FieldSmart® FiberFlex 3000

Installation Manual

CLEARFIELD

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About This Guide

This document provides a general installation practice for the Clearfield FiberFlex 3000 outdoor cabinet. This document also provides a general description of the cabinet and its subsystems, guidance for planning, site preparation, power installation, splicing to the outside plant, component installation and expansion, and cabinet maintenance.

All NEC., OSHA and local jurisdiction requirements shall be followed during installation.

Intended Audiences

This document is intended for use by network planning engineers, outside plant engineers, field support personnel, and craft personnel responsible for cabinet installation, splicing, equipment installation, and maintenance.

Safety Notices

This document uses the following safety notice conventions.

DANGER! Danger indicates the presence of a hazard that will cause severe personal injury or death if not avoided.

WARNING! Danger indicates the presence of a hazard that will cause severe personal injury or death if not avoided.

CAUTION! Danger indicates the presence of a hazard that will cause severe personal injury or death if not avoided.

ALERT! Danger indicates the presence of a hazard that will cause severe personal injury or death if not avoided.

DANGER! CLASS 1 LASER PRODUCT. INVISIBLE LASER RADIATION MAY BE PRESENT
Danger indicates the presence of a hazard that will cause severe personal injury or death if not avoided.

Chapter 1: FiberFlex 3000 Product Overview

This chapter provides a general description of the Clearfield FiberFlex 3000 outdoor cabinet, including its standard features and options.

Topics Covered

This chapter provides a general description of the Clearfield FiberFlex 3000 outdoor cabinet, including its standard features and options.

- A description of the FiberFlex 3000 cabinet.
- A description of the FiberFlex 3000 Node cabinet.
- A list of standard cabinet features.
- A list of cabinet options.
- Cabinet dimensions and weights
- Views of the cabinet compartment.

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Cabinet Description

The Clearfield FiberFlex 3000 cabinet is an Outside Plant (OSP) Cabinet designed to house and protect network electronics equipment. Use the FiberFlex 3000 to provide services from a node location.

The FiberFlex 3000 cabinet has a flexible compartment within a single cabinet that houses active electronic equipment together with various fiber terminations, enabling deployment of multiple applications from remote site. The active electronics area is equipped with either a 20RU or 30RU or 36RU and 19 or 23" equipment rack providing flexible mounting space.

The modular design of the FiberFlex 30000 enables incremental expansion of system capacity, lowering initial deployment costs while maintaining the capacity for future growth. Modular components designed for expansion include side by side cabinets, fiber management capacity, DC power modules, and cooling elements. The Fiber Flex3000 is truly an all-in-one cabinet that can grow as your network grows.

Node Cabinet Description

The Clearfield FiberFlex 3000 cabinet is an environmentally-controlled outdoor enclosure designed to house and protect network electronic equipment. Use the FiberFlex 3000 Node cabinet to provide services from a remote location. Clearfield has created three node cabinet configurations.

Three types of Node cabinets:

1. FTTH, used for fiber to the home projects, cabinet includes: 2 mounting rods for nodes, 288 fiber 100 ft pigtail SCA connectors, Splitter tray, convenience outlet and door alarms, Load Center 125amp 12 slots 240volt with surge protector.

2. Hub Collapse, used for hub collapse projects, Cabinet includes: 2 mounting rods for nodes, 288 fiber 100ft pigtails SCA connectors, 3 LGX empty panels, convenience outlet and door alarms, Load Center 125amp 12 slots 240volt with surge protector.

3. RDOF (rural deployment), load center 125amp 12 slots 240volt with surge arrestor.

Follow mounting procedures in this guide on page 40.

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Cabinet Features

Standard features of the FiberFlex 3000 cabinet include:

Enclosure Design

- Environmentally sealed design protects from dust and water intrusion
- Designed to GR-487
- Environmentally rated from -40C to +65C (per GR-487 specifications)

Equipment Support

- 19” or 23” equipment rack
- Mechanical support for fiber terminations
- 20RU or 30RU or 36RU (depends on configuration ordered)
- Master ground bar
- Alarm block
- Door intrusion alarm switch with “tech on site” feature.
- Sun shield lid to reduce heat load in cabinet.
- Heavy Duty wind guards for the doors.
- 1/4 turn locking mechism with hasp for pad lock
- Separate vented battery compartments with isolation pad
- Mounting plinth for pad mount or vault mount.

Power (Local)

Standard features for the local power configuration include:

- 240 VAC load center (ETL-listed); 125 amp main breaker,
- 12 slot capacity.
- AC surge arrestor
- Convenience outlet (GFCI protected)
- Optional Generator outlet with safety switch.
- Illumination Kit

Cabinet Options

Common options for the FiberFlex 3000 cabinet include:

Enclosure Mounting

- Clearfield designed pour in place templete to assist when a concrete pad is pre-casted or poured on site for alignment and mount of the plinth.
- Vault 60” x 36” x 36” (Third party supplied).

Fiber Management

• Build in fiber management to protect fiber within the cabinet.
• PON splitters via rugged outdoor splitters.
• Distribution up to 864 ports of internal distribution.
• Configuration choice of connectors to support need of deployment
• Fiber Pigtail in numerous configurations, all lengths 100ft..

Power

Local power support (commercial AC power supply); additional options include:

- 220/240 VAC input (240 preferred).
- Generator connector (Hubbell); 30A NEMA twist lock with breaker.

DC Power su (based on power configurations)

- Rectifier power and distribution, battery install kit provided.
- 30 amp modules for rectification.
- Distribution support 12-24 GMT fuse (max 15amps) two load breaker and two battery breakers.
- Supports battery strings from 100ah to 200ah based on Clearfield’s supported batteries.
- Battery heater kit.

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Cabinet Dimensions and Weights

The external dimensions of the FiberFlex 3000 cabinet are Height 72” Width 30” Depth 36”. The approximate weight of the FiberFlex 3000 is dependent on configuration and can arrange for 500lbs to 800lbs.

Cabinet Views

Views of the FiberFlex 3000 cabinet follow.

Front

The front of the cabinet provides access to the electronics equipment, cabinet power system, and fiber management. The cabinet power system consists of a side mounted AC load center option. For fiber access, the fiber management accessories may vary greatly according to the ordered options.

FiberFlex 3000 Front

FiberFlex 3000 Back

Back

The back of the cabinet provides access to the electronics equipment wiring And cabling needs, DC power system, and fiber management.

Battery Compartment

Configured cabinets include a battery base compartment for housing one string of front-access VRLA batteries.

Battery compartment interior dimensions (for batteries): Opening 13” x 27”, Interior hieght 14.165”

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Chapter 2: Installation Considerations

This chapter provides general considerations for cabinet installation. Review this information before starting the cabinet installation process.

Topics Covered

This chapter covers the following topics:

- Installation guidelines
- Space requirements
- General safety recommendations
- Installation kit contents
- User-supplied items
- Cabling requirements

Installation Guidelines

Review the following guidelines before starting installation activities.

General Guidelines

Follow these general guidelines and practices:

- Read this document completely before starting any installation activities.
- Only qualified personnel should perform the procedures described in this document.
- Follow standard safety precautions when performing installation and maintenance tasks.
- Always wear standard safety gear when performing installation and maintenance tasks (hard hats/safety headgear, eye protection, insulated gloves).
- For safety, keep bystanders and other unauthorized personnel away from work operations at all times.
- Do not perform installation activities when the threat of lightning is present.
- **Warning!** - Seal all cable entry locations immediately after the cabinet is installed to prevent ground moisture from condensing inside the cabinet and damaging equipment.

Site Selection

The location of a cabinet installation site should be carefully planned in advance. Consider the following factors when selecting an installation site:

1. Functional requirements

- **Suitable terrain.** Whenever possible, the cabinet should be located in an area with a firm flat soil surface that does not require extensive earth work. The location should not be constantly damp or prone to flooding. Check soil maps of potential sites for subsurface conditions.
- **Grounding properties.** Grounding properties. The earth at the cabinet location should have a low ground impedance to provide an effective grounding system for lightning protection and safety. Perform ground testing to determine the grounding requirements.
- **Safety.** Whenever possible, the cabinet should be located on vacant property away from motor traffic to reduce injury risks to maintenance personnel or damage to equipment. On streets and highways, avoid locations near busy intersections or curves in the road. Erecting guard rails or concrete pillars can provide additional safety barriers against motor traffic.
- **Solar exposure.** Whenever possible in hot or warm climates, avoid locations with heavy exposure to direct afternoon sun, so as to maximize the life of electronics equipment in the cabinet. High outdoor temperatures and heavy solar exposure raise temperatures inside cabinets, a condition that can reduce the life span of equipment. Conversely, wind exposure improves thermal conditions in a cabinet, so locations that do not block wind are desirable.

2. Accessibility requirements:

- **Easement size.** Select a location with an easement that provides enough space to walk around the perimeter of the cabinet with its doors open.
- **Right-of-Way.** Secure a permanent location on private property, whenever possible. Obtain a firm right-of-way agreement that includes right of access. Avoid locations in public rights-of-way.
- **Electrical access.** Locally-powered cabinets must have access to commercial AC power. Verify the availability of AC service at potential cabinet locations.
- **Parking.** Whenever possible, the cabinet should be located in an area that provides sufficient parking space for
- installation and maintenance vehicles.

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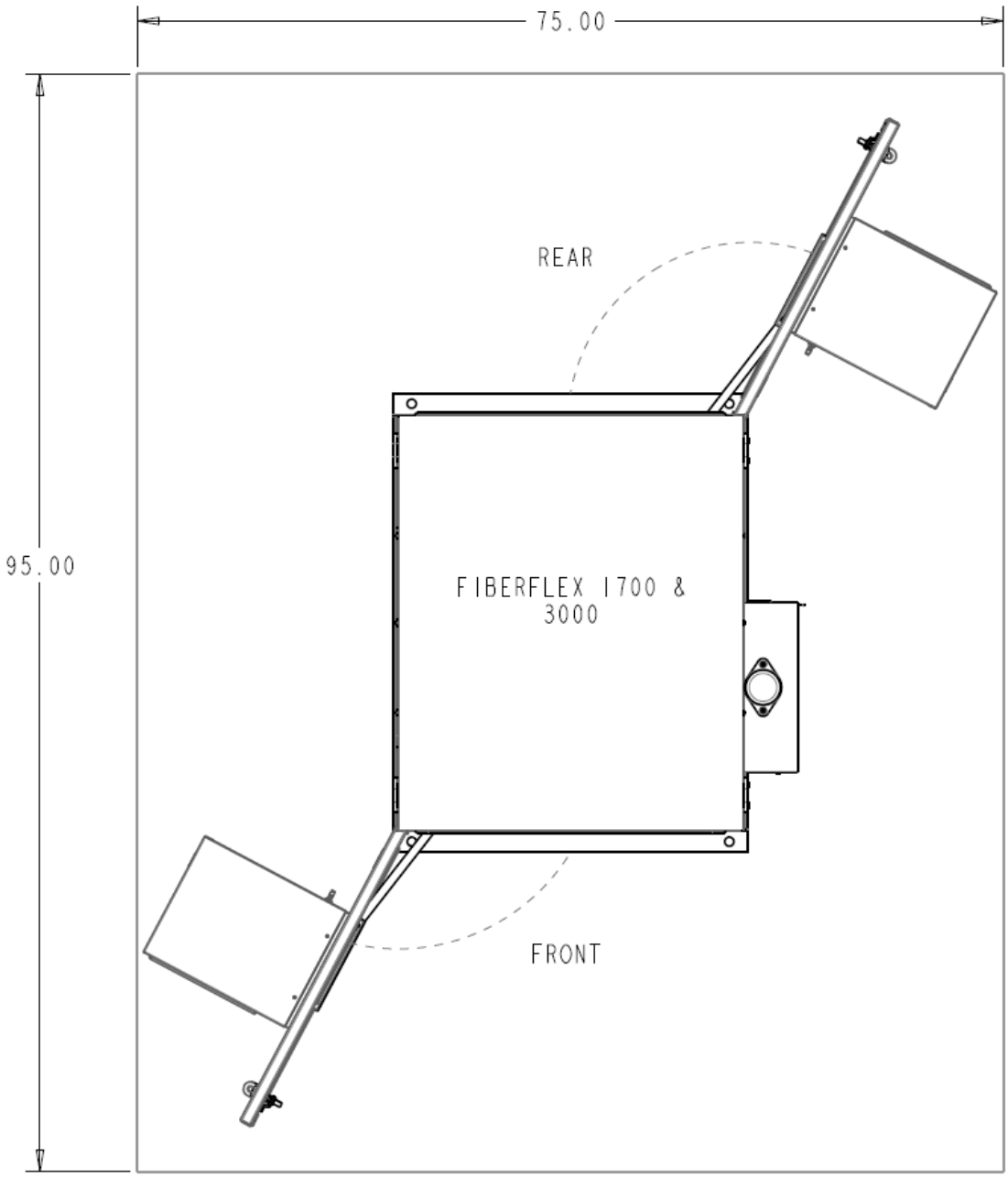
Space Requirements

The illustration below shows the cabinet clearance and space requirements.



The minimum clearance area around the cabinet site must be free of permanent impediments to allow full swing of the cabinet doors. This area must be kept clear of obstructions at all times to provide adequate access for all installation and maintenance activities.

General Safety Recommendations

WARNING! Only trained, qualified technical personnel should perform the procedures described in this document. These procedures involve potentially hazardous activities, including handling of heavy equipment and exposure to high electrical energy, which could cause injury to untrained personnel.

DANGER! Risk of high power current surge and electric shock. Read and understand all power procedures before performing tasks. Take necessary precautions and use appropriate insulated tools when working with power. This equipment must be installed, operated, and serviced by qualified technical personnel only.

WARNING! The cabinet and its components are heavy. Handle with care to avoid personal injury or damage to the equipment.

DANGER! CLASS 1 LASER PRODUCT. INVISIBLE LASER RADIATION MAY BE PRESENT.
Fiber optic radiation can cause severe eye damage or blindness. Do not look into the open end of an optical fiber.

CAUTION! Batteries contain a stored charge. Handle batteries with care.

ESD ALERT! Beware of electrostatic discharge. Follow standard ESD precautions. Always wear a grounded ESD wristband to avoid damaging the electronic equipment.

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Installation Kit

Clearfield supplies an installation kit with the cabinet that includes materials required for installation. The installation kit contents are listed below. Check to verify that your kit contains all of the listed items.:

☑	Qty	Item Description
	1	Telco hex key, 5/16”
	1	Isolation mat
	4	Hex nuts (for mounting)
	8	Flat washers (for mounting)
	4	Split lock washers (for mounting)
	4	1/2” hex head bolts (for mounting)

User-Supplied Items

Supply the following items for cabinet installation.

Tools

Bring the following tools to the installation site:

- Power drill with universal socket and screwdriver bit sets
- Socket wrench/nut driver set (standard)
- Box wrench set (standard)
- Screwdriver set (standard)
- Beam Level
- Insulated needle-nose pliers
- Wire stripper
- Compression crimping tool
- Fiber cleaver
- Fiber splicer
- RB Razor-Sharp Cutting Edge knife, or another similar tool
- 1/8 inch Allen wrench

Materials

Bring the following materials to the installation site:

- Leveling shims
- Silicone sealant

Equipment

Bring the following equipment to the installation site:

- Digital multi-meter
- Optical power meter
- Digital multi-function test set

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Cabling Requirements

Cables supplied to the cabinet must follow National Electric Code (NEC) and local codes.

Note: *Local climatic conditions, site conditions, or local practices may require adjustments to cabling requirements.*

Chapter 3: Preparing the Installation Site

This chapter describes how to prepare the installation site for cabinet placement, including establishing the cabinet mounting structure. You can install the cabinet onto a concrete foundation pad, or a foundation vault.

For pad-mount applications, you can construct a concrete pad using the Clearfield cast-in-place template. A composite foundation vault, available from a third-party supplier, can provide easy under-cabinet access.

For all mounting configurations, Clearfield requires installation of an earth ground circuit at the installation site to provide lightning protection.

NEC and local jurisdiction guidelines take precedence over Clearfield recommendations.

Topics Covered

This chapter covers the following topics:

- Installing a ground circuit at the installation site
- Constructing a concrete pad
- Installing a composite foundation vault

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Installing a Ground Circuit

Clearfield requires installing an earth ground circuit (earth electrode) at the installation site to provide protection from electric shock for equipment and personnel. The ground circuit may consist of a simple copper rod driven into the earth or a complex system of buried rods and wires. The lower the resistance of the electrode-to-earth connection, the more effective the ground system for safety and lightning protection.

Proper grounding conditions and requirements vary per site. The National Electric Code (NEC) specifies a maximum ground impedance of 25 ohms. Clearfield recommends achieving a ground impedance of no greater than 5 ohms wherever practical. If 5 ohms or less cannot be achieved, the maximum ground impedance should meet local codes or the NEC requirement of 25 ohms, whichever is less.

Grounding options

The cabinet main ground system must be bonded to a suitable earth ground circuit, which may include any of the following:

- **Ground rod(s):** A ground rod consists of a simple copper rod driven into the earth. A ground rod connects to the main cabinet or enclosure ground via an earth ground wire bonded to the ground rod and buried at the site. Multiple inter-connected ground rods provide increased ground electrode-to-earth conductivity (ground grid). You can add supplemental ground rods to a single ground grid in several arrangements, including a linear chain, fan array, or ring configuration. Refer to the NEC or local regulations for restrictions and details. All bonds to grounding electrodes must be suitable for direct burial using irreversible mechanical connections or exothermic welds. Follow local code or site practice to satisfy any additional grounding requirements.
- **Ground ring:** A ground ring consists of multiple ground electrodes that encircle the perimeter of a site. Ground rings represent the preferred earth grounding system for cabinet deployments. Ground rings follow the NEC provisions for multiple ground electrodes.

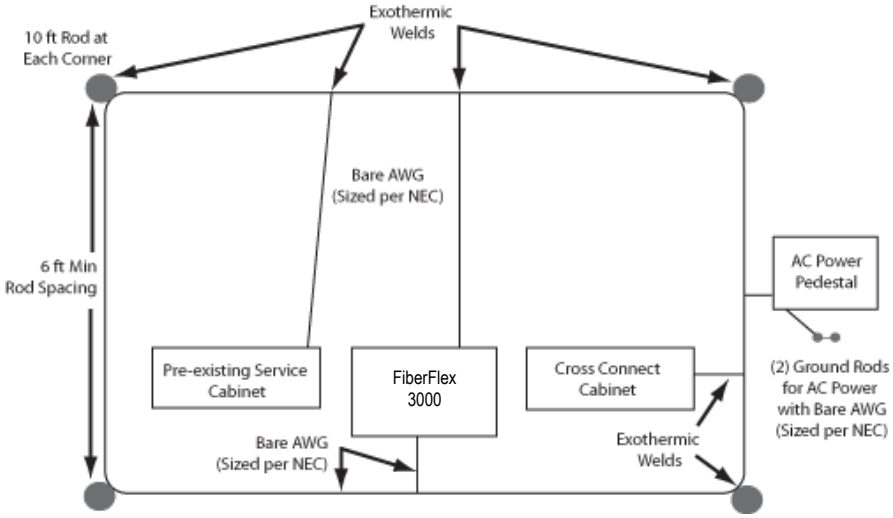
Environmental factors

Environmental factors that may affect grounding conditions include:

• Type and size of an electrical surge; a lightning-induced current surge, voltage spike during an electrical storm, or static build-up from power utility lines may overwhelm the earth ground.
• Wet soil provides low resistance ground, with resistance increasing as the soil dries. Rock, gravel, sand, loam and clay react differently to wet/dry conditions.

Follow local code to satisfy additional requirements, if applicable.

Example of PANI-compliant ground ring without a main site ground buss:



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Constructing a Concrete Pad

A concrete pad provides a permanent foundation to anchor the cabinet to the ground while protecting the cabinet from water damage and other outdoor surface conditions.

Construct a concrete foundation pad for the cabinet at the installation site. Pad construction requires excavating the site, trenching cable conduit, constructing a form, and casting concrete. Use the Clearfield -supplied cast-in-place template to provide exact locations for the mounting studs that anchor the cabinet to the pad and to provide the cable conduit locations.

