

## Liebert Deluxe System/3™ - Chilled Water

Installation Manual - 50 and 60 Hz, 2-60 Ton CW Systems (FH/UH)





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## PRODUCT MODEL INFORMATION

**Table 1 Model number designation**

DH FH	376	C	-	A	A	E	I
FH = Downflow CW UH = Upflow CW	Nominal Capacity in Thousand BTU/H	C = Chilled Water	- = Std. CW V VSD = (Variable Speed Drive)	A = 460/3/60 B = 575/3/60 C = 208/3/60 D = 230/3/60 F = 380/3/50 G = 415/3/50 H = 230/3/50 J = 200/3/50 M 380/415/ = 3/50	A = Advanced Micro-processor G = Advanced Graphics Micro-processor	0 = No Reheat E = Electric Reheat H Hot Water Reheat T = Steam Reheat	0 = No Humidifier I = Infrared Humidifier G Steam Grid Humidifier S = Steam Generating Humidifier



### WARNING

Installation and service of this equipment should be done only by qualified personnel who have been specially trained in the installation of air conditioning equipment. Improper installation could result in property damage, injury or loss of life.



### WARNING

Hazardous voltage! Always disconnect power before servicing.



### CAUTION

Evaporator unit requires drain connections and may also require water supply. Do not locate directly above any equipment that could sustain water damage.

## EQUIPMENT INSPECTION

Upon arrival of the unit, inspect all items for either visible or concealed damage. Damage should be immediately reported to the carrier and a damage claim filed with a copy sent to Liebert or to your sales representative.

**Table 2 Unit weights**

	Model	Weight lbs (kg)
Chilled Water Models FH/UH, 60 (50) Hz	147C	770 (350)
	200C	805 (365)
	248C	855 (388)
	302C	1090 (495)
	376C	1155 (524)
	422C	1320 (599)
	529C	1420 (644)
	600C (599C)	1785 (810)
	740C (739C)	1925 (873)

## 1.0 INTRODUCTION

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### 1.1 System Descriptions

Deluxe System/3 12 to 60 ton Chilled Water environmental control system is available in several configurations. Each configuration can operate with either Advanced Microprocessor Controls (AM), or Advanced Microprocessor Controls with Graphics (AG). A brief description of each, including operational differences, can be found below. Check model numbers to see what is supplied with your unit.

#### 1.1.1 Chilled Water Systems

##### **Cooling**

These systems utilize a central chiller and control cooling by modulating a control valve in the chilled water line.

##### **Heating**

Three stages of electric reheat standard; steam/hot water optional

##### **Humidification**

Infrared standard; steam grid and steam generating optional

##### **Dehumidification**

Chilled water valve opens proportionally in response to room needs

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## 2.0 INSTALLATION

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### 2.1 Room Preparation

The room should be well-insulated and must have a sealed vapor barrier. The vapor barrier in the ceiling can be a polyethylene film type. Use a rubber-base or plastic-base paint on concrete walls and floors. Doors should not be undercut or have grilles in them.

Outside, or fresh, air should be kept to an absolute minimum. Outside air adds to the heating, cooling, humidifying and dehumidifying loads of the site. It is recommended that outside air be kept below 5% of the total air circulated in the room.

### 2.2 Location Considerations

For a downflow unit, the unit can sit on an accessible, elevated flooring system. It may be necessary to furnish additional pedestal support below the unit to ensure maximum structural support. A separate floor stand for the unit may be used as support, independent of the elevated floor and installed prior to the flooring system.

For downflow and upflow units, provide approximately 34" (864 mm) service clearance on the left, right and in front of the unit whenever possible. The minimum space required for service is 18" (45.7 cm) on the left end, 18" (45.7 cm) on the right end, and 24" (61 cm) in front of the unit. This space is necessary to permit routine maintenance, such as replacing filters, adjusting the fan speed and cleaning the humidifier. On downflow chilled water units and upflow 599C, 600C, 735C and 740C models, left- and right-end minimum clearances are 0" (0 cm), with the exception of rear return.



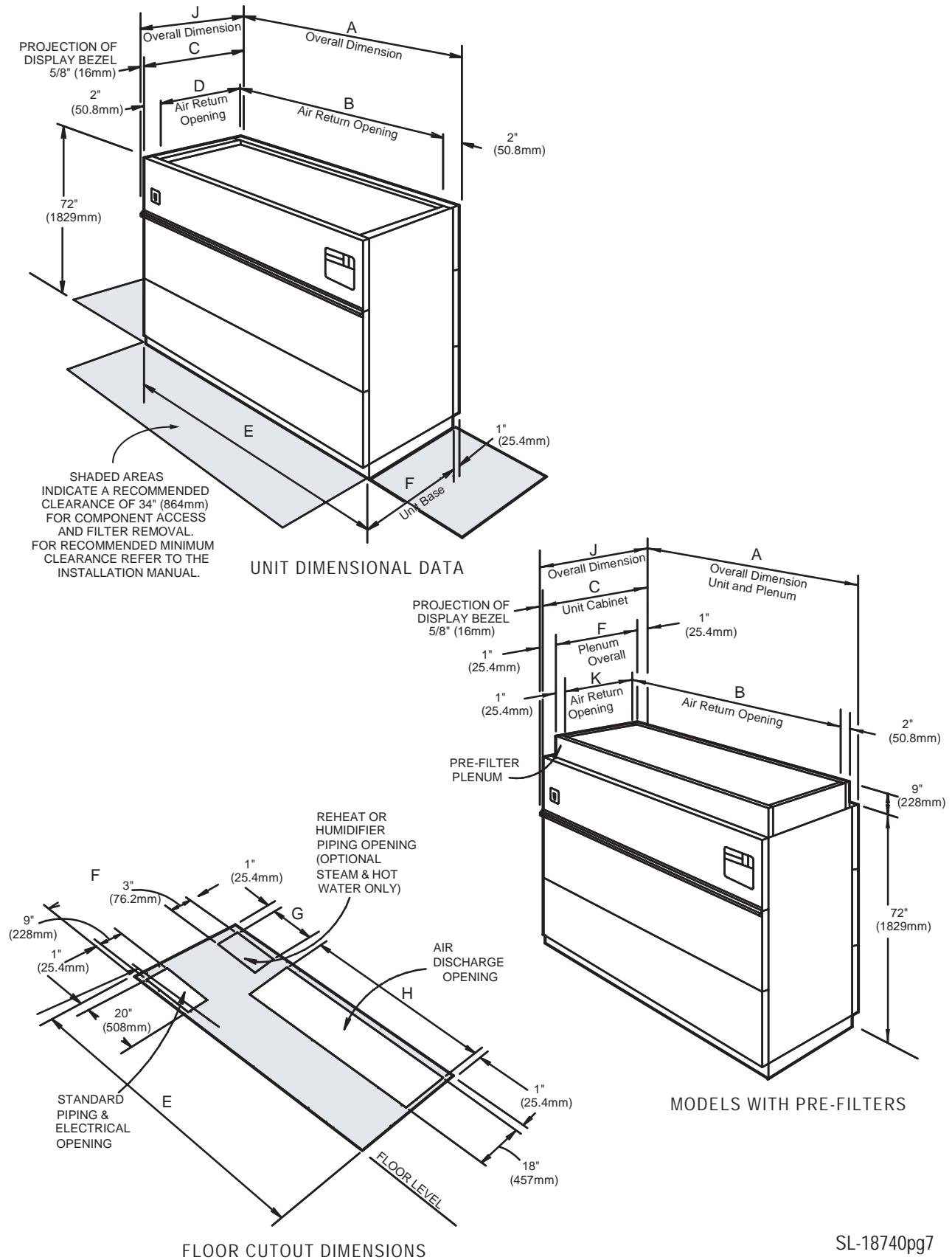
#### NOTE

*If high efficiency 6" filters are used, 25" (63.5 cm) clearance on the right end is required for removal and replacement of filters.*

Avoid locating units in an alcove or at the extreme end of a room that has a high aspect ratio (long narrow room). Also avoid locating units too close together. This tends to reduce the effectiveness of the air distribution as compared to units located 30-40 feet (9-12m) apart.

### 2.3 Unit Dimensions

Figure 1 Downflow chilled water (FH models except FH599C/FH600C and FH739C/FH740C) cabinet and floor planning dimensional data



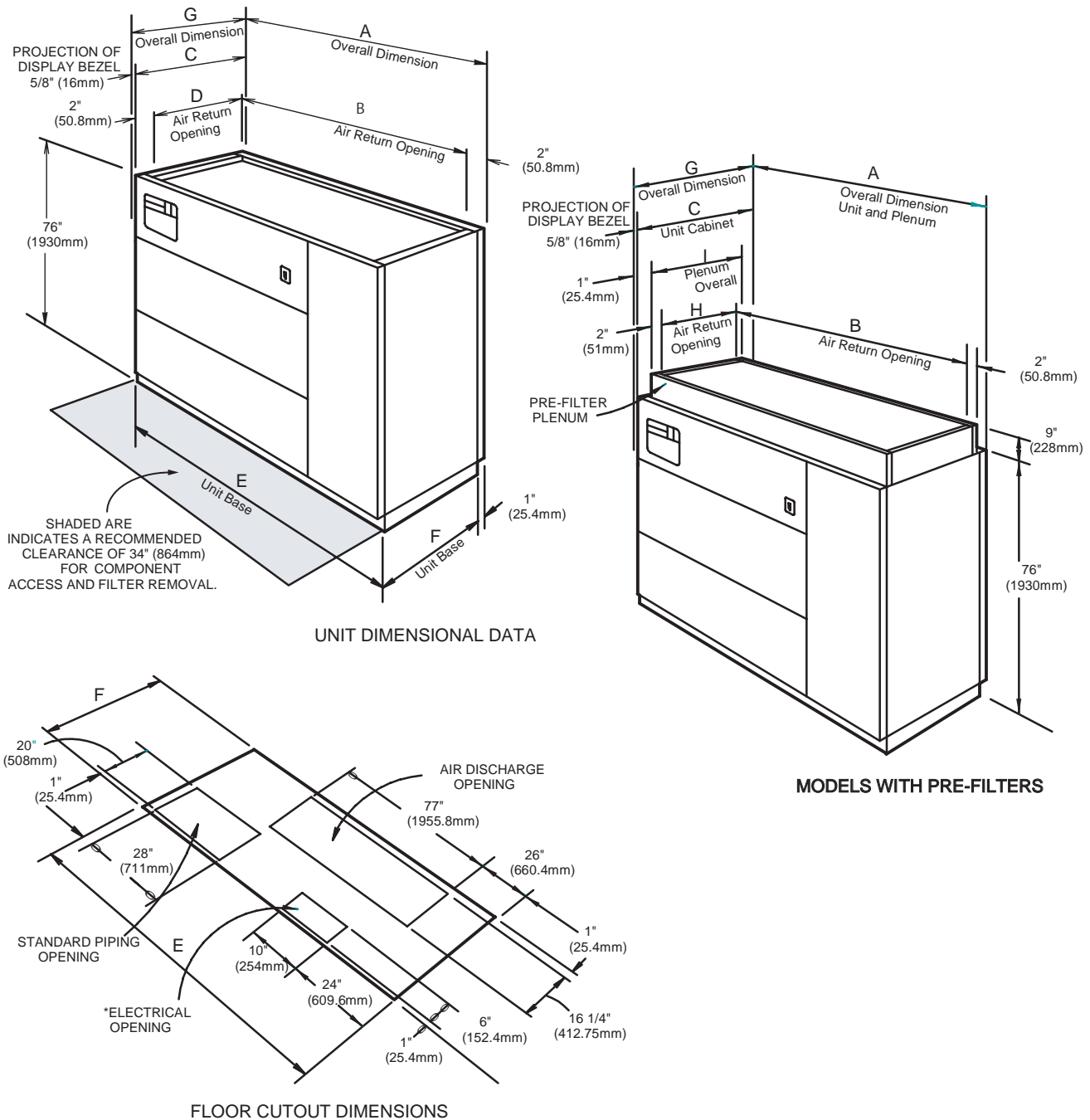
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**Table 3 Downflow chilled water (except FH599C/FH600C and FH739C/FH740C) floor cutout dimensions**

