We Invented Precision Cooling

Emerson Network Power knows precision cooling. After all, we invented it back in 1965! Over the years, our cooling systems have been proven as the world’s standard for reliable operation. In fact, there are Liebert precision cooling systems in the field that have been in constant use for over 30 years. Installed in thousands of critical data centers around the world, our latest precision cooling portfolio offers the highest efficiency without compromising reliability.

Understanding the 3 Rs of Precision Cooling

Despite the claims of different vendors promoting their own, specialized solutions, there is no silver bullet when it comes to precision cooling for every application. There is only the most appropriate cooling solution for your infrastructure, and an understanding of each cooling design can help determine which cooling approach and solution can best meet your business goals and infrastructure requirements.

Room Cooling

While densities are climbing steadily, standard density facilities remain the norm. Traditional room cooling uses precision air conditioners and is the most appropriate solution for these standard density environments. The standard complexity, ease of deployment and precision humidity and filtration control of these systems have seen hundreds of thousands of units deployed in critical facilities across Asia, with more added every day. Combined with a raised floor, precision air conditioners deliver the best value for money and represents significant increased efficiency over building or comfort cooling.

Row Cooling

If energy efficiency is top concern, row cooling can improve efficiency over the standard room approach by more than 30 percent. It supports high density applications by the utilization of cold aisle containment. Row cooling with SmartAisle™ can further improve efficiency and provide uniform and predictable temperature and humidity control to equipment with or without raised floor.

Rack Cooling

One of the proven best-practice approaches to dealing with high density heat issues is by bringing cooling technologies closer to the source of heat. Specialized precision cooling solutions for racks can support ultra-high-density applications, up to and above 30kW per rack. This dedicated cooling approach specifically cools a rack by providing the best direct air flow intake of the critical equipment.

What’s Inside

- Emerson Invented Precision Cooling
- Introducing Liebert PEX
- Why Precision Cooling?
- Room Cooling Attributes
- Improved Energy Efficiency
- Ensuring Availability
- Designed for Density
- Cooling Types
- Features Summary
- Technical Specifications
- Service Commitment
The Liebert PEX: More Than A Single Energy Efficient component

- The efficiency of the Liebert PEX is engineered into the product. Each component that goes into the Liebert PEX is carefully tested to ensure that it will contribute to its overall efficiency.
- All enhancements to energy efficiency are designed to reduce operating time and cycling of key components and increase reliability.
- In addition to having components that are individually engineered to provide the best efficiency, how these components work and interact with each other also contribute to the energy savings you get with the Liebert PEX.

Key Features Contributing To The Superior Efficiency Of The Liebert PEX

1. **EC Fan**
   - The EC fan technology regulates airflow and reduces the fan input power. In-floor configuration further reduces energy consumption in downflow units. This significantly reduces energy consumption and provides longer component life. Managed through Liebert iCOM controls, EC fans deliver airflow for the optimal operating conditions for IT equipment.

2. **Digital Scroll Compressor**
   - Liebert PEX with Digital Scroll Technology is highly reliable and is designed to achieve efficiency with flexibility and to lower TCO. The use of digital scroll technology actively manages capacity modulation from 20 percent to 100 percent. During the loaded state, cooling units consume full load power. On the other hand, during the unloaded state, the units run freely, consuming only about 10 percent of the full load.

3. **iCOM Controller**
   - The teamwork mode in the iCOM Controller, a key feature of the Liebert PEX, ensures efficiency by allowing multiple units to work together as a single system to optimize room performance.

4. **Infrared Humidifier**
   - The Infrared Humidifier has been a feature on Liebert environmental control systems for over 45 years. Its rapid response and the ability to handle varying water conditions has made it an industry standard in applications that demand precise, particle-free humidity control.

5. **Dual Cool Option**
   - This option provides a second coil that utilises the central building Chiller system water supply. The unit can function either as a DX (compressorized) or a Chilled water system. During times when the chiller supply is available compressorized operation is eliminated, reducing energy costs. In addition this option can provide increased redundancy and flexibility to the environmental control system.

