

■ Precision Cooling
For Business-Critical Continuity

Liebert PEX

Technical Data Manual - Small Frame



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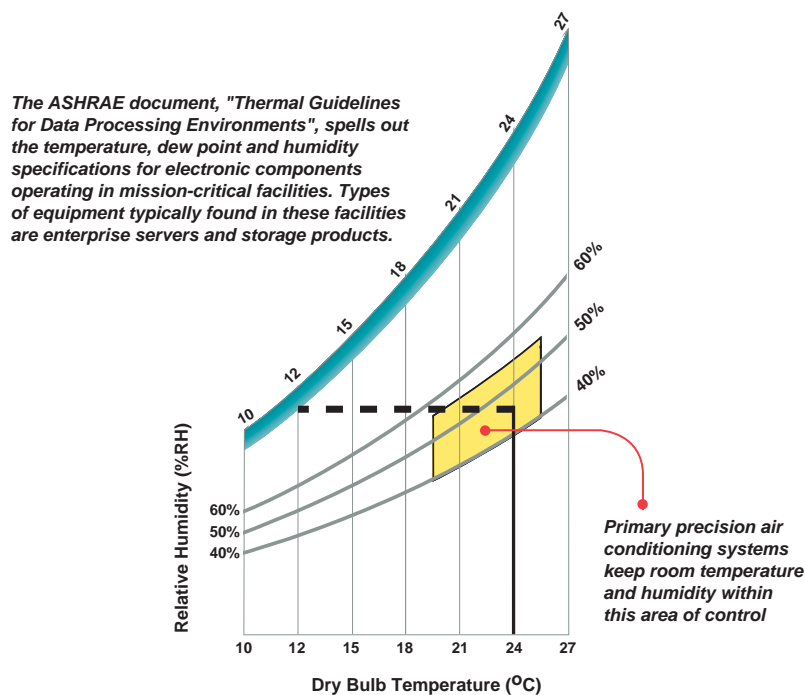
Introduction

The Liebert PEX is the next generation precision air conditioning system from Emerson Network Power. The PEX is the latest in a long line of advanced products from the Liebert family designed to support business-critical applications.

Sensitive electronics must be maintained in a stable environment of 20°C to 25°C (68°F to 77°F) with a relative humidity of 40% to 55%. Precision air conditioning systems must not only keep room conditions within this range, they must have the precision to react quickly to a drastic change in heat load and prevent wide temperature fluctuations.

Liebert PEX units are specifically developed for applications requiring close environmental control:

- Data Centres
- Telecom/CATV
- Computer Rooms
- Labs and Test Rooms
- Network Centres
- Production Facilities



The PEX Advantage

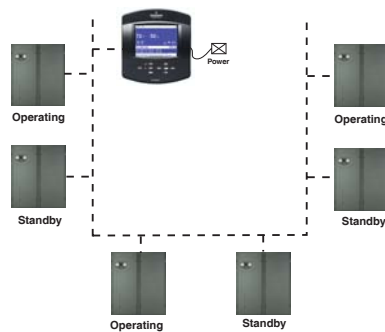
Only the Liebert PEX can give you all these advantages:

- *Comprehensive local support.*
Full pre-sales and post-sales support is readily available, anytime you need it.
- *Customisation expertise.*
PEX units can be customised to suit your requirements, with expertise and assistance from local R&D and Engineering teams.
- *Full Service capability*
Factory-trained Customer Engineers provide backup support 24 x 365.
- *Established company*
Emerson Network Power has been designing and manufacturing precision environmental control systems for over 30 years.

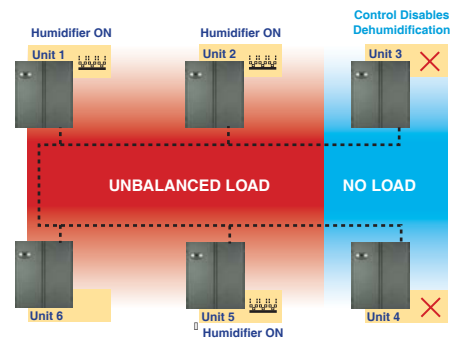
Features and Benefits

iCOM - Intelligent Communications and Monitoring

The Liebert iCOM™ control system offers the highest capabilities of unit control, communication and monitoring of Liebert mission-critical cooling units. Liebert iCOM provides advanced diagnostic and maintenance support, enabling multiple units to communicate and work together as a team to precisely control temperature and humidity across a room. In addition, the iCOM network provides a choice of Teamwork, Lead/Lag and Cascade functions.



Unit to Unit Configuration



Teamwork Mode

SlabEvaporator Coils

- High efficiency slab heat exchanger design for precise control of cooling and dehumidification
- Large face area cooling coil to maximise heat transfer efficiency
- Double-angle condensate trays ensure correct water drainage and are removeable for service

High Sensible Heat Ratio (SHR)

- All models operate high sensible heat ratios to match the low latent loads of modern computer rooms and telephone exchanges etc.
- With low latent capacity, little moisture is removed from the air so that humidity levels can be maintained without extra humidification, thereby ensuring lower energy consumption

High/Constant Airflow

- High airflow achieves favourable sensible heat ratios and provides maximum air change rate to ensure variations in room load are quickly detected and responded to
- Airflow is constant under all operating modes, including dehumidification, providing even air distribution across the room resulting in optimal temperature and humidity control

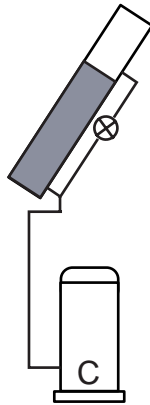
Footprint & Serviceability

- High kW to footprint ratio
- Front accessible for installation and routine servicing
- Front doors are removeable, offering improved service access to the unit internals

Features and Benefits

DX Systems - Dehumidification Cycle

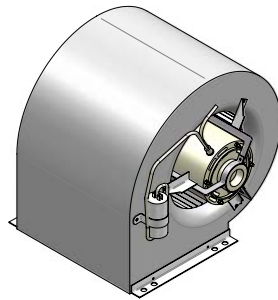
- Compressorised models employ split coil configurations, allowing latent cooling capacity to be substantially increased but only as required so that energy consumption is minimised whilst providing close temperature and humidity control. Room loads as low as 50% of unit cooling capacity can be supported with standard reheat.
- Smaller heater size and unit full load amps (FLA) lowers electrical connection requirements and reduces installation costs



Split-Coil Dehumidification

Direct Drive Fan

- Forward curved double width double inlet (DWDI) centrifugal fans coupled to high efficiency motors are standard on all models
- Insulated static regain ducts in floor discharge models reduce noise, turbulence and increase fan efficiency



Direct Drive System

Electric Heaters

- Single stage electric reheat system (2nd stage optional) employing low watt density, fin-tubular elements
- Optional Reheat/Humidifier lockout - reduces power requirements during emergency power operation

Dual Refrigerant Offering

All compressorised models are designed to operate on either HCFC R22 or HFC R407C refrigerants

