

Liebert® NXL™ Battery System

Installation Manual



BATTERY CABINET PRECAUTIONS

The following warning applies to all battery cabinets supplied with UPS systems. Additional warnings and cautions applicable to battery cabinets may be found in **Important Safety Instructions** beginning on page 1.



WARNING

Internal battery strapping must be verified prior to moving a battery cabinet (after initial installation).

- Battery cabinets contain non-spillable batteries.
- Keep units upright.
- Do not stack.
- Do not tilt.

Failure to heed this warning could result in smoke, fire or electric hazard.

Call 1-800-LIEBERT prior to moving battery cabinets (after initial installation).

CONTACTING LIEBERT FOR SUPPORT

To contact the Liebert Services section of Emerson Network Power for information or repair service in the United States, call 1-800-LIEBERT (1-800-543-2378). Liebert Services offers a complete range of startup services, repair services, preventive maintenance plans and service contracts.

For repair or maintenance service outside the 48 contiguous United States, contact Liebert Services, if available in your area.

For LGS to assist you promptly, have the following information available:

Part Numbers:

Serial Numbers:

Rating:

Date Purchased:

Date Installed:

Location:

Battery Voltage:

Battery Reserve Time:

Product Warranty Registration

To register for warranty protection, visit the **Service and Support** section of our Web site at:

www.liebert.com

Click on **Product Registration** and fill out the form.

TABLE OF CONTENTS

IMPORTANT SAFETY INSTRUCTIONS	1
1.0 MECHANICAL INSTALLATION	3
1.1 Introduction	3
1.2 Preliminary Checks	3
1.3 Environmental Considerations	3
1.3.1 Battery Room	3
1.3.2 Storage	3
1.4 Positioning	4
1.4.1 Moving the Cabinets.	4
1.4.2 Clearances.	5
1.4.3 Raised Floor Mounting.	5
1.5 System Composition.	5
2.0 BATTERY INSTALLATION	6
2.1 Safety	6
2.2 Layout.	6
2.3 Cable Entry.	10
2.4 Power Connection.	10
2.4.1 Connected System	10
2.4.2 Stand-Alone System	10
2.4.3 Attached/Detached System	10
2.4.4 MBD voltage sense leads	11
2.4.5 Grounding	11
2.5 Control Connection.	11
2.6 Alber Monitoring System—Optional.	14
2.7 External Battery Room Temperature Sensor—Optional.	14
3.0 INSTALLATION DRAWINGS	15
4.0 SPECIFICATIONS	37

FIGURES

Figure 1 Shipping bolts	5
Figure 2 Battery cabinets connected, attached to UPS	7
Figure 3 Battery cabinets connected, detached from UPS	7
Figure 4 Battery cabinets connected, with Module Battery Disconnect, attached to UPS	8
Figure 5 Battery cabinets connected, with Module Battery Disconnect, detached from UPS.	8
Figure 6 Battery cabinets connected, detached from Module Battery Disconnect, detached from UPS	9
Figure 7 Stand-alone battery cabinets, with Module Battery Disconnect, detached from UPS	9
Figure 8 Stand-alone battery cabinets, no Module Battery Disconnect, detached from UPS.	10
Figure 9 Wiring external interface board in UPS to battery interface board in battery cabinet	12
Figure 10 Control cable layout—Liebert NXL UPS to Liebert NXL Battery Cabinet.	13
Figure 11 Battery temperature sensor control connection	14
Figure 12 Outline drawing, Liebert Battery Cabinet	15
Figure 13 Main components, Liebert Battery Cabinet	16
Figure 14 Terminal details, Liebert Battery Cabinet	17

Figure 15	Outline drawing, 250-400kVA, Liebert Module Battery Disconnect	18
Figure 16	Terminal detail drawing, Liebert Module Battery Disconnect.	19
Figure 17	Outline drawing, 500-750kVA, Liebert Module Battery Disconnect	20
Figure 18	Wide junction cabinet terminal wiring	21
Figure 19	Liebert NXL Narrow Junction Cabinet—terminal detail and outline drawing	22
Figure 20	Liebert NXL Battery Cabinet control wiring	23
Figure 21	Liebert NXL Module Battery Disconnect control wiring	24
Figure 22	Voltage sense wire harness top input and bottom input	25
Figure 23	Liebert NXL Module Battery Disconnect CAN wire harness connection	26
Figure 24	Attached battery cabinet connections	27
Figure 25	Ground strap location for connected cabinets	27
Figure 26	Battery cabinet interconnection wiring to 250-400kVA UPS.	28
Figure 27	Liebert NXL Module Battery Disconnect interconnect wiring to 250-400kVA UPS.	29
Figure 28	Liebert NXL Battery Cabinet interconnect wiring to Liebert NXL Junction Cabinet	30
Figure 29	Liebert NXL UPS to Liebert NXL Module Battery Disconnect to wide Liebert NXL Junction Cabinet.	31
Figure 30	Liebert NXL UPS to Liebert NXL Module Battery Disconnect to Liebert NXL Battery Cabinet.	32
Figure 31	Alber battery monitoring connections	33
Figure 32	Battery Interface Board wiring to multiple battery cabinets.	34
Figure 33	Alber battery monitoring assembly diagram.	35
Figure 34	Alber Battery Monitoring transformer location and battery configuration.	36

TABLES

Table 1	Liebert-supplied interconnect wiring.	28
Table 2	Liebert-supplied interconnect wiring.	29
Table 3	Liebert-supplied interconnect wiring.	30
Table 4	Liebert-supplied interconnect wiring.	31
Table 5	Liebert-supplied interconnect wiring.	32
Table 6	Alber battery monitoring assembly connections	35
Table 7	Liebert NXL Battery Cabinet specifications	37
Table 8	Liebert NXL Module Battery Disconnect Cabinet	38
Table 9	Liebert NXL Junction Cabinet specifications	39
Table 10	Alber battery monitoring option specifications	39
Table 11	Currents for Liebert NXL Module Battery Disconnect Cabinet.	39
Table 12	Battery cabinet internal breaker selection based on 5 min EOD, amps	40
Table 13	Liebert NXL Battery Cabinet approximate weights.	40
Table 14	Approximate weights, Liebert NXL Module Battery Disconnect and Liebert NXL Junction Cabinets	40
Table 15	Recommended conduit and cable sizes for Liebert NXL Module Battery Disconnect	41
Table 16	Battery torque values	41
Table 17	Torque specifications, unless otherwise labeled	41

IMPORTANT SAFETY INSTRUCTIONS

SAVE THESE INSTRUCTIONS

This manual contains important instructions that should be followed during installation of your Liebert NXL™ battery cabinet and accessories. Read this manual thoroughly, paying special attention to the sections that apply to your installation, before working with the battery system. Retain this manual for use by installing personnel.



WARNING

Risk of electrical shock. Can cause personal injury or death.

Special safety precautions are required for procedures involving handling, installation and maintenance of the UPS system. Only properly trained and qualified personnel wearing appropriate personal protective equipment should be involved in installing the Liebert NXL Battery system or preparing the system for installation.

Special care must be taken when working with the batteries associated with this equipment. When connected together, the battery terminal voltage will exceed 400VDC and is potentially lethal. Be constantly aware that the battery system contains high DC as well as AC voltages. Check for voltage with AC and DC voltmeters before making contact.

Observe all DC safety precautions before working on or near the DC system.

Follow all battery safety precautions when installing, charging or servicing batteries. In addition to the hazard of electric shock, gas produced by batteries can be explosive and sulfuric acid can cause severe burns.

The following precautions must be observed when working on batteries:

- Remove watches, rings and other metal objects.
- Use tools with insulated handles.
- Wear rubber gloves and boots.
- Do not lay tools or metal parts on top of batteries.
- Disconnect charging source prior to connecting or disconnecting battery terminals.
- Determine whether the battery is grounded. If it is grounded, remove source of ground. Contact with any part of a grounded battery can result in electrical shock. The likelihood of such shock will be reduced if such grounds are removed during installation and maintenance.

If a battery leaks electrolyte, or is otherwise physically damaged, it must be replaced, stored in a container resistant to sulfuric acid and disposed of in accordance with local regulations.

If electrolyte comes into contact with the skin, the affected area should be washed immediately with water.



WARNING

Risk of electric shock, explosive reaction, hazardous chemicals and fire. Can cause equipment damage, personal injury and death.

Lead-acid batteries contain hazardous materials. Batteries must be handled, transported and recycled or discarded in accordance with federal, state and local regulations. Because lead is a toxic substance, lead-acid batteries must be recycled rather than discarded.

Do not dispose of a battery in a fire. The battery may explode.

Do not open or mutilate the battery or batteries. Released electrolyte is harmful to the skin and eyes. It is toxic.



WARNING

Risk of electric shock. Can cause personal injury or death.


In case of fire involving electrical equipment, use only carbon dioxide fire extinguishers or those approved for use in fighting electrical fires.



WARNING

Risk of heavy unit falling over. Can cause equipment damage, injury or death.

Exercise extreme care when handling battery cabinets to avoid equipment damage or injury to personnel. The battery system cabinets weigh from 3760 to 5750 lb. (1706 to 2608kg).

Locate center of gravity symbols  and determine unit weight before handling each cabinet. Test lift and balance the cabinets before transporting. Maintain minimum tilt from vertical at all times.

Slots at the base of the cabinets are intended for forklift use. Base slots will support the unit only if the forks are completely beneath the unit.



WARNING

Risk of electric shock. Can cause equipment damage, personal injury or death.

The area around the battery system must be kept free of puddles of water, excess moisture and debris.

Observe all precautions in the Operation and Maintenance Manual, SL 25425, before as well as during all installation and maintenance procedures. Observe all battery safety precautions before working on or near the battery.

This equipment contains several circuits that are energized with high voltage. Only test equipment designed for troubleshooting should be used. This is particularly true for oscilloscopes. Always check with an AC and DC voltmeter to ensure safety before making contact or using tools. Even when the power is turned Off, dangerously high potential electric charges may exist at the capacitor banks and at the batteries.

All power and control wiring must be installed by a properly trained and qualified electrician. All power and control wiring must comply with the NEC and applicable local codes.

When performing maintenance with any part of the equipment under power, service personnel and test equipment must be standing on rubber mats. The service personnel must wear insulating shoes for isolation from direct contact with the floor (earth ground).

One person should never work alone, even if all power is disconnected from the equipment. A second person should be standing by to assist and to summon help in case of an accident.



NOTE

Liebert Corporation neither recommends nor knowingly sells this product for use with life support or other FDA-designated "critical" devices.

NOTICE

This unit complies with the limits for a Class A digital device, pursuant to Part 15 Subpart J of the FCC rules. These limits provide reasonable protection against harmful interference in a commercial environment. This unit generates, uses and radiates radio frequency energy and, if not installed and used in accordance with this instruction manual, may cause harmful interference to radio communications. Operation of this unit in a residential area may cause harmful interference that the user must correct at his own expense.

1.0 MECHANICAL INSTALLATION

1.1 Introduction

This following section describes the requirements that must be taken into account when planning the positioning and cabling of the Liebert NXL battery equipment.

This chapter is a guide to general procedures and practices that should be observed by the installing engineer. The particular conditions of each site will determine the applicability of such procedures.

NOTICE

Do not apply electrical power to the UPS equipment before the arrival of the commissioning engineer.

1.2 Preliminary Checks

Before installing the battery equipment, please carry out the following preliminary checks:

- Visually examine the equipment for transit damage, both internally and externally. Report any damage to the shipper immediately.
- Verify that the correct equipment is being installed. The equipment supplied has an identification tag on the back of the main door.
- Verify that the battery room satisfies the environmental conditions stipulated in the equipment specification, paying particular attention to the ambient temperature and air exchange system.

1.3 Environmental Considerations

1.3.1 Battery Room

Batteries should be mounted in an environment where the temperature is consistent and even over the whole battery. Temperature is a major factor in determining the battery life and capacity. Typical battery manufacturer performance data are quoted for an operating temperature between 20 and 25°C (68 and 77°F). Operating above this range will reduce the battery life while operation below this range will reduce the battery capacity.

Battery Temperature

In a normal installation, the battery temperature should be kept between 15°C and 25°C (59 and 77°F).



NOTE

Keep batteries away from main heat sources or main air inlets etc.

1.3.2 Storage

Should the equipment not be installed immediately, it must be stored in a room for protection against excessive humidity and or heat sources (see **Table 7**).

NOTICE

An unused battery must be recharged periodically as recommended by the battery manufacturer.

1.4 Positioning

The cabinet is structurally designed to handle lifting from the base.

Access to the power terminals, auxiliary terminals blocks and power switches is from the front and top.

Removable panels on the top are secured to the chassis by screws. The door can be opened to give access to the power connections bars, auxiliary terminal blocks and power isolators. The front door can be opened at 180° for better service and more flexibility in installations.

1.4.1 Moving the Cabinets

The route to be travelled between the point of arrival and the unit's position must be planned to make sure that all passages are wide enough for the unit and that floors are capable of supporting its weight (for instance, check that doorways, lifts, ramps, etc. are adequate and that there are no impassable corners or changes in the level of corridors).

Ensure that the cabinet weight is within the designated surface weight loading (kg/cm^2) of any handling equipment. See **Table 4** for weight details.

Ensure any lifting equipment used in moving the battery equipment has sufficient lifting capacity.

Battery system equipment can be handled by means of a forklift or similar equipment.

Because the weight distribution in the cabinet is uneven, use extreme care during handling and transporting.

When moving the unit by forklift, care must be taken to protect the panels. Do not exceed a 15 degrees tilt with the forklift. Bottom structure will support the unit only if the forks are completely beneath the unit.


Handling the unit with straps is not authorized.



WARNING

Risk of heavy unit falling over. Can cause equipment damage, injury or death.

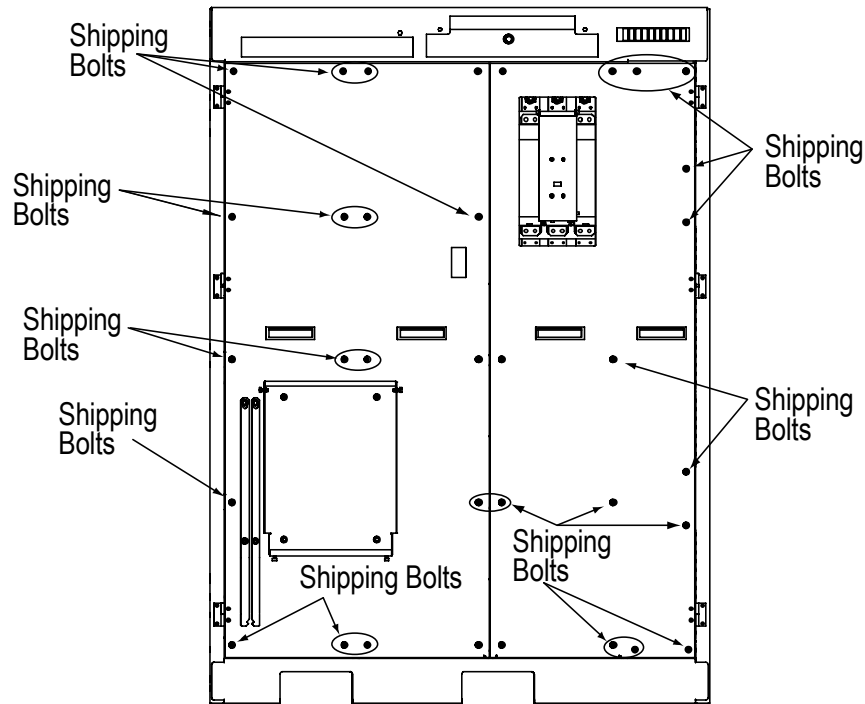
Exercise extreme care when handling battery cabinets to avoid equipment damage or injury to personnel. The battery system cabinets weigh from 3760 to 5750 lb. (1706 to 2608).

Locate center of gravity symbols  and determine unit weight before handling each cabinet. Test lift and balance the cabinets before transporting. Maintain minimum tilt from vertical at all times.

Slots at the base of the cabinets are intended for forklift use. Base slots will support the unit only if the forks are completely beneath the unit.

The battery ships with extra bolts installed on the interior doors. Once the cabinet is in the final position, these bolts can be removed. See **Figure 1**

Figure 1 Shipping bolts



* Doors removed for clarity

1.4.2 Clearances

Liebert NXL has no ventilation grilles at either side or at the rear of the battery system equipment. Clearance around the front of the equipment should be sufficient to enable free passage of personnel with the doors fully opened. It is important to leave a distance of 24" (610mm) between the top of the cabinet and the ceiling of the room in which it is installed to permit adequate circulation of air coming out of the unit.

1.4.3 Raised Floor Mounting

If the equipment is to be placed on a raised floor, it should be mounted on a pedestal suitably designed to accept the equipment point loading. Refer to the base view to design this pedestal.

1.5 System Composition

A battery system can consist of a number of equipment cabinets, depending on the individual system design requirements - e.g., Battery Cabinet, Module Battery Disconnect, Junction Cabinet. Refer to **3.0 - Installation Drawings** for the positioning of the cabinets described below.

2.0 BATTERY INSTALLATION

2.1 Safety

Special care should be taken when working with the batteries associated with the Liebert NXL Battery System equipment. When all the cells are connected together, the battery terminal voltage will exceed 400V and is potentially lethal. A primary safety consideration is to install the battery equipment in an isolated area, accessible only to properly trained and qualified maintenance personnel.

WARNING

Risk of electric shock. Can cause equipment damage, personal injury or death.

Hazardous battery voltage present behind covers. No user-serviceable parts are located behind covers that require a tool for removal. Only properly trained and qualified service personnel are authorized to remove such covers or perform installation or maintenance.

The following general battery safety precautions and warnings must be observed at all times:

- A battery can present risk of electric shock or burn from high short circuit currents.
- When connected in a string, the voltage will exceed 400VDC. This voltage is potentially lethal. Always observe high-voltage precautions.
- Eye protection must be worn to prevent injury from accidental electrical arcs.
- Remove rings, watches, necklaces, bracelets and all other metal objects.
- Use only tools with insulated handles.
- Wear appropriate personal protective equipment when handling batteries.
- If a battery leaks electrolyte or is otherwise physically damaged, it should be placed in a container resistant to wire and disposed of in accordance with local regulations.
- If electrolyte comes into contact with the skin, the affected area should be washed immediately with plenty of clean water.
- Batteries must always be disposed of according to local environmental laws.
- When replacing batteries, use the same number and type that were originally fitted.
- Disconnect charging source prior to connecting or disconnecting battery terminals.
- Determine if the battery is grounded. If it is grounded, remove source of ground. Contact with any part of a grounded battery can result in electrical shock.
- Battery support tray must be used whenever a battery tray is being pulled out.

2.2 Layout

Depending on the site layout, the Battery cabinets can be installed in any of several ways:

- **Connected**—Multiple Battery cabinets bolted together
- **Stand-Alone**—Cabinet not bolted to Liebert NXL equipment
- **Attached**—Battery Cabinets are bolted to a Liebert NXL UPS
- **Detached**—Battery Cabinets are not bolted to a Liebert NXL UPS

See **Figures 2** through **8**.

