CoolPhase Ceiling

System Design Catalog

Cooling System - 1, 2, 3, 4, 5, and 8 Ton (12, 24, 36, 48, 60, and 96 kW) Capacity, Ceiling Mounted, 60 Hz

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1 Nomenclature and Components

This section describes the model number for Vertiv™ CoolPhase Ceiling units and components.

1.1 Vertiv™ CoolPhase Ceiling Model Nomenclature and Digit Description

The tables below describe each digit of the 25-digit configuration number. The 14-digit model/number consists of the first 10 digits and last 4 digits of the configuration number. Table 2.2 below describes each digit of the model number.

Table 1.1 Model number nomenclature

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
M	M	I	1	2	E	0	0	R	0	0	N	0	A	0	N	0	0

Table 1.2 Digit and description nomenclature

Digit	Description	
Digits 1 and 2	Unit Family	MM = Vertiv™ CoolPhase Ceiling
Digits 3	Inverter	I
Digits 4 and 5	Nominal Cooling Capacity (Sizes)	12 - 1 Ton (12 kBtuh) 24 - 2 Tons (24 kBtuh) 36 - 3 Tons (36 kBtuh) 48 - 4 Ton (48 kBtuh) 60 - 5 Ton (60 kBtuh) 96 - 8 Ton (96 kBtuh)
Digit 6	Unit type	E - Air Cooled K - Air Cooled w/Free Cooling
Digit 7	Free	
Digit 8	Supply Power	0 = 208/230 V, 1-Ph, 50/60 Hz 1 = 208/230 V, 3-Ph, 60 Hz 4 = 460 V, 3-Ph, 60 Hz [MA1]
Digit 9	Humidifier	R = Remote Contact J = Steam Humidifier
Digit 10	Reheat	0 = No reheat S = Modulating Reheat
Digit 11	Disconnect (High-voltage options)	0 = Non-locking 1 = Locking, 5k SCCR 2 = Locking, 65k SCCR
Digit 12	Sensors	N = Base Package (with Filter Clog, High Temp Sensor, and Unity Card)

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Table 1.2 Digit and description nomenclature (continued)

Digit	Description	
		2 = Base Package and Smoke Sensor
Digit 13	Free	
Digit 14	Version	A - Standard S - ETO
Digits 15 to 18	Factory Configuration Number	0000 = Standard 4 digits other than 0= Engineering To Order designated number

1.2 Vertiv™ CoolPhase Condensing Unit Model Number Nomenclature

Table 1.3 Model number nomenclature

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
C	U	D	0	3	0	-	E	0	0	0	A	0	0	0

Table 1.4 Digit and description nomenclature

Digit	Description	
Digits 1 and 2	Unit Family	CU = Vertiv™ CoolPhase Condensing Unit
Digits 3	Version	D = Outdoor Air-Cooled Standard Ambient L = Outdoor Air-Cooled Low Ambient
Digits 4 and 5	Sizes	03 = 3.5 kW 07 = 7 kW 11 = 11 kW 15 = 15 kW 21 = 21 kW 28 = 28 kW
Digit 6	Voltage	0 = 208/230 V, 1-Ph, 50/60 Hz 1 = 208/230 V, 3-Ph, 60 Hz 4 = 460 V, 3-Ph, 60 Hz
Digit 7	Protection	0- No coating E - E-coating (Aggressive environments)
Digit 8	Power Supply feature	0 = Single Power supply configuration
Digit 9	Free	

Table 1.4 Digit and description nomenclature (continued)

Digit	Description	
Digit 10	Free	
Digit 11	Revision	A - Revision A
Digits 12 to 15	Factory Configuration Number	0000 = Standard 4 digits other than 0= Engineering To Order designated number

1.3 Component Location

1.3.1 Vertiv™ CoolPhase Ceiling Unit Components

Unit component locations are described in the submittal documents included in the Submittal Drawings. The following table lists the relevant documents by number and title.

Table 1.5 CoolPhase Ceiling Component Location Drawings

Document Number	Title
20000077	Component Location, Evaporator Unit, 1 Ton
20000078	Component Location, Evaporator Unit, 2 & 3 Ton
20000079	Component Location, Evaporator Unit, 4 & 5 Ton
20000080	Component Location, Evaporator Unit, 8 Ton

1.3.2 Components of the Vertiv™CoolPhase Condensing Unit

The unit component locations are described in the submittal documents included in Appendix C. The following table lists the relevant documents by number and title.

Table 1.6 CoolPhase Ceiling Component Location Drawings

Document Number	Title
20000915	CoolPhase Condensing Unit Component Location 3.5, 7 & 11 kW
20000710	CoolPhase Condensing Unit Component Location 15 kW
20000128	CoolPhase Condensing Unit Component Location 21 & 28 kW

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1.4 Product Overview

1.4.1 Vertiv™ CoolPhase Ceiling Cooling Configurations and Overview

The Vertiv™ CoolPhase Ceiling is a ceiling mounted, fully featured cooling system for Small IT rooms that occupy zero floor space. Other of its features are:

It comes in 6 different capacities, 1, 2, 3, 4, 5 and 8 ton. The CoolPhase Ceiling offers multiple heat rejection and power supply options.

- It comes in 6 different capacities: 1, 2, 3, 4, 5, and 8 Tons.
- Also, it offers multiple heat-rejection and power-supply options.
- Standard features include:
    - EC fan, inverter compressor,
    - Microchannel HEX to minimize refrigerant charge
    - Wall-mounted display
    - Remote monitoring via SNMP, HTTP, and Modbus.
    - More than 10,000 possible configurations
    - Digital scroll compressors
    - Humidity control
    - Three reheat types
    - Free-cooling option to save operating costs
    - Remote monitoring.

1.4.2 Vertiv™ CoolPhase Condensing Unit Cooling Configurations and Overview

The Vertiv™ CoolPhase Condensing Unit is an air-cooled condenser with a compressor that rejects the heat removed from the IT space into ambient air and uses low-GWP R-32 refrigerant. This unit is always used with an evaporator unit and is controlled and operated from it.

CoolPhase Condensing Units are classified by kilowatts. Some of these units are compatible for plenum installation: 3.5, 7, and 11 kW. The non-plenum-compatible units are the larger-capacity units: 15, 21, and 28 kW.

NOTE: Overcurrent and overvoltage protection shall be provided in accordance with applicable local and national electrical codes.

1.4.3 Standard and Optional Features

The Vertiv™ CoolPhase Ceiling Evaporator unit and Vertiv™ CoolPhase Ceiling Condensing unit standard and optional features are described in the submittal documents included in the.

The following table lists the relevant documents by number and title.

Table 1.7 Standard and optional features submittals

Document Number	Title
Vertiv™ CoolPhase Ceiling Evaporator unit	
20000200	Standard and Optional Features Evaporator Unit, 1-8 Ton
Vertiv™ CoolPhase Ceiling Condensing Unit	
20000162	Standard and Optional Features Condenser Unit 3.5, 7, 11 kW
20000574	Standard and Optional Features Condenser Unit 15, 21 & 28 kW

1.4.4 System Controls

The Vertiv™ CoolPhase Ceilingand the Vertiv™ CoolPhase Condensing unit are controlled by the Vertiv™iCOM™ Control System.

The LCD is field-wired to the iCOM™ Controller. The length of the factory-provided display cable is 50 ft (15 m).

For detailed information about two units networked and the general arrangement, dimensional data & field connections of the wall-mounted display, refer to the following submittal drawings.

Table 1.8 Controls submittal drawings

Document Number	Title
20000914	HMI Display Field Connection
20000913	Vertiv™ iCOM™ Unit-to-Unit Network Connection

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2 System Data

2.1 Air Cooled System Performance and Physical Data

Table 2.1 Vertiv™ CoolPhase Ceiling technical specifications

Models		1 Ton MMI12	2 Ton MMI24	3 Ton MMI36	4 Ton MMI48	5 Ton MMI60	8 Ton MMI96
Region		NAM					
Certification marks		cCSAus					
Piping Connections		Flare Connection					
Condenser Fan		EC Motor					
External Static Pressure		0.20 inH2O (50 Pa)					
Sensible Cooling Capacity (kW) @26.7 °C (80 °F) RAT, 38% Rh, 35 °C (95 °F) outdoor temp		1 (3.5)	2 (7)	3 (11)	4 (15)	6 (21)	8 (28)
Power Supply Evaporator		208/230 V, 1-Ph, 50/60 Hz		208/230 V, 1-Ph, 50/60 Hz 208/230 V, 3-Ph, 60 Hz 460 V, 3-Ph, 60 Hz	208/230 V, 3-Ph, 60 Hz 460 V, 3-Ph, 60 Hz		
Controls		Vertiv™ iCOM™					
Refrigerant (Field supplied/field charged. Not factory charged)		R-32					
Max Equivalent Length of Pipe between Indoor Unit and Condensing Unit		196.85 ft (60 m)			295.27 ft (90 m)		
Height between Indoor and Condensing Unit	Condensing unit placed higher than indoor unit	98.43 ft (30 m)			60 ft (18.3 m)	98.43 ft (30 m)	
	Condensing unit placed lower than indoor unit	-26.25 ft (-8 m)			-15 ft (4.6 m)	-26.25 ft (-8 m)	

1. Certified in accordance with the AHRI Datacom Cooling Certification Program at AHRI Standard 1360 (I-P) Standard Rating Conditions. Certified units may be found in the AHRI Directory at www.ahridirectory.org.
2. Some options or combinations of options may result in reduced air flow. Consult factory for recommendations.
3. Data rated at 100% fan speed and with Standard Feature filter.
4. Net capacity data has fan motor heat factored in for all ratings.
5. Performance data generated in GRS (Global Rating System).

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Table 2.2 Vertiv™ CoolPhase Condensing Unit technical specifications for small units (3.5, 7 and 11 kW)

Models		CUD030 CUL030	CUD070 CUL070	CUD111 CUL111	CUD114 CUL114
Region		Global		NAM	
Certification marks		cETLus, CE & UKCA		cETLus	
Piping Connections		Flare Connection			
Operating Temperature range		Low ambient Condensing Unit: -31 °F (-35 °C) ~118 °F (48 °C) Standard Ambient Condensing Unit with Wind Baffle Accessory: -4 °F (-20 °C) ~118 °F (48 °C) Standard Ambient Condensing Unit without Wind Baffle Accessory: 23 °F (-5 °C) ~118 °F (48 °C)			
Compressor		Variable speed rotary compressor			
Condenser Fan		EC Motor			
External Static Pressure		0.20 inH2O (50 Pa)	0.12 inH2O (30 Pa)		
Noise Data		68 dB		71 dB	
Noise Data of night mode		58 dB		56 dB	
Power Supply		208/230 V, 1-Ph, 50/60 Hz (-10%/+10%)		208/230 V, 3-Ph, 50/60 Hz (-10%/+10%)	460 V, 3-Ph, 60 Hz (±10%)
Refrigerant		R-32			
Max Equivalent Length of Pipe between Indoor Unit and Condensing Unit		196.85 ft (60 m)			
Height between Indoor and Condensing Unit	Condensing unit placed higher than indoor unit	98.4 ft (30 m)			
	Condensing unit placed lower than indoor unit	26.3 ft (8 m)			

NOTE: When the ambient temperature is below -4 °F (-20 °C) up to -31 °F (-35 °C), the low-ambient version must be used. Low Ambient versions of the units do not require a Wind Baffle accessory.

NOTE: The Low Ambient version of the Condensing Unit cannot be installed in plenum areas; only the standard version is plenum rated.

Table 2.3 CoolPhase Condensing Unit technical specifications for 15 kW units

Models	CUD151 / CUL151	CUD154 / CUL154
Certification marks	cCSAus (UL 60335-2-40 and CSA C22.2 No. 60335-2-40)	
Piping Connections	Flare Connection	
Operating Temperature range	Low ambient condensing unit: -31 °F (-35 °C) ~118 °F (48 °C) Standard ambient condensing Unit with wind baffle: -4 °F (-20 °C) ~118 °F (48 °C) Standard ambient condensing unit without wind baffle 23 °F (-5 °C) ~118 °F (48 °C)	

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Table 2.3 CoolPhase Condensing Unit technical specifications for 15 kW units (continued)

Models		CUD151 / CUL151	CUD154 / CUL154
Compressor		Variable speed Inverter-driven	
Condenser Fan		EC Motor	
Noise Data		72 dB	
Noise Data of night mode		64 dB	
Power Supply		208/230 V, 3-Ph, 50/60 Hz (±10%)	460 V, 3-Ph, 50/60 Hz (±10%)
Refrigerant		R-32	
Max Equivalent Length of Pipe between Indoor Unit and Condensing Unit		295.27 ft (90 m)	
Height between Indoor and Condensing Unit	Condensing unit placed higher than indoor unit	98.4 ft (30 m)	
	Condensing unit placed lower than indoor unit	26.3 ft (8 m)	

NOTE: When the ambient temperature is below -4 °F (-20 °C) up to -31 °F (-35 °C), the low-ambient version must be used. Low Ambient versions of the units do not require a Wind Baffle accessory.

NOTE: All CUD15 and CUL15 Condensing Unit models on the table above are not plenum-rated.

Table 2.4 CoolPhase Condensing Unit Technical Specifications for 21-28 kW Units

Models		CUD211 CUL211	CUD281 CUL281	CUD214 CUL214	CUD284 CUL284
Certification marks		cCSAus (UL 60335-2-40 and CSA C22.2 No. 60335-2-40)			
Piping Connections		Sweat Connection			
Operating Temperature range		Standard Ambient Condensing Unit: -4 °F (-20°C) ~118 °F (48°C) Low Ambient Condensing Unit: -31 °F (-35°C) ~118 °F (48°C)			
Compressor		Variable speed Inverter-driven			
Condenser Fan		EC Motor			
Noise Data		88 dB			
Noise Data of night mode		79 dB			
Power Supply		208/230 V, 3-Ph, 50-60 Hz (±10%)		460 V, 3-Ph, 50/60 Hz (±10%)	
Refrigerant		R-32			
Max Equivalent Length of Pipe between Indoor Unit and Condensing Unit		295.27 ft (90 m)			
Height between Indoor and Condensing Unit	Condensing unit placed lower than indoor unit	98.43 ft (30 m)			
	Condensing unit placed higher than indoor unit	26.2 ft (8 m)			

NOTE: All CUD21, CUL21, CUD28, and CUL28 Condensing Unit models on the table above are not plenum-rated.

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Table 2.5 Air Cooled Data, 60 Hz

Evaporator Model		MMI12	MMI24	MMI36	MMI48	MMI60	MMI96
Condensing Unit Type		Outdoor	Outdoor	Outdoor	Outdoor	Outdoor	Outdoor
DX Evaporator- Net Capacity Data - kW (kBTU/h) @ High-Speed CFM							
80 °F DB, 62.8 °F WB (26.7 °C DB, 17.1 °C WB) 38% Rh	Total	3.4 (11.6)	6.7 (22.8)	9.2 (31.3)	14.7 (51.0)	19.1 (65.2)	26.7 (91.1)
	Sensible	3.4 (11.6)	6.7 (22.8)	9.2 (31.3)	14.7 (51.0)	19.0 (64.8)	24.2 (82.6)
75 °F DB, 61 °F WB (23.9 °C DB, 16.1 °C WB) 45% Rh	Total	3.1 (11.6)	6.2 (21.1)	8.6 (29.3)	13.5 (46.1)	18.2 (62.1)	25.5 (87.0)
	Sensible	3.1 (11.6)	6.2 (21.1)	8.5 (29.1)	13.5 (46.1)	17.1 (58.4)	20.5 (70.0)
72 °F DB, 60 °F WB (22.2 °C DB, 15.5 °C WB) 50% Rh	Total	3.0 (10.1)	5.9 (20.0)	8.3 (28.4)	12.9 (44.0)	17.8 (59.7)	24.9 (85.0)
	Sensible	2.9 (10.0)	5.5 (18.8)	7.9 (26.8)	12.8 (43.7)	15.7 (53.6)	18.7 (63.8)
Fan Data - Evaporator							
CFM (CMH)		816 (1,386)	1,451 (2,465)	1,533 (2,605)	2,710 (4,607)	2,746 (4,665)	3,759 (6,387)
Fan Motor, HP (W)		0.16 (0.12)	0.37 (0.28)	0.56 (0.42)	0.95 (0.71)	1.10 (0.82)	1.60 (1.19)
External Static Pressure, in (mm) water gauge		0.2 (5.1)					
Evaporator Coil - Copper Tube/Aluminum Fin							
Face Area, ft2 (m2)		2.5 (0.23)	3.0 (0.28)	3.0 (0.28)	5.56 (0.52)	5.56 (0.52)	7.64 (.71)
Coil Rows		3	5	5	6	6	6
Max Face Velocity, fpm (m/s)		500 (2.54)					
Unit Refrigerant Charge, lb (kg)		0.5 (0.2)	1.0 (0.5)	1.8 (0.8)	2.8 (1.3)	3.3 (1.5)	3.7 (1.7)
Unit Operating Weight DX, lb (kg)		269 (122.2)	295 (134.0)	299 (136.0)	416 (187.5)	484 (219.5)	673 (305.4)
Unit Operating Weight DX+FC, lb (kg)		292 (132.6)	325 (147.6)	329 (149.6)	484 (219.5)	504 (228.5)	752 (341.4)
Electric Reheat Capacity, kW (kBTU/h)		SSR (Solid State Relay)					
Input Voltage 230-1-60		4.5 (15.35)	4.7 (16.04)	4.0 (13.65)	—	—	—
Input Voltage 230-3-60		—	—	7.0 (23.89)	10.0 (34.12)	15.0 (51.18)	10.0 (34.12)
Input Voltage 460-3-60		—	—	4.0 (13.65)	10.0 (34.12)	10.0 (34.12)	10.0 (34.12)
Humidifier Data - Steam Generator Type							
Steam capacity, lb/h (kg/h)		5 (2.27)			12 (5.44)		
Electrical Input Power 230-1-60, kW		10.6	14.4	17.4	N/A	N/A	N/A
Electrical Input Power 230-3-60, kW		N/A	N/A	18.1	20.7	20.7	24.8
Electrical Input Power 460-3-60, kW		N/A	N/A	8.4	10.8	10.8	14.4
Evaporator Connection Sizes							
Liquid line Diameter, in O.D. Cu		3/8	3/8	3/8	5/8	5/8	5/8
Suction Line Diameter, in O.D. Cu		1/2	1/2	1/2	7/8	7/8	7/8

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Table 2.5 Air Cooled Data, 60 Hz (continued)

Evaporator Model		MMI12	MMI24	MMI36	MMI48	MMI60	MMI96
Humidifier Supply		¼ in OD Copper Compression Fitting					
Evaporator/Condensate Drain		¾ in NPT-Female					
MERV 8 Filter							
External Filter Box, Nom. Size WxHxD, in (mm)		Qty. 1 20x16x4 (508x406x102)		Qty. 2 20x20x4 (508x508x102)		Qty. 2 25x20x4 (635x508x102)	
Air Distribution Plenum, Nom. Size WxHxD, in (mm)		Qty. 1 16x25x4 (406x635x102)			N/A		
Return Grille, Nom. Size WxHxD, in (mm)		Qty. 1 20x20x1 (508x508x25)			N/A		
Condensing Unit Model Number		CUD/L03	CUD/L07	CUD/L11	CUD/L15	CUD/L21	CUD/L28
Condensing Unit Rating Conditions		95 °F (35 °C) Ambient					
Coil Face Area ft2 (m2)		3.3 (0.31)	4.82 (0.45)	7.06 (0.66)	10.11 (0.94)	24.37 (2.3)	24.37 (2.3)
Type of Coil		Microchannel					
CFM (CMH)		2,222 (3,778)	2,714 (4,612)	3,892 (6,613)	5,113 (8,688)	8,839 (15,023)	8,447 (14,352)
Motor Hp (KW)		0.36 (0.27)	0.40 (0.3)	0.55 (0.41)	0.36 (0.27)	0.75 (0.57)	1.25 (0.93)
External Static Pressure, in (mm) water gauge		N/A					
STD Unit Refrigerant Charge, lb (kg)		1.3 (0.6)	1.5 (0.7)	1.8 (0.8)	2.9 (1.3)	3.0 (1.4)	5.0 (2.3)
LAK Unit Refrigerant Charge, lb (kg)		2.4 (1.1)	2.9 (1.3)	5.3 (2.4)	5.7 (2.6)	10.1 (4.6)	17.2 (7.8)
STD Unit Operating Weight, lb (kg)		110 (50)	118 (53.5)	175 (79.5)	268 (121.37)	425 (193)	425 (193)
LAK Unit Operating Weight, lb (kg)		117 (53)	130 (59)	184 (83.5)	277 (125.32)	458 (208)	458 (208)
Condensing Unit Connection Sizes							
Liquid line Diameter, in O.D. Cu		1/4	3/8	3/8	1/2	5/8	5/8
Suction Line Diameter, in O.D. Cu		1/2	1/2	5/8	3/4	7/8	7/8
Free Cooling Coil Option Net Capacity Data - kW (kBTU/h) using 45 °F (7.2 °C) EWT							
80 °F DB, 62.8 °F WB (26.7 °C DB, 17.1 °C WB) 38% Rh	Total	4.4 (15.01)	8.0 (27.30)	9.8 (33.44)	16.5 (56.30)	17.0 (58.01)	23.9 (81.54)
	Sensible	4.4 (15.01)	8.0 (27.30)	9.6 (32.76)	16.5 (56.30)	17.0 (58.01)	23.9 (81.54)
75 °F DB, 61 °F WB (23.9 °C DB, 16.1 °C WB) 45% Rh	Total	3.7 (12.63)	6.8 (23.20)	8.4 (28.66)	14.1 (48.11)	14.5 (49.48)	20.2 (68.93)
	Sensible	3.7 (12.63)	6.8 (23.20)	8.1 (27.64)	14.1 (48.11)	14.5 (49.48)	20.2 (68.93)
72 °F DB, 60 °F WB (22.2 °C DB, 15.5 °C WB) 50% Rh	Total	3.3 (11.26)	6.1 (20.41)	7.6 (25.93)	12.6 (42.99)	13.3 (45.38)	18.3 (62.45)
	Sensible	3.3 (11.26)	6.1 (20.41)	7.2 (24.57)	12.6 (42.99)	12.8 (43.68)	17.7 (60.19)
Flow Rate, GPM (l/m)		2.41 (9.12)	4.6 (17.41)	9.67 (36.61)	11.4 (43.15)	13.9 (52.62)	25.4 (96.86)
Pressure Drop, ft. water (kPa)		13.2 (39.5)	14.2 (42.24)	14.2 (42.24)	15 (44.83)	32.8 (98.13)	45.3 (135.4)

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Table 2.5 Air Cooled Data, 60 Hz (continued)

Evaporator Model	MMI12	MMI24	MMI36	MMI48	MMI60	MMI96
Free Cooling Coil - Copper Tube/Aluminum Fin						
Face Area, ft2 (m2)	2.5 (0.23)	3 (0.28)	3 (0.28)	5.56 (0.52)	5.56 (0.52)	7.64 (0.71)
Coil Rows	3	3	3	4	4	4
Max Face Velocity, fpm (m/s)	500 (2.54)					
Internal Fluid Volume, gal (l)	0.50 (1.9)	0.50 (1.9)	2.13 (8.0)	2.13 (8.0)	2.13 (8.0)	3.1 (11.7)
Free-cooling Coil supply/return connections, in. O.D. Cu	5/8	5/8	5/8	1-1/8	1-1/8	1-3/8

2.1.1 Operating Limits for Air Cooled Systems

The Vertiv™ CoolPhase Ceiling operates within the working ranges as shown in the table below . These limits refer to new units and those that have been correctly installed and serviced.

Table 2.6 Operating limits—Air Cooled Systems

Parameter		Design Condition	
		Minimum	Maximum
Unit Entering Air Conditions	Temperature	64.4 °F (18 °C)	113 °F (45 °C)
	Relative Humidity	17%	60%
Storage Conditions	Temperature	-4 °F (-20 °C)	118 °F (48 °C)
		NOTE: Unit remains operational up to 125.6 °F (52 °C) with reduced capacity.	
Power Supply Tolerances		Voltage ± 10%, Frequency ±2 Hz	

For working ranges of the Condensing units, refer to tables below.

Table 2.7 Operating limits—Condensing Units from 3 kW to 15 kW

Models	CUD030 CUL030	CUD070 CUL070	CUD111 CUL111	CUD114 CUL114	CUD151 CUL151	CUD154 CUL154
Operating Temperature range	Low ambient Condensing Unit: -31 °F (-35 °C) ~118 °F (48 °C) Standard Ambient Condensing Unit with Wind Baffle Accessory: -4 °F (-20 °C) ~118 °F (48 °C) Standard Ambient Condensing Unit without Wind Baffle Accessory: 23 °F (-5 °C) ~118 °F (48 °C)					

NOTE: When the ambient temperature is between -4 °F (-20 °C) and -31 °F (-35 °C), the Low Ambient version must be used. Low Ambient versions of units do not require a Wind Baffle accessory.

NOTE: The Low Ambient version of the Condensing Unit cannot be installed in plenum areas; only the standard version is plenum rated.

NOTE: All CUD15 and CUL15 Condensing Unit models on the table above are not plenum-rated.

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Table 2.8 Operating limits—Condensing Units of 21 kW and 28 kW

Models	CUD211 CUL211	CUD281 CUL281	CUD214 CUL214	CUD284 CUL284
Operating Temperature range	Standard Ambient Condensing Unit: -4 °F (-20 °C) ~ 118 °F (48 °C) Low Ambient Condensing Unit: -31 °F (-35 °C) ~ 118 °F (48 °C)			

NOTE: All CUD21, CUL21, CUD28, and CUL28 Condensing Unit models on the table above are not plenum-rated.

Table 2.9 Storage Environment

Item	Requirements
Storage environment	Store the unit in its original factory packaging in a clean indoor environment with good ventilation and no dust.
Ambient temperature	-40 °C ~+70 °C (-40 °F ~ +158 °F)
Ambient humidity	Less than 95% Rh @30 °C (86 °F)

2.1.2 Sound Data for Air Cooled Systems

Tables in this section show the sound pressure level in free field at 5 ft (1.5 m) high and 6-1/2 ft (2 m) in front of the air conditioner, with compressor and fan in operation. The sound data is without the Low Sound Package compressor jacket and sound deadening panel insulation installed.

Sound power is an absolute measurement that can be used for comparisons when all sound measurement parameters match exactly.

NOTE: Sound levels are provided for the corresponding airflow values shown in each table, based on factory fan speed settings.

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Table 2.10 Sound Data – MMI12 (1 Ton models)

Model Type			MMI12		
Sound Power Level (PWL, dB(A))	Airflow	SCFM	816	579	426
		m3/h	1386	984	724
	External Static Pressure, in w.g.		0.2	0.2	0.2
	Filter		MERV 8	MERV 8	MERV 8
	Free Cooling Coil		NO	NO	NO
	Octave Band Frequency (Hz)	63	38	35	39
		125	52	52	41
		250	51	51	42
		500	55	54	45
		1000	55	53	44
		2000	54	52	44
		4000	53	52	42
		8000	47	47	30
	A-Scale Weighted, dB(A)		63	55	52
	At Discharge Side, 2 m Distance, 1.5 m Above Ground, Free Field Conditions (2 m, f.f, dBA)		52	45	40

Table 2.11 Sound Data – MMI24 (2 Ton models)

Model Type			MMI24		
Sound Power Level (PWL, dB(A))	Airflow	SCFM	1451	952	725
		m3/h	2465	1617	1232
	External Static Pressure, in w.g.		0.2	0.2	0.2
	Filter		MERV 8	MERV 8	MERV 8
	Free Cooling Coil		NO	NO	NO
	Octave Band Frequency (Hz)	63	34	29	34
		125	50	52	49
		250	52	47	45
		500	61	56	53
		1000	59	53	52
		2000	56	51	47
		4000	53	46	42
		8000	49	41	34
	A-Scale Weighted, dB(A)		63	61	56
	At Discharge Side, 2 m Distance, 1.5 m Above Ground, Free Field Conditions (2 m, f.f, dBA)		52	50	46

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Table 2.12 Sound Data – MMI36 (3 Ton models)

Model Type			MMI36		
Sound Power Level (PWL, dB(A))	Airflow	SCFM	1533	1296	1130
		m3/h	2605	2202	1920
	External Static Pressure, in w.g.		0.2	0.2	0.2
	Filter		MERV 8	MERV 8	MERV 8
	Free Cooling Coil		NO	NO	NO
	Octave Band Frequency (Hz)	63	32	32	36
		125	51	49	45
		250	50	48	47
		500	56	54	51
		1000	55	53	51
		2000	53	50	48
		4000	49	46	44
		8000	45	41	36
	A-Scale Weighted, dB(A)		61	58	56
	At Discharge Side, 2 m Distance, 1.5 m Above Ground, Free Field Conditions (2 m, f.f, dBA)		50	47	45

Table 2.13 Sound Data – MMI48 (4 Ton models)

Model Type			MMI48		
Sound Power Level (PWL, dB(A))	Airflow	SCFM	2710	2097	1735
		m3/h	4604	3563	2948
	External Static Pressure, in w.g.		0.2	0.2	0.2
	Filter		MERV 8	MERV 8	MERV 8
	Free Cooling Coil		NO	NO	NO
	Octave Band Frequency (Hz)	63	49	44	39
		125	56	55	50
		250	63	58	52
		500	68	60	56
		1000	65	59	54
		2000	63	57	53
		4000	60	55	52
		8000	60	52	46
	A-Scale Weighted, dB(A)		73	66	61
	At Discharge Side, 2 m Distance, 1.5 m Above Ground, Free Field Conditions (2 m, f.f, dBA)		61	55	50

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Table 2.14 Sound Data – MMI60 (5 Ton models)

Model Type			MM60		
Sound Power Level (PWL, dB(A))	Airflow	SCFM	2746	2279	1888
		m3/h	4665	3872	3208
	External Static Pressure, in w.g.		0.2	0.2	0.2
	Filter		MERV 8	MERV 8	MERV 8
	Free Cooling Coil		NO	NO	NO
	Octave Band Frequency (Hz)	63	48	45	42
		125	59	57	52
		250	64	59	53
		500	68	62	57
		1000	64	59	55
		2000	62	58	54
		4000	60	56	54
		8000	61	55	49
	A-Scale Weighted, dB(A)		72	67	62
	At Discharge Side, 2 m Distance, 1.5 m Above Ground, Free Field Conditions (2 m, f.f, dBA)		60	56	51

Table 2.15 Sound Data – MMI96 (8 Ton models)

Model Type			MMI96		
Sound Power Level (PWL, dB(A))	Airflow	SCFM	3759	3061	2601
		m3/h	6387	5201	4419
	External Static Pressure, in w.g.		0.2	0.2	0.2
	Filter		MERV 8	MERV 8	MERV 8
	Free Cooling Coil		NO	NO	NO
	Octave Band Frequency (Hz)	63	52	48	45
		125	62	60	58
		250	68	63	60
		500	71	65	61
		1000	68	63	60
		2000	69	64	61
		4000	66	62	60
		8000	67	60	52
	A-Scale Weighted, dB(A)		77	72	69
	At Discharge Side, 2 m Distance, 1.5 m Above Ground, Free Field Conditions (2 m, f.f, dBA)		67	63	59

Table 2.16 Sound Data – CoolPhase Condensing Unit CU*03 (3.5 kW), Unit CU*07 (7 kW), and CU*11 (11 kW) models

Models		CUD030 / CUL030	CUD070 CUL070	CUD111 CUL111	CUD114 CUL114
Noise Data	1 m Distance, Free Field Conditions (f.f. dBA)	68 dB		71 dB	
Noise Data of night mode		58 dB		56 dB	

Table 2.17 CoolPhase Condensing Unit CU*15 (15 kW) models

Models		CUD151 / CUL151	CUD154 / CUL154
Noise Data	1 m Distance, Free Field Conditions (f.f. dBA)	72	
Noise Data of night mode		60	

Table 2.18 CoolPhase Condensing Unit CU*21 (21 kW) and CU*28 (28 kW) models

Models		CUD211 CUL211	CUD281 CUL281	CUD214 CUL214	CUD284 CUL284
Noise Data	1 m Distance, Free Field Conditions (f.f. dBA)	88 dB			
Noise Data of night mode		79 dB			

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2.2 Operating Conditions

The Vertiv™ CoolPhase Ceiling must be operated in a conditioned space within the ASHRAE recommended operating envelope for data centers. Operating the CoolPhase Ceiling outside of this envelope can decrease equipment reliability. Refer to ASHRAE's publication, "Thermal Guidelines for Data Processing Environments."

2.2.1 Cooling, Humidification, and Dehumidification

For operation in the Cooling, Humidification, or Dehumidification modes, the CoolPhase Ceiling unit's return air requirements for proper unit operation are:

- Maximum dew point of 59° F (15° C)
- Minimum 65° F (20° C) DB
- Maximum 85° F (29.4° C) DB

2.2.2 Heating

For operation in the Heating mode, the CoolPhase Ceiling unit's return air requirements for proper unit operation are:

- Maximum humidity: less than 80% RH and less than 64° F (17.8° C) dew point.
- Maximum dry bulb of 80° F (27° C) .

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3 Dimensions and Weights

3.1 Unit Weights

Table 3.1 Vertiv™ CoolPhase Ceiling Unit Weights

Model		Net Weight lb (kg)	Shipping Weight with pallet lb (kg)
MMI12 (1 Ton)	Minimum (DX only)	232 (106)	387 (176)
	Maximum (DX + FC)	266 (121)	421 (191)
MMI48/60 (4 & 5 Ton)	Minimum (DX only)	267 (121)	422 (191)
	Maximum (DX + FC)	308 (140)	463 (210)
MMI12 (1 Ton)	Minimum (DX only)	411 (187)	618 (281)
	Maximum (DX + FC)	493 (224)	700 (318)
MMI48/60 (4 & 5 Ton)	Minimum (DX only)	611 (277)	836 (379)
	Maximum (DX + FC)	682 (309)	906 (411)

Table 3.2 Weights of Vertiv™ CoolPhase Ceiling Condensing Units

Model	Net Weight lb (kg)	Shipping Weight lb (kg)
CUD03	110 (50)	170 (77)
CUL03	117 (53)	176 (80)
CUD07	118 (54)	189 (86)
CUL07	130 (59)	201 (91)
CUD11	175 (80)	259 (118)
CUL11	184 (84)	272 (124)
CUD151	165 (75)	255 (116)
CUL151	176 (80)	263 (120)
CUD154	268 (121)	325 (147)
CUL154	277 (125)	334 (151)
CUD21	268 (121)	325 (147)
CUL21	277 (125)	334 (151)
CUD28	425 (193)	546 (248)
CUL28	458 (208)	579 (263)

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3.2 Units Planning Dimensions

The unit, floor stand, and plenum dimensions are described in the submittal documents included in the Submittal Drawings.

The condenser dimensions are described in the submittal documents included in the Submittal Drawings. Condensers mounted above and below the relative elevation of the indoor unit must follow the guidelines found in the submittal drawings listed in the table.

The following table lists the relevant documents by number and title.

Table 3.3 Dimension planning drawings

Document Number	Title
20000081	Vertiv CoolPhase Ceiling Dimensional Data Cabinet Dimensions, 1 Ton
20000082	Vertiv CoolPhase Ceiling Dimensional Data Cabinet Dimensions, 2 & 3 Ton
20000083	Vertiv CoolPhase Ceiling Dimensional Data Cabinet Dimensions, 4 & 5 Ton
20000084	Vertiv CoolPhase Ceiling Dimensional Data Cabinet Dimensions, 8 Ton
20000159	Vertiv CoolPhase Condensing Unit Dimensional Data Condenser Unit 3.5, 7 & 11 kW
20000575	Vertiv CoolPhase Condensing Unit Dimensional Data Condenser Unit 15 kW
20000136	Vertiv CoolPhase Condensing Unit Cabinet Dimensions Condenser Unit 21 & 28 kW

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4 Power Requirements

NOTICE

Risk of equipment damage.

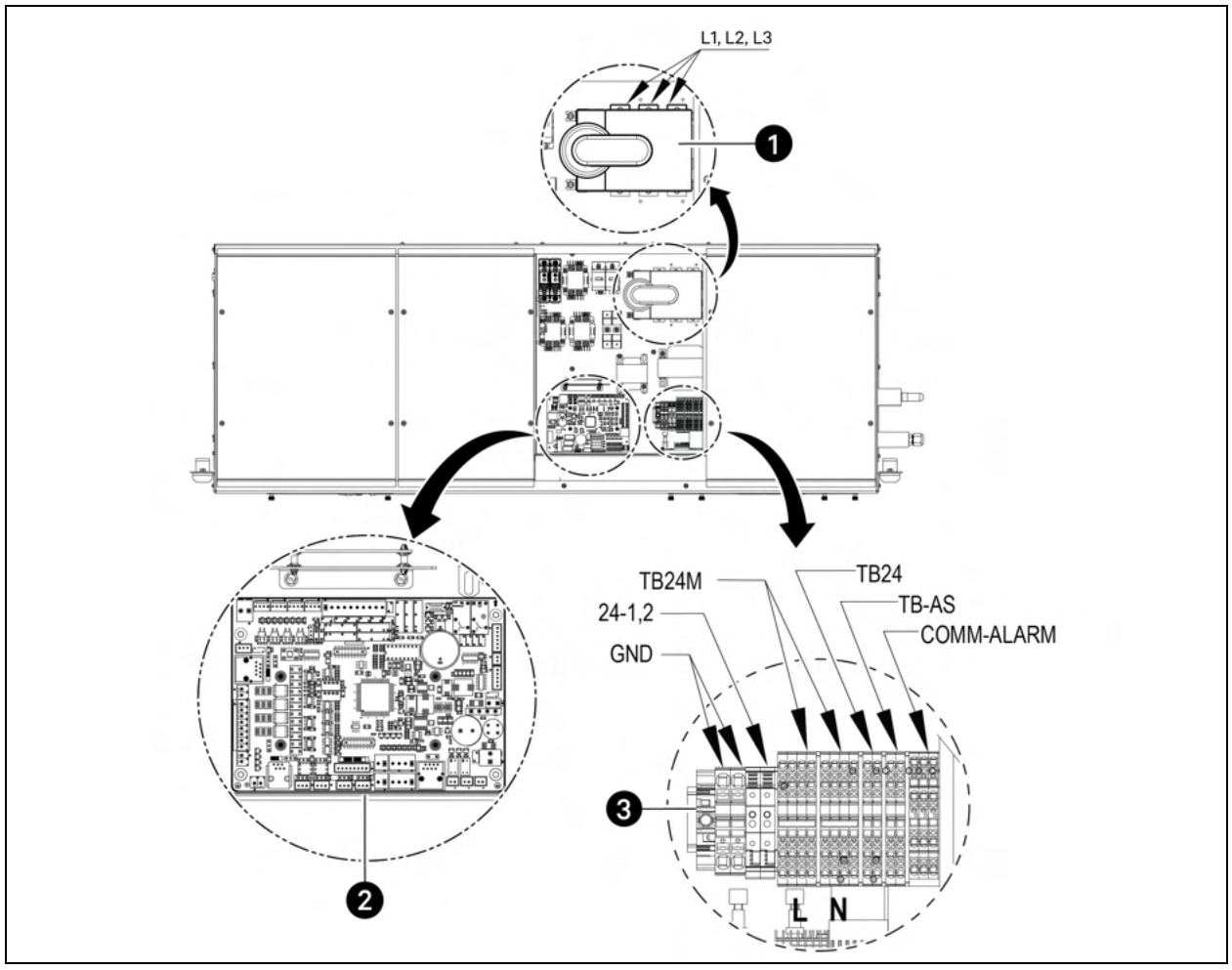
Fans must be connected only to the specified supply voltage and phase for the applicable model, either 208–230 VAC 1-phase or 3-phase or 460 VAC 3-phase.

Connection to an incorrect voltage or phase may result in overheating, abnormal operation, or permanent damage to the fan motor and associated components.

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Figure 4.1 Electrical connections - Interior



Item	Description	Item	Description
1	Input main power supply from customer site	2	Vertiv™ iCOM™
		3	Terminal blocks

HIGH VOLTAGE FEATURES:

- High Voltage Entrance: Located on top and left side of unit.
- Single and three-phase electric service and Earth Ground: Field-supplied power and service.
- Single and three-phase connection: Electric service connection terminals on disconnect.
- Disconnect Switch: Locking type standard.
- Earth ground connection: Connection terminals for field supplied earth grounding wire.

CONTROL FEATURES:

- 7" HMI Display communication: Vertiv Display connects with the DVI connector through DVI cable.

- Remote Temperature/Humidity Sensor: The Remote sensor connects with the Temperature and Humidity sensors that are installed in the unit.
- 7" HMI Display Power: Field connection between indoor display port and PWR connector on 7" display.
- Low Voltage and Control Wiring connections: Unit to unit, BMS and outdoor connections located on the front side of the unit.

COMMUNICATION CONNECTIONS:

- Customer supplies ethernet wire: connection to OHE thermal board and port ethernet port "VFD" on evaporator unit.

STANDARD LOW VOLTAGE FEATURES:

- Remote Alarm Device (RAD): Remote Alarm Device connect field connection wires on the 10DI board DI2 and GND see schematic for connections.

OPTIONAL LOW VOLTAGE TERMINAL PACKAGE:

- Optional Condensate pump switch: Customer must wire the condensate pump status wires between CP-WS-FBK1 and CP-WS-FBK2. Refer to schematic for connections.

4.1 Air Cooled Systems Electrical Data

Table below lists the power requirements for each Vertiv™ CoolPhase Ceiling model number.

Table 4.1 CoolPhase Ceiling Electrical Data

Model	Power Supply	Feature	FLA (A)	MCA (A)	MOP (A)
MMI12	230 V / 1-Ph	Reheat	28.0	35.0	35
		Reheat + Humidifier	28.0	35.0	45
		Humidifier	10.6	16.5	15
		Air Cooling	6.2	7.0	15
MMI24	230 V / 1-Ph	Reheat	41.0	51.3	60
		Reheat + Humidifier	41.0	51.3	60
		Humidifier	14.4	18.0	15
		Air Cooling	7.4	8.0	15

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Table 4.1 CoolPhase Ceiling Electrical Data (continued)

Model	Power Supply	Feature	FLA (A)	MCA (A)	MOP (A)
MMI36	230 V / 1-Ph	Reheat	39.2	48.9	50
		Reheat + Humidifier	39.2	48.9	50
		Humidifier	17.4	22.0	25
		Air Cooling	10.3	12.0	15
	230 V / 3-Ph	Reheat	30.5	38.0	35
		Reheat + Humidifier	30.5	47.0	50
		Humidifier	18.1	23.0	25
		Air Cooling	11.0	13.0	20
	460 V / 3-Ph	Reheat	15.0	21.0	20
		Reheat + Humidifier	15.0	19.0	20
		Humidifier	8.4	10.0	15
		Air Cooling	6.2	7.0	15
MMI48	230 V / 3-Ph	Reheat	38.6	48.0	50
		Reheat + Humidifier	38.6	61.0	70
		Humidifier	20.7	26.0	25
		Air Cooling	10.9	13.0	15
	460 V / 3-Ph	Reheat	18.4	23.0	20
		Reheat + Humidifier	18.4	29.0	30
		Humidifier	10.8	13.0	15
		Air Cooling	5.8	7.0	15
MMI60	230 V / 3-Ph	Reheat	52.5	66.0	70
		Reheat + Humidifier	52.5	78.0	80
		Humidifier	20.7	26.0	25
		Air Cooling	10.9	13.0	15
	460 V / 3-Ph	Reheat	18.4	29.0	30
		Reheat + Humidifier	18.4	23.0	20
		Humidifier	10.8	13.0	15
		Air Cooling	5.8	7.0	15

Table 4.1 CoolPhase Ceiling Electrical Data (continued)

Model	Power Supply	Feature	FLA (A)	MCA (A)	MOP (A)
MMI96	230 V / 3-Ph	Reheat	40.0	50.0	50
		Reheat + Humidifier	40.0	50.0	70
		Humidifier	24.5	30.6	35
		Air Cooling	12.3	15.3	20
	460 V / 3-Ph	Reheat	20.8	26.0	25
		Reheat + Humidifier	20.8	34.0	35
		Humidifier	14.4	18.0	20
		Air Cooling	8.2	10.0	15

FLA = Full Load Amps; MCA = Minimum Circuit Ampacity; MOP = Maximum Overcurrent Protection Device.

Table 4.2 below lists the power requirements for each Vertiv™ CoolPhase Condensing Unit model.

Table 4.2 Vertiv™ CoolPhase Condensing unit electrical data

Models	Nom. Tons	Volts / Phases	Compressor Qty.	Compressor Inverter (A)	Crank Case + Heating belt (A)	FLA (A)	MCA (A)	MOP (A)
CUD03 / CUL03	1	208/230 1-Ph	1	14	0/0.4	17	21	35
CUD07 / CUL07	2	208/230 1-Ph	1	20	0/0.4	23	28	50
CUD111 / CUL111	3	208/230 3-Ph	1	17	0/0.4	21	25	40
CUD114 / CUL114	3	460 3-Ph	1	11	0/0.4	15	18	30
CUD151	4	208/230 3-Ph	1	14	0/32.2	20	23	35
CUL151	4	460 3-Ph	1	14	0.5/32.2	20	24	35
CUD154	4	208/230 3-Ph	1	9	0/21.9	11	13	20
CUL154	4	460 3-Ph	1	9	0.25/21.9	11	13	20
CUD211	6	208/230 3-Ph	1	22	0/41.3	31	36	50
CUL211	6	460 3-Ph	1	22	0.5/41.3	31	37	50
CUD214	6	208/230 3-Ph	1	19	0/32.9	22	27	45
CUL214	6	460 3-Ph	1	19	0.25/32.9	23	27	45
CUD281	8	208/230 3-Ph	1	40	0/51.3	49	58	90
CUL281	8	460 3-Ph	1	40	0.5/51.3	49	59	90
CUD284	8	208/230 3-Ph	1	30	0/39.7	33	40	70
CUL284	8	460 3-Ph	1	30	0.25/39.7	33	41	70

FLA = Full Load Amps; MCA = Minimum Circuit Ampacity; MOP = Maximum Overcurrent Protection Device.

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4.2 Electrical Field Connections & Terminal Blocks

Electrical service must conform to national and local electrical codes.

Rated voltage of the condenser should be verified with available power supply before installation. Refer to the unit's electrical schematic and serial tag for specific electrical requirements. Line-voltage electrical service is required for all condensers at their locations.

The electrical connections are described in the submittal documents included in the . The following table lists the relevant documents by number and title.

Table 4.3 Electrical field connection drawings

Document Number	Title
20000193	CoolPhase Ceiling Electrical Field Connections 1 Ton DX & FC
20000194	CoolPhase Ceiling Electrical Field Connections 2 & 3 Ton DX & FC
20000195	CoolPhase Ceiling Electrical Field Connections 4 & 5 Ton DX & FC
20000196	CoolPhase Ceiling Electrical Field Connections 8 Ton DX & FC
20000161	CoolPhase Condensing Unit Electrical Field Connections 3.5, 7 & 11 kW
20000706	CoolPhase Condensing Unit Electrical Field Connections 15 kW
20000708	CoolPhase Condensing Unit Electrical Field Connections 21 kW
20000328	CoolPhase Condensing Unit Electrical Field Connections 28 kW

Table 4.4 Electrical schematics drawings

Document Number	Title
Vertiv™ CoolPhase Ceiling Electrical Schematics	
10092534P1DRW	CoolPhase Ceiling Electrical Schematics 1 Ton 1-Ph 203 230 VAC 50/60 Hz
10092534P2DRW	CoolPhase Ceiling Electrical Schematics 2 Ton 1-Ph 203 230 VAC 50/60 Hz
10092534P3DRW	CoolPhase Ceiling Electrical Schematics 3 Ton 1-Ph 203 230 VAC 50/60 Hz
10092534P4DRW	CoolPhase Ceiling Electrical Schematics 3 Ton 3-Ph 203 230 VAC 50/60 Hz
10092534P11DRW	CoolPhase Ceiling Electrical Schematics 3 Ton 3-Ph 460 VAC 50/60 Hz
10092534P5DRW	CoolPhase Ceiling Electrical Schematics 4 Ton 3-Ph 203 230 VAC 50/60 Hz
10092534P8DRW	CoolPhase Ceiling Electrical Schematics 4 Ton 3-Ph 460 VAC 50/60 Hz
10092534P6DRW	CoolPhase Ceiling Electrical Schematics 5 Ton 3-Ph 203 230 VAC 50/60 Hz

Table 4.4 Electrical schematics drawings (continued)

Document Number	Title
10092534P9DRW	CoolPhase Ceiling Electrical Schematics 5 Ton 3-Ph 460 VAC 50/60 Hz
10092534P7DRW	CoolPhase Ceiling Electrical Schematics 8 Ton 3-Ph 203 230 VAC 50/60 Hz
10092534P10DRW	CoolPhase Ceiling Electrical Schematics 8 Ton 3-Ph 460 VAC 50/60 Hz
Vertiv™ CoolPhase Condenser Electrical Schematics	
29044991	CoolPhase Condensing Electrical Schematics 3.5 & 7 kW 230 V 1-Ph
29044993	CoolPhase Condensing Electrical Schematics 11 kW 230 V 3-Ph
29045791	CoolPhase Condensing Electrical Schematics 11 kW 460 V 3-Ph
10068508P9DRW	CoolPhase Condensing Electrical Schematics 15 kW 230 V 3-Ph
10068508P10DRW	CoolPhase Condensing Electrical Schematics 15 kW 460 V 3-Ph
10068508P11DRW	CoolPhase Condensing Electrical Schematics 21 kW 230 V 3-Ph
10068508P12DRW	CoolPhase Condensing Electrical Schematics 21 kW 460 V 3-Ph
10068508P1DRW	CoolPhase Condensing Electrical Schematics 28 kW 230 V 3-Ph
10068508P2DRW	CoolPhase Condensing Electrical Schematics 28 kW 460 V 3-Ph

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5 Piping Connections

NOTE: Piping that is installed in the field should comply with local codes.

The pipe connection locations, piping general arrangement, and schematics are described in the documents included in the section Submittal Drawings on page 1 .

The following tables list the relevant documents by number and title.

Table 5.1 Piping general arrangement drawings

Document Number	Title
20000567	CoolPhase Ceiling General Arrangement 1-2 Ton DX Air Cooled
20000568	CoolPhase Ceiling General Arrangement 3-8 Ton DX Air Cooled
20000569	CoolPhase Ceiling General Arrangement 1-8 Ton Free Cooling

Table 5.2 Piping schematics

Document Number	Title
20000167	CoolPhase Ceiling Piping Schematic Direct Expansion Unit 1 Ton Piping Schematics
20000168	CoolPhase Ceiling Piping Schematics Free Cooling Option 1 Ton Piping Schematics
20000169	CoolPhase Ceiling Piping Schematic Direct Expansion Unit 2 & 3 Ton Piping Schematics
20000170	CoolPhase Ceiling Piping Schematics Free Cooling Option 2 & 3 Ton Piping Schematics
20000171	CoolPhase Ceiling Piping Schematic Direct Expansion Unit 4 & 5 Ton Piping Schematics
20000172	CoolPhase Ceiling Piping Schematics Free Cooling Option 4 & 5 Ton Piping Schematics
20000173	CoolPhase Ceiling Piping Schematic Direct Expansion Unit 8 Ton Piping Schematics
20000174	CoolPhase Ceiling Piping Schematics Free Cooling Option 8 Ton Piping Schematics

Table 5.3 Primary connection locations drawings

Document Number	Title
20000175	CoolPhase Ceiling Primary Connection Locations 1 Ton Dx & Fc
20000176	CoolPhase Ceiling Primary Connection Locations 2 & 3 Ton Dx & Fc
20000177	CoolPhase Ceiling Primary Connection Locations 4 & 5 Ton Dx & Fc
20000178	CoolPhase Ceiling Primary Connection Locations 8 Ton Dx & Fc
20000160	CoolPhase Condensing Unit Primary Connection Locations 3.5, 7 & 11 kW
20000573	CoolPhase Condensing Unit Primary Connection Locations 15 & 21 kW
20000154	CoolPhase Condensing Unit Primary Connection Locations 28 kW

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Table 5.4 Piping General Arrangement Drawings

Document Number	Title
20000916	CoolPhase Condensing Unit Above / Below Indoor Unit 3.5, 7 & 11 kW
20000572	CoolPhase Condensing Unit Above / Below Indoor Unit 15 & 21 kW
20000324	CoolPhase Condensing Unit Above / Below Indoor Unit 28 kW

Table 5.5 Pipe length and condensing unit elevation relative to evaporator

Model	Maximum Condensing Unit Level Above Evaporator, ft (m)	Maximum Condensing Unit Level Below Evaporator, ft (m)
MMI12	49.2 (15)	16.4 (5)
MMI24	49.2 (15)	16.4 (5)
MMI36	49.2 (15)	16.4 (5)
MMI48	49.2 (15)	16.4 (5)
MMI60	98.4 (30)	26.2 (8)
MMI96	98.4 (30)	26.2 (8)

5.1 Refrigerant Line Sizes and Equivalent Lengths

NOTE: Refrigerant is field-supplied and field-charged. The unit is not shipped with refrigerant, nor is it factory charged.

Table 5.6 Indoor evaporator approximate r-32 refrigerant charge

Model	Refrigerant charge lb (kg)
MMI12 (1 Ton)	0.50 (0.20)
MMI24 (2 Ton)	1.00 (0.50)
MMI36 (3 Ton)	1.80 (0.80)
MMI48 (4 Ton)	2.80 (1.30)
MMI60 (5 Ton)	3.30 (1.50)
MMI96 (8 Ton)	3.70 (1.70)

Table 5.7 DX products with R-32

Document Number	Title
20000457	A2L Refrigerant Dispersal Volume Calculation R32

Table 5.8 Outdoor condenser approximate R-32 refrigerant charge for standard units

Model	Refrigerant charge lb (kg)
CUD03	1.3 (0.6)
CUD07	1.5 (0.7)
CUD11	1.8 (0.8)
CUD15	2.9 (1.3)
CUD21	3.0 (1.4)
CUD28	5.0 (2.3)

Table 5.9 Outdoor condenser approximate R-32 refrigerant charge for units with Low Ambient Kit

Model	Refrigerant charge lb (kg)
CUL03	2.4 (1.1)
CUL07	2.9 (1.3)
CUL11	5.3 (2.4)

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Table 5.9 Outdoor condenser approximate R-32 refrigerant charge for units with Low Ambient Kit (continued)

Model	Refrigerant charge lb (kg)
CUL15	5.7 (2.6)
CUL21	10.1 (4.6)
CUL28	17.2 (7.8)

Table 5.10 Outdoor condenser approximate R-32 refrigerant charge for units with Low Ambient Kit

Model	Refrigerant charge lb (kg)
CUL03	2.4 (1.1)
CUL07	2.9 (1.3)
CUL11	5.3 (2.4)
CUL15	5.7 (2.6)
CUL21	10.1 (4.6)
CUL28	17.2 (7.8)

Table 5.11 Interconnecting piping refrigerant charge for R-32 for type L Tube

Line Size O.D.	Liquid Line, lb/100 ft (kg/30 m)	Suction Line, lb/100 ft (kg/30 m)
3/8	2.9 (1.3)	0.15 (0.07)
1/2	5.5 (2.5)	0.2 (0.1)
5/8	9.0 (4.0)	0.4 (0.2)
3/4	13.5 (6.0)	0.7 (0.3)
7/8	18.5 (8.4)	1.1 (0.5)
1 1/8	31.7 (14.4)	1.8 (0.8)
1 3/8	48.3 (21.9)	2.6 (1.2)

NOTE: If the condensing unit is installed indoors, the total system refrigerant charge (Indoor unit+ Condensing unit + Piping) can't exceed 4 lb.

Table 5.12 Piping dimensional data

Document Number	Title
20000160	CoolPhase Condensing Unit Piping Dimensional Data Condenser Units 15 kW & 21 kW
20000573	CoolPhase Condensing Unit Piping Dimensional Data Condenser Units 15 kW & 21 kW
20000326	CoolPhase Condensing Unit Piping Dimensional Data Condenser Units 28 & 35 kW

6 Optional Accessories

6.1 Accessories for Vertiv™ CoolPhase Ceiling Units

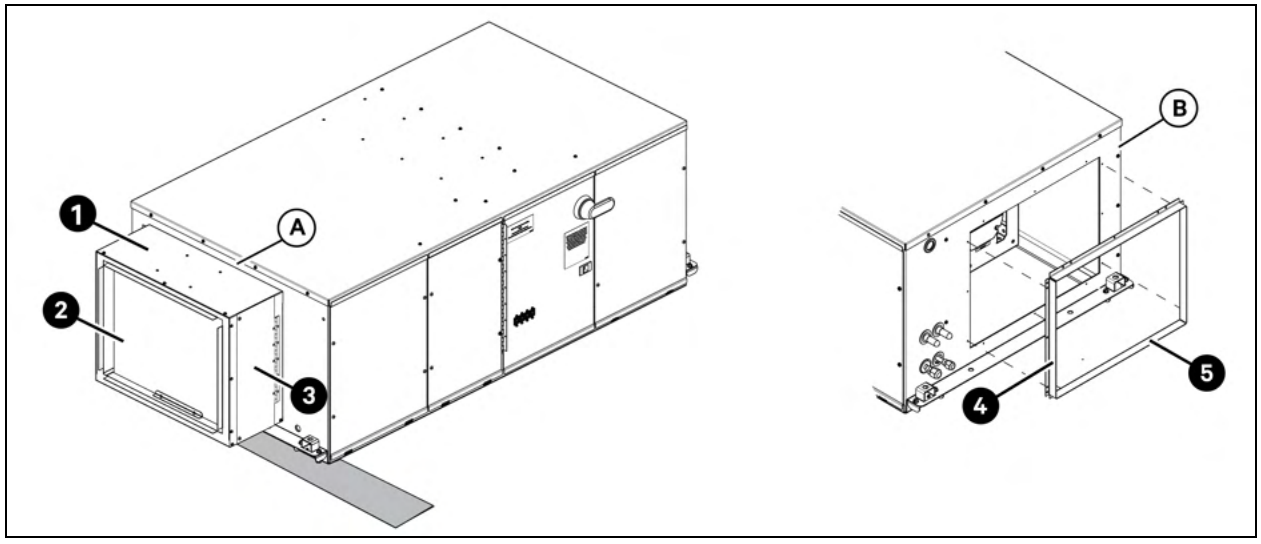
6.1.1 Filter Box with Duct Flanges

NOTE: The kit includes a MERV 8 filter as well as duct flanges for air supply connection.

Table 6.1 Filter Box SKUs and application

SKU	Item Accessory	Description
CEILFILTB-XS	Filter box with duct flanges	Ceiling Filter Box, 1 Ton
CEILFILTB-S		Ceiling Filter Box, 2 and 3 Ton
CEILFILTB-M		Ceiling Filter Box, 4 and 6 Ton
CEILFILTB-L		Ceiling Filter Box, 8 Ton

Figure 6.1 Main components



Item	Description	Item	Description
Return Side of Unit	3	Filter 16 x 20 x 4 in MERV 8	Return Side of Unit
Discharge End of Unit	4	Vertical Duct Flange for air supply	Discharge End of Unit
Filter access door	5	Horizontal Duct Flange for air supply	Filter access door
Filter box assembly (image example: MMI12)			Filter box assembly (image example: MMI12)

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Table 6.2 Filter Box drawings

Document Number	Title
20000085	Vertiv™ CoolPhase Ceiling Dimensional Data Filter Box 1 Ton
20000088	Vertiv™ CoolPhase Ceiling Dimensional Data Filter Box 2 & 3 Ton
20000091	Vertiv™ CoolPhase Ceiling Dimensional Data Filter Box 4 & 5 Ton
20000092	Vertiv™ CoolPhase Ceiling Dimensional Data Filter Box 8 Ton

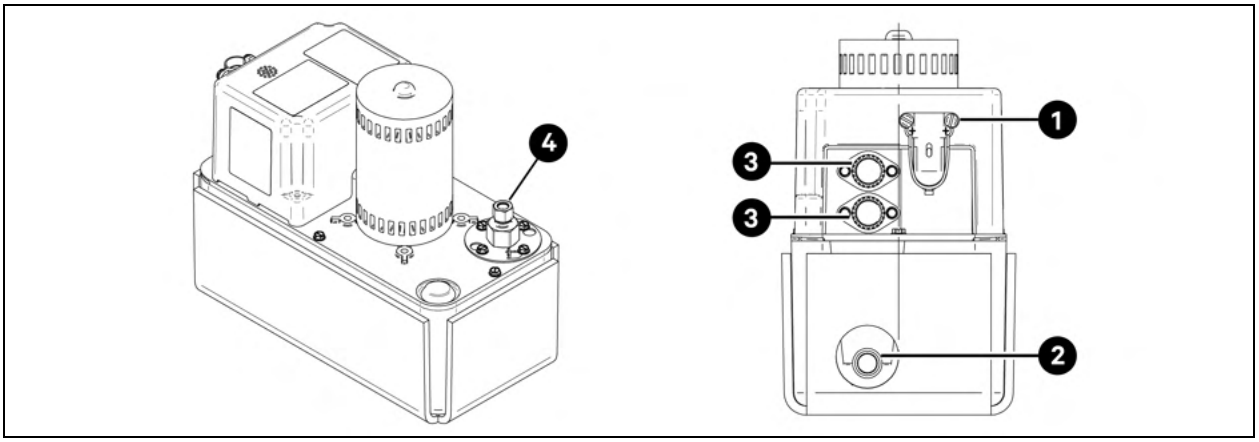
Refer to SL-80134 Vertiv™ CoolPhase Ceiling Filter Box Kit Quick Installation Guide for more details about installation instructions.

6.1.2 Condensate Pump Kit

Table 6.3 Condensate Pump kit SKUs and application

SKU	Item Accessory	Description
CEILPMPKIT-L	Condensate Pump Kit	Ceiling Condensate Pump Kit 230/1 & 230/3
CEILPMPKIT-H		Ceiling Condensate Pump Kit 460/3

Figure 6.2 Main components



Item	Description	Item	Description
A	Condensate Pump - Isometric view	2	Hose barb – Water inlet
B	Condensate Pump - Rear view	3	Fuse holder
1	Flex electrical connection	4	Outlet

Table 6.4 Condensate Pump Kit drawings

Document Number	Title
20000104	Vertiv™ CoolPhase Ceiling Piping Connections Condensate Pump Connection Locations, 1 Ton
20000105	Vertiv™ CoolPhase Ceiling Piping Connections Condensate Pump Connection Locations, 2 & 3 Ton
20000106	Vertiv™ CoolPhase Ceiling Piping Connections Condensate Pump Connection Locations, 4 & 5 Ton
20000107	Vertiv™ CoolPhase Ceiling Piping Connections Condensate Pump Connection Locations, 8 Ton

Refer to SL-80133 Vertiv™ CoolPhase Ceiling Condensate Pump Kit Quick Installation Guide for more details about installation instructions.

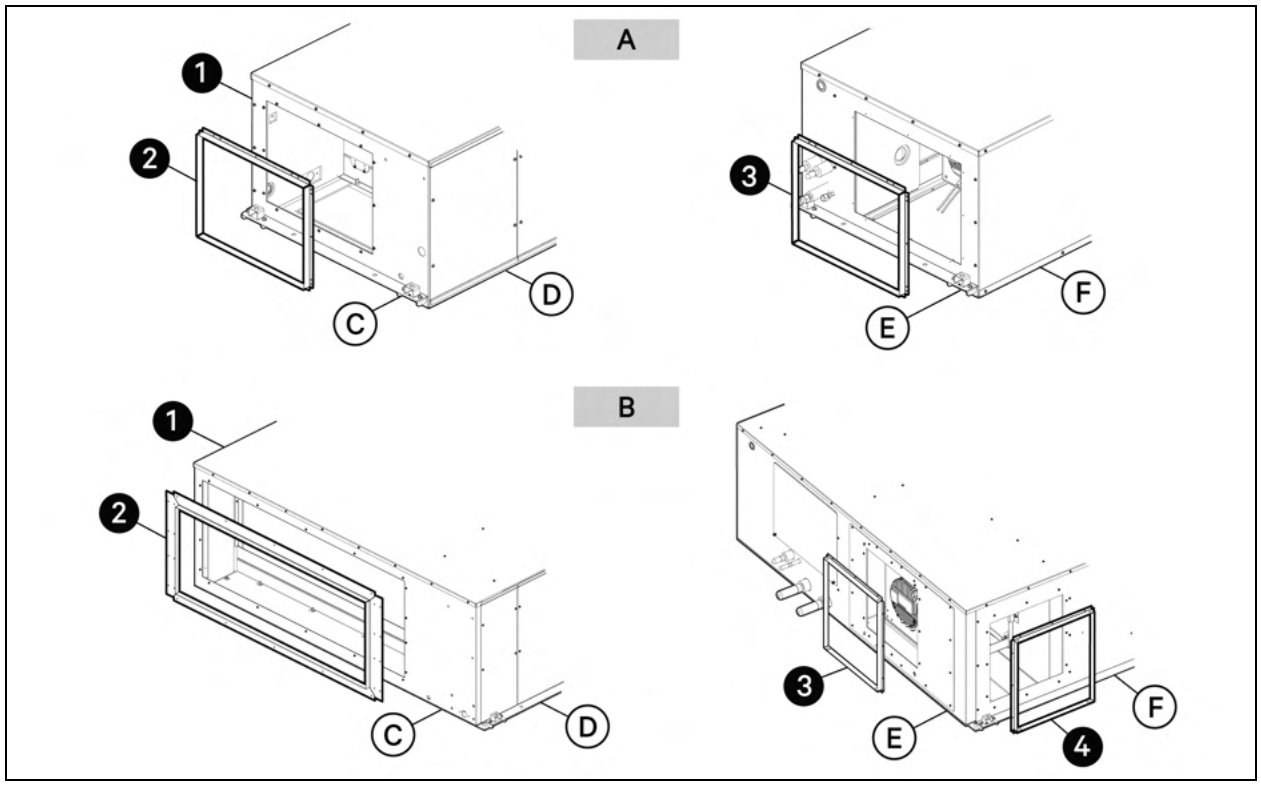
6.1.3 Duct Flanges

Table 6.5 Duct Flanges SKUs and application

SKU	Item Accessory	Description
CEILDUCTKIT-XS	Duct Flange Kit	Indoor Duct Flange Kit, 1 Ton
CEILDUCTKIT-S		Indoor Duct Flange Kit, 2 and 3 Ton
CEILDUCTKIT-M		Indoor Duct Flange Kit, 4 and 6 Ton
CEILDUCTKIT-L		Indoor Duct Flange Kit, 8 ton

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Figure 6.3 Main components



Item	Description	Item	Description
A	1, 2 and 3 Tons models	F	Rear of Unit
B	4, 5 and 8 Tons models	1	Evaporator
C	Return side of the unit	2	Air Return Duct Flange
D	Front of unit	3	Air Supply Duct Flange 1 (for all models)
E	Discharge side of unit	4	Air Supply Duct Flange 2 (for 4, 5 and 8 Ton models only)

Table 6.6 Duct Flanges drawings

Document Number	Title
20000256	Vertiv™ CoolPhase Ceiling Dimensional Data Duct Flanges, 1 Ton
20000257	Vertiv™ CoolPhase Ceiling Dimensional Data Duct Flanges, 2 & 3 Ton
20000258	Vertiv™ CoolPhase Ceiling Dimensional Data Duct Flanges, 4 & 5 Ton
20000259	Vertiv™ CoolPhase Ceiling Dimensional Data Duct Flanges, 8 Ton

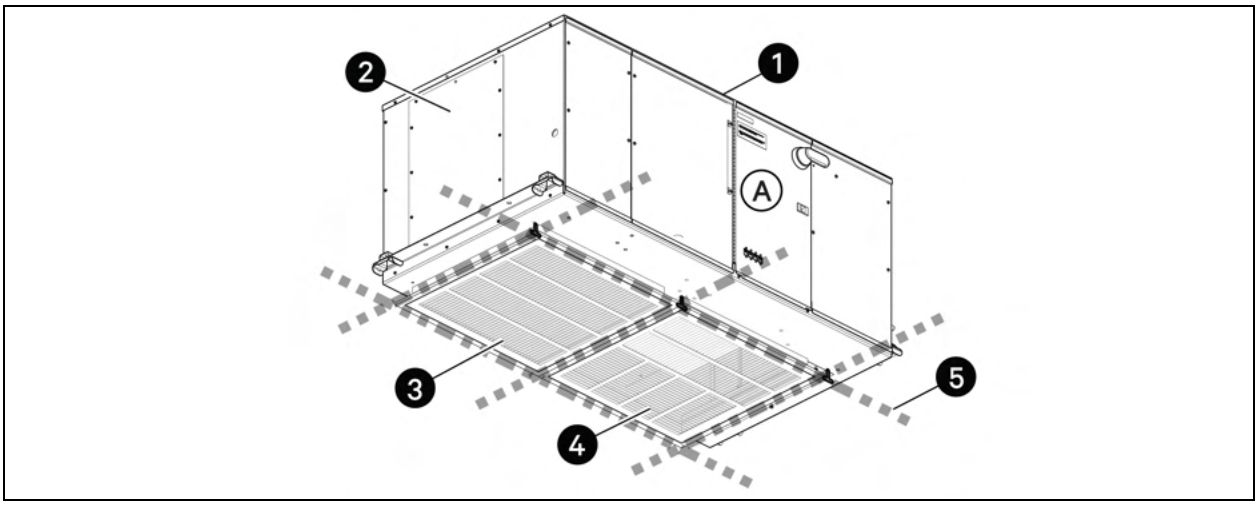
Refer to SL-80134 Vertiv™ CoolPhase Duct Flanges Quick Installation Guide for more details about installation instructions.

6.1.4 Downflow Grille

Table 6.7 Supply and Return grille SKUs and applications

SKU	Item Accessory	Description
CEILGRILLE-XS	Supply & Return Grille	Ceiling Supply & Return Grille, 1 Ton
CEILGRILLE-S		Ceiling Supply & Return Grille, 2 and 3 Ton

Figure 6.4 Main components



Item	Description	Item	Description
A	Front of indoor unit	3	One-way Return Grille
1	Evaporator	4	Three-way Supply Grille
2	Air return cover	5	24 in x 24 in Drop ceiling T-bars (Not included)

Table 6.8 Grille drawings

Document Number	Title
20000256	Vertiv™ CoolPhase Ceiling Dimensional Data Duct Flanges, 1 Ton
20000257	Vertiv™ CoolPhase Ceiling Dimensional Data Duct Flanges, 2 & 3 Ton

Refer to SL-80135 Vertiv™ CoolPhase Ceiling Supply and Return Grille Quick Installation Guide for more details about installation instructions.

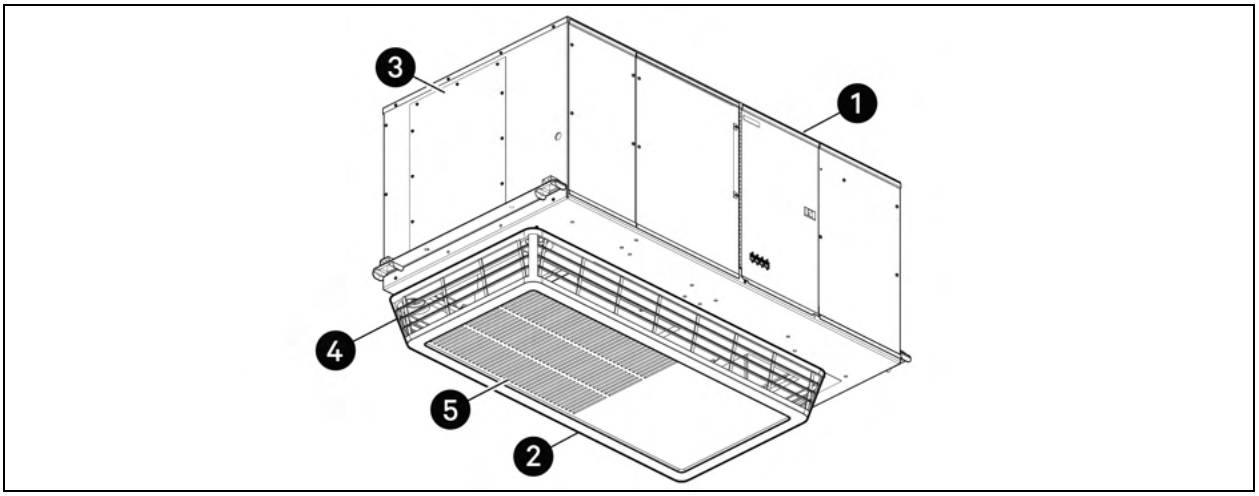
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6.1.5 Air Distribution Plenum

Table 6.9 Air Distribution Plenum SKUs and applications

SKU	Item Accessory	Description
CEILAIRPLEN-XS	Air Plenum	Ceiling Air Plenum, 1 Ton
CEILAIRPLEN-S		Ceiling Air Plenum, 2 and 3 Ton

Figure 6.5 Main components



Item	Description	Item	Description
1	Evaporator	4	Air distribution return inlet
2	Air distribution plenum	5	Air distribution supply outlet
3	Air return cover		

Table 6.10 Air distribution plenum drawings

Document Number	Title
20000086	Vertiv™ CoolPhase Ceiling Dimensional Data Air Distribution Plenum 1 Ton
20000089	Vertiv™ CoolPhase Ceiling Dimensional Data Air Distribution Plenum 2 & 3 Ton

Refer to the SL-80137 Vertiv™ CoolPhase Ceiling Air Distribution Plenum Quick Installation Guide for more details on installation.

6.2 Leak Detection Accessories

The system supports compatibility with Liebert® Liqui-Tect™ LT410 point leak detection sensors and LT460 zone leak detection modules, providing leak detection monitoring when used as part of the overall system installation.

Liebert® Liqui Tect™ 410 (LT410) is a solid state point leak detection sensor for remote mounting that monitors a specific location for water leaks, internal faults, and power loss, and provides dual outputs for alarm and monitoring connections.

The Liebert® Liqui Tect™ 460 KIT provides reliable leak detection with up to 100 feet of cable, selectable alarm modes, LED status indicators, and dual outputs for integration with alarms or management systems. It continuously monitors leaks, faults, and power failures, making it ideal for protecting sensitive equipment in critical environments.

For more information about specifications and installation, refer to SL-31050 Liebert® Liqui-Tect™ 410 Point Leak Detection Sensor and SL-31052 Liebert® Liqui-Tect™ 460 Zone Leak Detection Sensor Product Specification and Installation Guides.

Table 6.11 Leak Detection Sensor SKUs and applications

SKU	Item Accessory	Description
LT410	Liqui-Tect™ 410 Point Leak Detection Sensor	Single-point detection for leaks
LT460	Liqui-Tect™ 460 Zone Leak Detection Sensor	Zone detection for leaks

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Appendices

Appendix A: Technical Support and Contacts

A.1 Technical Support/Service in the United States

Vertiv Group Corporation

24x7 dispatch of technicians for all products.

1-800-543-2378

Liebert® Thermal Management Products

1-800-543-2778

Liebert® Channel Products

1-800-222-5877

Liebert® AC and DC Power Products

1-800-543-2378

A.2 Locations

United States

Vertiv Headquarters

505 N Cleveland Ave

Westerville, OH, 43082, USA

Europe

Via Leonardo Da Vinci 8 Zona Industriale Tognana

35028 Piove Di Sacco (PD) Italy

Asia

7/F, Dah Sing Financial Centre

3108 Gloucester Road, Wanchai

Hong Kong

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Appendix B: Guide Specifications

The following are the guide specifications for the Vertiv™ CoolPhase Ceiling and Vertiv™ CoolPhase Condensing Unit.

Vertiv™ CoolPhase Ceiling
Guide Specifications
Ceiling-Mounted Environmental Control System
1.0 GENERAL

1.1 Summary

These specifications describe requirements for a ceiling-mounted thermal management system. The system shall be designed to control the temperature conditions in rooms containing electronic equipment, with good insulation and vapor barrier. The system is also available with an optional humidity control package. The manufacturer shall design and furnish all equipment in the quantities and configurations shown on the project drawings.

1.2 Design Requirements

The Thermal Management system shall be CSA-Listed to the harmonized U.S. and Canadian product safety standards "CSA C22.2 No. 60335-1/UL60335-1 Household and similar electrical appliances - Safety - Part 1: General requirements & CSA C22.2 No. 60335-2-40/UL 60335-2-40 Household and similar electrical appliances - Safety - Part 2: Particular requirements for electrical heat pumps, air conditioners and dehumidifiers" and be marked with cCSAus logo.

The system shall be AHRI Listed, the trusted mark of performance assurance for heating, ventilation, air conditioning and commercial refrigeration equipment, using AHRI Standard 1360.

1.3 Submittals

Submittals shall be provided with the proposal and shall include: Single-Line Diagrams; Dimensional, Electrical, and Capacity Data; Piping and Electrical Connection Drawings.

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2.0 PRODUCT

2.1 Cooling System

2.1.1 Air-Cooled Refrigeration System

Refrigeration System

The single refrigeration circuit shall include a hydrophilic-coated Evaporator coil, a liquid-line filter drier, an electronic expansion valve, and from the 3 Ton to 8 Ton units: a liquid-line solenoid valve. The indoor evaporator refrigerant piping shall be with a nitrogen holding charge. Field relief of the Schrader valve shall indicate a leak-free system.

Hydrophilic-Coated Evaporator Coil

- **Indoor Evaporator Unit 1 Ton Models:** The evaporator section shall include evaporator coil, electronic expansion valve and filter drier. The evaporator coil shall have 2.45 sq ft (0.23 m^2) face area, three rows deep. It shall be constructed of internally rifled copper tubes and lanced-type aluminum fins and have a maximum face velocity of 485.81 FPM (2.47 m/s) at 1186 CFM (2015 CMH). The fan motor shall be 0.60 hp (500 W), maximum rating.
- **Indoor Evaporator Unit 2 Ton Models:** The evaporator section shall include evaporator coil, electronic expansion valve and filter drier. The evaporator coil shall have 3.1 sq ft (0.28 m^2) face area, five rows deep. It shall be constructed of internally rifled copper tubes and lanced-type aluminum fins and have a maximum face velocity of 476 FPM (2.4 m/s) at 1451 CFM (2465 CMH). The fan motor shall be 1.00 hp (747 W), maximum rating.
- **Indoor Evaporator Unit 3 Ton Models:** The evaporator section shall include evaporator coil, electronic expansion valve, shut-off valve and filter drier. The evaporator coil shall have 3.1 sq ft (0.28 m^2) face area, five rows deep. It shall be constructed of internally rifled copper tubes and lanced-type aluminum fins and have a maximum face velocity of 500 FPM (2.5 m/s) at 1530 CFM (2599 CMH). The fan motor shall be 4.43 hp (3,300 W), maximum rating.
- **Indoor Evaporator Unit 4 Ton Models:** The evaporator section shall include evaporator coil, electronic expansion valve, shut-off valve and filter drier. The evaporator coil shall have 5.6 sq ft (0.52 m^2) face area, six rows deep. It shall be constructed of internally rifled copper tubes and lanced-type aluminum fins and have a maximum face velocity of 488 FPM (2.5 m/s) at 2706 CFM (4597 CMH). The fan motor shall be 4.43 hp (3,300 W), maximum rating.
- **Indoor Evaporator Unit 5 Ton Models:** The evaporator section shall include evaporator coil, electronic expansion valve, shut-off valve and filter drier. The evaporator coil shall have 5.6 sq ft (0.52 m^2) face area, four rows deep. It shall be constructed of internally rifled copper tubes and lanced-type aluminum fins and have a maximum face velocity of 494 FPM (2.5 m/s) at 2739 CFM (4654 CMH). The fan motor shall be 4.43 hp (3,300 W), maximum rating.
- **Indoor Evaporator Unit 8 Ton Models:** The evaporator section shall include evaporator coil, electronic expansion valve, shut-off valve and filter drier. The evaporator coil shall have 7.64 sq ft (0.71 m^2) face area, six rows deep. It shall be constructed of internally rifled copper tubes and lanced-type aluminum fins and have a maximum face velocity of 489 FPM (2.5 m/s) at 3741 CFM (6356 CMH). The fan motor shall be 6.97 hp (5,200 W), maximum rating.

The evaporator coil shall be factory charged with nitrogen and sealed.

The system shall be field charged with field supplied R-32 refrigerant. The coil assembly shall be mounted in a condensate drain pan with internally trapped drain line. The evaporator drain pan shall include a factory installed float switch to shut down the evaporator upon high water condition.

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2.1.2 Air-Cooled Free-Cooling System

Free-Cooling System

The single Free-Cooling circuit shall include a 3-Way Valve, Inlet Fluid Pipe and Outlet Fluid Pipe. The indoor coil Free-Cooling piping shall be with a nitrogen holding charge. Field relief of the Schrader valve shall indicate a leak-free system.

Hydrophilic-Coated Free-Cooling Coil

- **Indoor Free-Cooling Coil Unit 1 Ton Models:** The coil section shall include coil, 3-Way Valve and Fluid Inlet and Outlet Piping. The coil shall have 2.45 sq ft (0.23 m^2) face area, three rows deep. It shall be constructed of internally soft copper tubes and lanced type aluminum fins and have a maximum face velocity of 485.81 FPM (2.47 m/s) at 1186 CFM (2015 CMH).
- **Indoor Free-Cooling Coil Unit 2 Ton Models:** The coil section shall include coil, 3-Way Valve and Fluid Inlet and Outlet Piping. The coil shall have 3.1 sq ft (0.28 m^2) face area, three rows deep. It shall be constructed of internally soft copper tubes and lanced-type aluminum fins and shall have a maximum face velocity of 476 FPM (2.4 m/s) at 1451 CFM (2465 CMH).
- **Indoor Free-Cooling Coil Unit 3 Ton Models:** The coil section shall include coil, 3-Way Valve and Fluid Inlet and Outlet Piping. The coil shall have 3.1 sq ft (0.28 m^2) face area, three rows deep. It shall be constructed of internally soft copper tubes and lanced-type aluminum fins and shall have a maximum face velocity of 500 FPM (2.5 m/s) at 1530 CFM (2599 CMH).
- **Indoor Free-Cooling Coil Unit 4 Ton Models:** The coil section shall include coil, 3-Way Valve and Fluid Inlet and Outlet Piping. The coil shall have 5.6 sq ft (0.52 m^2) face area, four rows deep. It shall be constructed of internally soft-copper tubes and lanced-type aluminum fins and shall have a maximum face velocity of 488 FPM (2.5 m/s) at 2706 CFM (4597 CMH).
- **Indoor Free-Cooling Coil Unit 5 Ton Models:** The coil section shall include coil, 3-Way Valve and Fluid Inlet and Outlet Piping. The coil shall have 5.6 sq ft (0.52 m^2) face area, four rows deep. It shall be constructed of internally soft-copper tubes and lanced-type aluminum fins and have a maximum face velocity of 494 FPM (2.5 m/s) at 2739 CFM (4654 CMH).
- **Indoor Free-Cooling Coil Unit 8 Ton Models**: The coil section shall include coil, 3-Way Valve and Fluid Inlet and Outlet Piping. The coil shall have 7.64 sq ft (0.71 m^2) face area, four rows deep. It shall be constructed of internal soft-copper tubes and lanced-type aluminum fins and shall have a maximum face velocity of 489 FPM (2.5 m/s) at 3741 CFM (6356 CMH).

Fan Motors

Each unit will have 1 coaxial fan: direct-driven centrifugal fans with diagonal shape impeller and electronically commutated motors. The fan speed shall be variable and automatically regulated by the Vertiv™ iCOM™ through all modes of operation. Each fan should have a dedicated motor, fault monitoring circuitry and speed controller, which provides a level of redundancy. The EC centrifugal fans shall be mounted in front of the coil assembly and draw air through.

2.1.3 Cabinet Construction

The cabinet shall be constructed of heavy gauge galvanized steel and shall be serviceable from one side. Mounting brackets shall be integral to the cabinet design. Internal cabinet insulation shall meet ASHRAE 62.1 requirements for Mold Growth, Humidity & Erosion, tested per UL 181 and ASTM 1338 standards.

2.1.4 Serviceability

The cabinet and chassis shall be constructed of heavy gauge galvanized steel and shall be serviceable from one side. Mounting brackets shall be integral to the cabinet design and be designed for ceiling mounting.

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2.2 Fan Section

The fan shall be plug/plenum type, with direct-drive variable-speed motorized impeller, single inlet and dynamically balanced. The fans shall be located to draw air over the coil to ensure even air distribution and maximum coil performance.

The evaporator system shall be capable of delivering the airflows at external static pressures shown in section 2.0.

System shall be suitable for ducted supply and return air distribution. Supply air location shall be field selectable, configured in one of three outlet locations: right side, back of cabinet (4, 5 and 8 Ton only), or right side, bottom of cabinet (1, 2 and 3 Ton only). The bottom supply configuration will require an additional kit (ordered and shipped separately).

2.3 Locking Disconnect Switch

A manual disconnect switch shall be mounted in the electrical panel and be capable of disrupting the flow of power to the unit. The electric panel compartment shall be accessible only with the switch in the Off position. It shall be located behind the main electrical panel box door for quick access.

2.4 Short-Circuit Current Rating (SCCR)

MMI12, 24, 36, 48, 60 and MMI96 Models: The electrical panel shall provide at least 65,000 A SCCR with disconnect switch (Option Disconnect – 2).

2.5 Electronic Expansion Valve

The electronic expansion valve (EEV) shall be selected for precise modulation of refrigerant mass flow in response to varying system loads. The EEV shall incorporate sensors for simultaneous collection of temperature and pressure signals to accurately regulate refrigerant flow. The valve shall operate within a wide envelope, enabling it to reduce condensing pressure when conditions allow, thereby optimizing energy consumption.

2.6 Steam Generating Canister Humidifier

The environmental control system shall be equipped with a steam generating humidifier that is controlled by the microprocessor control system. It shall be complete with disposable canister, all supply and drain valves, steam distributor and electronic controls. The need to change canister shall be announced on the microprocessor wall box control panel. The humidifier shall have a capacity for MMI12, MMI24 and MMI36 of 5 lb/h (2.27 kg/h) and 12 lb/h (5.44 kg/h) for MMI48, MMI60 and MMI96. A LED on the humidifier assembly shall indicate cylinder full, overcurrent detection, fill system fault and end-of-cylinder-life conditions. The canister flush water shall not drain into the coil drain pan, due to risk of aggressive corrosion of the evaporator coil.

2.7 Refrigerant Filter Drier

A factory installed filter drier shall be designed to remove moisture and contaminants from refrigeration system that may otherwise clog or damage the refrigeration system.

2.8 R-32 Refrigerant

The system shall use R-32 refrigerant with a GWP of 675. Refrigerant shall be field supplied and field charged.

2.9 Smoke detector

The smoke sensor shall immediately shut down the Thermal Management system and activate the alarm system when activated. The sensing element shall be located in the return air compartment. This smoke sensor shall not function or replace any room smoke detection system that may be required by local or national codes.

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2.10 Filter clog

The filter clog switch senses pressure drops across the filters and shall annunciate the wall controller upon exceeding the adjustable setpoint.

2.11 Ship Loose Accessories

2.11.1 Air Filter Box/Duct Flange

The evaporator section shall be supplied with an optional air filter box for use with ducted installations.

Pleated filters shall be supplied depending on each capacity:

- **1 Ton (MMI12):** One (1) filter 4 in x 16 in x 20 in (102 mm x 406 mm x 508 mm)
- **2 and 3 Ton (MMI24 and MMI36):** One (1) filter 4 in x 16 in x 20 in (102 mm x 406 mm x 508 mm)
- **4 and 5 Ton (MMI48 and MMI60):** Two (2) filters 4 in x 20 in x 20 in (102 mm x 508 mm x 508 mm) each.
- **8 Ton (MMI96):** Two (2) filters 4 in x 20 in x 25 in (102 mm x 508 mm x 635 mm) each.

All pleated type, with a MERV 8 rating, based on ASHRAE 52.2-2007. A duct flange shall be supplied for use on the supply air opening of the unit.

2.11.2 Condensate Pump

The condensate pump shall have the capacity of:

- **1 Ton (MMI12):** ___ GPH (___ l/h) at ___ ft. head (___ kPa).
- **2 and 3 Ton (MMI24 and MMI36):** ___ GPH (___ l/h) at ___ ft. head (___ kPa).
- **4, 5 and 8 Ton (MMI48, MMI60 and MMI96): ___** GPH (___ l/h) at ___ ft. head (__ kPa).

It shall be complete with integral float switch, pump, motor assembly, discharge check valve, duct/wall mountable bracket and reservoir. A secondary float switch shall be provided to permit field wiring to the unit control to shut down the evaporator upon a high-water level condition.

2.11.3 Condensate Pump Bracket

For the 4, 5 and 6 Ton (MMI48, MMI60, MMI96) models, a condensate pump bracket shall be provided to mount condensate pump directly to the end of the unit, allowing for easier installation and alignment of the condensate pump.

2.11.4 Duct Flanges

A pair of duct flanges shall be supplied for use on the supply and return air openings of the unit. Filters and box should be field-supplied.

2.11.5 Supply and Return Grille

For the 1, 2 and 3 Ton (MMI12, MMI24, MMI36) models, a factory-supplied supply and return grille kit shall be provided for supply and return air delivery through a 2 ft x 4 ft (0.6 m x 0.6 m) T-bar ceiling grid. Kit shall include an air baffle plate, supply grille, hinged return grille, 1 in x 20 in x 20 in (25.4 mm x 508 mm x 508 mm) MERV 8 (ASHRAE 52.2-2007) filter and mounting frame.

2.11.6 Air Distribution Plenum

For the 1, 2 and 3 Ton (MMI12, MMI24, MMI36) models, an air distribution plenum shall be supplied with an integral filter. The plenum shall be 24 in x 48 in (610 mm x 1219 mm) in size and shall provide 3-way air distribution for installation into a standard 24 in x 48 in (610 mm x 1219 mm) ceiling grid. Filter size shall be 4 in x 16 in x 25 in (102 mm x 406 mm x 535 mm), deep-pleated type with a MERV 8 rating, based on ASHRAE 52.2-2007.

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3.0 CONTROLS

3.1 Vertiv™ iCOM™ Microprocessor Control with 7-inch color touchscreen

The Vertiv™ iCOM™ shall be microprocessor-based with a 7" color touchscreen display and shall be mounted in an ergonomic, aesthetically pleasing housing. The controls shall be menu-driven. The system shall display user menus for active alarms, event log, graphic data, unit view/status overview (including the monitoring of room conditions, operational status in percentage of each function, date, and time), total run hours, various sensors, display setup and service contacts. A password shall be required to make system changes. Service menus shall include setpoints, standby settings (lead/lag), timers/sleep mode, alarm setup, sensor calibration, maintenance/wellness settings, options setup, system/network setup, auxiliary boards, and diagnostics/service mode.

- **Password Protection -** The Vertiv™ iCOM™ shall contain two unique passwords to protect against unauthorized changes. An auto hide/show feature shall allow the user to see applicable information based on the login used.
- **Unit Backup and Restore -** The user shall be able to create safe copies of important control parameters. The ICOM™ shall have the capacity for the user to automatically backup unit configuration settings to internal memory or USB storage drive. Configuration settings may be transferred to another unit for a more streamlined unit startup.
- **Parameter Download -** The ICOM™ shall enable the user to download a report that lists parameter names, factory default settings, and user-programmed settings in .csv format for remote reference.
- **Parameter Search -** The ICOM™ shall have search fields for efficient navigation and parameter lookup.
- **Setup Wizards -** The ICOM™ shall contain step-by-step tutorials or wizards to provide easy setup of the control.
- **Context-Sensitive Help -** The ICOM™ shall have an on-board help database. The database shall provide context-sensitive help to assist with setup and navigation of the menus.
- **Display Setup -** The user shall be able to configure the display information based on the specific user's preference. Language, units of measure, screen contrast, home screen layout, back-light timer and the hide/show of certain readouts shall be configurable through the display.
- **Additional Readouts -** The display shall enable the user to configure custom widgets on the main screen. Widget options will include items such as fan speed, call for cooling, maintenance status, call for electric reheat, call for dehumidification, call for humidification, airflow, static pressure
- **Status LED's -** The ICOM™ shall show the unit's operating status using an integral LED. The LED shall indicate if the unit has an active alarm; if the unit has an active alarm that has been acknowledged; or if the unit is On, Off or in standby status.
- **Event Log -** The ICOM™ shall automatically store the last 400 unit-only events (messages, warnings, and alarms).
- **Service Contact Information -** The ICOM™ shall be able to store the local service or sales contact information.
- **Upgradeable -** ICOM™ upgrades shall be performed through a USB connection.
- **Timers/Sleep Mode -** The menus shall allow various customer settings for turning the unit On or Off.

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- **Menu Layout -** The menus shall be divided into two main menus: User and Service. The User screen shall contain the menus to access parameters required for basic unit control and setup. The Service screen shall be designed for service personnel and shall provide access to advanced control setup features and diagnostic information.
- **Sensor Calibration -** The menus shall allow unit sensors to be calibrated with external sensors.
- **Maintenance/Wellness Settings -** The menus shall allow reporting of potential component problems before they occur.
- **Options Setup -** The menus shall provide operation settings for the installed components.
- **Auxiliary Boards -** The menus shall allow setup of optional expansion boards.
- **Diagnostics/Service Mode -** The ICOM™ control shall be provided with self-diagnostics to aid in troubleshooting. The microcontroller board shall be diagnosed and reported as pass/not pass. Control inputs shall be indicated as On or Off at the front display. Control outputs shall be able to be turned On or Off from the front display without using jumpers or a service terminal. Each control output shall be indicated by an LED on a circuit board.

3.2 Alarms

All unit alarms shall be annunciated through both audio and visual cues, clearly displayed on the screen, automatically recorded in the event log, and communicated to the customer's Building Management System/Building Automation System. The Vertiv™ iCOM™ shall activate an audible and visual alarm in event of any of the following conditions:

- High or Low Pressure
- Discharge High Temperature
- Low discharge superheat
- High- or Low-pressure lock
- Discharge high temperature lock alarm
- Discharge low super heat lock alarm
- Return air high or low temperature alarm
- Remote air high or low temperature alarm
- Filter clogged
- Remote powering off alarm
- Return air temperature sensor failure
- Return air humidity sensor failure
- High- or low-pressure sensor failure
- Suction temperature sensor failure
- Discharge temperature sensor failure
- EEV communication failure
- Compressor driver communication failure
- Water leakage alarm
- Return air high or low humidity alarm

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- Air flow loss alarm
- Fan detection board communication failure
- Fan failure alarm
- High condensate water alarm
- Teamwork addresses duplicated
- Teamwork primary unit loss
- Teamwork secondary unit loss
- Smoke alarm
- Custom Alarms
- Humidifier failure alarm
- CP driver protect
- CP driver lock
- EEV driver abnormal
- Air pressure sensor failure
- Filter maintenance
- Refrigerant Leak
- Cooling Disabled
- Condensate Pump High Water
- FreeCooling Lockout
- Reduced ECO Airflow

3.3 Vertiv™ iCOM™ Control Methods and Options

The Vertiv™ iCOM™ shall be factory-set to allow precise monitoring and control of the condition of the air entering and leaving the unit. This control shall include predictive methods to control air flow and cooling capacity-based control sensors installed. Proportional and Tunable PID shall also be user-selectable options.

3.4 Controlling Sensor Options

The Vertiv™ iCOM™ shall be flexible in the sense that it shall allow for controlling the capacity and fan from multiple different sensor selections. The sensor selections shall be:

Cooling Capacity

- Remote
- Return

Fan Speed

- Remote
- Return
- Manual (for diagnostic or to receive a signal from the BMS through the Liebert remote monitoring devices or analog input)

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3.4.1 Temperature Compensation

The Vertiv™ iCOM™ shall be able to adjust the capacity output based on Return or Remote temperature conditions to meet SLA guidelines while operating to highest efficiency.

3.4.2 Humidity Control

Dew point and relative humidity control methods shall be available (based on user preference) for humidity control within the conditioned space

3.5 Multi-Unit Coordination

Vertiv™ iCOM™ teamwork shall save energy by preventing multiple units in an area from operating in opposing modes. Teamwork allows the control to optimize a group of connected cooling units equipped with Vertiv™ iCOM™ using the U2U (Unit-to-Unit) network. There shall be three modes of teamwork operation:

- **Teamwork Mode 1:** Is best in small rooms with balanced heat loads. The controlling temperature and humidity sensor readings of all units in operation (fan on) are collected to be used for an average or worst-case sensor reading (user selectable). The master unit shall send the operating requirements to all operating units in the group. The control band (temperature, fan, and humidity) is divided and shared among the units in the group.
- **Teamwork Mode 2:** The iCOM™ calculates the worse-case demand for heating, cooling humidification and dehumidification. Based on the greatest demand within the group, each unit operates independently, meaning that the unit may respond to the thermal load and humidity conditions based on the unit's controlling sensors.

3.6 Standby/Lead Lag

The Vertiv™ iCOM™ shall allow scheduled rotation to keep equal run time on units and provide automated emergency rotation of operating and standby units.

3.7 Standby Unit Cascading

The Vertiv™ iCOM™ cascade option shall allow the units to turn On and Off based on heat load when utilizing Optimized Aisle, Teamwork Mode 3 and remote temperature sensors. Cascade mode dynamically coordinates the fan speed to save energy and to meet the cooling demands. For instance, with a Vertiv™ iCOM™ group of six units and only 50% of the heat load, the iCOM™ shall operate only four units at 80% fan speed and leave the other two units in standby. As the heat load increases, the iCOM™ shall automatically respond to the additional load and bring on another unit, increasing the units in operation to five. As the heat load shifts up or down, the control shall meet the needs by cascading units On or putting them into standby.

3.8 Virtual Primary

As part of the robust architecture of the Vertiv™ iCOM™ control, it shall allow for a virtual primary that coordinates operation. The Virtual Primary function shall provide smooth control operation if the group's communication is compromised. When the lead unit, which is in charge of component staging in teamwork, unit staging and standby rotation, becomes disconnected from the network, the iCOM™ shall automatically assign a virtual primary. The virtual primary shall assume the same responsibilities as the primary until communication is restored.

3.9 Compressor Short Cycle Control

To help maximize the life of the compressor, there shall be start-to-next start delay for the compressor. The control shall monitor the number of compressor starts in an hour. If the compressor starts more than 6 times in 60 minutes, the local display and remote monitoring shall notify the user through a Compressor 1 Short Cycle event. The Compressor 1 Short Cycle event will remain active for at least 1 hour after being enabled.

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3.10 Vertiv™ CoolPhase Condensing Unit

Units may be matched to a premium efficiency condenser control with enhanced monitoring, alarming, and diagnostics. The condenser control shall have an automated, low-noise mode and fan reversal for cleaning mode.

3.11 System Auto Restart

The auto restart feature shall automatically restart the system after a power failure. Time delay shall be programmable.

3.11.1 Sequential Load Activation

On initial startup or restart after power failure, each operational load shall be sequenced with a minimum delay of one second to minimize total inrush current.

3.11.2 Low Pressure Monitoring

Units shall ship standard with low-pressure transducers for monitoring compressor suction pressure. If the pressure falls due to loss of charge or other mechanical cause, the corresponding circuit shall shut down to prevent equipment damage. The user shall be notified of the low-pressure condition through the local display and remote monitoring.

3.12 Winter Start Time Delay - Air - Cooled Models

An adjustable software timer shall be provided to assist with compressor starting during cold weather. When the compressor starts, the low-pressure input shall be ignored for the period set in the user-adjustable timer. Once the time period has elapsed after the compressor start, the low-pressure input should remain in the normal state. If the low-pressure input does not remain in the normal state when the time delay has elapsed, the circuit shall lock out on low pressure. The low-pressure alarm shall be announced on the local display and communicated to remote monitoring systems.

3.12.1 Advanced Freeze Protection

Units shall ship standard with advanced freeze protection enabled. The advanced freeze protection shall monitor the circuit pressure using a transducer. The control shall interact with the fan and compressor to prevent the unit coil from freezing if circuit suction pressure drops. If a freeze condition is detected, the user shall be notified through the local display and remote monitoring systems.

3.13 Refrigerant Pressure Transducer Failure

The control shall monitor the high-side and low-side refrigerant pressure transducers. If the control senses the transducer has failed, has been disconnected, has shorted or the reading has gone out of range, the user shall be notified through an event on the local display and remote monitoring. The corresponding circuit in which the failure has occurred shall be disabled to prevent unit damage.

3.14 Oil Return Protection

The control shall monitor compressor operation and staging to ensure that liquid and hot gas velocity are maintained for proper oil return to the compressor.

3.15 Digital Scroll High Temperature Protection

The control shall monitor digital scroll temperature during unit operation. A compressor temperature limit shall be imposed to help prevent damage to the compressor. If the temperature reaches the maximum temperature limit, the compressor shall be locked out and an alarm shall be annunciated on the local display and through monitoring. After the initial lockout, the control shall continue to monitor compressor temperature during the off-cycle and re-enable the circuit once a safe operating temperature is reached. The control shall store the number of high temperature trips. The number of trips shall be accessible through the local display.

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3.16 Digital Scroll Sensor Failure

The control shall monitor the status of the digital scroll sensor. If the control senses that the thermistor is disconnected, shorted or the reading goes out of range, the user shall be notified through an event on the local display and remote monitoring.

3.17 Compressor High and Low Temperature Limit Protection

The control shall monitor the return air to ensure that the compressor(s) are operated within the manufacturer's defined window of operation. If the return air temperature deviates from the manufacturer's window of operation, the Vertiv™ iCOM™ shall automatically adjust to prevent damage to the cooling unit or reduction in its reliability.

3.18 Compressor Run Time Monitoring

- The control shall log these compressor statistics:
  - Number of compressor starts
  - Run hours
  - Average run time
  - Starts per day
  - Starts per day worst
  - Number of high-pressure alarms
  - Operating phase in which the high-pressure alarm occurred
  - Number of low-pressure alarms
  - Operating phase in which the low-pressure alarm occurred
  - Number of compressor overloads
  - Number of high-temperature alarms

The user shall have the ability to monitor compressor operating temperature and pressure from the local display to be used as a diagnostic tool.

