



**BELKA ENGINEERING
ASSOCIATES, INC.**

ADDENDUM NO. 1

UNIVERSITY OF SOUTH CAROLINA Columbia Campus - UPS Support Installation – 514 Main Street STATE PROJECT NO. H27-Z229

August 4, 2017

TO: ALL BIDDERS OF RECORD, CONSULTANTS, OWNER:

The following items shall take precedence over the drawings and specifications for the above-referenced project and shall become a part of the contract documents. Where any item called for in the specifications, or indicated on the drawings, is not supplemented hereby, the original requirements shall remain in effect. Where any original item is amended, voided or superseded hereby, the provisions of such item not specifically amended, voided or superseded shall remain in effect.

I. GENERAL CLARIFICATIONS:

- A. Drawing E1 – Note 1. The Contractor shall provide electrical connections between sections of UPS lineups per attached “Liebert EXM UPS 20-100kVA, 50/60Hz User Manual.”

II. DRAWINGS:

- A. Drawing E1 – Add Note 9 that reads, “Contractor shall remove approximately 100 feet of 3-1/2” conduit and conductors from under raised floor as directed by owner’s representative.
- B. Drawing E1 – In plan, feeder conduits are shown diagrammatically. Contractor shall coordinate with Owner’s representative specific conduit routings to maintain below raised floor organization.
- C. Drawing E2 – In Detail 2, delete reference to providing Vertis meter. Metering is incorporated in delivered UPS units.

III. ATTACHMENTS:

- A. Pre-Bid Conference Sign In List.
- B. Liebert EXM UPS 20-100kVA, 50/60Hz User Manual, pages 15 – 36.

END OF ADDENDUM NO. 1

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3.0 ELECTRICAL CONNECTIONS—UPS

The UPS requires both power and control cabling once it has been mechanically installed. All control cables must run separate from power cables in metal conduits or metal ducts that are electrically bonded to the metalwork of the cabinets to which they are connected.

WARNING

Risk of electric shock. Can cause property damage, injury and death.

Before connecting input power to the Liebert EXM, ensure that you are aware of the location and operation of the overcurrent protection devices that connect the UPS input/bypass supply to the power distribution panel.

De-energize and lockout or tagout all incoming high- and low-voltage power circuits before installing cables or making any electrical connections.

AVERTISSEMENT

Risque de décharge électrique pouvant entraîner des dommages matériels, des blessures et même la mort.

Avant de procéder au branchement de l'alimentation d'entrée du système EXM de Liebert, veuillez à prendre connaissance de l'emplacement et du fonctionnement des dispositifs de protection de surintensité qui raccordent l'alimentation d'entrée ou de dérivation du système ASC au panneau de distribution électrique.

Coupez l'alimentation et appliquez le verrouillage ou l'étiquetage à tous les circuits d'alimentation haute tension et basse tension avant d'installer les câbles ou d'effectuer tout autre branchement électrique.

3.1 POWER CABLING

3.1.1 Lug Size and Cable Rating

The main factors affecting the choice and size of cable are voltage, current (also taking into account overcurrent), room temperature and conditions of installation of the cable. Refer to ANSI/NFPA 70.

The power cables of the system must be sized with respect to the following description:

- UPS input cables - The UPS input cables must be sized for the maximum input current, including the maximum battery recharge current, given in **Table 16**, with respect to the unit rating and the input AC voltage.
- UPS bypass and output cables - The bypass and output cables must be sized for the nominal output current, given in **Table 16**, with respect to the unit rating and the output AC voltage.
- Battery cables - See the Liebert EXM External Battery Cabinet manual, SL-25651, for battery installation guidelines and instructions. The manual ships with the battery cabinet and is available at Liebert's Web site: www.liebert.com



NOTE

Table 16 gives nominal currents for determining the size of UPS power cables. Other important factors to consider include cable route length and coordination with protective devices.

The power cables can be sized to suit the UPS unit rating according to **Table 16**.

Torque Requirements

Refer to **Tables 3** and **4** for lug size and torque requirements.

Table 3 Busbars—Power wiring

Bolt Shaft Size	Lb-in (Nm)
1/2" (M12)	428 (48)

Table 4 Terminal block with compression lugs—Control wiring

AWG Wire Size or Range	Lb-in (Nm)
#22 - #14	3.5 to 5.3 (0.4 to 0.6)

3.2 EXTERNAL PROTECTIVE DEVICES

For safety concerns, it is necessary to install external circuit breakers or other protective devices for the input AC supply of the UPS system. This section provides generic practical information for qualified installation engineers. The installation engineers should be knowledgeable about regulatory wiring standards and the equipment to be installed.

To reduce the risk of fire, connect only to a circuit provided with branch circuit overcurrent protection in accordance with NEC ANSI/NFPA 70.

3.2.1 Rectifier and Bypass Input Supply of the UPS

Overcurrents

Install suitable protective devices in the distribution unit of the incoming mains supply, considering the power cable current-carrying capacity and overload capacity of the system. Generally, the magnetic circuit breaker with IEC60947-2 tripping curve C (normal) at the 125% of the nominal current listed in **Table 16** is recommended.

Split bypass: In case a split bypass is used, separate protective devices should be installed for the rectifier input and bypass input in the incoming mains distribution panel. A shunt trip coil of 120V must be installed in the bypass input breaker if the system does not include a Liebert Bypass Cabinet.



NOTE

The rectifier input and bypass input must use the same neutral line.

Earth Leakage, RCD Devices

Any residual current detector (RCD) installed upstream of the UPS input supply:

- Must be sensitive to DC unidirectional pulses (Class A)
- Must be insensitive to transient current pulses, and
- Must have an average sensitivity, adjustable between 0.3 and 1A.

To avoid false alarms, earth leakage monitoring devices when used in systems with split bypass input or when used in paralleled UPS configurations, must be located upstream of the common neutral sinking point. Alternatively, the device must monitor the combined four-wire rectifier and split bypass input currents.

3.2.2 UPS Output

If an external distribution panel is used for load distribution, the selection of protective devices must provide discrimination with those that are used at the input to the UPS (see **Table 21**).

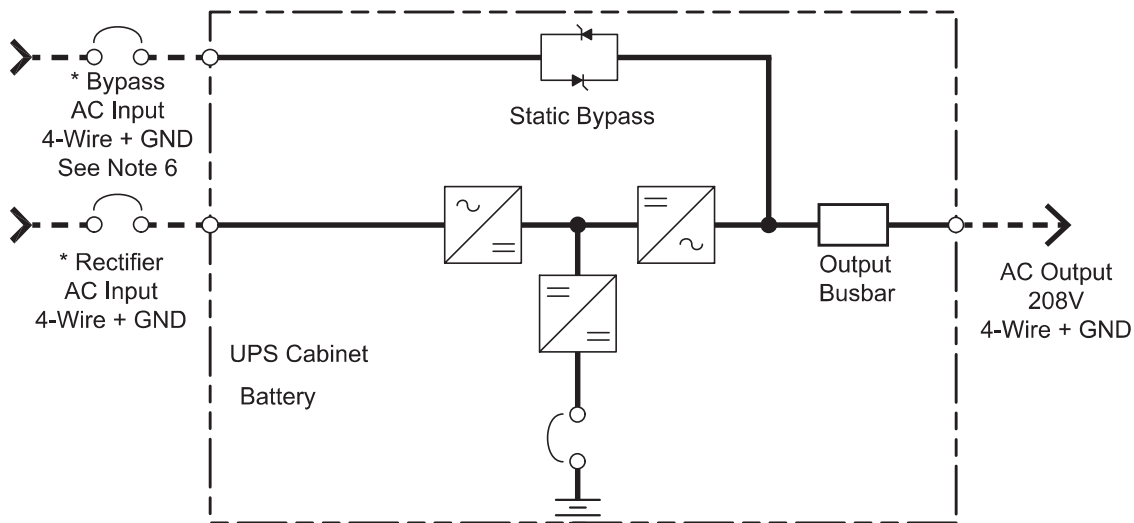
3.2.3 UPS Input Configuration

By default, the Liebert EXM ships with internal links installed between the bypass input and main (rectifier) input (single input configuration).

Figures 6 and 7 show the Liebert EXM in a split bypass (single source dual-input) configuration. In this configuration, the static bypass and the maintenance bypass lines are supplied by the same source using separate feeds. Both feeds must be protected externally with properly sized protective devices.

To wire the Liebert EXM as a single source dual-input UPS, remove the links and wire the bypass feed to the bypass busbars, then wire the main feed to the main busbars (see **Figure 9**).

