

Liebert® ITA2 Maintenance Bypass Cabinet

Installer/User Guide

15 to 20 kVA, 50/60 Hz, 208/220 V 40 kVA, 50/60 Hz, 220/230/240 V The information contained in this document is subject to change without notice and may not be suitable for all applications. While every precaution has been taken to ensure the accuracy and completeness of this document, Vertiv assumes no responsibility and disclaims all liability for damages result from use of this information or for any errors or omissions.

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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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Vertiv™ Liebert® ITA2 MBC Installer/User Guide

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1 Important Safety Information

IMPORTANT! This manual contains important safety instructions that must be followed during the installation and maintenance of the UPS and batteries. Read this manual thoroughly and the safety and regulatory information, available at https://www.vertivco.com/ComplianceRegulatoryInfo, before attempting to install, connect to supply, or operate this UPS.

Vertiv™ Liebert® ITA2 MBC Installer/User Guide

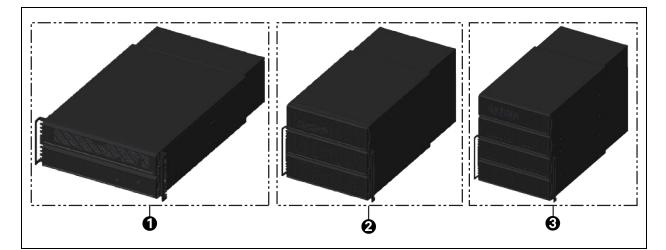
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2 Product Description

The Vertiv[™] Liebert[®] ITA2 15 to 20 kVA, 50/60 Hz, 208/220 V and 40 kVA, 50/60 Hz, 220/230/240 V UPS (referred as UPS, in this document), the Vertiv[™] Liebert[®] ITA2 Maintenance Bypass Cabinet (referred as MBC, in this document) can provide safe and reliable maintenance bypass function for users.

The MBC includes single MBC, 1+1/2+0 parallel MBC and 2+1 parallel MBC which is used together with the single UPS and parallel UPS respectively.

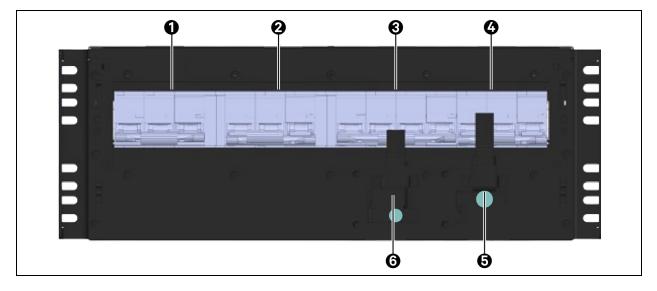
Figure 2.1 Liebert® ITA2 MBC



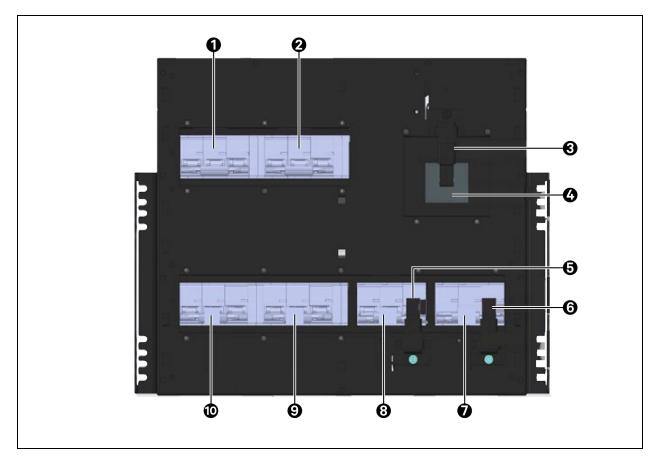
ltem	Description
1	Single MBC
2	1+1/2+0 parallel MBC
3	2+1 parallel MBC

2.1 Inside Front Panel Components

Figure 2.2 Components inside the Front Panel of Single MBC



ltem	Description
1	Rectifier input breaker (RIB)
2	Bypass input breaker (BIB)
3	Maintenance bypass breaker (MBB)
4	Main output breaker (MOB)
5	Interlock for MOB
6	Interlock for MBB



ltem	Description
1	Rectifier input breaker (RIB) for UPS1
2	Bypass input breaker (BIB) for UPS1
3	Interlock for MBB
4	Maintenance bypass breaker (MBB)
5	Interlock for MOB for UPS1
6	Interlock for MOB for UPS2
7	Main output breaker (MOB) for UP2
8	Main output breaker (MOB) for UP1
9	Bypass input breaker (BIB) for UPS2
10	Rectifier input breaker (RIB) for UPS2