3.19 Return Temperature/ Humidity Sensor

The Vertiv™ CoolPhase Ceiling shall be provided with the Vertiv™ Liebert® Return Temperature/Humidity sensor. The sensor shall provide real-time, direct feedback to the cooling unit to optimize the amount of cooling and airflow provided. The sensor data shall be available to remote BMS and monitoring systems. The sensor network shall consist of one CAN wire leaving the cooling unit and connecting to the Return Temperature/Humidity Sensor. Additional CAN based sensors (Remote) shall be connected to this sensor.

3.20 Communication Interface

3.20.1 Remote Shutdown Terminal

The remote shutdown terminal shall provide a location to remotely shut down the unit, complying with the National Fire Code.

3.20.2 Common Alarm Contact

The common alarm contact shall provide a set of normally open contacts for remote indication of unit alarms.

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3.20.3 Vertiv™ CoolPhase Ceiling One Extra Common Alarm Contact

One additional contact (total of two sets) of normally open (n/o) contacts for remote indication of unit alarms shall be provided.

3.21 10DI Digital Input Expansion Module

The 10DI Digital Input Expansion Module is an optional accessory designed to extend the digital input capabilities of system's main controller. It features 10 digital input channels and communicates with the main controller via Modbus RTU protocol over RS-485. The module is primarily used to monitor external feedback signals from EC (Electronically Commutated) fans and customer-installed Water Underflow accessory.

Core Functions:

- Provides 10 additional digital inputs for system integration
- Supports two types of digital input signals:
- Frequency-based feedback (tachometer) from EC fans for fan status monitoring
- Dry contact input for user-defined alarms (e.g., Water Underflow)
- Real-time status update of all input signals via Modbus communication
- Facilitates system diagnostics and enhances fault detection capabilities

Communication and Integration:

- Protocol: Modbus RTU (RS-485)

3.22 Refrigerant Leak Detection (RLS) System

Due to the slightly flammable nature of Refrigerant R-32, a refrigerant leak detector is installed into the unit.

Operation

When the sensor is powered up, an LED will indicate the sensor status. The LED is located on the reverse side of the sensor near the sensor membrane. While the sensor is mounted, the LED will backlight the sensor and be visible by the reflection from the mounting surface.

Item	Description
Solid green	Sensor power-up and self-test
Blinking green	Normal operation (heartbeat)
Solid red	Alarm state – gas detected
Blinking red	Sensor fault

In case of leakage the following actions will be taken:

- The compressor will shut down
- The evaporator and condenser fans will operate at 100% of their allowable speed
- The EEV will be closed completely
- Safety Shut-off Valve deactivates and will close completely, preventing additional refrigerant flow

NOTE: In case of leakage the unit will start mitigation actions and will send an alarm:

- The mitigation actions will continue for 5 minutes after detected gas levels drop below the sensor’s factory default threshold setting

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- Once the detected gas levels are below threshold and the 5-minute delay expires, the sensor will reactivate its status relay.
- Once the sensor's status relay is reactivated, the refrigerant leak related alarms are automatically cleared, the Evaporator and Condenser fans will be deactivated and turned Off, and Cooling Lockout alarms are displayed on the HMI
- Authorized personnel will clear the Cooling Lockout by pushing the refrigerant leak clear push button for 10 seconds. The push button is located in the EBOX
- Once cleared, the Safety Shut Off Valve will reactivate and open completely, the Cooling Lockout alarms are cleared automatically and the system will return to normal cooling operation, if the unit was previously actively cooling prior to the refrigerant leak.

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4.0 HEAT REJECTION

4.1 Vertiv™ CoolPhase Condensing Unit

4.1.1 Standard Features

The condenser shall consist of microchannel condenser coil(s), propeller fan(s) direct driven by individual fan motor(s), electrical controls, housing. Microchannel coils shall provide superior heat transfer, reduce air side pressure drop, increase energy efficiency, and shall significantly reduce the system refrigerant volume required. EC fans and fan operating techniques shall provide reduced maximum sound levels. Various methods shall be available to match indoor unit type, maximum outdoor design ambient and maximum sound requirements.

The unit includes service valves, low-pressure and high-pressure transducer, crankcase and heating belt for low/ambient application.

4.1.2 Compressor

The compressor shall be scroll-type with variable-capacity operation from 20% to 100%, commonly known as a variable-speed scroll compressor. The compressor shall include vibration isolators and shall operate at 100% speed at 60 Hz as follows: 1440 RPM for CU03, 1910 RPM for CU07, 2400 RPM for CU11, 2640 RPM for CU15, 3900 RPM for CU21, 5100 RPM for CU28, and 6000 RPM for CU35. The compressor shall be removable and serviceable from the front of the unit.

4.1.3 R-32 Refrigerant

The system shall be designed for use with R-32 refrigerant, which meets the U.S. Clean Air Act for phaseout of HCFC refrigerants.

4.1.4 Condenser Coil

Aluminum Microchannel Coil

Microchannel coils shall be constructed of aluminum microchannel tubes, fins, and manifolds. Tubes shall be flat and contain multiple, parallel flow microchannels and span between aluminum headers. Full-depth, louvered aluminum fins shall fill spaces between the tubes. Tubes, fins, and aluminum headers shall be oven-brazed to form a complete refrigerant-to-air heat exchanger coil. Copper stub pipes shall be electric resistance welded to aluminum coils and joints protected with polyolefin to seal joints from corrosive environmental elements. Complete coil/piping assembly shall be filled and sealed with an inert gas holding charge for shipment.

Aluminum Microchannel Coil with E-Coat

Aluminum microchannel coil with E-coat shall be epoxy-coated for extended coil life in corrosive environments, such as coastal areas. Factory-applied E-coat using immersion and baking process shall provide a flexible epoxy-coating to all coil surfaces. Coil color shall be black and shall be protected from solar UV ray degradation with a factory-applied UV topcoat. E-coat shall increase coil corrosion protection and shall reduce heat rejection capacity degradation to less than 10% after a severe 2000-hour 5% neutral salt spray test (ref. ASTM B117). The coating process shall ensure complete coil encapsulation.

4.1.5 Fan Motor/Blade Assembly

The fan motor/blade assembly shall have an external rotor motor, fan blades and fan/finger guard. Fan blades shall be constructed of cast aluminum or glass-reinforced polymeric material. Fan guards shall be heavy gauge, close-meshed steel wire, coated with a black, corrosion-resistant finish. Fan terminal blocks shall be enclosure located on the top of the fan motor. Fan assemblies shall be factory- balanced, tested before shipment and mounted securely to the condenser structure.

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EC Fan Motor

The EC fan motors shall be electronically commutated for variable speed operation and shall have ball bearings. The EC fans shall provide internal overload protection through built-in electronics. Each EC fan motor shall have a built-in controller and communication module, linked via RS-485, allowing each fan to receive and respond to precise fan speed inputs from the controller.

4.1.6 Electrical Controls

Electrical controls and service connection terminals shall be provided and factory-wired inside the attached control panel section. A locking disconnect switch shall be factory-mounted and wired to the electrical panel and controlled via an externally mounted locking and lockable door handle. Only high-voltage supply wiring and low-voltage indoor unit communication/interlock wiring shall be required at condenser installation.

Premium Control

The EC fan/Premium Control System shall include an electronic control board, EC fan motor(s) with internal overload protection, refrigerant and ambient temperature thermistors, and refrigerant pressure transducers. The control board shall receive an indoor unit run signal via field-supplied low voltage interlock wires to the compressor side switch via field-supplied CANbus communication wires from the indoor unit's Vertiv™ iCOM™ or via both. The control board shall use sensor and communication inputs to maintain refrigerant pressure by controlling each EC fan on the same refrigerant circuit to the same speed.

Locking Disconnect

A locking-type disconnect switch shall be factory-mounted and wired to the electrical panel. The switch shall be accessible from the outside of the unit with the door closed and shall prevent access to the high-voltage electrical components until switched to the Off position. The locking disconnect shall be lockable in support of lockout/tag-out safety programs.

Short Circuit Current Rating

The electrical panel shall provide at least 65,000A SCCR.

4.1.7 Cabinet

The condenser cabinet shall be constructed of galvanized steel sheet with powder coating finish and shall have a fan. Internal structural support members including microchannel supports and wire grille to protect microchannel, shall be galvanized steel with powder coating finish for strength and corrosion resistance. A panel door shall be provided next to the electrical enclosure to permit microchannel cleaning. And an electrical panel shall be contained inside a factory mounted, IP54 weatherproof electrical enclosure.

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5.0 EXECUTION

5.1 Installation of Vertiv™ Thermal Management Units

5.1.1 General

Install cooling units in accordance with manufacturer's installation instructions. Install units plumb and level, firmly anchored in locations indicated and maintain manufacturer's recommended clearances.

5.1.2 Electrical Wiring

Install and connect electrical devices furnished by manufacturer but not specified to be factory mounted. Furnish copy of manufacturer's electrical connection diagram submittal to electrical contractor.

5.1.3 Piping Connections

Install and connect devices furnished by manufacturer but not specified to be factory mounted. Furnish copy of manufacturer's piping connection diagram submittal to piping contractor.

5.1.4 Refrigerant Charging

Charge completed cooling system in accordance with manufacturer's refrigerant charging instructions.

5.1.5 Field Quality Control

Start-up cooling units in accordance with manufacturer's startup instructions. Test controls and demonstrate compliance with requirements. These specifications describe requirements for a computer room environmental control system. The system should be designed to maintain temperature and humidity conditions in the rooms containing electronic equipment.

The manufacturer shall design and furnish all equipment to be fully compatible with heat dissipation requirements.

5.1.6 Supply and Drain Water Piping

Connect water supply and drains to air conditioning unit. Provide pitch and trap as manufacturer's instructions and local codes require.

5.1.7 Vertiv™ CoolPhase Condensing Unit

Install condenser in accordance with manufacturer's installation instructions provided with seismic option. Firmly anchor, maintaining manufacturer's recommended clearances. Mounting requirement details such as anchor brand, type, embedment depth, edge spacing, anchor-to-anchor spacing, concrete strength, special inspection and attachment to non-building structures must be outlined and approved by the Engineer of Record for the projection or building. Wiring and piping connections must permit movement in three dimensions and isolate the unit from field connections. Electrical conduits shall be flexible, having at least one bend between the rigid connection at the unit cabinet and the connection to rigid conduit or foundation. The piping flexible connection or loop must be suitable for the operation pressure and temperature of the system. Furnish copy of manufacturer's piping connection diagram submittal to piping contractor.

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Appendix C: Submittal Drawings

The following are the submittal drawings of the Vertiv™ CoolPhase Ceiling and Vertiv™ CoolPhase Condensing Unit.

Document Number	Title
Component Locations	
20000077	Component Location, Evaporator Unit, 1 Ton
20000078	Component Location, Evaporator Unit, 2 & 3 Ton
20000079	Component Location, Evaporator Unit, 4 & 5 Ton
20000080	Component Location, Evaporator Unit, 8 Ton
20000915	Component Location Condenser Unit 3.5, 7 & 11 kW
20000710	Component Location Condenser Unit 15 kW
20000128	Component Location Condenser Unit 21 & 28 kW
Standard and Optional Features	
20000200	Standard and Optional Features Evaporator Unit, 1-8 Ton
20000162	Standard and Optional Features Condensing Unit, 3.5, 7, 11 kW
20000574	Standard and Optional Features Condensing Unit, 15, 21, 28 kW
iCOM submittals	
20000914	HMI Display Field Connection
20000913	Vertiv™ iCOM Unit-to-Unit Network Connection
Planning Dimensions	
20000081	Vertiv CoolPhase Ceiling Dimensional Data Cabinet Dimensions, 1 Ton
20000082	Vertiv CoolPhase Ceiling Dimensional Data Cabinet Dimensions, 2 & 3 Ton
20000083	Vertiv CoolPhase Ceiling Dimensional Data Cabinet Dimensions, 2 & 3 Ton
20000084	Vertiv CoolPhase Ceiling Dimensional Data Cabinet Dimensions, 8 Ton
20000159	Vertiv CoolPhase Condensing Unit Dimensional Data Condenser Unit 3.5, 7 & 11 kW
20000575	Vertiv CoolPhase Condensing Unit Dimensional Data Condenser Unit 3.5, 7 & 11 kW
20000136	Vertiv CoolPhase Condensing Unit Cabinet Dimensions Condenser Unit 21 & 28 kW
Electrical Field Connections & Terminal Blocks	
20000193	CoolPhase Ceiling Electrical Field Connections 1 Ton DX & FC
20000194	CoolPhase Ceiling Electrical Field Connections 2 & 3 Ton DX & FC
20000195	CoolPhase Ceiling Electrical Field Connections 2 & 3 Ton DX & FC
20000196	CoolPhase Ceiling Electrical Field Connections 8 Ton DX & FC
20000161	CoolPhase Condensing Unit Electrical Field Connections 3.5, 7 & 11 kW
20000706	CoolPhase Condensing Unit Electrical Field Connections 15 kW
20000708	CoolPhase Condensing Unit Electrical Field Connections 21 kW

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Document Number	Title
20000328	CoolPhase Condensing Unit Electrical Field Connections 28 kW
CoolPhase Ceiling Electrical Schematics	
10092534P1DRW	CoolPhase Ceiling Electrical Schematics 1 Ton 1-Ph 203 230 VAC 50/60 Hz
10092534P2DRW	CoolPhase Ceiling Electrical Schematics 2 Ton 1-Ph 203 230 VAC 50/60 Hz
10092534P3DRW	CoolPhase Ceiling Electrical Schematics 3 Ton 1-Ph 203 230 VAC 50/60 Hz
10092534P4DRW	CoolPhase Ceiling Electrical Schematics 3 Ton 3-Ph 203 230 VAC 50/60 Hz
10092534P11DRW	CoolPhase Ceiling Electrical Schematics 3 Ton 3-Ph 460 VAC 50/60 Hz
10092534P5DRW	CoolPhase Ceiling Electrical Schematics 4 Ton 3-Ph 203 230 VAC 50/60 Hz
10092534P8DRW	CoolPhase Ceiling Electrical Schematics 4 Ton 3-Ph 460 VAC 50/60 Hz
10092534P6DRW	CoolPhase Ceiling Electrical Schematics 5 Ton 3-Ph 203 230 VAC 50/60 Hz
10092534P9DRW	CoolPhase Ceiling Electrical Schematics 5 Ton 3-Ph 460 VAC 50/60 Hz
10092534P7DRW	CoolPhase Ceiling Electrical Schematics 8 Ton 3-Ph 203 230 VAC 50/60 Hz
10092534P10DRW	CoolPhase Ceiling Electrical Schematics 8 Ton 3-Ph 460 VAC 50/60 Hz
CoolPhase Condensing Unit Electrical Schematics	
29044991	CoolPhase Condensing Unit Electrical Schematics 3.5 & 7 kW 230 V 1-Ph
29044993	CoolPhase Condensing Unit Electrical Schematics 11 kW 230 V 3-Ph
29045791	CoolPhase Condensing Unit Electrical Schematics 11 kW 460 V 3-Ph
10068508P9	CoolPhase Condensing Unit Electrical Schematics 15 kW 230 V 3-Ph
10068508P10	CoolPhase Condensing Unit Electrical Schematics 15 kW 460 V 3-Ph
10068508P11	CoolPhase Condensing Unit Electrical Schematics 21 kW 230 V 3-Ph
10068508P12	CoolPhase Condensing Unit Electrical Schematics 21 kW 460 V 3-Ph
10068508P1	CoolPhase Condensing Unit Electrical Schematics 28 kW 230 V 3-Ph
10068508P2	CoolPhase Condensing Unit Electrical Schematics 28 kW 460 V 3-Ph
Piping General Arrangement Drawings	
20000567	CoolPhase Ceiling General Arrangement 1-2 Ton Dx Air Cooled
20000568	CoolPhase Ceiling General Arrangement 3-8 Ton Dx Air Cooled
20000569	CoolPhase Ceiling General Arrangement 1-8 Ton Free Cooling
Piping Schematics Drawings	
20000167	CoolPhase Ceiling Piping Schematic Direct Expansion Unit 1 Ton Piping Schematics
20000168	CoolPhase Ceiling Piping Schematics Free Cooling Option 1 Ton Piping Schematics
20000169	CoolPhase Ceiling Piping Schematic Direct Expansion Unit 2 & 3 Ton Piping Schematics
20000170	CoolPhase Ceiling Piping Schematics Free Cooling Option 2 & 3 Ton Piping Schematics
20000171	CoolPhase Ceiling Piping Schematic Direct Expansion Unit 4 & 5 Ton Piping Schematics

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Document Number	Title
20000172	CoolPhase Ceiling Piping Schematics Free Cooling Option 4 & 5 Ton Piping Schematics
20000173	CoolPhase Ceiling Piping Schematic Direct Expansion Unit 8 Ton Piping Schematics
20000174	CoolPhase Ceiling Piping Schematics Free Cooling Option 8 Ton Piping Schematics
Primary Connection Locations	
20000175	CoolPhase Ceiling Primary Connection Locations 1 Ton Dx & Fc
20000176	CoolPhase Ceiling Primary Connection Locations 2 & 3 Ton Dx & Fc
20000177	CoolPhase Ceiling Primary Connection Locations 4 & 5 Ton Dx & Fc
20000178	CoolPhase Ceiling Primary Connection Locations 8 Ton Dx & Fc
20000160	CoolPhase Condensing Unit Primary Connection Locations 3.5, 7 & 11 kW
20000573	CoolPhase Condensing Unit Primary Connection Locations 3.5, 7 & 11 kW
20000154	CoolPhase Condensing Unit Primary Connection Locations 15, 21 & 28 kW
Piping Schematic Condensing Unit Above / Below Indoor Unit	
20000916	CoolPhase Condensing Unit Above / Below Indoor Unit 3.5, 7 & 11 kW
20000572	CoolPhase Condensing Unit Above / Below Indoor Unit 15 & 21 kW
20000324	CoolPhase Condensing Unit Above / Below Indoor Unit 28 kW
DX Products with R32	
20000457	A2L Refrigerant Dispersal Volume Calculation R32
Pipe Dimensional Data	
20000160	CoolPhase Condensing Unit Piping Dimensional Data 3.5, 7 & 11 kW
20000573	CoolPhase Condensing Unit Piping Dimensional Data 15 & 21 kW
20000326	CoolPhase Condensing Unit Piping Dimensional Data 28 kW
OPTIONAL ACCESSORIES	
Filter Box	
20000085	Vertiv™ CoolPhase Ceiling Dimensional Data Filter Box 1 Ton
20000088	Vertiv™ CoolPhase Ceiling Dimensional Data Filter Box 2 & 3 Ton
20000091	Vertiv™ CoolPhase Ceiling Dimensional Data Filter Box 4 & 5 Ton
20000092	Vertiv™ CoolPhase Ceiling Dimensional Data Filter Box 8 Ton
Condensate Pump Kit	
20000104	Vertiv™ CoolPhase Ceiling Piping Connections Condensate Pump Connection Locations, 1 Ton
20000105	Vertiv™ CoolPhase Ceiling Piping Connections Condensate Pump Connection Locations, 2 & 3 Ton
20000106	Vertiv™ CoolPhase Ceiling Piping Connections Condensate Pump Connection Locations, 4 & 5 Ton
20000107	Vertiv™ CoolPhase Ceiling Piping Connections Condensate Pump Connection Locations, 8 Ton
Duct Flanges	

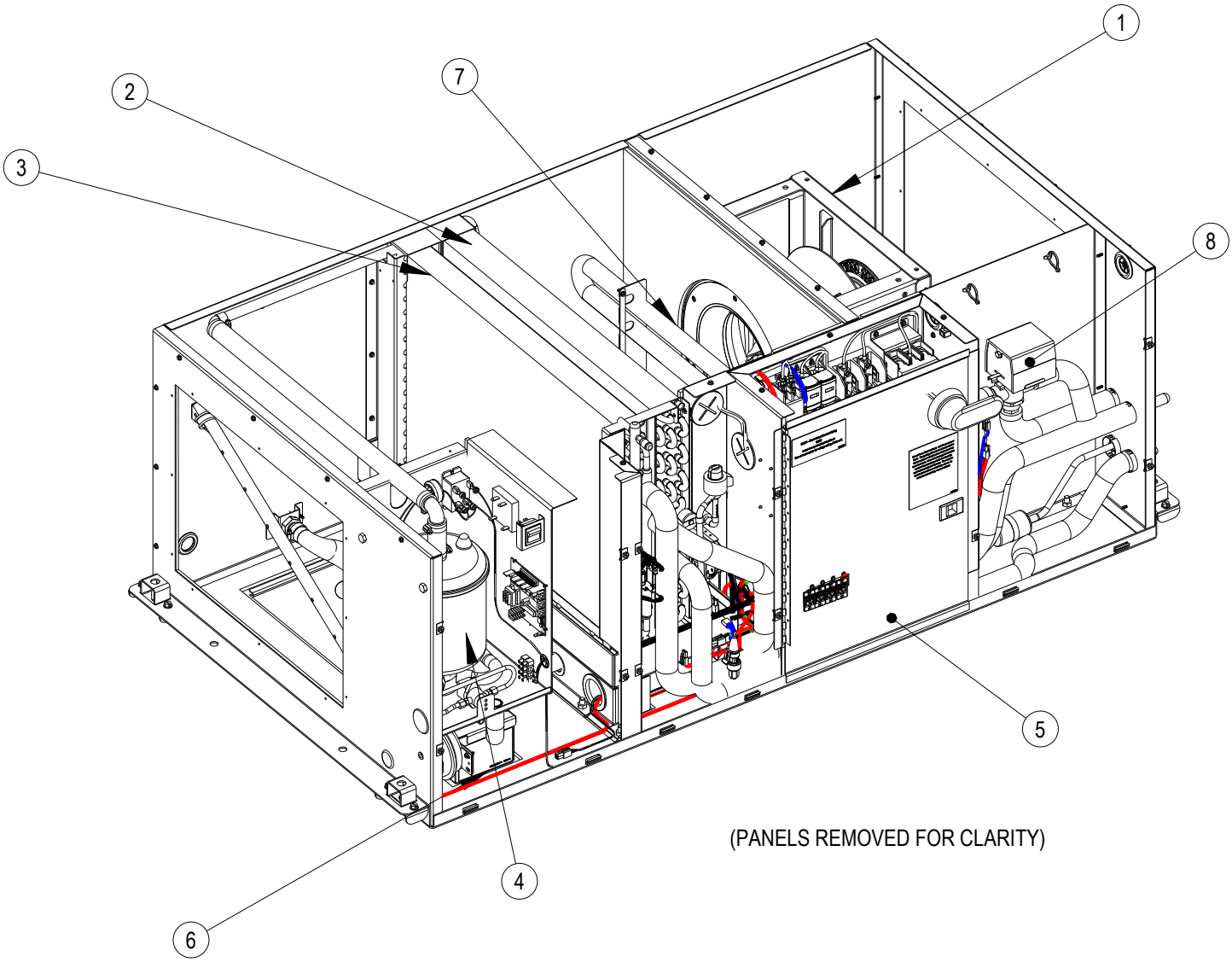
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Document Number	Title
20000256	Vertiv™ CoolPhase Ceiling Dimensional Data Duct Flanges, 1 Ton
20000257	Vertiv™ CoolPhase Ceiling Dimensional Data Duct Flanges, 2 & 3 Ton
20000258	Vertiv™ CoolPhase Ceiling Dimensional Data Duct Flanges, 4 & 5 Ton
20000259	Vertiv™ CoolPhase Ceiling Dimensional Data Duct Flanges, 8 Ton
Downflow Grille	
20000087	Vertiv™ CoolPhase Ceiling Dimensional Data Downflow Grille 1 Ton
20000090	Vertiv™ CoolPhase Ceiling Dimensional Data Downflow Grille 2 & 3 Ton
Air Distribution Plenum	
20000086	Vertiv™ CoolPhase Ceiling Dimensional Data Air Distribution Plenum 1 Ton
20000089	Vertiv™ CoolPhase Ceiling Dimensional Data Air Distribution Plenum 2 & 3 Ton
Hail Guard	
20000729	CoolPhase Condensing Unit Hail Guard 15 kW
20000183	CoolPhase Condensing Unit Hail Guard 21/28 kW
Wind Baffle Kit	
20000728	CoolPhase Condensing Unit Wind Baffle Kit 15 kW

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VERTIV COOLPHASE CEILING

COMPONENT LOCATION
EVAPORATOR UNIT, 1 TON

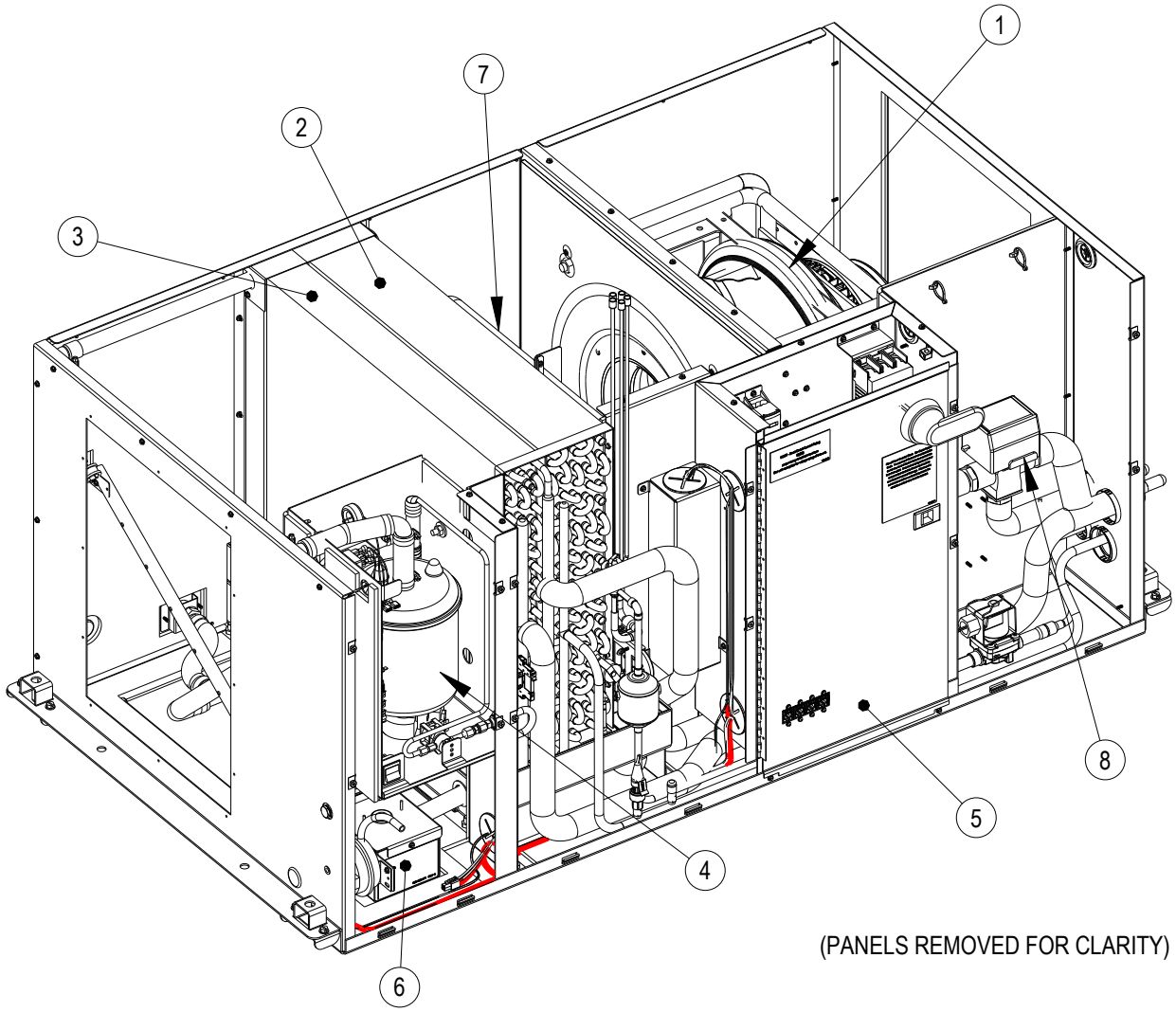


(PANELS REMOVED FOR CLARITY)

ITEM	DESCRIPTION
1	DIRECT DRIVE FAN WITH VARIABLE SPEED EC MOTOR
2	EVAPORATOR COIL DX
3	EVAPORATOR COIL FREE COOLING (OPTIONAL)
4	HUMIDIFIER (OPTIONAL)
5	ELECTRICAL BOX
6	SMOKE SENSOR (OPTIONAL)
7	ELECTRICAL REHEAT (OPTIONAL)
8	3-WAY VALVE (ONLY IN FREE COOLING OPTION)

VERTIV COOLPHASE CEILING

COMPONENT LOCATION
EVAPORATOR UNIT, 2 & 3 TON



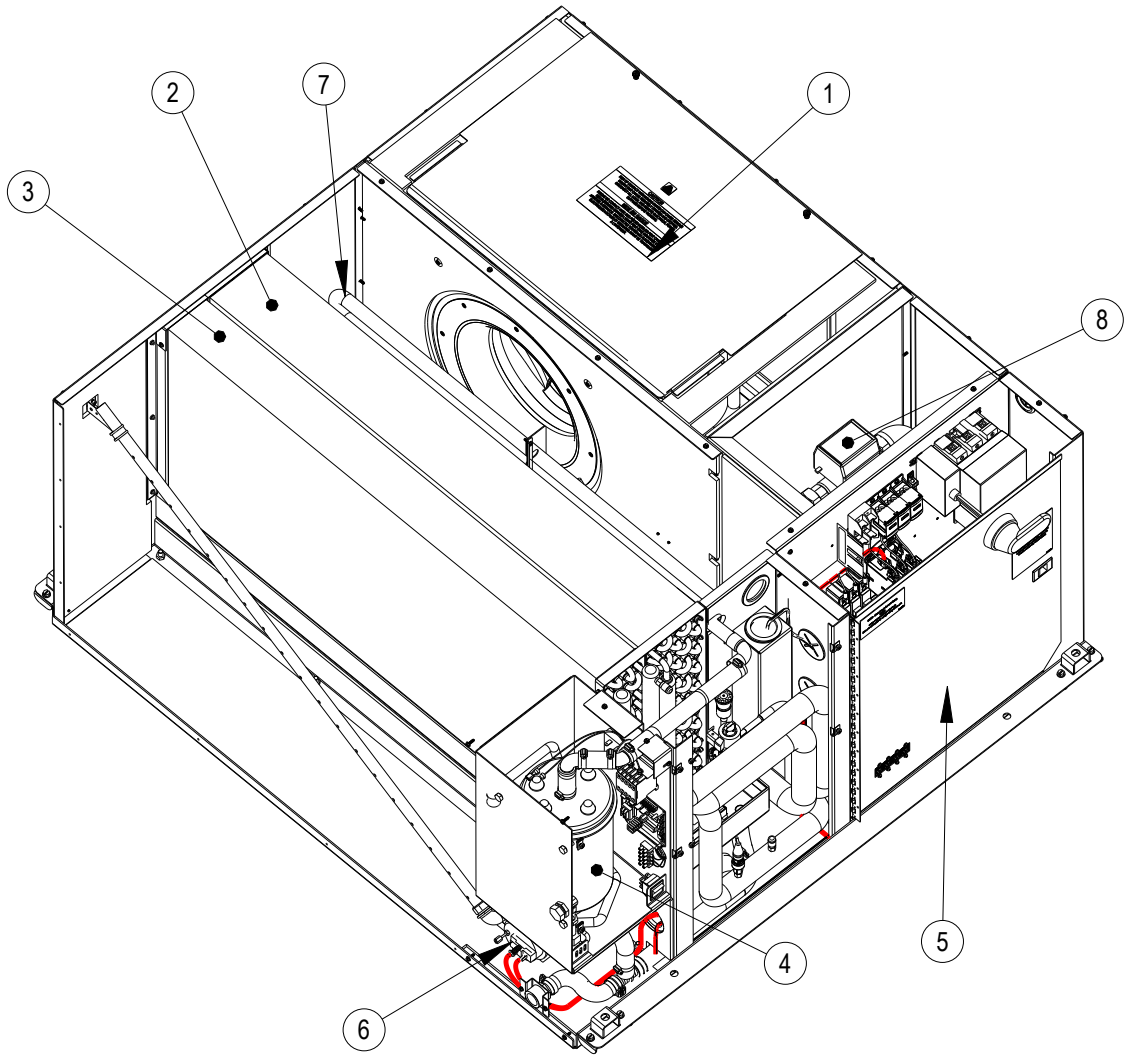
(PANELS REMOVED FOR CLARITY)

ITEM	DESCRIPTION
1	DIRECT DRIVE FAN WITH VARIABLE SPEED EC MOTOR
2	EVAPORATOR COIL DX
3	EVAPORATOR COIL FREE COOLING (OPTIONAL)
4	HUMIDIFIER (OPTIONAL)
5	ELECTRICAL BOX
6	SMOKE SENSOR (OPTIONAL)
7	ELECTRICAL REHEAT (OPTIONAL)
8	3-WAY VALVE (ONLY IN FREE COOLING OPTION)

VERTIV COOLPHASE CEILING

COMPONENT LOCATION

EVAPORATOR UNIT, 4 & 5 TON

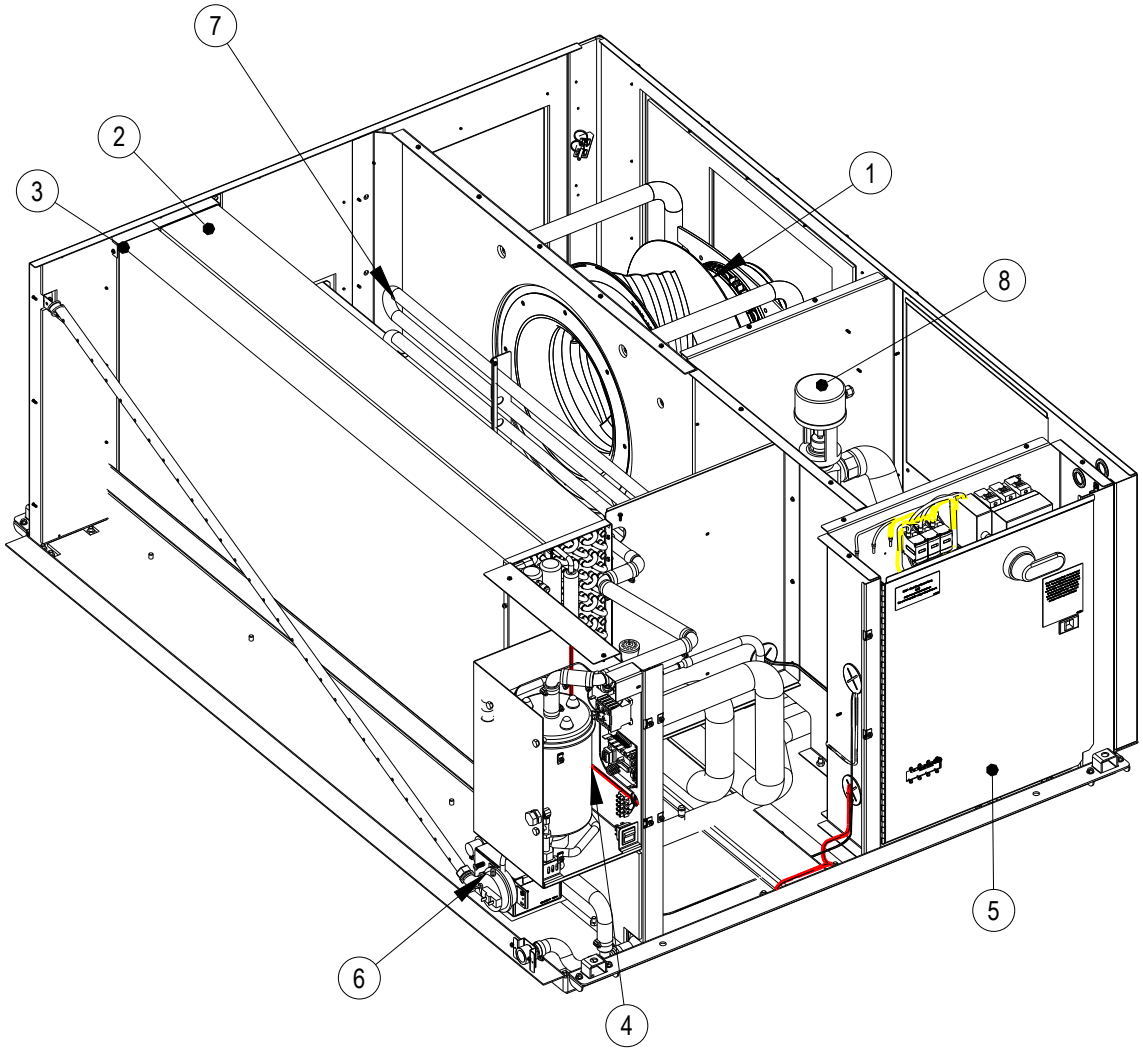


(PANELS REMOVED FOR CLARITY)

ITEM	DESCRIPTION
1	DIRECT DRIVE FAN WITH VARIABLE SPEED EC MOTOR
2	EVAPORATOR COIL DX
3	EVAPORATOR COIL FREE COOLING (OPTIONAL)
4	HUMIDIFIER (OPTIONAL)
5	ELECTRICAL BOX
6	SMOKE SENSOR (OPTIONAL)
7	ELECTRICAL REHEAT (OPTIONAL)
8	3-WAY VALVE (ONLY IN FREE COOLING OPTION)

VERTIV COOLPHASE CEILING

COMPONENT LOCATION
EVAPORATOR UNIT, 8 TON



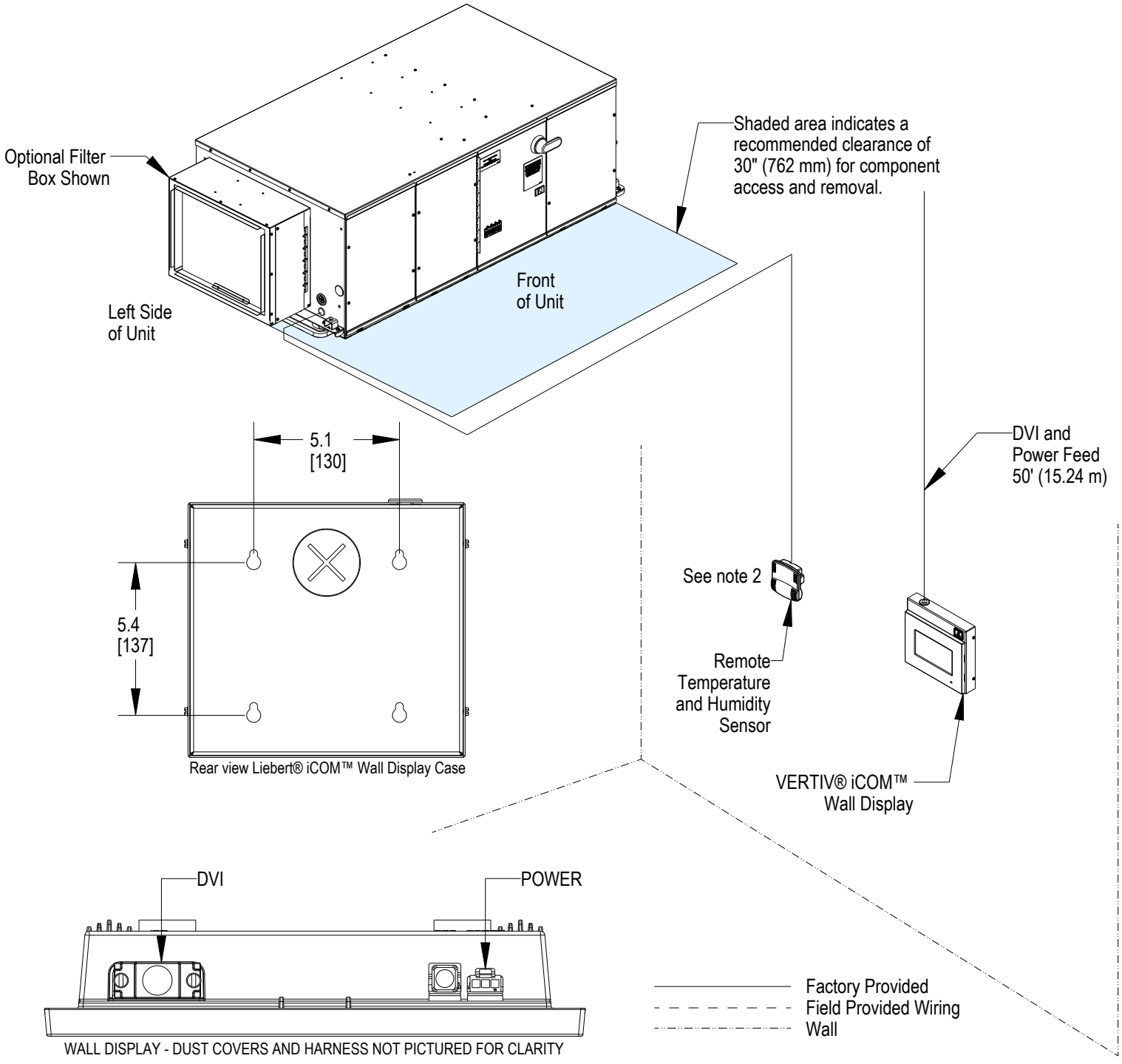
(PANELS REMOVED FOR CLARITY)

ITEM	DESCRIPTION
1	DIRECT DRIVE FAN WITH VARIABLE SPEED EC MOTOR
2	EVAPORATOR COIL DX
3	EVAPORATOR COIL FREE COOLING (OPTIONAL)
4	HUMIDIFIER (OPTIONAL)
5	ELECTRICAL BOX
6	SMOKE SENSOR (OPTIONAL)
7	ELECTRICAL REHEAT (OPTIONAL)
8	3-WAY VALVE (ONLY IN FREE COOLING OPTION)

VERTIV COOLPHASE CEILING

GENERAL ARRANGEMENT, DIMENSIONAL DATA & FIELD CONNECTIONS

VERTIV® ICOM™ WALLMOUNT DISPLAY

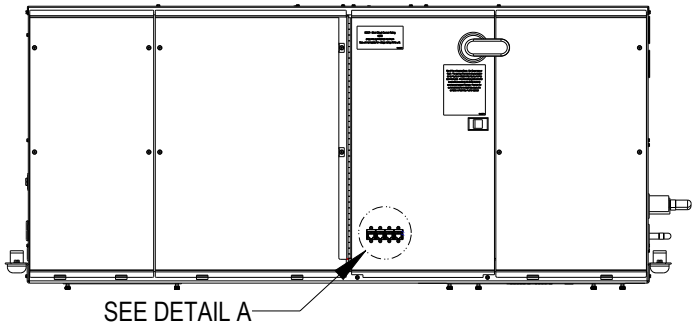


Notes:

1. Refer to 20000913 for connection points on Vertiv™ CoolPhase Ceiling Unit.
2. CANbus cable connection wired form P66 / P67 on the rear of the Remote Temperature / Humidity sensor.
Connection routed to secondary port on rear of Return T/H sensor inside unit or available CANbus port on internal control board (P66 / P67).

VERTIV COOLPHASE CEILING

UNIT TO UNIT NETWORK CONNECTIONS
TWO UNITS NETWORKED



DETAIL A

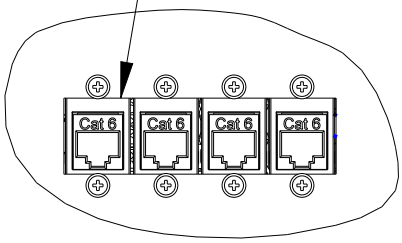
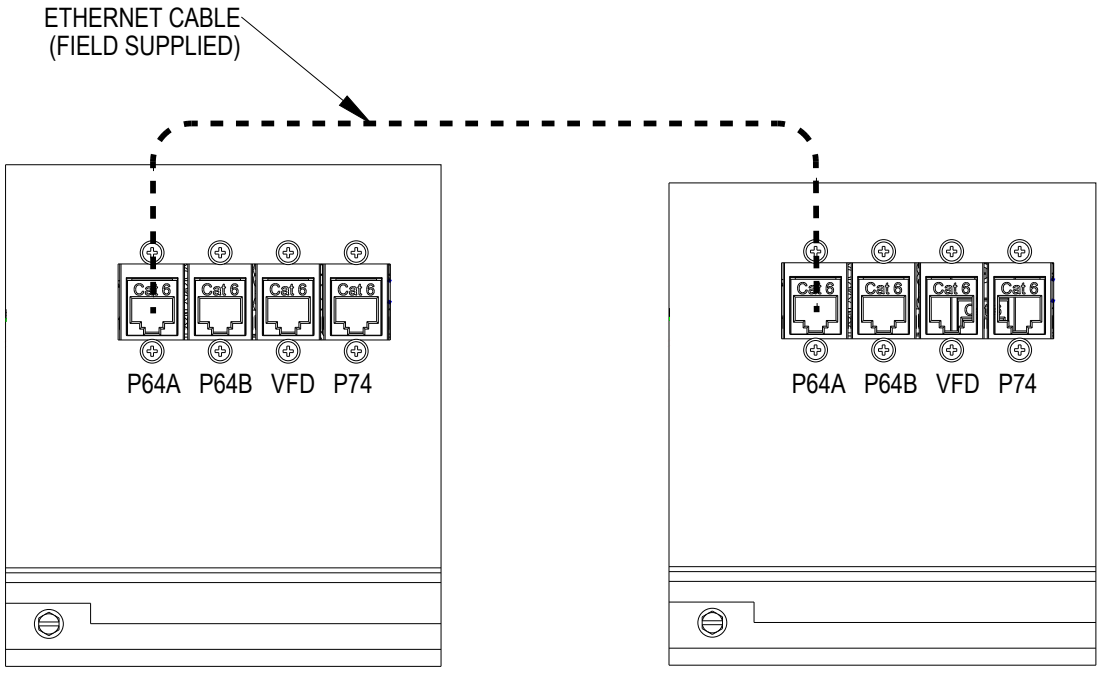


TABLE "A"	
PIN OUT	DESCRIPTION
VFD1 / VFD8	MODBUS A/B
VFD3 / VFD4	24VAC L/N

-P64A: U2U-A Unit-to-Unit Communication
-P64B: U2U-B Unit-to-Unit Communication
-VFD: Condenser Modbus (RS485) Communication. See Table "A"
-P74: BMS Connectivity / Embedded Unity



CoolPhase Ceiling Unit 1 U2U Connection

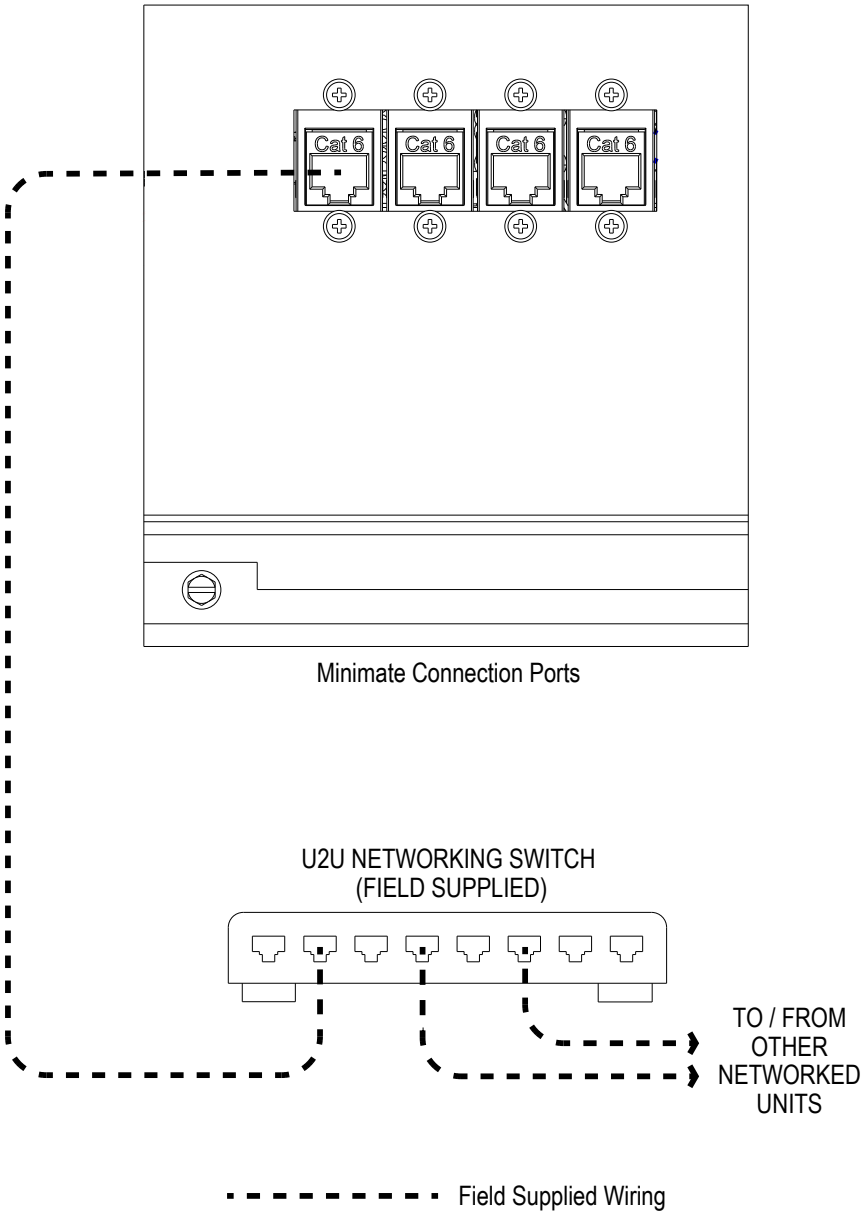
CoolPhase Ceiling Unit 2 U2U Connection

Field Supplied Wiring

Notes:
1. Refer to 20000193, 20000194, 20000195 & 20000196 for general arrangement and field connections.
2. The dual U2U connection ports on the iCOM contoller shall support networking through a daisy-chain Ethernet connection between each CoolPhase Ceiling unit by connection to U2U-A and U2U-B ports.

VERTIV COOLPHASE CEILING

UNIT TO UNIT NETWORK CONNECTIONS
TWO OR MORE UNITS NETWORKED USING SWITCH

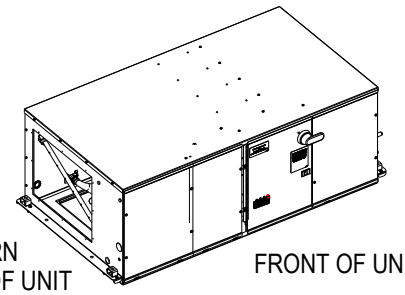


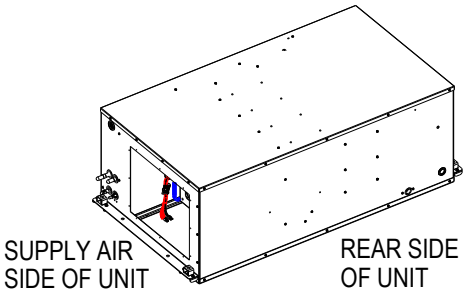
Notes:
1. Refer to 20000193, 20000194, 20000195 & 20000196 for general arrangement and field connections.
2. The dual U2U connection ports on the iCOM contoller shall support networking through a daisy-chain Ethernet connection between each CoolPhase Ceiling unit by connecting to U2U-A and U2U-B ports when network group size is 3+ units.
3. iCOM does not support a Loop Network configuration when networking multiple CoolPhase Ceiling units together and connecting them together through a daisy-chain connection by utilizing U2U-A and U2U-B ports.

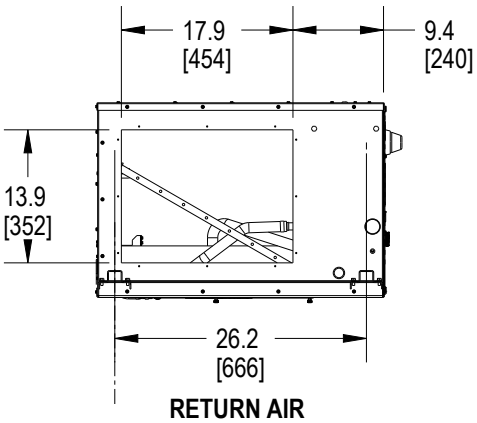
VERTIV COOLPHASE CEILING

DIMENSIONAL DATA

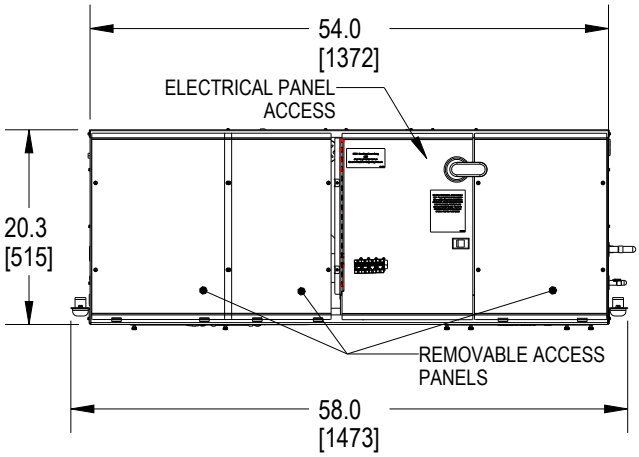
CABINET DIMENSIONS, 1 TON

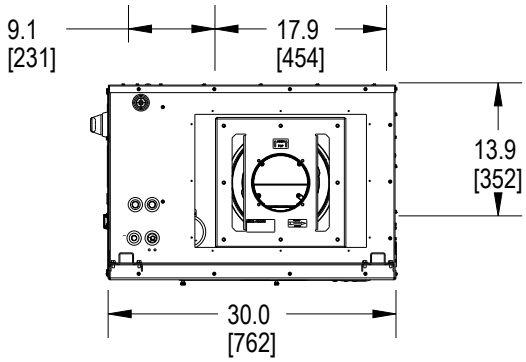




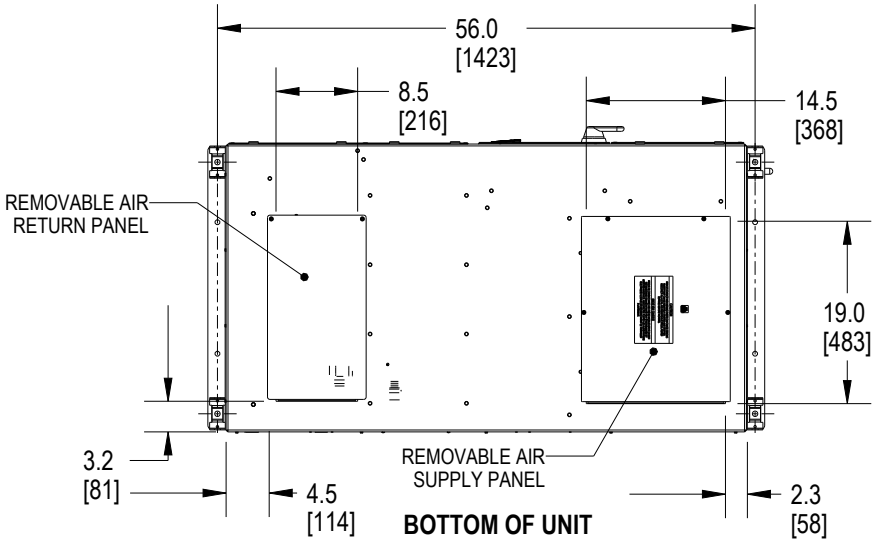


RETURN AIR SIDE OF UNIT





SUPPLY AIR SIDE OF UNIT



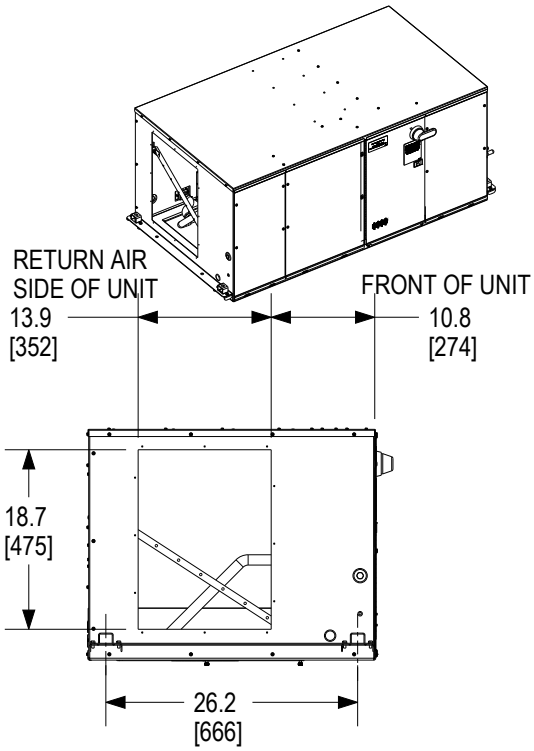
BOTTOM OF UNIT

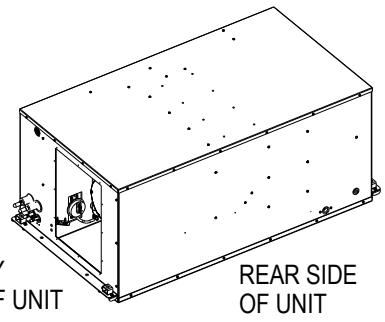
	EVAPORATOR COIL	UNIT NET WEIGHT LBS. (KG)
MMI12 (1 TON) MODEL	DX	269.4 (122.2)
	DX + FC	292.3 (132.6)

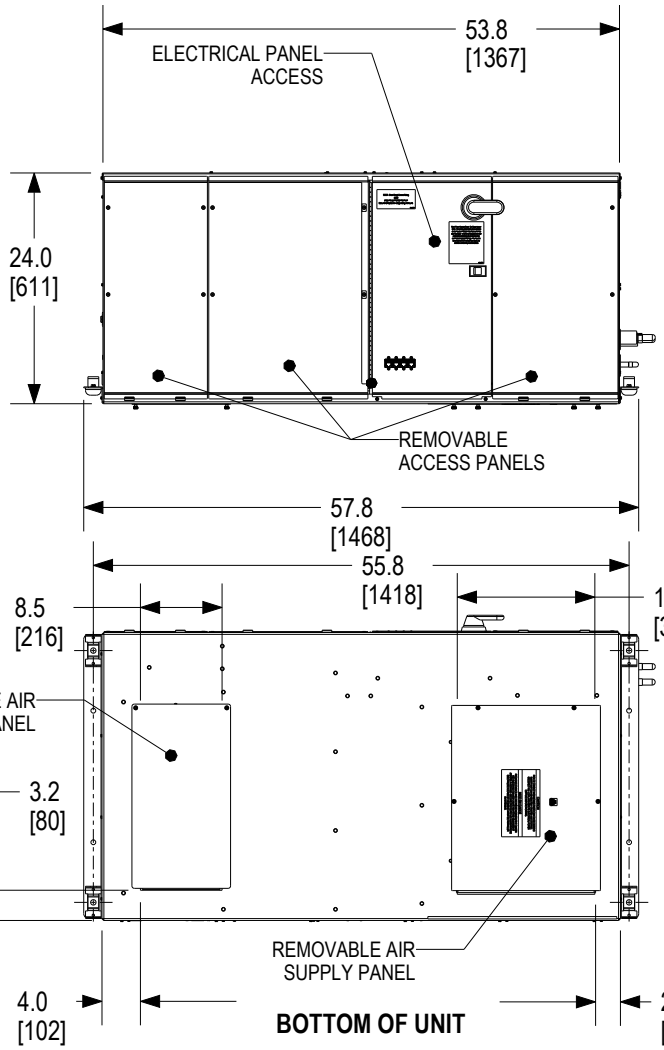
VERTIV COOLPHASE CEILING

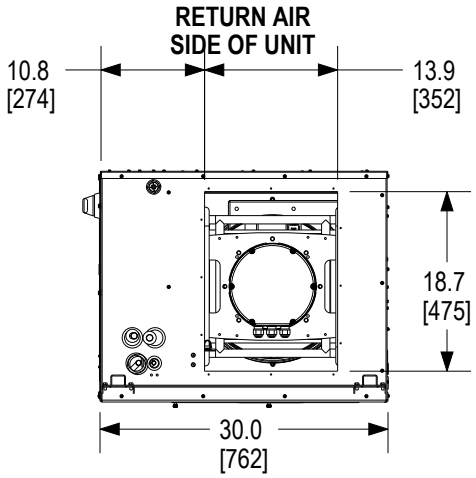
DIMENSIONAL DATA

CABINET DIMENSIONS, 2 & 3 TON







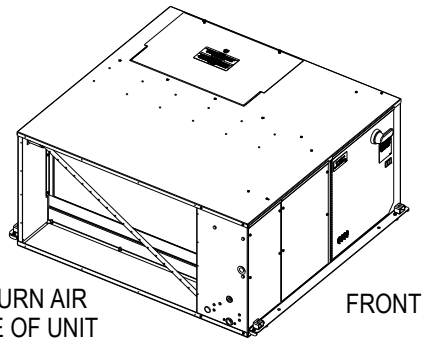


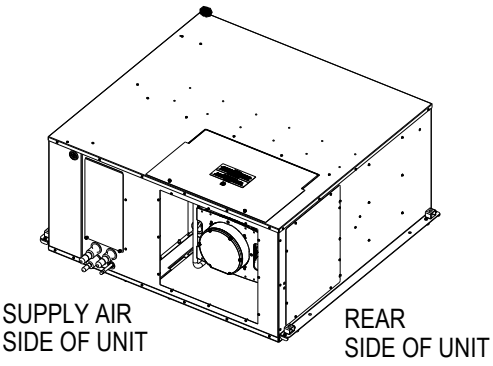
	EVAPORATOR COIL	UNIT NET WEIGHT LBS. (KG)
MMI24 (2 TON) MODEL	DX	295.4 (134.0)
	DX + FC	325.4 (147.6)
MMI36 (3 TON) MODEL	DX	299.8 (136.0)
	DX + FC	329.8 (149.6)

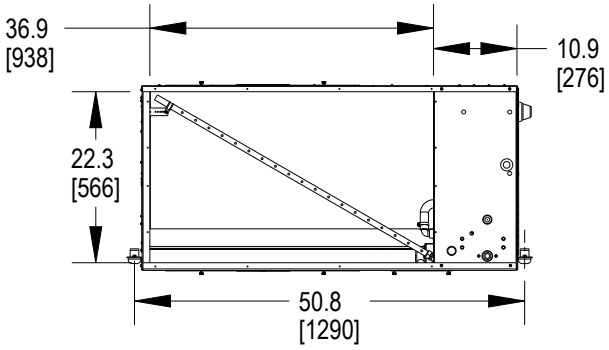
VERTIV COOLPHASE CEILING

DIMENSIONAL DATA

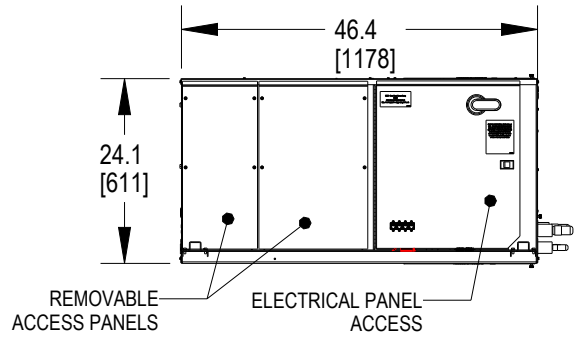
CABINET DIMENSIONS, 4 & 5 TON

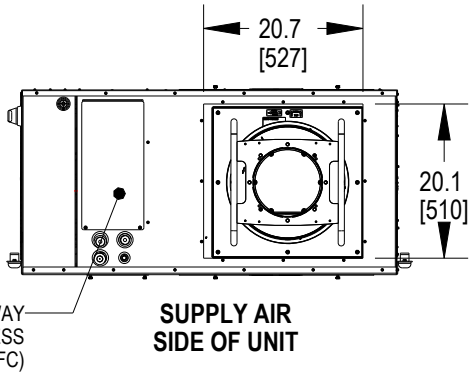




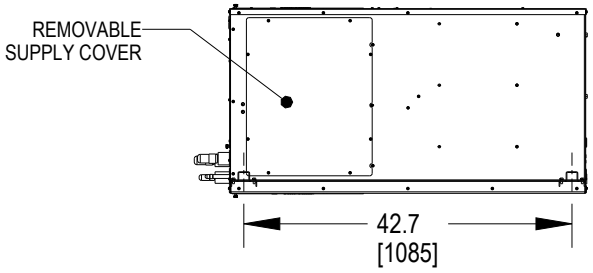


RETURN AIR SIDE OF UNIT

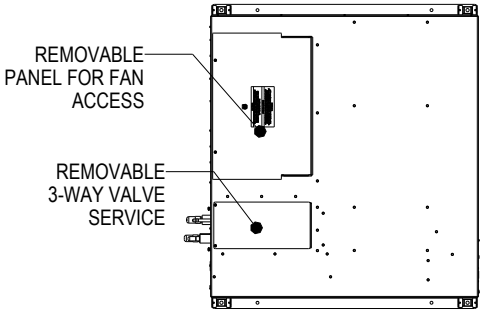




SUPPLY AIR SIDE OF UNIT



REAR SIDE OF UNIT



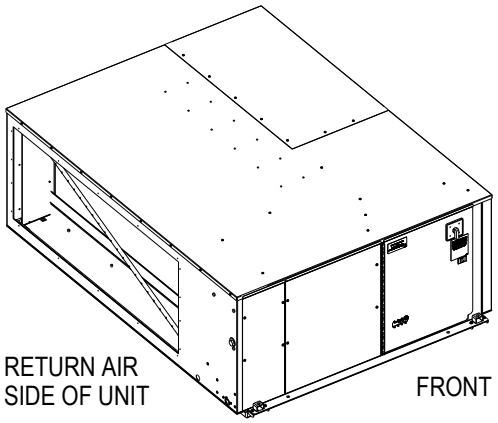
BOTTOM OF UNIT

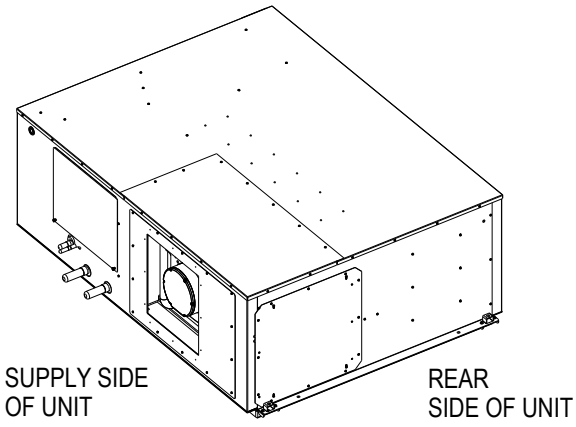
	EVAPORATOR COIL	UNIT NET WEIGHT LBS. (KG)
MMI48 (4 TON) MODEL	DX	413.4 (187.5)
	DX + FC	483.9 (219.5)
MMI60 (5 TON) MODEL	DX	433.2 (196.5)
	DX + FC	503.7 (228.5)

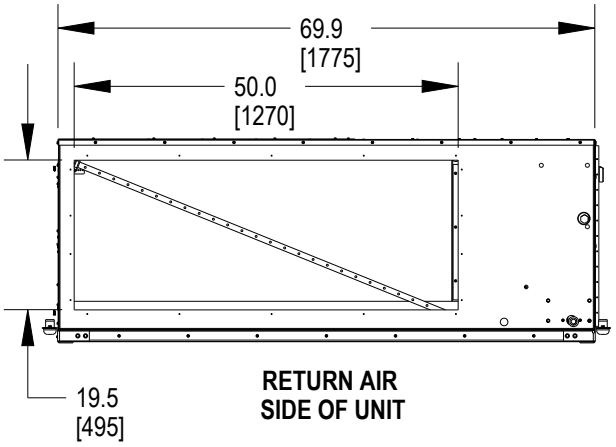
VERTIV COOLPHASE CEILING

DIMENSIONAL DATA

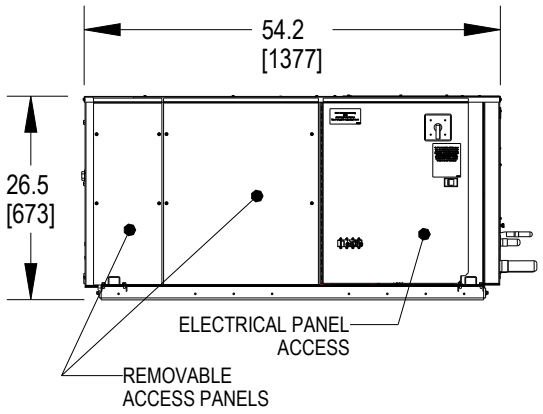
CABINET DIMENSIONS, 8 TON

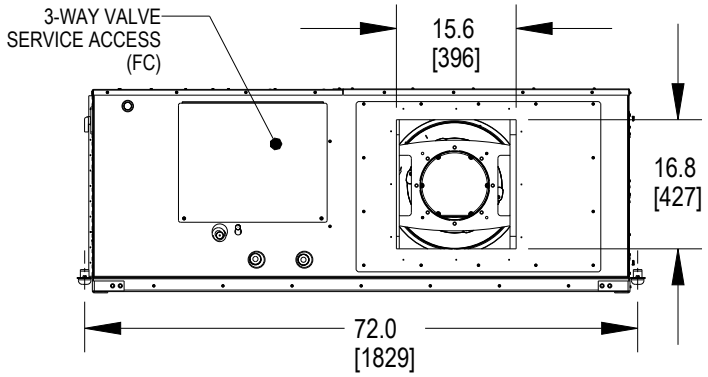




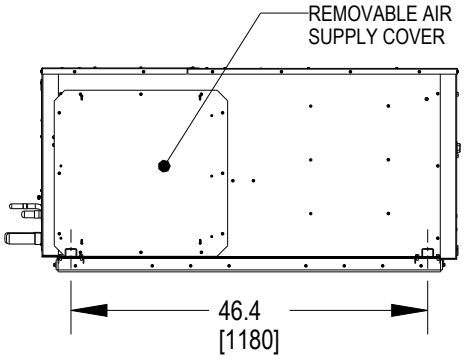


RETURN AIR SIDE OF UNIT





SUPPLY AIR SIDE OF UNIT

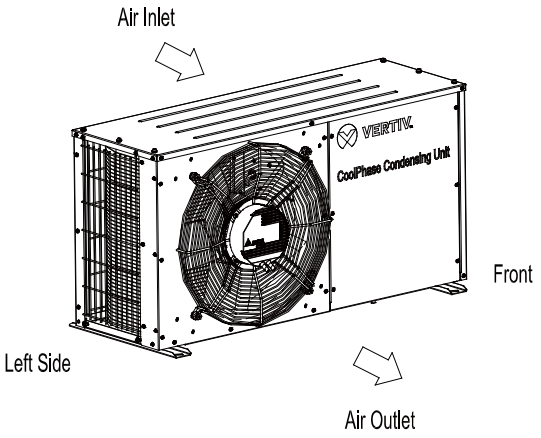


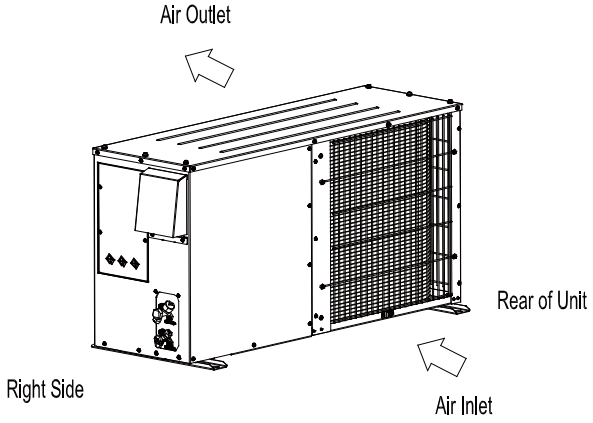
REAR SIDE OF UNIT

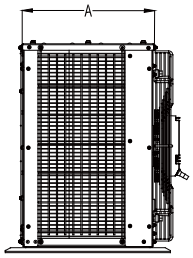
	EVAPORATOR COIL	UNIT NET WEIGHT LBS. (KG)
MMI96 (8 TON) MODEL	DX	673.3 (305.4)
	DX + FC	752.6 (341.4)

Vertiv CoolPhase Condensing Unit

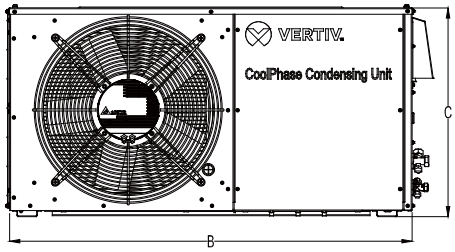
DIMENSIONAL DATA



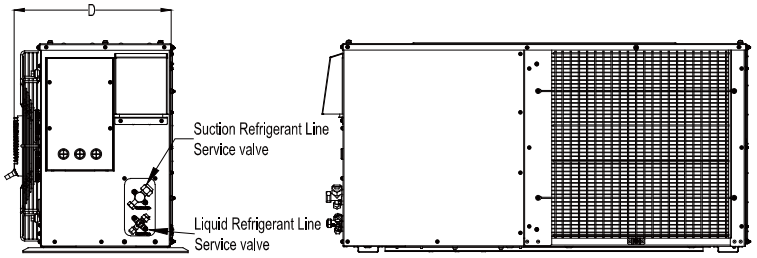




Left Side View

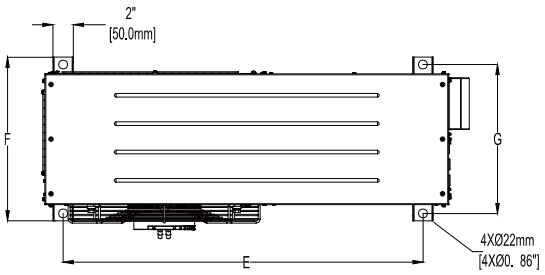


Front View

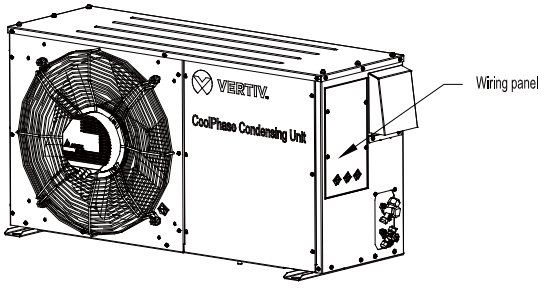


Right Side View

Rear View



Top View



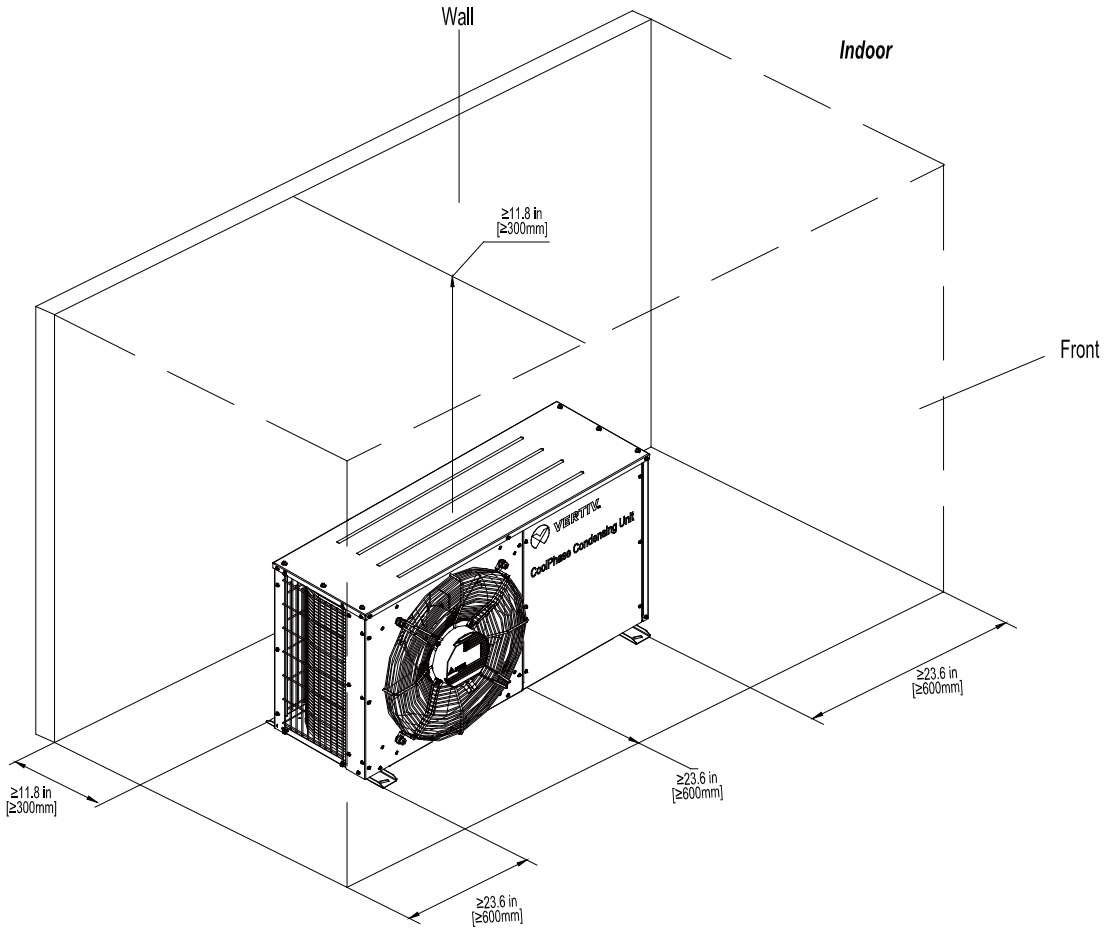
Front

Right Side

MODEL #	DIMENSIONAL DATA in. (mm).							NET WEIGHT lb (kg)		Shipping Dimensions(W×D×H) in.(mm).	SHIPPING WEIGHT lb (kg)	
	A	B	C	D	E	F	G	CUD	CUL	/	CUD	CUL
CUD030-E000A CUL030-E000A	12.6 (319)	38.8 (985)	20.3 (516)	15.2 (385)	34.7 (881)	15.9 (404)	14.5 (368)	110.2 (50)	116.8 (53)	45.2 x 22 x 28.8 (1149 x 559 x 732)	169.8 (77)	176.4 (80)
CUD070-E000A CUL070-E000A	16.5 (419)	44.4 (1128)		19.1 (485)	40.1 (1018)	19.8 (504)	18.4 (468)	118 (53.5)	130 (59)	50.7 x 26 x 28.8 (1289 x 659 x 732)	188.5 (85.5)	200.6 (91)
CUD111-E000A CUL111-E000A	20.5 (520)	51.3 (1303)	22.8 (580)	23.4 (595)	46.4 (1179)	23.8 (604)	22.4 (568)	175.3 (79.5)	184.1 (83.5)	57.6 x 30.1 x 31.3 (1464 x 764 x 795)	259 (117.5)	272.3 (123.5)
CUD115-E000A CUL115-E000A								174.17 (79)	183 (83)		257.9 (117)	271.2 (123)

CLEARANCE SPACE

Standard Condensing Unit Install indoor

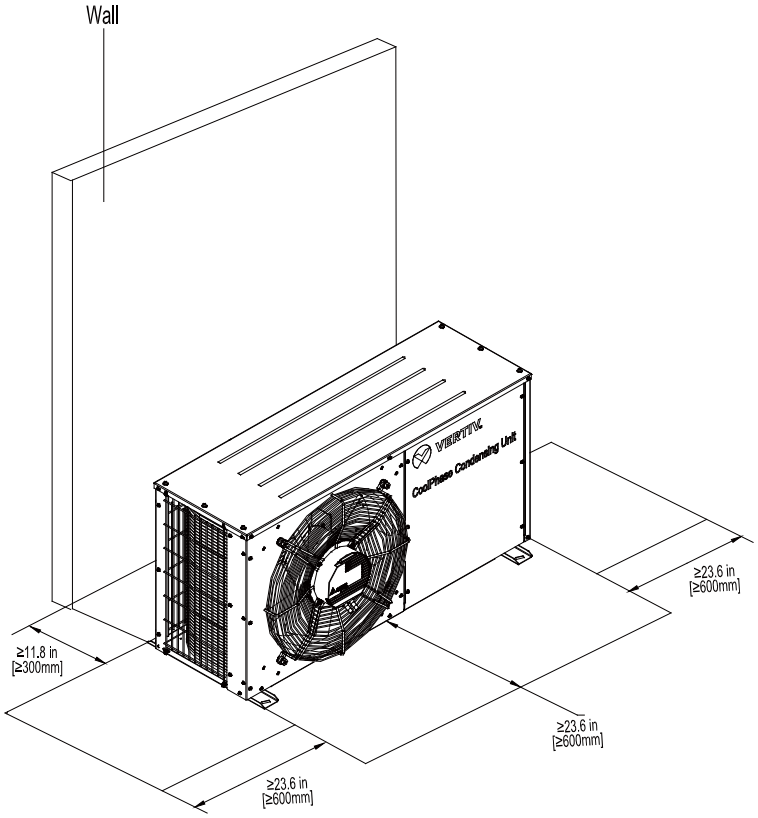


NOTES: When Standard Condensing Unit is installed in indoor environment, it is not necessary to install the wind baffle.

Vertiv CoolPhase Condensing Unit

CLEARANCE SPACE

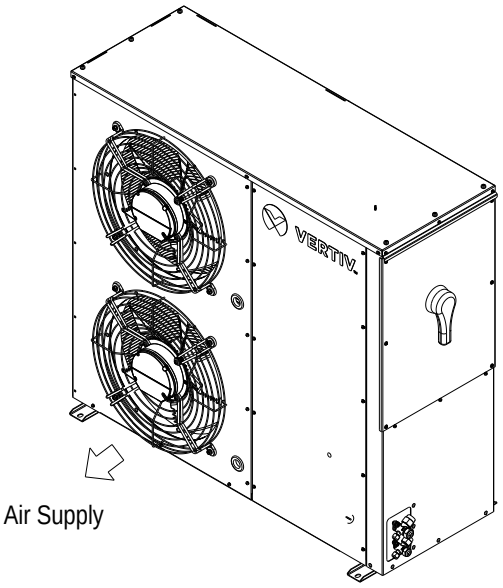
Standard Condensing Unit Install outdoor

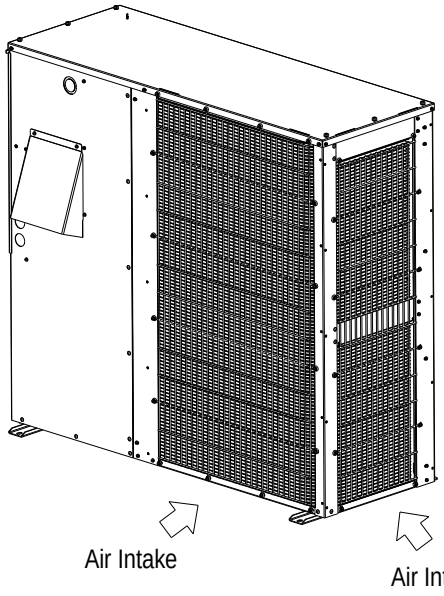


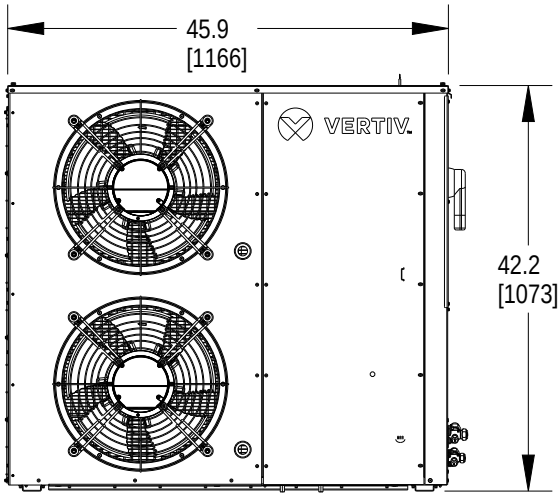
VERTIV COOLPHASE CONDENSING UNIT

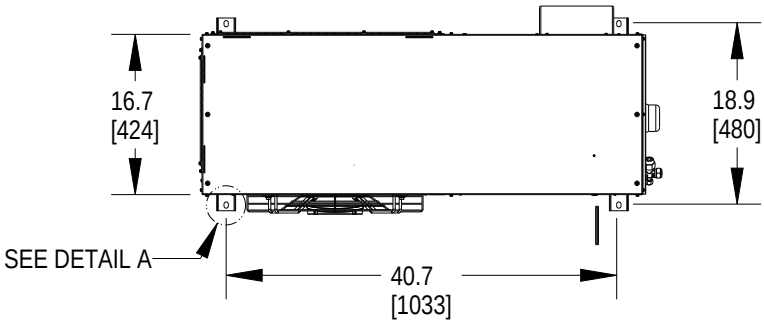
DIMENSIONAL DATA

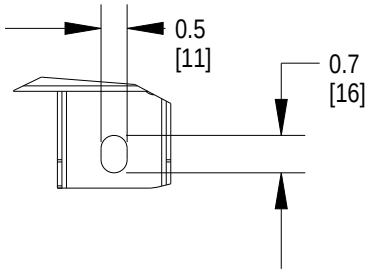
CONDENSER UNIT 15kW









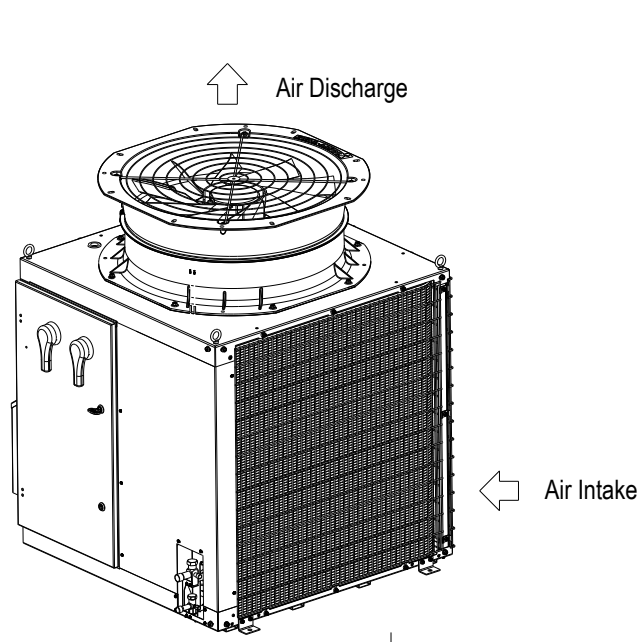


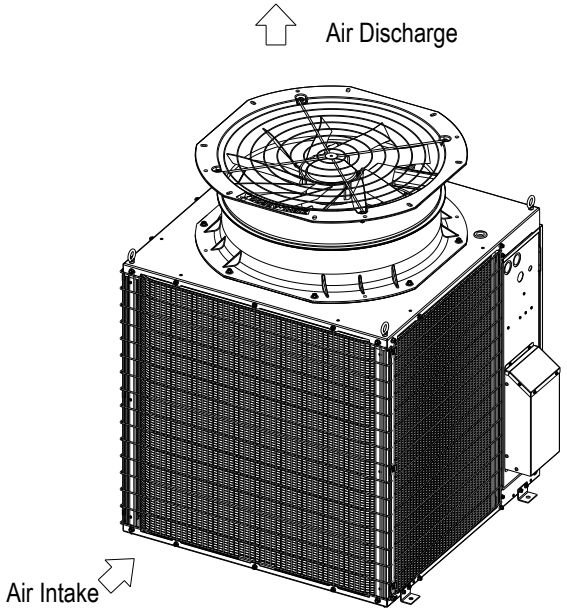
Unit	Net Weight Kg (lb)	Shipping Weight Kg (lb)
Standard 15kW	121.37 (267.57)	147.46 (325.09)
Low ambient 15kW	125.32 (276.56)	151.42 (333.83)

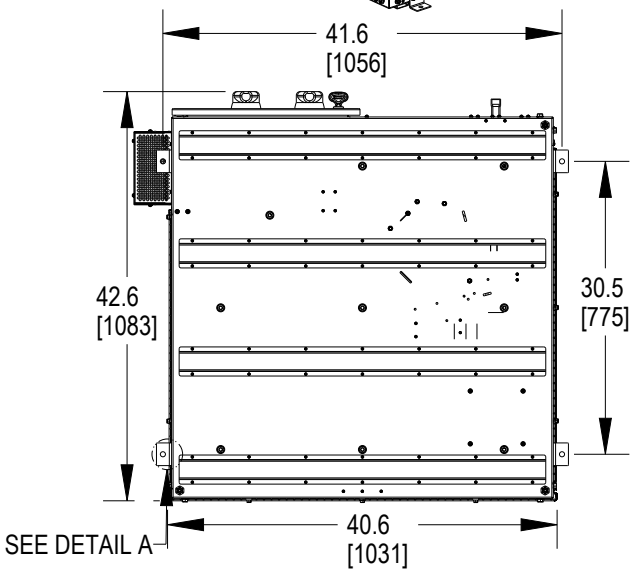
SINGLE POWER SUPPLY UNIT SHOWN*

VERTIV COOLPHASE CONDENSING UNIT

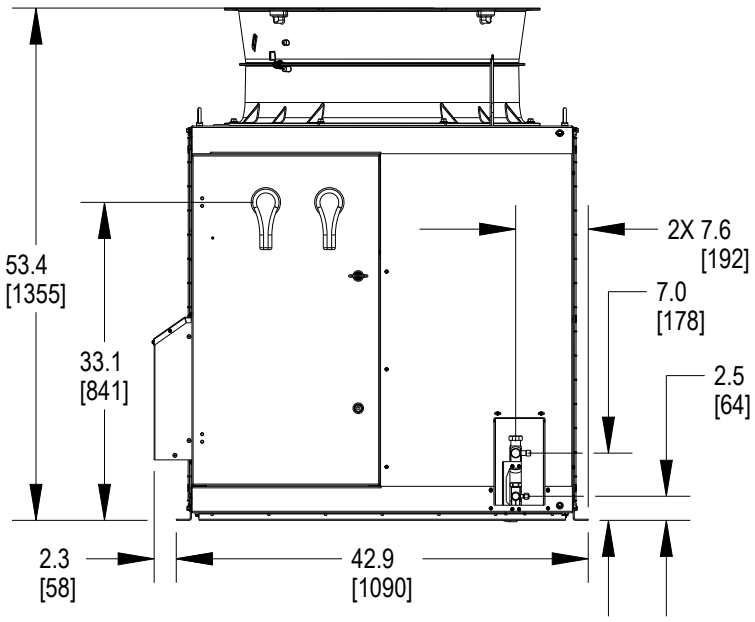
CABINET DIMENSIONS
CONDENSING UNIT 21/28KW



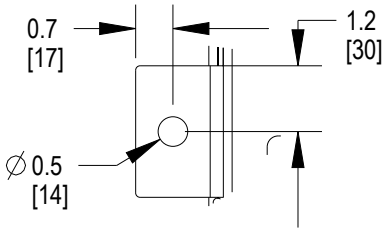




Bottom View



Front View



DETAIL A

Unit	Net Weight lbs (kg)	Shiping Weight lbs (kg)
Standard 21kW	421.1 (191.0)	542.3 (246.0)
Low ambient 21kW	443.1 (201.0)	564.4 (256.0)
Standard 28kW	424.6 (192.6)	546.7 (248.0)
Low ambient 28kW	457.6 (207.5)	579.81 (263.0)

DUAL POWER SUPPLY UNIT SHOWN*

VERTIV COOLPHASE CEILING

ELECTRICAL FIELD CONNECTIONS
1 TON DX & FC

STANDARD ELECTRICAL CONNECTIONS

1) High Voltage connection through the right side of the Ceiling Panel - 1.37" (35mm) diameter concetric knockout

2) Communication connection on the front of the Ceiling Panel
Connect according diagram in the corresponding ethernet port.

3) Electrical service (hard wired) - refer to serial tag information for unit electrical service requirement

- Three Phase - 208-230V 60HZ / 460 60HZ
- Single Phase - 208-230V 60HZ

Connnect to terminals on disconnect switch. Electrical service not by Vertiv. Use copper conductors only. Wire per local codes. Refer to specification sheet for total unit full load amps, wire sizeamps and max over current protection device size.

4) Communication Bracket

-P64A: U2U-A Unit-to-Unit Communication
-P64B: U2U-B Unit-to-Unit Communication
-VFD: Condenser Modbus (RS485) Communication
-P74: BMS Connectivity / Embedded Unity

5) Terminal Blocks Control Distribution Voltage / Power Voltage Terminals / Communication RS485

- TBK Terminal Ground
- TBK 24M Control Distribution Voltage 24VAC
- TBK 24-24AS Control Distribution Voltage 24VAC Insulated Voltage from Transformer 1:1

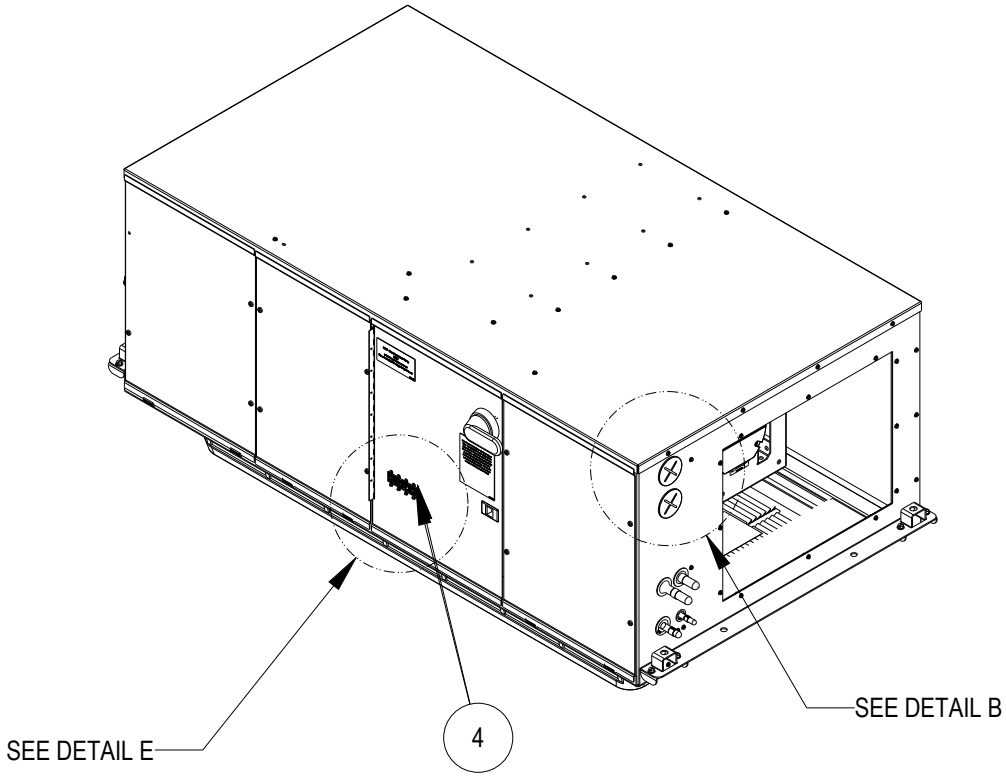
6) Fans Terminal Blocks

- MR relay is the power source for MF (Main Fan Relay)
- Main control signal from ICOM 4 (0-10V Distribution)

Reference models showed in this document are 300MM units. All connections, terminal block locations and communication ports also apply for 600MM units.

VERTIV COOLPHASE CEILING

ELECTRICAL FIELD CONNECTIONS
1 TON DX & FC



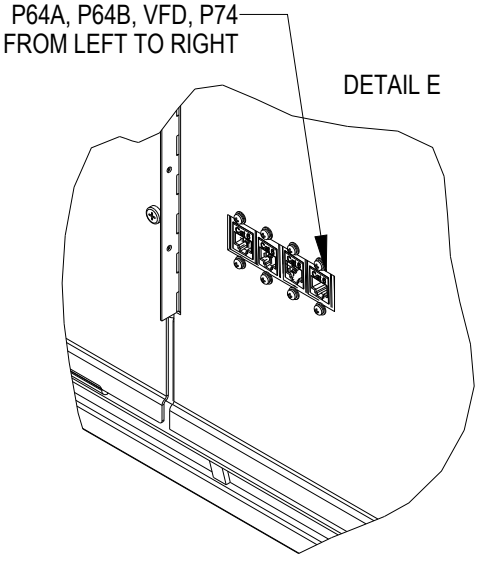
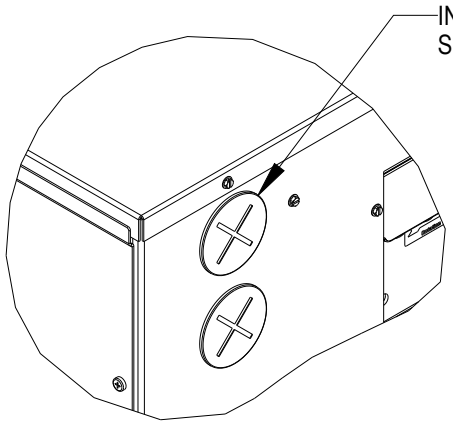


TABLE "A"	
PIN OUT	DESCRIPTION
VFD1 / VFD8	MODBUS A/B
VFD3 / VFD4	24VAC L/N



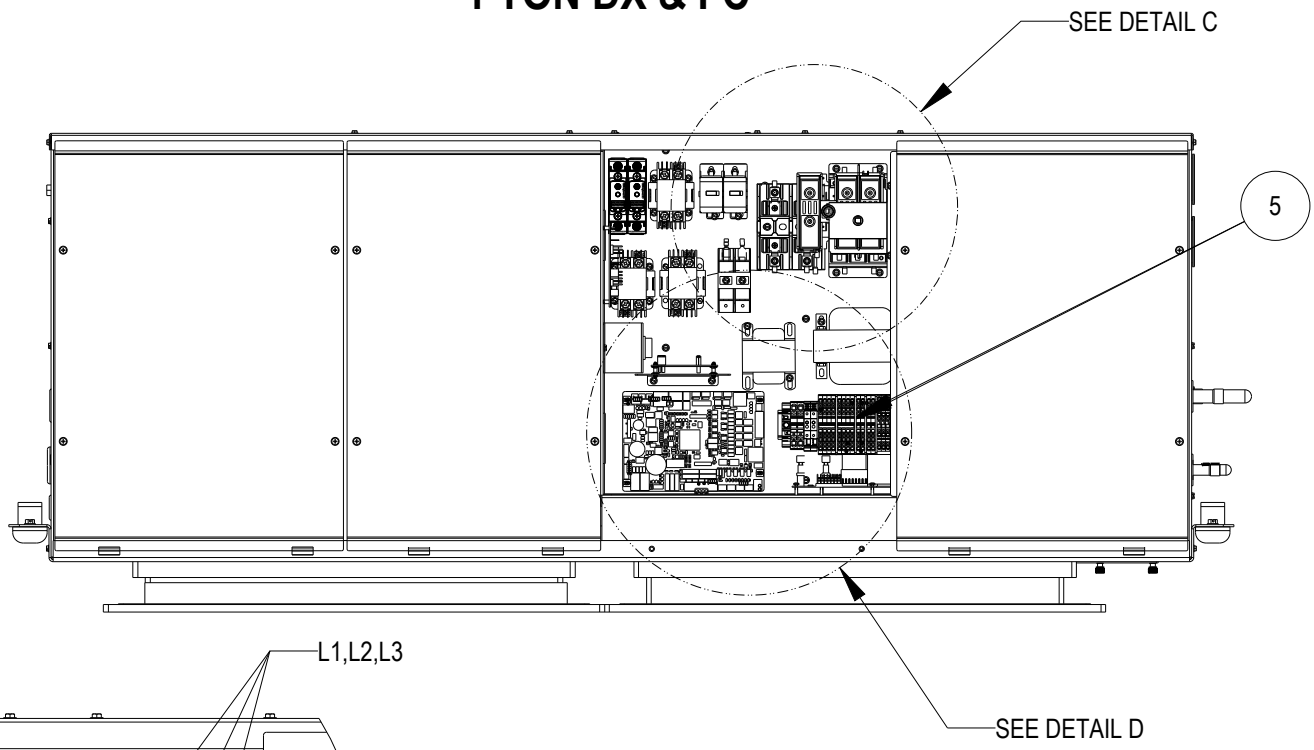
DETAIL B

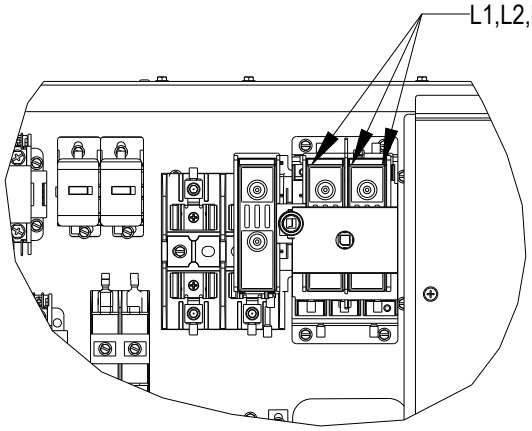
ETHERNET CABLE CONFIGURATION MUST BE
STRAIGHT CONFIGURATION.
VFD PIN OUT(INDOOR - OUTDOOR COMMUNICATION)
SEE TABLE "A"

VERTIV COOLPHASE CEILING

ELECTRICAL FIELD CONNECTIONS

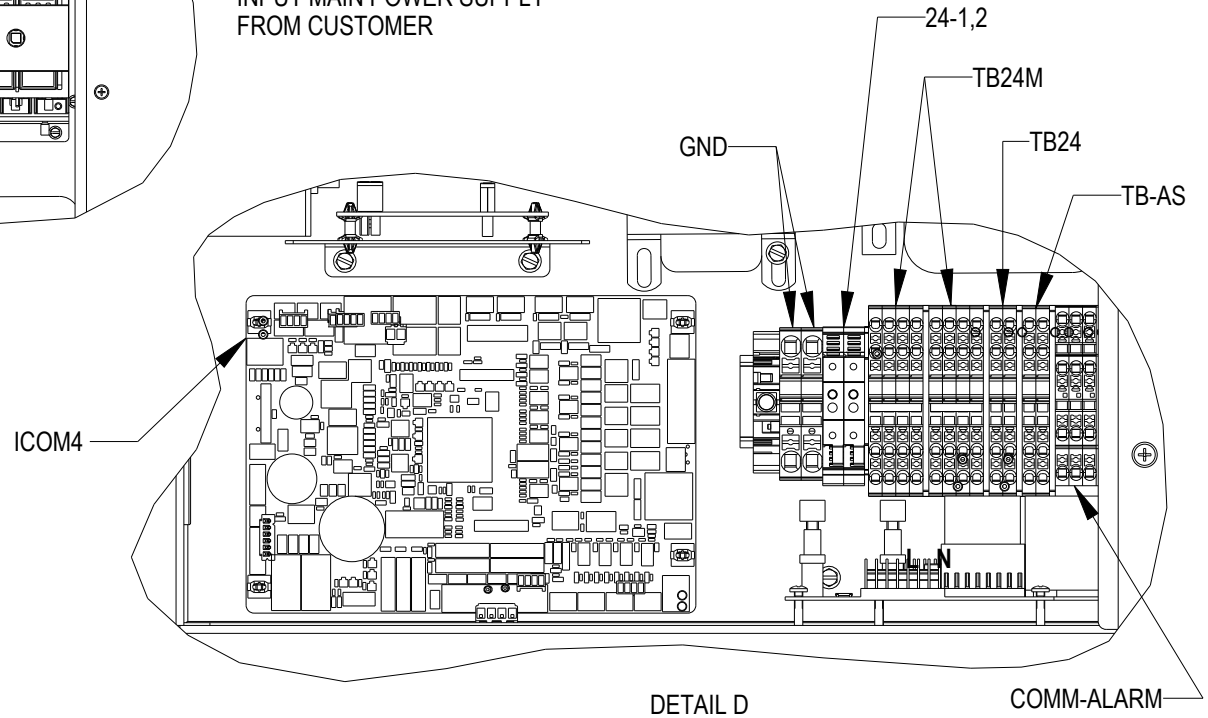
1 TON DX & FC





DETAIL C

INPUT MAIN POWER SUPPLY
FROM CUSTOMER



DETAIL D

VERTIV COOLPHASE CEILING

ELECTRICAL FIELD CONNECTIONS
2 & 3 TON DX & FC

STANDARD ELECTRICAL CONNECTIONS

1) High Voltage connection through the right side of the Ceiling Panel - 1.37" (35mm) diameter concentric knockout

2) Communication connection on the front of the Ceiling Panel
Connect according diagram in the corresponding ethernet port.

