



Liebert®

DS™

Designed To A Higher Standard  
Of Performance And Reliability



## Vertiv™ Understands The Need For Precision And Reliability... And Why This Is So Important To You

For sensitive electronics, environmental control is more than simple cooling. “Comfort” air conditioning systems are designed to cool people and office space. They simply cannot provide the kind of environment required by high performance computer or communication equipment.

### Why You Can't Take Chances When Cooling Your Critical Space

Standard building cooling systems are designed to keep people comfortable 8-12 hours each day from spring to autumn with no provision for winter operation. A precision cooling system is designed to operate over a wide range of ambient temperatures from as low as -30°F (-34.4°C) up to 120°F (48.9°C).

Sensitive electronics must be maintained in a stable environment of 64.4°F to 80.6°F (18°C to 27°C) with moisture between 41.9°F (5.5°C) dew point and 60% relative humidity with 59°F (15°C) dew point. Computers and communications equipment generate six to ten times the heat density of normal office space, the air conditioning system must have more than just enough cooling capacity.

**It must have the precision to react quickly to a drastic change in heat load and prevent wide temperature fluctuations—something a large building HVAC system cannot do.**

### Liebert® DS™ Is Ideally Suited For:

- Data Centers
- Computer Rooms
- Network Operations Centers
- Telecom/CATV
- Labs And Testing
- Production Facilities

### A Tradition Of Reliability You Can Count On

Liebert Precision Cooling equipment is the standard by which all others are judged. The number of units that are in the field far exceeds the combined number of all other brands. Nine out of ten Fortune 500 Companies use Liebert cooling systems.

Liebert Precision Cooling Systems are used in the most demanding, critical applications in the world. From banking to government to corporate computer and communications centers, when it has to be the best—this is the brand of choice.

## The Liebert® DS™ is Designed and Built Like No Other

### Why You Should Specify Liebert DS Over Competitive Precision Systems

Proper protection of critical facilities takes more than bolting together pre-engineered computer room cooling modules. In many cases, your critical systems are only as reliable as the support equipment protecting them. Compromising on a less capable precision cooling system can compromise your operations. Your critical operations demand support equipment that can provide the highest level of reliability.

### Engineering Excellence Goes Into Every Liebert DS

The Liebert DS is based on the proven design and technology of Liebert Deluxe Systems used in thousands of critical data centers around the world since 1965. Full scale analysis and evaluation of the Liebert DS during all phases of development and production is your assurance of the most advanced performance and highest quality. Units are thoroughly tested under a wide variety of temperature and humidity conditions.

### Reliability:

- The Liebert DS is designed with the highest quality components selected for their proven reliability and performance.
- Microprocessor technology adds automatic sequencing of components to even wear and extend service life.
- Corrosion resistant frame and cabinet.
- An alarm system and self-diagnostics provide rapid troubleshooting and can prevent a problem before it affects the electronic equipment room environment.
- Air delivery system designed for optimized air distribution and long service life.

### Flexibility:

- Available in both downflow and upflow configurations to cover a wide range of room applications.
- Choice of compressors to match performance and energy efficiency requirements. Front access provides easy serviceability and saves valuable floor space.
- Modular frame construction allows even more flexibility in meeting specific needs for installation—frame can be field-separated into three sections. Built-in humidity control and reheat function.
- Liebert iCOM control system brings high-level supervision to multiple units allowing them to work together as a single system to optimize room performance.
- R-407C environmentally friendly refrigerant.

### Low Total Cost Of Ownership:

- Energy efficiency options and configurations can save money and even pay back part of your investment over the life of the product.
- Built for serviceability, with many components—such as the Paradenser™ cleanable condenser—designed to be maintained rather than replaced.
- Specifically designed for the demanding requirements of year-round operation, the Liebert DS is actually less expensive to operate over its life cycle compared to both comfort cooling equipment and competitive precision air conditioning products.



## Engineered For Precision, Efficiency And Strength

The Liebert® DS™ is designed to fit room applications requiring high level precision control of the room environment, including temperature, humidity, filtration and airflow.

### Precise Temperature And Humidity Control

The environmental control system must be able to sense and react to temperature and humidity fluctuations far too small for building HVAC systems to control. The Liebert DS is capable of control to within  $\pm 1^\circ\text{F}$  ( $^\circ\text{C}$ ) and  $\pm 1\%$  RH. By analyzing the rate of change in temperature or the moisture content in the environment, the control system anticipates what is going to happen in the room, not simply responding to what has happened.

### Designed For Energy Efficiency

Liebert DS provides maximum energy efficiency without compromising the accuracy and reliability demanded by sensitive electronics. All enhancements to energy efficiency are designed to reduce operating time of key components and increase the Mean Time Between Failure. This is accomplished by taking advantage of alternate sources of cooling by minimizing compressor operation when heat loads in the conditioned space are lower. Energy savings is also gained through the use of high efficiency components such as advanced digital scroll and 4-step semi-hermetic compressors.

### Quality, Rugged Construction

The durable design of the Liebert DS provides a stable, virtually vibrationless platform for compressor and fan operation:

- **Autophoretic® frame coating**—protects frame against corrosion for years of reliable service.
- **Welded frame**—14 gauge steel provides rugged construction, proven to withstand shipping and handling through ISTA (International Safe Transit Association) certified ship testing.
- **Durable powder coated exterior panels**—look good and stay that way.
- **Slot and tab sheet metal**—for consistent, quality construction.
- **Optional double-skin panels**—eliminate insulation in the air stream. This allows for easy panel cleaning.
- **Optional floorstands**—Adjustable standard and seismic-rated floorstands allow for installation and connection of the system prior to the installation of the raised floor. Available in heights from 6" to 36", a field installed turning vane may be specified.







### Front Access And Serviceability Save Valuable Floor Space

Total front access provides space and serviceability benefits not found on previous models or competitive units.

The Liebert® DS™ can be placed adjacent to or in back of other equipment or against a wall or partition.

All key components are visible and accessible—from the front of the unit for easy maintenance and removal.

Compressors are removable from front—isolated from air stream for easier maintenance.



### Modular Frame Construction

The unit's modular frame construction allows even more flexibility in meeting specific needs for installation, energy efficiency and other special requirements.

The frame can be field-separated into three sections—enabling the unit to fit into small elevators or through other tight spaces.

## Flexible Cooling Configurations

The Liebert® DS™ provides a complete environmental control package, including both precision air conditioning as well as humidity control. Both upflow and downflow configurations are available to cover raised floor and non-raised applications.

The Liebert DS product line has been designed to cover the widest possible range of application requirements. These include choice of airflow configuration, cooling method options and many other selections that will create the most effective and efficient system for your facility.

### Liebert DS Units Can Be Configured For Optimum Cooling Of Any Type Of Space

**Downflow** configurations are designed for use in raised floor applications such as data centers and other facilities housing sensitive electronic equipment. The Liebert DS downflow configuration combines top air return with bottom air supply to circulate air underneath the floor.

**Upflow** units can be specified in situations where the floors are not raised, such as communications facilities, industrial control rooms and laboratories. These units can supply air directly into the room or be connected to distribution ductwork.

### Compressorized Systems Offer Flexibility, Efficiency, Reliability

Long recognized as the standard in environmental control systems for data center operations, Liebert DS compressorized systems are built to the highest specifications in the industry with proven components and design. They feature direct expansion operation in four types of cooling configurations: air cooled, water cooled, glycol cooled and our exclusive GLYCOOL free-cooling option.

