NetXtend™

Flex 20 Enclosure - Single Bay Outdoor Enclosures

Description and Installation Manual (631-205-400), Revision J

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ADMONISHMENTS USED IN THIS DOCUMENT

DANGER! Warns of a hazard the reader ***will*** be exposed to that will ***likely*** result in death or serious injury if not avoided. (ANSI, OSHA)

WARNING! Warns of a potential hazard the reader ***may*** be exposed to that ***could*** result in death or serious injury if not avoided. This admonition is not used for situations that pose a risk only to equipment, software, data, or service. (ANSI)

CAUTION! Warns of a potential hazard the reader ***may*** be exposed to that ***could*** result in minor or moderate injury if not avoided. (ANSI, OSHA) This admonition is not used for situations that pose a risk only to equipment, data, or service, even if such use appears to be permitted in some of the applicable standards. (OSHA)

ALERT! Alerts the reader to an action that ***must be avoided*** in order to protect equipment, software, data, or service. (ISO)

ALERT! Alerts the reader to an action that ***must be performed*** in order to prevent equipment damage, software corruption, data loss, or service interruption. (ISO)

FIRE SAFETY! Informs the reader of fire safety information, reminders, precautions, or policies, or of the locations of fire-fighting and fire-safety equipment. (ISO)

SAFETY! Informs the reader of general safety information, reminders, precautions, or policies not related to a particular source of hazard or to fire safety. (ISO, ANSI, OSHA)

IMPORTANT SAFETY INSTRUCTIONS

Safety Precautions Definitions

Definitions of the safety admonishments used in this document are listed under “Admonishments Used in this Document” on page 6.

General Safety Precautions

The following precautions shall be observed at all time when handling and installing the enclosure:

- Observe the general safety precautions against personal injury and equipment damage.
- The procedures outlined in this manual are only recommended guidelines. Ensure that all NEC (National Electric Code) and local codes for safety and wiring are followed.
  - Use listed two-hole compression connectors (lugs) to terminate all ground connections. Selected lug shall match wire and type, and crimped applied as specified by the lug manufacturer.
  - Apply NO-OX-ID-A to all ground connections.
  - Insulation of field-wire conductors should be rated no less than 105 °C, and gauge in a manner that is consistent with the NEC and local codes.
- Always use a non-contact voltage detector, when approaching an enclosure, to verify no leaks or shorts are presents on the external body.
- Read “Specific Safety Precautions” on page 10 in its entirety prior to attempting to handle or secure the enclosure.
- A minimum of two persons are required to safely install the enclosure.
- Hard hats and steel-toed boots should be worn while maneuvering the enclosure.
- Safety glasses should always be on while on-site.
- Safety gloves should be on when working in temperature extremes, with batteries, or with sharp objects.
- All electricians, operators, and technicians have been trained for the task at hand.
- Keep bystanders away.
- Ensure that all personnel on site are familiar with the first-aid kit location and emergency procedures in the event of an injury.
- Never leave the enclosure unattended. If leaving the site, close and secure the enclosure.

You Must Follow Approved Safety Procedures

DANGER! Performing the following procedures may expose you to hazards. These procedures should be performed by qualified technicians familiar with the hazards associated with this type of equipment. These hazards may include shock, energy, and/or burns. To avoid these hazards:

a) The tasks should be performed in the order indicated.

b) Remove watches, rings, and other metal objects.

c) Prior to contacting any uninsulated surface or termination, use a voltmeter to verify that no voltage or the expected voltage is present. Check for voltage with both AC and DC voltmeters prior to making contact.

d) Wear eye protection.

e) Use certified and well maintained insulated tools. Use double insulated tools appropriately rated for the work to be performed.

Voltages

AC Input Voltages

DANGER! This system operates from AC input voltage capable of producing fatal electrical shock. AC input power must be completely disconnected from the branch circuits wiring used to provide power to the system before any AC electrical connections are made. Follow local lockout/tagout procedures to ensure upstream branch circuit breakers remain de-energized during installation. DO NOT apply AC input power to the system until all electrical connections have been completed and checked.

DC Output and Battery Voltages

DANGER! This system produces DC power and may have a battery source connected to it. Although the DC voltage is not hazardously high, the rectifiers and/or battery can deliver large amounts of current. Exercise extreme caution not to inadvertently contact or have any tool inadvertently contact an output terminal or battery terminal or exposed wire connected to an output terminal or battery terminal. NEVER allow a metal object, such as a tool, to contact more than one termination or battery terminal at a time, or to simultaneously contact a termination or battery terminal and a grounded object. Even a momentary short circuit can cause sparking, explosion, and injury.

Battery

Refer to the battery manufacturer documentation for specific battery safety instructions. The following are general guidelines.

WARNING! Correct polarity must be observed when connecting battery leads.

WARNING! Special safety precautions are required for procedures involving handling, installing, and servicing batteries. Observe all battery safety precautions in this manual and in the battery instruction manual. These precautions should be followed implicitly at all times.

WARNING! A battery can present a risk of electrical shock and high short circuit current. Servicing of batteries should be performed or supervised only by properly trained and qualified personnel knowledgeable about batteries and the required precautions.

The following precautions should be observed when working on batteries:

- Remove watches, rings, and other metal objects.
- Eye protection should be worn to prevent injury from accidental electrical arcs.
- Use certified and well maintained insulated tools. Use double insulated tools appropriately rated for the work to be performed. Ensure that wrenches with more than one working end have only one end exposed.
- Do not lay tools or metal parts on top of batteries.
- Disconnect charging source prior to connecting or disconnecting battery terminals.
- Risk of explosion if battery is replaced with an incorrect type or if polarity is reversed. Recommended to replace batteries with the same manufacturer and type, or equivalent.
- Dispose of used batteries according to the instructions provided with the batteries. Do not dispose of batteries in a fire. They may explode.
- ALWAYS FOLLOW THE BATTERY MANUFACTURER'S RECOMMENDATIONS AND SAFETY INSTRUCTIONS.

DANGER! This equipment may be used in conjunction with lead-acid batteries. Working near lead-acid batteries is dangerous!

In addition to the hazard of electric shock, gas produced by batteries can be explosive and sulfuric acid can cause severe burns.

- Do not open or mutilate batteries. Released electrolyte is harmful to the skin and eyes, and is toxic.
- Batteries contain sulfuric acid.
- Batteries generate explosive gases during normal operation. Systems containing batteries should never be installed in an airtight room or space. Only install in a ventilated environment.
- Batteries are an energy source that can produce high amounts of electrical current.

FOR THESE REASONS, IT IS OF CRITICAL IMPORTANCE THAT YOU READ THESE INSTRUCTIONS AND FOLLOW THEM EXACTLY.

WHEN WORKING WITH LEAD-ACID BATTERIES:

- Follow the recommended PPE requirements per the SDS for the battery to be used.
- If battery acid enters your eye, immediately flush your eye with running cold water for at least 15 minutes. Get medical attention immediately.
- If battery acid contacts skin or clothing, wash immediately with soap and water.

ALERT! Performing maintenance and/or troubleshooting procedures may interrupt power to the loads, if battery reserve is not sufficient.

Specific Safety Precautions

DANGER! RISK OF ELECTRICAL SHOCK, GENERAL
All ground connections must be installed and verified prior to connecting any power cables (AC or DC) and turning-up of enclosure.

When connecting any discrete power connection, make the connection first with the ground/return and break last with ground/return.

Do not install equipment showing any physical damage.

DANGER! RISK OF ELECTRICAL SHOCK, AC
Proper actions, include, but not limited to:

a) Verify before contacting the enclosure that no current leakage or ground fault condition is present.

b) Verify a proper ground is in place.

c) Verify for AC hook-up, all enclosure circuit breakers are OFF and the utility incoming feed is OFF.

Use a trained licensed electrician.

DANGER! RISK OF ELECTRIC SHOCK
The DC bus is powered by DUAL power sources – Rectifiers and DC Batteries.

To properly work on the system, de-energize by disconnecting BOTH power sources. Even with the batteries turned off by using a local battery (circuit breaker) disconnect, batteries are still "LIVE" and hazardous, including a voltage >50 Vdc, and a source of high short circuit current.

Use extreme caution around the batteries and terminals.

Do not smoke.

DANGER! RISK OF ELECTRICAL SHOCK, OSP CABLES
If joint buried cables are used, check the cable sheath for voltage in accordance with local standards. If voltage is detected, do not proceed with the installation. Contact the supervisor and do not proceed until the voltage hazard is eliminated.

DANGER! RISK OF CHEMICAL EXPOSURE
A battery can present harmful chemicals. Refer to the Battery Installation Manuals and MSDS supplied with the batteries. Work in a ventilated area and follow all safety procedures.

At a minimum, wear safety glasses and gloves when working with batteries.

WARNING! PREVENT INJURIES, FROM LIFTING THE ENCLOSURE
Follow all local safety practices while lifting the enclosure. Wear all locally approved safety gear. All persons working with lifting equipment must wear standard safety headgear, eye protection, and (when required) gloves.

Keep bystanders away from work operations at all times.

Do not lift the enclosure over people. Do not let anyone work, stand, or pass under a lifted enclosure.

Use all four points (eyebolts) to lift the enclosure.

Do not move or lift the enclosure with the front door open.

Never lift or move the enclosure with batteries or rectifiers installed.

Do not allow the lifting equipment or enclosure to touch any electrical wiring or equipment.

Operate all lifting equipment within safety constraints, as defined by the manufacturer and local practices; for example, do not exceed the capacity of reach.

Do not use slings, clevises or shackles of insufficient capacity.

Crane Operation:

Only properly trained operators shall operate the crane.

Do not operate the crane until all stabilizers are extended. The stabilizers must be in firm contact with the ground or other adequate support structure. Do not retract or extend the stabilizers when the enclosure is suspended from the crane.

Do not lift the enclosure over people. Do not let anyone work, stand, or pass under a lifted enclosure.

Only the crane rigging crew should set up the crane and rigging.

Do not exceed the lifting capacity of the crane.

Forklift Operation:

The forklift must be rated for a lifting capacity of 4,000 lbs (1814 kg), or greater.

Required Equipment:

One hoist, crane, or forklift capable of lifting 4,000 lbs (1814 kg).

Four wire-rope slings, 8-ft. (2.44 m) long (minimum). Each sling should have 1,500 lb. (700 kg) capacity.

Four connecting links (clevises) (rated for a minimum of 1500 lb), to attach the wire-rope slings to the enclosure lifting eyes.

A 75-ft (20 m) rope, 5/8" (1.5 cm) in diameter, to use as a tagline. A tagline is used to guide the enclosure into position while it is lifted and lowered.

CAUTION! PREVENT EQUIPMENT DAMAGE, PROPER HANDLING
Do not stack nor lay the enclosure on its side.

Similarly, do not stack batteries or lay them on their side. Do not tip batteries -- keep in upright position at all times.

To avoid possible personnel injury or damage to the enclosure, do not remove it from the pallet until at the installation site, at the point of transfer onto the pad.

DANGER! PREVENT EQUIPMENT DAMAGE, MAINTAIN VENTILATION
To optimize the service life of this equipment, make sure there are no obstructions in front of the ventilation openings.

WARNING! RISK OF INJURY, FROM UNSECURED ENCLOSURE
Do not push or lean against an unsecured (unbolted) enclosure as it may tip over causing bodily injury.

Do not pull cables, terminate cables, install or place any batteries or rectifiers until enclosure has been secured onto a pad.

Use caution when opening and closing doors to an enclosure not secured onto a pad.

WARNING! RISK OF INJURY TO EYES AND SKIN, FROM OPTIC DEVICES
Do not look into a fiber cable or device, nor hold such cable or device against body, fabric or other material.

WARNING! RISK OF HAZARDOUS SUBSTANCES
After handling of the enclosure or any such component, such as batteries, cables, busbars, etc., always wash hands immediately after.

WARNING! RISK OF EXPLOSION
For safety reasons, never restrict or block the airflow through the door or entry panel ventilation openings.

CAUTION! PREVENT EQUIPMENT DAMAGE, FROM CONDENSATION
Until the enclosure is turned up for service, the bags of desiccant shipped with the enclosure must remain in the enclosure to prevent condensation.

Once service is in-place, remove the desiccant.

CAUTION! PREVENT EQUIPMENT DAMAGE, BUILD A GOOD PAD
The pad should be level to within 1/4 in (6.4 mm) over the entire length and width, with a crown in the middle to prevent any pooling of water and twist to the enclosure frame.

When mounting the enclosure on a pad, the compression strength of the concrete pad used must be a minimum of 4000 psi as determined by ASTM C39 test of compression strength of concrete cylinders.

Always use a barrier pad between the concrete and the pad to prevent corrosion.

CAUTION! PREVENT EQUIPMENT DAMAGE, OPERATING TEMPERATURE
The enclosure is approved for operation in an environment with an expected temperature range of -40°F to +115°F (–40° C to +46°C) and 5% to 95% relative humidity range, condensing. Do not use at temperatures or humidity exceeding these ranges.

The enclosure is not for indoor use.

CAUTION! PREVENT DAMAGES CAUSED BY ELECTROSTATIC DISCHARGES (ESD)
When handling the ECU unit, wear an appropriate antistatic device (a wrist strap for example) that is properly connected to a designated antistatic grounding point (on a framework, on an anti-static floor mat, etc.). ESD-protective packaging material shall also be used when carrying/shipping the ECU unit.

Personal Protective Equipment (PPE)

DANGER! ARC FLASH AND SHOCK HAZARD.
Appropriate PPE and tools required when working on this equipment. An appropriate flash protection boundary analysis should be done determine the "hazard/risk" category, and to select proper PPE.

Only authorized and properly trained personnel should be allowed to install, inspect, operate, or maintain the equipment.

Do not work on LIVE parts. If required to work or operate live parts, obtain appropriate Energized Work Permits as required by the local authority, per NFPA 70E "Standard for Electrical Safety in the Workplace".

Hazardous Voltage

DANGER! HAZARD OF ELECTRICAL SHOCK.
More than one disconnect may be required to de-energize the system before servicing.

Handling Equipment Containing Static Sensitive Components

ALERT! Installation or removal of equipment containing static sensitive components requires careful handling. Before handling any equipment containing static sensitive components, read and follow the instructions contained on the Static Warning Page.

Maintenance and Replacement Procedures

CAUTION! When performing any step in procedures that requires removal or installation of hardware, use caution to ensure no hardware is dropped and left inside the unit; otherwise service interruption or equipment damage may occur.

NOTE! *When performing any step in procedures that requires removal of existing hardware, retain all hardware for use in subsequent steps, unless otherwise directed.*

STATIC WARNING

This equipment contains static sensitive components. The warnings listed below must be observed to prevent damage to these components. Disregarding any of these warnings may result in personal injury or damage to the equipment.

1. Strictly adhere to the procedures provided in this document.
2. Before touching any equipment containing static sensitive components, discharge all static electricity from yourself by wearing a wrist strap grounded through a one megohm resistor. Some wrist straps have a built-in one megohm resistor; no external resistor is necessary. Read and follow wrist strap manufacturer's instructions outlining use of a specific wrist strap.
3. Do not touch traces or components on equipment containing static sensitive components. Handle equipment containing static sensitive components only by the edges that do not have connector pads.
4. After removing equipment containing static sensitive components, place the equipment only on conductive or anti-static material such as conductive foam, conductive plastic, or aluminum foil. Do not use ordinary Styrofoam™ or ordinary plastic.
5. Store and ship equipment containing static sensitive components only in static shielding containers.
6. If necessary to repair equipment containing static sensitive components, wear an appropriately grounded wrist strap, work on a conductive surface, use a grounded soldering iron, and use grounded test equipment.

ABOUT THIS DOCUMENT

Purpose

This practice provides installation instructions for Vertiv's NetXtend™ Flex Single Bay outdoor enclosures. These integrated enclosures are part of a versatile and scalable enclosure family to support a variety of wireless and wireline applications. The NetXtend™ Flex outdoor enclosures offer a broad array of climate control, power, mounting and configuration options.

When using this document, consider the footprint for the enclosure you are installing as well as any installed options when determining which procedures contained within this document will be applicable for your installation.

Additional Information

Refer to supplied documentation when installing the NetXtend™ Flex outdoor enclosures in pole or wall mount applications.

Figure 1: *NetXtend™ Flex Single Bay Outdoor Enclosures*

DESCRIPTION

Application

The NetXtend™ Flex outdoor enclosures are designed to provide secure and water-tight housing for equipment, power and batteries supporting both wireline and wireless telecommunications applications.

The NetXtend™ Flex outdoor enclosure depends upon a proven structural system, integrated mechanical components, and a sealing system that withstands rain, dust, snow and hurricane winds.

The NetXtend™ Flex outdoor enclosure is fully flexible and scalable - one standard product family to support various outside plant applications, within a generous height, width and depth range.

Multiple climate control solutions are available to keep equipment operating within its optimum temperature range. Heat exchangers, air conditioners, thermoelectric coolers, and venting options are available in various sizes.

The NetXtend Flex single bay enclosures can be pad, pole, or rooftop mounted.

Physical Specifications

Standard Sizes - The NetXtend™ Flex single bay enclosure can be provided with one equipment bay only, one equipment bay and one side chamber, or one equipment bay and two side chambers. The single bay enclosures are available in the following rack units (RUs): 8, 12, 17, 22, 27 and 32. See **Table 1** and **Table 3**.

Dimensions and Weights - Refer to **Table 1**, **Table 2**, and **Figure 2** through **Figure 7**.

Color - Off-white.

Finish - Finished in multistage dry powder polyester paint for maximum durability and performance against corrosion.

Lifting - The enclosures have four lifting eyebolts on the top that allow them to be lifted and lowered into position.

Standards Compliance

The NetXtend™ Flex outdoor enclosures are designed to meet the following standards where applicable:

- Telcordia, GR-487-CORE, *Generic Requirements for Electronic Equipment Enclosures*, Issue 3, April 2009. Standard enclosure options are designed to meet Seismic Zone 2 and Zone 4 requirements.
- Telcordia, GR-63-CORE, *Network Equipment - Building System (NEBS) Requirements: Physical Protection*, Issue 1, October 1995.
- Telcordia, GR-1089-CORE, *EMC and Electrical Safety Generic Criteria for Network Communications Equipment*, Issue 1 November 1997.
- Underwriters Laboratory, UL 60950/NWIN, Type 3R.
- IP55 and IP56 Rated Ingress Protection, some limitations may apply.

Table 1: *Dimensions and Weights for Zone 2 Enclosures*

NetXtend™ Flex Single Bay Outdoor Enclosure Configurations		Height [inches (mm)] (Equipment Bay w/ Solar Shield)	Depth [inches (mm)]	Width [inches (mm)]			Estimated Weight [lbs (kgs)]		
				No Side Chamber	1 Side Chamber	2 Side Chambers	No Side Chamber	1 Side Chamber	2 Side Chambers
25" Depth Enclosures	Flex 8	24.78 (630)	25.00 (635)	30.00 (762)	N/A	N/A	151 (68.5)	N/A	N/A
	Flex 12	30.07 (764)	25.00 (635)	30.00 (762)	42.00 (1067) (1067)	N/A	162 (73.5)	253 (114.8)	N/A
	Flex 17	38.82 (986)	25.00 (635)	30.00 (762)	42.00 (1067)	(1372)	175 (79.4)	290 (131.5)	TBD
	Flex 22	47.57 (1208)	25.00 (635)	30.00 (762)	42.00 (1067)	(1372)	190 (86.2)	364 (165.1)	482 (218.6)
	Flex 27	56.32 (1431)	25.00 (635)	30.00 (762)	42.00 (1067)	(1372)	203 (92.1)	TBD	TBD
32" Depth Enclosure	Flex 8	24.78 (630)	32.00 (813) (813)	30.00 (762) (762)	N/A	N/A	TBD	N/A	N/A
	Flex 12	30.07 (764)	32.00 (813)	30.00 (762)	42.00 (1067) (1067)	N/A	TBD	TBD	N/A
	Flex 17	38.82 (986)	32.00 (813)	30.00 (762)	42.00 (1067)	(1372)	196 (88.9)	TBD	TBD
	Flex 22	47.57 (1208)	32.00 (813)	30.00 (762)	42.00 (1067)	(1372)	TBD	TBD	TBD
	Flex 27	56.32 (1431)	32.00 (813)	30.00 (762)	42.00 (1067)	(1372)	234 (106.1)	TBD	TBD
	Flex 32	65.07 (1653)	32.00 (813)	30.00 (762)	N/A	N/A	252 (114.3)	N/A	N/A

N/A = Not available in this configuration.

Table 2: *Dimensions and Weights for Zone 4 Enclosures*

NetXtend™ Flex Single Bay Outdoor Enclosure Configurations		Height [inches (mm)] (Equipment Bay w/ Solar Shield)	Depth [inches (mm)]	Width [inches (mm)]			Estimated Weight [lbs (kgs)]		
				No Side Chamber	1 Side Chamber	2 Side Chambers	No Side Chamber	1 Side Chamber	2 Side Chambers
25" Depth Enclosures	Flex 8	24.78 (630)	25.00 (635)	30.00 (762)	N/A	N/A	151 (68.5)	N/A	N/A
	Flex 12	30.07 (764)	25.00 (635)	30.00 (762)	42.00 (1067)	N/A	162 (73.5)	253 (114.8)	N/A
	Flex 17	38.82 (986)	25.00 (635)	30.00 (762)	42.00 (1067)	54.00 (1372)	175 (79.4)	290 (131.5)	TBD
	Flex 22	47.57 (1208)	25.00 (635)	30.00 (762)	42.00 (1067)	54.00 (1372)	190 (86.2)	364 (165.1)	482 (218.6)
	Flex 27	56.32 (1431)	25.00 (635)	30.00 (762)	42.00 (1067)	54.00 (1372)	203 (92.1)	TBD	TBD
32" Depth Enclosure	Flex 8	24.78 (630)	32.00 (813) (813)	30.00 (762) (762)	N/A	N/A	TBD	N/A	N/A
	Flex 12	30.07 (764)	32.00 (813)	30.00 (762)	42.00 (1067) (1067)	N/A	TBD	TBD	N/A
	Flex 17	38.82 (986)	32.00 (813)	30.00 (762)	42.00 (1067)	54.00 (1372)	196 (88.9)	TBD	TBD
	Flex 22	47.57 (1208)	32.00 (813)	30.00 (762)	42.00 (1067)	54.00 (1372)	TBD	TBD	TBD
	Flex 27	56.32 (1431)	32.00 (813)	30.00 (762)	42.00 (1067)	54.00 (1372)	234 (106.1)	TBD	TBD
	Flex 32	65.07 (1653)	32.00 (813)	30.00 (762)	N/A	N/A	252 (114.3)	N/A	N/A

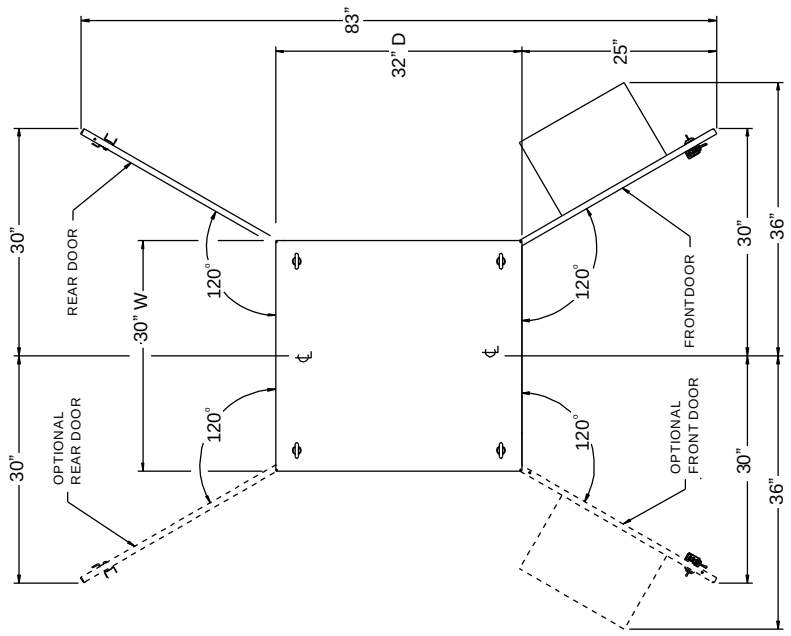
N/A = Not available in this configuration.

Table 3: *Available Equipment Rack Space - Relay Rack Units (RU)*

NetXtend™ Flex Single Bay Outdoor Enclosure Configurations	Fixed Racks / Integrated Racks			Swing Rack (enclosures with front access only)		
	RU[1]	Inches	mm	RU[1]	Inches	mm
Flex 8	8	14.00	356	N/A	N/A	N/A
Flex 12	12	21.00	534	10	17.50	444
Flex 17	17	29.75	756	15	26.25	667
Flex 22	22	38.50	978	20	35.00	889
Flex 27	27	47.25	1201	25	43.75	1111
Flex 32	32	56.00	1423	29	50.75	1289

1 1RU = 1.75"
2 N/A - Not available in this enclosure size.
3 Swing frame is not an option in Zone 4 enclosures.

Figure 2: *Approximate Area Required for Installing 30"x32" Cabinets (Use same footprint area for 30"x25")*



Width X Depth	Heights	8RU	12RU	17RU	22RU	27RU	32RU
30" x 25" OR 30" x 32"	H - Z2	15.50	15.50	15.50	15.50	15.50	15.50
	H - Z4	15.50	15.50	15.50	15.50	15.50	15.50
	H1 - Z2 & Z4	23.33	30.33	39.08	47.83	56.98	65.33
	H2 - Z2	38.87	45.87	54.62	63.37	72.00	80.87
	H2 - Z4	38.87	45.87	54.62	63.37	72.00	80.87
	H3 - Z2 & Z4	15.50	22.50	31.25	40.00	48.75	57.62

H - Z2 : Battery Base Height Zone 2
H - Z4 : Battery Base Height Zone 4
H1 - Z2 & Z4 : Cabinet Height Zone 2 & 4
H2 - Z2 : Cabinet Height with Battery Base Zone 2
H2 - Z4 : Cabinet Height with Battery Base Zone 4
H3 - Z2 & Z4 : Equipment Height Zone 2 & 4

Figure 3: *Enclosure Assembly with Battery Chamber (30"x32", 30"x25")*

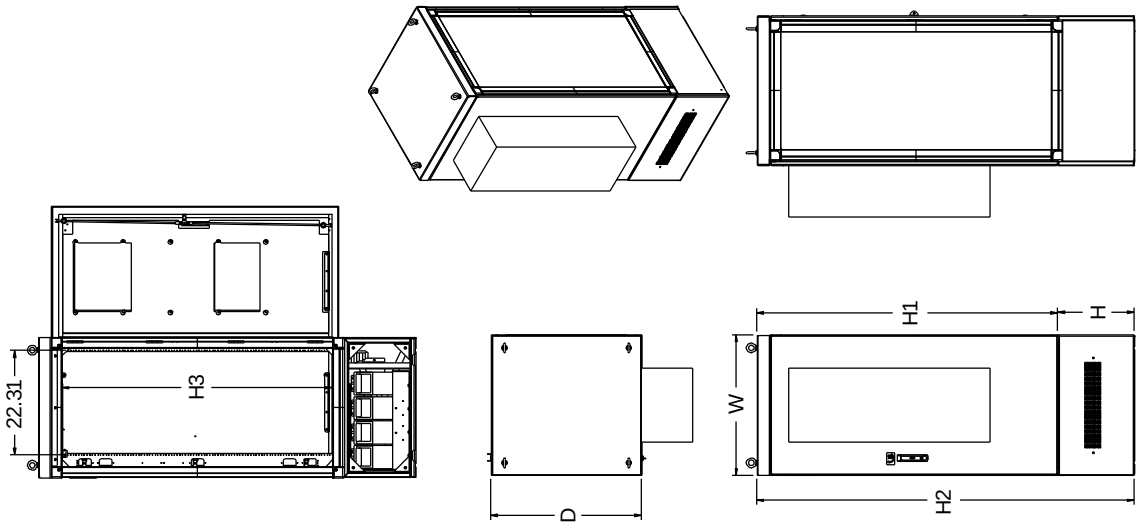


Figure 4: *Enclosure Assembly with Battery Chamber (42"x32", 42"x25")*

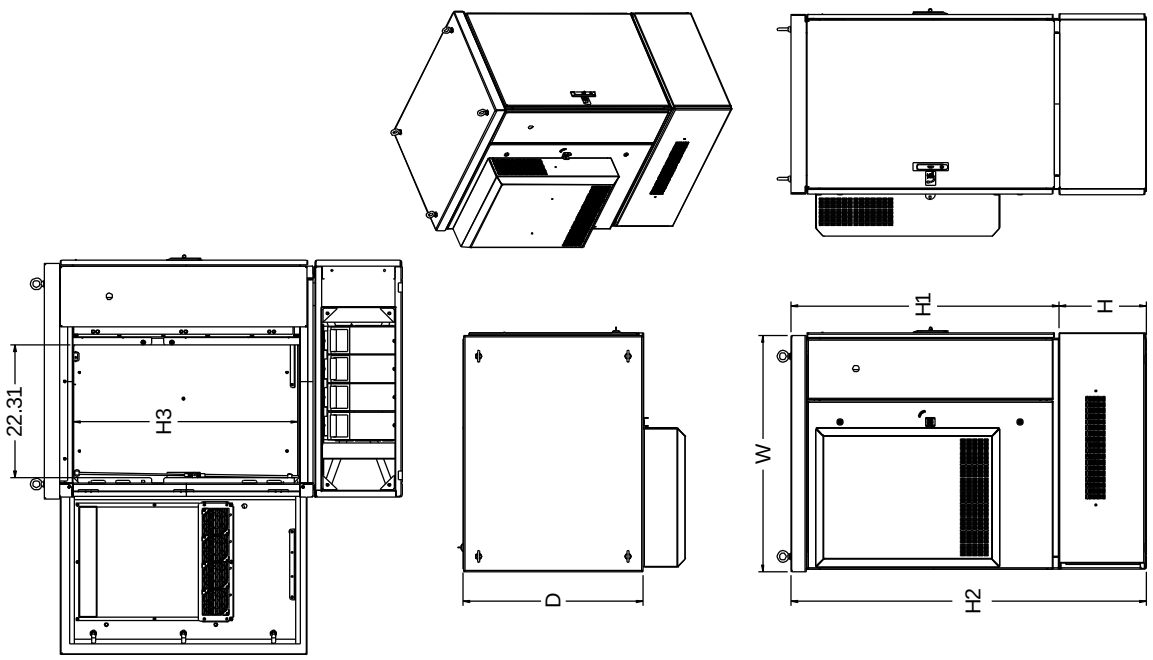
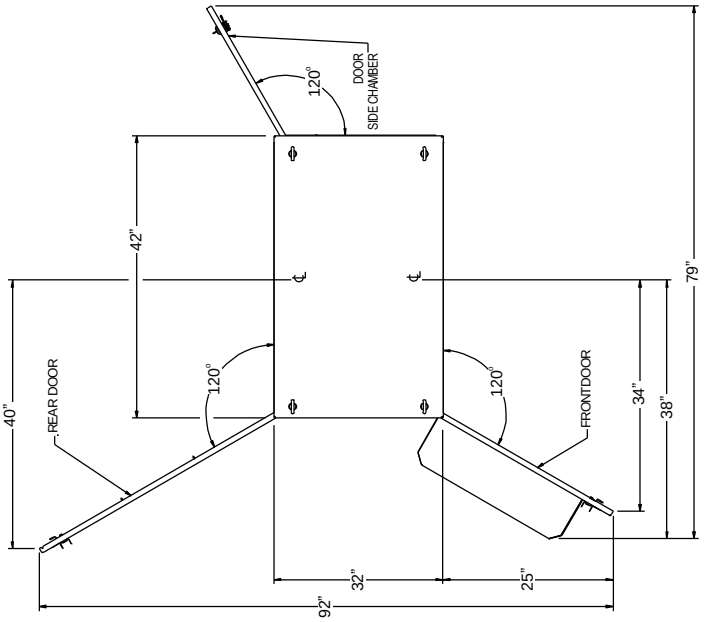


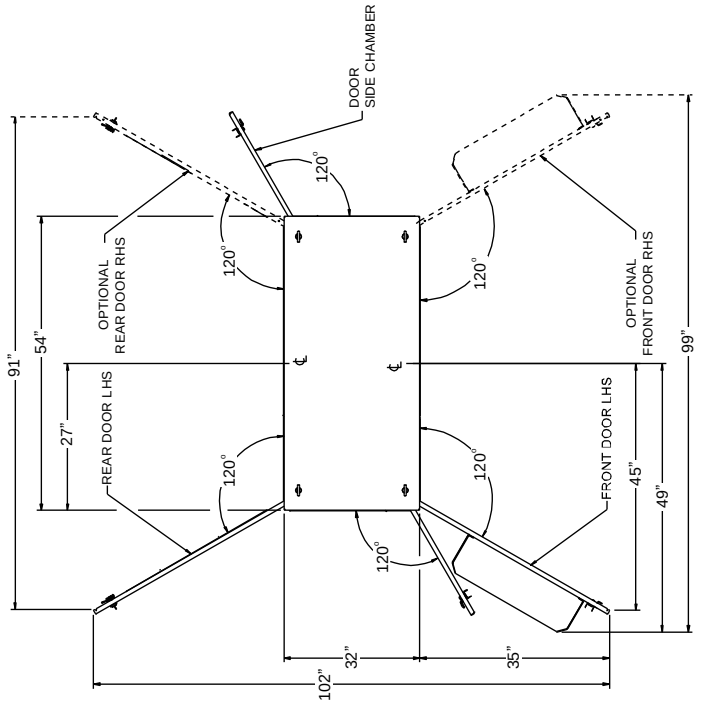
Figure 5: *Approximate Area Required for Installing 42"x32" Cabinets (Use same footprint area for 42"x25")*



Width X Depth	Heights	8RU	12RU	17RU	22RU	27RU	32RU
42" x 25" OR 42" x 32"	H - Z2	N/A	15.50	15.50	15.50	15.50	N/A
	H - Z4	N/A	15.50	15.50	15.50	15.50	N/A
	H1 - Z2 & Z4	N/A	30.33	39.08	47.83	56.98	N/A
	H2 - Z2	N/A	45.87	54.62	63.37	72.00	N/A
	H2 - Z4	N/A	45.87	54.62	63.37	72.00	N/A
	H3 - Z2 & Z4	N/A	22.50	31.25	40.00	48.75	N/A

H - Z2 : Battery Base Height Zone 2
H - Z4 : Battery Base Height Zone 4
H1 - Z2 & Z4 : Cabinet Height Zone 2 & 4
H2 - Z2 : Cabinet Height with Battery Base Zone 2
H2 - Z4 : Cabinet Height with Battery Base Zone 4
H3 - Z2 & Z4 : Equipment Height Zone 2 & 4

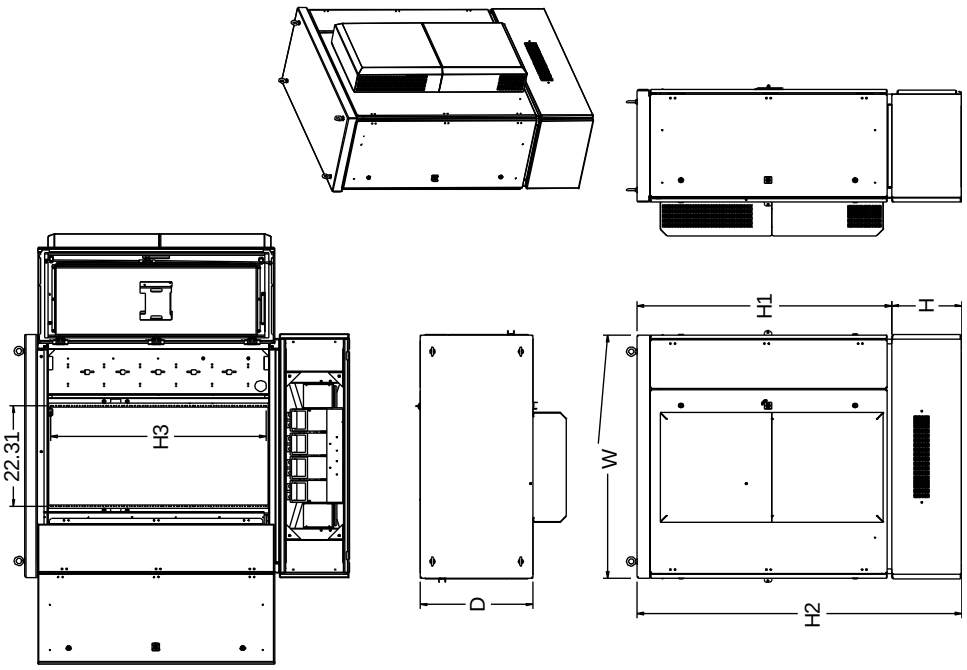
Figure 6: *Approximate Area Required for Installing 54"x32" Cabinets (Use same footprint area for 54"x25")*



Width X Depth	Heights	8RU	12RU	17RU	22RU	27RU	32RU
54" x 25" OR 54" x 32"	H - Z2	N/A	N/A	14.00	14.00	14.00	N/A
	H - Z4	N/A	N/A	15.50	15.50	15.50	N/A
	H1 - Z2 & Z4	N/A	N/A	39.08	47.83	56.98	N/A
	H2 - Z2	N/A	N/A	53.00	61.87	70.62	N/A
	H2 - Z4	N/A	N/A	54.62	63.37	72.00	N/A
	H3 - Z2 & Z4	N/A	N/A	31.25	40.00	48.75	N/A

H - Z2 : Battery Base Height Zone 2
H - Z4 : Battery Base Height Zone 4
H1 - Z2 & Z4 : Cabinet Height Zone 2 & 4
H2 - Z2 : Cabinet Height with Battery Base Zone 2
H2 - Z4 : Cabinet Height with Battery Base Zone 4
H3 - Z2 & Z4 : Equipment Height Zone 2 & 4

Figure 7: *Enclosure Assembly with Battery Chamber (54"x32", 54"x25")*



Enclosure Features and Options

Mechanical

- **Construction** - Side walls, panels, and floors and doors are 0.125 inch (3.2mm) aluminum.
- **Doors** - The NetXtend™ Flex outdoor enclosure has environmentally sealed doors. Front and rear doors provide access to the equipment chamber containing the system equipment. Side doors provide access to side chambers.
  - All doors are equipped with a locking mechanism that allows installation of a customer provided padlock and a security bolt.
  - A hex/pin (T-handle tool) or 216 (can wrench) security tool opens the security bolt.
  - The doors have intrusion alarm switches, and self-locking wind latches which secure the door open during installation or maintenance activities. See **Figure 8**.
  - The enclosure doors are hinged and each has environmental seal gaskets. EPDM rubber is used for door and seam seals.
- **Locking Mechanisms** - Swing handle with three-point rod-latch mechanism or 1/4 turn latches are available. Both have provisions for customer provided padlock for additional security.
- **Equipment Chambers** - Standard equipment chambers are 30 inches (762mm) in width and are available in either 25 inch (635mm) or 32 inch (813mm) depths. See **Figure 8**.
- **Side Chambers** - Each side chamber will add 12 inches (305mm) to enclosure width.
- **Rack Sizes** - Accommodates either 19" or 23" width integrated racks with EIA hole spacing. Swing frames are available in 23" widths. Refer to **Figure 8**.
- **Solar Shield** - A solar shield is standard on all enclosures.
- **Document Holder Option** - Available for select enclosure with standard doors.
- **Computer Shelf Option** - Available for select enclosure with standard doors and document holder.

Figure 8: *Door Intrusion Switch (typical view)*

Climate Control

- **Climate Control Options** - The NetXtend™ Flex outdoor enclosures are offered with a variety of climate control options depending upon enclosure size as shown in **Table 4**.

Table 4: *Climate Control Options*

		Flex 8	Flex 12	Flex 17	Flex 22	Flex 27	Flex 32
Heat Exchangers (-48Vdc & + 24Vdc)	**1000W**	✓	✓	✓	✓	✓	N/A
	1450W	N/A	N/A	✓	✓	✓	✓
	2800W	N/A	N/A	N/A	N/A	✓	✓
Thermoelectric Coolers (-48Vdc & +24Vdc)	**200W**	✓	✓	✓	✓	✓	N/A
	400W (2x200W)	N/A	N/A	N/A	N/A	✓	✓
Air Conditioners	**850 BTU**	✓	✓	N/A	N/A	N/A	N/A
	2000 BTU	N/A	✓	✓	✓	✓	✓
	4000 BTU	N/A	N/A	✓	✓	✓	✓
	8000 BTU	N/A	N/A	N/A	N/A	✓	✓
	19000 BTU	N/A	N/A	N/A	N/A	✓	✓
Fan Filter Assembly (-48Vdc & +24Vdc)	**Hydrophobic**	N/A	*	✓	*	✓	*
	Standard	✓	*	✓	*	✓	*

1. N/A - Not available in this enclosure size.
2. Heat Exchanger rating based on 19°C delta T: 65°C operating and 46°C ambient.
3. Enclosure solar load is not reflected in heat exchanger loads listed. This will vary by enclosure size.
4. * - this indicates climate option can be provided upon request.

- **Heat Exchangers** - Heat exchangers are available to properly cool electronics without the mixing of outside air, thus maintaining the enclosure sealed from the outside environment. These heat exchangers require no refrigerant, feature low-energy consumption fans, and will continue to function when AC line power is lost because they are DC powered.
- **Thermoelectric Coolers (TEC)** - Thermoelectric solid-state heat pump (Peltier) coolers provide cooling and heating without moving parts that tend to wear out. These are DC powered coolers, as well as the solid state cooling modules, and the internal and external air-moving fans. Also, the TEC acts as a 200W heater when the Environmental Control Unit (ECU) reverses the DC polarity to the TEC, thereby reversing the hot side and cold side.

- **Air Conditioners** – Air conditioners are offered in several cooling capacities. Units are equipped with adjustable thermostat controls to maintain desired equipment temperatures. AC heaters are included with each air conditioner to maintain internal enclosure temperatures during cold climate conditions. Air conditioners are AC powered, and are Freon-based vapor compression devices. The heaters are electric strip type, integral to the a/c unit.
- **Fan Filter Assembly** - Fan filter assemblies are offered for ventilated cabinet solutions. Assemblies can be provided with standard air filter or a hydrophobic filter, which mounts to front door. This is typically offered with an exhaust assembly that is typically mounted to the cabinet rear.

Controller

- Microprocessor based Environmental Control Unit (ECU) for climate control (heat exchanger and thermoelectric coolers only) and alarming functions. Air conditioners are controlled via their internal controls.

Battery Options

All standard battery options are designed to support or house front post VRLA type batteries.

Maximum Battery Dimensions:	21.1 (561mm) Depth x 4.9" (124mm) Width x 12.6" (316 mm]) height.
Maximum Battery Weight:	132 lbs (59.87 kg) each

- **Battery Storage** - Either internal or external battery compartments are available. External compartments are designed to meet GR-487 requirements.
- **Battery Racks and Shelves** - Provisions to add battery shelf in 23" configurations.
- **Battery Heater Pad** - Battery heater pad available for external battery compartment and battery riser base kits.
- **External Battery Compartment** - External compartments are designed to meet GR-487 requirements. Battery compartment is vented to prevent outgas buildup.
- **Internal Battery Storage** - Provisions to store battery shelves in the equipment for 23"rack width configurations. Vented roof or rear removable panel filter or both will be provided with this solution to prevent battery outgas buildup. Each battery shelf can support up to four front post VRLA batteries.
- **External Battery Riser Kit** - External battery riser base is available to support two strings of -48Vdc front post battery strings or four +24Vdc battery strings, which is equivalent to eight front post VRLA batteries. The riser base is two stacked battery compartments that are ventilated, 31-inch height (787.4 mm).
- **H-Frame Kits** - Kits are available for applicable enclosure. Zone 4 kits are also available.

Rack Units

- Refer to **Table 3** for available rack space per equipment bay.

AC Power Options

- **AC Load Center** - When ordered, a Square D type QO® 100A 8-position or 125A 12-position, 120/240VAC load center will be located in the rear of the equipment chamber or side chamber.

- **AC Junction Box** - When ordered, will be located in the equipment chamber in a 115VAC, 60 Hz, single phase 4x4 AC receptacle kit. The kit also includes a 15 amp 115VAC GFI receptacle. Can also be specified with twist-lock receptacles.
- **AC Junction Box (Twist Lock)** - 220Vac, 15A and 220Vac, 30A 4"x4" boxes with twist lock receptacles.
- **Ground Fault Circuit Interrupter (GFCI) Outlets** – 15A GFCI outlets are available and can be located in the equipment bay or side chambers.
- **AC Generator Options** - Two generator inlet kit options are available, 30A and 60A, to supply AC to the enclosure during a commercial power outage.

Grounding

- **Main Ground Bar (MGB)** - A 10-position dual lug ground bar is included as standard. For enclosures without side chambers, the MGB will be located in the rear of the equipment chamber. When side chambers are specified, a ground bar will be located in each side chamber and one will not be included in the equipment chamber. When two ground bars are present, the customer must designate one as the MGB. The ground bars have 1/4" studs on 5/8" centers and use 2-hole lugs.
- **Isolated Ground Bar Option** - An additional 10-position dual hole isolated ground bar can be added to enclosures if more ground points are required. A ground cable is also included to connect the isolated ground bar to main ground bar.

Mounting Options

Refer to **Table 5**.

- **Pad Mounting** - A pour-in-place pad template is available for all enclosure sizes. A rubber gasket is also included to prevent corrosion between the concrete pad and the enclosure mounting surfaces.
- **Mounting Plinth** - A 6-inch (152.4 mm) mounting plinth is available. Provides openings for cable entrance and accessibility.
- **Pole Kits** - Both chair and bracket style pole kits are available for applicable enclosures. Refer to **Table 5** for availability.
- **Battery Riser Kit** - Two stacked battery compartments, ventilated, 31-inch height (787.4 mm).

Table 5: *Available Mounting Accessories, Zone 2*

NetXtend™ Flex Single Bay Outdoor Enclosure Configurations		Available Mounting Accessories				
		Pad Template	Pole Kit (Chair)	Pole/ Wall Kit (Bracket)	6" Plinth	H-Frame Kit
25" Depth Enclosure	**No Side Chamber 30"W x 25"D (762mm x 635mm)**	F1009326	F1009327	F1009328	F1010143	F1010386
	1 Side Chamber 42"W x 25"D (1067mm x 635mm)	F1009331	F1009341	--	F1010112	N/A
	2 Side Chambers 54"W x 25"D (1372mm x 635mm)	F1009333	F1009342	--	N/A	N/A
32" Depth Enclosure	**No Side Chamber 30"W x 32"D (762mm x 813mm)**	F1009332	F1009343	--	F1010144	F1010564
	1 Side Chamber 42"W x 32"D (1067mm x 813mm)	F1010064	N/A	--	F1010113	N/A
	2 Side Chambers 54"W x 32"D (1372mm x 813mm)	F1010065	N/A	--	N/A	N/A
42" Depth Enclosure	**1 Side Chamber 32"W x 42"D (813mm x 1067mm)**	---	F1010165	--	N/A	N/A
	2 Side Chambers 25"W x 42"D (635mm x 1067mm)	---	F1010372	--	N/A	N/A

Reference Installation Manuals:

- NetXtend™ Flex Pole Mount Installation Practice (Chair Style) - 631-205-401
- NetXtend™ Flex Pole Mount Installation Practice (Bracket Style) - 631-205-402
- NetXtend™ Flex H-Frame Mounting Kit- 631-205-117

Table 6: *Available Mounting Accessories for Zone 4 Pad, Zone 4 Pole (Chair), H-Frame Zone 4, 6" Plinth Zone 4*

NetXtend™ Flex Single Bay Outdoor Enclosure Configurations		Available Mounting Accessories			
		Pad Template	Pole Kit (Chair)	6" Plinth	H-Frame Kit
25" Depth Enclosure	**No Side Chamber 30"W x 25"D (762mm x 635mm)**	F1009326	F1010429	F1010423	F1010416
	1 Side Chamber 42"W x 25"D (1067mm x 635mm)	F1009331	F1010431	F1010425	F1010418
	2 Side Chambers 54"W x 25"D (1372mm x 635mm)	F1009333	F1010432	N/A	F1010419
32" Depth Enclosure	**No Side Chamber 30"W x 32"D (762mm x 813mm)**	F1009332	F1010430	F1010424	F1010417
	1 Side Chamber 42"W x 32"D (1067mm x 813mm)	F1010064	F1010515	F1010426	F1010420
	2 Side Chambers 54"W x 32"D (1372mm x 813mm)	F1010065	F1010514	N/A	F1010421

Reference Installation Manuals for Zone 4:

- NetXtend™ Flex Pole-Mount (Chair Style) Kit - Zone 4 - 631-205-414
- NetXtend™ Flex 20 Enclosure - 631-205-418
- NetXtend™ Flex Pole Mount, Zone 4 - 631-205-414
- NetXtend™ Flex H-Frame Mount, Zone 4 - 631-205-118

Cable Entry

- **Cable Cones** - A minimum of two cable cones are provided with each standard enclosure. Enclosures without side chambers are equipped with 3-inch (76.2mm) cable cones. Enclosures with side chambers are equipped with 4-inch (101.6mm) cable cones.

Protection Options

- **M307 100** - pair protection blocks with multiple wiring patterns and connectors are available.

PREPARATION AND PRECAUTIONS

Installation Overview

The following is the recommended sequence for the installation and start-up procedures. The sequence may change according to job and site conditions.

1. Ensure all site drawings and approvals are in place.
2. Obtain the recommended tools and test equipment.
3. Read the "Safety and Precautions" section carefully.
4. Check that all the equipment and materials have been delivered.
5. Proceed with the physical installation of the NetXtend™ Flex outdoor enclosure.
6. Install and verify ground cables.
7. Install and verify the AC power.
8. Install and verify the DC power, if applicable.
9. Install and verify the batteries.
10. Route, splice and verify the OSP fiber and copper cables.
11. Turn-up, verify and adjust the system.

Tools and Test Equipment

The following tools, test equipment and material may be required for the physical installation of the NetXtend™ Flex outdoor enclosures:

- Can wrench for $^{7}/_{16}$ socket for 216 door security or T-Handle wrench for hex/pin door security;
- Non-contact voltage detector;
- Digital multimeter (DMM), 0 to 200Vdc, 0 to 300 VAC;
- Torque wrench, $^{1}/_{2}$" drive, recommended;
- Ratchet, $^{1}/_{2}$" drive, $^{3}/_{8}$" drive and $^{1}/_{4}$" drive;
- Socket, $^{3}/_{4}$" deep, $^{1}/_{2}$" drive;
- Socket set, range from $^{1}/_{4}$" to $^{3}/_{4}$";
- 3" and 6" extensions, $^{1}/_{2}$" drive;
- $^{5}/_{16}$" and $^{7}/_{16}$" ratchet wrench;
- 36" carpenter's level;
- Lineman's scissors;
- Lineman's strippers;

- Lineman's cutters;
- Crimping tool with dies from #6 AWG to #2 AWG;
- Electrician's insulated screwdrivers, Phillips, No. 1 and 2;
- Electrician's insulated screwdrivers, flat-blade, small and large;
- Insulated $^{3}/_{8}$", M6, M8, M10 nut drivers for battery installation;
- "Foam sealant (to seal cables entering the enclosure);
- or approved equivalent.

NOTE! *Outside the scope of this document, are the tools to fish, splice and terminate OSP Cables and laptop to setup the power system controller.*

NOTE! *Equipment associated with lifting the enclosures by the eyehooks is listed separately, in a subsequent section.*

NOTE! *Torque values may be listed and, unless directed otherwise, values are for reference only.*

General Safety and Precautions

The following precautions shall be observed at all time when handling and installing the NetXtend™ Flex outdoor enclosures:

- Observe the general safety precautions against personal injury and equipment damage.
- The procedures outlined in this manual are only recommended guidelines. Ensure that all regional and local codes for safety and wiring are followed.
  - Use listed two-hole compression connectors (lugs) to terminate all ground connections. Selected lug shall match wire and type, and crimped applied as specified by the lug manufacturer.
  - Apply to all ground connections.
  - Insulation of field-wire conductors should be rated no less than 105°C Celsius, and gauge in a manner that is consistent with the CEC and local codes.
- Always use a non-contact voltage detector, when approaching a cabinet, to verify no leaks or shorts are presents on the external body.
- Read “Enclosure Placement” on page 36, in its entirety prior to attempting to handle or secure the enclosure.
- Hard hats and steel-toed boots shall be worn while maneuvering the enclosure.
- Safety glasses should always be on while on-site.
- Safety gloves should be on when working in temperature extremes, with batteries, or with sharp objects, such as bare fiber.
- All electricians, operators and technicians have been trained for the task at hand.
- Keep bystanders away.

- Ensure that all personnel on site are familiar with the first-aid kit location and emergency procedures in the event of an injury.
- Never leave the cabinet unattended. If leaving the site, close and secure the enclosure.
- Follow all admonishments stated throughout document. Definitions are located on page viii earlier in document.

OPENING AND CLOSING THE ENCLOSURE DOORS

This section describes the locking mechanisms on the doors of the enclosure and explains how to open and close the doors. Refer to this section whenever instructed to open or close enclosure doors.

Available Latch Types

NetXtend™ Flex outdoor enclosures can be equipped with one of two locking mechanisms; either 1/4 turn security latches (**Figure 9**) or a swing handle, 3-point rod-latch system (**Figure 10**). When 1/4 turn security latches are specified, one latch per door will be equipped with a bracket for customer supplied padlock. The swing handle latch also includes provisions for a customer supplied padlock. Both can be keyed to accept either a 216 or hex with pin security tool.

Figure 9: *1/4-Turn Security Latches*

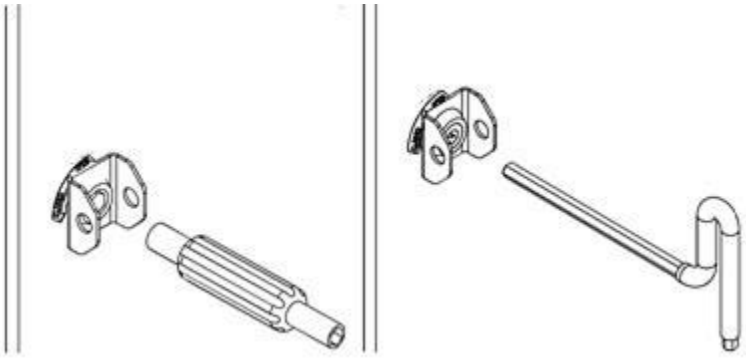


Figure 10: *Swing Handle Latch with Provision for Padlock*

Opening a Door

Perform the following steps to open a door:

Procedure

1. If required, unlock and remove the padlock from the front door latch.
2. Use the appropriate tamper-resistant wrench and turn the bolt a few degrees counter-clockwise to release the latch.
3. If using the swing handle latch, lift the latch to open the door.
4. Secure the wind latch at the bottom of the door by opening the door wide enough to engage the bushing on the end of the wind latch arm into the hole at the end of the slot in the wind latch bracket (**Figure 11**). The door is now secured.

Figure 11: *Securing the Wind Latch Assembly*

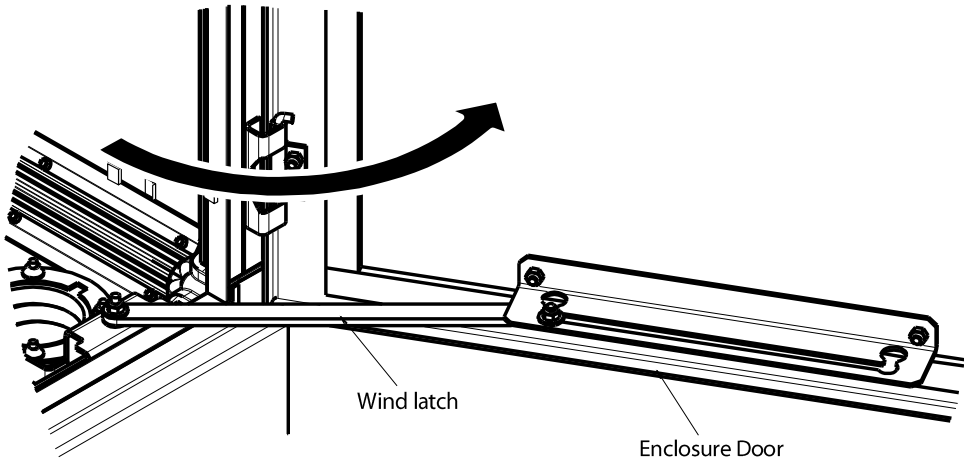
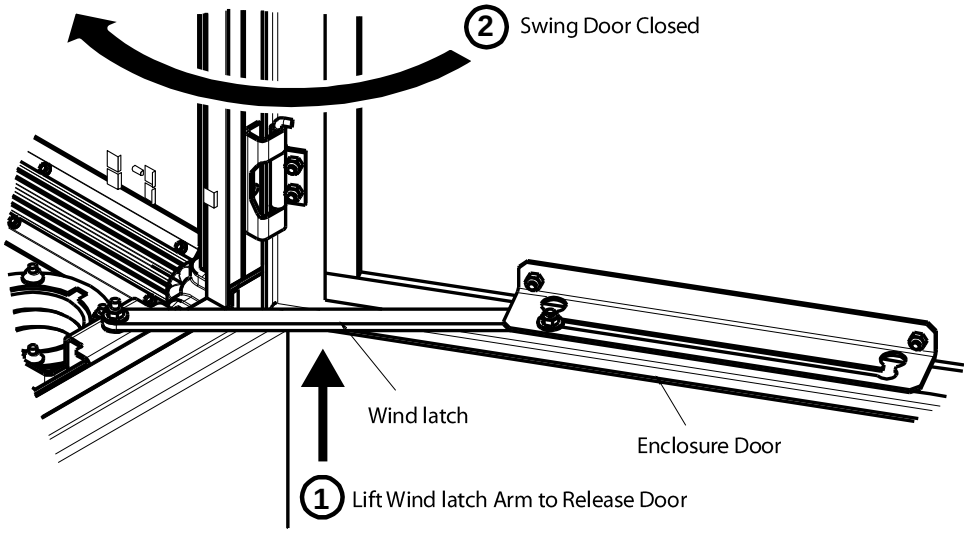


Figure 12: *Releasing the Wind Latch Assembly*



Closing a Door

Perform the following steps to close the door:

Procedure

1. Lift the wind latch arm to release the shoulder from the hole in the bar so it can slide. See **Figure 12**.
2. Close the door.
3. While holding the door closed, rotate the 1/4-turn security bolt one-quarter turn (90 degrees) toward top or bottom of the enclosure and lower the door latch into the lock bed (swing handle only).
4. Lock the door as required.
5. If required, replace padlock.

SITE SELECTION

Consider the following when selecting an existing pad or platform for enclosure placement:

- The enclosure may be installed on a new or existing concrete pad or metal platform. Obtain rights-of-way and other permits (building permit, electrical permit, etc.), depending on local codes and authorities, prior to installing the enclosure.
- The mounting pad or platform must be installed (according to local practices) before the enclosure can be installed.

Consider the following when deciding on the location for the rooftop site:

- Obtain all necessary building permits and other local approvals as necessary per local building codes.
- Select locations that will provide enough space to place the mounting platform and enclosure, and provide safe working conditions.
- Select locations where there are no electrical lines that could touch the enclosure and energize it.

Consider the following when deciding on the location for the concrete pad or platform:

- Place the enclosure on servitudes, on dedicated (recorded) easements, or on property owned by the company. Avoid any unrecorded easements.
- Use public safety road and street rights of way only where there is enough space to place the enclosure and provide safe working conditions. The enclosure should be easily accessible with adequate parking to ensure safety for people and vehicles. Place the enclosure where it will not create a visual or physical obstruction to either vehicles or pedestrians.
- Select locations that will minimize accidental or intentional vandalism. Consider the use of protective posts when the enclosure is located near parking areas where vehicles could back into it. Do not place the enclosure in ditches or areas subject to flooding. Do not place the enclosure in an area where the pad is subject to vehicle loads.
- Place the enclosure at least 42 inches (106.68 cm) away from any obstruction, fence, hedge, etc. Include adequate area for craft personnel to perform maintenance procedures.
- If an area is subject to frost, choose a site free of heaving.

ALERT! All enclosure grounding and ground ring must be installed prior to turn up of enclosure.

TRANSPORTATION AND STORAGE

WARNING! UNSECURED ENCLOSURES CAN TIP OVER PRESENTING A RISK OF INJURY OR EQUIPMENT DAMAGE. Follow all appropriate local safety and handling practices when transporting the enclosure to a staging or installation site, or when storing it.

ALERT! To avoid possible damage to the enclosure, do **not** remove the packaging or pallet from the enclosure until it is delivered to the installation or staging site. Do not stack units for transportation or during storage.

ALERT! Avoid stacking of enclosures while in transportation or storage as damage may result.

ALERT! If the covering on the package appears excessively damaged, do **not** accept the enclosure from the shipper. The damaged packaging may be an indicator that the interior of enclosure is damaged even though the exterior may seem fine.

NOTE! *The enclosure is shipped in protective packaging on a wooden pallet. If ordered, batteries will be shipped on a separate pallet.*

When the components are on a pallet, use lifting equipment, such as a crane or forklift, appropriately rated for the weight of the load to raise the enclosure and pallet.

Store the enclosure upright to avoid possible damage.