3) Electrical service (hard wired) - refer to serial tag information for unit electrical service requirement

- Three Phase - 208-230V 60HZ / 460 60HZ
- Single Phase - 208-230V 60HZ

Connnect to terminals on disconnect switch. Electrical service not by Vertiv. Use copper conductors only, wire per local codes. Refer to specification sheet for total unit full load amps, wire size amps and max over current protection device size.

4) Communication Bracket

-P64A: U2U-A Unit-to-Unit Communication
-P64B: U2U-B Unit-to-Unit Communication
-VFD: Condenser Modbus (RS485) Communication
-P74: BMS Connectivity / Embedded Unity

5) Terminal Blocks Control Distribution Voltage / Power Voltage Terminals / Communication RS485

- TBK Terminal Ground
- TBK 24M Control Distribution Voltage 24VAC
- TBK 24-24AS Control Distribution Voltage 24VAC Insulated Voltage from Transformer 1:1

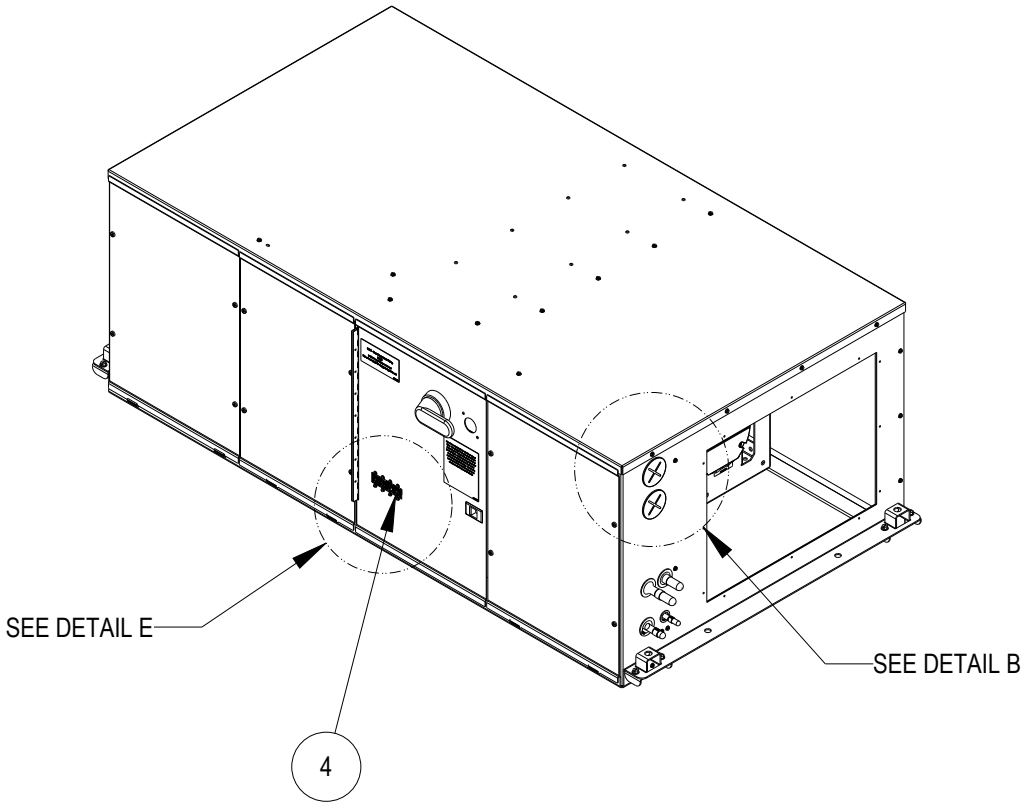
6) Fans Terminal Blocks

- MR relay is the power source for MF (Main Fan Relay)
- Main control signal from ICOM 4 (0-10V Distribution)

Reference models showed in this document are 300MM units. All connections, terminal block locations and communication ports also apply for 600MM units.

VERTIV COOLPHASE CEILING

ELECTRICAL FIELD CONNECTIONS
2 & 3 TON DX & FC



DETAIL E

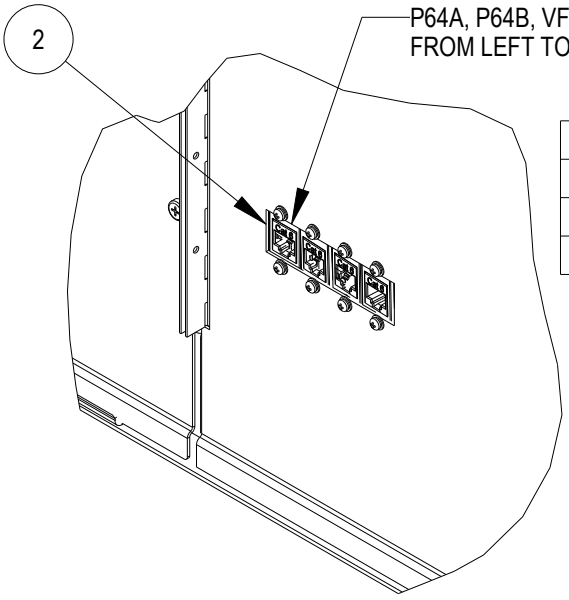
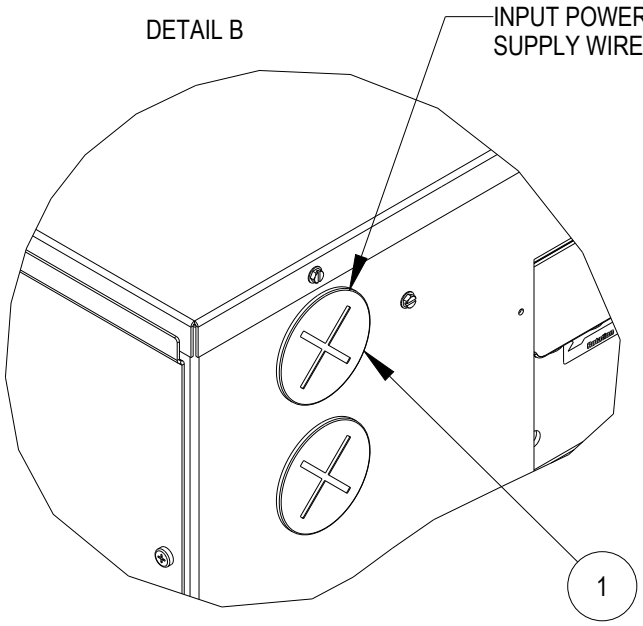


TABLE "A"	
PIN OUT	DESCRIPTION
VFD1/VFD8	MODBUS A/B
VFD3/VFD4	24VAC L/N

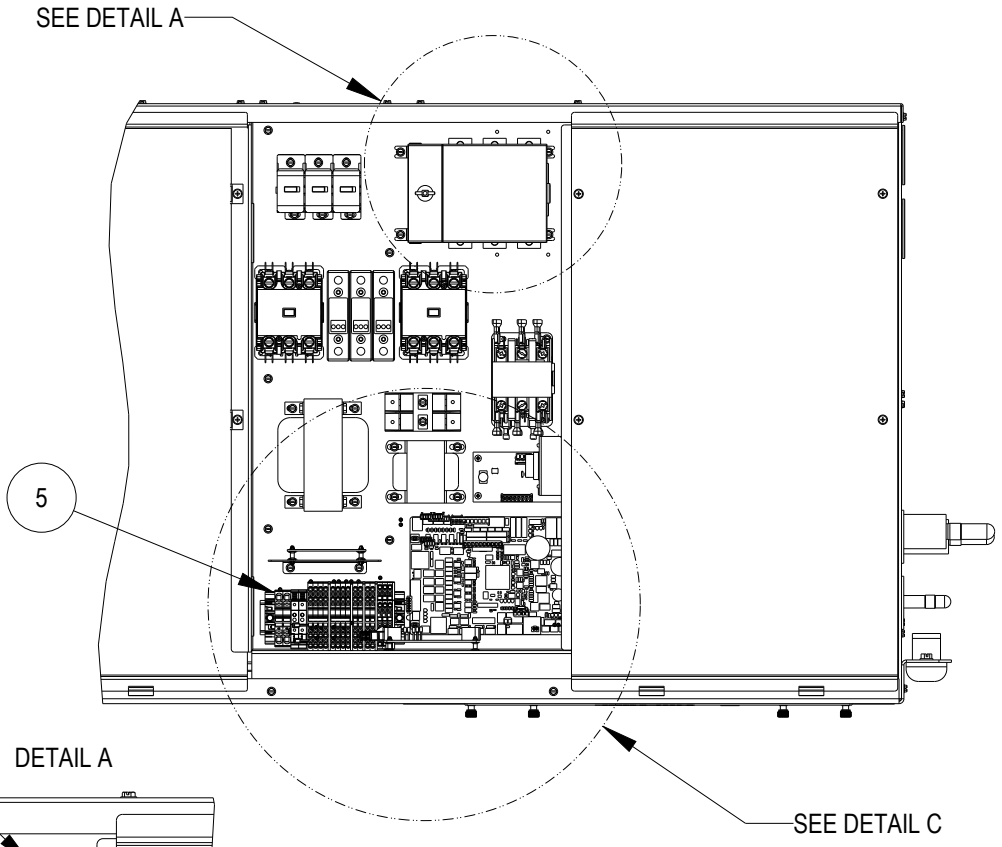
DETAIL B

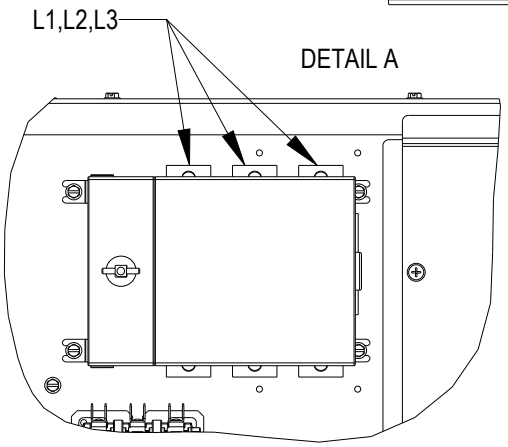


ETHERNET CABLE CONFIGURATION MUST BE
STRAIGHT CONFIGURATION.
Z4 PIN OUT(INDOOR - OUTDOOR COMUNICATION)
SEE TABLE "A"

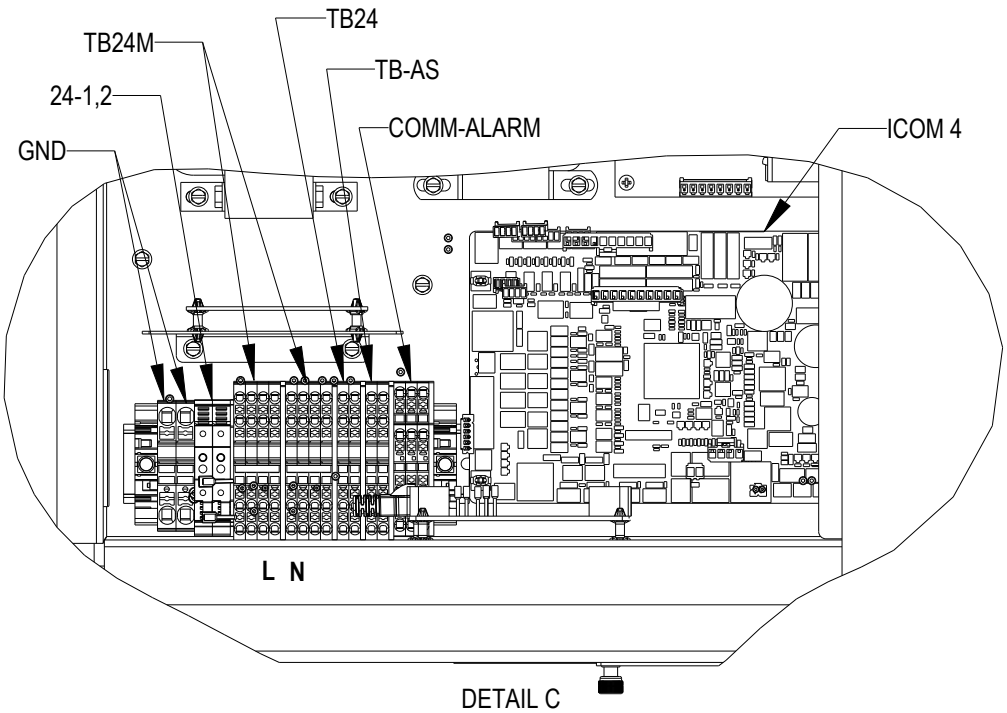
VERTIV COOLPHASE CEILING

ELECTRICAL FIELD CONNECTIONS
2 & 3 TON DX & FC





INPUT MAIN POWER SUPPLY
FROM CUSTOMER



VERTIV COOLPHASE CEILING

ELECTRICAL FIELD CONNECTIONS
4 & 5 TON DX & FC

STANDARD ELECTRICAL CONNECTIONS

1) High Voltage connection through the right side of the Ceiling Panel - 1.37" (35mm) diameter concetric knockout

2) Communication connection on the front of the Ceiling Panel
Connect according diagram in the corresponding ethernet port.

3) Electrical service (hard wired) - refer to serial tag information for unit electrical service requirement

- Three Phase - 208-230V 60HZ / 460 60HZ
- Single Phase - 208-230V 60HZ

Connnect to terminals on disconnect switch. Electrical service not by Vertiv. Use copper conductors only, wire per local codes. Refer to specification sheet for total unit full load amps, wire size amps and max over current protection device size.

4) Communication Bracket

-P64A: U2U-A Unit-to-Unit Communication
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- TBK 24-24AS Control Distribution Voltage 24VAC Insulated Voltage from Transformer 1:1

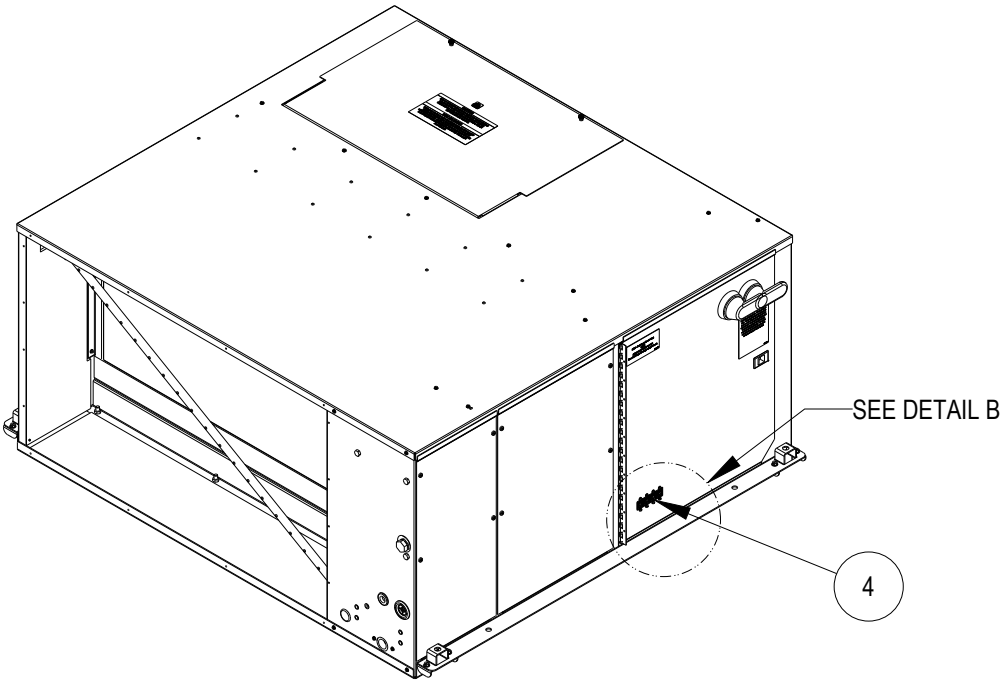
6) Fans Terminal Blocks

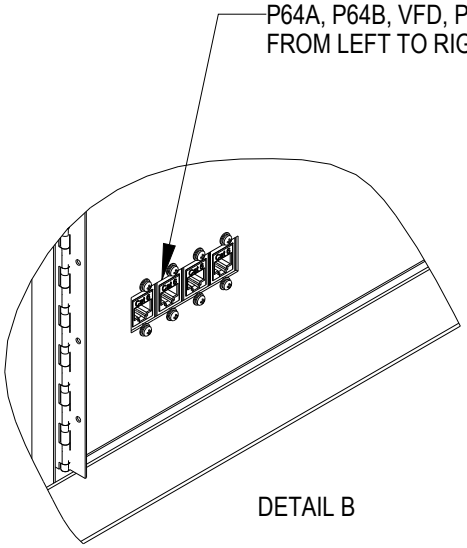
- MR relay is the power source for MF (Main Fan Relay)
- Main control signal from ICOM 4. (0-10V Distribution)

Reference models showed in this document are 300MM units. All connections, terminal block locations and communication ports also apply for 600MM units.

VERTIV COOLPHASE CEILING

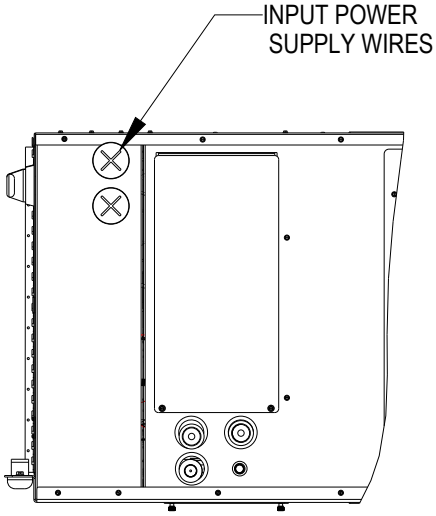
ELECTRICAL FIELD CONNECTIONS
4 & 5 TON DX & FC





DETAIL B

TABLE "A"	
PIN OUT	DESCRIPTION
VFD1 / VFD8	MODBUS A/B
VFD3 / VFD4	24VAC L/N



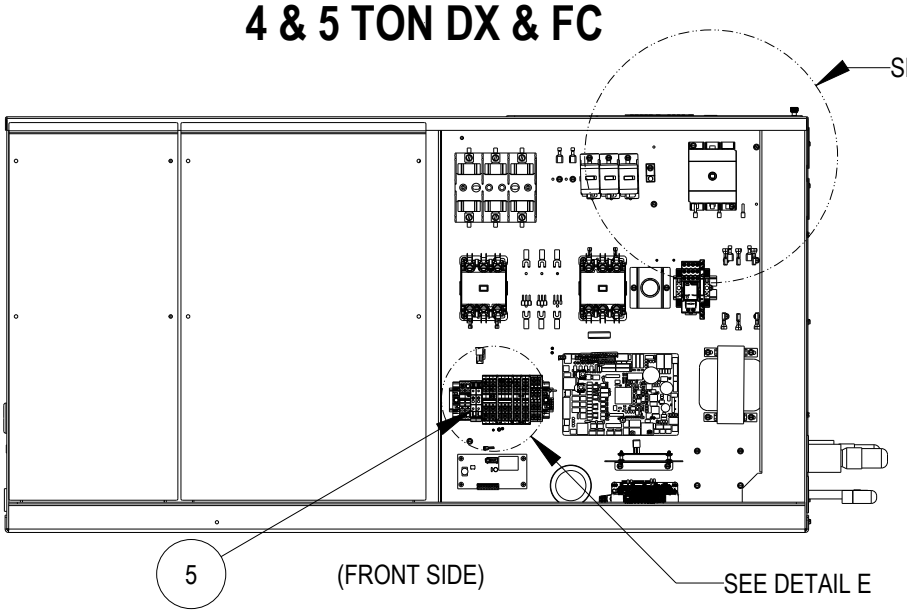
(RIGHT SIDE)

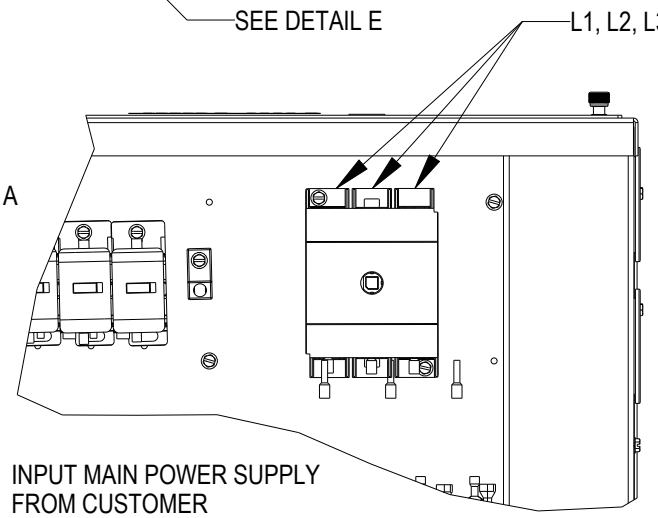
ETHERNET CABLE CONFIGURATION MUST BE STRAIGHT CONFIGURATION.
VFD PIN OUT(INDOOR - OUTDOOR COMMUNICATION) SEE TABLE "A"

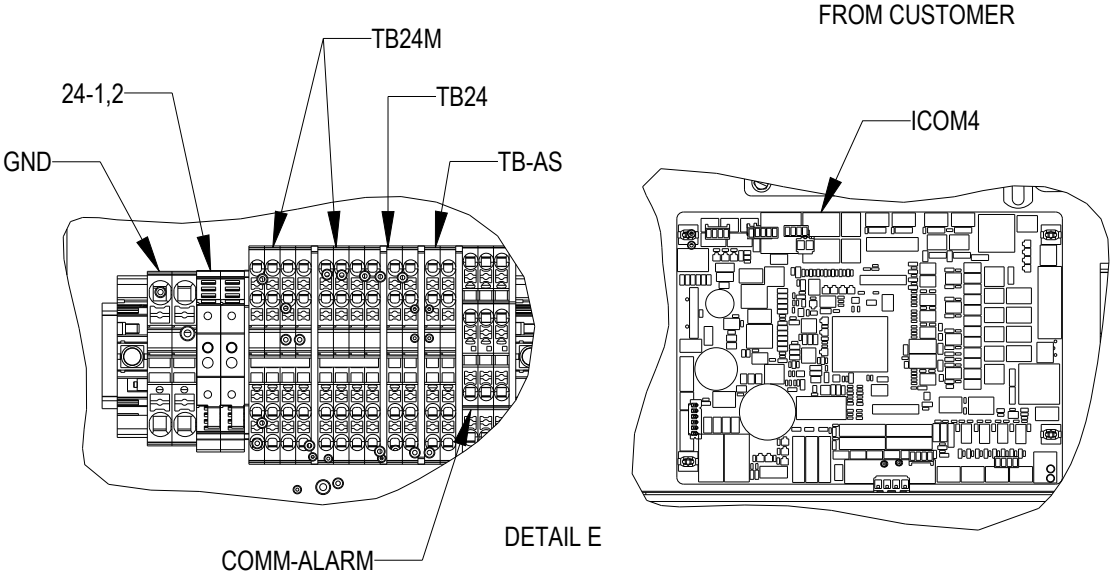
VERTIV COOLPHASE CEILING

ELECTRICAL FIELD CONNECTIONS

4 & 5 TON DX & FC







VERTIV COOLPHASE CEILING

ELECTRICAL FIELD CONNECTIONS
8 TON DX & FC

STANDARD ELECTRICAL CONNECTIONS

1) High Voltage connection through the right side of the Ceiling Panel - 1.37" (35mm) diameter concetric knockout

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Connect according diagram in the corresponding ethernet port.

3) Electrical service (hard wired) - refer to serial tag information for unit electrical service requirement

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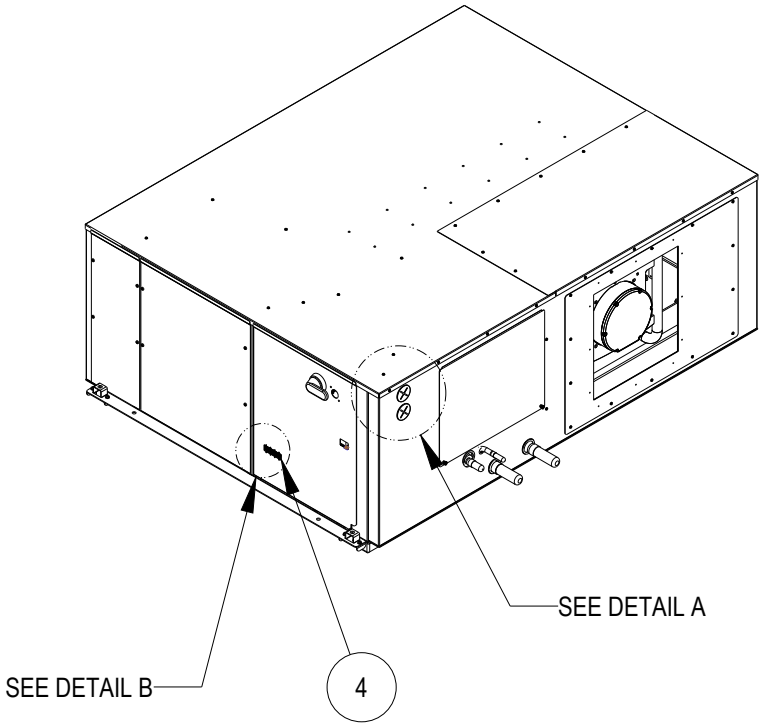
6) Fans Terminal Blocks

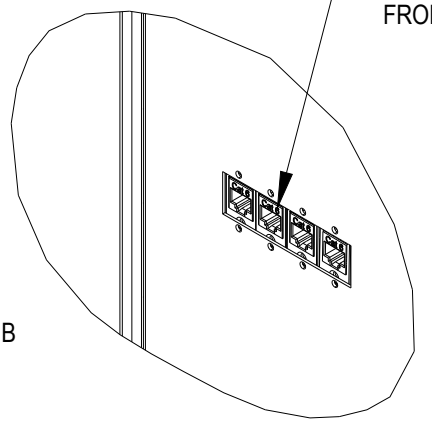
- MR relay is the power source for MF (Main Fan Relay)
- Main control signal from ICOM 4. (0-10V Distribution)

Reference models showed in this document are 300MM units. All connections, terminal block locations and communication ports also apply for 600MM units.

VERTIV COOLPHASE CEILING

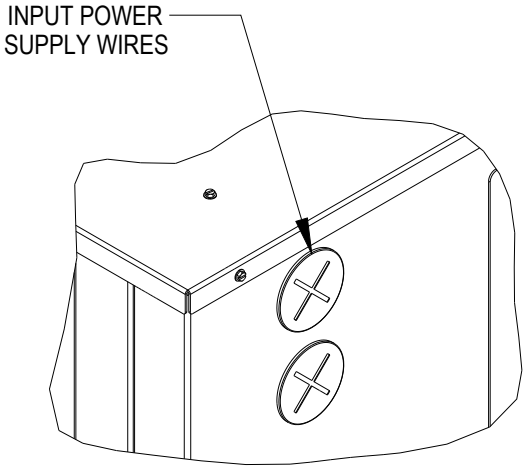
ELECTRICAL FIELD CONNECTIONS
8 TON DX & FC





DETAIL B

TABLE "A"	
PIN OUT	DESCRIPTION
VFD1 / VFD8	MODBUS A/B
VFD3 / VFD4	24VAC L/N



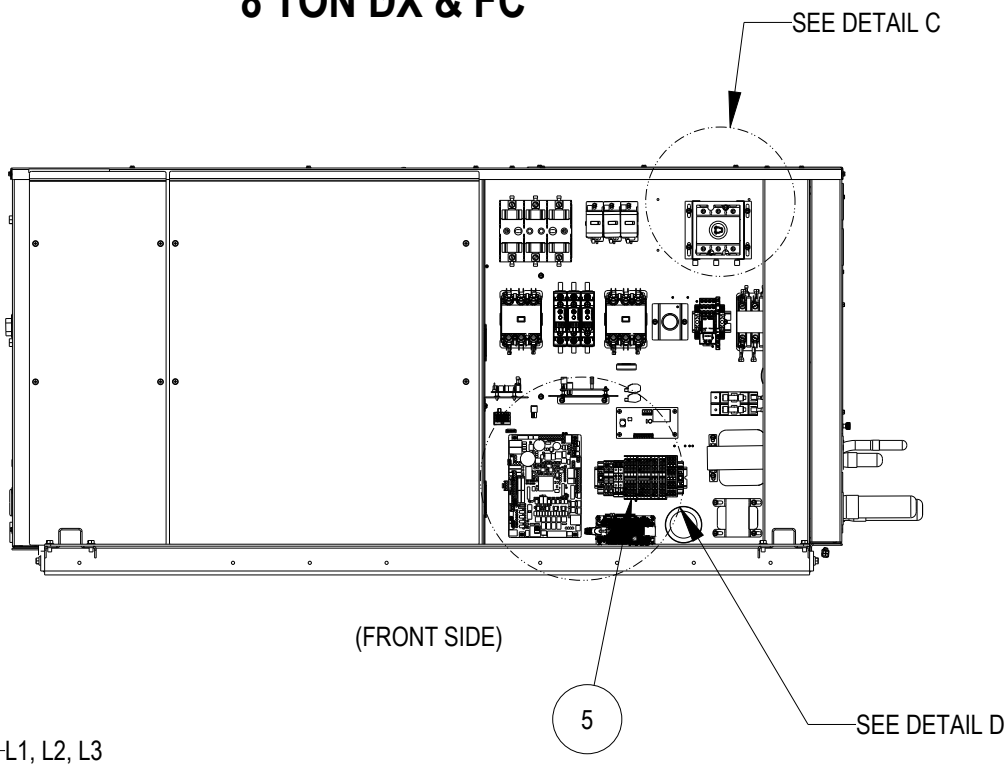
DETAIL A

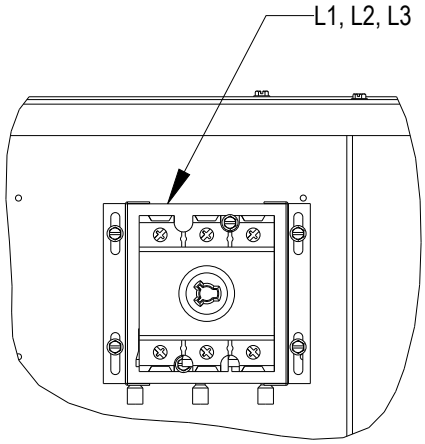
ETHERNET CABLE CONFIGURATION MUST BE
STRAIGHT CONFIGURATION.
Z4 PIN OUT(INDOOR - OUTDOOR
COMUNICATION) SEE TABLE "A"

VERTIV COOLPHASE CEILING

ELECTRICAL FIELD CONNECTIONS

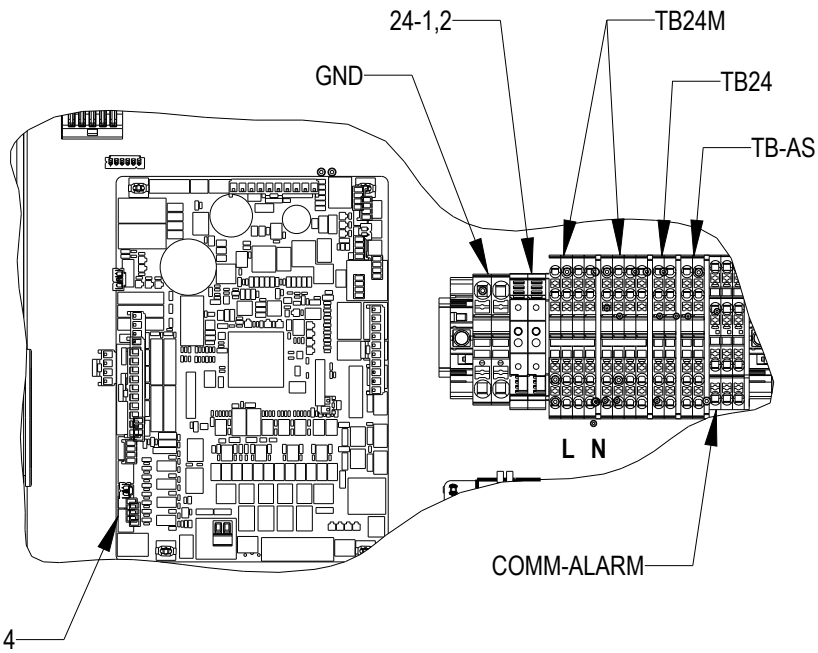
8 TON DX & FC





DETAIL C

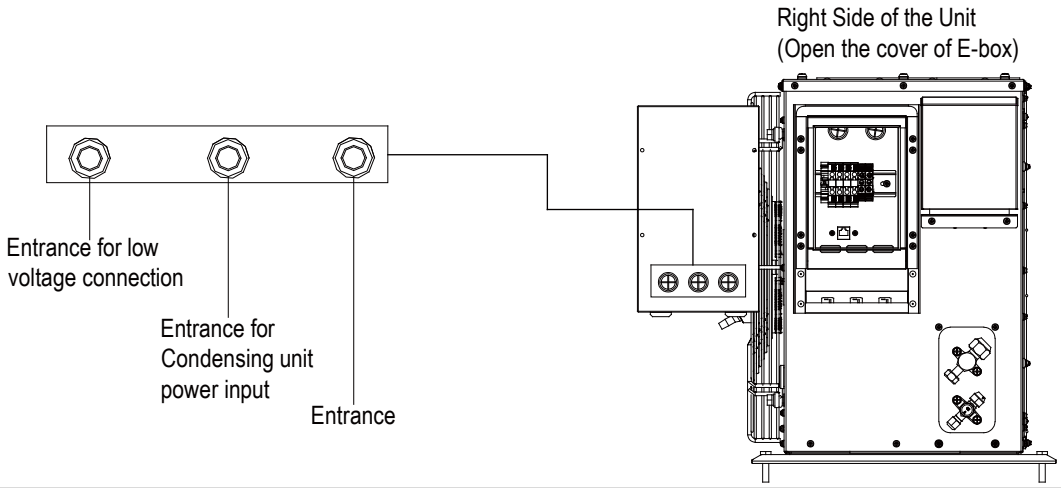
INPUT MAIN POWER SUPPLY
FROM CUSTOMER

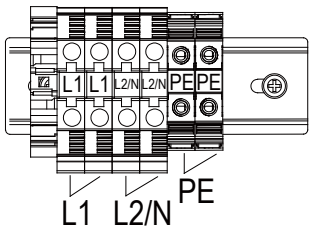
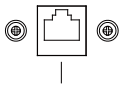
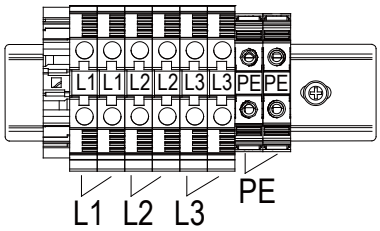
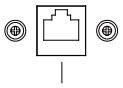
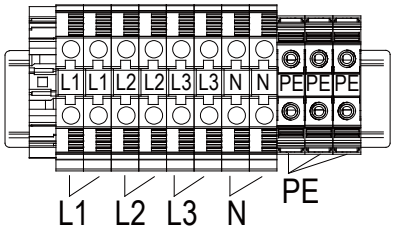
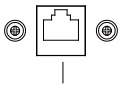


DETAIL D

Vertiv CoolPhase Condensing Unit

ELECTRICAL FIELD CONNECTIONS



Electric control box layout and power supply system		
CUD030-E000A, CUL030-E000A CUD070-E000A, CUL070-E000A	CUD111-E000A, CUL111-E000A	CUD115-E000A, CUL115-E000A
  RJ45-low voltage connector	  RJ45-low voltage connector	  RJ45-low voltage connector
208/230V/1Ph/50/60Hz	208/230V/3Ph/50/60Hz	400V/3Ph+N/50/60Hz

NOTE: After wiring is completed, secure the excess cables with wire ties. The Wire Saddles are at the bottom of the electrical box.

ELECTRICAL FIELD CONNECTIONS
CONDENSER UNIT 21kW

Condenser-rated voltage should be verified with available power supply before installation. Refer to the unit's electrical schematic and serial tag for specific electrical requirements. Line voltage electrical service is required for all condensers at the location of the condenser. The voltage supply to the condenser may not be the same voltage supply as required by the indoor unit. Consider using UPS equipment on both data center cooling units and Liebert MC condensers to maintain uninterrupted cooling capability. Refer to the unit's serial tag for specific condenser electrical requirements. A unit disconnect is standard. However, a site disconnect may be required per local code to isolate the unit for maintenance. Route the supply power to the site disconnect switch and then to the unit. Route the conduit to the knockout provided in the top right end of the electrical control enclosure. Connect the earth ground wire leads to the marked earth ground connection terminal provided near the factory-installed disconnect switch.

KEY ELECTRICAL POWER SUPPLY DETAILS:

1) Three phase electrical service (primary source) - The connection terminals are on top of fused switch. Three phase service not by Vertiv. See note 4.
2) Earth ground (primary source) - Field lug terminal for earth ground connection.
3) Three phase electrical service (secondary source) - The connection terminals are on top of fused switch, the fused switch is located at the top and right side of the E-box. Three phase service not by Vertiv. See note 4.
4) Earth ground (secondary source) - Terminal for field-supplied earth grounding wire.
5) Modbus terminal connections (RS-485) from the interior unit - The connection terminals are located in TB-A. See DETAIL B on page 3.
   RS485+ terminal is the input terminal for RS485 signal (positive).
   RS485- terminal is the input terminal for RS485 signal (negative).
   CGND terminal is the input terminal for signal reference ground.

6) 24V terminal connections from the interior unit - The connection terminals are located in TB-A. See DETAIL B on page 3.
   24V terminal is the input terminal for the hot wire used for leak detection mitigation on the indoor unit.
   COM terminal is the input terminal for the common wire used for leak detection mitigation on the indoor unit.
7) Three phase electrical service entrance (primary source) - One 1.875in (47.63mm) diameter knockout located at the top and left side of the E-Box.
8) Three phase electrical service entrance (secondary source) - One 1.875in (47.63mm) diameter knockout located at the top and left side of the E-Box.
9) Modbus terminal connections (RS-485) from the interior unit - Field connections for Modbus cable connection: One - 0.70" (18mm) diameter knockout located at the middle and left side of the E-Box.

NOTES:

1. Refer to specification sheet for unit voltage rating, full load amp, minimum circuit ampacity and maximum circuit protection.
2. The modbus (RS485) wiring is field supplied and must be (See drawing on page 3 for wire configuration):
   STP straight through wire type.
   22-18AWG stranded tinned copper.
   Twisted pair (minimum 4 twist per foot).
   Low Capacitance (15pF/FT or less).
   Must be rated to meet local codes and conditions.
3. Do not run in same conduit, raceway, or chase as high voltage wiring.
4. All wiring must be sized and selected for insulation case per NEC and other local codes.
5. Do not bend cables to less than four times the diameter of the cable.
6. UL approved temperature rated to 75°C.
7. UV - and moisture-resistance for exterior and if it is not provided in conduits.
8. Do not deform cables when securing in bundles or when hanging them.
9. Avoid running the cables by devices that may introduce noise, such as machines, fluorescent lights, and electronics.
10. Avoid stretching cables.

ELECTRICAL FIELD CONNECTIONS
CONDENSER UNIT 21kW

NOTICE

RISK OF IMPROPER INPUT POWER CAN CAUSE EQUIPMENT DAMAGE.

The electronically commutated motors included in the COOLPHASE CONDENSING UNITS are suitable for connection to an electrical service providing input power to the unit with 300V or less line -to-ground potential only.

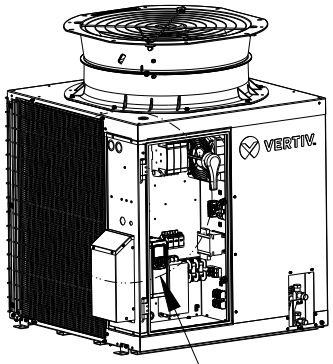
Acceptable unit input electrical service for 208V(230V) nominal units:
208V wye with solidly grounded neutral and 120V line-to-ground.

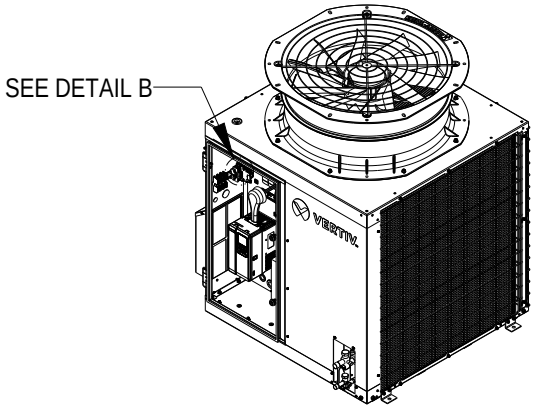
Acceptable unit input electrical service for 460V(480V) nominal units:
480V wye with solidly grounded neutral and 277V line-to-ground.

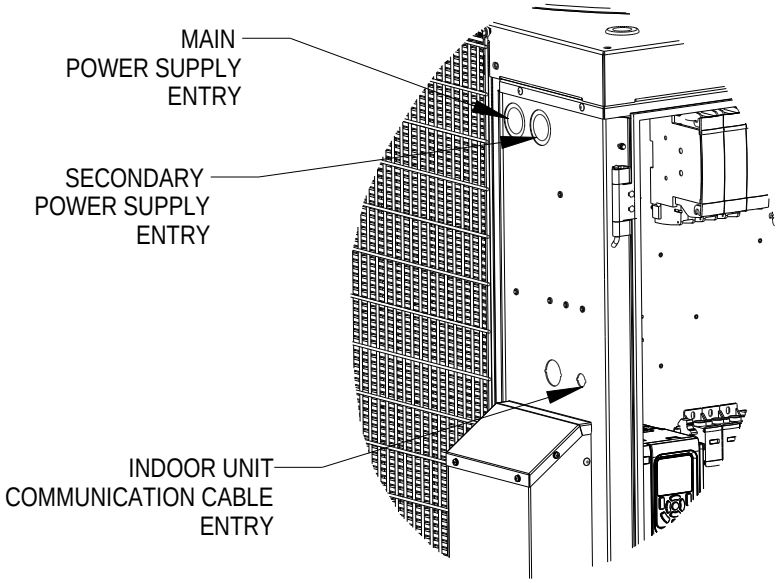
Unacceptable unit input electrical service for 208V to 460V (480V) nominal units:
- Wye with high resistance (or impedance) ground
- Delta without ground or with floating ground
- Delta with corner ground
- Delta with grounded center tap

ELECTRICAL FIELD CONNECTIONS

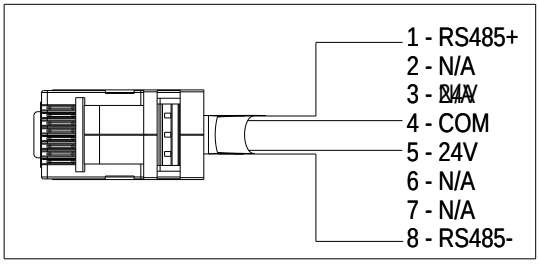
CONDENSER UNIT 21kW



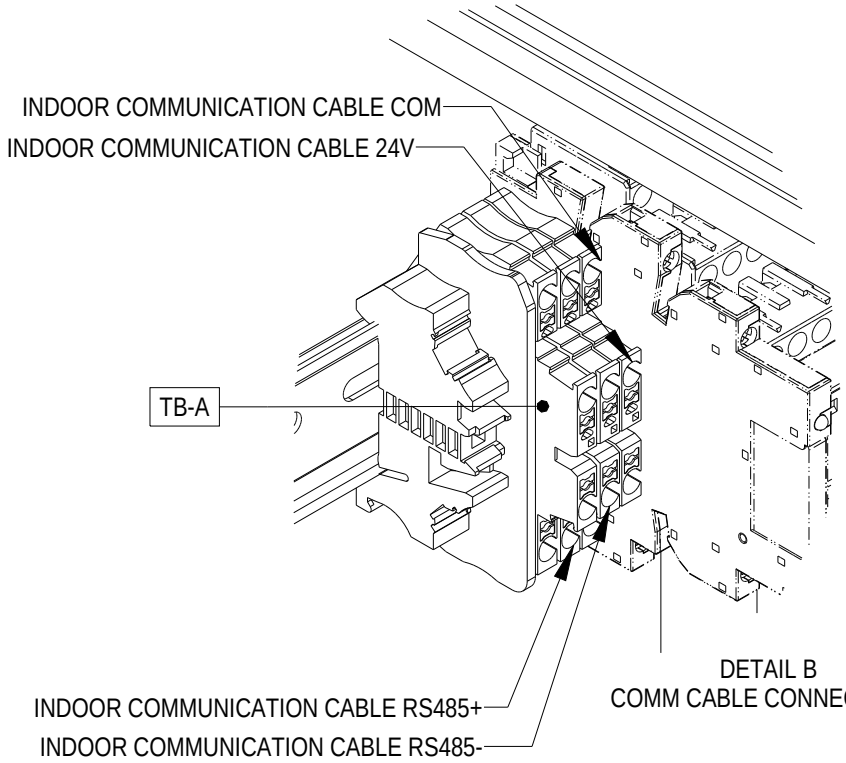




DETAIL A
CABLE ENTRY LOCATIONS



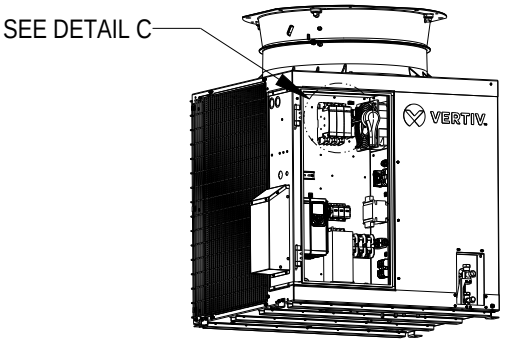
INDOOR-OUTDOOR COMMUNICATION
CABLE CONFIGURATION
USE ETHERNET SHIELDED STRAIGHT THROUGH



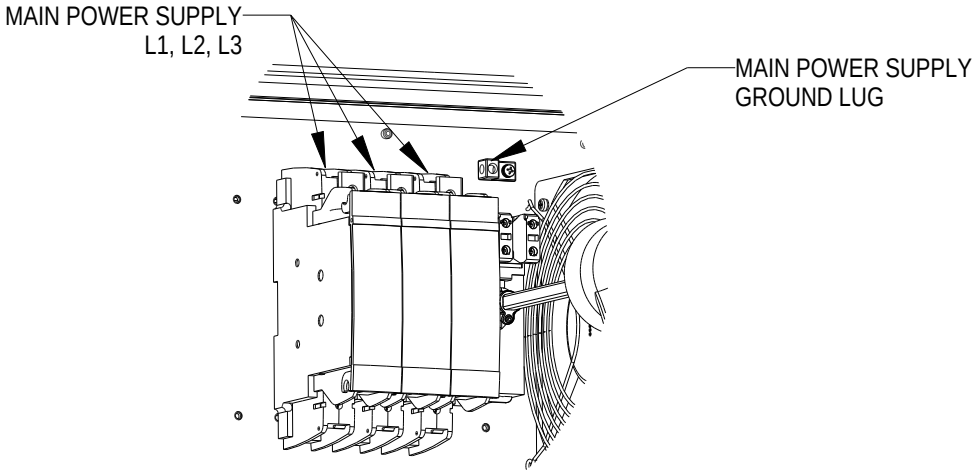
DETAIL B
COMM CABLE CONNECTIONS

ELECTRICAL FIELD CONNECTIONS

CONDENSER UNIT 21kW



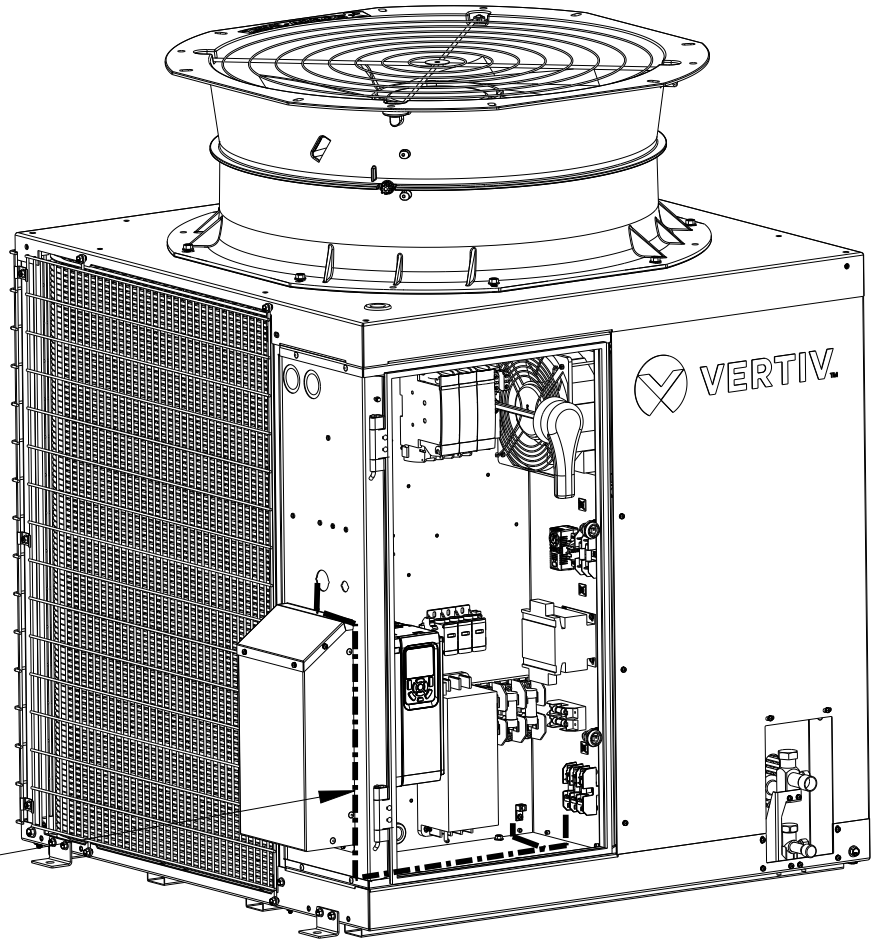
SINGLE POWER SUPPLY OPTIONS



DETAIL C
MAIN POWER SUPPLY CONNECTIONS
SINGLE POWER OPTION

ELECTRICAL FIELD CONNECTIONS

CONDENSER UNIT 21kW



ROUTE CABLE INSIDE
THE UNIT AS SHOWN

ELECTRICAL FIELD CONNECTIONS
CONDENSER UNIT 15kW

Condenser-rated voltage should be verified with available power supply before installation. Refer to the unit's electrical schematic and serial tag for specific electrical requirements. Line voltage electrical service is required for all condensers at the location of the condenser. The voltage supply to the condenser may not be the same voltage supply as required by the indoor unit. Consider using UPS equipment on both data center cooling units and Liebert MC condensers to maintain uninterrupted cooling capability. Refer to the unit's serial tag for specific condenser electrical requirements. A unit disconnect is standard. However, a site disconnect may be required per local code to isolate the unit for maintenance. Route the supply power to the site disconnect switch and then to the unit. Route the conduit to the knockout provided in the top right end of the electrical control enclosure. Connect the earth ground wire leads to the marked earth ground connection terminal provided near the factory-installed disconnect switch.

KEY ELECTRICAL POWER SUPPLY DETAILS:

1) Three phase electrical service (primary source) - The connection terminals are on top of fused switch. Three phase service not by Vertiv. See note 4.
2) Earth ground (primary source) - Field lug terminal for earth ground connection.
3) Three phase electrical service (secondary source) - The connection terminals are on top of fused switch, the fused switch is located at the top and right side of the E-box. Three phase service not by Vertiv. See note 4.
4) Earth ground (secondary source) - Terminal for field-supplied earth grounding wire.
5) Modbus terminal connections (RS-485) from the interior unit - The connection terminals are located in TB-A. See DETAIL B on page 3.
   RS485+ terminal is the input terminal for RS485 signal (positive).
   RS485- terminal is the input terminal for RS485 signal (negative).
   CGND terminal is the input terminal for signal reference ground.

6) 24V terminal connections from the interior unit - The connection terminals are located in TB-A. See DETAIL B on page 3.
   24V terminal is the input terminal for the hot wire used for leak detection mitigation on the indoor unit.
   COM terminal is the input terminal for the common wire used for leak detection mitigation on the indoor unit.
7) Three phase electrical service entrance (primary source) - One 1.875in (47.63mm) diameter knockout located at the top and left side of the E-Box.
8) Three phase electrical service entrance (secondary source) - One 1.875in (47.63mm) diameter knockout located at the top and left side of the E-Box.
9) Modbus terminal connections (RS-485) from the interior unit - Field connections for Modbus cable connection: One - 0.70" (18mm) diameter knockout located at the middle and left side of the E-Box.

NOTES:

1. Refer to specification sheet for unit voltage rating, full load amp, minimum circuit ampacity and maximum circuit protection.
2. The modbus (RS485) wiring is field supplied and must be (See drawing on page 3 for wire configuration):
   STP straight through wire type.
   22-18AWG stranded tinned copper.
   Twisted pair (minimum 4 twist per foot).
   Low Capacitance (15pF/FT or less).
   Must be rated to meet local codes and conditions.
3. Do not run in same conduit, raceway, or chase as high voltage wiring.
4. All wiring must be sized and selected for insulation case per NEC and other local codes.
5. Do not bend cables to less than four times the diameter of the cable.
6. UL approved temperature rated to 75°C.
7. UV - and moisture-resistance for exterior and if it is not provided in conduits.
8. Do not deform cables when securing in bundles or when hanging them.
9. Avoid running the cables by devices that may introduce noise, such as machines, fluorescent lights, and electronics.
10. Avoid stretching cables.

ELECTRICAL FIELD CONNECTIONS
CONDENSER UNIT 15kW

NOTICE

RISK OF IMPROPER INPUT POWER CAN CAUSE EQUIPMENT DAMAGE.

The electronically commutated motors included in the COOLPHASE CONDENSING UNITS are suitable for connection to an electrical service providing input power to the unit with 300V or less line -to-ground potential only.

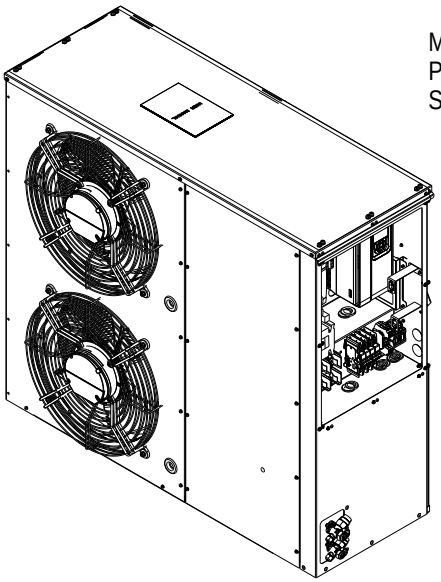
Acceptable unit input electrical service for 208V(230V) nominal units:
208V wye with solidly grounded neutral and 120V line-to-ground.

Acceptable unit input electrical service for 460V(480V) nominal units:
480V wye with solidly grounded neutral and 277V line-to-ground.

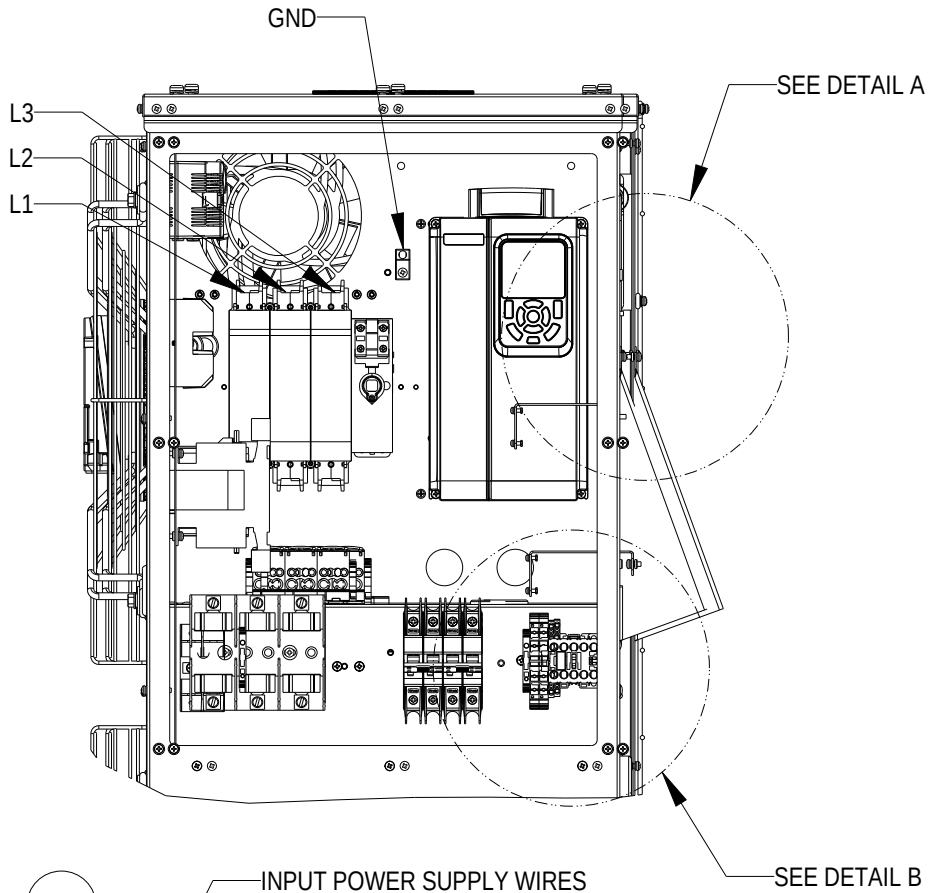
Unacceptable unit input electrical service for 208V to 460V (480V) nominal units:
- Wye with high resistance (or impedance) ground
- Delta without ground or with floating ground
- Delta with corner ground
- Delta with grounded center tap

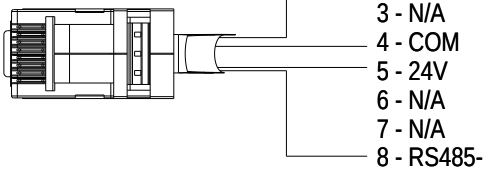
ELECTRICAL FIELD CONNECTIONS

CONDENSER UNIT 15kW

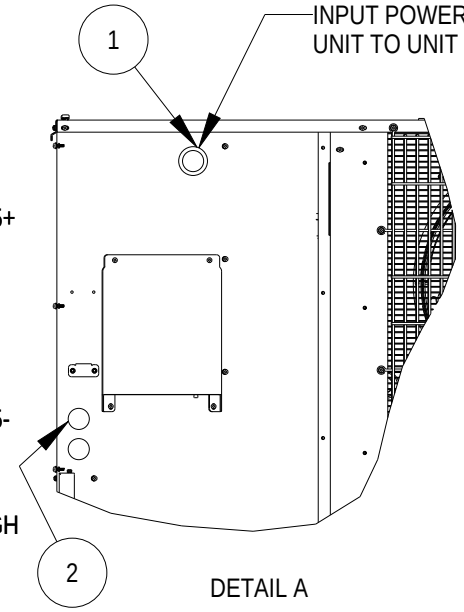


MAIN
POWER
SUPPLY

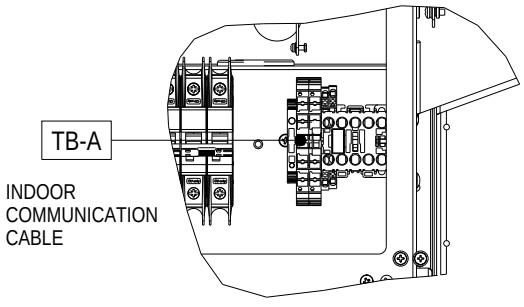




INDOOR-OUTDOOR COMMUNICATION
CABLE CONFIGURATION
USE ETHERNET SHIELDED STRAIGHT THROUGH



DETAIL A



DETAIL B

VERTIV COOLPHASE CONDENSING UNIT

ELECTRICAL FIELD CONNECTIONS

Condensing unit-rated voltage should be verified with available power supply before installation. Refer to the unit's electrical schematic and serial tag for specific electrical requirements. Line voltage electrical service is required for all condensing units at the location of the condensing units. The voltage supply to the condensing unit may not be the same voltage supply as required by the indoor unit. Consider using UPS equipment on both data center cooling units and CoolPhase Condensing units to maintain uninterrupted cooling capability. Refer to the unit's serial tag for specific condenser electrical requirements. A unit disconnect is standard. However, a site disconnect may be required per local code to isolate the unit for maintenance. Route the supply power to the site disconnect switch and then to the unit. Route the conduit to the knockout provided in the top right end of the electrical control enclosure. Connect the earth ground wire leads to the marked earth ground connection terminal provided near the factory-installed disconnect switch.

NOTE

CoolPhase Condensing unit may include a dual power supply option, this will require a separate line voltage electrical supply from an emergency power supply.

KEY ELECTRICAL POWER SUPPLY DETAILS:

1) Three phase electrical service (primary source) - The connection terminals are on top of fused switch. Three phase service not by Vertiv. See note 4.
2) Earth ground (primary source) - Field lug terminal for earth ground connection.
3) Three phase electrical service (secondary source) - The connection terminals are on top of fused switch, the fused switch is located at the top and right side of the E-box. Three phase service not by Vertiv. See note 4.
4) Earth ground (secondary source) - Terminal for field-supplied earth grounding wire.
5) Modbus terminal connections (RS-485) from the interior unit - The ethernet port Z4 are located in the bracket. See DETAIL C on page 3 CONNECT.
   RS485+ terminal is the input terminal for RS485 signal (positive).
   RS485- terminal is the input terminal for RS485 signal (negative).
   CGND terminal is the input terminal for signal reference ground.
   POWER METER RS485+ terminals are the input terminal for RS485 signal when using the Power Meter accessory. Refer to its QIG for more details on installation.
6) 24V terminal connections from the interior unit - The connection terminals are located in TB-A. See DETAIL B on page 3.
   24V terminal is the input terminal for the hot wire used for leak detection mitigation on the indoor unit.
   COM terminal is the input terminal for the common wire used for leak detection mitigation on the indoor unit.
7) Three phase electrical service entrance (primary source) - One 1.875in (47.63mm) diameter knockout located at the top and left side of the E-Box.
8) Three phase electrical service entrance (secondary source) - One 1.875in (47.63mm) diameter knockout located at the top and left side of the E-Box.
9) Modbus terminal connections (RS-485) from the interior unit - Field connections for Modbus cable connection: One - 0.70" (18mm) diameter knockout located at the middle and left side of the E-Box.

NOTES:

1. Refer to specification sheet for unit voltage rating, full load amp, minimum circuit ampacity and maximum circuit protection.
2. The modbus (RS485) wiring is field supplied and must be (See drawing on page 3 for wire configuration):
   STP straight through wire type.
   22-18AWG stranded tinned copper.
   Twisted pair (minimum 4 twist per foot).
   Low Capacitance (15pF/FT or less).
   Must be rated to meet local codes and conditions.
3. Do not run in same conduit, raceway, or chase as high voltage wiring.
4. All wiring must be sized and selected for insulation case per NEC and other local codes.
5. Do not bend cables to less than four times the diameter of the cable.
6. UL approved temperature rated to 75°C.
7. UV - and moisture-resistance for exterior and if it is not provided in conduits.
8. Do not deform cables when securing in bundles or when hanging them.
9. Avoid running the cables by devices that may introduce noise, such as machines, fluorescent lights, and electronics.
10. Avoid stretching cables.

ELECTRICAL FIELD CONNECTIONS

NOTICE

RISK OF IMPROPER INPUT POWER CAN CAUSE EQUIPMENT DAMAGE.

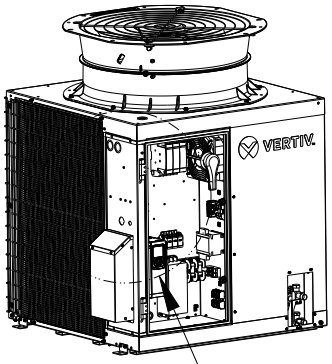
The electronically commutated motors included in the COOLPHASE CONDENSING UNITS - included in 480V in COOLPHASE ROW30 + CONDENSING UNIT AND COOLPHASE ROW40 + CONDENSING UNIT - are suitable for connection to an electrical service providing input power to the unit with 300V or less line -to-ground potential only.

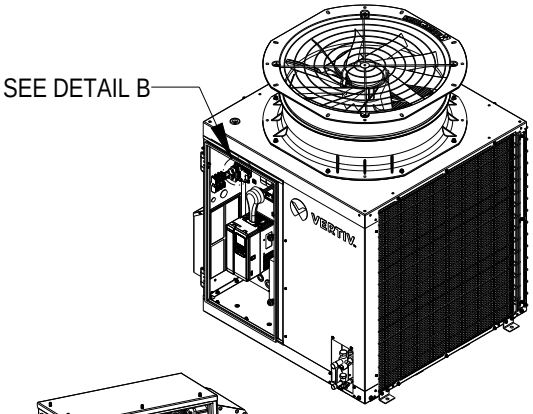
Acceptable unit input electrical service for 208V(230V) nominal units:
- 208V wye with solidly grounded neutral and 120V line-to-ground.

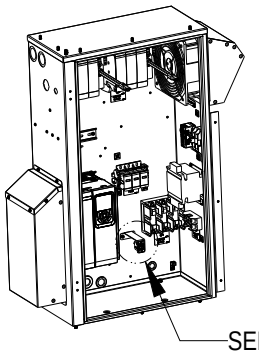
Acceptable unit input electrical service for 460V(480V) nominal units:
- 480V wye with solidly grounded neutral and 277V line-to-ground.

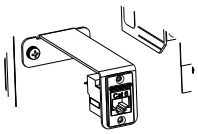
Unacceptable unit input electrical service for 208V to 460V (480V) nominal units:
- Wye with high resistance (or impedance) ground
- Delta without ground or with floating ground
- Delta with corner ground
- Delta with grounded center tap

ELECTRICAL FIELD CONNECTIONS

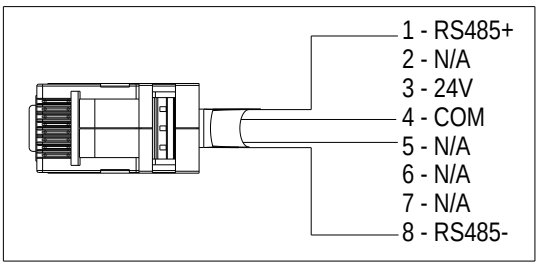




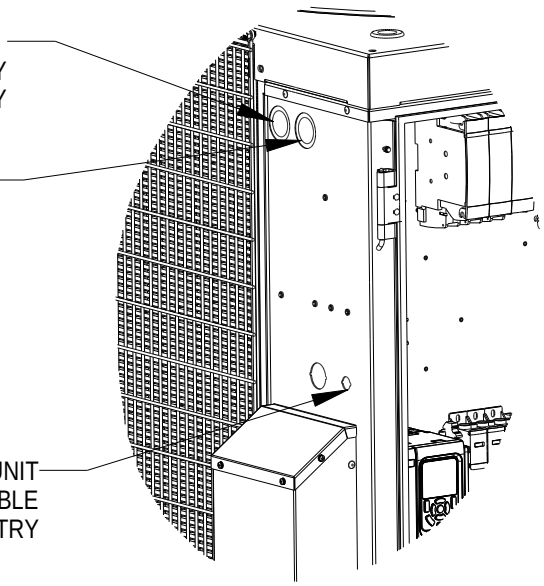




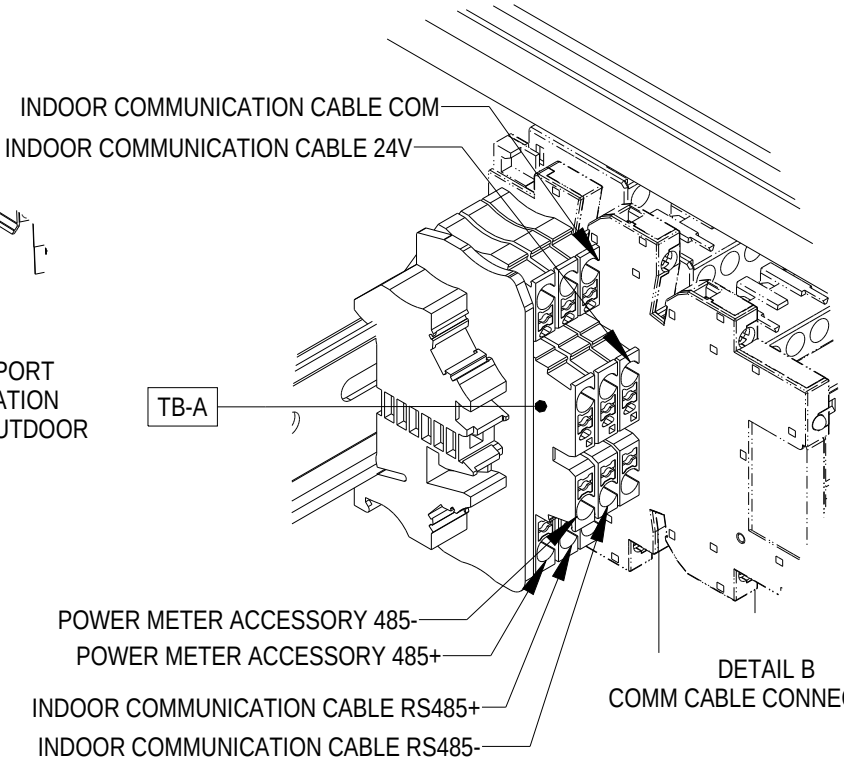
DETAIL A
ETHERNET PORT
COMMUNICATION
INDOOR - OUTDOOR
Z4



INDOOR-OUTDOOR COMMUNICATION
CABLE CONFIGURATION
USE ETHERNET SHIELDED STRAIGHT THROUGH

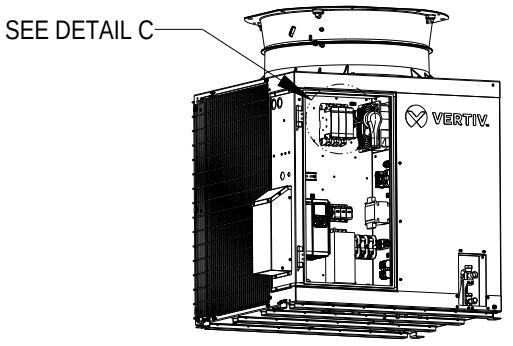


DETAIL A
CABLE ENTRY LOCATIONS

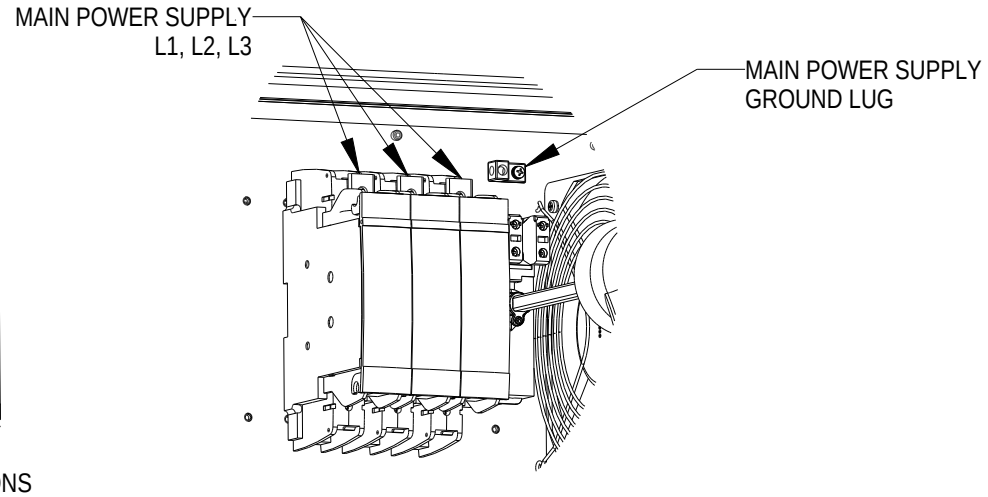


DETAIL B
COMM CABLE CONNECTIONS

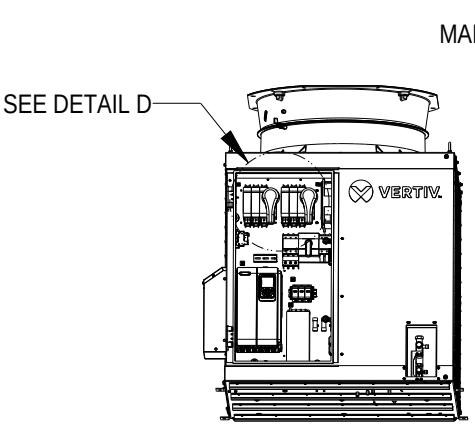
ELECTRICAL FIELD CONNECTIONS



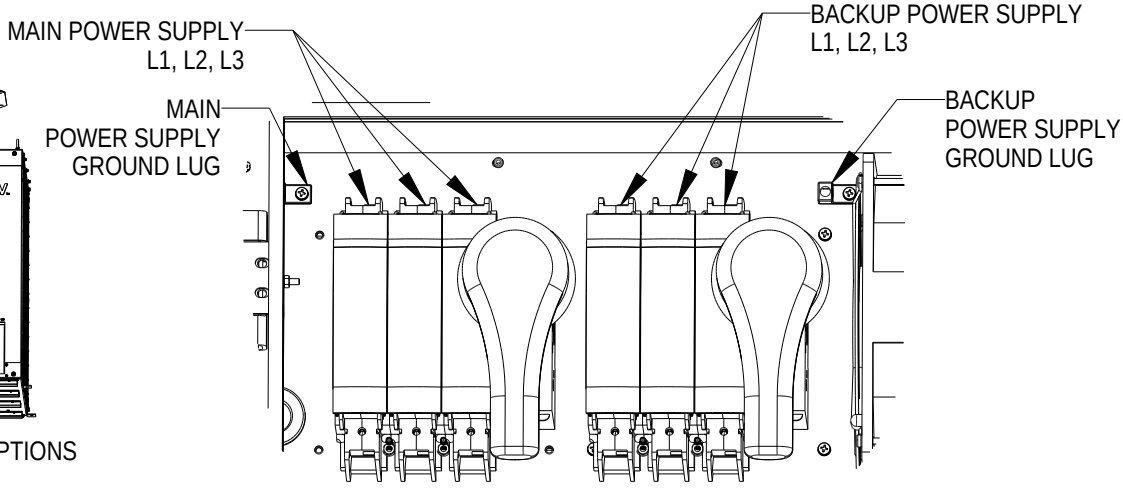
SINGLE POWER SUPPLY OPTIONS



DETAIL C
MAIN POWER SUPPLY CONNECTIONS
SINGLE POWER OPTION

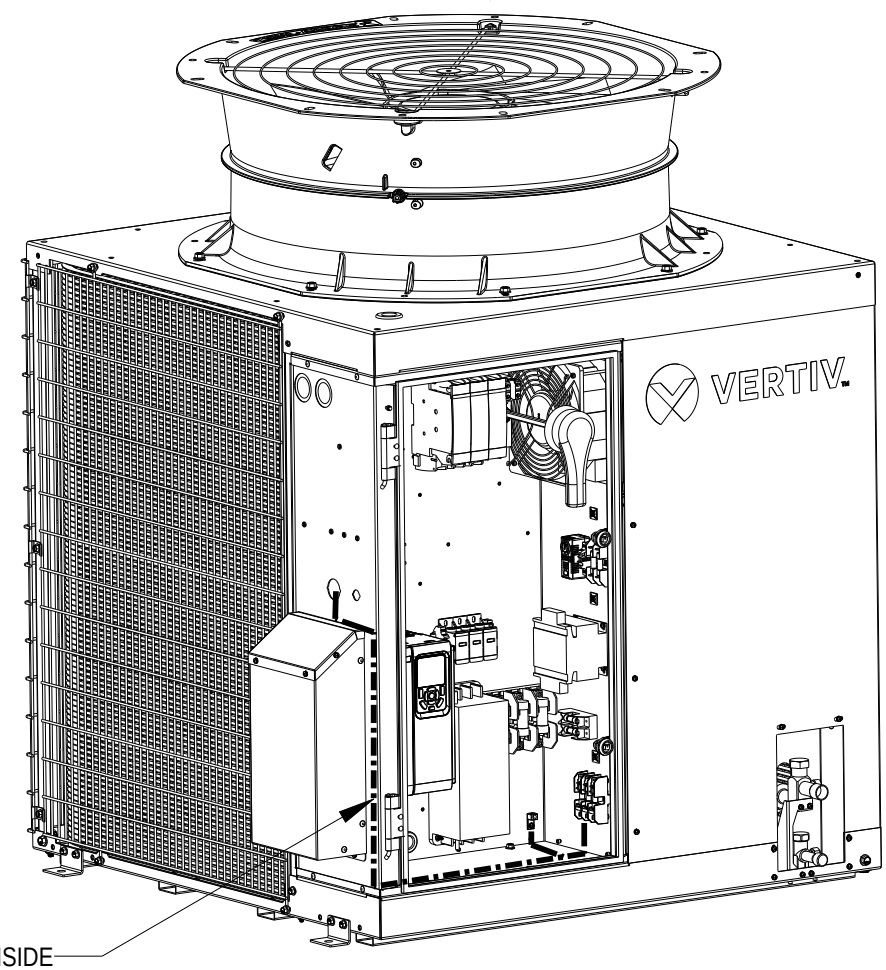


DUAL POWER SUPPLY OPTIONS

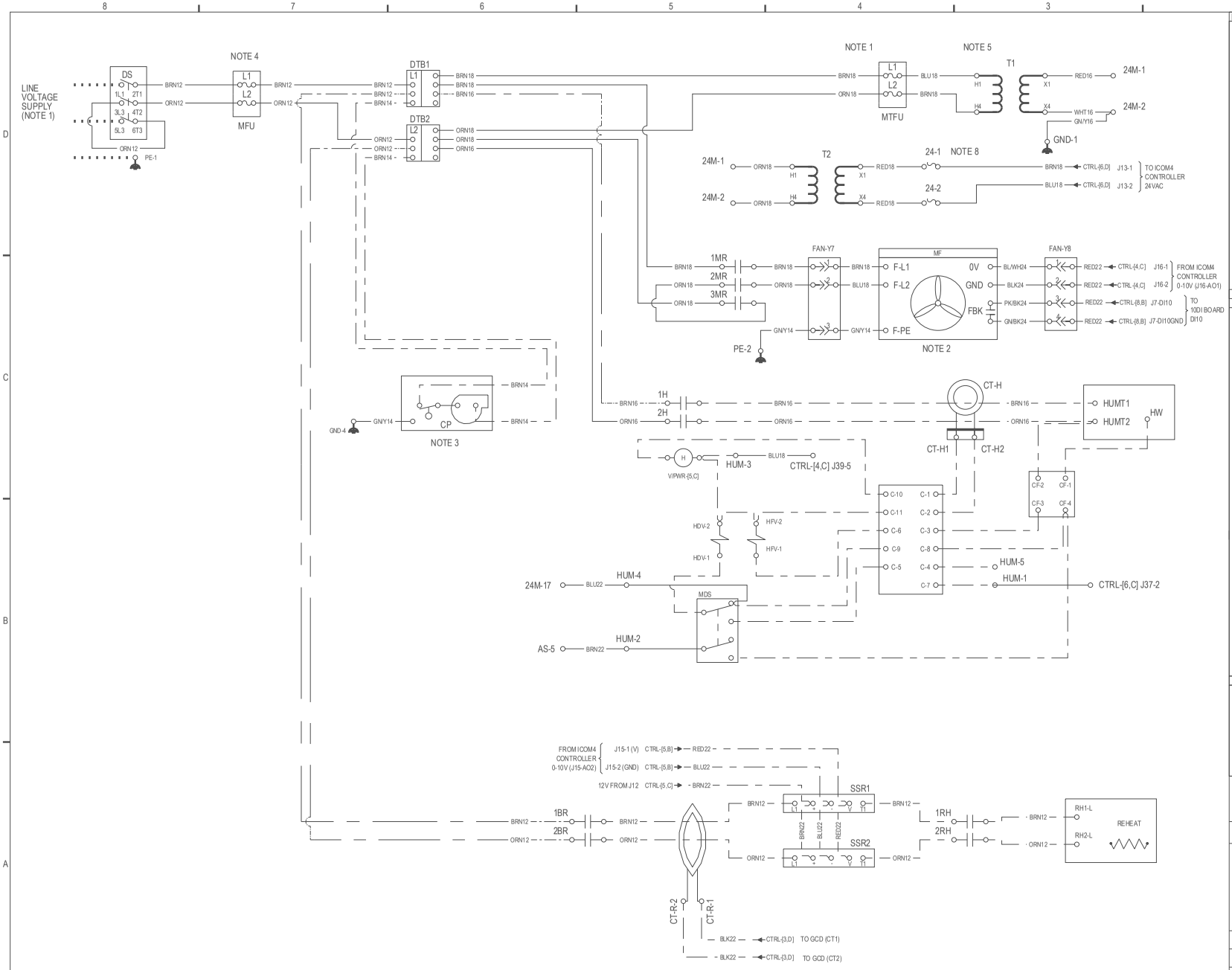


DETAIL D
MAIN POWER SUPPLY CONNECTIONS
DUAL POWER OPTION

ELECTRICAL FIELD CONNECTIONS



ROUTE CABLE INSIDE
THE UNIT AS SHOWN



NOTES:

1.- TRANSFORMER PRIMARY FUSES SUPPLIED ON UNITS WITH TRANSFORMER SIZES ABOVE 100VA.

2.- MAIN FAN MOTOR HAS INTERNAL OVERLOAD PROTECTION.

3.- CONDENSATE PUMP AUXILIARY SWITCH MUST BE WIRED TO DI6 WHEN OPTIONAL CONDENSATE PUMP IS SUPPLIED

4.- PART CAN BE EITHER FUSE (SHOWN) OR CIRCUIT BREAKER

5.- CONTROL VOLTAGE TRANSFORMER PRIMARY TAP POSITION DEPENDS ON THE ENTRY LINE VOLTAGE.

6.- ETHERNET STRAIGHT THROUGH CABLE.

7.- CAN PORT USE RJ12 CONNECTOR

8.- TERMINAL BLOCK WITH FUSE

9.- TERMINAL BLOCK JUMPER IS USED FOR VOLTAGE DISTRIBUTION ON TB-24M AND TB-AS.

NOMENCLATURE

POS	STANDARD DEVICES	POS	OPTIONAL DEVICES
			MISC OPTIONS
AQS	AQUA STAT SENSOR	CP	CONDENSATE PUMP
AS	AIR SAFETY SWITCH	CPAS	CONDENSATE PUMP AUX. SW.
DTB	DISTRIBUTION TERMINAL BLOCK	DS	DISCONNECT SWITCH
DS	DISCONNECT SWITCH	RAD1	REMOTE ALARM DEVICE
EEV	ELECTRONIC EXPANSION VALVE	SD	SMOKE DETECTOR
FC	FILTER CLOG	SDC	SMOKE DETECTOR CONTROL
HTS	HIGH TEMPERATURE STATUS	STS	INTERFACE BOARD
HWA	HIGH WATER ALARM		
LPT	LOW PRESSURE TRANSDUCER		**REHEAT / HUMIDIFIER**
MR	MAIN FAN RELAY	BR	BACK UP REHEAT CONTACTOR
MFU	MAIN FUSES	CT-H	CURRENT XFMR HUM
MTFU	MAIN TRANSFORMER FUSES	CT-R	CURRENT XFMR RHT
RLS	REFRIGERANT LEAK SENSOR	DV	DRAIN VALVE
SAS	SUPPLY AIR SENSOR	FV	FILL VALVE
SLTS	SUCCION LINE TEMP. SENSOR	GCD	GROUND CURRENT DETECTOR
SSR	SOLID STATE RELAY	H	HUMIDIFIER CONTACTOR
T1	CONTROL TRANSFORMER	HUM	HUMIDIFIER
T2	ISOLATION TRANSFORMER	MDS	MANUAL DRAIN SWITCH
TB24	24VAC ISOLATED T. BLOCKS	RH	REHEAT CONTACTOR
TB24M	24VAC NON ISOLATED T. BLOCKS	RHS1,2	REHEAT HI TEMP SAFETY
TBAS	AIR SAFETY SWITCH T. BLOCKS		
TH/HU	TEMP/HUMIDITY SENSOR		**COOLING COMPONENTS**
VFD	VARIABLE FREQUENCY DRIVE	CGT	CHILLED GLYCOL THERMOSTAT
WS	WIRE SPLICER	CGV	CHILLED GLYCOL VALVE

FACTORY SUPPLIED LINE VOLTAGE
FIELD INSTALLED LINE VOLTAGE WIRING
OPTIONAL LINE VOLTAGE WIRING
FACTORY SUPPLIED 24 VOLT NEC CLASS 2 WIRING
RELAY INTERNAL CIRCUIT
OPTIONAL 24 VOLT WIRING
FIELD SUPPLIED 24V NEC CLASS 2 WIRING
FIELD SUPPLIED EARTH GROUNDING WIRE
PIGTAIL LEAD 5.24 VOLT WIRING
TERMINAL STRIP CONNECTION
GROUNDING LUG CONNECTION
COMPONENT PLUG CONNECTION

WIRE COLOUR CODE

OR - ORANGE	PR - PURPLE	BL - BLUE
R - RED	GR - GREEN	BK - BLACK
BR - BROWN	Y - YELLOW	W - WHITE

1050 DEARBORN DRIVE, P.O. BOX 29186
COLUMBUS, OHIO 43229
CAGE CODE 1EDC2

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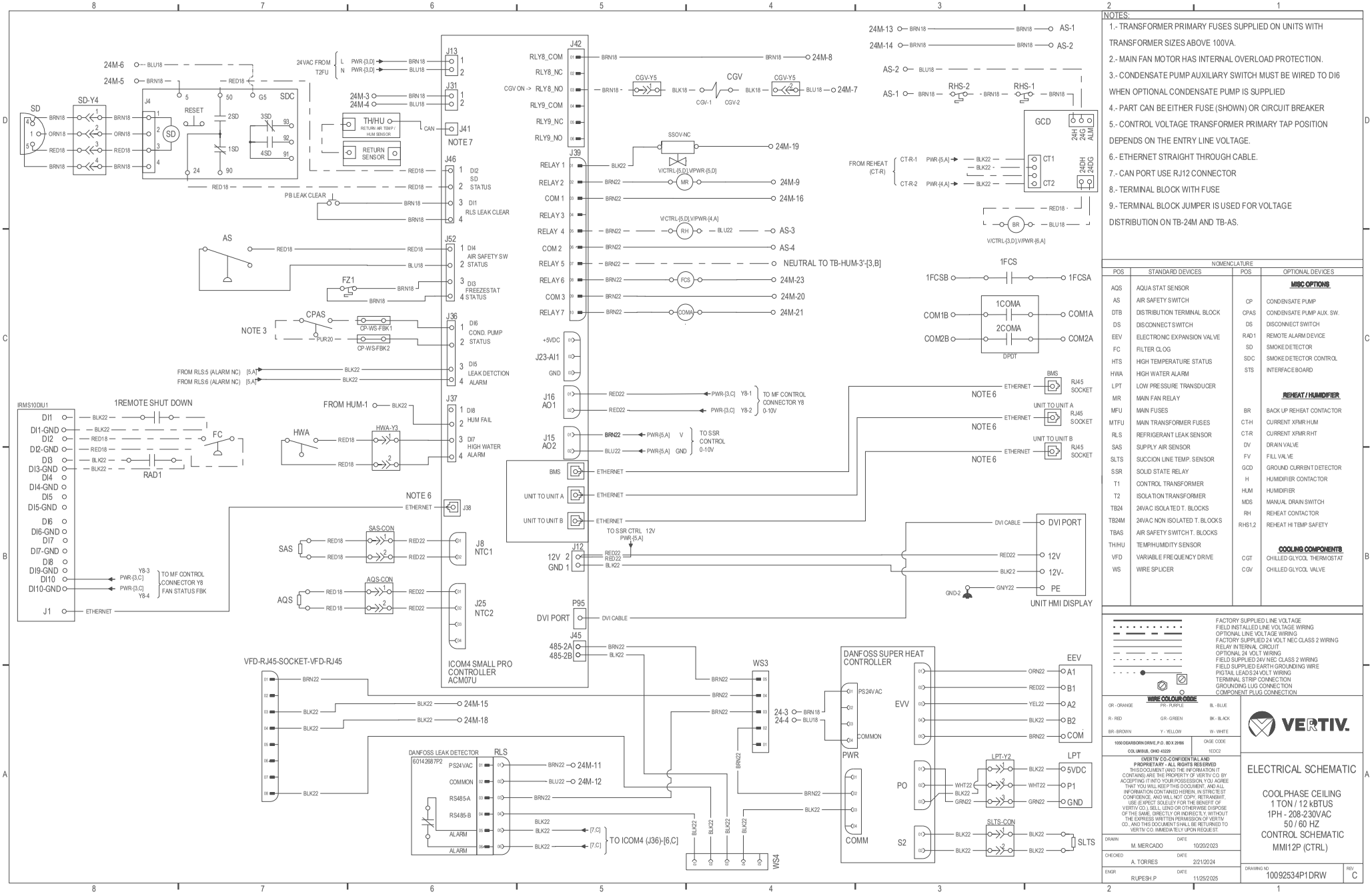
DRAWN	A. PATLAN	DATE 11/12/2025
CHECKED	A. TORRES	DATE 11/12/2025
ENGR	RUPESH.P	DATE 11/25/2025

VERTIV.

ELECTRICAL SCHEMATIC

COOLPHASE CEILING
1 TON / 12 kBTUS
1PH - 208-230VAC
50 / 60 HZ
POWER SCHEMATIC
MMI12P (PWR)

DRAWING NO 10092534P1DRW
REV C



NOTES:

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NOMENCLATURE

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AQS	AQUA STAT SENSOR
AS	AIR SAFETY SWITCH
DTB	DISTRIBUTION TERMINAL BLOCK
DS	DISCONNECT SWITCH
EEV	ELECTRONIC EXPANSION VALVE
FC	FILTER CLOG
HTS	HIGH TEMPERATURE STATUS
HWA	HIGH WATER ALARM
LPT	LOW PRESSURE TRANSDUCER
MR	MAIN FAN RELAY
MFU	MAIN FUSES
MTFU	MAIN TRANSFORMER FUSES
RLS	REFRIGERANT LEAK SENSOR
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T1	CONTROL TRANSFORMER
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TB24	24VAC ISOLATED T. BLOCKS
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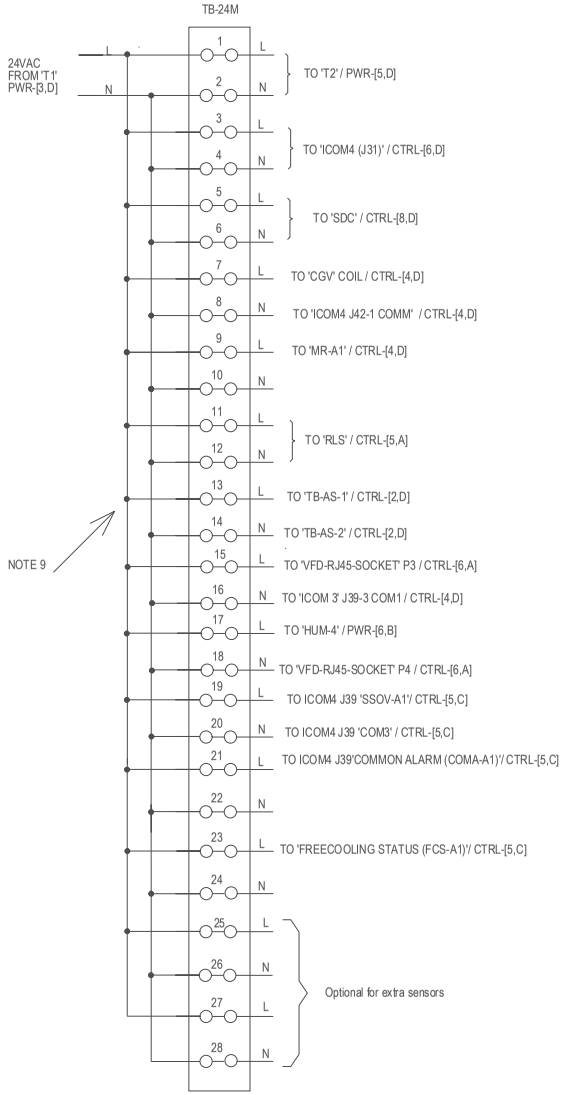
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CHECKED	A. TORRES	DATE 2/21/2024
ENGR	RUPESH.P	DATE 11/25/2025

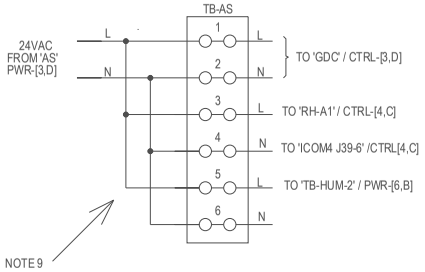
ELECTRICAL SCHEMATIC

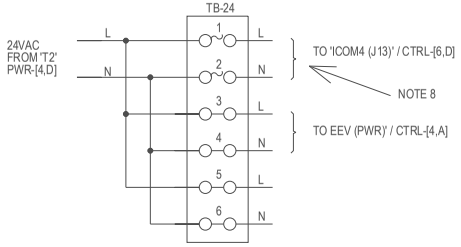
COOLPHASE CEILING
1 TON / 12 kBTUS
1PH - 208-230VAC
50 / 60 HZ
CONTROL SCHEMATIC
MMI12P (CTRL)

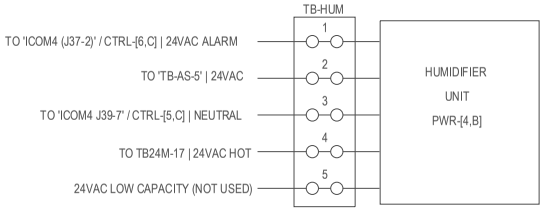
DRAWING NO 10092534P1DRW
REV C

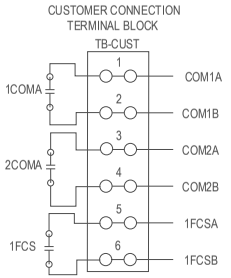
TERMINAL BLOCKS DISTRIBUTION DETAILS











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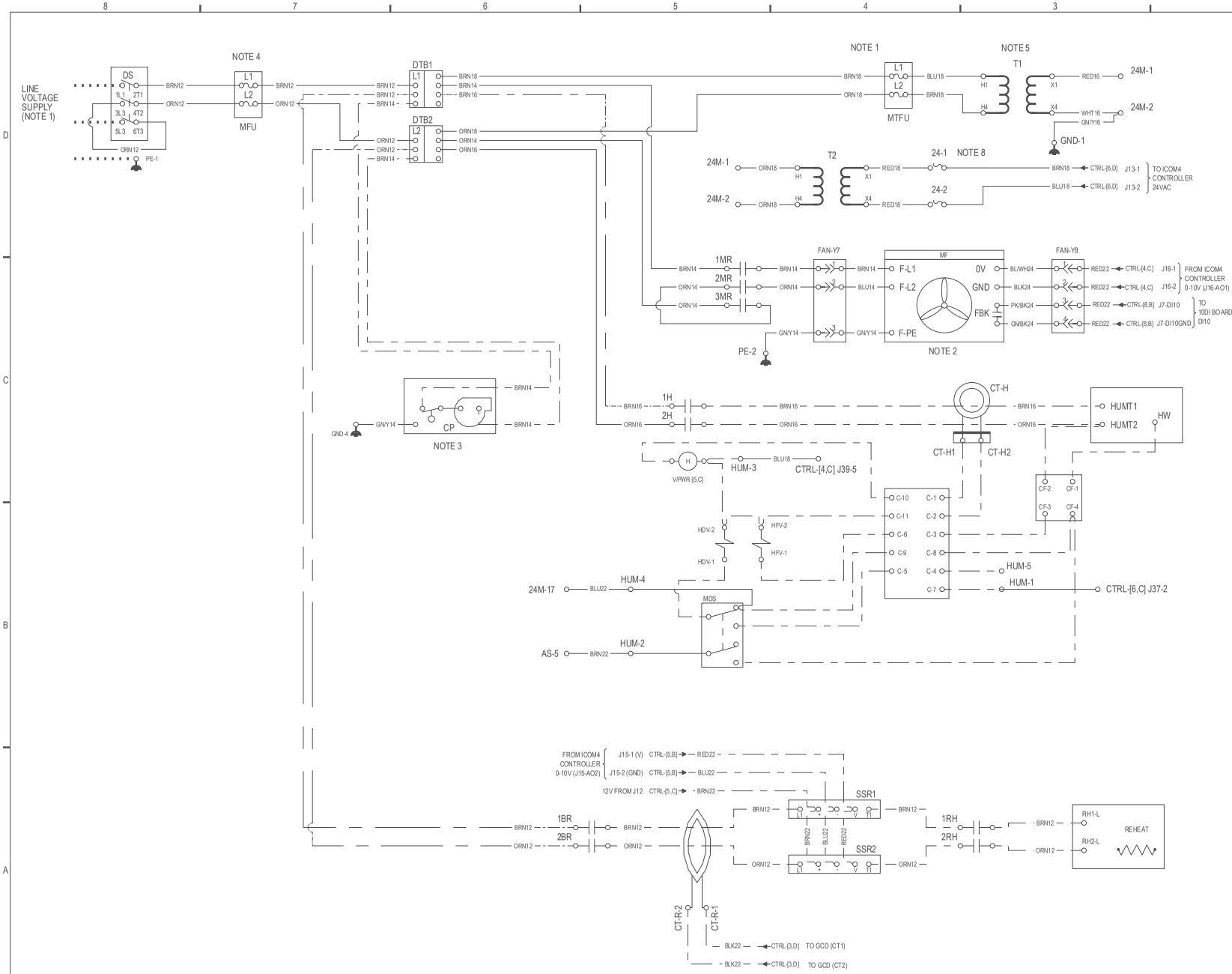
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ELECTRICAL SCHEMATIC

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1PH - 208-230VAC
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T. BLOCK DISTRIBUTION
MMI12P (TBLK)

DRAWING NO 10092534P1DRW
REV C



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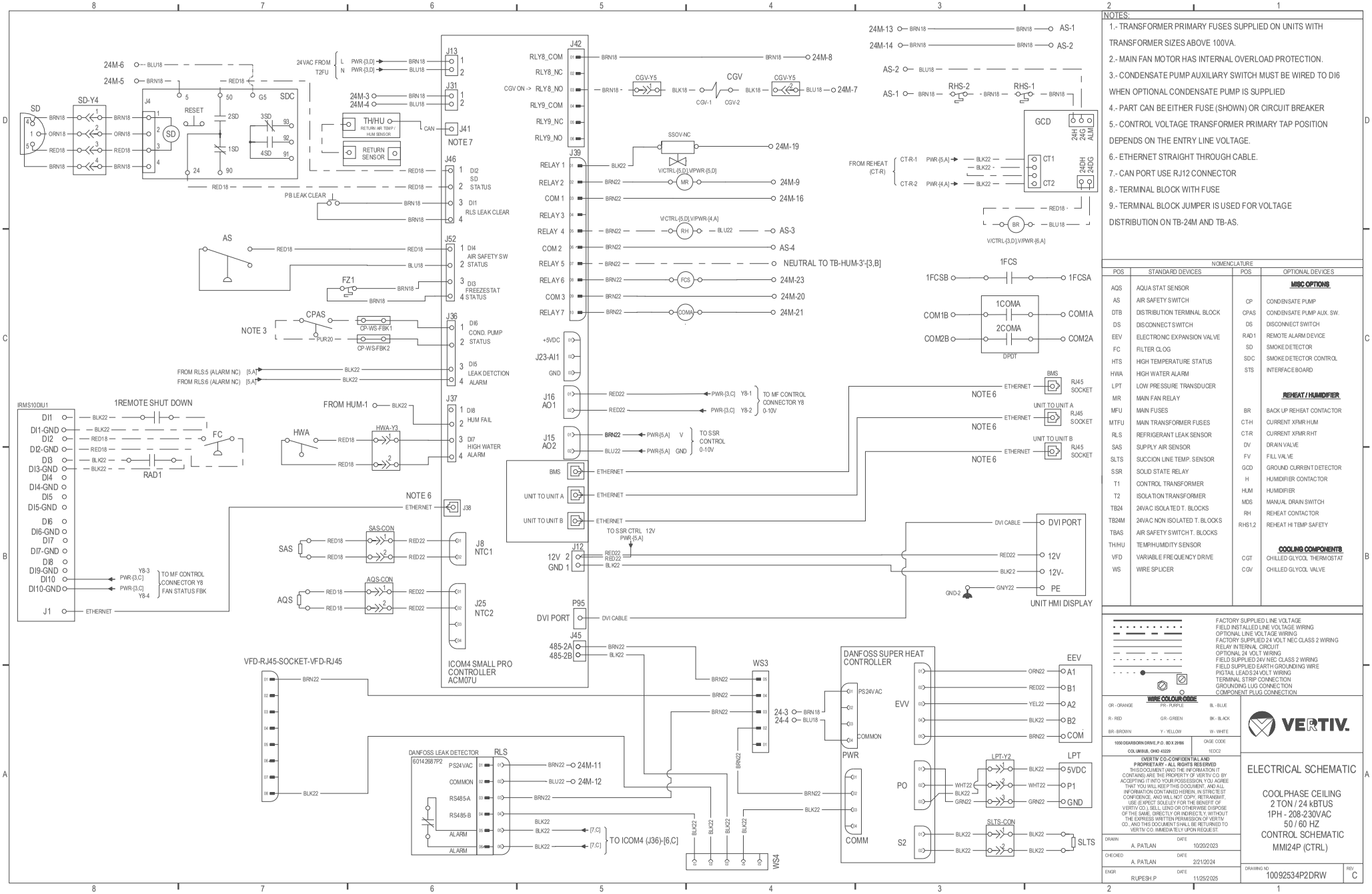
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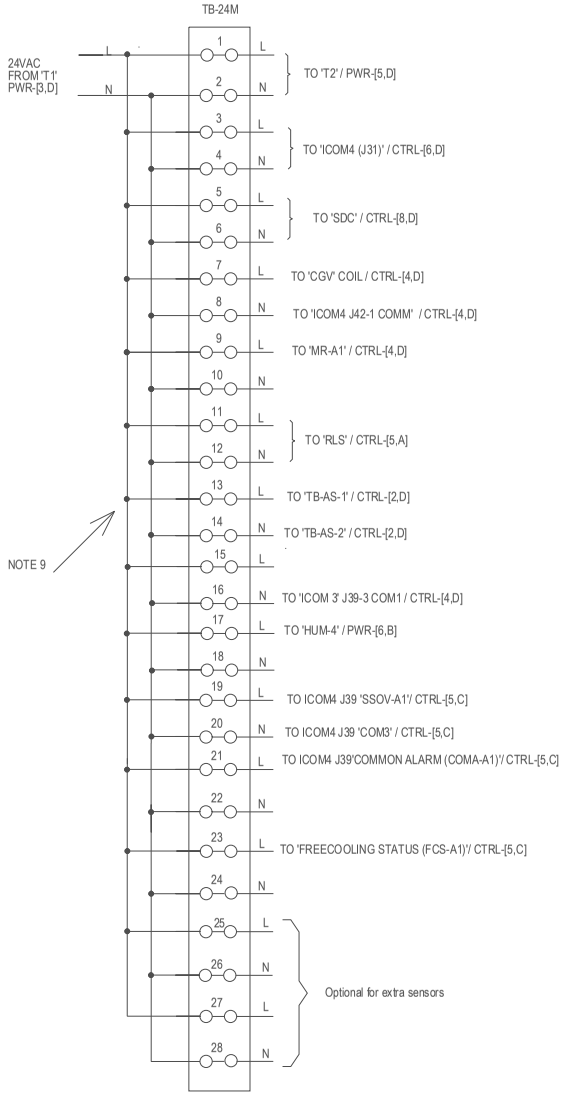
ELECTRICAL SCHEMATIC

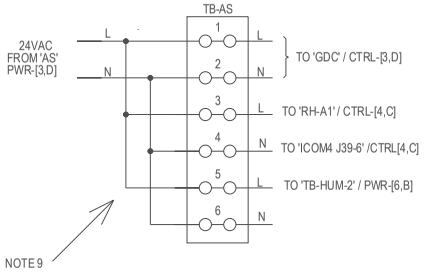
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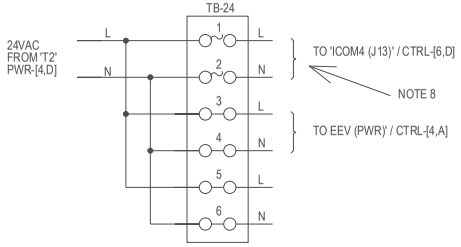
DRAWING NO 10092534P2DRW
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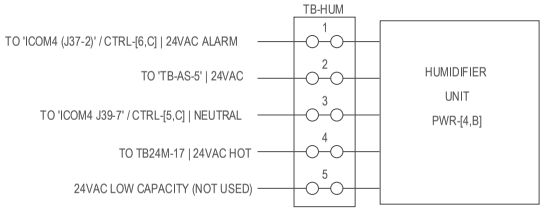

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DRAWN A. PATLAN DATE 10/20/2023
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ENGR RUPESH.P DATE 11/25/2025
VERTIV.
ELECTRICAL SCHEMATIC
COOLPHASE CEILING
2 TON / 24 kBTUS
1PH - 208-230VAC
50 / 60 HZ
CONTROL SCHEMATIC
MMI24P (CTRL)
DRAWING NO 10092534P2DRW
REV C

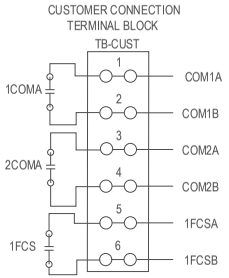
TERMINAL BLOCKS DISTRIBUTION DETAILS











NOTES:

1.- TRANSFORMER PRIMARY FUSES SUPPLIED ON UNITS WITH TRANSFORMER SIZES ABOVE 100VA.