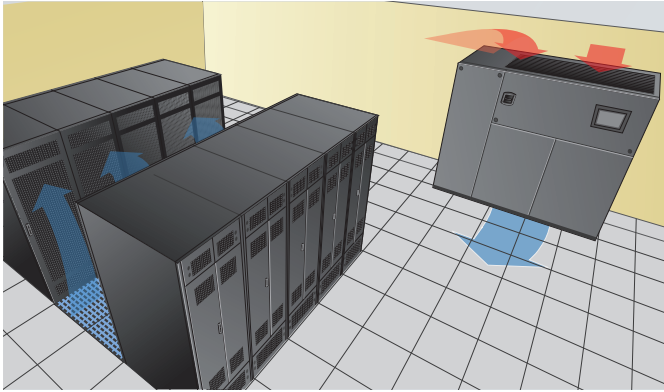


*Liebert DS Downflow*



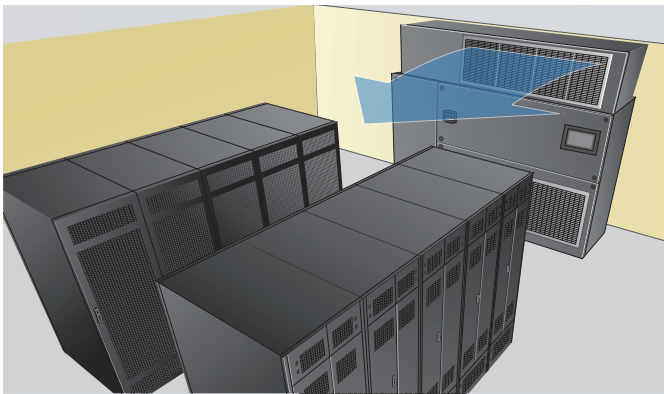
*Liebert DS Upflow*

## The Widest Variety Of Air Supply Choices



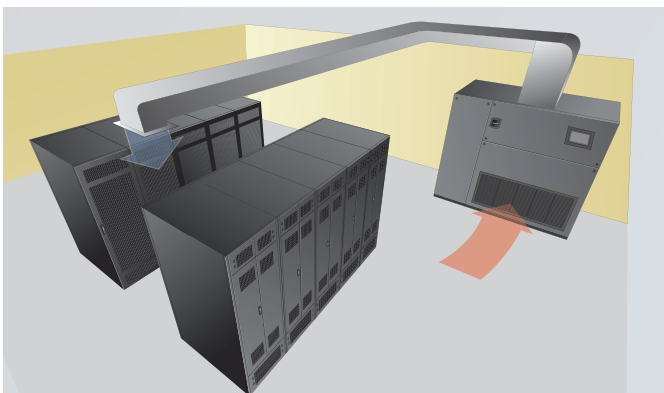
### Downflow Supply

Designed for raised-floor applications, the downflow air supply configuration is commonly found in data centers and other similar facilities housing sensitive electronic equipment.



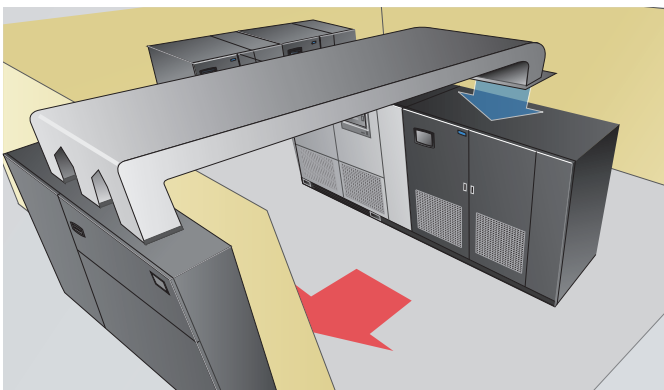
### Top Front Supply with Plenum & Grille and Front Return

In-the-space applications without ductwork, such as Telecommunications, Networks and Switching Centers, benefit from this economical configuration. Optional high filtration may be desirable.



### Top Front Supply and Front Return

Engineered for in-the-space applications utilizing duct work, this airflow design is commonly used for Telecommunications or Industrial applications. High static pressure and filtering options may be selected.



### Top Rear Supply and Rear Return

Designed for use in out-of-space applications, this configuration is typical for Industrial Processes such as Control Rooms, and Labs. Many of these sites will select a higher static pressure and optional high efficiency filters. (Customer ducted supply and return)

## Air Delivery System Designed For Optimized Air Distribution And Long Service Life

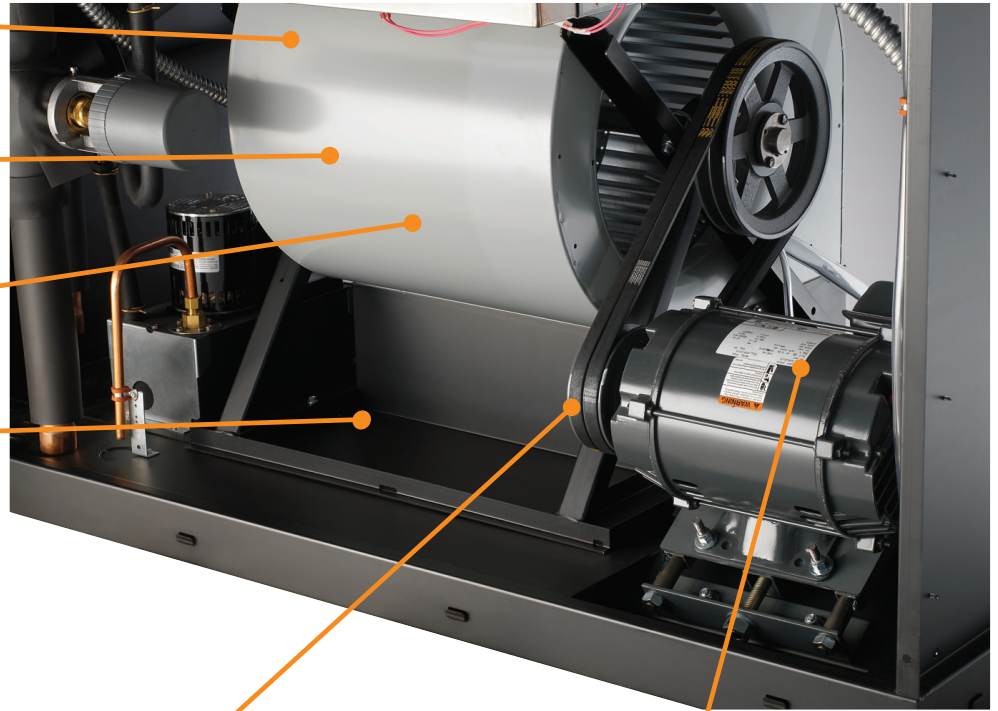
5-YEAR WARRANTY on drive components (bearings, belts, shaft, pulleys).

Centrifugal blowers enable performance over a wide range of air volume and static pressure ranges.

Pillow block fan bearing with minimum L3 life of 200,000 hours.

Static regain duct improves underfloor air distribution.

- Constant delivery of full airflow to keep delivering cold air when needed.
- Flexibility for high filtration or external static pressures up to 2.5"(625 Pa).



Pentadrive™ Blower - Special 5-year Liebert Belt. Automatic self-tensioning motor base increases belt life and reliability of shaft and bearings.

High efficiency motor meets NEMA Premium motor standard.

**Computers and other sensitive electronics require greater air volumes than comfort air conditioning can provide. The high density heat load in the relatively small space of a data center requires more air changes to remove heat properly. A key to the outstanding performance of the Liebert® DS™ is its optimized air delivery design. It combines high efficiency and effective air handling to deliver reliable, constant cooling under the most demanding conditions.**

### Pentadrive™ Blower System

Large capacity fans are dynamically balanced to minimize vibration and provide even air distribution. The low velocity fans use less fan motor energy and operate more quietly than forced air blowers. Filtered air at the right temperature and humidity is fed positively and evenly into the room.

### Motors

The Liebert DS features fan motors that are optimized for reliability and energy efficiency.

**High-efficiency open drip-proof motor** meets National Electrical Manufacturers Association (NEMA) Premium motor standard.

### Motor Options

- Optional TEFC (Totally Enclosed Fan-Cooled) motors—for rugged industrial environments.
- Optional larger horsepower motors available—for higher air volume or higher static pressures.