Chilled Water Model	Dimensional Data inches (mm)									
	A	B	C	D	E	F	G	H	J	K
FH147C	50 (1270)	46 (1168)	35 (889)	32 (813)	48 (1219)	33 (838)	10-1/2 (267)	35-1/2 (902)	35-5/8 (905)	31 (787)
FH200C	50 (1270)	46 (1168)	35 (889)	32 (813)	48 (1219)	33 (838)	10-1/2 (267)	35-1/2 (902)	35-5/8 (905)	31 (787)
FH248C	50 (1270)	46 (1168)	35 (889)	32 (813)	48 (1219)	33 (838)	10-1/2 (267)	35-1/2 (902)	35-5/8 (905)	31 (787)
FH302C	74 (1880)	70 (1778)	35 (889)	32 (813)	72 (1829)	33 (838)	10-1/2 (267)	59-1/2 (1511)	35-5/8 (905)	31 (787)
FH376C	74 (1880)	70 (1778)	35 (889)	32 (813)	72 (1829)	33 (838)	10-1/2 (267)	59-1/2 (1511)	35-5/8 (905)	31 (787)
FH422C	99 (2515)	95 (2413)	35 (889)	32 (813)	97 (2464)	33 (838)	16-1/4 (413)	78-3/4 (2000)	35-5/8 (905)	31 (787)
FH529C	99 (2515)	95 (2413)	35 (889)	32 (813)	97 (2464)	33 (838)	16-1/4 (413)	78-3/4 (2000)	35-5/8 (905)	31 (787)

**Figure 2 Downflow chilled water models FH599C/FH600C and FH739C/FH740C cabinet and floor planning dimensional data**



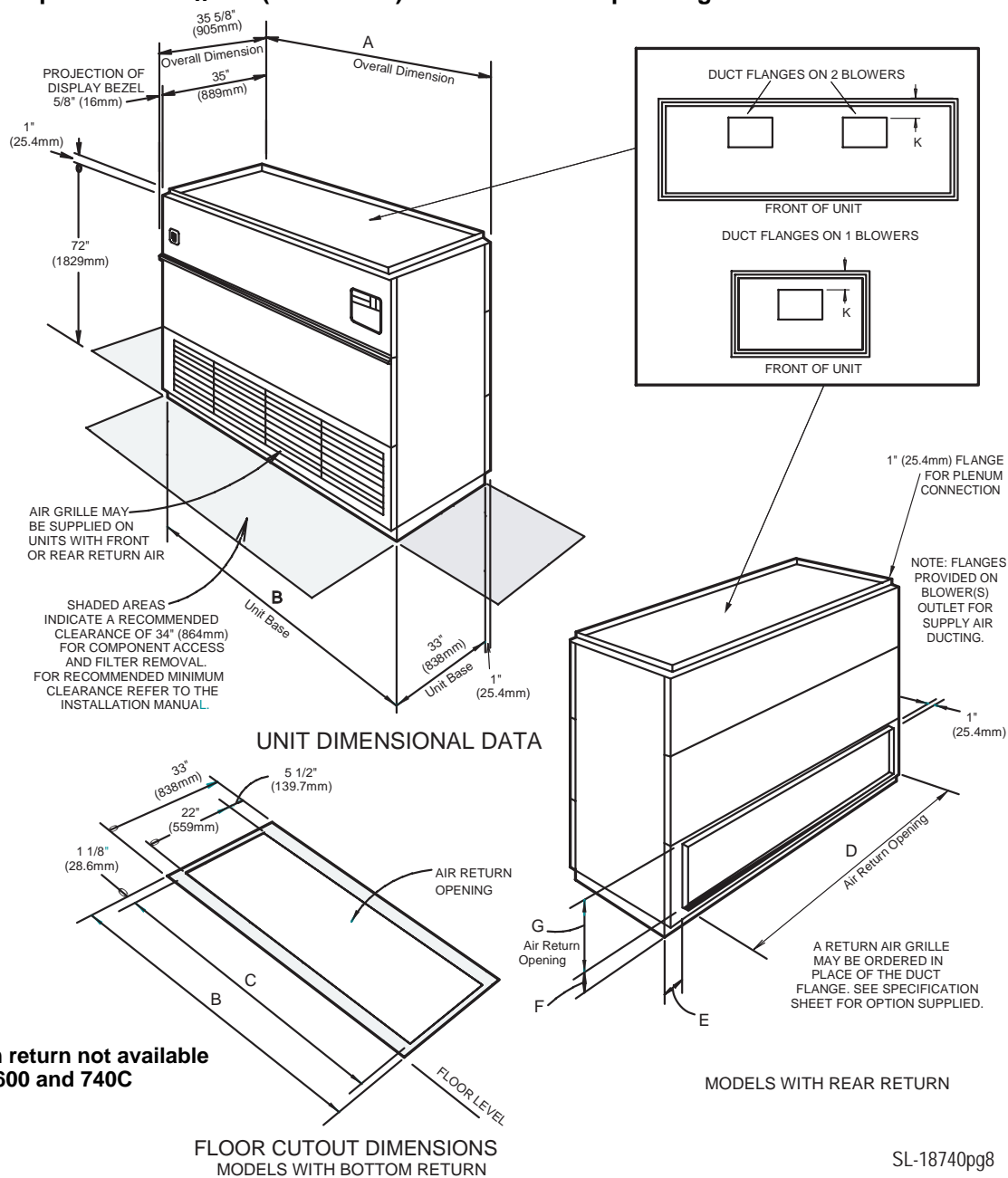
\*NOTE: ELECTRICAL OPENING IS ALSO USED FOR DRAIN CONNECTION OF OPTIONAL STEAM GENERATING CANISTER HUMIDIFIER.

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**Table 4 Downflow chilled water models FH599C/FH600C and FH739C/FH740C floor cutout dimensions**

Chilled Water Model	Dimensional Data inches (mm)								
	A	B	C	D	E	F	G	H	I
FH599C, 600C	122 (3099)	118 (2997)	35 (889)	31 (787)	120 (3048)	33 (838)	35-5/8 (905)	30 (762)	34 (864)
FH739C, 740C	122 (3099)	118 (2997)	35 (889)	31 (787)	120 (3048)	33 (838)	35-5/8 (905)	30 (762)	34 (864)

Figure 3 Upflow chilled water (UH models) cabinet and floor planning dimensional data



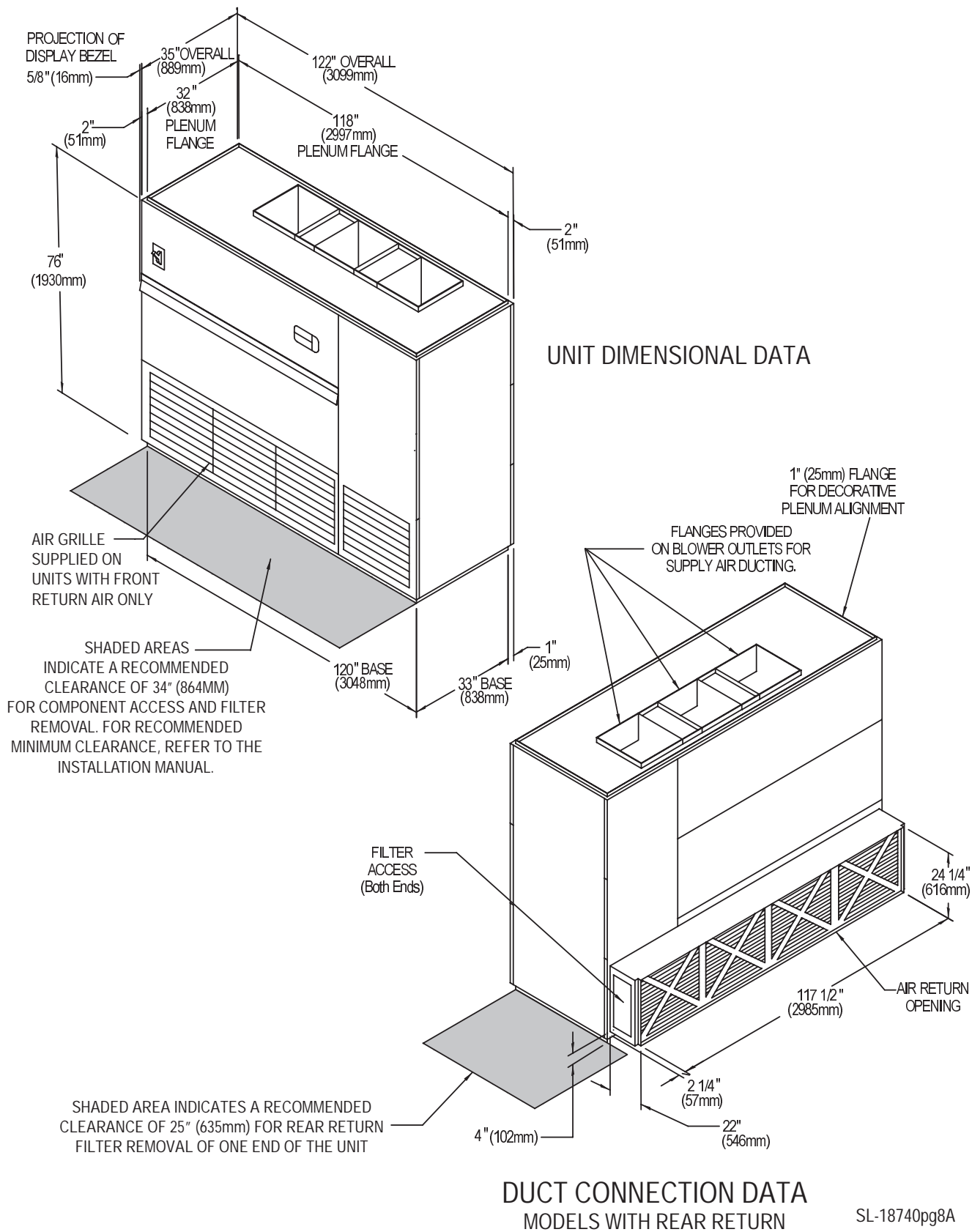
\* Bottom return not available on UH600 and 740C

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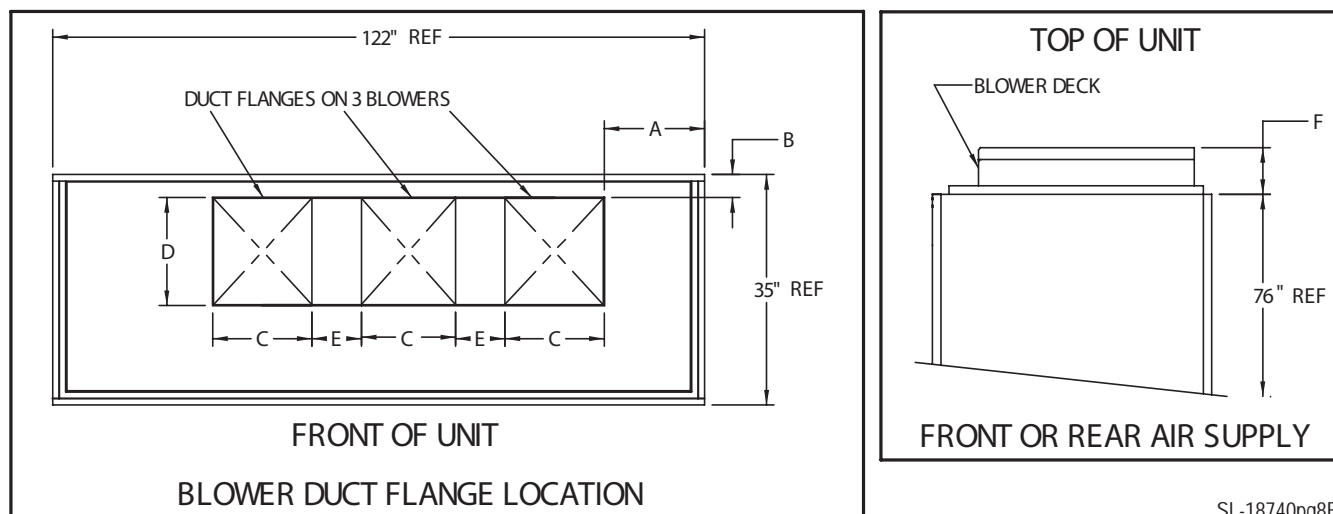
Table 5 Upflow chilled water (UH models) cabinet and floor planning dimensional data