Figure 6 Single UPS block diagram—Dual input, single source configuration, without bypass cabinet



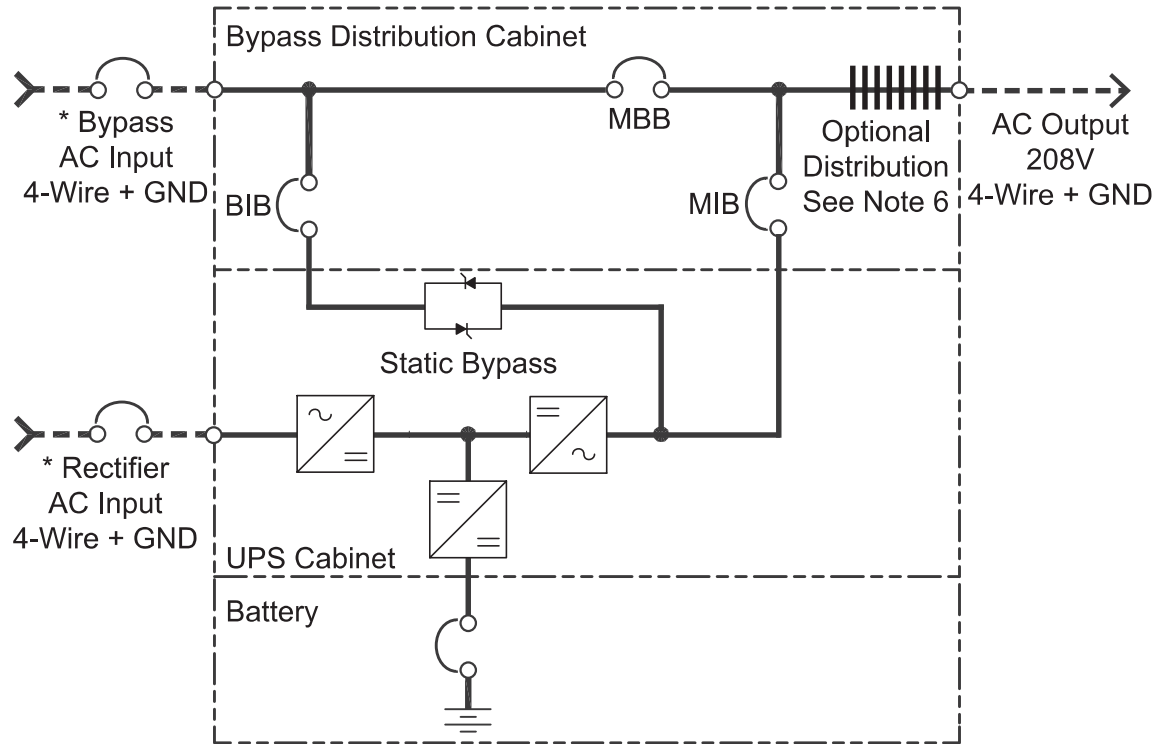
NOTES

1. Install in accordance with national and local electrical codes.
2. Input and bypass must share the same single source.
3. A neutral is required from the system AC input source. Vertiv recommends a full-capacity neutral conductor and grounding conductors.
4. Bypass and rectifier inputs and output cables must be run in separate conduits.
5. Control wiring must be run in separate conduits.
6. Customer must supply shunt trip breakers with 120V coils to the bypass.

* External overcurrent protection by others

----- Field-Supplied Wiring

Figure 7 Single UPS block diagram—Dual input, single source configuration



NOTES

1. Install in accordance with national and local electrical codes.
2. Input and bypass must share the same single source.
3. A neutral is required from the system AC input source. Vertiv recommends a full-capacity neutral conductor and grounding conductors.
4. Bypass and rectifier inputs and output cables must be run in separate conduits.
5. Control wiring must be run in separate conduits.
6. Optional 54-pole 400A distribution panel or two 225A subfeed breakers.
7. Customer must supply shunt trip breaker with 120V coil. If an optional Liebert BDC is not present, the shunt trip must be installed to Bypass Breaker.

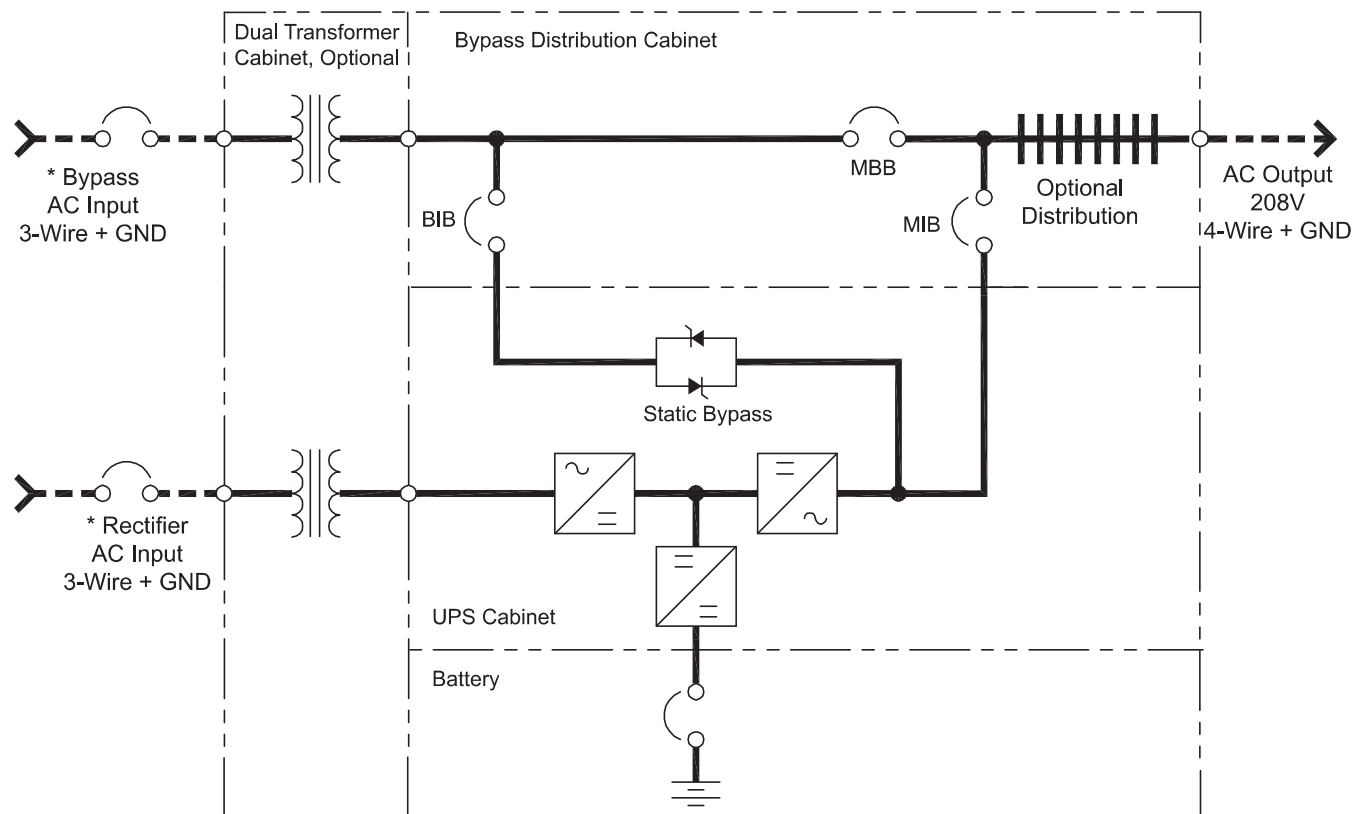
BIB - Bypass Isolation Breaker
 MBB - Maintenance Bypass Breaker
 MIB - Maintenance Isolation Breaker
 * External Overcurrent Protection by others
 - - - - Field-Supplied Wiring

3.2.4 UPS Input Configuration with Transformers

Figure 8 shows the Liebert EXM in a split bypass (single-source, dual-input) configuration using two transformers inside a dual-transformer cabinet.

In this configuration, the static bypass and the rectifier lines can be supplied by independent sources. The Liebert EXM Dual Transformer Cabinet is the only approved method for supplying the EXM from two independent sources. See SL-25655 for details. Both feeds must be protected externally with properly sized protective devices.

Figure 8 Liebert EXM in a split bypass configuration



The bypass distribution cabinet is available with a 480V, 600V or 208V optional internal transformer.

3.2.5 Cabling Guidelines

The following are guidelines only and are superseded by local regulations and codes of practice where applicable. Use wiring rated at 75°C or greater.

- Take special care when determining the size of the neutral cable, as current circulating on the neutral cable may be greater than nominal current in the case of non-linear loads. Refer to the values in **7.3 - UPS Electrical Characteristics**.
- The ground conductor should be sized according to such factors as the fault rating, cable lengths and type of protection. The ground cable connecting the UPS to the main ground system must follow the most direct route possible. Control wiring and power wiring must be run in separate conduit. Output and input cables must be run in separate conduit.
- Consider using paralleled smaller cables for heavy currents—this can ease installation.
- Refer to SL-25651 for guidelines and instructions when sizing battery cables.
- In most installations, the load equipment is connected to a distribution network of individually protected busbars fed by the UPS output, rather than connected directly to the UPS itself. When this is the case, the UPS output cables can be rated to suit the individual distribution network demands rather than being fully load-rated.



NOTE

If more load is added to the distribution panel, the unit's cabling must be resized.

- When laying power cables, do not form coils; this will help avoid increasing formation of electromagnetic interference.