## Energy Efficient Fan Selections



### Variable Speed Drive (VSD) Fan Motor

Liebert® DS™ models with digital scroll are available with an optional variable speed drive (VSD) on the fan motor used to drive the centrifugal blowers, matching the motor speed to the room cooling requirements.

This feature allows the unit to use far less motor energy to move room air. The VSD drive is controlled by the Liebert iCOM control system to match the speed of the blower with the compressor load consequently the load in the room. This option eliminates excessive energy use due to an oversized design or changing room conditions.



The downflow floormount Liebert DS models, larger than 12 tons, are now available with energy efficient EC Plug Fans.

**These energy efficient fans add to the superior efficiency already achieved by the use of a traditional variable speed drive system. In fact, many utility companies offer a rebate for using these energy efficient options – check with your local utility for details.**

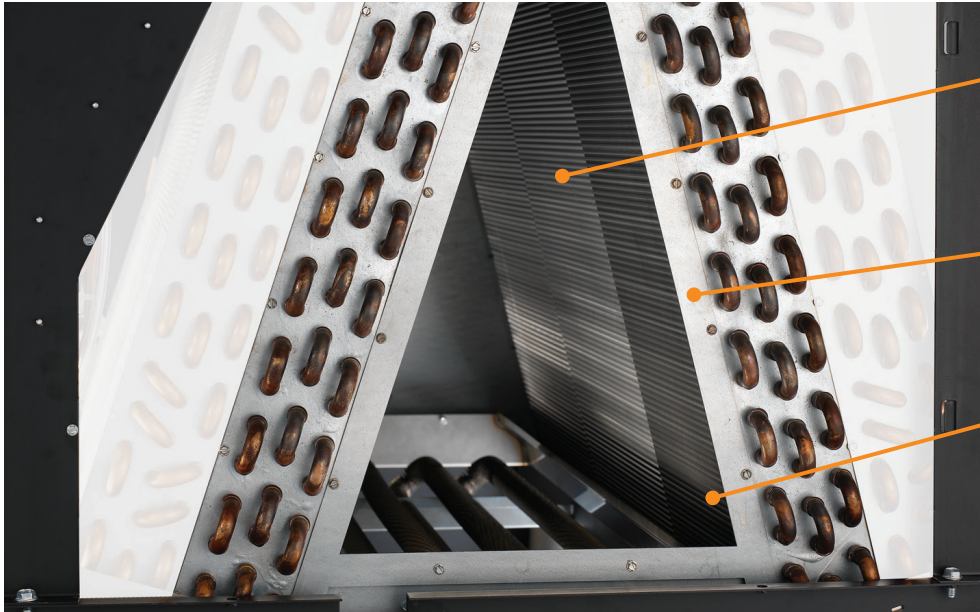
The Liebert DS with EC Plug Fan delivers energy efficiency gains via the fan system. These electrically commutated fans are a backward curved motorized impeller powered by a direct drive DC Motor with integrated AC-DC conversion.

This design uses less energy than standard centrifugal blowers by lowering motor kW. The EC Plug Fan uses 10-30% less energy on average than standard AC motors.

The EC Plug Fan is located in the area beneath the raised floor or within the unit. Superior energy savings can be realized with the fans located beneath the raised floor. Placing the fan in the raised floor space, is 30 percent more energy efficient than centrifugal blowers. The EC Plug Fan also provides greater energy savings than variable speed drives.



## Dependable, Effective Cooling System



Draw-through design pulls air evenly through the cooling coil, reheat and humidification systems.

Optional polymeric coating on coils protects against corrosion due to harsh environments.

A-frame coil design maximizes coil area, reduces air velocity, lowers chance of water blowing off coil, results in far less turbulence with superior efficiencies in heat transfer.

**At the heart of the Liebert® DS™ are its cooling system components, each designed to provide maximum reliability.**

### A-Frame Coil

This Liebert designed and manufactured A-Frame coil features a large face area/low face velocity design for precise control of cooling and dehumidification—and is designed to optimize heat transfer and minimize pressure drop.

### Dual Refrigeration Circuits For Redundancy

Dual compressors and refrigeration circuits assure reliability and feature automatic sequencing for even wear of components.

- **Components include** dual compressors and dual refrigeration circuits enabling the system to operate even if one circuit fails.
- **Pump-down evacuation of refrigerant from compressor crankcase** shields the compressors from the “hard starts” that can shorten their life.

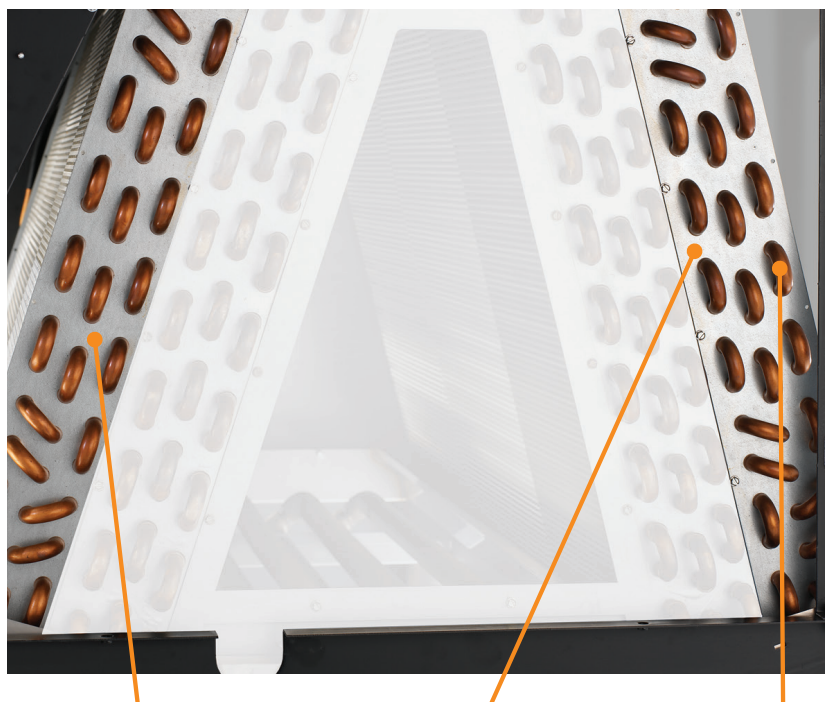
### Refrigeration System Features

Each refrigeration circuit includes:

- **Sight glasses** serve as a means of quick visual inspection to determine if there is moisture in the system and if the system is properly charged.
- **Refrigerant dehydrators** assure a moisture-free refrigerant system for extended component life.
- **Expansion valves** – Externally equalized expansion valves smoothly control refrigerant flow during indoor heat loads and outdoor ambients by controlling evaporator superheat.
- **Muffler** – Specially engineered mufflers afford a quiet pulsation-free refrigeration system.
- **Safety controls** – Each compressor has an automatic reset high pressure switch which locks-out after the third trip. A low pressure transducer protects against coil freezing and low refrigerant pressure.



## Hybrid Designs Offer Maximum Energy Efficiency



Optional 70/30 Cu/Ni free-cooling coil must be specified to prevent tube corrosion when used with a cooling tower loop or other open water system.

Provides redundancy and energy savings for increased ROI.

Optional econo-coil rests on an A-frame coil to minimize air pressure drop and increase efficiency.



Dual Cooling coil increases availability by using building chilled water as primary, compressor as back-up.

For even greater efficiency and reduced operating costs, Liebert® DS™ offers energy saving alternatives such as our GLYCOOL and Dual Cool options. Used where the climate permits, a conventional air or water cooled direct expansion system adds a second cooling coil which utilizes a building chiller supply to reduce compressor operation.

### GLYCOOL™ System

The Liebert GLYCOOL freecooling system incorporates a conventional glycol cooled unit along with the addition of a second cooling coil, control valves and a comparative temperature monitor. This allows the system to take advantage of cooler outdoor temperatures to reduce or eliminate compressor runtime.

During colder months, the glycol solution returning from the outdoor drycooler is routed to the second coil by a pre-piped modulating three-way valve. Located

upstream of the evaporator coil, the second coil becomes the primary source of cooling for the room. This coil is sufficiently sized to offer the identical cooling capacity as is obtained during the refrigeration cycle of both compressors.

