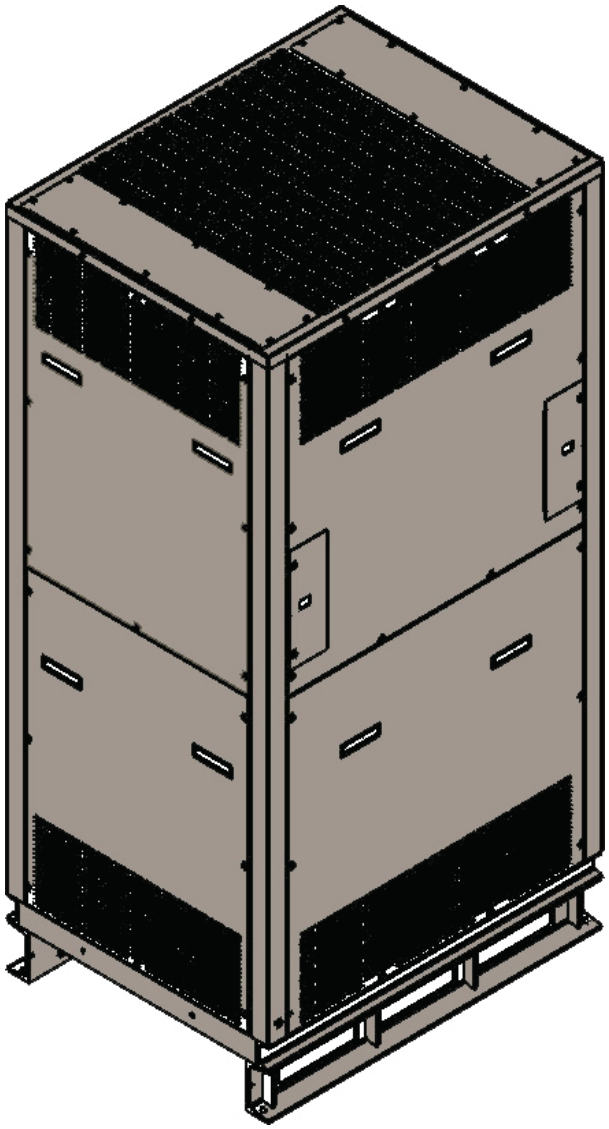
Eaton© Current-Limiting Reactor (2500A)

Installation Manual



Powering Business Worldwide

p/n: P-164001115
Revision 04

IMPORTANT SAFETY INSTRUCTIONS - SAVE THESE INSTRUCTIONS

This manual contains important instructions that you should follow during installation and maintenance of the equipment. Please read all instructions before operating the equipment and save this manual for future reference.

CONSIGNES DE SÉCURITÉ IMPORTANTES – CONSERVER CES INSTRUCTIONS

Ce manuel contient des instructions importantes que vous devez suivre lors de l'installation et de la maintenance de l'équipement. Veuillez consulter entièrement ces instructions avant de faire fonctionner l'équipement et conserver ce manuel afin de pouvoir vous y reporter ultérieurement.

⚠WARNING

This is a product for restricted sales distribution to informed partners (EN/IEC 62040-2). Installation restrictions or additional measures may be needed to prevent electromagnetic disturbances.

Dear Customer,

On behalf of everyone at Eaton, we thank you for partnering with us, for trusting us to maintain your business continuity and for preventing downtime at your facility.

Our suite of backup power, power distribution and power management products are designed to protect you from a host of threats including power outages, surges, and lighting strikes, and enable you to monitor and control your power infrastructure.

We trust that our products will deliver high quality, reliable power for your business, and we are committed to your success.

Please read this manual, which details the installation and operation processes for your new Eaton product.

Thank you for choosing Eaton!

Table of Contents

List of Figures

Chapter 1 Introduction

1.1 Intended Use

Reactor Power Panels (RPPs) make maintenance of downstream equipment safer by limiting fault current and reducing the risk of arc flash. The 2500A Current-Limiting Reactor is designed to be used as part of a reserve power source for multiple downstream RPPs with Bypass Cabinets. An Current-Limiting Reactor, when used as a component of a reserve power source, allows multiple downstream RPPs to be taken offline for maintenance while the Current-Limiting Reactor temporarily provides the same safety benefits as the offline RPPs.

1.2 Description

The Current-Limiting Reactor is a stand-alone unit with no operational controls. Switching to reserve power occurs at the downstream RPP Bypass Cabinet. For operational procedures on switching downstream RPPs to reserve power, see these companion Eaton manuals:

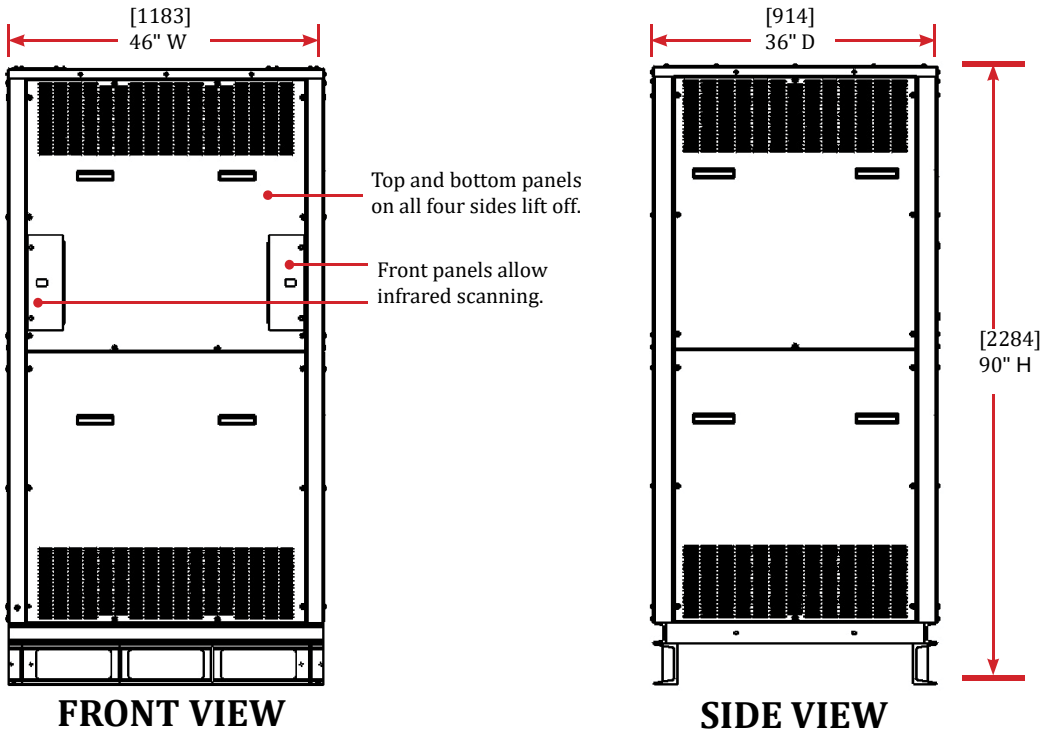
- Reactor Power Panel V2 (250A) Installation and Operation P–164001118.
- Retrofit Bypass Cabinet for Reactor Power Panels (250A) Installation and Operation P–164001119

Cable entry can be from top or bottom of the unit. An Current-Limiting Reactor can also have an optional side car that provides additional cable entry space for conduit. The side car allows already installed floor conduit to align with the unit. See section Chapter 4 *Power Cabling*.

