



Liebert®

Large UPS Battery System

Installer/User Guide

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Technical Support Site

If you encounter any installation or operational issues with your product, check the pertinent section of this manual to see if the issue can be resolved by following outlined procedures. Visit <https://www.Vertiv.com/en-us/support/> for additional assistance.

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1 IMPORTANT SAFETY INSTRUCTIONS

SAVE THESE INSTRUCTIONS

This manual contains important instructions that should be followed during installation, operation, and maintenance of your Liebert® Large UPS Battery System. Read this manual thoroughly, paying special attention to the sections that apply to your installation, before working with the UPS and battery system. Retain this manual for use by installing personnel.



WARNING! Risk of electrical shock. Can cause personal injury or death. This UPS has several circuits that are energized with high DC as well as AC voltages. Check for voltage with both AC and DC voltmeters before working within the UPS. Check for voltage with both AC and DC voltmeters before making contact. Only properly-trained and qualified personnel wearing appropriate safety headgear, gloves, shoes and glasses should be involved in installing the equipment or preparing for installation. When performing maintenance on any part of the equipment under power, service personnel and test equipment should be standing on rubber mats. 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. Improper handling can cause equipment damage, injury or death. Because the weight distribution in the cabinet is uneven, use extreme care while handling and transporting. Take extreme care when handling UPS cabinets to avoid equipment damage or injury to personnel. 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. For weights, see [Specifications](#) on page 29.



WARNING! Risk of electrical shock and fire. Can cause equipment damage, personal injury or death. Only normal safety precautions are necessary under typical operation and with all UPS doors closed. The area around the UPS system should be kept free of puddles of water, excess moisture and debris. Only test equipment that is 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 with the UPS or using tools to work on any UPS component. Dangerously high potential electric charges may exist at the capacitor banks and at the DC connections even when input power is turned Off. All wiring must be installed by a properly trained and qualified electrician. All power and control wiring must comply with all applicable national, state and local codes. 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.

NOTICE

This unit complies with the limits for a Class A digital device, pursuant to Part 15 Subpart J of 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.

NOTE: Materials sold hereunder cannot be used in the patient vicinity (e.g., use where UL, cUL or IEC 60601-1 is required). Medical applications such as invasive procedures and electrical life support equipment are subject to additional terms and conditions.

2 MECHANICAL INSTALLATION

2.1 Pre-Installation Planning

This section describes the requirements that must be taken into account when planning the positioning and cabling of the UPS and related equipment.

Installing personnel should observe these general procedures and practices. The particular conditions of each site will determine the applicability of such procedures.



WARNING! Risk of electrical shock. Can cause injury or death. Special care must be taken when working with the batteries associated with this equipment. When the batteries are connected together, the battery-terminal voltage will exceed 400VDC and is potentially lethal.

NOTE: All equipment not referred to in this manual is shipped with details of its own mechanical and electrical installation.

NOTICE

Risk of incorrect input power connection. Can cause equipment damage.

The standard Liebert® UPS is suitable for connection to 60-Hz, 3-phase, 3-wire-plus-ground input power.

NOTE: Do not apply electrical power to the UPS equipment before the arrival of the commissioning engineer. Connecting power before the commissioning engineer determines the system is properly installed may void the warranty.

2.2 Preliminary Checks

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

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

2.3 Environmental Considerations

2.3.1 Battery Room

The Battery System is intended for indoor installation and should be located in a cool, dry, clean-air environment with adequate ventilation to keep the ambient temperature within the specified operating range (see [Specifications](#) on page 29).

Temperature is a major factor in determining battery life and capacity. In a normal installation, the battery temperature should be kept between 59 and 77°F (15°C and 25°C). Operating above this range will reduce the battery life; operating below this range will reduce the battery capacity.

NOTE: Battery cabinets are convection-cooled. Keep batteries away from main heat sources, main air inlets and similar heating, ventilation and cooling features. These can cause inconsistent temperatures in sections of the batteries and reduce battery life or capacity.

2.3.2 Storing the UPS and Batteries for Delayed Installation

If the system will not be installed immediately, store it indoors in a clean, dry, and cool location (see [Specifications](#) on page 29). The batteries' requirements dictate the storage conditions. Unpack, install and charge batteries as soon as possible after delivery.

NOTICE

Risk of failure to properly charge batteries. Can cause permanent damage to batteries and void the warranty.

Batteries will discharge during storage. Batteries must be recharged as recommended by the battery manufacturer. A notice of "Charge Before Date" is affixed to each cabinet that has batteries inside. The "Charge Before Date" is calculated based on storing the batteries at 77°F (25°C). Storage at a higher temperature will increase the rate of self-discharge, which requires earlier recharge. Consult the battery manufacturer on how to determine when the batteries need to be recharged.

2.4 Positioning

The cabinet is structurally designed to permit lifting from the base with a forklift, pallet jack or similar equipment.

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

Removable panels on the top are secured by screws. The door can be opened for access to the power connection bars, auxiliary terminal blocks and power isolators. The front door can be opened 180 degrees for service and installation.

2.4.1 Moving the Cabinets

Plan the travel route between the point of arrival and the unit's final position to make sure that all passages are wide enough for the unit and that floors are capable of supporting its weight. Check that doorways, lifts, ramps and so on are adequate and that there are no impassable corners or changes in the level of corridors that would prevent passage.

Ensure that the cabinet weight is within the designated surface weight loading (kg/cm^2) of any handling equipment. For weights, see [Specifications](#) on page 29.

Move the battery cabinet with a forklift or similar equipment. The bottom structure of the cabinet will support the unit only if the forks are completely beneath the unit.

Ensure that any equipment used in moving the cabinet has sufficient lifting capacity to transport the unit. Care must be taken to protect the panels. Do not tilt the cabinet more than 15 degrees.

Handling with straps is not authorized.



WARNING! Risk of heavy unit falling over. Improper handling can cause equipment damage, injury or death. Because the weight distribution in the cabinet is uneven, use extreme care while handling and transporting. Take extreme care when handling UPS cabinets to avoid equipment damage or injury to personnel. 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. For weights, see [Specifications](#) on page 29.

2.4.2 Clearances

The battery system has no ventilation grilles at either side or at the rear. Leave a distance of 24 in. (610 mm) between the top of the unit and any overhead obstacles or ceiling for service access and adequate air circulation. Clearance around the front of the equipment should be sufficient to enable free passage of personnel with the doors fully opened.

2.4.3 Raised-Floor Installations

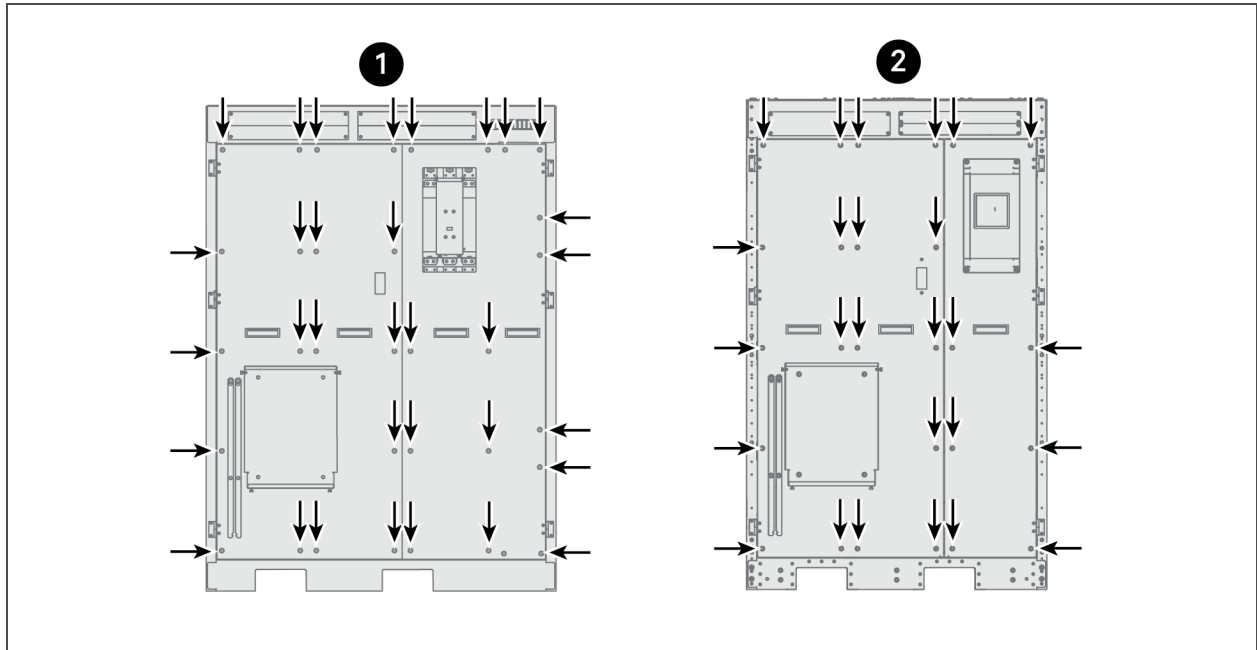
If the equipment will be installed on a raised floor, mount it on a pedestal suitably designed to accept the equipment-point loading. Refer to the base view to design this pedestal.

2.4.4 Removing Shipping Bolts

Cabinets with top-terminal and front-terminal batteries ship with extra bolts installed on the interior doors. Once the cabinet is in the final position, you can remove the bolts. See **Figure 2.1** on the next page, for the shipping-bolt locations.

NOTE: The outer doors are not shown in **Figure 2.1** on the next page.

Figure 2.1 Shipping Bolts on Inner Doors



Item	Description
1	Standard-width cabinet
2	Reduced-width cabinet

2.5 System Configuration

A UPS system comprises a number of equipment cabinets, depending on the individual system design requirements. In general, all the cabinets in an installation are the same height.