Pad Construction Guidelines

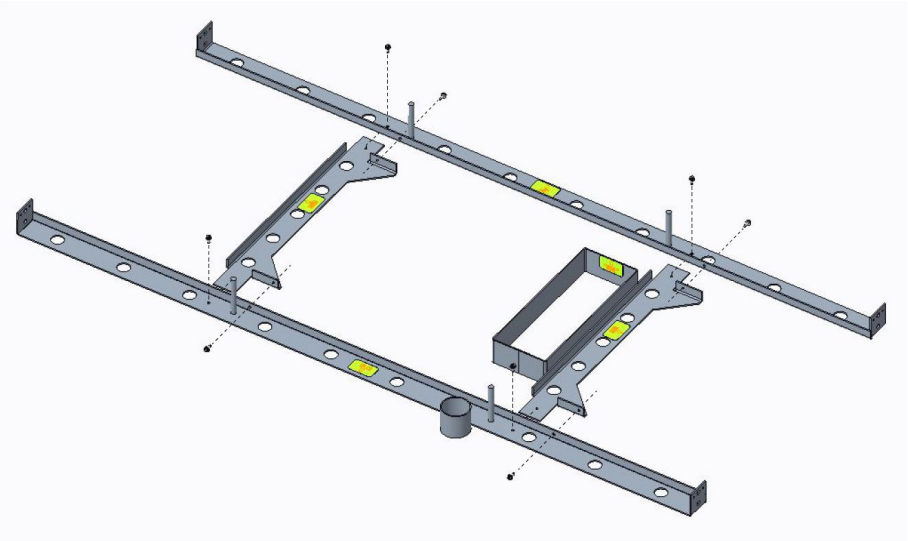
When constructing a concrete pad, observe the following guidelines and refer to the pad drawings for guidance. Follow these guidelines to ensure proper pad construction. Adjust for local conditions or practices as required.

- Construct the pad with a minimum height of 6 inches.
- Construct the pad with a maximum of 2 inches above-grade exposure.
- Use the Clearfield cast-in-place template to provide exact mounting stud and conduit locations.
- Use rebar or wire mesh inside the form to improve pad strength.
- Cast the pad from a single concrete pour. Do not make multiple pours.
- Ensure that the pad is smooth and level across its entire surface.
- Use 2-inch conduit (maximum) for AC cable (local power applications only). See drawing below for entry location.
- Include pull cords in all cable conduits.
- Review ASTM C39 and 143 as a standard
- Follow all local jurisdiction requirements

Assembling the Cast-In-Place Template

Assemble the Clearfield cast-in-place template as follows.

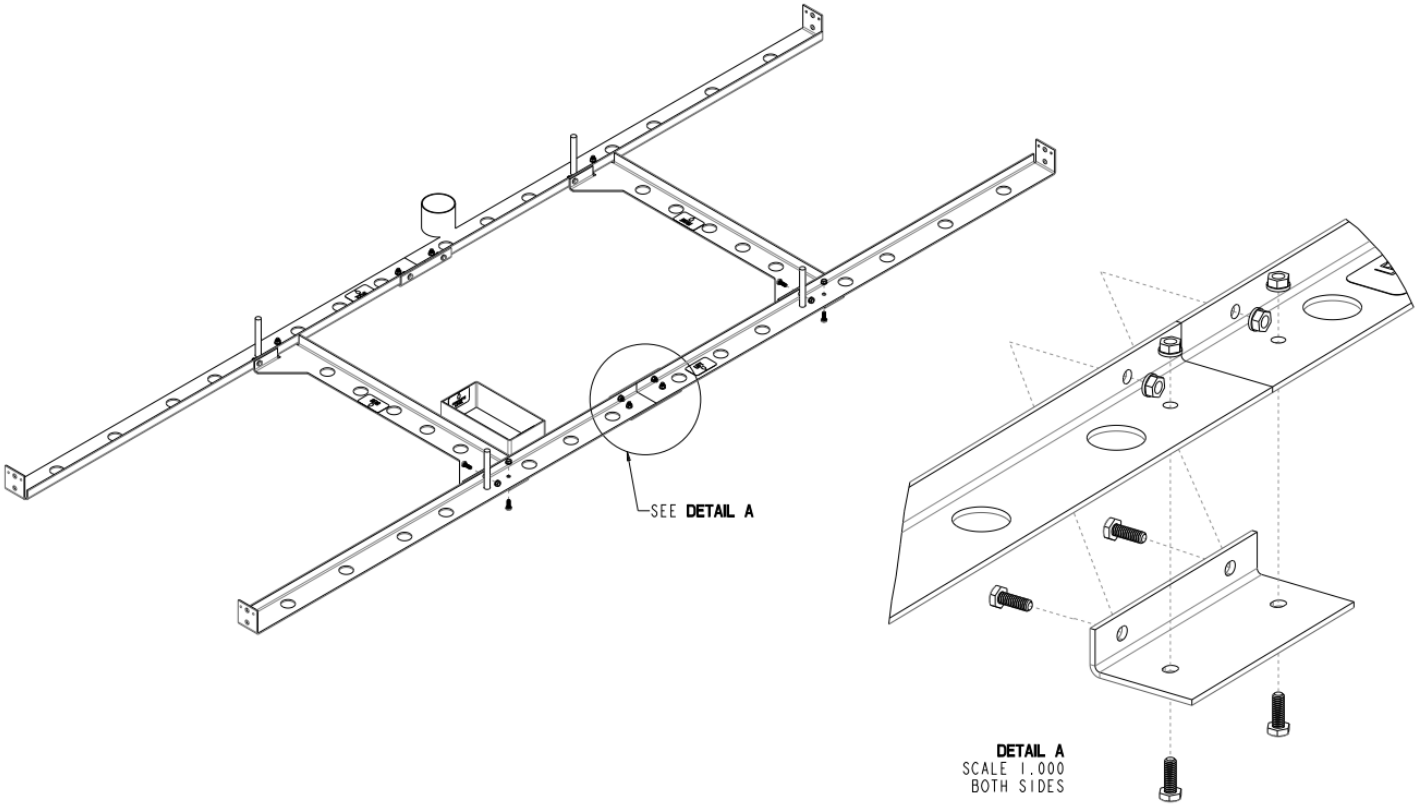
To assemble the template



Step 1: Unpack the template hardware from the shipping kit.

Step 2: Place the four bracket members on the ground, arranged as shown.

Step 3: Join the two halves of each long bracket piece as shown with the hardware provided.



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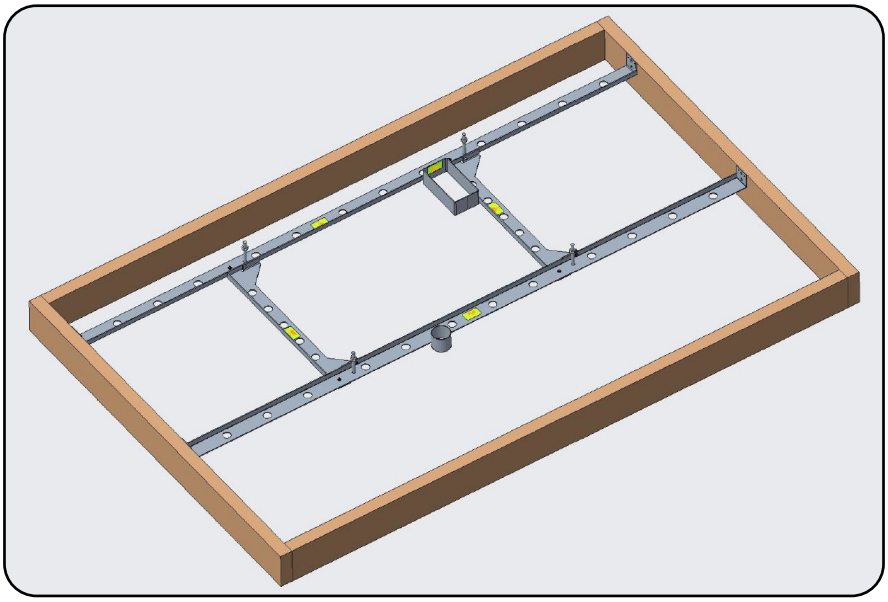
Step 4: Attach the short and long brackets together using the eight supplied screws, as shown.

Step 5: Tighten all screws to complete the template assembly.

Step 6: Place the two long brackets parallel with each other, flat side down.

Step 7: Place the two short brackets between (and perpendicular to) the long members, flat side down, with the conduit entry box bracket on the right.



Preparing the Site

To construct a concrete form

Step 1: Using 2 x 6 boards and stakes, construct a concrete form with interior dimensions of 96 x 60 inches inside the foundation hole. Make sure that the top edge of the form is level.

Step 2: Place gravel into the foundation hole to create a level base. The gravel layer should be at least two inches deep, compacted and leveled.

Step 3: Place and tie rebar inside the form elevated above the gravel.

Step 4: Place the Clearfield cast-in-place template (see page 14) into the form, guiding the cable conduits through the conduit entry ducts in the template.

Step 5:
- Use 2.5-inch conduit (maximum) for outside plant cables. See drawing below for entry locations.
- Use 2-inch conduit (maximum) for AC cable. See drawing below for entry location

Align the template mounting brackets flush with the top of the form, then nail the template to the form to secure it in place.

Note: *The mounting studs should protrude approximately one inch above the form.*

Step 6: Verify that the form remains level across the entire surface. Adjust as required.

Step 7: Pull the earth ground wire (from the conduit trench) through the entry duct in the template, allowing at least three feet of wire to extend above the top of the form.

Step 8: Mask the four mounting studs on the template to protect the threads from concrete.

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Casting the Pad

Cast the concrete foundation pad as described below. Adapt the instructions as needed for local requirements, practices, or conditions.

To cast the concrete pad

Step 1: Prepare the concrete mix. Be sure to mix enough concrete to cast the entire pad in a single pour.

Note: *To avoid structural weakening, do not cast a pad from multiple concrete pours.*

Step 2: Pour the concrete into the form. Do not allow the cast-in-place template to bend or twist out of shape during the pour.

Step 3: Smooth and level the top surface of the concrete.

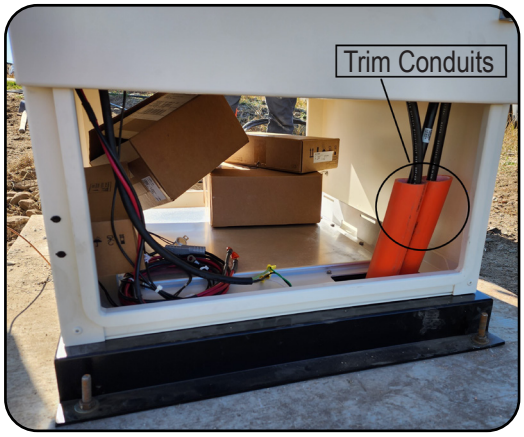
Step 4: Leave the pad to cure. Do not remove the form until the concrete has fully cured (at least 72 hours). Perform the remaining steps only after the concrete has cured.

Step 5: Remove and discard the form.

Step 6: Backfill the cable conduit trenches with soil or gravel as required.

Step 7: Backfill and grade the perimeter area around the pad with soil, as required.

Step 8: Trim the cable conduits to a height no more than 4 inches above the pad.

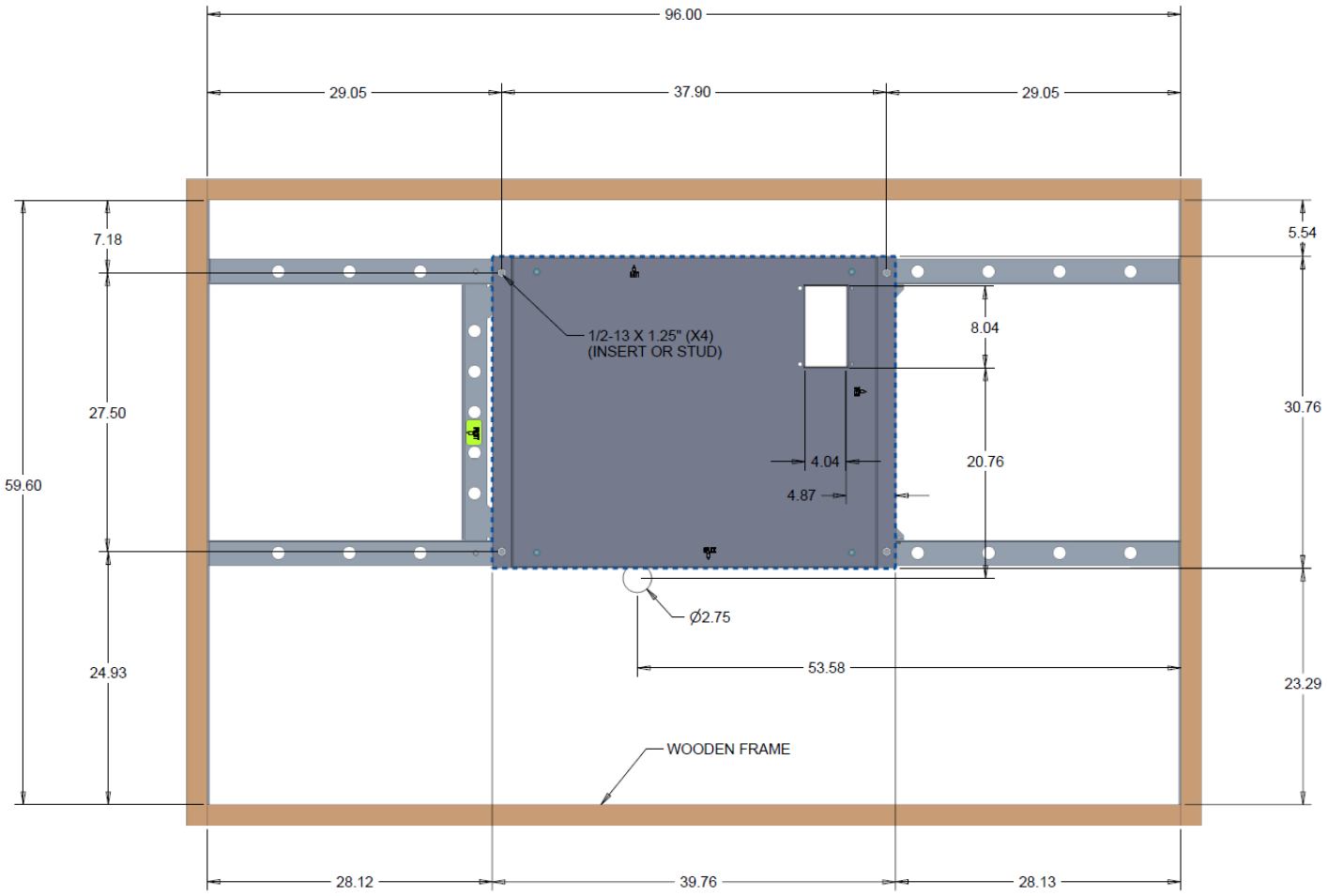


Pad Drawings

Standard

Use the following drawings for reference during site preparation. Actual pad dimensions may vary by manufacturer. Refer to the manufacturer's documentation for more information.

- Use 2.5-inch conduit (maximum) for outside plant cables. See drawing below for entry locations.
- Use 2-inch conduit (maximum) for AC cable. See drawing below for entry location



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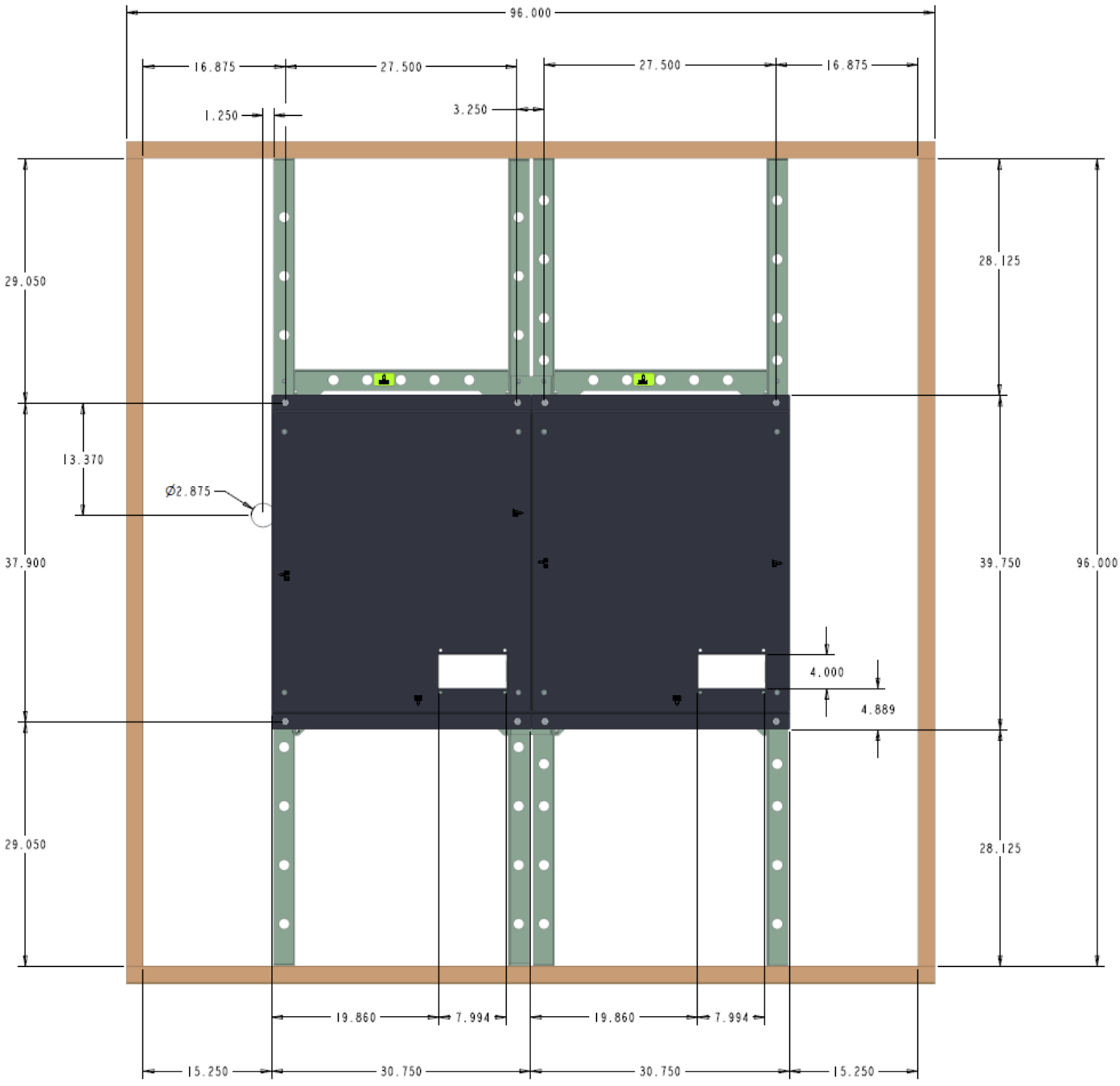
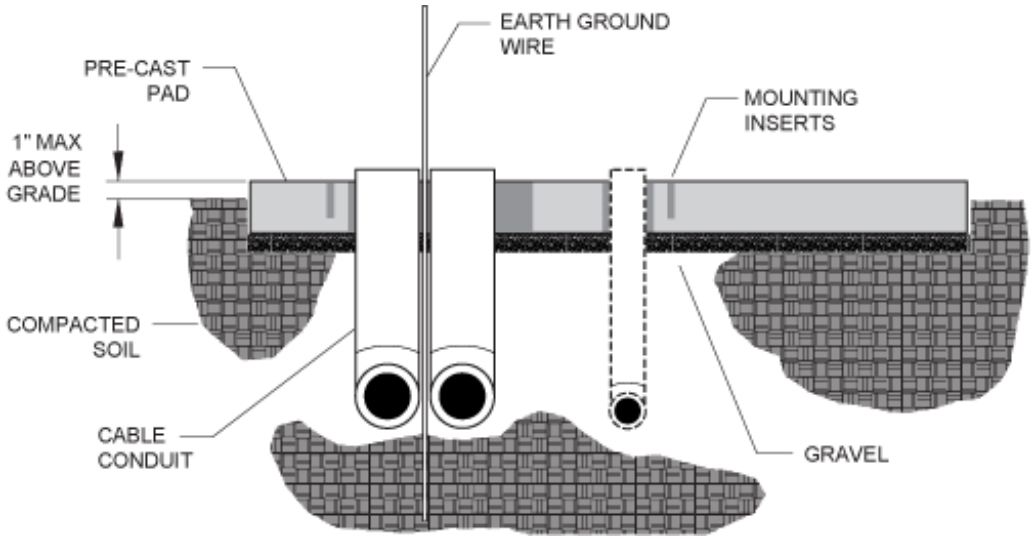
Convergent Series

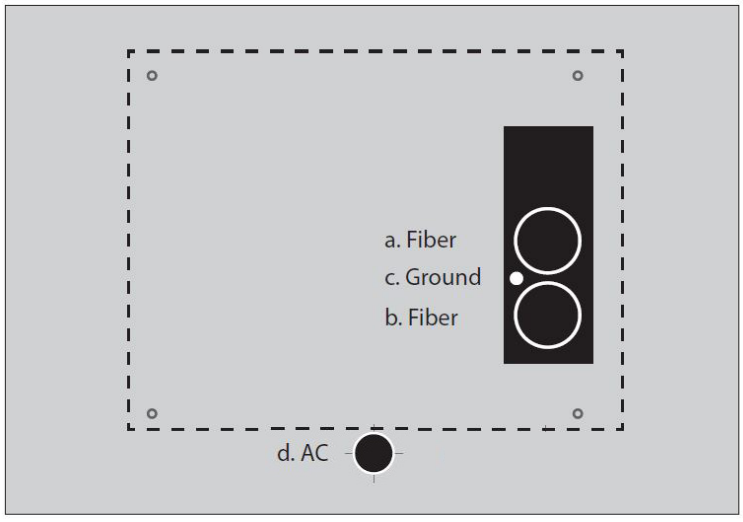
Use the following drawings for reference during site preparation. Actual pad dimensions may vary by manufacturer. Refer to the manufacturer's documentation for more information.

