

ENGINEERING GUIDE

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



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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

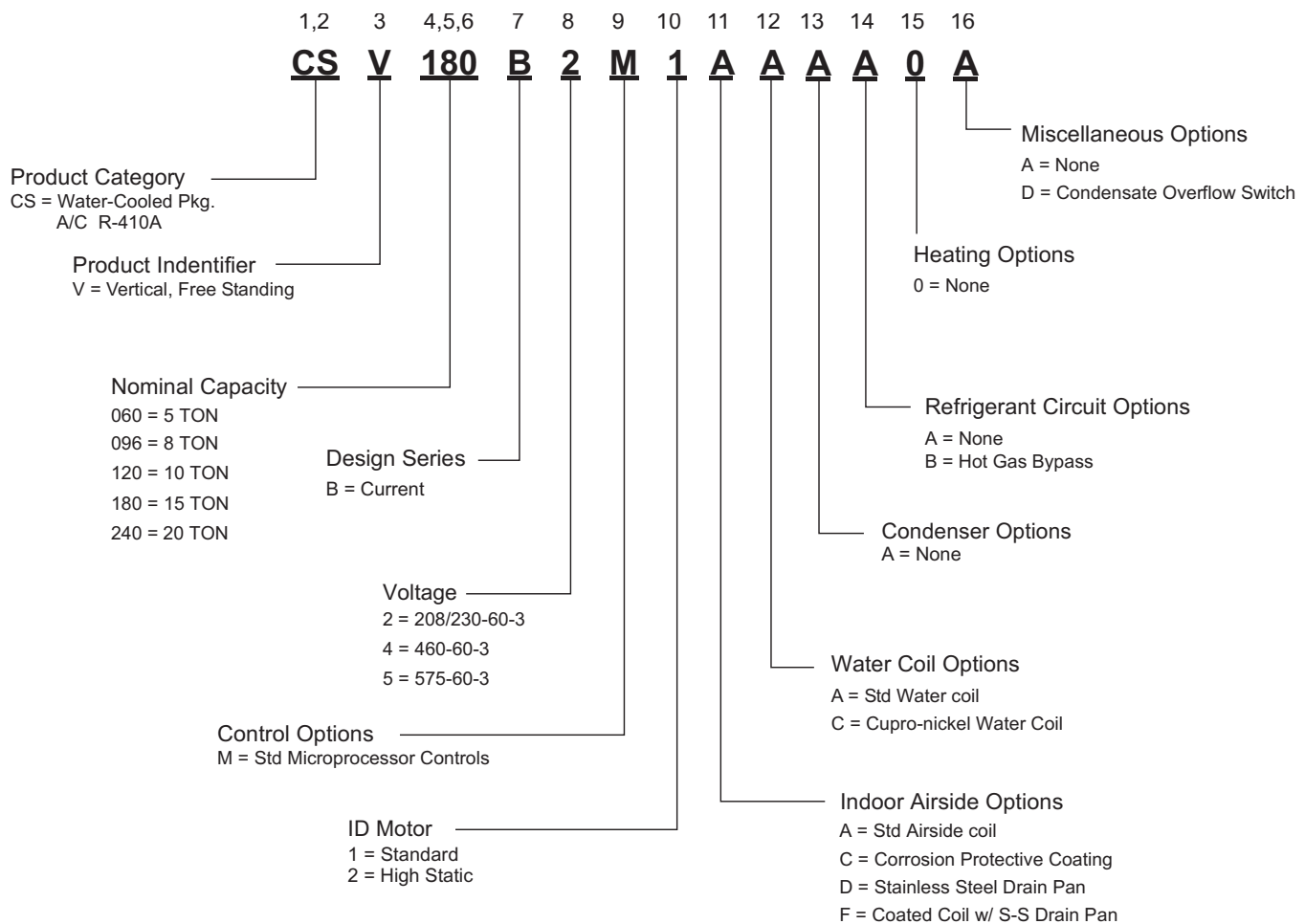
CSV

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
- Microprocessor control with LED status indicator for quick field diagnostics

NOMENCLATURE

WATER-COOLED SELF-CONTAINED UNIT



GENERAL DATA

Model	CSV060B	CSV096B	CSV120B	CSV180B	CSV240B
Nominal Cooling (Tons)	5	8	10	15	20
Refrigerant	R-410A	R-410A	R-410A	R-410A	R-410A

COOLING PERFORMANCE ^{1,2}

Gross Cooling Capacity (Btu/h)	60,000	100,500	126,000	182,000	253,000
Net Cooling Capacity (Btu/h)	58,000	96,000	120,000	173,000	238,000
Design Airflow (CFM)	2,000	3,200	4,000	6,000	8,000
Net Cooling Airflow (CFM)	2,000	3,200	4,000	6,000	8,000
EER	12.2	13.0	12.3	13.5	12.5
IEER	-	13.0	12.3	13.5	12.5
Compressor, Scroll - Qty	1	2	2	2	2
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	10.50	10.50	15.11	19.00
Rows/FPI	3/12	3/14	3/14	3/14	4/10
Refrigerant Controls	TX Valve				
Condensate Drain Connection (FPT)	3/4"				
Filters - Quantity/Size (in)	2-20x16x2	4-25x14x2	6-20x14x2	2-20x16x2 4-25x16x2	6-20x25x2

CONDENSER COIL

Type	Enhanced Surface Coaxial				
Quantity / Tons Capacity	1/5	2/4	2/6	2/7.5	2/10
Nominal Water Flow Rate (GPM)	15	24	30	45	60
Unit Water Connection Size (In/Out) (FPT)	1"	1-1/4"	1-1/4"	1-1/2"	2"

EVAPORATOR FAN - TYPE

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

Dimensions	- Height (in)	72	82	82	85	72
	- Width (in)	42	64	64	76	83
	- Depth (in)	26	29	29	30	32.5
Weight	- Operating (lbs)	590	775	945	1310	1465
	- Shipping (lbs)	635	815	985	1365	1525

- 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.
- 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

CSV060B		8 GPM									15 GPM								
2000 CFM		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	58.0	41.4	2.88	53.8	39.1	3.47	48.8	36.6	4.89	59.2	42.0	2.66	55.0	39.8	3.46	50.4	37.4	4.53
	80°F	58.1	47.9	2.89	53.9	45.7	3.47	49.0	43.2	4.90	59.3	48.5	2.66	55.2	46.4	3.47	50.6	44.1	4.53
	85°F	58.4	54.5	2.89	54.5	52.6	3.48	49.7	49.4	4.91	59.4	54.9	2.66	54.4	51.9	3.47	50.9	49.9	4.54
67°F	75°F	62.4	34.7	2.95	55.0	31.2	3.84	52.6	30.0	4.98	63.8	35.4	2.68	59.5	33.3	3.50	54.0	30.7	4.56
	80°F	62.8	40.3	2.95	55.7	37.7	3.85	53.0	36.3	4.98	64.3	41.8	2.68	59.9	40.4	3.50	54.3	37.0	4.57
	85°F	63.0	47.6	2.96	56.0	44.2	3.85	53.1	42.9	4.99	64.6	47.8	2.69	60.1	45.7	3.50	54.5	43.6	4.57
72°F	75°F	66.9	28.4	3.02	62.1	26.2	3.90	56.1	23.6	5.06	68.8	29.1	2.71	64.1	27.0	3.53	57.8	24.3	4.60
	80°F	67.5	34.4	3.03	62.8	32.3	3.91	56.7	29.6	5.08	69.5	35.3	2.72	64.8	33.2	3.54	58.5	30.4	4.61
	85°F	68.1	40.8	3.04	63.3	38.7	3.93	57.2	35.9	5.09	70.1	41.7	2.72	65.4	39.6	3.54	59.1	36.7	4.61