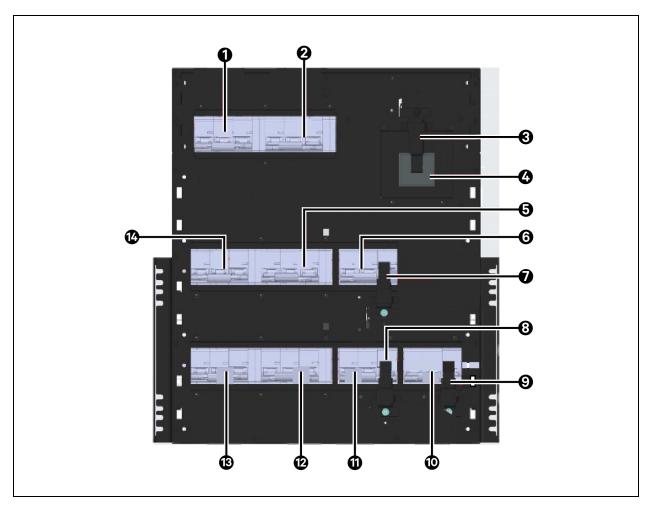


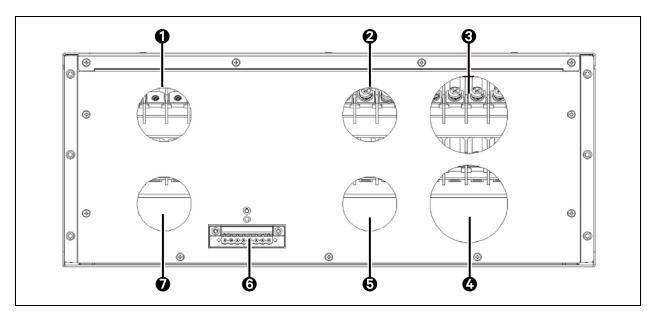
Figure 2.4 Components inside the Front Panel of 2+1 parallel MBC

ltem	Description
1	Rectifier input breaker (RIB) for UPS1
2	Bypass input breaker (BIB) for UPS1
3	Interlock for MBB
4	Maintenance bypass breaker (MBB)
5	Bypass input breaker (BIB) for UPS2
6	Main output breaker (MOB) for UP1
7	Interlock for MOB for UPS1
8	Interlock for MOB for UPS2
9	Interlock for MOB for UPS3
10	Main output breaker (MOB) for UP3
11	Main output breaker (MOB) for UP2

ltem	Description
12	Bypass input breaker (BIB) for UPS3
13	Rectifier input breaker (RIB) for UPS3
14	Rectifier input breaker (RIB) for UPS2

2.2 Rear Panel Components

Figure 2.5 Rear Panel with Junction Box of Single MBC



ltem	Description
1	User output
2	User bypass input
3	User main (rectifier) input
4	UPS main (rectifier) input
5	UPS bypass input
6	Dry contact terminal
7	UPS output

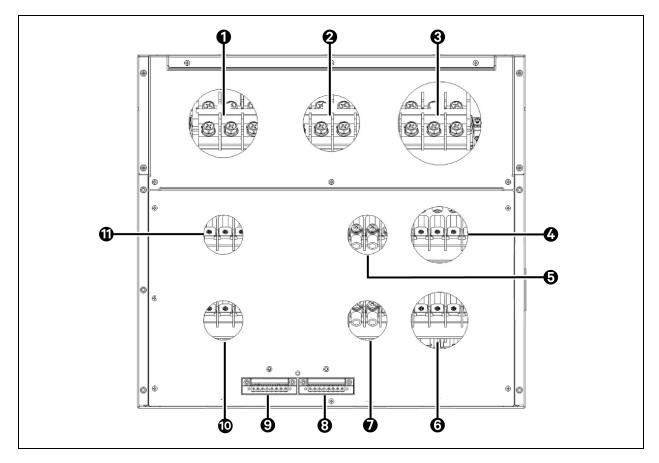


Figure 2.6 Rear Panel with Junction Box of 2+0 parallel MBC

ltem	Description
1	User output
2	User bypass input
3	User main (rectifier) input
4	UPS1 main (rectifier) input
5	UPS1 bypass input
6	UPS2 main (rectifier) input
7	UPS2 bypass input
8	Dry contact terminal for UPS2
9	Dry contact terminal for UPS1
10	UPS2 output
11	UPS1 output

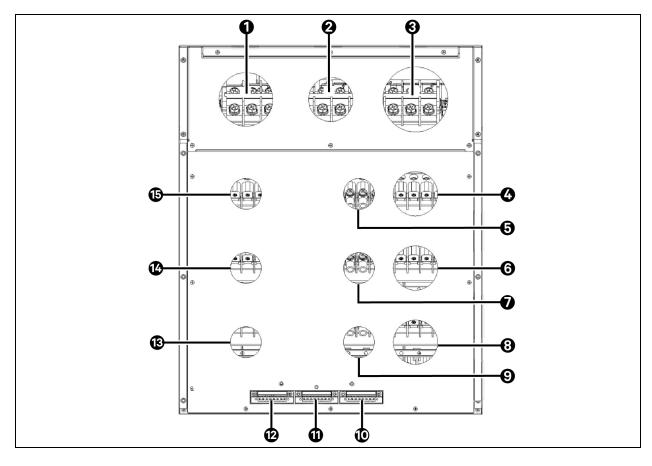


Figure 2.7 Rear Panel with Junction Box of 2+1 parallel MBC

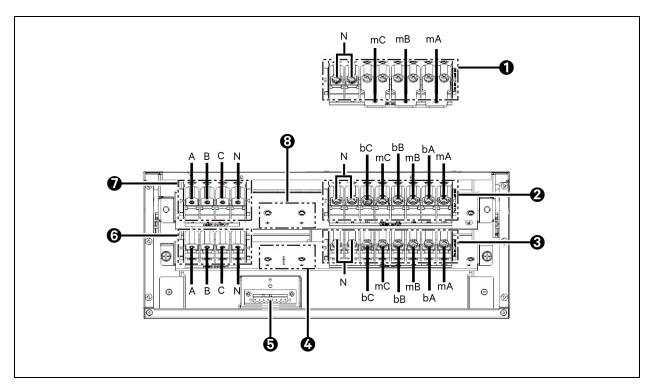
ltem	Description
1	User output
2	User bypass input
3	User main (rectifier) input
4	UPS1 main (rectifier) input
5	UPS1 bypass input
6	UPS2 main (rectifier) input
7	UPS2 bypass input
8	UPS3 main (rectifier) input
9	UPS3 bypass input
10	Dry contact terminal for UPS3
11	Dry contact terminal for UPS2
12	Dry contact terminal for UPS1