Chilled Water Model	# of Blowers	Dimensional Data inches (mm)											
		A	B	C	D	E	F	G	H	J	K	L	M
UH147C	1	50 (1270)	48 (1219)	46 (1168)	44 (1118)	3 (76)	5 (127)	18 (457)	15 7/8 (403)	18 5/8 (473)	2 3/16 (55)	17 3/8 (454)	-
UH200C	1	50 (1270)	48 (1219)	46 (1168)	44 (1118)	3 (76)	5 (127)	18 (457)	15 7/8 (403)	18 5/8 (473)	2 3/16 (55)	17 3/8 (454)	-
UH248C	1	50 (1270)	48 (1219)	46 (1168)	44 (1118)	3 (76)	5 (127)	18 (457)	15 7/8 (403)	18 5/8 (473)	2 3/16 (55)	17 3/8 (454)	-
UH302C	2	74 (1880)	72 (1829)	70 (1778)	68 (1727)	3 (76)	4 (102)	20 (508)	15 7/8 (403)	14 5/8 (371)	2 3/16 (55)	20 3/8 (517)	11-1/4 (286)
UH376C	2	74 (1880)	72 (1829)	70 (1778)	68 (1727)	3 (76)	4 (102)	20 (508)	15 7/8 (403)	14 5/8 (371)	2 3/16 (55)	20 3/8 (517)	11-1/4 (286)
UH422C	2	99 (2515)	97 (2464)	95 (2413)	68 (1727)	6 1/2 (165)	5 (127)	18 (457)	15 7/8 (403)	18 5/8 (473)	3 1/4 (82)	20 5/8 (524)	12-5/8 (321)
UH529C	2	99 (2515)	97 (2464)	95 (2413)	68 (1727)	6 1/2 (165)	5 (127)	18 (457)	15 7/8 (403)	18 5/8 (473)	3 1/4 (82)	20 5/8 (524)	12-5/8 (321)

**Figure 4 Cabinet and floor planning dimensional data (UH 599C, 600C, 739C and 740C chilled water models)**



**Figure 5 Blower duct and deck dimensional data (UH 599C, 600C, 739C and 740C chilled water models)**



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**Table 6 Blower duct and deck dimensional data (UH 599C, 600C, 739C and 740C chilled water models)**

Model	Blower	Supply	Motor Hp	Dimensional Data inches (mm)					
				A	B	C	D	E	F
UH599C UH739C UH600C UH740C	15x15	Top Front	10-15	27-1/2 (699)	3-1/2 (89)	18-11/16 (475)	16-3/16 (411)	10 (254)	4-1/2 (114)
		Top Rear	10-15	27-1/2 (699)	12-5/16 (313)	18-11/16 (475)	16-3/16 (411)	10 (254)	4-1/2 (114)
	15x11	Top Front	10-15	30 (762)	3-1/2 (89)	14-3/4 (375)	16-3/16 (411)	10 (254)	4-1/2 (114)
			20	30 (762)	3-1/2 (89)	14-3/4 (375)	16-3/16 (411)	10 (254)	4-1/2 (114)
		Top Rear	10-20	30 (762)	12-5/16 (313)	14-3/4 (375)	16-3/16 (411)	10 (254)	4-1/2 (114)

## 2.4 Piping

All fluid and refrigeration connections to the unit, with the exceptions of the condensate drain and live steam, are sweat copper. Factory-installed piping brackets must not be removed. Field-installed piping must be installed in accordance with local codes and must be properly assembled, supported, isolated and insulated. Avoid piping runs through noise-sensitive areas, such as office walls and conference rooms.

Refer to specific text and detailed diagrams in this manual for other unit-specific piping requirements.

### 2.4.1 Drain Line

A 3/4" NPT (1-1/4" NPT on 599C, 600C, 739C and 740C) is provided for the evaporator coil condensate drain. This drain line also drains the humidifier, if applicable. The drain line must be located so it will not be exposed to freezing temperatures. The drain should be at least the full size of the drain connection and pitched a minimum of 1/8" per ft. (11 mm per meter).



#### NOTE

*This line may contain boiling water. Use copper or other suitable material for the drain line.*

#### **For units without a condensate pump**

*The unit is shipped from the factory with an internally-mounted trap. No external trap is required. The drain line must comply with all applicable codes.*

#### **For units with a factory-installed condensate pump option**

*The unit is shipped from the factory with a condensate pump installed. The condensate pump discharge (drain) line must comply with all applicable codes.*

#### **For units with a field-installed condensate pump**

*The unit is shipped from the factory with the condensate pump option, unmounted in the unit, which must be installed in the field. The unit has an internally mounted trap. The drain line from the unit to the condensate pump does not require a trap. The discharge (drain) line from the pump must comply with all applicable codes.*

### 2.4.2 Piping Considerations for Raised-Floor Applications

All piping below the elevated floor must be located so that it offers the least resistance to air flow. Careful planning of the piping layout under the raised floor is required to prevent the air flow from being blocked. When installing piping on the subfloor, it is recommended that the pipes be mounted in a horizontal plane rather than stacked one above the other. Whenever possible, the pipes should be run parallel to the air flow.

## 2.5 Electrical Connections

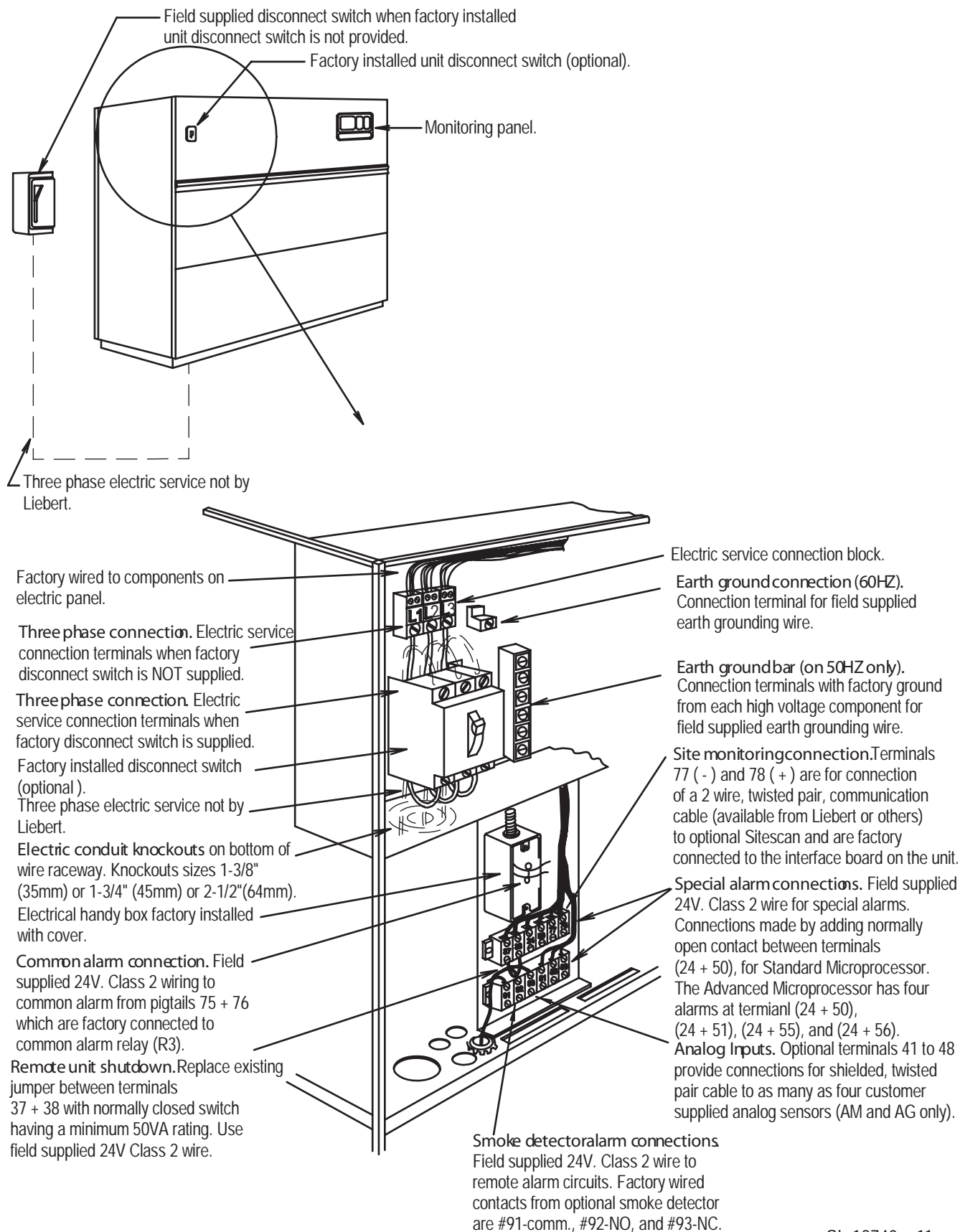
Three-phase electrical service is required for all models in either 208, 230, 460 or 575 V, 60 Hz; or 200, 230 or 400 V, 50 Hz. Electrical service shall conform to national and local electrical codes.

Install a manual electrical disconnect switch within 5 feet (1.6 m) of the unit in accordance with codes. A factory-supplied disconnect switch may be factory-mounted within the unit and accessible from the exterior.

Figure 6 Electrical connection details

ROOM UNIT CONNECTIONS		NOTES	
3-phase line voltage supply to line voltage connection block or optional main disconnect switch (Note 2)		<ol style="list-style-type: none"> <li>1. Refer to specification sheet for Full Load Amps and Wire Sizing Amps.</li> <li>2. Field-supplied room unit main disconnect switch in accordance with local codes ordered as optional equipment and factory-installed in Liebert room unit.</li> <li>3. For remote unit shutdown, replace jumper between 37 &amp; 38 at terminal strip with Normally Closed switch having a minimum 75VA rating.</li> <li>4. Special alarm connection made by adding Normally Open contacts between Terminals 24 &amp; 50, 24 &amp; 51, 24 &amp; 55 and 24 &amp; 56. Only one alarm (between 24 &amp; 50) is available on standard microprocessor.</li> <li>5. Heat rejection interlock is not supplied on chilled water models.</li> <li>6. Field-supplied disconnect switch mounted within sight of condenser/drycooler and in accordance with local codes or ordered as optional equipment and factory-installed in Liebert condenser/drycooler. CDF-065, CDF-083, CDF-086, CDF-097 and CDF-104L are single-phase fan speed condensers. All other condensers and all drycooler and pump packages require a 3-phase line voltage supply.</li> <li>7. Glycol pump package supplied with drycoolers only. Pump 2 is supplied only when dual pump package is ordered.</li> <li>8. Lee-Temp tanks and assembly supplied on air-cooled condensers with Lee-Temp control systems only.</li> </ol>	
Earth ground to ground lug bolt or optional ground bar			
2-wire connection for remote unit shutdown (Note 3)			
2-wire connection for each Special Alarm (Note 4)			
2-wire connection optional SiteScan			
4-pin plug connections for optional remote temperature and humidity sensor			
2-wire connection for common alarm			<p>6-inch pigtails at junction box</p> <p>Terminals 75 &amp; 76 are connected to common alarm relay (K3) NO contact (max 1A at 24V)</p> <p>Wires 70 &amp; 71 are connected to compressor side switches and Econ-O-Coil relay (R5). R5 is provided on FE/UE units only.</p>
2-wire connection for heat rejection interlock (Note 5)			
Remote Heat Rejection Connections		Wire Legend	
2-wire connection plus ground for Lee-Temp heater pads (Note 8)	<p>Diagram is for direct drive air-cooled condensers (for air-cooled units) and direct drive drycoolers (for glycol/GLYCOOL units).</p>	<p>————— Factory-supplied line voltage wiring</p> <p>- - - - - Field-supplied line voltage wiring</p> <p>————— Factory-supplied 24V, NEC Class 2 wiring</p> <p>- - - - - Field-supplied 24V NEC Class 2 wiring</p> <p>- . . . . Field-supplied earth grounding wire</p>	
3- or single-phase line voltage supply to optional main disconnect switch (Note 6)			
Earth Ground			
2-wire connection for heat rejection interlock			
3-wire line voltage connection plus ground for glycol pump. An additional 3-wire line voltage needed for dual pump packages (Note 7).			

