Liebert® MBX Busway 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.

TABLE OF CONTENTS

1 Unpacking and Preliminary Inspection **5**
1.1 Mechanical Lifting 5
1.2 Storage 5
1.3 Operating Environment, Specifications 5
2 Installation **7**
2.1 Power Feed Box 8
2.2 Hanging Brackets 11
2.3 Busway Track 12
2.4 Joint Pack Installation 13
2.5 Tap-Off Box 15
2.6 End Cap Installation 17
3 Equipment Inspection and Startup **19**
3.1 Inspection 19
3.2 Startup 19
4 Operating Instructions **21**
4.1 Startup Procedures 21
4.2 Normal System Shutdown 21
4.3 Normal System Turn On 21
5 Maintenance **23**
5.1 Tap-Off Box Maintenance 23
Appendices **25**
Appendix A: Technical Support 25
Appendix B: Inspection and Startup Checklist 25
Appendix C: Technical Specifications 28

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1 UNPACKING AND PRELIMINARY INSPECTION

IMPORTANT! Please visit http://www.Vertiv.com/Compliance RegulatoryInfo for important safety information before beginning installation.

IMPORTANT! Consultez la page http://www.Vertiv.com/Compliance RegulatoryInfo pour obtenir des informations importantes relatives à la sécurité avant de commencer l'installation.

NOTE: Read this entire manual before installing and operating the system. Upon receipt of a Vertiv™ Liebert® MBX Busway System, the installer should perform the following steps to ensure a top-quality installation.

- Inspect the shipment for damage or signs of mishandling before unpacking the unit(s).
- Unpack the system components carefully. Use care to avoid puncturing the container with sharp objects that could damage the contents.
- Remove the packing and vapor barriers and inspect the equipment for any obvious shipping damage.

1.1 Mechanical Lifting

- Some sections of the busway system may require mechanical lifting due to their weight. Options for mechanical lifting includes forklift, scissor lift, platform lift and block and tackle. A full assessment of the risks should be carried out by the installer before commencing work.
- The Liebert MBX must be safely secured to the lifting apparatus before lifting.
- Always check that the weight of the load does not exceed the safe working load of the lifting apparatus. Ensure that the lifting equipment is used according to the manufacturer's guidelines.

1.2 Storage

- The Liebert MBX is delivered to the customer neatly stacked on a wooden pallet for ease of removal. The maximum weight of the pallet will not exceed 5,500 lb. (2,500 kg).
- The Liebert MBX is protected from minor water ingress by an outer polythene wrap that should be left in place until the track is mounted.
- If the Liebert MBX will not be installed immediately upon delivery, it should be stored in a clean, dry area with temperatures maintained in the range of 32°F to 104°F (0°C to 104°C). The busway system should never be stored outdoors.
- Storage/transport: Up to 40,000 ft. (12,200m) above mean sea level.

1.3 Operating Environment, Specifications

For detailed information about the Liebert MBX's operating environment and other specifications, refer to Technical Specifications on page 28.

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2 INSTALLATION

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

IMPORTANT! Ces consignes s'adressent aux installateurs qualifiés qui doivent avoir connaissance des pratiques locales en matière de câblage applicables à l'équipement installé.

Before you begin ensure the following:

- The entire route is inspected for any obstructions before installation.
- A plumb line is applied from the start of the run to the end of the run as a guide for the installation.

Figure 2.1 Installation Overview

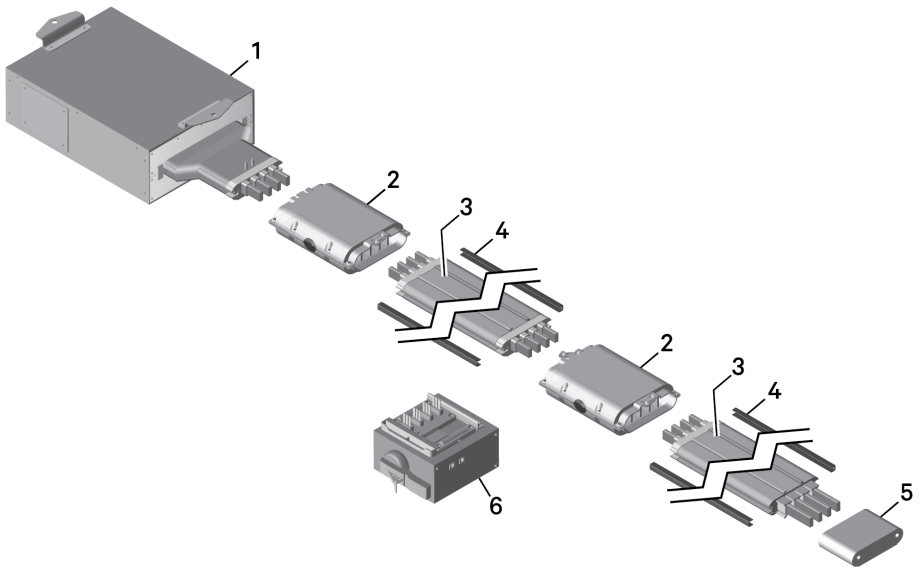


Table 2.1 Overview Description

ITEM	DESCRIPTION
1	Power Feed Box
2	Joint Pack
3	Busway track
4	Monitoring/Communication Cover
5	End Cap
6	Tap-Off Box

2.1 Power Feed Box

The Power Feed Box is a NEMA enclosure that provides connections for incoming power cables to the Liebert® MBX Busway System. The Power Feed Box is usually the first component to be mounted on a run.

NOTE: The Power Feed Box should be installed at the correct height in accordance with the approved drawings. Refer to the submittal drawing MBX-05-Sxxx and and MBX-17-Sxxx for installation height, torque values and additional technical information. Contact your Vertiv™ representative for copies of the appropriate submittal drawing.

Consult the design engineer's approved drawings for busway track installation requirements.

The power feed box may be installed using all-thread from the ceiling or Unistrut. For horizontal installations, move the mounting brackets to the narrow side of the box. For vertical installations, move the mounting brackets to the wide top side of the box. keep refer submittal drawing MBX-05-S00x and Figure 2.2 on page 8 and Figure 2.3 on page 9

Figure 2.2 Horizontal Mounting Bracket

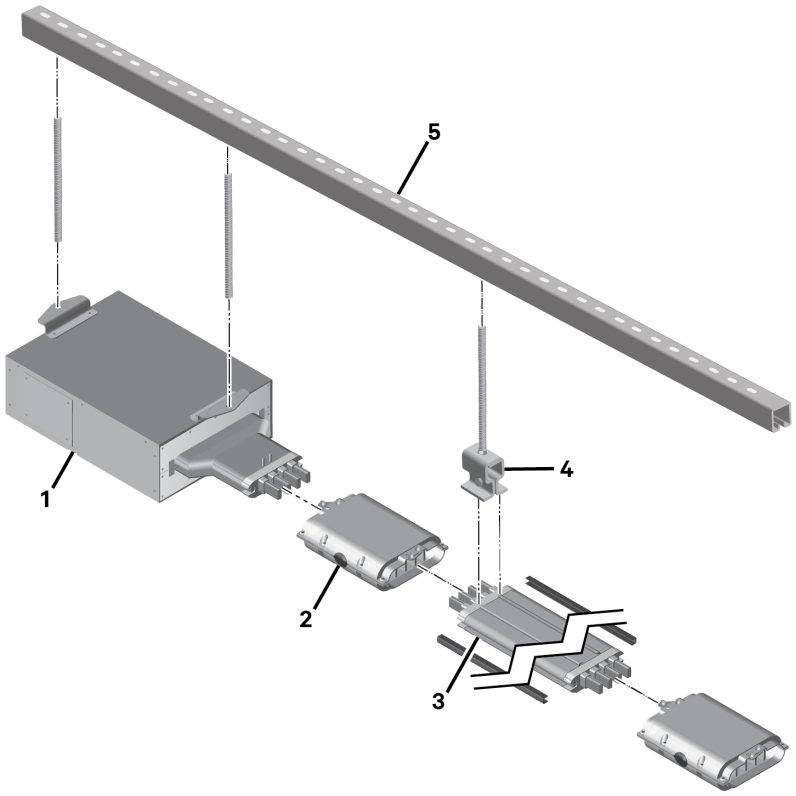


Table 2.2 Horizontal Mounting Overview

ITEM	DESCRIPTION
1	Power Feed Box
2	Joint Pack
3	Busway Track

Table 2.2 Horizontal Mounting Overview (continued)