item	Description
13	UPS3 output
14	UPS2 output
15	UPS1 output

NOTE: The blocks of knockout holes are not shown in above pictures.

The power distribution section is accessible when the conduit box is removed.





ltem	Description
1	User Single input
2	User Dual input
3	UPS input
4	UPS PE
5	UPS dry contact
6	UPS output
7	User output
8	User PE

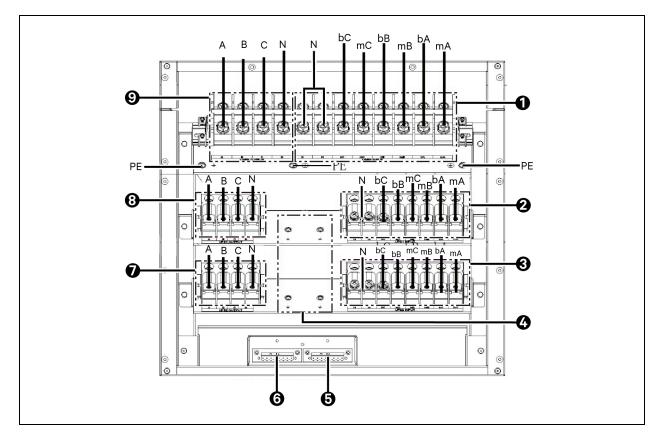


Figure 2.9 Rear Panel without Junction Box of 2+0 parallel MBC

ltem	Description
1	User dual input
2	User1 input
3	UPS2 input
4	UPS1 to 2 PE
5	UPS2 dry contact
6	UPS1 dry contact
7	UPS2 output
8	UPS1 output
9	User output

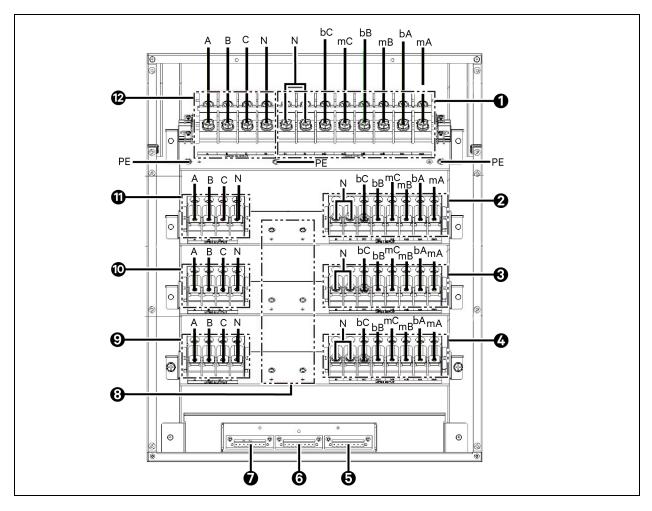


Figure 2.10 Rear Panel without Junction Box of 2+1 parallel MBC

ltem	Description
1	User dual input
2	User1 input
3	UPS2 input
4	UPS3 input
5	UPS3 dry contact
6	UPS2 dry contact
7	UPS1 dry contact
8	UPS1 to 3 PE
9	UPS3 output
10	UPS2 output
11	UPS1 output
12	User output

3 Installation

Installation must be performed by properly trained and qualified personnel. Do not start the UPS until the installation is finished, and the system is commissioned by an authorized engineer.



WARNING! Risk of electrical shock. Can cause property damage, injury, and death. The unit has several circuits that are energized with high DC and AC voltages. Check for voltage with both AC and DC voltmeters before making contact and before working within the UPS. Only properly trained and qualified personnel wearing appropriate, OSHA-approved personal protective equipment (PPE) should prepare for installation, install, and maintain the equipment. When performing maintenance with any part of the equipment under power, service personnel and test equipment must stand on rubber mats.



WARNING! Risk of electrical shock. Can cause equipment damage, injury and death. Before beginning installation, verify that all external overcurrent protection devices are open (Off), and that they are lockedout and tagged appropriately to prevent activation during the installation. After the power cables are connected, the terminal block's protective cover must be reinstalled to remove the electric shock hazard.



WARNING! Risk of heavy unit falling. Improper handling can cause equipment damage, injury, or death. Exercise extreme care when handling unit cabinets and rack-mounted units to avoid equipment damage or injury to personnel.

3.1 Pre-installation Preparation

3.1.1 Installation Tools

IMPORTANT! All tools used to install and maintain the Vertiv[™] Liebert[®] ITA2 MBC and equipment must be insulated.