### Dual Cool

Utilizing this option, a conventional air cooled Liebert DS is converted to a dual source cooling system by the addition of a second coil that utilizes a central building chiller supply. Using a modulating control valve and a comparative

temperature sensor, the unit can function either as a chilled water system, as a compressorized system—or a combination of both.

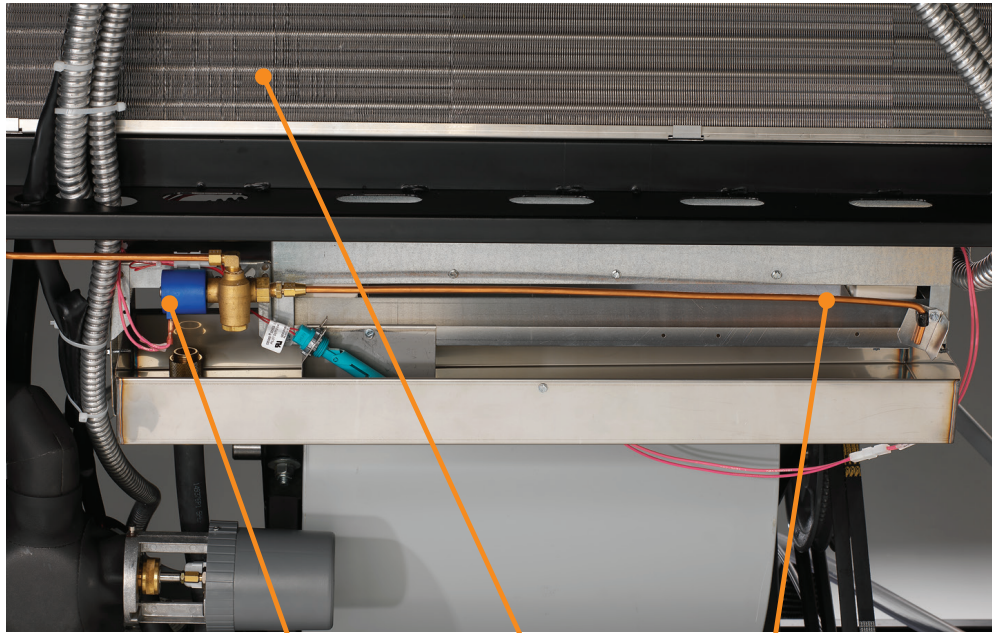
During times when the chiller supply is available, compressor operation is eliminated, reducing energy costs. Switchover between the two cooling modes is performed automatically by a microprocessor control and temperature sensor. In addition to energy efficiency, this option can provide increased redundancy and flexibility to the environmental control system.

## Air Delivery System Designed For Optimized Air Distribution And Long Service Life

**A key to the ability of a quality Precision Cooling system to control conditions within the critical space is its high “sensible heat ratio.”**

Unlike people, computers generate dry or “sensible” heat, but not humidity. With a large percentage of their total capacity devoted to the removal of moisture, comfort systems can lower room humidity far below acceptable standards for electronic equipment—and they have no provisions for adding moisture.

To correct this situation, precision air conditioning systems typically have a high ratio of sensible-to-total cooling capacity to remove heat from the air. This capability is provided through the use of integrated humidification systems to provide the necessary level of moisture control, higher air supply capacity and larger coil size.



### **Standard Infrared Humidifier**

Humidifier makeup valve controls flow of water to the humidifier pan.

Pure water vapor provides most effective humidification.

Does not depend on water quality. High-intensity quartz lamps shine on water creating instantaneous moisture using almost any water quality.

### **Humidity Control**

Maintaining the correct humidity level in the room is just as important as maintaining proper temperature. Inadequate humidity control can cause static electricity if it's too dry—or condensation that can corrode circuitry if the air is too moist. The Liebert® DS™ utilizes an integrated humidification system to provide the necessary level of moisture control.

#### **Standard Infrared Humidifier**

- Instant Humidification—on when needed, off when not needed.

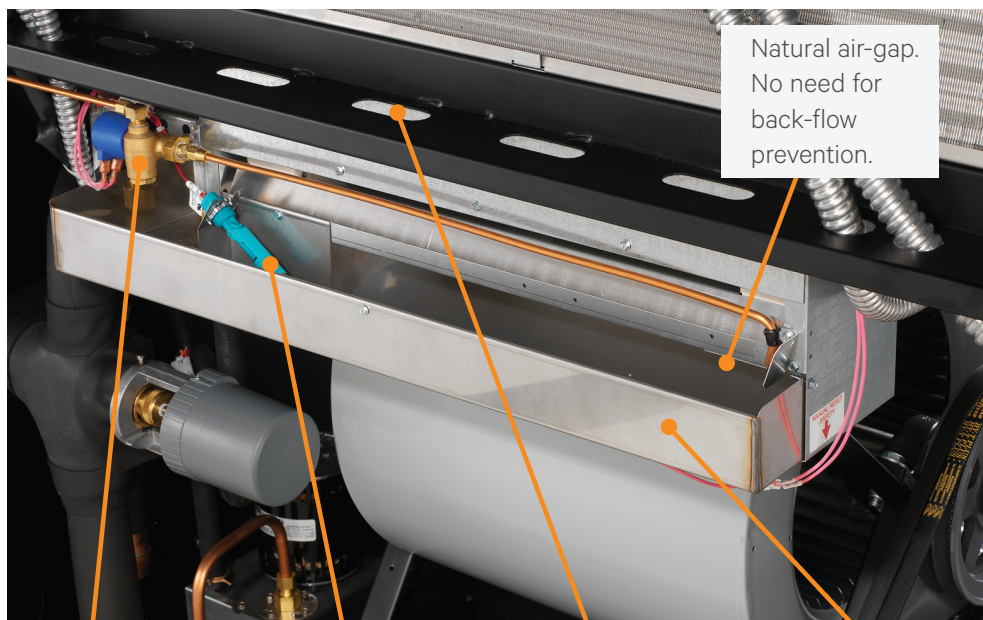
#### **Optional Steam Generating Canister Humidifier**

- Utilizes replaceable bottle—requires a specific water quality level for optimum operation.
- Utilizes a drain and refill cycle—to maintain a current setpoint.

### **Dehumidification Control**

The compressors operate at full capacity during dehumidification. The precision control of the Liebert DS saves energy by tightly regulating compressor operation and avoiding over dehumidification that causes the humidifier to come on when not needed.





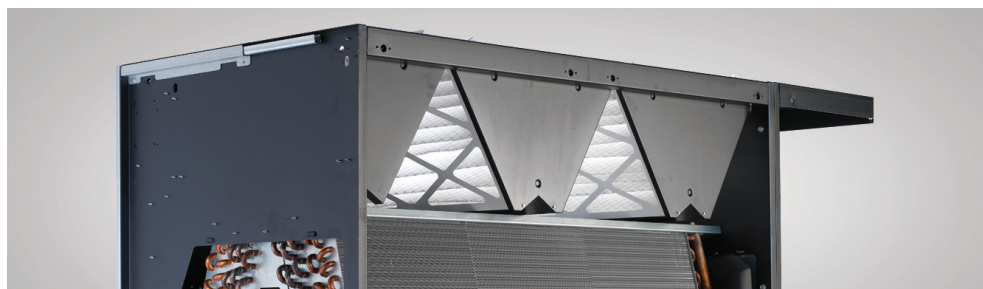
Autoflush system reduces build-up of mineral deposits and impurities in the water pan.

High water float switch shuts down humidifier upon high water.

Bypass air slots ensure that moisture can be introduced into air stream.

Cleanable stainless steel humidifier pan. Removable from front.

Natural air-gap. No need for back-flow prevention.



## Filtration System

The Liebert® DS™ features integral air filtration to protect against airborne contaminants within the critical environment. Without proper air filtration, even small amounts of dust and other particles can damage storage media and charged electronic components.