ITEM	DESCRIPTION
4	Horizontal Hanger (HDH)
5	Unistrut

Figure 2.3 Vertical Mounting Bracket

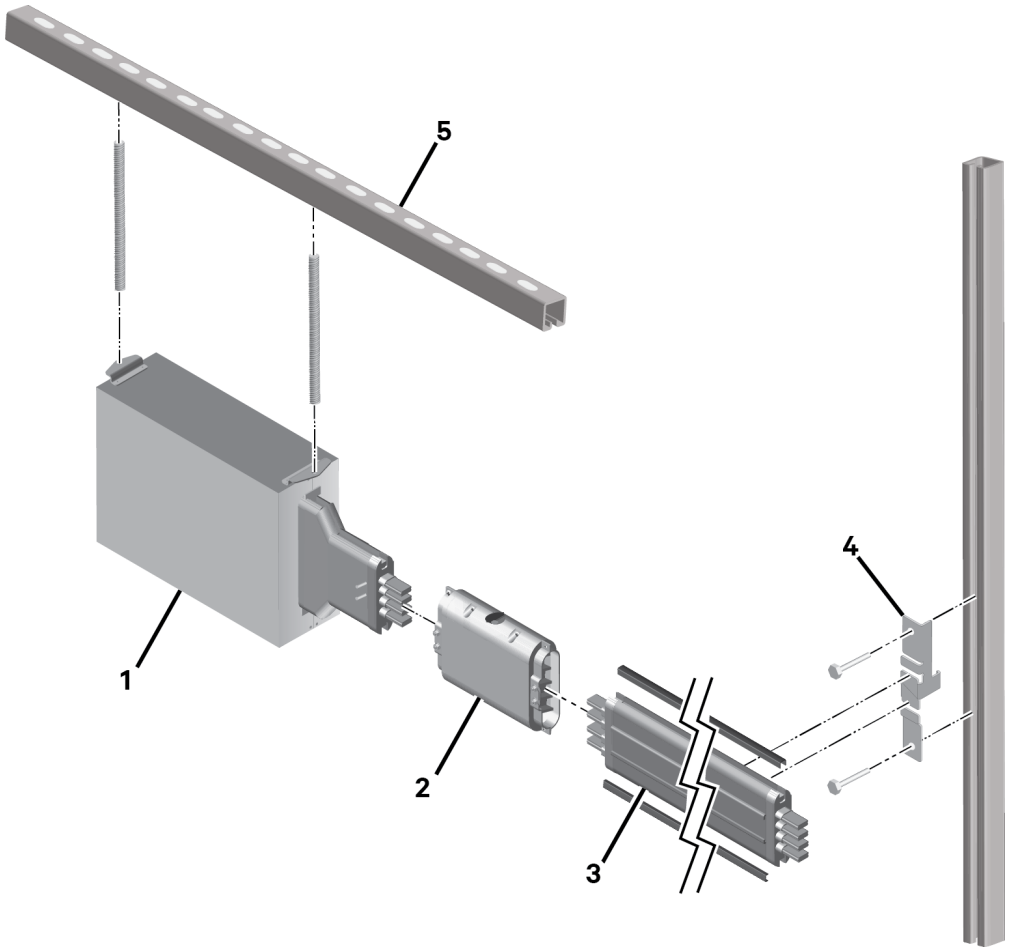


Table 2.3 Vertical Mounting Overview

ITEM	DESCRIPTION
1	Power Feed Box
2	Joint Pack
3	Busway Track
4	Vertical/Horizontal Hanger (VUB)
5	Unistrut

Torque the Power End Feed Box interior 3-phase live and neutral conductor connections according to Electrical Connection Torque Specifications on page 10. For units equipped with monitoring, the voltage sense leads are torqued to 7.4 ft.-lb. (10Nm) for 3-phase and neutral conductors; the monitoring ground is torqued to 3 ft.-lb. (4Nm).

If the monitoring option is included in your system, refer to SL-70526 for detailed monitoring setup information.

Figure 2.4 Applicable Hardware Stack for Electrical Torque Specifications

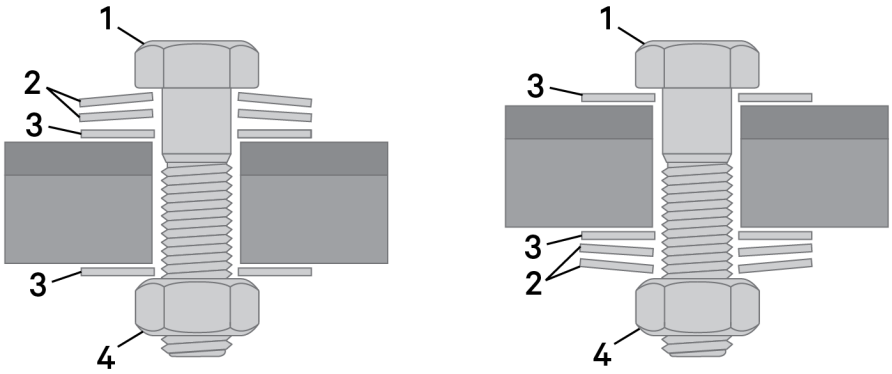


Table 2.4 Torque Specification Overview

ITEM	DESCRIPTION
1	Bolt
2	Belleville Washer
3	Flat Washer
4	Nut

Table 2.5 Electrical Connection Torque Specifications

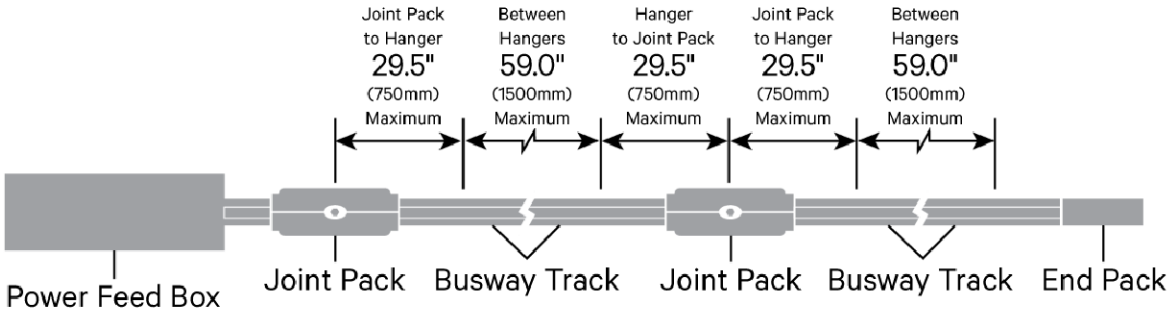
HARDWARE	1 BELLEVILLE WASHER	2 BELLVILLE WASHERS
1/4 in. (M6/10mm)	40 in.-lb. (4.5Nm)	80 in.-lb. (9.0Nm)
5/16 in. (M8/13mm)	80 in.-lb. (9.0Nm)	160 in.-lb. (18.0Nm)
3/8 in. (M10/17mm)	120 in.-lb. (13.6Nm)	240 in.-lb. (27.1Nm)
1/2 in. (M12/19mm)	480 in.-lb. (54.2Nm)	—

2.2 Hanging Brackets

The Liebert® MBX busway sections are secured to a framing system using hanging brackets. The busway system can be installed either flat (horizontally) or on its edge (vertically).

