



Liebert®

DSE™ Freecooling Economization  
50-250kW

Free Cooling Economization Without  
Using Water



**AHRI CERTIFIED®**  
[www.ahridirectory.org](http://www.ahridirectory.org)

Unitary Small AC  
AHRI Standard 210/240  
Certification applies only when the complete system  
is listed with AHRI.

Applies to 50kW-165kW models

## More Efficient. More Flexible. Smoother Transitions.

The air-cooled Liebert® DSE™ is world's leading pumped refrigerant economization solution for data centers, with more than 6000 installations globally.

It provides water-free, highly efficient free cooling throughout much of the year, and has fail-safe DX backup. Its innovative design makes it up to 75% more efficient than legacy systems, with more than two dozen configurations for virtually every data center application. The Liebert DSE complies with California Title 24 Building Energy Efficiency Standards.

## More Savings

Liebert DSE controls include an Optimization feature that improves upon the already industry-leading efficiency of the system.

- 50% more efficient via new optimized controls
- Comes standard on all new Liebert DSE units
- Available as retrofit to existing Liebert DSE units
- 18 month average payback period on retrofits

## The Liebert DSE solution lets you simplify every aspect of thermal management.

- 1. Add Capacity Efficiently** with a modular, scalable design and no need for additional chillers, cooling towers, or ductwork
- 2. Economize Easily** with automatic switchover
- 3. Operate Hassle-Free** with advanced controls and no water usage
- 4. Optimize Intelligently** with Liebert iCOM™ advanced thermal management system
- 5. Streamline Maintenance** with use of water, outside air, or manual adjustments

CITY	ANNUAL ENERGY USAGE <sup>1</sup>				
	TYPICAL DX SYSTEM	LIEBERT DSE SYSTEM	LIEBERT DSE SYSTEM SAVINGS	CHILLED WATER SYSTEM	LIEBERT DSE SYSTEM SAVINGS
Columbus	\$340,860	\$117,606	65%	\$294,220	60%
San Francisco	\$334,057	\$114,293	66%	\$189,221	40%
Phoenix	\$380,544	\$179,544	53%	\$213,015	16%

Compared to a 1MW data center using a chilled water cooling system with a water-cooled chiller plant, the DSE can reduce water usage by around 6.75 million gallons annually.

<sup>1</sup>1,000 kW Load, \$0.10 per kWhr, 70% load

## BENEFITS

### High Efficiency

Mechanical PUE as low as of 1.05 - 1.20

- Up to 75% more efficient than DX systems
- 26-53% higher SCOP at full load v. ASHRAE 90.1 standard
- Automated transitions capture every economization hour
- Expansion valves increase DX efficiency at low ambient temperatures

### Highly Flexible

- Split systems for indoor perimeter, gallery and full-face discharge airflow configurations

### Advanced Control

- Liebert iCOM™ controls provide smooth economization transitions
- Advanced, automated protection routines
- Multi-unit teamwork modes eliminate unit fighting
- Easy integration to BMS using onboard protocols

### Low Maintenance

- No water system to service
- No outside air dampers or louvers to manually maintain
- Virtual backdraft damper
- Fewer moving parts than other data center cooling systems
- Less refrigerant than traditional DX systems.

