixing box. Brackets are sized to allow hanging from the Unistrut framing system. The Unistrut framing system should be cut to the length one to two inches shorter than the width of the mixing box to avoid any interference with the damper linkages.

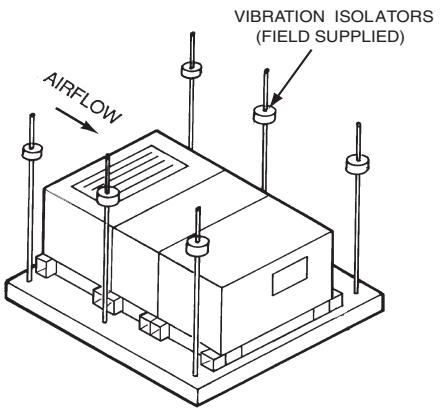
NOTE: Locate suspension rods so they do not block access panels or interfere with the electrical, mechanical, or drain functions of unit.

Floor Mounting — Unit may be mounted on a housekeeping pad, floor or platform.

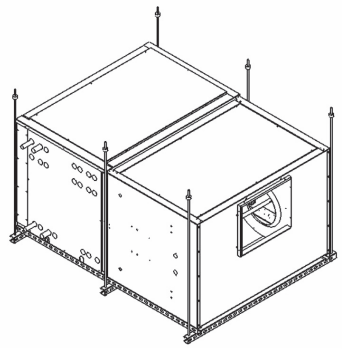
⚠ CAUTION

Make sure to allow enough elevation to permit construction of the condensate trap. Failure to follow this caution may result in unit damage.

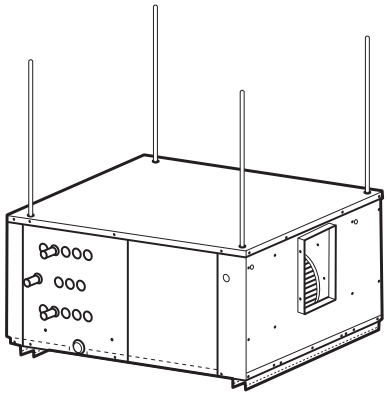
*Unistrut is a registered trademark of Unistrut International Corporation.



CEILING – RECOMMENDED PLATFORM MOUNT



CEILING – ALTERNATE CROSSBEAM MOUNT



CEILING – ALTERNATE SUSPENSION RODS WITH NO MOUNT

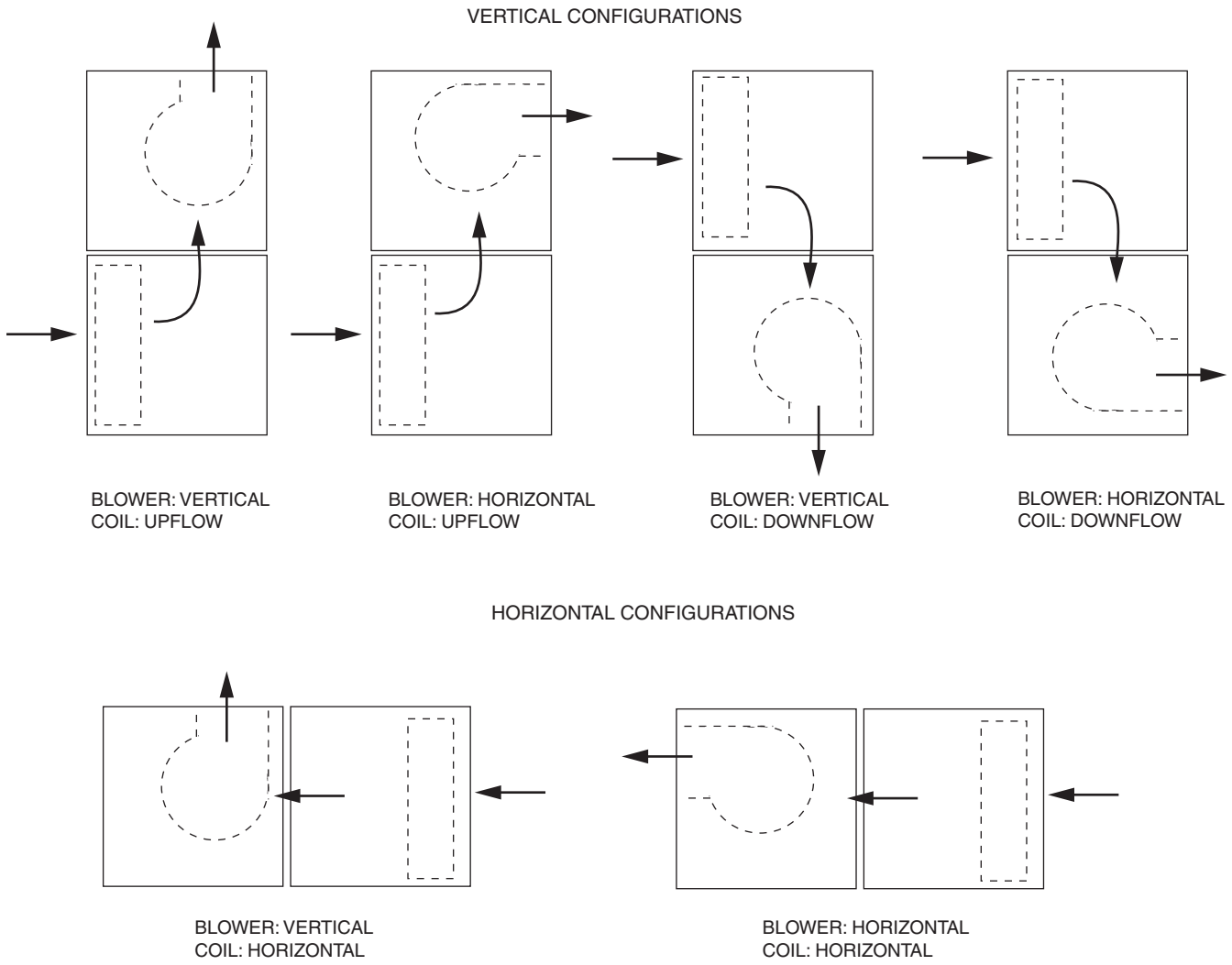
Fig. 23 — Unit Suspension

Vibration Isolators (Field Supplied) — If required, install isolators in the suspension rod system. Allow clearance as needed between isolators and unit.

Discharge Air Arrangements (39SM Units)

MODULAR CONFIGURATIONS — The unit is shipped in two sections for easier handling and smaller clearances. The two sections are manufactured and shipped to be joined in one of the specific configurations shown in Fig. 24. If ordered incorrectly, the sections may be field-modified to achieve one of the other configurations indicated in Fig. 24.

IMPORTANT: Deviating from the factory-designed configurations shown in Fig. 24 may result in improper or unacceptable operation including inadequate airflow, fan vibration, fan noise, or condensate carryover (blow-off).



NOTES:
1. Arrows indicate airflow direction.
2. Diagrams indicate general arrangement of coil and blower sections. Refer to dimensional drawings for details and connections.

Fig. 24 — 39SM Modular Configurations

JOINING MODULAR SECTIONS

NOTE: 39SM unit sizes 04 and 05 are single-section units and require no joining.

39SM Unit Sizes 07-17 (Vertical Configurations)

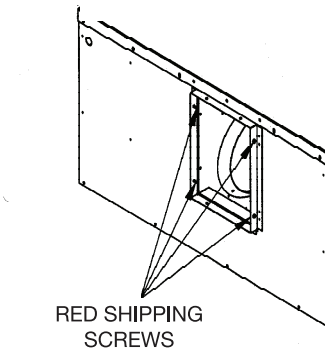
1. Remove red shipping screws from duct flange/blower outlet before assembly. See Fig. 25.

IMPORTANT: Failure to remove red shipping screws can result in unsatisfactory vibration or blower noise, or excessive air recirculation.

2. Use factory-provided foam gasket tape to seal the joint between the sections.

NOTE: Gasket material is factory-provided unless the orientation of the unit is being changed from that ordered. In that case, use field-provided gasket or factory-provided gasket kit.

3. Stack sections in vertical orientation. See Fig. 24. Sections must be installed in one of the vertical configurations shown in Fig. 24. Be sure to orient the blower section to match the selected configuration as shown in Fig. 24.
4. Remove access panel. See Fig. 26.
5. Install 4 (2 on each side) self-drilling sheet metal screws no. 10 x 3/4 in. long through the end panel flange into the coil section flange (Fig. 27).
6. Re-install access panel.
7. When coil section is on top of fan section, drive screws from coil section into fan section.



NOTE: There may by one or 2 blower discharges. Single discharge shown.

Fig. 25 — Remove Red Shipping Screws

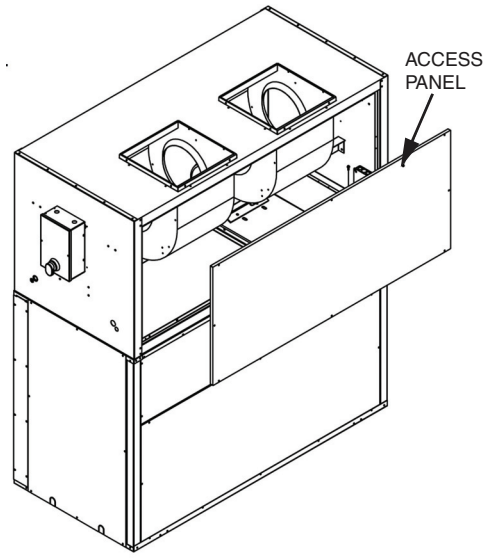


Fig. 26 — Remove Access Panel

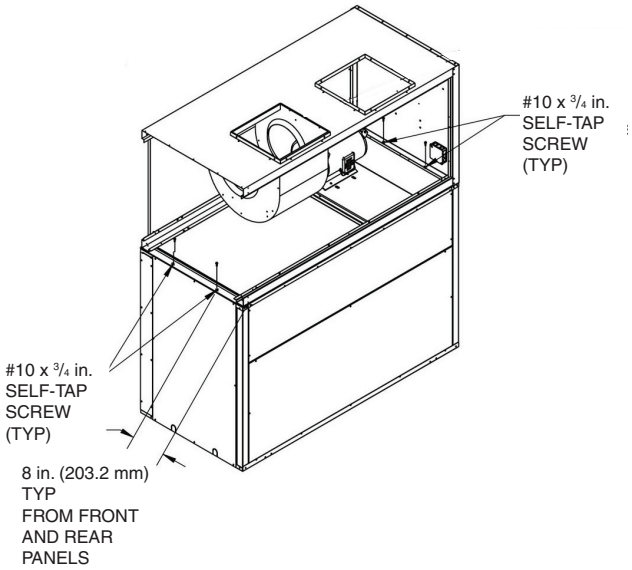


Fig. 27 — Connect Sections with Screws

39SM Unit Sizes 07-17 (Horizontal Configurations)

1. Remove red shipping screws from duct flange/blower outlet before assembly. See Fig. 25.

IMPORTANT: Failure to remove red shipping screws can result in unsatisfactory vibration or blower noise, or excessive air recirculation.

2. Use factory-provided foam gasket tape to seal the joint between the sections.

NOTE: Gasket material is factory-provided unless the orientation of the unit is being changed from that ordered. In that case, use field-provided gasket or factory-provided gasket kit.

3. Remove coil section side panels and blower section access panels. See Fig. 28.
4. Align coil and blower sections in the correct orientation, as shown in the appropriate horizontal configuration in Fig. 24.
5. Drill flanges and install 3/8-16 x 1 in. long bolts, flat washers and locknuts as shown in Fig. 27. Unit sizes 07 and 09 require 2 bolts per side (4 total). Unit sizes 13 and 17 require 3 bolts per side (6 total).
6. Reinstall side and access panels.

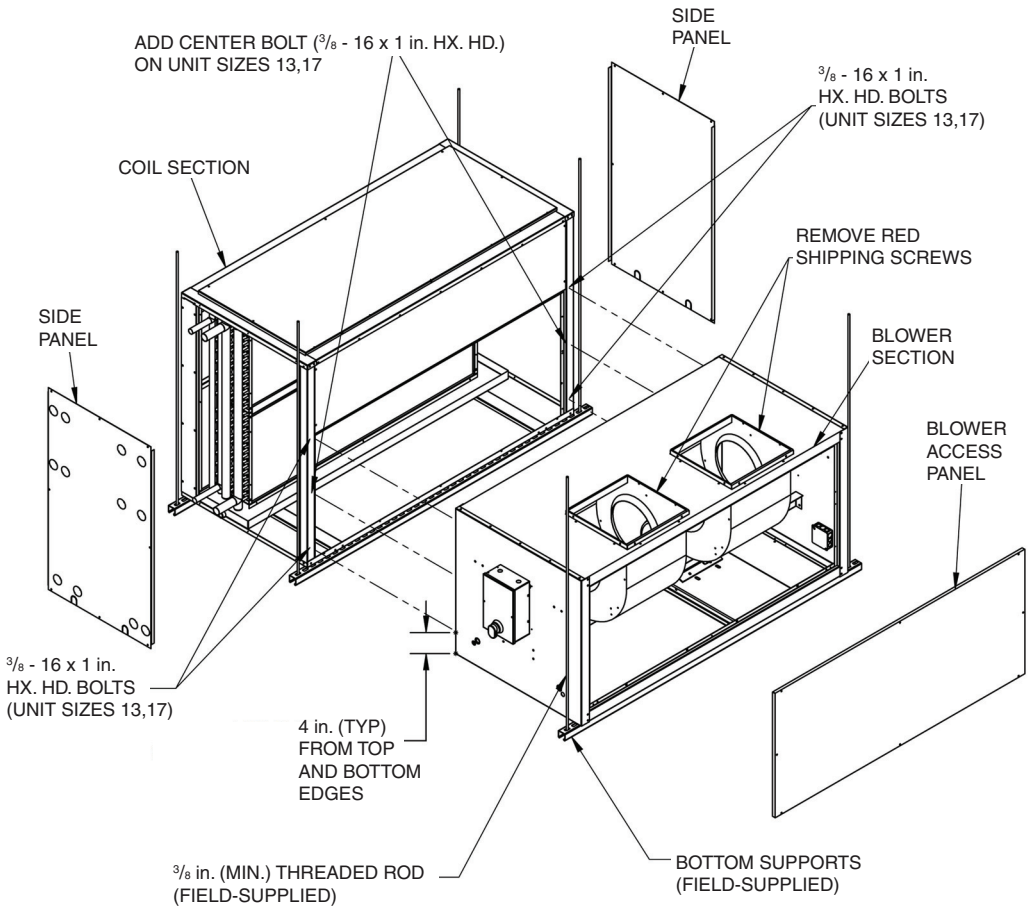


Fig. 28 — Connect Sections (Horizontal Configurations)

39SM UNIT SIZES 07-17 VERTICAL TO HORIZONTAL CONVERSION — Unit is shipped in one of the configurations shown in Fig. 24. It is possible to change the configuration to another shown in Fig. 24 using the following procedure:

1. Remove the front panel by removing the panel screws.
2. Remove the 2 side panels by removing the panel screws.
3. Rotate the blower section so that the opening is aligned with the front of the coil section. See Fig. 29. If desired, relocate motor mounting rails, plate, and motor to alternate location for easier service access.

IMPORTANT: The final configuration must match one of the permitted arrangements shown in Fig. 24.

4. Insert gasket kit or field-provided gasket material between the coil section and the blower section and fasten with bolts as required. See Fig. 29.
5. Replace the 2 side panels in their original locations.
6. Insert a suitable gasket material around the top flanged opening and place what was the front panel on the top of the unit (shaded panel in Fig. 30). Fasten with screws.

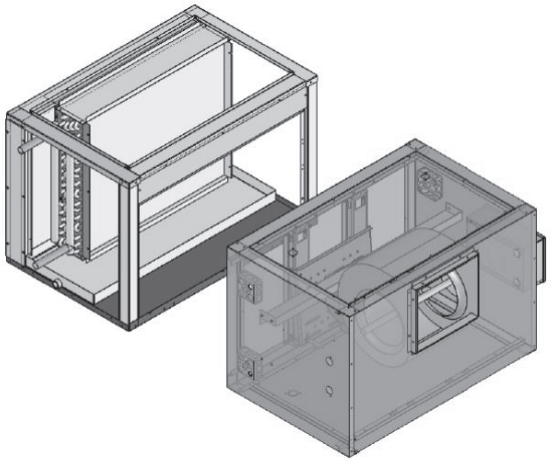
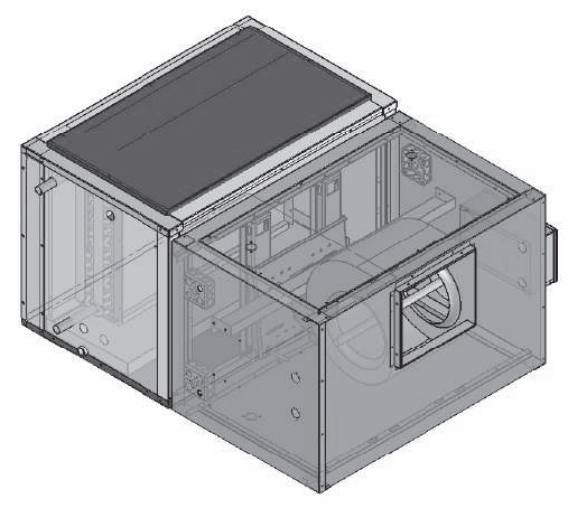


Fig. 29 — Align Blower Section Opening with Coil Section Front



NOTE: Dark shaded panel is original front panel, now on top of unit.

Fig. 30 — Assembled in Horizontal Configuration

Service Clearance — Provide adequate space for unit service access (fan shaft and coil removal, filter removal, motor access, damper linkage access, etc.).

Condensate Drain — To prevent excessive build-up of condensate in drain pan, adequate trap clearance (trap depth) must be provided beneath the unit as indicated in Fig. 31. See Installation, Condensate Drain section for additional details.

⚠ CAUTION

RECOMMMENDED: 39SHC, 39SHF, and 39SV units have an auxiliary condensate drain which should be piped to a condensate overflow sensor or safe drain location or both. Failure to follow this warning may cause damage to equipment and property in the case of condensate overflow.

In addition, the International Mechanical Code (IMC) section 307.2.3 requires the use of auxiliary drain pans. Many municipalities have adopted this code. Carrier holds that this practice represents the standard for professional installation whether or not this code has been adopted in a specific municipality or territory. As such, water damages that would have been prevented had an auxiliary pan been deployed will not be considered for compensation. This position is taken regardless of whether the source of the moisture was specified as a potential failure mode in the applicable building code or not. A freeze burst, cracked drain pan, failed weld, or corrosion induced leak are some of the potential failure modes that are mitigated when an auxiliary pan is properly installed. Professional installers recognize the value of protecting customer assets against foreseeable events. Customers who choose to avoid the cost of common protective measures waive their right to seek damages when those foreseeable events occur. If the product is located above a living space or where damage may result from condensate overflow, install a watertight pan of corrosion-resistant metal beneath the unit to catch over-flow which may result from clogged drains or from other reasons. Provide proper drain piping for this auxiliary pan. Consult local codes for additional precautions before installation.

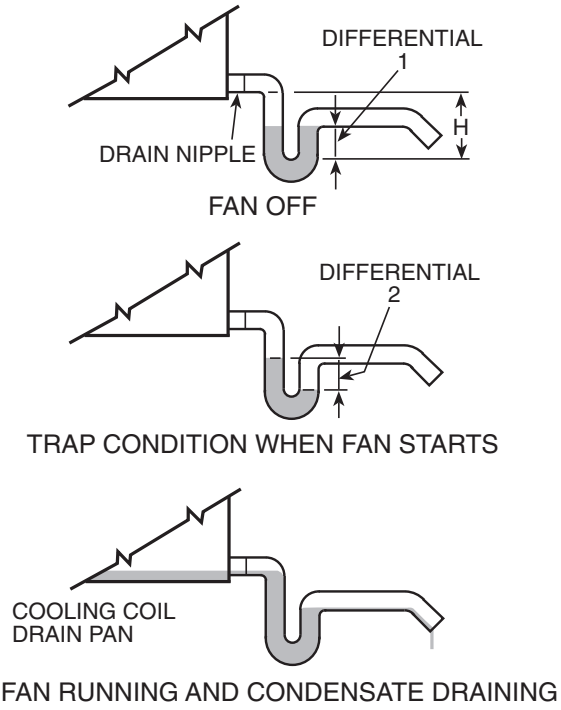


Fig. 31 — Condensate Drain

External Vibration Isolators — Install vibration isolators per certified drawings, and in accordance with the job specifications and the instructions of the vibration isolator manufacturer. The coil piping must be isolated or have a flexible connection to avoid coil header damage because of unit motion. A flexible connection should be installed at the fan discharge.

Figure 23 shows isolation locations for overhead suspension of unit.

INSTALLATION

Condensate Drain — Install a trapped condensate drain line at unit drain connection. All 39S units have a $^{3}/_{4}$ in. FPT condensate drain connection.

Measure maximum design negative static pressure upstream from the fan. Referring to Fig. 31, height "H" must be equal to or larger than negative static pressure at design operating conditions. Prime enough water in trap to prevent losing seal (Differential 1). When the fan starts, Differential 2 is equal to the maximum negative static pressure.

Provide freeze-up protection as required.

Bottom Return Economizer Package (BREP) and Horizontal Bottom Return Economizer Package (HBREP) (39SR Unit) — Economizers are used with 39SR units for automatic sensor-controlled introduction of outdoor air into the system through an electro-mechanically controlled damper.

To install BREP:

1. Check for correct number of parts shown in Fig. 32 and the following list.
   - 1 – Economizer assembly
   - 1 – Barometric relief hood
   - 1 – Outdoor air hood
   - 1 – Hardware bag
2. Disconnect all power to unit.