**Figure 7 Electrical field connections for downflow chilled water models (except FH599C/FH600C and FH739C/FH740C)**

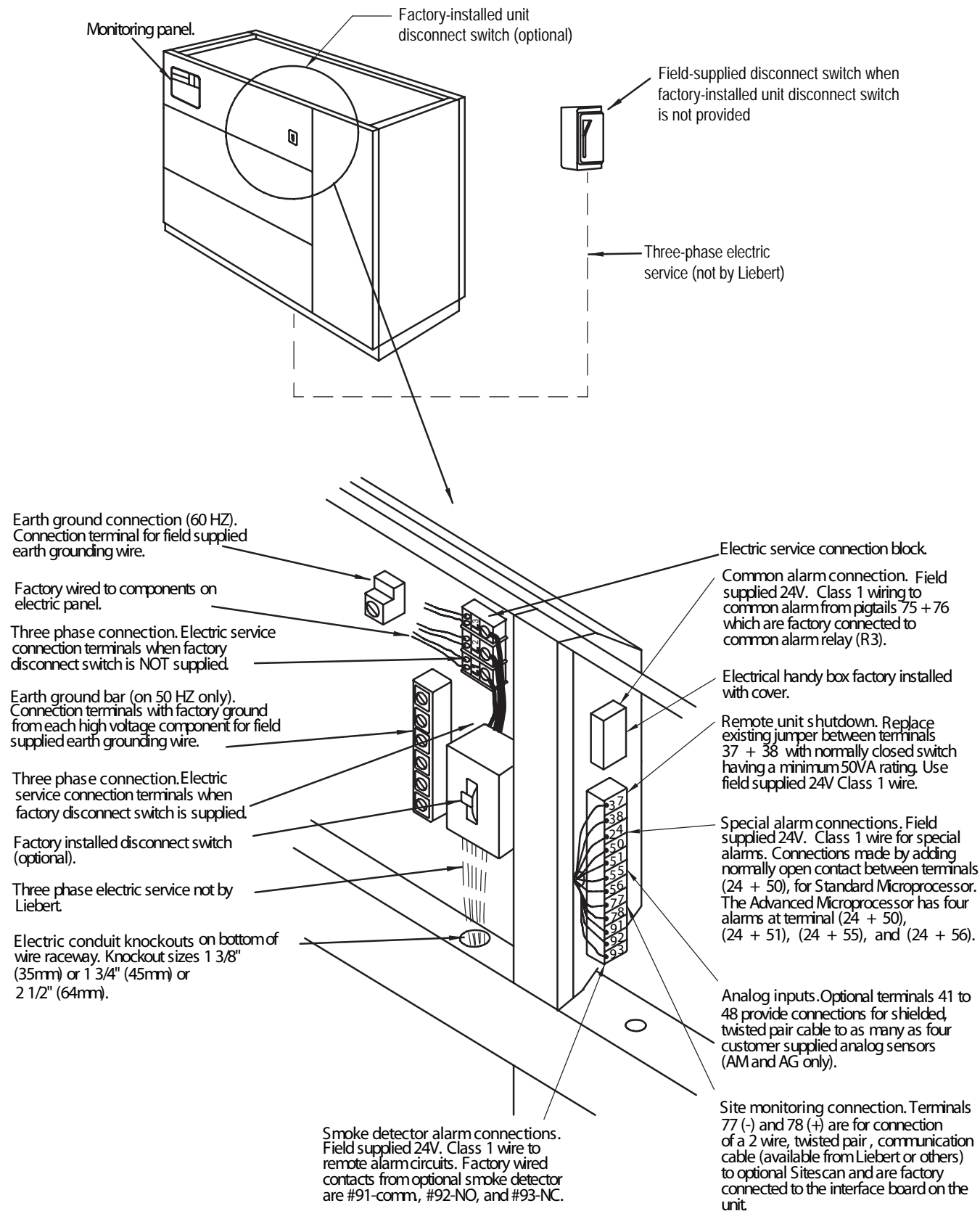


NOTE: Refer to specification sheet for full load amp. and wire size amp. ratings.

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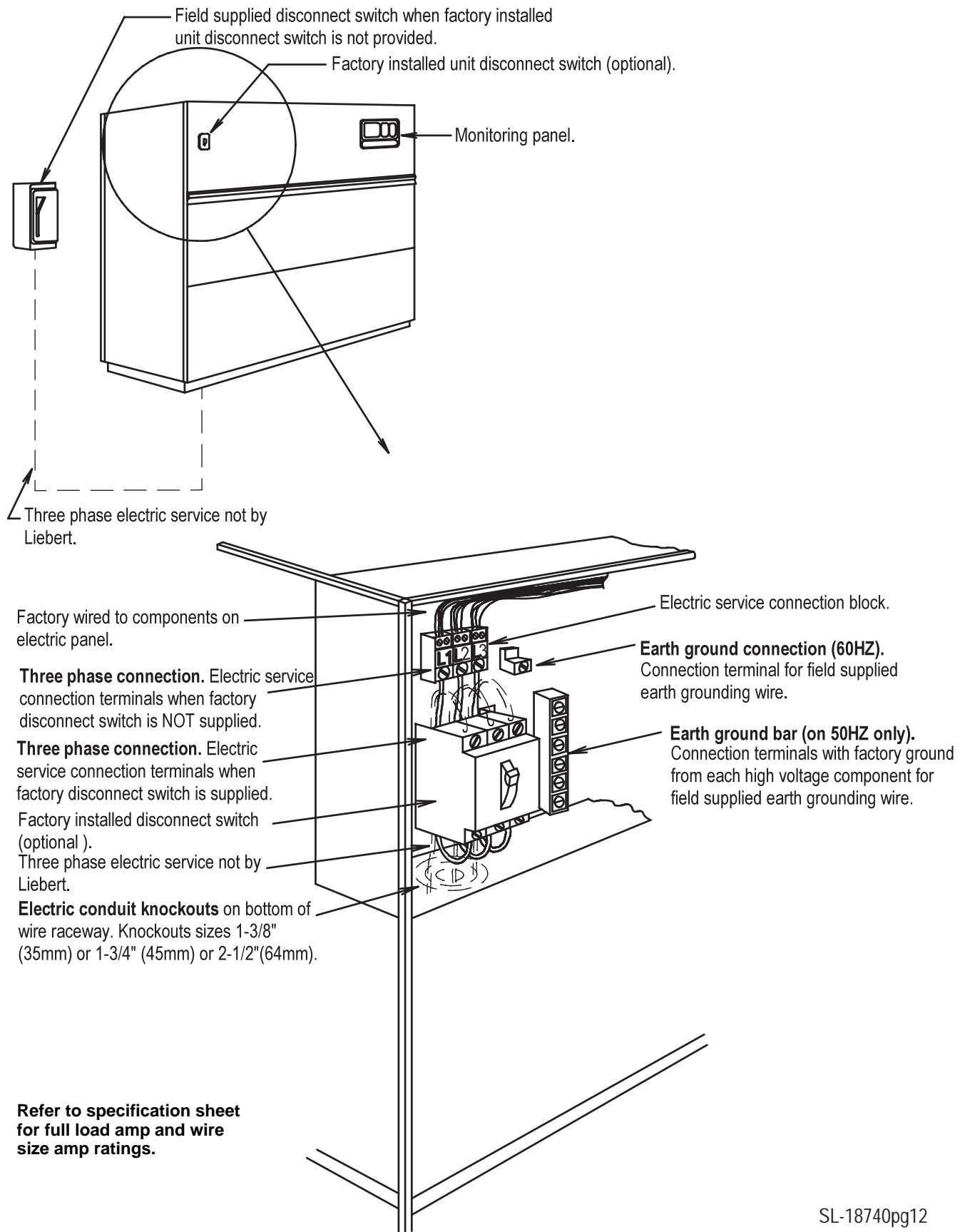
**Figure 8 Electrical field connections for downflow chilled water models FH599C/FH600C and FH739C/FH740C**



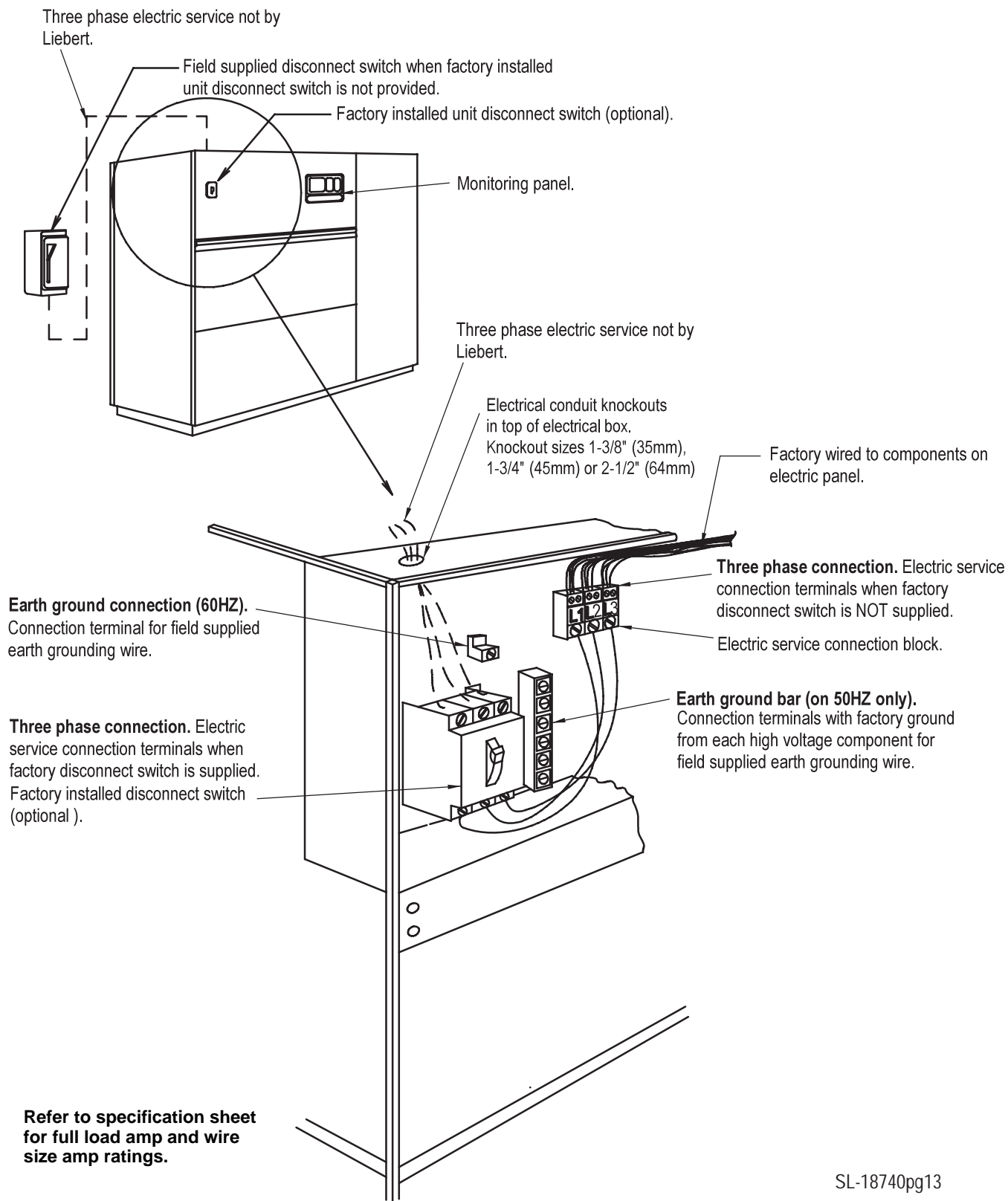
NOTE: Refer to specification sheet for full load amp. and wire size amp. ratings.

