The PTX500E-DC Transmitter is a component in a Digital Electricity™ line powering system. When paired with a VoltServer receiver unit, a Digital Electricity™ (DE) system is formed (see diagram). If a person or foreign conductor comes in contact with the DE wiring, power is disconnected; preventing fire, equipment damage and personal injury. The PTX500E-DC is certified to safety and EMC standards by a **Nationally Recognized Test Laboratory.**

PTX500E-DC

PTX500E-DC
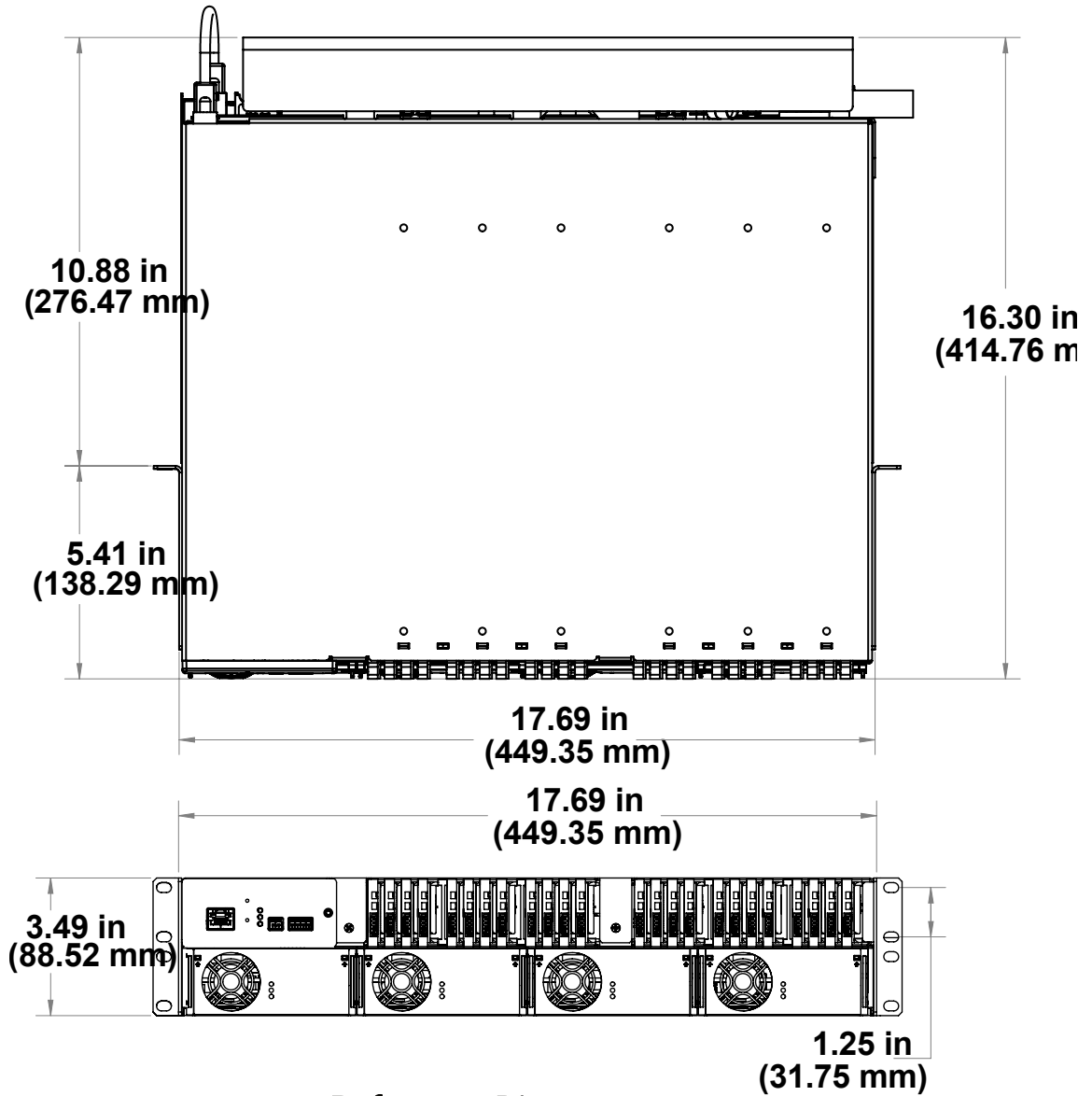**Digital Electricity Transmitter**
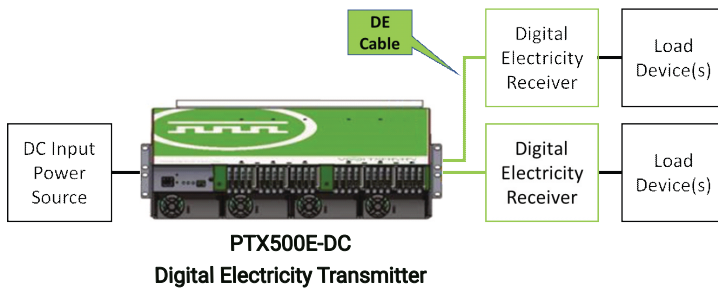
Digital Electricity™ is a **Limited Power Source** per IEC/UL/CAN 62368-1 suitable for supplying a **Class 2 circuit** under **NEC Art. 725** and **CEC Rule 16-200.** (Note: Always follow local codes).