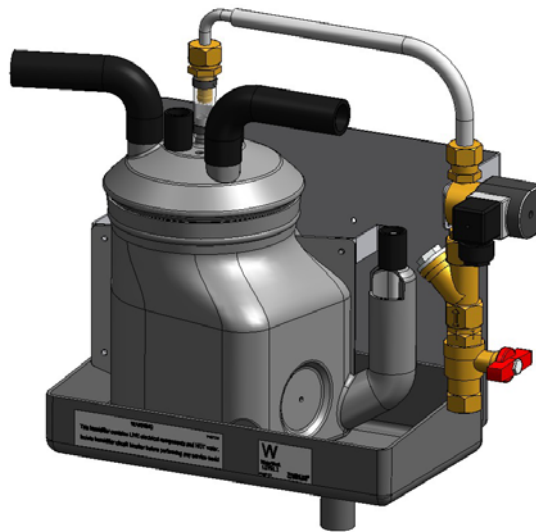


Choice of Refrigerants

Features and Benefits

Immersed Electrode Humidifier

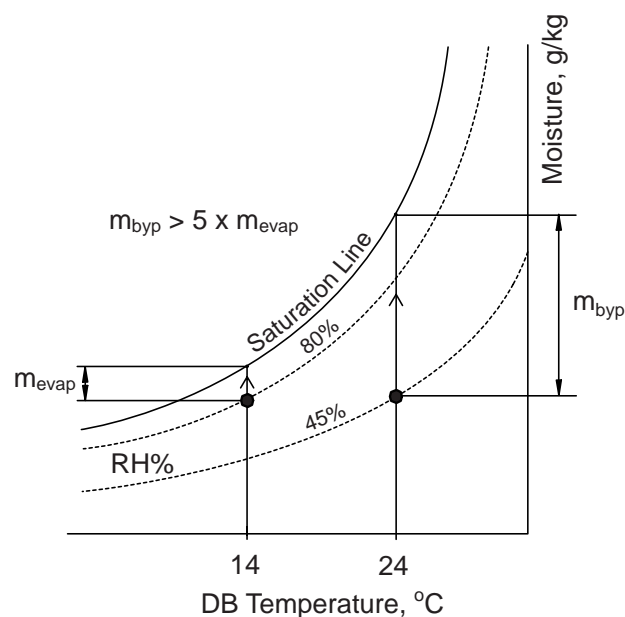
- Direct acting electrodes configurable for wide ranging water quality
- Fail safe operation (electrodes will not function without water)
- Water vapour introduced into coil bypass air avoids condensation
- Unique overflow flush cycle avoids problems associated with normal dump/drain valves
- Fully serviceable design ensures quick and cost effective maintenance
- Approved for direct connection to potable water supplies



Immersed Electrode Humidifier

Why is Bypass Air Introduction Important ?

From a psychrometric standpoint, return air at 24°C/45%RH has more than 5 times the capacity to absorb steam compared to air at 14°C/80%RH that has already been cooled by the evaporator and is now close to saturation. The capacity of this cool air to absorb water vapour is limited and can result in water condensing within the air unit and surrounding areas. Bypass air introduction of water vapour is a more efficient method of humidification.



Model Designation

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
	P	1	0	1	5	F	A	P	M	L	1	S	0	0	0
Product Range P = PEX															
No. Modules - Bays/Fans 1 = One 2 = Two															
Nominal kW 10 to 45															
Air Path F = Downflow (Forward Curve) U = Upflow (Forward Curve)															
Cooling Type A = Air Cooled W = Water Cooled C = Chilled Water															
Cooling Control P = R-22, scroll, 1 compressor Z = R-407C, scroll, 1 compressor 2 = 2 way CWV (CW, zero compressors) 3 = 3 way CWV (CW, zero compressors)															
Voltage M = 400/3/50															
iCOM Display S = Small Graphics Display L = Large Graphics Display															
Reheat Type 0 = None 1 = 1 Stage 2 = 2 Stage															
Humidification 0 = None S = Immersed Electrode															
Factory Configuration Number A-Z = Options A-Z = Options A-Z = Options															

PEX Downflow and Upflow Units Air/Water Cooled 50Hz

Model Size	1010	1015	2020	2025
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Rated Unit Performance R-22 and R-407C ⁽¹⁾ Downflow Units

24°C DB, 17.1°C WB (75.2°F DB, 62.8°F WB) 50% RH				
Total kW	8.0	11.0	16.7	21.0
BTUH	27,300	37,500	57,000	71,700
Sensible kW	6.9	9.7	14.5	20.6
BTUH	23,500	33,100	49,500	70,300

24°C DB, 16.3°C WB (75.2°F DB, 61.3°F WB) 45% RH

Total kW	7.7	10.8	16.0	21.3
BTUH	26,300	36,800	54,600	72,700
Sensible kW	7.4	10.4	15.3	21.1
BTUH	25,200	35,500	52,200	72,000

Rated Unit Performance R-22 and R-407C ⁽¹⁾ Upflow Units

24°C DB, 17.1°C WB (75.2°F DB, 62.8°F WB) 50% RH				
Total kW	7.9	10.8	16.2	20.8
BTUH	27,000	36,800	55,300	71,000
Sensible kW	6.7	8.9	13.9	18.8
BTUH	22,900	30,400	47,400	64,100

24°C DB, 16.3°C WB (75.2°F DB, 61.3°F WB) 45% RH

Total kW	7.6	10.5	15.9	20.4
BTUH	25,900	35,800	54,300	69,600
Sensible kW	7.2	9.5	14.9	20.1
BTUH	24,600	32,400	50,800	68,600

Evaporator Fan - Forward curve centrifugal fan, direct drive

Size	10-10			
No. of fan assemblies	1	1	2	2
Static Regain duct	Downflow units			
Std. Motor - kw (HP)	0.75 (1.0)			
Downflow Airflow - l/s	940	1,070	1,880	2,140
CFM	2,000	2,270	3,990	4,540
Upflow Airflow - l/s	860	850	1,720	1,700
CFM	1,830	1,800	3,650	3,610

Evaporator Coil - Copper tubes with rifled bore tubes, louvred aluminium fins

No. of rows	2	3	2	4
Fin series - FPM	551	551	551	512
FPI	14	14	14	13

Compressor - Copeland Compliant Scroll with Crankcase Heater

No. of compressors	1	1	1	1
Unit cooling steps	2	2	2	2
Safety controls - kPa psig	LP cutout/in (auto reset) 140/420, HP cutout (manual reset) 2800 LP cutout/in (auto reset) 20/60, HP cutout (manual reset) 400			

Humidifier - Immersed Electrode, Cleanable

Capacity - kg/h	3.3	3.3	4.5	4.5
lb./hr	7	7	10	10
Input power - kW	2.5	2.5	3.3	3.3

Reheat - Single stage, low watt density, fin tubular electric elements

Capacity - kW	6	6	6	6
Opt. 2nd stage - kW	6	6	6	6

PEX Downflow and Upflow Units Air/Water Cooled 50Hz

Model Size	1010	1015	2020	2025
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Filter - Dry media disposable G4 to AS/NZS1324.1 (MERV 8 to ASHRAE 52.2)				
Downflow - mm (in)	760x460x100 (30x18x4)			
Qty	1	1	2	2
Upflow - mm (in)	650x590x75 (25.5x23x3)			
Qty	1	1	2	2

Full Load Current - 400 Volts, 3 phase+N+E, 50 Hz Supply ⁽²⁾				
Standard Unit - Amps	20.6	22.0	26.3	26.3

Water Cooled Condenser - 316SS Brazed Plate Heat Exchanger - 2 Way ⁽³⁾					
Valve Size	3/4"	3/4"	1"	1"	
Water	Flow ⁽⁴⁾ - l/s	0.42	0.59	0.90	1.11
	GPM	6.7	9.4	14.3	17.6
	PD - kPa	16	14	22	28
	ft. H ₂ O	5.4	4.7	7.4	9.4

Unit Connections					
A	Hot Gas - O.D.	1/2"	5/8"	3/4"	3/4"
	Qty	1	1	1	1
	Liquid - O.D.	1/2"	1/2"	1/2"	1/2"
W	Qty	1	1	1	1
	Supply - I.D.	7/8"	7/8"	1-1/8"	1-1/8"
	Qty	1	1	1	1
	Return - O.D.	7/8"	7/8"	1-1/8"	1-1/8"
	Qty	1	1	1	1
	IE Hum. Drain - O.D.	25	25	25	25
Hum. Supply - BSP	1/2"	1/2"	1/2"	1/2"	

Unit Dimensions & Weight				
Width - mm	832	832	1662	1662
	in.	33	33	65
Depth - mm	550	550	550	550
	in.	21.7	21.7	21.7
Height - mm	1950	1950	1950	1950
	in.	77	77	77
Weight - kg	170	180	260	270
	lbs	374	396	572