ENCLOSURE PLACEMENT

Installing a Concrete Pad

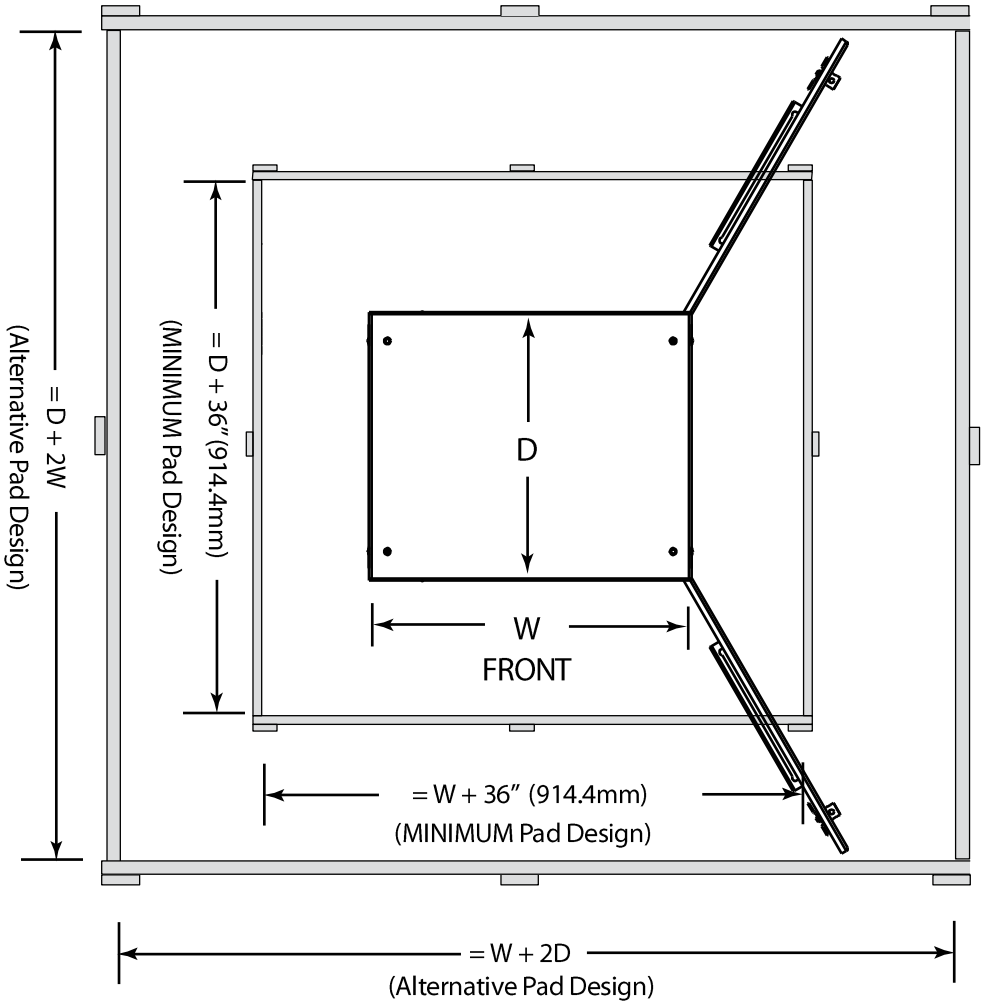
WARNING! When pad mounting, the compression strength of the concrete pad used must be a minimum of 4000 psi as determined by ASTM C39 test of compression strength of concrete cylinders.

ALERT! Due to varying enclosure sizes, before pouring concrete, confirm the pad template is properly sized for the enclosure that will be installed.

The NetXtend™ Flex outdoor enclosure can be installed on a concrete foundation pad, which is either pour-in-place or precast. Use concrete only for the foundation pad as substitute materials, such as reinforced plastics lack the rigidity required for enclosure placement.

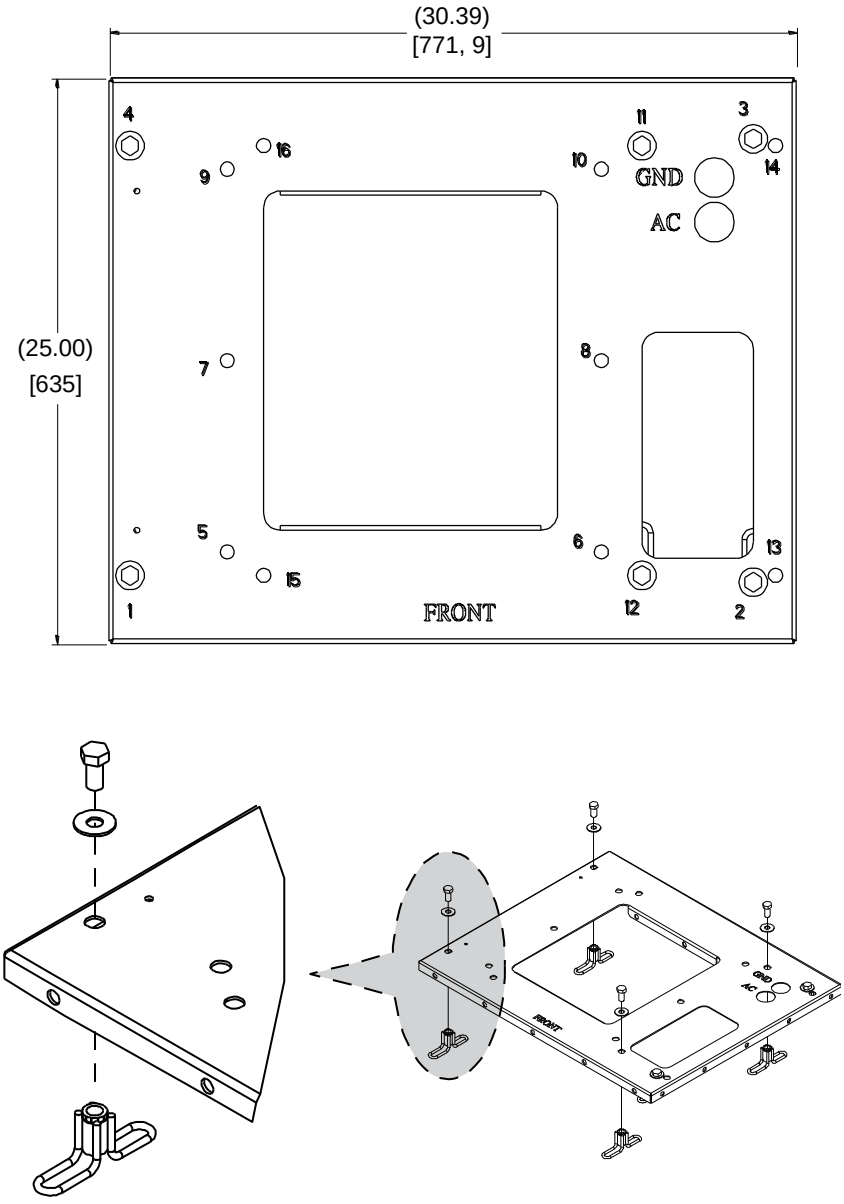
Referring to **Figure 13** determine the proper pad size for your application and space available. The MINIMUM recommend pad size extends 18" (457.2mm) past all sides of the enclosure. If space permits and it is desired, a larger pad can be constructed thus providing area to walk around the installed enclosure.

Figure 13: *Foundation Pad Design (Minimum and Alternative Design Shown)*



Referring to **Figure 14** through **Figure 25** as appropriate for your application, note conduit and mounting locations.

Figure 14: *Pour-in-Place Pad Template Diagram F1009326 [inches (30Wx25D), mm (762Wx635D)]*



NOTE! *See* ***Figure 15*** *for the Reference Table on Drill Template (P/N 558205) and for locating correct mounting holes. Place hardware as shown in* ***Figure 14*** *prior to placing pour-in-place pad template.*

Figure 15: *Drill Template (558205) 30"x25" NetXtend Cabinets*

REFERENCE TABLE FOR MOUNTING ZONE 2/4 CABINET (TABLA DE REFERENCIA PARA MONTAR GABINETES ZONA 2/4)	
CABINET Z2/Z4 MTG ON (GABINETE Z2/4 MONTADO EN)	**USE HOLE LOCATIONS (USE LOS ORIFICIOS)**
ZONE 2 ON CONCRETE PAD (ZONA 2 EN TAPETE DE CONCRETO)	5, 6, 7, 8, 9, 10
ZONE 2 ON BATTERY BASE (ZONA 2 EN BASE DE BATTERIAS)	1, 2, 3, 4, 6, 10
ZONE 2 ON PLINTH (ZONA 2 EN BASE DE ACERO)	1, 4, 11, 12, 13, 14
ZONE 2 ON PAD TEMPLATE (ZONA 2 EN PLANTILLA DE ACERO)	5, 6, 7, 8, 9, 10
ZONE 4 ON CONCRETE PAD (ZONA 4 EN TAPETE DE CONCRETO)	5, 6, 7, 8, 9, 10
ZONE 4 ON BATTERY BASE (ZONA 4 EN BASE DE BATTERIAS)	1, 2, 3, 4, 6, 10
ZONE 4 ON PLINTH (ZONA 4 EN BASE DE ACERO)	1, 2, 3, 4, 6, 10
ZONE 4 ON PAD TEMPLATE (ZONA 4 EN PLANTILLA DE ACERO)	5, 6, 7, 8, 9, 10

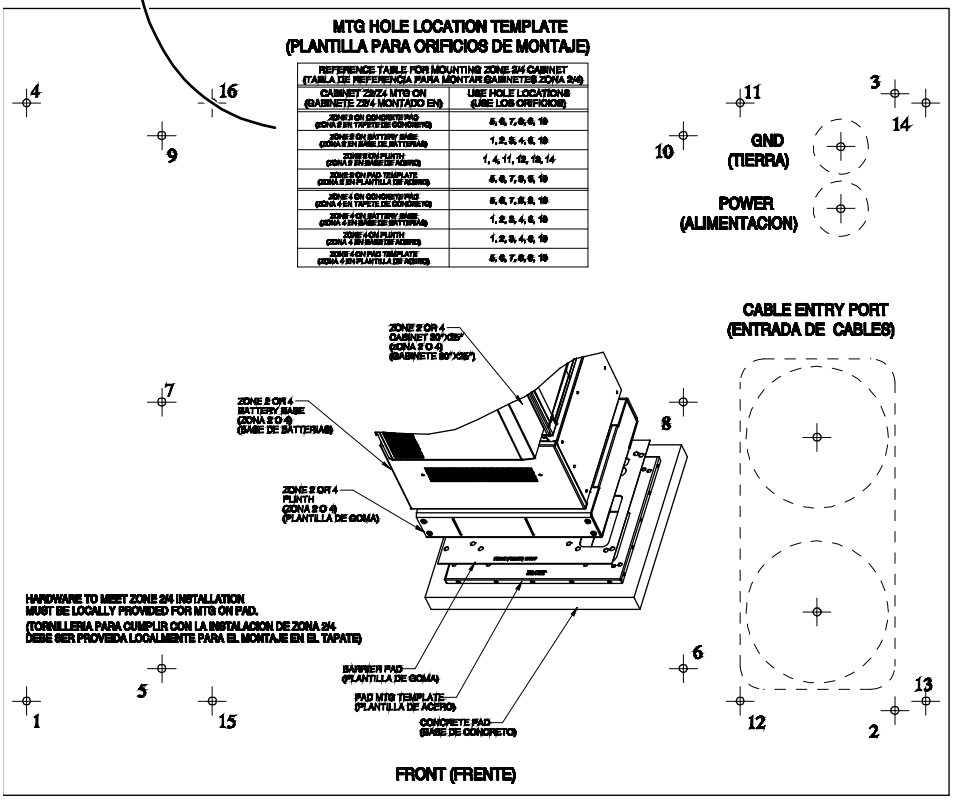
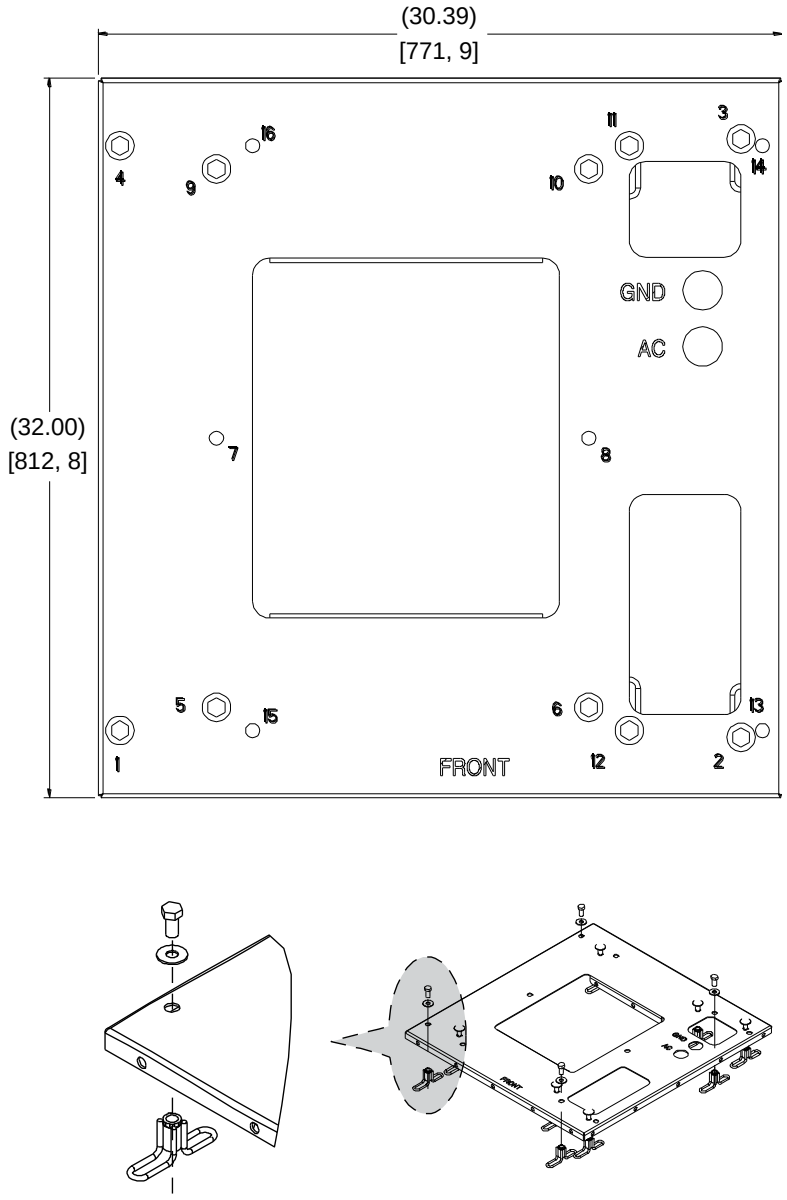
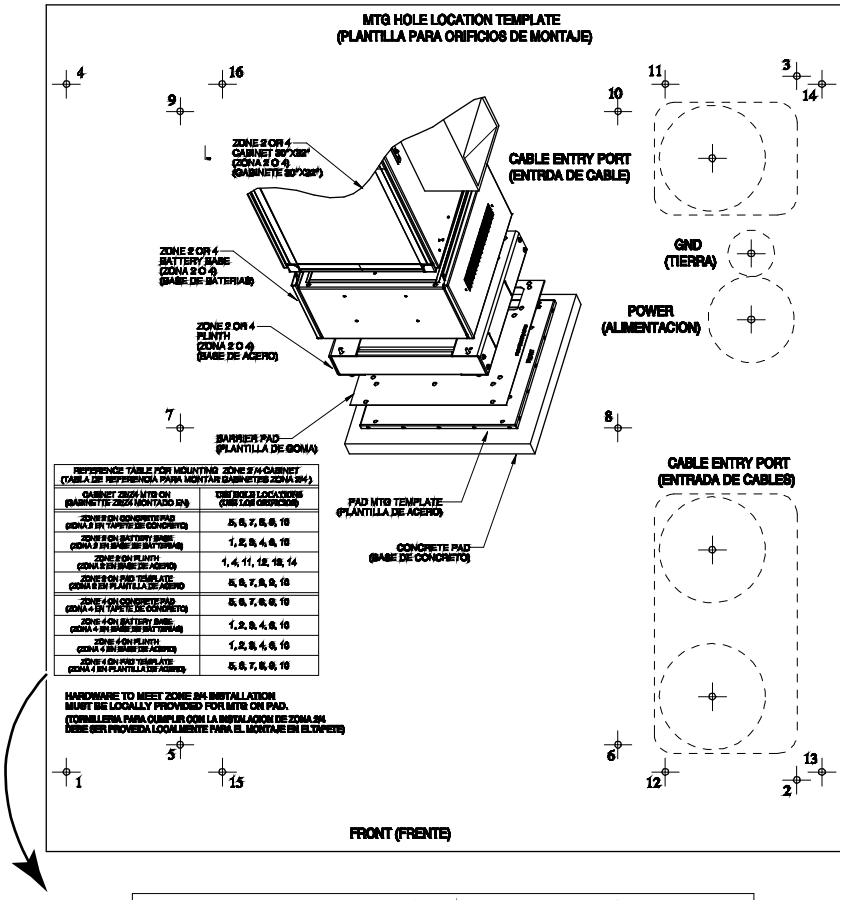


Figure 16: *Pour-in-Place Pad Template Diagram F1009332 [inches (30Wx32D), mm (762Wx813D)]*



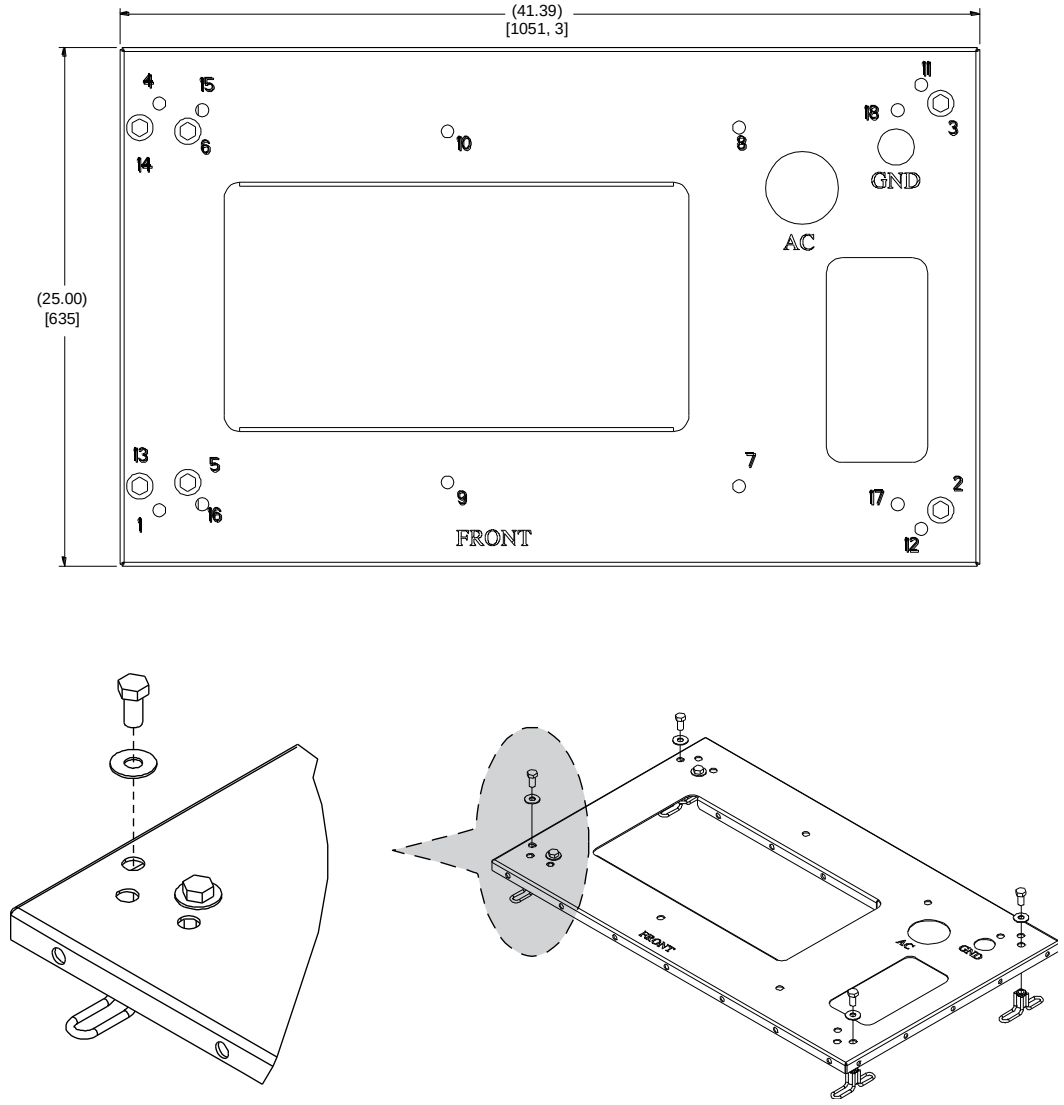
NOTE! *See* ***Figure 17*** *for the Reference Table on Drill Template (P/N 558206) and for locating correct mounting holes. Place hardware as shown in* ***Figure 16*** *prior to placing pour-in-place pad template.*

Figure 17: *Drill Template (558206) 30"x32" NetXtend Cabinets*



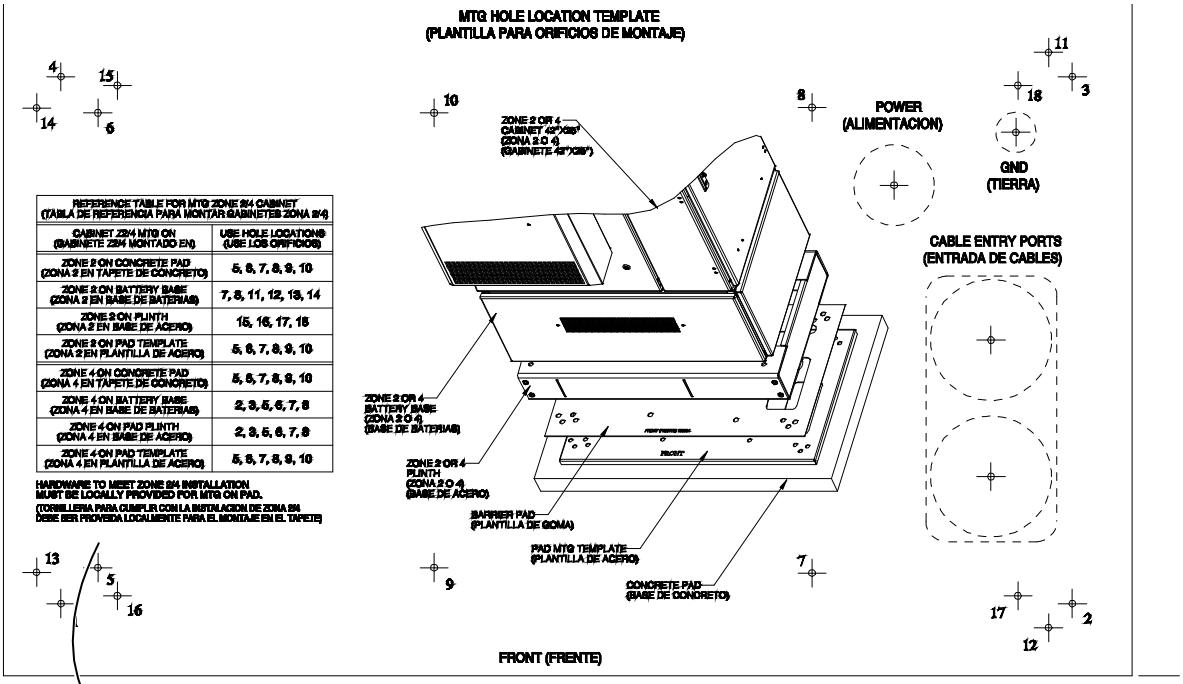
REFERENCE TABLE FOR MOUNTING ZONE 2 /4 CABINET (TABLA DE REFERENCIA PARA MONTAR GABINETES ZONA 2/4)	
CABINET Z2/Z4 MTG ON (GABINETTE Z2/Z4 MONTADO EN)	USE HOLE LOCATIONS (USE LOS ORIFICIOS)
ZONE 2 ON CONCRETE PAD (ZONA 2 EN TAPETE DE CONCRETO)	5, 6, 7, 8, 9, 10
ZONE 2 ON BATTERY BASE (ZONA 2 EN BASE DE BATTERIAS)	1, 2, 3, 4, 6, 10
ZONE 2 ON PLINTH (ZONA 2 EN BASE DE ACERO)	1, 4, 11, 12, 13, 14
ZONE 2 ON PAD TEMPLATE (ZONA 2 EN PLANTILLA DE ACERO	5, 6, 7, 8, 9, 10
ZONE 4 ON CONCRETE PAD (ZONA 4 EN TAPETE DE CONCRETO)	5, 6, 7, 8, 9, 10
ZONE 4 ON BATTERY BASE (ZONA 4 EN BASE DE BATTERIAS)	1, 2, 3, 4, 6, 10
ZONE 4 ON PLINTH (ZONA 4 EN BASE DE ACERO)	1, 2, 3, 4, 6, 10
ZONE 4 ON PAD TEMPLATE (ZONA 4 EN PLANTILLA DE ACERO)	5, 6, 7, 8, 9, 10

Figure 18: *Pour-in-Place Pad Template Diagram - F1009331 [inches (42Wx25D), mm (1067Wx762D)]s*



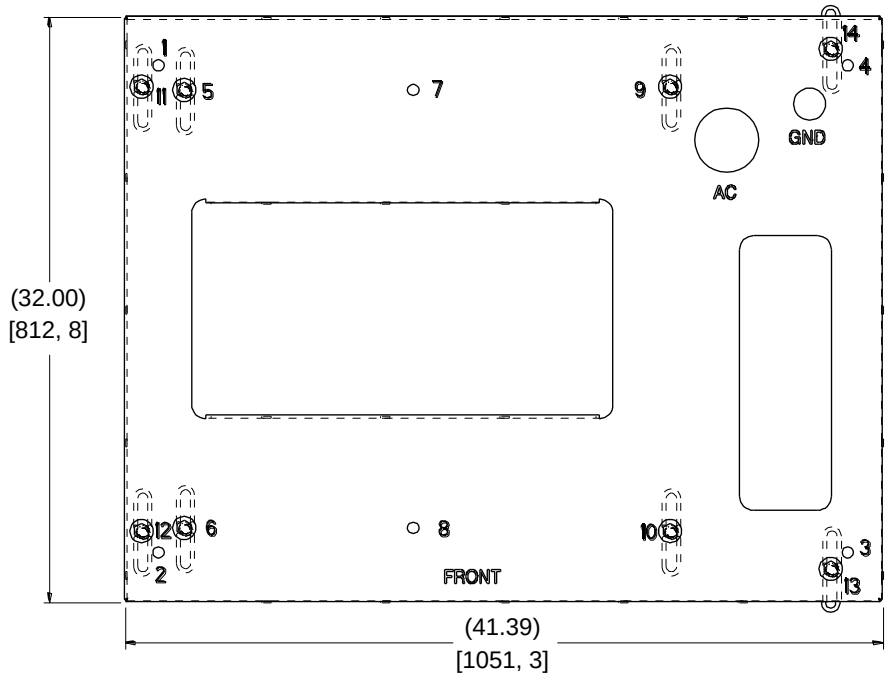
NOTE! *See* ***Figure 19*** *for the Reference Table on Drill Template (P/N 558207) and for locating correct mounting holes. Place hardware as shown in* ***Figure 18*** *prior to placing pour-in-place pad template.*

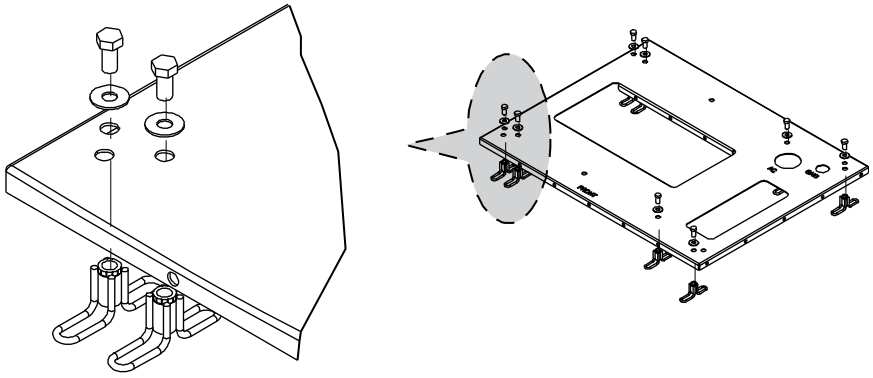
Figure 19: *Drill Template (558207) 42"x25" NetXtend Cabinets*



REFERENCE TABLE FOR MTG ZONE 2/4 CABINET (TABLA DE REFERENCIA PARA MONTAR GABINETES ZONA 2/4)	
CABINET Z2/4 MTG ON (GABINETE Z2/4 MONTADO EN)	USE HOLE LOCATIONS (USE LOS ORIFICIOS)
ZONE 2 ON CONCRETE PAD (ZONA 2 EN TAPETE DE CONCRETO)	5, 6, 7, 8, 9, 10
ZONE 2 ON BATTERY BASE (ZONA 2 EN BASE DE BATERIAS)	7, 8, 11, 12, 13, 14
ZONE 2 ON PLINTH (ZONA 2 EN BASE DE ACERO)	15, 16, 17, 18
ZONE 2 ON PAD TEMPLATE (ZONA 2 EN PLANTILLA DE ACERO)	5, 6, 7, 8, 9, 10
ZONE 4 ON CONCRETE PAD (ZONA 4 EN TAPETE DE CONCRETO)	5, 6, 7, 8, 9, 10
ZONE 4 ON BATTERY BASE (ZONA 4 EN BASE DE BATERIAS)	2, 3, 5, 6, 7, 8
ZONE 4 ON PAD PLINTH (ZONA 4 EN BASE DE ACERO)	2, 3, 5, 6, 7, 8
ZONE 4 ON PAD TEMPLATE (ZONA 4 EN PLANTILLA DE ACERO)	5, 6, 7, 8, 9, 10

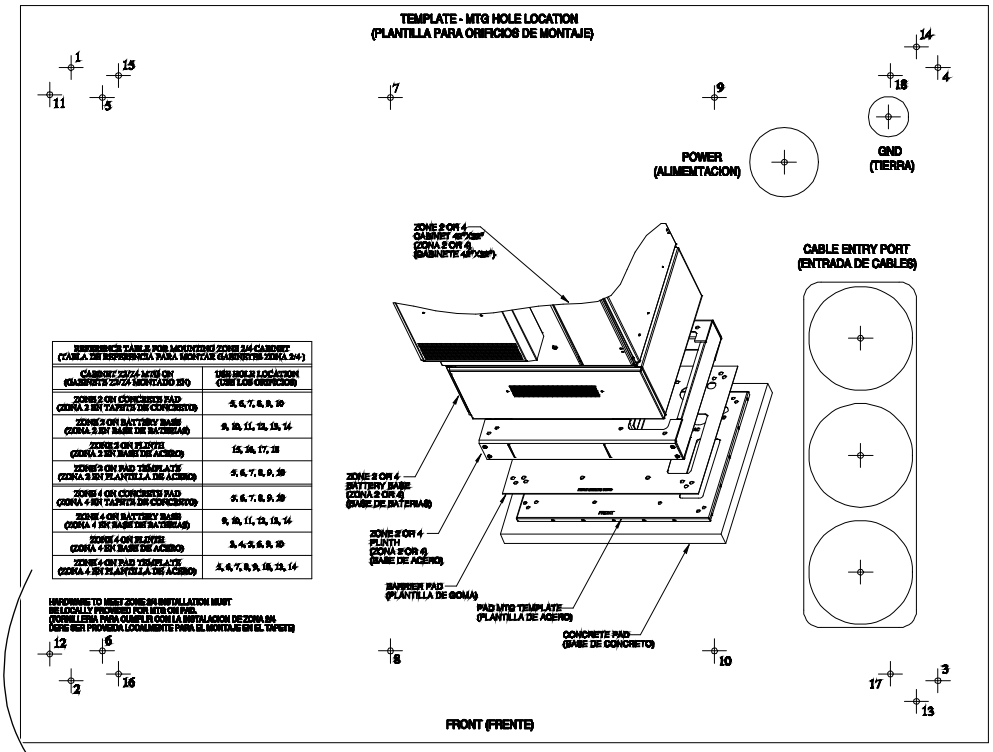
Figure 20: *Pour-in-Place Pad Template Diagram - F1010064 [inches (42Wx32D), mm (1067Wx813D)]*





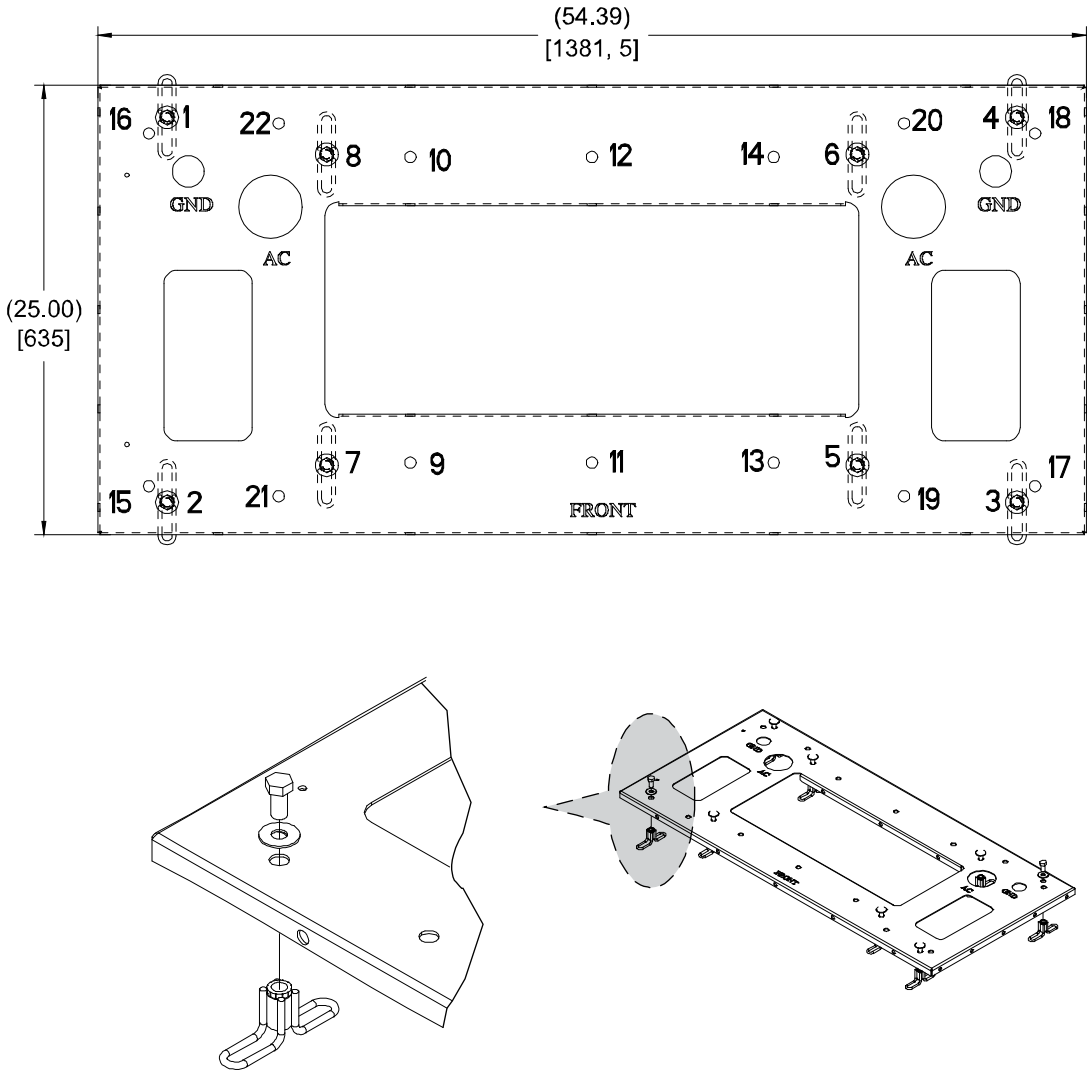
NOTE! *See* ***Figure 21*** *for the Reference Table on Drill Template (P/N 558208) and for locating correct mounting holes. Place hardware as shown in* ***Figure 20*** *prior to placing pour-in-place pad template.*

Figure 21: *Drill Template (558208) 42"x32" NetXtend Cabinets*



REFERENCE TABLE FOR MOUNTING ZONE 2/4 CABINET (TABLA DE REFERENCIA PARA MONTAR GABINETES ZONA 2/4)	
CABINET Z2/Z4 MTG ON (GABINETE Z2/Z4 MONTADO EN)	USE HOLE LOCATION (USE LOS ORIFICIOS)
ZONE 2 ON CONCRETE PAD (ZONA 2 EN TAPETE DE CONCRETO)	5, 6, 7, 8, 9, 10
ZONE 2 ON BATTERY BASE (ZONA 2 EN BASE DE BATERIAS)	9, 10, 11, 12, 13, 14
ZONE 2 ON PLINTH (ZONA 2 EN BASE DE ACERO)	15, 16, 17, 18
ZONE 2 ON PAD TEMPLATE (ZONA 2 EN PLANTILLA DE ACERO)	5, 6, 7, 8, 9, 10
ZONE 4 ON CONCRETE PAD (ZONA 4 EN TAPETE DE CONCRETO)	5, 6, 7, 8, 9, 10
ZONE 4 ON BATTERY BASE (ZONA 4 EN BASE DE BATERIAS)	9, 10, 11, 12, 13, 14
ZONE 4 ON PLINTH (ZONA 4 EN BASE DE ACERO)	3, 4, 5, 6, 9, 10
ZONE 4 ON PAD TEMPLATE (ZONA 4 EN PLANTILLA DE ACERO)	5, 6, 7, 8, 9, 10, 13, 14

Figure 22: *Pour-in-Place Pad Template Diagram - F1009333 [inches (54Wx25D), mm (1372Wx762D)]*



NOTE! *See* ***Figure 23*** *for the Reference Table on Drill Template (P/N 558210) and for locating correct mounting holes. Place hardware as shown in* ***Figure 22*** *prior to placing pour-in-place pad template.*

Figure 23: *Drill Template (558210) 54"x25" NetXtend Cabinets*

REFERENCE TABLE FOR MOUNTING ZONE 2/4 CABINET (TABLA DE REFERENCIA PARA MONTAR GABINETES ZONA 2/4)	
CABINET ZONE 2/4 MTG ON (GABINETE Z2/4 MONTADO EN)	**USE HOLES LOCATIONS (USE LOS ORIFICIOS**
ZONE 2 ON CONCRETE PAD (ZONA 2 EN TAPETE DE CONCRETO)	5, 6, 7, 8, 9, 10, 11, 12, 13, 14
ZONE 2 ON BATTERY BASE (ZONA 2 EN BASE DE BATERIAS)	1, 2, 3, 4, 5, 6, 7, 8
ZONE 2 ON PAD TEMPLATE (ZONA 2 EN PLANTILLA DE ACERO)	5, 6, 7, 8, 9, 10, 11, 12, 13, 14
ZONE 4 ON CONCRETE PAD (ZONA 4 EN TAPETE DE CONCRETO)	5, 6, 7, 8, 9, 10, 11, 12, 13, 14
ZONE 4 ON BATTERY BASE (ZONA 4 EN BASE DE BATERIAS	5, 6, 7, 8, 15, 16, 17, 18
ZONE 4 ON PAD TEMPLATE (ZONA 4 EN PLANTILLA DE ACERO)	5, 6, 7, 8, 9, 10, 11, 12, 13, 14

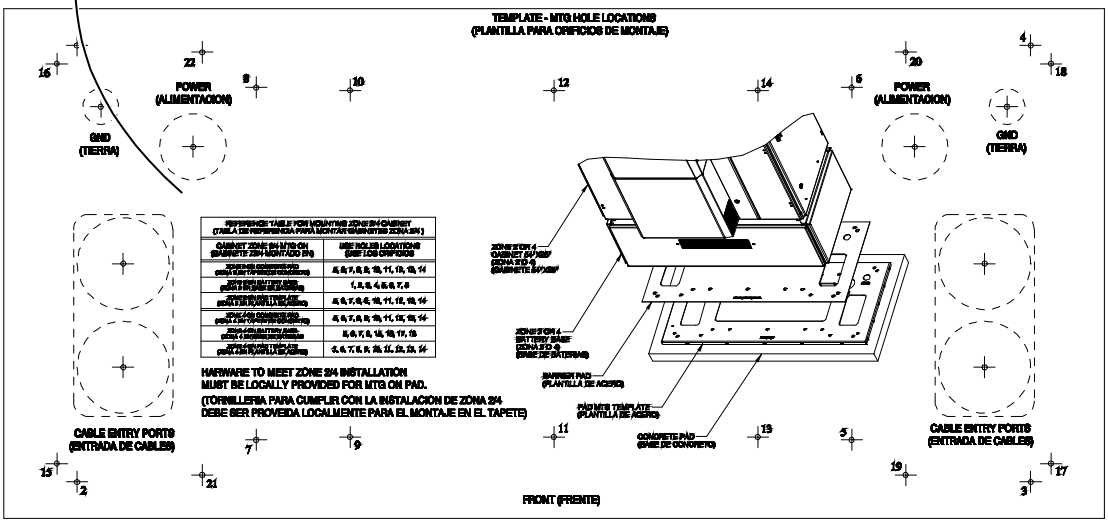
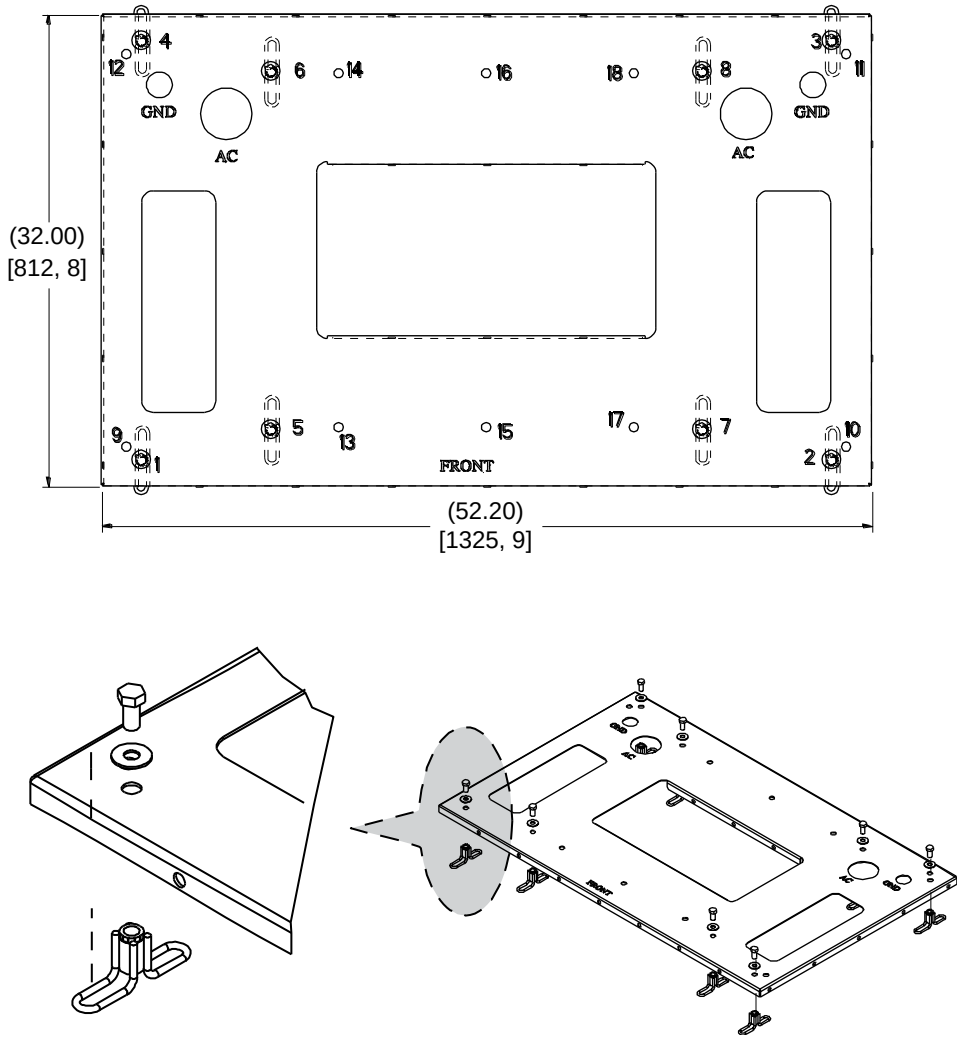
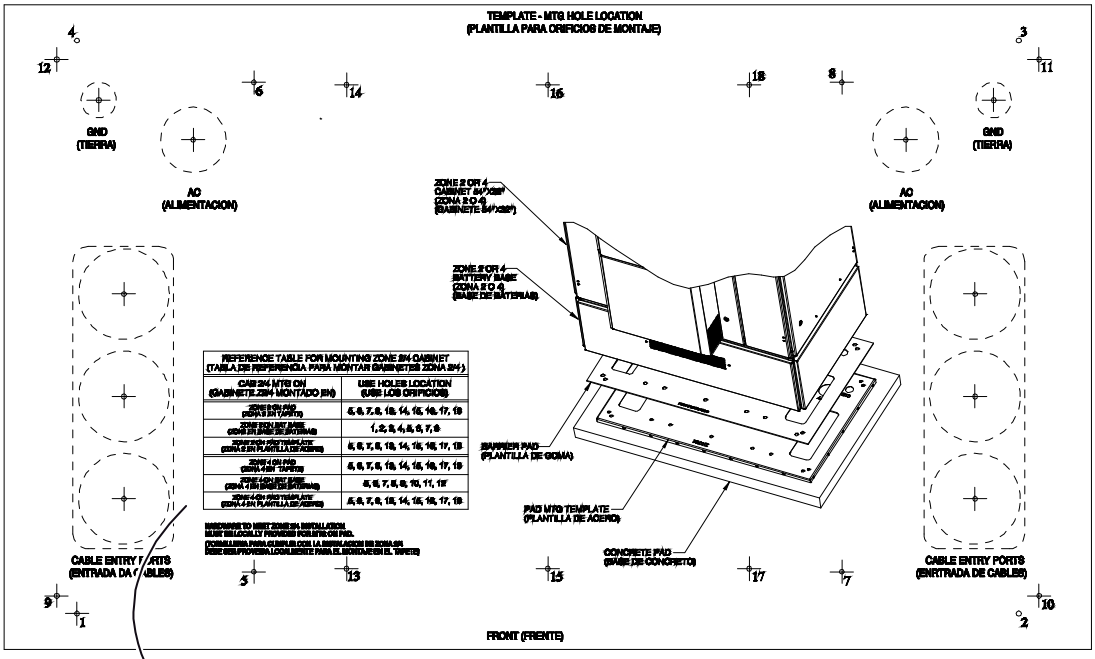


Figure 24: *Pour-in-Place Pad Template Diagram - F1010065 [inches (54Wx32D), mm (1372Wx813D)]*



NOTE! *See* ***Figure 25*** *for the Reference Table on Drill Template (P/N 558211) and for locating correct mounting holes. Place hardware as shown in* ***Figure 24*** *prior to placing pour-in-place pad template.*

Figure 25: *Drill Template (558211) 54"x32" NetXtend Cabinets*



REFERENCE TABLE FOR MOUNTING ZONE 2/4 CABINET (TABLA DE REFERENCIA PARA MONTAR GABINETES ZONA 2/4)	
CAB 2/4 MTG ON (GABINETE Z2/4 MONTADO EN)	**USE HOLES LOCATION (USE LOS ORIFICIOS)**
ZONE 2 ON PAD (ZONA 2 EN TAPETE)	5, 6, 7, 8, 13, 14, 15, 16, 17, 18
ZONE 2 ON BAT BASE (ZON2 EN BASE DE BATERIAS)	1, 2, 3, 4, 5, 6, 7, 8
ZONE 2 ON PAD TEMPLATE (ZONA 2 EN PLANTILLA DE ACERO)	5, 6, 7, 8, 13, 14, 15, 16, 17, 18
ZONE 4 ON PAD (ZONA 4 EN TAPETE)	5, 6, 7, 8, 13, 14, 15, 16, 17, 18
ZONE 4 ON BAT BASE (ZONA 4 EN BASE DE BATERIAS)	5, 6, 7, 8, 9, 10, 11, 12
ZONE 4 ON PAD TEMPLATE (ZONA 4 EN PLANTILLA DE ACERO)	5, 6, 7, 8, 13, 14, 15, 16, 17, 18

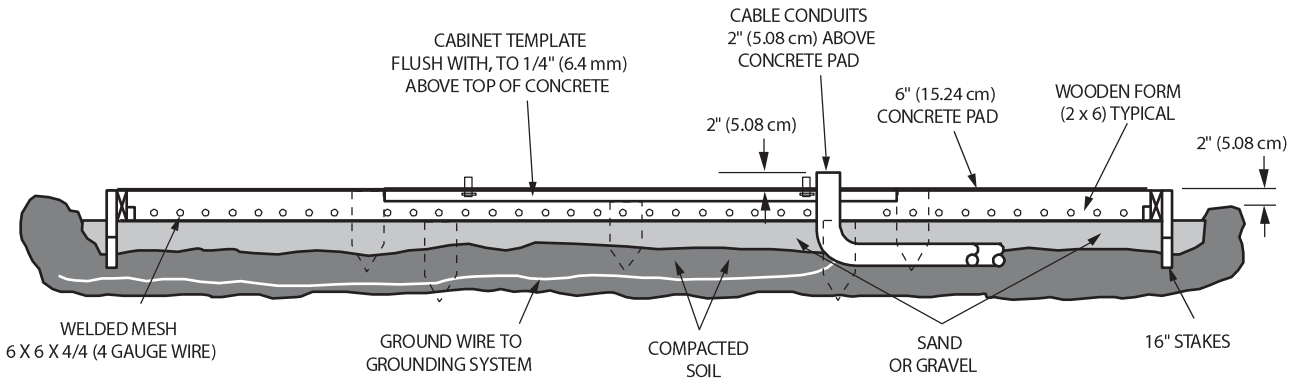
Referring to **Figure 26**, prepare a form per the following steps. Follow local practices or building codes if different than the information included in this section:

Procedure

1. If the soil is not firm, compact it per local practices. For a typical installation, excavate the foundation hole to a depth of 12 to 15 inches (30.48 to 38.1 cm).
2. Construct a level base for the pad, using a minimum of 6 inches (15.24 cm) of sand or gravel. The pad should be level to within 1/4-inch (6.35 mm) over the entire length and width.

NOTE! *Square and level the template(s) on the stakes so the tops of the mounting plates are flush with, or no more than 0.25" (1/4-in). (6 mm) above, the top of the pad. Square the template(s) so the diagonal measurement between the anchor bolts is equal.*

Figure 26: *Ground Level View of Typical Pad Construction*



3. Dig a trench where the cable and electrical conduit will rise into the enclosure. Excavate trenches to a depth of 30 inches (76.2 cm) for a standard installation, and 60 inches (152.4 cm) for areas where there is heavy frost.
4. Install a ring ground system around the proposed foundation pad in accordance with local practices and safety codes.
5. Place the wire mesh (5 x 4, 4 gauge) in the form according to local codes. Be sure the wire mesh is centered vertically.

NOTE! *No. 3 (3/8-inch or 9 mm) or larger reinforcing rod, placed on 15-inch (38.1 cm) centers may be used in place of wire mesh.*

NOTE! *Before pouring the concrete, be sure that all the wire mesh or reinforcing bars are set approximately 2 inches (5.08 cm) off the bottom of the form.*

6. If required per local codes, treat the area below the pad and for two feet (60.96 cm) around the perimeter against insect infestation.
7. Pour the concrete.
   - Use a high-early strength concrete mix so the enclosure may be placed three days following concrete pouring.
   - Coarse aggregate used in the concrete shall be graded from 3/4-inch (1.9 cm) to No. 4 only.

- The compression strength of the concrete must be a minimum of 4000 psi as determined by ASTM C39 test of compressions strength of concrete cylinders.

8. Cure the pad in a moist environment for a minimum of three days before enclosure installation, or according to the type of concrete used, and/or local practices. After the second day, the forms may be removed.

Unpacking the Enclosure

CAUTION! Do **not** open the door with door mounted climate control systems unless the enclosure is secured to the pallet or the mounting surface. An unsecured enclosure is unstable and could tip over causing injury or equipment damage.

Inspect the outside of the enclosure to be sure there is no shipping damage. If there is damage, note where the damage is and how much damage there is. Follow local practices for reporting and handling damaged goods. Do not proceed with the installation. If the enclosure appears undamaged, go on to unpack and install the enclosure.

Carefully remove all packaging material from around the enclosure and the pallet. Dispose of the packaging according to local practices. DO NOT REMOVE THE PALLET UNTIL THE ENCLOSURE IS READY TO BE MOUNTED.

NOTE! *Do not install the enclosure or support any significant load before the pad is completely cured.*

Lifting Preparation

CAUTION!

- Follow all local safety practices while lifting the enclosure. Wear all locally approved safety gear.
- Keep bystanders away from work operations at all times.
- All persons working with lifting equipment must wear standard safety headgear, eye protection, and (when required) gloves.
- Only properly trained operators shall operate the crane. Do not operate the crane until all stabilizers are extended and in firm contact with the ground or other adequate support structure. Do not retract or extend the stabilizers when the enclosure is suspended from the crane.
- Do not lift the enclosure over people. Do not let anyone work, stand, or pass under a lifted enclosure.
- The forklift must be rated at 4,000 lbs (1814 kg).
- RISK OF ELECTROCUTION. Do not allow the lifting equipment or enclosure to touch any electrical wiring or equipment

Equipment Required:

- One hoist or crane capable of lifting 4,000 lbs (1814 kg).

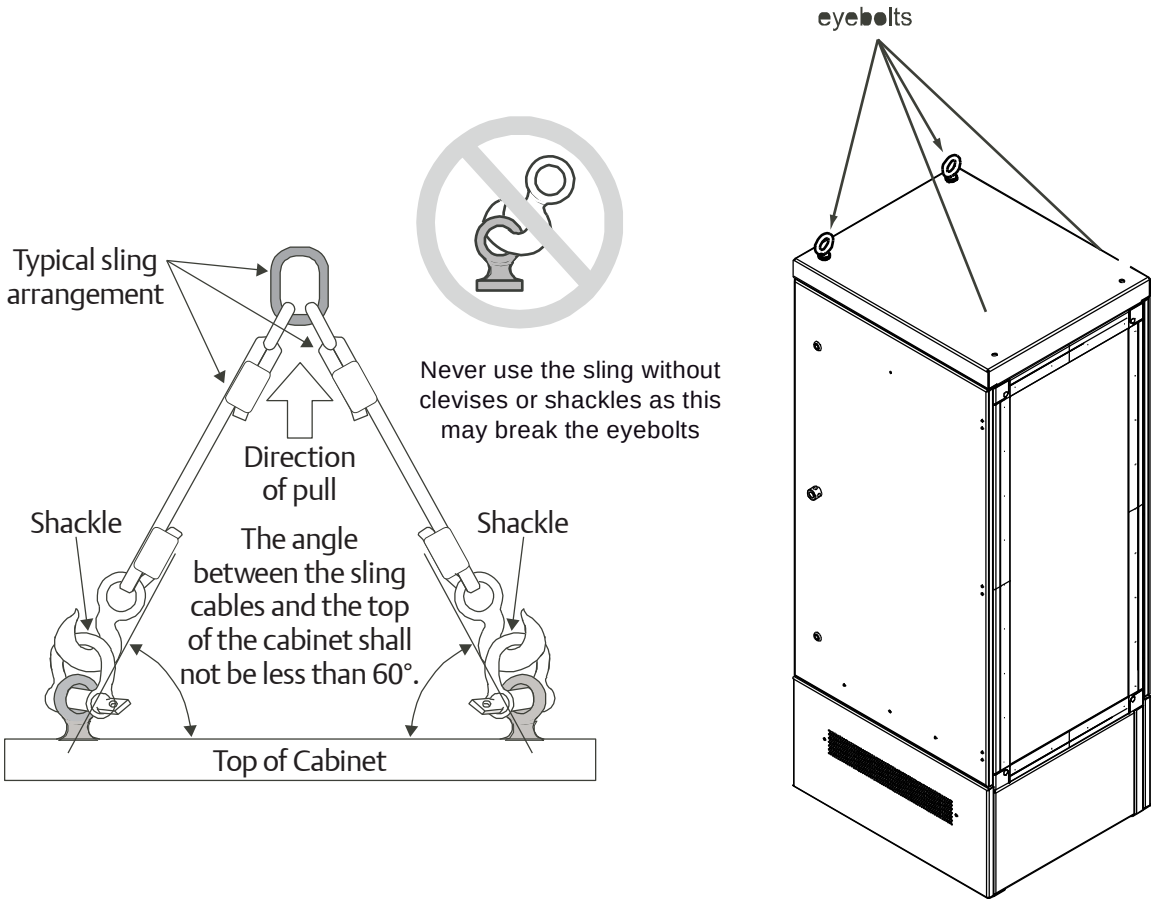
ALERT! Do **not** lift the enclosure with batteries installed.

WARNING! The maximum enclosure weight when lifted shall not exceed 2,200 lbs (998 kg).

- Four wire-rope slings, 8-ft. (2.4 m) long (minimum). Each sling should have 1,500 lb. (680.39 kg) capacity.

- Four connecting links (clevises), to attach the wire-rope slings to the enclosure lifting plates.
- A 75-ft. (22.86 m) rope, 5/8 inches in diameter, to use as a tagline. A tagline guides the enclosure into position while it is lifted.

Figure 27: *Lifting the NetXtend™ Flex Outdoor Enclosure*



Mounting Preparation

Procedure

1. While the enclosure is secured to the pallet, use the 216-type or Hex with Pin security tool to open the door.

CAUTION! The door with the climate control systems is very heavy. Do not lean or pull on it.

2. If so equipped, remove the bolts from the front battery base cover and set aside for re-use. See **Figure 28**. For the 2 side chamber enclosure, open a small door to access one of the bolts.
3. If equipped with battery base, remove side access cover by removing (2) bolts using 7/16" socket. See **Figure 22**. For the 2 side chamber enclosure, remove both side access covers.
4. Remove each cable cone from the enclosure floor by removing the 1/4" hardware. Remove and set the cable cones safely aside for later reattachment. See **Figure 40** or **Figure 41**.
5. Clean any debris from the concrete pad.
6. Remove the rubber gasket from the enclosure and install to concrete pad to prevent corrosion between the concrete pad and the enclosure mounting surfaces. The gasket should be placed to match cutouts are in position around the conduit openings, and over the anchor bolts.
7. Close and latch the doors in preparation for enclosure placement.

Figure 28: *Battery Base Front and Side Cover Removal*

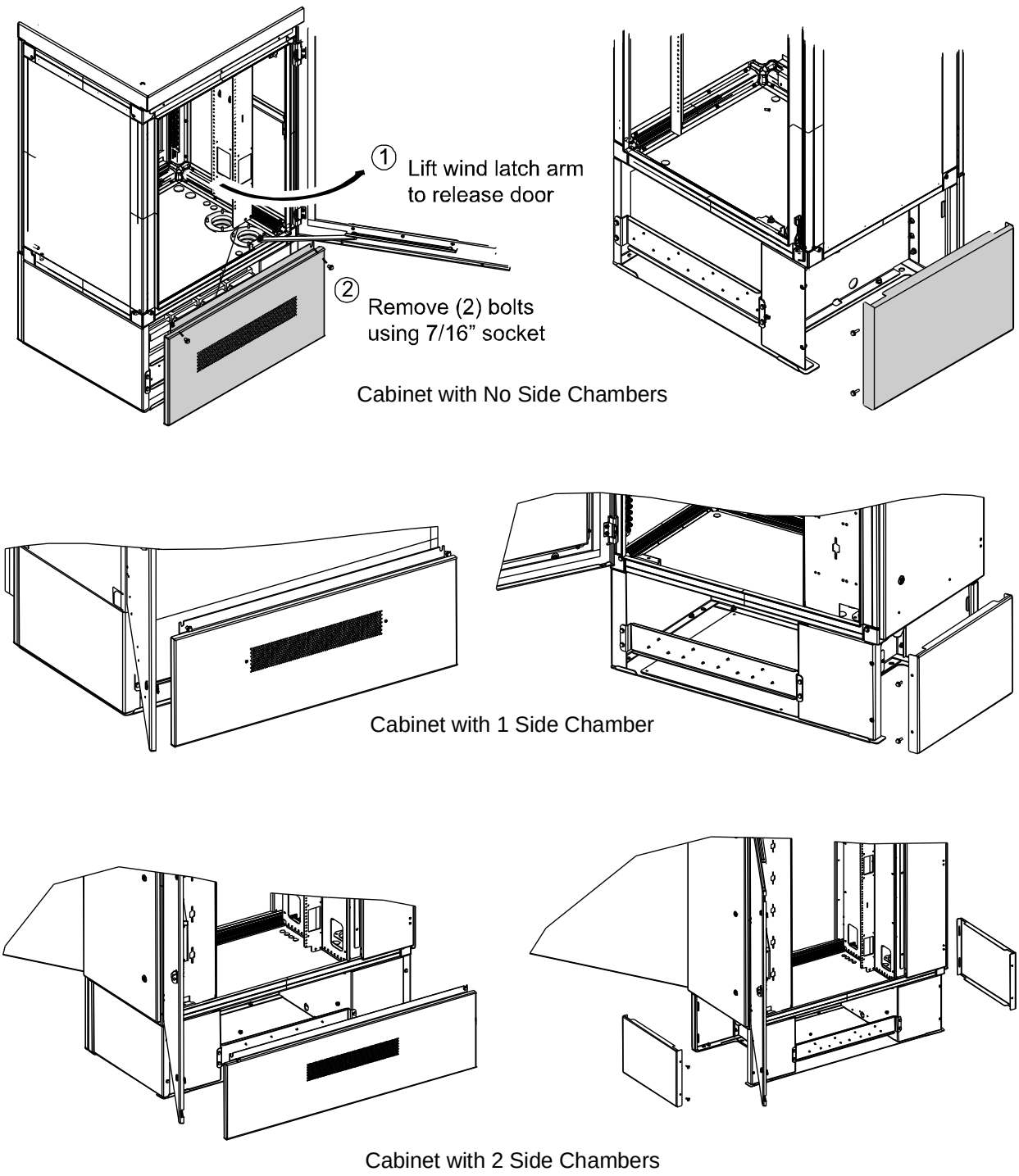
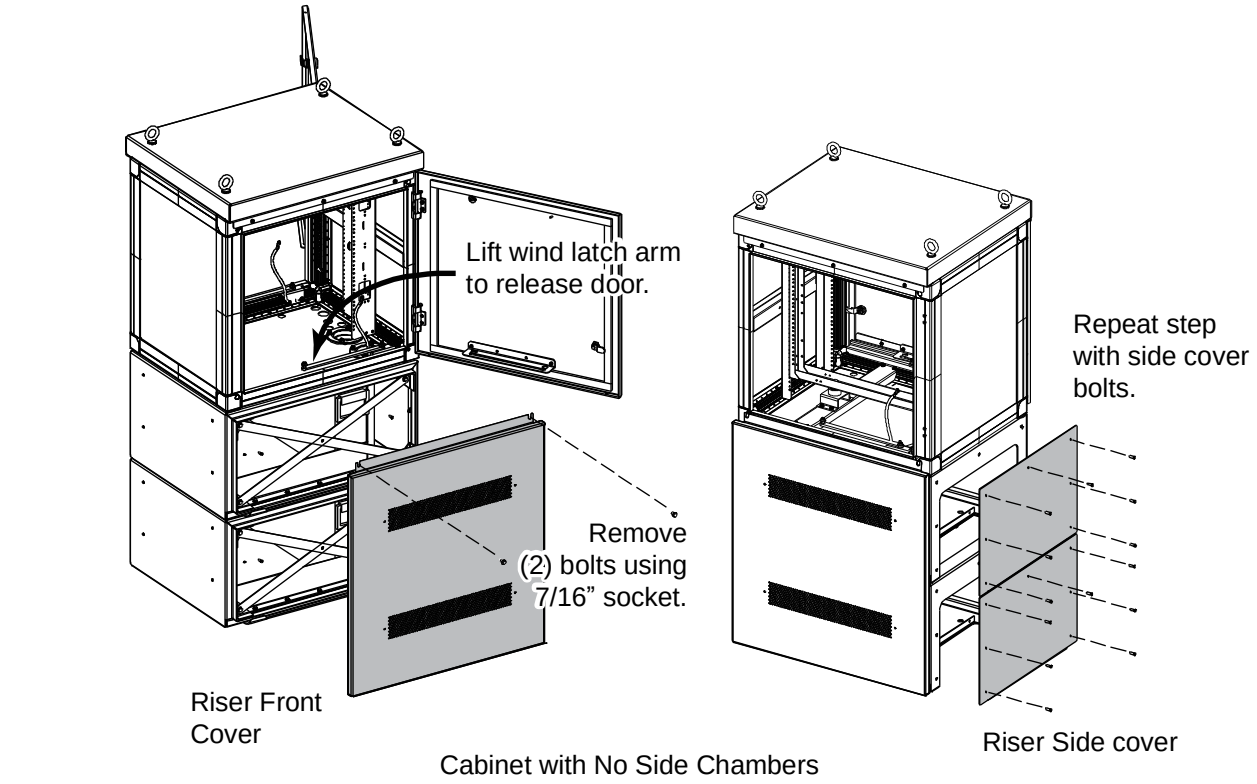


Figure 29: *Riser Front and Side Cover Removal*



PAD MOUNTING

Perform the following procedure to pad mount the NetXtend™ Flex Enclosure.

