ENGINEERING GUIDE

Water-Cooled Self-Contained Units C-Series, Vertical

Johnson Controls

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INTRODUCTION

High performance designs accommodate the increased installation requirements of today's market.

The C-Series Water-Cooled Self-Contained Units from Johnson Controls offer a complete line of unit options for indoor installation in high- and low-rise commercial building applications. Each one features high efficiency, quality engineering and dependable operation.

Johnson Controls' compact, low-profile indoor design protects against potential vandalism, weathering and eliminates the need for any unsightly exterior equipment. Floor-by-floor installation provides independent zone and temperature control, eliminating many of the complications encountered with rooftop equipment. Renovation and restoration projects are simplified where roof load, cooling tower, and construction restrictions can present installation problems.

Product Features

- Ideal for tenant change/renovation
- Protected from extreme weather conditions and vandalism
- Convenient access to all parts and service needs
- Allows independent metering/temperature control
- Compact, free-standing for increased rentable space
- Static capability to suit various installation requirements using centrifugal blowers and adjustable pulleys

Listings / Certifications

PRODUCT OVERVIEW

Refrigerant
R-410A

Sizes
5 – 20 Tons (17.8 – 70.3 kW)

Model
CSV

Features
- Ideal for the renovation/retrofit of interior spaces, in both high-rise and low-rise buildings
- Floor-by-floor, or zone-by-zone, installation allows independent metering / temperature control
- Convenient indoor access for all service needs
- Unit casings are constructed of heavy gauge galvanized steel. Cabinet interiors are lined with 1/2 inch thick, 2 lb. density, acoustic insulation
- Separate evaporator/compressor and fan section modules, allowing field separation if required for ease of ingress / handling in building corridors or elevators (except 20 ton).
- Belt driven centrifugal blowers, with adjustable pulleys, are employed for evaporator air movement; field adjustment of external static pressure capability to suit a wide range of installation requirements
- High efficiency Scroll compressors
- Each refrigerant circuit complete with schraeder access fittings, sight glass/moisture indicator, filter drier, and thermal expansion valve with external equalizer
- Dual independent compressor circuits on 8, 10, 15, and 20 ton models
- Electronic compressor protection / diagnostic module; including phase protection

NOMENCLATURE

WATER-COOLED SELF-CONTAINED UNIT

1,2	3	4,5,6	7	8	9	10	11	12	13	14	15
CS	**V**	**180**	**A**	**2**	**E**	**1**	**A**	**A**	**A**	**0**	**A**

Product Category
CS = Water-Cooled Pkg. A/C R-410A

Product Indentifier
V = Vertical Arrangement

Nominal Capacity
060 = 5 TON
096 = 8 TON
120 = 10 TON
180 = 15 TON
240 = 20 TON

Design Series
A = Current

Voltage
2 = 208/230-60-3
4 = 460-60-3
5 = 575-60-3

Control Options
E = Std Electromechnical Controls

Indoor Motor
1 = Std
2 = High Static

Indoor Airside Options
A = Std Airside coil
C = Corrosion Protective Coating
D = Stainless Steel Drain Pan
F = Coated Coil w/ S-S Drain Pan

Waterside Options
A = Std Water coil
N = Cupro-nickel Water Coil

Refrigerant Circuit Options
A = None
B = Hot Gas Bypass

Heating Options
0 = None

Miscellaneous Options
A = None
D = Condensate Overflow Switch

GENERAL DATA

Model		CSV060A	CSV096A	CSV120A	CSV180A	CSV240A
Nominal Cooling (Ton)		5	8	10	15	20
Refrigerant		R-410A	R-410A	R-410A	R-410A	R-410A
Cooling Performance (1)						
Gross Cooling Capacity (Btuh)		62,300	98,200	130,700	186,300	264,200
Design CFM		2,000	3,200	4,000	6,000	8,000
Net Cooling Capacity (2)		60,000	96,000	126,000	180,000	254,000
Net Cooling CFM		2,000	3,200	4,000	6,000	8,000
EER		12.5	13.0	12.5	12.2	11.9
Compressor - Qty / Type		1 / Scroll	2 / Scroll	2 / Scroll	2 / Scroll	2 / Scroll
Capacity Steps (%)		100/0	100/50/0	100/50/0	100/50/0	100/50/0
Evaporator Coil - Type		Enhanced Copper Tubes, Enhanced Aluminum Fins				
Face Area (sq ft)		5.00	9.37	10.50	15.11	19.00
Rows/FPI		3/14	3/14	3/14	3/14	4/14
Refrigerant Controls		TX Valve				
Condenser - Type		Enhanced Surface Coaxial				
Quantity / Tons Capacity		1/5	2/4	2/5	2/7.5	2/10
Nominal Water Flow Rate (gpm)		15	24	30	45	60
Unit Water Connection Size (In/Out)		1" FPT	1-1/4" FPT	1-1/4" FPT	1-1/2" FPT	2" FPT
Evaporator Fan - Type		Centrifugal, Forward Curved				
Quantity		1	1	1	2	2
Diameter x Width (in)		12x9	15x12	15x12	15x9	15x11
Drive		Adjustable Belt				
Motor HP (Standard/Oversize)		1/1.5	1.5/2	2/3	3/5	5/7.5
Filters						
Quantity-Size (in)		2-20x16x2	4-14x25x2	6-14x20x2	2-16x20x2 4-16x25x2	6-20x25x2
Dimensions						
Height (in)		72	82	82	85	72
Width (in)		42	64	64	76	83
Depth (in)		26	29	29	30	32.5
Condensate Drain Connection		3/4" FPT				
Weight	Operating	590	775	945	1310	1465
	Shipping	635	815	985	1365	1525

(1) Cooling performance is rated at 80°F entering dry bulb, 67°F entering wet bulb and CFM listed; Entering water temperature of 85°F. Gross capacity does not include the effect of fan motor heat.

(2) 5 ton unit is rated in accordance with AHRI Standard 210/240. 8 - 20 ton units are rated in accordance with AHRI Standard 360.

COOLING PERFORMANCE DATA

CPV060A 2000 CFM		8 GPM									15 GPM								
		65°F EWT			85°F EWT			105°F EWT			65°F EWT			85°F EWT			105°F EWT		
EWB	EDB	TC	SC	kW	TC	SC	kW	TC	SC	kW	TC	SC	kW	TC	SC	kW	TC	SC	kW
62°F	75°F	58.9	45.7	2.88	54.5	43.8	3.73	49.4	41.2	4.86	60.1	46.2	2.63	55.9	44.5	3.43	51.0	42.0	4.47
	80°F	60.4	55.9	2.90	56.3	53.9	3.77	51.4	51.4	4.90	61.7	56.2	2.63	57.7	47.1	3.44	53.1	52.4	4.45
	85°F	63.9	63.9	2.96	59.5	59.5	3.83	54.4	54.4	4.98	65.4	65.4	2.63	61.2	54.2	3.47	56.4	56.4	4.52
67°F	75°F	64.9	38.4	2.97	59.5	35.7	3.83	53.4	32.9	4.95	66.9	38.6	2.67	61.9	36.5	3.47	55.7	34.0	4.51
	80°F	65.2	47.2	2.96	59.9	44.8	3.83	53.8	42.0	4.96	67.1	48.1	2.67	62.3	45.9	3.47	56.1	43.1	4.52
	85°F	66.0	56.8	2.98	60.9	54.1	3.85	54.9	51.2	4.99	68.0	58.5	2.68	63.3	55.2	3.48	57.2	52.7	4.53
72°F	75°F	69.4	29.4	3.04	63.6	27.0	3.91	57.1	24.4	5.05	71.9	30.4	2.70	66.2	28.1	3.51	59.8	25.4	4.55
	80°F	70.2	38.9	3.06	64.4	35.5	3.93	57.8	32.8	5.06	72.7	39.0	2.71	67.0	36.7	3.52	60.6	34.0	4.56
	85°F	70.5	47.0	3.06	64.6	44.1	3.93	58.0	41.5	5.07	73.1	48.0	2.71	67.3	45.5	3.52	60.8	42.7	4.56

CSV096A 3200 CFM		16 GPM									24 GPM								
		65°F EWT			85°F EWT			105°F EWT			65°F EWT			85°F EWT			105°F EWT		
EWB	EDB	TC	SC	kW	TC	SC	kW	TC	SC	kW	TC	SC	kW	TC	SC	kW	TC	SC	kW
62°F	75°F	93.0	73.5	4.25	87.7	70.6	5.48	79.3	66.9	7.14	98.2	75.8	4.08	88.9	71.4	5.26	80.7	67.5	6.84
	80°F	96.0	90.0	4.26	90.6	87.3	5.49	82.7	82.7	7.15	100.0	91.4	4.09	91.8	88.0	5.26	84.1	84.1	6.85
	85°F	102.7	102.7	4.28	96.3	96.3	5.51	88.0	88.0	7.16	105.1	105.1	4.10	97.5	97.5	5.28	89.5	89.5	6.85
67°F	75°F	104.2	61.9	4.29	95.9	57.7	5.50	86.0	53.1	7.16	106.8	62.8	4.10	97.5	58.5	5.28	87.7	53.9	6.85
	80°F	104.9	76.1	4.29	96.7	72.4	5.51	86.9	67.8	7.16	107.2	77.4	4.11	98.2	73.2	5.28	88.6	68.6	6.85
	85°F	106.7	91.6	4.29	98.4	87.7	5.51	88.6	83.0	7.17	108.5	92.6	4.11	99.9	88.6	5.28	90.3	84.1	6.85
72°F	75°F	113.6	47.9	4.31	103.4	43.9	5.53	92.8	39.6	7.18	113.5	48.0	4.13	105.1	44.6	5.29	94.7	40.4	6.86
	80°F	115.1	62.1	4.32	104.7	57.8	5.54	94.1	53.4	7.18	114.6	61.9	4.13	106.4	58.4	5.30	96.0	54.2	6.87
	85°F	115.8	76.6	4.32	105.2	72.1	5.54	94.5	68.0	7.19	115.1	76.2	4.13	107.0	72.8	5.30	96.4	68.7	6.87

