

FieldSmart® FiberFlex 600

Installation Manual



FieldSmart® FiberFlex 600

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About This Guide

This document provides a general installation practice for the Clearfield FiberFlex 600 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 600 Product Overview

This chapter provides a general description of the Clearfield FiberFlex 600 outdoor cabinet, including its standard features and options.

Topics Covered

- A description of the FiberFlex 600 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 600 cabinet is an Outside Plant (OSP) Cabinet designed to house and protect network electronics equipment. Use the FiberFlex 600 to provide services from a node location.



The FiberFlex 600 is an all-in-one design, capable of integrating fiber and active equipment powered by AC Power Supply converter or DC rectification. The FiberFlex 600 equipment bay features a 19-inch vertical equipment rack to provide options for up to 6RU of equipment rack space including 2.5RU for active equipment deployment needs.

The FiberFlex 600 provides up to 72 internal fiber distribution ports for subscriber fiber connectivity. This unique design also offers an optional integrated AC Load Center with optional generator plug for back-up power (pad mount only).



Cabinet Features

Standard features of the FiberFlex 600 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" equipment rack
- Mechanical support for fiber terminations
- 6RU
- Master ground bar
- Alarm block
- Door intrusion alarm switch with "tech on site, pull to cancel" feature.
- Wind-stay hold-open latches for the doors.
- 1/4 turn locking mechanism with hasp for pad lock
- Optional separate vented battery compartments with isolation pad

Power

Standard features for the AC power configuration include:

- 240 VAC load center (ETL-listed); 30 amp main breaker,
- 8 slot capacity.
- AC surge suppressor
- Convenience outlet (GFCI protected)

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Cabinet Options

Common options for the FiberFlex 600 cabinet include:

Enclosure Mounting

- Pour-In-Place mounting template for site poured concrete pad mount.
- Pole mount kit

Fiber Management

- Blue Cassette options support patch only and patch and splice.
- Build in fiber management to protect fiber within the cabinet.
- Distribution: 24, 48 or 72 ports of internal distribution.
- Configuration choice of connectors to support need of deployment
- Fiber Pigtail in numerous configurations, all lengths 100ft.

AC Power

- 120/240 VAC input (240 preferred).
- Junction box without AC load center.
- Generator connector (Hubbell); 30A NEMA twist lock with breaker.
- Battery heater kit.

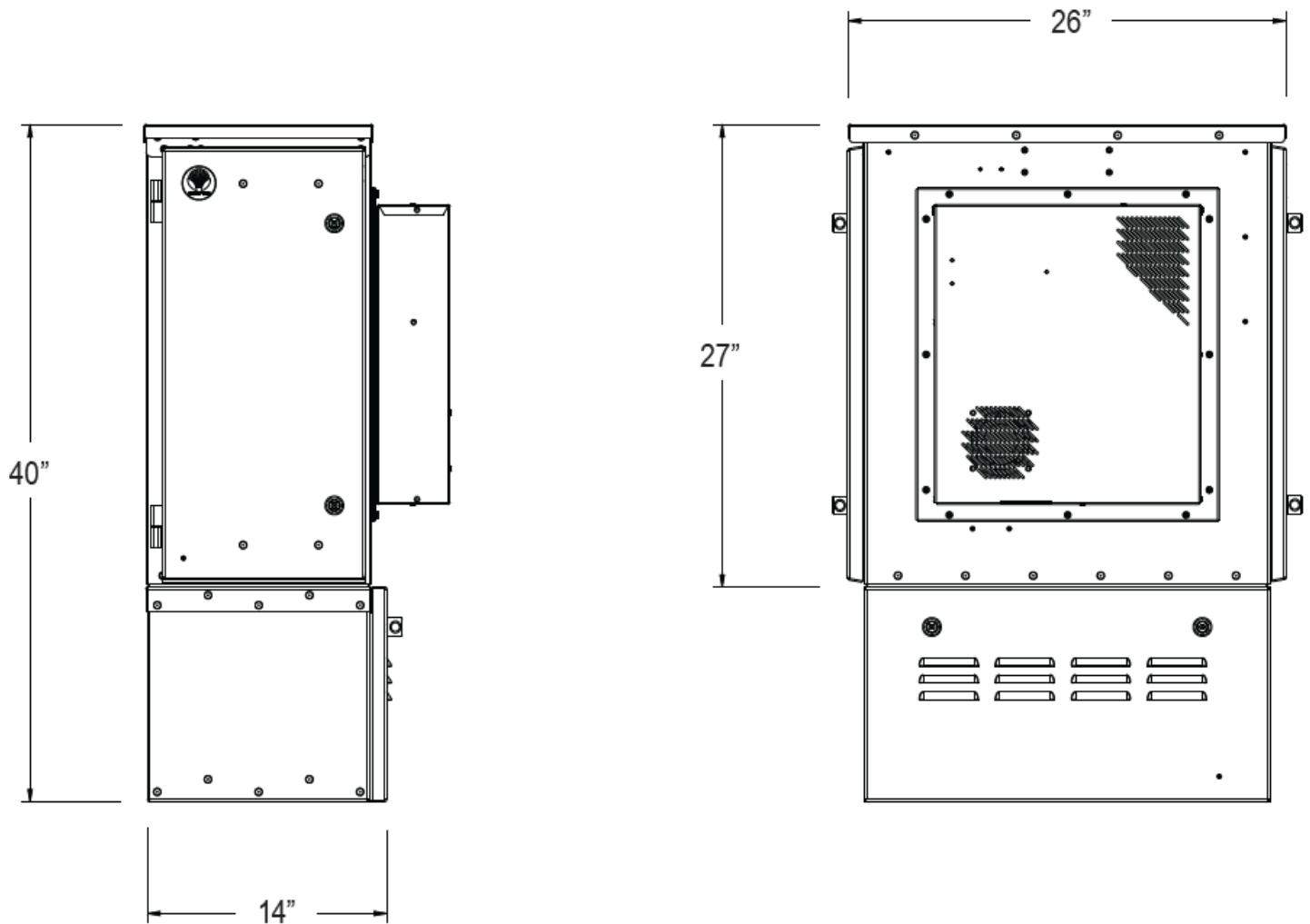
DC Power

- Rectifier power and distribution, battery string cable support provided.
- 2 20 amp modules for rectification.
- Distribution support 6 GMT fuse (max 15amps) and two battery breakers.
- Supports 1 battery string up to 62ah or 2 battery strings up to 124ah (dual battery base option).
- 600 watt power supply option.



