C-Series (CSV) Water-Cooled Self-Contained Units, C Generation Engineering Guide

LD30026

Engineering Guide

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New Release

Contents

Revision notes

The following revisions were completed in this version of the document.

Affected section	Description	Date implemented
Nomenclature	Updated nomenclature	September 2020
Plenum dimensions	Table 18 CVDP-180 dimensions updated	August 2020
Electrical data	Updated table information	August 2020
Waterside economizer	Updated table information	August 2020
Typical physical configuration	Updated images for C-generation	August 2020
Wiring diagrams	Updated drawings of electrical schematics for C-generation	July 2020
Waterside pressure drop	Updated images and added tables	July 2020
Electrical data	Updated table information for C-generation	June 2020
Cooling performance data	Updated table information for C-generation	June 2020
General data	Updated table information for C-generation	June 2020
Evaporator fan performance	Updated table information for C-generation	June 2020
Dimensional data	Updated drawings for C-generation	June 2020
Typical service clearances	Updated drawings for C-generation	June 2020

Listings and certifications

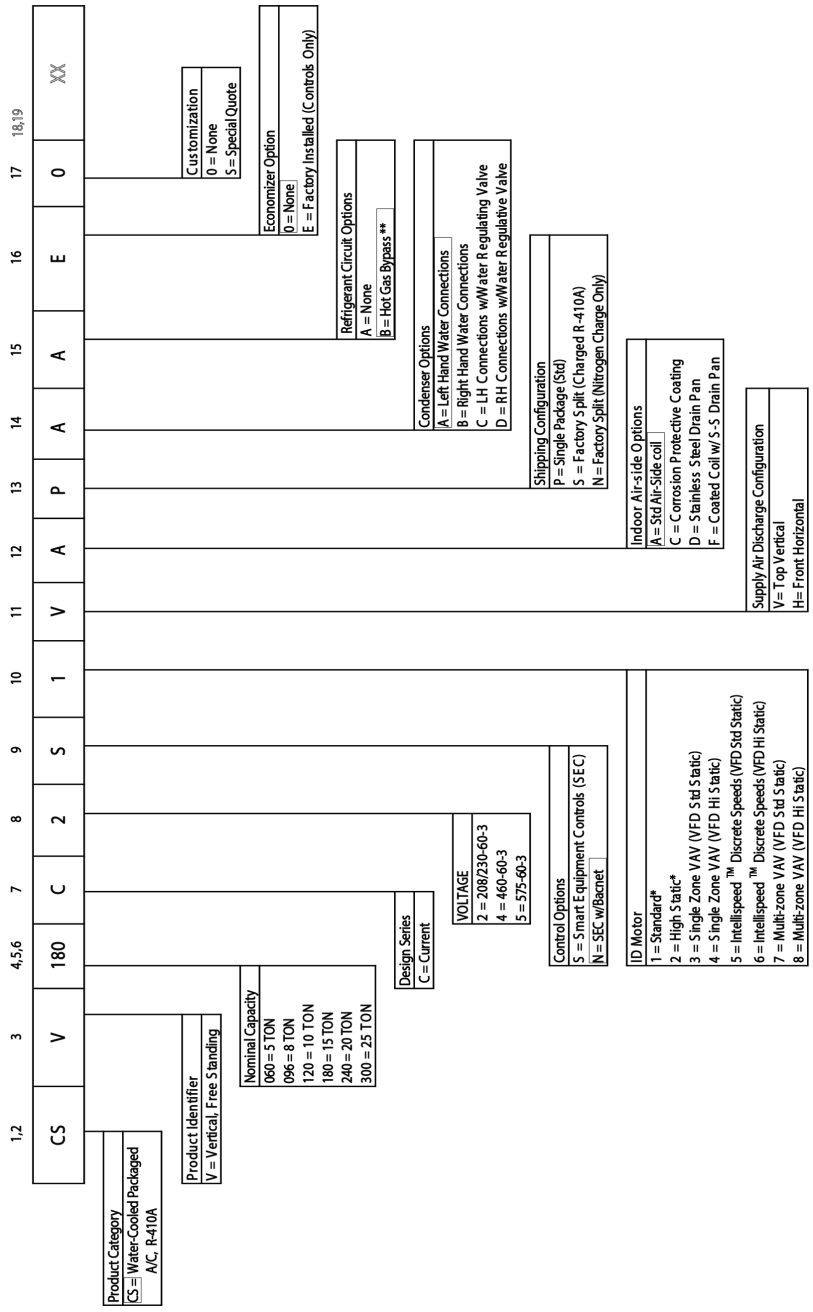
Additional literature

CSV shipping options

	Packaged (R-410a)	Split (R-410a)	Split (Nitrogen)
CSV060C	Available	Available	N/A
CSV096C	Available	Available	N/A
CSV120C	Available	Available	N/A
CSV180C	Available	Available	N/A
CSV240C	Available	N/A	Available
CSV300C	N/A	N/A	Available

Nomenclature

Figure 1: CSV water-cooled self-contained unit



Note:

* Evaporator motor without VFD available only on 5 ton. Evaporator motor VFD standard on 8 tons and up.

** Hot gas bypass not available on 5 ton unit.

Introduction

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

The C-Series Water-Cooled Self-Contained Units from SKYMARK 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.

SKYMARK's 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

Product overview

Refrigerant

R-410A

Sizes

5 – 25 Tons (17.6 – 87.9 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.
- Shipping options:
    - 5-15 ton models: packaged or split R-410a charged
    - 20 ton model: packaged or split Nitrogen charged
    - 25 ton model: factory split Nitrogen charged
- Smart Equipment Controller (SEC) with backlit display for quick field diagnostics.
- Units 8 ton and larger are supplied with factory installed Variable Frequency Drives (VFDs) for variable air volume (SZVAV/MZVAV) applications, or IntelliSpeed™ 2-speed operation.
- 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.
- Dual independent compressor circuits on 8-25 ton models.
- Each refrigerant circuit complete with Schrader access fittings, sight glass / moisture indicator, filter drier, and thermal expansion valve with external equalizer.
- High efficiency stainless steel brazed plate heat exchanger (BPHE) on condenser.
- #20 (#40 optional) mesh strainer-shutoff valve with blowdown valve and hose connection
- Sloped evaporator drain pan.
- Condensate overflow switch mounted in the evaporator drain pan. In the event of an alarm, power is shutoff to unit compressors and blowers.

General data

Model			CSV060C	CSV096C	CSV120C	CSV180C	CSV240C	CSV300C
Nominal cooling		(Tons)	5	8	10	15	20	25
Refrigerant			R-410A	R-410A	R-410A	R-410A	R-410A	R-410A
Cooling performance[1, 2]								
Gross cooling capacity		(Btu/h)	65,00	103,000	127,000	188,000	253,000	318,000
Net cooling capacity		(Btu/h)	60,000	100,000	120,000	180,000	240,000	300,000
Design airflow		(CFM)	2,000	3,200	4,000	6,000	8,000	9,200
Net cooling airflow		(CFM)	2,000	3,200	4,000	6,000	8,000	9,200
EER			13.0	13.0	12.7	14.0	14.2	14.0
IEER			-	14.8	14.8	16.0	18.0	18.0
Compressor, scroll - Qty			1	2	2	2	2	2
Capacity steps		(%)	100/0	100/50/0	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	29.50
Rows/FPI			3/12	3/14	3/14	3/14	4/10	5/14
Refrigerant controls			TX valve					
Condensate drain connection		(FPT)	3/4”					
Filters - quantity/size		(in)	2-20x18x2	6-20x14x2	6-20x14x2	2-20x16x2 4-25x16x2	6-20x25x2	6-25x18x2 6-20x18x2
Condenser coil								
Type			Brazed plate heat exchanger					
Quantity / tons capacity			1/5	1/8	1/10	1/15	1/20	1/25
Nominal water flow rate		(GPM)	15	24	30	45	60	75
Unit water connection size (in/out)		(FPT)	1”	1-1/4”	1-1/4”	1-1/2”	2”	2"
Evaporator fan - type								
Type			Centrifugal, forward curved					
Quantity			1	1	1	2	2	3
Diameter x width		(in)	12x9	15x12	15x12	15x9	15x11	15x11
Drive			Adjustable belt					
Motor HP (standard/ oversize)			1/1.5	1.5/2	2/3	3/5	5/7.5	7.5
Dimensions	**- Height**	(in)	72	82	82	85	72	77
	- Width	(in)	42	64	64	76	83	109
	- Depth	(in)	26	31.75	31.75	30	32.5	34
Weight	**- Operating**	(lbs)	495	820	825	1075	1245	1980
	- Shipping	(lbs)	525	850	855	1115	1295	2100

Note:

[1] Cooling performance is rated at 80.0°F entering dry bulb, 67.0°F entering wet bulb and CFM listed; Entering water temperature of 85.0°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

CSV060C		8 GPM (Gallon/Min)									15 GPM (Gallon/Min)								
1600 SCFM		65.0 (°F) EWT			85.0 (°F) EWT			100 (°F) EWT			65.0 (°F) EWT			85.0 (°F) EWT			100 (°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)	61.8	46.5	3.3	56.9	44.1	4.1	51.6	41.6	5	62.7	46.9	3.2	57.8	44.6	4	52.7	42.2	4.9
	80 (°F)	62	54.3	3.3	57	51.8	4.1	51.7	49.3	5	62.9	54.7	3.2	57.9	52.2	3.9	52.7	49.8	4.9
	85 (°F)	62	61.7	3.3	57.6	57.6	4.1	53.4	53.4	5	63	62.1	3.2	58.3	58.3	4	54.3	54.3	4.8
67 (°F)	75 (°F)	67.1	38.6	3.3	61.8	36.3	4.1	56.2	33.9	5	69.2	39.5	3.2	62.9	36.8	3.9	57.6	34.5	4.8
	80 (°F)	67.3	46.4	3.4	62	44	4.1	56.9	41.9	5	68.6	46.9	3.2	63.2	44.5	3.9	58.2	42.4	4.8
	85 (°F)	67.5	54.1	3.4	62.2	51.8	4.1	57	49.5	5	68.8	54.7	3.2	63.4	52.3	3.9	58.4	50.1	4.8
72 (°F)	75 (°F)	72.6	30.6	3.4	66.9	28.3	4.2	61.5	26.3	5	74.3	31.2	3.2	68.5	29	4	62.8	26.7	4.8
	80 (°F)	72.9	38.4	3.4	67.2	36.1	4.2	61.9	34	5	74.6	39	3.2	68.8	36.7	4	63.2	34.5	4.8
	85 (°F)	73.2	46.2	3.4	67.5	43.9	4.2	62.1	41.8	5	75	46.9	3.2	69.1	44.5	4	63.5	42.3	4.8

CSV060C		8 GPM (Gallon/Min)									15 GPM (Gallon/Min)								
2000 SCFM		65.0 (°F) EWT			85.0 (°F) EWT			100 (°F) EWT			65.0 (°F) EWT			85.0 (°F) EWT			100 (°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)	64.4	52	3.3	59.1	49.6	4.1	53.4	46.9	5	65.5	52.5	3.2	60.1	50	3.9	54.6	47.5	4.8
	80 (°F)	64.5	61.4	3.3	59.3	58.7	4.1	53.9	53.9	5	65.7	61.9	3.2	60.3	59.2	3.9	55	55	4.8
	85 (°F)	66.2	66.2	3.3	61.8	61.8	4.1	57.2	57.2	5	67.2	67.2	3.2	62.8	62.8	3.9	58.7	58.7	4.7
67 (°F)	75 (°F)	69.7	42.4	3.4	64	40	4.1	58.3	37.6	5	71.2	43	3.2	65.4	40.6	3.9	59.7	38.2	4.8
	80 (°F)	70	51.8	3.4	64.3	49.4	4.1	58.9	47.2	5	71.5	52.5	3.2	65.8	50	3.9	60.5	47.9	4.7
	85 (°F)	70.2	61.2	3.4	64.6	58.8	4.2	59	56.5	5	71.7	61.9	3.2	66	59.4	3.9	60.6	57.2	4.7
72 (°F)	75 (°F)	75.3	32.7	3.4	69	30.3	4.2	63.3	28.2	5	77.2	33.4	3.2	70.9	31	3.9	64.8	28.8	4.8
	80 (°F)	75.8	42.2	3.4	69.4	39.7	4.2	63.8	37.6	5	77.6	42.9	3.2	71.3	40.5	3.9	65.3	38.2	4.8
	85 (°F)	76.1	51.6	3.4	69.8	49.2	4.2	64.1	47.1	5	77.9	52.3	3.2	71.6	49.9	3.9	66	47.8	4.7

CSV060C		8 GPM (Gallon/Min)									15 GPM (Gallon/Min)								
2400 SCFM		65.0 (°F) EWT			85.0 (°F) EWT			100 (°F) EWT			65.0 (°F) EWT			85.0 (°F) EWT			100 (°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)	66.2	57.5	3.3	60.7	54.9	4.1	54.8	52.5	5	67.5	58.1	3.2	61.9	55.4	3.9	56.6	53.2	4.7
	80 (°F)	66.3	66.3	3.3	61.5	61.5	4.1	56.7	56.7	5.1	67.6	67.6	3.2	62.5	62.5	3.9	57.8	57.8	4.8
	85 (°F)	69.8	69.8	3.4	65	65	4.2	60.5	60.5	5	71.1	71.1	3.2	66.3	66.3	4	61.5	61.5	4.8

CSV060C		8 GPM (Gallon/Min)									15 GPM (Gallon/Min)								
2400 SCFM		65.0 (°F) EWT			85.0 (°F) EWT			100 (°F) EWT			65.0 (°F) EWT			85.0 (°F) EWT			100 (°F) EWT		
EWB	EDB	TC	SC	kW	TC	SC	kW	TC	SC	kW	TC	SC	kW	TC	SC	kW	TC	SC	kW
67 (°F)	75 (°F)	71.5	46.2	3.4	65.5	43.7	4.2	59.6	41.3	5.1	73.2	46.9	3.2	67.1	44.4	4	61.5	42.1	4.8
	80 (°F)	71.8	57.2	3.4	65.8	54.8	4.2	60.2	52.4	5	73.5	58	3.2	67.4	55.4	4	61.6	53	4.8
	85 (°F)	72	68.3	3.4	66.1	65.5	4.2	60.5	60.5	5	73.8	68.9	3.2	67.6	66.2	4	61.8	61.8	4.8
72 (°F)	75 (°F)	77.2	35	3.4	70.5	32.5	4.2	64.6	30.4	5	79.2	35.7	3.2	72.6	33.3	4	66.3	31	4.8
	80 (°F)	77.7	46	3.4	71.1	43.5	4.2	65.2	41.4	5	79.7	46.8	3.2	73.1	44.3	4	66.9	42	4.8
	85 (°F)	78	57	3.4	71.4	54.6	4.2	65.5	52.3	5	80	57.8	3.2	73.6	55.4	4	67.2	53	4.8

CSV096C		16 GPM (Gallon/Min)									>24 GPM (Gallon/Min)								
2400 SCFM		65.0 (°F) EWT			85.0 (°F) EWT			100 (°F) EWT			65.0 (°F) EWT			85.0 (°F) EWT			100 (°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)	95.8	69.8	5.3	88.4	66.2	6.6	79.7	61.9	8.5	96.3	70	5.2	88.9	66.4	6.5	80.8	62.4	8.2
	80 (°F)	96.3	80.8	5.3	88.9	77.1	6.6	79.5	72.8	8.5	96.8	81.1	5.2	89.3	77.3	6.5	81.2	73.5	8.2
	85 (°F)	96.6	91.5	5.3	89.3	87	6.6	80.8	80.8	8.6	97.1	91.8	5.2	89.7	87.3	6.5	82.5	82.5	8.1
67 (°F)	75 (°F)	103.9	58.9	5.3	96.1	55.3	6.6	87.4	51.5	8.3	104.6	59.2	5.2	96.7	55.6	6.5	89	52.2	8
	80 (°F)	104.6	69.8	5.3	96.9	66.3	6.6	88.5	62.6	8.2	105.3	70.1	5.2	97.5	66.6	6.5	89.7	63.1	8
	85 (°F)	105.3	80.9	5.3	97.4	77.3	6.6	89	73.6	8.2	106	81.2	5.2	98	77.6	6.5	90.2	74.1	8
72 (°F)	75 (°F)	112.8	47.7	5.3	104.5	44.4	6.6	95.6	40.9	8.2	113.8	48.1	5.2	105.4	44.7	6.5	97.4	41.5	7.9
	80 (°F)	113.4	58.8	5.3	105.3	55.4	6.6	96.8	52	8.1	114.4	59.2	5.2	106.1	55.7	6.5	98.2	52.5	7.9
	85 (°F)	114.2	69.7	5.3	106	66.3	6.6	97.5	62.9	8.1	115.2	70.2	5.2	106.9	66.7	6.5	98.9	63.4	7.9

CSV096C		16 GPM (Gallon/Min)									24 GPM (Gallon/Min)								
3200 SCFM		65.0 (°F) EWT			85.0 (°F) EWT			100 (°F) EWT			65.0 (°F) EWT			85.0 (°F) EWT			100 (°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)	101.6	80.4	5.3	93.6	76.6	6.6	84.5	72.3	8.3	102.3	80.7	5.2	94.2	76.9	6.5	85.7	72.9	8.1
	80 (°F)	102.1	94.7	5.3	94	90.6	6.6	85.5	85.2	8.3	102.8	95.1	5.2	94.6	90.8	6.5	86.3	85.7	8.1
	85 (°F)	103.7	103.7	5.3	96.5	96.5	6.6	89.4	89.4	8.2	104.4	104.4	5.2	97.1	97.1	6.5	90.4	90.4	8
67 (°F)	75 (°F)	110	66.4	5.3	101.5	62.7	6.6	92.7	59	8.2	110.9	66.8	5.2	102.3	63.1	6.5	93.7	59.4	8
	80 (°F)	110.9	80.4	5.3	102.3	76.7	6.6	93.5	72.9	8.2	111.8	80.8	5.2	103.1	77	6.5	94.6	73.3	8
	85 (°F)	111.5	94.4	5.3	102.8	90.8	6.6	94.1	87.1	8.2	112.4	94.8	5.2	103.7	91.1	6.5	95.1	87.6	8

CSV096C		16 GPM (Gallon/Min)									24 GPM (Gallon/Min)								
3200 SCFM		65.0 (°F) EWT			85.0 (°F) EWT			100 (°F) EWT			65.0 (°F) EWT			85.0 (°F) EWT			100 (°F) EWT		
EWB	EDB	TC	SC	kW	TC	SC	kW	TC	SC	kW	TC	SC	kW	TC	SC	kW	TC	SC	kW
72 (°F)	75 (°F)	118.8	52.3	5.4	109.8	48.8	6.6	100.7	45.4	8.1	120.1	52.8	5.2	110.9	49.2	6.5	101.9	45.8	7.9
	80 (°F)	119.8	66.3	5.4	110.8	62.7	6.6	101.7	59.2	8.1	121.1	66.7	5.2	111.9	63.1	6.5	102.9	59.7	7.9
	85 (°F)	120.7	80.2	5.4	111.7	76.7	6.6	102.8	73.2	8.1	121.9	80.7	5.2	112.8	77.1	6.5	103.8	73.6	7.9

CSV096C		16 GPM (Gallon/Min)									24 GPM (Gallon/Min)								
4000 SCFM		65.0 (°F) EWT			85.0 (°F) EWT			100 (°F) EWT			65.0 (°F) EWT			85.0 (°F) EWT			100 (°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)	105.5	91	5.3	96.9	87.1	6.6	88.1	83.7	8.1	106.4	91.4	5.2	97.7	87.4	6.5	89	84.1	8
	80 (°F)	106.1	106.1	5.3	98	98	6.6	89.6	89.6	8.2	107	107	5.2	98.7	98.7	6.5	90.8	90.8	8
	85 (°F)	110.2	110.2	5.3	103.1	103.1	6.6	95.4	95.4	8.2	111	111	5.2	103.8	103.8	6.5	96.6	96.6	8
67 (°F)	75 (°F)	114	74.2	5.3	105.1	70.5	6.6	95.5	66.6	8.2	115.1	74.7	5.2	106	70.9	6.5	97.3	67.3	7.9
	80 (°F)	114.9	91	5.3	105.9	87.2	6.6	96.7	83.4	8.1	116	91.5	5.2	106.8	87.6	6.5	98.2	84	7.9
	85 (°F)	115.5	108.2	5.3	106.4	103.9	6.6	97.8	97.8	8.1	116.6	108.7	5.2	107.4	104.4	6.5	98.6	98.6	7.9
72 (°F)	75 (°F)	122.8	57.4	5.4	113.4	53.9	6.6	103.8	50.4	8.1	124.2	58	5.2	114.6	54.4	6.5	105.1	50.9	7.9
	80 (°F)	124	74.1	5.4	114.5	70.5	6.6	105.3	67	8	125.4	74.6	5.2	115.8	70.9	6.5	106.3	67.4	7.9
	85 (°F)	125	90.9	5.4	115.5	87.2	6.7	106.5	83.9	8	126.4	91.4	5.2	116.7	87.7	6.5	107.6	84.2	7.8

CSV120C		20 GPM (Gallon/Min)									30 GPM (Gallon/Min)								
3200 SCFM		65.0 (°F) EWT			85.0 (°F) EWT			100 (°F) EWT			65.0 (°F) EWT			85.0 (°F) EWT			100 (°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)	121.3	93.3	6.4	111.9	88.8	7.9	100.8	83.6	9.9	122	93.6	6.3	112.5	89.1	7.8	102.2	84.2	9.7
	80 (°F)	121.5	108.5	6.4	112.2	103.9	7.9	101.3	97.8	10	122.2	108.9	6.3	112.8	104.2	7.8	103.1	98.8	9.7
	85 (°F)	123.5	121.3	6.4	114.8	114.8	7.9	105.4	105.4	9.8	124.2	121.8	6.3	115.4	115.4	7.8	106.3	106.3	9.7
67 (°F)	75 (°F)	132	77.7	6.4	121.9	73.3	8	110.9	68.6	9.8	133	78.1	6.3	122.8	73.7	7.8	112.5	69.3	9.5
	80 (°F)	132.4	93.2	6.4	122.3	88.8	8	111.8	84.2	9.7	133.4	93.6	6.3	123.2	89.1	7.8	113.3	84.9	9.5
	85 (°F)	132.5	108.5	6.4	122.5	104	8	112	99.4	9.7	133.5	108.9	6.3	123.4	104.4	7.8	113.5	100.1	9.5
72 (°F)	75 (°F)	143.2	61.7	6.5	132.4	57.5	8	121.1	53.2	9.7	144.5	62.2	6.3	133.6	58	7.8	122.9	53.9	9.4
	80 (°F)	143.7	77.4	6.5	133	73.1	8	122.1	68.9	9.7	145.1	77.9	6.3	134.2	73.6	7.8	123.6	69.5	9.4
	85 (°F)	144.2	92.9	6.5	133.4	88.6	8	122.7	84.4	9.7	145.5	93.4	6.3	134.6	89.1	7.8	124.1	85	9.4

CSV120C		20 GPM (Gallon/Min)									30 GPM (Gallon/Min)								
4000 SCFM		65.0 (°F) EWT			85.0 (°F) EWT			100 (°F) EWT			65.0 (°F) EWT			85.0 (°F) EWT			100 (°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	104.6	6.4	115.6	99.9	7.9	104.2	94.6	9.9	126.6	105	6.3	116.3	100.3	7.8	106.3	95.5	9.6
	80 (°F)	126.6	122.2	6.4	117.2	116.1	7.9	107	107	9.8	127.4	122.8	6.3	117.9	116.6	7.8	108.4	108.4	9.6
	85 (°F)	130.1	130.1	6.4	121.4	121.4	8	112.3	112.3	9.8	130.9	130.9	6.3	122.1	122.1	7.8	113.9	113.9	9.5
67 (°F)	75 (°F)	136.5	85.9	6.5	125.8	81.4	8	114.1	76.6	9.9	137.7	86.4	6.3	126.9	81.8	7.8	115.9	77.3	9.6
	80 (°F)	137.1	104.5	6.5	126.3	99.9	8	115	95.3	9.7	138.2	105	6.3	127.4	100.4	7.8	116.2	95.8	9.5
	85 (°F)	137.4	122.7	6.5	126.8	118.1	8	116.5	112.8	9.7	138.6	123.3	6.3	127.8	118.5	7.8	117.4	113.3	9.5
72 (°F)	75 (°F)	147.8	66.9	6.5	136.2	62.5	8	125.2	58.4	9.6	149.4	67.5	6.3	137.7	63	7.8	126.4	58.9	9.4
	80 (°F)	148.5	85.6	6.5	137	81.2	8	125.6	76.9	9.7	150	86.2	6.3	138.4	81.7	7.8	126.9	77.4	9.4
	85 (°F)	148.9	104.1	6.5	137.5	99.8	8	126.5	95.6	9.6	150.5	104.7	6.3	138.9	100.3	7.8	127.3	95.9	9.5

CSV120C		20 GPM (Gallon/Min)									30 GPM (Gallon/Min)								
4800 SCFM		65.0 (°F) EWT			85.0 (°F) EWT			100 (°F) EWT			65.0 (°F) EWT			85.0 (°F) EWT			100 (°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)	128.8	116.3	6.4	118.4	111.3	8	106.8	105.9	9.9	129.7	116.7	6.3	119.3	111.7	7.8	108.7	107	9.6
	80 (°F)	131	131	6.4	121.3	121.3	8	110.6	110.6	9.8	131.9	131.9	6.3	122.1	122.1	7.8	112.5	112.5	9.5
	85 (°F)	135.9	135.9	6.5	127.1	127.1	8	118.3	118.3	9.7	136.9	136.9	6.3	128	128	7.8	119.1	119.1	9.5
67 (°F)	75 (°F)	139.7	94.8	6.5	128.5	90.2	8	116.5	85.3	9.8	141	95.3	6.3	129.7	90.6	7.8	118.4	86.1	9.5
	80 (°F)	140.1	116	6.5	128.9	111.5	8	117.6	106.6	9.7	141.4	116.6	6.3	130	112	7.8	119.3	107.4	9.4
	85 (°F)	141	136.8	6.5	130.6	130.5	8	120.1	120.1	9.7	142.2	137.4	6.3	131.7	131.2	7.8	121.5	121.5	9.4
72 (°F)	75 (°F)	150.9	72.9	6.5	139	68.5	8	126.7	64.1	9.7	152.7	73.5	6.3	140.5	69.1	7.8	128.4	64.6	9.5
	80 (°F)	151.7	94.4	6.5	139.9	90	8	128.5	85.8	9.6	153.4	95	6.3	141.4	90.5	7.8	129.5	86.1	9.5
	85 (°F)	152.3	115.8	6.5	140.4	111.3	8	129	107.1	9.6	154	116.4	6.4	142	111.9	7.8	130.2	107.6	9.4

CSV180C		30 GPM (Gallon/Min)									45 GPM (Gallon/Min)								
4800 SCFM		65.0 (°F) EWT			85.0 (°F) EWT			100 (°F) EWT			65.0 (°F) EWT			85.0 (°F) EWT			100 (°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)	178	137.2	8.3	166.1	131.6	10.3	150.6	124.3	12.9	178.8	137.6	8.2	167.1	132	10.2	152.6	125.2	12.6
	80 (°F)	178.4	159.9	8.4	166.5	154	10.3	150.5	146	13.1	179.1	160.3	8.2	167.4	154.4	10.2	153	147.6	12.6
	85 (°F)	180.5	179.2	8.4	169.7	169.7	10.3	156.9	156.9	12.8	181.2	179.7	8.2	170.6	170.6	10.2	158	158	12.6

CSV180C		30 GPM (Gallon/Min)									45 GPM (Gallon/Min)								
4800 SCFM		65.0 (°F) EWT			85.0 (°F) EWT			100 (°F) EWT			65.0 (°F) EWT			85.0 (°F) EWT			100 (°F) EWT		
EWB	EDB	TC	SC	kW	TC	SC	kW	TC	SC	kW	TC	SC	kW	TC	SC	kW	TC	SC	kW
67 (°F)	75 (°F)	193.1	113.8	8.5	180.6	108.4	10.4	164.5	101.6	13	194.1	114.2	8.3	181.8	108.9	10.2	167.4	102.8	12.5
	80 (°F)	193.8	136.9	8.5	181.2	131.4	10.4	166.5	125.2	12.8	194.8	137.3	8.3	182.4	131.9	10.2	168.1	125.8	12.5
	85 (°F)	194.1	159.8	8.5	181.7	154.3	10.4	166.9	147.7	12.8	195.1	160.2	8.3	182.9	154.9	10.2	168.4	148.4	12.5
72 (°F)	75 (°F)	209.1	90	8.7	195.8	84.8	10.6	180.3	78.9	12.9	210.3	90.5	8.5	197.4	85.4	10.3	182.3	79.6	12.6
	80 (°F)	209.8	113.2	8.7	196.6	108	10.6	181.7	102.3	12.8	211	113.7	8.5	198.2	108.6	10.3	183.7	103	12.5
	85 (°F)	210.5	136.2	8.7	197.3	131	10.6	182	125.1	12.9	211.7	136.7	8.5	198.9	131.7	10.3	184.4	126	12.5

CSV180C		30 GPM (Gallon/Min)									45 GPM (Gallon/Min)								
6000 SCFM		65.0 (°F) EWT			85.0 (°F) EWT			100 (°F) EWT			65.0 (°F) EWT			85.0 (°F) EWT			100 (°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)	182.5	152.8	8.3	170	147.2	10.2	153.9	139.6	12.7	183.3	153.2	8.1	170.9	147.6	10	156.5	140.9	12.3
	80 (°F)	182.8	179.2	8.3	171.3	171.3	10.2	157.9	157.9	12.5	183.6	179.6	8.1	172.3	172.2	10	159.2	159.2	12.3
	85 (°F)	188.4	188.4	8.3	178.2	178.2	10.3	165.6	165.6	12.7	189.2	189.2	8.2	179.1	179.1	10.1	167.4	167.4	12.3
67 (°F)	75 (°F)	197.6	124.8	8.4	184.4	119.4	10.3	168.4	112.9	12.7	198.6	125.3	8.3	185.8	120	10.1	171.3	114	12.3
	80 (°F)	198.3	152.5	8.4	185.2	147	10.3	169.7	140.6	12.6	199.4	153	8.3	186.6	147.6	10.1	171.8	141.5	12.3
	85 (°F)	198.8	179.6	8.4	185.7	174.1	10.3	170.5	167	12.6	199.8	180.1	8.3	187	174.6	10.1	172.1	168	12.3
72 (°F)	75 (°F)	213.3	96.4	8.6	199.5	91.2	10.4	183.2	85.2	12.7	214.8	96.9	8.4	201.2	91.9	10.2	185.9	86.2	12.3
	80 (°F)	214.3	124.2	8.6	200.5	119	10.5	184.4	113	12.7	215.7	124.7	8.4	202.2	119.6	10.2	187.1	114	12.3
	85 (°F)	214.9	151.8	8.6	201.2	146.6	10.5	185.6	140.8	12.6	216.3	152.3	8.4	202.9	147.2	10.2	187.7	141.5	12.3