2.- MAIN FAN MOTOR HAS INTERNAL OVERLOAD PROTECTION.

3.- CONDENSATE PUMP AUXILIARY SWITCH MUST BE WIRED TO DI6 WHEN OPTIONAL CONDENSATE PUMP IS SUPPLIED

4.- PART CAN BE EITHER FUSE (SHOWN) OR CIRCUIT BREAKER

5.- CONTROL VOLTAGE TRANSFORMER PRIMARY TAP POSITION DEPENDS ON THE ENTRY LINE VOLTAGE.

6.- ETHERNET STRAIGHT THROUGH CABLE.

7.- CAN PORT USE RJ12 CONNECTOR

8.- TERMINAL BLOCK WITH FUSE

9.- TERMINAL BLOCK JUMPER IS USED FOR VOLTAGE DISTRIBUTION ON TB-24M AND TB-AS.

NOMENCLATURE

POS	STANDARD DEVICES	POS	OPTIONAL DEVICES
			MISC OPTIONS
AQS	AQUA STAT SENSOR	CP	CONDENSATE PUMP
AS	AIR SAFETY SWITCH	CPAS	CONDENSATE PUMP AUX. SW.
DTB	DISTRIBUTION TERMINAL BLOCK	DS	DISCONNECT SWITCH
DS	DISCONNECT SWITCH	RAD1	REMOTE ALARM DEVICE
EEV	ELECTRONIC EXPANSION VALVE	SD	SMOKE DETECTOR
FC	FILTER CLOG	SDC	SMOKE DETECTOR CONTROL
HTS	HIGH TEMPERATURE STATUS	STS	INTERFACE BOARD
HWA	HIGH WATER ALARM		
LPT	LOW PRESSURE TRANSDUCER		**REHEAT / HUMIDIFIER**
MR	MAIN FAN RELAY	BR	BACK UP REHEAT CONTACTOR
MFU	MAIN FUSES	CT-H	CURRENT XFMR HUM
MTFU	MAIN TRANSFORMER FUSES	CT-R	CURRENT XFMR RHT
RLS	REFRIGERANT LEAK SENSOR	DV	DRAIN VALVE
SAS	SUPPLY AIR SENSOR	FV	FILL VALVE
SLTS	SUCCION LINE TEMP. SENSOR	GCD	GROUND CURRENT DETECTOR
SSR	SOLID STATE RELAY	H	HUMIDIFIER CONTACTOR
T1	CONTROL TRANSFORMER	HUM	HUMIDIFIER
T2	ISOLATION TRANSFORMER	MDS	MANUAL DRAIN SWITCH
TB24	24VAC ISOLATED T. BLOCKS	RH	REHEAT CONTACTOR
TB24M	24VAC NON ISOLATED T. BLOCKS	RHS1,2	REHEAT HI TEMP SAFETY
TBAS	AIR SAFETY SWITCH T. BLOCKS		
TH/HU	TEMP/HUMIDITY SENSOR		**COOLING COMPONENTS**
VFD	VARIABLE FREQUENCY DRIVE	CGT	CHILLED GLYCOL THERMOSTAT
WS	WIRE SPLICER	CGV	CHILLED GLYCOL VALVE

FACTORY SUPPLIED LINE VOLTAGE
FIELD INSTALLED LINE VOLTAGE WIRING
OPTIONAL LINE VOLTAGE WIRING
FACTORY SUPPLIED 24 VOLT NEC CLASS 2 WIRING
RELAY INTERNAL CIRCUIT
OPTIONAL 24 VOLT WIRING
FIELD SUPPLIED 24V NEC CLASS 2 WIRING
FIELD SUPPLIED EARTH GROUNDING WIRE
PIGTAIL LEADS 24 VOLT WIRING
TERMINAL STRIP CONNECTION
GROUNDING LUG CONNECTION
COMPONENT PLUG CONNECTION

WIRE COLOUR CODE

OR - ORANGE	PR - PURPLE	BL - BLUE
R - RED	GR - GREEN	BK - BLACK
BR - BROWN	Y - YELLOW	W - WHITE

VERTIV.

1050 DEARBORN DRIVE, P.O. BOX 29186
COLUMBUS, OHIO 43229

CAGE CODE
1EDC2

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CHECKED	A. PATLAN	DATE 2/21/2024
ENGR	RUPESH.P	DATE 11/25/2025

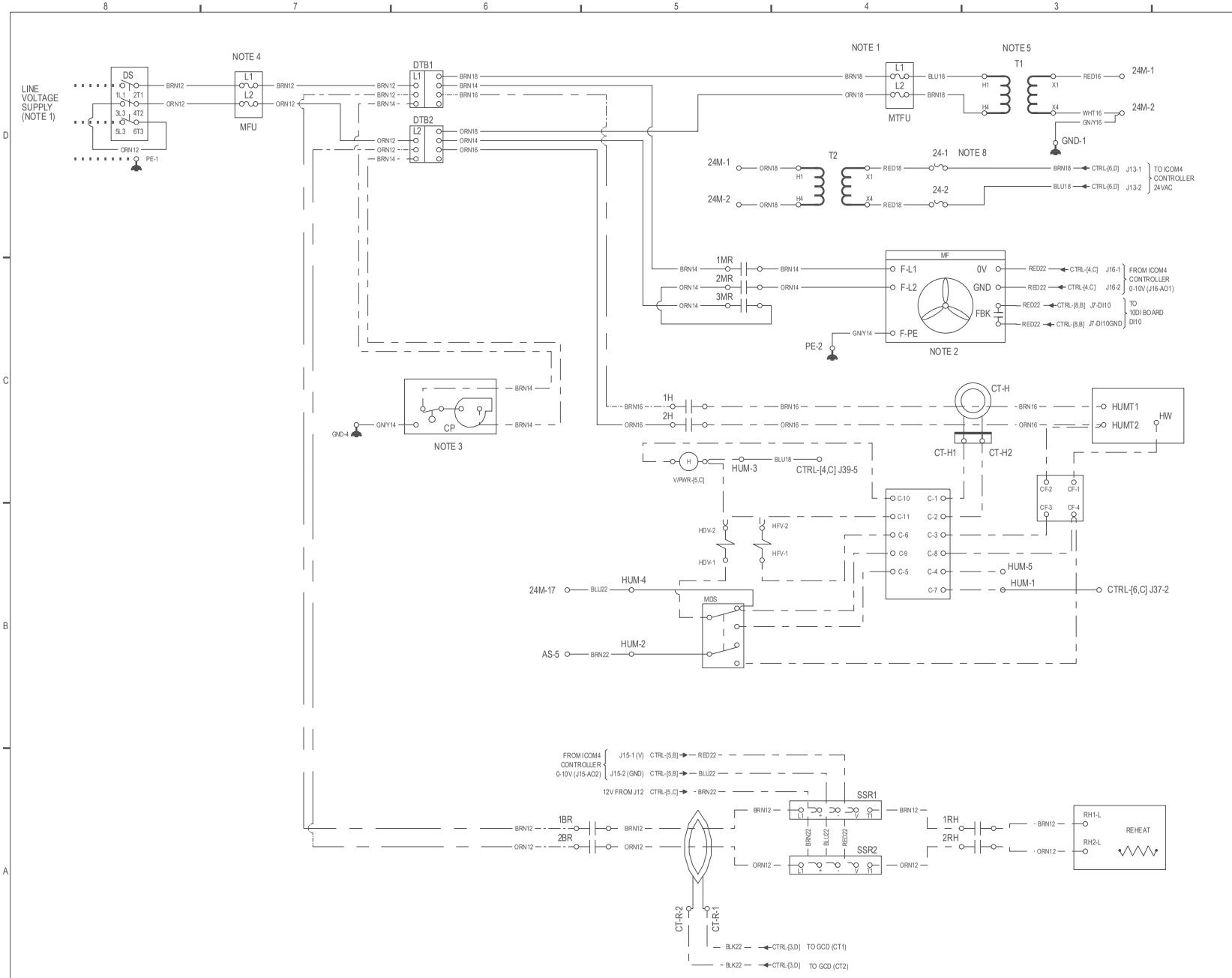
ELECTRICAL SCHEMATIC

COOLPHASE CEILING
2 TON / 24 kBTUS
1PH - 208-230VAC
50 / 60 HZ

T. BLOCK DISTRIBUTION
MMI24P (TBLK)

DRAWING NO 10092534P2DRW

REV C



NOTES:

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DTB	DISTRIBUTION TERMINAL BLOCK	DS	DISCONNECT SWITCH
DS	DISCONNECT SWITCH	RAD1	REMOTE ALARM DEVICE
EEV	ELECTRONIC EXPANSION VALVE	SD	SMOKE DETECTOR
FC	FILTER CLOG	SDC	SMOKE DETECTOR CONTROL
HTS	HIGH TEMPERATURE STATUS	STS	INTERFACE BOARD
HWA	HIGH WATER ALARM		
LPT	LOW PRESSURE TRANSDUCER		**REHEAT / HUMIDIFIER**
MR	MAIN FAN RELAY	BR	BACK UP REHEAT CONTACTOR
MFU	MAIN FUSES	CT-H	CURRENT XFMR HUM
MTFU	MAIN TRANSFORMER FUSES	CT-R	CURRENT XFMR RHT
RLS	REFRIGERANT LEAK SENSOR	DV	DRAIN VALVE
SAS	SUPPLY AIR SENSOR	FV	FILL VALVE
SLTS	SUCCION LINE TEMP. SENSOR	GCD	GROUND CURRENT DETECTOR
SSR	SOLID STATE RELAY	H	HUMIDIFIER CONTACTOR
T1	CONTROL TRANSFORMER	HUM	HUMIDIFIER
T2	ISOLATION TRANSFORMER	MDS	MANUAL DRAIN SWITCH
TB24	24VAC ISOLATED T. BLOCKS	RH	REHEAT CONTACTOR
TB24M	24VAC NON ISOLATED T. BLOCKS	RHS1,2	REHEAT HI TEMP SAFETY
TBAS	AIR SAFETY SWITCH T. BLOCKS		
TH/HU	TEMP/HUMIDITY SENSOR		**COOLING COMPONENTS**
VFD	VARIABLE FREQUENCY DRIVE	CGT	CHILLED GLYCOL THERMOSTAT
WS	WIRE SPLICER	CGV	CHILLED GLYCOL VALVE

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OPTIONAL LINE VOLTAGE WIRING
FACTORY SUPPLIED 24 VOLT NEC CLASS 2 WIRING
RELAY INTERNAL CIRCUIT
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FIELD SUPPLIED 24V NEC CLASS 2 WIRING
FIELD SUPPLIED EARTH GROUNDING WIRE
PIGTAIL LEAD S 24 VOLT WIRING
TERMINAL STRIP CONNECTION
GROUNDING LUG CONNECTION
COMPONENT PLUG CONNECTION

WIRE COLOUR CODE

OR - ORANGE	PR - PURPLE	BL - BLUE
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COLUMBUS, OHIO 43229
CAGE CODE 1EDC2

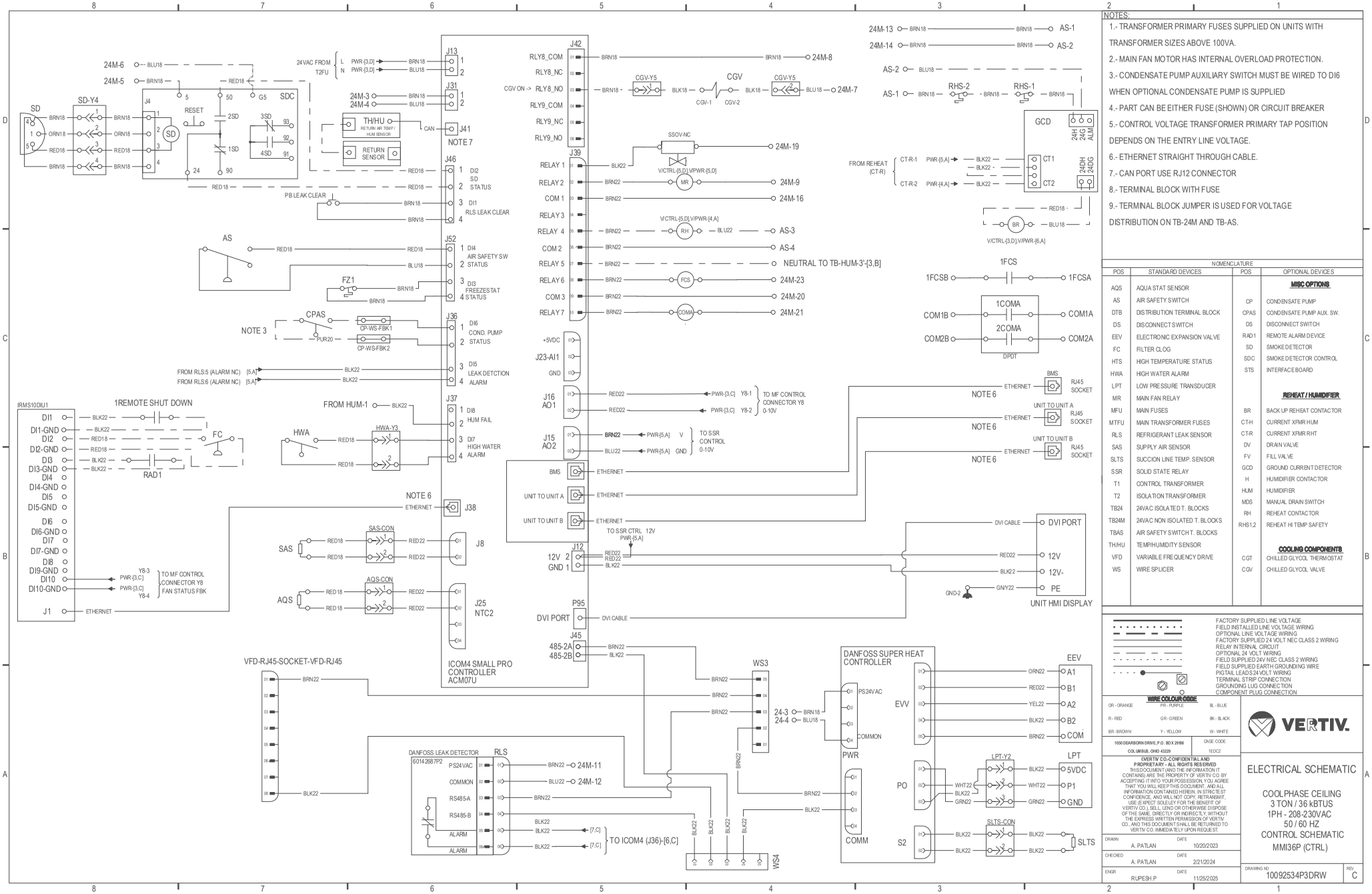
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ENGR	RUPESH.P	DATE 11/25/2025

ELECTRICAL SCHEMATIC

COOLPHASE CEILING
3 TON / 36 kBTUS
1PH - 208-230VAC
50 / 60 HZ
POWER SCHEMATIC
MMI36P (PWR)

DRAWING NO 10092534P3DRW
REV C



NOTES:

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AQS	AQUA STAT SENSOR
AS	AIR SAFETY SWITCH
DTB	DISTRIBUTION TERMINAL BLOCK
DS	DISCONNECT SWITCH
EEV	ELECTRONIC EXPANSION VALVE
FC	FILTER CLOG
HTS	HIGH TEMPERATURE STATUS
HWA	HIGH WATER ALARM
LPT	LOW PRESSURE TRANSDUCER
MR	MAIN FAN RELAY
MFU	MAIN FUSES
MTFU	MAIN TRANSFORMER FUSES
RLS	REFRIGERANT LEAK SENSOR
SAS	SUPPLY AIR SENSOR
SLTS	SUCCION LINE TEMP. SENSOR
SSR	SOLID STATE RELAY
T1	CONTROL TRANSFORMER
T2	ISOLATION TRANSFORMER
TB24	24VAC ISOLATED T. BLOCKS
TB24M	24VAC NON ISOLATED T. BLOCKS
TBAS	AIR SAFETY SWITCH T. BLOCKS
TH/HU	TEMP/HUMIDITY SENSOR
VFD	VARIABLE FREQUENCY DRIVE
WS	WIRE SPLICER

POS	OPTIONAL DEVICES
	MISC OPTIONS
CP	CONDENSATE PUMP
CPAS	CONDENSATE PUMP AUX. SW.
DS	DISCONNECT SWITCH
RAD1	REMOTE ALARM DEVICE
SD	SMOKE DETECTOR
SDC	SMOKE DETECTOR CONTROL
STS	INTERFACE BOARD
	REHEAT / HUMIDIFIER
BR	BACK UP REHEAT CONTACTOR
CT-H	CURRENT XFMR HUM
CT-R	CURRENT XFMR RHT
DV	DRAIN VALVE
FV	FILL VALVE
GCD	GROUND CURRENT DETECTOR
H	HUMIDIFIER CONTACTOR
HUM	HUMIDIFIER
MDS	MANUAL DRAIN SWITCH
RH	REHEAT CONTACTOR
RHS1,2	REHEAT HI TEMP SAFETY
	COOLING COMPONENTS
CGT	CHILLED GLYCOL THERMOSTAT
CGV	CHILLED GLYCOL VALVE

FACTORY SUPPLIED LINE VOLTAGE
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TERMINAL STRIP CONNECTION
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COMPONENT PLUG CONNECTION

WIRE COLOUR CODE

OR - ORANGE	PR - PURPLE	BL - BLUE
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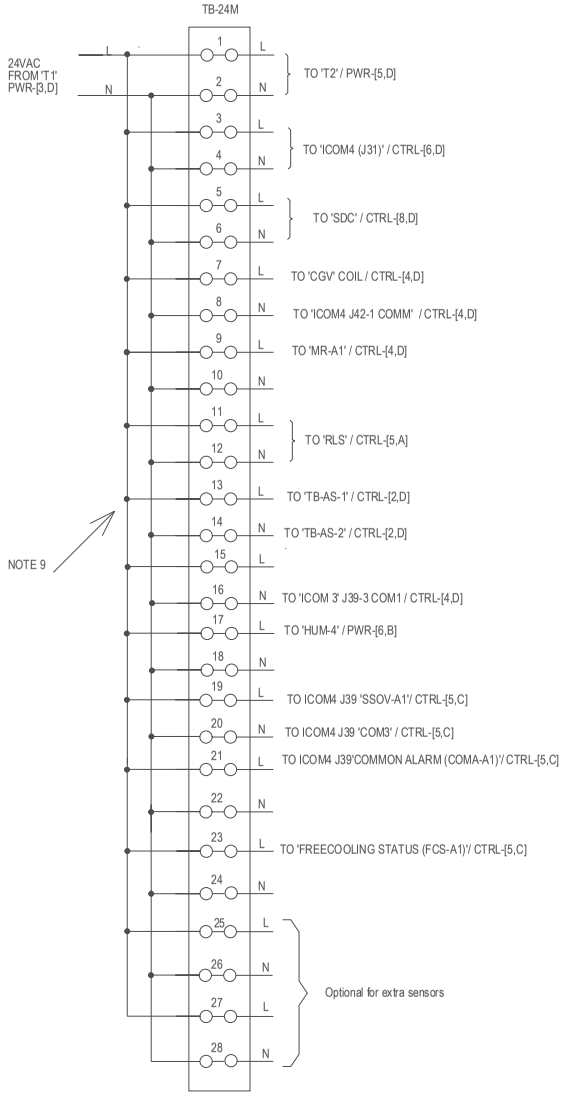
ELECTRICAL SCHEMATIC

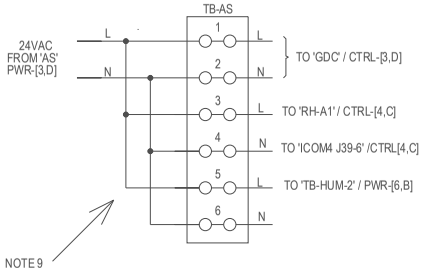
COOLPHASE CEILING
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CONTROL SCHEMATIC
MMI36P (CTRL)

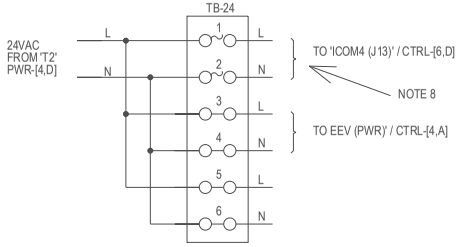
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CHECKED	A. PATLAN	2/21/2024
ENGR	RUPESH.P	11/25/2025

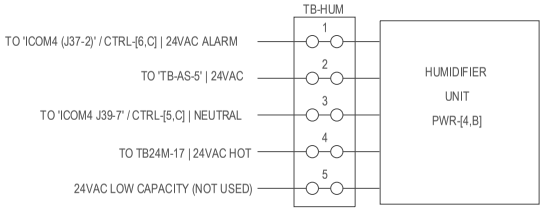
DRAWING NO 10092534P3DRW
REV C

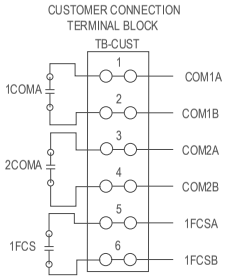
TERMINAL BLOCKS DISTRIBUTION DETAILS











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1050 DEARBORN DRIVE, P.O. BOX 29186
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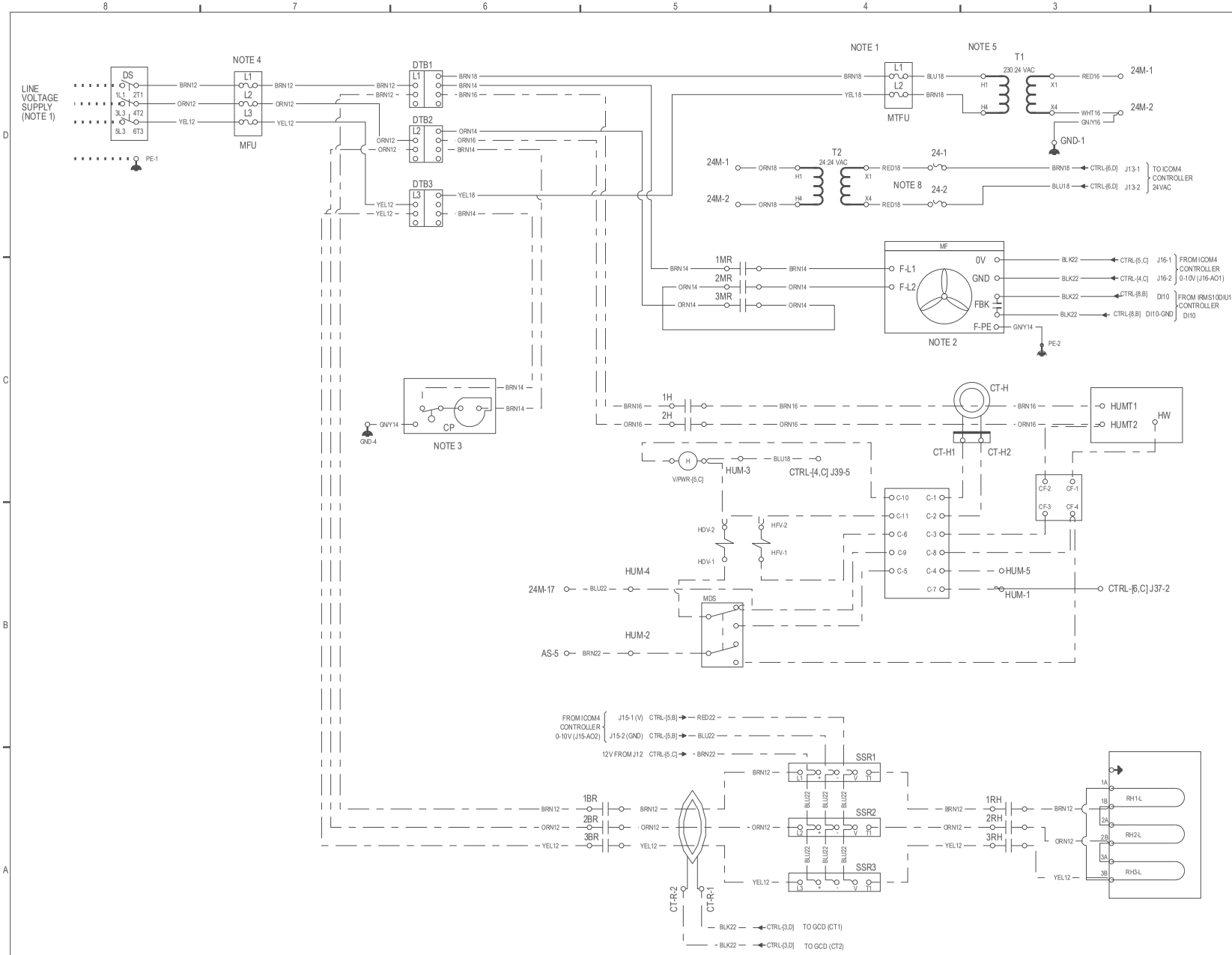
VERTIV.

ELECTRICAL SCHEMATIC

COOLPHASE CEILING
3 TON / 36 kBTUS
1PH - 208-230VAC
50 / 60 HZ

T. BLOCK DISTRIBUTION
MMI36P (TBLK)

DRAWING NO 10092534P3DRW
REV C



NOTES:

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TERMINAL STRIP CONNECTION
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COMPONENT PLUG CONNECTION

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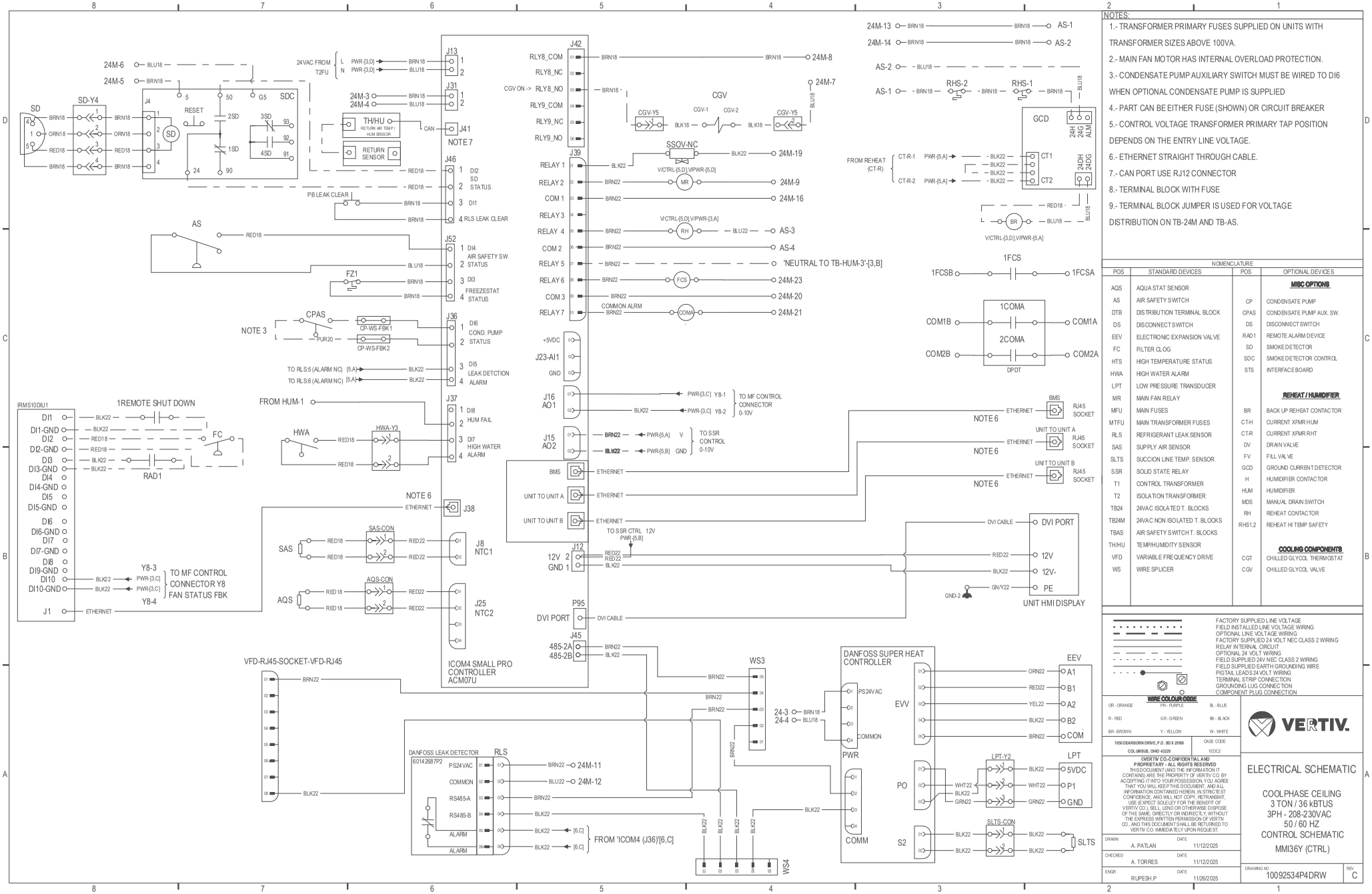
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CHECKED	A. TORRES	DATE 11/12/2025
ENGR	RUPESH.P	DATE 11/26/2025

VERTIV.

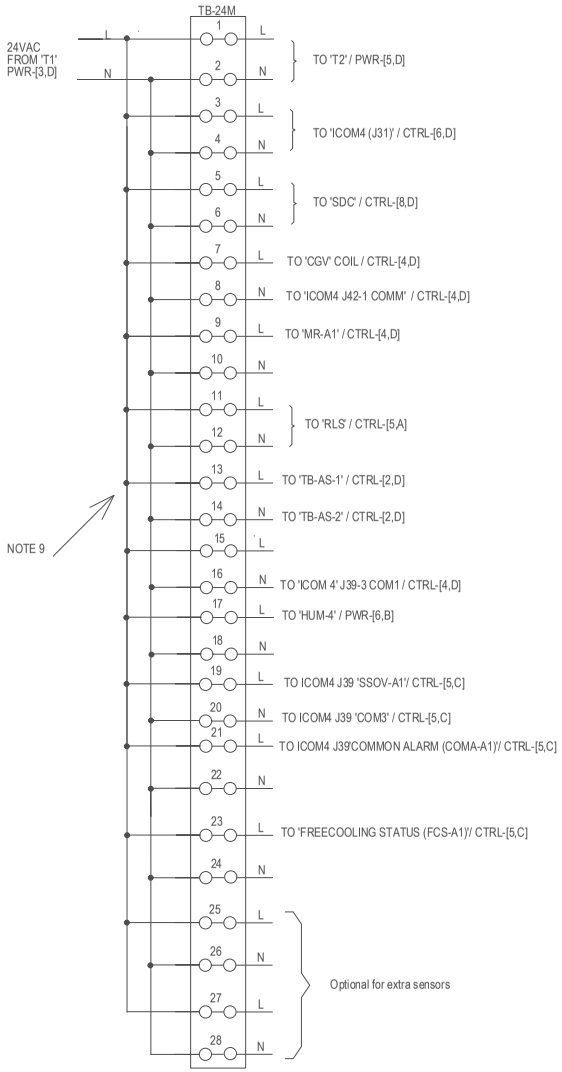
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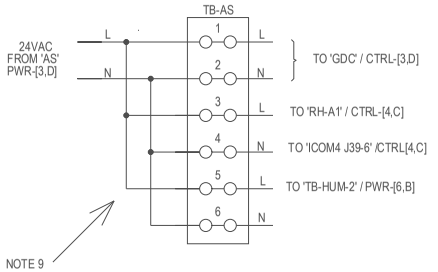
COOLPHASE CEILING
3 TON / 36 kBTUS
3PH - 208-230VAC
50 / 60 HZ
POWER SCHEMATIC
MMI36Y (PWR)

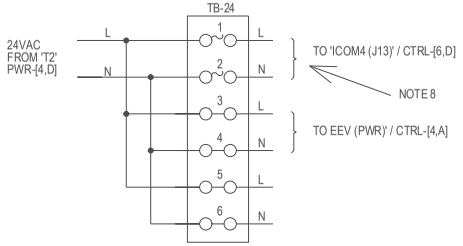
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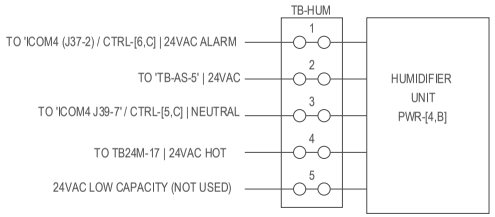

NOTES:
1.- TRANSFORMER PRIMARY FUSES SUPPLIED ON UNITS WITH TRANSFORMER SIZES ABOVE 100VA.
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3.- CONDENSATE PUMP AUXILIARY SWITCH MUST BE WIRED TO DI6 WHEN OPTIONAL CONDENSATE PUMP IS SUPPLIED
4.- PART CAN BE EITHER FUSE (SHOWN) OR CIRCUIT BREAKER
5.- CONTROL VOLTAGE TRANSFORMER PRIMARY TAP POSITION DEPENDS ON THE ENTRY LINE VOLTAGE.
6.- ETHERNET STRAIGHT THROUGH CABLE.
7.- CAN PORT USE RJ12 CONNECTOR
8.- TERMINAL BLOCK WITH FUSE
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NOMENCLATURE
POS STANDARD DEVICES
AQS AQUA STAT SENSOR
AS AIR SAFETY SWITCH
DTB DISTRIBUTION TERMINAL BLOCK
DS DISCONNECT SWITCH
EEV ELECTRONIC EXPANSION VALVE
FC FILTER CLOG
HTS HIGH TEMPERATURE STATUS
HWA HIGH WATER ALARM
LPT LOW PRESSURE TRANSDUCER
MR MAIN FAN RELAY
MFU MAIN FUSES
MTFU MAIN TRANSFORMER FUSES
RLS REFRIGERANT LEAK SENSOR
SAS SUPPLY AIR SENSOR
SLTS SUCCION LINE TEMP. SENSOR
SSR SOLID STATE RELAY
T1 CONTROL TRANSFORMER
T2 ISOLATION TRANSFORMER
TB24 24VAC ISOLATED T. BLOCKS
TB24M 24VAC NON ISOLATED T. BLOCKS
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TH/HU TEMP/HUMIDITY SENSOR
VFD VARIABLE FREQUENCY DRIVE
WS WIRE SPLICER
POS OPTIONAL DEVICES
MISC OPTIONS
CP CONDENSATE PUMP
CPAS CONDENSATE PUMP AUX. SW.
DS DISCONNECT SWITCH
RAD1 REMOTE ALARM DEVICE
SD SMOKE DETECTOR
SDC SMOKE DETECTOR CONTROL
STS INTERFACE BOARD
REHEAT / HUMIDIFIER
BR BACK UP REHEAT CONTACTOR
CT-H CURRENT XFMR HUM
CT-R CURRENT XFMR RHT
DV DRAIN VALVE
FV FILL VALVE
GCD GROUND CURRENT DETECTOR
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HUM HUMIDIFIER
MDS MANUAL DRAIN SWITCH
RH REHEAT CONTACTOR
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CGT CHILLED GLYCOL THERMOSTAT
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FACTORY SUPPLIED LINE VOLTAGE
FIELD INSTALLED LINE VOLTAGE WIRING
OPTIONAL LINE VOLTAGE WIRING
FACTORY SUPPLIED 24 VOLT NEC CLASS 2 WIRING
RELAY INTERNAL CIRCUIT
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PIGTAIL LEAD 5-24 VOLT WIRING
TERMINAL STRIP CONNECTION
GROUNDING LUG CONNECTION
COMPONENT PLUG CONNECTION
WIRE COLOUR CODE
OR - ORANGE
PR - PURPLE
BL - BLUE
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1050 DEARBORN DRIVE, P.O. BOX 29186
COLUMBUS, OHIO 43229
CAGE CODE
1EDC2
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DRAWN A. PATLAN DATE 11/12/2025
CHECKED A. TORRES DATE 11/12/2025
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VERTIV.
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COOLPHASE CEILING
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50 / 60 HZ
CONTROL SCHEMATIC
MMI36Y (CTRL)
DRAWING NO 10092534P4DRW
REV C

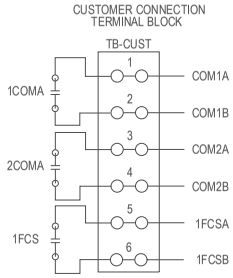
TERMINAL BLOCKS DISTRIBUTION DETAILS











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NOMENCLATURE

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			MISC OPTIONS
AQS	AQUA STAT SENSOR	CP	CONDENSATE PUMP
AS	AIR SAFETY SWITCH	CPAS	CONDENSATE PUMP AUX. SW.
DTB	DISTRIBUTION TERMINAL BLOCK	DS	DISCONNECT SWITCH
DS	DISCONNECT SWITCH	RAD1	REMOTE ALARM DEVICE
EEV	ELECTRONIC EXPANSION VALVE	SD	SMOKE DETECTOR
FC	FILTER CLOG	SDC	SMOKE DETECTOR CONTROL
HTS	HIGH TEMPERATURE STATUS	STS	INTERFACE BOARD
HWA	HIGH WATER ALARM		
LPT	LOW PRESSURE TRANSDUCER		**REHEAT / HUMIDIFIER**
MR	MAIN FAN RELAY	BR	BACK UP REHEAT CONTACTOR
MFU	MAIN FUSES	CT-H	CURRENT XFMR HUM
MTFU	MAIN TRANSFORMER FUSES	CT-R	CURRENT XFMR RHT
RLS	REFRIGERANT LEAK SENSOR	DV	DRAIN VALVE
SAS	SUPPLY AIR SENSOR	FV	FILL VALVE
SLTS	SUCCION LINE TEMP. SENSOR	GCD	GROUND CURRENT DETECTOR
SSR	SOLID STATE RELAY	H	HUMIDIFIER CONTACTOR
T1	CONTROL TRANSFORMER	HUM	HUMIDIFIER
T2	ISOLATION TRANSFORMER	MDS	MANUAL DRAIN SWITCH
TB24	24VAC ISOLATED T. BLOCKS	RH	REHEAT CONTACTOR
TB24M	24VAC NON ISOLATED T. BLOCKS	RHS1,2	REHEAT HI TEMP SAFETY
TBAS	AIR SAFETY SWITCH T. BLOCKS		
TH/HU	TEMP/HUMIDITY SENSOR		**COOLING COMPONENTS**
VFD	VARIABLE FREQUENCY DRIVE	CGT	CHILLED GLYCOL THERMOSTAT
WS	WIRE SPLICER	CGV	CHILLED GLYCOL VALVE

FACTORY SUPPLIED LINE VOLTAGE
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OPTIONAL LINE VOLTAGE WIRING
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RELAY INTERNAL CIRCUIT
OPTIONAL 24 VOLT WIRING
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FIELD SUPPLIED EARTH GROUNDING WIRE
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TERMINAL STRIP CONNECTION
GROUNDING LUG CONNECTION
COMPONENT PLUG CONNECTION

WIRE COLOUR CODE

OR - ORANGE	PR - PURPLE	BL - BLUE
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BR - BROWN	Y - YELLOW	W - WHITE

1050 DEARBORN DRIVE, P.O. BOX 29186
COLUMBUS, OHIO 43229
CAGE CODE 1EDC2

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		DATE
DRAWN	A. PATLAN	11/26/2025
CHECKED	A. TORRES	11/12/2025
ENGR	RUPESH.P	11/26/2025

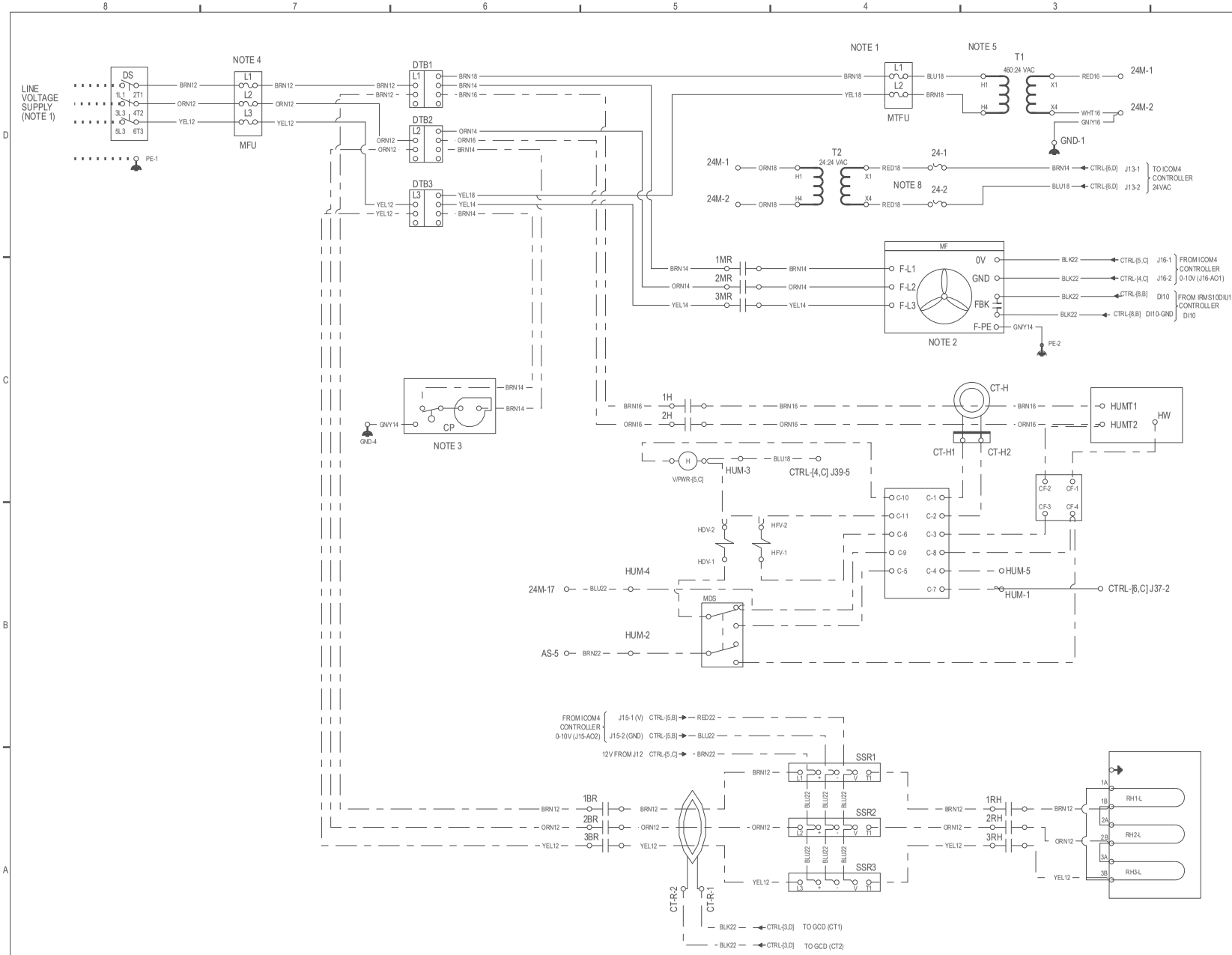
VERTIV.

ELECTRICAL SCHEMATIC

COOLPHASE CEILING
3 TON / 36 kBTUS
3PH - 208-230VAC
50 / 60 HZ

T. BLOCK DISTRIBUTION
MMI36Y (TBLK)

DRAWING NO 10092534P4DRW
REV C



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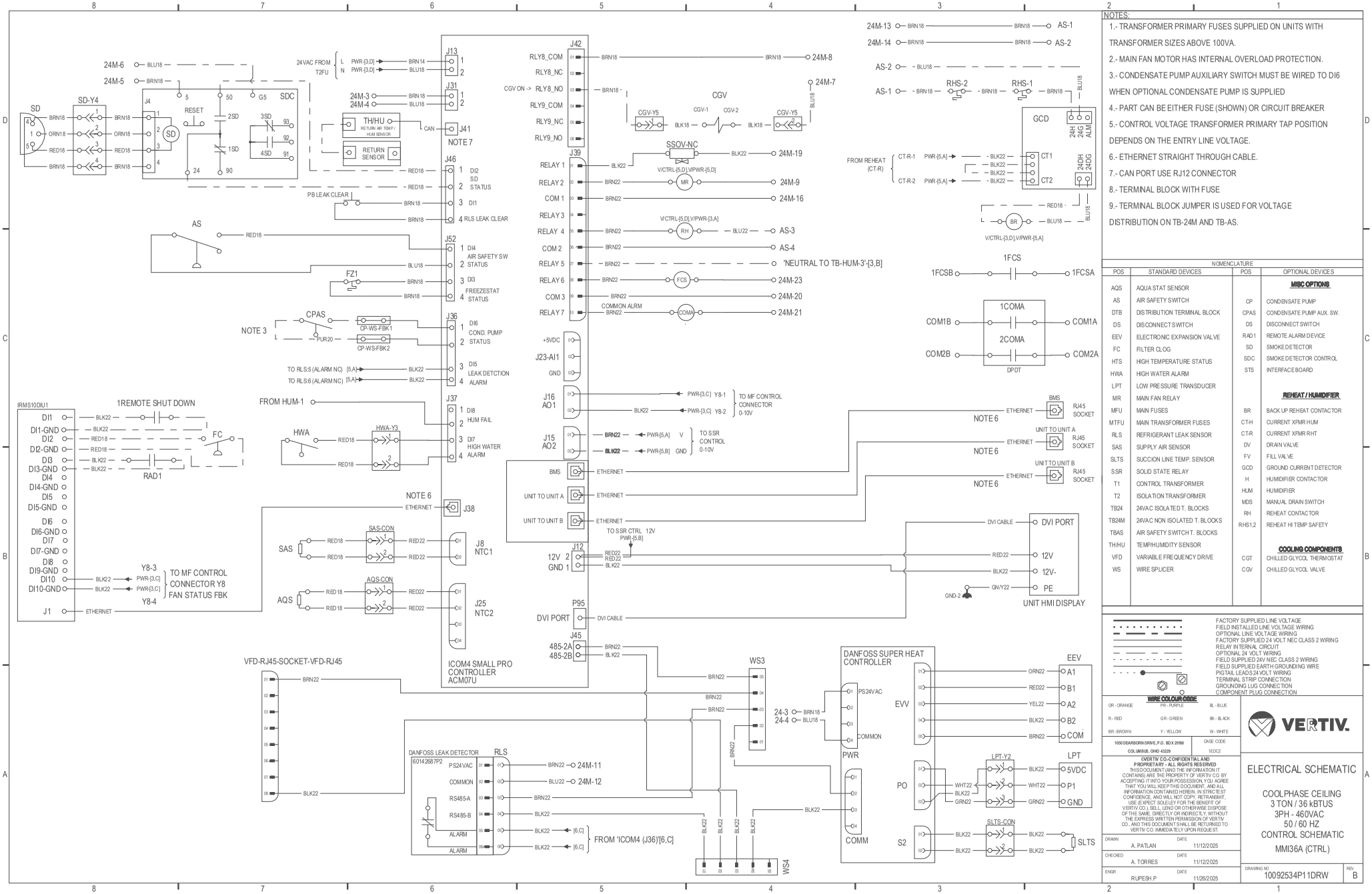
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DRAWN	A. PATLAN	DATE 11/12/2025
CHECKED	A. TORRES	DATE 11/12/2025
ENGR	RUPESH.P	DATE 11/26/2025

ELECTRICAL SCHEMATIC

COOLPHASE CEILING
3 TON / 36 kBTUS
3PH - 460VAC
50 / 60 HZ
POWER SCHEMATIC
MMI36A (PWR)

DRAWING NO 10092534P11DRW REV B



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HTS	HIGH TEMPERATURE STATUS	STS	INTERFACE BOARD
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TH/HU	TEMP/HUMIDITY SENSOR		**COOLING COMPONENTS**
VFD	VARIABLE FREQUENCY DRIVE	CGT	CHILLED GLYCOL THERMOSTAT
WS	WIRE SPLICER	CGV	CHILLED GLYCOL VALVE

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FIELD INSTALLED LINE VOLTAGE WIRING
OPTIONAL LINE VOLTAGE WIRING
FACTORY SUPPLIED 24 VOLT NEC CLASS 2 WIRING
RELAY INTERNAL CIRCUIT
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WIRE COLOUR CODE

OR - ORANGE	PR - PURPLE	BL - BLUE
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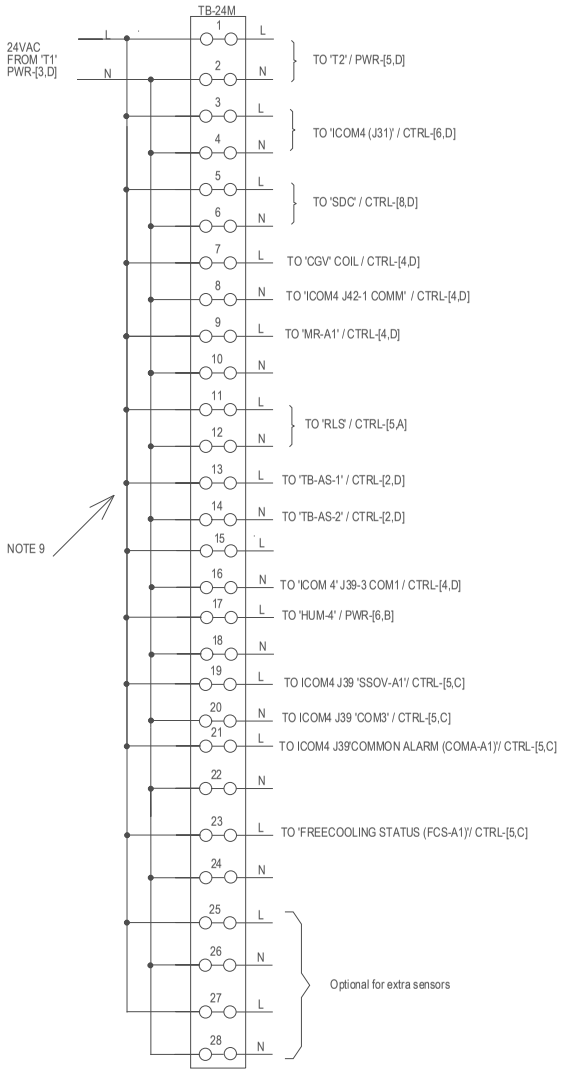
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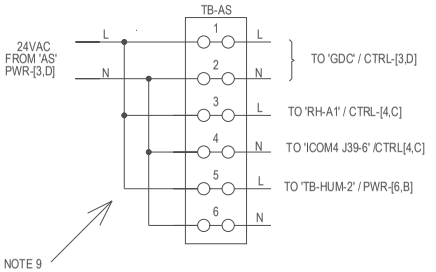
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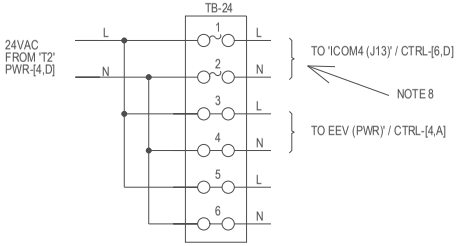
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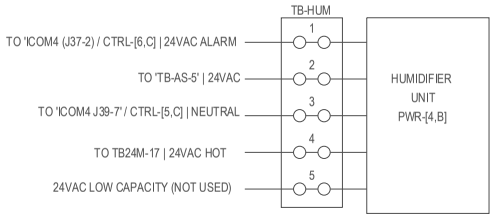
DRAWING NO 10092534P11DRW REV B

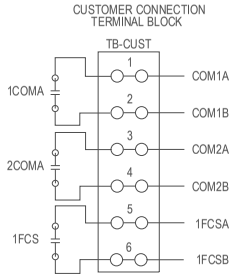
TERMINAL BLOCKS DISTRIBUTION DETAILS











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DRAWN	A. PATLAN	DATE 11/26/2025
CHECKED	A. TORRES	DATE 11/12/2025
ENGR	RUPESH.P	DATE 11/26/2025

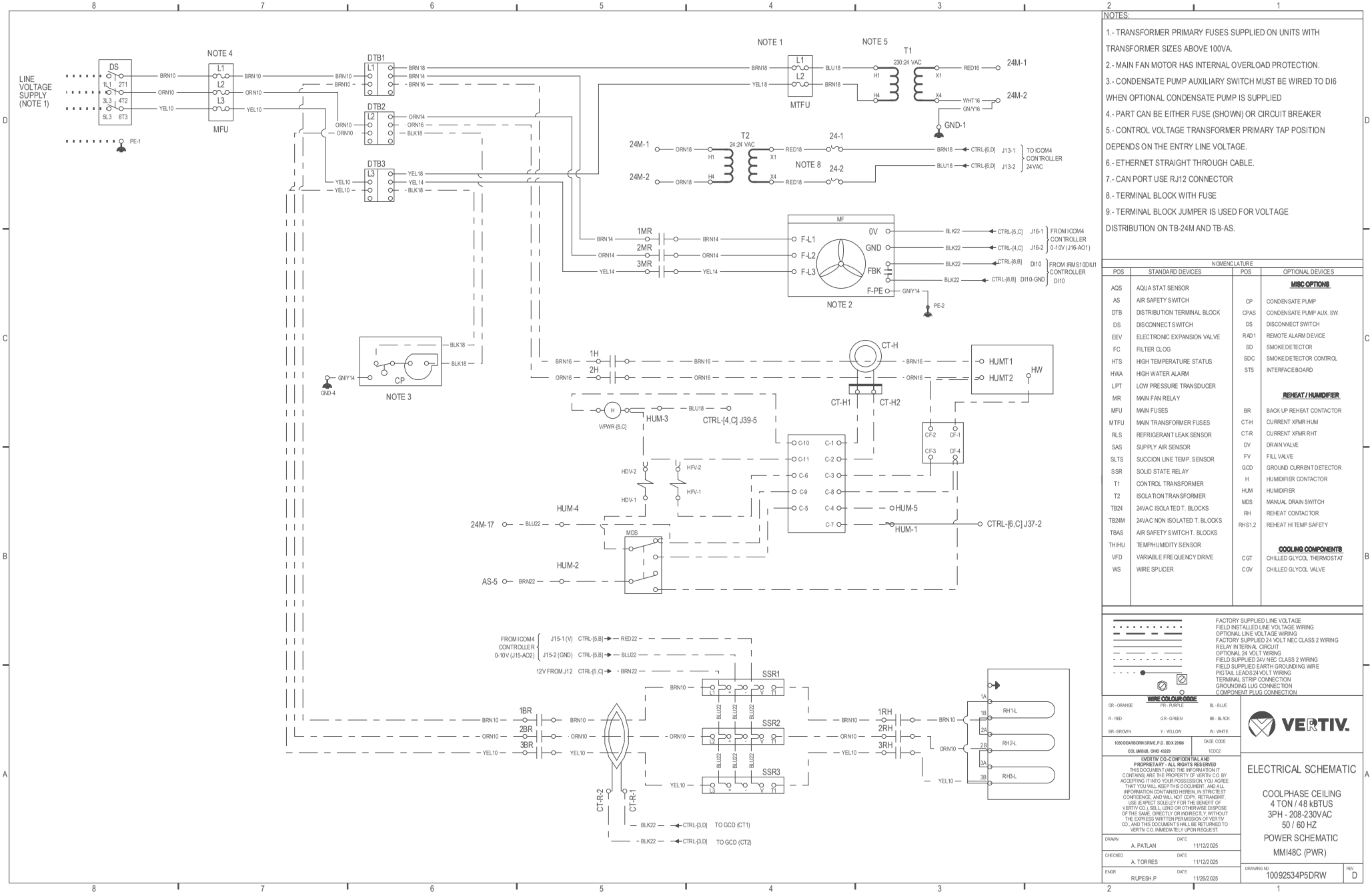
VERTIV.

ELECTRICAL SCHEMATIC

COOLPHASE CEILING
3 TON / 36 kBTUS
3PH - 460VAC
50 / 60 HZ

T. BLOCK DISTRIBUTION
MMI36A (TBLK)

DRAWING NO 10092534P11DRW
REV B



NOTES:

1.- TRANSFORMER PRIMARY FUSES SUPPLIED ON UNITS WITH TRANSFORMER SIZES ABOVE 100VA.

2.- MAIN FAN MOTOR HAS INTERNAL OVERLOAD PROTECTION.

3.- CONDENSATE PUMP AUXILIARY SWITCH MUST BE WIRED TO DI6 WHEN OPTIONAL CONDENSATE PUMP IS SUPPLIED

4.- PART CAN BE EITHER FUSE (SHOWN) OR CIRCUIT BREAKER

5.- CONTROL VOLTAGE TRANSFORMER PRIMARY TAP POSITION DEPENDS ON THE ENTRY LINE VOLTAGE.

6.- ETHERNET STRAIGHT THROUGH CABLE.

7.- CAN PORT USE RJ12 CONNECTOR

8.- TERMINAL BLOCK WITH FUSE

9.- TERMINAL BLOCK JUMPER IS USED FOR VOLTAGE DISTRIBUTION ON TB-24M AND TB-AS.

NOMENCLATURE

POS	STANDARD DEVICES	POS	OPTIONAL DEVICES
			MISC OPTIONS
AQS	AQUA STAT SENSOR	CP	CONDENSATE PUMP
AS	AIR SAFETY SWITCH	CPAS	CONDENSATE PUMP AUX. SW.
DTB	DISTRIBUTION TERMINAL BLOCK	DS	DISCONNECT SWITCH
DS	DISCONNECT SWITCH	RAD1	REMOTE ALARM DEVICE
EEV	ELECTRONIC EXPANSION VALVE	SD	SMOKE DETECTOR
FC	FILTER CLOG	SDC	SMOKE DETECTOR CONTROL
HTS	HIGH TEMPERATURE STATUS	STS	INTERFACE BOARD
HWA	HIGH WATER ALARM		
LPT	LOW PRESSURE TRANSDUCER		**REHEAT / HUMIDIFIER**
MR	MAIN FAN RELAY	BR	BACK UP REHEAT CONTACTOR
MFU	MAIN FUSES	CT-H	CURRENT XFMR HUM
MTFU	MAIN TRANSFORMER FUSES	CT-R	CURRENT XFMR RHT
RLS	REFRIGERANT LEAK SENSOR	DV	DRAIN VALVE
SAS	SUPPLY AIR SENSOR	FV	FILL VALVE
SLTS	SUCCION LINE TEMP. SENSOR	GCD	GROUND CURRENT DETECTOR
SSR	SOLID STATE RELAY	H	HUMIDIFIER CONTACTOR
T1	CONTROL TRANSFORMER	HUM	HUMIDIFIER
T2	ISOLATION TRANSFORMER	MDS	MANUAL DRAIN SWITCH
TB24	24VAC ISOLATED T. BLOCKS	RH	REHEAT CONTACTOR
TB24M	24VAC NON ISOLATED T. BLOCKS	RHS1,2	REHEAT HI TEMP SAFETY
TBAS	AIR SAFETY SWITCH T. BLOCKS		
TH/HU	TEMP/HUMIDITY SENSOR		**COOLING COMPONENTS**
VFD	VARIABLE FREQUENCY DRIVE	CGT	CHILLED GLYCOL THERMOSTAT
WS	WIRE SPLICER	CGV	CHILLED GLYCOL VALVE

FACTORY SUPPLIED LINE VOLTAGE
FIELD INSTALLED LINE VOLTAGE WIRING
OPTIONAL LINE VOLTAGE WIRING
FACTORY SUPPLIED 24 VOLT NEC CLASS 2 WIRING
RELAY INTERNAL CIRCUIT
OPTIONAL 24 VOLT WIRING
FIELD SUPPLIED 24V NEC CLASS 2 WIRING
FIELD SUPPLIED EARTH GROUNDING WIRE
PIGTAIL LEAD 5.24 VOLT WIRING
TERMINAL STRIP CONNECTION
GROUNDING LUG CONNECTION
COMPONENT PLUG CONNECTION

WIRE COLOUR CODE

OR - ORANGE	PR - PURPLE	BL - BLUE
R - RED	GR - GREEN	BK - BLACK
BR - BROWN	Y - YELLOW	W - WHITE

1050 DEARBORN DRIVE, P.O. BOX 29186
COLUMBUS, OHIO 43229
CAGE CODE 1EDC2

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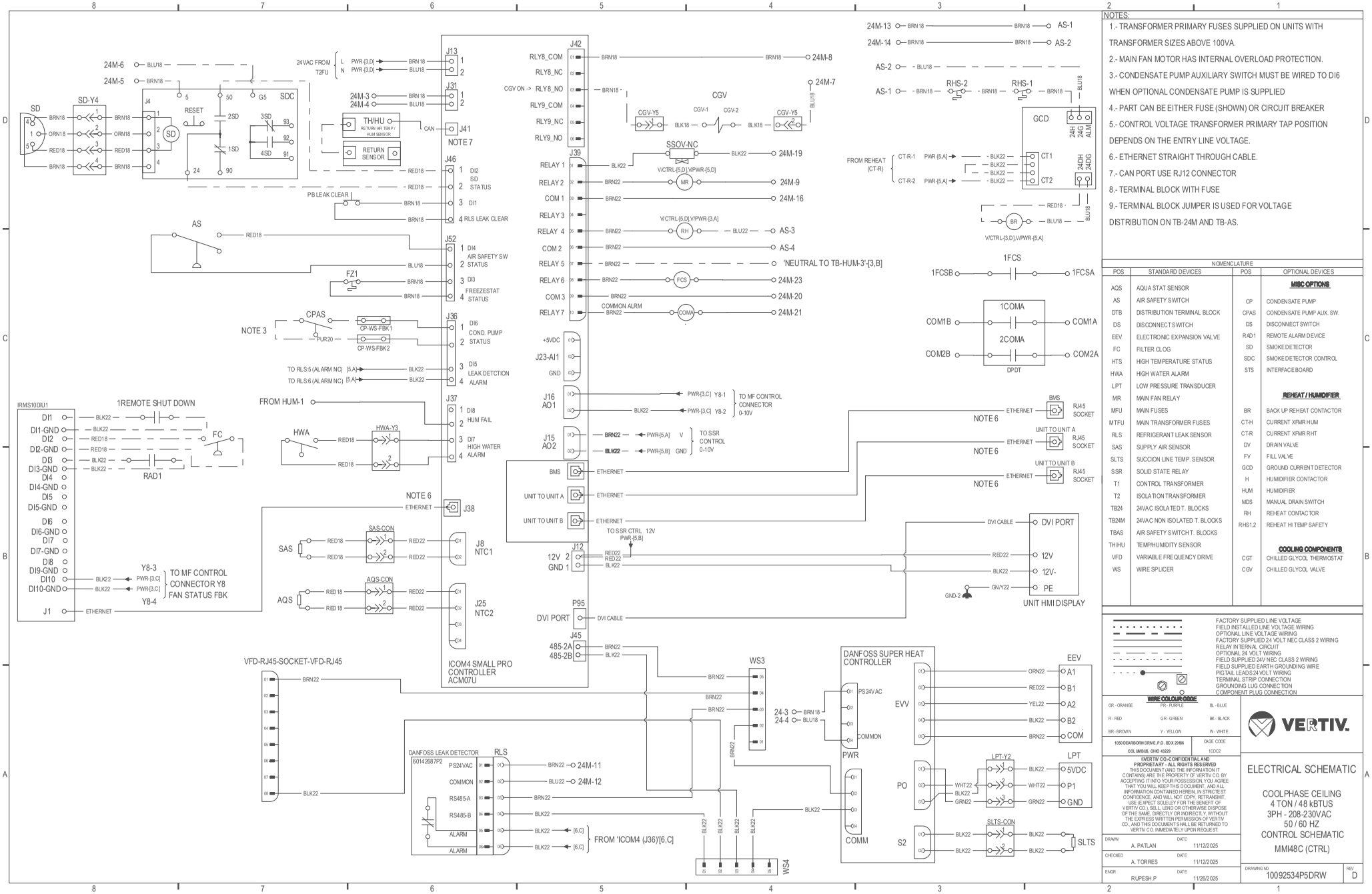
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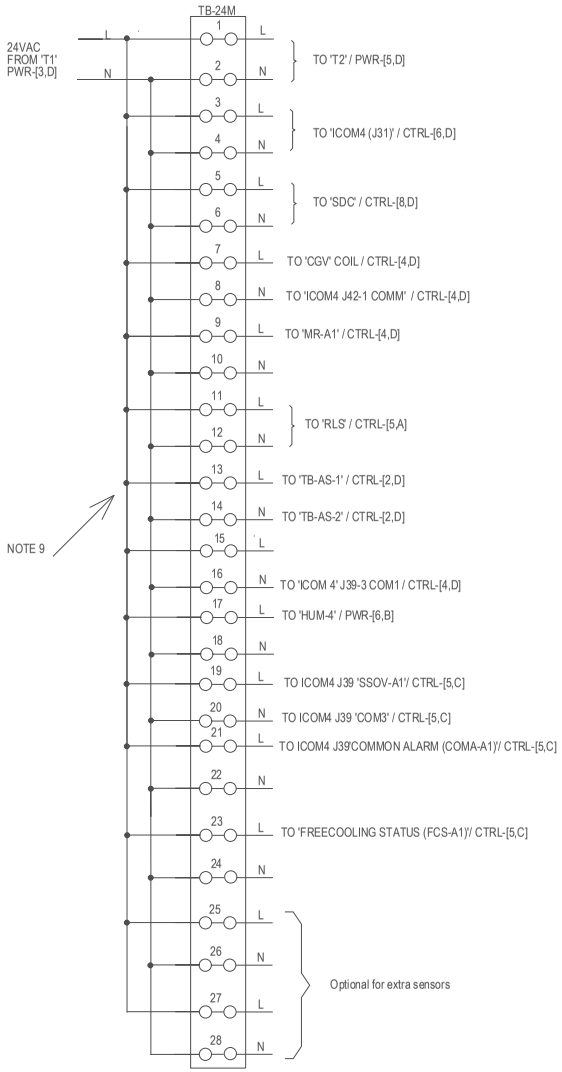
ELECTRICAL SCHEMATIC

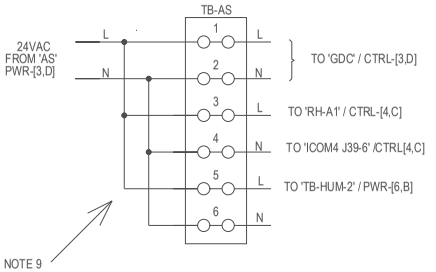
COOLPHASE CEILING
4 TON / 48 kBTUS
3PH - 208-230VAC
50 / 60 HZ
POWER SCHEMATIC
MMI48C (PWR)

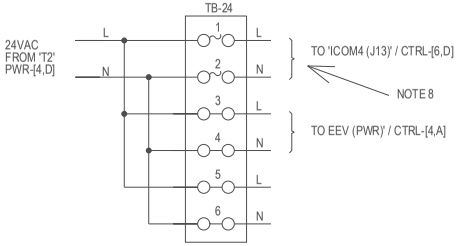
DRAWING NO 10092534P5DRW
REV D

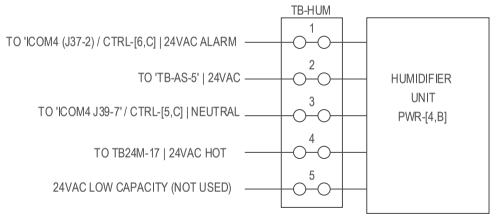

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DTB DISTRIBUTION TERMINAL BLOCK
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HWA HIGH WATER ALARM
LPT LOW PRESSURE TRANSDUCER
MR MAIN FAN RELAY
MFU MAIN FUSES
MTFU MAIN TRANSFORMER FUSES
RLS REFRIGERANT LEAK SENSOR
SAS SUPPLY AIR SENSOR
SLTS SUCCION LINE TEMP. SENSOR
SSR SOLID STATE RELAY
T1 CONTROL TRANSFORMER
T2 ISOLATION TRANSFORMER
TB24 24VAC ISOLATED T. BLOCKS
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RAD1 REMOTE ALARM DEVICE
SD SMOKE DETECTOR
SDC SMOKE DETECTOR CONTROL
STS INTERFACE BOARD
REHEAT / HUMIDIFIER
BR BACK UP REHEAT CONTACTOR
CT-H CURRENT XFMR HUM
CT-R CURRENT XFMR RHT
DV DRAIN VALVE
FV FILL VALVE
GCD GROUND CURRENT DETECTOR
H HUMIDIFIER CONTACTOR
HUM HUMIDIFIER
MDS MANUAL DRAIN SWITCH
RH REHEAT CONTACTOR
RHS1,2 REHEAT HI TEMP SAFETY
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CGT CHILLED GLYCOL THERMOSTAT
CGV CHILLED GLYCOL VALVE
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COLUMBUS, OHIO 43229
CAGE CODE
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VERTIV.
ELECTRICAL SCHEMATIC
COOLPHASE CEILING
4 TON / 48 kBTUS
3PH - 208-230VAC
50 / 60 HZ
CONTROL SCHEMATIC
MMI48C (CTRL)
DRAWN A. PATLAN 11/12/2025
CHECKED A. TORRES 11/12/2025
ENGR RUPESH.P 11/26/2025
DRAWING NO 10092534P5DRW
REV D

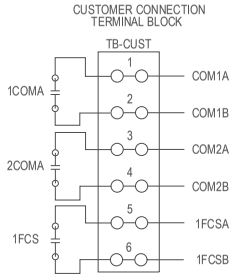
TERMINAL BLOCKS DISTRIBUTION DETAILS











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VERTIV.

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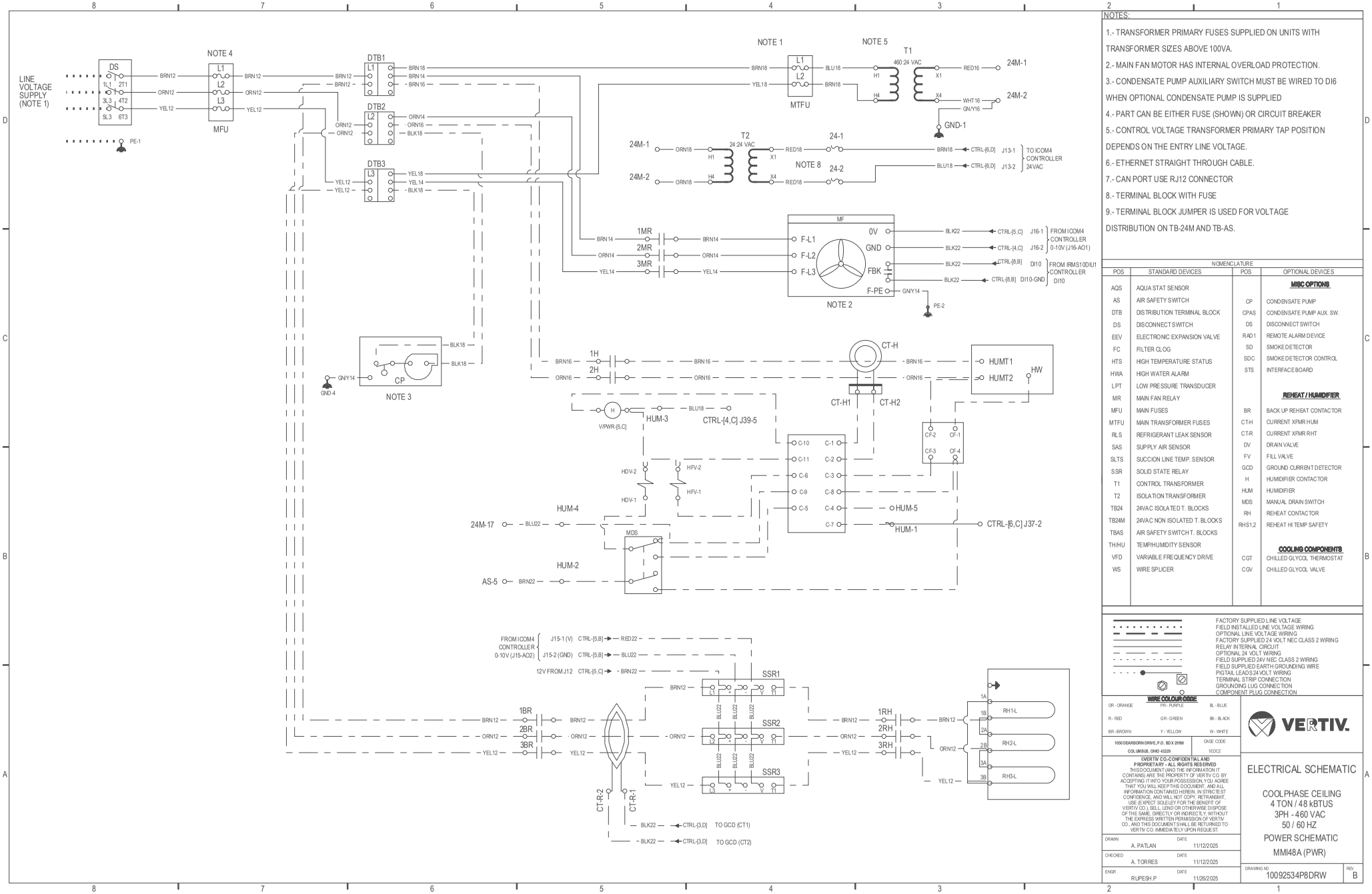
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ELECTRICAL SCHEMATIC

COOLPHASE CEILING
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3PH - 208-230VAC
50 / 60 HZ

T. BLOCK DISTRIBUTION
MMI48C (TBLK)

DRAWING NO 10092534P5DRW
REV D



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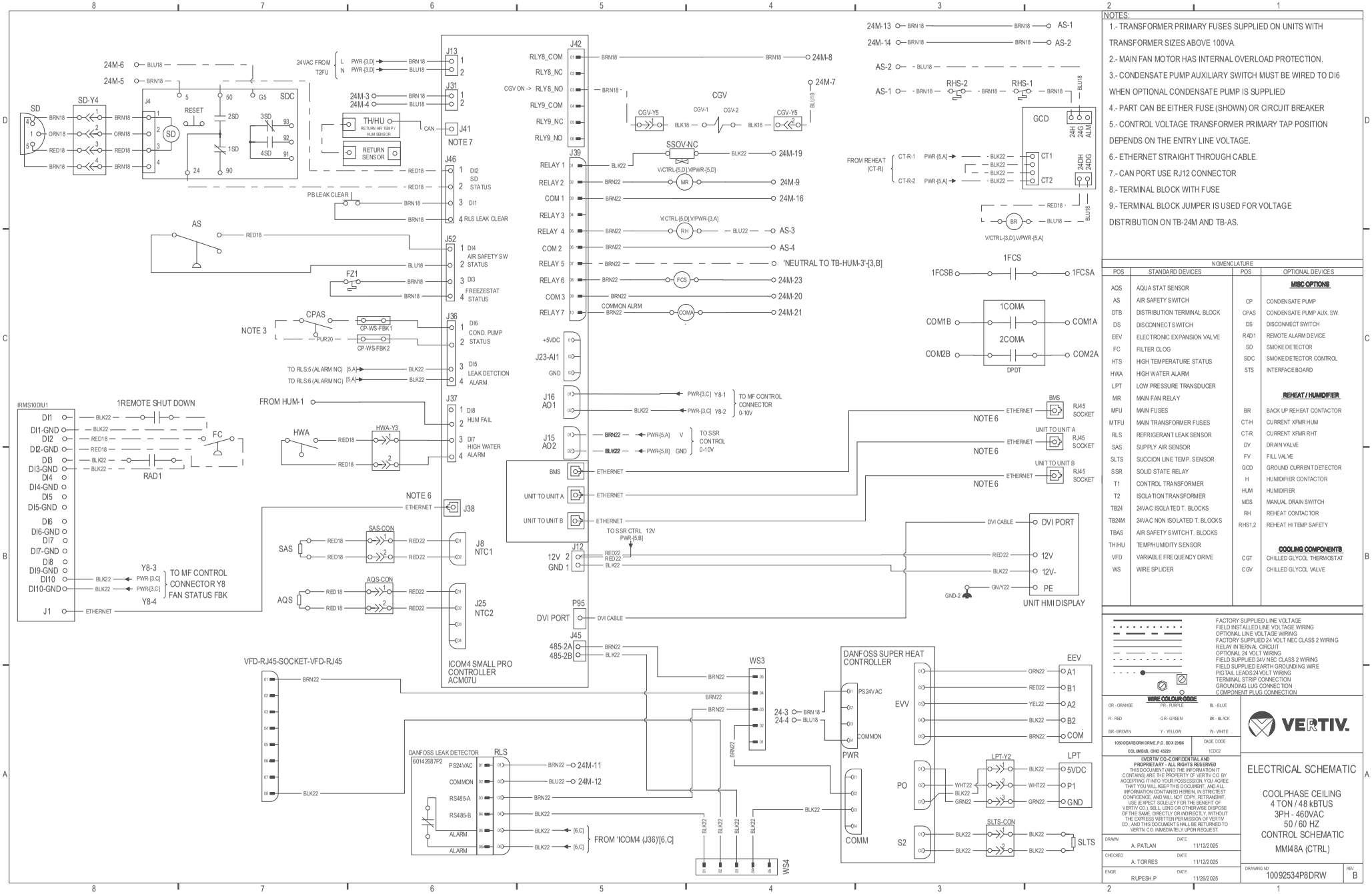
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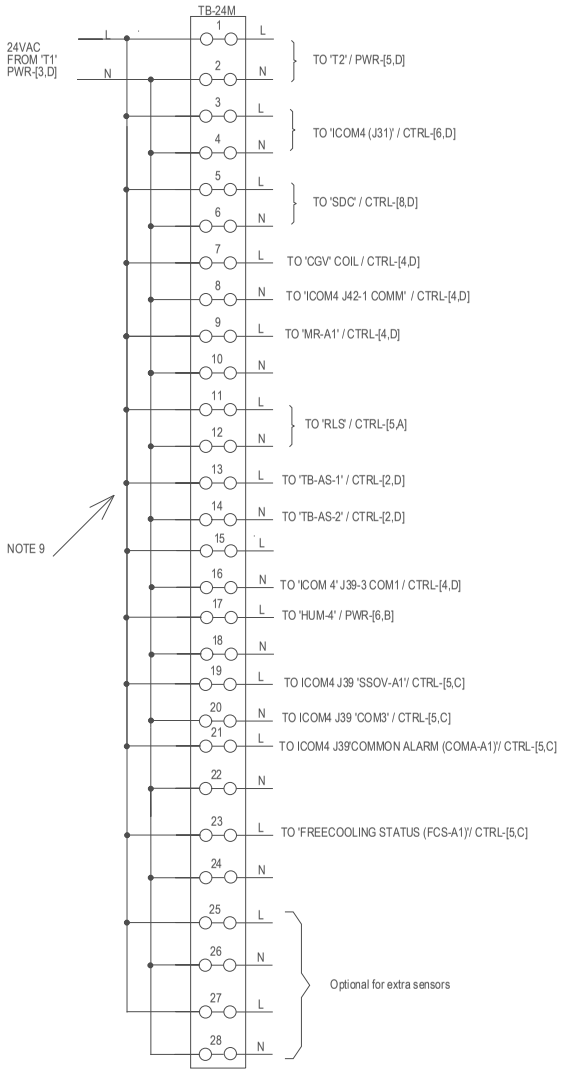
ELECTRICAL SCHEMATIC

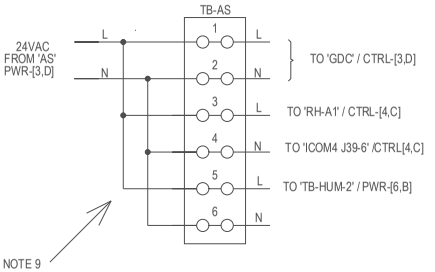
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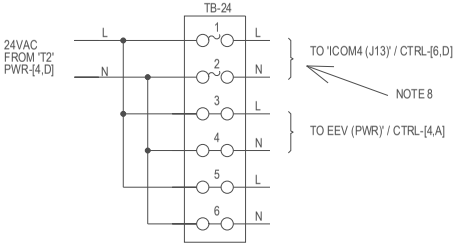
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REV B

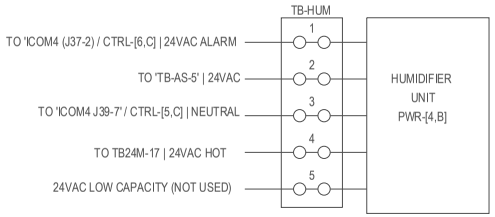

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MDS MANUAL DRAIN SWITCH
RH REHEAT CONTACTOR
RHS1,2 REHEAT HI TEMP SAFETY
COOLING COMPONENTS
CGT CHILLED GLYCOL THERMOSTAT
CGV CHILLED GLYCOL VALVE
FACTORY SUPPLIED LINE VOLTAGE
FIELD INSTALLED LINE VOLTAGE WIRING
OPTIONAL LINE VOLTAGE WIRING
FACTORY SUPPLIED 24 VOLT NEC CLASS 2 WIRING
RELAY INTERNAL CIRCUIT
OPTIONAL 24 VOLT WIRING
FIELD SUPPLIED 24V NEC CLASS 2 WIRING
FIELD SUPPLIED EARTH GROUNDING WIRE
PIGTAIL LEAD 5.24 VOLT WIRING
TERMINAL STRIP CONNECTION
GROUNDING LUG CONNECTION
COMPONENT PLUG CONNECTION
WIRE COLOUR CODE
OR - ORANGE
PR - PURPLE
BL - BLUE
R - RED
GR - GREEN
BK - BLACK
BR - BROWN
Y - YELLOW
W - WHITE
1050 DEARBORN DRIVE, P.O. BOX 29186
COLUMBUS, OHIO 43229
CAGE CODE
1EDC2
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DRAWN A. PATLAN DATE 11/12/2025
CHECKED A. TORRES DATE 11/12/2025
ENGR RUPESH.P DATE 11/26/2025
VERTIV.
ELECTRICAL SCHEMATIC
COOLPHASE CEILING
4 TON / 48 kBTUS
3PH - 460VAC
50 / 60 HZ
CONTROL SCHEMATIC
MMI48A (CTRL)
DRAWING NO 10092534P8DRW
REV B

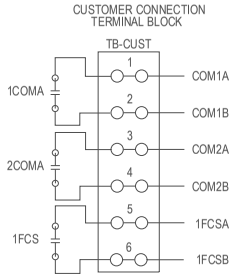
TERMINAL BLOCKS DISTRIBUTION DETAILS











NOTES:

1.- TRANSFORMER PRIMARY FUSES SUPPLIED ON UNITS WITH TRANSFORMER SIZES ABOVE 100VA.

2.- MAIN FAN MOTOR HAS INTERNAL OVERLOAD PROTECTION.

3.- CONDENSATE PUMP AUXILIARY SWITCH MUST BE WIRED TO DI6 WHEN OPTIONAL CONDENSATE PUMP IS SUPPLIED

4.- PART CAN BE EITHER FUSE (SHOWN) OR CIRCUIT BREAKER

5.- CONTROL VOLTAGE TRANSFORMER PRIMARY TAP POSITION DEPENDS ON THE ENTRY LINE VOLTAGE.

6.- ETHERNET STRAIGHT THROUGH CABLE.

7.- CAN PORT USE RJ12 CONNECTOR

8.- TERMINAL BLOCK WITH FUSE

9.- TERMINAL BLOCK JUMPER IS USED FOR VOLTAGE DISTRIBUTION ON TB-24M AND TB-AS.

NOMENCLATURE

POS	STANDARD DEVICES	POS	OPTIONAL DEVICES
			MISC OPTIONS
AQS	AQUA STAT SENSOR	CP	CONDENSATE PUMP
AS	AIR SAFETY SWITCH	CPAS	CONDENSATE PUMP AUX. SW.
DTB	DISTRIBUTION TERMINAL BLOCK	DS	DISCONNECT SWITCH
DS	DISCONNECT SWITCH	RAD1	REMOTE ALARM DEVICE
EEV	ELECTRONIC EXPANSION VALVE	SD	SMOKE DETECTOR
FC	FILTER CLOG	SDC	SMOKE DETECTOR CONTROL
HTS	HIGH TEMPERATURE STATUS	STS	INTERFACE BOARD
HWA	HIGH WATER ALARM		
LPT	LOW PRESSURE TRANSDUCER		**REHEAT / HUMIDIFIER**
MR	MAIN FAN RELAY	BR	BACK UP REHEAT CONTACTOR
MFU	MAIN FUSES	CT-H	CURRENT XFMR HUM
MTFU	MAIN TRANSFORMER FUSES	CT-R	CURRENT XFMR RHT
RLS	REFRIGERANT LEAK SENSOR	DV	DRAIN VALVE
SAS	SUPPLY AIR SENSOR	FV	FILL VALVE
SLTS	SUCCION LINE TEMP. SENSOR	GCD	GROUND CURRENT DETECTOR
SSR	SOLID STATE RELAY	H	HUMIDIFIER CONTACTOR
T1	CONTROL TRANSFORMER	HUM	HUMIDIFIER
T2	ISOLATION TRANSFORMER	MDS	MANUAL DRAIN SWITCH
TB24	24VAC ISOLATED T. BLOCKS	RH	REHEAT CONTACTOR
TB24M	24VAC NON ISOLATED T. BLOCKS	RHS1,2	REHEAT HI TEMP SAFETY
TBAS	AIR SAFETY SWITCH T. BLOCKS		
TH/HU	TEMP/HUMIDITY SENSOR		**COOLING COMPONENTS**
VFD	VARIABLE FREQUENCY DRIVE	CGT	CHILLED GLYCOL THERMOSTAT
WS	WIRE SPLICER	CGV	CHILLED GLYCOL VALVE

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PIGTAIL LEAD 5.24 VOLT WIRING
TERMINAL STRIP CONNECTION
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WIRE COLOUR CODE

OR - ORANGE	PR - PURPLE	BL - BLUE
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1050 DEARBORN DRIVE, P.O. BOX 29186
COLUMBUS, OHIO 43229
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CHECKED	A. TORRES	DATE 11/12/2025
ENGR	RUPESH.P	DATE 11/26/2025

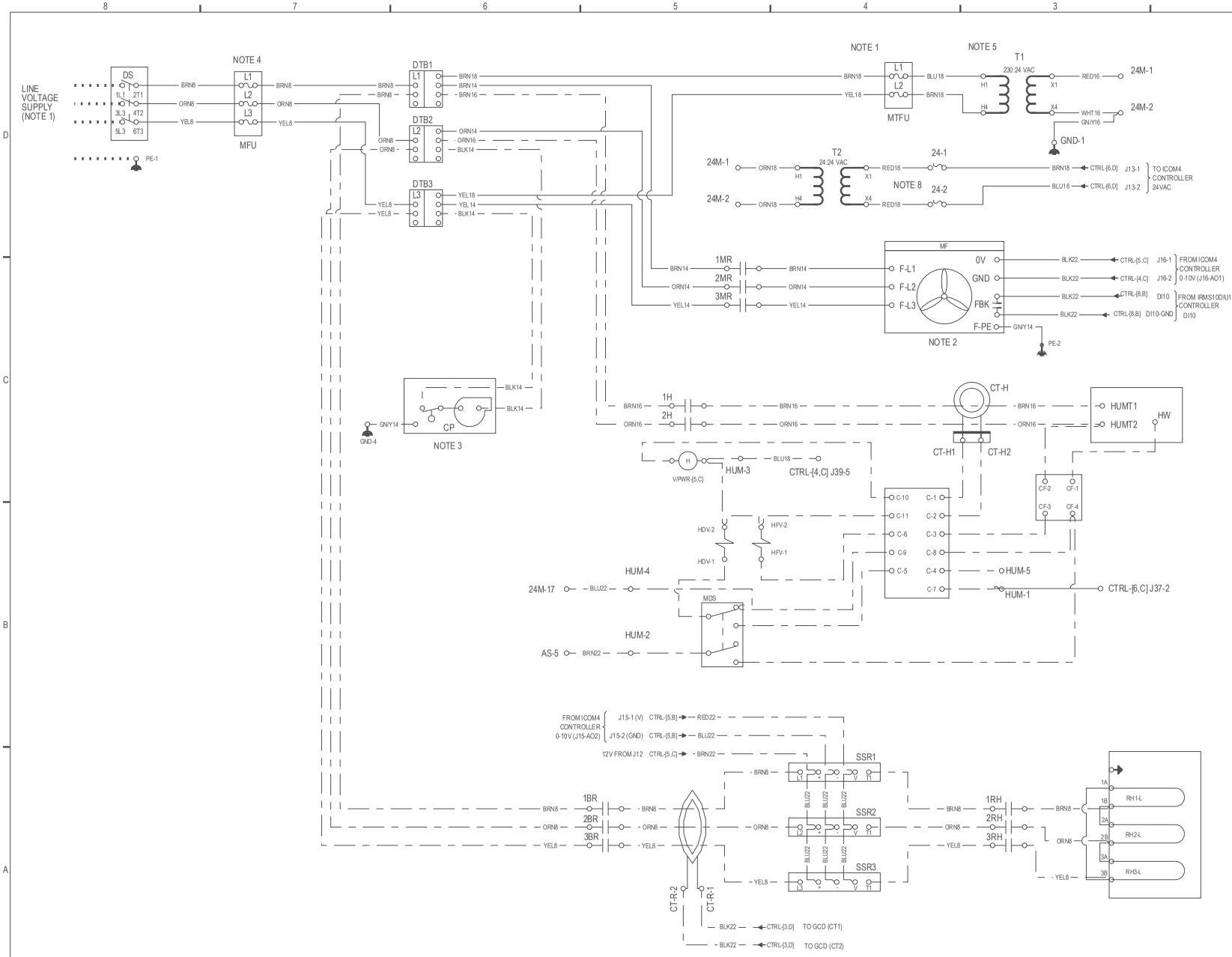
VERTIV.

ELECTRICAL SCHEMATIC

COOLPHASE CEILING
4 TON / 48 kBTUS
3PH - 460VAC
50 / 60 HZ

T. BLOCK DISTRIBUTION
MMI48A (TBLK)

DRAWING NO 10092534P8DRW
REV B



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HTS	HIGH TEMPERATURE STATUS	STS	INTERFACE BOARD
HWA	HIGH WATER ALARM		
LPT	LOW PRESSURE TRANSDUCER		**REHEAT / HUMIDIFIER**
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GROUNDING LUG CONNECTION
COMPONENT PLUG CONNECTION

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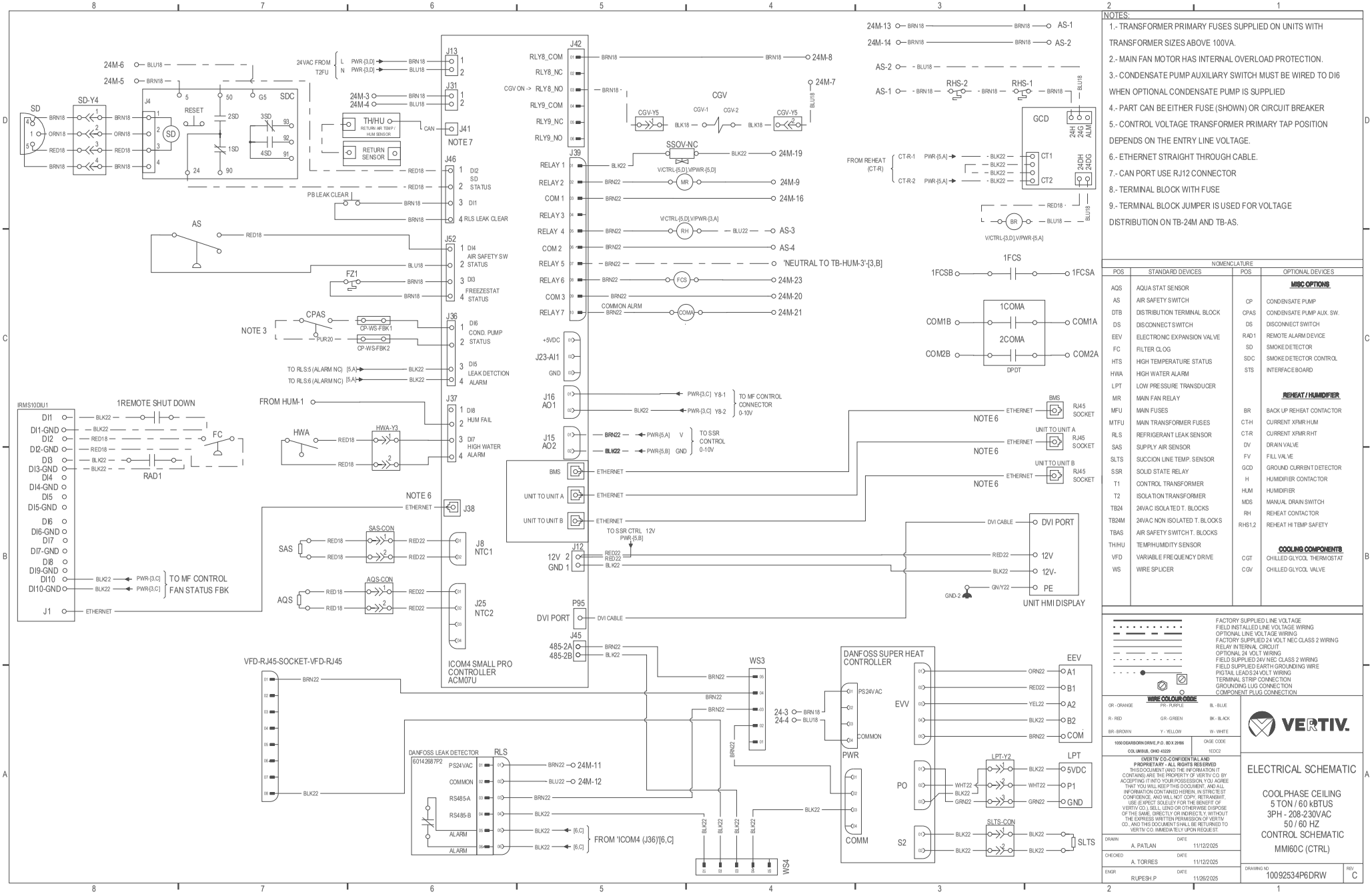
DRAWN	A. PATLAN	DATE 11/12/2025
CHECKED	A. TORRES	DATE 11/12/2025
ENGR	RUPESH.P	DATE 11/26/2025

VERTIV.

ELECTRICAL SCHEMATIC

COOLPHASE CEILING
5 TON / 60 kBTUS
3PH - 208-230VAC
50 / 60 HZ
POWER SCHEMATIC
MMI60C (PWR)

DRAWING NO 10092534P6DRW
REV C



NOTES:

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TH/HU	TEMP/HUMIDITY SENSOR		**COOLING COMPONENTS**
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TERMINAL STRIP CONNECTION
GROUNDING LUG CONNECTION
COMPONENT PLUG CONNECTION

WIRE COLOUR CODE

OR - ORANGE	PR - PURPLE	BL - BLUE
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1050 DEARBORN DRIVE, P.O. BOX 29186
COLUMBUS, OHIO 43229
CAGE CODE 1EDC2

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		DATE
DRAWN	A. PATLAN	11/12/2025
CHECKED	A. TORRES	11/12/2025
ENGR	RUPESH.P	11/26/2025

VERTIV.