CSV120A 4000 CFM		20 GPM									30 GPM								
		65°F EWT			85°F EWT			105°F EWT			65°F EWT			85°F EWT			105°F EWT		
EWB	EDB	TC	SC	kW	TC	SC	kW	TC	SC	kW	TC	SC	kW	TC	SC	kW	TC	SC	kW
62°F	75°F	127.8	100.6	5.62	118.0	95.8	7.30	106.7	89.8	9.51	129.6	101.5	5.31	120.0	96.8	6.93	108.9	91.1	9.03
	80°F	128.0	118.4	5.62	119.8	115.9	7.30	110.0	110.0	9.51	129.5	118.7	5.31	121.5	116.8	6.93	112.0	112.0	9.03
	85°F	135.3	135.3	5.62	126.5	126.5	7.30	116.1	116.1	9.51	137.2	137.2	5.31	128.6	128.6	6.93	118.5	118.5	9.03
67°F	75°F	138.4	81.5	5.75	127.3	76.2	7.42	114.7	70.4	9.60	140.9	82.7	5.39	129.9	77.5	7.01	117.5	71.8	9.09
	80°F	139.2	100.4	5.75	128.0	95.0	7.42	115.3	88.8	9.60	141.7	101.6	5.39	130.7	96.4	7.01	118.2	90.2	9.09
	85°F	140.3	120.0	5.75	129.3	114.3	7.42	116.7	108.2	9.60	142.9	122.9	5.39	131.9	115.7	7.01	119.5	109.4	9.09
72°F	75°F	148.4	62.8	5.89	136.4	57.9	7.59	123.0	52.5	9.79	151.4	82.5	5.48	139.6	59.2	7.12	126.3	53.8	9.20
	80°F	150.3	81.3	5.89	138.3	76.2	7.59	124.8	70.8	9.79	153.4	82.5	5.48	141.5	77.5	7.12	128.2	72.1	9.20
	85°F	151.2	100.4	5.89	139.1	95.6	7.59	125.5	90.0	9.79	154.3	101.9	5.48	142.3	96.8	7.12	128.9	91.4	9.20

CSV180A 6000 CFM		30 GPM									45 GPM								
		65°F EWT			85°F EWT			105°F EWT			65°F EWT			85°F EWT			105°F EWT		
EWB	EDB	TC	SC	kW	TC	SC	kW	TC	SC	kW	TC	SC	kW	TC	SC	kW	TC	SC	kW
62°F	75°F	182.4	143.6	8.35	168.5	136.8	10.45	152.9	128.7	13.16	185.2	145.0	7.97	171.4	138.3	9.98	156.1	130.7	12.56
	80°F	184.6	170.7	8.35	172.1	166.6	10.45	158.0	158.0	13.16	187.0	171.3	7.97	174.8	168.0	9.98	161.0	161.0	12.56
	85°F	194.8	194.8	8.35	182.2	182.2	10.45	167.8	167.8	13.16	197.4	197.4	7.97	185.0	185.0	9.98	171.0	171.0	12.56
67°F	75°F	197.5	116.3	8.56	181.7	108.8	10.61	164.2	100.8	12.70	200.7	117.8	8.25	185.1	110.5	10.13	168.0	102.6	12.68
	80°F	198.6	143.2	8.56	182.8	135.6	10.61	165.2	127.2	12.70	201.9	144.8	8.25	186.3	137.5	10.13	169.0	129.0	12.68
	85°F	202.3	172.9	8.56	184.7	163.3	10.61	165.6	153.5	12.70	206.0	177.2	8.25	188.6	165.4	10.13	169.7	155.3	12.68
72°F	75°F	212.1	89.7	8.82	195.3	82.8	10.87	176.6	75.4	13.56	215.8	91.2	8.42	199.1	84.4	10.36	180.8	77.0	12.91
	80°F	214.7	116.2	8.82	197.8	109.0	10.87	179.0	101.5	13.56	218.4	117.5	8.42	201.7	110.5	10.36	183.3	103.2	12.91
	85°F	215.6	143.2	8.82	198.3	136.2	10.87	179.2	128.5	13.56	219.4	144.8	8.42	202.3	137.6	10.36	183.5	130.1	12.91

CSV240A 8000 CFM		40 GPM									60 GPM								
		65°F EWT			85°F EWT			105°F EWT			65°F EWT			85°F EWT			105°F EWT		
EWB	EDB	TC	SC	kW	TC	SC	kW	TC	SC	kW	TC	SC	kW	TC	SC	kW	TC	SC	kW
62°F	75°F	254.9	203.9	12.21	237.8	196.2	15.26	220.0	191.4	19.18	261.9	207.5	11.32	242.4	198.3	14.27	220.0	188.0	18.05
	80°F	256.4	244.5	12.24	239.9	236.2	15.29	224.8	224.8	19.22	263.0	247.4	11.33	243.8	238.2	14.28	223.6	223.6	18.09
	85°F	268.0	268.0	12.39	254.4	254.4	15.52	245.6	245.6	19.44	271.2	271.2	11.43	255.0	255.0	14.42	228.1	228.1	18.14
67°F	75°F	283.1	166.4	12.60	262.1	157.6	15.67	229.9	143.9	19.70	283.1	239.5	11.58	262.1	185.9	14.51	238.2	147.3	18.27
	80°F	285.8	206.6	12.65	264.2	197.3	15.72	231.2	183.5	19.74	285.8	206.6	11.61	264.2	189.1	14.54	239.7	187.0	18.29
	85°F	286.9	274.1	12.67	265.5	238.0	15.75	232.5	223.6	19.78	286.9	247.1	11.62	265.5	191.0	14.55	241.1	227.7	18.31
72°F	75°F	304.4	130.2	13.04	271.5	115.5	16.22	245.7	139.2	20.21	305.0	129.0	11.86	282.6	119.8	14.79	257.7	110.3	18.53
	80°F	308.6	166.4	13.13	274.7	152.9	16.30	248.4	142.8	20.30	308.7	166.4	11.92	285.7	157.4	14.83	260.2	147.8	18.56
	85°F	311.8	206.2	13.21	277.7	194.2	16.40	251.3	180.0	20.40	312.8	207.7	11.97	289.8	200.2	14.89	264.3	192.9	18.63

TC - Total Cooling Capacity [MBh] **SC** - Sensible Cooling Capacity [MBh] **kW** - Compressor Power [kW]

Condenser Heat Rejection - CHR (MBh) = TC + (kW X 3.413) Leaving Water Temperature - LWT = 85F + (CHR / (GPM X 0.5))