- Use 2.5-inch conduit (maximum) for outside plant cables. See drawing below for entry locations.
- Use 2-inch conduit (maximum) for AC cable. See drawing below for entry location





Pad Cross-Section
(from left side)



Conduit Locations

For proper cable entry into the cabinet, place conduit into the following locations.

- **a.** Conduit for outside plant cable (fiber).
- **b.** Conduit for outside plant cable (fiber).
- **c.** Earth ground wire
- **d.** Conduit for AC cable

Use the Clearfield cast-in-place template to provide precise conduit orientation.

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Installing a Foundation Vault

A foundation vault constructed of composite materials provides a flexible cabinet mounting option. Because foundation vaults stand approximately three feet tall, you can either bury the vault below ground to provide a pad-like mounting fixture with underneath access for maintenance and splice case storage, or you can install the vault above ground to serve as a riser in areas subject to heavy snow, mud, or flooding.

Installing a foundation vault requires excavating the installation site, trenching cable conduit, creating a gravel foundation base, and placing the vault on the foundation base.

Foundation vaults ship configured with knockouts for conduit entry and mounting fixtures (threaded inserts) for anchoring the cabinet to the top of the vault. Specific features and dimensions vary by manufacturer and model. Contact your sales representative for Clearfield -certified supplier information.

Foundation Vault Requirements

When preparing for and installing a foundation vault, observe the following guidelines. Refer to the vault drawings for guidance.

Guidelines

Follow these guidelines to ensure proper foundation support for the cabinet. Adjust for local conditions or practices as required.

- Foundation vaults have a typical height of 36 inches, the depth of which to bury can vary:
    - When serving as an above-ground riser, install the vault at least 6 inches below-grade (typical).
    - When serving as a pad-like fixture, install the vault with a minimum of 1 inch above-grade exposure (typical).
- Use 2.5-inch conduit (maximum) for outside plant cables. See drawing below for entry locations.
- Use 2-inch conduit (maximum) for AC cable. See drawing below for entry location.
- Include pull cords in all cable conduits.

Refer to the vault manufacturer’s instructions for additional guidelines

Preparing the Site

Prepare the site for installation of a foundation vault. Some vaults may require custom preparations. Refer to the manufacturer's instructions for more information.

A general practice is described below for reference. Adapt the instructions as needed for local requirements, practices, or conditions.

To prepare the site for foundation vault installation

Step 1: Excavate the pad area. Dig a foundation hole to the required depth (six inches deep minimum). Follow OEM directions for installation.

Step 2: Grade and compact the excavated surface until it is firm and level.

Step 3: Trench out conduit paths through the foundation hole from the cable feeder location.

Step 4: Place the cable conduits into the conduit trench. Refer to the vault guidelines for conduit sizes and locations.

Step 5: Route the earth ground wire through the conduit trench (from the ground electrode).

Step 6: Place gravel into the foundation hole to create a level base. The gravel layer should be at least one inch deep, compacted and leveled.

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Installing the Foundation Vault

Install the foundation vault according to the manufacturer's instructions (typically supplied with the vault).

A general installation practice is described below for reference. Adapt the instructions as needed for local requirements, practices, or conditions.

WARNING! The foundation vault may be very heavy. Do not place any part of your body under the vault during lifting. Handle with care to avoid personal injury or damage to the vault.

To install a foundation vault

Step 1: Transport the foundation vault to installation site.

Step 2: Using a suitable lifting device, lift the vault into position above the foundation hole.

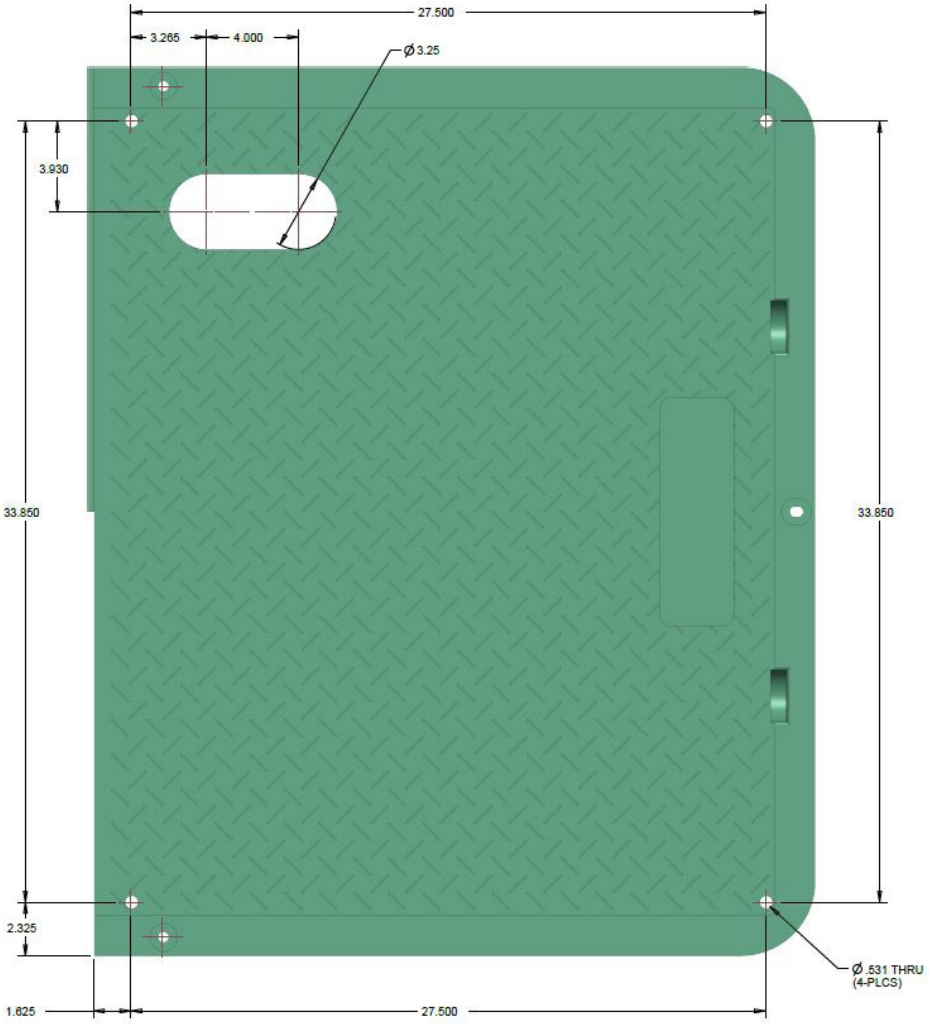
Step 3: Lower the pad onto the gravel base, making sure the conduits and earth ground wire pass inside the vault as it descends.

Step 4: Adjust the vault positioning on the gravel base until it is stable and level.

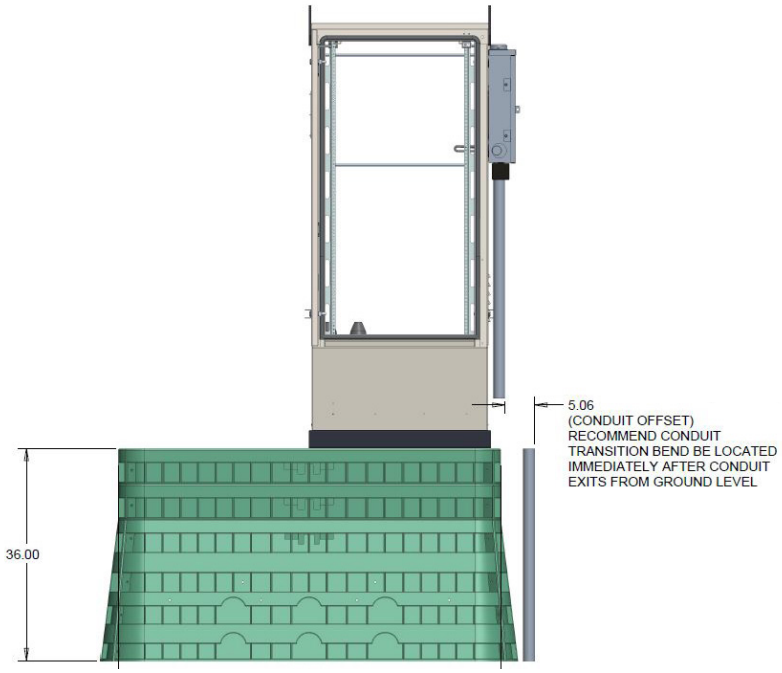
Step 5: Backfill and grade around the vault perimeter with soil to secure it in place.

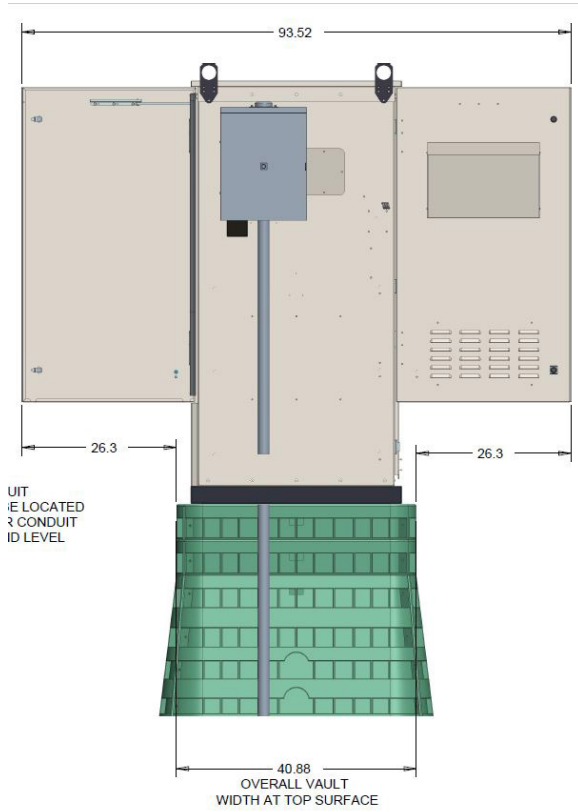
Step 6: Verify that the vault remains level. Adjust as required.

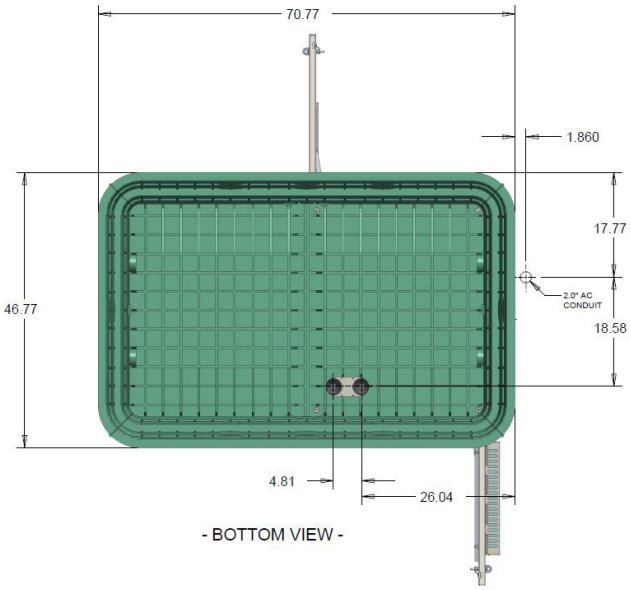
Vault Drawings

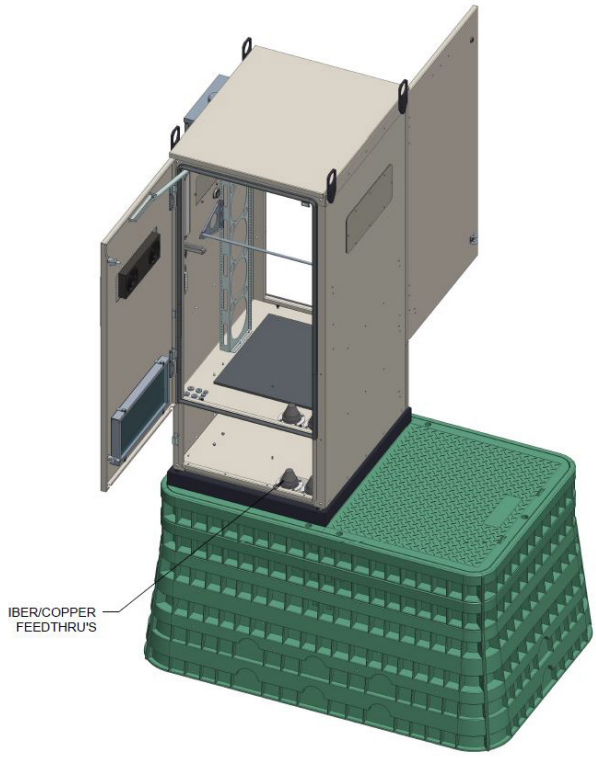


Proprietary Information: Not for use or disclosure except by written agreement with Clearfield.


5.06
(CONDUIT OFFSET)
RECOMMEND CONDUIT
TRANSITION BEND BE LOCATED
IMMEDIATELY AFTER CONDUIT
EXITS FROM GROUND LEVEL
36.00


93.52
26.3
26.3
UIT
E LOCATED
CONDUIT
ID LEVEL
40.88
OVERALL VAULT
WIDTH AT TOP SURFACE


70.77
1.860
17.77
2.0" AC
CONDUIT
18.58
46.77
4.81
26.04
- BOTTOM VIEW -


IBER/COPPER
FEEDTHRU'S

Chapter 4: Installing the Cabinet

This chapter describes how to install the Clearfield FiberFlex 3000 cabinet onto its permanent mounting location.

Topics Covered

This chapter covers the following topics:

- Unpacking the cabinet from its shipping crate.
- Operating the cabinet doors.
- Preparing the cabinet for installation.
- nstalling the cabinet onto a concrete pad
- Replacing the cabinet lifting detail brackets.
- Installing plinth and mounting of cabinet.
- Installing a ground circuit at the installation site

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Unpacking the Cabinet

The cabinet ships from the factory on a wooden pallet and is enclosed in cardboard crating for protection. The cabinet is secured to the pallet by four bolts.

Do not remove the cabinet from the pallet until after it has been delivered to the installation site. However, you can remove the cardboard crating to inspect the cabinet at the staging area, if required. Clearfield recommends keeping the protective packaging in place for transportation.

When transporting the cabinet to the installation site, strap down the cabinet securely to the truck or trailer to prevent shifting or tipping. Unpack the cabinet at the installation site.

To unpack the cabinet

Step 1: After the cabinet has been delivered to the installation site, remove the cardboard packaging from the cabinet.

Step 2: Review the packing list to verify that all shipped materials are present.

Step 3: Discard the packaging material.

Step 4: Retrieve the telco hex key tied or taped to one of the cabinet doors.

Note: *Use the supplied telco hex key to unlock the cabinet doors. See Operating Cabinet Doors (page 38) for instructions.*

Note: *Do not remove the bolts securing the cabinet to the pallet until the cabinet is ready for placement.*

Operating Cabinet Doors

Cabinet Doors

The cabinet has hinged front and side doors, each equipped with two telco hex-pin latches and a padlock hasp for security. Open and close doors using a Clearfield -supplied telco hex key.

Each door is equipped with an alarm switch that monitors the position of the door. When a door on an in-service cabinet is opened, an intrusion alarm reports through the equipment. Pull the switch plunger to disable the alarm reporting while you are working on the cabinet. The alarm switch is located at the upper right corner of the door frame.

To open a cabinet door

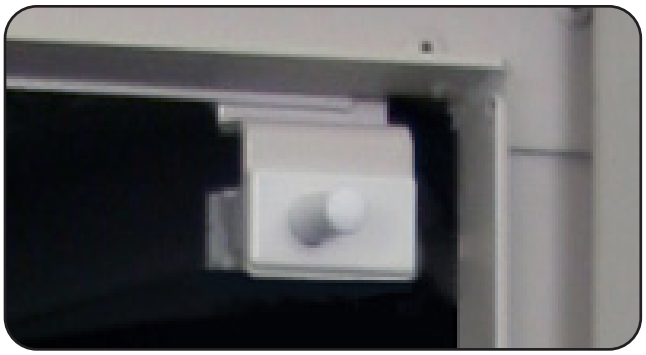
Step 1: Insert the telco hex key into the door's upper hex-pin latch.

Step 2: Turn the key counter-clockwise to disengage the latch.

Step 3: Repeat Steps 1 and 2 to disengage the lower latch.

Step 4: Swing the door open until the wind brace engages.

Step 5: On a powered cabinet, pull the alarm switch plunger to disable reporting of the intrusion alarm.



Note: *Do not rotate the switch plunger. Rotating the plunger may damage the switch.*

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To close a cabinet door

Step 1: Push up on the wind brace to disengage it.

Step 2: Swing the door closed.

Step 3: Insert the telco hex key into the door's upper latch.

Step 4: While holding the door firmly closed, turn the key clockwise to engage the latch.

Step 5: Repeat Steps 3 and 4 to engage the lower latch.

Battery Compartment Door

The battery compartment door is secured to the equipmart compartment via two spring clips which release the door. Use a Clearfield -supplied telco hex key to open and close the door.

To open a battery compartment door

Step 1: Open equipment section door.

Step 2: Pull up the spring clips to release the door

Step 3: Tilt and pull the door panel forward, away from the cabinet.

To close a battery compartment door

Step 1: Insert the tabs on the back of the door onto the bottom lip of the door frame. Tilt and push the door panel closed. Spring clips will slide in the aligned holes on the compartment door.

Preparing the Cabinet for Installation

Complete the following preparations before installing the cabinet.

To prepare the cabinet for installation

Step 1: Open the front and rear cabinet doors.

Step 2: From the battery compartment, remove the isolation mat and the bag containing the installation hardware. Set them aside for use during installation.

Step 3: Prepare the battery compartment as follows:

a. Remove the battery compartment door.
b. Remove the ground strap

Step 4:

Prepare the AC load center as follows:

a. Remove the four screws from the AC load center's front (breaker) panel, and then remove the panel from the load center housing. Retain the hardware for re-installation.

