

Owner: Engineering	Vertiv Co.	SUBTL SR2-5xIT racks 20kW- Power and Cooling Redundancy	SR2N05020FAA1 -SUBTL
Author: Tomáš Krech		SmartRow 2 Submittal	Rev B
Date: 4/4/2024			

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Smart Row 2 Site Planning Datasheet (208V, 3 phase, 4 wire + PE)

Configuration Number	Part Number	Max Row Capacity (kW)	IT Racks per Row	Capacity per Rack (kW)	Cooling Units per Row	pdu count	Main Input Breaker Size ⁶	Per Condenser Breaker Size	Per Condenser Dry Weight kg (lbs)	Row Dimensions (L x H x D) mm (in) ⁷	Row Weight kg (lbs)	Min. Staging Area m ² (ft ²)
1	SR2N02010NAA1	10	2	5	1	2	100A	N/A ⁵	60 (132.3)	2100 (82.7) x 2271 (107) x 1400 (55.2)	1463 (3227)	14.41 (155.2)
2	SR2N02010PAA1	10	2	5	1	4	100A	N/A ⁵	60 (132.3)	2100 (82.7) x 2271 (107) x 1400 (55.2)	1491 (3288)	14.99 (161.4)
3	SR2N02010FAA1	10	2	5	2	4	100A	N/A ⁵	60 (132.3)	2400 (94.5) x 2271 (107) x 1400 (55.2)	2112 (4656)	17.67 (190.2)
4	SR2N03010NAA1	10	3	3	1	3	100A	N/A ⁵	60 (132.3)	2700 (106.3) x 2271 (107) x 1400 (55.2)	1633 (3601)	15.76 (169.7)
5	SR2N03010PAA1	10	3	3	1	6	100A	N/A ⁵	60 (132.3)	2700 (106.3) x 2271 (107) x 1400 (55.2)	1675 (3694)	16.34 (175.9)
6	SR2N03010FAA1	10	3	3	2	6	100A	N/A ⁵	60 (132.3)	3000 (118.2) x 2271 (107) x 1400 (55.2)	2296 (5061)	19.02 (204.8)
7	SR2N03020NAA1	20	3	6	1	3	175A	15A	118 (260.2)	2700 (106.3) x 2271 (107) x 1400 (55.2)	1863 (4108)	18.46 (198.8)
8	SR2N03020PAA1	20	3	6	1	6	175A	15A	118 (260.2)	2700 (106.3) x 2271 (107) x 1400 (55.2)	1905 (4201)	20.51 (220.8)
9	SR2N03020FAA1	20	3	6	2	6	175A	15A	118 (260.2)	3000 (118.2) x 2271 (107) x 1400 (55.2)	2526 (5568)	24.42 (262.9)
10	SR2N04020NAA1	20	4	5	1	4	175A	15A	118 (260.2)	3300 (130) x 2271 (107) x 1400 (55.2)	2033 (4483)	19.81 (213.3)
11	SR2N04020PAA1	20	4	5	1	8	175A	15A	118 (260.2)	3300 (130) x 2271 (107) x 1400 (55.2)	2089 (4607)	21.86 (235.3)
12	SR2N04020FAA1	20	4	5	2	8	175A	15A	118 (260.2)	3600 (141.8) x 2271 (107) x 1400 (55.2)	2710 (5974)	25.77 (277.4)
13	SR2N05020NAA1	20	5	4	1	5	175A	15A	118 (260.2)	3900 (153.6) x 2271 (107) x 1400 (55.2)	2203 (4858)	21.16 (227.8)
14	SR2N05020PAA1	20	5	4	1	10	175A	15A	118 (260.2)	3900 (153.6) x 2271 (107) x 1400 (55.2)	2273 (5012)	23.21 (249.9)
15	SR2N05020FAA1	20	5	4	2	10	175A	15A	118 (260.2)	4200 (165.4) x 2271 (107) x 1400 (55.2)	2894 (6380)	27.12 (292)

Notes:

1. System Environmental Conditions: Indoors, 41 °F to 104 °F (5 °C to 40 °C), RH to 80% with Max dew point of 82.4 °F (28 °C)
2. Floor surface must be level and continuous (expansion joints sealed, raised floor tile gaps sealed, no floor drains, etc).
3. No building sprinkler head should be within 19.7 in (0.5 m).
4. Install in accordance with national and local electrical codes
5. 10kW condenser power is sourced from the indoor unit
6. Cable Sizing: 100A = 3 AWG ; 175A = 2/0 AWG
7. Row Dimensions do not include necessary space needed for access including per ADA or local codes.

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CO. NO.	DESIGNED BY:		DATE (LATEST REV)	
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		TITLE	Smart Row 2 Site Planning Datasheet (208V, 3 phase, 4 wire + PE)	

Vertiv Row Solution

Knowledge to Build Optimized Infrastructure Solutions



"Vertiv™ SmartRow™ 2": 5x IT Rack 20kW



Row IT Load Capacity: 20 kW
Power Redundancy UPS: Yes
Power Redundancy rPDU: Yes
Cooling Redundancy: Yes
Dimensions:
Length: 13.78 ft
Depth: 4.6 ft
Height: 7.38 ft

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TITLE / DESCRIPTION: "Vertiv™ SmartRow™ 2": 5x IT Rack 20kW

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Structure identifier overview

Full designation	Structure description
Function designation	
=vRow	
+PMC	UPS, Network Switch, FC Controller, PMU
+Rack1	vRack 1
+Rack2	vRack 2
+Rack3	vRack 3
+Rack4	vRack 4
+Rack5	vRack 5
+Thermal	Thermal Components and Condenser

Please note:

This document is intended to provide guidance to a qualified electrical installer. The installer, owner, and end user are responsible for adhering to all applicable building and electrical codes, regulations, laws, and standards, and nothing in this document is intended to conflict therewith.

Vertiv is not responsible for any failure to conform therewith. In addition, nothing in this document is intended to conflict with the applicable product manuals, installation guides, or other product documentation, which documents take precedence over this design document.

You are responsible for adhering to guidance in the appropriate product documentation, but for your convenience, some such documents are accessible here:



Before installing, connecting to supply or start operation, please review the provided safety and regulatory statements. This system represents a functional unit of an IT infrastructure solution, and the installer, owner, and end user are responsible for its proper operation.



WARNING

Arc flash and electric shock hazard.

Failure to comply can cause serious injury or death.

Before installing, connecting to supply or start operation, please review the provided Safety and Regulatory Statements.

Electrical work may only be carried out by qualified personnel.

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Vertiv™ SmartRow™ 2

Row IT Load Capacity: 20 kW
 Max kW per Rack: 4 kW
 UPS System: 20 kW w internal battery
 Power Redundancy UPS: Yes
 Power Redundancy rPDU: Yes
 Cooling Redundancy: Yes
 Containment: Yes
 Dimensions:
 Length: 13.78 ft
 Depth: 4.6 ft
 Height: 7.38 ft

- +PMC
- +Rack1
- +Thermal-CR019-1
- +Rack2
- +Rack3
- +Thermal-CR019-2
- +Rack4
- +Rack5



vRow Front View

Notes:

1. Row IT Load Capacity is driven by number of IT-Racks (IT-Rack x 4 kW per rack).
2. System Environmental Conditions: Indoors, 41 F to 104 F (5 C to 40 C), RH to 80% with Max dew point of 82.4 F (28 C).
3. Floor surface must be level and continuous (expansion joints sealed, raised floor tile gaps sealed, no floor drains, etc).
4. No building sprinkler head should be within 19.7 in (0.5 m).

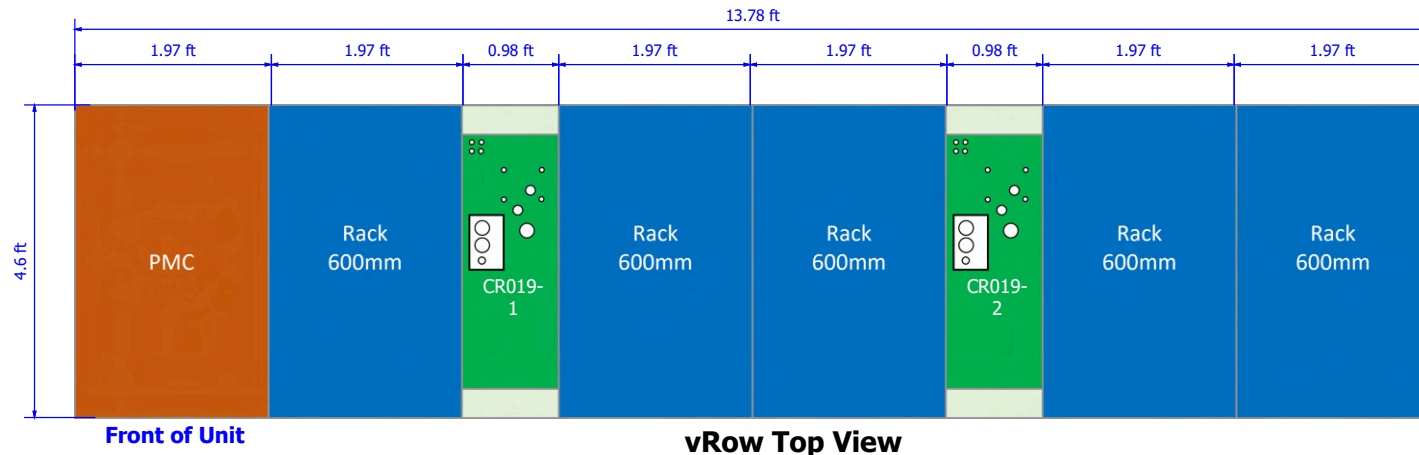
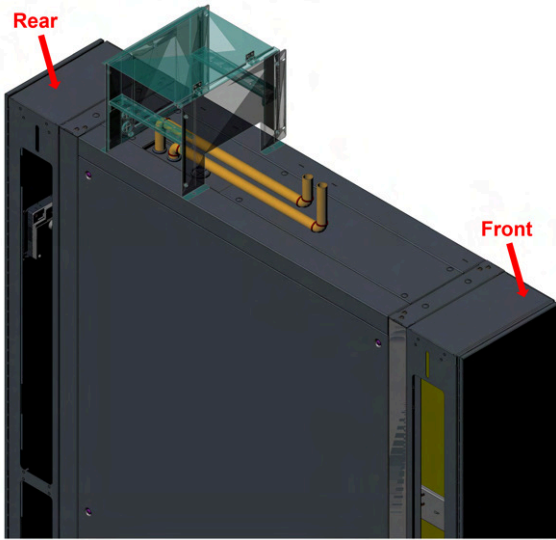
T2 Sensor probe

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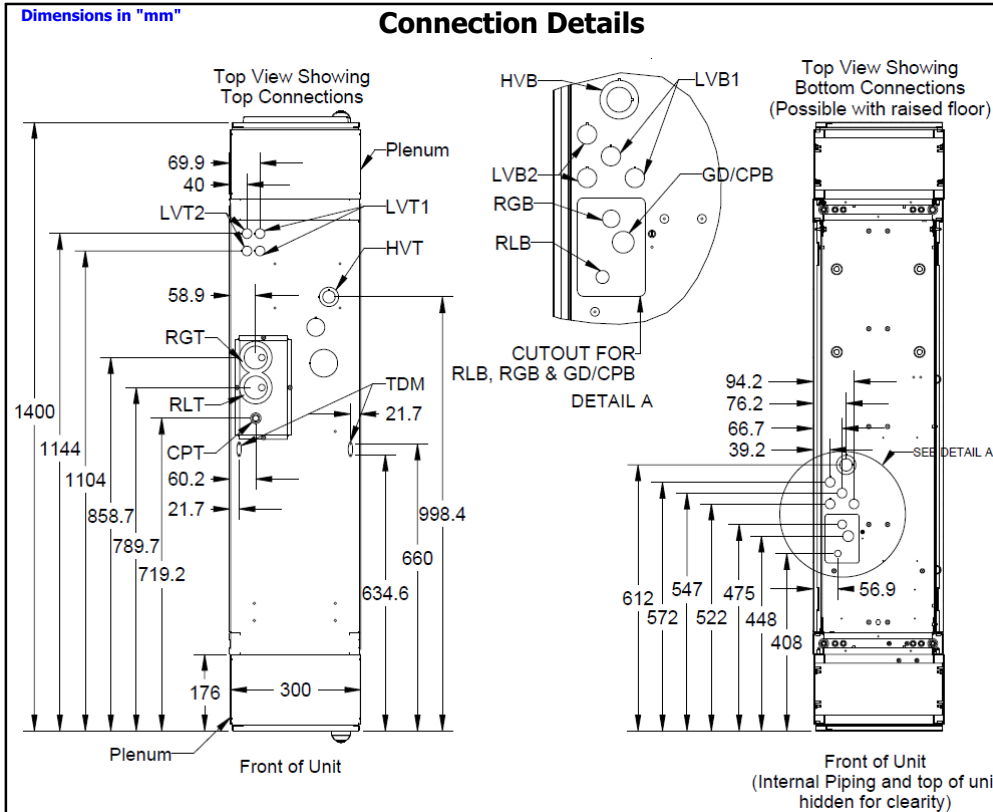
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Note:- CR019 Inlet/Outlet piping needs to be routed during installation

vRow Top View



Unit Top Connections			Unit Bottom Connections		
RLT	Refrigerant Liquid Line Inlet	1/2" O.D Copper	RLB	Refrigerant Liquid Line Inlet	1/2" O.D Copper
RGT	Refrigerant Gas Line Outlet	5/8" O.D Copper	RGB	Refrigerant Gas Line Outlet	5/8" O.D Copper
CPT	Condensate Pump	Knockout Hole Ø1-3/8" (35mm)	GD	Gravity Coil Pan Drain	Knockout Hole Diameter 1-3/4" (44mm)
HVT	High Voltage Top Connection	Combination Knockout Ø1-1/8" (29mm) & Ø1-3/4" (44mm)	CPB	Condensate Pump	
LVT1	Low Voltage (Twisted Pair)	Knockout Hole Ø7/8" (22mm) 2 places	HVB	High Voltage Bottom Entrance (feed through the base of the unit)	Combination Knockout 1-1/8" (29mm) & 1-3/4"
LVT2	Low Voltage (Shielded Cable)	Knockout Hole Ø7/8" (22mm) 2 places	LVB1	Low Voltage (Twisted Pair)	Knockout Hole Ø7/8" (22mm) 2 places
TDM	Tie Down (Top) Mounting	Hole Ø1/8" (3mm) 4 places	LVB2	Low Voltage (Shielded Cable)	

Note:- Piping and Electrical connections available at the top and bottom of unit.

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SR2 Main Components

9-inch Touchscreen Panel:
User-friendly display enables easy access to system running status & condition.

Centralized Infrastructure Management:
Enables central management of all intelligent equipment and IT devices within the system. Reading & data are consolidated into single platform.

Racks with Containment:
EIA310 19-inch rack system coupled with tempered glass door enables fully enclosed system design. Allows focused cooling in IT environment.

Precision Cooling:

Row-based solution designed to provide maximum cooling in a compact footprint. Cooling modulation enables cooling on demand and quickly adapts to load fluctuation.

Electronic Lock:

Enables rack level security and access log is recorded intelligently. Supports local & remote door authorization.

Power Management & Distribution:

Pre-assembled & pre-integrated switchboard with surge protection.

Power Protection:

On-line double conversion UPS with unity power factor ensures clean power feeding to critical IT equipment.

● Power Management & Protection

● Thermal Management

● Management & Monitoring



Emergency Ventilation:

Activates automatically in the event of overheating or cooling unit failure.

Environmental Sensor:

Report critical environmental information and alarm notification. Ensure IT equipment is kept in desired condition.

Explanation of terms:

- FU Emergency Fan Control Unit
- FDS Front Door Switch
- RDS Rear Door Switch
- FDL Front Door Lock Handle
- RDL Rear Door Lock Handle
- DC_PS DC Power Supply



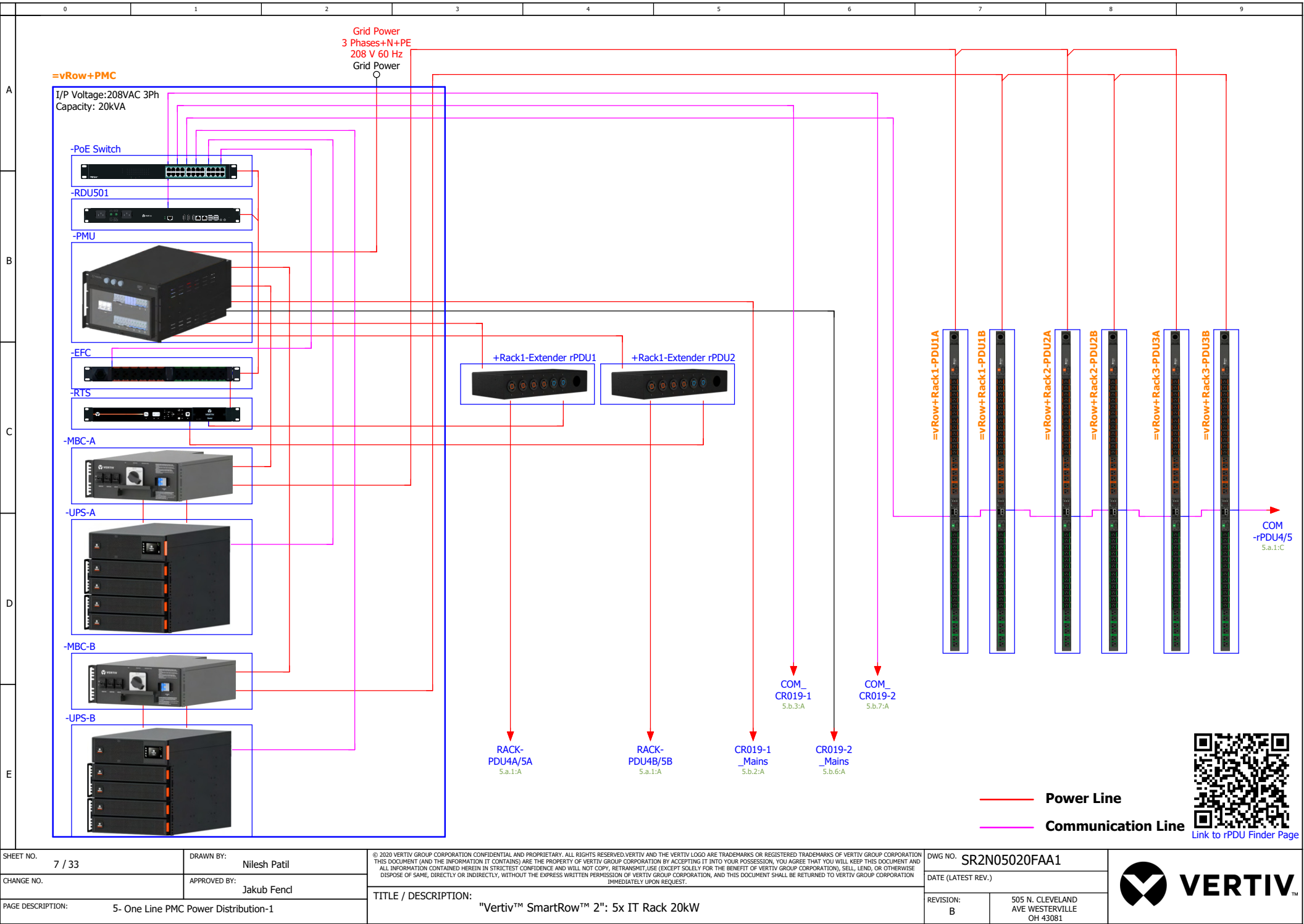
[Link to Vertiv™ SmartRow™ 2](#)