CSV096B		16 GPM									24 GPM								
3200 CFM		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	98.9	37.4	4.27	91.8	40.0	5.49	83.0	42.8	7.16	100.2	37.1	4.09	93.3	39.5	5.27	84.3	41.3	6.85
	80°F	101.3	46.5	4.27	93.2	48.8	5.50	85.8	51.3	7.17	102.5	45.9	4.09	94.5	47.9	5.27	87.7	51.1	6.85
	85°F	105.5	50.2	4.29	98.8	52.4	5.52	91.4	55.1	7.19	106.7	0.0	4.10	100.0	51.9	5.28	92.7	54.4	6.86
67°F	75°F	108.1	31.1	4.30	100.1	32.4	5.53	91.2	34.9	7.19	109.6	30.8	4.11	101.6	32.1	5.29	92.8	34.4	6.86
	80°F	108.4	38.7	4.31	100.3	40.6	5.53	91.4	44.6	7.19	109.9	38.2	4.11	101.9	40.1	5.29	93.1	43.8	6.86
	85°F	108.4	45.6	4.31	100.3	47.9	5.53	91.4	52.5	7.19	109.9	45.0	4.11	101.9	47.8	5.29	93.1	51.5	6.86
72°F	75°F	115.6	23.4	4.33	106.9	24.1	5.55	97.1	24.9	7.21	117.4	23.3	4.33	114.2	23.5	5.30	99.1	24.7	6.88
	80°F	116.8	30.9	4.34	108.0	31.9	5.56	98.2	34.0	7.21	118.5	30.6	4.34	115.8	31.0	5.30	100.3	33.5	6.88
	85°F	117.3	38.5	4.34	108.6	40.0	5.56	98.6	43.5	7.22	119.1	38.1	4.34	116.5	38.7	5.30	100.7	42.7	6.88

CSV120B		20 GPM									30 GPM								
4000 CFM		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	125.7	98.5	5.44	116.2	93.4	7.06	105.1	88.5	9.17	127.3	98.5	5.17	117.3	93.9	6.75	107.1	88.9	8.77
	80°F	127.9	119.5	5.46	118.8	114.7	7.09	108.4	108.4	9.22	129.4	118.7	5.19	119.4	115.0	6.77	110.3	110.3	8.80
	85°F	132.4	132.4	5.50	123.9	123.9	7.15	113.9	113.9	9.30	133.9	133.9	5.22	123.5	123.5	6.82	115.8	115.8	8.87
67°F	75°F	135.3	78.9	5.53	124.8	73.9	7.17	112.8	68.9	9.28	137.3	79.4	5.25	126.7	76.0	6.83	115.1	69.5	8.85
	80°F	136.5	98.0	5.54	125.7	92.4	7.18	113.6	87.3	9.29	138.5	98.0	5.25	127.7	95.6	6.84	115.8	87.7	8.86
	85°F	137.2	116.4	5.55	126.6	110.5	7.19	114.6	105.4	9.31	139.2	116.2	5.26	128.5	114.4	6.84	116.9	105.8	8.87
72°F	75°F	146.1	60.7	5.64	134.7	56.2	7.30	121.8	51.5	9.42	148.3	61.7	5.33	135.9	56.6	6.93	124.5	52.2	8.96
	80°F	147.3	78.6	5.66	135.8	73.9	7.31	122.9	69.2	9.44	149.6	79.1	5.34	137.4	74.5	6.94	125.6	69.8	8.97
	85°F	147.9	97.1	5.66	136.4	92.0	7.32	123.4	87.5	9.45	150.3	97.2	5.35	138.1	92.6	6.95	126.1	87.9	8.98

CSV180B		30 GPM									45 GPM								
6000 CFM		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	180.1	147.2	8.36	168.6	141.7	9.99	150.6	133.9	13.10	182.9	148.2	7.98	171.6	143.2	9.98	153.8	128.6	12.51
	80°F	183.0	178.0	8.40	172.3	172.3	10.05	155.4	155.4	13.18	185.6	179.1	8.02	175.1	174.7	10.03	158.5	158.5	12.58
	85°F	190.2	190.2	8.51	179.9	179.9	10.16	163.9	163.9	13.34	192.7	192.7	8.12	182.7	182.7	10.14	166.9	166.9	12.71
67°F	75°F	193.8	116.4	8.57	181.0	110.9	10.18	161.5	102.8	13.30	197.1	117.9	8.19	180.9	110.3	10.17	165.2	104.3	12.67
	80°F	194.9	145.7	8.59	182.0	140.0	10.19	162.2	131.4	13.31	198.2	147.2	8.21	181.9	138.8	10.18	166.0	133.2	12.70
	85°F	196.4	174.5	8.62	183.7	169.2	10.22	164.3	159.6	13.35	199.7	176.1	8.23	184.4	169.7	10.22	168.0	161.6	12.73
72°F	75°F	208.4	87.6	8.81	194.7	82.2	10.39	173.9	74.4	13.54	212.0	89.0	8.42	198.6	83.8	10.13	178.0	75.9	12.90
	80°F	210.2	115.7	8.84	196.5	110.6	10.42	175.6	103.3	13.58	213.9	117.1	8.44	200.4	112.0	10.20	179.7	104.6	12.93
	85°F	211.1	144.6	8.86	197.1	139.4	10.43	175.8	132.4	13.58	214.8	146.0	8.46	201.0	140.8	10.41	180.0	133.8	12.93

CSV240B		40 GPM									60 GPM								
8000 CFM		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	245.3	179.1	11.87	227.9	169.6	14.99	207.5	159.5	19.38	249.8	181.1	11.13	232.5	172.3	14.10	212.2	162.1	17.92
	80°F	245.8	208.9	11.88	228.6	200.0	14.96	208.0	189.5	19.42	250.3	211.3	11.13	233.2	202.2	14.12	212.7	191.9	17.92
	85°F	246.8	238.9	11.90	231.6	231.4	15.03	212.3	212.3	19.44	250.7	240.4	11.14	235.8	233.9	14.14	216.5	216.5	17.96
67°F	75°F	264.8	148.3	12.29	245.7	139.6	15.26	223.4	129.1	19.38	271.4	151.7	11.36	252.0	142.1	14.32	230.5	132.5	18.11
	80°F	266.3	177.4	12.32	247.1	168.3	15.42	224.9	157.9	19.42	273.0	180.7	11.38	253.6	171.4	14.34	232.1	161.1	18.13
	85°F	267.1	207.3	12.34	247.9	198.1	15.44	225.7	188.0	19.44	273.9	210.6	11.39	254.4	201.0	14.35	232.9	191.2	18.14
72°F	75°F	281.4	117.6	12.67	261.6	109.3	15.81	238.3	99.6	19.82	288.8	121.0	11.57	269.1	112.5	14.53	246.9	103.0	18.32
	80°F	285.4	145.8	12.77	265.1	137.6	15.90	241.4	127.5	19.92	293.4	149.3	11.63	273.1	140.9	14.59	250.3	131.2	18.36
	85°F	288.0	175.4	12.83	267.3	166.5	15.96	243.7	156.9	19.99	296.1	178.8	11.67	276.0	170.0	14.62	253.3	161.1	18.40

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))