3.2.6 Cable Connections

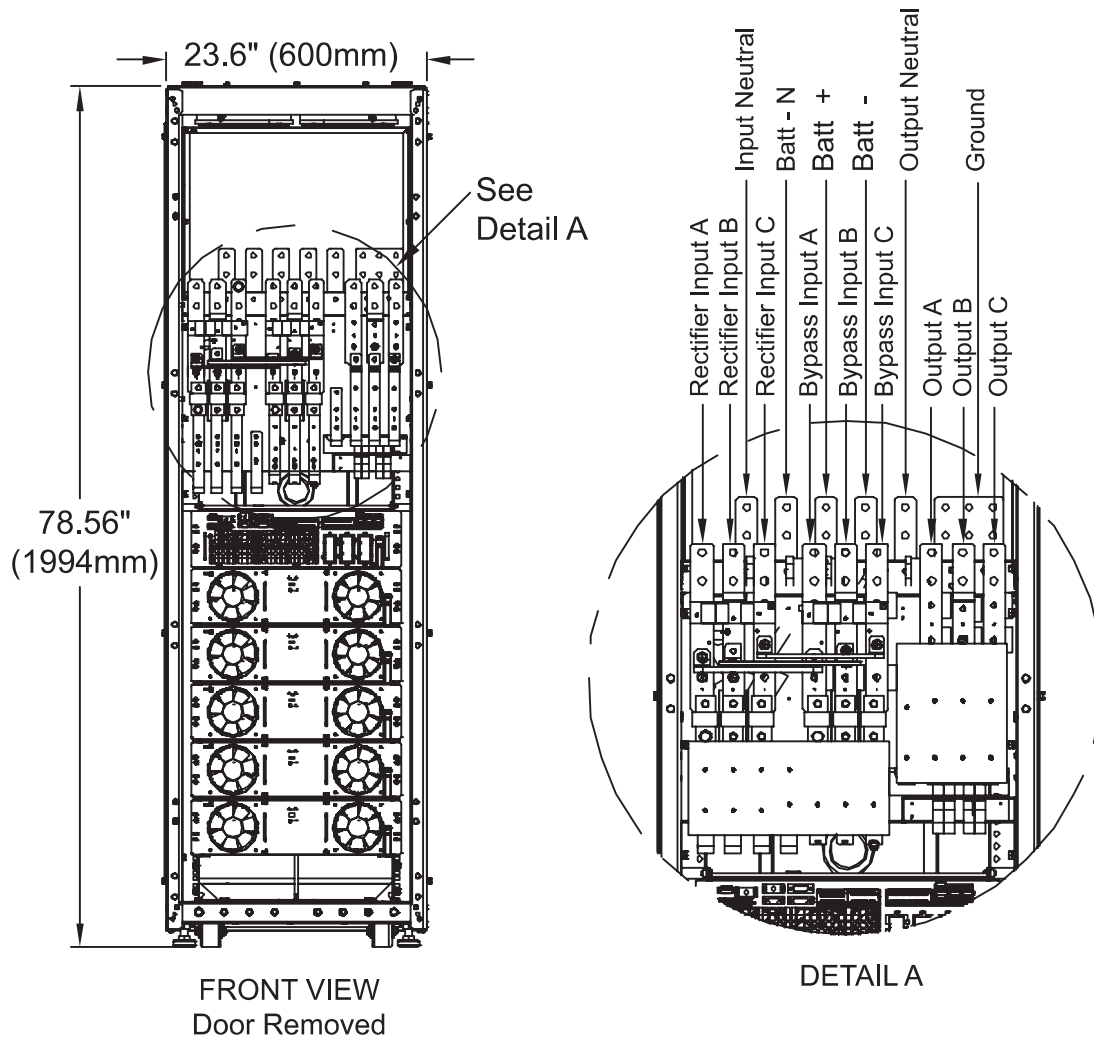
The rectifier input, bypass, output and battery are easily accessible from the front of the unit for installation. All require lug type terminations. They are connected to busbars on the front of the Liebert EXM, as shown in **Figure 9**. These busbars are accessible when the I/O panel is removed.

NOTICE

Risk of improper installation. Can cause equipment damage.

When wiring a single-input only system, connect only the power wiring to the input busbars.

Figure 9 Input busbars—Liebert EXM 20-100kVA frame



NOTES

1. Control wiring and power wiring must be run in separate conduits.
3. Shown with seismic mounting bracket.
4. All wiring must be in accordance with national and local electrical codes.

3.2.7 Accessory Fuses and Back-Feed Breaker Wiring

Two fuse blocks provide power for the back-feed breakers (standard) and the Alber® BDSUi (optional). The fuse blocks are at the lower right of the I/O panel on the front of the Liebert EXM UPS. See **Figure 10** for fuse-holder locations.

The back-feed breaker fuse block provides 120V nominal provided from the UPS output (L-N) and the fuse is rated for 8 amps. **Figure 11** shows the back-feed breaker wiring, located on the bypass static switch assembly.

The Liebert EXM does not include internal back-feed protection. A shunt trip coil of 120V must be installed in the bypass input breaker if the system does not include a Liebert Bypass Cabinet. This is a safety feature and will prevent the UPS inverter from back-feeding the bypass source.

The Alber BDSUi fuse block provides 208V nominal from the UPS output (L-L) and the fuse is rated at 8A. The Alber BDSUi power wiring is shown in SL-25651, the Liebert EXM Battery Cabinet manual.

Figure 10 Accessory fuses

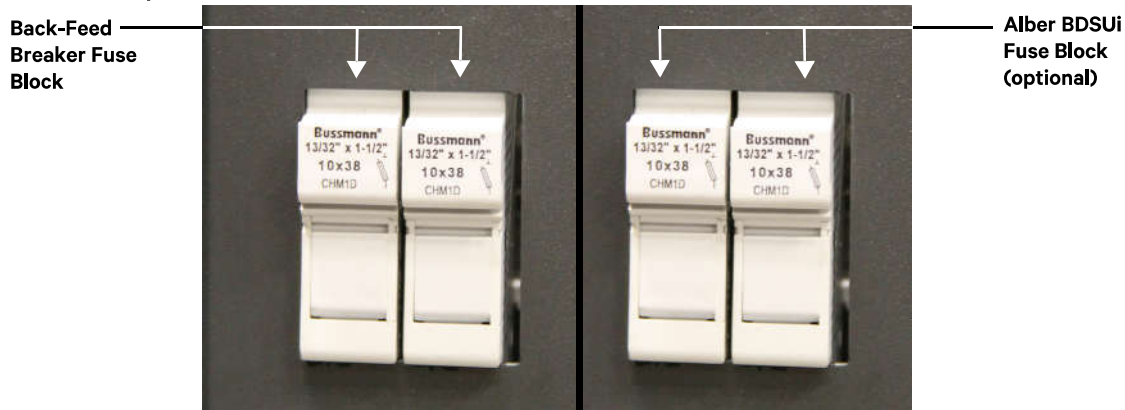
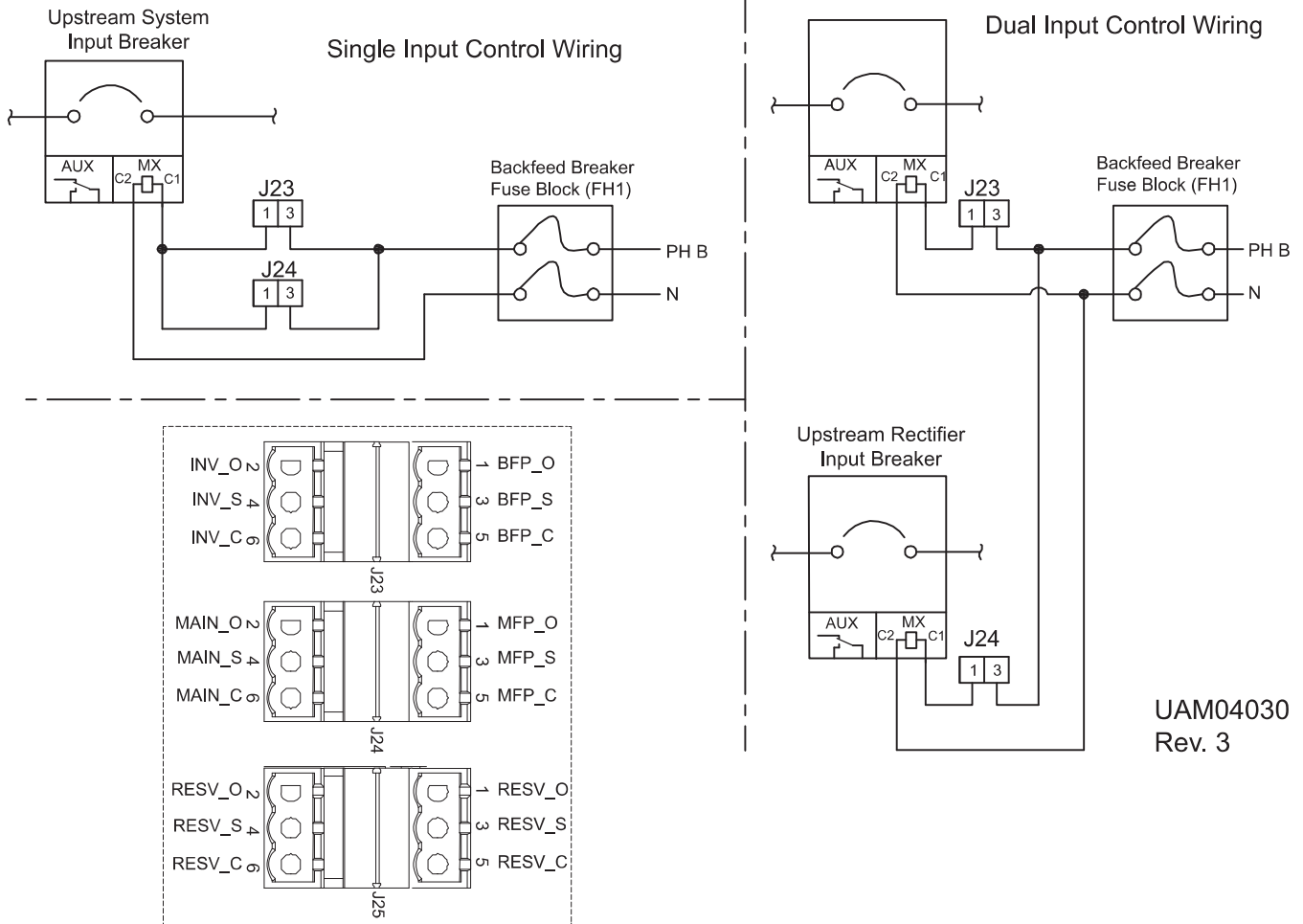