Left and right front panel doors enable infrared scanning from the front of the unit.

The 2500A Current-Limiting Reactor cabinet structure and dimensions are shown below.

Figure 1. Current-Limiting Reactor 2500A Dimensions



1.3 Using This Manual

Read this manual thoroughly and make sure you understand the procedures before you attempt to install, set up, operate or carry out any maintenance work on this Eaton product.

Read through each procedure before beginning the procedure. Perform only those procedures that apply to the unit being installed or operated.

1.4 Conventions Used in This Manual

This manual uses these type conventions:

NOTE Some conventions only apply to display screens (if installed).

- **Bold type** highlights important concepts in discussions, key terms in procedures, and menu options, or represents a command or option that you type or enter at a prompt.
- *Italic type* highlights notes and new terms where they are defined.
- `Screen type` represents information that appears on the screen or LCD.

Icon	Description
	Information notes call attention to important features or instructions.
[Keys]	Brackets are used when referring to a specific key, such as [Enter] or [Ctrl].

1.5 Symbols, Controls, and Indicators

The following are examples of symbols used on the reactor or accessories to alert you to important information:

RISK OF ELECTRIC SHOCK - Observe the warning associated with the risk of electric shock symbol.

CAUTION: REFER TO OPERATOR'S MANUAL - Refer to your operator's manual for additional information, such as important operating and maintenance instructions.

This symbol indicates that you should not discard waste electrical or electronic equipment (WEEE) in the trash. For proper disposal, contact your local recycling/reuse or hazardous waste center.

1.6 Getting Help

If help is needed with any of the following:

- Scheduling initial startup
- Regional locations and telephone numbers
- A question about any of the information in this manual

- A question this manual does not answer

Please call the Eaton Help Desk at:

United States:**1-800-843-9433** or **1-919-870-3028**

Canada:**1-800-461-9166 ext 260**

All other countries:**Call your local service representative**

Please use the following e-mail for manual comments, suggestions, or to report a technical error in this manual.

E-ESSDocumentation@eaton.com

1.7 Warranty and End User License Agreement

To view the warranty please click on the link or copy the address to download from the Eaton website:

Eaton Product Warranty

https://www.eaton.com/content/dam/eaton/products/backup-power-ups-surge-it-power-distribution/backup-power-ups/portfolio/eaton-three-phase-ups-warranty.pdf

https://www.eaton.com/content/dam/eaton/products/backup-power-ups-surge-it-power-distribution/backuppower-ups/portfolio/eaton-three-phase-ups-warranty.pdf

To view the End User License Agreement please click on the link or copy the address to download from the Eaton website:

Eaton End User License Agreement

https://www.eaton.com/content/dam/eaton/products/support-systems/software-and-cad-registration-form/eaton-end-user-software-license-agreement.pdf

Chapter 2 Safety

⚠WARNING

Follow safe electrical work practices:

- Read, understand, and follow the instructions before installing this product.
- Electrical equipment should be installed, operated, serviced, and maintained only by qualified personnel and in accordance with all local safety codes. Power Distribution, Inc. assumes no responsibility for any consequences arising out of the use of this manual. This document should not be viewed as sufficient by otherwise non-qualified personnel to operate, service, or maintain the equipment discussed.
- Disconnect and lock-out all power supplying equipment before working on or installing components. Use a properly rated voltage sensing device to confirm power is OFF.

⚠DANGER

- Severe or fatal injury can result from electrical shock during contact with high voltage conductors, monitoring PCBs, or similar equipment.
- Disconnect power before drilling holes, attaching conduit, or connecting power cables or control wiring.
- Use Lock Out/Tag Out procedures.
- Wear suitable personal protective clothing and use protective equipment for performing mechanical and electrical installations.
- Leave ample space for attaching and routing wires.

Chapter 3 Installation

3.1 Receiving and Unpacking the Current-Limiting Reactor

Current-Limiting Reactors and optional Side Cars are shipped bolted to shipping pallets and protected by two layers of external plastic covering. Units are first covered by a large plastic bag and then shrink-wrapped. Finally each unit is secured to its pallet with metal retaining bands.

For moving the Current-Limiting Reactor or Side Car on its pallet, Eaton recommends that you leave the retaining bands intact until you have moved the unit to a convenient location for removing it from its pallet.

Inspect the shipped unit twice, upon receipt and after removing packaging materials.

1. Upon receiving an Current-Limiting Reactor or Side Car pallet and before removing packaging, inspect the packaging for visible damage. If damage is evident notify the shipping company and Eaton (see below for Eaton contact information).
2. Carefully cut the retaining bands, making sure that they do not scrape the exterior of the unit or scratch the paint.

⚠WARNING

- Metal retaining bands are under tension. Exercise caution when cutting them.
- Wear protective clothing including eye, face, and hand protection when cutting retaining bands.

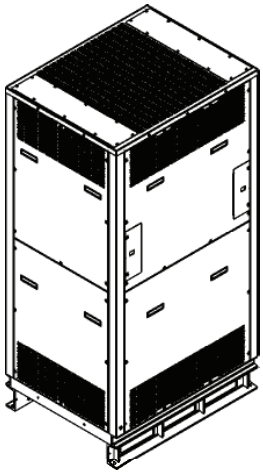
3. Carefully remove the outer layer of protective shrink wrap from the unit and the interior plastic covering bag. Use care to not puncture or scratch the Current-Limiting Reactor with cutting tools.
4. After removing the outer external packaging, inspect the unit's exterior panels and doors for any visible damage such as scratches, dents, or cracks. If you discover any damage, notify the shipping company and Eaton service.

3.2 Moving the Current-Limiting Reactor

Move the Current-Limiting Reactor off its pallet with a forklift as follows:

1. The Current-Limiting Reactor or its Side Car is bolted to a pallet. With the pallet resting on the floor, remove the bolts.
2. Insert forklift forks under the Current-Limiting Reactor Cabinet or optional Side Car from any side.
3. Move each unit to its installation location and withdraw the forklift. Units have no casters and should be precisely positioned with the forklift.