NOTE: Vertiv™ recommends that the hanging brackets be mounted no more than 29.5 in. (750mm) from the center of the joint packs and no more than 59 in. (1,500mm) apart.

Figure 2.5 Hanging Bracket Installation Requirements



Ensure that each section of the busway system has at least one set of hanging brackets fitted and that the busway track is level and plumb before final tightening of the joint packs.

The power feed box comes with mounting brackets pre-installed for vertical hanging using all-thread. If horizontal hanging is required, unbolt in the mounting bracket and reinstall on the rear of the box. Torque the bracket bolts to the box to 10Nm (89 in./lb.). See submittal drawing MBX-05-S00x for details.

Figure 2.6 Busway Hanging Brackets

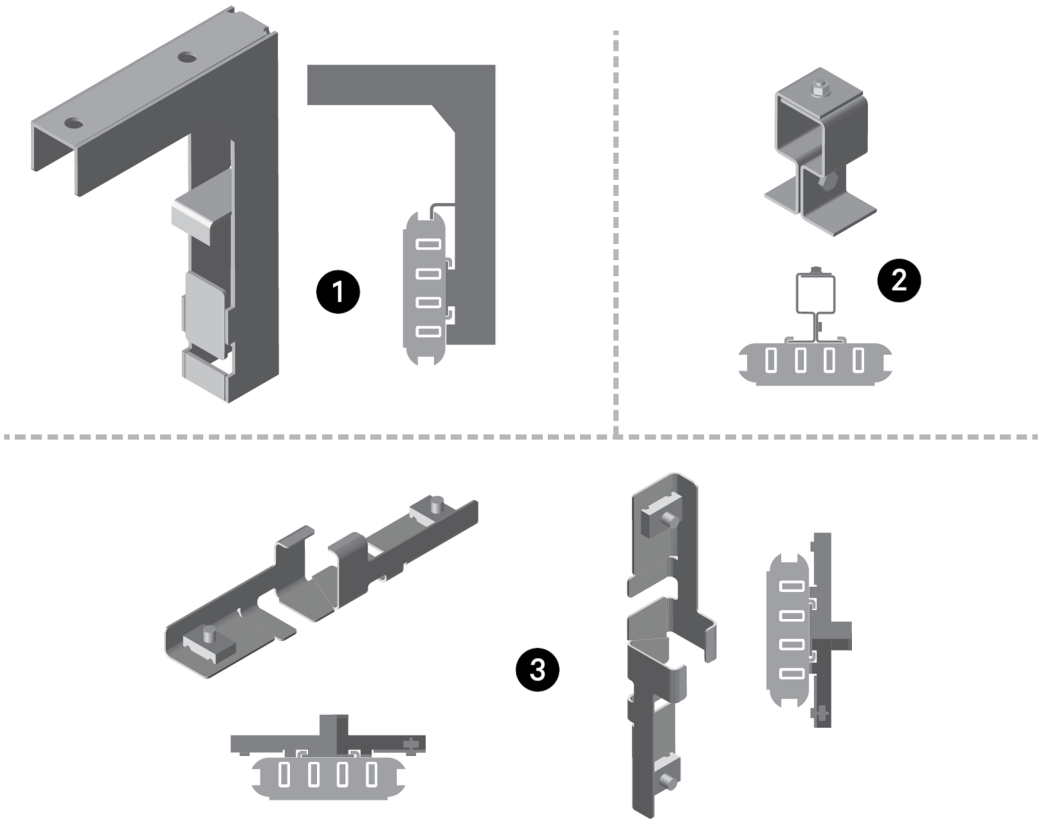


Table 2.6 Busway Hanging Bracket Overview

ITEM	DESCRIPTION
1	All-Thread Vertical Hanger (VDH)
2	All-Thread Horizontal Hanger (HDH)
3	Unistrut Vertical/Horizontal Hanger VUB

2.3 Busway Track

The Liebert® MBX Busway System system allows you to supply electrical power to other parts of the building using busway systems connected together. Busway track pieces must be connected to another track piece, an End Cap or a Joint Pack in order to complete an installation. Busway tracks come in 3-13 ft. sections and can be 250A, 400A, 600A or 800A.

NOTE: Busway track pieces must be level when they are installed to ensure that the Tap-Off Boxes mount to the track properly.

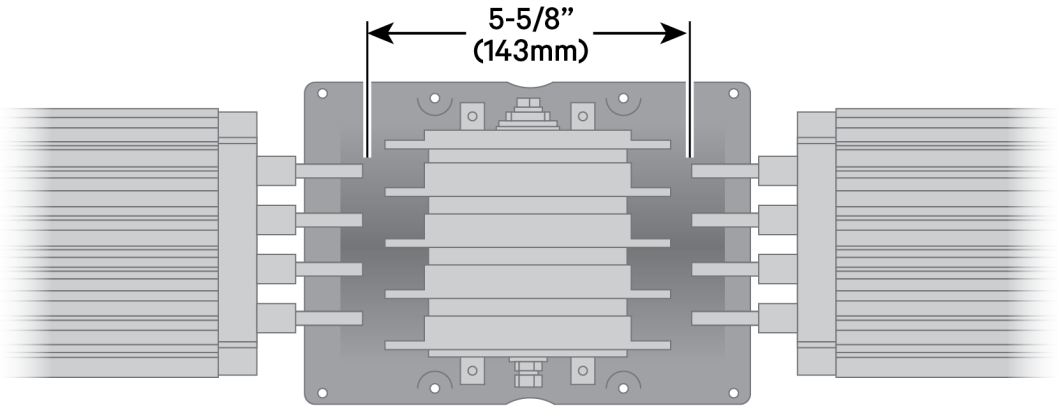
NOTE: The busway system should be installed at the correct height in accordance with the approved drawings. Refer to the submittal drawing MBX-17-Sxxx for installation height, torque values and additional technical information. Contact your Vertiv™ representative for copies of the appropriate submittal drawing.

2.4 Joint Pack Installation

To install a Joint Pack:

1. Remove the Joint Pack bottom cover. The busway tracks must be at least 5.6 in. (143mm) apart for the joint pack to be inserted.