- **High-efficiency air-filtration**—removes damaging particles from air.
- **Standard filter**—4" deep, Merv 8. (45% ASHRAE 52.1).
- **Optional high-efficiency filter**—4" deep, Merv Merv 11 (60-65% ASHRAE 52.1)
- **Optional 2" Merv 8 pre-filter** with 2" Merv 11 filter.
- **V bank filter arrangement**—reduces air pressure drop, top filter access.



## Reheat Function

The reheat function of the Liebert DS is primarily used to keep the temperature from going too low during the dehumidification cycle.

### Standard Reheat

- **Three-stage electric reheat**— low watt-density, 304 stainless-steel fin-tubular reheat, location maximizes airflow to maximize element life and improve reliability.

### Reheat Options

- **SCR electric reheat**— For specialized applications requiring tight temperature control. Multiple pulses of reheat vs. three equal stages provide smooth temperature adjustment.
- **Optional hot water reheat**— Uses existing building hot water, saving energy.
- **Reheat/humidifier lockout**—Reduces power requirements during emergency power operation.

## A Choice Of Compressors Offers Higher Efficiency, Adaptability And Reliable Operation

### It Starts With Reliable Scroll Compressor Technology

The scroll compressor design provides high efficiency, low sound levels and excellent durability. The Liebert® DS™ precision cooling system is available with either:

- A standard fixed-capacity scroll compressor.
- An optional Digital Scroll compressor with energy saving, variable capacity operation.

### The Standard Scroll Compressor: Rugged, Quiet, Efficient

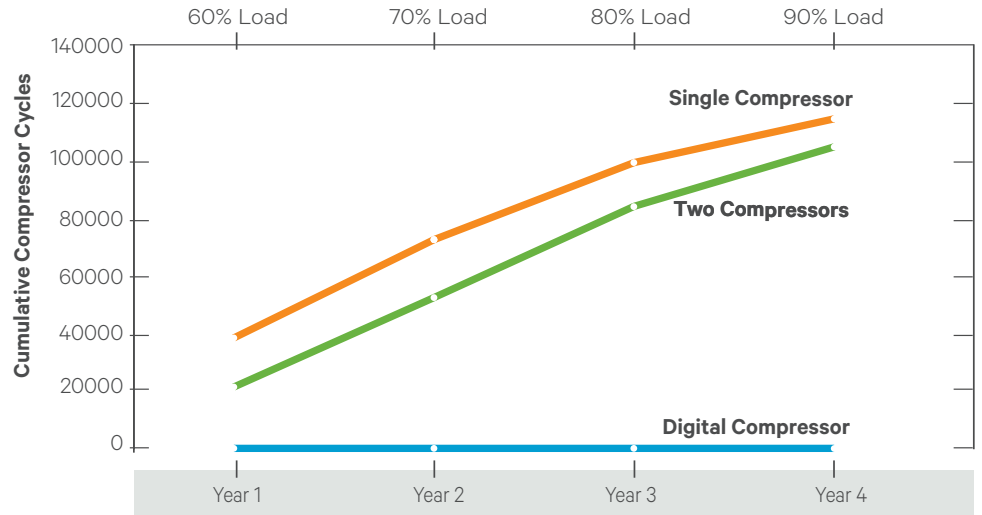
The standard scroll compressor offers efficient, reliable performance with a robust design that contains only a few moving parts. Quiet operation is accomplished through a continual, smooth compression process. Discharge gas and vibration are kept at a low level.

### The Digital Scroll Compressor: A New Standard For Performance and Reliability

The exclusive digital scroll compressor option on the Liebert DS utilizes the latest control technology to deliver precise operation and significantly higher energy efficiency. In addition to the advantages of the dependable scroll design, Digital Scroll technology provides infinitely variable capacity modulation that enables the output to precisely match the changing cooling demands of the room. This approach is as much as 30 percent more efficient than traditional hot-gas bypass. Benefits include:

- **Greater energy savings**—variable capacity system allows maximum load tracking for higher efficiency.
- **Improved reliability**—by reducing compressor cycling and component wear.
- **Improved performance**—the compressor can easily adapt to changing load conditions, providing precise temperature control.

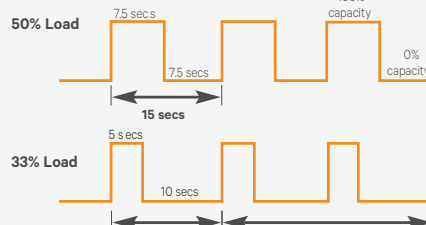
### Cumulative Compressor Cycles As Load Grows From 50% To 100%



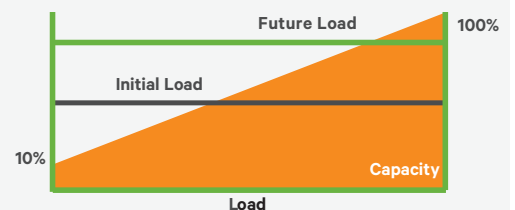
Increasing compressor cycling takes a toll on compressor life. Liebert Four-Step Semi-Hermetic compressors and Digital Scroll compressors automatically adjust to yearly increases in heat load, providing significantly greater component life than other compressor technologies.



### Digital Scroll Capacity Control Diagram



### Digital Scroll Capacity adapts as load changes

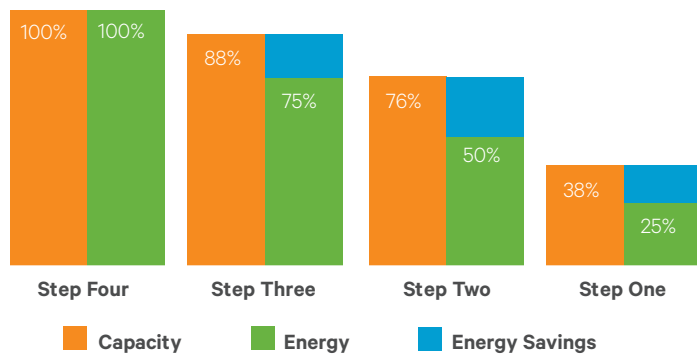


## Four-Step Semi-Hermetic Compressors: Proven Performance

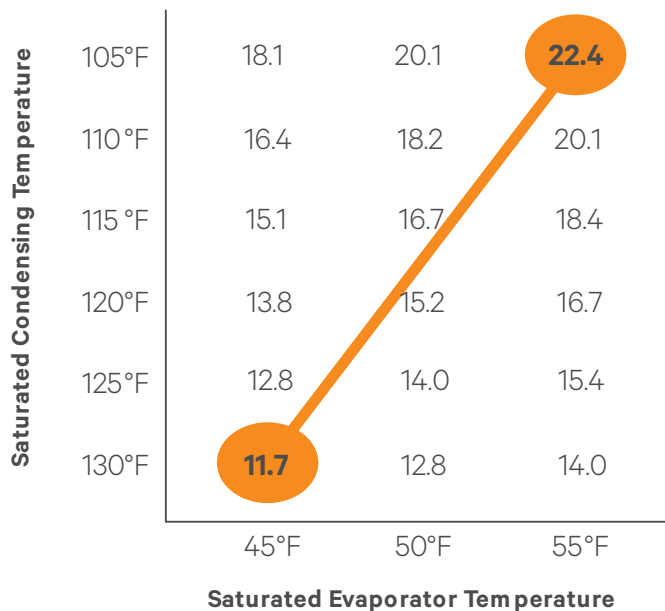
The Liebert® DS™ Four-Step system achieves high levels of energy efficiency through the integration of two high-efficiency semi-hermetic compressors with capacity control valves, an advanced microprocessor control system and a computer-optimized cooling coil.

The Four-Step system reduces compressor cooling capacity and energy consumption during periods of low room load conditions. As a result, four distinct stages of cooling are activated to more closely respond to changing room conditions. Reliability is enhanced by fewer and less stressful compressor starts for reduced wear.