CSV180C		30 GPM (Gallon/Min)									45 GPM (Gallon/Min)								
7200 SCFM		65.0 (°F) EWT			85.0 (°F) EWT			100 (°F) EWT			65.0 (°F) EWT			85.0 (°F) EWT			100 (°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)	188.8	170.8	8.4	175.8	164.5	10.4	159.1	157.1	13	189.7	171.3	8.3	176.9	165	10.2	162	158.5	12.5
	80 (°F)	191.2	191.2	8.5	179.2	179.2	10.4	163.9	163.9	13	192	192	8.3	180.3	180.3	10.2	166.4	166.4	12.5
	85 (°F)	199	199	8.6	188.1	188.1	10.5	175.3	175.3	12.8	199.9	199.9	8.4	189.3	189.3	10.3	176.9	176.9	12.5
67 (°F)	75 (°F)	204.3	138.6	8.6	190.6	133	10.5	173.1	126	13.1	205.5	139.1	8.4	192	133.6	10.3	176.4	127.2	12.5
	80 (°F)	204.9	170.3	8.6	191.1	164.9	10.5	174.5	157.8	13	206.1	170.8	8.4	192.6	165.4	10.3	177.2	158.9	12.5
	85 (°F)	205.7	201.2	8.6	192.6	192.6	10.5	178.1	178.1	12.8	206.9	201.8	8.4	194.1	194.1	10.3	179.9	179.9	12.5

CSV180C		30 GPM (Gallon/Min)									45 GPM (Gallon/Min)								
7200 SCFM		65.0 (°F) EWT			85.0 (°F) EWT			100 (°F) EWT			65.0 (°F) EWT			85.0 (°F) EWT			100 (°F) EWT		
EWB	EDB	TC	SC	kW	TC	SC	kW	TC	SC	kW	TC	SC	kW	TC	SC	kW	TC	SC	kW
72 (°F)	75 (°F)	220.3	106	8.8	205.8	100.7	10.6	188.9	94.6	12.9	221.8	106.5	8.5	207.8	101.4	10.4	191.2	95.4	12.6
	80 (°F)	221.4	137.9	8.8	206.9	132.6	10.7	190.8	126.6	12.8	222.9	138.5	8.5	208.8	133.2	10.4	191.9	127	12.7
	85 (°F)	222.1	169.7	8.8	207.6	164.3	10.7	191.6	158.5	12.9	223.7	170.3	8.6	209.6	165.1	10.4	193.3	159.1	12.6

CSV240C		40 GPM (Gallon/Min)									60 GPM (Gallon/Min)								
6400 SCFM		65.0 (°F) EWT			85.0 (°F) EWT			100 (°F) EWT			65.0 (°F) EWT			85.0 (°F) EWT			100 (°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)	240.6	180	10.7	222.9	171.3	13.7	201.8	161.4	17.6	241.8	180.6	10.5	224	172	13.5	205.3	163	16.9
	80 (°F)	241.1	208.6	10.7	223.1	200	13.7	202.7	191	17.4	242.5	209.3	10.5	224.4	200.6	13.5	205.9	192.6	16.8
	85 (°F)	242.3	235	10.8	226	223.5	13.7	208.9	208.9	17	243.5	235.8	10.5	227.1	224.4	13.5	209.7	209.7	16.9
67 (°F)	75 (°F)	262.1	151.5	10.9	243	143	13.8	221.8	133.8	17.4	263.9	152.3	10.7	244.7	143.7	13.6	226.2	135.7	16.7
	80 (°F)	262.9	180	10.9	243.9	171.6	13.8	223.7	162.7	17.3	264.7	180.8	10.7	245.5	172.3	13.6	227.2	164.3	16.6
	85 (°F)	263.7	208.6	10.9	244.6	200.1	13.8	225.1	191.6	17.1	265.5	209.5	10.7	246.3	200.9	13.6	228.1	192.9	16.6
72 (°F)	75 (°F)	285.7	122.4	11.2	265	114.2	14	244.1	106	17.2	288.2	123.5	10.9	267.3	115.1	13.7	247.5	107.3	16.7
	80 (°F)	286.5	151.3	11.2	265.7	142.8	14	245.8	135	17.1	289	152.3	10.9	268.1	143.8	13.7	248.3	136	16.7
	85 (°F)	287.4	179.9	11.2	266.7	171.5	14	247.2	163.7	16.9	289.9	181	10.9	269	172.4	13.7	249.4	164.6	16.7

CSV240C		40 GPM (Gallon/Min)									60 GPM (Gallon/Min)								
8000 SCFM		65.0 (°F) EWT			85.0 (°F) EWT			100 (°F) EWT			65.0 (°F) EWT			85.0 (°F) EWT			100 (°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)	250.7	201.1	10.8	231.9	192.2	13.7	212	183.2	17.1	252.2	201.8	10.6	233.2	192.9	13.5	214.2	184.2	16.8
	80 (°F)	250.7	236	10.8	232.4	225.4	13.7	213.3	212.9	17.3	252.5	236.6	10.6	233.7	226.4	13.5	215.2	214.1	16.9
	85 (°F)	256	256	10.9	238.1	238.1	13.8	221.5	221.5	17.3	257.5	257.5	10.6	239.4	239.4	13.5	224.3	224.3	16.7
67 (°F)	75 (°F)	272.7	167.1	11	252.2	158.2	13.9	231.5	149.6	17.1	275	168.1	10.7	254.1	159.1	13.6	234.6	150.8	16.7
	80 (°F)	273.9	201.2	11.1	253.4	192.4	13.9	232.7	183.6	17.1	276.1	202.2	10.8	255.3	193.2	13.6	235.7	185	16.7
	85 (°F)	275	235.5	11.1	254.1	226.8	13.9	232.6	218.7	17.1	277.2	236.5	10.8	256.1	227.6	13.6	236	219.8	16.7
72 (°F)	75 (°F)	296.4	132.4	11.3	274	123.9	14.1	252.5	115.8	17.1	299.5	133.7	10.9	276.6	124.9	13.8	255.5	116.9	16.5
	80 (°F)	297.5	166.7	11.3	275.3	158	14.1	254	149.9	17.1	300.5	167.9	11	277.8	159	13.8	256.2	150.8	16.8
	85 (°F)	298.7	200.9	11.3	276.5	192.1	14.1	255.9	184.1	17	301.8	202.1	11	279.1	193.2	13.8	257.5	184.6	16.7

CSV240C		40 GPM (Gallon/Min)									60 GPM (Gallon/Min)								
9600 SCFM		65.0 (°F) EWT			85.0 (°F) EWT			100 (°F) EWT			65.0 (°F) EWT			85.0 (°F) EWT			100 (°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)	258.4	223	10.9	238.3	214.3	13.8	216.5	204.9	17.3	260.2	223.8	10.6	239.9	214.9	13.5	219.6	206.3	16.8
	80 (°F)	259.7	259.6	10.9	241.1	241.1	13.8	221	221	17.3	261.4	260.7	10.6	242.5	242.5	13.6	224.2	224.2	16.7
	85 (°F)	266.8	266.8	11	250.3	250.3	13.9	233.3	233.3	17.2	268.4	268.4	10.7	251.9	251.9	13.6	235.6	235.6	16.6
67 (°F)	75 (°F)	280.3	183.6	11.1	258.6	174.6	13.9	237.1	165.8	17.2	282.7	184.6	10.8	260.9	175.6	13.6	240.2	166.9	16.8
	80 (°F)	281.6	222.9	11.1	260.1	213.8	14	238.4	205.1	17.2	284.1	223.9	10.8	262.3	214.7	13.7	241.1	206	16.8
	85 (°F)	282	262.8	11.1	260.3	253.4	14	240.9	240.9	17.1	284.6	263.8	10.8	262.5	254.7	13.7	243.4	242.6	16.6
72 (°F)	75 (°F)	303.9	144.1	11.4	280.6	135.3	14.2	257.6	126.9	17.3	307.2	145.3	11	283.5	136.4	13.8	261.3	128.2	16.8
	80 (°F)	305.4	183.3	11.4	282.4	174.5	14.2	260.9	166.4	17.1	308.9	184.7	11	285.2	175.6	13.8	262.6	167.1	16.8
	85 (°F)	307	222.6	11.4	283.7	213.5	14.2	262.2	205.4	17.1	310.4	223.9	11.1	286.7	214.8	13.8	265.4	206.6	16.5

CSV300C		50 GPM (Gallon/Min)									75 GPM (Gallon/Min)								
8400 SCFM		65.0 (°F) EWT			85.0 (°F) EWT			100 (°F) EWT			65.0 (°F) EWT			85.0 (°F) EWT			100 (°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)	310.9	248	13.1	286.2	236.8	16.1	260.4	225.3	19.7	312.8	248.9	12.9	287.9	237.6	15.8	263.7	226.6	19.3
	80 (°F)	310.4	290.9	13.1	287.3	277.2	16.1	261.2	261.2	19.9	312.2	291.8	12.9	288.8	278.2	15.9	265.7	264.8	19.3
	85 (°F)	316.1	316.1	13.2	296.3	296.3	16.2	276.1	276.1	19.7	317.8	317.8	12.9	297.8	297.8	15.9	278.9	278.9	19.2
67 (°F)	75 (°F)	339.5	204.3	13.4	312.6	193.3	16.3	285.2	182.2	19.9	342	205.4	13.2	315.1	194.3	16	289.9	184.2	19.2
	80 (°F)	339.4	247.3	13.4	312.6	236.3	16.3	286	225.5	19.7	342.2	248.5	13.2	315.1	237.3	16	290.1	227.1	19.2
	85 (°F)	339.1	290.2	13.4	312.3	278.9	16.3	286.8	268.5	19.6	342.1	291.4	13.1	314.8	280.1	16	289.7	269.8	19.2
72 (°F)	75 (°F)	370.3	160.3	13.8	340.9	149.3	16.6	313.6	139.3	19.8	374.1	161.7	13.5	344.4	150.5	16.3	316.5	140.3	19.4
	80 (°F)	370.3	203.4	13.8	341.2	192.6	16.6	313.8	182.8	19.8	374.3	204.9	13.5	344.6	193.8	16.3	317.6	184.1	19.3
	85 (°F)	370.3	246.5	13.8	341.1	235.6	16.6	314.1	225.6	19.8	374.5	248	13.5	344.6	236.8	16.3	317	226.7	19.4

CSV300C		50 GPM (Gallon/Min)									75 GPM (Gallon/Min)								
9200 SCFM		65.0 (°F) EWT			85.0 (°F) EWT			100 (°F) EWT			65.0 (°F) EWT			85.0 (°F) EWT			100 (°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)	316.1	261.3	13.2	290.9	250.3	16.1	264.2	238.5	19.8	318	262.4	12.9	292.8	251.2	15.9	266.8	239.7	19.4
	80 (°F)	316.9	306.2	13.2	292.6	291.6	16.1	267.6	267.6	19.8	318.9	307.4	12.9	294.4	292.8	15.9	270.6	270.6	19.3
	85 (°F)	326.3	326.3	13.3	305.4	305.4	16.3	284.4	284.4	19.7	328.1	328.1	13	307.3	307.3	16	287.4	287.4	19.2

CSV300C		50 GPM (Gallon/Min)									75 GPM (Gallon/Min)								
9200 SCFM		65.0 (°F) EWT			85.0 (°F) EWT			100 (°F) EWT			65.0 (°F) EWT			85.0 (°F) EWT			100 (°F) EWT		
EWB	EDB	TC	SC	kW	TC	SC	kW	TC	SC	kW	TC	SC	kW	TC	SC	kW	TC	SC	kW
67 (°F)	75 (°F)	345.1	213.8	13.5	317.3	202.5	16.4	290.4	192.1	19.7	348	215	13.2	320.1	203.6	16.1	294.4	193.7	19.2
	80 (°F)	345.1	260.9	13.5	317.4	249.4	16.4	290.1	238.8	19.8	348.2	262.2	13.2	320	250.3	16.1	294.1	240.4	19.3
	85 (°F)	344.6	307.6	13.5	316.8	296.1	16.4	291.3	282.6	19.8	347.6	308.8	13.2	319.4	297.5	16.1	295	284.3	19.3
72 (°F)	75 (°F)	376.1	165.3	13.9	345.8	154.5	16.7	318.1	144.3	19.8	380.2	166.8	13.6	349.5	155.8	16.3	320	144.9	19.6
	80 (°F)	376.2	212.6	13.9	346.2	201.7	16.7	318.4	191.9	19.8	380.2	214.1	13.6	349.9	203	16.3	321.4	192.9	19.5
	85 (°F)	376.2	259.7	13.9	346.2	248.8	16.7	318.5	238.5	19.8	380.4	261.3	13.6	349.8	250.1	16.3	321.3	239.7	19.5

CSV300C		50 GPM (Gallon/Min)									75 GPM (Gallon/Min)								
10000 SCFM		65.0 (°F) EWT			85.0 (°F) EWT			100 (°F) EWT			65.0 (°F) EWT			85.0 (°F) EWT			100 (°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)	320.4	275.1	13.2	294.4	263.8	16.2	267	252.1	19.8	322.7	276.2	13	296.2	264.6	15.9	270.3	253.8	19.3
	80 (°F)	322.4	320.8	13.2	297.5	297.5	16.2	274.4	274.4	19.8	324.7	322.3	13	299.6	299.6	15.9	278	278	19.2
	85 (°F)	335.4	335.4	13.4	313.7	313.7	16.3	292.7	292.7	19.6	337.5	337.5	13.1	315.7	315.7	16	295.4	295.4	19.2
67 (°F)	75 (°F)	349.9	223.4	13.6	321.4	212.1	16.4	293.7	201.5	19.8	353.2	224.7	13.3	324.3	213.3	16.1	297.9	203.2	19.3
	80 (°F)	349.5	274.2	13.6	321.3	263.2	16.4	294	252.5	19.9	352.9	275.7	13.3	324.1	264.2	16.1	299.5	254.5	19.2
	85 (°F)	349.2	325.3	13.5	322.3	311.1	16.4	297.1	297	19.7	352.5	326.2	13.3	324.9	312.7	16.1	299.8	298.4	19.3
72 (°F)	75 (°F)	381.1	171	14	350.2	159.8	16.7	321.8	149.6	19.8	385.3	172.6	13.6	354.2	161.2	16.4	323.9	150.4	19.6
	80 (°F)	381.3	221.9	14	350.6	211.2	16.7	322.1	201.3	19.9	385.7	223.6	13.6	354.5	212.5	16.4	326.4	202.8	19.4
	85 (°F)	381.4	273.2	14	350.5	262.2	16.7	322.1	252.2	19.8	385.8	274.8	13.6	354.4	263.6	16.4	325.1	253.1	19.5

Note:

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

Table 1: Model CSV060C

Supply CFM	Available 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	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
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	-	-	-	-	-	-

Low static drive (field-supplied)
Standard factory drive
High-static drive

Table 2: Model CSV096C

Supply CFM	Available 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	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
2400	*516*	*0.41*	*589*	*0.52*	656	0.62	781	0.73	776	0.84	832	0.95	884	1.07	933	1.19	981	1.31	1026	1.43
2800	577	0.62	642	0.73	703	0.85	760	0.97	814	1.10	866	1.23	915	1.36	962	1.49	1008	1.62	1051	1.76
3200	642	0.88	700	1.01	755	1.14	808	1.08	858	1.42	906	1.56	952	1.71	997	1.85	-	-	-	-
3600	708	1.21	761	1.36	811	1.46	859	1.66	906	1.81	951	1.97	972	1.96	-	-	-	-	-	-
4000	775	1.63	823	1.79	869	1.95	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Low static drive (field-supplied)
Standard factory drive + 1.5 HP
High-static drive + 2 HP

Table 3: Model CSV120C

Supply CFM	Available 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	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
3200	*626*	*0.85*	*686*	*0.98*	741	1.11	794	1.25	845	1.38	894	1.53	941	1.67	986	1.82	1029	1.96	1071	2.11
3600	*690*	*1.17*	744	1.31	795	1.46	844	1.61	891	1.76	936	1.92	980	2.08	1023	2.24	1064	2.40	1104	2.56
4000	755	1.56	804	1.73	851	1.89	897	2.05	940	2.22	983	2.39	1024	2.56	1064	2.74	1103	2.91	-	-
4400	821	2.05	866	2.22	901	2.40	952	2.58	993	2.76	1032	2.95	-	-	-	-	-	-	-	-
4800	888	2.62	929	2.81	970	3.00	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Low static drive (field-supplied)
Standard factory drive + 2HP
High-static drive +3 HP

Table 4: Model CSV180C

Supply CFM	Available 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	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
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	-	-	-	-	-	-	-	-	-	-

Low static drive (field-supplied)
Standard factory drive + 3HP
High-static drive + 5HP

Table 5: Model CSV240C

Supply CFM	Available 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	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
6400	*615*	*1.64*	*675*	*1.90*	*731*	*2.16*	785	2.44	836	2.72	885	3.00	932	3.28	977	3.58	1021	3.88	1063	4.18
7200	*677*	*2.26*	*731*	*2.56*	783	2.84	832	3.14	880	3.46	926	3.76	970	4.08	1013	4.40	1054	4.72	1094	5.06
8000	740	3.04	790	3.36	837	3.68	883	4.00	927	4.34	970	4.68	1012	5.02	1052	5.36	1091	5.72	1130	6.08
8800	805	3.96	793	3.88	850	4.32	937	5.04	978	5.40	1018	5.76	1008	5.66	-	-	-	-	-	-
9600	870	5.08	912	5.46	953	5.84	992	6.24	-	-	-	-	-	-	-	-	-	-	-	-

Low static drive (field-supplied)
Standard factory drive + 5HP
High-static drive + 7.5HP

Table 6: Model CSV300C

Supply CFM	Available 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	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
8200	*581*	*1.80*	*647*	*2.16*	*707*	*2.49*	765	2.85	819	3.24	870	3.60	920	3.99	967	4.38	1012	4.80	1056	5.19
8800	*639*	*2.31*	*699*	*2.70*	755	3.06	809	3.45	860	3.84	910	4.26	957	4.65	1002	5.07	1045	5.49	1087	5.94
9200	*676*	*2.70*	733	3.09	787	3.48	839	3.87	888	4.29	935	4.71	981	5.13	1025	5.58	1068	6.00	1109	6.45
9600	716	3.15	771	3.54	822	3.96	872	4.38	920	4.80	965	5.25	1010	5.70	1052	6.15	1093	6.60	1113	7.05
10000	755	3.63	807	4.05	856	4.47	904	4.92	950	5.37	994	5.82	1037	6.27	1079	6.75	1119	7.20	-	-

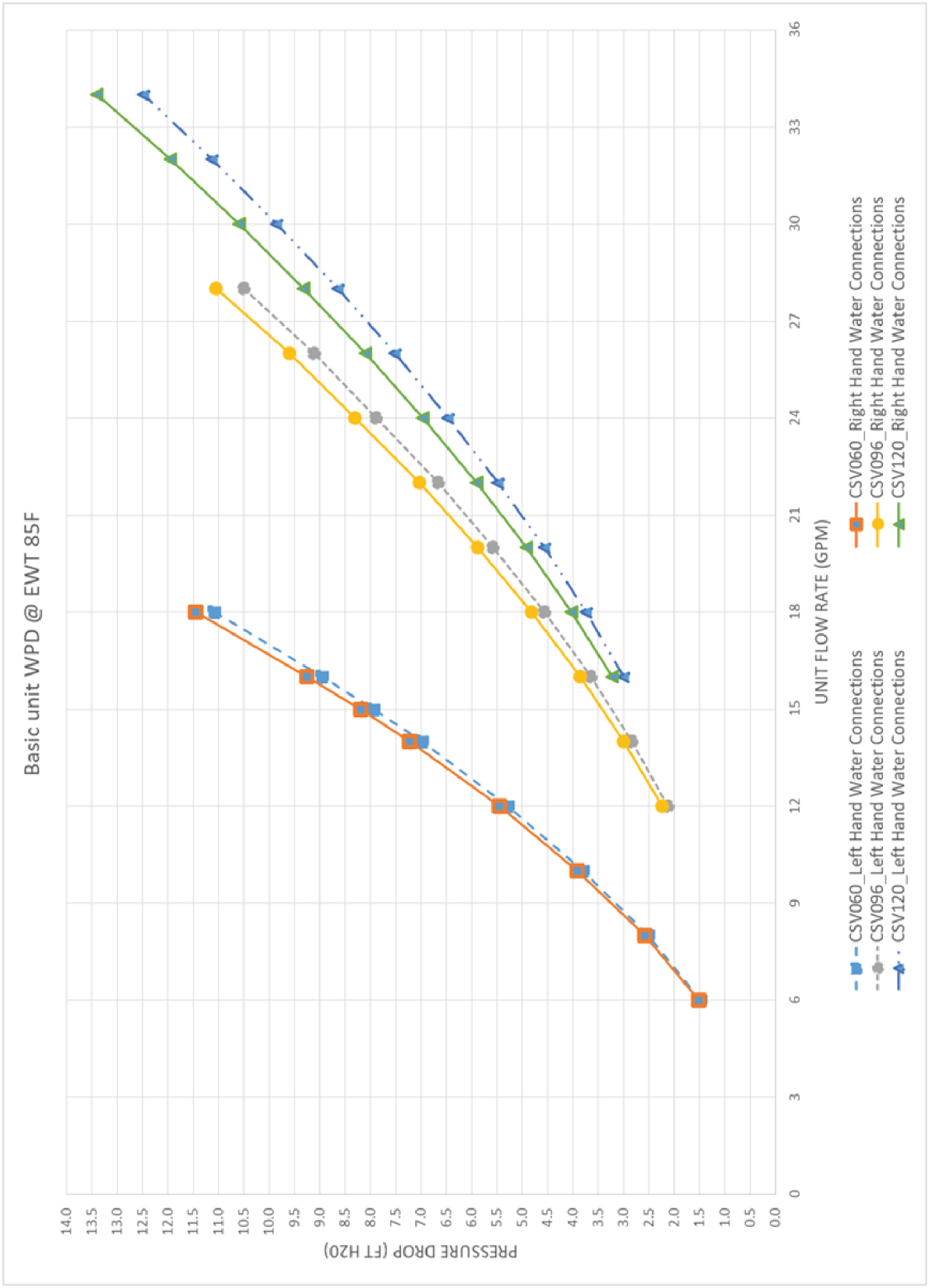
Low static drive (field-supplied)
Standard factory drive + 7.5HP
High-static drive + 7.5HP

Note:

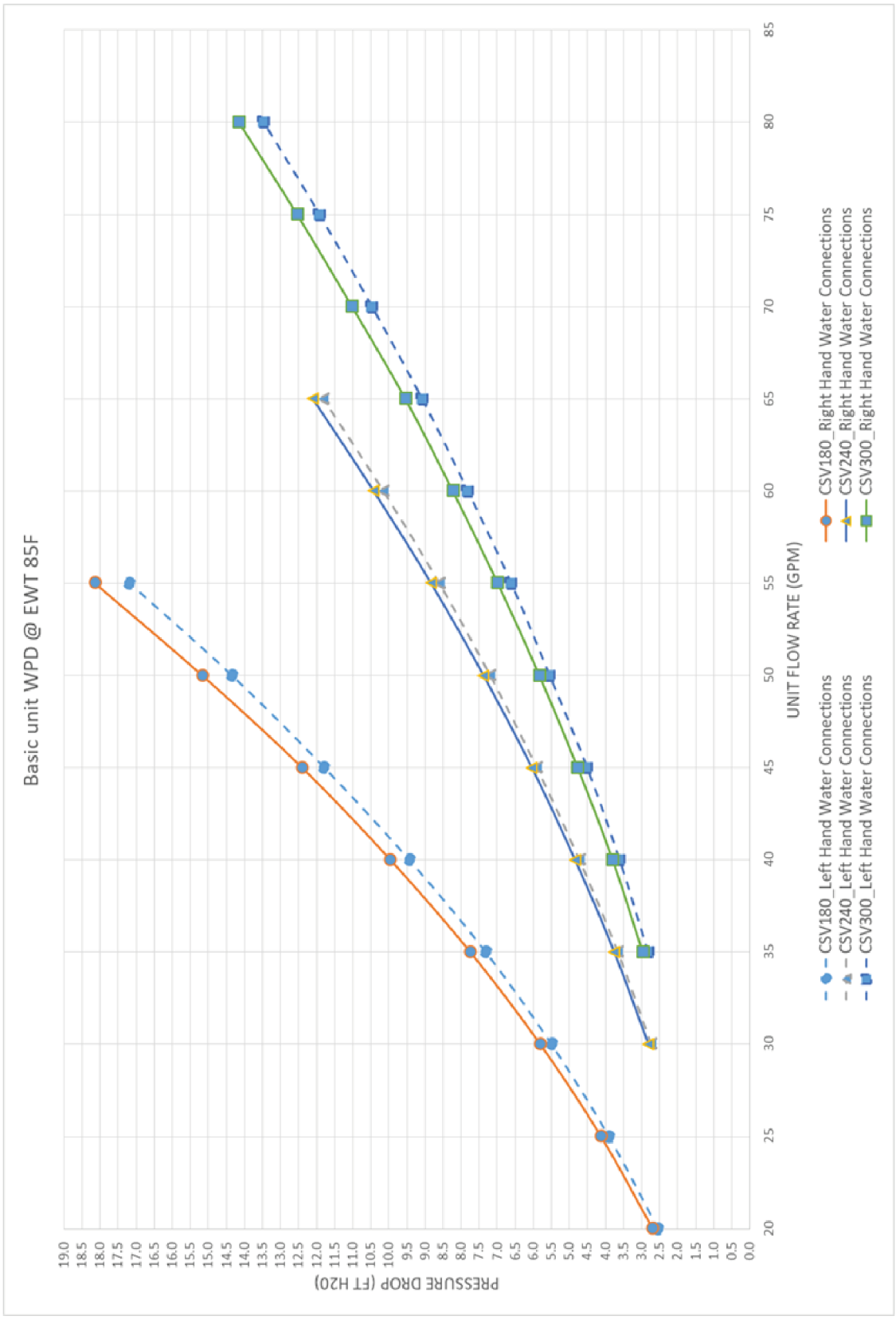
At higher evaporator airflows and wet bulb conditions, condensate carry-over may occur. Decrease airflow downward as necessary.

* Blower performance includes wet evaporator coil and 2” filters.

Waterside pressure drop



LD29999


Basic unit WPD @ EWT 85F
PRESSURE DROP (FT H20)
UNIT FLOW RATE (GPM)
CSV180_Left Hand Water Connections
CSV240_Left Hand Water Connections
CSV300_Left Hand Water Connections
CSV180_Right Hand Water Connections
CSV240_Right Hand Water Connections
CSV300_Right Hand Water Connections

LD30000

ⓘ Note:

1. The waterside pressure drop (WPD) graphs show WPD of basic unit for both LH & RH units at EWT 85°F.
2. Basic unit WPD = BPHE + water pipes inside cabinet PD only (strainer & hose excluded).
3. Use Table 7 to find the basic unit WPD at 65°F and 105°F for both the LH and RH unit by multiplying correction factor from Table 7 with the corresponding CSV model WPDthe from WPD graphs at the required gpm.
4. From Table 8, hose length PD effect can be found with this formula:
    - Hose length factor from Table 8 X Basic unit WPD from WPD graph @ EWT 85F
5. From Table 8 Strainer alone PD effect can be found with this formula:
    - *Strainer Factor from Table 8 X Basic unit WPD from WPD graph @ EWT 85°F*
6. From Table 8, Hose length + strainer EWT or strainer + EWT combined PD effect can be found with this formula:
    - *Hose length Factor **or** strainer factor from table 02 X EWT factor from Table 7 X Basic unit WPD from WPD graph @ EWT 85°F*
7. Water temperature effect on pressure drop not considered for Hose length and strainer.