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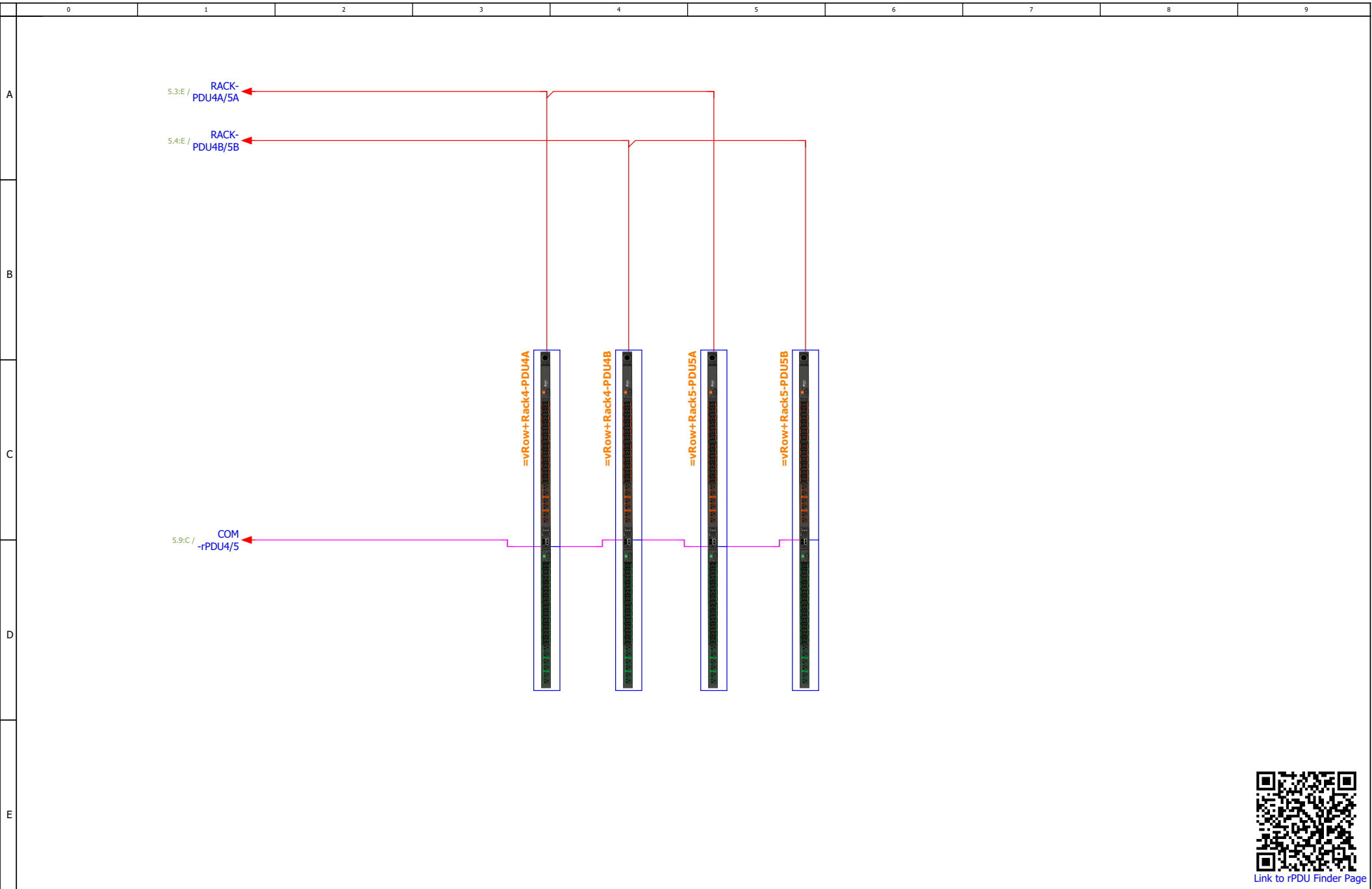
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PAGE DESCRIPTION:	5- One Line PMC Power Distribution-1		

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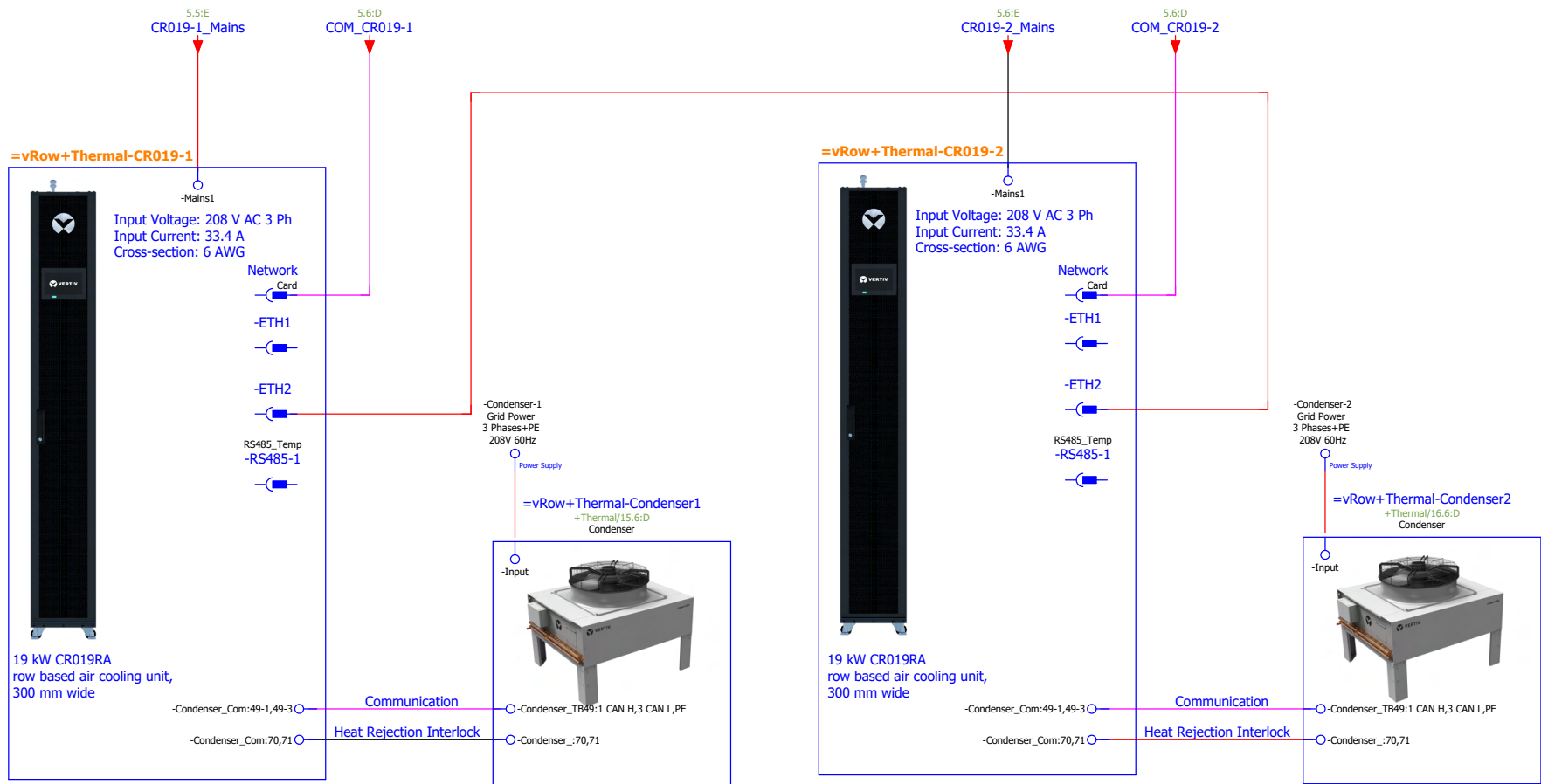
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VERTIV Supplied Cable & Parts list

Device Designation Schematic / position	Device Function	Designation	SKU Number
+PMC-MBC-A +PMC/9.b.4:A	GXT5 20 kW MBC-A	MBC GXT5 20 kW 208 V 60 Hz 2 Phases 4U, (3) L14-30R, optional 1x PD2 POD	VMBC-20KMVRT4U _
+PMC-MBC-B +PMC/9.c.4:A	GXT5 20 kW MBC-B	MBC GXT5 20 kW 208 V 60 Hz 2 Phases 4U, (3) L14-30R, optional 1x PD2 POD	VMBC-20KMVRT4U _
+PMC-PDU1 +PMC/9.e.0:A	Emergency Fan Control PDU	rPDU, Switched Unit Level Monitoring EC, 30A, 208V, 4.9kW, Horizontal	VP53100
+PMC-PMU +PMC/9.0:A	20kW PMC	PMC,MSR2-New designed PMC for NAM (SKU TBD) - 1P = GXT5 - 20kVA Rack (600w, HMI, SmartLock x2, THD x1, LED, FC, 4G Modem), qty: 1, RDU 501 (8COM card x1)	MSR2-NP2DS2G22
+PMC-POE Switch +PMC/9.h.1:C	POE Switch	POE Switch for Smart Aisle or Smart Row NAM Solutions	POESwitch24Port
+PMC-RDU501 +PMC/9.f.0:A	RDU501 Controller	Liebert RDU501 Intelligent Infrastructure Management Solution	RDU501
+PMC-RTS +PMC/9.d.1:A	Rack Transfer Switch	rPDU, Rack Transfer Switch Basic Upgradable, 30A, 208V, 4.9kW, Horizontal (1) NEMA L6-30R, 10ft / 3m power cords with L6-30P, Black Powder Coat.	VA1N3100
+PMC-UPS-A +PMC/9.b.1:A	GXT5 20 kW UPS-A	UPS GXT5 20 kW 208 V 60 Hz 2 Phases 11U with integrated Batteries	GXT5-20KMVRT11UXLN
+PMC-UPS-A-Network_card +PMC/9.b.1:C	RDU101	Network Card for UPS GXT5	RDU101
+PMC-UPS-B +PMC/9.c.1:A	GXT5 20 kW UPS-B	UPS GXT5 20 kW 208 V 60 Hz 2 Phases 11U with integrated Batteries	GXT5-20KMVRT11UXLN
+PMC-UPS-B-Network_card +PMC/9.c.1:C	RDU101	Network Card for UPS GXT5	RDU101
+Rack1-PDU1 +Rack1/10.1:A	Extender rPDU1	rPDU, Basic Standard, 60 A, 120/208 V, 10kVA, Horizontal (4) NEMA L14-30R, (2) NEMA L6-30R, Hardwired, Black Power Coat	VP0N6202
+Rack1-PDU1A +Rack1/10.a.2:A	PDU for Rack 1	rPDU, Monitored Outlet Level EC, 30A, 120/208V, 5.7kW, Vertical (24) Combination C13/C19, (12) NEMA 5-20R, 15ft power cord with L14-30P, Black Powder Coat	VP6N3010
+Rack1-PDU1B +Rack1/10.a.2:B	PDU for Rack1	rPDU, Monitored Outlet Level EC, 30A, 120/208V, 5.7kW, Vertical (24) Combination C13/C19, (12) NEMA 5-20R, 15ft power cord with L14-30P, Black Powder Coat	VP6N3010
+Rack1-PDU2 +Rack1/10.1:C	Extender rPDU2	rPDU, Basic Standard, 60 A, 120/208 V, 10kVA, Horizontal (4) NEMA L14-30R, (2) NEMA L6-30R, Hardwired, Black Power Coat	VP0N6202
+Rack2-PDU2A +Rack2/11.2:A	PDU for Rack 2	rPDU, Monitored Outlet Level EC, 30A, 120/208V, 5.7kW, Vertical (24) Combination C13/C19, (12) NEMA 5-20R, 15ft power cord with L14-30P, Black Powder Coat	VP6N3010
+Rack2-PDU2B +Rack2/11.2:B	PDU for Rack2	rPDU, Monitored Outlet Level EC, 30A, 120/208V, 5.7kW, Vertical (24) Combination C13/C19, (12) NEMA 5-20R, 15ft power cord with L14-30P, Black Powder Coat	VP6N3010
+Rack3-PDU3A +Rack3/12.2:A	PDU for Rack 3	rPDU, Monitored Outlet Level EC, 30A, 120/208V, 5.7kW, Vertical (24) Combination C13/C19, (12) NEMA 5-20R, 15ft power cord with L14-30P, Black Powder Coat	VP6N3010
+Rack3-PDU3B +Rack3/12.2:B	PDU for Rack3	rPDU, Monitored Outlet Level EC, 30A, 120/208V, 5.7kW, Vertical (24) Combination C13/C19, (12) NEMA 5-20R, 15ft power cord with L14-30P, Black Powder Coat	VP6N3010
+Rack4-PDU4A +Rack4/13.2:A	PDU for Rack 4	rPDU, Monitored Outlet Level EC, 30A, 120/208V, 5.7kW, Vertical (24) Combination C13/C19, (12) NEMA 5-20R, 15ft power cord with L14-30P, Black Powder Coat	VP6N3010

SHEET NO. 10 / 33	DRAWN BY: Nilesh Patil
CHANGE NO.	APPROVED BY: Jakub Fenc
PAGE DESCRIPTION: 6- Part List Vertiv Supplied	

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TITLE / DESCRIPTION: "Vertiv™ SmartRow™ 2": 5x IT Rack 20kW

DWG NO. SR2N05020FAA1	
DATE (LATEST REV.)	
REVISION: B	505 N. CLEVELAND AVE WESTERVILLE OH 43081



Cable overview

Cable type	Function text	Device tag	Conductors	Cross-section (AWG)	Length (m)
CRD Teaming Cable	Teaming connection_CR019-1/CR019-2	+Thermal-W4	1		5
Communication cable	PMU to 4DI SPD communication network cable	+PMC-PMU-W104	1		1.7
	PMU to RDU501 COM3 meter communication network cable	+PMC-PMU-W105	1		1.8
	PMU to RDU501 D02 Control Red Light Cable	+PMC-PMU_LED Control-W102	1		1.8
	PMU to RDU501 DO1 Strobe siren control cable	+PMC-PMU_LED Control-W103	1		
	PMC to RDU501_COM1 intelligent door lock front door com. cable	+PMC-W101	1		0.9
	4DI to RDU501 Sensor2 SPD Communication Network Cable	+PMC-W106	1		0.3
	PMC to RDU501_COM1 intelligent door lock rear door com. cable	+PMC-W107	1		0.9
	RDU501 COM2 to HMI communication cable	+PMC-W108	1		0.8
	PMC to RDU501 to PMC cabinet THD communication cable	+PMC-W109	1		0.7
	FC to Switch communication cable	+PMC-W114	1		0.8
	PDU to Switch communication cable	+Rack1-W115	1		3.5
	PDU1A to PDU1B communication cable	+Rack1-W116	1		3
	PDU2A to PDU2B communication cable	+Rack2-W116	1		3
	PDU3A to PDU3B communication cable	+Rack3-W116	1		3
	PDU3B to PDU4A communication cable	+Rack4-W116	1		3
	PDU4B to PDU5A communication cable	+Rack5-W116	2		3
	CRV019-1 to Switch communication cable	+Thermal-W110	1		3.5
	CRV019-2 to Switch communication cable	+Thermal-W111	1		10
	Smoke1 to CRV-Door microswitch cable	+Thermal-W401	1		3.5
Emergency fan to FC	PMC Emergency fan to FC controller cable	+PMC-W229	3	18	1.5
	Rack1 Emergency fan to FC controller cable	+Rack1-W213	3	18	4.5
	Rack2 Emergency fan to FC controller cable	+Rack2-W213	3	18	4.5
	Rack3 Emergency fan to FC controller cable	+Rack3-W214	3	18	5.5
	Rack4 Emergency fan to FC controller cable	+Rack4-W214	3	18	5.5
	Rack5 Emergency fan to FC controller cable	+Rack5-W214	3	18	5.5
Front door light cascade	PMC to Rack1 front door LED light power cable	+PMC-PMU_LED Control-W216	4	20	1

Please note: Always when "conductor" = 1, or "Cross-section" is empty, it represents a network/communication cable.

SHEET NO. 13 / 33	DRAWN BY: Nilesh Patil
CHANGE NO.	APPROVED BY: Jakub Fenc
PAGE DESCRIPTION: 8- Cable overview : =vRow+Thermal-W4 - =vRow+PMC-PMU_LED Control-W216	

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DATE (LATEST REV.)	
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Cable overview

Cable type	Function text	Device tag	Conductors	Cross-section (AWG)	Length (m)
Front door light cascade	RACK1 to RACK2 front door LED light cascade cable	+Rack1-W215	4	20	0.75
	RACK2 to RACK3 front door LED light cascade cable	+Rack2-W216	4	20	0.75
	RACK3 to RACK4 front door LED light cascade cable	+Rack3-W215	4	20	0.75
	RACK4 to RACK5 front door LED light cascade cable	+Rack4-W217	4	20	0.75
Front door microswitch cascade	PMC to RACK1 front door microswitch cascade cable	+PMC-PMU_LED Control-W218	2	20	0.75
	RACK1 to RACK2 front door microswitch cascade cable	+Rack2-W219	2	20	0.75
	RACK2 to RACK3 front door microswitch cascade cable	+Rack3-W218	2	20	0.75
	RACK3 to RACK4 front door microswitch cascade cable	+Rack4-W219	2	20	0.75
Interconnection CRV/Condenser	PMC to RACK4 front door microswitch cascade cable	+Rack5-W220	2	20	0.75
	Communication CR019/Condenser1	+Thermal-WA1	2	20	
	Communication CR019/Condenser2	+Thermal-WA2	2	20	
	Heat Rejection Interlock_Condenser1	+Thermal-WB1	2	18	
Power cable	Heat Rejection Interlock_Condenser2	+Thermal-WB2	2	18	
	PMU to PMC rear door LED light power cable	+PMC-PMU_LED Control-W14	2	20	1.2
	PMU to PMC front door LED light power cable	+PMC-PMU_LED Control-W16	4	20	1.75
	PMU to PMC front door microswitch power cable	+PMC-PMU_LED Control-W18	2	20	1.25
	PMU to PMC rear door microswitch power cable	+PMC-PMU_LED Control-W19	2	20	1.25
	PMU to MBC-A power cable	+PMC-W01	4	1	1.3
	PMU to MBC-B power cable	+PMC-W02	4	1	0.7
	MBC-A to PMU power cable	+PMC-W03	3	6	0.8
	MBC-B to PMU power cable	+PMC-W04	3	6	0.8
	MBC-A to UPS-A power cable (UPS-A input)	+PMC-W05	4	2	0.3
	MBC-B to UPS-B power cable (UPS-B input)	+PMC-W06	4	2	0.3
	UPS-A to MBC-A power cable (UPS-A output)	+PMC-W07	4	2	0.3
	UPS-B to MBC-B power cable (UPS-B output)	+PMC-W08	4	2	0.3
	PMU to CRV019-1 power cable	+PMC-W11	4	6	1.83
PMU to CRV019-2 power cable	+PMC-W12	4	6	5	

Please note: Always when "conductor" = 1, or "Cross-section" is empty, it represents a network/communication cable.