Procedure

1. Refer to “Installing a Concrete Pad” on page 36 for recommended concrete pad construction.
2. Clean all litter from the foundation pad surface.
3. Dress the cable/conduit so that it will easily enter the enclosure as it is being lowered onto the foundation pad.
4. Remove the anchor bolts and washers from the foundation pad. Set the hardware aside to attach the enclosure to the pad.
5. Place guide pins in pad template or at mounting locations as shown in **Figure 30** through **Figure 36**.

ALERT! During lifting, the enclosure must be lowered so that the enclosure is level and parallel to the pad surface. Place the enclosure so that it lines up with the anchor bolts. Make sure the enclosure is clear of the conduits in the foundation pad.

6. Place the enclosure on the pad. Loosen the slings so that the full weight of the enclosure is on the pad. Check to be sure the enclosure is properly lined up on the pad.
7. To secure the enclosure (or enclosure with battery base, plinth, or riser) to the pad, install 1/2-13 bolts with washers and lock washers into the bottom flange. Tighten all bolts securely. See **Figure 31**, **Figure 32**, **Figure 33**, **Figure 34**, **Figure 35** or **Figure 36** for bolt locations and quantity. Refer also to the pad template illustrations in **Figure 14** through **Figure 25**.
8. When the enclosure is secured, remove the slings, the tagline, and the lifting eyebolts. Replace the eyebolts with the nylon hex-head bolts included in the enclosure loose parts package.

ALERT! If the enclosure will not be powered up for an extended period, place a heat source, such as two 150W light bulbs wired in parallel inside the enclosure to prevent condensation.

Figure 30: *Attaching NetXtend™ Flex to Pad - Enclosure with No Side Chamber (battery base shown, w/o battery base similar except (4) inner set of mtg. holes used - refer to pad template illustrations)*

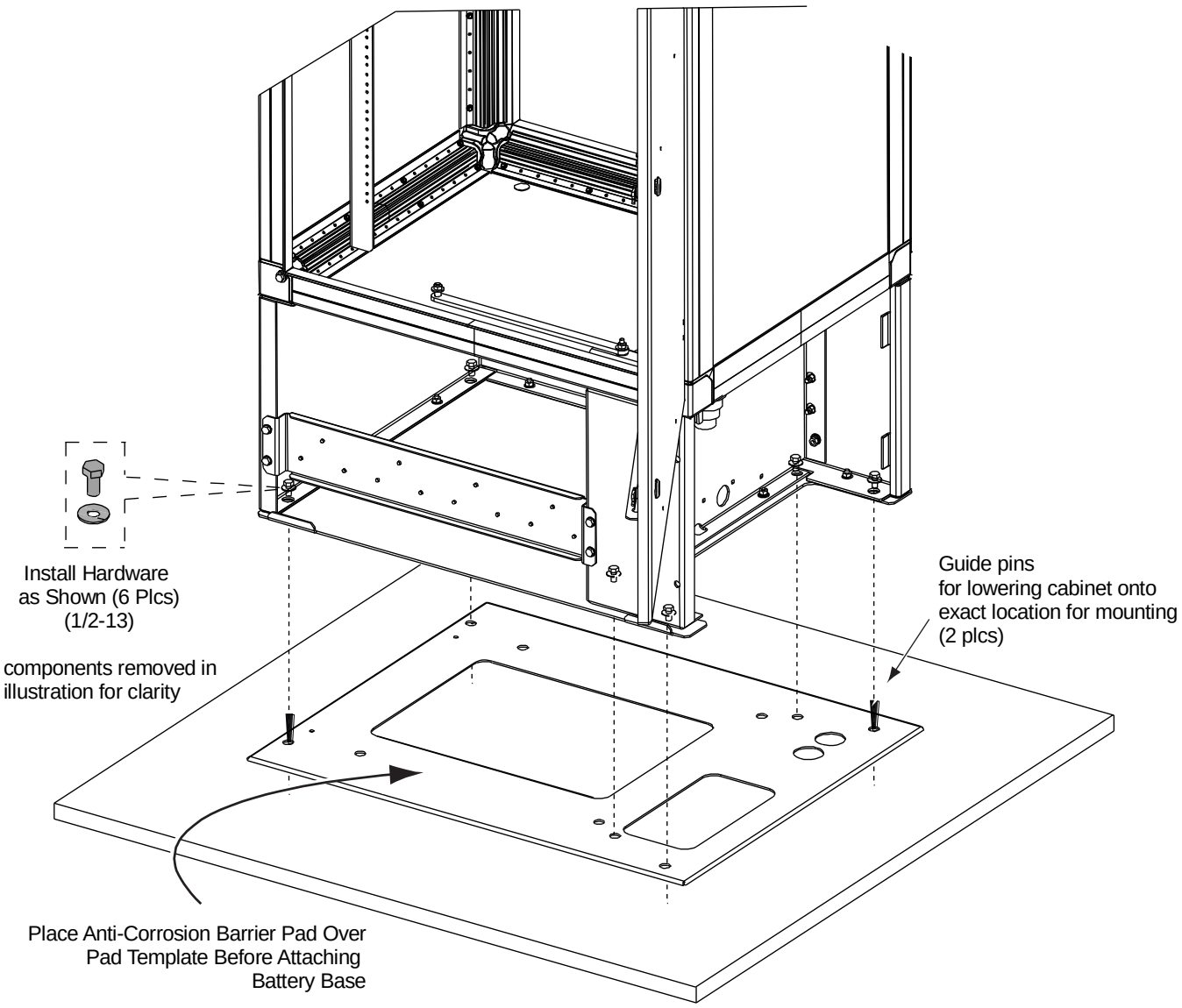


Figure 31: *Attaching NetXtend™ Flex to Pad - Enclosure with No Side Chamber (with riser installed - refer to pad template illustrations)*

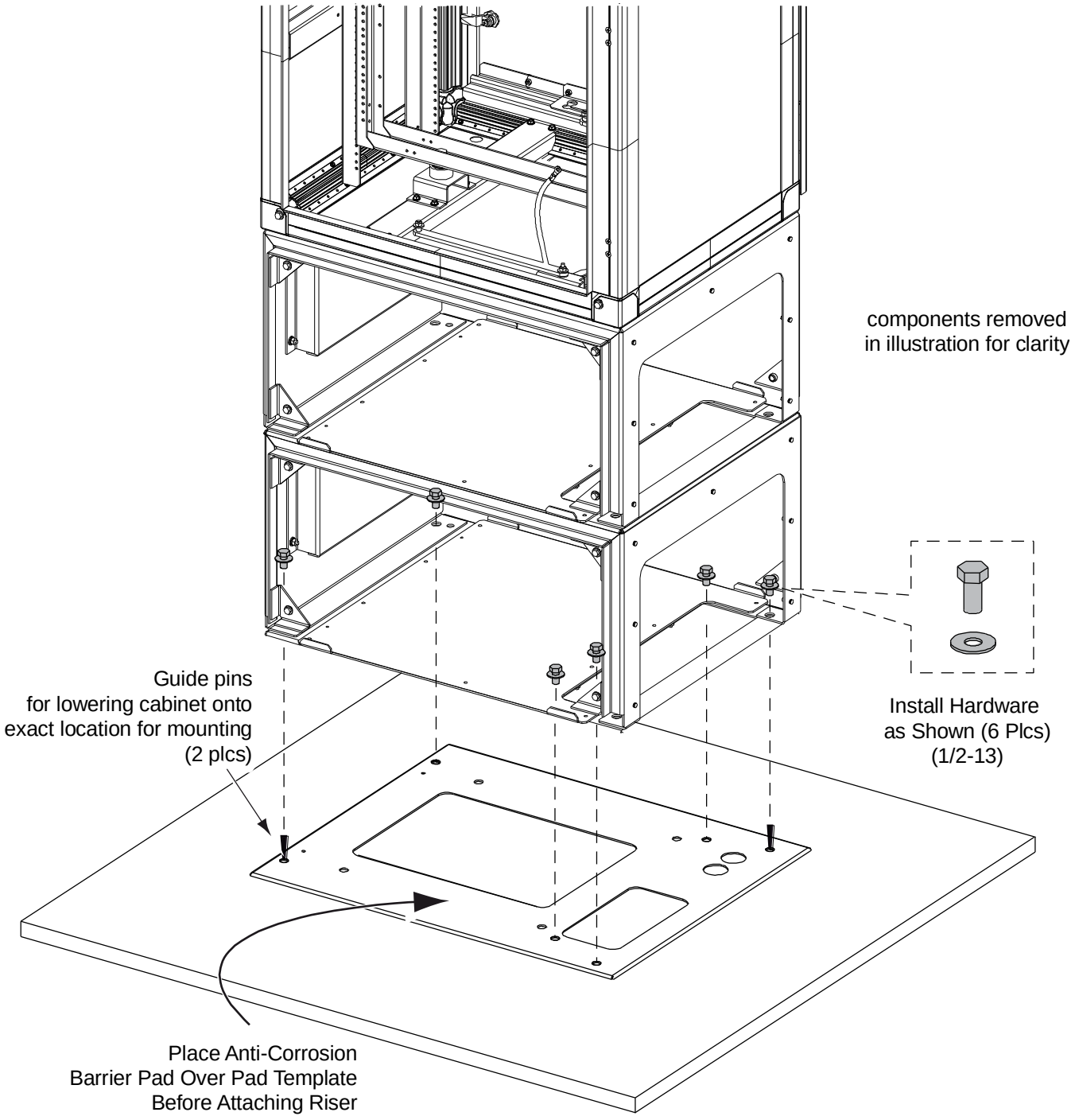


Figure 32: *Attaching NetXtend™ Flex to Pad - Enclosure with No Side Chamber (with 6" plinth installed - refer to pad template illustrations*

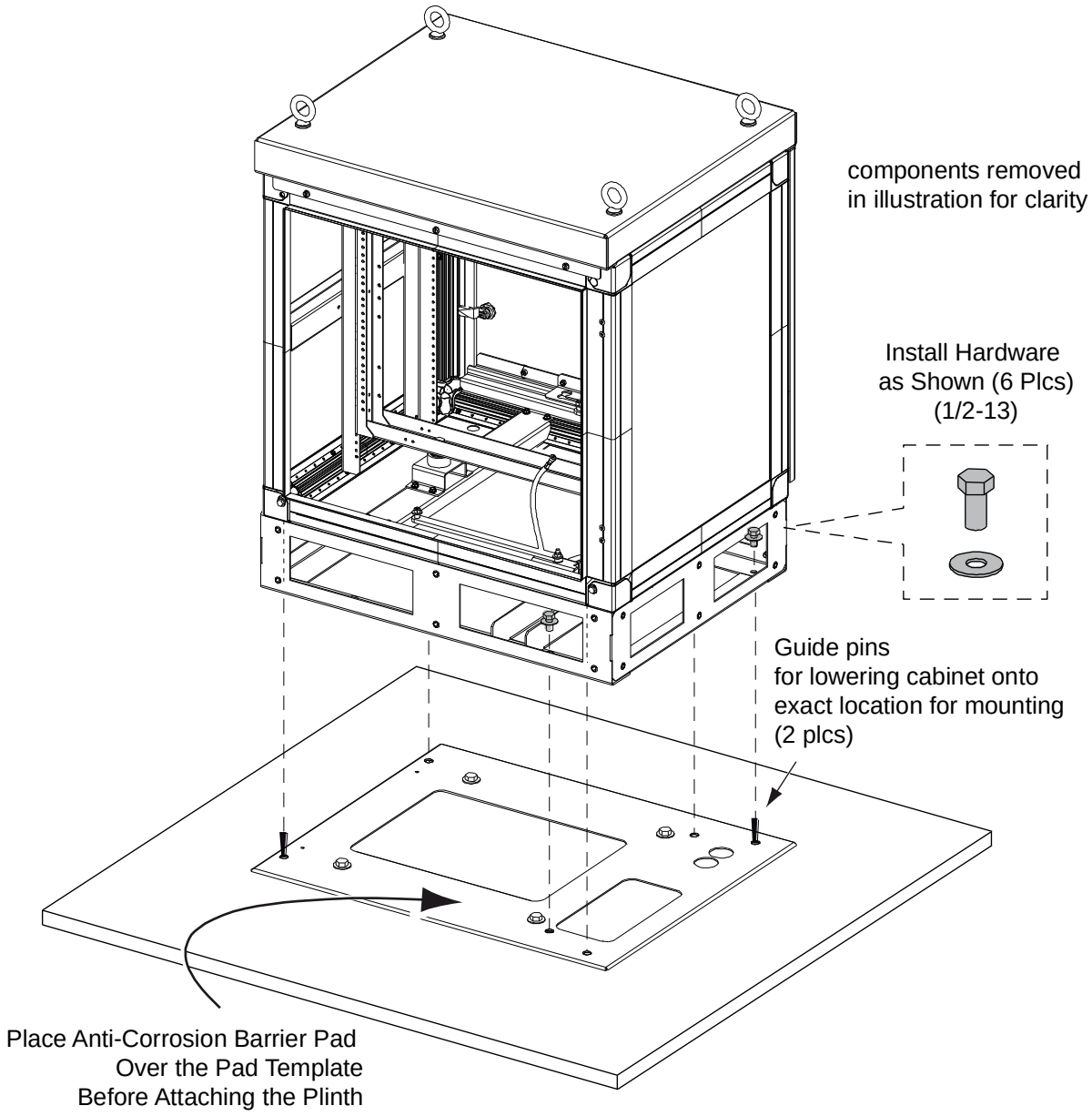


Figure 33: *Attaching NetXtend™ Flex to Pad - Enclosure with One Side Chamber (battery base shown, w/o battery base similar except (4) inner set of mtg. holes used - refer to pad template illustrations)*

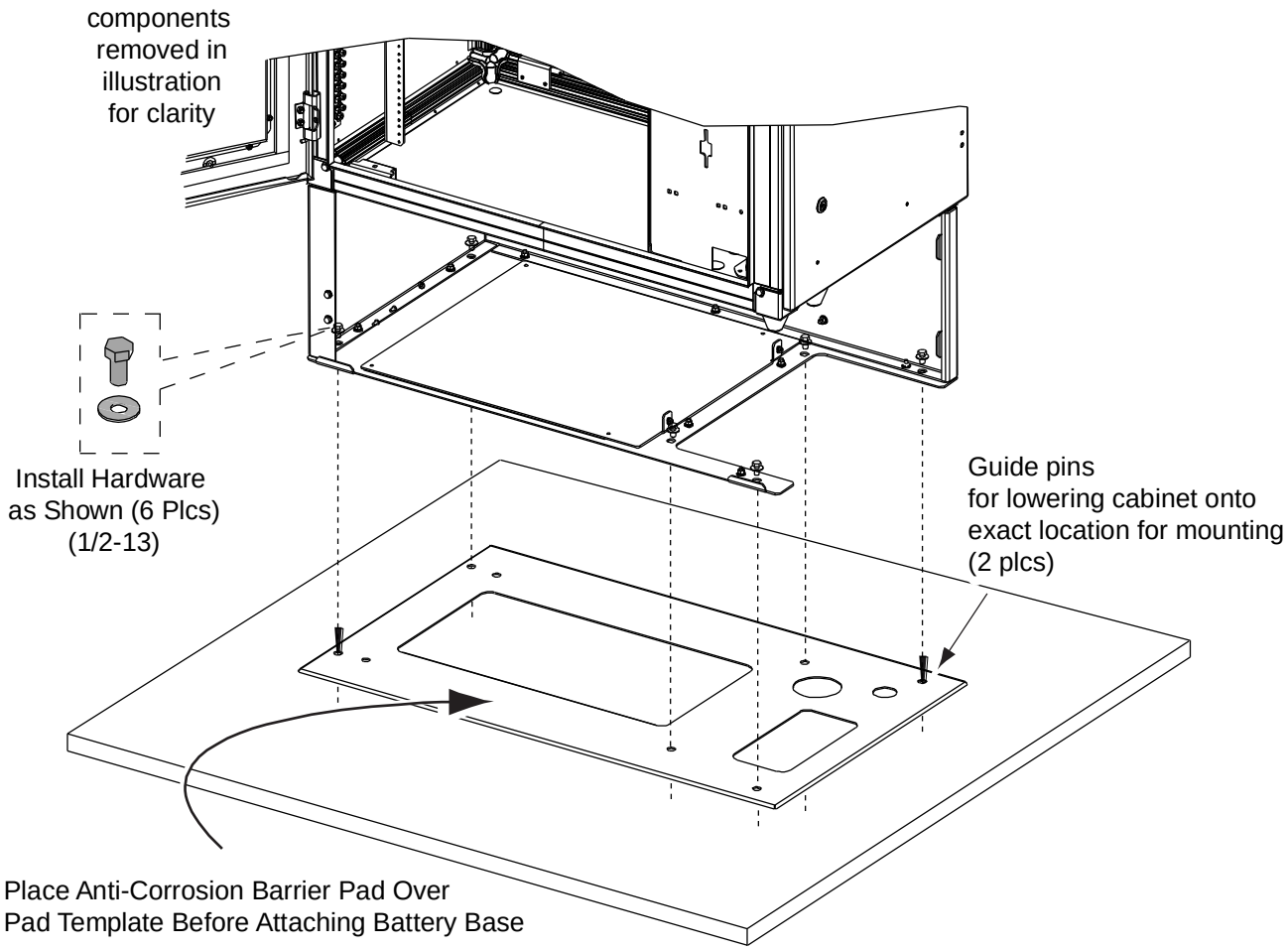


Figure 34: *Attaching NetXtend™ Flex to Pad - Enclosure with One Side Chamber (with riser installed - refer to pad template illustrations)*

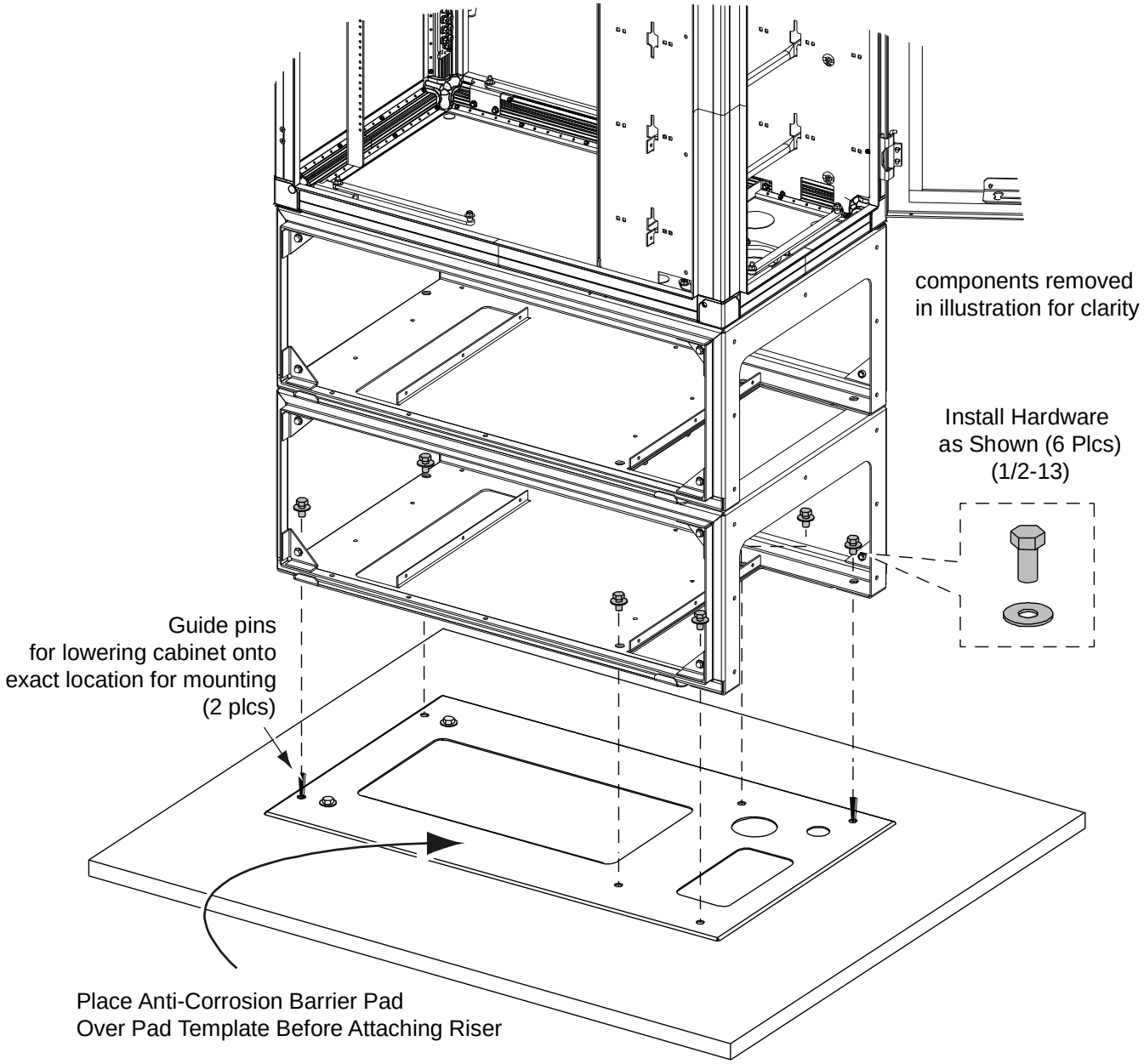


Figure 35: *Attaching NetXtend™ Flex to Pad - Enclosure with One Side Chamber (with 6" plinth installed - refer to pad template illustrations)*

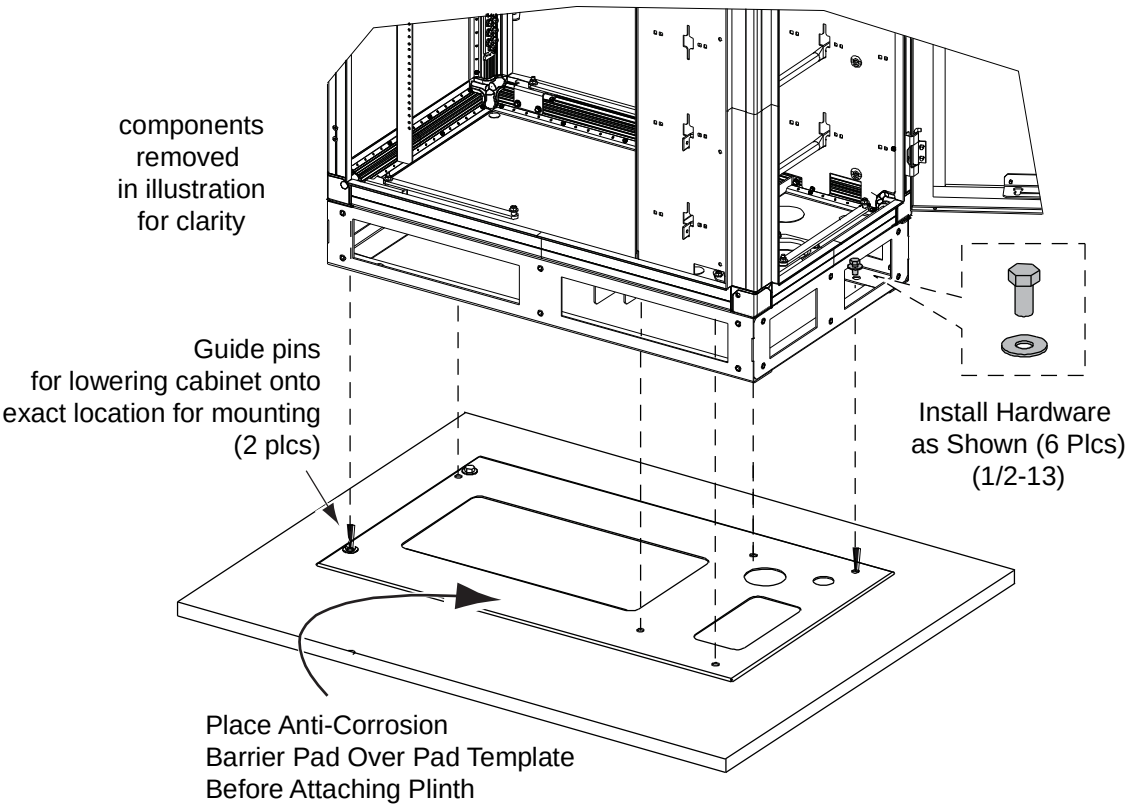
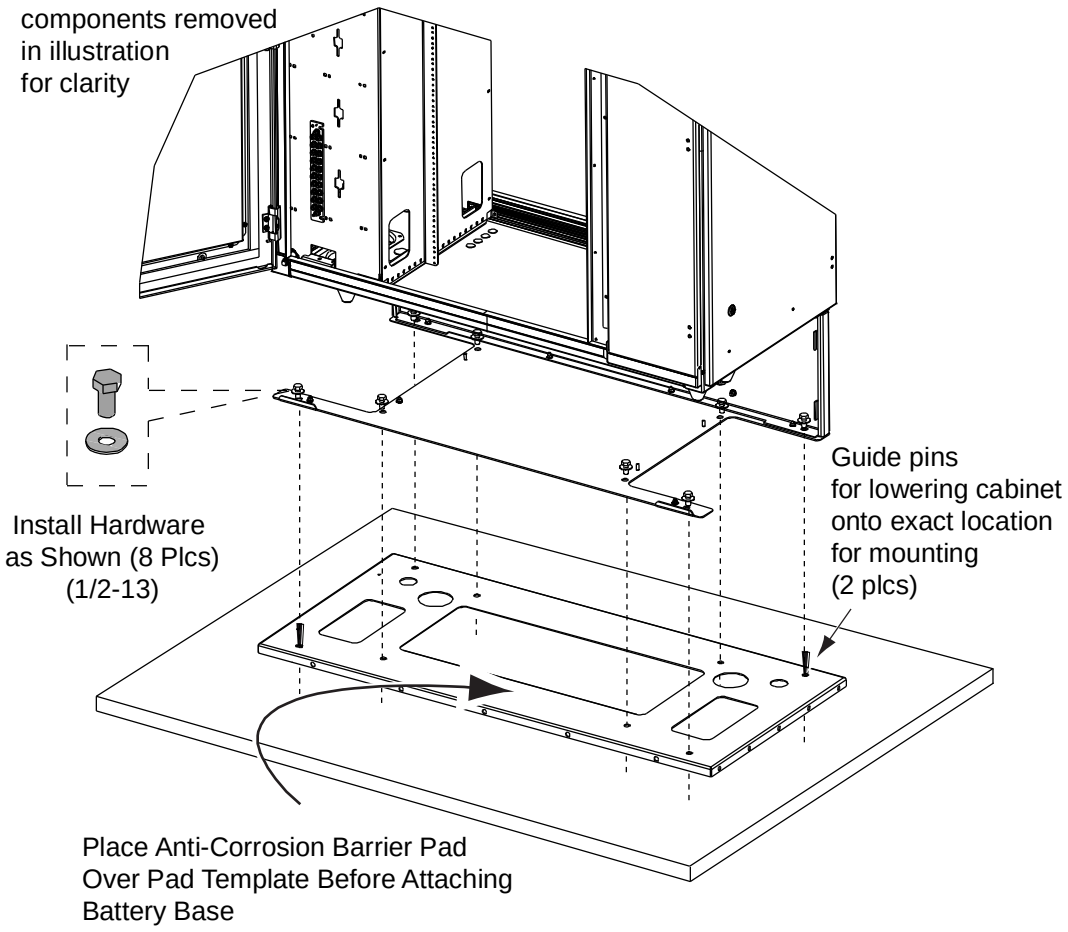


Figure 36: *Attaching NetXtend™ Flex to Pad - Enclosure with Two Side Chambers (with battery base shown, w/o battery base similar except (4) inner set of mtg. holes used - refer to pad template illustrations)*



OSP CABLES

General

DANGER! Risk of Electrical Shock, OSP Cables

If joint buried cables are used, check the cable sheath for voltage in accordance with local standards. If voltage is detected, do not proceed with the installation. Contact the supervisor and do not proceed until the voltage hazard is eliminated.

NOTE! *The following procedures are recommendations only, and are perform in conjunction with procedures and training that adhere to local practices.*

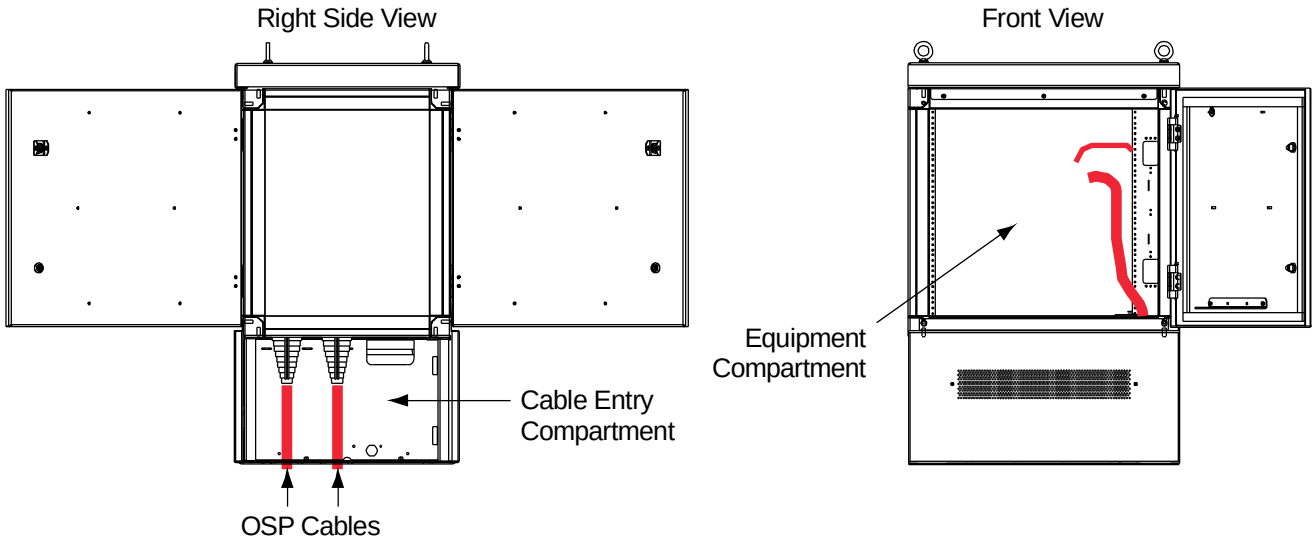
Installing OSP Cables (Copper and Fiber)

NOTE! *Enclosures without side chambers (30" wide enclosures) are equipped with 3" cones in the right side cable entry compartment. Enclosure's with one side chamber (42" wide enclosures) are equipped with 4" cones in the right side cable entry compartment. Enclosure's with two side chambers (52" wide enclosures) are equipped with 4" cones in the right and left side cable entry compartments.*

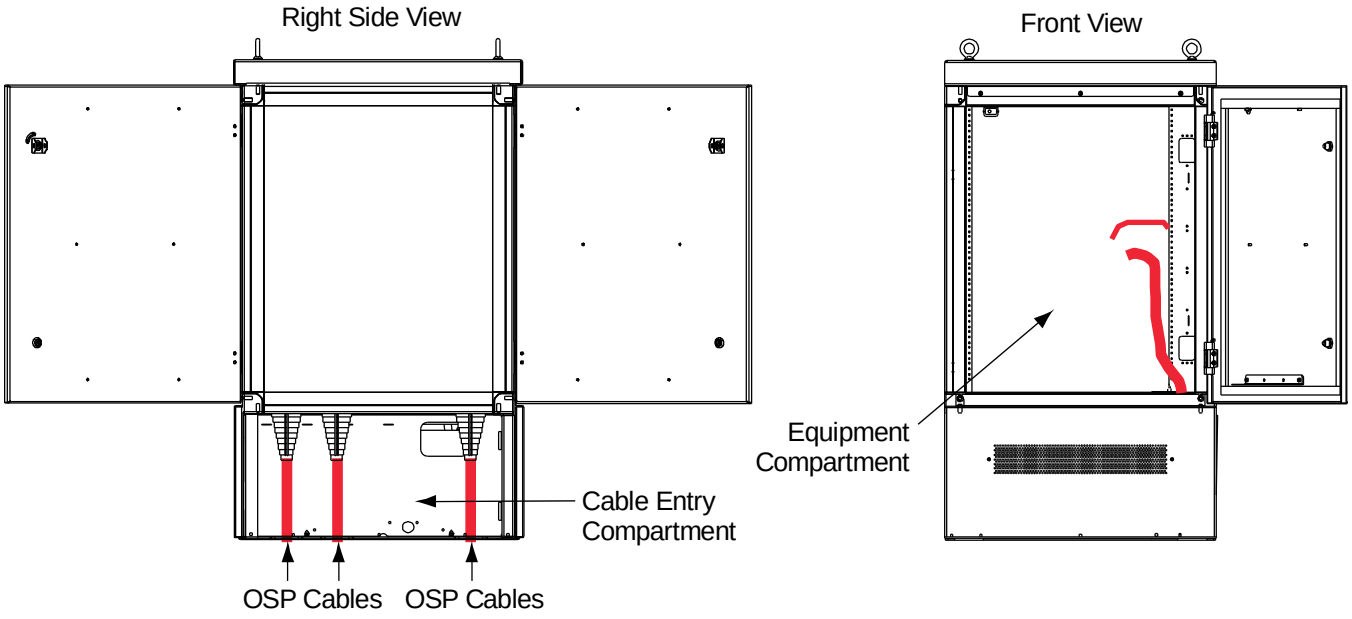
Enclosures with a depth of 25" are equipped with two (2) cones in the side cable entry compartment(s). Enclosures with a depth of 32" are equipped with three (3) cones in the side cable entry compartment(s).

OSP cables are typically run as illustrated in **Figure 37** and **Figure 38**.

Figure 37: *Typical OSP Cable Routing - Enclosures with No Side Chamber*



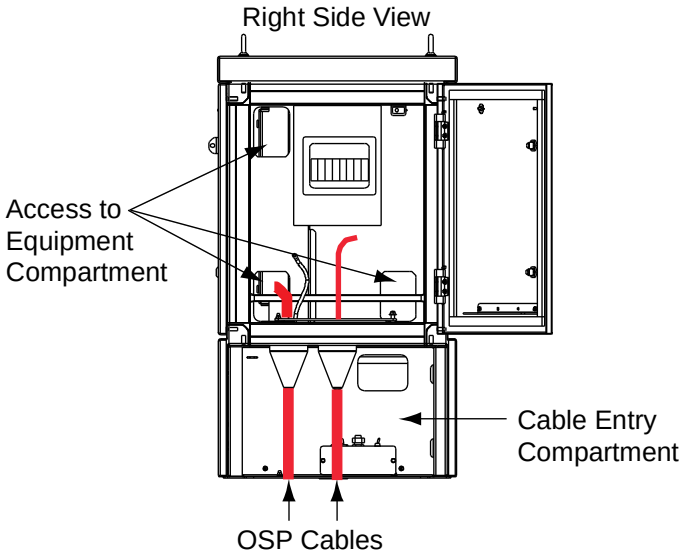
25” Deep Enclosure, No Side Chamber (30” Wide)
(Enclosure with Battery Base Shown, Plinth and Riser Similar)



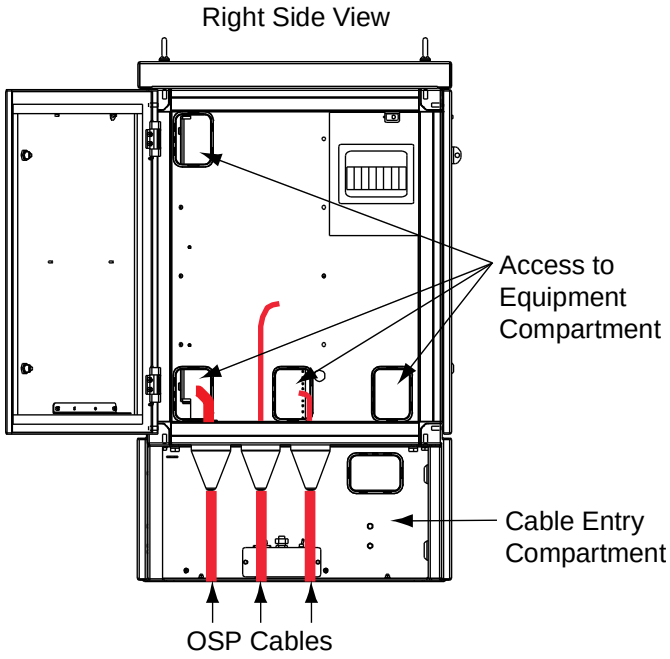
32” Deep Enclosure, No Side Chamber (30” Wide)
(Enclosure with Battery Base Shown, Plinth and Riser Similar)

Notes:
1. Cable lances are typically located on equipment rails.

Figure 38: *Typical OSP Cable Routing - Enclosures with 1 or 2 Side Chambers*



25” Deep Enclosure, One Side Chamber (42” Wide) Shown
Two Side Chambers (54” Wide) Similar
(Enclosure with Battery Base Shown, Plinth and Riser Similar)



32” Deep Enclosure, One Side Chamber (42” Wide) Shown
Two Side Chambers (54” Wide) Similar
(Enclosure with Battery Base Shown, Plinth and Riser Similar)

Notes:
1. Cable lances are typically
   located on equipment rails.

Installing Cables

Install copper cables as described in the following procedure. Refer to **Figure 37** and **Figure 38** for typical routing.

Procedure

1. Cable access covers and cable cones were removed in Mounting Preparation. Cable cones will be installed after cable installation. See Sealing Cable Entries.
2. Debark a minimum of 4' (1.3 m) of OSP Copper Cable as required.
3. Wipe and clean the conductor bundle.
4. Verify no cables have been damaged, nicked, or crimped beyond normal use.
5. Cut and expose the cable's ground shield as required.
6. In accordance to company procedures, install a bond clamp to the cable's ground shield.
7. Apply a #6 AWG wire from the newly installed bond clamp to the enclosure's Main Ground Bar. Follow all grounding practices, including use of No-Ox and double-hole lugs.

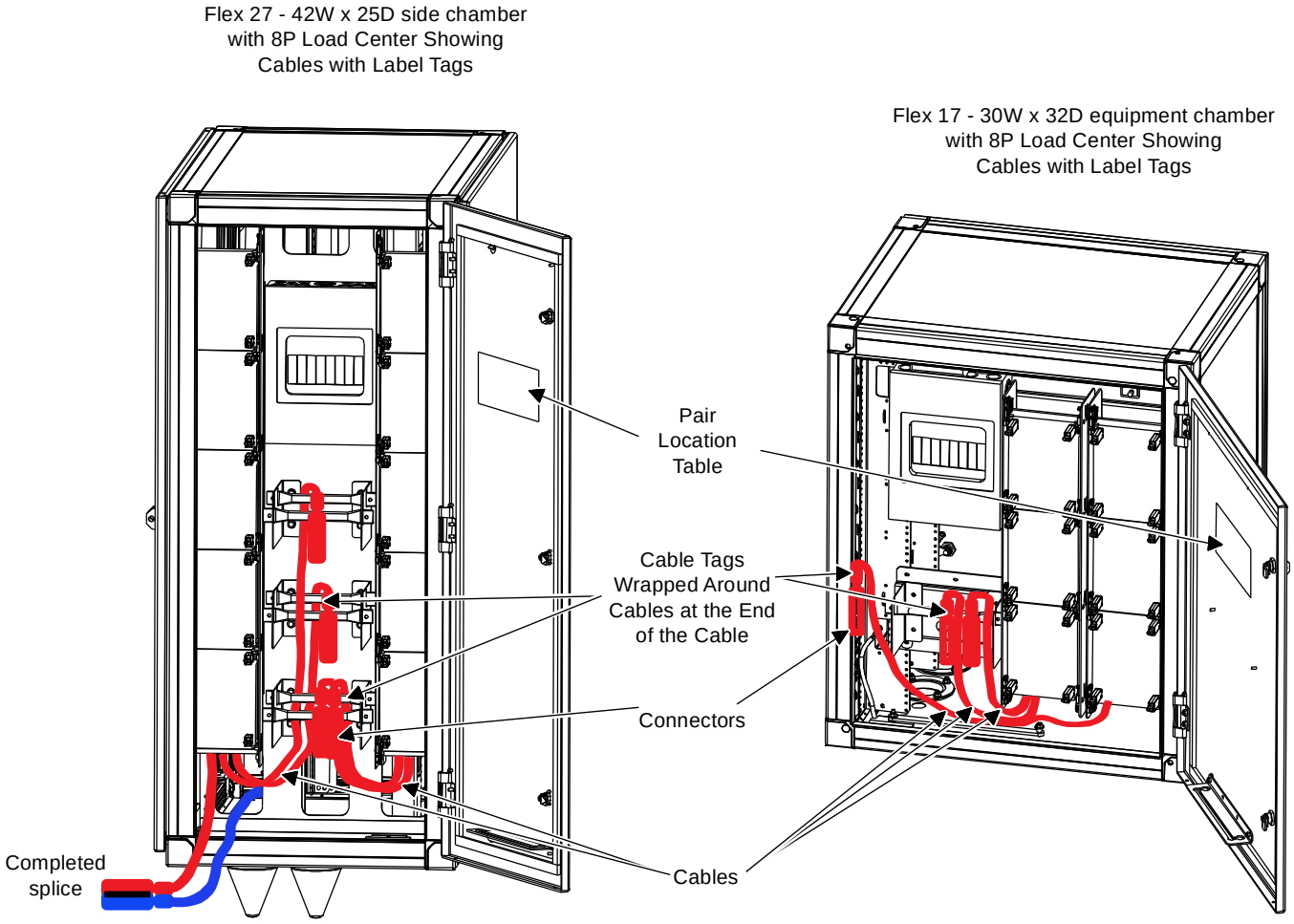
Splicing Copper Cables

Protector stubs may already be connectorized and arranged on the splicing support bars or lance panel. An identifying tag shows the pair count of each splicing module (see **Figure 39**).

ALERT! Do **not** remove the identification tags from the splicing modules.

1. If protection panels are furnished:
   a) Prepare the cable group – install binder group identification ties and remove the unit binders.
   b) Pull the cabinet cables out.
   c) Using drawings provided with enclosure or the protection pair count allocation label located on the inside surface of the equipment chamber rear door or the side chamber (splice area), arrange the appropriate OSP cable pairs with their corresponding protector stub cable pairs on the splicing support bars.
   d) Splice, following local practices with the matching OSP MS2 or 710 termination, referring to the cable tags.
   e) Record splice pair count information to label.
   f) Dress and secure the cables.
2. Refer to "Sealing Cable Entries" on page 69 and seal all cable grommets and cones.

Figure 39: *Splicing Details*



Installing Fiber Cables

Install fiber cables as described in the following procedure. Refer to **Figure 37** and **Figure 38** for typical routing.

Procedure

1. Cable access covers and cable cones were removed in “Mounting Preparation” on page 52. Cable cones will be installed after cable installation. See Sealing Cable Entries.
2. If cable is not pre-terminated, then…
   a) Temporarily route the fiber cable into the equipment chamber, allowing for routing/splicing as required, and then mark the place the fiber will be clamped.
   b) Debark the fiber cable as required.
   c) Secure in accordance to company procedures, any manifold or fan-out at the breakout.
3. If the fiber cable includes a ground sheath, apply a #6 AWG wire to the breakout, in accordance to company procedure.
4. From the cabinet accessories, apply the protective corrugated tubing around the “exposed” fibers. (Local procedures may require an additional internal protective tube.)
5. Secure the protective corrugated tubing at the breakout.
6. Route the OSP fiber cable loop, passing the corrugated tube into the equipment chamber.
7. Secure the OSP fiber cable.
   a) The fiber cable breakout is secured just beyond fiber clamp.
   b) Lances are typically available on the equipment rails.
   c) If fiber cable includes a ground, run and bond the #6 AWG ground wire to the Main Ground Bar. Follow all grounding practices, including use of No-Ox and double-hole lugs.
8. Secure the protective corrugated tubing in the equipment chamber.
9. The fibers are ready to be splice or terminated, in accordance to local tools and practices.
10. Refer to “Sealing Cable Entries” on page 69 and seal all cable grommets and cones.

Sealing Cable Entries

In keeping with local practices, seal all cable grommets and cones.

It is extremely important to maintain a well-sealed enclosure. Failure to do so can jeopardize the enclosure sensitive electronics, as well as the proper functioning of enclosure systems. All cable interfaces into the enclosure must be properly sealed after installation of cables.

It is suggested to use duct sealing foam and cable-ties to seal cables entering the enclosure via the cable cones.

The 3" or 4" cable cones were removed before cable installation. They must be reinstalled after cables have been run into the enclosure, as described in the following procedure. Refer to **Figure 40** or **Figure 41**.

Procedure

1. After cables have been run, determine the cable bundle diameter and cut the cable cone tip to provide same-size opening.
2. Slit the cable cone open along its length (between the cable spine for the 3" cones).
3. Wrap the cable cone around the cable bundle.
4. Slide the cable cone down the cable bundle and secure in place (using cable boot plates if furnished).
5. Use tie-wraps (inserted through slots in cable boot spine for the 3" cones) to close the boot shut.
6. Fill boot with sealant to completely seal the cable entry.

Figure 40: *Cable Cones - Enclosures without Side Chambers*

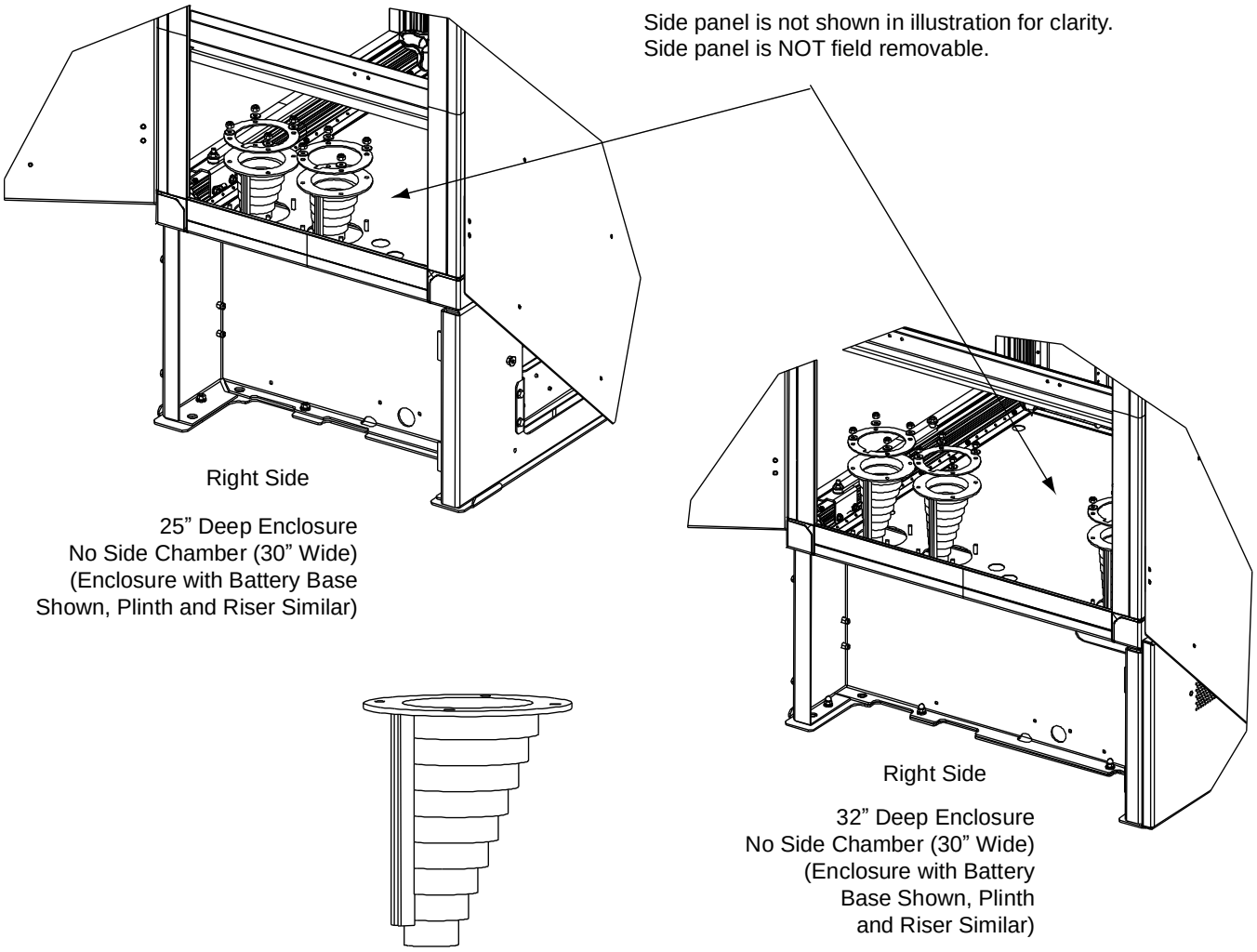
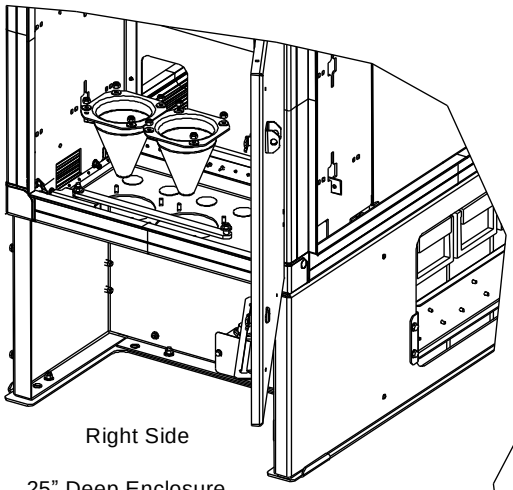
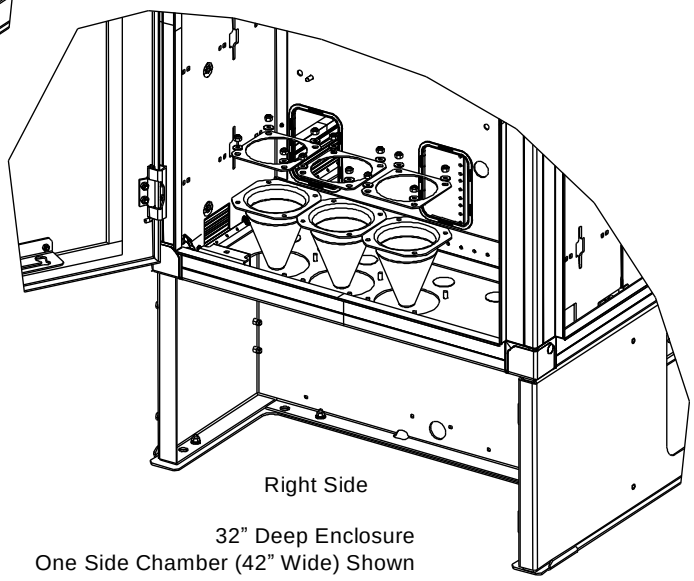


Figure 41: *Cable Cones - Enclosures with Side Chambers*



Right Side

25” Deep Enclosure
One Side Chamber (42” Wide) Shown
Two Side Chambers (54” Wide) Similiar
(Enclosure with Battery Base
Shown, Plinth and Riser Similiar)



Right Side

32” Deep Enclosure
One Side Chamber (42” Wide) Shown
Two Side Chambers (54” Wide) Similiar
(Enclosure with Battery Base
Shown, Plinth and Riser Similiar)

PROTECTION

The NetXtend™ Flex enclosures may be equipped with 100-pair M307 protection to terminate OSP cables entering and exiting the enclosure. The block accepts industry standard 5-pin plug-in protection modules.

NOTE! *The following procedure assumes the undressed cables have been pulled into the enclosure and sealed, as discussed in "OSP Cables" on page 63.*

ALERT! All positions in the M307 protection that have been spliced to active OSP pairs must have protectors installed.

Figure 42: *Protection Location for Single Bay Enclosures (w/o Load Center) without Side Chambers*

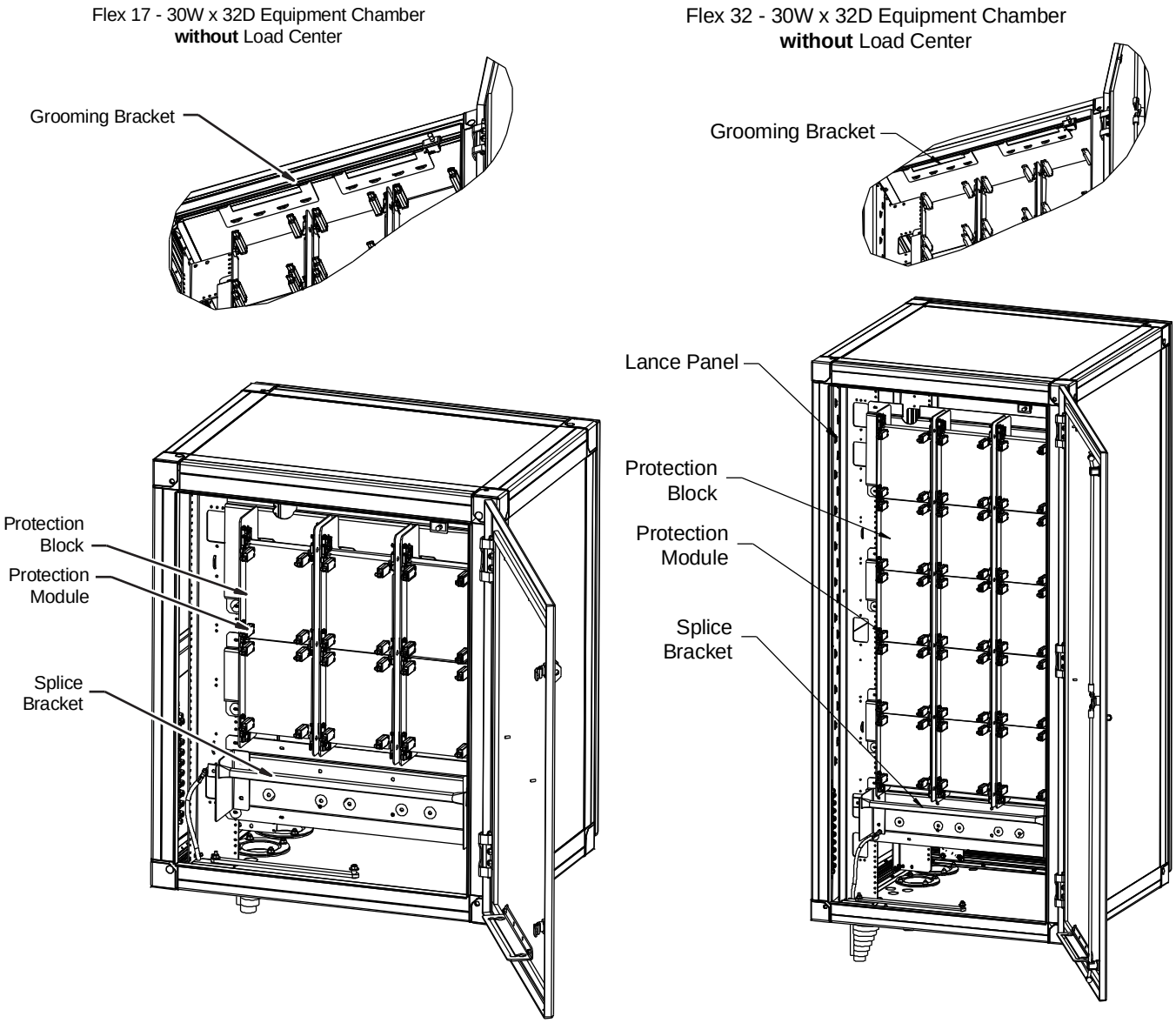
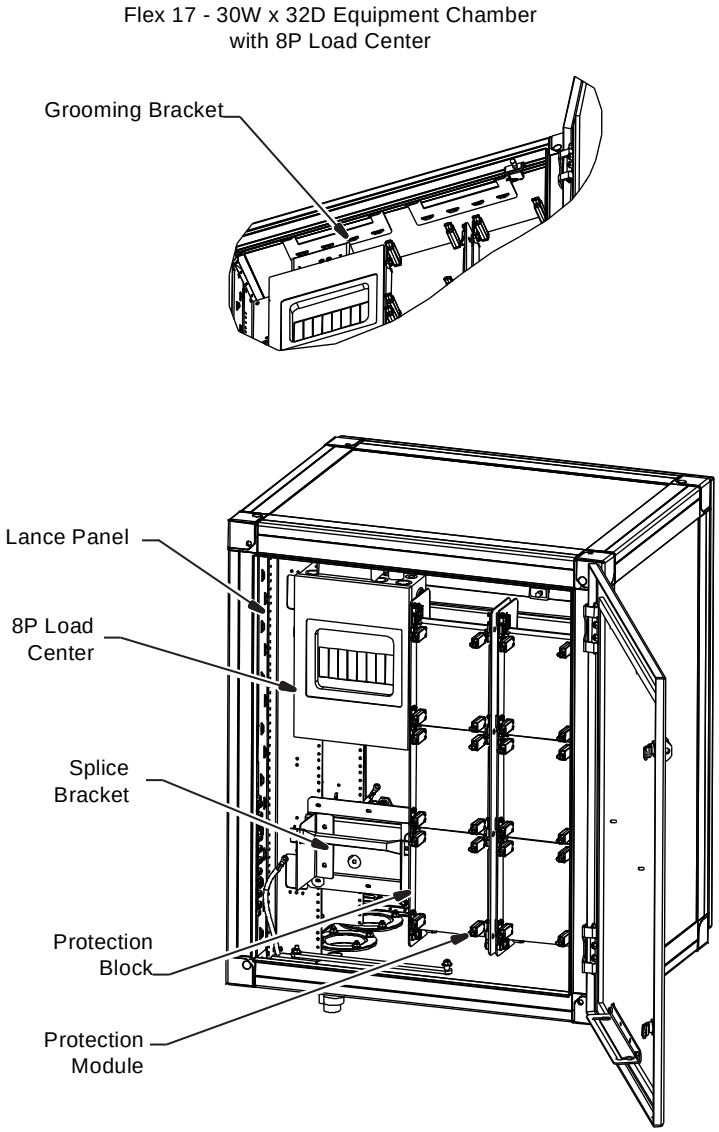


Figure 43: *Protection Location for Single Bay Enclosures (w/ Load Center) without Side Chambers (cont'd from previous page)*

Flex 17 - 30W x 32D Equipment Chamber
with 8P Load Center



Flex 32 - 30W x 32D Equipment Chamber
with 8P Load Center

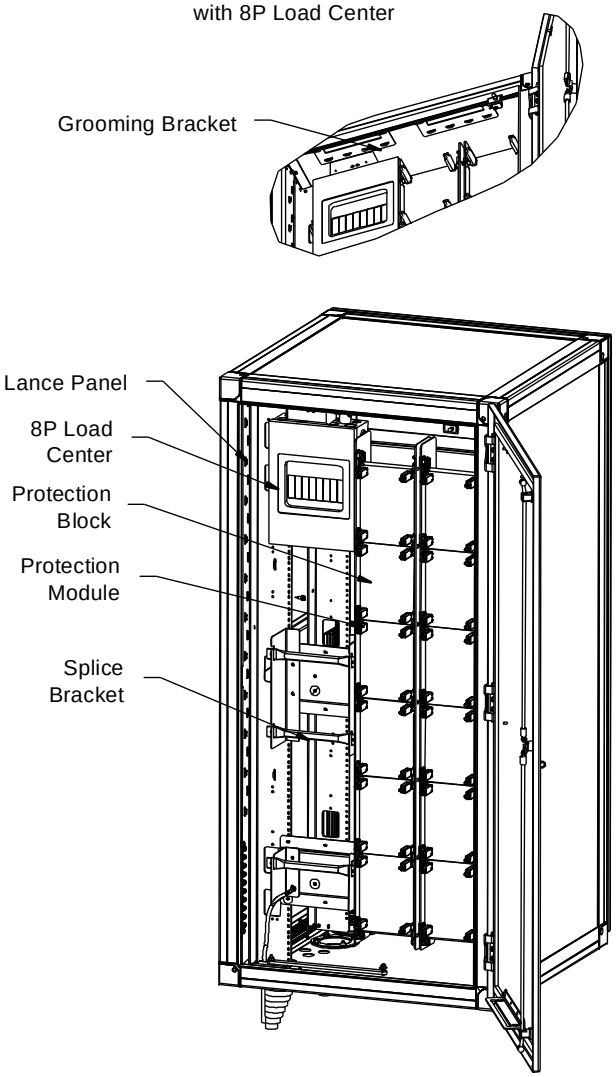
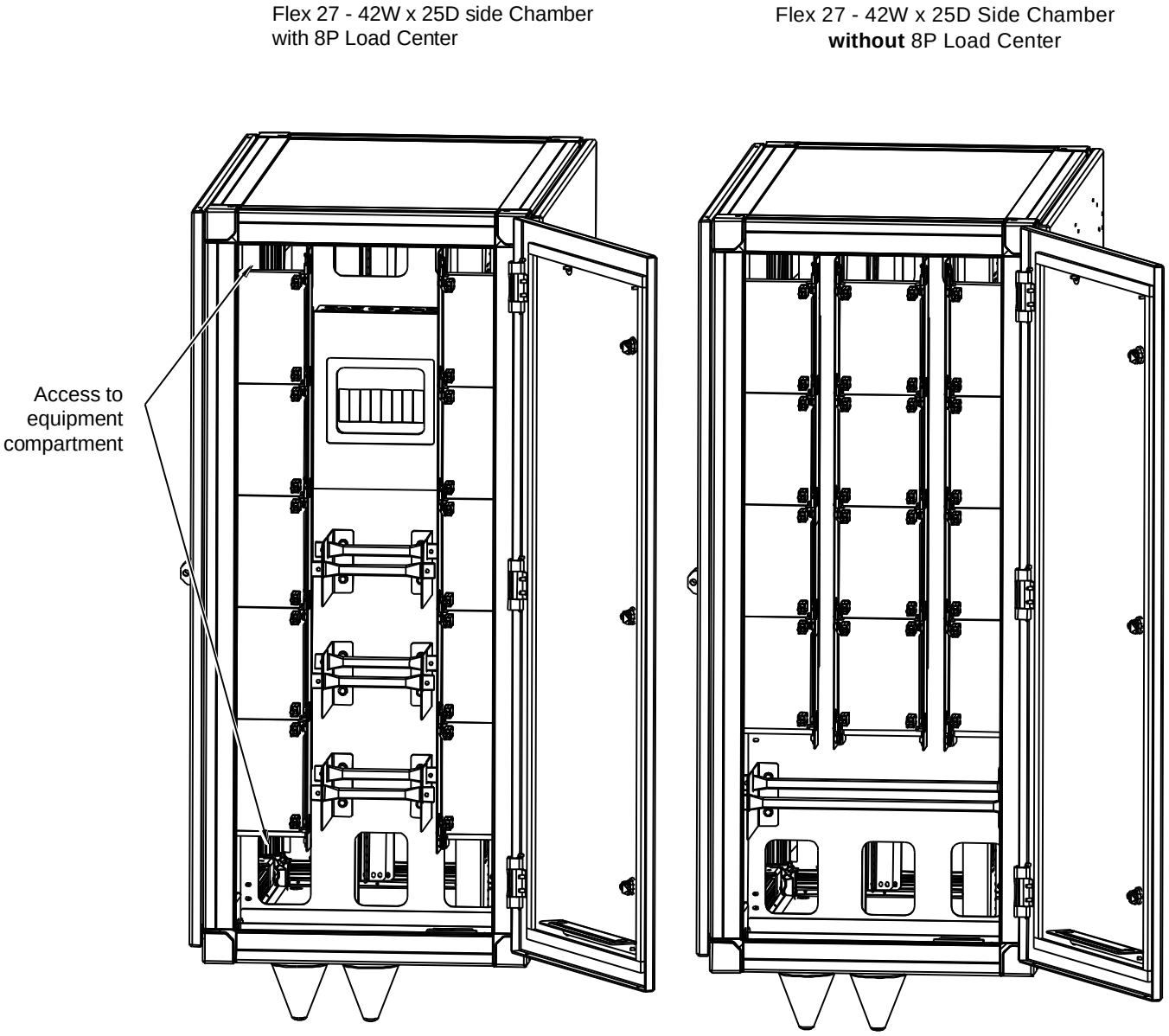


Figure 44: *Protection Location for Single Bay Enclosures (w/ and w/o Load Center) with Side Chambers*



M307 Protection Field Install

Tools Needed - To install the M307 Protection Block, you will need the following tools and supplies:

- a medium (number 2) flat head screwdriver,
- No-Ox.