The following tools are required to properly install your maintenance bypass cabinet:

- Torque wrench
- Adjustable wrench
- Phillips head screwdriver

3.2 Equipment Handling and Unpacking



WARNING! Risk of heavy unit falling. Improper handling can cause equipment damage, injury, or death. Take precautions when handling unit cabinets and rack mounted units to avoid equipment damage or injury to personnel.

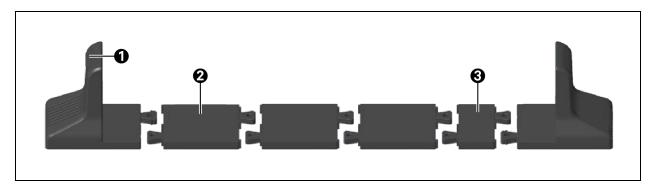
During unpacking:

• Check the accessories and model numbers against the delivery list. If you find any problem, notify Vertiv representative immediately.

3.3 Tower Installation

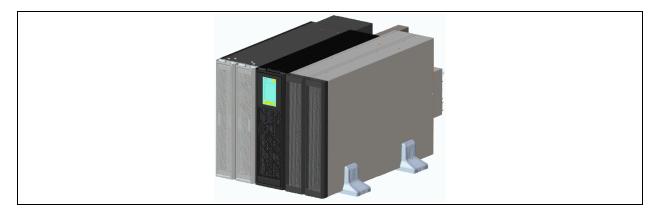
- 1. Take the support bases out of the accessories box.
- 2. Connect the spacers and the support bases as shown in **Figure 3.1** below. Each tower assembly requires two (2) support base/spacer assemblies, one in the front and one in the rear.
- 3. Place the UPS, battery cabinets, and the Vertiv[™] Liebert[®] ITA2 MBC on the two (2) support base assemblies.

Figure 3.1 Support bases



Item	Description
1	Support bases
2	2U Spacers with connectors
2	1U Spacers with connectors

Figure 3.2 Tower mounted Vertiv™ Liebert® ITA2 UPS System with Battery Cabinets and Vertiv™ Liebert® ITA2 MBC



3.4 Rack Installation

CAUTION: Risk of improper transport. Can cause damage to the UPS, MBC, or battery cabinets. Never attempt to lift or move the UPS, MBC, or battery cabinets with the rack brackets. The brackets and screws are not meant to lift the units.



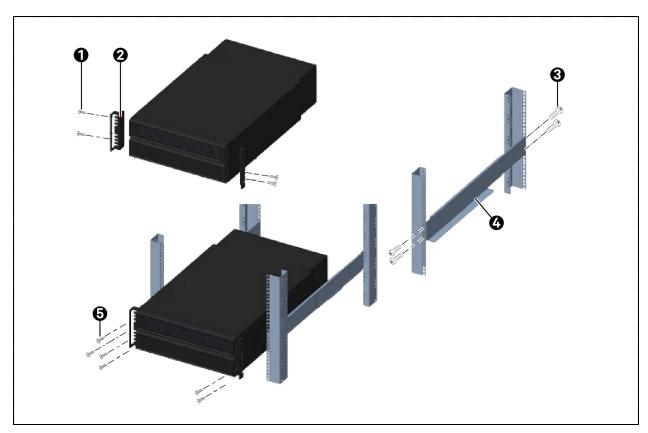
CAUTION: Risk of improper installation. Can make rack top heavy and cause a tipping hazard. The battery cabinets are heavier than the UPS. We recommend that you install the battery cabinets as near the bottom of the rack as possible to maintain a low center of gravity. Install the UPS above the battery cabinets. Install the MBC above the UPS.

Install each unit on its own set of rack mount guide rails. The rail kit will support the weight of a single UPS, MBC, or battery cabinet.

To mount the unit in the rack:

NOTE: Install the MBC above the UPS and battery cabinets below the UPS to facilitate cable connection.

- 1. Refer **Figure 3.3** on the next page to **Figure 3.5** on page 18, use four (4) of the M4 × 10 screws on each bracket, and attach a bracket to each front corner.
- 2. Refer Figure 3.3 on the next page to Figure 3.5 on page 18, mount the right and left guide rails for the MBC:
 - Adjust the length of each guide rail to the dimension of the rack.
 - Align the install holes on the ends of the rail to the square holes in the rack, and use four (4) of the provided screws, two (2) on each end to attach the rail to the rack.
- 3. Place the unit on the guide rails and push it completely into the rack along the guide rails.
- 4. Use M5 × 16 screws to secure the unit brackets to the rack, see Figure 3.3 on the next page to Figure 3.5 on page 18.





Item	Description
1	Bracket screw, 4 per bracket
2	Bracket (x2)
3	Rail screw, 4 per rail
4	Guide rail, 1 per side
5	Rack mount screw, 4 per bracket