6. **Free Cool Option**
   - Optional GLYCOOL free-cooling system permits compressorless operation in colder ambient conditions.

![Energy Efficiency Diagram](image-url)
Traditional approaches to cooling are only effective and efficient to a point. Unfortunately, a number of IT organizations still rely on commercial air conditioners to cool their critical facilities. Commercial air conditioning, known for its low upfront costs, is both ineffective and problematic. It does not address the needs of sensitive electronics such as year-round cooling, humidity & temperature control and air filtration, which makes Precision Cooling the only real solution for these applications.

**Comfort Cooling vs. Precision Cooling**

### Comfort Air
- Using rigid, overhead ducts provides insufficient air volume (30-40 l/s per kW) which results in hot spots. They are also difficult to relocate.
- Minimal air filtration is typically provided with comfort systems.
- Comfort systems can over-dry room air because of their lower Sensible Heat Ratio. They typically do not provide integral humidity control.

### Precision Cooling Air
- Precision cooling provides a cost-effective, energy-efficient solution to the requirements of today’s sensitive electronics, while enabling the flexibility to adapt to whatever the future brings.

**Why run the risk of relying on building air?**

- **RISK:** These systems shut down overnight on weekends
- **RISK:** Systems designed to operate 5 x 8 vs. Continuous Operation.
- **RISK:** Insufficient filtration for IT equipment and no humidity control
- **RISK:** Building air removes too much moisture, introducing the risk of static discharge
- **RISK:** Insufficient airflow causes overheating in IT equipment (Airflow designed for comfort not correct delivery for IT)

- **COST:**
  - Building air is designed to cool people (heat and sweat)
  - As a consequence a lot of energy (cost) goes into removing that moisture
  - This energy is wasted where building air is used to cool machines

* SMB study June 2008
Liebert PEX: Energy Efficient Room Cooling Solution

Liebert PEX is the most accessible for the broadest range of business needs. It represents a straightforward and effective solution to the majority of low to medium density applications. It reliably services the thermal requirements of a critical data center. The solution requires nothing more than direct front access for installation and routine servicing. This means that users can achieve 100% space utilization around the unit and not suffer dead space caused by service access requirements on the sides and rear.

When to Select Room Cooling

- Standard / Medium / High density environments
  - in room / raised floor

- Open architecture
  - Delivers filtration and humidity control
  - Thermal Mass minimizes risk of thermal runaway
  - Low complexity / ease of deployment
  - Broad capacity range
  - Redundancy / load sharing
  - Widest choice of cooling mediums

- Suitable for Mega Data Centers
  - For affordable and realistic redundancy

- Proven and time tested
  - Over 200,000 units deployed in Asia
Improved Energy Efficiency

EC Fan

The innovative energy efficient EC fan technology integrated with continuous speed control across the full operating range provides greatest value to the end user. The technology offers a simple and cost effective way of introducing energy efficient technology into the Liebert PEX. EC fan technology regulates airflow and reduces the fan input power. This significantly reduces energy consumption and provides longer component life. Managed through Liebert iCOM controls, EC fans deliver airflow for the optimal operating conditions for IT equipment.

Features and Benefits

- 10-30% less energy than average standard AC motor
- Backward curved, corrosion resistant aluminum fan impeller
- Electronically commutated motor, AC to DC conversion
- Direct driven with integrated electronics
- True soft start with inrush current lower than full load current

Merging Cooling Technologies

The Liebert PEX becomes the ultimate solution by combining the most reliable cooling technologies in the industry - The EC fan and Digital Scroll (DS) compressor technology. EC fan plays an integral role in the Liebert PEX by providing effective capacity control while retaining high energy efficiency and low noise levels. The DS compressor technology in the Liebert PEX enables superior room condition, humidity and temperature control by adapting to changing sensible heat load and latent conditions.
Digital Scroll

Liebert PEX with Digital Scroll technology is highly reliable and is designed to achieve efficiency with flexibility and to lower TCO. Emerson Precision Cooling units with Digital Scroll technology actively manage achieving capacity modulation from 20 percent to 100 percent. During the loaded state, cooling units consume full load power. On the other hand, during the unloaded state, the units run freely, consuming down to about 10 percent of the full load. Scalable, the Liebert Digital Scroll automatically adjusts to yearly increases in heat load. It is available on air cooled, water cooled, glycol cooled, dual cool and free cool models.