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**Figure 9 High voltage electrical field connections for upflow (UH) chilled water models except UH599C, UH600C, UH739C and UH740C**

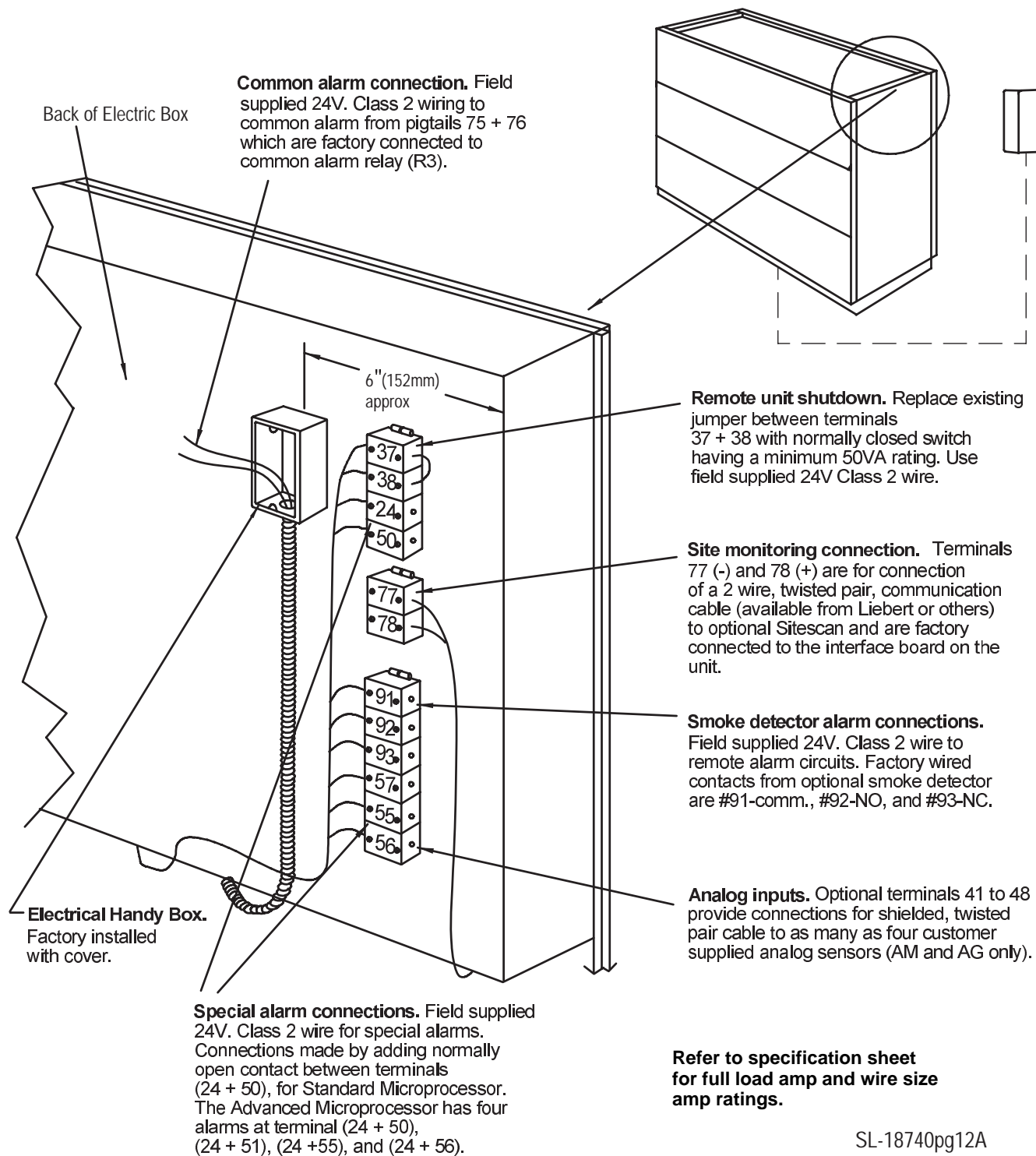


**Figure 10 High voltage electrical field connections for upflow (UH) chilled water models for UH599C, UH600C, UH739C and UH740C (120" frame)**

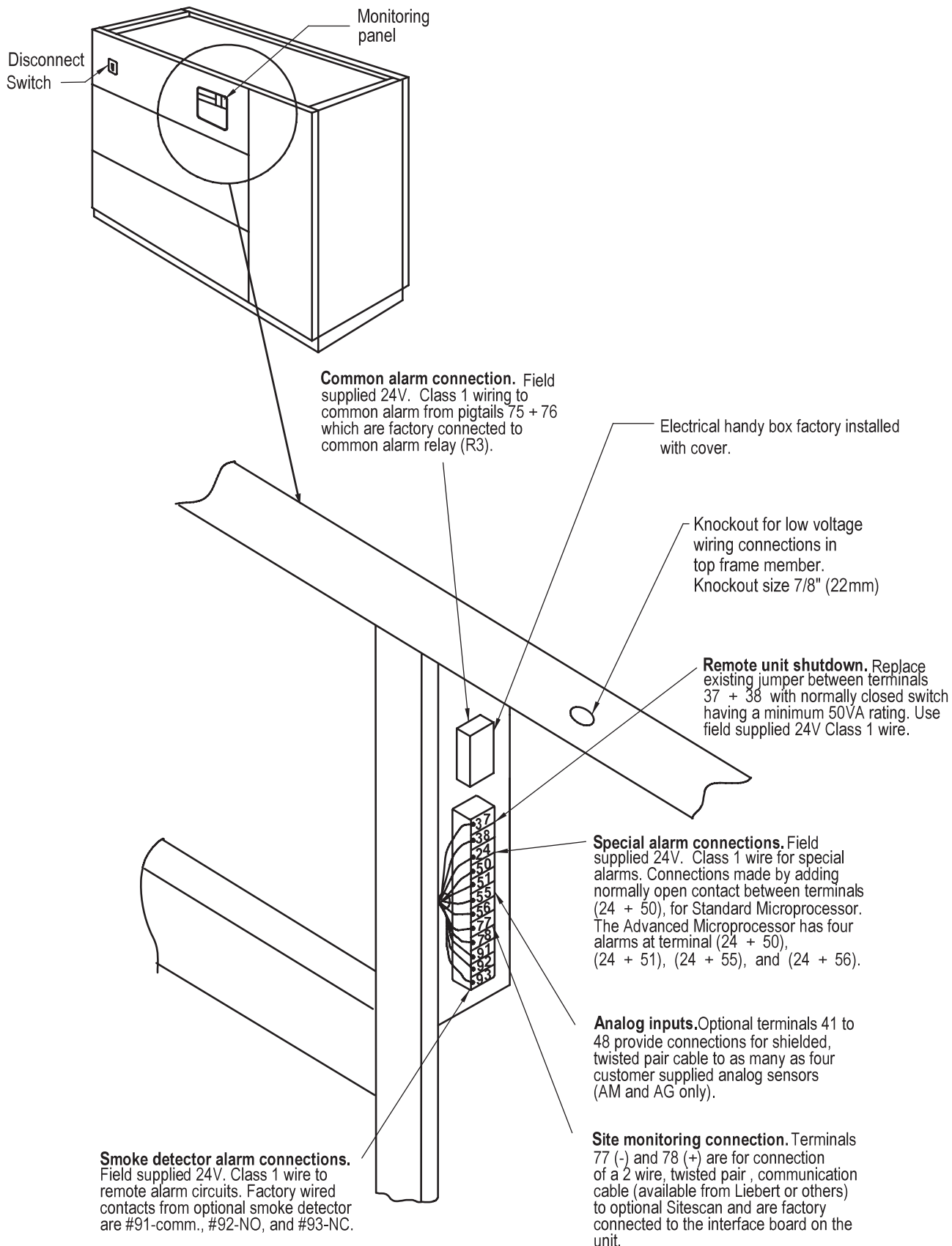


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**Figure 11 Low voltage electrical field connections for upflow (UH) chilled water models except UH599C, UH600C, UH739C and UH740C**



**Figure 12 Low voltage electrical field connections for upflow (UH) UH599C, UH600C, UH739C and UH740C (120" frame) chilled water models**



NOTE: Refer to specification sheet for full load amp and wire size amp ratings.

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## 2.6 Air Distribution Considerations

### 2.6.1 Raised-Floor Air Flow Distribution Considerations

To ensure proper air distribution, any unusual restrictions within the air circuit must be avoided. For under-floor air distribution, observe the following guidelines:

Select the air supply grilles and perforated panels for the raised floor to ensure minimum loss of pressure in the circuit. Air volume dampers on grilles, which extend several inches below the surface of the raised floor, are usually detrimental to airflow. Consideration of the height of the damper on the grille in conjunction with the floor height will determine whether this type of grille may be used.

The grilles used in raised floors vary in size, the largest being approximately 18" x 6" (457 x 152 mm). A larger grille size would be detrimental to the structural capacity of the raised floor panel. An 18" x 6" (457 x 152 mm) heavy-duty pencil proof type grille typically has 56 square inches (0.036 m<sup>2</sup>) of free area. Perforated panels are available from various manufacturers of raised floors. These panels are usually 2' x 2' (610 x 610 mm) square and have a nominal free area of approximately 108 to 144 square inches (0.07 to 0.09 m<sup>2</sup>). Use caution in selecting perforated panels as some manufacturers have only 36 to 40 square inches (0.023 to 0.026 m<sup>2</sup>) of free area, requiring four times as many panels.

Avoid floor elevations below 7-1/2" (190.5 mm), loosely installed flooring systems, and below-floor obstructions such as: electrical wiring chases, unusually long computer system cables, or piping clusters.

All piping below the elevated floor must be located so that it offers the least resistance to air flow. Careful planning of the piping layout under the raised floor is required to prevent the air flow from being blocked. When installing piping on the subfloor, it is recommended that the pipes be mounted in a horizontal plane rather than stacked one above the other. Whenever possible, the pipes should be run parallel to the air flow.

Always check specifications of the floor supplier before specifying the total number of perforated panels and grilles required to handle the air flow. The proper specifications for grilles and perforated panels should indicate the total free area required for air delivery rather than the number of panels and grilles. (See **Table 7** below for recommended free area required for each model.) This table indicates the recommended free area based on having the supply air grilles and perforated panels sized to handle approximately 75% of the total cubic feet per minute (CFM) of the units at a velocity of 550 to 600 ft./min. (2.8 - 3.1 m/s). The remaining 25 percent of the air flow in the raised floor passes through cable cutouts, cracks between the panels and other leakage areas.

**Table 7 Recommended free area ft<sup>2</sup> (m<sup>2</sup>) for grilles or perforated panels at output velocities of 550 and 600 fpm (2.8 and 3.1 m/s)**

	Model FH 60 (50) Hz	550 fpm (2.8 m/s)	600 fpm (3.1 m/s)
<b>Chilled Water Units</b>	147C	7.2 (0.65)	6.6 (0.60)
	200C	8.2 (0.74)	7.6 (0.70)
	248C	8.0 (0.73)	7.4 (0.67)
	302C	12.7 (1.15)	11.6 (1.05)
	376C	12.4 (1.13)	11.4 (1.03)
	422C	17.0 (1.54)	15.6 (1.42)
	529C	16.9 (1.53)	15.5 (1.41)
	600C (599C)	23.3 (2.16)	21.4 (1.95)
740C (739C)	22.5 (2.09)	20.6 (1.89)	

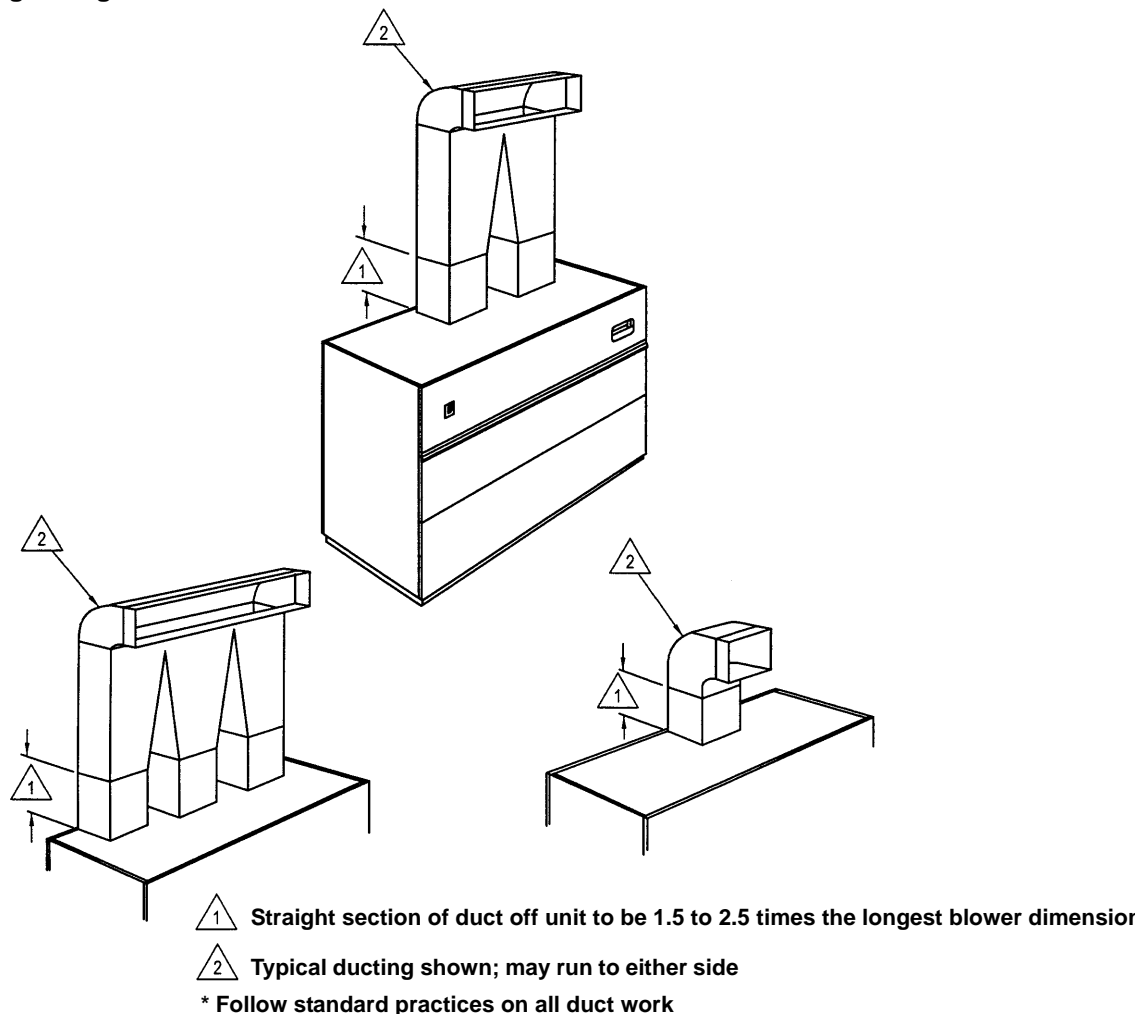
## 2.6.2 Upflow Systems Installation Considerations