Figure 2. Reactor and Side Car Dimensions



Current-Limiting Reactor 2500A

Height: 90" [2284]
Width: 46.6" [1184]
Depth: 36" [914]
Weight: 8000 lbs
approx. [3629 kg]

Side Car

Height: 90" [2284]
Width: 24" [610]
Depth: 36" [914]
Weight: 200 lbs
approx. [91 kg]

3.3 Clearances

Clearances:

- Service clearance, front: 30 inches [762 mm]
- Cabling clearance, one side 30 inches [762 mm] (for installing conduit and pulling conductors)

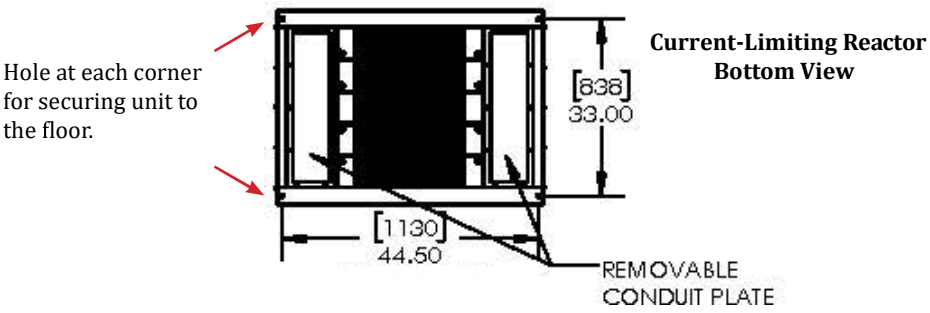
NOTE Panels lift off; there is no door swing.

- Ventilation clearance:
  - Min. 6" [152 mm] front, top, and one side
- Unit may be backed up to a wall without rear clearance. See detailed drawings in Chapter 7 *Current-Limiting Reactor 2500A Drawings*.

3.4 Anchoring the Current-Limiting Reactor to the Floor

The base frame of the Current-Limiting Reactor has (4) holes for anchoring the unit to the floor. Customer provides the ½" [13 mm] hardware for securing the unit to the floor.

Figure 3. Reactor Anchor Locations



3.5 Installing the Optional Side Car

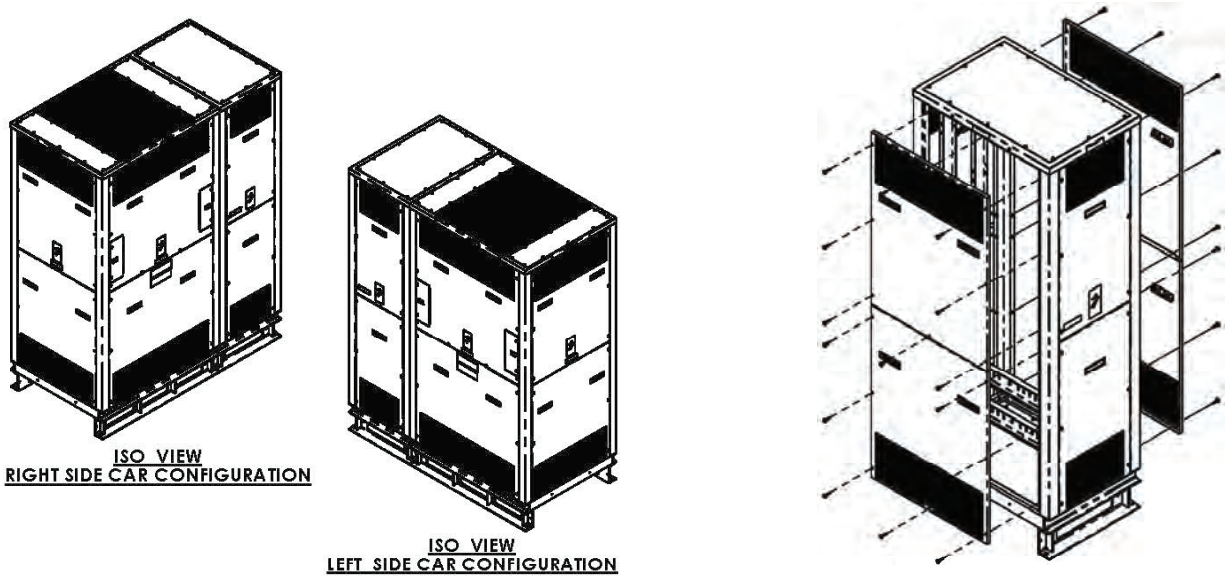
The Current-Limiting Reactor will sometimes be installed over existing conduit in a concrete floor and the position of the conduit may not match the unit's cable entry panels. To accommodate the spacing of existing conduit, an optional Side Car provides more cable entry space.

The Side Car has removable side panels allowing it to be attached to either side of an Current-Limiting Reactor.

1. On the sides to be joined together:
   a. On the Current-Limiting Reactor, remove the top and bottom side panels.
   b. On the Side Car, remove the top and bottom side panels.

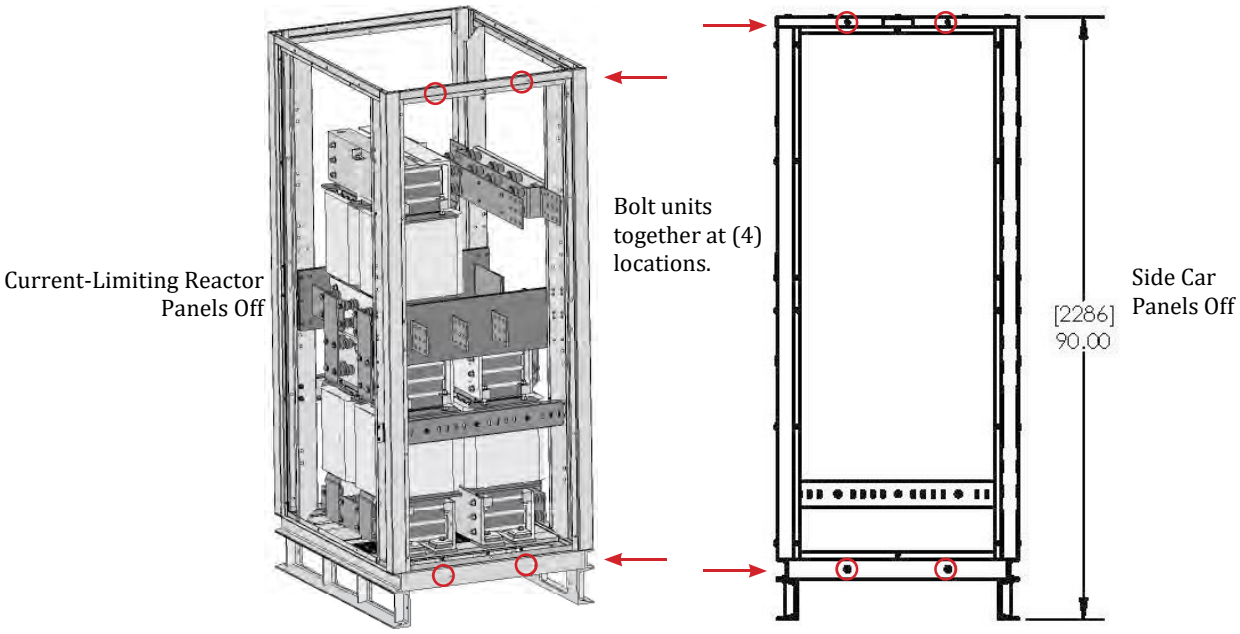
NOTE Side Car side panels can be removed from either side to make a Left-Hand or Right-Hand Side Car.

