C-Series (CSV) Water-Cooled Self-Contained Units, C-Generation, R-410A, Model CSV060C–300C

Installation, Operation, and Maintenance Manual

LD30026

Installation Guide

Issue Date: 2020-12-07

Form Number: 145.15-IOM8 (1220)

Supersedes: 145.15-IOM8 (1020)

Contents

Important!

Read Before Proceeding!

General safety guidelines

This equipment is a relatively complicated apparatus. During rigging, installation, operation, maintenance, or service, individuals may be exposed to certain components or conditions including, but not limited to: heavy objects, refrigerants, materials under pressure, rotating components, and both high and low voltage. Each of these items has the potential, if misused or handled improperly, to cause bodily injury or death. It is the obligation and responsibility of rigging, installation, and operating/service personnel to identify and recognize these inherent hazards, protect themselves, and proceed safely in completing their tasks. Failure to comply with any of these requirements could result in serious damage to the equipment and the property in which it is situated, as well as severe personal injury or death to themselves and people at the site.

This document is intended for use by owner-authorized rigging, installation, and operating/service personnel. It is expected that these individuals possess independent training that will enable them to perform their assigned tasks properly and safely. It is essential that, prior to performing any task on this equipment, this individual shall have read and understood the on-product labels, this document and any referenced materials. This individual shall also be familiar with and comply with all applicable industry and governmental standards and regulations pertaining to the task in question.

Safety symbols

The following symbols are used in this document to alert the reader to specific situations:

DANGER

Indicates a possible hazardous situation which will result in death or serious injury if proper care is not taken.

WARNING

Indicates a potentially hazardous situation which will result in possible injuries or damage to equipment if proper care is not taken.

CAUTION

Identifies a hazard which could lead to damage to the machine, damage to other equipment and/or environmental pollution if proper care is not taken or instructions and are not followed.

Note: Highlights additional information useful to the technician in completing the work being performed properly.

WARNING

External wiring, unless specified as an optional connection in the manufacturer's product line, is not to be connected inside the control cabinet. Devices such as relays, switches, transducers and controls and any external wiring must not be installed inside the micro panel. All wiring must be in accordance with manufacturer's published specifications and must be performed only by a qualified electrician. The manufacturer will NOT be responsible for damage/problems resulting from improper connections to the controls or application of improper control signals. Failure to follow this warning will void the manufacturer's warranty and cause serious damage to property or personal injury.

WARNING: This product can expose you to chemicals including formaldehyde, which is known to the state of California to cause cancer. For more information, go to www.P65Warnings.ca.gov.

WARNING

UNAUTHORIZED CUSTOMER MODIFICATIONS TO CERTIFIED PRODUCTS ARE PROHIBITED

The manufacturer has certified the product as being compliant with applicable government and/or industry standards. Product certification is designated either on the product itself or in the product literature. The certification mark identifies the applicable standards as well as the Nationally Recognized Test Lab (NRTL) or other testing facility that conducted the testing, where applicable. If changes are made to the product, an engineering review will be needed to assess the impact to the product certification. In some instances, the changes may be such that the NRTL or testing facility will need to review and potentially reapprove of the product by means of a field or site inspection and certification. Any person or entity making changes to the product is responsible for obtaining any necessary engineering review and reapproval. Unauthorized customer modifications to certified products are prohibited for the following reasons:

- Modifications may create hazards that could result in death, serious injury, or equipment damage.
- Modifications will void product warranties.
- Modifications may invalidate product certifications.
- Modifications may violate Country standards. Country standards may require that only certi-fiedproducts be used in certain applications, and modifications that result in the loss of product certification may violate those standards.

Changeability of this document

In complying with policy for continuous product improvement, the information contained in this document is subject to change without notice. There is no commitment to update or provide current information automatically to the manual or product owner. Updated manuals, if applicable, can be obtained by contacting the nearest service office.

It is the responsibility of rigging, lifting, and operating/ service personnel to verify the applicability of these documents to the equipment. If there is any question regarding the applicability of these documents, rigging, lifting, and operating/service personnel should verify whether the equipment

has been modified and if current literature is available from the owner of the equipment prior to performing any work on the equipment.

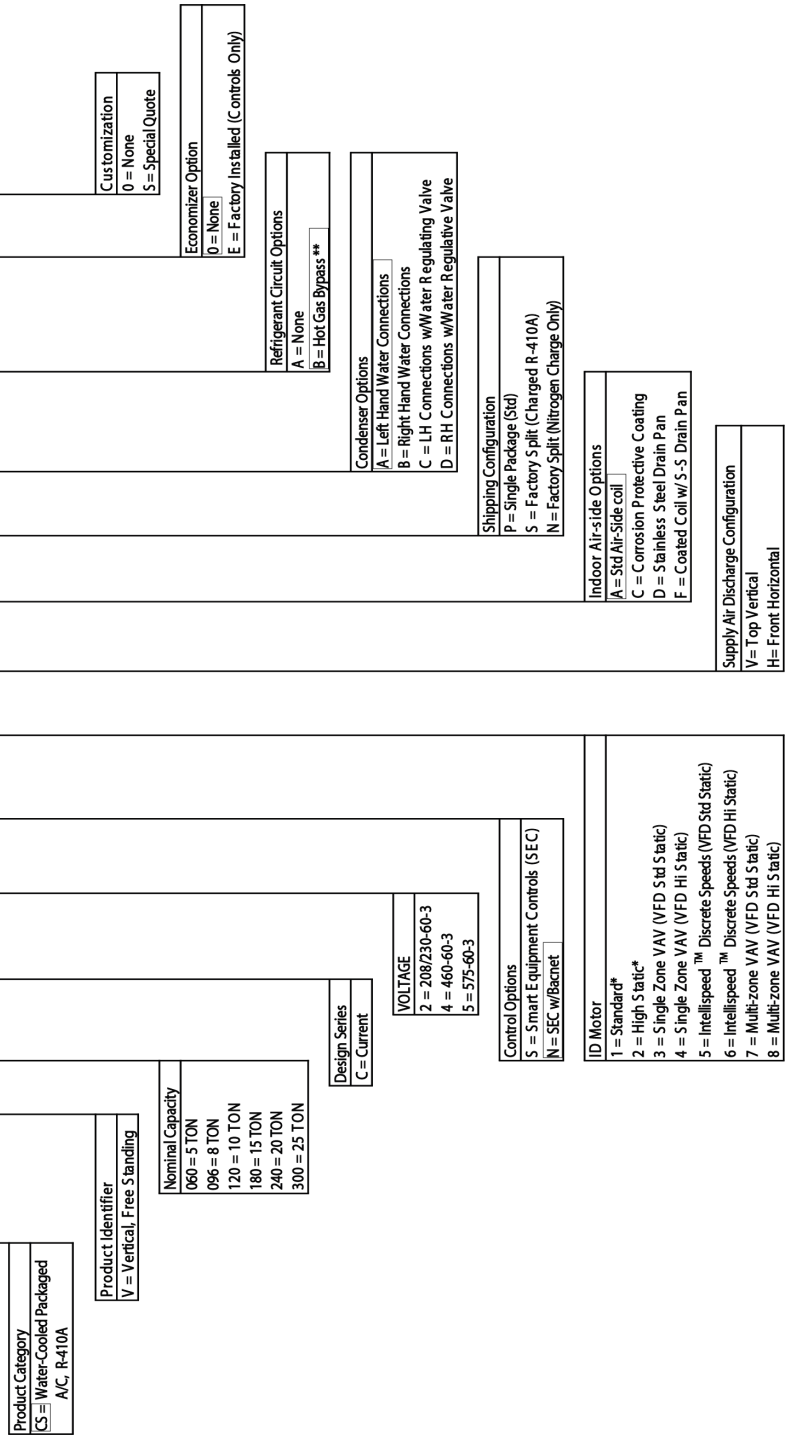
Revision notes

Affected section	Description	Date implemented
Appendix	Added appendix section	September 2020
Figure 8	Updated drawing for waterside economizer	July 2020
Unit wiring schematics	Updated drawings of electrical schematics for C-generation	July 2020
Dimensional data	Updated drawings for C-generation	June 2020
Typical service clearances	Updated drawings for C-generation	June 2020
Electrical data	Updated table information for C-generation	June 2020
Fan performance	Updated table information for C-generation	June 2020
Nomenclature	Updated nomenclature	May 2020

Associated literature

Manual description	Form number
Variable Frequency Drive (VFD) for Self-Contained Units Installation and Operation Instructions	145.13-NO2
Water Regulating Valve Kit for CSV096C-300C Units Installation Instructions	145.15-N1
Water Side Economizer (Model CVWSEK-XXXDPL/R-C-0/E) for CSV060C-300C Vertical R410a Water Cooled Air Conditioning Units Installation Instructions	145.15-NO1
Mobile Access Portal Gateway Product Bulletin	LIT-12011884
Smart Equipment Controls Sequence of Operation Overview	LIT-12011950

Figure 1: CSV water-cooled self-contained unit



Installation

General information

All models 5–20 tons are shipped as factory-charged unitized packages. 5-15 tons can also be shipped factory split R-410a charged, and 20 ton can be shipped factory split nitrogen charged. The 25-ton model is only shipped factory split with nitrogen charge.

Table 1: CSV shipping options

	Pacakged	Split	Split
	(R-410a)	**(R-410a)**	**(Nitrogen)**
CSV060C	Avail	Avail	N/A
CSV096C	Avail	Avail	N/A
CSV120C	Avail	Avail	N/A
CSV180C	Avail	Avail	N/A
CSV240C	Avail	N/A	Avail
CSV300C	N/A	N/A	Avail

All models can be selected with either a horizontal (front) or vertical (top) fan discharge.

The 5-ton unit utilizes a single compressor. All 8–25 ton models are dual compressor units with two independent refrigerant circuits. All units come standard with a Smart Equipment (SE Controller) microprocessor control board with safety controls and status display screen. (see Microprocessor controller for more details).

⚠ CAUTION

Only qualified personnel should perform installation and service of this equipment.

Pre-installation inspection of equipment

All units are factory tested to ensure safe operation and quality assembly. Units are packaged and sealed on shipping skids and shipped in first class condition. Torn and broken packaging and scratched or dented panels should be reported to carrier immediately. Internal inspection of all units should be performed prior to installation. Remove all access doors and check for visual defects that can occur during transport. Any problems found internally should be reported to carrier and manufacturer immediately. Refrigerant circuit should be checked to ensure no leaks have occurred during shipment. Install gauge set to high and low pressure ports to confirm pressure has been maintained and no leaks have occurred during shipment. Repair any damage prior to installation to ensure safe operation.

ⓘ **Note:** Record any unit damage on the Bill of Lading and report to carrier and factory immediately. Shipping and handling damages are not warranty items.

WARNING

Prior to mounting unit, check individual unit weights (Table 2) and verify lifting capacity of lifting equipment exceeds weight of units by safe margins. Failure to do so may result in unit damage, personal injury, or even death.

Table 2: CSV single packaged weight (lbs)

Unit	Shipping (lbs)	Operating (lbs)
CSV060C	525	495
CSV096C	850	820
CSV120C	855	825
CSV180C	1115	1075
CSV240C	1295	1245
CSV300C	2100	1980

WARNING

Follow all applicable regulations and safety practices during rigging and lifting. Prepare and follow written rigging and lifting plan. Lifting must be directed by trained professional rigger. Spreader bars must be used and be long enough to prevent rigging from contacting unit. Use all and only designated lift points according to unit's manual(s).

WARNING

Determine the actual center of gravity of the unit by performing a test lift. Lifting an unbalanced unit can cause personal injury or even death.

Installation site

WARNING

Lock all electrical power supply switches in the OFF position before installing the unit. Failure to disconnect power supply may result in electrical shock or even death.

WARNING

Do not install this unit outdoors.

WARNING

The system should be installed by qualified personnel. If not, it may cause water leakage, electric shock, or fire.

DANGER

Do not install units in a flammable environment due to the danger of an explosion.

DANGER

A compressor/unit comprises a pressurized system. Never loosen threaded joints while the system is under pressure, and never open pressurized system parts.

WARNING

Safety guards, shields, barrier, covers, and protective devices must not be removed while the compressor/unit is operating.

WARNING

All safety features, disengagement and interlocks must be in place and function correctly before the equipment is put into operation. Never bypass or wire around any safety device.

WARNING

Use gloves, protective goggles, and where appropriate, make sure to have a gas mask close at hand. Also use electrical protection equipment and tools suited for electrical operation purposes.

Location

To ensure unit operates at maximum efficiencies, choose a dry indoor area where the temperature is controlled between 50.0 °F and 115.0 °F. Consideration of surrounding areas should be taken when choosing a location to install the unit. Common vibration and sound levels associated with commercial equipment may be objectionable to people or equipment.

Install thermostats, air supplies, and returns so that each unit will operate only on individual unit control. Evaporator coil drain pan is factory sloped, but for faster drainage of condensate runoff, unit can be slightly pitched in the same direction as drain pan outlet.

Unit mounting

The 5–20 ton models are shipped as a fully assembled integral package. 5-15 tons can also be shipped factory split R-410A charged, and 20 ton can be shipped factory split nitrogen charged. The 25-ton model ships factory split with nitrogen holding charge only. Factory provided extension couplings are included for field assembly of the 20-25 ton models.

If required, units may be field split to allow for passage through doors, elevators, hallways, etc.

Duct flanges for evaporator return are incorporated into the filter rack.

Units should be secured on a solid, level pad or sturdy stand. The use of an isolating rubber sheet is recommended to reduce vibration and noise transmission. Ensure that the entire base is continuously supported; **DO NOT SUPPORT UNIT AT CORNER POINTS ONLY!** Unit may be pitched slightly to ensure faster drainage of condensate.

Blower section/condenser separation (CSV060C–CSV180C models)

The 5–15 ton models allow for easy removal of the blower section:

- Disconnect the evaporator motor high voltage wires. Pull all wiring into the evaporator compartment. Remove bushing/clamp from routing hole for evaporator motor wiring.
- Remove corner securing brackets from the outside corners of the cabinet, at the joint line between the blower and evaporator sections.
- Remove the blower section.

Evaporator/condenser separation (CSV240C model)

The 20-ton model requires the evaporator to be separated from the condenser:

- Reclaim the entire refrigerant charge from each compressor circuit.
- Disconnect the evaporator motor VFD high voltage from the unit electrical box at the fuse block. Disconnect VFD low voltage from the SEC board at P5 terminal with 3-pin Molex harness (115/ OR, 116/R, or 117/WH). Pull all wiring into the evaporator compartment. Remove bushing/clamp from routing hole for evaporator motor wiring.
- Cut and remove sections of all liquid and suction refrigerant lines. Units with optional Hot Gas Bypass will also require to be cut. Make two cuts in each line, approximately 6 inches above and below the evaporator floor/condenser roof.

⚠ CAUTION

Use a TUBING CUTTER ONLY; do not use a hacksaw to cut refrigerant tubing, otherwise serious damage can occur to refrigeration system.

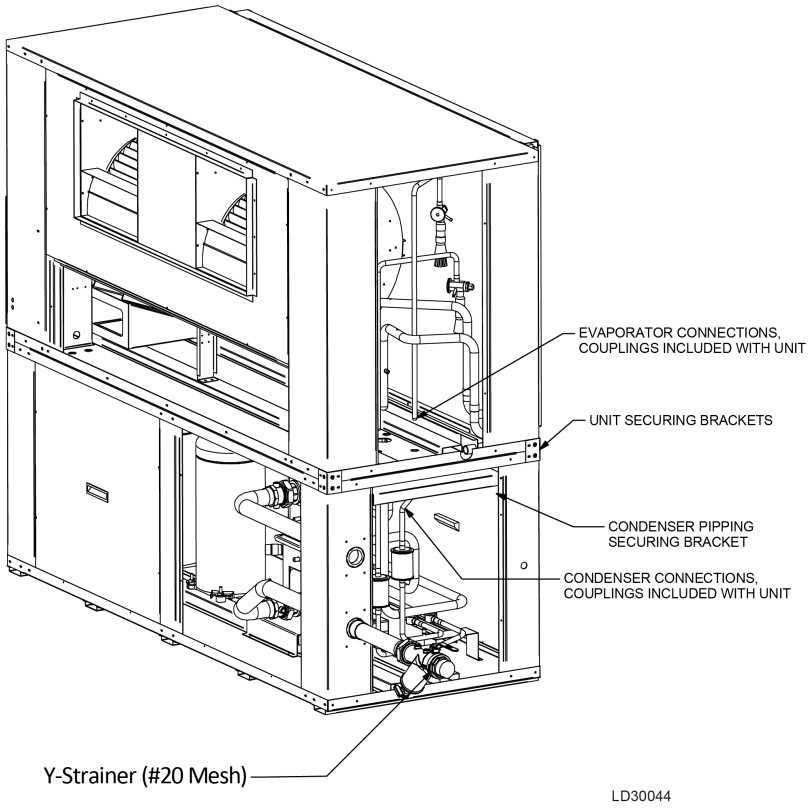
- Remove corner securing brackets from the outside corners of the cabinet at the joint line between the evaporator and condenser sections.
- Remove the evaporator section.

Assembly of split units (CSV240C– CSV300C models)

The 25-ton model comes factory split (20-ton optional) and includes copper pipe extension couplings for assembly. Corner brackets are shipped inside the unit.

- Place the condenser section in the required location.
- Carefully position the evaporator section atop the condensing section. Align all sides, the evaporator motor wire routing hole, and the refrigerant line routing holes.
- Install the securing brackets at all four corners, on the evaporator/condenser separation joint.

Figure 2: CSV 20-25 ton split unit field assembly



DANGER

Factory nitrogen-holding charge is 200psig. This pressure must be released from the evaporator and condenser section BEFORE cutting any refrigerant lines for installation.

- For the 20-25 ton model, cut off spun copper ends on each refrigerant pipe in evaporator and condenser. Units with optional Hot Gas Bypass will also require to have spun ends cut. Cut pipe to appropriate length to fit on couplings. Ensure circuit 1 from condenser connects to circuit 1 piping in evaporator; follow the same procedure for circuit 2. Do not cross circuits.
- Braze copper couplings to refrigerant pipe while using a flow of nitrogen gas through the refrigerant piping to minimize contamination to internal piping. Otherwise, fouling and damage to unit may occur. Use the service gauge ports for this procedure to introduce nitrogen flow. Once complete, pressure test with nitrogen (500 psig).
- Evacuate each circuit to at least 350 microns. If gauge pressure rises above 500 microns in one minute, evacuation is incomplete or the system has a leak.
- Charge circuit(s) to the value indicated on the unit nameplate, or see Start-up and operation.

Install bushing/clamp into evaporator wiring routing hole, and pull wires through into electrical control panel. Connect the indoor fan motor leads to the load terminals on VFD fuse terminals.

Note: Ensure evaporator motor rotation is correct upon unit start-up. Switch any two wires at VFD fuse terminals if blower rotation is not correct.

Connecting the VFD control wires

1. Connect the VFD 3-pin Molex harness (115/ OR, 116/R, or 117/WH) to the SE control (SEC) terminal P5.
2. Connect 151/R to the common terminal on the EVFR relay in the condenser box.
3. Connect 152/OR to the NO terminal on EVFR relay in the condenser box.
4. For variable air volume (VAV) units, connect the pressure transducer wiring harness (138/WH, 139/BLK) to P4.
5. Connect 140/R pressure transducer EXEC to the SEC (24V FOR OUTPUT) terminal.

Changing fan speed

Change the fan speeds on an SEC by changing the parameters in the controller itself. Refer to SEC parameters for CSV units, C-generation in this manual.

Water piping

All factory installed water piping terminates at the face of the unit and features FNPT connections.

CAUTION

Water connection fittings are threaded copper. Use caution when tightening steel pipe into copper fittings.

It is recommended that flexible connectors/hoses are used on the water supply and return lines if noise and vibration transmission could be a problem.

Installer should include shutoff/balancing valves to the water piping so the unit can be serviced without shutting down and draining the entire water supply circuit. Since units are piped in parallel piping circuits, the shutoff valves may be used to equalize the pressure drop to each branch for even condenser water distribution.

Units can be factory supplied with water piping in either left-hand or right-hand configuration.

Y-Strainer

Each model is shipped with a #20 mesh Y-strainer/shutoff with blowdown valve. #40 mesh is optional. The Y-strainer must be installed on the unit Water Inlet hose/piping to filter particles from entering the condenser brazed plate heat exchanger. The Y-strainer is equipped with a blowdown valve hose connection for easy cleanout. The #20 mesh screen is also removable for cleaning/ replacement.

ⓘ **Note:** Remember to leave enough space in front of the Y-strainer for connecting a hose or servicing the filter screen.

Condensate trap

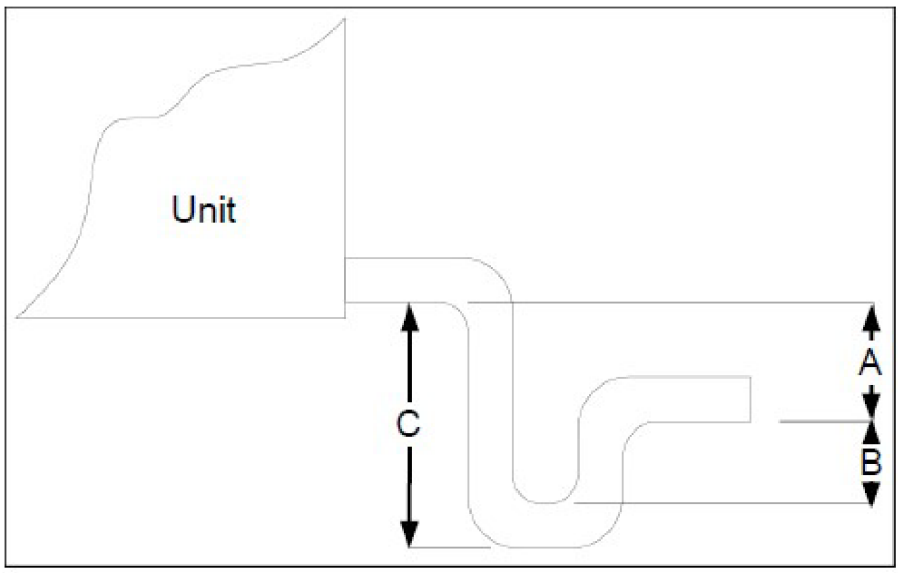
Condensate trap fitting is provided on all units and is 3/4-inch (FNPT). 5-15 ton units have internal p-trap installed. 20-25 ton will require field installed external condensate trap. Without a trap, condensate can be thrown into the airstream. This can cause water overflow, unit damage, and property damage. This system must be trapped according to a negative system pressure (draw-through). Use the dimensions in Figure 3. Adhere to local codes for piping the external trap and condensate

Figure 3: Example: trapping a system up to 2 inches external static pressure

A = (1 inch for each inch of maximum negative static pressure) + 1 inch

B = Half of A

C = A + B + pipe diameter



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Air filter replacement

To aid air filter removal, the factory tapes each row of filters together. When re-installing new filters don't forget to tape them together for the next change.

Figure 4: Air filter replacement

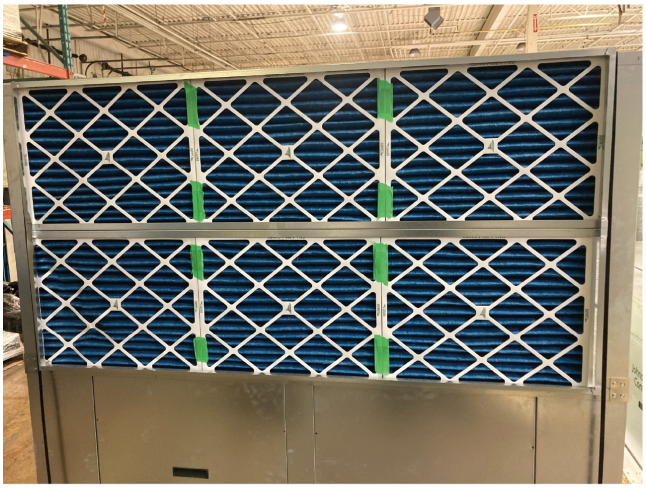

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Figure 5: Tape replacement

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Water flow

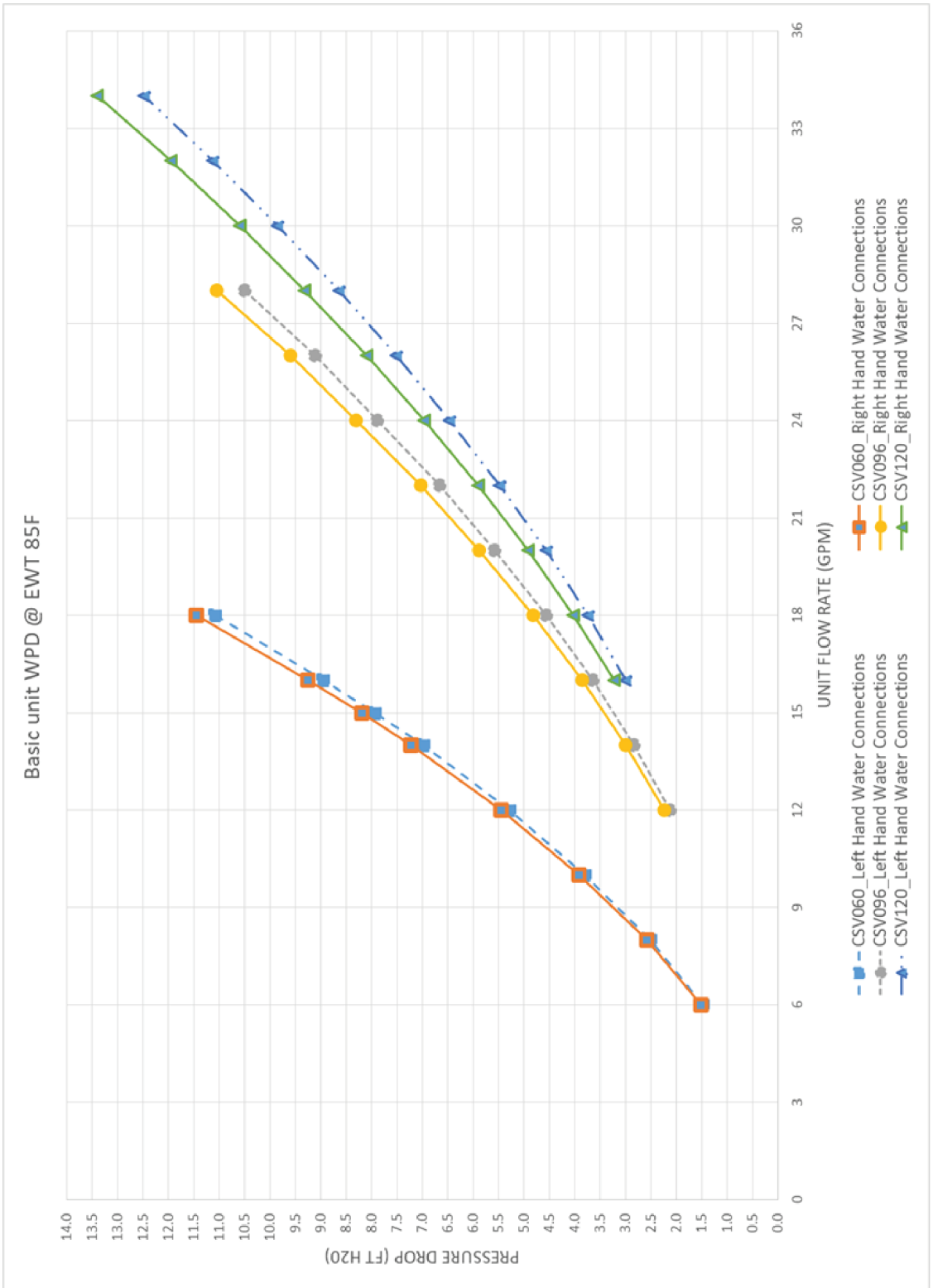
Refer to *CSV Engineering guide* (*Form 145.15-EG2*) for water flow rates based on EWT and EAT conditions. GPM vs. Pressure drop is shown in the graphs in Figure 6. This is for the unit only (internal piping and condenser). Engineer/installer must account for all external accessories, piping, fittings and hoses that increase the pressure drop between the chosen measurements points. Factory y-strainer/shutoff includes a PT port for pressure drop measurement on the water supply side. Factory hose kits include a return shutoff valve with PT port for return side measurement

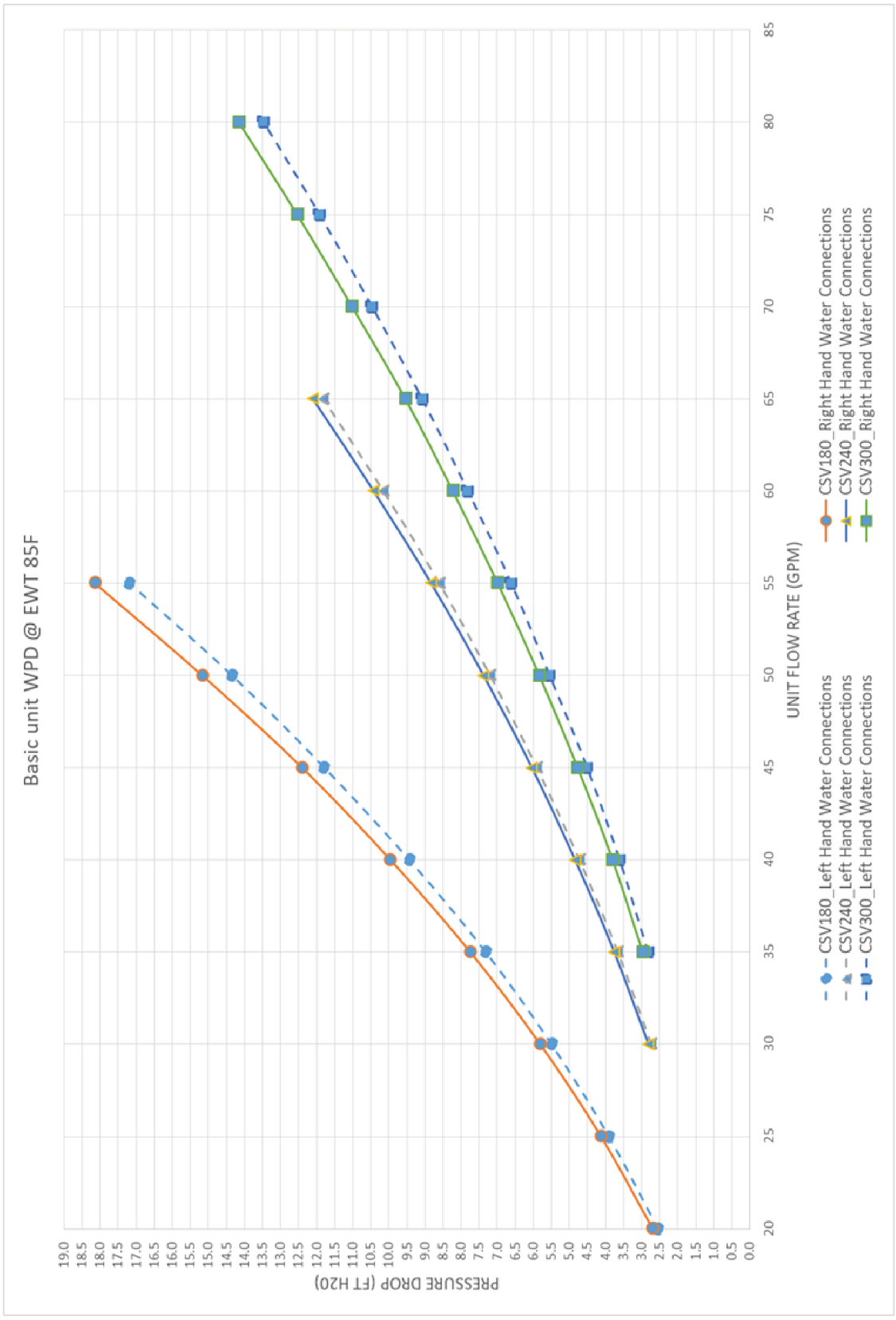
Table 3: Recommended operating conditions

	GPM	GPM	EWT	EWT	EWT*	EWT*		
	Min	**Max**	**Min**	**Max**	**Min**	**Max**	**EDB**	**EWB**
CSV060C	8	15	65	100	45	55	75F-85F	62F-72F
CSV096C	16	24	65	100	45	55	75F-85F	62F-72F
CSV120C	20	30	65	100	45	55	75F-85F	62F-72F
CSV180C	30	45	65	100	45	55	75F-85F	62F-72F
CSV240C	40	60	65	100	45	55	75F-85F	62F-72F
CSV300C	50	75	65	100	45	55	75F-85F	62F-72F

ⓘ **Note:** * With waterside economizer

Figure 6: Waterside pressure drop




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

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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 4 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 4 with the corresponding CSV model WPD from WPD graphs at the required gpm.
4. From Table 5, hose length PD effect can be found with this formula:
    - Hose length factor from Table 5 X Basic unit WPD from WPD graph @ EWT 85F
5. From Table 5 Strainer alone PD effect can be found with this formula:
    - *Strainer Factor from Table 5 X Basic unit WPD from WPD graph @ EWT 85°F*
6. From Table 5, 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 4 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 4: 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 5: Left hand water connections - correction factors 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

Table 6: Right hand water connections - correction factors for hose length

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

Water quality

General guidelines for required water quality are provided as a part of this manual. Having a proper water treatment and maintenance program in place is essential for all closed and open loop hydronic systems. Local codes and requirements of various other components used in specific hydronic systems might mandate some changes to recommended values. It is our strong recommendation that a professional water treatment company is employed for initial commissioning and ongoing annual maintenance of water loop system.

⚠ CAUTION

It is strongly recommended that a professional water treatment company is used to perform ongoing maintenance of the water loop system, including chemical analysis and if necessary flushing. The water loop testing should be performed at intervals recommended by the professional water treatment consultant. It is up to the customer to carry out adequate waterloop maintenance over the lifespan of the units, otherwise damage to the units may occur.

Potential problem	Controlled chemical condition	SS brazed plate heat exchanger range
Erosion	Cleaning	Proper surface cleaning required
	Filtration	Best practice filtration
	Suspended solids	Less than 10 ppm
	Water velocity	Less than 8 ft/s
Bacteria/mold	Iron bacteria	None
	Iron oxide	Less than 1 ppm
Scaling	Calcium & Magnesium carbonate	Less than 350 ppm

Potential problem	Controlled chemical condition	SS brazed plate heat exchanger range
Corrosion	pH range	7 to 9
	TDS (total dissolved units)	Less than 1000 ppm
	Ammonia, Ammonium hydroxide	Less than 0.5 ppm
	Ammonium nitrate, Ammonium chloride	Less than 0.5 ppm
	Calcium chloride/Sodium chloride	Less than 125 ppm
	Chlorine	Less than 0.5 ppm
	Hydrogen sulfide	None

The guide below indicates the corrosion resistance of stainless steels and brazing materials in district energy water at room temperature. The table lists a number of important chemical components. However, corrosion is a very complex process influenced by many different factors in combination. This table is therefore a considerable simplification and should not be considered definitive.

Explanations:

- + Good resistance under normal conditions
- 0 Corrosion problems possible especially when more factors have value 0
- - Use not recommended

Table 7: Water recommendations

Water content	Concentration(mg/l or ppm)	Time limits Analyze before	Plate material AISI 316	Copper brazing material
Alkalinity (HCO3-)	< 70	Within 24 h	+	0
	70-300		+	+
	> 300		+	0/+
Sulfate[1] (SO42-)	< 70	No limit	+	+
	70-300		+	0/-
	> 300		+	-
HCO3- / SO42-	> 1.0	No limit	+	+
	< 1.0		+	0/-
Electrical conductivity	< 10 µS/cm	No limit	+	0
	10-500 µS/cm		+	+
	> 500 µS/cm		+	0
pH[2]	< 6.0	Within 24 h	0	0
	6.0-7.5		+	0
	7.5-10.0		+	+
	>10.0		+	0
Ammonium (NH4+)	< 2	Within 24 h	+	+
	2-20		+	0
	> 20		+	-
Chlorides (Cl-) See also Table 8	< 100	No limit	+	+
	100-200		+	+
	200-300		+	+
	> 300		-	0/+
Free chlorine (Cl2)	< 1	Within 5 h	+	+
	1-5		-	0
	> 5		-	0/-
Oxygen	< 0.02 or as low as possible		+	+

Table 7: Water recommendations

Water content	Concentration(mg/l or ppm)	Time limits Analyze before	Plate material AISI 316	Copper brazing material
Hydrogen sulfide (H2S)	< 0.05	No limit	+	+
	> 0.05		+	0/-
Free (aggressive) carbon dioxide (CO2)	< 5	No limit	+	+
	5-20		+	0
	> 20		+	-
Total hardness (°dH)	4.0-8.5	No limit	+	+
Nitrate[1] (NO3-)	< 100	No limit	+	+
	> 100		+	0
Iron[3] (Fe)	< 0.2	No limit	+	+
	> 0.2		+	0
Aluminum (Al)	< 0.2	No limit	+	+
	> 0.2		+	0
Manganese[3] (Mn)	< 0.1	No limit	+	+
	> 0.1		+	0

Note:

- [1]Sulfates and nitrates inhibit pitting corrosion caused by chlorides in pH neutral environments.
- [2]In general low pH (below 6) increases corrosion risk; high pH (above 7.5) decreases corrosion risk.
- [3]Fe3+ and Mn4+ are strong oxidants and may increase the risk of localized corrosion on stainless steels

Table 8: Chloride concentrations and temperatures

Chloride content	Maximum temperature				
	30 °C/86 °F	60 °C/140 °F	80 °C/176 °F	120 °C/248 °F	130 °C/266 °F
= 10 ppm	-	-	-	-	-
= 25 ppm	-	-	-	-	SS 316*
= 50 ppm	-	-	-	-	-
= 80 ppm	-	-	-	SS 316*	-
= 150 ppm	-	-	SS 316*	-	-
= 300 ppm	-	SS 316*	-	-	-

Note: * With brazing copper material.

Note: The manufacturer will not accept any liability resulting from incorrect installation of this equipment. Follow installation instructions carefully.

Ductwork

When installing ductwork, adhere to local Codes and sensible practice. Minimize duct runs and avoid abrupt changes in direction where possible. Allow ample access space for servicing of the coils and changing of filters. Perform regular maintenance on ducts to increase unit life, maintain efficient operation, and reduce accumulation of explosive dust. Refer to blower performance charts and engineer duct runs and accessory pressure drop so as not to exceed maximum external static values. Refer to blower performance charts in Fan performance.

Canvas or other types of flexible collars are recommended for connecting the air ducts to the unit. The supply air duct collar can be connected directly to the blower outlet flanges. Return air may be ducted to the unit, or drawn directly from the conditioned space. If a ducted return is desired, duct connection flanges may be secured directly to the air intake opening; filters are accessible from either the left-hand or right-hand side.

Figure 7: Return/supply air temperature sensor

SAT sensor (Figure 7) is factory installed inside the evaporator section after the coil in the supply air flow.

RAT sensor is factory connected to an 8 ft extension and both are shipped inside unit electrical box (see Figure 7).

In order to insert a temperature sensor, a 5/16-inch hole must be field drilled in the duct work and the sensor inserted through the hole. Small wings keep the sensor secured in the hole. The extension wiring can be easily routed out of the unit through 7/8-inch pre-punched holes that are located on both sides of the unit. The location of the sensor has to be chosen according to local codes and installation practices.

EWT sensor is factory installed inside the unit on the **Water In** piping. This sensor will need to be relocated outside the unit before the chilled water coil if waterside economizer option is added.

All CSV units featuring the SEC are shipped with field-installed return air and factory-installed supply air sensors. Full details on operating logic can be found in the SMART Equipment Controls (SEC) Sequence of Operation Overview Technical Bulletin (*Code No.LIT-12011950*).

Variable frequency drive (VFD)

Indoor fan VFD (MZVAV supply duct pressure control)

A standard VFD controller for the evaporator (indoor) fan applies on 8–25 ton models. Mounted in the evaporator module section, the VFD allows the operator to set the duct static pressure while the evaporator fan speed is adjusted automatically by the unit SEC controller. To meet the desired supply duct static setpoint, the VFD controls the evaporator fan motor's frequency.

The VFD is factory mounted and wired. The installer must provide and field install two sensor tubing lines complete with static pressure probes (except to the configuration for discrete speed application). The installer must field wire the fan power wiring between the evaporator VFD and the unit electrical box (located in the condenser section) where the unit ships factory-split. For units with a static pressure control option, low voltage wiring from the pressure transducer must be connected to the unit controller (see the unit schematic for more details).

The power (and optional low voltage wiring for transducer) wiring can be found inside the VFD enclosure. No extra power wiring is required; sufficient length is provided. The VFD option does not include an evaporator fan bypass circuit in case of microdrive failure. Microdrive must be replaced to re-activate the unit. In case of a VFD failure, the evaporator fan stops running. However, unit compressors continue to run until a low pressure safety trip activates.

ⓘ **Note:** The unit does not carry a failsafe circuit to bypass the factory installed VFD and run the evaporator fan in the event of a VFD malfunction.

For detailed installation and operation instructions, refer to *Variable Frequency Drive Installation and Operation Instructions* (*Form 145.13-NO2*).

If the operational space temperature rises + 2°F or more above the VAV cooling supply air temperature reset setpoint (SATRst-Sp), the VAV cooling supply air temp lower setpoint (SATLo-Sp) is used for the operational VAV cooling setpoint.