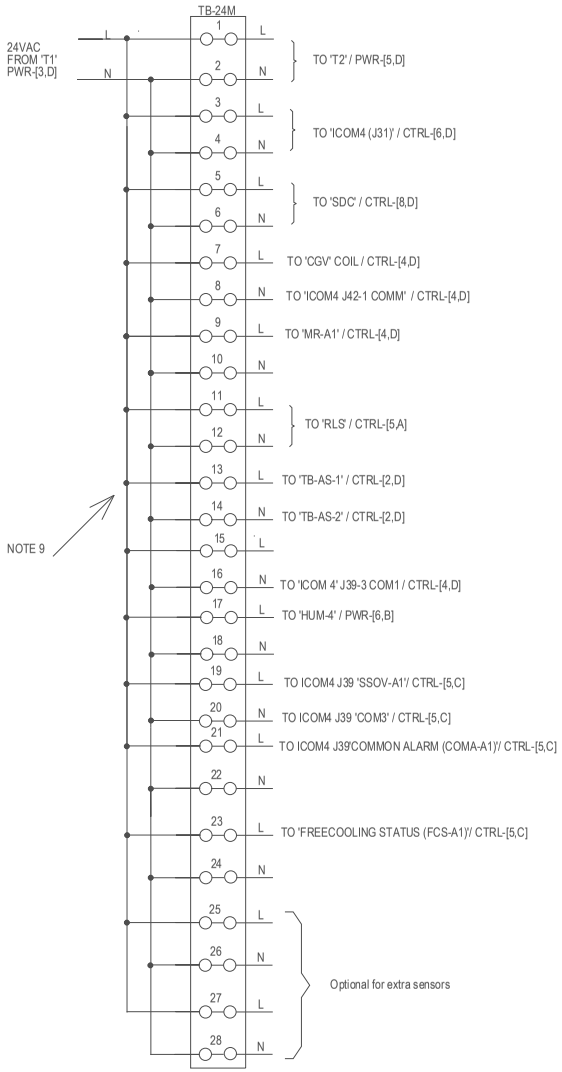
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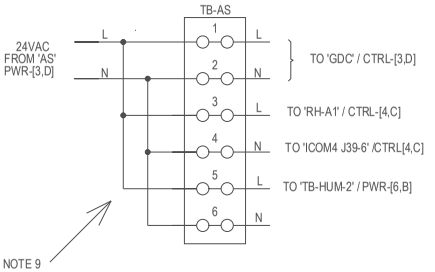
COOLPHASE CEILING
5 TON / 60 kBTUS
3PH - 208-230VAC
50 / 60 HZ
CONTROL SCHEMATIC
MMI60C (CTRL)

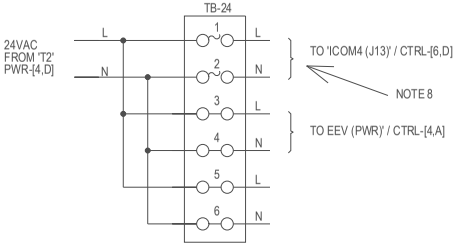
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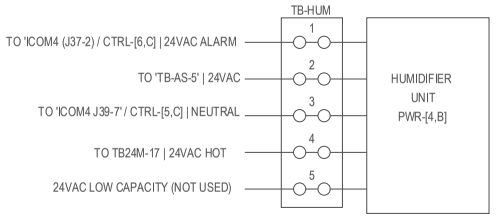
REV C

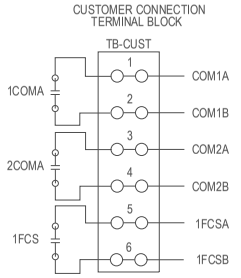
TERMINAL BLOCKS DISTRIBUTION DETAILS











NOTES:

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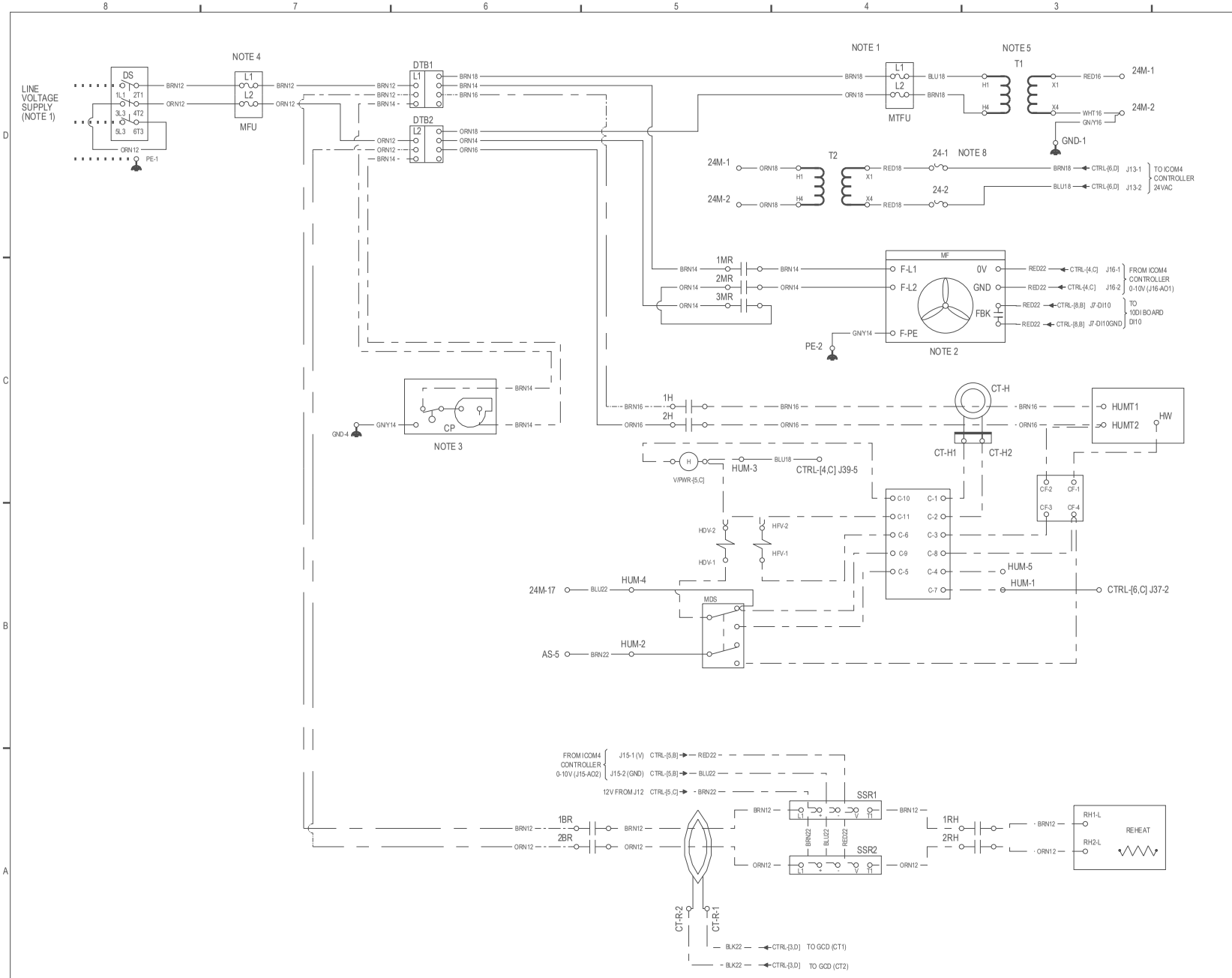
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ENGR	RUPESH.P	11/26/2025

ELECTRICAL SCHEMATIC

COOLPHASE CEILING
5 TON / 60 kBTUS
3PH - 208-230VAC
50 / 60 HZ

T. BLOCK DISTRIBUTION
MMI60C (TBLK)

DRAWING NO 10092534P6DRW
REV C



NOTES:

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FIELD SUPPLIED EARTH GROUNDING WIRE
PIGTAIL LEAD S 24 VOLT WIRING
TERMINAL STRIP CONNECTION
GROUNDING LUG CONNECTION
COMPONENT PLUG CONNECTION

WIRE COLOUR CODE

OR - ORANGE	PR - PURPLE	BL - BLUE
R - RED	GR - GREEN	BK - BLACK
BR - BROWN	Y - YELLOW	W - WHITE

1050 DEARBORN DRIVE, P.O. BOX 29186
COLUMBUS, OHIO 43229
CAGE CODE 1EDC2

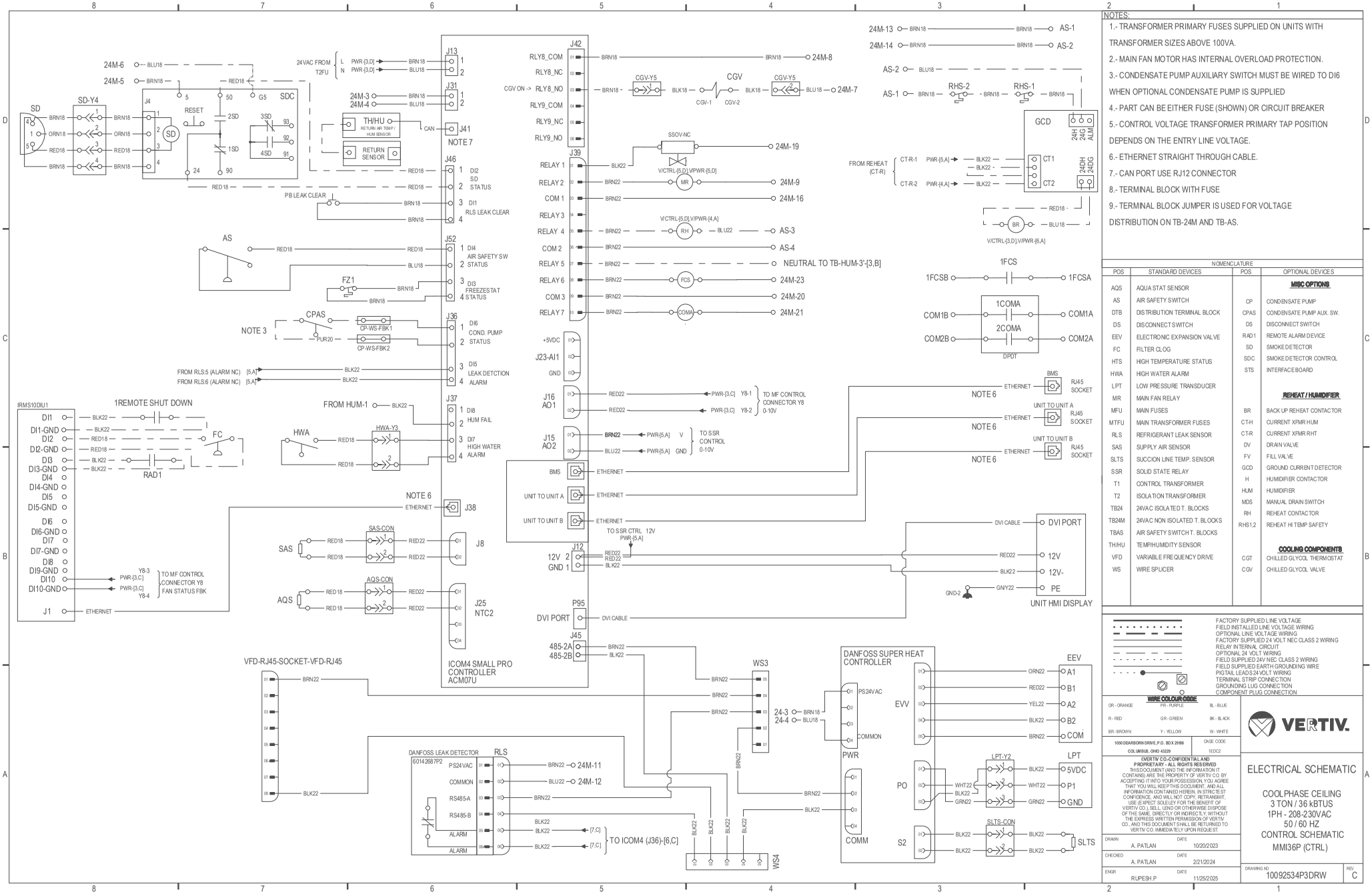
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DRAWN	A. PATLAN	DATE 11/12/2025
CHECKED	A. PATLAN	DATE 11/12/2025
ENGR	RUPESH.P	DATE 11/25/2025

ELECTRICAL SCHEMATIC

COOLPHASE CEILING
3 TON / 36 kBTUS
1PH - 208-230VAC
50 / 60 HZ
POWER SCHEMATIC
MMI36P (PWR)

DRAWING NO 10092534P3DRW
REV C



NOTES:

1.- TRANSFORMER PRIMARY FUSES SUPPLIED ON UNITS WITH TRANSFORMER SIZES ABOVE 100VA.

2.- MAIN FAN MOTOR HAS INTERNAL OVERLOAD PROTECTION.

3.- CONDENSATE PUMP AUXILIARY SWITCH MUST BE WIRED TO DI6 WHEN OPTIONAL CONDENSATE PUMP IS SUPPLIED

4.- PART CAN BE EITHER FUSE (SHOWN) OR CIRCUIT BREAKER

5.- CONTROL VOLTAGE TRANSFORMER PRIMARY TAP POSITION DEPENDS ON THE ENTRY LINE VOLTAGE.

6.- ETHERNET STRAIGHT THROUGH CABLE.

7.- CAN PORT USE RJ12 CONNECTOR

8.- TERMINAL BLOCK WITH FUSE

9.- TERMINAL BLOCK JUMPER IS USED FOR VOLTAGE DISTRIBUTION ON TB-24M AND TB-AS.

NOMENCLATURE

POS	STANDARD DEVICES
AQS	AQUA STAT SENSOR
AS	AIR SAFETY SWITCH
DTB	DISTRIBUTION TERMINAL BLOCK
DS	DISCONNECT SWITCH
EEV	ELECTRONIC EXPANSION VALVE
FC	FILTER CLOG
HTS	HIGH TEMPERATURE STATUS
HWA	HIGH WATER ALARM
LPT	LOW PRESSURE TRANSDUCER
MR	MAIN FAN RELAY
MFU	MAIN FUSES
MTFU	MAIN TRANSFORMER FUSES
RLS	REFRIGERANT LEAK SENSOR
SAS	SUPPLY AIR SENSOR
SLTS	SUCCION LINE TEMP. SENSOR
SSR	SOLID STATE RELAY
T1	CONTROL TRANSFORMER
T2	ISOLATION TRANSFORMER
TB24	24VAC ISOLATED T. BLOCKS
TB24M	24VAC NON ISOLATED T. BLOCKS
TBAS	AIR SAFETY SWITCH T. BLOCKS
TH/HU	TEMP/HUMIDITY SENSOR
VFD	VARIABLE FREQUENCY DRIVE
WS	WIRE SPLICER

POS	OPTIONAL DEVICES
	MISC OPTIONS
CP	CONDENSATE PUMP
CPAS	CONDENSATE PUMP AUX. SW.
DS	DISCONNECT SWITCH
RAD1	REMOTE ALARM DEVICE
SD	SMOKE DETECTOR
SDC	SMOKE DETECTOR CONTROL
STS	INTERFACE BOARD
	REHEAT / HUMIDIFIER
BR	BACK UP REHEAT CONTACTOR
CT-H	CURRENT XFMR HUM
CT-R	CURRENT XFMR RHT
DV	DRAIN VALVE
FV	FILL VALVE
GCD	GROUND CURRENT DETECTOR
H	HUMIDIFIER CONTACTOR
HUM	HUMIDIFIER
MDS	MANUAL DRAIN SWITCH
RH	REHEAT CONTACTOR
RHS1,2	REHEAT HI TEMP SAFETY
	COOLING COMPONENTS
CGT	CHILLED GLYCOL THERMOSTAT
CGV	CHILLED GLYCOL VALVE

FACTORY SUPPLIED LINE VOLTAGE
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OPTIONAL LINE VOLTAGE WIRING
FACTORY SUPPLIED 24 VOLT NEC CLASS 2 WIRING
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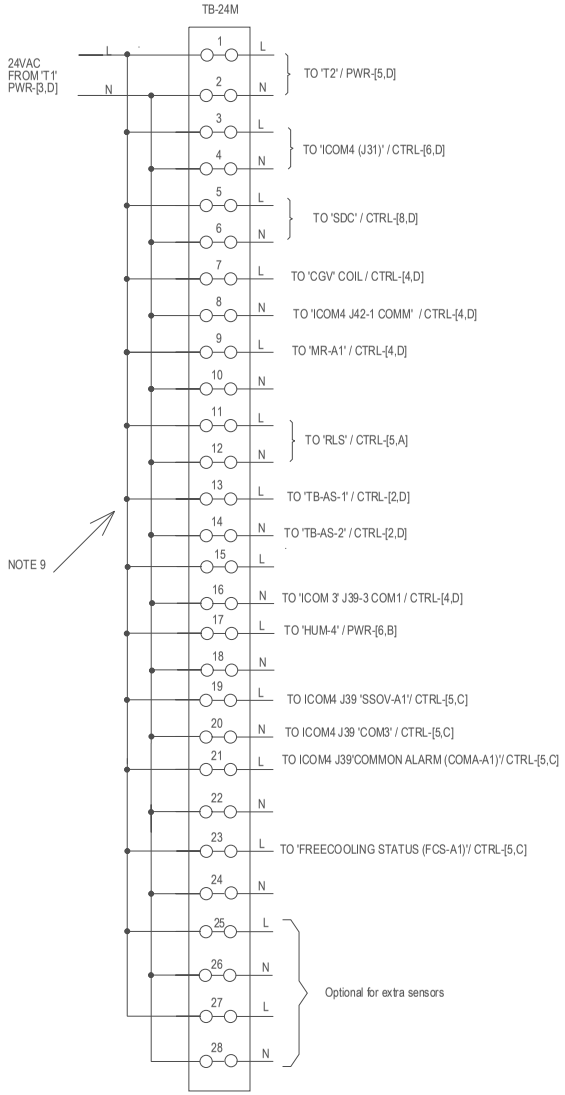
ELECTRICAL SCHEMATIC

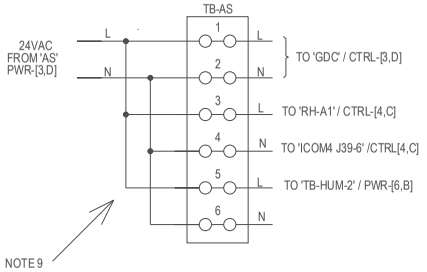
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1PH - 208-230VAC
50 / 60 HZ
CONTROL SCHEMATIC
MMI36P (CTRL)

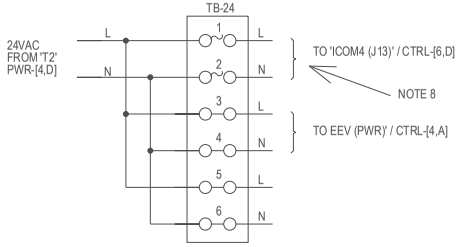
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CHECKED	A. PATLAN	2/21/2024
ENGR	RUPESH.P	11/25/2025

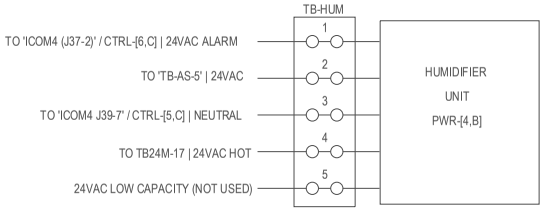
DRAWING NO 10092534P3DRW
REV C

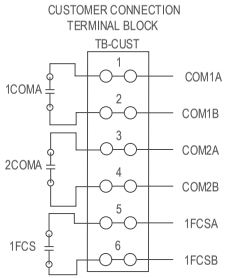
TERMINAL BLOCKS DISTRIBUTION DETAILS











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DS	DISCONNECT SWITCH	RAD1	REMOTE ALARM DEVICE
EEV	ELECTRONIC EXPANSION VALVE	SD	SMOKE DETECTOR
FC	FILTER CLOG	SDC	SMOKE DETECTOR CONTROL
HTS	HIGH TEMPERATURE STATUS	STS	INTERFACE BOARD
HWA	HIGH WATER ALARM		
LPT	LOW PRESSURE TRANSDUCER		**REHEAT / HUMIDIFIER**
MR	MAIN FAN RELAY	BR	BACK UP REHEAT CONTACTOR
MFU	MAIN FUSES	CT-H	CURRENT XFMR HUM
MTFU	MAIN TRANSFORMER FUSES	CT-R	CURRENT XFMR RHT
RLS	REFRIGERANT LEAK SENSOR	DV	DRAIN VALVE
SAS	SUPPLY AIR SENSOR	FV	FILL VALVE
SLTS	SUCCION LINE TEMP. SENSOR	GCD	GROUND CURRENT DETECTOR
SSR	SOLID STATE RELAY	H	HUMIDIFIER CONTACTOR
T1	CONTROL TRANSFORMER	HUM	HUMIDIFIER
T2	ISOLATION TRANSFORMER	MDS	MANUAL DRAIN SWITCH
TB24	24VAC ISOLATED T. BLOCKS	RH	REHEAT CONTACTOR
TB24M	24VAC NON ISOLATED T. BLOCKS	RHS1,2	REHEAT HI TEMP SAFETY
TBAS	AIR SAFETY SWITCH T. BLOCKS		
TH/HU	TEMP/HUMIDITY SENSOR		**COOLING COMPONENTS**
VFD	VARIABLE FREQUENCY DRIVE	CGT	CHILLED GLYCOL THERMOSTAT
WS	WIRE SPLICER	CGV	CHILLED GLYCOL VALVE

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CHECKED	A. PATLAN	DATE 2/21/2024
ENGR	RUPESH.P	DATE 11/25/2025

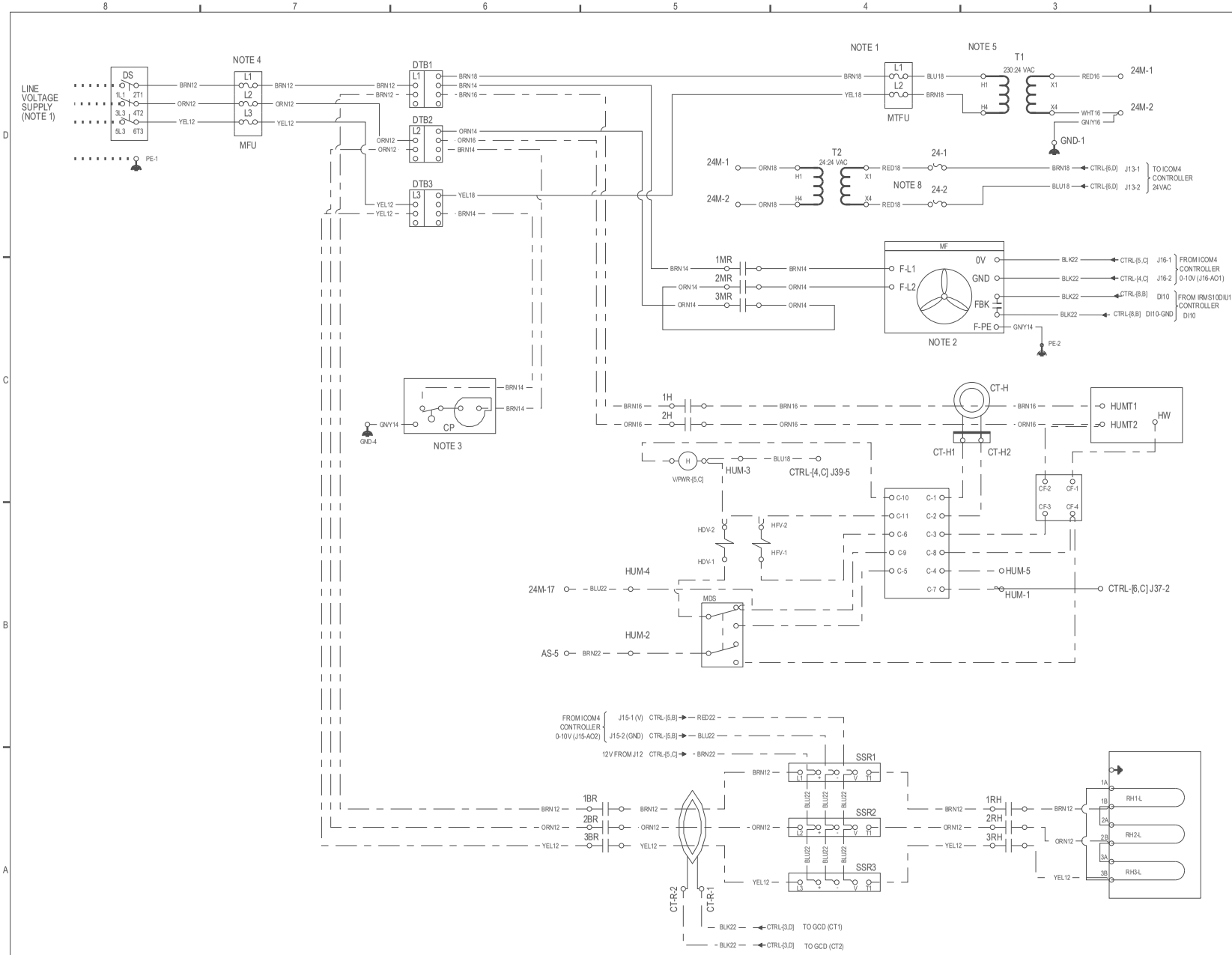
VERTIV.

ELECTRICAL SCHEMATIC

COOLPHASE CEILING
3 TON / 36 kBTUS
1PH - 208-230VAC
50 / 60 HZ

T. BLOCK DISTRIBUTION
MMI36P (TBLK)

DRAWING NO 10092534P3DRW
REV C



NOTES:

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DS	DISCONNECT SWITCH	RAD1	REMOTE ALARM DEVICE
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FC	FILTER CLOG	SDC	SMOKE DETECTOR CONTROL
HTS	HIGH TEMPERATURE STATUS	STS	INTERFACE BOARD
HWA	HIGH WATER ALARM		
LPT	LOW PRESSURE TRANSDUCER		**REHEAT / HUMIDIFIER**
MR	MAIN FAN RELAY	BR	BACK UP REHEAT CONTACTOR
MFU	MAIN FUSES	CT-H	CURRENT XFMR HUM
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T1	CONTROL TRANSFORMER	HUM	HUMIDIFIER
T2	ISOLATION TRANSFORMER	MDS	MANUAL DRAIN SWITCH
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TB24M	24VAC NON ISOLATED T. BLOCKS	RHS1,2	REHEAT HI TEMP SAFETY
TBAS	AIR SAFETY SWITCH T. BLOCKS		
TH/HU	TEMP/HUMIDITY SENSOR		**COOLING COMPONENTS**
VFD	VARIABLE FREQUENCY DRIVE	CGT	CHILLED GLYCOL THERMOSTAT
WS	WIRE SPLICER	CGV	CHILLED GLYCOL VALVE

FACTORY SUPPLIED LINE VOLTAGE
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WIRE COLOUR CODE:

OR - ORANGE	PR - PURPLE	BL - BLUE
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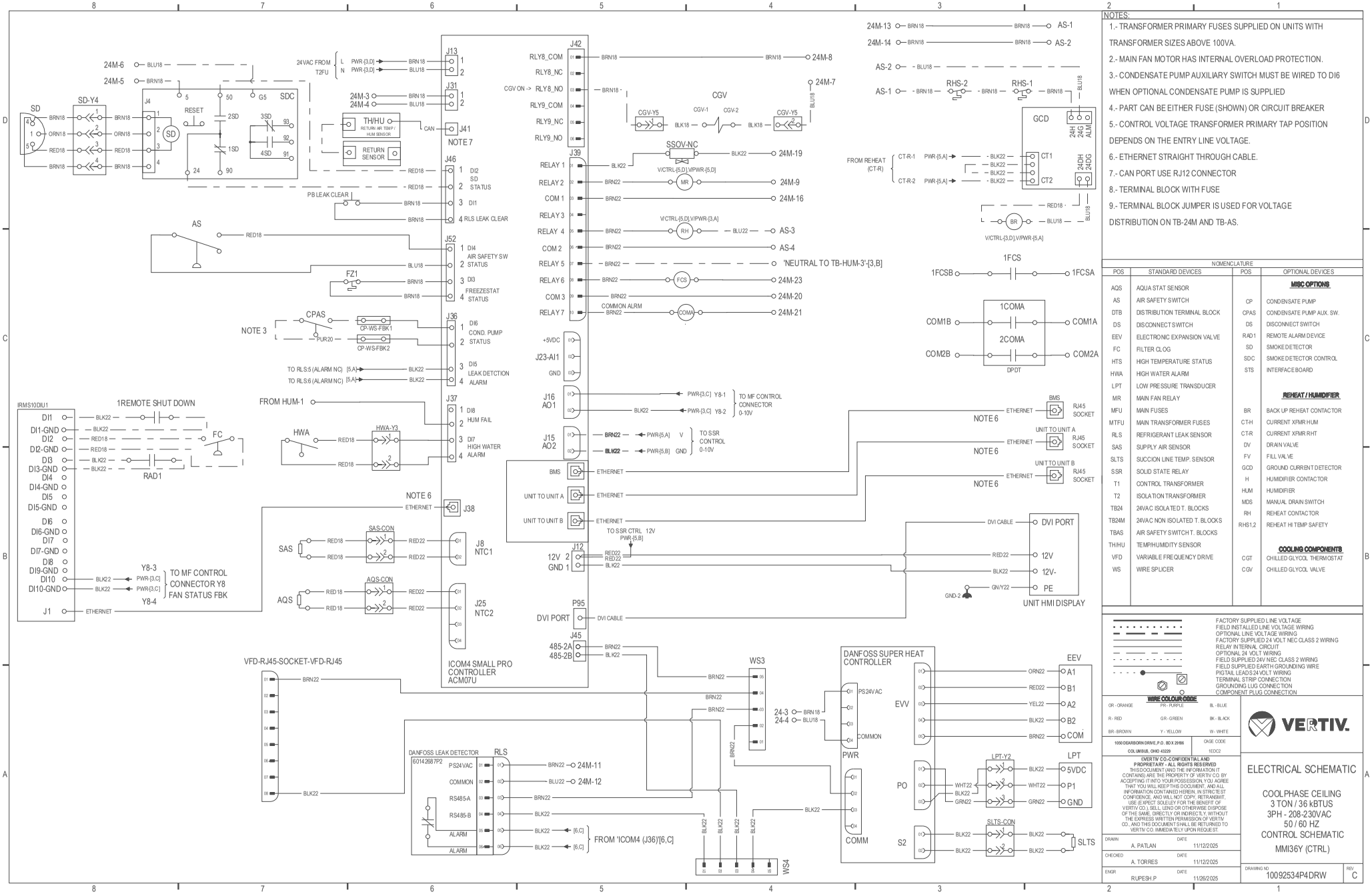
DRAWN	A. PATLAN	DATE 11/12/2025
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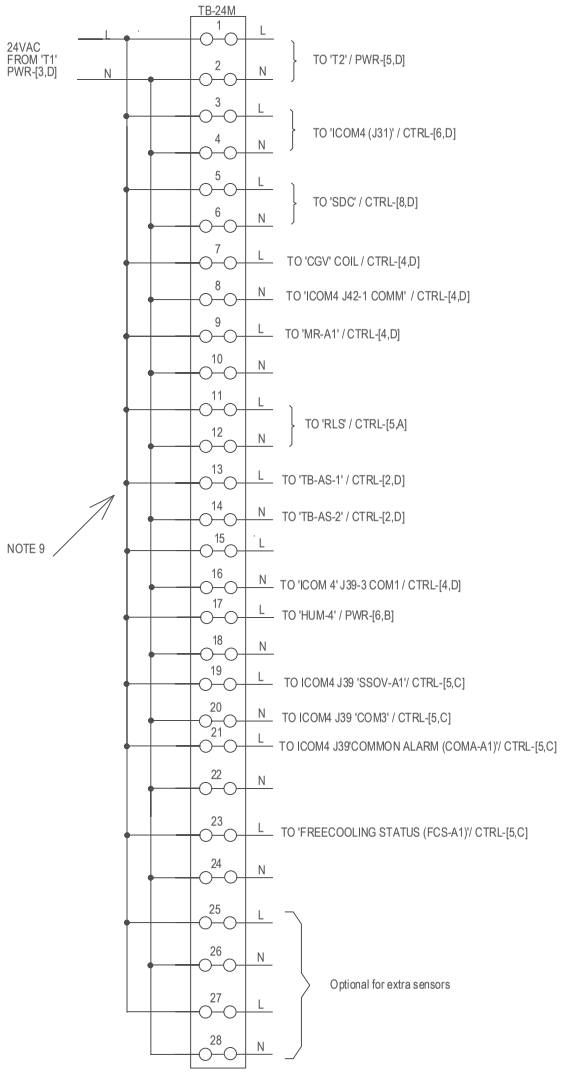
ELECTRICAL SCHEMATIC

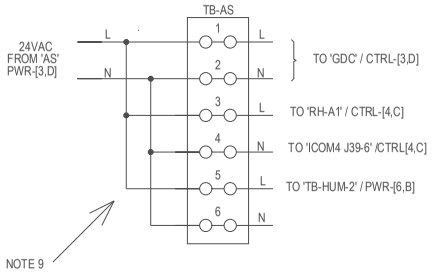
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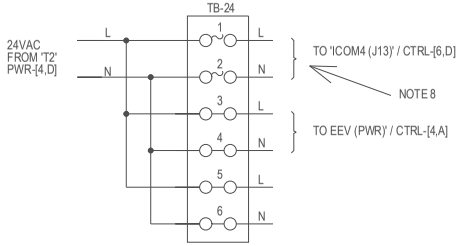
DRAWING NO 10092534P4DRW
REV C

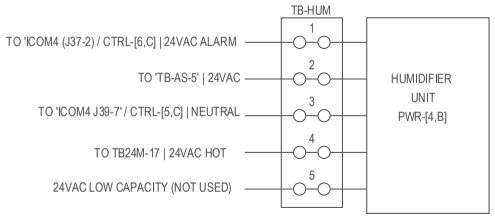

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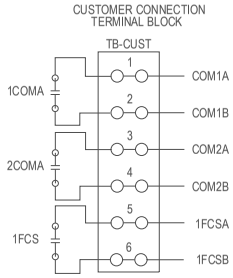
TERMINAL BLOCKS DISTRIBUTION DETAILS











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MTFU	MAIN TRANSFORMER FUSES	CT-R	CURRENT XFMR RHT
RLS	REFRIGERANT LEAK SENSOR	DV	DRAIN VALVE
SAS	SUPPLY AIR SENSOR	FV	FILL VALVE
SLTS	SUCCION LINE TEMP. SENSOR	GCD	GROUND CURRENT DETECTOR
SSR	SOLID STATE RELAY	H	HUMIDIFIER CONTACTOR
T1	CONTROL TRANSFORMER	HUM	HUMIDIFIER
T2	ISOLATION TRANSFORMER	MDS	MANUAL DRAIN SWITCH
TB24	24VAC ISOLATED T. BLOCKS	RH	REHEAT CONTACTOR
TB24M	24VAC NON ISOLATED T. BLOCKS	RHS1,2	REHEAT HI TEMP SAFETY
TBAS	AIR SAFETY SWITCH T. BLOCKS		
TH/HU	TEMP/HUMIDITY SENSOR		**COOLING COMPONENTS**
VFD	VARIABLE FREQUENCY DRIVE	CGT	CHILLED GLYCOL THERMOSTAT
WS	WIRE SPLICER	CGV	CHILLED GLYCOL VALVE

FACTORY SUPPLIED LINE VOLTAGE
FIELD INSTALLED LINE VOLTAGE WIRING
OPTIONAL LINE VOLTAGE WIRING
FACTORY SUPPLIED 24 VOLT NEC CLASS 2 WIRING
RELAY INTERNAL CIRCUIT
OPTIONAL 24 VOLT WIRING
FIELD SUPPLIED 24V NEC CLASS 2 WIRING
FIELD SUPPLIED EARTH GROUNDING WIRE
PIGTAIL LEADS 24 VOLT WIRING
TERMINAL STRIP CONNECTION
GROUNDING LUG CONNECTION
COMPONENT PLUG CONNECTION

WIRE COLOUR CODE

OR - ORANGE	PR - PURPLE	BL - BLUE
R - RED	GR - GREEN	BK - BLACK
BR - BROWN	Y - YELLOW	W - WHITE

1050 DEARBORN DRIVE, P.O. BOX 29186
COLUMBUS, OHIO 43229
CAGE CODE 1EDC2

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		DATE
DRAWN	A. PATLAN	11/26/2025
CHECKED	A. TORRES	11/12/2025
ENGR	RUPESH.P	11/26/2025

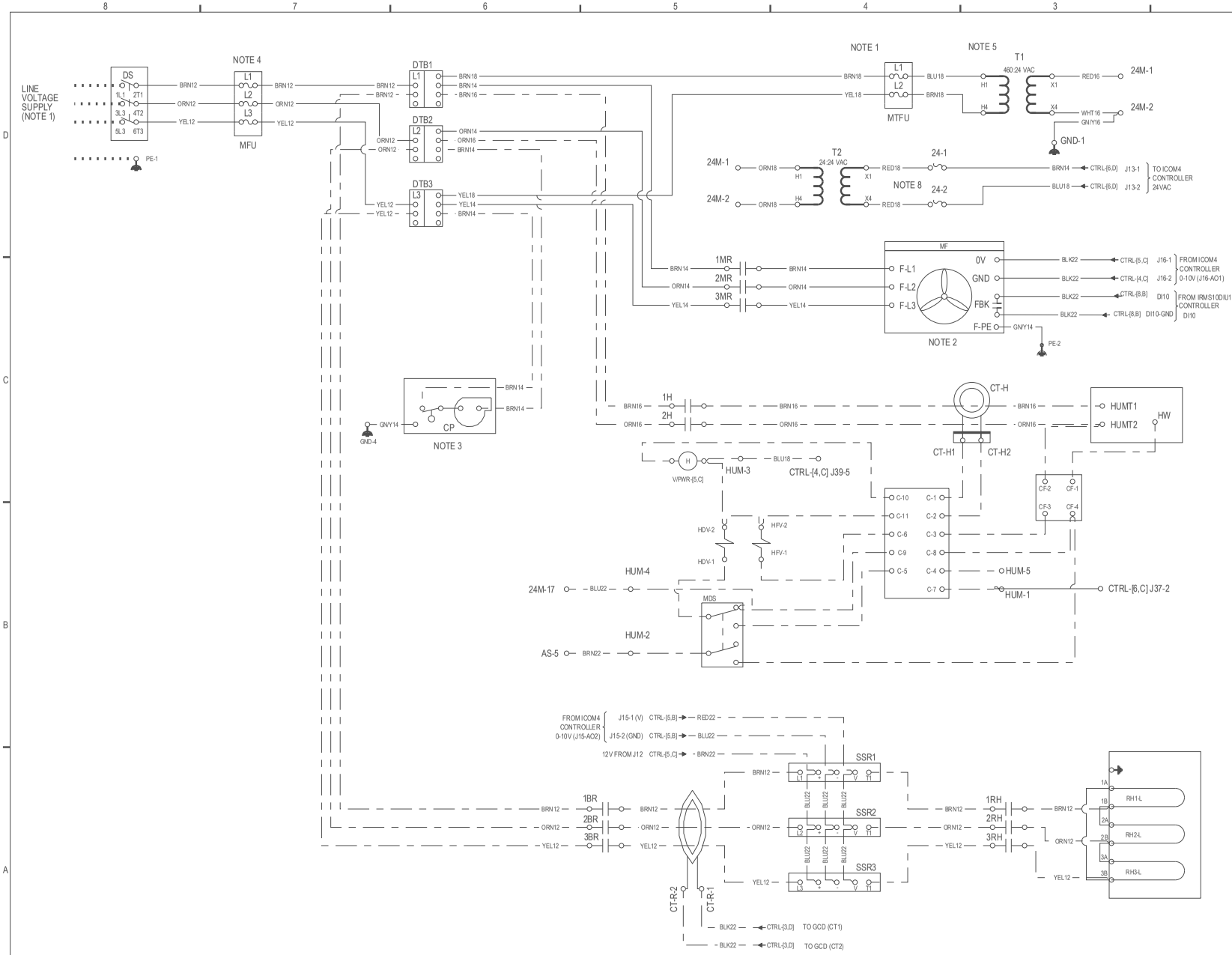
VERTIV.

ELECTRICAL SCHEMATIC

COOLPHASE CEILING
3 TON / 36 kBTUS
3PH - 208-230VAC
50 / 60 HZ

T. BLOCK DISTRIBUTION
MMI36Y (TBLK)

DRAWING NO 10092534P4DRW
REV C



NOTES:

1.- TRANSFORMER PRIMARY FUSES SUPPLIED ON UNITS WITH TRANSFORMER SIZES ABOVE 100VA.

2.- MAIN FAN MOTOR HAS INTERNAL OVERLOAD PROTECTION.

3.- CONDENSATE PUMP AUXILIARY SWITCH MUST BE WIRED TO DI6 WHEN OPTIONAL CONDENSATE PUMP IS SUPPLIED

4.- PART CAN BE EITHER FUSE (SHOWN) OR CIRCUIT BREAKER

5.- CONTROL VOLTAGE TRANSFORMER PRIMARY TAP POSITION DEPENDS ON THE ENTRY LINE VOLTAGE.

6.- ETHERNET STRAIGHT THROUGH CABLE.

7.- CAN PORT USE RJ12 CONNECTOR

8.- TERMINAL BLOCK WITH FUSE

9.- TERMINAL BLOCK JUMPER IS USED FOR VOLTAGE DISTRIBUTION ON TB-24M AND TB-AS.

NOMENCLATURE

POS	STANDARD DEVICES	POS	OPTIONAL DEVICES
			MISC OPTIONS
AQS	AQUA STAT SENSOR	CP	CONDENSATE PUMP
AS	AIR SAFETY SWITCH	CPAS	CONDENSATE PUMP AUX. SW.
DTB	DISTRIBUTION TERMINAL BLOCK	DS	DISCONNECT SWITCH
DS	DISCONNECT SWITCH	RAD1	REMOTE ALARM DEVICE
EEV	ELECTRONIC EXPANSION VALVE	SD	SMOKE DETECTOR
FC	FILTER CLOG	SDC	SMOKE DETECTOR CONTROL
HTS	HIGH TEMPERATURE STATUS	STS	INTERFACE BOARD
HWA	HIGH WATER ALARM		
LPT	LOW PRESSURE TRANSDUCER		**REHEAT / HUMIDIFIER**
MR	MAIN FAN RELAY	BR	BACK UP REHEAT CONTACTOR
MFU	MAIN FUSES	CT-H	CURRENT XFMR HUM
MTFU	MAIN TRANSFORMER FUSES	CT-R	CURRENT XFMR RHT
RLS	REFRIGERANT LEAK SENSOR	DV	DRAIN VALVE
SAS	SUPPLY AIR SENSOR	FV	FILL VALVE
SLTS	SUCCION LINE TEMP. SENSOR	GCD	GROUND CURRENT DETECTOR
SSR	SOLID STATE RELAY	H	HUMIDIFIER CONTACTOR
T1	CONTROL TRANSFORMER	HUM	HUMIDIFIER
T2	ISOLATION TRANSFORMER	MDS	MANUAL DRAIN SWITCH
TB24	24VAC ISOLATED T. BLOCKS	RH	REHEAT CONTACTOR
TB24M	24VAC NON ISOLATED T. BLOCKS	RHS1,2	REHEAT HI TEMP SAFETY
TBAS	AIR SAFETY SWITCH T. BLOCKS		
TH/HU	TEMP/HUMIDITY SENSOR		**COOLING COMPONENTS**
VFD	VARIABLE FREQUENCY DRIVE	CGT	CHILLED GLYCOL THERMOSTAT
WS	WIRE SPLICER	CGV	CHILLED GLYCOL VALVE

FACTORY SUPPLIED LINE VOLTAGE
FIELD INSTALLED LINE VOLTAGE WIRING
OPTIONAL LINE VOLTAGE WIRING
FACTORY SUPPLIED 24 VOLT NEC CLASS 2 WIRING
RELAY INTERNAL CIRCUIT
OPTIONAL 24 VOLT WIRING
FIELD SUPPLIED 24V NEC CLASS 2 WIRING
FIELD SUPPLIED EARTH GROUNDING WIRE
PIGTAIL LEAD 5.24 VOLT WIRING
TERMINAL STRIP CONNECTION
GROUNDING LUG CONNECTION
COMPONENT PLUG CONNECTION

WIRE COLOUR CODE

OR - ORANGE	PR - PURPLE	BL - BLUE
R - RED	GR - GREEN	BK - BLACK
BR - BROWN	Y - YELLOW	W - WHITE

1050 DEARBORN DRIVE, P.O. BOX 29186
COLUMBUS, OHIO 43229
CAGE CODE 1EDC2

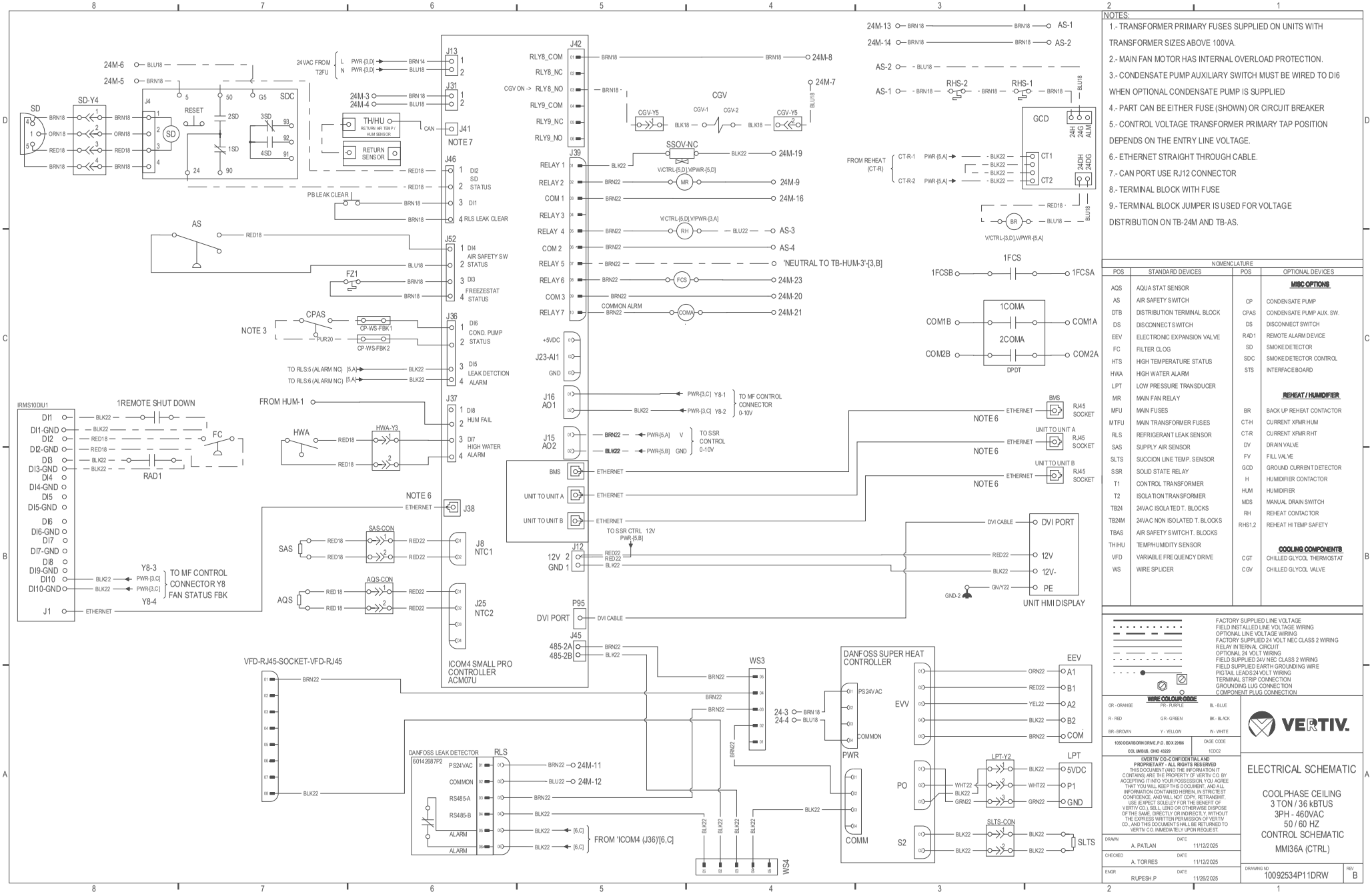
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DRAWN	A. PATLAN	DATE 11/12/2025
CHECKED	A. TORRES	DATE 11/12/2025
ENGR	RUPESH.P	DATE 11/26/2025

ELECTRICAL SCHEMATIC

COOLPHASE CEILING
3 TON / 36 kBTUS
3PH - 460VAC
50 / 60 HZ
POWER SCHEMATIC
MMI36A (PWR)

DRAWING NO 10092534P11DRW REV B



NOTES:

1.- TRANSFORMER PRIMARY FUSES SUPPLIED ON UNITS WITH TRANSFORMER SIZES ABOVE 100VA.

2.- MAIN FAN MOTOR HAS INTERNAL OVERLOAD PROTECTION.

3.- CONDENSATE PUMP AUXILIARY SWITCH MUST BE WIRED TO DI6 WHEN OPTIONAL CONDENSATE PUMP IS SUPPLIED

4.- PART CAN BE EITHER FUSE (SHOWN) OR CIRCUIT BREAKER

5.- CONTROL VOLTAGE TRANSFORMER PRIMARY TAP POSITION DEPENDS ON THE ENTRY LINE VOLTAGE.

6.- ETHERNET STRAIGHT THROUGH CABLE.

7.- CAN PORT USE RJ12 CONNECTOR

8.- TERMINAL BLOCK WITH FUSE

9.- TERMINAL BLOCK JUMPER IS USED FOR VOLTAGE DISTRIBUTION ON TB-24M AND TB-AS.

NOMENCLATURE

POS	STANDARD DEVICES	POS	OPTIONAL DEVICES
			MISC OPTIONS
AQS	AQUA STAT SENSOR	CP	CONDENSATE PUMP
AS	AIR SAFETY SWITCH	CPAS	CONDENSATE PUMP AUX. SW.
DTB	DISTRIBUTION TERMINAL BLOCK	DS	DISCONNECT SWITCH
DS	DISCONNECT SWITCH	RAD1	REMOTE ALARM DEVICE
EEV	ELECTRONIC EXPANSION VALVE	SD	SMOKE DETECTOR
FC	FILTER CLOG	SDC	SMOKE DETECTOR CONTROL
HTS	HIGH TEMPERATURE STATUS	STS	INTERFACE BOARD
HWA	HIGH WATER ALARM		
LPT	LOW PRESSURE TRANSDUCER		**REHEAT / HUMIDIFIER**
MR	MAIN FAN RELAY	BR	BACK UP REHEAT CONTACTOR
MFU	MAIN FUSES	CT-H	CURRENT XFMR HUM
MTFU	MAIN TRANSFORMER FUSES	CT-R	CURRENT XFMR RHT
RLS	REFRIGERANT LEAK SENSOR	DV	DRAIN VALVE
SAS	SUPPLY AIR SENSOR	FV	FILL VALVE
SLTS	SUCCION LINE TEMP. SENSOR	GCD	GROUND CURRENT DETECTOR
SSR	SOLID STATE RELAY	H	HUMIDIFIER CONTACTOR
T1	CONTROL TRANSFORMER	HUM	HUMIDIFIER
T2	ISOLATION TRANSFORMER	MDS	MANUAL DRAIN SWITCH
TB24	24VAC ISOLATED T. BLOCKS	RH	REHEAT CONTACTOR
TB24M	24VAC NON ISOLATED T. BLOCKS	RHS1,2	REHEAT HI TEMP SAFETY
TBAS	AIR SAFETY SWITCH T. BLOCKS		
TH/HU	TEMP/HUMIDITY SENSOR		**COOLING COMPONENTS**
VFD	VARIABLE FREQUENCY DRIVE	CGT	CHILLED GLYCOL THERMOSTAT
WS	WIRE SPLICER	CGV	CHILLED GLYCOL VALVE

FACTORY SUPPLIED LINE VOLTAGE
FIELD INSTALLED LINE VOLTAGE WIRING
OPTIONAL LINE VOLTAGE WIRING
FACTORY SUPPLIED 24 VOLT NEC CLASS 2 WIRING
RELAY INTERNAL CIRCUIT
OPTIONAL 24 VOLT WIRING
FIELD SUPPLIED 24V NEC CLASS 2 WIRING
FIELD SUPPLIED EARTH GROUNDING WIRE
PIGTAIL LEAD 5-24 VOLT WIRING
TERMINAL STRIP CONNECTION
GROUNDING LUG CONNECTION
COMPONENT PLUG CONNECTION

WIRE COLOUR CODE

OR - ORANGE	PR - PURPLE	BL - BLUE
R - RED	GR - GREEN	BK - BLACK
BR - BROWN	Y - YELLOW	W - WHITE

1050 DEARBORN DRIVE, P.O. BOX 29186
COLUMBUS, OHIO 43229
CAGE CODE 1EDC2

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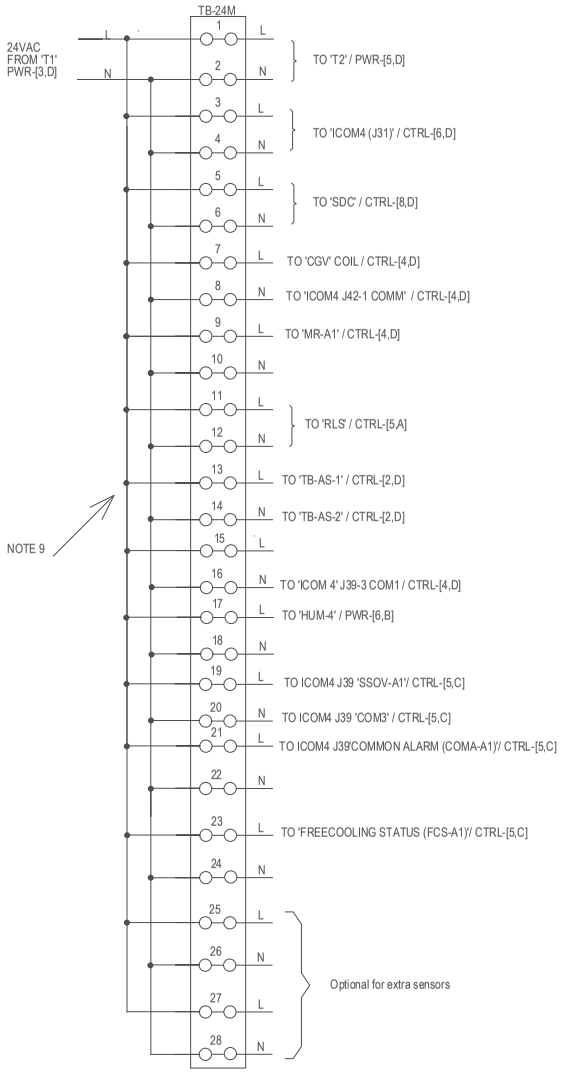
ELECTRICAL SCHEMATIC

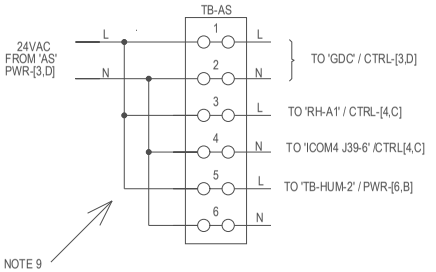
COOLPHASE CEILING
3 TON / 36 kBTUS
3PH - 460VAC
50 / 60 HZ
CONTROL SCHEMATIC
MMI36A (CTRL)

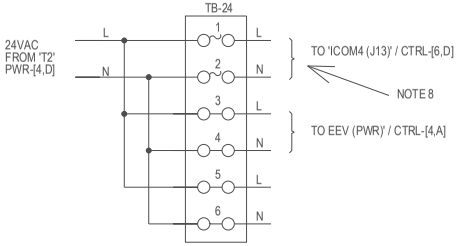
DRAWN	A. PATLAN	DATE 11/12/2025
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ENGR	RUPESH.P	DATE 11/26/2025

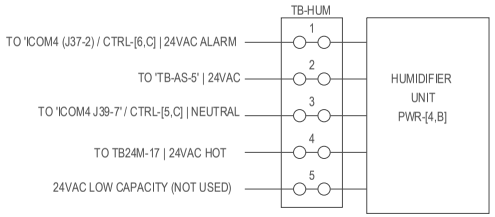
DRAWING NO 10092534P11DRW REV B

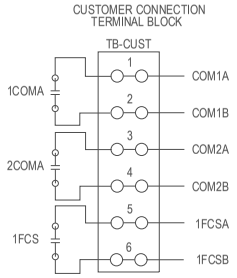
TERMINAL BLOCKS DISTRIBUTION DETAILS











NOTES:

1.- TRANSFORMER PRIMARY FUSES SUPPLIED ON UNITS WITH TRANSFORMER SIZES ABOVE 100VA.

2.- MAIN FAN MOTOR HAS INTERNAL OVERLOAD PROTECTION.

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7.- CAN PORT USE RJ12 CONNECTOR

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NOMENCLATURE

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			MISC OPTIONS
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AS	AIR SAFETY SWITCH	CPAS	CONDENSATE PUMP AUX. SW.
DTB	DISTRIBUTION TERMINAL BLOCK	DS	DISCONNECT SWITCH
DS	DISCONNECT SWITCH	RAD1	REMOTE ALARM DEVICE
EEV	ELECTRONIC EXPANSION VALVE	SD	SMOKE DETECTOR
FC	FILTER CLOG	SDC	SMOKE DETECTOR CONTROL
HTS	HIGH TEMPERATURE STATUS	STS	INTERFACE BOARD
HWA	HIGH WATER ALARM		
LPT	LOW PRESSURE TRANSDUCER		**REHEAT / HUMIDIFIER**
MR	MAIN FAN RELAY	BR	BACK UP REHEAT CONTACTOR
MFU	MAIN FUSES	CT-H	CURRENT XFMR HUM
MTFU	MAIN TRANSFORMER FUSES	CT-R	CURRENT XFMR RHT
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SAS	SUPPLY AIR SENSOR	FV	FILL VALVE
SLTS	SUCCION LINE TEMP. SENSOR	GCD	GROUND CURRENT DETECTOR
SSR	SOLID STATE RELAY	H	HUMIDIFIER CONTACTOR
T1	CONTROL TRANSFORMER	HUM	HUMIDIFIER
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TB24	24VAC ISOLATED T. BLOCKS	RH	REHEAT CONTACTOR
TB24M	24VAC NON ISOLATED T. BLOCKS	RHS1,2	REHEAT HI TEMP SAFETY
TBAS	AIR SAFETY SWITCH T. BLOCKS		
TH/HU	TEMP/HUMIDITY SENSOR		**COOLING COMPONENTS**
VFD	VARIABLE FREQUENCY DRIVE	CGT	CHILLED GLYCOL THERMOSTAT
WS	WIRE SPLICER	CGV	CHILLED GLYCOL VALVE

FACTORY SUPPLIED LINE VOLTAGE
FIELD INSTALLED LINE VOLTAGE WIRING
OPTIONAL LINE VOLTAGE WIRING
FACTORY SUPPLIED 24 VOLT NEC CLASS 2 WIRING
RELAY INTERNAL CIRCUIT
OPTIONAL 24 VOLT WIRING
FIELD SUPPLIED 24V NEC CLASS 2 WIRING
FIELD SUPPLIED EARTH GROUNDING WIRE
PIGTAIL LEADS 24 VOLT WIRING
TERMINAL STRIP CONNECTION
GROUNDING LUG CONNECTION
COMPONENT PLUG CONNECTION

WIRE COLOUR CODE

OR - ORANGE	PR - PURPLE	BL - BLUE
R - RED	GR - GREEN	BK - BLACK
BR - BROWN	Y - YELLOW	W - WHITE

1050 DEARBORN DRIVE, P.O. BOX 29186
COLUMBUS, OHIO 43229
CAGE CODE 1EDC2

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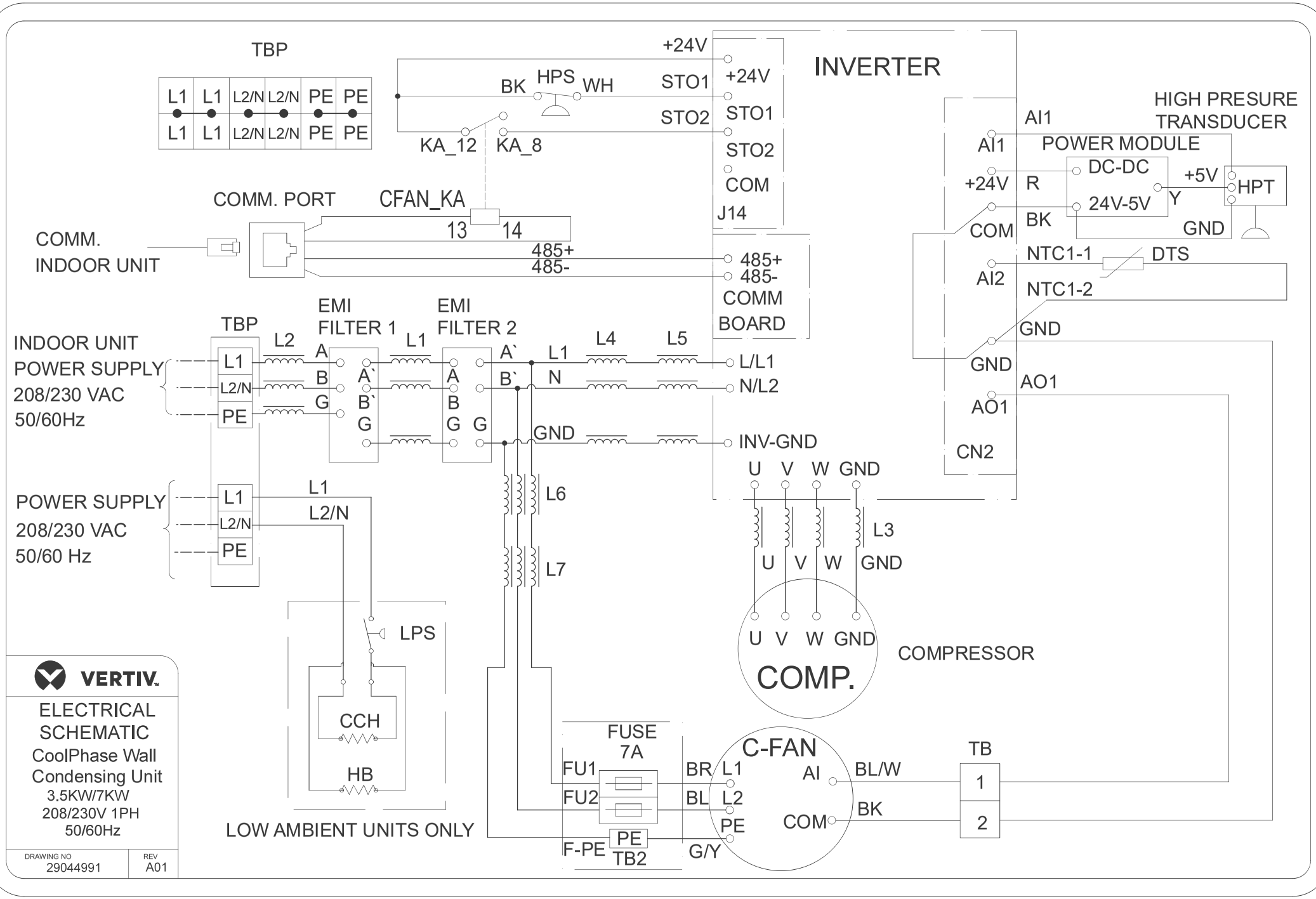
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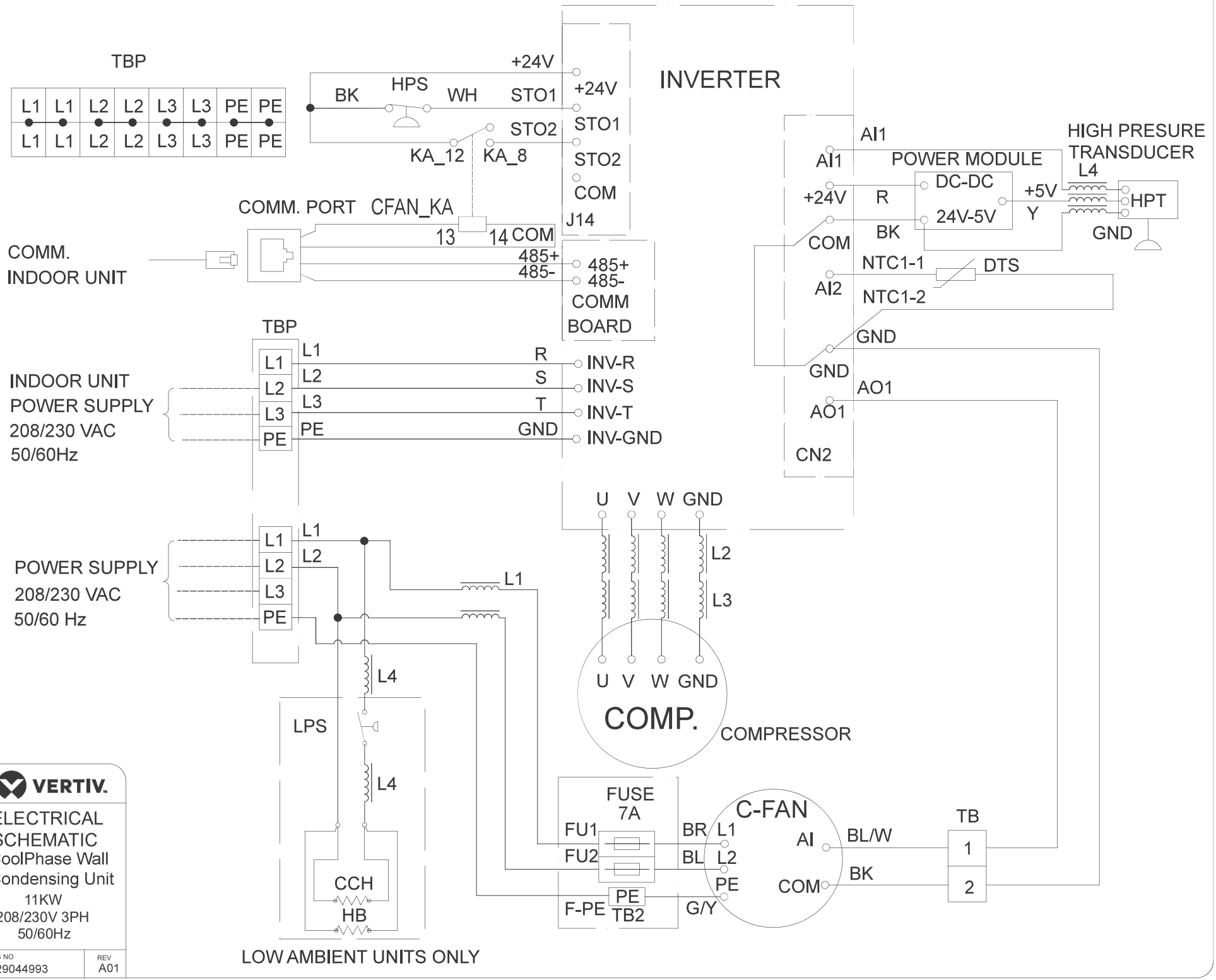
ELECTRICAL SCHEMATIC

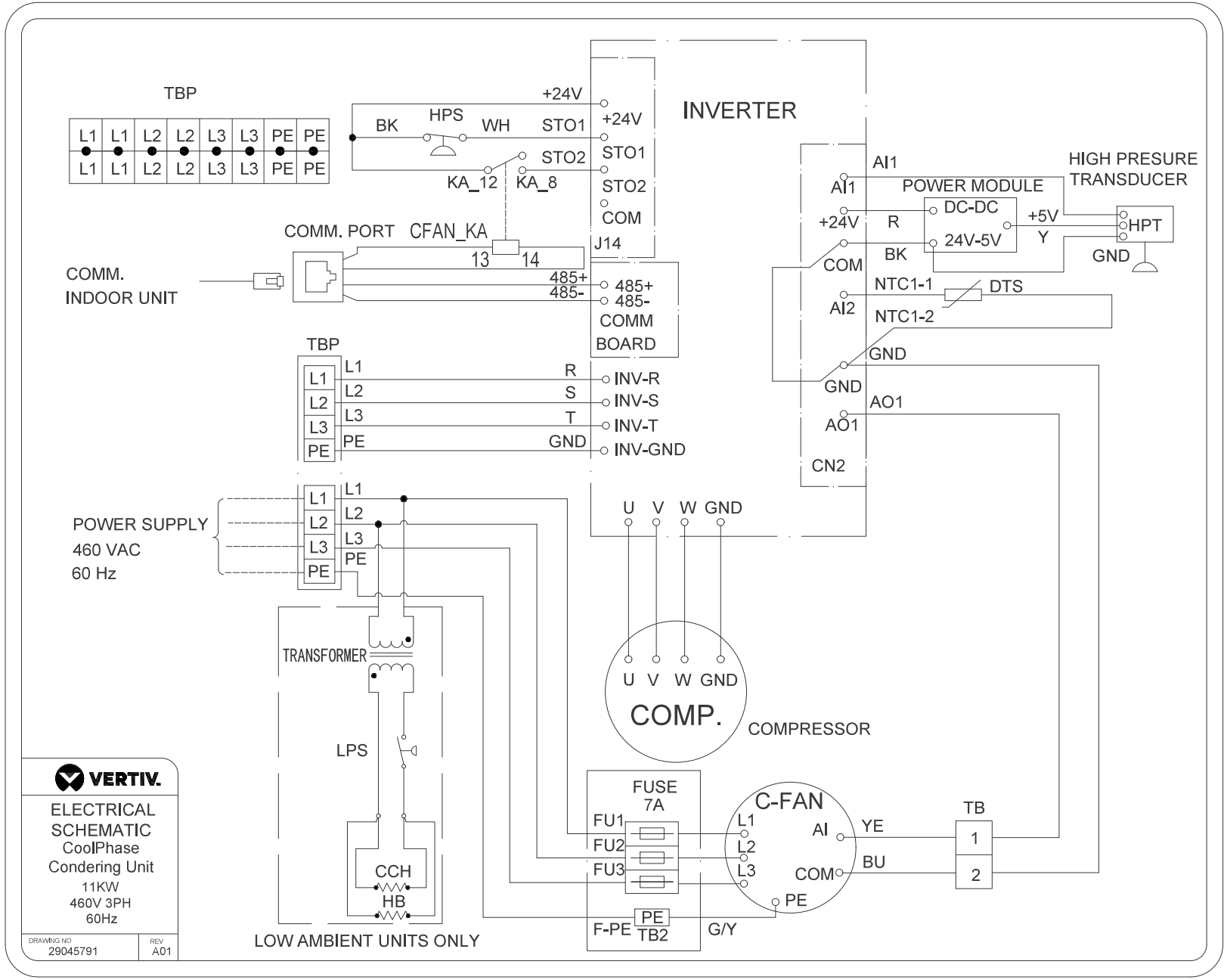
COOLPHASE CEILING
3 TON / 36 kBTUS
3PH - 460VAC
50 / 60 HZ

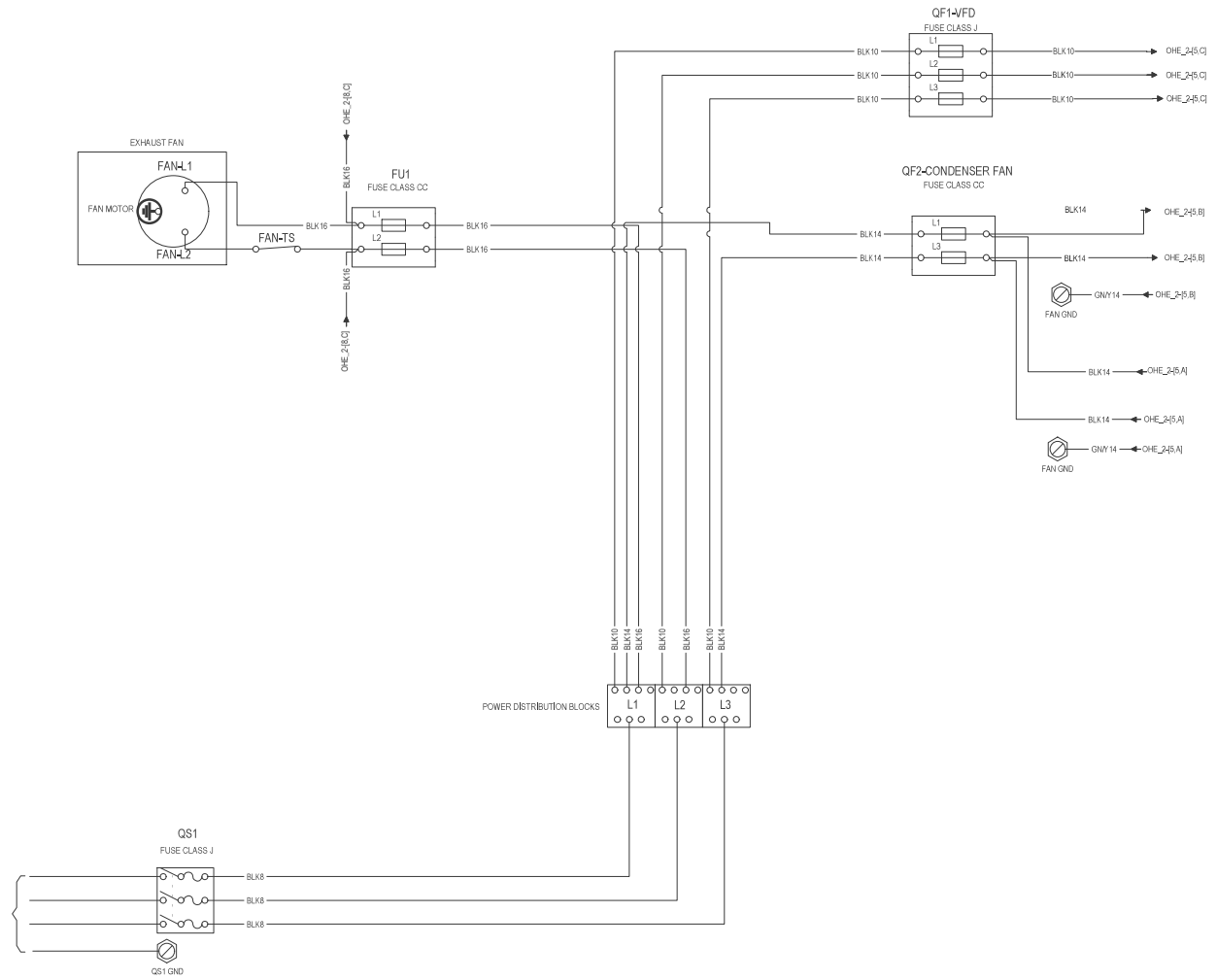
T. BLOCK DISTRIBUTION
MMI36A (TBLK)

DRAWING NO 10092534P11DRW
REV B


TBP
L1 L1 L2/N L2/N PE PE
L1 L1 L2/N L2/N PE PE
+24V
BK HPS WH
STO1
STO2
KA_12 KA_8
INVERTER
+24V
STO1
STO2
COM
J14
HIGH PRESURE TRANSDUCER
AI1
POWER MODULE
DC-DC
+24V R
24V-5V
+5V
Y
HPT
BK
GND
COMM. PORT
CFAN_KA
13 14
COMM. INDOOR UNIT
485+
485-
485+
485-
COMM BOARD
COM
NTC1-1
DTS
AI2
NTC1-2
GND
GND
AO1
AO1
CN2
INDOOR UNIT POWER SUPPLY 208/230 VAC 50/60Hz
TBP
L1
L2/N
PE
L2
EMI FILTER 1
A
B
G
A`
B`
G
L1
EMI FILTER 2
A
B
G G
A`
B`
L1
N
GND
L4
L5
L/L1
N/L2
INV-GND
POWER SUPPLY 208/230 VAC 50/60 Hz
L1
L2/N
PE
L1
L2/N
L6
L7
U V W GND
L3
U V W GND
U V W GND
COMP.
COMPRESSOR
LPS
CCH
HB
LOW AMBIENT UNITS ONLY
FUSE 7A
FU1
FU2
F-PE
PE
TB2
BR L1
BL L2
PE
G/Y
C-FAN
AI
COM
BL/W
BK
TB
1
2
VERTIV.
ELECTRICAL SCHEMATIC
CoolPhase Wall Condensing Unit
3.5KW/7KW
208/230V 1PH
50/60Hz
DRAWING NO
29044991
REV
A01


TBP
L1 L1 L2 L2 L3 L3 PE PE
L1 L1 L2 L2 L3 L3 PE PE
INVERTER
+24V
BK
HPS
WH
STO1
STO2
KA_12
KA_8
+24V
STO1
STO2
COM
J14
COMM. PORT
CFAN_KA
13
14 COM
COMM.
INDOOR UNIT
485+
485-
485+
485-
COMM
BOARD
AI1
AI1
POWER MODULE
DC-DC
24V-5V
+24V
R
BK
COM
+5V
Y
GND
HIGH PRESURE
TRANSDUCER
L4
HPT
GND
NTC1-1
DTS
AI2
NTC1-2
GND
GND
AO1
AO1
CN2
TBP
INDOOR UNIT
POWER SUPPLY
208/230 VAC
50/60Hz
L1
L2
L3
PE
L1
L2
L3
PE
R
S
T
GND
INV-R
INV-S
INV-T
INV-GND
U V W GND
POWER SUPPLY
208/230 VAC
50/60 Hz
L1
L2
L3
PE
L1
L2
L3
L4
U V W GND
COMP.
COMPRESSOR
LPS
L4
FUSE
7A
FU1
FU2
BR L1
BL L2
PE
F-PE
PE
TB2
G/Y
C-FAN
AI
COM
BL/W
BK
TB
1
2
CCH
HB
LOW AMBIENT UNITS ONLY
VERTIV.
ELECTRICAL
SCHEMATIC
CoolPhase Wall
Condensing Unit
11KW
208/230V 3PH
50/60Hz
DRAWING NO
29044993
REV
A01


TBP
L1 L1 L2 L2 L3 L3 PE PE
L1 L1 L2 L2 L3 L3 PE PE
INVERTER
+24V
BK
HPS
WH
STO1
STO2
KA_12
KA_8
+24V
STO1
STO2
COM
J14
COMM. PORT
CFAN_KA
13
14
COMM.
INDOOR UNIT
485+
485-
485+
485-
COMM
BOARD
TBP
L1
L2
L3
PE
R
S
T
GND
INV-R
INV-S
INV-T
INV-GND
POWER SUPPLY
460 VAC
60 Hz
U V W GND
TRANSFORMER
U V W GND
COMP.
COMPRESSOR
LPS
FUSE
7A
FU1
FU2
FU3
C-FAN
L1
L2
L3
PE
AI
COM
YE
BU
TB
1
2
CCH
HB
F-PE
PE
TB2
G/Y
LOW AMBIENT UNITS ONLY
AI1
HIGH PRESURE
TRANSDUCER
AI1
POWER MODULE
DC-DC
24V-5V
+24V
R
BK
COM
+5V
Y
HPT
GND
NTC1-1
DTS
AI2
NTC1-2
GND
GND
AO1
AO1
CN2
VERTIV.
ELECTRICAL
SCHEMATIC
CoolPhase
Condering Unit
11KW
460V 3PH
60Hz
DRAWING NO
29045791
REV
A01



NOTES:

1.- ALL FIELD WIRING TO BE PER LOCAL CODES. USE COPPER CONDUCTORS ONLY.

2.- SEE INTALLATION AND USER MANUAL(S).

3.- CONTACT CAPACITY: 250VAC/30VDC 5A.

4.- ETHERNET STRAIGHT THROUGH CABLE.

5.- WIRE SPLICE CONNECTORS ARE USED FOR ALL NODE CONNECTIONS(CONTROL).

6.- FOR SPECIFIC COMPONENT PART NUMBERS, REFER TO RESPECTIVE UNIT'S BOM.

7.- HARNESS BUILT IN THE ATS, MAKE CONNECTION PER DRAWING.

CIRCUIT BOARD PLUG AND TERMINAL ASSIGNMENTS

COMPRESSOR INVERTER

CN2 TERMINAL BLOCK

+24 - PRESSURE TRANSDUCER POWER SUPPLY
AI1 - PRESSURE TRANSDUCER ANALOG INPUT
AI2 - DISCHARGE TEMPERATURE SENSOR
AO1 - FAN SIGNAL ANALOG OUTPUT
GND - INVERTER SIGNAL GROUND

J14 TERMINAL BLOCK

+24 - STO POWER SUPPLY
STO1 - SAFE TORQUE OFF 1
STO2 - SAFE TORQUE OFF 2
COM - STO COMMON

MODBUS COMMUNICATION BOARD

RS485+ - RS485A
RS485- - RS485B

POWER CONNECTION

INV R - L1 POWER SUPPLY
INV S - L2 POWER SUPPLY
INV T - L3 POWER SUPPLY
INV GND - GROUND
U - COMPRESSOR POWER SUPPLY L1
V - COMPRESSOR POWER SUPPLY L2
W - COMPRESSOR POWER SUPPLY L3

NOMENCLATURE

LINE	STANDARD DEVICES		
7A	QS1 - PRIMARY POWER SUPPLY	4D	QF1 - VFD FUSE BLOCK
7A	FU1 - EXHAUST FAN FUSE	4C	QF2 - CONDENSER FAN FUSE BLOCK
7C	FAN-TS - EXHAUST FAN THERMOSTAT		

FACTORY SUPPLIED LINE VOLTAGE
FIELD INSTALLED LINE VOLTAGE WIRING
OPTIONAL LINE VOLTAGE WIRING
FACTORY SUPPLIED 24 VOLT NEC CLASS 2 WIRING
RELAY INTERNAL CIRCUIT
OPTIONAL 24 VOLT WIRING
FIELD SUPPLIED 24V NEC CLASS 2 WIRING
FIELD SUPPLIED EARTH GROUNDING WIRE
PIGTAIL LEADS 24VOLT WIRING
TERMINAL STRIP CONNECTION
GROUNDING LUG CONNECTION
COMPONENT PLUG CONNECTION

WIRE COLOUR CODE

ORN - ORANGE	PPR - PURPLE	BLU - BLUE
RED - RED	GRN - GREEN	BLK - BLACK
BRN - BROWN	Y - YELLOW	WHT - WHITE

VERTIV.

1050 DEARBORN DRIVE, P.O. BOX 29186
COLUMBUS, OHIO 43229

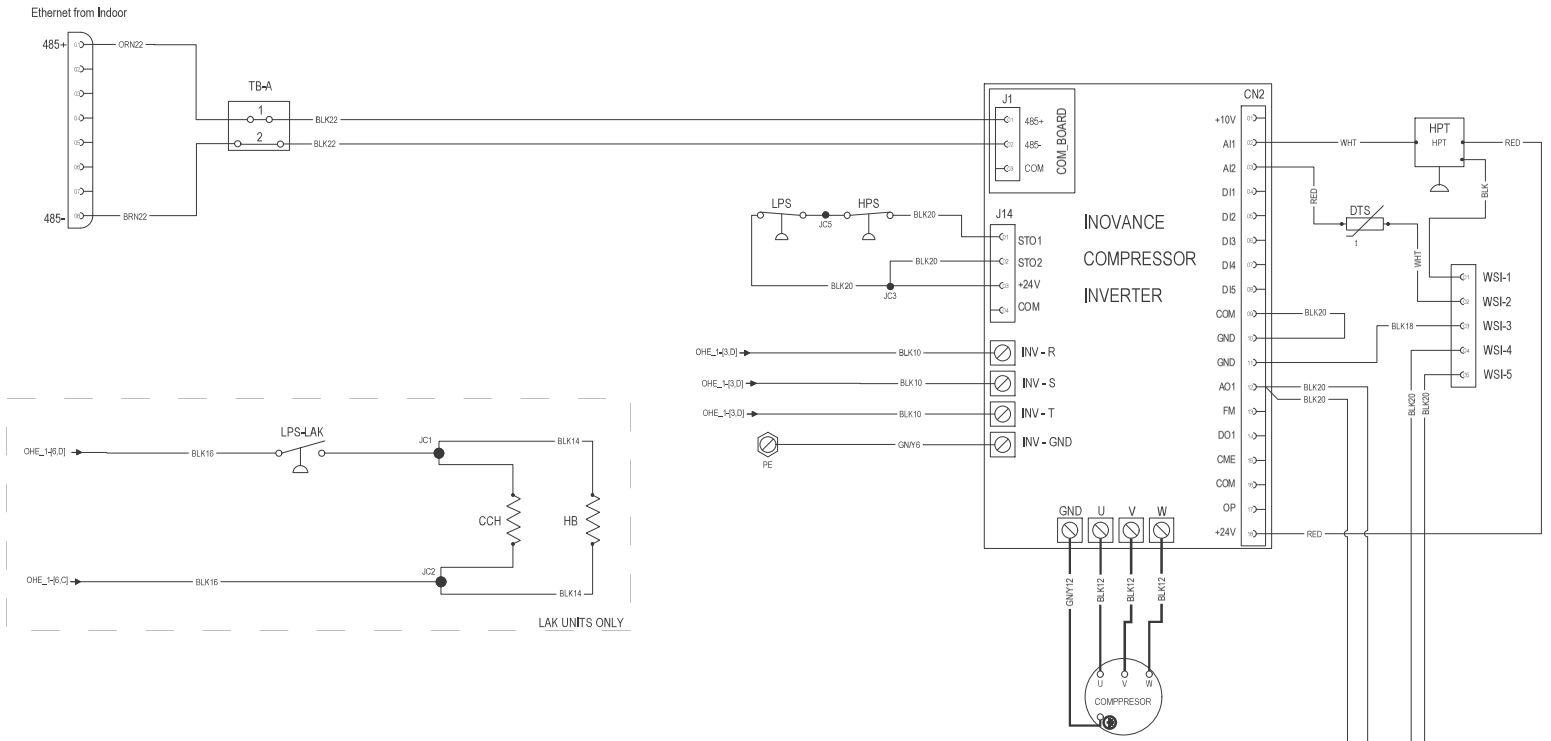
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		DATE
DRAWN	A. PATLAN	01/08/2026
CHECKED	A. TORRES	01/09/2026
ENGR	A. PATLAN	01/08/2026

OHE
208 / 230VAC - 3PH
15kW
WIRING DIAGRAM
50/60 HZ
SINGLE POWER SUPPLY
1 OF 2
*

DRAWING NO: 10068508P9
REV: C



NOTES:

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2.- SEE INSTALLATION AND USER MANUAL(S).

3.- CONTACT CAPACITY: 250VAC / 30VDC 5A.

4.- ETHERNET STRAIGHT THROUGH CABLE.

5.- WIRE SPLICE CONNECTORS ARE USED FOR ALL NODE CONNECTIONS (CONTROL).

6.- WIRE JOINT CONNECTOR ARE USED FOR THE LAK HEATER INTERCONNECTION

7.- THE TERMINAL BLOCK ON THE CONNECTION PANEL IS A DBL125 THAT HAS MULTIPLE INPUTS AND OUTPUTS

8.- FOR SPECIFIC COMPONENT PART NUMBERS, REFER TO RESPECTIVE UNIT'S BOM.

CIRCUIT BOARD PLUG AND TERMINAL ASSIGNMENTS

COMPRESSOR INVERTER

CN2 TERMINAL BLOCK

+24 - PRESSURE TRANSDUCER POWER SUPPLY
AI1 - PRESSURE TRANSDUCER ANALOG INPUT
AI2 - DISCHARGE TEMPERATURE SENSOR
AO1 - FAN SIGNAL ANALOG OUTPUT
GND - INVERTER SIGNAL GROUND

J14 TERMINAL BLOCK

+24 - STO POWER SUPPLY
STO1 - SAFE TORQUE OFF 1
STO2 - SAFE TORQUE OFF 2
COM - STO COMMON

MODBUS COMMUNICATION BOARD

RS485+ - RS485A
RS485- - RS485B

POWER CONNECTION

INV R - L1 POWER SUPPLY
INV S - L2 POWER SUPPLY
INV T - L3 POWER SUPPLY
INV GND - GROUND
U - COMPRESSOR POWER SUPPLY L1
V - COMPRESSOR POWER SUPPLY L2
W - COMPRESSOR POWER SUPPLY L3

NOMENCLATURE

LINE	STANDARD DEVICES	LINE	OPTIONAL DEVICES
3D	DTS - DISCHARGE TEMPERATURE SENSOR	6C	CCH - CRANKCASE HEATER
5D	HPS - HIGH PRESSURE SWITCH	6C	HB - HEATING BELT
5D	LPS - LOW PRESSURE SWITCH	7C	LPS LAK - LOW PRESSURE SWITCH
3D	HPT - HIGH PRESSURE TRANSDUCER		
3D	WS1 - WIRE SPLICER 1		
7C	JC1 - JOINT CONNECTOR 1		
7C	JC2 - JOINT CONNECTOR 2		
5D	JC3 - JOINT CONNECTOR 3		
3C	JC4 - JOINT CONNECTOR 5		

FACTORY SUPPLIED LINE VOLTAGE
FIELD INSTALLED LINE VOLTAGE WIRING
OPTIONAL LINE VOLTAGE WIRING
FACTORY SUPPLIED 24 VOLT NEC CLASS 2 WIRING
RELAY INTERNAL CIRCUIT
OPTIONAL 24 VOLT WIRING
FIELD SUPPLIED 24V NEC CLASS 2 WIRING
FIELD SUPPLIED EARTH GROUNDING WIRE
PIGTAIL LEADS 24VOLT WIRING
TERMINAL STRIP CONNECTION
GROUNDING LUG CONNECTION
COMPONENT PLUG CONNECTION

WIRE COLOUR CODE

ORN - ORANGE	PPR - PURPLE	BLU - BLUE
RED - RED	GRN - GREEN	BLK - BLACK
BRN - BROWN	Y - YELLOW	WHT - WHITE

VERTIV

1050 DEARBORN DRIVE, P.O. BOX 29186
COLUMBUS, OHIO 43229

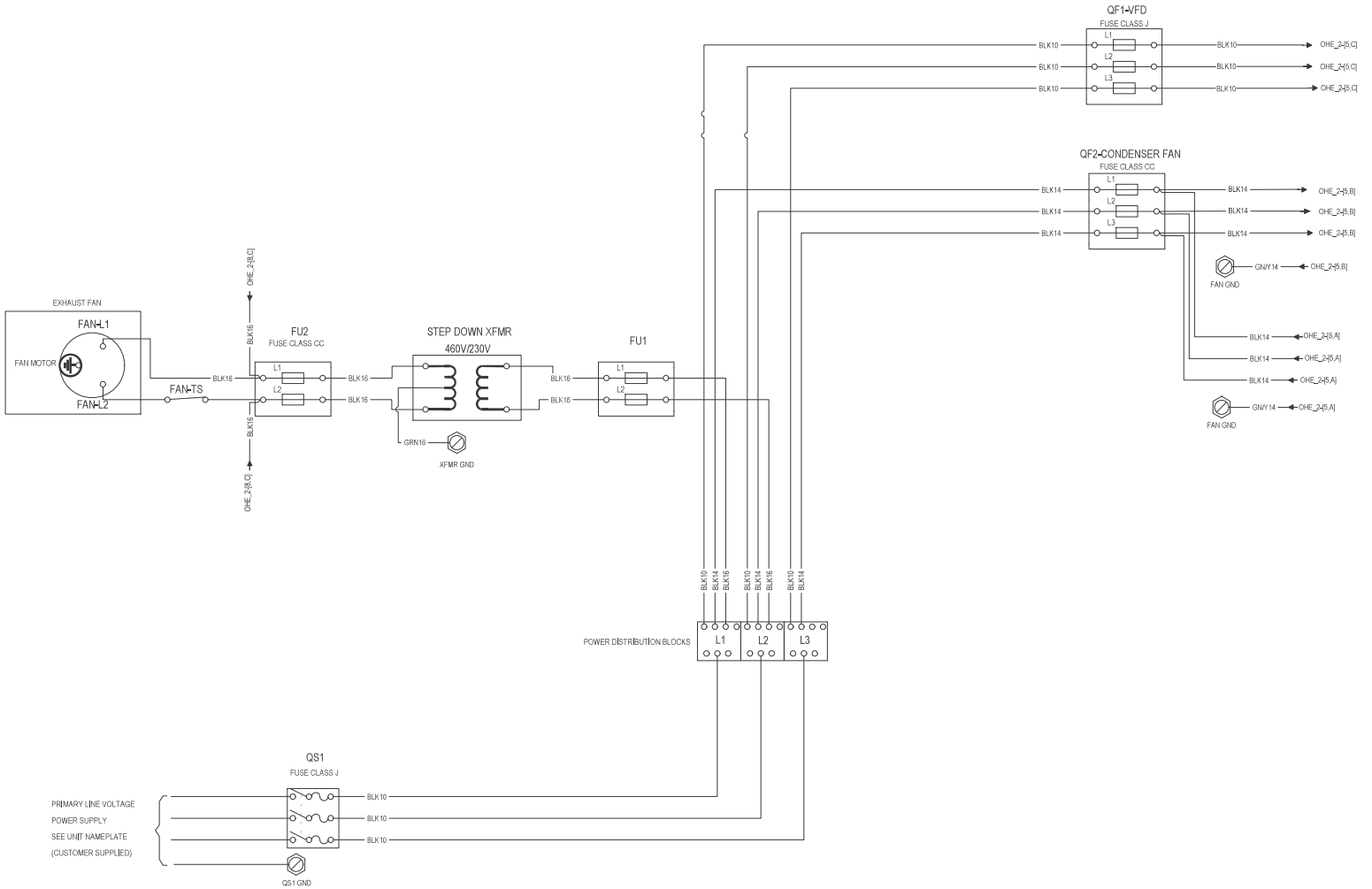
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		DATE
DRAWN	A. PATLAN	01/08/2026
CHECKED	A. TORRES	01/09/2026
ENGR	A. PATLAN	01/08/2026

OHE
208 / 230VAC - 3PH
50/60 HZ
15kW
WIRING DIAGRAM
SINGLE POWER SUPPLY
2 OF 2
*

DRAWING NO: 10068508P9
REV: C



NOTES:

1.- ALL FIELD WIRING TO BE PER LOCAL CODES. USE COPPER CONDUCTORS ONLY.

2.- SEE INTALLATION AND USER MANUAL(S).

3.- CONTACT CAPACITY: 250VAC/30VDC 5A.

4.- ETHERNET STRAIGHT THROUGH CABLE.

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6.- FOR SPECIFIC COMPONENT PART NUMBERS, REFER TO RESPECTIVE UNIT'S BOM.

7.- HARNESS BUILT IN THE ATS, MAKE CONNECTION PER DRAWING.

CIRCUIT BOARD PLUG AND TERMINAL ASSIGNMENTS

COMPRESSOR INVERTER

CN2 TERMINAL BLOCK

+24 - PRESSURE TRANSDUCER POWER SUPPLY
AI1 - PRESSURE TRANSDUCER ANALOG INPUT
AI2 - DISCHARGE TEMPERATURE SENSOR
AO1 - FAN SIGNAL ANALOG OUTPUT
GND - INVERTER SIGNAL GROUND

J14 TERMINAL BLOCK

+24 - STO POWER SUPPLY
STO1 - SAFE TORQUE OFF 1
STO2 - SAFE TORQUE OFF 2
COM - STO COMMON

MODBUS COMMUNICATION BOARD

RS485+ - RS485A
RS485- - RS485B

POWER CONNECTION

INV R - L1 POWER SUPPLY
INV S - L2 POWER SUPPLY
INV T - L3 POWER SUPPLY
INV GND - GROUND
U - COMPRESSOR POWER SUPPLY L1
V - COMPRESSOR POWER SUPPLY L2
W - COMPRESSOR POWER SUPPLY L3

NOMENCLATURE

LINE	STANDARD DEVICES		
7A	QS1 - PRIMARY POWER SUPPLY	4D	QF1 - VFD FUSE BLOCK
6C	FU1 - XFMR FUSE	4C	QF2 - CONDENSER FAN FUSE BLOCK
6C	T1 - XFMR 460/230V		
7C	FU2 - EXHAUST FAN FUSE		
8C	FAN-TS - EXHAUST FAN THERMOSTAT		

FACTORY SUPPLIED LINE VOLTAGE
FIELD INSTALLED LINE VOLTAGE WIRING
OPTIONAL LINE VOLTAGE WIRING
FACTORY SUPPLIED 24 VOLT NEC CLASS 2 WIRING
RELAY INTERNAL CIRCUIT
OPTIONAL 24 VOLT WIRING
FIELD SUPPLIED 24V NEC CLASS 2 WIRING
FIELD SUPPLIED EARTH GROUNDING WIRE
PIGTAIL LEADS 24VOLT WIRING
TERMINAL STRIP CONNECTION
GROUNDING LUG CONNECTION
COMPONENT PLUG CONNECTION

WIRE COLOUR CODE

ORN - ORANGE	PPR - PURPLE	BLU - BLUE
RED - RED	GRN - GREEN	BLK - BLACK
BRN - BROWN	Y - YELLOW	WHT - WHITE

1050 DEARBORN DRIVE, P.O. BOX 29186
COLUMBUS, OHIO 43229
CAGE CODE
1EDC2

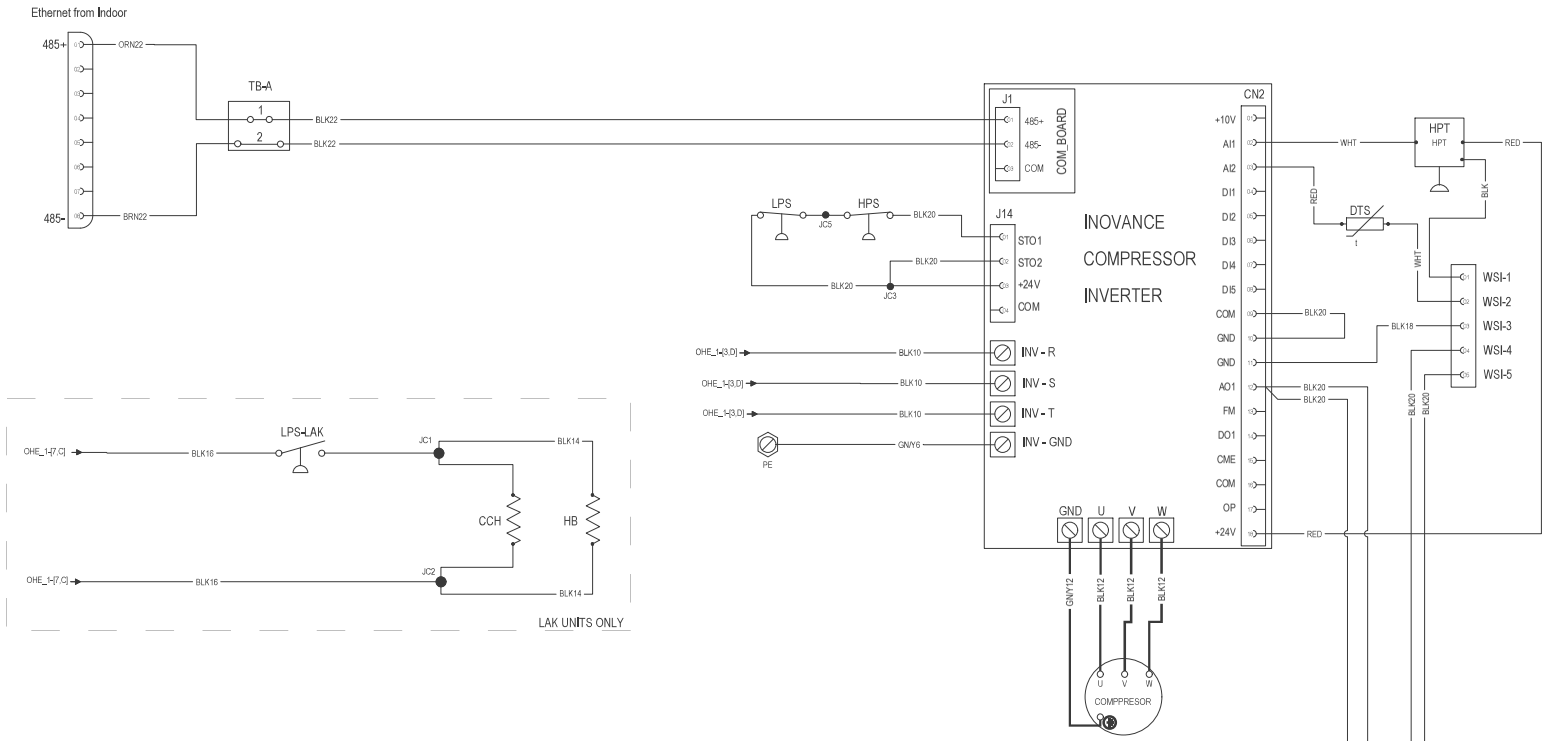
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DRAWN	A. PATLAN	DATE 01/08/2026
CHECKED	A. TORRES	DATE 01/08/2026
ENGR	A. PATLAN	DATE 01/08/2026

VERTIV.

