SmartAire®

Efficiently Manage Diverse & Variable Loads

The data center is in constant flux. Load diversity between racks and variable server loads are the norm. Managing airflow into the data center space is key to achieving reliability. New demands to reduce energy consumption in the green data center require a fine balance to ensure proper air flow to each rack during peak IT hardware operation, while not over-cooling partial load and idle states in a diverse environment.

Tate's SmartAire electronically controlled variable air volume damper used in conjunction with DirectAire adjusts the amount of air to meet the specific needs of the rack it services. This flexibility can help effectively cool facilities implementing virtualization, cloud computing and idle server shutdown strategies while saving energy. Multiple control options are available.

- **SmartAire C** - client sensor network
- **SmartAire S** - 1 rack mounted sensor
- **SmartAire M** - 3 rack mounted sensor

SmartAire Key Performance Characteristics

- 0-23kW supported IT load per DirectAire/SmartAire pair
- Power disruption fail safe to fully open position
- Zero maintenance
- Quick and easy installation
- Multiple control options available
- High Precision, Quick Response Temperature Measurement
- Optional BMS interface
- User programmable set point
- Robust design for high reliability
- 6 vane damper for large open area
- Damper position is infinitely variable from 0-100%
- Viewable maximum temp for walkthrough check of each rack

1

Sensor Mounted to the Face of the Rack for SmartAire M & S

2

Temp Display and Setpoint Interface for SmartAire M & S

3

0-100% Open VAV Actuating Damper

4

Power Module for Multiple Connections

Achieve the Ultimate in Financial Performance

SmartAire Takes Efficiency Even Further

The energy savings component of SmartAire is achieved through its effective management of diversity and variability. Virtualization is a common server management strategy to increase the computing power of existing hardware and to save energy. Virtualization often leads to variability and denser racks with wider ranges in demand between high utilization and idle states. SmartAire's ability to automatically and instantaneously adjust to distribute exactly the right amount of air needed to cool the equipment allows the CRAH units variable fan drive to adjust more accurately for optimum efficiency.

SmartAire also handles load diversity without over-cooling lower density racks saving energy. Deployed at the rack level rather than by row, SmartAire can reduce the amount of airflow to low density racks allowing more airflow to be delivered to high density areas without increasing underfloor static pressure or making costly equipment purchases.

To evaluate the potential impact on the efficiency of your facility download our in-floor cooling cost model at: www.tateinc.com/resources/cost_model.aspx

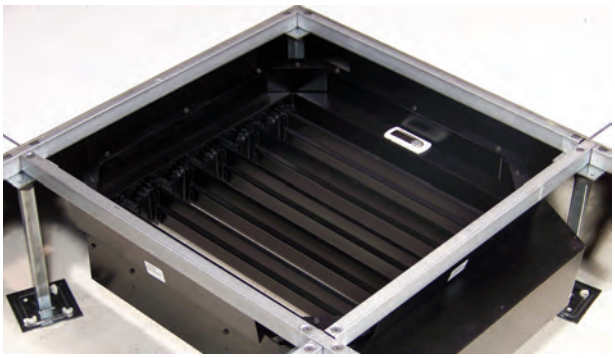
Example Data Center Characteristics	
User IT Load (kW)	1720
Number of Racks	200
Calculated Rack Density Average (kW)	8.6
IT Racks per Row	15
Maximum IT Load Per Rack (kW)	12.5
Per kWHr Cost	0.08
Expected IT Equipment Utilization	70%