Unit Footprint				
Unit only - m ²	0.46	0.46	0.91	0.91
	ft ²	4.9	4.9	9.8
Incl. Service area - m ²	1.16	1.16	2.33	2.33
	ft ²	12.5	12.5	25.0
Serv. Access - mm (in)	850 (33.5) front only			

NOTES:

- (1) All capacities are nominal values. Gross capacity based on 25Pa (0.1" H₂O) ESP, 0m a.s.l. For net capacities, deduct fan input power. Refer Liebert Rating Program for specific input conditions.
- (2) Input power supply +/-15%. FLA excludes heat rejection equipment. Refer IOM for electrical data on optional equipment.
- (3) Standard pressure water regulating valve (WRV) 1,000 kPa. Optional 2 way high pressure WRV (2,400 kPa) available.
- (4) Nominal flow & pressure drop figures are for total unit. Based upon 24°CDB/50%RH, 30°C EWT & 35.5°C LWT, R22 refrigerant

PEX Downflow and Upflow Units Chilled Water 50Hz

Model Size	Downflow	1015	2020	2030	2040
	Upflow	1015	2020	2030	N/A

Rated Unit Performance ⁽¹⁾ Downflow Units

24°C DB, 17.1°C WB (75.2°F DB, 62.8°F WB) 50% RH

Based on 7°C (44.6°F) EWT, 12.5°C (54.5°F) LWT

Total kW	13.2	27.1	36.8	48.4
BTUH	45,000	92,500	125,600	165,100
Sensible kW	12.1	22.5	30.4	36.6
BTUH	41,300	76,800	103,700	124,900
Flow - l/s	0.57	1.18	1.60	2.10
GPM	9.0	18.7	25.4	33.3
Pressure Drop - kPa	49	124	122	167
ft. H ₂ O	16.4	41.5	40.9	55.9

24°C DB, 16.3°C WB (75.2°F DB, 61.3°F WB) 45% RH

Based on 7°C (44.6°F) EWT, 12.5°C (54.5°F) LWT

Total kW	12.3	23.9	32.7	43.1
BTUH	42,000	81,500	111,600	147,100
Sensible kW	12.3	23.0	31.0	37.1
BTUH	42,000	78,500	105,800	126,600
Flow - l/s	0.53	1.04	1.42	1.87
GPM	8.4	16.5	22.5	29.6
Pressure Drop - kPa	43	97	97	133
ft. H ₂ O	14.4	32.5	32.5	44.6

24°C DB, 17.1°C WB (75.2°F DB, 62.8°F WB) 50% RH Upflow Units

Based on 7°C (44.6°F) EWT, 12.5°C (54.5°F) LWT

Total kW	11.3	25.7	34.6	n/a
BTUH	38,600	87,700	118,100	
Sensible kW	9.8	21.2	28.2	
BTUH	33,400	72,300	96,200	
Flow - l/s	0.50	1.12	1.50	
GPM	7.9	17.8	23.8	
Pressure Drop - kPa	38	112	108	
ft. H ₂ O	12.7	37.5	36.2	

24°C DB, 16.3°C WB (75.2°F DB, 61.3°F WB) 45% RH

Based on 7°C (44.6°F) EWT, 12.5°C (54.5°F) LWT

Total kW	10.4	22.8	30.8	n/a
BTUH	35,500	77,800	105,100	
Sensible kW	10.3	21.6	28.7	
BTUH	35,100	73,700	97,900	
Flow - l/s	0.50	0.99	1.34	
GPM	7.9	15.7	21.2	
Pressure Drop - kPa	38	90	87	
ft. H ₂ O	12.7	30.2	29.1	

Evaporator Fan - Forward curve centrifugal fan, induction motor, self-tensioning belt drive

Size	10-10			
No. of fan assemblies	1	2	2	2
Static Regain duct	Downflow units			
Std. Motor - kw (HP)	0.75 (1.0)			
Downflow Airflow - l/s	1,175	1,880	2,350	2,350
CFM	2,490	3,990	4,990	4,990
Upflow Airflow - l/s	860	1,720	2,120	n/a
CFM	1,830	3,650	4,500	n/a

PEX Downflow and Upflow Units Chilled Water 50Hz

Model Size	Downflow	1015	2020	2030	2040
	Upflow	1015	2020	2030	N/A

Evaporator Coil - Copper tubes, louvred aluminium fins					
No. of rows		3	3	4	5
Fin series - FPM		551	551	512	512
	FPI	14	14	13	13

Chilled Water Valve - 2 Way Valve ⁽²⁾					
Action		On/Off	On/Off	On/Off	Modulating
Size - mm (in.)		19 (3/4)	25 (1)	25 (1)	32 (1-1/4)
Control Port, K _v (C _v)		2.2 (2.5)	3.0 (3.5)	3.0 (3.5)	10 (11.6)
Close Off - kPa (psig)		276 (40)	172 (25)	173 (25)	590 (86)

Humidifier - Immersed Electrode, Cleanable					
Capacity - kg/h		3.3	4.5	4.5	4.5
	lb./hr	7	10	10	10
Input power - kW		2.5	3.3	3.3	3.3

Reheat - Single stage, low watt density, fin tubular electric elements					
Capacity - kW		6	6	9	9
Opt. 2nd stage - kW		6	6	9	9

Filter - Dry media disposable G4 to AS/NZS1324.1 (MERV 8 to ASHRAE 52.2)					
Downflow - mm (in)		760x460x100 (30x18x4)			
Qty		1	2	2	2
Upflow - mm (in)		650x590x75 (25.5x23x3)			
Qty		1	2	2	n/a

Full Load Current - 400 Volts, 3 phase+N+E, 50 Hz Supply ⁽³⁾					
Standard Unit - Amps		15.6	16.3	19.8	19.8

Unit Connections					
Supply		3/4" BSP	1" BSP	1" BSP	1-3/8" O.D.
Return		3/4" O.D.	1" O.D.	1" O.D.	1-3/8" O.D.
IE Hum. Drain - O.D.		25mm	25mm	25mm	25mm
IR Hum. Drain - FPT		3/4"	3/4"	3/4"	3/4"
Hum. Supply - BSP		1/2"	1/2"	1/2"	1/2"

Unit Dimensions & Weight					
Width - mm		832	1662	1662	1662
	in.	33	65	65	65
Depth - mm		550	550	550	550
	in.	21.7	21.7	21.7	21.7
Height - mm		1950	1950	1950	1950
	in.	77	77	77	77
Weight - kg		130	200	200	230
	lbs	286	440	440	506

Unit Footprint					
Unit only - m ²		0.46	0.91	0.91	0.91
	ft ²	4.9	9.8	9.8	9.8
Incl. Service area - m ²		1.16	2.33	2.33	2.33
	ft ²	12.5	25.0	25.0	25.0
Serv. Access - mm (in)		850 (33.5) front only			

NOTES:

- (1) All capacities are nominal values. Gross capacity based on 25Pa (0.1" H₂O) ESP, 0m a.s.l. For net capacities, deduct fan input power. Refer Liebert Rating Program for specific input
- (2) Standard pressure chilled water valve body rating 2,068 kPa (300 psig). Optional 3 way available.
- (3) Input power supply +/-15%. FLA based on humidifier lockout during reheat operation. Refer IOM for electrical data on optional equipment.

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The Liebert *iCOM* control system featured on the Liebert PEX brings high-level supervision to multiple units allowing them to work together as a single system to optimise room performance. The Liebert *iCOM* control system offers a variety of advantages.



The standard Small Graphic Display features a 128x64 dot matrix backlit screen. Advanced monitoring can be achieved with the addition of the Optional Wall Mounted Display.