OHE
460 VAC - 3PH
15kW
WIRING DIAGRAM
50/60 HZ
SINGLE POWER SUPPLY
1 OF 2
*

DRAWING NO 10068508P10 REV B



NOTES:

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CIRCUIT BOARD PLUG AND TERMINAL ASSIGNMENTS

COMPRESSOR INVERTER

CN2 TERMINAL BLOCK

+24 - PRESSURE TRANSDUCER POWER SUPPLY
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AO1 - FAN SIGNAL ANALOG OUTPUT
GND - INVERTER SIGNAL GROUND

J14 TERMINAL BLOCK

+24 - STO POWER SUPPLY
STO1 - SAFE TORQUE OFF 1
STO2 - SAFE TORQUE OFF 2
COM - STO COMMON

MODBUS COMMUNICATION BOARD

RS485+ - RS485A
RS485- - RS485B

POWER CONNECTION

INV R - L1 POWER SUPPLY
INV S - L2 POWER SUPPLY
INV T - L3 POWER SUPPLY
INV GND - GROUND
U - COMPRESSOR POWER SUPPLY L1
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NOMENCLATURE

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3D	HPT - HIGH PRESSURE TRANSDUCER		
3D	WS1 - WIRE SPLICER 1		
5D	JC3 - JOINT CONNECTOR 3		
3C	JC4 - JOINT CONNECTOR 5		

FACTORY SUPPLIED LINE VOLTAGE
FIELD INSTALLED LINE VOLTAGE WIRING
OPTIONAL LINE VOLTAGE WIRING
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RELAY INTERNAL CIRCUIT
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PIGTAIL LEADS 24VOLT WIRING
TERMINAL STRIP CONNECTION
GROUNDING LUG CONNECTION
COMPONENT PLUG CONNECTION

WIRE COLOUR CODE

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1050 DEARBORN DRIVE, P.O. BOX 29186
COLUMBUS, OHIO 43229
CAGE CODE
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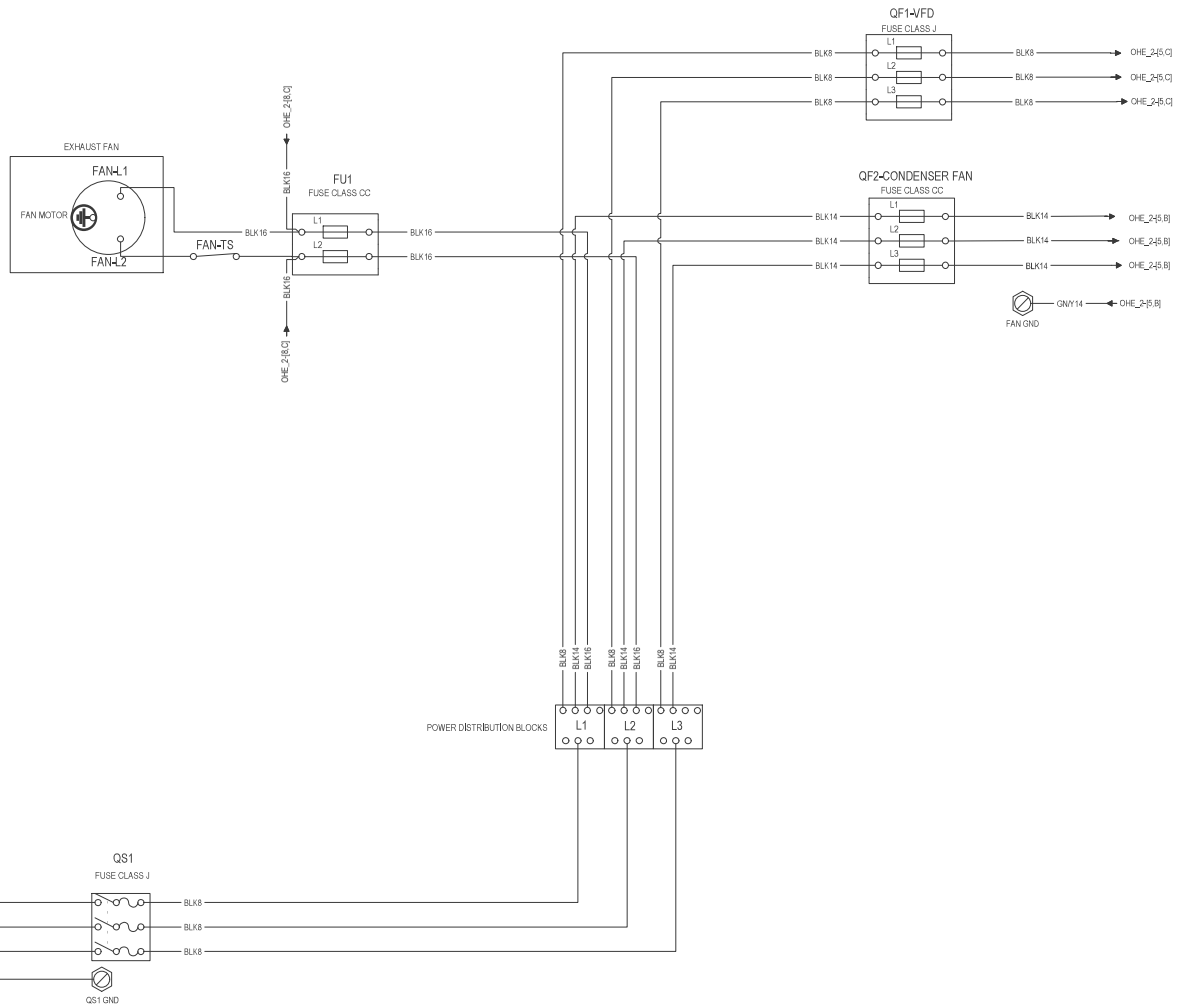
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DRAWN	A. PATLAN	DATE 01/08/2026
CHECKED	A. TORRES	DATE 01/09/2026
ENGR	A. PATLAN	DATE 01/08/2026

VERTIV.

OHE
460 VAC - 3PH
50/60 HZ
15kW
WIRING DIAGRAM
SINGLE POWER SUPPLY
2 OF 2
*

DRAWING NO 10068508P10
REV B



NOTES:

1.- ALL FIELD WIRING TO BE PER LOCAL CODES. USE COPPER CONDUCTORS ONLY.

2.- SEE INTALLATION AND USER MANUAL(S).

3.- CONTACT CAPACITY: 250VAC/30VDC 5A.

4.- ETHERNET STRAIGHT THROUGH CABLE.

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CIRCUIT BOARD PLUG AND TERMINAL ASSIGNMENTS

COMPRESSOR INVERTER

CN2 TERMINAL BLOCK

+24 - PRESSURE TRANSDUCER POWER SUPPLY
AI1 - PRESSURE TRANSDUCER ANALOG INPUT
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GND - INVERTER SIGNAL GROUND

J14 TERMINAL BLOCK

+24 - STO POWER SUPPLY
STO1 - SAFE TORQUE OFF 1
STO2 - SAFE TORQUE OFF 2
COM - STO COMMON

MODBUS COMMUNICATION BOARD

RS485+ - RS485A
RS485- - RS485B

POWER CONNECTION

INV R - L1 POWER SUPPLY
INV S - L2 POWER SUPPLY
INV T - L3 POWER SUPPLY
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NOMENCLATURE

LINE	STANDARD DEVICES		
7A	QS1 - PRIMARY POWER SUPPLY	4D	QF1 - VFD FUSE BLOCK
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FACTORY SUPPLIED LINE VOLTAGE
FIELD INSTALLED LINE VOLTAGE WIRING
OPTIONAL LINE VOLTAGE WIRING
FACTORY SUPPLIED 24 VOLT NEC CLASS 2 WIRING
RELAY INTERNAL CIRCUIT
OPTIONAL 24 VOLT WIRING
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FIELD SUPPLIED EARTH GROUNDING WIRE
PIGTAIL LEADS 24VOLT WIRING
TERMINAL STRIP CONNECTION
GROUNDING LUG CONNECTION
COMPONENT PLUG CONNECTION

WIRE COLOUR CODE

ORN - ORANGE	PPR - PURPLE	BLU - BLUE
RED - RED	GRN - GREEN	BLK - BLACK
BRN - BROWN	Y - YELLOW	WHT - WHITE

VERTIV.

1050 DEARBORN DRIVE, P.O. BOX 29186
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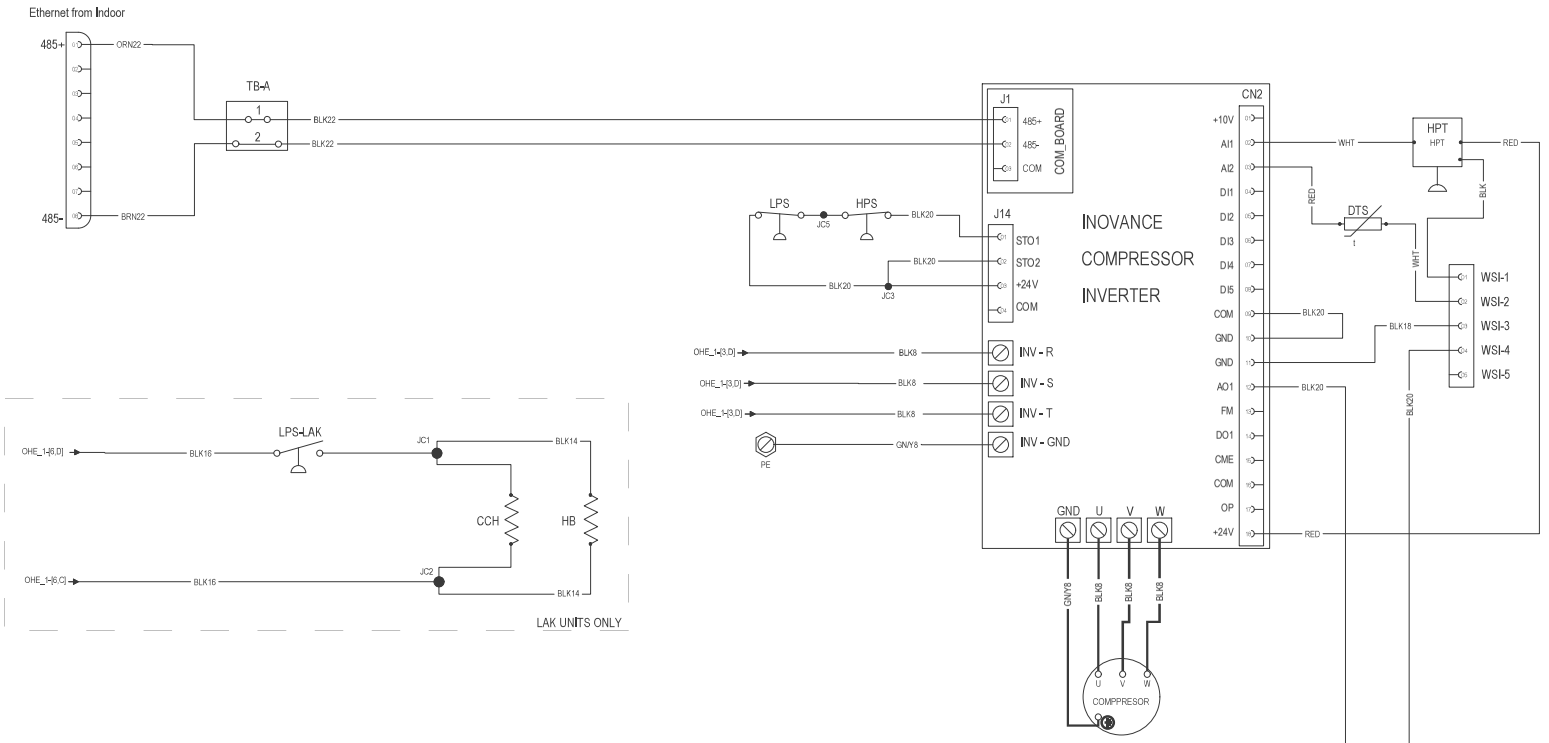
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DRAWN	A. PATLAN	DATE 01/08/2026
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ENGR	A. PATLAN	DATE 01/08/2026

OHE
208 / 230VAC - 3PH
21kW
WIRING DIAGRAM
50/60 HZ
SINGLE POWER SUPPLY
1 OF 2
*

DRAWING NO 10068508P11
REV B



NOTES:

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CIRCUIT BOARD PLUG AND TERMINAL ASSIGNMENTS

COMPRESSOR INVERTER

CN2 TERMINAL BLOCK

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J14 TERMINAL BLOCK

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STO1 - SAFE TORQUE OFF 1
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MODBUS COMMUNICATION BOARD

RS485+ - RS485A
RS485- - RS485B

POWER CONNECTION

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NOMENCLATURE

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3D	WS1 - WIRE SPLICER 1		
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FACTORY SUPPLIED LINE VOLTAGE
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GROUNDING LUG CONNECTION
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WIRE COLOUR CODE

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1050 DEARBORN DRIVE, P.O. BOX 29186
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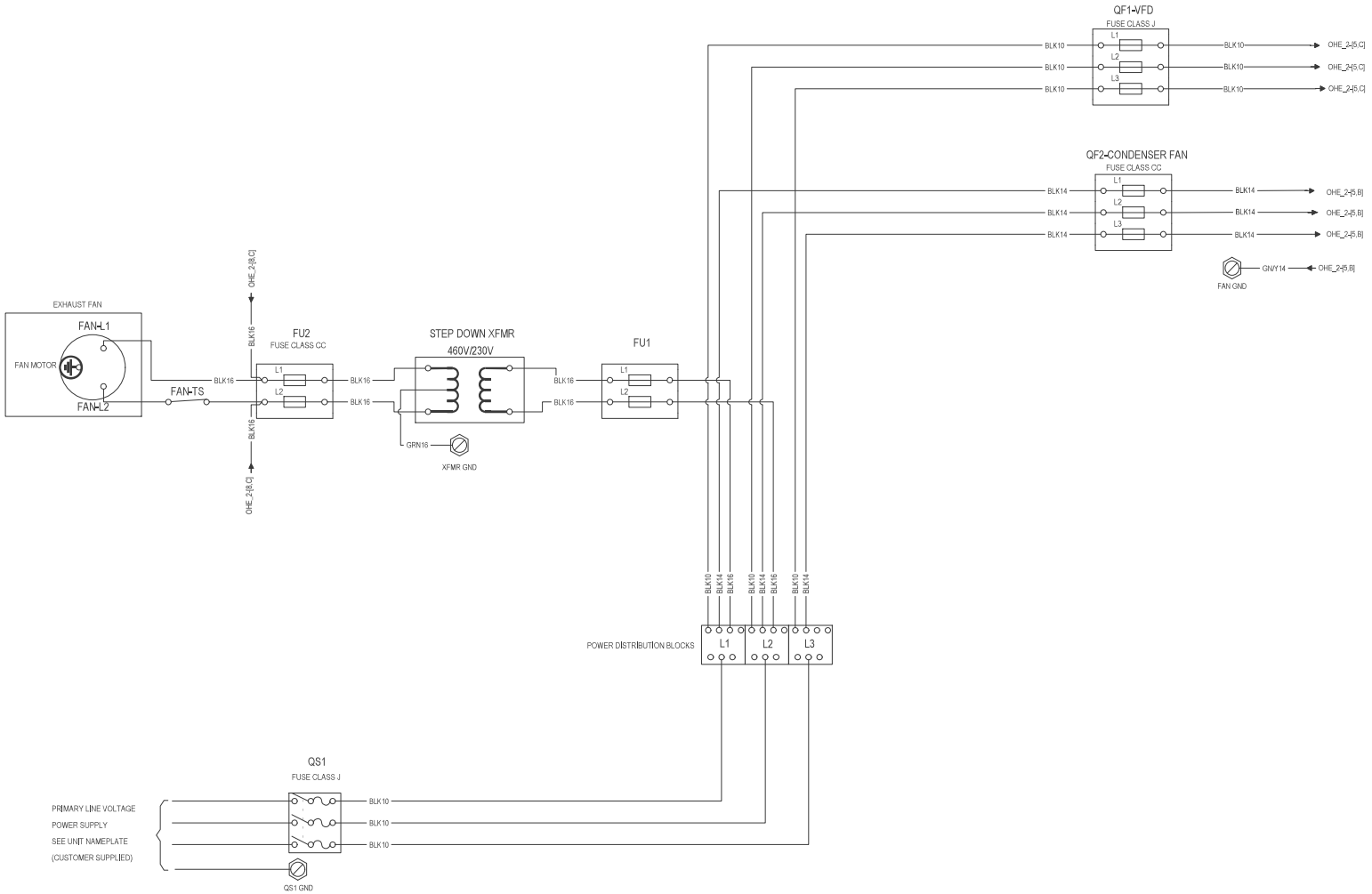
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ENGR	A. PATLAN	DATE 01/08/2026

VERTIV.

OHE
208 / 230VAC - 3PH
50/60 HZ
21kW
WIRING DIAGRAM
SINGLE POWER SUPPLY
2 OF 2
*

DRAWING NO 10068508P11 REV B



NOTES:

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CIRCUIT BOARD PLUG AND TERMINAL ASSIGNMENTS

COMPRESSOR INVERTER

CN2 TERMINAL BLOCK

+24 - PRESSURE TRANSDUCER POWER SUPPLY
AI1 - PRESSURE TRANSDUCER ANALOG INPUT
AI2 - DISCHARGE TEMPERATURE SENSOR
AO1 - FAN SIGNAL ANALOG OUTPUT
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J14 TERMINAL BLOCK

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STO1 - SAFE TORQUE OFF 1
STO2 - SAFE TORQUE OFF 2
COM - STO COMMON

MODBUS COMMUNICATION BOARD

RS485+ - RS485A
RS485- - RS485B

POWER CONNECTION

INV R - L1 POWER SUPPLY
INV S - L2 POWER SUPPLY
INV T - L3 POWER SUPPLY
INV GND - GROUND
U - COMPRESSOR POWER SUPPLY L1
V - COMPRESSOR POWER SUPPLY L2
W - COMPRESSOR POWER SUPPLY L3

NOMENCLATURE

LINE	STANDARD DEVICES		
7A	QS1 - PRIMARY POWER SUPPLY	4D	QF1 - VFD FUSE BLOCK
6C	FU1 - XFMR FUSE	4C	QF2 - CONDENSER FAN FUSE BLOCK
6C	T1 - XFMR 460/230V		
7C	FU2 - EXHAUST FAN FUSE		
8C	FAN-TS - EXHAUST FAN THERMOSTAT		

FACTORY SUPPLIED LINE VOLTAGE
FIELD INSTALLED LINE VOLTAGE WIRING
OPTIONAL LINE VOLTAGE WIRING
FACTORY SUPPLIED 24 VOLT NEC CLASS 2 WIRING
RELAY INTERNAL CIRCUIT
OPTIONAL 24 VOLT WIRING
FIELD SUPPLIED 24V NEC CLASS 2 WIRING
FIELD SUPPLIED EARTH GROUNDING WIRE
PIGTAIL LEADS 24VOLT WIRING
TERMINAL STRIP CONNECTION
GROUNDING LUG CONNECTION
COMPONENT PLUG CONNECTION

WIRE COLOUR CODE

ORN - ORANGE	PPR - PURPLE	BLU - BLUE
RED - RED	GRN - GREEN	BLK - BLACK
BRN - BROWN	Y - YELLOW	WHT - WHITE

VERTIV.

1050 DEARBORN DRIVE, P.O. BOX 29186
COLUMBUS, OHIO 43229

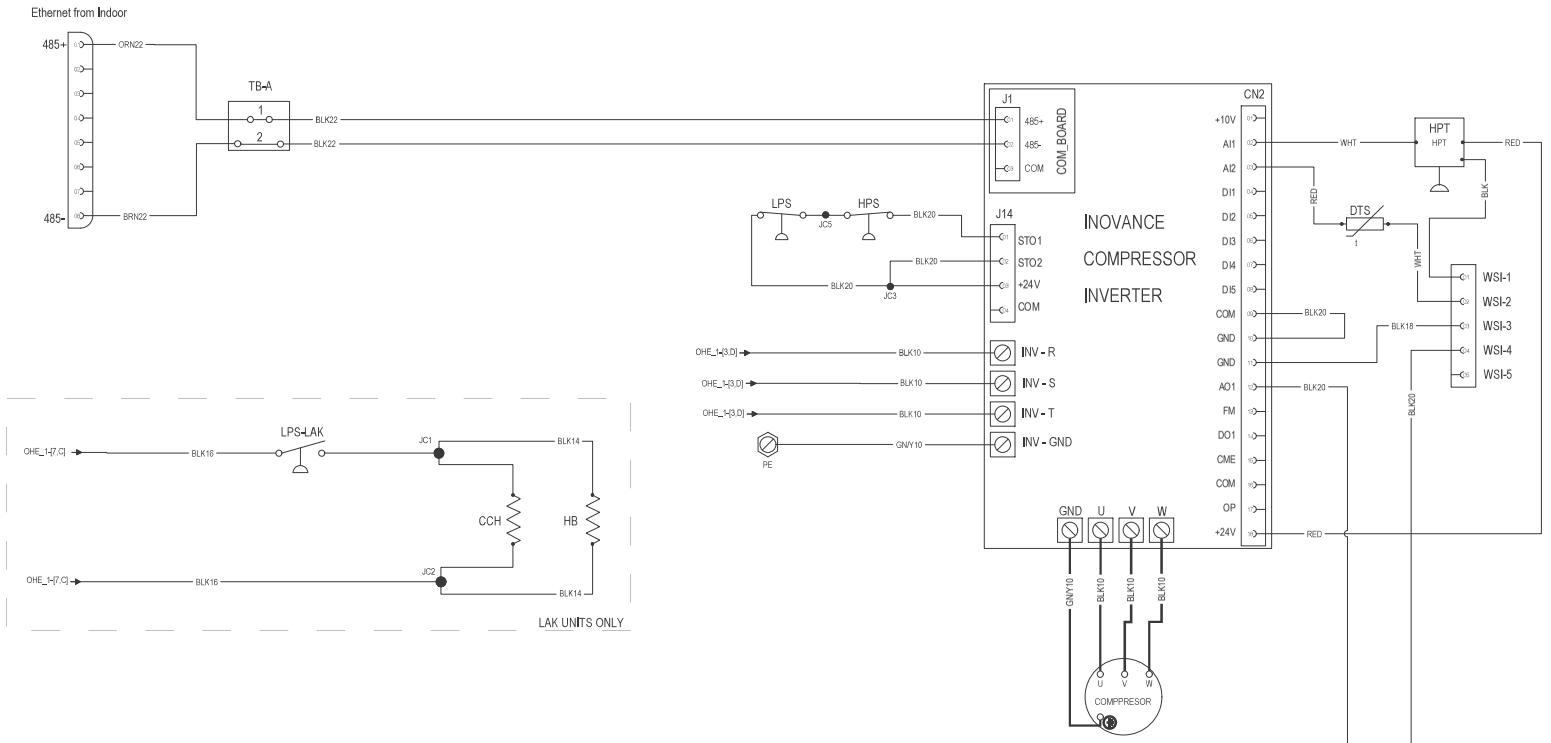
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DRAWN	A. PATLAN	DATE 01/08/2026
CHECKED	A. TORRES	DATE 01/08/2026
ENGR	A. PATLAN	DATE 01/08/2026

OHE
460 VAC - 3PH
21kW
WIRING DIAGRAM
50/60 HZ
SINGLE POWER SUPPLY
1 OF 2
*

DRAWING NO: 10068508P12
REV: B



NOTES:

1.- ALL FIELD WIRING TO BE PER LOCAL CODES. USE COPPER CONDUCTORS ONLY.

2.- SEE INSTALLATION AND USER MANUAL(S).

3.- CONTACT CAPACITY: 250VAC / 30VDC 5A.

4.- ETHERNET STRAIGHT THROUGH CABLE.

5.- WIRE SPLICE CONNECTORS ARE USED FOR ALL NODE CONNECTIONS (CONTROL).

6.- WIRE JOINT CONNECTOR ARE USED FOR THE LAK HEATER INTERCONNECTION

7.- THE TERMINAL BLOCK ON THE CONNECTION PANEL IS A DBL125 THAT HAS MULTIPLE INPUTS AND OUTPUTS

8.- FOR SPECIFIC COMPONENT PART NUMBERS, REFER TO RESPECTIVE UNIT'S BOM.

CIRCUIT BOARD PLUG AND TERMINAL ASSIGNMENTS

COMPRESSOR INVERTER

CN2 TERMINAL BLOCK

+24 - PRESSURE TRANSDUCER POWER SUPPLY
AI1 - PRESSURE TRANSDUCER ANALOG INPUT
AI2 - DISCHARGE TEMPERATURE SENSOR
AO1 - FAN SIGNAL ANALOG OUTPUT
GND - INVERTER SIGNAL GROUND

J14 TERMINAL BLOCK

+24 - STO POWER SUPPLY
STO1 - SAFE TORQUE OFF 1
STO2 - SAFE TORQUE OFF 2
COM - STO COMMON

MODBUS COMMUNICATION BOARD

RS485+ - RS485A
RS485- - RS485B

POWER CONNECTION

INV R - L1 POWER SUPPLY
INV S - L2 POWER SUPPLY
INV T - L3 POWER SUPPLY
INV GND - GROUND
U - COMPRESSOR POWER SUPPLY L1
V - COMPRESSOR POWER SUPPLY L2
W - COMPRESSOR POWER SUPPLY L3

NOMENCLATURE

LINE	STANDARD DEVICES	LINE	OPTIONAL DEVICES
3D	DTS - DISCHARGE TEMPERATURE SENSOR	6C	CCH - CRANKCASE HEATER
5D	HPS - HIGH PRESSURE SWITCH	6C	HB - HEATING BELT
5D	LPS - LOW PRESSURE SWITCH	7C	LPS LAK - LOW PRESSURE SWITCH
3D	HPT - HIGH PRESSURE TRANSDUCER		
3D	WS1 - WIRE SPLICER 1		
5D	JC3 - JOINT CONNECTOR 3		
3C	JC4 - JOINT CONNECTOR 5		

FACTORY SUPPLIED LINE VOLTAGE
FIELD INSTALLED LINE VOLTAGE WIRING
OPTIONAL LINE VOLTAGE WIRING
FACTORY SUPPLIED 24 VOLT NEC CLASS 2 WIRING
RELAY INTERNAL CIRCUIT
OPTIONAL 24 VOLT WIRING
FIELD SUPPLIED 24V NEC CLASS 2 WIRING
FIELD SUPPLIED EARTH GROUNDING WIRE
PIGTAIL LEADS 24VOLT WIRING
TERMINAL STRIP CONNECTION
GROUNDING LUG CONNECTION
COMPONENT PLUG CONNECTION

WIRE COLOUR CODE

ORN - ORANGE	PPR - PURPLE	BLU - BLUE
RED - RED	GRN - GREEN	BLK - BLACK
BRN - BROWN	Y - YELLOW	WHT - WHITE

1050 DEARBORN DRIVE, P.O. BOX 29186
COLUMBUS, OHIO 43229
CAGE CODE
1EDC2

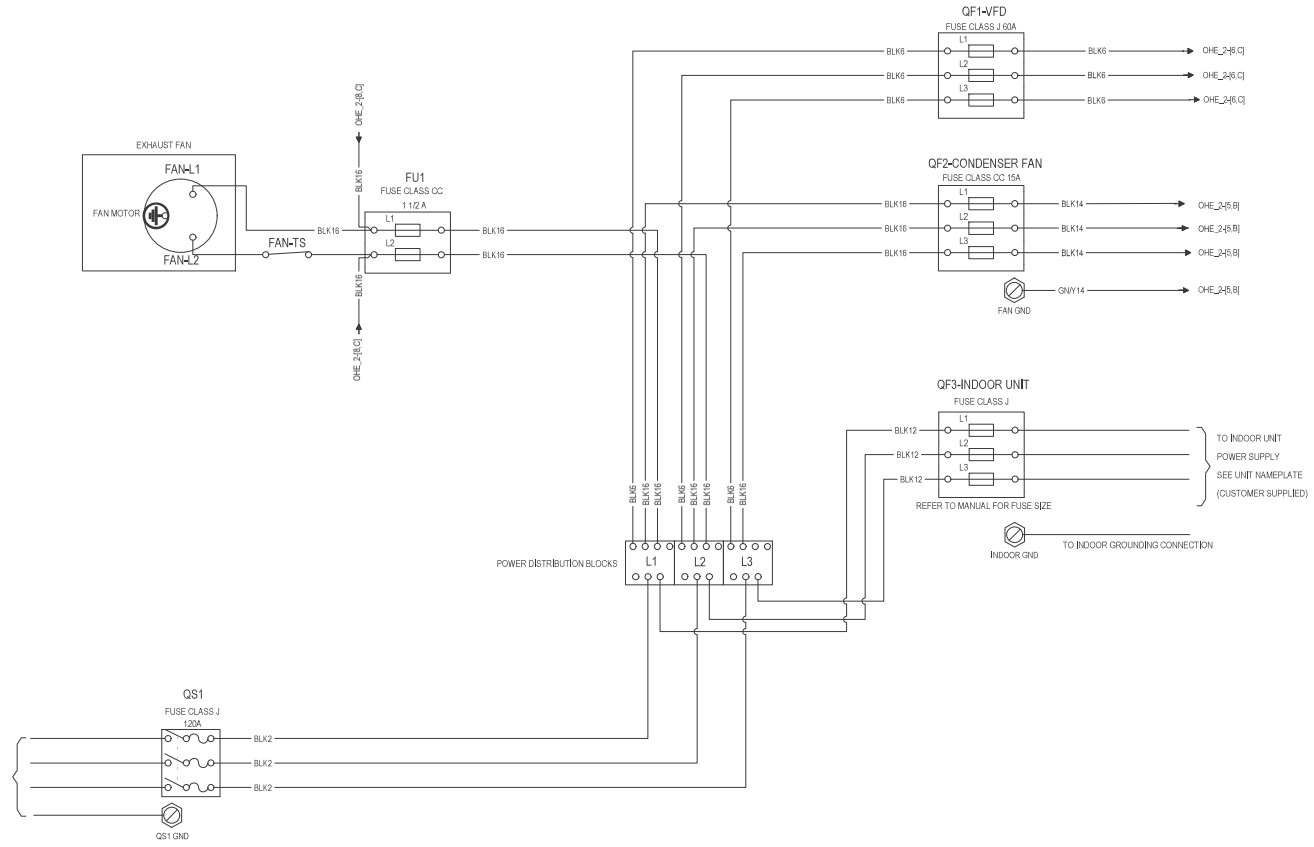
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DRAWN	A. PATLAN	DATE 01/08/2026
CHECKED	A. TORRES	DATE 01/09/2026
ENGR	A. PATLAN	DATE 01/08/2026

VERTIV.

OHE
460 VAC - 3PH
50/60 HZ
21kW
WIRING DIAGRAM
SINGLE POWER SUPPLY
2 OF 2
*

DRAWING NO 10068508P12
REV B



NOTES:

1.- ALL FIELD WIRING TO BE PER LOCAL CODES. USE COPPER CONDUCTORS ONLY.

2.- SEE INTALLATION AND USER MANUAL(S).

3.- CONTACT CAPACITY: 250VAC/30VDC 5A.

4.- ETHERNET STRAIGHT THROUGH CABLE.

5.- WIRE SPLICE CONNECTORS ARE USED FOR ALL NODE CONNECTIONS(CONTROL).

6.- FOR SPECIFIC COMPONENT PART NUMBERS, REFER TO RESPECTIVE UNIT'S BOM.

7.- HARNESS BUILT IN THE ATS, MAKE CONNECTION PER DRAWING.

CIRCUIT BOARD PLUG AND TERMINAL ASSIGNMENTS

COMPRESSOR INVERTER

CN2 TERMINAL BLOCK

+24 - PRESSURE TRANSDUCER POWER SUPPLY
AI1 - PRESSURE TRANSDUCER ANALOG INPUT
AI2 - DISCHARGE TEMPERATURE SENSOR
AO1 - FAN SIGNAL ANALOG OUTPUT
GND - INVERTER SIGNAL GROUND

J14 TERMINAL BLOCK

+24 - STO POWER SUPPLY
STO1 - SAFE TORQUE OFF 1
STO2 - SAFE TORQUE OFF 2
COM - STO COMMON

MODBUS COMMUNICATION BOARD

RS485+ - RS485A
RS485- - RS485B

POWER CONNECTION

INV R - L1 POWER SUPPLY
INV S - L2 POWER SUPPLY
INV T - L3 POWER SUPPLY
INV GND - GROUND
U - COMPRESSOR POWER SUPPLY L1
V - COMPRESSOR POWER SUPPLY L2
W - COMPRESSOR POWER SUPPLY L3

NOMENCLATURE

LINE	STANDARD DEVICES		
7A	QS1 - PRIMARY POWER SUPPLY	4D	QF1 - VFD FUSE BLOCK
3A	QS2 - SECONDARY POWER SUPPLY	4C	QF2 - CONDENSER FAN FUSE BLOCK
7A	ATS - AUTOMATIC TRANSFER SWITCH	4B	QF3 - INDOOR UNIT FUSE BLOCK
6C	FU1 - EXHAUST FAN FUSE		
7C	FAN-TS - EXHAUST FAN THERMOSTAT		

FACTORY SUPPLIED LINE VOLTAGE
FIELD INSTALLED LINE VOLTAGE WIRING
OPTIONAL LINE VOLTAGE WIRING
FACTORY SUPPLIED 24 VOLT NEC CLASS 2 WIRING
RELAY INTERNAL CIRCUIT
OPTIONAL 24 VOLT WIRING
FIELD SUPPLIED 24V NEC CLASS 2 WIRING
FIELD SUPPLIED EARTH GROUNDING WIRE
PIGTAIL LEADS 24VOLT WIRING
TERMINAL STRIP CONNECTION
GROUNDING LUG CONNECTION
COMPONENT PLUG CONNECTION

WIRE COLOUR CODE

ORN - ORANGE	PPR - PURPLE	BLU - BLUE
RED - RED	GRN - GREEN	BLK - BLACK
BRN - BROWN	Y - YELLOW	WHT - WHITE

VERTIV.

1050 DEARBORN DRIVE, P.O. BOX 29186
COLUMBUS, OHIO 43229

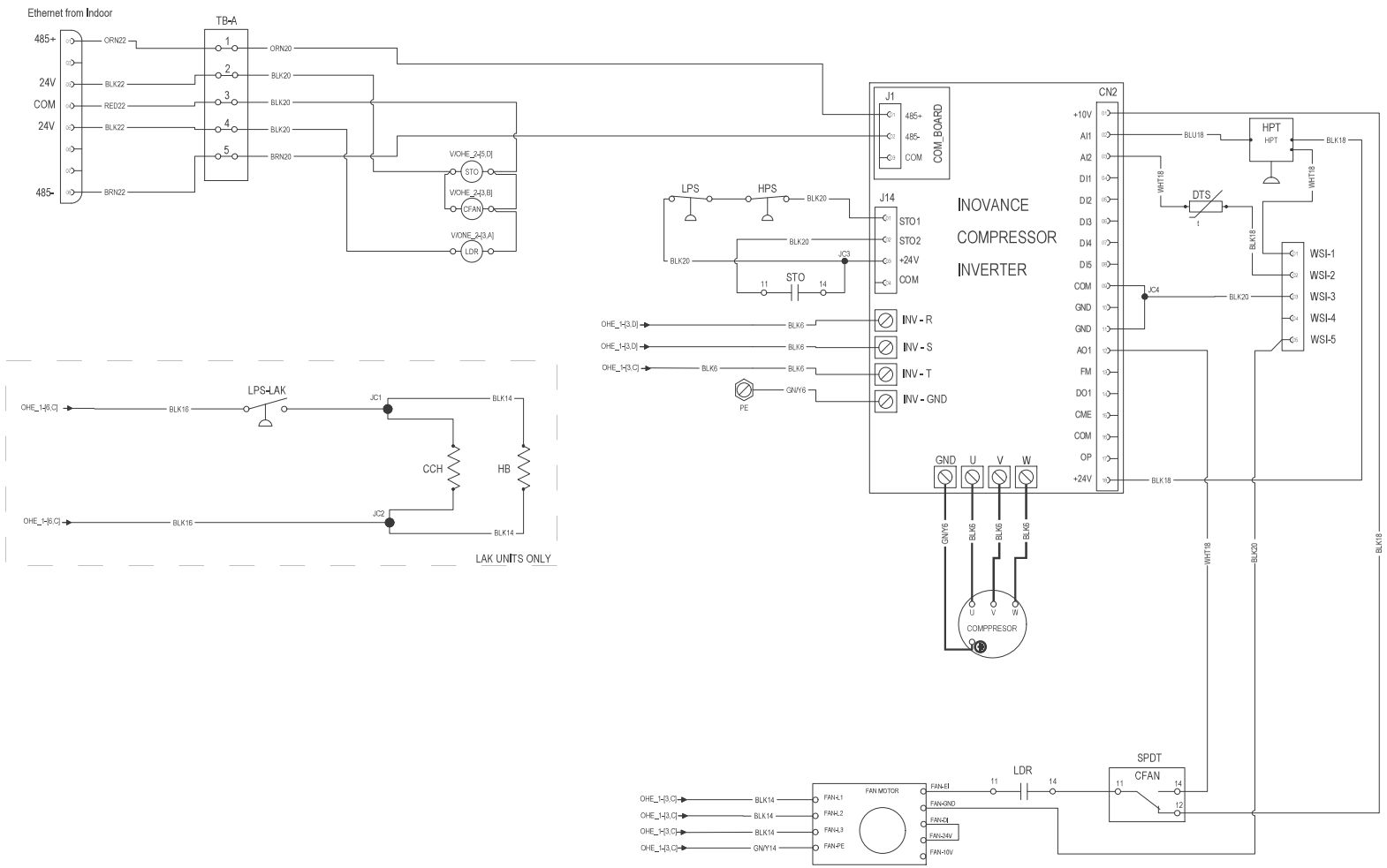
CAGE CODE
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		DATE
DRAWN	A. PATLAN	10/22/2025
CHECKED	A. TORRES	10/29/2025
ENGR	A. TORRES	10/22/2025

OHE
230VAC - 3PH
28kW
WIRING DIAGRAM
50/60 HZ
SINGLE POWER SUPPLY
1 OF 2
*

DRAWING NO: 10068508P1
REV: C



NOTES:

1.- ALL FIELD WIRING TO BE PER LOCAL CODES. USE COPPER CONDUCTORS ONLY.

2.- SEE INSTALLATION AND USER MANUAL(S).

3.- CONTACT CAPACITY: 250VAC / 30VDC 5A.

4.- ETHERNET STRAIGHT THROUGH CABLE.

5.- WIRE SPLICE CONNECTORS ARE USED FOR ALL NODE CONNECTIONS (CONTROL).

6.- WIRE JOINT CONNECTOR ARE USED FOR THE LAK HEATER INTERCONNECTION

7.- THE TERMINAL BLOCK ON THE CONNECTION PANEL IS A DBL125 THAT HAS MULTIPLE INPUTS AND OUTPUTS

8.- FOR SPECIFIC COMPONENT PART NUMBERS, REFER TO RESPECTIVE UNIT'S BOM.

CIRCUIT BOARD PLUG AND TERMINAL ASSIGNMENTS

COMPRESSOR INVERTER

CN2 TERMINAL BLOCK

+24 - PRESSURE TRANSDUCER POWER SUPPLY
AI1 - PRESSURE TRANSDUCER ANALOG INPUT
AI2 - DISCHARGE TEMPERATURE SENSOR
AO1 - FAN SIGNAL ANALOG OUTPUT
GND - INVERTER SIGNAL GROUND

J14 TERMINAL BLOCK

+24 - STO POWER SUPPLY
ST01 - SAFE TORQUE OFF 1
ST02 - SAFE TORQUE OFF 2
COM - STO COMMON

MODBUS COMMUNICATION BOARD

RS485+ - RS485A
RS485- - RS485B

POWER CONNECTION

INV R - L1 POWER SUPPLY
INV S - L2 POWER SUPPLY
INV T - L3 POWER SUPPLY
INV GND - GROUND
U - COMPRESSOR POWER SUPPLY L1
V - COMPRESSOR POWER SUPPLY L2
W - COMPRESSOR POWER SUPPLY L3

NOMENCLATURE

LINE	STANDARD DEVICES	LINE	OPTIONAL DEVICES
3D	DTS - DISCHARGE TEMPERATURE SENSOR	6C	CCH - CRANKCASE HEATER
5D	HPS - HIGH PRESSURE SWITCH	6C	HB - HEATING BELT
5D	LPS - LOW PRESSURE SWITCH	7C	LPS LAK - LOW PRESSURE SWITCH
3D	HPT - HIGH PRESSURE TRANSDUCER		
3D	WS1 - WIRE SPLICER 1		
7C	JC1 - JOINT CONNECTOR 1		
7C	JC2 - JOINT CONNECTOR 2		
5D	JC3 - JOINT CONNECTOR 3		
3C	JC4 - JOINT CONNECTOR 4		
3B	CFAN - FAN RELAY		
3A	LDR - LEAK DETECTION ROUTINE RELAY		
5C	STO - SAFETY TORQUE OFF RELAY		

FACTORY SUPPLIED LINE VOLTAGE
FIELD INSTALLED LINE VOLTAGE WIRING
OPTIONAL LINE VOLTAGE WIRING
FACTORY SUPPLIED 24 VOLT NEC CLASS 2 WIRING
RELAY INTERNAL CIRCUIT
OPTIONAL 24 VOLT WIRING
FIELD SUPPLIED 24V NEC CLASS 2 WIRING
FIELD SUPPLIED EARTH GROUNDING WIRE
PIGTAIL LEADS 24VOLT WIRING
TERMINAL STRIP CONNECTION
GROUNDING LUG CONNECTION
COMPONENT PLUG CONNECTION

WIRE COLOUR CODE

ORN - ORANGE	PPR - PURPLE	BLU - BLUE
RED - RED	GRN - GREEN	BLK - BLACK
BRN - BROWN	Y - YELLOW	WHT - WHITE

1050 DEARBORN DRIVE, P.O. BOX 29186
COLUMBUS, OHIO 43229
CAGE CODE
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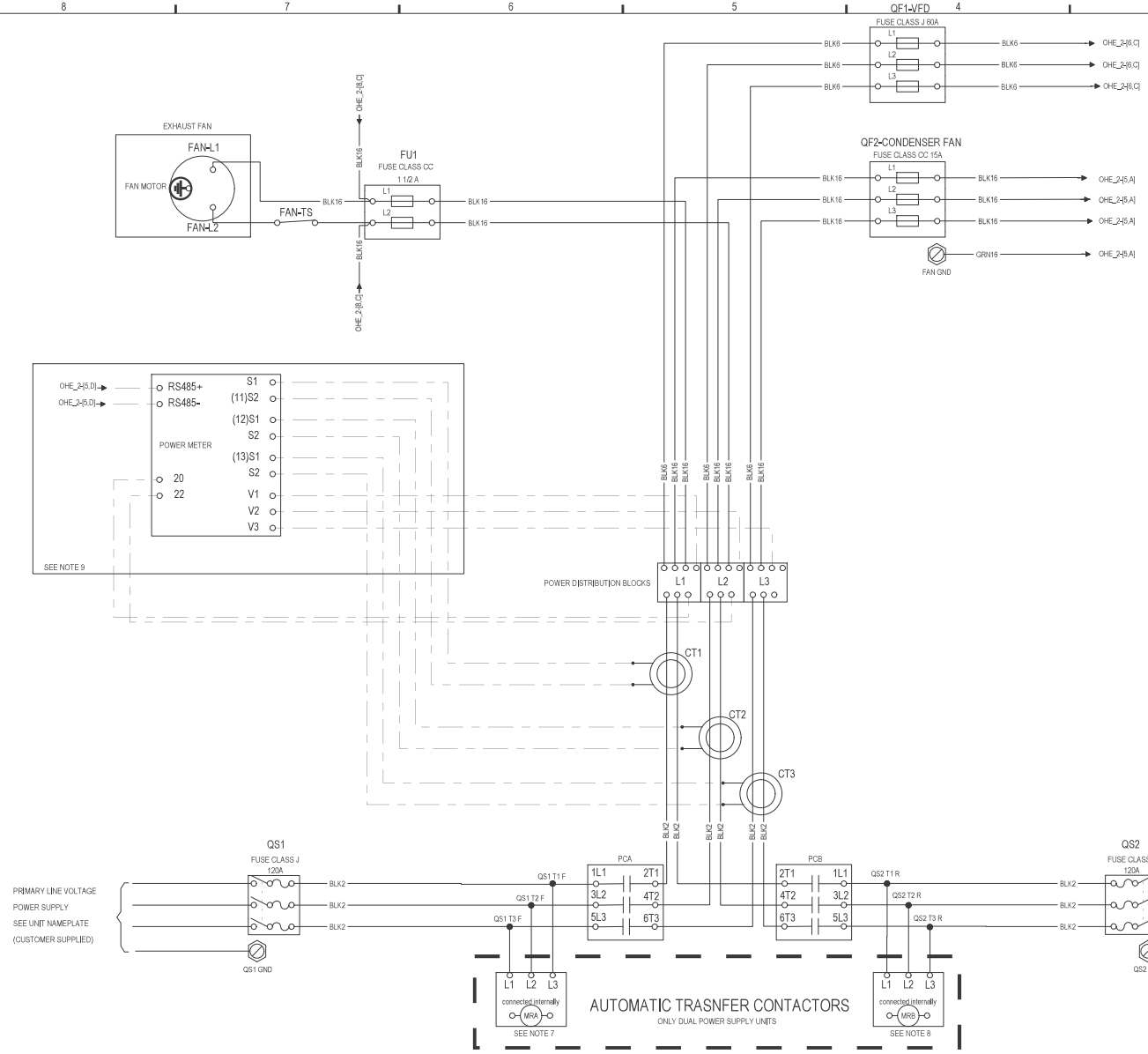
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DRAWN	A. PATLAN	DATE 10/22/2025
CHECKED	A. TORRES	DATE 10/29/2025
ENGR	A. TORRES	DATE 10/22/2025

VERTIV.

OHE
230VAC - 3PH
50/60 HZ
28kW
WIRING DIAGRAM
SINGLE POWER SUPPLY
2 OF 2
*

DRAWING NO 10068508P1
REV C



NOTES:

1.- ALL FIELD WIRING TO BE PER LOCAL CODES. USE COPPER CONDUCTORS ONLY.

2.- SEE INTALLATION AND USER MANUAL(S).

3.- CONTACT CAPACITY: 250VAC/30VDC 5A.

4.- ETHERNET STRAIGHT THROUGH CABLE.

5.- WIRE SPLICE CONNECTORS ARE USED FOR ALL NODE CONNECTIONS(CONTROL).

6.- FOR SPECIFIC COMPONENT PART NUMBERS, REFER TO RESPECTIVE UNIT'S BOM.

7.- DELAY CONFIGURATION FOR MRA SHOULD BE 1 SEC

8.- DELAY CONFIGURATION FOR MRB SHOULD BE 2 SEC

CIRCUIT BOARD PLUG AND TERMINAL ASSIGNMENTS

COMPRESSOR INVERTER

CN2 TERMINAL BLOCK

+24 - PRESSURE TRANSDUCER POWER SUPPLY
AI1 - PRESSURE TRANSDUCER ANALOG INPUT
AI2 - DISCHARGE TEMPERATURE SENSOR
AO1 - FAN SIGNAL ANALOG OUTPUT
GND - INVERTER SIGNAL GROUND

J14 TERMINAL BLOCK

+24 - STO POWER SUPPLY
STO1 - SAFE TORQUE OFF 1
STO2 - SAFE TORQUE OFF 2
COM - STO COMMON

MODBUS COMMUNICATION BOARD

RS485+ - RS485A
RS485- - RS485B

POWER CONNECTION

INV R - L1 POWER SUPPLY
INV S - L2 POWER SUPPLY
INV T - L3 POWER SUPPLY
INV GND - GROUND
U - COMPRESSOR POWER SUPPLY L1
V - COMPRESSOR POWER SUPPLY L2
W - COMPRESSOR POWER SUPPLY L3

NOMENCLATURE

LINE	STANDARD DEVICES		
7A	QS1 - PRIMARY POWER SUPPLY	4D	QF1 - VFD FUSE BLOCK
3A	QS2 - SECONDARY POWER SUPPLY	4C	QF2 - CONDENSER FAN FUSE BLOCK
6A	MRA - MONITORING VOLTAGE RELAY A	4B	QF3 - INDOOR UNIT FUSE BLOCK
4A	MRB - MONITORING VOLTAGE RELAY B	6C	FU1 - EXHAUST FAN FUSE
6A	PCA - POWER CONTACTOR A	7C	FAN-TS - EXHAUST FAN THERMOSTAT
5A	PCB - POWER CONTACTOR B		

FACTORY SUPPLIED LINE VOLTAGE
FIELD INSTALLED LINE VOLTAGE WIRING
OPTIONAL LINE VOLTAGE WIRING
FACTORY SUPPLIED 24 VOLT NEC CLASS 2 WIRING
RELAY INTERNAL CIRCUIT
OPTIONAL 24 VOLT WIRING
FIELD SUPPLIED 24V NEC CLASS 2 WIRING
FIELD SUPPLIED EARTH GROUNDING WIRE
PIGTAIL LEADS 24VOLT WIRING
TERMINAL STRIP CONNECTION
GROUNDING LUG CONNECTION
COMPONENT PLUG CONNECTION

WIRE COLOUR CODE

ORN - ORANGE	PPL - PURPLE	BLU - BLUE
RED - RED	GRN - GREEN	BLK - BLACK
BRN - BROWN	Y - YELLOW	WHT - WHITE

VERTIV.

1050 DEARBORN DRIVE, P.O. BOX 29186
COLUMBUS, OHIO 43229

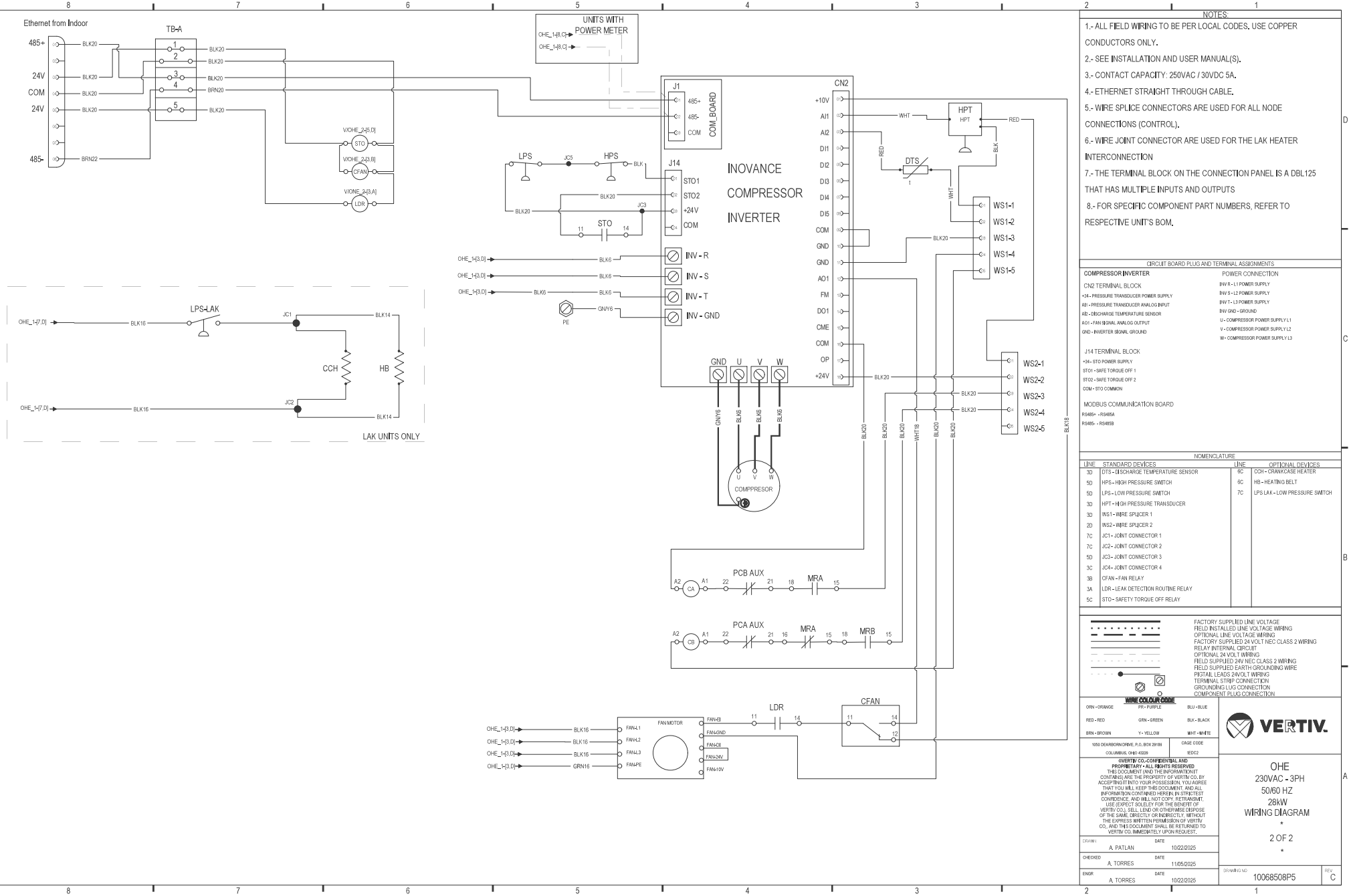
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DRAWN	A. PATLAN	DATE 10/22/2025
CHECKED	A. TORRES	DATE 11/05/2025
ENGR	A. TORRES	DATE 10/22/2025

OHE
230VAC - 3PH
28kW
WIRING DIAGRAM
50/60 HZ
*
1 OF 2
*

DRAWING NO 10068508P5
REV C



NOTES:

1.- ALL FIELD WIRING TO BE PER LOCAL CODES. USE COPPER CONDUCTORS ONLY.

2.- SEE INSTALLATION AND USER MANUAL(S).

3.- CONTACT CAPACITY: 250VAC / 30VDC 5A.

4.- ETHERNET STRAIGHT THROUGH CABLE.

5.- WIRE SPLICE CONNECTORS ARE USED FOR ALL NODE CONNECTIONS (CONTROL).

6.- WIRE JOINT CONNECTOR ARE USED FOR THE LAK HEATER INTERCONNECTION

7.- THE TERMINAL BLOCK ON THE CONNECTION PANEL IS A DBL125 THAT HAS MULTIPLE INPUTS AND OUTPUTS

8.- FOR SPECIFIC COMPONENT PART NUMBERS, REFER TO RESPECTIVE UNIT'S BOM.

CIRCUIT BOARD PLUG AND TERMINAL ASSIGNMENTS

COMPRESSOR INVERTER

CN2 TERMINAL BLOCK

+24 - PRESSURE TRANSDUCER POWER SUPPLY
AI1 - PRESSURE TRANSDUCER ANALOG INPUT
AI2 - DISCHARGE TEMPERATURE SENSOR
AO1 - FAN SIGNAL ANALOG OUTPUT
GND - INVERTER SIGNAL GROUND

J14 TERMINAL BLOCK

+24 - STO POWER SUPPLY
STO1 - SAFE TORQUE OFF 1
STO2 - SAFE TORQUE OFF 2
COM - STO COMMON

MODBUS COMMUNICATION BOARD

RS485+ - RS485A
RS485- - RS485B

POWER CONNECTION

INV R - L1 POWER SUPPLY
INV S - L2 POWER SUPPLY
INV T - L3 POWER SUPPLY
INV GND - GROUND
U - COMPRESSOR POWER SUPPLY L1
V - COMPRESSOR POWER SUPPLY L2
W - COMPRESSOR POWER SUPPLY L3

NOMENCLATURE

LINE	STANDARD DEVICES	LINE	OPTIONAL DEVICES
3D	DTS - DISCHARGE TEMPERATURE SENSOR	6C	CCH - CRANKCASE HEATER
5D	HPS - HIGH PRESSURE SWITCH	6C	HB - HEATING BELT
5D	LPS - LOW PRESSURE SWITCH	7C	LPS LAK - LOW PRESSURE SWITCH
3D	HPT - HIGH PRESSURE TRANSDUCER		
3D	WS1 - WIRE SPLICER 1		
2D	WS2 - WIRE SPLICER 2		
7C	JC1 - JOINT CONNECTOR 1		
7C	JC2 - JOINT CONNECTOR 2		
5D	JC3 - JOINT CONNECTOR 3		
3C	JC4 - JOINT CONNECTOR 4		
3B	CFAN - FAN RELAY		
3A	LDR - LEAK DETECTION ROUTINE RELAY		
5C	STO - SAFETY TORQUE OFF RELAY		

FACTORY SUPPLIED LINE VOLTAGE
FIELD INSTALLED LINE VOLTAGE WIRING
OPTIONAL LINE VOLTAGE WIRING
FACTORY SUPPLIED 24 VOLT NEC CLASS 2 WIRING
RELAY INTERNAL CIRCUIT
OPTIONAL 24 VOLT WIRING
FIELD SUPPLIED 24V NEC CLASS 2 WIRING
FIELD SUPPLIED EARTH GROUNDING WIRE
PIGTAIL LEADS 24VOLT WIRING
TERMINAL STRIP CONNECTION
GROUNDING LUG CONNECTION
COMPONENT PLUG CONNECTION

WIRE COLOUR CODE

ORN - ORANGE	PPR - PURPLE	BLU - BLUE
RED - RED	GRN - GREEN	BLK - BLACK
BRN - BROWN	Y - YELLOW	WHT - WHITE

VERTIV.

1050 DEARBORN DRIVE, P.O. BOX 29186
COLUMBUS, OHIO 43229

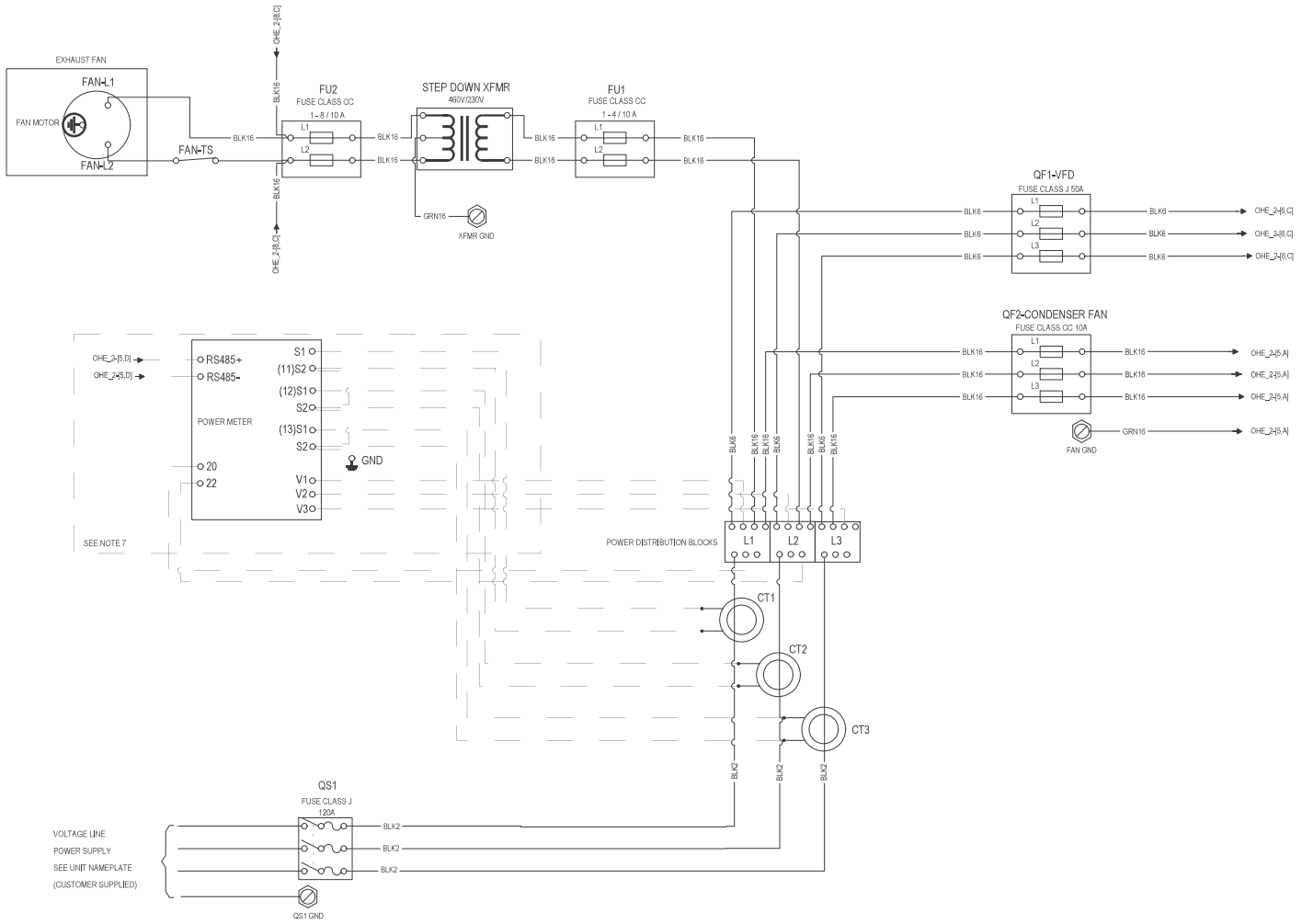
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DRAWN	A. PATLAN	DATE 10/22/2025
CHECKED	A. TORRES	DATE 11/05/2025
ENGR	A. TORRES	DATE 10/22/2025

OHE
230VAC - 3PH
50/60 HZ
28kW
WIRING DIAGRAM
*
2 OF 2
*

DRAWING NO 10068508P5
REV C



NOTES:

1.- ALL FIELD WIRING TO BE PER LOCAL CODES. USE COPPER CONDUCTORS ONLY.

2.- SEE INTALLATION AND USER MANUAL(S).

3.- CONTACT CAPACITY: 250VAC/30VDC 5A.

4.- ETHERNET STRAIGHT THROUGH CABLE.

5.- WIRE SPLICE CONNECTORS ARE USED FOR ALL NODE CONNECTIONS(CONTROL).

6.- FOR SPECIFIC COMPONENT PART NUMBERS, REFER TO RESPECTIVE UNIT'S BOM.

7.- POWER METER AND CURRENT TRANSFORMERS ARE PART OF AN ACCESSORY KIT TO BE INSTALLED BY END USER

CIRCUIT BOARD PLUG AND TERMINAL ASSIGNMENTS

COMPRESSOR INVERTER

CN2 TERMINAL BLOCK

+24 - PRESSURE TRANSDUCER POWER SUPPLY
AI1 - PRESSURE TRANSDUCER ANALOG INPUT
AI2 - DISCHARGE TEMPERATURE SENSOR
AO1 - FAN SIGNAL ANALOG OUTPUT
GND - INVERTER SIGNAL GROUND

J14 TERMINAL BLOCK

+24 - STO POWER SUPPLY
STO1 - SAFE TORQUE OFF 1
STO2 - SAFE TORQUE OFF 2
COM - STO COMMON

MODBUS COMMUNICATION BOARD

RS485+ - RS485A
RS485- - RS485B

POWER CONNECTION

INV R - L1 POWER SUPPLY
INV S - L2 POWER SUPPLY
INV T - L3 POWER SUPPLY
INV GND - GROUND
U - COMPRESSOR POWER SUPPLY L1
V - COMPRESSOR POWER SUPPLY L2
W - COMPRESSOR POWER SUPPLY L3

NOMENCLATURE

LINE	STANDARD DEVICES
7A	QS1 - PRIMARY POWER SUPPLY
4D	QF1 - VFD FUSE BLOCK
4C	QF2 - CONDENSER FAN FUSE BLOCK
6D	FU1 - EXHAUST FAN XFMR FUSE
7D	FU2 - EXHAUST FAN FUSE
8D	FAN-TS - EXHAUST FAN THERMOSTAT

FACTORY SUPPLIED LINE VOLTAGE
FIELD INSTALLED LINE VOLTAGE WIRING
OPTIONAL LINE VOLTAGE WIRING
FACTORY SUPPLIED 24 VOLT NEC CLASS 2 WIRING
RELAY INTERNAL CIRCUIT
OPTIONAL 24 VOLT WIRING
FIELD SUPPLIED 24V NEC CLASS 2 WIRING
FIELD SUPPLIED EARTH GROUNDING WIRE
PIGTAIL LEADS 24VOLT WIRING
TERMINAL STRIP CONNECTION
GROUNDING LUG CONNECTION
COMPONENT PLUG CONNECTION

WIRE COLOUR CODE

ORN - ORANGE	PPR - PURPLE	BLU - BLUE
RED - RED	GRN - GREEN	BLK - BLACK
BRN - BROWN	Y - YELLOW	WHT - WHITE

1050 DEARBORN DRIVE, P.O. BOX 29186
COLUMBUS, OHIO 43229
CAGE CODE
1EDC2

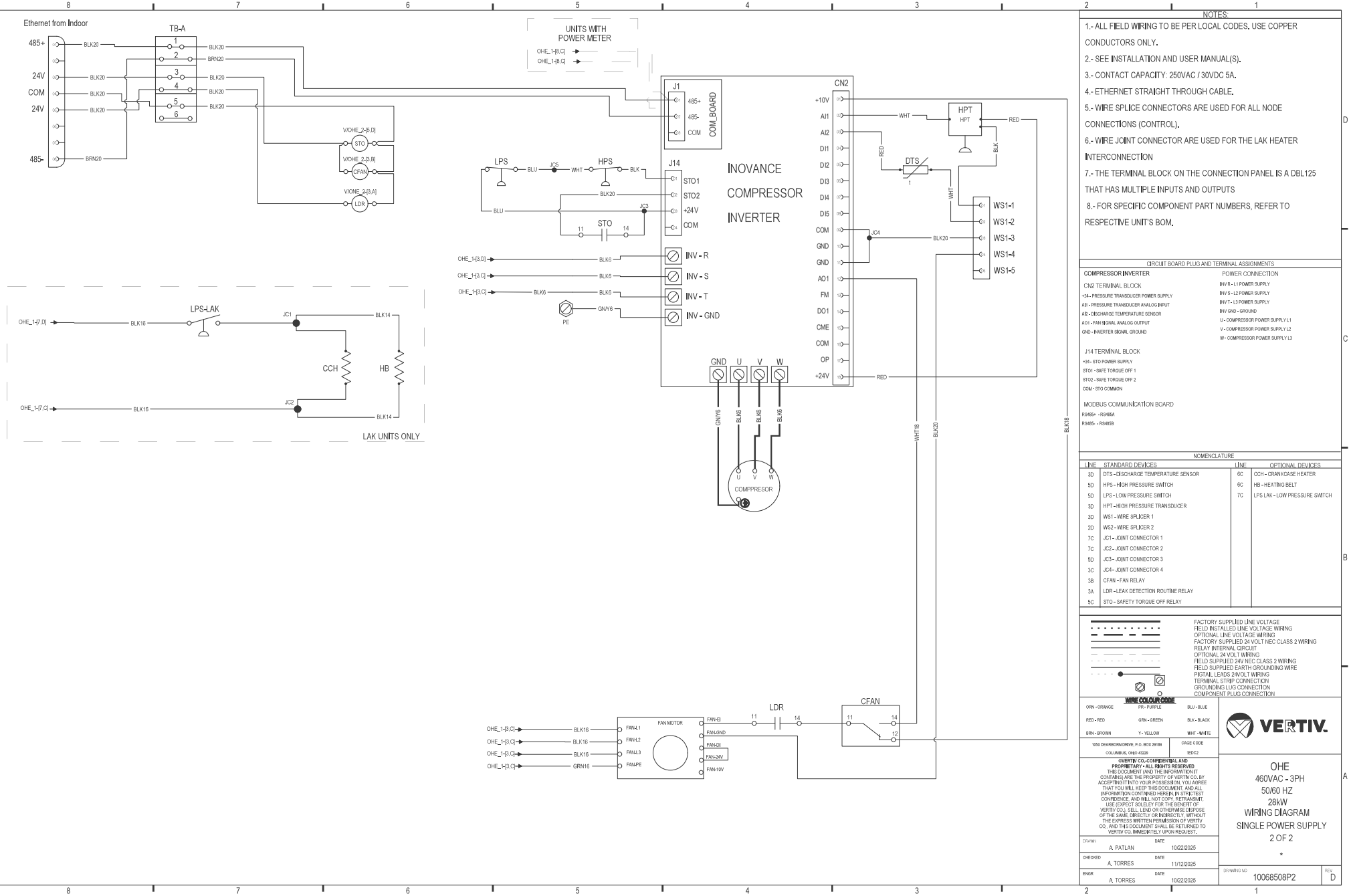
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DRAWN	A. PATLAN	DATE 10/22/2025
CHECKED	A. TORRES	DATE 11/12/2025
ENGR	A. TORRES	DATE 10/22/2025

VERTIV.

OHE
460VAC - 3PH
28kW
WIRING DIAGRAM
50/60 HZ
SINGLE POWER SUPPLY
1 OF 2
*

DRAWING NO 10068508P2 REV D



NOTES:

1.- ALL FIELD WIRING TO BE PER LOCAL CODES. USE COPPER CONDUCTORS ONLY.

2.- SEE INSTALLATION AND USER MANUAL(S).

3.- CONTACT CAPACITY: 250VAC / 30VDC 5A.

4.- ETHERNET STRAIGHT THROUGH CABLE.

5.- WIRE SPLICE CONNECTORS ARE USED FOR ALL NODE CONNECTIONS (CONTROL).

6.- WIRE JOINT CONNECTOR ARE USED FOR THE LAK HEATER INTERCONNECTION

7.- THE TERMINAL BLOCK ON THE CONNECTION PANEL IS A DBL125 THAT HAS MULTIPLE INPUTS AND OUTPUTS

8.- FOR SPECIFIC COMPONENT PART NUMBERS, REFER TO RESPECTIVE UNIT'S BOM.

CIRCUIT BOARD PLUG AND TERMINAL ASSIGNMENTS

COMPRESSOR INVERTER

CN2 TERMINAL BLOCK

+24 - PRESSURE TRANSDUCER POWER SUPPLY
AI1 - PRESSURE TRANSDUCER ANALOG INPUT
AI2- DISCHARGE TEMPERATURE SENSOR
AO1 - FAN SIGNAL ANALOG OUTPUT
GND - INVERTER SIGNAL GROUND

J14 TERMINAL BLOCK

+24 - STO POWER SUPPLY
STO1 - SAFE TORQUE OFF 1
STO2 - SAFE TORQUE OFF 2
COM - STO COMMON

MODBUS COMMUNICATION BOARD

RS485+ - RS485A
RS485- - RS485B

POWER CONNECTION

INV R - L1 POWER SUPPLY
INV S - L2 POWER SUPPLY
INV T - L3 POWER SUPPLY
INV GND - GROUND
U - COMPRESSOR POWER SUPPLY L1
V - COMPRESSOR POWER SUPPLY L2
W - COMPRESSOR POWER SUPPLY L3

NOMENCLATURE

LINE	STANDARD DEVICES	LINE	OPTIONAL DEVICES
3D	DTS - DISCHARGE TEMPERATURE SENSOR	6C	CCH - CRANKCASE HEATER
5D	HPS - HIGH PRESSURE SWITCH	6C	HB - HEATING BELT
5D	LPS - LOW PRESSURE SWITCH	7C	LPS LAK - LOW PRESSURE SWITCH
3D	HPT - HIGH PRESSURE TRANSDUCER		
3D	WS1 - WIRE SPLICER 1		
2D	WS2 - WIRE SPLICER 2		
7C	JC1 - JOINT CONNECTOR 1		
7C	JC2 - JOINT CONNECTOR 2		
5D	JC3 - JOINT CONNECTOR 3		
3C	JC4 - JOINT CONNECTOR 4		
3B	CFAN - FAN RELAY		
3A	LDR - LEAK DETECTION ROUTINE RELAY		
5C	STO - SAFETY TORQUE OFF RELAY		

FACTORY SUPPLIED LINE VOLTAGE
FIELD INSTALLED LINE VOLTAGE WIRING
OPTIONAL LINE VOLTAGE WIRING
FACTORY SUPPLIED 24 VOLT NEC CLASS 2 WIRING
RELAY INTERNAL CIRCUIT
OPTIONAL 24 VOLT WIRING
FIELD SUPPLIED 24V NEC CLASS 2 WIRING
FIELD SUPPLIED EARTH GROUNDING WIRE
PIGTAIL LEADS 24VOLT WIRING
TERMINAL STRIP CONNECTION
GROUNDING LUG CONNECTION
COMPONENT PLUG CONNECTION

WIRE COLOUR CODE

ORN - ORANGE	PPR - PURPLE	BLU - BLUE
RED - RED	GRN - GREEN	BLK - BLACK
BRN - BROWN	Y - YELLOW	WHT - WHITE

VERTIV.

1050 DEARBORN DRIVE, P.O. BOX 29186
COLUMBUS, OHIO 43229

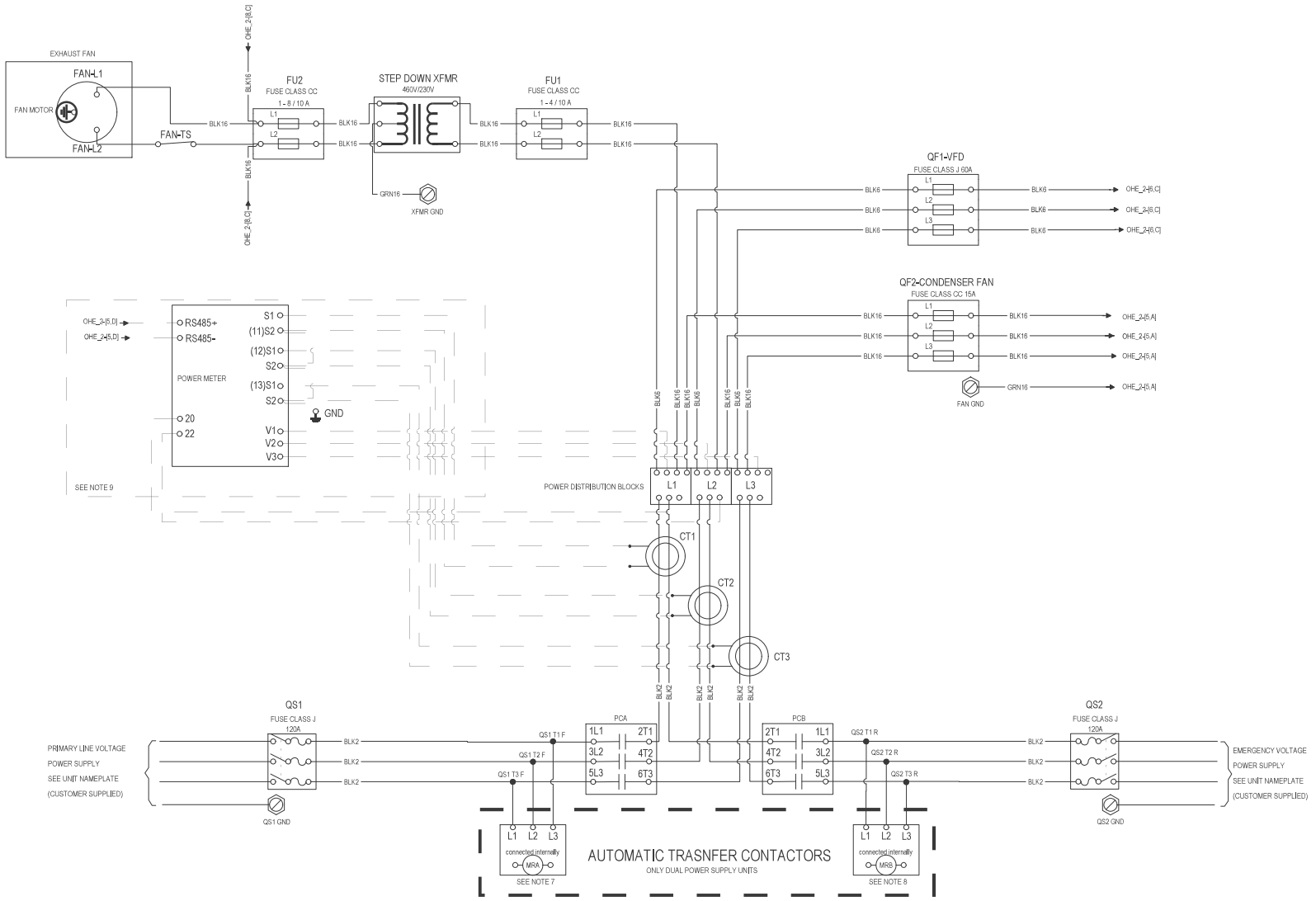
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ENGR	A. TORRES	DATE 10/22/2025

OHE
460VAC - 3PH
50/60 HZ
28kW
WIRING DIAGRAM
SINGLE POWER SUPPLY
2 OF 2
*

DRAWING NO 10068508P2
REV D



NOTES:

1.- ALL FIELD WIRING TO BE PER LOCAL CODES. USE COPPER CONDUCTORS ONLY.

2.- SEE INTALLATION AND USER MANUAL(S).

3.- CONTACT CAPACITY: 250VAC/30VDC 5A.

4.- ETHERNET STRAIGHT THROUGH CABLE.

5.- WIRE SPLICE CONNECTORS ARE USED FOR ALL NODE CONNECTIONS(CONTROL).

6.- FOR SPECIFIC COMPONENT PART NUMBERS, REFER TO RESPECTIVE UNIT'S BOM.

7.- DELAY CONFIGURATION FOR MRA SHOULD BE 1 SEC

8.- DELAY CONFIGURATION FOR MRB SHOULD BE 2 SEC

9.- POWER METER AND CURRENT TRANSFORMERS ARE PART OF AN ACCESSORY KIT TO BE INSTALLED BY END USER

CIRCUIT BOARD PLUG AND TERMINAL ASSIGNMENTS

COMPRESSOR INVERTER

CN2 TERMINAL BLOCK

+24 - PRESSURE TRANSDUCER POWER SUPPLY
AI1 - PRESSURE TRANSDUCER ANALOG INPUT
AI2 - DISCHARGE TEMPERATURE SENSOR
AO1 - FAN SIGNAL ANALOG OUTPUT
GND - INVERTER SIGNAL GROUND

J14 TERMINAL BLOCK

+24 - STO POWER SUPPLY
STO1 - SAFE TORQUE OFF 1
STO2 - SAFE TORQUE OFF 2
COM - STO COMMON

MODBUS COMMUNICATION BOARD

RS485+ - RS485A
RS485- - RS485B

POWER CONNECTION

INV R - L1 POWER SUPPLY
INV S - L2 POWER SUPPLY
INV T - L3 POWER SUPPLY
INV GND - GROUND
U - COMPRESSOR POWER SUPPLY L1
V - COMPRESSOR POWER SUPPLY L2
W - COMPRESSOR POWER SUPPLY L3

NOMENCLATURE

LINE	STANDARD DEVICES		
7A	QS1 - PRIMARY POWER SUPPLY	4D	QF1 - VFD FUSE BLOCK
3A	QS2 - SECONDARY POWER SUPPLY	4C	QF2 - CONDENSER FAN FUSE BLOCK
6A	MRA - MONITORING VOLTAGE RELAY A	4B	QF3 - INDOOR UNIT FUSE BLOCK
4A	MRB - MONITORING VOLTAGE RELAY B	6C	FU1 - EXHAUST FAN XFMR FUSE
6A	PCA - POWER CONTACTOR A	7C	FU2 - EXHAUST FAN FUSE
5A	PCB - POWER CONTACTOR B	8C	FAN-TS - EXHAUST FAN THERMOSTAT

FACTORY SUPPLIED LINE VOLTAGE
FIELD INSTALLED LINE VOLTAGE WIRING
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GROUNDING LUG CONNECTION
COMPONENT PLUG CONNECTION

WIRE COLOUR CODE

ORN - ORANGE	PPR - PURPLE	BLU - BLUE
RED - RED	GRN - GREEN	BLK - BLACK
BRN - BROWN	Y - YELLOW	WHT - WHITE

VERTIV.

1050 DEARBORN DRIVE, P.O. BOX 29186
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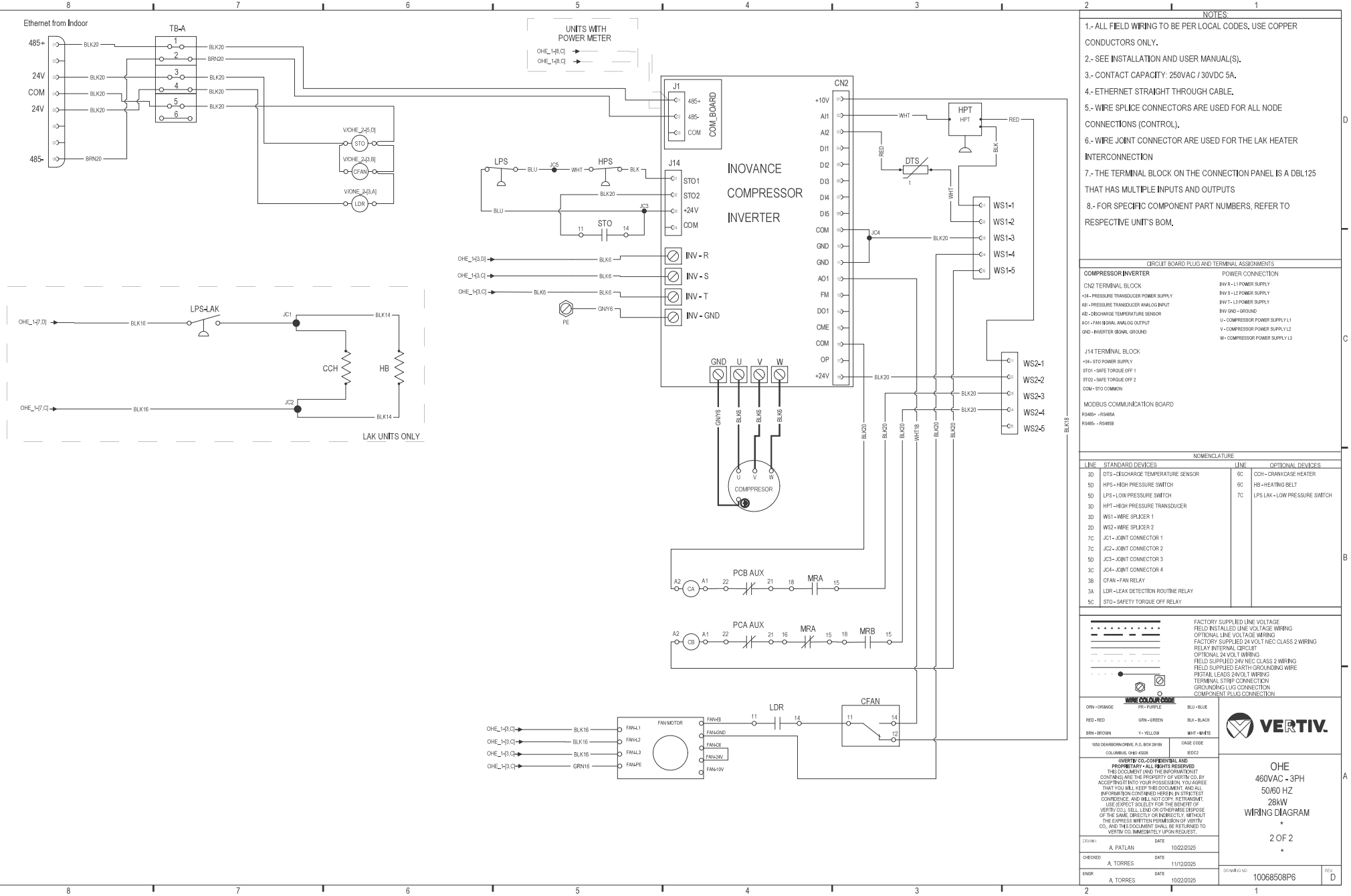
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DRAWN	A. PATLAN	DATE 10/22/2025
CHECKED	A. TORRES	DATE 11/12/2025
ENGR	A. TORRES	DATE 10/22/2025

OHE
460VAC - 3PH
28kW
WIRING DIAGRAM
50/60 HZ
*
1 OF 2
*

DRAWING NO 10068508P6
REV D



NOTES:

1.- ALL FIELD WIRING TO BE PER LOCAL CODES. USE COPPER CONDUCTORS ONLY.

2.- SEE INSTALLATION AND USER MANUAL(S).

3.- CONTACT CAPACITY: 250VAC / 30VDC 5A.

4.- ETHERNET STRAIGHT THROUGH CABLE.

5.- WIRE SPLICE CONNECTORS ARE USED FOR ALL NODE CONNECTIONS (CONTROL).

6.- WIRE JOINT CONNECTOR ARE USED FOR THE LAK HEATER INTERCONNECTION

7.- THE TERMINAL BLOCK ON THE CONNECTION PANEL IS A DBL125 THAT HAS MULTIPLE INPUTS AND OUTPUTS

8.- FOR SPECIFIC COMPONENT PART NUMBERS, REFER TO RESPECTIVE UNIT'S BOM.

CIRCUIT BOARD PLUG AND TERMINAL ASSIGNMENTS

COMPRESSOR INVERTER

CN2 TERMINAL BLOCK

+24 - PRESSURE TRANSDUCER POWER SUPPLY
AI1 - PRESSURE TRANSDUCER ANALOG INPUT
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J14 TERMINAL BLOCK

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MODBUS COMMUNICATION BOARD

RS485+ - RS485A
RS485- - RS485B

POWER CONNECTION

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INV T - L3 POWER SUPPLY
INV GND - GROUND
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NOMENCLATURE

LINE	STANDARD DEVICES	LINE	OPTIONAL DEVICES
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3C	JC4 - JOINT CONNECTOR 4		
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COMPONENT PLUG CONNECTION

WIRE COLOUR CODE

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RED - RED	GRN - GREEN	BLK - BLACK
BRN - BROWN	Y - YELLOW	WHT - WHITE

VERTIV.

1050 DEARBORN DRIVE, P.O. BOX 29186
COLUMBUS, OHIO 43229

CAGE CODE
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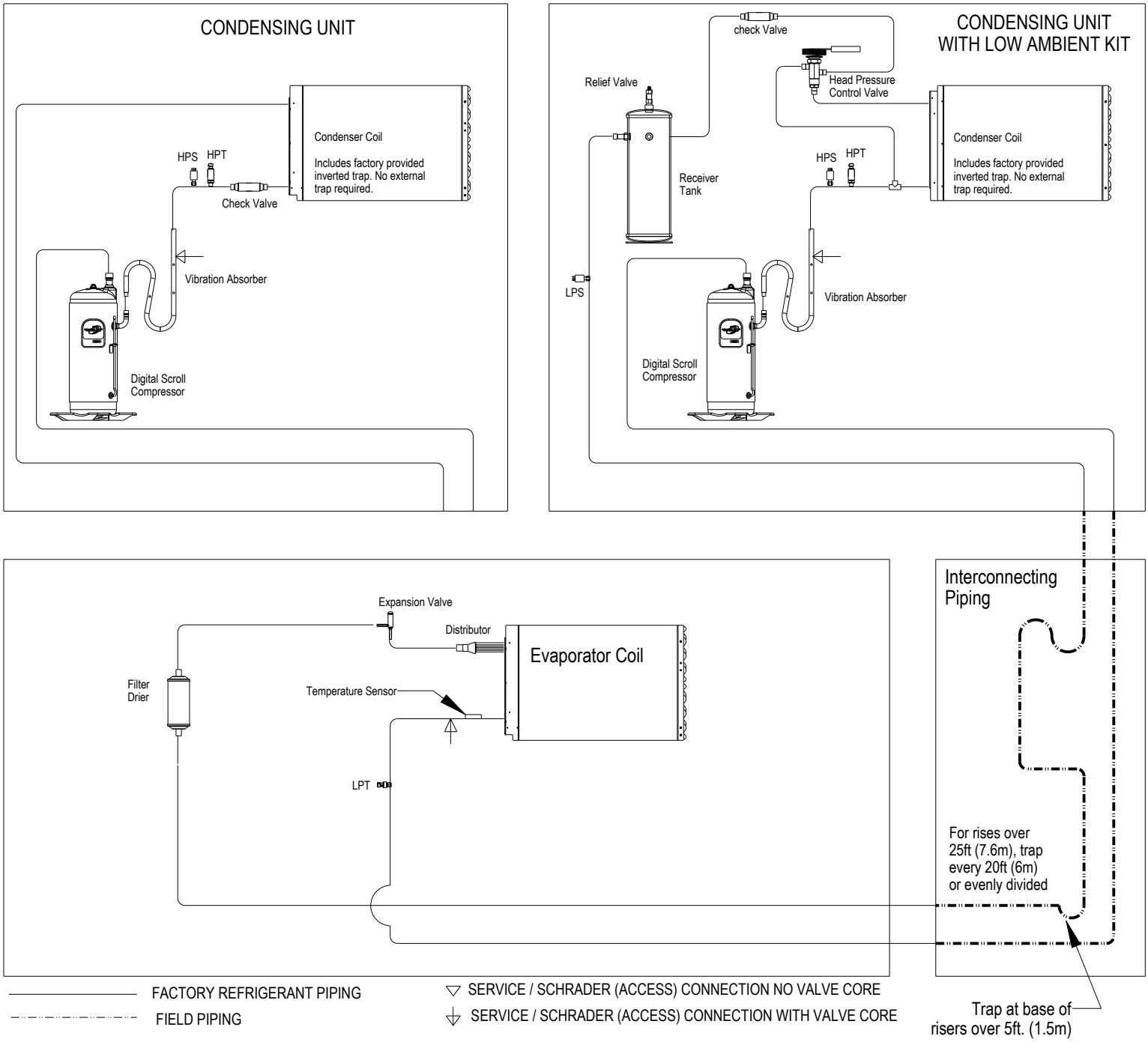
DRAWN	A. PATLAN	DATE 10/22/2025
CHECKED	A. TORRES	DATE 11/12/2025
ENGR	A. TORRES	DATE 10/22/2025

OHE
460VAC - 3PH
50/60 HZ
28kW
WIRING DIAGRAM
*
2 OF 2
*

DRAWING NO 10068508P6
REV D

VERTIV COOLPHASE CEILING

GENERAL ARRANGEMENT
1-2 TON DIRECT EXPANSION AIR COOLED

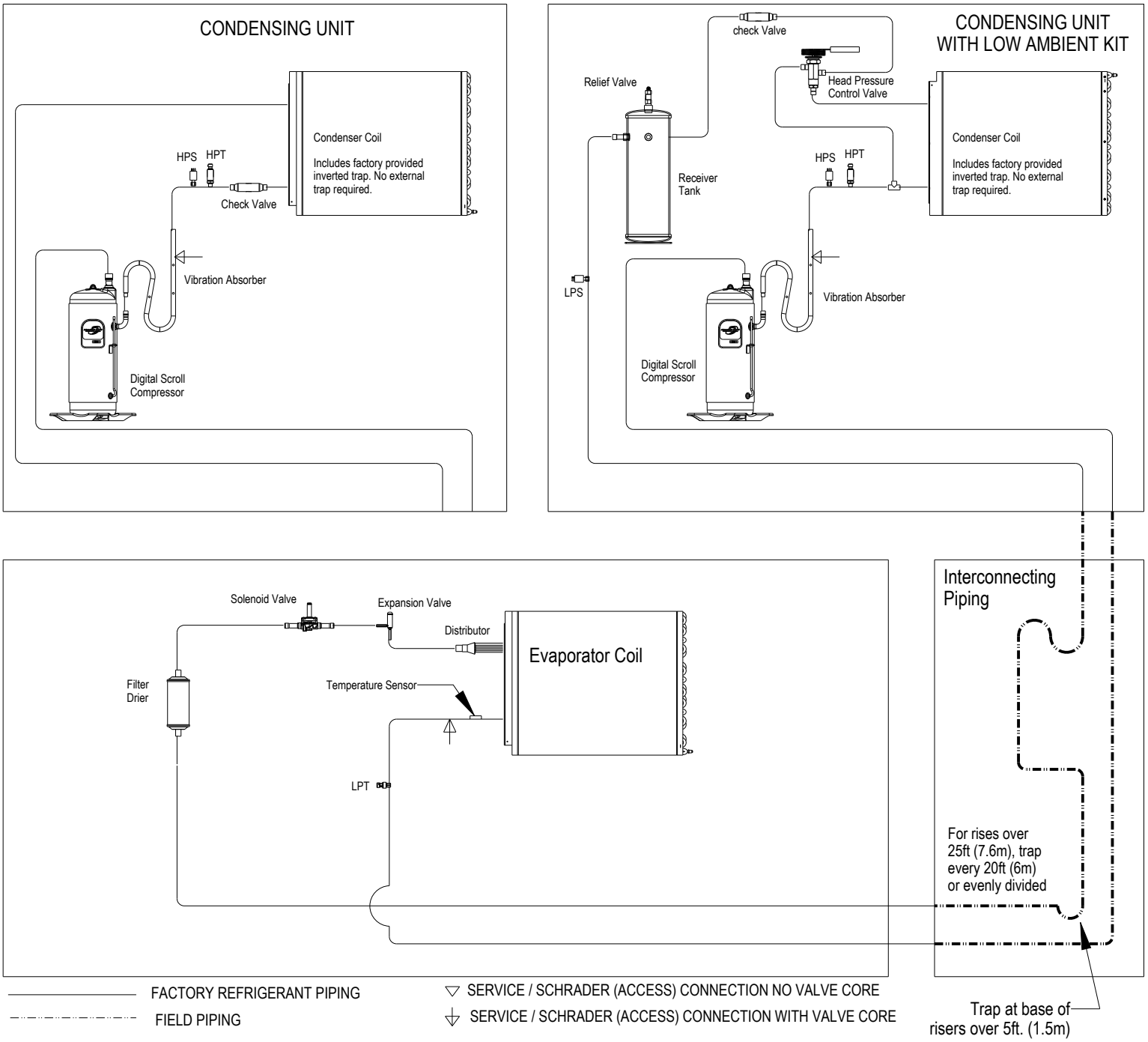


Notes:
1. Schematic representation shown. Do not use for specific connection location.
2. Interconnecting piping are not supplied by Vertiv™, but are required for proper circuit operation and maintenance.
3. Do not isolate any refrigerant circuit from over pressurization protection.
4. Traps must be installed and horizontal lines pitched to ensure proper oil return and to reduce liquid floodback to compressor. Pitch horizontal hot gas piping at a minimum of 1/2" per 10 feet (42mm per 10m) so that gravity will aid in moving oil in the direction of the refrigeration flow.

VERTIV COOLPHASE CEILING

GENERAL ARRANGEMENT

3-8 TON DIRECT EXPANSION AIR COOLED

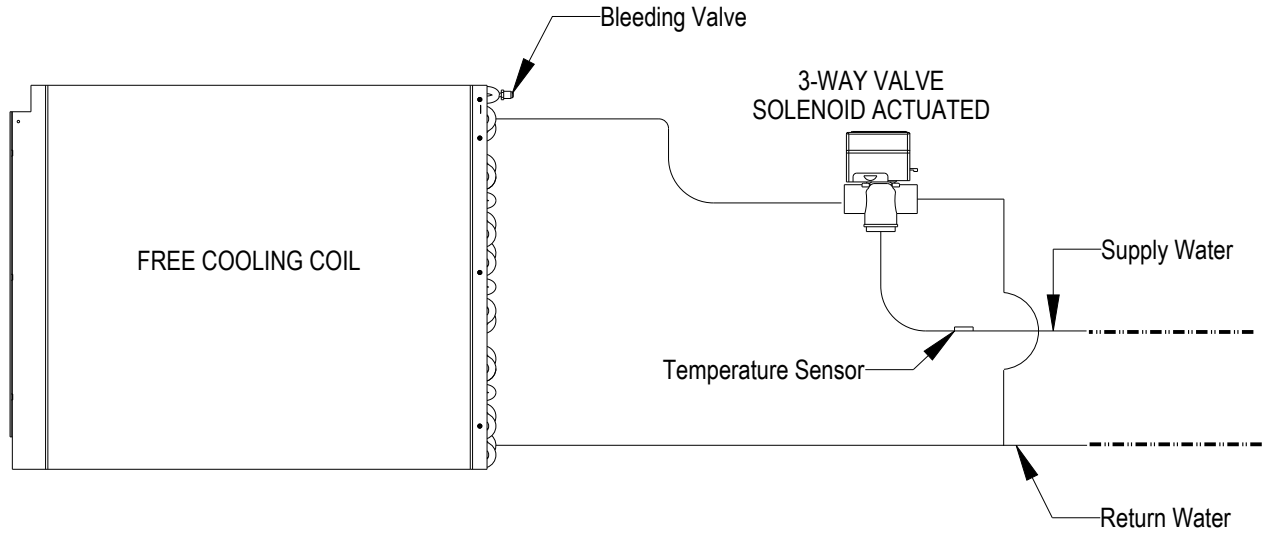


Notes:

1. Schematic representation shown. Do not use for specific connection location. Filter Drier and Solenoid Valve could be in diferent order in the liquid line depending on the model.
2. Interconnecting piping is not supplied by Vertiv™, but is required for proper circuit operation and maintenance.
3. Do not isolate any refrigerant circuit from over pressurization protection.
4. Traps must be installed and horizontal lines pitched to ensure proper oil return and to reduce liquid floodback to compressor. Pitch horizontal hot gas piping at a minimum of 1/2" per 10 feet (42mm per 10m) so that gravity will aid in moving oil in the direction of the refrigeration flow.

VERTIV COOLPHASE CEILING

GENERAL ARRANGEMENT
1-8 TON FREE COOLING



FACTORY PIPING

FIELD PIPING

SERVICE / SCHRADER (ACCESS) CONNECTION NO VALVE CORE

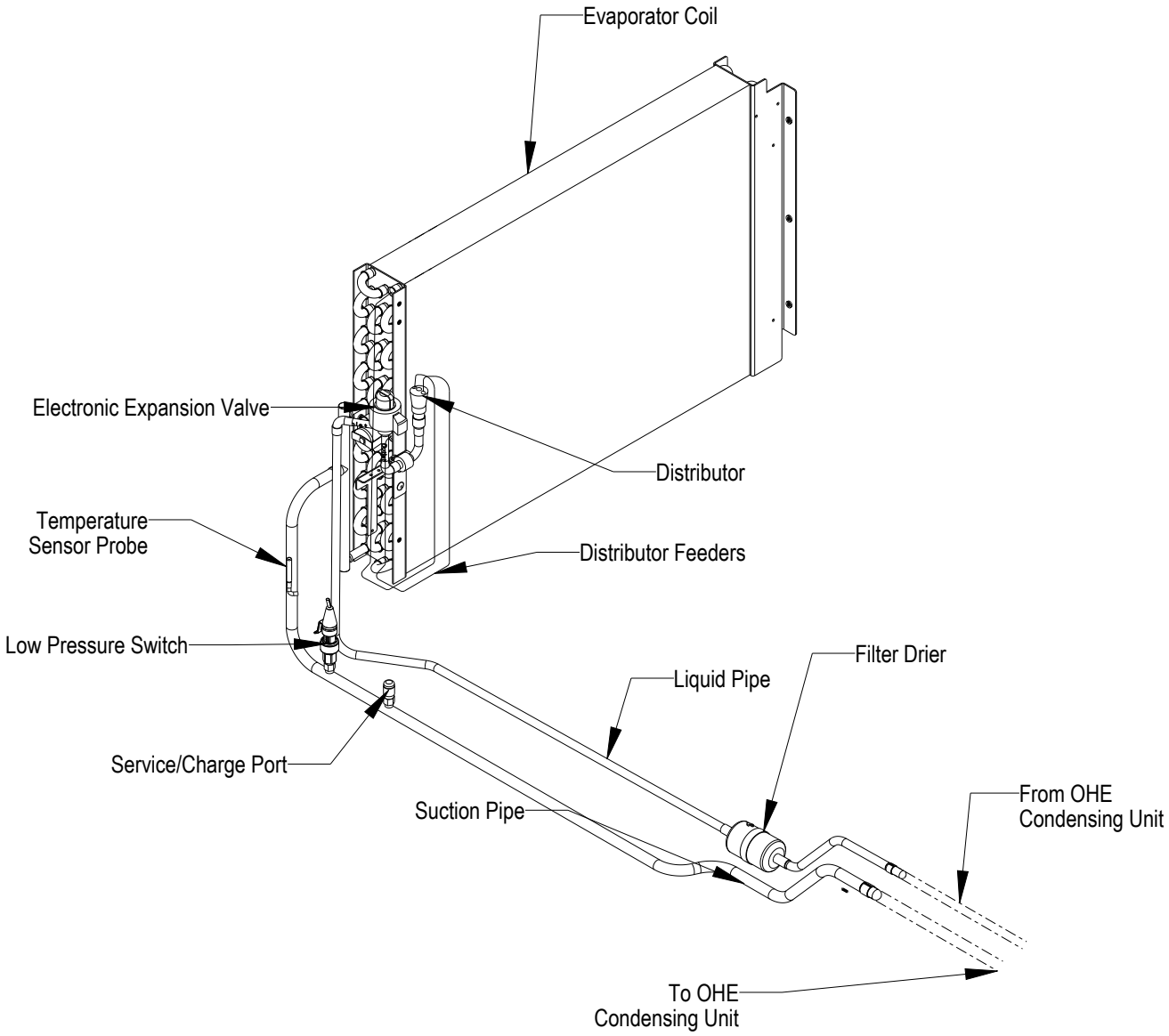
SERVICE / SCHRADER (ACCESS) CONNECTION WITH VALVE CORE

Notes:
1. Schematic representation shown. Do not use for specific connection location.