Cabinet Dimensions and Weights

The external dimensions of the FiberFlex 600 cabinet with the battery base are Height 40" Width 14" Depth 26" (without battery base 27" H x 14" W x 26" D). The approximate weight of the FiberFlex 600 is dependent on configuration, from 50lbs without battery base to 80lbs with a single battery base.



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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 600 Front



FiberFlex 600 Back

Back

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

Battery Compartment

Rectifier configured cabinets include a battery base compartment for housing one string of front-access VRLA batteries. Optional secondary battery base available for non pole mount applications.

Battery compartment interior dimensions (for batteries): Opening 10.8" x 20.8"



Chapter 2: Installation Considerations

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

Topics Covered

- 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

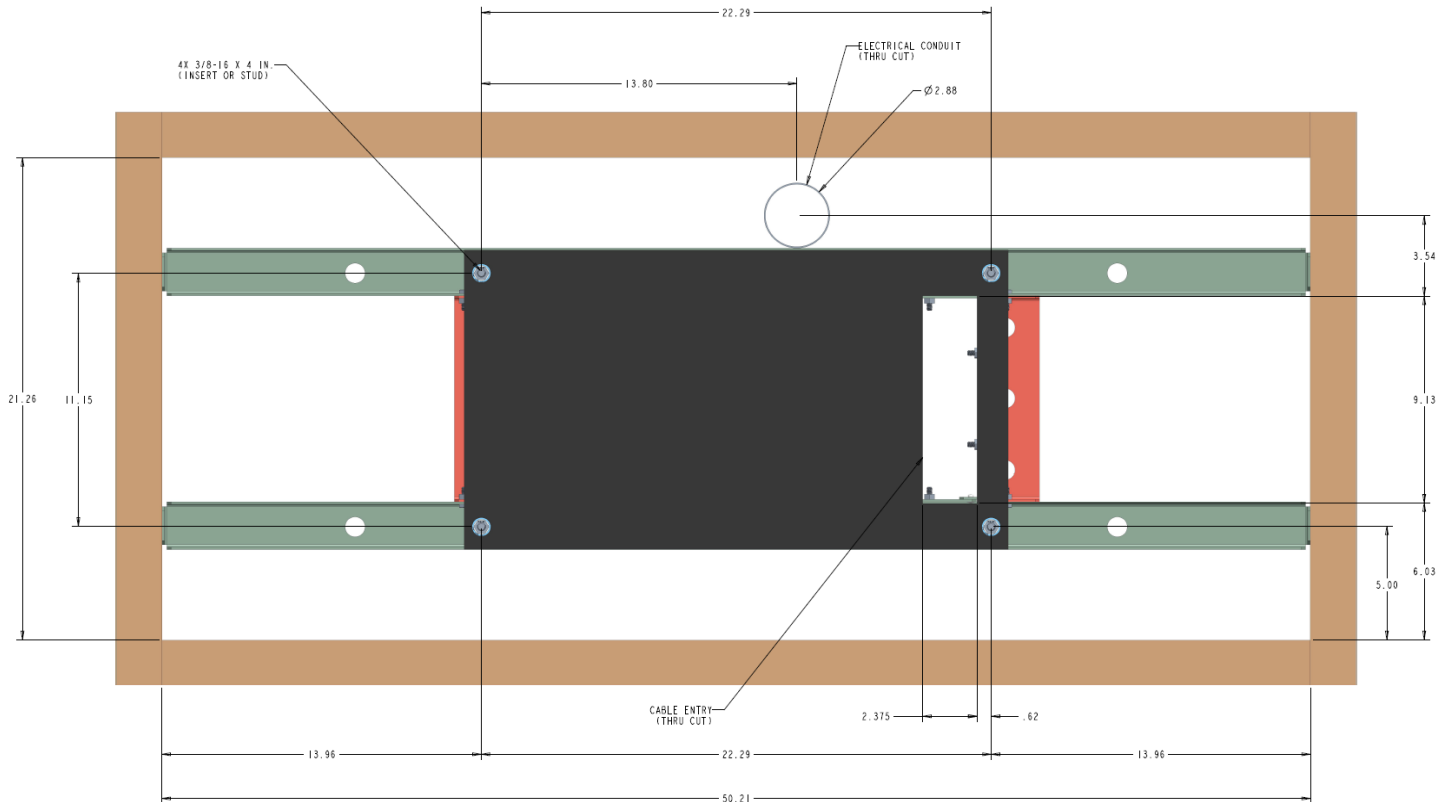
- **Suitable terrain.** Whenever possible, the cabinet should be located in an area with a firm flat soil surface that does not require extensive earth work. The location should not be constantly damp or prone to flooding. Check soil maps of potential sites for subsurface conditions.
- **Grounding properties.** 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.
- **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.

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.



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.:

<input checked="" type="checkbox"/>	Qty	Item Description
	1	Telco hex key, 5/16"
	1	Isolation pad
	4	Hex nuts (for mounting)
	8	Flat washers (for mounting)
	4	Split lock washers (for mounting)
	4	1/2" hex head bolts (for mounting)

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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

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



Cabling Requirements

Cables supplied to the cabinet must meet the following minimum requirements.

Function	Facility	Requirements
Power		
Ground	Copper	6 AWG solid bare copper wire (to earth ground circuit); terminates to ground bar with screw lug
AC	Copper	8–10 AWG stranded copper; Follow National Electric Code (NEC) and local codes If using AC load center, minimum 30 amp commercial AC power feed (240VAC single phase) Branch circuit protection provided by customer, customer supplied input single phase 240VAC, 50-60Hz, 20A

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 pole.

For pad-mount applications, you can construct a concrete pad using the Clearfield cast-in-place template.

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
- Preparing the pole for cabinet mounting



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 interconnected 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.