Step 5:

Remove the nuts from the four bolts securing the cabinet to the pallet. The bolts are located at the bottom four corners of the battery compartment.

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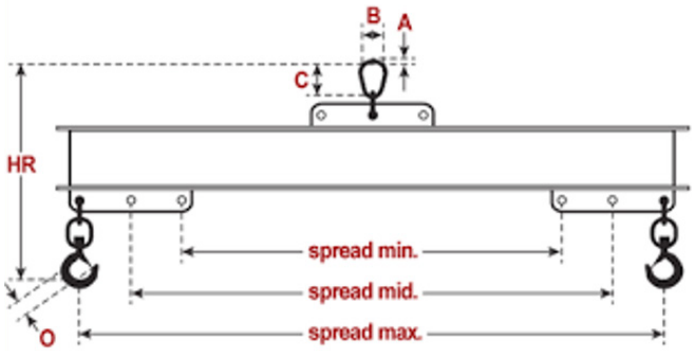
Installing the Cabinet on a Concrete Pad

The cabinet is equipped with two lifting details on which to attach slings to lift and move the cabinet using a boom crane, derrick, or backhoe. Use wire rope slings and appropriately rated connecting links or lifting hooks. The lifting device and slings you use must be capable of lifting at least a 300 lb. working load. When using a lifting device to place the cabinet, follow these guidelines:

- Check the two lifting details on top of the cabinet to ensure that they are securely attached.
- Attach the lifting slings to the lifting device; attach the other sling ends to the cabinet lifting details with connecting links or hooks.
- Do not disconnect the slings from the cabinet until after it rests securely on the pad.
- A spreader bar is recommended for lifting.



CAUTION! Installing the cabinet requires safe handling to ensure that no injury to personnel or damage to the cabinet occurs. Do not place any part of your body under the load during lifting. Follow local safety practices for lifting and moving heavy loads.

ALERT! Isolation mat usage is mandatory for concrete pad installations. Failure to use the supplied isolation mat can accelerate cabinet corrosion and may void the Clearfield cabinet warranty.

Before installing the cabinet, verify that the doors are locked in the open position (wind brace engaged). Verify that the battery compartment door has been removed.

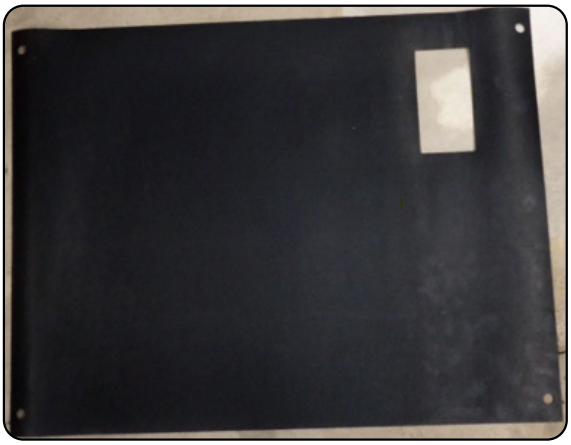
Ensure that, prior to lifting cabinet onto mounting plinth:

- Cabinet lifting eyes are installed
- Straps are on
- Doors are open and locked open by wind guards
- Cabinet is unbolted from pallet
- Fiber cable pigtails are stretched out

To install the cabinet on a concrete pad

Step 1: Sweep the pad free of dirt and debris.

Step 2: Install the isolation mat onto the concrete pad.



Step 3: Then install mounting plinth on top of isolation mat. Bolt plinth to concrete pad template bolts.

Step 4: Using a lifting mechanism, lift the cabinet directly above its mounting position on the pad.

Step 5: Slowly lower the cabinet, keeping the mounting holes in the cabinet base aligned with the anchor studs (or holes) in the pad.

Step 6: If cabinet comes equipped with fiber pigtails, take care not to damage cables while inserting cables in OSP conduits during the lift and as the cabinet is lowered to the mounting plinth.

Note: *If properly aligned, the entry ducts should slide down over the conduits as the cabinet lowers. If necessary, trim the conduit down to a height that enables it to pass into the entry duct.*

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Step 7: Pull the earth ground wire into the cabinet or riser through one of the cable entry ducts.

Step 8: Anchor the cabinet or riser to the plinth as follows:

Site-cast pads with anchor studs from pour-in-place template:

a. Get the four hex nuts, four flat washers, and four lock washers from the installation kit.

b. Install one flat washer, lock washer, and hex nut onto each of the four anchor studs.

c. Tighten the hex nuts to secure the cabinet to the plinth to the pad.

d. Lift cabinet over mounting plinth, align entry area for conduits and align mounting holes.

e. When cabinet mounting holes are aligned and cabinet is set on plinth bolt cabinet to plinth using hardware provided.

f. Verify that the doors open and close freely. If necessary, use shims to level the cabinet.

g. Apply silicone caulking to the bottom perimeter of the cabinet.

Lifting Eyes

Step 9: After the cabinet is installed, you can remove the lifting eyes and rotate 180 degrees and install back onto the cabinet. Cabinets must have lifting eyes installed.

Joining Convergent Cabinets

When installing multiple FiberFlex 3000's, the first cabinet on the right will be labeled Cabinet A. Install the cabinets from right to left in alphabetical order.

Step 1: Align and install both mounting plinths next to each other, following the steps shown in the previous sections.

Step 2: Mount the first cabinet (Cabinet A) to its plinth and flip the lifting eyes, using the lower holes to allow the lifting eyes to reach above the top of the cabinet.

Step 3: Place the joining collar into the pass through hole prior to placing the second cabinet (Cabinet B).

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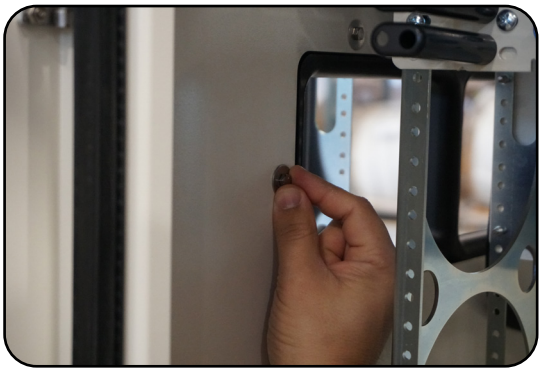
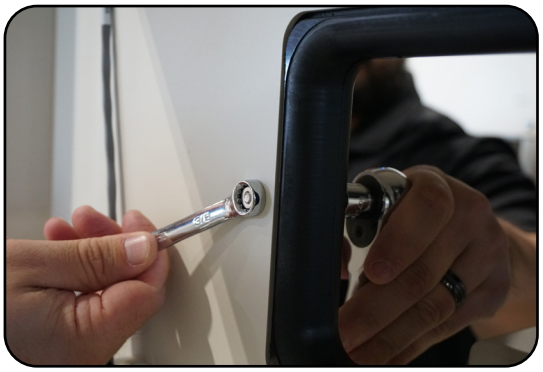
Step 4: Place Cabinet B onto its plinth, leaving room to flip the lifting eyes. Once completed, push the cabinet into place, aligning the joining collar and securing it in place with the pass through bolts.





Step 5: Ensure the lifting eyes of both cabinets are aligned, and secure them together with the provided hardware.

Step 6: Tightly secure the bolts attaching the cabinet to the mounting plinth.

Chapter 5: Installing Local AC Power

This chapter describes how to install AC local power to the cabinet.

- This process includes installing the cabinet earth ground connection and installing and wiring local AC power.

Install power according to your cabinet configuration type.

Topics Covered

This chapter covers the following topics:

- Installing the cabinet ground connection
- Installing local AC power

Proprietary Information: Not for use or disclosure except by written agreement with Clearfield.

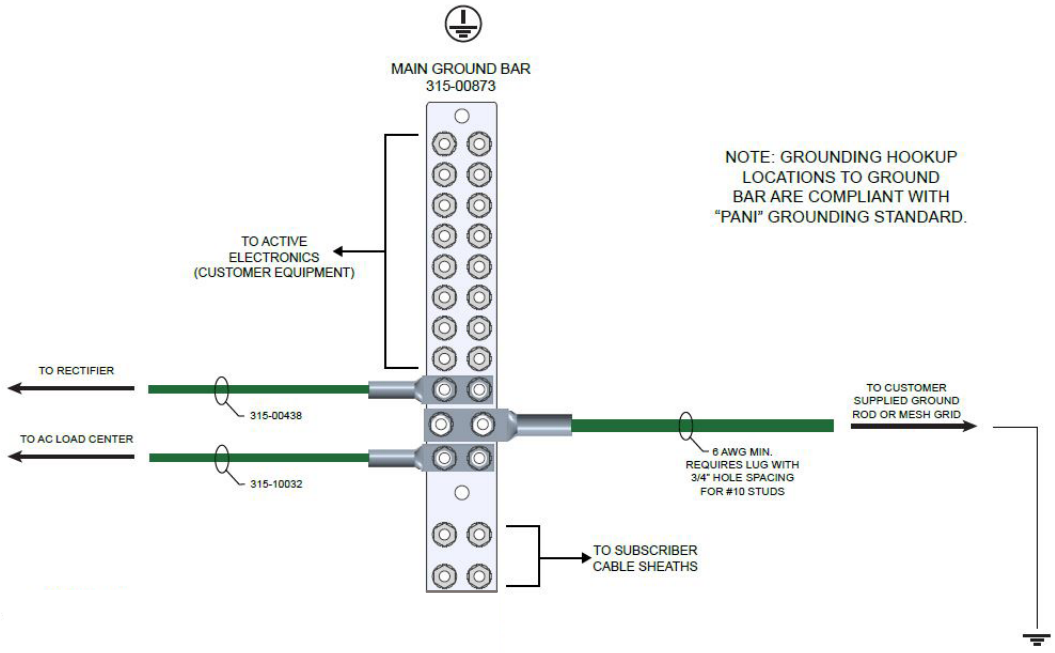
Installing the Cabinet Ground Connection

You must install the cabinet's connection to the earth ground circuit before you connect commercial power to the OSP cabinet.

Guidelines

Clearfield recommends adhering to PANI grounding methods to reduce ground current interaction while following local NEC jurisdiction:

- The PANI system divides the ground bar into sections, with one type of conductor in each section: Producers, surge Absorbers, Non-isolated and Isolated (PANI).
- The FiberFlex 3000 cabinet's main earth ground (that connects to the ground field) should bisect the main ground bar, effectively separating ground termination positions into two zones, as follows:
    - **Isolated Ground Zone (IGZ) 'equipment' grounds:** Active equipment ground terminations—as well as grounds for any DC power system(s), if collocated in the same enclosure—should be isolated from surge producing 'external' grounds.
    - **Surge producing 'external' grounds:** External interface ground connections (OSP cable sheath ground bonds, subscriber line protection panels, AC feeds, etc.) are considered surge producers and should be isolated from equipment grounds.
- The earth ground connection (middle position) on the FiberFlex 3000 cabinet ground bar serves as the primary surge absorber to isolate the equipment grounds from the surge-producing external grounds.



Note: *Cabinet ground wiring diagrams are available at [seeclearfield.com.](seeclearfield.com)*

To install the cabinet ground connection

Step 1: Open the cabinet's back door.

Step 2: Route the earth ground wire to the main ground bar and cut the wire to length.

Step 3: Using a ratcheting crimp tool with embossing dies, attach a two-hole compression lug (#2– #6 AWG, 3/4-inch hole spacing) to the earth ground wire. Ensure that the correct lug is used to match the earth ground wire.

Step 4: At the middle of the ground bar, locate a ground position with 3/4-inch stud spacing. Remove the nuts from the identified terminal studs.

Step 5: Attach the earth ground wire's two-hole lug onto the 3/4-inch ground terminal studs per PANI guidelines.

Step 6: Re-connect the nuts to the ground terminal studs and tighten to 26 inch-lbs. of torque.

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Installing AC Power (220-240 VAC)

Install 220-240 VAC power as described below.

DANGER! High voltage may be present. Risk of electrical shock. Do not apply AC power to the cabinet until the installation process is complete.

WARNING! Electrical hazard. Only a qualified electrician should perform this procedure.

Before proceeding, verify that AC service to the cabinet site is OFF at the local power transfer switch.

To install the cabinet ground connection

Step 1: Switch all AC load center breakers to the OFF position.

Step 2: If not done previously, prepare the AC load center for wiring as follows:

a. Remove the AC load center's front (breaker) panel, and then remove the panel from the load center housing. Retain the hardware for re-installation.

b. Loosen the coupling nut at the bottom of the housing to allow AC wires to pass into the load center.

Step 3: Install a user-supplied AC conduit into the load center. Install the conduit per local practice. Make sure the conduit is rated for AC cabling.

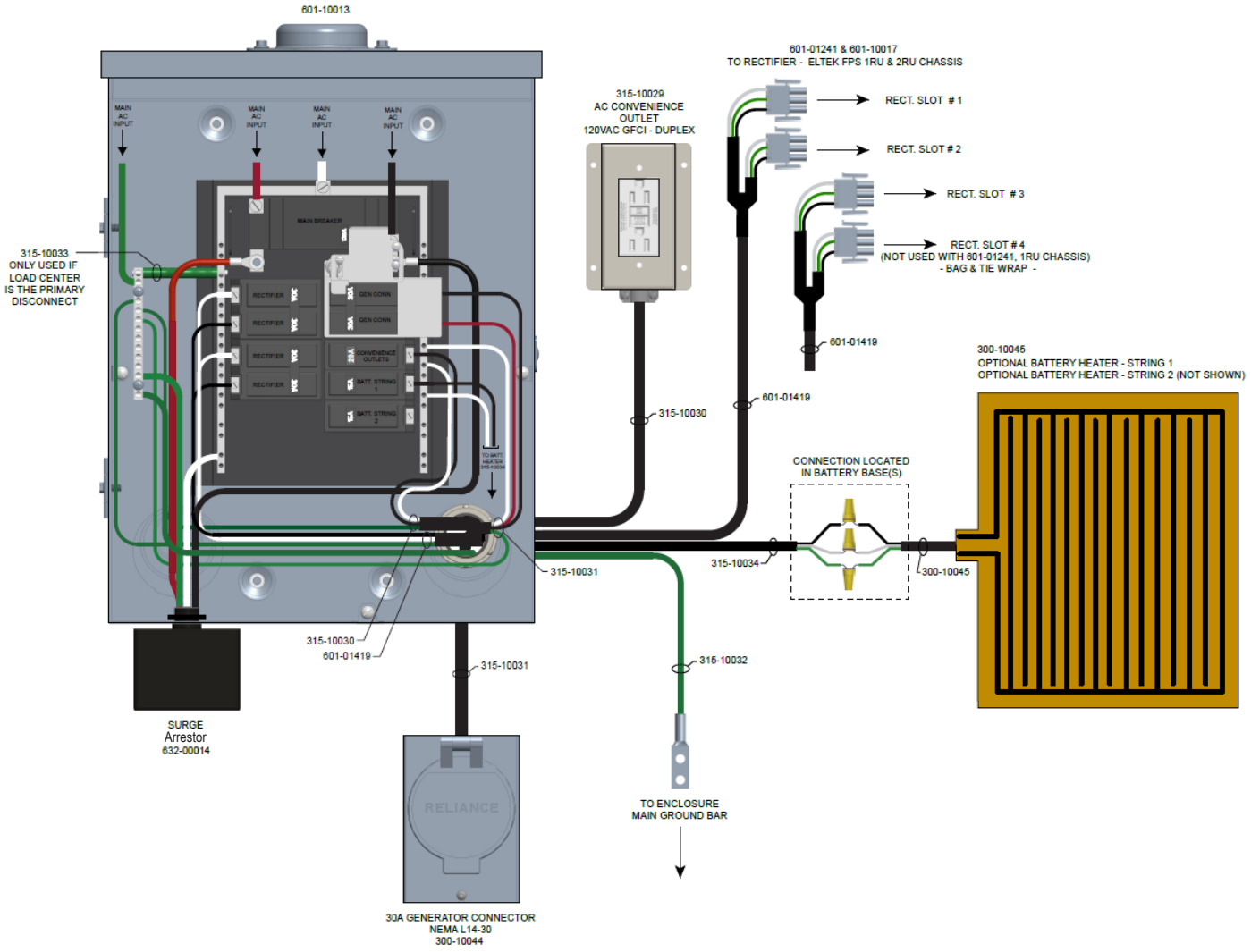
Step 4: Pull the AC wires (sized according to NEC and local practices) into the AC load center.

Step 5: Connect the AC wires to the load center according to the schematic.

Step 7: Tighten the coupling nut around the AC wires at the bottom of the load center housing.

Step 8: Re-install the cover panel on the AC load center.

AC Load Center Wiring Diagram



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Chapter 6: Installing Outside Plant Cables

This chapter describes how to install outside plant cables into the cabinet, including fiber plant (fiber-optic cables for transport/uplink).

Topics Covered

This chapter covers the following topics:

- Installing fiber cables.
- Sealing cable entry locations.

Bonding Cable Sheaths

The optical cable sheaths must be bonded as follows:

- Bond the metallic sheaths of all optical cables to a grounding rod or system at their first appearance at the cabinet/enclosure site (at the copper pedestal or splice case, and so forth). If this point is close enough to bond to the cabinet/enclosure grounding system, bond to the same point on the main site ground bar (SPGP or equivalent) that the cross-connect bonds to.
- Bond the metallic sheaths of all optical cables to a grounding rod or system at regular intervals along the entire run external to the cabinet/enclosure site, per RUS guidelines.
- Clearfield recommends that you bond optical fiber cable sheaths at the first entrance to the cabinet/enclosure site only (the splice case, or similar), and then isolate the sheaths in the short run between splice point and the Clearfield equipment cabinet/enclosure ground. The short run can then be bonded on either side (the Clearfield ground bar side or splice point side, but not both) per local practice.

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Installing Fiber Cable

The following are general guidelines only for installing outside plant (OSP) fiber cable in the cabine. Follow local practice wherever applicable.

Fiber management guidelines

When installing, splicing, and routing fibers in the cabinet, follow these guidelines:

- Avoid tight bend radii for fibers and provide adequate strain relief.
- Dress and secure fiber jumpers using Velcro straps or other soft-tie method designed for fiber. Avoid using plastic cable ties, which can damage a fiber.
- Label jumpers to simplify identification at splice and distribution locations.

Sealing Cable Entry Locations

Seal the cable entry locations to protect the cabinet and riser against moisture, dust, pests, and other contaminants. Use a silicon-based sealant or comparable compound.

Warning! - Seal all cable entry locations immediately after the cabinet is installed to prevent ground moisture from condensing inside the cabinet and damaging equipment. Failure to take these preventive measures will void cabinet warranty.

To seal the cable entry locations

Step 1: Open the cabinet's rear door and battery compartment door.

Step 2: Adjust or trim the rubber cone gaskets on the cable entry ducts to create a tight seal around the cables, as required.

Step 3: If required, prepare the sealant for application per the manufacturer instructions.

Step 4: Apply the sealant around any open areas on the entry ducts where cables enter the cabinet or riser. Seal all gaps around the cables per the manufacturer instructions.

Note: *Alternatively, you may invert the rubber cone gaskets and then inject a foam-type sealant into the cones around the cabling.*

CAUTION! Only a qualified technician should perform this procedure.

Use customer supplied sealant to seal entry cones

Seal conduit area with sealing foam provided

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Chapter 7: Turning Up the Cabinet Power System

This chapter describes how to turn up and test the cabinet power system.

This process includes checking the cabinet ground connection, checking the AC power supply voltage, installing rectifier modules into the rectifier shelf, installing batteries for reserve power, and turning up and testing the DC power system.

Topics Covered

This chapter covers the following topics:

- Turning up the cabinet power system (local power)

Turning Up the Power System

This section describes how to turn up and test the power system for locally-powered AC cabinets. The process includes checking the cabinet ground connection, checking the AC power supply voltage, installing batteries for reserve power, and turning up and testing the DC power system.

