

Liebert® DSE™

IBC Seismic Supplemental User Manual, 80-165kW, Downflow

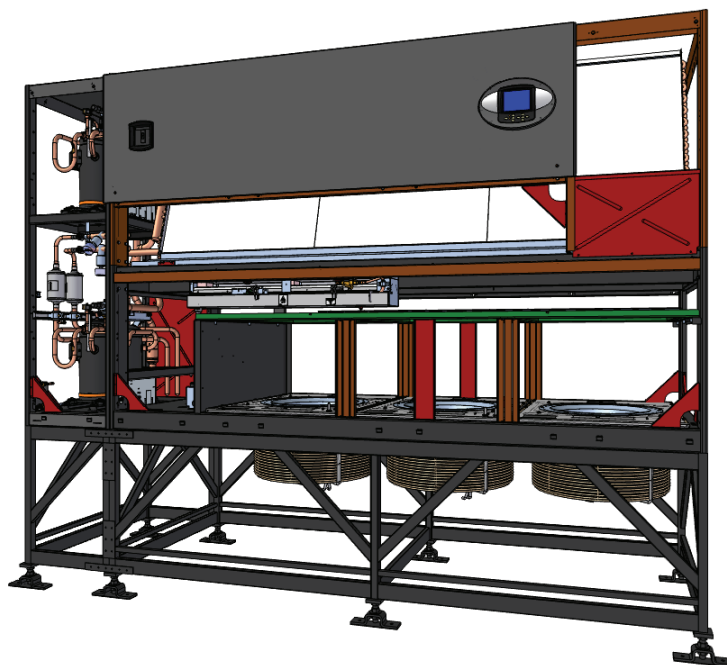


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IMPORTANT SAFETY INSTRUCTIONS

This manual contains important safety and installation instructions not included in the Liebert DSE user manual, SL-18925. The information in this manual is not a substitute for the data in the Liebert DSE user manual, but provides additional information required for units equipped with the seismic option. The information in this manual should be read carefully and used to ensure compliance with the International Building Code. Special inspection per IBC Section 1704 is required during all installations. Read this document and the Liebert DSE user manual, SL-18925, thoroughly before attempting to install or operate this unit.

Only properly trained and qualified personnel should move, install or service this equipment.

Adhere to all warnings, cautions and installation, operating and safety instructions on the unit, in the Liebert DSE user manual, SL-18925, and in this manual. Follow all operating and user instructions.

SAVE THESE INSTRUCTIONS



WARNING

Arc flash and electric shock hazard. Open all local and remote electric power disconnect switches and wear protective equipment per NFPA 70E before working within the electric control enclosure. Failure to comply can cause serious injury or death.

Before proceeding with installation, read all instructions, verify that all the parts are included and check the nameplate to be sure the voltage matches available utility power.

The Liebert iCOM™ microprocessor does not isolate power from the unit, even in the “Unit Off” mode. Some internal components require and receive power even during the “Unit Off” mode of the Liebert iCOM control.

The factory-supplied optional disconnect switch is inside the unit. The line side of this switch contains live high-voltage. With disconnect Off, check for voltage on the load side.

The only way to ensure that there is NO voltage inside the unit is to install and open a remote disconnect switch. Refer to unit electrical schematic.

Follow all local codes.



WARNING

Risk of high-speed moving parts. Can cause injury or death.

Open all local and remote electric power disconnect switches before working in the unit.



WARNING

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

Read all of the following instructions before attempting to move, lift, remove packaging from or prepare the unit for installation.



WARNING

Risk of seismic event. Can cause equipment damage, injury or death.

Unit must be welded to the floor stand and anchored to the floor or housekeeping pad. If not mounted on a floor stand, the unit must be anchored to the floor or housekeeping pad.



WARNING

Risk of arc flash, infrared exposure, hazardous fumes and toxic gases during welding operations. Can cause eye, skin and serious respiratory system, choking and breathing problems.

Welding may produce fumes and gases hazardous to health. Avoid breathing these fumes and gases. Use adequate ventilation.

Only properly trained and qualified personnel wearing appropriate safety headgear, gloves, shoes, skin and eye protection should be welding.



WARNING

Risk of concrete failure and/or loose or unsecured mounting anchors. Can cause unit to fall over or move during a seismic event resulting in building damage, injury, or death.

Installation in structural, lightweight concrete is not permitted unless otherwise approved by the structural engineer of record. Structural engineer of record is defined as: *The registered design professional responsible for the design of the designated seismic systems on the building construction documents.*



CAUTION

Risk of sharp edges, splinters and exposed fasteners. Can cause injury.

Only properly trained and qualified personnel wearing appropriate safety headgear, gloves, shoes and glasses should attempt to move, lift, remove packaging from or prepare the unit for installation.

NOTICE

Risk of overhead interference. Can cause unit and/or building damage.

The unit may be too tall to fit through a doorway while on the skid. Measure the unit and doorway heights and refer to the installation plans to verify clearances prior to moving the unit.

NOTICE

Risk of damage from forklift. Can cause unit damage.

Keep tines of the forklift level and at a height suitable to fit below the skid and/or unit to prevent exterior and/or underside damage.

NOTICE

Risk of improper storage. Can cause unit damage.

Keep the Liebert DSE upright, indoors and protected from dampness, freezing temperatures and contact damage.

NOTICE

Risk of leaking water. Can cause equipment and building damage.

This unit requires a water drain connection. It may also require an external water supply to operate.

Improper installation, application and service practices can result in water leakage from the unit. Water leakage can result in severe property damage and loss of critical data center equipment.

Do not install this unit above equipment or machines that could be damaged by leaking water. Do not install equipment or machines that could be damaged by leaking water below this unit.

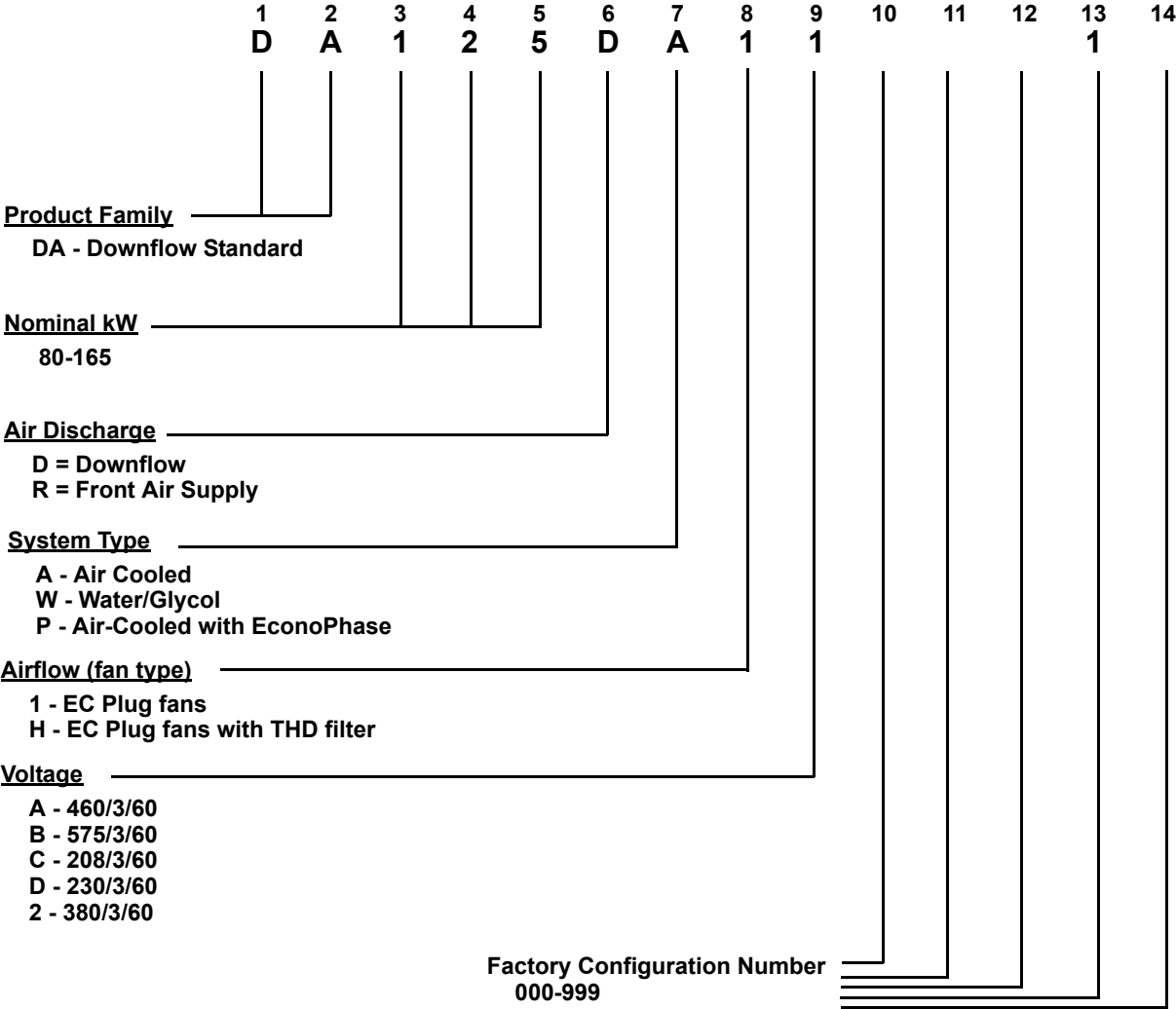
Emerson Network Power[®] recommends installing leak detection equipment for unit and supply lines.