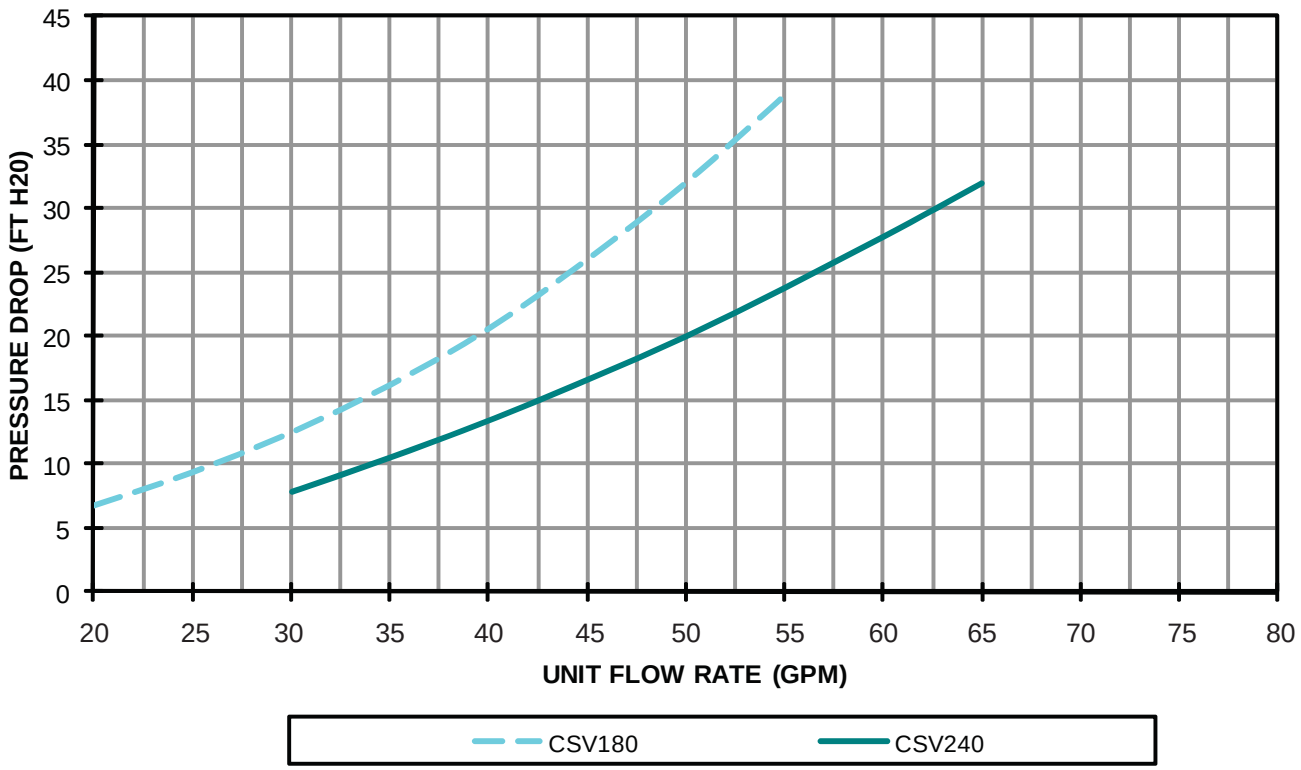
EVAPORATOR FAN PERFORMANCE

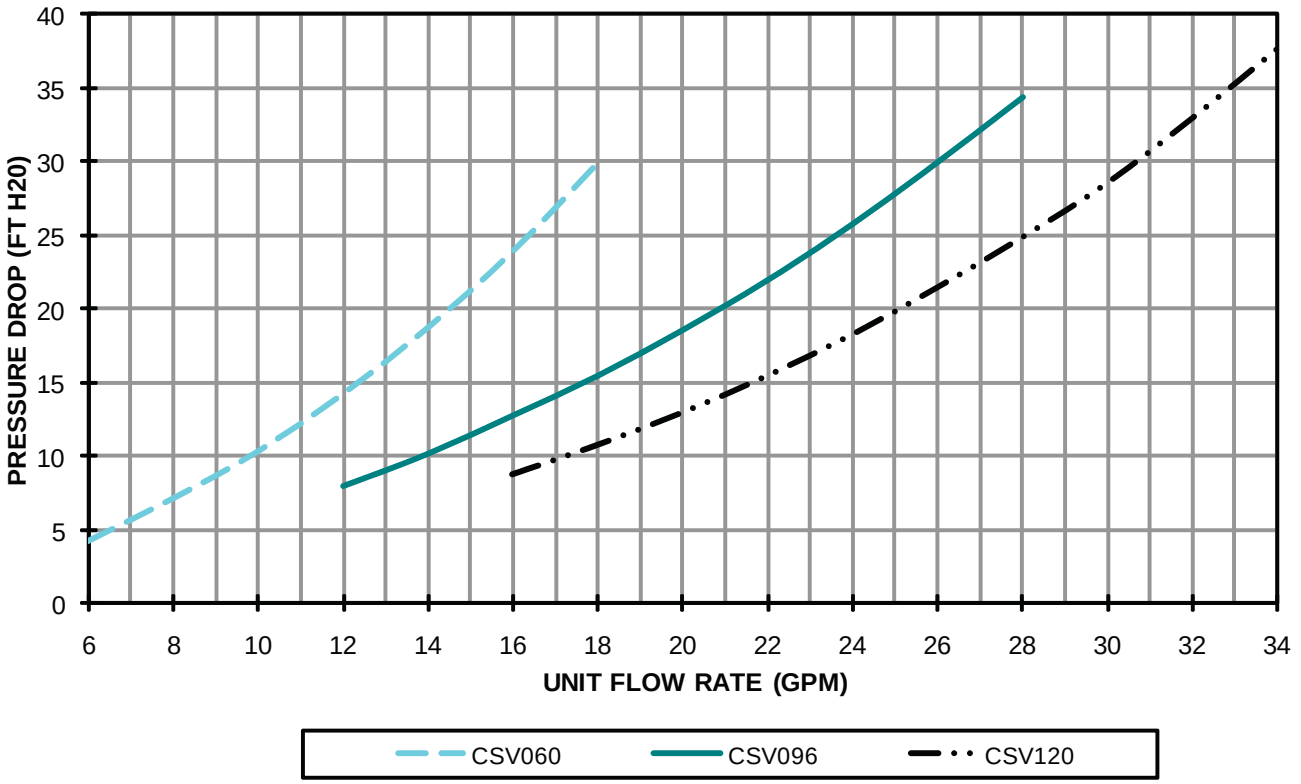
MODEL #	SUPPLY CFM	EXTERNAL STATIC PRESSURE - Inches W.C.																					
		0.2		0.4		0.6		0.8		1.0		1.2		1.4		1.6		1.8		2.0		2.2	
		RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
CSV060A	1800	791	0.46	872	0.53	948	0.60	1019	0.68	1090	0.76	1159	0.85	1193	0.89	1259	0.98	1321	1.07	1380	1.16	1437	1.25
	2000	860	0.60	935	0.69	1006	0.77	1077	0.85	1136	0.94	1199	1.03	1263	1.12	1324	1.22	1383	1.32	1440	1.42	1494	1.52
	2200	931	0.79	1001	0.88	1067	0.97	1129	1.06	1189	1.15	1247	1.25	1305	1.35	1363	1.45	1419	1.55	-	-	-	-
CSV096A	3000	568	0.70	628	0.81	688	0.92	746	1.05	801	1.19	855	1.35	906	1.50	954	1.65	1001	1.81	1046	1.97	-	-
	3200	594	0.82	651	0.94	707	1.06	762	1.19	816	1.33	867	1.49	917	1.65	964	1.81	1010	1.98	-	-	-	-
	3400	625	0.97	679	1.10	731	1.22	784	1.35	835	1.50	884	1.66	933	1.83	979	2.00	-	-	-	-	-	-
CSV120A	3600	620	1.04	666	1.16	716	1.29	765	1.43	815	1.56	864	1.71	912	1.88	958	2.00	1003	2.03	1046	2.41	1088	2.60
	4000	681	1.40	721	1.53	765	1.68	811	1.83	856	1.97	900	2.13	945	2.29	988	2.46	1030	2.65	1071	2.84	1112	3.05
	4400	726	1.77	760	1.91	797	2.05	837	2.21	878	2.38	919	2.54	960	2.70	1001	2.87	1040	3.05	-	-	-	-
CSV180A	5400	645	1.52	709	1.79	770	2.06	829	2.35	885	2.65	939	2.96	991	3.28	1042	3.61	1092	3.96	1140	4.32	1190	4.71
	6000	700	2.00	759	2.30	815	2.60	870	2.91	922	3.23	973	3.56	1022	3.90	1070	4.25	1116	4.62	1162	4.99	-	-
	6600	761	2.63	815	2.94	867	3.26	917	3.60	966	3.94	1014	4.29	1060	4.66	1104	5.02	-	-	-	-	-	-
CSV240A	7200	659	2.10	714	2.37	767	2.65	817	2.94	866	3.23	912	3.52	957	3.82	998	4.13	1037	4.44	1076	4.76	1115	5.11
	8000	719	2.81	770	3.11	818	3.42	865	3.73	910	4.05	954	4.37	997	4.70	1038	5.03	1078	5.36	1115	5.71	1151	6.08
	8800	782	3.67	828	4.00	873	4.34	916	4.68	959	5.02	1000	5.37	1040	5.73	1079	6.09	1117	6.45	1154	6.81	1190	7.18

NOTE:

1. At higher evaporator airflows and wet bulb conditions, condensate carry-over may occur. Adjust airflow downward as necessary
2. Values include pressure drop from wet coil and clean filters
3. Shaded areas indicate oversize motors.

WATERSIDE PRESSURE DROP





ELECTRICAL DATA

STANDARD MOTORS

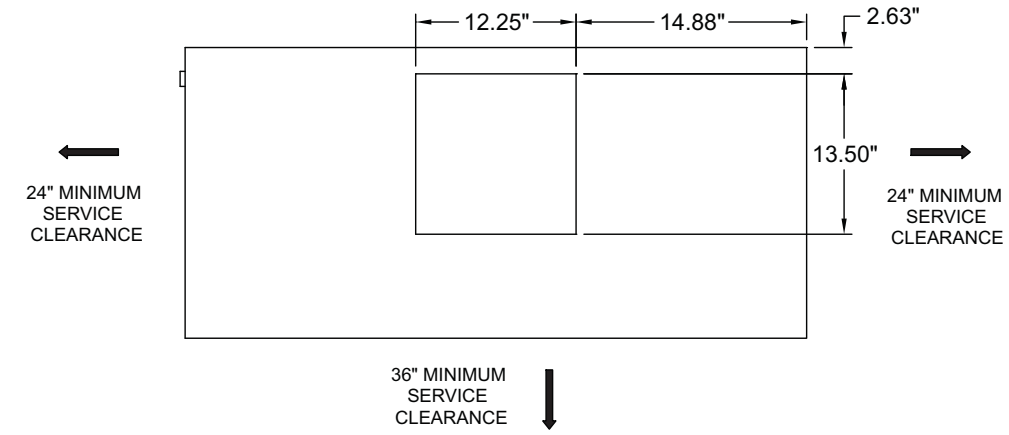
MODEL #	VOLTAGE	COMPRESSOR				EVAPORATOR		MIN. CCT. AMPACITY	MAX FUSE / CCT. BKR. AMP
		QTY		RLA	LRA	HP	FLA		
CSV060A	208-230/3/60	1	@	16.0	110.0	1.00	3.6	23.60	35
	460/3/60	1	@	7.8	52.0	1.00	1.7	11.40	15
	575/3/60	1	@	5.7	38.9	1.00	1.1	8.23	15
CSV096A	208-230/3/60	2	@	13.7	83.1	1.50	4.5	35.33	45
	460/3/60	2	@	6.2	41.0	1.50	2.2	16.15	20
	575/3/60	2	@	4.8	33.0	1.50	1.8	12.60	15
CSV120A	208-230/3/60	2	@	16.0	110.0	2.00	6.0	42.00	50
	460/3/60	2	@	7.8	52.0	2.00	3.0	20.55	25
	575/3/60	2	@	5.7	38.9	2.00	2.4	15.23	20
CSV180A	208-230/3/60	2	@	23.2	164.0	3.00	8.4	60.60	80
	460/3/60	2	@	11.2	75.0	3.00	4.2	29.40	40
	575/3/60	2	@	7.9	54.0	3.00	3.4	21.18	25
CSV240A	208-230/3/60	2	@	30.1	225.0	5.00	14.0	81.73	110
	460/3/60	2	@	16.7	114.0	5.00	6.6	44.18	60
	575/3/60	2	@	12.2	80.0	5.00	5.7	33.15	45