Topics Covered

This chapter covers the following topics:

- Checking the cabinet ground connection
- Checking the AC power supply voltage
- Installing rectifier modules into the Rectifier shelf
- Installing batteries for reserve power
- Turning up and testing the DC power system

Checking the Ground Connection

Check the impedance of the cabinet ground connection before turning up the cabinet power system.

Note: *The following procedure does not test the quality of the earth ground circuit (earth electrode), which should have been installed and tested before the cabinet was installed.*

To check the cabinet ground connection

Step 1: Using an ohm meter, test between the main ground bar and the earth ground wire:

a. Place one lead on the main cabinet ground bar.

b. Place the other lead on the earth ground wire.

Step 2: Verify that the ohm meter reads 5 ohms or less.

Step 3: If the reading is greater than 5 ohms, check the ground wire connection at the main ground bar, then retest.

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Checking the AC Power Supply Voltage

The cabinet ships from the factory equipped to support 220-240 VAC service. Check the AC power supply voltage as follows.

DANGER! High voltage may be present. Only a qualified electrician should perform these procedures.

To check 220-240 VAC power supply voltage

Step 1: Apply AC power to the cabinet at the local power transfer switch.

Step 2: At the cabinet AC load center, do the following:

a. Remove the front panel from the AC load center.

b. Switch the Main breaker to ON.

Step 3: Using a volt meter, test between the L1 and neutral busses:

a. Place one lead on the L1 buss.

b. Place the other lead on the neutral buss.

c. Verify that the volt meter reads between 110 and 120 VAC.

Step 4: Using a volt meter, test between the L2 and neutral busses:

a. Place one lead on the L2 buss.

b. Place the other lead on the neutral buss.

c. Verify that the volt meter reads between 110 and 120 VAC

Step 5: Using a volt meter, test between the L1 and L2 busses.

a. Place one lead on the L1 buss.

b. Place the other lead on the L2 buss.

c. Verify that the volt meter reads between 220 and 240 VAC.

Step 6: Switch the branch breakers on as follows:
- Switch the 15A Conv Outlet breaker to ON.
- If you are using an optional battery heater, switch the 15A Battery Heater breaker to ON.

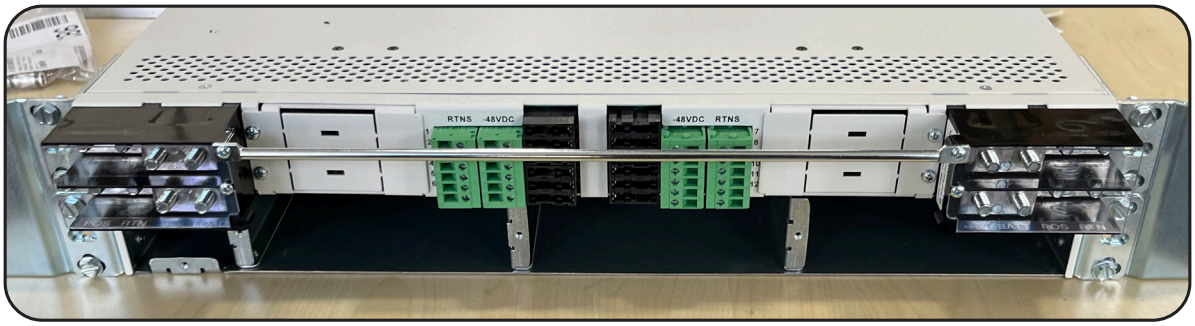
Note: *Do not switch on the Rectifier breaker at this time.*

Step 7: Re-attach the front panel on the AC load center.

Installing Rectifier Modules

Depending on what configuration is ordered, your FiberFlex cabinet may have either an ABB or Eltek Rectifier system integrated from the factory. Each of these different types of systems can come configured with different distribution options.

The FiberFlex 3000 cabinet uses the 19-inch ABB SPS modular rectifier shelf to generate and distribute -48 VDC bulk power. The ABB SPS modular rectifier shelf supports up to three rectifier modules. Normal operation for the FiberFlex 3000 cabinet supports multiple 30A rectifier modules.



The 2 RU ABB SPS shelf provides integrated distribution, with 12 GMT fuse positions for equipment, 2 battery breakers, and 2 load breakers. The ABB SPS shelf is equipped with a Edge Pulsar controller module that monitors power functions and alarm information and regulates voltage in response to battery temperature. The controller module ships pre-programmed for operation in the FiberFlex 3000 cabinet.

Install ABB SPS rectifier modules into the shelf as described below.

Note: *The controller module ships installed in the rectifier shelf. Push firmly on the controller module to verify that it is fully seated in the slot.*

To install a rectifier module

Step 1: Unpack the rectifier module.

Step 2: Insert the rectifier module into slots from left to right for desired rectification amperage.

Step 3: Push firmly on the module to seat it in the slot.

Step 4: Repeat steps to install an additional rectifier module.

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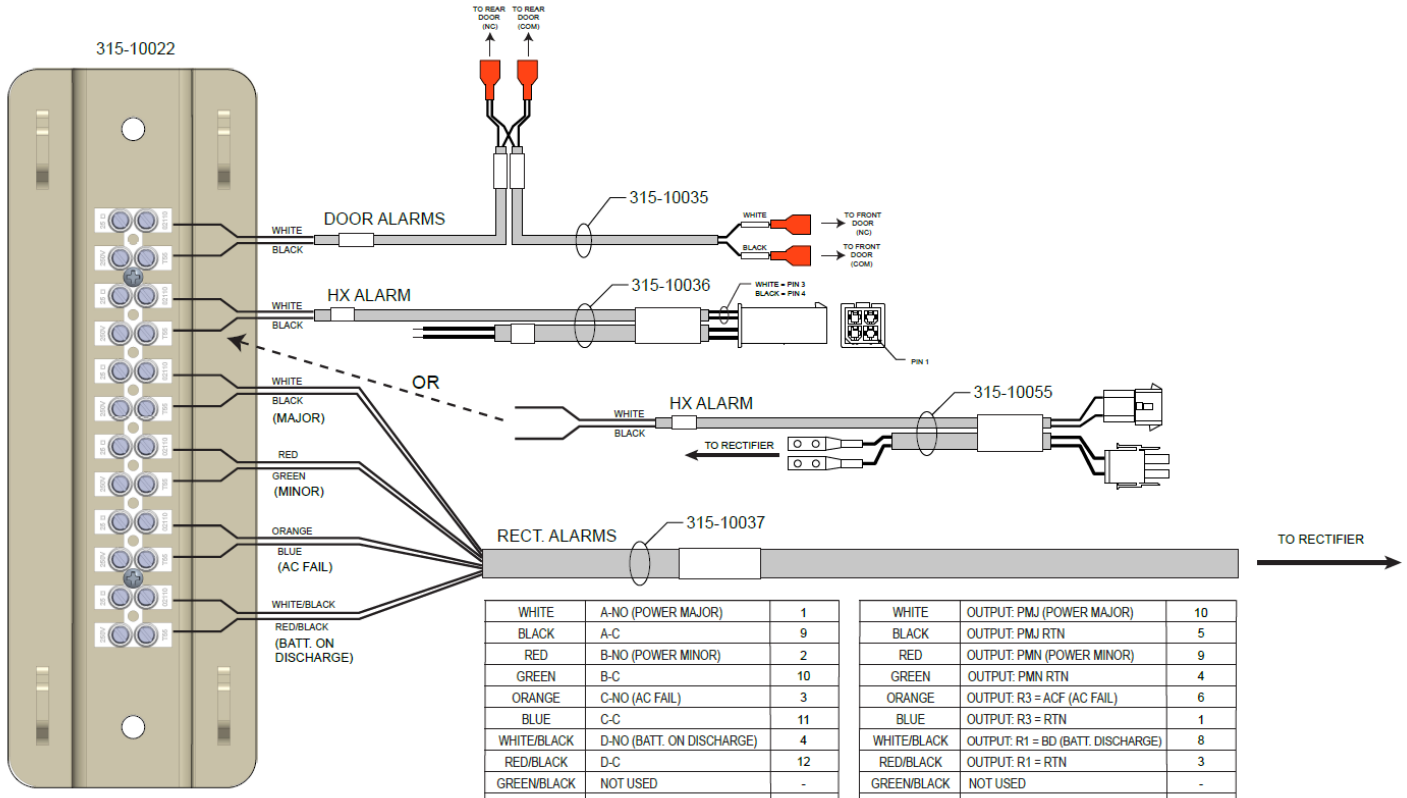
Installation of Alarm Wiring

Step 1: Alarms will be connected to alarm block as shown below.

Step 2: If customer chooses to purchase and install rectifer plant on their own use the alarm diagram as an example of how to wire alarms.



WHITE	A-NO (POWER MAJOR)	1
BLACK	A-C	9
RED	B-NO (POWER MINOR)	2
GREEN	B-C	10
ORANGE	C-NO (AC FAIL)	3
BLUE	C-C	11
WHITE/BLACK	D-NO (BATT. ON DISCHARGE)	4
RED/BLACK	D-C	12
GREEN/BLACK	NOT USED	-
ORANGE/BLACK	NOT USED	-
WIRE COLOR	DESCRIPTION	IDC PIN #

ELTEK FPS RECTIFIER IDC CONNECTOR PIN OUT

WHITE	OUTPUT: PMJ (POWER MAJOR)	10
BLACK	OUTPUT: PMJ RTN	5
RED	OUTPUT: PMN (POWER MINOR)	9
GREEN	OUTPUT: PMN RTN	4
ORANGE	OUTPUT: R3 = ACF (AC FAIL)	6
BLUE	OUTPUT: R3 = RTN	1
WHITE/BLACK	OUTPUT: R1 = BD (BATT. DISCHARGE)	8
RED/BLACK	OUTPUT: R1 = RTN	3
GREEN/BLACK	NOT USED	-
ORANGE/BLACK	NOT USED	-
WIRE COLOR	DESCRIPTION	J1 PIN #

ABB SLIMLINE RECTIFIER ALARM PIN OUT

Installing and Testing Batteries

The cabinet can house a single string of front-terminal VRLA batteries (four batteries per string). A cabinet can also be equipped with an optional riser compartment to support a second battery string. See Supported Batteries for a list of supported battery types.

This topic provides instructions for the following task:

- Installing and testing a single string of batteries

WARNING! Electrical hazard. Batteries contain a stored charge. Only a qualified technician should perform this procedure.

CAUTION! Electrical, chemical, fire, and heat hazard. Handle batteries with care to avoid personal injury or damage to the equipment.

ALERT! Read the battery manufacturer's instructions before installing batteries. Follow the manufacturer guidelines and local safety practices.

To prepare batteries for installation

Step 1: Unpack the batteries from the shipping packaging and inspect for damage.

Step 2: Remove the terminal caps from the top of each battery.

Step 3: Clean and apply No-Ox anti-corrosion grease to each battery terminal.

Step 4: Locate the bagged kit containing the string jumper straps and other materials. Set the kit aside for use during installation.

Note: *If the batteries are not fully charged, perform these procedures after charging the batteries.*

WARNING! In -48V telecom systems, red leads connect to the negative terminal and black leads connect to the positive terminal. Do not reverse the wiring polarities.

Proprietary Information: Not for use or disclosure except by written agreement with Clearfield.

To install a single string of batteries

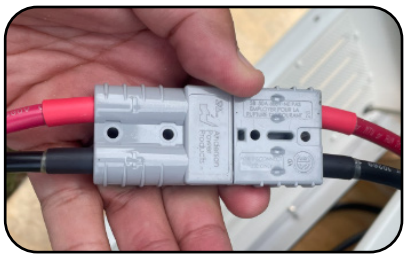
Note: *If you plan to install a second battery string in the riser compartment, go to the next procedure. If you do not plan to install a second battery string, locate the Anderson connector for the second battery string and disconnect if required.*

Step 1: At the rectifier shelf, verify that the battery breaker is OFF.

Step 2: Remove the battery compartment door. See Operating Cabinet Doors for instructions.

Note: *If you are using the optional battery heater, install the heater before installing batteries. See Installing a Battery Heater for instructions.*

Step 3: In the battery compartment, disconnect the #8 AWG battery power cables from the power supply leads and set the cables aside.



Step 4: Place a string of four batteries partially into the battery compartment, arranged with the terminals accessible in front.

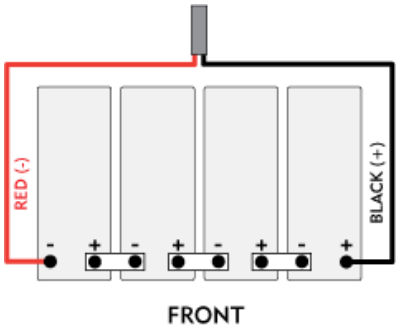
Note: *Locate the temperature sensor cable and battery warmer temperature probe prior to installing batteries to avoid damaging with batteries. You will slide the batteries into the battery tray after installing the cables and protective covers.*

Step 5: Connect the battery power cables as follows:

a. Remove the protective caps from the cable ring lugs.

b. Attach the black cable to the positive (+) terminal post at the positive end of the string.

c. Attach the red cable to the negative (-) terminal post at the negative end of the string.



ALERT! Check all connections carefully to verify correct wiring polarities.

d. Install the temperature sensor cable lug onto the string's negative (-) terminal post.

e. Tighten the hardware on the terminal posts to the torque specified by the manufacturer.

Step 6: Install the three jumper straps between the battery terminal posts using the supplied flat washers, split lock washers, and bolts.

Step 8: Before connecting the batteries, pull out one rectifier module.

Step 9: Using a digital volt meter, check for correct polarity and test the battery connection between the negative and positive battery leads:

a. Place the red voltmeter lead on the red negative (-) battery lead.

b. Place the black voltmeter lead on the black positive (+) battery lead.

c. Verify that the voltmeter reads between -46 and -54 VDC.

d. Measure the voltage difference between the power system and the battery string. The voltage difference should be less than 3V. If the voltage difference is greater than 3V, check for connection integrity, replace bad battery cell as applicable, and retest the voltage. Reconnect the battery power cables to the power supply leads.

Step 10: Install the protective covers (manufacturer-supplied) over the battery terminals.

Step 11: Connect the string of batteries to the power system by plugging the battery string and the rectifier system output Anderson connectors together.

Step 12: Re-install the rectifier module removed in step 8.

Step 13: Verify that the cabinet heat exchanger fans are running (if the temperature is high enough).

Step 14: At the AC load center, do the following:

a. Set the Main breaker to OFF. The heat exchanger fans should continue to run.

b. Set the Main breaker to ON and verify that power restores to the rectifier shelf.

Step 15: Slide the battery string into the battery tray.

Step 16: Replace the battery compartment door.

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Turning Up and Testing the DC Power System

Turn up and test the cabinet DC bulk power system as described below.

To turn up and test the DC power system

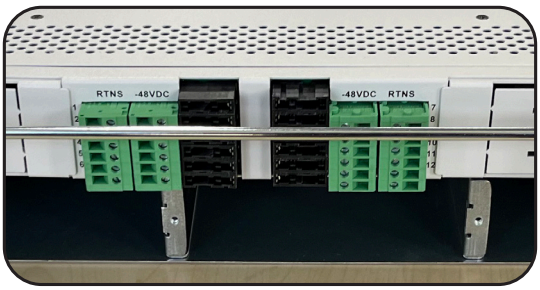
Step 1: At the AC load center, verify that the Main breaker is **ON**.

Step 2: At the AC load center, switch the 30A Rectifier breaker **ON**.

Step 3: Verify that the ABB power shelf boots up and the rectifier modules are operational.

Note: *The ABB shelf controller is factory programmed with default settings that enable safe power up and operation. You can modify the settings for system voltages, battery configuration, temperature compensation, and so forth, if required.*

Step 4: At the rectifier shelf do the following:



a. To apply power to the first active service unit, install a pair of GMT fuses in fuse positions 1 and 2 (A/B power). Verify that the unit powers up.

b. If the cabinet is equipped with additional active service units, install an appropriately rated pair of GMT fuses in fuse positions 3 and 4 (for the second service unit) and positions 5 and 6 (for the third service unit, as applicable). Verify that the additional unit(s) power up.

c. Install a 7.5A GMT fuse in position 10 and verify that the heat exchanger fans start running (if internal temperature is high enough).

Step 5: Using a volt meter, test the DC power supply voltage at the shelf. Verify that the voltage reads between -48 and -54 VDC.

Step 6: At the rectifier fuse panel, switch the battery breaker **ON** to charge the batteries.

Testing Batteries

If the batteries are not fully charged, perform this procedure after charging the batteries

WARNING! Electrical hazard. Only a qualified technician should perform these procedures.

To test the batteries

Step 1: Using a digital volt meter, test the battery connection between the negative and positive battery leads:

a. Place the red volt meter lead on the red negative (-) battery lead.

b. Place the black volt meter lead on the black positive (+) battery lead.

c. Verify that the volt meter reads between -46 and -54 VDC.

d. Measure the voltage difference between the power system and the battery string. The voltage difference should be less than 3V. If the voltage difference is greater than 3V, check for connection integrity, replace bad battery cell as applicable, and retest the voltage.

Step 2: Verify that the cabinet heat exchanger fans are running (if the temperature is high enough).

Step 3: At the AC load center, set the Main breaker to **OFF**. The heat exchanger fans should continue to run.

Step 4: At the AC load center, set the Main breaker to **ON** and verify that power restores to the rectifier shelf.

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Installing Polarium Lithium Batteries

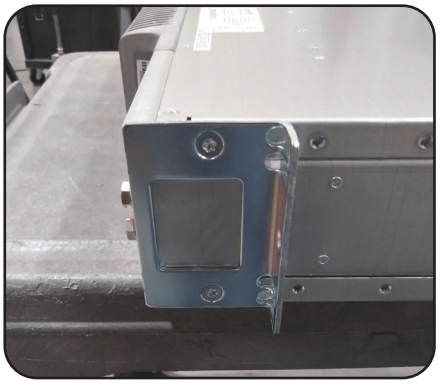
Step 1: Before battery installation, ensure the rack rail is properly grounded. Batteries can also be grounded individually.

Step 2: Remove SLB48-100-226-10 from the packaging. Using hardware provided with the Stacking Kit, fasten the torx head screws to the battery on both sides as shown.

SLB48-100-226-10

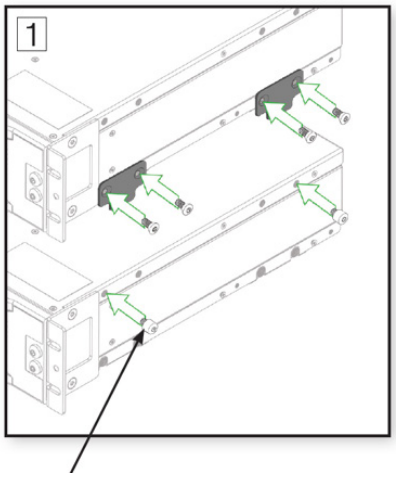
Stacking Kit

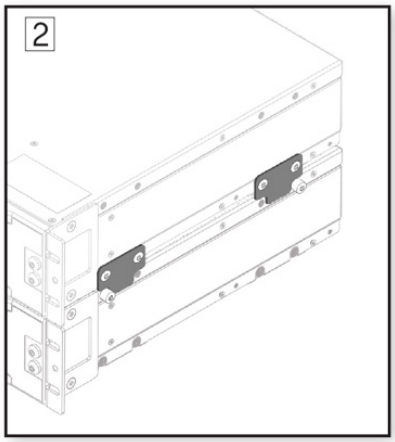
Step 3: Flip the front mounting brackets around to add more space in front of the battery stack.



Step 4: Before placing the batteries inside the cabinet, adjust the rack rails to the rear to allow more space for the battery cover to open. Do not cover the feedthrough plate.

Step 5: Place battery on the floor of the cabinet and fasten to the rack rail. Remove the 2nd battery from packaging and fasten the remaining hardware and bracket to the sides of the battery as shown.