Figure 2.7 Busway Track Requirements



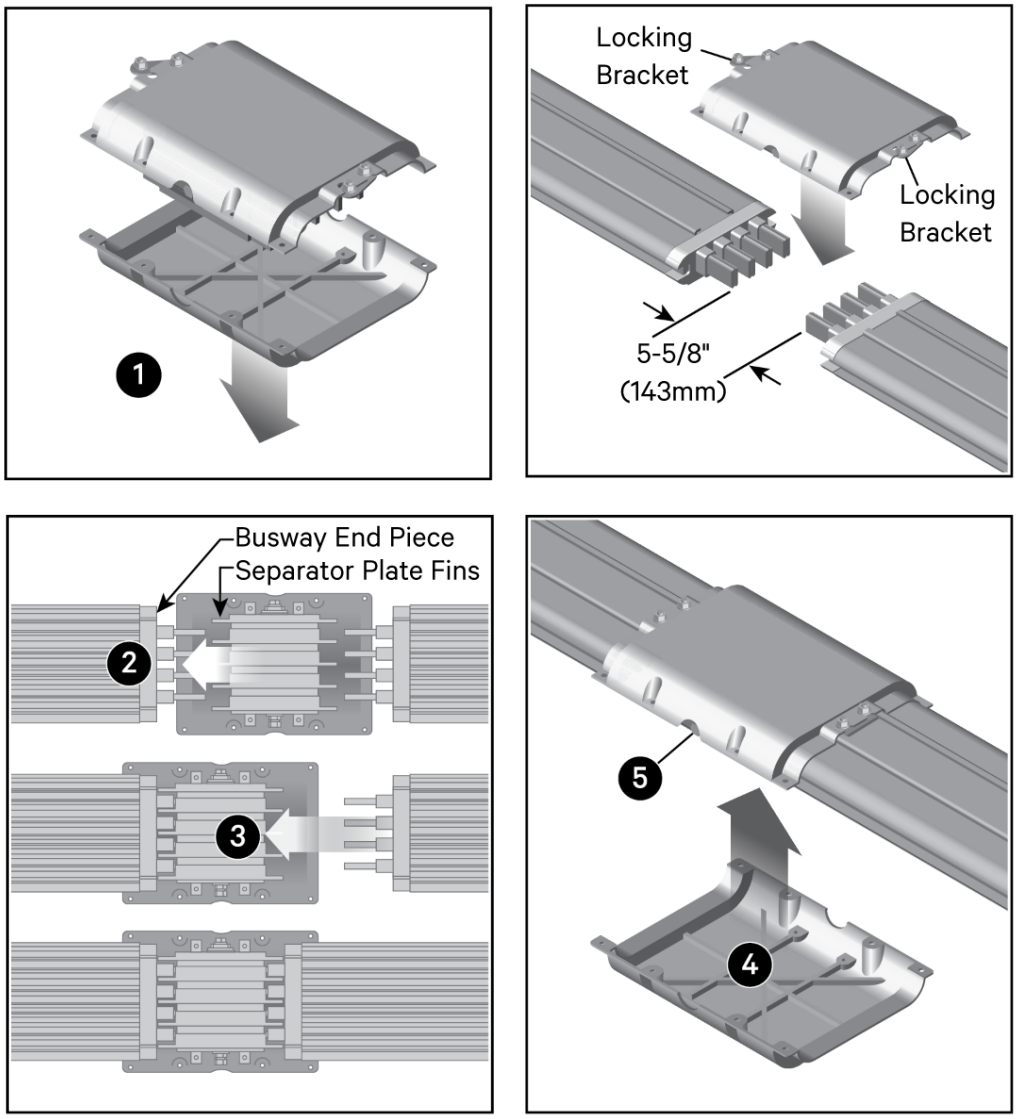
NOTE: The top cover of the Joint Pack comes fixed to the internal joint pack parts.

2. Align the Joint Pack with the first length and push until the separator plate fins are touching the end piece of the busway track. Insert the first Joint Pack locking bracket by rotating it into place and loosely tightening the nuts.
3. Align and insert the second length until the separator plate fins are touching the end piece of both busway tracks. Insert the second Joint Pack locking bracket by rotating it into place. Tighten both Joint Pack brackets to 7.4 ft./lb. (10 Nm).

NOTE: Never force the joint or strike it with an object. The joint should be inserted by means of constant force.

4. Attach the bottom of the Joint Pack cover using the provided M6 socket cap screws and tighten them to 7.4 ft./lb. (10Nm). A 3/16 in. (5mm) hex wrench or T30 Torx bit is required for tightening the screws.
5. Tighten the Joint Pack center bolt to 18.5 ft./lb. (25Nm) using a calibrated torque wrench. Two 1/2 in. (13mm) wrenches are required for tightening the Joint Pack center bolt.

Figure 2.8 Joint Pack Installation



2.5 Tap-Off Box

The Tap-Off Box contains an arrangement of enclosure, circuit breaker, monitoring device (optional), rotary handle (load isolator) and safety interlocks that provide a unique set of safety features that allow installing or removing the Tap-Off Boxes while the Liebert® MBX Busway System is energized.

The proprietary, spring-loaded mechanical interlock ensures:

- The Tap-Off Box can be inserted in the busway system only with the rotary handle (load isolator) in the Off position.
- The Tap-Off Box is correctly located and fixed to the busway track frame.
- The tap-off conductors can be inserted onto the busway track while ensuring that no conductors are exposed to the installer.

The Liebert MBX housing, earth strip and mechanical housing ensure that the Tap-Off Box cannot be inserted the wrong way with reverse polarity.

The rotary handle (load isolator) of the Tap-Off Box has a further positive engagement tab that must be operated to allow the rotary handle to be operated.

The Tap-Off Box is fully grounded/earthed before any phase connections are made and the earth/ground remains intact after any phase connections are broken in the event of Tap-Off Box installation/withdrawal. This safety features ensures electrical safety throughout the operation.

To install the Tap-Off Box:

NOTE: Remove the Tap-Off Box from its packaging and ensure no damage is visible to the device.

1. Align the Tap-Off Box with the housing and visually line up the earth/ground strip and the interlock channel on the casing. Insert the ground strip.
2. Pull back the spring-loaded interlock and rotate the box into position, then release the spring-loaded interlock when parallel with the busway track.
3. Verify that the ground strip has rotated within the interlock channel and the spring-loaded interlock has released. Verify that the Tap-Off Box is secured in place. See Tap-Off Box Installation on page 16.

NOTE: Ensure that the box is fully supported during this procedure.

CAUTION: Ensure the spring-loaded interlock is seated properly before engaging the rotary handle.

4. Engage the contacts by rotating the rotary handle 90 degrees. The handle has a safety feature built in and the engagement tab must be pushed in before the rotary handle can be turned.
5. (Optional) If a Tap-Off Box has a factory-installed monitoring option, it will have two ethernet ports on the side of the enclosure (see supplement SL-70526 for detailed monitoring connection information). Using an RJ-45 ethernet cable, connect one end to the power feed box; daisy-chain the other between Tap-Off Boxes, as required.
6. Connect one RJ-45 cable from the network to the Power Feed Box for monitoring of the Tap-Off Boxes. See Optional Ethernet Connection on page 16
7. As an additional safety feature, you can padlock the handle in the Off position. This allows you to work freely within the cabinet without electrical hazard risk. See Padlock Diagram on page 16.

NOTE: Padlock not factory-provided.