Table 7: Waterside pressure drop at 65°F and 105°F for LH and RH unit

Model	Correction factor for EWT effect on WPD (Factor X Basic unit WPD from graph@EWT 85°F)		Remarks
	EWT 65°F	EWT 105°F	
CSV060	1.04	0.97	Applicable for LH, RH
CSV096 to 300	1.02	0.98	Applicable for LH, RH

Table 8: LH and RH correction factor for hose length

Model	GPM range	LH_Correction factor for Hose length, strainer effect on WPD(Factor X Basic unit WPD from WPD graph@EWT 85F)			
		Correction for Basic unit + strainer (@ 85F EWT)	Correction for Basic unit + 18" Hose + strainer (@ 85F EWT)	Correction for Basic unit + 24" Hose + strainer (@ 85F EWT)	Correction for Basic unit + 36" Hose + strainer (@ 85F EWT)
CSV060	6	1.69	2.05	2.15	2.18
	8	1.72	2.10	2.20	2.23
	10	1.75	2.14	2.23	2.27
	12	1.78	2.18	2.28	2.31
	14	1.80	2.21	2.32	2.35
	15	1.81	2.23	2.33	2.37
	16	1.81	2.24	2.34	2.38
	18	1.83	2.26	2.37	2.41
CSV096	12 to 28	1.21	1.41	1.42	1.45
CSV120	16 to 34	1.26	1.51	1.52	1.57
CSV180	20 to 55	1.49	1.63	1.66	1.74
CSV240	30 to 65	1.17	1.26	1.31	1.32
CSV300	35 to 80	1.23	1.34	1.41	1.43

Model	GPM range	RH_Correction factor for Hose length, strainer effect on WPD(Factor X Basic unit WPD from WPD graph@EWT 85F)			
		Correction for Basic unit + strainer (@ 85F EWT)	Correction for Basic unit + 18" Hose + strainer (@ 85F EWT)	Correction for Basic unit + 24" Hose + strainer (@ 85F EWT)	Correction for Basic unit + 36" Hose + strainer (@ 85F EWT)
CSV060	6	1.67	2.02	2.11	2.14
	8	1.71	2.07	2.16	2.19
	10	1.73	2.10	2.20	2.23
	12	1.75	2.14	2.24	2.27
	14	1.77	2.17	2.27	2.31
	15	1.63	2.04	2.14	2.18
	16	1.79	2.20	2.30	2.33
	18	1.81	2.22	2.33	2.36
CSV096	12 to 28	1.2	1.39	1.39	1.43
CSV120	16 to 34	1.24	1.47	1.48	1.53
CSV180	20 to 55	1.47	1.59	1.63	1.7
CSV240	30 to 65	1.17	1.25	1.3	1.31
CSV300	35 to 80	1.22	1.32	1.39	1.41

Electrical data

Table 9: Electrical data-standard motor

Model #	Voltage	Compressor				Evaporator fan		Min. CKT. Ampacity	Max fuse / CKT. Bkr. amp
		Qty		RLA	LRA	Hp	FLA		
CSV060C2	208-230/3/60	1	@	16.0	110.0	1.00	3.1	23.10	35
CSV060C4	460/3/60	1	@	7.8	52.0	1.00	1.5	11.25	15
CSV060C5	575/3/60	1	@	5.7	38.9	1.00	1.2	8.33	15
CSV096C2	208-230/3/60	2	@	13.7	83.1	1.50	4.5	33.98	45
CSV096C4	460/3/60	2	@	6.2	41.0	1.50	2.2	15.93	20
CSV096C5	575/3/60	2	@	4.8	33.0	1.50	1.8	11.70	15
CSV120C2	208-230/3/60	2	@	16.0	110.0	2.00	5.8	41.80	50
CSV120C4	460/3/60	2	@	7.8	52.0	2.00	2.9	20.45	25
CSV120C5	575/3/60	2	@	5.7	38.9	2.00	2.3	15.13	20
CSV180C2	208-230/3/60	2	@	25.0	164.0	3.00	8.5	60.70	80
CSV180C4	460/3/60	2	@	12.8	100.0	3.00	4.2	29.40	40
CSV180C5	575/3/60	2	@	9.6	78.0	3.00	3.4	21.18	25
CSV240C2	208-230/3/60	2	@	30.1	225.0	5.00	14.0	81.73	110
CSV240C4	460/3/60	2	@	16.7	114.0	5.00	6.6	44.18	60
CSV240C5	575/3/60	2	@	12.2	80.0	5.00	5.3	32.75	40
CSV300C2	208-230/3/60	2	@	34.0	240.0	7.50	20.4	96.90	125
CSV300C4	460/3/60	2	@	16.0	140.0	7.50	9.7	45.70	60
CSV300C5	575/3/60	2	@	12.9	107.6	7.50	7.5	37.04	45

Table 10: Electrical data-oversized motor (high static)

Model #	Voltage	Compressor				Evaporator fan		Min. CKT. Ampacity	Max fuse / CKT. Bkr. amp
		QTY		RLA	LRA	Hp	FLA		
CSV060C2	208-230/3/60	1	@	16.0	110.0	1.50	4.5	24.50	40
CSV060C4	460/3/60	1	@	7.8	52.0	1.50	2.2	11.95	15
CSV060C5	575/3/60	1	@	5.7	38.9	1.50	1.8	8.93	15
CSV096C2	208-230/3/60	2	@	13.7	83.1	2.00	5.8	36.63	50
CSV096C4	460/3/60	2	@	6.2	41.0	2.00	2.9	16.85	20
CSV096C5	575/3/60	2	@	4.8	33.0	2.00	2.3	13.10	15
CSV120C2	208-230/3/60	2	@	16.0	110.0	3.00	8.5	44.50	60
CSV120C4	460/3/60	2	@	7.8	52.0	3.00	4.2	21.75	25
CSV120C5	575/3/60	2	@	5.7	38.9	3.00	3.4	16.23	20
CSV180C2	208-230/3/60	2	@	25.0	164.0	5.00	14.0	70.25	80
CSV180C4	460/3/60	2	@	12.8	100.0	5.00	6.6	35.40	40
CSV180C5	575/3/60	2	@	9.6	78.0	5.00	5.3	26.90	35
CSV240C2	208-230/3/60	2	@	30.1	225.0	7.50	20.4	88.13	110
CSV240C4	460/3/60	2	@	16.7	114.0	7.50	9.7	47.28	60
CSV240C5	575/3/60	2	@	12.2	80.0	7.50	7.8	35.25	45

Dimensional data

Figure 2: CSV060C front return/top discharge/LH water connection dimensional data

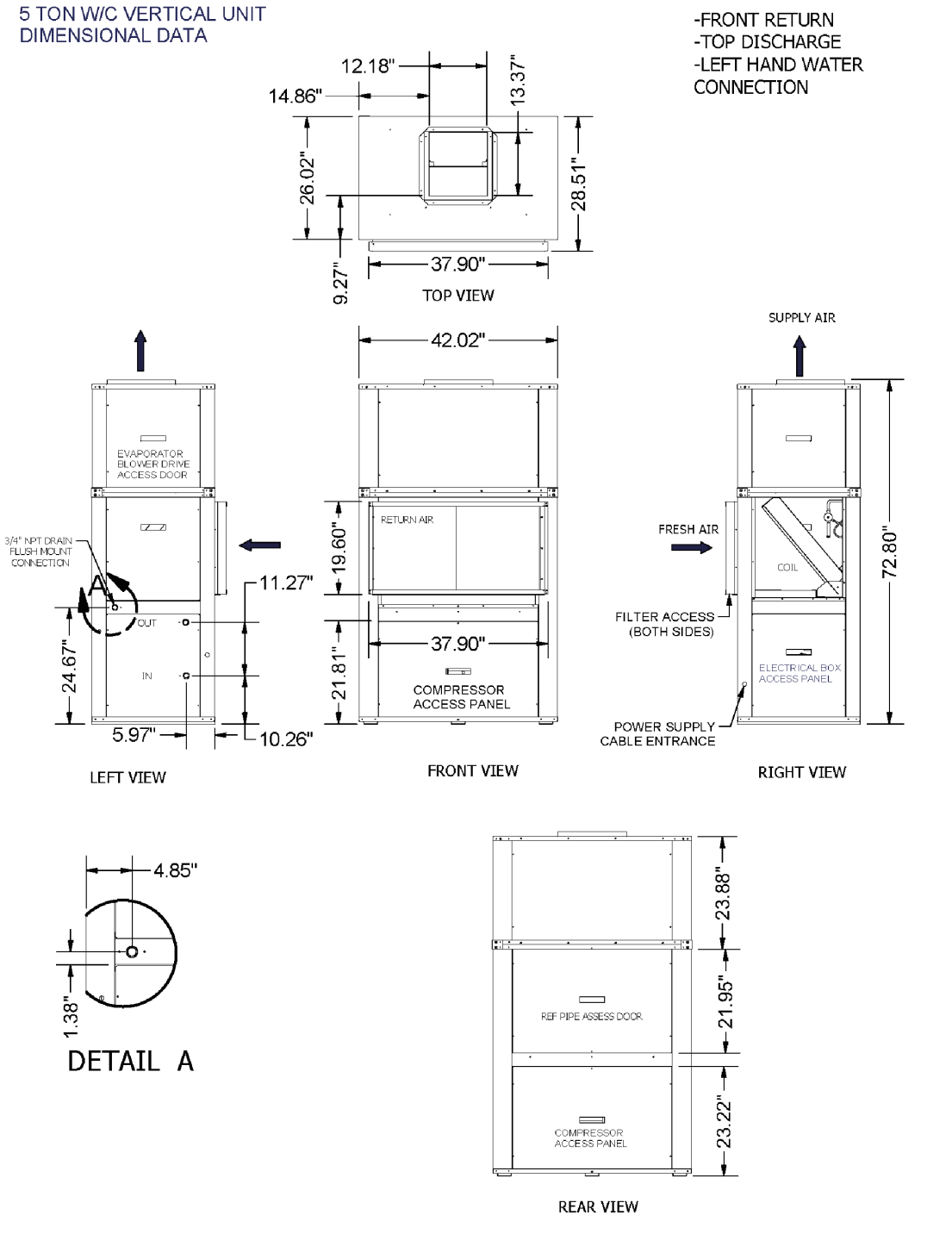


Figure 3: CSV060C front return/front discharge/LH water connection dimensional data

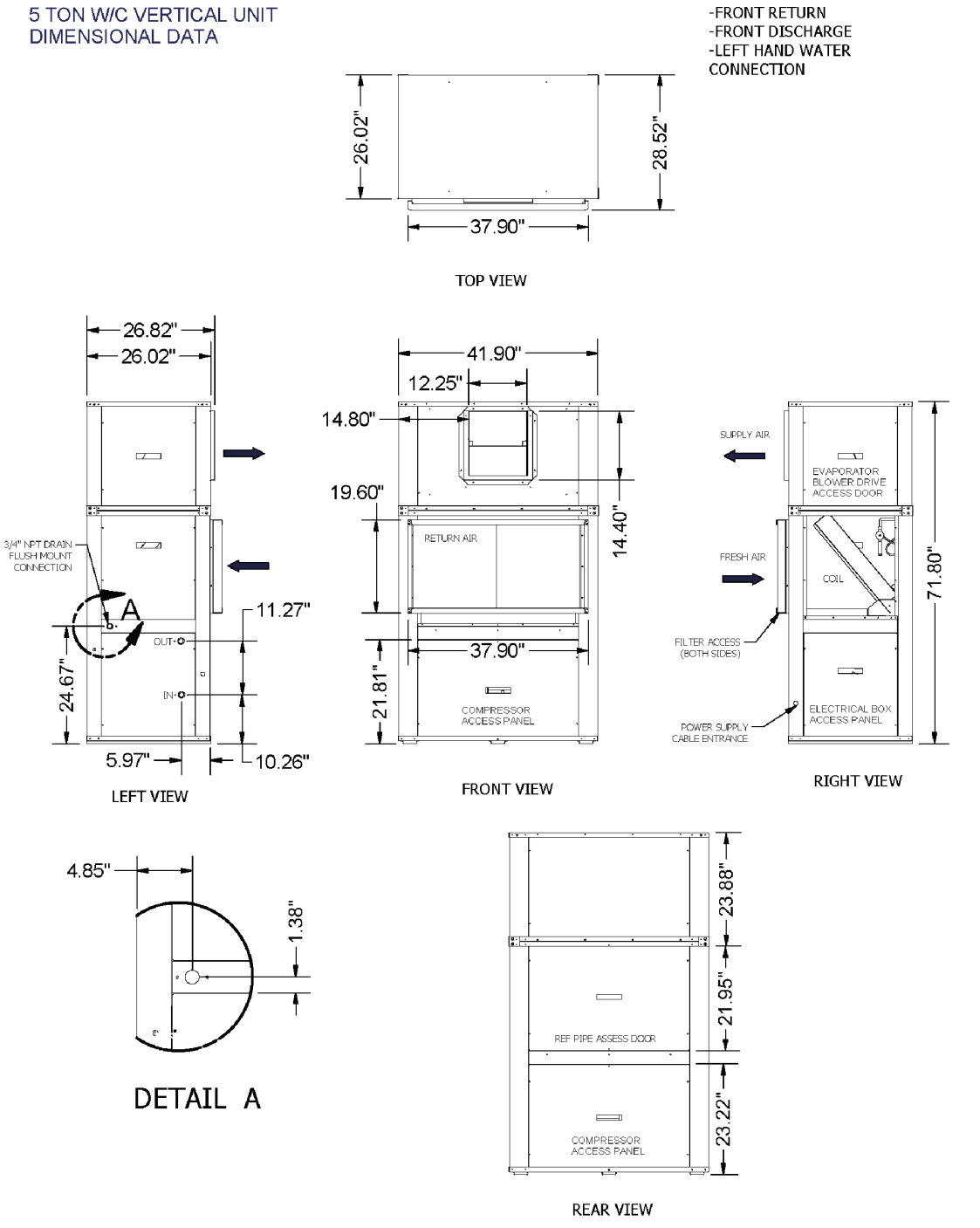


Figure 4: CSV060C front return/top discharge/RH water connection dimensional data

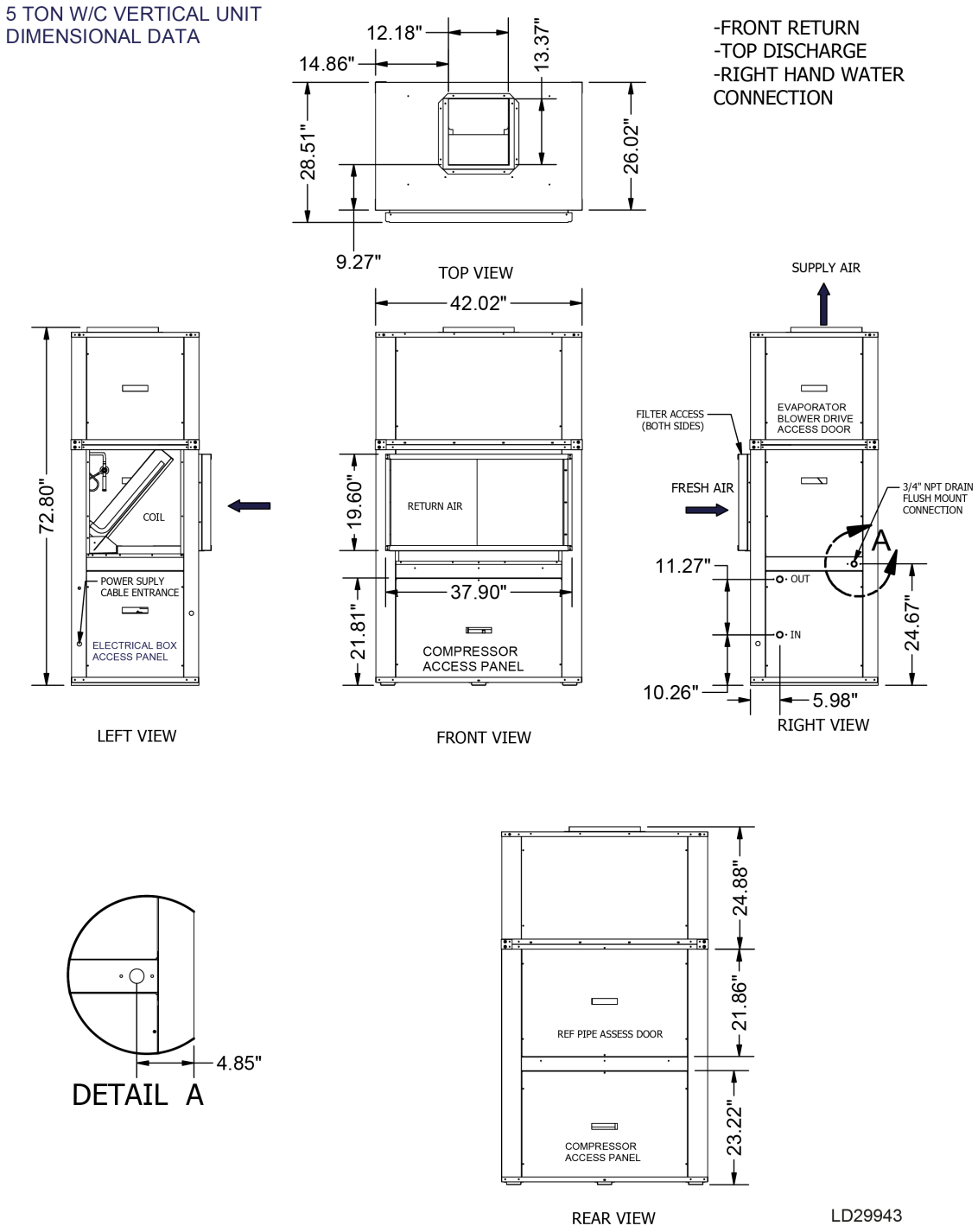


Figure 5: CSV060C front return/front discharge/RH water connection dimensional data

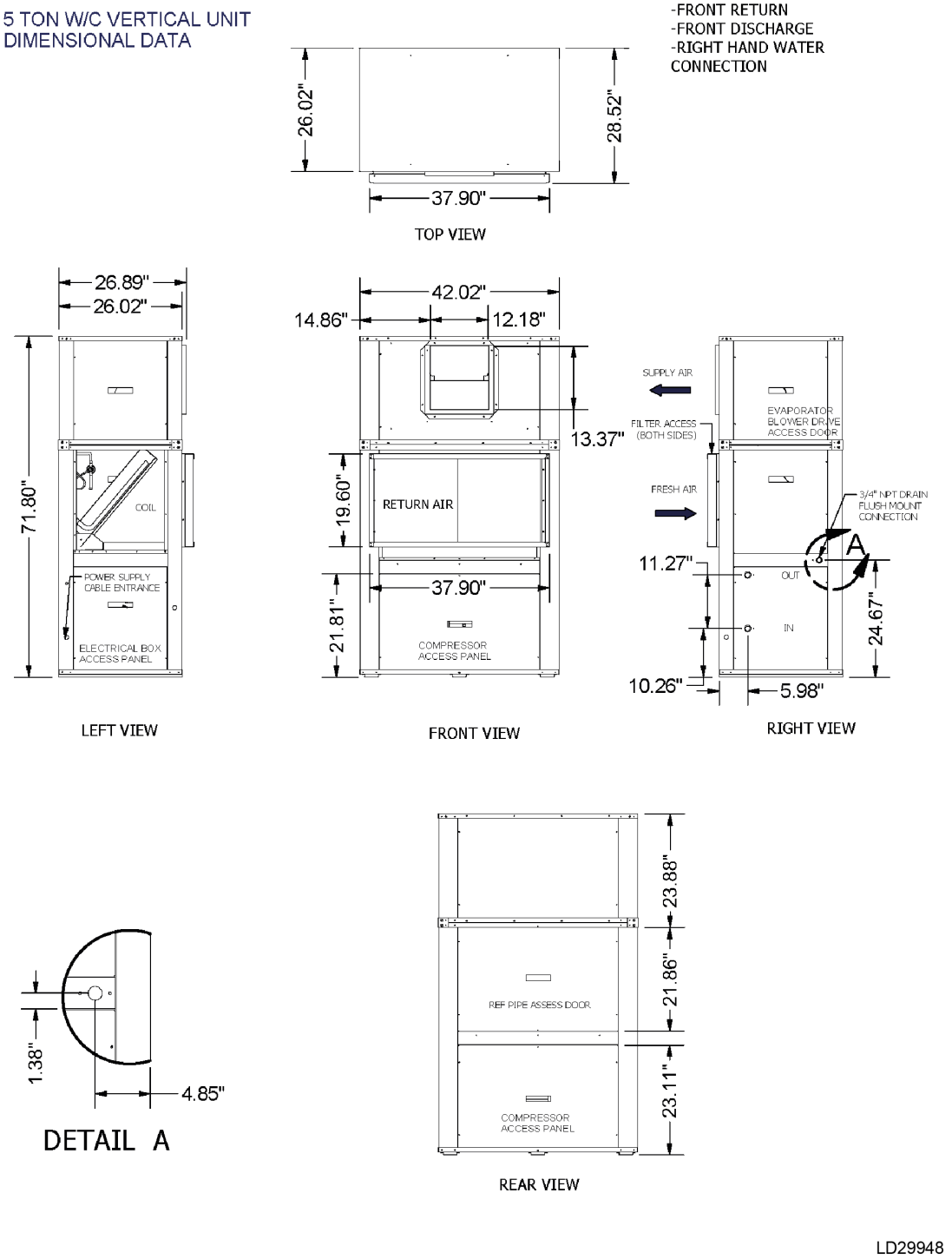


Figure 6: CSV096/120C front return/top discharge/LH water connection dimensional data

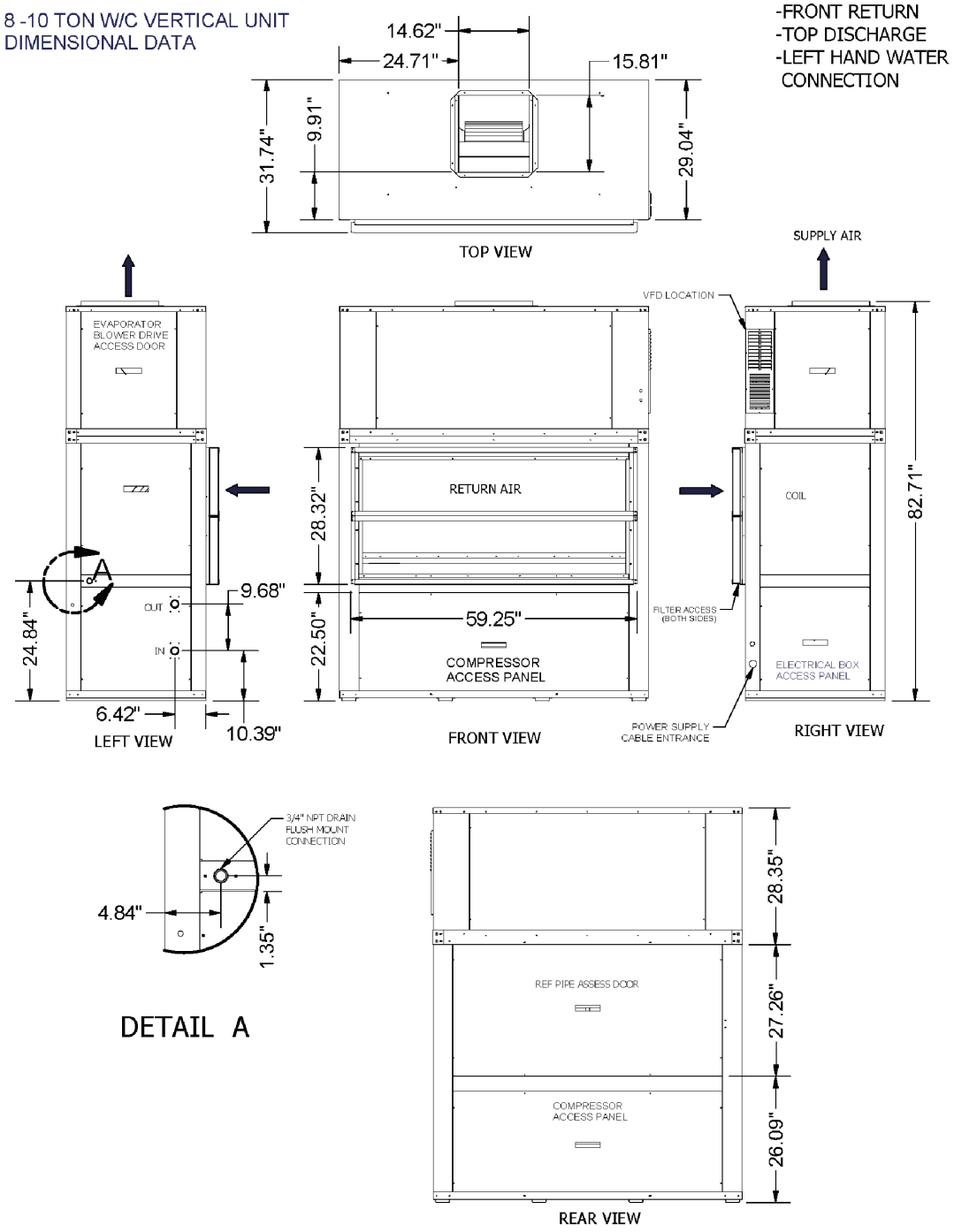


Figure 7: CSV096/120C front return/front discharge/LH water connection dimensional data

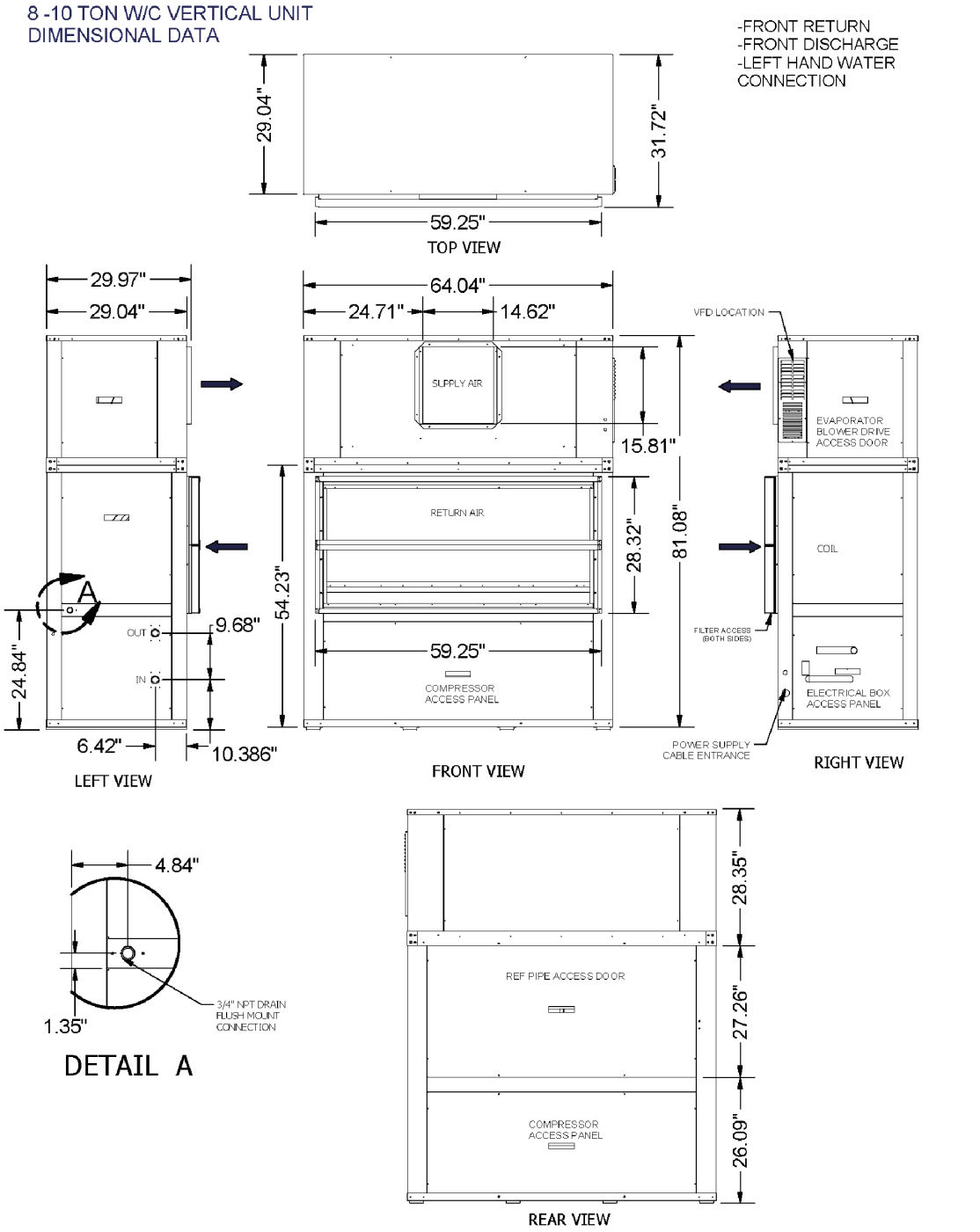


Figure 8: CSV096/120C front return/top discharge/RH water connection dimensional data

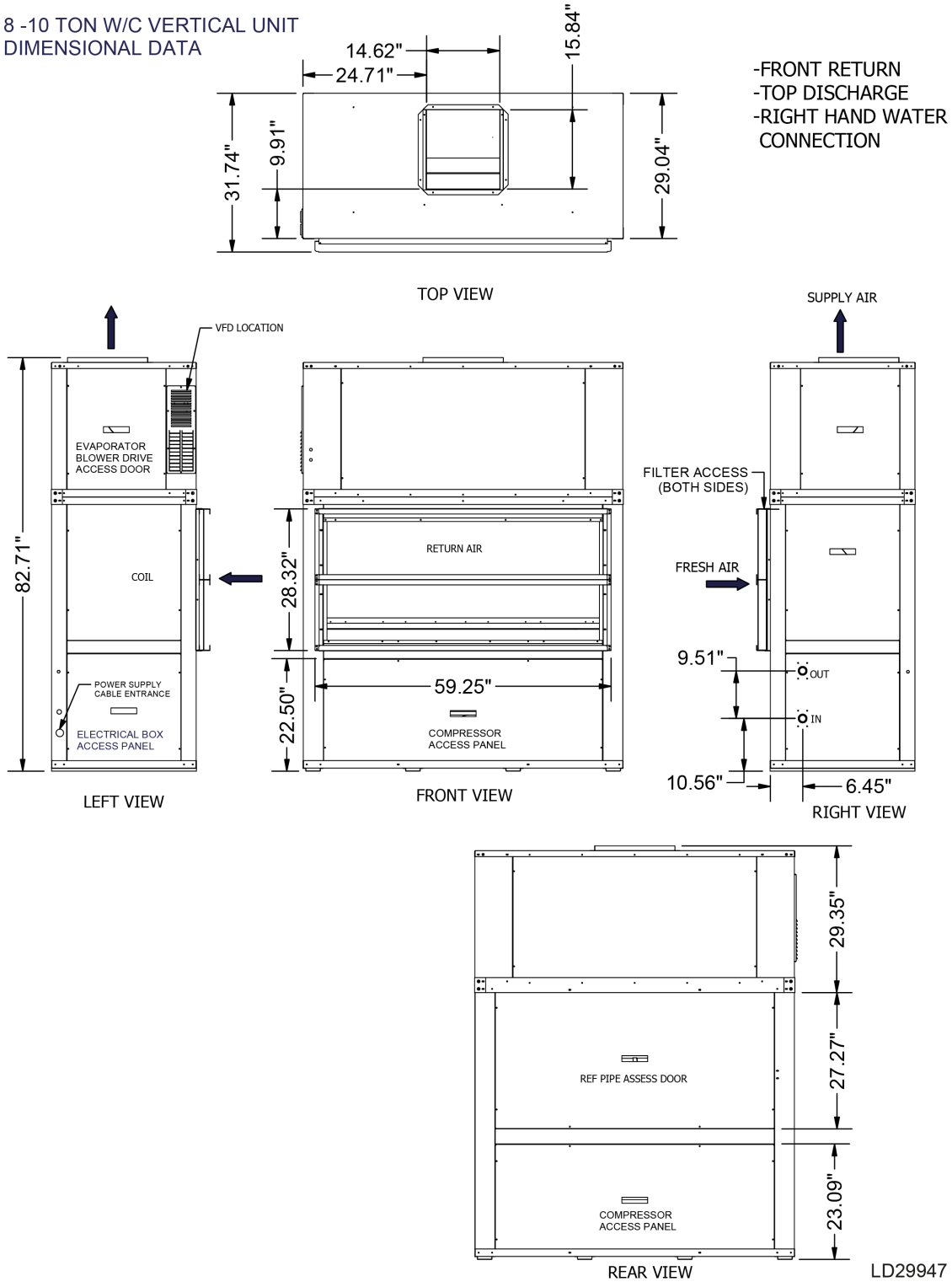


Figure 9: CSV096/120C front return/front discharge/RH water connection dimensional data