Specifications

TYPE	PARAMETER	SPECIFICATION	NOTES
Input	Voltage	42-75 VDC	
	Max Current	140 A	Maximum circuit breaker size is 175A per input connection
Output	Voltage	315-350 VDC (336 VDC Nominal)	Digital Electricity™ output
	Total Power	Up to 5.4kW	
	Number of Output Channels	Up to 24 Transmitter Cards	
	Max Current per Channel	Up to 3.0A	Use design rules for calculating actual output
	Max Distance	Contact VoltServer	
	Cable Capacitance	20-40 pF/ft	
Environment	Access Location	Restricted Access Location Only	Transmitter only. DE cables or receivers do not need to be in restricted access location.
	Operating Temperature	-20°C (-4°F) to 50°C (122°F)	Requires operation in a conditioned environment to ensure reliable operation
	Altitude	Up to 2000m	
	Humidity	5 to 95% Non-condensing	
Mechanical	Dimensions	17.7" W x 16.3" L x 3.49" H (449mm x 415 mm x 89mm)	Fits 19" (48mm) racks, 2RU tall (3.5 inches, 133.4mm)
	Weight	Fully populated 37 lbs (16.78kg)	
Approvals	Safety	IEC/UL/CAN 62368-1	
	EMC	EN 55032 (CISPR 32) - Class A, FCC Part 15B - Class A, EN 300 386 v2.1.1, EN 50121-4	
	Others	CE, RoHS	
Communication/ Signals	Ethernet	RJ45, 10/100Mbps	Remote monitoring and control via web GUI, SNMP v2c
	Dry Contact Alarm Output	1x Normally Open (NO) 1x Normally Closed (NC)	Two relay outputs, NO and NC. Can support alarm circuitry with maximum steady state current of 500mA at 25C.
	Dry Contact Alarm Input	1x NO or NC	Software selectable
Box Contents	Hardware Kit	[See page 3]	

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Detailed Dimensions
in (mm)

**10.88 in
(276.47 mm)**

**16.30 in
(414.76 m**

**5.41 in
(138.29 mm)**

**17.69 in
(449.35 mm)**

**17.69 in
(449.35 mm)**

**3.49 in
(88.52 mm)**

**1.25 in
(31.75 mm)**

Reference Diagram

MGT500E
module

RJ45

LED Status
Indicators

Dry Alarm
Contacts

Transmitter Shelf
for TX550 cards

Power Shelf
for PM500 modules

WARNING!

Ensure that the unit is de-energized before contacting any exposed conductors.

WARNING!

The voltage rating of the transmission wiring between VoltServer Transmitter and Receiver(s) must be a minimum of 300Vrms.

WARNING!

The minimum wire gauge for use with VoltServer Transmitters is 20AWG copper conductors. Mutual conductor capacitance shall be no more than 40pf per foot or 131.2 pF per meter.

WARNING!

VoltServer Transmitter outputs are intended to be used with VoltServer Receiver products only.

WARNING!

This equipment is not suitable for use in locations where children are likely to be present.