Intelligent Communications and Monitoring

- Saves Energy using Predictive Humidity Control
- Built-in Lead/Lag Functions for enhanced system reliability
- Wellness Calculation alerts service personnel before problems occur
- Unit to Unit (U2U) Communications allows Lead/Lag and optional teamwork settings for maximum flexibility and control
- Optional IntelliSlot cards offer external monitoring through Modbus RTU and HTTP/SNMP protocols



The optional Wall Mounted Large Graphic Display provides centralised monitoring and control of connected Liebert PEX units.



The Liebert IntelliSlot Web and 485 cards can provide Liebert SiteScan® Web and BMS systems with the capability to monitor your Liebert PEX unit.



Removable display makes troubleshooting servicing easier.



Parts list available on control for easier maintenance.



Monitors all key system functions and reports to alarm, if needed.



On-board Unit Diary provides a maintenance history to any authorized user.

Additional Views Available with Large Graphic Displays

- **System View** - Allows you to see the average operation of the "system" or all units that are working together in Unit to Unit (U2U) Communications mode for Teamwork or Lead/Lag from a centralised location.
- **Spare Parts List** - Critical spare part numbers are saved in unit memory and may be displayed on the Large Graphic Display, speeding identification of parts.
- **Unit Diary** - Free field area within the unit memory where unit maintenance shares history with any authorised users, including record of what others have done.



The optional Large Graphic Display features a 320x240 dot matrix backlit screen with helpful system and maintenance views.

VIEW NETWORK		SYSTEM	
UNIT 01	UNIT ON	UNIT 09	STANDBY
UNIT 02	ALARM OFF	UNIT 10	STANDBY
UNIT 03	REMOTE OFF	UNIT 11	STANDBY
UNIT 04	LOCAL OFF	UNIT 12	WARNING ON
UNIT 05	UNIT ON	UNIT 13	STANDBY
UNIT 06	MONITORING OFF	UNIT 14	STANDBY
UNIT 07	UNIT ON	UNIT 15	STANDBY
UNIT 08	UNIT ON	UNIT 16	STANDBY

View Network

SPARES			UNIT 01
DESCRIPTION	QTY	CODE	
MAIN FAN MOTOR	1	B-025A	
FAN BELT	2	B-0600	
AIR FILTER	4	A-0010	
COMPRESSOR	2	1C18810P2	
HEATER ELEMENT	3	148367P19	
HUMIDIFIER LAMP	4	H-0020	

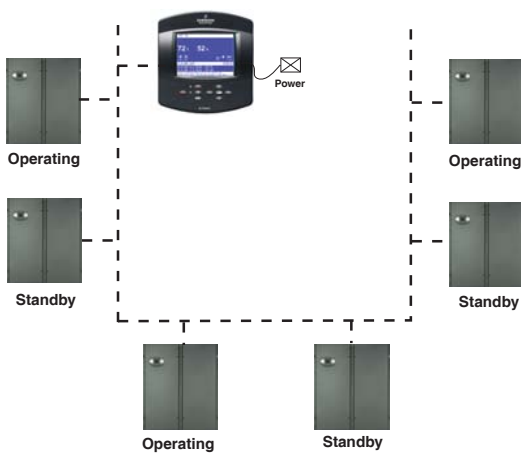
Spare Parts

UNIT DIARY		UNIT 01
09.13.2007	No problems found.	Fred
08.23.2007	Set 73F as setpoint, convinced customer that 64F is far too low.	Jim
08.22.2007	Filters changed, were dirty.	John
08.16.2007	Fanspeed changed to 100% on customer request.	Jack

Unit Diary

U2U Configuration Example

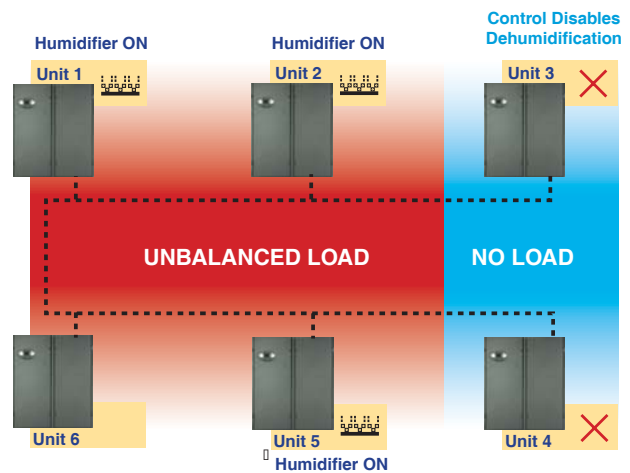
Liebert PEX units with Small Graphic Display may be centrally monitored and controlled with the Optional Wall Mounted Large Graphic Display.



(Note: Field supplied network switch required for unit-to-unit communications)

Teamwork: Mode 2

Units work together to provide precision cooling in rooms with unbalanced loads.



Refer 051536 iCOM User manual for further information on iCOM features and operation.

GENERAL

Summary

These specifications describe requirements for a Mission Critical Cooling system. The system shall be designed to control temperature and humidity conditions in rooms containing electronic equipment, with good insulation and vapour barrier. The manufacturer shall design and furnish all equipment to be fully compatible with heat dissipation requirements of the room.

PRODUCT

Design Requirements

The Mission Critical Cooling system shall be a Liebert PEX model _____ self-contained factory assembled unit with (upflow) (downflow) air delivery. The system shall have a total cooling capacity of _____ kW, with a sensible cooling capacity of _____ kW, based on an entering air temperature of _____ °C dry bulb and _____ °C wet bulb. The unit is to be supplied with _____ volt _____ ph _____ Hz electrical service and include a rating nameplate stating the unit FLA or kW/kVA.

Cabinet Construction

The frame shall be constructed of 2.5, 2.0 and 1.2 mm folded galvanised steel. The exterior panels shall be constructed of 1.2 mm zinc coated sheet steel and insulated with foam insulation. The cabinet shall be powder coated in Charcoal Grey colour and have a textured finish. The front panels shall be removeable and include captive 1/4 turn fasteners. The cabinet shall be assembled with pop rivets providing ease of disassembly.

Filtration

The filter panels shall be an integral part of the system and withdrawable from the top (downflow)/front (upflow) of the unit. Filtration shall be provided by deep V form, dry disposable media housed in a metal frame. The rated efficiency shall be G4 to AS/NZS 1324.1 (MERV8 to ASHRAE 52.2 Standard).

Standard FC Fans - Direct Expansion and Chilled Water Systems

The fan section shall be designed for _____ l/s at an external static pressure of _____ Pa. The unit shall be fitted with one (two) direct drive, forward curved (FC) centrifugal type, double width, double inlet fan(s). Each fan shall be separately driven by a multi-speed high efficiency electric motor. They shall be statically and dynamically balanced.

HUMIDIFIER

A humidifier shall be factory installed inside the unit. Bypass air shall be used to enable moisture to be absorbed into the airstream without condensation. The humidifier capacity shall be _____ kg/hr (lb/hr). The humidifier shall be serviceable and removable from the front of the unit.

Immersed Electrode Humidifier

Humidification shall be provided by boiling water in a high temperature polypropylene steam generator. The humidifier shall have an efficiency of not less than 1.3 kg/kW and be fitted with an auto flush cycle activated on demand from the microprocessor control system. The humidifier shall be fully serviceable with replaceable electrodes. Waste water shall be flushed from the humidifier by the initiation of the water supply solenoid water valve via a U-pipe overflow system. Drain solenoid valves will not be used. The humidifier shall be approved for direct connection to potable water supplies in accordance with ATS 5200.101 and carry the WaterMark label. Humidifier steam nozzles shall be readily accessible for inspection and cleaning in accordance with AS/NZS 3666.2.2002 CI 2.3.3.1.

ELECTRIC HEATING

Electric heating shall be provided in a single stage. The elements shall be of low watt density and high temperature painted steel fin tubular construction, protected by thermal safety switches. The heating system shall include dual safety protection through loss of air and manual reset high temperature controls in accordance with AS/NZS 3102.2002 CI 7.3.