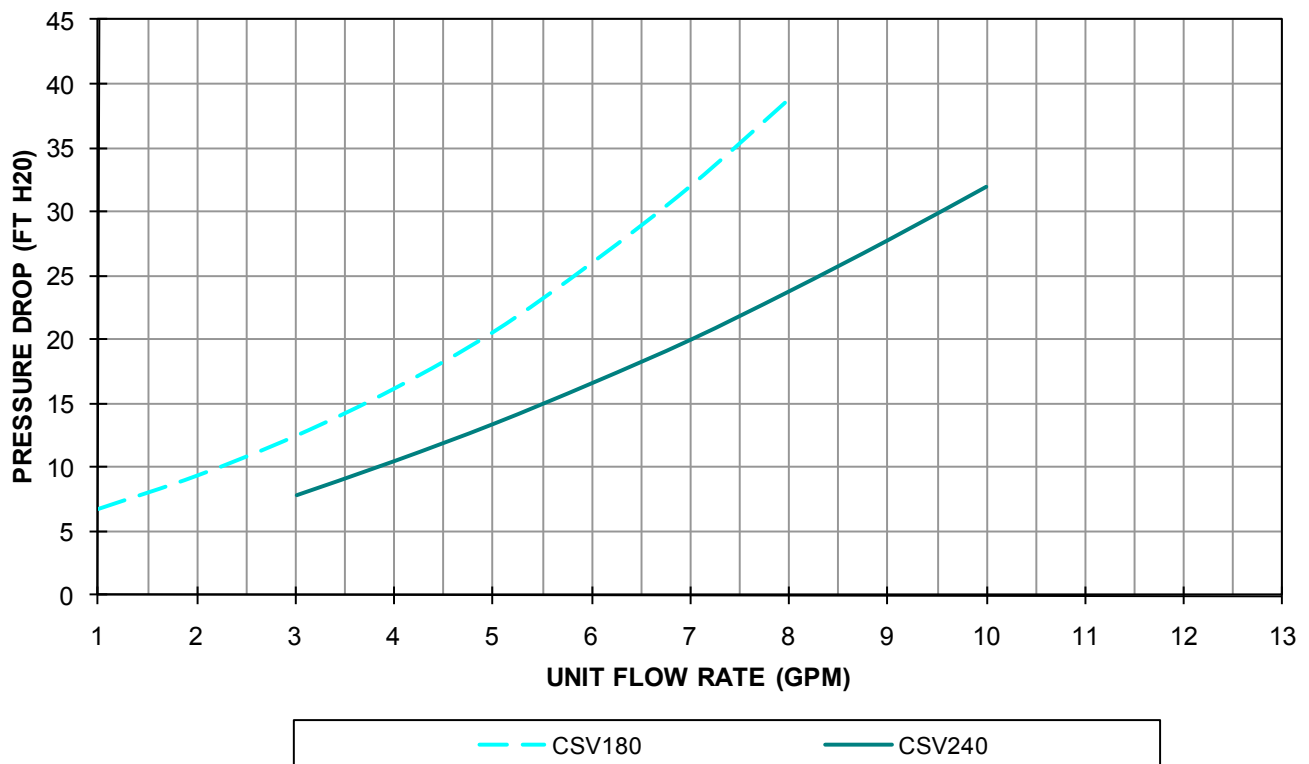
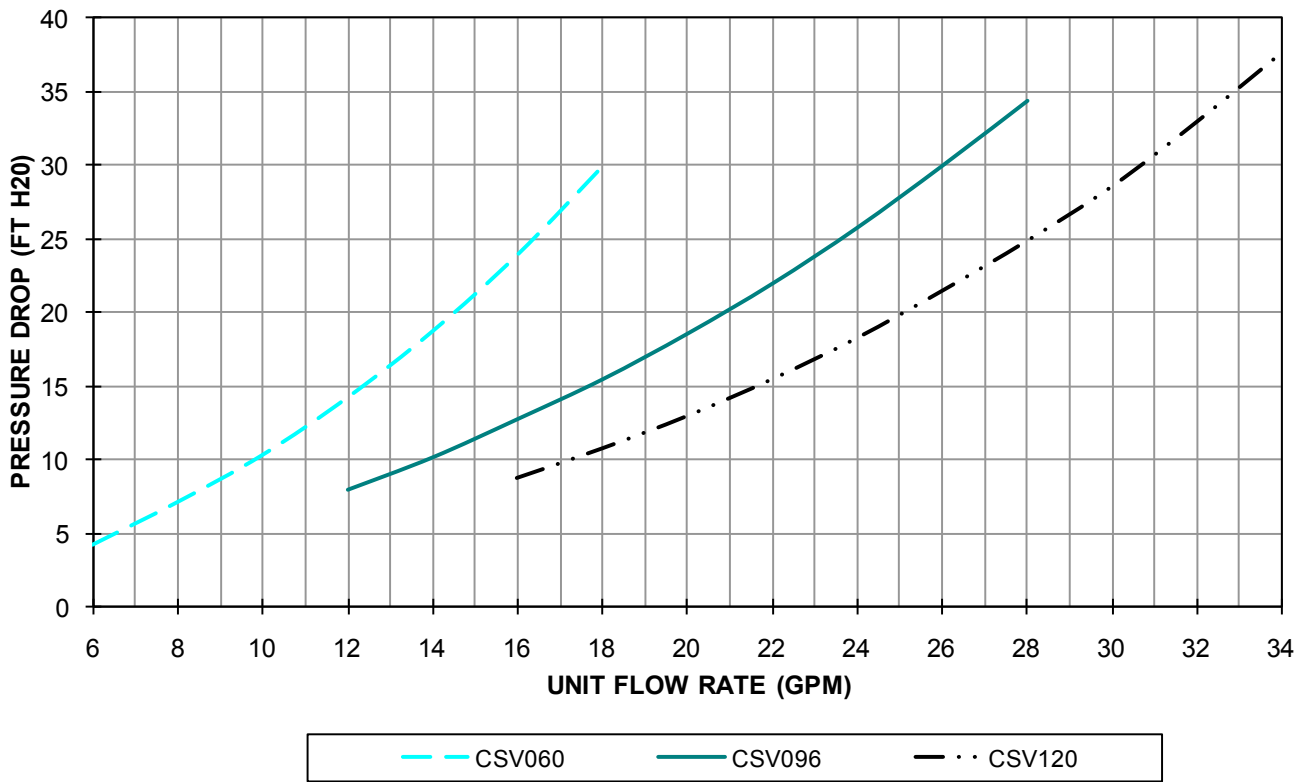
EVAPORATOR FAN PERFORMANCE

MODEL	SUPPLY CFM	AVAILABLE EXTERNAL STATIC PRESSURE - Inches W.C. ¹																			
		0.2		0.4		0.6		0.8		1.0		1.2		1.4		1.6		1.8		2.0	
		RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
CSV060B	1600	645	0.29	733	0.36	814	0.43	888	0.50	958	0.57	1024	0.64	1087	0.72	1154	0.83	1211	0.91	1245	0.99
	1800	708	0.40	788	0.48	863	0.55	933	0.63	999	0.71	1061	0.79	1121	0.87	1178	0.95	1233	1.04	1295	1.17
	2000	763	0.52	837	0.61	907	0.69	973	0.77	1035	0.86	1095	0.95	1152	1.04	1207	1.13	1260	1.22	1311	1.31
	2200	836	0.69	904	0.78	969	0.87	1030	0.97	1089	1.06	1145	1.15	1199	1.25	1252	1.35	1303	1.45	-	-
	2400	898	0.88	961	0.98	1021	1.08	1079	1.18	1135	1.28	1188	1.38	1240	1.48	-	-	-	-	-	-
CSV096B	2400	495	0.37	570	0.47	638	0.57	701	0.67	761	0.77	817	0.88	870	0.98	920	1.09	968	1.21	1015	1.34
	2800	553	0.55	619	0.66	682	0.78	740	0.89	795	1.01	847	1.13	897	1.25	945	1.37	991	1.50	1036	1.62
	3200	617	0.80	677	0.92	733	1.05	786	1.18	837	1.31	886	1.44	933	1.57	979	1.71	1022	1.85	1064	1.99
	3600	679	1.10	734	1.24	785	1.38	835	1.52	882	1.66	928	1.81	972	1.96	1014	2.11	-	-	-	-
	4000	744	1.47	793	1.63	840	1.78	886	1.94	930	2.10	-	-	-	-	-	-	-	-	-	-
CSV120B	3200	617	0.80	677	0.92	733	1.05	786	1.18	837	1.31	886	1.44	933	1.57	979	1.71	1022	1.85	1064	1.99
	3600	679	1.10	734	1.24	785	1.38	835	1.52	882	1.66	928	1.81	972	1.96	1014	2.11	1056	2.26	1096	2.42
	4000	744	1.47	793	1.63	840	1.78	886	1.94	930	2.10	973	2.26	1014	2.42	1055	2.58	1094	2.75	1132	2.92
	4400	807	1.92	852	2.09	896	2.26	938	2.43	980	2.60	1020	2.78	1059	2.95	1097	3.13	-	-	-	-
	4800	871	2.45	913	2.64	954	2.82	993	3.01	-	-	-	-	-	-	-	-	-	-	-	-
CSV180B	4800	634	1.20	697	1.42	757	1.62	813	1.84	867	2.06	918	2.30	968	2.52	1015	2.76	1065	3.02	1109	3.32
	5400	701	1.66	758	1.90	812	2.14	864	2.38	914	2.62	962	2.88	1009	3.12	1053	3.38	1097	3.66	1139	3.92
	6000	765	2.22	817	2.48	867	2.74	916	3.00	962	3.28	1007	3.54	1051	3.82	1093	4.10	1134	4.38	1174	4.68
	6600	832	2.90	880	3.20	927	3.48	972	3.76	1015	4.06	1057	4.34	1099	4.64	1139	4.96	-	-	-	-
	7200	900	3.72	945	4.02	988	4.34	1030	4.64	1070	4.96	-	-	-	-	-	-	-	-	-	-
CSV240B	6400	705	1.96	760	2.22	812	2.48	862	2.72	910	3.02	956	3.28	1001	3.56	1043	3.84	1085	4.12	1125	4.42
	7200	788	2.76	837	3.06	884	3.34	930	3.64	952	3.78	995	4.08	1037	4.38	1078	4.70	1118	5.00	1156	5.32
	8000	861	3.70	906	4.02	950	4.34	992	4.66	1033	4.98	1073	5.32	1111	5.66	1149	5.98	1186	6.32	1222	6.68
	8800	949	4.94	970	5.12	1010	5.46	1049	5.82	1087	6.18	1125	6.52	1161	6.90	1197	7.26	-	-	-	-
	9600	1028	6.34	1066	6.72	1103	7.10	1139	7.48	-	-	-	-	-	-	-	-	-	-	-	-

1. Blower performance includes wet evaporator coil and 2" filters
2. At higher evaporator airflows and wet bulb conditions, condensate carry-over may occur. Decrease airflow downward as necessary.