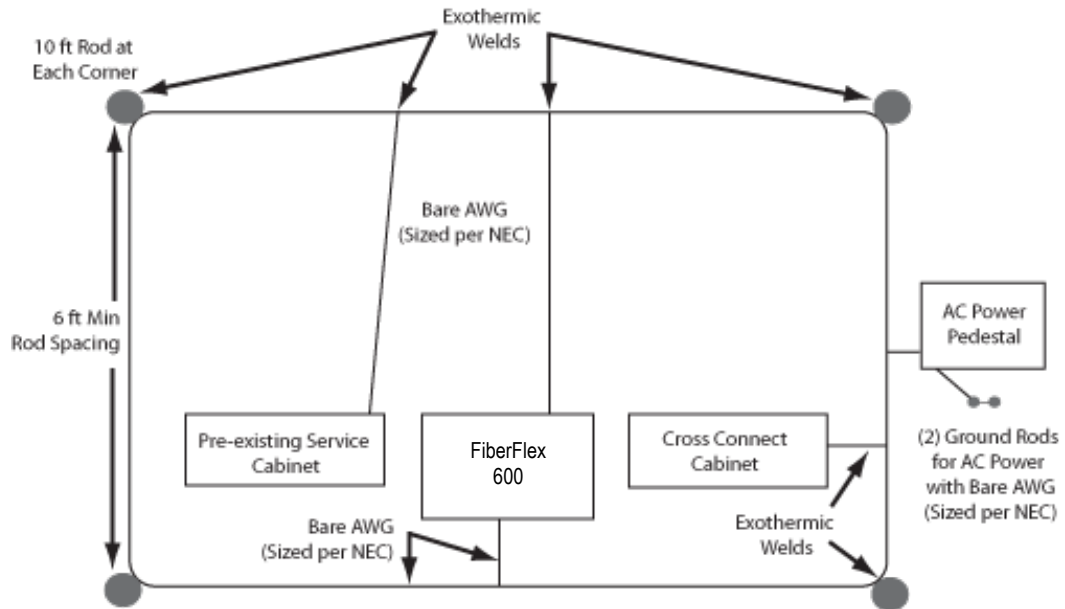
Environmental factors

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:





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. See drawing below for entry location.
- Include pull cords in all cable conduits.
- Use up to 2 2-inch conduits (maximum) for outside plant cables.
- Review ASTM C39 and 143 as a standard
- Follow all local jurisdiction requirements

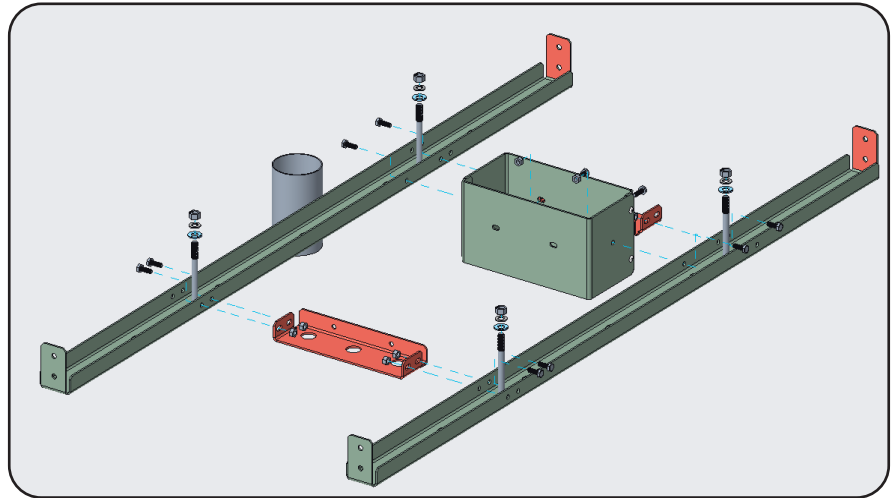
Assembling the Cast-In-Place Template

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

To assemble the template

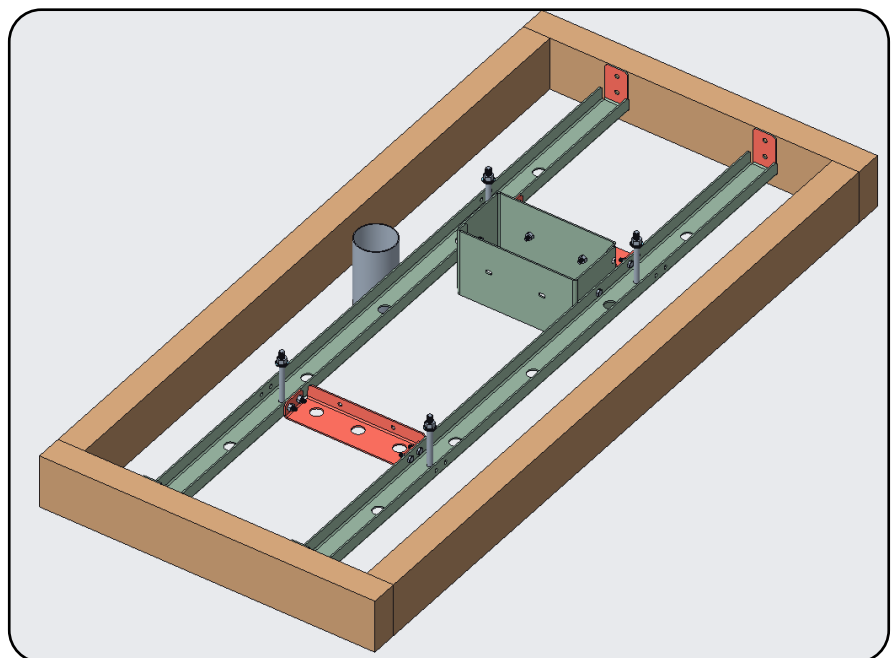
Step 1: Unpack the template hardware from the shipping kit.

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



Step 3: Attach the short and long brackets together using the eight supplied screws, as shown.

Step 4: Tighten all screws to complete the template assembly.





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 21.26" x 50.21" 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 into the form, guiding the cable conduits through the conduit entry ducts in the template.
- Step 5:**
- Use 2-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.

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.