Single compressor models utilize Digital Scroll compressor while dual compressor models utilize two Digital Scroll compressors to provide the maximum energy benefit at part loads and system cooling and dehumidification cycles.

Managed by the iCOM control system, the combination of these technologies not only provides precise temperature control but also provides relative humidity control without initially resorting to dehumidifying or humidifying. It helps lower operating costs and reduces energy consumption by as much as 30 percent, compared to standard cooling solutions.

Features and Benefits

- Up to 30% less energy
- Variable capacity compressor can improve efficiency at less than peak capacity / on part load condition
- More precise control of the environment
- Save power at reduced duty (lower loads)
- Fast regulation to rapidly changing loads
- Powered by 50/60 Hz AC without frequency converter
- Lower EMC compared to variable frequency drives
Ensuring Availability

Proactive Control and Monitoring of Critical Systems
High-Level Supervision to Multiple Units with the Liebert iCOM Control System

1. Energy Efficiency With Teamwork Mode
   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 optimize room performance.

2. Additional Views Available with Large Graphic Displays
   The optional Large Graphic Display features a 320x240 dot matrix backlit screen with helpful system and maintenance views. It allows you to see the average operation of the “system” or all units that are working together in Unit to Unit (U2U) Communication mode for Teamwork or Lead/Lag from a centralized location.

   Adaptive Monitoring: Increase Availability and Reduce Support Costs
   Adaptive monitoring technologies allow easy information maneuverability to key resources, whether you need to integrate critical system data with your Network Management System, Building Management System or enable a Web browser interface.

   SiteScan Web does it all
   - Real-Time Monitoring and Control
   - Event Management and Reporting
   - Data Analysis and Trending
   - Building Management Integration

   Liebert SiteScan® Web is a comprehensive critical systems management solution dedicated to ensuring reliability through graphics, event management and data extrapolation. The standard Web interface allows users easy access from anywhere at anytime.

   - Single and multi-site applications
   - Event management and unit control
   - Trend and historical data captures and reporting
   - Full ASHRAE BACnet compatibility
   - Java based
   - Windows 2000, XP and 2003 compatible

   Liebert’s monitoring technology puts critical systems information at the fingertips of support personal - wherever they are - addressing the increasing concern for improved internal communication between management groups surrounding a data center.

   Enterprise Management with Liebert SiteScan® Web Software

For customers who require extensive management of critical system equipment that span multiple locations in an ever-moving global enterprise, Liebert SiteScan® Web will centrally manage your critical equipment and give you the power to move beyond the event-responsive service paradigm.

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- Real-Time Monitoring and Control
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- Single and multi-site applications
- Event management and unit control
- Trend and historical data captures and reporting
- Full ASHRAE BACnet compatibility
- Java based
- Windows 2000, XP and 2003 compatible

3. Easy Serviceability With The Liebert iCOM
   Monitors all system functions and reports alarm.
   Removable display makes servicing easier

   Unit Diary
   Free field areas are within the unit memory where unit maintenance shares history with any authorized users or logged-in service contacts, including record of what others have done.
Designed for Density

Cooling Options Available on Your Liebert PEX

Configure The Liebert PEX to meet your specific needs

**Up Flow**
*Designed for in-room or ducted applications*

**Down Flow**
*Designed for raised floor applications*
All cooling types are available in single and dual compressors. Single compressor diagrams are shown above for clarity.
All cooling types are available in single and dual compressors. Single compressor diagrams are shown above for clarity.
Features Summary

**Energy Efficiency**
- Infrared Humidifier for precise humidity control
- iCOM controller for optimized room performance
- Combined technologies of EC Fan and Digital Scroll Compressor yield higher level of efficiency
- EC Fan with inflloor configuration
- Efficient dehumidification cycle