Figure 4. Side Car Configurations



2. Move the Side Car up against the Current-Limiting Reactor so that edges and holes align.
3. Bolt units together at (4) bolt locations (2 upper, 2 lower) in the upper and lower frames.
4. Secure the Side Car to the floor using customer-provided ½" [13 mm] hardware as for the Current-Limiting Reactor.

Figure 5. Side Car Joining



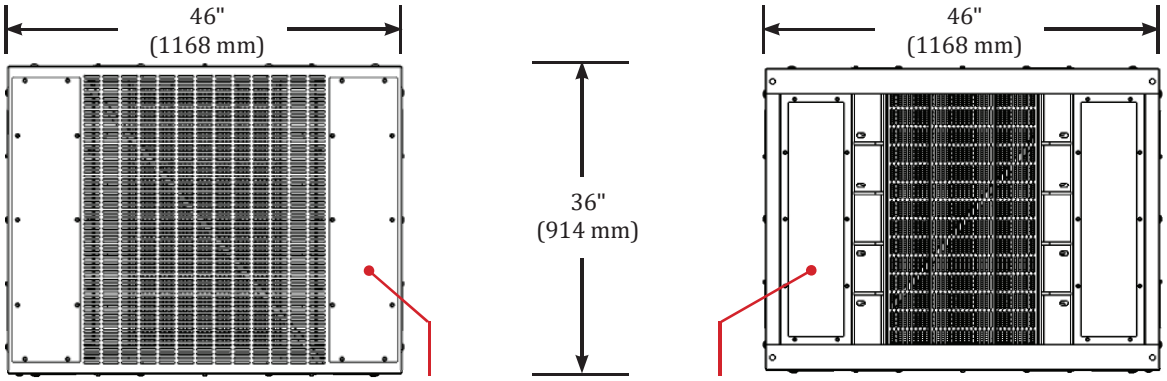
Chapter 4 Power Cabling

4.1 Cable Entry

4.1.1 Cable Entry Panels

The Current-Limiting Reactor has (2) top and (2) bottom cable entry panels. Installers can create up to (5) 4.0" [102 mm] cut-outs in each panel. The unit supports internal cable bend radius for cables up to 600 MCM.

Figure 6. Cable Entry Panels

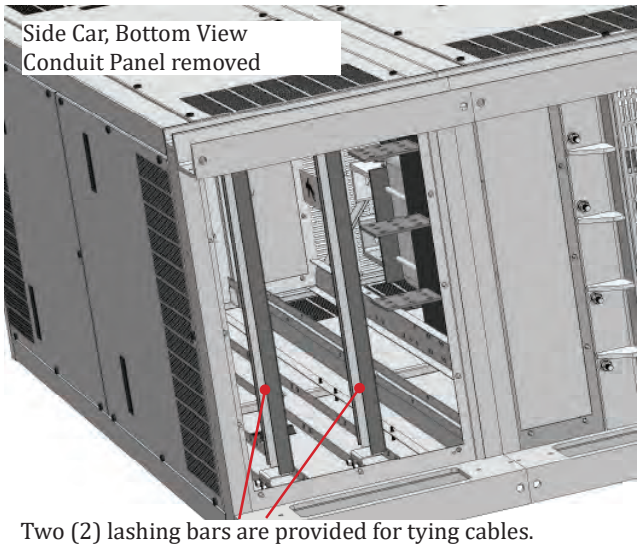


4.1.2 Side Car Cable Entry

When installing an Current-Limiting Reactor over existing conduit in the concrete floor, conduits may not align with the bottom cable entry panels. The Current-Limiting Reactor can have an optional side car that provides additional cable entry space to enable conduit installed in the concrete floor to correctly align with cable entry panels.

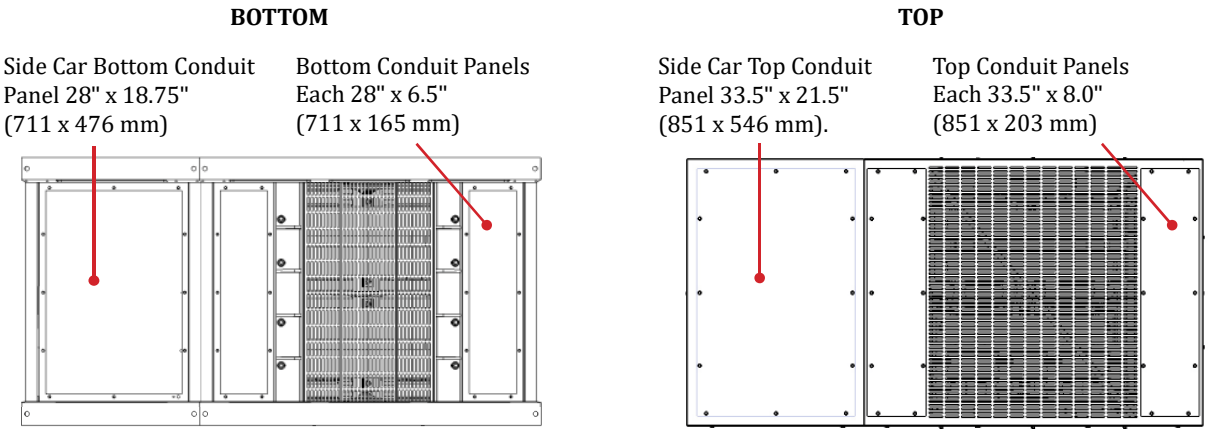
The side car interior is open with no panels between the side car and the Current-Limiting Reactor bus bars, providing easy access to bus bars.

Figure 7. Side Car Cable Entry



Two (2) lashing bars are provided for tying cables.