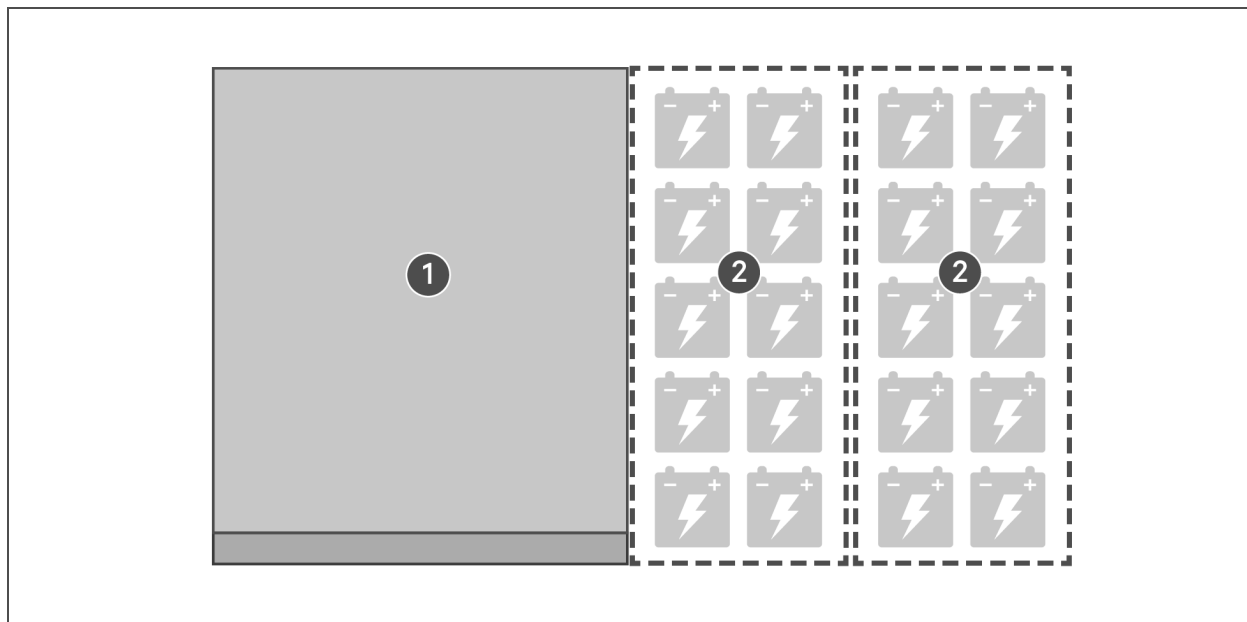
NOTE: If you are bolting cabinets together, remove the side panels before beginning installation.

- **UPS with connected battery cabinets**—The battery cabinets are connected to the UPS and internally wired. The battery cabinets must be installed on the right of the UPS in a connected system. On 600-kVA and lower models, the battery-wiring cabinet is a separate cabinet installed on the right side of the UPS between the UPS and battery cabinets.
- **Stand-alone, interconnected battery cabinets**—Shown in **Figure 2.3** on page 9, with the battery-junction cabinet on one end. The battery cabinets are interconnected with the battery-wiring cabinet, but are not connected to the right side of the UPS. In this configuration, the battery-junction cabinet may be on either end or between the battery cabinets.
- **Stand-alone battery system**—The battery-cabinet system stands alone. In this configuration, there is no junction cabinet, and the battery cabinets are not connected to the UPS. Battery power cables are routed directly to the DC busbars in the UPS I/O cabinet.

NOTE: Make sure that you complete all cabinet and battery interconnections before making any power cabling connections. The interconnects are very hard to access after the power wiring is complete. Refer to the submittal drawings that shipped with the battery system, or contact your Vertiv sales representative for the drawings.

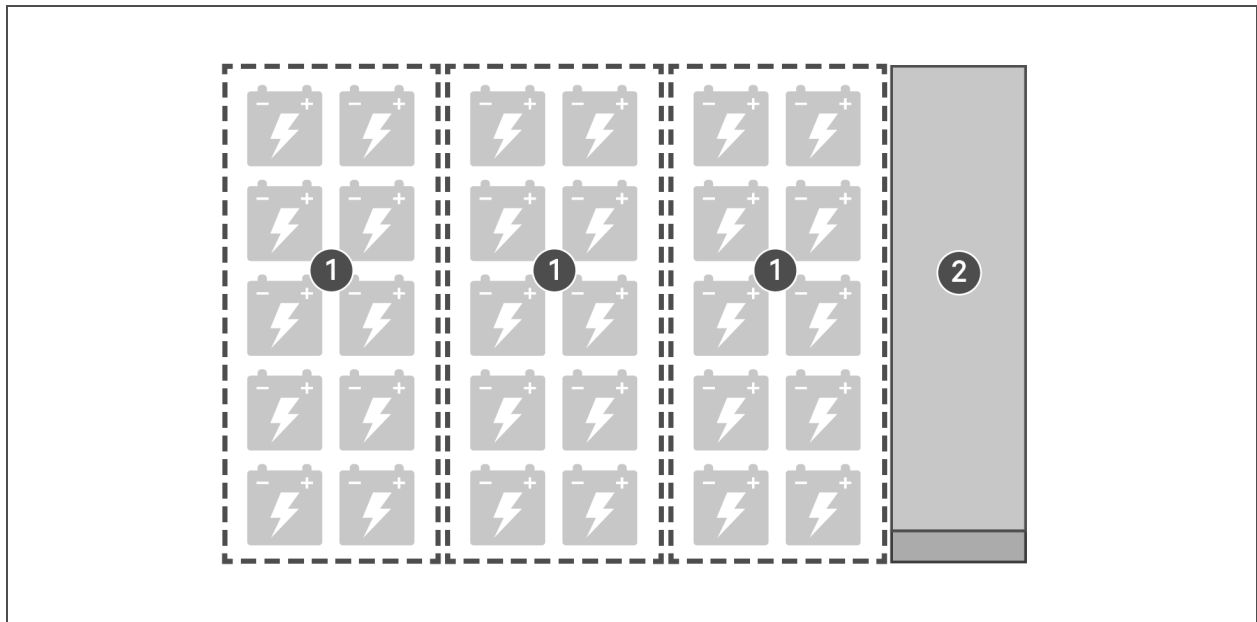
The detailed arrangement and cabinet dimensions for your Battery Cabinet is described in the installation drawings. Refer to the appropriate illustrations for your unit included in submittal drawings that shipped with the battery system, or contact your Vertiv sales representative for the drawings.

Figure 2.2 Connected and Internally-Wired UPS System



Item	Description
1	UPS
2	Battery cabinets

Figure 2.3 Stand-Alone, Interconnected Battery Cabinets



Item	Description
1	Battery cabinet
2	Junction cabinet

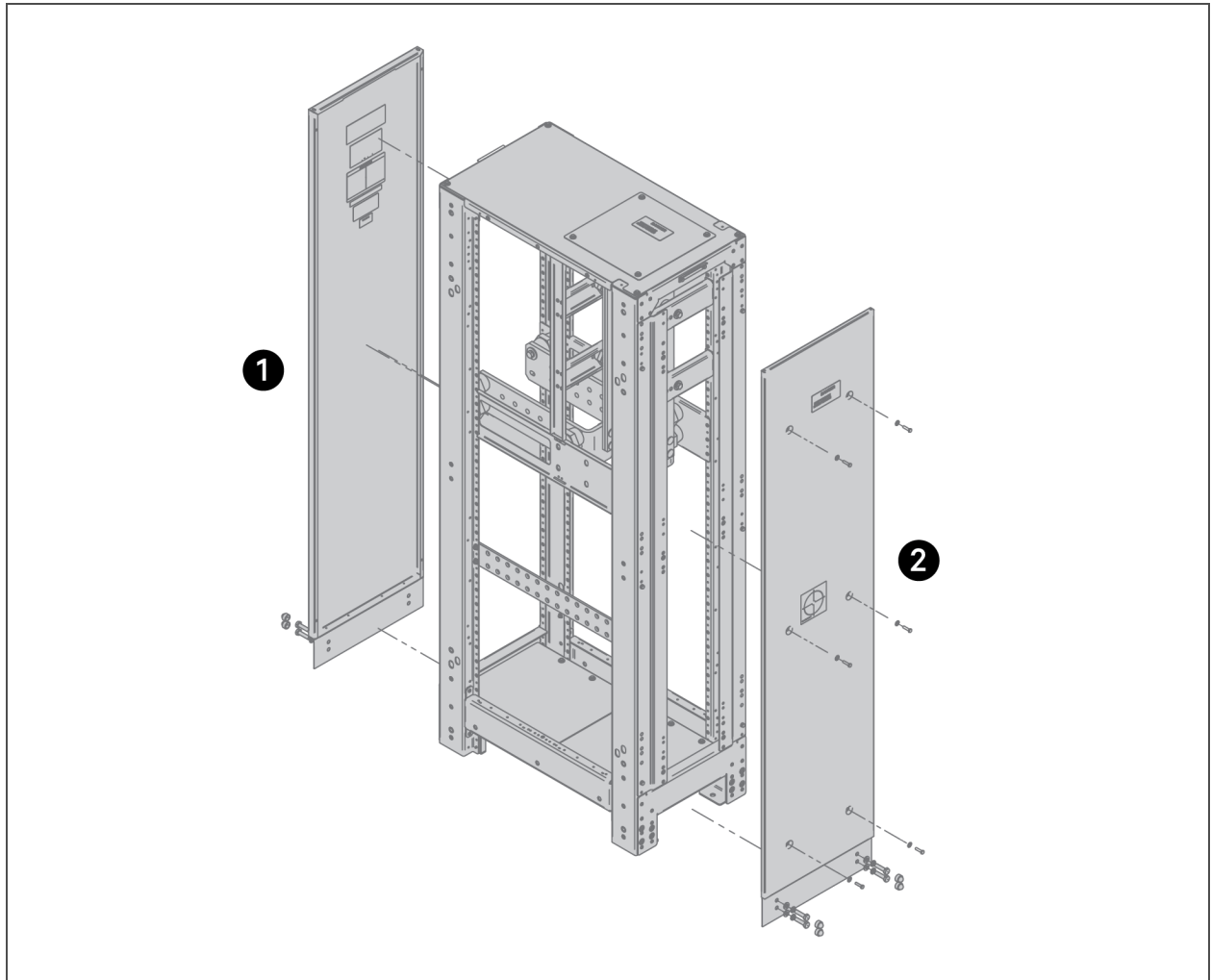
2.6 Installing a Junction Cabinet

The junction cabinet extends the busbars from the battery cabinet and provides space for routing the power cables to the UPS.