**Space Savings**
- 15% more kW per square meter compared to industry average
- Requires nothing more than direct front access
- Downflow EC fans serviceable from above floor without disturbing the raised floor
- Units can be dismantled and reassembled for difficult site jobs

**Communications and Monitoring**
- Teamwork Mode allows units to work together in rooms with unbalanced loads
- Spare parts list allows speedy identification of parts
- Unit diary shares history with any authorized users or service contacts

**System Supervision and Management**
- Enhanced remote communications and control with Liebert Intellislot card
- Centralized Management with Liebert Nforms software
- Enterprise Management with Liebert SiteScan Web Software

**Multiple Configurations**
- Twelve different configurations for Upflow and Downflow units
- Configure for your specific needs

**Dual Cool**
- Second coil that utilizes the central building Chiller system water supply
- Unit can function either as a DX (compressorized) or a Chilled water system
- Reduces energy cost
- Increases redundancy and flexibility to the environmental control system

**Free Cool**
- Glycol Free Cool System
- Unit can function as a DX (compressors), or Free Cool or mixed for energy savings
- Reduces energy costs in colder climates
### Technical Specifications

#### Downflow - DX

<table>
<thead>
<tr>
<th>Model Size</th>
<th>1020</th>
<th>1025</th>
<th>1030</th>
<th>1035</th>
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<tr>
<td><strong>DX - Air, Water, Glycol, Free Cool based on 24°C DB, 50% RH, 45°C Condensing</strong></td>
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<td><strong>Digital Scroll compressor - EC Fan</strong></td>
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<td>33.2</td>
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<tr>
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<td>26.4</td>
<td>30.4</td>
<td>35.2</td>
<td>39.2</td>
<td>44.9</td>
<td>52.8</td>
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<td>72.4</td>
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<td>8,700</td>
<td>8,500</td>
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<td>89.8</td>
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<tr>
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<td>22.6</td>
<td>28.2</td>
<td>30.4</td>
<td>35.2</td>
<td>39.2</td>
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<td>72.4</td>
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<td>8,500</td>
<td>10,000</td>
<td>11,200</td>
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<td>45.0</td>
<td>53.2</td>
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<td>21.5</td>
<td>29.6</td>
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<td>31.7</td>
<td>41.7</td>
<td>47.3</td>
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<td>53.5</td>
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<td>71.1</td>
<td>79.6</td>
<td>88.4</td>
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<td>6,660</td>
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<td>8,190</td>
<td>9,900</td>
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<td>16,020</td>
<td>20,160</td>
<td>20,100</td>
<td>23,940</td>
<td>23,760</td>
</tr>
</tbody>
</table>

#### Dual Cool - 24°C DB, 50% RH, 45°C Condensing. CW Based on 7°C EWT, 12°C LWT

| **Digital Scroll compressor - EC Fan** | | | | | | | | | | | | | | | |
| Total kW | 20.3 | 23.2 | 30.2 | 37.0 | 41.3 | 47.2 | 55.6 | 67.0 | 74.0 | 82.7 | 90.1 | 100.0 | | | |
| Sensible kW | 20.1 | 22.6 | 26.8 | 35.2 | 39.2 | 44.9 | 51.2 | 62.4 | 72.4 | 84.2 | 92.8 | | | | |
| CW | 25.6 | 28.0 | 28.7 | 48.6 | 52.2 | 59.0 | 63.1 | 67.3 | 92.6 | | | | | |
| Air Flow m³/h | 6,500 | 7,500 | 8,700 | 10,000 | 11,200 | 13,800 | 15,500 | 17,600 | 23,000 | | | | | |

#### Evaporator Fan - Backward curve EC motor, direct drive

| No. of fan assemblies | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 3 | 3 | 3 | 3 | | | | |
| Standard EC Motor kW | 2.3 | 2.3 | 3.1 | 2.3 | 2.3 | 2.3 | 2.3 | 3.1 | 3.1 | 2.3 | 3.1 | | | | |
| Standard FC Motor kW | 2.2 | 2.2 | 3.0 | 3.0 | 2.2 | 2.2 | 2.2 | 3.0 | 3.0 | 2.2 | 3.0 | | | | |
| **Compressor - Copeland Compliant Scroll with Crankcase Heater** | | | | | | | | | | | | | | | |
| No. of compressors | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 2 | | | |
| Unit cooling steps | 2 via HGBP | 2 via Compressors | | | | | | | | | | | | | |