If the operational space temperature falls below the supply air temperature reset setpoint the supply air temperature upper setpoint (SATUp-Sp) is used for the operational VAV cooling setpoint.

The supply air temperature is controlled to the operational VAV cooling setpoint (OprVAVClg-Sp) A stage percent command for cooling determines how many stages of cooling are running (StgClgCmd). The stage percent command increases or decreases based on relationship of the operational VAV cooling setpoint and supply air temperature.

If the SAT is above the setpoint by more than 1.8°F, the staged percent command for cooling increases and stages compressors ON based on staging switch points.

If the SAT is below the setpoint by more than 1.8°F, the staged percent command for cooling decreases and stages compressors OFF based on staging switch points.

Indoor fan VFD (SZ VAV supply air temperature control)

A standard VFD controller for the evaporator (indoor) fan applies on 8-25 Ton models. Mounted in the evaporator module section, the VFD allows the unit to automatically adjust evaporator fan speed to meet the desired Supply Air Temperature (SAT), by controlling the fan motor's frequency. Zone Temperature (Network Sensor) and SAT are required as inputs. No thermostat required for SZVAV operation.

When there is no cooling demand, unit will run SZ VAV min. fan speed setting. (SZVAVMinFanSpd).

If the zone temperature is above the SZ VAV occupied cooling setpoint by more than half of the cooling manual tuning (ClgManualTune), unit cooling operation begins. Supply fan output modulates to control the SAT to the SZ VAV operating cooling setpoint (SZVAVClgOcc-Sp) +/- 0.6°F.

If the SAT drops below the SZ VAV operating cooling setpoint by more than 0.6°F, supply fan speed increases to raise the SAT to within 0.6°F

If the SAT rises above the SZ VAV operating cooling setupoint by more than 0.6°F, supply fan speed decreases to lower the SAT to within 0.6°F

Two discrete speeds (IntelliSpeed™) 8-25 ton

Indoor fan shall have two discrete speeds. High and low indoor fan discrete speeds are achieved by means of VFD. The high speed is available only when both compressor stages are active. The low speed (60% of high speed CFM) is activated only when running single compressor stage, fan only, or waterside economizer.

ⓘ **Note:** Do not run evaporator fan motor below 30Hz otherwise coil freeze-up and nuisance lock-outs may occur.

⚠ CAUTION

Building excessive ductwork pressure can cause damage to unit or personnel.

Hot gas bypass (HGBP, 8-25 ton)

To allow for low cooling load operation, a direct-acting pressure-modulating bypass control valve is installed on the system #1 discharge line. To maintain a desired minimum evaporator pressure, use this valve to divert high temperature, high pressure refrigerant around the TXV. HGBP valve adjustment range is 95-115 psig, with factory setting at 105 psig.

Adjusting HGBP setpoint

When the HGBP valve opens, select the coil suction pressure or coil temperature by adjusting the screw on the HGBP valve. To set the load, run the unit and cool down the evaporator coil. To do this, either shut off the fans or block the airflow until the suction pressure drops at least 5 psi below the chosen evaporator coil setpoint. Next, allow the bypassed gas to raise the pressure. The screw spring adjustment can be set until the HGBP valve closes at the chosen setpoint.

The pressure of the evaporator coil is set to maintain an evaporator coil temperature above the point that frost and coil freeze-up can form.

Waterside economizer

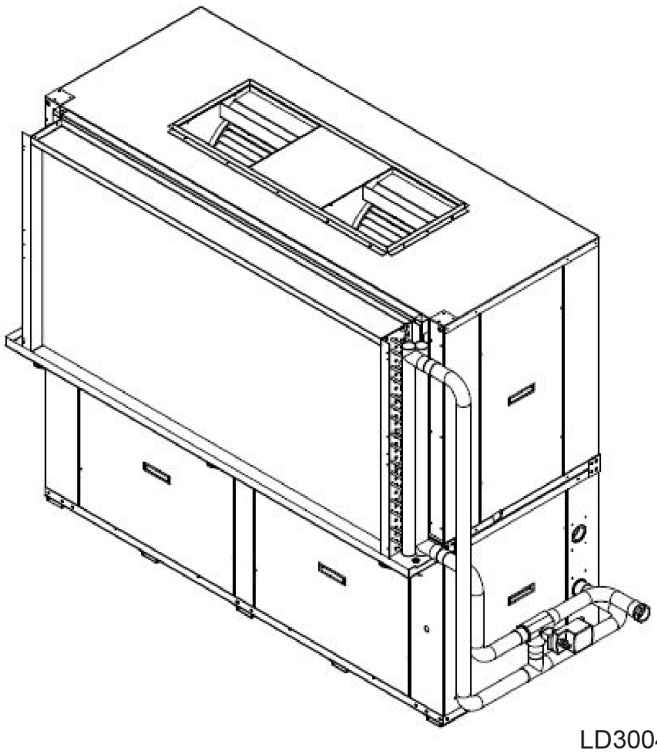
Optional Waterside Economizer can be ordered as an accessory from the factory. When entering fluid temperatures are appropriate, unit will stage compressors (on/off) and proportionally divert fluid to chilled water coil and unit condensor to minimize power consumption. The control setpoint for the economizing cycle is user-adjustable (recommended operating setpoint is 55.0 °F EWT).

The economizer is set up through the LCD keypad display and joystick located on the unit SEC board or through a recommended mobile access portal (MAP) gateway, available for purchase from the factory – see *Mobile Access Portal Gateway Product Bulletin* (*LIT- 12011884*). The UCB and economizer control boards are mounted inside the unit main electrical box.

Communication between SEC board and WSE board is automatically established through an SA bus connection. The factory supplied economizer includes: economizer control module, chilled water coil, optional piping on deluxe kits, EWT temperature sensor, wiring harnesses and modulating 3-way diverting valve.

Refer to the appropriate *Waterside Economizer Installation, Operation, and Maintenance* manuals for more information on installation and sequence of operation.

Figure 8: Waterside economizer



Water regulating valve kit

Optional water regulating valve kit modulates the condenser water flow in order to control the condensing pressure in each refrigeration circuit. Valve opens and closes in response to rise and fall of the condensing pressure as sensed by the capillary tube, which is connected to the liquid line access fittings of refrigerant circuit #1.

When the valves are properly installed and adjusted, waterflow will automatically decrease as the discharge pressure falls and will increase as the discharge pressure rises. Refer to the *Water Regulating Valve Kit for CSV060C-300C Installation manual (145.15-N1)* for more information on installation and operation.

Electrical wiring

High voltage wiring

Follow local electrical codes when making electrical connections. Units are completely factory wired for normal supply voltages (for example, 208-230/460/575V/3Ph/60Hz). Confirm the unit specifications by checking the unit data plate. All electrical components are accessible through an independent electrical panel located on the opposite side of the water connections. The electrical control boxes are located behind outer access panels. There are wiring diagrams printed on 11 x 17 inches paper available in plastic pouches attached to the unit.

ⓘ **Note:** Ensure evaporator motor rotation is correct upon unit start-up. Switch any two wires at VFD fuse block if blower rotation is not correct.

WARNING

Disconnect and lock out power when servicing unit. Unit may start automatically if power is not disconnected. Failure to do so may result in personal injury or death due to electrical shock.

If canvas flexible joints are used on the ductwork, install a ground wire to the ductwork as well.

WARNING

All wiring must comply with applicable local and national codes (NEC). Type and location of disconnect switches must comply with all applicable codes.

Low voltage wiring

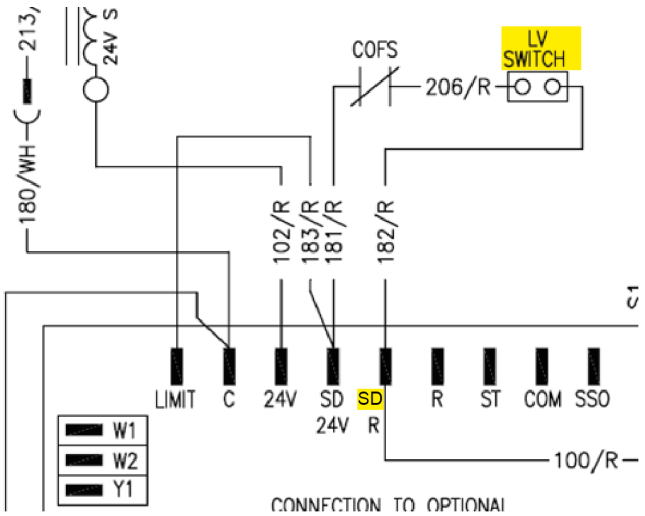
For low voltage thermostat wiring, an 18 gauge wire can be used for up to 100 foot lengths. A single or multiple stage thermostat (up to 2 cooling stages) must be used depending on size of the unit. Locate the thermostat on an inside wall approximately 56 inches above the floor. At this location, it is not subject to drafts, sun exposure, or heat from electrical fixtures or appliances.

Follow the manufacturer's instructions enclosed with the thermostat for the general installation procedure. Use the seven color-coded, insulated wires to connect the thermostat to the unit.

Low voltage shutdown switch (LV)

CSV units are wired with an on/off switch (LV) in series to the COFS into the SD terminal. This switch is located inside the main electrical box. If this switch is opened during operation, the compressors and fans will shut down similar to any SD alarm trigger. This will allow Field to shutdown unit operation while maintaining power to the SEC board for making parameter changes, or firmware updates without having to resume operation after anti-short cycle delay.

Figure 9: Low voltage shutdown switch



Remote shutdown devices

Field provided and installed remote shutdown devices can be connected to the SD-R terminal on the SEC. 24 VAC must come from the SD-24 terminal.

Use dry contacts on the remote shut down devices 24 VAC present at SD-R, unit will operate. If 24 VAC is not present, unit will immediately shutdown until the 24 VAC is restored.

Auxiliary staged heating

Specific auxiliary staged heating devices are permitted for use with CSV units. This is limited to electric duct heaters, and gas duct furnaces installed in the supply duct at least 6 ft away from the CSV discharge. The aforementioned heating devices must have standalone safety certification (CSA,UL,ETL) independent of the CSV unit. Hydronic coils, steam coils, or any heating device requiring modulating signal output from the CSV unit are not supported.

The advanced SEC offers seamless integration with heating options listed above and provides full heating stage control directly from a CSV unit. SEC equipped CSV units are capable of controlling up to 2 stages of discrete heating steps. The limit on supply air temperature passing through CSV in heating is 104.0°F due to temperature limits of the indoor fan motor to prevent premature motor failure.

Heating operation

The CSV with the SEC can support the operation of staged electric and gas fired heaters. It is not able to support modulating gas, SCR electric heaters or hydronic heating coils. Trying to control modulating type heaters using the SEC will void the unit warranty.

Single stage discrete heating logic

Upon energizing the W1 terminal from the thermostat (24VAC from the thermostat), a 24VAC signal is directed straight through the SEC board to the H1 pin (H1 is part of the P3 plug on the SEC board). Internally, the board senses signal presence on W1 and starts time delay on timer for the indoor fan. After 30 seconds, the indoor fan starts.

Once set up in the SEC using the MAP tool, the W1 signal is lost (thermostat is satisfied), it starts the fan delay off timer. After 60 seconds, the indoor fan stops. Standard fan time delay on and off can be changed by Field if required.

The compressor does not start when W1 energizes. The 24VAC signal from H1 (or H2) can be field-wired and dedicated to energize discrete control signal for electric duct heater or gas duct furnace. Power for the auxiliary heating device is not provided by the CSV unit.

Figure 10: Auxiliary staged heating

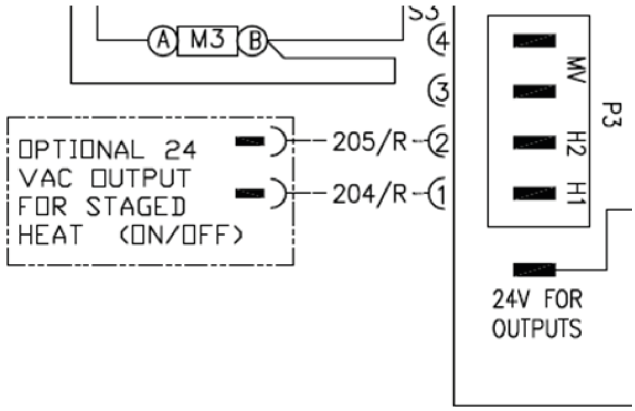
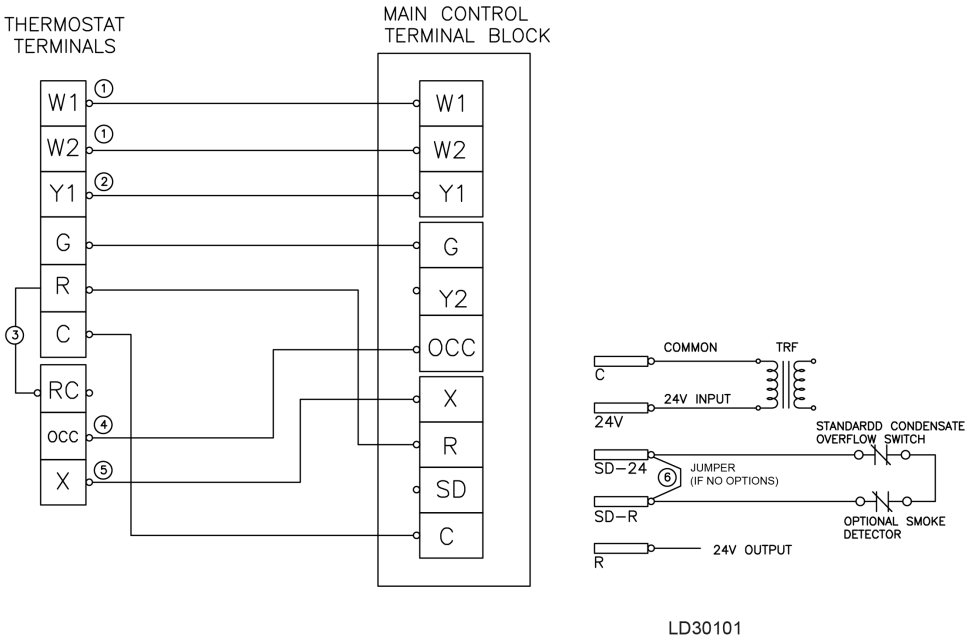
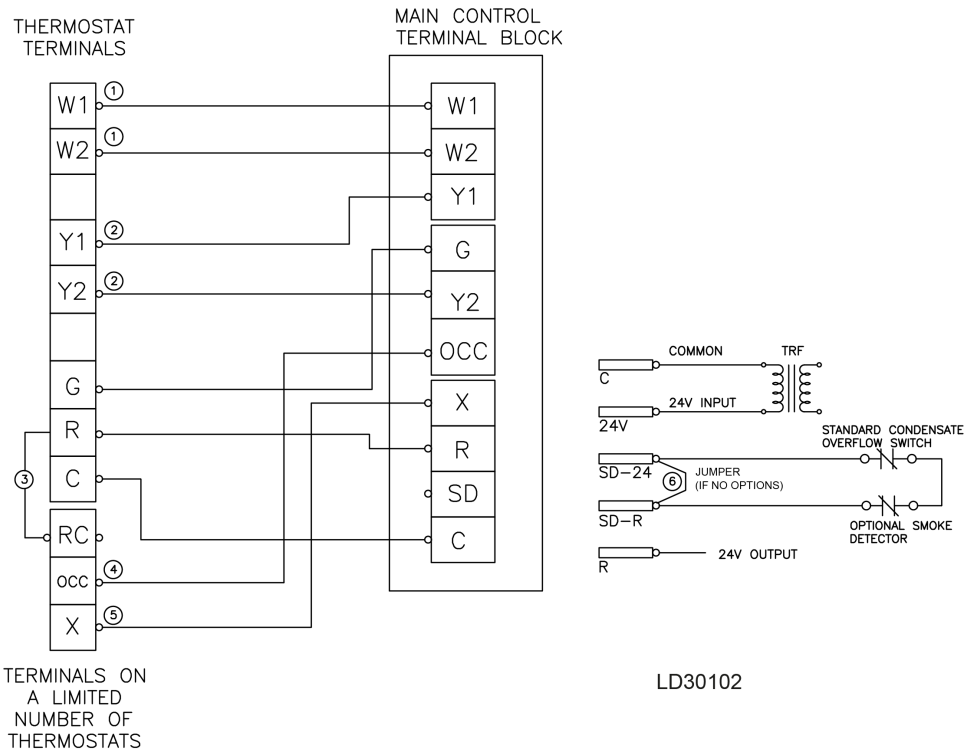


Figure 11: CSV060C one stage cooling / two stage heating typical control diagram



① Unit is capable of supporting up to 2 stages of discrete heating
② Unit is designed to support 1 stage of discrete cooling.
③ Jumper is required for any combination of R, RC, or RH.
④ OCC is an output from the thermostat to indicate the Occupied condition
⑤ X is an input to thermostat to display Error Status
⑥ Jumper is required, if no options are installed between SD-24 and SD-R.

Figure 12: CSV096C-300C two stage cooling / two stage heating typical control diagram



① Unit is capable of supporting up to 2 stages of discrete heating
② Unit is designed to support 2 stages of discrete cooling.
③ Jumper is required for any combination of R, RC, or RH.
④ OCC is an output from the thermostat to indicate the Occupied condition
⑤ X is an input to thermostat to display Error Status
⑥ Jumper is required, if no options are installed between SD-24 and SD-R.

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

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

Fan performance

Table 11: 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 12: 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 13: 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 14: 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 15: 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 16: 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.

Motor and pulley data

Table 17: Evaporator - standard blower motor and drive data

Model	Drive range (RPM)	Motor		Adjustable motor pulley	Fixed motor pulley
		Hp	Frame size	Pitch diameter (inches)	Pitch diameter (inches)
CSV060C	745-1117	1	145	1.9–2.9	4.7
CSV096C	614-921	1.5	145	1.9–2.9	5.7
CSV120C	711-984	2	145	2.4–3.4	6.4
CSV180C	724-925	3	184	3.4–4.4	8.7
CSV240C	769-971	5	184	3.8-4.8	8.7
CSV300C	716-882	7.5	213	5.2–6.4	12.7

Table 18: Evaporator - oversized blower motor and drive data

Model	Drive range (RPM)	Motor		Adjustable motor pulley	Fixed motor pulley
		Hp	Frame size	Pitch diameter (inches)	Pitch diameter (inches)
CSV060C	897-1346	1.5	145	1.9-2.9	3.9
CSV096C	798-1105	2	145	2.4-3.4	5.7
CSV120C	875-1118	3	184	3.4-4.4	7.2
CSV180C	894-1122	5	184	4.7-5.9	9.2
CSV240C	956-1200	7.5	213	4.7-5.9	8.7
CSV300C	850-1047	7.5	213	5.2-6.4	10.4

Blower speed adjustment

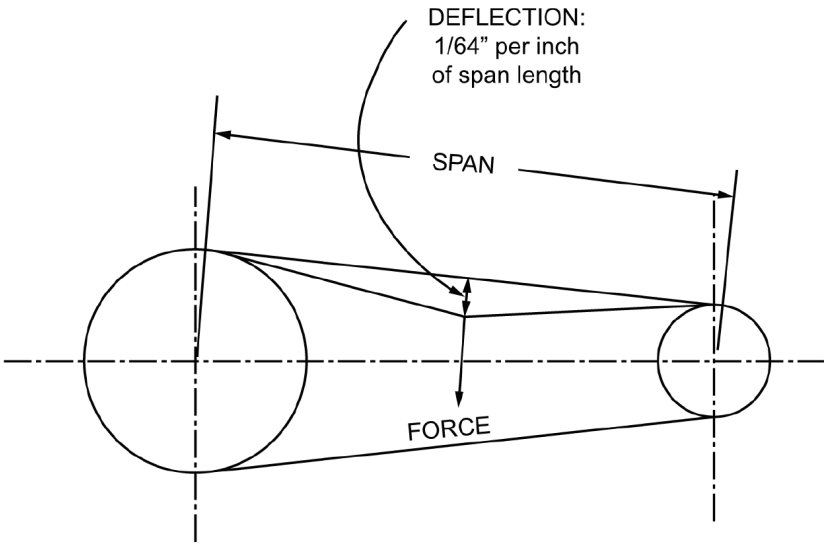
The RPM of the supply air blowers will depend on the required CFM, and the static resistances of both the supply and the return duct systems.

ⓘ **Note:** Units with oversized motors or oversized drive kits are designed to operate in the shaded region of the fan table otherwise nuisance overloads trips can occur. Motor overload trips can be remedied by increasing the external static pressure. Refer to fan tables.

With this information, the RPM for the blowers can be determined from the blower performance tables. Adjustment of blower speed is accomplished as follows:

1. Loosen belt tension by moving motor towards the blower shaft via the adjustable mounting.
2. Loosen the setscrew in the adjustable motor pulley flange. Remove external key on pulleys 4-inches diameter and larger.
3. Blower speed will increase when moveable flange is adjusted towards the fixed flange (closed). Blower speed will decrease when the moveable flange is adjusted away from the fixed flange (opened). Pulleys are adjustable only in half-turn increments. **Do not open pulley more than five full turns for "4L" and "A" belts or six full turns for "B" belts.**
4. Once the pulley has been opened/closed the appropriate number of turns, replace the external key and tighten the adjustment setscrew. Proper torque is 110–130 in.-lbs.
5. Install drive belt and adjust motor mount to tension belt.

Figure 13: Belt tension adjustment



BELT TENSION ADJUSTMENT
DEFLECTION FORCE VERSUS DRIVE BELT CROSS-SECTION
LD20679

Cross section	Pounds force	
	Min	Max
4L	1-1/2	2-1/2
A	3-1/2	6-1/2
B	5-1/2	8
BX	8	11

Start-up and operation

Start-up and operation

Start unit and check rotation of fans and compressors.

Compressor wiring is verified at the factory before shipping. The following information may be useful for compressor replacement in the field. Scroll compressors will only compress in one rotational direction. Three-phase compressors will rotate in either direction depending upon phasing of the power. Since there is a 50/50 chance of connecting power in such a way as to cause rotation in the reverse direction, **it is important to ensure proper rotation direction is achieved when the system is installed and operated.**

Monitor the microprocessor board for any fault codes. This will ensure proper unit operation. Verification of proper compressor direction is made by observing that suction pressure drops and pressure rises when the compressor is energized. Reverse compressor rotation also results in an elevated sound level, as well as substantially reduced current draw.

⚠ WARNING

The Air Conditioning section of this equipment is charged with R-410A; a hi-pressure refrigerant. Only qualified technicians, using appropriately pressure-rated test instruments, should perform troubleshooting or service on this equipment.

There is no negative impact on durability caused by operating three-phase scroll compressors in the reversed direction for a short period of time (under one hour). However, after several minutes of operation, the compressors internal protector will trip.

If opposite rotation is observed, disconnect and reverse any two leads of the three-phase supply. Reconnect power.

ⓘ **Note:** Observe unit operation and check for unusual noise or vibration.

Table 19: Pressure switch settings - all models

	High	Low
Cut out (PSIG)	625	68
Cut in (PSIG)	500	107

Table 20: Refrigerant charge (lbs)

Unit	Circuit 1	Circuit 2
CSV060C	5.41 lbs (5 lbs, 6.5 oz)	-
CSV096C	4.08 lbs (4 lbs, 1.25 oz)	4.16 lbs (4 lbs, 2.5 oz)
CSV120C	4.92 lbs (4 lbs, 14.75 oz)	4.84 lbs (4 lbs, 13.5 oz)
CSV180C	6.55 lbs (6 lbs, 8.75 oz)	8.09 lbs (8 lbs, 1.5 oz)
CSV240C	9.61 lbs (9 lbs, 9.75 oz)	9.37 lbs (9 lbs, 6 oz)
CSV300C	16.17 lbs (16 lbs, 2.75 oz)	15.8 lbs (15 lbs, 12.75 oz)

Checking superheat and subcooling

R-410A temperature charts list the associated saturation temperature in one column and the associated pressure in another column. See Table 21.

Subcooling

Full load conditions - Unit running 100% capacity. CSV060C (Y1) - one compressor running, CSV096C-300C (Y2) - both compressors running.

When the refrigerant charge is correct, there is no vapor in the liquid sight glass with the system operating under full load conditions.

The subcooling temperature of each system can be calculated:

1. Record the temperature of the liquid line at the outlet of the condenser.
2. Subtract it from the saturation temperature listed in Table 21 for the corresponding discharge pressure.
3. If the unit lacks an access port for liquid access, subtract the condenser coil pressure drop value from Table 21 from the discharge pressure to determine the equivalent saturation temperature. CSV units have liquid line access ports.

For example, when the discharge pressure is 388 psig and the liquid line temperature is 95.0°F:

- Liquid Pressure = Discharge Pressure (388 psig) minus 33 psig = 355 psig
- Saturation Temperature for 355 psig = 108.0°FLiquid Line Subcooling = Saturation Temperature (108.0°F) minus Liquid Line Temperature (95.0°) = 13.0°F

Subcooling should be 12.0–15.0°F at design conditions.

Table 21: R-410A pressure and temperature chart

PSIG	Temp ˚F	PSIG	Temp ˚F
0	-60	78	20
2	-58	80	21
4	-54	85	24
6	-50	90	26
8	-46	95	29
10	-42	100	32
12	-39	105	34
14	-36	110	36
16	-33	115	39
18	-30	120	41
20	-28	125	43
22	-26	130	45
24	-24	135	47
26	-20	140	49
28	-18	145	51
30	-16	150	53
32	-14	160	57
34	-12	170	60
36	-10	180	64
38	-8	190	67
40	-6	200	70
42	-4	210	73
44	-3	220	76
46	-2	225	78
48	0	235	80

Table 21: R-410A pressure and temperature chart

PSIG	Temp ˚F	PSIG	Temp ˚F
50	1	245	83
52	3	255	85
54	4	265	88
56	6	275	90
58	7	285	92
60	8	295	95
62	10	305	97
64	11	325	101
66	13	355	108
68	14	375	112
70	15	405	118
72	16	500	134
74	17	600	149
76	19	700	159

Superheat

Full load conditions - Unit running 100% capacity. CSV060C (Y1) - one compressor running, CSV096C-300C (Y2) - both compressors running.

Only check superheat after establishing the steady state operation of the unit, pulling down the discharge air temperature to within the control range, and running the unit in a fully loaded condition.

The superheat is calculated as the difference between the actual temperature of the refrigerant gas in the suction line and the temperature corresponding to the suction pressure as shown in Table 21.

For example, when the suction pressure is 130 psig and the suction line temperature is 57.0°F:

- Saturation Temperature for 130 psig = 45.0°F
- Evaporator Superheat = Suction Line Temperature (57.0°F) minus Saturation Temperature (45.0°F) = 12.0°F

When adjusting the expansion valve, do not turn the adjusting screw more than one turn at a time This allows sufficient time (approximately 15 minutes) between adjustments for the system and the thermal expansion valve to respond and stabilize.

The superheat setting should be adjusted to 8.0–11.0°F at design conditions.

Leak checking

Leak check compressors, fittings, and piping to ensure there are no leaks. If leak checking a unit charged with R-410A, ensure the leak test device is capable of sensing refrigerant R-410A.

WARNING

Verify the evaporator distributor tubes do not have bare copper touching each other or are against a sheet metal edge.

Startup (cooling)

Prestart checklist

After installation has been completed, make the following checks:

1. Check the electrical supply voltage. Ensure that it is the same as listed on the unit nameplate.
2. Set the room thermostat to the OFF position.
3. Turn ON the unit electrical power.
4. Check for water leaks.
5. Set the room thermostat fan switch to ON.
6. Check the indoor blower rotation.
7. Check the blower drive belt tension.
8. Check the unit's supply air (CFM).
9. Measure the evaporator fan motor's amp draw.
10. Set the room thermostat fan switch to OFF.
11. Turn the unit electrical power OFF.

Operating instructions

1. Ensure water supply to unit is on and GPM matches unit capacity.
2. Turn the unit's electrical power ON.
3. Set the room thermostat to lower than the room temperature.
4. After the built-in time delay (5 minutes), the first stage compressors energize.

Post start checklist

1. Verify the proper system pressures.
2. Measure the temperature drop across the evaporator coil.
3. Check for any water leaks.

Microprocessor controller

Units come with the state of the art Smart Equipment control (SEC) system. All units are factory commissioned, configured, and run tested. The SEC can be configured to use with a standard thermostat, a zone sensor, or to communicate with the field controller (FC) bus using BACnet® MS/TP, Modbus™ or N2 protocols.

Temperature sensors

Each unit comes with standard supply air temperature (SAT), return air temperature (RAT), and entering water temperature (EWT) sensor. SAT/EWT are factory installed, RAT sensor is field wired and installed.

USB port

The controller comes with a long list of features including data logging, current and previous system faults, and software update capabilities using the on-board USB port and a common flash drive (8GB max.). Energy use monitoring capabilities allow custom tailoring. This allows a system

to work more efficiently at all times and occupancy levels. Self-test and startup reports are also available from the board through the USB port.

ⓘ **Note:** The only device that should be plugged into the SEC USB port is a flash drive. (No phones or any other devices.)

LCD display

The board has an easy to read, built-in LCD display and easy to use buttons and a navigation joystick. These features allow the user to quickly navigate the menus that display the unit status, options, current function, supply, return and entering water temperature, fault codes, and other information.

Safety monitoring

The control monitors the following values:

- Entering water, supply air, and return air temperatures
- The high and low pressure switch status on the independent refrigerant circuits
- The voltage supplied to the unit. If the low voltage is due to a brown out, or some other electrical issue occurs, the control protects the unit

Low entering water temperature

With optional water regulating valve kit installed, this allows units to maintain condensing pressure from 350-375 psig, and operate efficiently with lower entering water temperatures. Minimum recommended entering water temperature without water regulating valve is 65°F. However, this will also depend on airside conditions. See performance tables in Engineering Guide.

Anti-short cycle delay (ASCD) protection

To extend compressor life, the standard control incorporates an ACSD. The compressor reliability is further ensured by programmable minimum runtimes.

Fan delays

Fan on and fan off delays are fully SEC programmable. Furthermore, the heating and cooling fan delay times are independent of one another. All units are programmed with default values based upon their cooling or heating capacity configuration.

Nuisance trip protection and three strikes

To prevent nuisance calls, the control board has three soft faults before a hard lock out operation. The high/ low-pressure switch, anti-freeze protection, low voltage, or heating high limit must trip three times within two hours before the unit control board locks out the associated compressor. The LCD screen displays an alarm message.

Lead-lag

This option is always disabled from the Factory on all CSV models. Enabling lead-lag will void the warranty of the unit.

ⓘ **Note:** Enabling lead-lag function will affect logic of CSV unit and disable unit operation.

ⓘ **Note:** Enabling leg-lag function will also void the factory warranty.

Condensate overflow switch

A condensate overflow fault occurs when the condensate overflow switch opens for the first time, as the switch is connected to the onboard shutdown (SD) contact. The compressor is shut down regardless of minimum runtime. The ASCD is initiated and the alarm is tripped. The fan continues

to operate in its current state. The compressor re-energizes once the condensate overflow switch closes, the ASCD has been satisfied, and a call for cooling is still present.

Operation

Compressor operation

Compressor operation includes the following features:

1. Compressors are controlled by the Y1 through a maximum of Y2 thermostat inputs.

   ⓘ **Note:** As lead-lag function must be turned OFF, Y1 input energizes the C1 output when the compressor #1 ACSD is at 0 and all refrigerant safety devices are closed (default 5 minutes).

2. The fan output for indoor fan operation energizes with any cooling output after the indoor fan cool on delay expires. See Table 25 and Table 26.
3. When the thermostat cooling inputs are lost and the minimum runtime expires, the compressor outputs stage off (the default is 3 minutes).
4. A 30 second interstate delay occurs when multiple stages are requested.

- Here is the sequence of operation for a two stage unit:
- Y1 energizes compressor 1
- Y2 energizes compressor 2

IntelliSpeed™ supply fan control (8-25 ton)

Table 22: Setpoints and related data

Stages	Fan control type	Fixed
One stage (60%)	Occupied. No heat or cool % command	60%
Two stage (60/100%)	Occupied. One stage heat or cool % command	60%
	Occupied. Two stage heat or cool % command	100%
Economizer minimum position for low speed fan		100%

The outputs have the following values:

- 24 VAC from fan on the unit control board (UCB) to enable indoor VFD.
- 2–10 VDC from VFD terminal on UCB to control the speed of the indoor VFD.

The VFD operation has the following values:

- 2–10 VDC output from VFD terminal on UCB operates the supply fan VFD proportional to the minimum and maximum frequency settings of the VFD (the defaults are 30–60hz).

The supply fan only operation is as follows:

- When there is no demand for heating or cooling, to run, the supply fan operates at the percent output of the fan only % CMD (FanOn OCC, must be YES. Factory default is NO).

The cooling supply fan operation is as follows:

- With a demand for cooling, the VFD operates at the frequency relating to the setpoint Occupied, # Stage of Cool % Command as defined under the Indoor Fan setting menu on the SE controller.

- The supply air temperature is controlled to the operational VAV cooling setpoint. A stage percent command for cooling determines how many stages of cooling are running. The stage percent command increases or decreases based on relationship of the operational VAV cooling setpoint and supply air temperature.

Figure 14: Smart equipment controller (SEC)

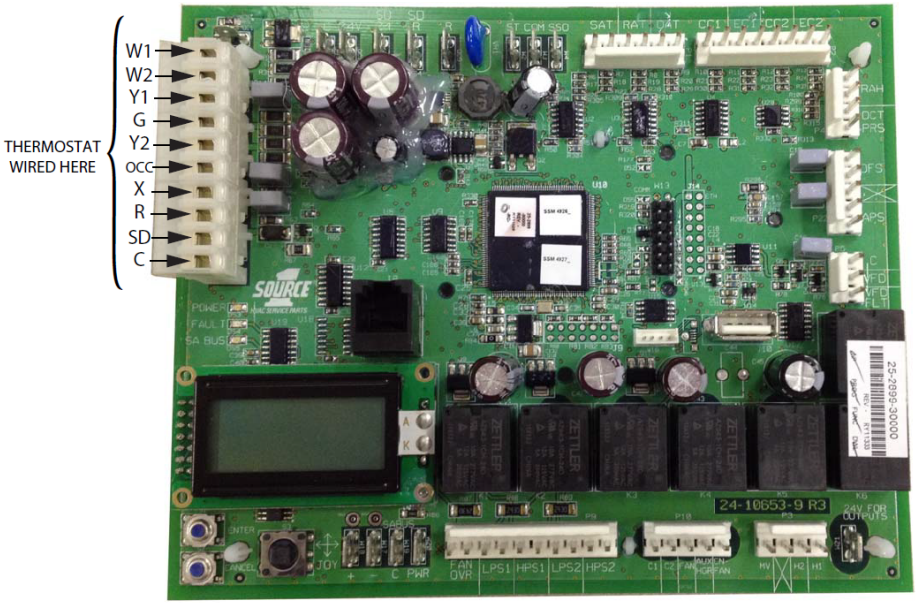


Table 23: Smart equipment™ UCB details

Description		Function and comments
Terminal Directional orientation: viewed with silkscreen labels upright		
Limit, 24 VAC power and shutdown connections from unit wiring harness at left on upper edge of UCB		
Limit	Monitored 24 VAC input through heat section limit switch(es)	If voltage is absent, indicating the heat section is overtemperature, the UCB will bring on the indoor blower
C	24 VAC, 75 VA transformer Common referenced to cabinet ground	Connects through circuit traces to thermostat connection strip C and indoor blower VFD pin C
24V	24 VAC hot out for factory accessory smoke detector, condensate overflow and/or user shutdown relay switching in series	Connects through circuit trace to thermostat connection strip SD-24. A wiring harness jumper plug connecting SD 24 to SD R is in place if factory accessories for unit shutdown are not used - this jumper plug must be removed if the switching of field-added external accessories for unit shutdown are wired between thermostat connection strip SD-24 and R
SD 24	24 VAC hot out for factory accessory smoke detector, condensate overflow and/or user shutdown relay switching in series	Connects through circuit trace to thermostat connection strip SD-24. A wiring harness jumper plug connecting SD 24 to SD R is in place if factory accessories for unit shutdown are not used - this jumper plug must be removed if the switching of field-added external accessories for unit shutdown are wired between thermostat connection strip SD-24 and R
SD R	24 VAC hot return from factory accessory smoke detector, condensate overflow and user shutdown relay switching in series	Connects through circuit trace to the R terminal on the upper left of the board
R	24 VAC hot for switched inputs to the UCB	Connects through circuit trace to the thermostat connection strip R terminal, right FAN OVR pin, right HPS1 pin, right HPS2 pin, lower DFS pin and lower APS pin
Terminal thermostat connection strip on left edge of UCB		

Table 23: Smart equipment™ UCB details

Description		Function and comments
W1	1st stage heating request, 24 VAC input switched from R	Not effective for cooling-only units
W2	2nd stage heating request, 24 VAC input switched from R	Not effective for cooling-only units or units with single-stage heat sections
Y1	1st stage cooling request, 24 VAC input switched from R	
Y2	2nd stage cooling request, 24 VAC input switched from R	Visible in the display menu when the #ClgStgs parameter is set for 2 or more, also effective for economizer free cooling supply air temperature reset when the #ClgStgs parameter is set for 1 or more
G	Continuous indoor blower request, 24 VAC input switched from R	
OCC	Occupancy request, 24 VAC input switched from R	Must have the OccMode parameter set for External to be effective
X	Hard lockout indicator, 24 volt output to a light thermostat LED	
R	24 VAC hot for thermostat switching and power	If field-added external accessories for unit shutdown are used, 24 VAC hot return from smoke detector, condensate overflow and/or user shutdown relay switching in series
SD-24	If field-added external accessories for unit shutdown are used, 24 VAC hot out for smoke detector, condensate over-flow and/or user shutdown relay switching in series	Unit wiring harness jumper plug for factory shutdown accessories must be removed if the switching of field-added external accessories for unit shutdown are wired between thermostat connection strip SD-24 and R
C	24 VAC common for thermostat power	
LEDs on left edge of UCB		
POWER	Green UCB power indicator	Lit indicates 24 VAC is present at C and 24V terminals
FAULT	Red hard lockout, networking error and firmware error indicator	1/2 second on/off flashing indicates one or more alarm is currently active, 1/10th second on/off flashing indicates a networking error (polarity, addressing, etc.) or a firmware error (likely correctable with re-loading from USB flash drive)
SA BUS	Green UCB SA bus communication transmission indicator	Lit/flickering indicates UCB SA bus communication is currently active, off indicates the UCB is awaiting SA bus communication
Terminal space temperature sensor connections at center on upper edge of UCB		
ST	Space Temperature sensor input from 10KΩ @ 77°F, Type III negative temperature coefficient thermistor	Positive of VDC circuit (3.625 VDC reading to COM with open circuit), effective if “Thermostat-only Control” parameter is set OFF, space sensor override momentary shorts ST to COM to initiate/terminate temporary occupancy
COM	Common for ST and SSO inputs	Negative of VDC circuit for ST and SSO inputs
SSO	Space Sensor Offset input from 0 to 20KΩ potentiometer	Positive of VDC circuit (3.625 VDC reading to COM with open circuit), 10KΩ/2.5 VDC is 0°F offset, 0Ω/0 VDC is maximum above offset and 20KΩ/3.4 VDC is maximum below offset from active space temperature setpoint
Pin temperature sensor connections at right on upper edge of UCB		
SAT+	Supply air temperature sensor input from 10KΩ @ 77°F, Type III negative temperature coefficient thermistor	Input required for operation; 3.625 VDC reading SAT+ to SAT– with open circuit. Used in heat/cool staging cutouts, free cooling operation, demand ventilation operation, comfort ventilation operation, economizer loading operation, VAV cooling operation, hydronic heat operation.
RAT+	Return air temperature sensor input from 10KΩ @ 77°F, Type III negative temperature coefficient thermistor	Input required for operation; 3.625 VDC reading RAT + to RAT– with open circuit. Used in return air enthalpy calculation. Substitutes for space temperature if no other space temperature input is present.