NOTE: Stand-alone battery cabinets do not include a junction cabinet.

Junction cabinets vary in width, depending on the rating of your system. **Figure 2.4** on the next page, shows an example assembly of a 17in. junction cabinet. For details of assembly, busbar installation and cable routing, refer to the submittal drawings that shipped with the battery system, or contact your Vertiv sales representative for the drawings.

Figure 2.4 Example Junction Cabinet Assembly



Item	Description
1	Front
2	Rear

3 ELECTRICAL INSTALLATION

These guidelines are for qualified installers who must have knowledge of local wiring practices pertaining to the equipment to be installed.



WARNING! Risk of electrical shock. Can cause injury or death. The UPS contains high AC and DC voltages. Check for voltage with AC and DC voltmeters before working within the UPS. Only properly trained and qualified personnel wearing appropriate, OSHA-approved PPO should prepare to install or install the UPS.

3.1 Grounding Configuration for Battery Systems

Battery cabinet systems must be connected as floating (ungrounded) systems.

Center-tapped or grounded battery systems are not possible with battery cabinet systems.

Whether the battery system is open-rack or cabinet, the metal rack parts or cabinet must be grounded to the UPS-module ground bus.

3.2 Connecting Equipment Ground Cables and Straps

The grounding conductor must be connected to the ground busbar and bonded to each cabinet in the system. For the location of the ground busbar for your system, see the appropriate illustrations for your unit included in the submittal drawings that shipped with the battery system, or contact your Vertiv sales representative for the drawings.

For connected or attached cabinets, ground cables and hardware are supplied. For detached or stand-alone cabinets, the cables and hardware are field-supplied. See the terminal detail drawings for the ground busbar's location.

All cabinets and cabling must be grounded in accordance with local regulations.

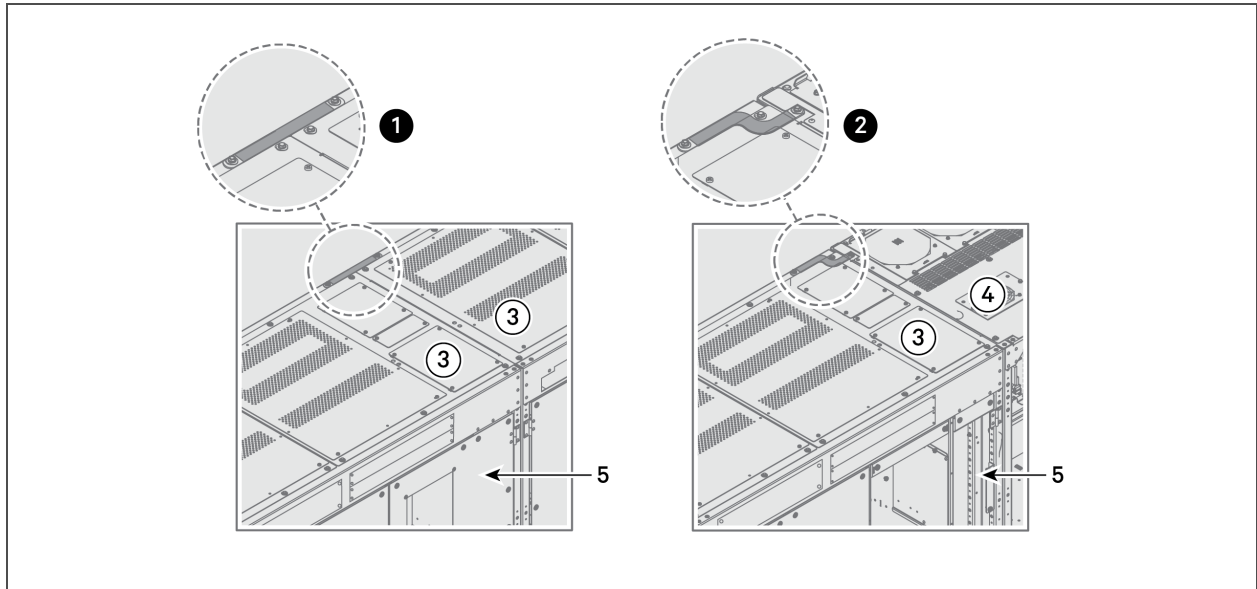


WARNING! Failure to follow adequate grounding procedures can result in electric shock hazard to personnel, or the risk of fire, should a ground fault occur. All operations described in this section must be performed by properly trained and qualified electricians or technical personnel. If any difficulties are encountered, contact Vertiv Technical Support, <http://www.Vertiv.com/en-us/support/>.

Once the equipment is positioned and secured, refer to the appropriate illustrations for your unit included in submittal drawings that shipped with the battery system, or contact your Vertiv sales representative for the drawings, and complete the following steps:

1. Open the exterior and interior panels on the front of the I/O sections.
2. Connect the ground cable to the equipment ground busbar in the I/O sections.
3. For a connected/attached battery system, connect ground straps. See **Figure 3.1** on the next page.

Figure 3.1 Typical Ground Strap Connections between Cabinets



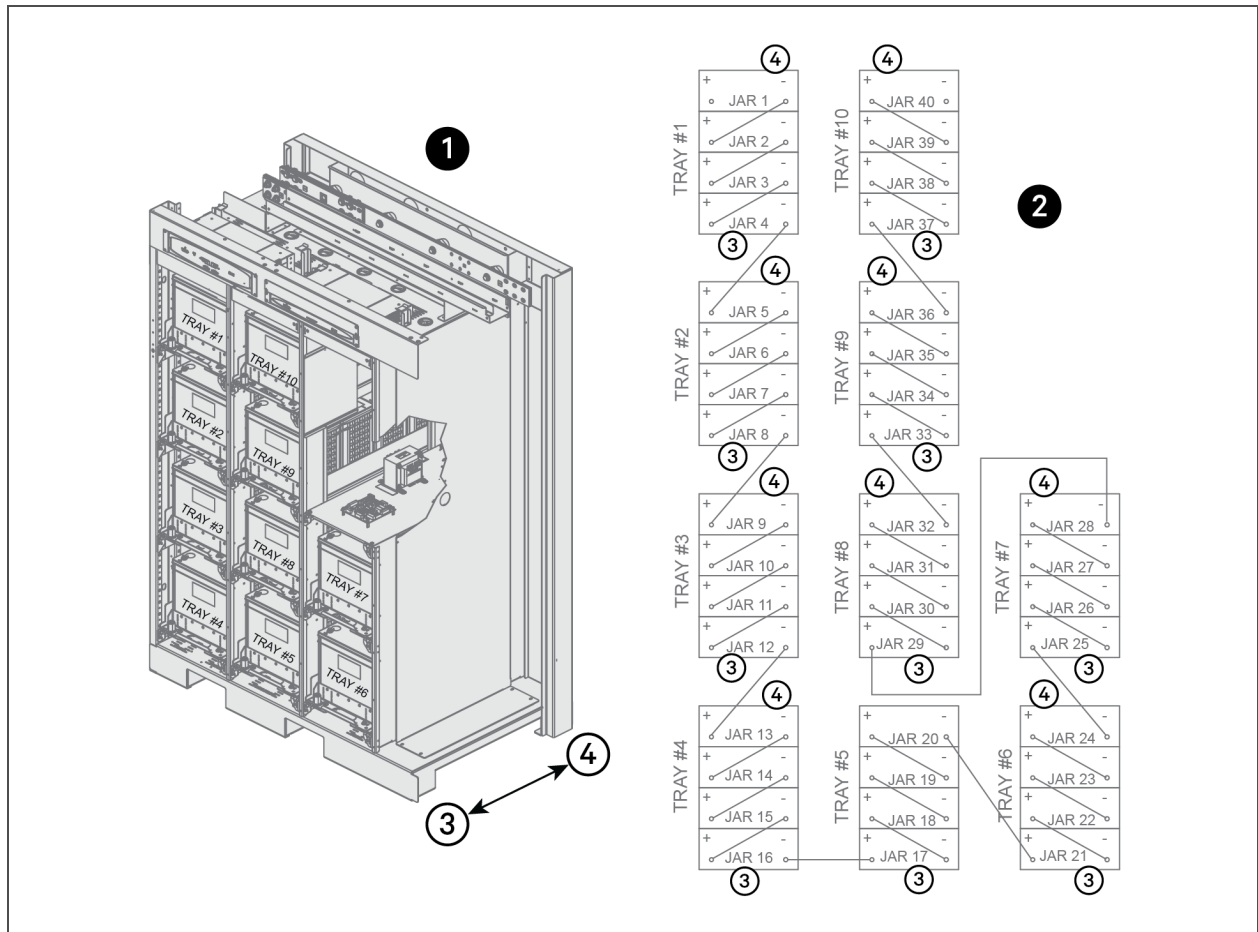
Item	Description
1	Example ground strap connection between battery cabinets.
2	Example ground strap connection between battery cabinet and a UPS or other type of cabinet.
3	Battery cabinet
4	UPS or junction box
5	Front-side of units

3.3 Interconnecting Battery Cables in a Top-Terminal Cabinet

NOTE: Make sure that you complete all cabinet and battery interconnections before making any power cabling connections. The interconnects are very hard to access after the power wiring is complete. Refer to the submittal drawings that shipped with the battery system, or contact your Vertiv sales representative for the drawings.

Figure 3.2 on the facing page, shows the interconnection between each battery tray and battery jar.