Figure 8. Side Car and Reactor Conduit Panels



4.2 Power Connections

IMPORTANT

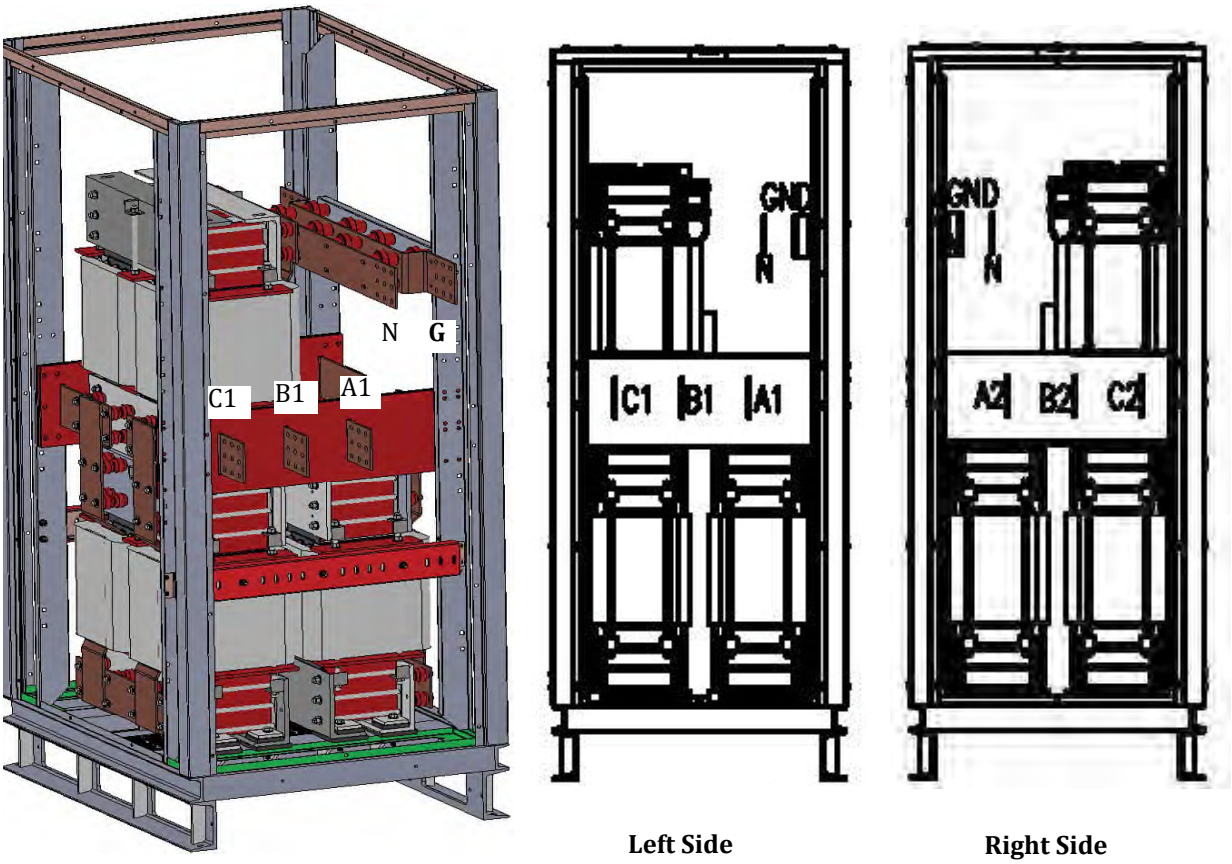
- A licensed electrician must install the Current-Limiting Reactor and connect external wiring.
- Installers should use Lock-Out/Tag-Out procedures and observe other precautions listed in the introductory Safety section.

IMPORTANT

Power wiring and grounding must comply with NEC and applicable local codes.

There are ABCNG power connections on both the left and right sides of the unit. Utility or other input power is connected on one side and output on the other side, but the sides can be reversed. The Aggregate Reactor does not have directional power flow. Phase rotation is not critical with single-phase reactors.

Figure 9. Power Connections



Left Side Power Connections

Left Side **Right Side**

From Section **7 Current-Limiting Reactor 2500A Drawings**

All Views with Panels Removed

4.3 Wiring the PT100 Sensor

The Current-Limiting Reactor has a PT100 sensor installed in the reactor coil. The front upper panel of the Current-Limiting Reactor cabinet has a compartment with terminal blocks that are wired to the sensor. All wiring from the sensor to the terminal blocks is wired to the bottom of the terminal blocks at the factory.

Customer's installers wire to the terminal blocks from overhead. Reference the PT100 sensor schematic on the following page. Installers must make their own cable-entry panel cut-outs.

Remove the cover plate to the terminal block compartment by turning the (2) side screws 1/4 turn.