Warranty Statement

There are no serviceable parts within the PTX500E-DC, MGT500E, or PM500-48DC. Opening or modifying these modules will void the warranty.

Included Parts List

- 1x PTX500E-DC transmitter chassis
- 1x MGT500E management card
- 1x PM500-48DC power module
- 1x Rear cover
- 2x 1/4-20 x 1/2" Phillips 18-8 stainless machine screw for rear cover (MFN 96278A511)
- 1x 0.5ft RJ45 CAT5E cable for CAN bus connection
- 1x Dry Contact Input Connector (MFN: 1745894)
- 1x Alarm Relay Output Connector (MFN: 1952283)
- 4x 18-8 lock-nuts, 3/8"-16 thread size for 48V input connections (MFN: 96278A527)
- 1x 18-8 Stainless Steel Locknut with External-Tooth Lock Washer 10-32 Thread Size for supplementary ground connection (MFN: 96278A411)
- 1x Protective Earth Ground Lug, 2 Hole Copper Compression Double Lug, 6 AWG, 1/4" studs, 5/8" spacing (MFN: YAZV6C2TC14FX)
- 2x 48V input Lug, 2 Hole Copper Compression Double Lug, 2/0 AWG, 3/8" studs, 1" spacing (MFN: YAZV262TC38FX)
- 1x 10-12AWG #10 connector ring terminal for supplementary ground connection (MFN: 0190700123)
- 2x 1/4"-20, 18-8 Stainless Steel Locknut with External-Tooth Lock Washer for supplementary ground connection (MFN: 1952283)

Symbols

Hazardous Voltages present when energized. Do not open the unit while it is energized.

HAZARDOUS VOLTAGE

This symbol indicates the protective earth terminal for the device. See "Grounding Requirements" section.

This symbol indicates the supplementary ground terminal for the device. See "Grounding Requirements" section.

Components and Accessories (Sold Separately)

- **TX550-01:** Transmitter Cards (Required)
- **PM500-48DC:** Additional Power Modules
- **CBL-TX-001:** pre-terminated cable, TX550-01 to Phoenix Connector, 10ft, 20AWG
- **TRMBLK-01-19-8:** Transmitter Terminal Blocks & DIN Rail Populated with 8 x 4 Pair Positions per 19" DIN Rail
- Receiver Modules such as RX548, RX554, etc.

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Input and Output wiring

Installation Instructions

NOTE
Input and Output wiring and over current protection must be installed in accordance with all local and national electric codes and requirements.

NOTE
After making/terminating input and output connections, ensure that there are no bare contacts or conductors. Conductors must be properly insulated from contact.

NOTE
Readily accessible disconnect devices, such as a breaker, must be incorporated external to the PTX500E-DC for each source.

NOTE
It is a common practice in highly resilient systems to design for N+1 redundancy. When applied to the PTX500E-DC transmitter chassis, this typically means that one additional PM500-48DC module is added to the system in addition to the number of modules required to power the load.

MINIMUM WIRE SIZE FOR BREAKER AMPACITY IS SHOWN IN THE TABLE BELOW, USING 2/0 AWG FOR ALL APPLICATIONS IS A COMMON BEST PRACTICE

Physical Installation

The PTX500E-DC transmitter is designed to be rack-mounted in a 19" rack using provided rack-mount brackets. Use 19" to 23" rack mounting adapters, as required.

If installing multiple transmitters, space them a minimum of ½ RU apart, with preferred spacing of 1 RU. Rack-mount hardware (rack screws, rack nuts, clips, etc.) is not included.

CAN-bus Cable

Ensure that the small Ethernet style CAN-bus jumper cables are installed between the top and bottom portions on the rear of the chassis. This allows communication between the MGT500E Module and PM500-48DC Modules.

CAN-bus jumper

Input Power Source

The PTX500E-DC accepts 42-75VDC. Prior to making input power connections, review the polarity markings on the rear of the PTX500E-DC unit.

Proper polarity must be maintained to avoid damage.

The maximum circuit breaker size for each DC input connection is 175A. The recommended circuit breaker size varies depending on the number of PM500-48DC power modules installed and the supply voltage. The recommended breaker sizes are shown in the table below. The PTX500E-DC unit should be protected with a circuit breaker on each input circuit (there are two input connections on the PTX500E-DC).