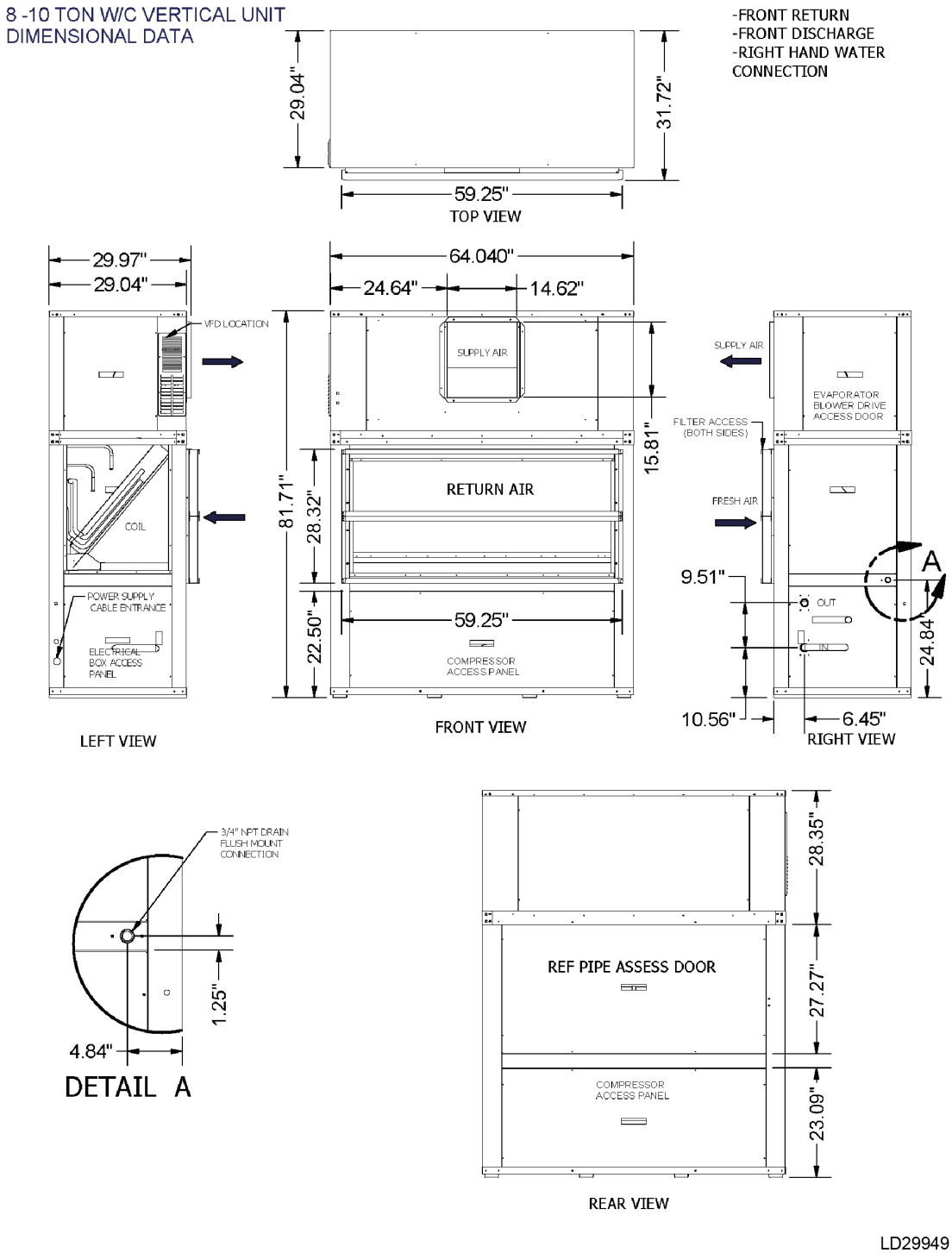


Figure 10: CSV180C front return/top discharge/LH water connection dimensional data

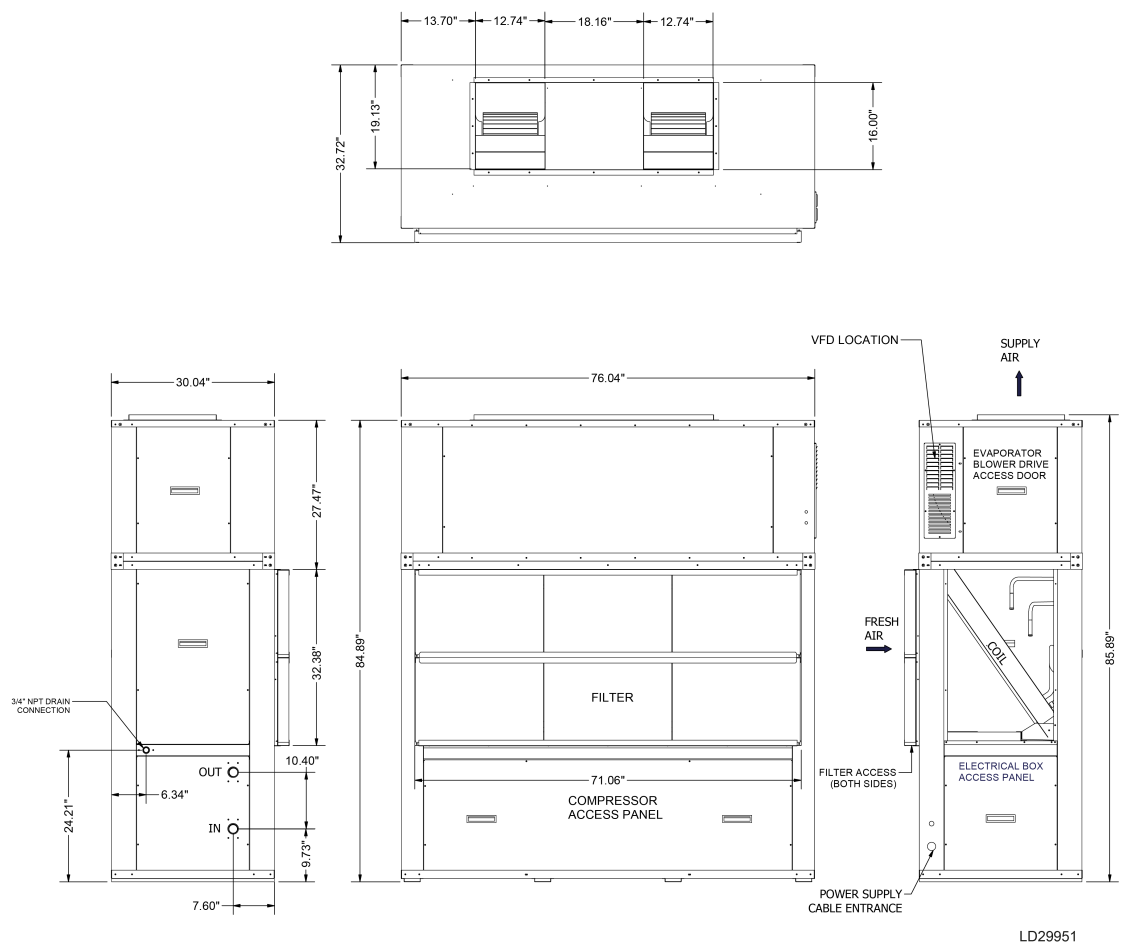


Figure 11: CSV180C front return/front discharge/LH water connection dimensional data

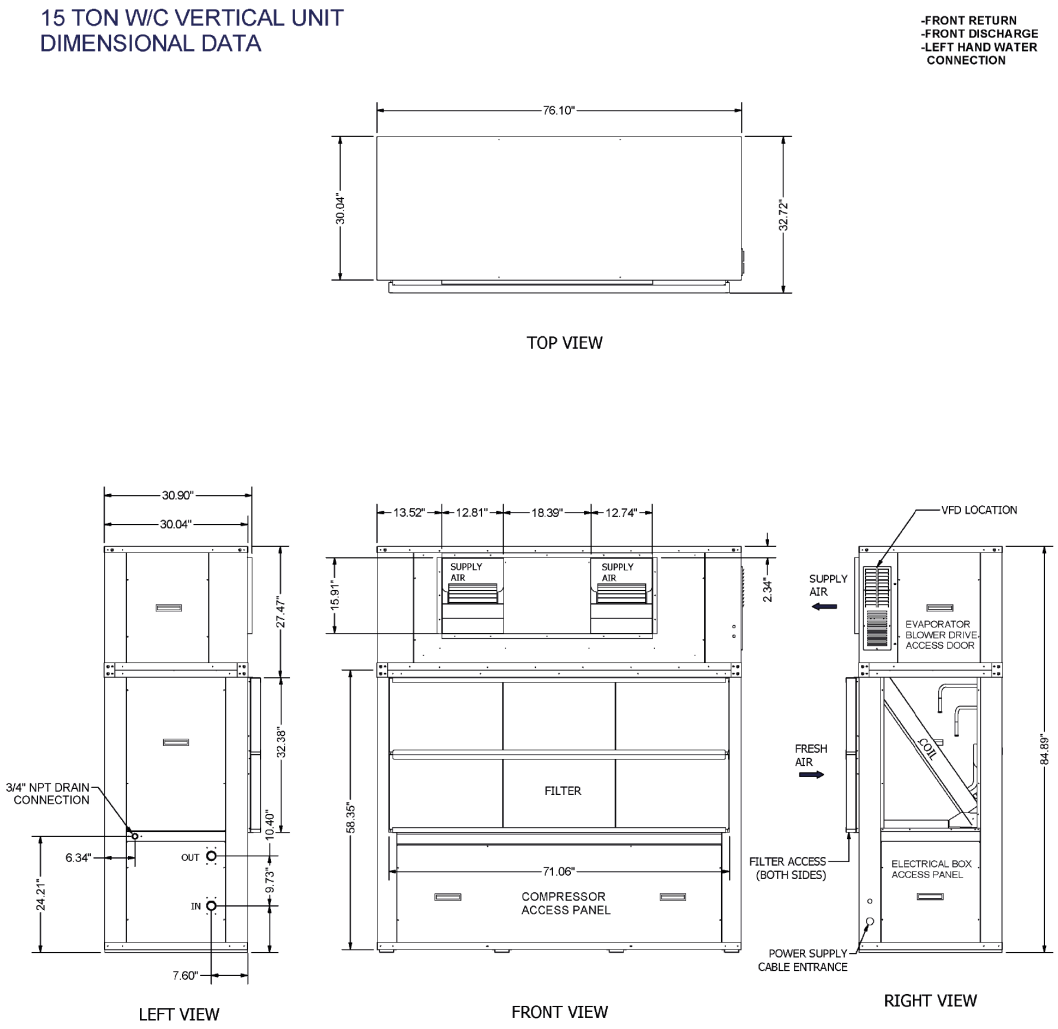


Figure 12: CSV180C front return/top discharge/RH water connection dimensional data

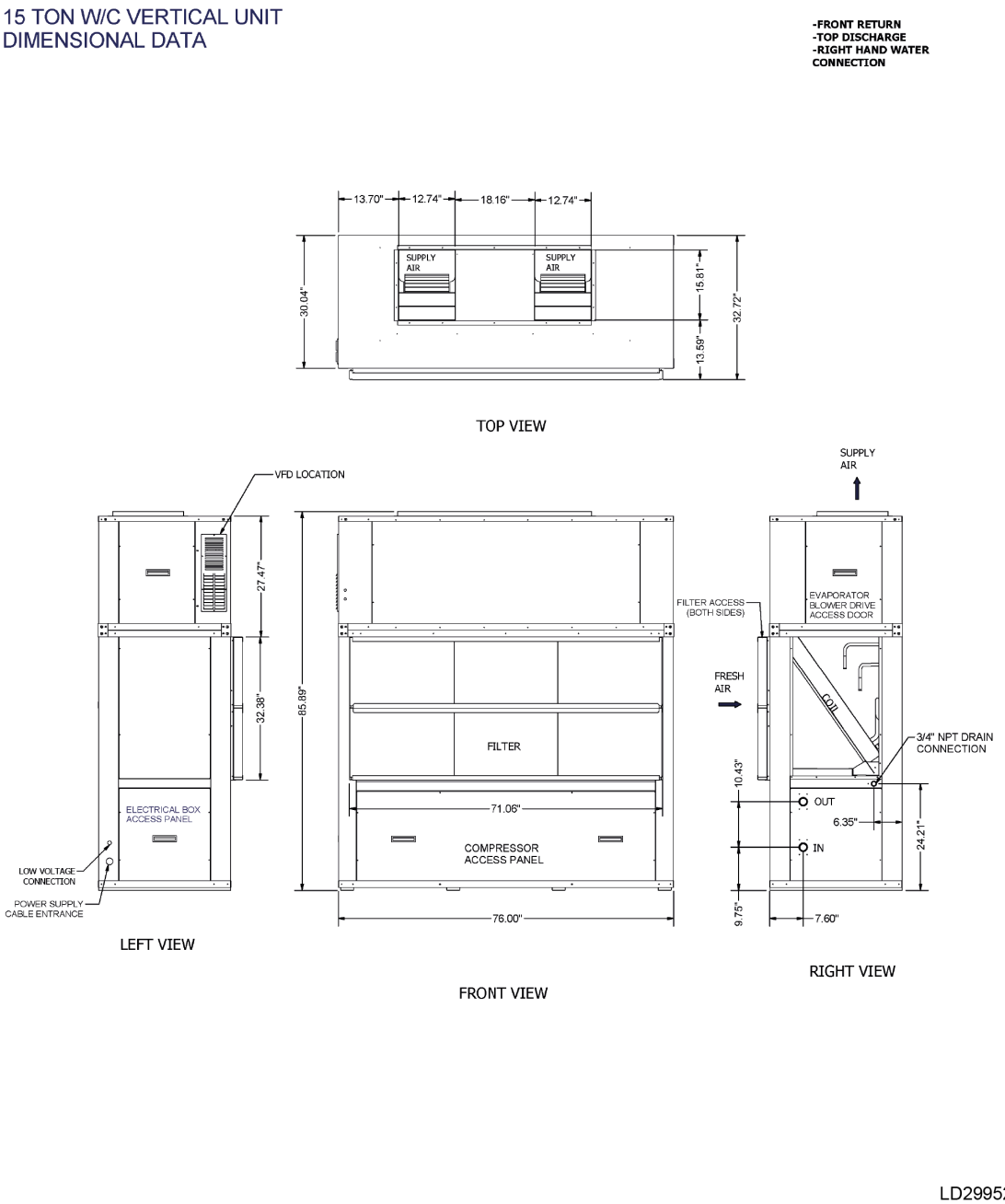


Figure 13: CSV180C front return/front discharge/RH water connection dimensional data

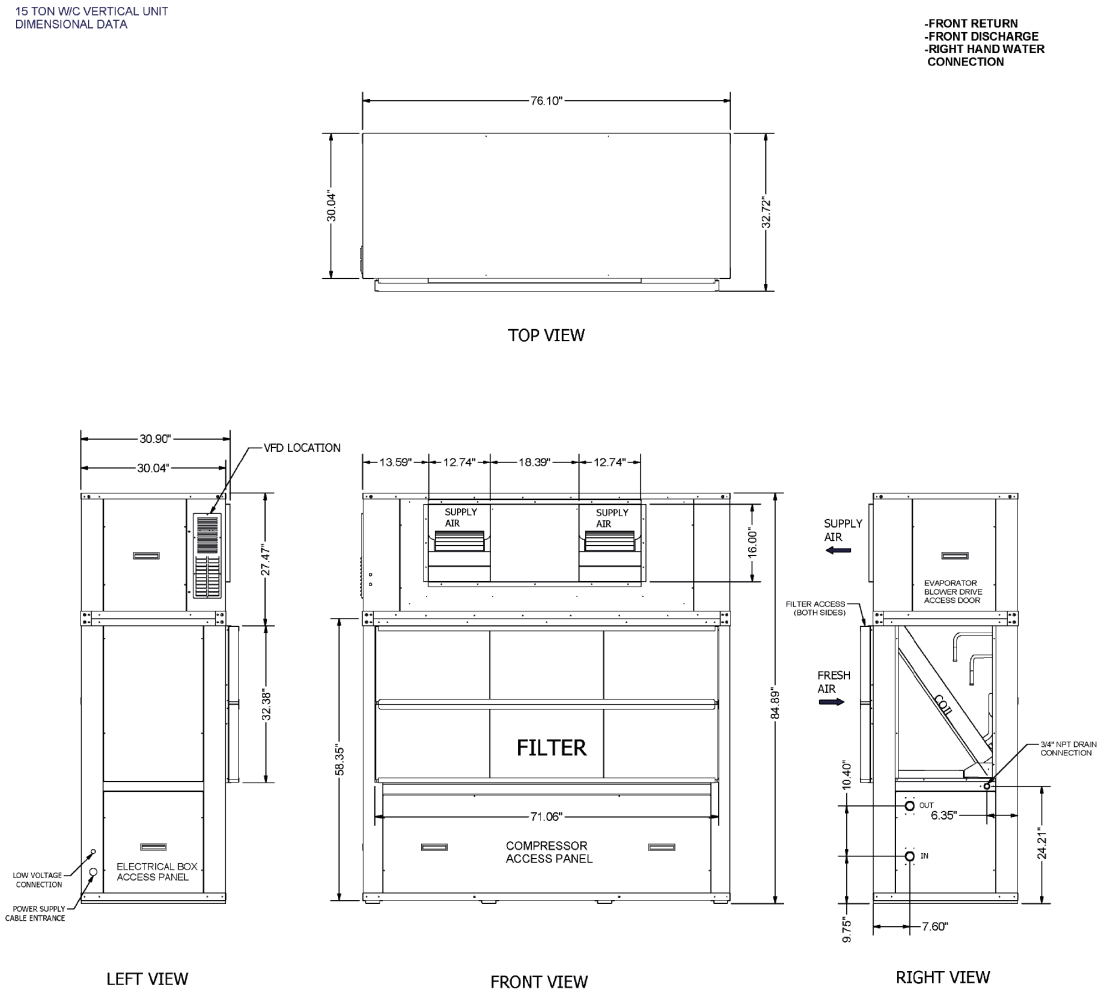


Figure 14: CSV240C front return/rear discharge/LH water connection dimensional data

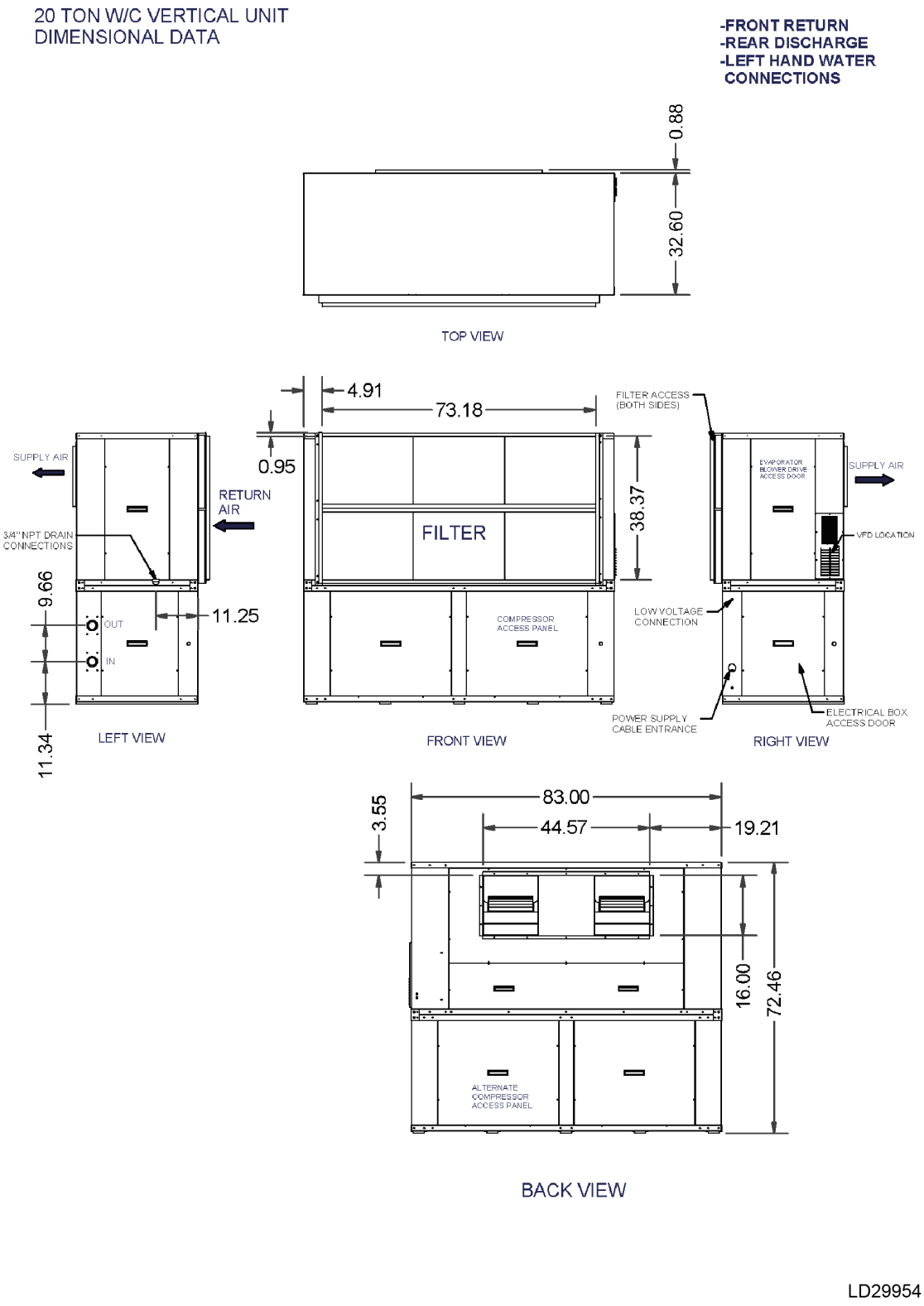


Figure 15: CSV240C front return/top discharge/LH water connection dimensional data

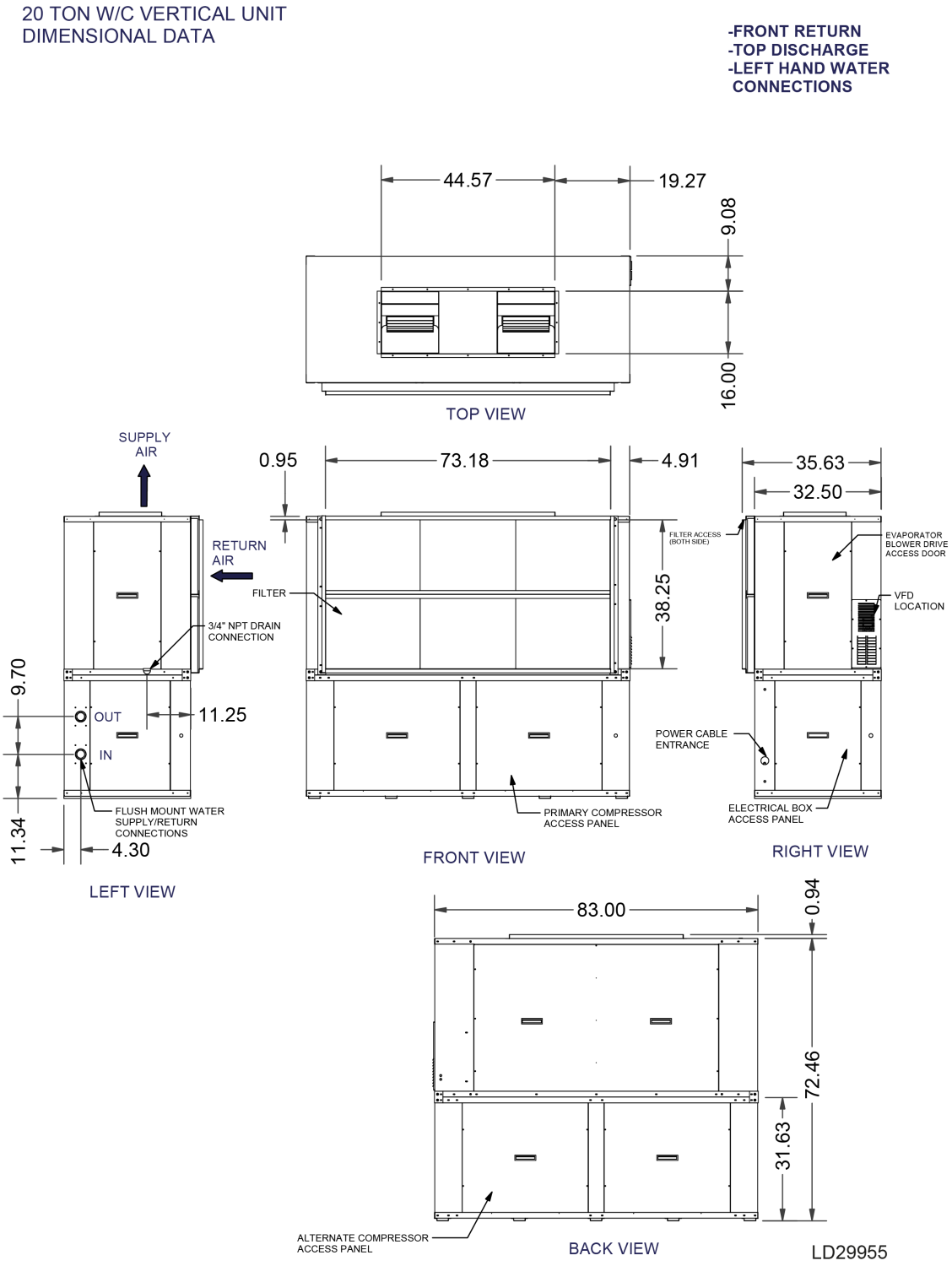


Figure 16: CSV240C front return/rear discharge/RH water connection dimensional data

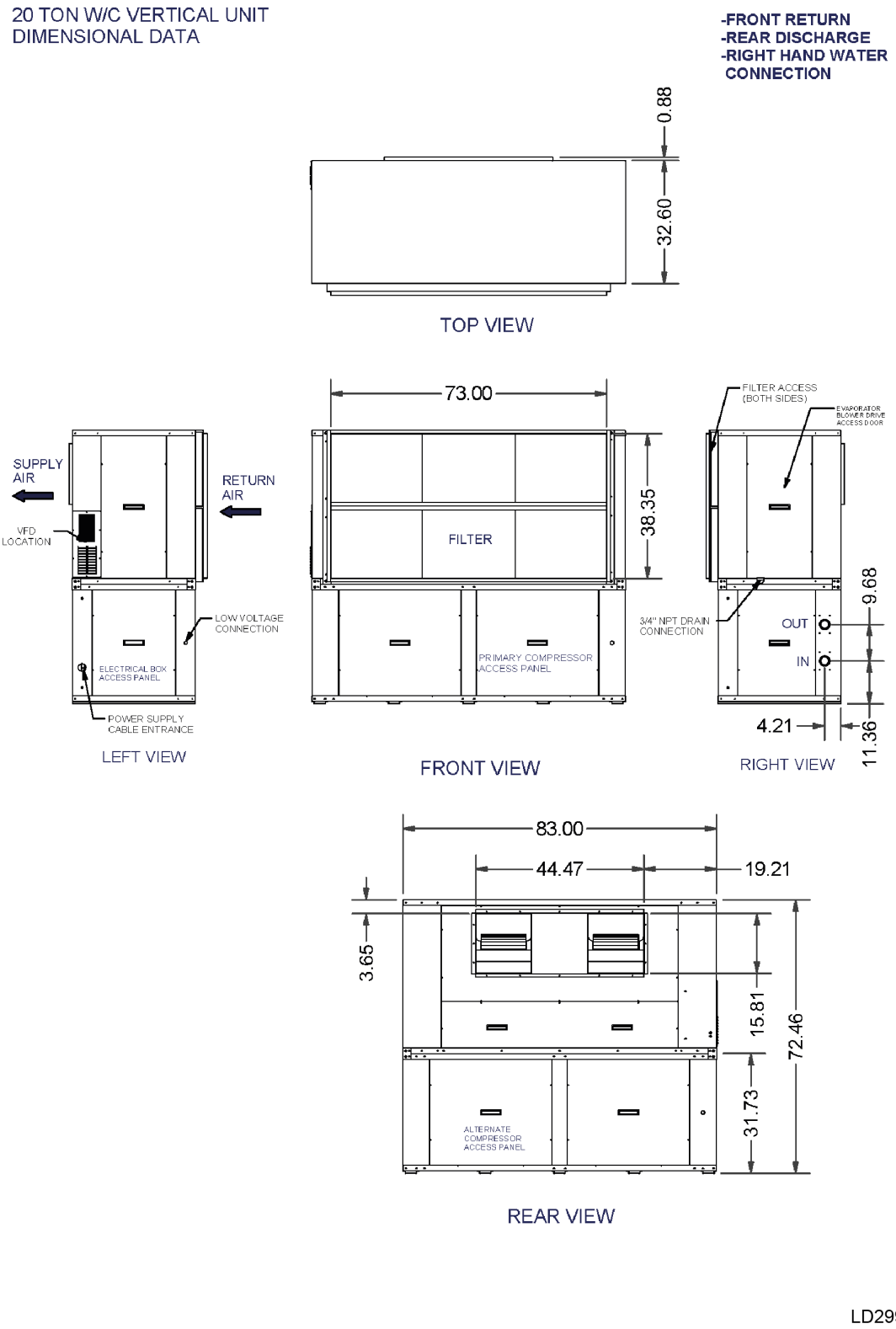


Figure 17: CSV240C front return/top discharge/RH water connection dimensional data