Figure 11 Dual input back-feed breaker wiring when bypass distribution cabinet not used

1. Auxiliary contacts not needed for backfeed breaker operation.
2. A 120V shunt trip coil is required for proper operation.



NOTE

Shunt trips are required in upstream breakers to allow back-feed protection to function properly.
Shunt trip of the upstream rectifier input breaker is optional.

3.2.8 Safety Ground

The safety ground busbar is below the neutral input and output busbars as shown in **Figure 12** below. The safety ground cable must be connected to the ground busbar and bonded to each cabinet in the system. This ground busbar is then connected to the ground electrode conductor (GEC).

All cabinets and cable conduit should be grounded in accordance with local regulations.

WARNING

Risk of electrical shock and arc flash. Can cause property damage, injury and death.

Failure to follow proper grounding procedures can result in electric shock hazard to personnel or the risk of fire, should a ground fault occur.

AVERTISSEMENT

Le non-respect des procédures de mise à la terre peut entraîner des risques d'électrocution du personnel, ou des risques d'incendie en cas de défectuosité de la mise à la terre.

Toutes les opérations décrites dans cette section ne doivent être effectuées que par des électriciens ou des techniciens professionnels dûment formés et qualifiés. En cas de difficultés, communiquez avec Vertiv. Pour obtenir les renseignements de contact, consultez la dernière page de ce manuel.



NOTE

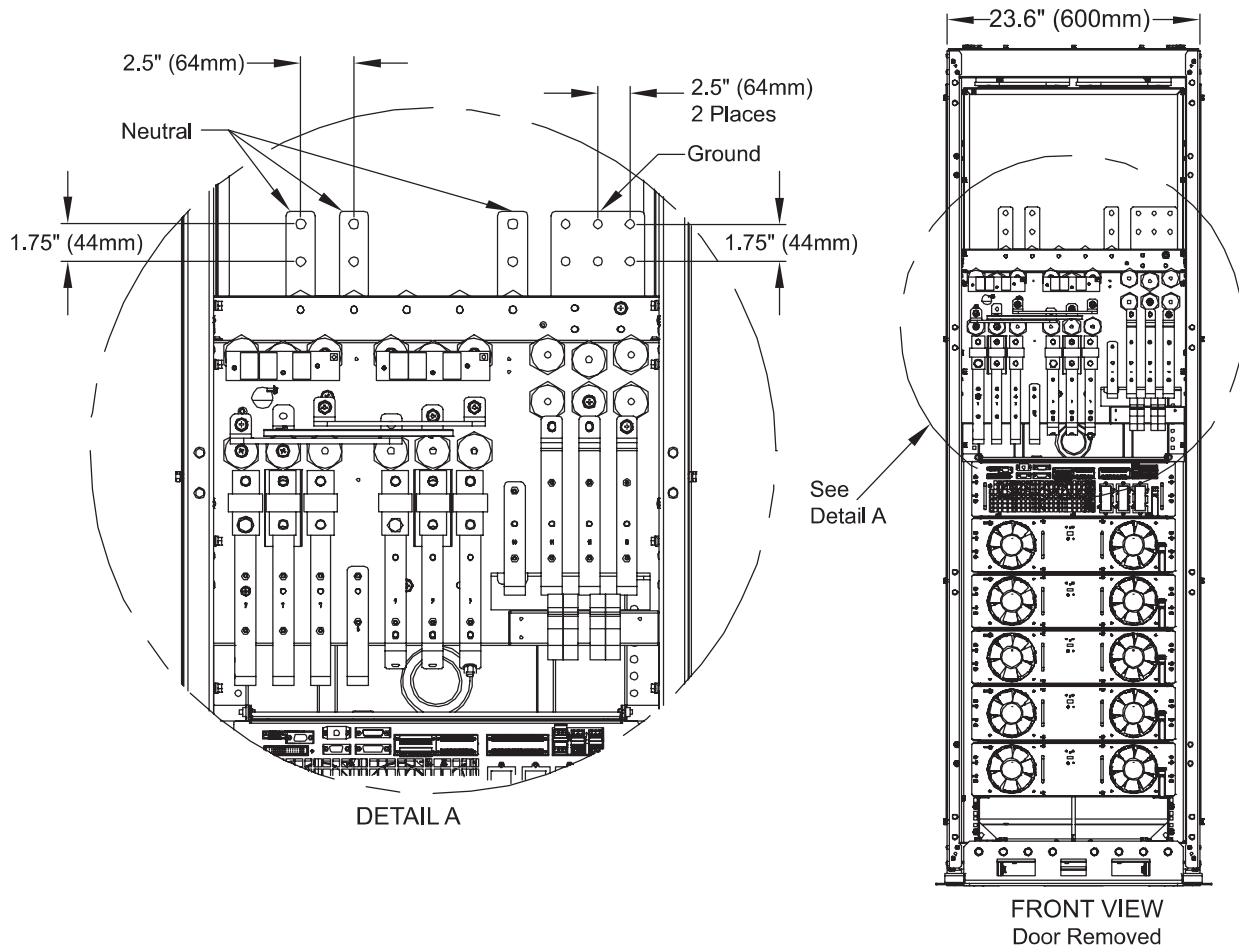
Proper grounding significantly reduces problems caused by electromagnetic interference.



NOTE

The ground and neutral busbars are easily accessible when the I/O panel is removed. Cable connections should be made before a cabinet is attached to the right side of the Liebert EXM or before the UPS is placed where another obstruction, such as a wall, is against the Liebert EXM's the right side.

Figure 12 Ground and neutral busbar connections—20-100kVA frame busbars



3.2.9 Protective Devices

For safety, it is necessary to install circuit breakers in the input AC supply external to the UPS system. Given that every installation has its own characteristics, this section provides guidelines for qualified installation engineers with knowledge of operating practices, regulatory standards and the equipment to be installed.

UPS Rectifier and Bypass Input Supply

Protection from excessive overcurrents and short circuits in power supply input

External overcurrent protection for the AC output circuit is to be provided. See **7.3 - UPS Electrical Characteristics** and **Table 21** for recommended breaker ratings.

Overcurrent protection for the battery circuit must be provided by the customer when using an optional External Battery Cabinet.

- **Dual Input Single Source**—When wiring the UPS with dual inputs but with a single input source, the Rectifier input and the Bypass input must be protected separately. Size the breakers according to the input currents shown in **Tables 16 and 17**.



NOTE

*For single or dual input, a 120V shunt trip coil(s) is required when a breaker is supplied by the customer. See **Figures 7 and 8** for details.*

System Output

When using an external distribution panel for load distribution, the output neutral and input neutral must be separated at the input to the UPS.

3.2.10 Cabling Procedure



WARNING

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. See the back page of this manual for contact information.



AVERTISSEMENT

Toutes les opérations décrites dans cette section ne doivent être effectuées que par des électriciens ou des techniciens professionnels dûment formés et qualifiés. En cas de difficultés, communiquez avec Vertiv. Pour obtenir les renseignements de contact, consultez la dernière page de ce manuel.



NOTE

Hydraulic pressure pliers, combinative tools and piston ring pliers should be used to connect AC wiring.

Once the equipment has been positioned and secured for operation, and the battery and ground lugs have been connected (see **3.2.6 - Cable Connections**), connect the power cables as described below. (Study the reference drawing in **4.0 - Installation Drawings**.)