Figure 3.2 Top-Terminal Cabinet Battery-Interconnection Layout



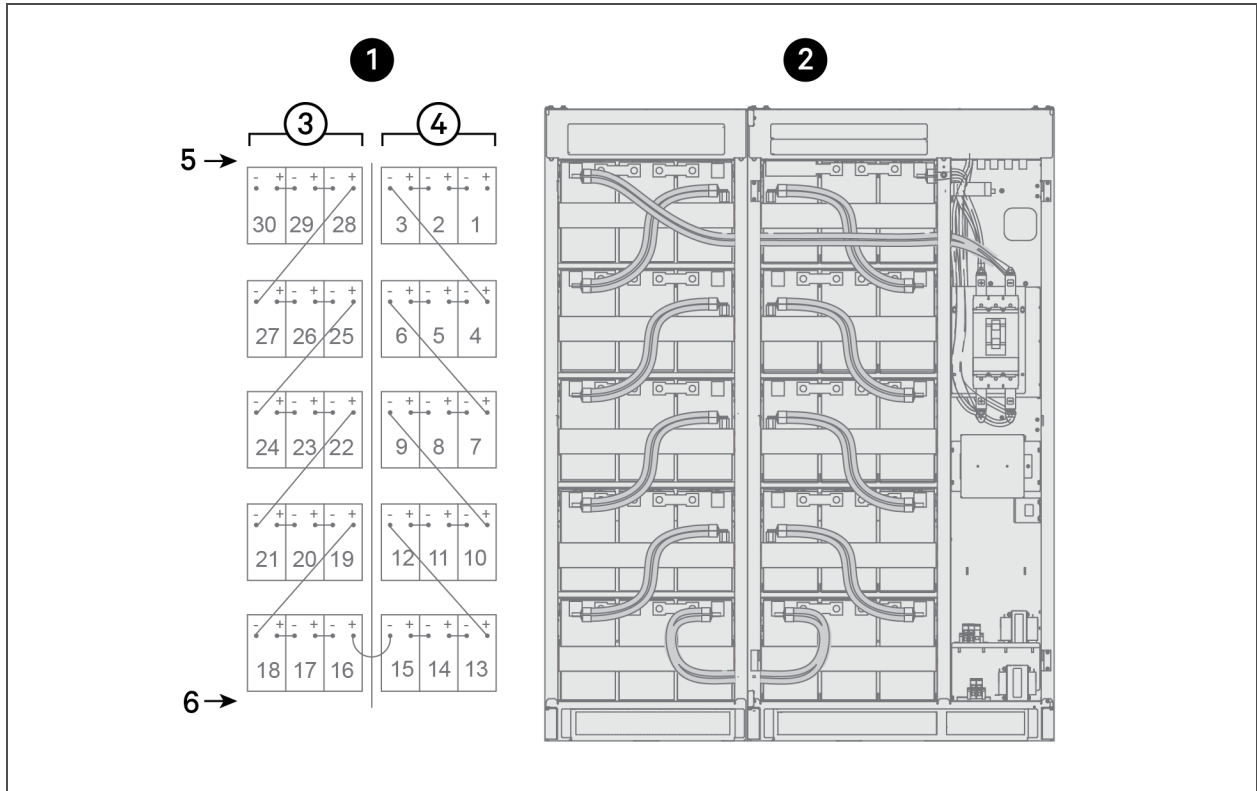
Item	Description
1	Tray location
2	Cable interconnection
3	Front
4	Rear

3.4 Interconnecting Battery Cables in a Front-terminal Cabinet

NOTE: Make sure that you complete all cabinet and battery interconnections before making any power cabling connections. The interconnects are very hard to access after the power wiring is complete. Refer to the submittal drawings that shipped with the battery system, or contact your Vertiv sales representative for the drawings.

Figure 3.3 on the next page, shows the interconnection between each battery tray and battery jar.

Figure 3.3 Front-Terminal Cabinet Battery-Interconnection Layout



Item	Description
1	Cable interconnection
2	Battery location
3	Cabinet A
4	Cabinet B
5	Top of cabinet
6	Bottom of cabinet

NOTE: Ensure that the CT is secured to the cables

3.5 Connecting DC Input Power

NOTE: Make sure that you complete all cabinet and battery interconnections before making any power cabling connections. The interconnects are very hard to access after the power wiring is complete. Refer to the submittal drawings that shipped with the battery system, or contact your Vertiv sales representative for the drawings.



WARNING! Risk of electrical shock. Can cause injury or death. The UPS contains high AC and DC voltages. Check for voltage with AC and DC voltmeters before working within the UPS. Only properly trained and qualified personnel wearing appropriate, OSHA-approved PPO should prepare to install or install the UPS.



WARNING! Risk of electrical shock. Can cause injury or death. If the load equipment will not be ready to accept power on the arrival of the commissioning engineer, ensure that the system output cables are safely isolated at their termination.



WARNING! Risk of electrical shock. Can cause injury or death. When connecting the cables between the battery extremities to the circuit breaker, always connect the circuit breaker end of the cable first.

The battery power cables require lug-type terminations and are connected to busbars in the I/O sections. The terminal details and connections for your battery system are described in the installation drawings. Refer to the submittal drawings that shipped with the battery system, or contact your Vertiv sales representative for the drawings.

UPS models with the static bypass only employ busbars that are contained by the battery cabinet and the input/output cabinet.

UPS models with the back-feed disconnect, common mode choke or bypass sharing inductors or with any combination of these options employ busbars that extend through openings in the tops of the adjacent battery cabinet and input/output cabinet. These busbars require a protective, factory-supplied shroud that is attached to the input/output cabinet and the adjacent attached battery cabinet. The protective, factory-supplied shroud is shown in **Figure 3.4** on the next page.

When Liebert® battery cabinets are attached to the UPS, the busbars and cables for the power connections are factory-supplied.

To connect power cables for a battery system:

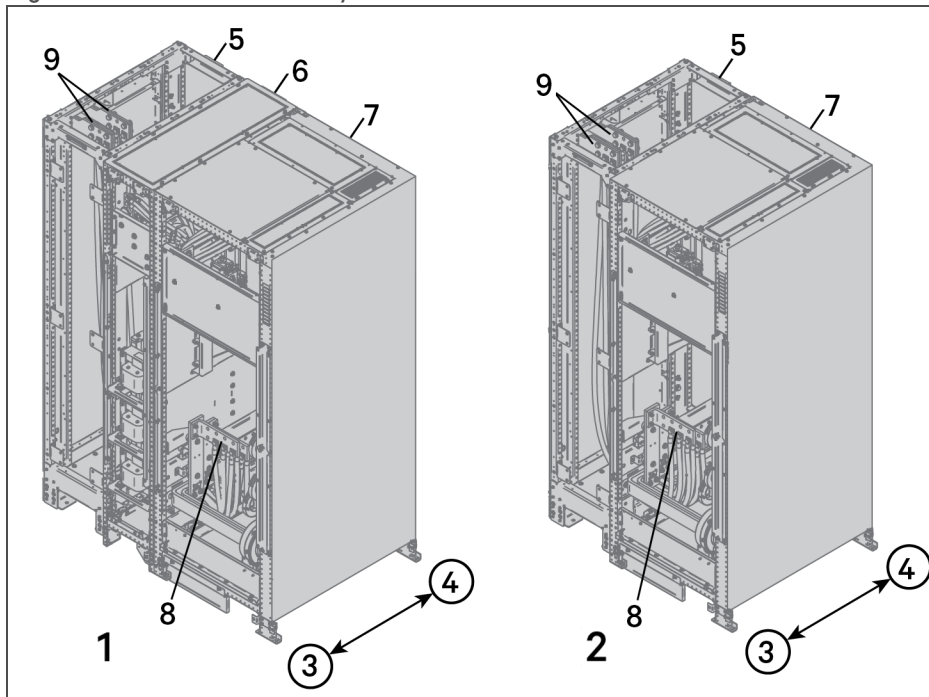
1. Remove the panels from the right side of the input/output cabinet and from the left side of the adjacent battery cabinet.
2. Position the cabinets and bolt them together.
3. Remove two interconnect straps and the M10 mounting hardware from the battery cabinet. Keep the straps and hardware for possible future use.
4. Use the hardware supplied in the cable kit to connect the output busbars from the battery cabinet to the input busbars in the input/output cabinet.

NOTE: Busbar connections vary depending on the system rating. For details, refer to the submittal drawings that shipped with the battery system, or contact your Vertiv sales representative for the drawings. **Figure 3.4** below and **3.5** on the previous page, shows an overview of the connection.

5. Torque the busbar and cable connectors to 480 in-lb. (54Bm).
6. Ensure correct phase rotation.
7. For control connection details, see [Control Cabling](#) on page 19.
8. Close and secure the interior and exterior doors.
9. Attach the kick plates to the bottom of the unit.

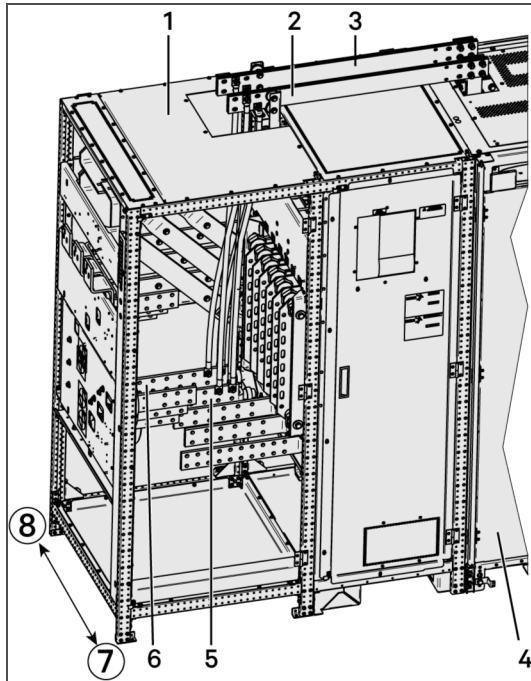
NOTE: If the unit will be installed in a position that does not permit access to rear kick plates, then the kick plates must be installed before the unit is placed in its final position.