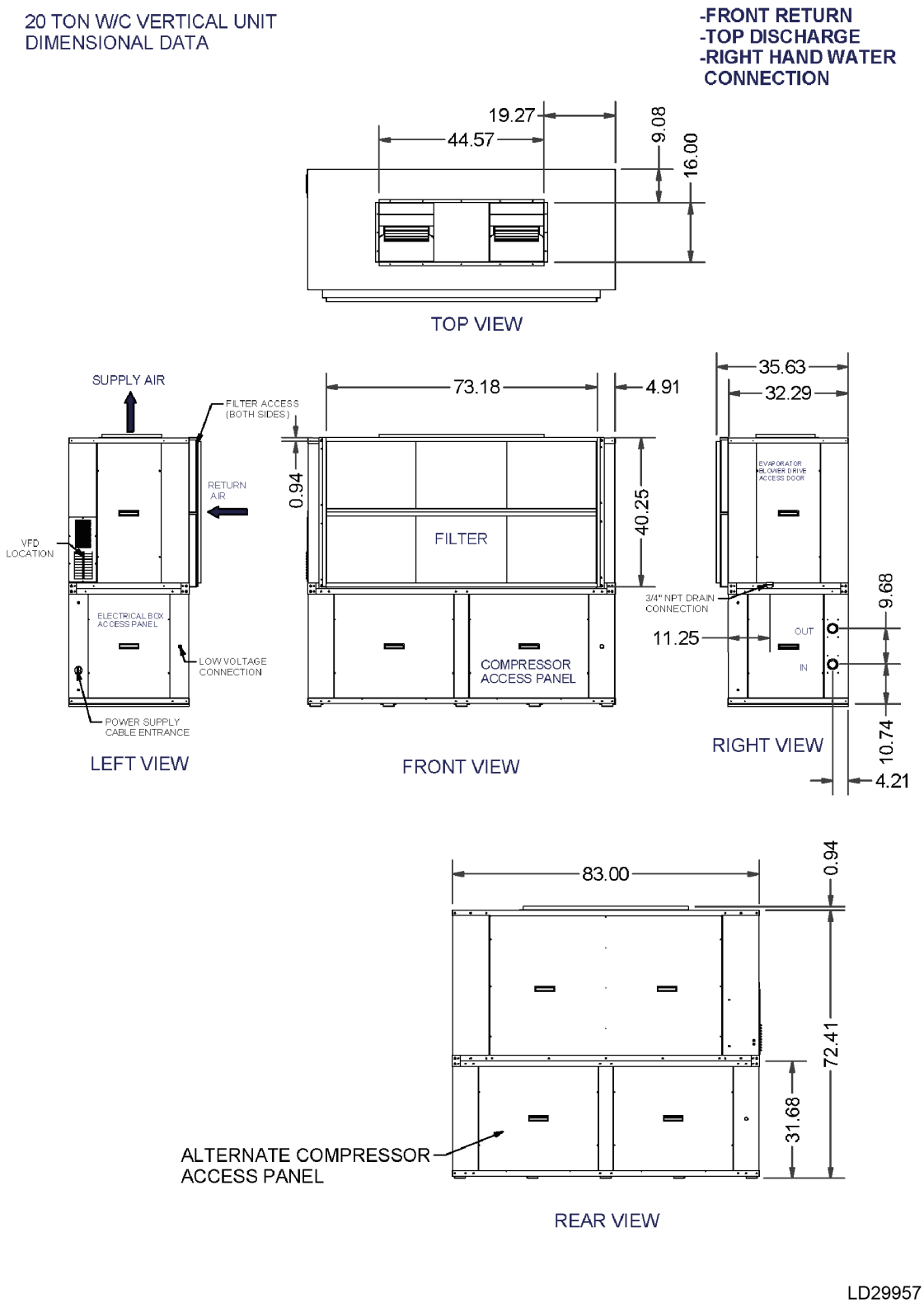


Figure 18: CSV300C front return/rear discharge/LH water connection dimensional data

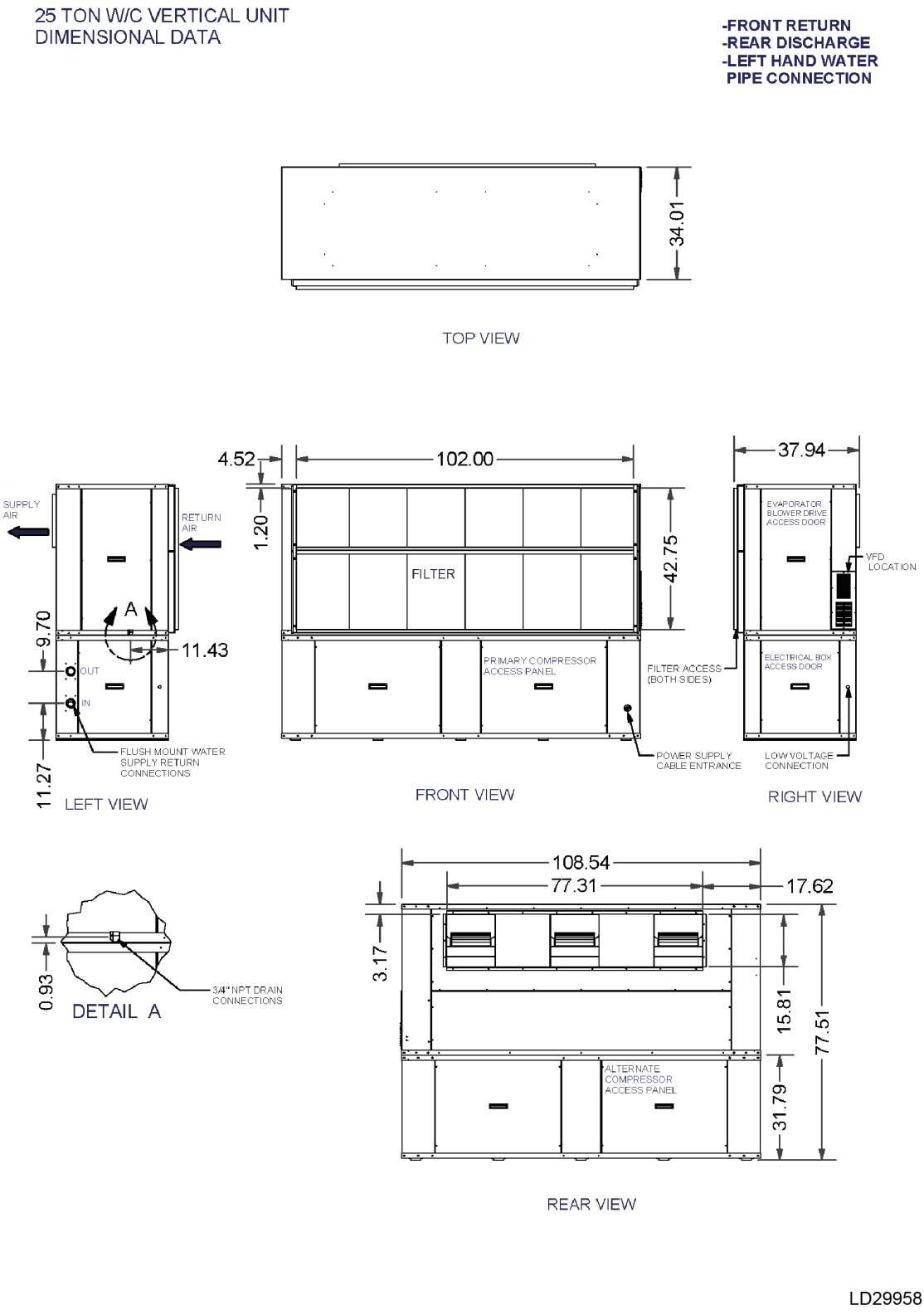


Figure 19: CSV300C front return/top discharge/LH water connection dimensional data

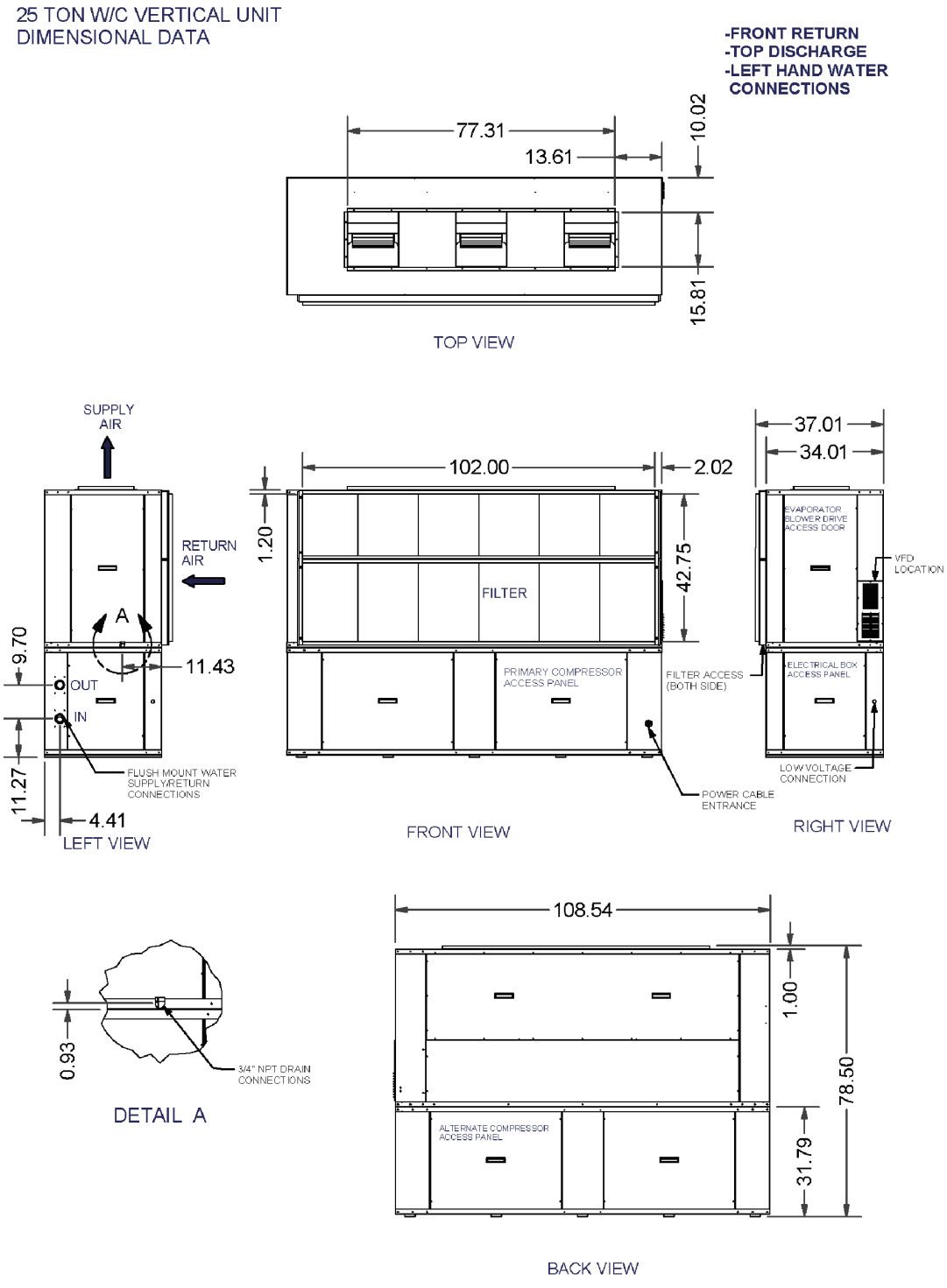


Figure 20: CSV300C front return/rear discharge/RH water connection dimensional data

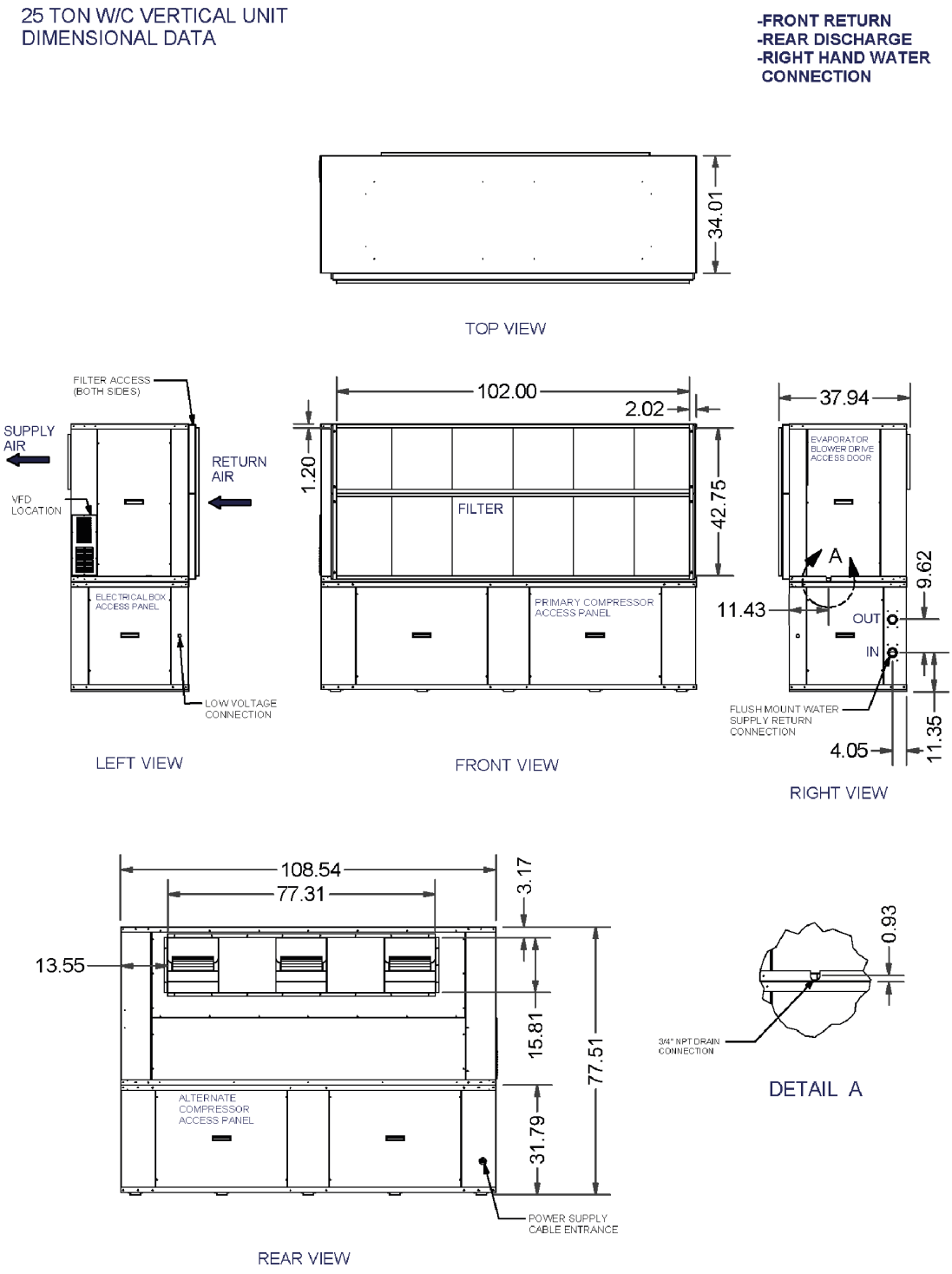
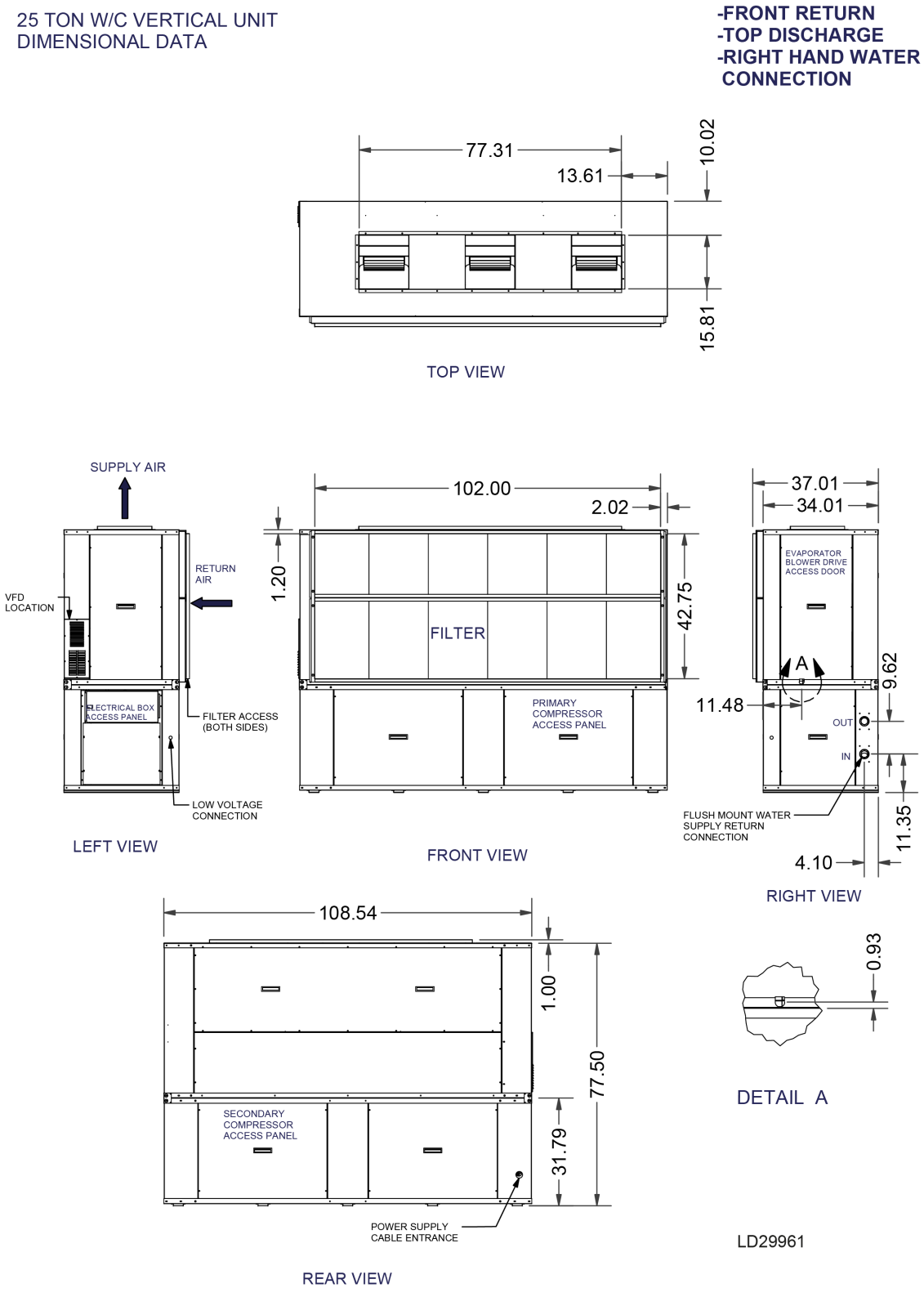


Figure 21: CSV300C front return/top discharge/RH water connection dimensional data



Typical service clearances

Figure 22: CSV060C service clearances

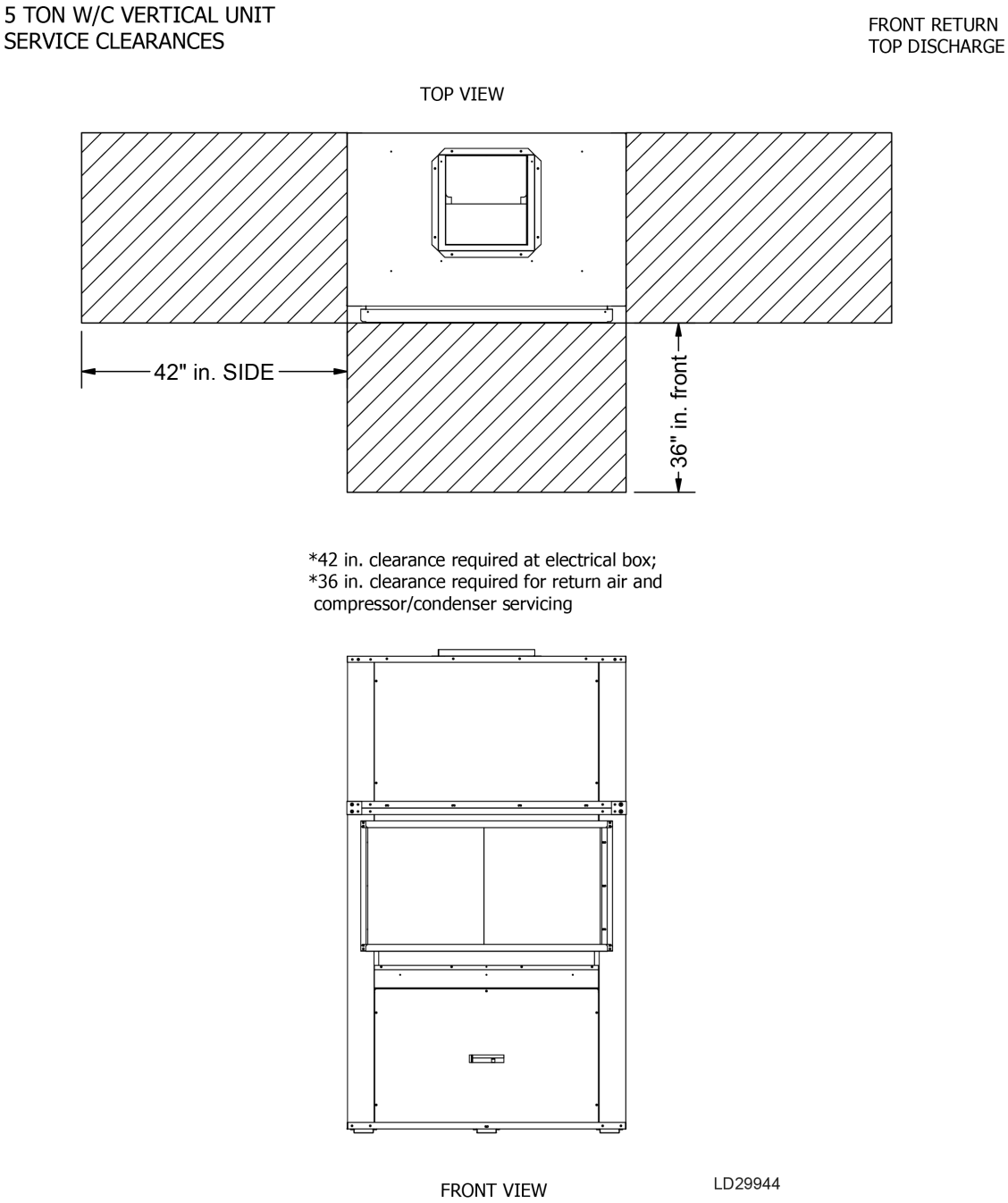


Figure 23: CSV096/120C service clearances

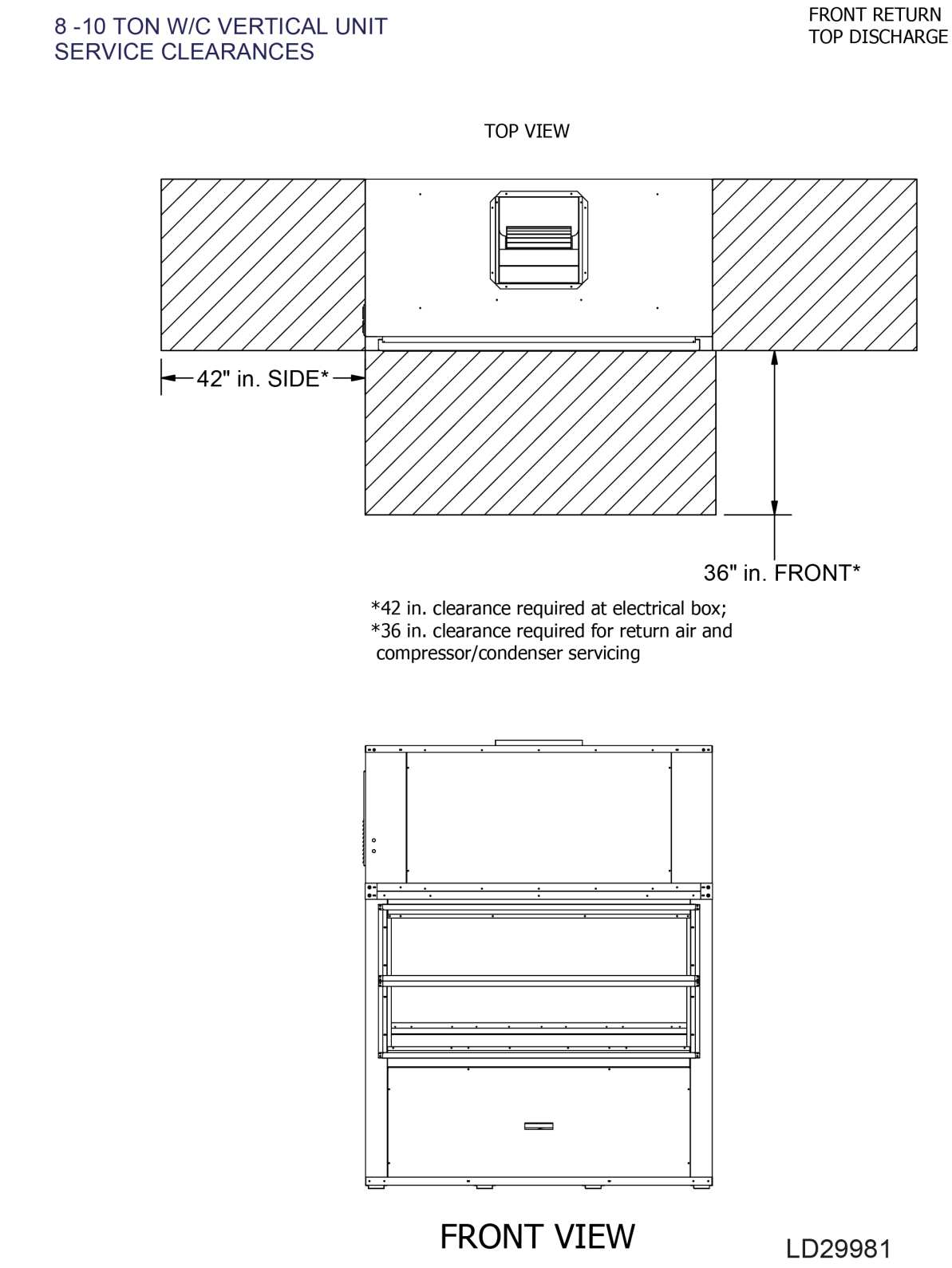
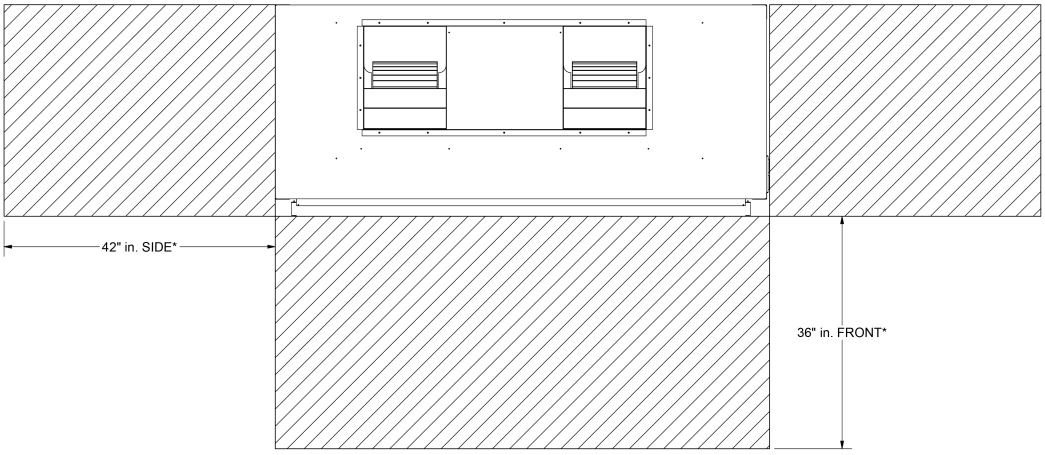


Figure 24: CSV180C service clearances

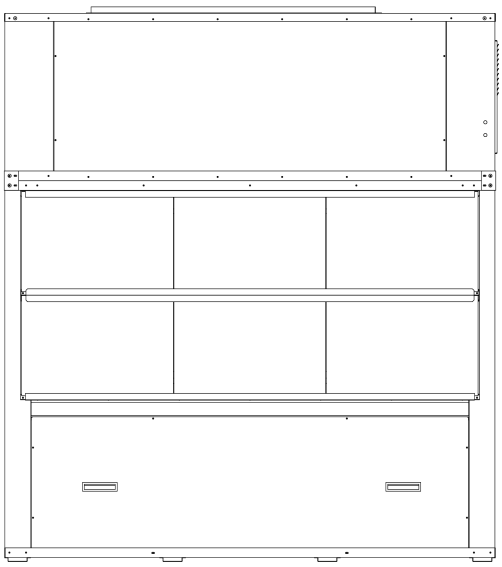
15 TON W/C VERTICAL UNIT
DIMENSIONAL DATA

-FRONT RETURN
-TOP DISCHARGE
-LEFT HAND WATER
CONNECTIONS

TOP VIEW



*42 in. clearance required at electrical box;
*36 in. clearance required for return air and
compressor/condenser servicing