Table 23: Smart equipment™ UCB details

Description		Function and comments
OAT+	Outside Air Temperature sensor input from 10KΩ @ 77°F, Type III negative temperature coefficient thermistor	Input required for operation but may be a communicated value; 3.625 VDC reading OAT+ to OAT– with open circuit. Used in heat/cool cutouts, low ambient cooling determination, dry bulb free cooling changeover, outside air enthalpy calculation, economizer loading operation, heat pump demand defrost calculation.
CC1+	#1 refrigerant circuit Condenser Coil temperature sensor input from 10KΩ @ 77°F, Type III negative temperature coefficient thermistor	Input required for heat pump units, not required for A/C units; 3.625 VDC reading CC1+ to CC1– with open circuit. Used in heat pump demand defrost calculation.
EC1+	#1 refrigerant circuit Evaporator Coil temperature sensor input from 10KΩ @ 77°F, Type III negative temperature coefficient thermistor	Input required for operation; 3.625 VDC reading EC1+ to EC1– with open circuit. Used in suction line temperature safety.
CC2+	#2 refrigerant circuit Condenser Coil temperature sensor input from 10KΩ @ 77°F, Type III negative temperature coefficient thermistor	Input required for 2-compressor heat pump units, not required for 2-compressor A/C units, not active for 1-compressor units; 3.625 VDC reading CC2+ to CC2– with open circuit. Used in heat pump demand defrost calculation.
EC2+	#2 refrigerant circuit Evaporator Coil temperature sensor input from 10KΩ @ 77°F, Type III negative temperature coefficient thermistor	Input required for operation of 2-compressor units, not active for 1-compressor units; 3.625 VDC reading EC2+ to EC2– with open circuit. Used in suction line temperature safety.
Pinned connections on right edge of UCB		
RAH+	Return Air Humidity input from 0-10 VDC @ 0-100% RH sensor	Input required for reheat units, optional in all other units, may be a communicated value. Used in return air enthalpy calculation, temperature/humidity setpoint reset, reheat operation.
DCT PRS+	Supply Duct Pressure input from 0-10 VDC @ 0-5” w.c. sensor	Input required for variable air volume units. Used in VAV indoor blower operation.
DFS (upper pin)	24 VAC hot return from Dirty Filter Switch	Optional input; switch closure for greater than 15 seconds during indoor blower operation initiates a notification alarm
DFS (lower pin)	24 VAC hot out for Dirty Filter Switch	Connects through circuit trace to the R terminal
C	Common for the VFD output	Negative of the VDC circuit for the VFD output
VFD	2-10 VDC (0-100%) output for the indoor blower Variable Frequency Drive	Output is active with indoor blower operation. For CV units: this output provides stepped IntelliSpeed control of the indoor blower VFD based on fan-only, cooling stage and heating stage outputs. For VAV units: this output provides control of the indoor blower VFD based on supply duct static pressure input and setpoint.
VFDFLT	24 VAC hot input from the normally open VFD alarm contact	The VFD alarm contact switches from R within the unit wiring harness. 24 VAC input results in unit shutdown and a “VFD fault” alarm
Terminal at lower right corner of UCB		
24V for outputs	24 VAC hot for H1, H2, CN-FAN, AUX HGR, FAN C1 and C2 output relay contact switching	Output relay circuitry is isolated from other UCB components and the 24 VAC hot source may be from a second transformer in the unit
Pin heat section connections at right on lower edge of UCB		
H1	24 VAC hot output for heat section stage 1	Not effective for cooling-only units. Output if demand is present and permissions allow one stage or two stages of heat section operation
H2	24 VAC hot output for heat section stage 2	Not effective for cooling-only units or units with single-stage heat sections. Output if demand is present and permissions allow two stages of heat section operation
Pin cooling and fan output connections at right on lower edge of UCB		
CN-Fan	24 VAC hot output for the condenser fan contactor coil	Output with either C1 or C2 output; interrupted during defrost cycle for heat pump units

Table 23: Smart equipment™ UCB details

Description		Function and comments
Fan	24 VAC hot output for indoor blower contactor coil/indoor blower VFD enable relay coil	Output with heat/cool operation, G input or schedule demand
C1	24 VAC hot output for compressor 1	If demand is present and permissions allow compressor 1 operation; output with compressor cooling, comfort ventilation cooling, reheat or heat pump heating demands
C2	24 VAC hot output for compressor 2	Not effective for one stage compressor UCBs. If demand is present and permissions allow compressor 2 operation; output with compressor cooling, comfort ventilation cooling or heat pump heating demands
Pin refrigerant circuit safety switch and indoor blower overload connections at center on lower edge of UCB		
HPS1 (right pin)	24 VAC hot out for refrigerant circuit 1 High Pressure Switch	Connects through circuit trace to the R terminal
HPS1 (left pin)	24 VAC hot return from refrigerant circuit 1 High Pressure Switch	Input is only considered if C1 output is needed; input must be present to allow C1 output. Three HPS1 trips in a two hour period cause a “High Pressure Switch 1 Lockout” and C1 output is then prevented until alarm reset. Connects through circuit trace to the right LPS1 pin.
LPS1 (right pin)	24 VAC hot out for refrigerant circuit 1 Low Pressure Switch	Connects through circuit trace to the left HSP1 pin
LPS1 (left pin)	24 VAC hot return from refrigerant circuit 1 Low Pressure Switch	Input is only considered after 30 seconds of C1 output; afterwards, input must be present to allow C1 output. Three LPS1 trips in a one hour period cause a “Low Pressure Switch 1 Lockout” and C1 output is then prevented until alarm reset.
HPS2 (right pin)	24 VAC hot out for refrigerant circuit 2 High Pressure Switch	Not effective for one stage compressor UCBs. Connects through circuit trace to the R terminal
HPS2 (left pin)	24 VAC hot return from refrigerant circuit 2 High Pressure Switch	Not effective for one stage compressor UCBs. Input is only considered if C2 output is needed; input must be present to allow C1 output. Three HPS2 trips in a two hour period cause a “High Pressure Switch 1 Lockout” and C2 output is then prevented until alarm reset. Connects through circuit trace to the right LPS2 pin.
LPS2 (right pin)	24 VAC hot out for refrigerant circuit 2 Low Pressure Switch	Not effective for one stage compressor UCBs. Connects through circuit trace to the left HSP2 pin
LPS2 (left pin)	24 VAC hot return from refrigerant circuit 2 Low Pressure Switch	Not effective for one stage compressor UCBs. Input is only considered after 30 seconds of C2 output; afterwards, input must be present to allow C2 output. Three LPS2 trips in a one hour period cause a “Low Pressure Switch 2 Lockout” and C2 output is then prevented until alarm reset.
Terminal SA BUS1 connections on at left on lower edge and center of UCB		
PWR	Power for SA (“Sensor-Actuator”) BUS devices	Also incorporated in the J8 6-pin phone jack connector at the left-center of the board. Positive of the 15 VDC (reading to C) circuit for powering an optional netstat and/or Multi Touch gateway
C	Common for SA BUS power and communication circuits	Also incorporated in the J8 6-pin phone jack connector at the left-center of the board. Negative of the SA BUS circuits
-	Communication for SA BUS devices	Also incorporated in the J8 6-pin phone jack connector at the left-center of the board. Positive of the VDC (typically, a fluctuating 1.5 to 3.5 volts reading to C; at least 0.25 volts lower than +) SA BUS communication circuit to optional economizer board, 4-stage board, fault detection & diagnostics board, netstat and/or Multi Touch gateway

Table 23: Smart equipment™ UCB details

Description		Function and comments
+	Communication for SA BUS devices	Also incorporated in the J8 6-pin phone jack connector at the left-center of the board. Positive of the VDC (typically, a fluctuating 1.5 to 3.5 volts reading to C; at least 0.25 volts higher than –) SA BUS communication circuit to optional economizer board, 4-stage board, fault detection & diagnostics board, netstat and/or Multi Touch gateway
J8	6-pin phone jack connector	Incorporates the SA BUS terminals for convenience/alternate connection of SA BUS devices, primarily used for temporary service connection of the Multi Touch gateway
Item integrated user interface at lower left corner of UCB		
Display	On-board, 2-line x 8-character back-lit display	On-board display, buttons and joystick allow access to UCB, economizer, 4-stage and FDD board parameters
Enter	Button for display menu acknowledgment and navigation	
Cancel	Button for display menu navigation and zeroing of active compressor ASCD timer	
Joy	4-way joystick for display menu navigation	
Item USB connector at right of UCB		
J10	Type A female Universal Serial Bus connector	Used for backup, restoration, & copying of board parameters as well as board software updating through a flash drive
J15	Factory wired SA Bus connector	
Optional communication sub-board at center of UCB		
Terminal FC BUS connections on left edge of the communication board		
FC+	FC (“Field Connected”) BUS BACnet MSTP communication	Positive of the VDC (typically, a fluctuating 1.5 to 3.5 volts reading to COM; at least 0.25 volts higher than –) FC bus BACnet MSTP communication circuit
FC-	FC (“Field Connected”) BUS BACnet MSTP communication	Positive of the VDC (typically, a fluctuating 1.5 to 3.5 volts reading to COM; at least 0.25 volts lower than +) FC bus BACnet MSTP communication circuit
COM	Common for the FC (“Field Connected”) BUS BACnet MSTP communication circuit	Negative of the VDC FC bus BACnet MSTP communication circuit
SHLD	Shield for the FC (“Field Connected”) BUS BACnet MSTP communication circuit	Earth ground reference of the cable to prevent interference on the FC bus BACnet MSTP communication circuit
Item selector in red housing at left on top edge of the communication board		
EOL switch	Green end of line indicator	Lit indicates the EOL switch is selected ON
FC bus	Green FC bus communication transmission indicator	Lit/flickering indicates outgoing UCB FC bus communication is currently active, off indicates the UCB is awaiting incoming FC bus communication
ISO bus	Green communication board Isolated Power indicator	Lit indicates the UCB is supplying power to the communication sub-board

Maintenance/service

WARNING

Disconnect and lock out power when servicing unit. Failure to do so may result in personal injury or death due to electrical shock.

CAUTION

Exercise care when working around the sharp metal edges of door panels, door frames, etc. These edges can cause injury.

Evaporator coil

Inspect the evaporator coil at filter change intervals. Dirty or clogged evaporator coils causes low suction pressure and lost capacity. If the coils appear dirty, they should be cleaned using a mild detergent or an approved commercial coil cleaning agent. Do not use cleaners that contain acids (e.g., vinegar) or ammonia as they can damage evaporator coil and lead to coil leaks due to formicary corrosion.

Refrigerant circuit(s)

WARNING

The Air Conditioning section of this equipment is charged with R-410A; a high pressure refrigerant. Only qualified technicians, using appropriately pressure rated test instruments, should perform troubleshooting or service on this equipment.

With the unit operating, check and record the compressor discharge and suction pressures. The compressor running current should also be recorded. A maintenance log of these readings can indicate if the unit is operating within its normal limits. Abnormal readings should be investigated and the cause corrected.

Blower

Inspect the evaporator blower at each regular service interval. Clean blower wheel as needed. Bearings are permanently sealed ball bearing type and do not require lubrication. Check bearings for any signs of wear (movement between inner and outer races). Ensure bearing locking collars are secure to the shaft and that collar locking screw is properly set. Check that the blower wheel is tight on the shaft and that the hub set screws are properly torqued.

Drive belt

Examine belt periodically for wear. Glazed areas on the drive surfaces indicate overheating due to belt slippage. Ideal tension is the lowest tension at which the belt will not slip under peak load conditions. Over-tensioning shortens belt and bearing life (see section Blower speed adjustment).

The tension on the belt should be adjusted for a deflection of 1/64 of an inch per inch of belt span, with the appropriate force applied at the midpoint of the span (see section Blower speed adjustment). Tension “New” belts at the maximum value indicated. Used belts should be maintained at the minimum value.

Filters

Inspect filters monthly and replace as necessary. Use UL Class 2 rated filters. Factory supplied filters are medium efficiency, extended surface pleated type. Replacements should be of the same type in order to maintain optimum airflow performance. Filter sizes are as follows:

Table 24: Filter sizes

Filters	Qty/size
CSV060C	2/20x18x2
CSV096C	6/14x20x2
CSV120C	6/14x20x2
CSV180C	2/16x20x2 4/16x25x2
CSV240C	6/20x25x2
CSV300C	6/25x18x2 6/20x18x2

Drain pan & condensate

Inspect the field installed condensate trap for any blockage. Remove and clean as necessary. Inspect the drain pan regularly to ensure for adequate drainage and that no sitting water is present.

Dimensional data

Figure 15: CSV060C front return/top discharge/LH water connection dimensional data

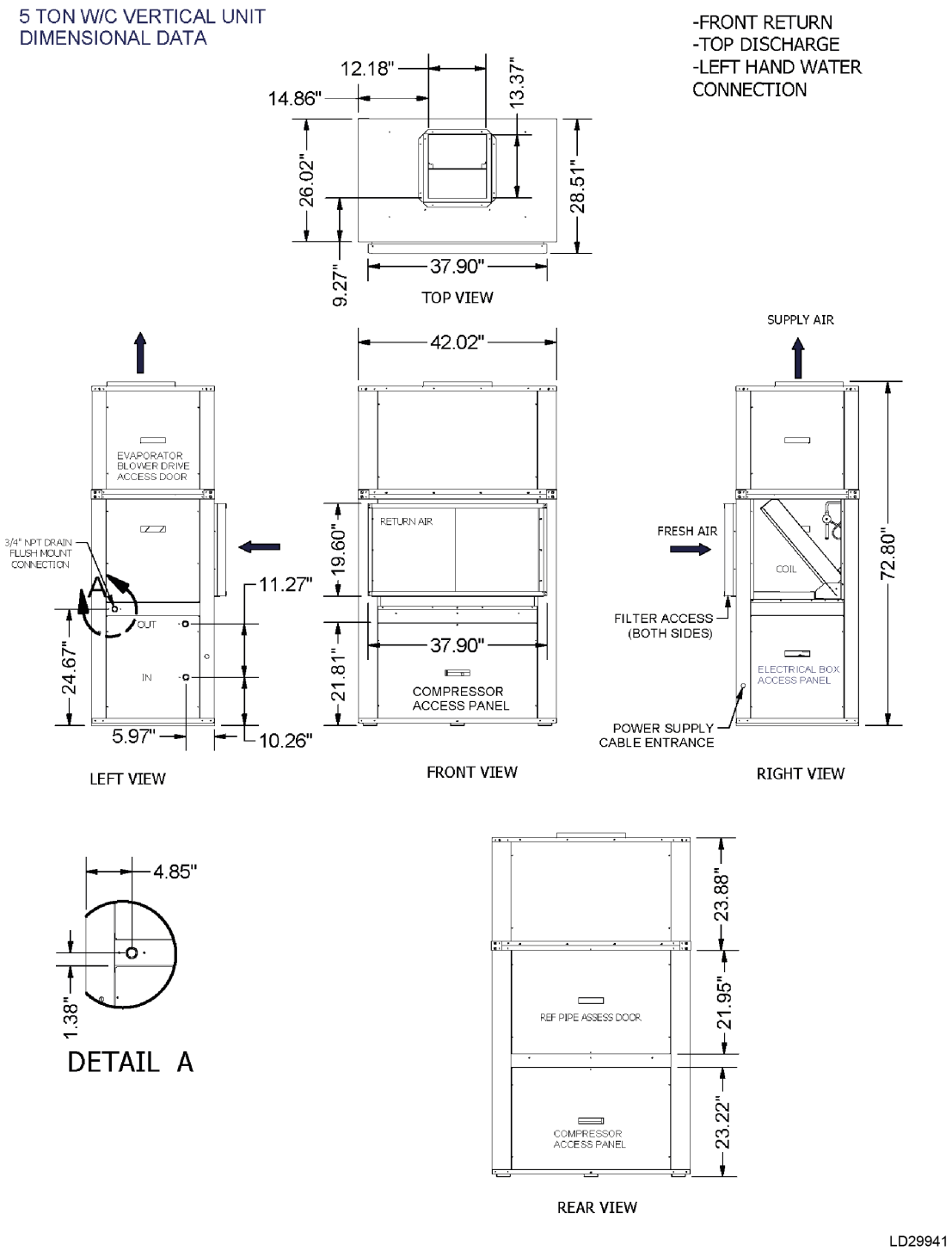


Figure 16: CSV060C front return/front discharge/LH water connection dimensional data

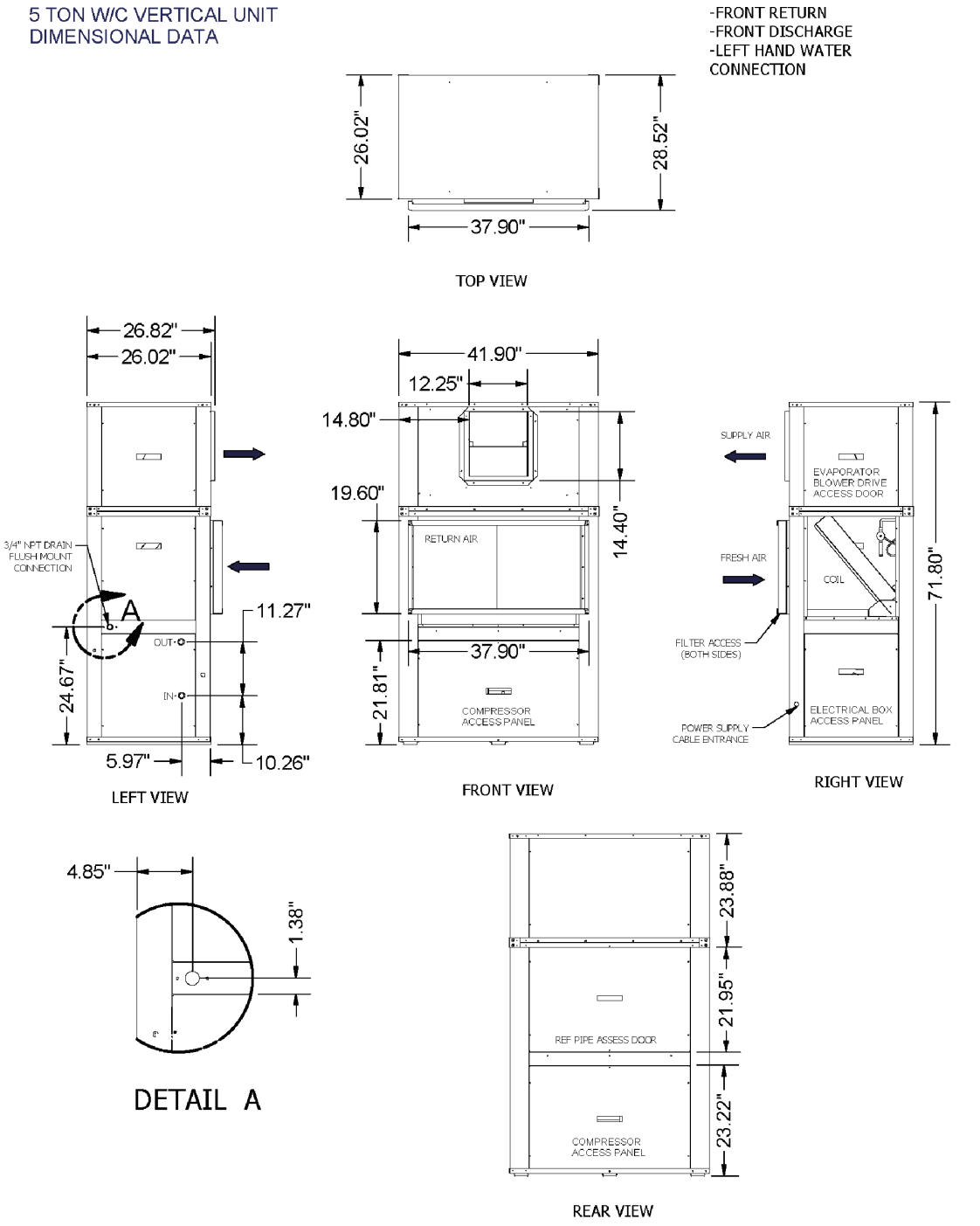


Figure 17: CSV060C front return/top discharge/RH water connection dimensional data

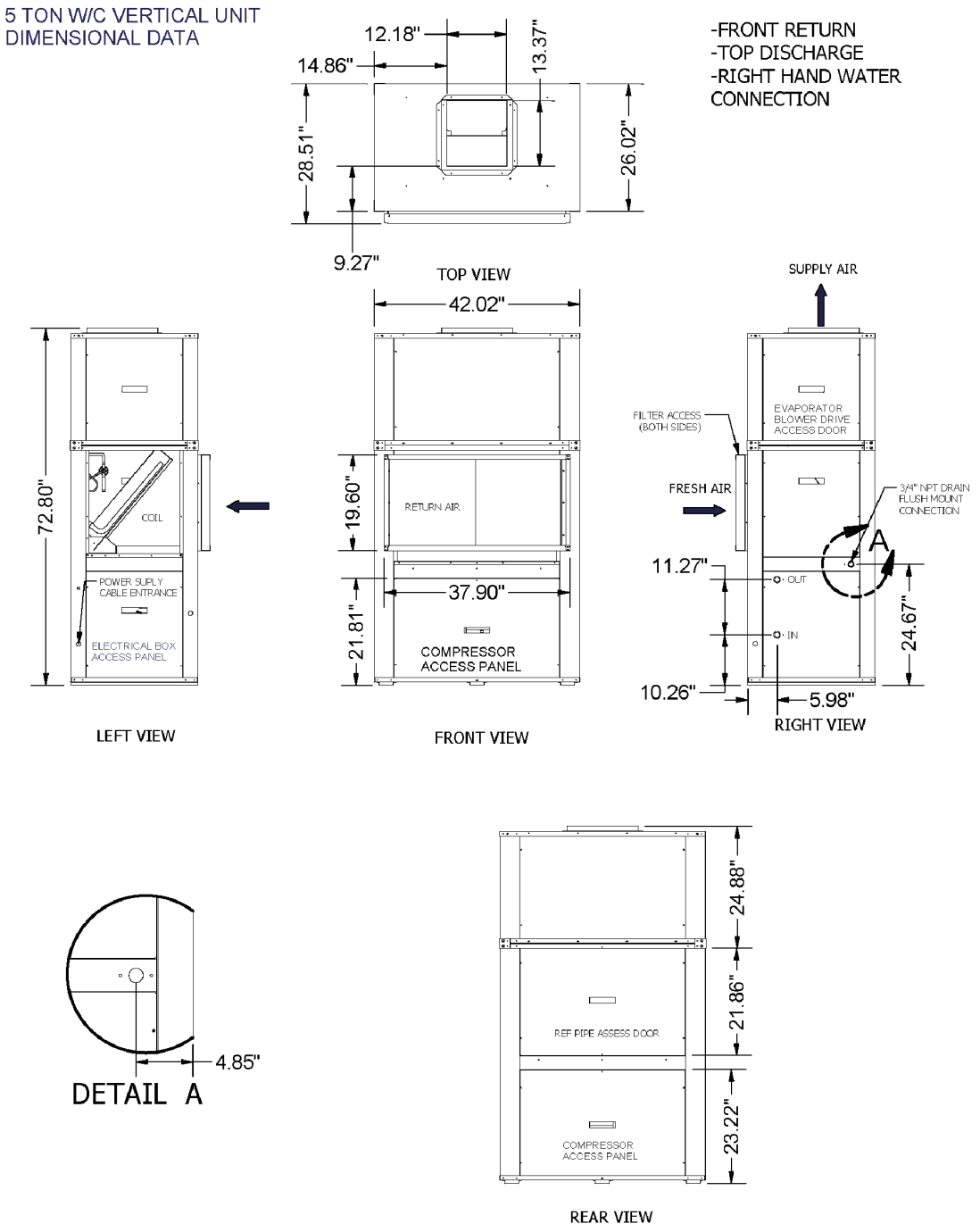


Figure 18: CSV060C front return/front discharge/RH water connection dimensional data

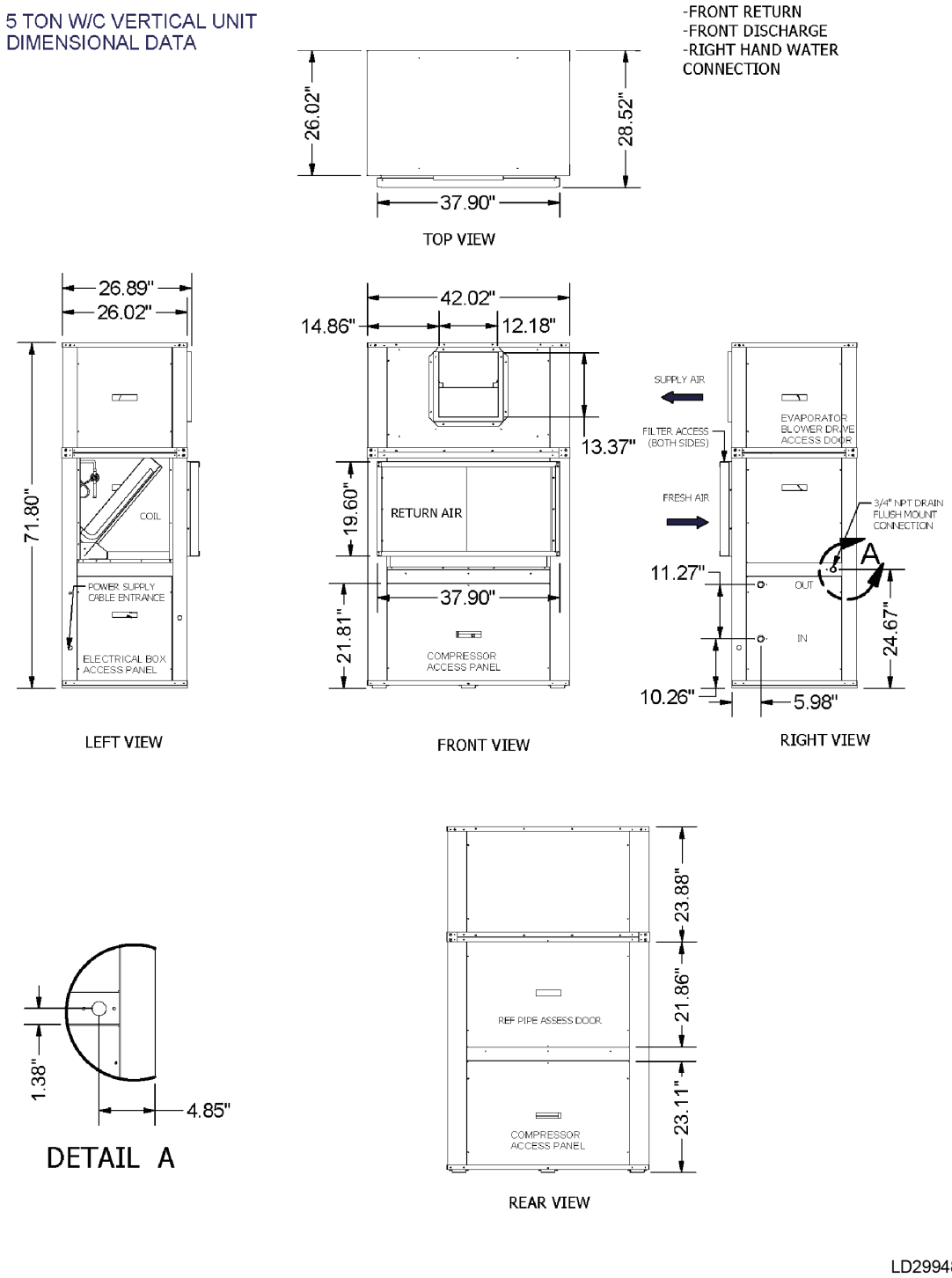


Figure 19: CSV096/120C front return/top discharge/LH water connection dimensional data

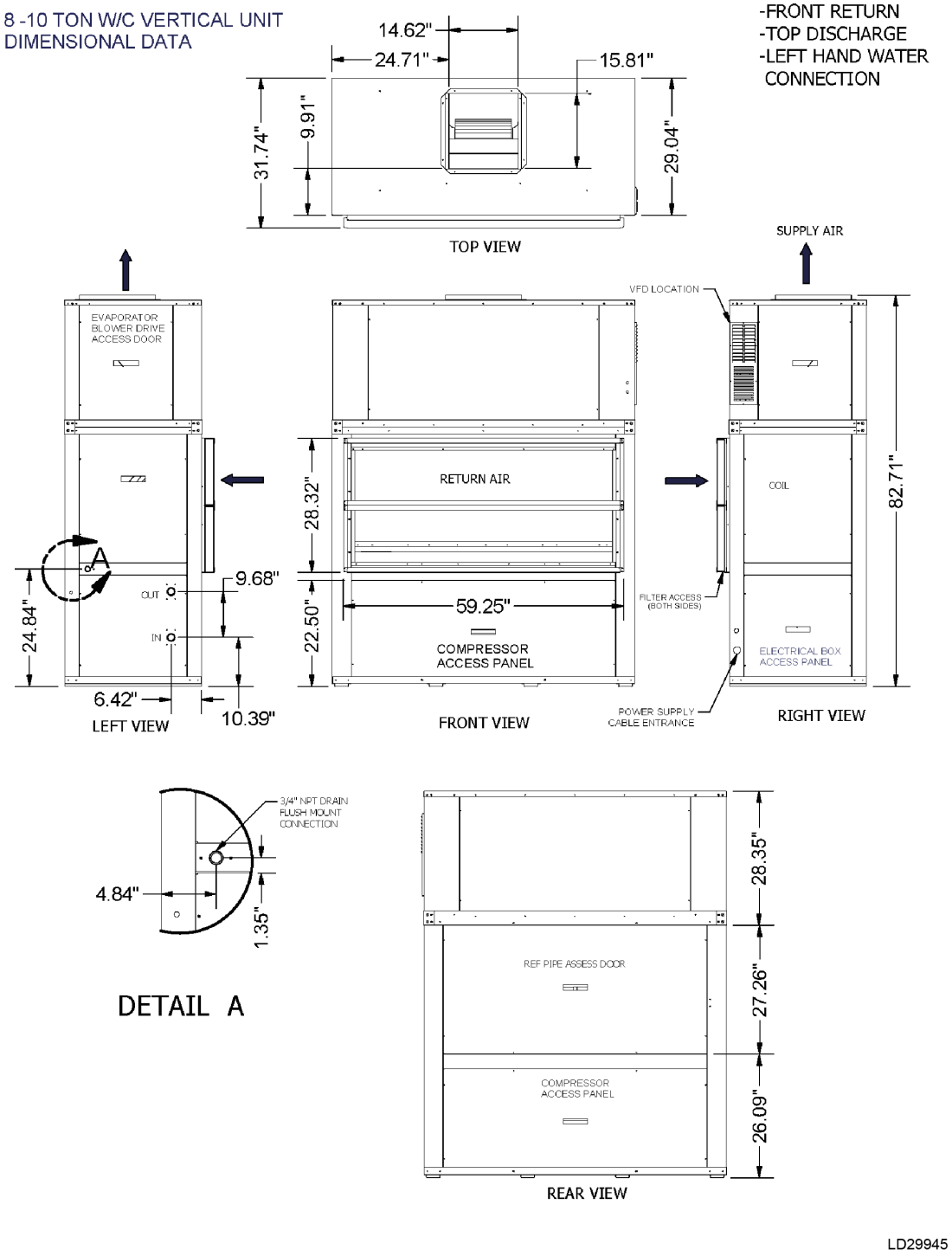


Figure 20: CSV096/120C front return/front discharge/LH water connection dimensional data

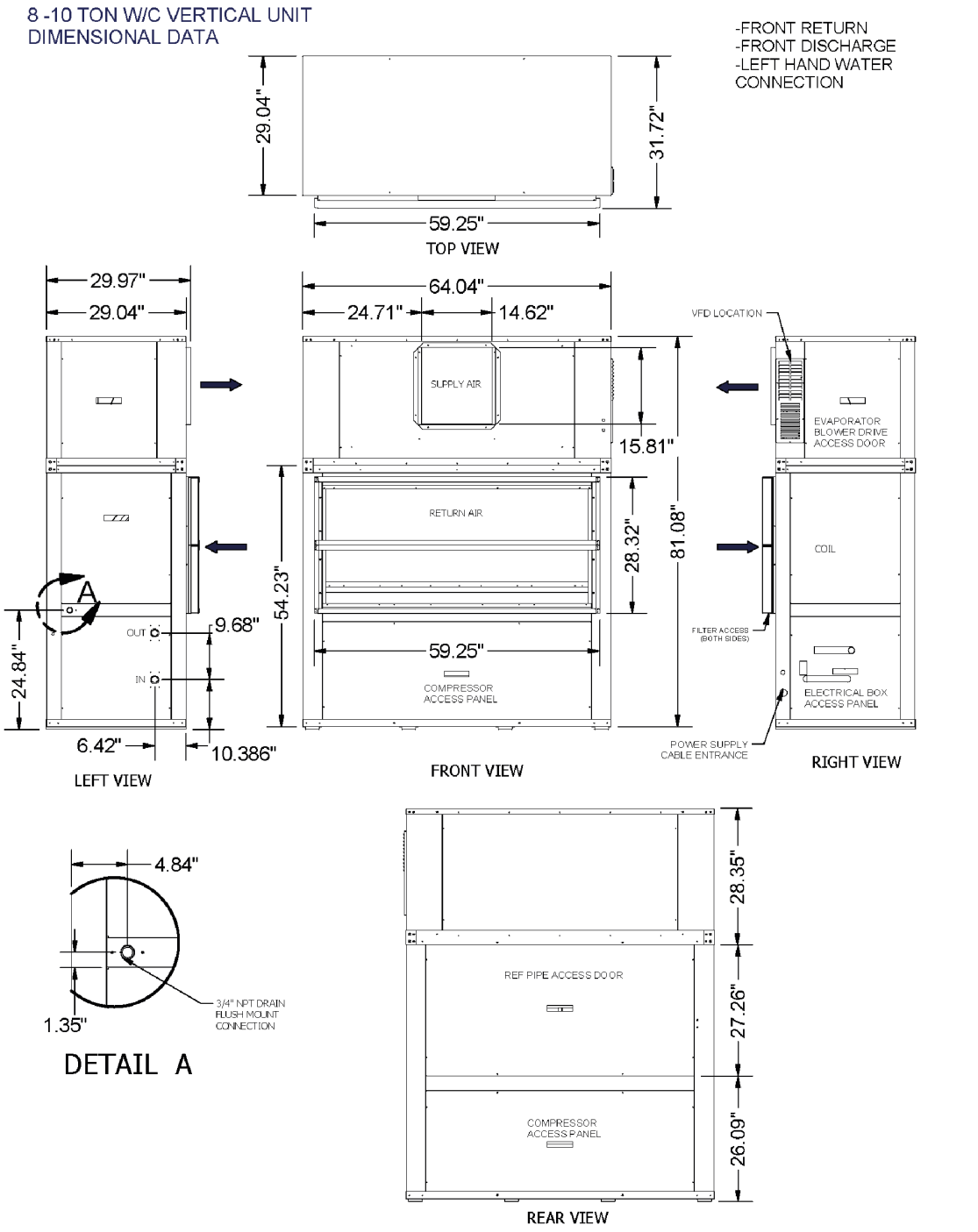


Figure 21: CSV096/120C front return/top discharge/RH water connection dimensional data

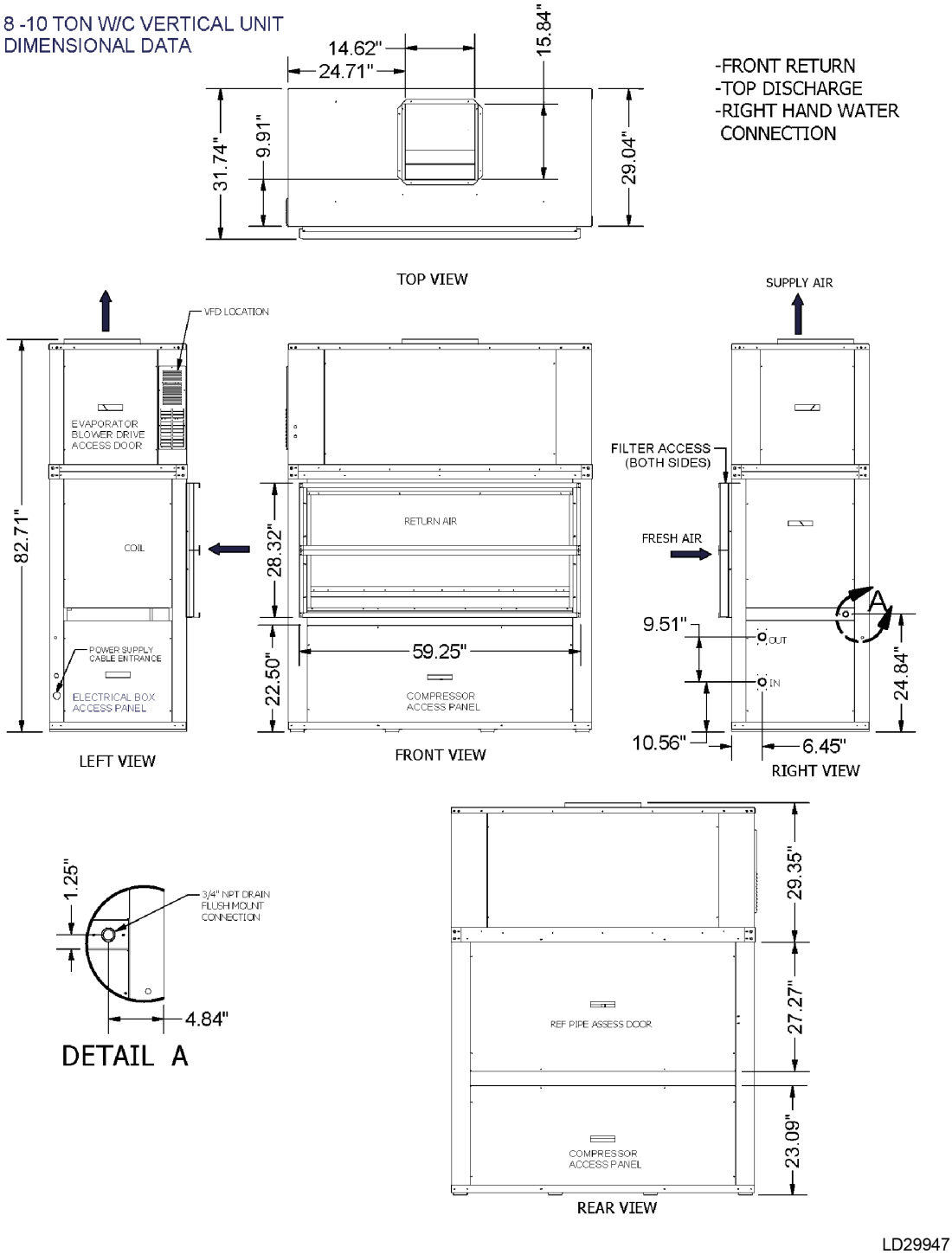


Figure 22: CSV096/120C front return/front discharge/RH water connection dimensional data

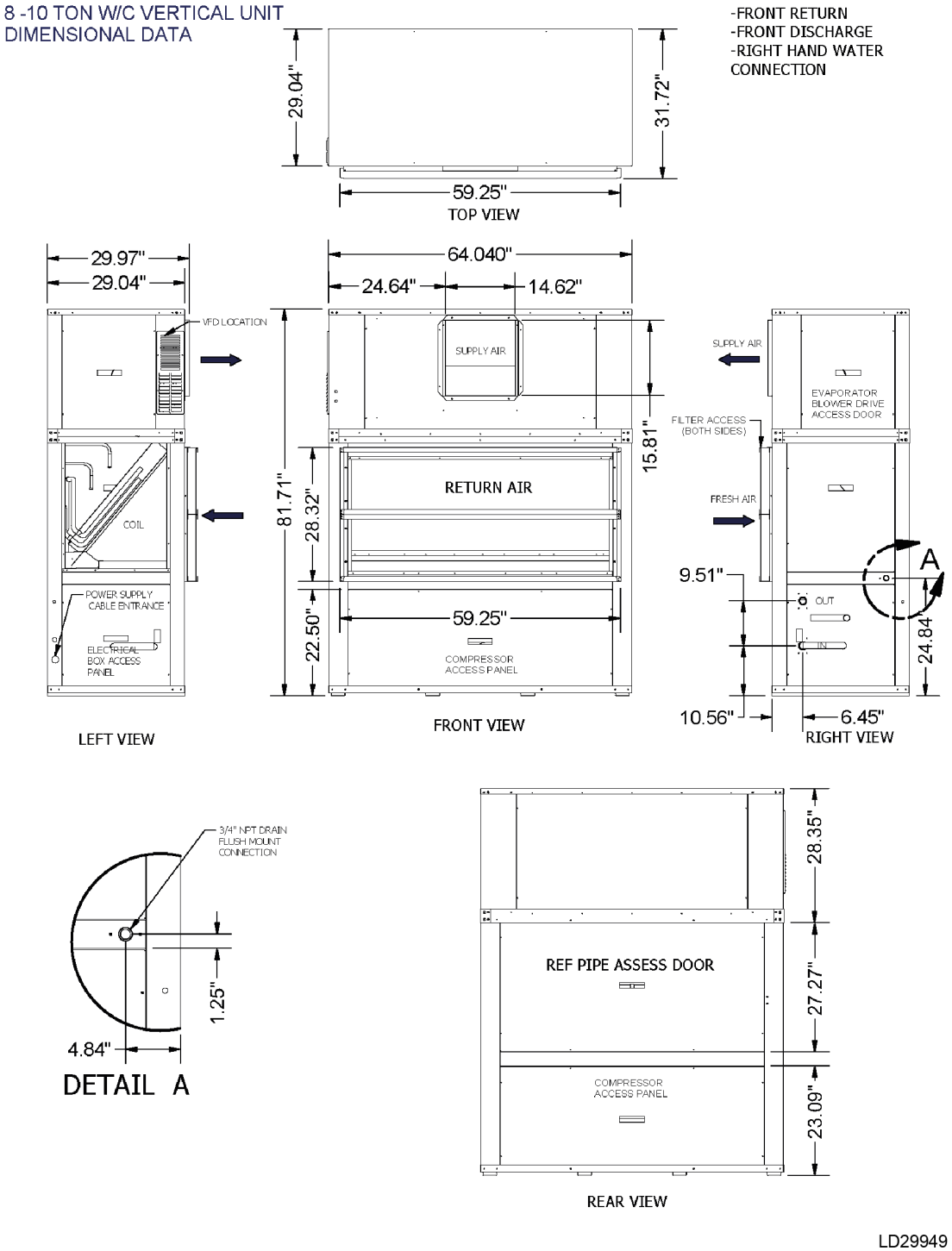


Figure 23: CSV180C front return/top discharge/LH water connection dimensional data