Figure 3.4 Attached battery cabinet busbar connections to EXL S1 250-600kVA



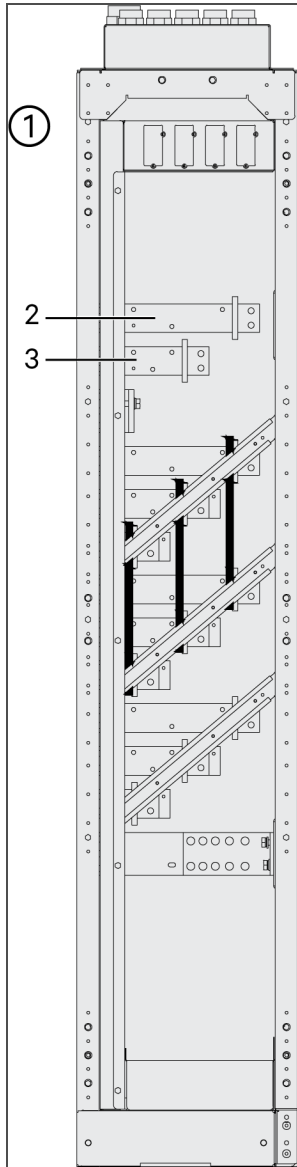
Item	Description
1	EXL S1 250-600kVA with backfeed disconnect or sharing inductors
2	EXL S1 250-600kVA without backfeed disconnect or sharing inductors
3	Rear of cabinet
4	Front of cabinet
5	Battery wiring cabinet
6	Backfeed disconnect and/or sharing inductor input/output cabinet
7	Standard input/output cabinet
8	UPS input/output cabinet positive and negative busbars
9	Battery cabinet positive and negative busbars

Figure 3.5 Attached battery cabinet busbar connections to EXL S1 625-1200kVA



ITEM	DESCRIPTION
1	Standard input/output cabinet
2	Battery positive busbar
3	Battery negative busbar
4	Battery cabinet
5	Negative battery bus
6	Positive battery bus
7	Front of cabinet
8	Rear of cabinet

Figure 3.6 Attached battery cabinet busbar connections to NXL input/output cabinet



ITEM	DESCRIPTION
1	Standard input/output cabinet
2	Positive DC busbar
3	Negative DC busbar

The Liebert NXL is available in multiple configurations (single-module, multi-module, 1+N and N+1). For configurations without an input/output cabinet, refer to the submittals that shipped with the UPS.

3.6 Control Cabling

On standard- and wide-width cabinets, cable entry may be from the top or bottom via conduit connected to the removable plate. On reduced-width cabinets, only top entry is available.

Each cabinet battery contains a battery-interface board (BIB) connected in series. The interconnection cabling and hardware are factory-supplied for connected/attached battery-cabinet systems. To connect stand-alone cabinets, observe the following requirements:

- Cabling and hardware must be field-supplied.
- Use Belden 9156 or equivalent wire.
- The total length of cable from the UPS to all battery-interface connections must be less than 1000 ft (300 m).

NOTE: Route control cables away from high-voltage cables and busbars.

NOTICE

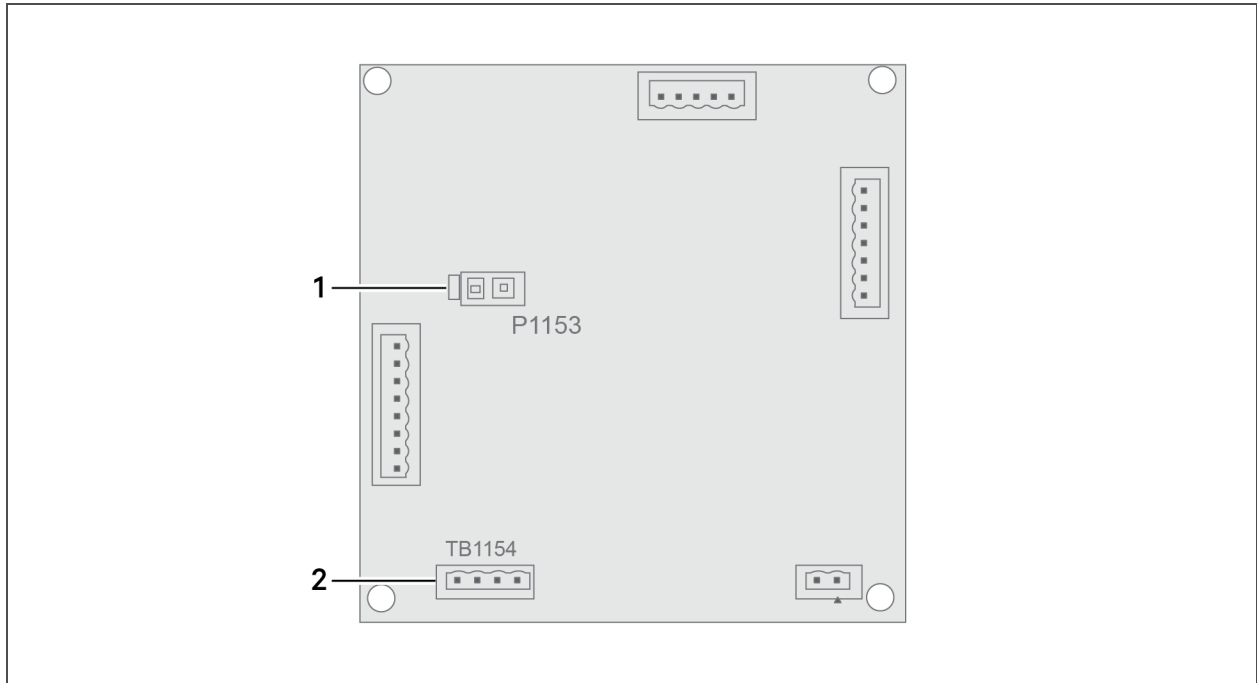
Risk of improper installation. Can cause equipment damage. During system commissioning, the Vertiv technician sets the jumpers on the external interface board (EIB) and battery interface board (BIB). If additional battery cabinets are added to the system after commissioning, the jumpers on the EIB and BIBs must be reset by a Vertiv technician.

The cable connects to TB1154 on the BIB, see **Figure 3.7** on the next page.

To connect to the external-interface board (EIB) in the UPS, refer to the appropriate section for your UPS model:

- [Connecting to Liebert EXL S1](#) on page 20
- [Connecting to Liebert EXL](#) on page 21
- [Connecting to Liebert NX](#) on page 22
- [Connecting to Liebert NXL](#) on page 24

Figure 3.7 Connectors on the BIB



Item	Description
1	P1153
2	TB1154

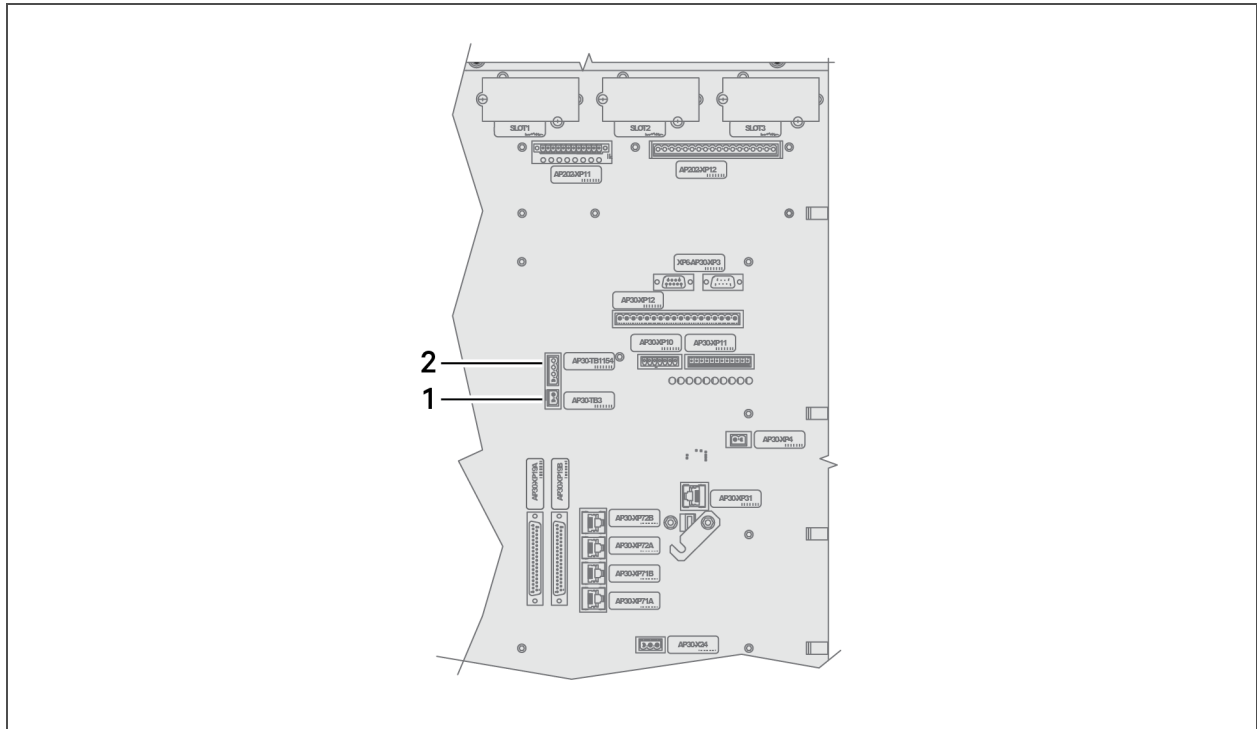
3.6.1 Connecting to Liebert EXL S1

Connect to TB1154 on the EXL S1 communication board, see **Figure 3.8** on the facing page.