Optional 2nd Stage Electric Heating

Electric heating shall be provided in two equal stages. The elements shall be of low watt density and high temperature painted steel fin tubular construction, protected by thermal safety switches. The heating system shall include dual safety protection through loss of air and manual reset high temperature controls in accordance with AS/NZS 3102.2002 Cl 7.3.

COMPRESSORISED SYSTEMS

Scroll Compressor

The compressor shall be of the high efficiency Compliant Scroll design, with an E.E.R. (energy efficiency ratio) of not less than 11.1 BTUH/watt (C.O.P. of not less than 3.25) at ARI rating conditions. The compressor shall be charged with polyolester oil and designed for operation on HCFC R22 or HFC R407C. Each compressor shall have internal motor protection and be mounted on vibration isolators.

Refrigeration Circuit

The refrigeration system shall be of the direct expansion type with two cooling stages and incorporate one hermetic scroll compressor, complete with crankcase heater. A hot gas bypass solenoid valve shall be used to provide 50% or 100% cooling capacity. The system shall include a manual reset high pressure control, auto reset low pressure switch, externally equalised thermal expansion valve, high sensitivity refrigerant sight glass, large capacity filter drier and charging/access ports in each circuit.

Evaporator Coil

The coil shall be constructed of enhanced surface aluminium fins mechanically bonded to copper tubes, with the frame and drip tray fabricated from heavy gauge aluminium. All metal parts in contact with condensate shall be the same material to prevent electrolytic corrosion. The evaporator drain tray shall incorporate double sloped gutters for complete condensate removal and shall be removeable for cleaning in accordance with AS/NZS 3666.1.2002 Cl 2.8.1. The cooling coil shall be a maximum of 5 rows and 551 fins per metre (14 FPI) and the face velocity shall not be more than 2.5 m/s (500 fpm).

Dehumidification

A specific dehumidification cycle (split-suction) shall operate by reducing the operating surface temperature in a section of the refrigeration coil by means of a solenoid valve on the suction header. Room loads as low as 50% of the unit sensible cooling capacity shall be supported during dehumidification without the need for larger capacity or additional heating stages. Full airflow of the unit will be maintained at all times to ensure consistent air distribution to the conditioned space.

Air Cooled Systems

The indoor evaporator unit shall include refrigerant piping, with a factory holding charge of nitrogen. The refrigeration circuit shall include rigidly mounted isolation valves in the discharge and liquid lines to aid servicing and installation.

Remote Air Cooled Condenser

The model _____ air cooled condenser shall be the low profile, weatherproof type incorporating high efficiency, direct drive, external rotor motors with axial blade fans. The condenser shall balance the heat rejection of the compressor at ____°C ambient. The condenser shall be constructed from heavy duty aluminium and corrosion resistant components. Heavy duty mounting legs and all assembly hardware shall be included. Condensers shall be suitable for 24 hour operation and be capable of providing vertical or horizontal discharge. The condenser shall be fully factory wired to an input isolator and require 230 volt 1 phase ____ Hz electrical service. The high performance heat exchanger shall include mechanically expanded cross-hatched copper tubes and louvred aluminium fins for maximum heat transfer. The coil shall be finished in a high performance modified epoxy coating (KoilKote®) to offer increased protection in aggressive environments.

The coil shall be have a maximum of ___ rows and _____ fins per metre (___ FPI) and the face velocity shall not be more than ___ m/s (___ FPM).

Fan Speed Control Condenser

The condenser fans shall be directly driven by ___ pole _____ rpm 230 volt ___ Hz electric motors with an IP54 enclosure rating and class F insulation. The motors shall be equipped with permanently sealed ball bearings and high temperature grease. The motors shall be speed controlled to ensure stable operating conditions from -5°C to 45°C ambient by a factory fitted, direct acting pressure actuated electronic fan speed controller. The control system shall be complete with input isolator, transducers and pressure switch.

Water Cooled Systems

The indoor evaporator unit shall include a plate heat exchanger, water regulating valve and pipework for each refrigeration circuit, complete with refrigerant holding charge. Balancing and isolation valves shall be field supplied and fitted by others. A strainer with 1mm mesh (#20) must be installed on the supply side of each water circuit by the contractor.

Water Cooled Condenser, 2 Way Regulating Valve

The water cooled condenser/heat exchanger shall be of the high efficiency, counterflow, stainless steel brazed plate type rated for 3000 kPa (435 psig) maximum working pressure. Water flow shall be controlled by a 2-way factory fitted, pressure actuated water regulating valve rated for 1000 kPa (145 psig) maximum working pressure. Water/glycol requirements for the unit shall be _____ l/s (USGPM) of _____ °C (°F) entering water based on a ___ K (°F) rise and produce a maximum pressure drop of 150 kPa (50 ft. of water).

Optional 2 Way Condenser Water Regulating Valve - High Pressure

An optional 2 way high pressure water regulating valve rated for 2400 kPa (350 psig) pressure shall be fitted.

CHILLED WATER SYSTEMS

The indoor evaporator unit shall include a chilled water cooling coil, control valve and (on/off) (motorised) actuator. Balancing and isolation valves shall be field supplied and fitted by others.

2 Way Chilled Water Control Valve - On/Off Type

The water circuit shall include 2-way on/off type spring return control valve. The valve body shall be designed for up to 20 bar (300 psig) water pressure. The actuator/valve combination shall have a maximum closeoff pressure of ___ bar (___ psig). The iCOM control opens/closes the valve in response to room conditions. For dehumidification, the valve is opened to establish maximum moisture removal and operate its reheat to support space temperature.

2 Way Chilled Water Control Valve - Modulating Type

The water circuit for model P2040FC shall include 2-way modulating control valve. The valve body shall be designed for up to 20 bar (300 psig) water pressure. The actuator/valve combination shall have a maximum closeoff pressure of ___ bar (___ psig). The iCOM control positions the valve in response to room conditions. Cooling capacity will be controlled by modulating the control valve. The modulating valve travel for dehumidification shall be proportional.

Optional 3 Way Chilled Water Control Valve - On/Off Type

The water circuit shall include 3-way on/off type spring return control valve. The valve body shall be designed for up to 20 bar (300 psig) water pressure. The actuator/valve combination shall have a maximum closeoff pressure of ___ bar (___ psig). The microprocessor positions the valves in response to room conditions. Cooling capacity will be controlled by bypassing chilled water around the coil. The modulating valve travel for dehumidification shall be proportional.

Optional 3 Way Chilled Water Control Valve - Modulating Type

The water circuit for model P2040FC shall include 3-way modulating control valve. The valve body shall be designed for up to 20 bar (300 psig) water pressure. The actuator/valve combination shall have a maximum closeoff pressure of ____ bar (____ psig). The microprocessor positions the valves in response to room conditions. Cooling capacity will be controlled by bypassing chilled water around the coil. The modulating valve travel for dehumidification shall be proportional.

UNIT SIZE

Compressorised Systems

The maximum footprint area of the unit shall not exceed:

0.46 m² up to 11 kW

0.92 m² above 11 and up to 21 kW

The unit shall require front access only for routine service and installation work.

Chilled Water Systems

The maximum footprint area of the unit shall not exceed:

0.46 m² up to 13 kW

0.92 m² above 13 and up to 48 kW

The unit shall require front access only for routine service and installation work.