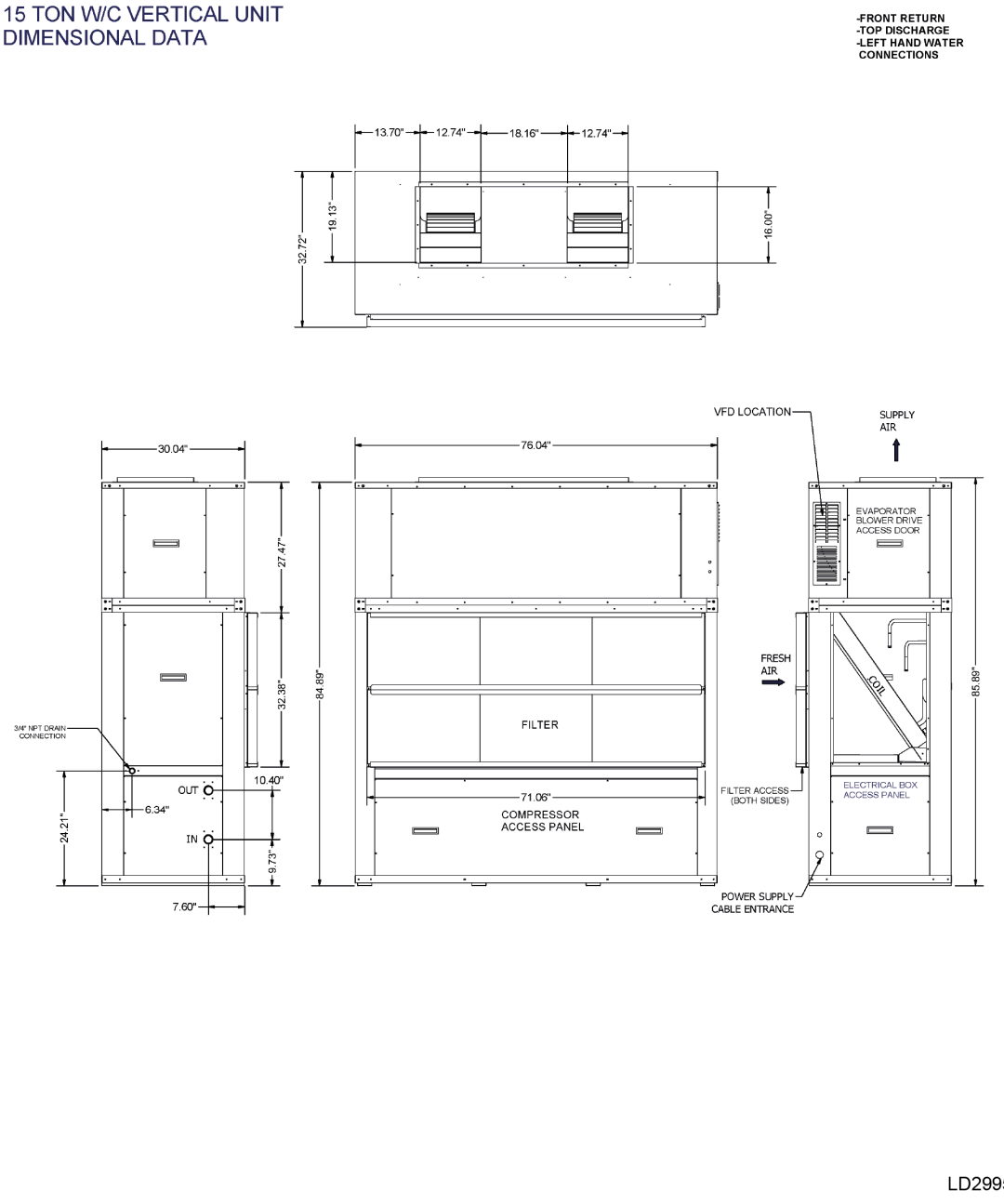


Figure 24: CSV180C front return/front discharge/LH water connection dimensional data

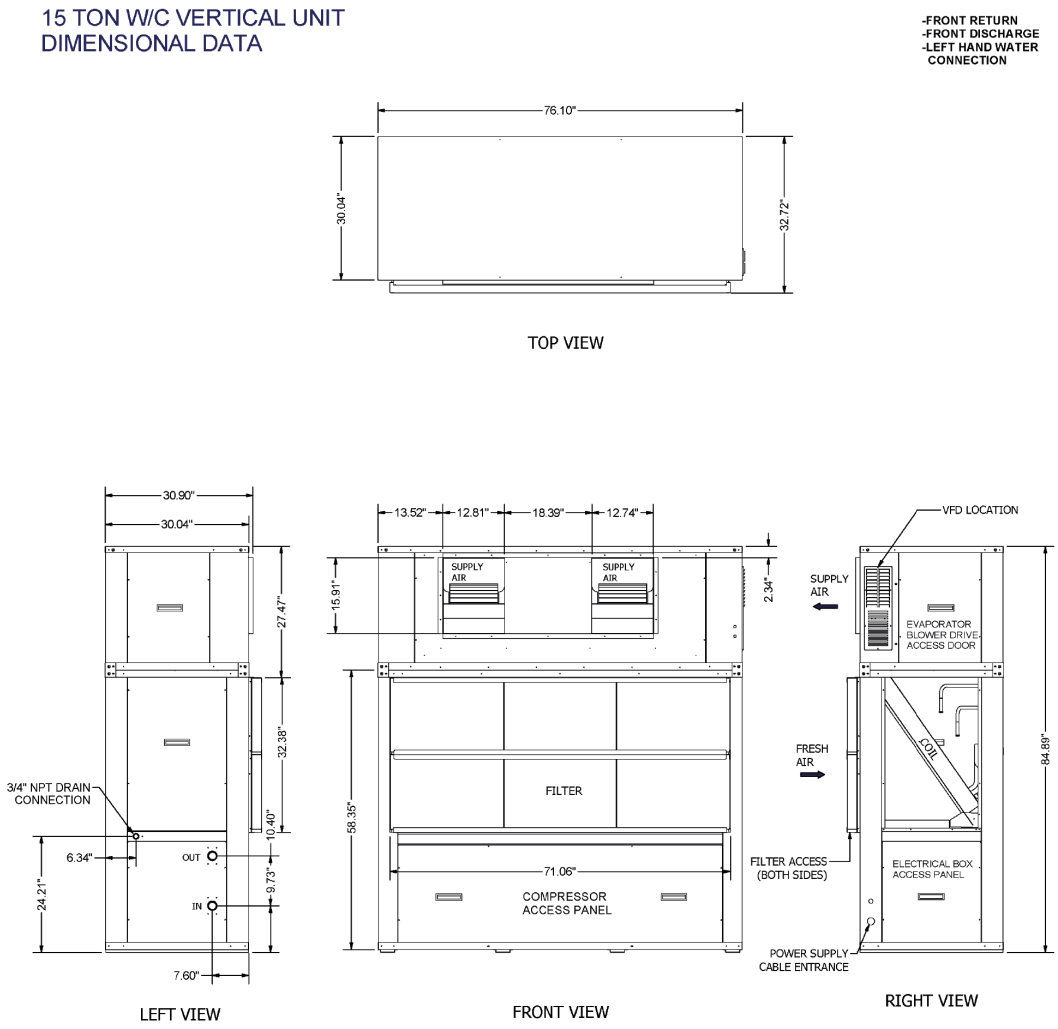


Figure 25: CSV180C front return/top discharge/RH water connection dimensional data

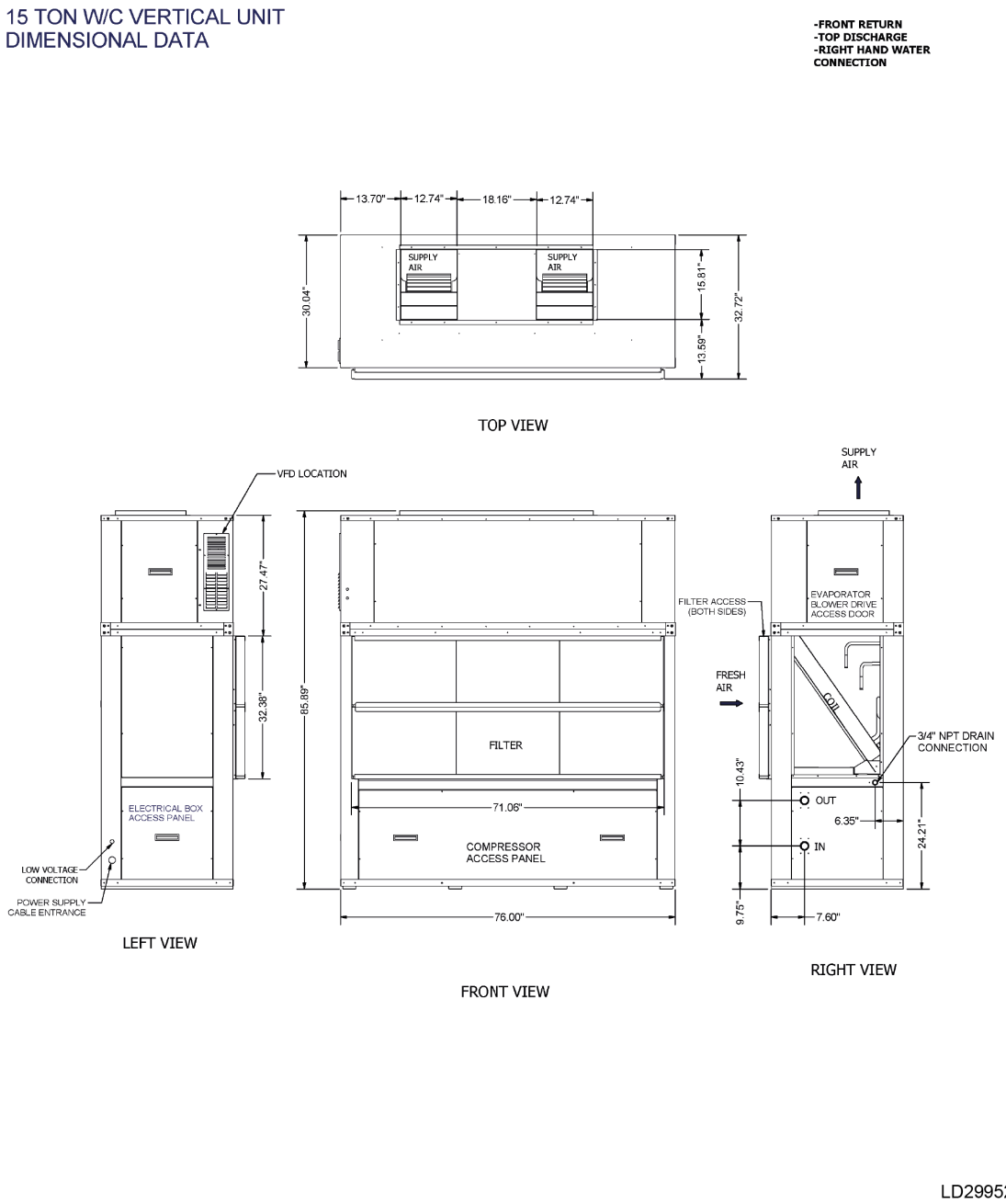


Figure 26: CSV180C front return/front discharge/RH water connection dimensional data

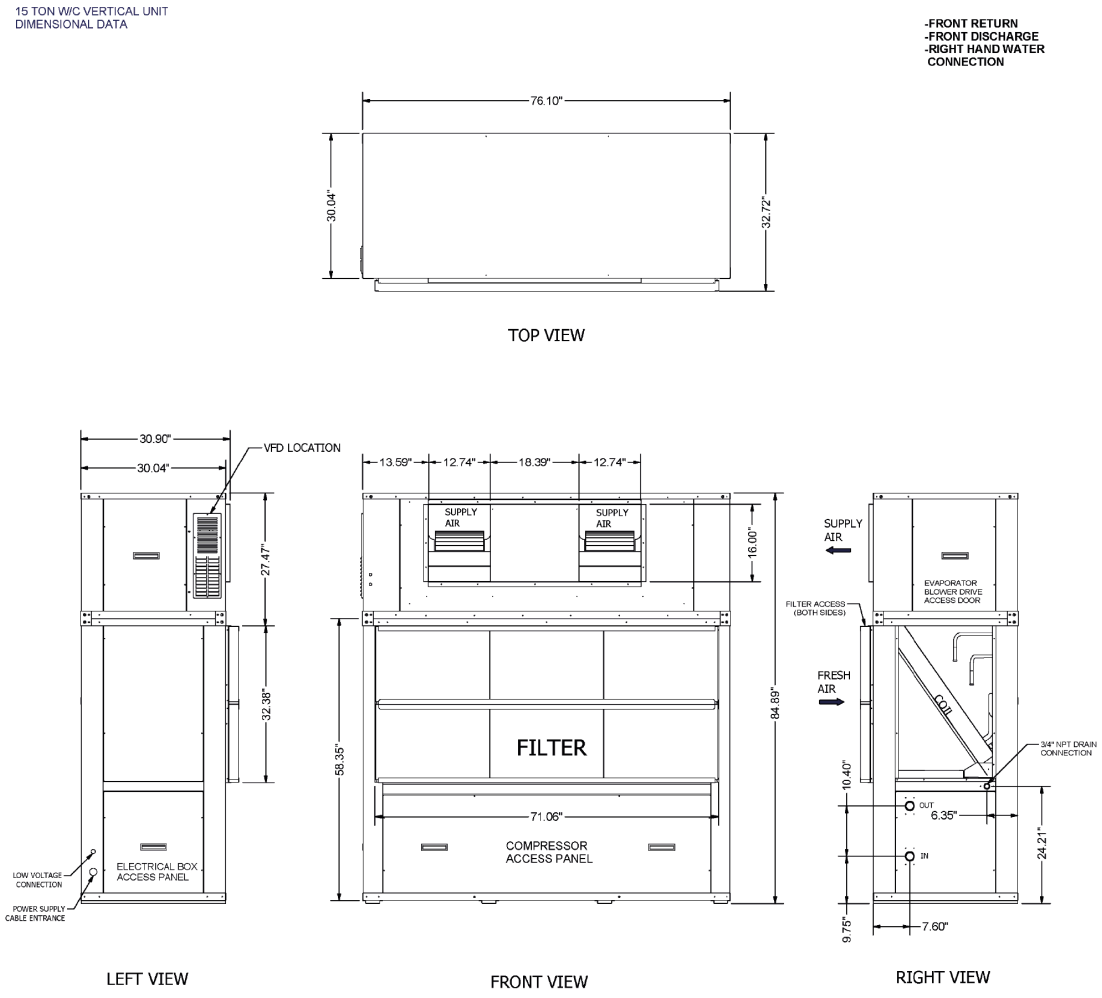


Figure 27: CSV240C front return/rear discharge/LH water connection dimensional data

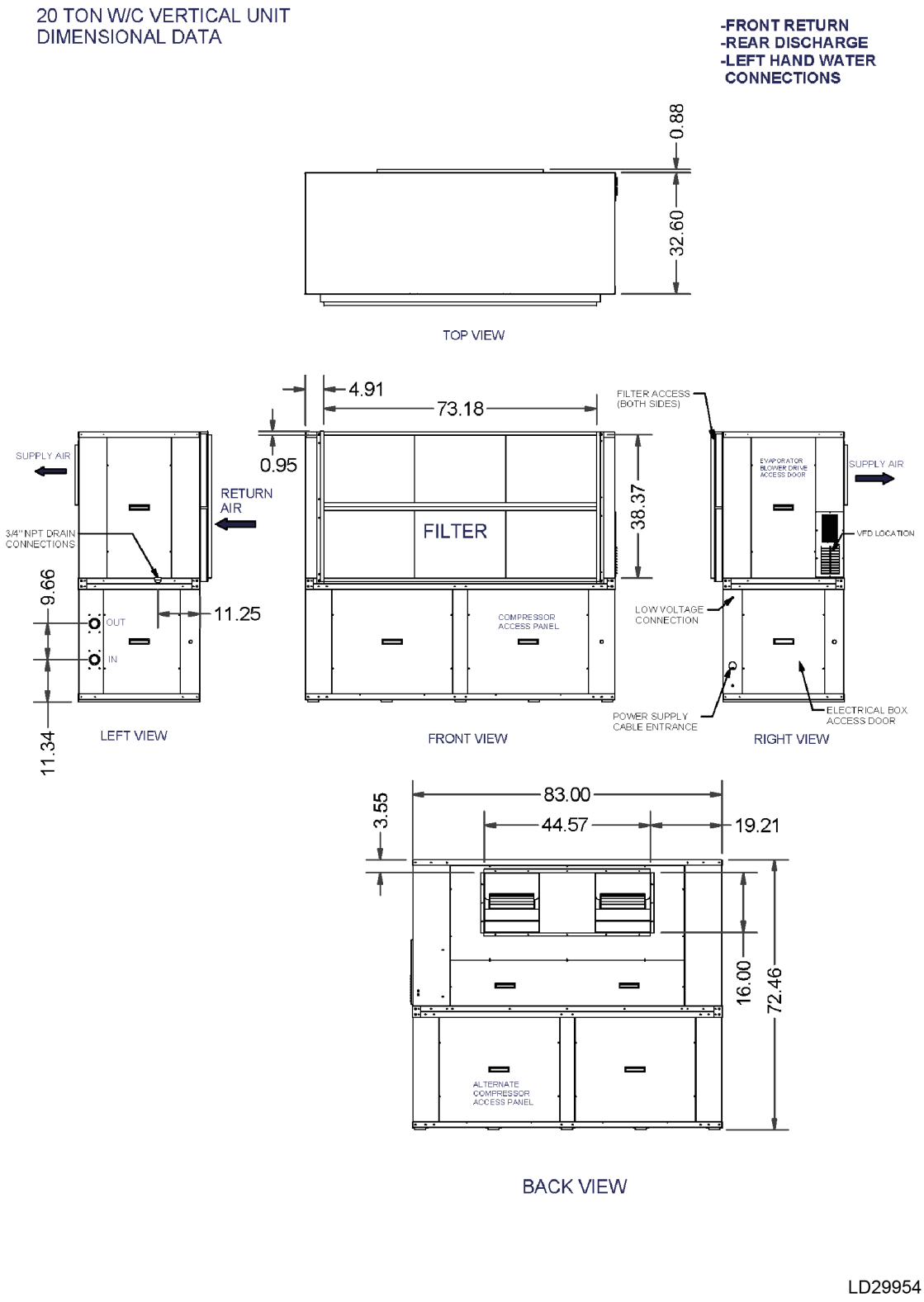


Figure 28: CSV240C front return/top discharge/LH water connection dimensional data

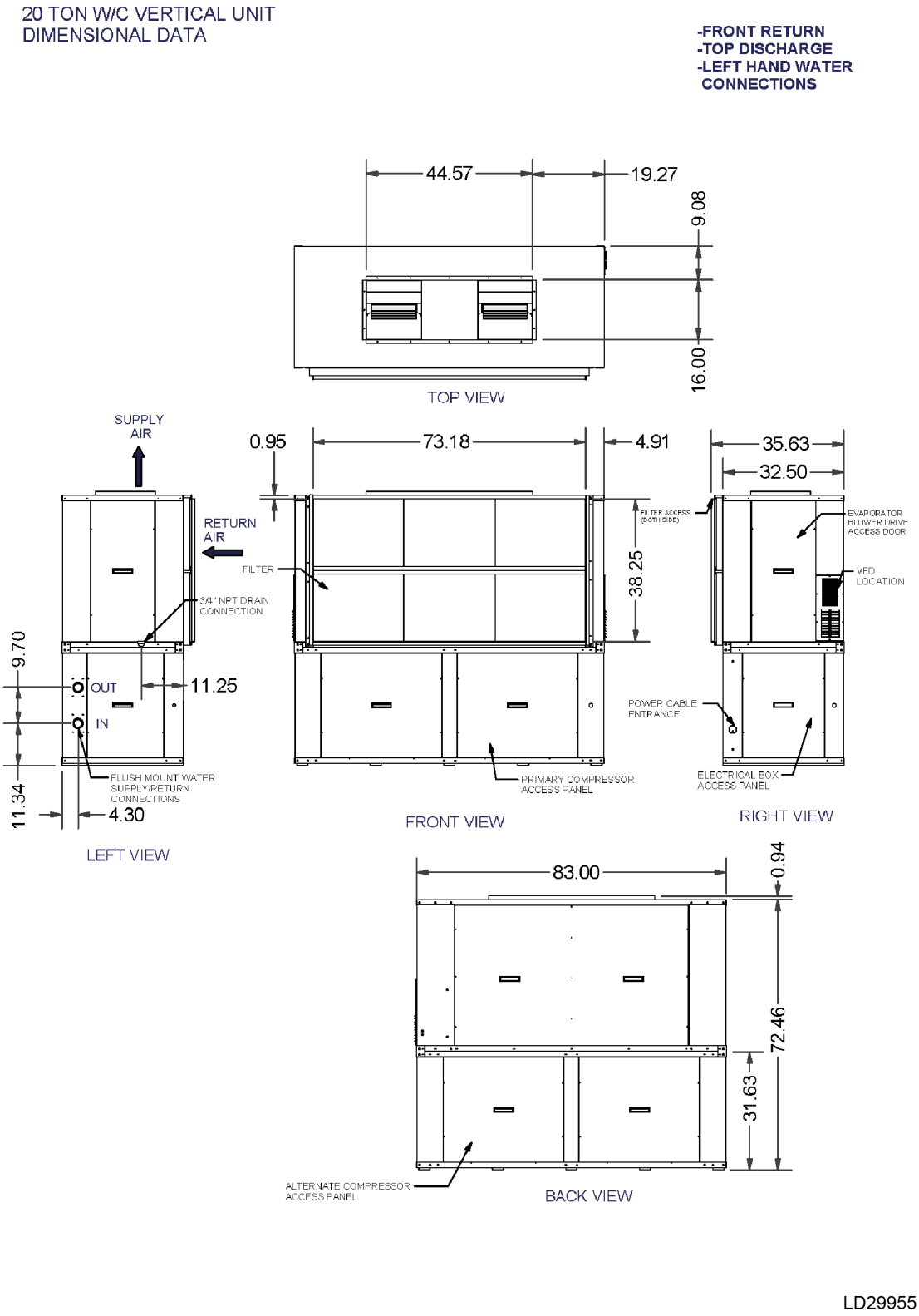


Figure 29: CSV240C front return/rear discharge/RH water connection dimensional data

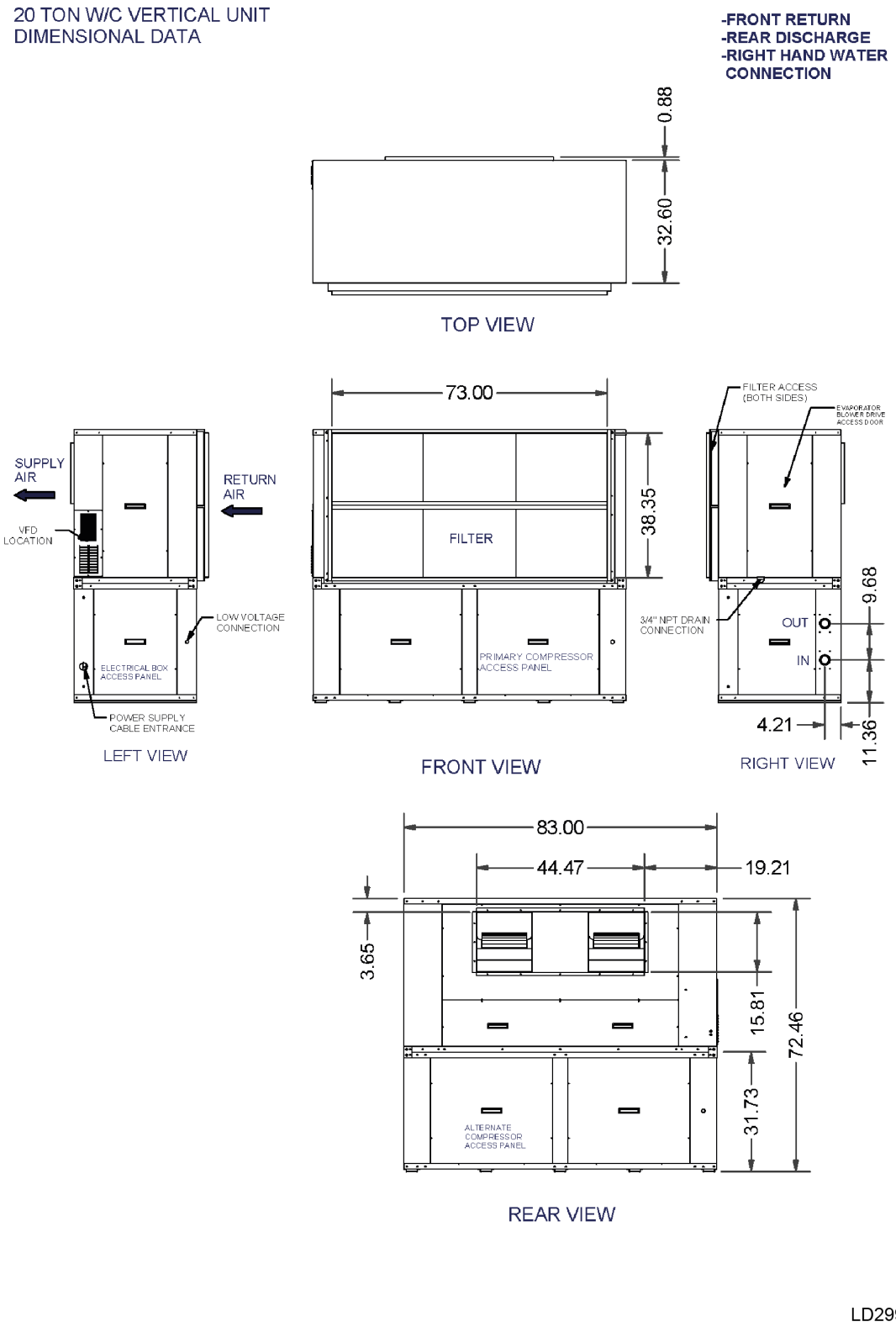


Figure 30: CSV240C front return/top discharge/RH water connection dimensional data

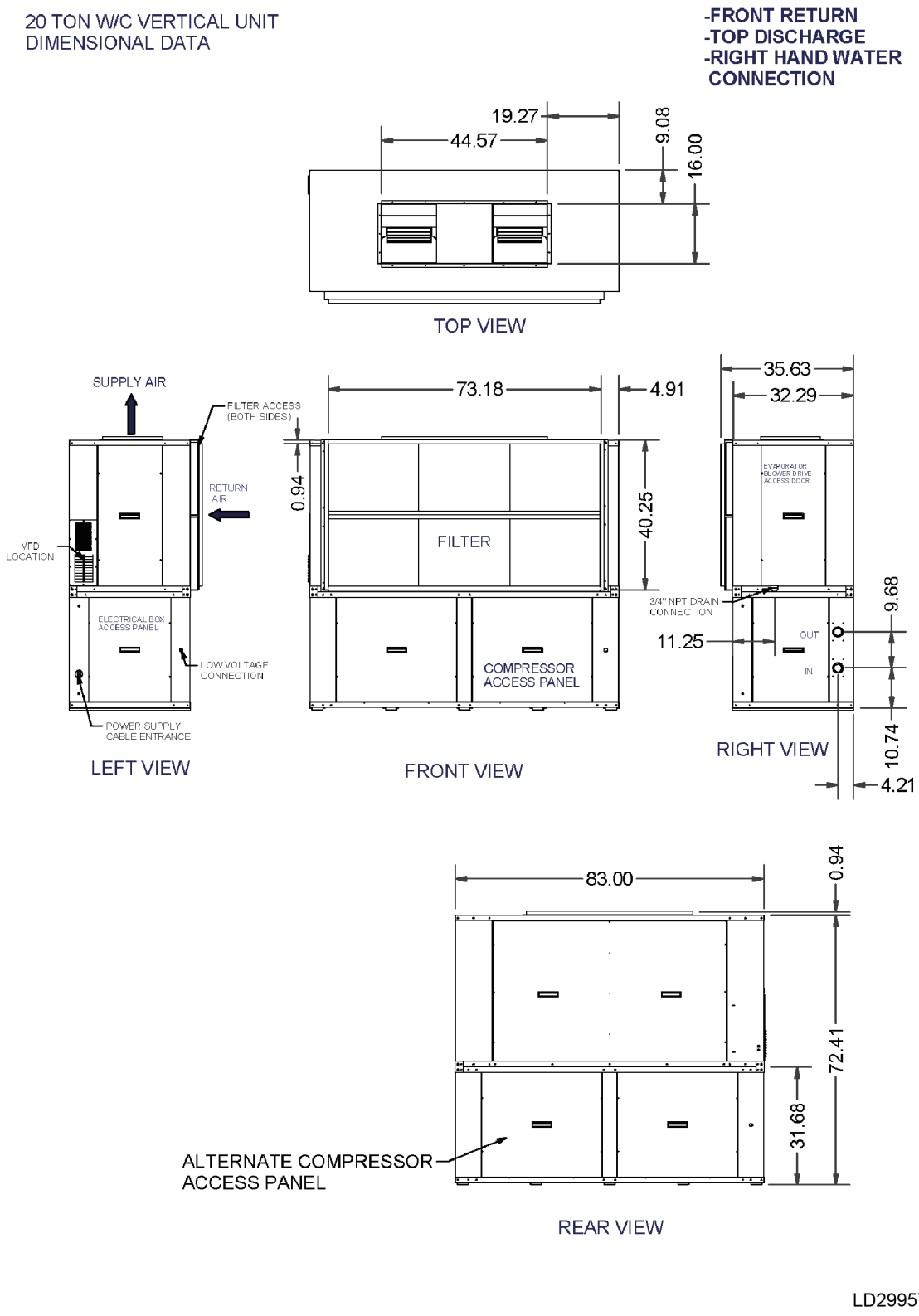


Figure 31: CSV300C front return/rear discharge/LH water connection dimensional data

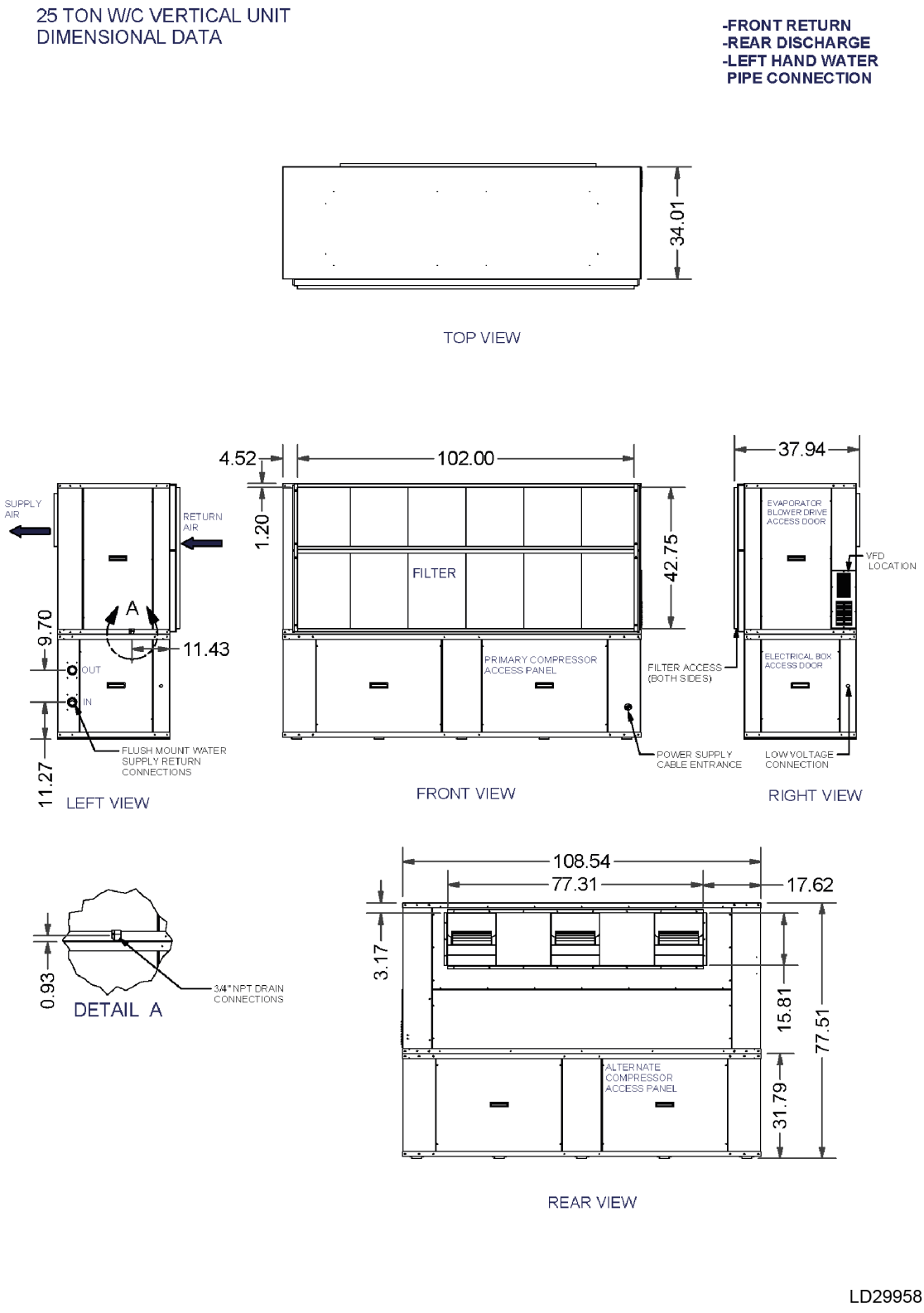


Figure 32: CSV300C front return/top discharge/LH water connection dimensional data

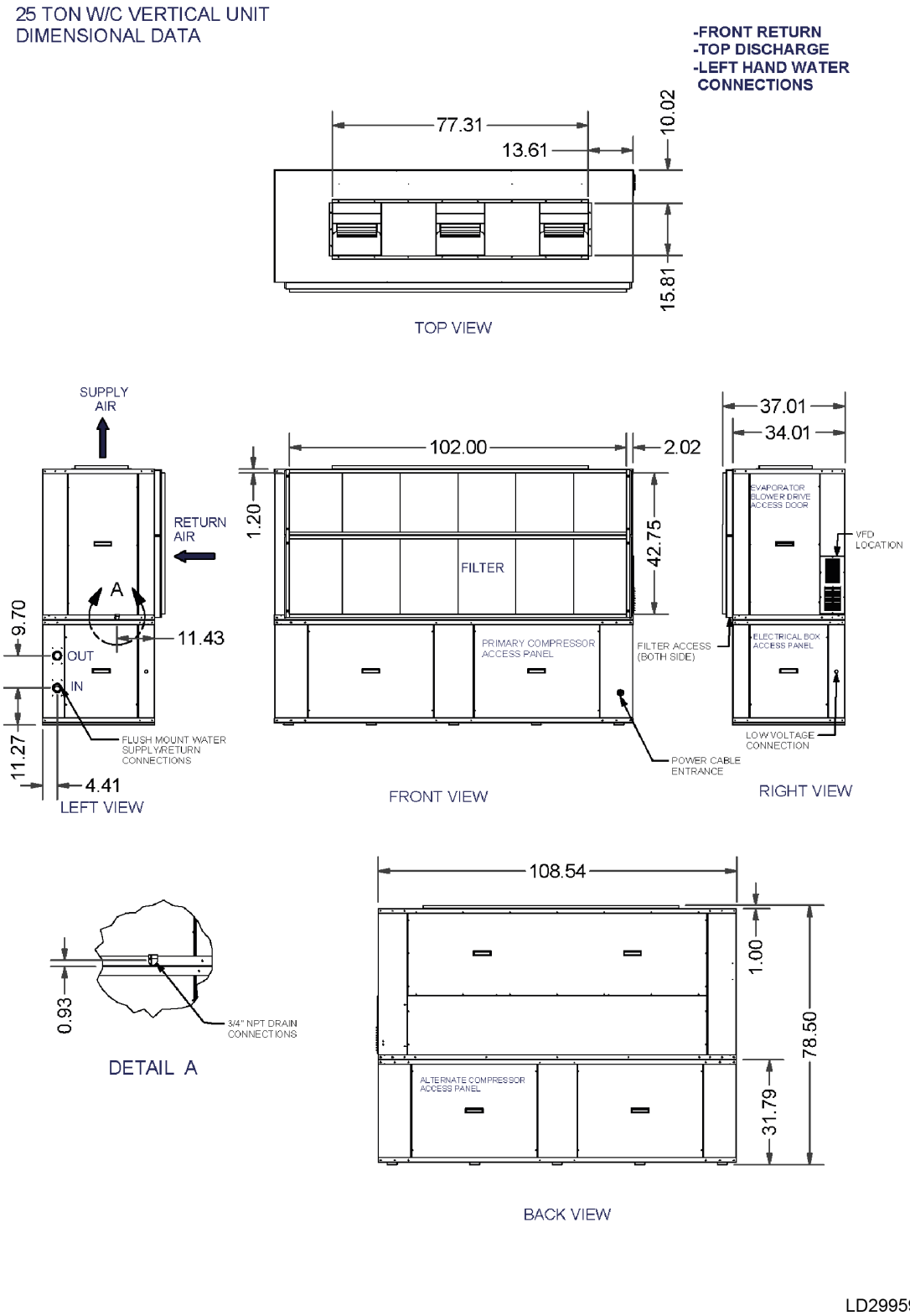


Figure 33: CSV300C front return/rear discharge/RH water connection dimensional data

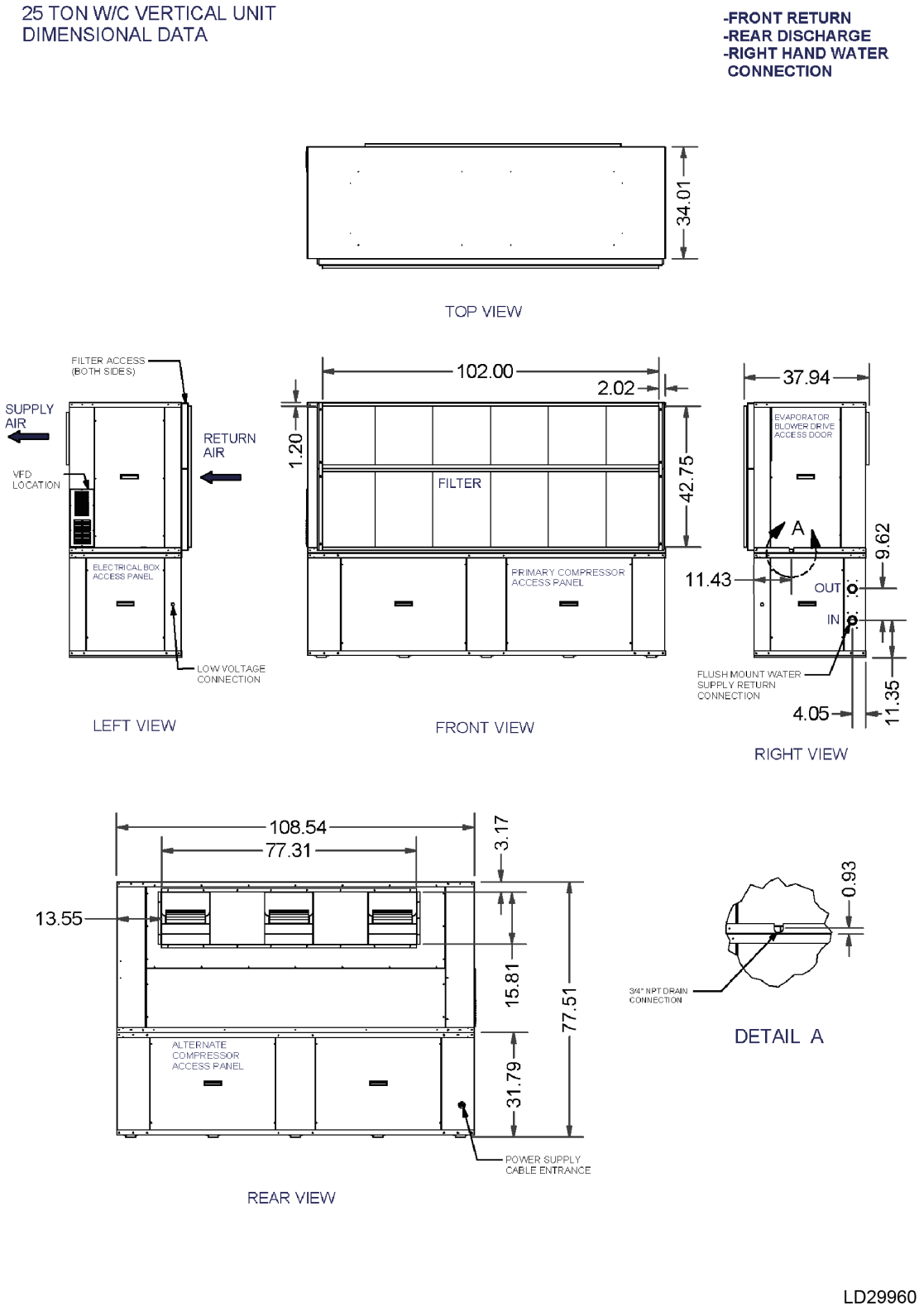


Figure 34: CSV300C front return/top discharge/RH water connection dimensional data