Figure 10. PT100 Sensor

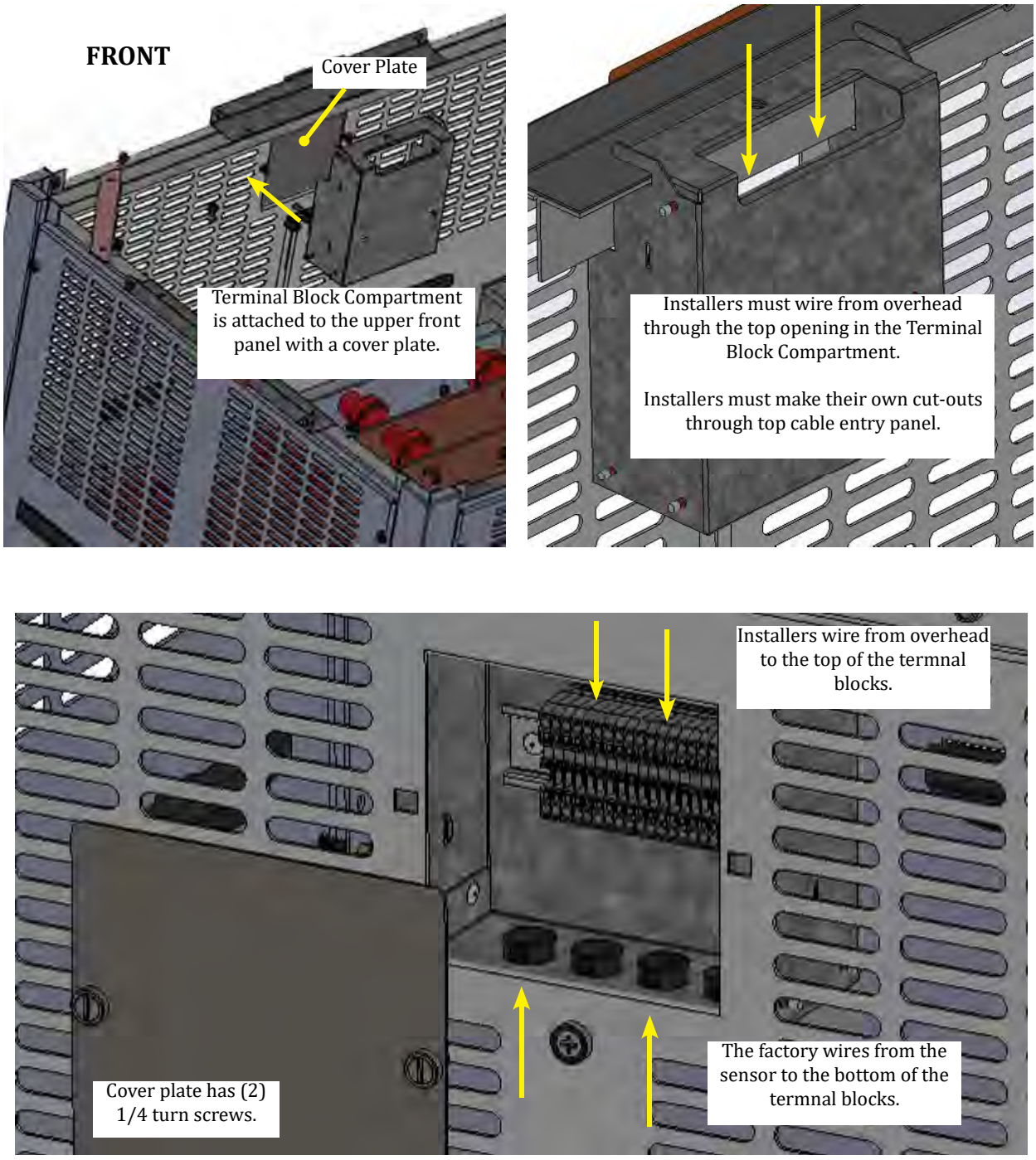
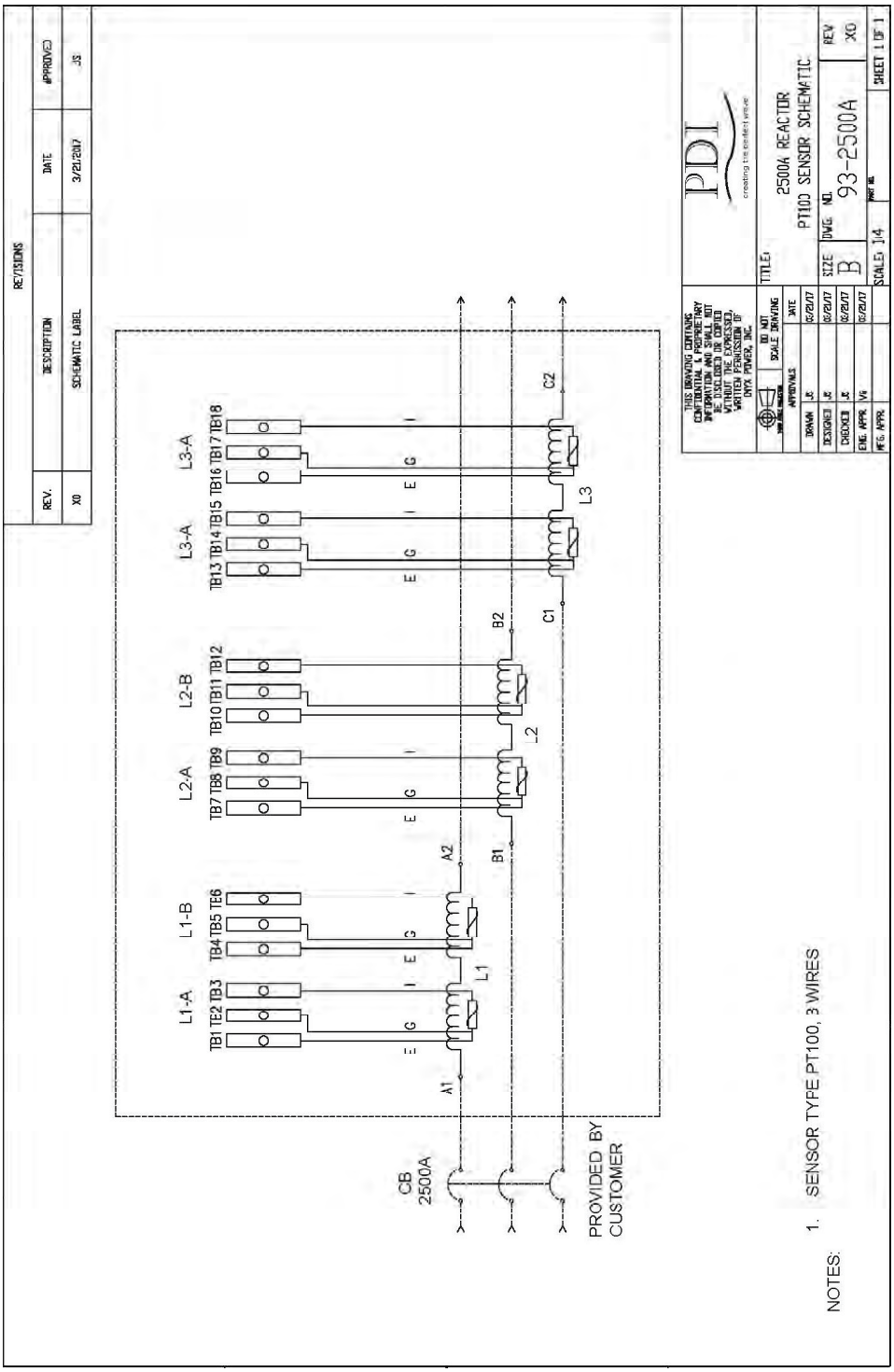


Figure 11. PT100 Sensor Wiring



Chapter 5 Service and Maintenance

Eaton Service contracts help to provide the added insurance that the reliability of your critical power systems is intact. By following our stringent maintenance procedures, Eaton's factory trained Customer Support Engineers provide the added assurance for the availability of critical systems, thereby maximizing the company's profitability. See below for further details.

5.1 The Service Promise

With factory-trained technicians in every major city in North America, Eaton can respond rapidly and provide on-site assistance in emergency down time situations. Eaton provides telephone support 24 hours a day, 7 days a week with a direct line to Service (1-800-843-9433).

5.2 Preventive Maintenance

During a preventive maintenance visit, Eaton technicians inspect, test, calibrate, update and clean components, as well as update software as applicable. You'll receive a report at the end of the visit detailing the results of the inspection and specific recommendations for remedial actions, proactive replacements, and upgrades.

5.3 Eaton Provides Flexibility and Commitment

- We understand that service plans are not "one size fits all." That's why we offer a broad range of service options, designed to meet the varied requirements and applications of businesses of all shapes and sizes. Eaton can modify your contract on variables such as number of PM visits per year, scope of coverage, response time and length of contract.
- Eaton employs 250+ field technicians with an average tenure of more than ten years. Eaton CSEs are experts on Eaton products and receive ongoing product training and certification. Our technicians have expertise in power, electrical engineering, software and connectivity, batteries, UPSs and related products, and can deliver advanced troubleshooting and a reduced mean time to repair.
- When you rely on an Eaton service plan, rest assured that every factory-trained field technician stocks a solid inventory of parts to remedy emergencies.

5.4 Time and Materials

In most cases the customer will be covered by startup service or Maintenance Contracts, however, there may be times when the customer needs Eaton service and lacks the benefits that these two packages provide. Therefore, Eaton provides Time and Material coverage for those in need of our customer support engineers.

5.5 Startup

At the initial startup of the Current-limiting Reactor, an Eaton factory-authorized technician is recommended to validate correct operation. The product warranty may be voided if the correct startup procedures are not followed.

5.6 Infrared Scanning

To gain access to bus bars and cables for infrared scanning, open the left or right scanning panels on the front of the unit.