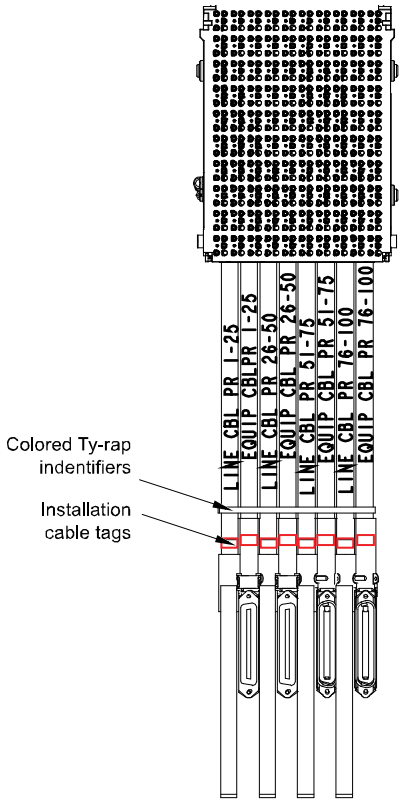
ALERT! *Do **not*** use wire terminals or associated parts - such as nuts, screws, inserts or washers - made of ferrous metals or aluminum. User wire metals and associated parts made of brass, bronze, or equivalent alloys.

ALERT! The two #10-32 screws must be short enough that when they are used to connect the ground cable to the M307 Protection Block, the tips of the screws do not come in contact with plastic of the block

Procedure

Perform the following steps to install the M307 Protection Block:

Figure 45: *M307 Protection Block (Front View)*



1. Unpack the M307 Protection Block, and dispose of the packaging according to local practices.
2. Install the cable labels to all M307 Protection Block cables using identification as shown in the **Figure 45** and **Table 7**

NOTE! *Only 400 pairs are shown here; your dead pair configuration may be different.*

Table 7: *M307 Cable Tags*

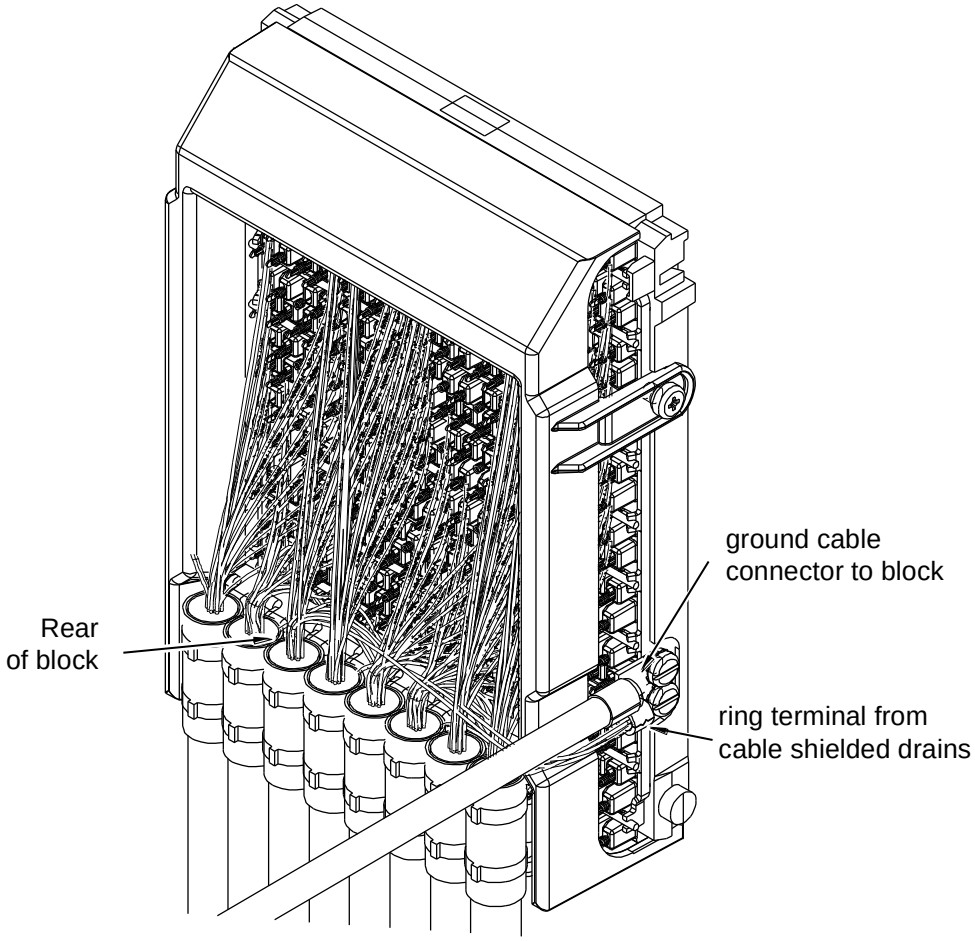
Block 4 Equipment								Block 4 Line/ FLD
Blue		Orange		Green		Brown		
EQ 301-325		EQ 326-350		EQ 351-375		EQ 376-400		
FLD 301-325		FLD 326-350		FLD 351-375		FLD 376-400		
Blue		Orange		Green		Brown		
Block 3 Equipment								Block 3 Line/ FLD
Blue		Orange		Green		Brown		
EQ 201-225		EQ 226-250		EQ 251-275		EQ 276-300		
FLD 201-225		FLD 226-250		FLD 251-275		FLD 276-300		
Blue		Orange		Green		Brown		

Table 7: *M307 Cable Tags*

	Block 1 Equipment				Block 2 Equipment			
Ty-rap Color	Blue	Orange	Green	Brown	Blue	Orange	Green	Brown
Equipment Cable Labels	EQ 1-25	EQ 26-50	EQ 51-75	EQ 76-100	EQ 101-125	EQ 126-150	EQ 151-175	EQ 176-200
Line Cable Labels	FLD 1-25	FLD 26-50	FLD 51-75	FLD 76-100	FLD 101-125	FLD 126-150	FLD 151-175	FLD 176-200
Ty-rap Color	Blue	Orange	Green	Brown	Blue	Orange	Green	Brown
	Block 1 Line/ FLD				Block 2 Line/ FLD			

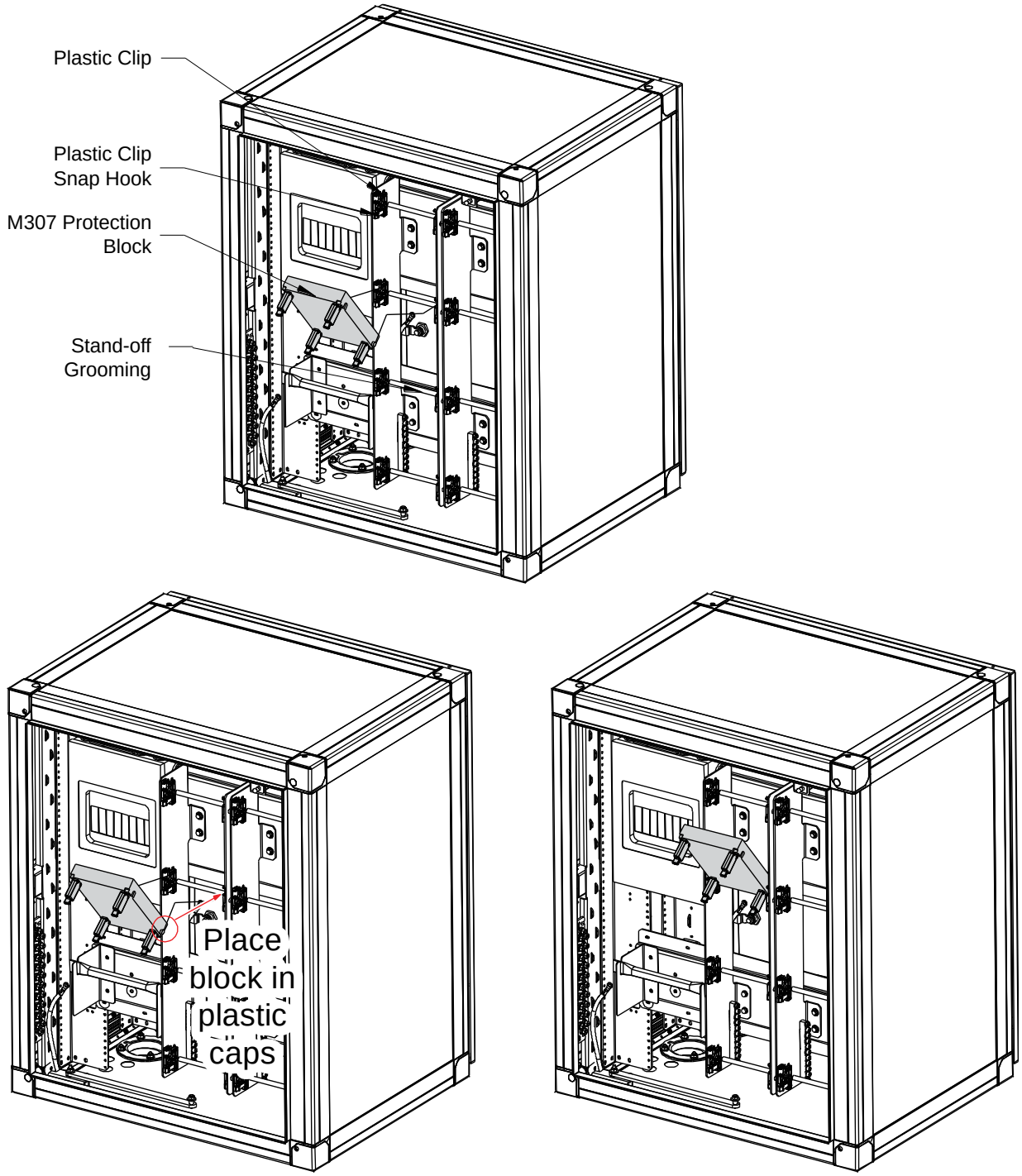
3. Prepare the ground cable per local practices. Install No-Ox to all ground connections.
4. Use the #10-32 screws and two external tooth lock washers (supplied) to connect one end of the ground cable to the ground bar on the lower left side of the M307 Protection Block. If applicable, place ring terminal over ground cable lug on block ground.

Figure 46: *Ground Wire Attached to M307 Protection Block*



5. Connect the block's stub cable to the cables from the outside plant cable splice area, per procedure from "Splicing Copper Cables" on page 66.
6. Secure cables to grooming brackets and lance panel as required.

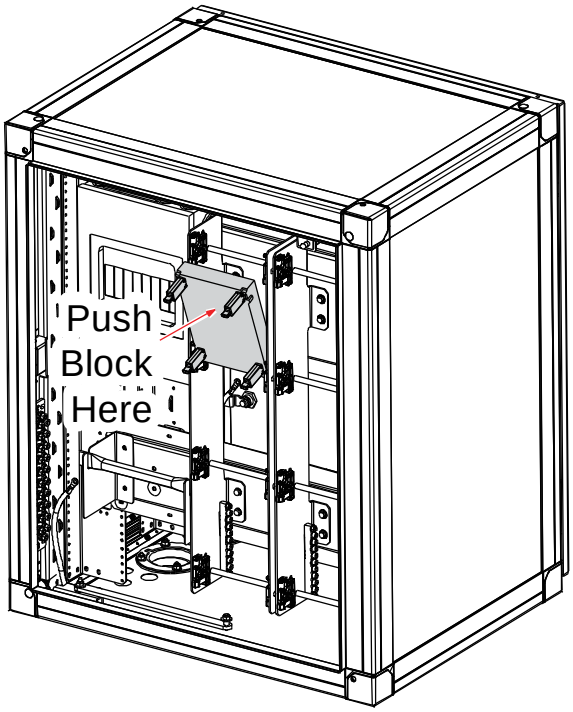
Figure 47: *Block Installation Instructions (cont'd to next page)*



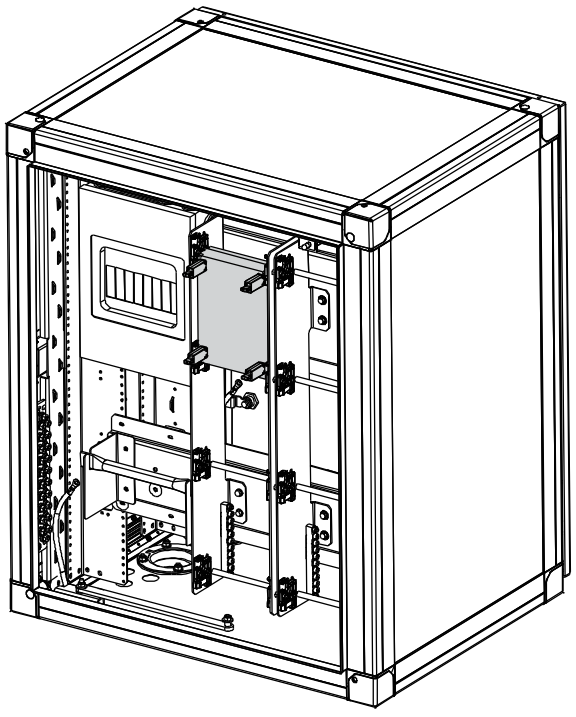
Step 1: Arrange the cables of the block over the stand-off grooming and place the M307 block on the plastic cap.

Step 2: Rotate the M307 block towards the snap hook at the top.

Figure 47: *Block Installation Instructions (cont'd from previous page)*



Step 3: Push the top surface of the M307 block towards the snap hooks.



Step 4: Fix the M307 block by locking with snap hooks. To remove the block, move the snap hooks and pull out the block.

Figure 48: *Cable Routing and Splicing Options for Protection Cables*

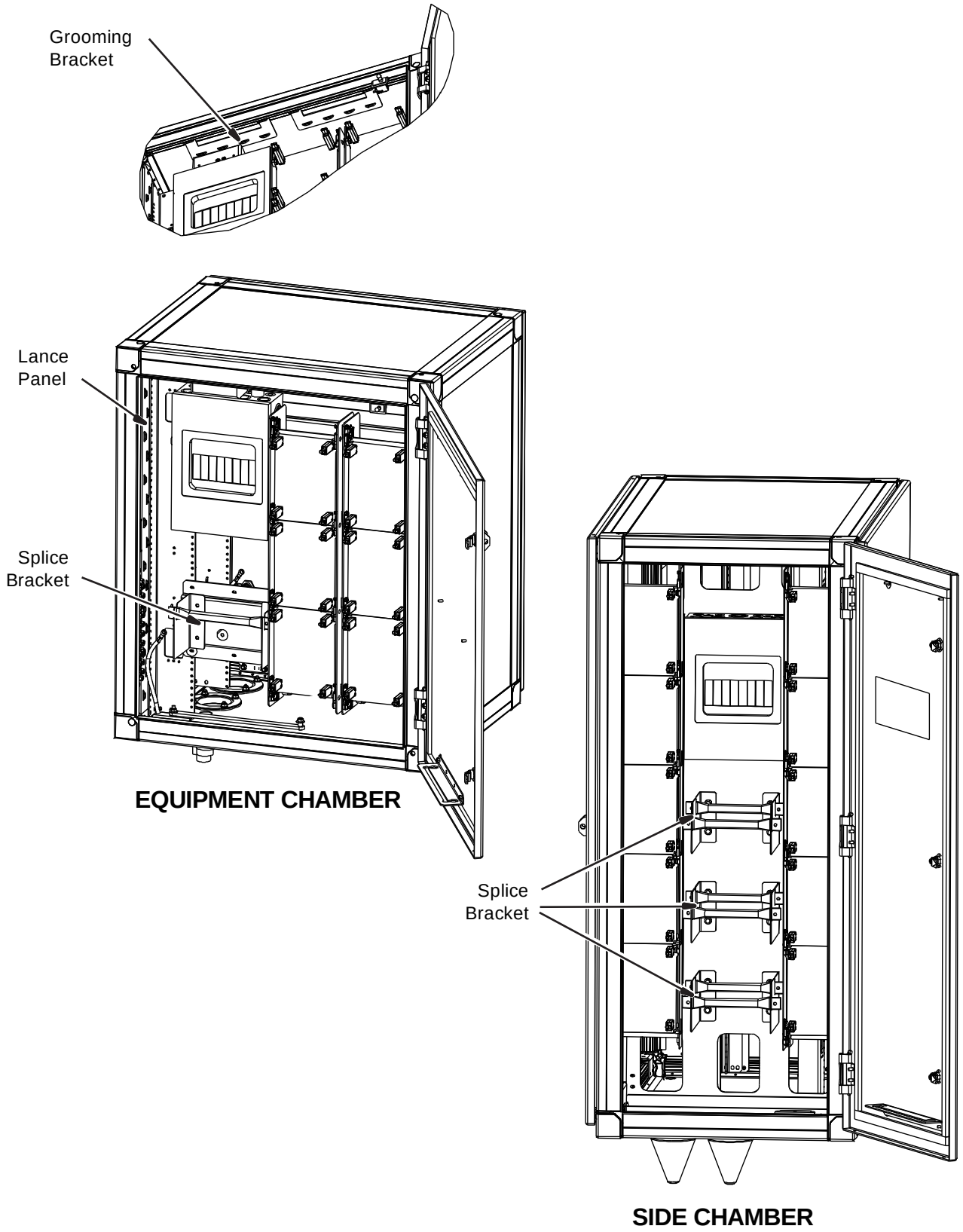


Figure 49: *Grounding of Block with Bracket*

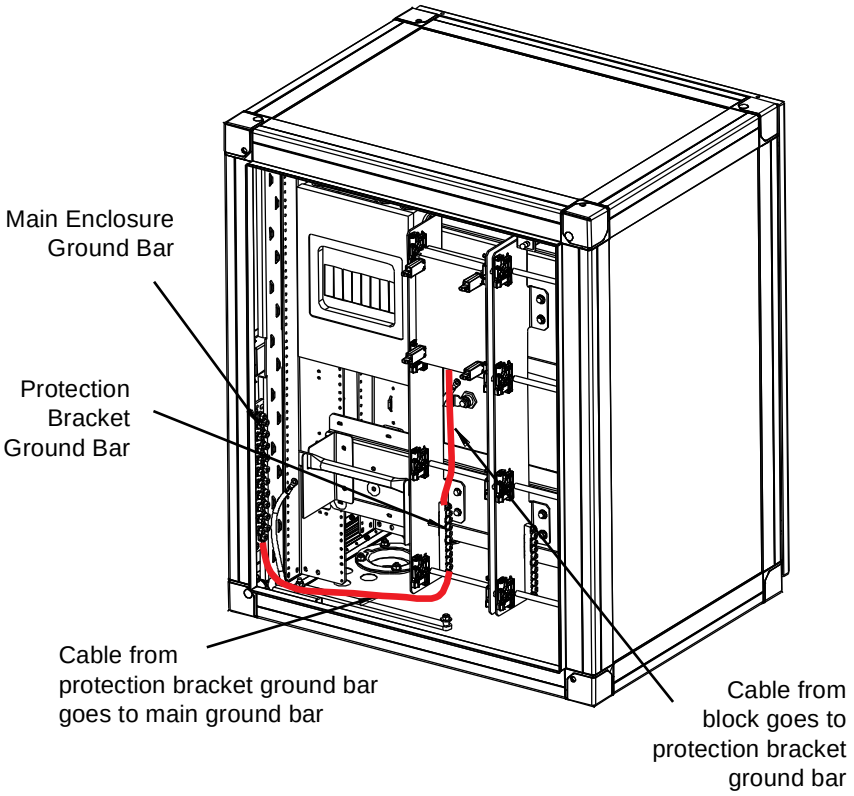
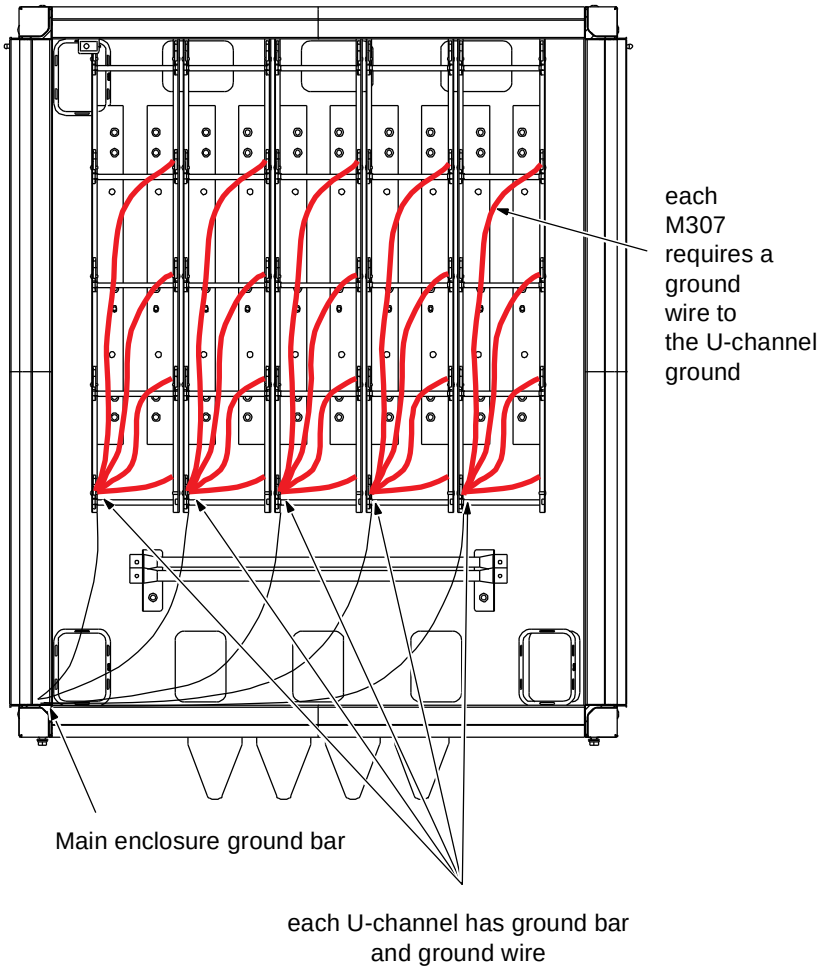


Figure 50: *Wiring Ground Scheme of Cable Routings*



Note: Ground straps from each individual blocks will be connected to protection bracket ground bar. Another ground strap will connect the main ground bar with each protection bracket ground bar (of each vertical bracket).

This grounding scheme is the same for side chamber protection layout as well.

AC POWER

Safety Precautions

DANGER! Risk of Electrical Shock, General

- All ground connections must be installed and verified, prior to connecting any power cables (AC or DC) and turning-up of enclosure.
- Before installation, the AC grounding electrode system must be bonded to an AC main service power neutral/ground bus. Contact your local power company or local practices for information about codes or restrictions for your installation.
- When connecting any discrete power connection, make the connection first with the ground/return and break last with ground/return.
- Remove rings, metallic wrist bands, or bracelets, etc.

DANGER! Risk of Electrical Shock, AC

- Proper actions, include, but not limited to:
  - Verify before contacting the enclosure that no current leakage or ground fault condition is present.
  - Verify a proper ground is in place.
  - Verify for AC hook-up, all enclosure circuit breakers are OFF and the utility incoming feed is OFF.
- Use a trained licensed electrician.

DANGER! Electrical Hazard

Observe all safety precautions as specified by local building codes and the National Electrical Code (NEC). All procedures should be performed by a licensed electrician. If local building codes specify procedures different from those in this section, follow local codes.

Enclosure AC Schematic

The complete system schematics are included with each enclosure.

Grounding the Enclosure

ALERT! Grounding should be accomplished according to local practices and in accordance with the latest NEC codes.

All enclosure grounding and ground ring must be installed prior to turn up of enclosure.

The enclosure should be grounded to an external ground ring using a #2 AWG solid wire. The resistance of the ground ring, as verified with a Megger, shall be less than 25 ohms.

NOTE! *The internal frame and external enclosure are factory grounded to a ground bar located inside the enclosure.*

Ground Bar Locations

Enclosures without side chambers are equipped with a ground bar located at the rear of the enclosure. This ground bar may be designated as the enclosure's Main Ground Bar (MGB) (depending on local practices).

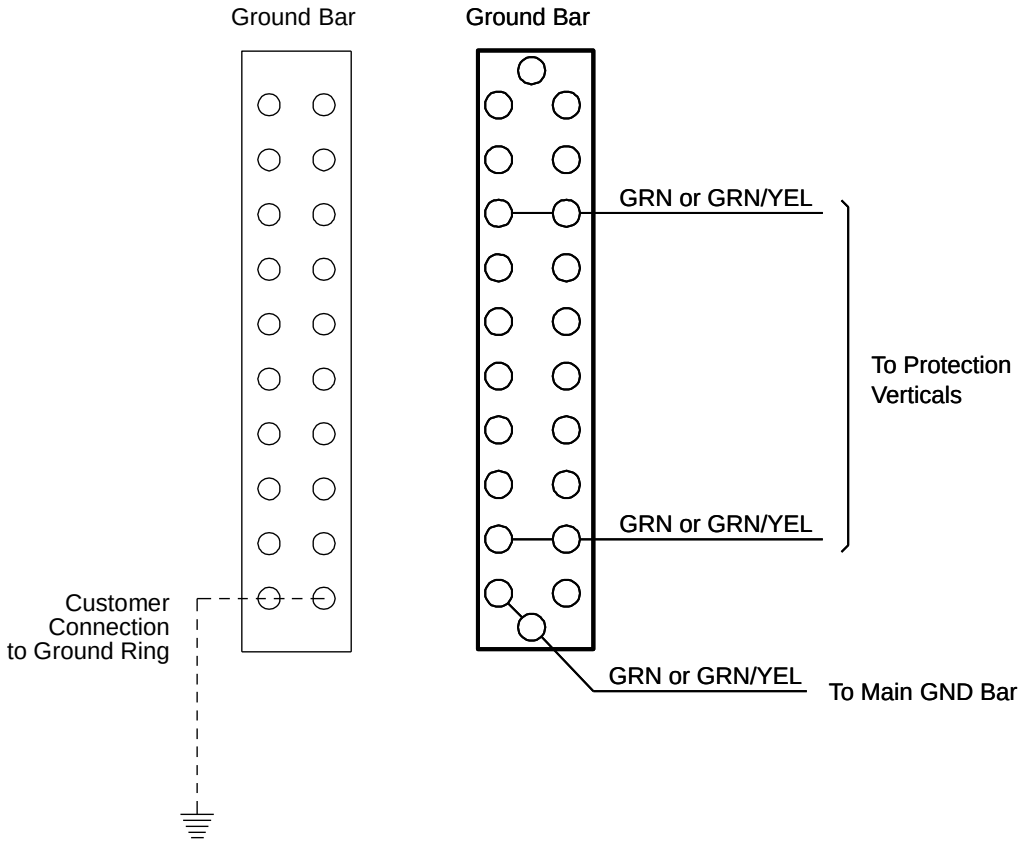
Enclosures with one side chamber are equipped with a ground bar located in the side chamber. This ground bar may be designated as the enclosure's Main Ground Bar (MGB) (depending on local practices).

Enclosures with two side chambers are equipped with a ground bar located in each side chamber. The ground bar located in the right side chamber may be designated as the enclosure's Main Ground Bar (MGB) (depending on local practices).

Procedure

- For enclosures with one ground bar (enclosures with no side chamber or one side chamber), connect the ground bar to the ground ring.
- For enclosures with two side chambers, both ground bars (one in each side chamber) are to be connected to the ground ring.

Figure 51: *Typical Enclosure Grounding*



AC Input Connections

DANGER! Adhere to "Safety Precautions" on page 84.

General

Various AC input configurations and kits are available. A general procedure is provided here for making AC input connections. Illustrations are provided after this procedure for typical AC input configuration options. Select the proper illustration from those presented in this section for the AC input configuration furnished in your enclosure. Refer also to the schematic drawings shipped with your enclosure for a detailed AC wiring diagram.

Refer to **Figure 52** for AC input cable entry into the various enclosure configurations. Also refer to the pad template illustrations in “Installing a Concrete Pad” on page 36.

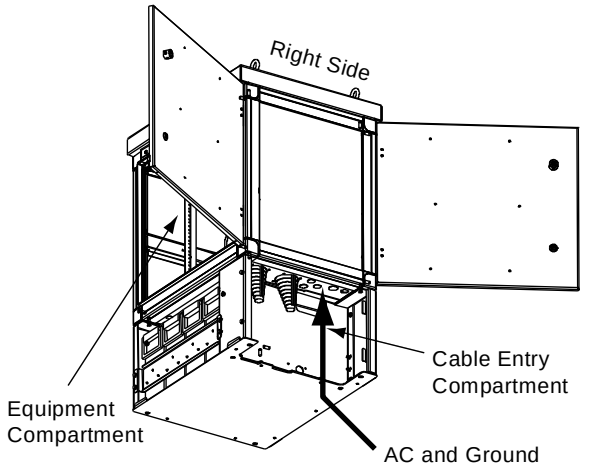
Make connections per the current edition of the American National Standards Institute (ANSI) approved National Fire Protection Association's (NPFA) National Electrical Code (NEC), and applicable local codes.

The following procedure shall be performed by a trained licensed electrician.

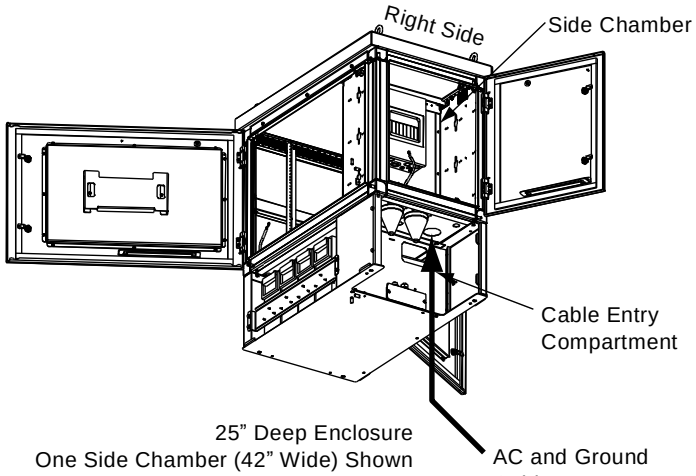
General Procedure

1. Use a non-contact voltage detector to verify the enclosure is safe.
2. Verify that the enclosure is properly grounded.
3. Verify that all breakers feeding the enclosure and all breakers within the enclosure are in the OFF position.
4. Refer to the schematic drawings shipped with your enclosure for a detailed AC wiring diagram. See also the typical illustrations provided after this general procedure.
5. Determine the AC cabling route into the enclosure for your installation site. Remove access panels as required to access the AC input routing and connection points.
6. Pull the AC Power and Ground Cables into the enclosure.
7. Connect the required feeds per the schematic drawings shipped with your enclosure and the typical illustrations provided after this general procedure.

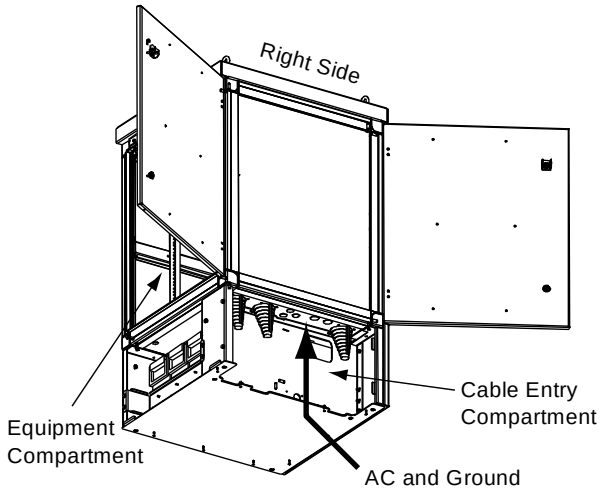
Figure 52: *Typical AC Input Routing (cont'd on next page)*



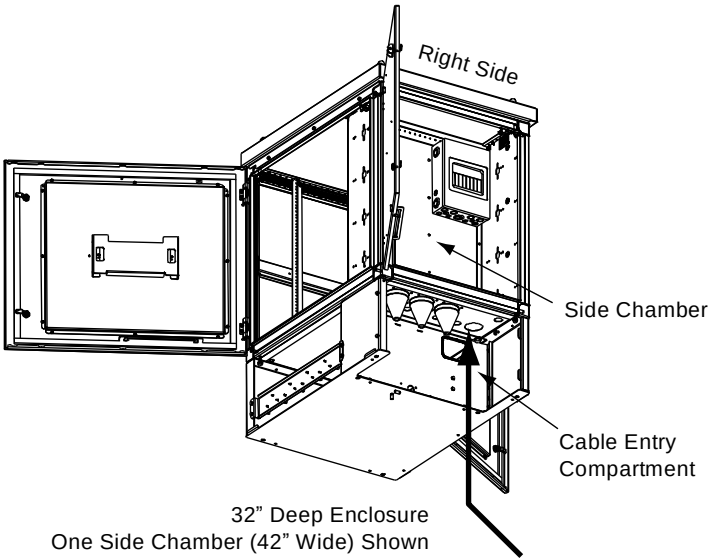
25" Deep Enclosure
No Side Chamber (30" Wide)
(Enclosure with Battery Base
Shown, Plinth and Riser Similiar)



25" Deep Enclosure
One Side Chamber (42" Wide) Shown
Two Side Chambers (54" Wide) Similiar
(Enclosure with Battery Base
Shown, Plinth and Riser Similiar)

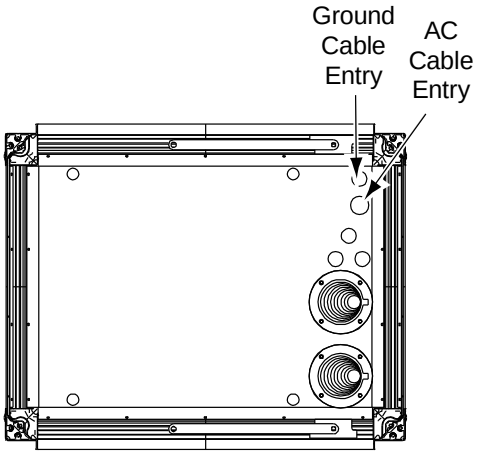


32" Deep Enclosure
No Side Chamber (30" Wide)
(Enclosure with Battery
Base Shown, Plinth
and Riser Similiar)

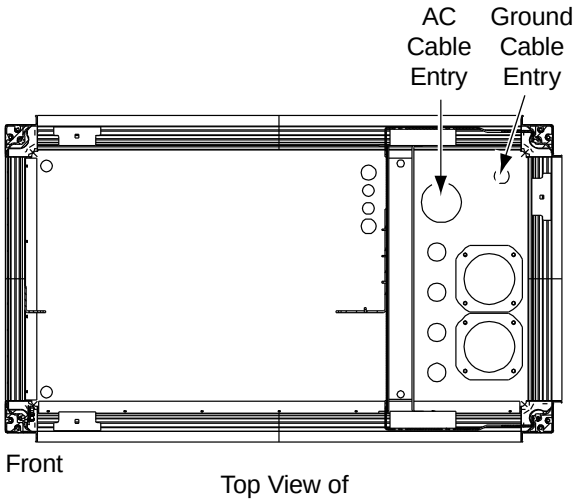


32" Deep Enclosure
One Side Chamber (42" Wide) Shown
Two Side Chambers (54" Wide) Similiar
(Enclosure with Battery Base
Shown, Plinth and Riser Similiar)

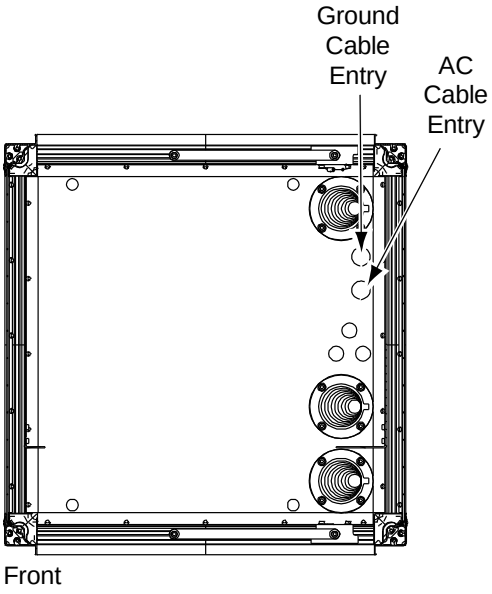
Figure 53: *Typical AC Input Routing (cont'd from previous page)*



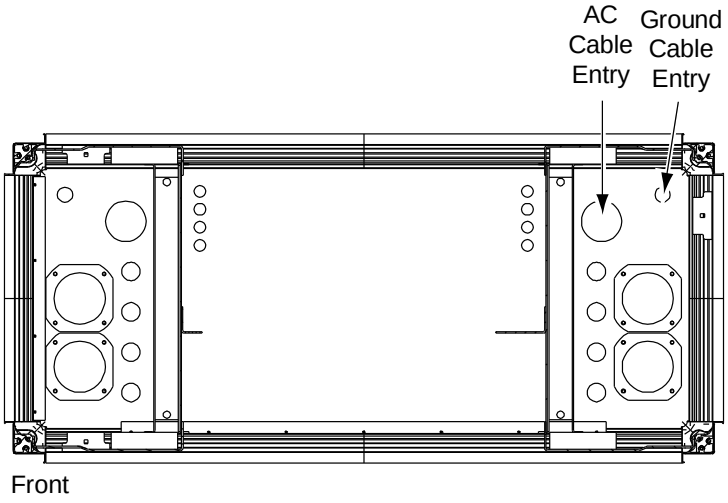
Top View of
Equipment Chamber Floor
25" Deep Enclosure
No Side Chamber (30" Wide)



Top View of
Equipment / Side Chamber Floor
25" Deep Enclosure
One Side Chamber (42" Wide)



Top View of
Equipment Chamber Floor
32" Deep Enclosure
No Side Chamber (30" Wide)

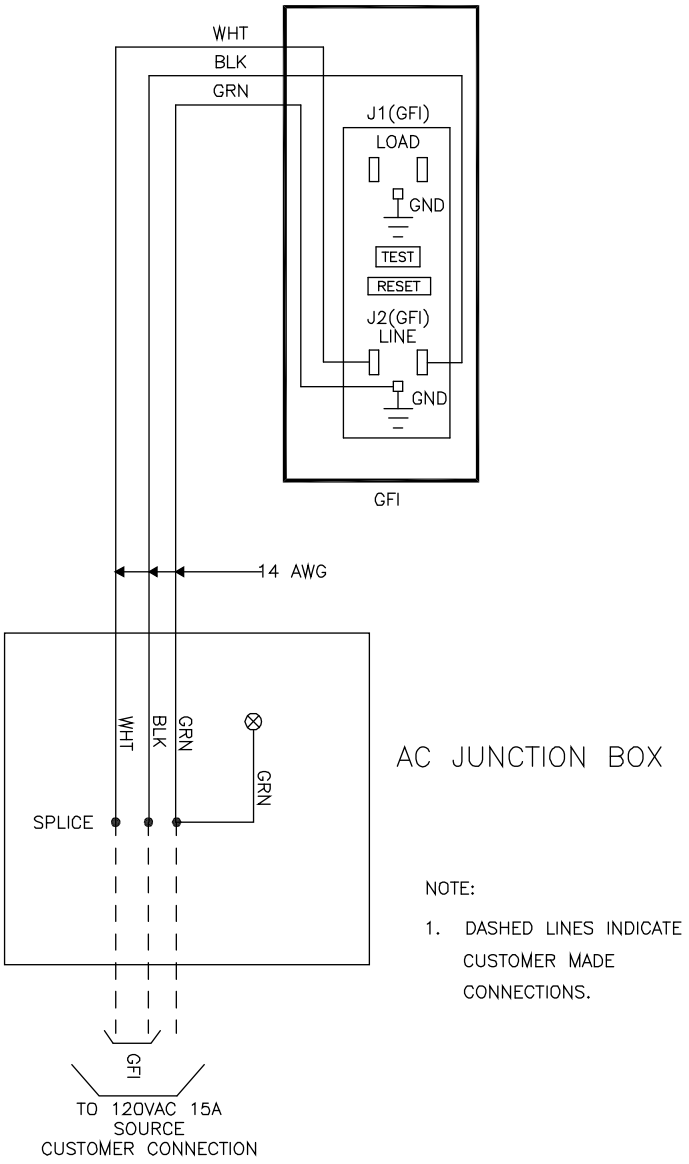


Top View of
Equipment / Side Chamber Floor
25" Deep Enclosure
Two Side Chambers (54" Wide)

AC Input Junction Box Kit P/N 544966 - Typical Wiring (120VAC/15A)

Customer AC input connections are made in the furnished AC input junction box (120VAC, 60 Hz, 15A service). Depending on enclosure configuration, the junction box may be located in the Equipment Compartment or a Side Chamber. See **Figure 54**.

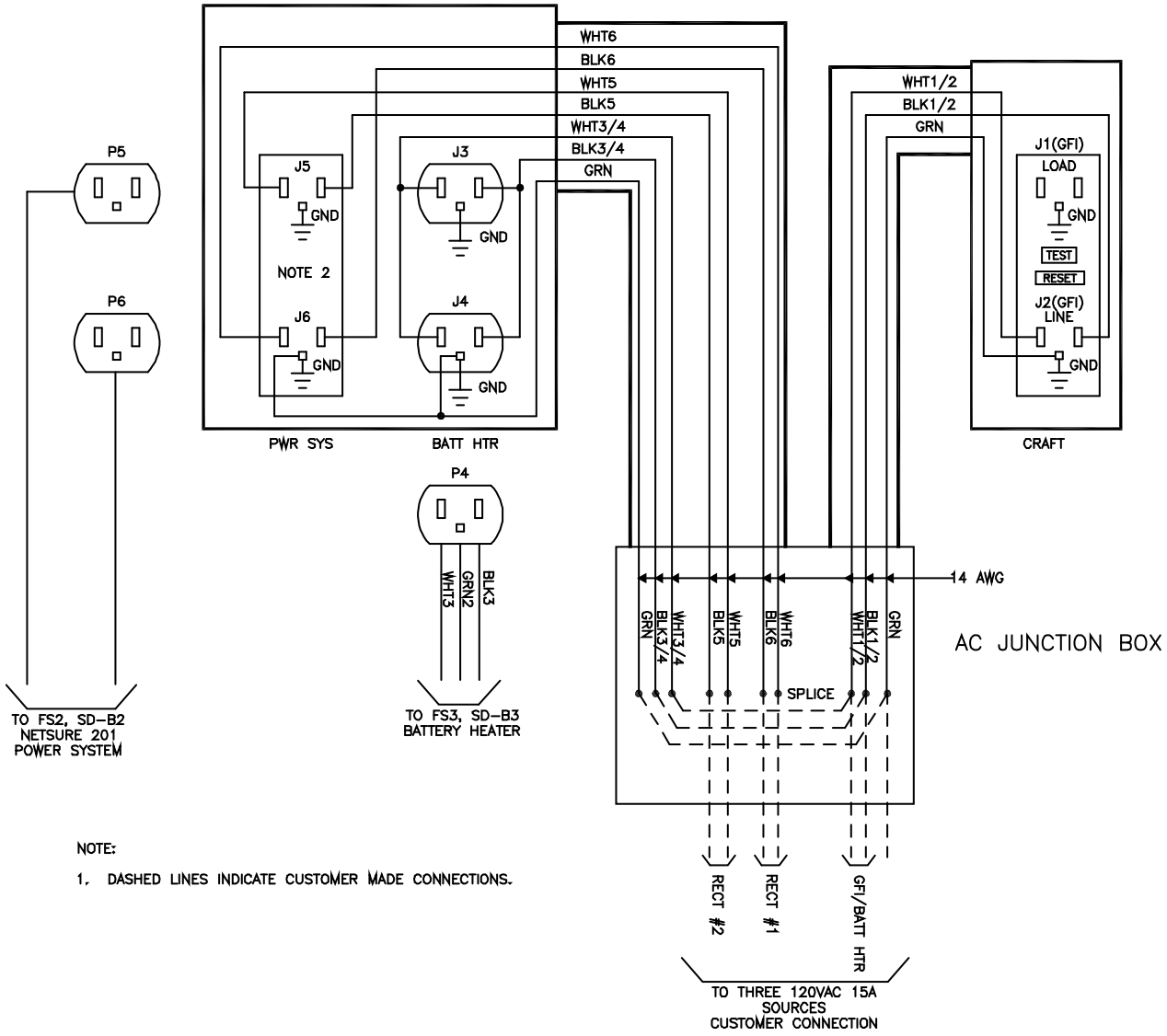
Figure 54: *AC Input Junction Box Kit P/N 544966 - Typical Wiring*



AC Input Junction Box - Typical Wiring (120VAC/15A)

Customer AC input connections are made in the furnished AC input junction box (120VAC, 60 Hz, 15A services). Depending on enclosure configuration, the junction box may be located in the Equipment Compartment or a Side Chamber. See **Figure 55**.

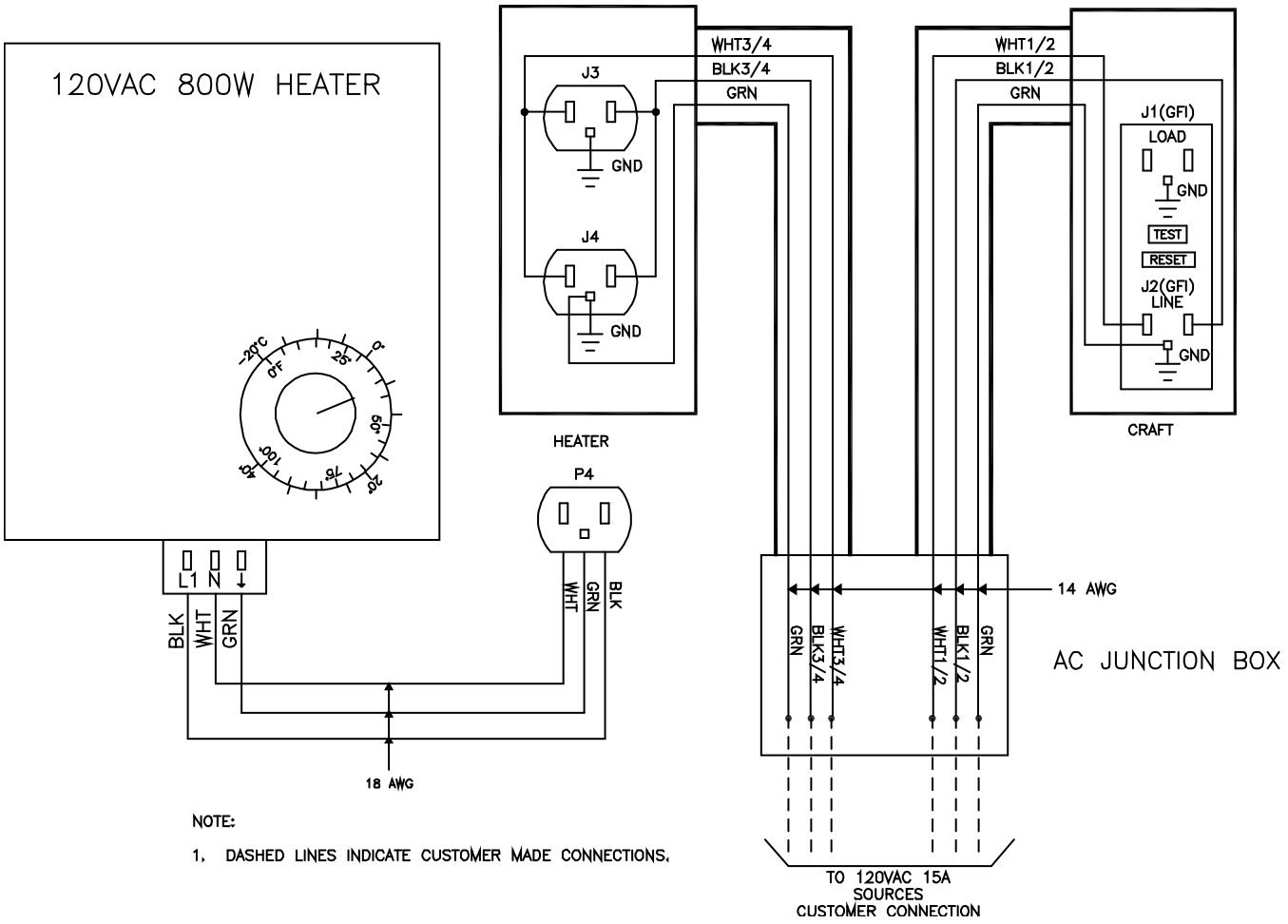
Figure 55: *AC Input Junction Box - Typical Wiring (120VAC/15A)*



AC Input Junction Box - Typical Wiring (120VAC/15A)

Customer AC input connections are made in the furnished AC input junction box (120VAC, 60 Hz, 15A services). Depending on enclosure configuration, the junction box may be located in the Equipment Compartment or a Side Chamber. See **Figure 56**.

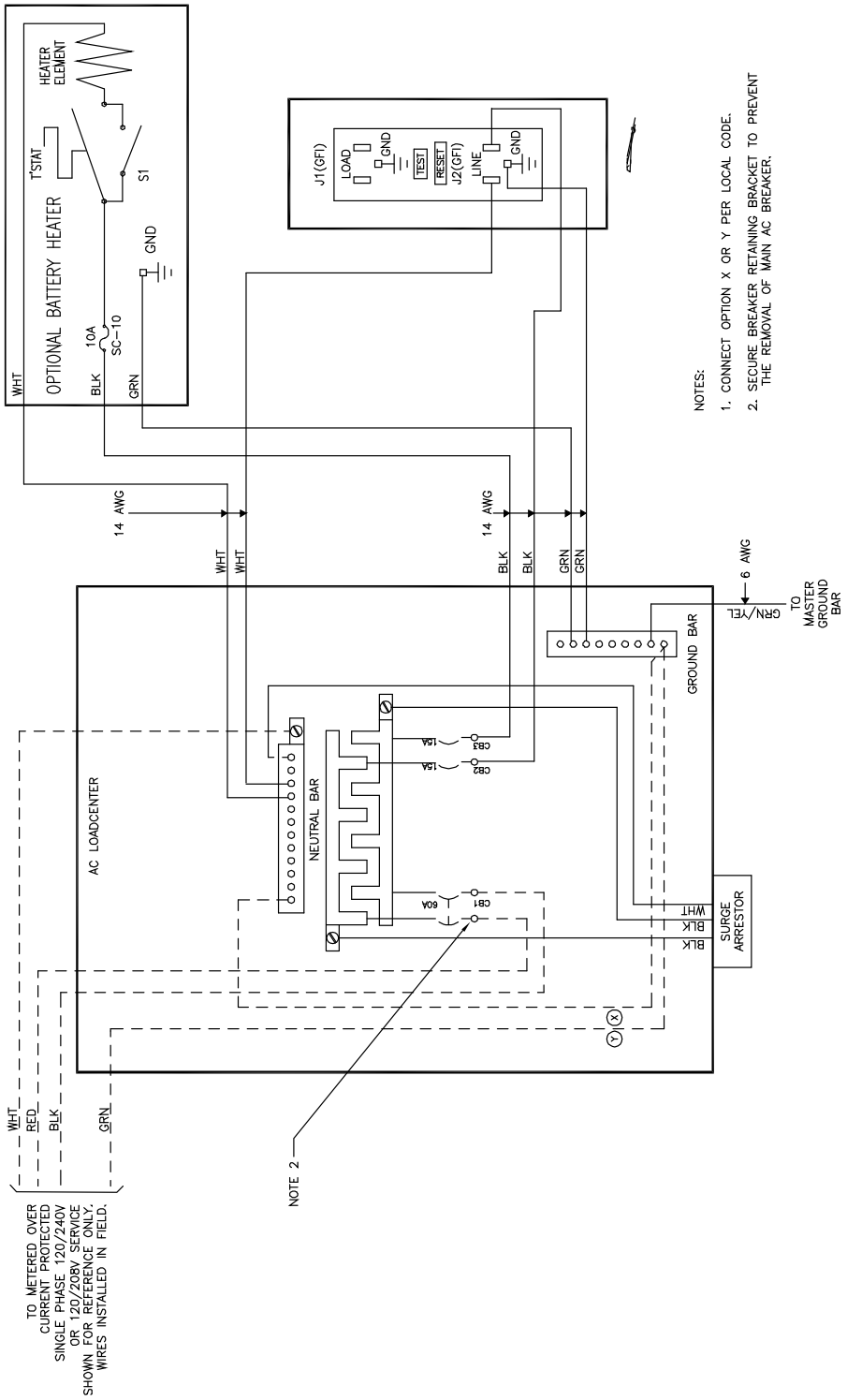
Figure 56: *AC Input Junction Box - Typical Wiring (120VAC/15A)*



8-Position Load Center Kit P/Ns 544970 and 546425 - Typical Wiring

Provides a 120/240VAC or 120/208VAC, 60 Hz, 100A, 8-position load center. Depending on enclosure configuration, the load center may be located in the Equipment Compartment or a Side Chamber. See **Figure 57**.

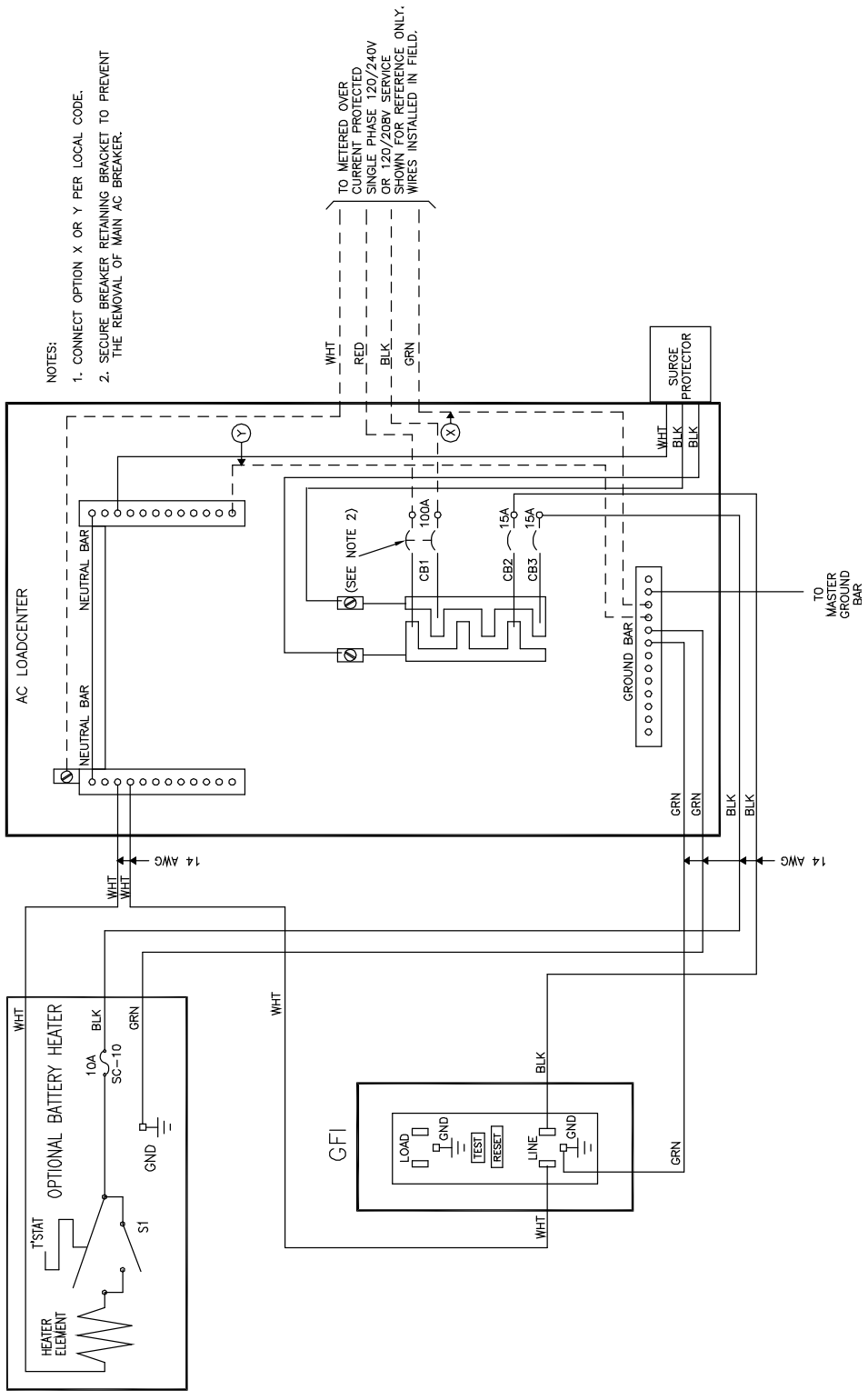
Figure 57: *8-Position Load Center Kit P/Ns 544970 and 546425 - Typical Wiring*



12-Position Load Center Kit P/N 547095 and 547096 - Typical Wiring

Provides a 120/240VAC or 120/208VAC, 125A, 12-position load center. Depending on enclosure configuration, the load center may be located in the Equipment Compartment or a Side Chamber. See **Figure 58**.