NOTICE

Risk of structural damage. Drilling holes all the way through the floor or housekeeping pad may cause damage to the structure and can result in damage to lower floors.

Drilling holes that penetrate either the floor or the housekeeping pad must be properly filled and sealed.

1.0 LIEBERT DSE NOMENCLATURE



2.0 INTRODUCTION

2.1 Background

The International Code Council's International Building Code (IBC) is the primary code document for the design and installation of building systems. This has brought about increased scrutiny of mechanical and electrical equipment that is used in the operation of facilities, particularly those buildings designated as "essential facilities." Previously, codes focused only on preventing equipment from breaking free from anchoring and becoming projectiles, and did not consider its structural integrity. These new codes, depending on the Use Group and Importance Factor of the building, may require equipment to function after a seismic event.

IBC-2009 and 2012 has made the manufacturer of mechanical and electrical equipment responsible for designing, testing and certifying systems. Emerson[®], through a recognized, approved agency, has conducted analytical modeling and dynamic shake-table testing of the Liebert DSE to provide an option for those systems requiring seismic certification of compliance. The seismic shake-table testing was conducted in accordance with ICC-ES AC-156. This certification goes beyond the equipment's ability to withstand seismic forces. The IBC system approach includes the equipment, equipment anchoring and the connections to the equipment (power, water supply and return and ducting). In essential applications the equipment must be capable of performing its primary function after a seismic event within the limit of certification.



NOTE

An approved agency is defined by IBC section 1702 as: An established and recognized agency regularly engaged in conducting tests or furnishing inspection services, when such agency has been approved.

2.2 Determining Whether a Unit is IBC-Compliant

The catalog Liebert DSE unit is IBC-compliant to a maximum S_s of 1.50g (1.50 times the force of gravity), units must be ordered with the factory-built seismic floor stand. To be IBC-compliant to a maximum level of S_s of 3.75g, units must be ordered with the factory-installed seismic bracing option. Liebert DSE units with the seismic bracing option will have:

- Certification label—near the unit nameplate, behind the front panel
- Certificate of compliance—included in the customer envelope with this manual
- Factory-installed seismic bracing components
- Factory-built seismic floor stand



NOTE

Factory-installed seismic bracing components are painted red and must not be removed.

2.3 Certification Criteria

Liebert DSE units equipped with the seismic option are certified to a maximum S_s of 3.75g (3.75 times the force of gravity), adjusted by the soil site coefficient to Soil Site Class D as the default when neither the site soil properties nor the final equipment installation location is known. The certification maximum S_{ds} value of 3.75g includes Soil Class and Seismic Use group corrections. Soil Classes A, B, C, D, E, Seismic Use groups I, II, III, IV and Seismic Design Categories A, B, C, D, E and F are all covered under this certification, limited by the S_{ds} value stated above. A seismic importance factor, I_p , of 1.5 applies to this certification to include essential facility requirements and life-safety applications for the Liebert DSE system's functionality after a seismic event. Shake-table testing conducted in accordance with ICC-ES AC-156 enveloped a required response spectrum (RRS) defined in the tables below.

Table 1 Liebert DSE on factory-built seismic floor stand

Soil Class	$S_s =$	$S_1 =$	$S_{ds} =$	$S_{d1} =$	$F_a =$	$F_v =$	$z/h =$
D	1.50	0.64	1.00	0.64	1	1.5	1
AFLEX Horizontal		ARIG Horizontal		AFLEX Vertical		ARIG Vertical	
1.60		1.20		0.67		0.27	

Table 2 Liebert DSE on factory-built seismic floor stand and factory-installed seismic option

Soil Class	$S_s =$	$S_1 =$	$S_{ds} =$	$S_{d1} =$	$F_a =$	$F_v =$	$z/h =$
D	3.75	1.28	multiple	1.28	1	1.5	1.0
$S_{ds} =$	AFLEX Horizontal		ARIG Horizontal		AFLEX Vertical		ARIG Vertical
2.00	3.20		2.40		N/A		N/A
2.50	N/A		N/A		1.68		0.68

A Liebert DSE, as described above, is approved for seismic application as a system when properly installed in the following configurations:

- Liebert DSE unit, with factory-installed seismic option, attached directly to a housekeeping pad using the anchoring system defined in this document.
- Liebert DSE unit, with factory-installed seismic option and with factory-supplied plenum.
- Plenums must be flexibly attached to the duct system (if applicable). Unit and plenum must be anchored as defined in this document.
- Liebert DSE unit, with factory-installed seismic option, installed on an Emerson-supplied, IBC-certified floor stand and attached securely to the building structure. The floor stand and mounting system must be Emerson® catalog items, purchased from Emerson. The system must be anchored as specified in this document.
- The certification excludes all non-Emerson supplied accessories, including but not limited to floor stands, isolators and restraints. Use of non-Emerson accessories will void IBC certification of the Liebert DSE system.

3.0 SITE REQUIREMENTS OF SEISMIC INSTALLATION

All floor and housekeeping pads must be approved by the structural engineer of record to resist the added seismic loads from components being anchored as specified in **8.0 - Anchor and Load Requirements of Seismic Installation**. When anchoring the Liebert DSE to a floor, rebar interference must be considered.

The minimum housekeeping pad thickness must be the thickness required by the qualification report for the selected post-installed anchor or 1.5 times the depth the anchor is embedded, whichever is greater.



WARNING

Risk of concrete failure and/or loose or unsecured mounting anchors. Can cause unit to fall over or move during a seismic event resulting in building damage, injury, or death.

Installation in structural, lightweight concrete is not permitted unless otherwise approved by the structural engineer of record. Structural engineer of record is defined as: *The registered design professional responsible for the design of the designated seismic systems on the building construction documents.*

Contact your Emerson® representative if a detailed Seismic Installation Calculation Package is required. The information required to perform the calculations should include (but not be limited to):

Floor Data

- Concrete compressive strength and aggregate content
- Slab or lightweight concrete over metal deck
- Thickness
- Type of reinforcement (rebar, wire mesh or none)

Housekeeping Pad

- Concrete compressive strength and aggregate content
- Length, width and thickness
- Type of reinforcement (rebar, wire mesh or none)
- Doweled to floor or integrated

4.0 FLOOR AND FLOOR STAND SEISMIC MOUNTING

Whether floor-mounted or installed on a floor stand, the Liebert DSE must be anchored to the floor or housekeeping pad. Field welding is required for seismic installations. In addition to the clearances specified in the Liebert DSE user manual, SL-18925, clearance is required behind the unit to prevent damage to the equipment or building structure in a seismic event. Clearance requirements are dependent on the system mounting. Refer to **4.1 - Anchoring Systems** for recommendations.

The post-installed anchors used for unit anchoring must be pre-qualified for seismic applications in accordance with *ACI 335.2* and documented in a report by a reputable testing agency, such as the *Evaluation Service Report* issued by the International Code Council. Anchors must be installed to the torque specifications recommended by the anchor manufacturers to ensure maximum loading. Wide washers, sized to match the nominal diameter of the specified anchors, must be used at each anchor location. For tension load distribution the washer is to be placed between the anchor head and the connected equipment. The washers are to be Type A, Series W plain washers per *ANSI B18.22.1 - 1965, R1975*.

The floor or housekeeping pad must be rebar-reinforced structural concrete that is designed and approved by the structural engineer of record to resist the added seismic loads from components being anchored to the floor (see **3.0 - Site Requirements of Seismic Installation**). When installing anchors, rebar interference must be considered.

The installing contractor is responsible for the proper installation of all anchors and mounting hardware, observing the mounting requirement details outlined by the structural engineer of record.



NOTE

The floor stand used with EC units is not symmetrical, and its orientation to the Liebert DSE is critical to lowering the EC fans. Unless the floor stand is installed in the correct position, the blowers will not lower into the floor stand.