Table 3.1 EXL S1 control contacts to BIB

Terminal block	Pin	Connects to (describes external item)	Maximum Voltage	Maximum Current
TB1154	1	CAN +24V	24VDC	2A
	2	CAN Common		
	3	CANbus High		
	4	CANbus Low		

Figure 3.8 Connectors on the EXL S1 EIB



Item	Description
1	TB3 (24VDC option power)
2	TB1154 (BIB interface)

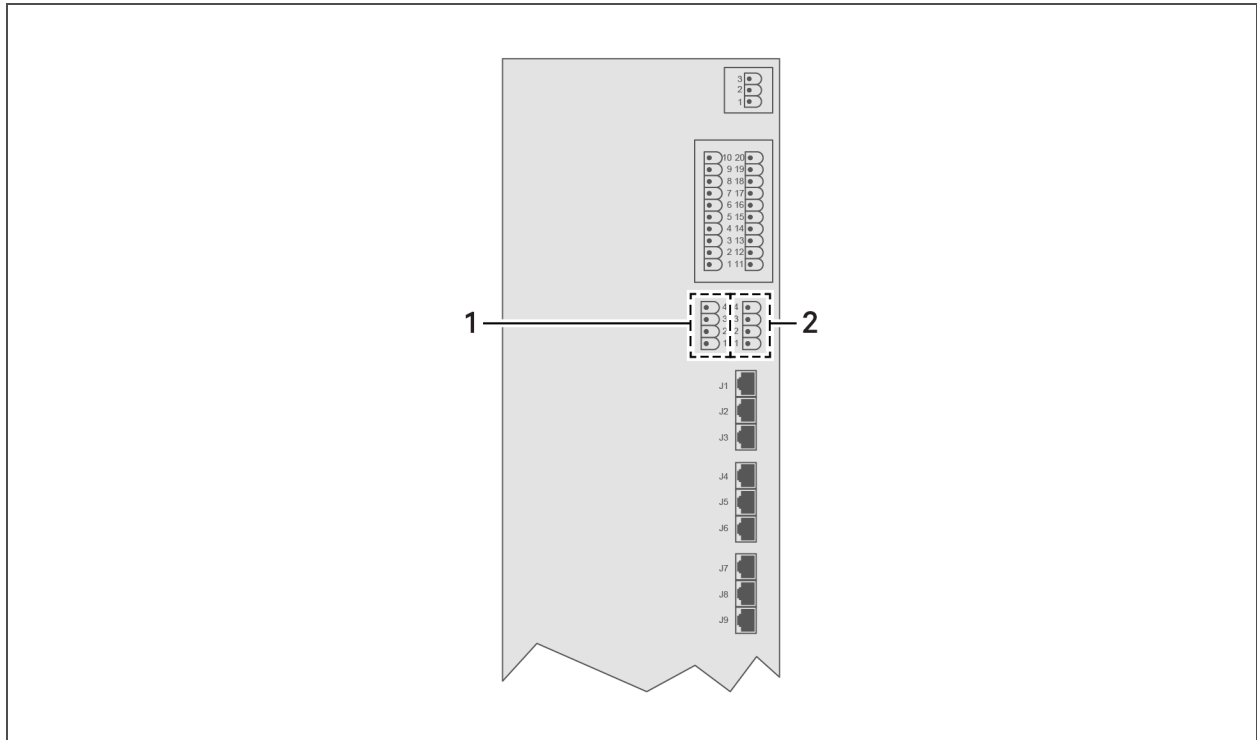
3.6.2 Connecting to Liebert EXL

Connect to TB1154 of the EXL control drawer, see [Figure 3.9](#) on the next page.

Table 3.2 EXL control contacts to BIB

Terminal block	Pin	Connects to (describes external item)	Maximum Voltage	Maximum Current
TB1154	1	CAN +24V	24VDC	2A
	2	CAN Common		
	3	CANbus High		
	4	CANbus Low		

Figure 3.9 Connector on the EXL Control Drawer



Item	Description
1	TB1 (Remote status panel)
2	TB1154

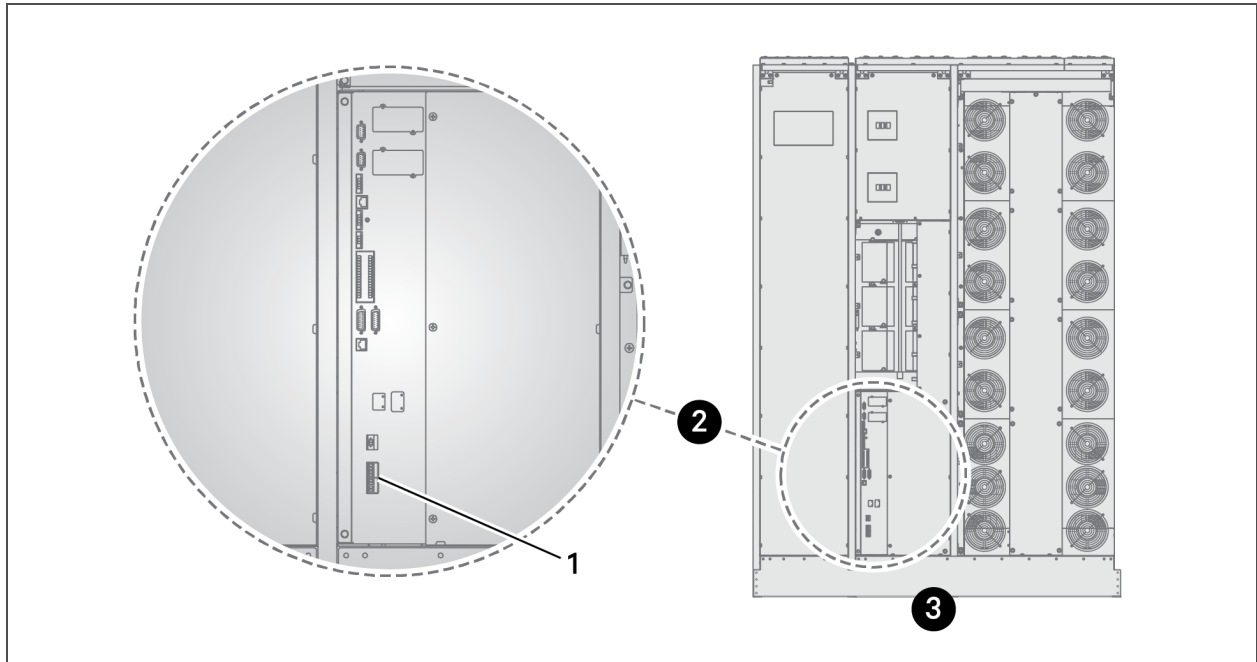
3.6.3 Connecting to Liebert NX

Connect to TB3 on the external communication panel, see **Figure 3.10** on the facing page, or **Figure 3.10** on the facing page, depending on your NX model.

Table 3.3 NX control contacts to BIB

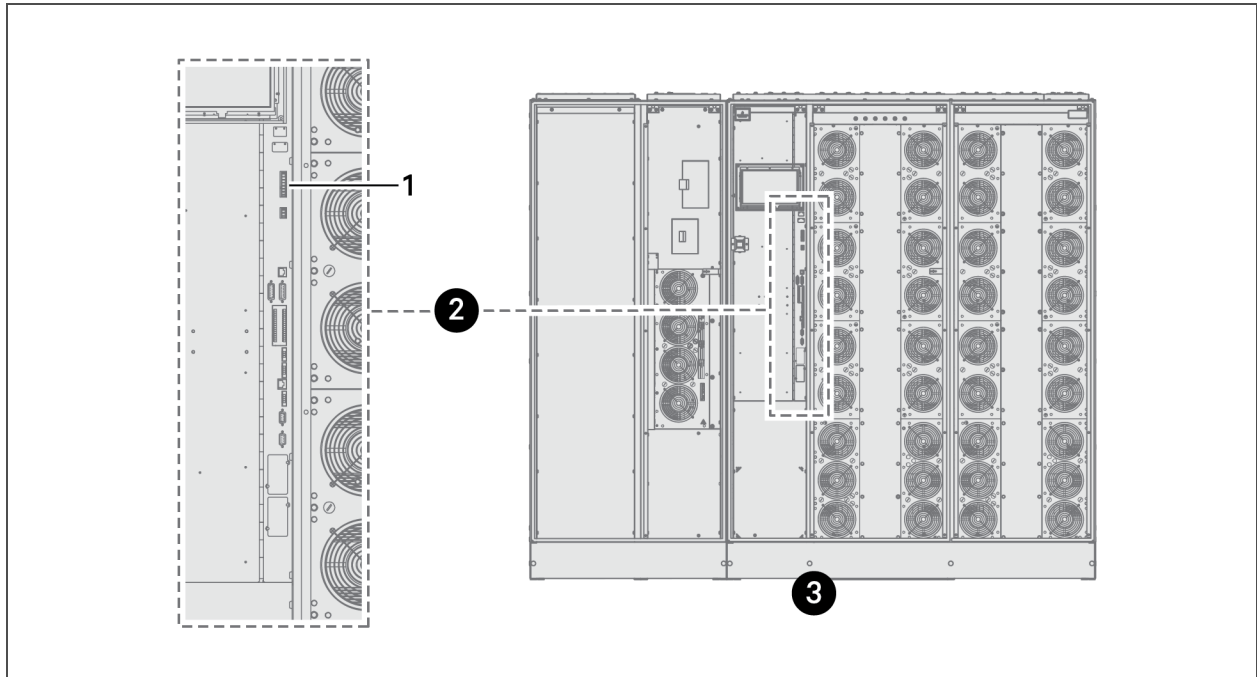
Terminal block	Pin	Connects to (describes external item)
TB3	1	CAN +24V - Battery Interface Board TB1154-1
	2	GND - Battery Interface Board TB1154-2
	3	CANbus High - Battery Interface Board TB1154-3
	4	CANbus Low - Battery Interface Board TB1154-4

Figure 3.10 Connector on the Communication Panel of 225 – 300kVA models



Item	Description
1	TB3
2	External communication panel
3	Unit with front doors not shown

Figure 3.11 Connector on the Communication Panel of 400 – 600kVA models



Item	Description
1	TB2
2	External communication panel
3	Unit with front doors not shown