1. Verify that all incoming high and low voltage power circuits are de-energized and locked out or tagged out before installing cables or making any electrical connections.
2. Remove the front I/O panel to gain easier access to the connections busbars.
3. Connect the facility ground and ancillary ground bus cables to the copper ground busbar located in the middle of the Liebert EXM behind the output connections. All cabinets in the UPS system must be connected to the user's ground connection.



NOTE

The grounding and neutral bonding arrangement must comply with the National Electrical Code and all applicable local codes.

4. Identify and make power connections with incoming cables according to **Steps 5 through 8**.

Common Input Connections—Ensure Correct Phase Rotation

5. For common bypass and main inputs, connect the AC input supply cables to the UPS input terminals (A2-B2-C2-N1) and tighten the connections to 428 lb-in. (48Nm) (M12 bolt). Ensure correct phase rotation.



NOTE

For common bypass and main inputs, the AC input cables must be connected to the bypass terminal (A2-B2-C2-N1) but not the main input terminal (A2-B2-C2).

Split Bypass Connections

6. If a split bypass configuration is used, connect the AC input supply cables to the rectifier input terminals (A1-B1-C1-N1) and the AC bypass supply cables to the bypass input terminals (A2-B2-C2-N1) and tighten the connections to 428 lb-in. (48Nm) (M12 bolt). Ensure correct phase rotation.



NOTE

For split bypass operation, ensure that the busbars between bypass and rectifier inputs are removed. The neutral line of the bypass input must be connected to that of the rectifier input.

Output System Connections—Ensure Correct Phase Rotation

7. Connect the system output cables between the UPS output busbars (A-B-C-N terminals) and the critical load and tighten the connections to 428 lb-in. (48Nm) (M12 bolt). Ensure correct phase rotation.



WARNING

Risk of electrical shock. Can cause equipment damage, personal injury and death.

The following procedure provides power to the critical load distribution system. Verify that the critical load distribution is ready to accept power. Make sure that personnel and equipment are ready for the critical load distribution system to be energized.



AVERTISSEMENT

Risque de décharge électrique pouvant entraîner des dommages matériels, des blessures et même la mort.

La procédure suivante fournit de l'énergie au système de distribution de la charge critique. Vérifiez que ce système est prêt à être alimenté. Assurez-vous que le personnel et les équipements sont préparés pour la mise sous tension du système de distribution de la charge critique.

Observe the battery cable polarity. Be sure that the battery connections, if any, are made with the correct polarity.

8. Refit all protective covers removed for cable installation.

3.3 CONTROL CABLES DETAILS

3.3.1 Static Bypass Assembly Features

Based on your site's specific needs, the UPS may require auxiliary connections to manage the battery system (external battery circuit breaker, battery temperature sensor), communicate with a personal computer or provide alarm signaling to external devices or for Remote Emergency Power Off (REPO). Terminations for these functions are located at the front of the static bypass assembly. The main features are:

- Input and output dry contacts signal (one pair of contacts of relay)
- Emergency Power Off control (EPO)
- Environmental parameter input interface
- User communication (for data setting and user background monitor)
- Liebert IntelliSlot™ interface
- Temperature detect interface

Figure 13 Static bypass assembly connections to display cabinet and options

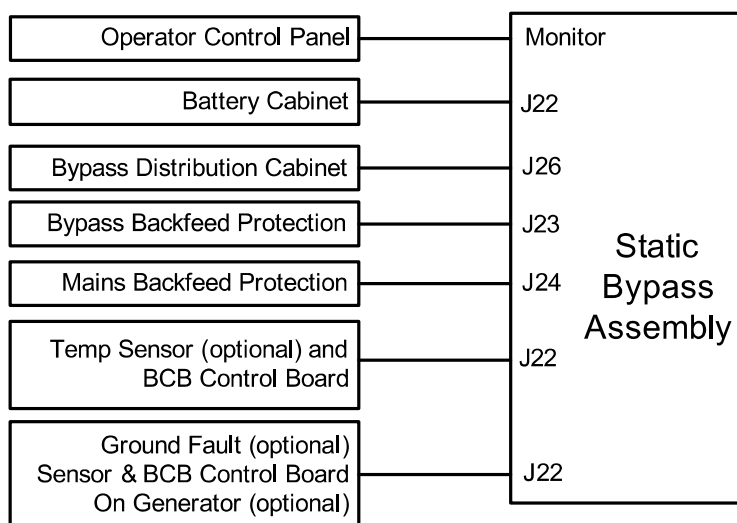
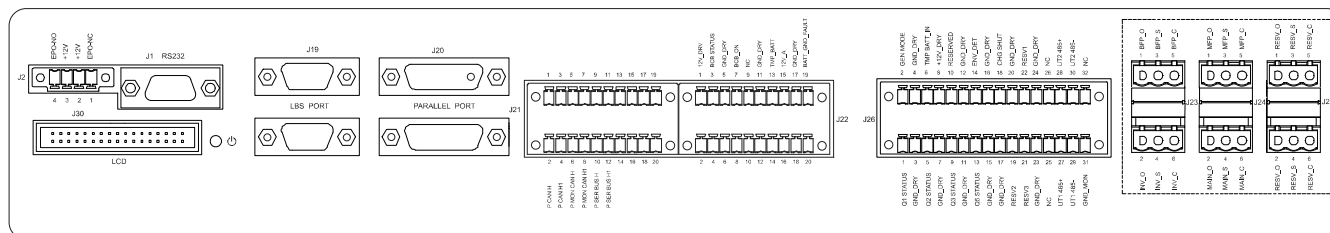


Figure 14 Auxiliary terminal block detail (static switch assembly front panel)



3.4 DRY CONTACTS

The UPS provides input dry contacts and output dry contacts on the Auxiliary Terminal Block (ATB).

3.4.1 Input Dry Contacts

External input dry contacts are connected via the ATB. Dry contacts are available for environment detection, battery ground fault detection, etc.

The UPS accepts external signal from zero-voltage (dry) contacts connected through external dry contact terminals produced, and these terminals are on the static bypass assembly. Through software programming, these signals become active when these contacts connect to +12V to ground (in the most left side). The cables connected to the monitor board must be separated from power cables. Moreover, these cables should be double-insulated with a typical cross-section of 0.5 to 1mm² for a maximum connection length between 82 and 165ft. (25-50m). The ATB has several input dry contacts.

Figure 15 Input dry contacts

See Table 5 for pins and description.