Low Static Drive (Field-Supplied)
Standard Factory Drive
High-Static Drive

WATERSIDE PRESSURE DROP



ELECTRICAL DATA

ELECTRICAL DATA-STANDARD MOTOR

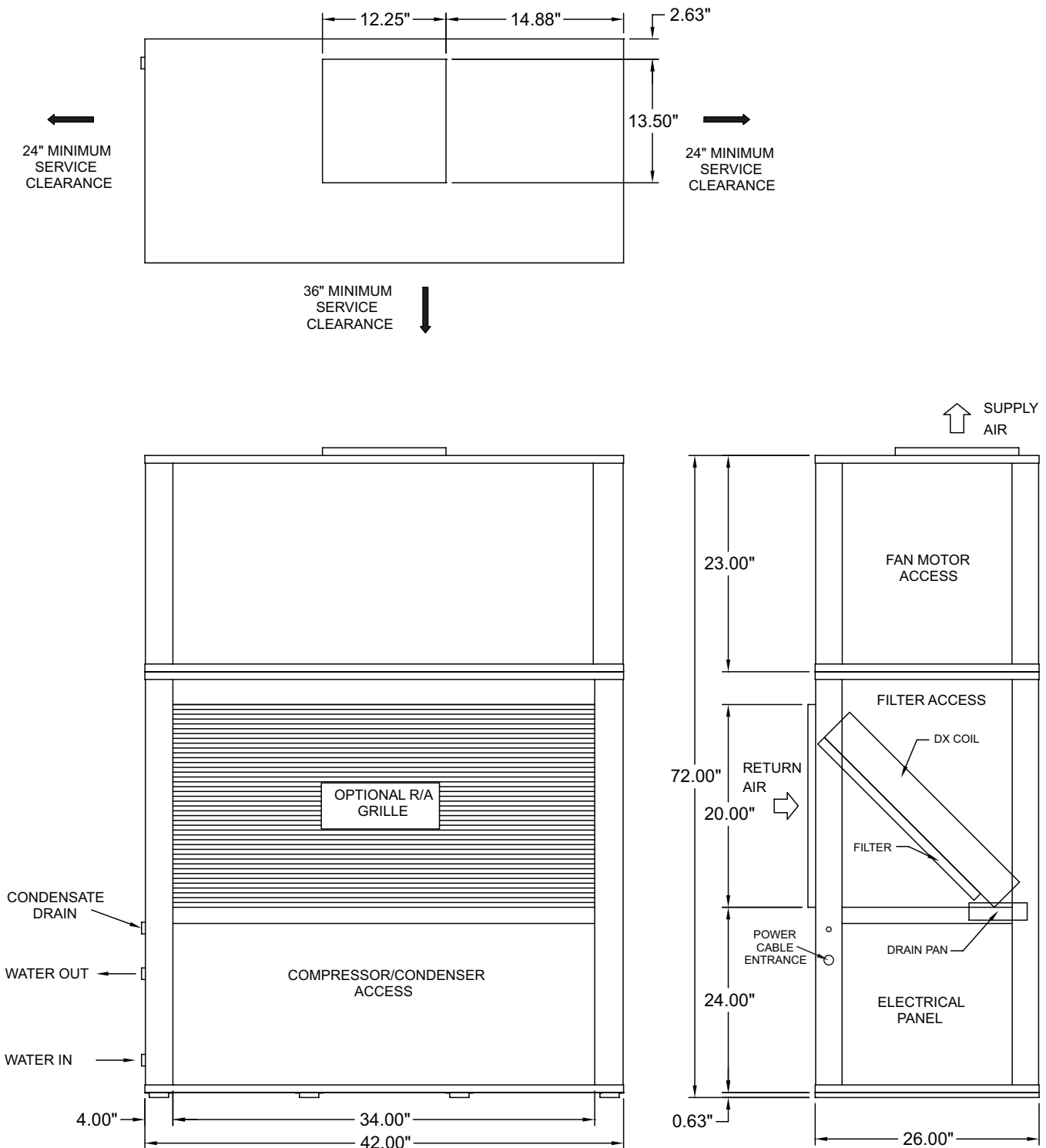
MODEL #	VOLTAGE	COMPRESSOR			EVAPORATOR FAN		MIN. CKT. AMPACITY	MAX FUSE / CKT. BKR. AMP	
		QTY	RLA	LRA	HP	FLA			
CSV060B	208-230/3/60	1	@	16.0	110.0	1.00	3.1	23.10	35
	460/3/60	1	@	7.8	52.0	1.00	1.5	11.25	15
	575/3/60	1	@	5.7	38.9	1.00	1.2	8.33	15
CSV096B	208-230/3/60	2	@	13.1	83.1	1.50	4.5	33.98	45
	460/3/60	2	@	6.1	41.0	1.50	2.2	15.93	20
	575/3/60	2	@	4.4	33.0	1.50	1.8	11.70	15
CSV120B	208-230/3/60	2	@	16.0	110.0	2.00	5.8	41.80	50
	460/3/60	2	@	7.8	52.0	2.00	2.9	20.45	25
	575/3/60	2	@	5.7	38.9	2.00	2.3	15.13	20
CSV180B	208-230/3/60	2	@	23.2	164.0	3.00	8.5	60.70	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
CSV240B	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	5.3	32.75	40

ELECTRICAL DATA-OVERSIZED MOTOR

MODEL #	VOLTAGE	COMPRESSOR			EVAPORATOR FAN		MIN. CKT. AMPACITY	MAX FUSE / CKT. BKR. AMP	
		QTY	RLA	LRA	HP	FLA			
CSV060B	208-230/3/60	1	@	16.0	110.0	1.50	4.5	24.50	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	1.8	8.93	15
CSV096B	208-230/3/60	2	@	13.1	83.0	2.00	5.8	35.28	45
	460/3/60	2	@	6.1	41.0	2.00	2.9	16.63	20
	575/3/60	2	@	4.4	33.0	2.00	2.3	12.20	15
CSV120B	208-230/3/60	2	@	16.0	110.0	3.00	8.5	44.50	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
CSV180B	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	5.3	23.08	30
CSV240B	208-230/3/60	2	@	30.1	225.0	7.50	20.4	88.13	110
	460/3/60	2	@	16.7	114.0	7.50	9.7	47.28	60
	575/3/60	2	@	12.2	80.0	7.50	7.8	35.25	45