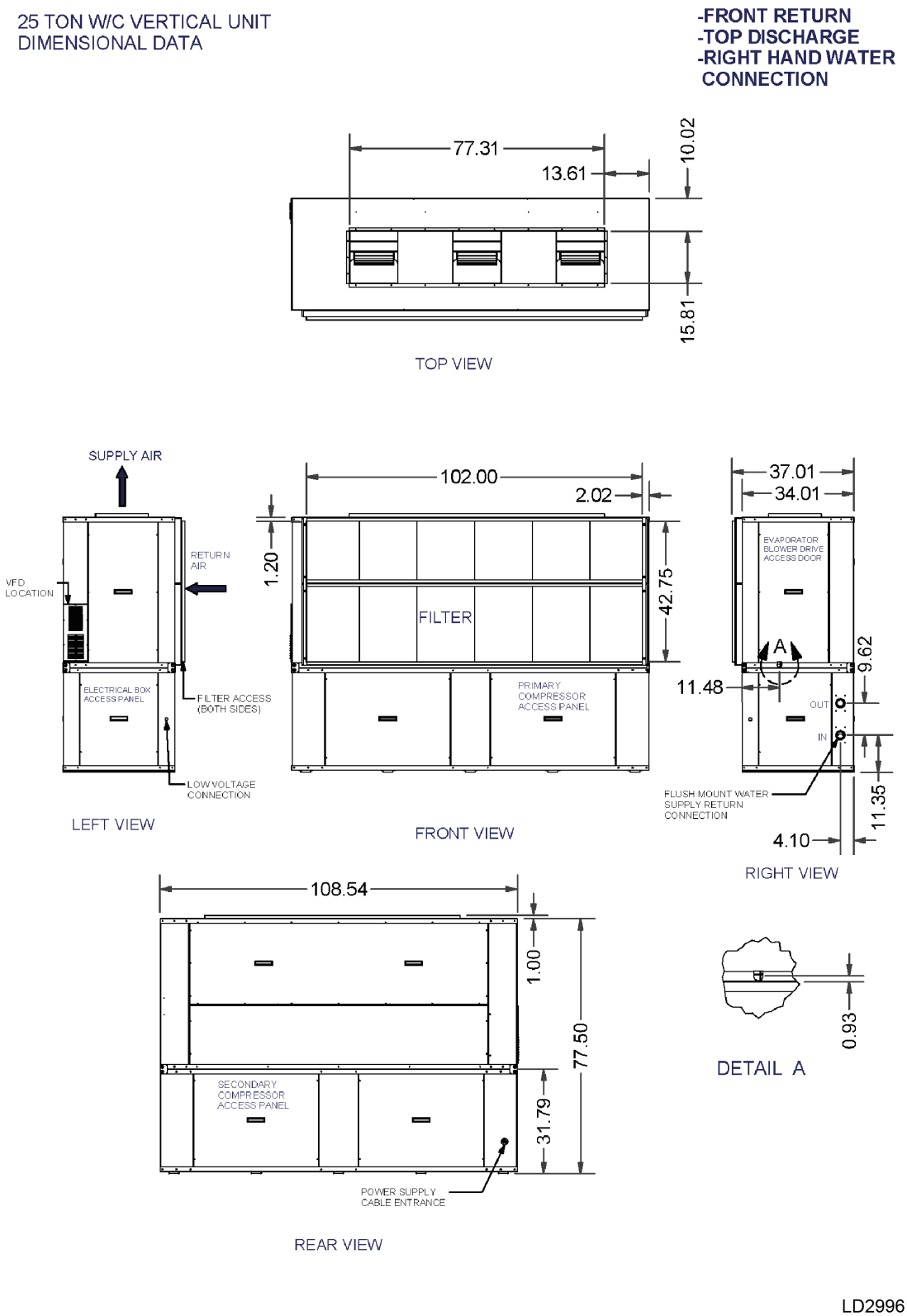


Figure 35: CSV060C service clearances

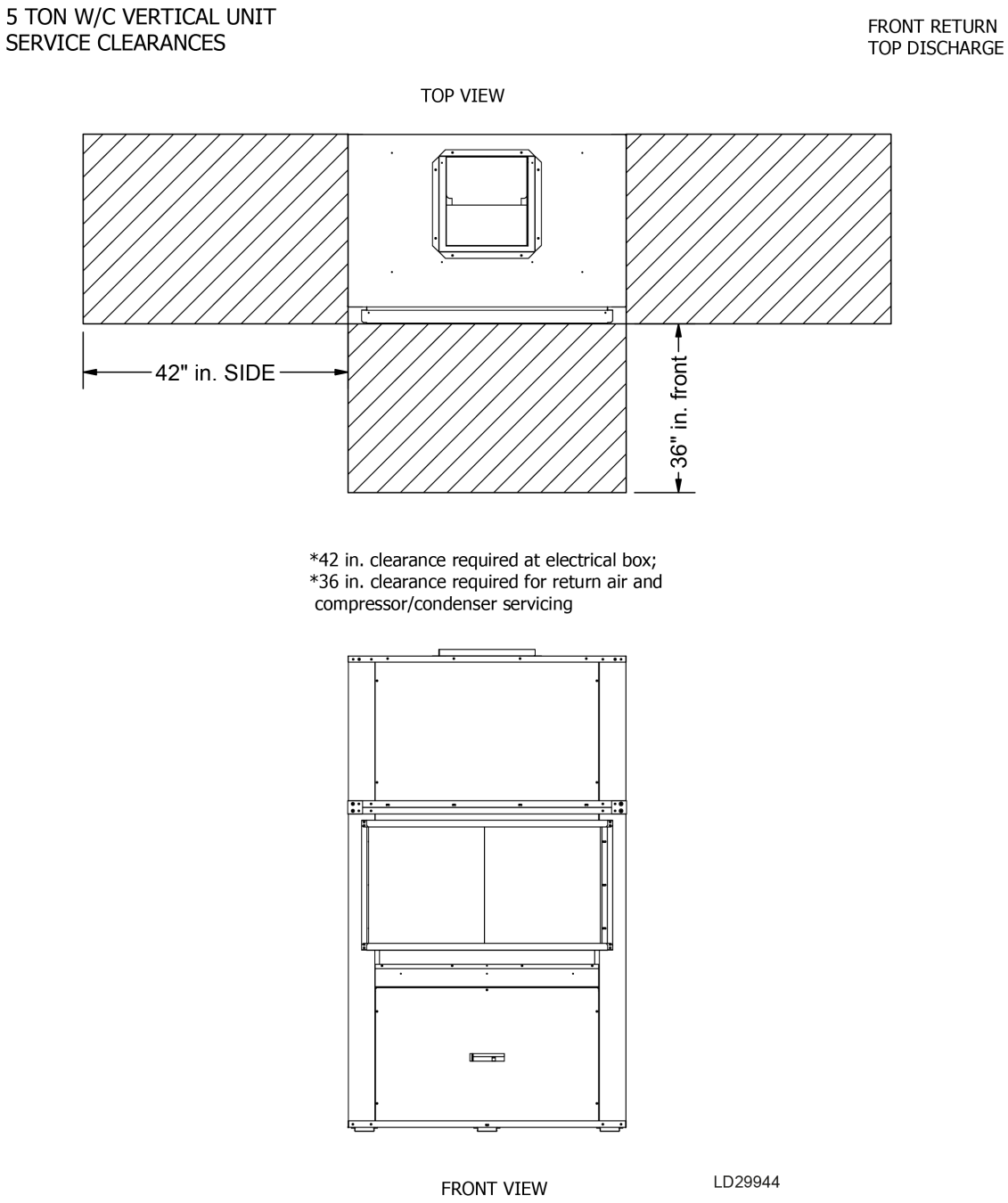


Figure 36: CSV096/120C service clearances

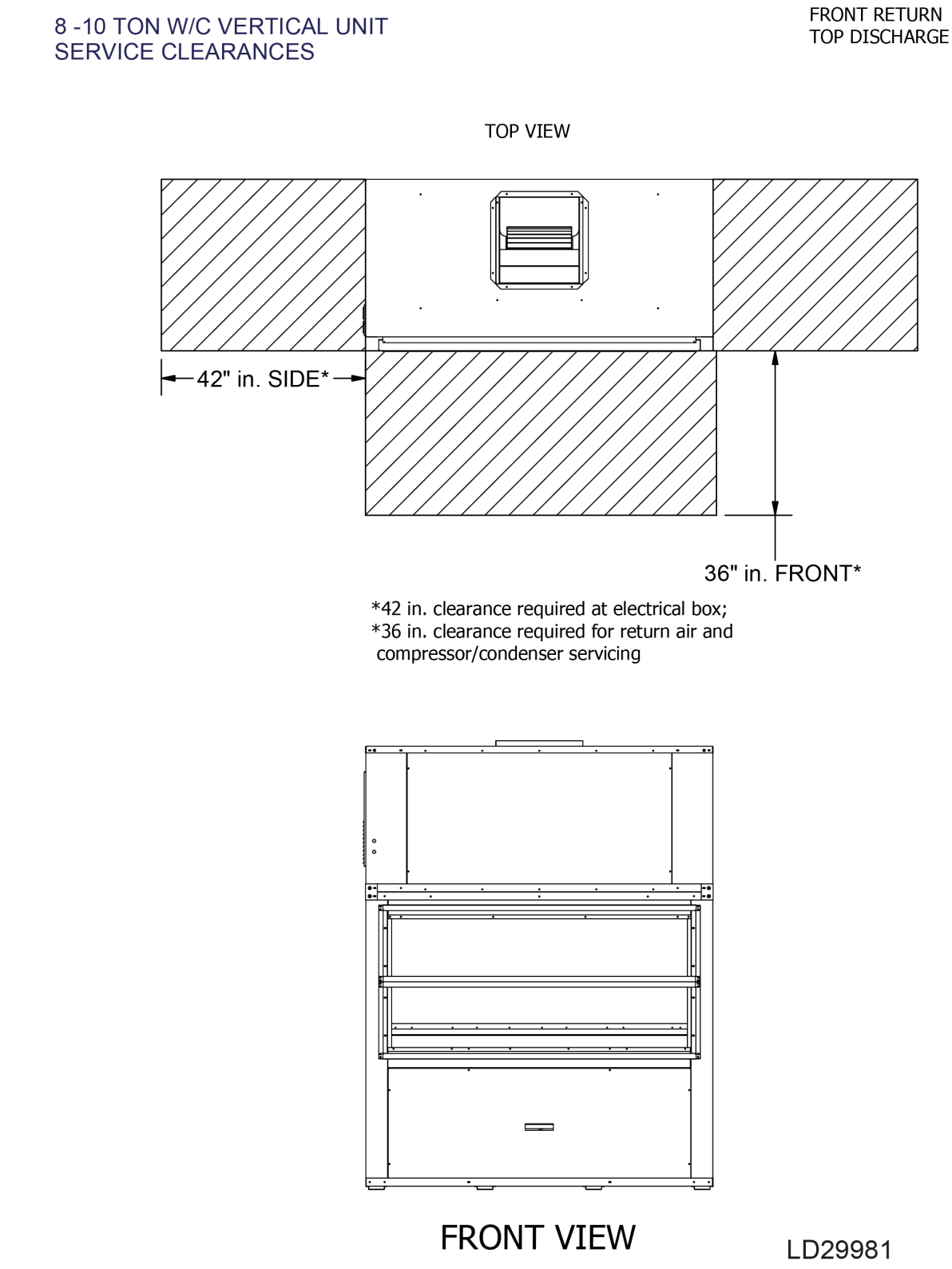


Figure 37: CSV180C service clearances

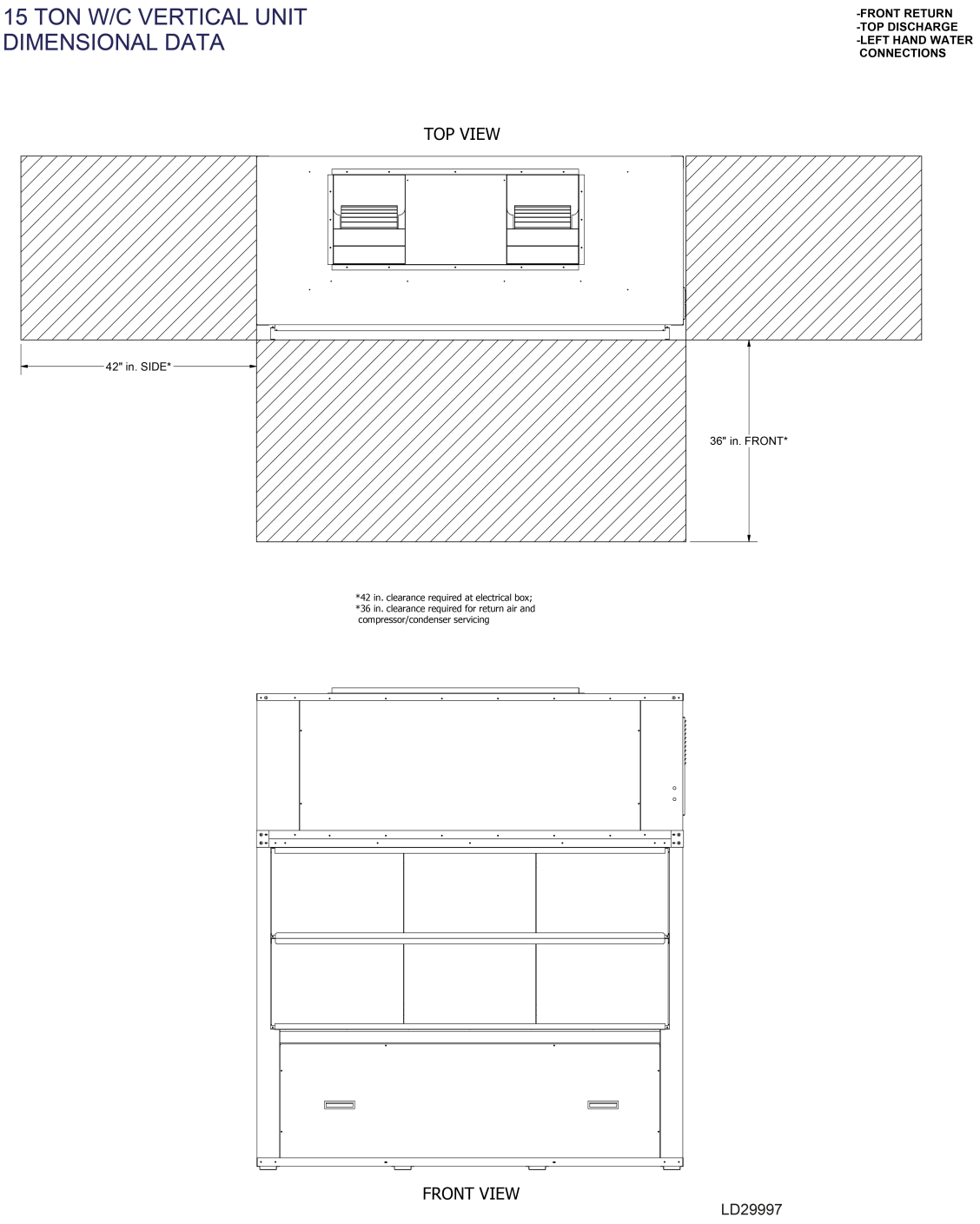


Figure 38: CSV240C service clearances

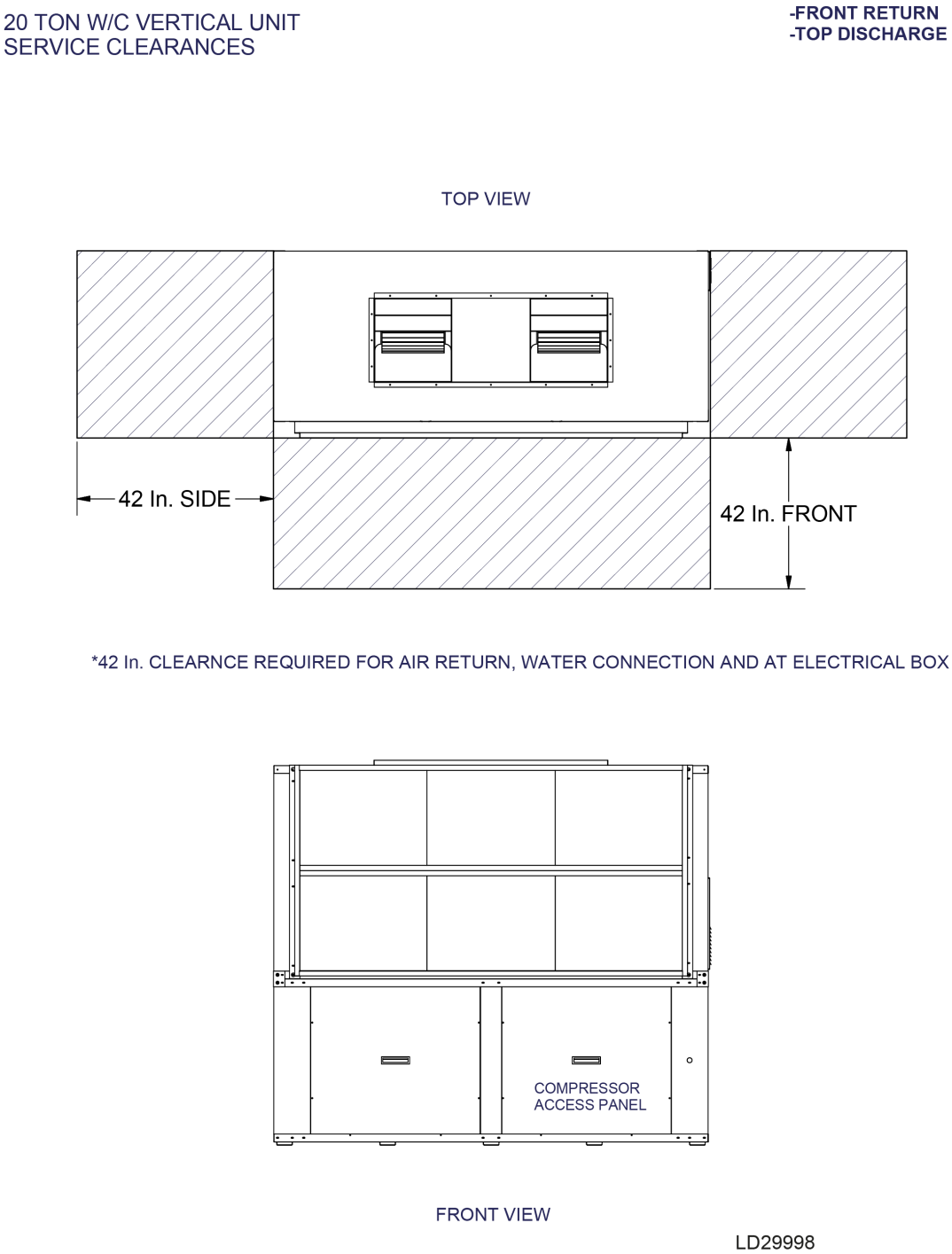
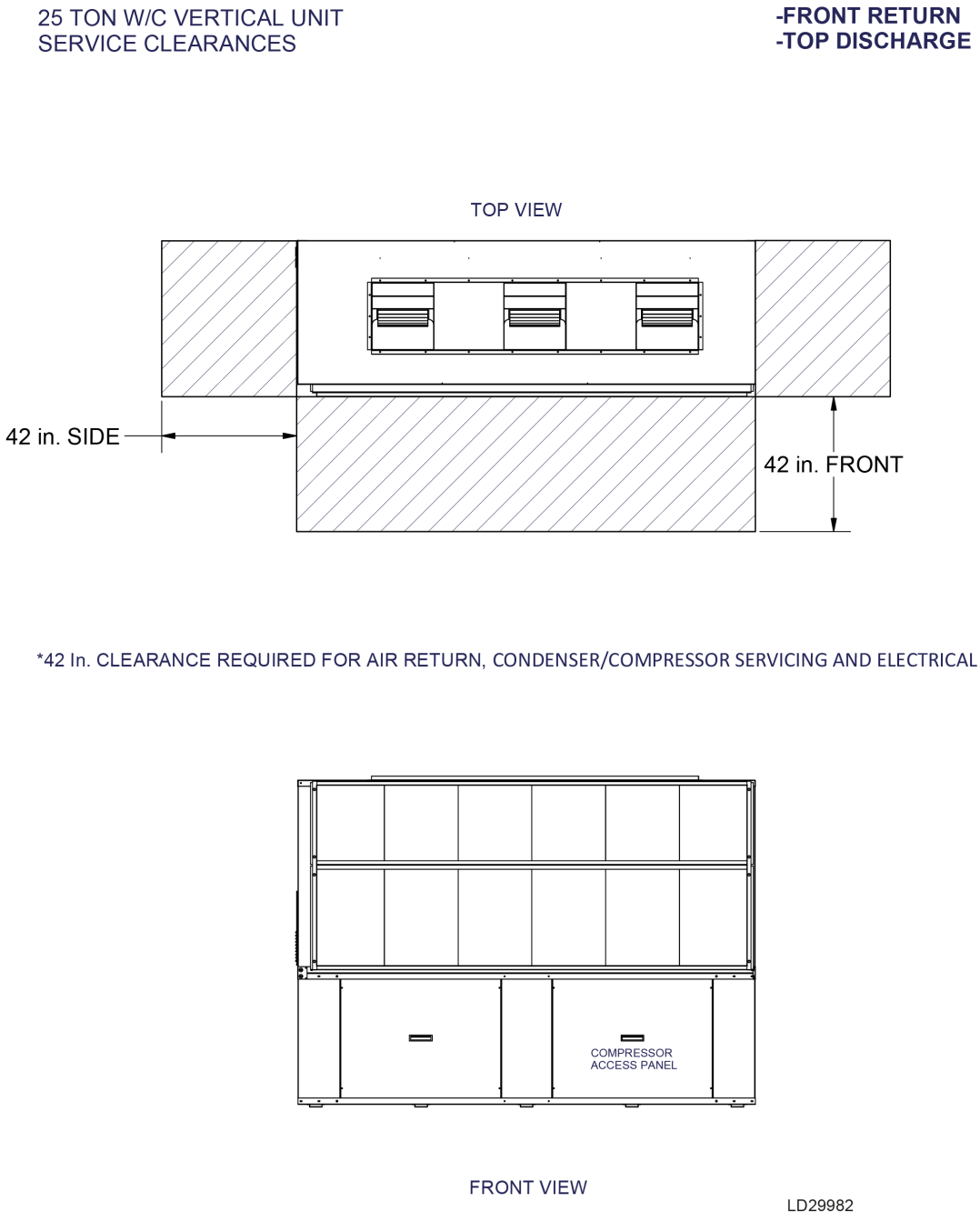


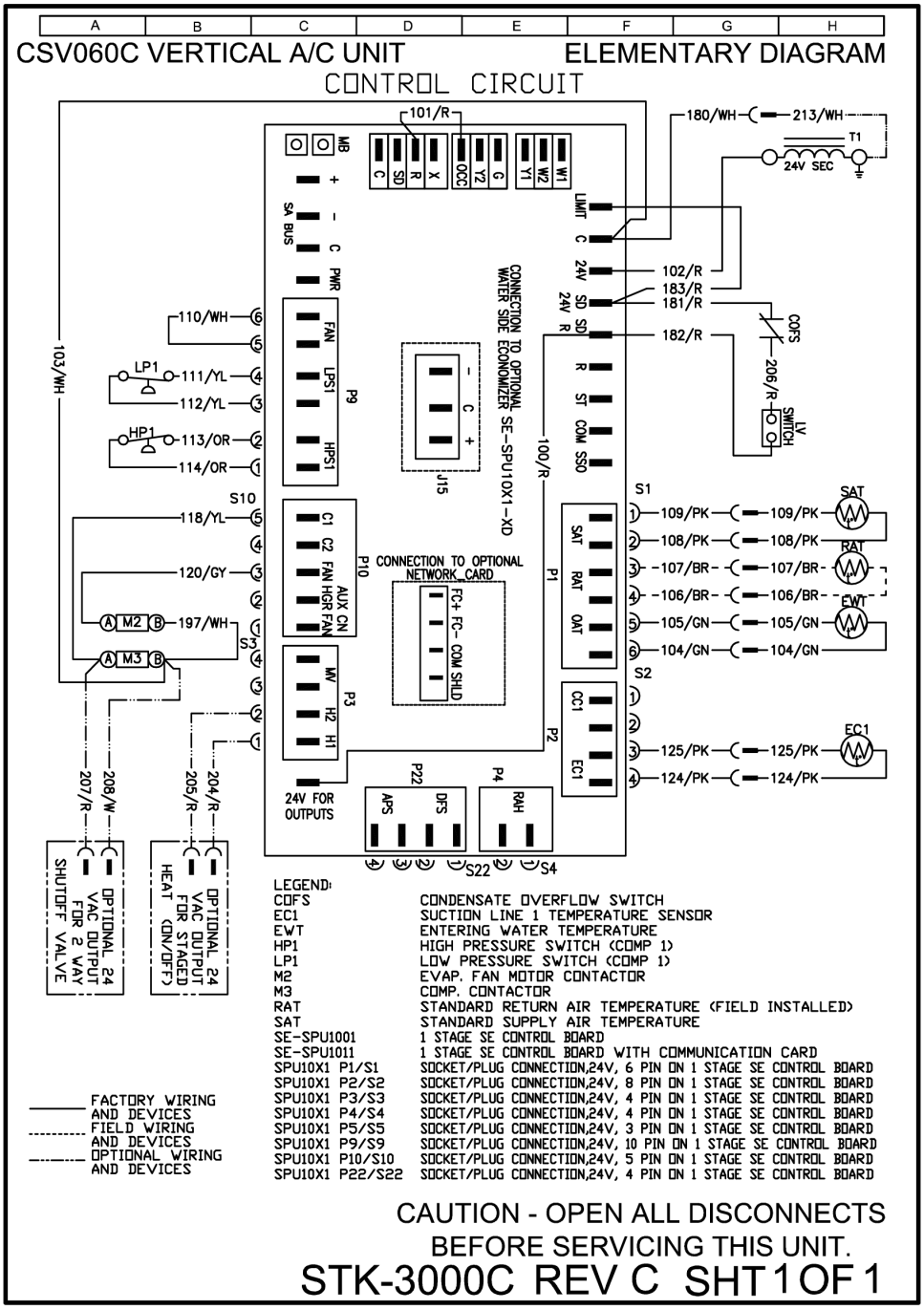
Figure 39: CSV300C service clearances



Note: The manufacturer will not accept any liability resulting from incorrect installation of this equipment. Follow installation instructions carefully.

Unit wiring schematics

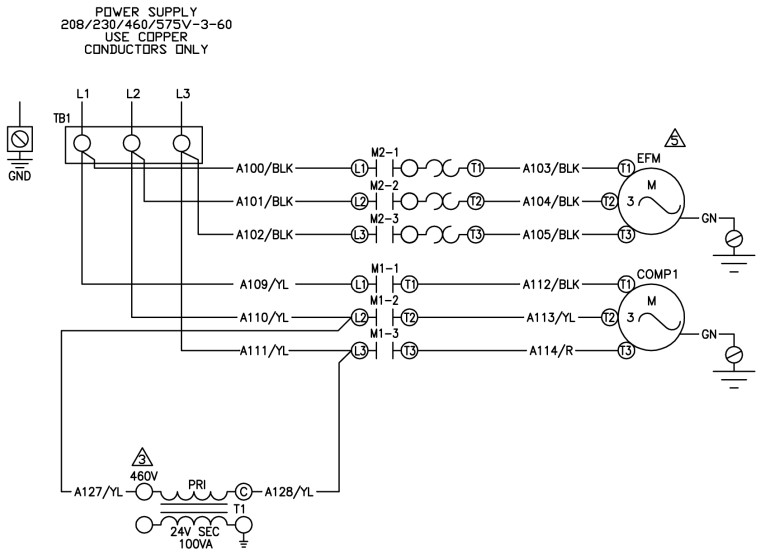
5 ton unit

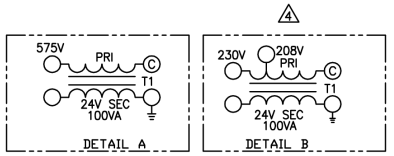

CSV060C VERTICAL A/C UNIT ELEMENTARY DIAGRAM
CONTROL CIRCUIT
LEGEND:
COFS CONDENSATE OVERFLOW SWITCH
EC1 SUCTION LINE 1 TEMPERATURE SENSOR
EWT ENTERING WATER TEMPERATURE
HP1 HIGH PRESSURE SWITCH (COMP 1)
LP1 LOW PRESSURE SWITCH (COMP 1)
M2 EVAP. FAN MOTOR CONTACTOR
M3 COMP. CONTACTOR
RAT STANDARD RETURN AIR TEMPERATURE (FIELD INSTALLED)
SAT STANDARD SUPPLY AIR TEMPERATURE
SE-SPU1001 1 STAGE SE CONTROL BOARD
SE-SPU1011 1 STAGE SE CONTROL BOARD WITH COMMUNICATION CARD
SPU10X1 P1/S1 SOCKET/PLUG CONNECTION,24V, 6 PIN ON 1 STAGE SE CONTROL BOARD
SPU10X1 P2/S2 SOCKET/PLUG CONNECTION,24V, 8 PIN ON 1 STAGE SE CONTROL BOARD
SPU10X1 P3/S3 SOCKET/PLUG CONNECTION,24V, 4 PIN ON 1 STAGE SE CONTROL BOARD
SPU10X1 P4/S4 SOCKET/PLUG CONNECTION,24V, 4 PIN ON 1 STAGE SE CONTROL BOARD
SPU10X1 P5/S5 SOCKET/PLUG CONNECTION,24V, 3 PIN ON 1 STAGE SE CONTROL BOARD
SPU10X1 P9/S9 SOCKET/PLUG CONNECTION,24V, 10 PIN ON 1 STAGE SE CONTROL BOARD
SPU10X1 P10/S10 SOCKET/PLUG CONNECTION,24V, 5 PIN ON 1 STAGE SE CONTROL BOARD
SPU10X1 P22/S22 SOCKET/PLUG CONNECTION,24V, 4 PIN ON 1 STAGE SE CONTROL BOARD
FACTORY WIRING AND DEVICES
FIELD WIRING AND DEVICES
OPTIONAL WIRING AND DEVICES
CAUTION - OPEN ALL DISCONNECTS BEFORE SERVICING THIS UNIT.
STK-3000C REV C SHT 1 OF 1

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:

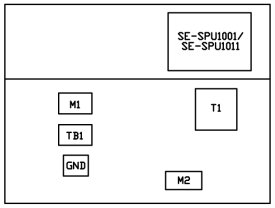
1. ALL FIELD WIRING TO BE ACCOMPLISHED FOLLOWING CITY, LOCAL AND/OR NATIONAL CODES IN EFFECT AT THE TIME OF INSTALLATION OF THIS UNIT.
2. CAUTION: LABEL ALL WIRES PRIOR TO DISCONNECTION WHEN SERVICING CONTROLS. WIRING ERRORS CAN CAUSE IMPROPER AND DANGEROUS OPERATION. IF ANY OF THE WIRING, AS SUPPLIED 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.

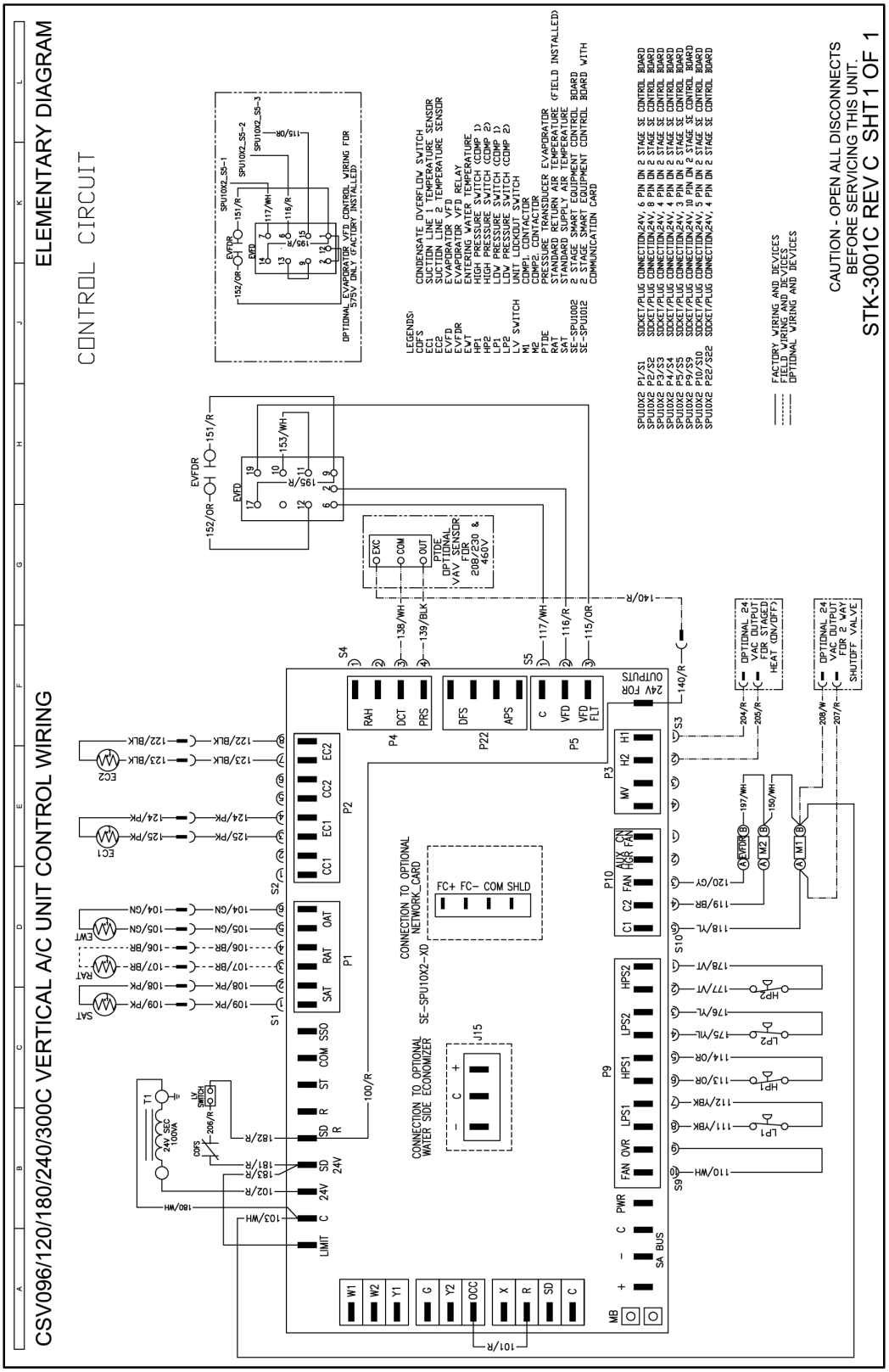
△5. FOR EVAP. FAN MOTOR WITH HIGH STATIC VFD OPTION USE SAME WIRING.

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



CAUTION - OPEN ALL DISCONNECTS BEFORE SERVICING THIS UNIT.

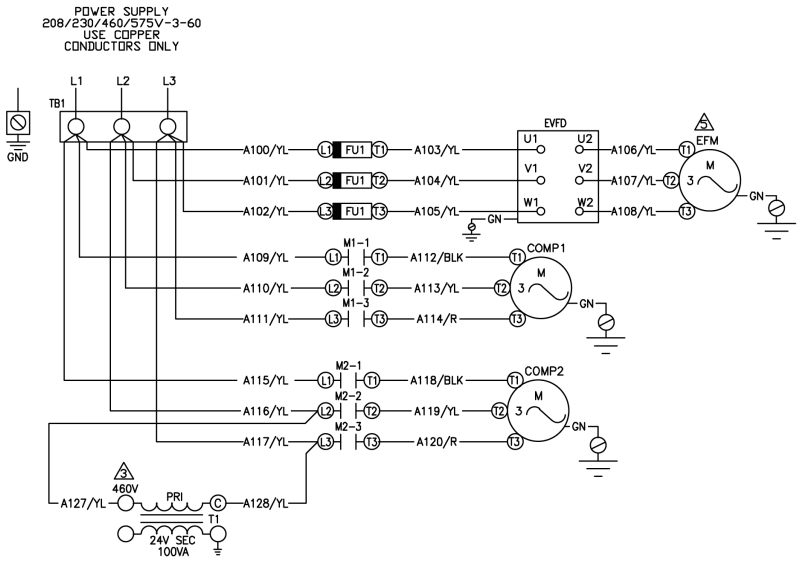
STK-3002C REV B SHT 1 OF 1

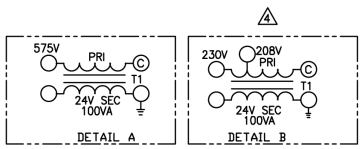

ELEMENTARY DIAGRAM
CONTROL CIRCUIT
CSV096/120/180/240/300C VERTICAL A/C UNIT CONTROL WIRING
STK-3001C REV C SHT 1 OF 1
CAUTION - OPEN ALL DISCONNECTS BEFORE SERVICING THIS UNIT.
FACTORY WIRING AND DEVICES
FIELD WIRING AND DEVICES
OPTIONAL WIRING AND DEVICES
LEGENDS:
CONDENSATE OVERFLOW SWITCH
SUCTION LINE 1 TEMPERATURE SENSOR
SUCTION LINE 2 TEMPERATURE SENSOR
EVAPORATOR VFD
EVAPORATOR VFD RELAY
ENTERING WATER TEMPERATURE
HIGH PRESSURE SWITCH (COMP 1)
HIGH PRESSURE SWITCH (COMP 2)
LOW PRESSURE SWITCH (COMP 1)
LOW PRESSURE SWITCH (COMP 2)
UNIT LOCKOUT SWITCH
COMP1 CONTACTOR
COMP2 CONTACTOR
PRESSURE TRANSDUCER EVAPORATOR
RETURN AIR TEMPERATURE (FIELD INSTALLED)
STANDARD SUPPLY AIR TEMPERATURE
2 STAGE SMART EQUIPMENT CONTROL BOARD
2 STAGE SMART EQUIPMENT CONTROL BOARD WITH COMMUNICATION CARD
SPU10X2 P1/S1 SIDEKET/PLUG CONNECTION 24V, 6 PIN ON 2 STAGE SE CONTROL BOARD
SPU10X2 P2/S2 SIDEKET/PLUG CONNECTION 24V, 6 PIN ON 2 STAGE SE CONTROL BOARD
SPU10X2 P3/S3 SIDEKET/PLUG CONNECTION 24V, 4 PIN ON 2 STAGE SE CONTROL BOARD
SPU10X2 P4/S4 SIDEKET/PLUG CONNECTION 24V, 4 PIN ON 2 STAGE SE CONTROL BOARD
SPU10X2 P5/S5 SIDEKET/PLUG CONNECTION 24V, 3 PIN ON 2 STAGE SE CONTROL BOARD
SPU10X2 P9/S9 SIDEKET/PLUG CONNECTION 24V, 10 PIN ON 2 STAGE SE CONTROL BOARD
SPU10X2 P10/S10 SIDEKET/PLUG CONNECTION 24V, 5 PIN ON 2 STAGE SE CONTROL BOARD
SPU10X2 P22/S22 SIDEKET/PLUG CONNECTION 24V, 4 PIN ON 2 STAGE SE CONTROL BOARD
SPU10X2_S5-1
SPU10X2_S5-2
SPU10X2_S5-3
OPTIONAL EVAPORATOR VFD CONTROL WIRING FOR SYSV ONLY (FACTORY INSTALLED)
EVFDR
EVFD
PTDE OPTIONAL VAV SENSOR FOR 208/230 & 460V
CONNECTION TO OPTIONAL NETWORK CARD
SE-SPU10X2-XD
CONNECTION TO OPTIONAL WATER SIDE ECONOMIZER
OPTIONAL 24 VAC OUTPUT FOR STAGED HEAT (ON/OFF)
OPTIONAL 24 VAC OUTPUT FOR 2 WAY SHUTOFF VALVE
24V FOR OUTPUTS
T1
24V SEC 100VA
LIV SWITCH
CDFS
EC2
EC1
CWT
RAT
SAT
HPS1
HPS2
LPS1
LPS2
FAN OVR
PWR
SA BUS
LIMIT
W1
W2
Y1
G
Y2
OCC
X
R
SD
C
MB
RAH
DCT
PRS
DFS
APS
VFD
VFD FLT
MV
AUX FOR FAN
FC+ FC- COM SHLD
J15
SD R
ST COM
SSO
SAT
RAT
OAT
CC1
EC1
CC2
EC2
SD R
SD 24V
24V

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:

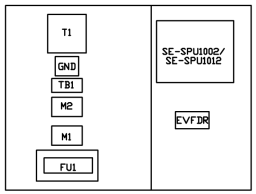
1. ALL FIELD WIRING TO BE ACCOMPLISHED FOLLOWING CITY, LOCAL AND/OR NATIONAL CODES IN EFFECT AT THE TIME OF INSTALLATION OF THIS UNIT.
2. CAUTION: LABEL ALL WIRES PRIOR TO DISCONNECTION WHEN SERVICING CONTROLS. WIRING ERRORS CAN CAUSE IMPROPER AND DANGEROUS OPERATION. IF ANY OF THE WIRING, AS SUPPLIED 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

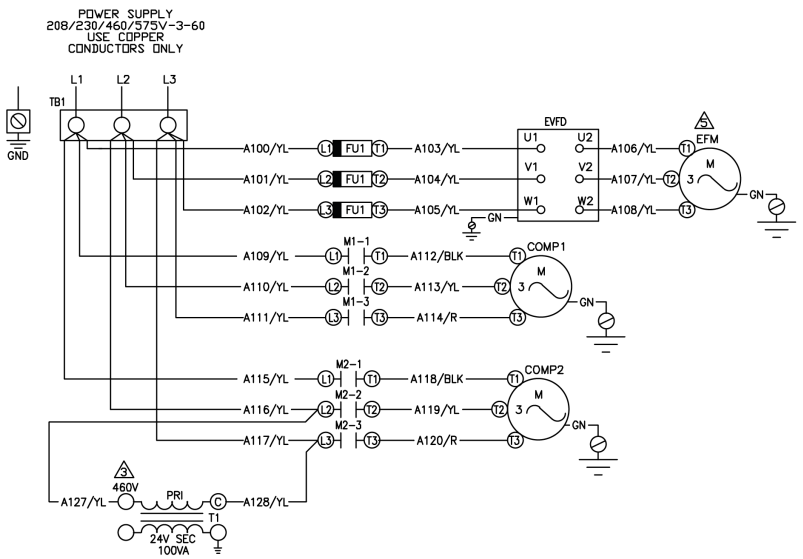


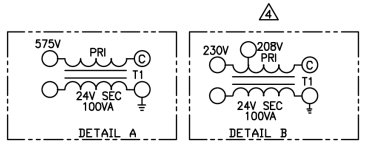
CAUTION - OPEN ALL DISCONNECTS
BEFORE SERVICING THIS UNIT.