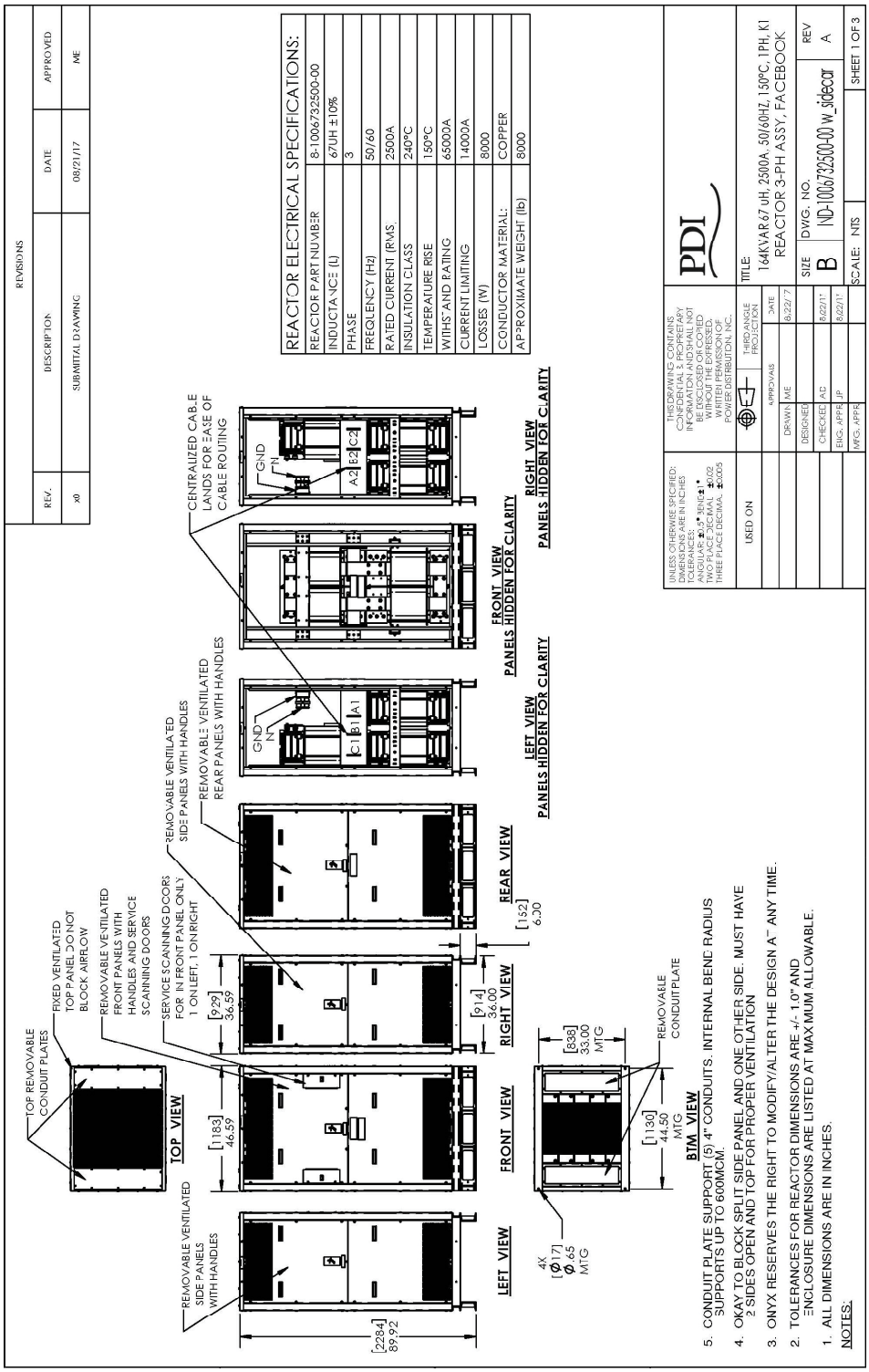
Chapter 6 2500A Current-Limiting Reactor Specifications

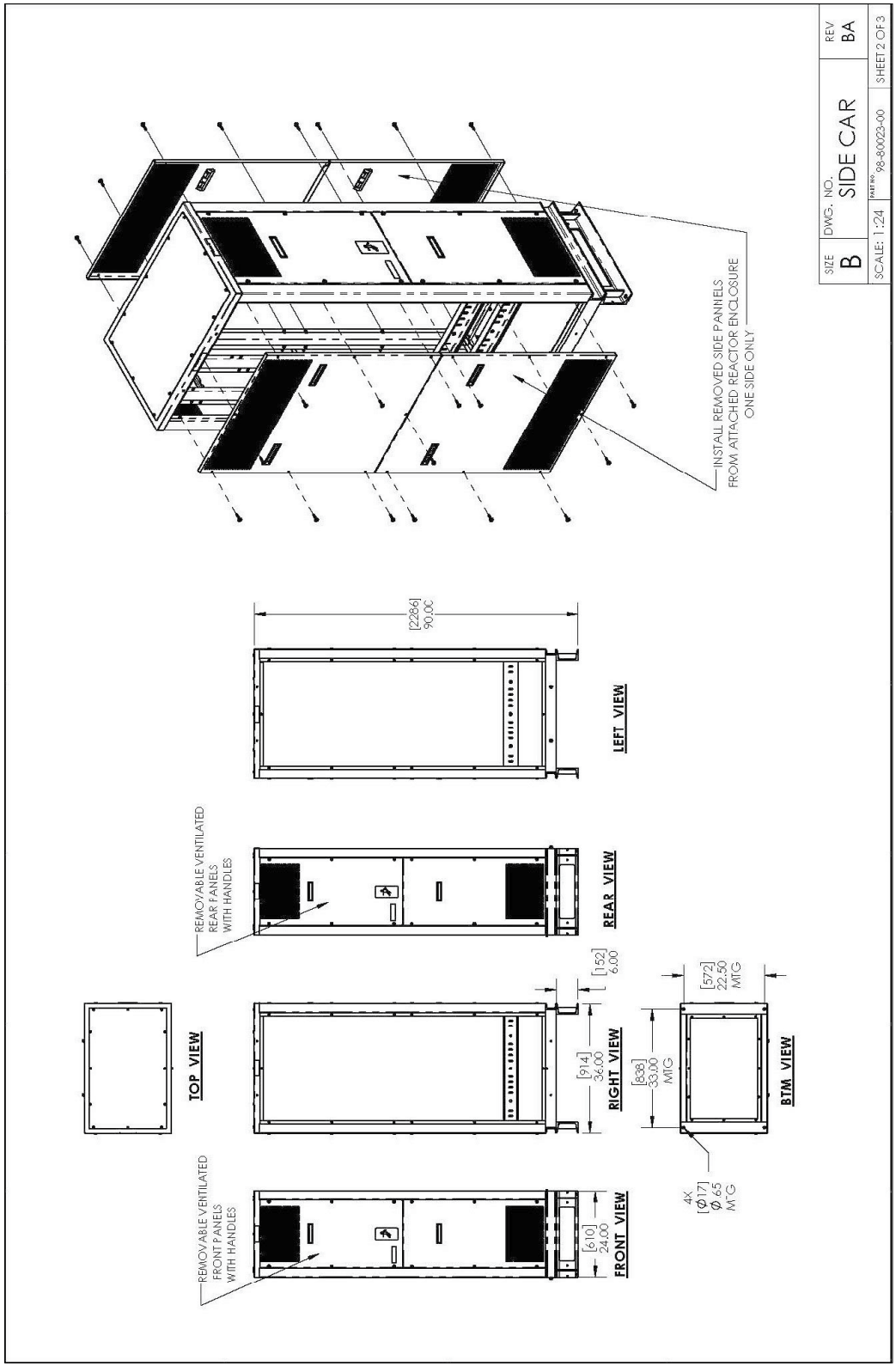
Operating Voltage	480V
Frequency	50Hz
Inductance	67uH +/- 10%
Phase	3
Rated Current	2500A
Insulation Class	240°C
Temperature Rise	150°C
Withstand Rating	65000A
Current Limiting	14000A
Losses (W)	8000W