4.1 Anchoring Systems

Units installed on floor stands must be welded to the floor stand as specified herein. Emerson® provides a floor stand and mounting systems as selectable items that are IBC-certified and matched to the Liebert DSE.

The unit certification is valid only with the Emerson, IBC-certified, matched floor stand.

Clearances behind the unit of floor stand-mounted systems require space for access to the system anchoring points and clearance for unit movement during a seismic event.

4.1.1 Floor Stand Anchoring Requirements for Seismic Installations

Anchoring Requirements Without a Floor Stand

- Anchor selection must meet or exceed IBC 2009 and 2012 compliance requirements.
- All anchors listed and any housekeeping pad must be installed to meet compliance.
- Anchors must be installed per ICC ESR instructions.
- Special inspection per IBC Section 1704 is required on all installations.

Liebert DSE (DA080, 085)

- Twelve (12) concrete expansion anchors
- Twelve (12) Type A, Series W plain washers

Liebert DSE (DA125, 150,165)

- Sixteen (16) concrete expansion anchors
- Sixteen (16) Type A, Series W plain washers

Anchoring Requirements with a 7-inch (178mm) Floor Stand

- Anchor selection must meet or exceed IBC 2009 and 2012 compliance requirements.
- All anchors listed and any housekeeping pad must be installed to meet compliance.
- Anchors must be installed per ICC ESR instructions.
- Special inspection per IBC Section 1704 is required on all installations.

Refer to **Figure 5** for dimensions and anchoring locations.

Liebert DSE—All Models

- 24 concrete expansion anchors
- 24 Type A, Series W plain washers

NOTICE

Risk of structural damage. Drilling holes all the way through the floor or housekeeping pad may cause damage to the structure and can result in damage to lower floors.

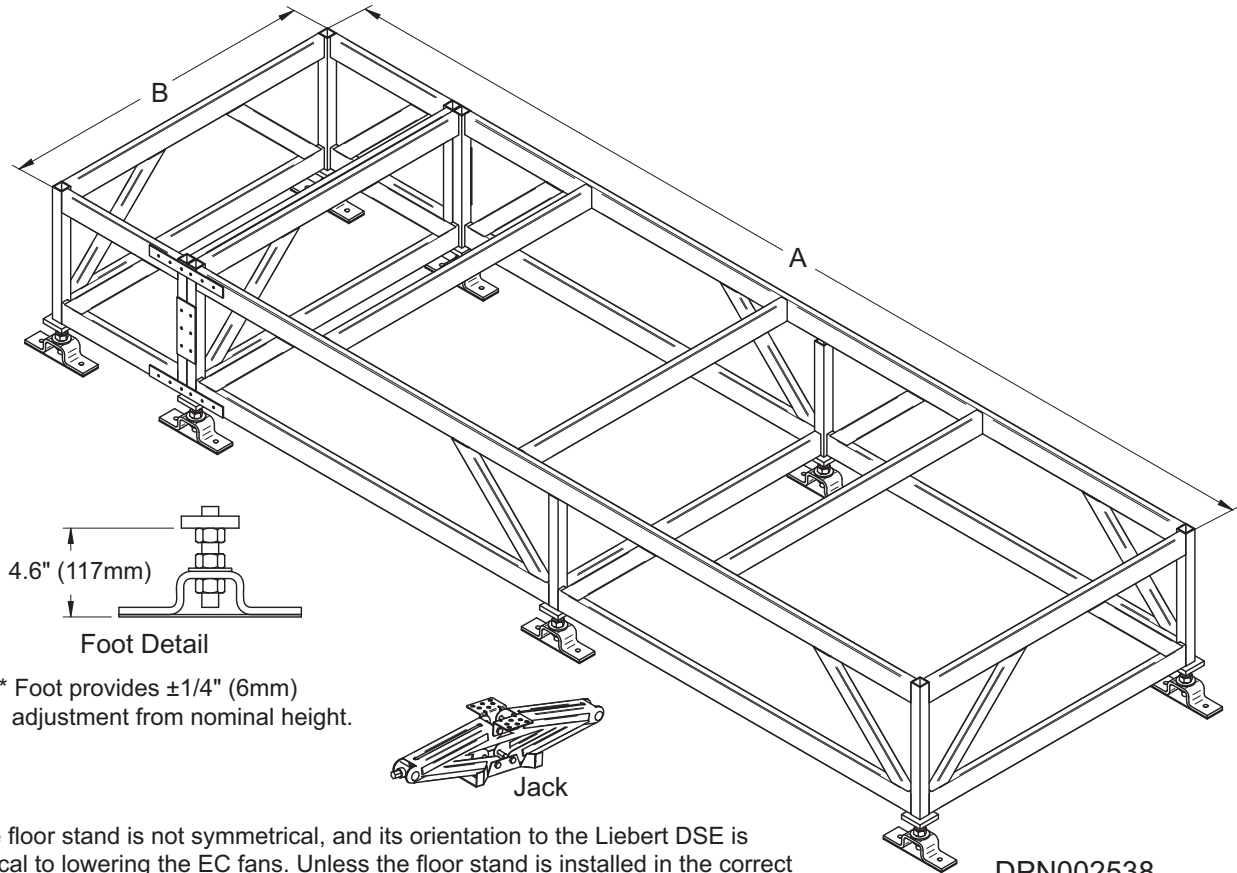
Drilling holes that penetrate either the floor or the housekeeping pad must be properly filled and sealed.



NOTE

The seismic floor stand is not symmetrical, and its orientation to the Liebert DSE unit is critical. Unless the floor stand is installed in the correct position, features such as turning vane and EC plug fans may not function properly.

Figure 1 Dimensions, foot details for 18-48" (457-1219mm) high floor stands, Liebert DSE 080-165



* Foot provides $\pm 1/4"$ (6mm) adjustment from nominal height.

The floor stand is not symmetrical, and its orientation to the Liebert DSE is critical to lowering the EC fans. Unless the floor stand is installed in the correct position, the blowers will not lower into the floor stand.

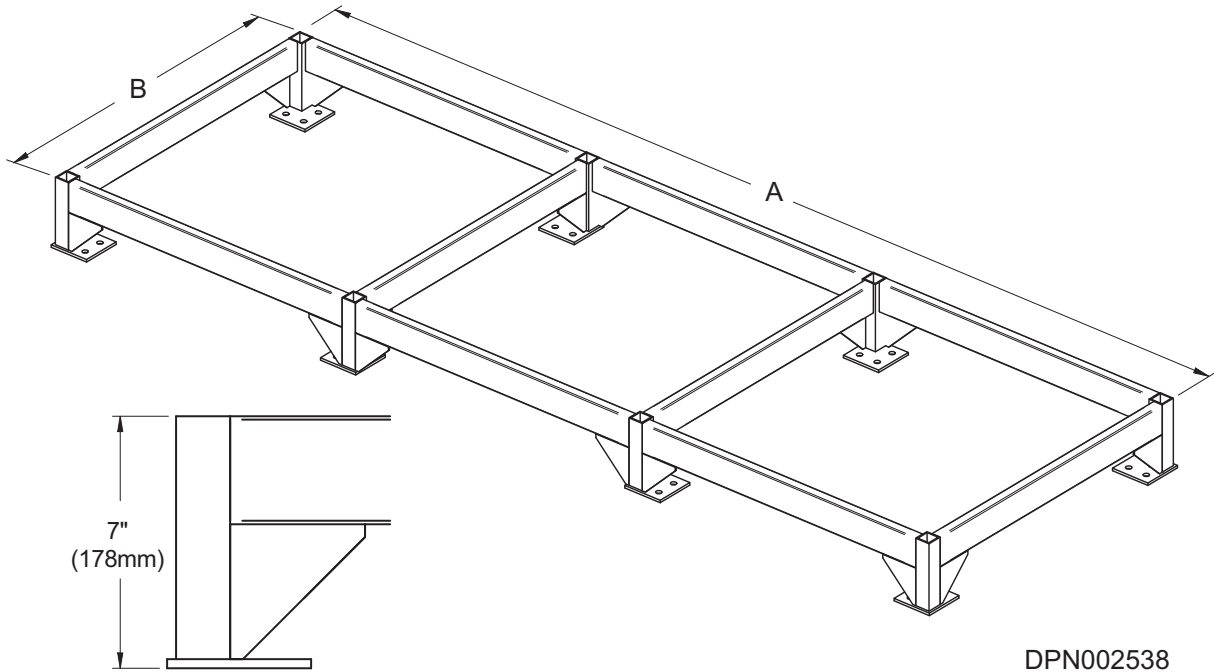
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Table 3 Dimensions, 18-48" (457-1219mm) high floor stands, Liebert DSE 080-165

Model	Dimensions, in. (mm)			Height H* (Nominal), In. (mm)
	Overall Unit Length	A	B	
DA080/085	100(2540)	99 (2515)	33 (838)	18 (457)
DA125/150/165	144 (3658)	142 (3607)	45 (1143)	24 (610)
				30 (762)
				36 (914)
				42 (1067)
				48 (1219)

Source: DPN002538, Rev. 2

Figure 2 Dimensions, foot details for 7" (178mm) high floor stands, Liebert DSE 080-165



7" (178mm) Foot Detail
 No adjustment on 7" (178mm) floor stands.