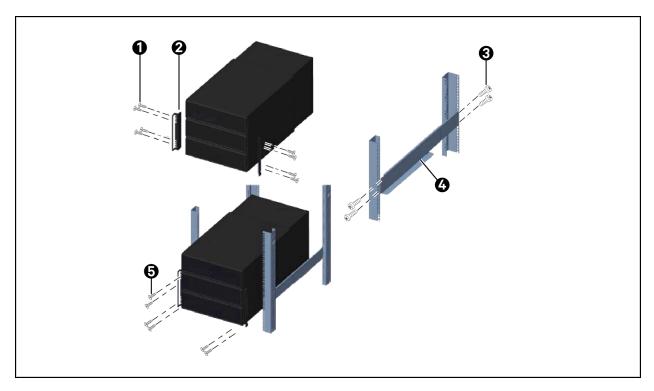
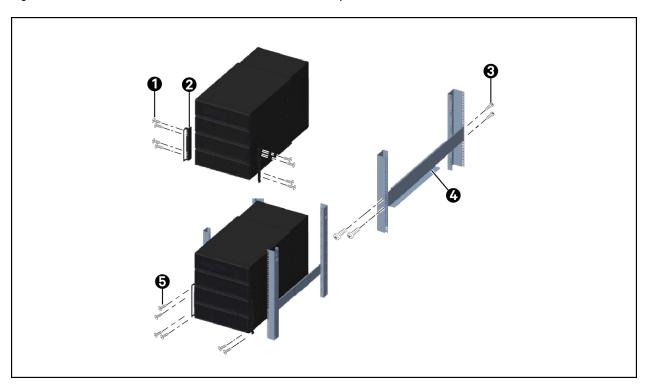


Figure 3.4 Guide Rail and Rack Bracket Installation of for 2+0 parallel MBC

ltem	Description
1	Bracket screw, 4 per bracket
2	Bracket (x2)
3	Rail screw, 4 per rail
4	Guide rail, 1 per side
5	Rack mount screw, 4 per bracket





ltem	Description
1	Bracket screw, 4 per bracket
2	Bracket (x2)
3	Rail screw, 4 per rail
4	Guide rail, 1 per side
5	Rack mount screw, 4 per bracket

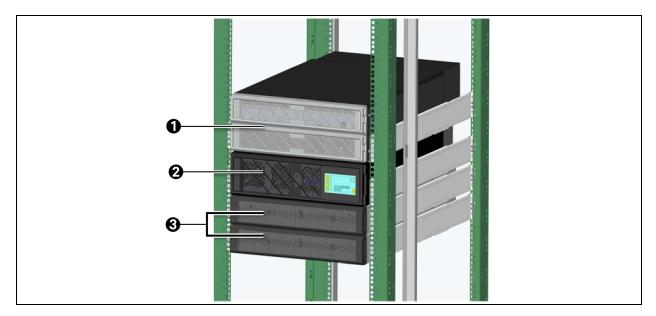


Figure 3.6 Rack-mounted Vertiv™ Liebert® ITA2 UPS System with Battery Cabinets and Vertiv™ Liebert® ITA2 MBC

ltem	Description
1	Liebert® ITA2 20/40 kVA MBC
2	Liebert® ITA2 20/40 kVA UPS
3	Liebert® ITA2 EBC

NOTE: When MBC and EBCs are configurated together with UPS, install the MBC above the UPSs and install EBCs under UPSs, refer to the **Figure 3.6** above.

3.5 Connecting Power Cables

WARNING! Risk of electrical shock. Can cause property damage, injury, and death. The unit has several circuits that are energized with high DC and AC voltages. Check for voltage with both AC and DC voltmeters before making contact and before working within the UPS. Only properly trained and qualified personnel wearing appropriate, OSHA-approved personal protective equipment (PPE) should prepare for installation, install, and maintain the equipment. When performing maintenance with any part of the equipment under power, service personnel and test equipment must stand on rubber mats.



WARNING! Risk of electrical shock. Can cause equipment damage, injury and death. Before beginning installation, verify that all external overcurrent protection devices are open (Off), and that they are lockedout and tagged appropriately to prevent activation during the installation. After the power cables are connected, the terminal block's protective cover must be reinstalled to remove the electric shock hazard.

NOTE: The main input, bypass input and output wiring of single MBC, 2+0 parallel MBC, and 2+1 parallel MBC are totally the same refer to Connecting a Single Input Configuration on the facing page or Connecting a Dual Input Configuration on page 25.

NOTE: The Connecting to UPS on page 25 is suitable for interconnecting between single MBC, 2+0 MBC, or 2+1 MBC and UPS. The 2+0 MBC and 2+1 MBC wiring only need to repeat the steps in Connecting to UPS on page 25 according to the quantity of UPS in system.

When connecting input and output cables, follow national and local wiring regulations, take the environment into account, and refer to NFPA 70, Table 310-16. The recommended minimum cables and overcurrent protection is listed in **Table 3.1** below, and **Table 3.2** on the facing page, are based upon an 86 °F (30 °C) ambient temperature.

Unit Rating	Maximum Input Current	Recommended OPD	75 °C THW Copper Wire (phase) *Number of Cable per phase:1	75 °C THW Copper Wire (neutral) * Number of Cable:1	75 °C THW Copper Wire (Ground) * Number of Cable: 1	Recommended Torque
Single MBC	75 A	100 A	1/0 AWG	1/0 AWG	6 AWG	50 LB-IN
2+0 MBC	150 A	200 A	300 kcmil	300 kcmil	4 AWG	53 LB-IN
2+1 MBC	150 A	200 A	300 kcmil	300 kcmil	4 AWG	53 LB-IN

Table 3.1 Currents and Wire Size— MBC User Main (Rectifier) Input

NOTE: The short circuit current of main input breaker should be at least 10 kA.