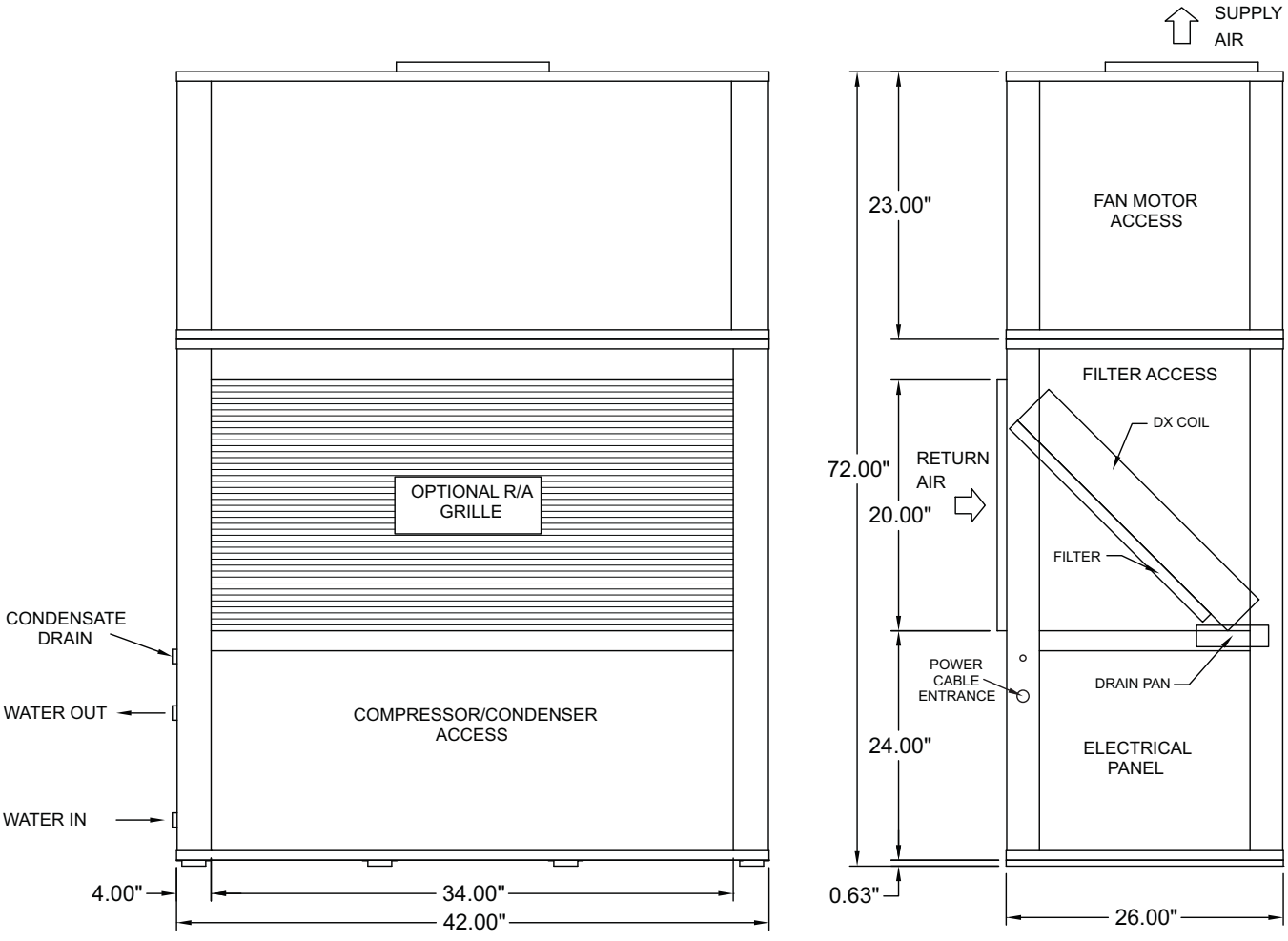
OVERSIZED MOTORS

MODEL #	VOLTAGE	COMPRESSOR				EVAPORATOR		MIN. CCT. AMPACITY	MAX FUSE / CCT. BKR. AMP
		QTY		RLA	LRA	HP	FLA		
CSV060A	208-230/3/60	1	@	16.0	110.0	1.50	4.8	24.80	40
	460/3/60	1	@	7.8	52.0	1.50	2.2	11.95	15
	575/3/60	1	@	5.7	38.9	1.50	1.7	8.83	15
CSV096A	208-230/3/60	2	@	15.3	83.0	2.00	6.0	40.43	50
	460/3/60	2	@	6.2	41.0	2.00	3.0	16.95	20
	575/3/60	2	@	4.8	33.0	2.00	2.4	13.20	15
CSV120A	208-230/3/60	2	@	16.0	110.0	3.00	8.4	44.40	60
	460/3/60	2	@	7.8	52.0	3.00	4.2	21.75	25
	575/3/60	2	@	5.7	38.9	3.00	3.4	16.23	20
CSV180A	208-230/3/60	2	@	23.2	164.0	5.00	14.0	66.20	80
	460/3/60	2	@	11.2	75.0	5.00	6.6	31.80	40
	575/3/60	2	@	7.9	54.0	5.00	5.7	23.48	30
CSV240A	208-230/3/60	2	@	30.1	225.0	7.50	22.2	89.93	110
	460/3/60	2	@	16.7	114.0	7.50	10.8	48.38	60
	575/3/60	2	@	12.2	80.0	7.50	8.4	35.85	45