Figure 2 Battery cabinets connected, attached to UPS

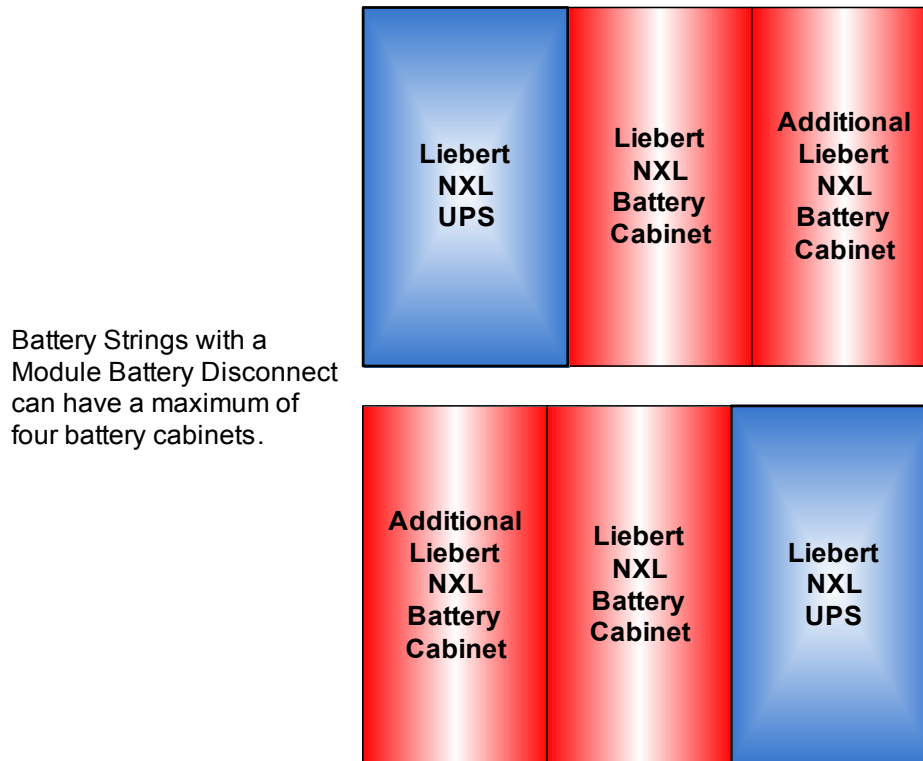


Figure 3 Battery cabinets connected, detached from UPS

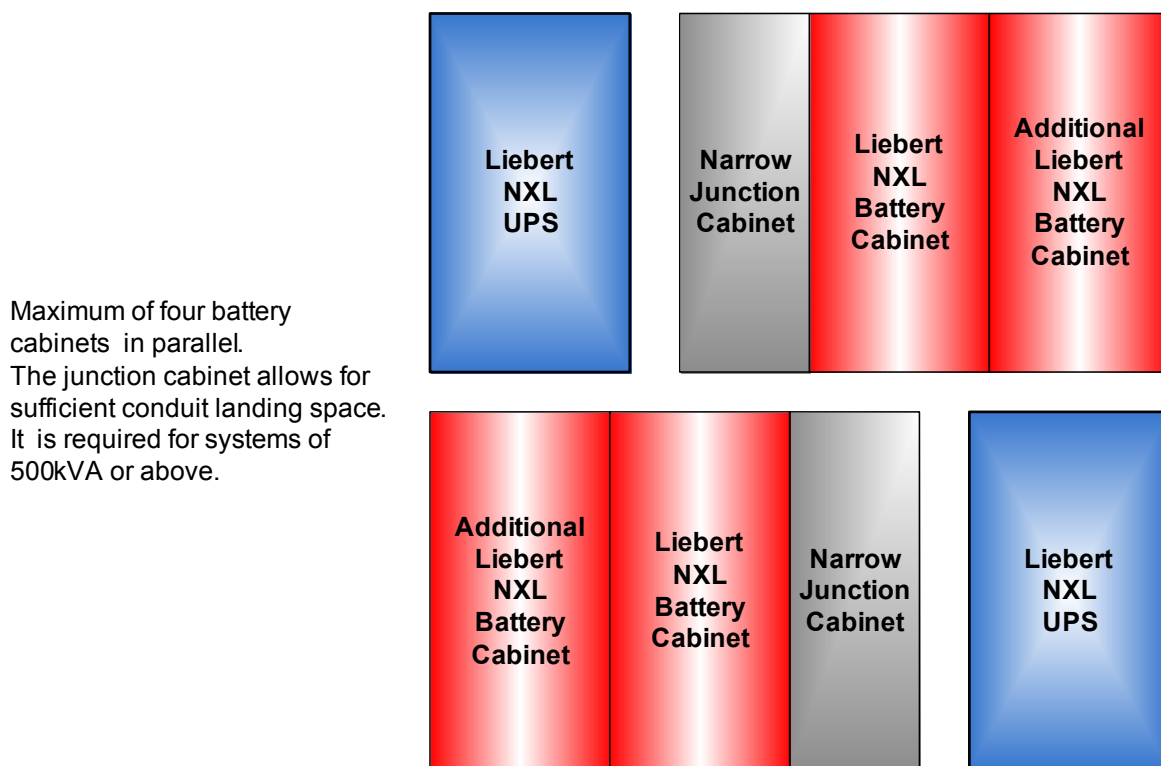


Figure 4 Battery cabinets connected, with Module Battery Disconnect, attached to UPS

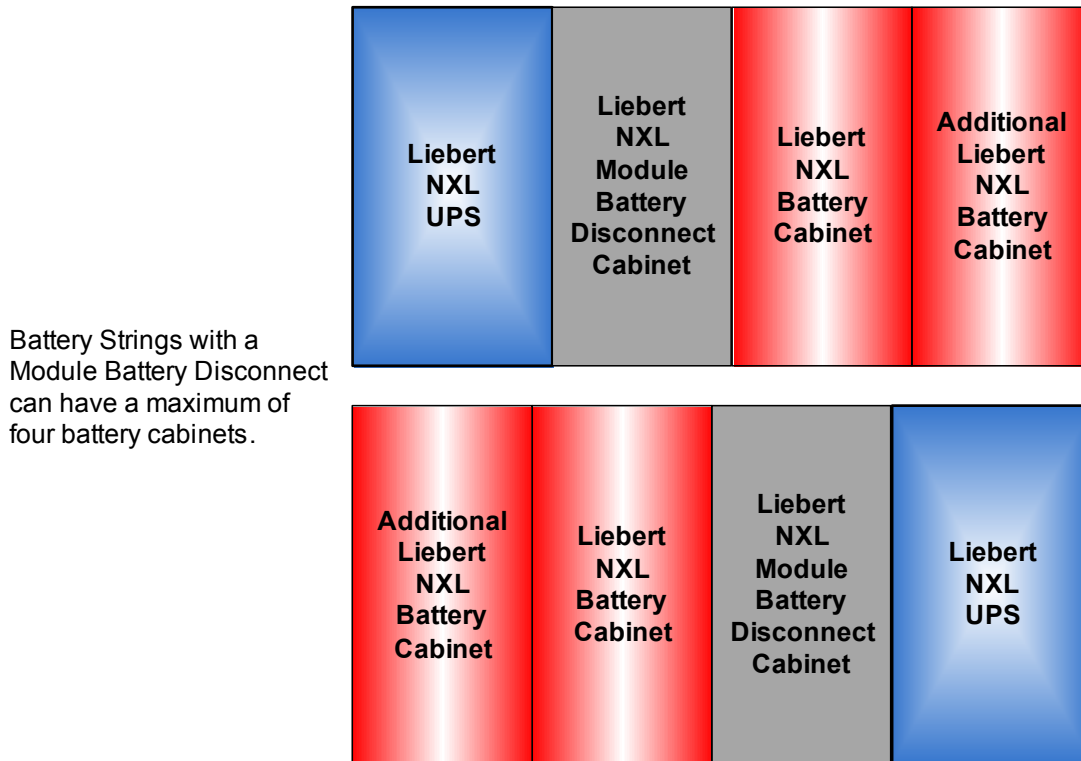


Figure 5 Battery cabinets connected, with Module Battery Disconnect, detached from UPS

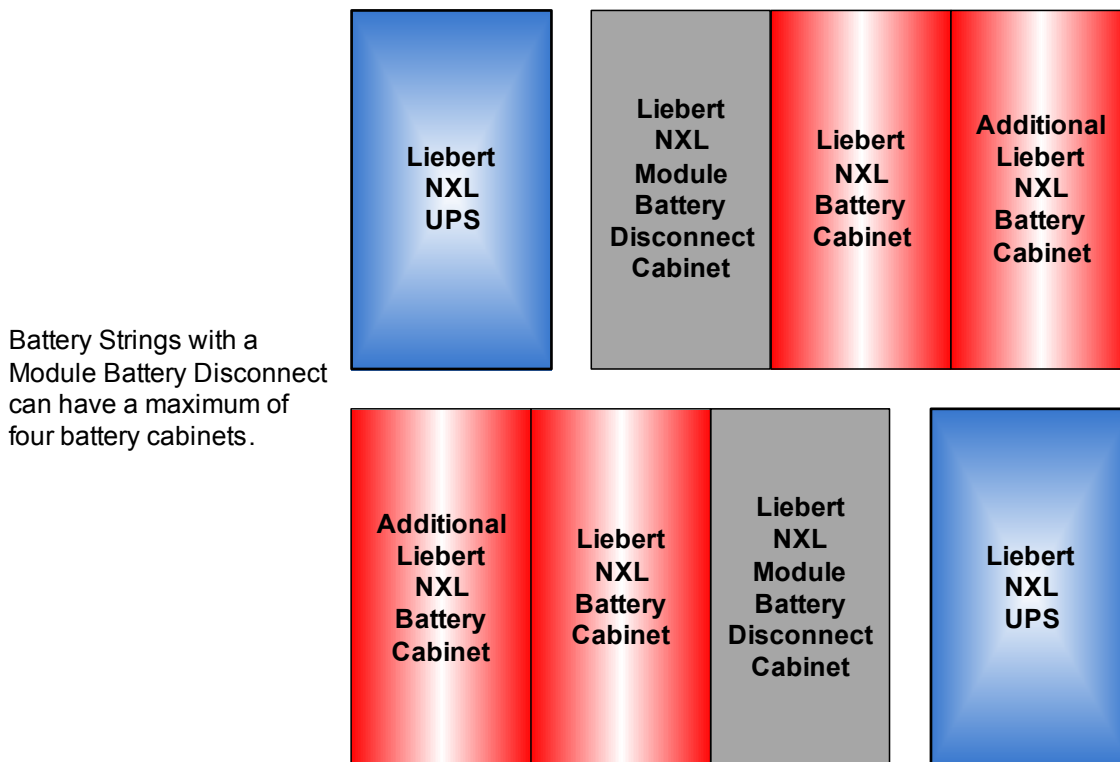


Figure 6 Battery cabinets connected, detached from Module Battery Disconnect, detached from UPS

Battery Strings with a Module Battery Disconnect can have a maximum of four battery cabinets.
The junction cabinet is used to allow for sufficient conduit landing space and is required for systems of 500kVA or above.

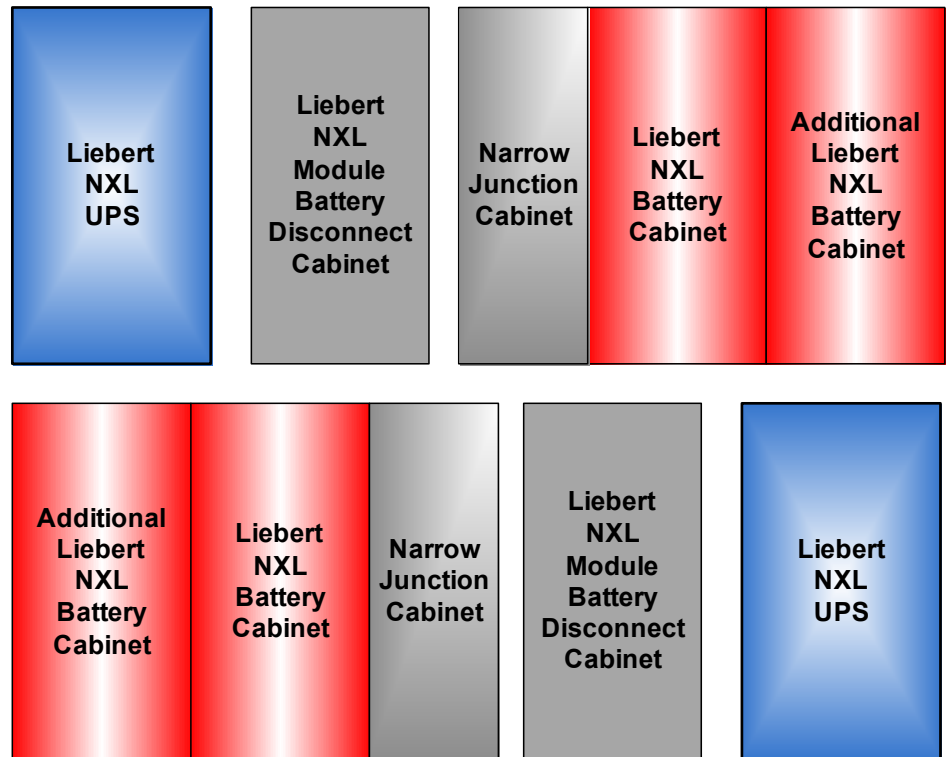


Figure 7 Stand-alone battery cabinets, with Module Battery Disconnect, detached from UPS

Battery Strings with a Module Battery Disconnect can have a maximum of four battery cabinets.
The junction cabinet provides sufficient conduit landing space and is required for all systems in this configuration.

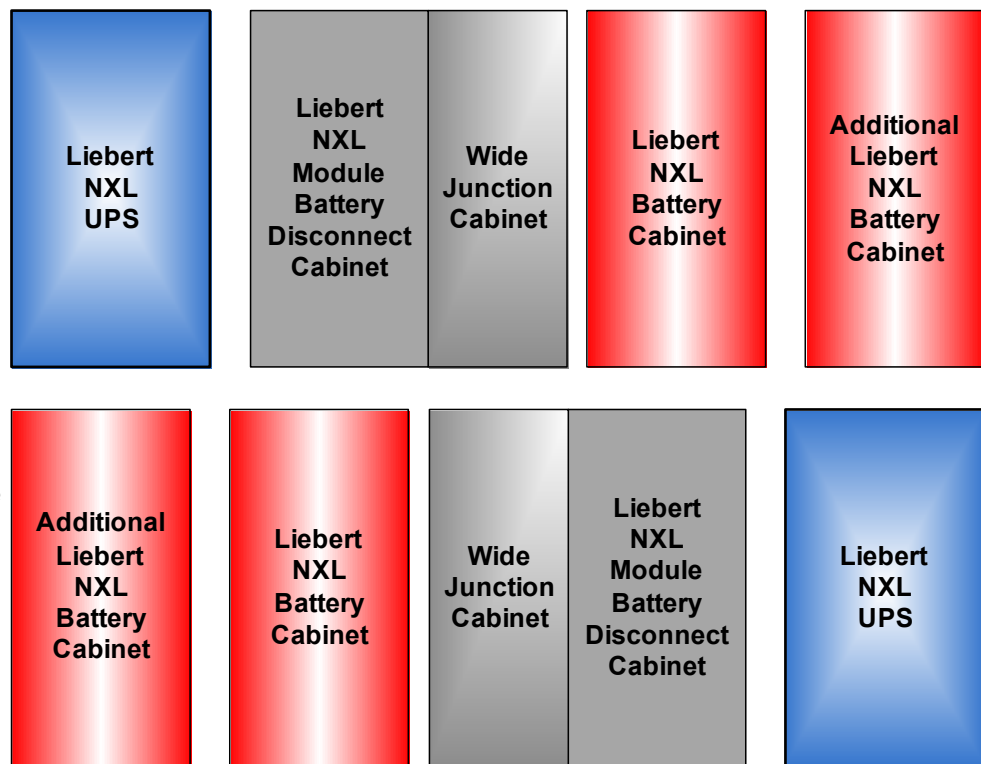
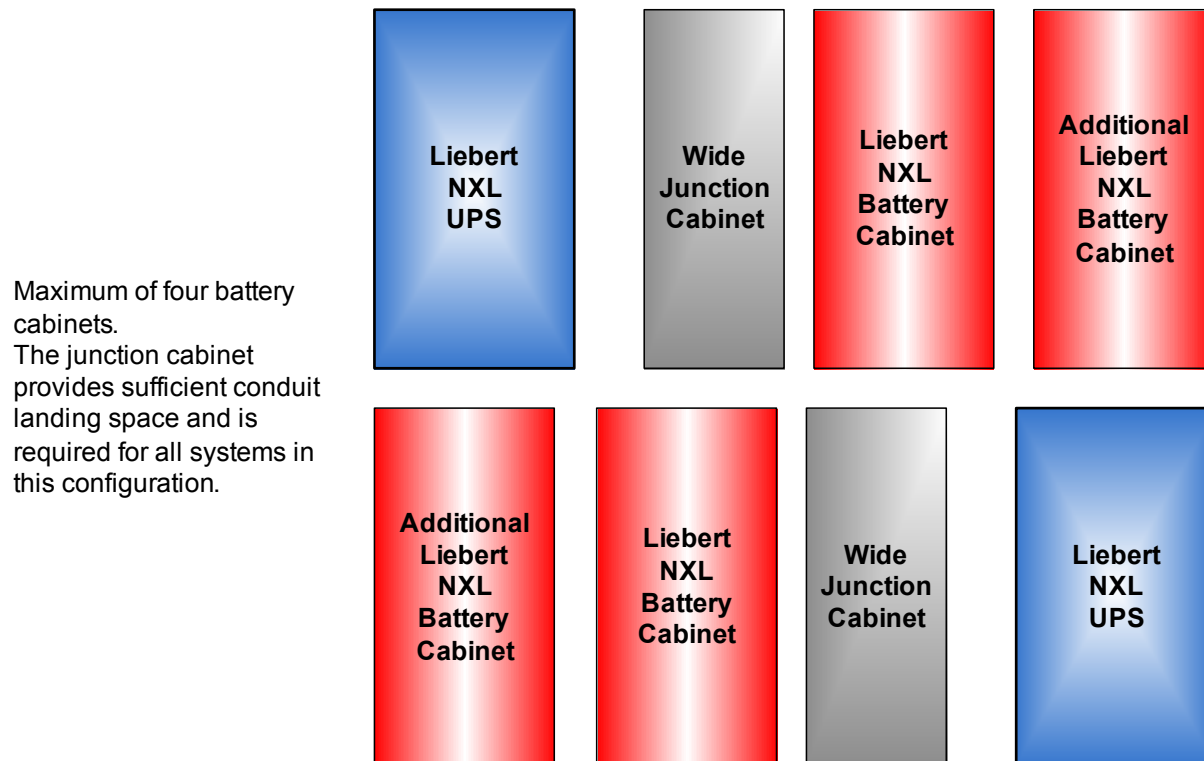


Figure 8 Stand-alone battery cabinets, no Module Battery Disconnect, detached from UPS

2.3 Cable Entry

Cables may enter the battery cabinet from either the top or the bottom. Cable entry is made possible by installing conduit to the removable plate fitted at the top or bottom. See **3.0 - Installation Drawings**.

2.4 Power Connection

Depending on the site layout, the Battery cabinets can be cabled several ways. See **Figures 2 through 8**.

2.4.1 Connected System

For cabinets that have been ordered as connected (battery cabinets will bolt to each other), the positive and negative busbars can be bolted together using the supplied bus bar connector extensions. See **Figure 24**

2.4.2 Stand-Alone System

For cabinets that are ordered as stand-alone, customer must supply all the interconnecting cables and hardware. See **Table 15** for current ratings and recommended cable sizes.

2.4.3 Attached/Detached System

For battery cabinets that are connecting to a Liebert NXL UPS, Liebert NXL MBD cabinet or Liebert NXL Junction cabinet (see **Figures 2 through 6**), cables will run from the positive and negative busbars of the adjacent battery cabinet to the positive and negative DC connections of UPS, MBD or Junction cabinet.