#### Compressor - Copeland Digital Scroll with Crankcase Heater

| No. of compressors | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 2 | | | |
| Capacity modulation | 20% to 100% | 20% to 100% | | | | | | | | | | | | | |

#### Humidification

| Standard Infrared - kg/h | 4.5 | 4.5 | 4.5 | 4.5 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | | |

#### Reheat - electric heater elements

| Standard 1 stage - kW | 6 | 6 | 6 | 6 | 6 | 9 | 9 | 9 | 9 | 9 | 9 | 12 | | |
| Optional 2 stage - kW | 12 | 12 | 12 | 12 | 12 | 18 | 18 | 18 | 18 | 18 | 24 | 24 | 24 | 24 |

#### Electrical 400V 50Hz 3phase - Std DX unit only

| RFLA | 22.7 | 24.8 | 31.3 | 33.2 | 40.0 | 45.8 | 53.4 | 39.4 | 43.6 | 56.6 | 60.4 | 61.4 | 67.2 | 76.9 | 86.9 |
| Width - mm | 853 | 853 | 853 | 853 | 1703 | 1703 | 1703 | 1703 | 1703 | 1703 | 1703 | 2553 | 2553 | 2553 | 2553 |
| Depth - mm | 873 | 873 | 873 | 873 | 873 | 873 | 873 | 873 | 873 | 873 | 873 | 873 | 873 | 873 | 873 |
| Height - mm | 1970 | | | | | | | | | | | | | | |
| Unit Weight - kg | 350 | 360 | 370 | 380 | 600 | 610 | 630 | 650 | 670 | 700 | 720 | 970 | 990 | 1030 | 1050 |
| Unit only - m³ | 0.74 | 0.74 | 0.74 | 0.74 | 1.49 | 1.49 | 1.49 | 1.49 | 1.49 | 1.49 | 1.49 | 2.23 | 2.23 | 2.23 | 2.23 |
| Incl. Service area - m² | 1.47 | 1.47 | 1.47 | 1.47 | 2.93 | 2.93 | 2.93 | 2.93 | 2.93 | 2.93 | 2.93 | 4.40 | 4.40 | 4.40 | 4.40 |
| Service Access min - mm | 850 | | | | | | | | | | | | | | |

**Notes**

All rated capacities are nominal values based on an ESP for Downflow 20pa and for Upflow 50pa, at sea level, for R407c and R22. For net capacities, deduct fan input power. Refer to the Liebert PEX Rating Program for specific input conditions, air flow, and configuration. Minimum unit depth, without front panels and hinges is 841mm. Minimum raised floor height 325mm for EC fan units. Weights shown are for water cooled DX models only, Input power supply 400V +/-15%, 50Hz +/- 2%. RFLA is for the standard configuration unit only and excludes all heat rejection equipment, Chillers and Pumps etc.. RFLA is based on standard unit with EC fan. Refer to Liebert PEX Rating Program & User Manual for electrical data on option equipment. All information and Technical Data are subject to change without notice.
## Technical Specifications

### Upflow - DX

<table>
<thead>
<tr>
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</table>

### Digital Scroll compressor - EC Fans

<table>
<thead>
<tr>
<th></th>
<th>DX</th>
<th>Sensible kW</th>
<th>Air Flow m³/h</th>
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</thead>
<tbody>
<tr>
<td><strong>Total kW</strong></td>
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<td>26.7</td>
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<td>19.8</td>
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<tr>
<td><strong>Air Flow m³/h</strong></td>
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### Scroll compressor - EC Fans

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<td>8,300</td>
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### Scroll compressor - FC Fans