Unit Rating	Maximum Input Current	Recommended OPD	75°C THW Copper Wire (phase) *Number of Cable per phase:1	75°C THW Copper Wire (neutral) * Number of Cable:1	75°C THW Copper Wire (Ground) * Number of Cable: 1	Recommended Torque
Single MBC	60.6 A	80 A	2 AWG	2 AWG	8 AWG	50 LB-IN
2+0 MBC	121.2 A	175 A	4/0 AWG	4/0 AWG	4 AWG	53 LB-IN
2+1 MBC	121.2 A	175 A	4/0 AWG	4/0 AWG	4 AWG	53 LB-IN
NOTE: * Input sizes and values apply to dual-source configuration.						

Table 3.2 Currents and Wire Size—MBC User Bypass Input* and User Output

NOTE: The short circuit current of bypass input breaker and output breaker should be at least 10kA.

Table 3.3 Recommended Conduit Sizes

Unit Rating	USER Rectifier Input	USER Bypass input	USER Output	UPS Rectifier input	UPS Bypass input	UPS Output
Single MBC	2 in. (50 mm)	1.25 in. (31.75 mm)	1.25 in. (31.75 mm)			
2+0 MBC	3 in. (76.2 mm)	2 in. (50 mm)	2.5 in. (63.5 mm)	2 in. (50 mm)	1.25 in. (31.75 mm)	1.25 in. (31.75 mm)
2+1 MBC	3 in. (76.2 mm)	2 in. (50 mm)	2.5 in. (63.5 mm)			

3.5.1 Connecting a Single Input Configuration

WARNING! Risk of electrical shock. Can cause equipment damage, injury and death. Before beginning installation, verify that all external overcurrent protection devices are open (Off), and that they are lockedout and tagged appropriately to prevent activation during the installation. After the power cables are connected, the terminal block's protective cover must be reinstalled to remove the electric shock hazard.

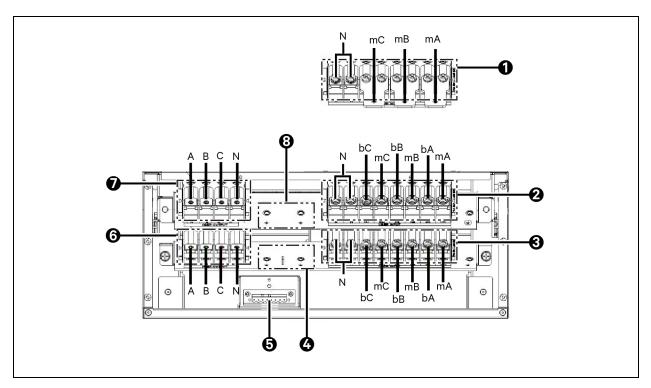
1. Prepare for connection by removing the conduit box from the MBC, opening knockout holes, and routing cables through the conduit.

NOTE: Copper shorting busbars are factory installed between rA and bA; rB and bB; rC and bC; and N. Leave the shorting busbars in place on the MBC main input terminal block.

- 2. Referring to the MBC Main Input terminal block in **Figure 3.7** on the next page, connect input cables:
 - Phase A to busbar between mA and bA.
 - Phase B to busbar between mb and bB.
 - Phase C to busbar between mC and bC.
 - Neutral to two N terminal.
 - Ground to the PE screw (next to mA of user input terminal)
- 3. To connect the Vertiv[™] Liebert[®] ITA2 MBC to a dedicated output distribution panel, refer to the MBC Main Output terminal block in **Figure 3.7** on the next page, and connect output cables:
 - Phase A to A.
 - Phase B to B.
 - Phase C to C.
 - Output neutral to N.
 - Safety ground to the ground (PE) screw (next to A of user output terminal).
- 4. To connect the MBC to the UPS, refer to the appropriate procedure Connecting to UPS on page 25.

- 5. Torque all customer side connections per recommendations in **Table 3.1** on page 20, and **Table 3.2** on the previous page.
- 6. Replace the conduit box and secure it.

Figure 3.7 Vertiv™ Liebert® ITA2 MBC Single and Dual Input Wiring Diagram of Single MBC



ltem	Description
1	User single input
2	User dual input
3	UPS input
4	UPS PE
5	UPS dry contact
6	UPS output
7	User output
8	User PE

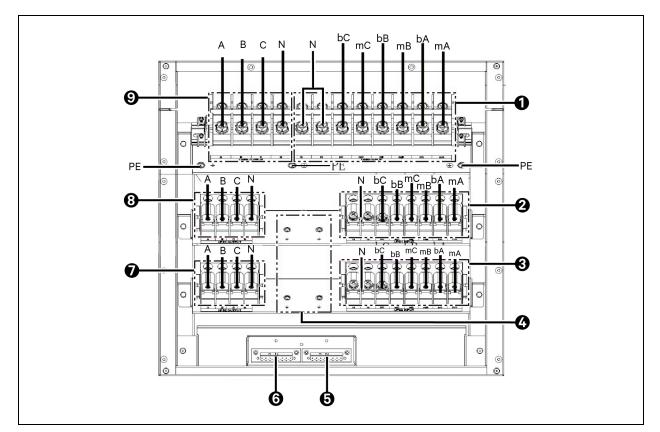
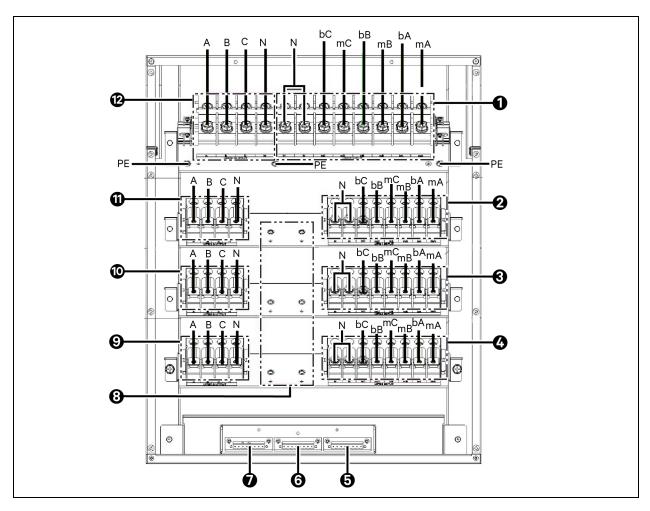
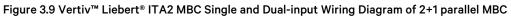