For attached systems (the cabinets bolt to each other) the cables can run internal to the cabinets and will be supplied.

For detached systems (the cabinets do not bolt to each other), the cables must be run outside the cabinets. The customer must supply all the interconnecting cables and hardware. See **Table 15** for current ratings and recommended cable sizes.

2.4.4 MBD voltage sense leads

For ease of installation, the power cables from the battery cabinets can be installed on either the top or bottom breaker busbars (depending if top or bottom entry is used). The voltage sense leads need to be connected to the busbars on the input of the circuit breaker (busbars that have the cables from the battery system connected.) See **Figure 22**.



WARNING

Risk of electric shock. Can cause equipment damage, personal injury or death.

Hazardous battery voltage may be present on busbar. Install battery voltage sense leads before connecting the positive and negative power cables.

2.4.5 Grounding

For cabinets that have been ordered as connected or attached, the ground cables and hardware will be supplied. See **Figure 25** for location of cabinet-to-cabinet grounding.

For cabinets ordered as detached or stand-alone, customer must supply the cables and hardware. See **Table 15** for current ratings and recommended cable sizes.

2.5 Control Connection

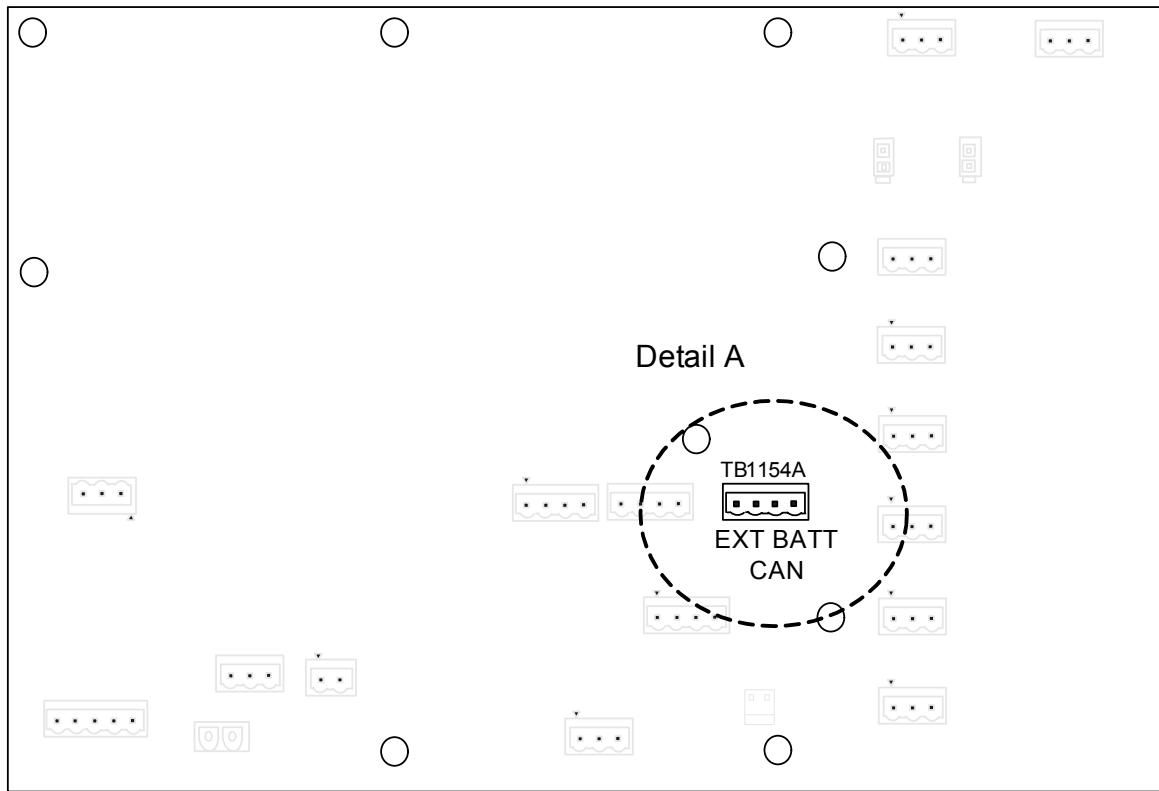
Each Liebert NXL Battery Cabinet and Liebert NXL Module Battery Disconnect (MBD) contains a Battery Interface Board (BIB). See 3.0 - Installation Drawings. All cabinets in a system must have their Battery Interface boards connected in series. See **Figure 14** for battery cabinet details and **Figure 16** for MBD details.



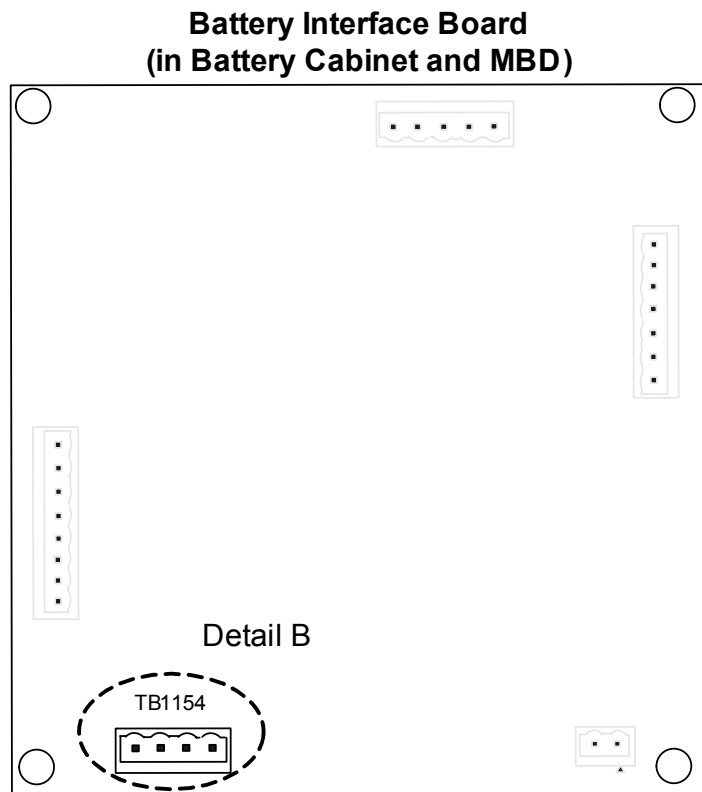
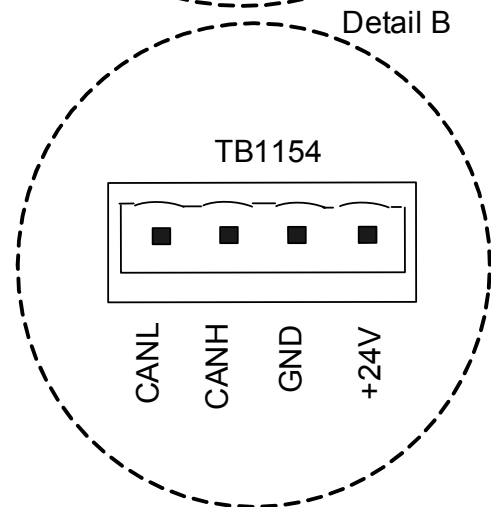
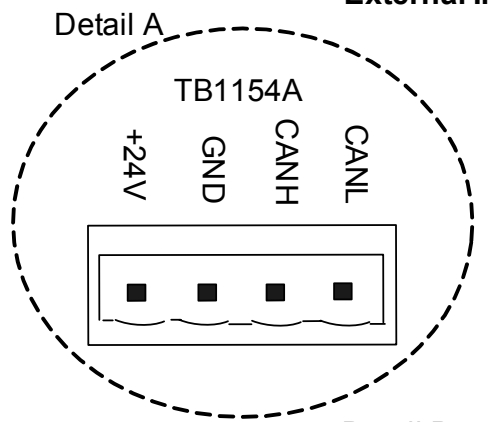
NOTE

Care must be taken to route the control cables away from high voltage cables or busbars.

Figure 9 Wiring external interface board in UPS to battery interface board in battery cabinet

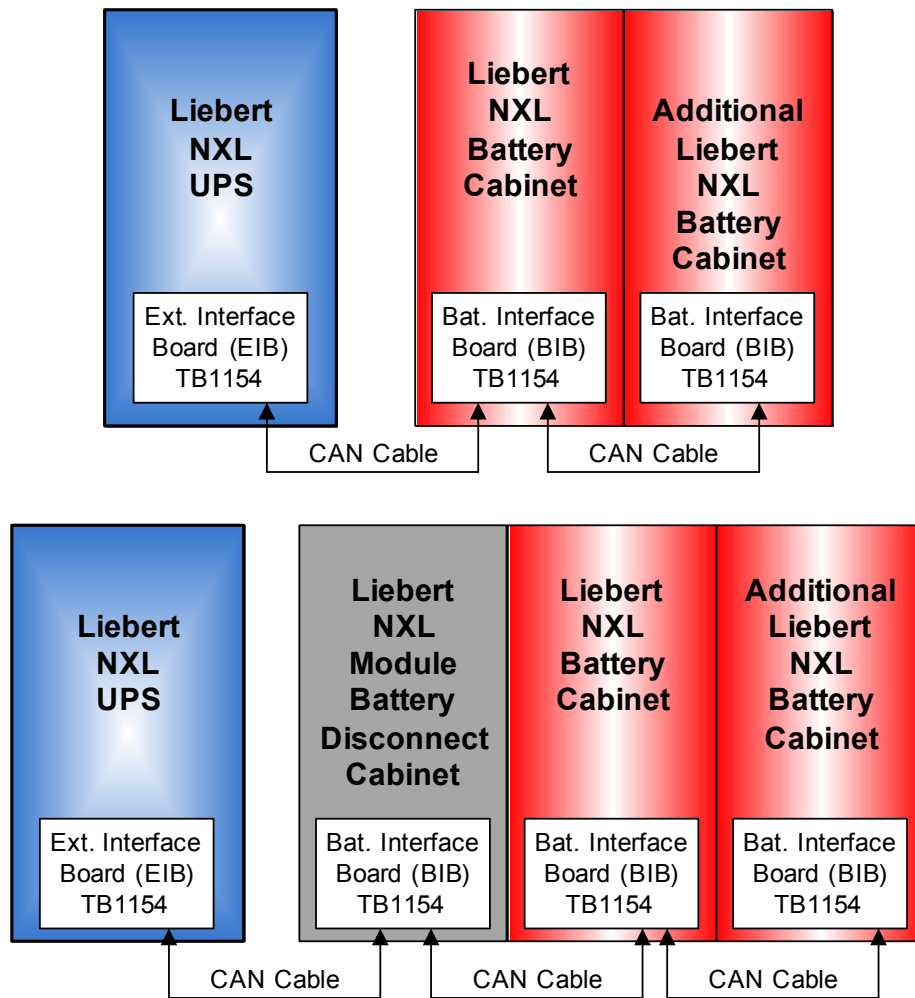


External Interface Board (in UPS)



Battery Interface Board (in Battery Cabinet and MBD)

Figure 10 Control cable layout—Liebert NXL UPS to Liebert NXL Battery Cabinet



The CAN cables must be two, twisted pair, shielded 18AWG (Belden 9156 or equivalent). All interconnecting cables and hardware for connected and attached cabinets will be provided.

NOTICE

Risk of improper installation. Can cause equipment damage.

During system commissioning, Liebert Services will set the jumpers on the EIB and the BIB. If another battery cabinet is added to the system after commissioning, it is imperative that Liebert Services reset the jumpers on the EIB board and the BIB board.

2.6 Alber Monitoring System—Optional

The Liebert matching battery cabinet allows installing an optional Alber battery monitoring system in the cabinet. The Alber battery monitoring continuously checks all critical battery parameters, such as cell voltage, overall string voltage, current and temperature. Automatic periodic tests of internal resistance of each battery will verify the battery's operating integrity. Additional capabilities include automatic internal DC resistance tests and trend analysis providing the ability to analyze performance and aid in troubleshooting.

The Alber monitoring system is installed inside the battery cabinet (see **Figure 33**). The monitoring system requires approximately 0.5A, single-phase power.

This power can come from the output of the UPS the battery cabinet is supplying (see **Figure 33**).

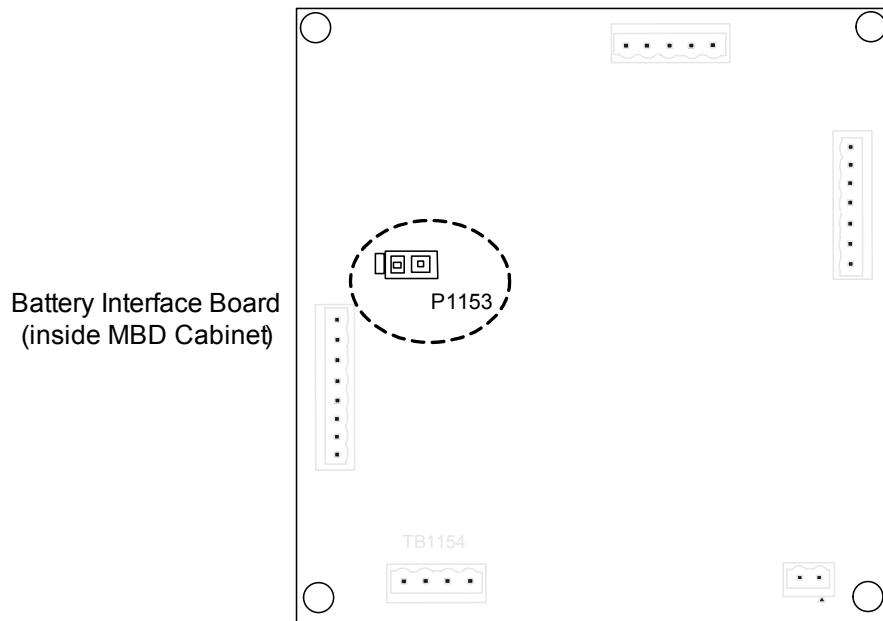
The Alber monitoring system consists of a Controller Module and Data Collector Module (see **Figure 31**). One Controller Module can monitor up to six (6) battery cabinets with a Data Collector Module installed. The Battery cabinet with the Controller Module (battery cabinet #1) must be install in the position closest to the UPS.

For details about operating the Alber system, see the Alber Monitoring System manual, available at the Liebert Web Site, www.liebert.com

2.7 External Battery Room Temperature Sensor—Optional

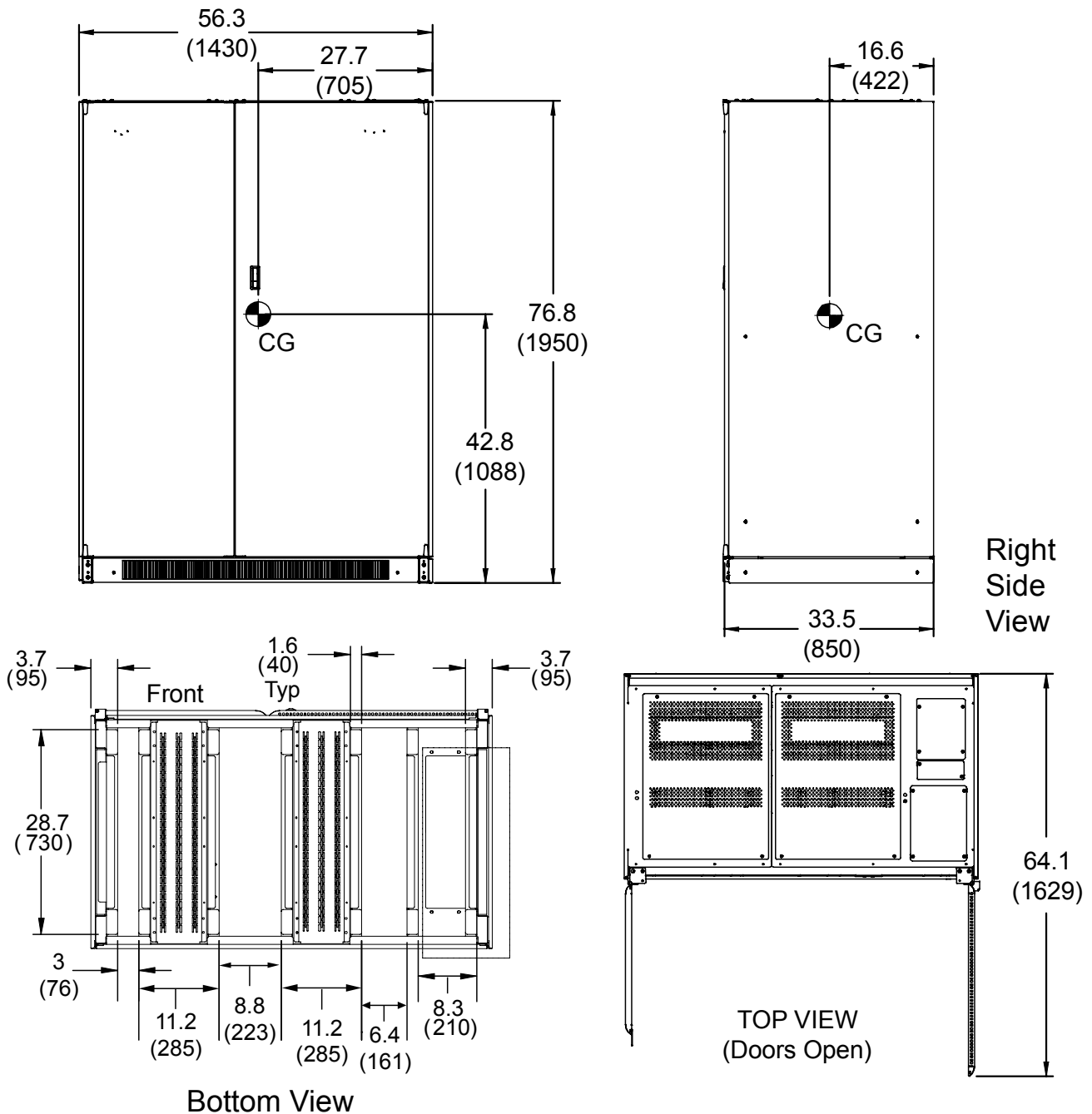
For systems that do not use Liebert NXL battery cabinets, but have an MBD connected to a battery string, an optional temperature sensor can be installed to monitor the ambient room temperature. This sensor is connected to the BIB in the MBD cabinet (see **Figure 11**). This sensor will allow the Liebert NXL UPS to perform temperature compensation charging.

Figure 11 Battery temperature sensor control connection



3.0 INSTALLATION DRAWINGS

Figure 12 Outline drawing, Liebert Battery Cabinet



NOTE:

1. All dimensions are in in. (mm)
2. 24" minimum clearance above unit required for air exhaust.
3. Keep cabinet within 15 degrees of vertical.
4. Top and bottom cable entry available through removable access plates.
5. Control wiring and power wiring must be run in separate conduit.
6. Aluminum and copper-clad aluminum cables are not recommended.
7. Widths are with side panels. The width is 55.1" (1400mm) without side panels.
8. The depth dimension includes the front door and rear panel.