ALL SYSTEMS**Water Under Floor Sensor (LWD)**

Each unit shall be supplied with a single water under floor point detector as standard. Up to 5 sensors in total may be connected in series from each iCOM cooling unit. Any individual sensor shall signal a water under floor alarm to the controller upon detecting water.

iCOM Microprocessor Control with SMALL Graphic Display

The iCOM unit control shall be factory-set for Intelligent Control which uses "fuzzy logic" and "expert systems" methods. Proportional and Tunable PID shall also be user selectable options. Internal unit component control shall include the following:

Compressor Short Cycle Control

Prevents compressor short-cycling and needless compressor wear

System Auto Restart

The auto restart feature will automatically restart the system after a power failure. Time delay is programmable

Sequential Load Activation

On initial startup or restart after power failure, each operational load is sequenced with a minimum of one second delay to minimize total inrush current

Predictive Humidity Control

Calculates the moisture content in the room and prevents unnecessary humidification and dehumidification cycles by responding to changes in dew point temperature

The iCOM control shall be compatible with all Liebert remote monitoring and control devices. Options are available for BMS interface via MODbus, BACNet and SNMP.

The iCOM control processor shall be microprocessor based with a 128x64 dot matrix graphic front monitor display and control keys for user inputs mounted in an ergonomic, aesthetically pleasing housing. The controls shall be menu driven. The display & housing shall be viewable while the unit panels are open or closed.

The display shall be organized into three main sections: User Menus, Service Menus and Advanced Menus. The system shall display user menus for: active alarms, event log, graphic data, unit view/status overview (including the monitoring of room conditions, operational status in % of each function, date and time), total run hours, various sensors, display setup and service contacts. A password shall be required to make system changes within the service menus. Service menus shall include: setpoints, standby settings (lead/lag), timers/ sleep mode, alarm setup, sensor calibration, maintenance/wellness settings, options setup, system/network setup, auxiliary boards and diagnostics/service mode. A password shall be required to access the advanced menus.

User Menus Shall be Defined as Follows:**Active Alarms**

Unit memory shall hold the 200 most recent alarms with time and date stamp for each alarm

Event Log

Unit memory shall hold the 400 most recent events with id number, time and date stamp for each event

Graphic Data View

Two graphic records shall be available: return air temperature and return air humidity

Unit View - Status Overview

Simple or Graphical. Unit View summary displays shall include temperature and humidity values, active functions (and percent of operation) and any alarms of the host unit.

Total Run Hours

Menu shall display accumulative component operating hours for major components including compressors, fan motor, humidifier and reheat

Display Setup

Customer shall pre-select the desired grouping of display languages at the time of the order from the following choices:

- Group 1: English, French, Italian, Spanish, German
- Group 2: English, Russian, Greek
- Group 3: English, Japanese, Chinese, Arabic

Service Contacts

Menu shall allow display of local service contact details.

Service Menus Shall be Defined as Follows:

Setpoints

Menu shall allow setpoints within the following ranges:

- Temperature Setpoint 18-29°C (65-85°F)*
- Temperature Sensitivity 0.6-5.6°C (1-10°F)
- Humidity Setpoint 20-80% RH*
- Humidity Sensitivity 1-30% RH
- High Temperature Alarm 2-32°C (35-90°F)
- Low Temperature Alarm 2-32°C (35-90°F)
- High Humidity Alarm 15-85% RH
- Low Humidity Alarm 15-85% RH

**The microprocessor may be set within these ranges, however the unit may not be able to control to extreme combinations of temperature and humidity.*

Standby Settings/Lead-Lag

Menu shall allow planned rotation or emergency rotation of operating and standby units.

Timers/Sleep Mode

Menu shall allow various customer settings for turning on/off unit.

Alarm Setup

Menu shall allow customer settings for alarm notification (audible/local/remote). The following alarms shall be available:

- High Temperature
- Low Temperature
- High Humidity
- Low Humidity
- Compressor Overload (Optional)
- Main Fan Overload (Optional)
- Humidifier Problem
- High Head Pressure
- Change Filter
- Fan Failure
- Low Suction Pressure
- Unit Off

Audible Alarm

The audible alarm shall annunciate any alarm that is enabled by the operator.

Common Alarm

A programmable common alarm shall be provided to interface user selected alarms with a remote alarm device.

Remote Monitoring

All alarms shall be communicated to the Liebert monitoring system with the following information: Date and time of occurrence, unit number and present temperature and humidity.

Sensor Calibration

Menu shall allow unit sensors to be calibrated with external sensors.

Maintenance/Wellness Settings

Menu shall allow reporting of potential component problems before they occur.

Options Setup

Menu shall provide operation settings for the installed components.

System/Network Setup

Menu shall allow Unit-to-Unit (U2U) communication and setup for teamwork modes of operation (up to 32 units).

Teamwork Modes of Operation

Saves energy by preventing operation of units in opposite modes multiple units.

Auxiliary Boards

Menu shall allow setup of optional expansion boards.

Diagnostics/Service Mode

Control input and output values and status shall be displayed to aid in unit diagnostics and troubleshooting. Control inputs shall be indicated as on or off at the front display. Control outputs shall be able to be turned on or off from the front display without using jumpers or a service terminal. Each control output shall be indicated by an LED on a circuit board.

Advanced Menus**Factory Settings**

Configuration settings shall be factory-set based on the pre-defined component operation.

UNIT OPTIONS***iCOM Microprocessor Control With LARGE Graphic Display***

The iCOM unit control with large graphic display shall include all of the features as the iCOM with small graphic display, except that it includes a larger graphical display and shall include the additional features of: "System View", Spare Parts List, Unit Diary.

The iCOM control processor shall be microprocessor based with a 320x240 dot matrix graphic front monitor display panel and control keys for user inputs mounted in an ergonomic, aesthetically pleasing housing.

System View - Status Overview

"System View" shall display a summary of operation for the total number of operating units within a Unit-to-Unit(U2U) configuration.

Spare Parts List

Menu shall include a list of critical spare parts, their quantity and part numbers.

Unit Diary

Menu shall include a free field area within the unit memory where unit history may be stored for reference.

iCOM Wall Mount LARGE Graphic Display

The iCOM Large Graphic Display Kit shall include an ergonomic, aesthetically pleasing housing, a 320x240 dot matrix graphic display and a 230V (120V) power supply. The Wall Mount Large Graphic Display shall be used to allow remote location of a "System View" display and all features of the Large Graphic User, Service and Advanced menus for use with Liebert iCOM controlled products connected for Unit-to-Unit (U2U) communications.

vNSA Network Switch

The vNSA network switch is designed to connect multiple iCOM equipped cooling units to form a network and allow the units to communicate and function as a team. Available with or without a Large Graphics Display, the vNSA can support up to 14 Small Graphics Display units. Supplied in a wall mount enclosure with key lock. Requires 100-240VAC single phase power.

IntelliSlot WEB Card

The Liebert IntelliSlot Web card provides HTTP browsing, SNMP and WEB-management capability of Liebert PEX units within your Network Management System (NMS).

IntelliSlot 485 Card

The Liebert IntelliSlot 485 card provides BMS management of Liebert PEX units over EIA-485 via Modbus RTU or Liebert's proprietary protocol for SiteLink connectivity.

iCOM Ethernet Cable

Certified CAT5e patch cable with fully moulded ends used for connecting an iCOM to a network switch. Available in lengths of 10, 15, 20, 30 and 45 metres (33, 50, 65, 100 and 150 feet). Bulk cable is also available in 305 metre (1000 feet) rolls.

iCOM Ethernet Crossover Cable

Certified CAT5e crossover cable with fully moulded ends for networking 2 Small Graphics Display iCOM units together are available in lengths of 10, 20 and 30 metres (33, 65 & 100 feet).

Remote Air Cooled Condenser Power Kit

A 10 amp rated single pole circuit breaker and contactor shall be provided in the electrical panel for field connection to power the remote factory matched air cooled condensers.