Upflow models can be configured in several different ways with front return, rear return, or bottom return and top front supply or top rear supply. For in-room applications with no ductwork, and optional plenum with grill, proper clearance must be maintained on the return air side of the unit. For a front return, this means several feet in front of the unit. For a bottom return, at least 6-8 inches of unrestricted under-floor height is needed.

## 2.6.3 Ducted Application Installation

Duct flanges are supplied on the blower outlets. Follow the SMACNA-Duct Construction Standard for single-, dual-, or triple-blower systems. Do not run ductwork off the perimeter flange on the top of the unit. This flange is for positioning and attaching the optional air discharge plenum with grill. Attaching a duct to this flange may reduce airflow to inadequate levels.

Figure 13 Ducting configurations



## 2.6.4 Plenum Installation

When installing the plenum to the top of system, secure the plenum to the unit flange using sheet metal screws.



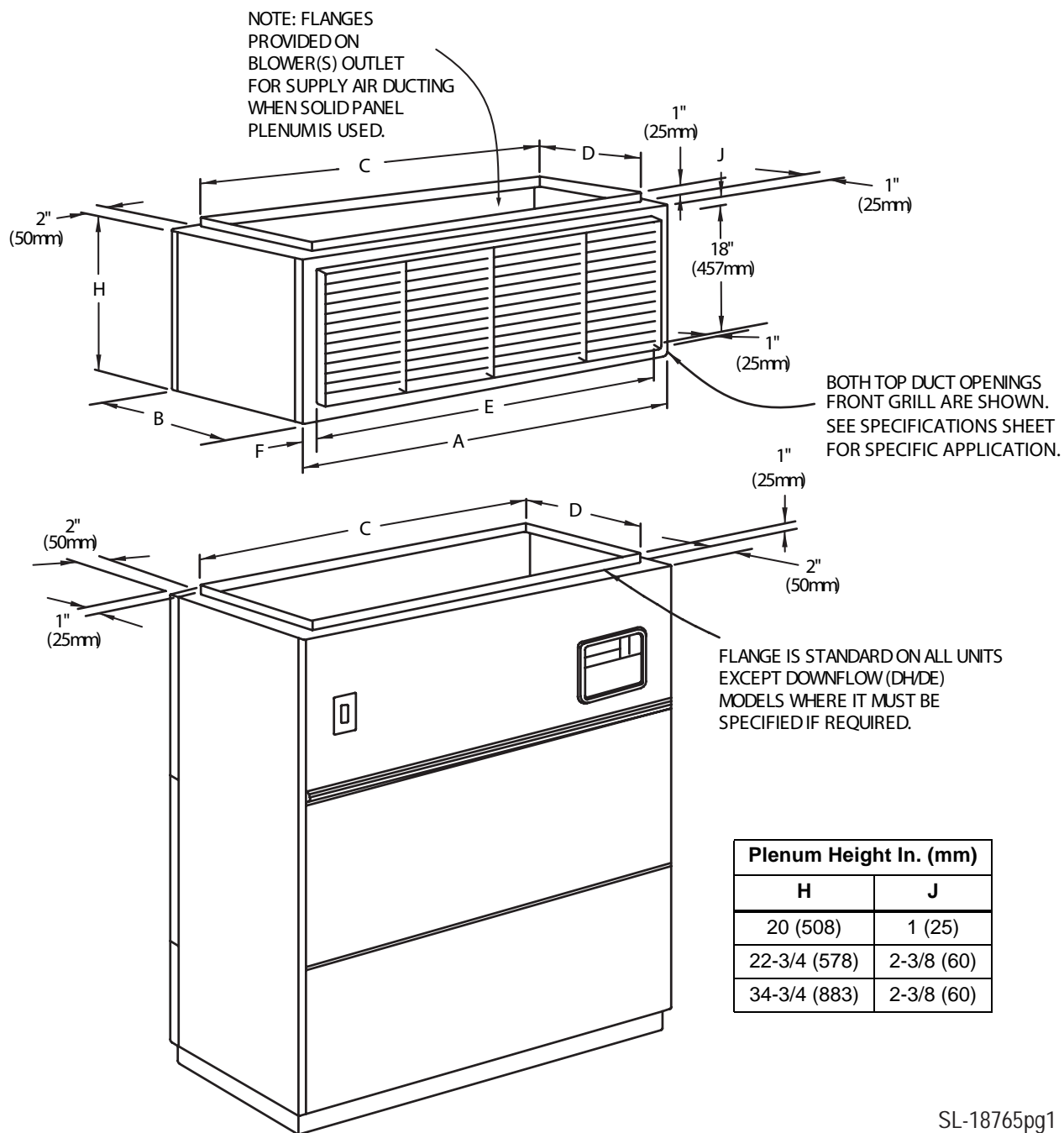
### NOTE

*Air distribution plenums are available as Top Return/Downflow, Top Discharge/Upflow, and Front Discharge (with or without grilles)/Upflow. These plenums are shipped separate and unassembled. Refer to assembly manual included with plenums.*

## 2.6.5 Filter Box Installation (Upflow Rear Return)

When installing the filter box to the back of the unit, secure the box to the unit using self tapping sheet metal screws. Seal around all edges with a silicone sealant to prevent air leakage.

Figure 14 Plenum dimensional data (FH/UH-147C—529C)



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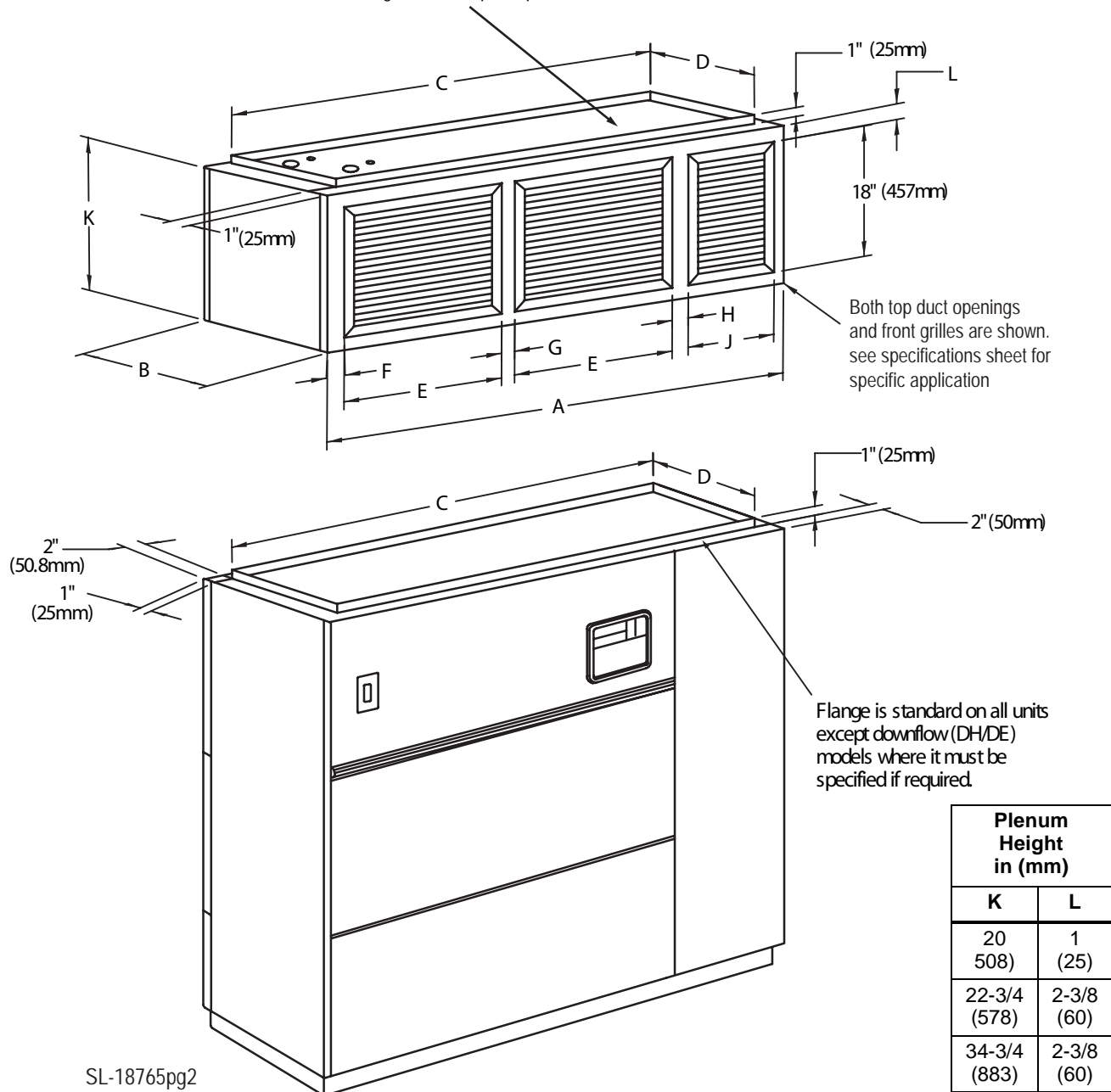
Table 8 Plenum dimensional data in. (mm) for FH/UH-147C—529C

Model	A	B	C	D	E	F	Grille Free Area Sq Ft (sq m)
FH/UH-147C, 200C, 248C	50 (1270)	34 (864)	46 (1168)	32 (813)	44 (1118)	3 (76)	4.29 (.40)
FH/UH-302C, 376C	74 (1880)	34 (864)	70 (1778)	32 (813)	60 (1524)	7 (178)	5.85 (.54)
FH/UH-422C, 529C	99 (2515)	34 (864)	95 (2413)	32 (813)	70 (1778)	14-1/2 (368)	6.83 (.63)



**Figure 15 Plenum dimensional data (FH/UH-599C—740C)**

NOTE: Flanges provided on blower(s) outlet for supply air ducting for supply air ducting when solid panel plenum is used.



**Table 9 Plenum dimensional data in. (mm) for FH/UH-599C—740C**

Model	A	B	C	D	E	F	G	H	J	Grille Free Area Sq Ft (sq m)
FH/UH-599C, 600C FH/UH-739C, 740C	122 (3099)	34 (864)	118 (2997)	32 (813)	44 (1118)	3-1/2 (89)	4 (102)	7 (178)	16 (406)	10.14 (.94)

### 3.0 CHILLED WATER MODELS

#### 3.1 Piping Considerations

Manual shut-off valves should be installed at the supply and return lines to each unit. This provides for routine service and emergency isolation of the unit.

The lowest water temperature to be supplied by the chiller will determine whether insulation is needed to prevent condensation on the supply and return lines. To prevent water damage to flooring and subflooring, install a water detection system, such as a Liqui-tect or floor drains with wet traps.