Voltage Drop across 2500 A 67 µH CURRENT LIMITING REACTOR
Available Fault Current 55 kA @ 400 V 50 Hz Source Impedance 4.2 mOhm = 13.37 µH
Reactance at 50Hz is 0.0218 Ohm
Total Impedance = 80.37 µH = 25.24 mOhm
Voltage Drop Across Reactor per Phase = 63 Volt @ 2500 A

Current A	Ph/Ph Voltage Drop Across Reactor	Power Factor 0.8 Lag		Power Factor Unity		Power Factor 0.9 Lead	
		Load Voltage Volt	Percent Voltage Drop	Load Voltage Volt	Percent Voltage Drop	Load Voltage Volt	Percent Voltage Rise
250	10.93	393.54	1.62	399.85	0.04	404.88	1.22
500	21.87	387.28	3.18	399.40	0.15	410.00	2.50
750	32.80	381.23	4.69	398.65	0.34	415.35	3.84
1000	43.73	375.40	6.15	397.60	0.60	420.90	5.23
1250	54.66	369.80	7.55	396.25	0.94	426.67	6.67
1500	65.60	364.44	8.89	394.58	1.35	432.64	8.16
1750	76.53	359.34	10.17	392.61	1.85	438.79	9.70
2000	87.46	354.50	11.38	390.32	2.42	445.14	11.28
2250	98.39	349.93	12.52	387.71	3.07	451.65	12.91
2500	109.33	345.65	13.59	384.77	3.81	458.34	14.58

Chapter 7 Current-Limiting Reactor 2500A Drawings

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FROM ATTACHED REACTOR ENCLOSURE
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SIDE CAR
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SHEET 2 OF 3
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REMOVABLE VENTILATED
REAR PANELS
WITH HANDLES
REAR VIEW
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6.00
[572]
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MTG
TOP VIEW
[914]
36.00
RIGHT VIEW
[838]
33.00
MTG
BTM VIEW
REMOVABLE VENTILATED
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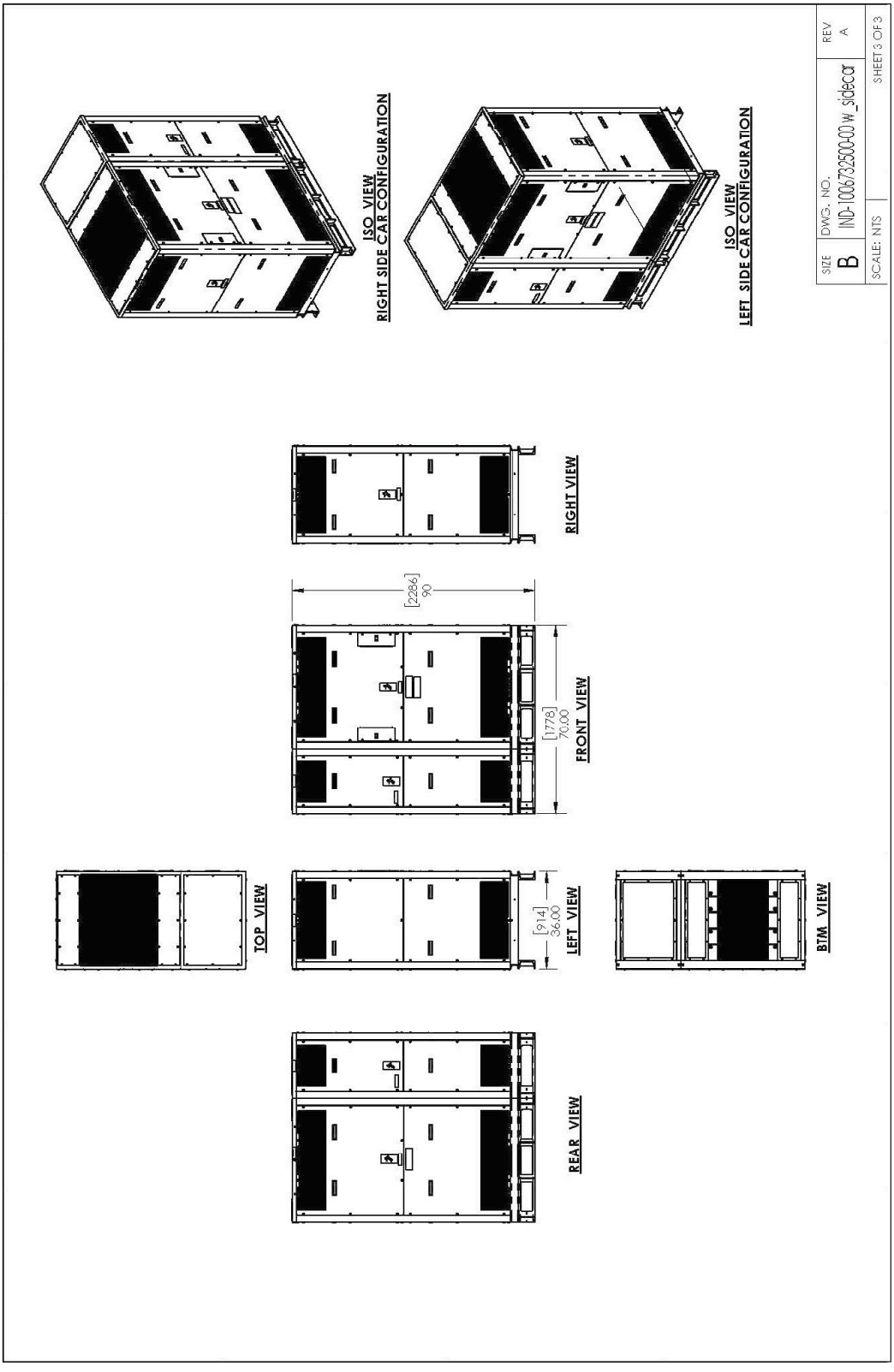
ISO VIEW
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