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:

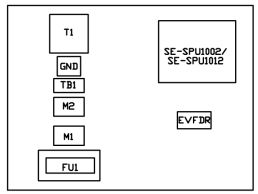
1. ALL FIELD WIRING TO BE ACCOMPLISHED FOLLOWING CITY, LOCAL AND/OR NATIONAL CODES IN EFFECT AT THE TIME OF INSTALLATION OF THIS UNIT.
2. CAUTION: LABEL ALL WIRES PRIOR TO DISCONNECTION WHEN SERVICING CONTROLS. WIRING ERRORS CAN CAUSE IMPROPER AND DANGEROUS OPERATION. IF ANY OF THE WIRING, AS SUPPLIED 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.

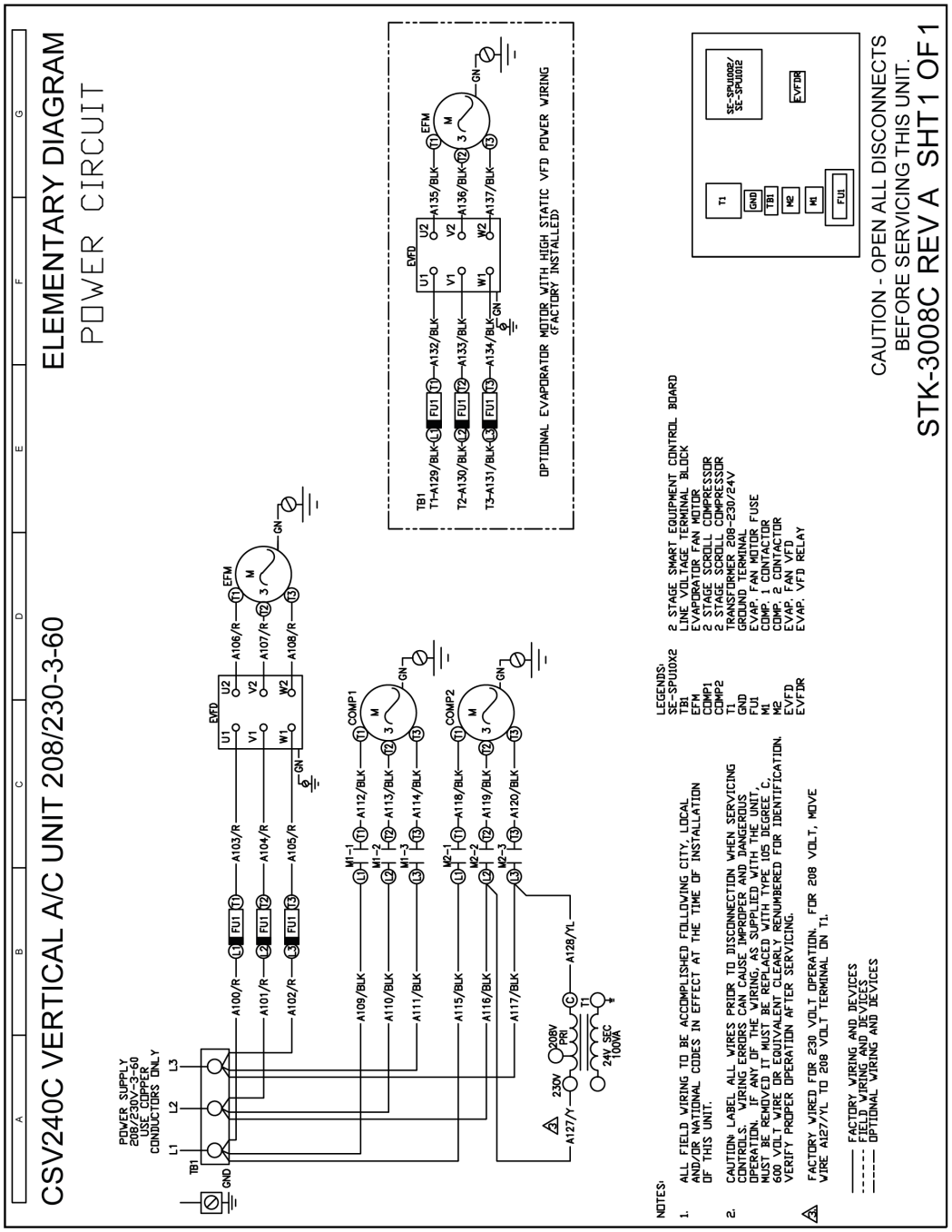
△5 FOR EVAP. FAN MOTOR WITH HIGH STATIC VFD OPTION USE SAME WIRING.

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



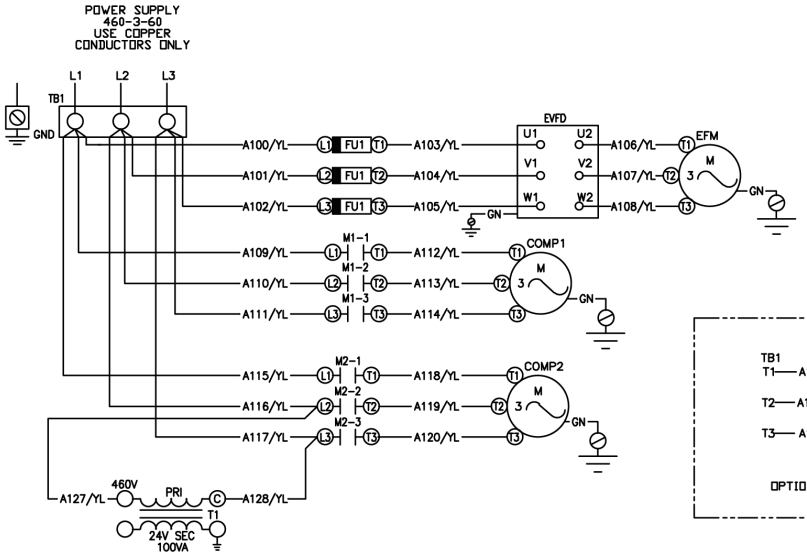
CAUTION - OPEN ALL DISCONNECTS BEFORE SERVICING THIS UNIT.

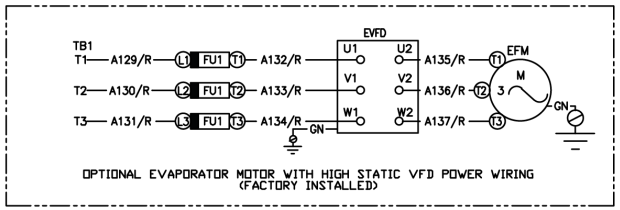
STK-3005C REV A SHT 1 OF 1


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 208/230-3-60 USE COPPER CONDUCTORS ONLY
OPTIONAL EVAPORATOR MOTOR WITH HIGH STATIC VFD POWER WIRING (FACTORY INSTALLED)
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. VERIFY PROPER OPERATION AFTER SERVICING. 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.
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
SE-SPU10X2/ SE-SPU10X2
EVFDR
T1
GND
TB1
M2
M1
FU1

CSV240C VERTICAL A/C UNIT 460-3-60

ELEMENTARY DIAGRAM
POWER CIRCUIT





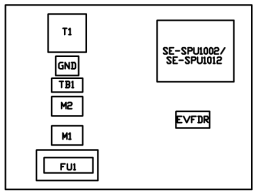
NOTES:

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

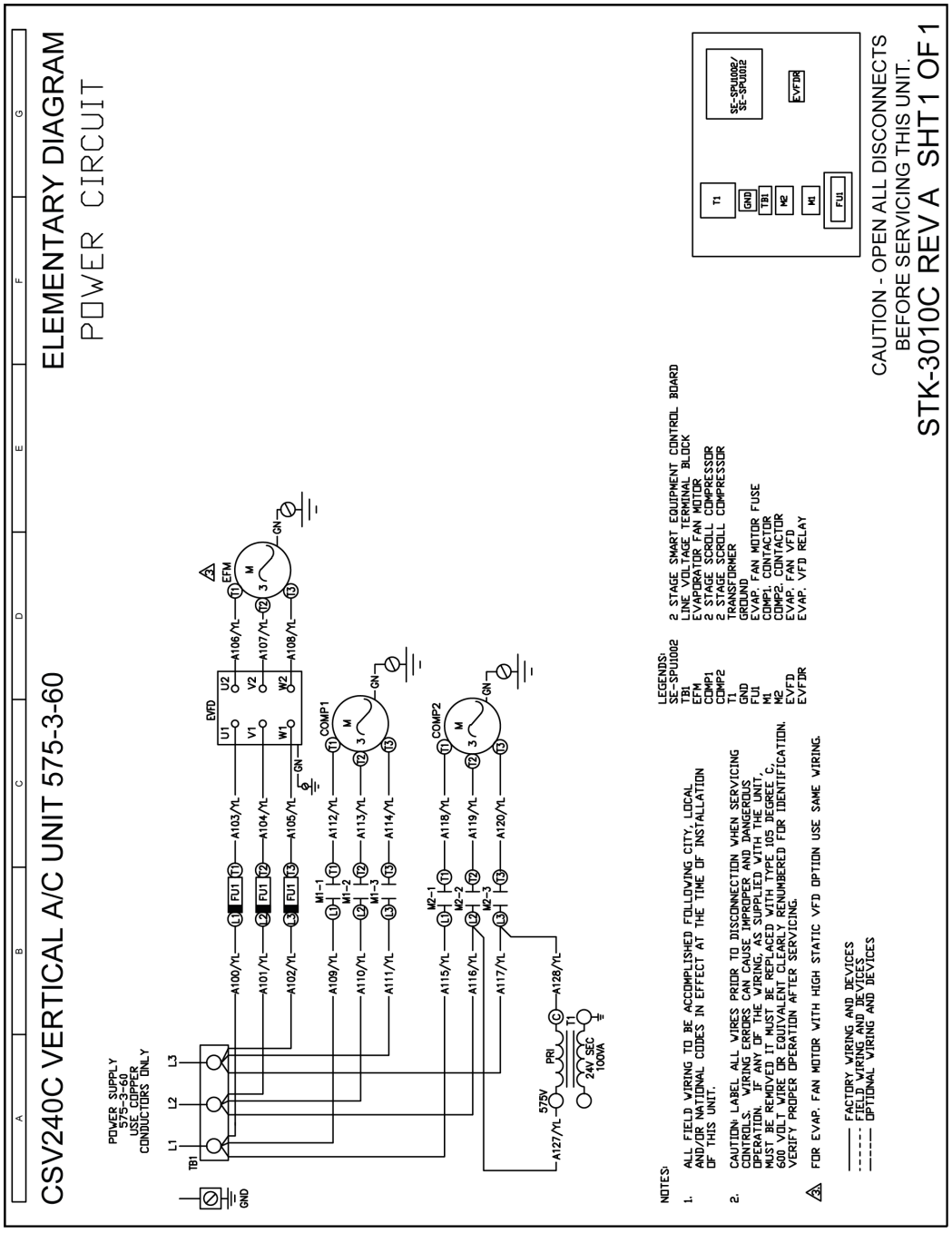
LEGENDS:

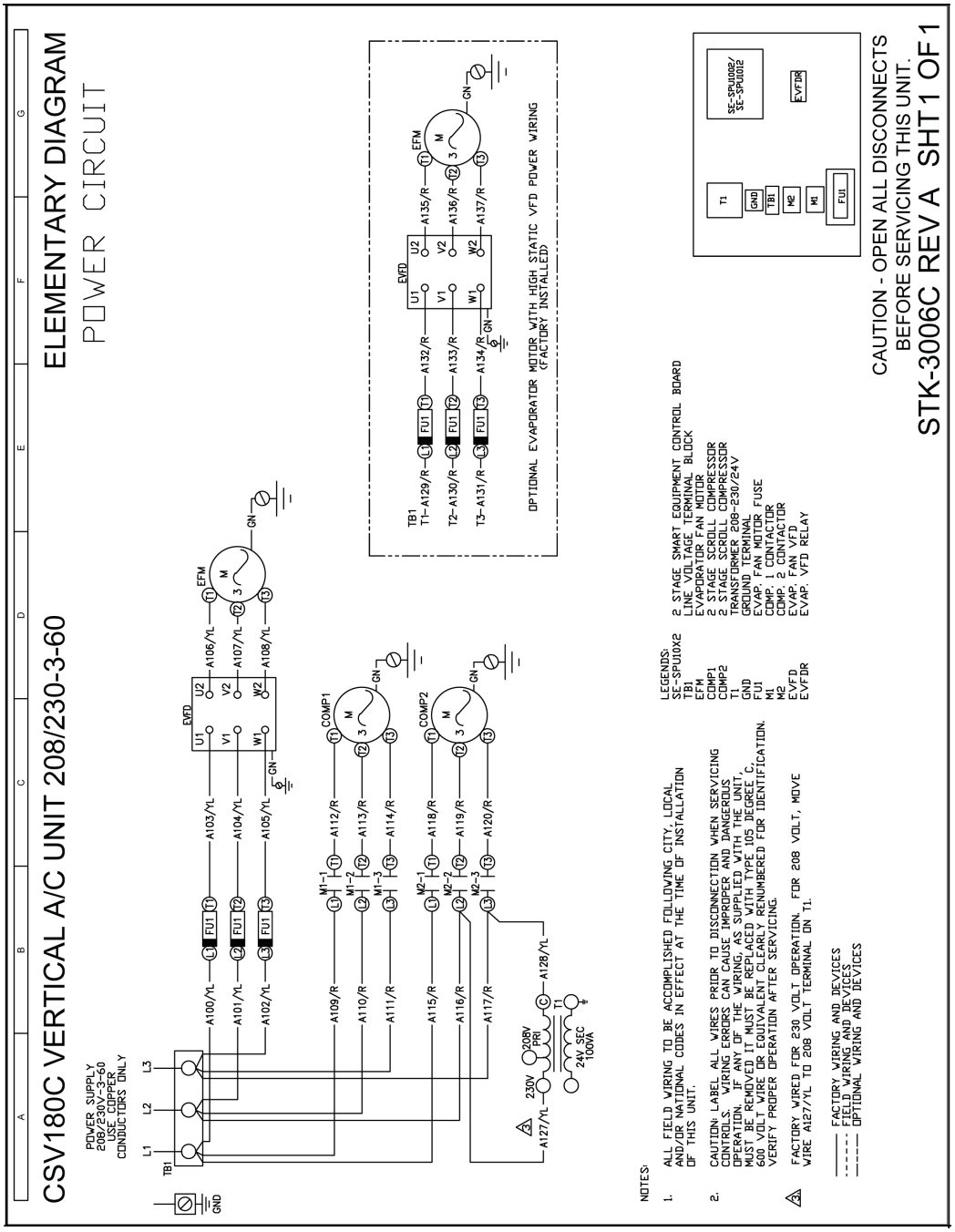
SE-SPU10X2	2 STAGE SMART EQUIPMENT CONTROL BOARD
TB1	LINE VOLTAGE TERMINAL BLOCK
EFM	EVAPORATOR FAN MOTOR
COMP1	2 STAGE SCROLL COMPRESSOR
COMP2	2 STAGE SCROLL COMPRESSOR
T1	TRANSFORMER
GND	GROUND
FU1	EVAP. FAN MOTOR FUSE
M1	COMP1. CONTACTOR
M2	COMP2. CONTACTOR
EVFD	EVAP. FAN VFD
EVFDR	EVAP. VFD RELAY



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
POWER SUPPLY
575-3-60
USE COPPER
CONDUCTORS ONLY
L1
L2
L3
TB1
GND
FU1
EVFD
U1
V1
W1
U2
V2
W2
EFM
COMP1
COMP2
M1-1
M1-2
M1-3
M2-1
M2-2
M2-3
575V
PRI
SEC
24V
100VA
T1
A100/YL
A101/YL
A102/YL
A103/YL
A104/YL
A105/YL
A106/YL
A107/YL
A108/YL
A109/YL
A110/YL
A111/YL
A112/YL
A113/YL
A114/YL
A115/YL
A116/YL
A117/YL
A118/YL
A119/YL
A120/YL
A127/YL
A128/YL
GN
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.
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
T1
GND
TB1
M2
M1
FU1
SE-SPU1002/
SE-SPU002E
EVFDR
CAUTION - OPEN ALL DISCONNECTS
BEFORE SERVICING THIS UNIT.
STK-3010C REV A SHT 1 OF 1


CSV180C VERTICAL A/C UNIT 208/230-3-60
ELEMENTARY DIAGRAM
POWER CIRCUIT
POWER SUPPLY 208/230V-3-60 MUST COMPLY WITH NEC CONDUCTORS ONLY
CAUTION - OPEN ALL DISCONNECTS BEFORE SERVICING THIS UNIT.
STK-3006C REV A SHT 1 OF 1
OPTIONAL EVAPORATOR MOTOR WITH HIGH STATIC VFD POWER WIRING (FACTORY INSTALLED)
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. 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-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
T1
GND
TB1
M2
M1
FU1
SE-SPU1002/ SE-SPU1012
EVFDR
TB1
T1-A129/R
T2-A130/R
T3-A131/R
A132/R
A133/R
A134/R
A135/R
A136/R
A137/R
EVFD
EFM
COMP1
COMP2
TB1
GND
230V
208V PRI
24V SEC 100VA
A100/YL
A101/YL
A102/YL
A103/YL
A104/YL
A105/YL
A106/YL
A107/YL
A108/YL
A109/R
A110/R
A111/R
A112/R
A113/R
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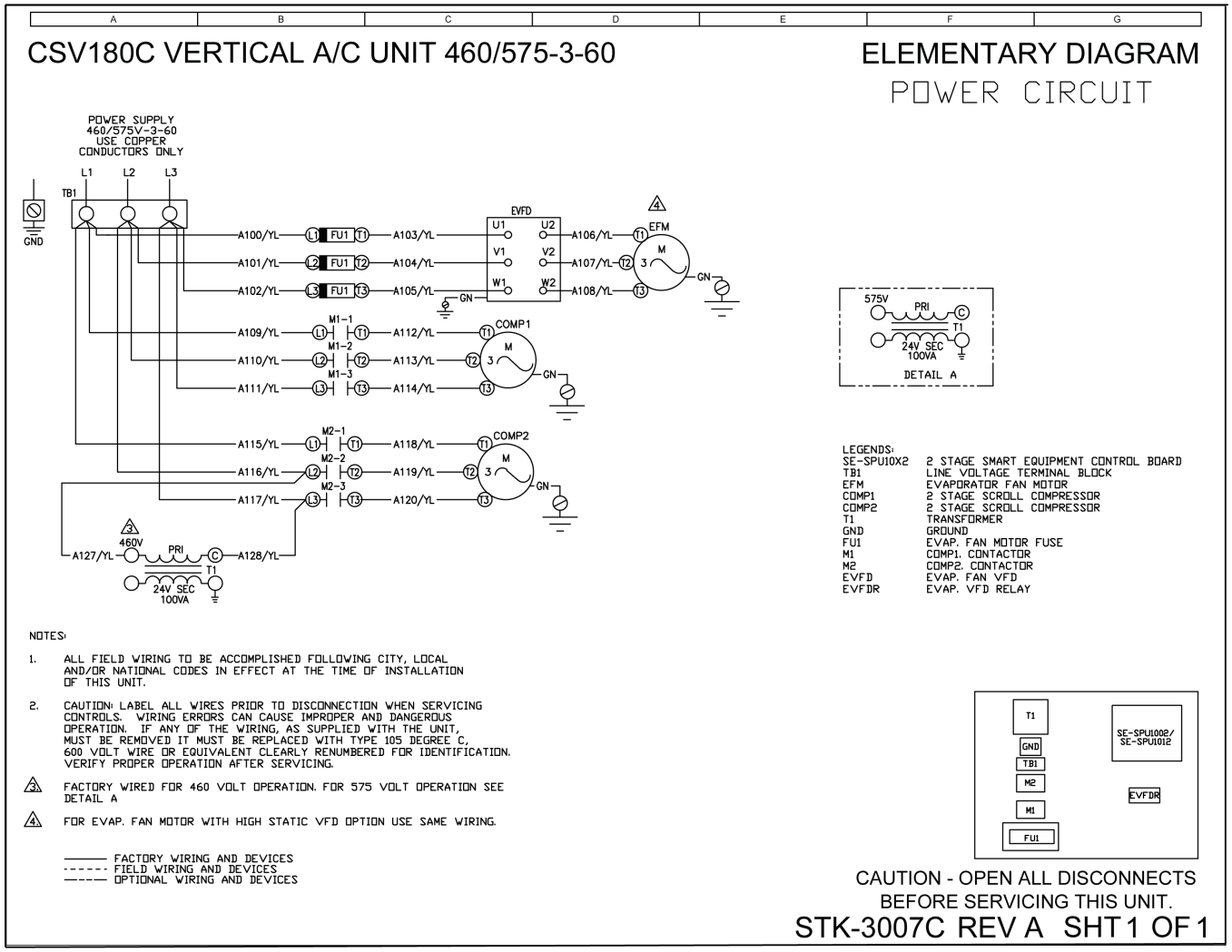
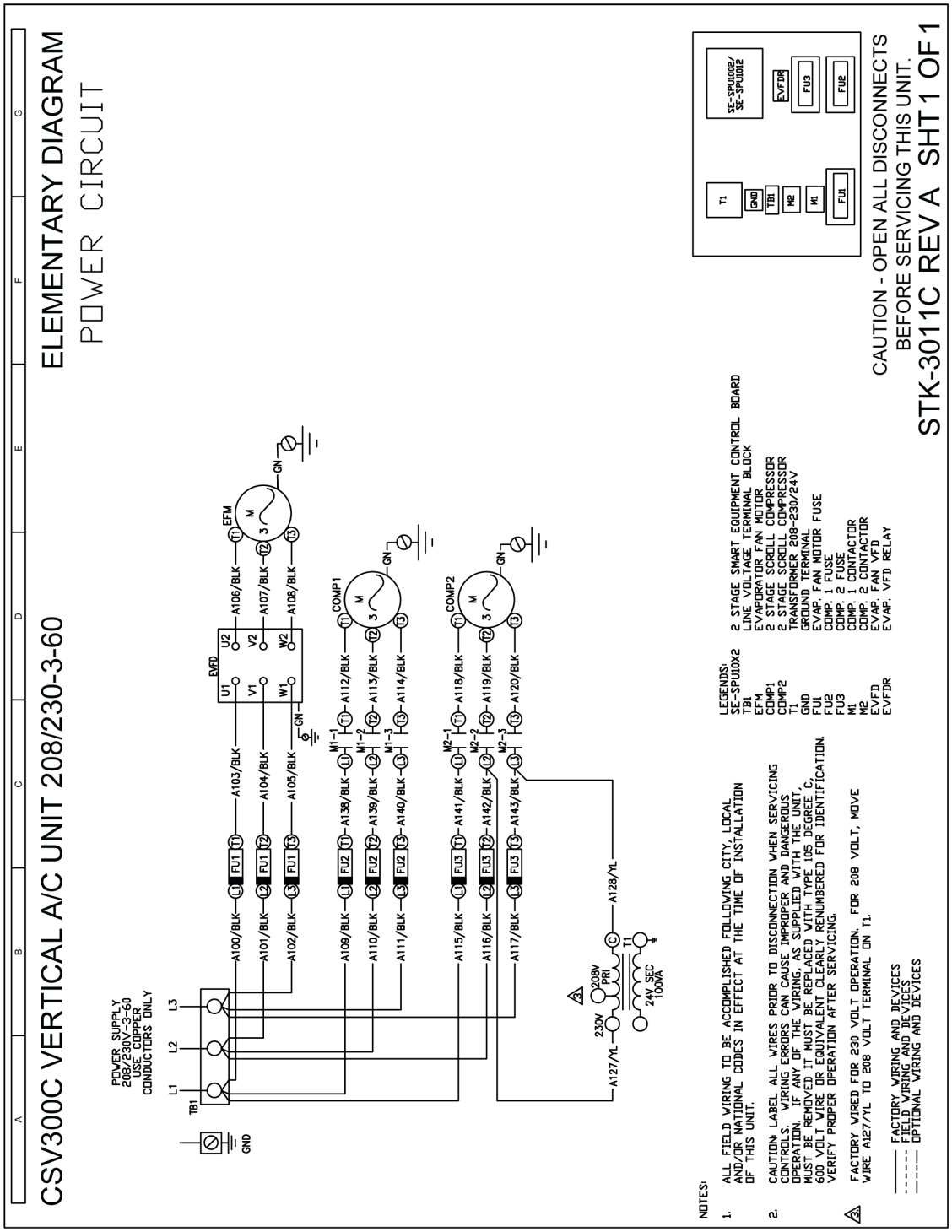
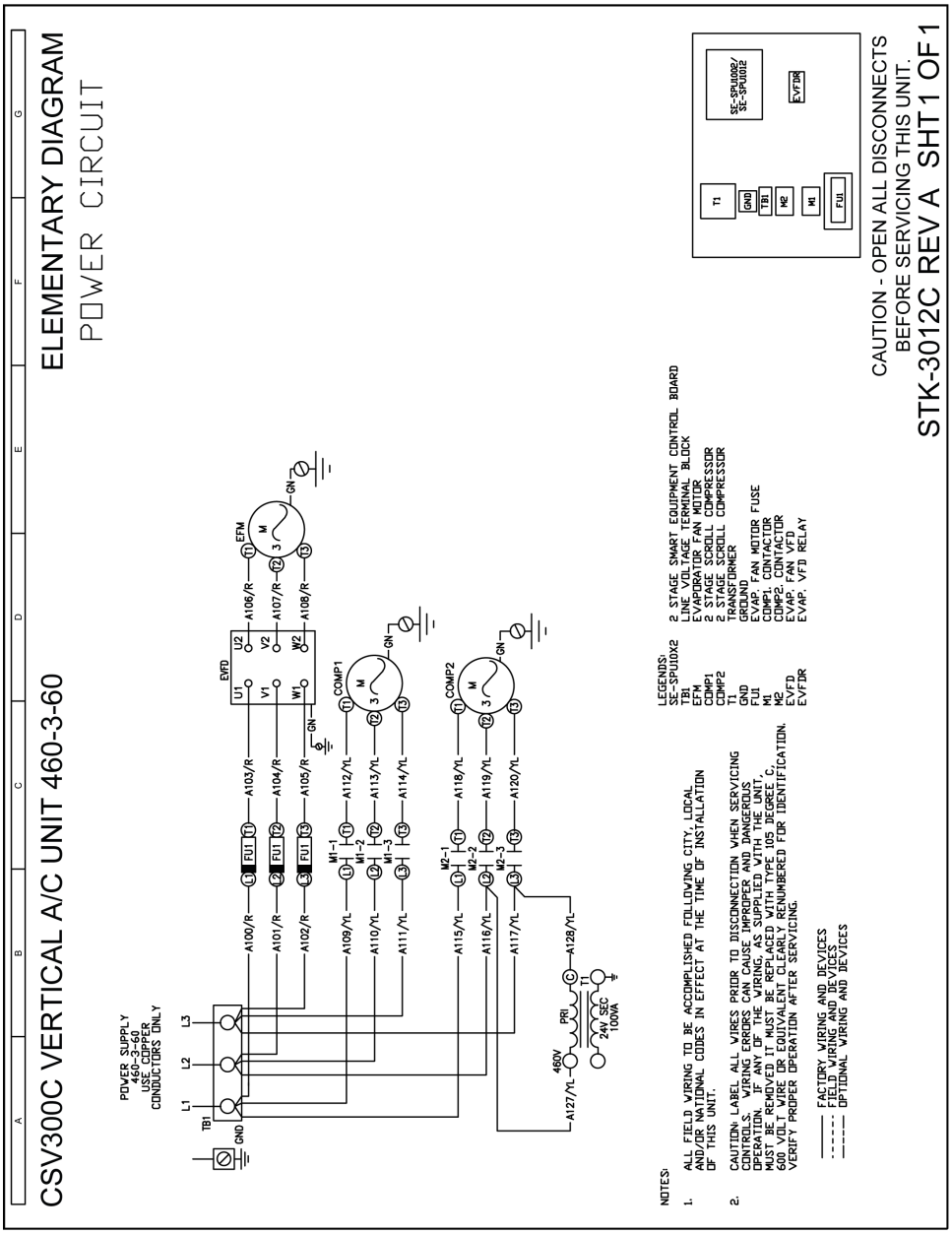
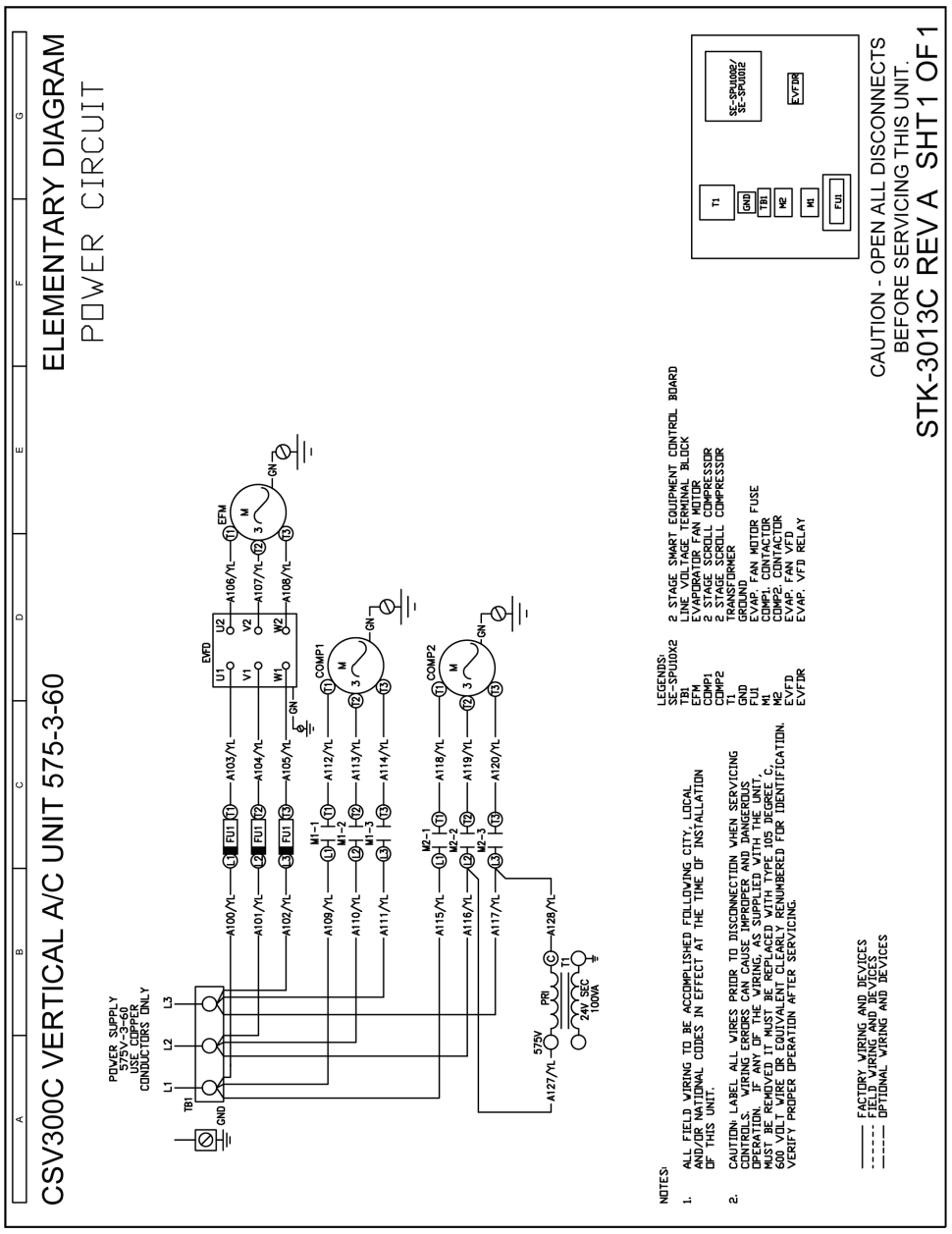
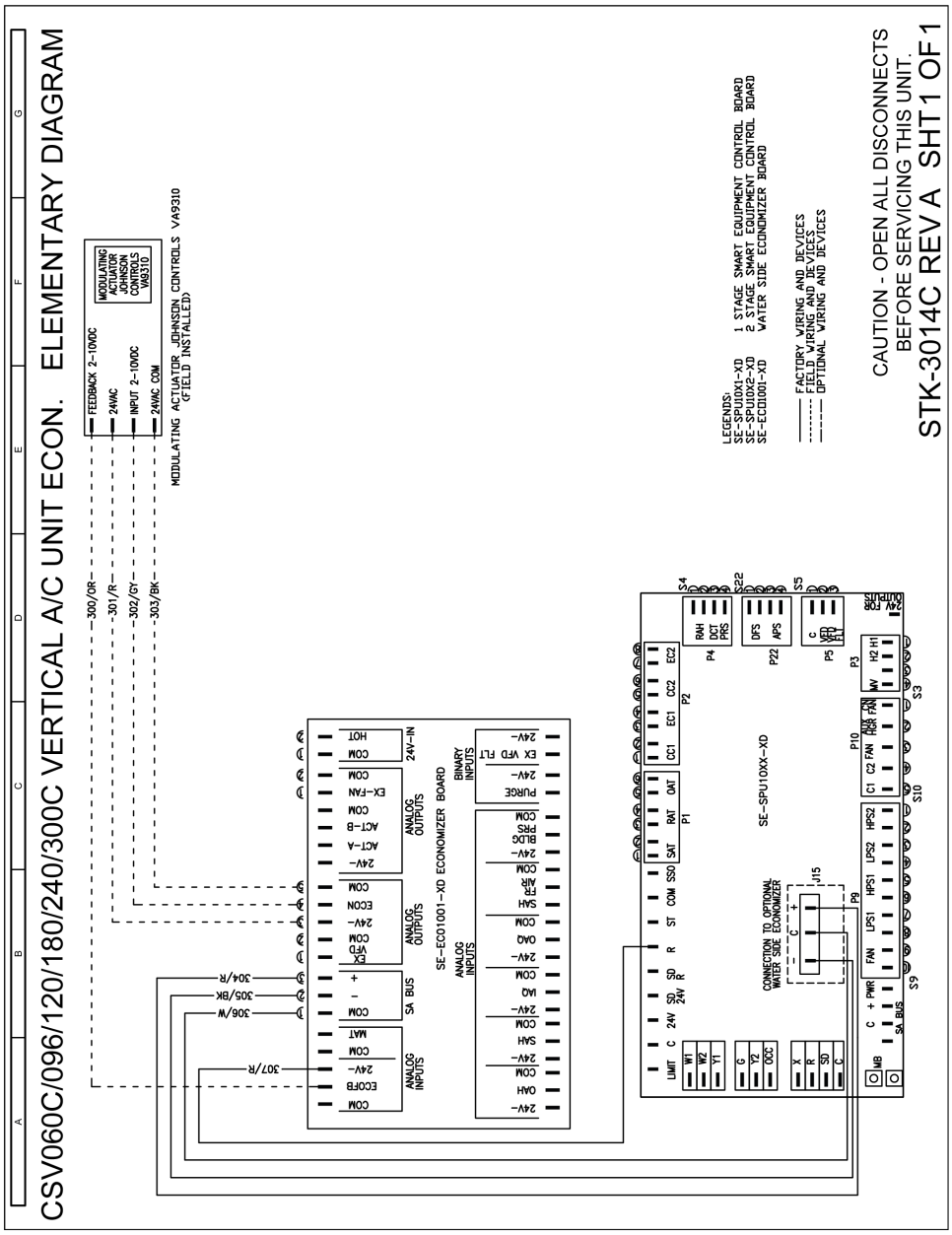
A119/R
A120/R
A127/YL
A128/YL


A B C D E F G
CSV180C VERTICAL A/C UNIT 460/575-3-60
ELEMENTARY DIAGRAM
POWER CIRCUIT
POWER SUPPLY
460/575V-3-60
USE COPPER
CONDUCTORS ONLY
L1 L2 L3
TB1
GND
EVFD
U1 U2 V1 V2 W1 W2
EFM
M
3
COMP1
COMP2
FU1
M1-1 M1-2 M1-3
M2-1 M2-2 M2-3
A100/YL A101/YL A102/YL A103/YL A104/YL A105/YL A106/YL A107/YL A108/YL
A109/YL A110/YL A111/YL A112/YL A113/YL A114/YL
A115/YL A116/YL A117/YL A118/YL A119/YL A120/YL
A127/YL A128/YL
GN
460V
PRI
T1
24V SEC
100VA
575V
DETAIL A
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
T1
GND
TB1
M2
M1
FU1
SE-SPU1002/
SE-SPU1012
EVFDR
CAUTION - OPEN ALL DISCONNECTS
BEFORE SERVICING THIS UNIT.
STK-3007C REV A SHT 1 OF 1


ELEMENTARY DIAGRAM
POWER CIRCUIT
CSV300C VERTICAL A/C UNIT 208/230-3-60
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
L1
L2
L3
TB1
GND
EVFD
EFM
COMP1
COMP2
A100/BLK
A101/BLK
A102/BLK
A103/BLK
A104/BLK
A105/BLK
A106/BLK
A107/BLK
A108/BLK
A109/BLK
A110/BLK
A111/BLK
A112/BLK
A113/BLK
A114/BLK
A115/BLK
A116/BLK
A117/BLK
A118/BLK
A119/BLK
A120/BLK
A127/YL
A128/YL
208V PRI
230V
24V SEC 100VA
T1
FU1
FU2
FU3
EVFDR
SE-SPU10X2/ SE-SPU01Z
GND
TB1
M2
M1
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
FU2 COMP. 1 FUSE
FU3 COMP. 2 FUSE
M1 COMP. 1 CONTACTOR
M2 COMP. 2 CONTACTOR
EVFD EVAP. FAN VFD
EVFDR EVAP. VFD RELAY


CSV300C VERTICAL A/C UNIT 460-3-60
ELEMENTARY DIAGRAM
POWER CIRCUIT
POWER SUPPLY
460-3-60
USE COPPER
CONDUCTORS ONLY
L1
L2
L3
TB1
GND
FU1
EVFD
EFM
COMP1
COMP2
M1-1
M1-2
M1-3
M2-1
M2-2
M2-3
460V
PRI
24V SEC
100VA
T1
A127/YL
A128/YL
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
T1
GND
TB1
M2
M1
FU1
SE-SPU10X2/
SE-SPU10X2
EVFDR
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
POWER SUPPLY
575V 3PH 60HZ
USE COPPER
CONDUCTORS ONLY
L1
L2
L3
TB1
GND
EVFD
EFM
COMP1
COMP2
M1-1
M1-2
M1-3
M2-1
M2-2
M2-3
FU1
PRI
24V SEC
100VA
575V
A100/YL
A101/YL
A102/YL
A103/YL
A104/YL
A105/YL
A106/YL
A107/YL
A108/YL
A109/YL
A110/YL
A111/YL
A112/YL
A113/YL
A114/YL
A115/YL
A116/YL
A117/YL
A118/YL
A119/YL
A120/YL
A127/YL
A128/YL
GN
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. VERIFY PROPER OPERATION AFTER SERVICING.
IF ANY OF THE WIRING AS SUPPLIED WITH THE UNIT MUST BE REPLACED, IT MUST BE REPLACED WITH TYPE 600 VOLT WIRE OR EQUIVALENT. CLEARLY RENUMBERED FOR IDENTIFICATION.
FACTORY WIRING AND DEVICES
FIELD WIRING AND DEVICES
OPTIONAL WIRING AND DEVICES
LEGENDS:
SE-SPU00X2 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
T1
GND
TB1
M2
M1
FU1
SE-SPU00X2/
SE-SPU00X2
EVFDR
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
A
B
C
D
E
F
G
FEEDBACK 2-10VDC
24VAC
INPUT 2-10VDC
24VAC COM
MODULATING ACTUATOR JOHNSON CONTROLS VA9310
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

SEC parameters for CSV units, C-generation

Table 25: SEC parameters for CSV060C units with single speed evaporator fan

Menu / sub-menu			Parameter	Factory value
Commission	**Standard**		T-stat only	Yes
	Options		# Refrig sys	1
			# Ht pump stgs	0
Details	**Occ**		Occ mode[1]	External
			Off during unocc	No
	Cooling	**Setup**	Clg-En	Yes
			# Clg stgs	1
			C1-En	Yes
			Low-amb-En[2]	No
			Lead-lag-En[3]	No
			Clg OAT cutout-En	Yes
			Clg OAT cutout	45
			SAT cool limit-En	Yes
			SAT cool limit-SP	45
			Freeze-SP	26
	Heating		Htg-En[4]	No
			# Htg stgs	0
	Fan		Fan ctl-type	Single speed
			Fan on dly cool	0
			Fan off dly cool	45

Note:

1. Factory shipped units equipped with Occ jumper on UCB
2. Do not enable low ambient
3. Do not enable LeadLag
4. Field supplied option

Table 26: SEC parameters for CSV096C-300C units with SZVAV or MZVAV evaporator fan

Menu / sub-menu			Parameter	Factory value
Commission	**Standard**		T-stat only	Yes for SZVAV No for MZVAV
	Options		# Refrig sys	2
			# Ht pump stgs	0
Details	**Occ**		Occ mode[1]	External
			Off during unocc	No
	Cooling	**Setup**	Clg-En	Yes
			# Clg stgs	2
			C1-En	Yes
			C2-En	Yes
			C3-En	No
			C4-En	No
			Low-amb-En[2]	No
			Lead-lag-En[3]	No
			Clg OAT cutout-En	Yes
			Clg OAT cutout	45
			SAT cool limit-En	Yes
			SAT cool limit-SP	45
			Freeze-SP	26
			SATUp-SP	Field select
			SATLo-SP	Field select
			SATRst-SP	Field select
	Heating		Htg-En[4]	No
			# Htg stgs	0
	Fan		Fan ctl-type	Variable
			Fan on dly cool	0
			Fan off dly cool	30
	Fan VFD		Dct-prs-SP[5]	1.5 IWG
			Dct-shutdown-SP[5]	4.5 IWG

Note:

1. Factory shipped units equipped with Occ jumper on UCB
2. Do not enable low ambient
3. Do not enable LeadLag
4. Field supplied option
5. Field set parameter

Table 27: SEC parameters for CSV096C-300C units with IntelliSpeed™ evaporator fan

Menu / sub-menu			Parameter	Factory value
Commission	**Standard**		T-stat only	Yes
	Options		# Refrig sys	2
			# Ht pump stgs	0
Details	**Occ**		Occ mode[1]	External
			Off during unocc	No
	Cooling	**Setup**	Clg-En	Yes
			# Clg stgs	2
			C1-En	Yes
			C2-En	Yes
			C3-En	No
			C4-En	No
			Low-amb-En[2]	No
			Lead-lang-En[3]	No
			Clg OAT cutout-En	Yes
			Clg OAT cutout	45
			SAT cool limit-En	Yes
			SAT cool limit-SP	45
			Freeze-SP	26
	Heating		Htg-En[4]	No
			# Htg stgs	0
	Fan		Fan ctl-type	Fixed variable
			Fan on Occ	No
			Fan on dly cool	0
			Fan off dly cool	30
			Fan only % cmd	0
			1 clg stg -% cmd	60
			2 clg stg -% cmd	100

Note:

1. Factory shipped units equipped with Occ jumper on UCB
2. Do not enable low ambient
3. Do not enable LeadLag
4. Field supplied option

R-410A quick reference guide

Refer to Installation Instructions for specific installation requirements.