Long Line Pipe Kit - Air Cooled Systems

A factory fitted liquid line solenoid valve and field installed non-return valve (supplied loose) shall be provided for the refrigeration circuit to prevent liquid refrigerant migration to the evaporator/compressor during off cycles in air cooled installations. *Note: Mandatory for pipe runs in excess of 30 metres.*

Condensate Pump - Immersed Electrode Humidifier equipped units

The condensate pump shall have a nominal capacity of 1625 l/hr (430 USGPH) at 3.2 m (10 ft.) head and be suitable for pumping 100°C (212°F) water. It shall be complete with integral dual-float switches, pump-and-motor assembly and reservoir. The secondary float shall send a signal to the local alarm and shut down the unit upon high water condition. The pump shall be supplied loose and be field installed external to the unit.

Reheat/Humidifier Lockout (Emergency Power Lockout)

A field supplied 24VAC source to field wiring terminals in the electrical panel will lockout the electric heaters and humidifier.

Common Alarm Terminals (Additional)

A total of three (3) common alarm terminals (normally open) rated at 24VAC 3 amps each shall provide remote alarm indication.

Phase Fault Relay

The unit shall shutdown upon detection of a loss of any phase and report an alarm.

Main Fan Auxiliary Contact

Dry contact terminals (normally open) shall provide remote status indication for the main fan(s).

Water Under Floor Sensor (LWD)

Additional water under floor sensors (up to 5 in total) may be series connected under the raised floor. *Note: each unit is shipped with one (1) off LWD sensor and 3.7m (12 feet) lead as standard.*

Liquitect Unit Shutdown Sensor (LT410)

Liquitect signal shuts down unit, and provides one (1) N/O contact for field alarm connection.

Low Pressure Transducer

Replaces the standard pressure switch to indicate refrigerant suction pressure via the iCOM display panel.

Remote Sensors

Remote temperature and humidity sensor compatible with iCOM controls are available in lengths of 9, 18, 27, 36 and 45 metres (30, 60, 90, 120 and 150 feet).

Floor Stand

The floor stand shall be constructed from welded galvanised steel. The floor stand shall have adjustable legs and be _____ mm (in.) high.

Upflow Unit Plenum with Discharge Grille(s)

The air plenum shall be constructed from 1.2mm zinc coated sheet steel and powder coated in Charcoal Grey colour with a textured finish. The plenum shall be 400 mm (15.75 in.) high. Double deflection discharge grilles made from aluminium and powder coated black shall be fitted to the front panels.

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Unit Installation

To achieve design performance and maximum product life, correct installation is vital. The following information relates specifically to our products and should be applied in conjunction with prevailing industry standards for mechanical and electrical installations. For more detailed information on installing Liebert PEX systems, please refer to the *PEX User manual*.

Air Cooled Systems

The PEX air cooled unit is shipped with a factory holding charge of nitrogen. Each circuit is supplied with quarter turn isolation valves on the liquid and discharge lines to facilitate installation and servicing. The refrigerant piping must be connected in the field to a matched air cooled condenser and then pressure tested, dehydrated and charged with either R22 or R407C refrigerant. In addition the following services are required to make the system operational:

- electrical supply to the indoor unit
- electrical supply to the air cooled condenser
- humidifier drain
- humidifier water supply

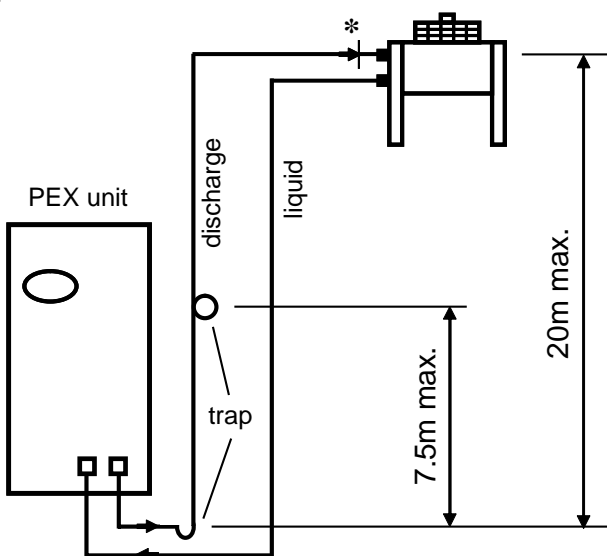
Refrigeration Piping

All refrigeration piping joints must be high temperature silver brazed. Avoid using solders containing hazardous substances. Any applicable local codes relating to fire safety in terms of pressure relief must be observed. Standard industry procedures must be followed for selection and placement of pipe supports, system evacuation, oil addition and charging with refrigerant. Consideration must be given to pipeline pressure drop, oil return to the compressor, avoidance of oil logging in parts of the system and minimisation of noise and vibration.

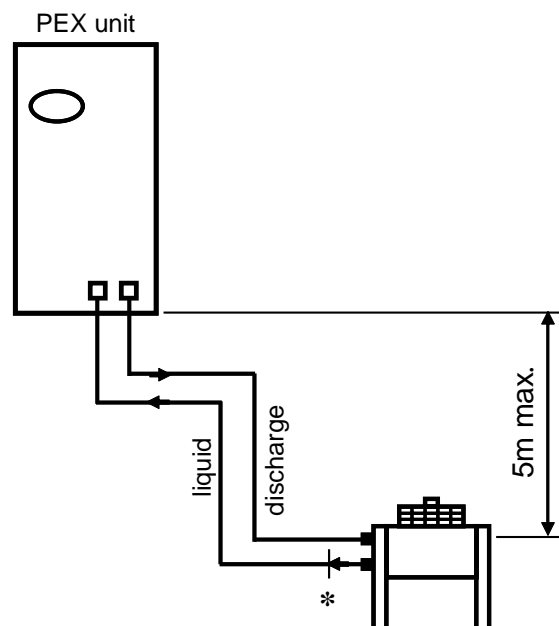
Pipe sizing tables are provided in *051539 User manual* for each model and are for 'equivalent lengths', which include an allowance for bends. They are suggestions only and it is the installer's responsibility to confirm that sizes are appropriate for site conditions.

Note: An optional long-line pipe kit, comprising a liquid line shutoff valve and non-return valve, is required for equivalent lengths in excess of 30 metres. Consult the factory whenever the equivalent length exceeds 60m, or if the vertical separations exceed those shown.*

Condenser Located Above PEX Unit:



Condenser Located Below PEX Unit:



• **Discharge line**

Discharge lines should be insulated where they are routed in the conditioned space (including under a raised floor). Traps must be fitted in vertical risers every 7.5 metres and at the base of a riser. Slope discharge lines in the direction of refrigerant flow.

• **Liquid line**

Liquid lines should not be exposed to any heat sources and should be insulated.

Air cooled condenser location

Condensers should be located for maximum security and maintenance accessibility. Vertical or horizontal discharge condensers may be used. The surrounding area should be clean and away from trees, loose dirt and building exhausts.

Please refer to the air cooled condenser technical data manual for more information including dimensions, weights and connection sizes.

Water Cooled Systems

The PEX water cooled unit is shipped with a factory charged refrigeration system of either R22 or R407C, and includes a brazed plate stainless steel plate heat exchanger and 2 way water regulating control valve per circuit. In addition the following services are required to make the system operational:

- electrical supply to the indoor unit
- condenser water supply
- humidifier drain
- humidifier water supply

Water Cooled Piping

A strainer with a 1mm mesh (#20) and isolation valves on either side, **must** be fitted to the condenser water supply for each unit. A balancing valve is also recommended for each circuit as a minimum to provide adjustment of condenser water flow rates.

Refer to *051539 User manual* for further information.