Figure 2.9 Tap-Off Box Installation

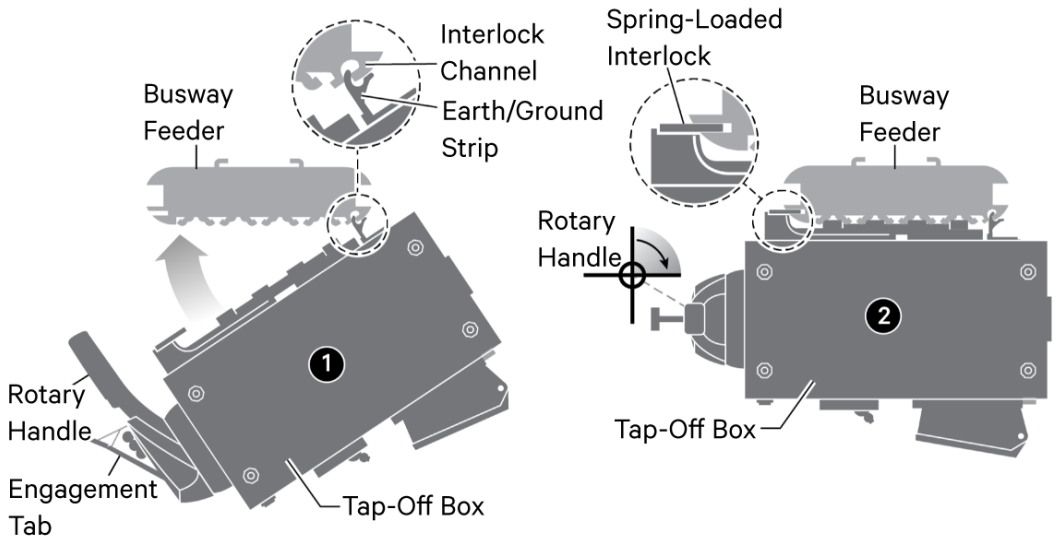


Figure 2.10 Optional Ethernet Connection

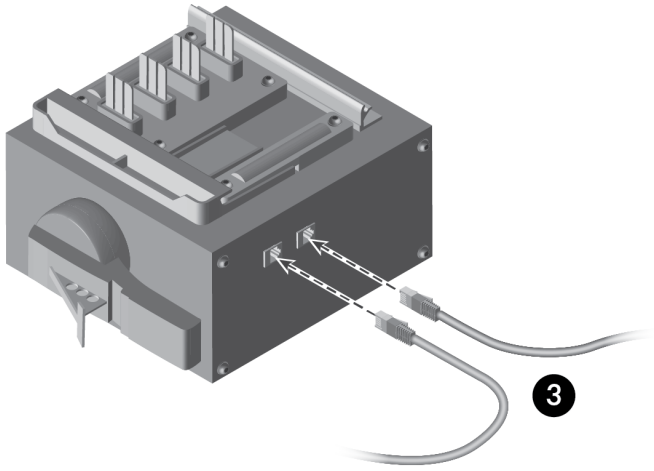
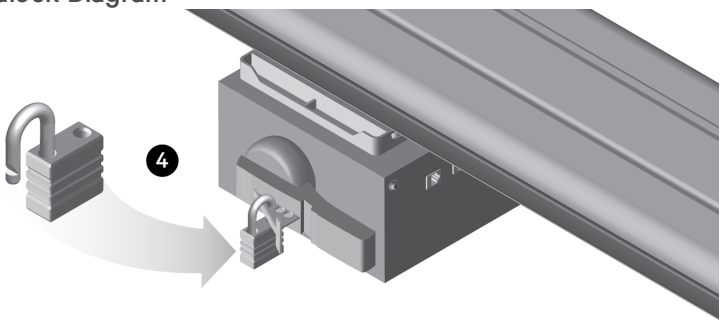


Figure 2.11 Padlock Diagram

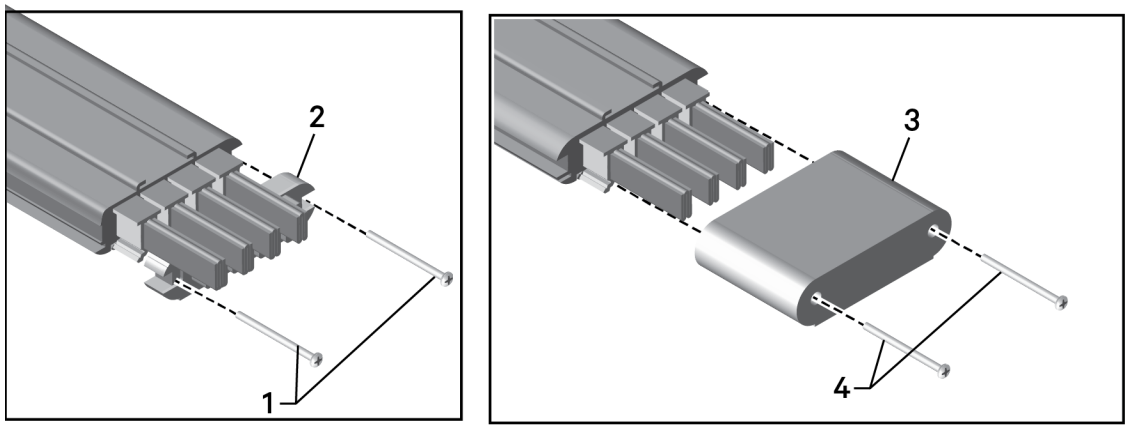


2.6 End Cap Installation

To install the End Cap:

1. Remove the two Phillips-head screws from the End Cap using a P3 screwdriver.
2. Remove the End Cap from the Liebert® MBX Busway System.
3. Install the busway End Cap in place of the end piece.
4. Secure the End Cap with the two Phillips-head screws that were removed from the end piece.

Figure 2.12 End Cap Installation



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3 EQUIPMENT INSPECTION AND STARTUP

3.1 Inspection

The following must be completed before energizing the Liebert® MBX Busway System.

- Perform a continuity test to verify that the run is complete.
- Perform a contact resistance test (ductor test) to check the resistance of the Joint Packs through the entire length.
- Perform a Megger test, 600VDC between each conductor and ground. Readings will vary widely from site-to-site due to length of run, humidity, temperature and site conditions. If readings less than 5MΩ are obtained, installers must identify the location of the low-resistance level and take appropriate measures to increase the resistance level. This test must be carried out by properly trained and qualified personnel.
- Ensure that all Tap-Off Boxes are correctly installed and are in the On position for insulation resistance testing.
- Ensure that all connections to the busway track and Tap-Offs are disconnected.
- Verify that all Joint Packs are torqued according to the recommended setting and have not been subsequently loosened.
- Ensure that all joint covers are firmly secured.
- When reconnecting the system before energizing it, ensure correct phase rotation is achieved by testing prior to energizing the supply.
- Ensure that all Tap-Off Boxes are turned Off again prior to energizing the Liebert MBX.

3.2 Startup

Follow the Inspection and Startup Checklist on page 25 when installing the busway system. A qualified electrician should be employed to perform the equipment inspection and startup. System startup may be arranged by calling your local Vertiv™ sales representative or Vertiv.

- All loads connected to the busway system should be isolated prior to energizing.
- The busway main supply switch must be energized first.
- If equipped, the protection settings for the main circuit breaker located within the End Feed Box should be adjusted per the engineer-of-record's short-circuit study recommendations.
- Following the successful closing of the supply breaker, close the circuit breakers supplying the connected loads (via Tap-Offs) one by one.
- Visually inspect the energized Liebert MBX route to look for any anomalies. Listen for noises from the system as this could indicate loose cover plates or connections.