DIMENSIONAL DATA

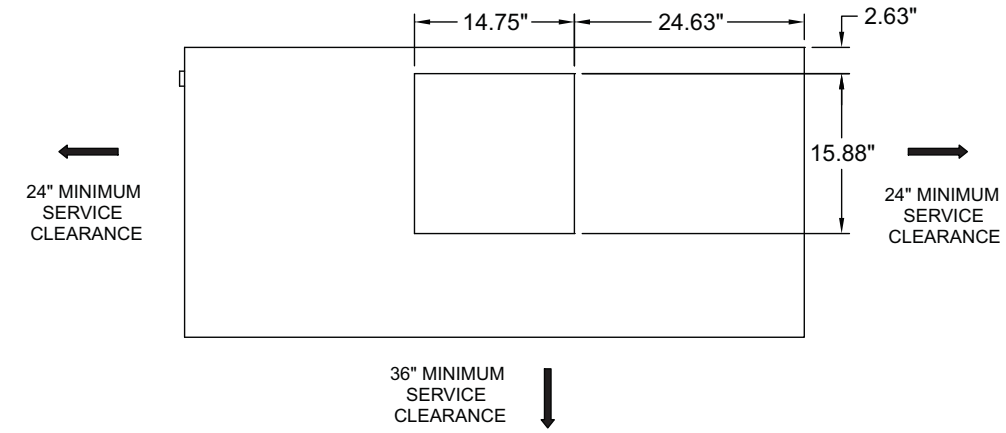
5 TON UNIT

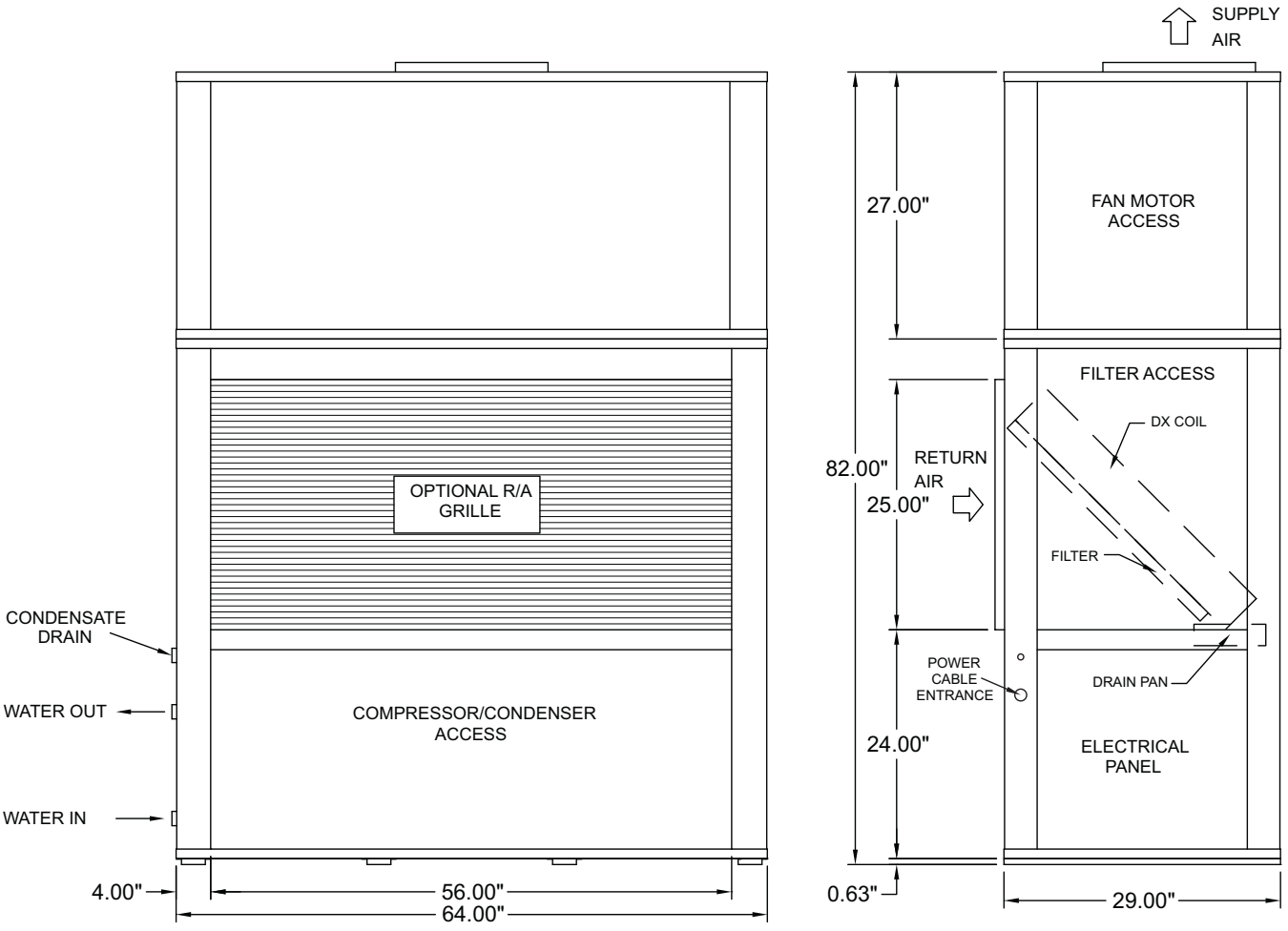




DIMENSIONAL DATA

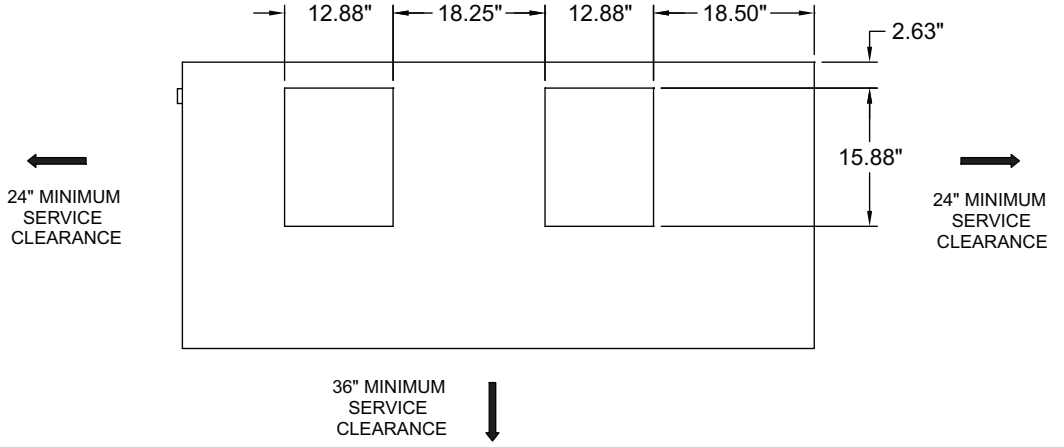
8 & 10 TON UNIT

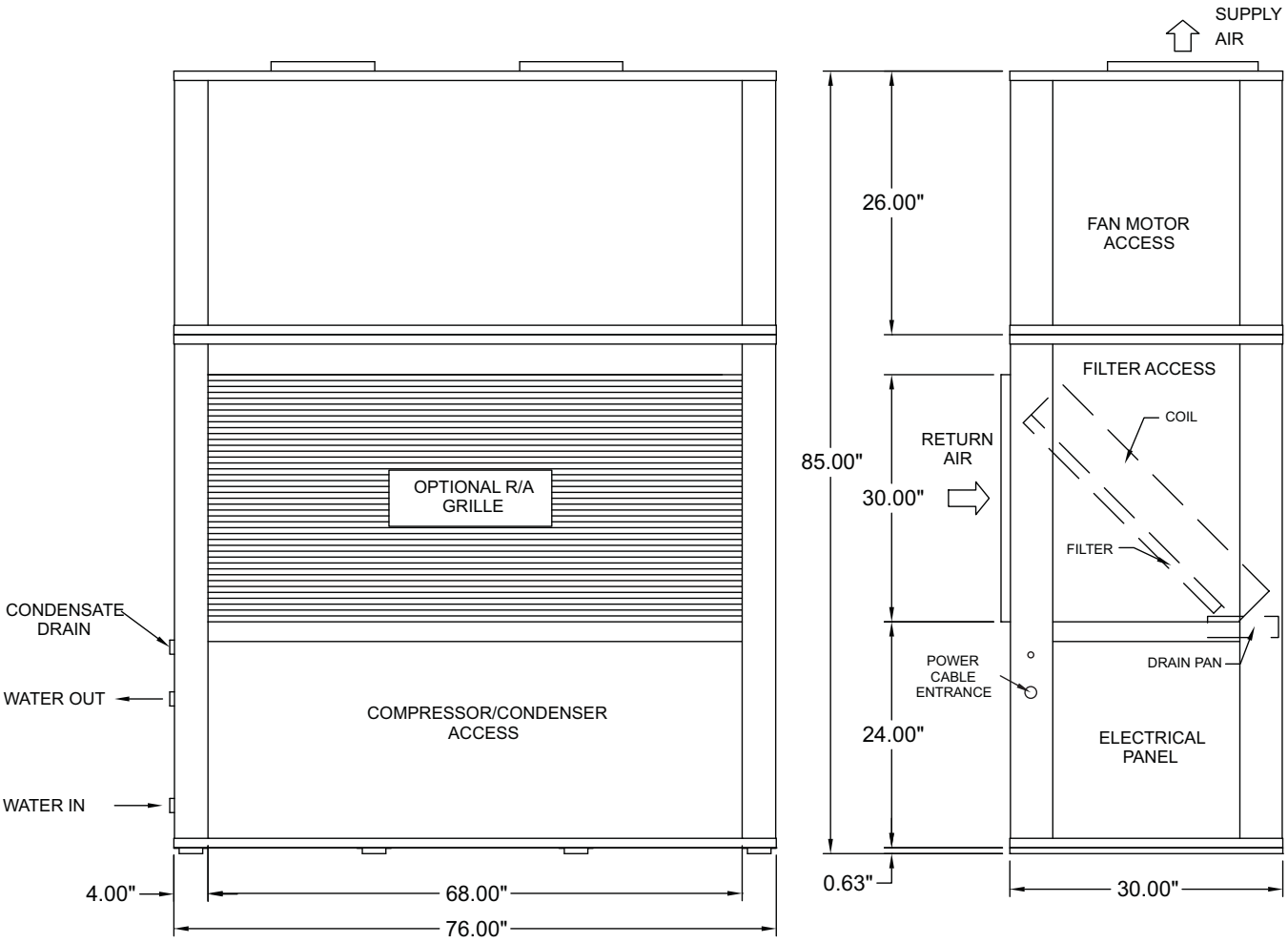




DIMENSIONAL DATA

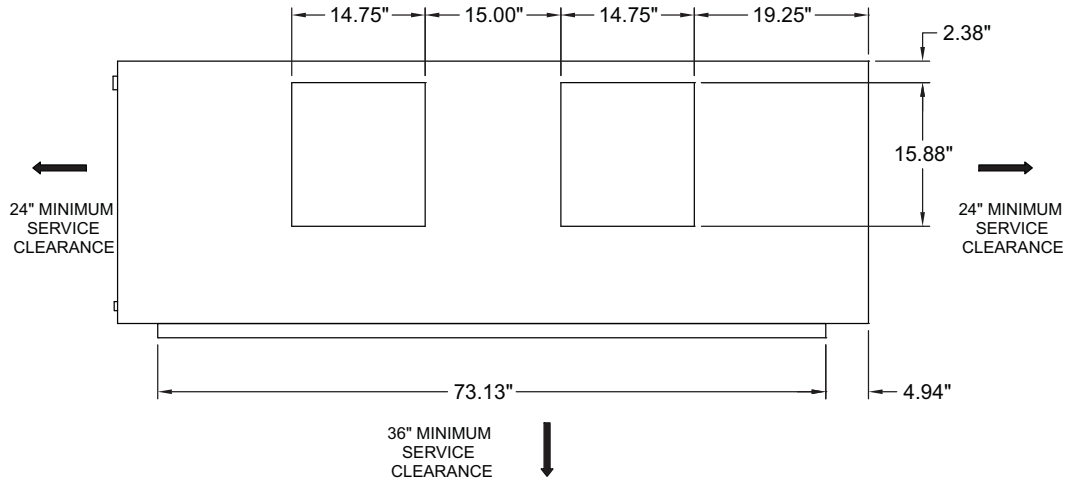
15 TON UNIT

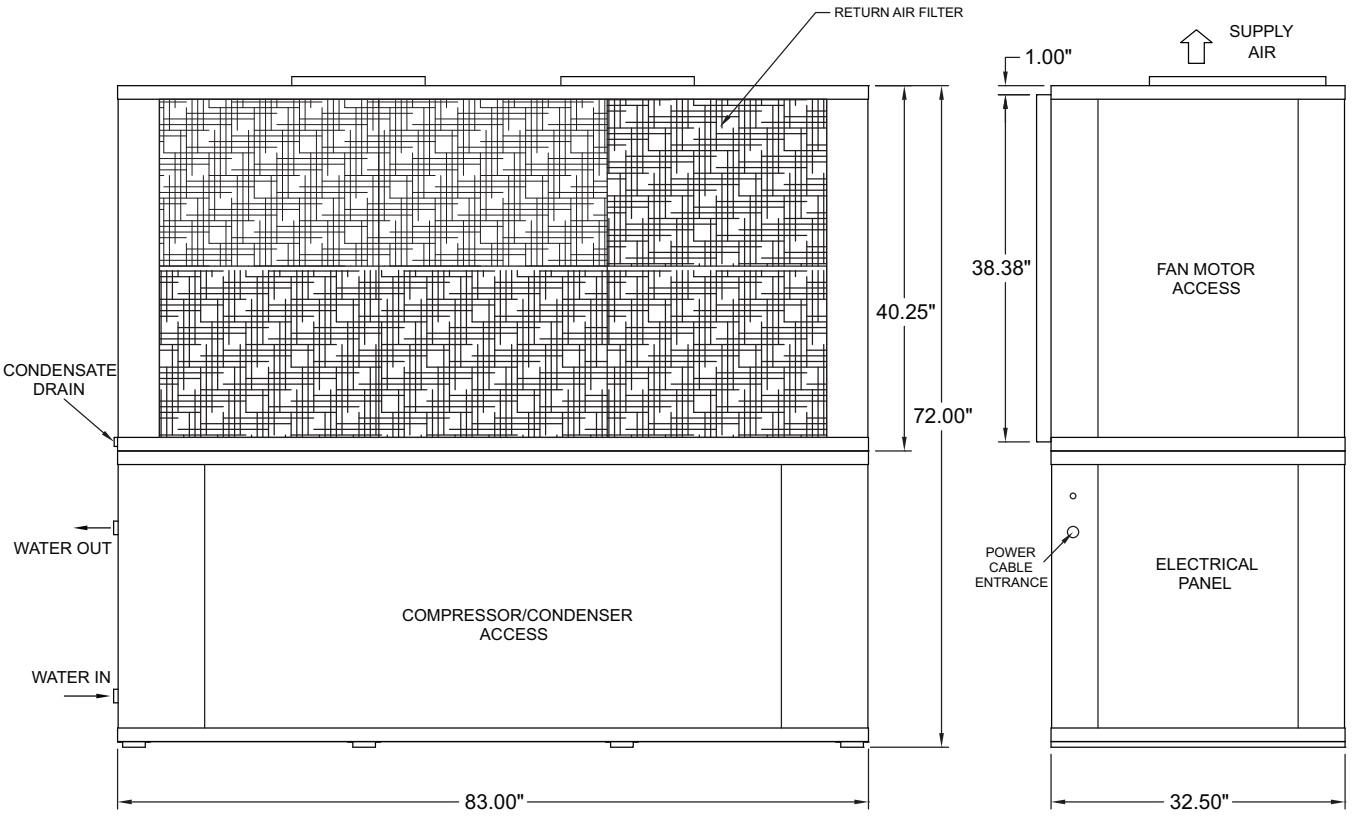




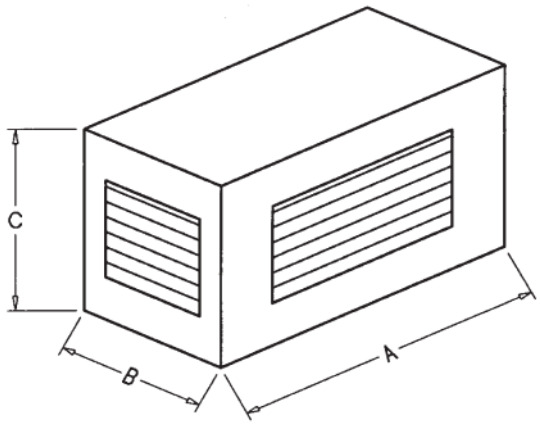
DIMENSIONAL DATA

20 TON UNIT



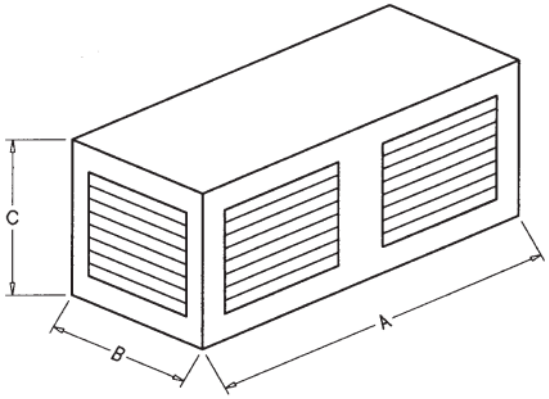


DIMENSIONAL DATA



PLENUM DIMENSIONS (INCHES)

UNIT SIZE	PLENUM MODEL	DIMENSIONS			Side Grill	Front Grill
		A	B	C		
5 Ton	CVDP-060	42	26	20	16x12 (2x)	32x12
8/10 Ton	CVDP-120	64	29	24	20x16 (2x)	38x16



PLENUM DIMENSIONS (INCHES)

UNIT SIZE	PLENUM MODEL	DIMENSIONS			Side Grill	Front Grill
		A	B	C		
15 Ton	CVDP-180	64	29	28	20 x 20 (2x)	28 x 20 (2x)
20 Ton	CVDP-240	83	32.5	28	24 x 20 (2x)	32 x 20 (2x)

WATERSIDE ECONOMIZER

The Waterside Economizer Kit consists of a field-mounted water cooling coil, pre-assembled external piping sections (Deluxe Kit only), a motorized three-way valve, and all necessary controls for unit operation from a conventional 24-Volt thermostat.

The chilled water coil is constructed of ½ in. copper tubes and aluminum fins, with copper supply and return headers. The coil casing includes a return air filter rack to relocate the unit filters upstream of the economizer coil. Return air may be ducted to the filter intake.

The water circuit is a single inlet and outlet connection – serving both the refrigerant condensers and the economizer coil. The external piping circuit between the economizer coil and the refrigerant condensers is field assembled from several pre-fabricated sections (coupling joints between sections must be field brazed). The three-way motorized valve is field mounted, external to the unit cabinet. A separate drain pan is included for the economizer coil. This drain must be independently connected and trapped from the primary DX evaporator drain.

The chilled water coil is installed upstream of the DX evaporator, on the return air opening of the unit cabinet. The large economizer coil face area features low air pressure drop, to ensure maximum external static capability from the unit.

When the entering water temperature is suitable for economizing, water flow is directed first through the economizer coil and then through the refrigerant condensers. The economizer and compressor staging operation is controlled by field installed water temperature thermostats. The thermostat set points are adjustable if field conditions differ from the factory settings.

When a waterside economizer is used, the condensing loop water pump must be operated continuously. The cooling tower should be operated at maximum capacity in an attempt to produce the lowest possible water temperature at all times. The output capacity of the economizer coil has been selected to be as close as possible to the mechanical cooling capacity of the base unit - when supplied with a 45°F entering water temperature, and 3 GPM per ton of mechanical cooling.