SHEET NO. 14 / 33	DRAWN BY: Nilesh Patil
CHANGE NO.	APPROVED BY: Jakub Fenc
PAGE DESCRIPTION: 8.a- Cable overview : =vRow+Rack1-W215 - =vRow+PMC-W12	

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Cable overview

Cable type	Function text	Device tag	Conductors	Cross-section (AWG)	Length (m)
Power cable	PMU to PMC intelligent door lock power cable	+PMC-W13	2	22	1.1
	PMU to HMI power cable	+PMC-W15	2	22	2.2
	PMU to Extender1 power cable	+Rack1-W09	4		
	PMU to Extender2 power cable	+Rack1-W10	4		
Rear door light cascade	PMC to Rack1 rear door LED light power cable	+PMC-PMU_LED Control-W225	2	20	1
	RACK1 to RACK2 rear door LED light cascade cable	+Rack1-W224	4	20	0.75
	RACK2 to RACK3 rear door LED light cascade cable	+Rack2-W225	4	20	0.75
	RACK3 to RACK4 rear door LED light cascade cable	+Rack3-W224	4	20	0.75
Rear door microswitch cascade	PMC to RACK1 rear door microswitch cascade cable	+PMC-PMU_LED Control-W221	2	20	0.75
	RACK1 to RACK2 rear door microswitch cascade cable	+Rack2-W222	2	20	0.75
	RACK2 to RACK3 rear door microswitch cascade cable	+Rack3-W221	2	20	0.75
	RACK3 to RACK4 rear door microswitch cascade cable	+Rack4-W222	2	20	0.75
Smart door lock cascade	PMC to RACK1 power cascade cables	+PMC-W201	2	22	0.85
	No.7 Lock front door to RDU501_COM3 communication cable	+PMC-W205	1		
	No.7 Lock rear door to RDU501_COM4 communication cable	+PMC-W206	1		
	PMC to RACK1 communication cascade cables	+PMC-W210	1		1
	RACK1 to CRV1 power cascade cables	+Rack1-W203	2	22	0.85
	RACK1 to CR019-1 communication cascade cables	+Rack1-W209	1		0.85
	RACK2 to RACK3 power cascade cables	+Rack2-W201	2	22	0.85
	RACK2 to RACK3 communication cascade cables	+Rack2-W210	1		0.85
	RACK3 to CRV2 power cascade cables	+Rack3-W203	2	22	0.85
	RACK4 to RACK5 power cascade cables	+Rack4-W201	2	22	0.85
	RACK4 to RACK5 communication cascade cables	+Rack4-W210	1		0.85
	CRV1 to RACK2 power cascade cables	+Thermal-W204	2	22	0.85
	CR019-1 to RACK2 communication cascade cables	+Thermal-W207	1		0.85

Please note: Always when "conductor" = 1, or "Cross-section" is empty, it represents a network/communication cable.

SHEET NO. 15 / 33	DRAWN BY: Nilesh Patil
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PAGE DESCRIPTION: 8.b- Cable overview : =vRow+PMC-W13 - =vRow+Thermal-W207	

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Cable overview

Cable type	Function text	Device tag	Conductors	Cross-section (AWG)	Length (m)
THD cascading	PMC to RACK1 Cascade Cable	+PMC-W212	1		0.85
	RACK1 to RACK2 Cascade Cable	+Rack1-W212	1		0.85
	RACK2 to RACK3 Cascade Cable	+Rack2-W212	1		0.85
	RACK3 to RACK4 Cascade Cable	+Rack3-W211	1		0.85
	RACK4 to RACK5 Cascade Cable	+Rack4-W211			
Water immersion to RDU501	Water immersion 1 to RDU501 communication cable	+Thermal-W120	1		1.5
	Water immersion 2 to RDU501 communication cable	+Thermal-W121	1		4

Please note: Always when "conductor" = 1, or "Cross-section" is empty, it represents a network/communication cable.

SHEET NO. 16 / 33	DRAWN BY: Nilesh Patil
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PAGE DESCRIPTION: 8.c- Cable overview : =vRow+PMC-W212 - =vRow+Thermal-W121	

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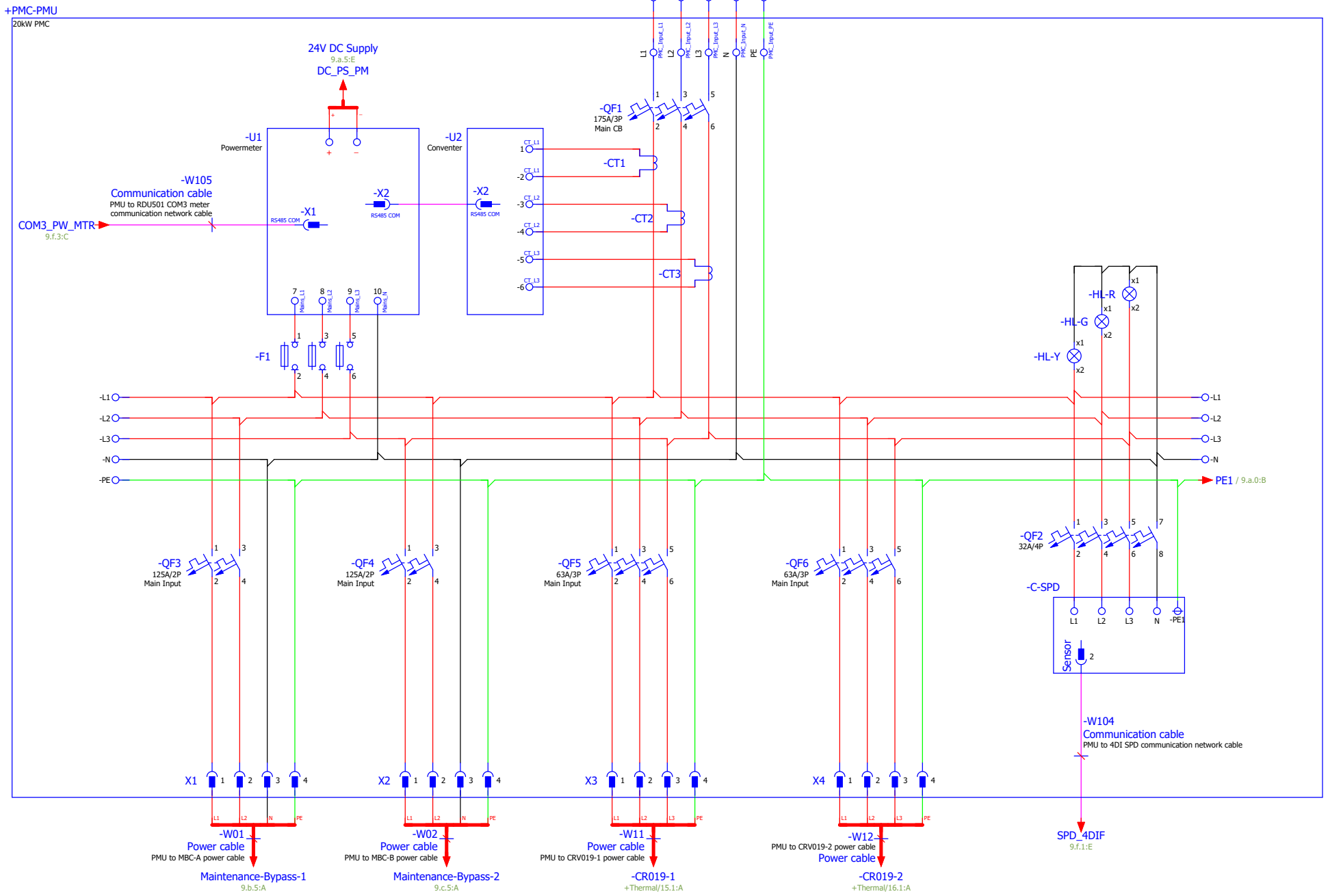
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PAGE DESCRIPTION: 9- PMU Power Distribution	

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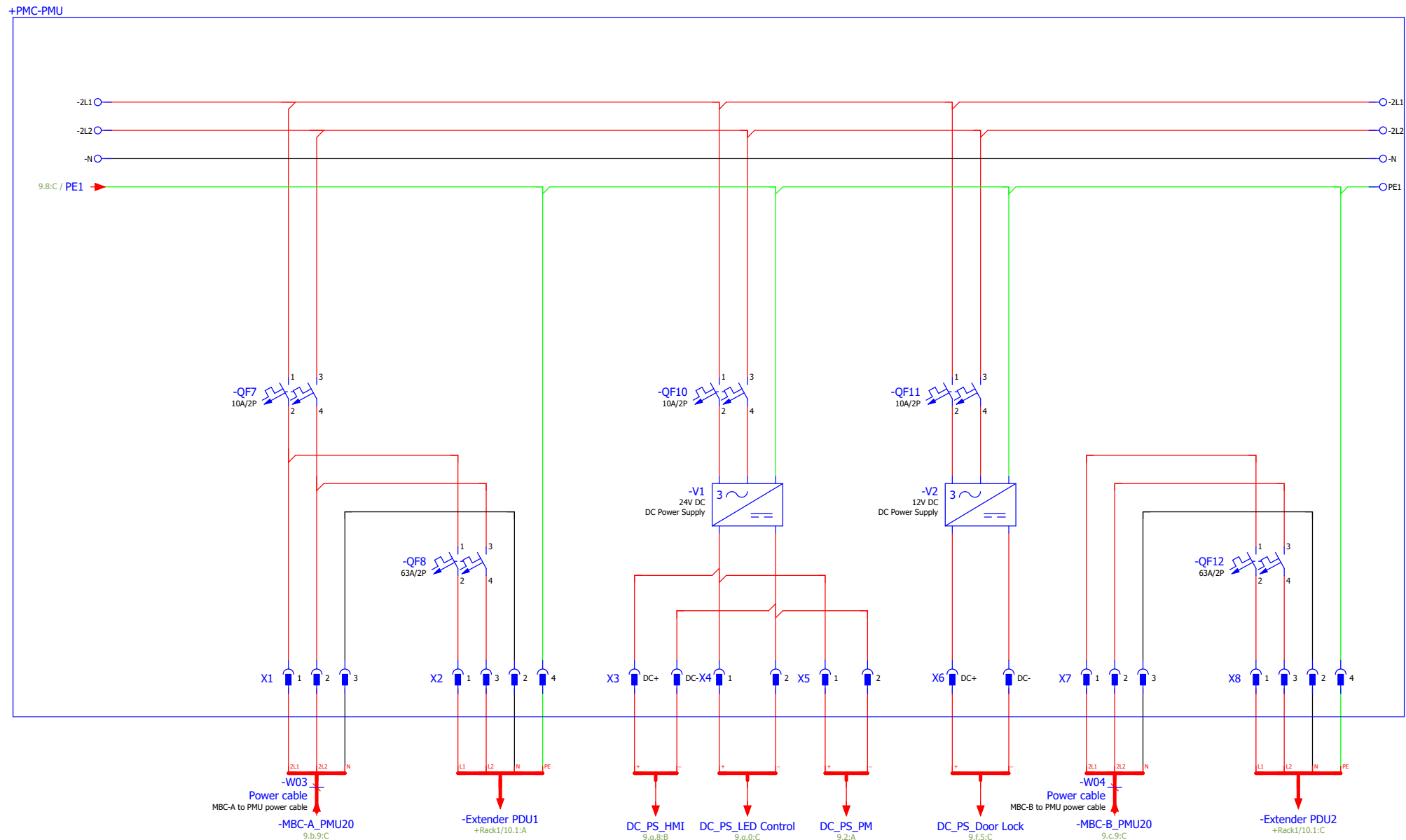
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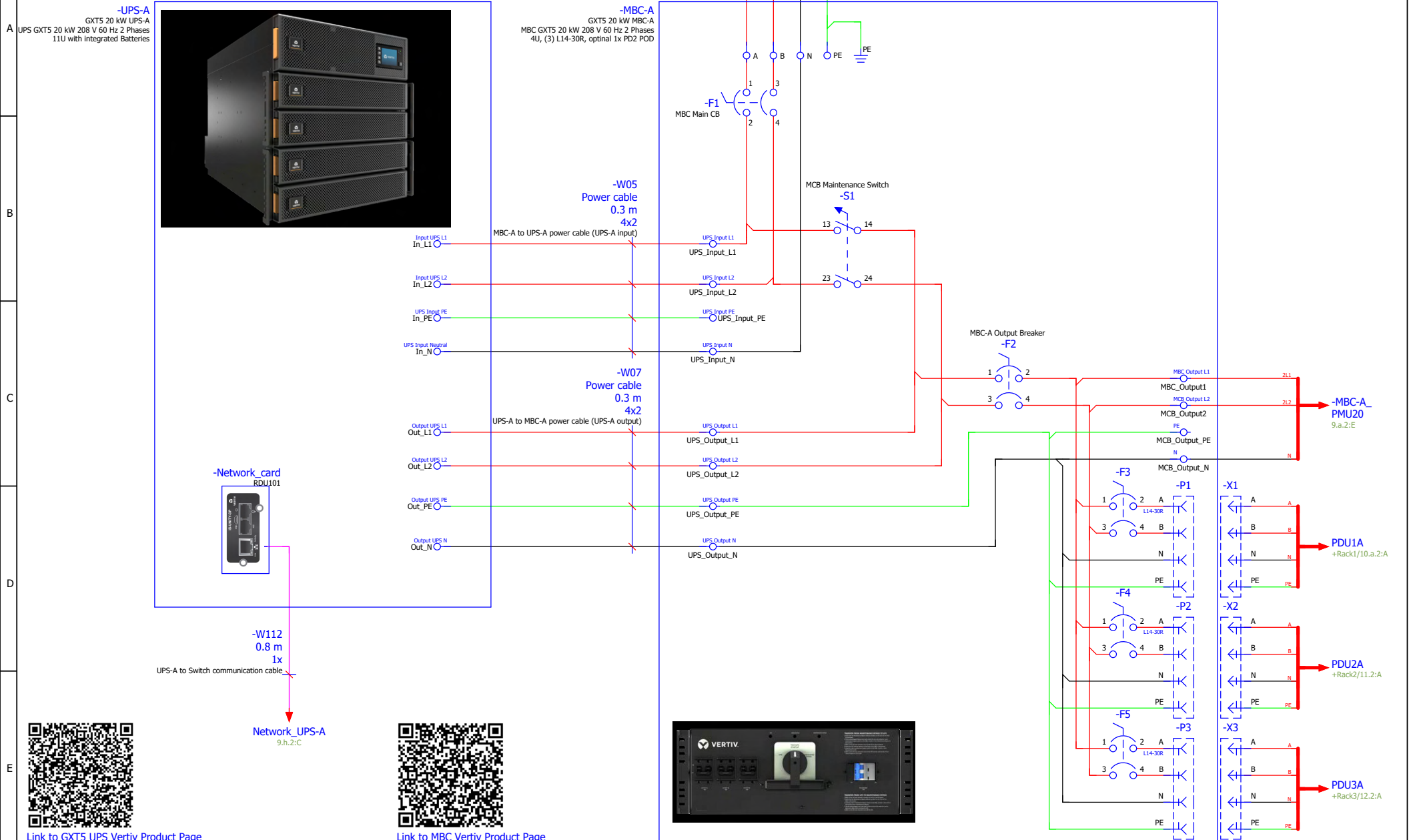
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CHANGE NO.	APPROVED BY: Jakub Fenc
PAGE DESCRIPTION: 9.a- Power Distribution	

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Link to GXT5 UPS Vertiv Product Page



Link to MBC Vertiv Product Page

SHEET NO.	19 / 33	DRAWN BY:	Nilesh Patil
CHANGE NO.		APPROVED BY:	Jakub Fenc
PAGE DESCRIPTION:	9.b- GXT5 20k-A		

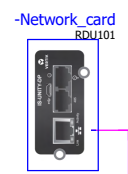
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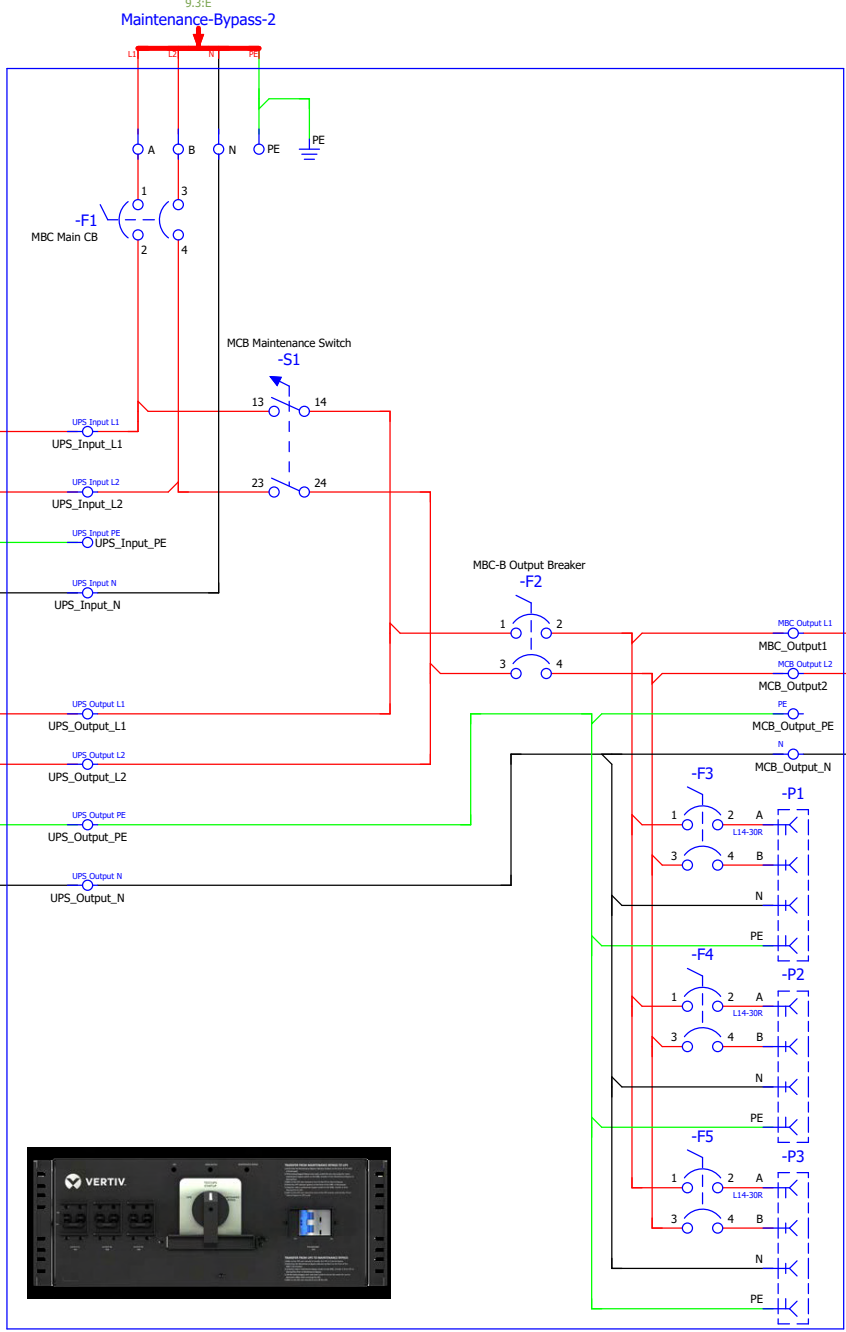
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GXT5 20 kW UPS-B
UPS GXT5 20 kW 208 V 60 Hz 2 Phases
11U with integrated Batteries



