PIOVAN

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Inverter Speed Control

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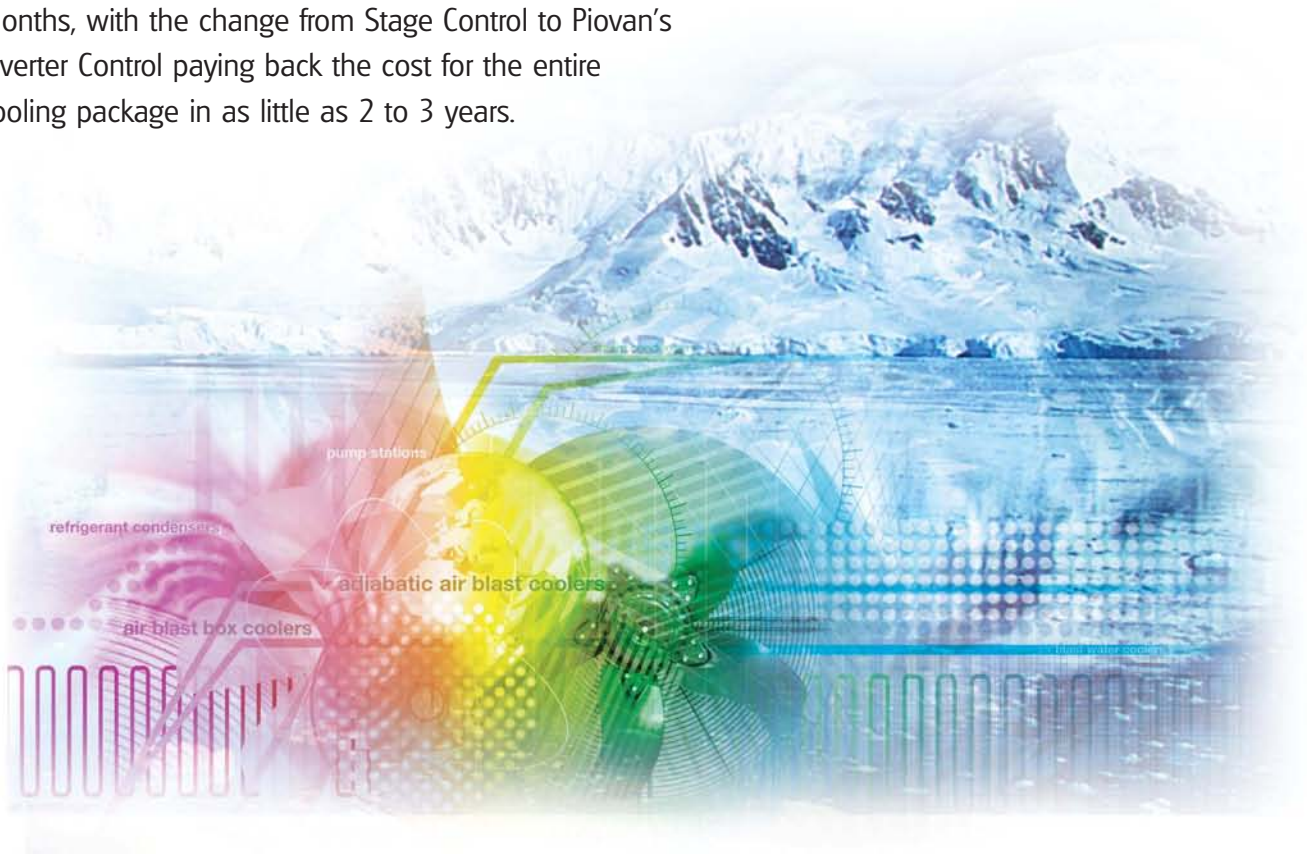
Piovan's Inverter Speed Control of air blast cooler fans provides substantial energy savings and reduced noise emissions.

Using standard Stage Control, fans are switched on and off at full speed to match cooling requirements and the cooler input power increases or decreases in direct proportion to the number of fans in operation. This wastes a great deal of power and creates unnecessary noise.

However, using Piovan's Inverter Control, cooler capacity is matched to load by changing the speed of all fans in unison. Power consumption falls dramatically with any reduction of load or ambient. (The input power requirement is relative to the cube of the fan speed.)

It is this difference in operation that allows big reductions in both energy consumption and noise emissions (see graph A and B opposite).

The payback on the additional cost for Inverter Control, where applicable, can be as little as 3 months, with the change from Stage Control to Piovan's Inverter Control paying back the cost for the entire cooling package in as little as 2 to 3 years.



