Carrier
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Aero® 39M Air Handlers

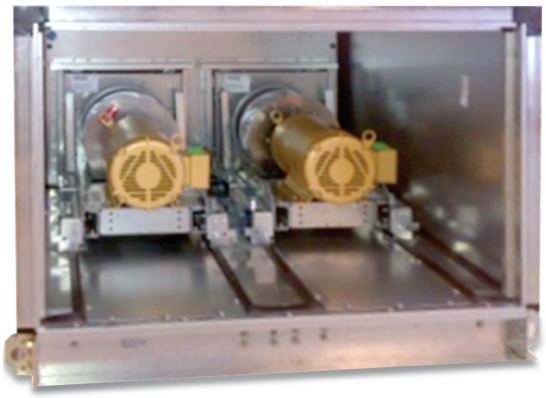
Fan Arrays

Carrier's 39M air handler offers a wide selection of direct drive plenum fan options.* From single direct drive fans in sizes 03 through 61, dual fans in sizes 08 through 85, four fan arrays in sizes 40 through 61 and six fan arrays in the largest size air handlers sizes 50 and larger, the 39M provides the fan solution options to best fit your specific needs.

What are the benefits of a fan array?

The main benefit of using a fan array is the redundancy that they provide. If one fan in the array were to fail, the other fan(s) will be able to handle a portion of, if not all, the design airflow.

Fan arrays typically result in shorter fan section lengths since the arrays use smaller fans and motors which ultimately determine the length of the fan section. A larger operating spectrum (especially at low flow) and high fan static efficiencies at partial load bring benefits to a fan array as well. With smaller fans and motors to potentially replace, serviceability is typically easier with a fan array.



What are the benefits of a single fan over a fan array?

The benefits of using a fan array come at a significant cost. Dual fan systems, for example, can be as much as 20-30% more expensive than a single fan system. Additional options such as multiple VFDs, back draft dampers and the need for maintenance access for a large fan array (for example having adequate access for a ladder inside the air handler), can add to the unit cost.

Single fans generally have lower sound values compared to fan arrays. Sound levels are a function of the fan RPM, and smaller wheels (as seen in fan arrays) will typically have higher RPM than larger wheels that are seen in a single fan system. A fan array's higher sound levels, however, are in the higher octave bands. While attenuation may be needed for a fan array's sound levels, attenuation in these higher bands is relatively easy and may add only minimal cost.

The serviceability of a fan array can be easier than that in a single fan system. However, by having fewer moving parts, a single fan system is less likely to experience a component failure compared to a fan array and thus is more reliable.

Which solution is best for me?

This depends on what's important. For example, does the redundancy that the fan array provides warrant the additional first cost? Is the reduction in fan section length worth the potentially higher sound levels of a fan array? These decisions may be difficult to make seeing as how there are many trade-offs. Table 1 (next page) should be used in your decision making process, as it outlines the factors involved in choosing between a single fan or a fan array system, and which system holds the advantage.


ARENAS


DATA CENTERS


EDUCATION


HEALTHCARE


HOSPITALITY

CONTROL FOOTPRINT SERVICEABILITY

*Where cabinet width permits

Table 1: Advantages of a Single Fan and a Fan Array			
Parameter	**Single Fan Advantage**	**Fan Array Advantage**	**Reasoning**
Installed Cost	◆		More fans increase installed cost. Back draft dampers and multiple VFDs add cost as well.
Efficiency (Design Load)	◆		At or near design conditions, a single motor and fan are more efficient.
			Backdraft dampers add pressure drop when selected with fan arrays, increasing energy consumption
Efficiency (Part Load)	◆	◆	Multiple, smaller fans are often more efficient at low load, but a single fan is more efficient closer to design load.
Cabinet Length		◆	Fan arrays will have shorter fan section lengths, however additional service clearance may be required for an array (i.e. access for a ladder).
Sound	◆		Sound levels typically increase as more fans are added. Fan arrays have higher sound, but may be easier to attenuate (higher cost and possible added airway length).
Serviceability		◆	Smaller, lighter wheels and motors make for easier maintenance, but maintenance frequency will increase with array. Multi-level arrays may require ladder access (added airway length).
Reliability	◆		More components increase the probability of failure. Larger motors are generally more reliable.
Redundancy		◆	One motor/fan failure will not shutdown the system. However, larger motors often needed for redundancy (higher cost, added AWL).
Operating Spectrum		◆	Flow spectrum is larger with more fans.

Summary

Every application is different. Carrier's wide offering of direct drive plenum fan solutions will provide you with the optimum fan choice.

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