Figure 13 Main components, Liebert Battery Cabinet

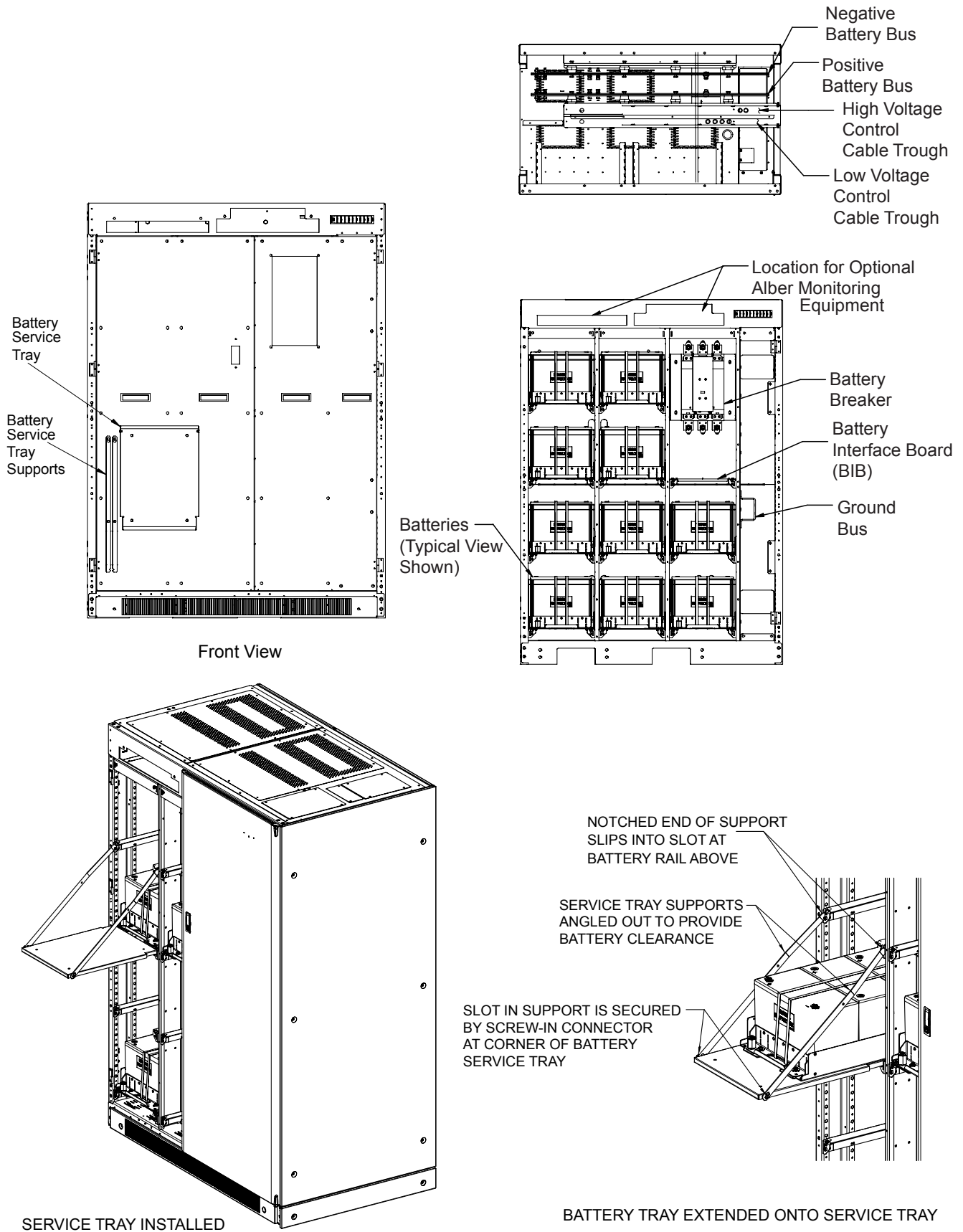
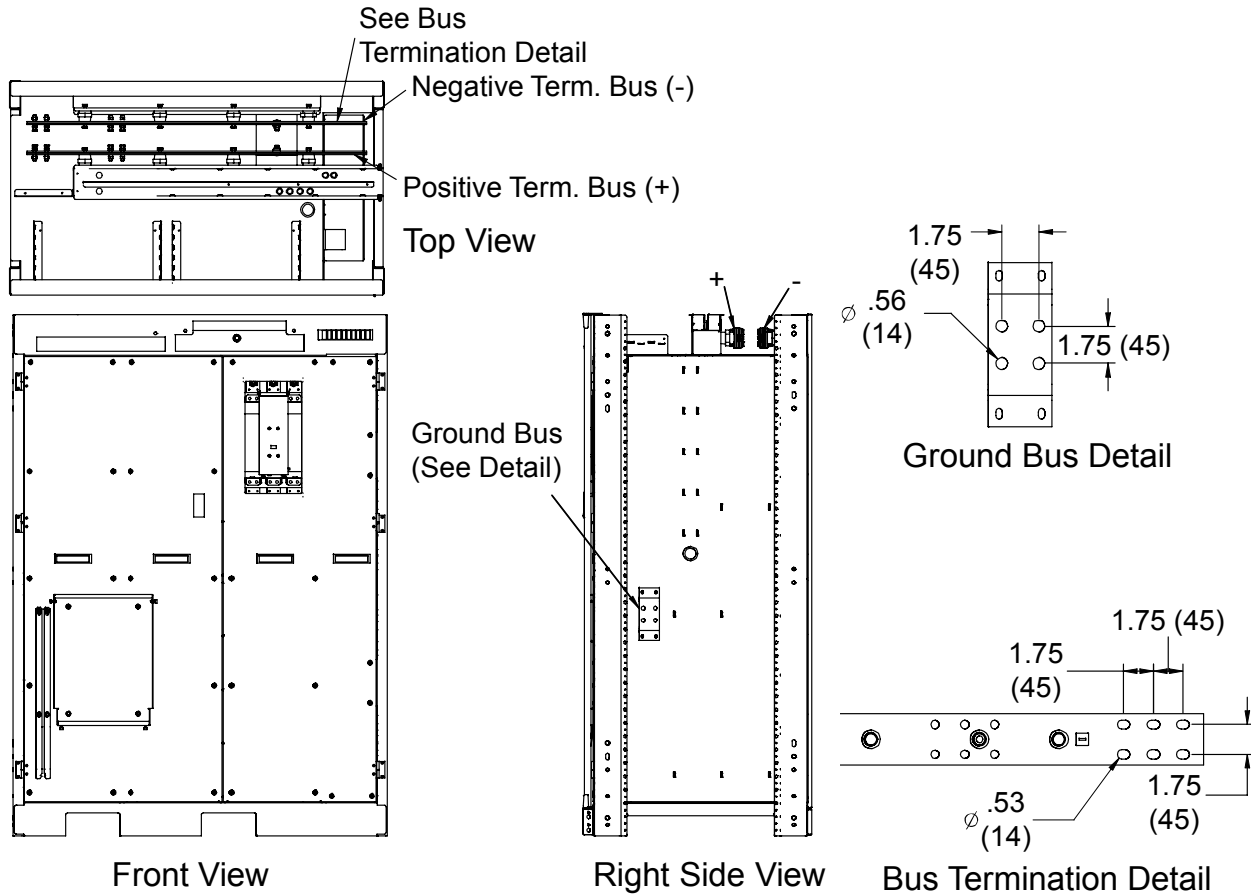


Figure 14 Terminal details, Liebert Battery Cabinet

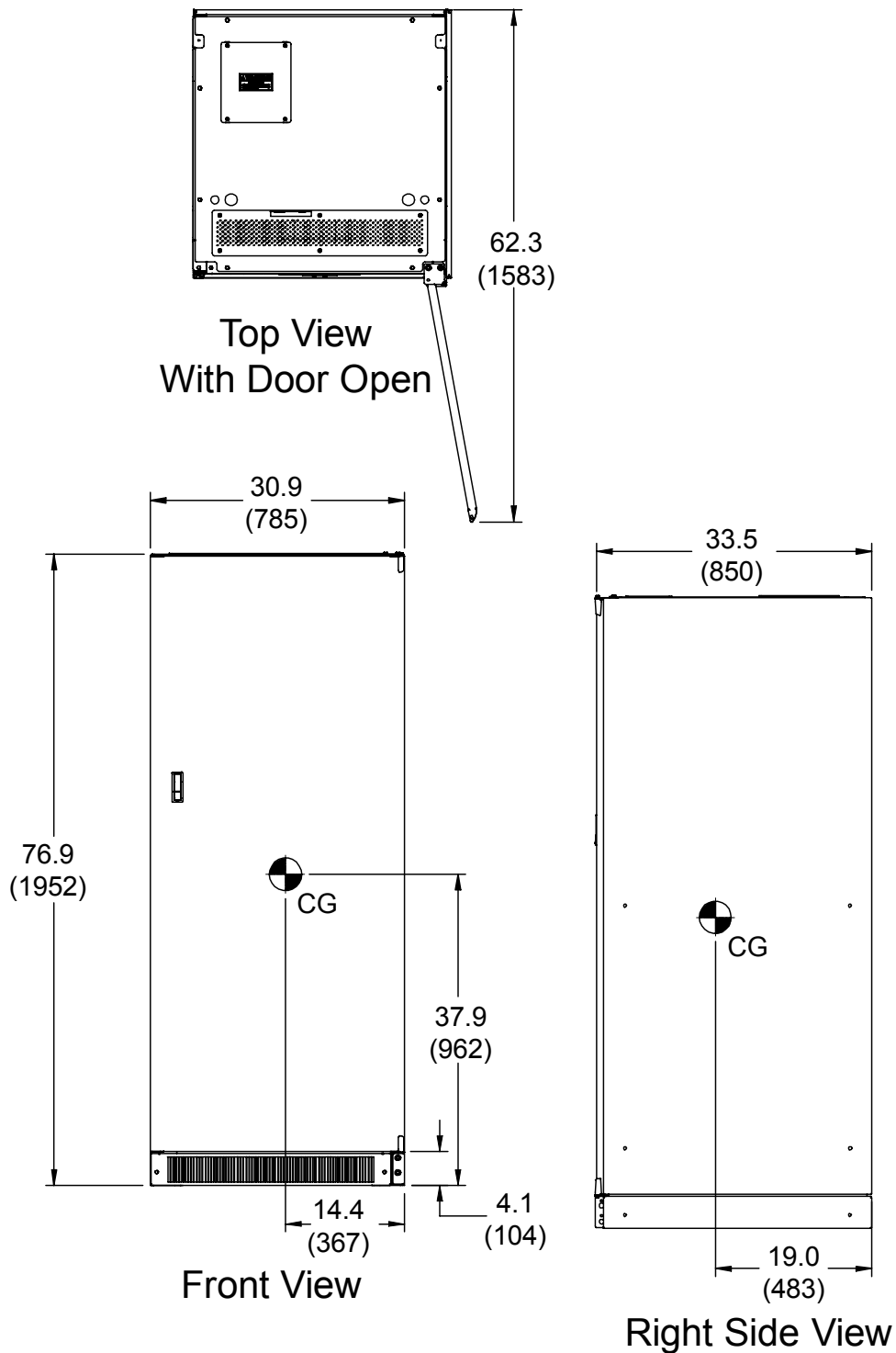


* Doors And Covers Removed for Clarity

Note:

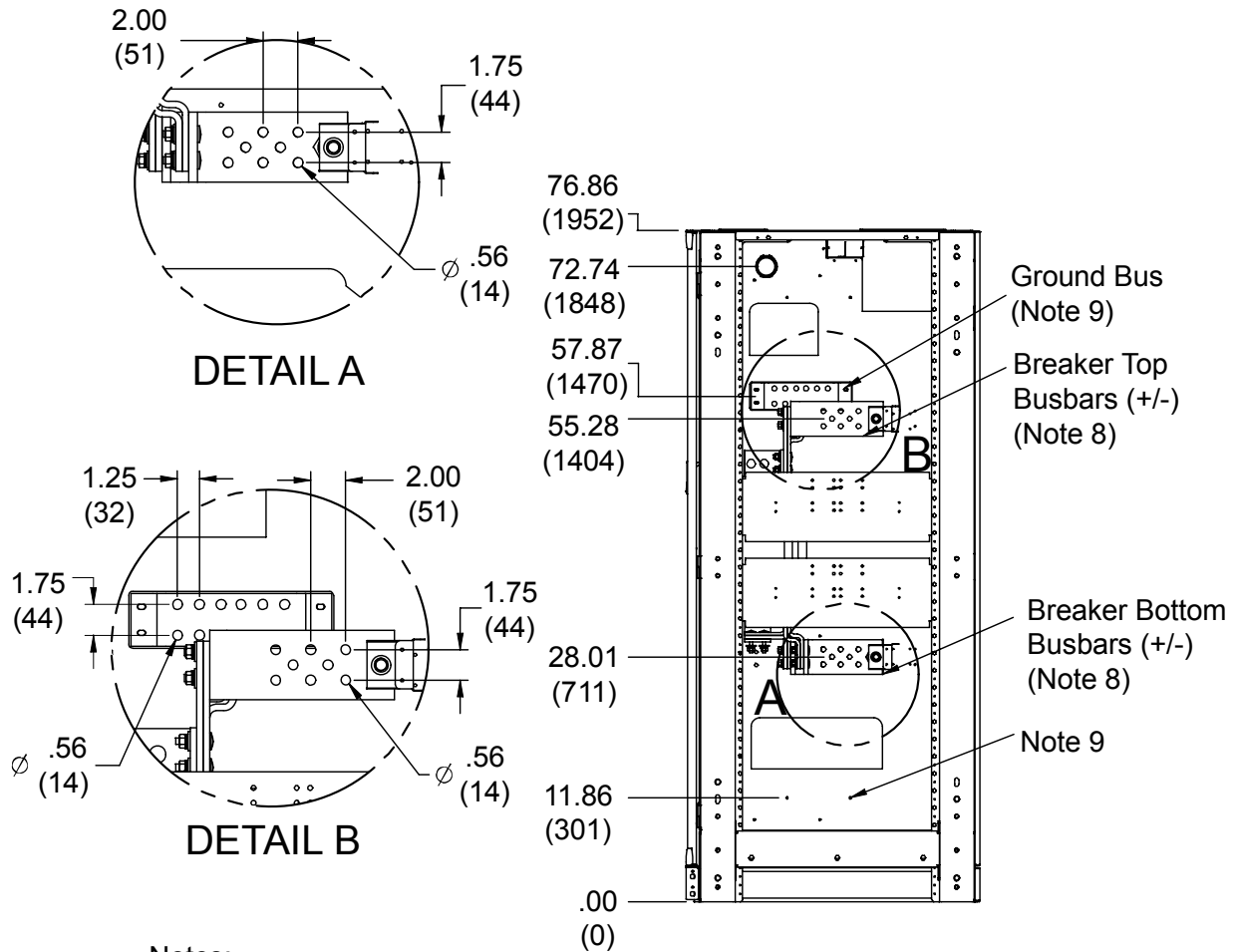
1. All dimensions are in inches (mm)
- 2.. 24" minimum clearance above unit required for air exhaust.
3. Keep cabinet within 15 degrees of vertical.
4. Top and bottom cable entry available through removable access plates.
5. Control wiring and power wiring must be run in separate conduit.
6. Aluminum and copper-clad aluminum cables are not recommended.
7. All wiring must be in accordance with national and local electrical codes.

Figure 15 Outline drawing, 250-400kVA, Liebert Module Battery Disconnect



1. All dimensions are in inches (mm).
2. 24" minimum clearance above unit required for air exhaust.
3. Keep cabinet within 15 degrees of vertical.
4. Top and bottom cable entry available through removable access plates.
5. Control wiring and power wiring must be run in separate conduit.
6. Aluminum and copper-clad aluminum cables are not recommended.
7. Widths are without side panels. The width is 32.1" (815mm) with side panels.
8. The depth dimension includes the front door and rear panel.

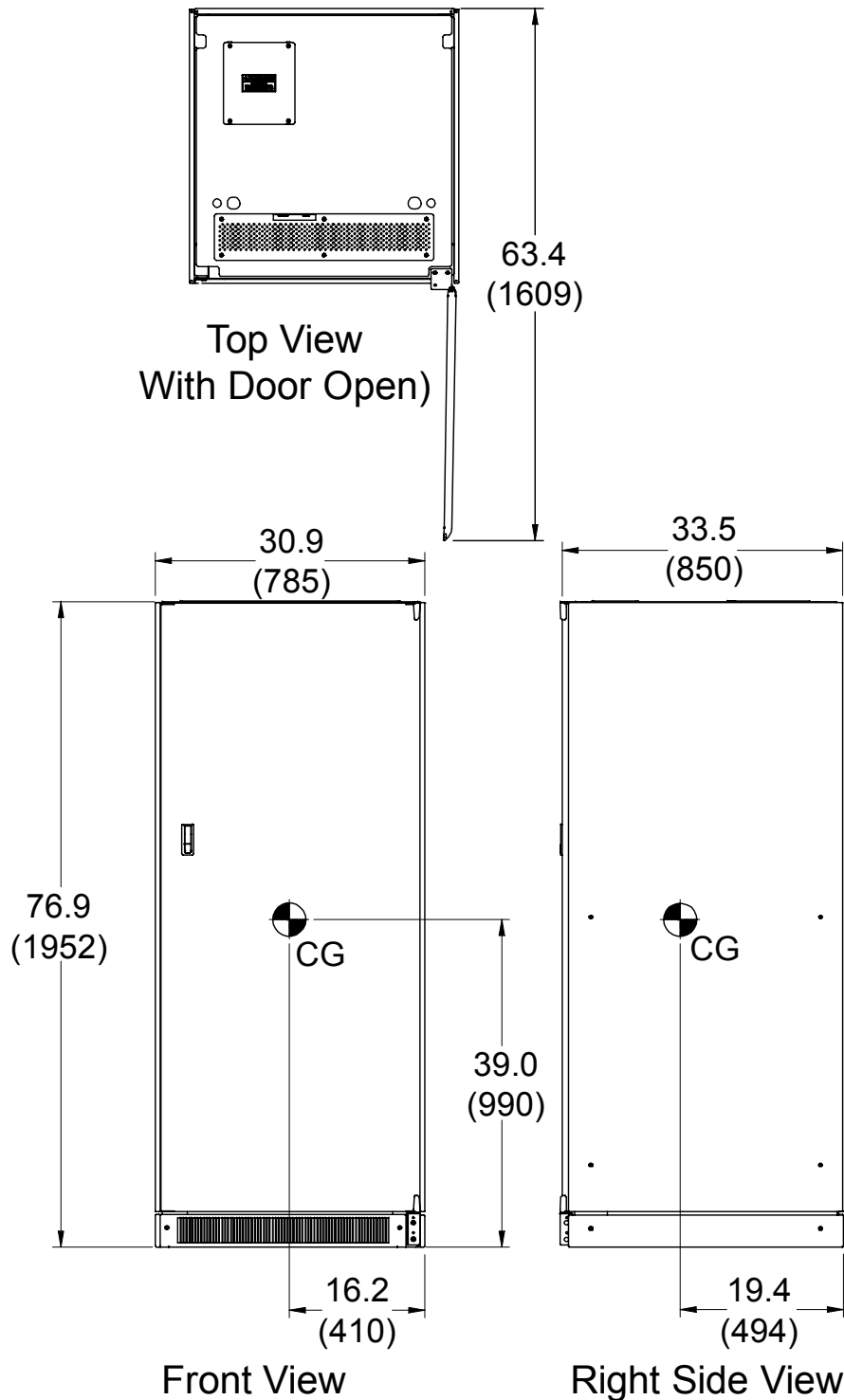
Figure 16 Terminal detail drawing, Liebert Module Battery Disconnect



Notes:

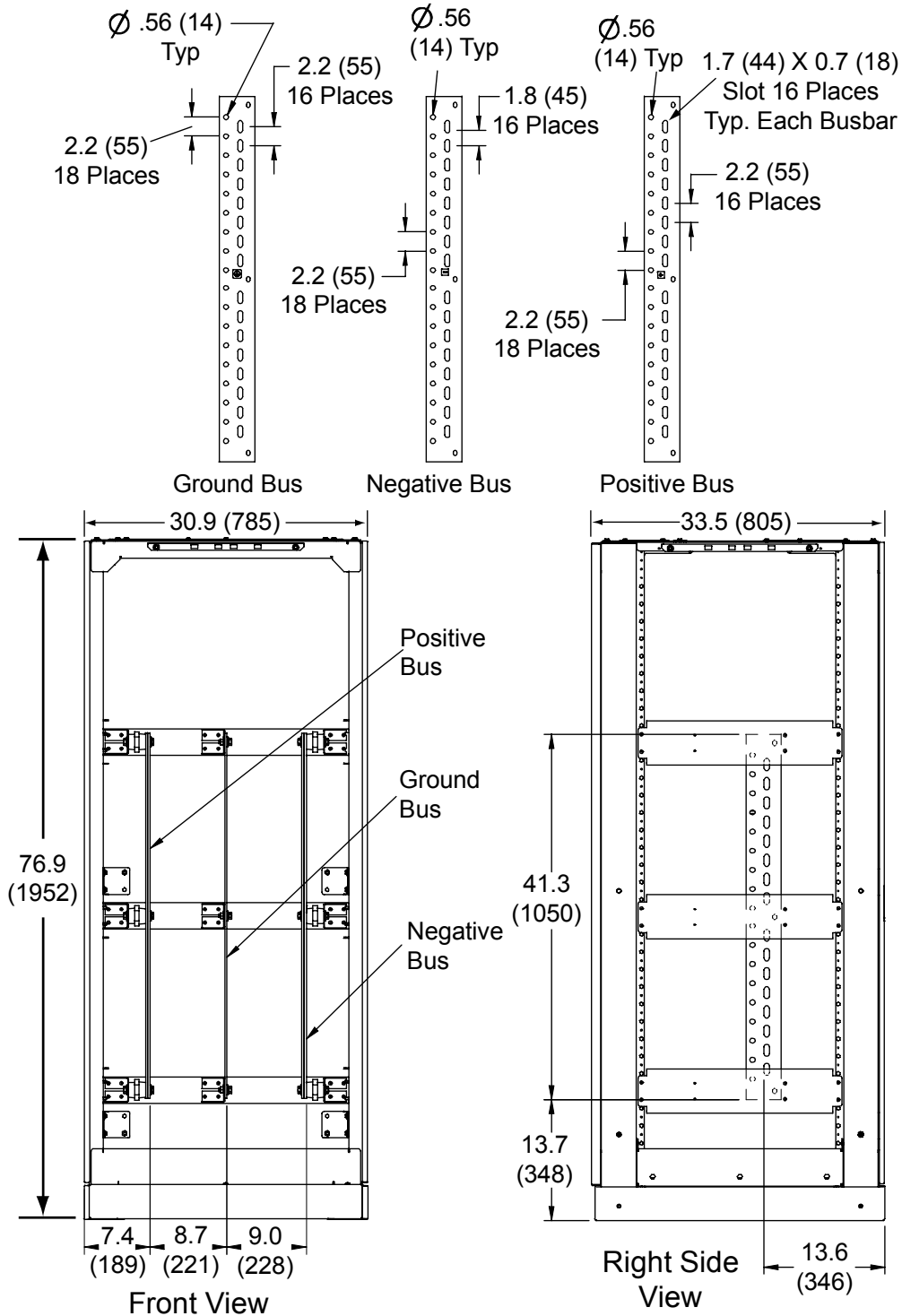
1. All dimensions are in in. (mm)
2. 24" minimum clearance above unit required for air exhaust.
3. Keep cabinet within 15 degrees of vertical.
4. Top and bottom cable entry available through removable access plates.
5. Control wiring and power wiring must be run in seperate conduit.
6. Aluminum and copper-clad aluminum cables are not recommended.
7. All wiring is to be in accordance with national and local electrical codes.
8. Cables from battery system can be connected to either breaker top or bottom busbars.
9. Ground bus shown in factory-installed location, optional gnd bus mount location located near bottom of cabinet.

Figure 17 Outline drawing, 500-750kVA, Liebert Module Battery Disconnect



1. All dimensions are in inches (mm).
2. 24" minimum clearance above unit required for air exhaust.
3. Keep cabinet within 15 degrees of vertical.
4. Top and bottom cable entry available through removable access plates.
5. Control wiring and power wiring must be run in separate conduit.
6. Aluminum and copper-clad aluminum cables are not recommended.
7. Widths are without side panels. The width is 32.1" (815mm) with side panels.
8. The depth dimension includes the front door and rear panel.

Figure 18 Wide junction cabinet terminal wiring



Notes:

1. All dimensions are in inches (mm).
2. 24" minimum clearance above unit required for air exhaust.
3. Keep cabinet within 15 degrees of vertical.
4. Top and bottom cable entry available through removable access plates.
5. Control wiring and power wiring must be run in separate conduit.
6. Aluminum and copper-clad aluminum cables are not recommended.
7. Widths are without side panels. The width is 32.1" (815mm) with side panels.
8. The depth dimension includes the front door and rear panel.

Figure 19 Liebert NXL Narrow Junction Cabinet—terminal detail and outline drawing

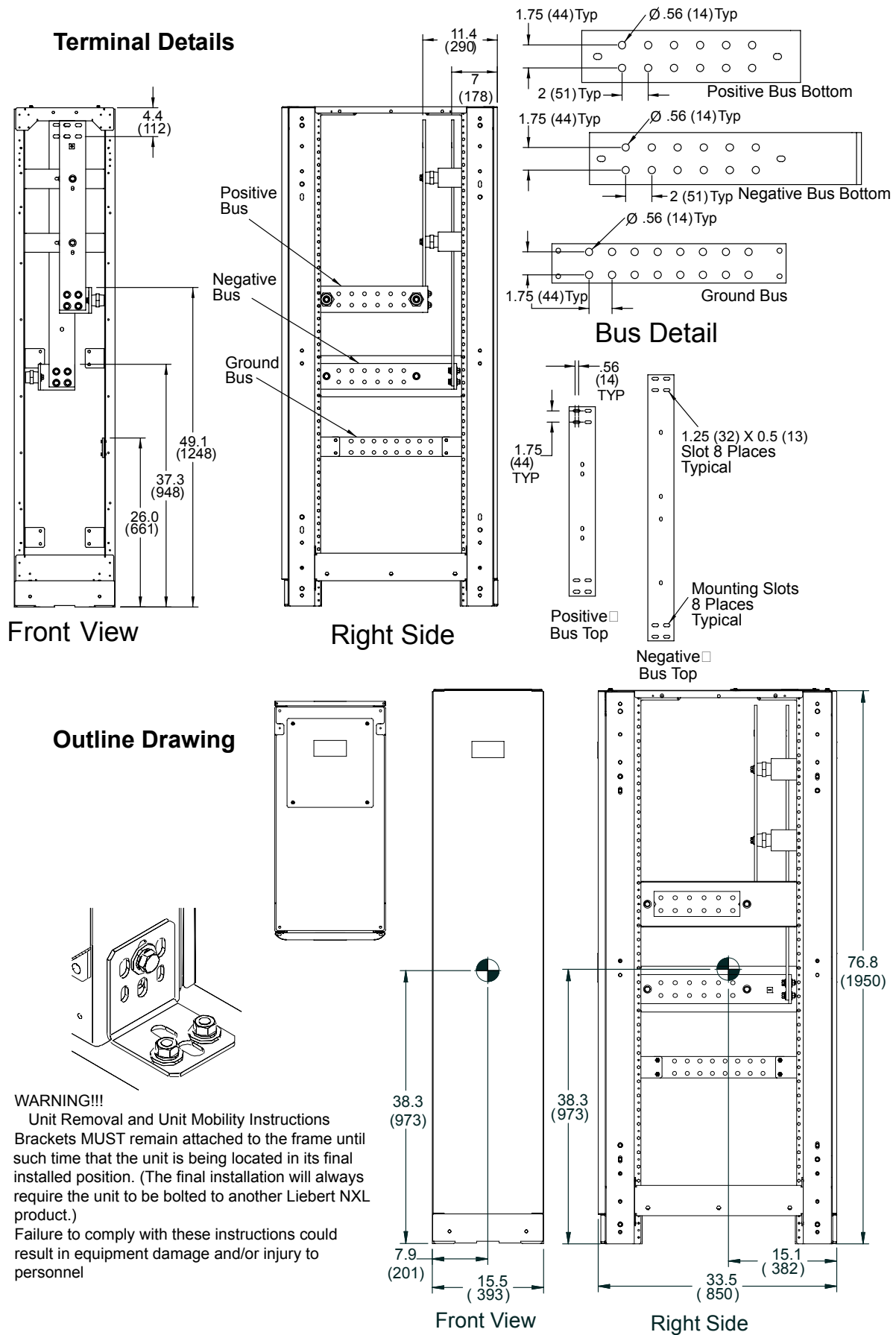


Figure 20 Liebert NXL Battery Cabinet control wiring

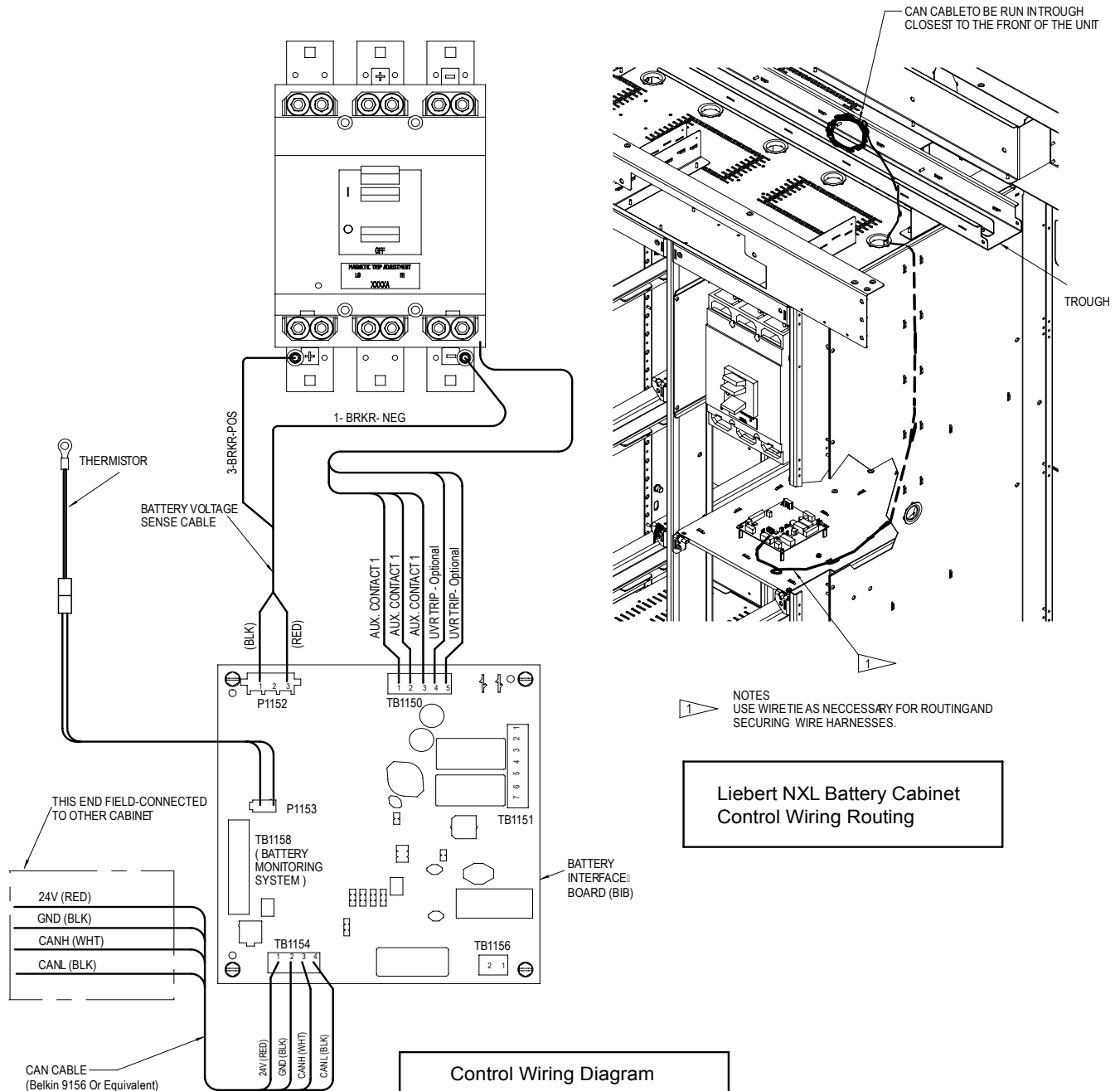


Figure 21 Liebert NXL Module Battery Disconnect control wiring

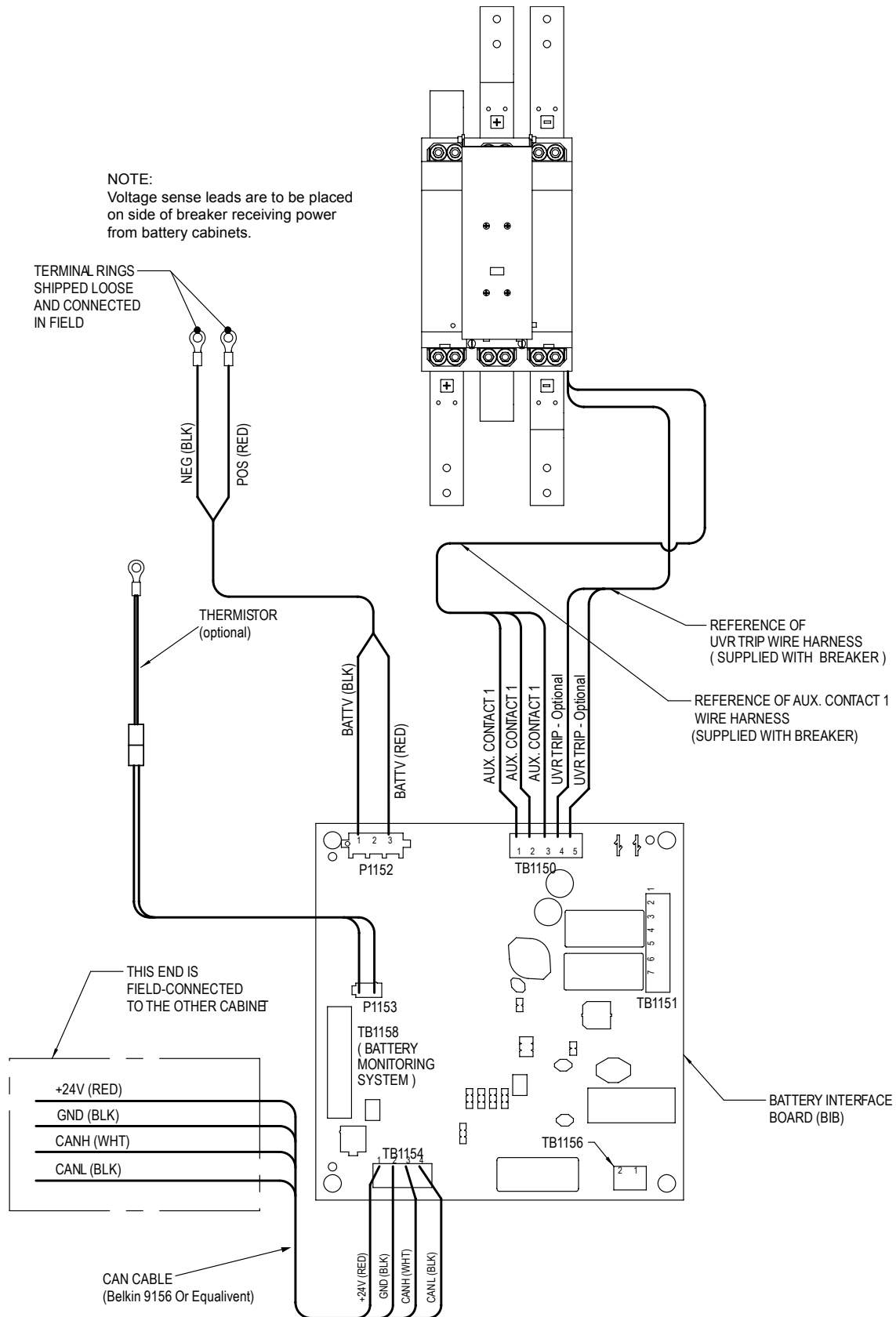
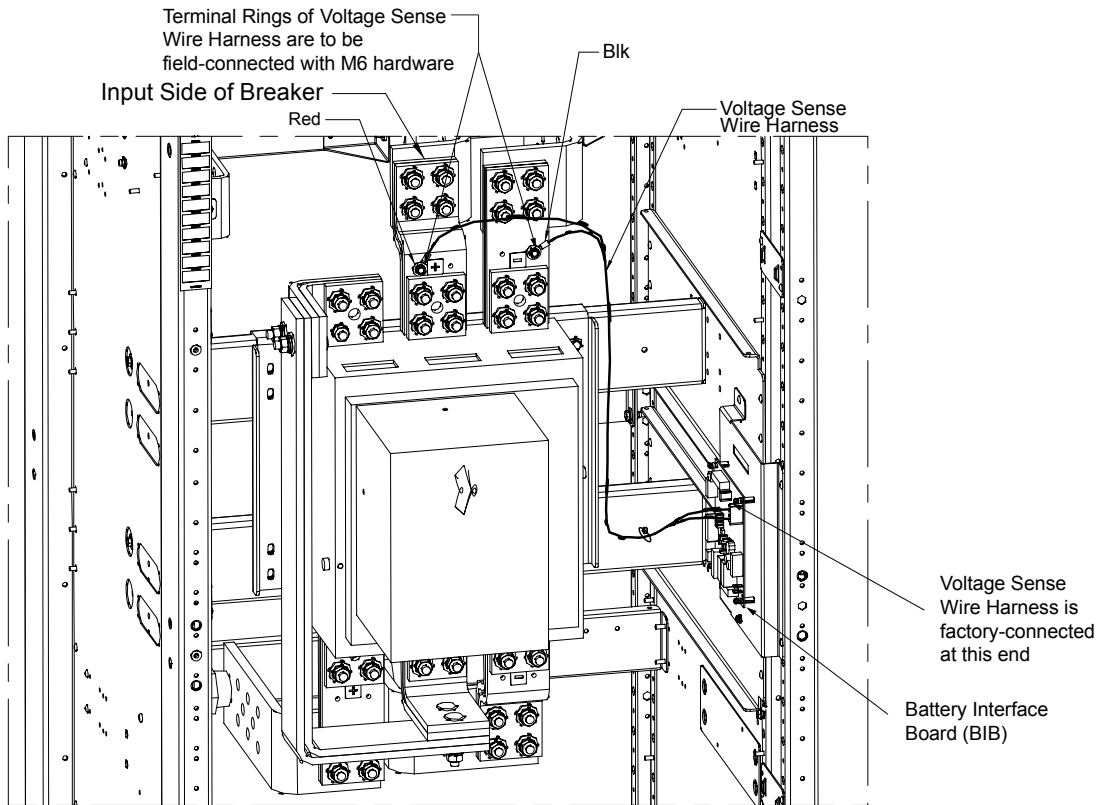
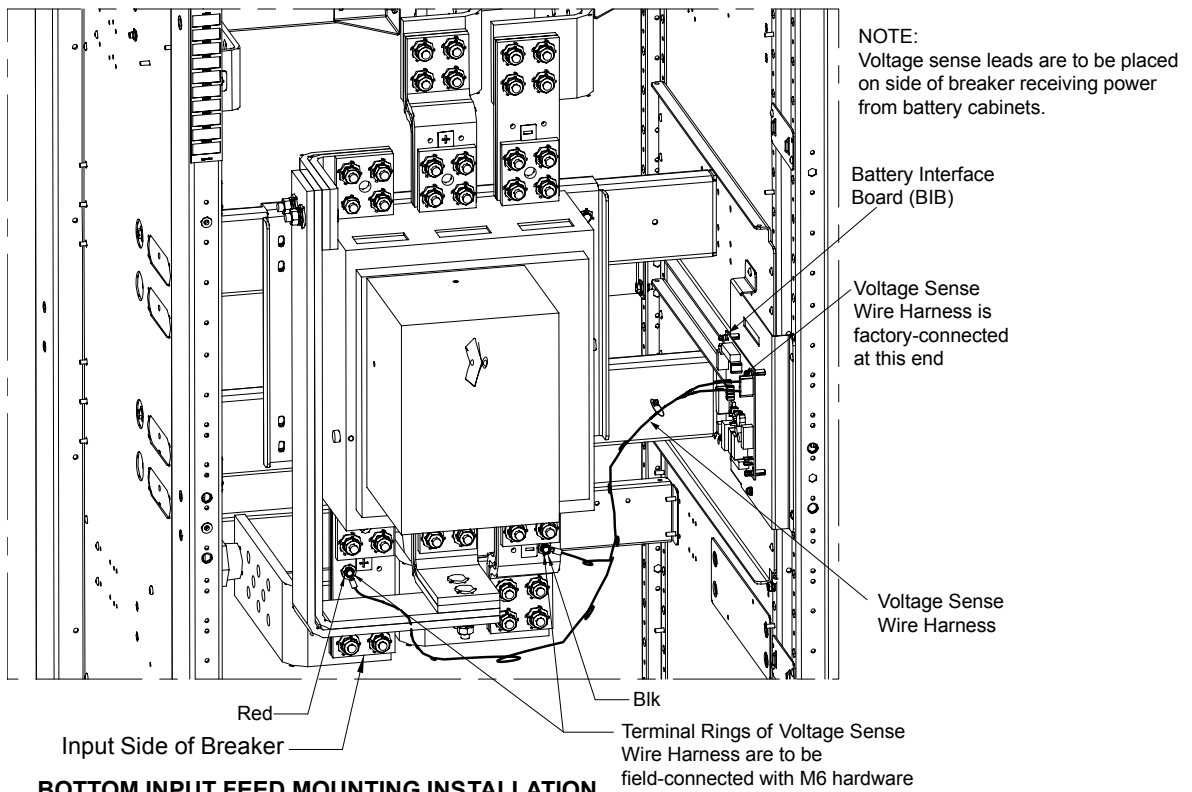