Figure 3.8 Vertiv™ Liebert® ITA2 MBC Single and Dual-input Wiring Diagram of 2+0 parallel MBC

ltem	Description
1	User dual input
2	User1 input
3	UPS2 input
4	UPS1 to 2 PE
5	UPS2 dry contact
6	UPS1 dry contact
7	UPS2 output
8	UPS1 output
9	User output





ltem	Description
1	User dual input
2	User1 input
3	UPS2 input
4	UPS3 input
5	UPS3 dry contact
6	UPS2 dry contact
7	UPS1 dry contact
8	UPS1 to 3 PE
9	UPS3 output
10	UPS2 output
11	UPS1 output
12	User output

3.5.2 Connecting a Dual Input Configuration



WARNING! Risk of electrical shock. Can cause equipment damage, injury and death. Before beginning installation, verify that all external overcurrent protection devices are open (Off), and that they are lockedout and tagged appropriately to prevent activation during the installation. After the power cables are connected, the terminal block's protective cover must be reinstalled to remove the electric shock hazard.

1. Prepare for connection by removing the conduit box from the MBC, opening knockout holes, and routing cables through the conduit.

NOTE: Copper shorting busbars are factory installed between rA and bA, rB and bB, rC and bC, and N. Remove the shorting busbars from the MBC main input terminal block.

- 2. For rectifier input, refer to the MBC Main Input terminal block in Figure 3.7 on page 22, and connect input cables:
 - Phase A to mA.
 - Phase B to mB.
 - Phase C to mC.
 - Neutral to N.
 - Ground to the PE screw (next to mA of user input terminal).
- 3. For bypass input, refer to the MBC Main Input terminal block in Figure 3.7 on page 22, and connect input cables:
 - Phase A to bA.
 - Phase B to bB.
 - Phase C to bC.
 - Neutral to N.
 - Ground to the PE screw (next to N of user input terminal).
- 4. To connect the MBC to the UPS, refer to the appropriate procedure Connecting to UPS below.
- 5. Torque all customer side connections per recommendations in Table 3.1 on page 20, and Table 3.2 on page 21.
- 6. Replace the conduit box and secure it.

3.5.3 Connecting to UPS

WARNING! Risk of electrical shock. Can cause equipment damage, injury and death. Before beginning installation, verify that all external overcurrent protection devices are open (Off), and that they are lockedout and tagged appropriately to prevent activation during the installation. After the power cables are connected, the terminal blocks protective cover must be reinstalled to remove the electric shock hazard.

NOTE: When MBC and EBCs are configurated together with UPSs, install the MBC above the UPS and install EBCs under UPS, refer to the **Figure 3.6** on page 19.

- 1. Prepare for connection by removing the conduit box cover from the UPS, opening knockout holes, and routing cables through the conduit.
- 2. Remove the shorting busbars between terminals mA and bA, mB and bB, mC and bC, and mN and bN of the input terminals on UPS.
- 3. Referring to Figure 3.10 on the next page and Figure 3.11 on page 27, connect cables from the MBC's UPS Input terminal block to the UPS: Input terminal block.

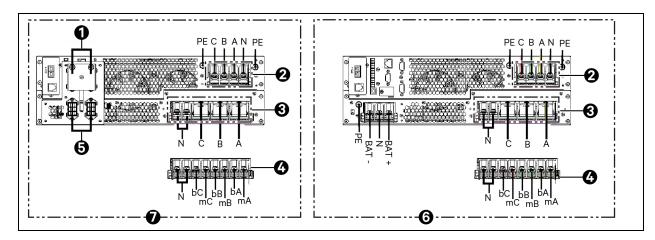
Phase	From	То	Description	
	UPS Input terminal on MBC	Input Terminal on UPS		
A	mA	mA		
В	mB	mB		
С	mC	mC	main input	
Ν	Ν	Ν		
Ground	PE(next to mA)	PE bus bar		
A	bA	bA		
В	bB	bB	bypass input	
С	bC	bC	by pass input	
Ν	Ν	Ν		

4. To connect to UPS output, refer to Figure 3.10 below, connect cables from the MBC's UPS Output terminal block to the UPS: Output terminal block.