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Table 4 Dimensions for 7" (178mm) high floor stands, Liebert DSE 080-165

Model	Dimensions, in. (mm)		
	Overall Unit Length	A	B
DA080/085	100 (2540)	99 (2515)	33 (838)
DA125/150/165	144 (3658)	142 (3607)	45 (1143)

Source: DPN002538, Rev. 2

4.1.2 Floor Stand Anchoring

See **Figure 3** for weld and anchoring details of DS080 - DA165 7" (178mm) floor stands; **Figure 4** for weld and anchoring details of DS080/085 floor stands; and **Figure 5** for weld and anchoring details of DS125-165 floor stands.

1. Check the proposed finished floor height.
2. Turn the floor stand over and screw the feet on the bottom until the measurement from the bottom of the foot to the top surface of the upper tube equals the finished floor height.
3. Turn the floor stand right side up.
4. Place the floor stand in the final location in the correct orientation.



NOTE

The floor stand used with EC units is not symmetrical, and its orientation to the Liebert DSE is critical to lowering the EC fans. Unless the floor stand is installed in the correct position, the blowers will not lower into the floor stand.

5. Level the stand by turning the foot/isolator up or down as necessary. Make sure all feet/isolators are firmly resting on the floor.
6. Tighten foot/isolator jam nuts to prevent movement.
7. Mark foot/isolator hole locations on the floor or housekeeping pad. Remove floor stand and set floor stand aside.
8. Drill holes and install anchors according to the manufacturer's recommendations.
9. Set the floor stand into position over the anchor studs and tighten all hardware to the manufacturer's torque specifications.
10. Position the unit on the floor stand and weld the unit base to the floor stand gussets using a 1/8" (3mm) continuous weld. See **Figures 3, 4 and 5**.



WARNING

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

Read all of the following instructions before attempting to move, lift, remove packaging from or prepare the unit for installation.



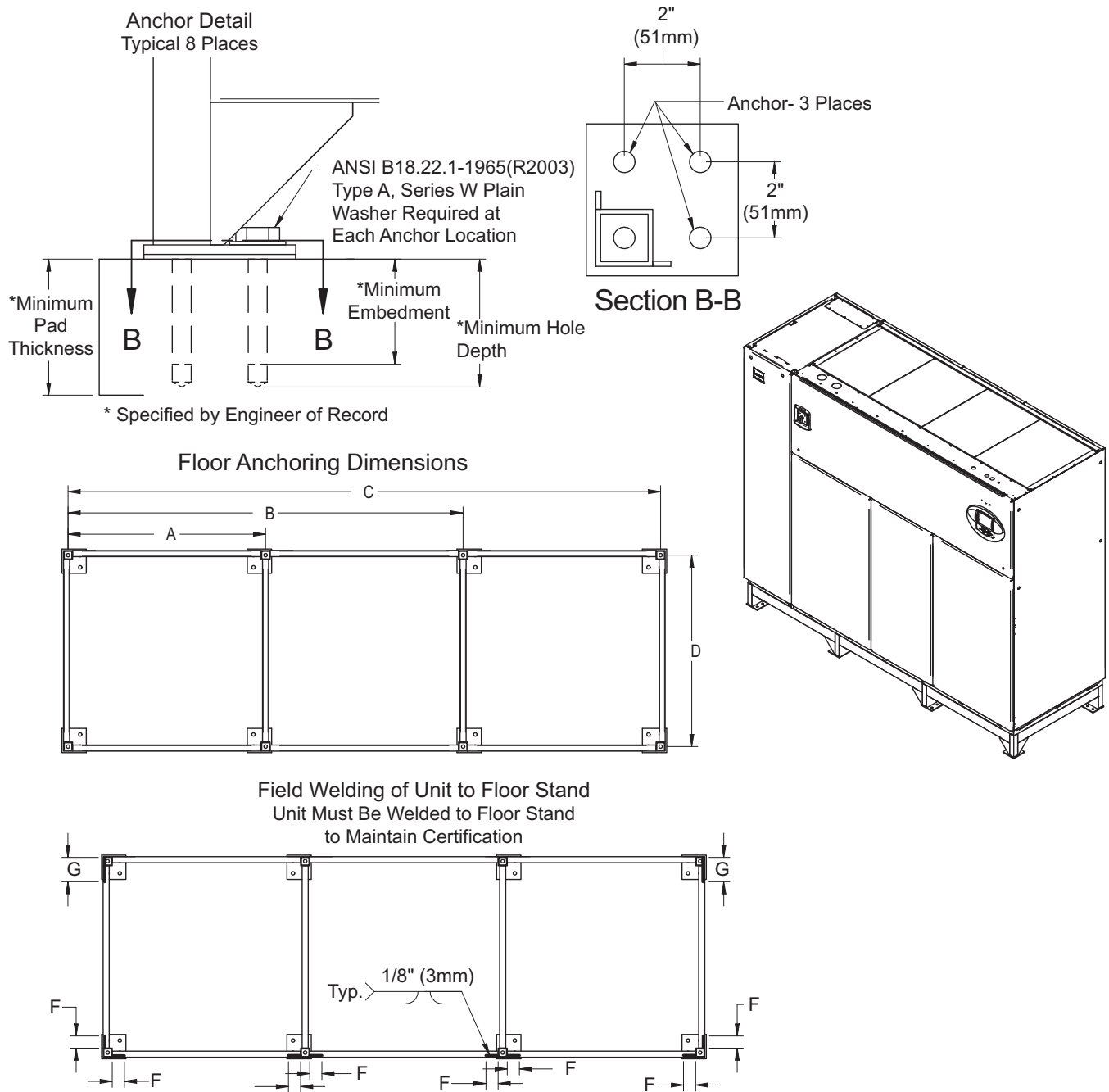
WARNING

Risk of arc flash, infrared exposure, hazardous fumes and toxic gases during welding operations. Can cause eye, skin and serious respiratory system, choking and breathing problems.

Welding may produce fumes and gases hazardous to health. Avoid breathing these fumes and gases. Use adequate ventilation.

Only properly trained and qualified personnel wearing appropriate safety headgear, gloves, shoes, skin and eye protection should be welding.

Figure 3 Seismic anchoring dimensions, 7" (178mm) floor stands—DA080-DA165



Anchor bolt sized per Hilti Kwik Bolt TZ carbon and stainless in concrete, ICC ESR-1917. Alternates are subject to review by Emerson or engineer of record.