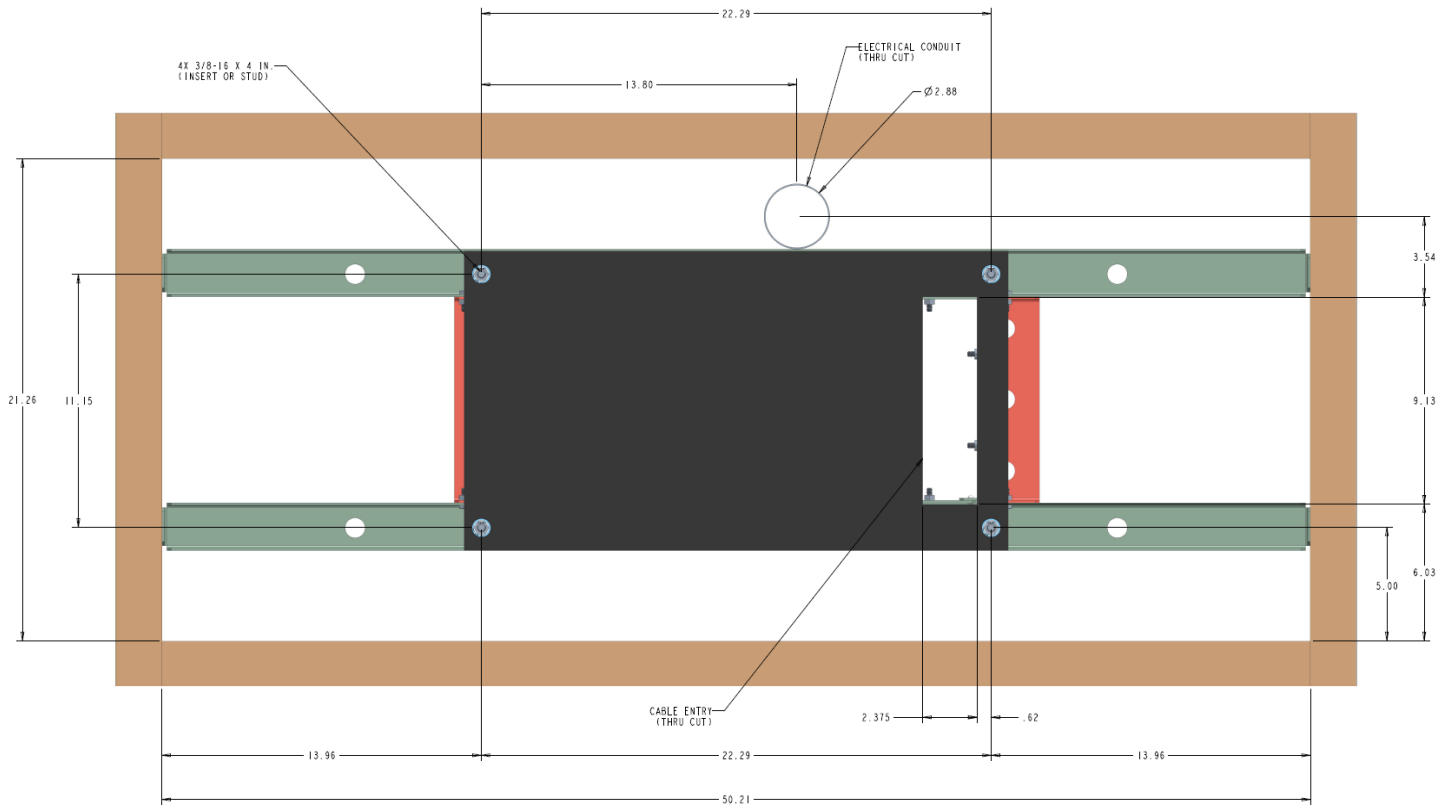
Step 7: Backfill and grade the perimeter area around the pad with soil, as required.

Step 8: Trim the cable conduits to a height no more than 1 inch above the pad.

Pad Drawings

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-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



Preparing the Pole for Cabinet Mounting

A vertical wooden pole or post can provide a useful mounting structure for elevating the cabinet above the ground, particularly in areas subject to severe surface conditions such as flooding, mud, or heavy snow. Pole mounting also allows cabinets to be installed in locations where the required terrestrial right-of-way may be unavailable.

Use the Clearfield pole-mounting kit to provide the mounting fixture. The pole-mounting kit consists of two tooth brackets and a support bracket. You can install the mounting kit onto an existing pole, or you can install a new pole at the installation site to support the cabinet. Installing the pole-mounting kit requires trenching cable conduit to the pole location and installing the mounting fixture on the pole.

When installing the FiberFlex 600 pole-mount kit for power configurations with or without a battery base, observe the following guidelines.

Guidelines

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

- Clearfield recommends that the bottom of the cabinet or battery base be a minimum of 18 inches above the ground
- The pole/post must be vertically plumb.
- The pole/post must support a minimum load weight, as required for the cabinet configuration:
Battery base: 80 lbs
No battery base: 50 lbs
- The pole-mount kit includes hardware to attach the mounting assembly to the cabinet. Mount brackets to pole per local practice
- Use 2-inch conduit (maximum) for outside plant cables.
- Use 1-inch conduit (maximum) for AC cable (local power applications only).
- Include pull cords in all cable conduits.



Preparing the Site

Prepare the site for installation of a pole-mounting kit. A general practice is described below for reference. Adapt the instructions as needed for local requirements, practices, or conditions.

To prepare the site for a pole installation

- Step 1:** At the installation site, verify the following:
- The pole is installed and plumb.
 - The pole meets the cabinet mounting requirements.
- Step 2:** Trench out conduit paths to the pole from the cable feeder location.
- Step 3:** Place the cable conduits into the conduit trench. At the pole, allow the conduit to extend above ground to the approximate height of the cabinet base.
- Step 4:** Route the earth ground wire through the conduit trench (from the ground electrode). Pull six feet of wire above ground and position it adjacent to the pole.
- Step 5:** Backfill the conduit trench with soil.

Chapter 4: Installing the Cabinet

This chapter describes how to install the Clearfield FiberFlex 600 cabinet onto its permanent mounting location.

Topics Covered

- Unpacking the cabinet from its shipping crate.
- Operating the cabinet doors.
- Preparing the cabinet for installation.
- Installing the cabinet onto a concrete pad.
- Installing the cabinet onto a pole.
- Installing a ground circuit at the installation site.



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* for instructions.

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



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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.

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 equipment compartment via hex-pin latches. Use a Clearfield supplied telco hex key to open and close the door. Tilt and pull the door panel forward, away from the cabinet.



Preparing the Cabinet for Installation

Complete the following preparations before installing the cabinet.

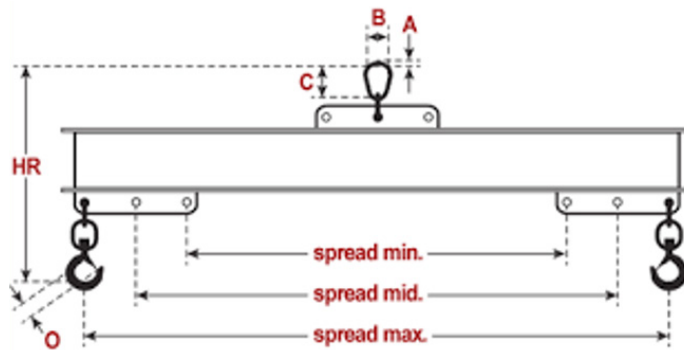
To prepare the cabinet for installation

- Step 1:** Open the front and rear cabinet doors.
- Step 2:** From the battery compartment, remove the isolation pad and the bag containing the installation hardware. Set them aside for use during installation.
- Step 3:** Prepare the battery compartment (if present) as follows:
- Remove the battery compartment door.
 - Remove the ground strap
- Step 4:** Prepare the AC load center (if present) as follows:
- 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.

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 200 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 pad usage is mandatory for concrete pad installations. Failure to use the supplied isolation pad 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 concrete mounting pad:

- 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

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To install the cabinet on a concrete pad

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

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



Step 3: Using a lifting mechanism, lift the cabinet directly above its mounting position on the pad.