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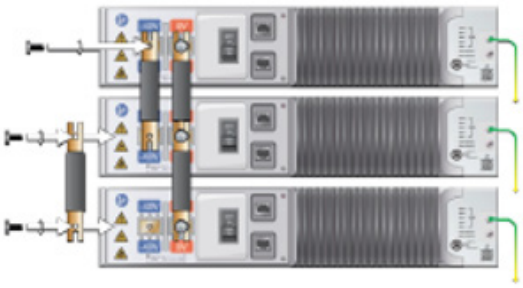
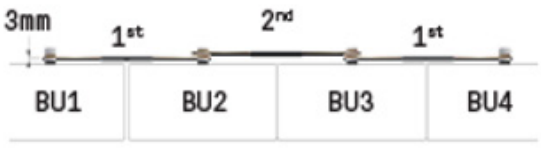
Step 6: Once all batteries are stacked and fastened to the front rack rail, mount the Polarium Connect Alert using the hardware provided with kit.

Step 7: Interconnect installed and secured batteries to each other with supplied bushbars or power cables that meet your power requirements for your application.

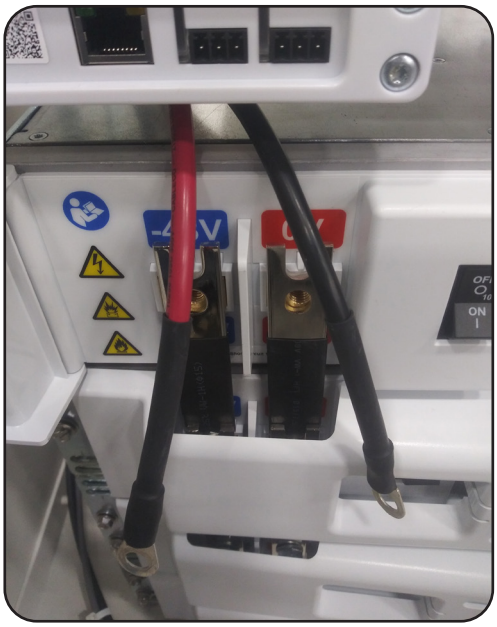
Note: *In the case of 3 or more battery units being installed, it is best practice to install bushbars on every other battery unit initially and then completing the chain with new bushbars installed on top of the initially installed bushbars. Bushbars should not be bent.*



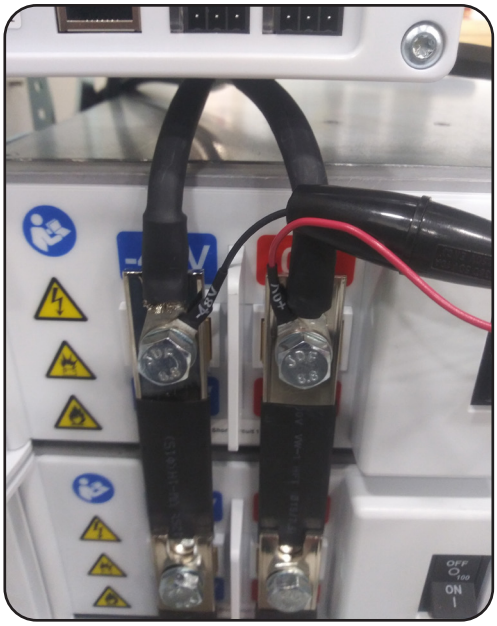


Step 8: Feed battery string cable to the top battery post. The cables will be terminated as shown to the right with RED fastened to the -48V and BLACK fastened to the OV post.

Note: *Connect Alert wires will be terminated as they are labeled.*



Step 9: Fasten connect alert to the posts along with the battery string cables using hardware provided with batteries.



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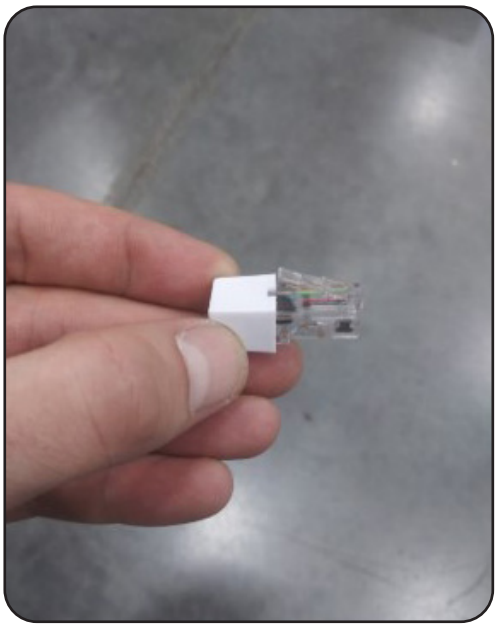
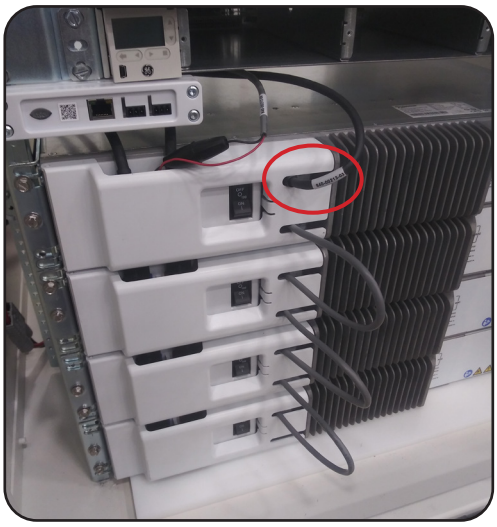
Step 10: Locate terminator resistor plug in the STACKING KIT and plug it into the bottom most RJ45 port.

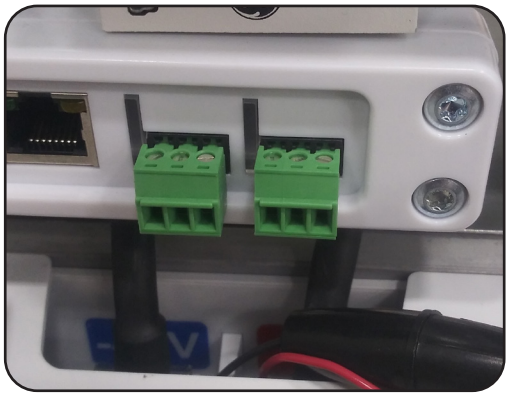


Step 11: Locate the Cat 5E comm cable from the STACKING KIT and start daisy chaining to each battery.

Step 12: Plug the Cat5E cable from the Connect Alert into the topmost comm port.

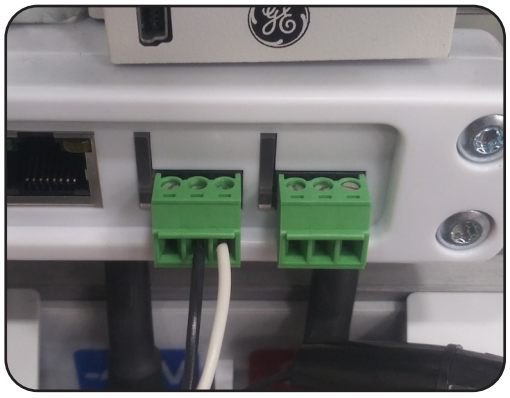


Step 13: Intall 3 position terminal block plugs. Part number 277-1162-ND from Digi-Key.



Step 14: Wire a small gauge 2 conductor cable to the COM and N.O. terminals.

N.C. COM N.O.



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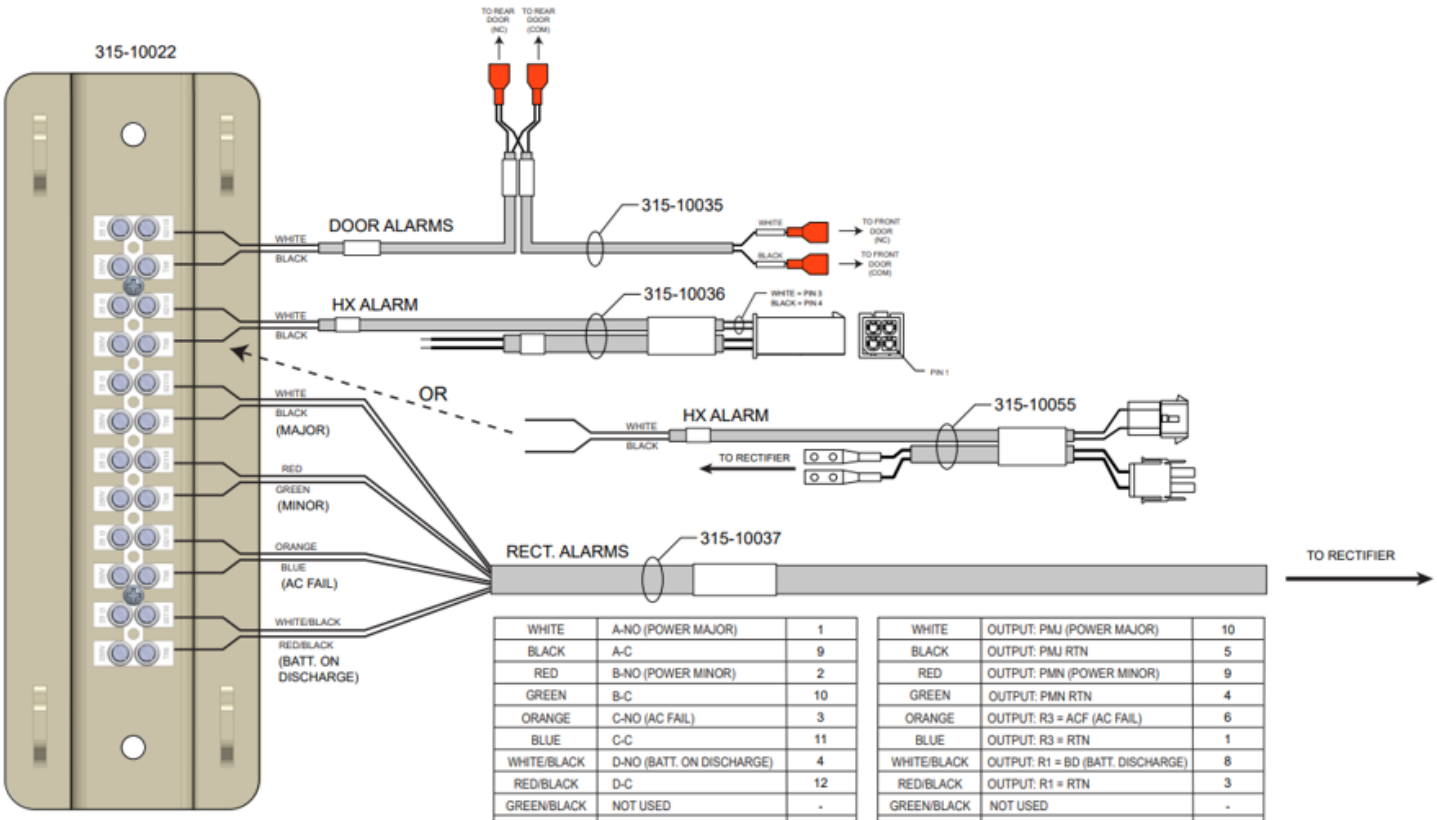
Step 15: Customer can choose which alarm the battery stack will report to, but MAJOR or MINOR is recommended.



WHITE	A-NO (POWER MAJOR)	1
BLACK	A-C	9
RED	B-NO (POWER MINOR)	2
GREEN	B-C	10
ORANGE	C-NO (AC FAIL)	3
BLUE	C-C	11
WHITE/BLACK	D-NO (BATT. ON DISCHARGE)	4
RED/BLACK	D-C	12
GREEN/BLACK	NOT USED	-
ORANGE/BLACK	NOT USED	-
WIRE COLOR	DESCRIPTION	IDC PIN #

ELTEK FPS RECTIFIER IDC CONNECTOR PIN OUT

WHITE	OUTPUT: PMJ (POWER MAJOR)	10
BLACK	OUTPUT: PMJ RTN	5
RED	OUTPUT: PMN (POWER MINOR)	9
GREEN	OUTPUT: PMN RTN	4
ORANGE	OUTPUT: R3 = ACF (AC FAIL)	6
BLUE	OUTPUT: R3 = RTN	1
WHITE/BLACK	OUTPUT: R1 = BD (BATT. DISCHARGE)	8
RED/BLACK	OUTPUT: R1 = RTN	3
GREEN/BLACK	NOT USED	-
ORANGE/BLACK	NOT USED	-
WIRE COLOR	DESCRIPTION	J1 PIN #

ABB SLIMLINE RECTIFIER ALARM PIN OUT

Step 16: Customers can also connect to the battery stack using the Polarium Connect App to view in-depth information about their batteries. Installation and Bluetooth pairing are simple. Once App is installed, open the App and scan for available Bluetooth devices. Select the Connect Alert and then scan the QR code on the faceplate of the Connect Alert.

Chapter 8: Installing Equipment, Options and Adding Capacity

This chapter describes how to install optional equipment and components into the cabinet, including expansion components to increase system capacity. The cabinet allows for modular growth of line capacity and supports field installation of all factory options.

Topics Covered

This chapter covers the following topics:

- Installing a battery heater
- Installing fiber splitters
- Installing radius limiter spools
- Installing patch only panels

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Installing a Battery Heater

For colder climates, Clearfield recommends using an optional battery heater to prevent batteries from freezing and to prolong battery life. The battery heater is controlled by a thermostat set for the following operation:

- **4° C** – Battery heater turns On.
- **16° C** – Battery heater turns Off.

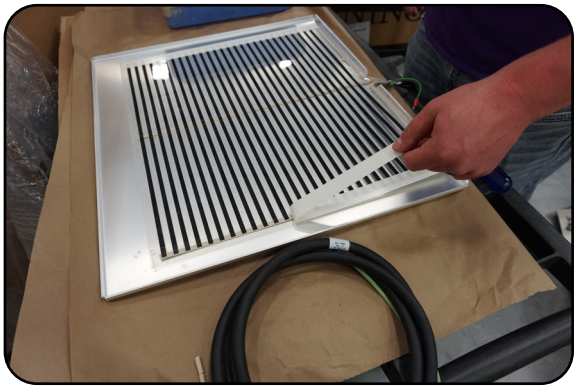
Note: *The battery heater sits directly underneath the battery string, so you must install a heater into the battery tray before installing batteries.*

To install a battery heater in a battery compartment

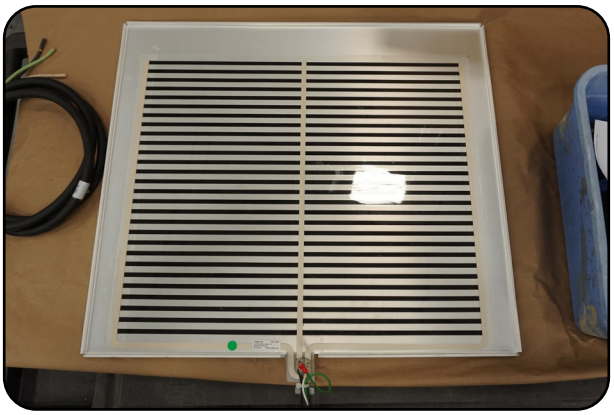
Step 1: Unpack the battery heater from the shipping packaging, and then remove the battery compartment door. See Operating Cabinet Doors for instructions.

Step 2: Install the battery heater into the battery tray as follows:

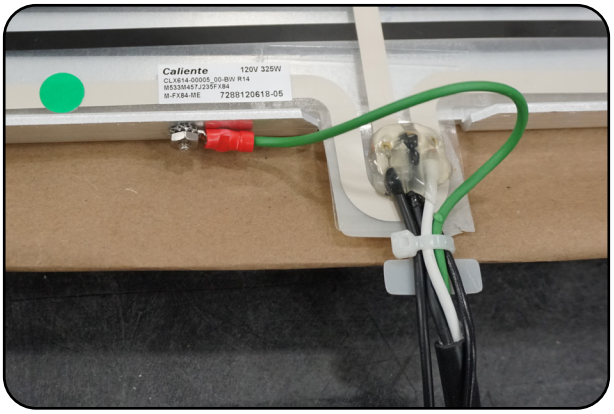
a. Remove the adhesive backing from the battery warmer



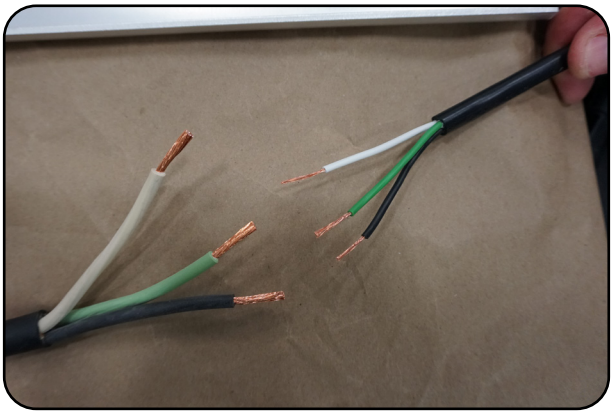
b. Adhere the battery warmer to the inside of the battery warmer mount plate



c. Attach the battery warmer ground wire to the battery warmer mount plate ground stud using washer 639-00002 & nut 637-00026.



d. Cut off the 120V plug from the heater strip element power leads. Strip back the cable to expose the white, black, and green cables. Strip back each of these cables 1”.



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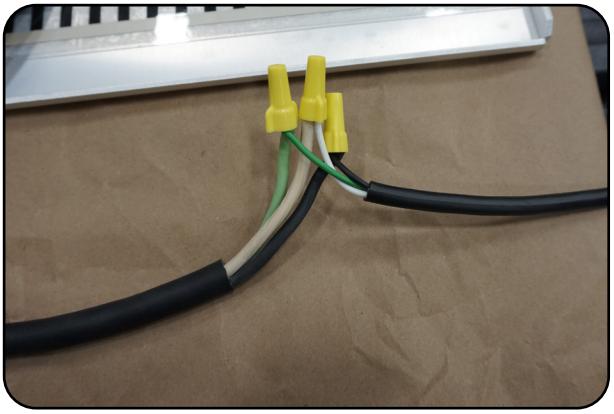
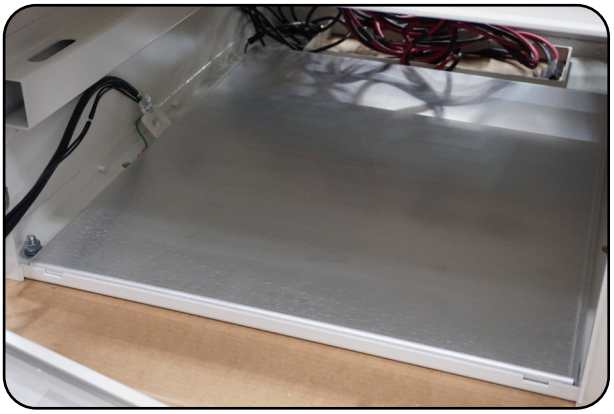
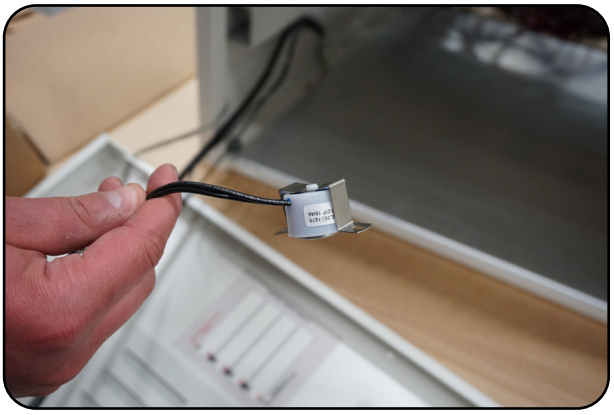
e. Attach the white, black, and green cables of the battery warmer assembly to the white, black, and green cables of the provided AC power cords using 3x wire nuts.



f. Install the battery warmer assembly in the battery base on top of the plastic pad with the assembly towards the left side of the cabinet. The battery warmer will rest in place and it does not need to be fastened down.