- R-410A Refrigerant operates at 50–70% higher pressures than R-22. Be sure that servicing equipment and replacement components are designed to operate with R-410A.
- R-410A Refrigerant cylinders are rose colored.
- Recovery cylinder service pressure rating must be 400 psig. DOT 4BA400 or DOT BW400.
- Recovery equipment must be rated for R-410A.
- Do not use R-410A service equipment on R-22 systems. All hoses, gages, recovery cylinders, charging cylinders and recovery equipment must be dedicated for use on R-410A systems only.
- Manifold sets must be at least 700 psig high side and 180 psig low side with 550 psig retard.
- All hoses must have a service pressure rating of 800 psig.
- Leak detectors, must be designed to detect HFC refrigerants.
- Systems must be charged with refrigerant. Use a commercial type metering device in the manifold hose.
- R-410A can only be used with POE type oils.
- POE type oils rapidly absorb moisture from the atmosphere.
- Vacuum pumps will not remove moisture from POE type oils.
- Do not use liquid line driers with a rated working pressure rating less than 600 psig.
- Do not install suction line driers in the liquid line.
- A liquid line drier is required on every unit.
- Do not use an R-22 TXV. If a TXV is to be used, it must be an R-410A TXV.
- Never open system to atmosphere when under vacuum.
- If system must be opened for service, evacuate system then break the vacuum with dry nitrogen and replace filter driers.

Appendix

Communication board installation and setup

Installation instructions: S1-SE COM1001-0 communication board to a Simplicity SE unit control board

Description

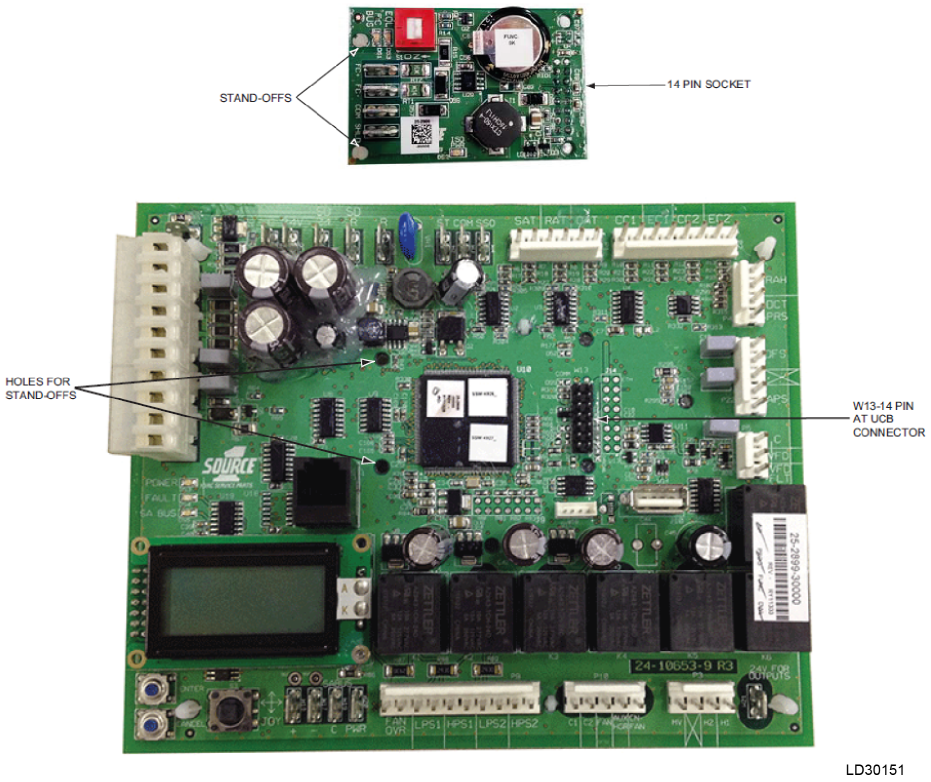
The Simplicity® SE communications card provides an interface between a series of rooftop units at a single site, as well as communication to building automation system (BAS).

The card is a multi-protocol capable network card. It provides options for many of the more commonly used BAS protocols including BACnet MS/TP, Modbus RTU, and JCI N2. The board comes defaulted to BACnet MS/TP protocol from the factory, however, as a simple setting in the UCB can be used to select Modbus RTU or N2 if desired.

Installation

1. Power down the UCB.
2. Ensure that no power source is connected to the unit.
3. Align the SE-COM1001 (14 slot) Socket with the 14 pins at W13 on the Unit Control Board (UCB).
4. Carefully insert the socket into the pins on the UCB as shown (see Figure 40).

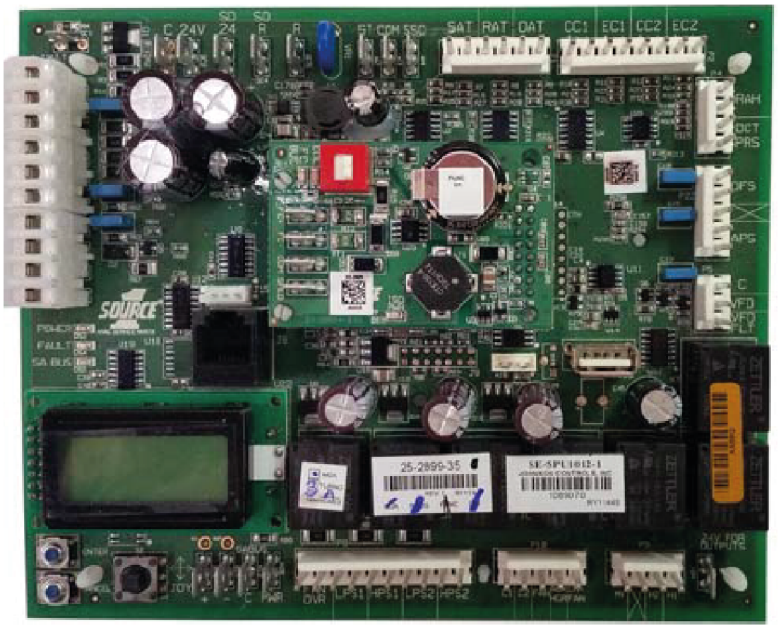
Figure 40: Socket and pin location



5. Align the support pins on the SE-COM1001 with the holes on the UCB (see Figure 40.)
6. Carefully seat the pins on the board.

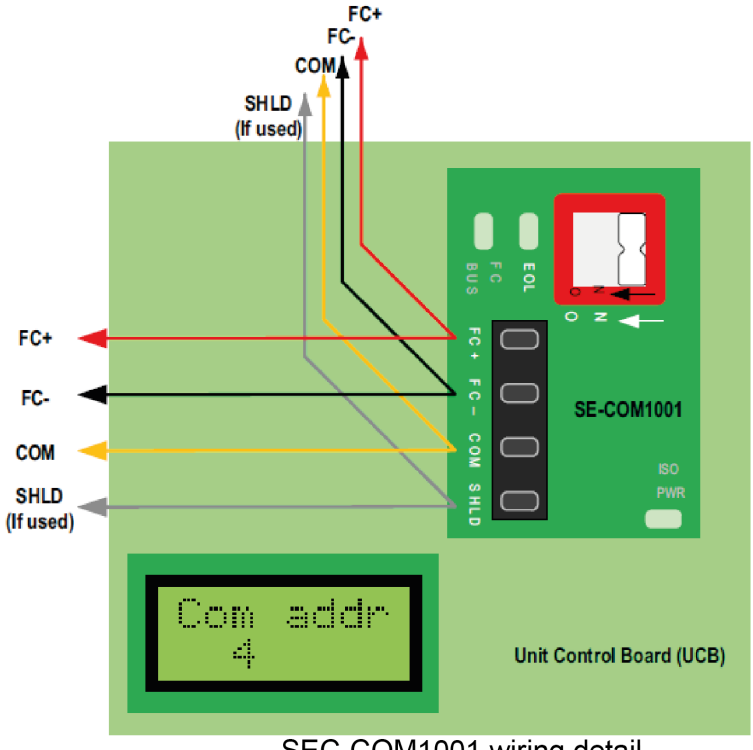
7. After the SE-COM1001 board is attached to the UCB, connect the field communications cable to the SECOM1001 as shown in Figure 41 and Figure 42.

Figure 41: Communication board installed



LD30152

Figure 42: SE-COM1001 wiring detail

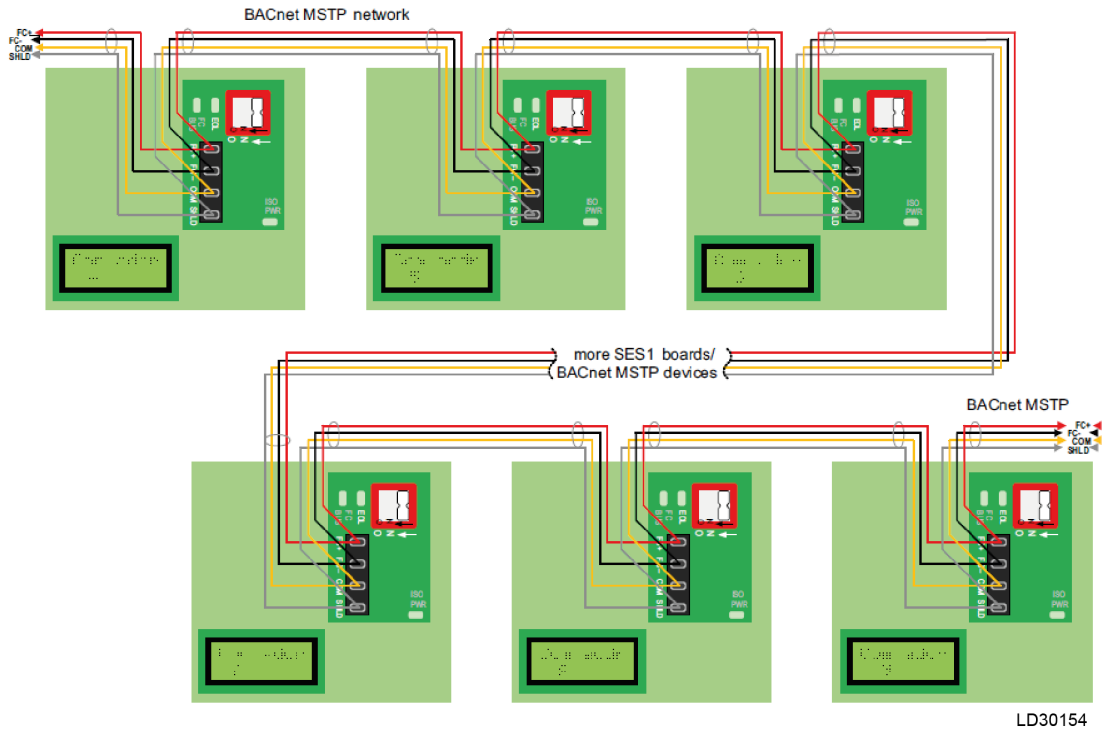


SEC-COM1001 wiring detail

LD30153

Note: For the best performance on MS/TP bus applications, use 22 AWG stranded, 3-wire, twisted in a shielded cable with proper cable shield grounding. Other wire gauges and non-shielded cable may provide acceptable bus performance in many applications, especially applications that have short cable runs and low ambient inductive noise levels.

Figure 43: BACnet MSTP network



8. After connecting the field communications bus to the SECOM1001, power the unit up and wait for the controller to become operational.

To finish the installation process, the following 2 steps need to be completed:

1. Set the communication protocol to be used (LCD Menu => Controller > Network > FcBusMode). Choices are as follows:

    a. **Wired field bus** = BACnet MS/TP (default)
    b. **Wireless** = not used
    c. **Modbus field bus** = Modbus RTU
    d. **N2 slave field bus** = JCI N2
    e. **Ethernet field bus**

2. Set the board address (LCD Menu => Controller > Network > Address)

    a. **Default** = 4
    b. **Board address range** = 1-127

3. Shutdown the unit and restart.

Note: The board address must be unique on the communication segment or communication errors will occur.

BACnet points listing

Table 28: BACnet points list

Long name	Short name	Data type	Object ID	Attribute ID	Modbus address	N2 point type	N2 point address	BACoid	Modify
Unit Status	Unit-S	MV	1	7000	280	ADI	1	29803	Read Only
Unit Name	Name	SV	1	7001				29804	Read/Write
Unit Model Number	Model#	SV	1	7002				29805	Read/Write
Unit Serial Number	Serial#	SV	1	7003				29806	Read/Write
Firmware Version	FirmVer	SV	1	7004				29807	Read Only
Firmware Status	Firm-S	MV	1	7005					Read Only
Heating Control Type	Htg-Type	MV	1	7006				29501	Read/Write
Exhaust Type	ExFType	MV	1	7008	412	ADI	129	29503	Read/Write
UCB 24VAC Input	UCB24VForOutp	AV	1	7009					Read Only
Cancel ASCD Timers	N/A	MV	1	7010					Read/Write
Reset Lockouts	ResetLO	MV	1	7011	80	ADI	2	29826	Read/Write
Outputs Disabled Due to Low Input Voltage	N/A	MV	1	7012					Read Only
Outputs Limited Due to Low Input Voltage	N/A	MV	1	7013					Read Only
Model Name	ModelName	SV	1	7014					Read Only
CCS Online	N/A	MV	1	7015					Read/Write
Rooftop Controller Type	CntrlType	MV	1	7017					Read/Write
Rooftop Equipment Type	EquipType	MV	1	7018					Read/Write
Unit Enable	UnitEn	MV	1	7019	411	ADI	128	29896	Read/Write
SZ VAV Enabled	SZVAVEn	MV	1	7020	399	ADI	118	29908	Read/Write
Hardware Reset	HdwrReset	MV	1	7021	126	ADI	109	29909	Read/Write
Software Version	N/A	AV	1	7022	0				Read Only
Event 1 Value	N/A	AV	1	7023	268				Read Only
Event 2 Value	N/A	AV	1	7024	269				Read Only
Event 3 Value	N/A	AV	1	7025	276				Read Only
Event 4 Value	N/A	AV	1	7026	277				Read Only
Event 5 Value	N/A	AV	1	7027	278				Read Only
Event 1 Set	N/A	AV	1	7028	394				Read Only
Event 2 Set	N/A	AV	1	7029	395				Read Only
Event 3 Set	N/A	AV	1	7030	396				Read Only
Event 4 Set	N/A	AV	1	7031	397				Read Only
Event 5 Set	N/A	AV	1	7032	398				Read Only
Y1 - Thermostat	Y1-Tstat	MV	2	7000	281	BI	1	29504	Read Only
Y2 - Thermostat	Y2-Tstat	MV	2	7001	282	BI	2	29505	Read Only
Y3 - Thermostat	Y3-Tstat	MV	2	7002	283	BI	3	29506	Read Only
Y4 - Thermostat	Y4-Tstat	MV	2	7003	284	BI	4	29507	Read Only
W1 - Thermostat	W1-Tstat	MV	2	7004	285	BI	5	29508	Read Only
W2 - Thermostat	W2-Tstat	MV	2	7005	286	BI	6	29509	Read Only
W3 - Thermostat	W3-Tstat	MV	2	7006	287	BI	7	29510	Read Only
G - Thermostat	G-Tstat	MV	2	7007	288	BI	8	29511	Read Only
X-OUT	X-Out	MV	2	7009	289	BO	1	29513	Read Only
Thermostat Only Control Enabled	Tstat-Only	MV	2	7010	413	BI	42	29514	Read/Write
Local Occupancy Input - Thermostat	Occ-Tstat	MV	2	7008				29512	Read Only
Fan Status	Fan-S	MV	3	7000	302	ADI	23	29550	Read Only
Fan % Command	FanVFD	AV	3	7001	157	AO	1	29551	Read Only
Fan VFD Fault	FanVFDFlt	MV	3	7002	303	BI	10	29552	Read Only
Fan Overload	FanOvrload	MV	3	7003	304	BI	11	29553	Read Only
Fan Accumulated Runtime	Fan-RT	AV	3	7004	9	ADF	30	29554	Read/Write
Fan Control Type	FanCtl-Type	MV	3	7005	400	ADI	119	29555	Read/Write

Table 28: BACnet points list

Long name	Short name	Data type	Object ID	Attribute ID	Modbus address	N2 point type	N2 point address	BACoid	Modify
Air Proving Switch Setup	APSSetup	MV	3	7006	414	ADI	130	29556	Read/Write
Air Proving Switch	APS	MV	3	7007	305	BI	12	29557	Read Only
Fan On Delay for Cool	FanOnDlyCool	AV	3	7008	90	ADI	24	29558	Read/Write
Fan Off Delay for Cool	FanOffDlyCool	AV	3	7009	415	ADI	131	29559	Read/Write
Fan On Delay for Heat	FanOnDlyHeat	AV	3	7010	416	ADI	132	29560	Read/Write
Fan Off Delay for Heat	FanOffDlyHeat	AV	3	7011	417	ADI	133	29561	Read/Write
Dirty Filter Switch	DFS	MV	3	7012	306	BI	13	29562	Read Only
Fan Command	Fan	MV	3	7013	307	BO	2	29563	Read Only
Supply Air Temperature	SAT	AV	3	7014	158	AI	3	29564	Read Only
Duct Static Pressure	DctPrs	AV	3	7015	159	AI	4	29565	Read Only
Duct Pressure Setpoint	DctPrs-Sp	AV	3	7016	10	ADF	31	29566	Read/Write
Duct Pressure Shutdown Setpoint	DctShutdownSp	AV	3	7017	11	ADF	32	29567	Read/Write
Continuous Fan Operation in Occupied Mode	FanOnOcc	MV	3	7018	91	ADI	25	29568	Read/Write
Turn Off Continuous Fan Operation When Starting Heat	FanOffStartHeat	MV	3	7019	92	ADI	26	29569	Read/Write
Occupied: No Heat or Cool % Command	FanOnly-%Cmd	AV	3	7020	12	ADF	33	29570	Read/Write
Occupied: One Stage of Cool % Command	1ClgStg-%Cmd	AV	3	7021	13	ADF	34	29571	Read/Write
Occupied: Two Stage of Cool % Command	2ClgStg-%Cmd	AV	3	7022	14	ADF	35	29572	Read/Write
Occupied: One Stage of Heat % Command	1HtgStg-%Cmd	AV	3	7023	17	ADF	38	29573	Read/Write
Occupied: Two Stage of Heat % Command	2HtgStg-%Cmd	AV	3	7024	18	ADF	39	29574	Read/Write
Supply Air Temperature Sensor Fault	N/A	MV	3	7025					Read Only
Duct Static Pressure Sensor Fault	N/A	MV	3	7026					Read Only
Occupied: Three Stage of Cool % Command	3ClgStg-%Cmd	AV	3	7027	15	ADF	36	29819	Read/Write
Occupied: Four Stage of Cool % Command	4ClgStg-%Cmd	AV	3	7028	16	ADF	37	29820	Read/Write
Occupied: Three Stage of Heat % Command	3HtgStg-%Cmd	AV	3	7029	19	ADF	40	29821	Read/Write
Unit Locked Out Due to Air Proving Switch	N/A	MV	3	7030					Read Only
Unit Shutdown Due to Air Proving Switch	N/A	MV	3	7031					Read Only
Unit Shutdown Due High Duct Static Pressure	N/A	MV	3	7033					Read Only
Unit Locked Out Supply Fan Overload	N/A	MV	3	7034					Read Only
Dirty Filter Switch Installed	DFSInst	MV	3	7035					Read/Write
Air Proving Switch Stuck Closed	N/A	MV	3	7036					Read Only
SZ VAV Minimum Fan Speed	SZVAVMinFanSpd	AV	3	7037	73	ADF	159	29913	Read/Write
Low Pressure Limit 1	DctPrs	AV	3	7038					Read/Write
Low Pressure Limit 2	DctPrs	AV	3	7039					Read/Write
Time	Time	AV	3	7040					Read/Write
Time	Time	AV	3	7041					Read/Write
Cooling Mode Enabled For Operation	Clg-En	MV	4	7000	93	ADI	27	29575	Read/Write
Number of Cooling Stages Installed	#ClgStgs	AV	4	7001	401	ADI	120	29576	Read/Write
Cooling Status	Clg-S	MV	4	7002	308	ADI	28	29577	Read Only
Minimum Runtime for a Cooling Stage	MinRtCoolStg	AV	4	7003	20	ADF	41	29578	Read/Write
Lead/Lag Equalize Cooling Stage Runtime Enabled	LeadLag-En	MV	4	7004	402	ADI	121	29579	Read/Write
Low Ambient Fan Pre-run Time For Cooling	LowAmbFanPrerun Cool	AV	4	7005	418	ADI	134	29580	Read/Write
OAT Cooling Cutout Enabled	ClgOATCutout-En	MV	4	7006	94	ADI	29	29581	Read/Write

Table 28: BACnet points list

Long name	Short name	Data type	Object ID	Attribute ID	Modbus address	N2 point type	N2 point address	BACoid	Modify
OAT Cooling Cutout	ClgOATCutout	AV	4	7007	21	ADF	42	29582	Read/Write
Economizer Loading Enabled	EconLoad-En	MV	4	7008	95	ADI	30	29583	Read/Write
All Compressors Off in Free Cooling	AllCompOff-Econ	MV	4	7009	96	ADI	31	29584	Read/Write
Low Ambient Cooling Stages 10 on 5 off Setpoint	LowAmb10On5OffSp	AV	4	7010	419	ADF	177	29585	Read/Write
Temperature/Humidity (Return) Control Enable	TempHumCtrl-En	MV	4	7011	97	ADI	32	29586	Read/Write
Temperature/Humidity Setpoint	TempHum-Sp	AV	4	7012	22	ADF	43	29587	Read/Write
Maximum Temperature / Humidity Setpoint Offset	MaxTempHumSpOff	AV	4	7013	23	ADF	44	29588	Read/Write
Temperature / Humidity Value per Degree Offset	TempHumValPerDegOff	AV	4	7014	24	ADF	45	29589	Read/Write
SAT Limit for Cooling Enable	SATCoolLimit-En	MV	4	7015	98	ADI	33	29590	Read/Write
SAT Limit for Cooling Setpoint	SATCoolLimit-Sp	AV	4	7016	25	ADF	46	29591	Read/Write
Freeze Condition Setpoint	Freeze-Sp	AV	4	7017	420	ADF	178	29592	Read/Write
Condenser Fan 1	CN-Fan	MV	4	7018	309	BO	3	29593	Read Only
Condenser Fan 2	CF2	MV	4	7019	310	BO	4	29594	Read Only
Unit Type	UnitType	MV	4	7020	403	ADI	122	29595	Read/Write
EER	EER	AV	4	7021	404	ADF	175	29596	Read/Write
Subcooling Goal	SubcoolGoal	AV	4	7022	421	ADF	179	29597	Read/Write
Refrigerant Type	RefrigType	MV	4	7023	405	ADI	123	29598	Read/Write
High Side Port Location	HiSidePortLoc	MV	4	7024	422	ADI	135	29599	Read/Write
Evaporator Coil Type	EvapCoil-Type	MV	4	7025	406	ADI	124	29600	Read/Write
Condenser Coil Type	CondCoil-Type	MV	4	7026	423	ADI	136	29601	Read/Write
Indoor Metering Device Type	InMeterDev-Type	MV	4	7027	424	ADI	137	29602	Read/Write
Outdoor Metering Device Type	OutMeterDev-Type	MV	4	7028	425	ADI	138	29603	Read/Write
VAV Cooling Supply Air Temp Upper Setpoint	SATUp-Sp	AV	4	7029	26	ADF	47	29604	Read/Write
VAV Cooling Supply Air Temp Lower Setpoint	SATLo-Sp	AV	4	7030	27	ADF	48	29605	Read/Write
VAV Supply Air Temp Reset Setpoint	SATRst-Sp	AV	4	7031	28	ADF	49	29606	Read/Write
VAV Operating Cooling Supply Air Temp Setpoint	OprVAVClg-Sp	AV	4	7032	160	ADF	50	29607	Read Only
CV Occupied Cooling Setpoint	ClgOcc-Sp	AV	4	7033	29	ADF	51	29608	Read/Write
CV Unoccupied Cooling Setpoint	ClgUnocc-Sp	AV	4	7034	30	ADF	52	29609	Read/Write
CV Operating Cooling Setpoint	OprCVClg-Sp	AV	4	7035	161	ADF	53	29610	Read Only
Excessive Supply Air Cooling Fault	N/A	MV	4	7036					Read Only
Cooling Lockout due to Low Outdoor Air Temp	N/A	MV	4	7037					Read Only
Unit Capacity	UnitCap	AV	4	7038	407	ADF	176	29886	Read/Write
Fan Power	FanPower	AV	4	7039	426	ADF	180	29887	Read/Write
Super Heat Goal	SuperHeatGoal	AV	4	7040	427	ADF	181	29888	Read/Write
Altitude	Altitude	AV	4	7041	31	ADF	54	29889	Read/Write
Cooling Manual Tuning	ClgManualTune	MV	4	7042					Read/Write
Cooling Adaptive Tuning Enable	ClgAdapTunEn	MV	4	7043	100	ADI	35	29882	Read/Write
Number of Refrig Systems Installed	#RefrigSys	AV	4	7044	32	ADF	55	29890	Read/Write
DAT Cooling Min SP	DATClgMinSP	AV	4	7045	74	ADF	160	29907	Read/Write
Pump Out Enable	PmpOut-En	MV	4	7046	428	ADI	139	29921	Read/Write
Staged Cooling Command	StgClgCmd	AV	4	7047	263	ADF	165	29922	Read Only
SZ VAV Occupied Cooling Setpoint	SZVAVClgOcc-Sp	AV	4	7048	270	ADF	169	29925	Read/Write
SZ VAV Unoccupied Cooling Setpoint	SZVAVClgUnocc-Sp	AV	4	7049	271	ADF	170	29926	Read/Write
SZ VAV Operating Cooling Setpoint	OprSZVAVClg-Sp	AV	4	7050	266	ADF	171	29927	Read Only
Low Ambient Enabled	LowAmb-En	MV	4	7051	429	ADI	140	29928	Read/Write
VAV Unoccupied Cooling Setpoint	VAVClgUnocc-Sp	AV	4	7052	79	ADF	168	29932	Read/Write
SZ VAV Cooling Load	SZVAVClgLd	AV	4	7053	435	ADF	186	29935	Read Only
Operational Error Sigma	N/A	AV	4	7054					Read/Write
4 Pipe Split Enable	4pipeEna	MV	4	7055					Read/Write
Low Ambient Start	LowAmbStart	MV	4	7056					Read/Write

Table 28: BACnet points list

Long name	Short name	Data type	Object ID	Attribute ID	Modbus address	N2 point type	N2 point address	BACoid	Modify
Alarm Delay	N/A	AV	4	7057					Read/Write
Compressor Stage Number	N/A	AV	5	7000					Read Only
Compressor Stage Command 1	C1	MV	5	7001	311	BO	5	29611	Read Only
Compressor Stage 1 Status	C1-S	MV	5	7002	312	BI	14	29615	Read Only
Compressor Stage 1 Enabled	C1-En	MV	5	7003	101	ADI	36	29619	Read/Write
Hot Gas Bypass Present	HGP-Inst	MV	5	7004	408	ADI	125	29623	Read/Write
Compressor Stage Accumulated Runtime 1	C1RunTim	AV	5	7005	33	ADF	56	29627	Read/Write
Compressor Stage Number Times On 1	N/A	AV	5	7006					Read/Write
Min On Time Remaining 1	C1OnTmr	AV	5	7007	162	ADI	37	29631	Read Only
Anti-Short Cycle Delay Time Remaining 1	C1ASCDTmr	AV	5	7008	163	ADI	38	29635	Read Only
High Pressure Limit 1	HPS1	MV	5	7009	313	BI	15	29639	Read Only
High Pressure Lockout 1	HPS1-LO	MV	5	7010	314	ADI	39	29643	Read Only
Low Pressure Limit 1	LPS1	MV	5	7011	315	BI	16	29647	Read Only
Low Pressure Lockout 1	LPS1-LO	MV	5	7012	316	ADI	40	29651	Read Only
Freeze Condition 1	FS1	MV	5	7013	317	BI	17	29655	Read Only
Freeze Condition Lockout 1	FS1-LO	MV	5	7014	318	ADI	41	29659	Read Only
Evaporator Coil Temp 1	EC1	AV	5	7015	164	AI	5	29663	Read Only
Condenser Coil Temp 1	CC1	AV	5	7016	165	AI	6	29667	Read Only
Evaporator Coil Temp Sensor Fault 1	N/A	MV	5	7017					Read Only
Condenser Coil Temp Sensor Fault 1	N/A	MV	5	7018					Read Only
Cooling Circuit Test Status 1	ClgCktTestS-1	MV	6	7000	343	ADI	60	29829	Read Only
Suction Pressure 1	SLP-1	AV	6	7001	178	AI	13	29671	Read Only
Liquid Pressure 1	LLP-1	AV	6	7002	179	AI	14	29675	Read Only
Suction Temperature 1	SLT-1	AV	6	7003	180	AI	15	29679	Read Only
Liquid Temperature 1	LLT-1	AV	6	7004	181	AI	16	29683	Read Only
Superheat 1	C1-SuperHeat	AV	6	7005	182	ADF	60	29687	Read Only
Subcooling 1	C1-SubCool	AV	6	7006	183	ADF	61	29691	Read Only
Condensing Temperature over Ambient 1	C1-CondTempOvrAmb	AV	6	7007	184	ADF	62	29695	Read Only
Efficiency Index 1	C1-EI	AV	6	7008	185	ADF	63	29699	Read Only
Capacity Index 1	C1-CI	AV	6	7009	186	ADF	64	29703	Read Only
Suction Pressure Sensor Fault 1	N/A	MV	6	7010					Read Only
Suction Temperature Sensor Fault 1	N/A	MV	6	7011					Read Only
Liquid Pressure Sensor Fault 1	N/A	MV	6	7012					Read Only
Liquid Temperature Sensor Fault 1	N/A	MV	6	7013					Read Only
Evaporating Temp Value 1	C1-EvapTempValue	AV	6	7014	187	ADF	65	29833	Read Only
Condenser Temperature Over Ambient High 1	C1-CondTempOAHigh	AV	6	7015	188	ADF	66	29849	Read Only
Condenser Temperature Over Ambient Low 1	C1-CondTempOALow	AV	6	7016	189	ADF	67	29853	Read Only
Superheat High 1	C1-SuperheatHigh	AV	6	7017	190	ADF	68	29857	Read Only
Superheat Low 1	C1-SuperheatLow	AV	6	7018	191	ADF	69	29861	Read Only
Subcool High 1	C1-SubcoolHigh	AV	6	7019	192	ADF	70	29865	Read Only
Subcool Low 1	C1-SubcoolLow	AV	6	7020	193	ADF	71	29869	Read Only
Evaporating Temperature High 1	C1-EvapTempHigh	AV	6	7021	194	ADF	72	29873	Read Only
Evaporating Temperature Low 1	C1-EvapTempLow	AV	6	7022	195	ADF	73	29877	Read Only
Compressor Stage Number	N/A	AV	7	7000					Read Only
Compressor Stage Command 2	C2	MV	7	7001	319	BO	6	29612	Read Only
Compressor Stage 2 Status	C2-S	MV	7	7002	320	BI	18	29616	Read Only
Compressor Stage 2 Enabled	C2-En	MV	7	7003	102	ADI	42	29620	Read/Write
Hot Gas Bypass Present	N/A	MV	7	7004					Read/Write

Table 28: BACnet points list

Long name	Short name	Data type	Object ID	Attribute ID	Modbus address	N2 point type	N2 point address	BACoid	Modify
Compressor Stage Accumulated Runtime 2	C2RunTim	AV	7	7005	34	ADF	57	29628	Read/Write
Compressor Stage Number Times On 2	N/A	AV	7	7006					Read/Write
Min On Time Remaining 2	C2OnTmr	AV	7	7007	166	ADI	43	29632	Read Only
Anti-Short Cycle Delay Time Remaining 2	C2ASCDTmr	AV	7	7008	167	ADI	44	29636	Read Only
High Pressure Limit 2	HPS2	MV	7	7009	321	BI	19	29640	Read Only
High Pressure Lockout 2	HPS2-LO	MV	7	7010	322	ADI	45	29644	Read Only
Low Pressure Limit 2	LPS2	MV	7	7011	323	BI	20	29648	Read Only
Low Pressure Lockout 2	LPS2-LO	MV	7	7012	324	ADI	46	29652	Read Only
Freeze Condition 2	FS2	MV	7	7013	325	BI	21	29656	Read Only
Freeze Condition Lockout 2	FS2-LO	MV	7	7014	326	ADI	47	29660	Read Only
Evaporator Coil Temp 2	EC2	AV	7	7015	168	AI	7	29664	Read Only
Condenser Coil Temp 2	CC2	AV	7	7016	169	AI	8	29668	Read Only
Evaporator Coil Temp Sensor Fault 2	N/A	MV	7	7017					Read Only
Condenser Coil Temp Sensor Fault 2	N/A	MV	7	7018					Read Only
Cooling Circuit Test Status 2	ClgCktTestS-2	MV	8	7000	344	ADI	61	29830	Read Only
Suction Pressure 2	SLP-2	AV	8	7001	196	AI	17	29672	Read Only
Liquid Pressure 2	LLP-2	AV	8	7002	197	AI	18	29676	Read Only
Suction Temperature 2	SLT-2	AV	8	7003	198	AI	19	29680	Read Only
Liquid Temperature 2	LLT-2	AV	8	7004	199	AI	20	29684	Read Only
Superheat 2	C2-SuperHeat	AV	8	7005	200	ADF	74	29688	Read Only
Subcooling 2	C2-SubCool	AV	8	7006	201	ADF	75	29692	Read Only
Condensing Temperature over Ambient 2	C2-CondTempOvrAmb	AV	8	7007	202	ADF	76	29696	Read Only
Efficiency Index 2	C2-EI	AV	8	7008	203	ADF	77	29700	Read Only
Capacity Index 2	C2-CI	AV	8	7009	204	ADF	78	29704	Read Only
Suction Pressure Sensor Fault 2	N/A	MV	8	7010					Read Only
Suction Temperature Sensor Fault 2	N/A	MV	8	7011					Read Only
Liquid Pressure Sensor Fault 2	N/A	MV	8	7012					Read Only
Liquid Temperature Sensor Fault 2	N/A	MV	8	7013					Read Only
Evaporating Temp Value 2	C2-EvapTempValue	AV	8	7014	205	ADF	79	29834	Read Only
Condenser Temperature Over Ambient High 2	C2-CondTempOAHigh	AV	8	7015	206	ADF	80	29850	Read Only
Condenser Temperature Over Ambient Low 2	C2-CondTempOALow	AV	8	7016	207	ADF	81	29854	Read Only
Superheat High 2	C2-SuperheatHigh	AV	8	7017	208	ADF	82	29858	Read Only
Superheat Low 2	C2-SuperheatLow	AV	8	7018	209	ADF	83	29862	Read Only
Subcool High 2	C2-SubcoolHigh	AV	8	7019	210	ADF	84	29866	Read Only
Subcool Low 2	C2-SubcoolLow	AV	8	7020	211	ADF	85	29870	Read Only
Evaporating Temperature High 2	C2-EvapTempHigh	AV	8	7021	212	ADF	86	29874	Read Only
Evaporating Temperature Low 2	C2-EvapTempLow	AV	8	7022	213	ADF	87	29878	Read Only
Compressor Stage Number	N/A	AV	9	7000					Read Only
Compressor Stage Command 3	C3	MV	9	7001	327	BO	7	29613	Read Only
Compressor Stage 3 Status	C3-S	MV	9	7002	328	BI	22	29617	Read Only
Compressor Stage 3 Enabled	C3-En	MV	9	7003	103	ADI	48	29621	Read/Write
Hot Gas Bypass Present	N/A	MV	9	7004					Read/Write
Compressor Stage Accumulated Runtime 3	C3RunTim	AV	9	7005	35	ADF	58	29629	Read/Write
Compressor Stage Number Times On 3	N/A	AV	9	7006					Read/Write
Min On Time Remaining 3	C3OnTmr	AV	9	7007	170	ADI	49	29633	Read Only
Anti-Short Cycle Delay Time Remaining 3	C3ASCDTmr	AV	9	7008	171	ADI	50	29637	Read Only
High Pressure Limit 3	HPS3	MV	9	7009	329	BI	23	29641	Read Only
High Pressure Lockout 3	HPS3-LO	MV	9	7010	330	ADI	51	29645	Read Only

