LIEBERT® ECONOPHASE™

Pumped Refrigerant Economizer

BENEFITS

High Efficiency

- Active refrigerant economizer provides more hours of annual free cooling than passive thermosyphon systems
- Pumps use less than one-tenth the energy as CRAC compressors
- Refrigerant carries 2 times twice as much heat as water and 40 times as much heat as air
- Instant changeover to economizer mode, even for short periods

Greater Protection

- No outside air contamination, and no dampers or louvers to maintain
- Automatic failure diagnostics; pump unit serviceable without loss of cooling

Low Maintenance

- Virtually maintenance-free, with no moving parts except the sealed pumps

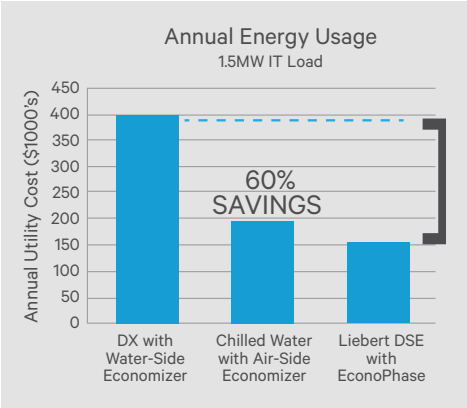
Easy to Install

- Can be installed as a unit or as part of a bundle with the Liebert MC or MCV
- Allows for greater line lengths than passive thermosiphon systems (up to 300 ft)

Highly Efficient, Water-Free Economization

The Liebert® EconoPhase Pumped Refrigerant Economizer has changed the face of data center cooling by providing high efficiency without using water. The first pumped refrigerant economizer for data centers, this innovative technology is installed in more than 6000 locations worldwide. It offers significant advantages over passive thermosiphon systems.

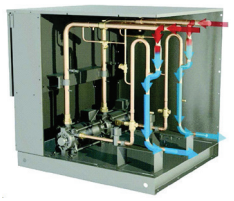
The economizer is a critical part of the Liebert DSE system, working with the indoor evaporator and Liebert MC or MCV Outdoor Condensers to significantly improve data center efficiency —without bringing in outside air and without using water.



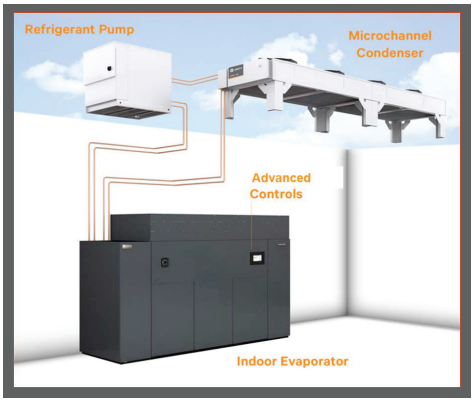
How It Works

Liebert EconoPhase™ operates as part of the Liebert DSE™ Free-Cooling Economization Solution to reduce energy usage. All of the system's main components - compressors, condenser fans, CRAC fans and refrigerant pumps - are coordinated by its Liebert iCOM™ controls. The controls automatically transition the system between full economization, partial economization and full compressor phases, based on IT loads, return air temperatures and outdoor temperatures, maximizing the use of available economization hours.

In cold temperatures, iCOM deactivates the compressors and activates the economizer pumps which move refrigerant at a fraction of the energy usage. During the hottest temperatures, compressors are activated, bypassing the economizer pumps. In moderate temperatures - fall, spring or even during the night - iCOM may activate one compressor and one refrigerant pump to gain partial economization and energy savings.