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<tr>
<th></th>
<th>DX</th>
<th>Sensible kW</th>
<th>Air Flow m³/h</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total kW</strong></td>
<td>19.4</td>
<td>22.1</td>
<td>29.2</td>
</tr>
<tr>
<td><strong>Sensible kW</strong></td>
<td>18.3</td>
<td>20.7</td>
<td>25.9</td>
</tr>
<tr>
<td><strong>Air Flow m³/h</strong></td>
<td>5,400</td>
<td>6,300</td>
<td>7,870</td>
</tr>
</tbody>
</table>

### Dual Cool - 24°C DB, 50° RH, 45°C Condensing, CW Based on 7°C EWT, 12°C LWT

<table>
<thead>
<tr>
<th></th>
<th>DX</th>
<th>Sensible kW</th>
<th>Air Flow m³/h</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total kW</strong></td>
<td>19.9</td>
<td>22.4</td>
<td>26.7</td>
</tr>
<tr>
<td><strong>Sensible kW</strong></td>
<td>19.8</td>
<td>22.3</td>
<td>26.1</td>
</tr>
<tr>
<td><strong>Air Flow m³/h</strong></td>
<td>6,500</td>
<td>7,500</td>
<td>8,300</td>
</tr>
</tbody>
</table>

### Compressor - Copeland Compliant Scroll with Crankcase Heaters

### Evaporator Fan - Backward curve EC motor, direct drive / Forward curve centrifugal fan, HE motor, auto tensioning drive

| No. of fans assemblies | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |

### Compressor - Copeland Digital Scroll with crankcase heater

### Reheat - electric heater elements

| Standard 1 stage - kW | 6 | 6 | 6 | 6 | 9 | 9 | 9 | 9 | 9 | 9 | 9 | 9 | 9 | 9 | 9 |
| Optional 2 stage - kW | 12 | 12 | 12 | 12 | 18 | 18 | 18 | 18 | 18 | 18 | 24 | 24 | 24 | 24 | 24 |

### Electrical 400V, 50Hz, 3 Phase - Std DX unit only

| RFLA | 22.7 | 24.8 | 31.3 | 33.2 | 40.0 | 45.8 | 53.4 | 39.4 | 43.6 | 56.6 | 60.4 | 61.4 | 67.2 | 76.9 | 86.9 |

### Unit Dimensions & Weight

| Width - mm | 853 | 853 | 853 | 853 | 853 | 1703 | 1703 | 1703 | 1703 | 1703 | 1703 | 1703 | 1703 | 1703 | 1703 |
| Height - mm | 873 | 873 | 873 | 873 | 873 | 873 | 873 | 873 | 873 | 873 | 873 | 873 | 873 | 873 | 873 |
| Weight - kg | 1970 |      |      |      |      |      |      |      |      |      |      |      |      |      |      |

### Unit footprint

| Unit only - m² | 0.74 | 0.74 | 0.74 | 0.74 | 1.49 | 1.49 | 1.49 | 1.49 | 1.49 | 1.49 | 1.49 | 1.49 | 2.23 | 2.23 | 2.23 |
| Incl. Service area - m² | 1.47 | 1.47 | 1.47 | 1.47 | 2.93 | 2.93 | 2.93 | 2.93 | 2.93 | 2.93 | 2.93 | 2.93 | 4.40 | 4.40 | 4.40 |
| Service Access min - m² | 850 |      |      |      |      |      |      |      |      |      |      |      |      |      |      |

### Notes

All rated capacities are nominal values based on an ESP for Downflow 20pa and for Upflow 50pa, at sea level, for R407c and R22. For net capacities, deduct fan input power. Refer to the Liebert PEX Rating Program for specific input conditions, air flow, and configuration. Minimum unit depth without front panels and hinges is 84mm. Minimum raised floor height 325mm for EC fans units. Weights shown are for water cooled DX models only. Input power supply 400V +/-15%, 50Hz +/- 2. RFLA is for the standard configuration unit only and excludes all heat rejection equipment, Chillers and Pumps etc. RFLA is based on standard unit with EC fan. Refer to Liebert PEX Rating Program & User Manual for electrical data on optional equipment. All information and Technical Data are subject to change without notice.
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Over 570 Technical Support Staff
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