Chilled Water Systems

The PEX chilled water unit is shipped with factory installed water control valves and piping for direct connection to the building system chilled water loop. In addition the following services are required to make the system operational:

- electrical supply to the indoor unit
- chilled water supply
- humidifier drain
- humidifier water supply

Chilled Water Piping

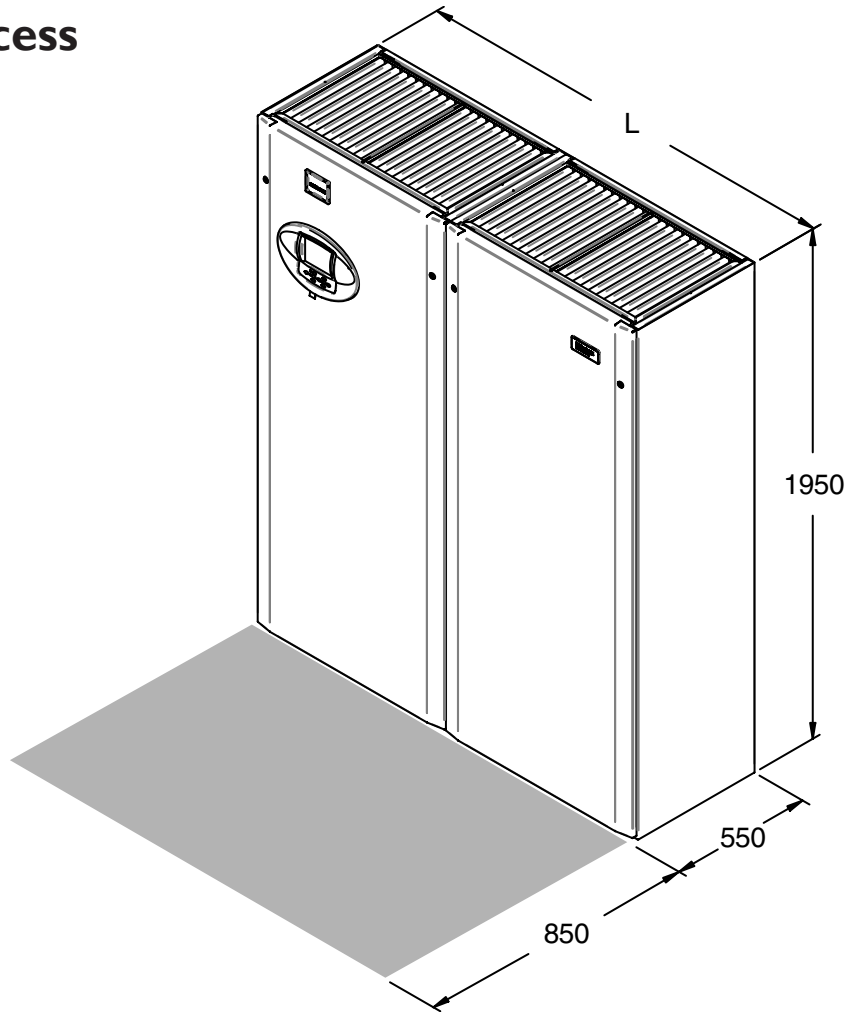
There is a single connection for the chilled water supply (in) and chilled water return (out) pipes. It is recommended that isolation and balancing valves are installed on supply/return lines external to each unit. All pipework should be insulated to prevent condensation occurring. Care should be taken when installing pipework underfloor so as to minimise air flow resistance. Pipework should be horizontally mounted as opposed to stacking and routed parallel to floor discharge unit air paths.

Refer to *051539 User manual* for further information.

Humidifier / Drain

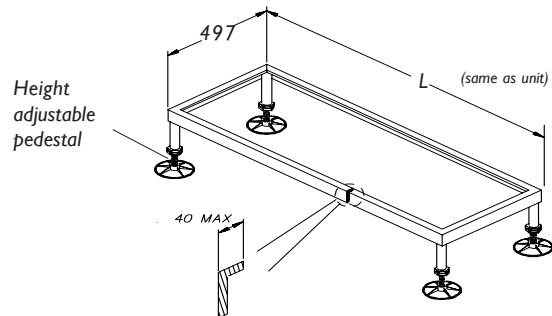
A water supply and drain connection is required for each unit. Drain lines should be copper and comply with local building codes. Refer to *051539 User manual* for further information.

Unit Dimensions & Service Access



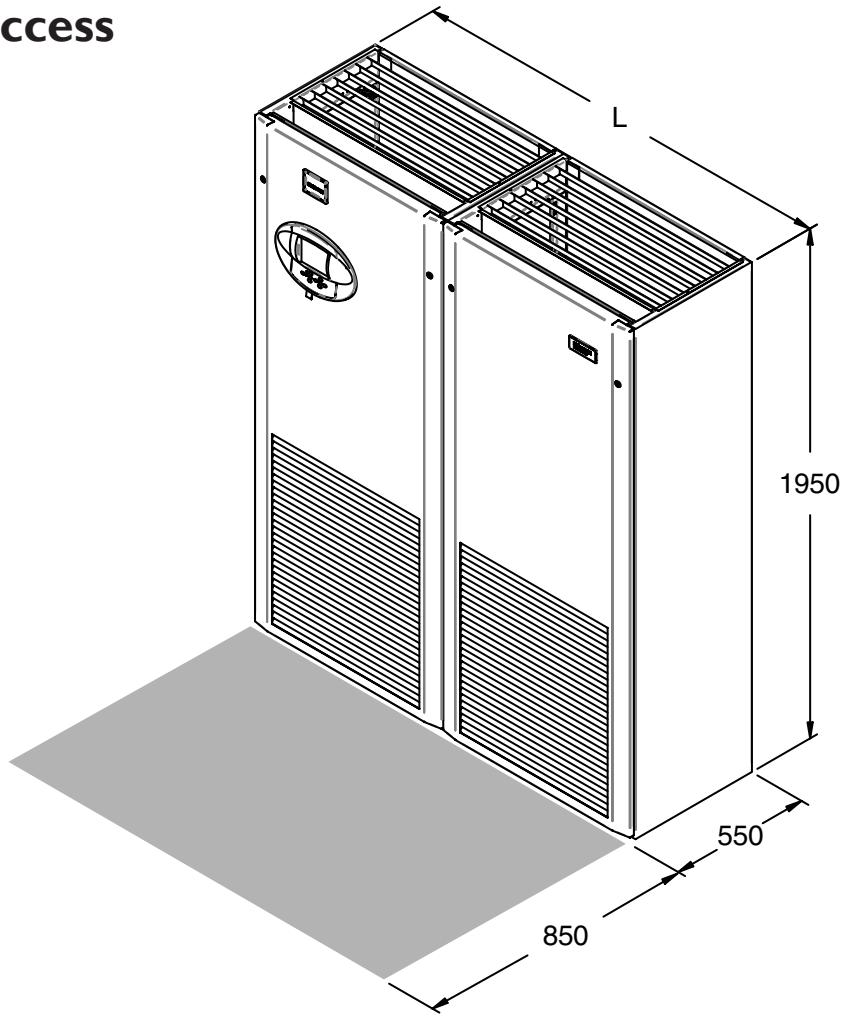
PEX Small Frame - Downflow Unit (Type F)
FOR RAISED FLOOR APPLICATIONS

Bays	Model		Width L (mm)
	FA/W	FC	
1	1010	1015	832
1	1015	-	832
2	2020	2020	1662
2	2025	2030	1662
2	-	2040	1662



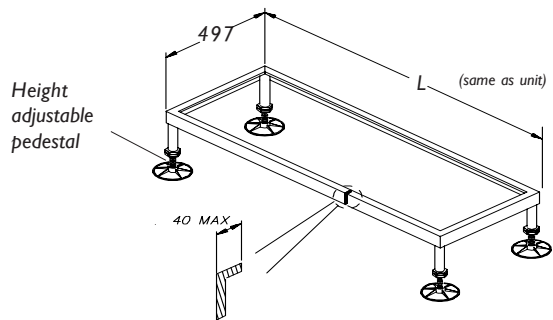
FLOORSTAND
(Optional)

Unit Dimensions & Service Access



PEX Small Frame - Upflow Unit (Type U)

Bays	Model		Width L (mm)
	UA/W	UC	
1	1010	1015	832
1	1015	-	832
2	2020	2020	1662
2	2025	2030	1662



FLOORSTAND (Optional)

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