VERTIV COOLPHASE CEILING

PIPING SCHEMATICS DIRECT EXPANSION UNIT

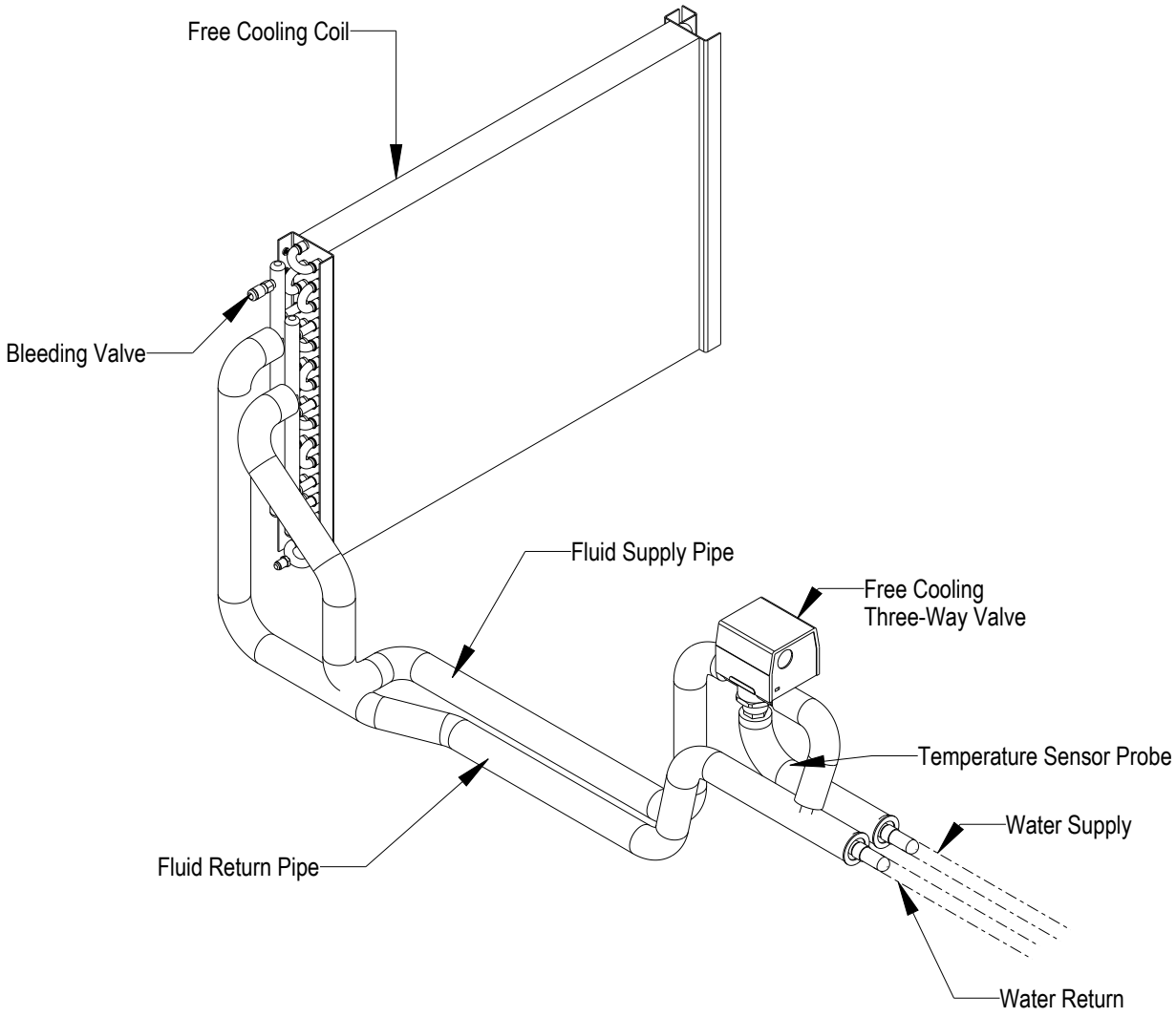
1 TON PIPING SCHEMATICS



VERTIV COOLPHASE CEILING

PIPING SCHEMATICS FREE COOLING OPTION

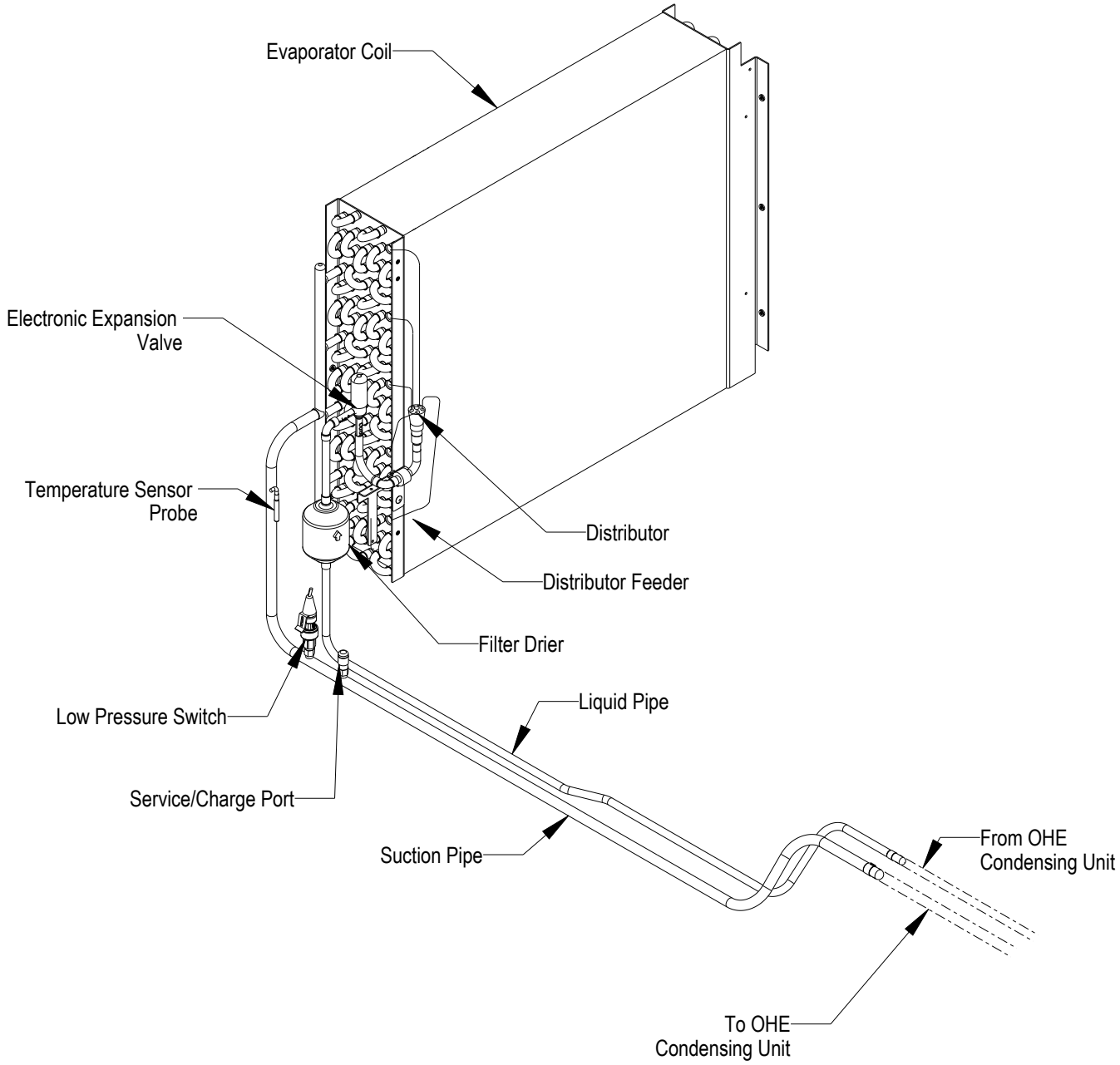
1 TON PIPING SCHEMATICS



VERTIV COOLPHASE CEILING

PIPING SCHEMATICS DIRECT EXPANSION UNIT

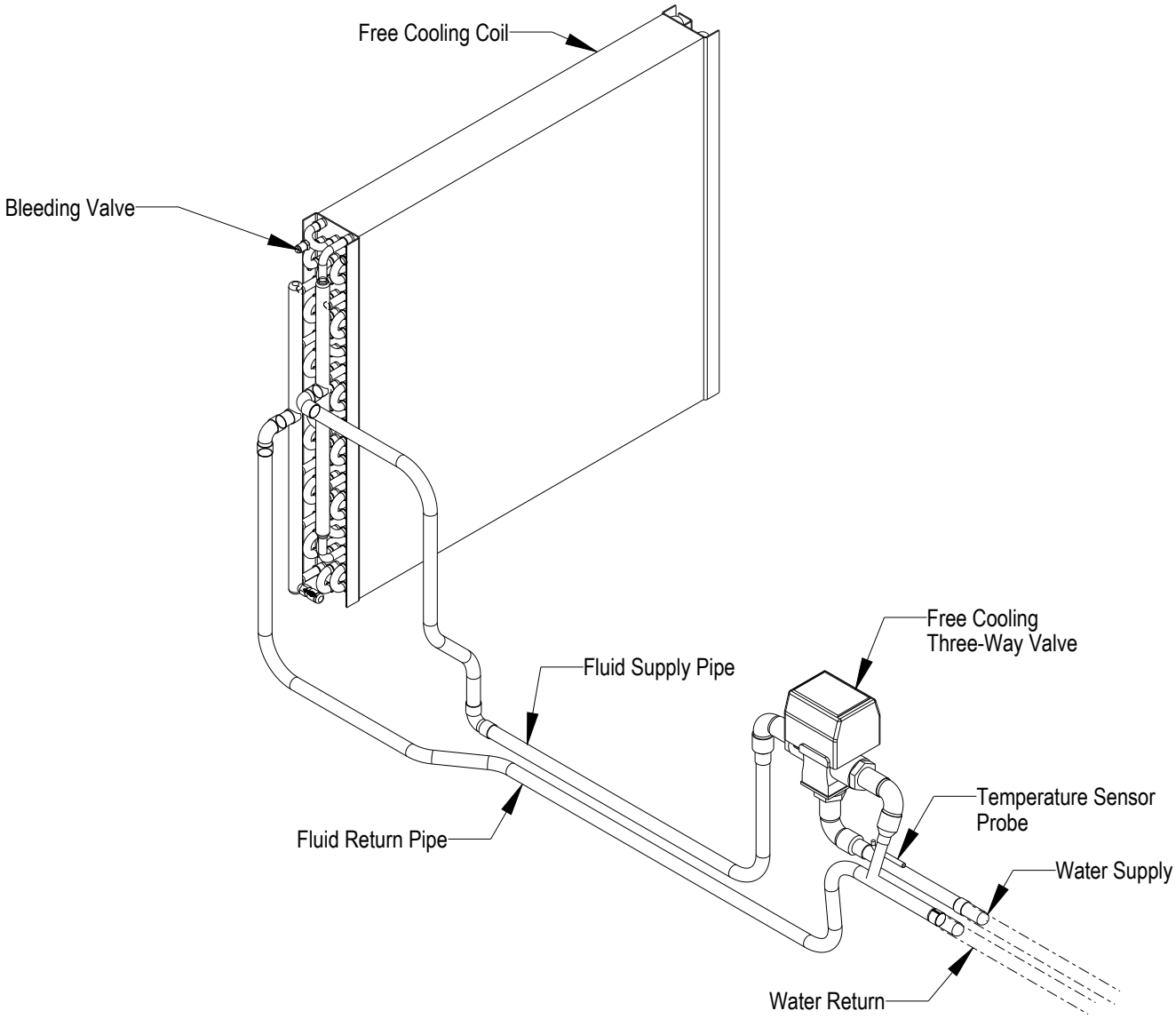
2 & 3 TON PIPING SCHEMATICS



VERTIV COOLPHASE CEILING

PIPING SCHEMATICS FREE COOLING OPTION

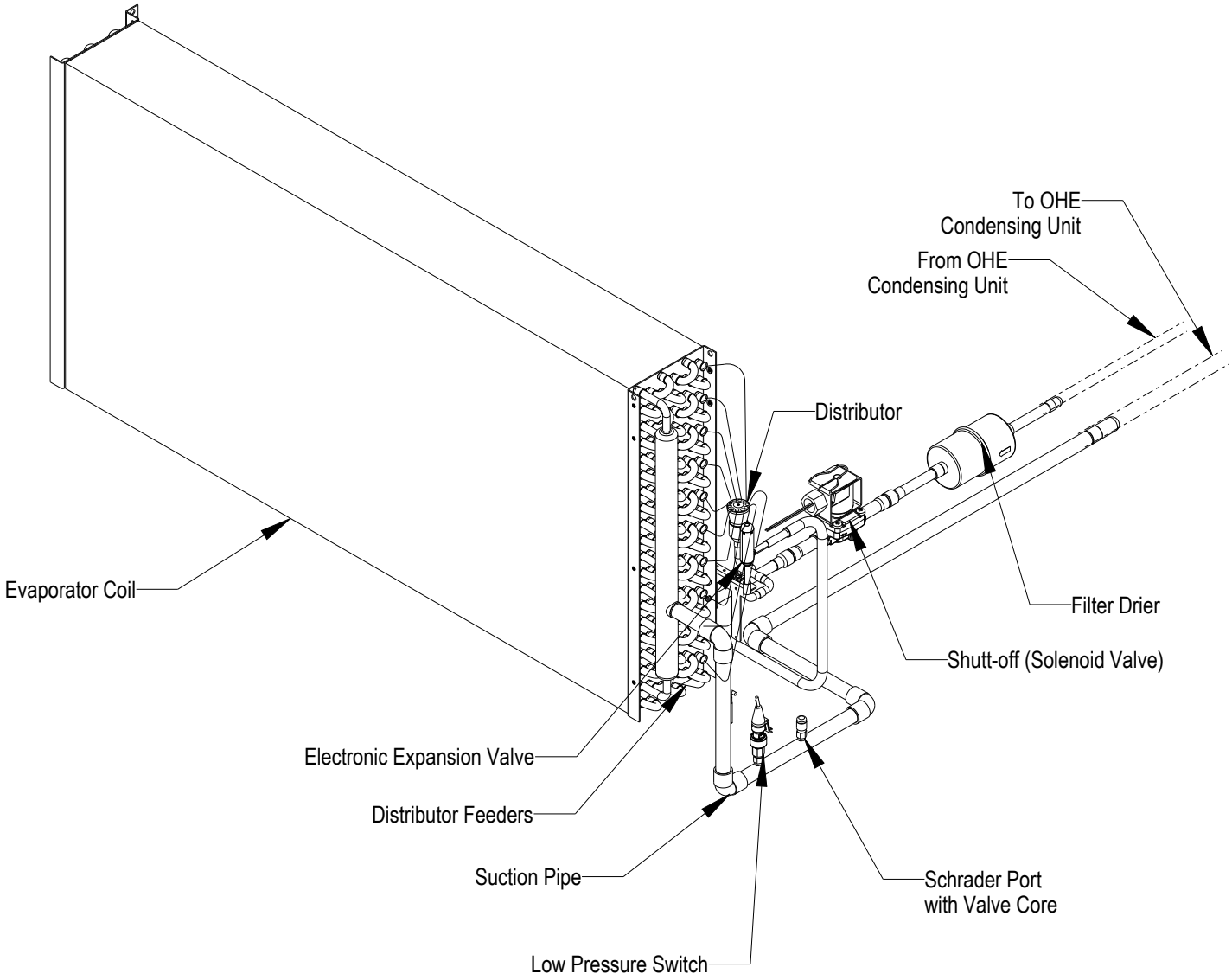
2 & 3 TON PIPING SCHEMATICS



VERTIV COOLPHASE CEILING

PIPING SCHEMATICS DIRECT EXPANSION UNIT

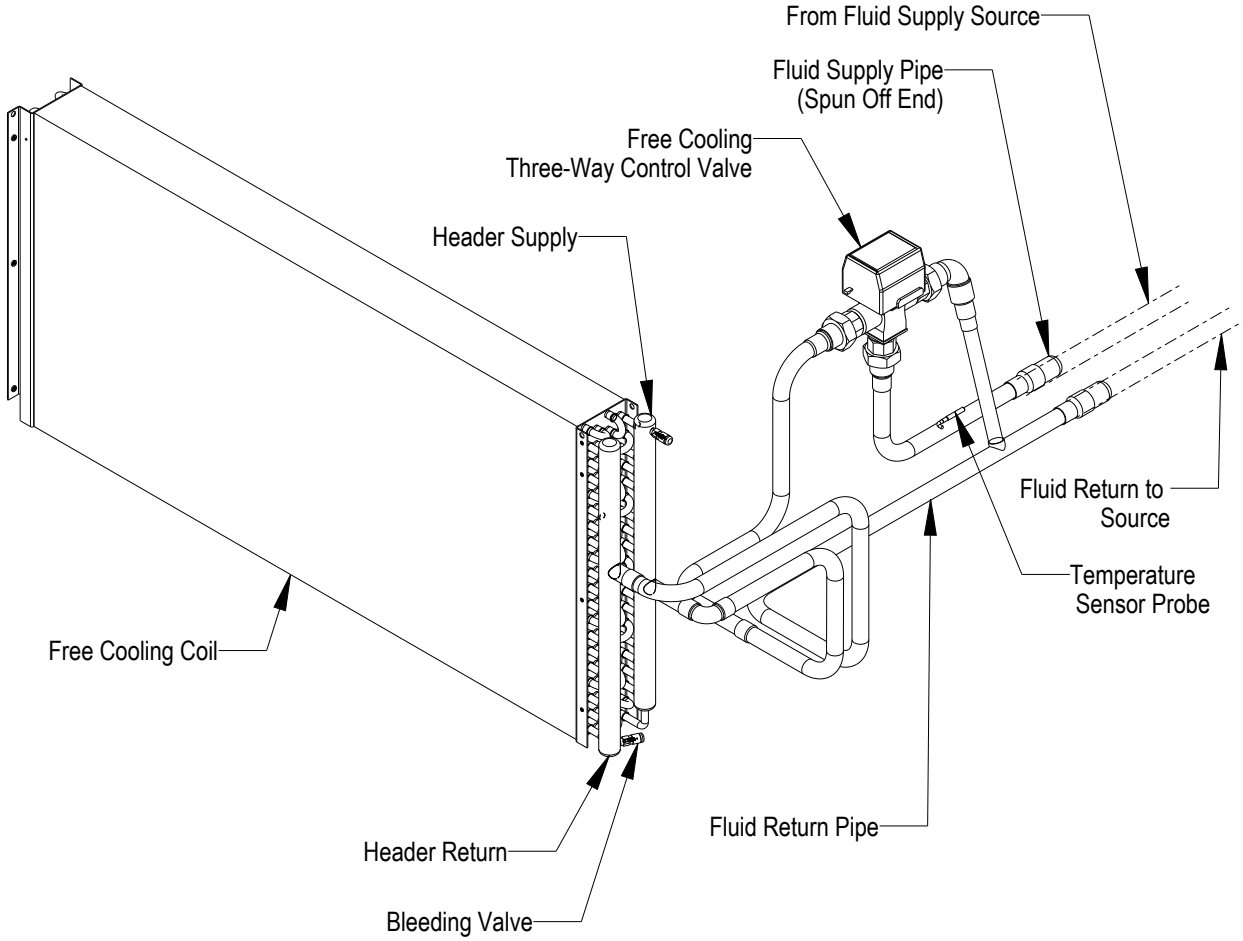
4 & 5 TON PIPING SCHEMATICS



VERTIV COOLPHASE CEILING

PIPING SCHEMATICS FREE COOLING OPTION

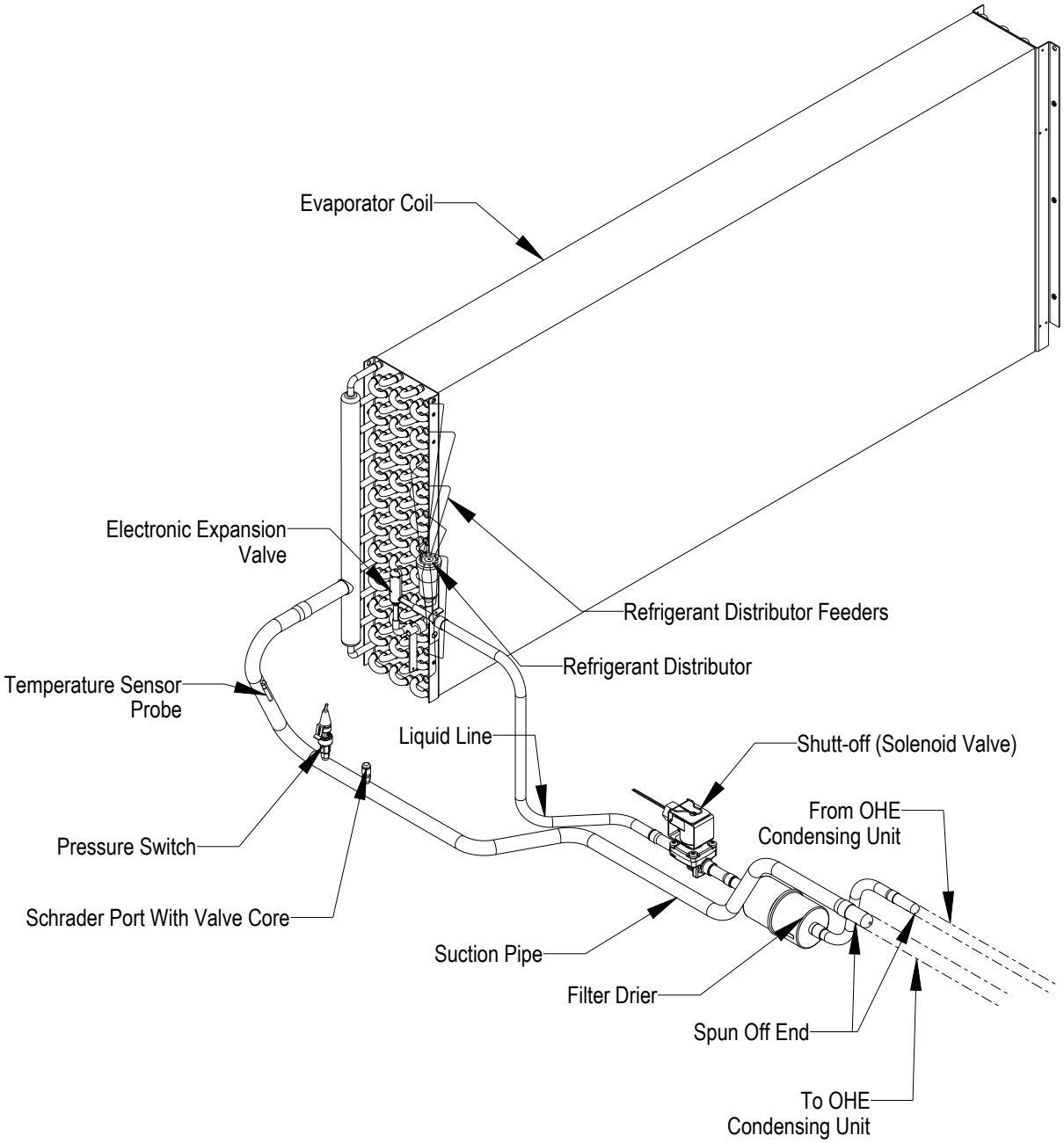
4 & 5 TON PIPING SCHEMATICS



VERTIV COOLPHASE CEILING

PIPING SCHEMATIC DIRECT EXPANSION UNIT

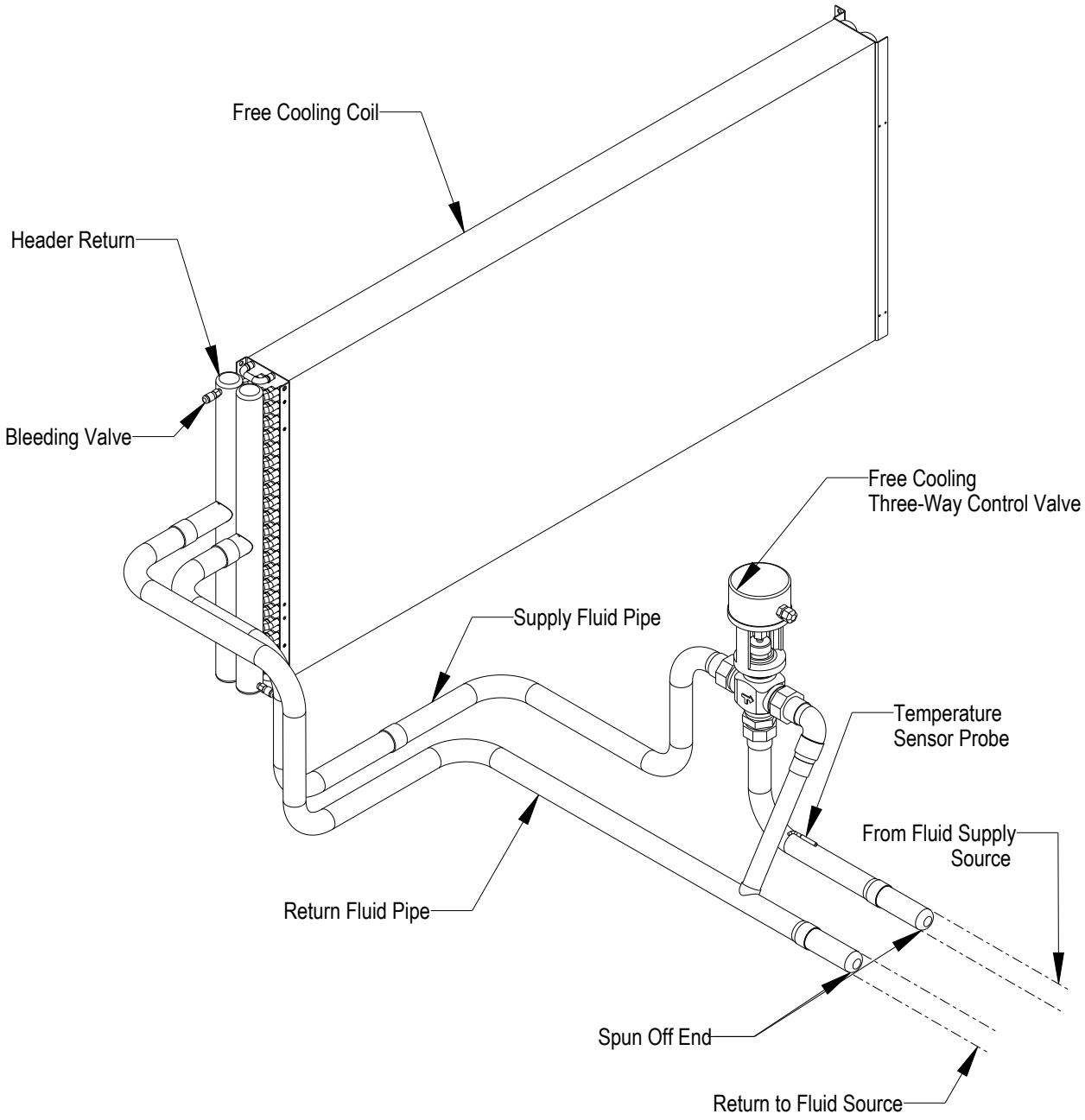
8 TON PIPING SCHEMATICS



VERTIV COOLPHASE CEILING

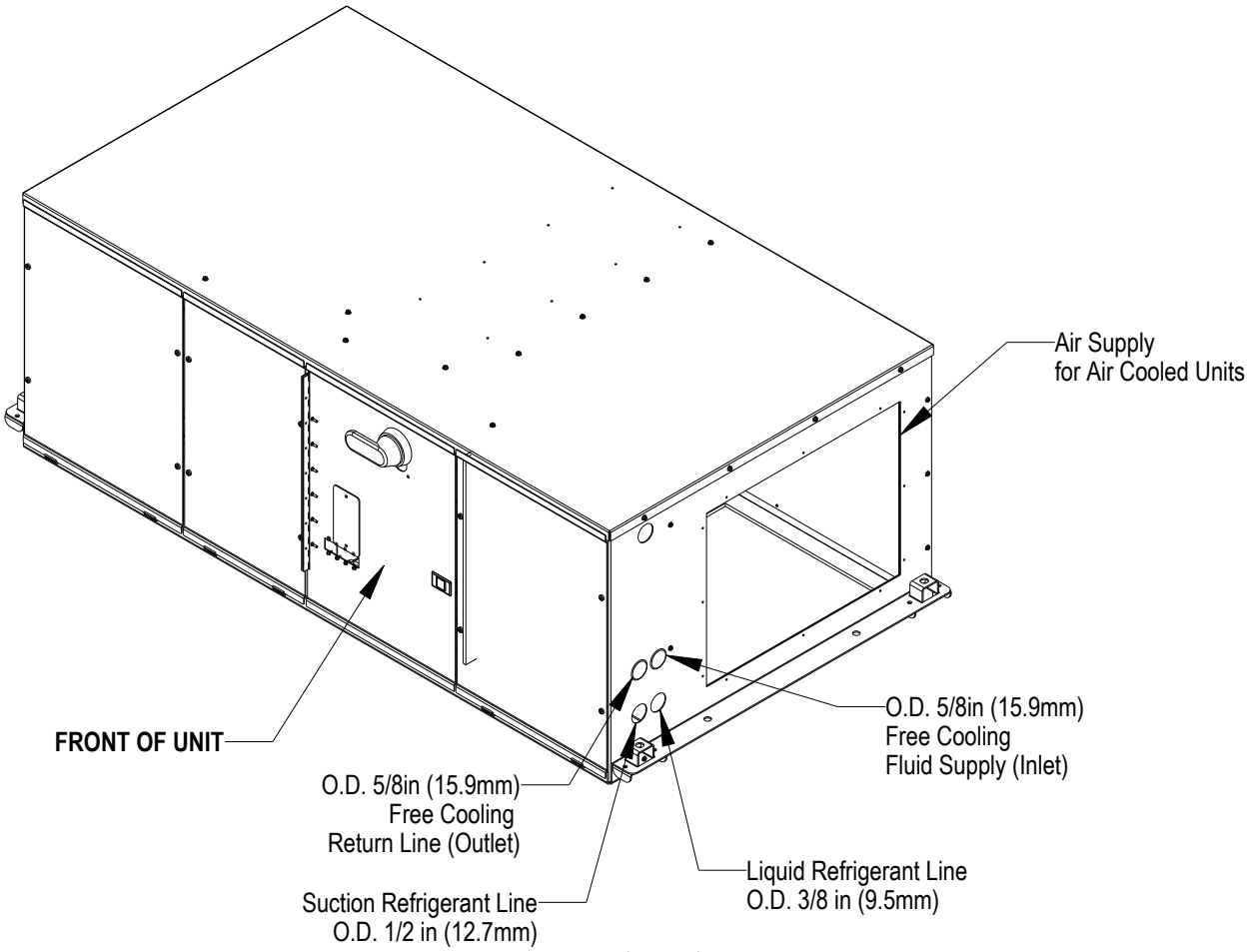
PIPING SCHEMATICS FREE COOLING OPTION

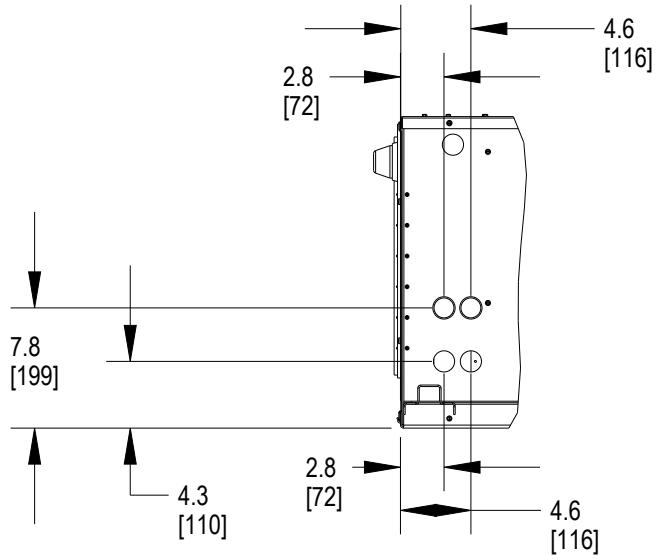
8 TON PIPING SCHEMATICS



VERTIV COOLPHASE CEILING

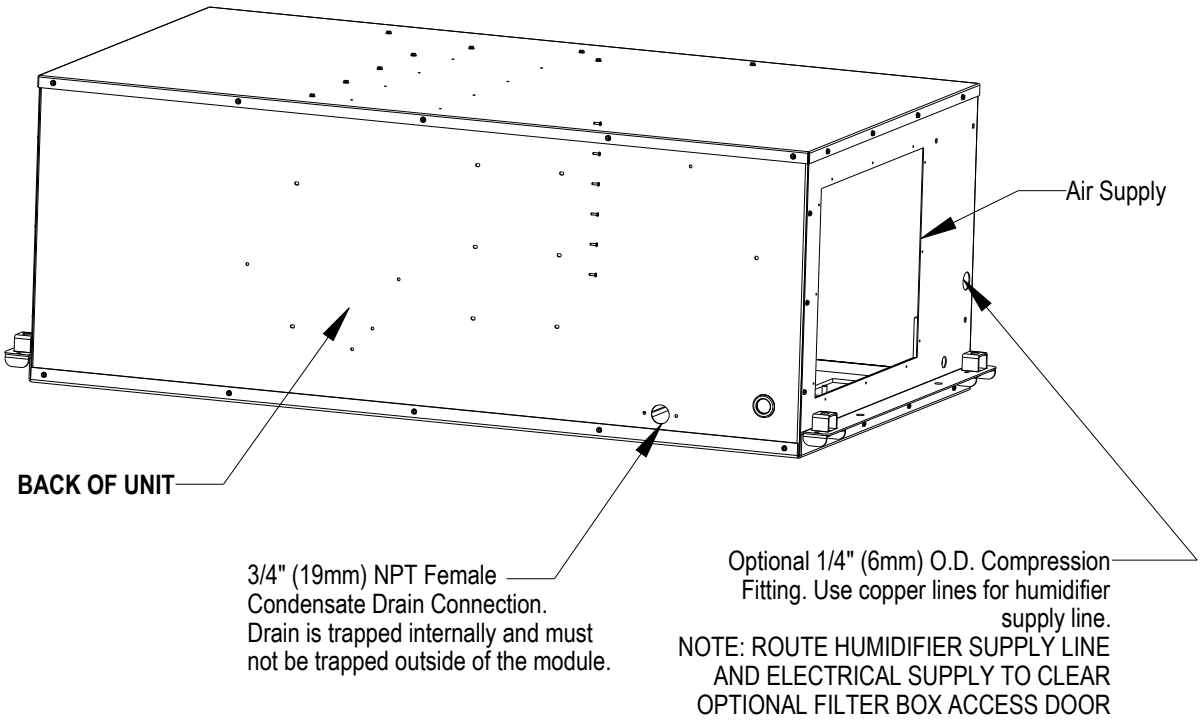
PRIMARY CONNECTION LOCATIONS
1 TON DIRECT EXPANSION & FREE COOLING

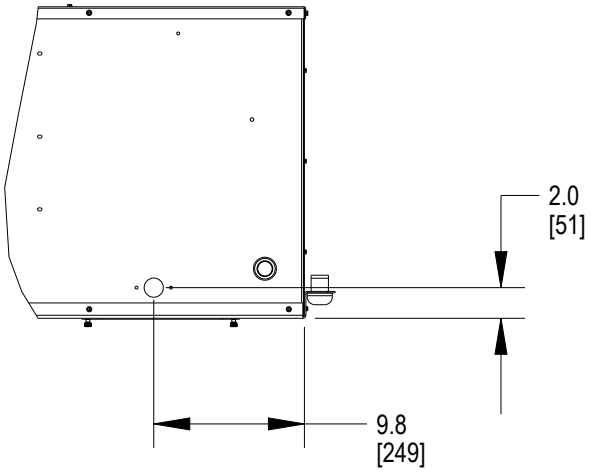


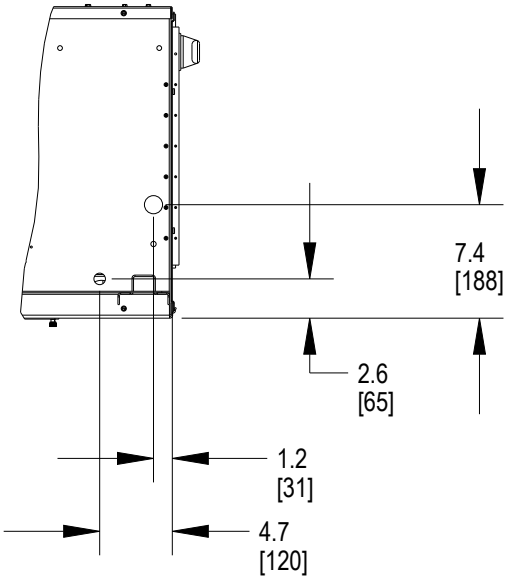


VERTIV COOLPHASE CEILING

PRIMARY CONNECTION LOCATIONS
1 TON DIRECT EXPANSION & FREE COOLING



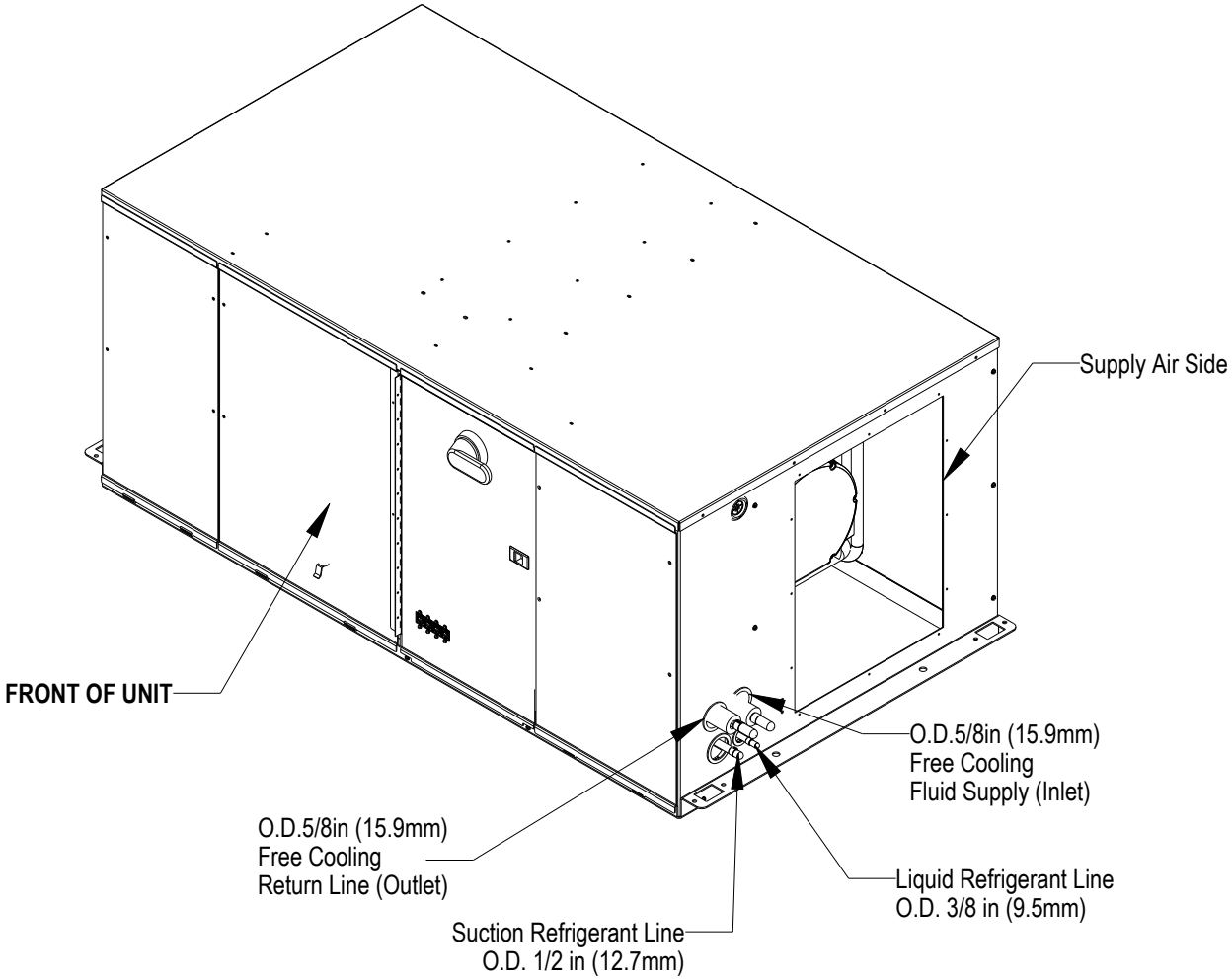


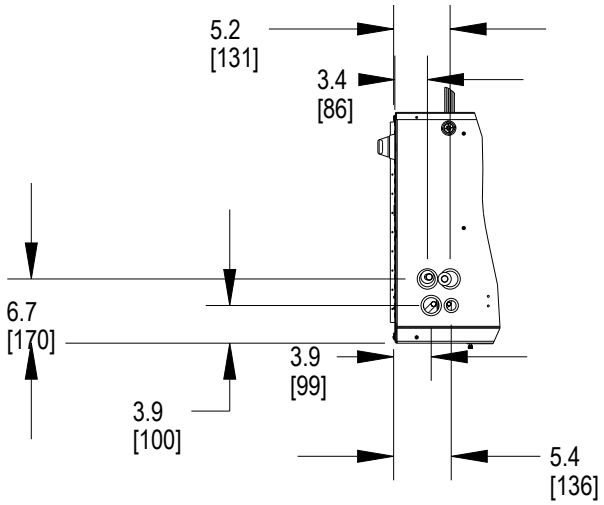


VERTIV COOLPHASE CEILING

PRIMARY CONNECTION LOCATIONS

2 & 3 TON DIRECT EXPANSION & FREE COOLING

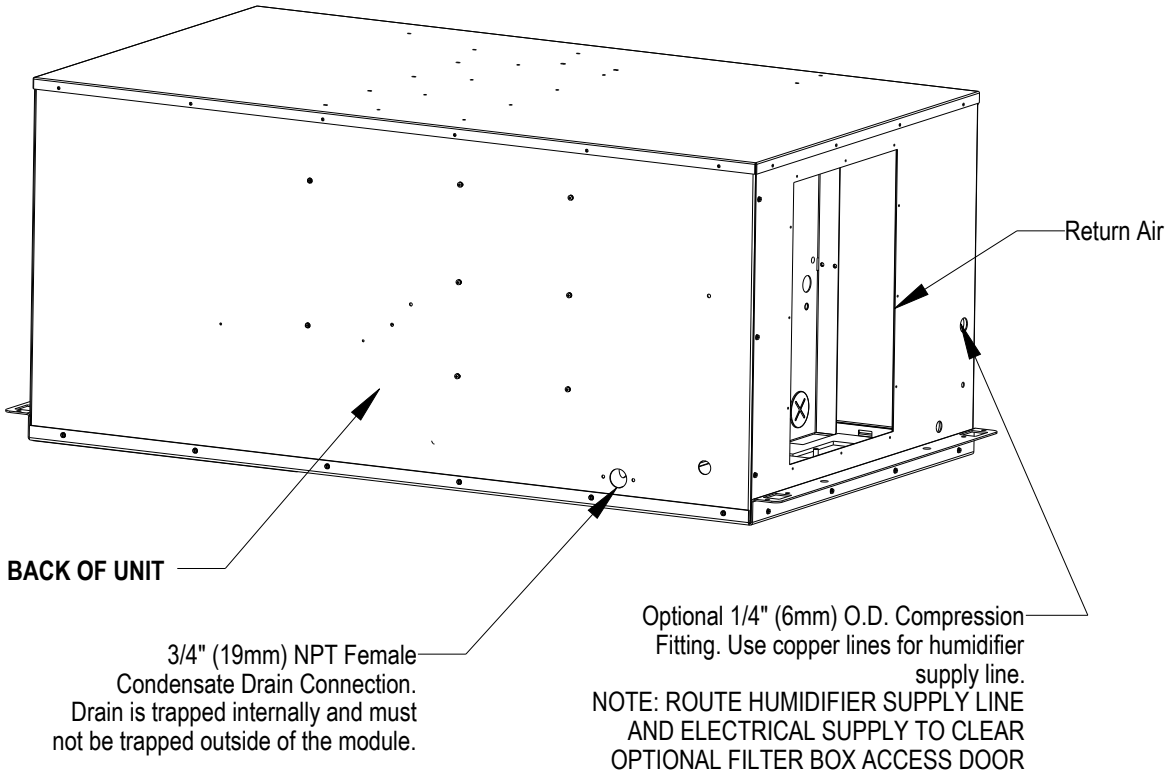


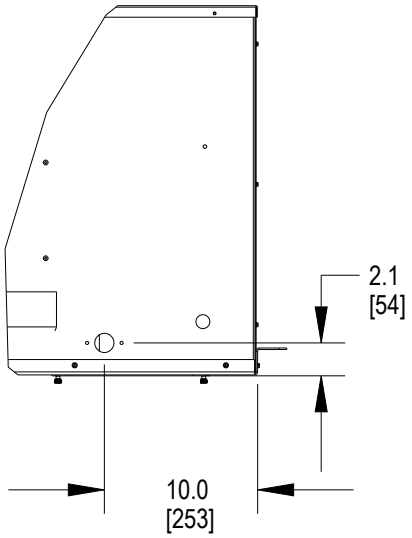


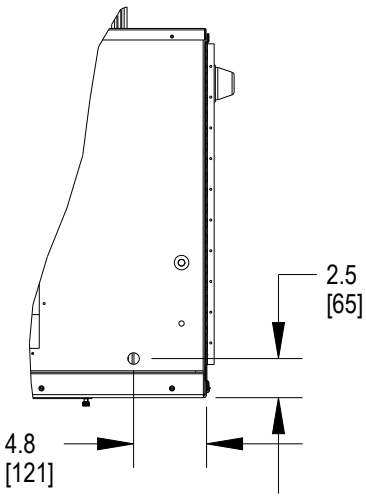
VERTIV COOLPHASE CEILING

PRIMARY CONNECTION LOCATIONS

2 & 3 TON DIRECT EXPANSION & FREE COOLING



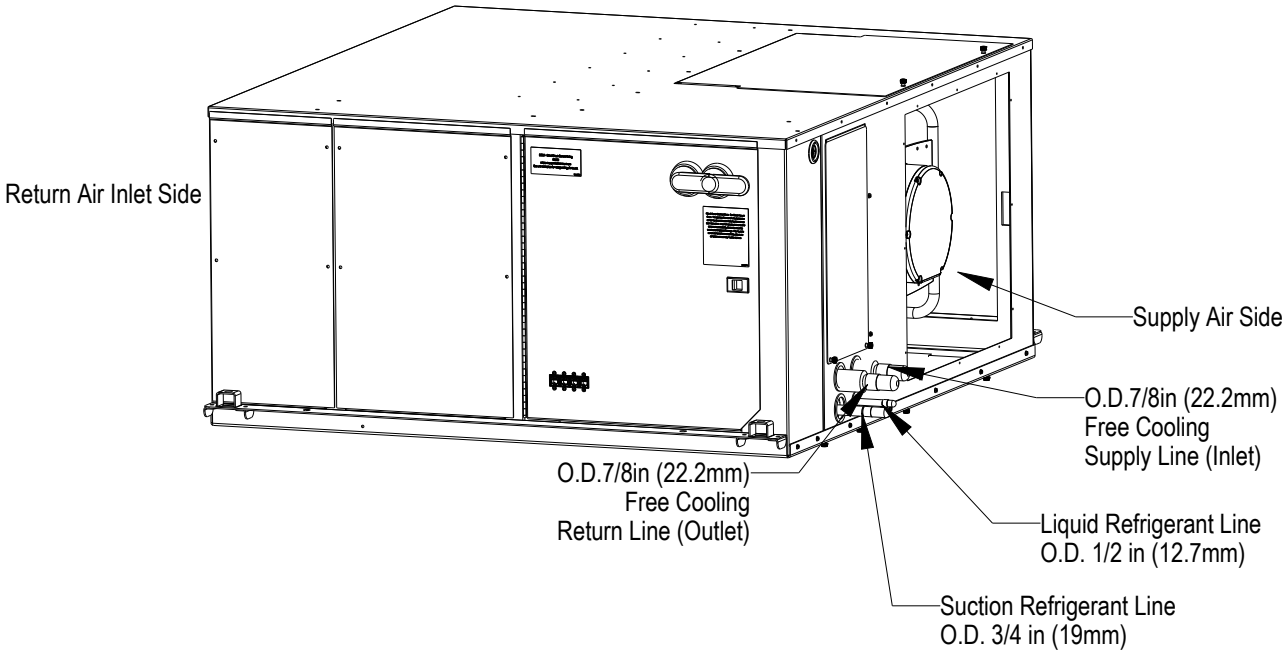


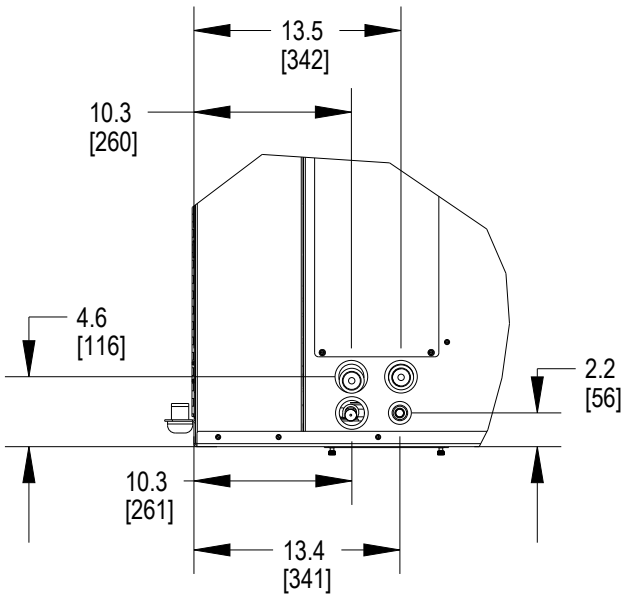


VERTIV COOLPHASE CEILING

PRIMARY CONNECTION LOCATIONS

4 & 5 TON DIRECT EXPANSION & FREE COOLING

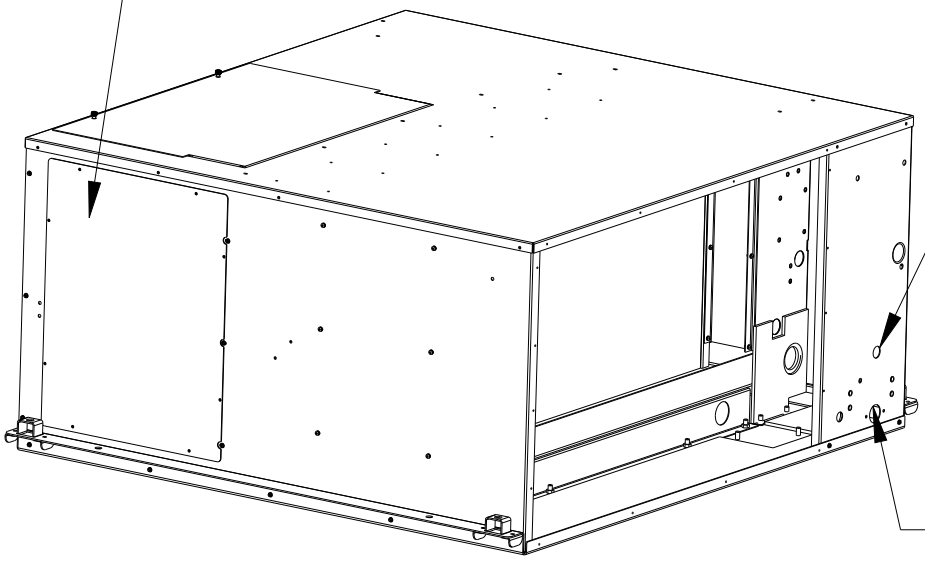


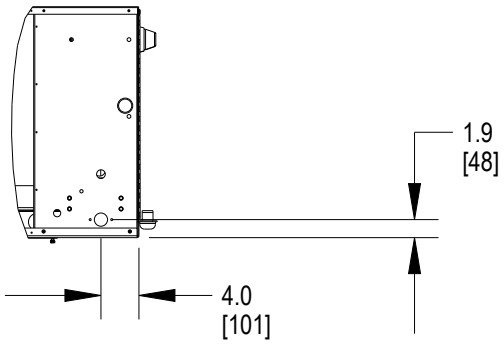


VERTIV COOLPHASE CEILING

PRIMARY CONNECTION LOCATIONS

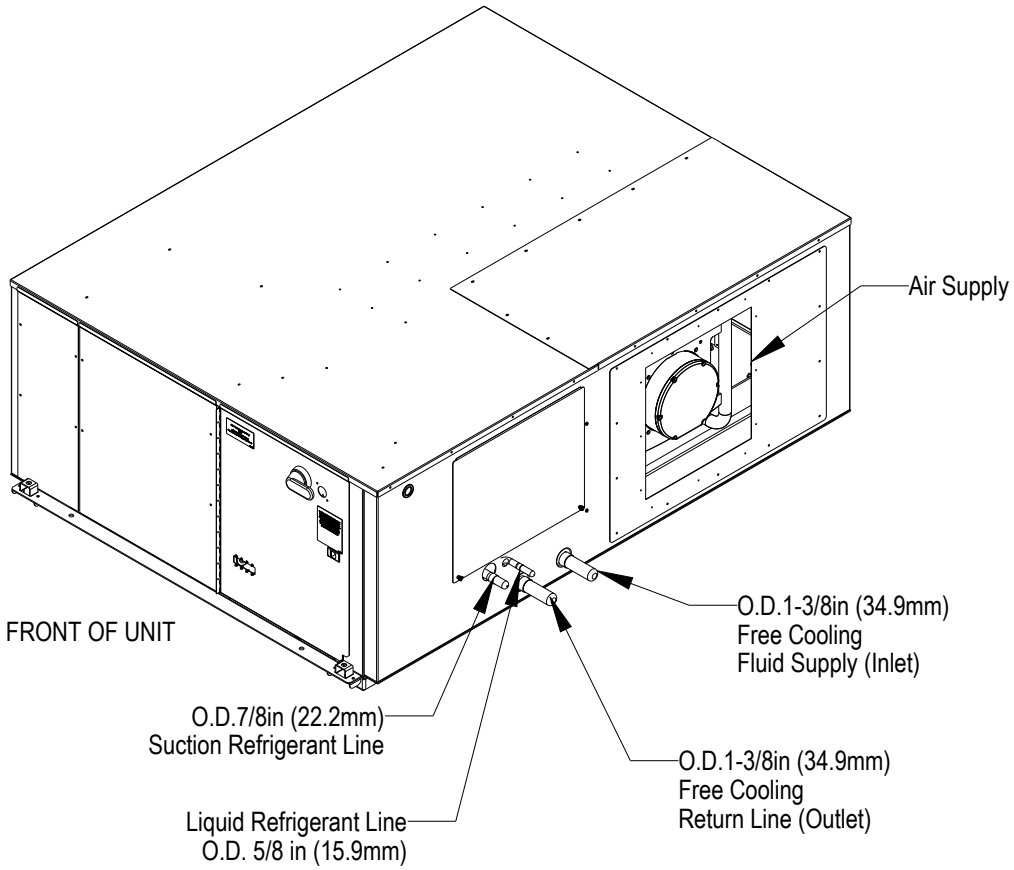
4 & 5 TON DIRECT EXPANSION & FREE COOLING

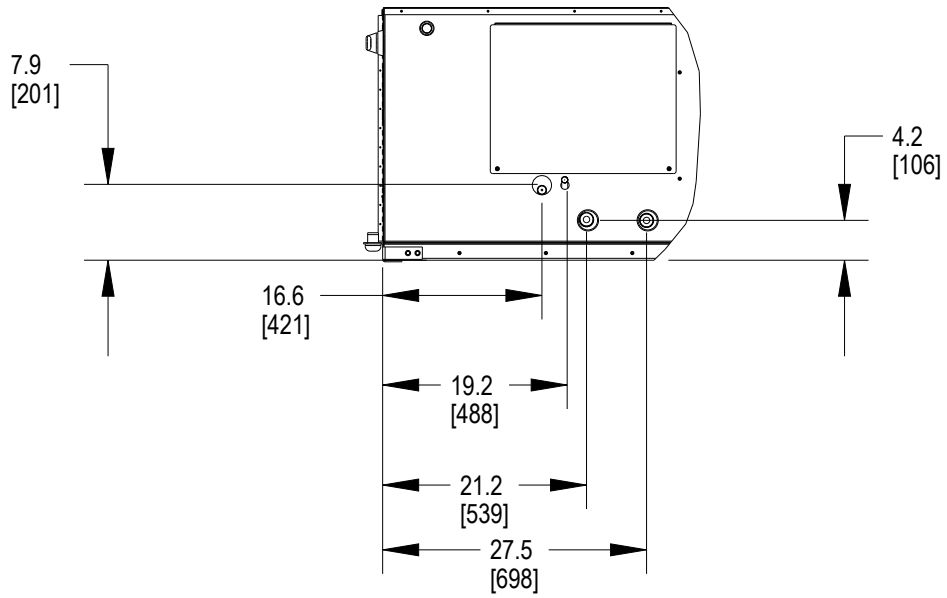




VERTIV COOLPHASE CEILING

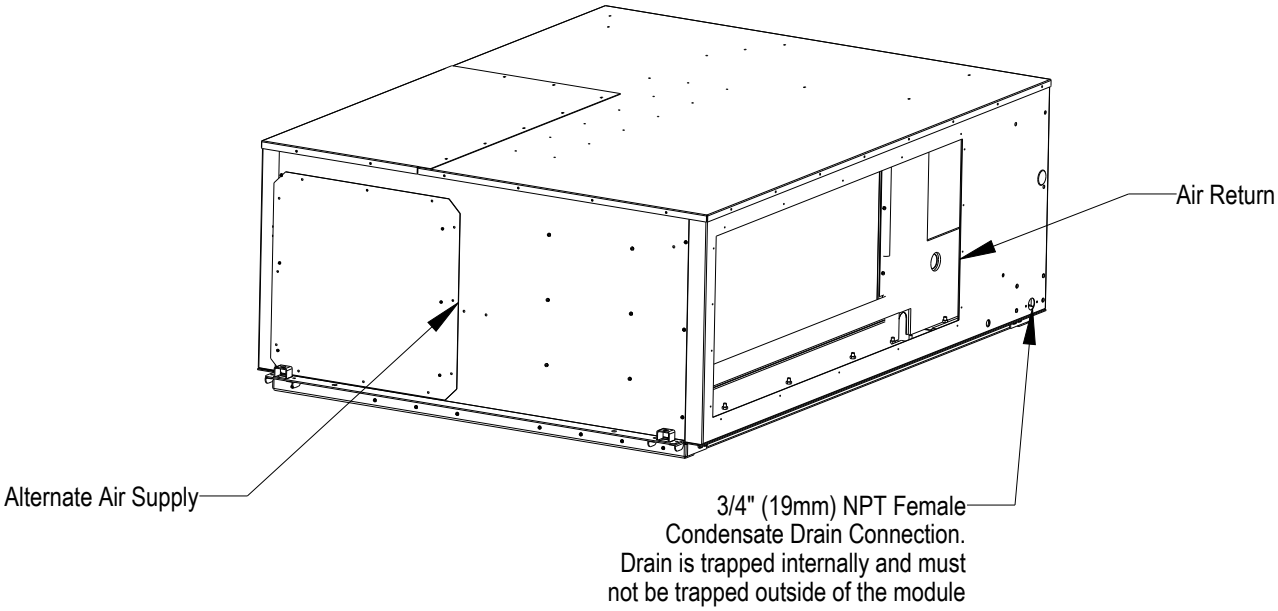
PRIMARY CONNECTION LOCATIONS
8 TON DIRECT EXPANSION & FREE COOLING

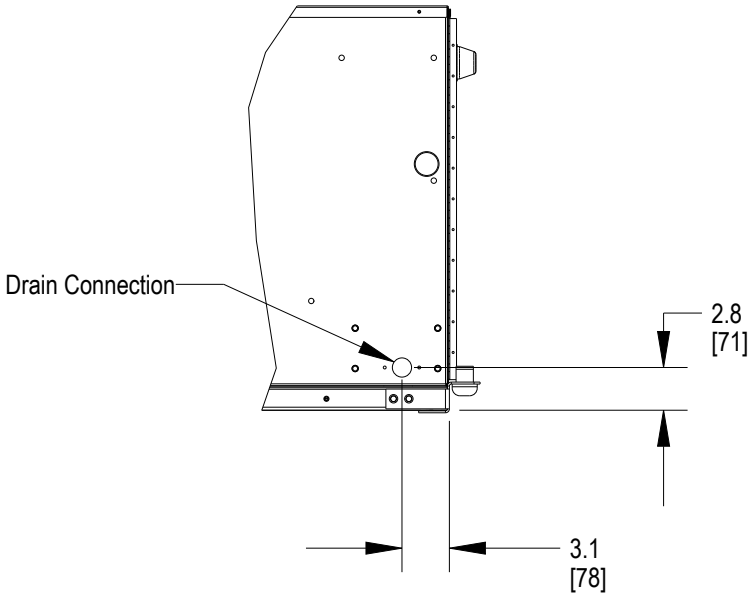




VERTIV COOLPHASE CEILING

PRIMARY CONNECTION LOCATIONS
8 TON DIRECT EXPANSION & FREE COOLING





Vertiv CoolPhase Condensing Unit

PRIMARY CONNECTION LOCATIONS

Field-installed piping must comply with all applicable local codes.
The vertical riser pipe size must be reduced according to the following trade sizes: (1-1/8 to 7/8, 7/8 to 3/4, 3/4 to 5/8, 5/8 to 1/2.)

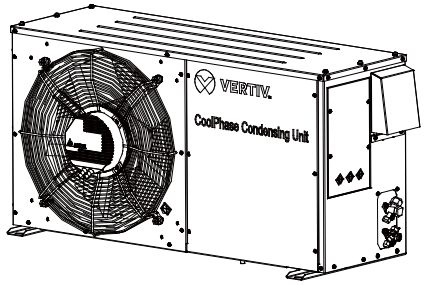


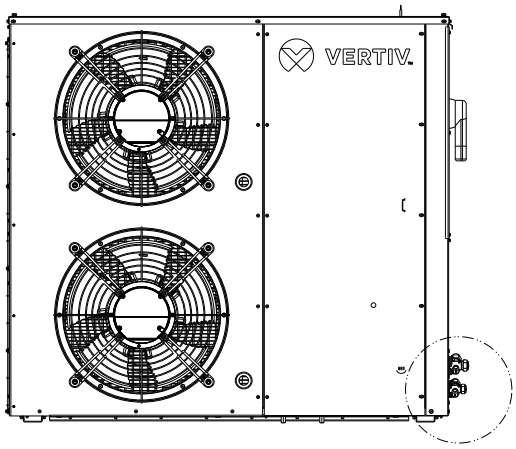
Table 1. Vertiv Coolphase Condensing Unit recommended refrigerant line size of standard units and low ambient units

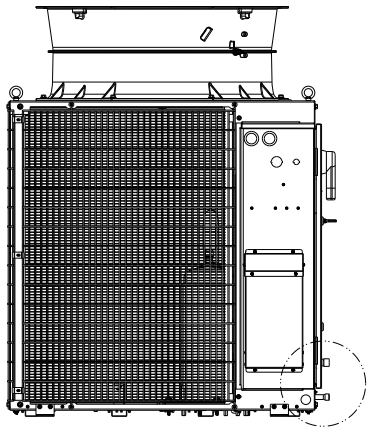
	A	B	C	D	E	F
1	Outdoor Model	Refrigerant line length ft(m)	Liquid line diameter ANSI(mm)	Suction line diameter ANSI(mm)	"LIQUID LINE SERVICE VALVE"	"SUCTION LINE SERVICE VALVE"
2	CUD030-E000A CUL030-E000A	L≤(33)10	1/4"(6.35)	1/2"(12.7)	7/16"-20UNF	3/4"-16UNF
3		33(10) < L≤197(60)	3/8"(9.52)	1/2"(12.7)	7/16"-20UNF	3/4"-16UNF
4	CUD070-E000A CUL070-E000A	L≤(33)10	3/8"(9.52)	1/2"(12.7)	5/8"-18UNF	3/4"-16UNF
5		33(10) < L≤115(35)	3/8"(9.52)	5/8"(16)	5/8"-18UNF	3/4"-16UNF
6		115(35) < L≤197(60)	1/2"(12.7)	5/8"(16)	5/8"-18UNF	3/4"-16UNF
7	CUD111-E000A CUL111-E000A CUD115-E000A CUL115-E000A	L≤66(20)	3/8"(9.52)	5/8"(16)	5/8"-18UNF	7/8"-14UNF
8		66(20) < L≤148(45)	1/2"(12.7)	3/4"(19.05)	5/8"-18UNF	7/8"-14UNF
9		148(45) < L≤197(60)	1/2"(12.7)	7/8"(22.23)	5/8"-18UNF	7/8"-14UNF

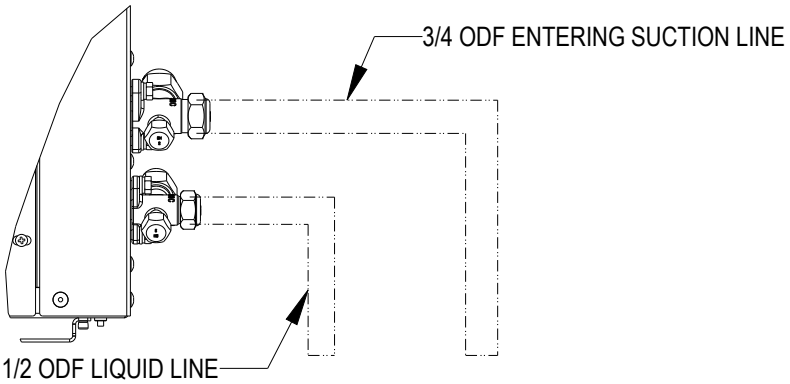
VERTIV COOLPHASE CONDENSING UNIT

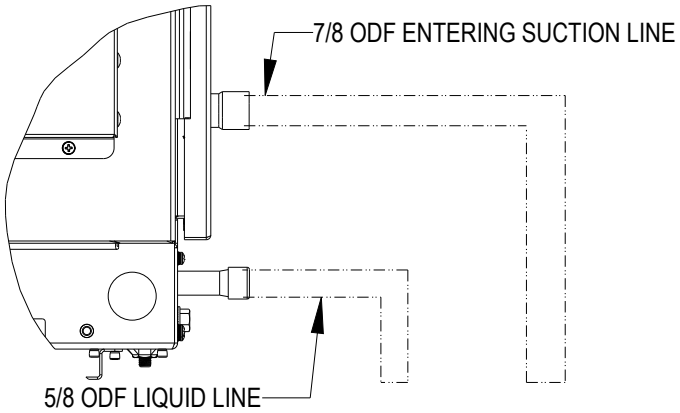
PIPING DIMENSIONAL DATA

CONDENSER UNITS 15 kW & 21kW







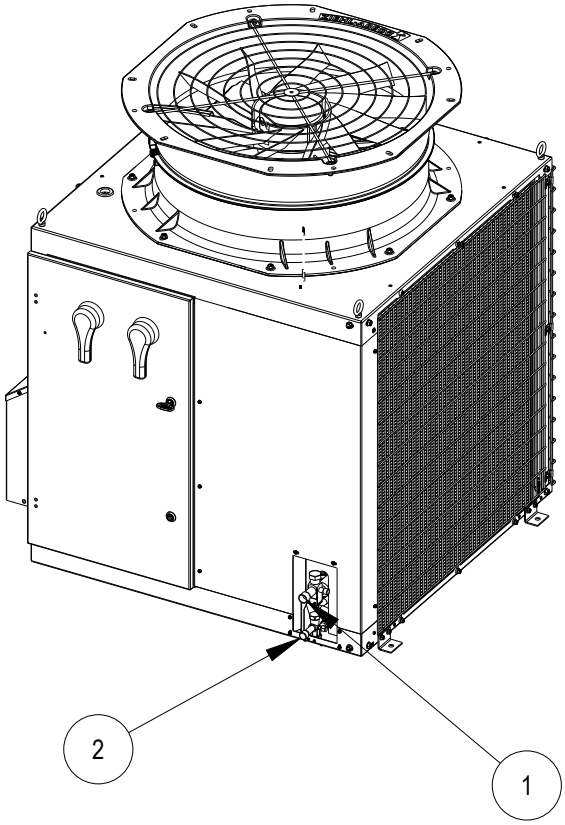


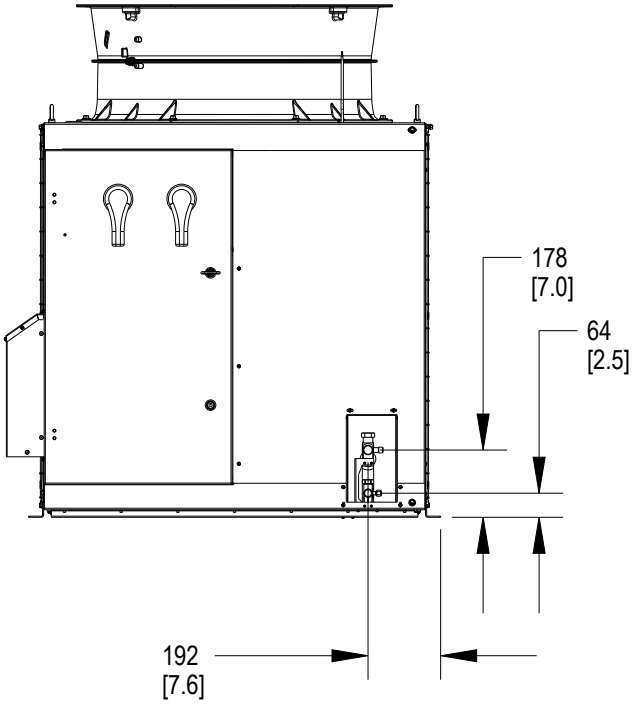
Model / Capacity	Length (mts)	Length (ft)	Liquid Line Diameter (mm)	Liquid Line Diameter (ANSI)	Suction Line Diameter (mm)	Suction Line Diameter (ANSI)
CU15 kW	5	16	12.7	1/2	19.05	3/4
	10	33	12.7	1/2	19.05	3/4
	15	49	12.7	1/2	22.23	7/8
	20	66	12.7	1/2	22.23	7/8
	25	82	12.7	1/2	22.23	7/8
	30	98	15.88	5/8	28.58	1 1/8
	35	115	15.88	5/8	28.58	1 1/8
	40	131	15.88	5/8	28.58	1 1/8
	45	148	15.88	5/8	28.58	1 1/8
	50	164	15.88	5/8	28.58	1 1/8
	55	180	15.88	5/8	28.58	1 1/8
	60	197	15.88	5/8	28.58	1 1/8
	65	213	15.88	5/8	28.58	1 1/8
	70	230	15.88	5/8	28.58	1 1/8
	75	246	15.88	5/8	28.58	1 1/8
	80	262	15.88	5/8	28.58	1 1/8
	85	279	15.88	5/8	28.58	1 1/8
	90	295	15.88	5/8	28.58	1 1/8

Model / Capacity	Length (mts)	Length (ft)	Liquid Line Diameter (mm)	Liquid Line Diameter (ANSI)	Suction Line Diameter (mm)	Suction Line Diameter (ANSI)
CU21 kW	5	16	12.7	1/2	19.05	3/4
	10	33	12.7	1/2	22.23	7/8
	15	49	12.7	1/2	22.23	7/8
	20	66	15.88	5/8	28.58	1 1/8
	25	82	15.88	5/8	28.58	1 1/8
	30	98	15.88	5/8	28.58	1 1/8
	35	115	15.88	5/8	28.58	1 1/8
	40	131	15.88	5/8	28.58	1 1/8
	45	148	15.88	5/8	28.58	1 1/8
	50	164	15.88	5/8	28.58	1 1/8
	55	180	15.88	5/8	28.58	1 1/8
	60	197	19.05	3/4	34.93	1 3/8
	65	213	19.05	3/4	34.93	1 3/8
	70	230	19.05	3/4	34.93	1 3/8
	75	246	19.05	3/4	34.93	1 3/8
	80	262	19.05	3/4	34.93	1 3/8
	85	279	19.05	3/4	34.93	1 3/8
	90	295	19.05	3/4	34.93	1 3/8
	95	312	19.05	3/4	34.93	1 3/8
	100	328	19.05	3/4	34.93	1 3/8
	105	344	19.05	3/4	34.93	1 3/8
	110	361	19.05	3/4	34.93	1 3/8
	115	377	19.05	3/4	34.93	1 3/8
	120	394	19.05	3/4	34.93	1 3/8

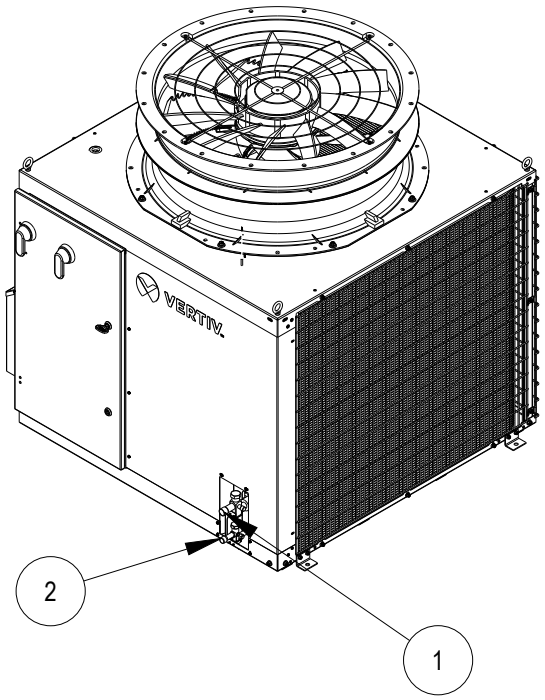
VERTIV COOLPHASE ROW

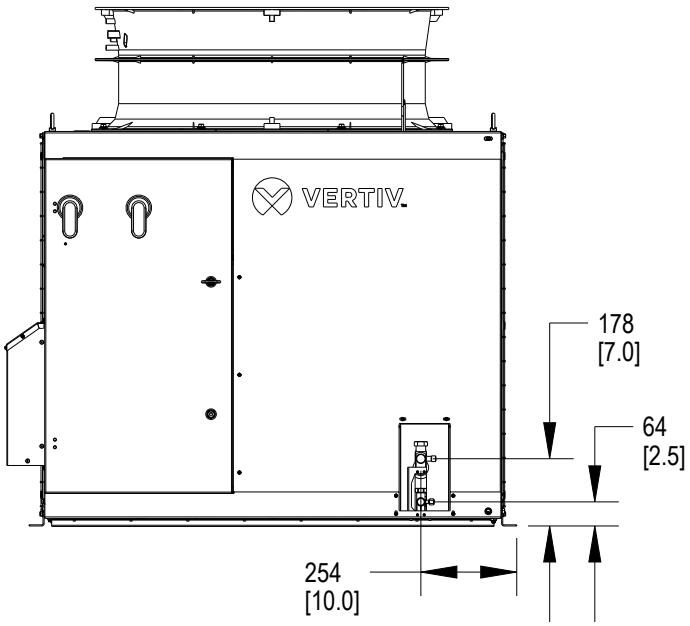
PIPING CONNECTION LOCATIONS
CONDENSING UNIT 28KW & 35KW





1	SUCTION LINE INLET	5/8" ODF
2	LIQUID LINE OUTLET	7/8" ODF



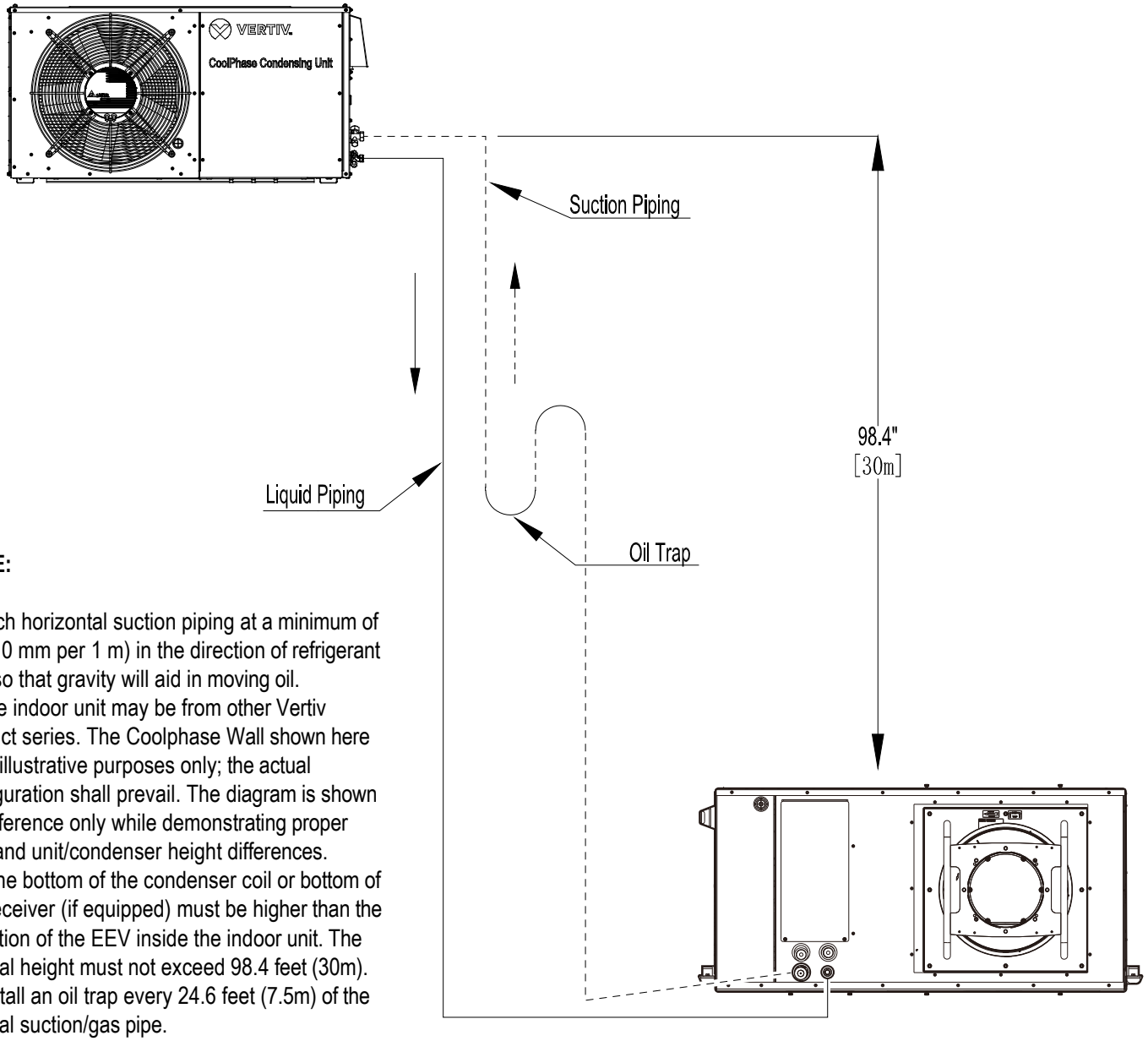


1	SUCTION LINE INLET	5/8" ODF
2	LIQUID LINE OUTLET	7/8" ODF

Vertiv CoolPhase Condensing Unit

PIPING SCHEMATIC

CONDENSING UNIT ABOVE INDOOR UNIT 3.5, 7 & 11 kW



NOTE:

1. Pitch horizontal suction piping at a minimum of 1% (10 mm per 1 m) in the direction of refrigerant flow so that gravity will aid in moving oil.
2. The indoor unit may be from other Vertiv product series. The Coolphase Wall shown here is for illustrative purposes only; the actual configuration shall prevail. The diagram is shown for reference only while demonstrating proper pipe and unit/condenser height differences.
3. If the bottom of the condenser coil or bottom of the receiver (if equipped) must be higher than the elevation of the EEV inside the indoor unit. The vertical height must not exceed 98.4 feet (30m).
4. Install an oil trap every 24.6 feet (7.5m) of the vertical suction/gas pipe.
5. If the condensing unit is installed indoors, the total system refrigerant charge (Indoor unit + Condensing unit + Piping) can't exceed 4 lbs.

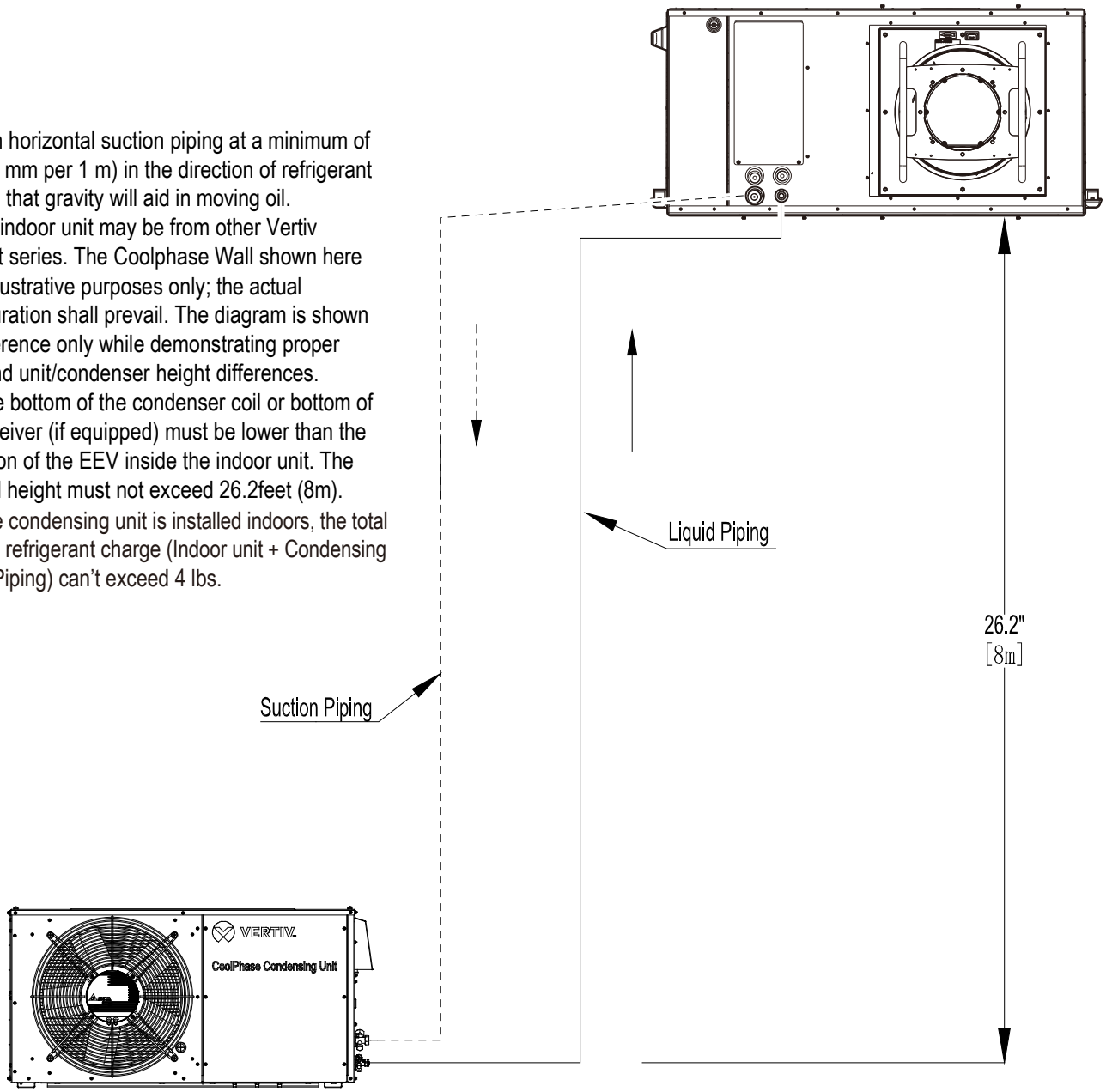
Vertiv CoolPhase Condensing Unit

PIPING SCHEMATIC

CONDENSING UNIT ABOVE INDOOR UNIT 3.5, 7 & 11 kW

NOTE:

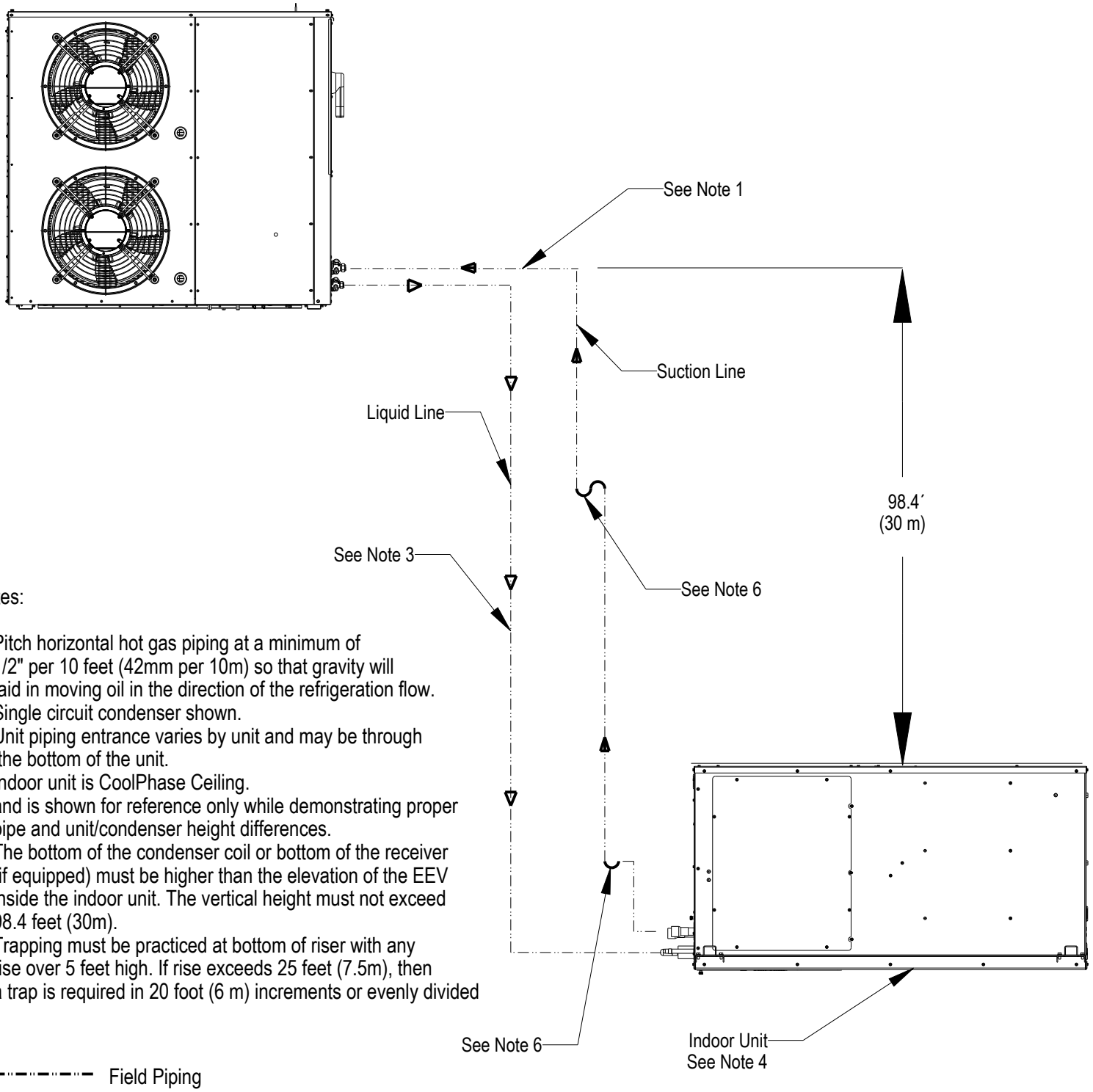
1. Pitch horizontal suction piping at a minimum of 1% (10 mm per 1 m) in the direction of refrigerant flow so that gravity will aid in moving oil.
2. The indoor unit may be from other Vertiv product series. The Coolphase Wall shown here is for illustrative purposes only; the actual configuration shall prevail. The diagram is shown for reference only while demonstrating proper pipe and unit/condenser height differences.
3. If the bottom of the condenser coil or bottom of the receiver (if equipped) must be lower than the elevation of the EEV inside the indoor unit. The vertical height must not exceed 26.2feet (8m).
4. If the condensing unit is installed indoors, the total system refrigerant charge (Indoor unit + Condensing unit + Piping) can't exceed 4 lbs.



VERTIV COOLPHASE CONDENSING UNIT

PIPING SCHEMATIC

CONDENSING UNIT ABOVE INDOOR UNIT 15 kW



Notes:

1. Pitch horizontal hot gas piping at a minimum of 1/2" per 10 feet (42mm per 10m) so that gravity will aid in moving oil in the direction of the refrigeration flow.
2. Single circuit condenser shown.
3. Unit piping entrance varies by unit and may be through the bottom of the unit.
4. Indoor unit is CoolPhase Ceiling. and is shown for reference only while demonstrating proper pipe and unit/condenser height differences.
5. The bottom of the condenser coil or bottom of the receiver (if equipped) must be higher than the elevation of the EEV inside the indoor unit. The vertical height must not exceed 98.4 feet (30m).
6. Trapping must be practiced at bottom of riser with any rise over 5 feet high. If rise exceeds 25 feet (7.5m), then a trap is required in 20 foot (6 m) increments or evenly divided

Field Piping

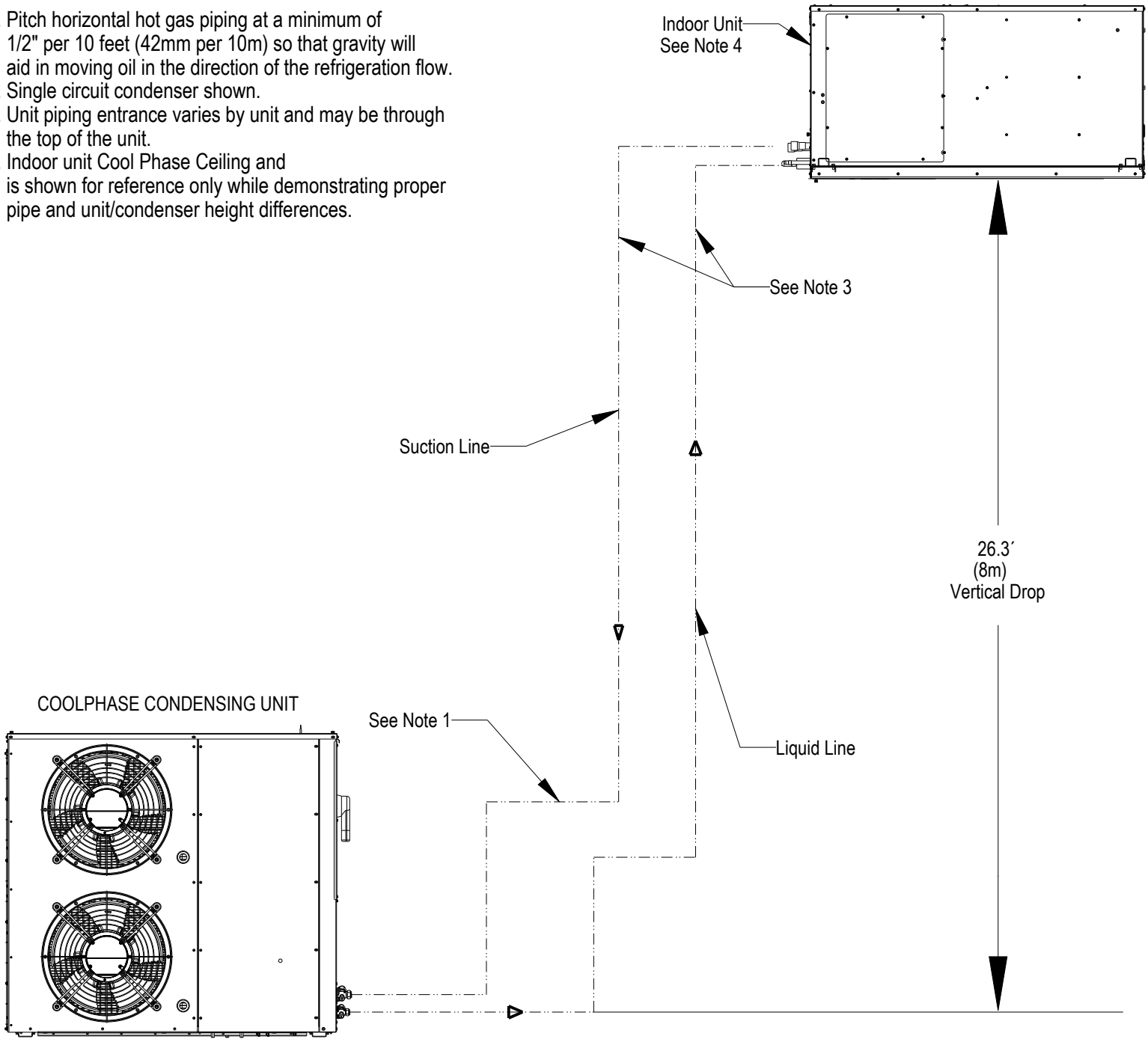
VERTIV COOLPHASE CONDENSING UNIT

PIPING SCHEMATIC

CONDENSING UNIT BELOW INDOOR UNIT 15kW

Notes:

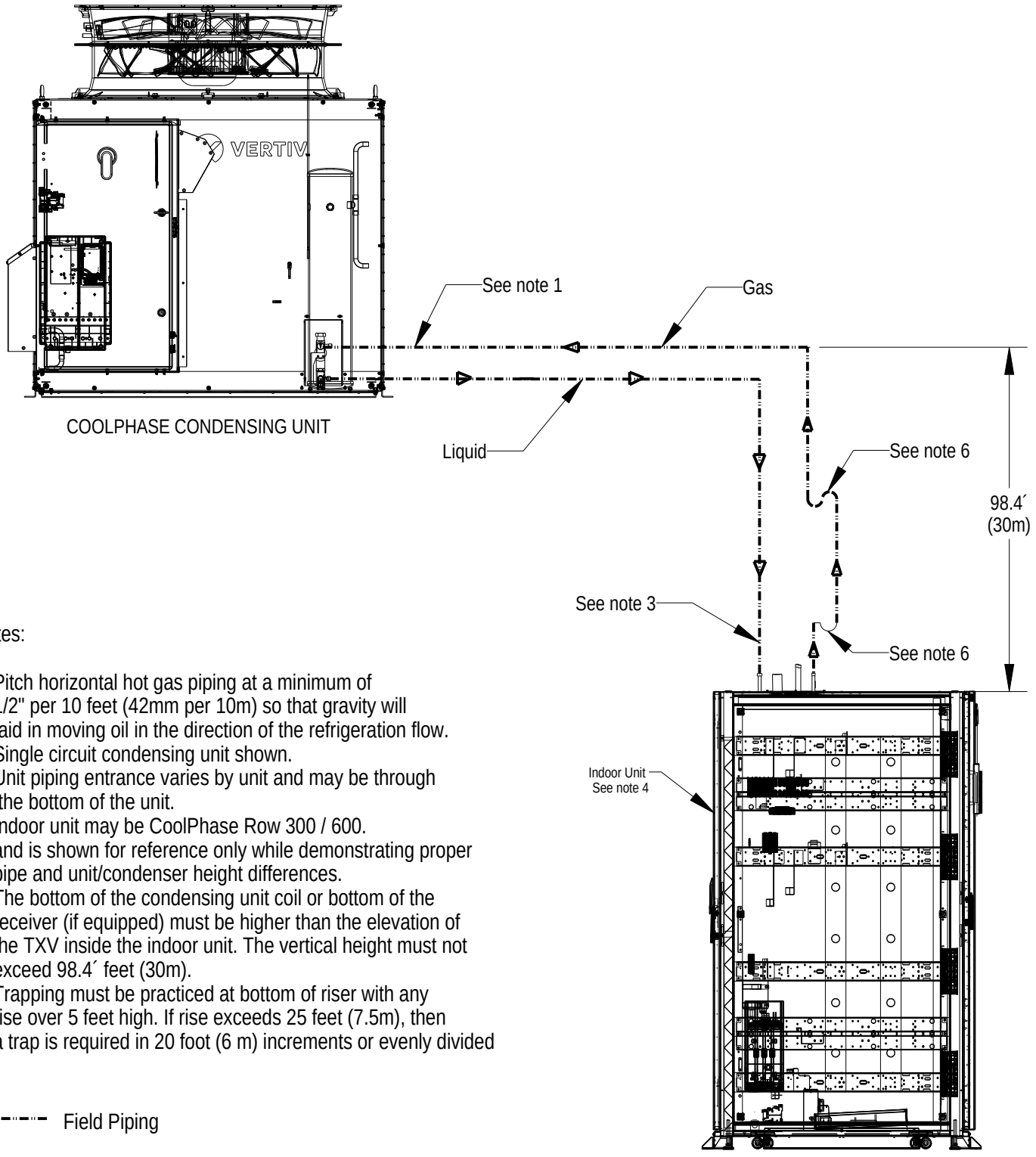
1. Pitch horizontal hot gas piping at a minimum of 1/2" per 10 feet (42mm per 10m) so that gravity will aid in moving oil in the direction of the refrigeration flow.
2. Single circuit condenser shown.
3. Unit piping entrance varies by unit and may be through the top of the unit.
4. Indoor unit Cool Phase Ceiling and is shown for reference only while demonstrating proper pipe and unit/condenser height differences.



VERTIV COOLPHASE CONDENSING UNIT

PIPING SCHEMATIC

CONDENSING UNIT ABOVE INDOOR UNIT 21 & 28kW



Notes:

1. Pitch horizontal hot gas piping at a minimum of 1/2" per 10 feet (42mm per 10m) so that gravity will aid in moving oil in the direction of the refrigeration flow.
2. Single circuit condensing unit shown.
3. Unit piping entrance varies by unit and may be through the bottom of the unit.
4. Indoor unit may be CoolPhase Row 300 / 600. and is shown for reference only while demonstrating proper pipe and unit/condenser height differences.
5. The bottom of the condensing unit coil or bottom of the receiver (if equipped) must be higher than the elevation of the TXV inside the indoor unit. The vertical height must not exceed 98.4´ feet (30m).
6. Trapping must be practiced at bottom of riser with any rise over 5 feet high. If rise exceeds 25 feet (7.5m), then a trap is required in 20 foot (6 m) increments or evenly divided

Field Piping

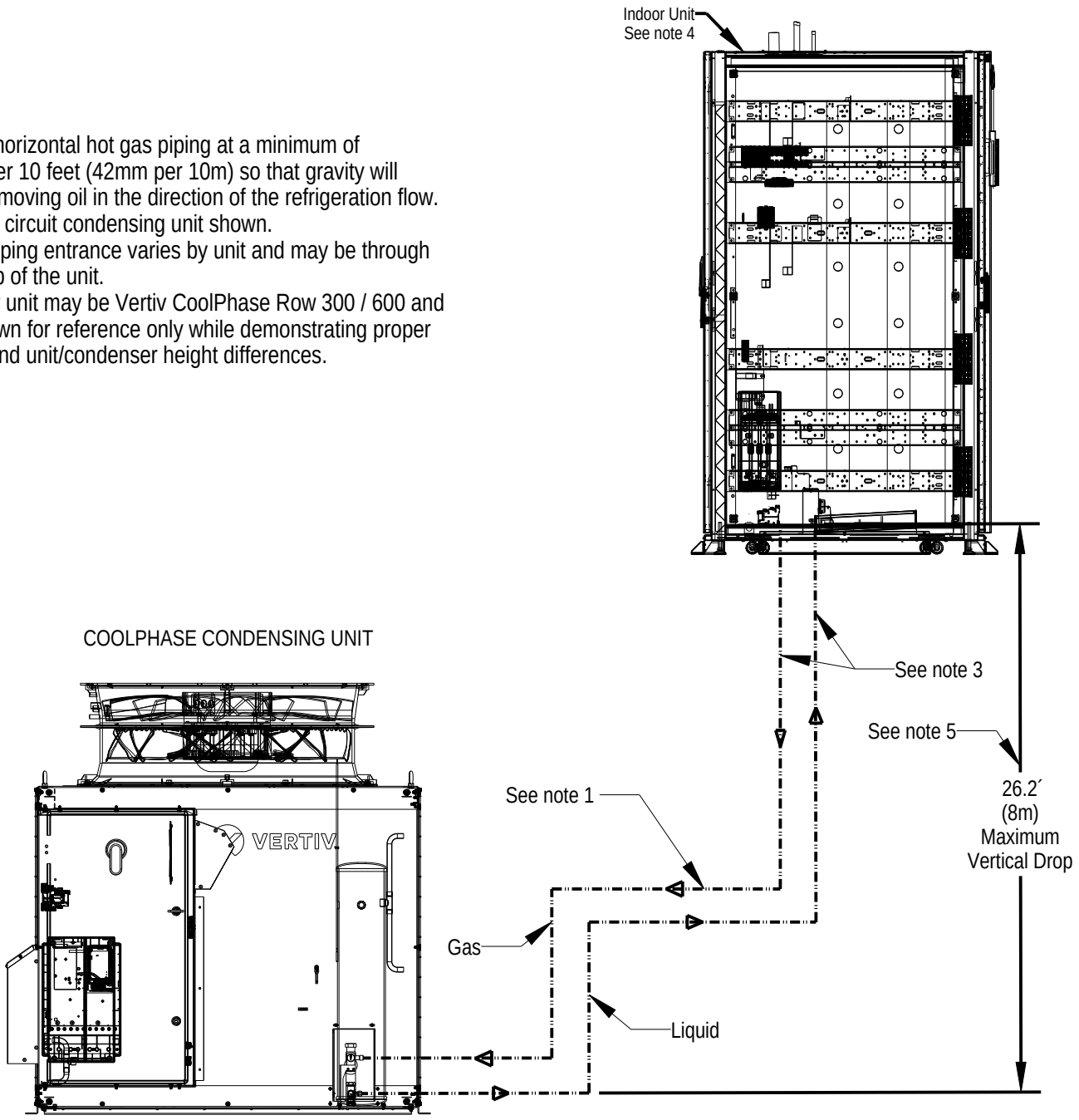
VERTIV COOLPHASE CONDENSING UNIT

PIPING SCHEMATIC

CONDENSING UNIT BELOW INDOOR UNIT 21 & 28kW

Notes:

1. Pitch horizontal hot gas piping at a minimum of 1/2" per 10 feet (42mm per 10m) so that gravity will aid in moving oil in the direction of the refrigeration flow.
2. Single circuit condensing unit shown.
3. Unit piping entrance varies by unit and may be through the top of the unit.
4. Indoor unit may be Vertiv CoolPhase Row 300 / 600 and is shown for reference only while demonstrating proper pipe and unit/condenser height differences.



Field Piping

DX PRODUCTS WITH R32

A2L REFRIGERANT DISPERSAL VOLUME CALCULATION R32

Engineer of record to determine the Refrigerant Charge m_c and required minimum Effective Dispersal Volume V_{ED} of the space to which the appliance can be utilized for the cooling of ITE AREAS.