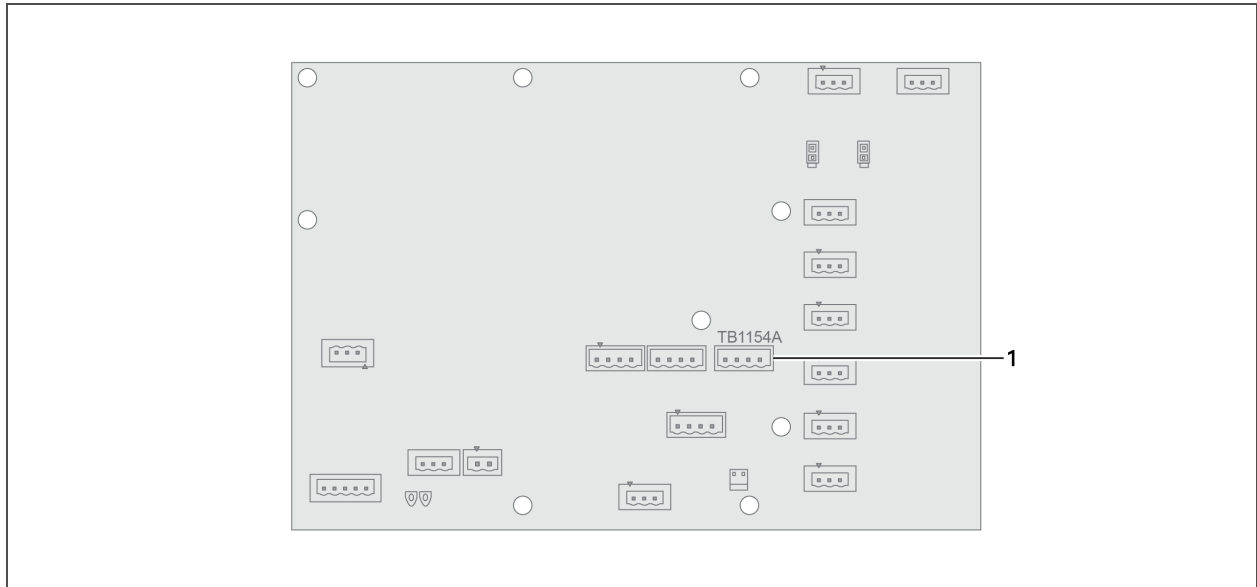
3.6.4 Connecting to Liebert NXL

Connect to TB1154A on the NXL communication board, see **Figure 3.12** on the facing page.

Table 3.4 NXL control contacts to BIB

Terminal block	Pin	Connects to (describes external item)
TB1154A	1	CAN +24V - Battery Interface Board TB1154-1
	2	GND - Battery Interface Board TB1154-2
	3	CANbus High - Battery Interface Board TB1154-3
	4	CANbus Low - Battery Interface Board TB1154-4

Figure 3.12 Connectors on the NXL EIB



Item	Description
1	TB1154A

3.6.5 Connecting a Vertiv™ Battery Monitoring System

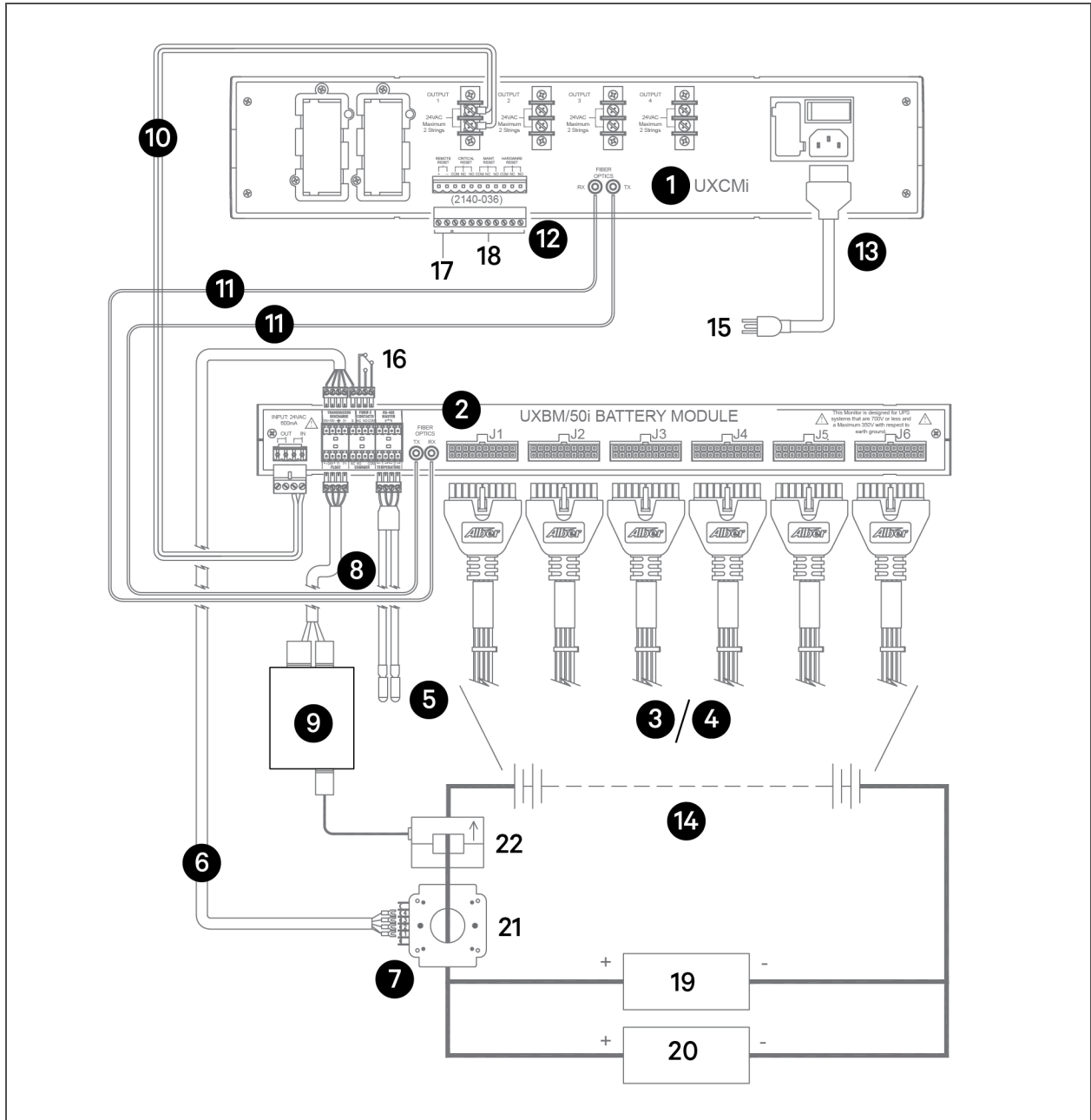
Your system may include an optional, battery monitoring system in the cabinet. Battery monitoring continuously checks critical battery parameters and automatically conducts periodic tests to verify battery operating integrity.

If included, install the battery monitoring system inside the battery cabinet.

- See **Figure 3.13** on the next page, for an overview of the equipment and connections.
- **Figure 3.14** on page 28, shows the typical location of the battery monitoring components when installed in the cabinet. For detailed installation instructions, refer to the "Albér Universal Battery Diagnostic System Installer/User Guide" available at www.Vertiv.com.

NOTE: The monitoring system transformer is powered from the output of the UPS to which the battery cabinet is connected. If monitoring multiple battery cabinets, the cabinet that contains the Control Module must be installed in the position closest to the UPS.

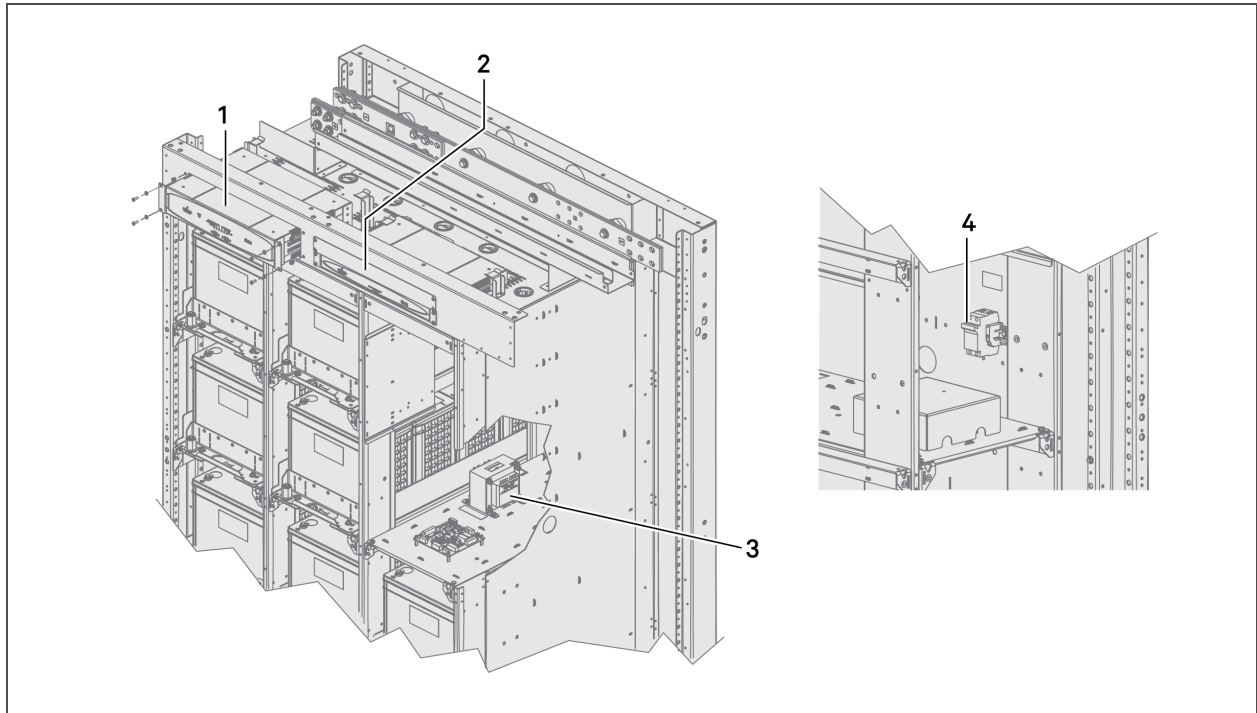
Figure 3.13 Battery Monitoring System Overview



Item	Description
1	Control module
2	Battery module
3	Resistive load connection (depending on battery configuration)
4	Voltage sense and interior sense connections (depending on battery configuration)

Item	Description
5	Temperature sensor
6	String-/Ripple-current transducer cable
7	Discharge-current transducer
8	Float current transducer cable
9	Float current transducer
10	Power cable, 24VAC
11	Fiber optic cable
12	Alarm connections on control module
13	Control module power cord
14	Battery string
15	Connects to UPS-protected 120-VAC outlet.
16	Alarm report
17	Remote reset
18	Alarm contacts
19	Load
20	Charger
21	Transducer
22	Float current sensor

Figure 3.14 Monitoring System Components in the Battery Cabinet



Item	Description
1	Control module
2	Battery module
3	Monitoring system power transformer
4	Monitoring system power input fuse

3.6.6 Connecting an External Room Temperature Sensor

Your system may include an optional temperature sensor that monitors the ambient temperature of the room. Monitoring the temperature allows temperature compensation charging by a connected Liebert® UPS.