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4 OPERATING INSTRUCTIONS

4.1 Startup Procedures

Before the Liebert® MBX Busway System is placed in service after initial installation, after equipment relocation or after equipment has been de-energized for an extended period of time, perform equipment inspection and startup procedures as detailed in Inspection and Startup Checklist on page 25.

After initial system startup, the following guidelines can be used for standard equipment operation. These guidelines should be reviewed for any special equipment modifications, special site considerations and company policies that may require changes to the standard equipment operation.

4.2 Normal System Shutdown

To perform a normal system shutdown, perform an orderly load equipment shutdown according to the load equipment manufacturer's recommended shutdown sequence. The load equipment can be turned Off at each piece of load equipment. Turn Off the Tap-Off Box circuit breakers and, if equipped, turn Off the main input circuit breaker located within the End Feed Box. To remove all power from the unit, turn Off the building power to the unit.

4.3 Normal System Turn On

Make certain that all unit circuit breakers are in the Off position. All unit circuit breakers are located in the Tap-Off Boxes and within the End Feed Box, if equipped. Turn On building power to the unit. If the circuit breaker has been tripped Off (instead of being turned Off), the circuit breaker handle must be moved to the Off position before being turned On. Individually turn On each Tap-Off Box circuit breaker following the load equipment manufacturer's startup sequence.

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5 MAINTENANCE

The design of the Liebert® MBX Busway System lends itself to simple, reliable installation that enables future modifications to be carried out easily. It has no defined routine maintenance requirements. Any maintenance that may be required is easily identified by thermal imaging of the run.

Standard electrical troubleshooting procedures should be used to isolate problems in the unit. Repair or replacement of standard items, such as circuit breakers and fuses can either be handled by qualified electricians or referred to Vertiv™. Repairs related to the monitoring system should be referred to Vertiv. See Technical Support on page 25 for contact information.

Annual general system inspections, cleaning and operation checks are recommended to ensure system performance and long service life.

5.1 Tap-Off Box Maintenance

As with the main busway track, the Joint Packs require checking on the tap-off connections and thermal imaging can identify localized hot spots.

Upon identifying a local problem, preventive maintenance should be investigated with the busway track isolated.

- Visually check the installation of the Tap-Off Box.
- Check outgoing cable connections.
- Check the operation of the switching On/Off operation.
- Examine protective device for signs of short circuit operation. If a short circuit has occurred on the equipment connected to the Tap-Off Module, check operation of device and the integrity of the device.

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APPENDICES

Appendix A: Technical Support

Our Technical Support staff is ready to assist you with any installation or operating issues you may encounter with your Liebert® product. Please call or e-mail your local Vertiv™ sales representative, visit www.vertiv.com, or in the United States call 1-800-543-2378.

Appendix B: Inspection and Startup Checklist

A copy of the appropriate checklist (furnished with the equipment) must be completed, signed, dated and returned to Vertiv. Warranty coverage of the equipment is not effective unless the checklist is received by the factory.

WARNING! Risk of improper startup. Can cause equipment damage, personal injury and death. Hazardous voltages are present during startup procedures. Electrical safety precautions must be followed throughout inspection and startup. Equipment inspection and startup should be performed only by properly trained and qualified personnel wearing appropriate safety headgear, gloves and shoes.

AVERTISSEMENT! Risque de démarrage incorrect. Peut provoquer des dommages matériels, ainsi que des blessures potentiellement mortelles. Des tensions dangereuses sont présentes lors des procédures de mise en service. Les précautions applicables en matière de sécurité électrique doivent être suivies pendant toute la durée de l'inspection et de la mise en service. L'inspection et la mise en service de l'équipement doivent être réalisées uniquement par des personnes dûment formées, qualifiées et équipées de casques, de gants et de chaussures de sécurité adaptés.

Unit Serial Number:

Unit Model Number:

Date:

B.1 Inspection

WARNING! Risk of electric shock. Can cause personal injury or death. Lethal voltages are present during startup procedures. Electrical safety precautions must be followed throughout inspection and startup. Verify that all incoming power circuits are de-energized and locked out before performing any internal inspection.

AVERTISSEMENT! Risque de choc électrique. Peut provoquer des blessures potentiellement mortelles. Des tensions mortelles sont présentes lors des procédures de mise en service. Les précautions applicables en matière de sécurité électrique doivent être suivies pendant toute la durée de l'inspection et de la mise en service. Vérifiez que l'ensemble des circuits de tension d'entrée sont désactivés et verrouillés avant toute inspection interne.

Exterior Inspection

1. ___ Confirm that the exterior of the unit is undamaged.
2. ___ Confirm that service and maintenance clearances are adequate.

End Feed Box Inspection

1. ___ Open the End Feed Box door.
2. ___ Inspect all conductor insulation for damage.
3. ___ Check all connections for tightness. Re-torque, before if necessary.
4. ___ Remove any foreign objects from the components or the interior area of the unit.
5. ___ Close the End Feed Box door.

Tap-Off Box Inspection

1. ___ Ensure that all Tap-Off Boxes are securely fastened to the busway track.
2. ___ Ensure that the breakers located in each Tap-Off Box are in the Off position before energizing the Liebert® MBX.

Joint Pack and End Cap Inspection

1. ___ Ensure that the joint pack center bolt is torqued to the required value indicated in the Joint Pack Installation on page 13 .
2. ___ Ensure that the joint pack cover plates are secure.
3. ___ Ensure that the end cap is installed and secured.

B.2 Startup

WARNING! Risk of electric shock. Can cause personal injury or death. Hazardous voltages are present in the equipment throughout the startup procedure. This unit has several circuits that are energized with high AC voltage. Only properly trained and qualified personnel wearing appropriate safety headgear, gloves, shoes and glasses should be involved in starting this unit. When performing any procedure with any part of the equipment under power, 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. 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.

AVERTISSEMENT! Risque de choc électrique. Peut provoquer des blessures potentiellement mortelles. L'équipement est soumis à des tensions dangereuses pendant la procédure de mise en service. Cette unité contient plusieurs circuits alimentés par des tensions c.a. élevées. La mise en marche de cette unité doit être réalisée uniquement par des personnes dûment formées, qualifiées et équipées de casques, de gants, de chaussures et de lunettes de sécurité adaptés. Lors de toute procédure sur une quelconque partie de l'équipement sous tension, le personnel et l'équipement de test doivent se trouver sur des tapis en caoutchouc. En cas d'incendie impliquant du matériel électrique, utilisez uniquement des extincteurs au dioxyde de carbone ou ceux homologués pour la lutte contre les incendies d'origine électrique. Ne travaillez jamais seul, même si l'équipement est complètement déconnecté de l'alimentation. Une deuxième personne doit être présente pour vous porter assistance et demander de l'aide en cas d'accident.

1. ___ Make sure all circuit breakers are in the Off position and that power to the unit is locked out.
2. ___ Turn On the building power to the unit. If equipped, check the phase rotation of the End Feed Box main input circuit breaker. Phase rotation should be A, B, C as indicated.
3. ___ Check and record the input voltages. If output voltage is incorrect, check for wiring errors or incorrect input voltage.

Table A.1 Input Voltages

	INPUT 1	INPUT 2	INPUT 3	INPUT 4
Volts, Phase A to Phase B =				
Volts, Phase B to Phase C =				
Volts, Phase C to Phase A =				

Appendix C: Technical Specifications

Contact your Vertiv™ representative for the Liebert® MBX Busway System Guide Specification document for detailed electrical and mechanical information.