### Energy Savings



4-Step Compressor Operation Improves Energy Efficiency Ratio



## New Refrigerants To Meet Government Regulations

Without the ability to utilize newer environmentally-friendly refrigerants, your cooling equipment could become obsolete and “out of compliance.” The Montreal Protocol and EPA Clean Air Act require cooling equipment manufacturers to switch to environmentally-friendly refrigerants by 2010.

- **R-407C** environmentally-friendly refrigerant is the standard in the Liebert DS.



Semi-Hermetic Compressors

## Liebert® iCOM®

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

### Various Intelligent Control Methods

- Return Air Temperature is a traditional method that changes the unit capacity based on the return air temperature to the unit
- Supply Air Temperature is a method that changes the unit capacity based on the unit outlet air temperature.
- Static Pressure Control uses a single pressure sensor to adjust the fan speed. The airflow compensates for floor tile layout changes.

Dynamic Cold Aisle Management (DCAM) separates the fan speed and cooling capacity to meet the server air volume and heat load. This allows less energy to be used for the same amount of cooling.

### 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 Communications allows Lead/Lag and optional teamwork settings for maximum flexibility of control of up to 32 units per zone and up to 99 zones per network.



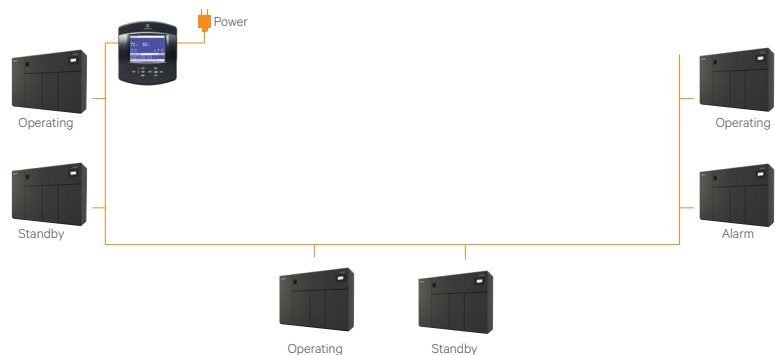
The Optional Wall Mounted Large Graphic Display provides centralized monitoring and control of connected Liebert DS units.



The optional vNSA with iCOM combines a Wall Mounted Large Graphic Display along with a network switch to facilitate U2U wiring in one convenient cabinet.

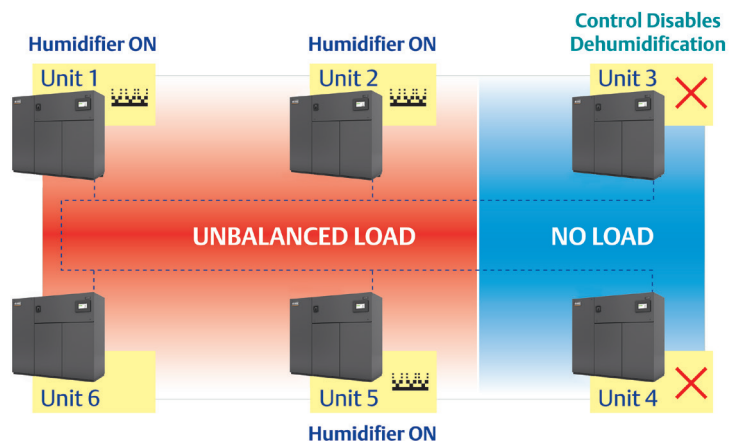
### U2U Configuration 2

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



### Teamwork: Mode 2

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







## 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) Communication mode for Teamwork or Lead/Lag from a centralized 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 authorized users or logged-in service contacts, including record of what others have done.

USER MENU		
RETIVE PLANTS	EVENT LOG	
SPARES	UNIT 01	
DESCRIPTION	QTY	PART #
MAIN FAN MOTOR	1	B-025A
FAN BELT	2	B-0600
AIR FILTER	4	A-0010
COMPRESSOR	2	1C18810P2
HEATER ELEM	3	148367P19
HUMIDIFIER LAMP	4	H-0020

Spare Parts

SERVICE MENU		
UNIT 01		
UNIT DIARY		
09.13.2004	No problem found	Fred
08.23.2004	Set 77 °F as setpoint, convinced customer that 68 °F is far too low	Jim
08.22.2004	Filters changed, were dirty	John
08.16.2004	Routine Maintenance performed.	Jack

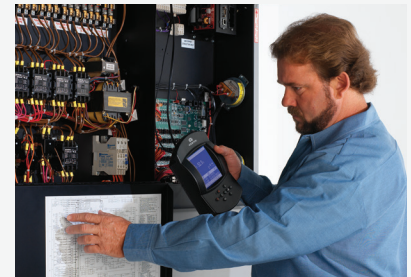
Unit Diary

STANDBY SETTINGS / LEAD-LAG		SYSTEM
S501	PASSWORD (Actual Level 0)	????
S502	Number of Standby Units	0
S503	Rotation Frequency	No
S504	Rotate at (hour)	00
S505	Rotate at (minute)	00
S506	Rotate by	1
S507	Perform one Rotation	No
S508	Cascade Units	No
S509	Start all Standby Units by HT	No
S510		
S511		

Standby Settings (Lead/Lag Set-up)



Removable display makes troubleshooting servicing easier.



Parts list available on control for easier maintenance. On-board Unit Diary provides a maintenance history to any authorized user.

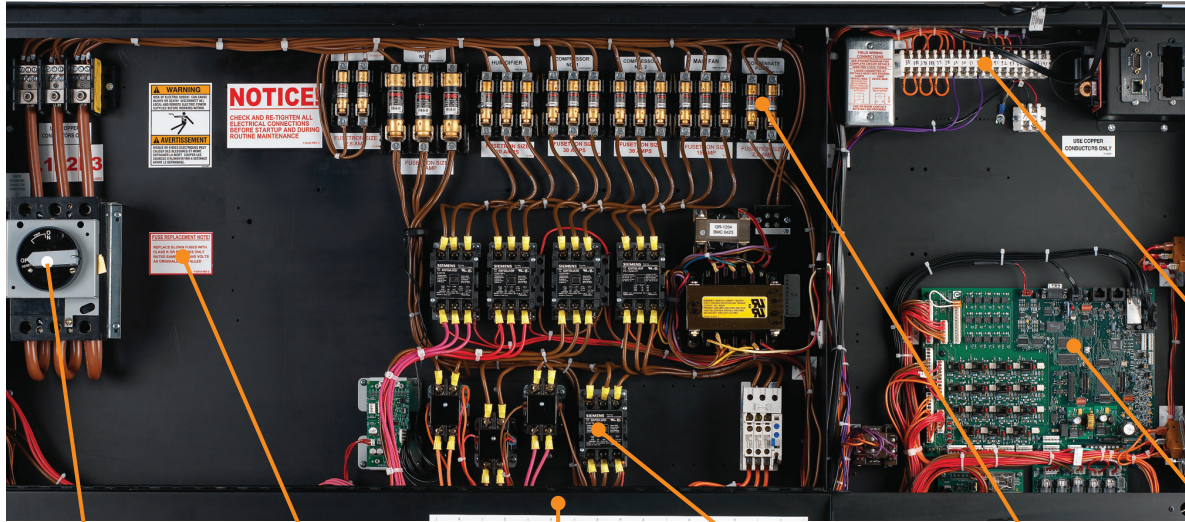


Monitors all key system functions and reports to alarm, if needed. On-board Unit Diary provides a maintenance history to any authorized user.

## Easy Component and Control Option Access

### Electric Panel

The electric panel of the Liebert® DS™ is designed for easy access to critical electrical and control components.



Optional disconnect switch available as non-locking or locking.

Location for optional secondary disconnect switch for non-critical loads.

Deadfront panel folds down for easy viewing of electrical schematic.

Optional solidstate contactors used on SCR reheat for tight temperature applications.

Individually-fused components high-rated fuses for maximum reliability, high interrupt rating, and cooler operating fuses for maximum reliability.

IntelliSlot™ for easy plug-in of optional communication cards.