PM500-48DC Modules	Circuit Breaker	Wire Size	Input Lugs (3/8" studs, 1" spacing)
4	175A	2/0 AWG	YAZV262TC38FX
3	150A	1/0 AWG	YAZV252TC38FX
2	100A	2 AWG	YAZV2C2TC38FX
1	50A	6 AWG	YAZV6C2TC38FX

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Installation Instructions (cont.)

Input Power Connections and Wiring

Caution: Ensure source power is disconnected/de-energized prior to making connections.

Caution: Always confirm polarity of the power cables from the power plant before making connections. Reversed polarity can cause permanent damage to the PTX500E-DC unit.

1. Determine Correct Input Wire Gauge - The input wire gauges on the PTX500E-DC are determined by the number of installed PM500-48DC power modules. See "Input Power Source" section for breaker and wire gauge sizes.

2. Crimp Input Lugs Onto Wire - Once power polarity has been successfully verified, make the connections to the PTX500E-DC. The double lugs sized for 2/0 AWG cable are provided in the hardware kit for this purpose. If the recommended circuit breaker size allows for thinner cable gauge, the appropriate lugs must be purchased. See the table in the "Input Power Source" section for part numbers.

3. Secure Input Lugs - Use the provided 3/8"-16 lock-nuts to secure the lugs to the PTX500E-DC input terminals. Torque the nuts to 120in.lbs.

4. Install Back Cover - Attach the clear back cover to the PTX500E-DC using the supplied 1/4"-20 screws and mounting stand-offs.

Input Power Locations (4 total)

**Positive**   **Negative**
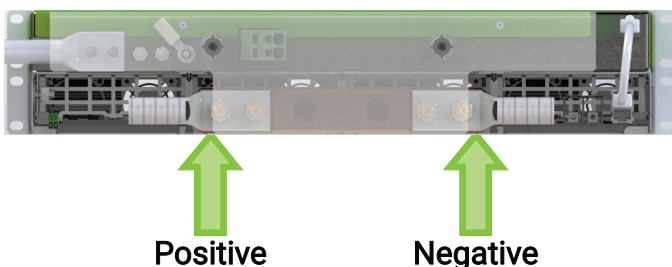
Protective Earth Requirements

The PTX500E-DC feature a double lug connection with 1/4" studs and a 5/8" spacing on the rear of the chassis for protective earth grounding.. A 6 AWG double lug (MFN: YAZV6C2TC14FX) is provided in the accessory pack for this purpose. The minimum diameter of the protective earthing conductor and associated lug vary with number of installed PM500-DC48 modules. **Earth conductor size must meet local code requirements based on installed breaker size or match power conductor size**. Use the provided 1/4"-20 lock-nuts to secure the lug to the PTX500E grounding bracket. Torque the nuts to 77in.lbs

NOTE: ALWAYS MATCH THE MINIMUM REQUIRED PROTECTIVE EARTH CONDUCTOR SIZE TO THE RECOMMENDED BREAKER SIZE. SEE PAGE 4 FOR RECOMMENDED BREAKER SIZES.

Supplementary Earth

In addition to the required protective earth ground connection, a supplementary earth ground location is provided on the PTX500E-DC. The intended use of the supplementary ground connection is to provide a means to connect a local ground for improved EMC performance. Use the provided lock-nut and ring terminal to secure the terminal to the supplementary grounding stud. Torque the nut to 32in.lbs

Ground Locations (2 total)

Protective Earth Location

Supplementary Earth Location
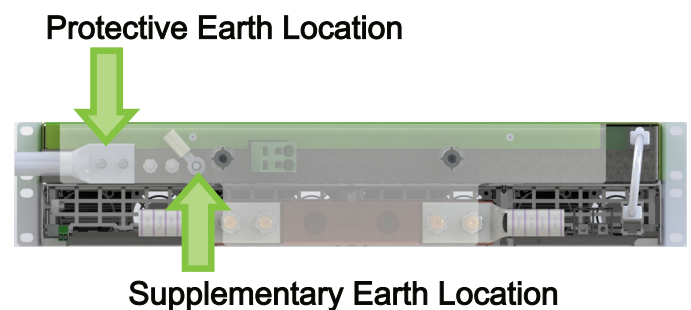
Output Power Connections and Wiring

Each Digital Electricity™ TX550 card has a four pin output connector (Phoenix Contact p/n: 1778858). 20AWG output connectors are recommended for output connections to terminal blocks. Larger conductors are recommended for long cable runs. Contact VoltServer for more information.