Table A.2 Technical Data

NAME	REQUIREMENT
Clearance Requirements	Top of busway track to ceiling - 6 in. (152mm)
	Side of busway track to wall - 4 in. (102mm)
	Bottom of busway track to top of rack - 14.75 in. (375mm)
	Bottom of power feed box to top of rack - 24 in. (610mm) when installed over equipment in horizontal configuration.
Cable Entry - End Feed Box	Both sides and rear of End Feed Box are available
Cable Entry - Center Feed Box	Top
Voltages, V	208-600
Frequency, Hz	50/60
Current Ratings, A	250, 400, 600, 800
Operating Temperature, °F (°C)	32 to 104 (0 to 40) without derating
Storage Temperature, °F (°C)	32 to 104 (0 to 40)
Humidity	95% non-condensing
Operating Altitude, ft. (m)	Up to 6,560 (2,000) above Mean Sea Level
Storage Altitude, ft. (m)	Up to 40,000 (12,200)

Table A.3 Busway Track Weight

SR. NO	BUSWAY RATING	CONFIGURATION	LENGTH, FT.	WEIGHT, LB. (KG)
1	250A	TPN: Three-Phase, 100% Neutral, GND	3	22 (10)
			5	36 (17)
			6	43 (20)
			10	71 (33)
			12	85 (39)
			13	92 (42)
2	250A	TPON: Three-Phase, Oversized Neutral, GND	3	24 (11)
			5	40 (19)
			6	48 (22)
			10	79 (36)
			12	95 (44)
			13	103 (47)

Table A.3 Busway Track Weight (continued)

SR. NO	BUSWAY RATING	CONFIGURATION	LENGTH, FT.	WEIGHT, LB. (KG)
3	400A	TPN: Three-Phase, 100% Neutral, GND	3	29 (14)
			5	47 (22)
			6	57 (26)
			10	94 (43)
			12	113 (52)
			13	123 (56)
4	400A	TPON: Three-Phase, Oversized Neutral, GND	3	33 (15)
			5	54 (25)
			6	65 (30)
			10	107 (49)
			12	129 (59)
			13	139 (64)
5	600A	TPN: Three-Phase, 100% Neutral, GND	3	40 (19)
			5	66 (30)
			6	79 (36)
			10	131 (60)
			12	157 (72)
			13	170 (78)
6	800A	TPN: Three-Phase, 100% Neutral, GND	3	36 (17)
			5	60 (28)
			6	72 (33)
			10	119 (54)

Table A.4 Tap-Off Box Weights (Unpacked)

SR. NO	CONFIGURATION	WEIGHT, LB. (KG)
1	TOB consisting of 2 x 15Amp, 10kA 1P MCB + 2 x 5-15R2 (Non-Locking Receptacle)	15 (7)
2	TOB consisting of 2 x 15Amp, 22kA 1P MCB + 2 x 5-15R2 (Non-Locking Receptacle)	9 (5)
3	TOB consisting of 1 x 20Amp, 10kA 1P MCB + 1 x 5-20R2 (Non-Locking Receptacle)	10 (5)
4	TOB consisting of 1 x 20Amp, 22kA 1P MCB + 1 x 5-20R2 (Non-Locking Receptacle)	10 (5)
5	TOB consisting of 2 x 20Amp, 10kA 1P MCB + 2 x 5-20R2 (Non-Locking Receptacle)	15 (7)
6	TOB consisting of 2 x 20Amp, 22kA 1P MCB + 2 x 5-20R2 (Non-Locking Receptacle)	15 (7)
7	TOB consisting of 3 x 20Amp, 10kA 1P MCB + 3 x 5-20R1 (Non-Locking Receptacle)	17 (8)
8	TOB consisting of 3 x 20Amp, 22kA 1P MCB + 3 x 5-20R1 (Non-Locking Receptacle)	17 (8)

Table A.4 Tap-Off Box Weights (Unpacked) (continued)

SR. NO	CONFIGURATION	WEIGHT, LB. (KG)
9	TOB consisting of 2 x 20Amp, 10kA 2P MCB + 2 x 6-20R1 (Non-Locking Receptacle)	15 (7)
10	TOB consisting of 2 x 20Amp, 22kA 2P MCB + 2 x 6-20R1 (Non-Locking Receptacle)	15 (7)
11	TOB consisting of 2 x 20Amp, 10kA 2P MCB + 2 x 6-20R2 (Non-Locking Receptacle)	15 (7)
12	TOB consisting of 2 x 20Amp, 22kA 2P MCB + 2 x 6-20R2 (Non-Locking Receptacle)	10 (5)
13	TOB consisting of 2 x 30Amp, 10kA 2P MCB + 2 x 6-30R1 (Non-Locking Receptacle)	15 (7)
14	TOB consisting of 2 x 30Amp, 22kA 2P MCB + 2 x 6-30R1 (Non-Locking Receptacle)	15 (7)
15	TOB consisting of 2 x 30Amp, 10kA 2P MCB + 2 x L14-30R (Twist-Lock Receptacle)	15 (7)
16	TOB consisting of 2 x 30Amp, 22kA 2P MCB + 2 x L14-30R (Twist-Lock Receptacle)	15 (7)
17	TOB consisting of 1 x 20Amp, 10kA 3P MCB + 1 x L15-20R (Twist-Lock Receptacle)	10 (5)
18	TOB consisting of 1 x 20Amp, 22kA 3P MCB + 1 x L15-20R (Twist-Lock Receptacle)	10 (5)
19	TOB consisting of 1 x 30Amp, 10kA 3P MCB + 1 x L15-30R (Twist-Lock Receptacle)	10 (5)
20	TOB consisting of 1 x 30Amp, 22kA 3P MCB + 1 x L15-30R (Twist-Lock Receptacle)	10 (5)
21	TOB consisting of 2 x 30Amp, 10kA 3P MCB + 2 x L15-30R (Twist-Lock Receptacle)	15 (7)
22	TOB consisting of 2 x 30Amp, 22kA 3P MCB + 2 x L15-30R (Twist-Lock Receptacle)	11 (5)
23	TOB consisting of 1 x 20Amp, 10kA 3P MCB + 1 x L21-20R (Twist-Lock Receptacle)	10 (5)
24	TOB consisting of 1 x 20Amp, 22kA 3P MCB + 1 x L21-20R (Twist-Lock Receptacle)	10 (5)
25	TOB consisting of 2 x 20Amp, 10kA 3P MCB + 2 x L21-20R (Twist-Lock Receptacle)	15 (7)
26	TOB consisting of 2 x 20Amp, 22kA 3P MCB + 2 x L21-20R (Twist-Lock Receptacle)	15 (7)
27	TOB consisting of 1 x 30Amp, 10kA 3P MCB + 1 x L21-30R (Twist-Lock Receptacle)	10 (5)
28	TOB consisting of 1 x 30Amp, 22kA 3P MCB + 1 x L21-30R (Twist-Lock Receptacle)	10 (5)
29	TOB consisting of 2 x 30Amp, 10kA 3P MCB + 2 x L21-30R (Twist-Lock Receptacle)	15 (7)
30	TOB consisting of 2 x 30Amp, 22kA 3P MCB + 2 x L21-30R (Twist-Lock Receptacle)	15 (7)
31	TOB consisting of 2 x 20Amp, 10kA 3P MCB + 2 x L22-20R (Twist-Lock Receptacle)	15 (7)
32	TOB consisting of 2 x 20Amp, 22kA 3P MCB + 2 x L22-20R (Twist-Lock Receptacle)	12 (6)
33	TOB consisting of 1 x 15Amp, 10kA 1P MCB + 1 x L5-15R (Twist-Lock Receptacle)	10 (5)
34	TOB consisting of 1 x 15Amp, 22kA 1P MCB + 1 x L5-15R (Twist-Lock Receptacle)	10 (5)
35	TOB consisting of 2 x 15Amp, 10kA 1P MCB + 2 x L5-15R (Twist-Lock Receptacle)	15 (7)
36	TOB consisting of 2 x 15Amp, 22kA 1P MCB + 2 x L5-15R (Twist-Lock Receptacle)	15 (7)
37	TOB consisting of 3 x 15Amp, 10kA 1P MCB + 3 x L5-15R (Twist-Lock Receptacle)	15 (7)
38	TOB consisting of 3 x 15Amp, 22kA 1P MCB + 3 x L5-15R (Twist-Lock Receptacle)	15 (7)
39	TOB consisting of 1 x 20Amp, 10kA 1P MCB + 1 x L5-20R (Twist-Lock Receptacle)	10 (5)
40	TOB consisting of 1 x 20Amp, 22kA 1P MCB + 1 x L5-20R (Twist-Lock Receptacle)	10 (5)
41	TOB consisting of 2 x 20Amp, 10kA 1P MCB + 2 x L5-20R (Twist-Lock Receptacle)	15 (7)