Table 28: BACnet points list

Long name	Short name	Data type	Object ID	Attribute ID	Modbus address	N2 point type	N2 point address	BACoid	Modify
Low Pressure Limit 3	LPS3	MV	9	7011	331	BI	24	29649	Read Only
Low Pressure Lockout 3	LPS3-LO	MV	9	7012	332	ADI	52	29653	Read Only
Freeze Condition 3	FS3	MV	9	7013	333	BI	25	29657	Read Only
Freeze Condition Lockout 3	FS3-LO	MV	9	7014	334	ADI	53	29661	Read Only
Evaporator Coil Temp 3	EC3	AV	9	7015	172	AI	9	29665	Read Only
Condenser Coil Temp 3	CC3	AV	9	7016	173	AI	10	29669	Read Only
Evaporator Coil Temp Sensor Fault 3	N/A	MV	9	7017					Read Only
Condenser Coil Temp Sensor Fault 3	N/A	MV	9	7018					Read Only
Cooling Circuit Test Status 3	ClgCktTestS-3	MV	10	7000	345	ADI	62	29831	Read Only
Suction Pressure 3	SLP-3	AV	10	7001	214	AI	21	29673	Read Only
Liquid Pressure 3	LLP-3	AV	10	7002	215	AI	22	29677	Read Only
Suction Temperature 3	SLT-3	AV	10	7003	216	AI	23	29681	Read Only
Liquid Temperature 3	LLT-3	AV	10	7004	217	AI	24	29685	Read Only
Superheat 3	C3-SuperHeat	AV	10	7005	218	ADF	88	29689	Read Only
Subcooling 3	C3-SubCool	AV	10	7006	219	ADF	89	29693	Read Only
Condensing Temperature over Ambient 3	C3-CondTempOvrAmb	AV	10	7007	220	ADF	90	29697	Read Only
Efficiency Index 3	C3-EI	AV	10	7008	221	ADF	91	29701	Read Only
Capacity Index 3	C3-CI	AV	10	7009	222	ADF	92	29705	Read Only
Suction Pressure Sensor Fault 3	N/A	MV	10	7010					Read Only
Suction Temperature Sensor Fault 3	N/A	MV	10	7011					Read Only
Liquid Pressure Sensor Fault 3	N/A	MV	10	7012					Read Only
Liquid Temperature Sensor Fault 3	N/A	MV	10	7013					Read Only
Evaporating Temp Value 3	C3-EvapTempValue	AV	10	7014	223	ADF	93	29835	Read Only
Condenser Temperature Over Ambient High 3	C3-CondTempOAHigh	AV	10	7015	224	ADF	94	29851	Read Only
Condenser Temperature Over Ambient Low 3	C3-CondTempOALow	AV	10	7016	225	ADF	95	29855	Read Only
Superheat High 3	C3-SuperheatHigh	AV	10	7017	226	ADF	96	29859	Read Only
Superheat Low 3	C3-SuperheatLow	AV	10	7018	227	ADF	97	29863	Read Only
Subcool High 3	C3-SubcoolHigh	AV	10	7019	228	ADF	98	29867	Read Only
Subcool Low 3	C3-SubcoolLow	AV	10	7020	229	ADF	99	29871	Read Only
Evaporating Temperature High 3	C3-EvapTempHigh	AV	10	7021	230	ADF	100	29875	Read Only
Evaporating Temperature Low 3	C3-EvapTempLow	AV	10	7022	231	ADF	101	29879	Read Only
Compressor Stage Number	N/A	AV	11	7000					Read Only
Compressor Stage Command 4	C4	MV	11	7001	335	BO	8	29614	Read Only
Compressor Stage 4 Status	C4-S	MV	11	7002	336	BI	26	29618	Read Only
Compressor Stage 4 Enabled	C4-En	MV	11	7003	104	ADI	54	29622	Read/Write
Hot Gas Bypass Present	N/A	MV	11	7004					Read/Write
Compressor Stage Accumulated Runtime 4	C4RunTim	AV	11	7005	36	ADF	59	29630	Read/Write
Compressor Stage Number Times On 4	N/A	AV	11	7006					Read/Write
Min On Time Remaining 4	C4OnTmr	AV	11	7007	174	ADI	55	29634	Read Only
Anti-Short Cycle Delay Time Remaining 4	C4ASCDTmr	AV	11	7008	175	ADI	56	29638	Read Only
High Pressure Limit 4	HPS4	MV	11	7009	337	BI	27	29642	Read Only
High Pressure Lockout 4	HPS4-LO	MV	11	7010	338	ADI	57	29646	Read Only
Low Pressure Limit 4	LPS4	MV	11	7011	339	BI	28	29650	Read Only
Low Pressure Lockout 4	LPS4-LO	MV	11	7012	340	ADI	58	29654	Read Only
Freeze Condition 4	FS4	MV	11	7013	341	BI	29	29658	Read Only
Freeze Condition Lockout 4	FS4-LO	MV	11	7014	342	ADI	59	29662	Read Only
Evaporator Coil Temp 4	EC4	AV	11	7015	176	AI	11	29666	Read Only
Condenser Coil Temp 4	CC4	AV	11	7016	177	AI	12	29670	Read Only
Evaporator Coil Temp Sensor Fault 4	N/A	MV	11	7017					Read Only

Table 28: BACnet points list

Long name	Short name	Data type	Object ID	Attribute ID	Modbus address	N2 point type	N2 point address	BACoid	Modify
Condenser Coil Temp Sensor Fault 4	N/A	MV	11	7018					Read Only
Cooling Circuit Test Status 4	ClgCktTestS-4	MV	12	7000	346	ADI	63	29832	Read Only
Suction Pressure 4	SLP-4	AV	12	7001	232	AI	25	29674	Read Only
Liquid Pressure 4	LLP-4	AV	12	7002	233	AI	26	29678	Read Only
Suction Temperature 4	SLT-4	AV	12	7003	234	AI	27	29682	Read Only
Liquid Temperature 4	LLT-4	AV	12	7004	235	AI	28	29686	Read Only
Superheat 4	C4-SuperHeat	AV	12	7005	236	ADF	102	29690	Read Only
Subcooling 4	C4-SubCool	AV	12	7006	237	ADF	103	29694	Read Only
Condensing Temperature over Ambient 4	C4-CondTempOvrAmb	AV	12	7007	238	ADF	104	29698	Read Only
Efficiency Index 4	C4-EI	AV	12	7008	239	ADF	105	29702	Read Only
Capacity Index 4	C4-CI	AV	12	7009	240	ADF	106	29706	Read Only
Suction Pressure Sensor Fault 4	N/A	MV	12	7010					Read Only
Suction Temperature Sensor Fault 4	N/A	MV	12	7011					Read Only
Liquid Pressure Sensor Fault 4	N/A	MV	12	7012					Read Only
Liquid Temperature Sensor Fault 4	N/A	MV	12	7013					Read Only
Evaporating Temp Value 4	C4-EvapTempValue	AV	12	7014	241	ADF	107	29836	Read Only
Condenser Temperature Over Ambient High 4	C4-CondTempOAHigh	AV	12	7015	242	ADF	108	29852	Read Only
Condenser Temperature Over Ambient Low 4	C4-CondTempOALow	AV	12	7016	243	ADF	109	29856	Read Only
Superheat High 4	C4-SuperheatHigh	AV	12	7017	244	ADF	110	29860	Read Only
Superheat Low 4	C4-SuperheatLow	AV	12	7018	245	ADF	111	29864	Read Only
Subcool High 4	C4-SubcoolHigh	AV	12	7019	246	ADF	112	29868	Read Only
Subcool Low 4	C4-SubcoolLow	AV	12	7020	247	ADF	113	29872	Read Only
Evaporating Temperature High 4	C4-EvapTempHigh	AV	12	7021	248	ADF	114	29876	Read Only
Evaporating Temperature Low 4	C4-EvapTempLow	AV	12	7022	249	ADF	115	29880	Read Only
Heating Mode Enabled For Operation	Htg-En	MV	13	7000	105	ADI	64	29707	Read/Write
Heating Status	Htg-S	MV	13	7001	347	ADI	65	29708	Read Only
SAT Air Temp Limit for Heating Enabled	SATHtgLimit-En	MV	13	7002	106	ADI	66	29709	Read/Write
SAT Air Temp Limit For Heating Setpoint	SATHtgLimit-Sp	AV	13	7003	37	ADF	116	29710	Read/Write
Outdoor Air Temp Heating Cutout Setpoint	HtgOATCutout-Sp	AV	13	7004	38	ADF	117	29711	Read/Write
Hot Water Freeze Stat	FSHW	MV	13	7005	348	ADI	67	29712	Read Only
Gas Valve1 Input	MV	MV	13	7006	349	BI	30	29713	Read Only
Gas Valve2 Input	GV2	MV	13	7007	350	BI	31	29714	Read Only
Gas Valve3 Input	GV3	MV	13	7008	351	BI	32	29715	Read Only
Heat Limit1 Switch	Limit	MV	13	7009	352	BI	33	29716	Read Only
Heat Limit1 Switch Lockout	LimitLO	MV	13	7010	353	ADI	68	29717	Read Only
Heat Limit2 Switch	Lim2	MV	13	7011	354	BI	34	29718	Read Only
Heat Limit2 Switch Lockout	Lim2LO	MV	13	7012	355	ADI	69	29719	Read Only
Heat Limit3 Switch	Lim3	MV	13	7013	356	BI	35	29720	Read Only
Heat Limit3 Switch Lockout	Lim3LO	MV	13	7014	357	ADI	70	29721	Read Only
VAV Occupied Heating Enabled	HtgOcc-En	MV	13	7015	107	ADI	71	29722	Read/Write
VAV Occupied Heating Setpoint	VAVHtgOcc-SP	AV	13	7016	39	ADF	118	29723	Read/Write
Unoccupied Heating Enabled	HtgUnocc-En	MV	13	7017	108	ADI	72	29724	Read/Write
VAV Unoccupied Heating Setpoint	VAVHtgUnocc-Sp	AV	13	7018	40	ADF	119	29725	Read/Write
VAV Operating Heating Setpoint	VAVOprHtg-Sp	AV	13	7019	250	ADF	120	29726	Read Only
Morning Warmup Enabled	MornW-En	MV	13	7020	109	ADI	73	29822	Read/Write
Morning Warmup/Return Air Temp Setpoint	MornWRAT-Sp	AV	13	7021	41	ADF	121	29823	Read/Write
VAV Box Heat Command	VAV Box	MV	13	7022	358	BO	9	29727	Read Only
CV Occupied Heating Setpoint	CVHtgOcc-SP	AV	13	7023	42	ADF	122	29728	Read/Write
CV Unoccupied Heating Setpoint	CVHtgUnocc-Sp	AV	13	7024	43	ADF	123	29729	Read/Write
CV Operating Heating Setpoint	CVOprHtg-Sp	AV	13	7025	251	ADF	124	29730	Read Only

Table 28: BACnet points list

Long name	Short name	Data type	Object ID	Attribute ID	Modbus address	N2 point type	N2 point address	BACoid	Modify
Main Valve No Proof Fault	N/A	MV	13	7026					Read Only
Gas Valve 2 No Proof Fault	N/A	MV	13	7027					Read Only
Gas Valve 3 No Proof Fault	N/A	MV	13	7028					Read Only
Main Valve On When Shouldn't Fault	N/A	MV	13	7029					Read Only
Gas Valve 2 On When Shouldn't Fault	N/A	MV	13	7030					Read Only
Gas Valve 3 On When Shouldn't Fault	N/A	MV	13	7031					Read Only
Heating Lockout due to High Outdoor Air Temp	N/A	MV	13	7032					Read Only
Excessive Supply Air Heating Fault	N/A	MV	13	7033					Read Only
Morning Cooldown Enabled	MornC-En	MV	13	7034	110	ADI	74	29891	Read/Write
Morning Cooldown/Return Air Temp Setpoint	MornCRAT-Sp	AV	13	7035	44	ADF	125	29892	Read/Write
Optimal Start Enabled	OptStrt-En	MV	13	7036	111	ADI	75	29893	Read/Write
Occupancy BI Enabled	OccBI-En	MV	13	7037	112	ADI	76	29894	Read/Write
Early Start Period	EarlyStrtPeriod	AV	13	7038	45	ADF	126	29895	Read/Write
Number of Gas Valves Installed	#GasVlvs	AV	13	7039					Read/Write
Heating Manual Tuning	HtgManualTune	MV	13	7040					Read/Write
Heating Adaptive Tuning Enable	HtgAdapTunEn	MV	13	7041	114	ADI	78	29881	Read/Write
Number of Limit Switches	#LimSwtchs	AV	13	7042	47	ADF	128		Read Only
DAT Max Heating SP	DATMaxHtgSP	AV	13	7043	75	ADF	161	29905	Read/Write
DAT Satisfied SP	DATSatSP	AV	13	7044	76	ADF	162	29906	Read/Write
Staged Heating Command	StgHtgCmd	AV	13	7045	264	ADF	166	29923	Read Only
Proportional Heating Command	PropHtgCmd	AV	13	7046				29924	Read Only
SZ VAV Occupied Heating Setpoint	SZVAVHtgOcc-Sp	AV	13	7047	272	ADF	172	29929	Read/Write
SZ VAV Unoccupied Heating Setpoint	SZVAVHtgUnocc-Sp	AV	13	7048	273	ADF	173	29930	Read/Write
SZ VAV Operating Heating Setpoint	OprSZVAVHtg-Sp	AV	13	7049	267	ADF	174	29931	Read Only
SZ VAV Heating Load	SZVAVHtgLd	AV	13	7050	436	ADF	187	29936	Read Only
Operational Error Sigma	N/A	AV	13	7051					Read/Write
Low Limit Enable	LL_Enable	MV	13	7052					Read/Write
Low Limit Upper SAT Setpoint	LL_UpSAT_SP	AV	13	7053					Read/Write
Low Limit Lower SAT Setpoint	LL_LowSAT_SP	AV	13	7054					Read/Write
COBP Occupied Heating Enabled	HtgOcc-En	MV	13	7055					Read/Write
Number of Heating Stages Installed	#HtgStgs	AV	14	7000	430	ADI	141	29731	Read/Write
Heat Stage Command 1	H1	MV	15	7000	359	BO	10	29732	Read Only
Heat Stage 1 Status	H1-S	MV	15	7001	360	BI	36	29735	Read Only
Heating Stage 1 Min On Time Remaining	H1OnTmr	AV	15	7003					Read Only
Heating Stage 1 Anti-Short Cycle Delay Time Remaining	H1ASCDTmr	AV	15	7004					Read Only
Heat Stage 1 Accumulated Runtime	H1RunTim	AV	15	7006	48	ADF	129	29738	Read/Write
Heat Stage 1 Number of Times On	N/A	AV	15	7007					Read/Write
Heat Stage Command 2	H2	MV	16	7000	361	BO	11	29733	Read Only
Heat Stage 2 Status	H2-S	MV	16	7001	362	BI	37	29736	Read Only
Heating Stage 2 Min On Time Remaining	H2OnTmr	AV	16	7003					Read Only
Heating Stage 2 Anti-Short Cycle Delay Time Remaining	H2ASCDTmr	AV	16	7004					Read Only

Table 28: BACnet points list

Long name	Short name	Data type	Object ID	Attribute ID	Modbus address	N2 point type	N2 point address	BACoid	Modify
Heat Stage 2 Accumulated Runtime	H2RunTim	AV	16	7006	49	ADF	130	29739	Read/Write
Heat Stage 2 Number of Times On	N/A	AV	16	7007					Read/Write
Heat Stage Command 3	H3	MV	17	7000	363	BO	12	29734	Read Only
Heat Stage 3 Status	H3-S	MV	17	7001	364	BI	38	29737	Read Only
Heating Stage 3 Min On Time Remaining	H3OnTmr	AV	17	7003					Read Only
Heating Stage 3 Anti-Short Cycle Delay Time Remaining	H3ASCDTmr	AV	17	7004					Read Only
Heat Stage 3 Accumulated Runtime	H3RunTim	AV	17	7006	50	ADF	131	29740	Read/Write
Heat Stage 3 Number of Times On	N/A	AV	17	7007					Read/Write
Hydronic Heat Valve % Command	HWV	AV	18	7000	252	AO	2	29741	Read Only
Hydronic Heat Valve Reverse Acting	HydReverse	MV	18	7001	115	ADI	79	29742	Read/Write
Hydronic Heating Stage #1 Supply Air Setpoint	HydH1SA-Sp	AV	18	7002	51	ADF	132	29743	Read/Write
Hydronic Heating Stage #2 Supply Air Setpoint	HydH2SA-Sp	AV	18	7003	52	ADF	133	29744	Read/Write
Hydronic Heat SAT Tempering Enabled	SATTempHydHt-En	MV	18	7004	116	ADI	80	29745	Read/Write
Hydronic Heat SAT Tempering Setpoint	SATTempHydHt-Sp	AV	18	7005	53	ADF	134	29746	Read/Write
Hydronic Heat On due to Freeze Stat	N/A	MV	18	7006					Read Only
Hot Water Freeze Stat Opened When It Should Not	N/A	MV	18	7007					Read Only
Economizer Enabled For Operation	Econ-En	MV	19	7000	118	ADI	84	29747	Read/Write
Economizer Damper % Command	Econ	AV	19	7001	253	AO	3	29748	Read Only
Econ Free Cooling Available	Econ-Free	MV	19	7002	369	ADI	85	29749	Read Only
Economizer Status	Econ-S	MV	19	7003	370	ADI	86	29750	Read Only
Free Cooling Current Mode	FreeClg-Mode	MV	19	7004	371	ADI	87	29751	Read Only
Free Cooling Selection	FreeClg-Sel	MV	19	7005	119	ADI	88	29752	Read/Write
Economizer Outdoor Air Temp Enable Setpoint	EconOAT-SpEn	AV	19	7006	55	ADF	136	29753	Read/Write
Economizer Outdoor Air Enthalpy Setpoint	EconOAEnth-Sp	AV	19	7007	56	ADF	137	29754	Read/Write
Low Ambient Economizer Setpoint	LowAmb-Sp	AV	19	7008	57	ADF	138	29755	Read/Write
Low Ambient Economizer Minimum Position	LowAmb-MinPos	AV	19	7009	58	ADF	139	29756	Read/Write
Economizer Damper Position	EconDampPos	AV	19	7011	254	ADF	141	29824	Read Only
Mixed Air Temperature	MAT	AV	19	7012	255	AI	29	29760	Read Only
Supply Air Humidity	SAH	AV	19	7014	256	AI	30	29762	Read Only
Return Air Enthalpy	RA-Enth	AV	19	7015	257	ADF	142	29763	Read Only
Economizer Minimum Position Setpoint	Econ-MinPos	AV	19	7017	77	ADF	163	29759	Read/Write
Excess Outdoor Air	ExcessOutAirFlt	MV	19	7018	372	ADI	89	29809	Read Only
Not Economizing When Should	NotEconFlt	MV	19	7019	373	ADI	90	29810	Read Only
Damper Not Modulating	EconDampFlt	MV	19	7020	374	ADI	91	29811	Read Only
Economizing When Should Not	EconWhenShouldNotFlt	MV	19	7021	375	ADI	92	29812	Read Only
Mixed Air Temperature Sensor Fault	N/A	MV	19	7022					Read Only
Supply Air Humidity Sensor Fault	N/A	MV	19	7023					Read Only
Economizer Damper Minimum Position Low Speed Fan	LowSpeedFan-MinPos	AV	19	7025	54	ADF	135	29808	Read/Write

Table 28: BACnet points list

Long name	Short name	Data type	Object ID	Attribute ID	Modbus address	N2 point type	N2 point address	BACoid	Modify
Not Economizing - No Supply Air Sensor	N/A	MV	19	7026					Read Only
EconMech Setup	EconMechStp	MV	19	7027	409	ADI	126	29912	Read/Write
Economizer Fault Detection Enable	EconFltDetectEn	MV	19	7028	132	ADI	115	29915	Read/Write
FDD Economizer Alarm Delay	EconAlrmDly	AV	19	7029	431	ADF	182	29916	Read/Write
FDD Economizer Damper Allowed Error	EconPosErr	AV	19	7030	432	ADF	183	29917	Read/Write
FDD Damper Min Position Tolerance	EconMinErr	AV	19	7031	433	ADF	184	29918	Read/Write
Hot Gas Reheat Enabled For Operation	HGR-En	MV	20	7000	123	ADI	96	29789	Read/Write
Hot Gas Reheat Command	HGR	MV	20	7001	379	BO	16	29790	Read Only
Hot Gas Reheat Status	HGR-S	MV	20	7002	380	BI	41	29791	Read Only
Hot Gas Reheat Humidity Setpoint	HGRHum-Sp	AV	20	7003	68	ADF	153	29792	Read/Write
Hot Gas Reheat Alternate Operation Enabled	HGRAlt-En	MV	20	7004	124	ADI	97	29793	Read/Write
Hot Gas Reheat Alternate Operation Writeable	HGRAltWrite	MV	20	7005	410	ADI	127	29794	Read/Write
HGR Unoccupied Humidity Setpoint	HGRUnoccHum-SP	AV	20	7006	78	ADF	164	29903	Read/Write
HGR Enabled for Unoccupied Operation	HGRUnocc-En	MV	20	7007	133	ADI	116	29904	Read/Write
HGR Humidity Setpoint Differential	HGR-Diff	AV	20	7008				29937	Read/Write
Aux Mode	Mode	MV	20	7009					Read/Write
Exhaust Fan Command	ExFan	MV	21	7001	376	BO	15	29775	Read Only
Exhaust Fan VFD % Command	ExFanVFD	AV	21	7002	258	AO	4	29776	Read Only
Exhaust Fan Status	ExF-S	MV	21	7003	377	BI	39	29777	Read Only
Exhaust Fan VFD Fault	ExFanVFDFlt	MV	21	7004	378	BI	40	29778	Read Only
Exhaust Fan Accumulated Runtime	ExF-RunTim	AV	21	7005	259	ADF	146	29779	Read Only
Building Pressure Setpoint	Bldg-Sp	AV	21	7006	63	ADF	147	29780	Read/Write
Building Static Pressure	BldgPres	AV	21	7007	260	AI	33	29781	Read Only
Exhaust Damper % Command	EAD-O	AV	21	7008	261	AO	5	29782	Read Only
Exhaust Damper Position for Exhaust Fan to Turn On	ExDmpPosFanOn	AV	21	7009	64	ADF	149	29783	Read/Write
Exhaust Damper Position for Exhaust Fan to Turn Off	ExDmpPosFanOff	AV	21	7010	65	ADF	150	29784	Read/Write
Economizer Damper Position for Exhaust Fan to Turn On	EconDmpPosFanOn	AV	21	7011	66	ADF	151	29785	Read/Write
Economizer Damper Position for Exhaust Fan to Turn Off	EconDmpPosFanOff	AV	21	7012	67	ADF	152	29786	Read/Write
ERV Enabled	ERV-En	MV	21	7013	121	ADI	94	29787	Read/Write
ERV Unoccupied Fan Enabled	ERVUnoccFan-En	MV	21	7014	122	ADI	95	29788	Read/Write
Building Static Pressure Sensor Fault	N/A	MV	21	7015					Read Only
Comfort Ventilation Status	CVent-S	MV	22	7000				29769	Read Only
Comfort Ventilation for Cooling Enabled	CVentCLG-En	MV	22	7001				29770	Read/Write
Comfort Ventilation for Heating Enabled	CVentHtg-En	MV	22	7002				29771	Read/Write
Comfort Ventilation Upper Setpoint	CVentUp-Sp	AV	22	7003				29772	Read/Write
Comfort Ventilation Lower Setpoint	CVentLow-Sp	AV	22	7004				29773	Read/Write
Demand Ventilation Mode of Operation	DVent-Mode	MV	23	7000	120	ADI	93	29765	Read/Write

Table 28: BACnet points list

Long name	Short name	Data type	Object ID	Attribute ID	Modbus address	N2 point type	N2 point address	BACoid	Modify
Demand Ventilation Maximum Economizer Position	DVentMaxEconPos	AV	23	7001	60	ADF	143	29766	Read/Write
Demand Ventilation Indoor Air Quality Setpoint	DVentIAQ-Sp	AV	23	7002	61	ADF	144	29767	Read/Write
Demand Ventilation Differential Setpoint	DVentDiff-Sp	AV	23	7003	62	ADF	145	29768	Read/Write
No Air Quality Control Bad IAQ sensor Fault	N/A	MV	23	7004					Read Only
Fresh Air Intake Setpoint	MOAFlow-Sp	AV	24	7000	69	ADF	154	29795	Read/Write
Fresh Air Intake Value	Fr Air	AV	24	7001	262	ADF	155	29796	Read Only
Fresh Air Intake Max Sensor Range	MOA-Range	AV	24	7002	70	ADF	156	29797	Read/Write
Fresh Air Intake Sensor Fault	N/A	MV	24	7003					Read Only
Fresh Air Intake Enable	FrAir-En	MV	24	7004	134	ADI	117	29933	Read/Write
Fresh Air Range	Control	AV	24	7005					Read/Write
Occupancy Input Source	OccSrc	MV	25	7000	290	ADI	3	29515	Read Only
Operational Occupancy	OprOcc	MV	25	7001	292	ADI	5	29517	Read Only
Occupancy Mode	OccMode	MV	25	7002	82	ADI	6	29518	Read/Write
Network Temporary Occupancy Request	NetTempOcc	MV	25	7003	83	ADI	7	29519	Read/Write
Network Occupancy Request	NetOcc	MV	25	7004	84	ADI	8	29520	Read/Write
Temporary Occupancy Timeout	TempOccTimeout	AV	25	7005	85	ADI	9	29521	Read/Write
Operational Space Temperature	OprST	AV	25	7006	135	AI	31	29522	Read Only
Space Temperature Source	STSrc	MV	25	7007	293	ADI	10	29523	Read Only
Space Temperature Alarm Setpoint Offset	STAlarmOffset	AV	25	7008	274	ADF	2	29524	Read/Write
Space Temperature Alarm Time Delay	STAlarmDelay	AV	25	7009	86	ADI	11	29525	Read/Write
Space Temperature Input	ST	AV	25	7010					Read Only
Network Override Space Temperature	NetST	AV	25	7011	1	ADF	3	29526	Read/Write
Operational Indoor Air Quality	OprIAQ	AV	25	7012	136	ADF	4	29527	Read Only
Indoor Air Quality Source	IAQSrc	MV	25	7013	294	ADI	12	29528	Read Only
Indoor Air Quality	IAQ	AV	25	7014					Read Only
Indoor Air Quality Sensor Range	IAQRange	AV	25	7015	2	ADF	5	29529	Read/Write
Network Override Indoor Air Quality	NetIAQ	AV	25	7016	3	ADF	6	29530	Read/Write
Operational Space Humidity	OprSH	AV	25	7017	137	AI	32	29531	Read Only
Space Humidity Source	SHSrc	MV	25	7018	295	ADI	13	29532	Read Only
Space Humidity RAH Input	RAH	AV	25	7019	138	AI	1	29828	Read Only
Network Override Zone Humidity	NetSH	AV	25	7020	4	ADF	8	29533	Read/Write
Operating Fan Request	OprFanReq	MV	25	7021	296	ADI	14	29534	Read Only
Fan Request Source	FanReqSrc	MV	25	7022	297	ADI	15	29535	Read Only
Network Override Fan Request	NetFanReq	MV	25	7023	87	ADI	16	29536	Read/Write
Operational Space Temperature Setpoint Offset	OprSSO	AV	25	7024	140	ADF	9	29537	Read Only
Space Temperature Setpoint Offset Source	SSOSrc	MV	25	7025	298	ADI	17	29538	Read Only
Space Temp Setpoint Offset Input	SSO	AV	25	7026	141	ADF	10	29539	Read Only
Network Override Space Setpoint Offset	NetSSO	AV	25	7027	5	ADF	11	29540	Read/Write
Space Temperature Setpoint Offset Range	SSORange	AV	25	7028					Read/Write
Number of Network Sensors Online	#NetSensors	AV	25	7029					Read Only
Occupancy Input	OCC	MV	25	7030	291	BI	9	29516	Read Only
Space Temperature Sensor Fault	N/A	MV	25	7031					Read Only
Space Temperature Setpoint Offset Fault	N/A	MV	25	7032					Read Only
Indoor Air Quality Sensor Fault	N/A	MV	25	7033					Read Only

Table 28: BACnet points list

Long name	Short name	Data type	Object ID	Attribute ID	Modbus address	N2 point type	N2 point address	BACoid	Modify
Space Humidity Sensor Fault	N/A	MV	25	7034					Read Only
Netsensor Battery Fault	N/A	MV	25	7035					Read Only
Netsensor Signal Strength Fault	N/A	MV	25	7036					Read Only
Scheduled Occupancy	N/A	MV	25	7037					Read/Write
Return Air Temperature	RAT	AV	25	7038	139	AI	2	29764	Read Only
Return Air Temperature Sensor Fault	N/A	MV	25	7039					Read Only
Temporary Occupancy Input	TempOCC	MV	25	7040	81	ADI	4	29825	Read/Write
Space Temperature Cooling Alarm	N/A	MV	25	7041					Read Only
Space Temperature Heating Alarm	N/A	MV	25	7042					Read Only
Load Shed Active	LoadShedEnable	MV	25	7043	127	ADI	110	29883	Read/Write
Load Shed Rate Limit	LoadShedRateLim	AV	25	7044	71	ADF	157	29884	Read/Write
Load Shed Adjust	LoadShedAdjust	AV	25	7045	72	ADF	158	29885	Read/Write
Time to Next Occupancy Period	TimeToNextOcc	AV	25	7046	142	ADF	12	29837	Read Only
Operating Mode	OprMode	MV	25	7047	299	ADI	18	29838	Read Only
Cooling Weighting Parameter 1	ClgWeight1	AV	25	7048	143	ADF	13	29839	Read Only
Cooling Weighting Parameter 2	ClgWeight2	AV	25	7049	144	ADF	14	29840	Read Only
Heating Weighting Parameter 1	HtgWeight1	AV	25	7050	145	ADF	15	29841	Read Only
Heating Weighting Parameter 2	HtgWeight2	AV	25	7051	146	ADF	16	29842	Read Only
EWMA Cooling Demand	EWMAClgDmd	AV	25	7052	147	ADF	17	29843	Read Only
EWMA Heating Demand	EWMAHtgDmd	AV	25	7053	148	ADF	18	29844	Read Only
Corrected Return Time	CorrRetTime	AV	25	7054	149	ADF	19	29845	Read Only
Uncorrected Return Time	UncorrRetTime	AV	25	7055	150	ADF	20	29846	Read Only
Warmup Cooldown Start Time	WarmCoolStrtTime	AV	25	7056	151	ADF	21	29847	Read Only
Warmup Cooldown Start Temperature	WarmCoolStrtTemp	AV	25	7057	152	ADF	22	29848	Read Only
RAT Instead of Space-T	N/A	MV	25	7058					Read Only
Off During Unoccupied	OffDurUnocc	MV	25	7059	88	ADI	19	29914	Read/Write
Use Occupancy Schedule	UseOccSched	MV	25	7060	89	ADI	20		Read/Write
Direct Loadshed	DirLoadshd	MV	25	7061	128	ADI	111	29910	Read/Write
Redline	Redline	MV	25	7062	129	ADI	112	29911	Read/Write
PID Tuning Reset	PIDTunRst	MV	25	7063	130	ADI	113	29919	Read/Write
Adaptive Tuning Enable	N/A	MV	25	7064					Read/Write
Pre Occupancy Purge Enable	PreOccPurgeEna	MV	25	7065					Read/Write
Pre Occupancy Purge Time	PreOccPurgeTime	AV	25	7066					Read/Write
Pre Occupancy Purge Upper SAT Setpoint	PreOccUpSAT_SP	AV	25	7067					Read/Write
Pre Occupancy Purge Lower SAT Setpoint	PreOccLowSAT_SP	AV	25	7068					Read/Write
Operational Outdoor Air Temperature	OprOAT	AV	26	7000	153	ADF	23	29541	Read Only
Outdoor Air Temperature Source	OATSrc	MV	26	7001	300	ADI	21	29542	Read Only
Outdoor Air Temperature Input	OAT	AV	26	7002					Read Only
Network Override Outdoor Air Temperature	NetOAT	AV	26	7003	6	ADF	24	29543	Read/Write
Operational Outdoor Air Humidity	OprOAH	AV	26	7004	154	ADF	25	29544	Read Only
Outdoor Air Enthalpy	OA-Enth	AV	26	7005	155	ADF	26	29545	Read Only
Outdoor Air Humidity Source	OAHSrc	MV	26	7006					Read Only
Outdoor Air Humidity Input	OAH	AV	26	7007					Read Only
Network Override Outdoor Air Humidity	NetOAH	AV	26	7008	7	ADF	27	29546	Read/Write
Operational Outdoor Air Quality	OprOAQ	AV	26	7009	156	ADF	28	29547	Read Only
Outdoor Air Quality Source	OAQSrc	MV	26	7010	301	ADI	22	29548	Read Only
Outdoor Air Quality Input	OAQ	AV	26	7011					Read Only
Outdoor Air Quality Sensor Range	OAQRange	AV	26	7012					Read/Write

Table 28: BACnet points list

Long name	Short name	Data type	Object ID	Attribute ID	Modbus address	N2 point type	N2 point address	BACoid	Modify
Network Override Outdoor Air Quality	NetOAQ	AV	26	7013	8	ADF	29	29549	Read/Write
Outdoor Air Temperature Sensor Fault	N/A	MV	26	7014					Read Only
Outdoor Air Humidity Sensor Fault	N/A	MV	26	7015					Read Only
Outdoor Air Quality Sensor Fault	N/A	MV	26	7016					Read Only
Operating Purge Command	OprPurgeCmd	MV	27	7000	381	ADI	98	29798	Read Only
Purge Command Source	PurgeCmdSrc	MV	27	7001	382	ADI	99	29799	Read Only
Local Purge Command Input	Purge	MV	27	7002	383	ADI	100	29800	Read Only
Network Override Purge Command	NetPurge	MV	27	7003	125	ADI	101	29801	Read/Write
Shutdown Input/Smoke Detector	SD	MV	27	7004	384	ADI	102	29802	Read Only
Self Test Command	N/A	MV	28	7000					Read/Write
Self Test Status	N/A	MV	28	7001					Read Only
Current Test	N/A	MV	28	7002					Read/Write
Self Test Time Remaining	N/A	AV	28	7003					Read Only
Fan To Test	N/A	MV	28	7004					Read/Write
C1 To Test	N/A	MV	28	7005					Read/Write
C2 To Test	N/A	MV	28	7006					Read/Write
C3 To Test	N/A	MV	28	7007					Read/Write
C4 To Test	N/A	MV	28	7008					Read/Write
H1 To Test	N/A	MV	28	7009					Read/Write
H2 To Test	N/A	MV	28	7010					Read/Write
H3 To Test	N/A	MV	28	7011					Read/Write
Econ To Test	N/A	MV	28	7012					Read/Write
Exhaust To Test	N/A	MV	28	7013					Read/Write
Reset	N/A	MV	28	7014					Read/Write
Self Test Pause	N/A	MV	28	7015					Read/Write
Econ Prompt	N/A	MV	28	7016					Read/Write
Fan Prompt	N/A	MV	28	7017					Read/Write
Econ Answer	N/A	MV	28	7018					Read/Write
Fan Answer	N/A	MV	28	7019					Read/Write
Abort	N/A	MV	28	7020					Read/Write
State	N/A	MV	28	7021					Read Only
Fan State	FanResult	MV	28	7022					Read Only
C1 State	C1Result	MV	28	7023					Read Only
C2 State	C2Result	MV	28	7024					Read Only
C3 State	C3Result	MV	28	7025					Read Only
C4 State	C4Result	MV	28	7026					Read Only
H1 State	H1Result	MV	28	7027					Read Only
H2 State	H2Result	MV	28	7028					Read Only
H3 State	H3Result	MV	28	7029					Read Only
Econ State	EconResult	MV	28	7030					Read Only
Exhaust State	ExhResult	MV	28	7031					Read Only
Current State Status	N/A	MV	28	7032					Read Only
Global Fault	N/A	MV	28	7033					Read Only
Language	Language	MV	29	7000					Read/Write

Table 28: BACnet points list

Long name	Short name	Data type	Object ID	Attribute ID	Modbus address	N2 point type	N2 point address	BACoid	Modify
Units	Units	MV	29	7001					Read/Write
Relearn System	Relearn	MV	29	7002					Read/Write
BAS Communication	BASCom	MV	29	7003					Read Only
Econ Controller	EconCntlr	MV	29	7004	385	ADI	103	29813	Read Only
4 Stage Controller	4StgCntlr	MV	29	7005	386	ADI	104	29814	Read Only
FDD Master Controller	FDDMCntlr	MV	29	7006	387	ADI	105	29815	Read Only
FDD Slave Controller	FDDSCntlr	MV	29	7007	388	ADI	106	29816	Read Only
Stepped Heat Controller	StpHeatCntlr	MV	29	7008				29817	Read Only
Device Name	DevName	SV	29	7009				29818	Read/Write
Description	Descrip	SV	29	7010					Read/Write
Time	Time	Time	30	7000					Read Only
Date	Date	Date	30	7001					Read Only
Time Zone	TimeZone	MV	30	7007					Read/Write
Daylight Savings Enable	DaylightSav	MV	30	7008					Read/Write
Time Format	TimeFormat	MV	30	7009					Read/Write
Communication Status	Comm-S	MV	31	7000					Read Only
Address	Address	AV	31	7001	275				Read/Write
Device OID	DeviceId	AV	31	7002				29897	Read/Write
Operating Baud Rate	OprBaudRate	MV	31	7003					Read Only
Baud Rate	BaudRate	MV	31	7004					Read/Write
Number of Peer Devices	N/A	AV	31	7005					Read Only
End of Line Switch On	EOL-On	MV	31	7006	390	ADI	108	29827	Read Only
FC Comm Mode	FcBusMode	MV	31	7007					Read Only
BACnet Encoding Type	EncodeType	MV	31	7008				29934	Read/Write
Firmware Main Version	UCBMainVer	SV	32	7000					Read Only
Application Version	UCBAppVer	SV	32	7001					Read Only
Board Communication Status	N/A	MV	32	7002					Read Only
Hardware Version	UCBHardVer	SV	32	7003					Read Only
Calibration Data Fault	N/A	MV	32	7004					Read Only
Firmware Failure	N/A	MV	32	7005					Read Only
Parameter Corruption	N/A	MV	32	7006					Read Only
Firmware Main Version	EconMainVer	SV	33	7000					Read Only
Application Version	EconAppVer	SV	33	7001					Read Only
Board Communication Status	N/A	MV	33	7002					Read Only
Hardware Version	EconHardVer	SV	33	7003					Read Only
Calibration Data Fault	N/A	MV	33	7004					Read Only
Firmware Failure	N/A	MV	33	7005					Read Only
Parameter Corruption	N/A	MV	33	7006					Read Only
Firmware Main Version	4StgMainVer	SV	34	7000					Read Only
Application Version	4StgAppVer	SV	34	7001					Read Only
Board Communication Status	N/A	MV	34	7002					Read Only
Hardware Version	4StgHardVer	SV	34	7003					Read Only
Calibration Data Fault	N/A	MV	34	7004					Read Only
Firmware Failure	N/A	MV	34	7005					Read Only
Parameter Corruption	N/A	MV	34	7006					Read Only

Table 28: BACnet points list

Long name	Short name	Data type	Object ID	Attribute ID	Modbus address	N2 point type	N2 point address	BACoid	Modify
Firmware Main Version	FDDMMainVer	SV	35	7000					Read Only
Application Version	FDDMAppVer	SV	35	7001					Read Only
Board Communication Status	N/A	MV	35	7002					Read Only
Hardware Version	FDDMHardVer	SV	35	7003					Read Only
Calibration Data Fault	N/A	MV	35	7004					Read Only
Firmware Failure	N/A	MV	35	7005					Read Only
Parameter Corruption	N/A	MV	35	7006					Read Only
Firmware Main Version	FDDSMainVer	SV	36	7000					Read Only
Application Version	FDDSAppVer	SV	36	7001					Read Only
Board Communication Status	N/A	MV	36	7002					Read Only
Hardware Version	FDDSHardVer	SV	36	7003					Read Only
Calibration Data Fault	N/A	MV	36	7004					Read Only
Firmware Failure	N/A	MV	36	7005					Read Only
Parameter Corruption	N/A	MV	36	7006					Read Only
Firmware Main Version	N/A	SV	37	7000					Read Only
Application Version	N/A	SV	37	7001					Read Only
Board Communication Status	N/A	MV	37	7002					Read Only
Hardware Version	N/A	SV	37	7003					Read Only
Calibration Data Fault	N/A	MV	37	7004					Read Only
Firmware Failure	N/A	MV	37	7005					Read Only
Parameter Corruption	N/A	MV	37	7006					Read Only
Number of Heat Pump Stages Installed	#HtPumpStgs	AV	38	7000	434	ADF	185	29898	Read/Write
Defrost Enable	N/A	MV	38	7001					Read/Write
Test Defrost Enable	TestDefrostEnable	MV	38	7002					Read/Write
Compressor Delay Enable	CompDelayEnable	MV	38	7003					Read/Write
Defrost Curve Selection	DefrostCurveSel	MV	38	7004	117	ADI	81	29899	Read/Write
Defrost State	DefrostState	MV	38	7005				29899	Read Only
Defrost Terminate Curve 6	N/A	AV	38	7006					Read/Write
Initiate Curve 6	N/A	AV	38	7007					Read/Write
Initiate Curve Intercept 6	N/A	AV	38	7008					Read/Write
Defrost Inhibit Time 6	N/A	AV	38	7009					Read/Write
Max Defrost Cycle Time 6	N/A	AV	38	7010					Read/Write
Reversing Valve	RevVlv	MV	38	7011	366	BO	13	29900	Read Only
Auxiliary Heat	AuxHtg	MV	38	7012	367	BO	14	29901	Read Only
Mode	Mode	MV	38	7013	368	ADI	83	29902	Read Only
Max Defrost Cycle Time 6	N/A	AV	38	7014					Read/Write
Warmer/Cooler Adjust Enable	N/A	MV	39	7000					Read/Write
Heat Cool Mode	N/A	MV	39	7001					Read/Write
Operating State	N/A	MV	39	7002					Read Only
Effective Y4 Call	N/A	MV	39	7003					Read/Write
Effective W3 Call	N/A	MV	39	7004					Read/Write
Emergency Heat Only	N/A	MV	39	7006					Read/Write
Active Mode	N/A	MV	39	7007					Read Only
Control Mode	N/A	MV	39	7008					Read/Write

Table 28: BACnet points list

Long name	Short name	Data type	Object ID	Attribute ID	Modbus address	N2 point type	N2 point address	BACoid	Modify
Standby Cooling Setpoint	N/A	AV	39	7011					Read/Write
Standby Heating Setpoint	N/A	AV	39	7012					Read/Write
CCS Temp Occ Status	N/A	MV	39	7013					Read/Write
Fan Speed High	N/A	AV	39	7014					Read/Write
Fan Speed Low	N/A	AV	39	7015					Read/Write
Power Fail Restart Enable	N/A	MV	39	7016					Read/Write
VFD Econ Min Pos Reset	N/A	MV	39	7017					Read/Write
Plug and Play Occupancy Request	N/A	MV	39	7018					Read Only
CCS Fan Request	N/A	MV	39	7019					Read/Write
COBP Supply Air Temperature Setpoint	N/A	AV	39	7020					Read/Write

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Note: Items with an '' have presence indicators and may not show on the UI.