-W113
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UPS-B to Switch communication cable

Network_UPS-B
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4U, (3) L14-30R, optional 1x PD2 POD



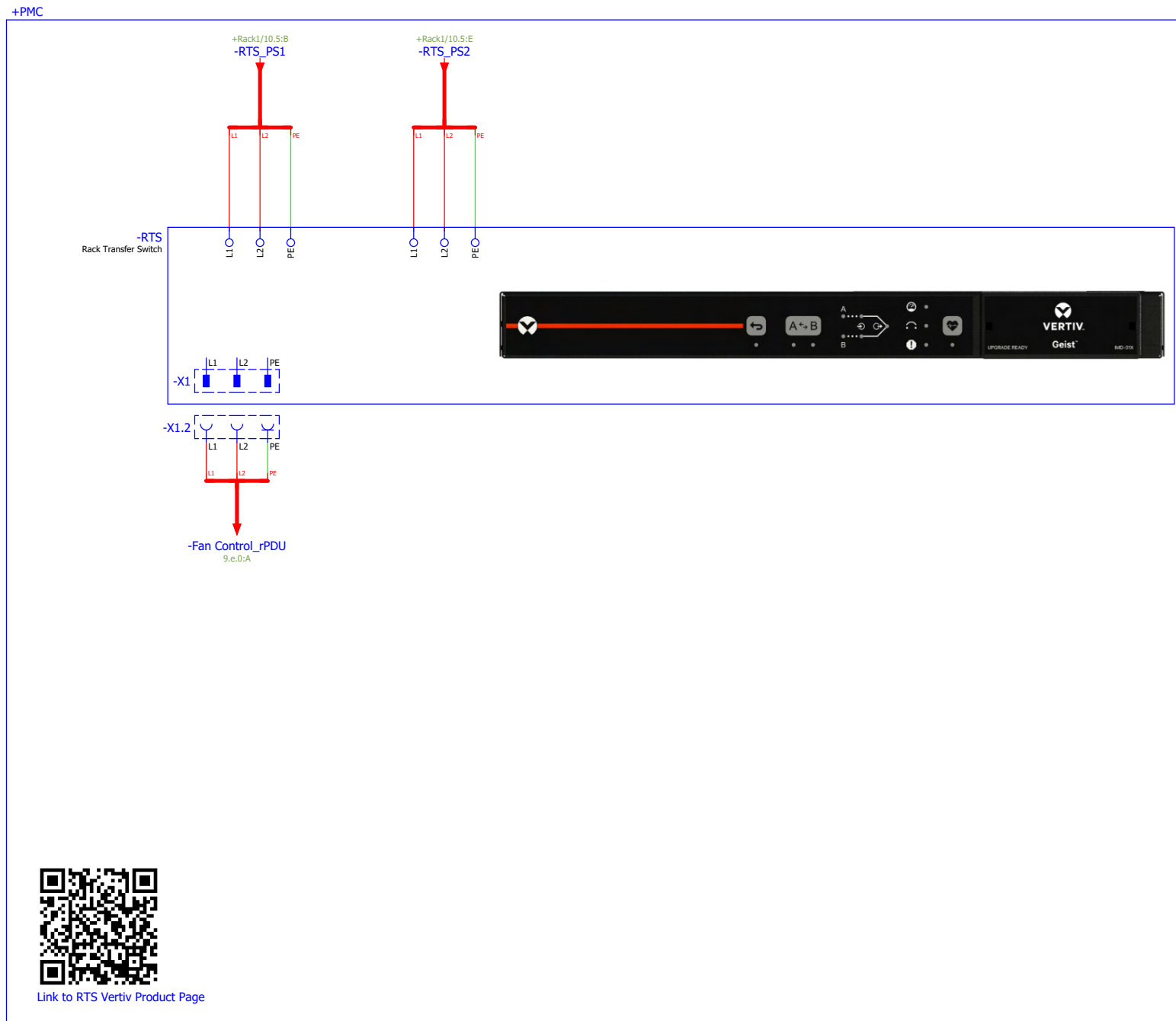
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TITLE / DESCRIPTION:
"Vertiv™ SmartRow™ 2": 5x IT Rack 20kW


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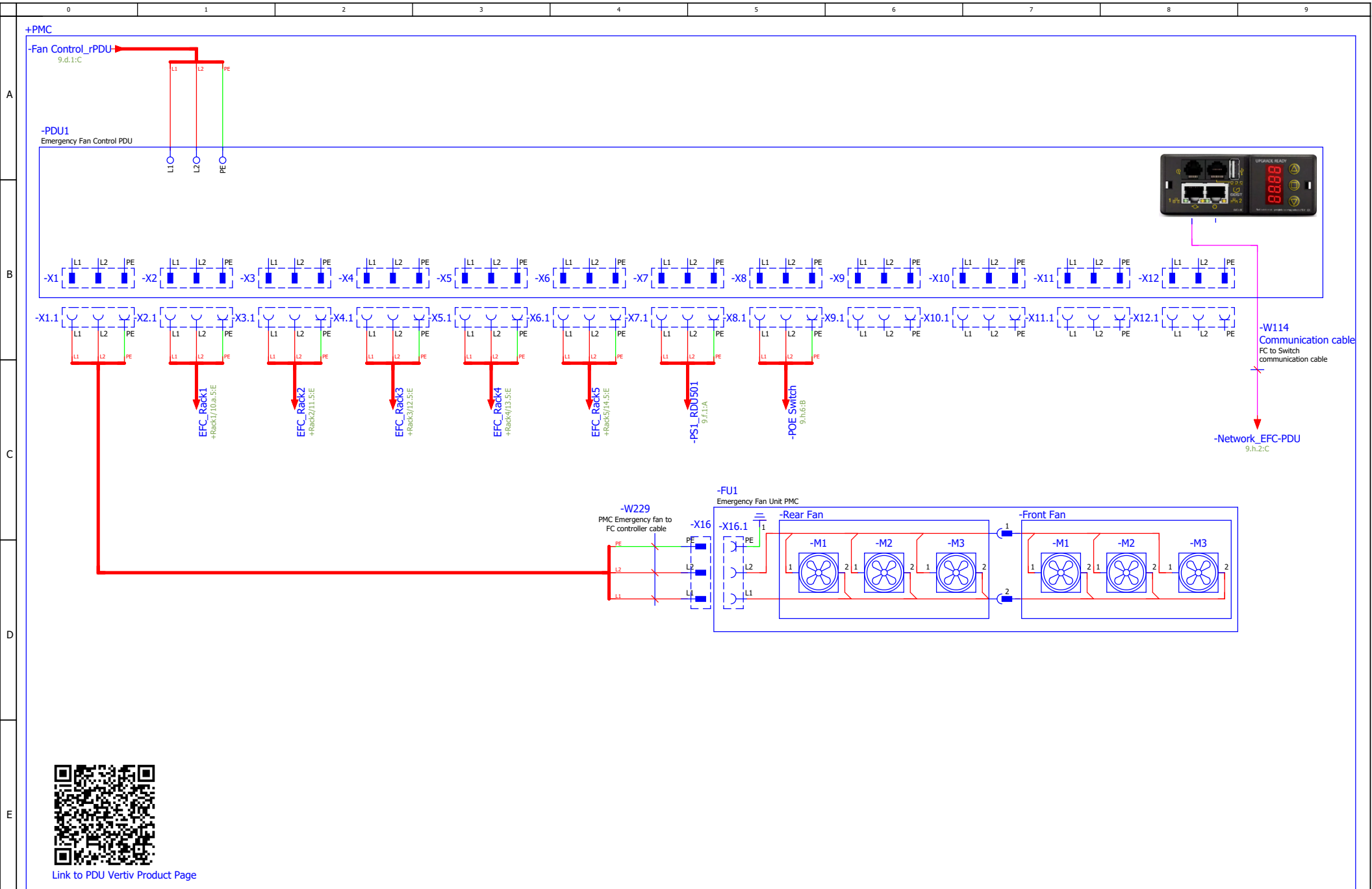
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[Link to RTS Vertiv Product Page](#)

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CHANGE NO.	APPROVED BY: Jakub Fenc		DATE (LATEST REV.)	
PAGE DESCRIPTION: 9.d- Rack Transfer Switch			REVISION: B	
TITLE / DESCRIPTION: "Vertiv™ SmartRow™ 2": 5x IT Rack 20kW				



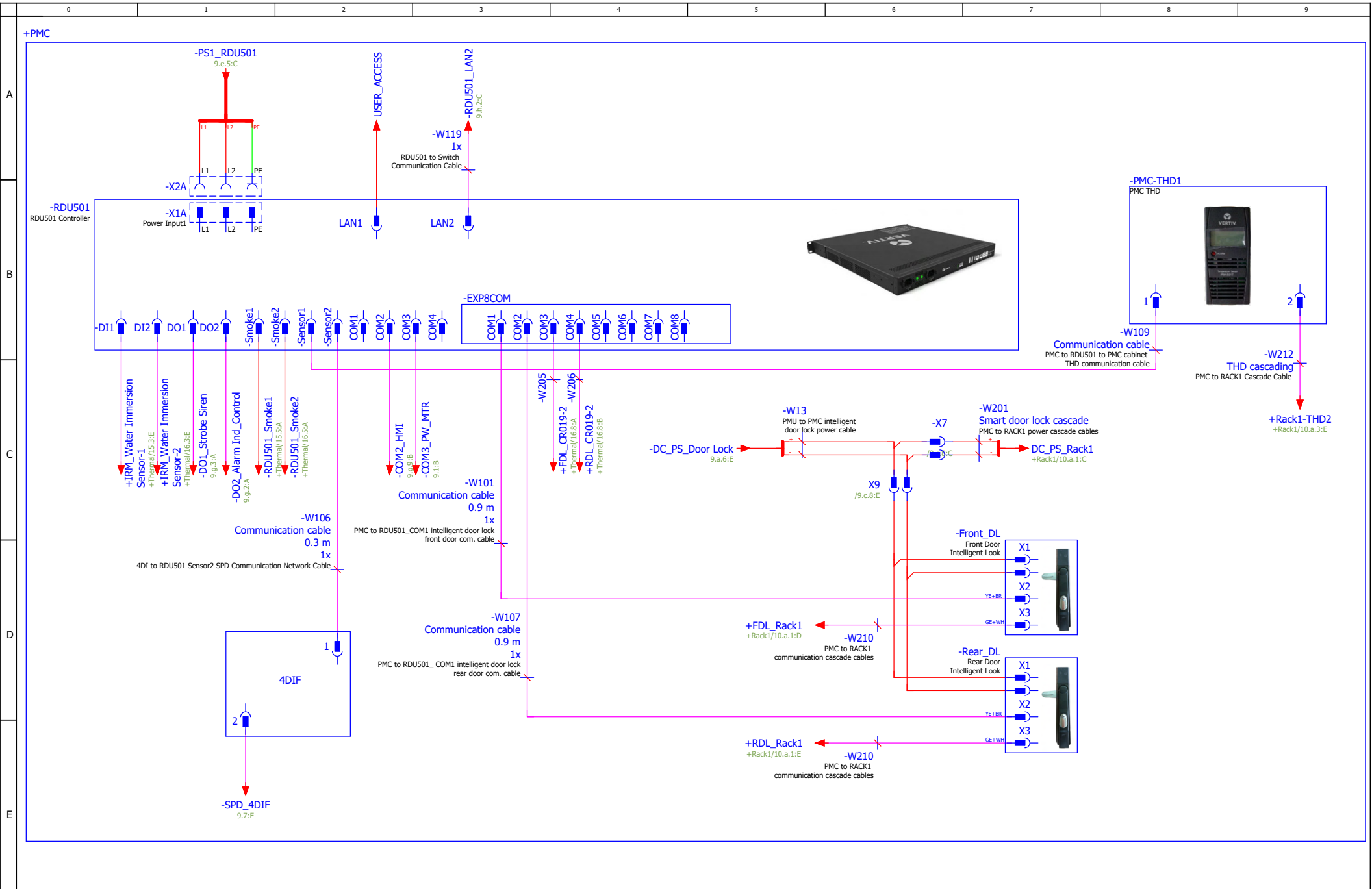
[Link to PDU Vertiv Product Page](#)

SHEET NO.	22 / 33	DRAWN BY:	Nilesh Patil
CHANGE NO.		APPROVED BY:	Jakub Fenc
PAGE DESCRIPTION:	9.e- Emergency Fan Control		

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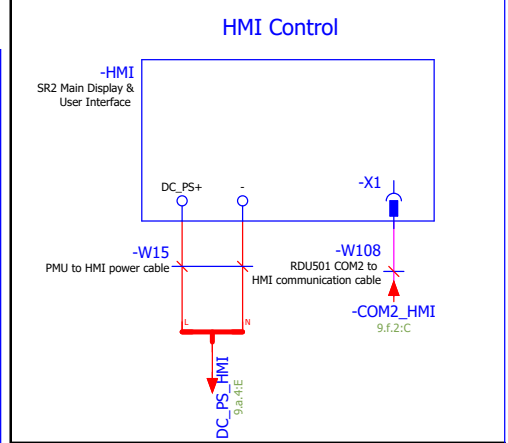
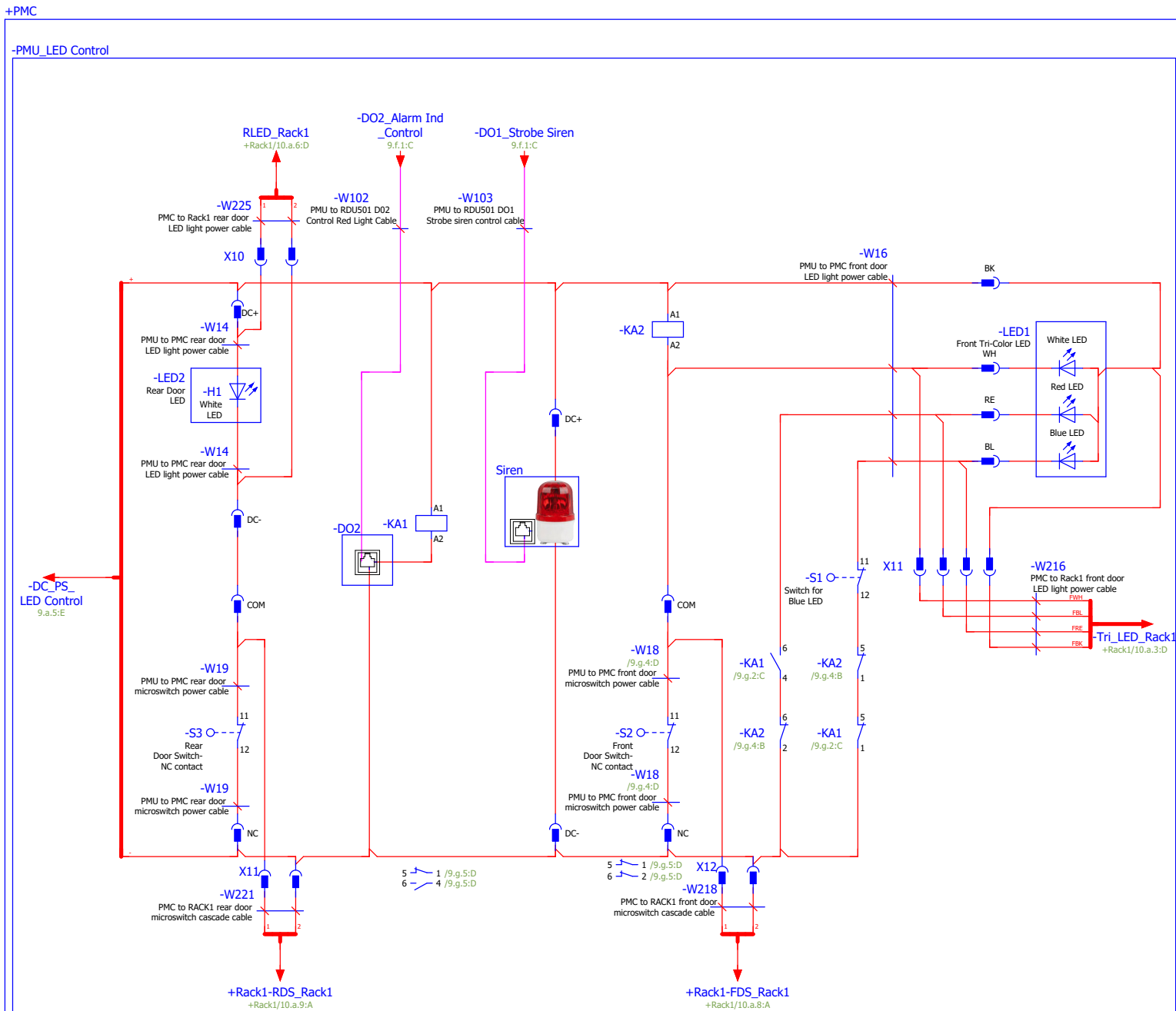


SHEET NO. 23 / 33	DRAWN BY: Nilesh Patil
CHANGE NO.	APPROVED BY: Jakub Fenc
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TITLE / DESCRIPTION: "Vertiv™ SmartRow™ 2U: 5x IT Rack 20kW"	