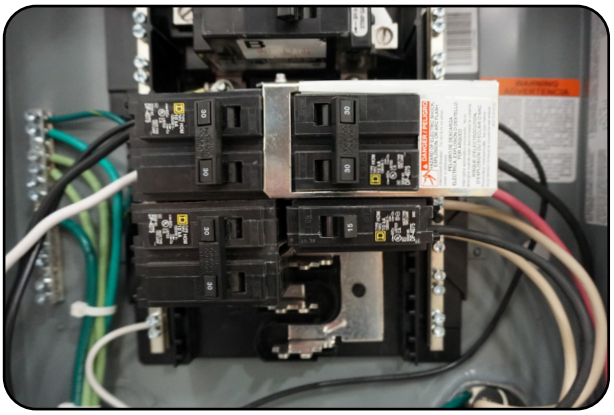
Step 3: Route the temperature sensor/thermometer through one of the cutouts in the side channel. The thermostat will later be rested on top of the batteries after they are installed.



Step 4: Install a 15A breaker into the AC Load Center (ACLC) as follows:

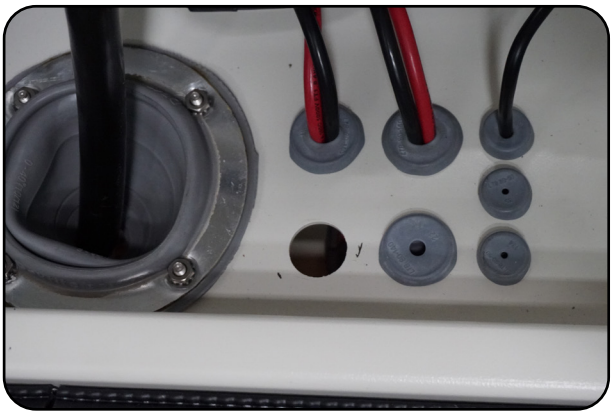
a. Remove the ACLC face plate. Remove the knockout from the ACLC face plate. Location 8 for the 1st battery warmer breaker, and Location 10 for the 2nd battery warmer breaker.

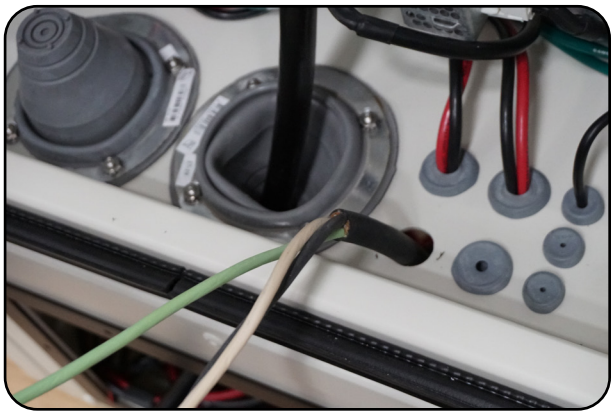
b. Install the 15A breaker into the ACLC.



Step 5: Install the AC power cords into the AC Load Center (ACLC) as follows:

a. Remove a grommet through an unused feedthrough in the cabinet base. Run the AC power cords up into the back of the cabinet through this open feed through.





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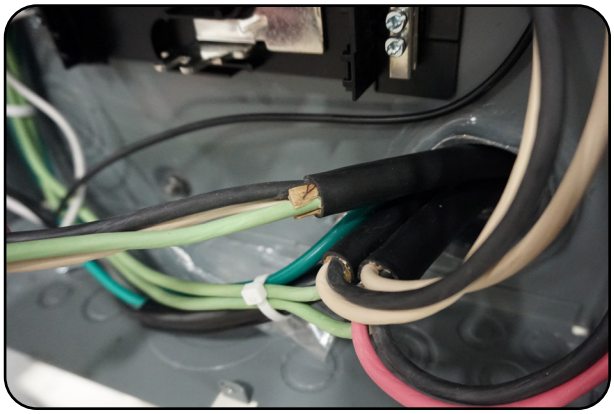
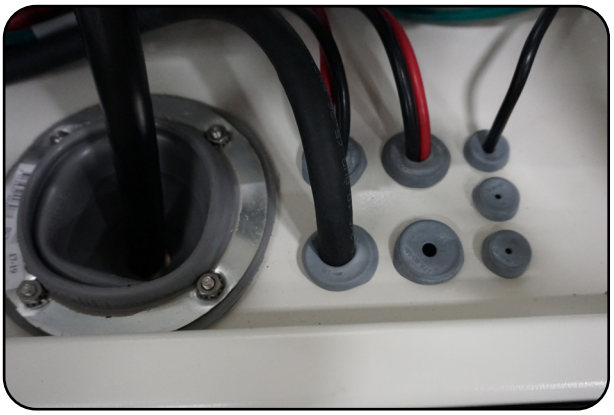
b. Install the grommet onto the AC power cords and push it back along the cable out of the way.

c. Run the AC power cords through the cabinet and into the ACLC. The thick jacket of the cable should extend into the ACLC by ~1-2".

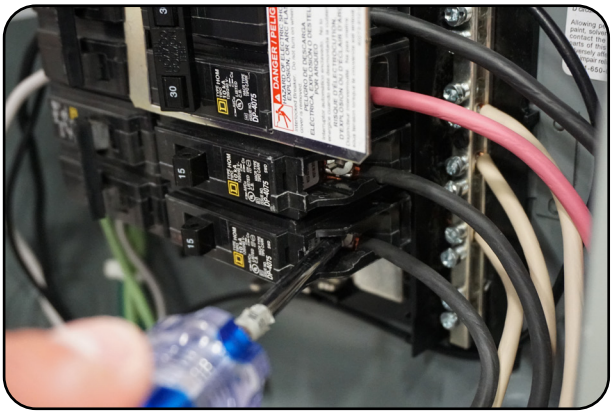


d. Push the grommet down the cable to the correct position, and install the grommet into the feed through hole to seal it off. Excess slack in the cable should be stored in the battery base.



e. In the ACLC, attach the ground and neutral wires from the cable to the ground and neutral bars in the ACLC.

f. Attach the black wire to the 15A breaker installed in step 4.



g. Reinstall the ACLC faceplate

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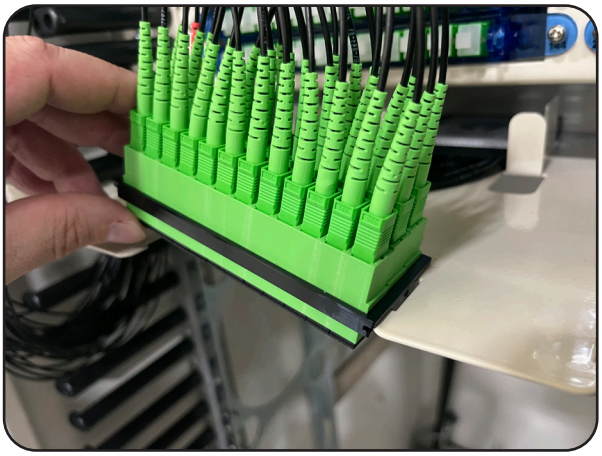
Installing Fiber Splitters

The FieldSmart FiberFlex 3000 will arrive with patch-only panels and splitter trays pre-installed. Install splitters and route the splitter legs as shown.

Step 1: Install the WaveSmart Ruggedized Splitter into the splitter tray. Place the splitter body into the tray near the back. There are three splitter body slots which can hold multiple splitters each.

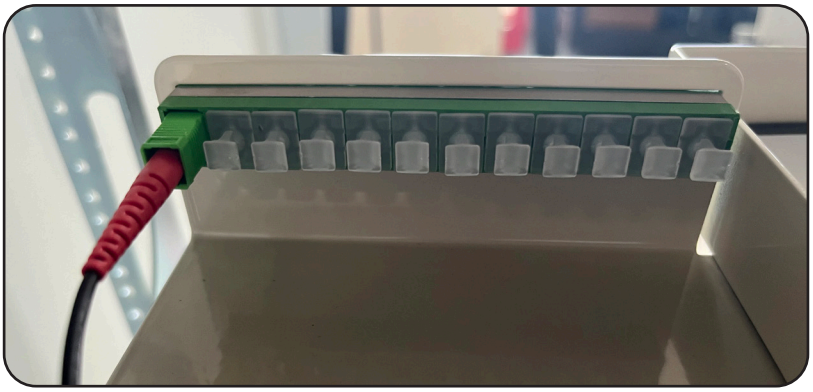
Step 2: Route the splitter leg out of the tray towards the closest side to store the slack. Exit through the two radius fingers on the splitter tray and take up slack by traveling downwards then routing back up around the second row of radius fingers on the interbay bracket. Re-enter the splitter tray with the staging plate.

Step 3: Install the staging plate into the splitter tray by inserting the forward edge into the cutout in the splitter tray. Once the notches on the tray are engaged with the staging plate, swing the other side down until the tab locks



Step 4: Plug the feeder leg of the splitter into the adapater plate on the splitter tray.

Note: *Inspect before you connect.*



Proprietary Information: Not for use or disclosure except by written agreement with Clearfield.

Step 5: Remove the splitter leg you wish to connect from the staging plate. Exit the splitter tray through the two radius fingers on the splitter tray and travel downwards, then back up around the radius fingers of the interbay bracket to take up slack. Pass over the radius finger on the panel which is closest to the row of adapaters in which you intend to make the connection. Connect the splitter leg into the desired port after inspecting the connector.

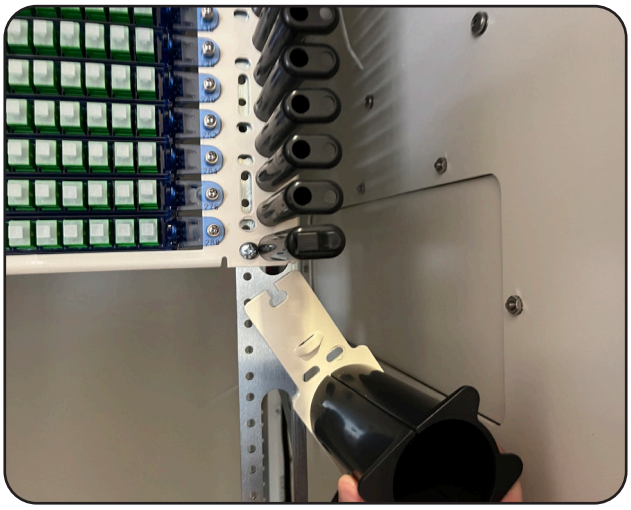
Step 6: Continue making connections as needed. There is a second slot in the splitter tray for an additional staging plate. When all splitter legs have been connected, remove the staging plate to make room for the next one.

Installing Radius Limiter Spools

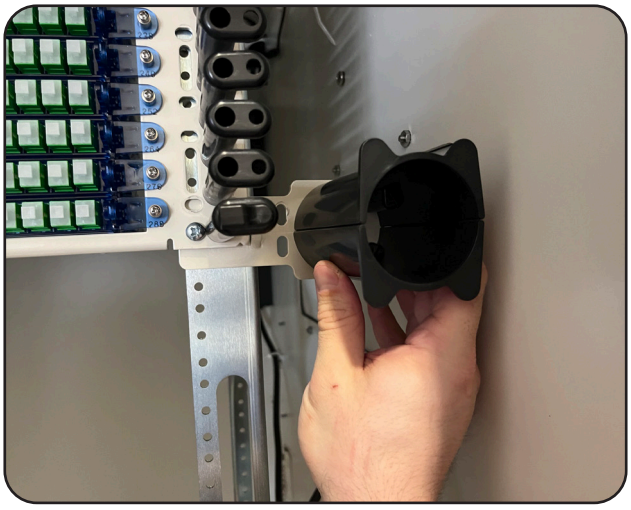
To install additional fiber management radius limiter spools if no interbays are present, follow the steps below.

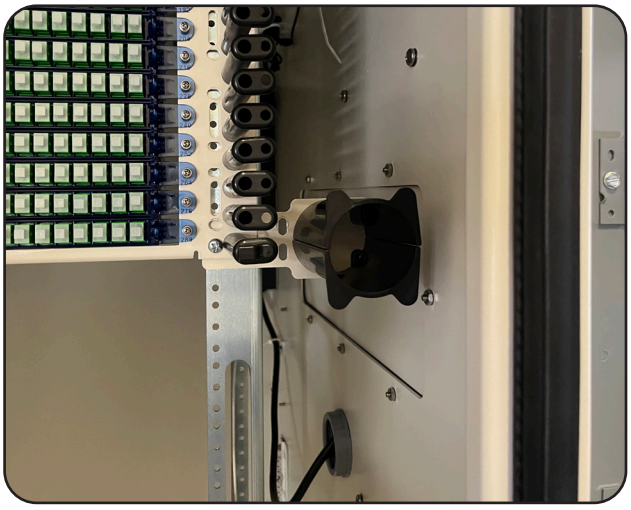
19” Rack Configuration

Step 1: Loosen the bolt holding the panel to the frame, slide the channel of the spool mounting bracket behind the panel bulkhead and around the bolt from an angle until fully seated.



Step 2: Rotate the radius limiter spool until horizontal and secure in place by tightening the bolt.





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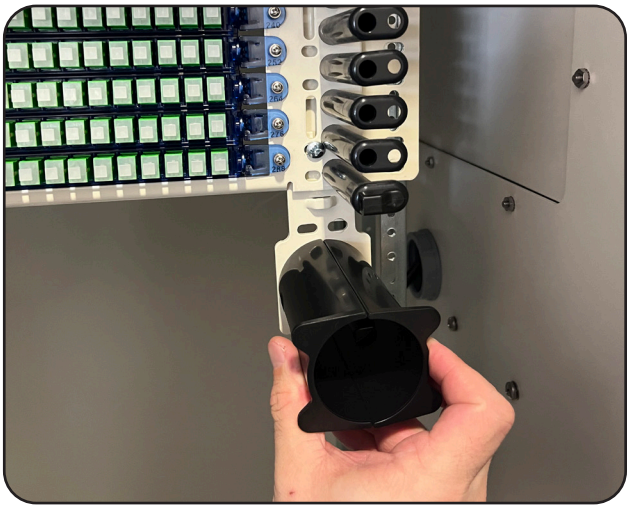
23” Rack Configuration

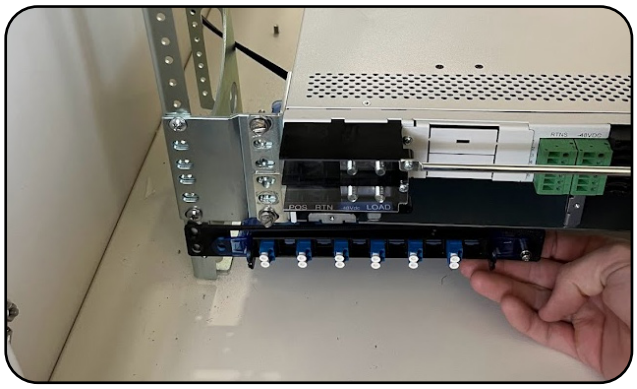
Step 1: Loosen bolt holding the panel to the expansion bracket, slide the channel of the spool mounting bracket behind the panel bulkhead and around the bolt from an angle until fully seated.



Step 2: Rotate the radius limiter spool until horizontal and secure in place by tightening the bolt.

FiberFlex 3000 Fiber Transport Module

Clearfield offers a Fiber Transport Module solution. If ordered, the Fiber Transport Module can be installed where space is available below the rectifier using the transport module bracket.



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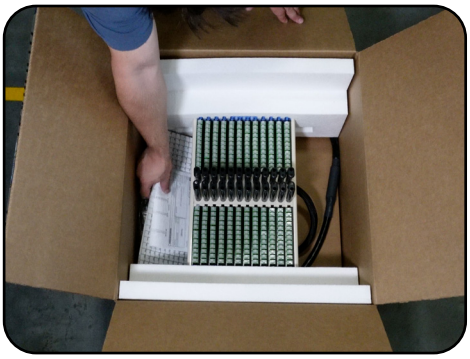
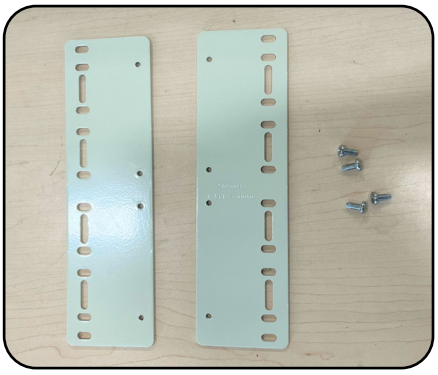
Installing Clearview Blue Patch-Only Panels

Step 1: Remove the bag of ship-along components and the designation card from the box.

Step 2: Carefully lift the panel from the box, managing the fiber breakout as you lift.



Step 3: Prep the panel, installing expansion brackets and unwinding the cable to feed through the cabinet.



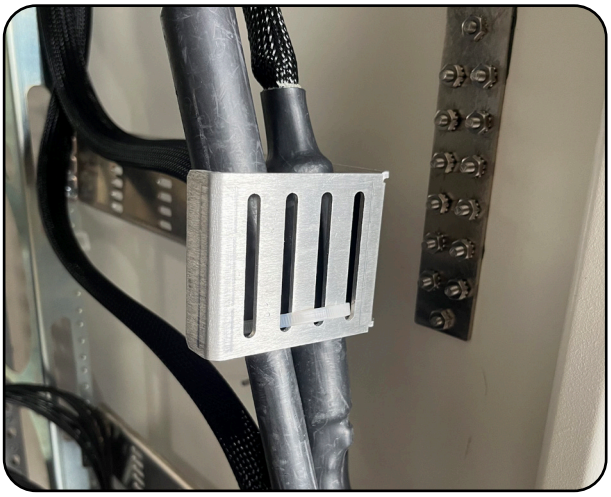
Step 4: Feed the cable down through the entry cones, pulling the slack out of the cabinet as you walk the panel towards the rack.

Step 5: Secure the panel into the frame with the provided hardware.

Step 6: Manage the buffer tubes with velcro and secure the breakouts to the rack with cable ties.

Step 7: Secure the breakouts at the strain relief bar attached to the back of the rack.

Step 8: Secure the cable at the strain relief bracket at the cable entry cone.



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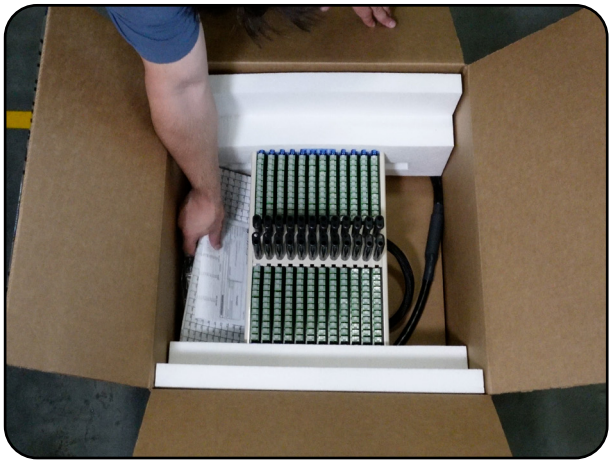
Installing Clearview Black Patch-Only Panels in Node Configuration Cabinets

For use in node configurations of the FiberFlex 3000, follow the below instructions to field install patch-only panels with Clearview Black cassettes. Visit the link below or scan the QR code to view a video on installing panels.

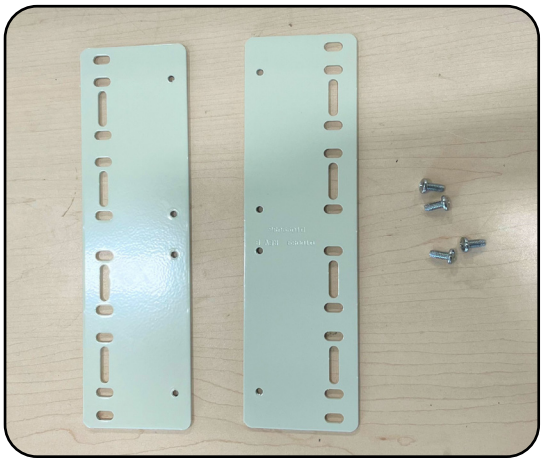
https://vimeo.com/865656276/d3f9076714

Step 1: Remove the bag of ship-along components and the designation card from the box.

Step 2: Carefully lift the panel from the box, managing the fiber breakout as you lift.