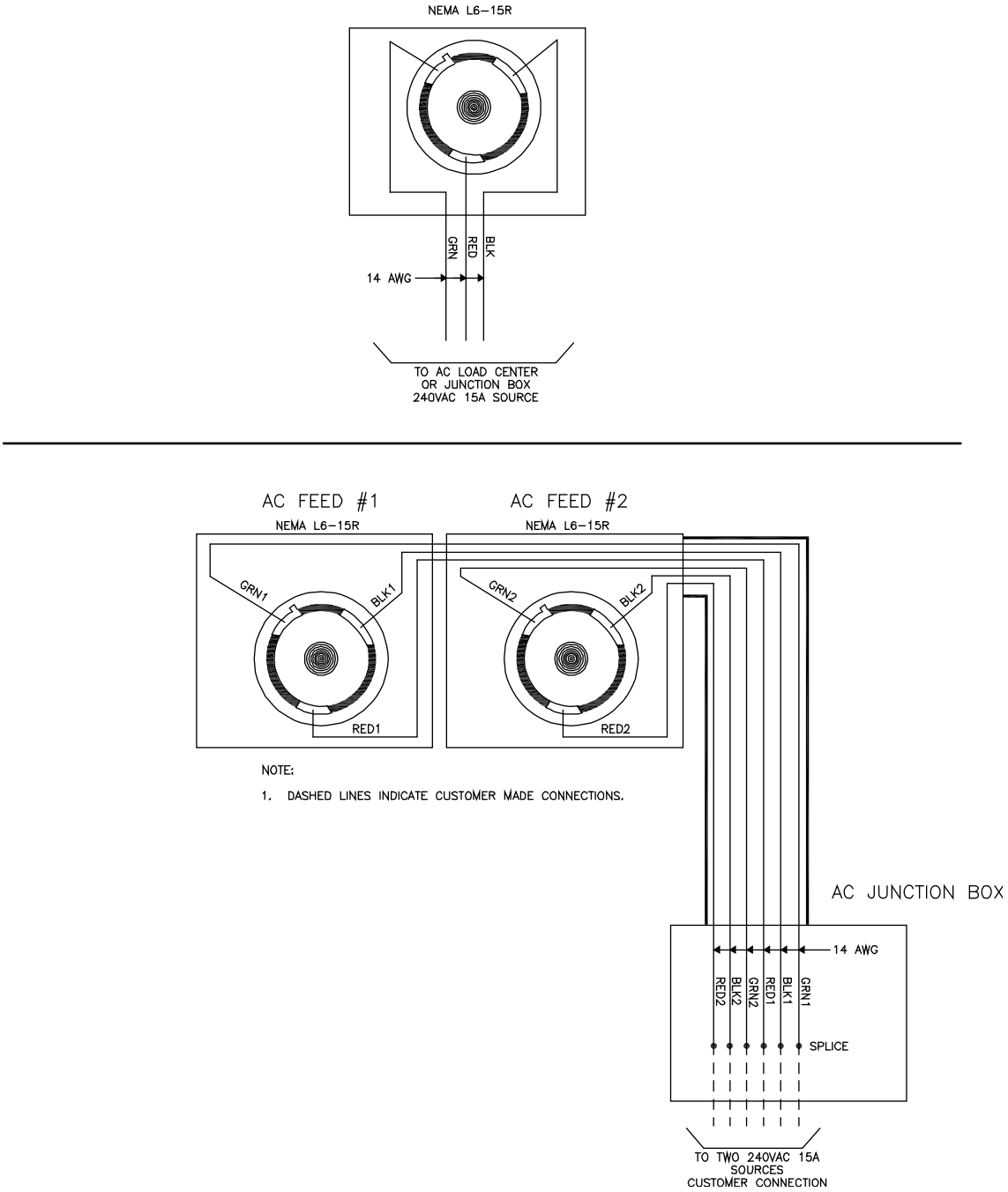
Figure 58: *12-Position Load Center Kit P/Ns 547095 and 547096 - Typical Wiring*



240VAC/15A Twist Lock Receptacle Kit P/N 545101 - Typical Wiring

May be used in conjunction with the AC Junction Box Kit or one of the Load Center Kits to provide a 240VAC, 60 Hz, 15A twist lock plug(s) for the furnished power system and/or air conditioner. Depending on enclosure configuration, the twist lock plug may be located in the Equipment Compartment or a Side Chamber. See **Figure 59**.

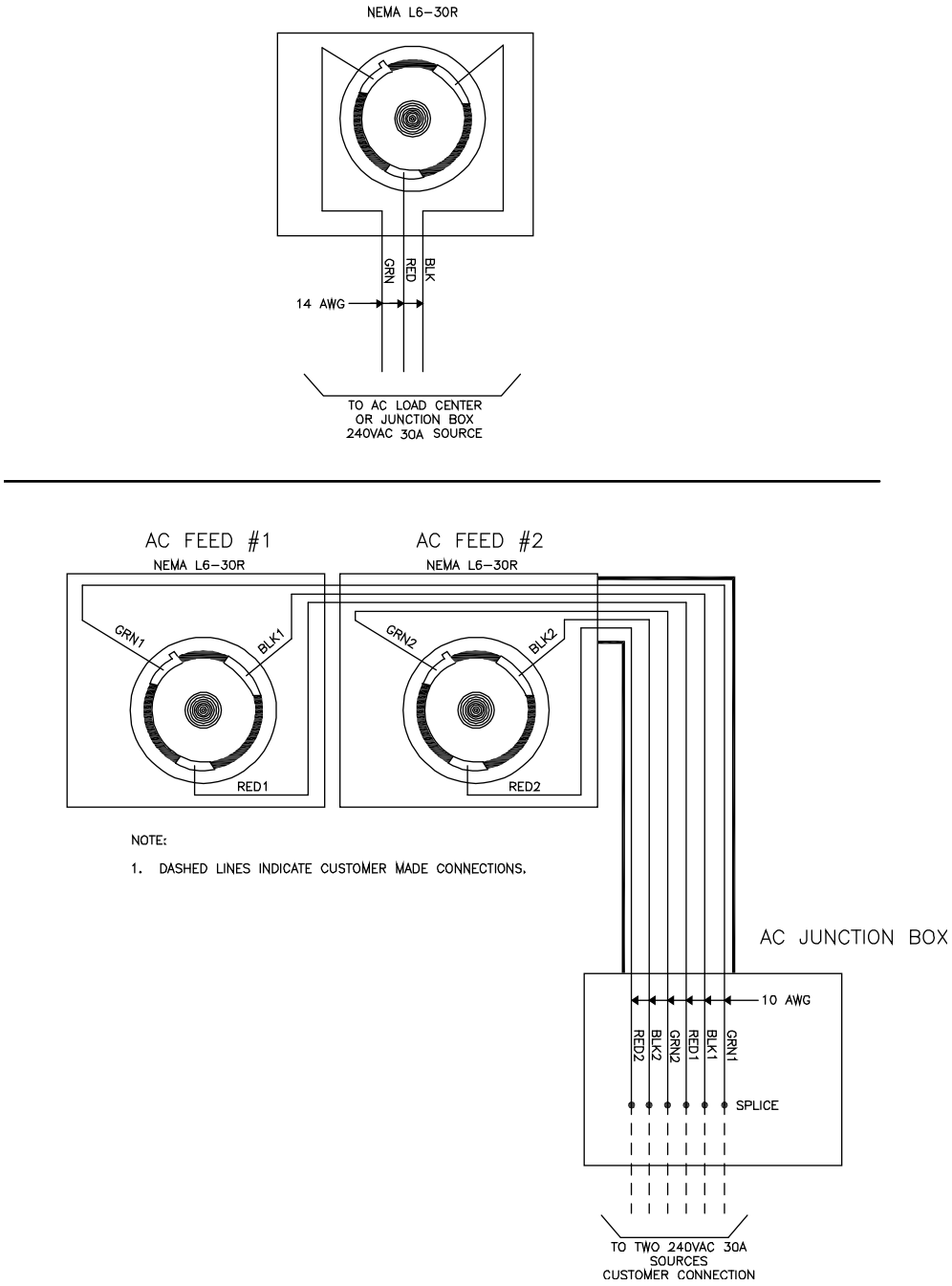
Figure 59: *240VAC/15A Twist Lock Receptacle Kit P/N 545101 Typical Wiring*



240VAC/30A Twist Lock Receptacle Kit P/N 545102 - Typical Wiring

May be used in conjunction with the AC Junction Box Kit or one of the Load Center Kits to provide a 240VAC, 60 Hz, 30A twist lock plug(s) for the furnished power system and/or air conditioner. Depending on enclosure configuration, the twist lock plug may be located in the Equipment Compartment or a Side Chamber. See **Figure 60**.

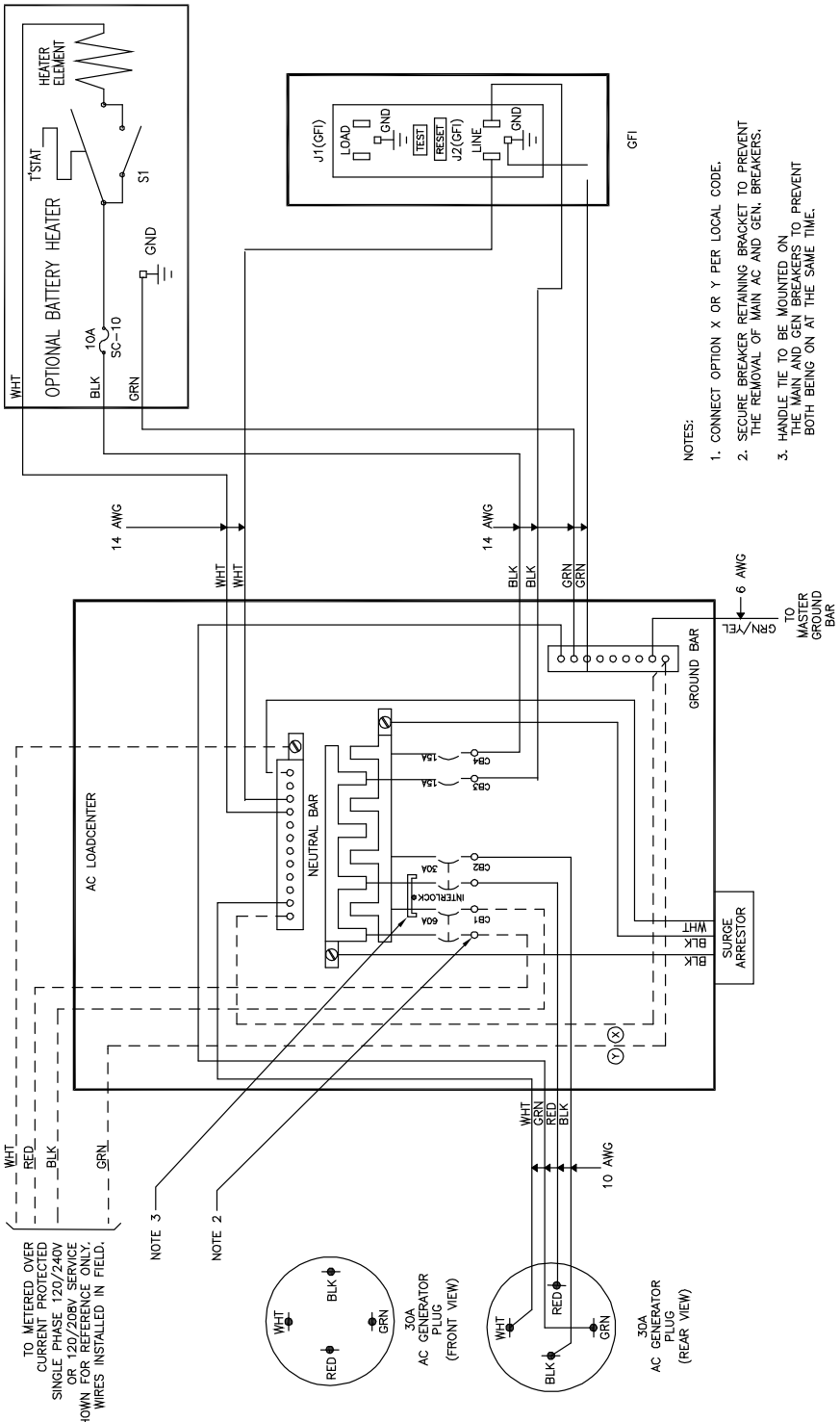
Figure 60: *240VAC/30A Twist Lock Receptacle Kit P/N 545102 Typical Wiring*



Optional 30A Generator Connection Kit P/Ns 544974 and 547097 - Typical Wiring

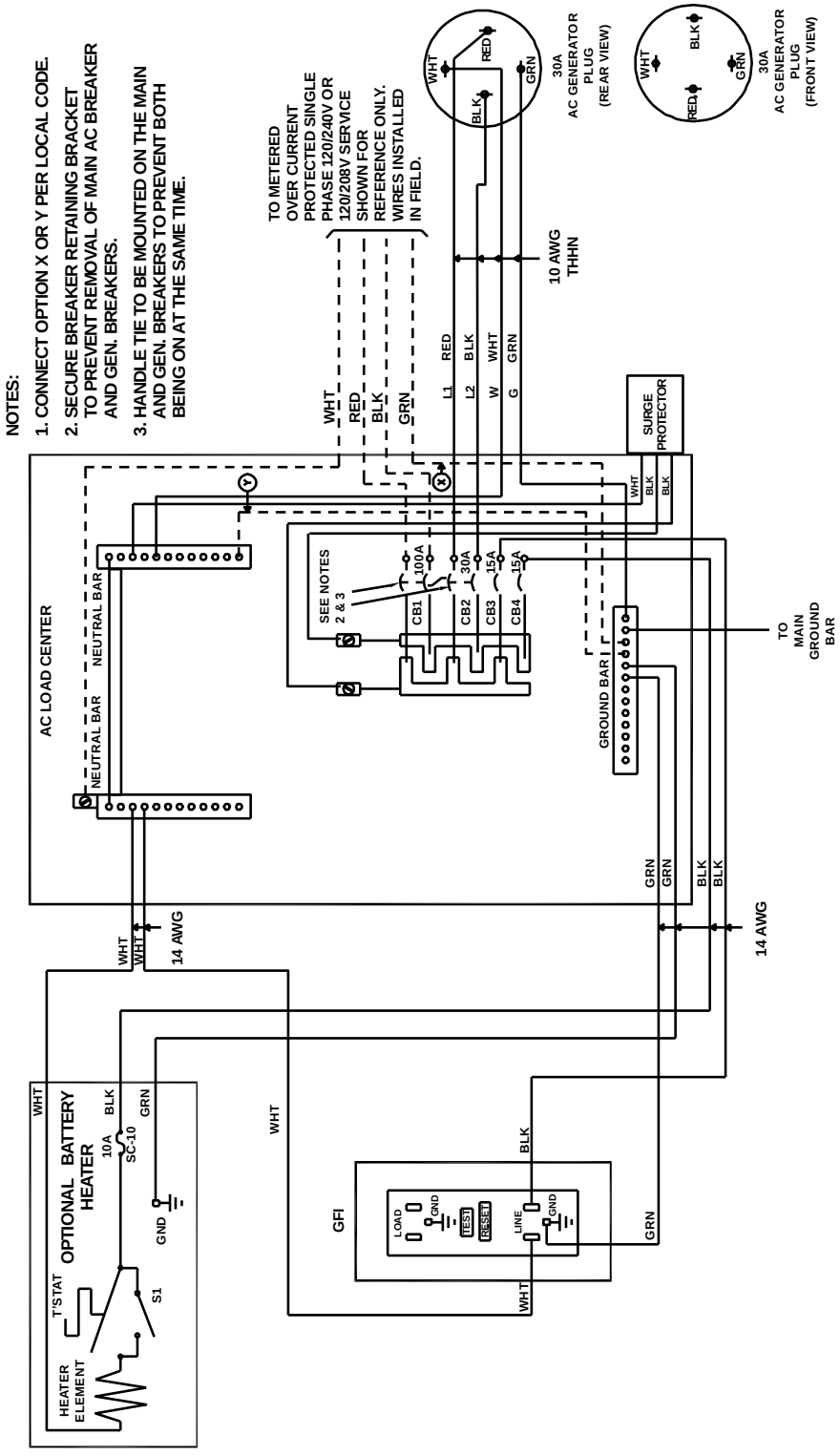
P/N 544974 is used in conjunction with the 8-Position Load Center to provide connections for a 120/240VAC or 120/208VAC, 60 Hz, 30A generator service. Connections between the load center and the generator inlet are factory made. See **Figure 61**.

Figure 61: *Optional 30A Generator Connection Kit P/N 544974 Typical Wiring*



P/N 547097 is used in conjunction with the 12-Position Load Center to provide connections for a 120/240VAC or 120/208VAC, 60 Hz, 30A generator service. Connections between the load center and the generator inlet are factory made. See **Figure 62**.

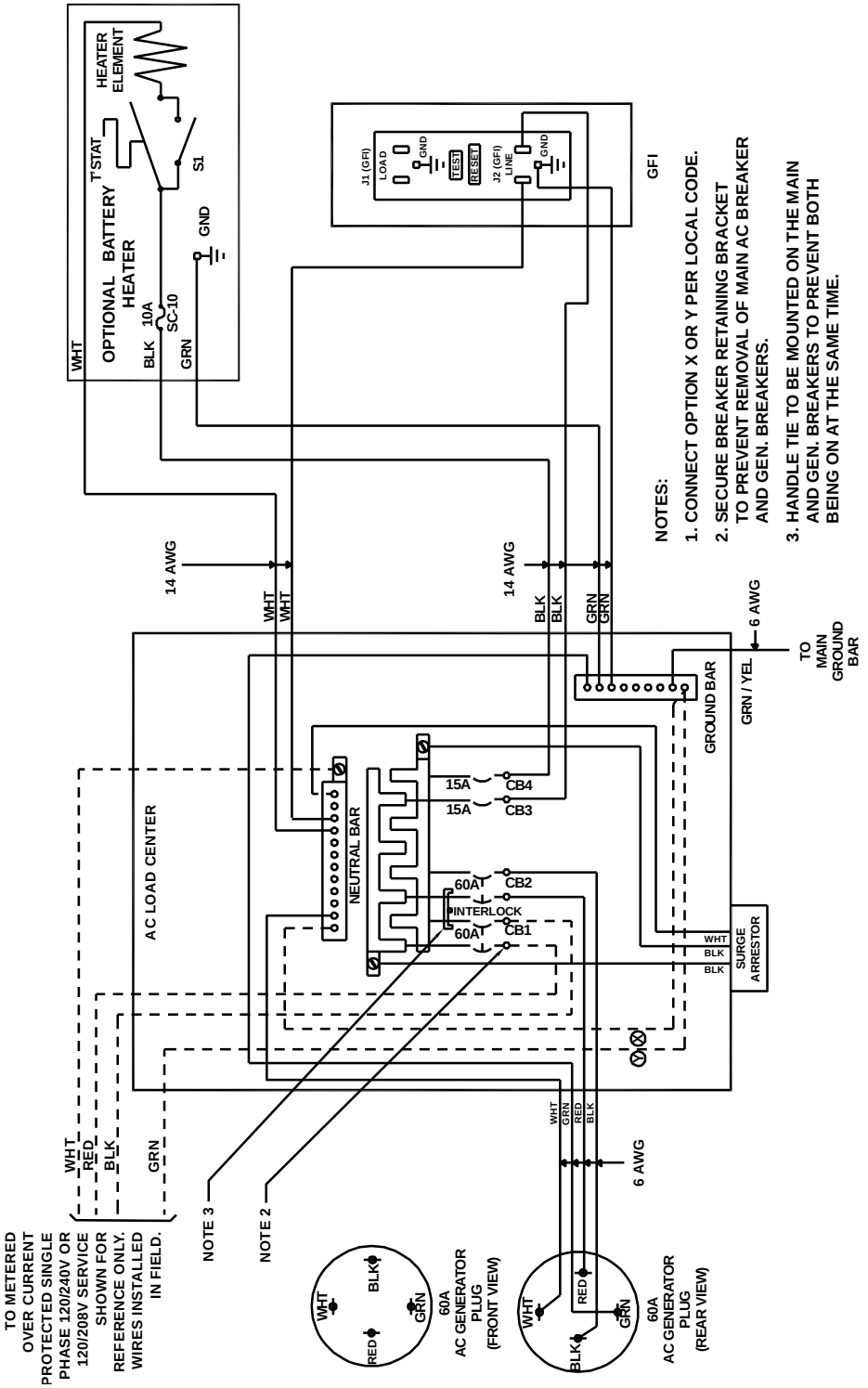
Figure 62: *Optional 30A Generator Connection Kit P/N 547097 Typical Wiring*



Optional 60A Generator Connection Kit P/Ns 546478 and 547098 - Typical Wiring

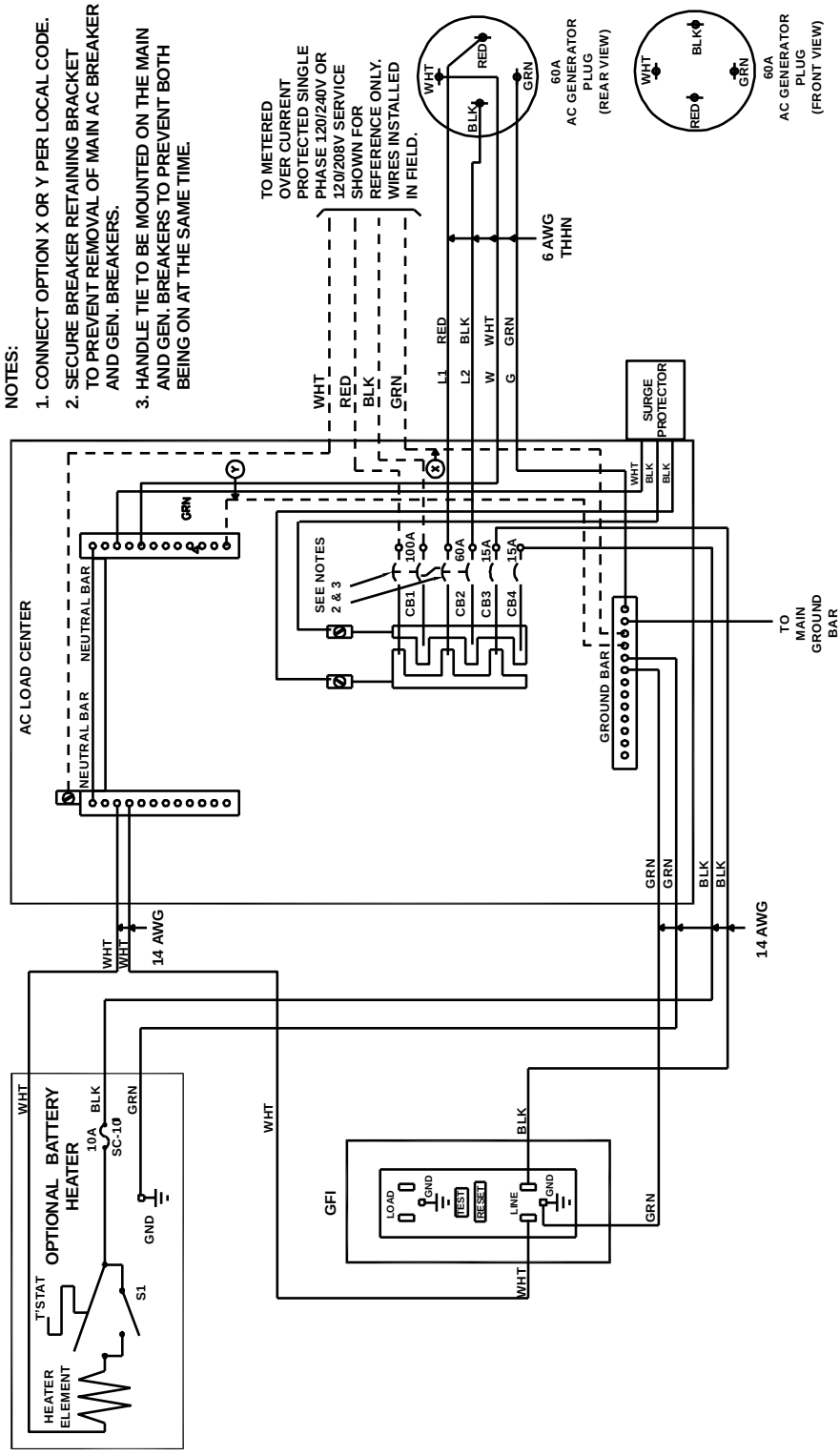
P/N 546478 is used in conjunction with the 8-Position Load Center to provide connections for a 120/240VAC or 120/208VAC, 60 Hz, 60A generator service. Connections between the load center and the generator inlet are factory made. See **Figure 63**.

Figure 63: *Optional 60A Generator Connection Kit P/Ns 546478 Typical Wiring*



P/N 547098 is used in conjunction with the 12-Position Load Center to provide connections for a 120/240VAC or 120/208VAC, 60 Hz, 60A generator service. Connections between the load center and the generator inlet are factory made. See **Figure 64**.

Figure 64: *Optional 60A Generator Connection Kit P/N 547098 Typical Wiring*



INSTALLING AND CONNECTING BATTERIES

Safety Precautions

DANGER! ELECTRICAL HAZARD. Risk of serious injury and/or equipment damage.

- Exercise extreme care when handling the batteries and connecting them to the string. Two people are recommended for lifting and placing batteries. Wear heavy gloves and safety glasses while lifting the batteries. Handle each battery ONLY by its lifting slot. Keep hands well away from the connector posts.
- Arcing is possible during battery connection procedures. Use heavy gloves during all procedures involving the batteries to avoid potential injury. Do not wear rings, metallic wrist bands or bracelets when working on batteries. Do not allow metal objects to rest on the batteries or to fall across the terminals.
- Make sure the battery disconnect breakers are set to “OFF”.

DANGER! Electrical and Explosion Hazard.

Batteries can be a lethal source of electrical power under certain conditions. Batteries are electrically live at all times. Although the voltages are not hazardous, the batteries can deliver large amounts of current. Even if the case is damaged, the battery is capable of supplying high short-circuit current.

General

NetXtend™ Flex configuration options allow batteries to be housed either in an internal battery tray(s) or an external battery base or an external battery riser. The battery tray, battery base, and battery riser can accommodate either -48Vdc or +24Vdc battery strings.

Before installing batteries, refer to:

- The schematic drawings shipped with your enclosure for a wiring diagram.
- The battery vendor’s documentation set for installation and testing instructions.
- Battery vendor’s documentation set for battery safety precautions and notices.

A battery disconnect circuit breaker is provided in the Equipment Compartment for each string of battery the enclosure accommodates.

Installing Batteries

Depending on enclosure configuration, 12Vdc front post batteries are installed in either…

- an internal battery tray(s) (refer to **Figure 65**),
- an external battery base (refer to **Figure 66**, **Figure 67**, **Figure 68**, or **Figure 69**), or
- an external battery riser (refer to **Figure 70**).

NOTE! *The enclosure is not shipped with batteries installed. The batteries are to be installed in the field.*

NOTE! *The maximum battery rating and weight, that the system has been designed and tested to, is 190 Ah (133 lbs) per battery.*

NOTE! *If installing batteries in an external battery riser and only one -48Vdc battery string (or two +24Vdc battery strings) is installed, batteries should be installed in the top battery shelf (bottom battery shelf left vacant).*

Procedure

1. Open the enclosure's front door and secure with the wind latch.
2. Refer to the appropriate **Figure 65**, **Figure 66**, **Figure 67**, **Figure 68**, or **Figure 69**, or **Figure 70** and remove any front cover, braces, and battery retaining brackets as required. Set these and the hardware aside for re-use.
3. Ensure all battery disconnect circuit breakers are in the "off" position.
4. Using a Digital Multimeter (DMM), measure the battery voltages to make sure all batteries are in good condition. A good battery will indicate approximately 12.5Vdc. Per internal battery procedures, replace any battery measured at less than 11.0Vdc.
5. If necessary, remove all the connecting hardware from the battery terminals.
6. Coat all battery terminals with an anti-oxidation compound (NO-OX-ID-A).
7. Locate the interconnect busbars, covers, and lug bolts in the battery kit.
8. Ensure factory battery cables will be in an accessible position after batteries are installed.
9. Install the batteries into each battery tray, battery base, or battery riser. Ensure the battery lifting handle straps are kept clear of the battery shelf "clamps" front and back.
10. Secure batteries within the battery shelf with the previously removed restraint brackets.

Figure 65: *Battery Placement in Battery Tray(s)*

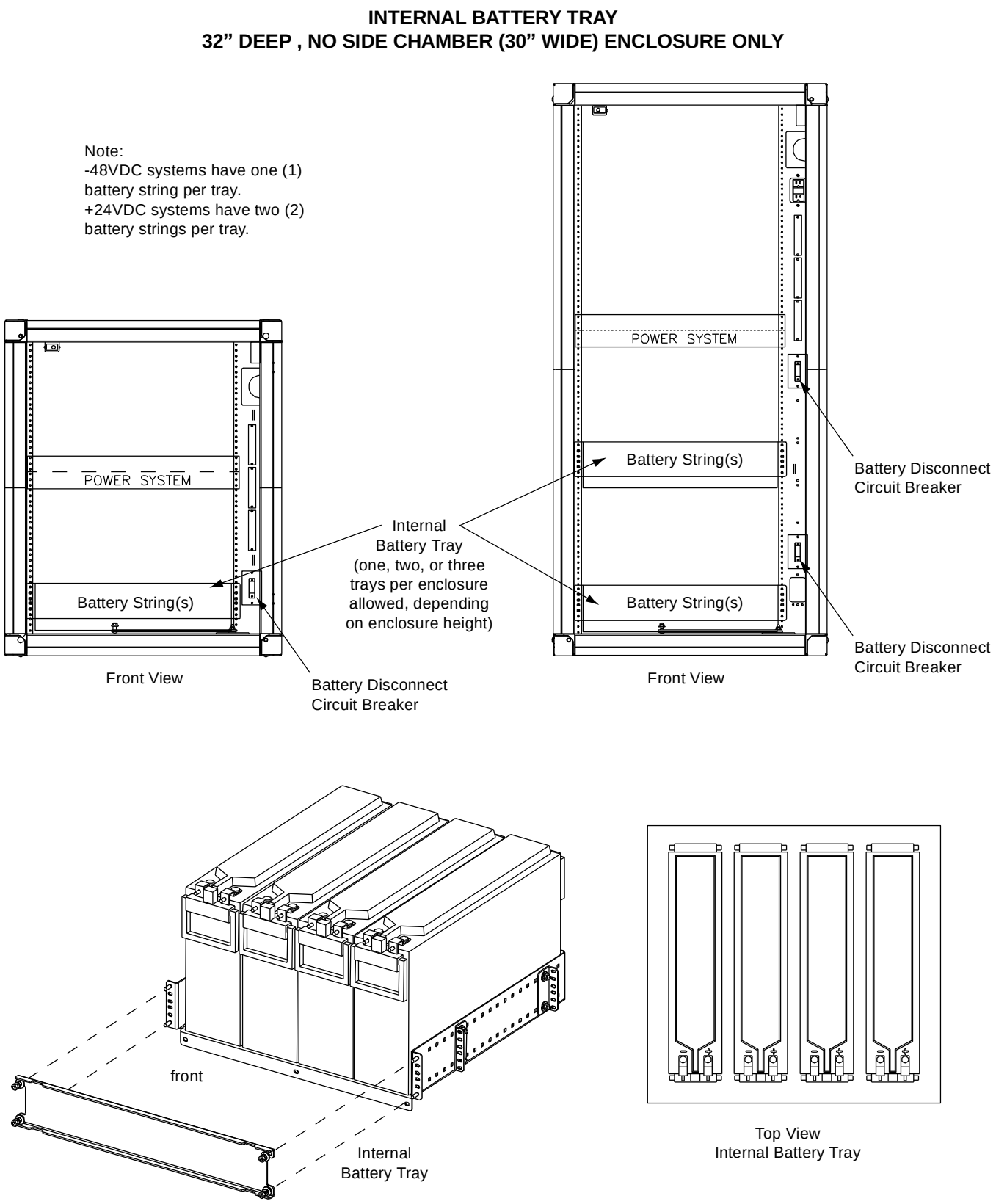


Figure 66: *Battery Placement in Battery Base (30"W x 25"D)*

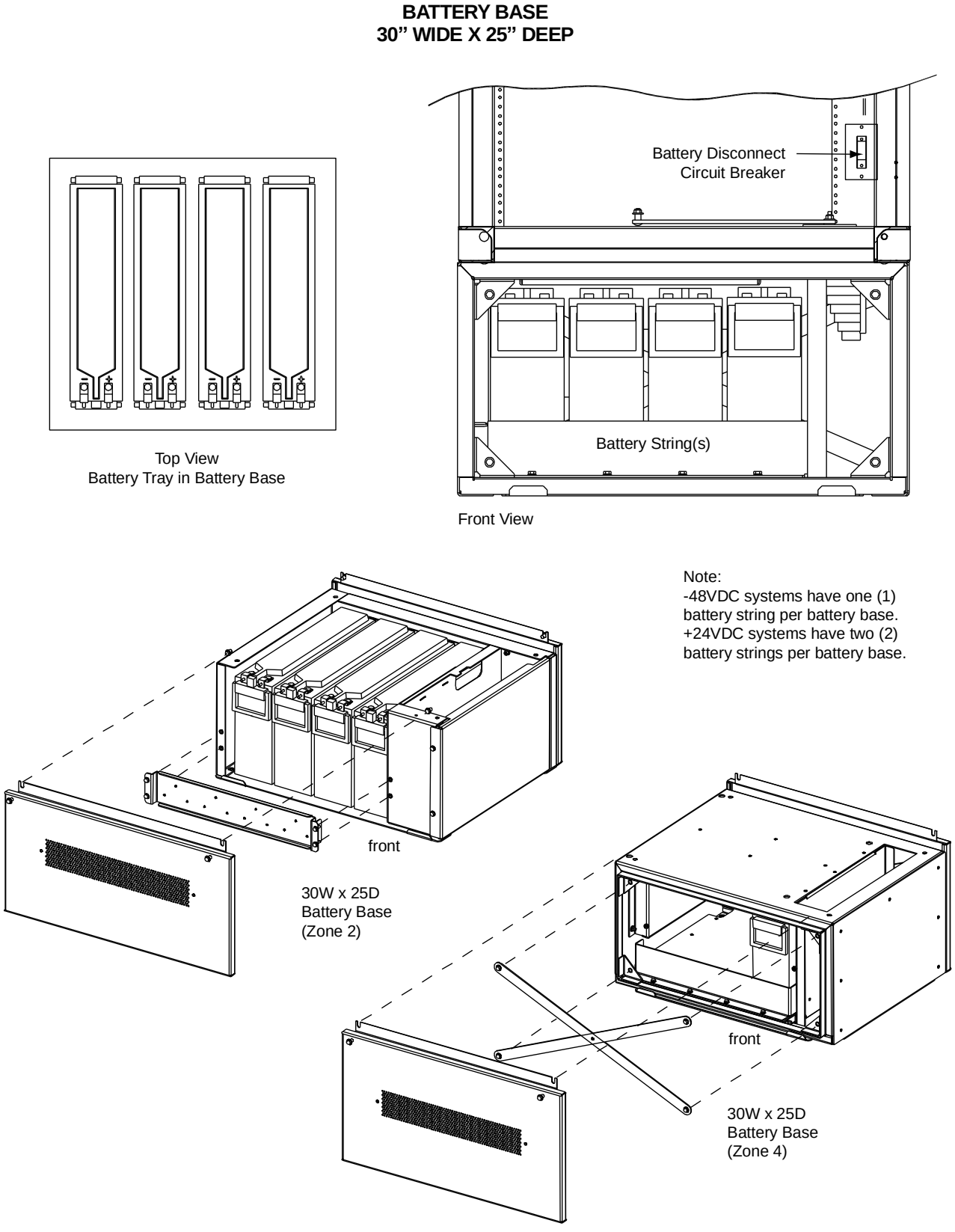


Figure 67: *Battery Placement in Battery Base (30"W x 32"D)*

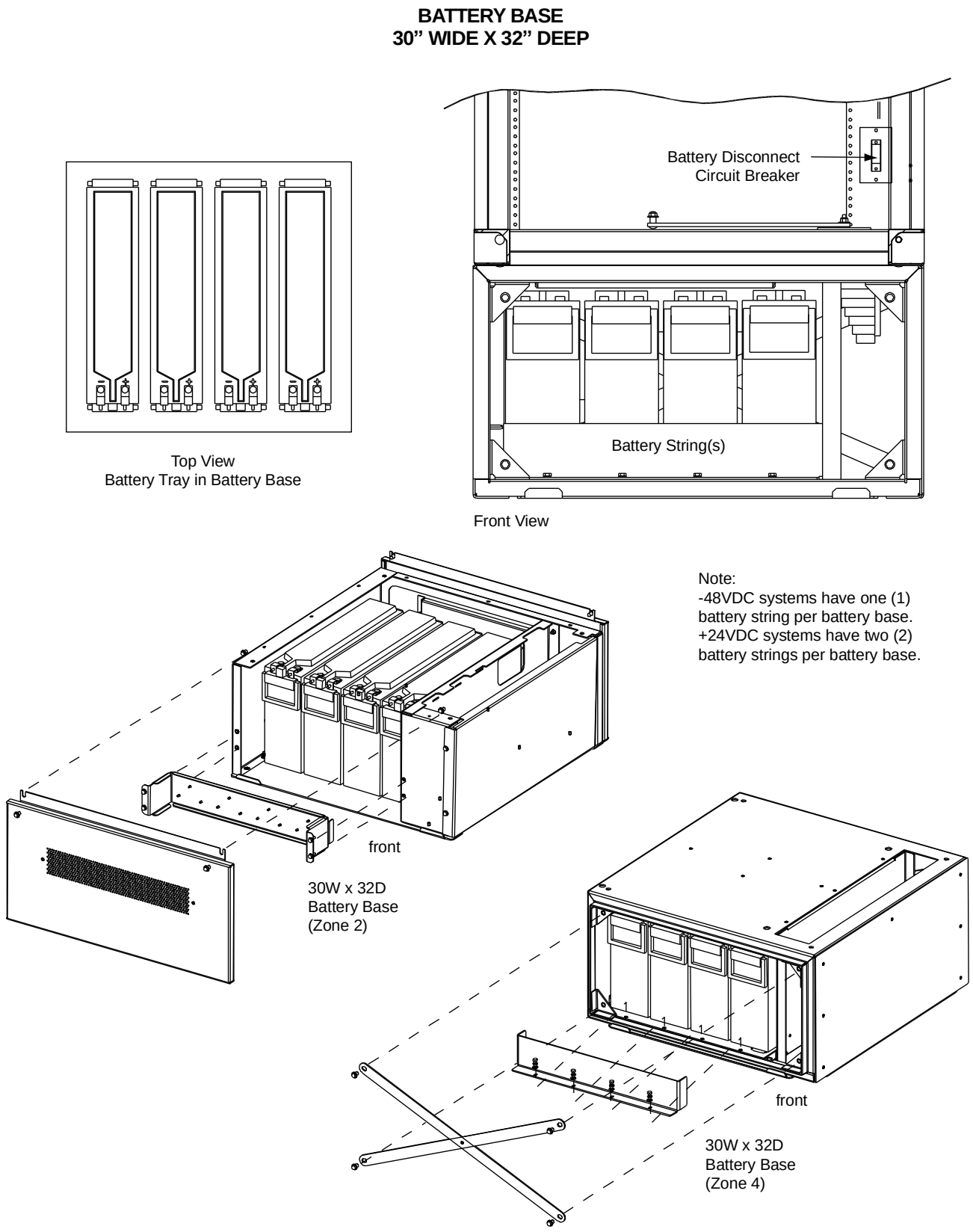


Figure 68: *Battery Placement in Battery Base (42"W x 25"D)*

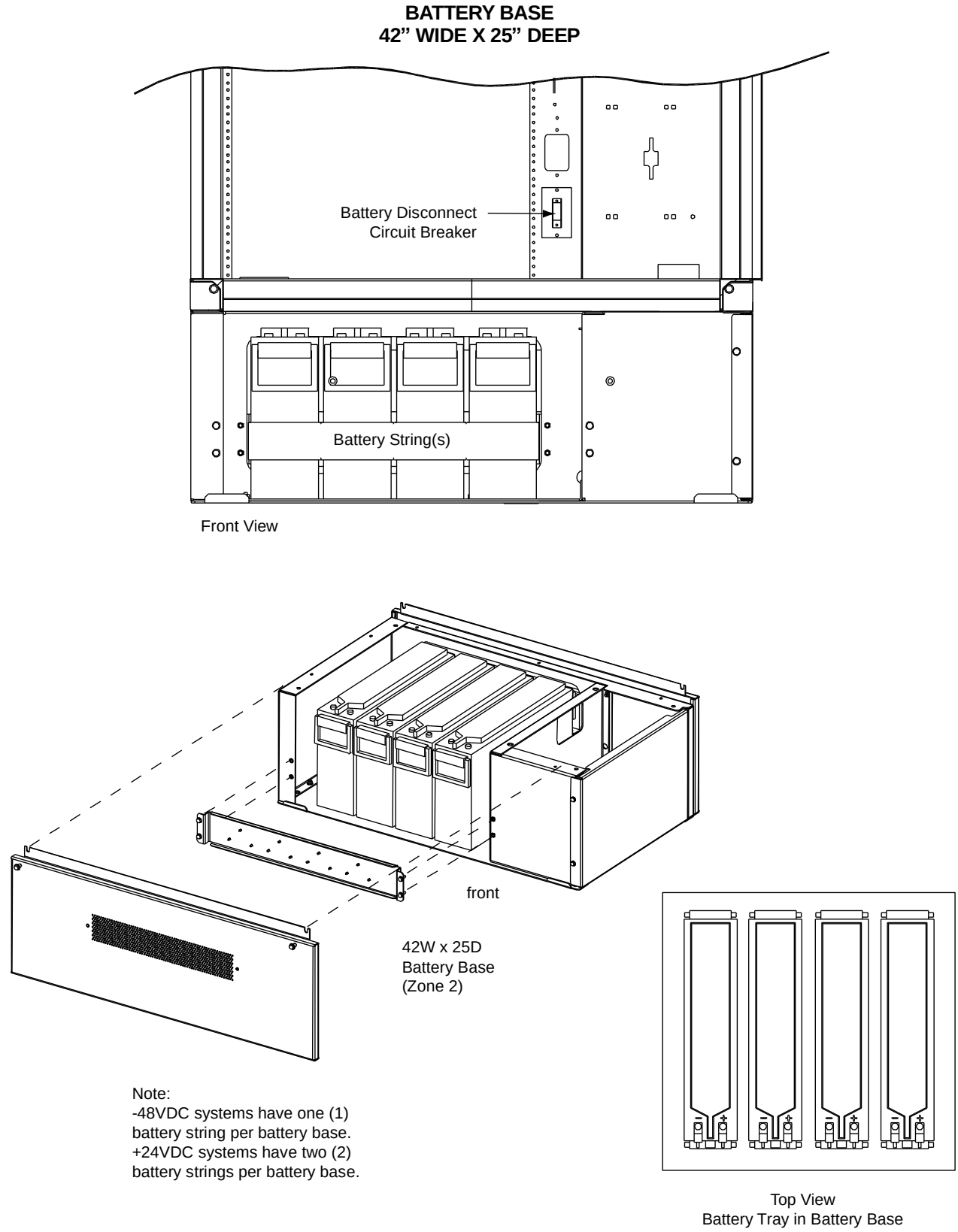
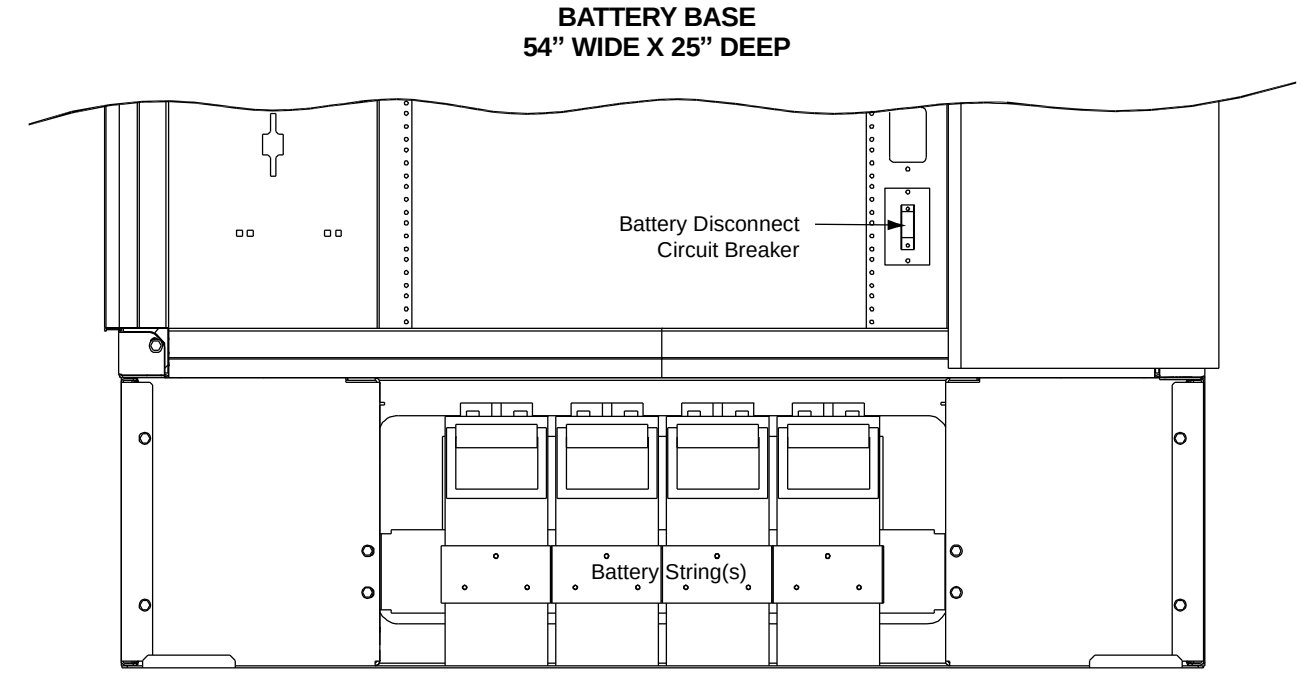
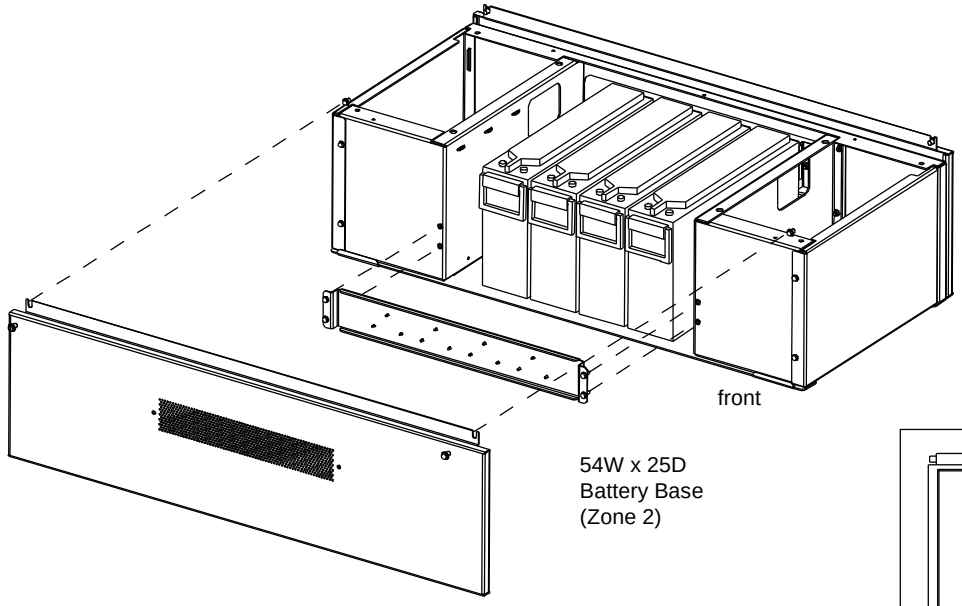


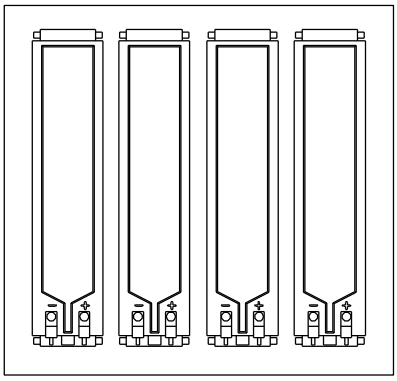
Figure 69: *Battery Placement in Battery Base (54"W x 25"D)*



Front View



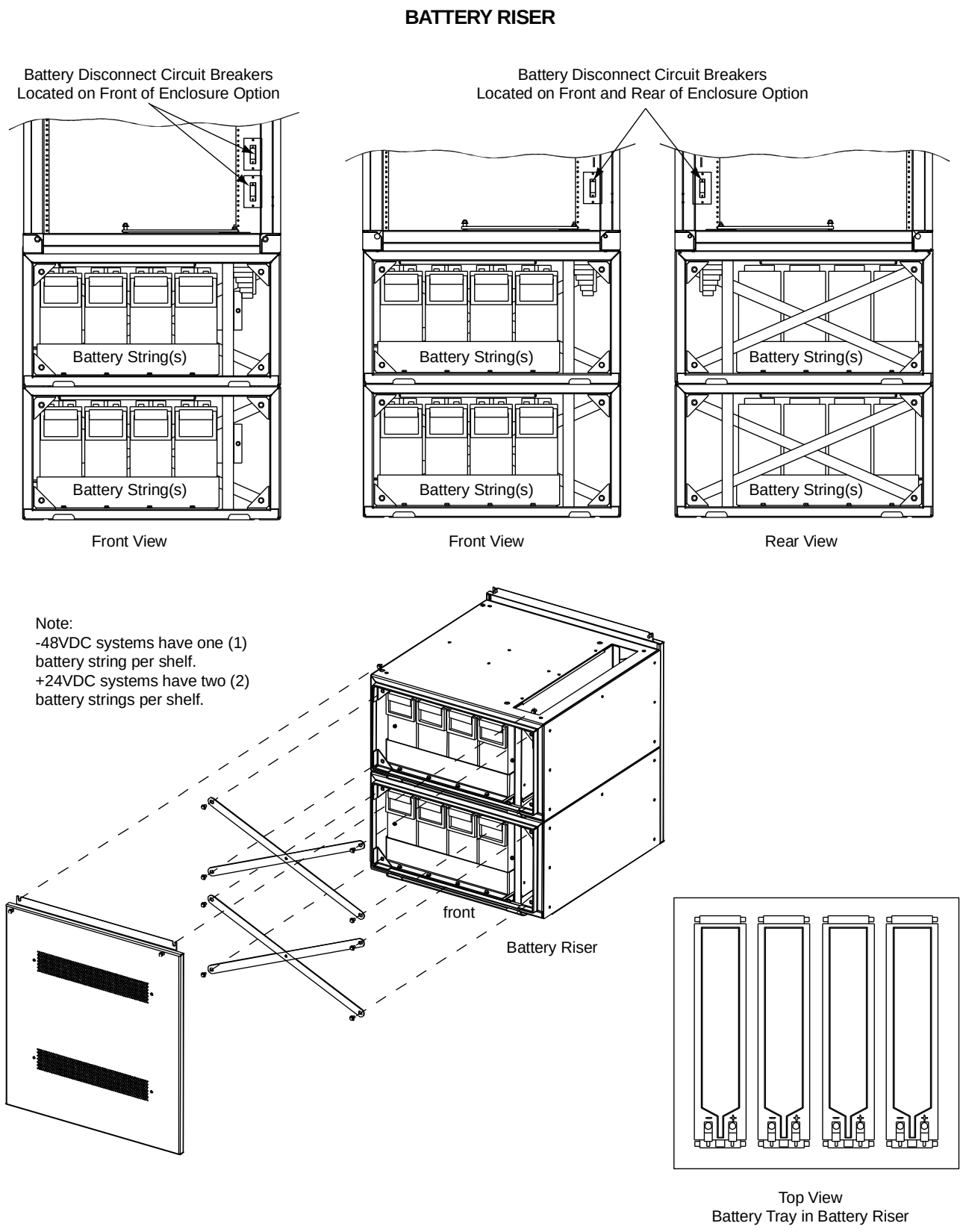
54W x 25D
Battery Base
(Zone 2)



Top View
Battery Tray in Battery Base

Note:
-48VDC systems have one (1) battery string per battery base.
+24VDC systems have two (2) battery strings per battery base.

Figure 70: *Battery Placement in Battery Riser*



Wiring Batteries

-48Vdc Systems

ENCLOSURE IS PRE-WIRED FOR -48Vdc BATTERY STRING INSTALLATION ONLY.

Refer to **Figure 71** as this procedure is performed.

NOTE! *Refer to the documentation provided with the Power System and install the Battery Charge Temperature Compensation Probe (if furnished) as the batteries are being cabled.*

Procedure

1. For each battery shelf, connect a battery interconnect busbar between the left two batteries as shown in **Figure 71**.

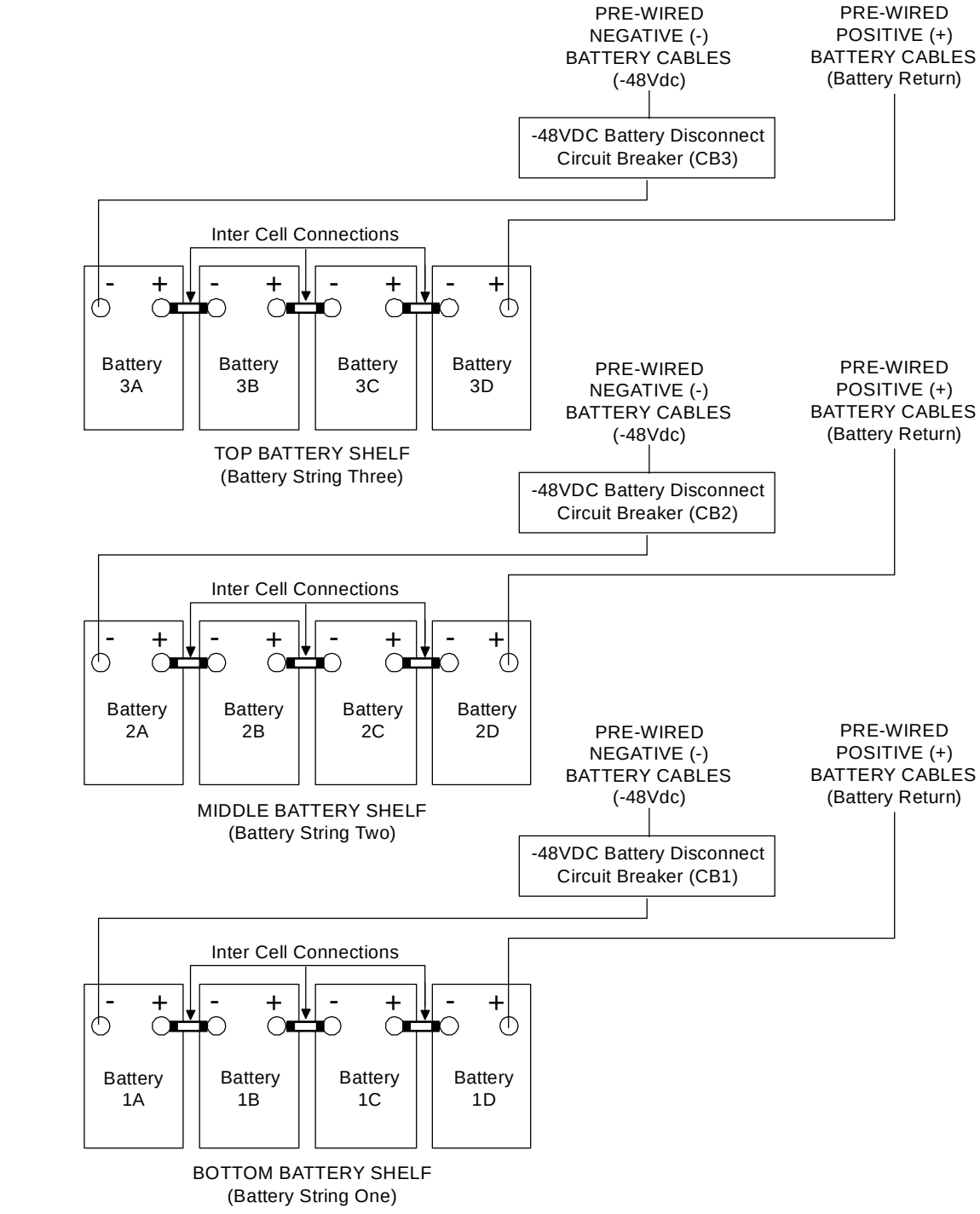
NOTE! *When ordered, batteries are generally shipped with battery interconnect busbars. The battery interconnect busbars are approximately 3.25" inches in length.*

2. For each battery shelf, connect a battery interconnect busbar between the middle two batteries as shown in **Figure 71**.
3. For each battery shelf, connect a battery interconnect busbar between the right two batteries as shown in **Figure 71**.

CAUTION! To prevent arcing, the positive (+) battery cables must be connected to the positive (+) battery terminals and the negative (-) battery cables must be connected to the negative (-) battery terminals.

4. For each battery shelf, locate the pre-wired positive (+) battery cable. Connect this cable to the positive (+) battery terminal of the fourth battery (right most). See **Figure 71**.
5. For each battery shelf, ensure the battery disconnect circuit breaker is in the “OFF” position before performing the next step.
6. For each battery shelf, locate the pre-wired negative (-) battery cable. Connect this cable to the negative (-) battery terminal of the first battery (left most). See **Figure 71**.
7. Using a torque wrench, tighten all battery hardware per manufacturer's specifications.
8. For each string, verify the connections for proper polarity.
9. Install the covers on the batteries.
10. Reinstall any braces and/or covers removed to install the batteries.
11. Close and secure the front door.

Figure 71: *-48Vdc Battery String Wiring Diagram*



+24Vdc Systems

ENCLOSURE IS PRE-WIRED FOR +24Vdc BATTERY STRING INSTALLATION ONLY.

Refer to **Figure 72** as this procedure is performed.

NOTE! *Refer to the documentation provided with the Power System and install the Battery Charge Temperature Compensation Probe (if furnished) as the batteries are being cabled.*

Procedure

1. For each battery shelf, connect a battery interconnect busbar between the left two batteries as shown in **Figure 72**.

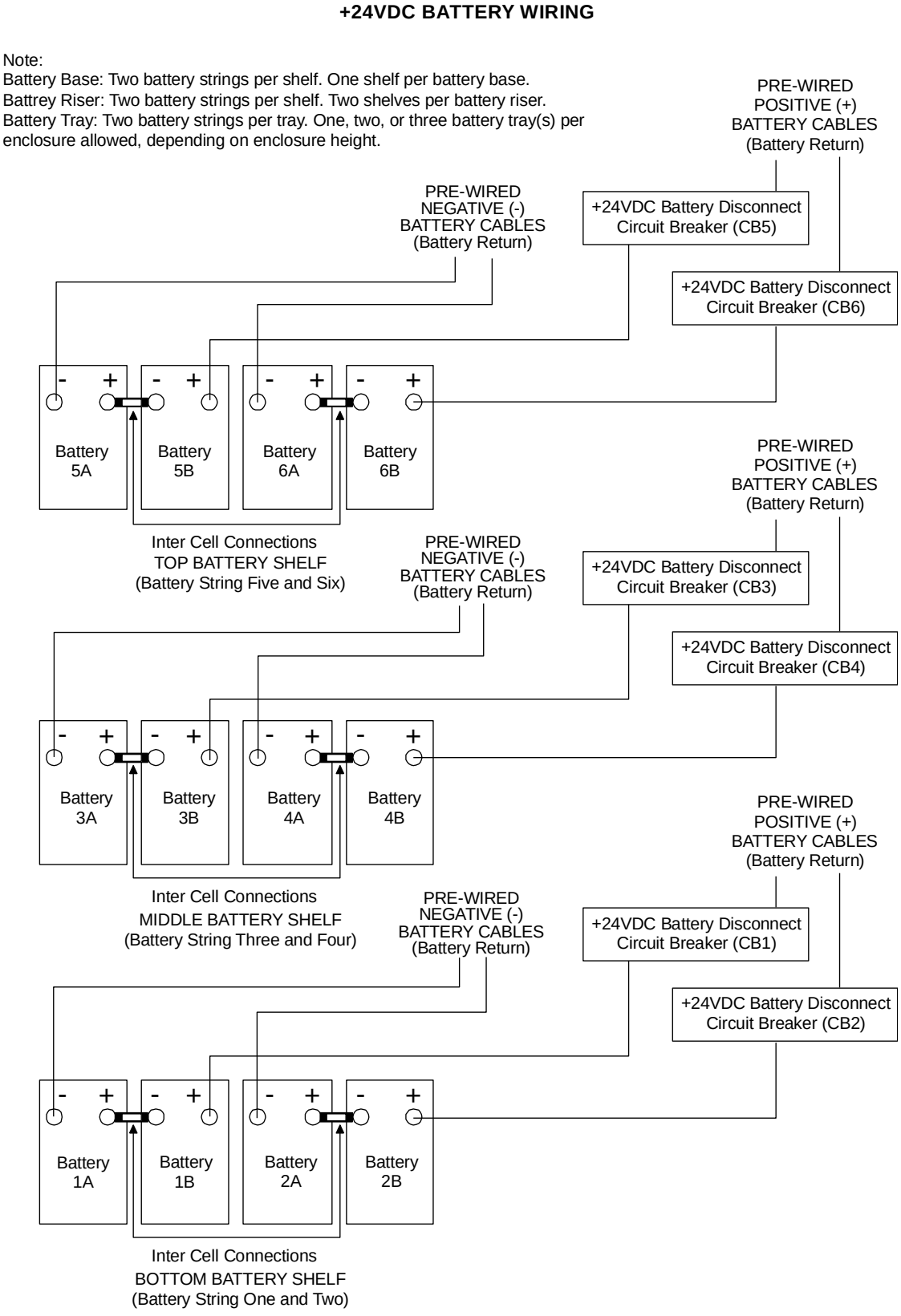
NOTE! *When ordered, batteries are generally shipped with battery interconnect busbars. The battery interconnect busbars are approximately 3.25" inches in length.*

2. For each battery shelf, connect a battery interconnect busbar between the right two batteries as shown in **Figure 72**.