WATERSIDE ECONOMIZER

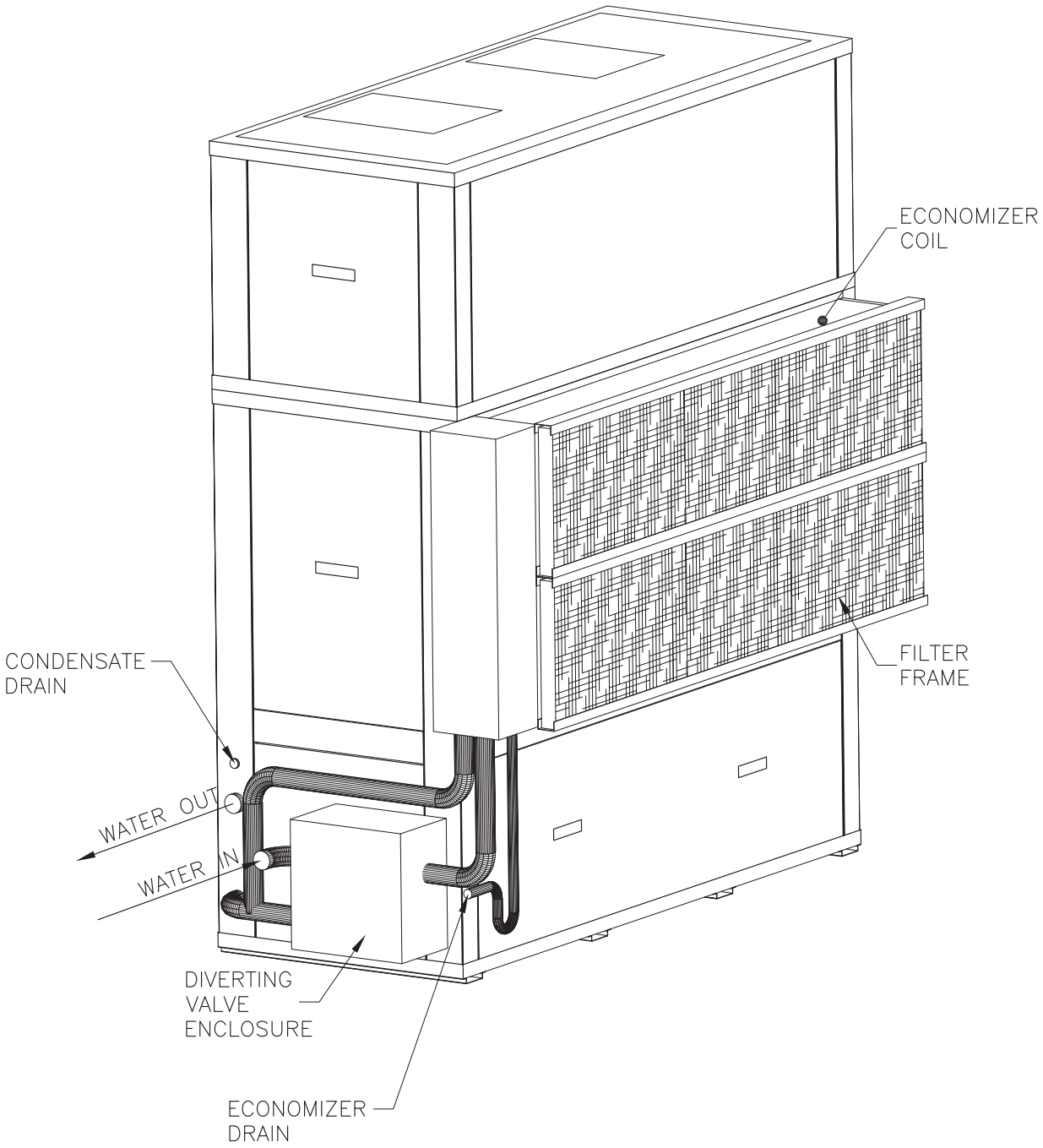
Unit	Air @ 80ºF EDB, 67ºF EWB		Water			Capacity (MBH)	
	CFM	PD (in WG)	Flow (GPM)	PD (PSI)	EWT (ºF)	Total	Sensible
CSV060A	2000	0.20	8	1.5	45	40.8	36.9
					55	28.0	28.0
			15	3.9	45	50.8	41.3
					55	32.8	32.8
CSV096A	3200	0.16	16	3.0	45	83.2	67.3
					55	55.8	54.8
			24	6.4	45	94.9	72.6
					55	59.8	58.1
CSV120A	4000	0.23	20	4.5	45	98.6	80.7
					55	64.0	64.0
			30	9.7	45	109.7	85.9
					55	69.9	69.0
CSV180A	6000	0.20	30	4.0	45	138.4	116.6
					55	93.6	93.6
			45	8.8	45	158.7	125.9
					55	100.8	100.8
CSV240A	8000	0.28	40	5.5	45	223.2	181.2
					55	144.9	144.9
			60	12.2	45	252.4	195.0
					55	163.0	157.6

Note:

1. All economizer coils are 3R, 10 FPI, aluminum fins with copper tubes and headers.
2. For total system waterside pressure drop, add condenser pressure drop and waterside economizer coil pressure drop.