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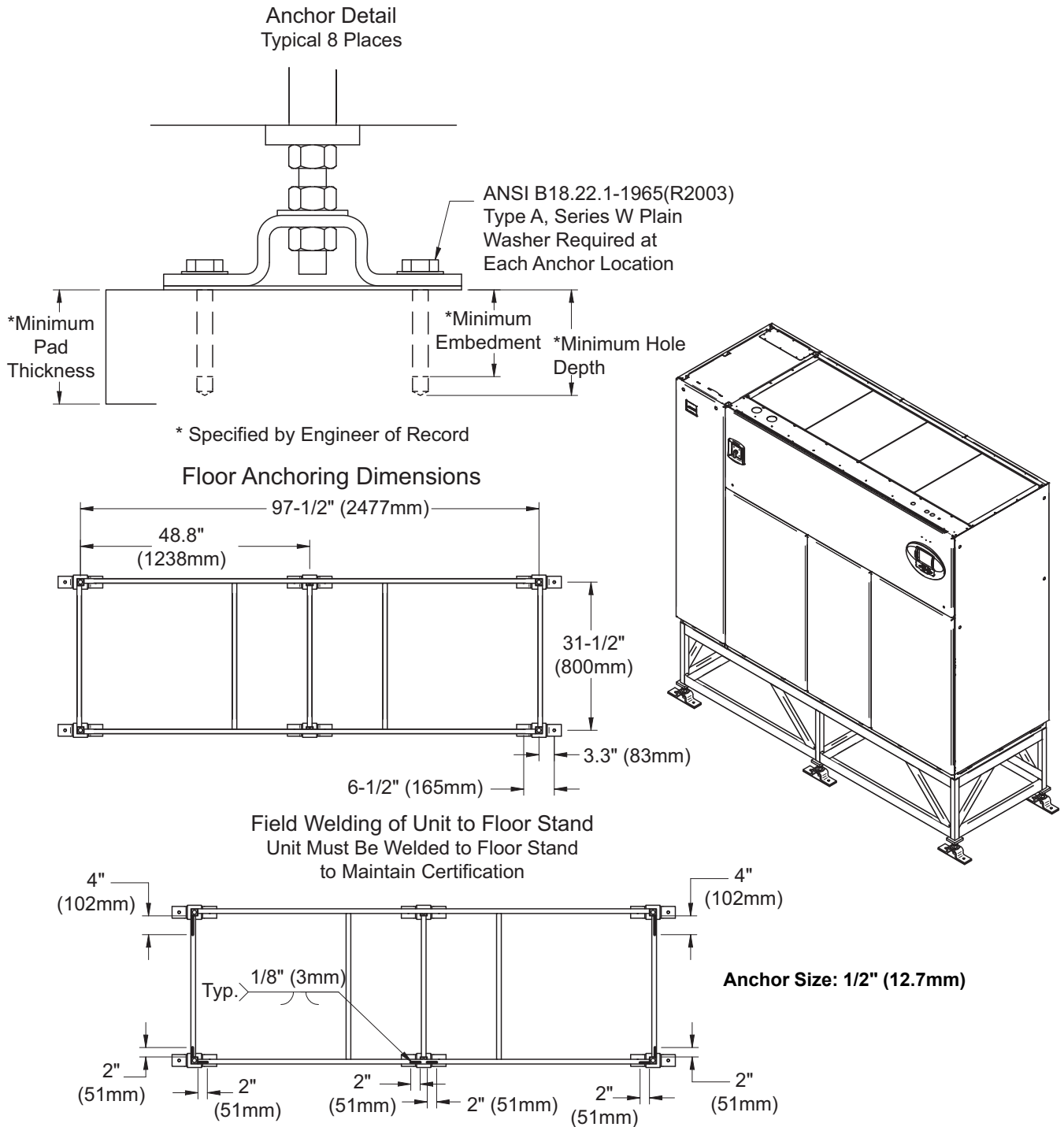
Table 5 Dimensions in Figure 3

Model #	A in. (mm)	B in. (mm)	C in. (mm)	D in. (mm)
DA080; DA085	32.5 (826)	65 (1651)	97.5 (2477)	31.5 (800)
DA125; DA150; DA165	45.5 (1156)	93 (2362)	140.5 (3569)	43.5 (1105)

Anchor Size	F in. (mm)	G in. (mm)
1/2"	2 (51)	4 (102)

Source: DPN002538, Rev. 2

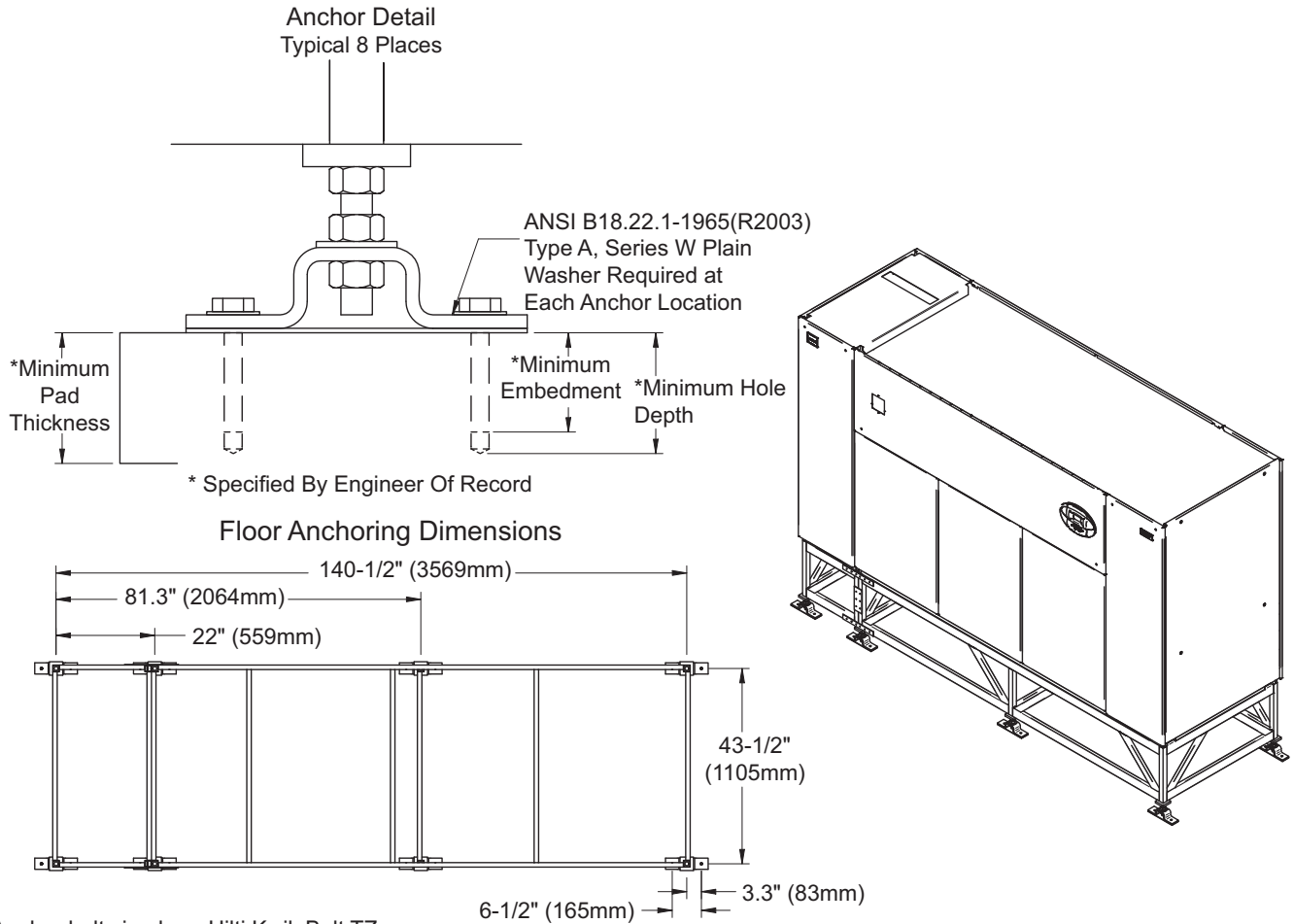
Figure 4 Seismic anchoring dimensions—DA080/085



Anchor bolt sized per Hilti Kwik Bolt TZ carbon and stainless in concrete, ICC ESR-1917. Alternates are subject to review by Emerson or engineer of record.

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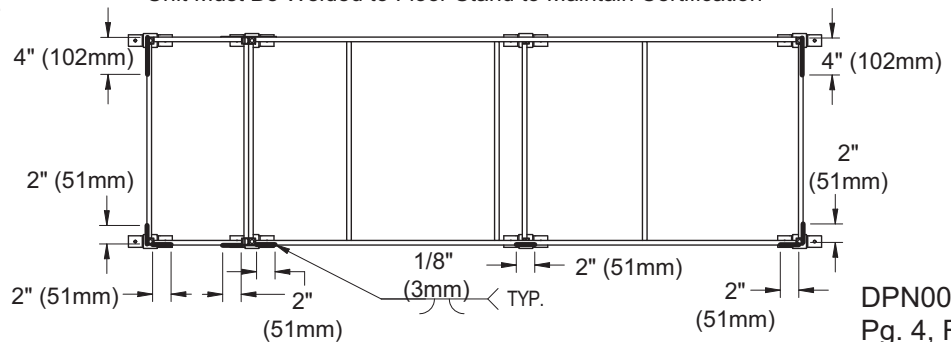
Figure 5 Seismic anchoring dimensions—DA125/150/165



Anchor bolt sized per Hilti Kwik Bolt TZ carbon and stainless in concrete, ICC ESR-1917. Alternates are subject to review by Emerson or engineer of record.

Field Welding of Unit to Floor Stand
Unit Must Be Welded to Floor Stand to Maintain Certification

Anchor Size: 1/2" (12.7mm)



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5.0 ELECTRICAL CONSIDERATIONS OF SEISMIC INSTALLATION

Input power and control wiring connections to the Liebert DSE must be flexible and able to withstand movement in three dimensions. Relative motion caused by a seismic event must be absorbed to prevent damage to the unit, building structure and wiring. It is recommended that all connections to the unit be made as low as possible. The flexible connection should include at least one bend between the unit connection location and the first clamping point at the foundation or structure. It must be of sufficient length to makeup for the maximum displacement indicated in **Figure 6**.