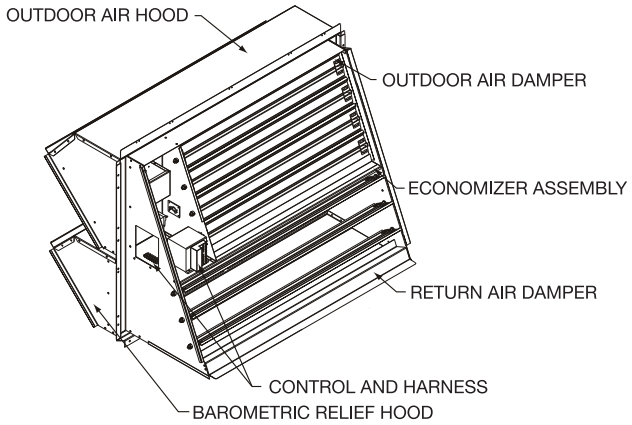


Fig. 32 — Bottom Return Economizer Package (BREP) for Sizes 07-17

3. Remove return air access panel from unit and rear access panel(s) if applicable as shown in Fig. 33.
4. To assemble the barometric relief hood, the following will be needed. See Fig. 34.

   30 – Screws (type A no. 10 - 16 x 1/2 in.)

   1 – 15 ft gasket (1/8 in. x 1/2 in.)

   1 – 15 ft gasket (1/8 in. x 3/4 in.)

   a. Take hood bottom and left hood panel, putting the flange of hood bottom to the inside of left hood panel and screw into place.

   b. Take right hood panel and screw in place like Step a.

   c. Take top rail and place flanges over left hood panel and right hood panel and secure.

   d. Take top panel and do the same as Step c.

   e. Take 1/8 in. x 3/4 in. gasket and place around perimeter of front panel to seal between damper section and hood.

   f. Take front panel and slide inside of left hood panel and right hood panel and secure.

   g. Set barometric relief hood to the side for use later.
5. To assemble the outside air hood, the following will be needed. See Fig. 35.

   20 – Screws (type A no. 10 - 16 x 1/2 in.)

   1 – 15 ft gasket (1/8 in. x 1/2 in.)

   a. Take hood bottom and left hood panel, putting the flange of hood bottom to the inside of left hood panel and screw into place.

   b. Place 1/8 in. x 1/2 in. gasket on flanges on hood bottom, left hood panel, right hood panel, and top panel that attach to the face of the economizer when installed.

   c. Take right hood panel and screw in place like Step a.

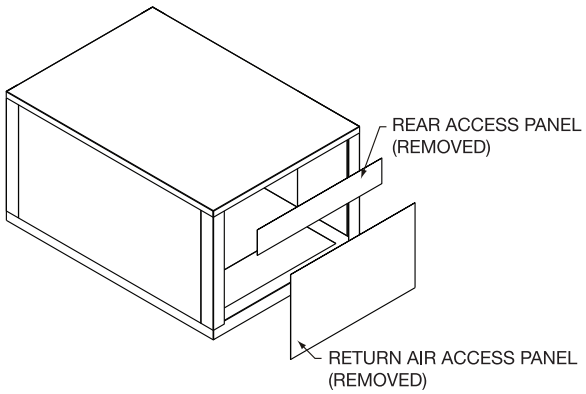


Fig. 33 — Remove Access Panel(s) from Unit

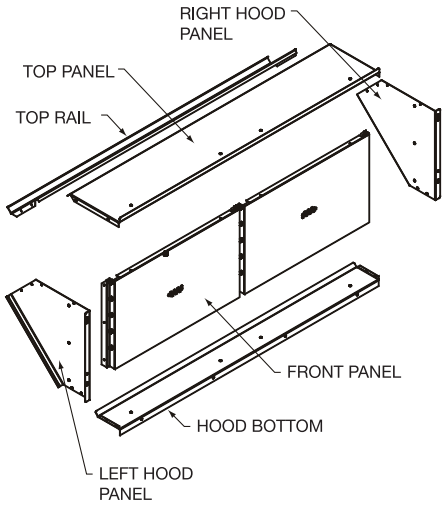


Fig. 34 — Assemble Barometric Relief Hood

   d. Take top rail and place flanges over left hood panel and right hood panel and secure.

   e. Take side rail and line up to holes in left hood panel and secure.

   f. Repeat Step d for side rail and right hood panel.

   g. Take front panel and slide inside of side rails.

   h. Take top panel and do the same as Step d.

   i. Place 1/8 in. x 1/2 in. gasket on flanges on hood bottom, left hood panel, right hood panel, and top rail that attach to the face of the economizer when installed.

   j. Set outside air hood to the side for use later.
6. As shown in Fig. 36, slide economizer assembly into unit over return opening, but DO NOT insert completely into unit. Connect low and high voltage wiring to the terminal block and transformer per wiring diagram shown in Fig. 37.

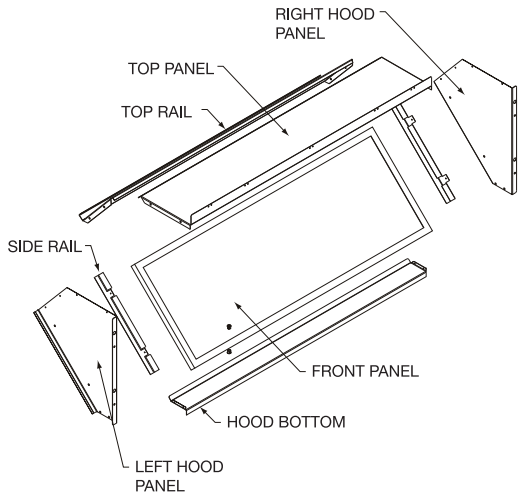


Fig. 35 — Assemble Outside Air Hood

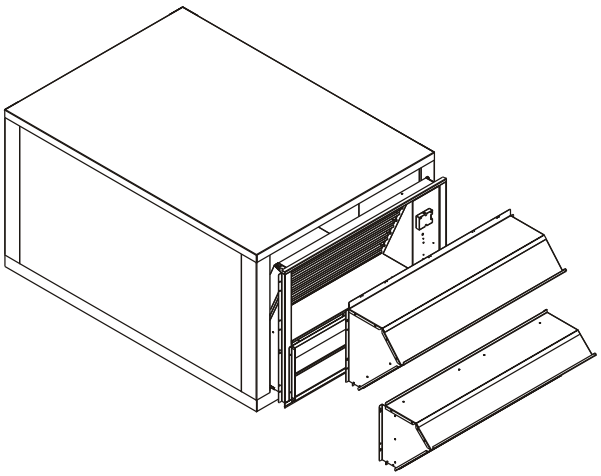
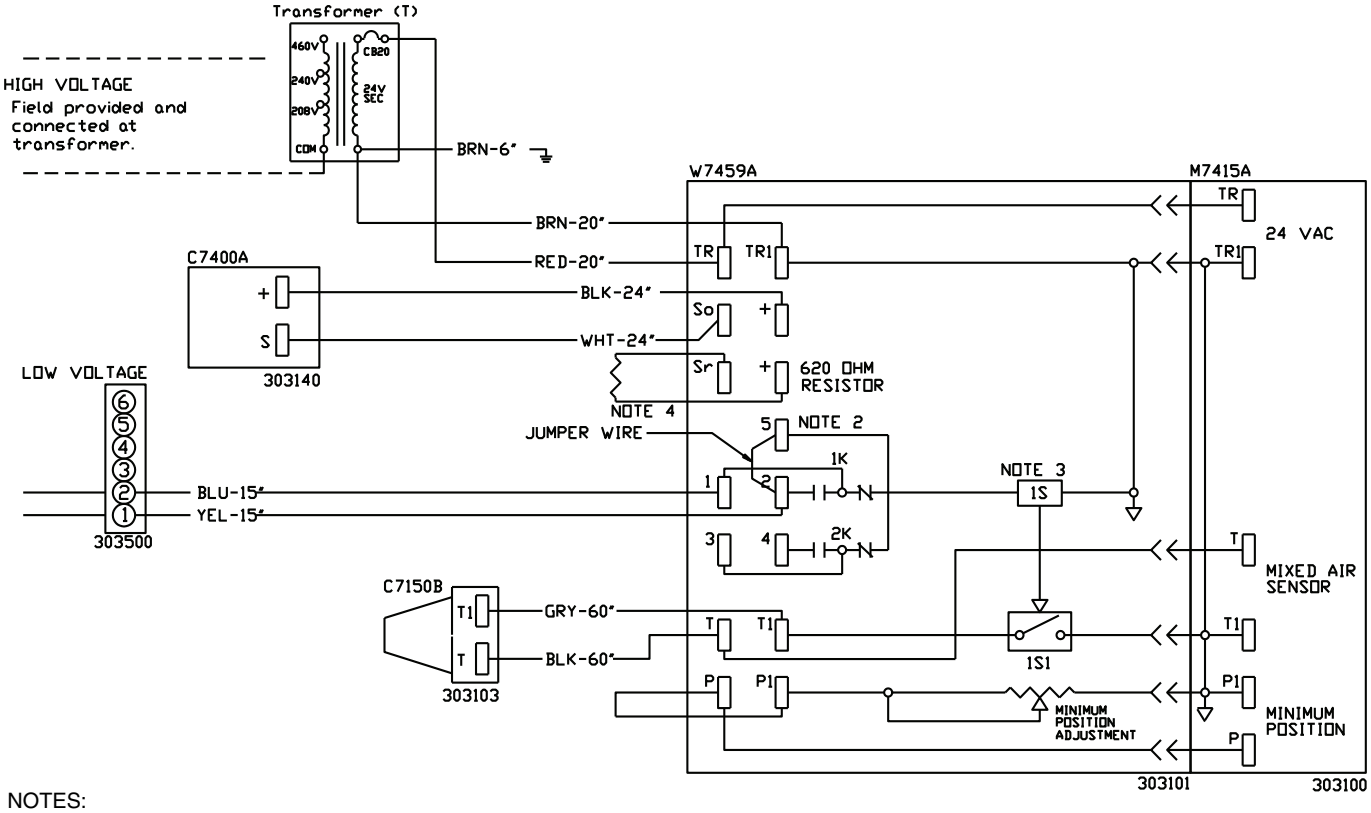


Fig. 36 — Slide Economizer Assembly into Unit



NOTES:
1. Unit wiring shown as reference only. Check unit wiring for actual unit wiring.
2. Relays 1K and 2K actuate when the outdoor air enthalpy is higher than the return air enthalpy.
3. 1S is an electronic switch that closes when powered by a 24 VAC input.
4. Factory-installed resistor should be removed only if C7400 differential enthalpy sensor is added.

Fig. 37 — Modulating Gear Economizer with Relief for Sizes 07-17 BREP Units

7. To install barometric hood:

   For bottom return applications:

   Take the barometric hood and secure to economizer using screws as shown in Fig. 38.

   For horizontal return applications:

   a. Connect field-installed horizontal return ductwork to duct flange. Ensure that bottom return on unit is capped.

   b. Install barometric hood over exhaust opening in field-installed ductwork. For exhaust and horizontal return opening sizes see duct flange dimensions in Fig. 39.

8. Install the outside air hood. The upper flange of the hood should rest against the top of the economizer. See Fig. 40.

9. Apply $^1/_8$ x $^1/_2$ in. gasketing along mounting flanges. Slide economizer assembly fully into unit and secure with the supplied no. 10-16 x $^1/_2$ screws. See Fig. 41.

10. Replace all panels and restore power to the unit.

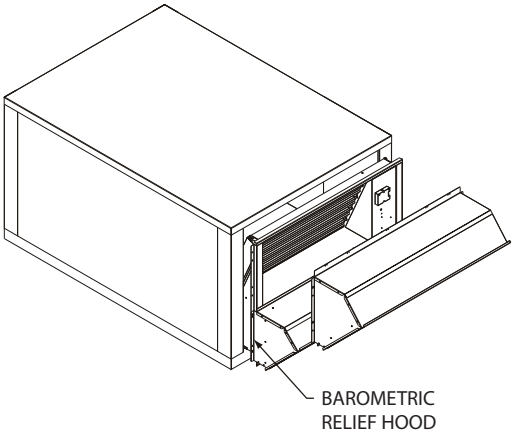
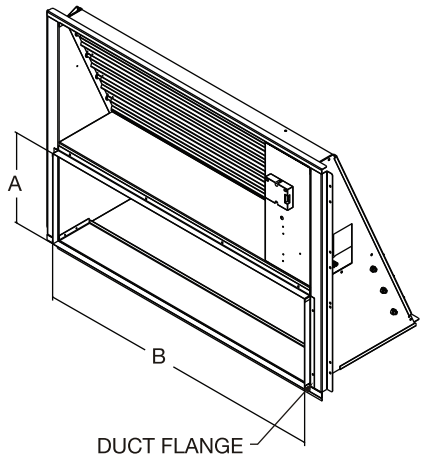


Fig. 38 — Install Barometric Relief Hood



39SR UNIT SIZE	DUCT FLANGE DIMENSION (in.)	
	A	B
07, 09	13.75	44.25
13	18.75	44.25
17	19.00	63.00

Fig. 39 — 39SR Unit Duct Flange Dimensions for Horizontal Return Applications

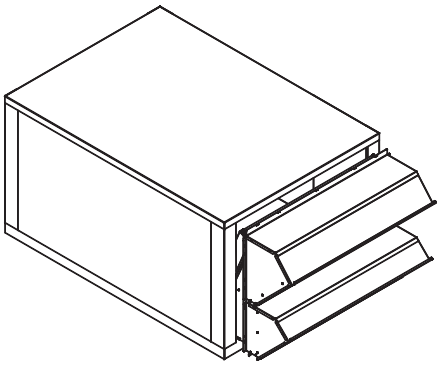


Fig. 40 — Install Outside Air Hood

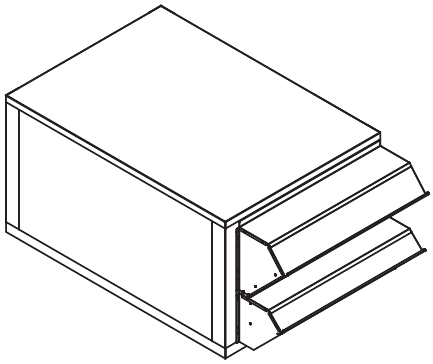


Fig. 41 — Slide Economizer into Unit

Motorized Outside Air Damper — To install the motorized outside air damper:

1. Check for correct number of parts shown in Fig. 42 and the following list.
   1 – Hood top
   2 – Hood sides
   2 – Filter channels
   1 – Filter
   1 – Filter access panel
   1 – Door panel with outside air slide
   1 – Adapter panel (provided if necessary)
   1 – Hardware bag
2. To assemble outdoor air hood (shown in Fig. 43):
   a. Secure the filter channels to the hood sides using the supplied no. 10-16 x $^1/_2$ screws.
   b. Place the hood sides to the inside of the side flange of the hood top and secure with the supplied no. 10-16 x $^1/_2$ screws.
   c. Slide the filter inside the filter channels.
   d. Place the filter access panel over the hood side panels and secure with no. 10-16 x $^1/_2$ screws.
3. Adjust the position of the outside air slides on the door panel to determine the amount of fresh air provided to the unit. See Fig. 42.
4. After the slides are in the desired position, secure the outdoor air hood to the door panel using the provided no. 10-16 x ½ screws as shown in Fig. 43.
5. Remove the return air access panel from unit and the rear access panel(s) if applicable as shown in Fig. 44.
6. Locate the adapter panel (provided if necessary). Position the adapter panel at the top of the return air access panel under the rooftop unit top panel. Secure the adapter panel to the rooftop unit using the supplied no. 10-16 x $^1/_2$ screws as shown in Fig. 45.
7. Center the door panel over the return-air access opening.
8. Align the holes in the top and bottom of the door panel to the holes in the rooftop unit. Secure the door panel to the unit using the provided no. 10-16 x $^1/_2$ screws as shown in Fig. 46.

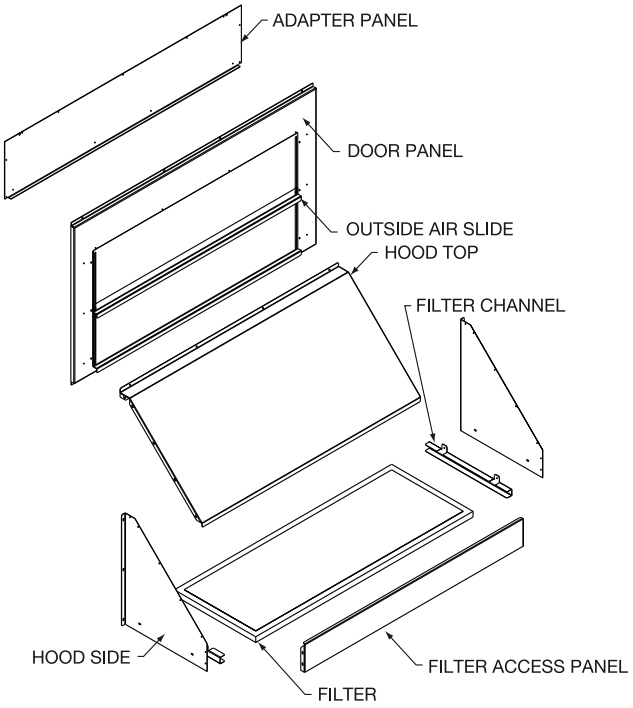


Fig. 42 — Motorized Outside Air Damper

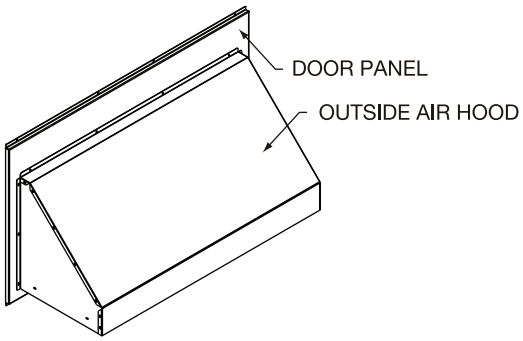


Fig. 43 — Assemble the Outside Air Hood

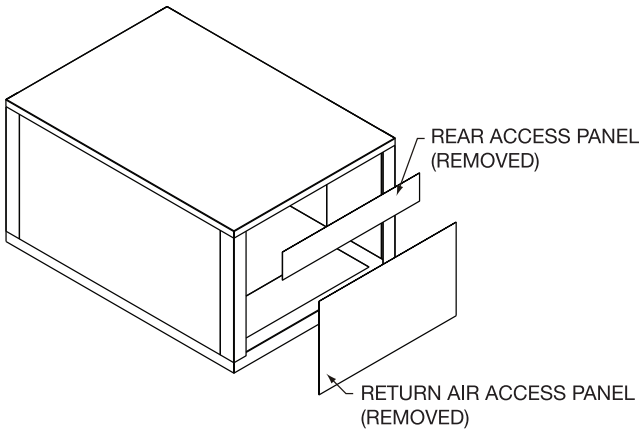


Fig. 44 — Remove Access Panel(s) from Unit

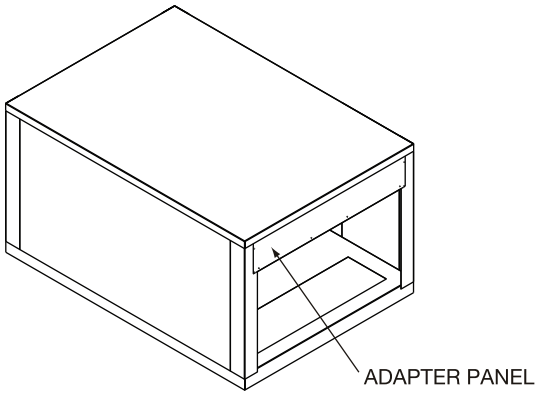


Fig. 45 — Secure Adapter Panel to Unit

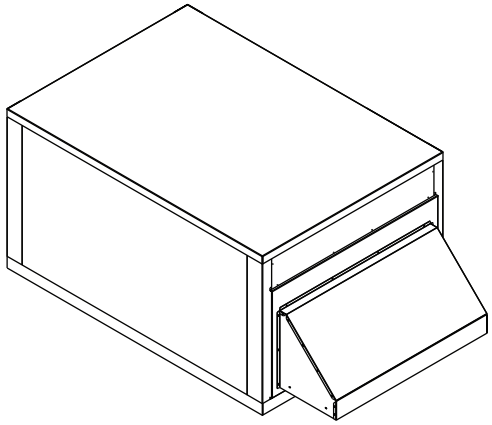


Fig. 46 — Secure Door Panel to Unit

Mixing Box Actuator (for 39SHK and 39SM Horizontal Return Units Only)

MIXING BOX ACTUATOR ASSEMBLY (Fig. 47 and 48) — To assemble the mixing box actuator:

1. Press logic module onto actuator.
2. Remove lock nut from swivel nut assembly. Place swivel nut assembly into slot on actuator arm. Hand tighten lock nut onto swivel nut assembly. Swivel nut assembly will need to be adjusted once installed for proper actuator motion.
3. Attach actuator arm assembly to actuator with four $^1/_4$-in. screws. Arm may need to be repositioned once installed to ensure proper actuator motion.