WATERSIDE ECONOMIZER

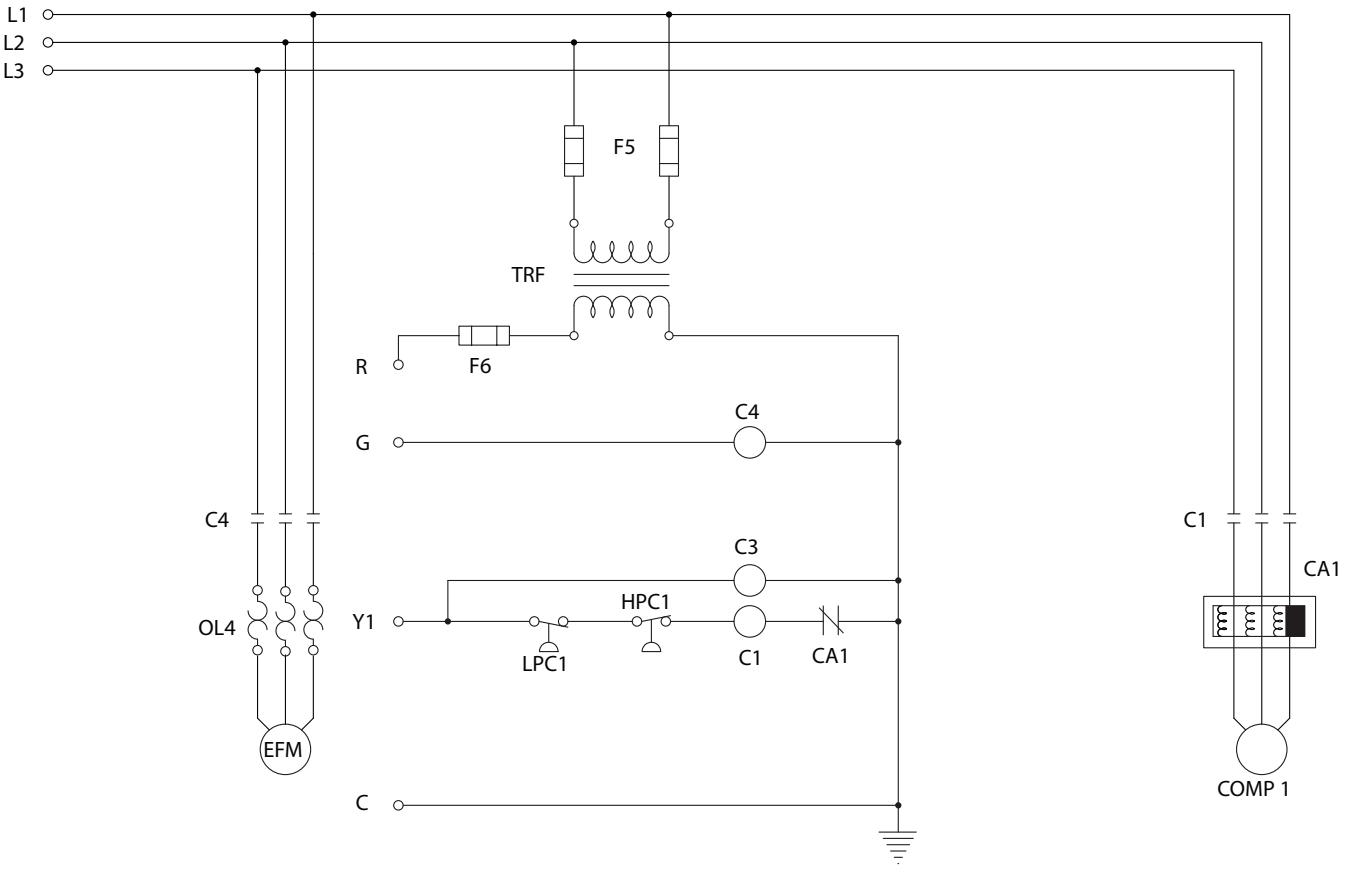
TYPICAL PHYSICAL CONFIGURATION



WIRING DIAGRAMS

5 TON WIRING DIAGRAM

208-230, 460, 575V/3PH/60HZ

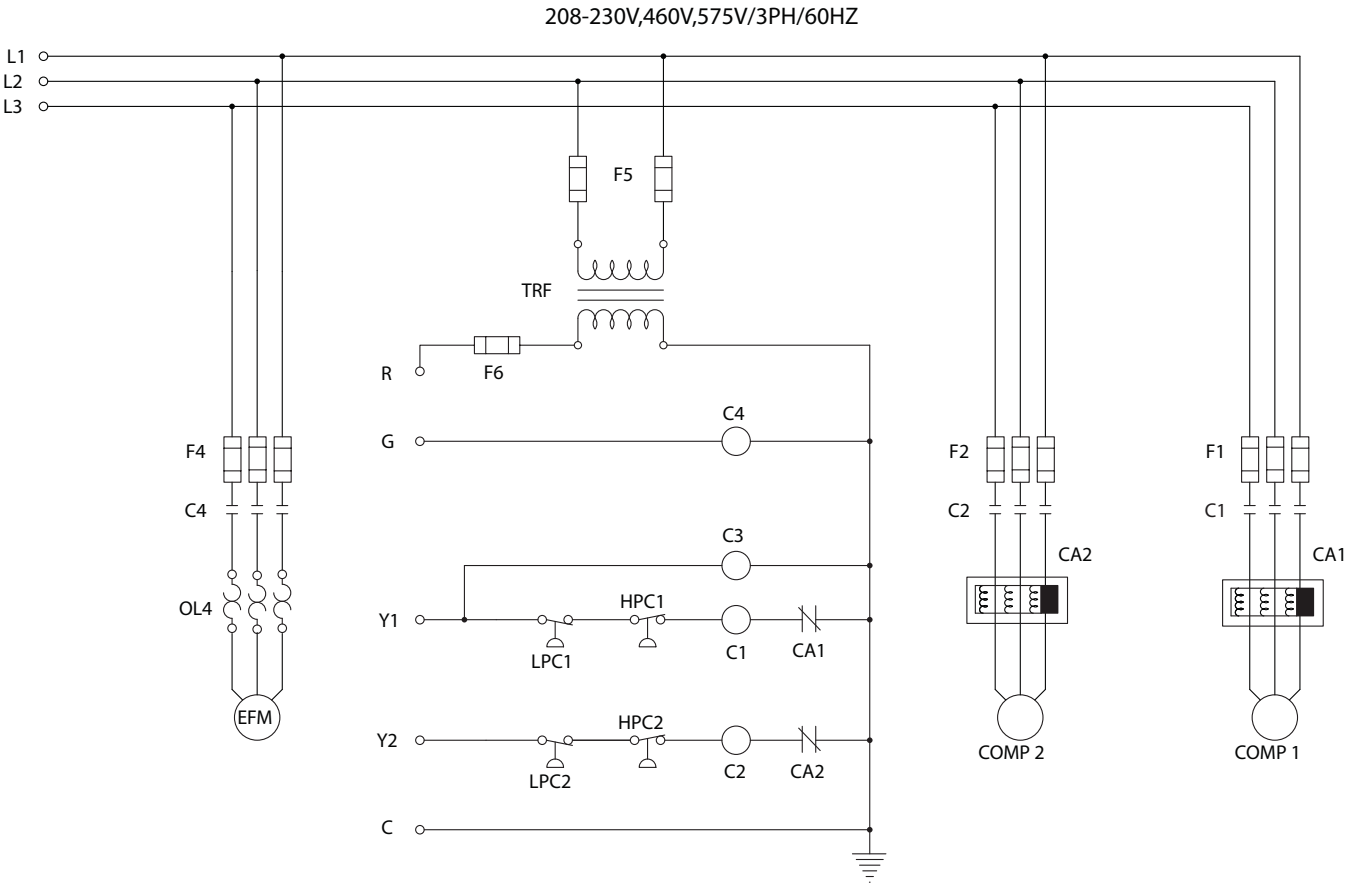


TB1	-	LINE VOLTAGE TERMINAL BLOCK
TB2	-	LOW VOLTAGE TERMINAL BLOCK
EFM	-	EVAPORATOR FAN MOTOR
COMP 1	-	COMPRESSOR ONE
F5	-	TRANSFORMER PRIMARY FUSE
F6	-	TRANSFORMER SECONDARY FUSE
CA1	-	COMFORT ALERT DIAGNOSTICS MODULE 1
TRF	-	TRANSFORMER
GRD	-	GROUND

C1	-	COMPRESSOR ONE CONTACTOR
C4	-	EVAP. FAN MOTOR CONTACTOR
OL4	-	EVAP. FAN MOTOR OVERLOAD
HPC1	-	HIGH PRESSURE SWITCH
LPC1	-	LOW PRESSURE SWITCH

WIRING DIAGRAMS

8-20 TON WIRING DIAGRAM



TB1	-	LINE VOLTAGE TERMINAL BLOCK
TB2	-	LOW VOLTAGE TERMINAL BLOCK
EFM	-	EVAPORATOR FAN MOTOR
COMP 1	-	COMPRESSOR ONE
COMP 2	-	COMPRESSOR TWO
F4	-	EVAP. FAN MOTOR FUSE
F5	-	TRANSFORMER PRIMARY FUSE
F6	-	TRANSFORMER SECONDARY FUSE
CA1	-	COMFORT ALERT DIAGNOSTICS MODULE 1
CA2	-	COMFORT ALERT DIAGNOSTICS MODULE 1
F1	-	COMPRESSOR ONE FUSE
F2	-	COMPRESSOR TWO FUSE

C1	-	COMPRESSOR ONE CONTACTOR
C2	-	COMPRESSOR TWO CONTACTOR
C4	-	EVAP. FAN MOTOR CONTACTOR
OL4	-	EVAP. FAN MOTOR OVERLOAD
HPC1	-	HIGH PRESSURE SWITCH (COMP 1)
LPC1	-	LOW PRESSURE SWITCH (COMP 1)
HPC2	-	HIGH PRESSURE SWITCH (COMP 2)
LPC2	-	LOW PRESSURE SWITCH (COMP 2)
TRF	-	TRANSFORMER
GRD	-	GROUND

SPECIFICATIONS

GENERAL

All models ship as factory-charged unitized packages. Installation is possible through standard height doorways and elevators. All packages are designed for free standing mounting on the floor, or on a field fabricated structural steel stand. All models are shipped with vertical evaporator fan discharge as standard. Units are completely factory wired and piped. Dual circuit models feature internally manifolded condensers.

CABINET

All cabinets are completely constructed of heavy gauge galvanized steel. The entire unit interior (both evaporator and condensing section) is insulated with 1/2" thick, 2-lb density insulation. Service panels are equipped with lifting handles for ease of removal and handling. Duct flanges for evaporator discharge are provided with the unit for field installation, and return air intake flanges are incorporated into the filter frame.

COMPRESSORS

All models utilize “Scroll” type, R-410A, hermetic compressors. Compressors are mounted on rubber isolators to minimize vibration transmission. Internal overload protection is provided. External high pressure and low pressure cut-out switches are included in each compressor control circuit. The 8-20 ton units have two individual scroll compressors.

REFRIGERANT CIRCUITS

The 8-20 ton units feature two independent refrigeration circuits. Each refrigeration circuit includes an adjustable thermal expansion valve (with external equalizer), liquid line filter drier, sight glass/moisture indicator, and service gauge ports.

EVAPORATOR COIL

The evaporator coil is constructed of internally enhanced copper tubes mechanically bonded to rippled aluminum plate fins. Coil is employed in a draw-thru configuration. Large evaporator coil face area minimizes potential water blow-off.

INDOOR FANS

Forward curved, double inlet and double width centrifugal blowers are used for evaporator air movement. Blower wheels are fabricated of galvanized steel. Blowers employ solid steel shafts, supported in permanently lubricated ball bearings. All blowers are belt driven. Variable-pitch motor sheaves allow for field adjustment of blower rpm. Motor shall be 1750 RPM, open drip proof design. Evaporator motors are provided with external manual reset overload protection.

ELECTRICAL/CONTROLS

All units are completely factory wired with all necessary controls. All models come equipped with an electronic diagnostic compressor protection module. A flashing LED indicator is used to communicate alert codes. Phase protection and anti-short cycle time delay protection is provided on each compressor circuit. Compressor will be locked out for 3 minutes when thermostat opens, or there is a momentary power outage. All units feature an auto-reset soft lock-out, on each compressor control circuit in the event of a high/low cut-out, and a manual reset hard lock-out due to multiple high/low pressure cut-outs. A 24 volt control circuit, with oversize transformer, is provided for field connection.

FILTERS

All models are shipped with 2-inch thick medium-efficiency throwaway filters factory installed. Filters are accessible from either front or right hand side on 5-15 ton models. The 20 ton filter rack is external to the cabinet (shipped loose).

SPECIFICATIONS

FACTORY INSTALLED OPTIONS

Oversized Evaporator Fan Motors
Increased horsepower motors and drive components are available for those applications where external static pressure requirements exceed the capability of the standard motor.

Corrosion Resistant Coating
Evaporator coil shall receive a 1-mil thickness of a cathodic epoxy type electro-deposition coating, applied in a multiple dip and bake process.

Cupro-Nickel Coaxial Condenser Coil
Coaxial condenser coil shall be of a Cupro-Nickel alloy for increased life expectancy and protect against contamination build-up, corrosion from chemical attack, oxidization, and water cavitation.

Stainless Steel Drain Pan
Evaporator drain pan shall be fabricated of 304 Stainless Steel material. The 3/4" NPT drain connection fitting is also constructed of 304 Stainless Steel.

Condensate Overflow Switch
Condensate overflow switch shall be mounted in the evaporator drain pan and in the event of an alarm, shut off power to the unit compressor(s).

Hot Gas Bypass
Adjustable hot gas regulator and all necessary piping shall be installed on lead compressor circuit. The modulating regulator diverts hot discharge gas to evaporator inlet. Bypass capacity shall be minimum 50% of compressor capacity. The Bypass valve opens at a preset suction pressure to prevent coil freeze-up at light evaporator load, or low airflow conditions.

FIELD INSTALLED OPTIONS

Oversized Evaporator Fan Motor Kit
Increased horsepower motors and drive components are available for field installation.

Condenser Pressure Control
Water regulating valves provide control of the quantity of condenser water supplied to the unit by sensing the condensing temperature. The field installed Condenser Pressure Control option provides a regulating valve for each internal condenser water circuit. The Water Regulating Valve carries a 150 psig water side pressure rating, and is installed inside of the unit cabinet.

Water Side Economizer
A Water-Side Economizer 'kit' is available as a field installed option. The addition of the chilled water coil will provide for substantial energy savings by utilizing low temperature tower water, thereby reducing the operation of the mechanical cooling system. The Waterside Economizer Kit consists of a field installed water cooling coil, pre-assembled external piping sections (Deluxe Kit only), a three-way motorized valve, and all necessary controls for unit operation from a conventional 24-Volt thermostat.

Return Air Grille
Available on all models up to 15 tons and recommended for applications where return air is not ducted and drawn directly from the conditioned space.

Discharge Plenum
Plenums mount on top of the evaporator section. Double deflection grills shall allow air discharge in multiple directions.

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Johnson Controls