FRONT VIEW

LD29997

Figure 25: CSV240C service clearances

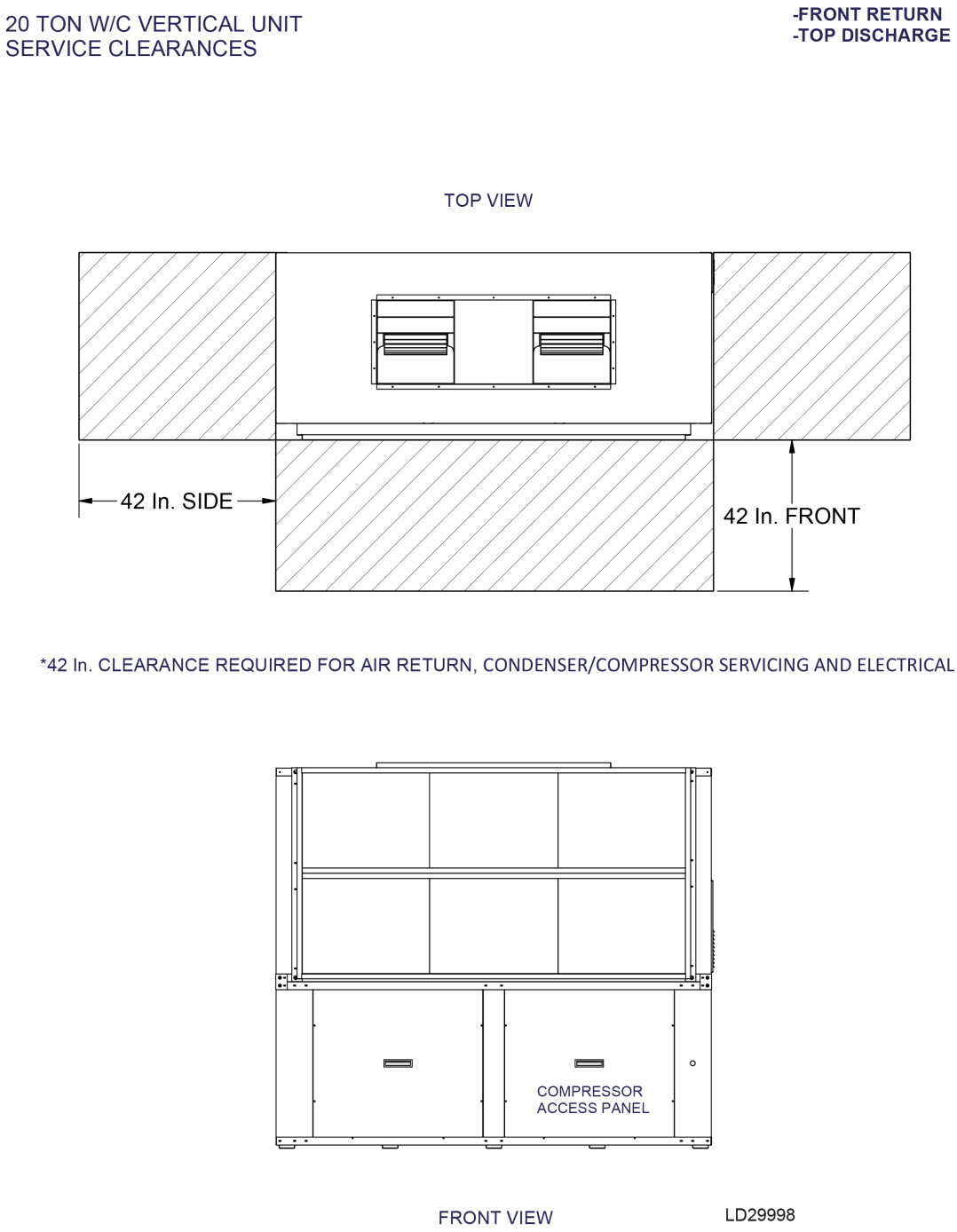
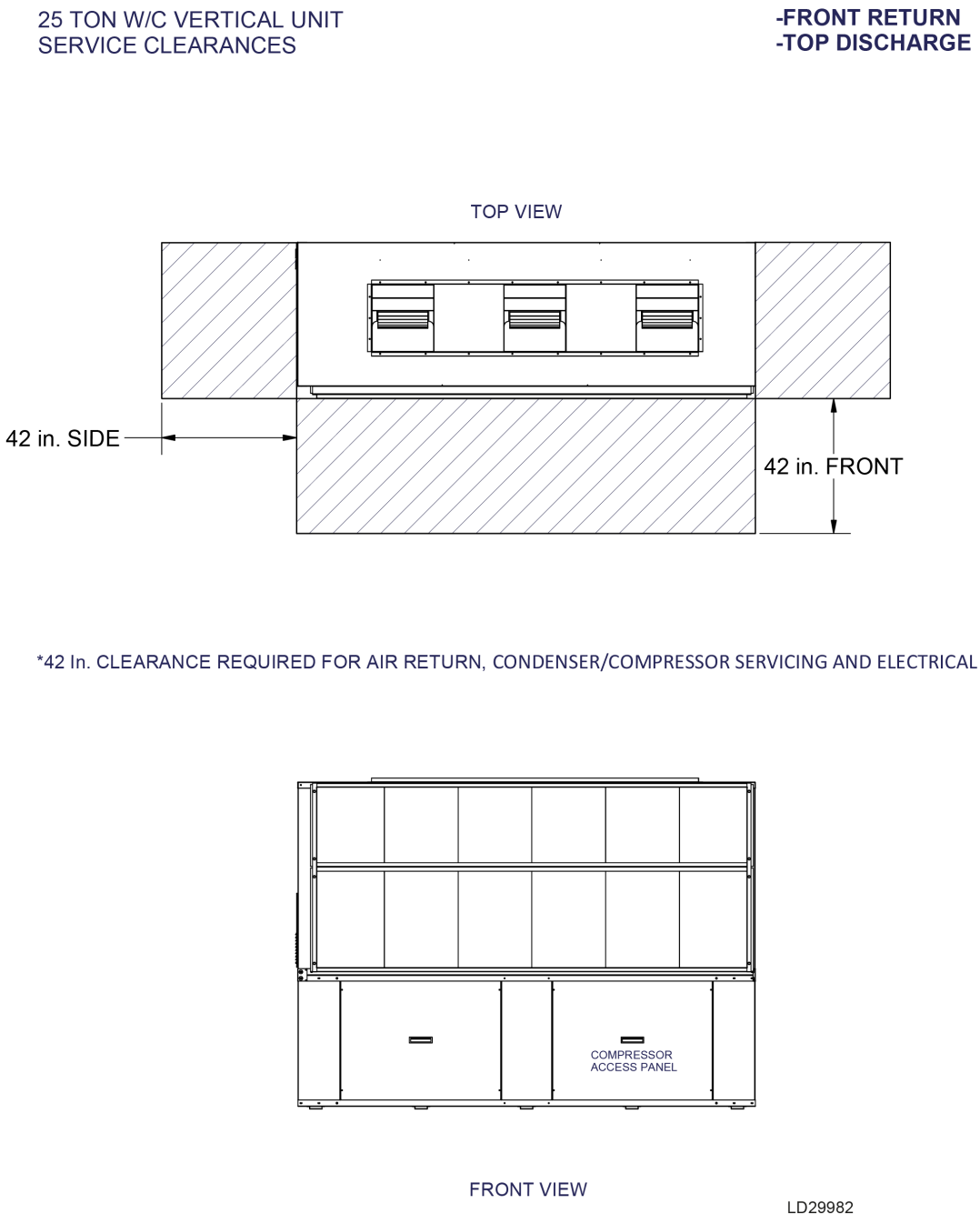


Figure 26: CSV300C service clearances



Plenum dimensions

Figure 27: CSV060C-120C plenum dimensions

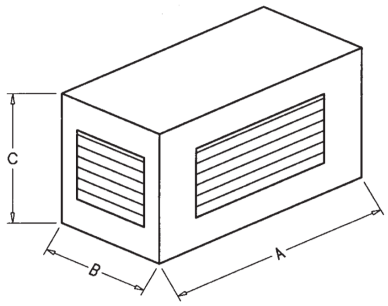


Table 11: CSV060C-120C plenum dimension (inches)

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

Figure 28: CSV180C-300C plenum dimensions

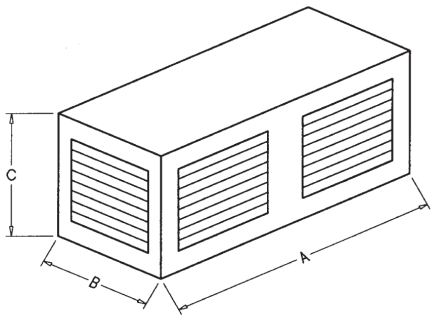


Table 12: CSV180C-300C plenum dimension (inches)

Unit size	Plenum model	Dimensions			Side grill	Front grill
		A	B	C		
15 Ton	CVDP-180	76	30	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)
25 Ton	CVDP-300B	108.5	34	28	24x20(2x)	42x20(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 1/2-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 45.0 °F entering water temperature, and 3 GPM per ton of mechanical cooling.

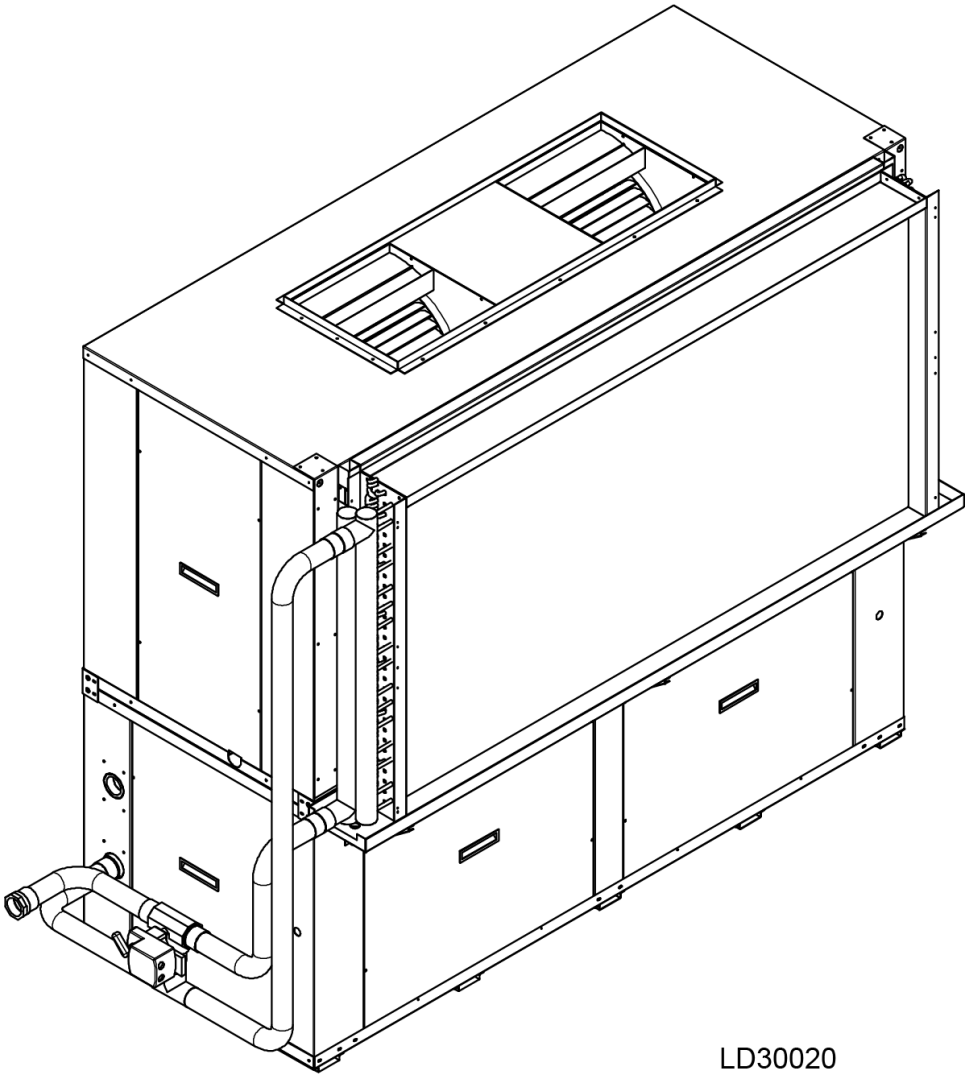
Unit	Air @ 80°F EDB, 67°F EWB		Water			Capacity (MBH)	
	CFM	PD (in WG)	Flow (GPM)	PD (PSI)	EWT (°F)	Total	Sensible
CSV060C	2000	0.23	8	2.77	45	42.6	37.1
					55	29.0	29.0
			15	9.29	45	53.7	42.4
					55	34.6	34.2
CSV096C	3200	0.15	16	5.19	45	87.4	69.0
					55	57.6	55.9
			24	11.26	45	99.9	74.6
					55	62.0	59.3
CSV120C	4000	0.22	20	7.96	45	103.6	82.7
					55	67.9	66.7
			30	17.32	45	116.5	88.6
					55	72.8	70.7
CSV180C	6000	0.23	30	5.93	45	147.7	120.3
					55	96.9	96.9
			45	12.95	45	168.3	129.8
					55	106.6	104.4
CSV240C	8000	0.21	40	5.29	45	197.6	160.8
					55	128.3	128.3
			60	11.49	45	223.0	173.1
					55	141.6	138.2
CSV300C	9200	0.14	45	6.63	45	261.5	202.4
					55	170.5	163.8
			75	17.64	45	304.5	222.6
					55	186.8	175.5

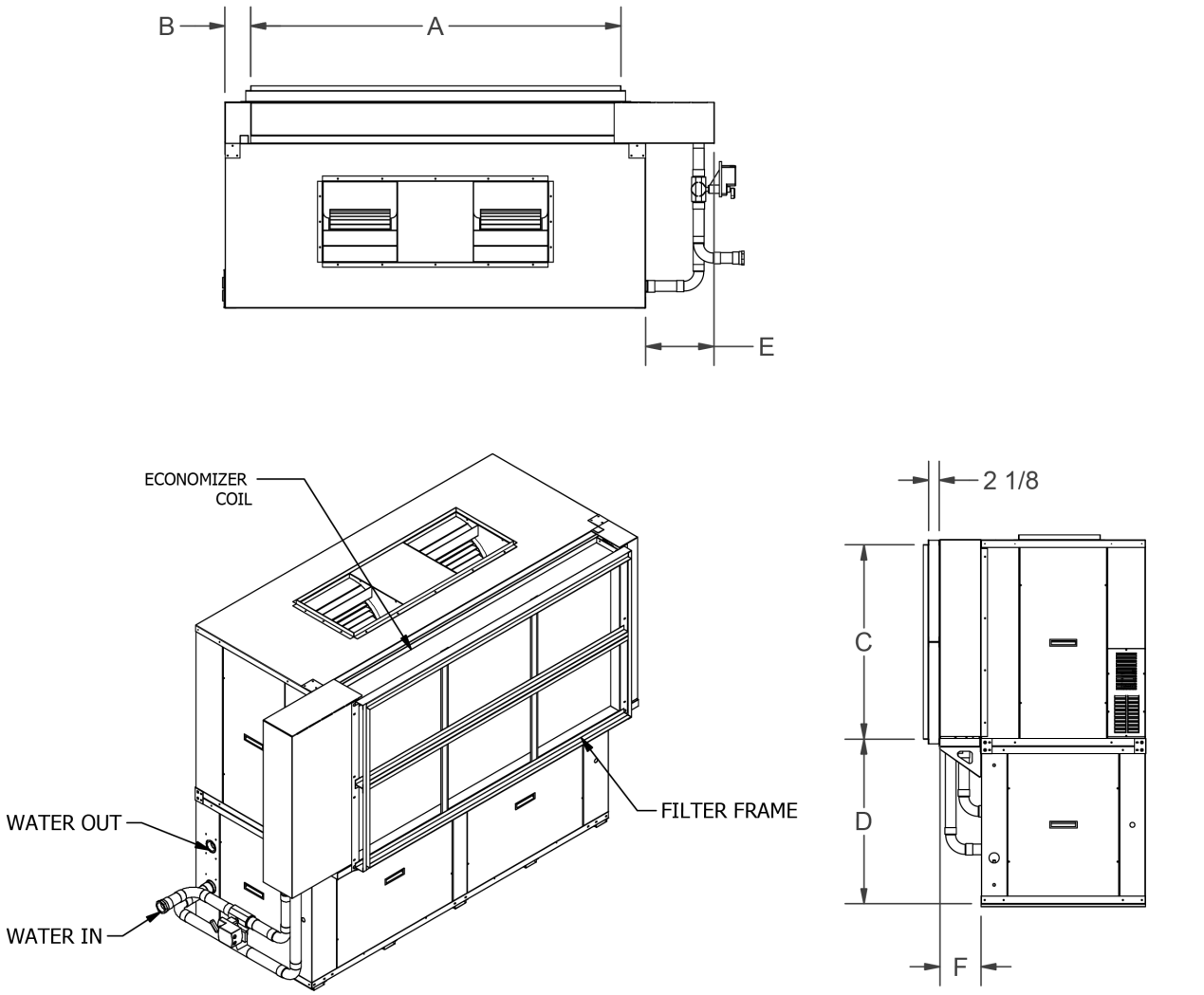
Note:

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.

Typical physical configuration

Figure 29: Typical waterside economizer configuration





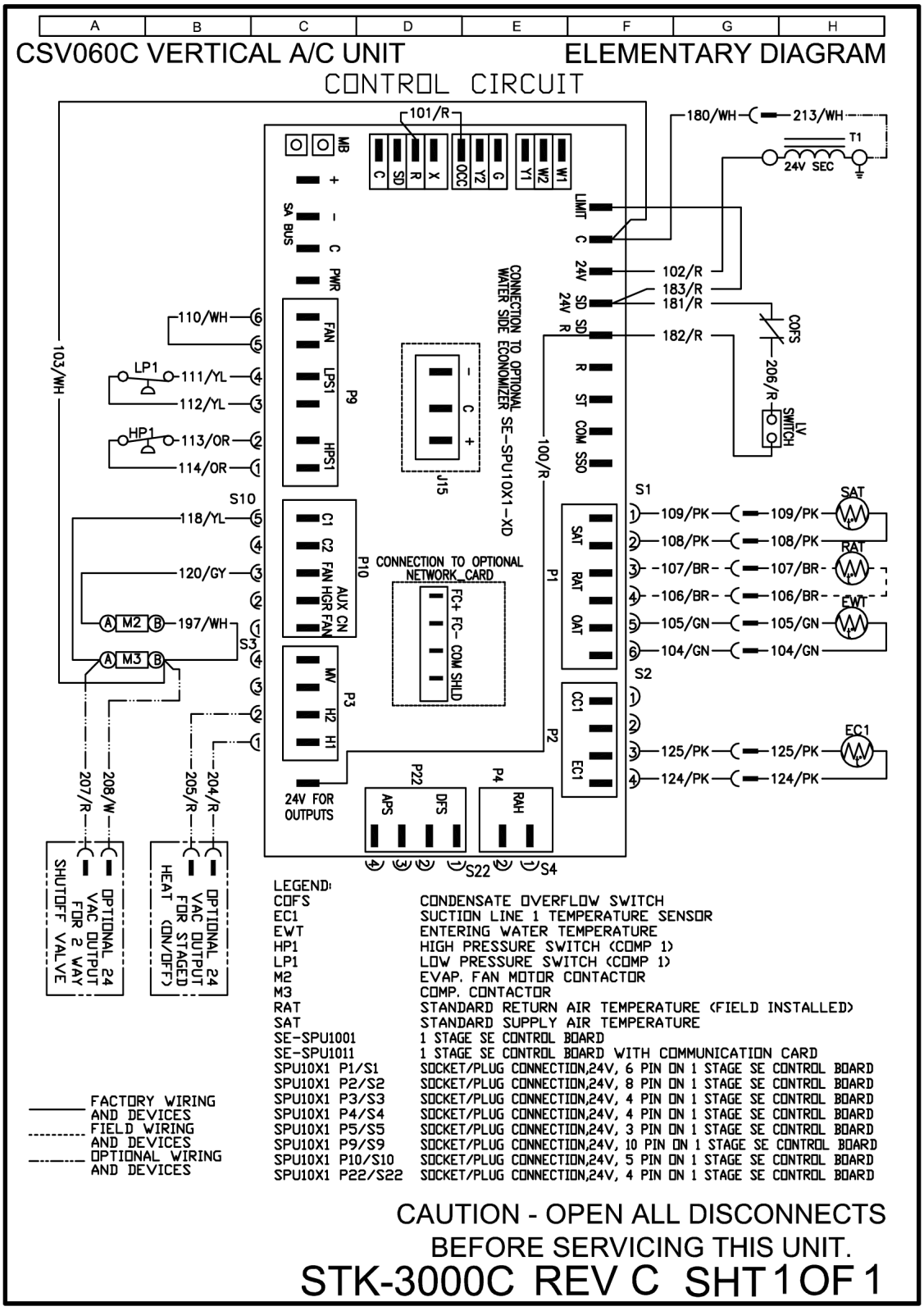
LD30025

Table 13: Waterside economizer dimensions

Unit	A	B	C	D	E	F
CSV060	34"	4"	20"	24.63"	11.00"	6.75"
CSV096/120	57.63"	3.19"	26.13"	24.06"	13.14"	6.75"
CSV180	68"	4"	30.38"	24.44"	14.56"	6.68"
CSV240	73.13"	4.94"	38.38"	32.75"	13.65"	8.24"
CSV300	102.13"	1.56"	42.88"	32.75"	13.10"	8.70"

Wiring diagrams

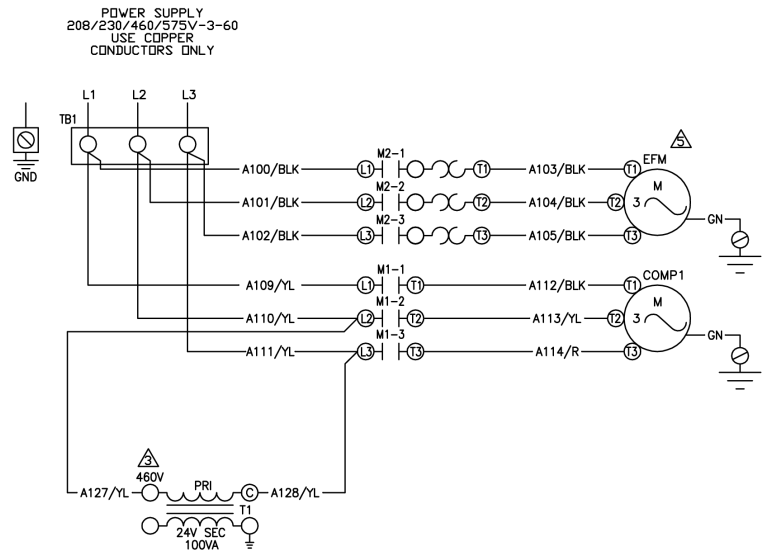
5 ton unit

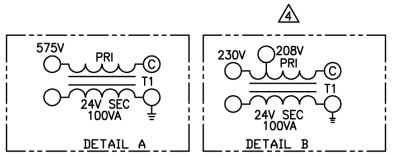


CSV060C VERTICAL A/C UNIT 208/230/460/575-3-60

ELEMENTARY DIAGRAM

POWER CIRCUIT





LEGENDS:

SE-SPU10X1	1 STAGE SMART EQUIPMENT CONTROL BOARD
TB1	LINE VOLTAGE TERMINAL BLOCK
EFM	EVAPORATOR FAN MOTOR
COMP1	SCROLL COMPRESSOR
T1	TRANSFORMER
GND	GROUND
M1	COMP1. CONTACTOR
M2	EVAP. FAN CONTACTOR + OLR

NOTES:

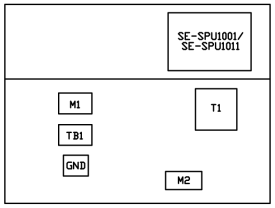
1. ALL FIELD WIRING TO BE ACCOMPLISHED FOLLOWING CITY, LOCAL AND/OR NATIONAL CODES IN EFFECT AT THE TIME OF INSTALLATION OF THIS UNIT.
2. CAUTION: LABEL ALL WIRES PRIOR TO DISCONNECTION WHEN SERVICING CONTROLS. WIRING ERRORS CAN CAUSE IMPROPER AND DANGEROUS OPERATION. IF ANY OF THE WIRING, AS SUPPLIED WITH THE UNIT, MUST BE REMOVED IT MUST BE REPLACED WITH TYPE 105 DEGREE C, 600 VOLT WIRE OR EQUIVALENT CLEARLY RENUMBERED FOR IDENTIFICATION. VERIFY PROPER OPERATION AFTER SERVICING.

△3 FOR 575 VOLT OPERATION SEE DETAIL A & FOR 208/230 SEE DETAIL B.

△4 FACTORY WIRED FOR 230 VOLT OPERATION. FOR 208 VOLT, MOVE WIRE A127/YL TO 208 VOLT TERMINAL ON T1.

△5 FOR EVAP. FAN MOTOR WITH HIGH STATIC VFD OPTION USE SAME WIRING.

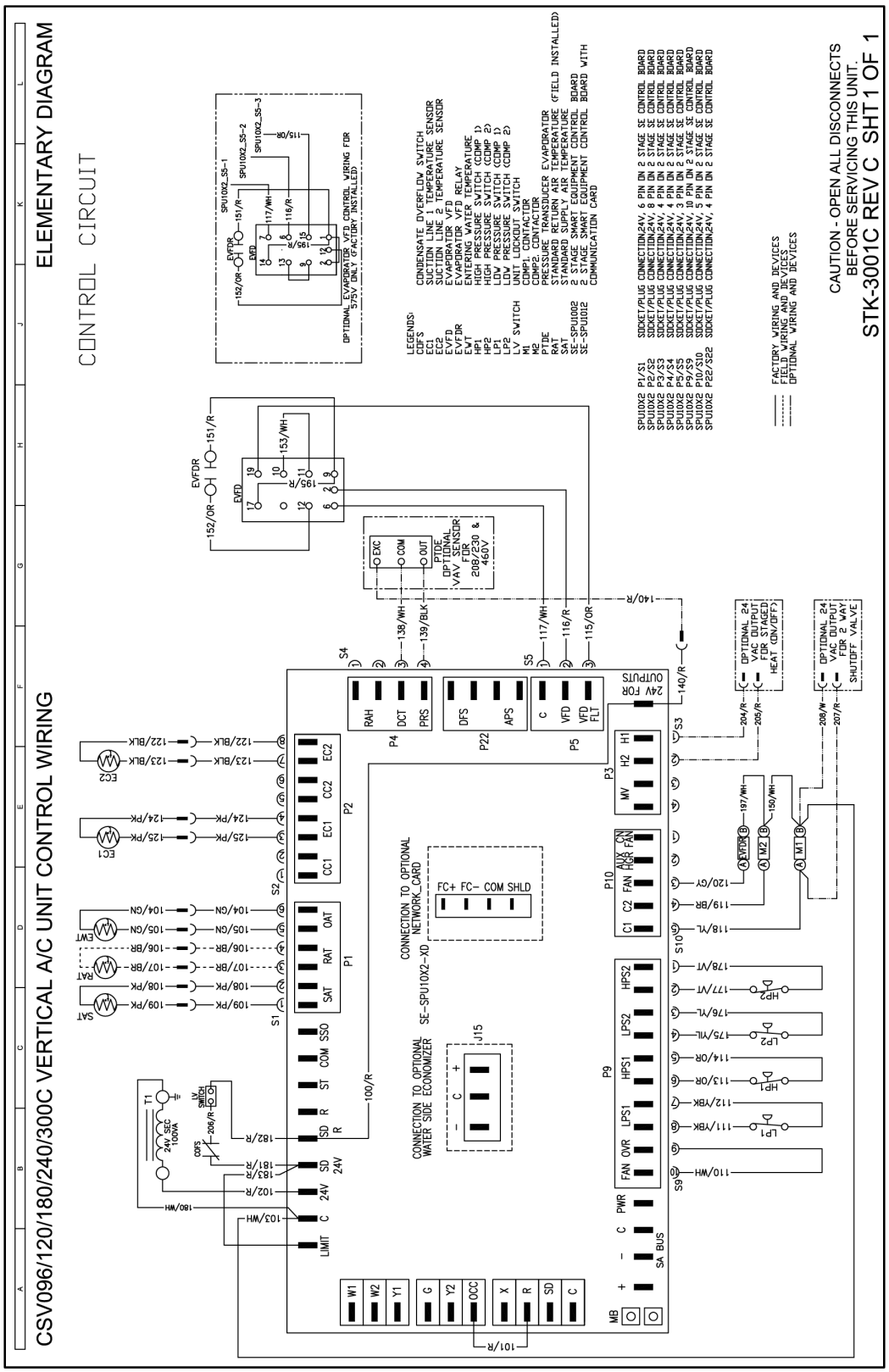
——— FACTORY WIRING AND DEVICES
- - - - - - FIELD WIRING AND DEVICES
—·—·— OPTIONAL WIRING AND DEVICES



CAUTION - OPEN ALL DISCONNECTS BEFORE SERVICING THIS UNIT.