Low voltage terminal strip provides connection flexibility.

Control interface board for easy access.

### Unit Monitoring And Control Options

- Dual float condensate pump—installed in unit, with secondary float to shut down unit and trigger alarm if high water detected.
- Optional low voltage terminal package—two extra n/o common alarm contacts, two extra remote shutdown terminals, one main fan auxiliary contact. When connected to an optional water sensor, shuts down unit and provides dry contact closure.
- High temperature sensor—alerts users to any high temperature situations within the system. Senses return air temperature and shuts down unit if temperature exceeds 125°F (51.7°C).
- Smoke sensor—senses the return air, shuts down the unit upon detection, and sends visual and audible alarm. Dry contacts are available for a remote customer alarm. This smoke sensor is not intended to function as, or replace, any room smoke detection system that may be required by local or national codes.
- Analog input wiring—includes four customer-accessible analog inputs for sensors provided by others. The analog inputs accept a 4 to 20 mA signal. Gains Calibration for each input are programmable from the front panel.
- Compressor overload—activates an audible and visual alarm in the event of a compressor overload.
- Main Fan Overload—activates an audible and visual alarm in the event of a motor overload.

## Paradenser™ Cleanable Condenser Provides Liebert® DS™ With Longer Service Life

Liebert DS offers the new Paradenser condenser for use in water/glycol systems. This patented component utilizes a counter-flow design and features a shell and tube type construction.

- Fully cleanable—eliminates costly condenser failures due to plugging and providing a longer service life. This reduces fouling and scaling which can degrade heat rejection performance and result in cooling system shutdown.
- Large water passages prevent plugging and allow for conventional tube cleaning methods.
- Sturdy, corrosion-resistant materials—Steel shell, copper tubes, and nickel-plated plug are durable, non-corrosive and easy to clean.
- Shell side of the condenser acts as a receiver—holds refrigerant charge during pumpdown.
- Utilizes no gaskets—offers further reliability by preventing leaks.



- Fully cleanable Paradenser tubes are located for convenient maintenance.



## Liebert® Heat Rejection Systems—Flexible Configurations To Meet Application Requirements

### Liebert Condensers & Drycoolers

Vertiv™ manufactures its own high-efficiency Liebert air cooled condensers and drycoolers that are precisely matched to the heat rejection requirements of our precision air conditioning systems. Constructed with an aluminum cabinet and a copper-tube aluminum-fin coil, these exceptionally dependable units are corrosion resistant and designed to operate for prolonged periods of exposure to the worst weather conditions. Liebert condensers and drycoolers are fully factory wired and tested for easy installation.



- **Wide range of heat rejection solutions**—vertical or horizontal airflows, indoor or outdoor models, freestanding or ducted configurations.
- **Standard units**—Sized for maximum outdoor ambient temperatures of 85 °F (29.4°C) to 105°F (40.6°C).
- **Liebert VFD Control Condenser**—Features a variable frequency drive (VFD) and an inverter duty fan motor with ceramic bearings. The VFD control integrates pressure variations from either compressor operation, including digital scroll compressors, using pressure transducers and modulates the condenser fan motor speed to hold condensing temperatures constant. This system allows for operation at ambient temperatures as low as -20°F (-28.9°C).
- **Fan Speed Control Condenser**—A fan-speed control varies the variable speed fan motor based on compressor head pressure to maintain constant condensing temperatures. This system allows for operation at ambient temperatures as low as -20°F (-28.9°C).
- **Drycoolers, Pumps, Tanks and Controls**—Complete heat rejection solutions for glycol-cooled and GLYCOOL units consist of drycoolers, glycol pumps, expansion tanks and integral or separate pump electrical control boxes.
- **Quiet-Line™ Condenser/Drycooler**—Operate with the lowest noise level of any heat rejection available, offering levels of less than 57 dBA.
- **Indoor Piggyback Condenser/Drycooler**—Indoor condensers/drycoolers designed to provide heat rejection by ducting air from outside the building, such as high-rise buildings.
- **Outdoor Centrifugal Condenser/Drycooler**—Centrifugal drycoolers suitable for outdoor or indoor mounting, providing heat rejection for unique applications requiring ducted airflow.
- **High Ambient Condensers**—Utilize increased coil surfaces for operation in outdoor climates up to 120 °F (48.9 °C).

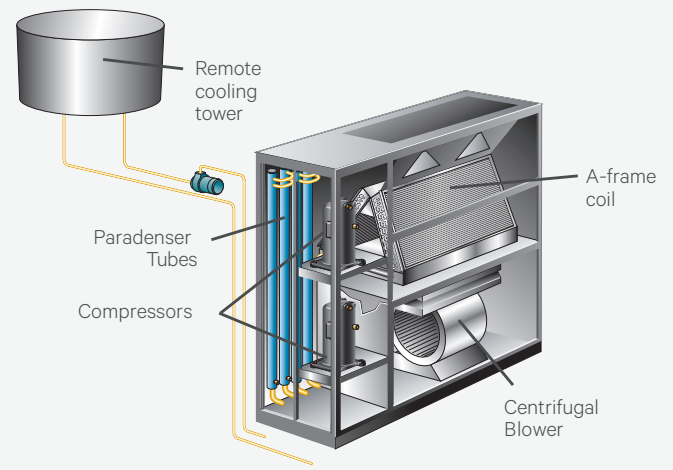
## The Liebert® DS™ Has A Solution To Meet Your Critical Needs

### No Other Precision Cooling System Offers This Much Flexibility

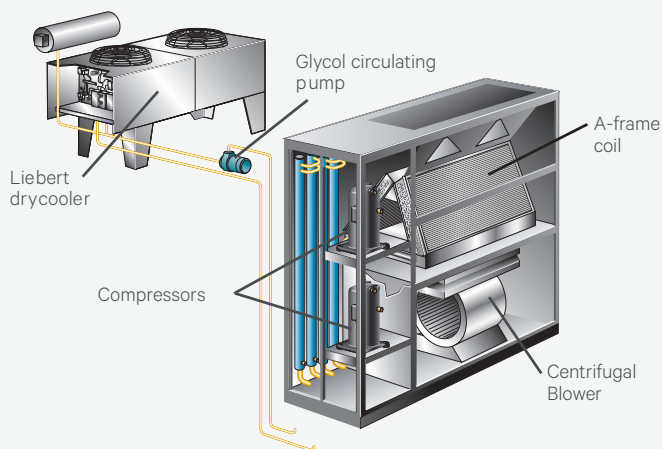
Long recognized as the standard in environmental control systems for data center operations, the Liebert DS is built to the most demanding specifications in the industry with proven components and design.

Liebert DS features compressorized direct expansion operation in air cooled, water cooled and glycol cooled configurations, as well as GLYCOOL™ free-cooling models and chilled water systems.