Cutaway view of EconoPhase pumps and piping

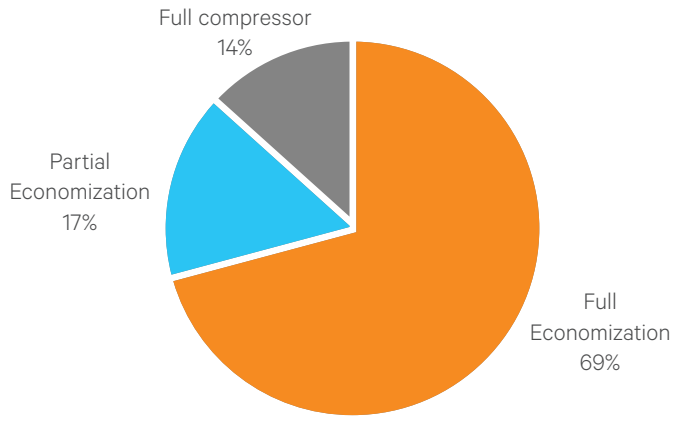


COMPARING HEAT REJECTION EFFICIENCES		
	Refrigerant v Air	**Refrigerant v Water**
Heat Density of Fluid	6931 btu/ft³ v 0.5 btu/ft³	6831 btu/ft³ v 3445 btu/ft³
Heat Removal Coefficient Performance (COP)	1188 kW/kW v 29.5 kW/kW	1188 kW/kW v 591 kW/kW
Increase in Heat Removal Efficiency Compared to Air	+4023%	+2000 %

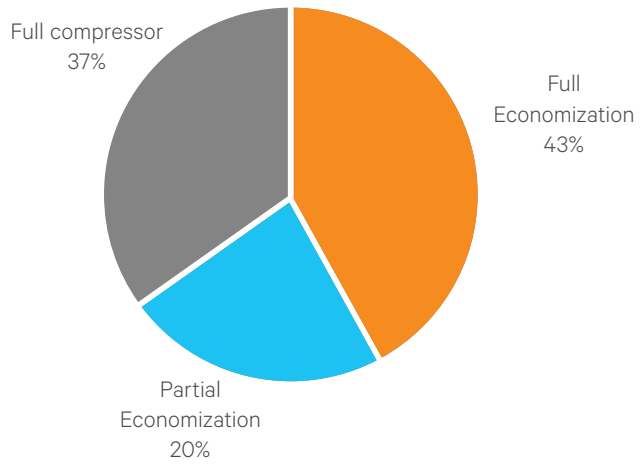
Refrigerant carries 2 times as much heat as water and 40 times as much heat as air.

Liebert DSE Pumped Refrigerant Economization By City

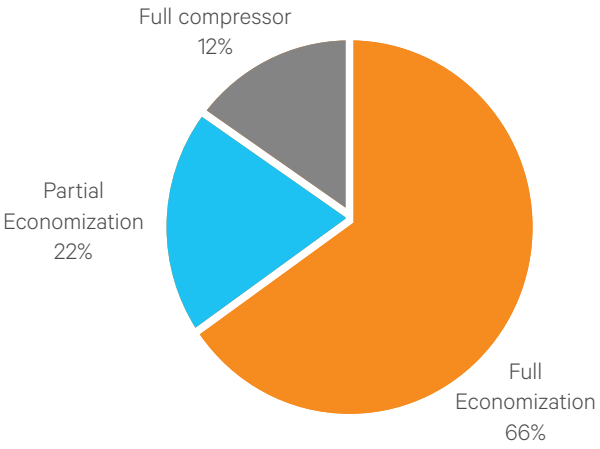
Chicago



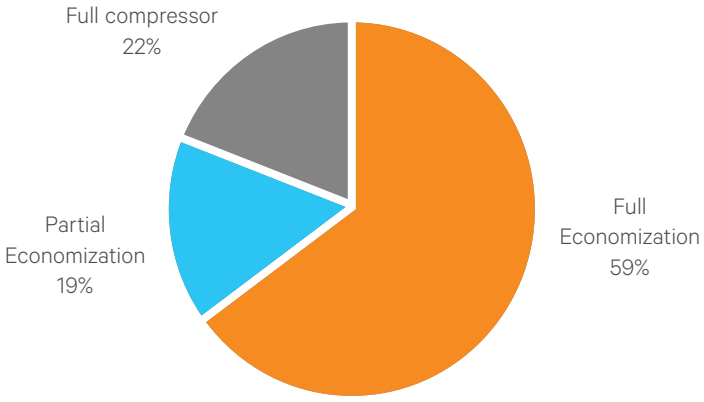
Dallas



San Jose



Ashburn, VA



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