WARNING

Risk of electric shock. Can cause injury or death.

Open all local and remote electric power disconnect switches before working within unit electrical enclosures.

Before proceeding with installation, read all instructions, verify that all the parts are included and check the nameplate to be sure the voltage matches available utility power.

The Liebert iCOM™ microprocessor does not isolate power from the unit, even in the “Unit Off” mode. Some internal components require and receive power even during the “Unit Off” mode of the Liebert iCOM control.

The factory-supplied optional disconnect switch is inside the unit. The line side of this switch contains live high-voltage. With disconnect Off, check for voltage on load side.

The only way to ensure that there is NO voltage inside the unit is to install and open a remote disconnect switch. Refer to unit electrical schematic.

Follow all local codes.



WARNING

Risk of high-speed moving parts. Can cause injury or death.

Open all local and remote electric power disconnect switches before working in the unit.



WARNING

Risk of improper wiring, piping, moving, lifting and handling. Can cause equipment damage, injury or death.

Installation and service should be done only by personnel who have been properly trained and qualified in the installation of air conditioning equipment.

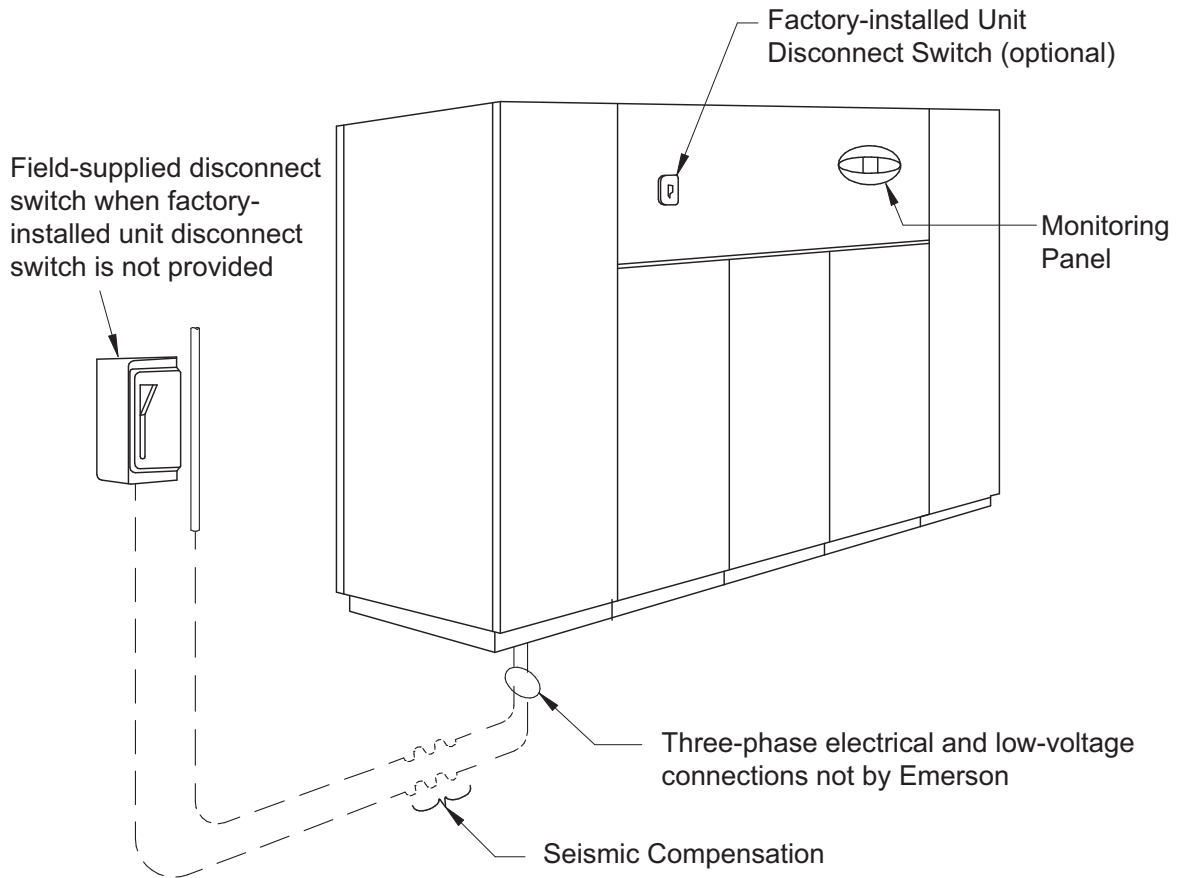


WARNING

Risk of overheated electrical connection terminals. Can cause wiring and component damage, smoke and fire resulting in building damage, serious injury or death.

Use copper wiring only. Make sure that all connections are tight.

Figure 6 Electrical wiring—seismic considerations



Flexible conduit and conductors must be provided to allow the unit to move in three dimensions during a seismic event. The flexible conduit must have at least one bend between the rigid connection at the unit cabinet and the connection to the rigid conduit or foundation.

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6.0 PIPING CONSIDERATIONS OF SEISMIC INSTALLATION

All fluid connections to the unit must be flexible and able to withstand movement in three dimensions. Relative motion caused by a seismic event must be absorbed to prevent damage to the unit, building structure and piping. It is recommended that all connections to the unit are made as low as possible.

6.1 Fluid Connections

NOTICE

Risk of water leaks. Can cause unit and/or building damage. This unit requires a water drain connection and an external water supply to operate.

Improper installation, application and service practices can result in water leakage from the unit.

Do not install this unit above equipment or machines that could be damaged by leaking water.

Do not install equipment or machines that could be damaged by leaking water below this unit.

Emerson® recommends installing leak detection equipment for unit and supply lines.

6.1.1 Condensate Piping—Field-Installed



CAUTION

Risk of boiling water. Can cause personal injury.

The unit requires a drain line that may contain boiling water. Only properly trained and qualified personnel wearing appropriate safety equipment should service the drain line or work on parts near or connected to the drain line.

Whether supplied with 3/4" NPT gravity drain connection or 1/2" copper sweat connection from a factory-installed condensate pump, the drain line of the unit will require a flexible element to permit movement. When selecting a suitable flexible element consider the following:

- The drain line may contain boiling water.
- Drain is trapped internally. Do not trap external to the equipment.
- Gravity drain line must be sized for 2 gpm (7.61 l/m) flow.
- Condensate pump discharge sized based on available head.
- Drain line must comply with all applicable codes.

6.1.2 Humidifier Supply Water—Optional Infrared or Steam Generating Humidifier

When selecting a suitable flexible element, permitting movement in three dimensions of sufficient length to make up for the maximum displacement, consider the following:

- The humidifier supply connection is 1/4" copper line with a maximum water pressure of 150 psi (1034kPa).
- Size the supply line for 1 gpm (3.8 l/m), with a minimum water pressure of 20 psi (138kPa).

6.2 Refrigerant Piping

The refrigerant connections of the Liebert DSE, as with all connections, require a flexible element permitting movement in three dimensions to avoid damage to the unit, structure or piping system. For these connections, Emerson® recommends flexible expansion loops. Loops typically consist of two flexible sections of convoluted stainless or bronze metallic hose with braided cover, two elbows and 180° return section with or without support bracket. These loops minimize the seismic loads to the piping system anchor points. Depending on the manufacturer, the connections to the loop are available in female copper sweat, NPT thread, flange or grooved.