Step 3: Prep the panel, installing expansion brackets and unwinding the cable to feed through the cabinet.



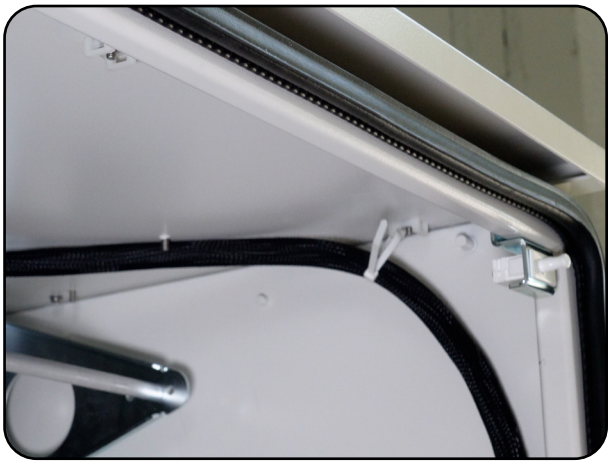
Step 4: Pass the cable over the top of the bar of the node bracket.

Note: *Panels installed after the first will need to route the fiber tail under the panels above and over the node bracket's bar as well.*

Step 5: Feed the cable down through the entry cones, pulling the slack out of the cabinet as you walk the panel towards the rack.

Step 6: Secure the panel into the frame with the provided hardware.

Step 7: Using the tie down point located at the top corner above the entry cones, loosely secure the slack of the fiber breakout(s).



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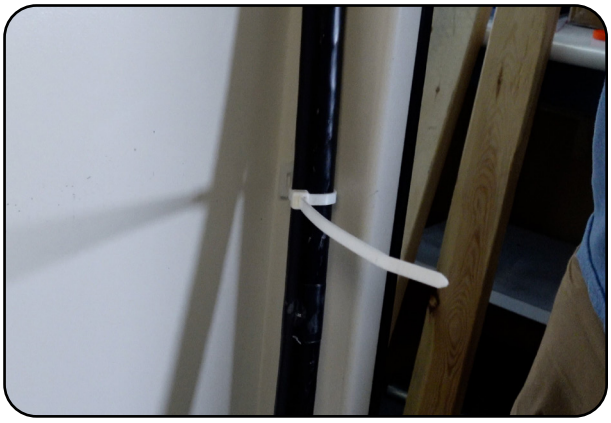
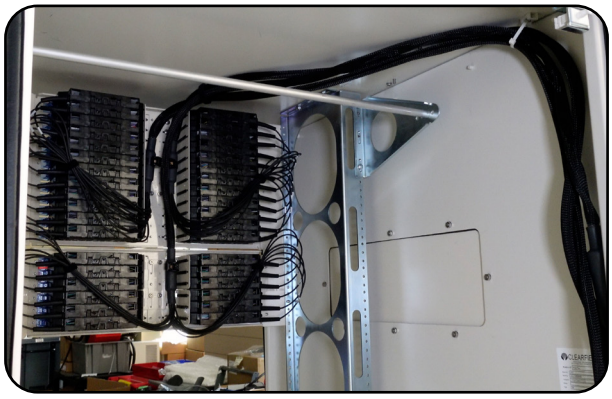
Step 8: Secure the cable in place using the strain relief bracket.

Step 9: Using the tie down location on the inside of the doorframe by the entry cones, secure the cable to the wall.



Step 10: Repeat the previous steps for additional panels.



Chapter 9: Cabinet Maintenance

This chapter describes how to perform cabinet maintenance, including routine maintenance and corrective maintenance to replace worn or failed parts and equipment.

Topics Covered

This chapter covers the following topics:

- Routine cabinet maintenance
- Replacing parts and equipment

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Routine Maintenance

This section describes how to perform routine maintenance on the cabinet.

Checking Cabinet Surfaces

Clean and inspect the cabinet for contaminants, damage, and wear once a year. Items to check include the following:

Inspect interior surfaces

Items to check inside the cabinet include the following:

- Inspect the interior of the cabinet for signs of visible damage to the metal or paint.
- Note any damage to the metal work. If the damaged area interferes with operation of the cabinet or electronics, contact Clearfield support for assistance with a resolution.
- Repair damage to the paint using touch-up paint available from Clearfield after cleaning the surface and removing rust.
- Inspect all gaskets around the doors and the roof to ensure a tight secure fit.

Inspect exterior surfaces

Items to check outside the cabinet include the following:

- Inspect the exterior of the cabinet for signs of damage to the metal work or paint.
- Repair damage to the paint using approved type touch-up paint after cleaning the surface and removing rust.
- Note damage to the metal work. If the damaged area interferes with operation of the cabinet or electronics, contact Clearfield support for assistance with a resolution.
- Clean all surfaces so that they are free of dirt, dust, and foreign material.
- Remove all material from air intake screens and louvers (i.e. spider webs, leaves, etc.).
- Clean the air vents on the heat exchangers and the battery compartment with a dry, soft brush to ensure optimal airflow.

Checking Electrical Components

Check all electrical components in the cabinet for wear at least once a year.

In cabinets configured for local power, inspections include:

- Check the circuit breakers on the AC load center. Verify that all breakers are in the ON position.
- Check the AC surge arrestor on the AC load center. Verify that the operational indicators are lit.
- Check the GFCI convenience outlet. Test the outlet per local code.
- Check the controller module on the rectifier shelf. Verify that the controller operational indicator is lit.
- Check the rectifier modules in the rectifier shelf. Verify that the operational indicators are lit on each module.
- Check the circuit breaker and fuses on the rectifier shelf. Verify that the breaker is in the ON position and that no fuses are blown.
- Check the heat exchanger. Verify that the air intake locations are unobstructed and that the fans are running.

If any of the inspected items requires replacement due to failure or damage, replace the item as described in Replacing Parts and Equipment.

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Checking Cable Connections

Check external cable connections at least once a year. External cables are any cable that enters the cabinet from the outside plant.

- Visually inspect all cables for signs of physical damage. If damage is present, cables should be repaired or replaced per local practice.
- Check all outside plant copper connections for complete and secure connection.
- Ensure that all cable management accessories provide a clean appearance. Replace any fastening devices (i.e. cable ties) so that they include all cables being secured.
- Check all fiber optic connectors to ensure that they are securely fastened.
- Check all connections on the cabinet ground bar for a tight and secure fit.
- Check all protector modules to ensure that all devices are securely seated.
- Check all conduits to ensure that any material used to seal between the cable and the conduit is still present and providing a complete seal.

Checking the Heating the Heating and Cooling Systems

CAUTION! Always disconnect power to the heat exchanger prior to servicing.

Check for proper functioning at least once a year. Follow OEM information on maintenance procedures.

Battery Maintenance

Battery maintenance applies to locally powered cabinets only. Perform routine inspection and maintenance of batteries to improve battery life. Follow the manufacturer's maintenance recommendations. Additional general maintenance guidelines are provided below.

Battery maintenance does not impact cabinet service, provided that an AC power failure does not occur during the maintenance process. Clearfield recommends connecting an external generator to the cabinet while performing battery maintenance to ensure service continuity in the event of an AC outage.

WARNING! Electrical hazard. Batteries contain a stored charge. Only a qualified technician should perform this procedure.

CAUTION! Electrical, chemical, fire, and heat hazard. Handle batteries with care to avoid personal injury or damage to the equipment.

ALERT! To ensure service continuity in the event of an AC outage, connect an external generator to the cabinet while performing battery maintenance.

To perform battery maintenance

Step 1: At the rectifier shelf, open the fuse panel door. Switch the battery breaker to OFF.

Step 2: Remove the battery compartment door. See Operating Cabinet Doors for instructions.

Step 3: To remove the batteries from the battery compartment:

a. Disconnect the battery power cables from the power supply terminals.

b. Slide the batteries out of the battery compartment.

c. Remove the protective covers from the battery terminals.

d. Remove the red and black battery power cables from the terminals at each end of the string.

e. Remove the jumper straps from between the terminals of the batteries in the string.

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Step 4: Visually inspect each battery for defects such as:

- Fractured housing or other physical damage
- Leakage
- Bulging

Note: *Replace any battery that displays a defect. See Replacing Batteries for instructions.*

Step 5: Perform the following maintenance tasks:

a. Load test each battery to verify that ample current is available to maintain the system.

b. Ensure that each battery provides 13.5 VDC (plus or minus .2 VDC).

c. Clean each battery to remove dust, dirt, or corrosion from the battery surface.

Note: *Only use water for cleaning the battery surface. Do not use any chemicals.*

d. Clean the battery terminals and apply No-Ox anti-corrosion grease to each.

e. Record the inspection and maintenance details in the cabinet records per local practice.

Step 6: Inspect the battery compartment for any signs of damage. Clean the compartment and fix any damage to painted areas by removing all rust and dirt from the affected area, and then applying touch-up paint to the area to prevent future corrosion.

Step 7: Re-install the batteries into the battery compartment. See Installing Batteries for instructions.

Replacing Parts and Equipment

This section describes how to replace worn or failed parts and equipment in the cabinet.

Removing a Cabinet Door

You can remove the cabinet doors for convenience during cabinet installation or maintenance activities, or to replace a door.

Replacing a cabinet door may become necessary if a door becomes damaged.

You can replace cabinet doors in the field without impacting service.

CAUTION! Handle detached cabinet doors with care to avoid personal injury or damage to the door.

To remove a cabinet door

Step 1: For a door (equipped with a heat exchanger), disconnect the heat exchanger cable.

Step 2: Disconnect the ground strap from the door by removing the hex nut. Save the nut to re-attach the strap to the new door.

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Step 3: Disconnect the wind brace bracket from the door:

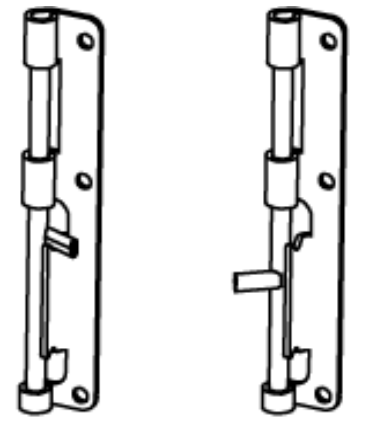
a. Remove the three nuts securing the wind brace bracket to the door. Save the nuts to re-attach the bracket to the new door.

b. Detach the wind brace bracket from the three studs on the door.

Step 4: On the door hinges, disengage the hinge pin lever from its cradle:

a. Top hinge: Lift the pin lever up and rotate it away from the cradle.

b. Bottom hinge: Press the pin lever down and rotate it away from the cradle.



Step 5: Release the hinge pins from the hinge pin channels as follows:

a. Top hinge: Press down on the pin lever until the pin slides free from the channel.

b. Bottom hinge: Lift up on the pin lever until the pin slides free from the channel.

Installing a Cabinet Door

You can quickly install a cabinet door in the field without impacting service.

CAUTION! Handle cabinet doors with care to avoid personal injury or damage to the door.

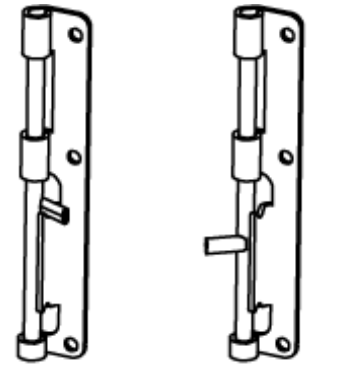
To install a cabinet door

Step 1: Unpack the new door from its shipping packaging.

Step 2: On the new door hinges, disengage the hinge pin lever from its cradle:

a. Top hinge: Lift the pin lever up and rotate it away from the cradle.

b. Bottom hinge: Press the pin lever down and rotate it away from the cradle.



Step 3: Release the hinge pins from the hinge pin channels:

a. Top hinge: Press down on the pin lever until the pin slides free from the channel.

b. Bottom hinge: Lift up on the pin lever until the pin slides free from the channel.

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Step 4: Insert the new door into the door frame. Align the door hinge knuckles with the counterpart hinge knuckles on the door frame.

Step 5: Engage the hinge pins to secure the door in place as follows:

a. Top hinge: Lift up on the pin lever until the pin slides completely into the pin channel.

b. Bottom hinge: Press down on the pin lever until the pin slides completely into the pin channel.

c. Rotate the pin levers into the cradles to secure the hinges.

Step 6: Attach the wind brace bracket to the inside of the door using the three nuts removed from the previous door.

Step 7: Attach the ground strap to the door using the hex nut removed from the previous door.

Step 8: For a heat exchanger door, connect the heat exchanger power (and alarm) cable to the cabinet wiring:

a. Locate the heat exchanger cable on the inside of the door.

b. Route and connect the heat exchanger cable to the cabinet extension cable.

Ice Removal on Cabinet Doors

If the cabinet is covered in ice, it will be need to be removed to access the cabinet's interior. In order to remove the ice from the locks, hinges and door seals holding the cabinet closed, use a blunt, non-metallic tool, such as a rubber mallet or back side of a screwdriver. Gently strike the ice until it has broken away from thge the hinges, locks and door seal, allowing the cabinet to be opened.

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Replacing AC Breakers

On cabinets configured for local power, if a circuit breaker in the AC load center fails or becomes damaged, you can replace the breaker in the field as described below. If the cabinet is equipped with charged batteries, this procedure does not affect service.

DANGER! High voltage may be present. Only a qualified electrician should perform this task. Follow NEC and local codes when handling power systems. Do not restore AC power until the task is complete.

To replace an AC circuit breaker

Step 1: At the local power transfer switch, disconnect AC power to the cabinet.

Note: *If the cabinet is equipped with charged batteries, this action does not affect service. The equipment automatically switches to battery reserve power.*

Step 2: At the AC load center, switch the Main circuit breaker to OFF.

Step 3: Remove the cover panel from the AC load center.

Step 4: Remove any wires from the defective circuit breaker.

Step 5: Remove the defective breaker from the load center and replace it with a new breaker of the same type and rating.

Step 6: Reconnect all wiring to the new circuit breaker.

Step 7: Replace the AC load center cover panel.

Step 8: At the AC load center, switch all breakers to ON.

Step 9: At the local power transfer switch, restore AC power to the cabinet.

Replacing Rectifier Modules

On cabinets configured for local power, if a rectifier module experiences a failure, you can replace the module in the field. Rectifier modules are hot-swappable and can be replaced without disconnecting power to the ABS SPS shelf.

To replace an rectifier module follow OEM instructions

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Replacing Batteries

If a battery or string of batteries fails, becomes damaged, or wears out its life, you can replace the battery or string as described below. Replacing batteries does not impact cabinet service, provided that an AC power failure does not occur during the replacement process. Clearfield recommends connecting an external generator to the cabinet while performing battery maintenance to ensure service continuity in the event of an AC outage.

WARNING! Electrical hazard. Batteries contain a stored charge. Only a qualified technician should perform this procedure.

CAUTION! Electrical, chemical, fire, and heat hazard. Handle batteries with care to avoid personal injury or damage to the equipment.

ALERT! To ensure service continuity in the event of an AC outage, connect an external generator to the cabinet while performing battery maintenance.

To replace batteries

Step 1: At the rectifier shelf, switch the battery breaker to OFF.

Step 2: Remove the battery compartment door. See Operating Cabinet Doors for instructions.

Step 3: To remove an old battery string:

a. Disconnect the battery power cables from the power supply terminals.

b. Slide the batteries out of the battery compartment.

c. Remove the protective covers from the battery terminals.

d. Remove the red and black battery power cables from the terminals at each end of the string.

e. Remove the jumper straps from between the terminals of the batteries in the string.

Step 4: Install the new batteries into the battery tray. See Installing Batteries for instructions.

Step 5: Re-install the seismic protection bracket, if present.

Step 6: Replace the battery compartment door and switch the battery breaker to ON.

Replacing a Battery Heater

If the optional battery heater fails or becomes damaged, you can replace it in the field. Replacing a battery heater requires removing the batteries from the battery compartment.

To replace a battery heater

Step 1: At the rectifier shelf, switch the battery breaker to OFF.

Step 2: At the AC load center, switch the Battery Heater breaker to OFF.

Step 3: Remove the battery compartment door. See Operating Cabinet Doors for instructions.

Step 4: If present, remove the batteries from the battery compartment. See Replacing Batteries for battery removal instructions.

Step 5: Remove the battery heater from the battery tray:

a. Disconnect the heater power cord from the supply lead, located on the left compartment wall.

b. Disconnect the thermostat from the side of the battery tray.

c. Lift the battery heater out of the battery tray.

Step 6: Install the new battery heater into the battery tray. See Installing a Battery Heater for instructions.

Step 7: Re-install and reconnect the batteries. See Installing Batteries for instructions.

Step 8: At the AC load center, switch the Battery Heater breaker to ON.

Step 9: Replace the battery compartment door and switch the battery breaker to ON.

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Appendix A: Reference Information

This appendix provides general reference information about the FiberFlex 3000 cabinet.

Topics Covered

This chapter covers the following topics:

- Supported batteries

Supported Batteries

The FiberFlex 3000 supports many brands and sizes of 60ah to 200ah front post type batteries

Standard Warranty

Clearfield warrants to the original purchaser of the Product sold hereunder is free from defects in material and workmanship under normal use and service, subject to exceptions stated herein. Product purchased is warranted as follows: Clearfield designed and branded Products are warranted for three (3) years: Products manufactured by Clearfield to customer prints and/or specifications are warranted for one (1) year; and any Product Clearfield acquires from or through a third-party manufacturer or distributor and resells to Customer as the original customer will carry the manufacturer's pass-through warranty, if any. In all cases, the warranty period commences on the date of shipment to the original purchaser.

Warranty Claim Procedure

If any Product purchased from Clearfield is found defective under the above warranty, the following basic procedure must be followed:

1. Customer must contact Clearfield and obtain a Return Materials Authorization
2. Following authorization, the Customer ships the product-freight collect-to Clearfield's manufacturing facility
3. Clearfield shall repair or replace the defective Product at its sole option and discretion, and return the repaired or replacement Product to Customer's site, freight prepaid

Note: If the Product is not found to be defective by Clearfield, the product will be returned to the Customer and the customer billed for freight in both directions.

View our warranty policy here: https://www.seeclearfield.com/warranty.html

Limitations of Warranty

Correction of defects by repair or replacement, at the option of Clearfield Inc, shall constitute the exclusive sole remedy for a breach of this limited warranty. Clearfield shall not be liable under any circumstances for any special, consequential, incidental, punitive, or exemplary damages arising out of or in any way connected with the product or with agreement to sell product to buyer, including, but not limited to damages for lost profits, loss of use, or for any damages or sums paid by buyer to third parties. The foregoing limitation of liability shall apply whether the claim is based upon principles of contract, warranty, negligence or other tort, breach of statutory duty, principles of indemnity or contribution, the failure of any limited or exclusive remedy to achieve its essential purpose, or otherwise.

Clearfield will not be responsible for any labor or materials costs associated with installation or incorporation of Clearfield products at customer sites, including any costs of alteration, replacement or defective product, or any field repairs.

Other Limitations

Clearfield assumes no warranty liability regarding defects caused by:

1. Customer's modification of Product, excepting installation activities described in Clearfield documentation
2. Customer re-packaging of Product for shipment to third parties or destinations other than those originally shipped to by Clearfield, or any defects suffered during shipping where the Product has been re-packaged
3. Customer's installation or maintenance, excepting activities described in and performed in accordance with Clearfield documentation
4. Customer's improper or negligent use or application of Product
5. Other causes external to the Product, including but not limited to accidents, catastrophe, acts of God, government action, war, riot, strikes, civil commotion, sovereign conduct, or the acts or conduct of any person or persons not party to or associated with Clearfield
6. Environmental factors and weathering resulting in aging and damage not necessary or applicable to the function of the product

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However, no guarantee is given or implied that the document is error free or that it is accurate with regard to any specification.

Technical Support

Clearfield, Inc. can be contacted for any issues that arise with the supplied product.

If you need to return the supplied product, you must contact the Clearfield, Inc. Customer Service Department to request a Returned Materials Authorization (RMA) number.

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