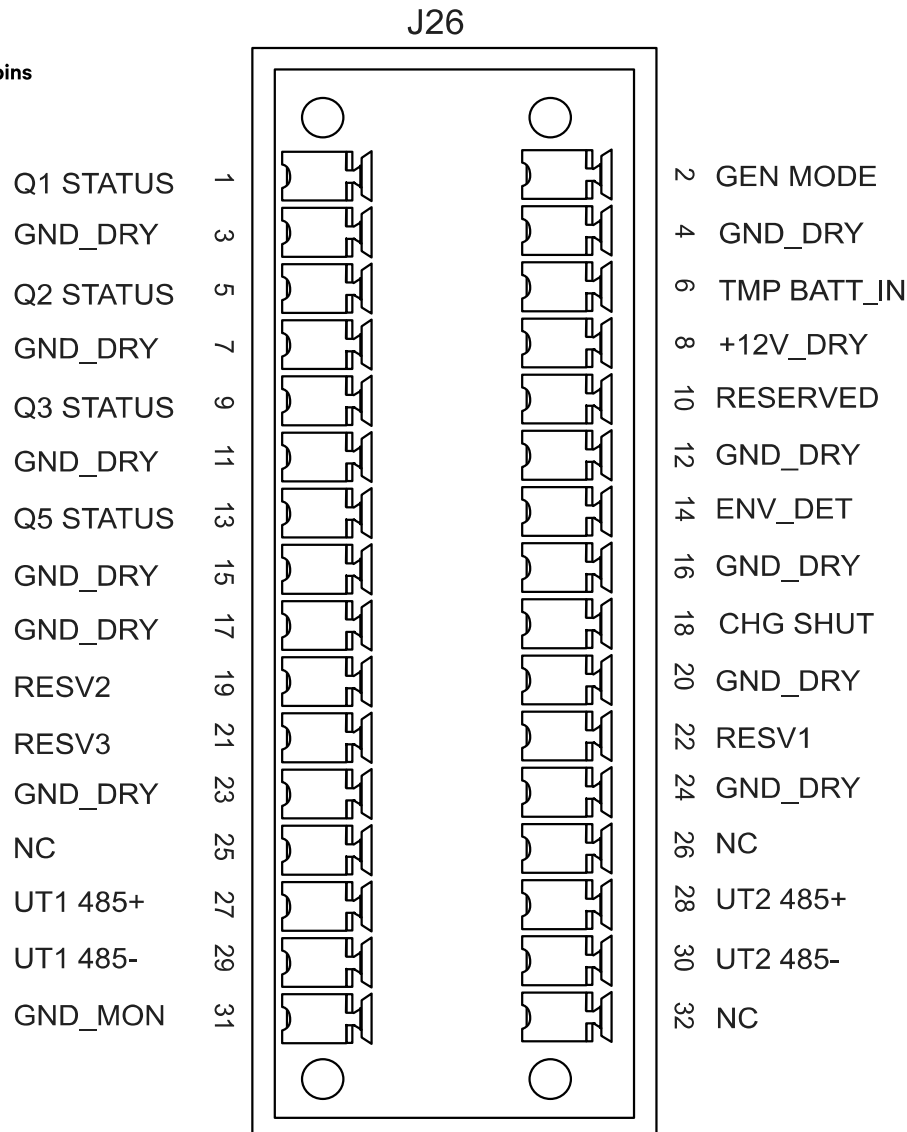


Table 5 Input dry contacts—J26

Port	Pin	Name	Description
J26	1	Q1 STATUS	The main input switch status signal
	3	GND_DRY	Dry ground
	5	Q2 STATUS	The bypass input switch status signal
	7	GND_DRY	Dry ground
	9	Q3 STATUS	External maintenance switch status signal
	11	GND_DRY	Dry ground
	13	Q5 STATUS	External output switch status signal
	15	GND_DRY	Dry ground
	17	GND_DRY	Dry ground
	19	RESV2	Reserved
	21	RESV3	Reserved
	23	GND_DRY	Dry ground
	25	NC	NC
	27	UT1 485+	485+
	29	UT1 485-	485-
	31	GND_MON	Monitor ground
	2	GEN MODE	Generator mode input. Generator mode when not connected.
	4	GND_DRY	Dry ground
	6	TMP BATT_IN	Internal Battery Temperature Detect
	8	+12V_DRY	Power
	10	Reserved	Reserved
	12	GND_DRY	Dry ground
	14	ENV_DET	Battery room temperature detect
	16	GND_DRY	Common ground
	18	CHG SHUT	Charger off contact
	20	GND_DRY	Dry ground
	22	RESV1	Reserved
	24	GND_DRY	Dry ground
	26	NC	NC
	28	UT2 485+	485+
	30	UT2 485-	485-

3.4.2 Output Dry Contacts

The Auxiliary Terminal Block has three output dry contact relays (see **Figure 16** and **Table 6**).

Figure 16 Output dry contacts and EPO wiring

See Table 6 for pins and description.

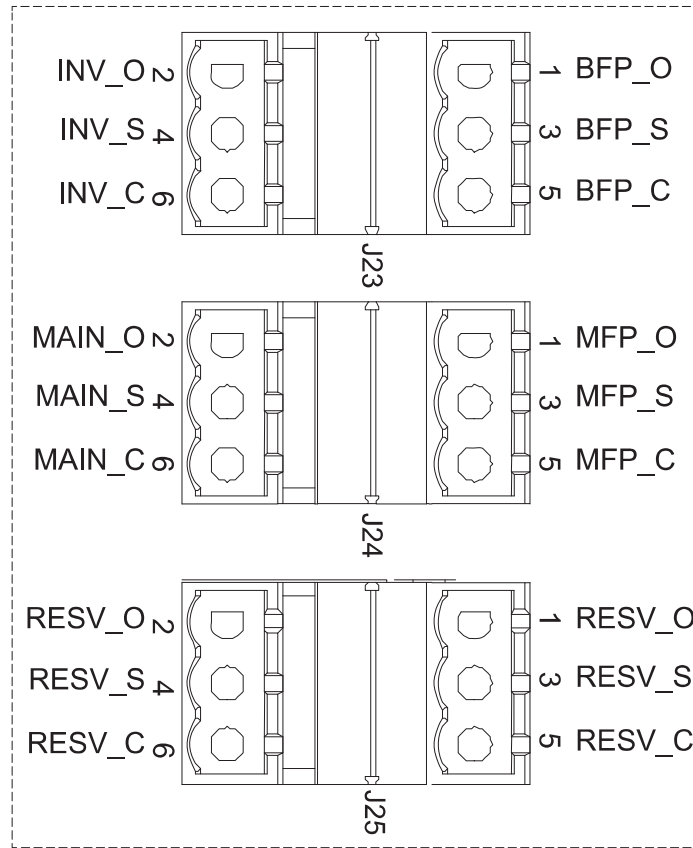


Table 6 Output dry contact relays

Port	Pin	Name	Description
J24	1	MFP_O	Rectifier back-feed normally open contact. Open when there is no back-feed.
	3	MFP_S	Rectifier back-feed common contact.
	5	MFP_C	Rectifier back-feed normally closed contact. Closed when there is no back-feed.
J23	2	INV_O	Inverter state normally open contact. Open when the inverter is abnormal.
	4	INV_S	Inverter state common contact.
	6	INV_C	Inverter state normally open contact. Closed when the inverter is normal.
J23	1	BFP_O	Bypass back-feed normally open contact. Open when there is no back-feed.
	3	BFP_S	Bypass back-feed common contact.
	5	BFP_C	Bypass back-feed normally closed contact. Closed when there is no back-feed.
J24	2	MAIN_O	Rectifier input state normally open contact. Open when the rectifier is abnormal.
	4	MAIN_S	Rectifier input state common contact.
	6	MAIN_C	Rectifier input state normally closed contact. Closed when the rectifier is normal.



NOTE

All auxiliary cables of terminal must be double-insulated. Wire should be 20-16AWG stranded for maximum runs between 80 and 200 feet (25-60m), respectively.

3.4.3 Liebert BDC Interface

The Liebert BDC interface is on the Auxiliary Terminal Block at J26. Refer to **Figure 15** for circuit details.

Table 7 Liebert BDC interface

Position	Name	Description
J26.1	Q1 STA	The main input switch status signal
J26.5	Q2 STA	The bypass input switch status signal
J26.9	Q3 STA	External maintenance switch status signal
J26, 3, 7, 9	GND	Dry ground

These contacts cannot be active unless they are set via software.



NOTE

All auxiliary cables of terminal must be double-insulated. Wire should be 20-16AWG stranded for maximum runs between 80 and 200 feet (25-60m), respectively.



NOTE

Refer to SL-25653, the Liebert EXM Bypass Distribution Cabinet manual for the Liebert BDC wiring.

3.4.4 Battery Cabinet Interface Connectors

The battery cabinet interface is on the Auxiliary Terminal Block at J22. Refer to **Figure 17** for circuit details.

Figure 17 Battery cabinet interface—J22

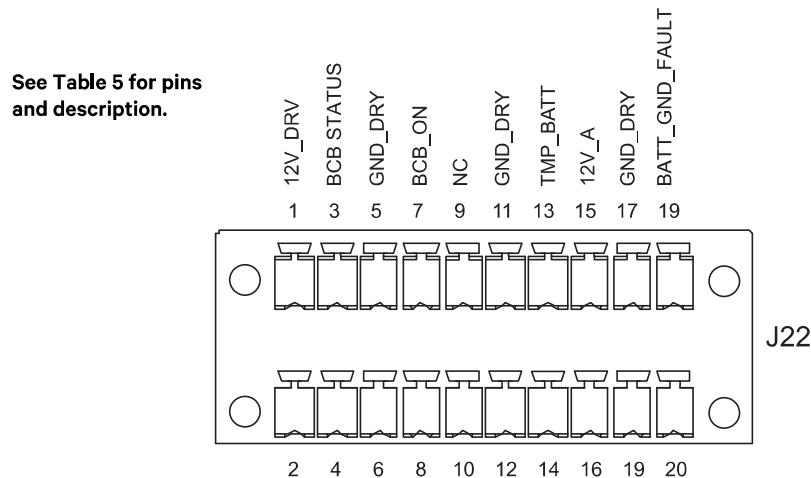


Table 8 Battery cabinet interface—J22

Pin	Name	Description
1	12V_DRV	BCB driver signal
3	BCB STATUS	BCB state signal
5	GND_DRY	Dry ground
7	BCB_ON	BCB on line signal
9	NC	NC
11	GND_DRY	Dry ground
13	TMP_BATT	External Battery temperature
15	12V_A	Power
17	GND_DRY	Dry ground
19	BATT_GND_FAULT	Battery ground fault signal



NOTE

All auxiliary cables of terminal must be double-insulated. Wire should be 20-16AWG stranded for maximum runs between 80 and 200 feet (25-60m), respectively.

3.4.5 EPO Input—Optional

NOTICE

Risk of exceeding internal voltage limits. Can cause equipment damage.

Do not apply more than 12V to the Emergency Power Off (EPO) input. Exceeding 12V on this input can damage the Liebert EXM's internal circuitry and control boards. Exceeding 12V will also put the Liebert EXM in an EPO state, and the unit will not reset, making it non-functional.

The UPS has an Emergency Power Off (EPO) function operated by a button on the control panel or by a remote contact provided by the user. The EPO button is under a hinged, clear plastic shield.

The J2 connector, shown in **Figure 18**, is the remote EPO input interface. The EPO has NO/NC contacts that become active when shorting terminals J2:3 and 4 or open terminal connection J2:2 and 1.

If an external Emergency Stop capability is required, it is connected at terminals J2: 1 and 2 and at J2: 3 and 4 on the monitor board. It also is connected to the Normally Open or Normally Closed remote stop switch between these two terminals using shielded cable (see **Figure 18** and **Table 9**). If this function is not used, Terminals J2:3 and 4 must be opened and J2:1 and 2 must be closed.