CAUTION! To prevent arcing, the positive (+) battery cables must be connected to the positive (+) battery terminals and the negative (-) battery cables must be connected to the negative (-) battery terminals.

3. For each battery shelf, locate the two pre-wired negative (-) battery cables. Connect one negative (-) battery cable to the negative (-) battery terminal of the first battery. Connect the remaining negative (-) battery cable to the negative (-) battery terminal of the third battery. See **Figure 72**.
4. For each battery shelf, ensure the battery disconnect circuit breaker is in the "OFF" position before performing the next step.
5. For each battery shelf, locate the two pre-wired positive (+) battery cables. Connect one positive (+) battery cable to the positive (+) battery terminal of the second battery. Connect the remaining positive (+) battery cable to the positive (+) battery terminal of the fourth battery. See **Figure 72**.
6. Using a torque wrench, tighten all battery hardware per manufacturer's specifications.
7. For each string, verify the connections for proper polarity.
8. Install the covers on the batteries.
9. Reinstall any braces and/or covers removed to install the batteries.
10. Close and secure the front door.

Figure 72: *+24Vdc Battery String Wiring Diagram*



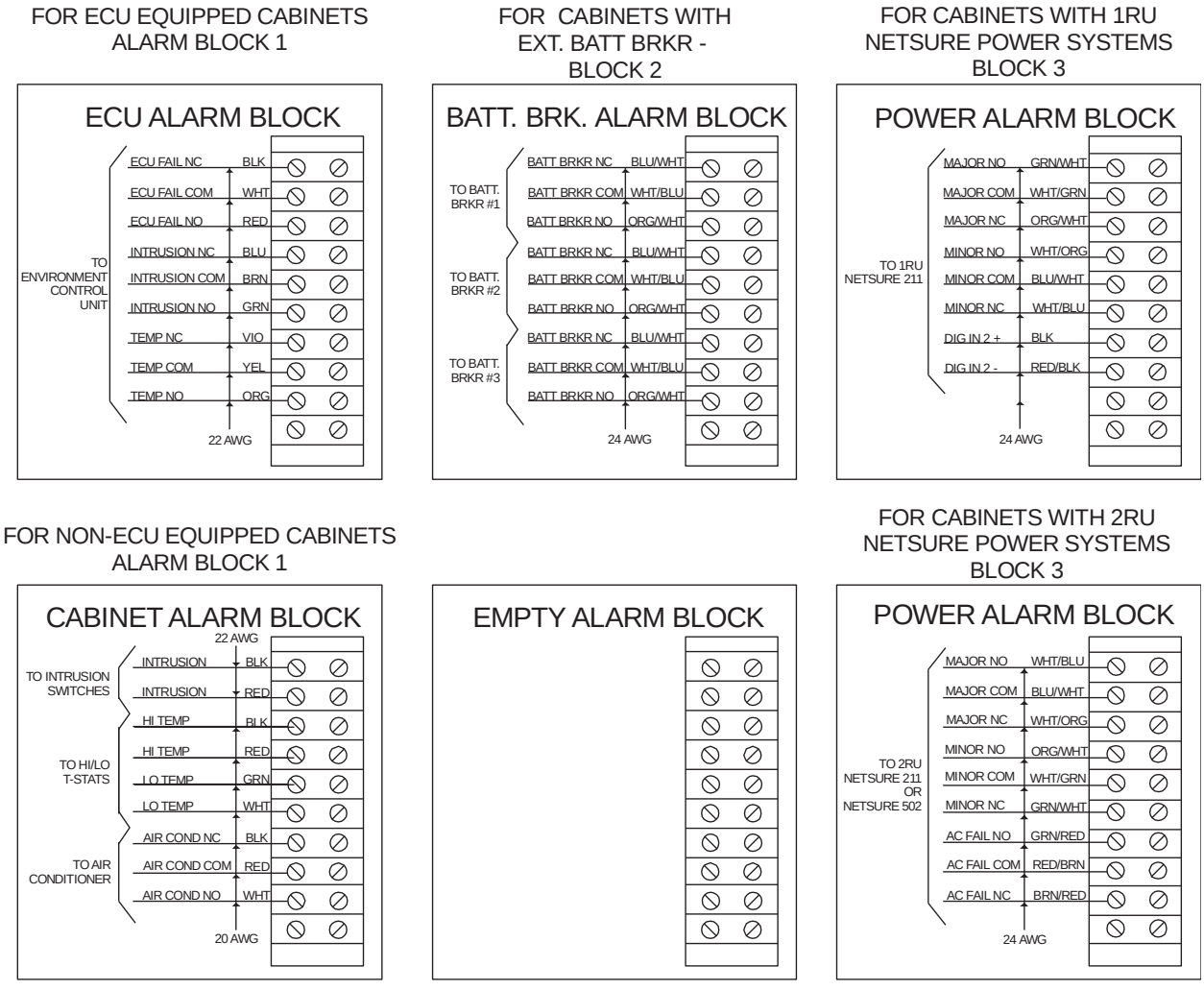
ALARM WIRING

Alarm Wiring (same information for both single and dual bay documents)

Alarms can connect to optional 10-position alarm termination blocks located on the equipment rails inside the enclosure equipment bay. Refer to **Figure 73** for typical alarm wiring when used with standard NetXtend™ Flex options. The alarm termination blocks are factory wired to support the alarm wiring specified for given cabinet configuration.

Refer to schematic drawing shipped with the enclosure for additional alarm details.

Figure 73: *Typical Alarm Wiring*



NOTE: ALARM BLOCKS ARE INSTALLED FROM TOP TO BOTTOM.
TOP ALARM BLOCK IS POSITION 1 AND SHOULD BE ALARM BLOCK 1

THE ALARM BLOCK IN POSITION 2 SHOULD BE ALARM BLOCK 2 (IF APPLICABLE)

THE ALARM BLOCK IN POSITION 3 SHOULD BE ALARM BLOCK 3 (IF APPLICABLE)

CLIMATE CONTROL OPTIONS

The NetXtend™ Flex single bay outdoor enclosures can be configured with several climate control options, as described in this section.

Heat Exchangers

Refer to this section when the NetXtend™ Flex enclosure is equipped with a heat exchanger. The heat exchanger is door mounted and offered in three standard sizes: 1000W, 1450W and 2800W. See **Figure 74** and **Figure 75**.

The heat exchanger is a vertical air flow device that will keep the equipment or batteries within the manufacturer's recommended temperature range. The exterior cooling air is never mixed with the air in the electronics chamber.

The heat exchangers are equipped with internal and external fans that can run independently of one another. If one fan fails, the others will keep operating. The external fans draw exterior air through the bottom of the enclosure and exhaust it out into the air chamber in the enclosure top. The internal fans draw interior air in from the top of the equipment chamber and exhaust it out the bottom of the chamber. See **Figure 76** for a heat exchanger air flow diagram.

As part of the installation process, a quick check of heat exchanger operation can be performed by the following:

Procedure

1. Confirm fan operation by noting sound and air movement near the vents on the door.
2. If fans do not operate as expected when the enclosure is first installed, press the reset button on the ECU (**Figure 77** or **Figure 78**). If the problem is not resolved after resetting the ECU, contact Vertiv technical support at (800) 800-5260.
3. If replacing a heat exchanger fan refer to “Heat Exchanger - Fan Replacement” on page 163.

Table 8: *Heat Exchangers in Single Bay NetXtend Flex Enclosures*

30-Width Enclosures						
RU vs Watts	30"Wx25"D NetXtend Flex			30"Wx32"D NetXtend Flex		
	1000W	1450W	2800W	1000W	1450W	2800W
8RU	YES	N/A	N/A	N/A	N/A	N/A
12RU	YES	N/A	N/A	YES	N/A	N/A
17RU	YES	YES	N/A	YES	YES	N/A
22RU	YES	YES	N/A	YES	YES	N/A
27RU	YES	YES	YES	YES	YES	YES
32RU	N/A	N/A	N/A	N/A	YES	YES
42-Width Enclosures						
RU vs Watts	42"Wx25"D NetXtend Flex			42"Wx32"D NetXtend Flex		
	1000W	1450W	2800W	1000W	1450W	2800W
8RU	N/A	N/A	N/A	N/A	N/A	N/A
12RU	YES	N/A	N/A	YES	N/A	N/A
17RU	YES	YES	N/A	YES	YES	N/A
22RU	YES	YES	N/A	YES	YES	N/A
27RU	YES	YES	YES	YES	YES	YES
32RU	N/A	N/A	N/A	N/A	N/A	N/A
54-Width Enclosures						
RU vs Watts	54"Wx25"D NetXtend Flex			54"Wx32"D NetXtend Flex		
	1000W	1450W	2800W	1000W	1450W	2800W
8RU	N/A	N/A	N/A	N/A	N/A	N/A
12RU	N/A	N/A	N/A	N/A	N/A	N/A
17RU	YES	YES	N/A	YES	YES	N/A
22RU	YES	YES	N/A	YES	YES	N/A
27RU	YES	YES	YES	YES	YES	YES
32RU	N/A	N/A	N/A	N/A	N/A	N/A

Figure 74: *NetXtend Flex Heat Exchangers (Flex 8, 12, 17)*

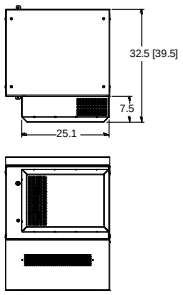
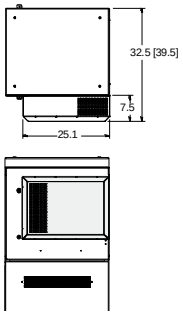
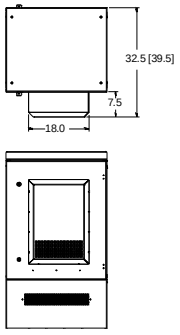
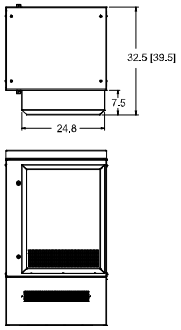
Heat Exchangers in Single Bay NetXtend Flex Enclosures				
RU #	**Enclosure Size**	**1000W**	**1450W**	**2800W**
8RU	30"Wx25"D		Not Available in this Enclosure Size	Not Available in this Enclosure Size
12RU	30"Wx25"D		Not Available in this Enclosure Size	Not Available in this Enclosure Size
	30"Wx32"D			
	42"Wx25"D			
	42"Wx32"D			
17RU	30"Wx25"D			Not Available in this Enclosure Size
	30"Wx32"D			
	42"Wx25"D			
	42"Wx32"D			
	54"Wx25"D			
	54"Wx32"D			

Figure 75: *NetXtend Flex Heat Exchangers (Flex 22, 27, 32)*

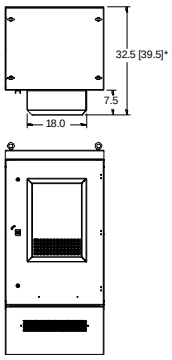
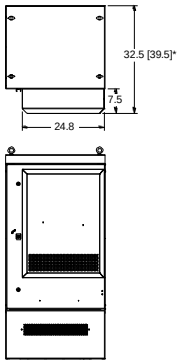
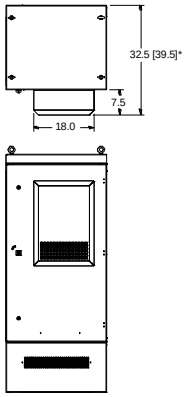
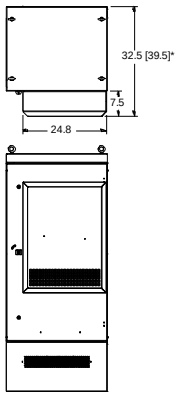
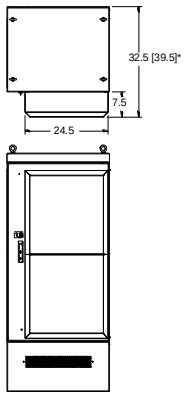
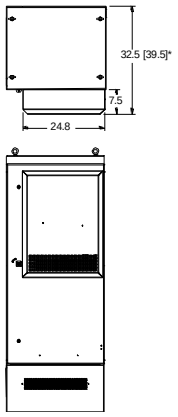
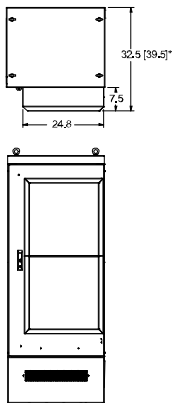
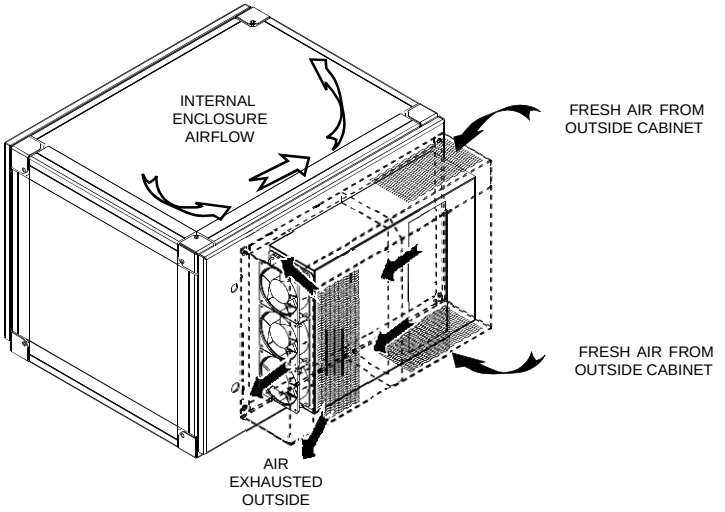
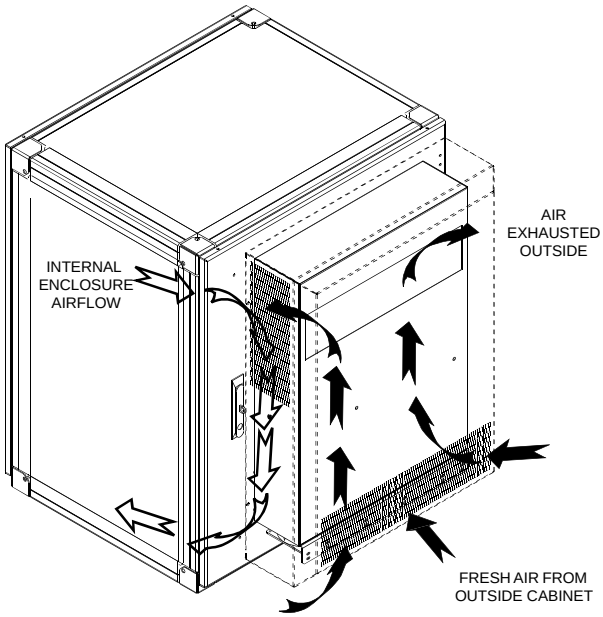
Heat Exchangers in Single Bay NetXtend Flex Enclosures				
RU #	**Enclosure Size**	**1000W**	**1450W**	**2800W**
22RU	30"Wx25"D			Not Available in this Enclosure Size
	30"Wx32"D			
	42"Wx25"D			
	42"Wx32"D			
	54"Wx25"D			
	54"Wx32"D			
27RU	30"Wx25"D			
	30"Wx32"D			
	42"Wx25"D			
	42"Wx32"D			
	54"Wx25"D			
	54"Wx32"D			
32RU	30"Wx32"D	Not Available in this Enclosure Size		

Fig. 76 : Heat Exchanger Air Flow Diagrams

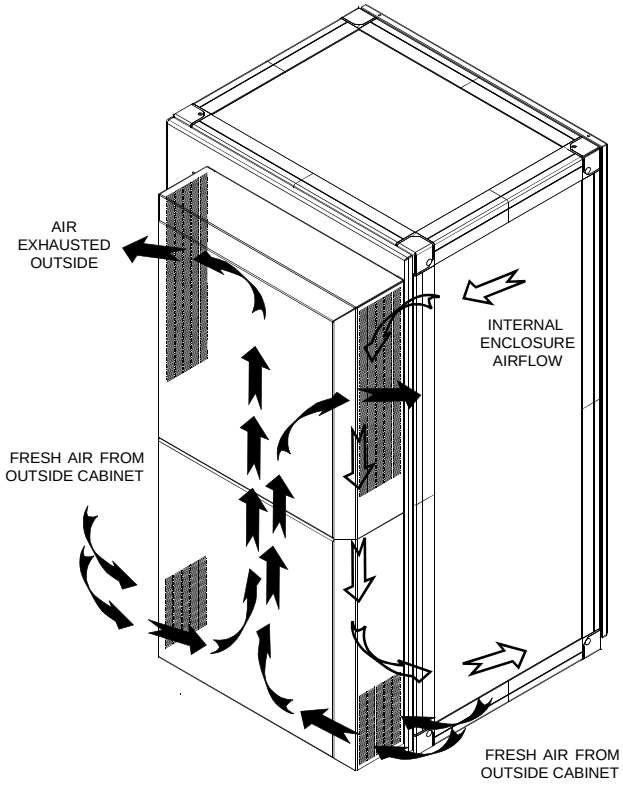
Figure 76: *Heat Exchanger Air Flow Diagrams*



1000W Heat Exchanger
(Shown on Flex 8)
(Rotate heat exchanger 90° counterclockwise for Flex 17 and higher RU cabinets.)



1450W Heat Exchanger
(Shown on Flex 17)



2800W Heat Exchanger
(Shown on Flex 27)

Heat Exchanger Environmental Control Unit (ECU)

The ECU controls the heat exchanger's thermal components. Besides controlling the thermal components, the ECU also provides the following functions:

- monitoring for thermal system component failure (fans and thermistors),
- high and low temperature alarming, and
- intrusion alarming (audible and extended relay contacts).

Refer to **Figure 77**, **Figure 78** and **Figure 79** for illustrations of an ECU controlling a heat exchanger.

All thermal system components are input voltage and polarity sensitive. These instructions cover both +24Vdc and -48Vdc systems. Refer to the label on the front of your ECU for the specific voltage requirement of your ECU.

ECU Input Voltage Range:

- +24Vdc ECU: +20.0Vdc to +28.3Vdc.
- -48Vdc ECU: -40.0Vdc to -56.7Vdc.

ALERT! The ECU requires either +24Vdc or -48Vdc input voltage, depending upon enclosure configuration. Observe proper polarity for ECU input connections to avoid equipment damage. Polarity for the two input voltages is as follows:

- +24Vdc Input Systems: 24V Battery is +, 24V Return is -.
- -48Vdc Input Systems: 48V Battery is -, 48V Return is +.

Heat Exchanger Thermal Components

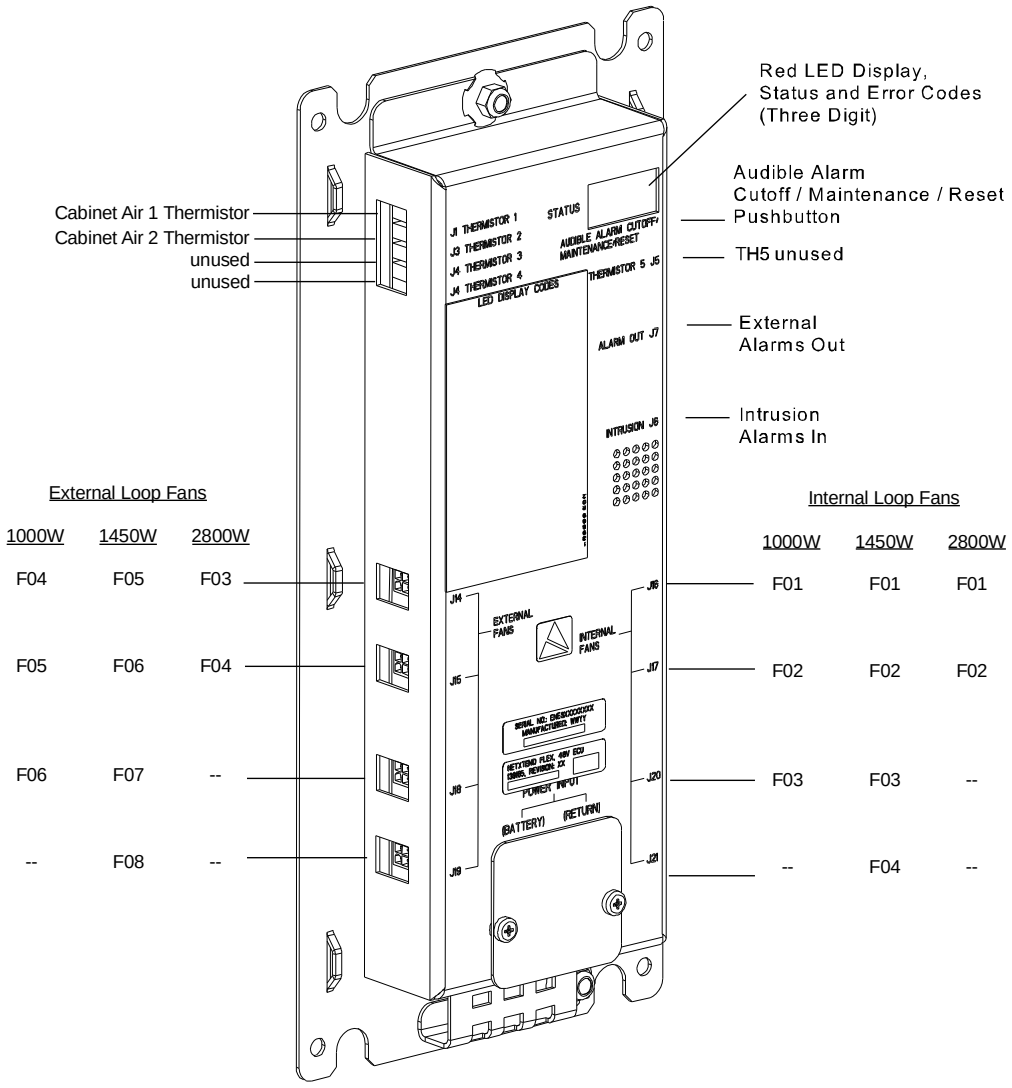
The heat exchanger thermal components controlled by the ECU consist of:

- 1000W Heat Exchanger - 6 fans (3 internal loop / 3 external loop)
- 1450W Heat Exchanger - 8 fans (4 internal loop / 4 external loop)
- 2800W Heat Exchanger - 4 fans (2 internal loop / 2 external loop)

All heat exchangers also include (2) enclosure thermistors. See next section for further detail.

NOTE! *APC (Acoustic Pleasing Code) fan codes are used. Fan RPM's are limited to approximately 1/3 fan speed up until approximately 60°C internal temperature. This is done to optimize the enclosure acoustic performance (i.e., keep the enclosure quiet), while maximizing the heat exchanger performance. The fan speeds are dictated strictly by reading the enclosure's internal temperature via the two supplied thermal sensors.*

Figure 77: *+24Vdc EC*



LED DISPLAY CODES
UP - CONTROLLER OK
C01, C02 - FAN PCB FAILURE
d01 - DOOR OPEN d02 - DOOR AJAR d03 - MAINTENANCE MODE
E01 - TH1 FAIL (INTERNAL #1) E02 - TH2 FAIL (INTERNAL #2) E07 - HIGH TEMP #1 E08 - HIGH TEMP #2 E12 - LOW TEMP #1 E13 - LOW TEMP #2
F01-J16 INTERNAL FAN #1 FAIL F02-J17 INTERNAL FAN #2 FAIL F03-J20 INTERNAL FAN #3 FAIL F04-J14 EXTERNAL FAN #1 FAIL F05-J15 EXTERNAL FAN #2 FAIL F06-J18 EXTERNAL FAN #3 FAIL

1000W

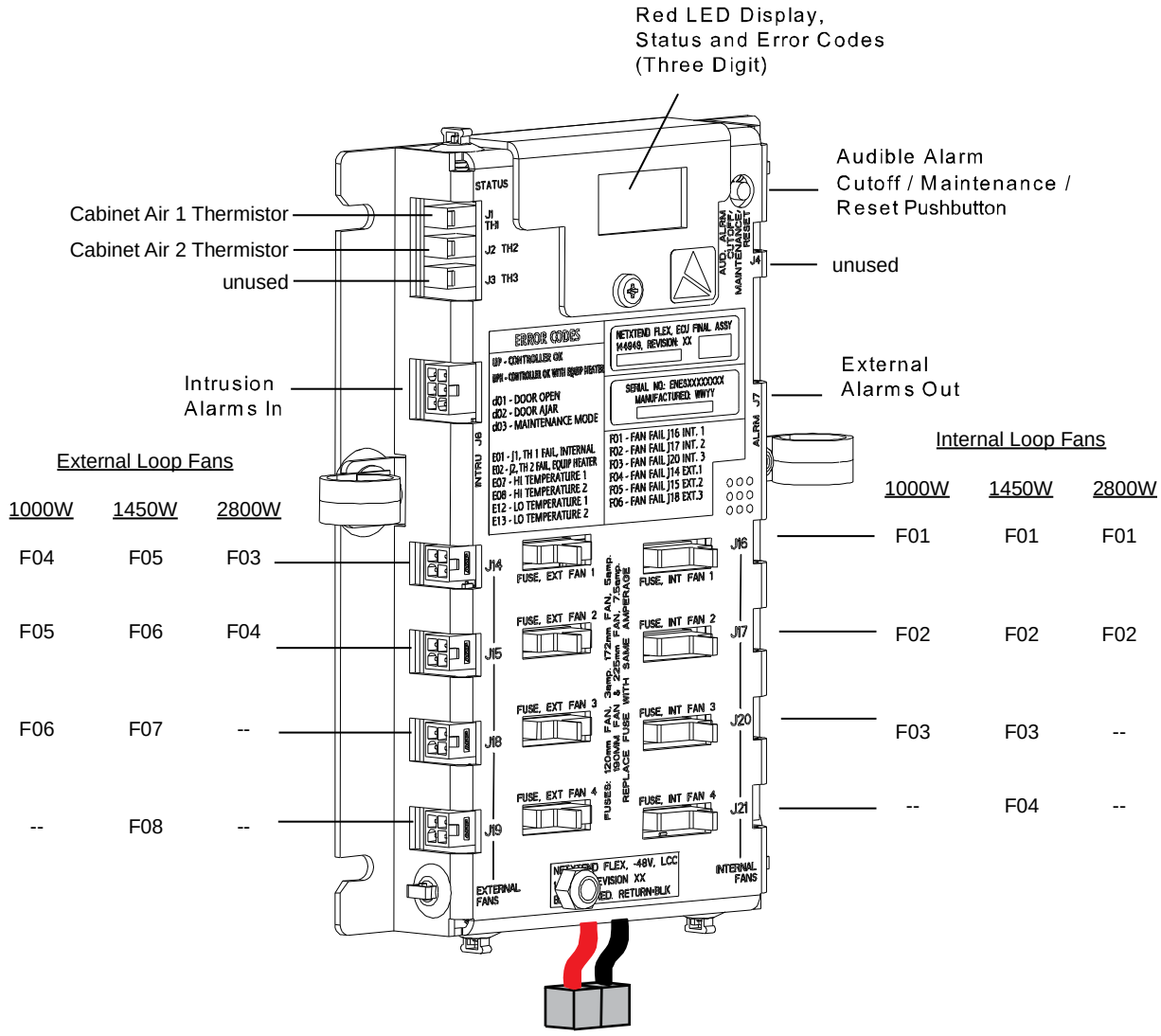
LED DISPLAY CODES
UP - CONTROLLER OK
C01, C02 - FAN PCB FAILURE
d01 - DOOR OPEN d02 - DOOR AJAR d03 - MAINTENANCE MODE
E01 - TH1 FAIL (INTERNAL #1) E02 - TH2 FAIL (INTERNAL #2) E07 - HIGH TEMP #1 E08 - HIGH TEMP #2 E12 - LOW TEMP #1 E13 - LOW TEMP #2
F01-J16 INTERNAL FAN #1 FAIL F02-J17 INTERNAL FAN #2 FAIL F03-J20 INTERNAL FAN #3 FAIL F04-J21 INTERNAL FAN #4 FAIL F05-J14 EXTERNAL FAN #1 FAIL F06-J15 EXTERNAL FAN #2 FAIL F07-J18 EXTERNAL FAN #3 FAIL F08-J19 EXTERNAL FAN #4 FAIL

1450W

LED DISPLAY CODES
UP - CONTROLLER OK
C01, C02 - FAN PCB FAILURE
d01 - DOOR OPEN d02 - DOOR AJAR d03 - MAINTENANCE MODE
E01 - TH1 FAIL (INTERNAL #1) E02 - TH2 FAIL (INTERNAL #2) E07 - HIGH TEMP #1 E08 - HIGH TEMP #2 E12 - LOW TEMP #1 E13 - LOW TEMP #2
F01-J16 INTERNAL FAN #1 FAIL F02-J17 INTERNAL FAN #2 FAIL F03-J14 EXTERNAL FAN #1 FAIL F04-J15 EXTERNAL FAN #2 FAIL

2800W

Figure 78: *-48Vdc ECU*



LED DISPLAY CODES
UP – CONTROLLER OK
UPH – CONTROLLER OK WITH EQUIP HEATER
d01 – DOOR OPEN
d02 – DOOR AJAR
d03 – MAINTENANCE MODE
E01 – J1, TH 1 FAIL, INTERNAL
E02 – J2, TH 2 FAIL, EQUIP HEATER
E07 – HI TEMPERATURE 1
E08 – HI TEMPERATURE 2
E12 – LO TEMPERATURE 1
E13 – LO TEMPERATURE 2
F01 – FAN FAIL J16 INT. 1
F02 – FAN FAIL J17 INT. 2
F03 – FAN FAIL J20 INT. 3
F04 – FAN FAIL J14 EXT. 1
F05 – FAN FAIL J15 EXT. 2
F06 – FAN FAIL J18 EXT. 3

1000W

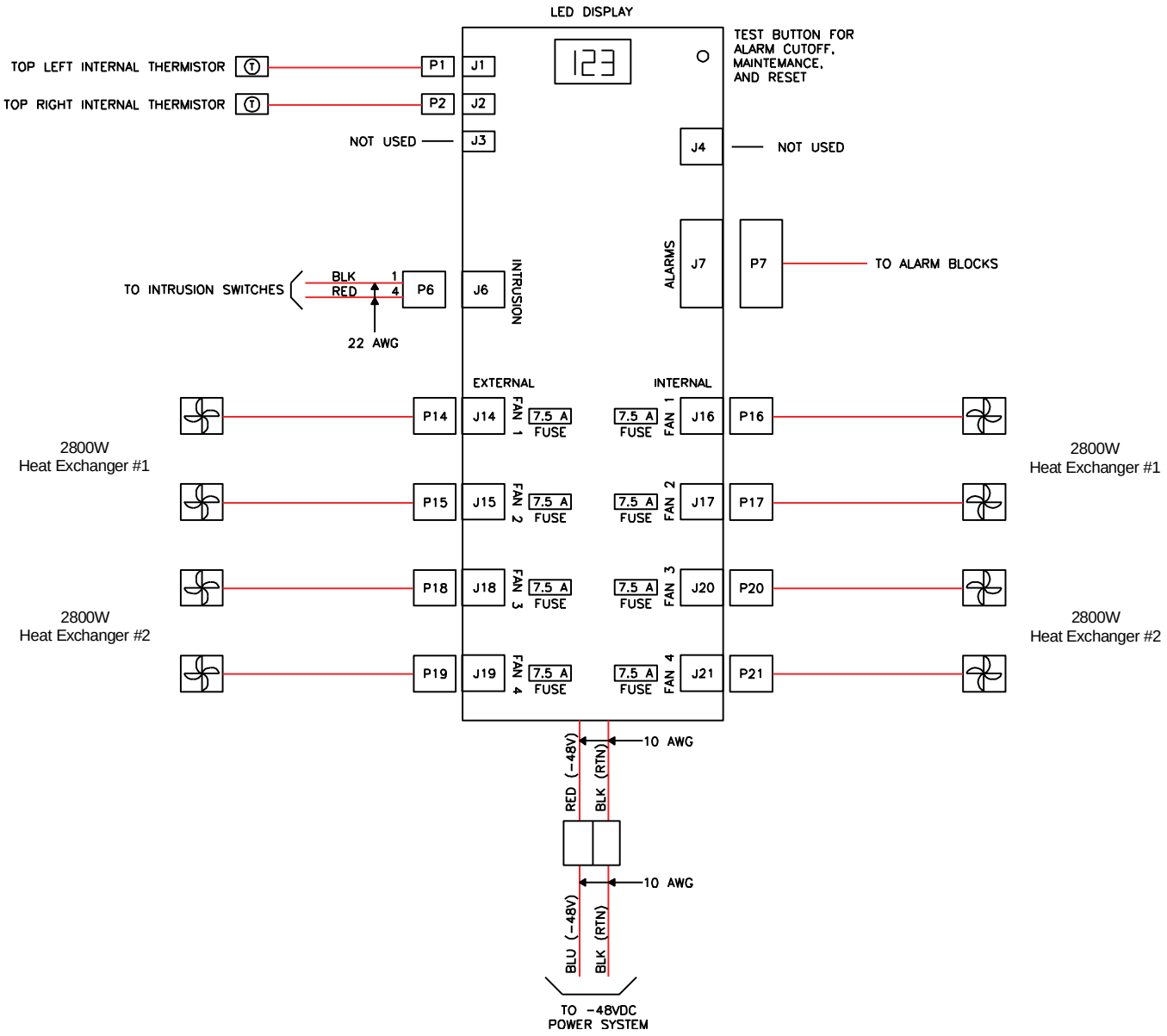
LED DISPLAY CODES
UP – CONTROLLER OK
UPH – CONTROLLER OK WITH EQUIP HEATER
d01 – DOOR OPEN
d02 – DOOR AJAR
d03 – MAINTENANCE MODE
E01 – J1, TH 1 FAIL, INTERNAL
E02 – J2, TH 2 FAIL, EQUIP HEATER
E07 – HI TEMPERATURE 1
E08 – HI TEMPERATURE 2
E12 – LO TEMPERATURE 1
E13 – LO TEMPERATURE 2
F01 – FAN FAIL J16 INT. 1
F02 – FAN FAIL J17 INT. 2
F03 – FAN FAIL J20 INT. 3
F04 – FAN FAIL J21 INT. 4
F05 – FAN FAIL J14 EXT. 1
F06 – FAN FAIL J15 EXT. 2
F07 – FAN FAIL J18 EXT. 3
F08 – FAN FAIL J19 EXT. 4

1450W

LED DISPLAY CODES
UP – CONTROLLER OK
UPH – CONTROLLER OK WITH EQUIP HEATER
d01 – DOOR OPEN
d02 – DOOR AJAR
d03 – MAINTENANCE MODE
E01 – J1, TH 1 FAIL, INTERNAL
E02 – J2, TH 2 FAIL, EQUIP HEATER
E07 – HI TEMPERATURE 1
E08 – HI TEMPERATURE 2
E12 – LO TEMPERATURE 1
E13 – LO TEMPERATURE 2
F01 – FAN FAIL J16 INT. 1
F02 – FAN FAIL J17 INT. 2
F03 – FAN FAIL J14 EXT. 1
F04 – FAN FAIL J15 EXT. 2

2800W

Figure 79: *ECU Wiring for Two (2) -48Vdc 2800W Heat Exchangers*



ECU Control of the Heat Exchanger Thermal Components (+24Vdc and -48Vdc ECU)

The NetXtend Flex enclosures have a typical ambient operating temperature range of -40°C to +46°C. The range of operating temperature for the equipment to be housed in the enclosure is -40°C to +65°C. The purpose of the heat exchanger is to remove heat dissipated from equipment while maintaining equipment inlet air temperature. By controlling enclosure air temperature, the ECU maximizes electronic equipment life. In addition, the ECU limits acoustic noise by reducing fan speeds when possible.

Refer to **Table 9** and **Table 10** for 'Heat Exchanger Temperature and Alarm States'.

Table 9: *Heat Exchanger General Temperature Control States*

State	Control Mode Setting
Cooling Range, from Fans "on" at approx. 40°C to 60°C set point #1	60°C set point #1
From 60°C Set Point #1 to 63°C Set Point #2	63°C set point #2
From 63°C Set Point #2 to between 65°C to 67°C	Full Speed Fans

Table 10: *Heat Exchanger General Alarm States*

State	Hi-Temp Alarm Condition	ECU Local LED Display	Remote Alarm Relay Output
1000W and 1450W Heat Exchangers, and 2800W Heat Exchanger	67°C	E07 E08	Relay #3 "Temp"

Enclosure Temperature Sensors

The ECU has two thermistors for sensing air temperature. Both are located inside the enclosure and determine the Enclosure Air Temperature ($T_{enclosure}$). ($T_{enclosure}$ is defined as the highest temperature measured by the two enclosure air sensors.)

The enclosure air thermistors are factory placed as follows:

- Enclosure Air 1 Thermistor is located at the heat exchanger return vent.
- Enclosure Air 2 Thermistor is located on the rack at the highest point in the enclosure. The placement of this thermistor is flexible and may be relocated by the customer to the intake of a critical piece of equipment. Remember, the ECU bases cooling on the hotter of the two enclosure air sensors.

Fan Speed Control Scheme

See **Figure 80** and **Figure 81** for Fan Speed vs. Internal Temperature charts.

- Fan speed is determined by the enclosure air temperature readings.

- The speed of internal loop fans is controlled separately from the speed of external loop fans.
- Once a bank of fans has turned "on", all fans in the bank run.
- Once either bank of fans turns "on", the other fan bank also turns on to maximize cooling.
- If the temperature reaches 40°C (104°F) inside the enclosure at either internal thermistor, ALL FANS RUN.
- Typically, all fans will be OFF if the internal temperature falls to 35°C (95°F).
- The ECU varies the speed of the fans between OFF and Maximum Fan Speed for the various ranges to maintain $T_{enclosure}$ at the Set Point Temperature.
- All fans will slow and eventually shutoff for any enclosure temperature less than the Set Point Temperature (see above).
- High Temperature Override: If $T_{enclosure}$ exceeds 67°C at any time, the ECU overrides the Maximum Internal and External Fan speed limits and runs all fans at maximum speed. Fans return to normal speed control when $T_{enclosure}$ is reduced to 60°C.
- Minimum Run Time: To prevent rapid cycling of the fans, the ECU has a minimum run time and a minimum off time for fans. Once fans are turned on, they run for a minimum of 5 minutes. Once fans are turned off, they remain off for a minimum of 5 minutes.
- Exception to Minimum Run Time: If $T_{enclosure}$ goes above Set Point +5°C, the minimum off time is overridden, to prevent enclosure air temperature from exceeding the maximum operating limit of the equipment. If $T_{enclosure}$ goes below the Set Point -5°C, the minimum run time is overridden, to prevent enclosure air temperature from falling excessively low in temperature.
- Fault Conditions: Refer to the next section titled "Failure Modes".

Failure Modes

In general, the application accounts for single points of failure. Failures will cause the enclosure to enter a *system fault* mode in which cooling device is turned full on. Refer to **Table 11** for a Fault Condition Summary.

Table 11: *Fault Condition Summary*

Fan Failure	Thermistor Failure		Over Temp	Under Temp
	Enclosure Air 1	Enclosure Air 2		
Remaining Fans operate normally	All Fans Full Speed	All Fans Full Speed	All Fans Full Speed	All Fans Off

Thermistor Failure Open or Short

Enclosure enters *fault* mode.

Fan Speed Low

A fan alarm is detected when a fan is commanded to run at a specified rpm and the actual rpm detected is not within an acceptable tolerance. Enclosure enters *fault* mode.

Figure 80: *Fan Speed vs. Internal Temperature (1000 & 1450W Heat Exchangers)*

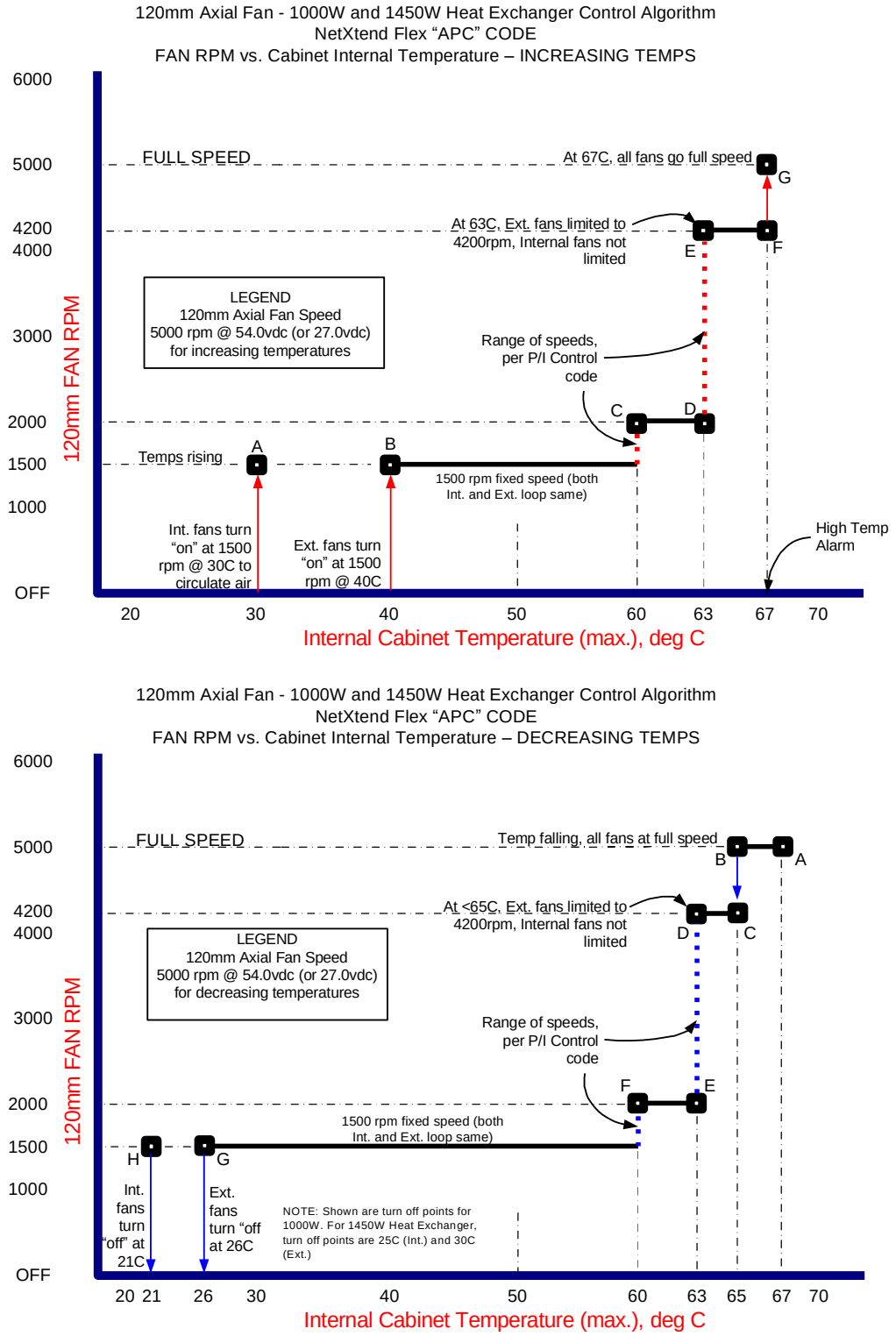
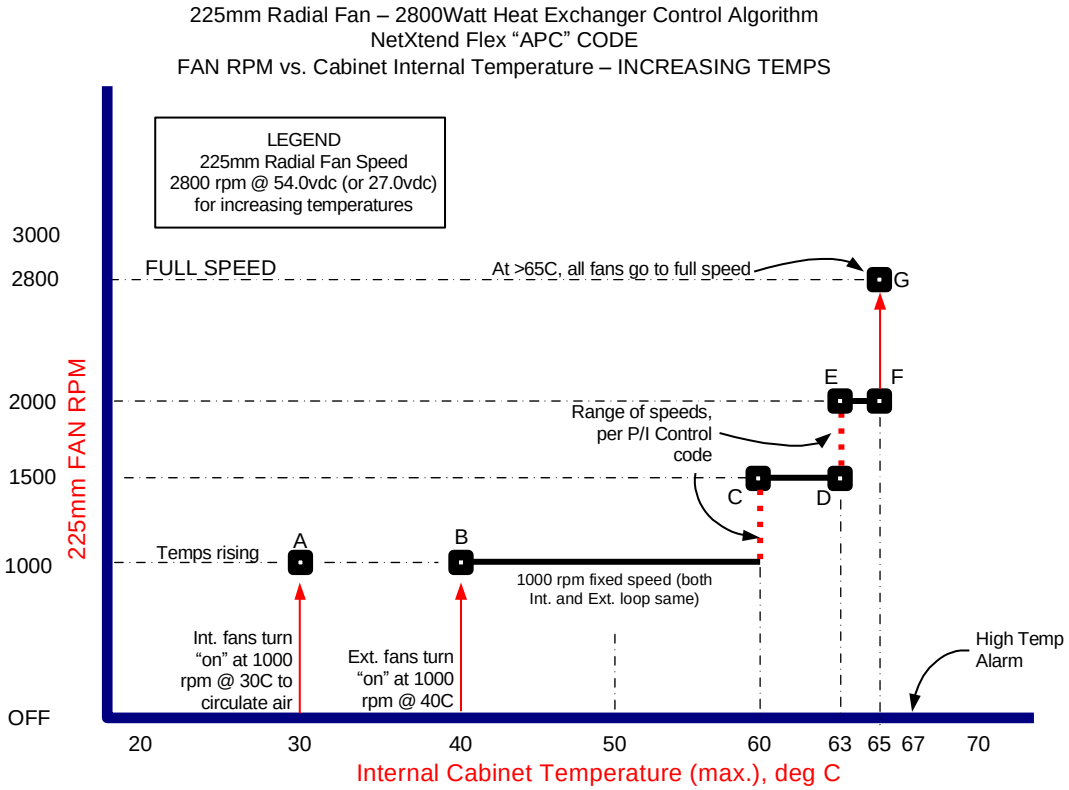
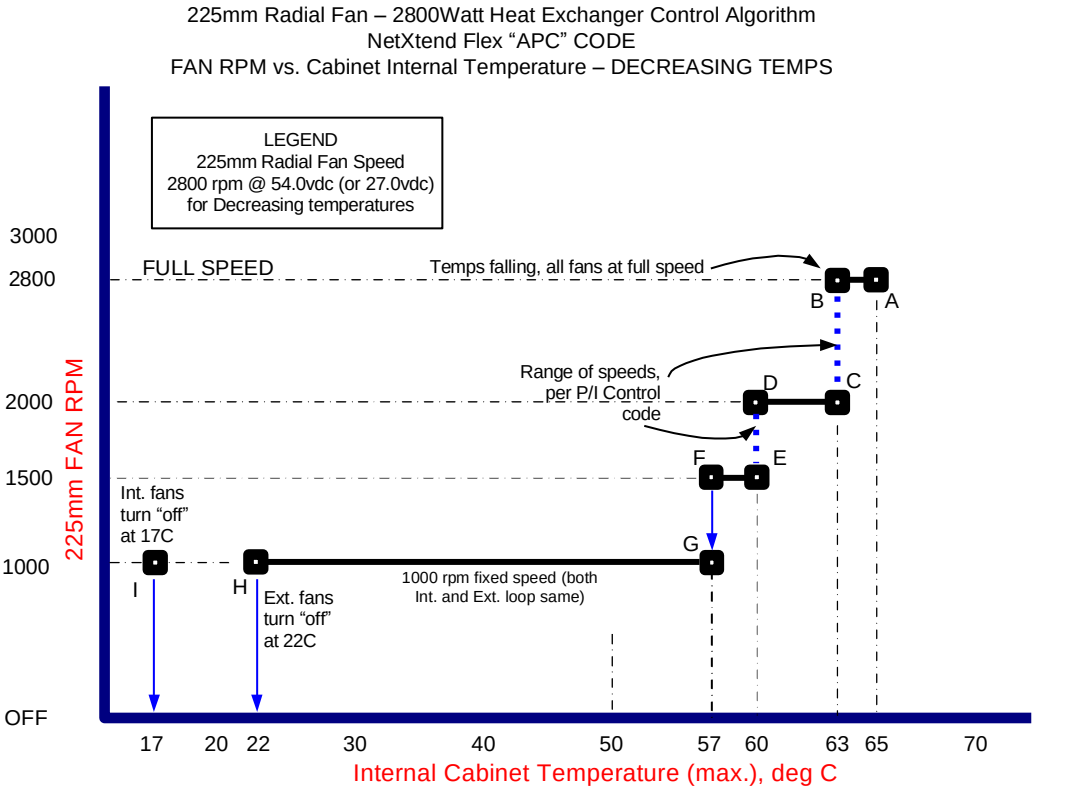


Figure 81: *Fan Speed vs. Internal Temperature (2800W Heat Exchanger)*





ECU User Interface (+24Vdc and -48Vdc ECU)

Initial Start-Up Sequence

When power is first applied to the ECU, the ECU goes through the following Start-Up sequence.

Start-Up Sequence

1. Firmware revision number displays. The ECU displays "FC" followed by a 3-digit number. Applicable code in this practice is Version "2.0.0" or later.
2. 1000W and 1450W HX: All fans run at full speed for 30-45 seconds to detect any fault conditions, then fan speeds will decrease gradually to the normal operation mode based upon the sensing thermistors, per code operation curves.

NOTE! *If either enclosure door is open during turn-up, the alarm buzzer sounds and a d01 door open alarm appears on the front ECU display. To silence the buzzer and clear the d01 alarm for 30 minutes, momentarily depress the Audible Alarm Cutoff / Maintenance / Reset pushbutton located on the ECU (see* ***Figure 77****). This also inhibits the remote intrusion alarm from being sent and turns all fans and components "OFF" for 30 minutes.*

3. "UP" displays when everything is operating as expected and there were no problems found with any component, or Continuous cycle of error codes when any fault is detected.
4. When a call for cooling occurs, the code requires the cooling fans to run a minimum of 5 minutes. Unless temperatures fall to 29°C, the code will shut down the fans (so no thermal shock occurs to the equipment).

LED Display Codes

Refer to **Table 12**.

Table 12: *LED Display Codes*

Code [1]	Description	External Alarm
UP	Controller OK	--
PC	Product Code	--
xxx	Product Code (follows PC) (*xxx* = 000-999)	--
FC	Firmware Code (revision)	--
N.N.N	Firmware Code (revision) (follows FC) (*N* = 0-9)	--
C01 24Vdc only	Fan PCB 1 Communication Failure	HVAC Major Alarm

Code [1]	Description	External Alarm
C02 24Vdc only	Fan PCB 2 Communication Failure (1000W and 1450W HX only)	HVAC Major Alarm
d01	Intrusion Open (software does not treat as alarm resulting in a system fault condition)	Intrusion Alarm
d02	Intrusion Ajar (software does not treat as alarm resulting in a system fault condition)	Intrusion Alarm
d03 (followed by minutes remaining in maintenance mode or seconds remaining if less than 1 minute)	Maintenance Mode	--
E01	TH1 (Thermistor) Fail (Enclosure Air 1) (Note: E07 and E12 inhibited)	HVAC Major Alarm
E02	TH2 (Thermistor) Fail (Enclosure Air 2) (Note: E08 and E13 inhibited)	HVAC Major Alarm
E06	Voltage High/Low	High/Low ECU Voltage
E07	High Temperature (Enclosure Air 1) (inhibited by E01)	Temperature Alarm
E08	High Temperature (Enclosure Air 2) (inhibited by E02)	Temperature Alarm
E12	Low Temperature (Enclosure Air 1) (inhibited by E01)	Temperature Alarm
E13	Low Temperature (Enclosure Air 2) (inhibited by E03)	Temperature Alarm

Code [1]	Description	External Alarm
F01	Fan #1 Fail [2, 3]	HVAC Major Alarm
F02	Fan #2 Fail [2, 3]	HVAC Major Alarm
F03	Fan #3 Fail [2, 3]	HVAC Major Alarm
F04	Fan #4 Fail [2, 3]	HVAC Major Alarm
F05	Fan #5 Fail [2, 3]	HVAC Major Alarm
F06	Fan #6 Fail [2, 3]	HVAC Major Alarm
F07	Fan #7 Fail [2, 3]	HVAC Major Alarm
F08	Fan #8 Fail [2, 3]	HVAC Major Alarm

1 Display cycles continuously through all active messages.
2 Fan fail alarms are latched until controller is reset by depressing reset button on side of ECU.
3 See **Figure 77** for fan fail code identification.

External Alarms

The ECU provides the following external alarms.

- **HVAC Major Alarm**: Activates if any of the following conditions occur.
  - One or more fans failed.
    Note that an unplugged fan will not alarm unless the ECU tells it to turn ON.
  - Thermistor 1 or 2 failed or is open.
  - ECU board communications failure.
- **Intrusion Alarm:** Activates if any door is opened as all doors are equipped with intrusion switches.
- **High / Low Temperature Alarm:** Activates during a high or low temperature condition inside the enclosure as measured by either temperature sensor.

Intrusion Alarm

Whenever the front door is opened, an intrusion alarm activates. The intrusion alarm…

- Displays Code d01 (Door Open) on the ECU LED display.
- Activates an audible alarm.
- Activates an external intrusion alarm, if connected.
- Turns all fans off (if there are no major alarms).

- Starts an intrusion alarm timer (30 minute timer).

To Disable Audible Alarm

To disable the audible alarm, momentarily depress the Audible Alarm Cutoff / Maintenance / Reset pushbutton located on the ECU. See **Figure 77** for location. This cancels the intrusion alarm and restarts the intrusion alarm timer, providing the enclosure temperature is less than its high temperature alarm limit.

Intrusion Alarm Timer

If the door is not closed before the 30 minute timer expires (or 30 minutes elapse after depressing the Audible Alarm Cutoff pushbutton), the following occurs.

- Code d02 (Door Ajar) displays on the ECU LED display.
- Audible alarm (if silenced) re-activates.
- External intrusion alarm (if silenced) re-activates.
- All fans turn on.
- Thermal control is restored.

Maintenance Mode

The system can be placed into the Maintenance Mode to perform such tasks as fan replacement. To enter the Maintenance Mode, open the front door and depress the Audible Alarm Cutoff / Maintenance / Reset pushbutton located on the ECU for more than 5 seconds but less than 10 seconds. See **Figure 7** for the pushbutton location in the ECU. The following occurs.

- The system is placed into the Maintenance Mode for 60 minutes.
- The audible alarm is turned off.
- All thermal devices are turned off.
- Code d03 (Maintenance Mode) displays on the ECU LED display, along with a countdown of the minutes remaining.

NOTE! *The display continues to cycle through all other active messages.*

NOTE! *When the time remaining is down to 1 minute or less, the audible buzzer will beep as a warning that this mode will be exited and the fans may start. The display continues to cycle through all active messages.*

Manually Exiting Maintenance Mode

Maintenance Mode can be exited by closing the door or by depressing the Audible Alarm Cutoff / Maintenance / Reset pushbutton for more than 10 seconds.

Resetting the Maintenance Mode

To reset the Maintenance Mode for another 60 minutes, depress the Audible Alarm Cutoff / Maintenance / Reset pushbutton for more than 5 seconds but less than 10 seconds.

Resetting the ECU

To reset (restart) the ECU, open the front door and depress the Audible Alarm Cutoff / Maintenance / Reset pushbutton located on the ECU for more than 10 seconds. See **Figure 7** for location.

NOTE! *The ECU is reset if a hard power down (remove ECU input voltage) and power up occurs.*

Thermoelectric Coolers (TEC)

Refer to this section when the NetXtend™ Flex enclosure is equipped with a Thermoelectric Cooler (TEC). The enclosure may have one (1) TEC for 200W of heating and cooling, or two (2) TECs for 400W of heating and cooling. The TEC's are door mounted.

Figure 82: *NetXtend Flex 8, 12 and 17 Thermoelectric Coolers (TEC)*

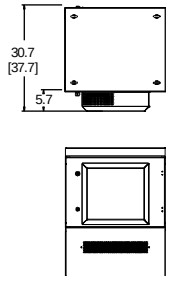
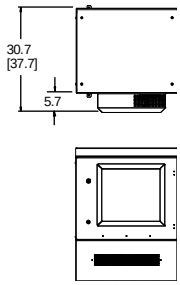
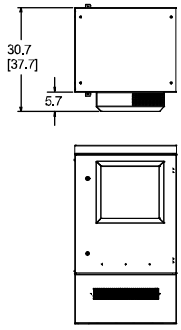
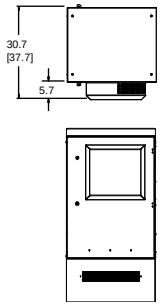
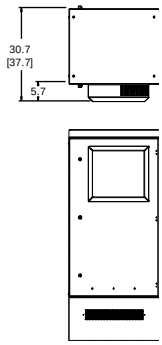
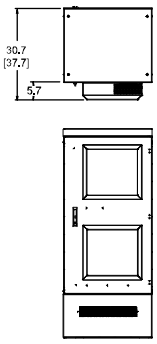
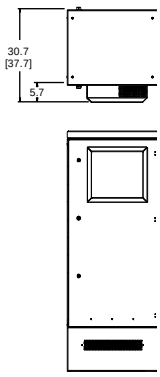
Thermoelectric Coolers in Single Bay NetXtend Enclosures			
RU #	**Enclosure Size**	**200W (TEC)**	**400W (2 x 200) TEC**
8RU	30"Wx25"D		Not Available in this Enclosure Size
12RU	30"Wx25"D		Not Available in this Enclosure Size
	30"Wx32"D		
	42"Wx25"D		
	42"Wx32"D		
17RU	30"Wx25"D		Not Available in this Enclosure Size
	30"Wx32"D		
	42"Wx25"D		
	42"Wx32"D		
	54"Wx25"D		
	54"Wx32"D		

Figure 83: *NetXtend Flex 22, 27 and 32 Thermoelectric Coolers (TEC)*

Thermoelectric Coolers in Single Bay NetXtend Enclosures			
RU #	**Enclosure Size**	**200W (TEC)**	**400W (2 x 200) TEC**
22RU	30"Wx25"D		Not Available in this Enclosure Size
	30"Wx32"D		
	42"Wx25"D		
	42"Wx32"D		
	54"Wx25"D		
	54"Wx32"D		
27RU	30"Wx25"D		
	30"Wx32"D		
	42"Wx25"D		
	42"Wx32"D		
	54"Wx25"D		
	54"Wx32"D		
32RU	30"Wx32"D	Not Available in this Enclosure Size	

TEC Environmental Control Unit (ECU)

The ECU controls the TEC's thermal components. Besides controlling the thermal components, the ECU also provides the following functions:

- monitoring for thermal system component failure (fans and thermistors),
- high and low temperature alarming, and
- intrusion alarming (audible and extended relay contacts).

Refer to **Figure 84** and **Figure 85** for illustrations of an ECU controlling one (1) and two (2) TECs, respectively.

All thermal system components are input voltage and polarity sensitive. These instructions cover both +24Vdc and -48Vdc systems. Refer to the label on the front of your ECU for the specific voltage requirement of your ECU.

ECU Input Voltage Range:

- +24Vdc ECU: +20.0Vdc to +28.3Vdc.
- -48Vdc ECU: -40.0Vdc to -56.7Vdc.