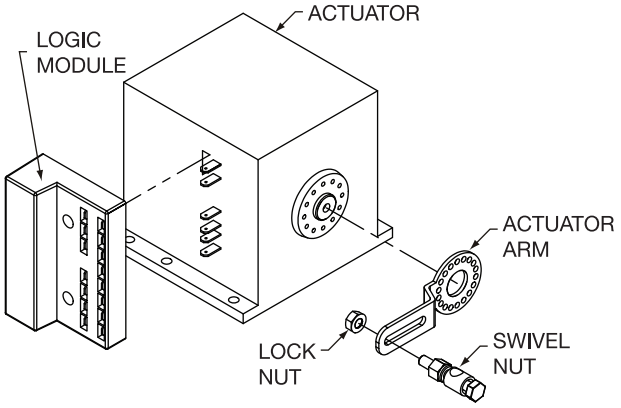


Fig. 47 — Actuator Assembly

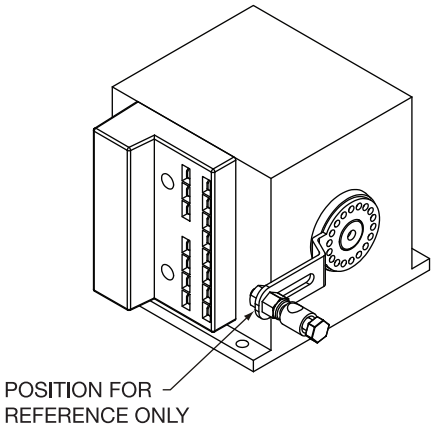


Fig. 48 — Assembled Actuator

ACTUATOR INSTALLATION — To install the actuator:

1. Align actuator so that the actuator linkage arm will have enough clearance for full range of motion. Refer to Fig. 49-52. Align center line of the actuator as close to the centerline of DR4 as possible. See Fig. 51 and 52. Use at least 4 self-drilling screws to mount directly to top of unit.
2. Place linkage arm assembly (linkage arm and swivel nut arm) onto DR4 as shown in Fig. 51 and 52. Do not tighten to DR4 as adjustments need to be made.
3. Place linkage rod between actuator arm and linkage arm on DR4. See Fig. 51. Linkage rod may need to be cut to length. Ensure actuator arm and linkage arm are parallel.
4. Ensure linkage assemblies are properly secured as shown in the linkage assembly instructions sent with the unit.
5. Open one set of dampers to 100% open and the other to 100% closed. Ensure actuator motion will operate as needed and tighten all linkages, swivel assemblies, and linkage rods into place.
6. Ensure actuator motion opens and closes damper assemblies fully. If not, adjust settings of linkage arm, actuator arm, swivel nut assemblies, and linkage rods one at a time until full operation is achieved.

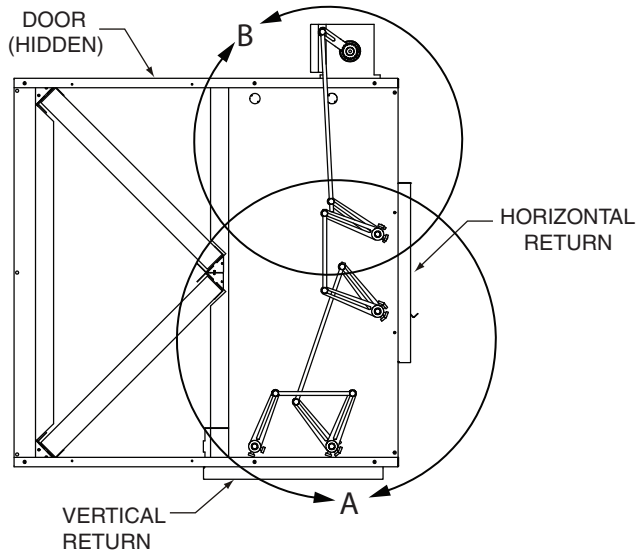


Fig. 49 — Actuator Installation Front View

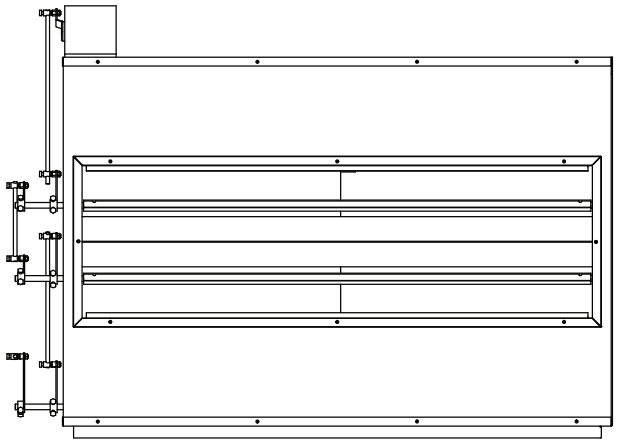


Fig. 50 — Actuator Installation Side View

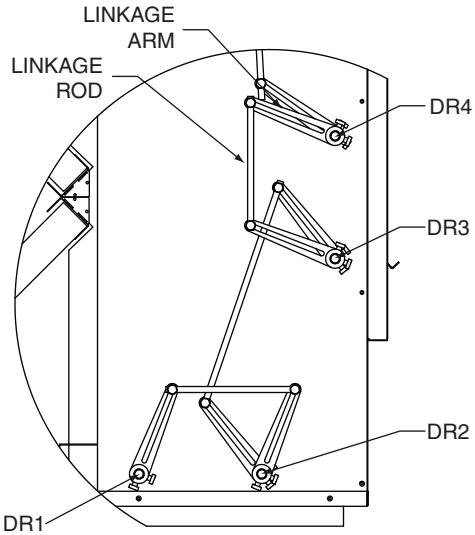


Fig. 51 — Area A Detailed View

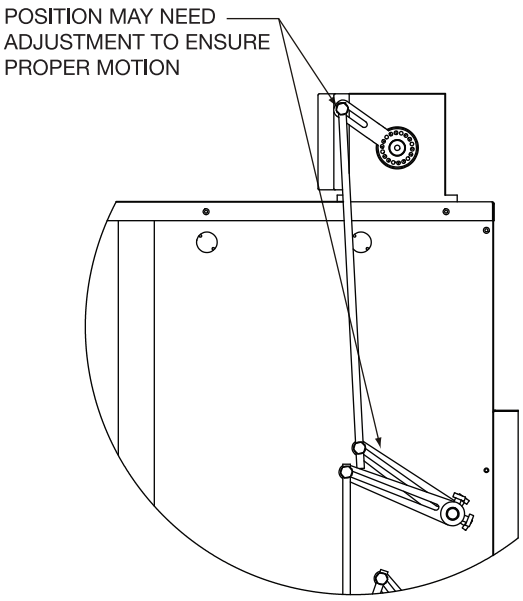


Fig. 52 — Area B Detailed View

Mixing Box Air Sensor

MIXING BOX MIXED AIR SENSOR BRACKET ASSEMBLY — To assemble the mixed air sensor bracket assembly to the mixing box, attach mixed air sensor to mixed air sensor bracket. See Fig. 53.

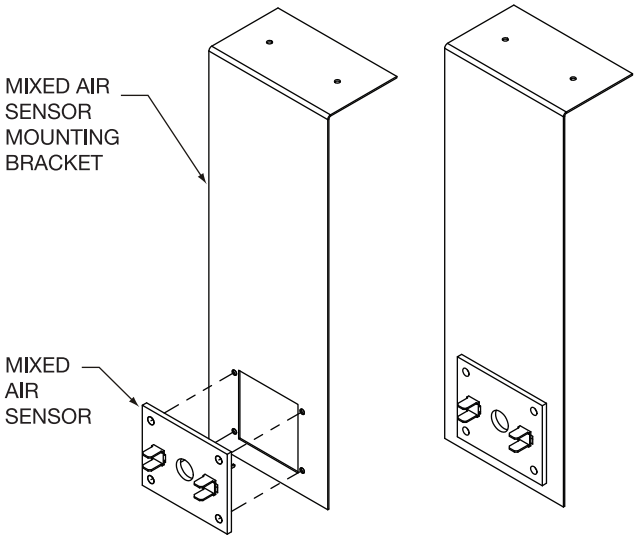


Fig. 53 — Mixed Air Sensor Bracket

MIXED AND OUTSIDE AIR SENSORS INSTALLATION

1. Remove access panel and filters as needed.
2. Place mixed air sensor assembly in airstream as shown in Fig. 54.
3. Attach to top of unit with self drilling screws.
4. Drill or knockout $^1/_2$ in. hole into top of mixing box close to actuator as shown in Fig. 54.
5. Insert snap bushing in hole. Run wires inside unit, along top of mixing box, between the filter rail and insulation, and attach to mixed air sensor.
6. Place enthalpy sensor, shown in Fig. 55, in location suitable to meet manufacturer's requirements.
7. Connect all sensors to logic module per manufacturer's instructions.
8. Test to ensure proper function.
9. Replace all parts and tape or fill any holes or gaps made.

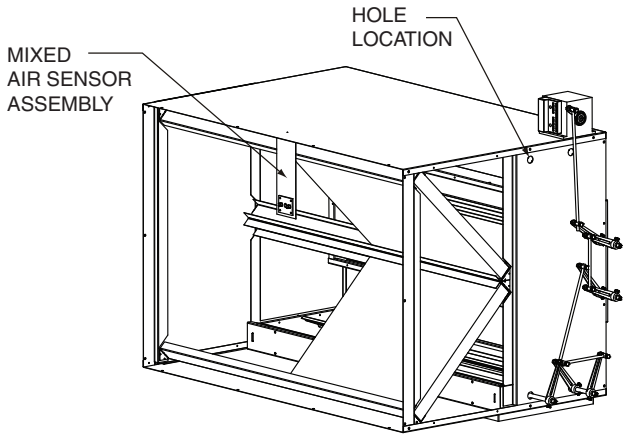


Fig. 54 — Mixed Air Sensor Installation

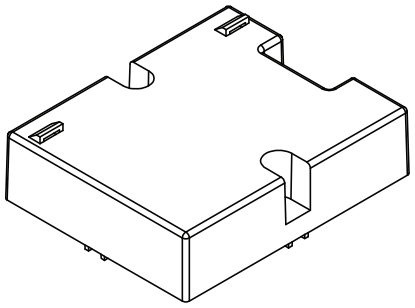


Fig. 55 — Enthalpy Sensor

Mixing Box — To install mixing box:

1. Insert rear return duct flanges of unit into opening of mixing box.
2. Ensure all unit flanges are inside the opening of the mixing box and screw a minimum of three screws into each of the unit's four flanges using self-drilling screws.
3. The mixing box should now hang freely from the unit.
4. Remove unit filters from unit before start-up.

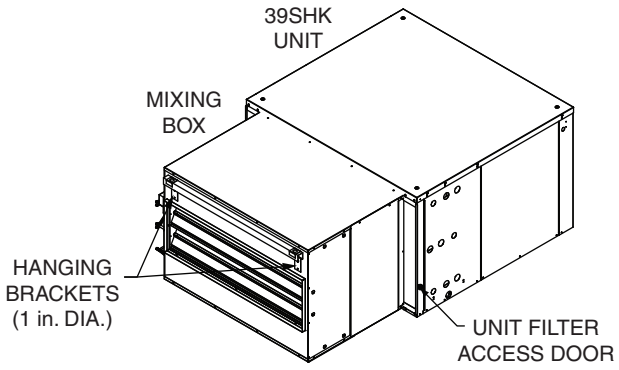


Fig. 56 — Installing Mixing Box

MIXING BOX LINKAGE INSTALLATION (39SHK Unit Sizes 00-03) — To install the mixing box linkage assembly (sizes 00-03):

1. Check for correct number of parts:
   1 – Linkage rod
   2 – Linkage arms
   2 – Swivel joints

   NOTE: A $^7/_{16}$ in. box end wrench and/or socket will be needed for linkage installation.
2. Attach actuator (optional item) to unit with actuator mounting hardware included with actuator. Actuator should be mounted on damper rod 1 (DR1) as shown in Fig. 57.
3. Orientate actuator to avoid interference with linkage assembly.
4. Ensure dampers are fully closed or open depending on application, and secure actuator to shaft. Actuator should open and close dampers fully. Adjust actuator as needed.
5. Place a linkage arm onto DR1 and DR2. See Fig. 57 and 58 for proper positioning. Ensure that swivel joints are fully extended to the end of the linkage arm and tighten.
6. Insert linkage rod into swivel joints and tighten. Linkage rod may need to be cut down to size. Linkage arms should be parallel.
7. Ensure one set of dampers are fully open and the other fully closed. Adjust linkage assembly to allow travel without interference and tighten to DR1 and DR2.

8. The actuator should now be able to power the dampers fully open and fully closed without interference. Adjust linkage assemblies as needed.

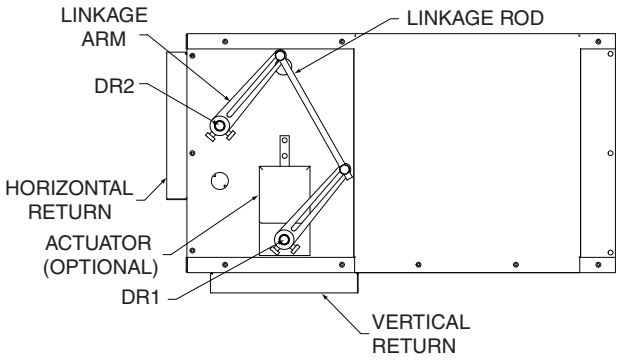


Fig. 57 — Linkage Assembly Front View (Sizes 00-03)

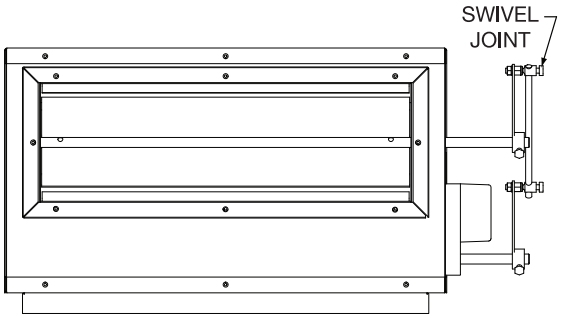


Fig. 58 — Linkage Assembly Side View (Sizes 00-03)

MIXING BOX LINKAGE INSTALLATION (Sizes 04-17) — To install the mixing box linkage assembly (sizes 04-17):

1. Check for correct number of parts:
   3 – Linkage rods
   6 – Linkage arms
   6 – Swivel joints

   NOTE: A $^{7}/_{16}$ in. box end wrench and/or socket will be needed for linkage installation.
2. An alternate field-supplied actuator may be installed directly on the damper shaft if required. If a factory-supplied actuator is ordered for the mixing box, refer to Mixing Box Actuator section on page 36.
3. Orientate actuator to avoid interference with linkage assembly. Refer to Fig. 59 and 60.
4. Ensure dampers are fully closed or open depending on application, and secure actuator to shaft. Actuator should open and close dampers fully. Adjust actuator as needed.
5. Place a linkage arm onto DR3 and DR2. See Fig. 61 and 62 for proper positioning. Ensure that swivel joints are fully extended to the end of the linkage arm and tighten.

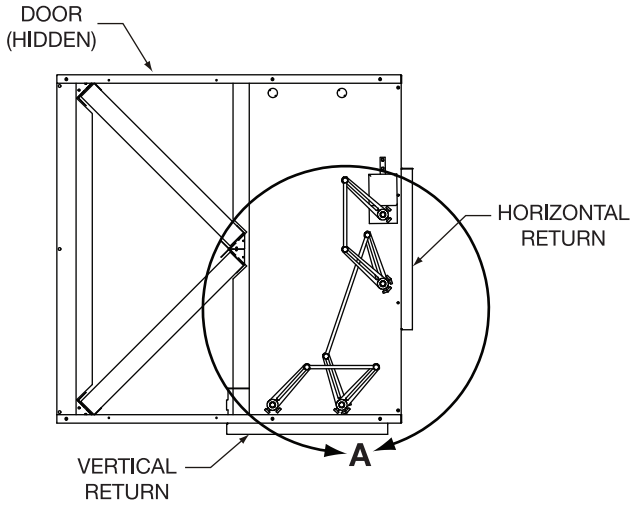


Fig. 59 — Linkage Assembly Front View (Sizes 04-17)

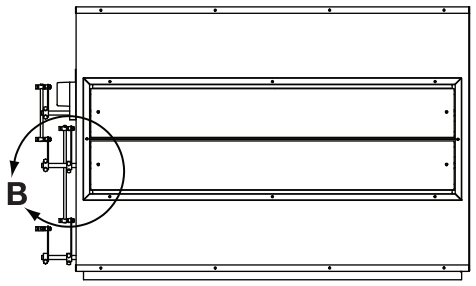


Fig. 60 — Linkage Assembly Side View (Sizes 04-17)

6. Insert linkage rod into swivel joints and tighten. Linkage rod may need to be cut down to size. Linkage arms should be parallel. Assembly should still be loose on damper rods. This will be linkage assembly no. 1.
7. Place linkage arm onto DR1 and DR2. Ensure swivel joints are fully extended to the end of the linkage arm and tighten.
8. Insert linkage rod into swivel joints and tighten. Linkage rod may need to be cut down to size. Linkage arms should be parallel.
9. Ensure dampers are fully open or closed and tighten linkage arms to damper rods. Linkage assembly should be able to open and close dampers fully without interference. Adjust accordingly.
10. Place linkage arm onto DR3 and DR4. Ensure swivel joints are fully extended to the end of the linkage arm and tighten.
11. Insert linkage rod into swivel joints and tighten. Linkage rod may need to be cut down to size. Linkage arms should be parallel.
12. Ensure dampers are fully open or closed and tighten linkage arms to damper rods. Linkage assembly should be able to open and close dampers fully without interference. Adjust accordingly.
13. Ensure one set of dampers is fully open and the other fully closed. Adjust linkage assembly no. 1 to allow travel without interference and tighten to DR2 and DR3.
14. The actuator should now be able to power the dampers fully open and fully closed without interference. Adjust linkage assemblies as needed.

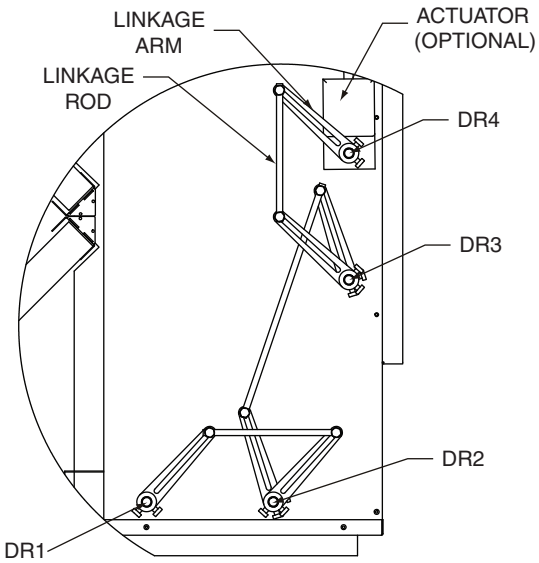


Fig. 61 — Area A Detailed View

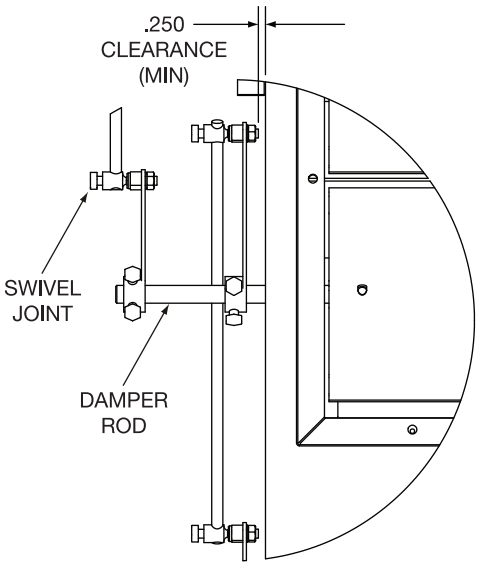


Fig. 62 — Area B Detailed View

Install Sheaves on Motor and Fan Shafts —

Factory-supplied drives are prealigned and tensioned, however, Carrier recommends that the belt tension and alignment be checked before starting the unit. Always check the drive alignment after adjusting belt tension.

When field installing or replacing sheaves, install sheaves on fan shaft and motor shaft for minimum overhang. (See Fig. 63.) Use care when mounting sheave on fan shaft; too much force may damage bearing. Remove rust-preventative coating or oil from shaft. Make sure shaft is clean and free of burrs. Add grease or lubricant to bore of sheave before installing.

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 will enter and leave the grooves at an angle, causing excessive belt cover 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 will be parallel.
2. Check alignment of sheaves:

   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 lined up the string will touch them at the points indicated by the arrows in Fig. 64.

   Adjustable sheave — 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. 64. Adjustable pitch drives are installed on the motor shaft.

⚠ CAUTION

With adjustable sheave, do not exceed maximum fan rpm. Failure to follow these instructions may result in equipment damage.

3. Rotating each sheave a half revolution will determine whether the sheave is wobbly or the drive shaft is bent. Correct any misalignment.

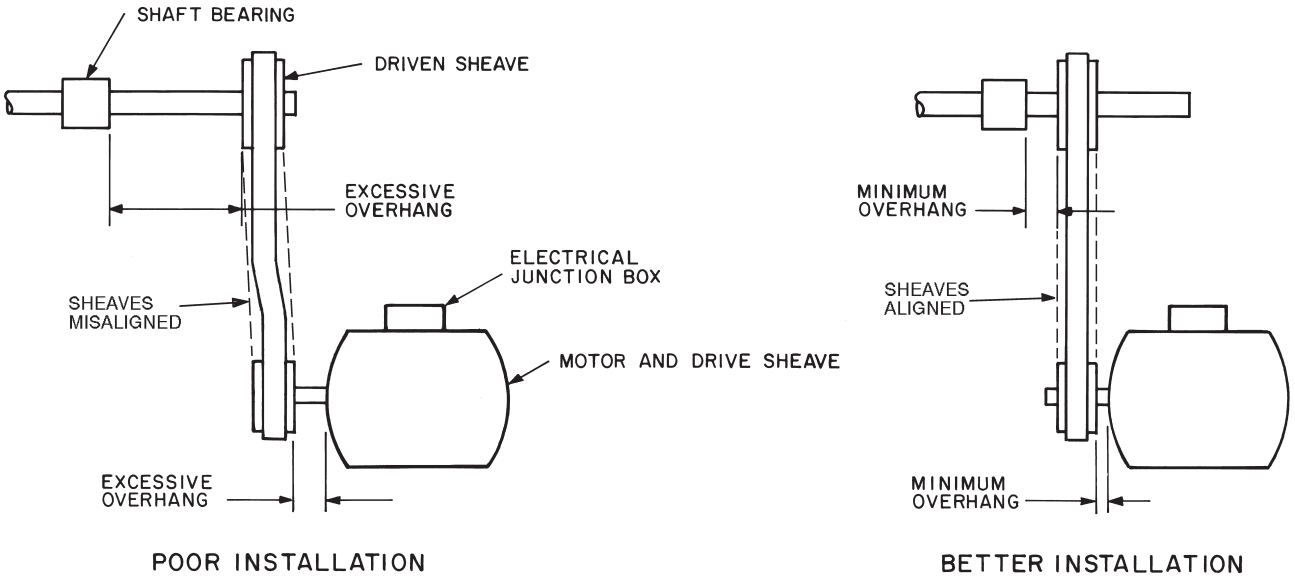


Fig. 63 — Determining Sheave-Shaft Overhang

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.