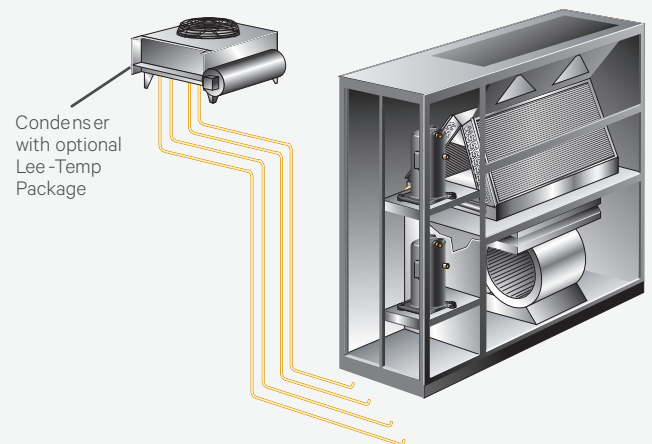
#### Water Cooled



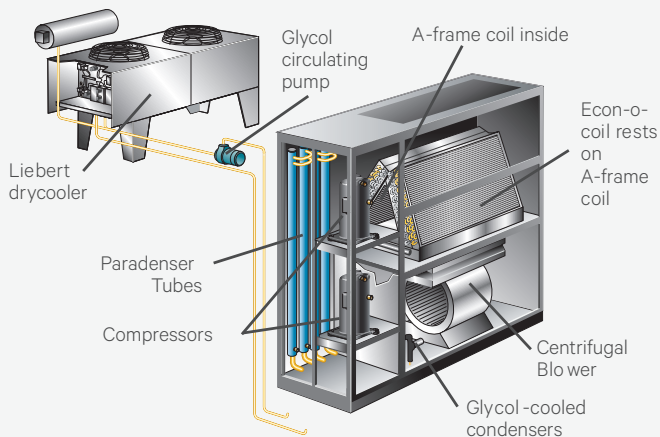
#### Glycol Cooled



#### Air Cooled

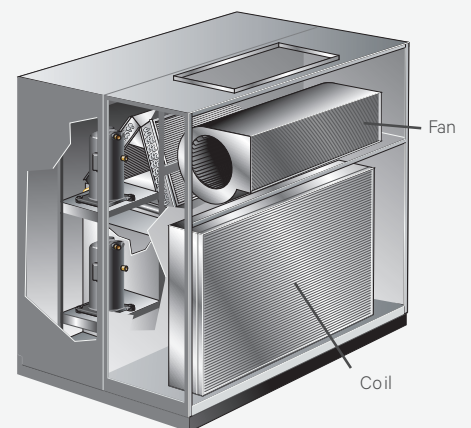


#### GLYCOOL™ System with free-cooling cool



#### Piggyback Heat Rejection Configurations

Air-cooled or Glycol-cooled configurations available



## Stand-Alone Monitoring And Leak Detection Solutions

Autonomous microprocessor controlled modules are available to provide supervision, control and remote notification of Liebert® precision cooling equipment. These stand-alone devices include:

### Liebert Universal Monitor

The Liebert Universal Monitor is an all-purpose, easy-to-use microprocessor-based monitoring panel with connections for up to 8 digital inputs, 8 digital outputs and 4 analog inputs. Designed to bring critical monitoring information directly to your facility or offsite location, the unit includes an on-board modem to provide remote monitoring while minimizing configuration and installation requirements. It features a built-in LCD user interface, making the panel self contained and accessible without additional hardware and software.

### Contact Closure Alarm Panels

The Liebert RCM series of contact closure alarm panels provides customized alarm indication at a single location for any dry contact input from environmental, power and UPS systems, including Liebert units. These remote systems continuously monitor your most critical support equipment and instantly alert you to alarm conditions. Three different system configurations are available for monitoring up to eight points with communications and pager interface plus eight digital outputs.

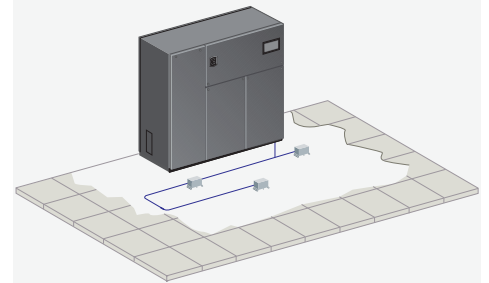


*Liebert Universal Monitor*

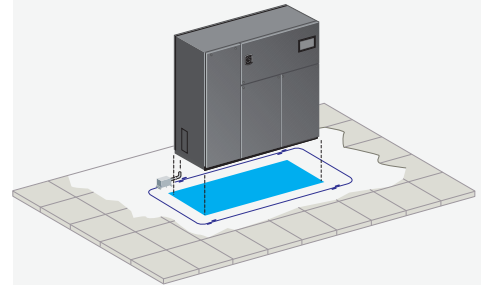
### Temperature and Humidity Recorder

A seven-day temperature and humidity recorder permits close examination of computer room environment condition and can be used as a permanent record of the environmental control system's operation efficiency.

### Liqui-tect 410 Point Leak Detection Configuration



### Liqui-tect 460 Zone Leak Detection Configuration



### Liebert Leak Detection Modules

Liebert Liqui-tect® leak detection systems provide quick sensing and accurate reporting of leaks below the floor or above the ceiling in critical facilities. These reliable systems provide immediate warning and precise location, allowing you to find and correct a leak before moisture can damage computers, wiring connections or other sensitive electronics.



## Maximizing Your Investment Through Adaptive Monitoring

### Distributed Management With Liebert® IntelliSlot® Interface Cards

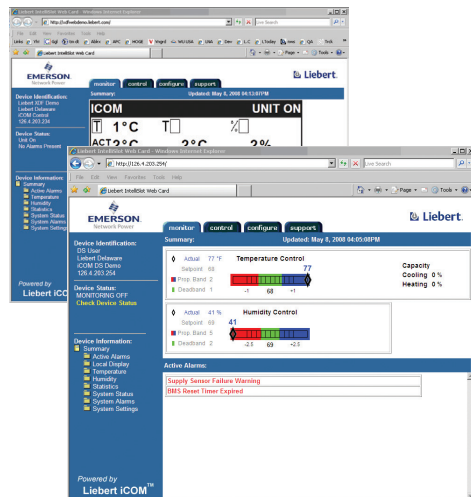
For enhanced remote communications and control of your Liebert units, the Liebert IntelliSlot Web and 485 Cards deliver the communication capabilities you require.

#### Monitoring and control through your existing Network with no additional software required.

Each Liebert system equipped with an Liebert IntelliSlot Web Card takes full advantage of your Ethernet network, allowing remote monitoring from your computer desktop, network operations center or wherever network access is permitted, without the need for front-end software.

#### Monitoring integration with your existing Building Management System.

A Liebert system equipped with an IntelliSlot 485 Card can be seamlessly integrated with your existing Building Management System.



Liebert IntelliSlot Web

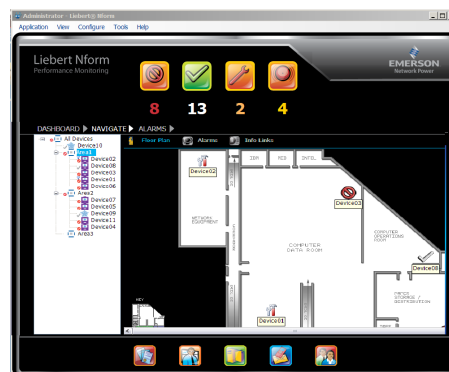
### Centralized Management With Liebert Nform™ Software

As business grows, your critical equipment infrastructure will expand, thus the need for centralized management of this equipment will be key to your business success. Connecting to equipment in the distributed critical space is only part of the monitoring challenge.

#### Liebert Nform leverages the network connectivity capabilities of your Liebert equipment to provide a centralized monitoring view of your distributed equipment.

Utilizing the SNMP and Web technologies built into each of the Liebert IntelliSlot communication cards, Nform will centrally manage alarm notifications to provide you with an easy interface to access critical status information.

Liebert Nform puts critical systems information at the fingertips of support personnel—wherever they are—increasing responsiveness to alarm-event conditions, thus allowing IT organizations to maximize their system availability.



Liebert Nform

### Enterprise Management with Liebert SiteScan® Web Software

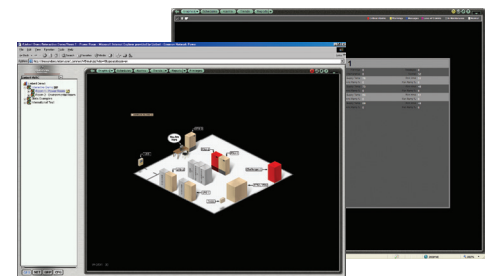
For customers who require extensive management of critical system equipment that may span multiple locations in an ever-moving global enterprise, Liebert SiteScan Web will centrally manage your critical equipment and give you the power to move beyond the event-responsive service paradigm.

#### SiteScan Web does it all—

- Real-Time Monitoring and Control
- Event Management and Reporting
- Data Analysis and Trending
- Building Management Integration

Liebert SiteScanWeb 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 SiteScan Web



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