Step 4: Slowly lower the cabinet, keeping the mounting holes in the cabinet base aligned with the anchor studs (or holes) in the pad.

Step 5: If cabinet comes equipped with fiber pigtail, take care not damaging cables while inserting cables in OSP conduits during the lift and as the cabinet is lowered.

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.*

Step 6: Pull the earth ground wire into the cabinet through one of the cable entry ducts.

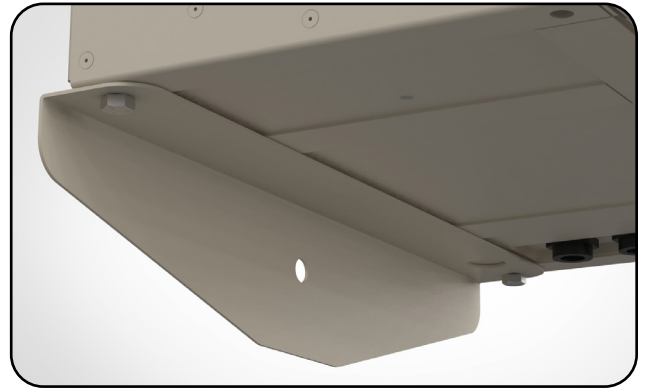
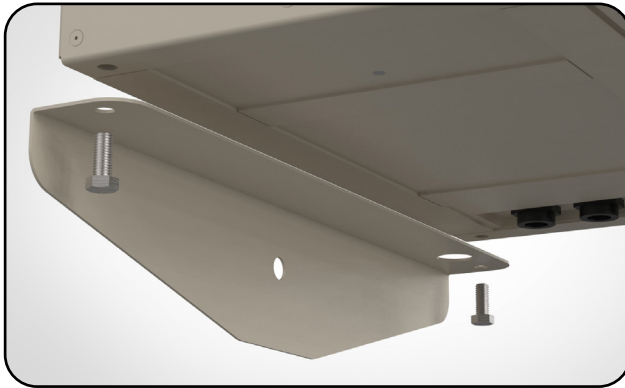
Step 7: Anchor the cabinet or battery base to the pad as follows:

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

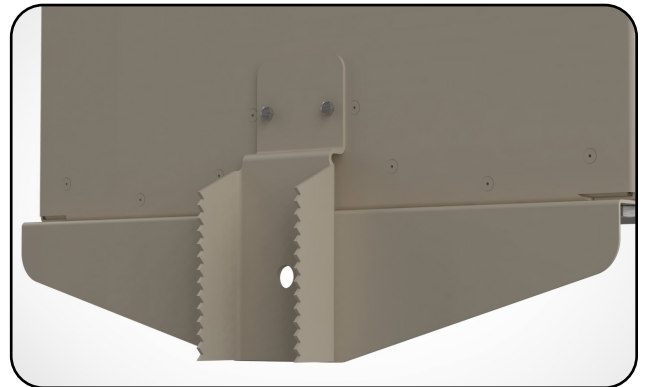
- a. Get the four hex nuts, four flat washers, and four lock washers from the installation kit.
- b. Inside the battery base, install one flat washer, lock washer, and hex nut onto each of the four anchor studs.
- c. Tighten the hex nuts to secure the cabinet to the pad.
- f. Verify that the doors open and close freely. If necessary, use shims to level the cabinet.
- g. Apply silicone caulking to the bottom perimeter of the cabinet.

Installing the Cabinet on a Pole

Step 1: On the bottom of the cabinet (or battery base if present) install the support bracket using the hardware provided.



Step 2: Using the hardware provided, install one of the toothed brackets onto the cabinet (or battery base if present).



Step 3: Determine the top height of the cabinet. Drill a 5/8" hole approximately 9 inches below the anticipated height of the cabinet, all the way through the pole.

Note: Clearfield does not provide the mounting hardware. Required hardware includes two 5/8" threaded rods (3" longer than pole diameter), washers, lock washers, nuts and Lock Tight (red).

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Step 4: Mount the other toothed bracket to the pole using threaded rod, washers and nuts on either side of the pole. Rod length will depend on the diameter of the pole. It is suggested to add 3" to the diameter of pole for rod length.

Note: Care should be taken to avoid over-tightening and deforming the toothed bracket. Lock tight (red) should be used on nuts to prevent loosening of nuts. Make sure the thread rod/nut does not exceed the top bend in bracket or it will interfere with cabinet.



Step 5: Lower the cabinet onto the pole mounted toothed bracket until the hoist plate is over the flange of the toothed bracket.



Step 6: Level cabinet and drill 5/8" hole through lower bracket and pole, and install 5/8" rod, washers and nuts.



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

- Installing the cabinet ground connection
- Installing local AC power



Installing the Cabinet Ground Connection

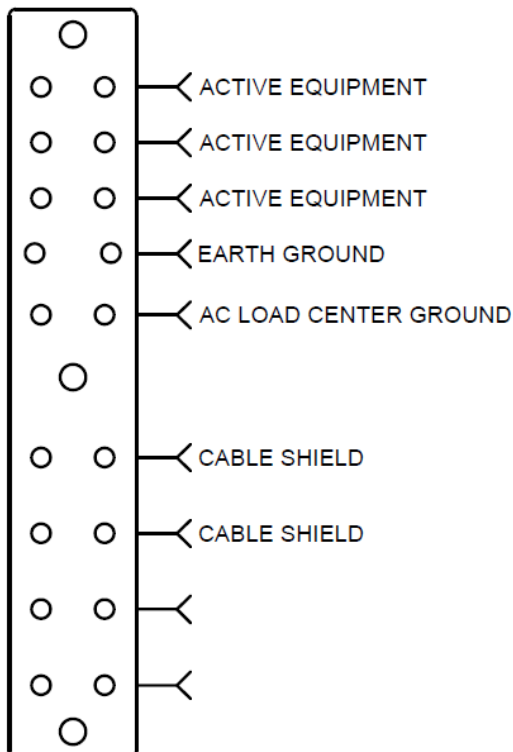
You must install the cabinet's connection to the earth ground circuit before you connect commercial power to the cabinet.

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 600 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 600 cabinet ground bar serves as the primary surge absorber to isolate the equipment grounds from the surge-producing external grounds.

Main Ground Bar



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.

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 AC connection using AC load center

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. Open and stow the front cover of the AC Load Center in the open position. Remove the breaker panel cover and set aside. Retain hardware for re-installation.

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 (8–10 AWG) into the AC load center.

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

Step 6: Tighten the coupling nut around the AC wires at the bottom of the load center housing.