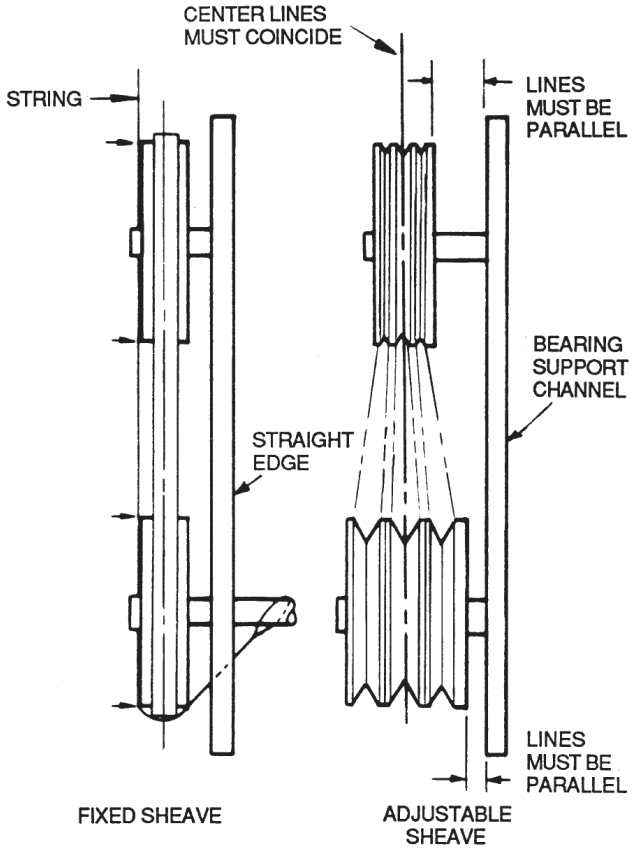


Fig. 64 — Sheave Alignment

Install 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.

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. 65).
6. To determine correct belt tension, use the deflection formula given below and the tension data from Fig. 65 as follows:

   EXAMPLE:

   Given

   Belt Span 16 in.

   Belt Cross-Section A, Super Belt

   Small Sheave Pitch Diameter 5 in.

$$\text{Deflection} = \frac{\text{(Belt Span)}}{64}$$

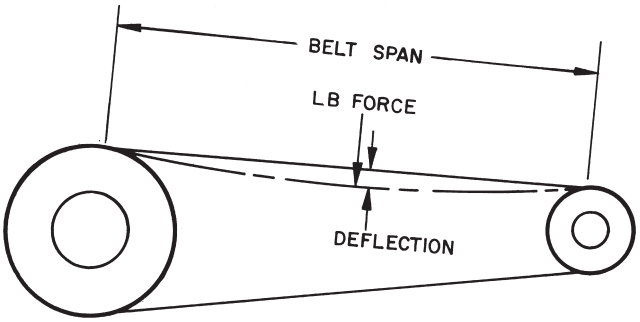
   Solution

1. From Fig. 65 find that deflection force for type A, super belt with 5-in. small sheave pitch diameter is 4 to $5^1/_2$ lb.
2. $$\text{Deflection} = \frac{16}{64}$$
3. Increase or decrease belt tension until force required for $^1/_4$-in. deflection is $5^1/_2$ 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	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
3V	2.65-3.65	3 1/2	5	3 7/8	5 1/2	—	—
	4.12-6.90	4 3/4	6 7/8	5 1/4	7 7/8	—	—
5V	4.40-6.70	—	—	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	—	—	—	—

PD — Pitch Diameter, inches

Fig. 65 — Fan Belt Tension Data

Water and Steam Coil Piping Recommendations

GENERAL — Use straps around the coil casing 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. 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. Some 39S coils have 3 connections on either side of the coil (for a total of 6 connections). In these cases, the middle connection is used as the return connection. See Fig. 66.

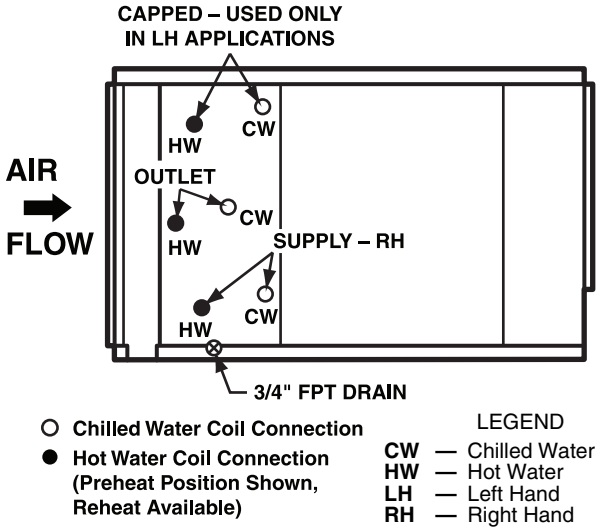


Fig. 66 — Water Coil Connection

STEAM COILS — Position the steam supply connection at the top of the coil, and the return (condensate) connection at the bottom.

Figure 67 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 ¼-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.

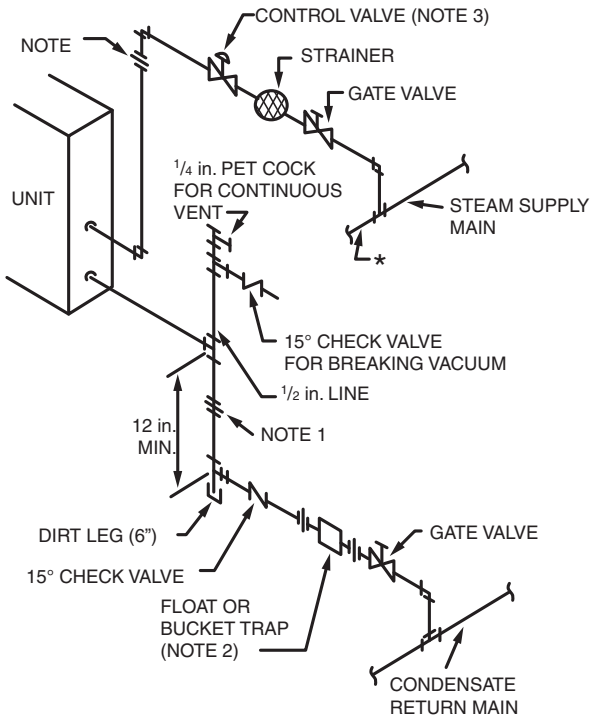
For vacuum return systems, the vacuum breaking check valve would be piped into the condensate line between the trap and the gate valve instead of open to the atmosphere.

Figure 68 illustrates the typical piping at the end of every steam supply main. Omitting this causes many field problems and failed coils.

Figure 69 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 70 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 71 illustrates the basic condensate lift piping.

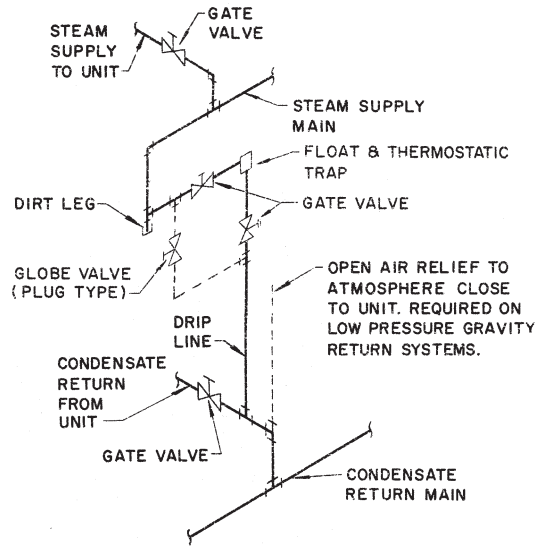


*When end of supply main, see Fig 68

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 de-aerators which vent the air.

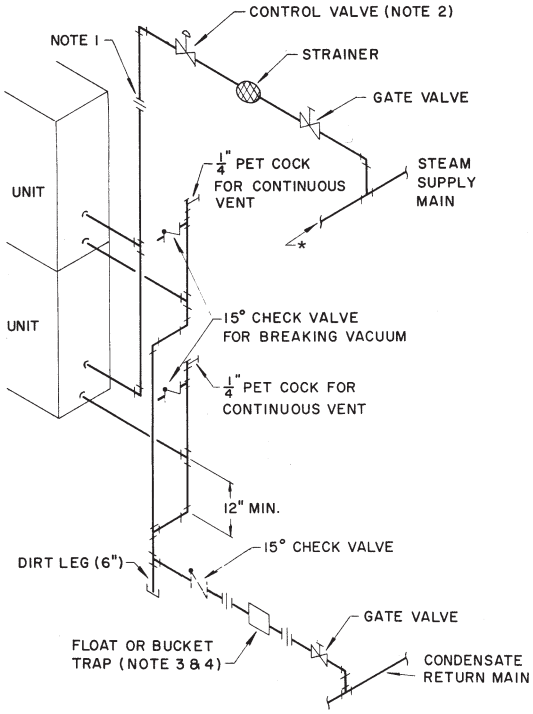
Fig. 67 — Low, Medium or High Pressure Coil Piping



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. 68 — Dripping Steam Supply to Condensate Return

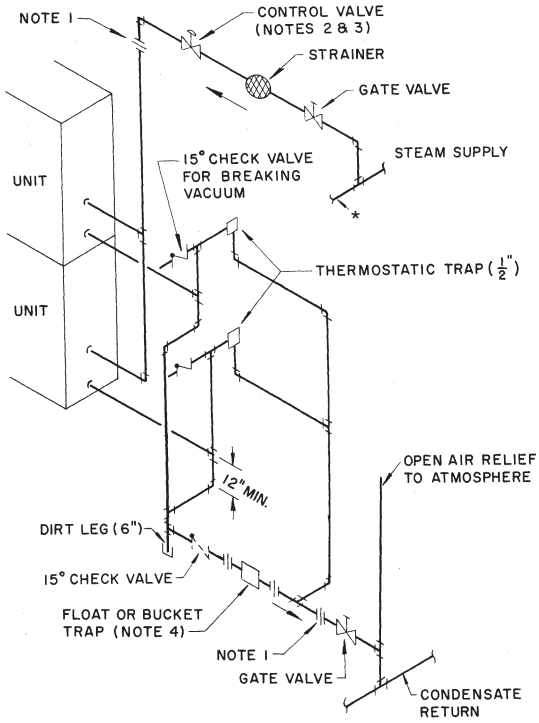


*Refer to Fig. 68 when dripping steam supply main to condensate supply.

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 de-aerators which vent the air.

Fig. 69 — Multiple Coil High Pressure Piping

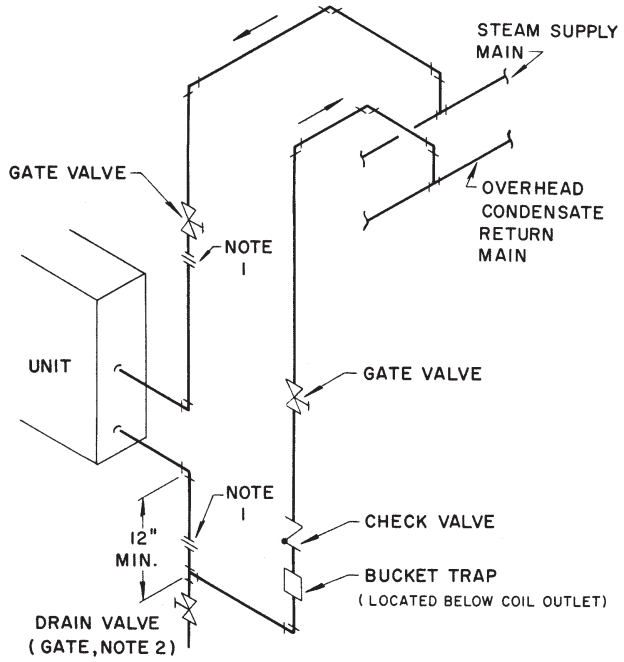


*Refer to Fig. 68 when dripping supply to return.

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. 70 — 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. 71 — Condensate Lift to Overhead Return

Following the piping diagrams in Fig. 67-71, 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 non-condensable 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.

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.

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 39S 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. The IDT steam coils are pitched toward the header end as installed in the unit.

10. Ensure the AHU (air-handling unit) 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. The 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 (DX) Coils — Direct-expansion coils are divided into 1 or 2 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.

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.*

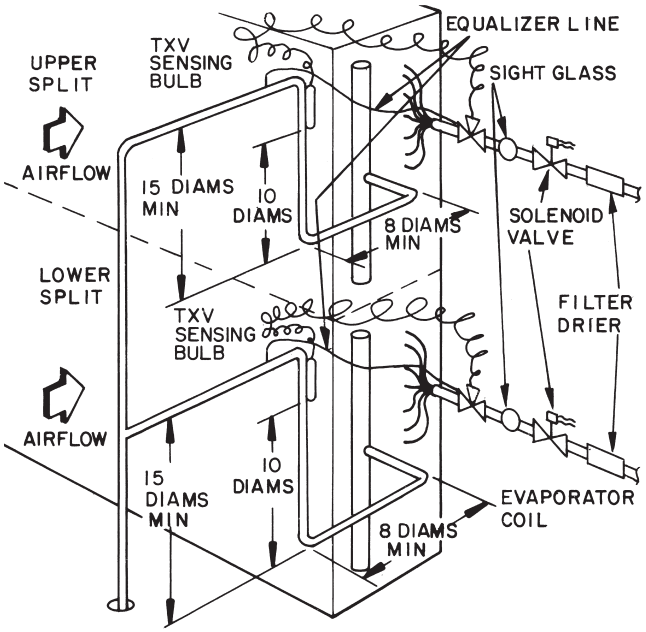
⚠ CAUTION

Direct-expansion coils are shipped pressurized with dry nitrogen. 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.

Failure to follow these procedures could result in personal injury or equipment damage.

SUCTION PIPING — Connect suction piping as shown in Fig. 72 for face split coil.



TXV — Thermostatic Expansion Valve

Fig. 72 — Face Split Coil Suction Line Piping

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 2.5°F. Refer to Fig. 73 for piping risers to the compressor.

To minimize the possibility of flooded starts and compressor damage during prolonged light load operation, install an accumulator in the suction line or a solenoid in the liquid line of *last-on, first off* split in row-split applications.

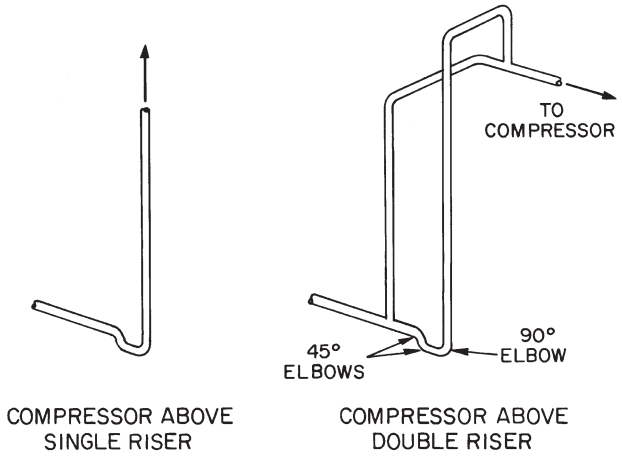


Fig. 73 — Suction Line Riser Piping

EXPANSION VALVE PIPING — Distributor nozzles and expansion valves sized for acceptable performance for a range of conditions are factory supplied. Use the AHU (air-handling unit) selection program in the electronic catalog to select optimal nozzle sizes.

Circuiting selection should result in a circuit loading of 0.8 to 2.0 tons per circuit at design load. Circuit loading must be evaluated at minimum load to ensure that it does not drop below 0.6 tons per circuit. Solenoid valves may be used, if necessary, to shut off the refrigerant supply to individual expansion valves to maintain adequate coil circuit loading.

Compressor minimum unloading and TXV quantity is necessary to determine minimum tonnage per circuit.

Minimum Unloading Equation:

$$\frac{\textit{(Tons per Circuit) x (Minimum Unloading) x (Total no. of TXVs)}}{\textit{no. of TXVs Active}}$$

Example:

Condensing Unit: 38ARS012
Minimum Unloading: 33%
Coil: . . . . . 6 row, 11 FPI, Half Circuit
Coil Tons per Circuit: 1.68
Total TXVs: 2

In the first example we will determine the tons per circuit when both TXVs are active and the compressor is unloaded to its minimum of 33%.

$$= \frac{\textit{(1.68 Tons per Circuit) x (33\% Minimum Unloading) x (2 TXVs)}}{\textit{2 TXVs Active}}$$

$$= \frac{(1.68) \times (.33) \times (2)}{2}$$

= .55 tons per circuit at minimum unloading UNACCEPTABLE

If we install a liquid line solenoid valve before one of the TXVs and close it so that only one TXV is active when the compressor is unloaded to its minimum of 33%, we see the following:

$$= \frac{\textit{(1.68 Tons per Circuit) x (33\% Minimum Unloading) x (2 TXVs)}}{\textit{1 TXV Active}}$$

$$= \frac{(1.68) \times (.33) \times (2)}{1}$$

= 1.10 tons per circuit at minimum unloading ACCEPTABLE

There are three different options to control tons per circuit when using an unloading compressor. The first is to use drop solenoid valve control as illustrated above and let the suction cutoff unloaders "ride" with the load. The second is to use drop solenoid valve control as illustrated above with electric unloaders and let the control algorithm determine the combination of solenoid valves and unloaders to limit tons per circuit to acceptable limits. The third is to limit the minimum amount of unloading so that tons per circuit is within acceptable limits.

Heat Pump Bypass Kit — The Heat Pump Bypass Kit can be used with 39SHK, 39SM, 39SR, and 39SV07-09 units. Follow this procedure to install the kit:

1. Cut off the ends of the stubout tubes near the location of the dotted lines shown in Fig. 74.
2. Slip the swaged ends of the bypass kit over the open tube ends.
3. Cut copper ell as required for fit.
4. Check assembly to ensure proper orientation for free flow.
5. Braze the joints. The check valve body must be protected from overheating.
6. Check for leaks.

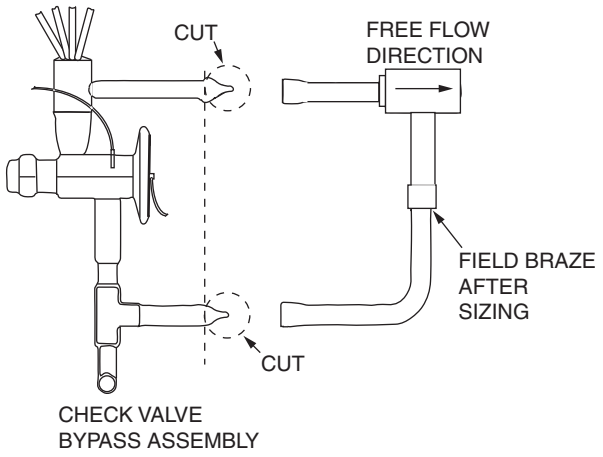


Fig. 74 — Heat Pump Bypass Kit Installation

Drain Pan Replacement — The following drain pan replacement procedure applies to 39SHC/SHF/SHK units with any standard drain pan offering.

1. Identify drain pan type (plastic or stainless steel).
2. Remove coil stubout panel on the connection side of the unit (39SHC/SHF/SHK sizes 00-05). For sizes 07-17 skip to Step 3 (coil panel will be one piece).
3. Remove filter access panel and filter.
4. Remove coil retaining screws (sizes 00-05 have 4 each and sizes 07-17 contain up to 6 each). Screws are accessible from the filter side of the unit. Screws are used to attach the first coil to the coil panel.
5. Remove top panel screws at sides and rear (do not remove front screws).

NOTE: Ensure unit is properly supported before removing screws. Top panel will not be removed.

6. Remove screws at bottom of coil panel. Remove coil panel.
7. Next, remove the coils from the unit along with the drain pan.

NOTE: Drain pan will slide out of the unit.

NOTE: To remove coils, lift top panel.

8. If the unit is single wall construction, simply install the new drain pan and the coils.
9. For double wall units, coil panels have a liner panel that ends above the edge of the drain pan. For these panels, apply adhesive backed closed cell insulation (15-1/4 in. x 1-1/2 in.) to the inside of the coil panel, flush with the bottom of the liner panel. This provides an air seal to the end of the drain pan. Proceed with the installation of the new drain pan and coils.
10. Set coil panel in place and attach coils to the panels. Install coil panel screws at bottom and top of unit. Install all top panel screws.

NOTE: Ensure that the top filter rail is behind the top panel flange, and that the rear leg is on the outside of the top panel flange.

NOTE: Galvanized drain pans shall be attached to coil panel using (2) No. 8 sheet metal screws.