Table A.4 Tap-Off Box Weights (Unpacked) (continued)

SR. NO	CONFIGURATION	WEIGHT, LB. (KG)
42	TOB consisting of 2 x 20Amp, 22kA 1P MCB + 2 x L5-20R (Twist-Lock Receptacle)	13 (6)
43	TOB consisting of 3 x 20Amp, 10kA 1P MCB + 3 x L5-20R (Twist-Lock Receptacle)	16 (8)
44	TOB consisting of 3 x 20Amp, 22kA 1P MCB + 3 x L5-20R (Twist-Lock Receptacle)	16 (8)
45	TOB consisting of 1 x 30Amp, 10kA 1P MCB + 1 x L5-30R (Twist-Lock Receptacle)	10 (5)
46	TOB consisting of 1 x 30Amp, 22kA 1P MCB + 1 x L5-30R (Twist-Lock Receptacle)	10 (5)
47	TOB consisting of 2 x 30Amp, 10kA 1P MCB + 2 x L5-30R (Twist-Lock Receptacle)	15 (7)
48	TOB consisting of 2 x 30Amp, 22kA 1P MCB + 2 x L5-30R (Twist-Lock Receptacle)	15 (7)
49	TOB consisting of 3 x 30Amp, 10kA 1P MCB + 3 x L5-30R (Twist-Lock Receptacle)	16 (8)
50	TOB consisting of 3 x 30Amp, 22kA 1P MCB + 3 x L5-30R (Twist-Lock Receptacle)	16 (8)
51	TOB consisting of 1 x 20Amp, 10kA 2P MCB + 1 x L6-20R (Twist-Lock Receptacle)	10 (5)
52	TOB consisting of 1 x 20Amp, 22kA 2P MCB + 1 x L6-20R (Twist-Lock Receptacle)	14 (7)
53	TOB consisting of 1 x 15Amp, 10kA 2P MCB + 1 x L6-15R (Twist-Lock Receptacle)	10 (5)
54	TOB consisting of 1 x 15Amp, 22kA 2P MCB + 1 x L6-15R (Twist-Lock Receptacle)	10 (5)
55	TOB consisting of 1 x 15Amp, 10kA 2P MCB + 1 x L6-15R (Twist-Lock Receptacle)	10 (5)
56	TOB consisting of 1 x 15Amp, 22kA 2P MCB + 1 x L6-15R (Twist-Lock Receptacle)	10 (5)
57	TOB consisting of 2 x 20Amp, 10kA 2P MCB + 2 x L6-20R (Twist-Lock Receptacle)	15 (7)
58	TOB consisting of 2 x 20Amp, 22kA 2P MCB + 2 x L6-20R (Twist-Lock Receptacle)	15 (7)
59	TOB consisting of 1 x 30Amp, 10kA 2P MCB + 1 x L6-30R (Twist-Lock Receptacle)	10 (5)
60	TOB consisting of 1 x 30Amp, 22kA 2P MCB + 1 x L6-30R (Twist-Lock Receptacle)	10 (5)
61	TOB consisting of 2 x 30Amp, 10kA 2P MCB + 2 x L6-30R (Twist-Lock Receptacle)	15 (7)
62	TOB consisting of 2 x 30Amp, 22kA 2P MCB + 2 x L6-30R (Twist-Lock Receptacle)	15 (7)
63	TOB consisting of 3 x 30Amp, 10kA 2P MCB + 3 x L6-30R (Twist-Lock Receptacle)	16 (8)
64	TOB consisting of 3 x 30Amp, 22kA 2P MCB + 3 x L6-30R (Twist-Lock Receptacle)	16 (8)
65	TOB consisting of 4 x 30Amp, 10kA 2P MCB + 4 x L6-30R (Twist-Lock Receptacle)	19 (9)
66	TOB consisting of 4 x 30Amp, 22kA 2P MCB + 4 x L6-30R (Twist-Lock Receptacle)	19 (9)
67	TOB consisting of 2 x 20Amp, 5kA 1P MCB + 2 x L7-20R (Twist-Lock Receptacle)	15 (7)
68	TOB consisting of 2 x 20Amp, 10kA 1P MCB + 2 x L7-20R (Twist-Lock Receptacle)	15 (7)

Table A.5 Busway Component Weight (Unpacked)

SR. NO	BUSWAY RATING	CONFIGURATION	COMPONENT	WEIGHT, LB. (KG)
1	250A	TPN: Three-Phase, 100% Neutral, GND	End Feed Box	34 (16)
			Center Feed Box	42 (20)
			Joint Pack	11 (5)
			End Cap	1 (1)
2	250A	TPON: Three-Phase, Oversized Neutral, GND	End Feed Box	35 (16)
			Center Feed Box	42 (20)
			Joint Pack	11 (5)
			End Cap	1 (1)
3	400A	TPN: Three-Phase, 100% Neutral, GND	End Feed Box	36 (17)
			Center Feed Box	46 (21)
			Joint Pack	11 (5)
			End Cap	1 (1)
4	400A	TPON: Three-Phase, Oversized Neutral, GND	End Feed Box	38 (18)
			Joint Pack	12 (6)
			End Cap	1 (1)
5	600A	TPN: Three-Phase, 100% Neutral, GND	End Feed Box	40 (19)
			Joint Pack	12 (6)
			End Cap	1 (1)
6	800A	TPN: Three-Phase, 100% Neutral, GND	End Feed Box	97 (44)
			Joint Pack	17 (8)
			End Cap	1 (1)
7	All	Hanger Detail, Vertical/Horizontal Unistrut Hanger, Liebert® MBX Busway System	PN: 568881P1	0.5 (0.23)
8	All	Hanger Detail, Horizontal Hanger HDH, Liebert MBX	PN: 568881P2	0.5 (0.23)
9	All	Hanger Detail, Vertical Hanger VDH, Liebert MBX	PN: 568881P4	0.5 (0.23)

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SL-70371_REV1_05-20