	Baseline	RetroFit	New
Perimeter CRAH Unit Design	Typical Grate w/Belt Drive Centrifugal Fans	DirectAire, SmartAire & EC Fans	DirectAire, SmartAire & EC Fans
Rack Density for Calculation (kw)	12.5	8.6	8.6
Expected TAC %	50%	93%	93%
Total Required CFM to be delivered (CFM)	628,940	232,640	232,640
CRAH Units Required (50 Ton Units)	34	13	13
Total Fan Power Required (kw)	402.5	56.4	56.4
Estimated Annual Energy Consumption (kWh)	3,526,090	493,827	493,827
Fan Annual Energy Cost $	$282,087	$39,506	$39,506
Required CFM Per Rack (CFM)	1,572	1,082	1,082
Required CFM Per Panel (CFM)	3,145	1,163	1,163
Average Cost Per DirectAire & SmartAire M & S		($1,149)	($1,149)
Number of Units Required		200	200
Total Cost of DirectAire & SmartAire		($229,760)	($229,760)
CRAH Unit Reduction Savings		$0	$735,000
Fan Upgrades (EC Tech)		($143,000)	($143,000)
Upfront Cost or Savings using DirectAire & SmartAire		**($407,760)**	**$362,240**
Annual Energy Savings		$242,581	$242,581
Payback in Months (simple)		20.2	0.0
3 Year Savings		$319,983	$1,089,983
PUE Impact	1.80	1.60	1.60

Over $240,000 Annual Energy Savings

Product Specifications

SmartAire Product Specifications



SmartAire VAV Airflow Damper: High volume variable air flow damper for use in raised floor roll formed stringer system. 20 gauge steel construction with an open area of approximately 63%, and when installed with DirectAire panel will have the following air distribution capabilities: 2134 CFM at 0.1" of H2O (static pressure).

VAV airflow Damper Control

SmartAire M & S units only:

a) In-floor VAV airflow damper shall have an internal control system to evaluate a single (SmartAire S) or three (SmartAire M) factory supplied rack mounted temperature probes and set damper position based on the current peak input value.

b) Units to have PID multiloop control system

c) Units to have viewable temperature control unit through airflow panel

SmartAire C units only:

a) In-floor VAV damper position shall be controlled via 0-10V input signal provided by others.

VAV airflow Damper features

a) Fail Open Operation - Damper must return to the fully open position from any position in less than 15 seconds after power is removed.

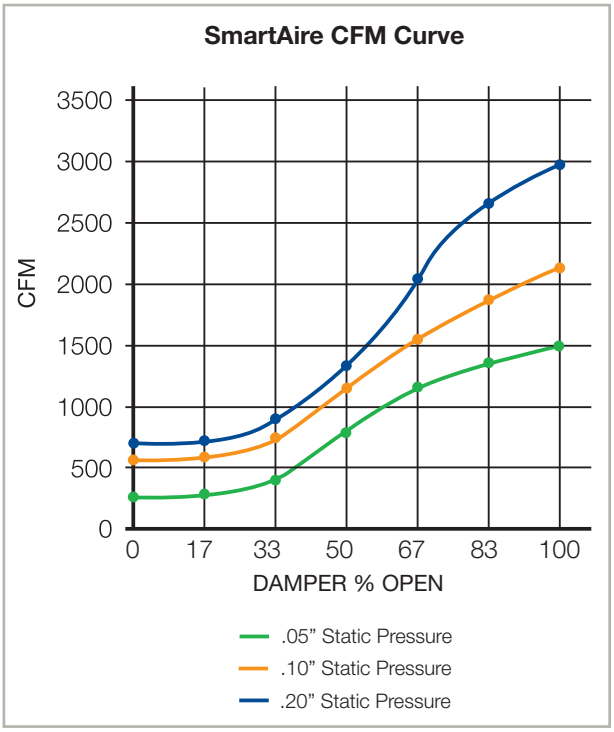
b) 0-23kW supportable IT load per panel/damper combination

c) No regularly schedule maintenance required

d) Damper position shall be infinitely variable between 0-100%

e) Unit shall draw less than 20VA during peak operation

SmartAire™/DirectAire™ Paired - CFM & Cooling Capacity		
Pressure (in. H2O)	CFM (100% Open)	kW/rack at 100% Open
.02	1018	7.5
.04	1426	10.5
.05	1590	11.7
.06	1738	12.8
.08	1998	14.7
.10	2226	16.4
.12	2432	17.9
.14	2620	19.3
.16	2795	20.6
.18	2960	21.9
.20	3114	23.0



The graph above shows the CFM delivered through a DirectAire panel equiped with a SmartAire VAV damper as it opens and closes at a given static pressure.

1. Sensor Mounted to the Front of the Rack
2. High Efficiency EC Fan
3. Temp Display and Setpoint Interface