The required minimum EFFECTIVE DISPERSAL VOLUME V_{ED} is a function of the refrigerant charge, m_c and is represented by the following equation:

$V_{ED} = m_c / 0.5 \times LFL$

V_{ED} = the minimum Effective Dispersal Volume in ft^3 (m^3)

m_c = the refrigerant charge of the largest single circuit of a unit in lbs (kg)

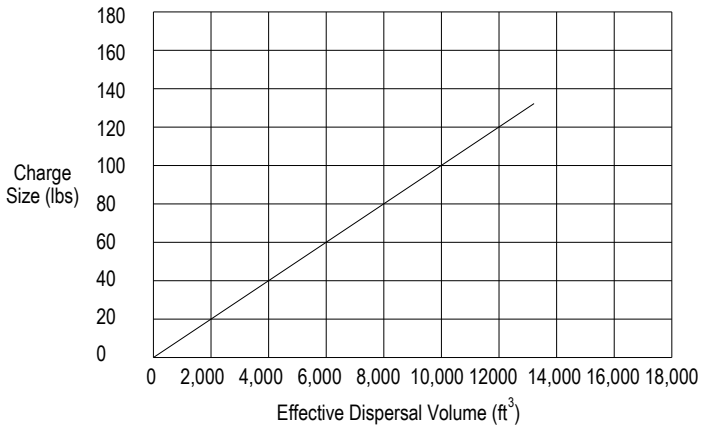
0.5 = the concentration factor

LFL = the Lower Flammability Limit in lbs/1000 ft^3 (kg/m^3)

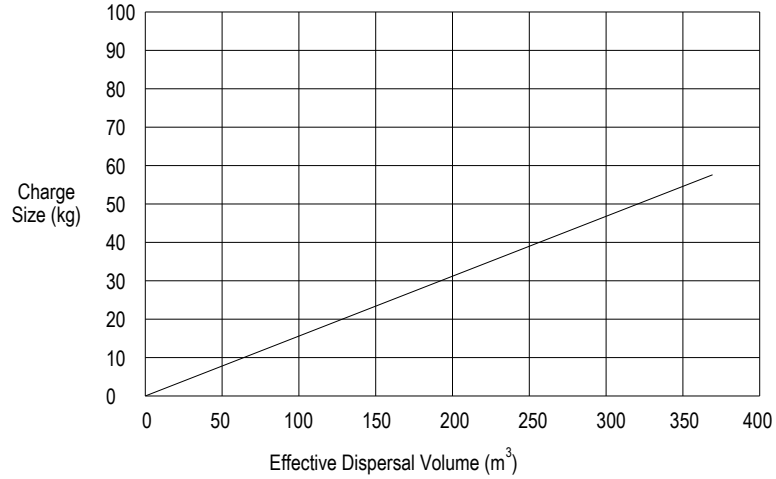
Note: The LFL of R32 is 19.2 lbs/1000 ft^3 (307.0 g/m^3) according to ASHRAE 34-2022.

Minimum Effective Dispersal Volume V_{ED} of the space shall be based on altitude of the installation location. For locations above sea level, the engineer of record will need to adjust the value of LFL in accordance with ANSI/ASHRAE 34 before applying it to the equation for determining the required minimum Effective Dispersal Volume V_{ED}.

Charge Size vs. Effective Dispersal Volume



Charge Size vs. Effective Dispersal Volume



A2L REFRIGERANT DISPERSAL VOLUME CALCULATION R32

How to Determine the Effective Dispersal Volume of an ITE Area

Volume Calculations shall be based on the overall volume of space available to which the refrigerant disperses within the CIRCULATION AIRFLOW in the event of a refrigerant leak. This overall volume shall be modified with the appropriate deductions. For the purposes of determining the EFFECTIVE DISPERSAL VOLUME of an ITE AREA the following shall apply:

a) The EFFECTIVE DISPERSAL VOLUME shall only include the circulated airflow of the system.
b) The EFFECTIVE DISPERSAL VOLUME shall initially include the ITE AREA enclosed by the floor, walls, and ceiling of that space.
c) When the CIRCULATION AIRFLOW includes underfloor spaces, suspended ceiling spaces, or other partitioned spaces, such as equipment galleries, the volume of those spaces may be included.

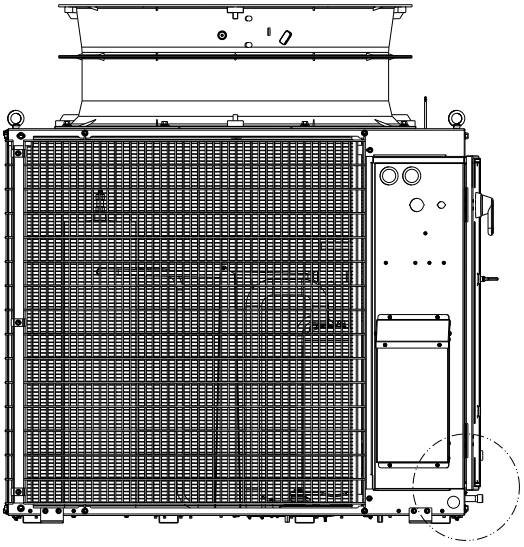
In general, the volume of equipment, piping, wiring, or other apparatus that consume space within and are isolated from the CIRCULATION AIRFLOW shall be deducted from the EFFECTIVE DISPERSAL VOLUME. The following deductions shall be applied:

a) When the CIRCULATION AIRFLOW has been fully contained on both hot and cold sides of the aisle, via ducts or other apparatus, any room volume outside of that containment shall not be included when calculating the EFFECTIVE DISPERSAL VOLUME.
b) When the overall volume of space available, or a partitioned portion of that volume includes ducted openings from partially ducted systems, some volume of that space may require a deduction. No volume greater than 4 feet away in height from the upper most supply or return duct opening in the space may be included when calculating the EFFECTIVE DISPERSAL VOLUME, unless an analysis of the airflow has been conducted to show that the volume of air has effective movement for the mixing of a leaked refrigerant.
c) Obstructions of tubing, piping, wiring, etc., consuming more than 0.0071 m^3 (0.25 ft^3) of space shall be included in the deductions from the overall volume.
d) The ITE within the circulated airflow shall be evaluated for their deduction from the EFFECTIVE DISPERSAL VOLUME. The deducted volume of the ITE shall be based on the designed maximum capacity or fill of the servers.
e) As a maximum value, no more than 75 % of the ITE's volume shall be included as circulating air space in the EFFECTIVE DISPERSAL VOLUME. The total volume of the ITE shall be defined by the overall dimensions of its ITE ENCLOSURE. Small gaps in between individual server racks shall not be included in the EFFECTIVE DISPERSAL VOLUME.
f) Any other volume within the circulation airflow that is otherwise enclosed or partitioned off from the airflow shall be deducted in the calculation of the EFFECTIVE DISPERSAL VOLUME.

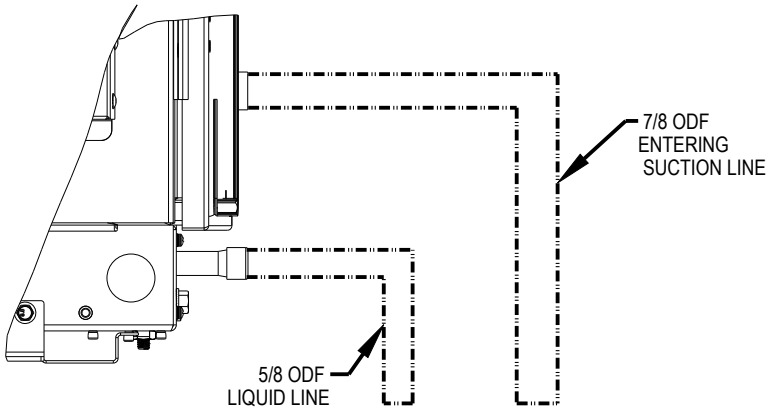
VERTIV COOLPHASE CONDENSING UNIT

PIPING DIMENSIONAL DATA

CONDENSING UNITS 28 & 35 kW



FIELD PIPING



OPTIONAL FUSIBLE PLUG SERVICE KIT TO BE BRAZED INTO THE LIQUID LINE(S) IN EITHER THE VERTICAL OR HORIZONTAL POSITION. (WHERE REQUIRED)

(VERTICAL POSITION IS PREFERRED, HORIZONTAL POSITION IS OPTIONAL.)

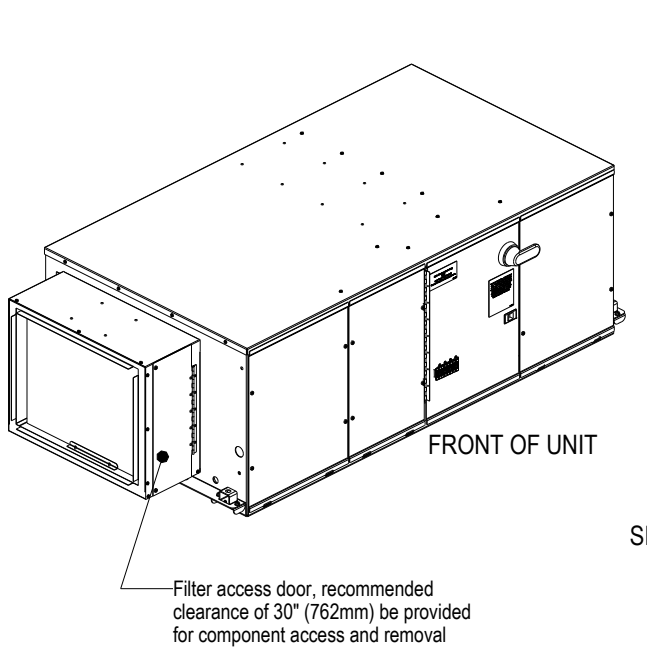
☐ CONNECTION SIZES:

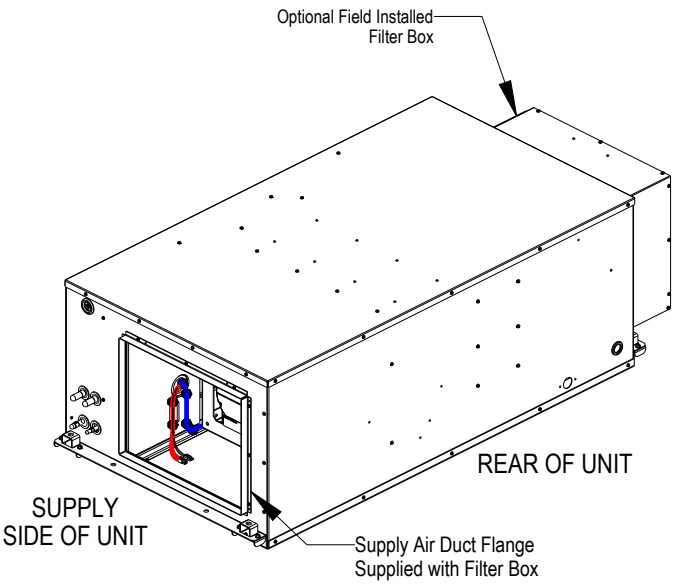
Model / Capacity	Length (mts)	Length (ft)	Liquid Line Ø (mm)	Liquid Line Ø (ANSI)	Suction Line Ø (mm)	Suction Line Ø (ANSI)
CU28 kW	1	3.28	12.7	1/2	22.23	7/8
	5	16.40	12.7	1/2	22.23	7/8
	10	32.81	15.88	5/8	22.23	7/8
	15	49.21	15.88	5/8	28.58	1 1/8
	20	65.62	15.88	5/8	28.58	1 1/8
	25	82.02	15.88	5/8	28.58	1 1/8
	30	98.43	19.05	3/4	28.58	1 1/8
	35	114.83	19.05	3/4	34.93	1 3/8
	40	131.23	19.05	3/4	34.93	1 3/8
	45	147.64	19.05	3/4	34.93	1 3/8
	50	164.04	19.05	3/4	34.93	1 3/8
	55	180.45	19.05	3/4	34.93	1 3/8
	60	196.85	19.05	3/4	34.93	1 3/8
	65	213.25	19.05	3/4	34.93	1 3/8
	70	229.66	19.05	3/4	34.93	1 3/8
	75	246.06	19.05	3/4	34.93	1 3/8
	80	262.47	22.23	7/8	34.93	1 3/8
	85	278.87	22.23	7/8	41.28	1 5/8
	90	295.28	22.23	7/8	41.28	1 5/8
	95	311.68	22.23	7/8	41.28	1 5/8
	100	328.08	22.23	7/8	41.28	1 5/8
	105	344.49	22.23	7/8	41.28	1 5/8
	110	360.89	22.23	7/8	41.28	1 5/8
	115	377.30	22.23	7/8	41.28	1 5/8
	120	393.70	22.23	7/8	41.28	1 5/8

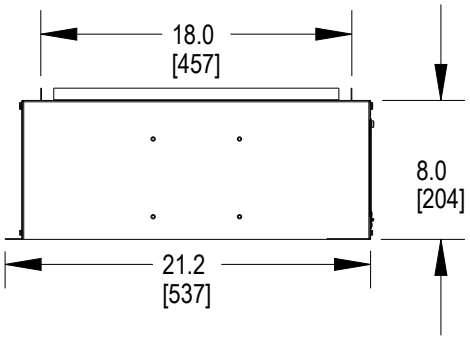
Model / Capacity	Length (mts)	Length (ft)	Liquid Line Ø (mm)	Liquid Line Ø (ANSI)	Suction Line Ø (mm)	Suction Line Ø (ANSI)
CU35 kW	1	3.28	12.7	1/2	22.23	7/8
	5	16.40	12.7	1/2	22.23	7/8
	10	32.81	15.88	5/8	28.58	1 1/8
	15	49.21	15.88	5/8	28.58	1 1/8
	20	65.62	15.88	5/8	28.58	1 1/8
	25	82.02	19.05	3/4	34.93	1 3/8
	30	98.43	19.05	3/4	34.93	1 3/8
	35	114.83	19.05	3/4	34.93	1 3/8
	40	131.23	19.05	3/4	34.93	1 3/8
	45	147.64	19.05	3/4	34.93	1 3/8
	50	164.04	19.05	3/4	34.93	1 3/8
	55	180.45	19.05	3/4	34.93	1 3/8
	60	196.85	22.23	7/8	41.28	1 5/8
	65	213.25	22.23	7/8	41.28	1 5/8
	70	229.66	22.23	7/8	41.28	1 5/8
	75	246.06	22.23	7/8	41.28	1 5/8
	80	262.47	22.23	7/8	41.28	1 5/8
	85	278.87	22.23	7/8	41.28	1 5/8
	90	295.28	22.23	7/8	41.28	1 5/8
	95	311.68	22.23	7/8	41.28	1 5/8
	100	328.08	22.23	7/8	41.28	1 5/8
	105	344.49	22.23	7/8	41.28	1 5/8
	110	360.89	22.23	7/8	41.28	1 5/8
	115	377.30	22.23	7/8	41.28	1 5/8
	120	393.70	22.23	7/8	41.28	1 5/8

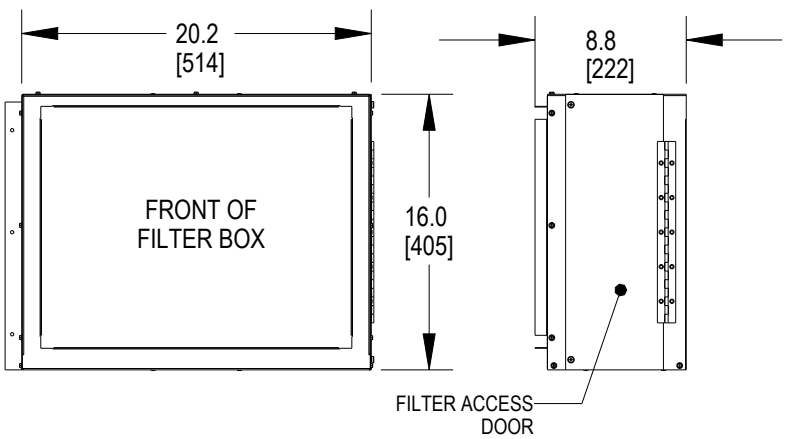
VERTIV COOLPHASE CEILING

DIMENSIONAL DATA
FILTER BOX 1 TON

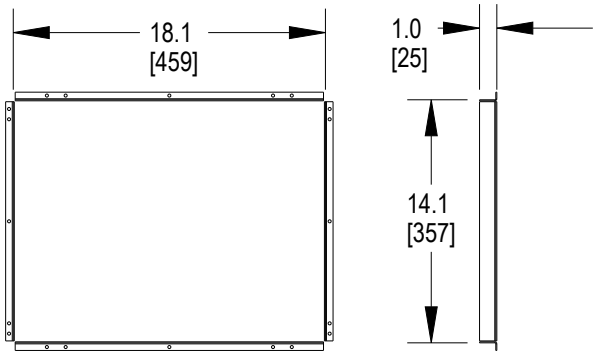








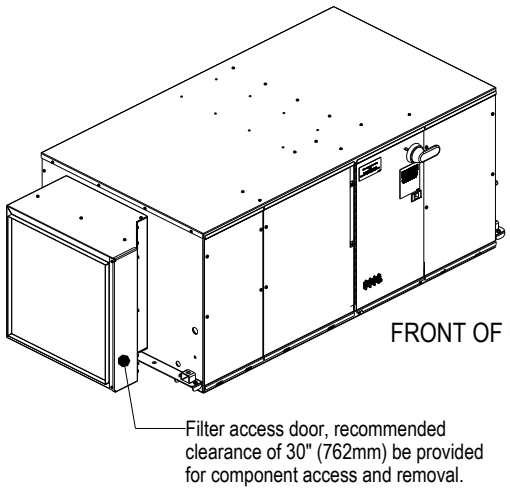
OPTIONAL FILTER BOX

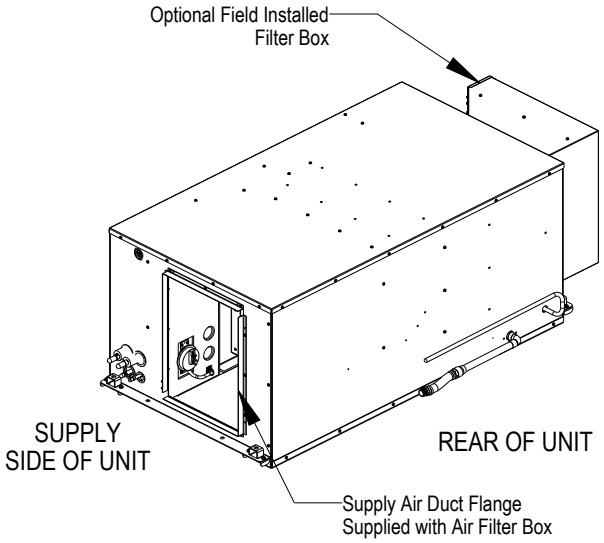


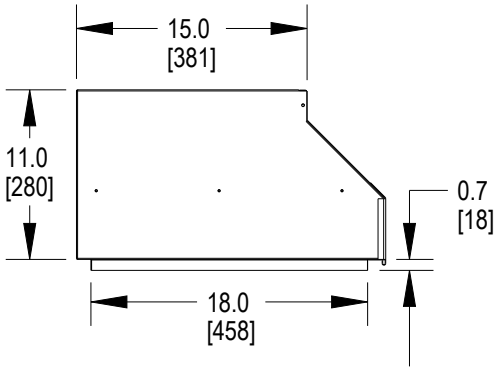
SUPPLY AIR DUCT FLANGE
INSTALLED DIMENSIONS

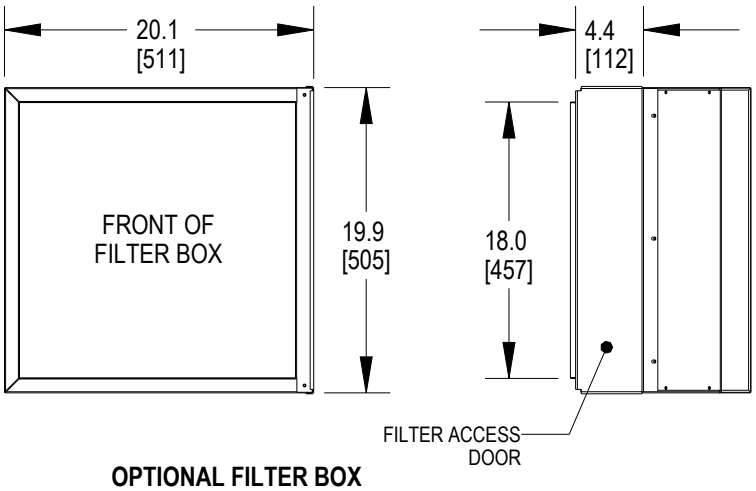
VERTIV COOLPHASE CEILING

DIMENSIONAL DATA
FILTER BOX 2 & 3 TON

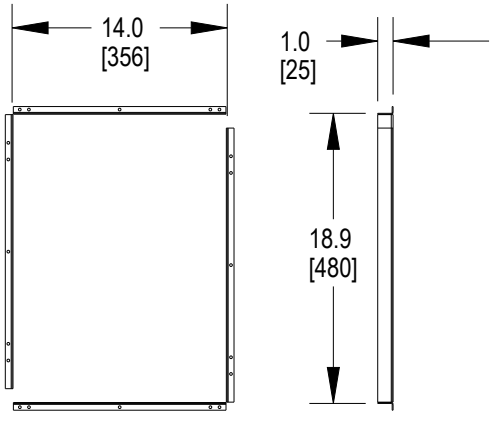








OPTIONAL FILTER BOX

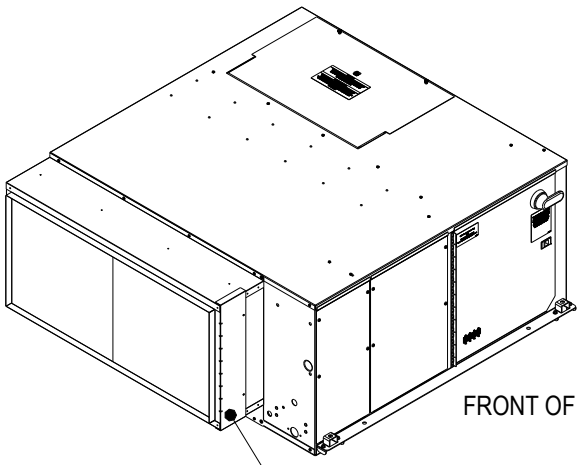


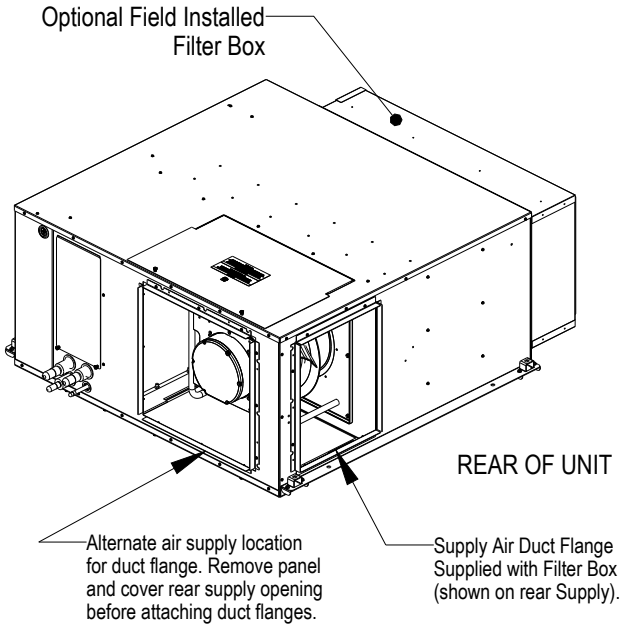
SUPPLY AIR DUCT FLANGES

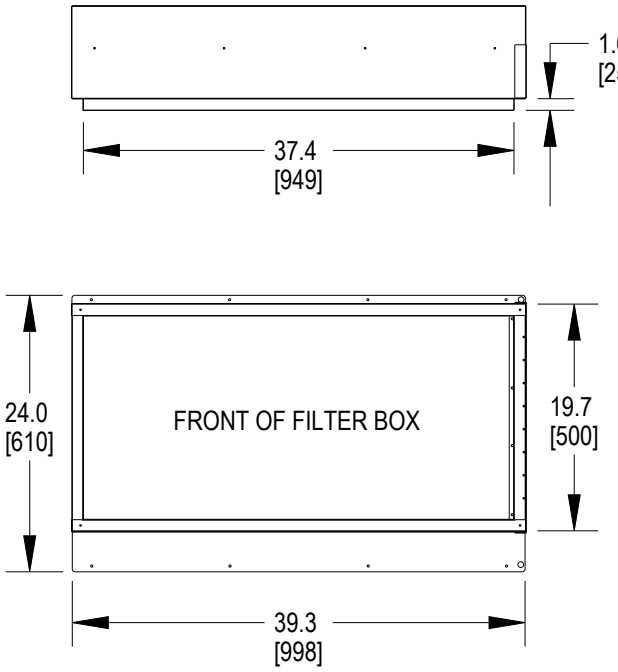
INSTALLED DIMENSIONS

VERTIV COOLPHASE CEILING

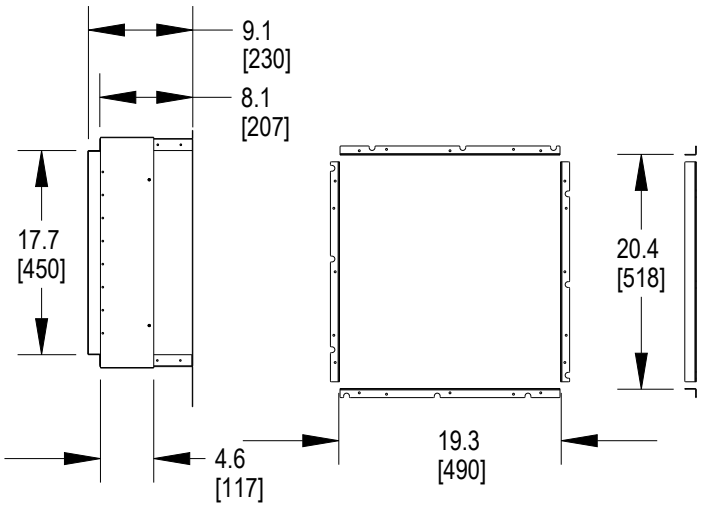
DIMENSIONAL DATA
FILTER BOX 4 & 5 TON







OPTIONAL FILTER BOX

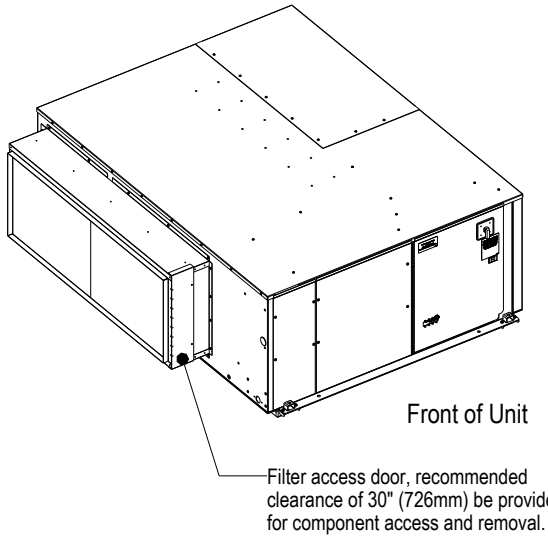


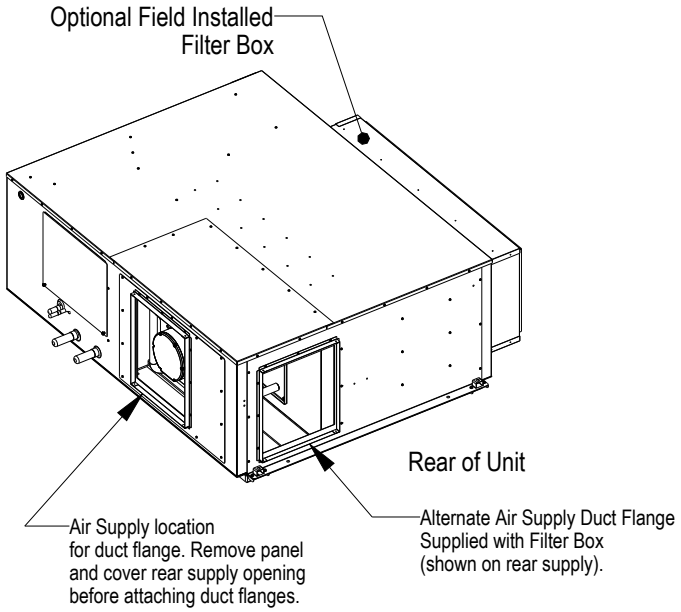
SUPPLY AIR DUCT FLANGES

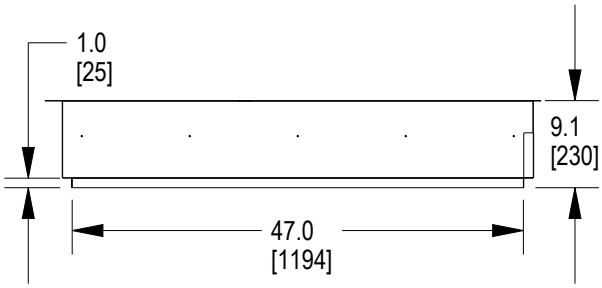
INSTALLED DIMENSIONS

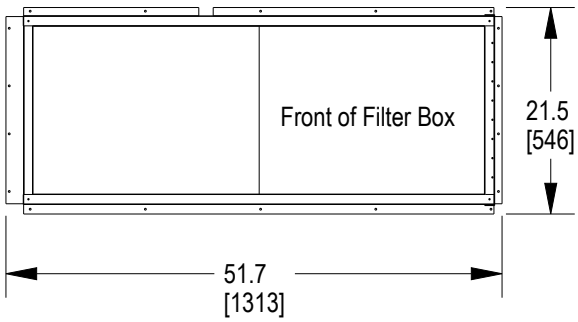
VERTIV COOLPHASE CEILING

DIMENSIONAL DATA
FILTER BOX 8 TON

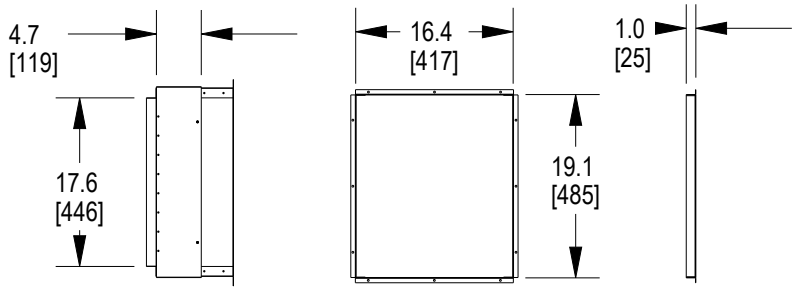








OPTIONAL FILTER BOX

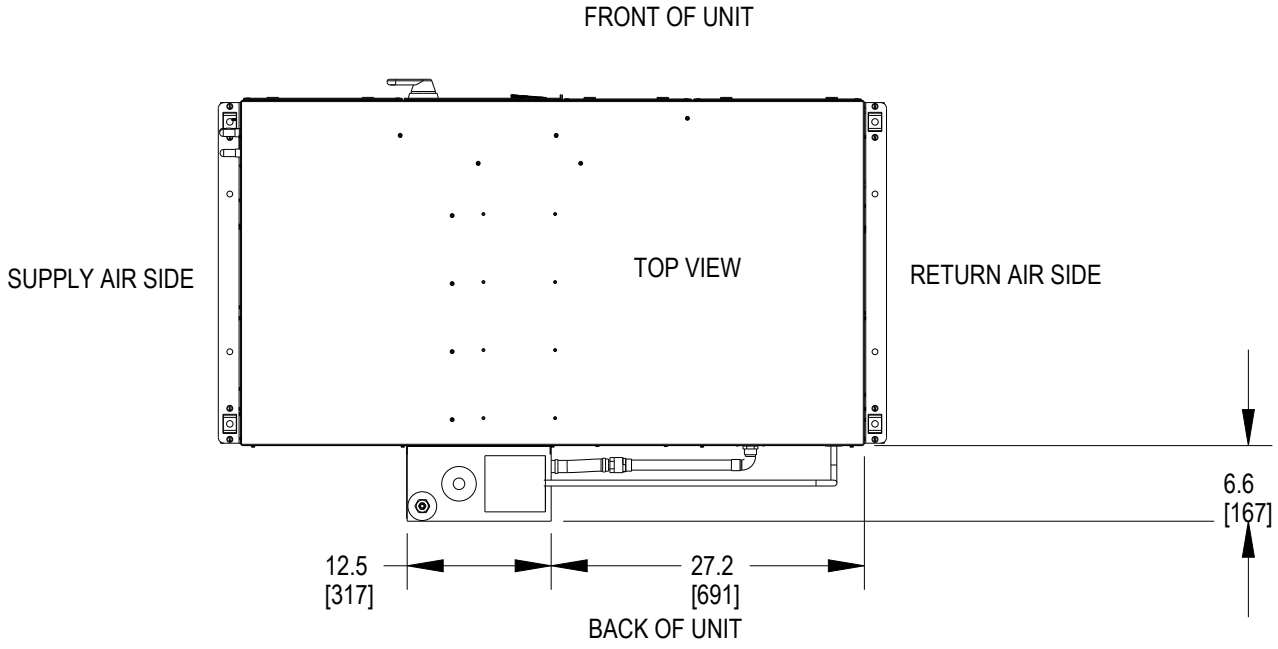


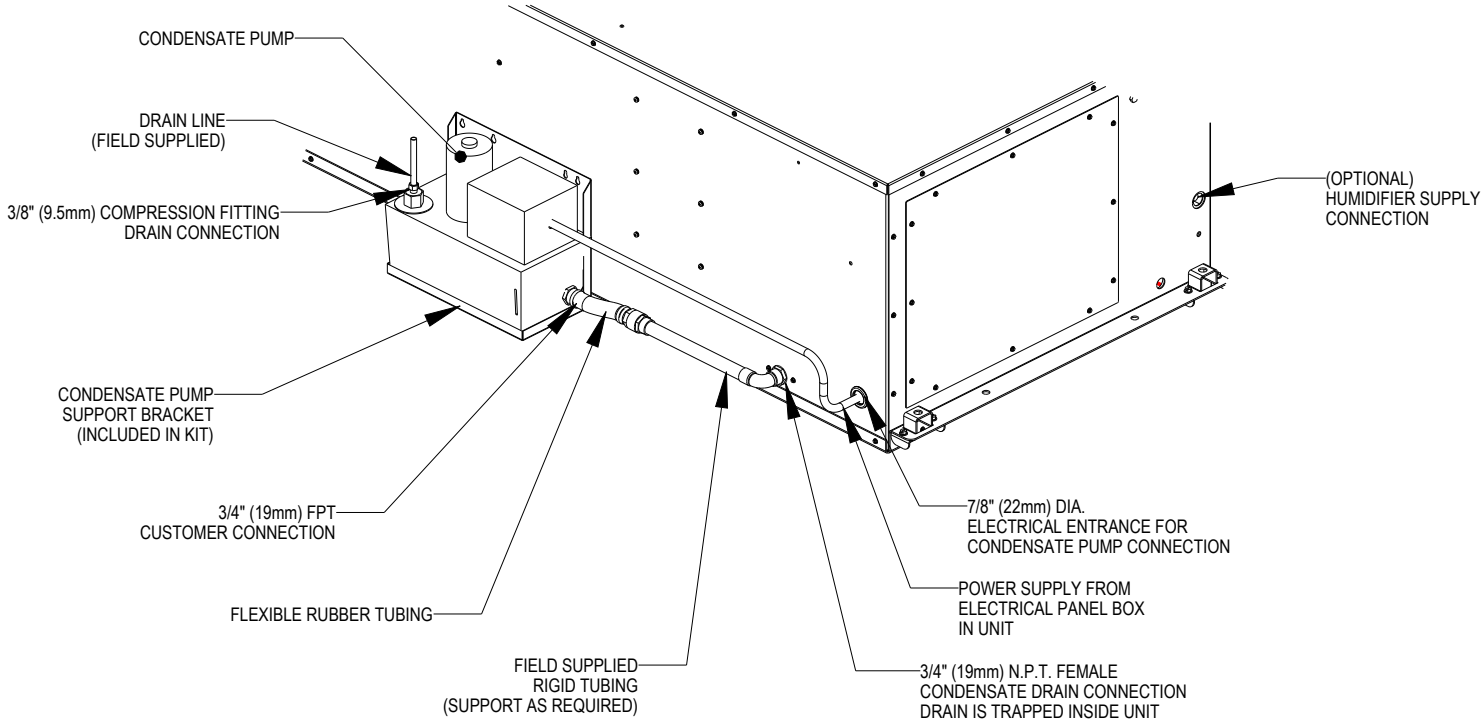
SUPPLY AIR DUCT FLANGES
INSTALLED DIMENSIONS

VERTIV COOLPHASE CEILING

PIPING CONNECTIONS

CONDENSATE PUMP CONNECTION LOCATIONS, 1 TON

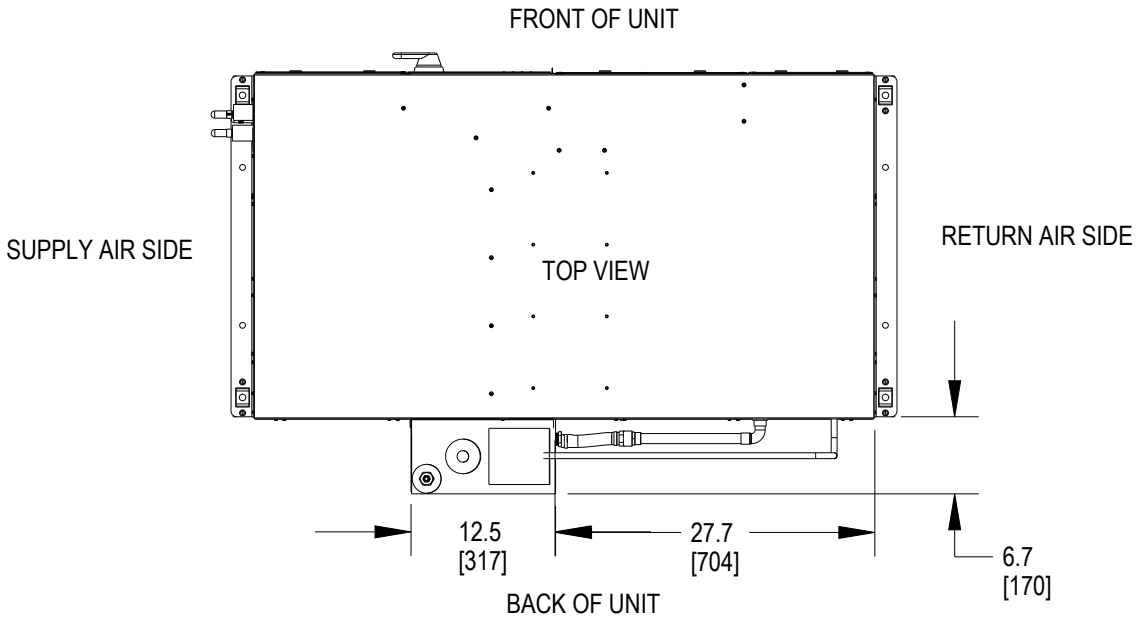


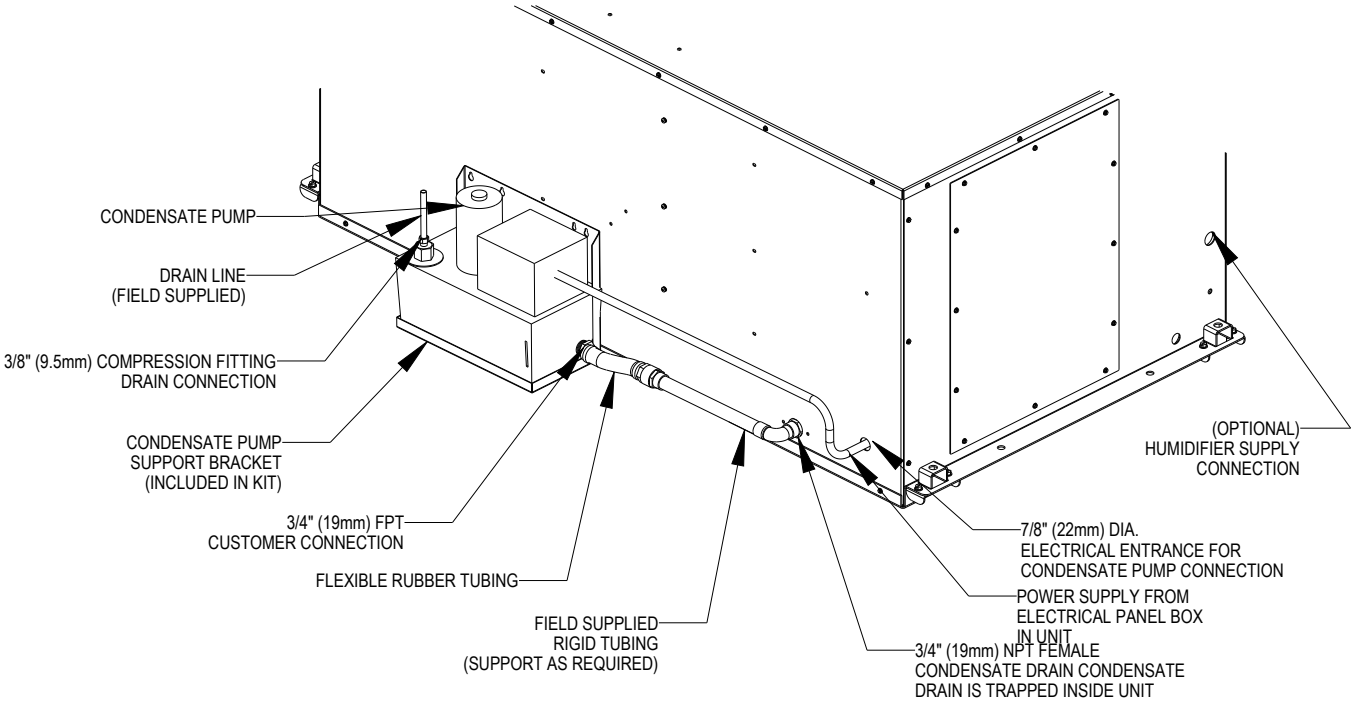


VERTIV COOLPHASE CEILING

PIPING CONNECTIONS

CONDENSATE PUMP CONNECTION LOCATIONS, 2 & 3 TON

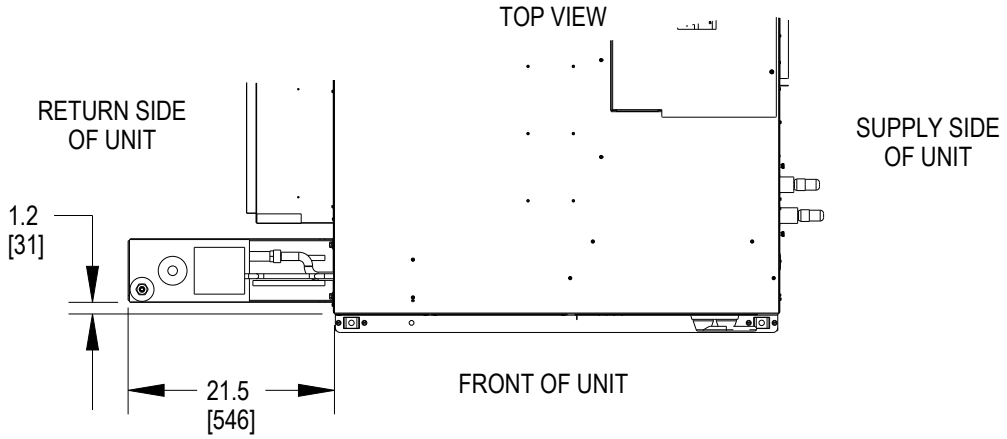


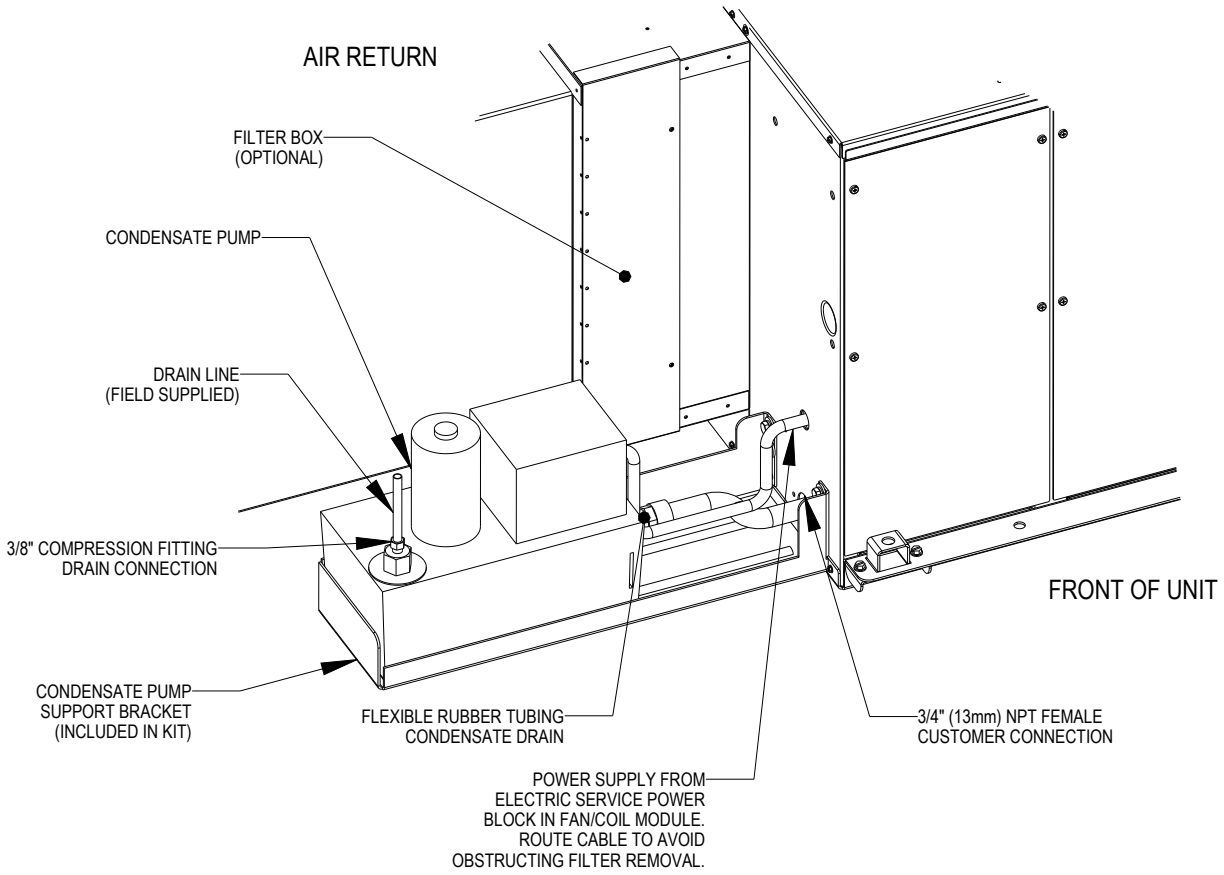


VERTIV COOLPHASE CEILING

PIPING CONNECTIONS

CONDENSATE PUMP CONNECTION LOCATIONS, 4 & 5 TON

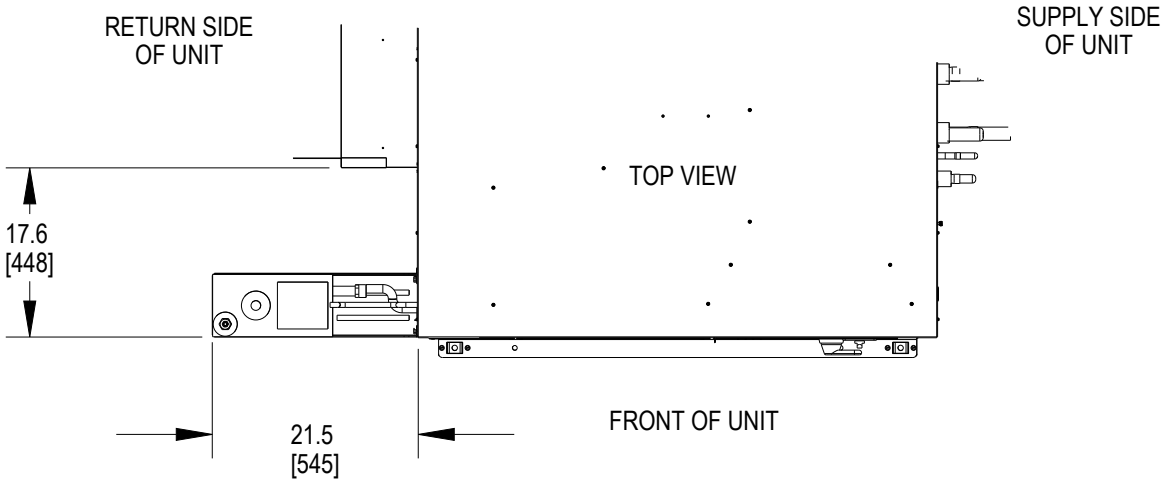


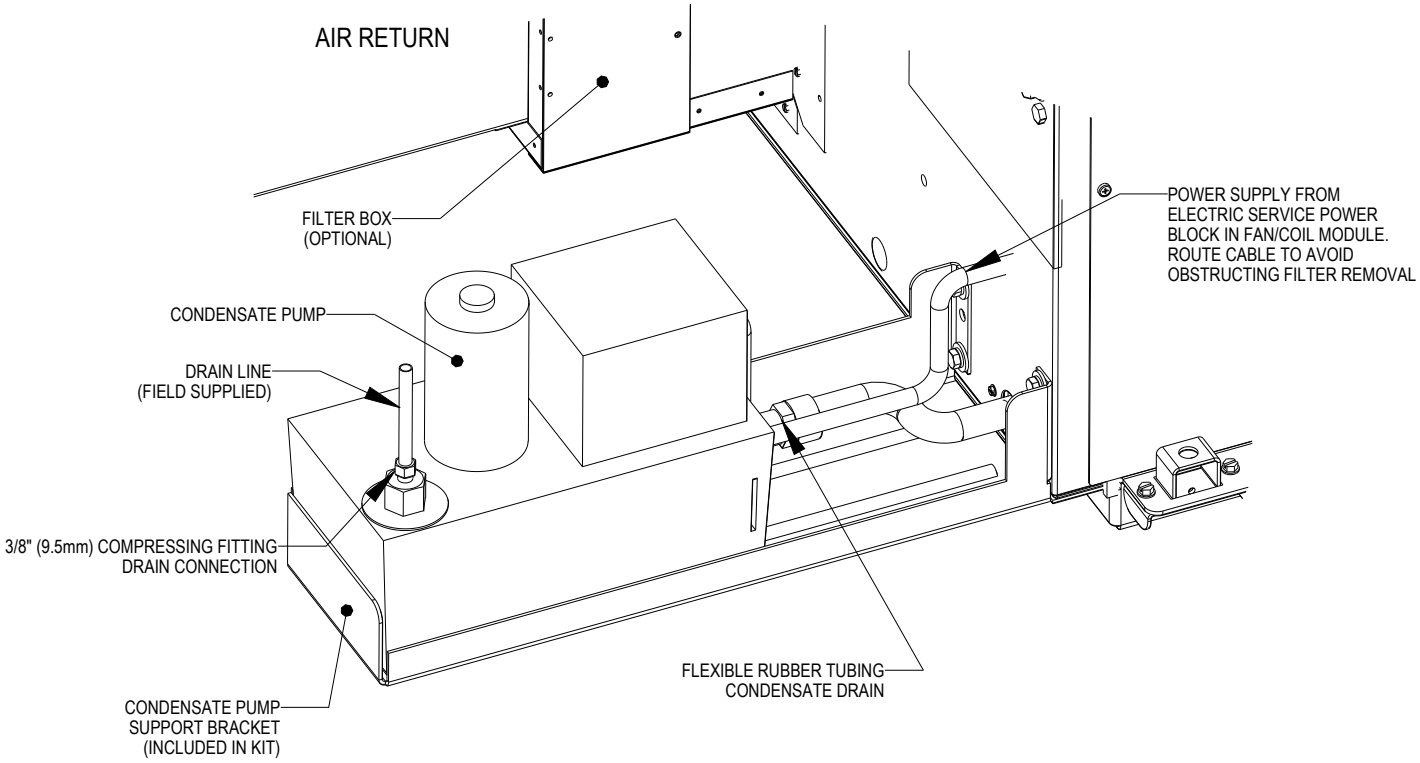


VERTIV COOLPHASE CEILING

PIPING CONNECTIONS

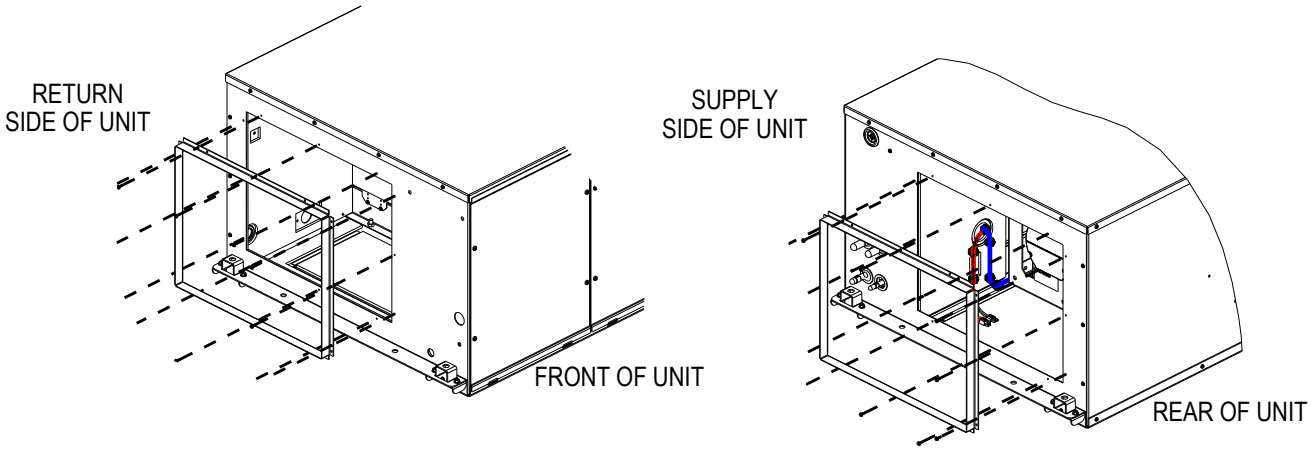
CONDENSATE PUMP CONNECTION LOCATIONS, 8 TON

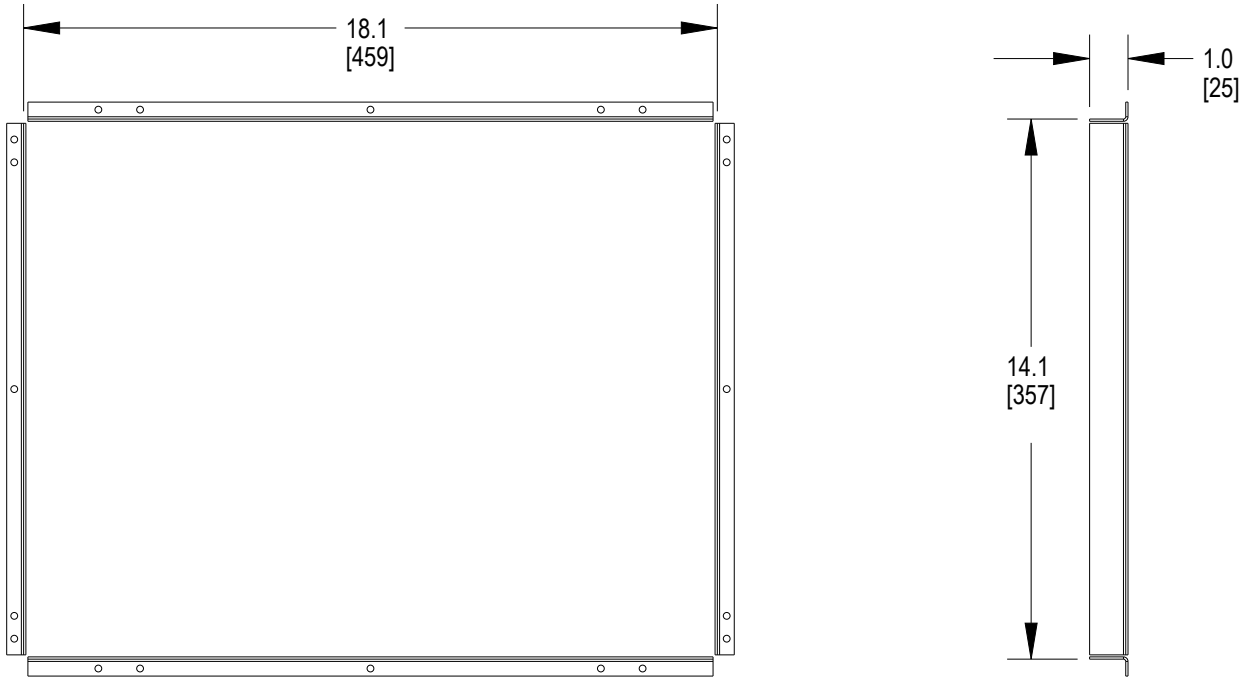




VERTIV COOLPHASE CEILING

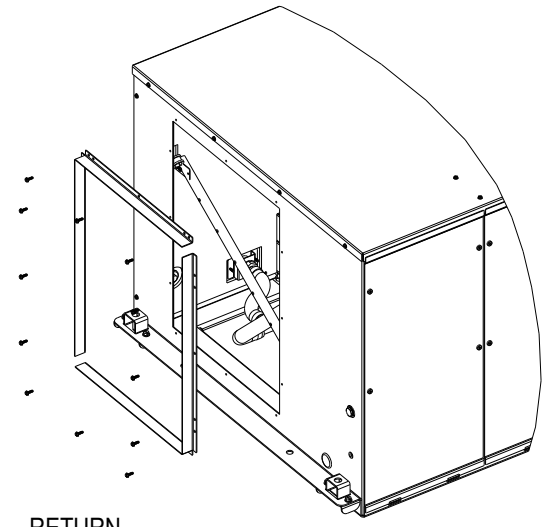
DIMENSIONAL DATA
DUCT FLANGES, 1 TON





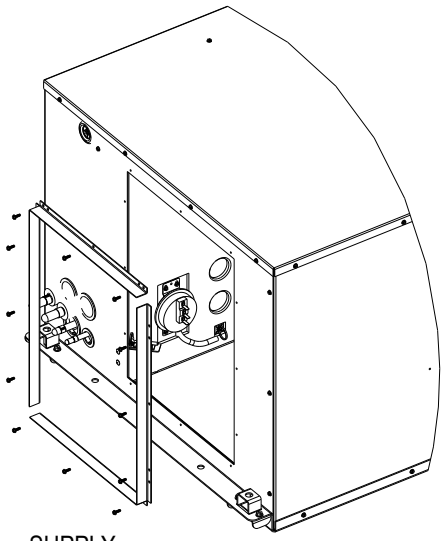
VERTIV COOLPHASE CEILING

DIMENSIONAL DATA
DUCT FLANGES, 2 & 3 TON



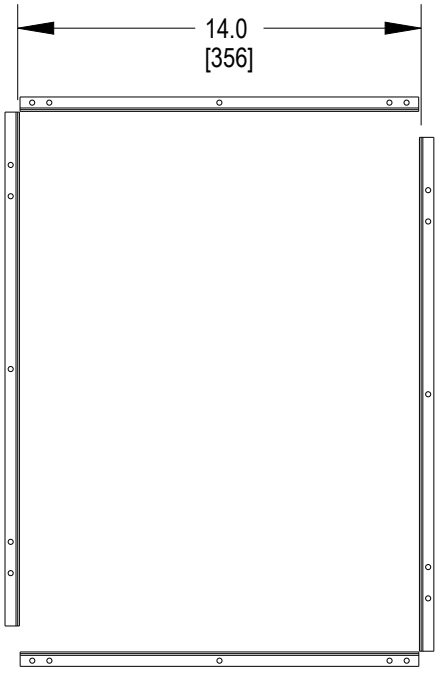
RETURN
SIDE OF UNIT

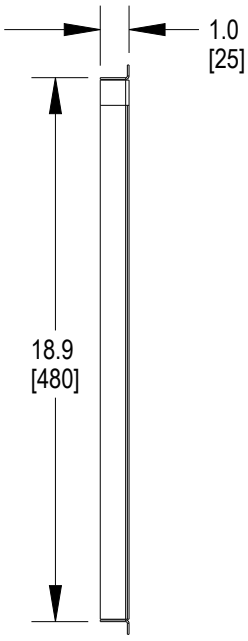
FRONT OF UNIT



SUPPLY
SIDE OF UNIT

REAR OF UNIT

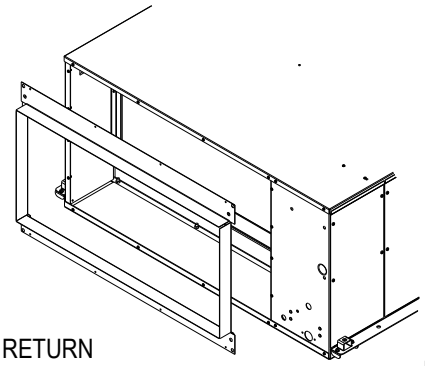




VERTIV COOLPHASE CEILING

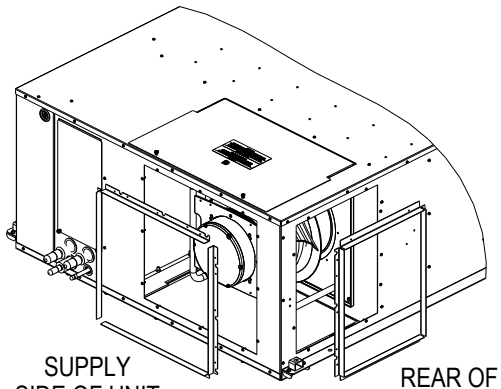
DIMENSIONAL DATA

DUCT FLANGES, 4 & 5 TON



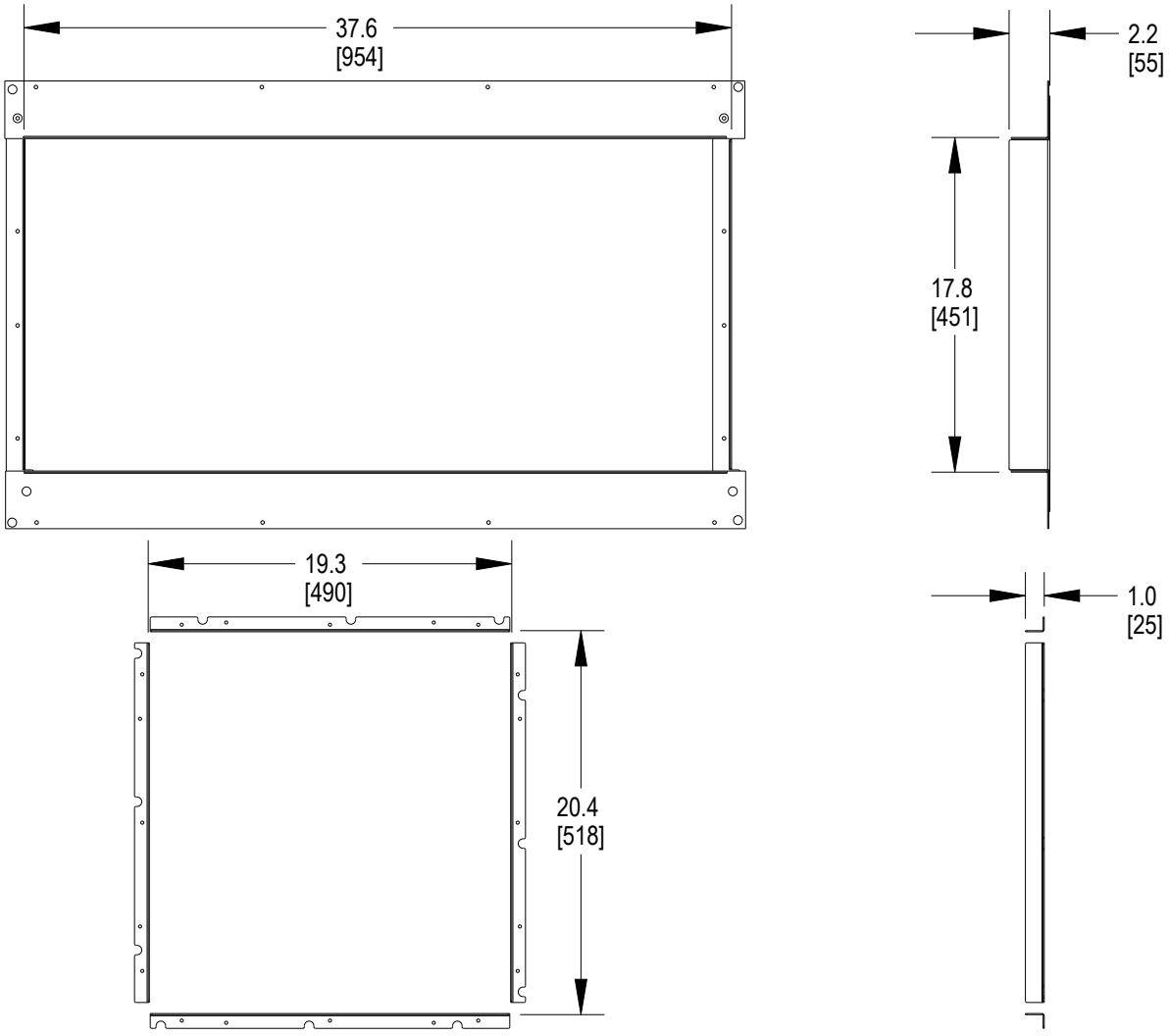
RETURN
SIDE OF UNIT

FRONT OF UNIT



SUPPLY
SIDE OF UNIT

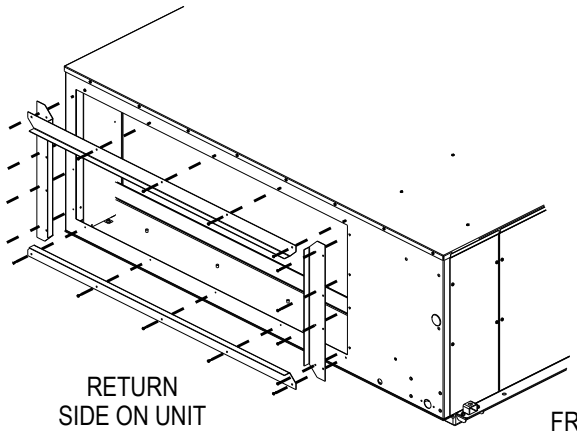
REAR OF UNIT



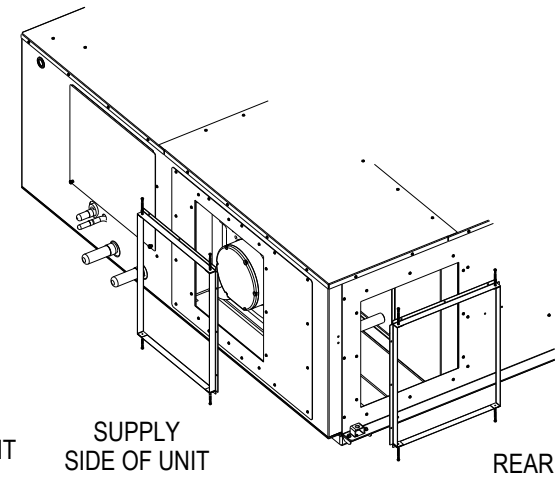
VERTIV COOLPHASE CEILING

DIMENSIONAL DATA

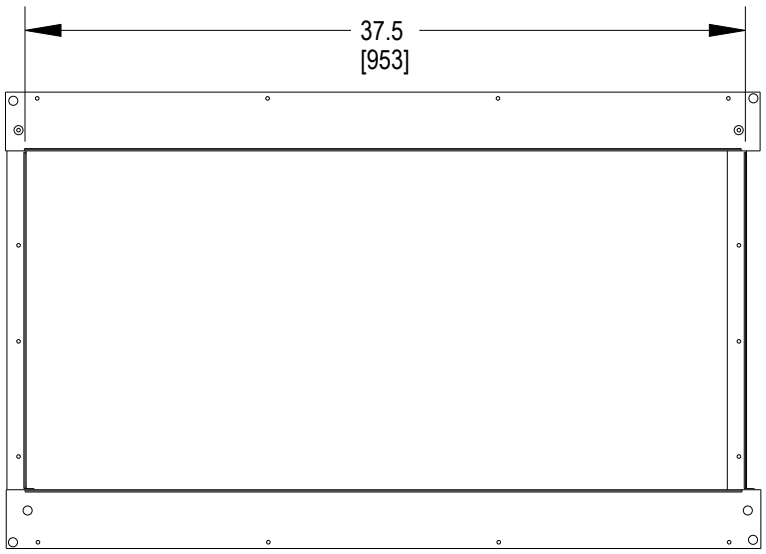
DUCT FLANGES, 8 TON

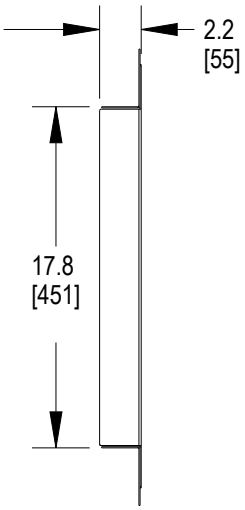


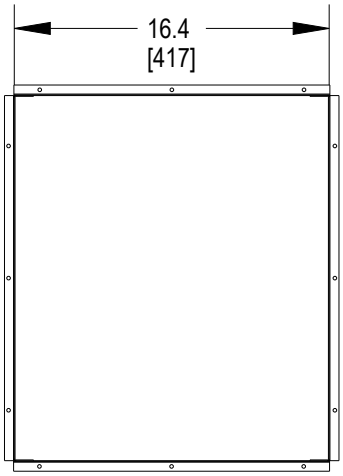
FRONT OF UNIT

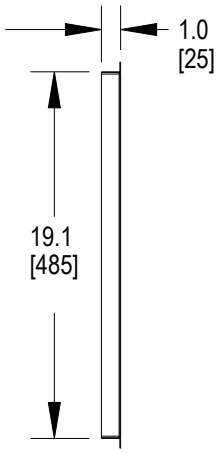


REAR OF UNIT



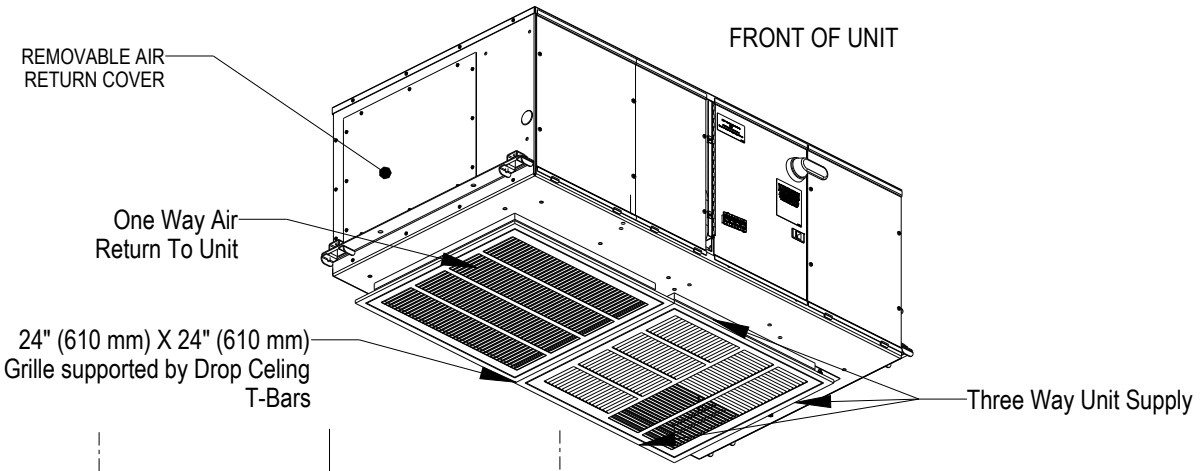


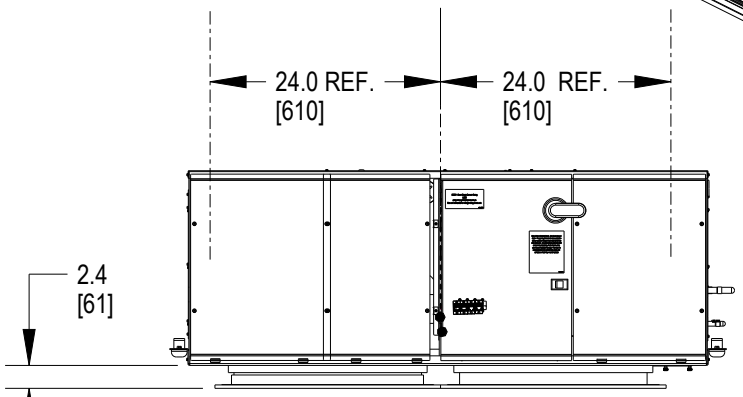


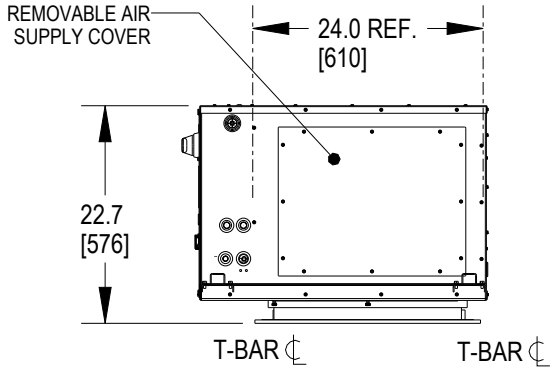


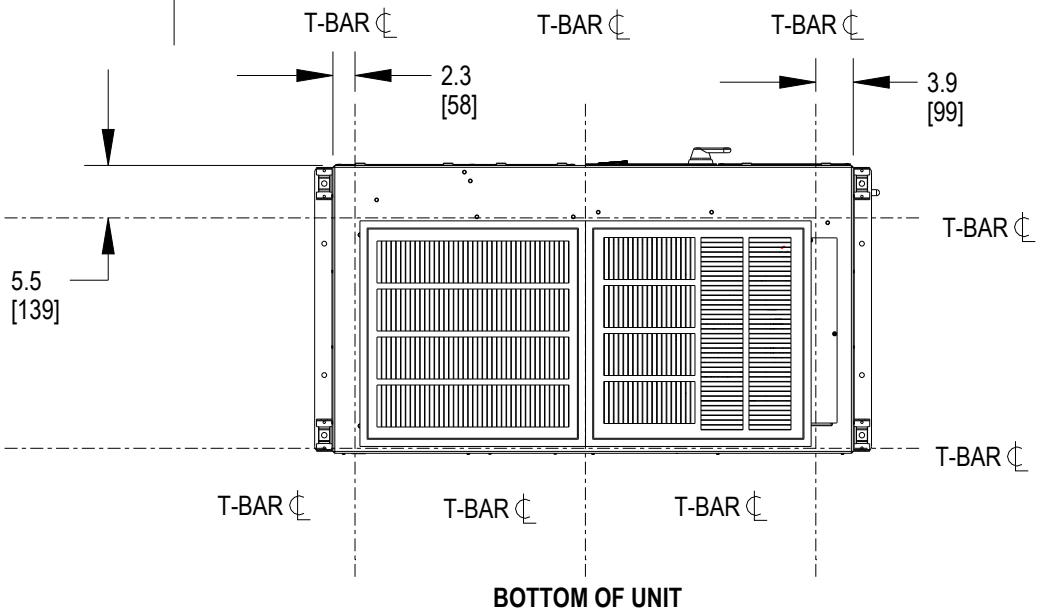
VERTIV COOLPHASE CEILING

DIMENSIONAL DATA
DOWNFLOW GRILLE 1 TON



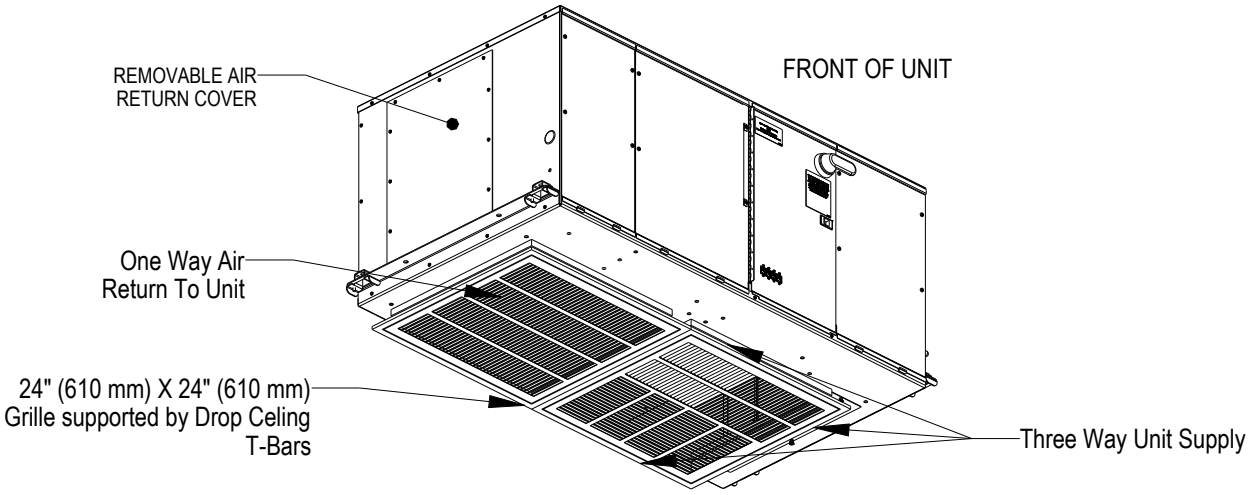


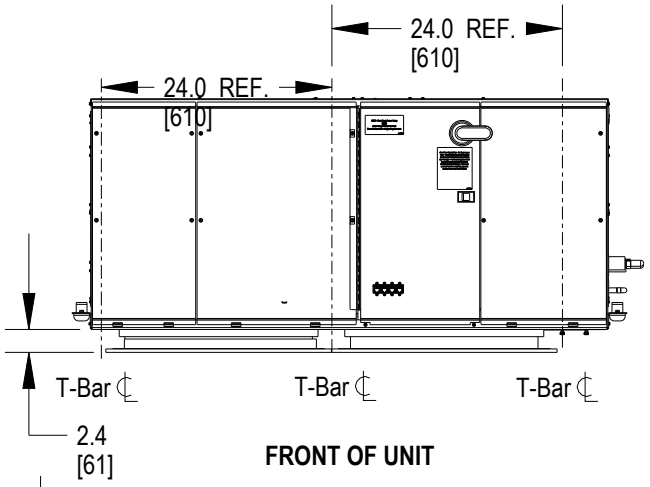




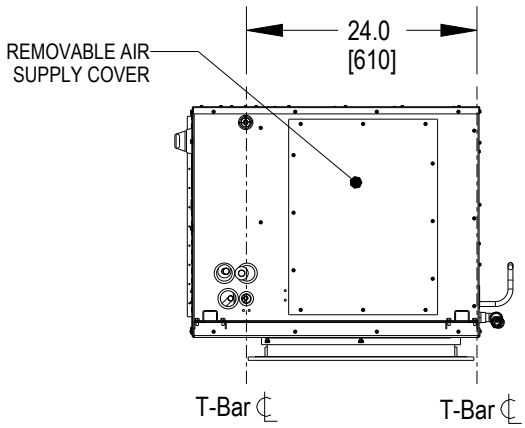
VERTIV COOLPHASE CEILING

DIMENSIONAL DATA
DOWNFLOW GRILLE 2 & 3 TON

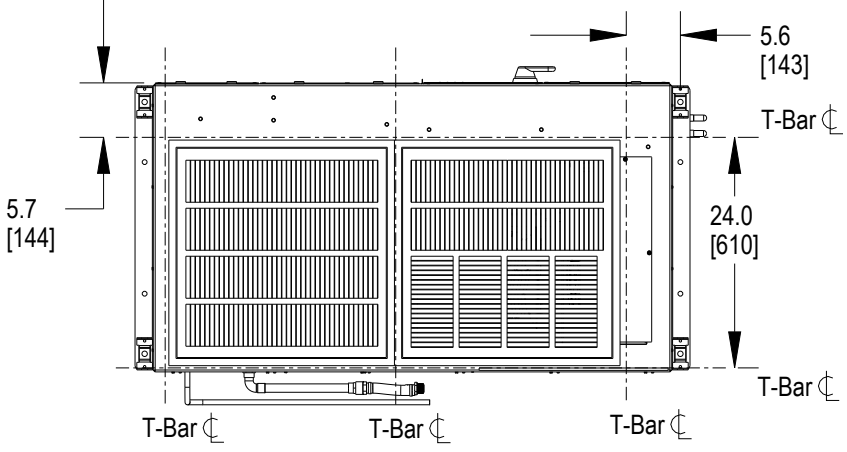




FRONT OF UNIT



SUPPLY SIDE OF UNIT

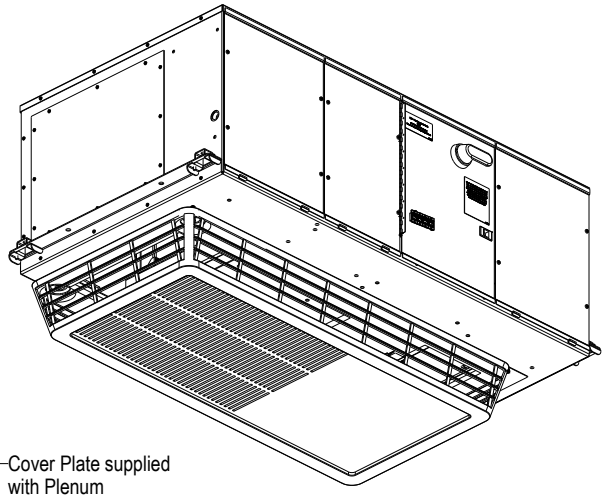


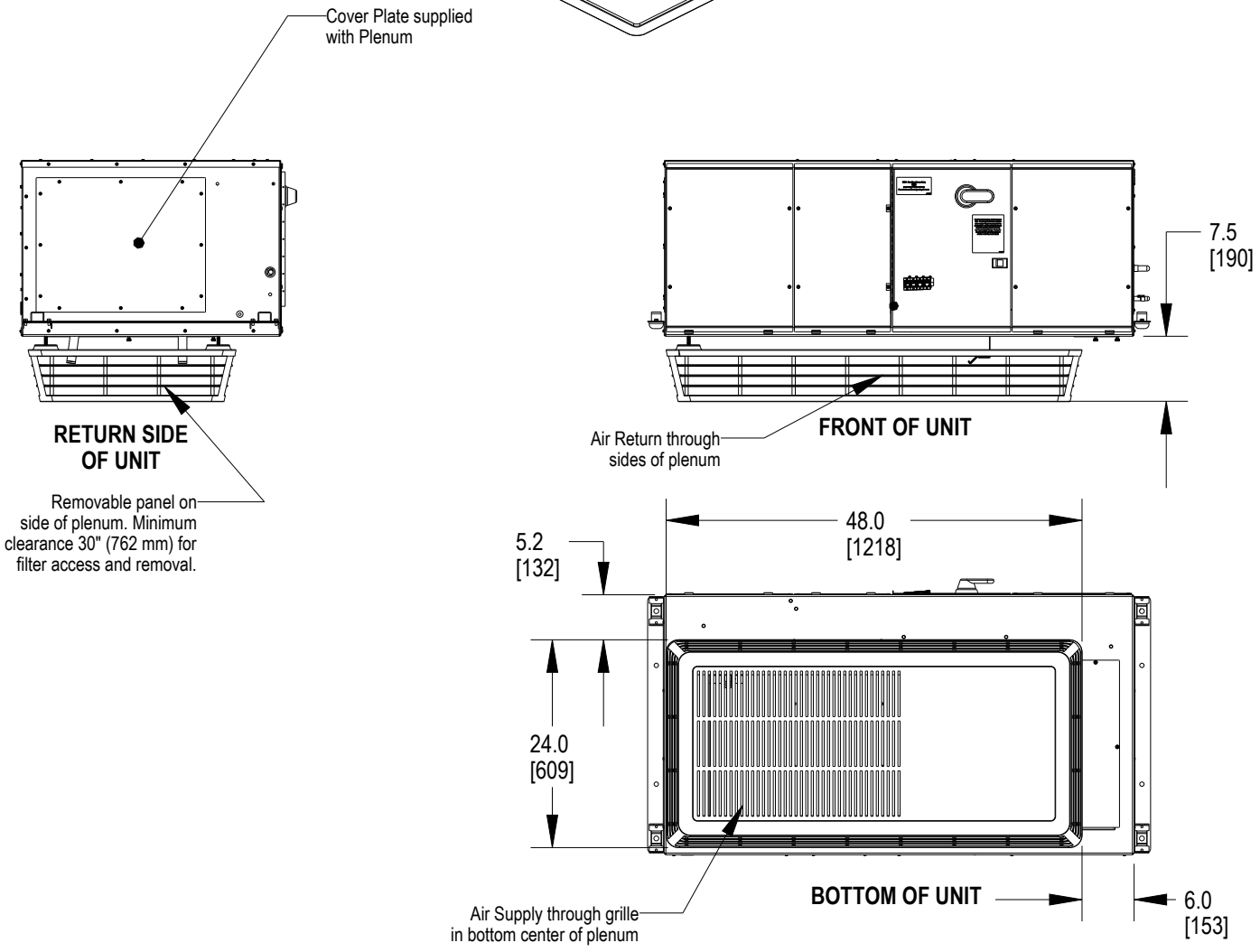
BOTTOM OF UNIT

VERTIV COOLPHASE CEILING

DIMENSIONAL DATA

AIR DISTRIBUTION PLENUM 1 TON

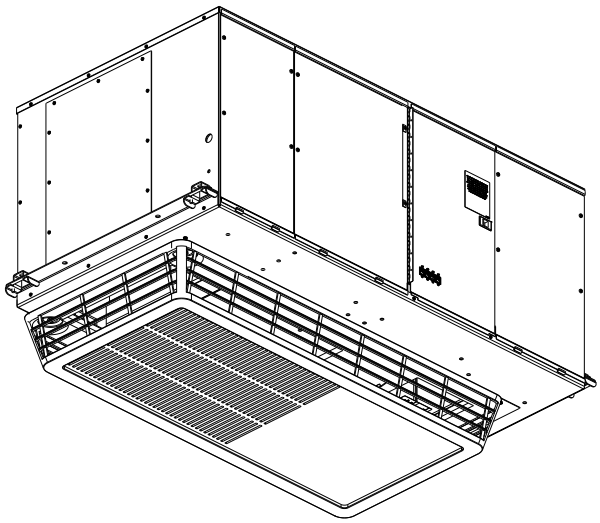


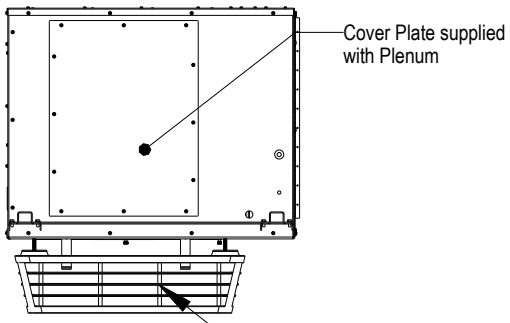


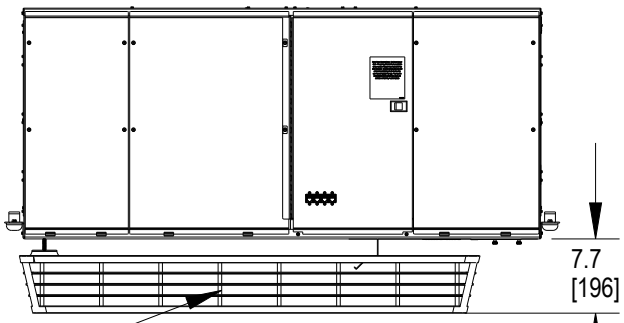
VERTIV COOLPHASE CEILING

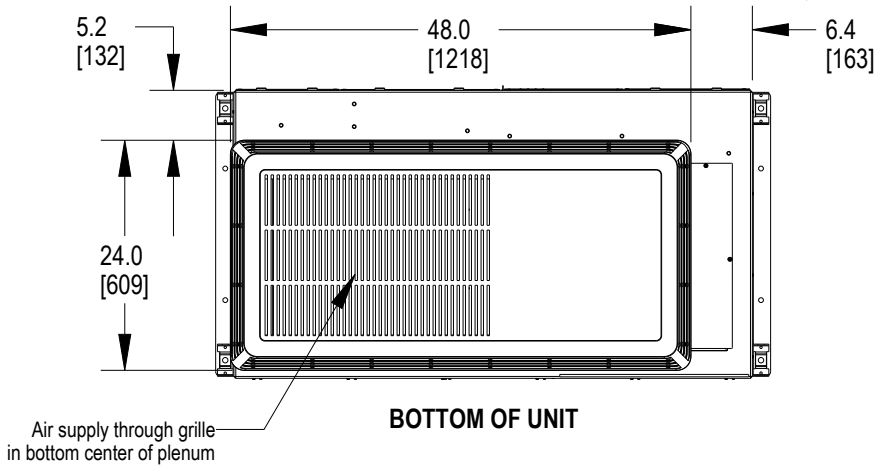
DIMENSIONAL DATA

AIR DISTRIBUTION PLENUM 2 & 3 TON





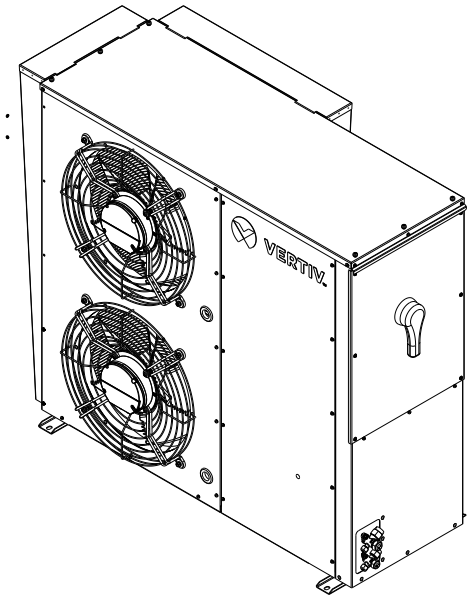


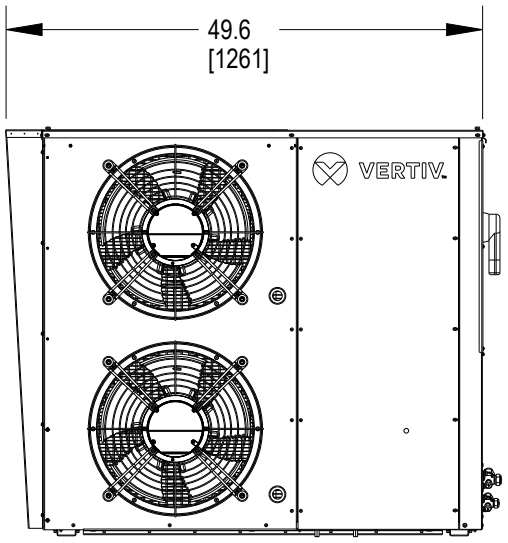


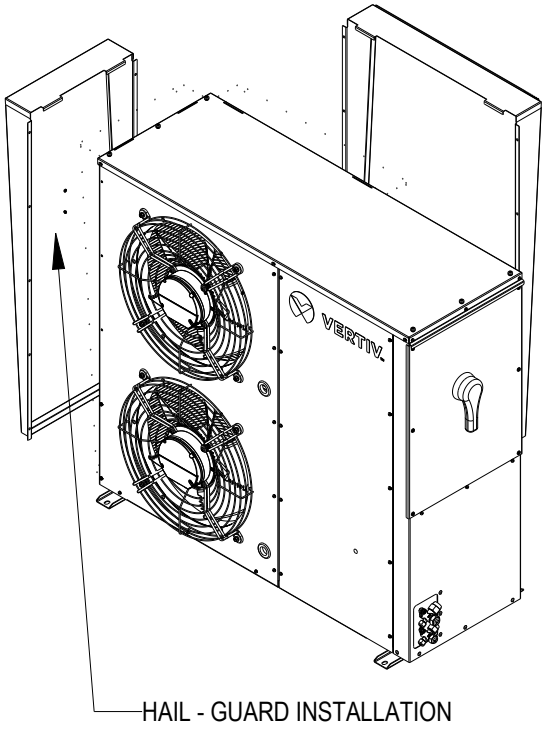
VERTIV COOLPHASE CONDENSER

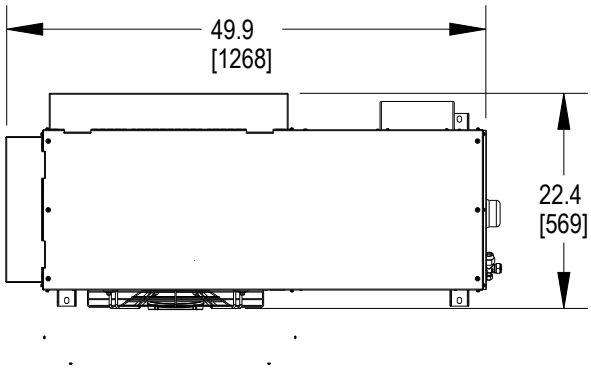
GENERAL DIMENSIONS

HAIL-GUARD 15kW



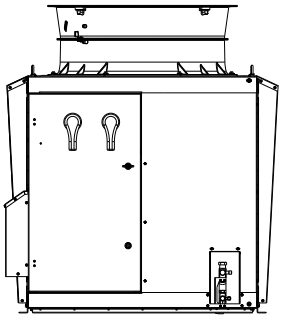


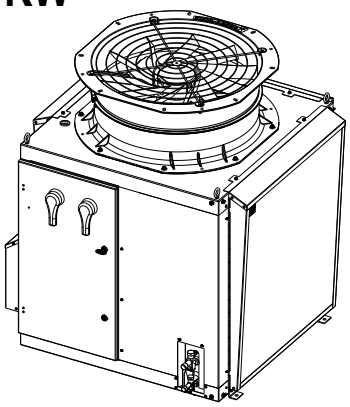




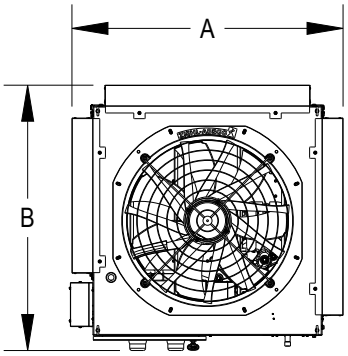
VERTIV COOLPHASE CONDENSING UNIT

HAILGUARD KIT DATA
CONDENSING UNIT 21/28 KW, 35 KW

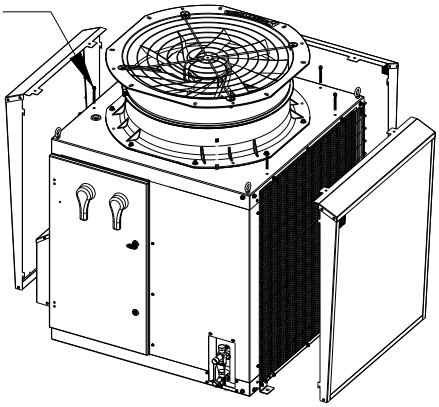


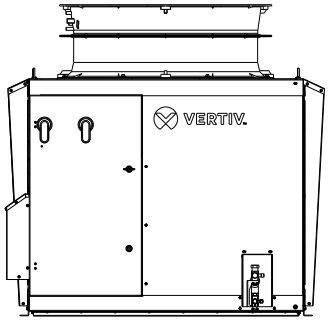


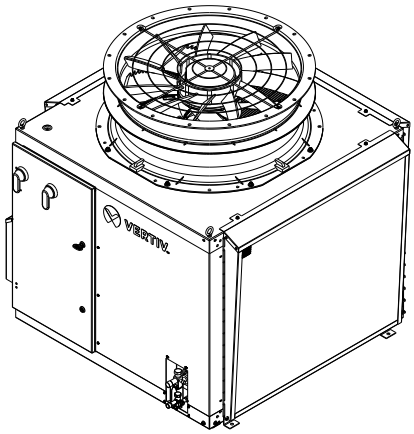
DIMENSIONS CONDENSING UNIT 21/28 KW IN [MM]	
A	47.1 [1195]
B	46 [1170]



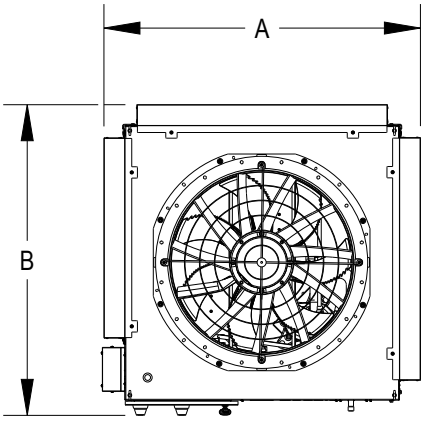
HAIL GUARD INSTALLATION



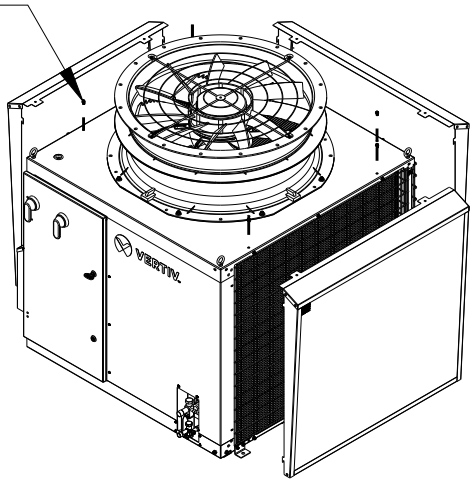




DIMENSION CONDENSING UNIT 35 KW IN [MM]	
A	54.9 [1395]
B	53.9 [1369]

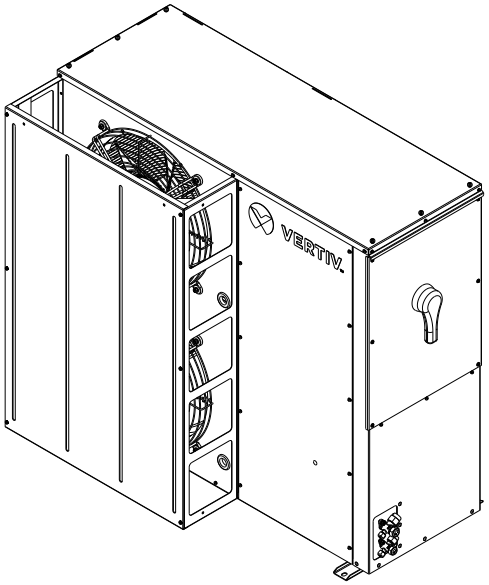


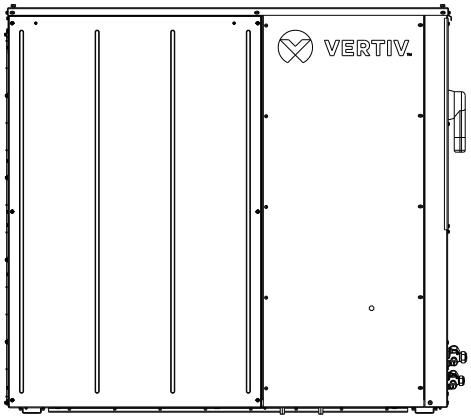
HAIL GUARD INSTALLATION



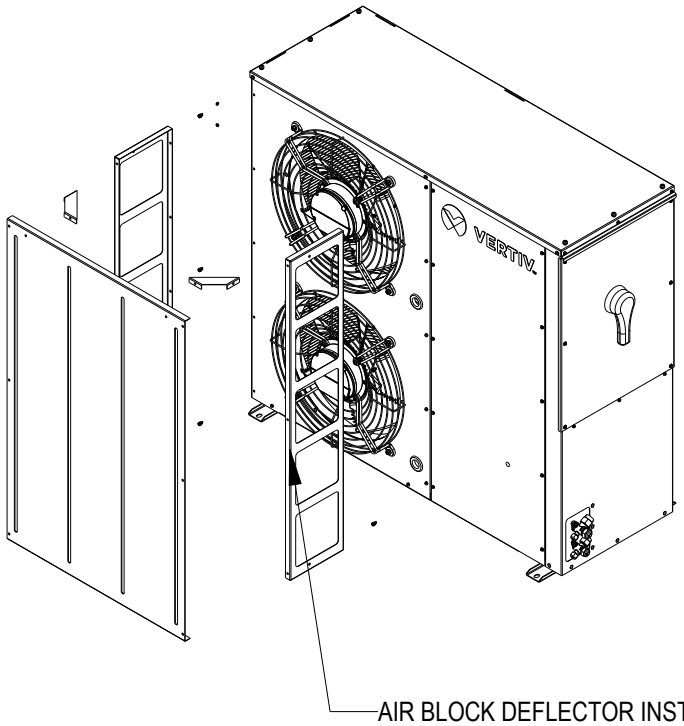
VERTIV COOLPHASE CONDENSER

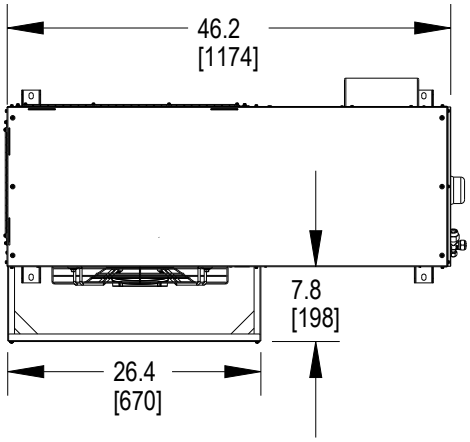
GENERAL DIMENSIONS
WIND BAFFLE KIT 15 kW





FRONT VIEW OF UNIT





TOP OF UNIT

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