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## Installation Instructions (cont.)

PM500-48DC Power Module Installation

Up to four (4) PM500-48DC modules may be installed in the PTX500E-DC Transmitter shelf in the lower power bay openings. PM500-48DC modules may be inserted in any bay of the shelf. All PM500-48DC Power Modules may be "hot swapped" for in-service maintenance purposes.

- Place a small screwdriver under the release button in the windows located in the upper corners of the PM500-48DC module
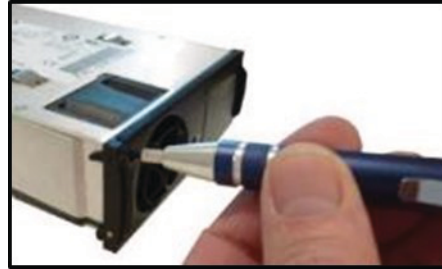
- Pull the screwdriver downwards to release the PM500-48DC extraction handle, repeat on opposite side
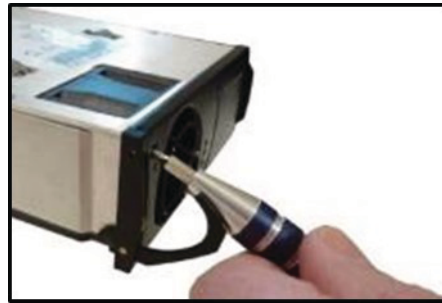
- Push PM500-48DC module into a bay of the transmitter shelf until it firmly seats in the connector

- Press extraction levers upward until they fully seat and lock into place. The PM500-48DC module is now locked into place. Repeat the above steps for each PM500-48DC module, perform the above steps to release the extraction handles, and pull the PM500-48DC from the transmitter using the handles


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Installation Instructions (cont.)

TX550 Transmitter Card Installation

The transmitter shelf can accommodate up to 24 TX550 transmitter cards which drive a single pair (two conductors) to a receiver. VoltServer recommends the practice of using multiple pairs to drive a receiver for redundancy purposes. When driving multiple pairs to a VoltServer receiver, all TX550 transmitters driving those pairs **MUST** be from the same PTX500E-DC shelf.

TX550 Card Insertion
- Select the proper slot and slide TX550 card into the transmitter shelf
- Seat the card by pressing on the plastic faceplate until the card edge fingers seat into the backplane connector
- To remove the TX550 card, pull the card using the indentation on the top of the plastic faceplate
- TX550 cards may be hot-swapped as required
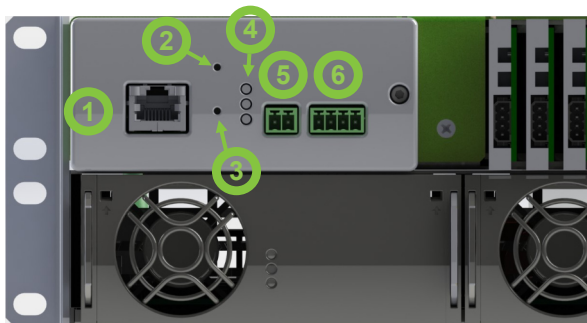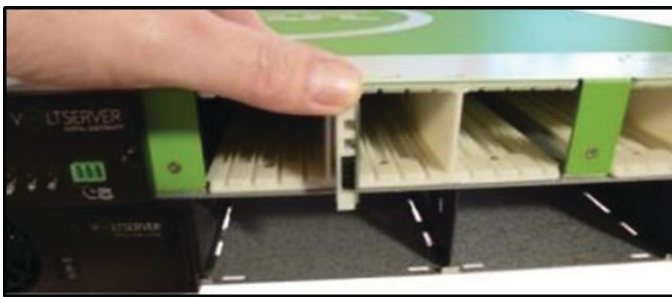
The MGT500E management module provides software control and fault alerting capability for the PTX500E product. The features present on the front panel of the MGT500E are described here:

① Ethernet Port
The management module provides the system with an Ethernet (IPv4/ IPv6) network interface. This allows the system to be connected to a local network for remote monitoring and management.