11. Reinstall the coil stubout panel (unit sizes 00-05) along with the filter and filter door.

Coil Removal

⚠WARNING

Never enter an enclosed fan cabinet or reach into a unit while the fan is running. Failure to follow this warning can result in severe personal injury.

⚠WARNING

To avoid possible injury or death due to electrical shock, lock open and tag the fan motor power disconnect switch before working on a fan. Remove and retain fuses and note removal on tag.

⚠WARNING

To avoid possible injury or death due to electrical shock, lock open and tag the electric heat coil power disconnect switch before working on or near heaters.

Follow these steps to remove and replace coil.

1. Isolate and drain coil from heating/cooling fluid and/or reclaim refrigerant. Disconnect unit from piping.
2. Remove supply piping to allow access into the coil section from the side.
3. Remove coil section access panel.

NOTE: If the blower section is on top of coil section, lift the blower section up to allow removal of cross rail. Blower section must be raised up approximately 2 in. during the entire procedure.

4. Remove screws at filter side of coil and far side from coil. Remove cross rail.
5. Remove screws that attach the coil to the vertical and horizontal coil mounting pieces (if present).

6. Lift coil up approximately 1 in. and remove from unit. Drain pan remains in place.
7. (If one coil will be installed, skip to Step 8.) If two coils are to be installed, set new coils upright on a flat surface resting on their bottom edges. Attach coils together along horizontal top flange using at least (2) screws and at least 1 screw on each side flange.
8. Set new coil into drain pan, move coil into position and attach to vertical mounting surfaces using (2) self-drilling sheet metal screws across the top flange, and at least (1) screw on each side flange.
9. Install cross rail.

NOTE: If blower section is on top of coil section, set blower section back down on coil section and secure.

10. Install coil section access panel.
11. Restore unit to service.

Electric Heaters — Electric heaters may be factory-installed or factory-supplied for field installation. Figures 75-83 are electric heater wiring diagrams.

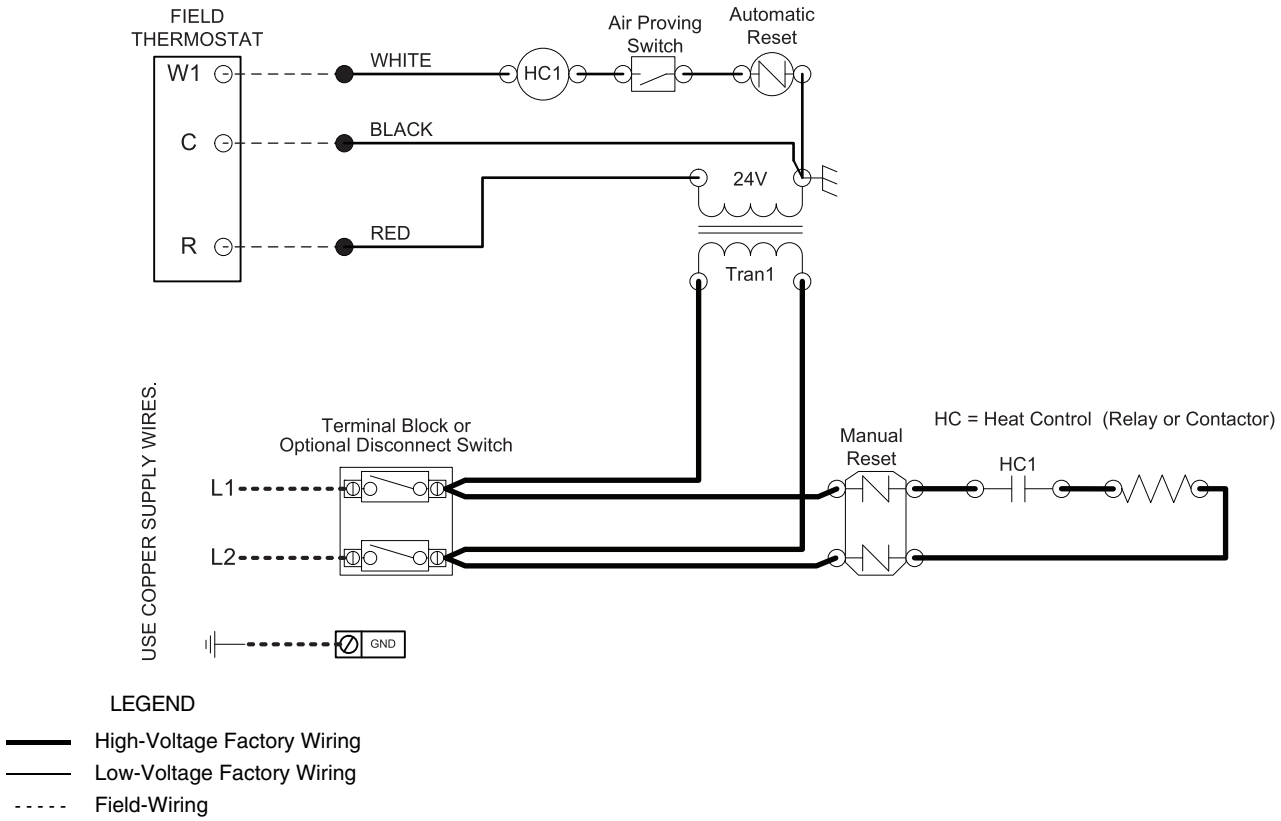


Fig. 75 — Electric Heat Wiring Schematic, Dual Point Power (1 Element), 240V, Single Phase, 1 to 6 kW

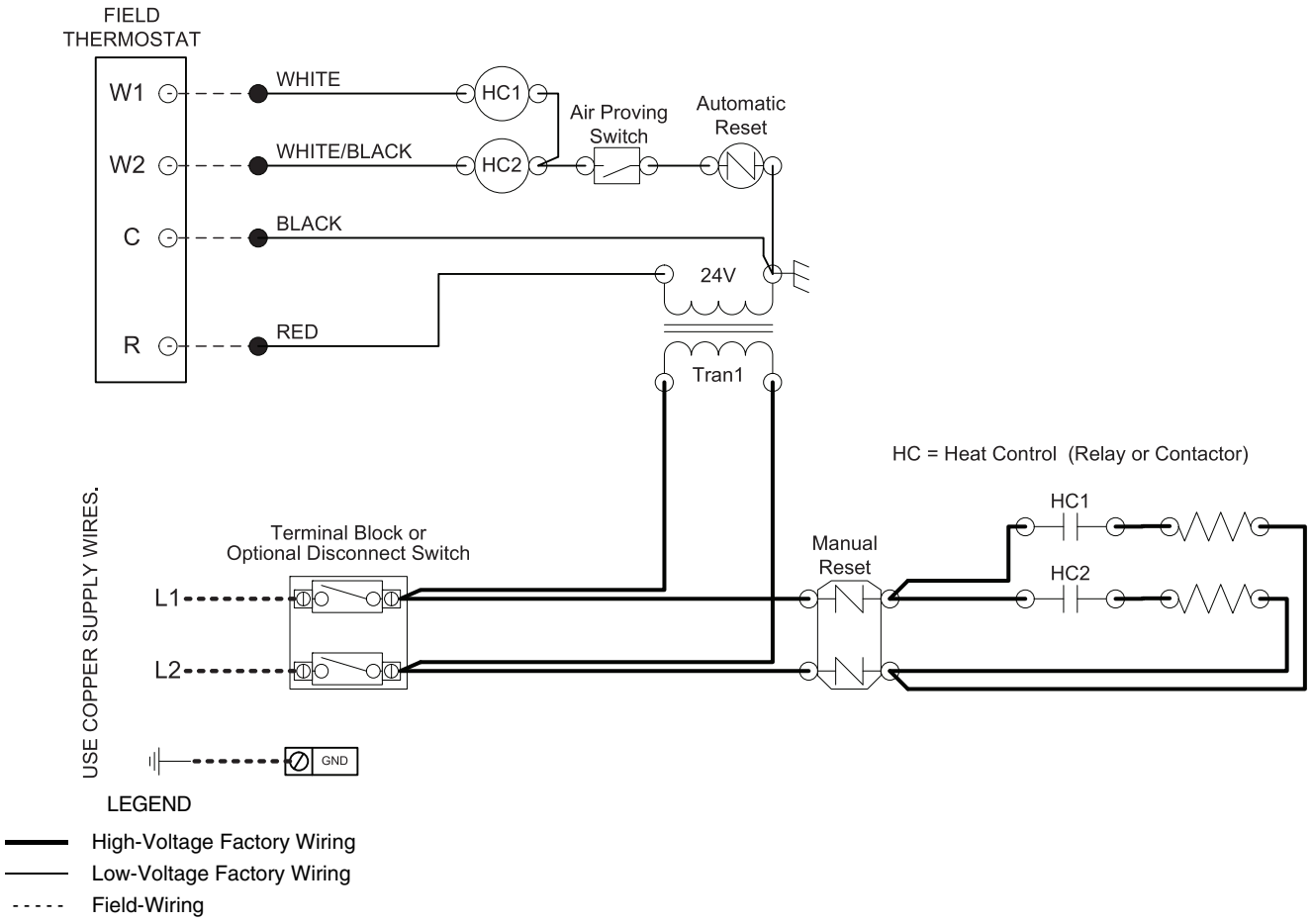


Fig. 76 — Electric Heat Wiring Schematic, Dual Point Power (2 Elements), 240V, Single Phase, 7 to 10 kW

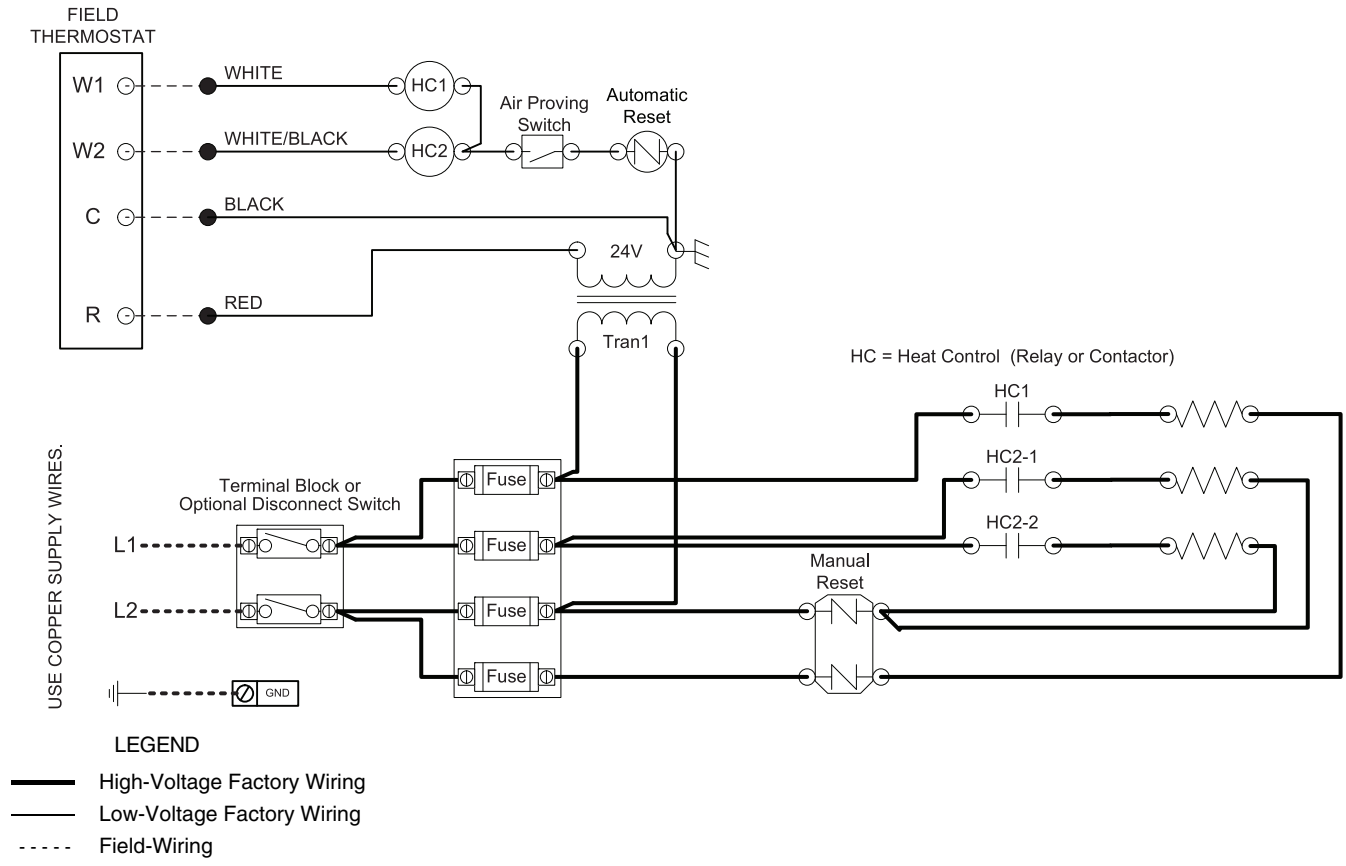


Fig. 77 — Electric Heat Wiring Schematic, Dual Point Power (3 Elements), 240V, Single Phase, 11 to 17 kW

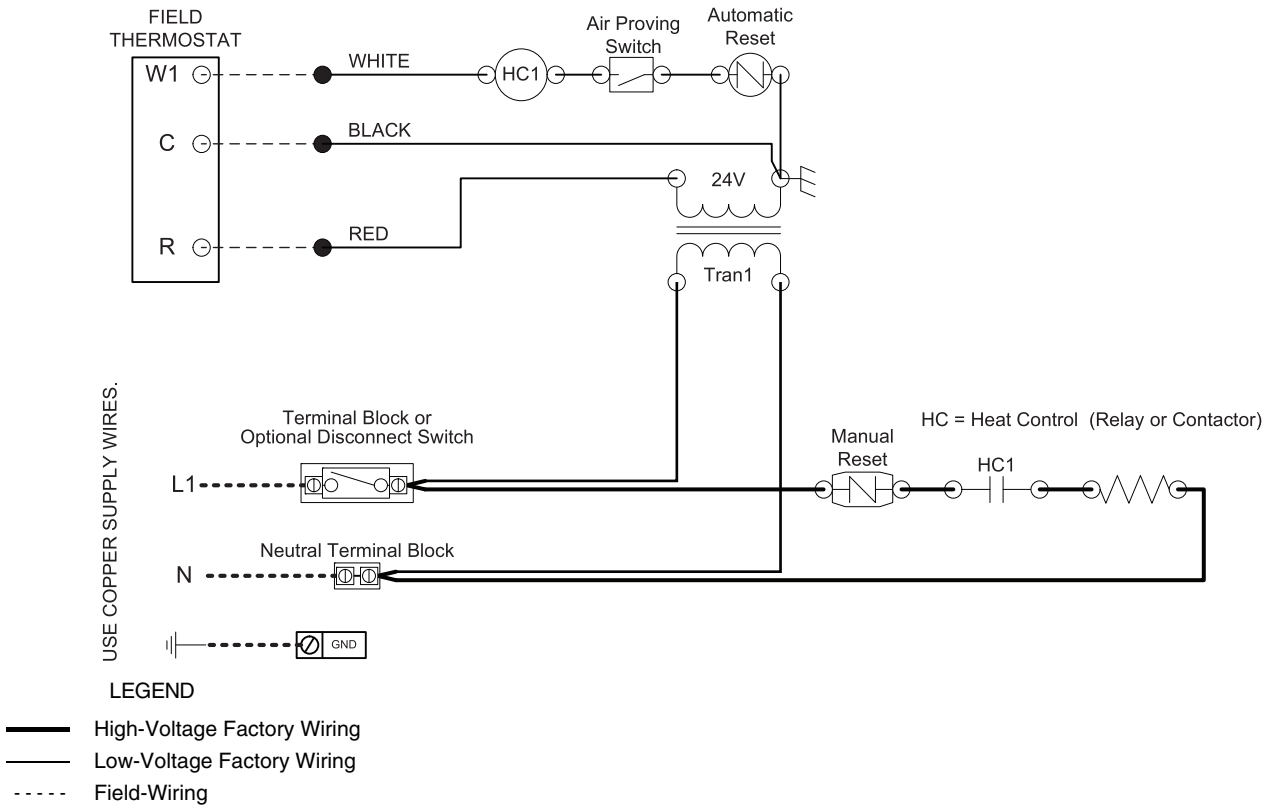


Fig. 78 — Electric Heat Wiring Schematic, Dual Point Power (1 Element), 277V, Single Phase, 1 to 6 kW

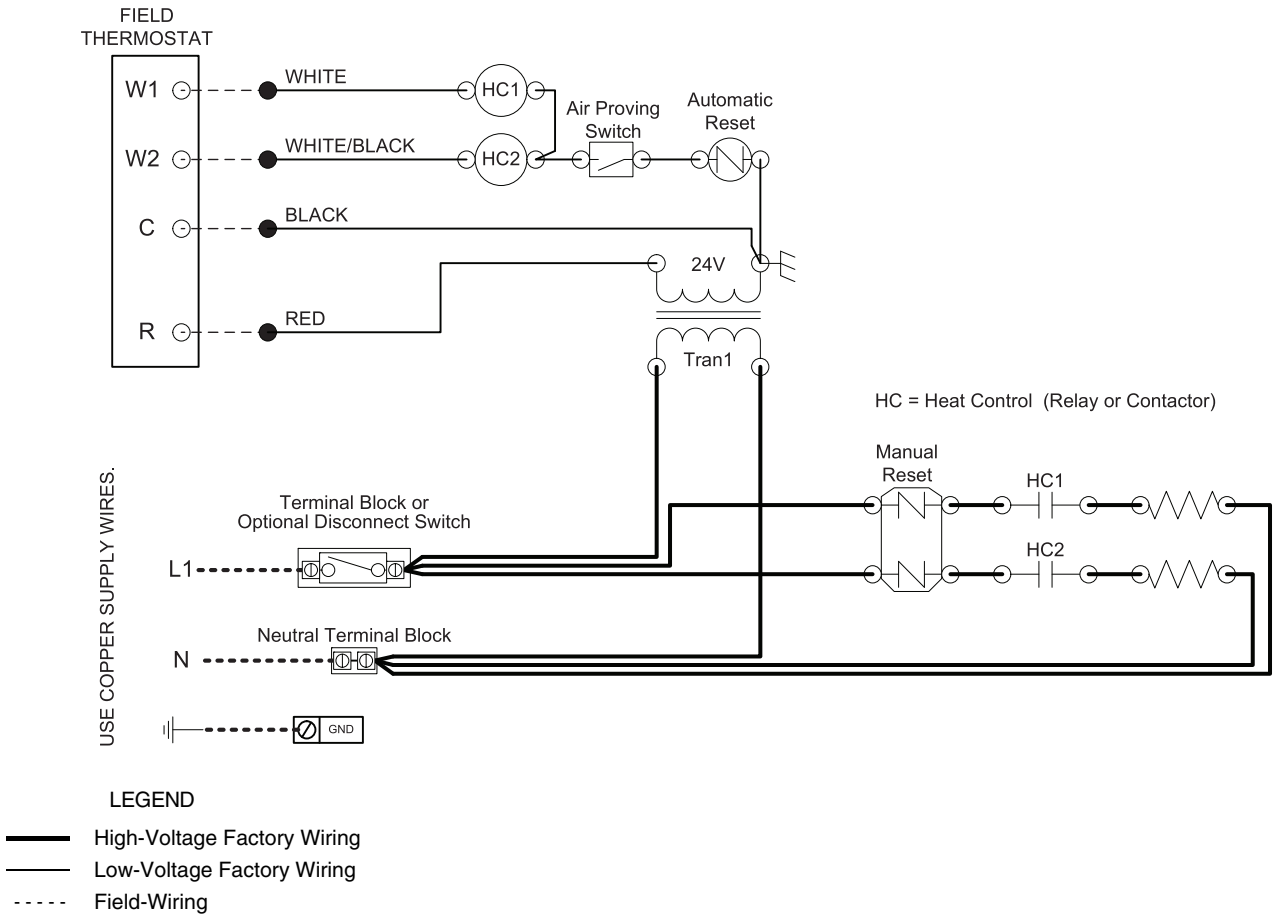


Fig. 79 — Electric Heat Wiring Schematic, Dual Point Power (2 Elements), 277V, Single Phase, 7 to 10 kW