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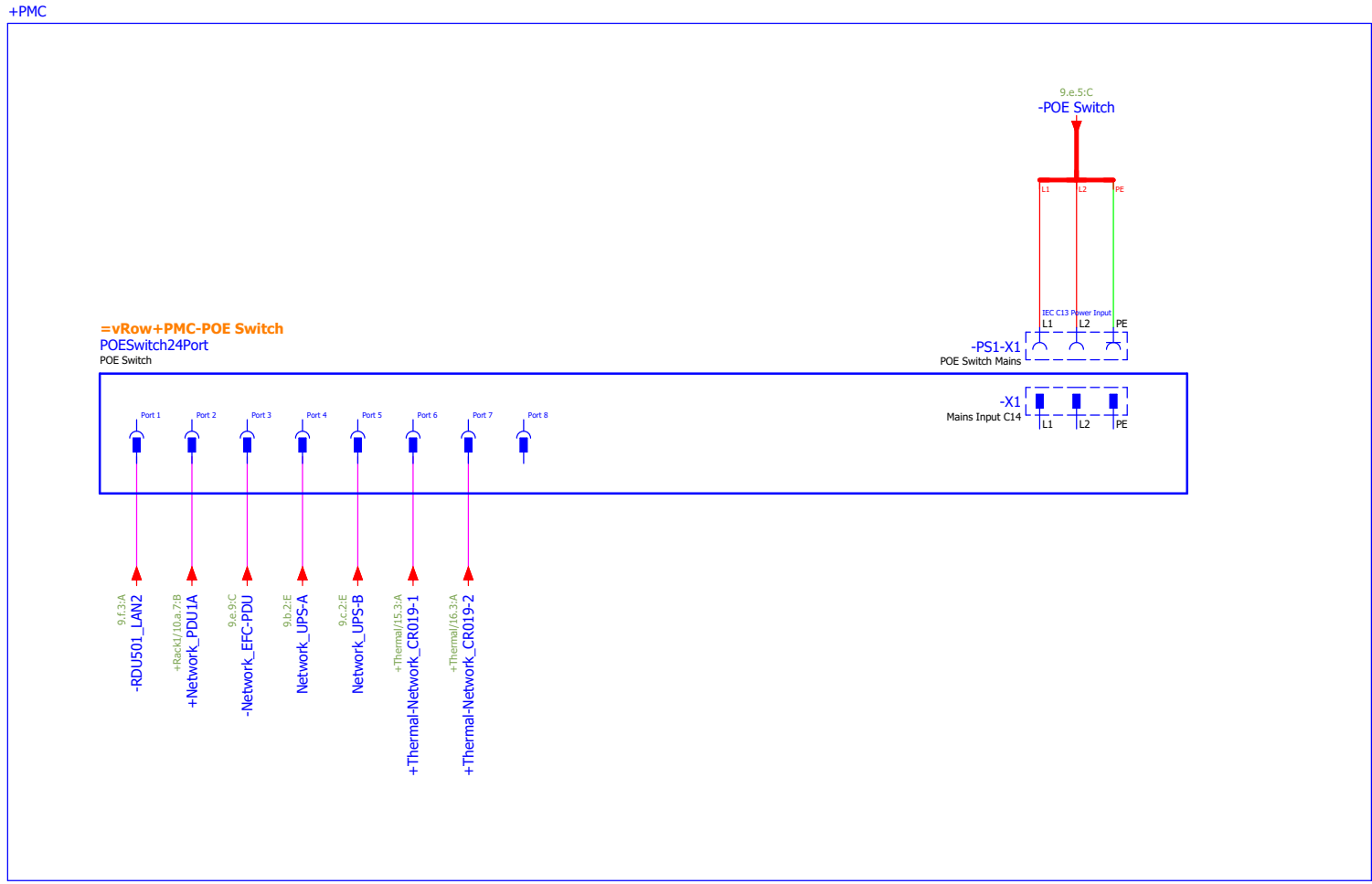
SHEET NO. 24 / 33	DRAWN BY: Nilesh Patil
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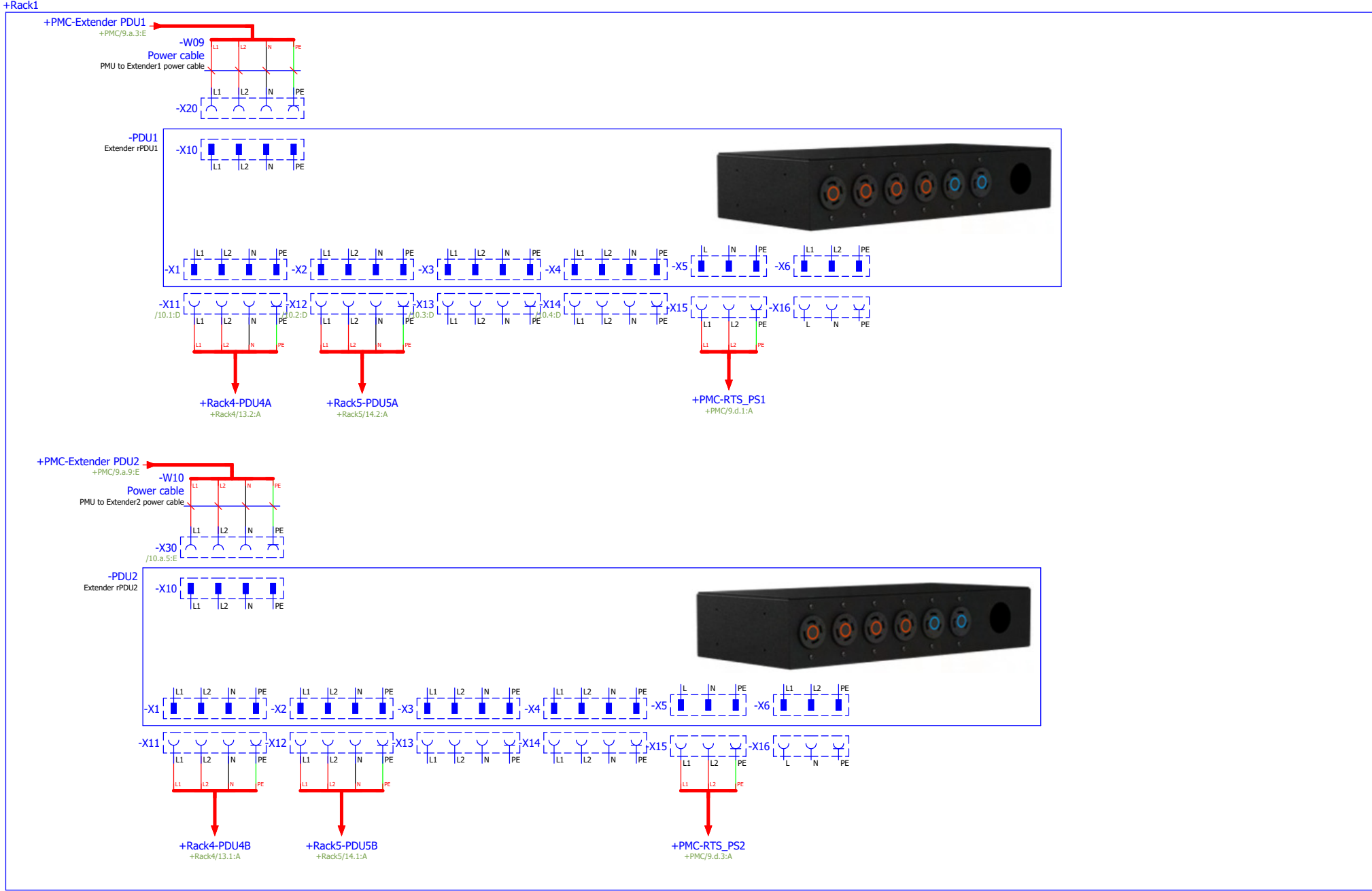
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PAGE DESCRIPTION: 9.h- POE Switch	

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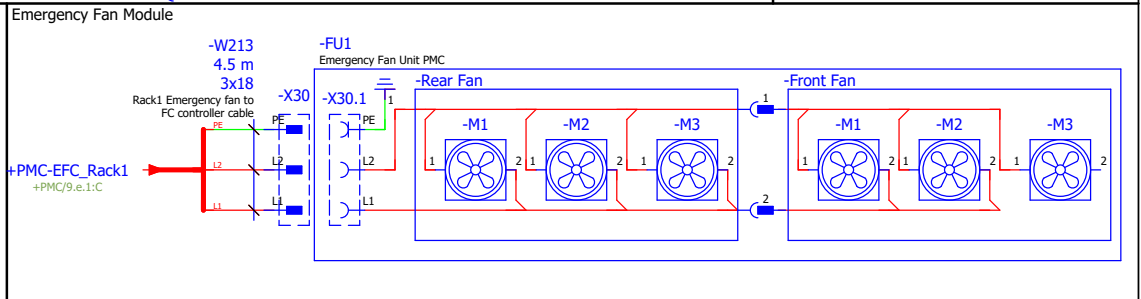
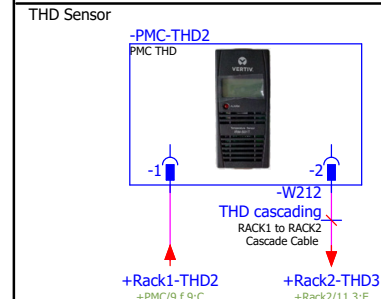
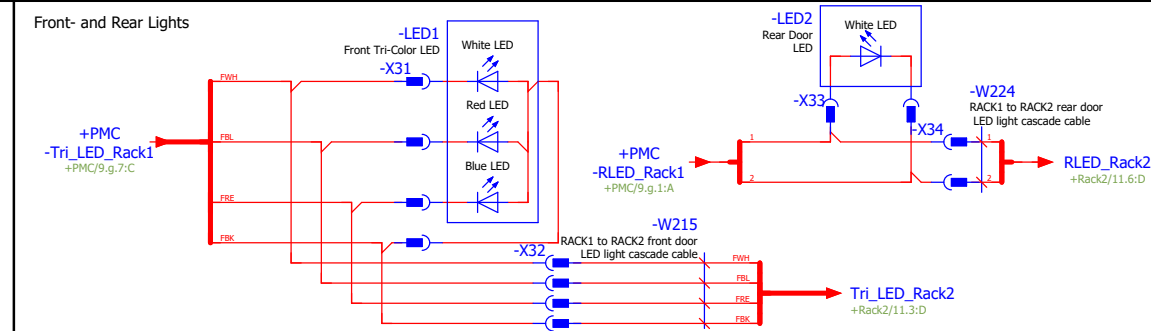
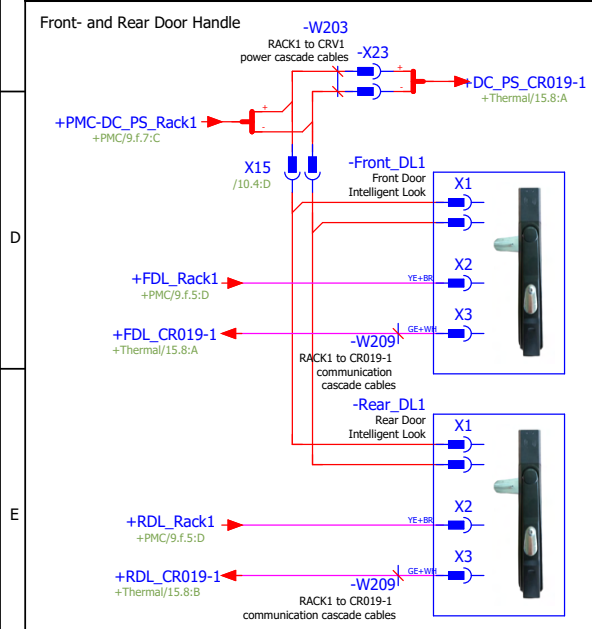
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CHANGE NO.		APPROVED BY:	Jakub Fenc
PAGE DESCRIPTION:	10- IT Rack 1_Extender PDU Power Distribution		

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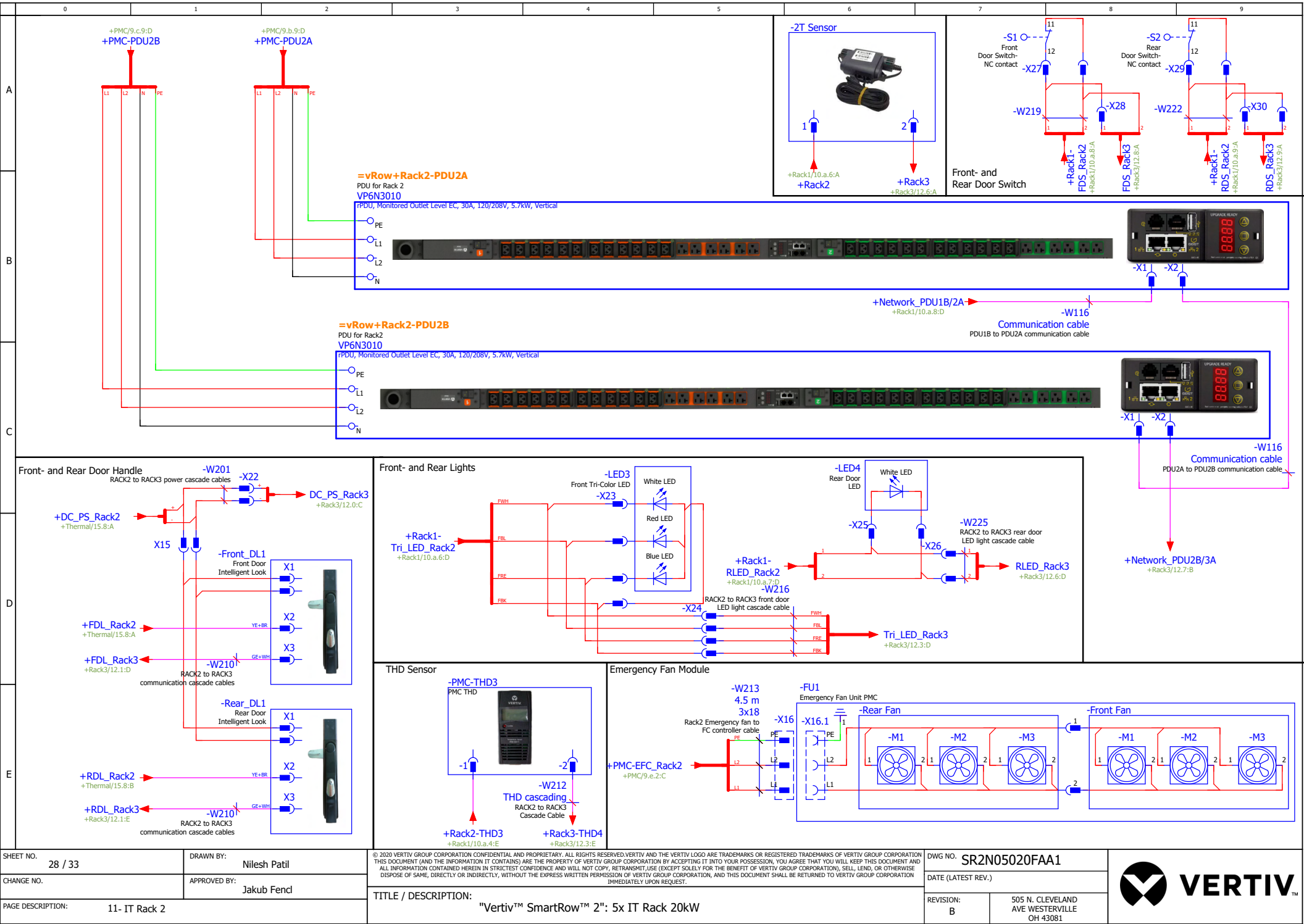
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CHANGE NO.		APPROVED BY:	Jakub Fenc
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TITLE / DESCRIPTION: "Vertiv™ SmartRow™ 2": 5x IT Rack 20kW

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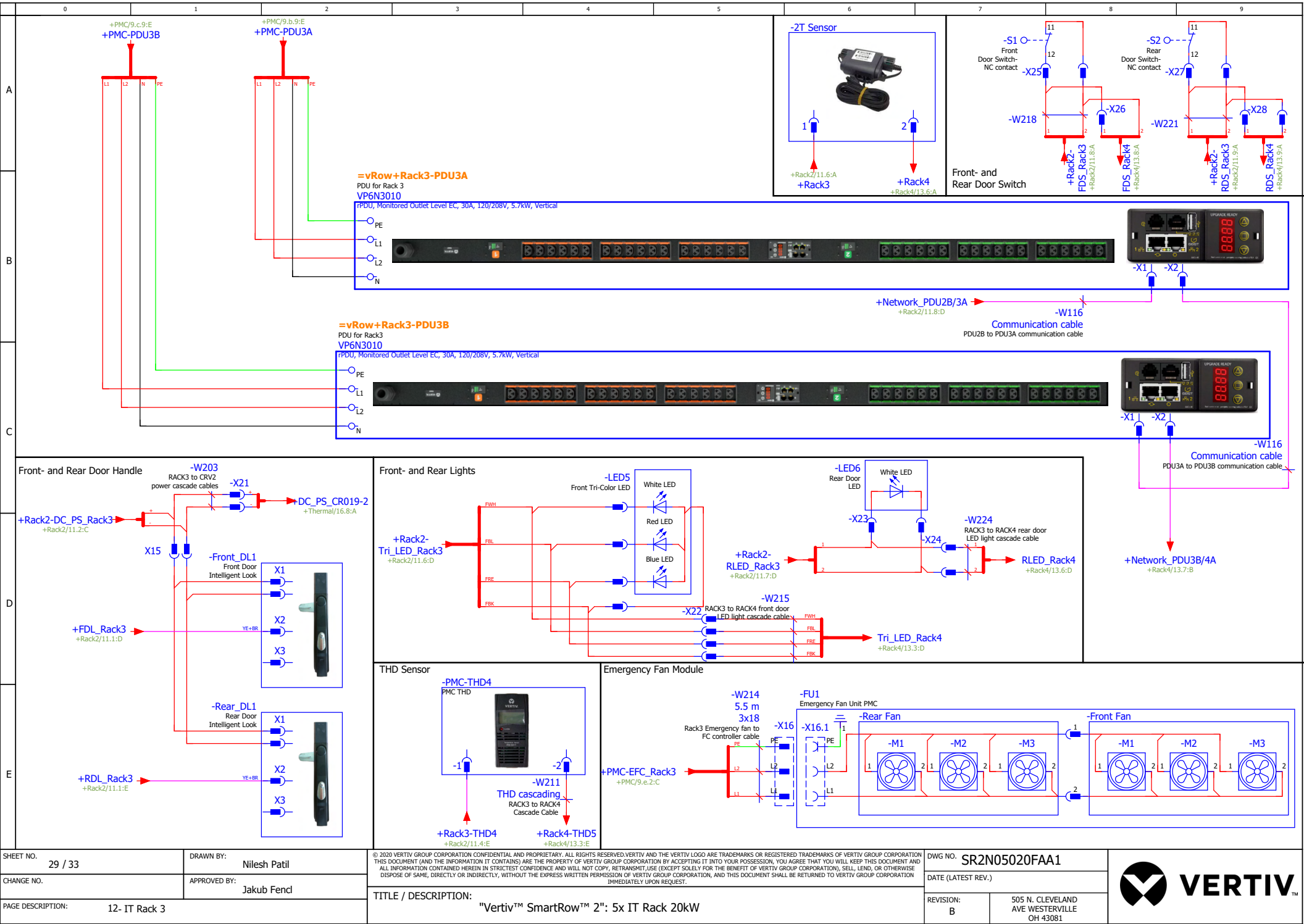
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CHANGE NO.		APPROVED BY:	Jakub Fenc
PAGE DESCRIPTION:	11- IT Rack 2		