Figure 22 Voltage sense wire harness top input and bottom input



TOP INPUT FEED MOUNTING INSTALLATION



BOTTOM INPUT FEED MOUNTING INSTALLATION

Figure 23 Liebert NXL Module Battery Disconnect CAN wire harness connection

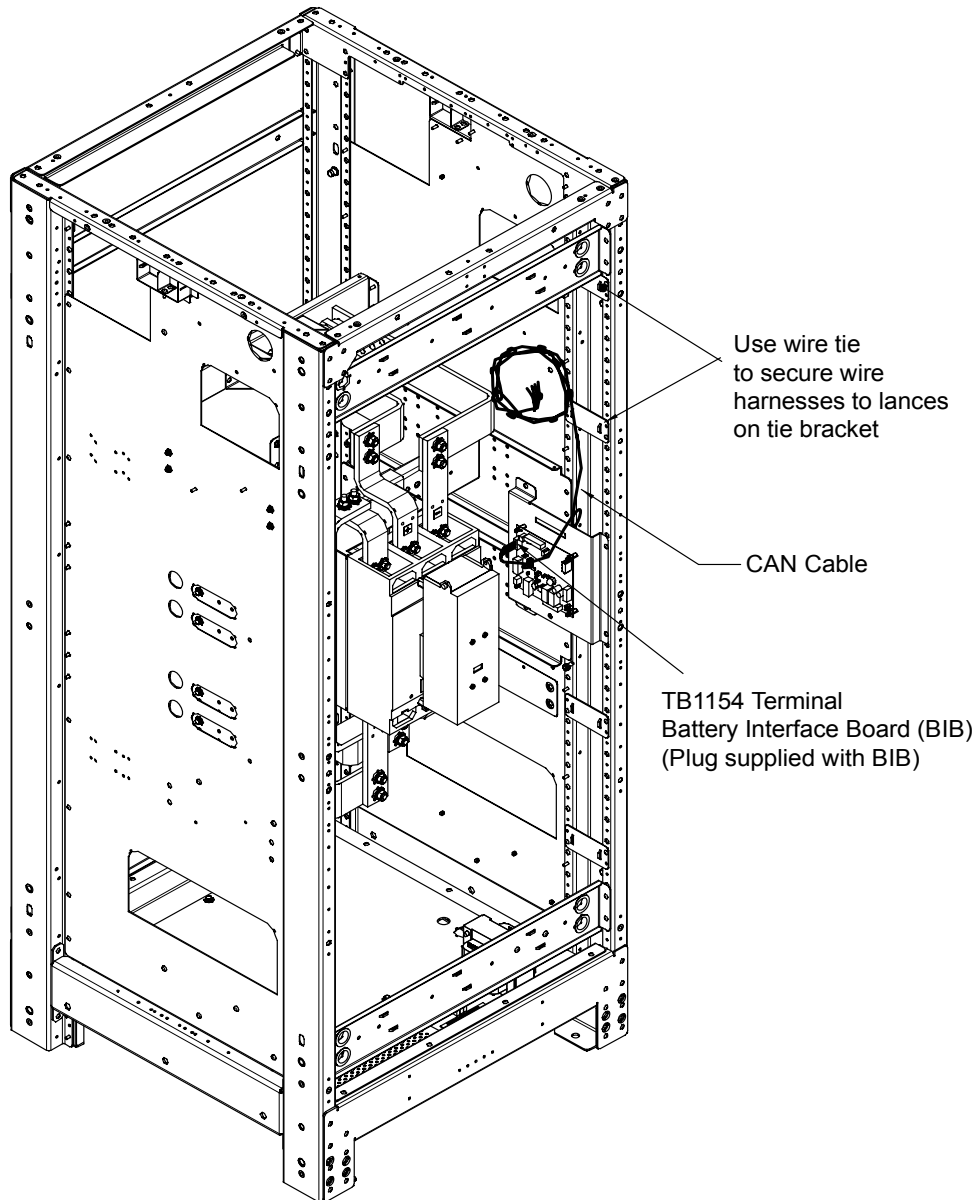


Figure 24 Attached battery cabinet connections

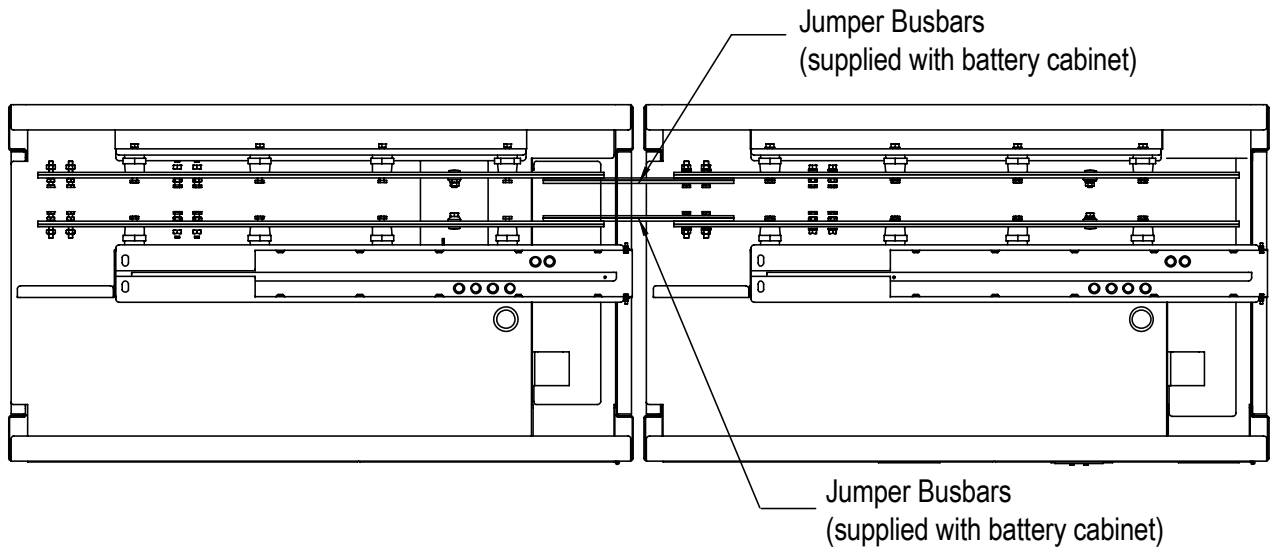
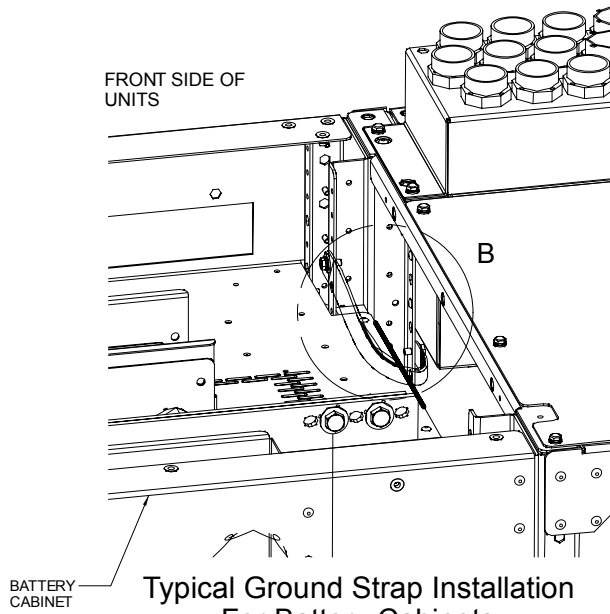
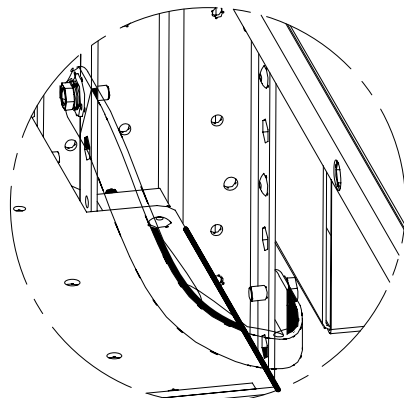


Figure 25 Ground strap location for connected cabinets

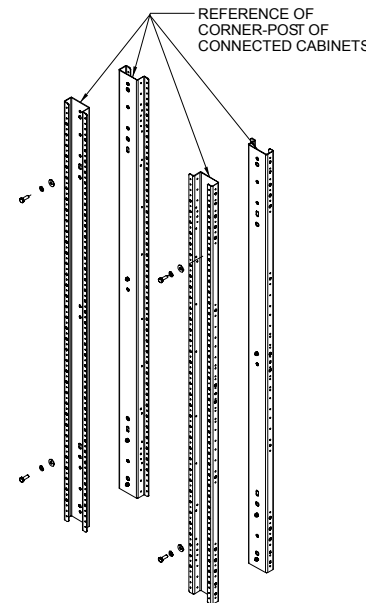


Typical Ground Strap Installation For Battery Cabinets

(ALL GROUNDING OF BATTERY CABINETS TO BE INTERNAL AND CONNECTED AT THE CORNER-POSTS)



DETAIL B



Cabinet-to-Cabinet Bolting Instructions

Figure 26 Battery cabinet interconnection wiring to 250-400kVA UPS

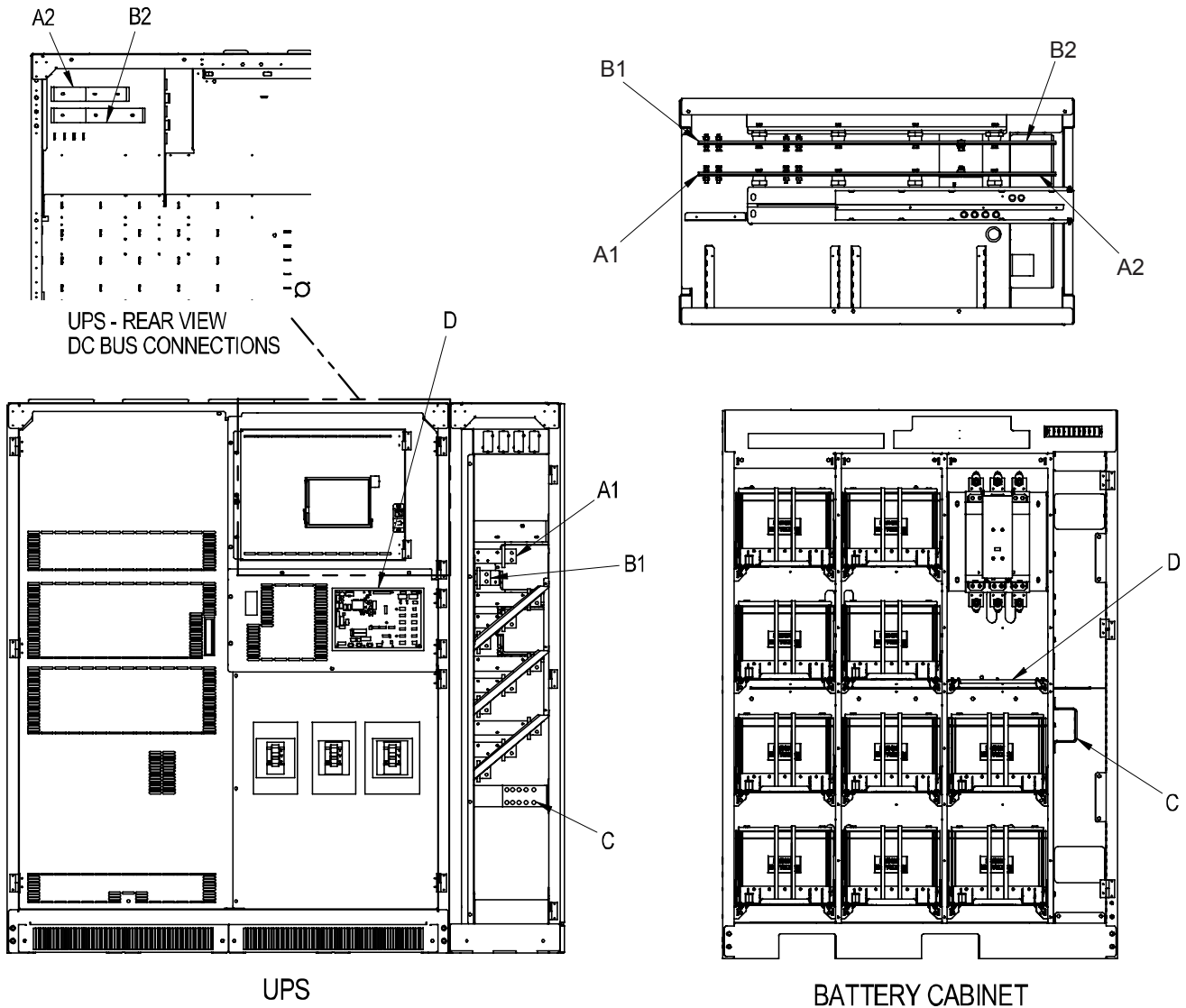


Table 1 Liebert-supplied interconnect wiring

Run	From	To	Conductors
A1	- DC+ Busbar	Battery Cabinet - DC+ Busbar	Positive Power - RH Mount/Stand Alone
B1	UPS - DC- Busbar	Battery Cabinet - DC- Busbar	Negative Power - RH Mount/Stand Alone
A2	- DC+ Busbar	Battery Cabinet - DC+ Busbar	Positive Power - Left Mount
B2	UPS - DC- Busbar	Battery Cabinet - DC- Busbar	Negative Power - Left Mount
C	UPS - Ground	Battery Cabinet - Ground	Ground *
D	UPS - External Interface Board (EIB)	Battery Cabinet - Battery Interface Board (BIB)	CAN Control Cables

* This is used only for detached cabinets. If the cabinets are attached, use the grounding shown in Figure 25.

Figure 27 Liebert NXL Module Battery Disconnect interconnect wiring to 250-400kVA UPS

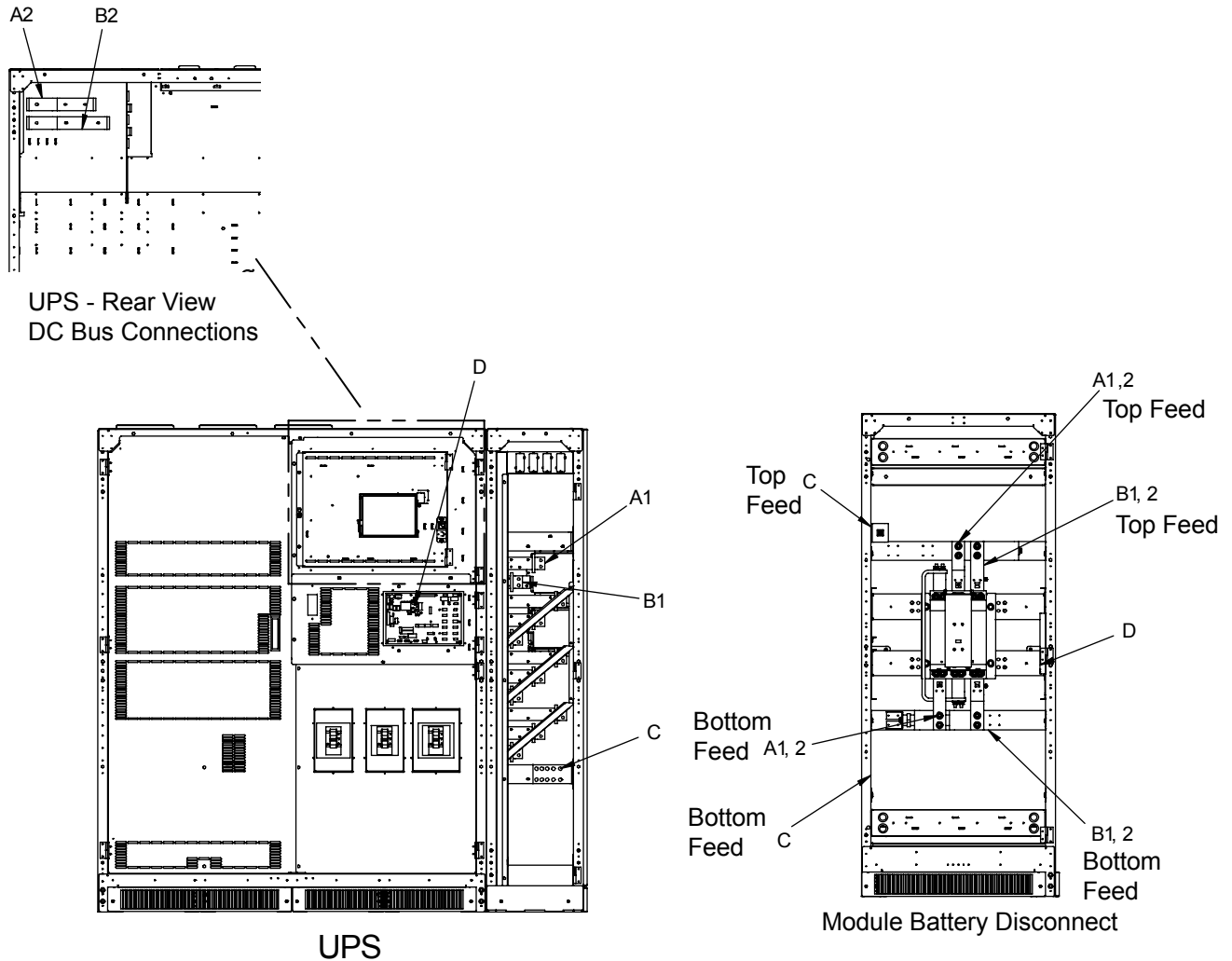


Table 2 Liebert-supplied interconnect wiring

Run	From	To	Conductors
A1	UPS - DC+ Busbar	MBD - DC + Busbar	Positive Power - Right Mount
B1	UPS - DC- Busbar	MBD - DC - Busbar	Negative Power - Right Mount
A2	UPS - DC+ Busbar	MBD - DC + Busbar	Positive Power - Left Mount
B2	UPS - DC- Busbar	MBD - DC - Busbar	Negative Power - Left Mount
C *	UPS - GROUND	MBD - GROUND	Ground
D	UPS - External Interface Board (EIB)	MBD - Battery Interface Board (BIB)	CAN Control Cables

* This is used only for detached cabinets. If the cabinets are attached, use the grounding shown in Figure 25.