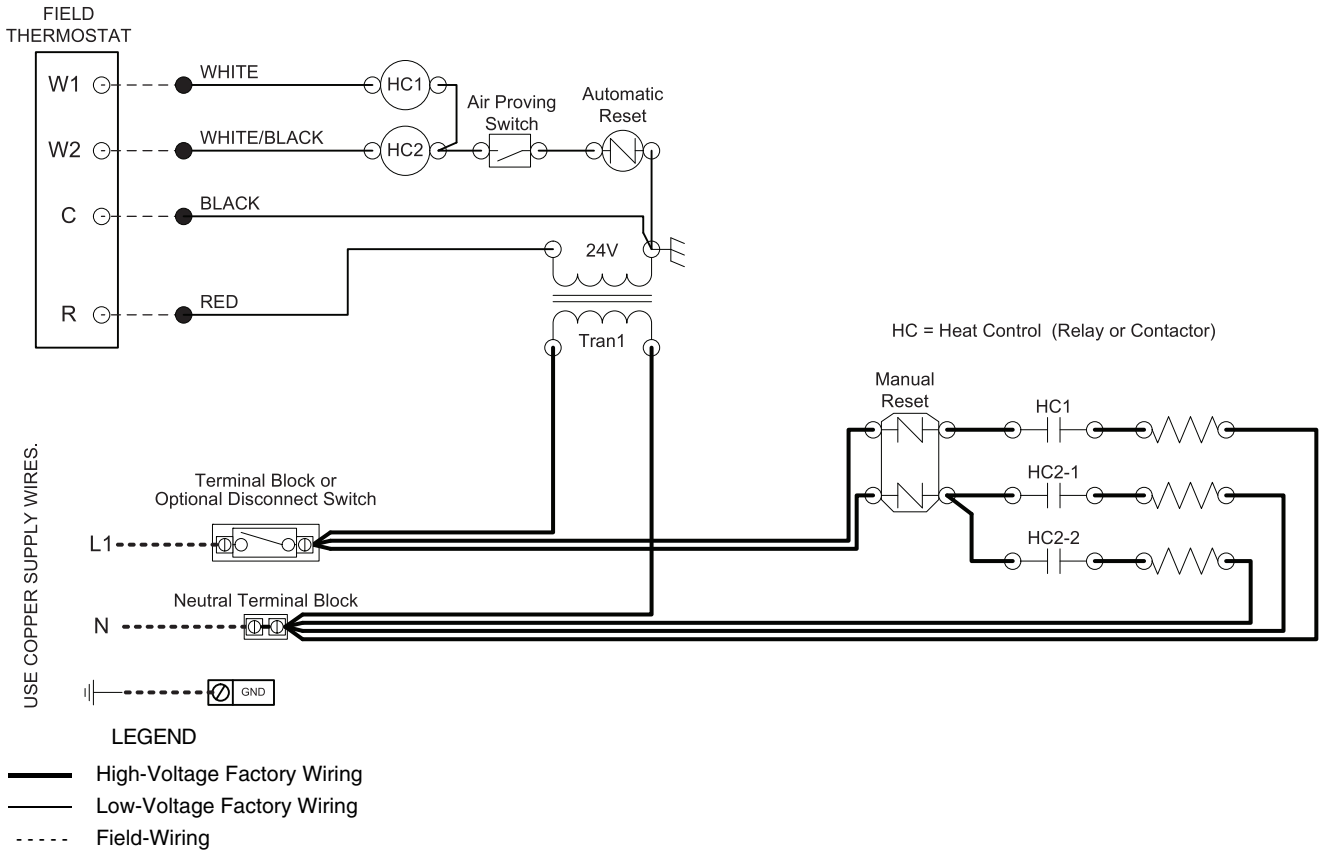


Fig. 80 — Electric Heat Wiring Schematic, Dual Point Power (3 Elements), 277V, Single Phase, 11 to 13 kW

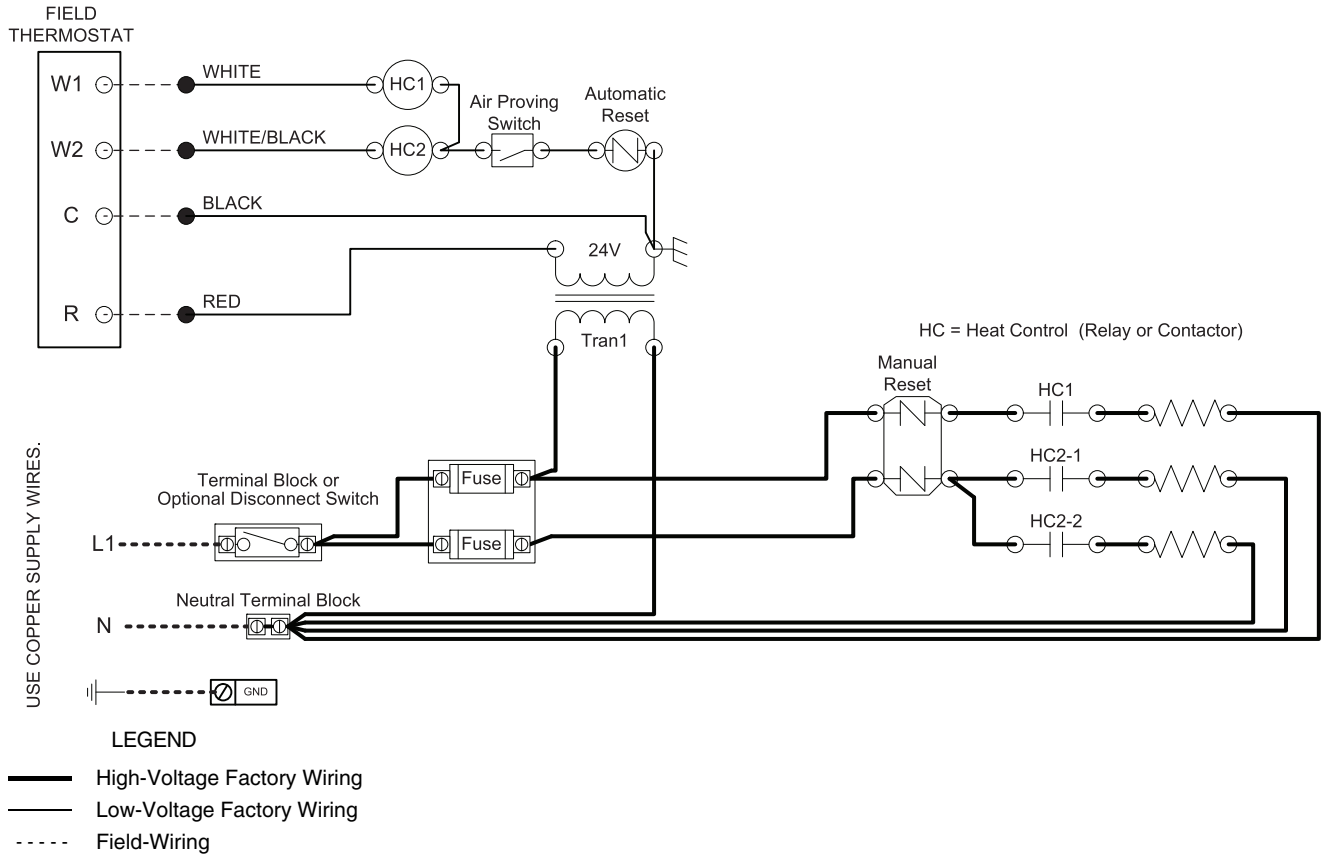


Fig. 81 — Electric Heat Wiring Schematic, Dual Point Power (3 Elements), 277V, Single Phase, 14 to 17 kW

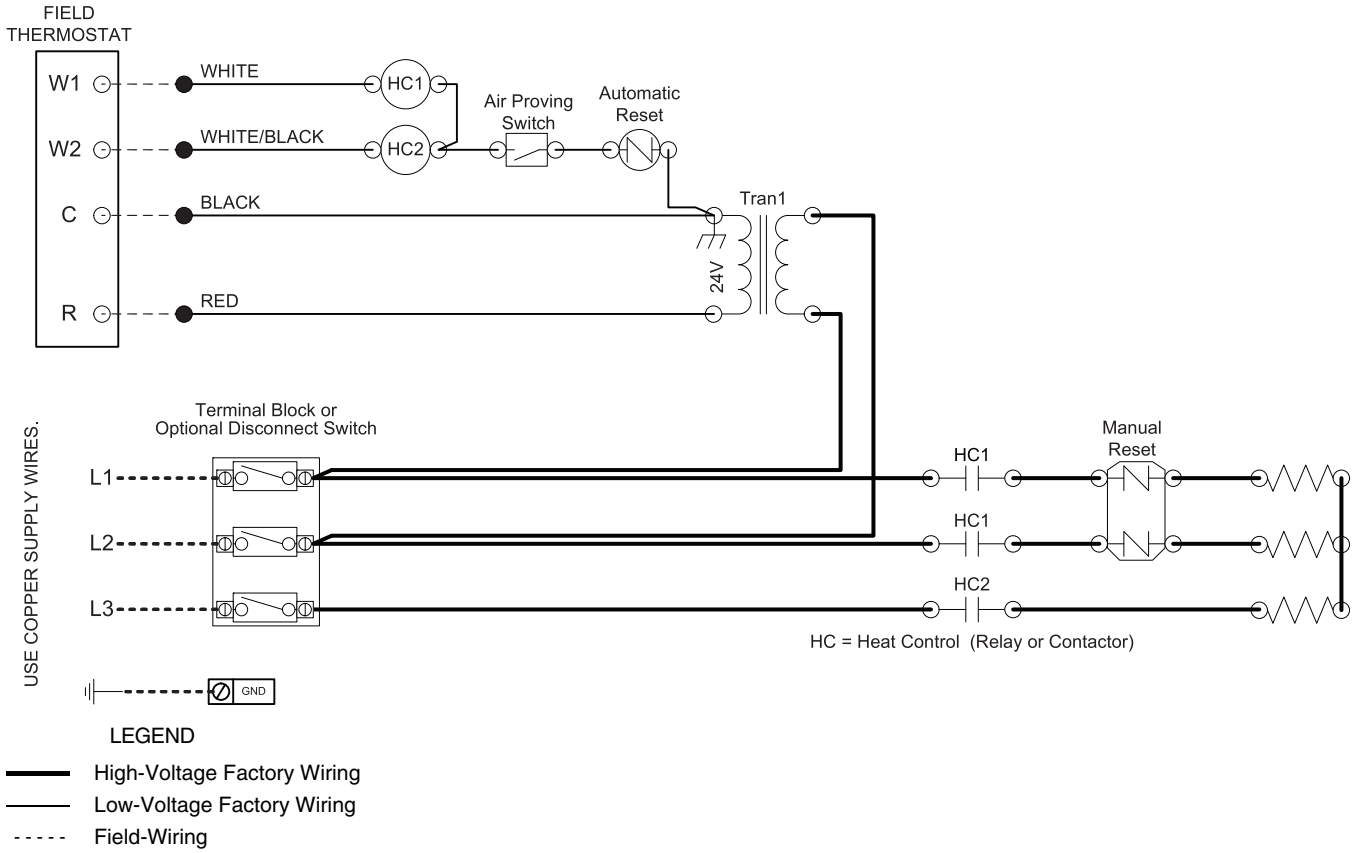


Fig. 82 — Electric Heat Wiring Schematic, Dual Point Power (Star Wiring), 240V 3-Phase 1 to 10 kW and 480V 3-Phase 2 to 20 kW

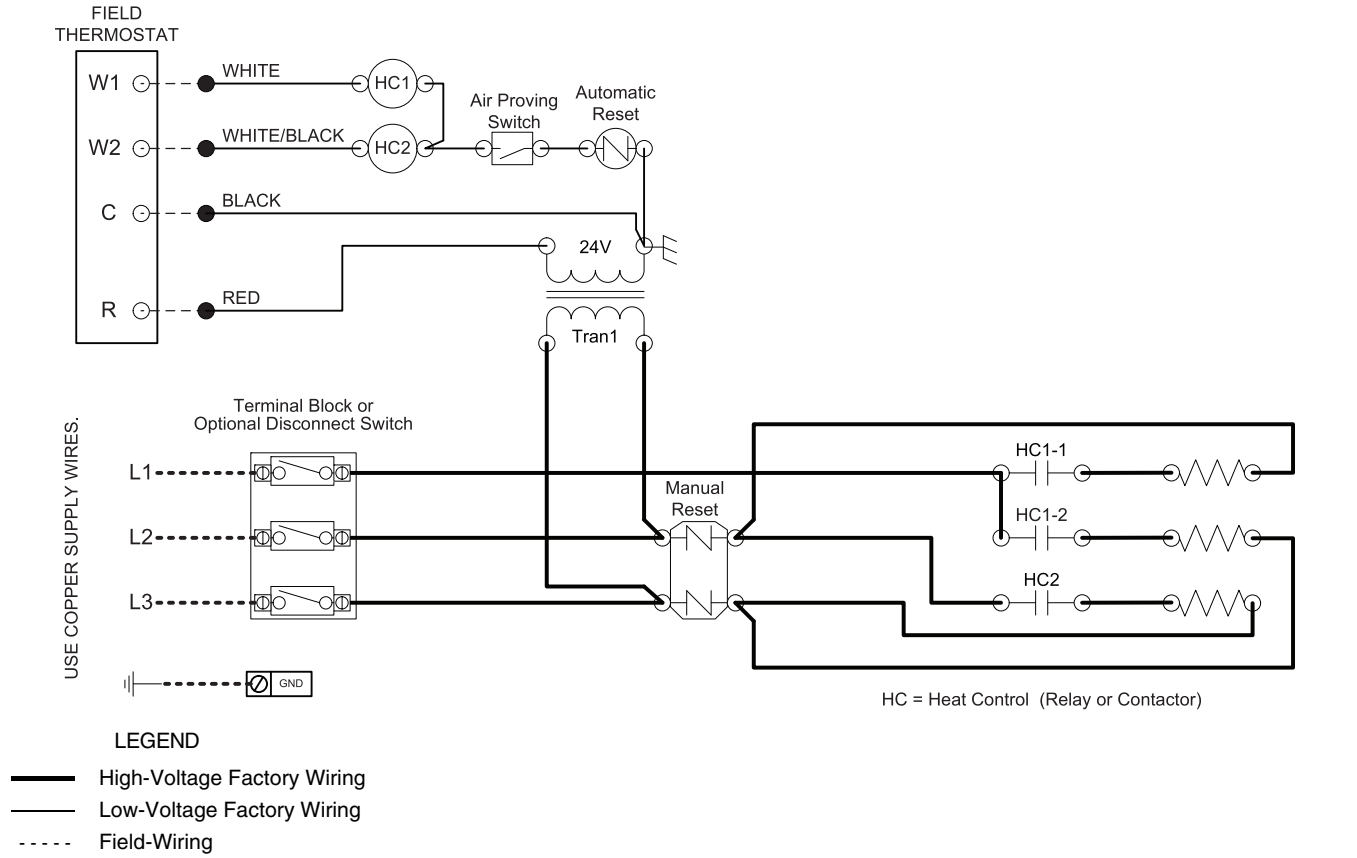


Fig. 83 — Electric Heat Wiring Schematic, Dual Point Power (Delta Wiring), 240V 3-Phase 11 to 17 kW and 480V 3-Phase 21 kW

Motor Start/Stop Stations

⚠ WARNING

To avoid possible injury or death due to electrical shock, open the power supply disconnect switch and secure it in an open position during installation.

⚠ CAUTION

Use only copper conductors for field-installed electrical wiring. Unit terminals are not designed to accept other types of conductors.

All field-installed wiring, including the electrical ground, MUST comply with the National Electrical Code (NEC) as well as applicable local codes. In addition, all field wiring must conform to the Class II temperature limitations described in the NEC.

Refer to Fig. 84-86 for optional factory-installed motor start/stop station wiring diagrams.

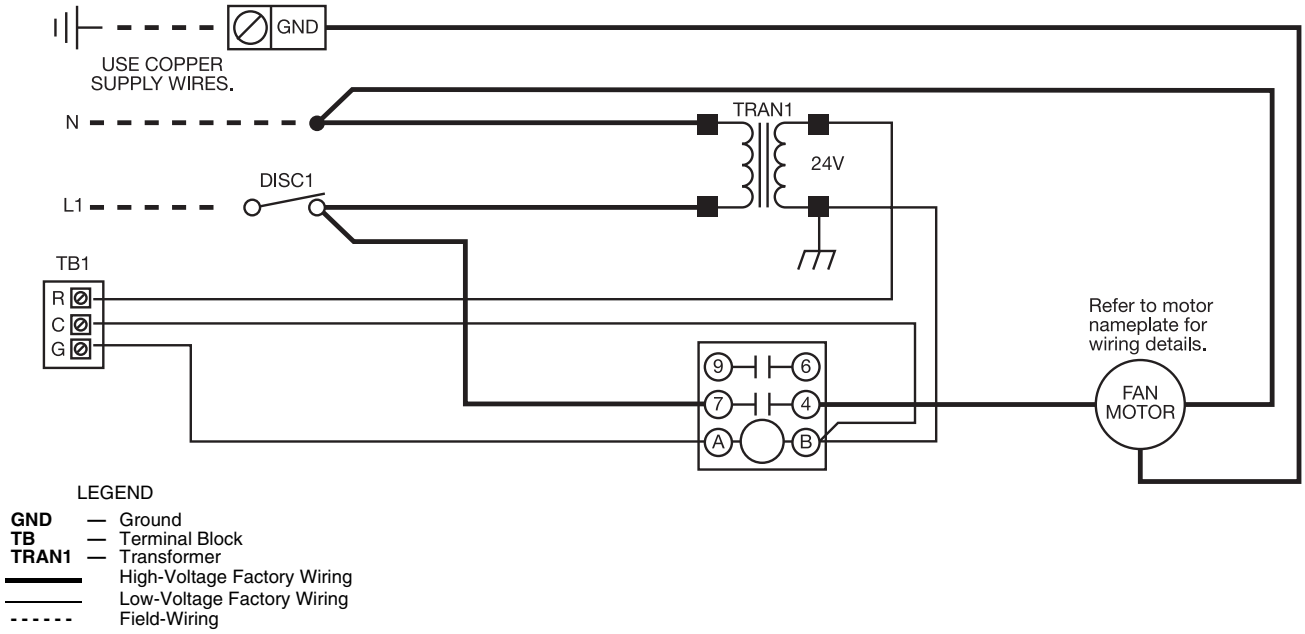


Fig. 84 — Single-Phase Motor Start/Stop Station Wiring Diagram

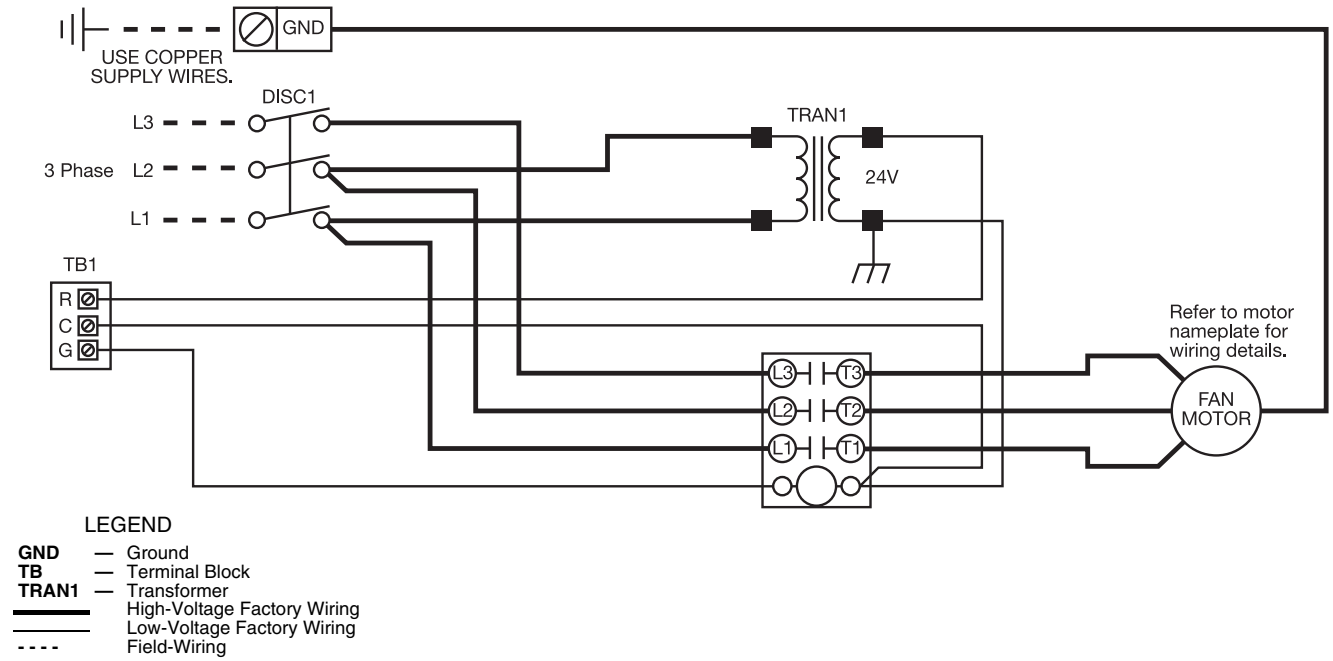
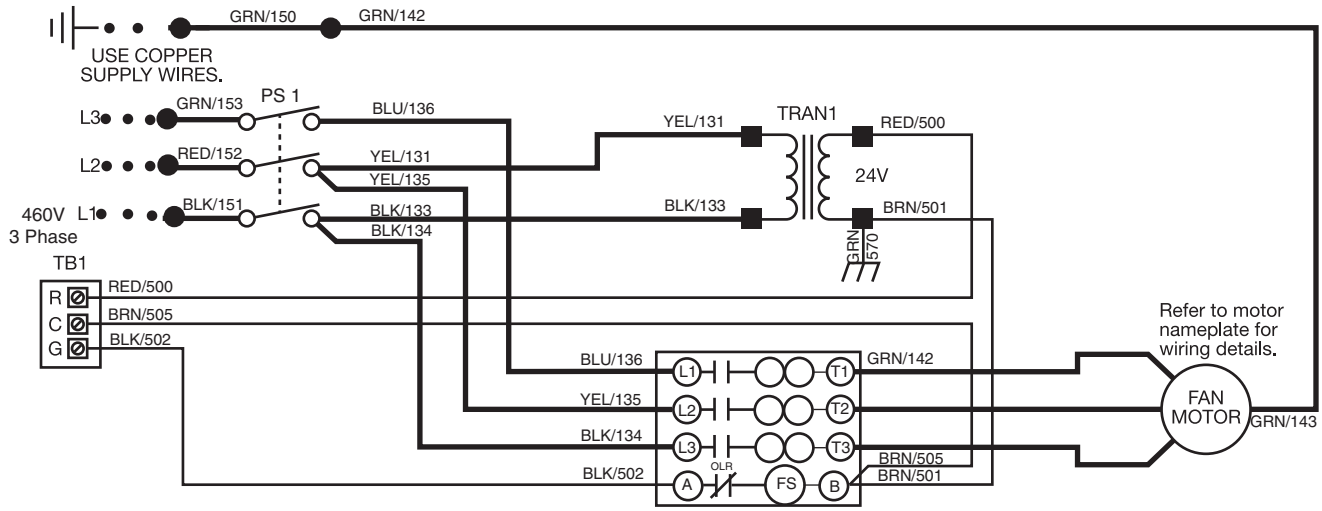


Fig. 85 — 3-Phase Motor Start/Stop Station Wiring Diagram



LEGEND

FS — Fan Starter
OLR — Overload Relay
PS — Power Switch
TB — Terminal Block
TRAN1 — Transformer

Chassis Ground

Splice

Connection Point

High-Voltage Factory Wiring

Low-Voltage Factory Wiring

Field-Wiring

Fig. 86 — Typical Motor Start/Stop Station Wiring

VFD

⚠ WARNING

Dangerous voltage is present when input power is connected. After disconnecting power supply wait at least 5 minutes before performing any maintenance. Failure to follow these instructions may result in personal injury or equipment damage.