The sensor connects to the battery interface board at P1153. See **Figure 3.7** on page 20 for the location of the connector on the board.

4 SPECIFICATIONS

Table 4.1 Liebert Battery Cabinet Specifications

Battery Cabinet Parameters	Values	
	Top-Terminal Cabinet	Front-Terminal Cabinet
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)	
Physical Parameters and Standards		
Width, in. (mm) ¹	Standard Width: 56.5 (1435) Reduced Width: 48.3 (1227)	63.0 (1600)
Depth, in. (mm) ²	33.5 (850)	33.5 (850)
Height, in. (mm)	76.8 (1950)	76.8 (1950)
Weight, lb (kg) approx.	See Table 4.4 on page 32	
Standard Color	Black (ZP-7021)	
Front Door Opening (for serviceability)	More than 180°	
Degree of Protection for UPS Enclosure	IP 20 (with and without front door open)	
Minimum Clearance, Top	24" (610mm)	
Minimum Clearance, Back	0 in.	
Minimum Clearance, Sides	0 in.	
Cable Entrance	Top or Bottom	
Standards and Conformities	UL 1778; CSA 22.2 107.3 FCC Part 15, Class A; ISTA Procedure 1H; WEEE; IBC 2012/CBC 2010	
Environmental Parameters		
Storage Temperature Range	-4°F to 104°F (-20°C to 40°C) ³ 74°F to 80°F (23-27°C) for optimal battery life	

Table 4.1 Liebert Battery Cabinet Specifications (continued)

Battery Cabinet Parameters	Values	
	Top-Terminal Cabinet	Front-Terminal Cabinet
Operating Temperature Range	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	4920ft. (1500m) (as per IEC 62040/3) - 1% Maximum kW derate / 330ft. (100m) rise between 4920-9900 ft. (1500-3000m)	
<ol style="list-style-type: none"> 1. Width dimensions are with side panels attached. Subtract 1.4 in. (35 mm) for dimensions without side panels. 2. Depth dimensions include the front door and rear panel. 3. Contact the factory about storage at temperatures outside this range. 		

Table 4.2 Liebert Junction Cabinet Specifications

Junction Cabinet Parameters	Value		
	500 – 750kVA Attached	Stand-Alone	800 – 1100kVA Attached
Battery Specifications			
Nominal Battery Bus, VDC	480V		
Battery Float Voltage, VDC	540V		
Minimum EOD Voltage, VDC	384V (for VRLA / Flooded Lead Acid)		
Physical Parameters			
Width, in (mm) ¹	15.5 (393)	30.9 (785)	17.5 (445)
Depth, in (mm) ²	33.5 (850)	33.5 (850)	33.5 (850)
Height, in (mm)	76.8 (1950)	76.8 (1950)	76.8 (1950)
Weight, lb (kg) approx.	255 (115)	400 (180)	255 (115)
Color	Black (ZP-7021)		
Degree of Protection for UPS Enclosure	IP 20		
Minimum clearance, Top	24" (610mm)		
Minimum clearance, Back	0"		
Minimum clearance, Sides	0"		
Location of cable entrance	Top or Bottom		
Standards and Conformities	UL 1778; CSA 22.2 107.3; FCC Part 15, Class A ISTA Procedure 1H; WEEE; IBC 2012/CBC 2010		
Environmental			
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 / 330ft rise between 4900-9800ft. (100m rise between 1500-3000m)		
1. Width dimensions are with side panels attached. Subtract 1.4 in. (35 mm) for dimensions without side panels. 2. Depth dimensions include the front door and rear panel.			

Table 4.3 Alber Monitoring (Option) Electrical Data

Electrical Data	Value
Input Voltage	115VAC ±10%
Input Current	3.6A
Frequency	50-60Hz

Table 4.4 Battery-cabinet Weight and Breaker Frame Size

Battery Manufacturer	Battery Code	Battery Model #	Cabinet Weight, lb (kg)	Breaker Frame Size	Torque Value, in.-lb (Nm)
C&D	PR	UPS12-300MR	3465 (1572)	350AT/600AF	110 (12.4)
C&D	QU	UPS12-305PLP	3465 (1572)	400AT/600AF	110 (12.4)
C&D	RR	UPS12-350MR	3825 (1735)	400AT/600AF	110 (12.4)
C&D	SU	UPS12-355PLP	3825 (1735)	450AT/600AF	110 (12.4)
C&D	UR	UPS12-400MR	4215 (1912)	500AT/600AF	110 (12.4)
C&D	UU	UPS12-405PLP	4215 (1912)	500AT/600AF	110 (12.4)
C&D	WR	UPS12-490MR	5175 (2347)	500AT/600AF	110 (12.4)
C&D	WU	UPS12-495PLP	5175 (2347)	600AT/600AF	110 (12.4)
C&D	XR	UPS12-540MR	5225 (2370)	600AT/600AF	110 (12.4)
C&D	XU	UPS12-545PLP	5225 (2370)	600AT/600AF	110 (12.4)
C&D	ZR	UPS12-600MR	5585 (2533)	700AT/1200AF	110 (12.4)
C&D	ZU	UPS12-605PLP	5585 (2533)	700AT/1200AF	110 (12.4)
EnerSys	PX	12HX300	3525 (1599)	350AT/600AF	65 (7.3)
EnerSys	RX	12HX330	3965 (1798)	400AT/600AF	65 (7.3)
EnerSys	UX	12HX400	4375 (1984)	450AT/600AF	65 (7.3)
EnerSys	WX	12HX505	5295 (2402)	600AT/600AF	65 (7.3)
EnerSys	XX	12HX540	5465 (2479)	600AT/600AF	65 (7.3)
EnerSys	PG	XE60	3155 (1431)	700AT/1200AF	60 (6.8)
EnerSys	VG	XE95	4275 (1939)	800AT/1200AF	60 (6.8)
EnerSys	2K	16HX800F-FR	8500 (3856)	Liebert® EXL™ 800AT/1200AF	100 (11.3)
EnerSys	2K	16HX800F-FR	8500 (3856)	Liebert® NX™ 225-600 225kW: 600AT/600AF 250kW: 700AT/1200AF 300-600kW: 800AT/1200AF	100 (11.3)
EnerSys	2K	16HX800F-FR	8500 (3856)	Liebert® NXL™ 225kW 700AT/1200AF 270-1100kW: 800AT/1200AF	100 (11.3)

Table 4.4 Battery-cabinet Weight and Breaker Frame Size (continued)

Battery Manufacturer	Battery Code	Battery Model #	Cabinet Weight, lb (kg)	Breaker Frame Size	Torque Value, in.-lb (Nm)
EnerSys	4K	16HX925F-FR	9100 (4128)	Liebert® EXL™ 900AT/1200AF	100 (11.3)
EnerSys	4K	16HX925F-FR	9100 (4128)	Liebert® NX™ 225-600 225kW 600AT/600AF 250kW 700AT/1200AF 300kW 800AT/1200AF 400-600kW: 900AT/1200AF	100 (11.3)
EnerSys	4K	16HX925F-FR	9100 (4128)	Liebert® NXL™ 225kW 700AT/1200AF 270kW 800AT/1200AF 360-1100kW: 900AT/1200AF	100 (11.3)
East Penn	QA	HR3000	3565 (1617)	400AT/600AF	65 (7.3)
East Penn	TA	HR3500	3965 (1798)	450AT/600AF	65 (7.3)
East Penn	VA	HR4000	4375 (1984)	500AT/600AF	65 (7.3)
East Penn	WA	31HR5000	5095 (2311)	500AT/600AF	65 (7.3)
East Penn	YA	HR5500	5455 (2474)	600AT/600AF	65 (7.3)

Table 4.5 Recommended Lug Sizes

Cable Size	T&B Copper One Hole	T&B Copper Two Hole	T&B Aluminum One Hole	T&B Aluminum Two Hole
#8AWG	54930BE	54850BE	60104-TB	—
#6AWG	54905BE	256-30695-868	60109-TB	—
#4AWG	54906BE	256-30695-733	60114-TB	—
#2-3AWG	54942BE	54811BE	60120	—
#1AWG	54947BE	54857BE	60126	—
#1/0AWG	54950BE	256-30695-593	60132	—
#2/0AWG	54951BE	54862BE	60138	60238
#3/0AWG	54965BE	54864BE	60144	60244
#4/0AWG	54970BE	54866BE	60150	60250
250kcmil	54913BE	54868BE	60156	60256
300kcmil	54914BE	54870BE	60162	60262
350kcmil	54915BE	54872BE	60165	60267
400kcmil	54916BE	54874BE	60168	60269
500kcmil	54918BE	54876BE	60171	60273
600kcmil	54920BE	54878BE	60176	60275
750kcmil	54922BE	54880BE	60178	60277

NOTE: The torque specifications in **Table 4.6** below, apply unless otherwise labeled.

Table 4.6 Nut/Bolt Combinations Torque Specifications

Bolt Shaft Size	Grade 2 Standard, lb-in. (Nm)	Electrical Connections with Belleville Washers, lb-in (Nm)
1/4 (M6)	53 (6.0)	46 (5.2)
5/16 (M8)	107 (12)	60 (6.8)
3/8 (M10)	192 (22)	95 (11)
1/2 (M12)	428 (48)	256 (29)

NOTE: The torque specifications in **Table 4.7** below, apply unless otherwise labeled.

Table 4.7 Circuit Breaker with Compression Lug Torque Specifications

Wiring type	lb-in. (Nm)
Power Wiring	
Current Rating: 400 - 1200 Amps	300 (34)
Control Wiring	
AWG Wire Size or Range: #22 - #14	3.5 to 5.3 (0.4 to 0.6)





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