② Factory Reset Button
Hold for 5 seconds to reset the software settings to factory defaults. The "SW" LED will blink blue while reset is in progress. Transmitter card status will not be affected during the reset process.

③ Software Reboot Button
Push momentarily for SW reboot. The software LED will turn off for about 30 seconds. Once LED has turned back on, software is accessible.

④ LED Indicators
LED information is provided on the last page of this quick start guide.

⑤ Dry Contact Input
The PTX500E-DC features a dry contact input enables the user's system to trigger the software policy to enable features such as load shedding for battery back-up. **The dry contact input should be connected to either an open circuit or closed circuit. Do not apply voltage to the dry contact.** For details on this functionality, contact VoltServer support.

Maximum Cable Length	3 m
Accepted Wire Gauge	14-22 AWG
Default Operating Mode	Open Circuit

⑥ Alarm Relay Output
The alarm relay output port can be used to notify external devices of fault conditions on the PTX500E-DC.

Maximum Cable Length	3 m
Accepted Wire Gauge	14-22 AWG

Pin	Connection	Description
1	NC	Normally closed
2	GND1	Common for NC connection
3	GND2	Common for NO connection
4	NO	Normally open

Software Instructions

IP Discovery via Zeroconf

The IP address of a device on a local network may be determined using the device's hostname plus .local as the domain. The default hostname is printed on the unit label on the rear of the device.

Absent any Ethernet switch the device can be connected directly to a laptop/PC using an Ethernet patch cable, i.e. "crossover connection."

By default, the device hostname is **"voltserv-XXXX"** where **XXXX** is the last 4 characters of the device's MAC address. For example, if the device's MAC ends with **:42:09**, the default hostname will **voltserv-4209**.

Test network connectivity to the device by opening a command prompt and running
ping [hostname].local

Software Web UI Login

Software configuration is performed via a web browser interface. Access the web interface by opening

http://[hostname].local or
http://[IP address]

in a supported browser. The factory-programmed password can be found on the unit label on the rear or side of the device.
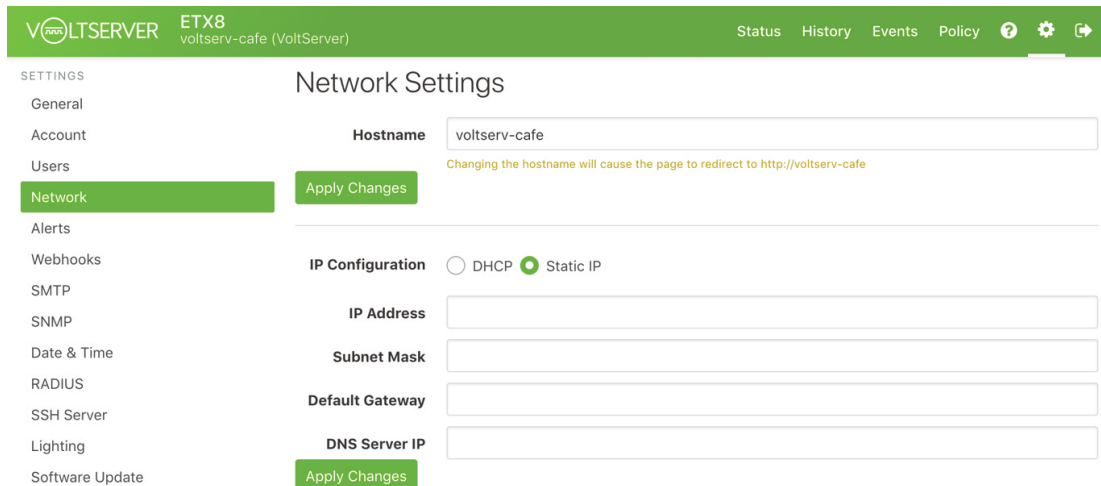
The default username is admin.