Factory installed variable frequency drives (VFD) are wired to the motor and fully tested before shipment. Drive programming is also done at the factory.

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

39SHK and 39SHF products have several control options. For all options, the VFD can be put into manual mode from the keypad. Other control options allow for field-supplied fan speed signal and for keypad control (manual speed setting). VFDs are located inside the blower compartment. Keypad is mounted on unit exterior for all control options.

Typical wiring diagrams are shown FOR REFERENCE, see Fig. 87-89. Always refer to the wiring diagram on the air handling unit for actual wiring.

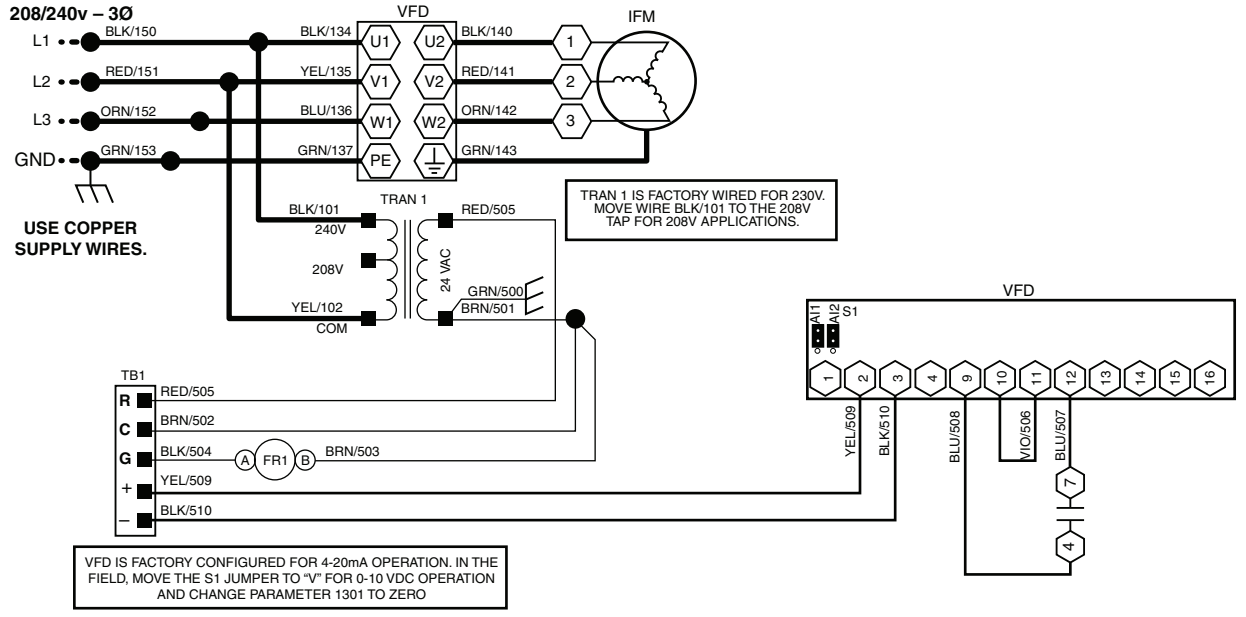
Connect electrical service to unit. Refer to unit wiring diagram.

NOTE: Check motor rating plate for correct line voltage.

For power supply connection, route field power wiring to field-provided and installed disconnect switch and from switch to junction box on unit. Unit is internally wired from junction box to VFD.

Refer to nameplate FLA, maximum overcurrent protection device (MOPD) and minimum circuit ampacity (MCA). Also refer to wiring diagram affixed to unit to make control and power wiring connections.

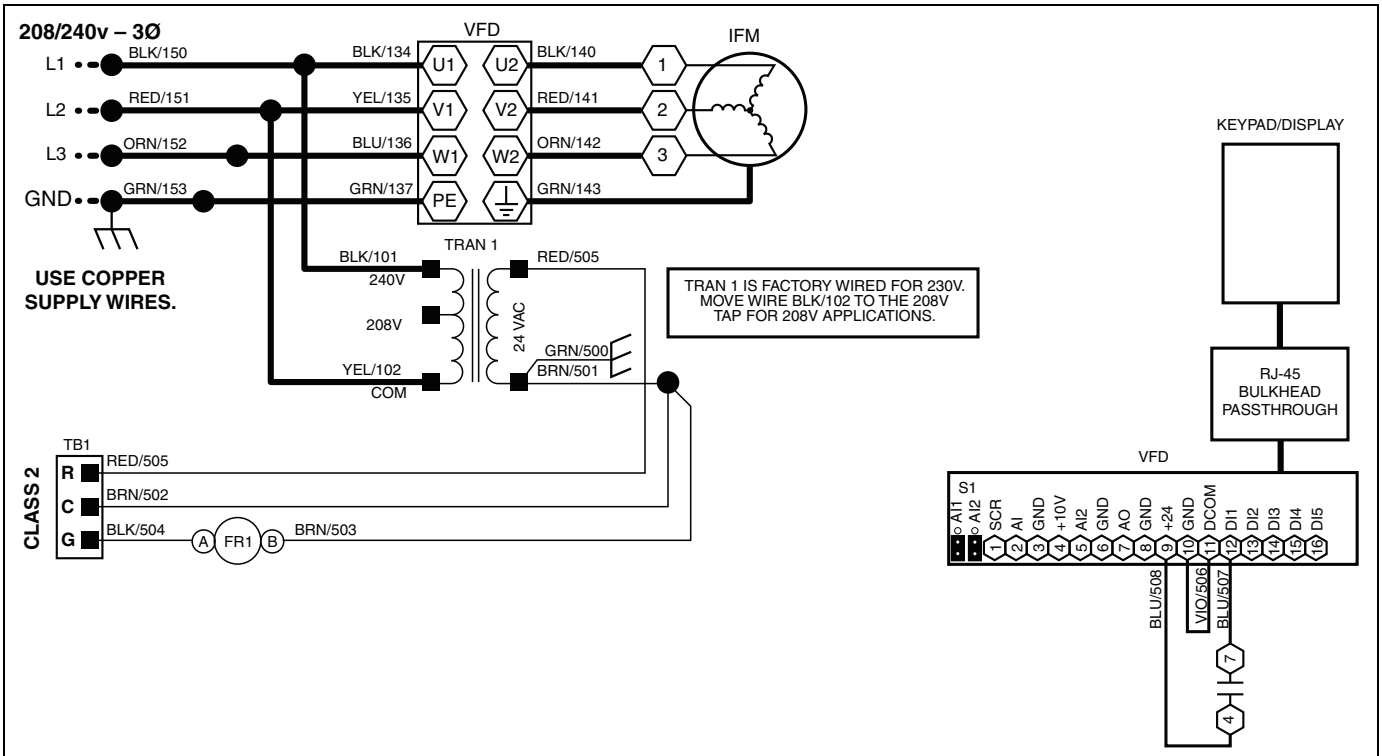
NOTE: Installer is responsible for power wiring and branch circuit over current protection.



NOTES:

1. This diagram represents the factory-installed electrical option with 4-20 mA field signal input for fan speed control. Includes VFD keypad mounted on outside of unit.
2. Typical wiring is shown. For exact wiring, refer to the wiring diagram provided with the unit.
3. Field wiring includes power wiring (upper left hand corner) and low voltage control wiring (terminal block TB1).
4. Units ordered for 208V-240V voltage selection are factory wired for 240V. Field may rewire motor and transformer primary tap for operation at 208V.
5. Selection of field provided and installed electrical components is the responsibility of the installer, including branch circuit protection and wiring.
6. To start the fan, connect R and G to energize fan relay FR1. Control fan speed by providing 4-20 mA signal at + and - connections at TB1.
7. The control power (R and C at terminal block TB1) can be used to power a standard 24VAC thermostat, DX relay and up to 2 control valves.

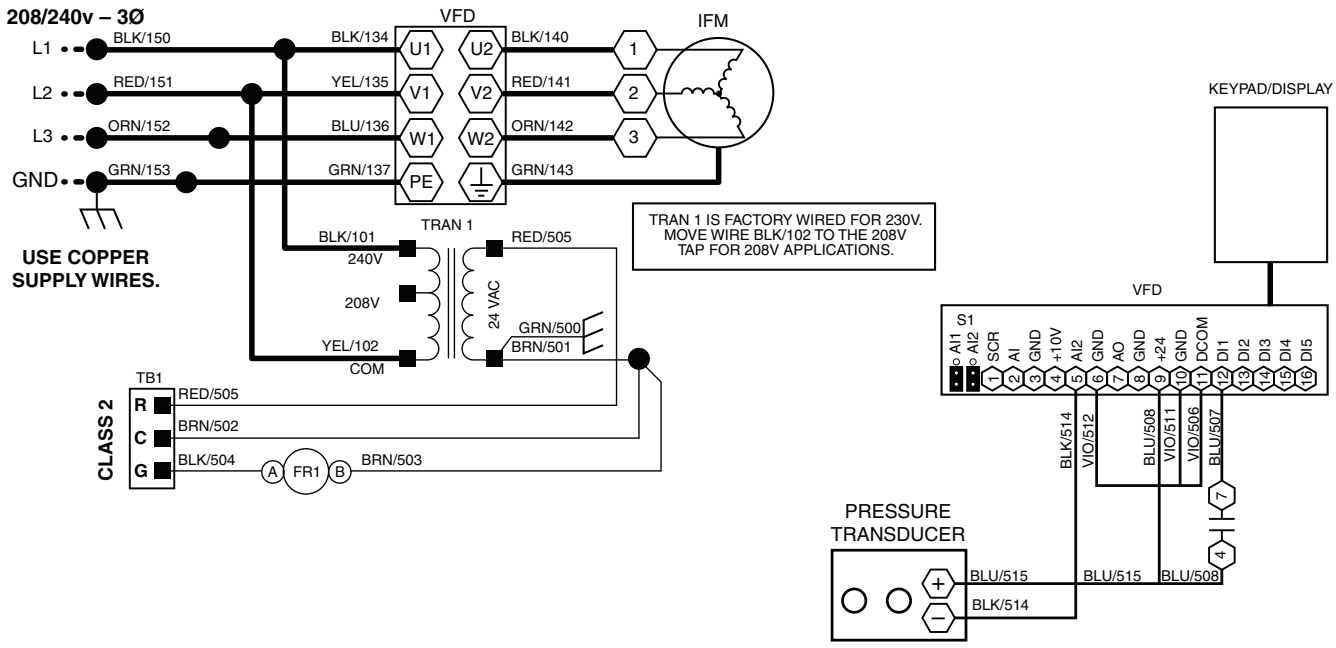
Fig. 87 — Control Option "A," 4-20 mA Fan Speed Control Typical Wiring Diagram



NOTES:

1. This diagram represents the factory-installed electrical option with manual fan speed control using the VFD keypad mounted on outside of unit.
2. Typical wiring is shown. For exact wiring, refer to the wiring diagram provided with the unit.
3. Field wiring includes power wiring (upper left hand corner) and low voltage control wiring (terminal block TB1).
4. Units ordered for 208V-240V voltage selection are factory wired for 240V. Field may rewire motor and transformer primary tap for operation at 208V.
5. Selection of field provided and installed electrical components is the responsibility of the installer, including branch circuit protection and wiring.
6. To start the fan, connect R and G to energize fan relay FR1. Control fan speed using the keypad.
7. The control power (R and C at terminal block TB1) can be used to power a standard 24VAC thermostat, DX relay and up to 2 control valves.

Fig. 88 — Control Option "B," Manual Fan Speed Control Typical Wiring Diagram



NOTES:

1. This diagram represents the factory-installed electrical option with constant CFM control using the pressure transducer mounted inside the unit. Control loop logic is contained in the VFD programming. VFD keypad is mounted on outside of unit.
2. Typical wiring is shown. For exact wiring, refer to the wiring diagram provided with the unit.
3. Field wiring includes power wiring (upper left hand corner) and low voltage control wiring (terminal block TB1).
4. Units ordered for 208V-240V voltage selection are factory wired for 240V. Field may rewire motor and transformer primary tap for operation at 208V.
5. Selection of field provided and installed electrical components is the responsibility of the installer, including branch circuit protection and wiring.
6. To start the fan, connect R and G to energize fan relay FR1. Fan speed is controlled by the VFD using the pressure transducer signal to maintain a fixed airflow (constant pressure difference across the calibrated fan nozzle).
7. The control power (R and C at terminal block TB1) can be used to power a standard 24VAC thermostat, DX relay and up to 2 control valves.

Fig. 89 — Control Option "D," Constant CFM Control Typical Wiring Diagram

Reset VFD to Factory Settings

⚠ CAUTION

Failure to follow these instructions may result in equipment damage. Changing certain parameters can lead to improper motor operation, such as operation at current higher than the allowable maximum. DO NOT CHANGE the following settings without written factory approval:

- maximum output frequency
- maximum motor current
- motor direction
- minimum frequency
- motor nominal current
- motor nominal speed

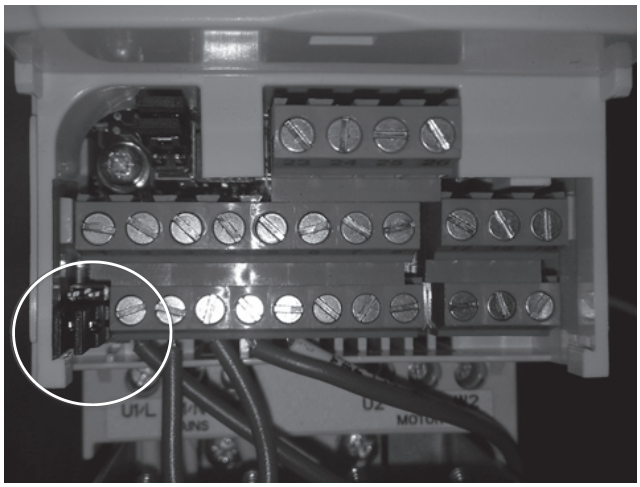
TO RESET VFD PARAMETERS TO THE FACTORY SETTINGS

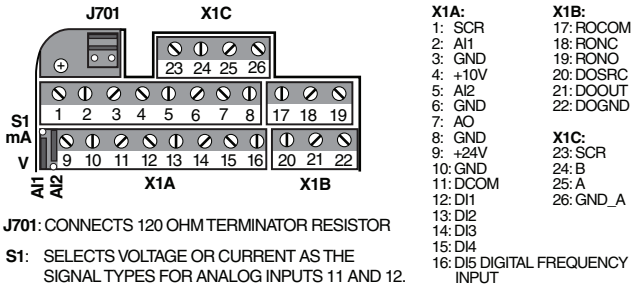
1. Move jumper S1 (see Fig. 90) settings on VFD to match factory wiring diagram,
2. Change parameter 9902 to "HVAC default" to reset all the parameters,
3. Set all parameters to values indicated in Tables 6-8.

MODIFY VFD FACTORY SETTINGS

To modify certain VFD parameters, select those parameters and modify as needed. To change parameters:

a. Press <Menu>
b. Select Parameters
c. Press <Enter>
d. Select sub-group (first two digits of the parameters)
e. Press <SEL>
f. Select parameter
g. Press <EDIT>
h. Select the new value
i. Press <SAVE>
j. Select any other parameters of the group to change and go to "g." above.
k. When complete, press <Exit>
l. Select any other parameter groups to change and go to "e." above.
m. When complete, Press <Exit>
n. Press <Exit> until the status menu is visible (HZ, PSI, PSI)





NOTES:
1. Refer to electrical installation section for conversion from 4-20mA fan speed control to 0-10VDC.
2. For assistance with VFD setup for special applications or detailed troubleshooting, contact VFD manufacturer service.

Fig. 90 — VFD Jumper S1 Location and Terminal Details

Table 6 — VFD Parameters — Control Option A, B, C (Keypad or 4-20 mA Control Signal)

CONTROL OPTION		PARAMETER INDEX	PARAMETER FUNCTION	SETTING
A	B/C			
X	X	1611 (ACS310-320)	Parameter View	3 (Long View)
X	X	n/a (ACS55 ONLY)	Parameter View — Menu PAr S/ PAr L	PAr L (Long View)
X	X	1001	Start/Stop Command	1 (DI1)
X	X	1003	Motor Direction	1 (Forward)
X	X	1104	Min. Frequency	10 Hz
X	X	1105	Max Ref. Frequency	See Table 8
X	X	1109 (ACS55 ONLY)	Local Reference Source	1 (Keypad)
X	X	1201	Constant Speed Selection	0 (No Constant Speed)
	X	1301 (POTENT. ONLY)	Minimum AI1	0%
X		1301 (4-20mA ONLY)	Minimum AI1	20%
X	X	1601	Run Enable	1 (DI1)
X	X	1608	Start Enable	1 (DI1)
X	X	1610	Display Alarms	1 (Yes)
X	X	2003	Max Motor Current	See Table 8
X	X	2008	Maximum Output Drive Frequency	See Table 8
X	X	2606	Switching Frequency	16 kHz
X	X	9905	Motor Nominal Voltage	115 (for 115V) or 230 (for 208-230V) or 460 (for 460V)
X	X	9906	Motor Nominal Current	See Table 8
X	X	9908	Motor Nominal Speed	3500

NOTES:
1. Control Option “A” indicates factory settings for VFD ready for 4-20 mA proportional fan speed signal. Fan speed control is automatic by field-provided 4-20 mA signal.
2. Control Option “B” indicates factory settings for VFD with exterior mounted keypad. Fan speed control is manual and controlled at the keypad.
3. Control Option “C” indicates factory settings for VFD with potentiometer (dial). Fan speed control is manual and is set at the potentiometer.

Table 7 — VFD Parameters — Control Option D (Constant CFM Control)

PARAMETER INDEX	PARAMETER FUNCTION	SETTING
1611	Parameter View	3 (Long View)
9902	Application Macro	1 (HVAC Default)
9905	Motor Nom Voltage	230 or 460 (see Nameplate)
9906	Motor Nominal Current	See Table 8
9908	Motor Nominal Speed	3500
1001	Start/Stop Command	1 (DI1)
1002	EXT 2 Commands	1 (DI1)
1003	Motor Direction	1 (Forward)
1102	EXT 1 - EXT 2 SEL	EXT 2
1104	Min Frequency	10 Hz
1105	Max Ref Frequency	See Table 8
1103	REF1 Select	2(AI2)
1106	REF2 Select	19(PID1Out)
1201	Constant Speed Selection	0 (No Constant Speed)
1301	AI-1 Minimum	0.2
1302	AI-1 Maximum	1
1601	Run Enable	1 (DI1)
1608	Start Enable	1 (DI1)
1609	Start Enable 2	1 (DI1)
1610	Display Alarms	1 (Yes)
2003	Max Motor Current	See Table 8
2008	Maximum Output drive frequency	See Table 8
2202	Acceleration Time	5s
2203	Decel Time	5s
2606	Switching Frequency	16 kHz
3404	OUTPUT 1 DISPLAY FORM	9 (Direct)
3408	SIGNAL 2 PARAM	130 (PID 1 FBK)
3411	OUTPUT 2 DSP FORM	6 (2 DEC)
3412	OUTPUT 2 DSP UNIT	58 (in H20)
3415	OUTPUT 3 PARAMETER	0128 (PID SETPOINT)
3418	OUTPUT 3 DISPLAY FORM	6 (2 DEC)
3419	OUTPUT 3 UNITS	58 (in H20)
4001	PID GAIN	0.7
4002	PID INTEGRATE	5 s
4005	ERROR VALUE INVERTED	0 (No)
4006	UNITS	58 (in H20)
4007	UNIT SCALE	2 (2 DEC)
4008	0% VALUE	0.0 (in H20)
4009	100 % VALUE	25.0 (in H20)
4010	SET POINT SELECT	19 (INTERNAL)
4011	SET POINT	See Table 9
4014	Feedback Select	1 (ACT1)
4016	ACT-1 Input	2(AI2)

NOTE: Control Option “D” indicates factory settings for VFD with constant CFM (airflow) control. VFD speed is controlled using the differential pressure output from the differential pressure transducer. The VFD changes RPM to keep the DP setpoint constant, which results in constant airflow.

Table 8 — VFD Parameters — All Control Options

UNIT	HP	PARAMETER	2003/9906		11105/2008
		115/160	208-230	460V	MAX
		FLA	FLA	FLA	FREQ
HHA08/12	1.0	3.75	3.75	1.81	76
	1.5	—	4.83	2.30	85
HHA16/20/25	2.0	—	6.44	2.88	55
	3.0	—	8.74	4.37	59
	5.0	—	14.60	6.90	76

LEGEND

FLA —Full Load Amps

CONSTANT CFM CONTROL OPTION — With the constant CFM option the pressure transducer measures differential pressure (DP, units of in w.g.) across the fan inlet "nozzle." The DP signal goes to the VFD which has the control logic, and the controls change fan RPM to try to maintain the DP setpoint. As the filters load up, the airflow drops and the control loop speeds up the fan to compensate, keeping the DP (and therefore CFM) the same. Below is the procedure for changing the DP setpoint. Table 9 show airflow and corresponding DP settings to choose from. Note that the VFD will limit the max RPM and motor current to protect the motor and drive, so some of these settings won't be possible with all static pressures.