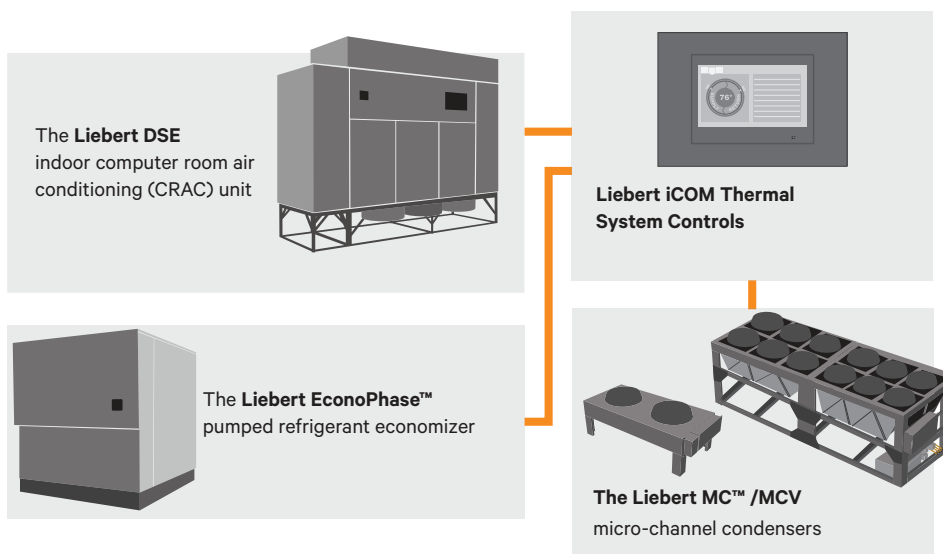


Applies to 50kW-165kW models

## Highly Efficient Performance

The air-cooled Liebert® DSE™ offers water-free economization, rapidly deployable configurations and advanced Liebert iCOM™ thermal controls that let you optimize each unit and harmonize multiple units for temperature and airflow.

A highly scalable and modular solution, the Liebert DSE easily accommodates changing IT loads and is ideal for upgrading outdated or inefficient cooling systems.



## Optimization Through Intelligent Controls

Each of the unit's main components – compressors, condenser fans, CRAC fans and refrigerant pumps – are coordinated by its integrated Liebert iCOM controls. These controls automatically manage economization phases, based on IT loads, return air temperatures and outdoor temperatures, to maximize the use of available economization hours.

		SPLIT-SYSTEM MODELS						
		DA050 <sup>2</sup>	DA080 <sup>2</sup>	DA085 <sup>2</sup>	DA125 <sup>2</sup>	DA150 <sup>2</sup>	DA165 <sup>2</sup>	DA250
95°F DB, 52°F DP	Total Capacity kW (net)	54	92	99	146	181	193	253
	Sensible Capacity kW (net)	54	92	99	146	181	192	253
	Full-load SCOP @ 95°F ambient	2.9	4	3.3	3.6	3.4	3.2	3.0
	SCOP @ 35°F ambient (kW/kW) <sup>1</sup>	8.5	12.0	11.0	10.0	8.6	8.6	8.4
85°F DB, 52°F DP <sup>2</sup>	Total Capacity kW (net)	49	84	90	130	165	177	228
	Sensible Capacity kW (net)	49	81	87	130	159	166	228
	Full-load SCOP @ 95°F ambient	2.7	3	2.9	3.2	3.0	2.8	2.7
	SCOP @ 35°F ambient (kW/kW) <sup>1</sup>	7.0	10.4	9.6	9.2	7.7	7.7	7.5

Calculations based on 1000kW load, \$0.10 per kWhr, 70% load

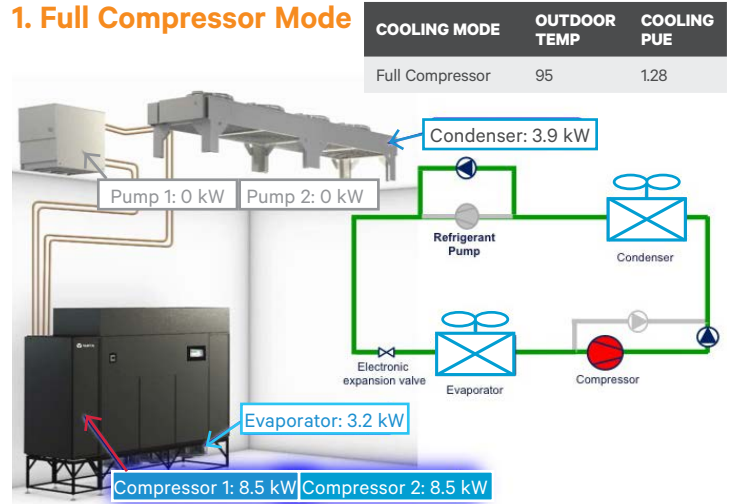
Notes:

1. Economizer mode operating at 100% of DX capacity
2. Certified in accordance with the AHRI Datacom Cooling Certification Program at AHRI Standard 1360 Standard Rating Conditions. Certified units may be found in the AHRI Directory at [www.ahridirectory.org](http://www.ahridirectory.org).

