

# Vertiv™ EconoPhase

## Pumped Refrigerant Economizer



### Benefits

#### 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

- Allows for greater line lengths and more flexibility than passive thermosyphon systems (up to 300 ft).

#### Environmental efficiency

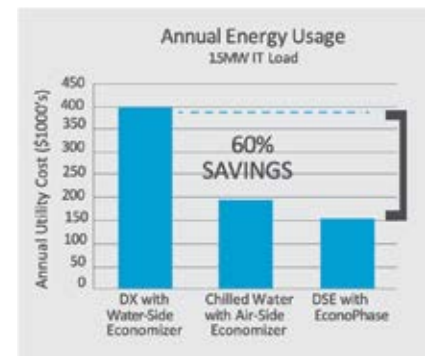
- Active Refrigerant Economizer provides better control and reliability than passive thermosyphon systems.
- Pumps use less than one-tenth the energy of CRAC compressors.
- Low-GWP Refrigerant (R-454B) carries twice as much heat as water and 40 times as much heat as air.
- Instant changeover to economizer mode, even for short periods, to maximize efficiency.

The Vertiv™ EconoPhase Pumped Refrigerant Economizer has changed the face of data center cooling by providing high efficiency cooling 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 thermosyphon systems.

The economizer is a critical part of the Vertiv™ DSE system, working with the Vertiv™ CoolPhase Condensers to significantly improve data center efficiency —without bringing in outside air and without using water.

### How it works

Vertiv™ EconoPhase operates as part of the Vertiv™ DSE Free-Cooling Economization Solution to reduce compressor usage. All of the system's main components — compressors, condenser fans, CRAC fans and refrigerant pumps — are coordinated by its Liebert® iCOM™ controls. These controls automatically move 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 pipin





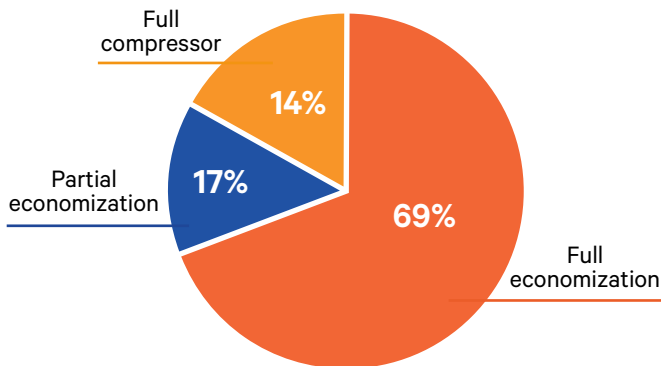
## Comparing heat rejection efficiencies

	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
Increase in Heat Removal Efficiency Compared to Air	+4023%	+2000 %

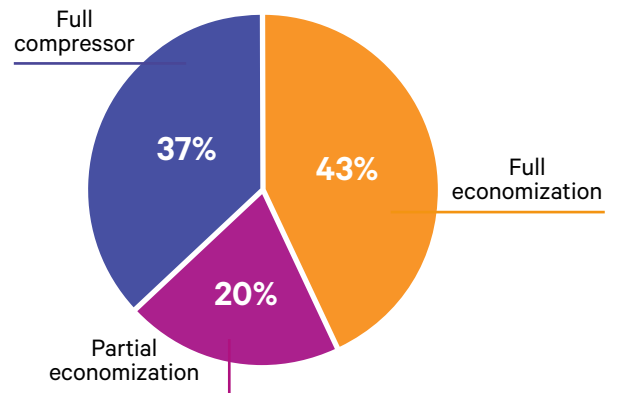
Refrigerant carries 2 times as much heat as water and 40 times as much heat as air.

## Vertiv™ Liebert® DSE Pumped Refrigerant Economization by city

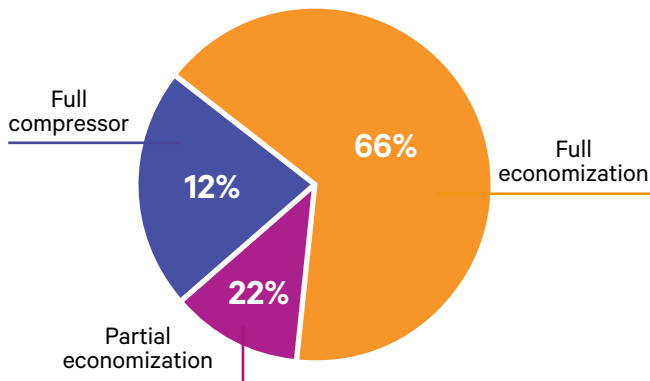
Chicago



Dallas



San Jose



Ashburn, VA