STK-3002C REV B SHT 1 OF 1

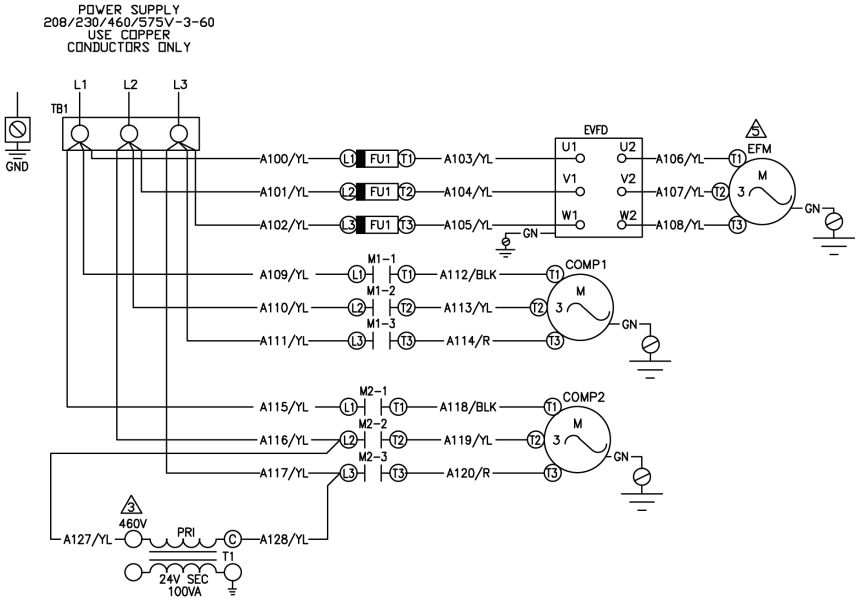
8-10 ton unit

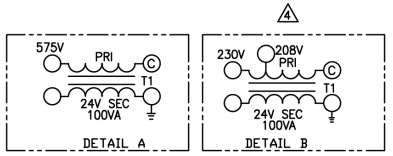

ELEMENTARY DIAGRAM
CONTROL CIRCUIT
CSV096/120/180/240/300C VERTICAL A/C UNIT CONTROL WIRING
STK-3001C REV C SHT 1 OF 1
CAUTION - OPEN ALL DISCONNECTS BEFORE SERVICING THIS UNIT.
FACTORY WIRING AND DEVICES
FIELD WIRING AND DEVICES
OPTIONAL WIRING AND DEVICES
LEGENDS:
CONDENSATE OVERFLOW SWITCH
SUCTION LINE 1 TEMPERATURE SENSOR
SUCTION LINE 2 TEMPERATURE SENSOR
EVAPORATOR VFD
EVAPORATOR VFD RELAY
EVAPORATOR WATER TEMPERATURE
HIGH PRESSURE SWITCH (CDMP 1)
HIGH PRESSURE SWITCH (CDMP 2)
LOW PRESSURE SWITCH (CDMP 1)
LOW PRESSURE SWITCH (CDMP 2)
UNIT LOCKOUT SWITCH
COMPR1 CONTACTOR
COMPR2 CONTACTOR
PRESSURE TRANSDUCER EVAPORATOR (FIELD INSTALLED)
STANDARD RETURN AIR TEMPERATURE
STANDARD SUPPLY AIR TEMPERATURE
2 STAGE SMART EQUIPMENT CONTROL BOARD
2 STAGE SMART EQUIPMENT CONTROL BOARD WITH COMMUNICATION CARD
SPU10X2 P1/S1 SOCKET/PLUG CONNECTION,24V, 6 PIN DN 2 STAGE SE CONTROL BOARD
SPU10X2 P2/S2 SOCKET/PLUG CONNECTION,24V, 8 PIN DN 2 STAGE SE CONTROL BOARD
SPU10X2 P3/S3 SOCKET/PLUG CONNECTION,24V, 4 PIN DN 2 STAGE SE CONTROL BOARD
SPU10X2 P4/S4 SOCKET/PLUG CONNECTION,24V, 4 PIN DN 2 STAGE SE CONTROL BOARD
SPU10X2 P5/S5 SOCKET/PLUG CONNECTION,24V, 4 PIN DN 2 STAGE SE CONTROL BOARD
SPU10X2 P9/S9 SOCKET/PLUG CONNECTION,24V, 10 PIN DN 2 STAGE SE CONTROL BOARD
SPU10X2 P10/S10 SOCKET/PLUG CONNECTION,24V, 5 PIN DN 2 STAGE SE CONTROL BOARD
SPU10X2 P22/S22 SOCKET/PLUG CONNECTION,24V, 4 PIN DN 2 STAGE SE CONTROL BOARD
OPTIONAL EVAPORATOR VFD CONTROL WIRING FOR 575V ONLY (FACTORY INSTALLED)
EVFDR
EVFD
SPU10X2_S5-1
SPU10X2_S5-2
SPU10X2_S5-3
152/OR
151/R
117/WH
116/R
115/OR
195/R
153/WH
EVFDR
152/OR
151/R
EVFD
195/R
153/WH
EXC
COM
OUT
PTDE
OPTIONAL VAV SENSOR FOR 208/230 & 460V
138/WH
139/BLK
140/R
117/WH
116/R
115/OR
S4
S5
P4
P22
P5
RAH
DCT
PRS
DFS
APS
C
VFD
VFD FLT
24V FOR OUTPUTS
OPTIONAL 24 VAC OUTPUT FOR STAGED HEAT (ON/OFF)
OPTIONAL 24 VAC OUTPUT FOR 2 WAY SHUTOFF VALVE
204/R
205/R
208/W
207/R
S3
P3
MV
H2
H1
EC2
EC1
122/BLK
123/BLK
124/PK
125/PK
CC1
EC1
CC2
EC2
P2
S2
104/GN
105/GN
106/BR
107/BR
108/PK
109/PK
OAT
RAT
SAT
EMT
P1
S1
CONNECTION TO OPTIONAL NETWORK CARD
FC+ FC- COM SHLD
CONNECTION TO OPTIONAL WATER SIDE ECONOMIZER
SE-SPU10X2-XD
J15
100/R
182/R
181/R
183/R
102/R
103/WH
180/WH
T1
24V SEC 100VA
LV SWITCH
208/R
CDFS
SD
R
ST
COM
SSO
24V
C
LIMIT
P10
AUX CN
HGR FAN
FAN
C1
C2
120/GY
119/BR
118/VT
197/WH
150/WH
EVFDR
CM2
M1
P9
HPS2
LPS2
HPS1
LPS1
FAN OVR
PWR
178/VT
177/VT
176/VL
175/VL
114/OR
113/OR
112/YBK
111/YBK
110/WH
HP2
LP2
HP1
LP1
S10
S9
MB
SA BUS
W1
W2
Y1
G
Y2
OCC
X
R
SD
C
101/R

CSV096C VERTICAL A/C UNIT 208/230/460/575-3-60

ELEMENTARY DIAGRAM

POWER CIRCUIT





LEGENDS:

SE-SPU10X2	2 STAGE SMART EQUIPMENT CONTROL BOARD
TB1	LINE VOLTAGE TERMINAL BLOCK
EFM	EVAPORATOR FAN MOTOR
COMP1	2 STAGE SCROLL COMPRESSOR
COMP2	2 STAGE SCROLL COMPRESSOR
T1	TRANSFORMER
GND	GROUND
FU1	EVAP. FAN MOTOR FUSE
M1	COMP1. CONTACTOR
M2	COMP2. CONTACTOR
EVFD	EVAP. FAN VFD
EVFDR	EVAP. VFD RELAY

NOTES:

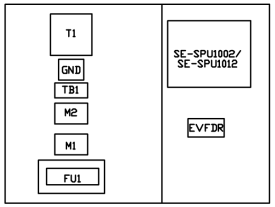
1. ALL FIELD WIRING TO BE ACCOMPLISHED FOLLOWING CITY, LOCAL AND/OR NATIONAL CODES IN EFFECT AT THE TIME OF INSTALLATION OF THIS UNIT.
2. CAUTION: LABEL ALL WIRES PRIOR TO DISCONNECTION WHEN SERVICING CONTROLS. WIRING ERRORS CAN CAUSE IMPROPER AND DANGEROUS OPERATION. IF ANY OF THE WIRING, AS SUPPLIED WITH THE UNIT, MUST BE REMOVED IT MUST BE REPLACED WITH TYPE 105 DEGREE C, 600 VOLT WIRE OR EQUIVALENT CLEARLY RENUMBERED FOR IDENTIFICATION. VERIFY PROPER OPERATION AFTER SERVICING.

3. FOR 575 VOLT OPERATION SEE DETAIL A & FOR 208/230 SEE DETAIL B.

4. FACTORY WIRED FOR 230 VOLT OPERATION. FOR 208 VOLT, MOVE WIRE A127/YL TO 208 VOLT TERMINAL ON T1.

5. FOR EVAP. FAN MOTOR WITH HIGH STATIC VFD OPTION USE SAME WIRING.

——— FACTORY WIRING AND DEVICES
------ FIELD WIRING AND DEVICES
—–—– OPTIONAL WIRING AND DEVICES



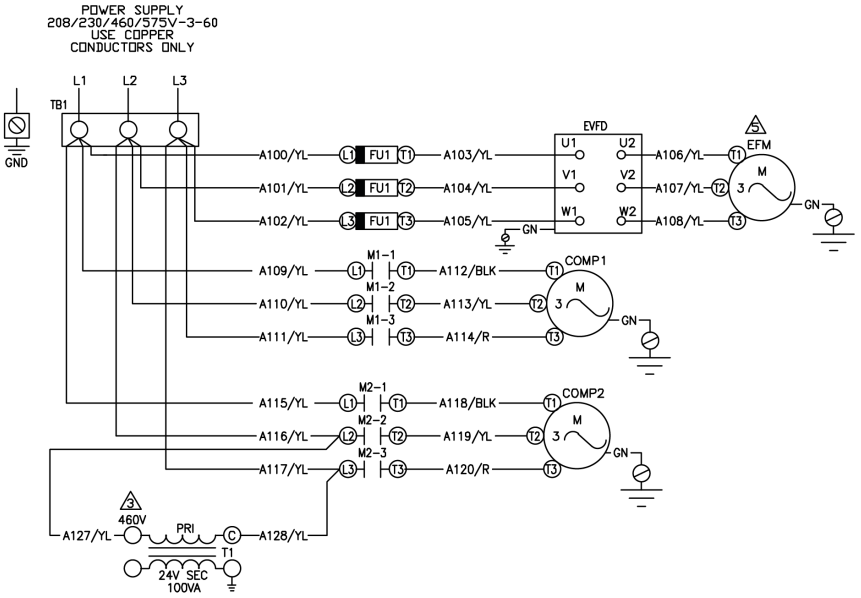
CAUTION - OPEN ALL DISCONNECTS
BEFORE SERVICING THIS UNIT.

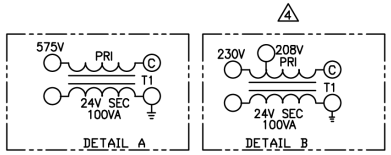
STK-3004C REV A SHT 1 OF 1

CSV120C VERTICAL A/C UNIT 208/230/460/575-3-60

ELEMENTARY DIAGRAM

POWER CIRCUIT





LEGENDS:

SE-SPU10X2	2 STAGE SMART EQUIPMENT CONTROL BOARD
TB1	LINE VOLTAGE TERMINAL BLOCK
EFM	EVAPORATOR FAN MOTOR
COMP1	2 STAGE SCROLL COMPRESSOR
COMP2	2 STAGE SCROLL COMPRESSOR
T1	TRANSFORMER
GND	GROUND
FU1	EVAP. FAN MOTOR FUSE
M1	COMP1. CONTACTOR
M2	COMP2. CONTACTOR
EVFD	EVAP. FAN VFD
EVFDR	EVAP. VFD RELAY

NOTES:

1. ALL FIELD WIRING TO BE ACCOMPLISHED FOLLOWING CITY, LOCAL AND/OR NATIONAL CODES IN EFFECT AT THE TIME OF INSTALLATION OF THIS UNIT.

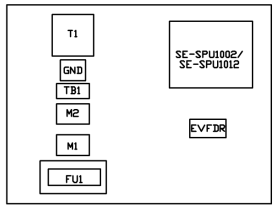
2. CAUTION: LABEL ALL WIRES PRIOR TO DISCONNECTION WHEN SERVICING CONTROLS. WIRING ERRORS CAN CAUSE IMPROPER AND DANGEROUS OPERATION. IF ANY OF THE WIRING, AS SUPPLIED WITH THE UNIT, MUST BE REMOVED IT MUST BE REPLACED WITH TYPE 105 DEGREE C, 600 VOLT WIRE OR EQUIVALENT CLEARLY RENUMBERED FOR IDENTIFICATION. VERIFY PROPER OPERATION AFTER SERVICING.

3. FOR 575 VOLT OPERATION SEE DETAIL A & FOR 208/230 SEE DETAIL B.

4. FACTORY WIRED FOR 230 VOLT OPERATION. FOR 208 VOLT, MOVE WIRE A127/YL TO 208 VOLT TERMINAL ON T1.

5. FOR EVAP. FAN MOTOR WITH HIGH STATIC VFD OPTION USE SAME WIRING.

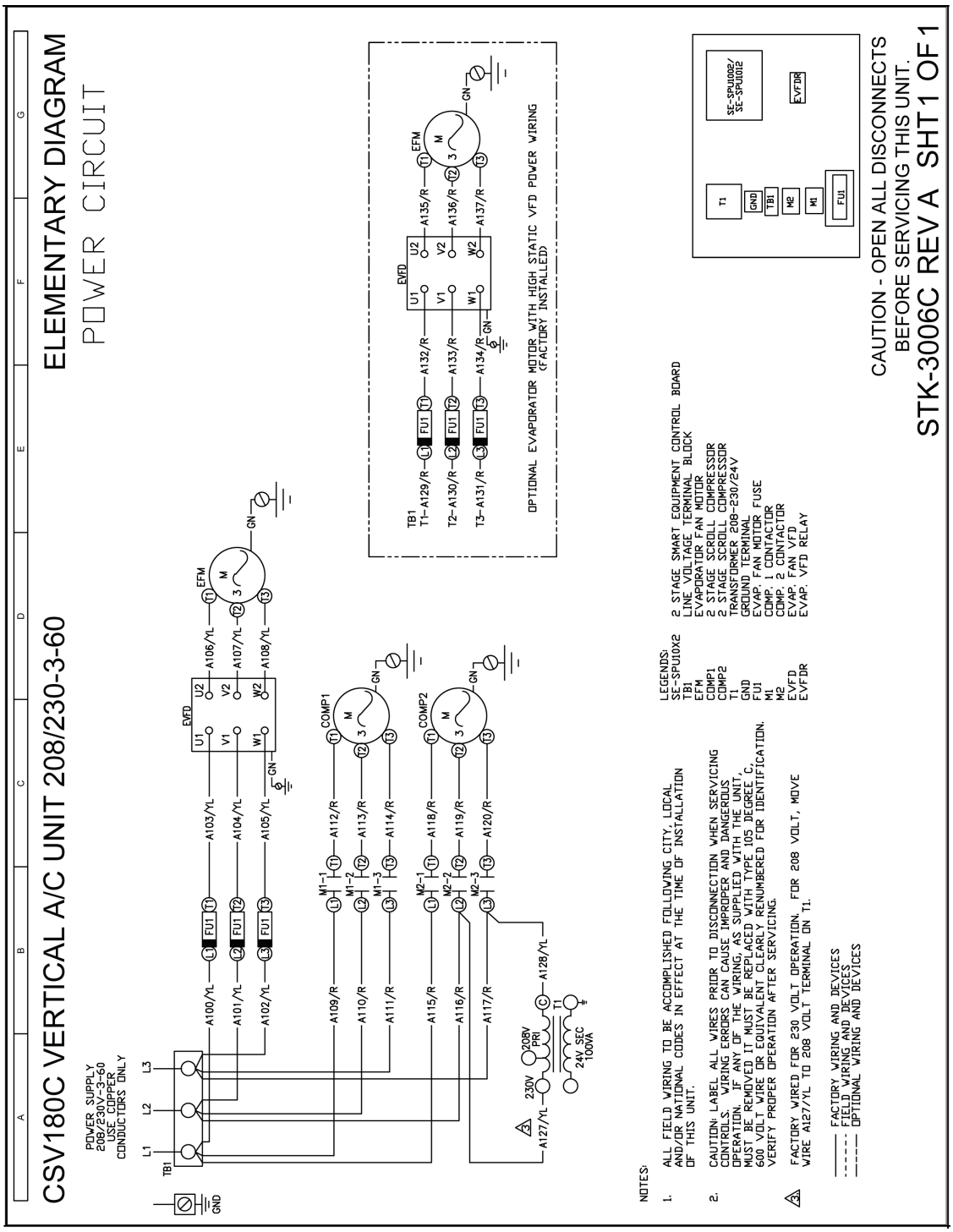
——— FACTORY WIRING AND DEVICES
------ FIELD WIRING AND DEVICES
—–—– OPTIONAL WIRING AND DEVICES



CAUTION - OPEN ALL DISCONNECTS BEFORE SERVICING THIS UNIT.

STK-3005C REV A SHT 1 OF 1

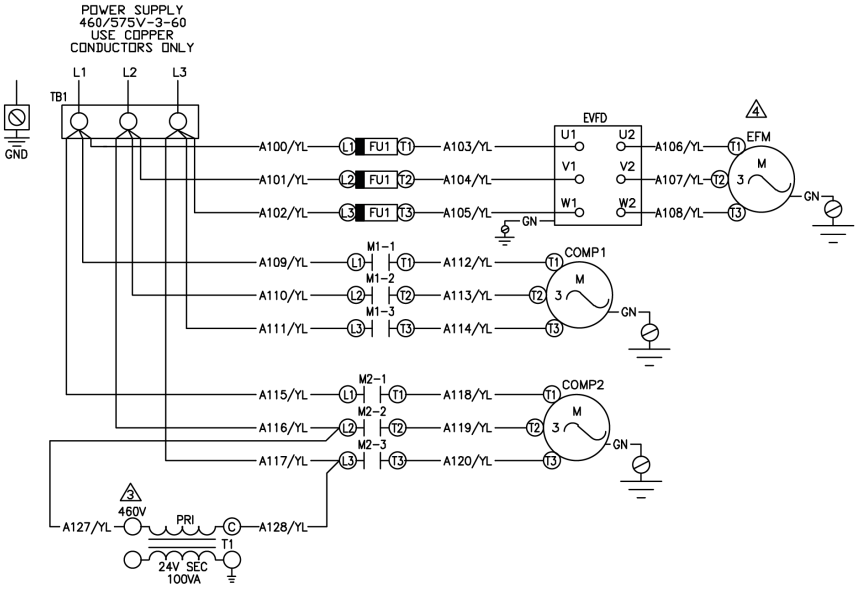
15 ton unit

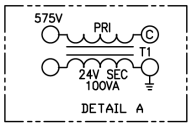

CSV180C VERTICAL A/C UNIT 208/230-3-60
ELEMENTARY DIAGRAM
POWER CIRCUIT
POWER SUPPLY
208/230V-3-60
USE COPPER
CONDUCTORS ONLY
L1
L2
L3
TB1
GND
A100/YL
A101/YL
A102/YL
A103/YL
A104/YL
A105/YL
A106/YL
A107/YL
A108/YL
FU1
EVFD
EFM
COMP1
COMP2
A109/R
A110/R
A111/R
A112/R
A113/R
A114/R
A115/R
A116/R
A117/R
A118/R
A119/R
A120/R
A127/YL
A128/YL
230V
208V
PRI
24V SEC
100VA
TB1
T1-A129/R
T2-A130/R
T3-A131/R
A132/R
A133/R
A134/R
A135/R
A136/R
A137/R
OPTIONAL EVAPORATOR MOTOR WITH HIGH STATIC VFD POWER WIRING
(FACTORY INSTALLED)
SE-SPU10X2/
SE-SPU10E2
EVFDR
CAUTION - OPEN ALL DISCONNECTS
BEFORE SERVICING THIS UNIT.
STK-3006C REV A SHT 1 OF 1
NOTES:
1. ALL FIELD WIRING TO BE ACCOMPLISHED FOLLOWING CITY, LOCAL AND/OR NATIONAL CODES IN EFFECT AT THE TIME OF INSTALLATION OF THIS UNIT.
2. CAUTION: LABEL ALL WIRES PRIOR TO DISCONNECTION WHEN SERVICING CONTROLS. WIRING ERRORS CAN CAUSE IMPROPER AND DANGEROUS OPERATION. IF ANY OF THE WIRING, AS SUPPLIED WITH THE UNIT, MUST BE REMOVED IT MUST BE REPLACED WITH TYPE 105 DEGREE C, 600 VOLT WIRE OR EQUIVALENT CLEARLY RENUMBERED FOR IDENTIFICATION. VERIFY PROPER OPERATION AFTER SERVICING.
3. FACTORY WIRED FOR 230 VOLT OPERATION. FOR 208 VOLT, MOVE WIRE A127/YL TO 208 VOLT TERMINAL ON T1.
FACTORY WIRING AND DEVICES
FIELD WIRING AND DEVICES
OPTIONAL WIRING AND DEVICES
LEGENDS:
SE-SPU10X2 2 STAGE SMART EQUIPMENT CONTROL BOARD
TB1 LINE VOLTAGE TERMINAL BLOCK
EFM EVAPORATOR FAN MOTOR
COMP1 2 STAGE SCROLL COMPRESSOR
COMP2 2 STAGE SCROLL COMPRESSOR
T1 TRANSFORMER 208-230/24V
GND GROUND TERMINAL
FU1 EVAP. FAN MOTOR FUSE
M1 COMP. 1 CONTACTOR
M2 COMP. 2 CONTACTOR
EVFD EVAP. FAN VFD
EVFDR EVAP. VFD RELAY

CSV180C VERTICAL A/C UNIT 460/575-3-60

ELEMENTARY DIAGRAM

POWER CIRCUIT





LEGENDS:

SE-SPU10X2	2 STAGE SMART EQUIPMENT CONTROL BOARD
TB1	LINE VOLTAGE TERMINAL BLOCK
EFM	EVAPORATOR FAN MOTOR
COMP1	2 STAGE SCROLL COMPRESSOR
COMP2	2 STAGE SCROLL COMPRESSOR
T1	TRANSFORMER
GND	GROUND
FU1	EVAP. FAN MOTOR FUSE
M1	COMP1. CONTACTOR
M2	COMP2. CONTACTOR
EVFD	EVAP. FAN VFD
EVFDR	EVAP. VFD RELAY

NOTES:

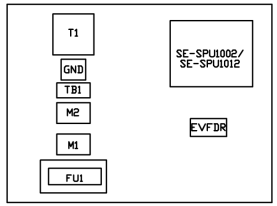
1. ALL FIELD WIRING TO BE ACCOMPLISHED FOLLOWING CITY, LOCAL AND/OR NATIONAL CODES IN EFFECT AT THE TIME OF INSTALLATION OF THIS UNIT.

2. CAUTION: LABEL ALL WIRES PRIOR TO DISCONNECTION WHEN SERVICING CONTROLS. WIRING ERRORS CAN CAUSE IMPROPER AND DANGEROUS OPERATION. IF ANY OF THE WIRING, AS SUPPLIED WITH THE UNIT, MUST BE REMOVED IT MUST BE REPLACED WITH TYPE 105 DEGREE C, 600 VOLT WIRE OR EQUIVALENT CLEARLY RENUMBERED FOR IDENTIFICATION. VERIFY PROPER OPERATION AFTER SERVICING.

3. FACTORY WIRED FOR 460 VOLT OPERATION. FOR 575 VOLT OPERATION SEE DETAIL A

4. FOR EVAP. FAN MOTOR WITH HIGH STATIC VFD OPTION USE SAME WIRING.

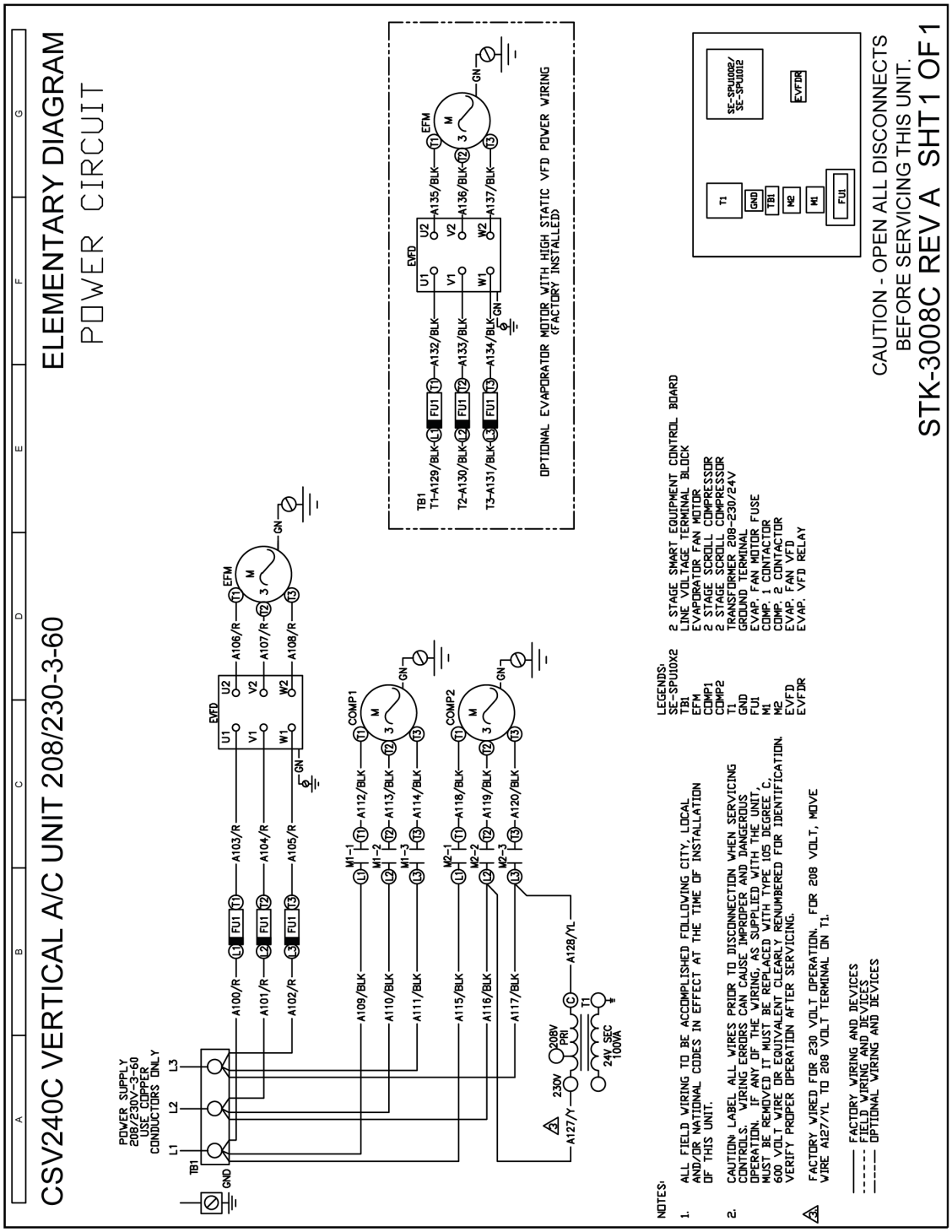
——— FACTORY WIRING AND DEVICES
- - - - - - FIELD WIRING AND DEVICES
———— OPTIONAL WIRING AND DEVICES



CAUTION - OPEN ALL DISCONNECTS BEFORE SERVICING THIS UNIT.

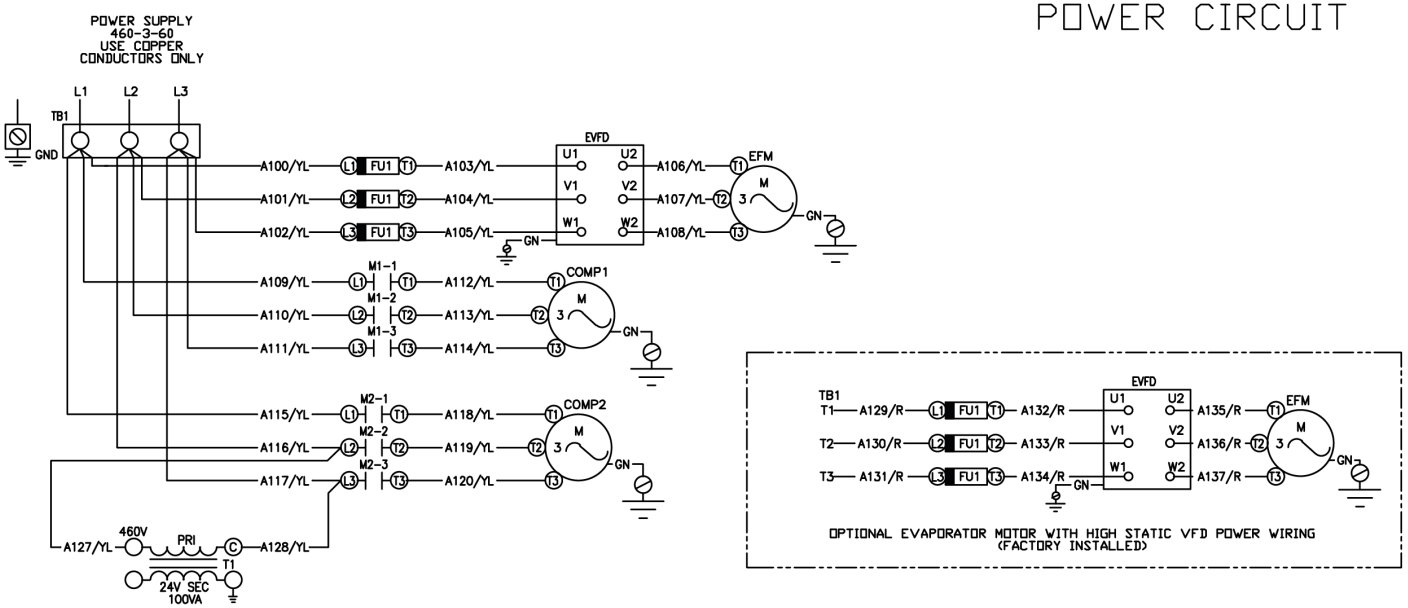
STK-3007C REV A SHT 1 OF 1

20 ton unit


CSV240C VERTICAL A/C UNIT 208/230-3-60
ELEMENTARY DIAGRAM
POWER CIRCUIT
STK-3008C REV A SHT 1 OF 1
CAUTION - OPEN ALL DISCONNECTS BEFORE SERVICING THIS UNIT.
POWER SUPPLY 208/230V-3-60 USE COPPER CONDUCTORS ONLY
OPTIONAL EVAPORATOR MOTOR WITH HIGH STATIC VFD POWER WIRING (FACTORY INSTALLED)
LEGENDS:
SE-SPU10X2 2 STAGE SMART EQUIPMENT CONTROL BOARD
TB1 LINE VOLTAGE TERMINAL BLOCK
EFM EVAPORATOR FAN MOTOR
COMP1 2 STAGE SCROLL COMPRESSOR
COMP2 2 STAGE SCROLL COMPRESSOR
T1 TRANSFORMER 208-230/24V
GND GROUND TERMINAL
FU1 EVAP. FAN MOTOR FUSE
M1 COMP. 1 CONTACTOR
M2 COMP. 2 CONTACTOR
EVFD EVAP. FAN VFD
EVFDR EVAP. VFD RELAY
NOTES:
1. ALL FIELD WIRING TO BE ACCOMPLISHED FOLLOWING CITY, LOCAL AND/OR NATIONAL CODES IN EFFECT AT THE TIME OF INSTALLATION OF THIS UNIT.
2. CAUTION LABEL ALL WIRES PRIOR TO DISCONNECTION WHEN SERVICING CONTROLS. WIRING ERRORS CAN CAUSE IMPROPER AND DANGEROUS OPERATION. IF ANY OF THE WIRING, AS SUPPLIED WITH THE UNIT, MUST BE REMOVED IT MUST BE REPLACED WITH TYPE 105 DEGREE C, 600 VOLT WIRE OR EQUIVALENT CLEARLY RENUMBERED FOR IDENTIFICATION. VERIFY PROPER OPERATION AFTER SERVICING.
3. FACTORY WIRED FOR 230 VOLT OPERATION. FOR 208 VOLT, MOVE WIRE A127/YL TO 208 VOLT TERMINAL ON T1.
FACTORY WIRING AND DEVICES
FIELD WIRING AND DEVICES
OPTIONAL WIRING AND DEVICES
SE-SPU10X2/ SE-SPU10Z
EVFDR

CSV240C VERTICAL A/C UNIT 460-3-60

ELEMENTARY DIAGRAM
POWER CIRCUIT



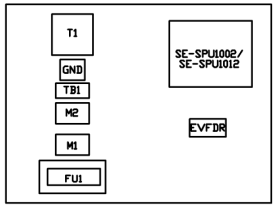
NOTES:

1. ALL FIELD WIRING TO BE ACCOMPLISHED FOLLOWING CITY, LOCAL AND/OR NATIONAL CODES IN EFFECT AT THE TIME OF INSTALLATION OF THIS UNIT.
2. CAUTION: LABEL ALL WIRES PRIOR TO DISCONNECTION WHEN SERVICING CONTROLS. WIRING ERRORS CAN CAUSE IMPROPER AND DANGEROUS OPERATION. IF ANY OF THE WIRING, AS SUPPLIED WITH THE UNIT, MUST BE REMOVED IT MUST BE REPLACED WITH TYPE 105 DEGREE C, 600 VOLT WIRE OR EQUIVALENT CLEARLY RENUMBERED FOR IDENTIFICATION. VERIFY PROPER OPERATION AFTER SERVICING.