Figure 7 Horizontal expansion loop

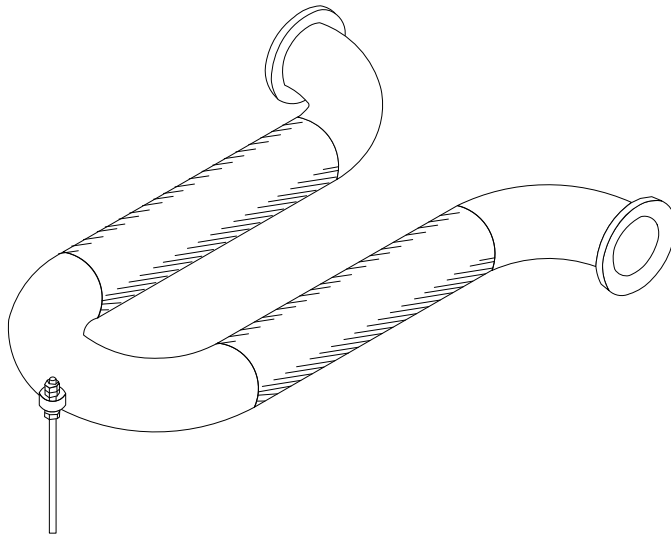
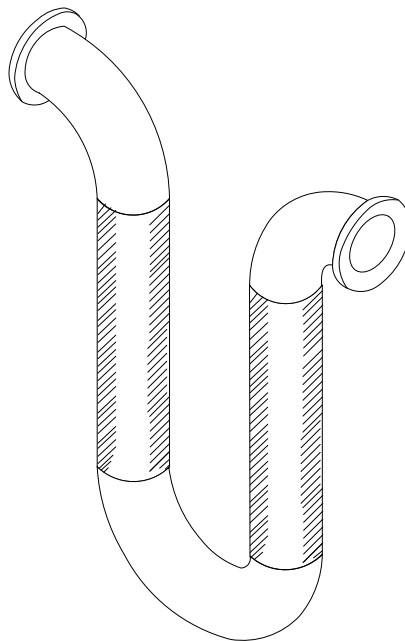
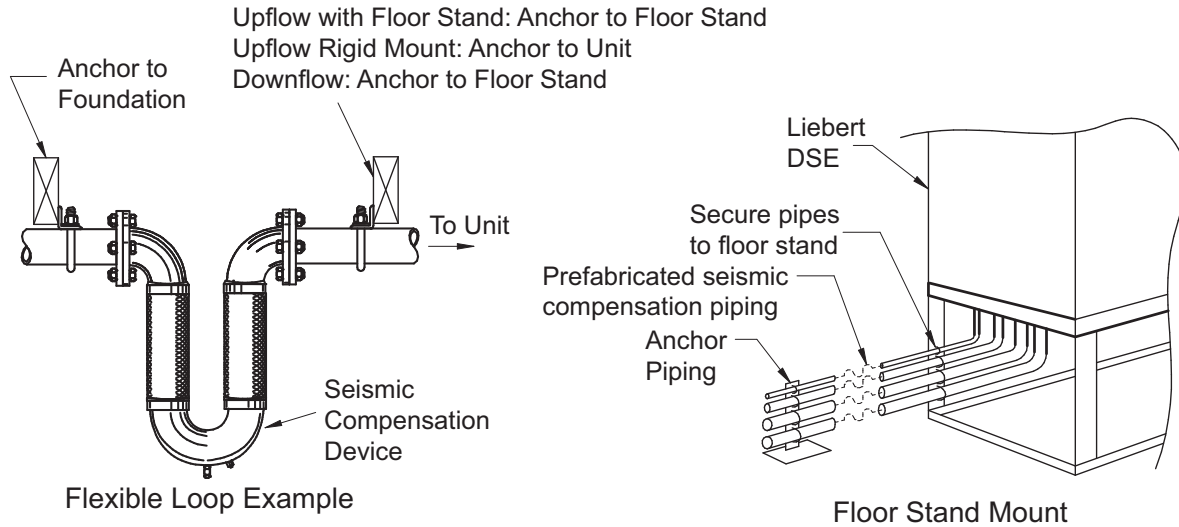


Figure 8 Vertical expansion loop



Manual shutoff valves should be installed at the supply and return lines to each unit. This provides for routine service and emergency isolation of the unit. To prevent water damage, install a water detection system, such as a Liebert Liqui-tect® or floor drains with wet traps.

Figure 9 Piping—seismic considerations



Flexible Loops

All units must be attached to the piping system using flexible loops designed for seismic movement. Flexible loops must be capable of movement in each plane and must completely isolate the equipment from the piping. The loops must be suitable for the system's operating pressure and temperature; refer to Emerson installation instructions. This includes 1/4" copper humidifier supply, condensate drainage and chilled water supply and return. Follow manufacturer's installation instructions for proper seismic application of flexible loops.

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7.0 PLENUM AND DUCTING CONSIDERATION OF SEISMIC INSTALLATION

7.1 Plenum Installation

Seismic-certified installation of Liebert plenums requires the plenum to be securely attached to the top of the unit. Refer to the plenum instructions, 197652P1, included with the plenum, for details.



WARNING

Risk of improper plenum mounting. Can cause equipment damage, injury or death in a seismic event.



WARNING

Risk of high-speed moving parts. Can cause injury or death.

Open all local and remote electric power disconnect switches before working in the unit.



WARNING

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

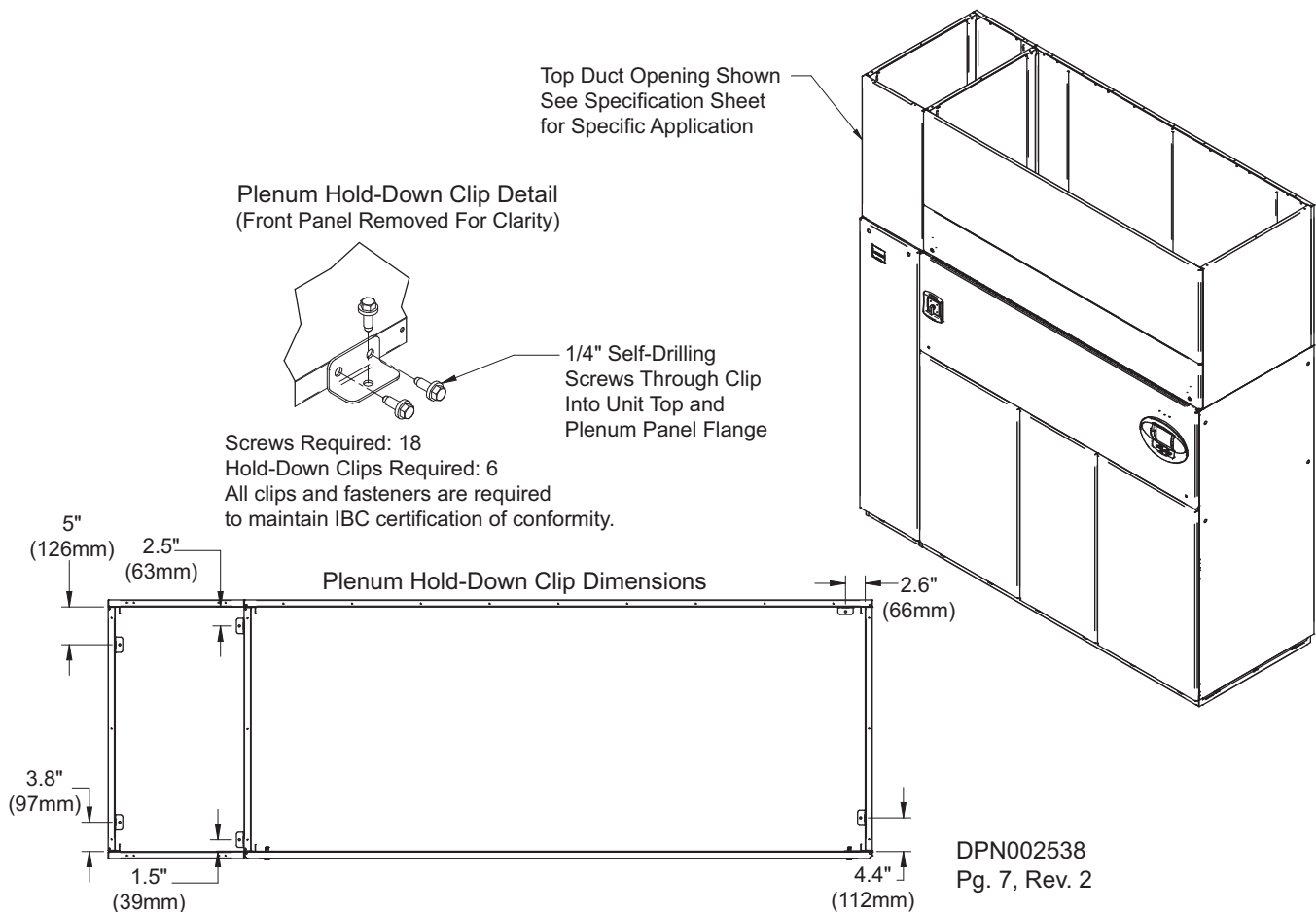
Read all of the following instructions before attempting to move, lift, remove packaging from or prepare the unit for installation.



NOTE

All clips and fasteners are required to maintain IBC certification of conformity.