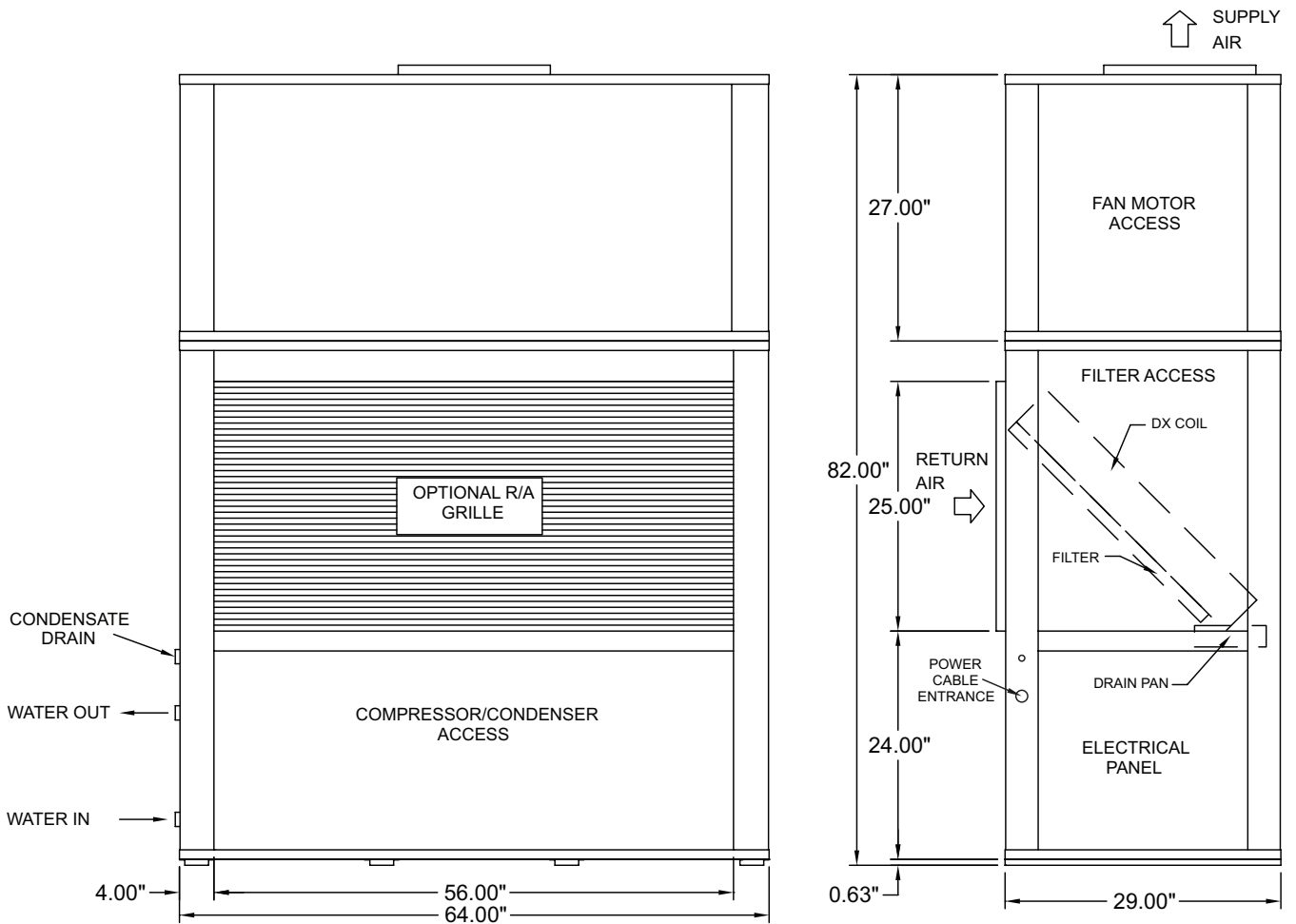
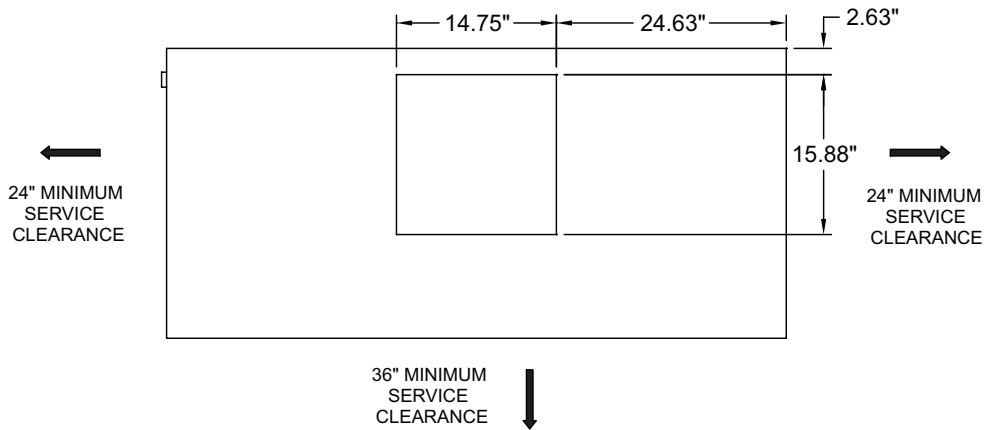
DIMENSIONAL DATA

5 TON UNIT



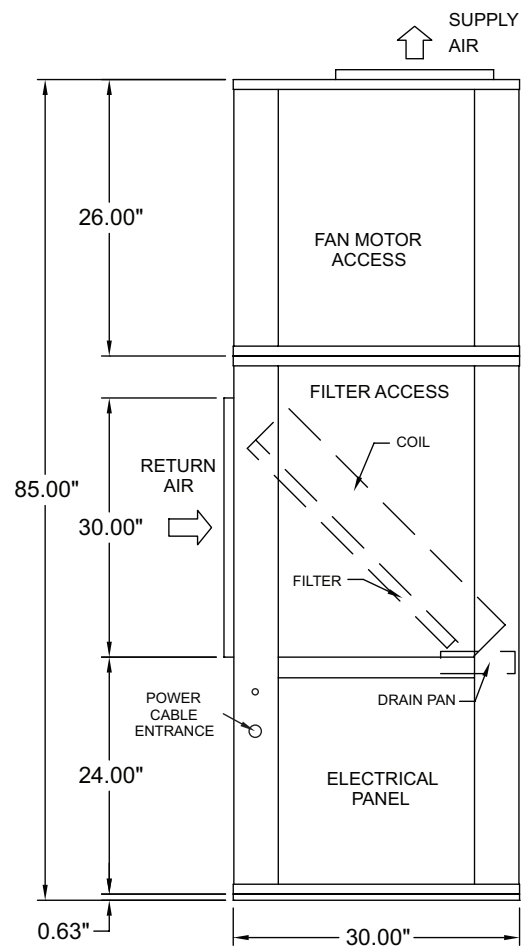
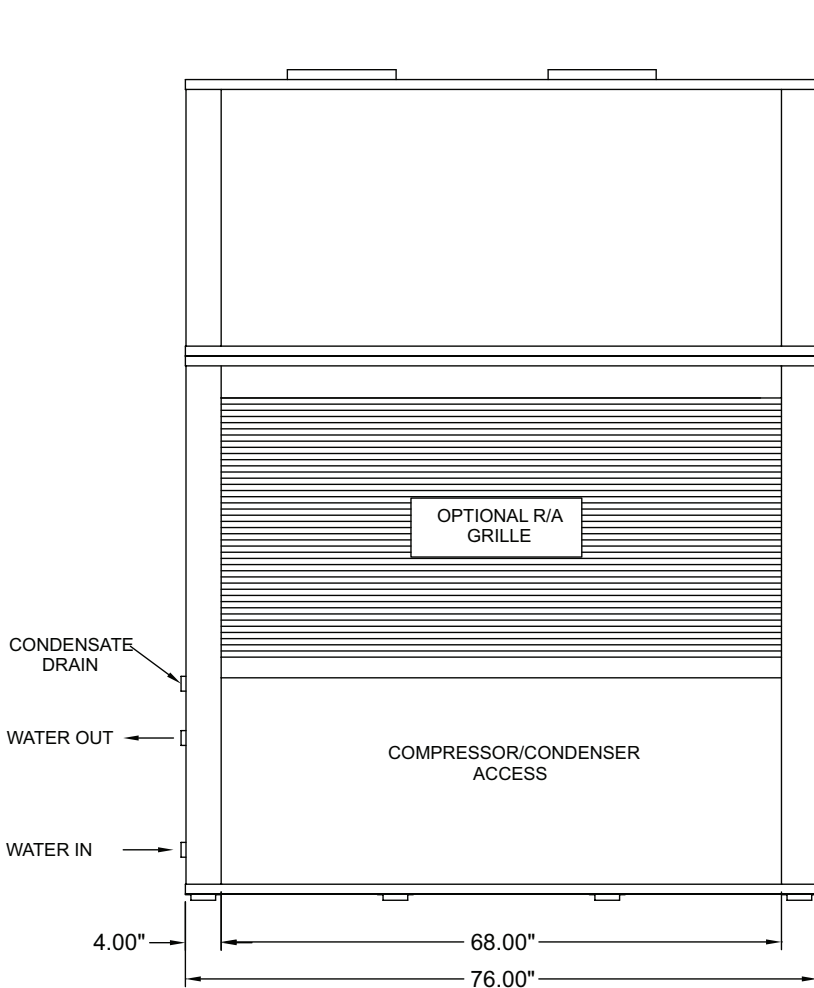
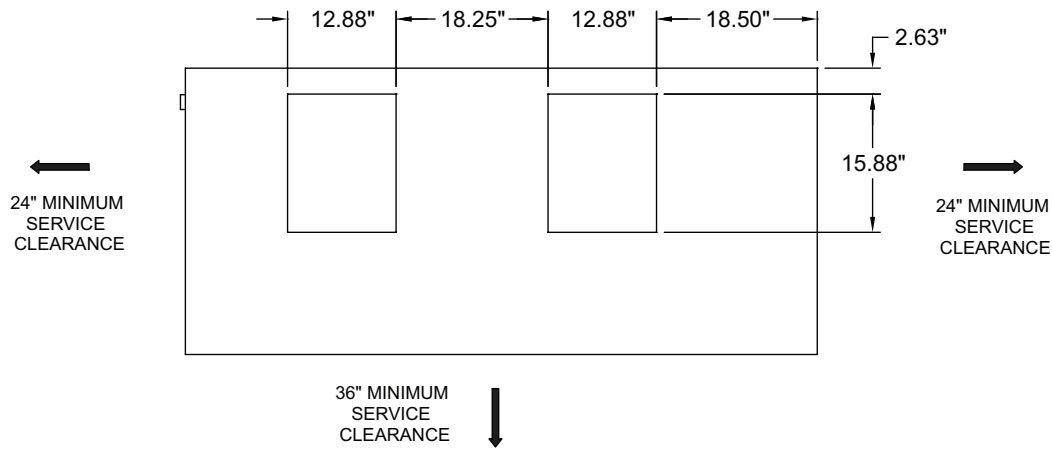
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8 & 10 TON UNIT