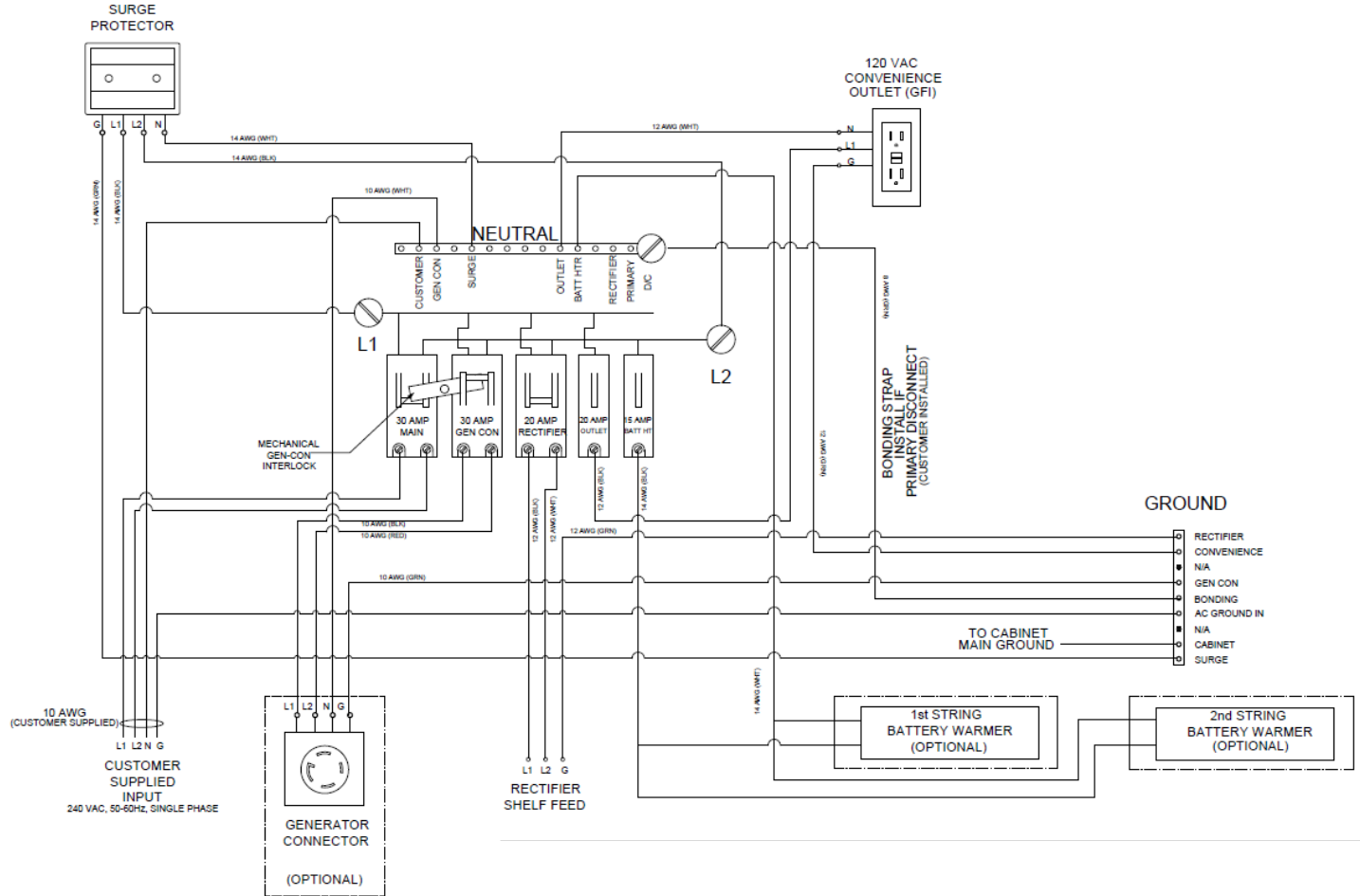
Step 7: Re-install the cover panel on the AC load center.

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AC Load Center Wiring Diagram



Installing AC Power (220-240 VAC) For Power Supply Configurations

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 AC connection using power supply and junction box

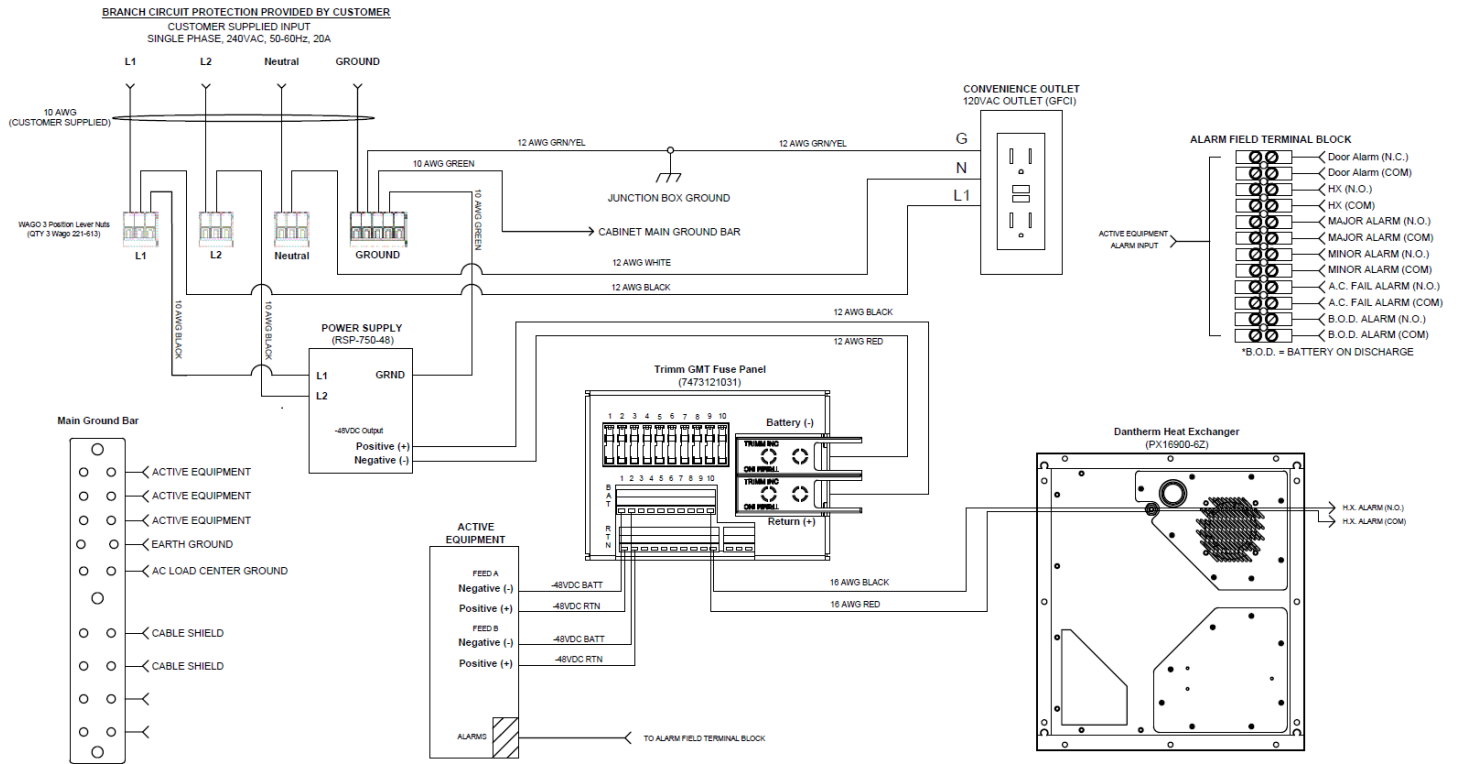
- Step 1:** Ensure Main and branch circuit breakers feeding the cabinet are off.
- Step 2:** Remove the cover from the junction/GFCI Outlet box.
- Step 3:** Install a user supplied AC conduit into the battery base. Install conduit per local practice. Ensure the conduit is AC rated.
- Step 4:** Pull the wires (10-12 AWG) into the cabinet and up into the junction box.
- Step 5:** Connect the AC wires to the Wago lever nuts as shown in the schematic. Ensure termination is adequate by tugging on the wires after inserting and locking them in the lever nuts.
- Step 6:** Tighten any couplings the AC wires used at the battery base or the junction box.
- Step 7:** Re-install the cover for the junction box.