IP Configuration & Hostname

Hostname and static IPv4 address may be configured from the Network Settings page. Click "Apply Changes" to save new settings.
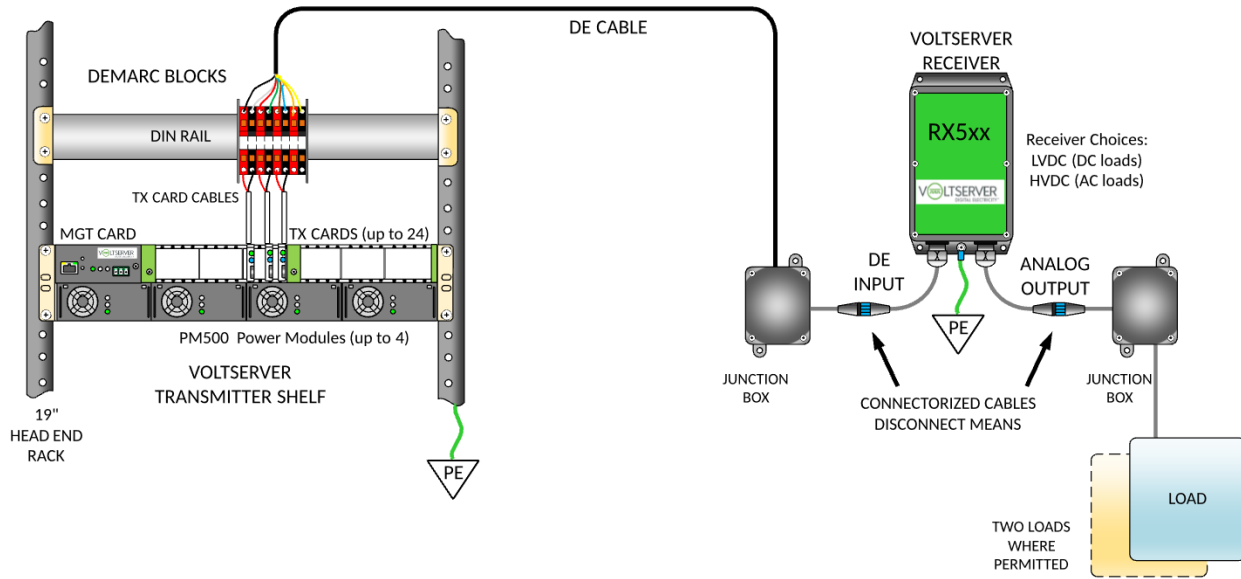
After network settings are saved, the browser will redirect to the new IP address or hostname after settings are applied. In most cases it will be necessary to login to the web UI again after the redirect.

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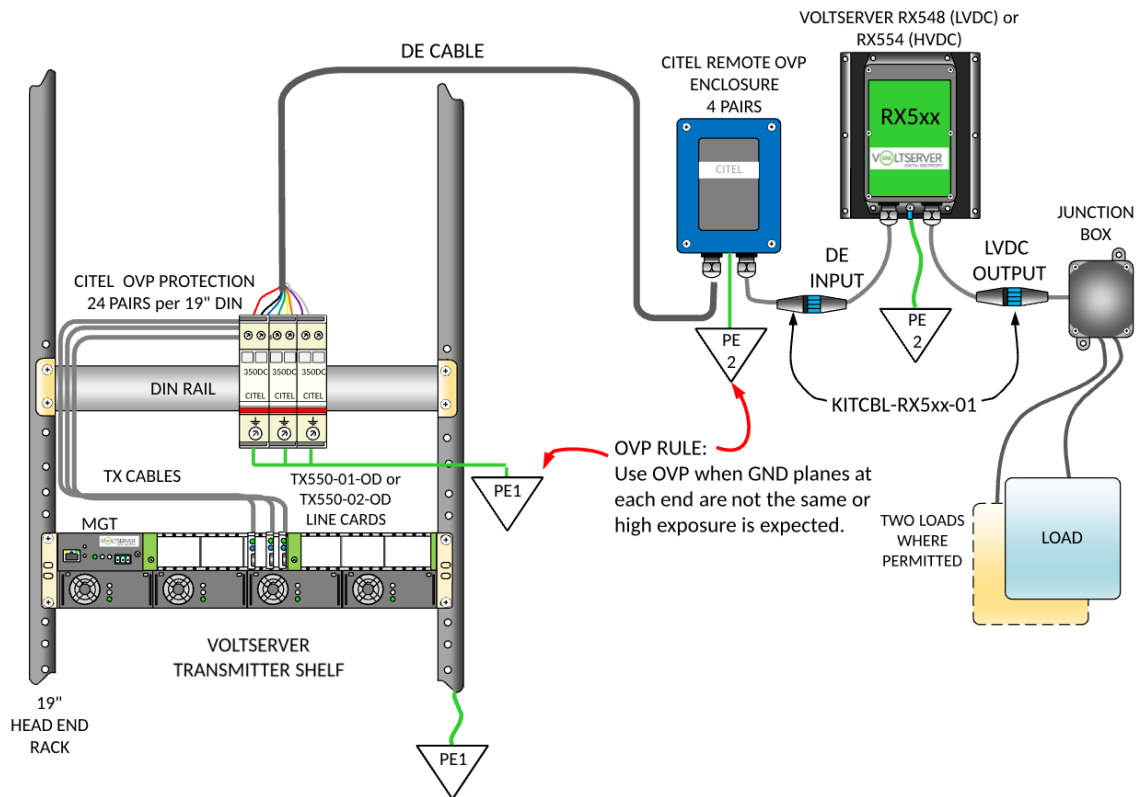VoltServer Inc. | www.voltserver.com | contact@voltserver.com