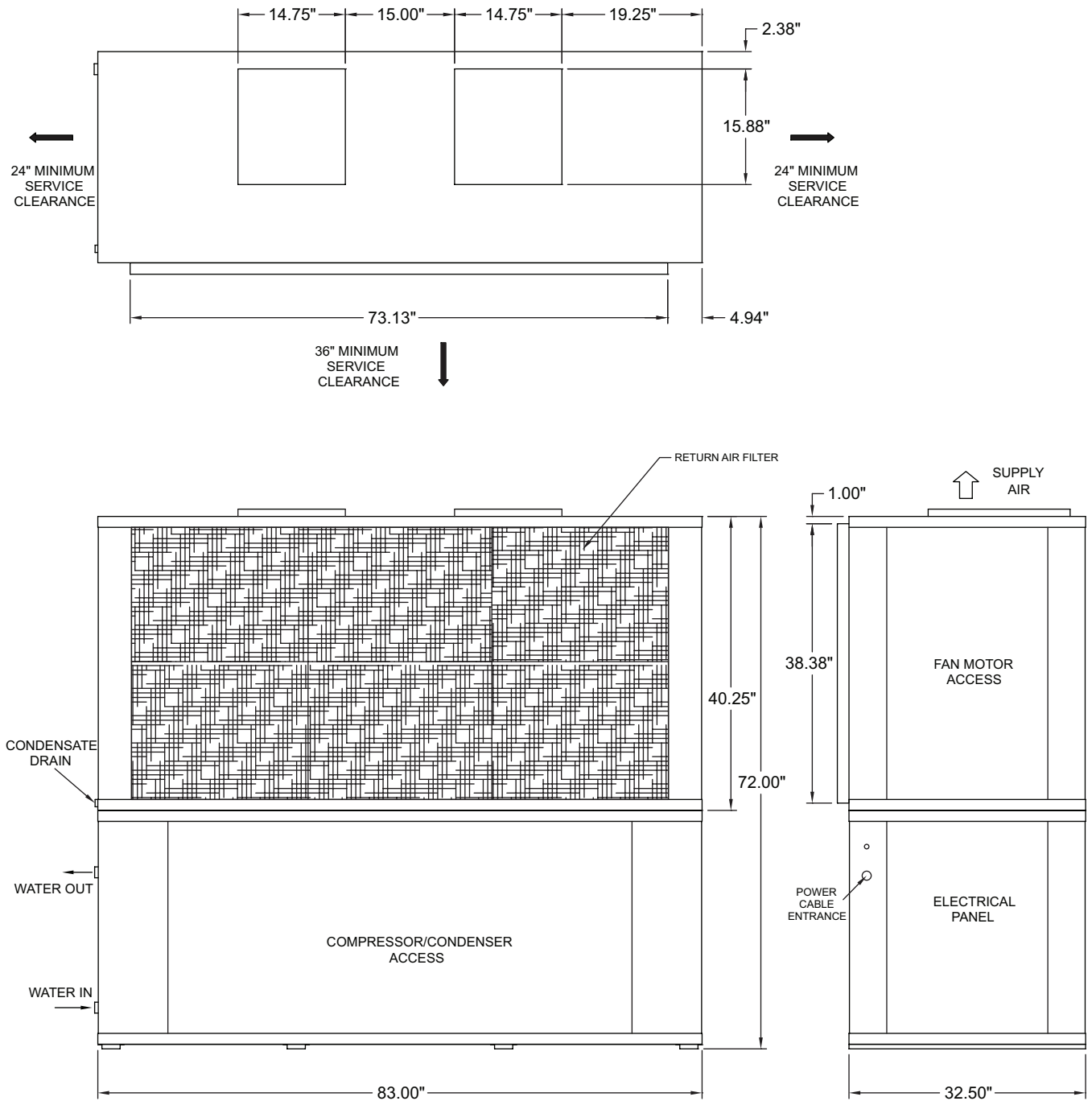
DIMENSIONAL DATA

15 TON UNIT

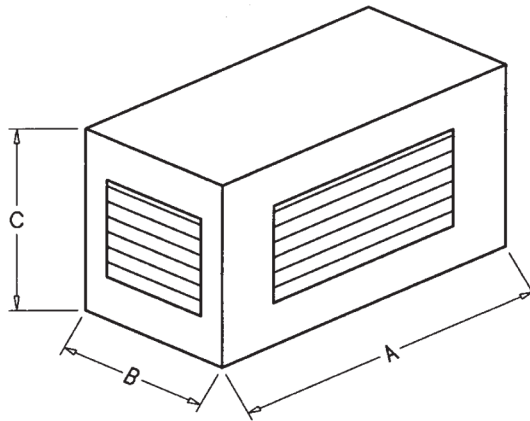


DIMENSIONAL DATA

20 TON UNIT

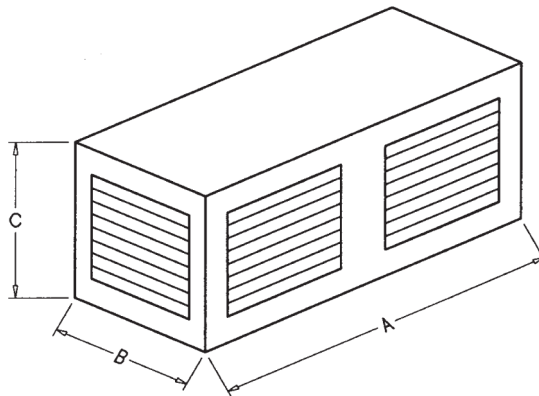


DIMENSIONAL DATA



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

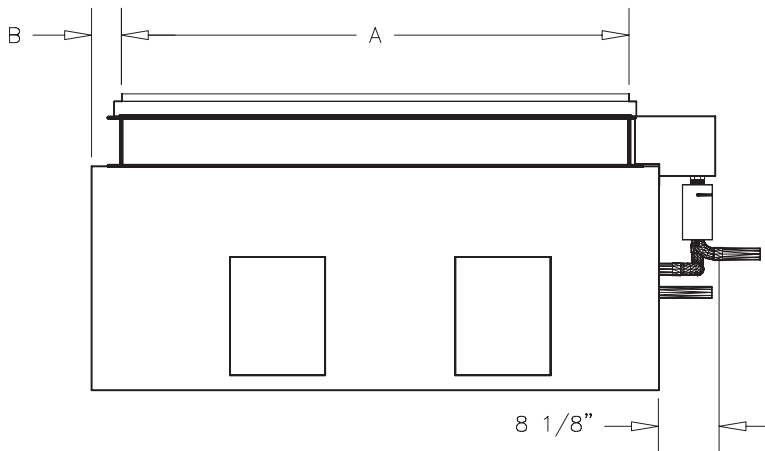
Unit	Air @ 80°F EDB, 67°F EWB		Water			Capacity (MBH)	
	CFM	PD (in WG)	Flow (GPM)	PD (PSI)	EWT (°F)	Total	Sensible
CSV060B	2000	0.20	8	1.5	45	40.8	36.9
					55	28.0	28.0
			15	3.9	45	50.8	41.3
					55	32.8	32.8
CSV096B	3200	0.16	16	3.0	45	83.2	67.3
					55	55.8	54.8
			24	6.4	45	94.9	72.6
					55	59.8	58.1
CSV120B	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
CSV180B	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
CSV240B	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:

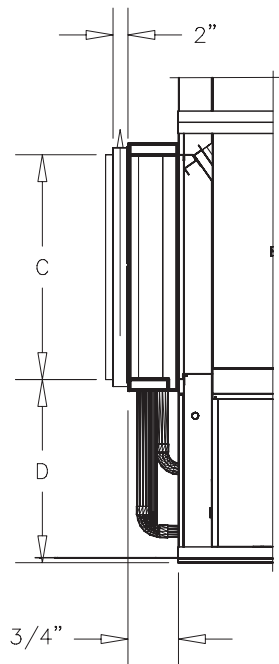
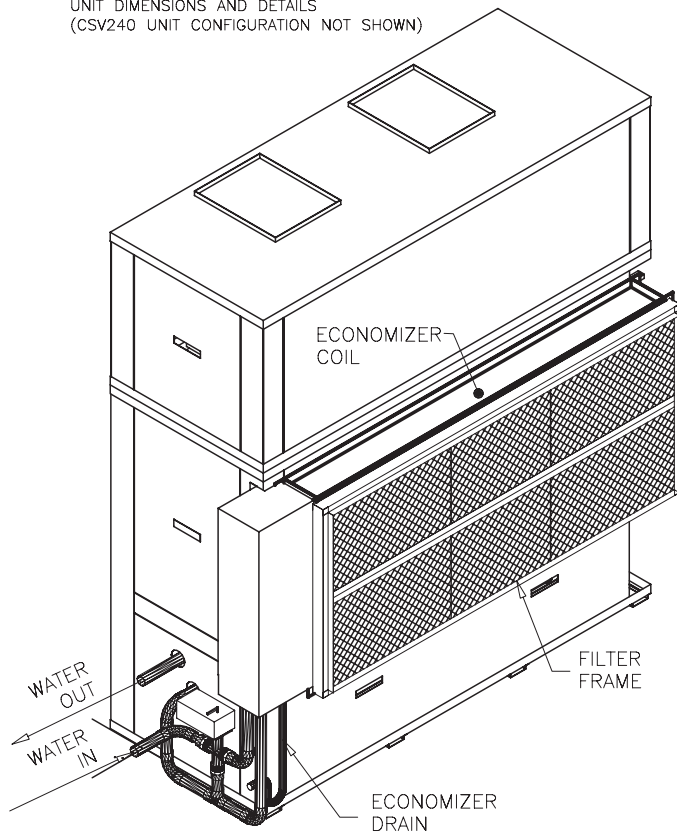
- All economizer coils are 3R, 10 FPI, aluminum fins with copper tubes and headers.
- For total system waterside pressure drop, add condenser pressure drop and waterside economizer coil pressure drop.

WATERSIDE ECONOMIZER

TYPICAL PHYSICAL CONFIGURATION



NOTE: CHECK BASIC UNIT DRAWING FOR OVERALL UNIT DIMENSIONS AND DETAILS (CSV240 UNIT CONFIGURATION NOT SHOWN)



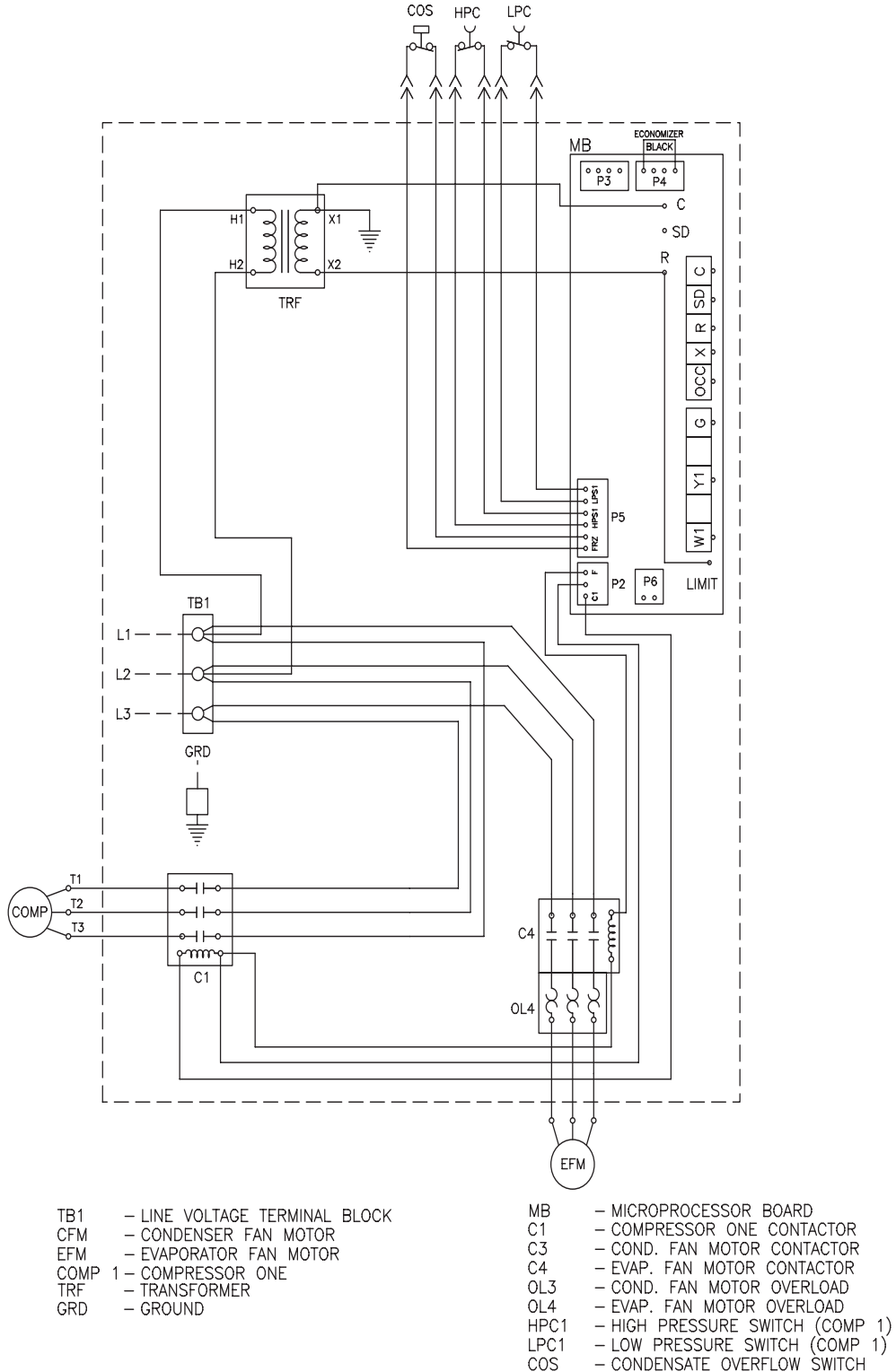
UNIT	A	B	C	D
CSV060	34"	4"	20"	24.63"
CSV096/120	57.63"	3.19"	26.13"	24.06"
CSV180	68"	4"	30.38"	24.44"
CSV240	73.13"	4.94"	38.38"	32.75"