Inverter Speed Control - short payback and continual energy saving

- Reduced energy consumption
- Reduced noise emissions with no start-up noise
- Close control giving improved process efficiency
- Lower carbon footprint and improved 'green profile'
- Payback for inverter controls in as little as 3 months
- Payback for entire cooler package in as little as 2 to 3 years

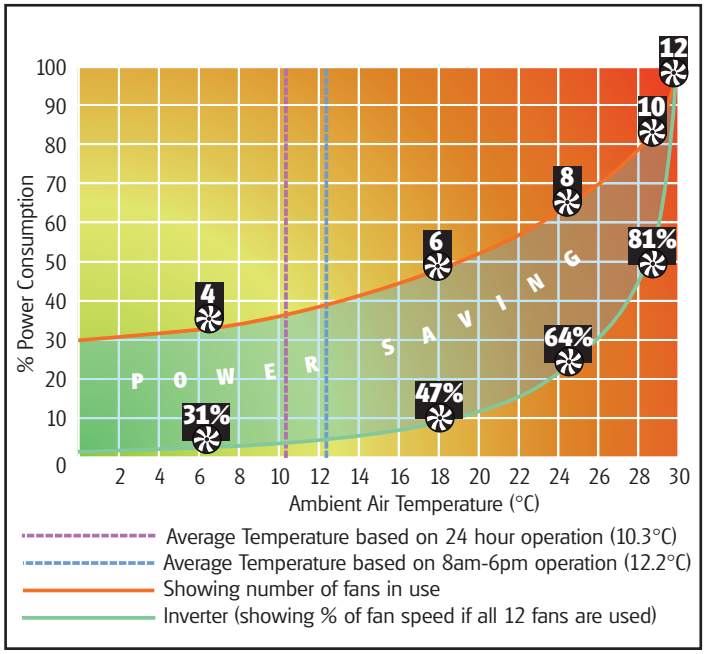
Where the ambient and/or heat dissipation requirement dictates that half of the fans operate at full speed on standard Stage Control, all of the fans would need to operate at 47% speed on inverter control:

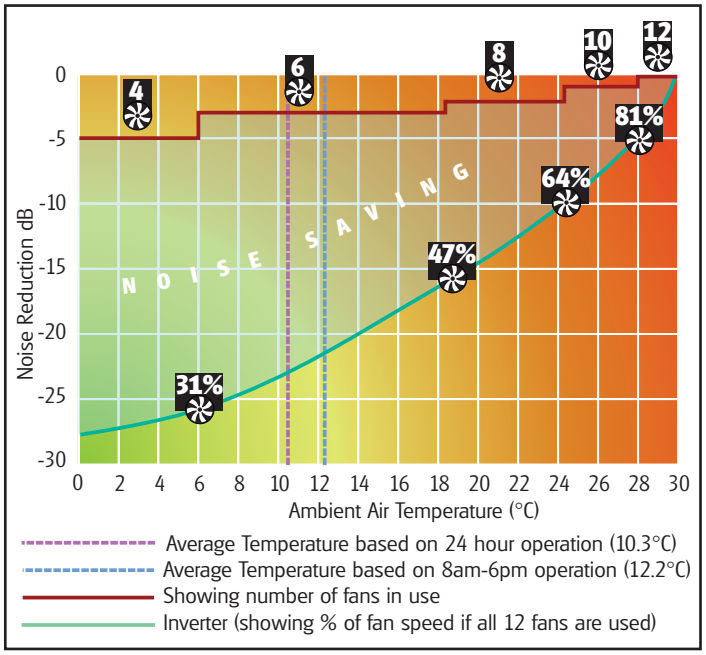
Stage Control
Half of the fans running at full speed =
50% of total input power
Noise reduction of 3dB

Piovan Inverter Control
All fans running at 47% of full speed (0.47^3) =
10.4% of total input power
Noise reduction of 16dB

Inverter control reduces carbon emissions giving both an improved 'green profile' and increased profit margins.

Speed regulation of the fans also offers closer temperature control and eliminates start-up noise – often the major cause of noise complaints.





Relative power consumption when using Inverter Speed Control versus Stage Control

This clearly shows the energy savings which can be achieved by using Inverter Speed Control rather than conventional Stage Control of the air blast cooler fans.

The saving in energy consumption results from the power required by a fan varying as the cube of its speed and the inverter's ability to react to this requirement with little or no energy loss.

Relative noise reductions when using Inverter Speed Control versus Stage Control

As can be seen from the graph, reducing the number of fans operating does not produce a significant reduction in noise levels (only 3dB when half of the fans are running).

Inverter Speed Control, on the other hand, provides dramatic reductions in noise levels (a 15dB reduction at 50% fan speed).

Based on central England, Coleshill MET Office weather data, the average temperature throughout the year over 24 hours per day is 10.3°C and between 8am and 6pm is 12.2°C. On this basis the following applies when switching from Stage Control to Inverter Control[A]:

24 hour operation:

Average temperature	10.3°C	
Stage Control input power @	10.3°C	13.2kW
Inverter Control input power @	10.3°C	1.7kW
Average energy reduction per hour		11.5kW
Annual energy reduction[B]		96,600kW
Annual cost reduction[D]		£ 9,660.00

8am-6pm operation:

Average temperature	12.2°C	
Stage Control input power @	12.2°C	13.9kW
Inverter Control input power @	12.2°C	2.0kW
Average energy reduction per hour		11.9kW
Annual energy reduction[C]		29,750kW
Annual cost reduction[D]		£ 2,974.00

A Examples are based on a TDFW/H-26D unit cooling from 45°C to 40°C
B Based on 24 hours per day, 7 days per week, 50 weeks per year
C Based on 8am – 6pm, 5 days per week, 50 weeks per year
D Assumes energy cost of £0.10/kWh

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