## Designed for the Highest Efficiency

1. The example to the right shows full compressor operation with the Liebert DSE units operating at 70% capacity. During warm summer months, the Liebert EconoPhase unit is idled, and the system instead uses compressors to drive heat rejection. To maximize efficiency in this scenario, the variable-speed evaporator fans, variable speed condenser fans, and the digital scroll compressors automatically adjust to match IT load and optimize energy usage.

### 1. Full Compressor Mode

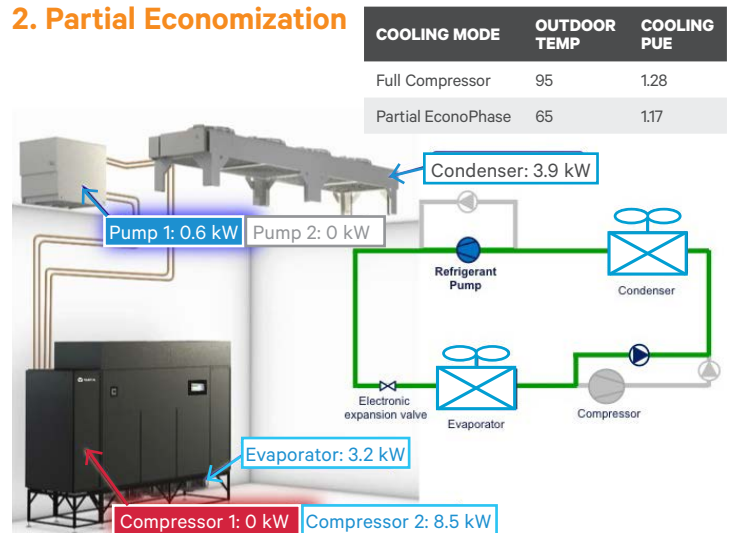


2. During cooler times, such as mild seasons and at night, the refrigerant economizer has the ability to provide partial free cooling, offsetting some of the compressor power usage.

Assuming an 85°F return air temperature to the CRAC unit, when the outdoor temperature drops low enough (65°F for the example shown, but at even higher temperatures for lower load applications), the Liebert EconoPhase can begin to offer partial economization.

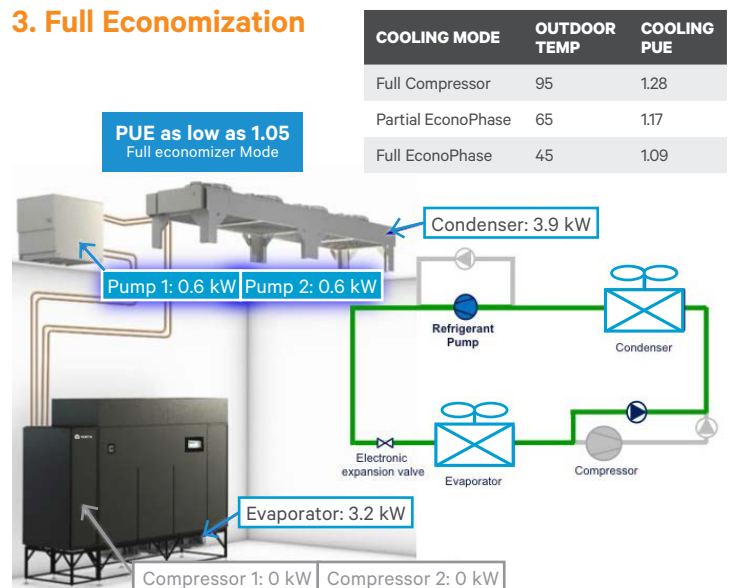
In this mode, refrigerant bypasses the CRAC's first compressor, allowing it to idle. Pump One of the EconoPhase system is then activated, consuming only 0.6 kW - a net savings of over 90% compared to compressor operation. The result is a lower cooling PUE of 1.17 or a system SCOP of 5.8.