NOTE: WSE COIL HEADER COVER SUPPLIED WITH DELUXE KIT ONLY

WIRING DIAGRAMS

5 TON UNIT

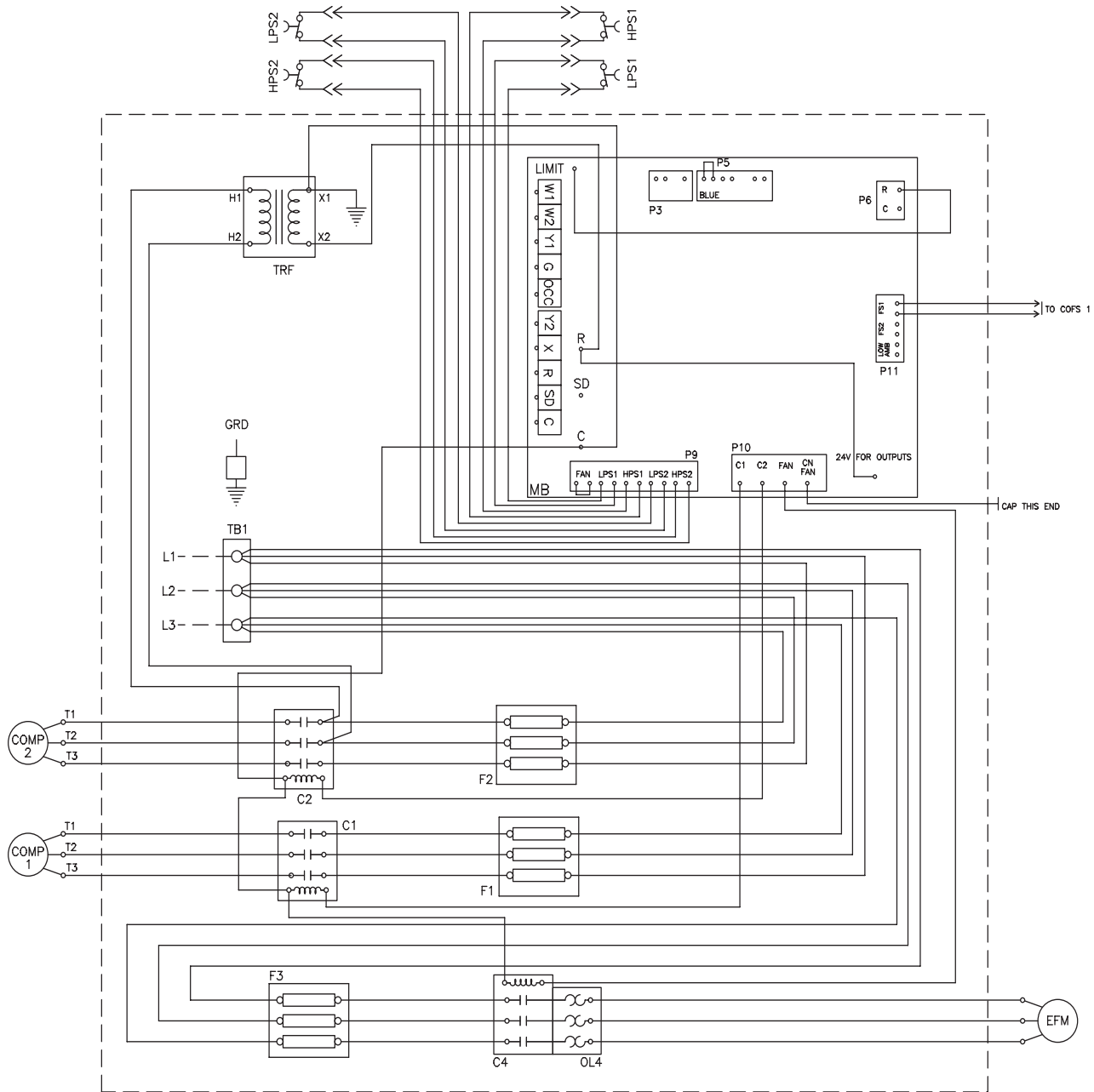
CSV060B - 208-230, 460, 575V/3PH/60HZ



WIRING DIAGRAMS

20 TON UNIT

CSV240B - 208-230, 460, 575V/3PH/60HZ



- TB1 - LINE VOLTAGE TERMINAL BLOCK
- EFM - EVAPORATOR FAN MOTOR
- COMP 1 - COMPRESSOR ONE
- COMP 2 - COMPRESSOR TWO
- F1 - COMPRESSOR ONE FUSES
- F2 - COMPRESSOR TWO FUSES
- F3 - EVAP. FAN MOTOR FUSES
- GRD - GROUND
- COFS - CONDENSATE OVERFLOW SWITCH

- MB - MICROPROCESSOR BOARD
- C2 - COMPRESSOR TWO CONTACTOR
- C1 - COMPRESSOR ONE 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)

SPECIFICATIONS

GENERAL

All models shall be shipped as factory-charged unitized packages. Installation shall allow passage through standard height doorways and elevators. All packages shall be designed for free standing mounting on the floor. All models shall be shipped with vertical evaporator fan discharge as standard. Units shall be completely factory wired and piped. Dual circuit models shall have internally manifolded condensers.

CABINET

All cabinets shall be completely constructed of heavy gauge corrosion-resistant steel. The entire unit interior (both evaporator and condensing section) shall be insulated with 1/2" thick, 2-lb. density insulation. Service panels shall be equipped with lifting handles for ease of removal and handling. Duct flanges for evaporator discharge shall be provided with the unit for field installation.

COMPRESSORS

All models shall utilize Scroll-type, R-410A, hermetic compressors. Compressors shall be mounted on rubber isolators to minimize vibration transmission. Internal overload protection shall be provided. External high pressure and low pressure cut-out switches shall be included in each compressor control circuit. The 5 ton unit shall have one scroll compressor, while 8-20 ton units shall have two individual scroll compressors.

REFRIGERANT CIRCUITS

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

The tube-in-tube condensers shall have a convoluted inner tube design. Standard models shall have a copper inner tube surrounded by a steel outer tube, and carry a 400 psig water-side working pressure rating.

EVAPORATOR COIL

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

INDOOR FAN

Forward curved, double inlet and double width centrifugal blowers shall be used for evaporator air movement.

Blower wheels shall be fabricated of galvanized steel. Blowers shall employ solid steel shafts, supported in permanently lubricated ball bearings. All blowers shall be belt driven. Variable-pitch motor sheaves shall allow for field adjustment of blower rpm. Motor shall be 1750 RPM, open drip proof design.

FILTERS

All models shall be shipped with 2-inch thick medium-efficiency throwaway filters factory installed.

ELECTRICAL/CONTROLS

All units shall be completely factory wired with all necessary controls. Current overload protection shall be provided on both evaporator and condenser motors, with external manual-reset overload. The 24 volt control circuit includes an oversized transformer with an internal circuit breaker.

MICROPROCESSOR CONTROLS

The control system microprocessor board shall be specifically designed for water-cooled unit operation.

- a) Unit shall be complete with self-contained low-voltage control circuit.
- b) Unit shall incorporate a lockout circuit which provides reset capability at the space thermostat or base unit, should any of the following standard safety devices trip and shut off compressor.
 - Loss-of-charge/Low-pressure switch
 - High-pressure switch
 - Condensate Overflow protection switch
- c) Unit shall operate with conventional thermostat designs and have a low voltage terminal strip for easy hook-up.
- d) Unit control board shall have on-board diagnostics and fault code display.
- e) Standard controls shall include anti-short cycle and low voltage protection.
- f) Control board shall monitor each refrigerant safety switch independently.
- h) Control board shall retain last 5 fault codes in non-volatile memory which will not be lost in the event of a power loss.

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 Coatings

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

Stainless Steel Drain Pan

Evaporator drain pan shall be fabricated of 304 stainless steel material. The 3/4" NPT drain connection fitting is also fabricated 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, shutoff power to unit compressor(s).

Cupro-Nickel Water Coil

Water side coaxial condenser shall be constructed of a Cupro-Nickel metal alloy for increased corrosion resistance and contamination build-up.

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

Return Air Grille

Available on 5 ~ 15 ton models for applications where return air is not ducted and air is drawn directly from the conditioned space.

Oversized Evaporator Fan Motor Kit

Increased horsepower motors and drive components are available for field installation.

Water Side Economizer Kit

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. This feature cannot be selected with the Condenser Pressure Control. There are two 'kits' available:

Basic Kit

Includes the following: water coil; economizer drain pan assembly; coil attachment hardware; 3-way diverting valve & actuator; temperature control panel with pre-terminated harness and external filter rack (5 thru 15 ton only).

Deluxe Kit

All components from Basic Kit, plus the following: header and return bend cover panels (improves appearance); diverting valve cover enclosure (improves appearance and protects valve/actuator); all necessary copper piping and fittings for coil connection into unit water circuit; pipe insulation.

Condenser Pressure Control

Water regulating valves provide control of the quantity of condenser water supplied to each internal condenser water circuit by sensing the condensing temperature. The valves shall be field installed inside the unit cabinet. This feature cannot be selected with the Water Side Economizer Kit.

Discharge Plenum

Plenums shall mount on top of the evaporator section, with fans arranged for vertical discharge. Double deflection grills shall allow air discharge in multiple directions.

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