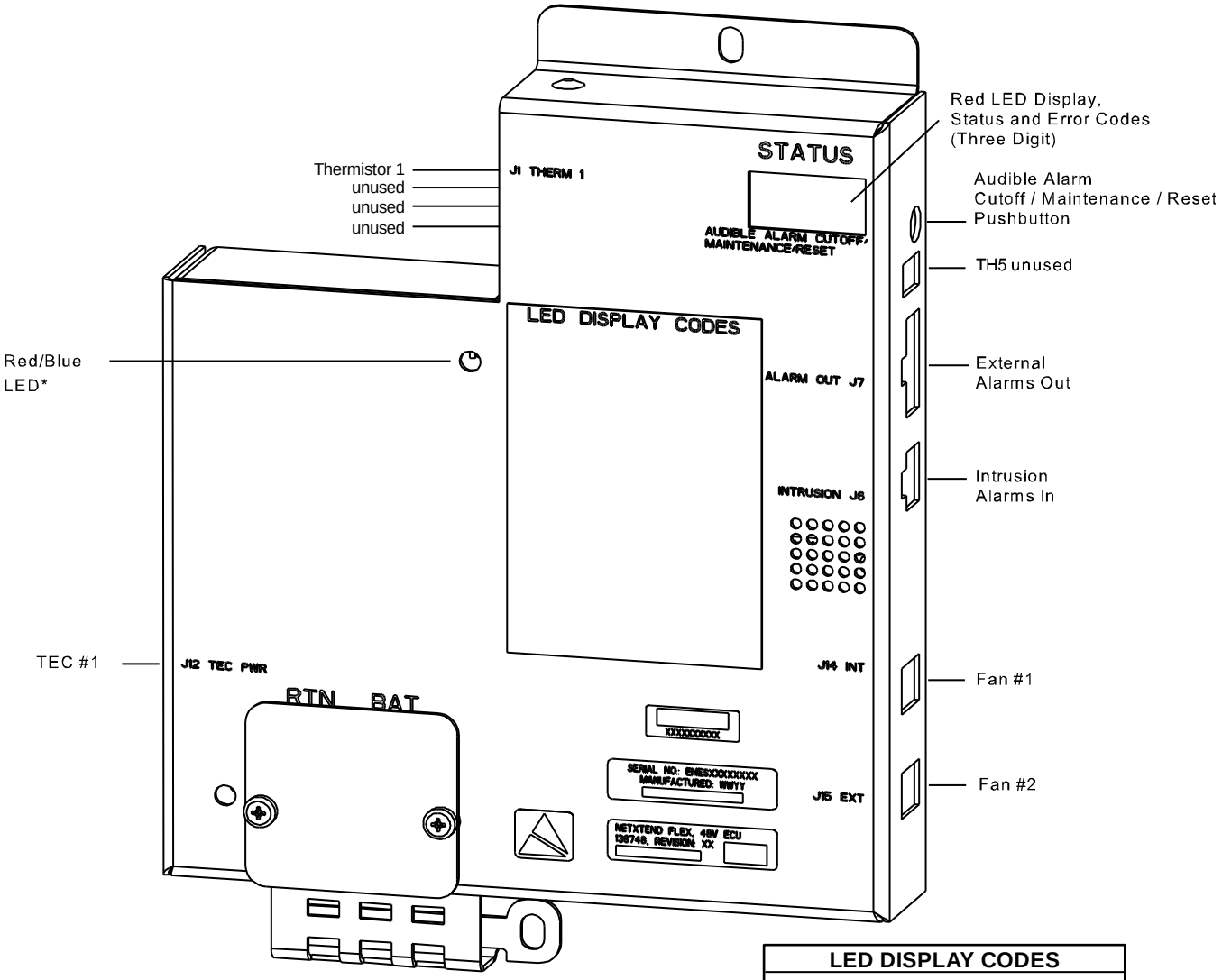
NOTE! *In ECUs that control TECs, the ECU does monitor input voltage, and if programmed for battery applications, can disconnect and reconnect the TEC power and indicate this on the LED display as an LVD alarm.*

ALERT! The ECU requires either +24Vdc or -48Vdc input voltage, depending upon enclosure configuration. Observe proper polarity for ECU input connections to avoid equipment damage. Polarity for the two input voltages is as follows:

+24Vdc Input Systems: 24V Battery is +, 24V Return is -.

-48Vdc Input Systems: 48V Battery is -, 48V Return is +.

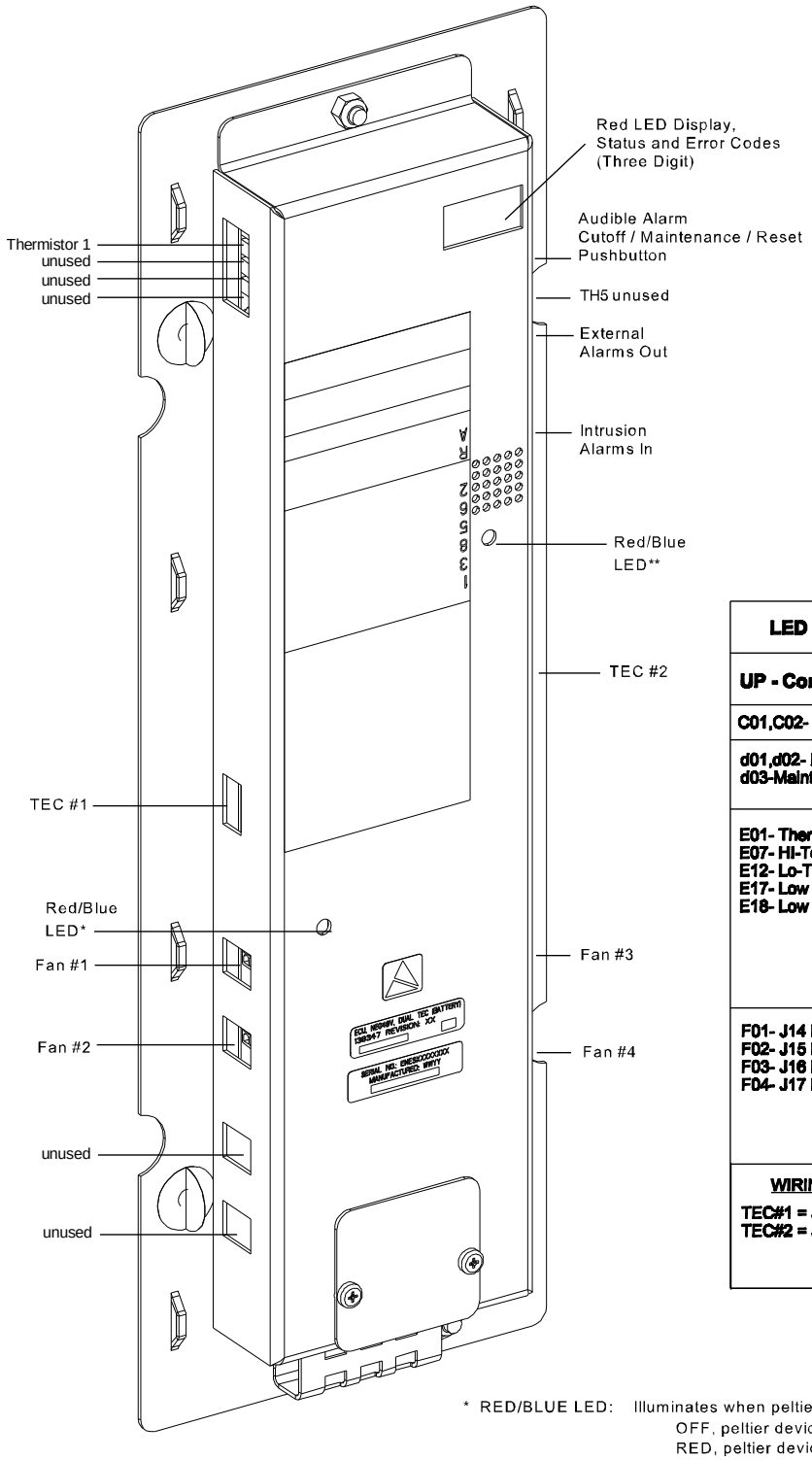
Figure 84: *+24Vdc and -48Vdc ECU Controlling One (1) TEC*



* RED/BLUE LED: Illuminates when peltier device at J12 is in operation.
OFF, peltier device is OFF.
RED, peltier device is in HEATING MODE.
BLUE, peltier device is in COOLING MODE.

LED DISPLAY CODES
UP - Controller OK PC = Product Code FC = Firmware Code Version X.X.X
C01, C02 - PCB Comm Failure
d01, d02 - Door Open d03 - Maintenance Mode **MAINTENANCE MODE**: Press Button for 6 seconds to enter 60min. controller disable mode **RESET**: Press Button for 11 seconds to reset controller
E01 - Thermistor 1 (J1) FAIL E02 - Hi Temp E12 - Lo Temp E18 - Voltage Low/Disconnect
F01 - J14 Fan Failure (Internal) F02 - J15 Fan Failure (External)
TEC WIRING REF ONLY J12 - Power Input to TEC

Figure 85: *+24Vdc and -48Vdc ECU Controlling Two (2) TECs*



LED DISPLAY CODES
UP - Controller OK
C01,C02- COMM PCB FAILURE
d01,d02- DOOR OPEN **d03-Maintenance Mode**
E01- Therm.1 FAIL (J1) **E07- HI-Temp TEC** **E12- Lo-Temp TEC** **E17- Low Volt TEC #1 Discon.** **E18- Low Volt TEC #2 Discon.**
F01- J14 Fan Fail Int. TOP **F02- J15 Fan Fail Ext TOP** **F03- J16 Fan Fail Int BOT.** **F04- J17 Fan Fail Ext BOT.**
WIRING DESIGNATIONS **TEC#1 = J12 TOP** **TEC#2 = J13 BOTTOM**

* RED/BLUE LED: Illuminates when peltier device at J12 is in operation.
OFF, peltier device is OFF.
RED, peltier device is in HEATING MODE.
BLUE, peltier device is in COOLING MODE.

** RED/BLUE LED: Illuminates when peltier device at J13 is in operation.
OFF, peltier device is OFF.
RED, peltier device is in HEATING MODE.
BLUE, peltier device is in COOLING MODE.

TEC Thermal Components

Just like the ECU, the TEC's are voltage sensitive. There is a +24Vdc version and a -48Vdc version TEC. The ECU is specific to the TEC. All power inputs are to the ECU and the ECU distributes power to the TEC and the fans on the TEC.

There are also two (2) types of TEC's available.

- Type A: TEC set for cooling electronics, setpoint at +35°C. This type is for applications with electronics assumed to be +40°C rated.
- Type B: TEC set for cooling batteries:, setpoint at +25°C. This type is for applications to prolong the life of Valve Regulated Lead Acid (VRLA) type batteries.

The setpoints are coded in firmware and are not adjustable.

Disconnection at Low Voltage: Because the TEC draws a lot of power, under battery back-up conditions where the voltage sags, the Battery Cooling Type TEC is designed to be power disconnected, to save battery life. Battery cooling is not required during battery discharge. The reconnect voltage, once a low voltage disconnect has occurred, is 1V higher than the disconnect point. That is, disconnect at 48.0V (24.0V), reconnect power to the TEC at 49.0V (25.0V).

The TEC consists of the following thermal components.

- Enclosure Thermistor.
- One (1) or Two (2) 200W Thermoelectric Cooler(s) (TEC) with an internal and an external fan. The fans are mounted to the TEC's respective finned heatsinks.

  The TEC provides both heating and cooling, as required, to maintain an enclosure temperature of +25°C or +35°C. The TEC is a solid-state Peltier device. The ECU switches the TEC between heating and cooling by switching the input polarity to the Peltier devices. The ECU also controls the operation of the external fan (the internal fan is always running to circulate the air in the enclosure).

  The TEC device is programmed to turn itself off if battery voltage drops below 24.0Vdc (24 systems) or 48Vdc (48V systems).

ECU Control of the TEC Thermal Components

Refer to **Table 13** and **Table 15** for 'ECU TEC Control Details' and **Table 14** and **Table 16** for ECU Setpoint Summary.

Table 13: *ECU TEC Type A Control Details (35°C Control for Electronics)*

Setpoint Description	Value/Range	TEC State	Comment
Temperature in TEC Off Range – DEAD BAND.	+15°C < T < +30°C	OFF	This range defines the hysteresis for heat and cool.
Temperature Transitions from Off Range to Cool.	T >= +35°C	COOL “ON”	Stays in cooling until temperature returns to dead band.
Temperature Transitions from Off Range to Heat.	T <= +10°C	HEAT “ON”	Stays in heating until temperature returns to dead band.
Low Voltage Disconnect (LVD)	N/A	N/A	No LVD Disconnect
Low Voltage Reconnect (LVD)	N/A	N/A	N/A
Fan Operation	• Internal fan always “ON” to circulate air. • In TEC state "HEAT", external fan is off. • In TEC state "COOL", external fan is on. • Internal fan runs at constant 3800 rpm when on. Runs full speed T = +37°C, then back to 3800 rpm T = +35°C. • External fan runs at constant 3000 rpm when on. Runs full speed T = +37°C, then back to 3000 rpm T = +35°C. • TEC fan fails (see **Table 17**).		

[1] Fault conditions are overridden by LVD.

Table 14: *ECU Type A Setpoint Summary (35°C Control for Electronics)*

Description	State	Control Mode Settings	Input	Alarm Hi	Alarm Lo	LED Display	Remote Alarm
TEC 1 & 2	COOL	35°C on 30°C off	Thermistor 1	55°C (retires at 50°C)	-40°C (retires at -35°C)	E07 Hi E12 Lo	Temperature Alarm Relay
	HEAT	10°C on 15°C off					
TEC1&2 Low Voltage Disconnect	OFF	N/A	N/A	N/A	N/A	N/A	No LVD Disconnect

Table 15: *ECU TEC Type B Control Details (25°C Control for Batteries)*

Setpoint Description	Value/Range	TEC State	Comment
Temperature in TEC Off Range – DEAD BAND.	+15°C < T < +20°C	OFF	This range defines the hysteresis for heat and cool.
Temperature Transitions from Off Range to Cool.	T >= +25°C	COOL “ON”	Stays in cooling until temperature returns to dead band.
Temperature Transitions from Off Range to Heat.	T <= +10°C	HEAT “ON”	Stays in heating until temperature returns to dead band.
Low Voltage Disconnect (LVD)	24.0V (24V Systems) 48.0V (48V Systems)	OFF	This overrides compartment faults [1].
Low Voltage Reconnect (LVD)	25.0V (24V Systems) 50.0V (48V Systems)	N/A	N/A
Fan Operation	• Internal fan always “ON”, circulating air always. • In TEC state "HEAT", external fan is off. • In TEC state "COOL", external fan is on. • Internal fan runs at constant 3800 rpm when on. Runs full speed T = +27°C, then back to 3800 rpm T = +25°C. • External fan runs at constant 3000 rpm when on. Runs full speed T = +27°C, then back to 3000 rpm T = +25°C. • TEC fan fails (see **Table 17**).		

Table 16: *ECU Setpoint Summary (Type B Only)*

Description	State	Control Mode Settings	Input	Alarm Hi	Alarm Lo	LED Display	Remote Alarm
TEC 1 & 2	COOL	25°C on 20°C off	Thermistor 1	55°C (retires at 50°C)	-40°C (retires at -35°C)	E07 Hi E12 Lo	Temperature Alarm Relay
	HEAT	10°C on 15°C off					
TEC1&2 Low Voltage Disconnect	OFF	N/A	Measured Supply Voltage	N/A	24V or 48V (reconnect and retire at 25V or 50V)	E17,E18 LVD	Major Alarm Relay

Failure Modes

In general, the application accounts for single points of failure. Failures cause the enclosure to enter a *system fault* mode in which cooling device is turned full on. Refer to **Table 17** for a Fault Condition Summary.

Thermistor Failure Open or Short

Enclosure enters *fault* mode.

Fan Speed Low

Enclosure enters *fault* mode.

Table 17: *Fault Condition Summary*

Fan Failure		Loss of Therm. (TH1)	High Temp.	Low Temp.
Internal Fan Fail	External Fan Fail	TEC Cool. Both Fans Full Speed.	TEC Cool. Both Fans Full Speed.	TEC Heat. Internal Fan 3800 RPM. External Fan Off.
TEC Off. Both Fans Off.	Internal Fan Operates Normally. Cooling is Disabled. Heating Operates Normally.			

[1] Fault conditions are overridden by LVD (when used in Type B TEC).
[2] The fault condition of one TEC does not affect the other TEC.

ECU User Interface (+24Vdc and -48Vdc)

Initial Start-Up Sequence

When power is first applied to the ECU, the ECU goes through the following Start-Up sequence.

Start-Up Sequence

1. Firmware revision number displays.
2. All fans run at full speed for approximately 30-45 seconds to detect any fault conditions, then normal operation resumes.
3. "UP" displays when everything is operating as expected or Continuous cycle of error codes when any faults are detected.

LED Display Codes

Refer to **Table 18**.

Table 18: *LED Display Codes*

Code [1]	Description	External Alarm
UP	Controller OK	--
PC	Product Code	--
xxx	Product Code (follows PC) (*xxx* = 000-999)	--
FC	Firmware Code (revision)	--
N.N.N	Firmware Code (revision) (follows FC) (*N* = 0-9)	--
C01 24Vdc only	Fan PCB 1 Communication Failure	HVAC Major Alarm
C02 24Vdc only	TEC PCB Communication Failure	HVAC Major Alarm
d01	Intrusion Open (software does not treat as alarm resulting in a system fault condition)	Intrusion Alarm
d02	Intrusion Ajar (software does not treat as alarm resulting in a system fault condition)	Intrusion Alarm

Code [1]	Description	External Alarm
d03 (followed by minutes remaining in maintenance mode or seconds remaining if less than 1 minute)	Maintenance Mode	--
E01	TH1 (Thermistor) Fail (Note: E07 and E12 inhibited)	HVAC Major Alarm
E07	High Temperature (inhibited by E01)	Temperature Alarm
E12	Low Temperature (inhibited by E01)	Temperature Alarm
E17	Battery TEC#1 Low Voltage Disconnect.	HVAC Major Alarm
E18	Battery TEC#2 Low Voltage Disconnect.	HVAC Major Alarm
F01	Fan #1 Fail [2]	HVAC Major Alarm
F02	Fan #2 Fail [2]	HVAC Major Alarm
F03	Fan #3 Fail [2]	HVAC Major Alarm
F04	Fan #4 Fail [2]	HVAC Major Alarm

[1] Display cycles continuously through all active messages.
[2] Fan fail alarms are latched until controller is reset.

RED and RED/BLUE LEDS

Refer to **Figure 84** and **Figure 85** for locations and descriptions.

External Alarms

The ECU provides the following external alarms.

- **HVAC Major Alarm:** Activates if any of the following conditions occur.
  - One or more fans failed.
    Note that an unplugged fan will not alarm unless the ECU tells it to turn ON.
  - Thermistor 1 failed or is open.
  - ECU board communications failure.

- **Intrusion Alarm:** Activates if the front door is opened.
- **High / Low Temperature Alarm:** Activates during a high or low temperature condition.

Intrusion Alarm

Whenever the front door is opened, an intrusion alarm activates. The intrusion alarm…

- Displays Code d01 (Door Open) on the ECU LED display.
- Activates an audible alarm.
- Activates an external intrusion alarm, if connected.
- Turns all fans off (if there are no alarms).
- Starts an intrusion alarm timer (30 minute timer).

To Disable Audible Alarm

To disable the audible alarm, momentarily depress the Audible Alarm Cutoff / Maintenance / Reset pushbutton located on the ECU. See **Figure 84** or **Figure 85** for location. This cancels the intrusion alarm and restarts the intrusion alarm timer, providing the enclosure temperature in any compartment is less than its high temperature alarm limit.

Intrusion Alarm Timer

If the door is not closed before the 30 minute timer expires (or 30 minutes elapse after depressing the Audible Alarm Cutoff pushbutton), the following occurs.

- Code d02 (Door Ajar) displays on the ECU LED display.
- Audible alarm (if silenced) re-activates.
- External intrusion alarm (if silenced) re-activates.
- All fans turn on.
- Thermal control is restored.

Maintenance Mode

The system can be placed into the Maintenance Mode to perform such tasks as fan replacement. To enter the Maintenance Mode, open the front door and depress the Audible Alarm Cutoff / Maintenance / Reset pushbutton located on the ECU for more than 5 seconds but less than 10 seconds. See **Figure 84** or **Figure 85** for location. The following occurs.

- The system is placed into the Maintenance Mode for 60 minutes.
- The audible alarm is turned off.
- All thermal devices are turned off.
- Code d03 (Maintenance Mode) displays on the ECU LED display, along with a countdown of the minutes remaining.

NOTE! *The display continues to cycle through all other active messages.*

NOTE! *When the time remaining is down to 1 minute or less, the audible buzzer will beep as a warning that this mode will be exited and the fans may start. The display continues to cycle through all active messages.*

Manually Exiting Maintenance Mode

Maintenance Mode can be exited by closing the door or by depress the Audible Alarm Cutoff / Maintenance / Reset pushbutton for more than 10 seconds.

Resetting the Maintenance Mode

To reset the Maintenance Mode for another 60 minutes, depress the Audible Alarm Cutoff / Maintenance / Reset pushbutton for more than 5 seconds but less than 10 seconds.

Resetting the ECU

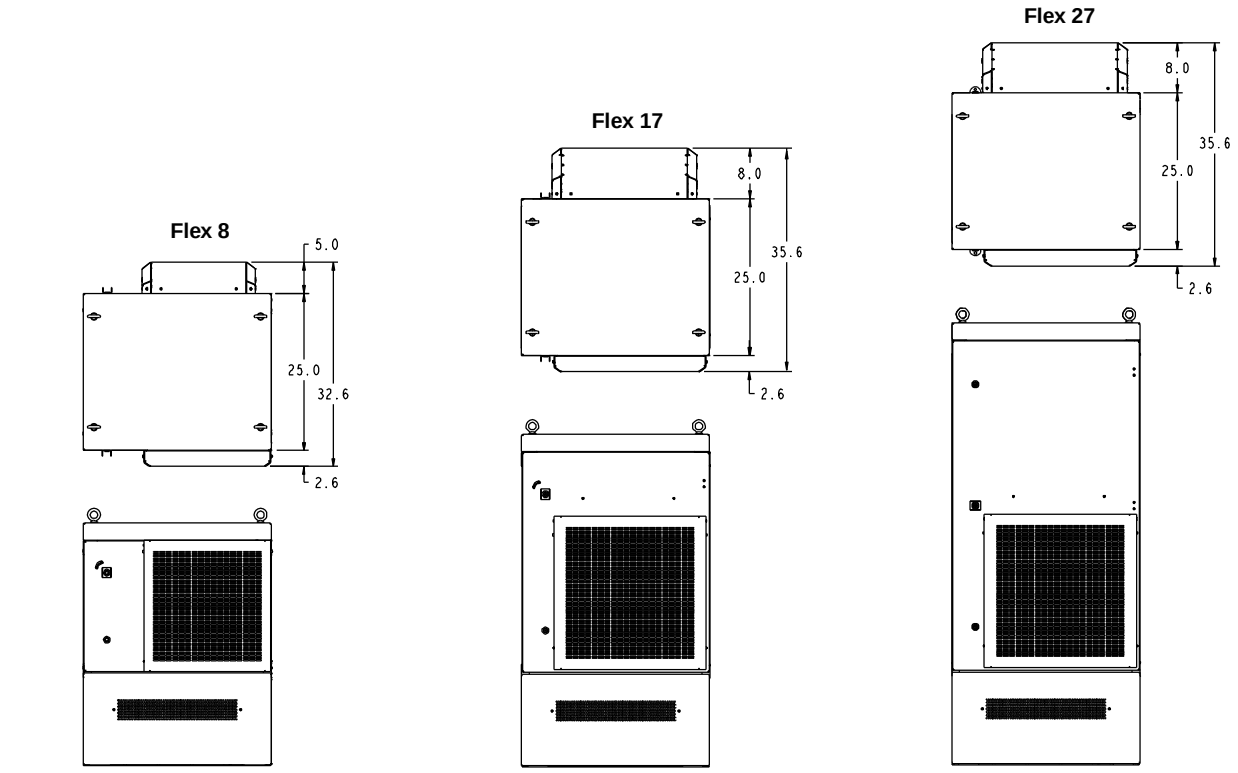
To reset (restart) the ECU, open the front door and depress the Audible Alarm Cutoff / Maintenance / Reset pushbutton located on the ECU for more than 10 seconds. See **Figure 84** or **Figure 85** for location.

NOTE! *The ECU is reset if a hard power down (remove ECU input voltage) and power up occurs.*

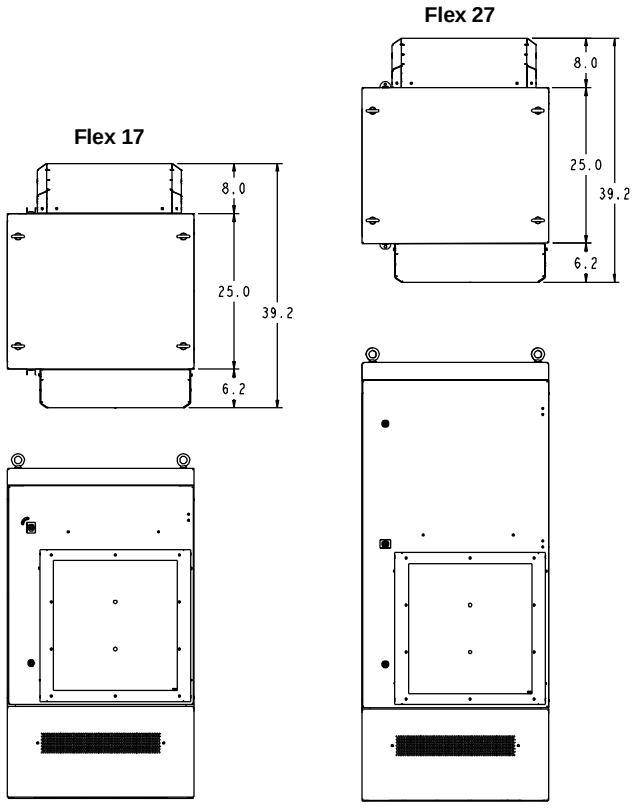
Fan Filter Assembly

Refer to this section when the NetXtend™ Flex enclosure is equipped with a Fan Filter Assembly. The Fan Filter Assembly consists of a door mounted filtered air intake fan assembly (with two fans) and a thermistor which are controlled and monitored by the ECU. An exhaust vent is also located on the opposite side of the enclosure. The fans draw outside filtered air into the enclosure and out the exhaust vent. See **Figure 86**.

Figure 86: *NetXtend™ Flex Fan Filter Assembly (Flex 8, 17, and 27)*



Standard Filter



Fan Filter Assembly Environmental Control Unit (ECU)

The ECU controls the air intake fans. Besides controlling the air intake fans, the ECU also provides the following functions:

- monitoring for thermal system component failure (fans and thermistors),
- high and low temperature alarming, and
- intrusion alarming (audible and extended relay contacts).

Refer to **Figure 87** and **Figure 88** for an illustration of an ECU controlling a Fan Filter Assembly.

All thermal system components are input voltage and polarity sensitive. These instructions cover both +24Vdc and -48Vdc systems. Refer to the label on the front of your ECU for the specific voltage requirement of your ECU.

ECU Input Voltage Range:

- +24Vdc ECU: +20.0Vdc to +28.3Vdc.
- -48Vdc ECU: -40.0Vdc to -56.7Vdc.

ALERT! The ECU requires either +24Vdc or -48Vdc input voltage, depending upon enclosure configuration. Observe proper polarity for ECU input connections to avoid equipment damage. Polarity for the two input voltages is as follows:

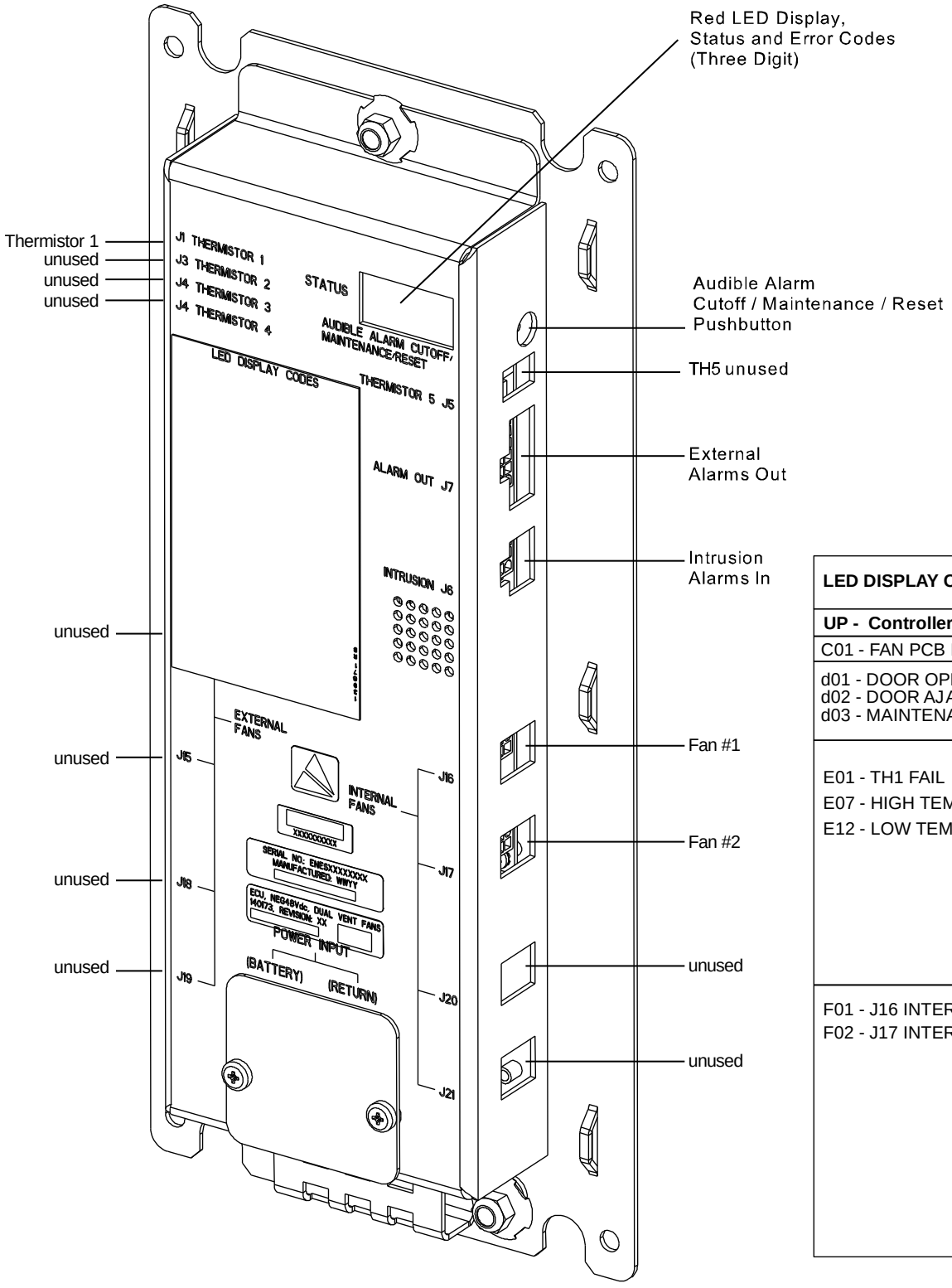
- +24Vdc Input Systems: 24V Battery is +, 24V Return is -.
- -48Vdc Input Systems: 48V Battery is -, 48V Return is +.

Fan Filter Assembly Thermal Components

The Fan Filter Assembly consists of the following thermal components.

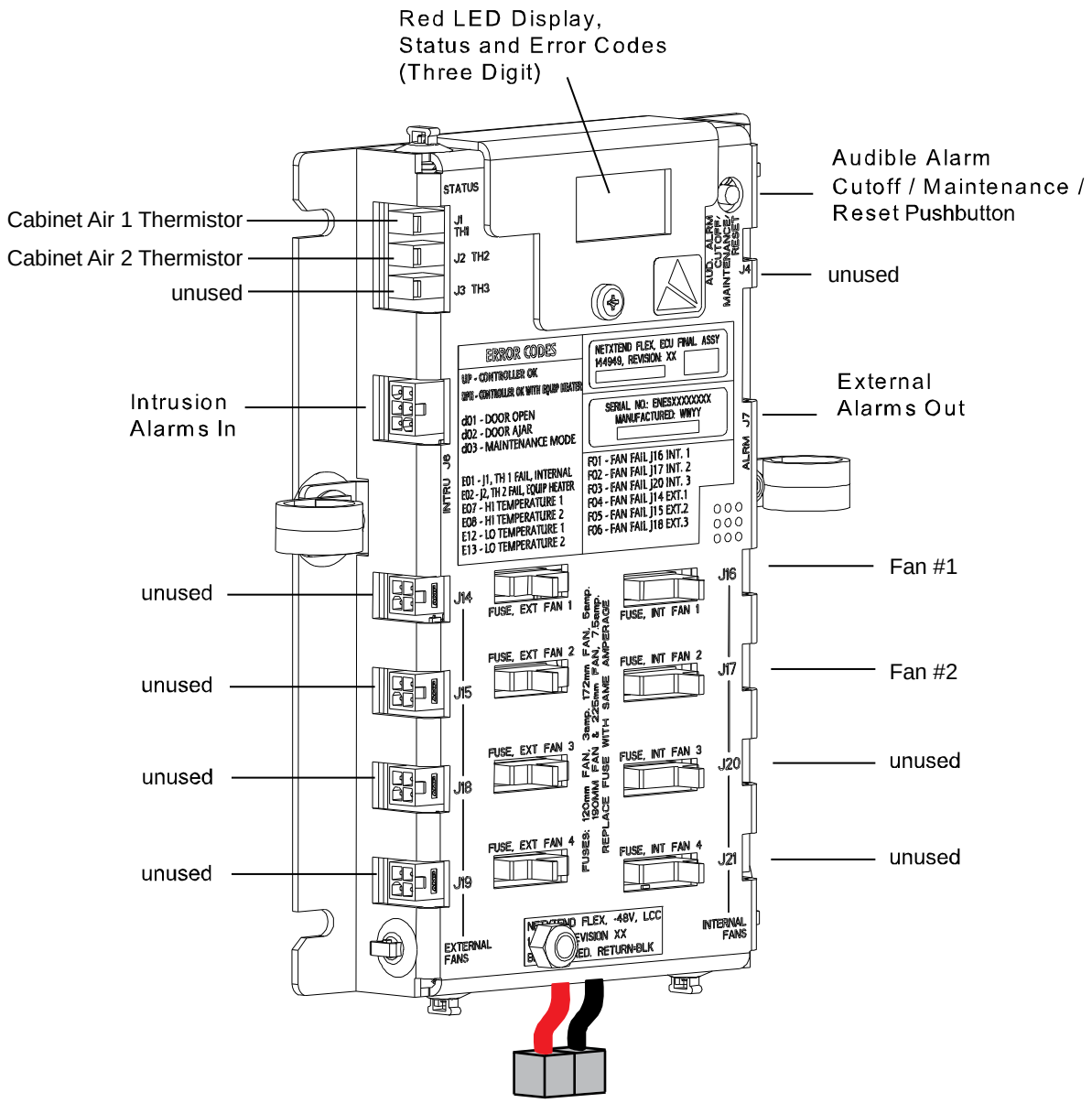
- Enclosure thermistor.
- Two (2) air intake fans mounted on a door. The fans provide filtered fresh air to vent cool the enclosure. The ECU controls whether none, one, or two fans are operating; and the speed of the fan(s) to maintain an internal temperature of approximately +40°C (+104°F). The ECU designates one fan as the primary fan, and the other as the secondary fan. The ECU switches these designations to improve fan life. The vent fans do not turn “on” unless the compartment temperature reaches +40°C (+104°F).

Figure 87: *+24Vdc ECU Controlling a Fan Filter Assembly*



LED DISPLAY CODES
UP - Controller OK
C01 - FAN PCB FAILURE
d01 - DOOR OPEN d02 - DOOR AJAR d03 - MAINTENANCE MODE
E01 - TH1 FAIL E07 - HIGH TEMP #1 E12 - LOW TEMP #1
F01 - J16 INTERNAL FAN #1 FAIL F02 - J17 INTERNAL FAN #2 FAIL

Figure 88: *-48Vdc ECU Controlling a Fan Filter Assembly*



LED DISPLAY CODES
UP – CONTROLLER OK UPH – CONTROLLER OK WITH EQUIP HEATER
d01 – DOOR OPEN d02 – DOOR AJAR d03 – MAINTENANCE MODE
E01 – J1, TH 1 FAIL, INTERNAL E07 – HIGH TEMPERATURE 1 E12 – LO TEMPERATURE 1
F01 – FAN FAIL J16 INT. 1 F02 – FAN FAIL J17 INT. 2

MAINTENANCE MODE: PRESS AND HOLD BUTTON 6 SECONDS TO ENTER 60 MINUTE CONTROLLER DISABLE MODE.

RESET: PRESS AND HOLD BUTTON 11 SECONDS TO RESET CONTROLLER.

ECU Control of the Fan Filter Assembly Thermal Components

Refer to **Table 19** for 'ECU Setpoints' and **Table 20** for 'ECU Control Details'.

Table 19: *ECU Setpoints*

High Temperature Alarm	Low Temperature Alarm	LED Display Codes	External Alarm
+70°C (+158°F), retires at +65°C (+149°F)	-45°C (-49°F), retires at -40°C (-40°F)	E07: High Temperature #1 E12: Low Temperature #1	P/O High/Low Temperature Alarm

Table 20: *ECU Control Details*

Fan Filter Assembly Thermistor (J1 TH1), Vent Fans (J16, J17)		
Setpoint Description	**Value/Range**	**Comment**
Temperature Transitions from Off Range to Cooling	T >= +40°C (+104°F)	Servo Control Maintains +40°C (+104°F)
Fan Operation	Vent fans vary speed to maintain temperature at +40°C (+104°F). Vent fan fails results in full speed setting on all vent fans. TC fail results in full speed setting on all vent fans. (see **Table 21**)	

Failure Modes

In general, the application accounts for single points of failure. Failures cause the enclosure to enter a *system fault* mode in which cooling device is turned full on. Refer to **Table 21** for a Fault Condition Summary.

Thermistor Failure Open or Short

Enclosure enters *fault* mode.

Fan Speed Low

Enclosure enters *fault* mode.

Table 21: *Fault Condition Summary*

Loss of Communications	Fan Failure	Loss of Therm. (TH1)	High Temp.	Low Temp.
Fans Full Speed	Fans Full Speed	Fans Full Speed	Fans Full Speed	Fans Off

ECU User Interface (+24Vdc and -48Vdc)

When power is first applied to the ECU, the ECU goes through the following Start-Up sequence.

Start-Up Sequence

1. Firmware revision number displays. The ECU displays "FC" followed by a 3-digit number. Applicable code in this practice is Version "2.0.0" or later.
2. All fans run at full speed for 30-45 seconds to detect any fault conditions, then fan speeds will decrease gradually to the normal operation mode based upon the sensing thermistors, per code operation curves.

NOTE! *If either enclosure door is open during turn-up, the alarm buzzer sounds and a d01 door open alarm appears on the front ECU display. To silence the buzzer and clear the d01 alarm for 30 minutes, momentarily depress the Audible Alarm Cutoff / Maintenance / Reset pushbutton located on the ECU (see* ***Figure 77****). This also inhibits the remote intrusion alarm from being sent and turns all fans and components "OFF" for 30 minutes.*

3. "UP" displays when everything is operating as expected and there were no problems found with any component or Continuous cycle of error codes when any faults are detected.

LED Display Codes

Refer to **Table 22**.

Table 22: *LED Display Codes*

Code [1]	Description	External Alarm
UP	Controller OK	--
PC	Product Code	--
xxx	Product Code (follows PC) (*xxx* = 000-999)	--
FC	Firmware Code (revision)	--

Code [1]	Description	External Alarm
N.N.N	Firmware Code (revision) (follows FC) (*N* = 0-9)	--
C01 24Vdc only	Fan PCB 1 Communication Failure	HVAC Major Alarm
d01	Intrusion Open (software does not treat as alarm resulting in a system fault condition)	Intrusion Alarm
d02	Intrusion Ajar (software does not treat as alarm resulting in a system fault condition)	Intrusion Alarm
d03 (followed by minutes remaining in maintenance mode or seconds remaining if less than 1 minute)	Maintenance Mode	--
E01	TH1 (Thermistor) Fail (Note: E07 and E12 inhibited)	HVAC Major Alarm
E07	High Temperature (inhibited by E01)	Temperature Alarm
E12	Low Temperature (inhibited by E01)	Temperature Alarm
F01	Fan #1 Fail (J16) [2]	HVAC Major Alarm
F02	Fan #2 Fail (J17) [2]	HVAC Major Alarm

[1] Display cycles continuously through all active messages.
[2] Fan fail alarms are latched until controller is reset.

External Alarms

The ECU provides the following external alarms.

- **HVAC Major Alarm:** Activates if any of the following conditions occur.
  - One or more fans failed.
    Note that an unplugged fan will not alarm unless the ECU tells it to turn ON.
  - Thermistor 1 failed or is open.
  - ECU board communications failure.

- **Intrusion Alarm:** Activates if the front door is opened.
- **High / Low Temperature Alarm:** Activates during a high or low temperature condition.

Intrusion Alarm

Whenever the front door is opened, an intrusion alarm activates. The intrusion alarm…

- Displays Code d01 (Door Open) on the ECU LED display.
- Activates an audible alarm.
- Activates an external intrusion alarm, if connected.
- Turns all fans off (if there are no alarms).
- Starts an intrusion alarm timer (30 minute timer).

To Disable Audible Alarm

To disable the audible alarm, momentarily depress the Audible Alarm Cutoff / Maintenance / Reset pushbutton located on the ECU. See **Figure 87** for location. This cancels the intrusion alarm and restarts the intrusion alarm timer, providing the enclosure temperature in any compartment is less than its high temperature alarm limit.

Intrusion Alarm Timer

If the door is not closed before the 30 minute timer expires (or 30 minutes elapse after depressing the Audible Alarm Cutoff pushbutton), the following occurs.

- Code d02 (Door Ajar) displays on the ECU LED display.
- Audible alarm (if silenced) re-activates.
- External intrusion alarm (if connected) re-activates.
- All fans turn on.
- ECU Thermal control is restored to normal operation.

NOTE! *The intrusion alarm can be defeated by pulling the door switch plunger out. ECU will return to normal operation, functioning as if the door were closed.*

Maintenance Mode

The system can be placed into the Maintenance Mode to perform such tasks as fan replacement. To enter the Maintenance Mode, open the front door and depress the Audible Alarm Cutoff / Maintenance / Reset pushbutton located on the ECU for more than 5 seconds but less than 10 seconds. See **Figure 87** for location. The following occurs.

- The system is placed into the Maintenance Mode for 60 minutes.
- The audible alarm is turned off.
- All thermal devices are turned off.
- Code d03 (Maintenance Mode) displays on the ECU LED display, along with a count down of the minutes remaining.

NOTE! *The display continues to cycle through all other active messages.*

NOTE! *When the time remaining is down to 1 minute or less, the audible buzzer will beep as a warning that this mode will be exited and the fans may start. The display continues to cycle through all active messages.*

Manually Exiting Maintenance Mode

Maintenance Mode can be exited by closing the door or by depressing the Audible Alarm Cutoff / Maintenance / Reset pushbutton for more than 10 seconds.

Resetting the Maintenance Mode

To reset the Maintenance Mode for another 60 minutes, depress the Audible Alarm Cutoff / Maintenance / Reset pushbutton for more than 5 seconds but less than 10 seconds.

Resetting the ECU

To reset (restart) the ECU, open the front door and depress the Audible Alarm Cutoff / Maintenance / Reset pushbutton located on the ECU for more than 10 seconds. See **Figure 87** for location.

NOTE! *The ECU is reset if a hard power down (remove ECU input voltage) and power up occurs.*

NOTE! *When the time remaining is down to 1 minute or less, the audible buzzer will beep as a warning that this mode will be exited and the fans may start. The display continues to cycle through all active messages.*

Air Conditioners

Refer to this section when the NetXtend Flex enclosure is equipped with an air conditioner. See **Figure 89** and **Figure 90**.

Environmental Controls

If air conditioner cooling is used, the air conditioner is controlled via its own built in internal controls.

User Interface

The air conditioner is an independent unit. Refer to the instructions supplied by the air conditioner manufacturer.

Table 23: *AC Conditioning in Single Bay NetXtend Flex Enclosures*

30-Width Enclosures										
RU vs BTU	30"Wx25"D NetXtend Flex					30"Wx32"D NetXtend Flex				
	850 BTU	2000 BTU	4000 BTU	8000 BTU	19000 BTU	850 BTU	2000 BTU	4000 BTU	8000 BTU	19000 BTU
8RU	YES	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
12RU	YES	YES	N/A	N/A	N/A	YES	YES	N/A	N/A	N/A
17RU	N/A	YES	YES	N/A	N/A	N/A	YES	YES	N/A	N/A
22RU	N/A	YES	YES	N/A	N/A	N/A	YES	YES	N/A	N/A
27RU	N/A	YES	YES	YES	YES	N/A	YES	YES	YES	YES
32RU	N/A	N/A	N/A	N/A	N/A	N/A	YES	YES	YES	YES
42-Width Enclosures										
RU vs BTU	42"Wx25"D NetXtend Flex					42"Wx32"D NetXtend Flex				
	850 BTU	2000 BTU	4000 BTU	8000 BTU	19000 BTU	850 BTU	2000 BTU	4000 BTU	8000 BTU	19000 BTU
8RU	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
12RU	YES	YES	N/A	N/A	N/A	YES	YES	N/A	N/A	N/A
17RU	N/A	YES	YES	N/A	N/A	N/A	YES	YES	N/A	N/A
22RU	N/A	YES	YES	N/A	N/A	N/A	YES	YES	N/A	N/A
27RU	N/A	YES	YES	YES	YES	N/A	YES	YES	YES	YES
32RU	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
54-Width Enclosures										
RU vs BTU	54"Wx25"D NetXtend Flex					54"Wx32"D NetXtend Flex				
		2000 BTU	4000 BTU	8000 BTU	19000 BTU		2000 BTU	4000 BTU	8000 BTU	19000 BTU
8RU		N/A	N/A	N/A	N/A		N/A	N/A	N/A	N/A
12RU		N/A	N/A	N/A	N/A		N/A	N/A	N/A	N/A
17RU		YES	YES	N/A	N/A		YES	YES	N/A	N/A
22RU		YES	YES	N/A	N/A		YES	YES	N/A	N/A
27RU		YES	YES	YES	YES		YES	YES	YES	YES
32RU		N/A	N/A	N/A	N/A		N/A	N/A	N/A	N/A

Figure 89: *NetXtend Flex Air Conditioners (Flex 8, 12, 17)*

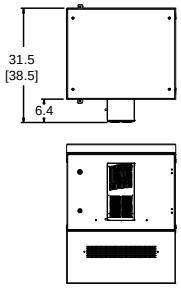
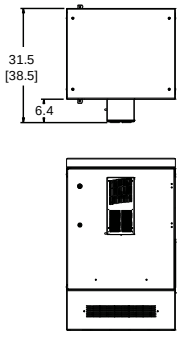
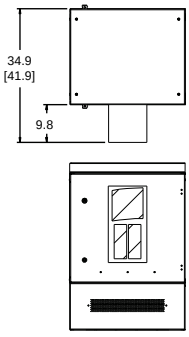
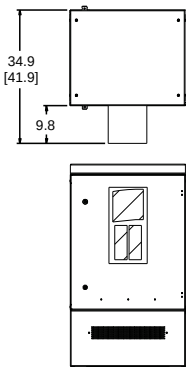
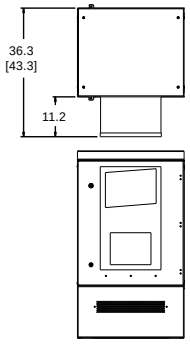
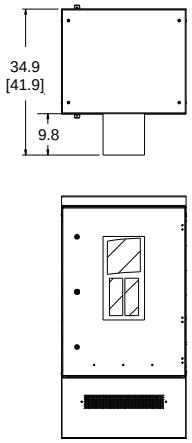
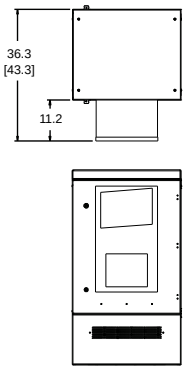
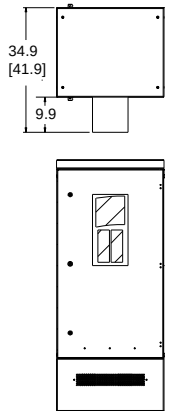
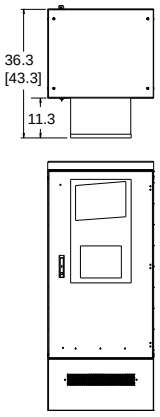
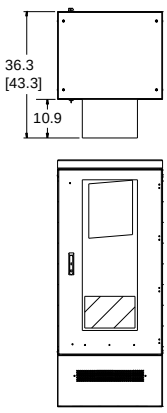
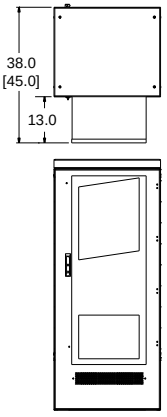
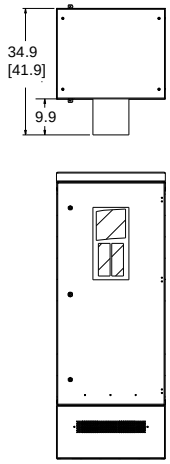
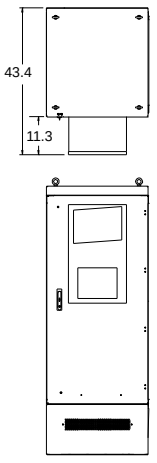
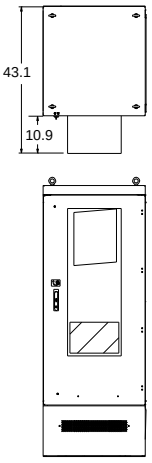
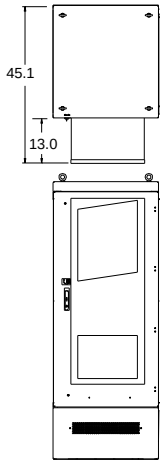
Air Conditioning in Single Bay NetXtend Flex Enclosures						
RU #	**Enclosure Size**	**850BTU**	**2000BTU**	**4000BTU**	**8000BTU**	**19000BTU**
8RU	30"Wx25" D		**Not Available in this Enclosure Size**	Not Available in this Enclosure Size	Not Available in this Enclosure Size	Not Available in this Enclosure Size
12RU	30"Wx25" D 30"Wx32" D 42"Wx25" D 42"Wx32" D			Not Available in this Enclosure Size	Not Available in this Enclosure Size	Not Available in this Enclosure Size
17RU	30"Wx25" D 30"Wx32" D 42"Wx25" D 42"Wx32" D 54"Wx25" D 54"Wx32" D	Not Available in this Enclosure Size			Not Available in this Enclosure Size	Not Available in this Enclosure Size

Figure 90: *NetXtend Flex Air Conditioners (Flex 22, 27, and 32)*

Air Conditioning in Single Bay NetXtend Flex Enclosures						
RU #	**Enclosure Size**	**850BTU**	**2000BTU**	**4000BTU**	**8000BTU**	**19000BTU**
22RU	30"Wx25"D 30"Wx32"D 42"Wx25"D 42"Wx32"D 54"Wx25"D 54"Wx32"D	Not Available in this Enclosure Size			Not Available in this Enclosure Size	Not Available in this Enclosure Size
27RU	30"Wx25"D 30"Wx32"D 42"Wx25"D 42"Wx32"D 54"Wx25"D 54"Wx32"D	Not Available in this Enclosure Size				
32RU	30"Wx32"D	Not Available in this Enclosure Size				

MAINTENANCE AND REPLACEMENT PROCEDURES

Battery Maintenance (+24Vdc and -48Vdc enclosures)

Procedure

1. Make sure that the batteries and battery area are clean and dry.
2. Inspect the battery terminals. Make sure that the battery terminals are clean and the connections are tight. If necessary, clean and tighten the terminals in accordance with local practices, using approved cleaning solution. Reapply antioxidant compound (NO-OX-ID™ or equivalent).
3. In high discharge rate applications, or in areas subject to high vibration, periodically check battery terminal tightness.

NOTE! *Tighten all battery terminal adapter post nuts to the torque specifications specified by the battery manufacturer only.*

4. Keep records of battery and cell voltages as required by battery manufacturer and local practices to monitor long-term changes in battery condition. To ensure battery warranty protection, keep any additional records as required by the battery manufacturer. Refer to the Battery Installation and Maintenance Record supplied with the batteries.

Filter Maintenance

Standard Filter

To clean the standard filter, follow one of the following procedures.

- *Compressed Air* - If compressed air is available, use it to blow off dust and dirt from the filter screen. Point the compressed air nozzle in the opposite direction of operating air flow (blow from exhaust side toward intake side).
- *Warm Water and Detergent* - Where stubborn air-borne dirt is present, the filter may be dipped in a solution of warm water and mild detergent (DO NOT USE SOLVENTS!). Then simply rinse in clear water, let stand until completely dry and free of moisture, and return to service.
- *Vacuum Cleaner* - A few passes of a vacuum cleaner will remove accumulated dust and dirt in seconds.

Hydrophobic Filter (Filtered Air Intake)

Maintaining the filters for the filtered air intake is very important for the proper function of this cooling system. It is suggested that the pre-filter be cleaned at regular intervals to prevent buildup of dust and other debris. The primary filter cannot be cleaned effectively, except to "shake off some dust". The design of this filter, along with proper use of the pre-filter, should allow it to function for several years before needing replacement.

- Inspect and clean the pre-filter every 6 months to maximize the life of the hydrophobic filter.
- The expected life of the primary hydrophobic filter is 5 years under standard conditions.

Filter Assembly Replacement - Hydrophobic Patches

- Cabinets with vented roof - typically, used on cabinets with internal battery shelves; illustrations needed to show where located and how to replace in the field.

- Cabinets with removable panels with filter - May be used on cabinets when venting is required. This can be used in combination with the vented roof.

Fan Filter Assembly - Standard Filter Replacement

You Will Need-

To replace the Fan Filter Assembly's standard filter, you will need the following tools.

- Proper tool to remove filter cover tamper-resistant screws.
- Replacement filter.

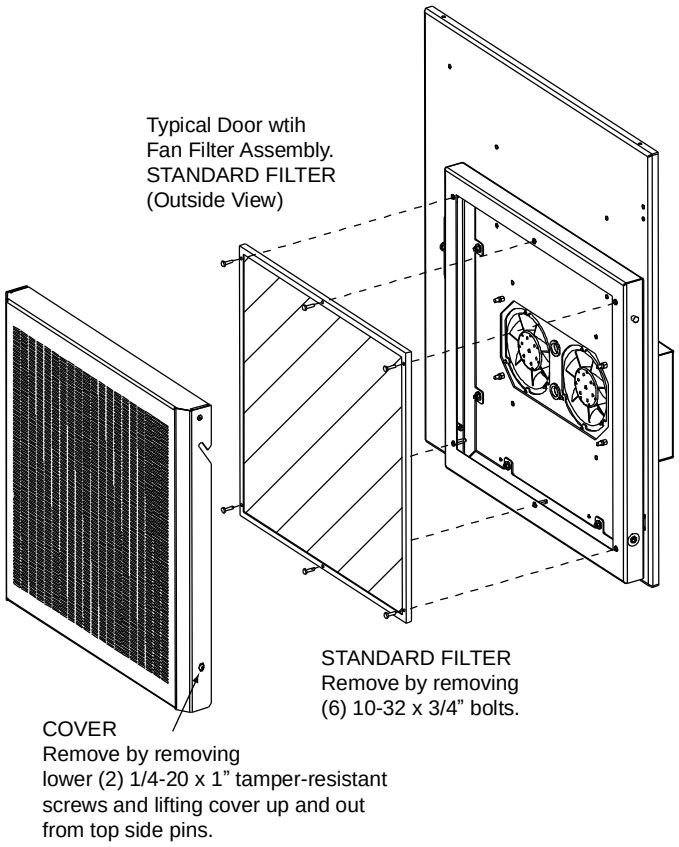
Replacing the Filter-

Perform the following steps to replace the filter. See **Figure 91**.

Procedure

1. Remove the filter cover by removing the two (2) lower tamper-resistant screws and then lifting the cover up and out from the top side pins.
2. Remove the filter by removing the six (6) bolts securing it.
3. Secure the new filter using the existing bolts just removed.
4. Slide the filter cover over the top pins and then push the bottom into place. Secure the bottom with the existing tamper-resistant screws.

Figure 91: *Fan Filter Assembly - Standard Filter Replacement*



Fan Filter Assembly - Hydrophobic Filter Replacement

You Will Need –

To replace the Fan Filter Assembly's Hydrophobic filter, you will need the following tools:

- Proper tool to remove filter cover tamper-resistant screws.
- Replacement filter.

Replacing the Filter –

Perform the following steps to replace the filter. See **Figure 92**

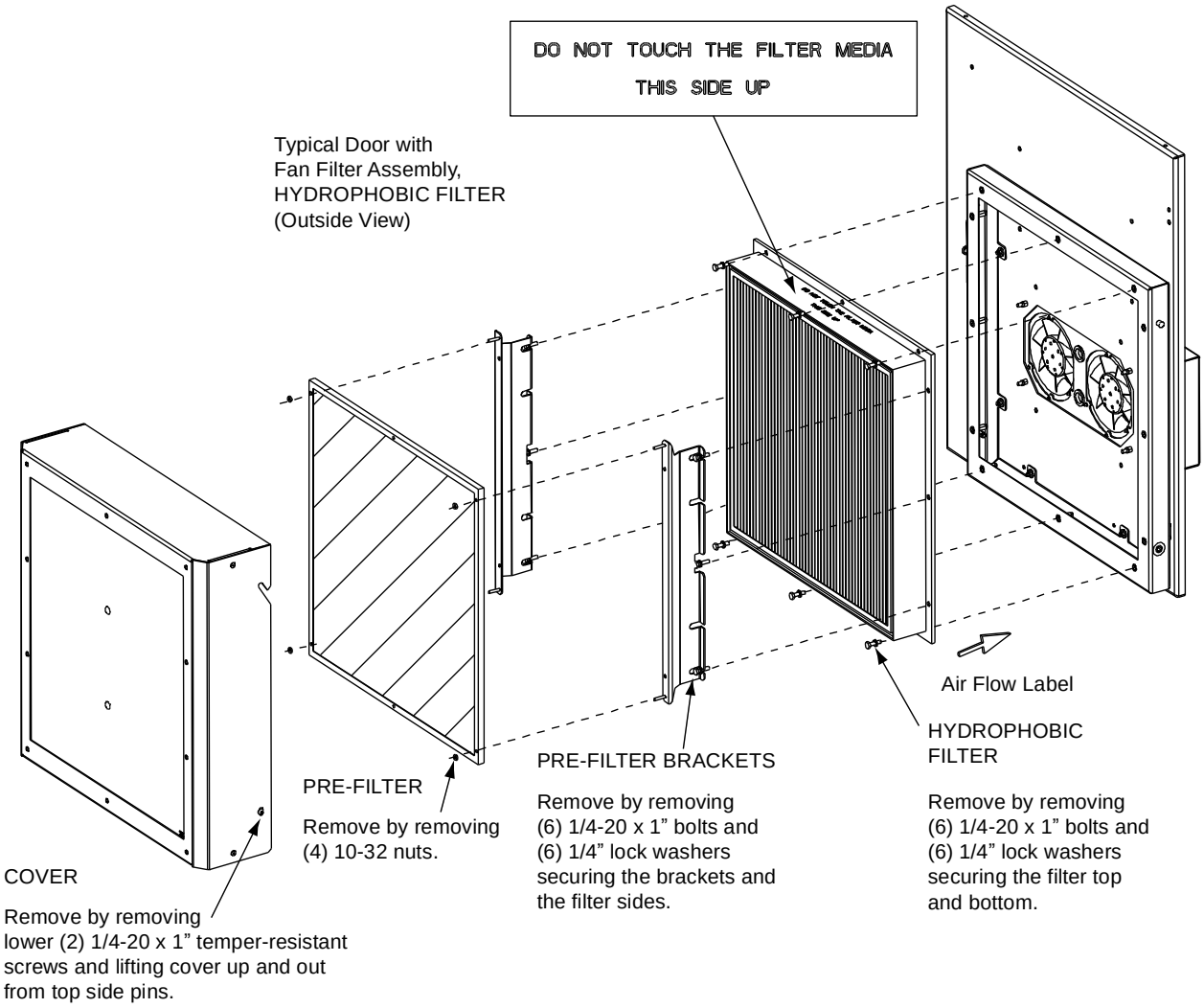
Procedure

1. Remove the filter cover by removing the two (2) lower tamper-resistant screws and then lifting the cover up and out from the top side pins.
2. Remove the pre-filter by removing the four (4) nuts securing it.
3. Remove the pre-filter brackets by removing the four (4) bolts and hardware securing them. Also remove the two (2) bolts and hardware in the center cutout positions of the brackets.
4. Remove the filter by removing the six (6) bolts and hardware securing the top and bottom of the filter.

ALERT! In the next step, DO **NOT** TOUCH THE FILTER MEDIA.
Install the filter with the THIS SIDE UP text at the top.
Install the filter with the AIR FLOW label pointing in the direction shown in **Figure 92**.

5. Secure the new filter at the top and bottom locations using the existing bolts and hardware just removed.
6. Secure the pre-filter brackets using the existing four (4) bolts and hardware. Also secure the filter at the center cutout positions of the pre-filter brackets using the existing bolts and hardware.
7. Secure the pre-filter with the existing four (4) nuts.
8. Slide the filter cover over the top pins and then push the bottom into place. Secure the bottom with the existing tamper-resistant screws.

Figure 92: *Fan Filter Assembly - Hydrophobic Filter Replacement*



Fan Filter Assembly - Fan Replacement

DANGER! ELECTRICAL HAZARD/MECHANICAL HAZARD.
RISK OF ELECTRIC SHOCK OR BEING CUT BY MOVING FAN BLADES. BEFORE REPLACING ANY FAN, DISCONNECT POWER TO THE ENVIRONMENTAL CONTROL UNIT (ECU).

You Will Need –

To replace one of the Fan Filter Assembly fans, you will need the following tools.

- Proper tool to unlatch the door (if equipped with security latches).
- Standard telco socket wrench set.
- Standard mechanic telco tools.
- Replacement fan.