Figure 28 Liebert NXL Battery Cabinet interconnect wiring to Liebert NXL Junction Cabinet

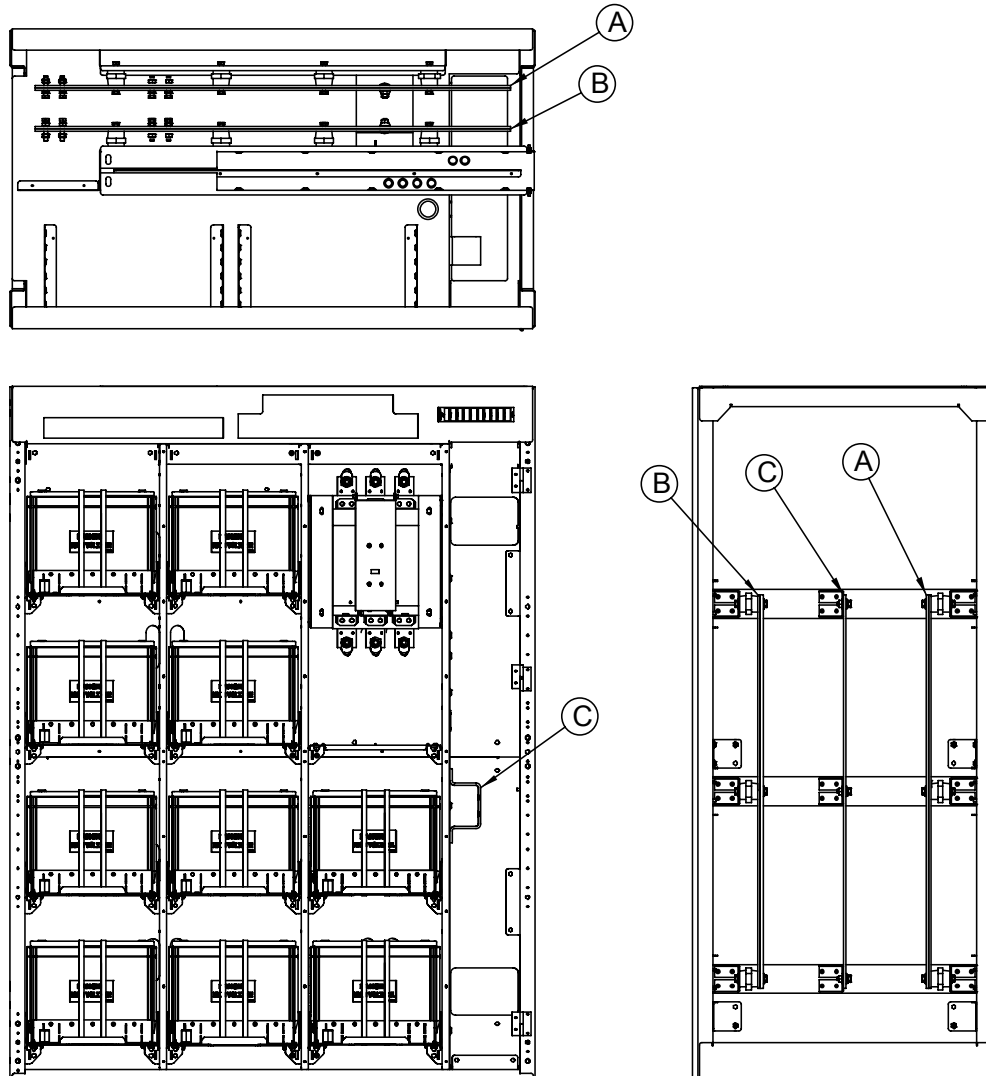


Table 3 Liebert-supplied interconnect wiring

Run	From	To	Conductors
A	Battery Cabinet Negative Bus	Junction Negative Bus	Negative DC Power
B	Battery Cabinet Positive Bus	Junction Positive Bus	Positive DC Power
C *	Battery Cabinet Ground	Junction Ground	Ground

* For detached units only

Figure 29 Liebert NXL UPS to Liebert NXL Module Battery Disconnect to wide Liebert NXL Junction Cabinet

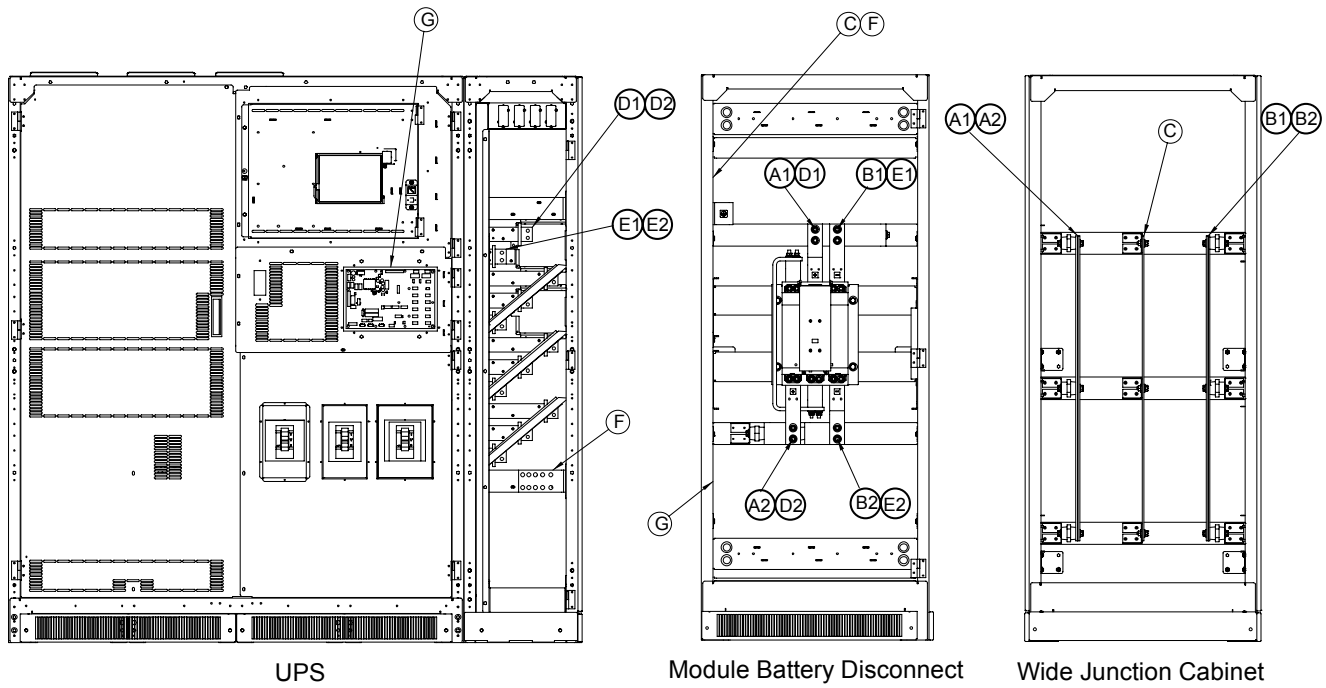


Table 4 Liebert-supplied interconnect wiring

Run	From	To	Conductors
A1	MBD - DC Positive Busbar	Junction Positive Busbar	Positive - Top Feed
A2	MBD - DC Positive Busbar	Junction Positive Busbar	Positive - Bottom Feed
B1	MBD - DC Negative Busbar	Junction Negative Busbar	Negative - Top Feed
B2	MBD - DC Negative Busbar	Junction Negative Busbar	Negative - Bottom Feed
C *	MBD Ground	Junction - Ground	Ground
D1	UPS - DC Positive Busbar	MBD - DC Positive Busbar	Positive - Top Feed
D2	UPS - DC Positive Busbar	MBD - DC Positive Busbar	Positive - Bottom Feed
E1	UPS - DC Negative Busbar	MBD - DC Negative Busbar	Negative - Top Feed
E2	UPS - DC Negative Busbar	MBD - DC Negative Busbar	Negative - Bottom Feed
F *	UPS Ground	MBD Ground	Ground
G	UPS - External Interface Board (EIB)	MBD - Battery Interface Board (BIB)	CAN Control Cables

* For detached units only

Figure 30 Liebert NXL UPS to Liebert NXL Module Battery Disconnect to Liebert NXL Battery Cabinet

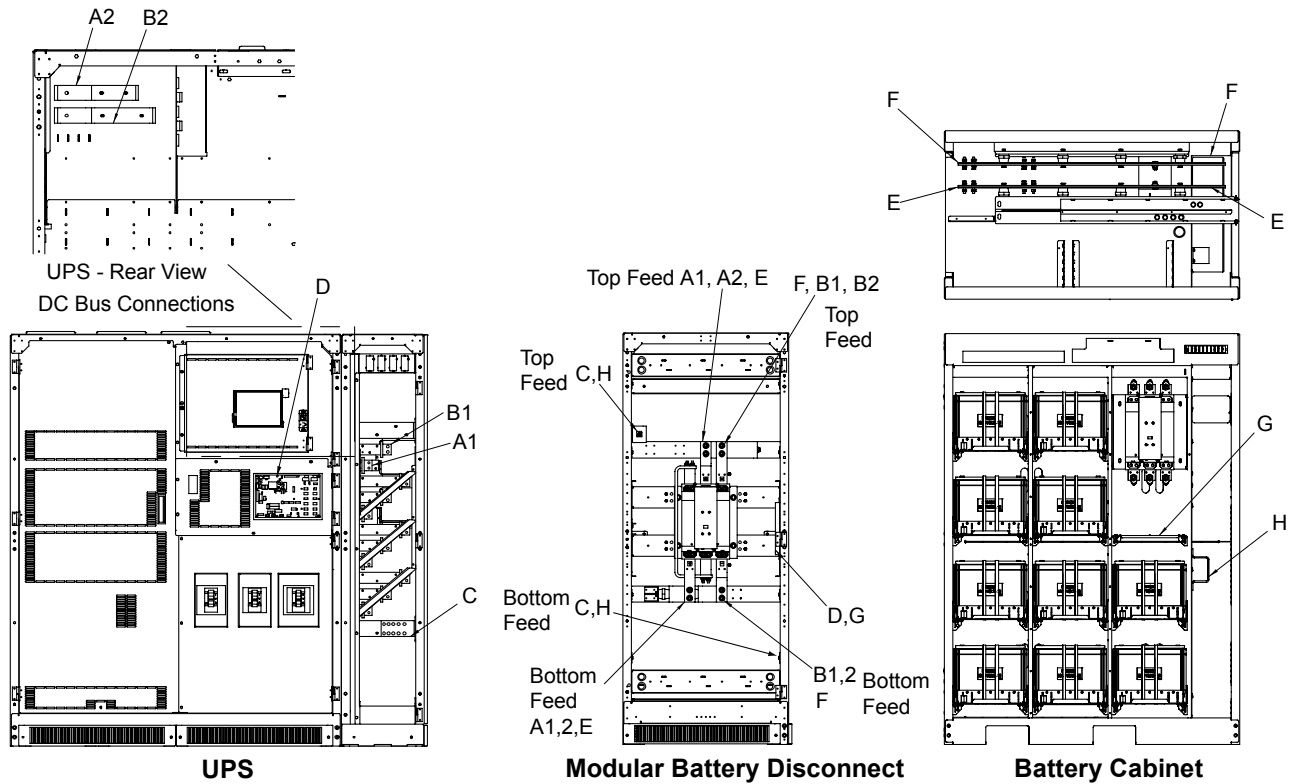


Table 5 Liebert-supplied interconnect wiring

Run	From	To	Conductors
A1	UPS - DC+ Busbar	MBD - DC+ Busbar	Positive Power - RH Mount/ Stand-Alone
B1	UPS - DC- Busbar	MBD - DC- Busbar	Negative Power - RH Mount/ Stand-Alone
A2	UPS - DC+ Busbar	MBD - DC+ Busbar	Positive Power - Left Mount
B2	UPS - DC- Busbar	MBD - DC- Busbar	Negative Power - Left Mount
C*	UPS - Ground	MBD - Ground	Ground
D	UPS - External Interface Board (EIB)	MBD - Battery Interface Board (BIB)	CAN Control Cables
E	MBD - DC+ Busbar	Battery Cabinet - DC+ Busbar	Positive Power
F	MBD - DC- Breaker	Battery Cabinet - DC- Busbar	Negative Power
G	MBD - Battery Interface Board (BIB)	Battery Cabinet - Battery Interface Board (BIB)	CAN Control Cables
H*	MBD - Ground	Battery Cabinet - Ground	Ground