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Power Supply Wiring Diagram





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

- 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 regular intervals along the entire run external to the cabinet/enclosure site, per RUS guidelines and local practices.
- 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.



Installing Fiber Cable

This section describes how to install fiber optic cable into the cabinet, including how to route and groom the outside plant cable and splice fibers for terminating to the equipment.

Fiber management guidelines

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

- Be aware of your cable bend radius and 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.

Installing Outside Plant Fiber Cable

Install outside plant (OSP) fiber cable into the cabinet and prepare it for splicing. The following steps are general guidelines only. Follow local practice wherever applicable.

If the fiber splices will not reside in the cabinet (such as when located in an external splice case), then adjust the installation procedure accordingly. In such cases, installation typically involves finished, individually jacketed fibers instead of OSP cable. Install this fiber per local practice.

To install outside plant fiber cable

- Step 1:** Open the cabinet's rear and battery compartment doors
- Step 2:** Loosen the dome nut on the sealcon that the cable will be passing through. If necessary, swap the rubber grommet to a more appropriate size by removing the dome nut and pushing it out from behind, then reinstall the dome nut.
- Step 3:** Route the OSP fiber cable from the feeder location through the conduit and up into the battery base.
- Step 4:** Pull the fiber cable up into the cabinet through the sealcon. Pull enough slack to allow for a slack loop (approximately 5 feet) and enough fiber to splice in the cassettes (3 feet, for a total of 8 feet).
- Step 5:** If splicing shall be performed at a later time, do the following:
- Using rope or cable ties, temporarily hang and secure the OSP cable inside the cabinet.
 - Make sure the cable arrangement allows the door to close. Take care to not violate the cable bend radius requirements.
- Step 6:** Secure the cable by tightening the dome nut. After prepping the cable, optionally secure the cable's strength member in the strength member clamp.

These steps are general guidelines only. Follow local practice where applicable.

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:** Securely tighten the dome nuts on the sealcons inside the cabinet
- Step 3:** If required, prepare the sealant for application per the manufacturer instructions.
- Step 4:** Apply the sealing foam around any open areas on the entry ducts where cables enter the battery compartment. Seal all gaps around the cables per the manufacturer instructions.



CAUTION! Only a qualified technician should perform this procedure.



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

- 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

Turning Up the 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.



Checking the AC Power Supply Voltage for Rectifier Configurations

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. Open and stow the front cover of the AC Load Center in the open position. Remove the breaker panel cover and set aside. Retain hardware for re-installation.

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 20A 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.

Checking the AC Power Supply Voltage for Power Supply Configurations

The cabinet ships from the factory equipped to support 220-240 VAC service. Check the AC power supply voltage for power supply configurations 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: At the cabinet junction box, do the following:

- a. Remove the front panel from the junction box.
- b. Separate the Wago lever nuts out for accessibility.

Step 2: Apply AC power to the cabinet at the user supplied load center.

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

- a. Place one lead in the L1 Wago lever nut.
- b. Place the other lead in the neutral Wago lever nut.
- c. Verify that the volt meter reads between 110 and 120 VAC.

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

- a. Place one lead in the L2 Wago lever nut.
- b. Place the other lead in the neutral Wago lever nut.
- c. Verify that the volt meter reads between 110 and 120 VAC

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

- a. Place one lead in the Wago lever nut.
- b. Place the other lead in the L2 Wago lever nut.
- c. Verify that the volt meter reads between 220 and 240 VAC.

Step 6: Fasten the junction box cover. Turn off user supplied Main breaker if applicable for safety.



Installing Rectifier Modules

The FiberFlex 600 cabinet uses the 19-inch ABB SPS 1RU rectifier shelf to generate and distribute -48 VDC power. The ABB SPS rectifier shelf supports up to two rectifier modules. Normal operation for the FiberFlex 600 cabinet supports (2) 1600W rectifier modules that derate to 1000W when used in this rectifier shelf.