System Wiring Diagram
For reference only, refer to venue package for exact installation details

Wiring Diagram without Overvoltage Protection (OVP)

Wiring Diagram with Overvoltage Protection (OVP)

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Output Channel (TX550) LED Codes

NORMAL STATES	LED PATTERN	NOTE
Normal Operation	GRN OUTPUT — ON RED FAULT — OFF BLU SYSTEM — BRIEF BLINK (heartbeat)	
Boot-up	GRN OUTPUT — OFF RED FAULT — OFF BLU SYSTEM — BLINK (booting up)	Start-up sequence occurs when power is first applied to the receiver.
Pre-charge DE	GRN OUTPUT — BLINK (slow) RED FAULT — OFF BLU SYSTEM — OFF	Part of normal start-up sequence
Pre-charge Load	GRN OUTPUT — BLINK RED FAULT — OFF BLU SYSTEM — OFF	Part of normal start-up sequence

FAULTS	LED PATTERN	FAULT CODE	TROUBLESHOOTING
Disconnected		1 Blink	Check DE wiring and connections
Startup		2 Blinks	Check wiring Check receiver Check cable length & gauge
Transmission		3 Blinks	Check wiring Check receiver Check cable length & gauge Reduce load on the receiver output
Overload	GRN — OFF RED — BLINKS=FAULT CODE BLU — OFF	4 Blinks	Reduce load on the receiver output Check receiver Check wiring
Temperature		5 Blinks	Reduce ambient temperature Reduce load
Short Circuit		6 Blinks	Check for damaged wiring Check for short in termination/ connectors Reduce load
Ground		7 Blinks	Check wiring Check earth ground on receiver Check earth ground connection on the transmitter
Input Power		8 Blinks	Ensure transmitter card is properly inserted Check power module, MGT, main power
Internal		9 Blinks	Internal hardware failure Contact VoltServer support

Management Unit (MGT500E) "SW" LED Codes

LED PATTERN	DURATION	MEANING
BLU	5s after power on/ reboot	Software module power-on and pre-boot. Pushing the "Factory" button during this time will cause the device to boot into Recovery Mode
GRN	30s (approx.)	Software is booting (green "heartbeat" blink pattern)
GRN	Until reboot	Software is running
BLU	20s (approx.)	Factory reset is in progress
BLU	Until reboot	Software is in Recovery Mode (blue "heartbeat" blink pattern)

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Document Revision History

Revision	Date	Description
A	03/24/2020	Initial release
B	08/28/2020	
C	03/29/2021	Harmonized language and format
D	04/13/2021	Split from 3U model
E	08/11/2021	Current rating changed to 140A. Power conductor size reduced to 2/0 for 4x PM500-48DC case. Grounding requirements changed to rely on local code requirements.
F	10/12/2022	Wording for "Input Wiring" note updated. Corrected number of modules in PM500 install instructions. Fixed issue with NC/NO in alarm contact table.

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