To change constant CFM setpoint: change VFD parameter 4011 to the value in the table that corresponds to the desired CFM. Interpolate as needed to reach CFM values between the table values.

For example: To operate HHA20 at 2040 cfm, go to the HHA16-25 table (Table 9), locate 2040 cfm, read DP Set Point of 7.0 in. wg (first column), so 7.0 will be the setting for parameter 4011.

Table 9 — Constant CFM Differential Pressure (DP) Set Points

HHA04 THROUGH HHA12		HHA16 THROUGH HHA25	
DP Set Point (in. w.g.) Parameter 4011	CFM	DP Set Point (in. w.g.) Parameter 4011	CFM
0.5	353	**2.0**	1095
1.0	433	**2.5**	1222
1.5	521	**3.0**	1372
2.0	560	**3.5**	1475
2.5	614	**4.0**	1561
3.0	694	**4.5**	1662
3.5	752	**5.0**	1775
4.0	793	**5.5**	1838
4.5	832	**6.0**	1916
5.0	869	**6.5**	1975
5.5	916	**7.0**	2040
6.0	950	**7.5**	2223
6.5	983	**8.0**	2288
7.0	1015	**8.5**	2352
7.5	1045	**9.0**	2406
8.0	1075	**9.5**	2567
8.5	1104	**10.0**	2641
9.0	1132	**10.5**	2701
9.5	1169	**11.0**	2748
10.0	1205	**11.5**	2805
10.5	1239		
11.0	1264		
11.5	1305		

START-UP

Pre-Start-Up

BUILDING ENVELOPE — All building windows and doors should be installed and closed before starting unit. During summer construction, avoid unit sweating by allowing for gradual pull down: use elevated chilled water temperature, reduce chilled water flow rate (gpm), and use maximum available airflow.

HEATING FLUID TEMPERATURE — Maximum entering water temperature is 180°F, unless nameplate indicates 200°F.

⚠ CAUTION

If unit is marked for 200°F maximum entering water temperature, customer must ensure that water vaporization does not occur, especially at higher elevations when entering water temperatures are greater than 190°F.

TEMPERATURE CONTROLS — Check that unit or wall-mounted thermostat or field-supplied controller is connected to the unit.

OUTSIDE AIR AND FREEZE PROTECTION

⚠ CAUTION

Ensure that the unit is protected against freezing conditions. Failure to provide freeze protection may result in equipment or property damage.

Freeze protection measures are customer-provided and installed, and include but are not limited to low-limit thermostats, automatic temperature controls, and use of glycol-based heat transfer fluids (see the section Coil Freeze-Up Protection on page 45).

DAMPER OPERATION — If "locking quadrant" manual damper operator is provided, set to desired position. If a damper actuator is provided, ensure that the actuator opens the damper when the fan turns on, and closes when the fan stops. Test mixing box controls to make sure the outside air damper closes on power failure or upon activation of customer-supplied and installed low-limit thermostat or other freeze protection device.

Checklist — Make a walkway inside unit components to protect insulation. Remove all construction debris from unit interior. *Remove walkway before starting unit.*

FILTERS — Install unit filters in all filter sections.

FANS

1. 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 damper linkages to check for freedom of movement.
2. Check tightness of bearing setscrews or locking collars. Also, check tightness of setscrews on fan wheels and sheaves.
3. Check tightness of fan shaft bearing mounting.
4. Recheck sheave alignment and belt tension. (Refer to Fig. 63 and 64.)
5. Hand turn fan to make certain fan wheel does not rub in housing.

6. 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 estimate the pitch diameters by using the pulley outside diameters.

   Then:

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

   Example:

	Actual	Approximate
Nameplate Motor Rpm =	1760	1760
Mtr Sheave Pitch Diameter =	8.9 in.	9.0 in. (OD)
Fan Sheave Pitch Diameter =	12.4 in.	12.5 (OD)
Fan RPM =	1760 x 8.9	1760 x 9.0
=	12.4	12.5
=	1263 rpm	1267 rpm

   Refer to the product data catalog for maximum allowable fan speeds for standard wheels. *Excessive fan speed may result in condensate carryover from cooling coil or fan motor overload and wheel failure.*

7. Check direction of rotation (see Fig. 91). Arrow on drive side of fan housing indicates correct direction of rotation.

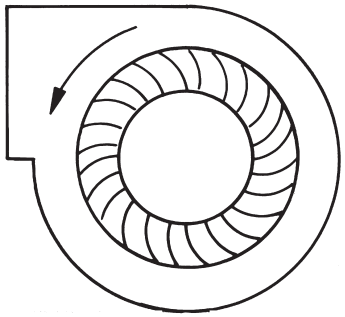


Fig. 91 — Fan Wheel Rotation

8. 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).

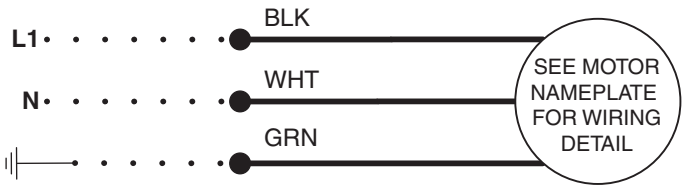
SERVICE

General

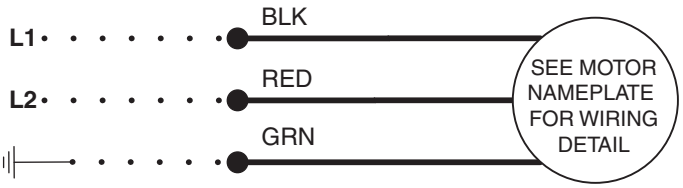
1. Place a suitable walkway to protect floor insulation whenever entering the fan section.
2. Review Safety Considerations at beginning of these instructions. Good safety habits are important tools when performing service procedures.
3. To make speed measurements, use a strobe-style tachometer or calculate per Step 6 of Start-Up, Check List.

Fan Motor Replacement — see Fig. 92-96 for typical motor wiring diagrams.

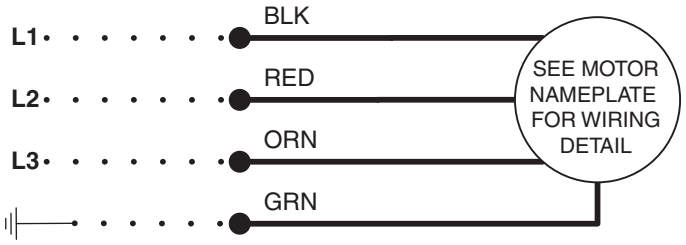
1. Shut off motor power.
2. Disconnect and tag power wires at motor terminals.
3. Loosen motor brace-to-mounting-rail attaching bolts. Loosen belt tensioning bolts to adjust the motor position so V-belts can be removed without stretching over grooves.
4. Mark belt as to position. Remove and set aside belts.
5. Remove motor to motor bracket holddown bolts.
6. Remove motor pulley and set aside.
7. Remove motor.
8. Install new motor. Reassemble by reversing Steps 1-6. Be sure to reinstall multiple belts in their original position. 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 discussed previously (Fig. 63-65).
9. Reconnect motor leads and restore power. Check fan for proper rotation as described in Start-Up, Check List.



115 V OR 265 V, SINGLE PHASE

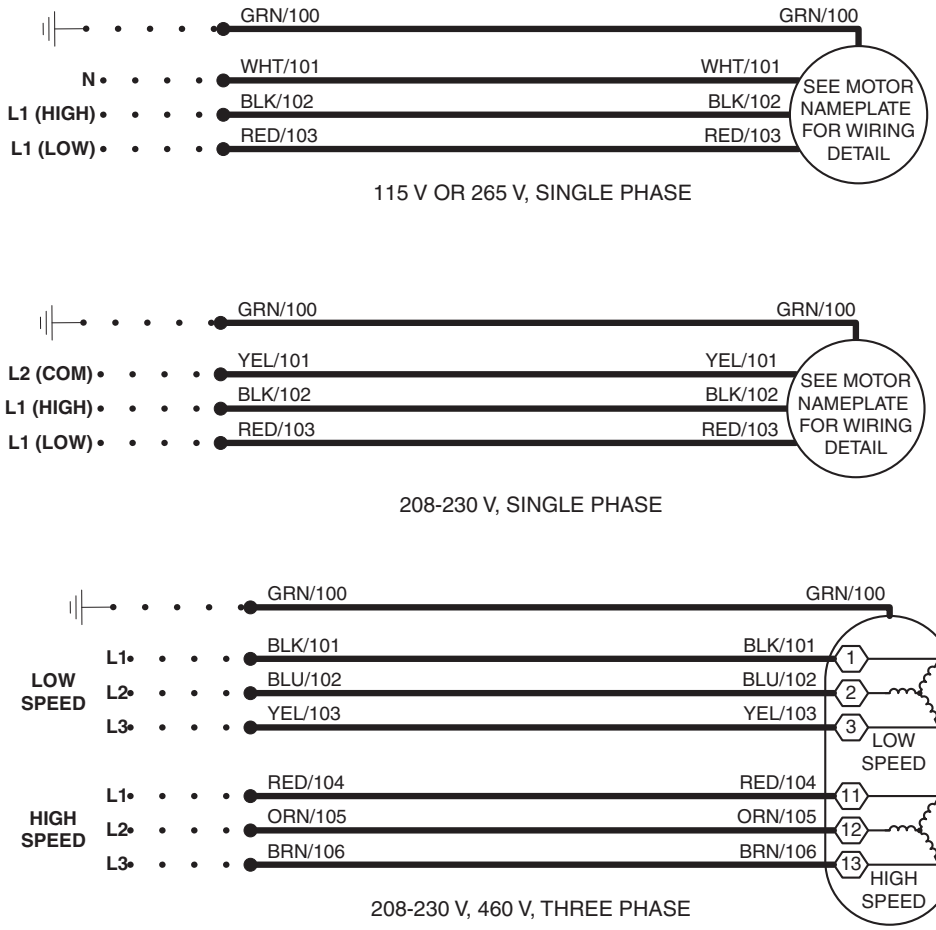


208-230 V, SINGLE PHASE



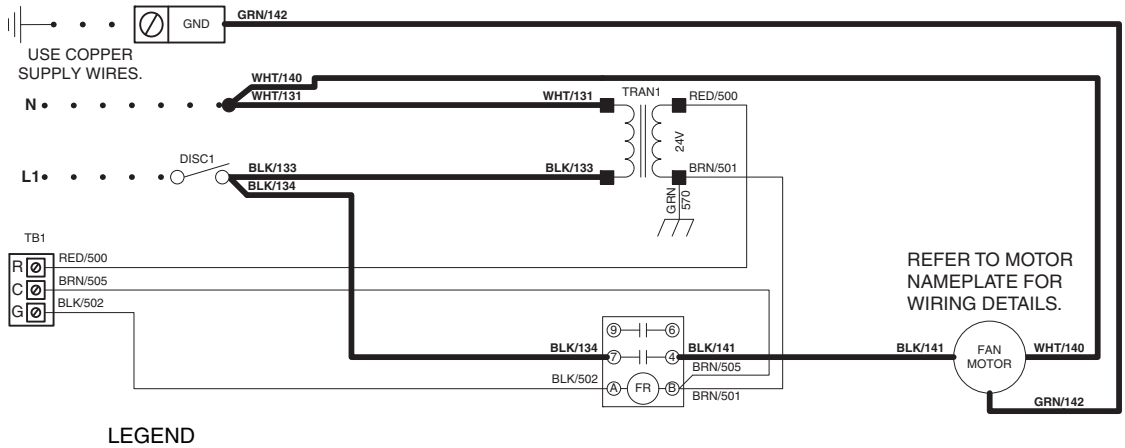
208-230 V, 460 V, THREE PHASE

Fig. 92 — Typical Wiring Diagrams, Single-Speed Fan Motors



NOTES:
1. Field-supplied fan controls must prevent simultaneous engagement of both high and low speeds.
2. Field-supplied fan controls must provide motor overload protection and both motor windings must be connected in the correct phase sequence.

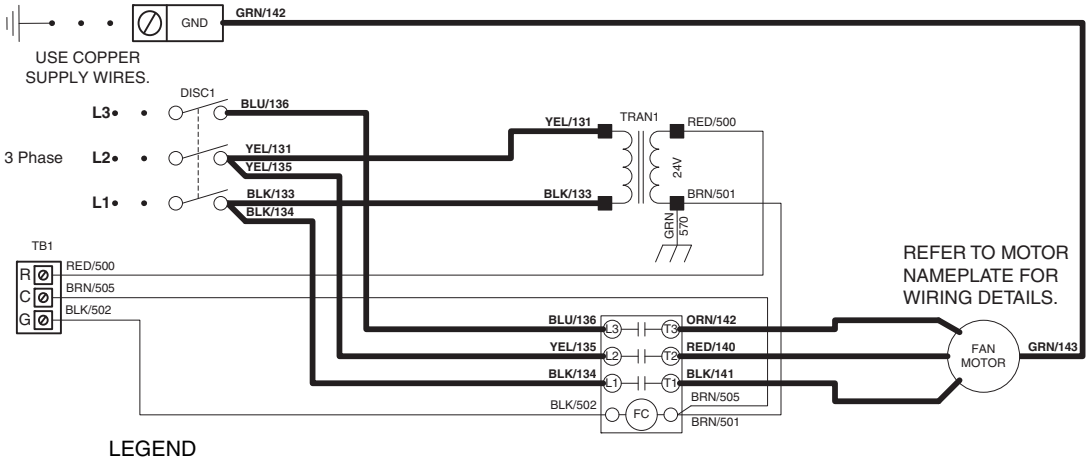
Fig. 93 — Typical Wiring Diagrams, Dual Speed Fan Motors



LEGEND

DISC1 — Disconnect
FR — Fan Relay
GND — Ground
TRAN1 — Transformer
——— High Voltage Wiring
▬▬▬ Low Voltage Wiring

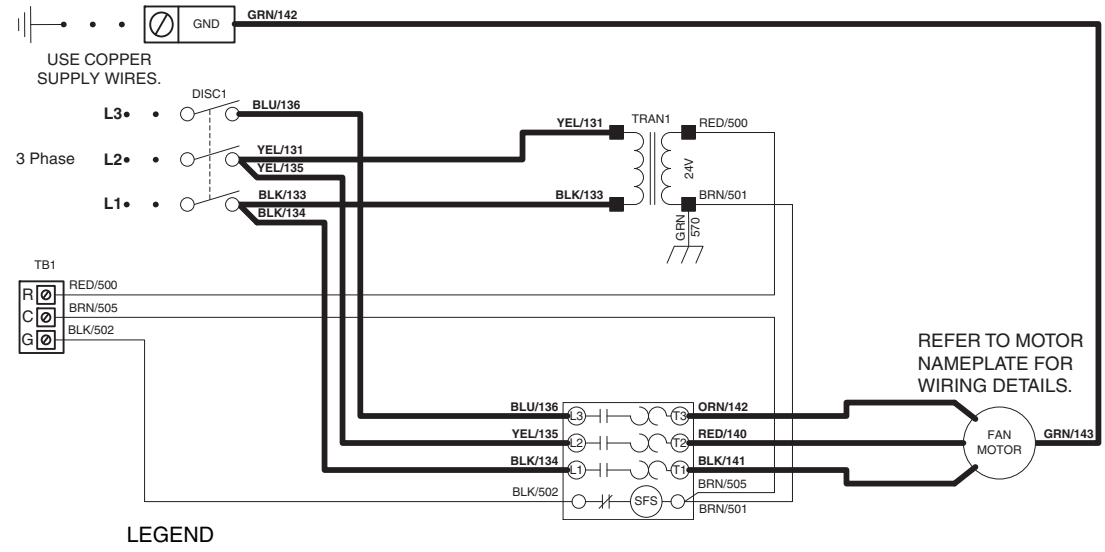
Fig. 94 — Typical Wiring Diagram, Single-Phase Relay Control



LEGEND

DISC1 — Disconnect
FC — Fan Contactor
GND — Ground
TRAN1 — Transformer
——— High Voltage Wiring
▬▬▬ Low Voltage Wiring

Fig. 95 — Typical Wiring Diagram, Three-Phase Contactor Control



LEGEND

DISC1 — Disconnect
GND — Ground
SFS — Supply Fan Starter
TRAN1 — Transformer
——— High Voltage Wiring
▬▬▬ Low Voltage Wiring

Fig. 96 — Typical Wiring Diagram, Three-Phase Starter Control

Coil Cleaning

DETERGENT — Spray mild detergent solution on coils with garden-type sprayer. Rinse with fresh water. Check to ensure condensate line is free. Excess water from cleaning may flood unit if condensate line is plugged.

Winter Shutdown (Chilled Water Coil Only)

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.
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.

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

FILTER SECTIONS — Open or remove filter panel to replace old filter with a new filter. See physical data tables for filter data.

Lubrication

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

BEARINGS

Fan Bearings — Lubricate fan bearings in accordance with manufacturer's recommendations included with blower.

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START-UP CHECKLIST — 39S AHU UNITS

NOTE: To avoid injury to personnel and damage to equipment or property when completing the procedures listed in this start-up checklist, use good judgment, follow safe practices, and adhere to the safety considerations/information as outlined in preceding sections of this Installation Instruction document.

I. PRELIMINARY INFORMATION

MODEL NO.JOB NAME _____

SERIAL NO. ADDRESS _____

START-UP DATE _____

TECHNICIAN NAME _____

ADDITIONAL ACCESSORIES

_____

II. PRE-START-UP

CONTROLS

Are thermostat(s) and indoor fan control wiring connections made and checked? (Y/N) _____

Are all wiring terminals tight? (including power to fan motors, heaters, etc.) (Y/N) _____

ELECTRICAL

Does electrical service correspond to unit nameplate? (Y/N) _____

Nameplate Supply Voltage/Phase: Rated _____ Measured _____

Nameplate Rated FLA Motor Current: Rated _____ Measured _____

Does setting for overload device (factory or field-provided) match motor FLA? (Y/N) _____

Does all field wiring conform to unit wiring diagram? (Y/N) _____

AIR HANDLER

Remove packaging and any construction debris. (Y/N) _____

Inspect for shipping and/or handling damage, make claims as required. (Y/N) _____

Inspect all panel flanges for damage. Panel flanges should be smooth with no sharp bends. (Y/N) _____

Are all corner connectors and frame to channel joints smooth with no cracks, large bumps or depressions in the caulk? (Y/N) _____

Are any door latches loose or damaged? If so, tighten or replace. (Y/N) _____

Remove red shipping screws from blower discharge (fan stabilizers during shipping). (Y/N) _____

Check fan bearings and shaft(s) for tightness. (Y/N) _____

Hand turn fan to ensure no rubbing with housing. (Y/N) _____

Have fan and motor pulleys been checked for proper alignment? (Y/N) _____

Do the fan belts have proper tension? (Y/N) _____

Check fan speed with a laser-type tachometer or use VFD output to confirm operating speed. (Y/N) _____

Are proper air filters in place? (Y/N) _____

Are all wiring terminals to fan motors and heaters tight? (Y/N) _____

Is duct connected to unit? (Y/N) _____

Is unit properly supported? (Y/N) _____

Is unit level (for effective condensate drainage? (Y/N) _____

Verify wiring is correct for application (voltage, etc.) per component label. (Y/N) _____

Are field wiring penetrations into 39S properly sealed for air and water leaks (includes conduit inside box)? (Y/N) _____

PIPING

Is condensate trap properly sized? (Y/N) _____

Has water been placed in drain pan to confirm proper drainage? (Y/N) _____

Is auxiliary external condensate drain pan installed as recommended by IOM? (Not required for valid warranty) (Y/N) _____

Have leak checks been made at chillers, boilers, valves, and indoor coils? (Y/N) _____

Has air been bled from system? (Y/N) _____

Is freeze protection provided (if required)? (Y/N) _____

For DX system, has system been charged with refrigerant? (Y/N) _____

Is expansion valve sensing bulb properly installed and insulated? (Y/N) _____

Is Heat Pump Bypass Kit (HPK) present if required? (Y/N) _____

Does the hydronic system include a pressurer relief valve or other pressure relief device to protect the coil from operating pressures beyond the nameplate design working pressure rating? (Y/N) _____

Are coils equipped with control valves to stop fluid flow to save energy and prevent cabinet condensation (wild coil in cooling) when heating/coolign is not required? (Y/N) _____

Locate, repair, and report any leakes and ensure insulation is in place where needed. (Y/N) _____

III. START-UP

If this unit is to be used for construction conditioning without ductwork, ensure balancing is redone and filters replaced once construction is complete.

If fan is direct drive, ensure that the VFD has been properly programmed for maximum frequency output to limit fan speed to maximum. (Y/N) _____

Ensure correct fan rotation. (Y/N) _____

After air and water balance is complete, are pulleys aligned? (Y/N) _____

If the fan sheaves were changed during the air balance, the assembly must be rebalanced.

Were the sheaves changed? (Y/N) _____

Was a dynamic balance performed on the fan assembly? (Y/N) _____

After air and water balance and at least 10 minutes running time, record the following measurements:

Check indoor fan speed and record: Fan RPM _____

Entering air db temp _____

Unit entering air wb temp _____

Leaving air db temp _____

Leaving air wb temp _____

Entering water temp _____

Leaving water temp _____

Ensure all water inside air handler is in condensate pan. (Y/N) _____

Check for vibration levels. (Y/N) _____

If electric heater is supplied, ensure heater airflow switch closes at design airflow. (Y/N) _____

NOTES:

_____

_____

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_____

SIGNATURE:_____ **DATE:**_____

CUT ALONG DOTTED LINE

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