Figure 18 EPO wiring and signal names for J2

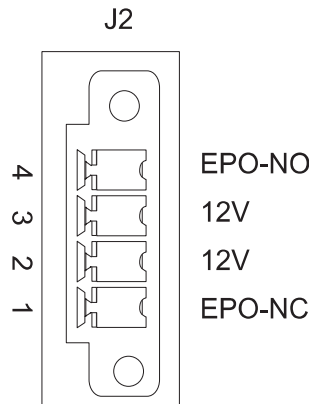


Table 9 EPO input contact relays—J2

Pin	Name	Description
1	EPO-NC	EPO activated when opened to Pin 2
2	+ 12V	EPO activated when opened to Pin 1
3	+ 12V	EPO activated when shorted to Pin 4
4	EPO-NO	EPO activated when shorted to Pin 3



NOTE

The Emergency Stop action within the UPS shuts down the rectifier, inverter and static bypass. It does not internally disconnect the input power supply. To disconnect ALL power to the UPS, open the upstream feeder breaker(s) after the remote EPO is activated.



NOTE

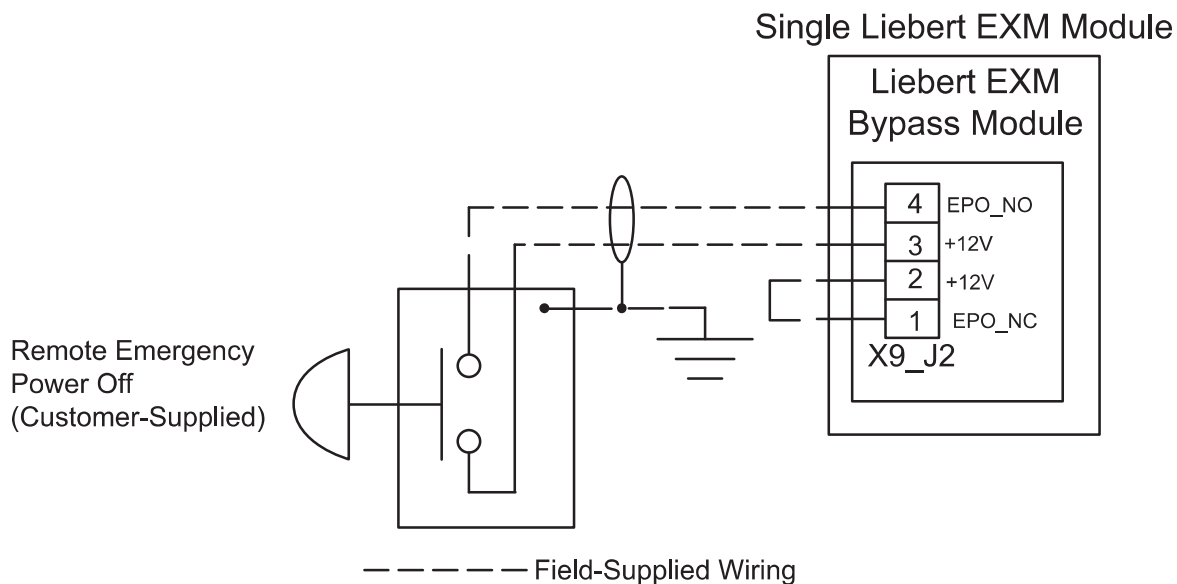
Normally Closed EPO – J2: 12, these terminals are supplied factory-linked on the Bypass Module on the UPS. The terminals must remain installed if using NO contacts.



NOTE

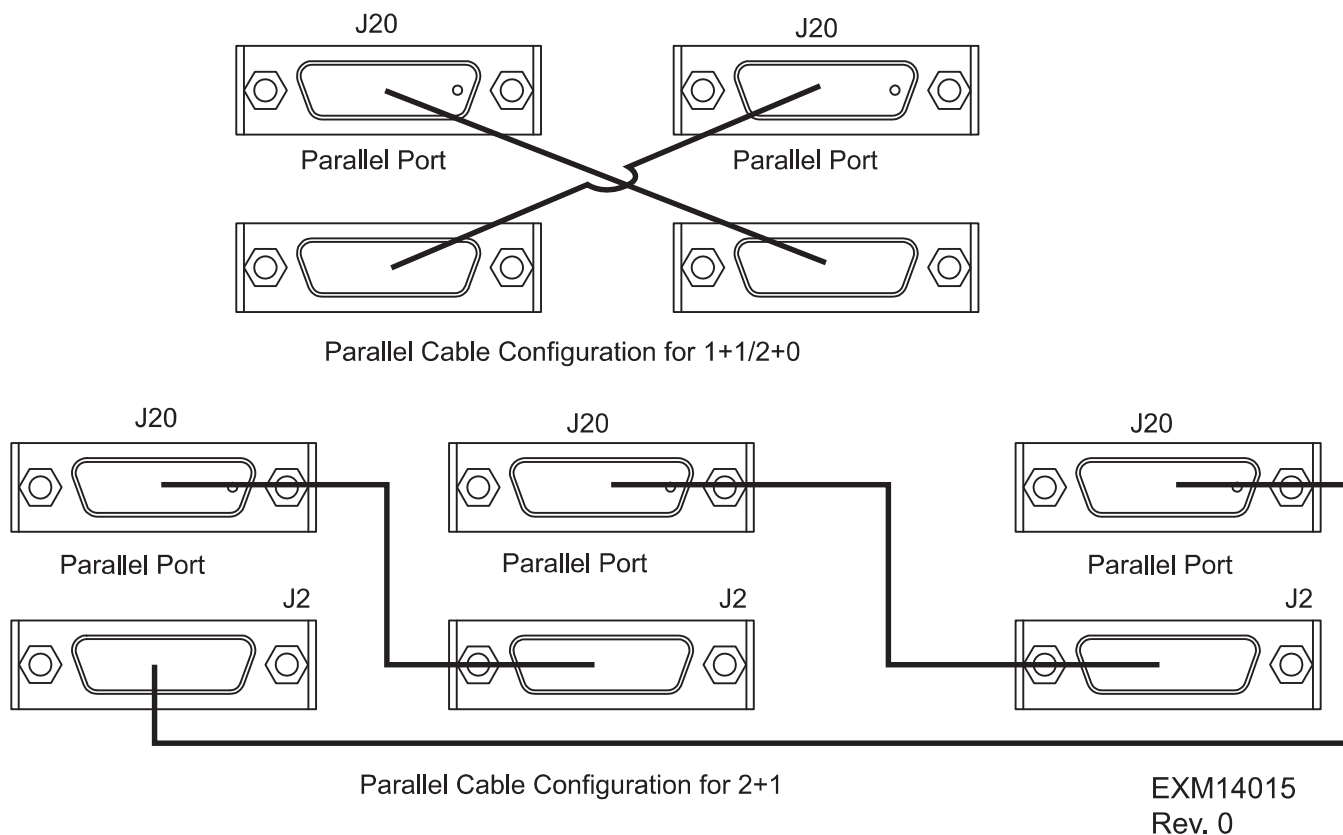
All auxiliary cables of terminal must be double-insulated. Wire should be 20-16AWG stranded for maximum runs between 80 and 200 feet (25-60m), respectively.

Figure 19 Single UPS Remote Emergency Power Off



3.5 PARALLEL CABLE CONNECTIONS

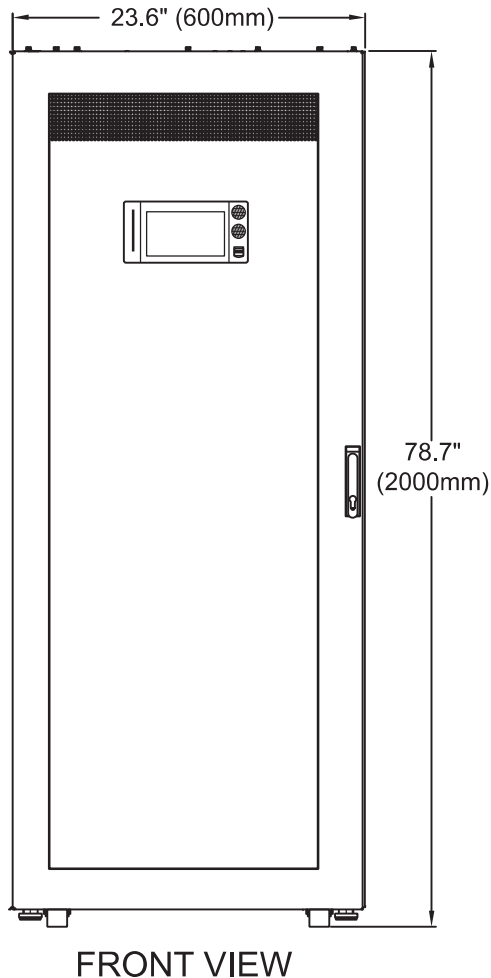
Figure 20 Parallel cable wiring diagram



4.0 INSTALLATION DRAWINGS

The diagrams in this section illustrate the key mechanical and electrical characteristics of the Liebert EXM UPS system cabinets (UPS, Liebert BDC and battery).