Figure 10 Plenum seismic mounting data, Liebert DA080/085



7.2 Duct Connections

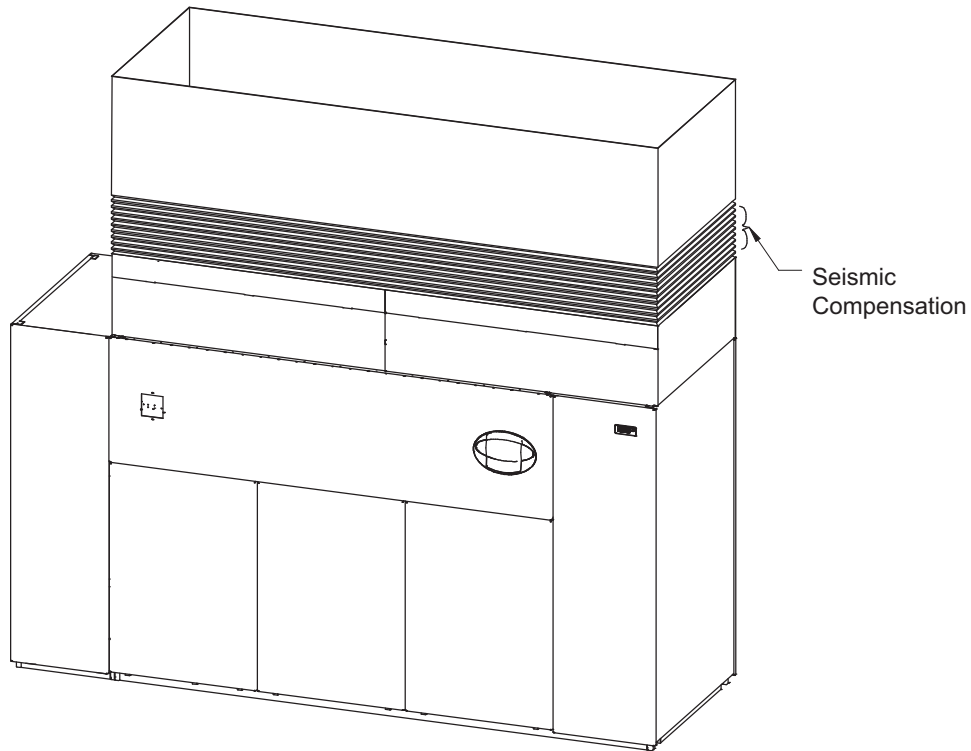
Duct connections made to the unit or unit-mounted plenum must be connected with a flexible transition that will not transfer damaging loads to the unit or plenum.



NOTE

Special inspection per IBC section 1704 may be required on ductwork installation.

Figure 11 Seismic duct connection considerations



Downflow Ducting Example for Seismic Applications

All ducted units must be attached to the ducting system using flexible duct designed for seismic movement. Flexible loops must be capable of movement in each plane and must completely isolate the equipment from the duct work. Refer to Emerson installation instructions for ducting requirements. Follow manufacturer's installation instructions for proper seismic application of flexible ducts.

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8.0 ANCHOR AND LOAD REQUIREMENTS OF SEISMIC INSTALLATION

All floor and housekeeping pads must be approved by the structural engineer of record to resist the added seismic loads from components being anchored as defined in this section. Data is presented by system configuration. The maximum system loads are given for each loading location or floor stand foot. The maximum load at the anchor is provided for proper sizing of the anchors (not provided by Emerson®).



NOTE

The floor stand used with EC units is not symmetrical, and its orientation to the Liebert DSE is critical to lowering the EC fans. Unless the floor stand is installed in the correct position, the blowers will not lower into the floor stand.



NOTE

Load interactions must be considered when selecting anchors.

Table 6 Downflow Liebert DSE models DA085-165 on floor stand with 18" (457mm) filter plenum

Model #	Floor Stand Height, in. (mm)	Operating Mass * lb (kg)	Restraint Locations	Maximum Load per Anchor		Maximum Load per Location		Anchors per Location
				Tension lb. (kg)	Shear lb. (kg)	Tension lb. (kg)	Shear lb. (kg)	
DA080D DA085D	48 (1219)	2318 (1051)	6	1683.1 (763.4)	302.6 (137.3)	3283.4 (1489.3)	554.0 (251.3)	2
	24 (610)	2222 (1008)	6	1197.1 (543.0)	290.1 (131.6)	2335.0 (1059.1)	531.0 (240.9)	2
	7 (178)	2110 (957)	8	507.7 (230.3)	128.5 (58.3)	1325.9 (601.4)	383.8 (174.1)	3
DA125D DA150D DA165D	48 (1219)	4248 (1927)	8	1593.9 (723.0)	417.7 (189.5)	3156.7 (1431.9)	885.1 (401.5)	2
	24 (610)	4194 (1902)	8	1133.4 (514.1)	412.4 (187.0)	2245.17 (1018.3)	873.8 (396.4)	2
	7 (178)	3962 (1797)	8	564.6 (256.1)	229.8 (104.2)	1527.5 (692.9)	695.0 (315.2)	3

* Operating mass includes the operating refrigerant and water volume, floor stand and plenum

9.0 MAINTENANCE



WARNING

Risk of electric shock. Can cause injury or death.

Open all local and remote electric power disconnect switches before working within.

Before proceeding with installation, read all instructions, verify that all the parts are included and check the nameplate to be sure the voltage matches available utility power.

The Liebert iCOM[®] microprocessor does not isolate power from the unit, even in the “Unit Off” mode. Some internal components require and receive power even during the “Unit Off” mode of the Liebert iCOM control.

The factory-supplied optional disconnect switch is inside the unit. The line side of this switch contains live high-voltage. With disconnect Off, check for voltage on the load side.

The only way to ensure that there is NO voltage inside the unit is to install and open a remote disconnect switch. Refer to unit electrical schematic.

Follow all local codes.



WARNING

Risk of high-speed moving parts. Can cause injury or death.

Open all local and remote electric power disconnect switches before working in the unit.

9.1 Seismic Bracing

Liebert DSE units supplied with the seismic option can be easily identified once the panels are removed. All seismic bracing is painted red and is factory-installed. Seismic bracing should not be removed except when absolutely necessary. If any bracing is removed for service access, reinstall it immediately after servicing unit.

9.1.1 Temporary Service Access



WARNING

Risk of unit collapse. Can cause injury or death.

Braces are required for seismic certification. If removed for service access, reinstall brace after servicing unit.

Seismic bracing is fastened to the unit frame with 1/4" self-drilling screws or bolts requiring a 3/8" (10mm) wrench for removal. Any bracing removed for service must be reinstalled, and the 1/4" fasteners must be tightened to 10 ft-lb. (13.5Nm). If a screw is stripped out, install a replacement at a new location within 1/2" (12mm) of the original location.

9.2 Inspection of System Connections

Check all connections to the system during routine maintenance and take appropriate action to correct any issues. System maintenance schedules must be established and performed.

9.3 Post-Seismic Inspection

Many areas of the country that are subject to seismic activity are working to draft local and national guidelines and procedures for evaluating earthquake-damaged buildings and equipment. In 1989, with funding from the California Office of Emergency Services, California Office of Statewide Health Planning and Development and the Federal Emergency Management Agency, the Applied Technology Council (ATC) published the *ATC-20 Procedures for Post Earthquake Safety Evaluation of Buildings*. Inspections outlined in the document, may be required by areas that have adopted ATC-20 and must be performed by a qualified individual.

The Liebert DSE seismic certification of conformity is an assurance that the system will withstand a seismic event occurring within the defined limits of **2.3 - Certification Criteria** and continue to perform the primary function of cooling. After any significant seismic event greater than magnitude 6.5, Emerson® requires an inspection of the system structure and connections by a registered professional engineer with five years of experience in seismic anchorage. This inspection will apply to equipment within a 100 mile (160km) radius of the seismic event. If evidence of structural cracks, yielding or loosening of structural members is found, the system must be replaced or restored to the original design configuration.

NOTES

Technical Support / Service

Web Site

www.liebert.com

Monitoring

liebert.monitoring@emerson.com

800-222-5877

Outside North America: +00800 1155 4499

Single-Phase UPS & Server Cabinets

liebert.upstech@emerson.com

800-222-5877

Outside North America: +00800 1155 4499

Three-Phase UPS & Power Systems

800-543-2378

Outside North America: 614-841-6598

Environmental Systems

800-543-2778

Outside the United States: 614-888-0246

Locations

United States

1050 Dearborn Drive

P.O. Box 29186

Columbus, OH 43229

Europe

Via Leonardo Da Vinci 8

Zona Industriale Tognana

35028 Piove Di Sacco (PD) Italy

+39 049 9719 111

Fax: +39 049 5841 257

Asia

29/F, The Orient Square Building

F. Ortigas Jr. Road, Ortigas Center

Pasig City 1605

Philippines

+63 2 687 6615

Fax: +63 2 730 9572

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