The 1 RU ABB SPS shelf provides integrated distribution, with 6 GMT fuse positions for equipment and up to 2 30A battery 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 600 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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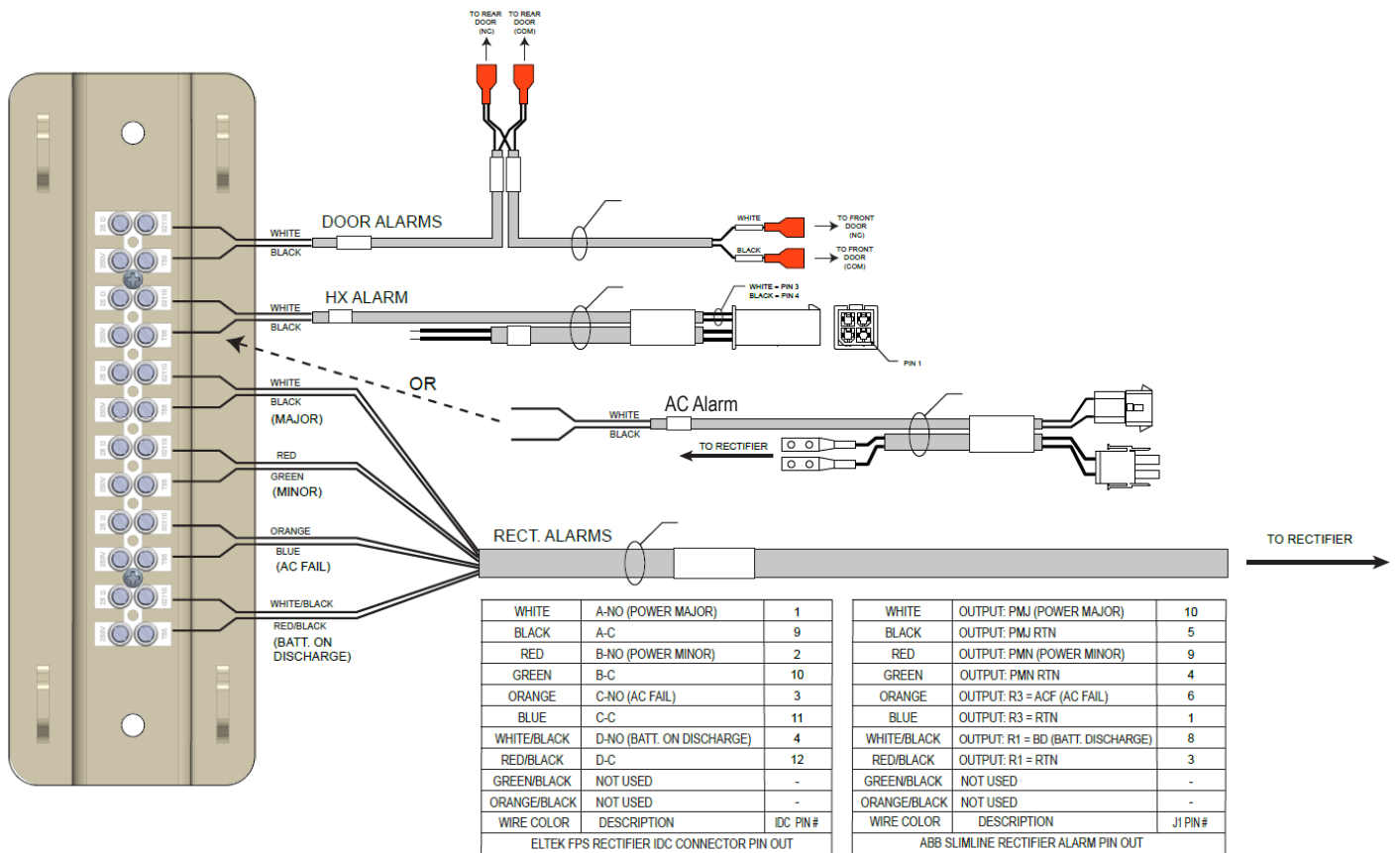
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Installation of Alarm Wiring

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

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



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 (pad only).

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.
- 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.

To install a single string of batteries

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.

Step 3: In the battery compartment, locate the batter power cable shipped separately from the main hardness and set aside.

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

Note: You will slide the batteries into the battery compartment after installing the cables and protective covers.

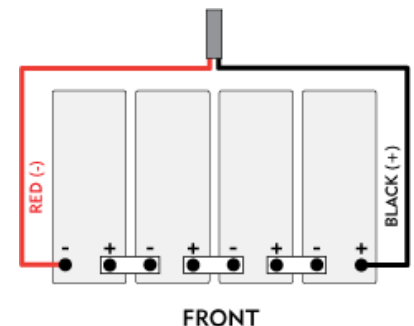
Step 5: Connect the battery power cables as follows:

- 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:
- Place the red voltmeter lead on the red negative (-) battery lead.
 - Place the black voltmeter lead on the black positive (+) battery lead.
 - Verify that the voltmeter reads between -46 and -54 VDC.
 - 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.
- Step 14:** At the AC load center, do the following:
- Set the Main breaker to OFF. The heat exchanger fans should continue to run.
 - Set the Main breaker to ON and verify that power restores to the rectifier shelf.
- Step 15:** Slide the battery string into the battery compartment.
- Step 16:** Replace the battery compartment door.

Turning Up and Testing the DC Power System

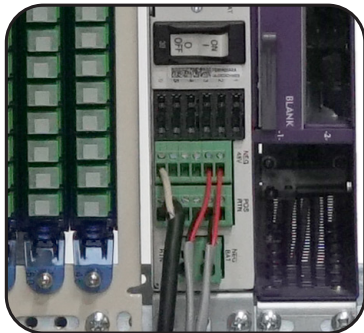
Turn up and test the cabinet DC bulk power system as described below.

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:



- 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.
 - 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). Verify that the additional unit(s) power up.
 - Install a 5A GMT fuse in position 6 and verify that the heat exchanger fans start running.
- 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 30A 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:
- Place the red volt meter lead on the red negative (-) battery lead.
 - Place the black volt meter lead on the black positive (+) battery lead.
 - Verify that the volt meter reads between -46 and -54 VDC.
 - 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.
- 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.

Chapter 8: 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

- Routine cabinet maintenance
- Replacing parts and equipment



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.



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.
- 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 connections on the cabinet ground bar for a tight and secure fit.
- 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:
- Disconnect the battery power cables from the power supply terminals.
 - Slide the batteries out of the battery compartment.
 - Remove the protective covers from the battery terminals.
 - Remove the red and black battery power cables from the terminals at each end of the string.
 - Remove the jumper straps from between the terminals of the batteries in the string.



- 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.

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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.



Replacing Parts and Equipment

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

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.

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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



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 compartment. See Installing Batteries for instructions.
- Step 5:** 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 compartment:
- Disconnect the heater power cord from the supply lead, located on the left compartment wall.
 - Disconnect the thermostat from the side of the battery compartment.
 - Lift the battery heater out of the battery compartment.
- Step 6:** Install the new battery heater into the battery compartment. 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.



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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Proprietary Notice

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Its purpose is to provide the user with adequately detailed documentation to efficiently install the equipment supplied. Every effort has been made to keep the information contained in this document current and accurate as of the date of publication or revision.

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.

Clearfield, Inc.
7050 Winnetka Ave N
Minneapolis, MN 55428

Toll Free: 800.422.2537
Phone: 763.476.6866
Fax: 763.475.8457

Customer Support: sales@seeclearfield.com
Technical Support: techsupport@seeclearfield.com