Figure 21 UPS dimensions—Front view



NOTES

1. Dimensions are in inches (mm)
2. 24" (610mm) minimum clearance above unit and 12" (305mm) rear clearance required for air exhaust.
36" (914mm) front access required for service
3. Keep cabinet within 15 degrees of vertical.
4. Top and bottom cable entry available through removable access plates. Remove, punch to suit conduit size and replace.
5. Unit bottom is structurally adequate for forklift handling.
6. Control wiring and power wiring must be run in separate conduits.
7. Copper cables only are recommended.
8. All wiring is to be in accordance with national and local electrical codes.
9. All battery cabinets must be positioned on the left side of the UPS.
10. Battery cabinets offered at 600mm and 880mm widths.

Figure 22 UPS main components—Typical 20-100kVA unit

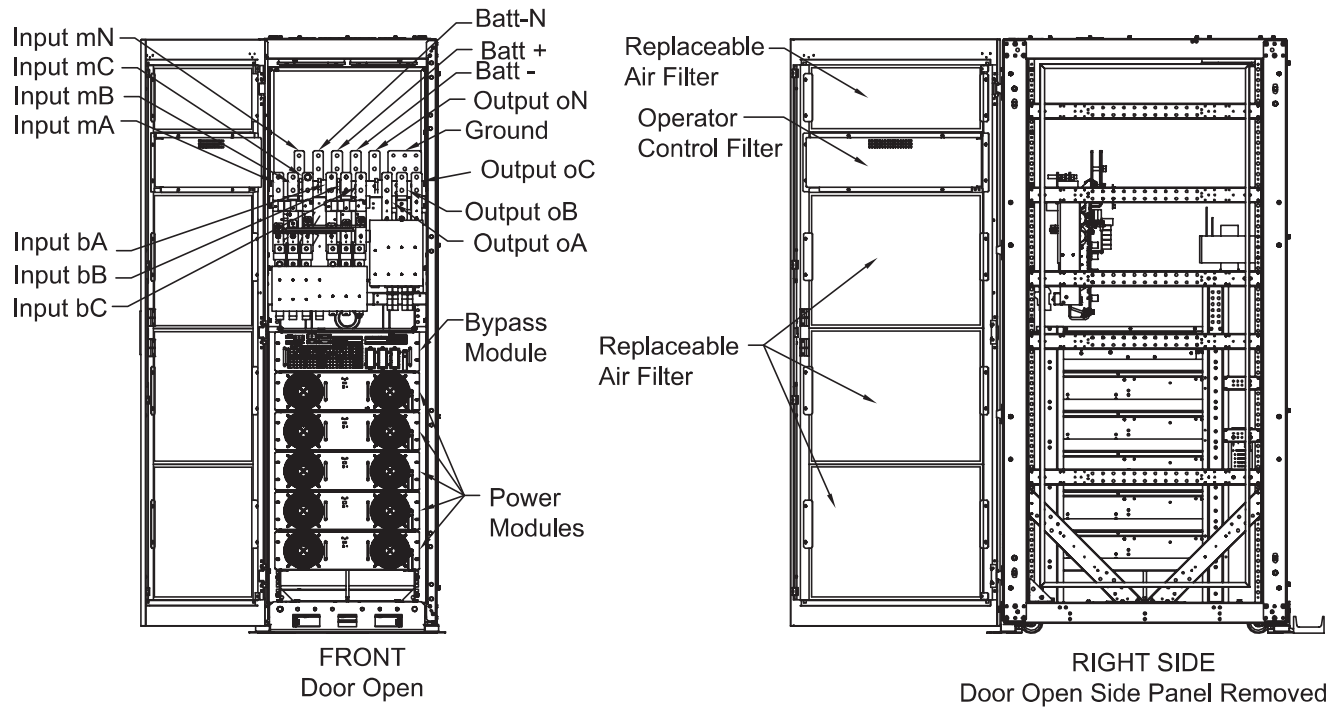
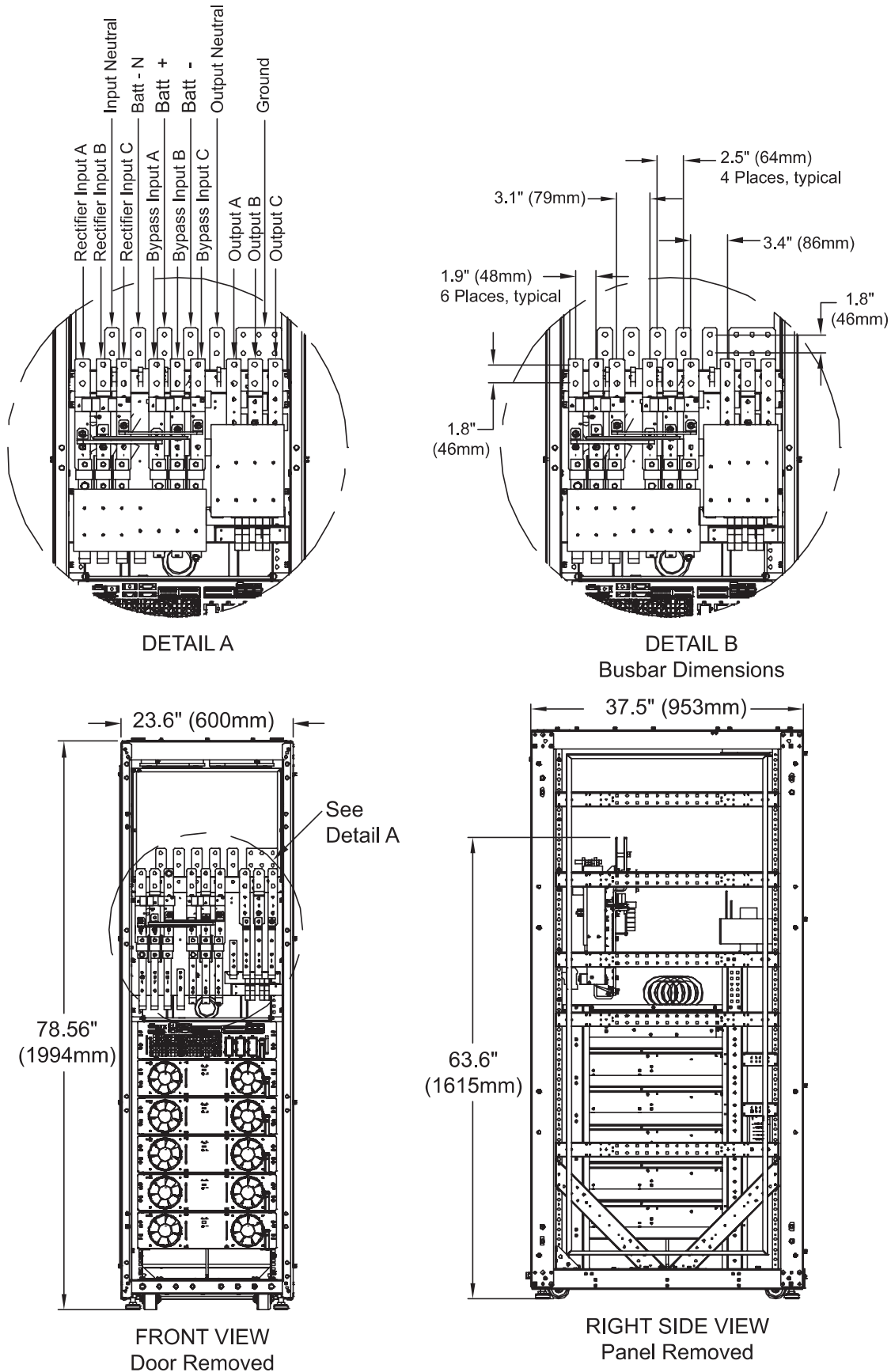


Figure 23 UPS cable connections—20-100kVA frames



University of South Carolina

Pre Bid Sign In Sheet

Columbia, South Carolina

Project Name: Uninterrupted Power Service Support Installation

Project Number: H27-Z229

Pre Bid Date & Time: August 2, 2017 10:00 AM

SWMBE?	Name	Company Name	Address	Phone #	Email
Yes No	Dexter Kennedy	USC	1244 Blossum	7-3057	dkenned3@mailbox.sc.edu
Yes No	Dwayne Wagner	"	"	7-1840	dwagner@sc.edu
Yes No	CLIFF STRINGFIELD	BEKA ENG.	7 clusters Ct. Colq. 29210	(803) 731-0650	cestringfield@bea-consulting.com
Yes No	Chuck Williams	DVB Electric	310 Cedar Crest Dr Lexington, SC 29072	803 381-2296	Chuck@DNBElectrics.com
Yes No	A Derrick	USC	743 Greene St	7-5811	ademink@sc.edu
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Yes No	Hatice Hikmet	USC			hikmeth@mailbox.sc.edu
Yes No					
Yes No					

***By signing this sheet you agree to receive information electronically.