TITLE / DESCRIPTION: "Vertiv™ SmartRow™ 2U: 5x IT Rack 20kW

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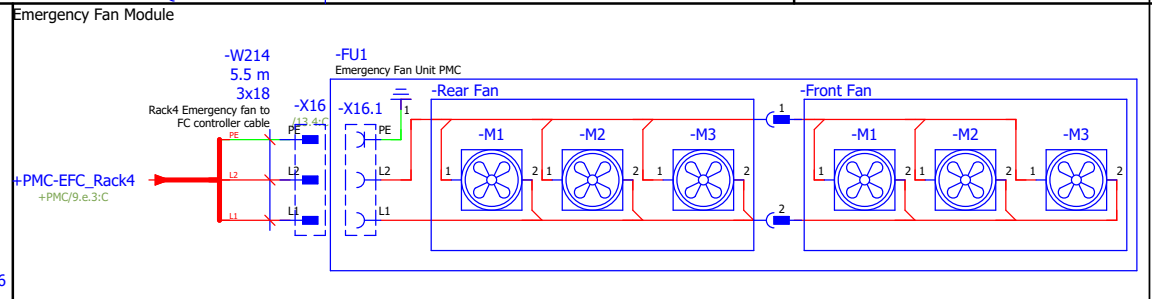
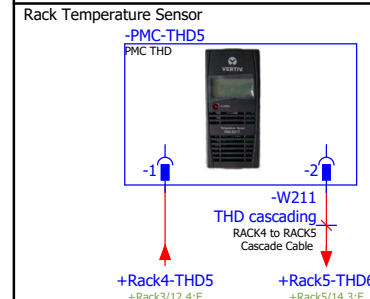
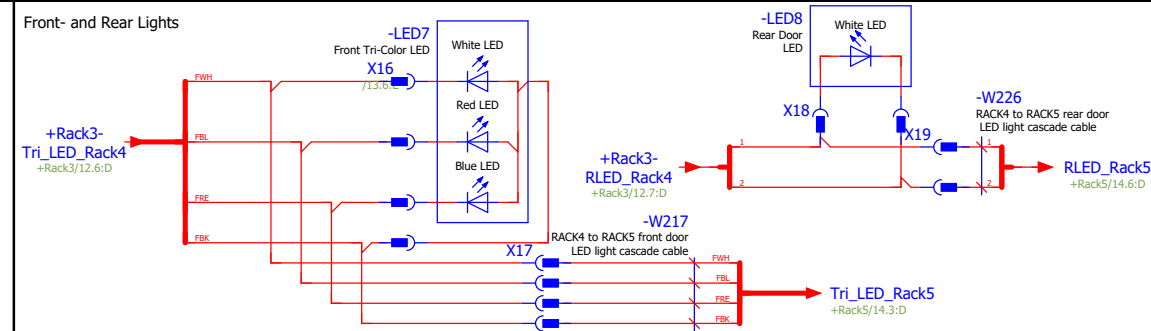
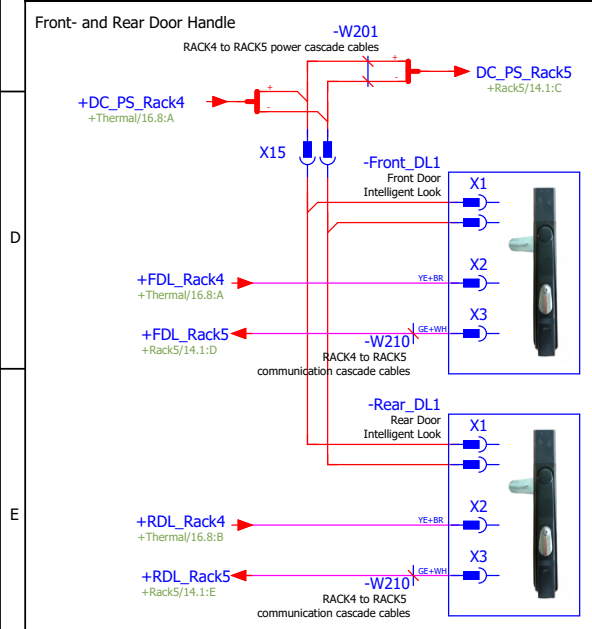
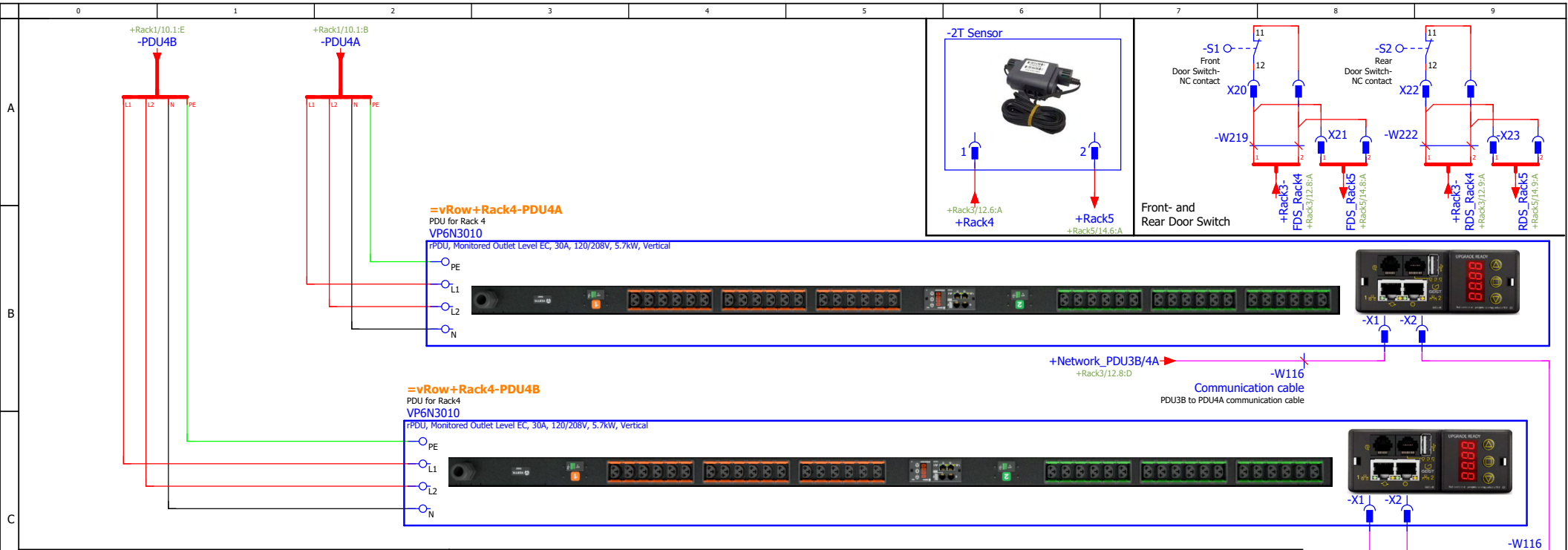


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CHANGE NO.		APPROVED BY:	Jakub Fenc
PAGE DESCRIPTION:	12- IT Rack 3		

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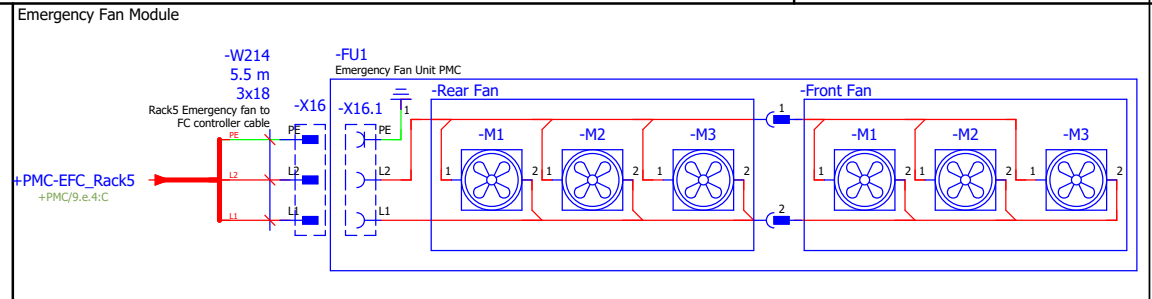
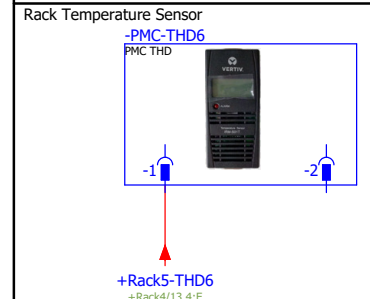
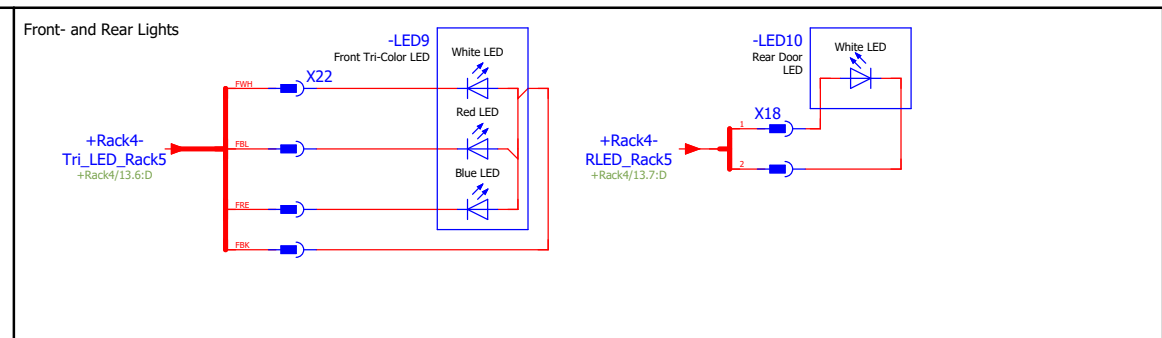
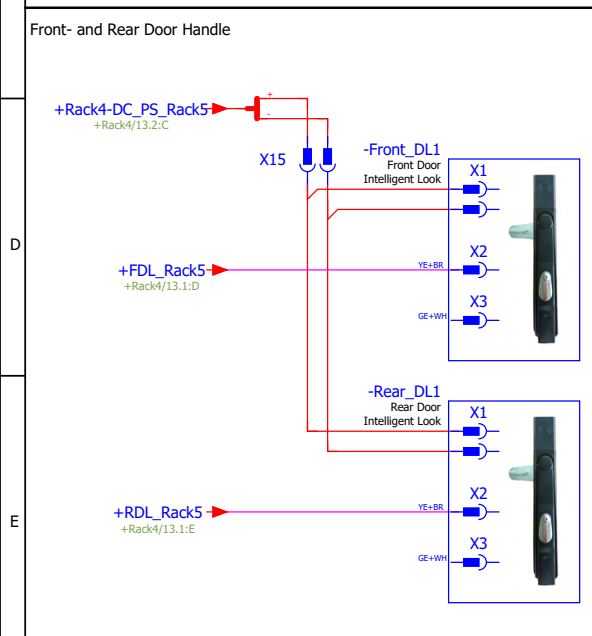
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PAGE DESCRIPTION:	13- IT Rack 4		

TITLE / DESCRIPTION: "Vertiv™ SmartRow™ 2": 5x IT Rack 20kW

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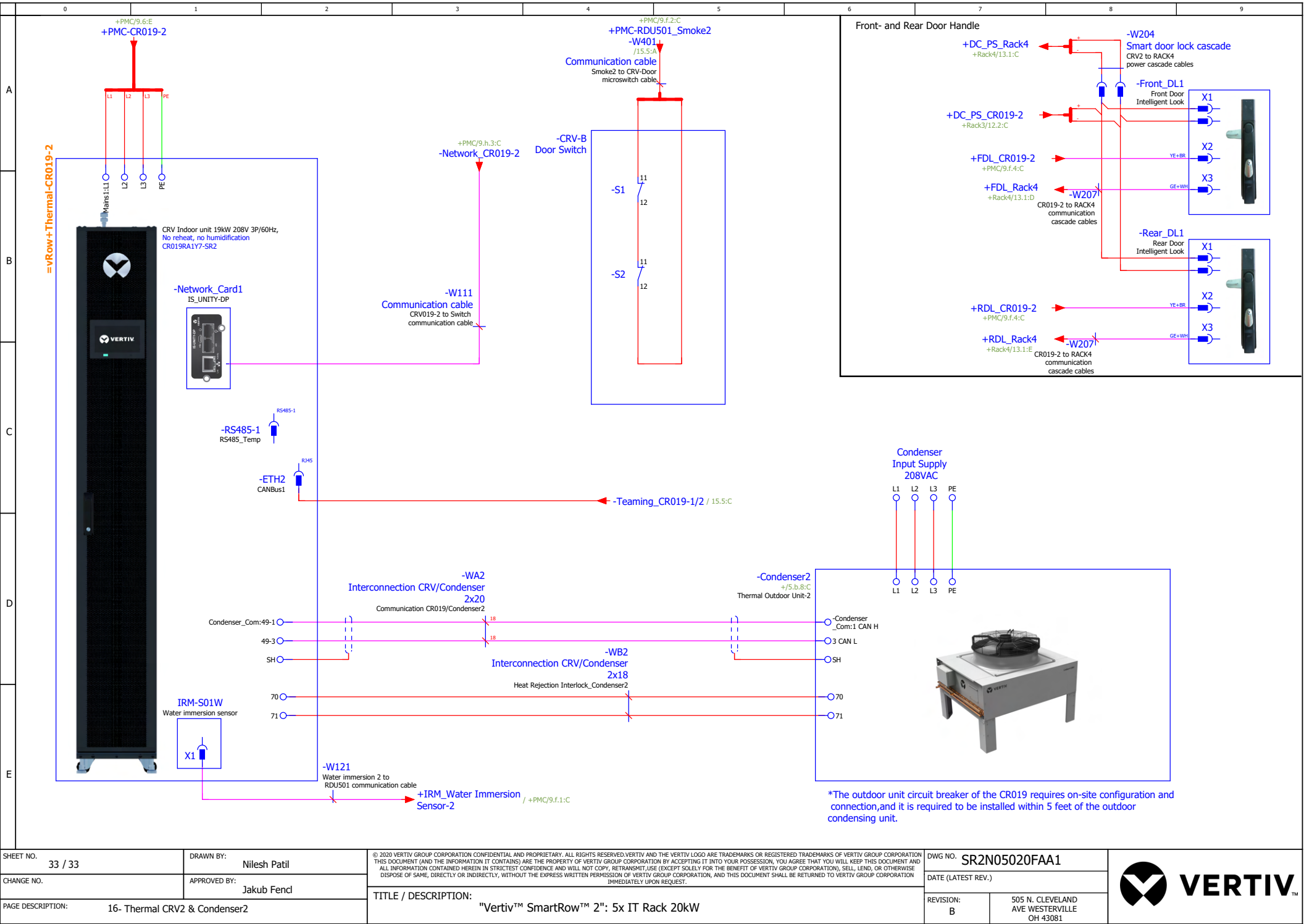
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PAGE DESCRIPTION:	14- IT Rack 5		

TITLE / DESCRIPTION: "Vertiv™ SmartRow™ 2": 5x IT Rack 20kW

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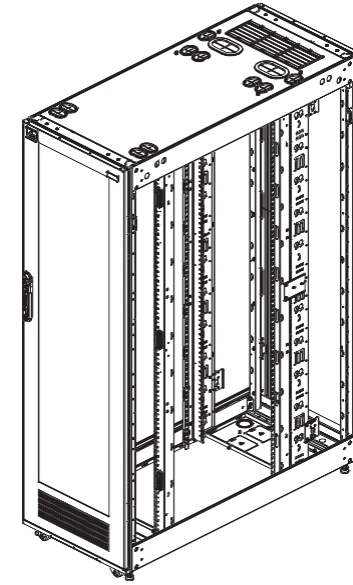
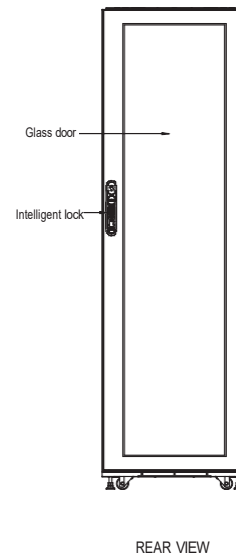
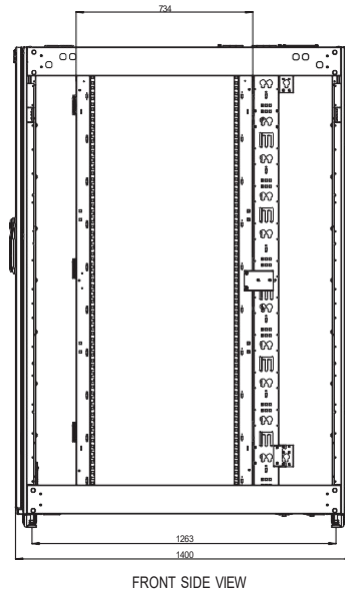
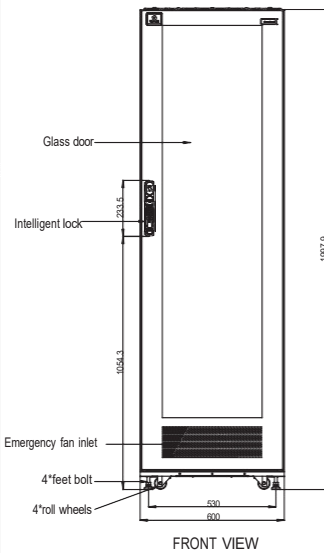
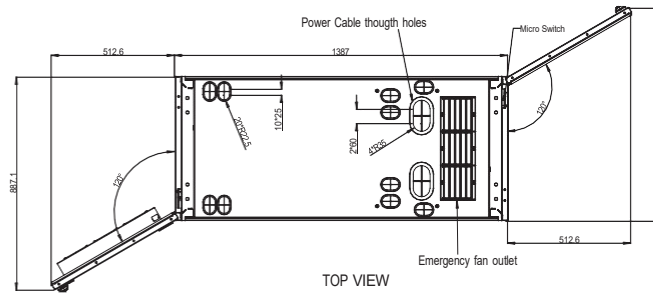
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CHANGE NO.		APPROVED BY:	Jakub Fenc
PAGE DESCRIPTION:	16- Thermal CRV2 & Condenser2		

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TITLE / DESCRIPTION: "Vertiv™ SmartRow™ 2": 5x IT Rack 20kW	

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*The outdoor unit circuit breaker of the CR019 requires on-site configuration and connection, and it is required to be installed within 5 feet of the outdoor condensing unit.



- NOTES:
1. ALL DIMENSIONS ARE IN MM
 2. FRONT AND REAR DOOR WITH THE GLASS AND INTELLIGENT LOCKS.
 3. SWING RADIUS OF 120° (FRONT AND REAR DOORS).
 4. EACH RACK HAS FOUR FEET 50MM AND ROLL WHEELS;
 5. ON THE BOTTOM FRONT DOOR SIDE, THERE IS A EMERGENCY FAN UNIT(3 FANS); ON THE TOP OF REAR DOOR SIDE, THERE IS A EMERGENCY FAN UNIT(3 FANS);
 6. ON THE TOP FRONT FRAME SIDE, THERE IS A TRI COLOR LED AND MICRO SWITCH; ON THE TOP REAR FRAME SIDE, THERE IS A WHITE COLOR LED AND MICRO SWITCH.