* For detached units only

Figure 31 Alber battery monitoring connections

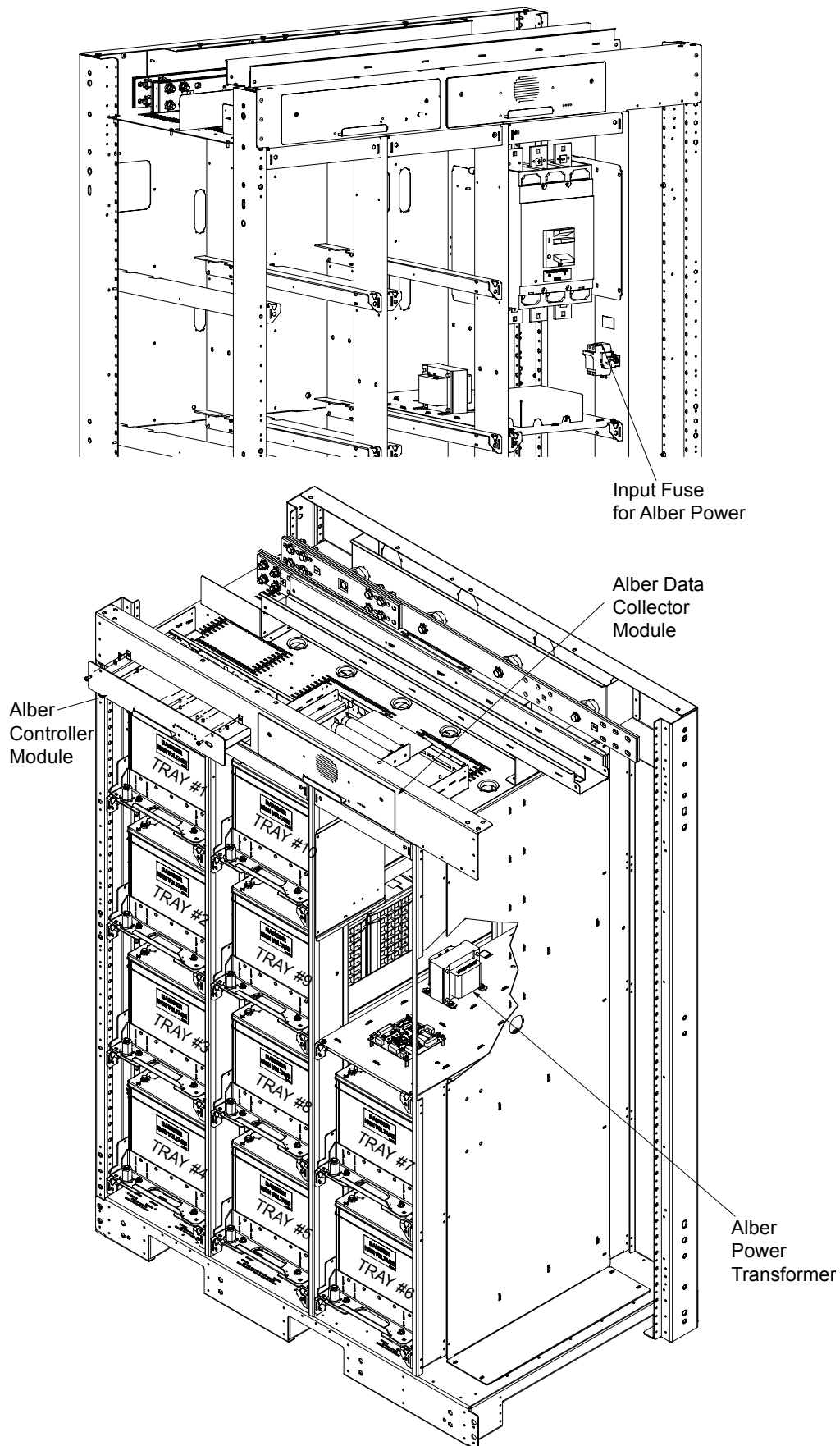


Figure 32 Battery Interface Board wiring to multiple battery cabinets

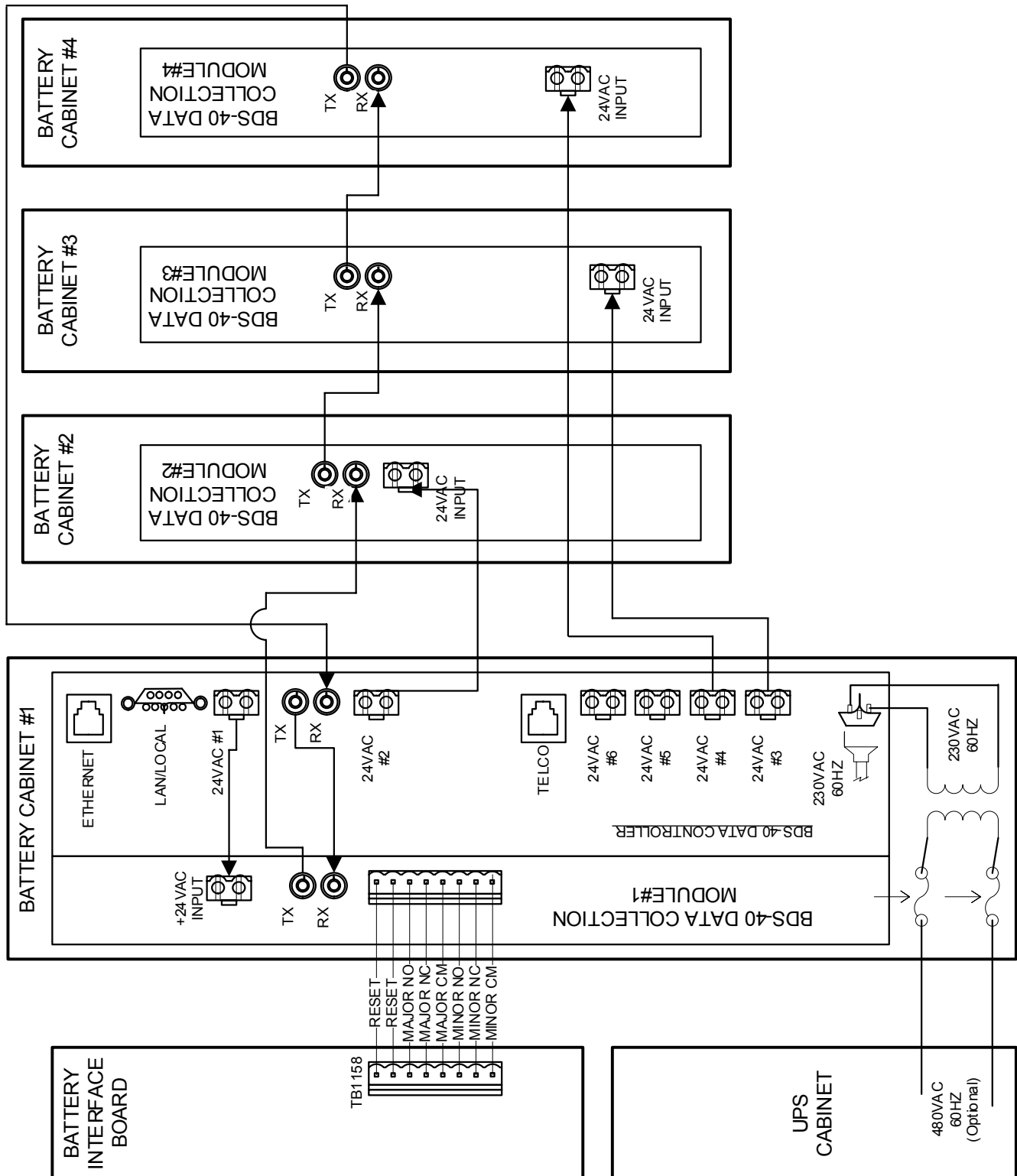
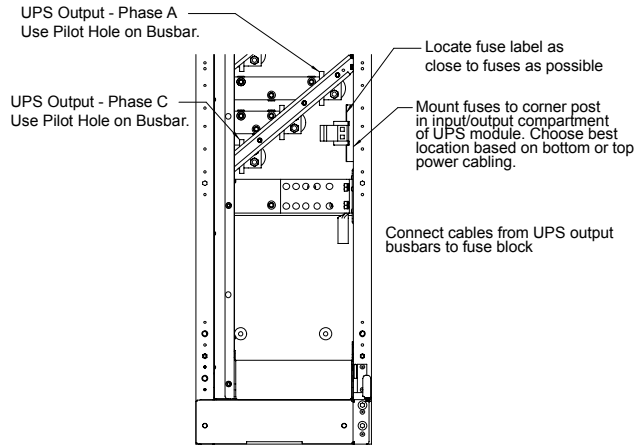
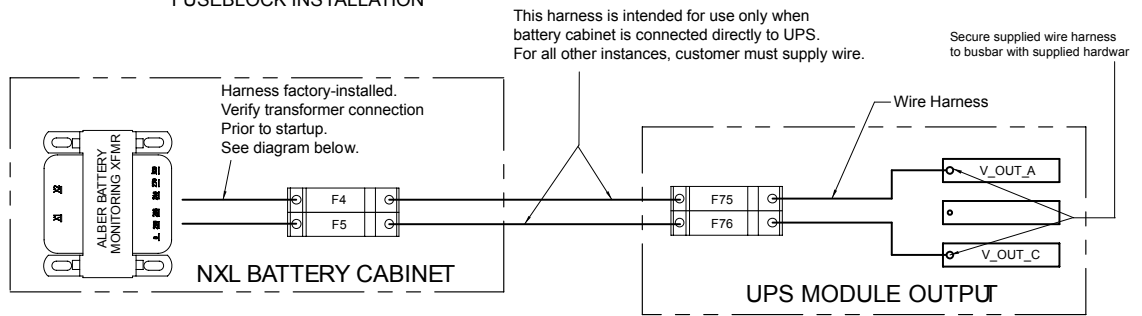


Figure 33 Alber battery monitoring assembly diagram



250, 300, & 400 KVA UPS MODULE
FUSEBLOCK INSTALLATION



XFMR CONNECTION DIAGRAM

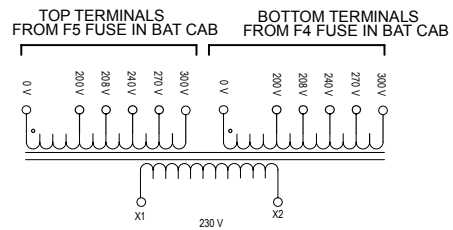
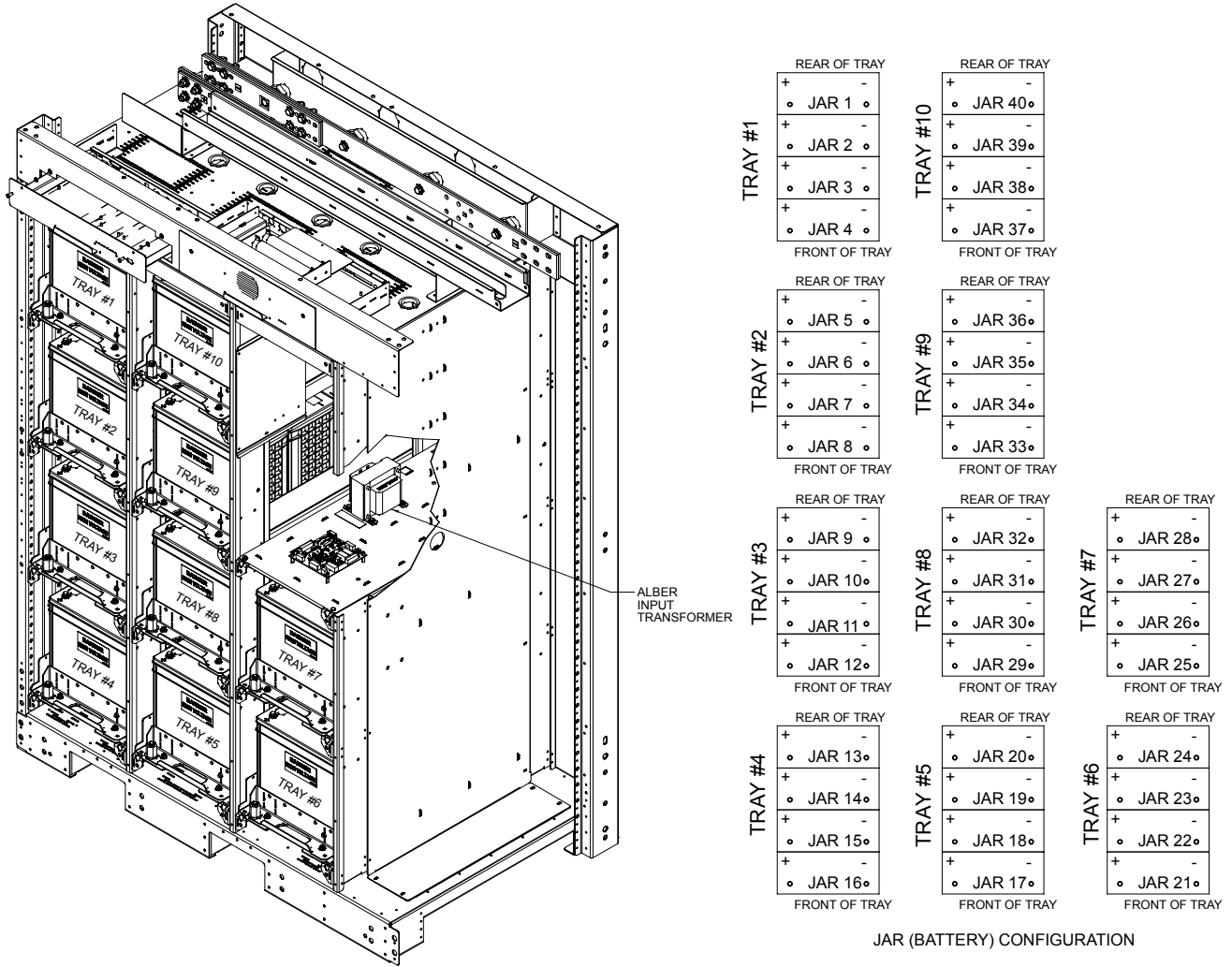


Table 6 Alber battery monitoring assembly connections

Input Voltage	Alber Transformer-2 (Wht)	Jumper	Alber Transformer-1 (Blk)	F4-F5 Fuse Rating
600	0 (Top)	300 (Top) to 0 (Bottom)	300 (Bottom)	2.25 A, 600VAC
480	0 (Top)	240 (Top) to 0 (Bottom)	240 (Bottom)	1.25 A, 600VAC
380	0 (Top)	300 (Top) to 208 (Bottom)	300 (Bottom)	1 A, 600VAC
208	0 (Top)	0 (Top) to 0 (Bottom) and 208 (Top) to 208 (Bottom)	208 (Top)	0.75A, 600VAC

Figure 34 Alber Battery Monitoring transformer location and battery configuration



4.0 SPECIFICATIONS

Table 7 Liebert NXL Battery Cabinet specifications

Battery Cabinet Parameters	Values
Battery Type	VRLA (Valve Regulated Lead Acid)
Nominal Battery Bus, VDC	480V
Battery Float Voltage, VDC	540V
Minimum EOD Voltage, VDC	384V (for VRLA / Flooded Lead Acid)
Battery Discharging Max current (EOD), A	See Table 12
Physical Parameters and Standards	
Width, in. (mm) without side panels attached	55.1 (1400)
Depth, in. (mm)	33.5 (850)
Height, in. (mm)	76.8 (1950)
Weight, lb (kg) approx.	Table 13
Color	Charcoal (ZP-0420)
Front Door Opening (for serviceability)	More than 180°
Degree of Protection for UPS Enclosure	IP 20 (with and without front door open)
Standards & Conformities	UL 1778 CSA 22.2 107.3 FCC Part 15, Class A ISTA Procedure 1H WEEE
Minimum Clearance, Top	24" (610mm)
Minimum Clearance, Back	0"
Minimum Clearance, Sides	0"
Location of Cable Entrance	Top or Bottom
Environmental	
Storage Temperature Range, °F (°C)	-13°F to 158°F (-25°C to 70°C) 74°F to 80°F (23-27°C) for optimal battery life
Operating Temperature Range, °F (°C)	32°F to 104°F (0 to 40°C) 74°F to 80°F (23-27°C) for optimal battery life
Relative Humidity	up to 95% Non-Condensing (Operating and Non-Operating)
Maximum Altitude Above MSL, ft (m)	4920 (1500) (as per IEC 62040/3) - 1% Maximum kW derate / 100m rise between 1500-3000m

Table 8 Liebert NXL Module Battery Disconnect Cabinet

Battery Parameters	Value
Nominal Battery Bus, VDC	480V
Battery Float Voltage, VDC	540V
Minimum EOD Voltage, VDC	384V (for VRLA / Flooded Lead Acid)
Battery Discharging Max current (EOD), A	See Table 11
Physical Parameters and Standards	
Width in. (mm) without side panels attached	30.9 (785)
Depth, in. (mm)	33.5 (850)
Height, in. (mm)	76.8 (1950)
Weight, lb (kg) approx.	See Table 14
Color	Charcoal (ZP-0420)
Front Door Opening (for serviceability)	More than 180°
Degree of Protection for UPS Enclosure	IP 20 (with and without front door open)
Standards & Conformities	UL 1778 CSA 22.2 107.3 FCC Part 15, Class A ISTA Procedure 1H WEEE
Minimum clearance, Top)	24" (610mm)
Minimum clearance, Back)	0"
Minimum clearance, Sides)	0"
Location of cable entrance	Top or Bottom
Environmental Parameters	
Storage Temperature Range, °F (°C)	-13°F to 158°F (-25°C to 70°C)
Operating Temperature Range, °F (°C)	32°F to 104°F (0 to 40°C)
Relative Humidity	Maximum 95% Non-Condensing (Operating and Non-Operating)
Maximum Altitude Above Mean Sea Level, ft (m)	4920 (1500) (as per IEC 62040/3) - 1% Max kW derate / 100m rise between 1500-3000m

Table 9 Liebert NXL Junction Cabinet specifications

Battery Specifications	Value
Nominal Battery Bus, VDC	480V
Battery Float Voltage, VDC	540V
Minimum EOD Voltage, VDC	384V (for VRLA / Flooded Lead Acid)
Battery Discharging Max current (EOD), A	Table 11
Physical Parameters and Standards	
Narrow Liebert NXL Junction Cabinet, Width, without side panels, in (mm)	15.5 (393)
Wide Liebert NXL Junction Cabinet, Width, without side panels, in (mm)	30.9 (785)
Depth, in (mm)	33.5 (850)
Height, in (mm)	76.8 (1950)
Weight, lb (kg) approx.	Table 14
Color	Charcoal (ZP-0420)
Degree of Protection for UPS Enclosure	IP 20
Standards and Conformities	UL 1778 CSA 22.2 107.3 FCC Part 15, Class A ISTA Procedure 1H WEEE
Minimum clearance, Top	24" (610mm)
Minimum clearance, Back	0"
Minimum clearance, Sides	0"
Location of cable entrance	Top or Bottom
Environmental Parameters	
Storage Temperature Range, °F (°C)	-13°F to 158°F (-25°C to 70°C)
Operating Temperature Range, °F (°C)	32°F to 104°F (0 to 40°C)
Relative Humidity	Maximum 95% Non-Condensing (Operating and Non-Operating)
Maximum Altitude above MSL, ft (m)	4920 (1500) (as per IEC 62040/3) - 1% maximum kW derate / 328ft rise between 4900-9800ft (100m rise between 1500-3000m)

Table 10 Alber battery monitoring option specifications

Electrical Data	Value
Input Voltage	220-600VAC
Input Current	< 0.5A
Frequency	60Hz

Table 11 Currents for Liebert NXL Module Battery Disconnect Cabinet

UPS Rating		Max Battery Current at End of Discharge	External Breaker Trip Amps
kVA	kW		
250	225	615	700
300	270	737	800
400	360	981	1000
500	450	1224	1600
625	562.5	1526	1600
750	675	1828	2000

Table 12 Battery cabinet internal breaker selection based on 5 min EOD, amps

Model Number Code	Battery Type	Battery Currents for Various Discharge Times			Required Breaker Thermal Trip Amps
		Discharge Time (Min)	Watts to Discharge to 1.60V in 5 min.	Amps @ EOD	
PR	UPS12-300MR	5	580	363	400
RR	UPS12-350MR	5	672	420	450
UR	UPS12-400MR	5	770	481	500
WR	UPS12-490MR	5	840	525	600
XR	UPS12-540MR	5	952	595	600
PX	HX300-FR	5	591	369	400
RX	HX330-FR	5	678	424	450
UX	HX400-FR	5	771	482	500
WX	HX500-FR	5	941	588	600

Table 13 Liebert NXL Battery Cabinet approximate weights

Battery Code	Manufacturer	Battery Model	Total Weight lb (kg)
PR	C&D Batteries	UPS12-300MR	3910 (1774)
RR		UPS12-350MR	4265 (1935)
UR		UPS12-400MR	4600 (2087)
WR		UPS12-490MR	5545 (2515)
XR		UPS12-540MR	5545 (2515)
PX	Energys	HX300-FR	3760 (1706)
RX		HX330-FR	4200 (1905)
UX		HX400-FR	4760 (2159)
WX		HX500-FR	5750 (2608)

Table 14 Approximate weights, Liebert NXL Module Battery Disconnect and Liebert NXL Junction Cabinets

Module Battery Disconnect Cabinet		Junction Cabinet	
Cabinet Size	Weight, lb (kg)	Cabinet Size	Weight, lb (kg)
250-400kVA	544 (247)	Narrow	255 (115)
500-750kVA	544 (247)	Wide	400 (180)

Table 15 Recommended conduit and cable sizes for Liebert NXL Module Battery Disconnect

UPS Size, kVA	Nominal Selection		Alternate Selection	
	Top Cable Entry Input Wire & Conduit Wires, G THW / FMC	Bottom Cable Entry Input Wire & Conduit Wires, G THW / RNC	Top Cable Entry Input Wire & Conduit Wires, G THW / FMC	Bottom Cable Entry Input Wire & Conduit Wires, G THW / RNC
250kVA	(2) 2.5C 2-350kcmil, #1/0AWG	(3) 2C 2-#4/0AWG, #1/0AWG	(2) 2.5C 2-350kcmil, #1/0AWG	(3) 2C 2-#4/0AWG, #1/0AWG
300kVA	(2) 2.5C 2-500kcmil, #1/0AWG	(3) 2C 2-250kcmil, #1/0AWG	(2) 2.5C 2-500kcmil, #1/0AWG	(3) 2C 2-250kcmil, #1/0AWG
400kVA	(3) 2.5C 2-500kcmil, #4/0AWG	(4) 2.5C 2-250kcmil, #4/0AWG	(3) 2.5C 2-500kcmil, #4/0AWG	(4) 2.5C 2-250kcmil, #4/0AWG
500kVA	(4) 3C 2-750kcmil, #4/0AWG	(4) 3.5C 2-750kcmil, #4/0AWG	(5) 2.5C 2-500kcmil, #4/0AWG	(5) 3C 2-500kcmil, #4/0AWG
625kVA	(4) 3C 2-750kcmil, #4/0AWG	(4) 3.5C 2-750kcmil, #4/0AWG	(5) 2.5C 2-500kcmil, #4/0AWG	(5) 3C 2-500kcmil, #4/0AWG
750kVA	(5) 3.5C 2-750kcmil, 250kcmil	(5) 3.5C 2-750kcmil, 250kcmil	(6) 3C 2-500kcmil, 250kcmil	(6) 3C 2-500kcmil, 250kcmil

The recommendations in this table are guidelines only and are superseded by local regulations and codes of practice where applicable:

1. Take special care when determining the size of the neutral cable, because current circulating on the neutral cable may be greater than nominal current in the case of non-linear loads. Refer to the values given in the UPS electrical characteristics in this table.
2. The ground conductor should be sized according to the fault rating, cable lengths, type of protection, etc. The ground cable connecting the UPS to the main ground system must follow the most direct route possible.
3. Consideration should be given to the use of paralleled smaller cables for heavy currents, as this can ease installation considerably.
4. When laying the power cables, do not form coils. Coiling power cables increases the likelihood of electromagnetic interference.

Table 16 Battery torque values

Battery Code	Manufacturer	Battery Model	Torque Value in-lb (Nm)
PR	C&D Batteries	UPS12-300MR	110 (12.4)
RR		UPS12-350MR	110 (12.4)
UR		UPS12-400MR	110 (12.4)
WR		UPS12-490MR	110 (12.4)
XR		UPS12-540MR	110 (12.4)
PX	Energysys	HX300-FR	65 (7.3)
RX		HX330-FR	65 (7.3)
UX		HX400-FR	65 (7.3)
WX		HX500-FR	65 (7.3)

Table 17 Torque specifications, unless otherwise labeled

Nut and Bolt Combinations		
Bolt Shaft Size	Grade 2 Standard lb-in (Nm)	Electrical Connections with Belleville Washers lb-in (Nm)
1/4	53 (6.0)	46 (5.2)
5/16	107 (12)	60 (6.8)
3/8	192 (22)	95 (11)
1/2	428 (48)	256 (29)
Circuit Breakers with Compression Lugs (For Power Wiring)		
Current Rating	lb-in (Nm)	—
400 - 1200 Amps	300 (34)	—
Circuit Breakers with Compression Lugs (For Control Wiring)		
AWG Wire Size or Range	lb-in (Nm)	—
#22 - #14	3.5 to 5.3 (0.4 to 0.6)	—

Notes

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