### 2. Partial Economization



3. When outdoor temperatures are at their lowest (particularly in winter months), the Liebert DSE™ can leverage the Liebert EconoPhase system to operate at full economization. In this scenario (45°F ambient shown, but potentially higher for lighter loads), all of the Liebert DSE system's compressors are idled and bypassed, replaced entirely by 9 kW of power for the cooling system for every 100 kW of IT load.

### 3. Full Economization



## Designed for High Performance

### Liebert® DSE™ Evaporator Unit

The Liebert DSE high-efficiency cooling system provides greater protection and far exceeds ASHRAE 90.1 – the industry standard for energy efficiency in thermal management solutions.

#### Protection

- Higher unit reliability:
  - Direct-drive EC fans with no belts or pulleys to maintain
  - Automatic economizer transition maximizes economizer run time and minimizes wear and tear on compressors
- Variable capacity digital scroll compressors match heat rejection capacity to IT equipment, ensuring proper cooling of critical components

#### Efficiency

- Integrated Liebert iCOM unit control coordinates compressor utilization with economizer transition points to minimize system power consumption
- Digital scroll compressors minimize energy consumption by matching heat rejection capacity to IT load
- Electronic expansion valve allows reduced head pressure operating to minimize system power consumption
- Staged evaporator coil allows for increased part-load efficiency



Liebert DSE Indoor Evaporator Unit

### Liebert EconoPhase Economizer

The Liebert DSE utilizes the Liebert EconoPhase pumped refrigerant economizer, to ensure efficiency and cost-savings while maintaining simplicity of installation without the use of water.

#### Protection

- No water inside the data center
- No outside air and humidity contamination
- No outside air dampers and louvers to maintain

#### Efficiency

- No additional coils or heat exchangers
- Liebert iCOM automated economizer switchover routines maximize hours of economizer operation



Liebert™ EconoPhase Pumped Refrigerant Economizer

### Liebert MC and MCV Microchannel Condensers

The air-cooled Liebert MC and MCV condensers have a microchannel coil design that reduces energy costs and operational expenses. The Liebert MCV provides higher capacity condensing with a small footprint.

#### Protection

- Communications with indoor CRAC unit for optimal system operations
- Annual fan power savings of up to 85% compared to traditional fin and tube models
- Operational status is visible via Liebert iCOM controls

#### Efficiency

- Lower refrigerant charge
- Quieter operation
- Smaller footprint
- Lighter weight



Liebert MC Condenser



Liebert MCV Condenser



Microchannel condenser

## Liebert® iCOM™ Thermal Controls

The Liebert DSE cooling system utilizes Liebert iCOM thermal controls, which offer thermal management optimization at both the unit and system levels. It's easy-to-use, touch screen interface gives data center managers the insight needed to maximize performance. An optional capacitive buffer provides

continuous control operation during power outages of up to three minutes. Continuous operation of controls allows for monitoring systems to remain active, and allows for faster restart times after power is restored.



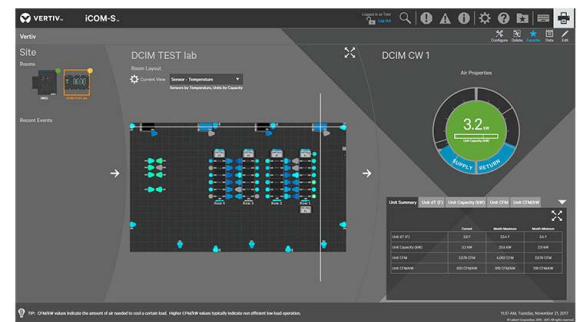
**At the cooling unit level**, the Liebert iCOM unit control provides the highest protection available and optimal performance.