Figure 16 Chilled water upflow general arrangement

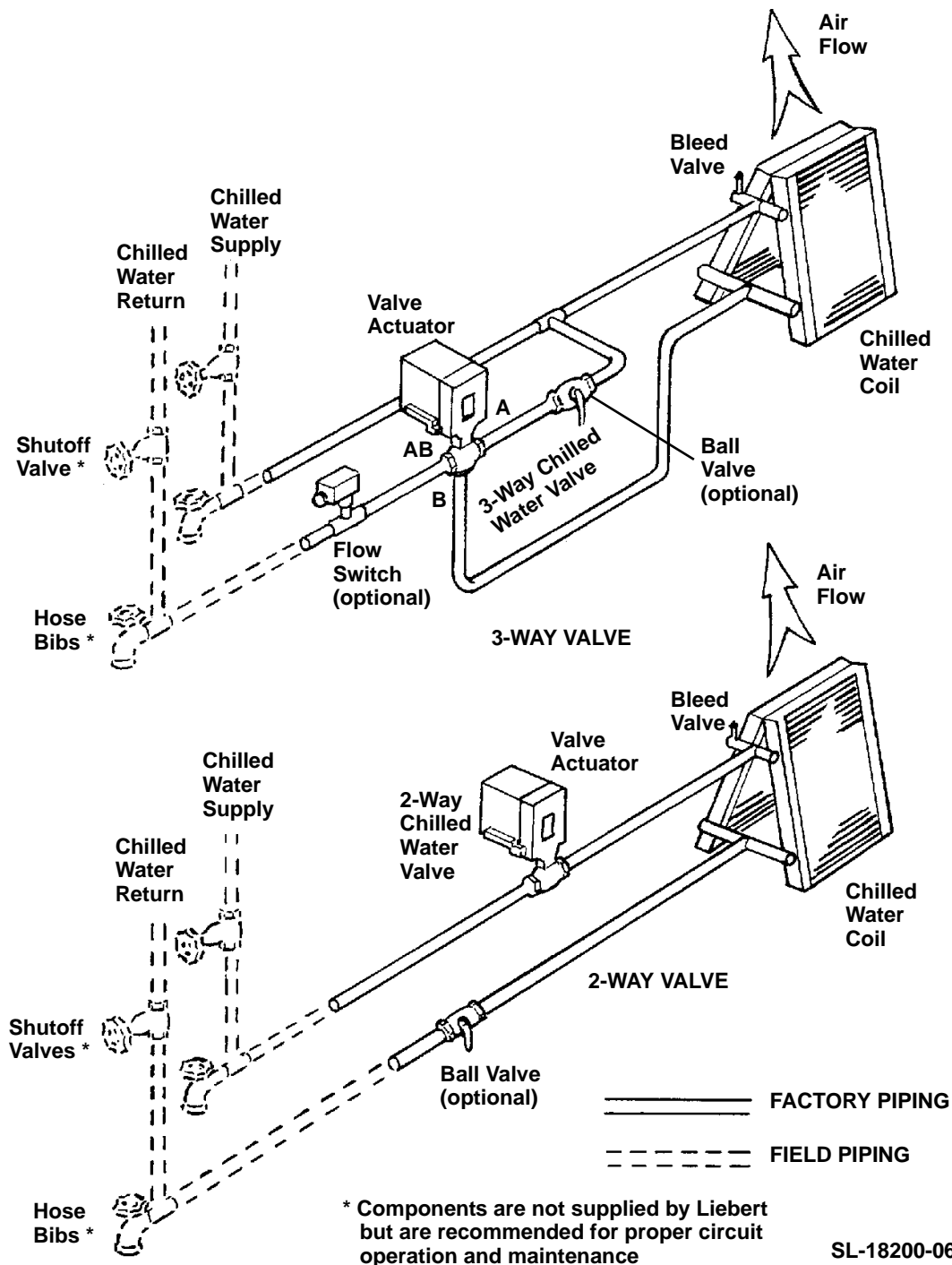
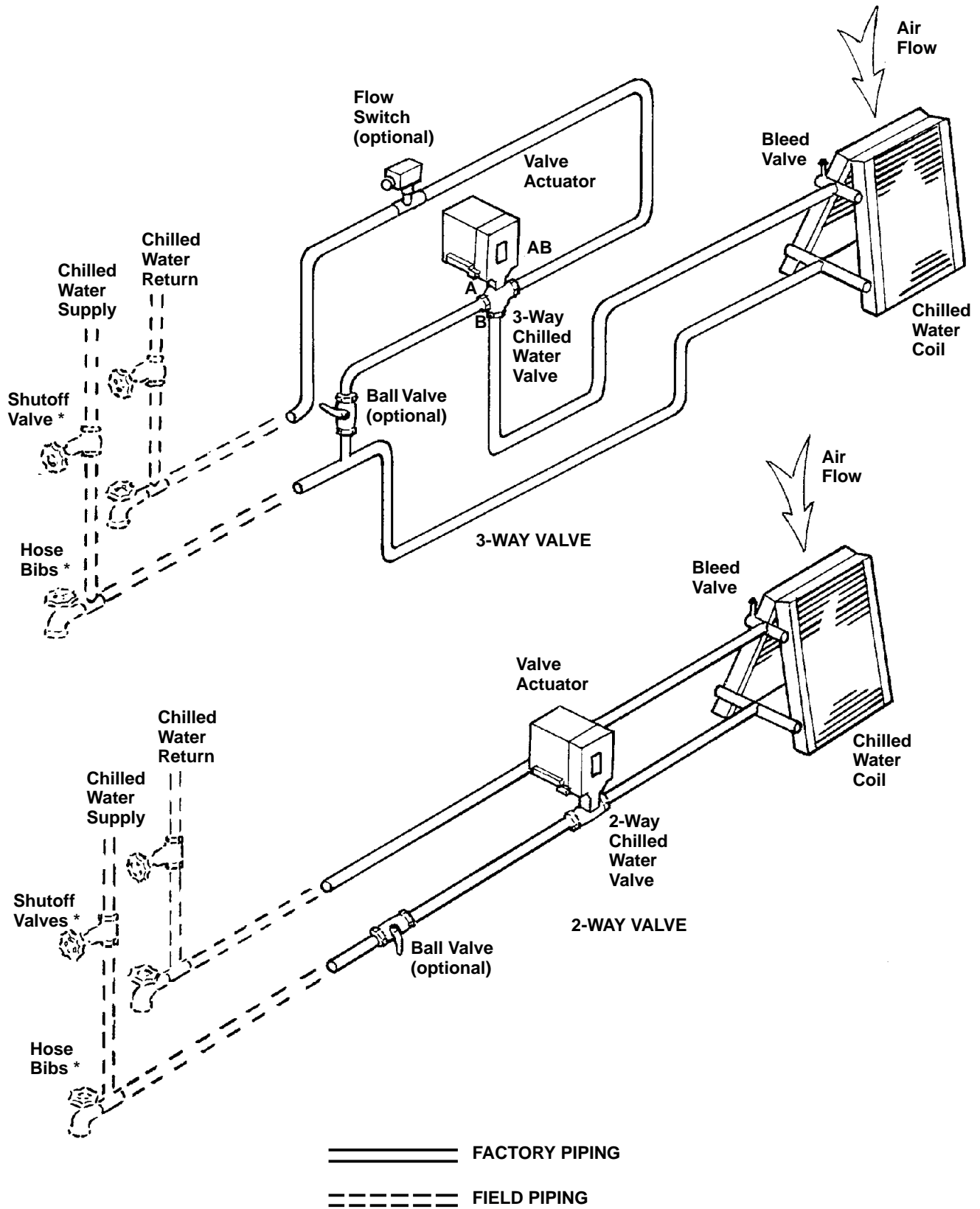
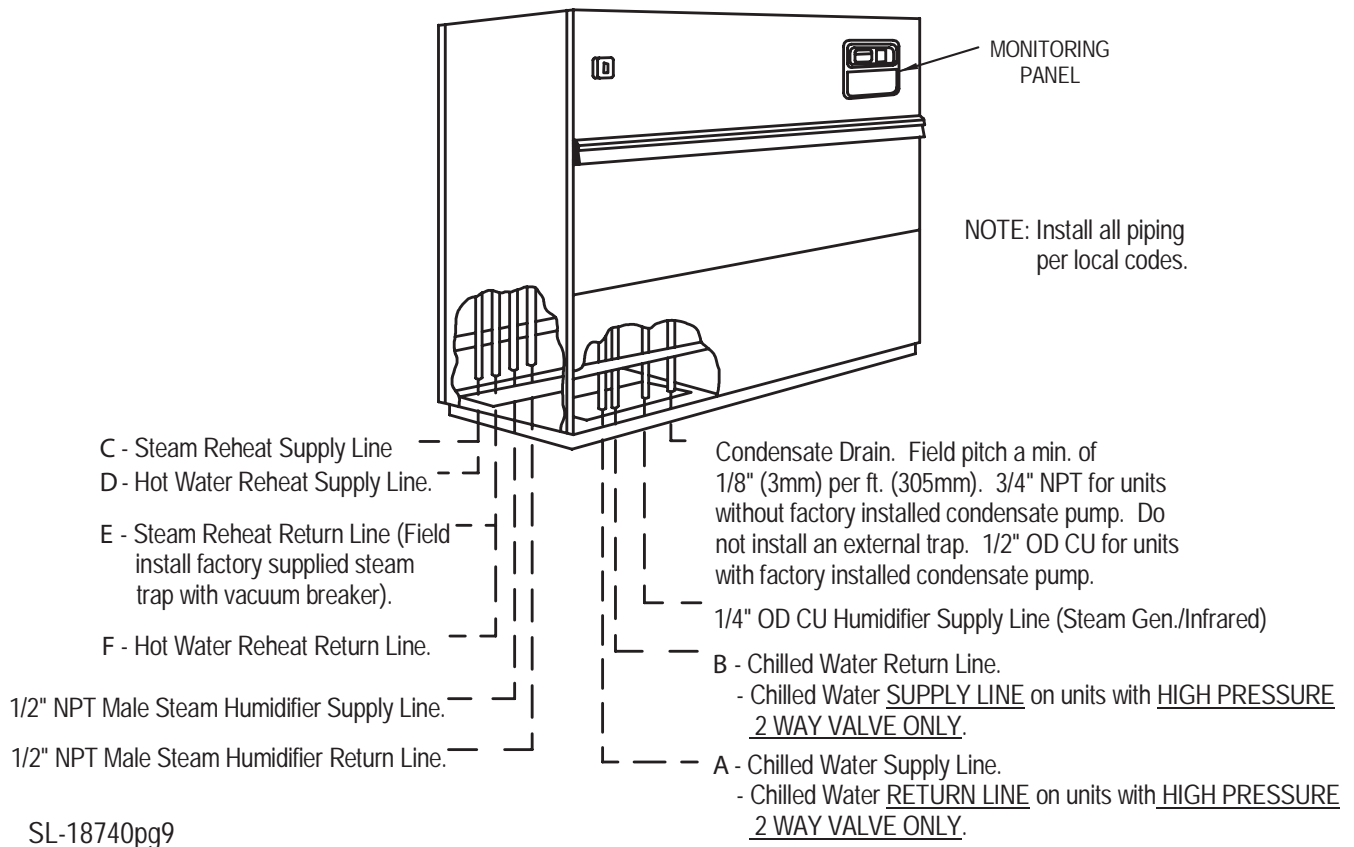


Figure 17 Chilled water downflow general arrangement



\* Components are not supplied by Liebert but are recommended for proper circuit operation and maintenance

Figure 18 Downflow chilled water (FH) piping connections



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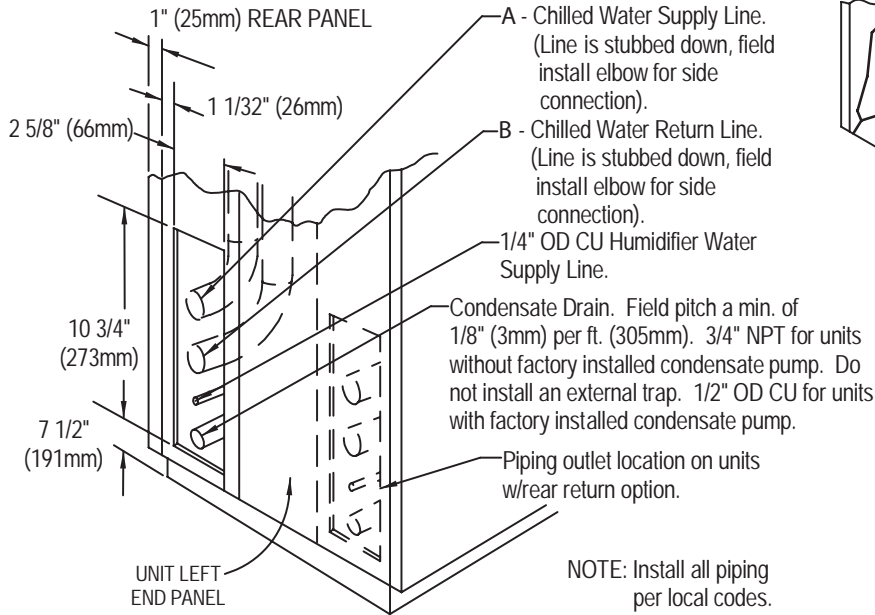
Table 10 Downflow chilled water cooled (FH) piping connection sizes, inches