Phase	From	То	Description
	UPS Output Terminal on MBC	Output Terminal on UPS	
A	А	sA	
В	В	sB	
С	С	sC	Output
Ν	Ν	Ν	
Ground	PE(next to N)	PE bus bar	

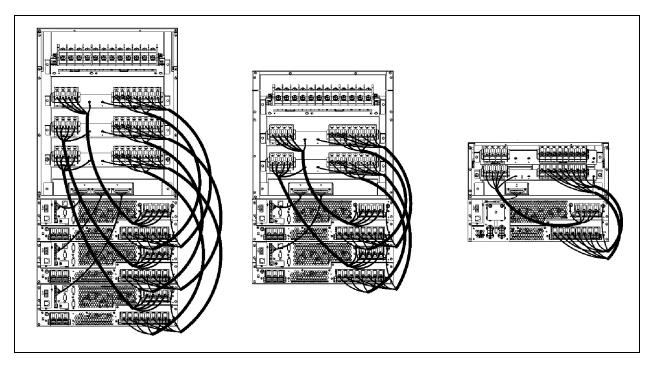
- 5. Torque all customer side connections according to the recommendations in **Table 3.1** on page 20, and **Table 3.2** on page 21.
- 6. Replace the conduit box cover and secure it.

Figure 3.10 UPS Single and Dual Input Wiring Diagram



ltem	Description
1	Li-ion
2	Output termianl block
3	Single input terminal block
4	Dual input terminal block
5	VRLA
6	Liebert® ITA2 40 k 400 V UL UPS
7	Liebert® ITA2 20 k 208 V UL UPS

Figure 3.11 Wiring between MBC and UPS



3.6 Connecting Communication Cable

The Vertiv[™] Liebert[®] ITA2 MBC includes a signal cable to connect to the UPS.

NOTE: This chapter describes interconnection between single MBC, 2+0 MBC, or 2+1 MBC and UPS. The 2+0 MBC and 2+1 MBC wiring only need to repeat the steps in this chapter according to the quantity of UPS in system.

To connect the cable:

- 1. Connect the 8 pin connector of the signal cable from the dry contact port on MBC to the dry contact port on the UPS.
- 2. Connect the each of the 2 pin connectors to the appropriate dry contact port on the UPS according to the connector/port labels.

No	From	То	Description
	Dry Contact Terminal on MBC	Dry Contact Terminal on UPS	
1	1	1	Main input feedback protection
2	2		Main input reedback protection
3	3	2	Bypass input feedback protection
4	4	Z	Bypass input reedback protection
5	5	3	Maintenance bypass mode
6	6	0	Maintenance by pass mode
7	7	4	Service mode
8	8	+	

NOTE: If signal cables are connected between MBC and UPS, make sure the dry contact function of UPS is set same as above table to obtain functions.

To connect the parallel cables between UPS:

- When 2 and above UPSs are configurated in the system, the parallel cables between UPS should be connected.
- There are two parallel communication ports, named as PARALLELED PORT 1 and PARALLELED PORT 2 at the rear of each UPS, refer to the User manual of UPS to get more details.

The following steps and **3.6** above show the way to build the communication between 3 UPS:

- Connect the parallel cable from the PARALLEL PORT 2 of the 1st UPS to the PARALLELED PORT 1 of the 2nd UPS and
- Connect the parallel cable from the PARALLEL PORT 2 of the 2nd UPS to the PARALLELED PORT 1 of the 3rd UPS.
- 3. Connect the parallel cable from the PARALLEL PORT 2 of the 3rd UPS back to the PARALLELED PORT 1 of the 1st UPS.
- 4. Tighten the screws on all parallel cables terminals.

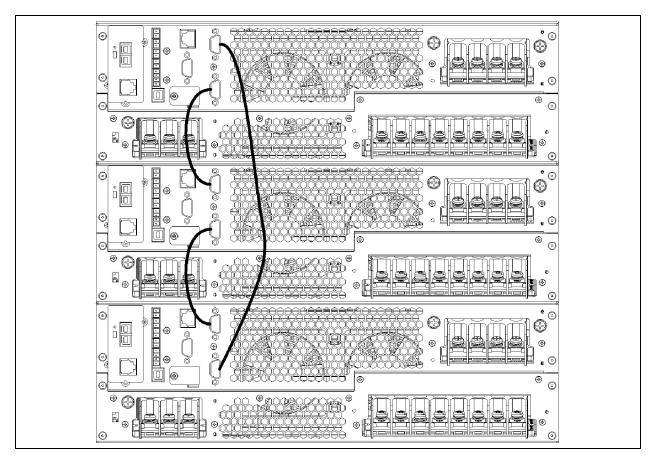


Figure 3.12 Parallel cable wiring for 3 Parallel Connected UPS

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Appendices

Appendix A: Technical Support and Contacts

A.1 Technical Support/Service in the United States

Vertiv Group Corporation

24x7 dispatch of technicians for all products.

1-800-543-2378

Liebert® Thermal Management Products

1-800-543-2378

Liebert[®] Channel Products

1-800-222-5877

Liebert® AC and DC Power Products

1-800-543-2378

A.2 Locations

United States

Vertiv Headquarters

505 N Cleveland Ave

Westerville, OH 43082

Europe

Via Leonardo Da Vinci 8 Zona Industriale Tognana

35028 Piove Di Sacco (PD) Italy

Asia

7/F, Dah Sing Financial Centre

3108 Gloucester Road, Wanchai

Hong Kong

India

Vertiv Headquarters

Plot C-20, Rd No. 19, Wagle Ind. Estate, Road No. 16 V

Wagle Industrial Estate, MIDC Thane (W), Maharashtra, India

+91 22 71975400

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