——— FACTORY WIRING AND DEVICES
------ FIELD WIRING AND DEVICES
—–—– OPTIONAL WIRING AND DEVICES

LEGENDS:

SE-SPU10X2	2 STAGE SMART EQUIPMENT CONTROL BOARD
TB1	LINE VOLTAGE TERMINAL BLOCK
EFM	EVAPORATOR FAN MOTOR
COMP1	2 STAGE SCROLL COMPRESSOR
COMP2	2 STAGE SCROLL COMPRESSOR
T1	TRANSFORMER
GND	GROUND
FU1	EVAP. FAN MOTOR FUSE
M1	COMP1. CONTACTOR
M2	COMP2. CONTACTOR
EVFD	EVAP. FAN VFD
EVFDR	EVAP. VFD RELAY



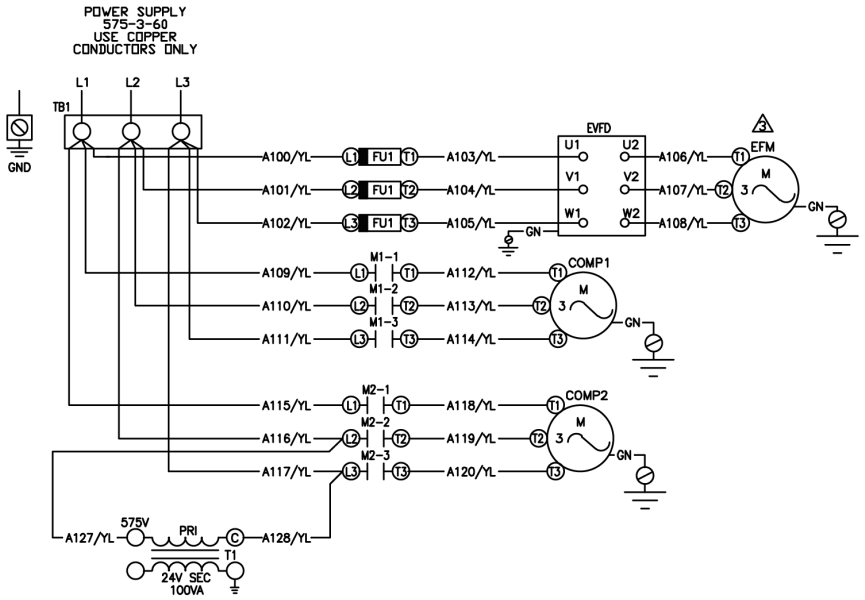
CAUTION - OPEN ALL DISCONNECTS
BEFORE SERVICING THIS UNIT.

STK-3009C REV A SHT 1 OF 1

CSV240C VERTICAL A/C UNIT 575-3-60

ELEMENTARY DIAGRAM

POWER CIRCUIT



NOTES:

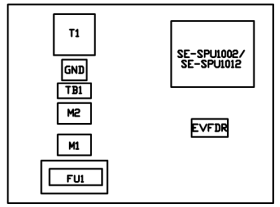
1. ALL FIELD WIRING TO BE ACCOMPLISHED FOLLOWING CITY, LOCAL AND/OR NATIONAL CODES IN EFFECT AT THE TIME OF INSTALLATION OF THIS UNIT.
2. CAUTION: LABEL ALL WIRES PRIOR TO DISCONNECTION WHEN SERVICING CONTROLS. WIRING ERRORS CAN CAUSE IMPROPER AND DANGEROUS OPERATION. IF ANY OF THE WIRING, AS SUPPLIED WITH THE UNIT, MUST BE REMOVED IT MUST BE REPLACED WITH TYPE 105 DEGREE C, 600 VOLT WIRE OR EQUIVALENT CLEARLY RENUMBERED FOR IDENTIFICATION. VERIFY PROPER OPERATION AFTER SERVICING.

△3 FOR EVAP. FAN MOTOR WITH HIGH STATIC VFD OPTION USE SAME WIRING.

——— FACTORY WIRING AND DEVICES
------ FIELD WIRING AND DEVICES
—–—– OPTIONAL WIRING AND DEVICES

LEGENDS:

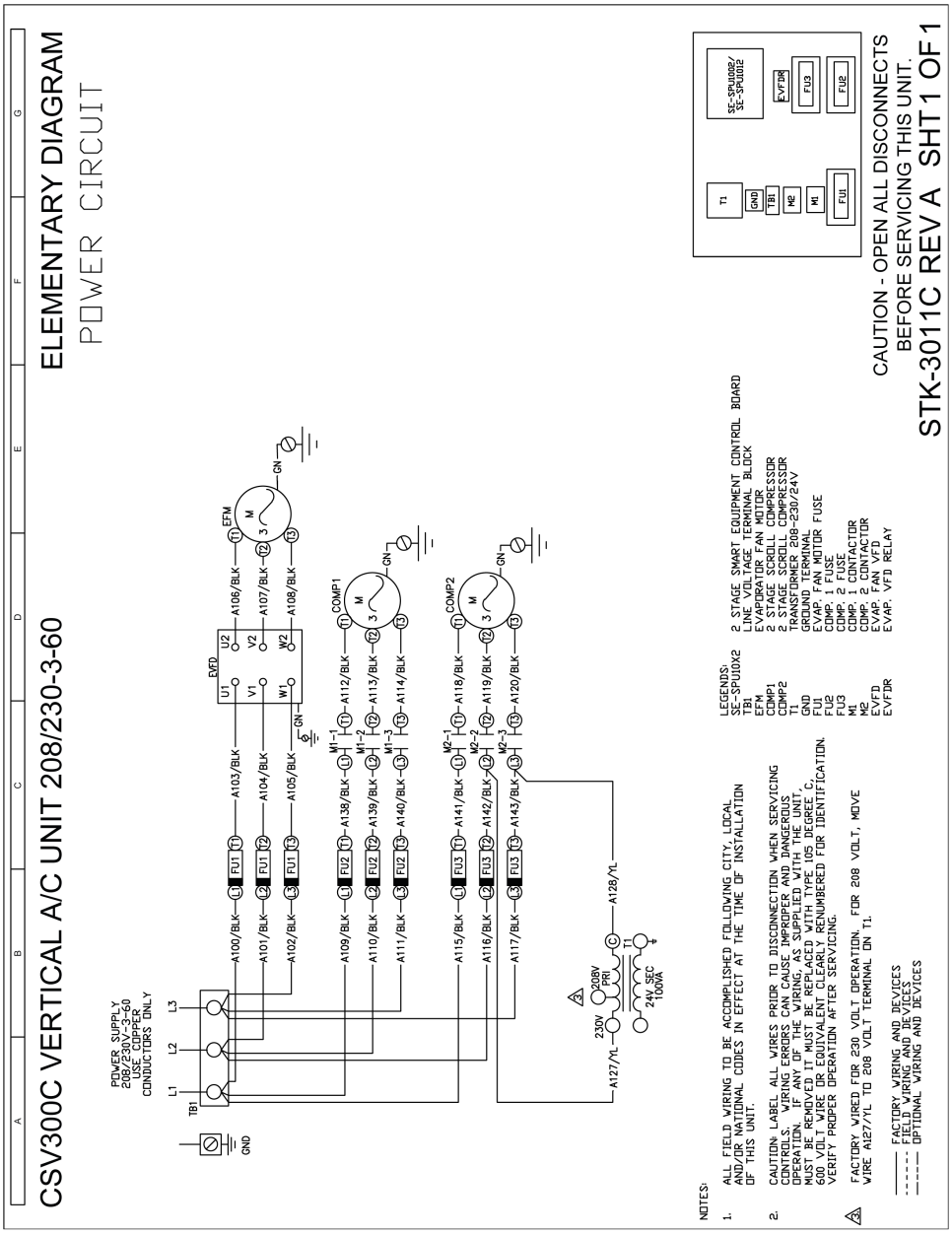
SE-SPU1002	2 STAGE SMART EQUIPMENT CONTROL BOARD
TB1	LINE VOLTAGE TERMINAL BLOCK
EFM	EVAPORATOR FAN MOTOR
COMP1	2 STAGE SCROLL COMPRESSOR
COMP2	2 STAGE SCROLL COMPRESSOR
T1	TRANSFORMER
GND	GROUND
FU1	EVAP. FAN MOTOR FUSE
M1	COMP1. CONTACTOR
M2	COMP2. CONTACTOR
EVFD	EVAP. FAN VFD
EVFDR	EVAP. VFD RELAY



CAUTION - OPEN ALL DISCONNECTS BEFORE SERVICING THIS UNIT.

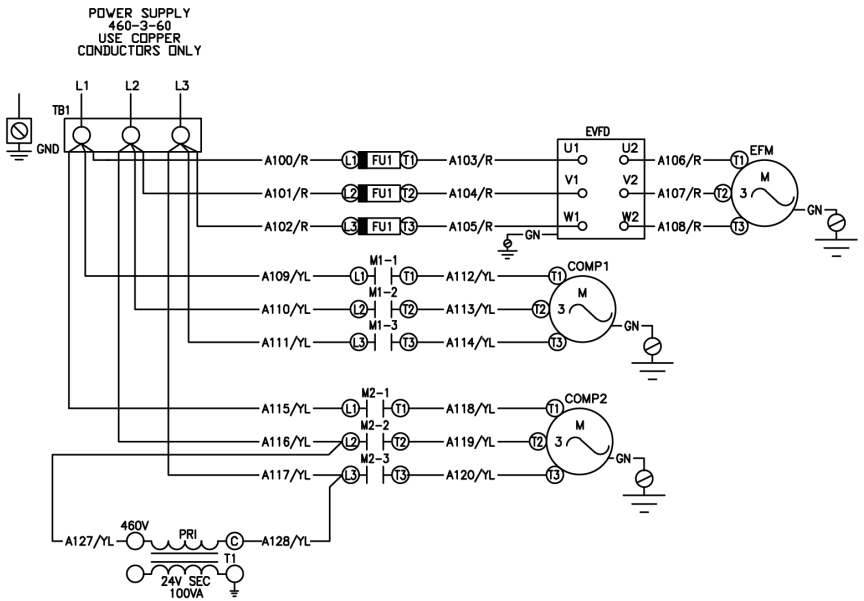
STK-3010C REV A SHT 1 OF 1

25 ton unit


CSV300C VERTICAL A/C UNIT 208/230-3-60
ELEMENTARY DIAGRAM
POWER CIRCUIT
STK-3011C REV A SHT 1 OF 1
CAUTION - OPEN ALL DISCONNECTS
BEFORE SERVICING THIS UNIT.
POWER SUPPLY
208/230V-3-60
USE COPPER
CONDUCTORS ONLY
NOTES:
1. ALL FIELD WIRING TO BE ACCOMPLISHED FOLLOWING CITY, LOCAL AND/OR NATIONAL CODES IN EFFECT AT THE TIME OF INSTALLATION OF THIS UNIT.
2. CAUTION: LABEL ALL WIRES PRIOR TO DISCONNECTION WHEN SERVICING CONTROLS. WIRING ERRORS CAN CAUSE IMPROPER AND DANGEROUS OPERATION. IF ANY OF THE WIRING, AS SUPPLIED WITH THE UNIT, MUST BE REMOVED IT MUST BE REPLACED WITH TYPE 105 DEGREE C. 600 VOLT WIRE OR EQUIVALENT. CAREFULLY RENUMBERED FOR IDENTIFICATION. VERIFY PROPER OPERATION AFTER SERVICING.
FACTORY WIRED FOR 230 VOLT OPERATION. FOR 208 VOLT, MOVE WIRE A127/YL TO 208 VOLT TERMINAL ON T1.
FACTORY WIRING AND DEVICES
FIELD WIRING AND DEVICES
OPTIONAL WIRING AND DEVICES
LEGENDS:
SE-SPU100X2 2 STAGE SMART EQUIPMENT CONTROL BOARD
TB1 LINE VOLTAGE TERMINAL BLOCK
EFM EVAPORATOR FAN MOTOR
COMP1 2 STAGE SCROLL COMPRESSOR
COMP2 2 STAGE SCROLL COMPRESSOR
T1 TRANSFORMER 3 208-230/24V
GND GROUND TERMINAL
FU1 EVAP. FAN MOTOR FUSE
FU2 COMP. 1 FUSE
FU3 COMP. 2 FUSE
M1 COMP. 1 CONTACTOR
M2 COMP. 2 CONTACTOR
EVFD EVAP. VFD
EVFDR EVAP. VFD RELAY
TB1
L1
L2
L3
GND
EFM
BVFD
COMP1
COMP2
T1
208V
PRI
24V SEC
100VA
SE-SPU100B/
SE-SPU101Z
EVFDR
FU3
FU2
FU1
M2
M1
GND

CSV300C VERTICAL A/C UNIT 460-3-60

ELEMENTARY DIAGRAM
POWER CIRCUIT



NOTES:

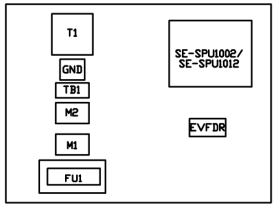
1. ALL FIELD WIRING TO BE ACCOMPLISHED FOLLOWING CITY, LOCAL AND/OR NATIONAL CODES IN EFFECT AT THE TIME OF INSTALLATION OF THIS UNIT.

2. CAUTION: LABEL ALL WIRES PRIOR TO DISCONNECTION WHEN SERVICING CONTROLS. WIRING ERRORS CAN CAUSE IMPROPER AND DANGEROUS OPERATION. IF ANY OF THE WIRING, AS SUPPLIED WITH THE UNIT, MUST BE REMOVED IT MUST BE REPLACED WITH TYPE 105 DEGREE C, 600 VOLT WIRE OR EQUIVALENT CLEARLY RENUMBERED FOR IDENTIFICATION. VERIFY PROPER OPERATION AFTER SERVICING.

——— FACTORY WIRING AND DEVICES
------ FIELD WIRING AND DEVICES
———— OPTIONAL WIRING AND DEVICES

LEGENDS:

SE-SPU10X2	2 STAGE SMART EQUIPMENT CONTROL BOARD
TB1	LINE VOLTAGE TERMINAL BLOCK
EFM	EVAPORATOR FAN MOTOR
COMP1	2 STAGE SCROLL COMPRESSOR
COMP2	2 STAGE SCROLL COMPRESSOR
T1	TRANSFORMER
GND	GROUND
FU1	EVAP. FAN MOTOR FUSE
M1	COMP1. CONTACTOR
M2	COMP2. CONTACTOR
EVFD	EVAP. FAN VFD
EVFDR	EVAP. VFD RELAY

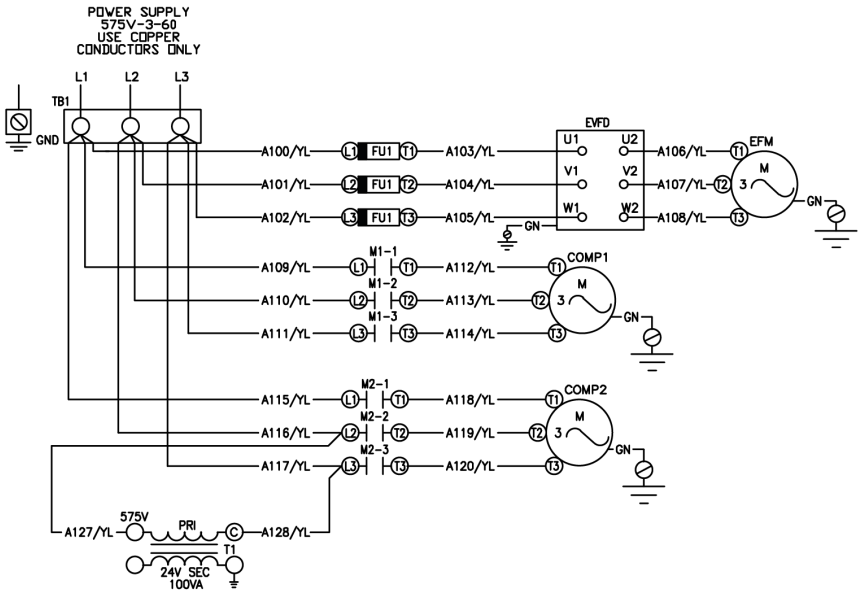


CAUTION - OPEN ALL DISCONNECTS
BEFORE SERVICING THIS UNIT.

STK-3012C REV A SHT 1 OF 1

CSV300C VERTICAL A/C UNIT 575-3-60

ELEMENTARY DIAGRAM
POWER CIRCUIT



NOTES:

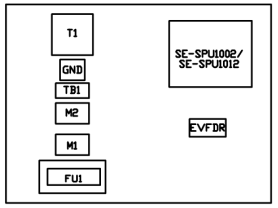
1. ALL FIELD WIRING TO BE ACCOMPLISHED FOLLOWING CITY, LOCAL AND/OR NATIONAL CODES IN EFFECT AT THE TIME OF INSTALLATION OF THIS UNIT.

2. CAUTION: LABEL ALL WIRES PRIOR TO DISCONNECTION WHEN SERVICING CONTROLS. WIRING ERRORS CAN CAUSE IMPROPER AND DANGEROUS OPERATION. IF ANY OF THE WIRING, AS SUPPLIED WITH THE UNIT, MUST BE REMOVED IT MUST BE REPLACED WITH TYPE 105 DEGREE C, 600 VOLT WIRE OR EQUIVALENT CLEARLY RENUMBERED FOR IDENTIFICATION. VERIFY PROPER OPERATION AFTER SERVICING.

LEGENDS:

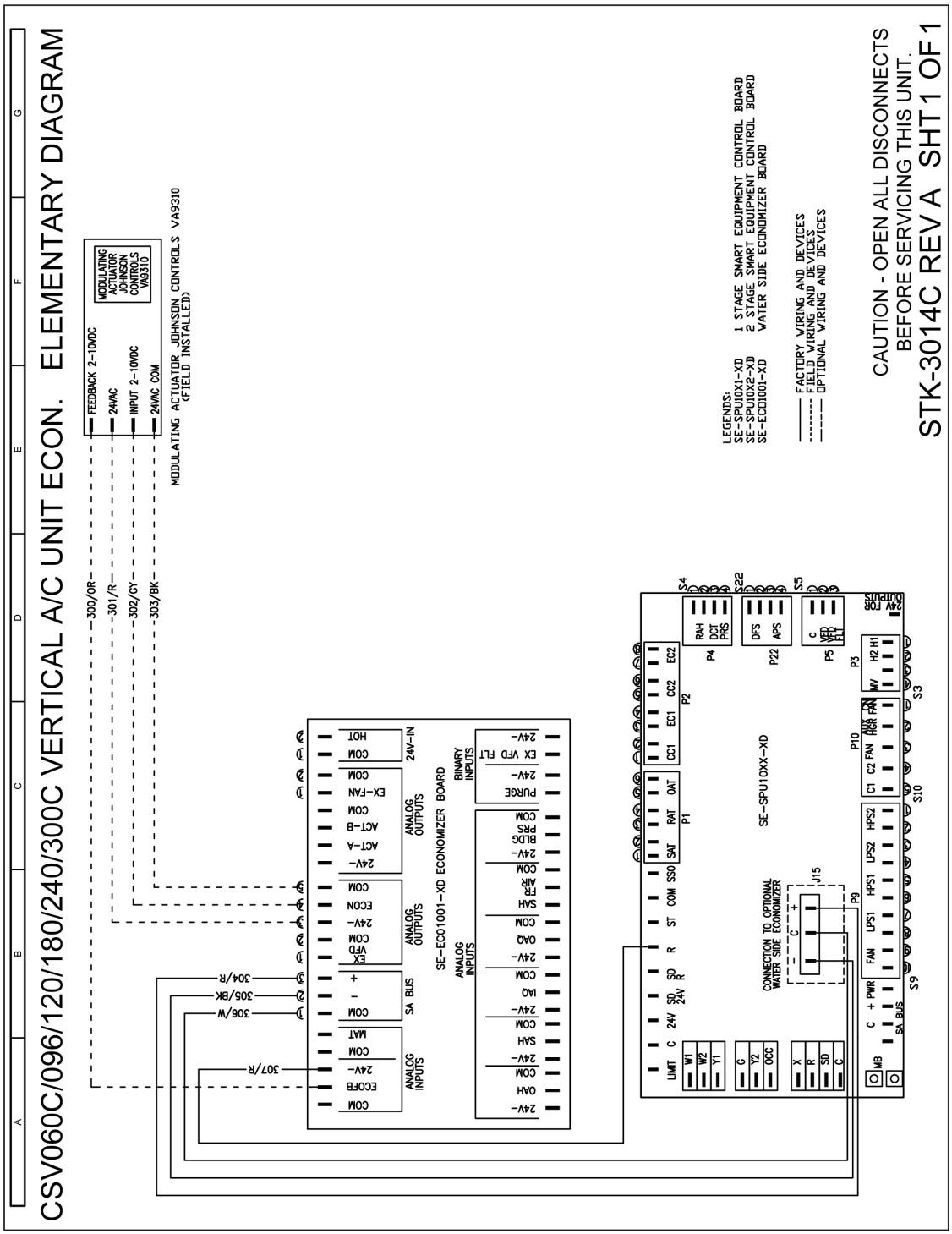
SE-SPU10X2	2 STAGE SMART EQUIPMENT CONTROL BOARD
TB1	LINE VOLTAGE TERMINAL BLOCK
EFM	EVAPORATOR FAN MOTOR
COMP1	2 STAGE SCROLL COMPRESSOR
COMP2	2 STAGE SCROLL COMPRESSOR
T1	TRANSFORMER
GND	GROUND
FU1	EVAP. FAN MOTOR FUSE
M1	COMP1. CONTACTOR
M2	COMP2. CONTACTOR
EVFD	EVAP. FAN VFD
EVFDR	EVAP. VFD RELAY

——— FACTORY WIRING AND DEVICES
------ FIELD WIRING AND DEVICES
—–—– OPTIONAL WIRING AND DEVICES



CAUTION - OPEN ALL DISCONNECTS
BEFORE SERVICING THIS UNIT.

STK-3013C REV A SHT 1 OF 1


CSV060C/096/120/180/240/300C VERTICAL A/C UNIT ECON. ELEMENTARY DIAGRAM
MODULATING ACTUATOR JOHNSON CONTROLS VA9310
FEEDBACK 2-10VDC
24VAC
INPUT 2-10VDC
24VAC COM
MODULATING ACTUATOR JOHNSON CONTROLS VA9310 (FIELD INSTALLED)
300/OR
301/R
302/GY
303/BK
304/R
305/BK
306/W
307/R
SE-ECO1001-XD ECONOMIZER BOARD
SE-SPU10XX-XD
CONNECTION TO OPTIONAL WATER SIDE ECONOMIZER
LEGENDS:
SE-SPU10X1-XD 1 STAGE SMART EQUIPMENT CONTROL BOARD
SE-SPU10X2-XD 2 STAGE SMART EQUIPMENT CONTROL BOARD
SE-ECO1001-XD WATER SIDE ECONOMIZER BOARD
FACTORY WIRING AND DEVICES
FIELD WIRING AND DEVICES
OPTIONAL WIRING AND DEVICES
CAUTION - OPEN ALL DISCONNECTS BEFORE SERVICING THIS UNIT.
STK-3014C REV A SHT 1 OF 1

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 8-25 ton units shall have two individual scroll compressors.

Refrigerant circuits

The 8-25 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.

Brazed plate heat exchanger condenser

All units feature a single brazed plate heat exchanger condenser. It is constructed from multiple stainless steel plates, copper vacuum and brazed together for corrosion resistant reliability operation. On 8-25 ton units, a true dual condenser delivers high performance at part and full load.

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.

Standard Variable Frequency Drive (VFD) controller for the evaporator fan, mounted in the corner post of the evaporator module, is available on the 8–25T models. The VFD shall be approved for plenum duty applications. There are 3 VFD applications available: MZVAV Variable Air Volume

- supply pressure controlled, SZVAV Variable Air Volume - supply temperature controlled, and IntelliSpeed™ two discrete speed.

Supply pressure controlled variable frequency drive (VFD)

Airflow modulation and static pressure control shall be achieved by increasing or decreasing the frequency of the VFD. For MZVAV, the compressors (8-25 ton) shall be staged to meet the VAV supply air temperature set point. The installer shall provide and install two sensor tubing lines complete with static pressure taps from a factory installed pressure transducer (located in VFD enclosure) to duct locations.

Temperature controlled variable frequency drive (VFD)

Airflow modulation shall be achieved by increasing or decreasing the frequency of the VFD to meet the VAV supply air temperature setpoint. For SZVAV, the compressors (8-25 Ton) shall be staged to meet the VAV SAT setpoint. The installer shall install a zone temperature sensor (NS Network Sensor) in the single zone to be conditioned.

IntelliSpeed™ two speed

Indoor fans have two discrete speeds (8-25 ton). High and low indoor fan discrete speeds are achieved by means of a VFD. The high speed is available only when both compressor stages are active. The low speed (60% of the high speed RPM) is activated only when running the single compressor stage or fan. The 5 ton unit does not support IntelliSpeed™, only single speed.

Filters

All models shall be shipped with 2-inch thick MERV 8 filters factory installed.

Sloped drain pan

Sloped evaporator drain pan for improved condensate removal.

Condensate overflow switch

A condensate overflow switch is mounted in the evaporator drain pan. In the event of an alarm, power to the unit compressor(s) will be shut off.

Y-strainer

All units include a Y-strainer (#20) shutoff valve with a blow down valve and hose connection for field installation. Connections are FNPT x FNPT. The valve body has two ¼" FNPT accessory ports.

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.

1. Unit shall be complete with self-contained low-voltage control circuit. Microprocessor shall be of direct digital controller (DDC) type.

2. 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
    - Suction line temperature sensor
    - SD alarm (smoke or any other shutdown alarm)
    - Supply air temperature

3. Unit shall operate with conventional thermostat designs and have a low voltage terminal strip for easy hook-up. Instead of thermostat, unit can be controlled by a Johnson Controls Net Sensor or network communicated temperature value (BMS).
4. Unit control board shall have on-board diagnostics, local display, and fault code display.
5. Standard controls shall include anti-short cycle, random start, and low voltage protection.
6. Control board shall monitor each refrigerant safety switch independently.
7. Control board shall have an LED display independently showing the status of serial communication, running, errors, power, all digital outputs, and all analog inputs.
8. Control board shall accept the following inputs: space temperature, set point adjustment, outdoor air temperature, indoor air quality (IAQ), outdoor air quality (OAQ), compressor lockout, fire shutdown, enthalpy switch, and fan status/filter status/humidity/ remote occupancy.
9. Control board shall retain last five fault codes in non-volatile memory which will not be lost in the event of a power loss (applicable to units with optional communication card).

Factory installed options

Oversized (high static) 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.

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.

Hot gas bypass (8-25 ton only)

Adjustable hot gas regulator and all necessary piping are installed on lead compressor circuit. The modulating regulator diverts hot discharge gas to the evaporator inlet. The bypass capacity is maximum 50% of the compressor #1 capacity on 25 ton units. For 8-20 ton units, the bypass capacity is maximum 100% of compressor #1 capacity. The bypass valve opens at a preset suction pressure to prevent coil freeze-up at light evaporator load, or low airflow conditions.

Network communication cards

The Smart Equipment Controller (SEC) communication card comes with a connector that enables communication to a BMS. This card supports BACnet® MS/TP, Modbus™, and N2 communication types. For LONWORKS networks, an external gateway is required from the BACnet device to the Modbus network.

Communication card features include:

- Support for multiple communication types
- Plug-in on the UCB
- Real-time clock chip
- Communication traffic LEDs and on-board end-of-line switch

Economizer controls package

Johnson Controls economizer control module factory mounted and wired to SEC control board, making unit ready for installation of SKYMARK or 3rd party waterside economizer.

Hose kits

Stainless steel hose kits are available from the factory. Options include autoflow balancing.

Field installed options

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 (Water Regulating Valve). There are two ‘kits’ available:

- **Basic kit**

  Includes the following: water coil; economizer drain pan assembly; coil attachment hard- ware; 3-way valve & modulating actuator; economizer control module, wiring harness and enthalpy sensor.

- **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 valve)

For Low EWT operation, water regulating valve provides flow control to condenser water circuit by sensing the condensing refrigerant pressure. The valve is field installed inside the unit cabinet on the water out pipe. This feature cannot be selected with the Water Side Economizer Kit.

Network sensor

The surface-mounted NS Series network sensor with fault code capability is an electronic zone sensor designed to function directly with Johnson Controls BACnet MS/TP digital controllers in SEC controls. Models in this series monitor the temperature set point and zone temperature and transmit this data to a field controller on the sensor actuator (SA) bus. Optional integrated passive infrared (PIR) occupancy sensor that detects motion to determine if a space is occupied is available.

MAP gateway

MAP gateway is an intuitive controller commissioning tool that simplifies how users can access the SKYMARK family of products. The MAP gateway enables users to leverage the power of mobility using smart phones, tablets, and laptop PCs to interact with building automation equipment controls and HVAC equipment.

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.