Chilled Water Models	A (OD Cu)	B (OD Cu)	C (NPT Male)	D (OD Cu)	E (NPT Male)	F (OD Cu)
FH147C	1-1/8	1-1/8	1/2	5/8	1/2	5/8
FH200C	1-3/8	1-3/8	1/2	5/8	1/2	5/8
FH248C	1-5/8	1-5/8	1/2	5/8	1/2	5/8
FH302C	1-5/8	1-5/8	1/2	7/8	1/2	7/8
FH376C	2-1/8	2-1/8	3/4	7/8	3/4	7/8
FH422C	2-1/8	2-1/8	3/4	7/8	3/4	7/8
FH529C	2-1/8	2-1/8	3/4	7/8	3/4	7/8

**Figure 19 Upflow chilled water (UH) piping connections except 599C, 600C, 739C and 740C**

**UNIT FIELD PIPING LOCATIONS**

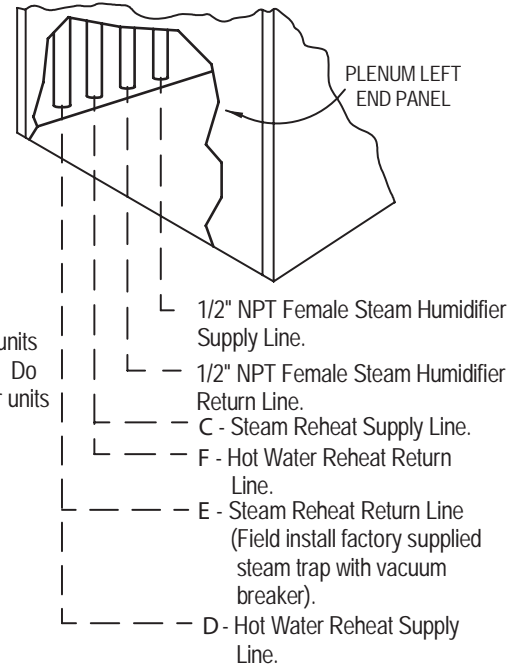
Piping stubbed out inside unit end compartment for field connection through 2 5/8" x 10 3/4" (66 x 273mm) opening as shown. Piping may also exit through bottom or top of end compartment by field cutting an opening in a suitable location (except bottom return air units).



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**PLENUM FIELD PIPING LOCATIONS**

For separate steam or hot water plenum in UPFLOW (UH) units, piping may exit through bottom, top or sides by field cutting an opening in a suitable location.



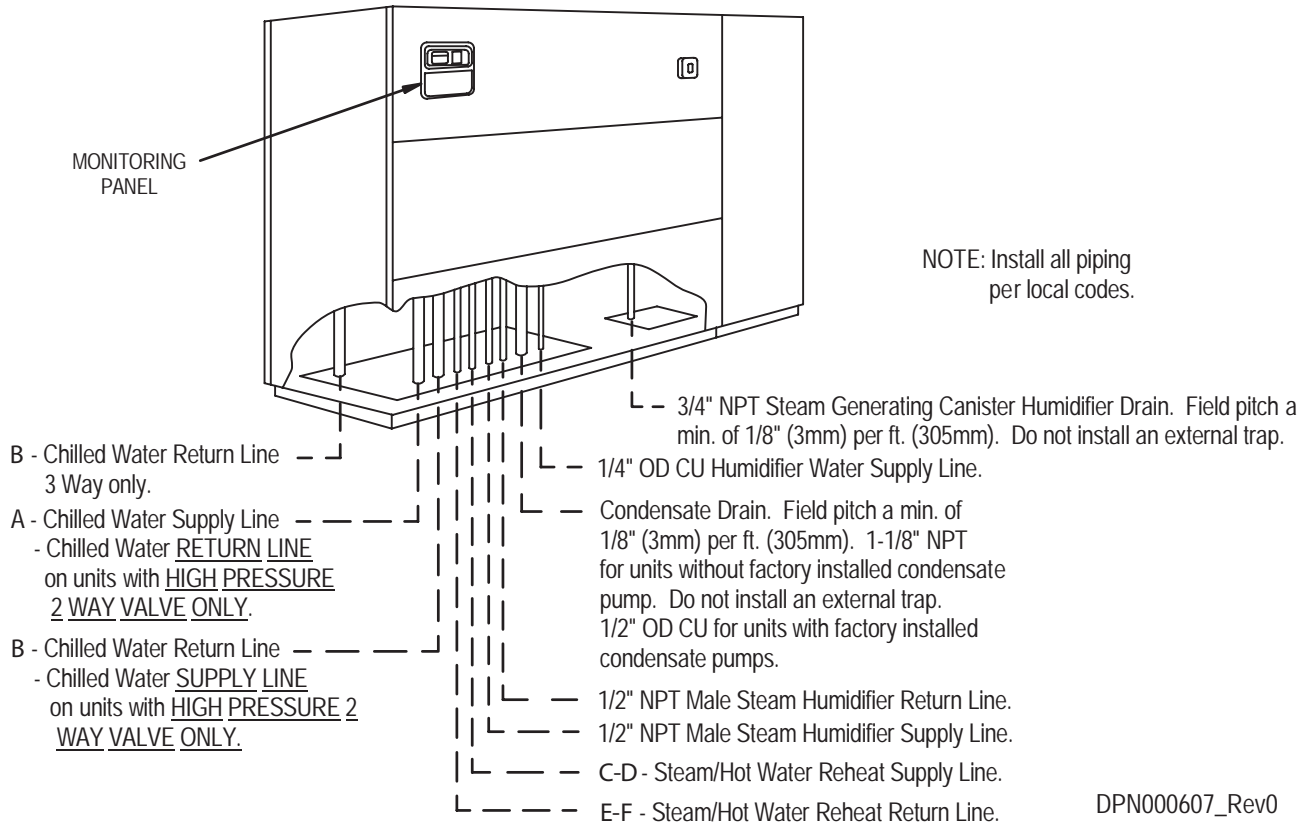
**Table 11 Upflow chilled water cooled (UH) piping connection sizes, inches**

Chilled Water Models 50 & 60 Hz	A (OD Cu)	B (OD Cu)	C (NPT Male)	D (OD Cu)	E (NPT Male)	F (OD Cu)
UH147C	1-1/8	1-1/8	1/2	5/8	1/2	5/8
UH200C	1-3/8	1-3/8	1/2	5/8	1/2	5/8
UH248C	1-5/8	1-5/8	1/2	5/8	1/2	5/8
UH302C	2-5/8	2-5/8	3/4	7/8	1/2	7/8
UH376C	2-1/8	2-1/8	3/4	7/8	3/4	7/8
UH422C	2-1/8	2-1/8	3/4	7/8	3/4	7/8
UH529C	2-1/8	2-1/8	3/4	7/8	3/4	7/8

**Figure 20 Downflow chilled water (599C, 600C, 739C and 740C) piping connections**

**UNIT CONNECTION LOCATIONS**

(See Cabinet And Floor Planning  
Dimensions For Piping Opening Sizes.)



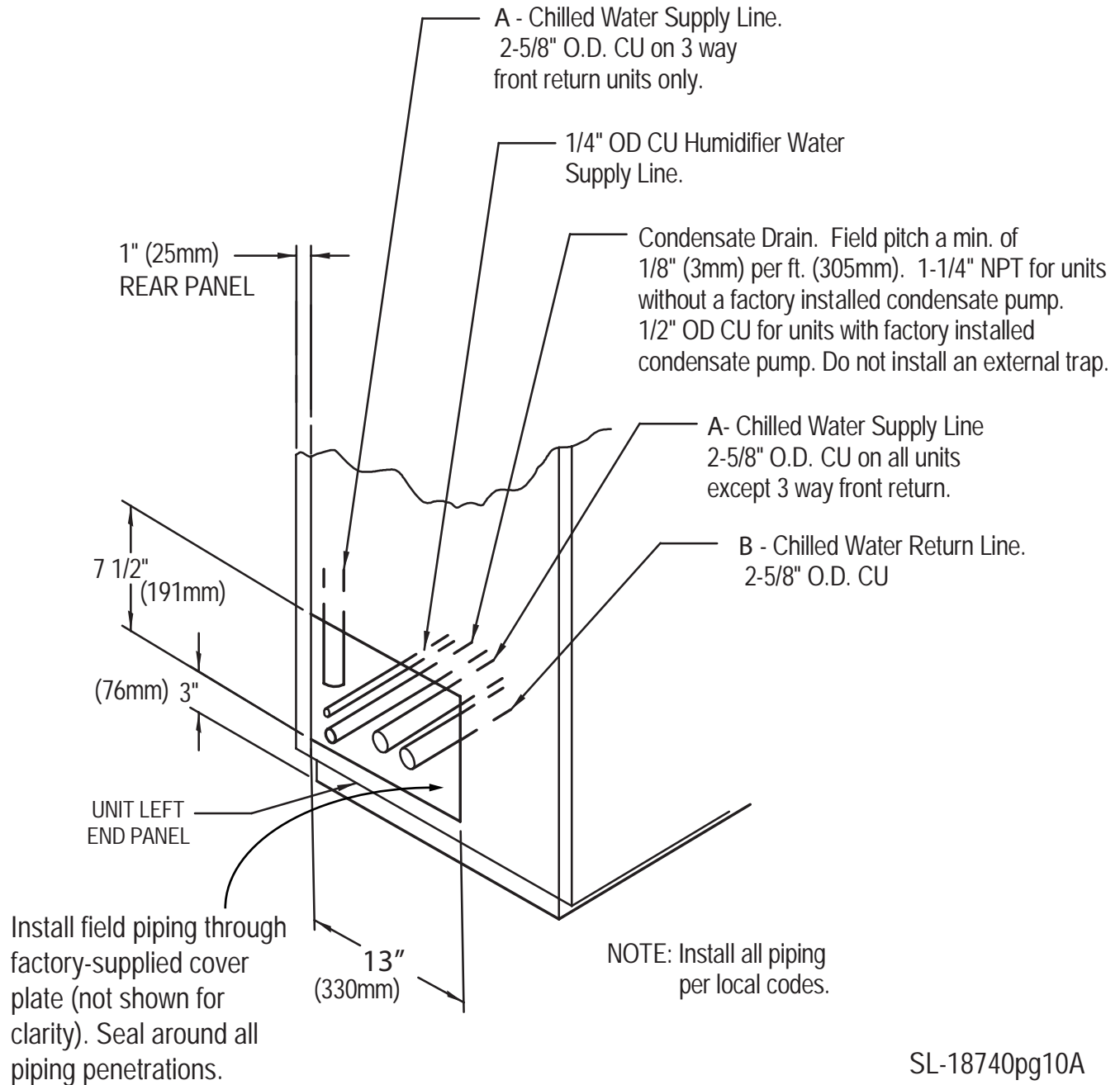
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**Table 12 Downflow chilled water cooled (FH, 120" frame) piping connection sizes, inches**

120" Frame Chilled Water	A (OD CU)	B (OD CU)	C (NPT Male)	D (OD CU)	E (NPT Male)	F (OD CU)
FH599C, 600C	2-1/8	2-1/8	3/4	7/8	3/4	7/8
FH739C, 740C	2-5/8	2-5/8	3/4	7/8	3/4	7/8

**Figure 21 Upflow chilled water (599C, 600C, 739C and 740C) piping connections**

Piping stubbed out inside unit end compartment for field connection through 13" x 6-1/2" (330 x 165mm) opening as shown. Piping may also exit through bottom of end compartment by field cutting an opening in a suitable location.



SL-18740pg10A











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