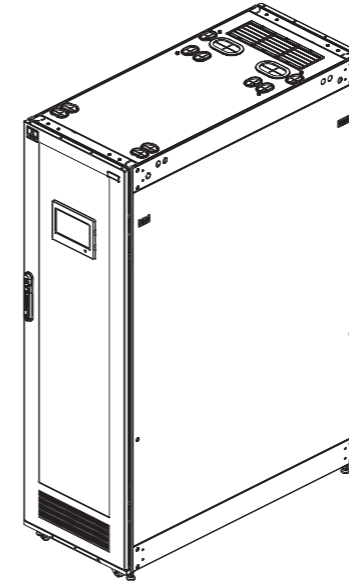
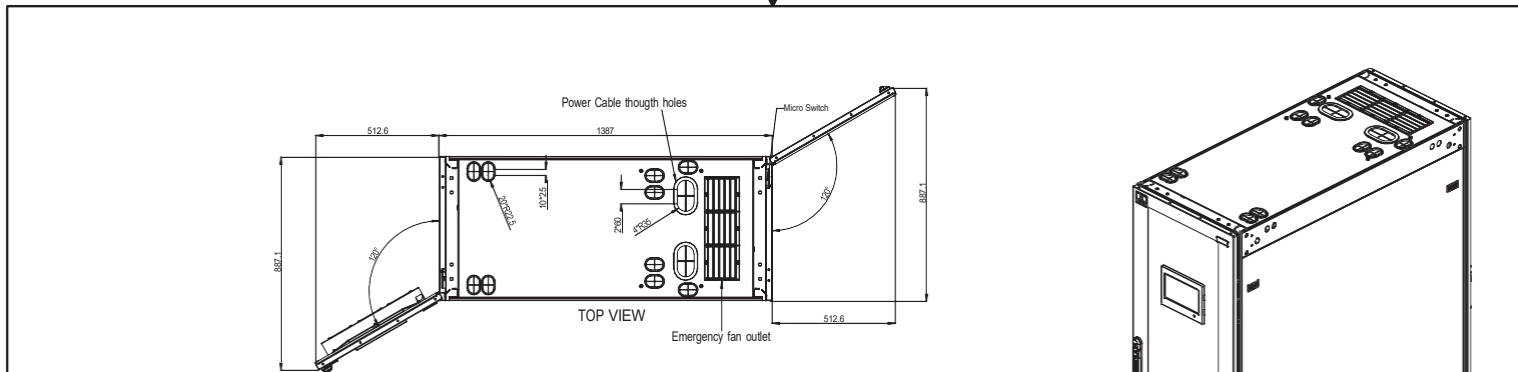
Net weight: 150 kg
Shipping weight: 250 kg

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1 OF 1	Terry
CD. NO.	DESIGNED BY:
-	
REF DWG.	APPROVED BY:
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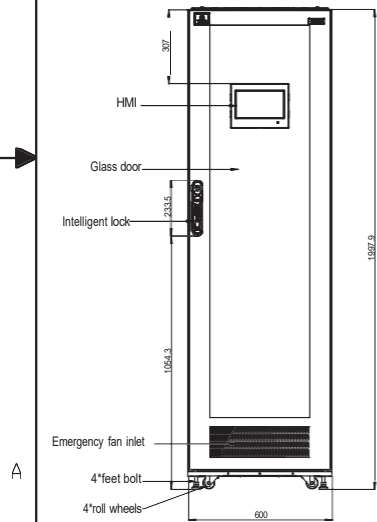
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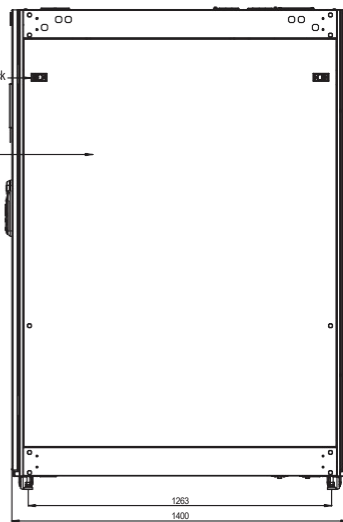




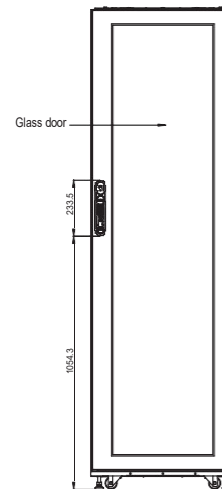
FRONT ISOMETRIC VIEW



FRONT VIEW



FRONT SIDE VIEW



REAR VIEW

NOTES:

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5. ON THE BOTTOM FRONT DOOR SIDE, THERE IS A EMERGENCE FAN UNIT(3 FANS); ON THE TOP OF REAR DOOR SIDE, THERE IS A EMERGENCE FAN UNIT(3 FANS);
6. ON THE TOP FRONT FRAME SIDE, THERE IS A TRI-COLOR LED AND MICRO SWITCH; ON THE TOP REAR FRAME SIDE, THERE IS A WHITE COLOR LED AND MICRO SWITCH.

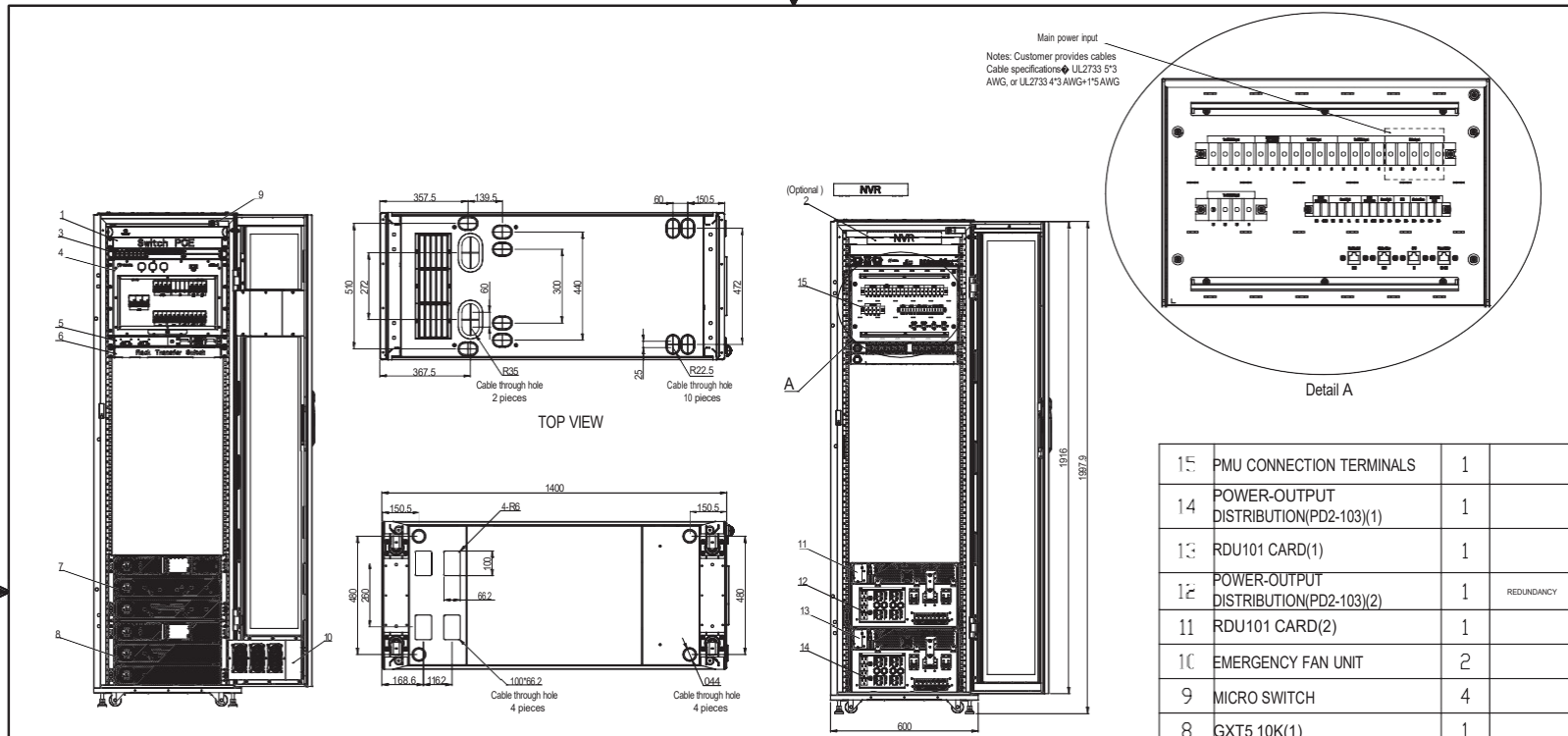
PMC-10 Net weight: 250 kg Shipping weight: 355 kg
 PMC-20 Net weight: 265 kg Shipping weight: 370 kg

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FRONT VIEW

BOTTOM VIEW

REAR VIEW (REMOVE PMU COVER)

- NOTES:
1. POWER REDUNDANCY FOR PMC10
 2. FAN CONTROLLER IS A GU2.0 GEIST PDU WITH UNIT LEVEL MONITORING,HORIZONTAL (12) COMBINATION C13/C19.OUTLET 1-6 IS ONLY FOR FAN POWER SUPPLY,THE OTHERS IS FOR RDU501/NVR/POE SWITCH POWER SUPPLY.
 3. THE POWER-OUTPUT DISTRIBUTION(PD2-103) INSTALLED IN GXT5 UPS,WHICH WILL PROVIDE POWER FOR RACK PDU AND FAN CONTROLLER.
 4. THE GXT5 UPS INTEGRATS THE INTERNAL BATTERY,BUT NEED INSTALL ON SITE.
 5. ON THE TOP FRONT FRAME SIDE,THERE IS A TRI-COLOR LED AND MICRO SWITCH;ON THE TOP REAR FRAME SIDE,THERE IS A WHITE COLOR LED AND MICRO SWITCH.ONE MICROSWITCH IS FOR DETECTING THE DOOR STATUS,THE OTHER ONE IS FOR CONTROL LED(DOOR IS OPNE,THE LED WHITE IS ON).
 6. RACK TRANSFER SWITCH IS AN AUTO SWITCHING -IN EVEBR OF POWER FAILURE. ENSURE CONTINUOUS FC POWER SUPPLY.

INSTALLED WEIGHT: 525 Ng

15	PMU CONNECTION TERMINALS	1	
14	POWER-OUTPUT DISTRIBUTION(PD2-103)(1)	1	
13	RDU101 CARD(1)	1	
12	POWER-OUTPUT DISTRIBUTION(PD2-103)(2)	1	REDUNDANCY
11	RDU101 CARD(2)	1	
10	EMERGENCY FAN UNIT	2	
9	MICRO SWITCH	4	
8	GXT5 10K(1)	1	
7	GXT5 10K(2)	1	REDUNDANCY
6	RACK TRANSFER SWITCH	1	
5	FAN CONTROLLER	1	
4	PMU-10	1	
3	RDU501	1	
2	NVR	1	Optional
1	POE SWITCH	1	
NO.	NAME	4t	REMARK

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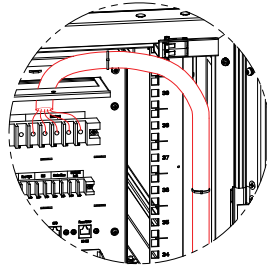
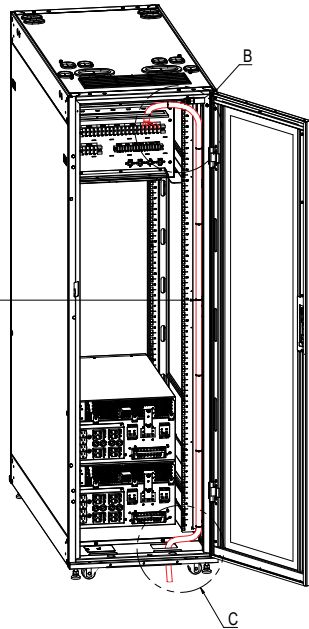


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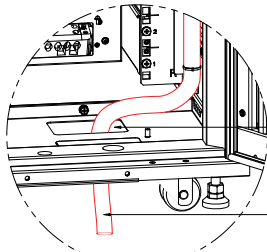
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B

B



Detail B



PMC bottom panel cable entry hole

The main input cable

Detail C

NOTES:

When the main input cable enters the PMC from the bottom panel cable entry hole, it is bundled along the cable management board and connected to the PMU

A

A

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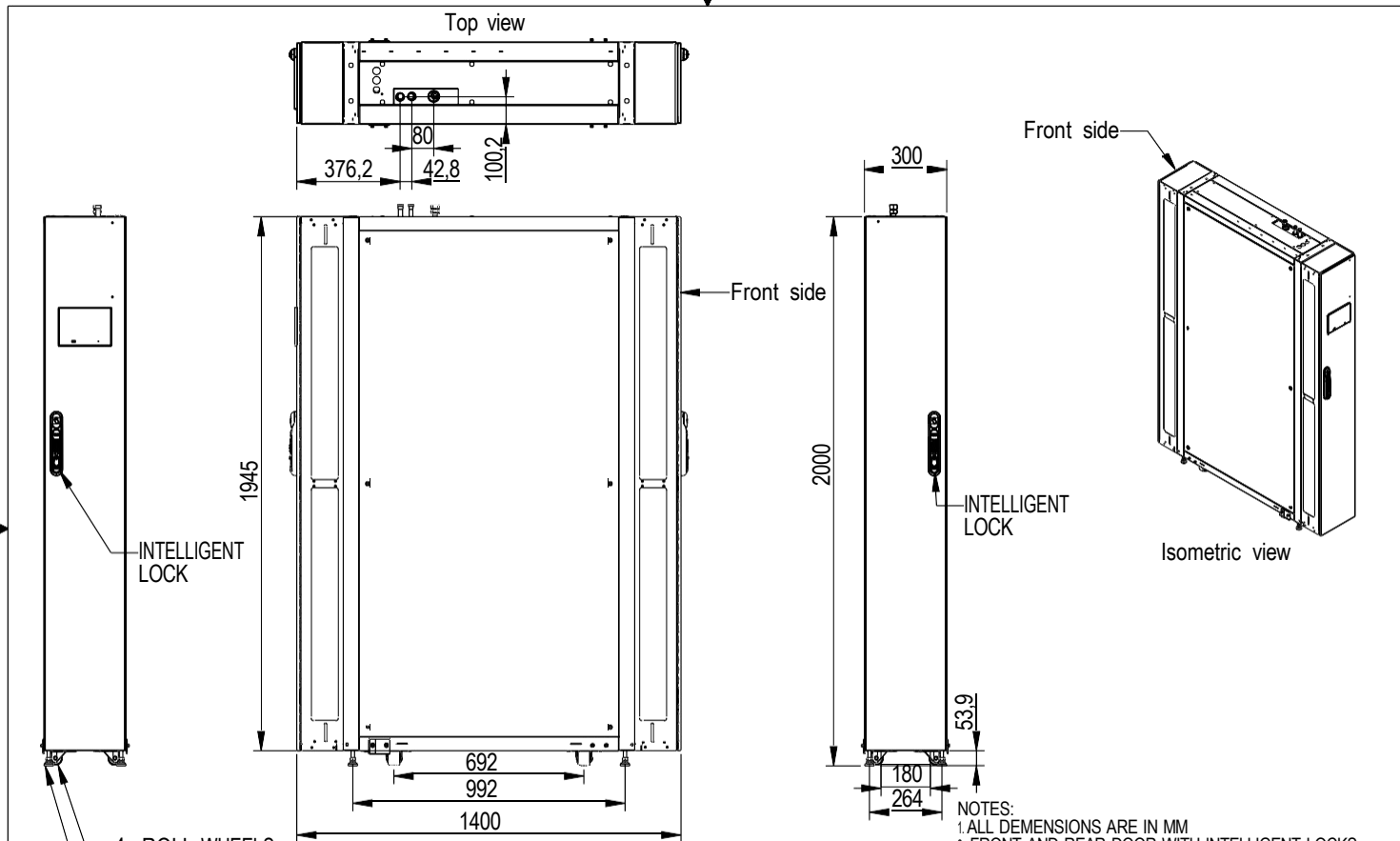
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2

1



- NOTES:
 1. ALL DIMENSIONS ARE IN MM
 2. FRONT AND REAR DOOR WITH INTELLIGENT LOCKS.
 3. SWING RADIUS OF 120° (FRONT AND REAR DOORS).
 4. EACH RACK HAS FOUR FEET BOLT AND ROLL WHEELS.
 5. FRONT AND REAR DOOR WITH DOOR SENSOR.
 6. WEIGHT 280Kg

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TITLE CRD10 WITH PLENUM			

2

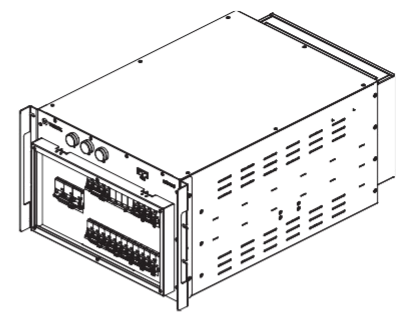
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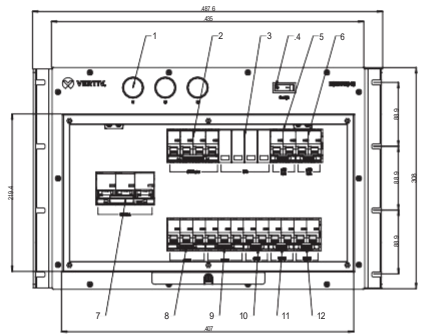
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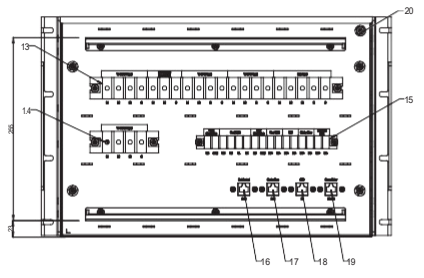
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FRONT ISOMETRIC VIEW



FRONT VIEW



REAR VIEW
(PMU COVER REMOVED)

20	GROUND SCREWS	1	
19	POWER METER RS.485(RJ.45)	1	
18	SPD DI(RJ.45)	1	
17	STOBE SIREN CONTROL DO1(RJ.45)	1	
16	RED CONTROL DO2(RJ.45)	1	
15	DC POWER TERMINAL BLOCKS	1	
14	TO CRV2 POWER TERMINAL BLOCKS	1	
13	POWER TERMINAL BLOCKS	1	
12	24VDC BREAKER	1	
11	12VDC BREAKER	1	
10	AC/DC BREAKER	1	
9	CRV2 BREAKER	1	
8	CRV1 BREAKER	1	
7	MAIN INPUT BREAKER	1	
6	UPS2 INPUT BREAKER	1	
5	UPS1 INPUT BREAKER	1	
4	BOATLIKE SWITCH FOR BLUE LIGHT	1	
3	SPD	1	
2	SPD BREAKER	1	
1	POWER LIGHT(L1/L2/L3)	3	
NO	NAME	Qty	REMARK

NOTES:

PMU10 is used in Power Redundancy and No Power Redundancy PMC
Net weight: 36 kg

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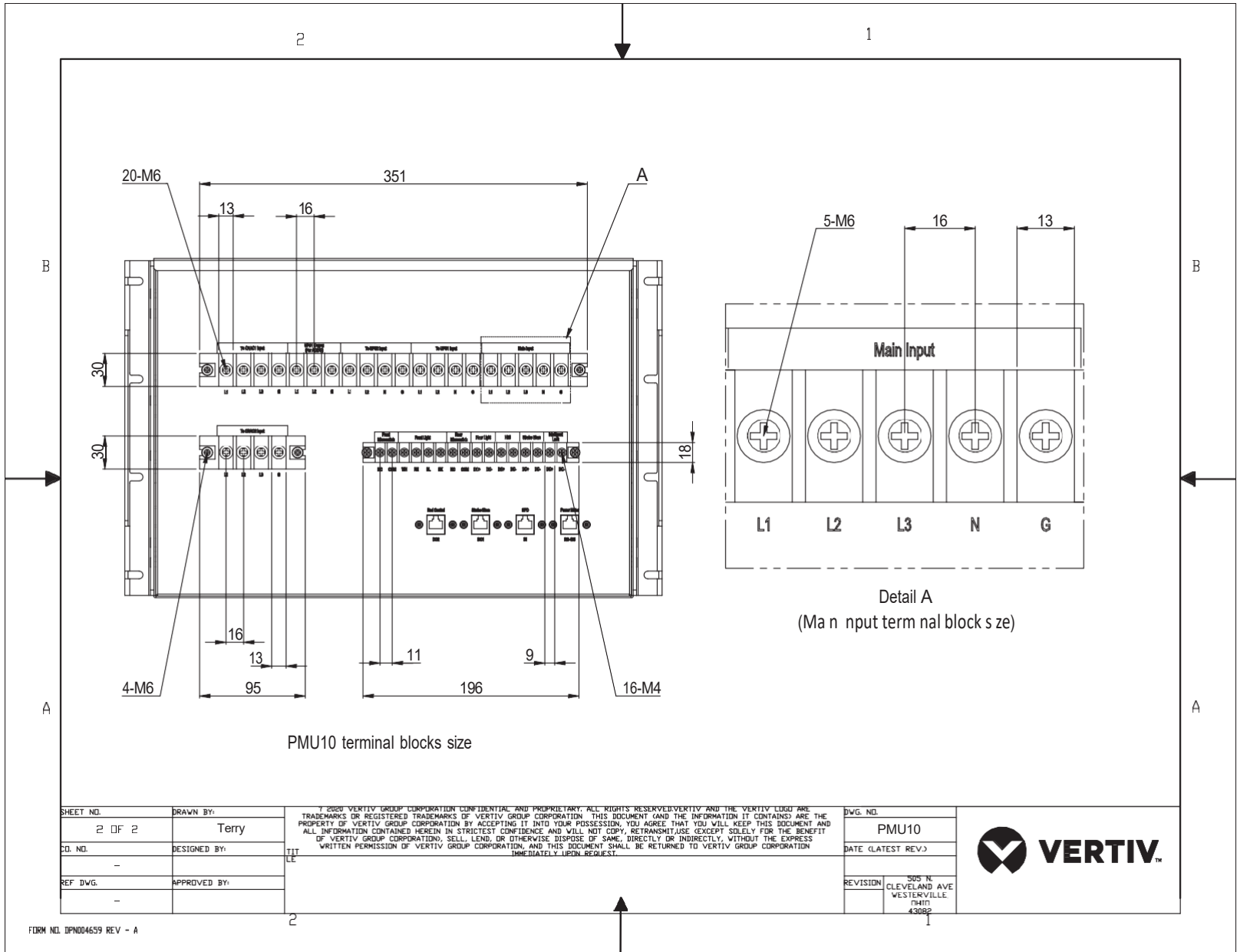
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2

1



PMU10 terminal blocks size

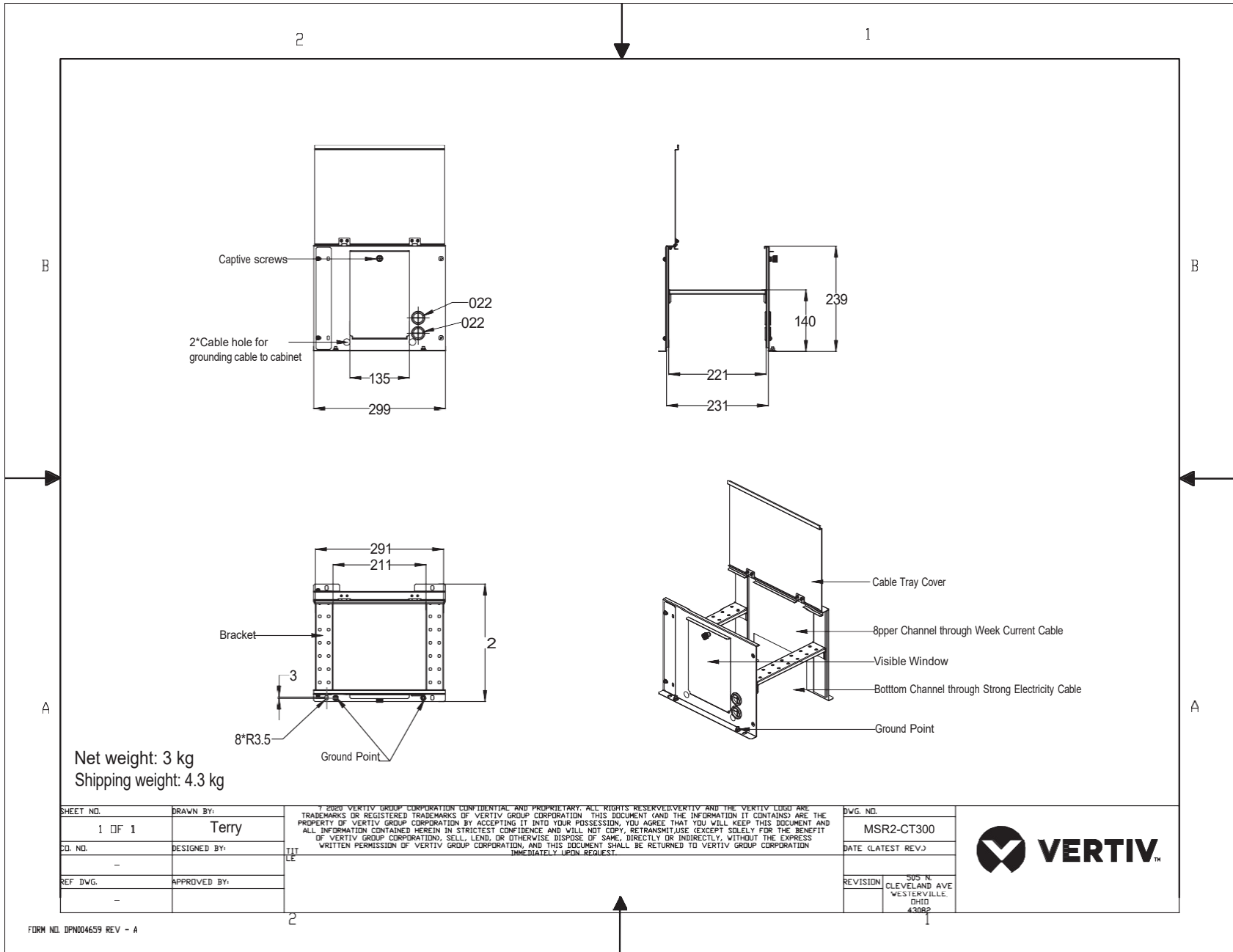
Detail A
(Main input terminal blocks size)

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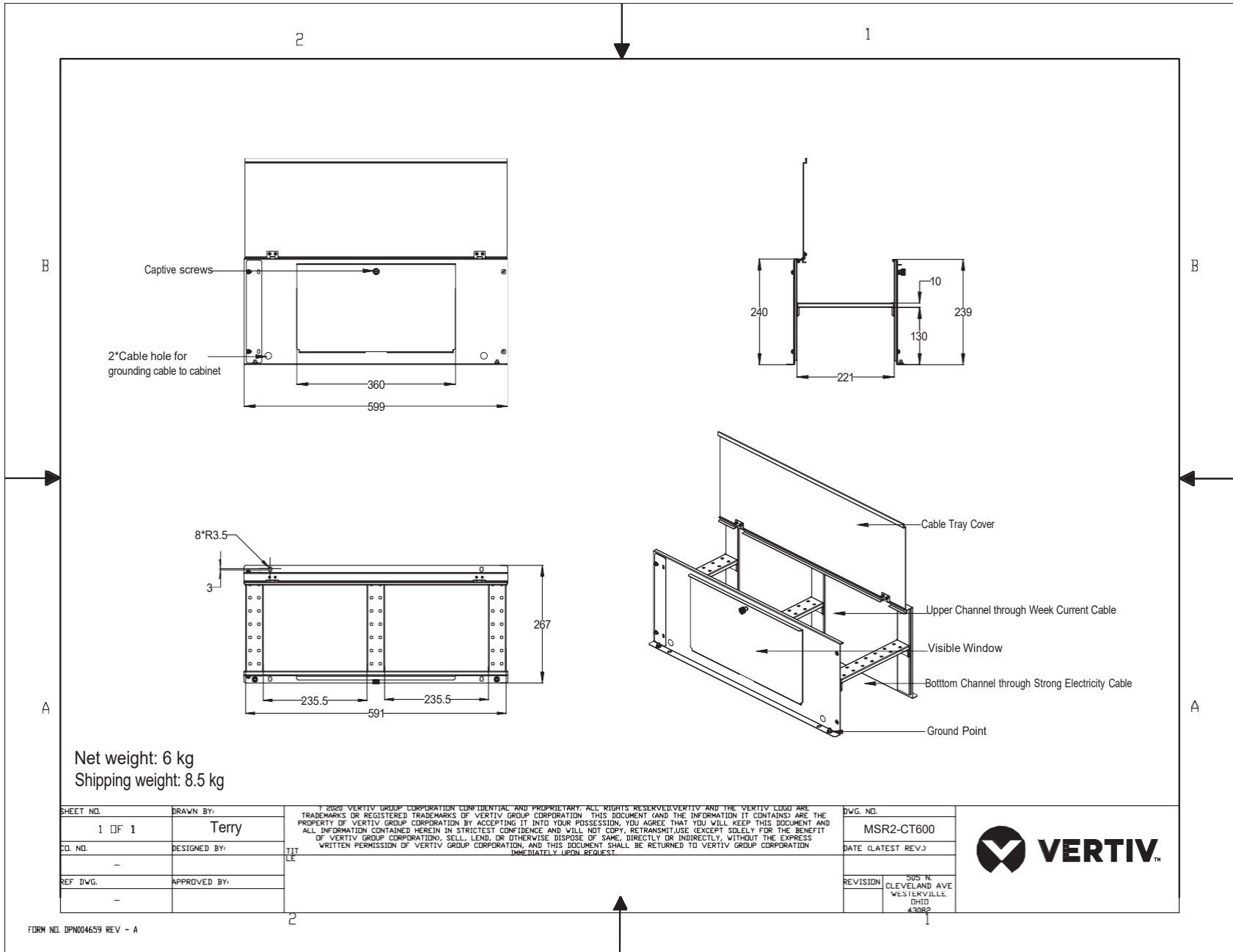


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VERTIV™

SCOPE OF WORK

SmartRow2 Assembly

SERVICE SUMMARY

Feature	Detail
On-Site Service	Site trip(s) within the 48 contiguous states. Visit(s) to be scheduled by the customer between 7 am-5 pm, Monday-Friday (excluding weekends & national holidays).
Customer Support	Includes access to the Customer Resolution Center (1-800-543-2378) and the Vertiv Customer Services Network Online Internet portal for extent of product warranty.
Consolidation	The SmartRow2 includes numerous shippable units (typically pallets or boxes) that originate from multiple factories and suppliers. Vertiv consolidates these items into a single customer shipment and reduces the likelihood of shippable units being lost at the customer site. This benefits the customer by relieving the burden of keeping track of multiple partial shipments.
Inside Delivery	Vertiv Service will move the shippable units from the delivery truck to the Staging Area. Vertiv Services will unpackage the shippable units and remove/dispose of the packaging material so that it is ready for assembly. Vertiv will verify that all material on the sales order has been received.
Project Management	Included with Consolidation and Inside Delivery. Vertiv will assign a project manager for the project. The Project Manager will supervise the Consolidation and Inside Delivery Process and communicate hardware shipment schedules with the customer.
Assembly	SmartRow2 is assembled onsite by Vertiv factory-trained and authorized technicians equipped with Vertiv Proprietary tools and software. Vertiv CEs and Vertiv Partners are the only approved OEM service providers for Vertiv products. These technicians are supervised by a Site Manager who also gathers site-specific requirements like safety and work procedures
Factory Startup	Warranty inspection and startup validates the warranty and initializes the warranty coverage period

SERVICE PERFORMED

Consolidated Shipment

Shippable units may be available at time of order or built-to-order with a lead time. Vertiv safely stores these items in-warehouse until the customer is ready to receive the SmartRow2 in a single shipment

Inside Delivery

Vertiv Services will deliver the shippable units from the delivery truck to the Staging Area. Vertiv Services will unpackage the shippable units and remove/dispose of the packaging material so that it is ready for assembly. Vertiv will verify that all material has been received.

Change order option:

- There must be an appropriate loading dock with continuous, level floor from the dock to the staging area. If the shippable units must be moved up/down stairs, the customer must provide a suitable elevator, or charges for special rigging will be incurred. If the customer does not have an appropriate loading dock, nominal charges may/may-not apply for a lift-truck delivery.

Project Management

Vertiv will assign a project manager and a site manager for the project.

The Project Manager will supervise the Consolidation and Inside Delivery Process and communicate schedules with the customer.

The Site Manager will supervise the assembly, startup, warranty inspection and turn over the SmartRow2 to the customer

Site-Specific Requirements

All personnel will be available for up to two hours per week for Site Access, Safety Training and other site-specific requirements

Change Order Option:

- Vertiv can quote a price for additional man-hours if 2 hours per week is insufficient

Assembly

There shall be continuous, level floor between the Staging Area and the Installation Location so that heavy items can be moved via casters/pallet jacks.

Change Order Option:

- If there is not continuous level floor, the customer must provide or pay for any necessary lift/rigging equipment.

Vertiv PMC, including RDU501 SmartRow2 Controller/Display

Vertiv will position, level, and bay together the PMC as described in the submittal documents.

The customer is responsible for providing primary electrical power to the PMC.

Vertiv will program and configure the SmartRow2 RDU501 controller/display. This includes setting IP addresses so that the customer can monitor the system status remotely

Change Order Option:

- Vertiv will quote IP addressing of equipment on the customer network, but this would be done by other personnel and scheduled separately. This is outside the scope of SmartRow2 assembly.

Vertiv IT Rack(s)

Vertiv will position, level, and bay together the Vertiv IT Racks as described in the submittal documents.

Vertiv will not populate racks with customer IT gear, including blanking panels, servers, shelves, etc.

The customer must define addressing conventions (1,2,3,4, right-to-left or left-to-right) prior to start of work.

Cable Trays

Vertiv will install the SmartRow2 cable trays that are included with the SmartRow2 solution as described in the submittal documents

Liebert® CRV's, Temperature Sensors, Modbus cables, and associated Plenums

Vertiv will position and level the Liebert® CRV and attach the associated plenums to provide cooling to the SmartRow2.

Vertiv will connect the necessary temperature sensors.

The customer is responsible for piping and primary power to the CRV along with connecting CANBus cable between the CRV and heat rejection. All specific requirements (such as piping traps and proper electrical grounding) for correct product installation are detailed in the product installation manual.

After the SmartRow2 is assembled and the Liebert® CRV is piped and powered by the customer in accordance with the product installation manual, Vertiv will perform a factory warranty inspection along with the rest of the SmartRow2

Liebert® MC / CCD Condensers for Liebert® CRV's

Project Management

The customer is responsible for installing the associated heat rejection. This includes primary power, CANBus communication wire, piping, refrigerant charging, and all other tasks in the Installation Manual. Any/all penetration points in the walls/ceilings/floors for any wiring or piping are also the customer's responsibility.

Rack PDUs

Vertiv will install and connect all rack PDUs (if applicable) including GXT5 power extensions (if applicable) as described in the submittal documents

Liebert® GXT5 Single Phase UPS's

Vertiv will install and connect all Liebert® GXT5 UPS's and connect power within the PMC cabinet and output to the PDUs as described in the submittal documents.

Additionally, Vertiv will install ancillary equipment such as Maintenance bypass and PD2-103 cabling and connectors if not already preinstalled.

After the SmartRow2 is assembled and Primary Power to the SmartRow2 is provided by the customer, Vertiv will perform factory startup of all GXT5 equipment along with the rest of the SmartRow2

Switch

Vertiv will install and connect the switch within the PMC cabinet. as described in the submittal documents

Firmware Updates

Vertiv will update firmware of any/all units to the current revision level. Shippable units are sourced globally and firmware evolves as products may be in stock with prior revisions

Wiring

Vertiv will run all necessary wiring for power and communication between cabinets as part of assembly. This includes setting IP/DIP switch settings for proper communication between the device and the PMC

Accessories

The SmartRow2 is available with lights, door locks/sensors, temperature sensors that Vertiv will connect and install.

Services associated with cameras are sold separately and out-of-scope for the SmartRow2 Assembly

RDU Monitor SmartRow2 mobile application

Services associated with the RDU Monitor SmartRow2 mobile applications are quoted separately and out-of-scope for SmartRow2 assembly

ASSUMPTIONS AND CLARIFICATIONS

- Vertiv start-up validates product warranty.
- Defects or damage resulting from installation not performed by Vertiv are not covered.
- Parts and Labor coverage is in accordance with Product Warranty. If a modified warranty is purchased, terms default to that specific package.
- Any customer site visit is limited to eight (8) hours per visit. Any time beyond forty (40) hours/wk or eight (8) hrs/day or additional Startup visits will be billed separately.

- Expenses incurred due to delays that are beyond the control of Vertiv may be billed at cost.
- Startup visit must be scheduled confirmation of proper installation (if Vertiv not involved with installation).
- This pricing excludes any load bank testing. This can also be quoted separately if required.
- Pricing excludes activities associated with 3rd party commissioning
- Pricing excludes any type of circuit breaker NEMA testing. This can also be quoted separately if required.
- Customer/Installing contractor is responsible for providing elevated access as necessary.
- Any additional requests beyond the scope of this document will be billed separately by Vertiv.
- Vertiv will not perform physical changes to the site building (such as drilling holes, etc.)

CUSTOMER RESPONSIBILITIES

In order to provide timely, accurate and thorough execution of the services described herein, Vertiv requests the following:

- Point of Contact: Provide an authorized point of contact(s), specific for the scope of work, for scheduling and coordination purposes.
- Scheduling: Make dates available for scheduling service. All visits must be requested 4 weeks in advance for assembly and 10 days for startup/warranty-inspection of need by contacting the Vertiv Project Manager. Site must be available for 5 consecutive business days. Customer may choose to pay for premium time if weekend work is necessary.
- Site Access: Prior to time of scheduled work, provide site access including any customer required escort, security clearance, safety training and badging for Vertiv personnel.
- Equipment Access: Convenient access to the equipment covered by the Scope of Work. Prior to scheduled time of work, notify Vertiv personnel of any special requirements for equipment access including lifts, ladders, etc.
- Shutdown: Service may require shutdown of load to ensure electrical connection integrity.
- Notification: If for any reason the work cannot be performed during scheduled time, notify Vertiv personnel 24-hours prior to scheduled event.
- Provide Method of Procedure (MOP) requirements/ templates, and required review period(s)

TERMS AND CONDITIONS

Subject to all Terms & Conditions as noted in the Vertiv Terms & Conditions or the terms of a Master Agreement between the parties, if any, shall apply.