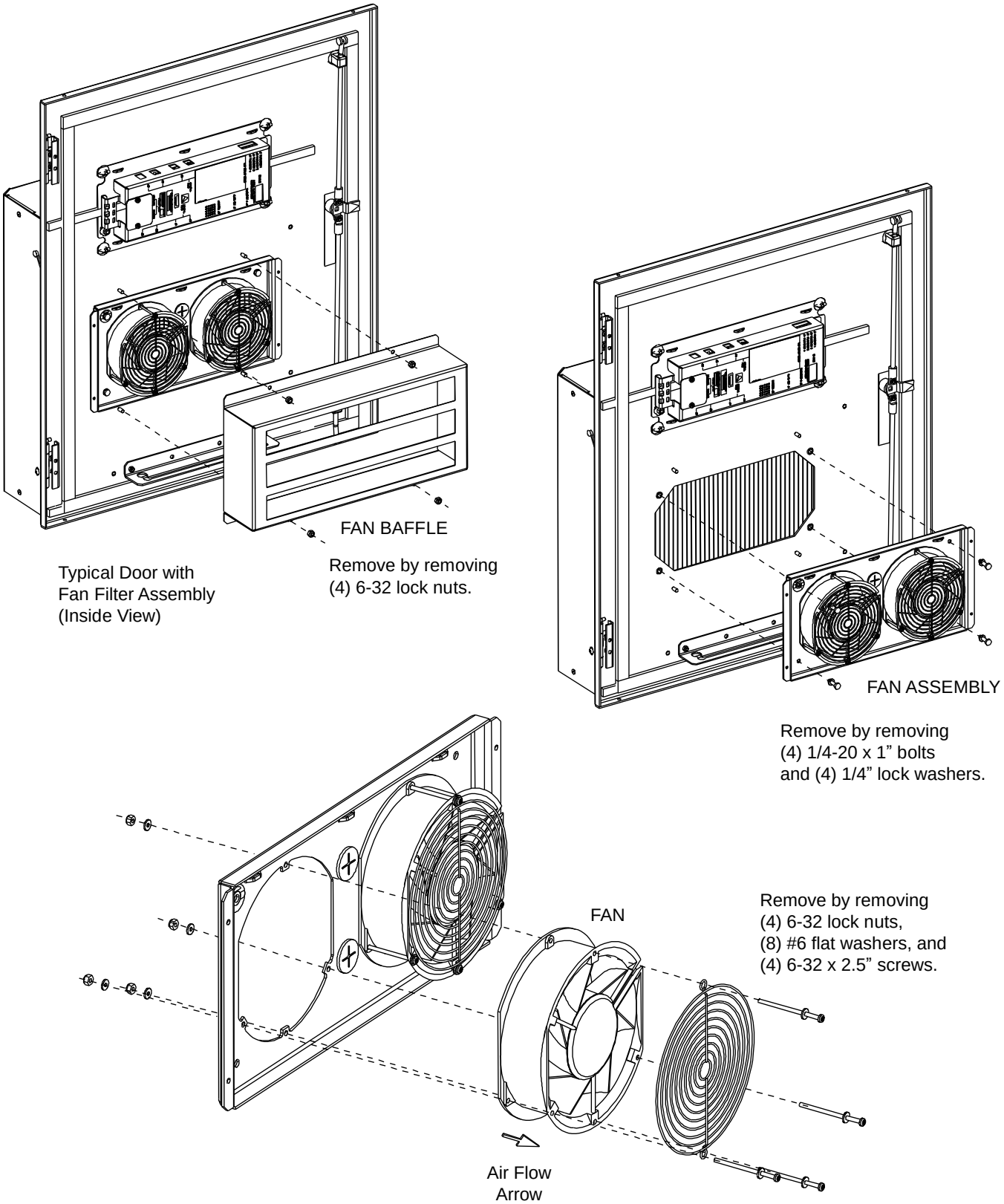
Replacing a Fan –

Perform the following steps to replace a Fan Filter Assembly's fan. See **Figure 93**.

Procedure

1. Remove the padlock from the enclosure door on which the Fan Filter Assembly is mounted, if present.
2. Open the enclosure door.
3. Secure the door in the open position with the wind latch.
4. Using the ECU Status, verify that the fan being replaced is the defective one. Refer to **Figure 87** and **Figure 88**.
5. Verify that the replacement fan is of the appropriate model.
6. Temporarily disconnect power to the ECU by separating the in-line connectors in the ECU power cable or by turning off its breaker or remove the fuse.
7. Remove the inside fan baffle by removing the four (4) lock nuts securing it.
8. Note or mark both fan power leads and which connector they plug into. Disconnect both fans power lead connectors.
9. Remove the fan assembly (with both fans) by removing the four (4) bolts and hardware securing it. Set the assembly on a proper work surface.
10. For proper orientation of the replacement fan, note the location of the fan wires and the air flow arrows on the defective fan. Remove the defective fan by removing the four (4) nuts, bolts, and hardware securing it.
11. Position the replacement fan over its mounting locations, ensuring the fan wires and air flow arrows match the orientation noted above. Secure the replacement fan using the hardware just removed. Also secure the existing fan guard to the replacement fan using the same hardware.
12. Replace the fan assembly (with both fans) and secure with the existing hardware.
13. Plug both fan connectors into the appropriate connectors as noted above. Verify that the connectors are fully seated in the mating connectors.
14. Replace the fan baffle and secure with the existing lock nuts.
15. Reconnect power to the ECU by mating the in-line ECU power cable connectors.
16. Monitor the ECU to make sure that the replacement fan is powered up and that it initializes, calibrates and goes into steady state.
17. Close the enclosure door on which the Fan Filter Assembly is mounted.
18. Replace the door padlock, if required.

Figure 93: *Fan Filter Assembly Fan Replacement*



Heat Exchanger - Fan Replacement

DANGER! ELECTRICAL HAZARD/MECHANICAL HAZARD.
RISK OF ELECTRIC SHOCK OR BEING CUT BY MOVING FAN BLADES. BEFORE REPLACING ANY FAN, DISCONNECT POWER TO THE ENVIRONMENTAL CONTROL UNIT (ECU).

You Will Need –

To replace one of the heat exchanger's fans, you will need the following tools.

- Proper tool to unlatch the door (if equipped with security latches).
- Standard telco socket wrench set (including 0.44 ($^{7}/_{16}$) socket).
- Standard mechanic telco tools.
- (2) Sets of no. 4 flat washers, 4-40 external lock washers and 4-40 x 1.375 pan-head machine screws for each replacement fan.
- Replacement fan.

Replacing an Internal or External Fan (1000W and 1450W Heat Exchanger) –

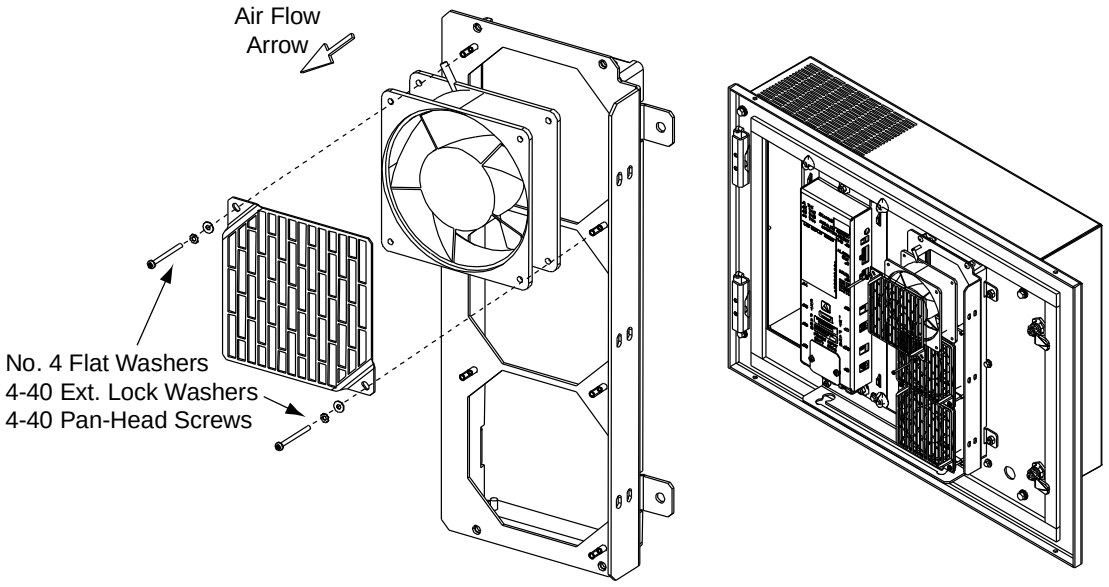
Perform the following steps to replace an internal or external fan on a 1000W or 1450W Heat Exchanger. Refer to **Figure 94** and **Figure 95**.

Procedure

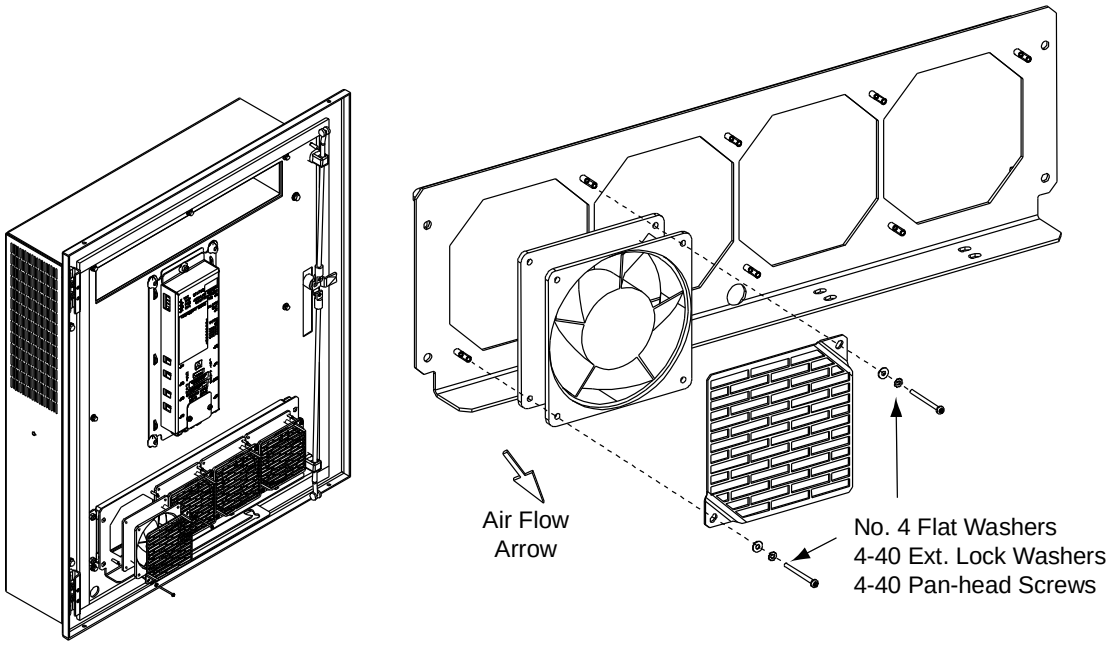
1. Remove the padlock from the enclosure door on which the heat exchanger is mounted, if present.
2. Open the enclosure door.
3. Secure the door in the open position with the wind latch.
4. Using the ECU Status, identify the fan to be replaced and its location.
5. Verify that the replacement fan is of the appropriate model.
6. Temporarily disconnect power to the ECU by separating the in-line connectors in the ECU power cable.
7. For an external fan, on the inside of the door, remove the bolts securing the Heat Exchanger's shroud. Set the shroud and hardware safely aside.
8. Disconnect the defective fan's power lead connector.
9. For proper orientation of the replacement fan, note the location of the fan wires and the air flow arrows on the defective fan. Remove the two sets of screw, flat washer, and lock washer securing the defective fan in place. Remove the fan and discard. Save the fan mounting hardware for re-use.
10. Install the replacement fan and secure it in place using the hardware removed above. Ensure the fan wires and air flow arrows match the orientation noted above.
11. Plug the connector of the replacement fan into the connector vacated when disconnecting the defective fan. Verify that the connector is fully seated in the mating connector.
12. For an external fan, replace the heat exchanger's shroud.

13. Reconnect power to the ECU by mating the in-line ECU power cable connectors.
14. Monitor the ECU to make sure that the replacement fan is powered up and that it initializes, calibrates and goes into steady state.
15. Close the enclosure door on which the heat exchanger is mounted.
16. Replace the door padlock, if required.

Figure 94: *1000W and 1450W Heat Exchanger Internal Fan Replacement*

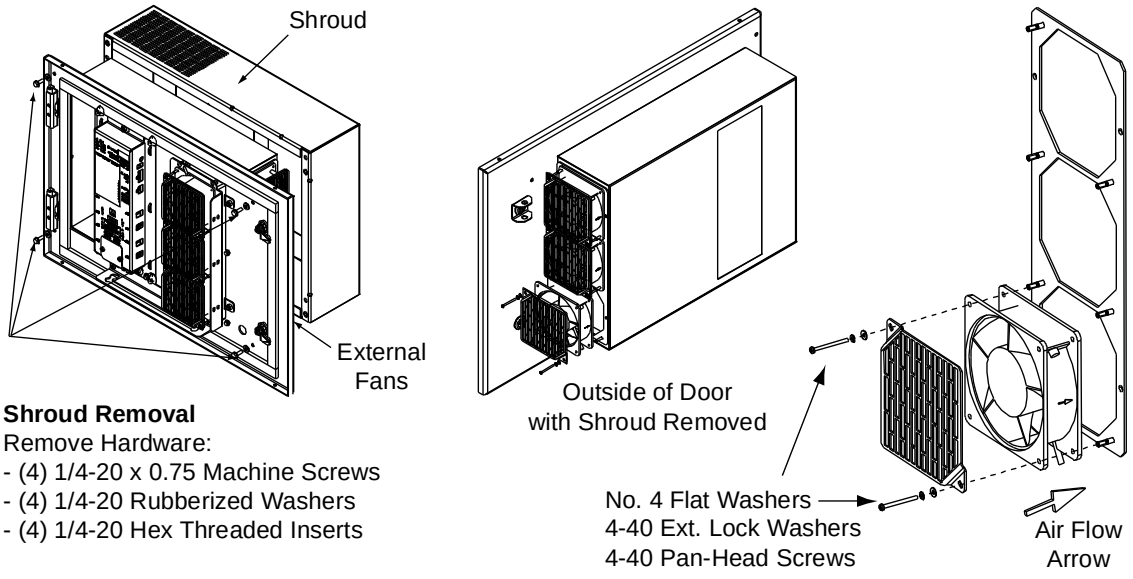


1000W Heat Exchanger Internal Fan Replacement



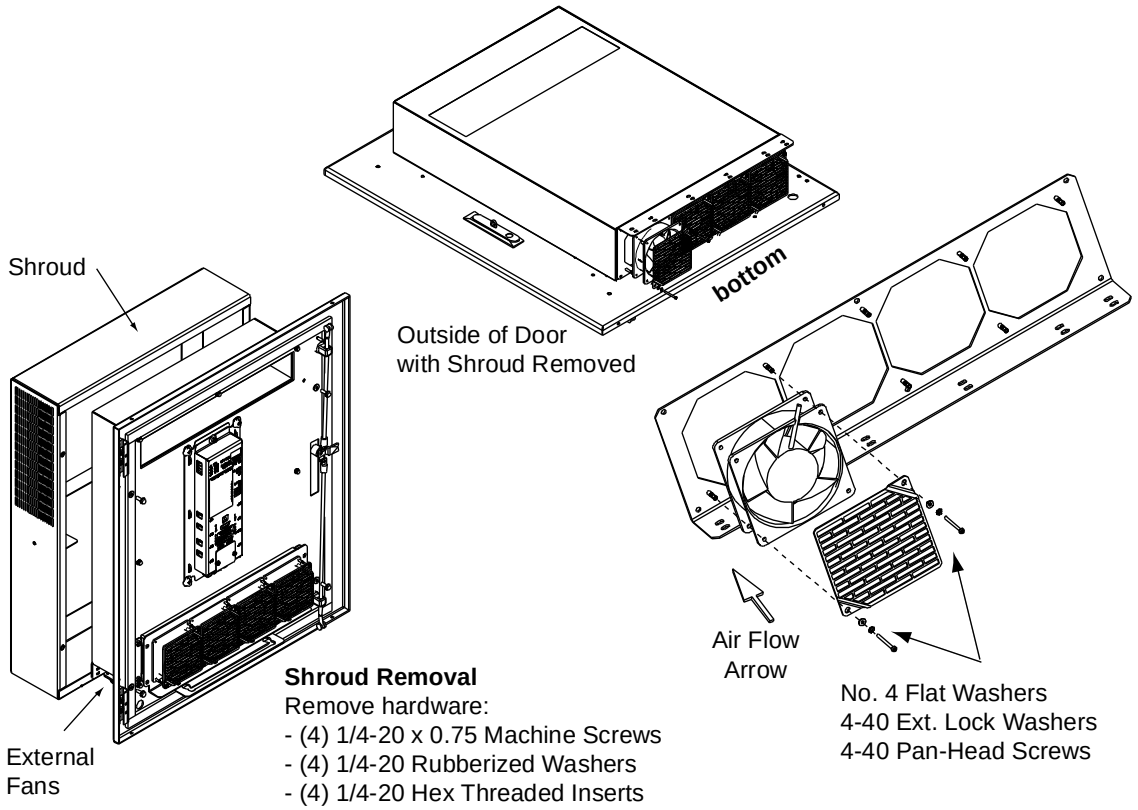
1450W Heat Exchanger Internal Fan Replacement

Figure 95: *1000W and 1450W Heat Exchanger External Fan Replacement*



Shroud Removal
Remove Hardware:
- (4) 1/4-20 x 0.75 Machine Screws
- (4) 1/4-20 Rubberized Washers
- (4) 1/4-20 Hex Threaded Inserts

1000W Heat Exchanger External Fan Replacement



Shroud Removal
Remove hardware:
- (4) 1/4-20 x 0.75 Machine Screws
- (4) 1/4-20 Rubberized Washers
- (4) 1/4-20 Hex Threaded Inserts

1450W Heat Exchanger External Fan Replacement

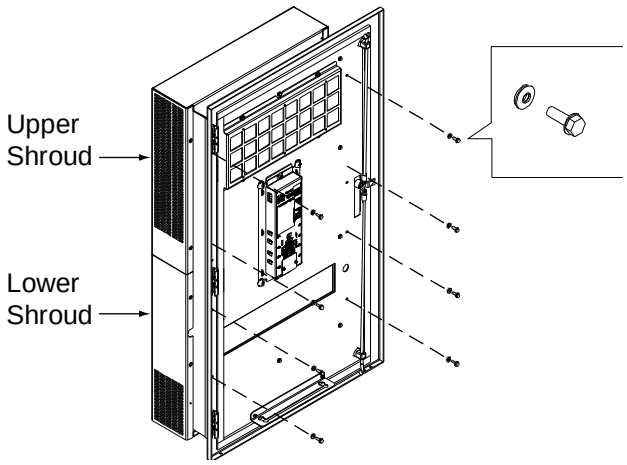
Replacing an Internal or External Fan (2800W Heat Exchanger) –

Perform the following steps to replace an internal or external fan on a 2800W Heat Exchanger.

Procedure

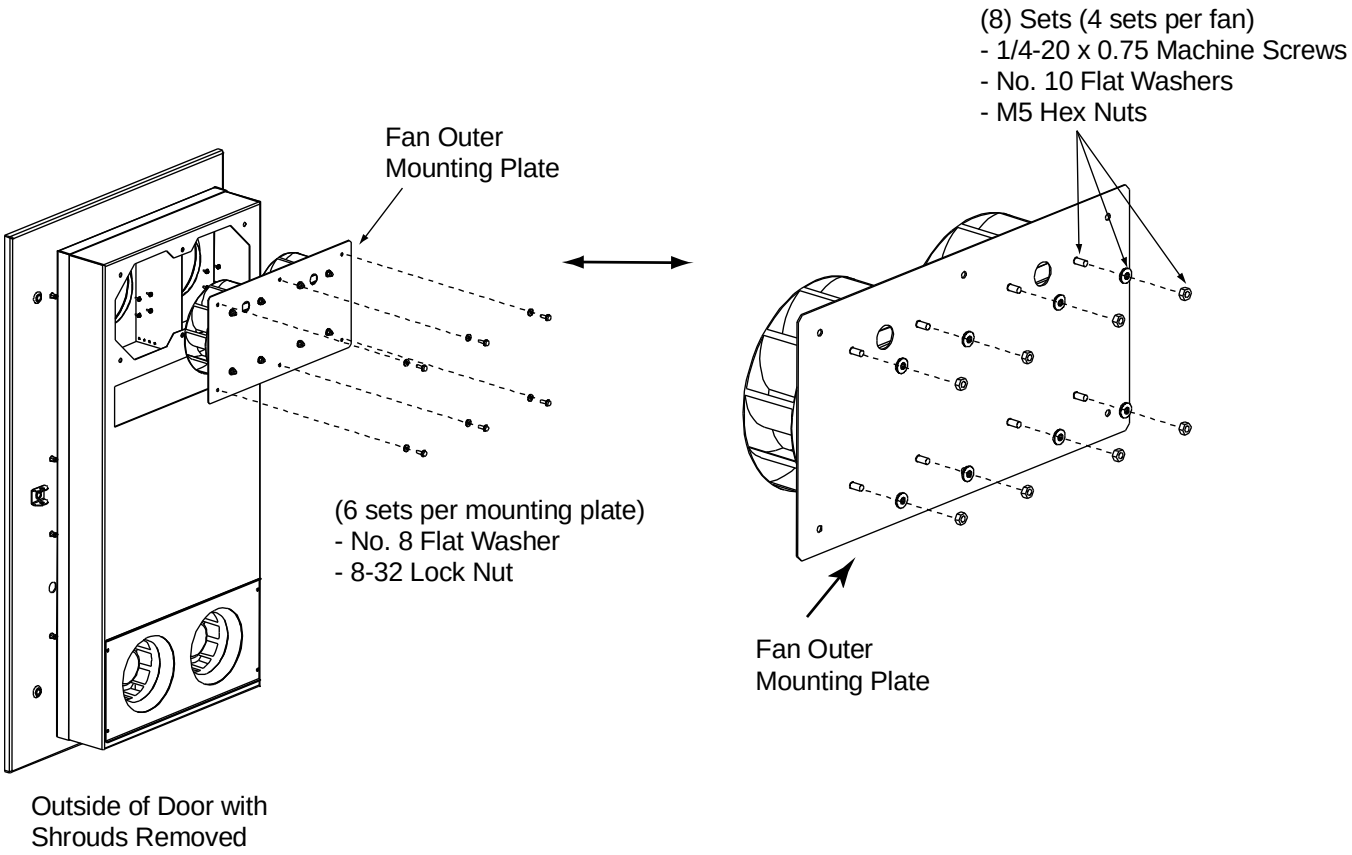
1. Remove the padlock from the enclosure door on which the heat exchanger is mounted, if present.
2. Open the enclosure door.
3. Secure the door in the open position with the wind latch.
4. Using the ECU Status, identify the fan to be replaced and its location.
5. Verify that the replacement fan is of the appropriate model.
6. Temporarily disconnect power to the ECU by separating the in-line connectors in the ECU power cable.
7. On the inside of the door, remove the bolts securing the Heat Exchanger's upper shroud (internal fan) or lower shroud (external fan). Set the shroud and hardware safely aside. Refer to **Figure 96**.

Figure 96: *Removing the Fan Shroud*



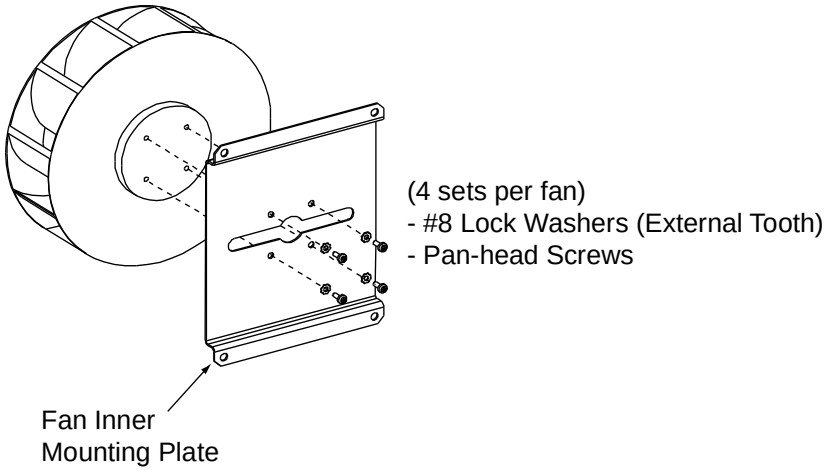
8. For an internal fan, perform the following steps. Save all hardware for re-use.
   a) Remove the top (3) and bottom (3) sets of bolts and lock washers from the fan outer mounting plate. Refer to **Figure 97**.
   b) Carefully slide the fan outer mounting plate with fans attached out far enough to disconnect the fan connectors.
   c) Set the fan outer mounting plate with fans attached on a suitable work surface.
   d) Remove the defective fan with inner mounting plate attached from the fan outer mounting plate by removing the (4) sets of nuts and lock washers. Refer to **Figure 97**.

Figure 97: *Removing the Fan Outer Mounting Plate*



e) Separate the defective fan from the fan inner mounting plate by removing the (4) sets of screws and star washers. Discard the defective fan. See **Figure 98**.

Figure 98: *Removing the Fan Inner Mounting Plate*



f) Attach the replacement fan to the fan inner mounting plate with the (4) sets of screws and star washers previously removed.

g) Attach the inner mounting plate with replacement fan attached to the fan outer mounting plate with the (4) sets of nuts and lock washers previously removed.

h) Carefully slide the fan outer mounting plate with fans attached into the mounting position far enough to reconnect the fan connectors.

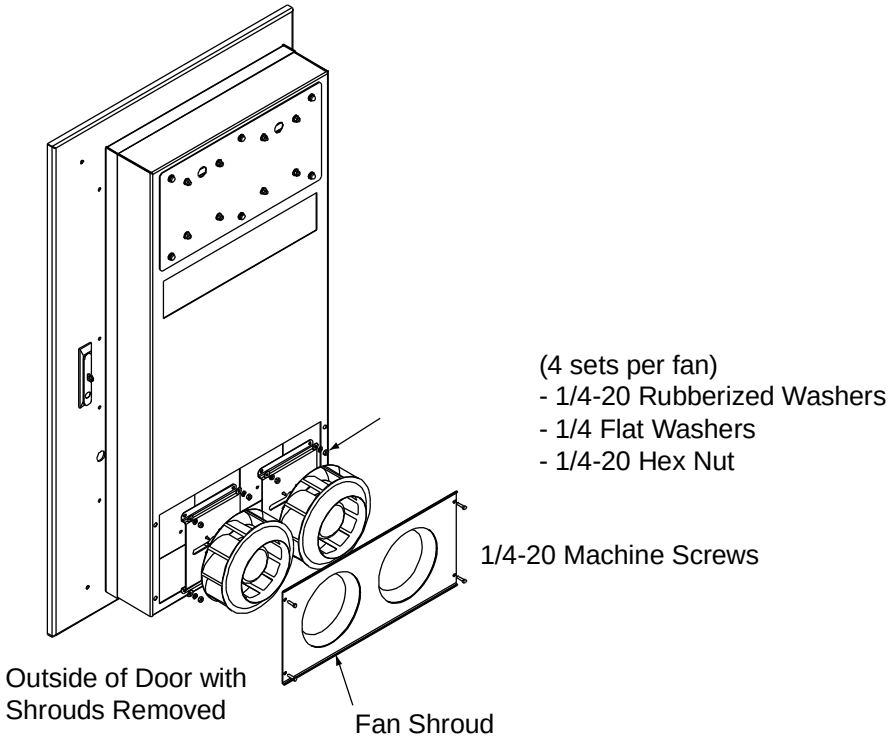
i) Slide the fan outer mounting plate with fans attached all the way in and secure with the top (3) and bottom (3) sets of bolts and lock washers previously removed.

9. For an External Fan, perform the following steps. Save all hardware for re-use.

a) Remove the fan shroud from the external fans by removing the (4) screws. Save the fan shroud and hardware. Refer to **Figure 99**.

b) Remove the defective fan with inner mounting plate attached by removing the (4) sets of flat washers, lock washers, and nuts securing the fan inner mounting plate. Refer to **Figure 99**.

Figure 99: *Removing the Fan Shroud and Defective Fan*



c) Carefully slide the defective fan with inner mounting plate attached out far enough to disconnect the fan connectors.

d) Set the fan inner mounting plate with fans attached on a suitable work surface.

e) Separate the defective fan from the fan inner mounting plate by removing the (4) sets of screws and star washers. Discard the defective fan. Refer to **Figure 98**.

f) Attach the replacement fan to the fan inner mounting plate with the (4) sets of screws and star washers previously removed.

g) Carefully slide the fan inner mounting plate with fans attached into the mounting position far enough to reconnect the fan connectors.

h) Slide the fan inner mounting plate with fans attached all the way in and secure with the (4) sets of flat washers, lock washers, and nuts previously removed.

10. Using the hardware previously removed, replace the heat exchanger's upper shroud (internal fan) or lower shroud (external fan).
11. Reconnect power to the ECU by mating the in-line ECU power cable connectors.
12. Monitor the ECU to make sure that the replacement fan is powered up and that it initializes, calibrates and goes into steady state.
13. Close the enclosure door on which the heat exchanger is mounted.
14. Replace the door padlock, if required.

Thermoelectric Cooler - Fan Replacement

DANGER! ELECTRICAL HAZARD/MECHANICAL HAZARD.
RISK OF ELECTRIC SHOCK OR BEING CUT BY MOVING FAN BLADES. BEFORE REPLACING ANY FAN, DISCONNECT POWER TO THE ENVIRONMENTAL CONTROL UNIT (ECU).

You Will Need –

To replace one of the Thermoelectric Cooler (TEC) fans, you will need the following tools.

- Proper tool to unlatch the door (if equipped with security latches).
- Standard telco socket wrench set (including 0.44 ($^{7}/_{16}$) socket).
- Standard mechanic telco tools.
- (4) Long push-rivet fasteners for each replacement fan.
- Replacement fan.

Replacing an Internal or External TEC Fan –

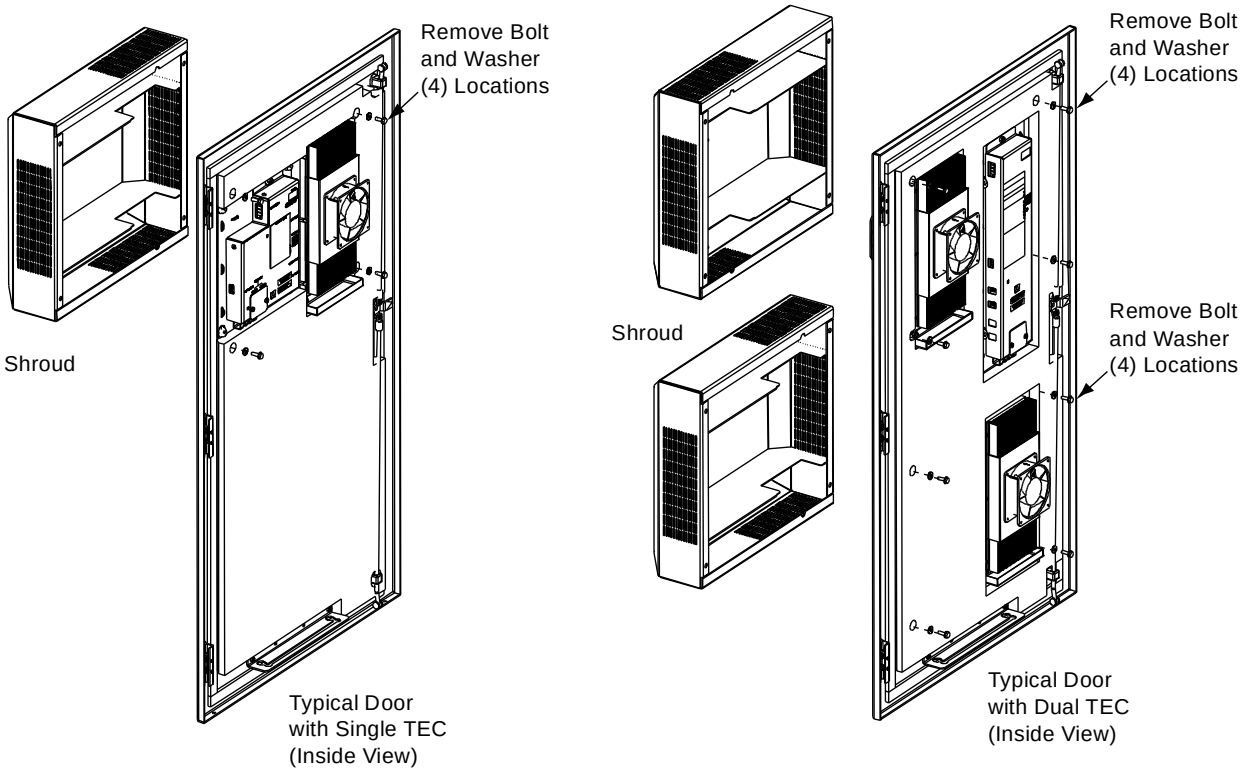
Perform the following steps to replace an internal or external TEC fan.

Procedure

1. Remove the padlock from the enclosure door on which the TEC is mounted, if present.
2. Open the enclosure door.
3. Secure the door in the open position with the wind latch.
4. Using the ECU Status, verify that the fan being replaced is the defective one. Refer to **Figure 84** (Single TEC) or **Figure 85** (Dual TEC).
5. Verify that the replacement fan is of the appropriate model.
6. Temporarily disconnect power to the ECU by separating the in-line connectors in the ECU power cable.

7. For an external fan, on the inside of the door, remove the bolts and hardware securing the TEC's shroud. Set the shroud and hardware safely aside. See **Figure 100**.
8. Disconnect the defective fan's power lead connector.
9. For proper orientation of the replacement fan, note the location of the fan wires and the air flow arrows on the defective fan. Remove the four push rivets securing the defective fan in place. Remove the fan and discard. See **Figure 100** (external fan) or **Figure 101** (internal fan).
10. Install the replacement fan and secure it in place using new push rivets. Ensure the fan wires and air flow arrows match the orientation noted above. See **Figure 100** (external fan) or **Figure 101** (internal fan).
11. Plug the connector of the replacement fan into the connector vacated when disconnecting the defective fan. Verify that the connector is fully seated in the mating connector.
12. For an external fan, replace the TEC's shroud. See **Figure 100**.
13. Reconnect power to the ECU by mating the in-line ECU power cable connectors.
14. Monitor the ECU to make sure that the replacement fan is powered up and that it initializes, calibrates and goes into steady state.
15. Close the enclosure door on which the TEC is mounted.
16. Replace the door padlock, if required.

Figure 100: *TEC External Fan Replacement*



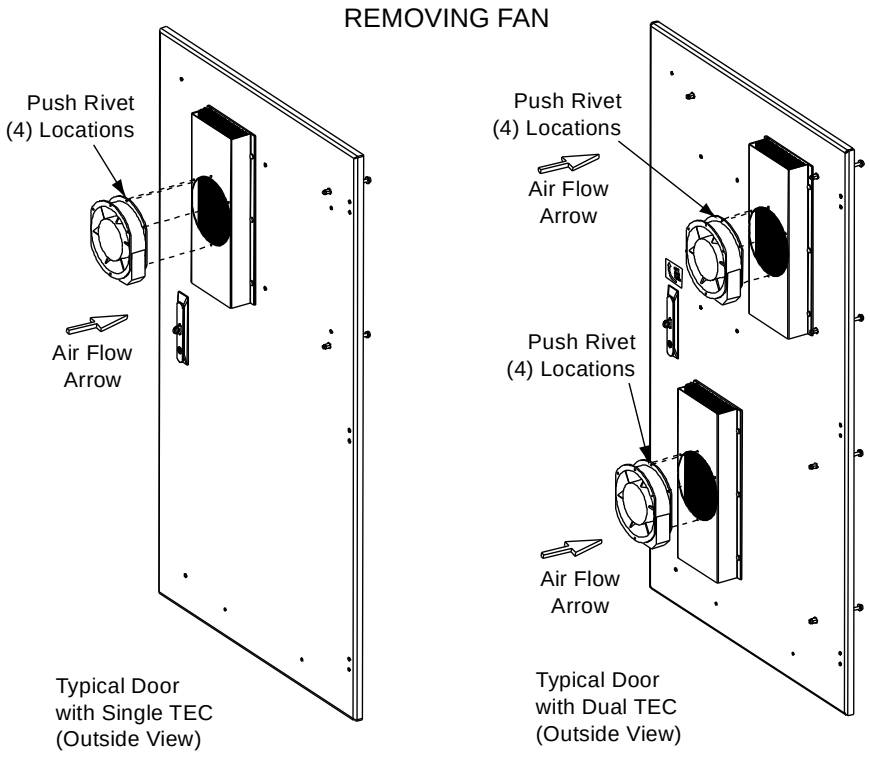
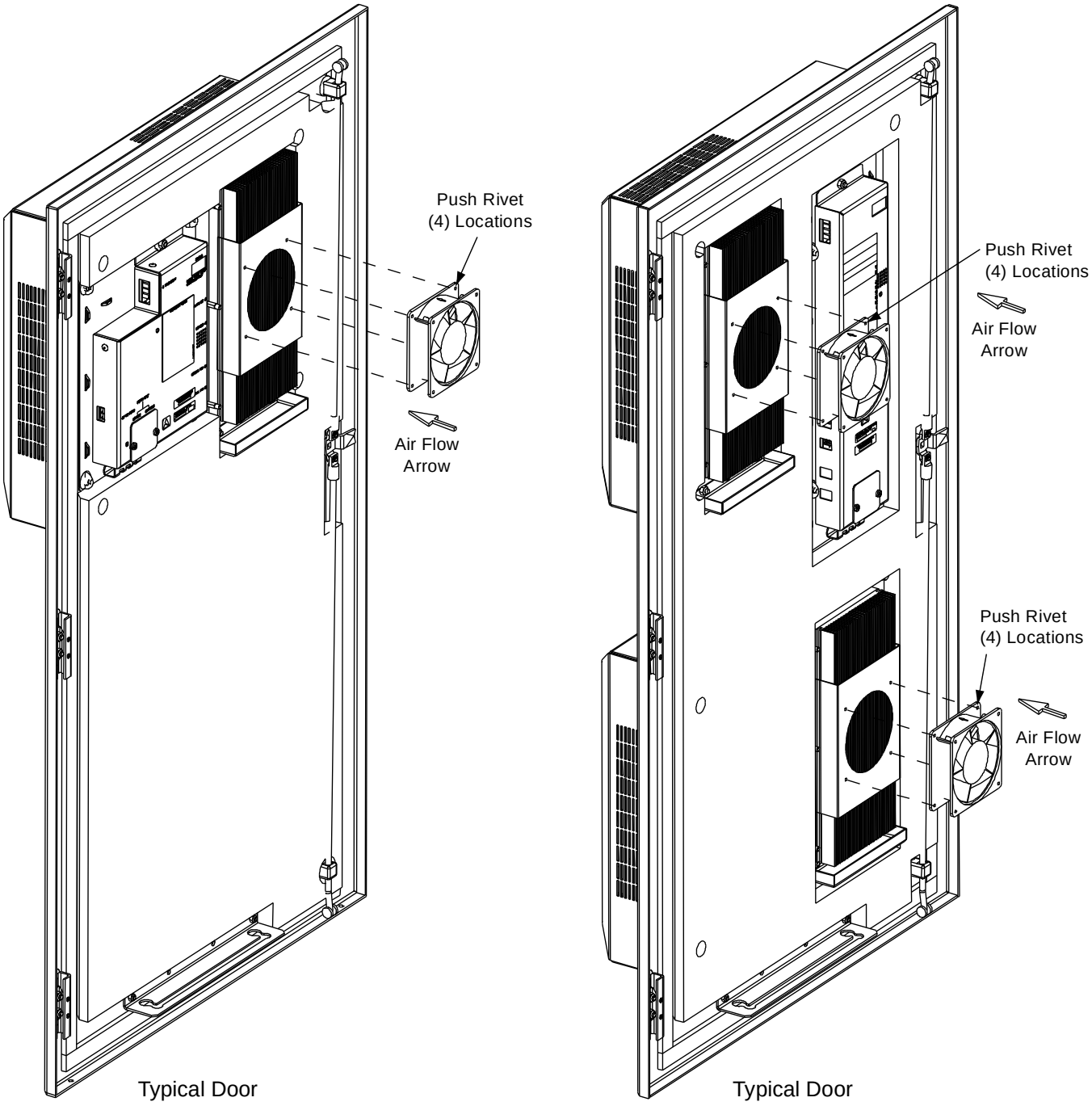


Figure 101: *TEC Internal Fan Replacement*



ECU Replacement

DANGER! ELECTRICAL HAZARD/MECHANICAL HAZARD. RISK OF ELECTRIC SHOCK. BEFORE REPLACING ECU UNIT, DISCONNECT POWER TO ECU BY TURNING OFF ITS BREAKER OR REMOVING THE FUSE.

Before beginning this procedure, verify that you have all the materials required for installation.

NOTE! *Please contact Vertiv OSP Spare Parts if any component is missing from the ECU replacement or retrofit kits. Contact information is located at the end of this document.*

Removing Existing ECU Assembly

1. Locate the existing ECU from the door panel.
2. Disconnect all the existing ECU cable assemblies.
3. Remove the existing ECU and discard. Retain the mounting hardware for reuse.

Installing ECU

1. Secure the ECU to the door using the existing hardware.
2. Plug in cables to appropriate connection points.
3. Return the ECU's power breaker to its ON position and ensure the ECU is functioning properly, i.e.: "UP" appears on its display.

Completing ECU Installation

After ECU set-up is complete, perform the following procedure:

- **Initial Start-up Sequence**

1. Properly secure the cables.
2. Clean up site according to local practices.
3. Close and secure doors.

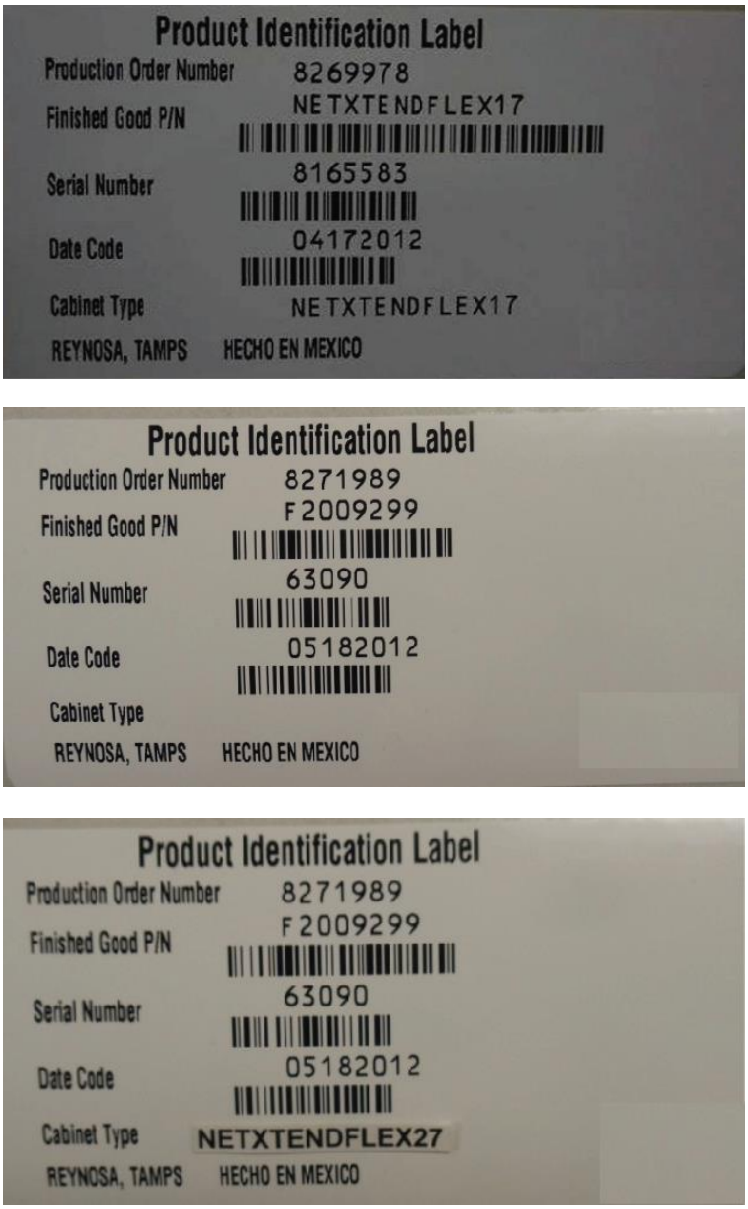
Contact local alarm center to notify work has been completed according to local practices.

WHEN FIELD REPLACEMENT

Cabinet Identification

Prior to contacting Vertiv for support and/or replacement parts, note the enclosure part number, serial number, and manufactured date code, which can be found on the ID tag located on the inner surface of the equipment or splice chambers' doors.

Figure 102: *Typical Identification Labels for NetXtend™ Flex*



ACCESSORIES AND REPLACEMENTS

Refer to the following tables for lists of accessories (AC) and replacement parts (RP).

Contact Vertiv Customer Service at 800-800-1280 for information regarding Accessories; Part Group at 800-800-5260 opt 5 for Replacement Parts and 800-800-5260 opt 2 or 3 for Technical Services.

Table 24: *Available Accessories for the NetXtend™ Flex Single Bay Enclosures*

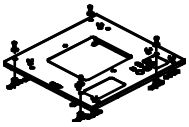
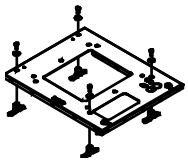
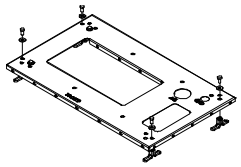
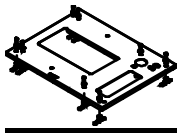
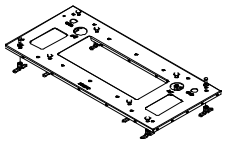
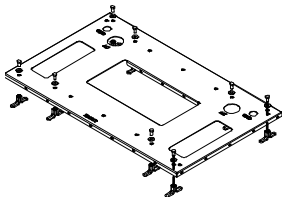
Description	Kit Part Number	Pad Mtg Pad Template	Footprint Size (WxD) [mm]	For Use With These Enclosures:
Pad Mount Templates 	F1009326 (AC)	# 558205	30x25 [762x635]	NetXtend™ Flex Single Bay
	F1009332 (AC)	# 558206	30x32 [762x813]	NetXtend™ Flex Single Bay
	F1009331 (AC)	# 558207	42X25 [1067x635]	NetXtend™ Flex Single Bay + 1 Side Chamber
	F1010064 (AC)	# 558208	42x32 [1067x813]	NetXtend™ Flex Single Bay + 1 Side Chambers
	F1009333 (AC)	# 558210	54x25 [1372x635]	NetXtend™ Flex Single Bay + 2 Side Chambers
	F1010065 (AC)	#558211	54x32 [1372x813]	NetXtend™ Flex Single Bay + 2 Side Chambers

Table 25: *Other Accessories for the NetXtend™ Flex Single Bay Enclosures*

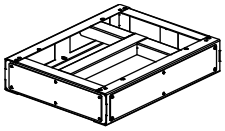
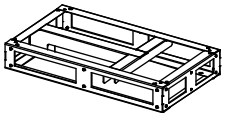
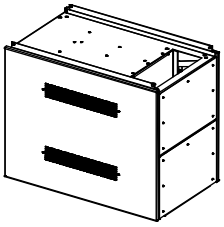
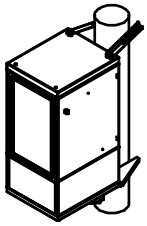
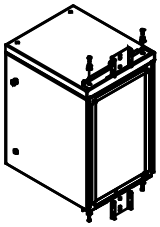
Description	Kit Part Number	Footprint Size (WxD) [mm]	For Use With These Enclosures:
6" Mounting Plinths 		30x25 [762x635] 30x32 [762x813]	NetXtend™ Flex Single Bay NetXtend™ Flex Single Bay
		42x25 [1067x635] 42x32 [1067x813]	NetXtend™ Flex Single Bay + 1 Side Chamber NetXtend™ Flex Single Bay + 1 Side Chamber
Riser Kits 		30x25 [762x635] 30x32 [762x813] 42x25 [1067x635] 42x32 [1067x813]	NetXtend™ Flex Single Bay NetXtend™ Flex Single Bay NetXtend™ Flex Single Bay + 1 Side Chamber NetXtend™ Flex Single Bay + 1 Side Chamber
Pole Mount – Chair Kits 		30x25 [762x63] 42X25 [1067x635] 54x25 [1372x635] 30x32 [762x813]	NetXtend™ Flex Single Bay NetXtend™ Flex Single Bay + 1 Side Chamber NetXtend™ Flex Single Bay + 2 Side Chambers NetXtend™ Flex Single Bay (Refer to document 631-205-401 for Pole Mount - Chair installation instructions.)
Pole Mount – Bracket 		30x25 [762x635]	NetXtend™ Flex Single Bay (Refer to document 631-205-402 for Pole Mount - Bracket installation instructions.)

Table 26: *Reference, Protection Block Base Part Numbers * (AC)*

NetXtend™ Cabinet	Wiring Configuration	Part Number	Stubbed Blocks No Connectors Installed *
Flex 12, Flex 17, Flex 27, Flex 32.	No dead pairs	550920	M307 BLK ASM, CAT3 24AWG SHLD W/ DRAIN FLD & EQP, LNG CBL
		550921	M307 BLK ASM, CAT3 24AWG SHLD W/ DRAIN FLD & EQP, SHRT CBL
		550922	M307 BLK ASM, CAT5 24AWG UNSHLD FLD & EQP, LNG CBL
		550923	M307 BLK ASM, CAT5 24AWG UNSHLD FLD & EQP, SHRT CBL
		550924	M307 BLK ASM, CAT5 24AWG SHLD W/ DRAIN EQ, UNSHLD FLD, LNG CBL
		550925	M307 BLK ASM, CAT5 24AWG SHLD W/ DRAIN EQ, UNSHLD FLD, SHRT CBL
Flex 12, Flex 17, Flex 27, Flex 32.	1-24 wired, 25 dead, 26-49 wired, 50 dead, 51-74 wired, 75 dead, 76-99 wired, 100 dead	553106	M307 BLK ASM, CAT3 24AWG SHLD'D FLD & EQP, LNG CBL
		553107	M307 BLK ASM, CAT3 24AWG SHLD'D FLD & EQP, SHRT CBL
		553108	M307 BLK ASM, CAT5 24AWG UNSHLD'D FLD & EQP, LNG CBL
		553109	M307 BLK ASM, CAT5 24AWG UNSHLD'D FLD & EQP, SHRT CBL
		553110	M307 BLK ASM, CAT5 24AWG UNSHLD FLD, SHLD'D EQ, LNG CBL
		553111	M307 BLK ASM, CAT5 24AWG UNSHLD FLD, SHLD'D EQ, SHRT CBL
	1-48 wired, 49-50 dead and 51-98 wired, 99-100 dead	553094	M307 BLK ASM, CAT3 24AWG SHLD W/ DRAIN FLD & EQP, LNG CBL
		553095	M307 BLK ASM, CAT3 24AWG SHLD W/ DRAIN FLD & EQP, SHRT CBL
		553096	M307 BLK ASM, CAT5 24AWG UNSHLD FLD & EQP, LNG CBL

NetXtend™ Cabinet	Wiring Configuration	Part Number	Stubbed Blocks No Connectors Installed *
		553097	M307 BLK ASM, CAT5 24AWG UNSHLD FLD & EQP, SHRT CBL
		553098	M307 BLK ASM, CAT5 24AWG SHLD W/ DRAIN EQ, UNSHLD FLD, LNG CBL
		553099	M307 BLK ASM, CAT5 24AWG SHLD W/ DRAIN EQ, UNSHLD FLD, SHRT CBL
Flex 12, Flex 17, Flex 27, Flex 32.	1-96 wired, 97-100 dead	553100	M307 BLK ASM, CAT3 24AWG SHLD W/ DRAIN FLD & EQP, LNG CBL
		553101	M307 BLK ASM, CAT3 24AWG SHLD W/ DRAIN FLD & EQP, SHRT CBL
		553102	M307 BLK ASM, CAT5 24 AWG UNSHLD FLD & EQP, LNG CBL
		553103	M307 BLK ASM, CAT5 24AWG UNSHLD FLD & EQP, SHRT CBL
		553104	M307 BLK ASM, CAT5 24 AWG SHLD W/ DRAIN EQ, UNSHLD FLD, LNG CBL
		553105	M307 BLK ASM, CAT5 24 AWG SHLD W/ DRAIN EQ, UNSHLD FLD, SHRT CBL
** Call Account Management for ordering Protection Blocks separately, 800-800-1280 opt 3.*			

Table 27: *Ground Cables Provided in* ***Table 28*** *and* ***Table 29*** *Protection Bracket Kits*

Part Number	Cable to connect M307 Block to Protection Bracket Ground Bar
554556	KIT, GROUND CABLE, M307 600 PAIR, FLEX
554557	KIT, GROUND CABLE, M307 500 PAIR, FLEX
554558	KIT, GROUND CABLE, M307 400 PAIR, FLEX
554559	KIT, GROUND CABLE, M307 300 PAIR, FLEX
554560	KIT, GROUND CABLE, M307 200 PAIR, FLEX
Part Number	**Cable to connect Protection Bracket Ground Bar to Cabinet Main Ground Bar**
554562	KIT, GROUND CABLE, M307 600 PAIR, FLEX

Table 28: *Ordering Guide Equipment Chamber Protection Bracket Kits (AC)*

	NetXtend™ Configuration	Kit Part Numbers	Protection Bracket Kit *	MAX No. of Pairs	Splice Kit 1 Part Number *	Splice Kit 2 Part Number *	Lance Kit *	Grooming Bracket with Qty *	Support Channel Top Kit *	Support Channel Bottom Kit *
8 Position Load Center	FLEX 17 (30WX32D)	550551	550527 - 300 pair	600	551010	-	551286	549953 - 1 qty	551290	551291
	FLEX 27 (30W X 32D)	551053	550801 - 500 pair	1000	550858	551010	551288	549953 - 1 qty	551290	551291
	FLEX 32 (30W X 32D)	551054	550809 - 600 pair	1200	550858	551010	551289	549953 - 2 qty	551290	551291
No Load Center	FLEX 17 (30W X 32D)	551055	550790 - 200 pair	600	551013	-	-	-	551290	551291
	FLEX 27 (30W X 32D)	551059	550794 - 400 pair	1200	551013	-	551288	549953 - 2 qty	551290	551291
	FLEX 32 (30W X 32D)	551060	550801 - 500 pair	1500	551013	-	551289	549953 - 2 qty	551290	551291
12 Position Load Center	FLEX 17 (30W X 32D)	551061	550889 - 300 pair	300	551020	-	-	-	551292	551291
	FLEX 27 (30W X 32D)	551063	550892 - 500 pair	500	551020	-	-	-	551292	551291
	FLEX 32 (30W X 32D)	551064	550809 - 600 pair	600	551020	-	-	-	551292	551291

** Included with kit part number, also includes block ground wires.*

Table 29: *Ordering Guide Side Chamber Protection Bracket Kits (AC)*

	NetXtend™ Configuration	Kit Part Numbers	Protection Bracket Kit *	No. of Pairs *	Splice Kit *	Lance Kit *	Side Partition Kit *
No Load Center	FLEX 17 (42WX25D)	557380	551157 – 200 pair (AC)	600	551219	-	553359
	FLEX 17 (42WX32D)	557381	551157 – 200 pair (AC)	800	551219	-	553362
	FLEX 17 (42WX46D)	557382	551157 – 200 pair (AC)	1200	551219	-	553365
	FLEX 12 (42WX25D)	557383	551157 – 200 pair (AC)	400	-	553435	553367
	FLEX 27 (42WX25D) (2 Bay)	557384	551160 – 400 pair (AC)	1200	551219	-	553370
	FLEX 27 (54WX25D) (2 Side chamber)	557429	551160 – 400 pair (AC)	2400	551219	-	553370
	FLEX 27 (72WX32D) (2 Bay, 1 Side chamber)	557385	551160 – 400 pair (AC)	1600	551219	-	553373
	FLEX 27 (84WX32D) (2 Bay, 2 Side chamber)	557430	551160 -400 pair (AC)	3200	551219	-	553373 (2)
	FLEX 27 (42WX46D) (2 Bay,1 Side chamber)	557386	551160 – 400 pair (AC)	2000	552914	-	553376

** Included with kit part number, also includes block ground wires.*

	NetXtend™ Configuration	Kit Part Numbers	Protection Bracket Kit *	No. of Pairs *	Splice Kit *	Lance Kit *	Side Partition Kit *
8 Position Load Center	FLEX 17 (42WX25D) - 8P LOAD CENTER	550611	550649 – 300 pair (AC)	600	551168	-	553357
	FLEX 17 (42WX32D)	557368	550649 – 300 pair (AC)	600	552913	-	553360
	FLEX 17 (42WX46D)	557369	550649 - 300 pair (AC)	1200	551193	-	553363
	FLEX 12 (42WX25D)	557370	551157- 200 air (AC)	400	551168	-	553366
	FLEX 27 (42WX25D) (2 Bay)	557371	551163 – 500 pair (AC)	1000	551168	-	553368
	FLEX 27 (54WX25D) (2 Side chamber)	557424	551160 – 400 pair (AC) / 551163 - 500 pair (AC)	2200	551168	-	553368
	FLEX 27 (72WX32D) (2 Bay, 1 Side chamber)	557372	551163 – 500 pair (AC)	1000	552913	-	553371
	FLEX 27 (84WX32D) (2 Bay, 2 Side chamber)	557425	551160 - 400 pair (AC) / 551163 – 500 pair (AC)	2600	552913	-	553371
	FLEX 27 (42WX46D) (2 Bay, 1 Side chamber)	557373	553171 – 600 pair / 551163 - 500 pair (AC)	2200	552893	-	553374

** Included with kit part number, also includes block ground wires.*

	NetXtend™ Configuration	Kit Part Numbers	Protection Bracket Kit *	No. of Pairs *	Splice Kit *	Lance Kit *	Side Partition Kit *
12 Position Load Center	FLEX 17 (42WX25D)	557374	550649 – 300 pair (AC)	300	552913	-	553358
	FLEX 17 (42WX32D)	557375	550649 - 300 pair (AC)	600	552913	-	553361
	FLEX 17 (42WX46D)	557376	550649 - 300 pair (AC)	1200	551193	-	553364
	FLEX 27 (42WX25D) (2 Bay)	557377	551163 -500 pair (AC)	500	552913	-	553369
	FLEX 27 (54WX25D) (2 Side chamber)	557426	551160 – 400 pair (AC) / 551163 – 500 pair (AC)	1700	552913	-	553369
	FLEX 27 (72WX32D) (2 Bay, 1 Side chamber)	557378	551163 -500 pair (AC)	1000	552913	-	553372
	FLEX 27 (84WX32D) (2 Bay, 2 Side chamber)	557428	551160 -400 pair (AC) / 551163 – 500 pair (AC)	2600	552913	-	553372
	FLEX 27 (42WX46D) (2 Bay, 1 Side chamber)	557379	553171 – 600 pair (AC)	1800	551193	-	553375

** Included with kit part number, also includes block ground wires.*

Table 30: *Ground Bar Kits Ordering Guide*

NetXtend™ Kit	Part Number	Kit Configuration
Main GB Bracket Kit (AC)	553456	Flex 25D Footprint
Optional GB Kit (AC)	553628	Flex 25D and 32D Footprint
Optional GB Kit (AC)	554600	Flex 42D Footprint
Optional GB Kit (AC)	554601	Flex 30W x 25D/32D Footprint

Table 31: *Common Enclosure Replacement Parts or Accessories*

Item Description	Part Number
Tamper-proof wrench 5/16 Hex Pin (AC)	F529732
Can Wrench (216-type tool) AC	F003205
Internal Fan 120mm (RP)	137974
External Fan 120mm (RP)	
Finger Guard Fan (RP)	542352L
Intrusion Switch (RP)	P92538
Thermistor (External J1) (RP)	130471
Thermistor (Internal J2) (RP)	139224
Door Handle (5/16 Hex Pin) (RP)	141495
ECU Fan Fuse (RP)	248610900
Fuse Cover with Pull Tab (RP)	102774
Surge Protector (RP)	128023

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DC POWER, OUTDOOR ENCLOSURE & SERVICE CONTACTS

CUSTOMER SERVICE (PRE-SHIPMENT)		
Email	CustomerService.ESNA@VertivCo.com	Pricing and availability [1,2], purchase orders, expediting requests and order tracking. Ask for your company's dedicated Customer Service Associate.
Phone	1.800.800.1280 option 1	
CUSTOMER SUPPORT CENTER (POST-SHIPMENT)		
Email	ESNACustomerSupportCenter@VertivCo.com	After an order has shipped, contact our Customer Support Center with related questions, concerns or claims.
Phone	1.956.661.6867	
PRODUCTS		
Email	AccountManagement.ESNA@VertivCo.com	Provides quotes and bid responses for custom configured [2] DC power systems and outdoor enclosures for customers and channel partners (Reps, VARs & Distributors).
Phone	1.800.800.1280 option 2	
SPARE PARTS		
Email	DCpower.Spares@VertivCo.com OSP.Spares@VertivCo.com	Pricing and purchase orders for spare parts, including but not limited to breakers, cables, fuses, rectifier fans, misc. breaker and fuse panels, enclosure fans, doors and switches, etc.
Phone	1.800.800.1280 option 5	
DC POWER DEPOT REPAIR		
Email	DCpower.Repair@VertivCo.com	Creates and processes RMAs for depot repair and refurbishment. Determines repair and refurbishment lead times and pricing based on warranties/contractual agreements. Provides repair shipping information and status.
Phone	1.800.800.1280 option 6	
INSTALLATION & AFTER MARKET SERVICES		
Email	ESNA.FieldService@VertivCo.com	Provides quotes for engineering, furnishing and installation of DC power systems, telecom & IT equipment, cabling infrastructure, and field services of existing DC equipment.
TECHNICAL SUPPORT		
Email	DCpower.TAC@VertivCo.com OSP.TAC@VertivCo.com	Answers technical product and system questions; determines status of warranties and contractual agreements for repair.
Phone	1.800.800.5260	

[1] Contact Account Management for custom configurations.
[2] Contact Spare Parts for parts and accessories.

VertivCo.com | **Vertiv Headquarters,** 1050 Dearborn Drive, Columbus, OH, 43085, USA

631-205-400 (RJ 10/17)