- Monitors 380 component and unit data points to eliminate single points of failure
- Self-healing features avoid passing unsafe operating thresholds
- Highly intuitive, full-color, touch screen simplifies operations to save time and reduce human error
- Multiple, automated unit protection routines, including lead/lag, cascade, rapid restart, refrigerant protection and valve calibration

The Liebert DSE Optimization feature improves unit energy efficiency by up to 50% and is standard on all new cooling units and available as a retrofit on existing units in the field

**At the supervisory level**, the Liebert iCOM-S system control offers a revolutionary way to harmonize and optimize thermal system performance to optimize capacity across the data center, gain quick access to actionable data, and automate system diagnostics and trending.

- Advanced monitoring and at-a-glance reporting on performance metrics and trends for efficiency, capacity and adverse events
- Up to 50% system efficiency gains
- 30% lower deployment costs
- Teamwork modes that prevent conflict between units and allow them to adapt to changes in facility and IT demand to improve efficiency and availability and reduce system wear and tear – saving more than \$10,000 per unit per year in energy costs
- Simple and easy to deploy — auto-configuration to detect and configure up to 4,800 sensors, eliminating the need for custom integration to building management systems and cutting sensor deployment times in half



Liebert iCOM unit control and Liebert iCOM-S system control are available for new Vertiv data center cooling units or as retrofits.



## Simplify Thermal System Management for Protection, Efficiency and Insight

	LIEBERT ICOM® UNIT CONTROL	LIEBERT ICOM-S SYSTEM CONTROL
<b>Description</b>	Mission critical unit control for greater protection	Supervisory, multi-unit mission critical control for higher efficiency and insight
	Available on new Vertiv cooling units and backward compatible for retrofits	Direct integration with Liebert iCOM unit controls, with U2U connection
	7" color, capacitive touch screen	22" color, high-definition, capacitive touch screen display
	2USB, 2 RS-485 and 2 Ethernet ports	24-port network switch - no monitoring cards required Integrated firewall/router
	LED and audible alarms	Integrated Wi-Fi/Ethernet
<b>Protection and Insight</b>	Highest unit protection available	Advanced monitoring and collaborative protection
	380 unit and component monitoring points	Efficiency, capacity and system performance monitoring, trending and planning
	Over 200 unit and component alarms	Visual floor plan thermal sensor map
	Redundant unit failsafe modes	High security wireless sensor network
	Unit protection routines – lead/lag, cascade, temperature compensation	Adaptive control for hot spot reduction and self-healing
	Quick start	
	Refrigerant protection	
	Adaptive PID	
<b>Efficiency</b>	10-20% unit efficiency gains	Up to 50% system efficiency gains
	Shared workload teamwork <ul style="list-style-type: none"> <li>• Parallel</li> <li>• Independent</li> <li>• Optimized Aisle</li> </ul>	Advanced machine-to-machine (M2M) teamwork with wireless sensor integration
	Collaborative, non-fighting teamwork	Independent airflow and temperature control with fan speed coordination
	Predictive auto-economization	Group/Zone control to reduce temperature variations
	Dew point, rack sensor, supply air, return air or differential pressure control	Set point change coordination
<b>Deployment</b>	20% reduction in deployment time/costs compared to integrating and mapping each cooling unit to a building management system	30% lower wireless sensor deployment costs through automatic sensor discovery
	Quick start wizard set up	Sensor detect and configuration for up to 4800 sensors
	BMS points generator tool Embedded unity	Single connection point for all thermal equipment
	Single wire unit-to-unit connection Backup and Restore for display customization and setpoints	Integrated cable management and wall mounting bracket
	1-hour retrofit installation	Single person installation
	Exportable configuration parameters and event history	Desk or wall-mount applications



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