



# GET COMFORTABLE

A Thermo King publication for the mobile climate control industry.

Fall 2005

## Getting More for Less

S391 and S616 screw compressors



Rooftop brushless motor

Heavy-duty clutch



IntelligAIRE II™ microprocessor controller

### Thermo King Offers Money-Saving Solutions

**W**ould you buy a car with a five-year engine if you knew you would have to keep the car for ten years? Probably not, especially if you knew there was a ten-year engine available and that the upfront costs would be less than replacing the engine after five years. The same principle applies to transit operators, who deal with buses that have a 12-year life. It's a given that not every component on the bus will last 12 years, so it boils down to how often during the 12 years will the operator have to service it or replace these components? This is where Thermo King can help.

"Knowing the expectations of the transit operators, we have been driven for many years to develop options that lower operating costs," says Paul Smith, Thermo King director, bus solutions. "Delivering quality and reliability is a must just to stay competitive in the business. What our customers are looking for are ways to lower their operating costs over the service life of the vehicle."

#### S391 and S616 Screw Compressors

Thermo King offers an array of cost-saving products that can be selected individually or bundled together to optimize savings over the long run. The S391 and S616 screw compressors produce less noise and vibration and also save fuel with a programmable unloading feature. How much fuel saved depends on the operating profile, but it could be as much as two to three gallons per day per bus. With 80 percent fewer moving parts than most reciprocating compressors, maintenance intervals and service life are also extended.

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### Rooftop Brushless Motor

Another cost-saving option is the new rooftop brushless motor. With a bearing life expectancy of 36,000 hours and no brushes to maintain, large savings can be realized over a 12-year period. This motor also features a low-noise design and increased airflow in both the evaporator and the condenser.

### Heavy-Duty Clutch

The Thermo King heavy-duty clutch also offers savings opportunities. Clutch maintenance and repair are ongoing activities in every transit fleet because of the tough duty cycle to which clutches are exposed. A more robust clutch design that has more torque, a long-life sealed bearing, bi-directional rotation and a high temperature coil means extended maintenance intervals and less hands-on time by the HVAC technician. The exclusive spring design helps maintain air gap settings for a longer period of time once set.

### IntelligAIRE II™ Microprocessor Controller

And of course, there is the IntelligAIRE II microprocessor controller that not only interfaces with these other options but can also be used to optimize their performance with simple software changes. Technicians save time when diagnosing system malfunctions because the IntelligAire II monitoring and alarm function often indicates exactly where the problem is. You can choose specific components to monitor for maintenance with one of the multiple hour meters. When it's time to check the unit for proper operation, the pre-trip function will do it for you and give you an alarm if anything is wrong.

**FOR MORE INFORMATION on these and other cost-saving Thermo King products, contact your local Thermo King representative or call 952-887-2313.**

# Let's Clear the Air

## New Technologies Make for Happier and Healthier Passengers

**O**ver the past several decades, there has been increasing concern about the quality of the air we breathe, both outdoors and inside. Government bodies from the federal level down to local municipalities have enacted Clean Air regulations, ranging from vehicle exhaust limitations to smoking bans. With increased public awareness and government requirements, there has been a tremendous growth in the development and marketing of air purification systems and devices.

While very explicit standards exist for Indoor Air Quality (IAQ) in public buildings, regulations for air quality in public vehicles are somewhat unclear and generally deal with the introduction of fresh air into the cabin through the HVAC system. On tour buses, commuter lines and over-the-road routes, where passengers may be confined to the cabin for long periods of time, some fresh air exchange is necessary. Regulations usually require a certain volume of fresh air per passenger or that a percentage of the total volume come from fresh air. Transit and City Bus applications typically do not have

to use fresh air because of the frequent door openings. Additionally, the air from a congested city environment is usually quite polluted, and the deliberate introduction of this air into the bus is not practical.

The bus riding public, like the rest of the population, is increasingly aware of air quality issues and is seeking healthier and more comfortable environments. The automobile industry has acted on consumer demands by offering a variety of standard and optional air-purification systems on a wide variety of vehicles while the bus industry is just beginning to address the public's concerns.

So, what can be done to make the ride healthier and more comfortable for Transit users? Thermo King has introduced EnviroFresh™, a product to deal with the most frequent complaint from the riding public: odors. "Bad smelling buses can be found everywhere and you can only clean them so often," says Steve Johnson, Thermo King director, bus product management, "so why not treat the buses continuously while they are in service?" This unique concept is applied through the HVAC system and actually neutralizes the microbes that cause odors without using caustic chemicals as is sometimes done during bus cleaning.

Odor buildup can also have a residual affect, with microbes settling on the HVAC filter, the HVAC coil and in the ducts. Control comes in the form of service, changing the filter and washing the coil. The new technologies being introduced in the market are designed specifically to reduce the frequency of these activities.

Other technologies, such as UV light technology, ionizers and anti-microbial filters are now available in the automotive and commercial building industries and are finding their way on to buses. All can offer additional protection for drivers and passengers by preventing the growth and the subsequent spreading of mold, bacteria, viral agents and some deadly diseases like anthrax and smallpox. "Independent laboratory tests found our EnviroFresh product to be 100 percent effective against staph and strep growth," says Johnson.

Thermo King is aggressively testing and evaluating these and other technologies for use in transit, coach and rail applications, so stay tuned!

**FOR MORE INFORMATION, contact your local Thermo King representative or call 952-887-2313.**



# Got Power? GET COOLING!

## Alternative Power for Electric HVAC

New Flyer DE40LF diesel-electric hybrid drive  
with Thermo King T11 Electric

*"There is technology available to provide power  
to a electric HVAC unit on a diesel engine driven bus,"*

**Don Nielsen**  
Thermo King bus HVAC, engineering manager



**OPTIMA OPUS Low Floor  
Hybrid with Thermo King LRT-E**

posts on top of the trolley. If you are in the bus industry, as most of our readers are, then you know about hybrid technology and that its main benefit is its environmental friendliness, primarily through lower engine emissions.

"Where the power comes from for the electric HVAC is not as important as the condition of the power when it gets to the unit," says Don Nielsen, Thermo King bus HVAC engineering manager. "If the unit is designed for 230VAC 60hz or 380VAC 50hz, that's what it needs in order to see whether it starts with 600VDC from the hybrid battery pack or 900VDC from the power line."

While there has been a recent resurgence in the demand for hybrid buses, most of the buses delivered still come with conventional diesel engines, which are also changing due to lower emissions standards. "There is technology available to provide power to a electric HVAC unit on a diesel engine driven bus," says Nielsen. "We have been using this technology for several years in refrigeration applications and during the same period we have been testing it on HVAC applications. The challenge is keeping the power supply level and stable throughout the rpm range of the engine. The ultimate payoff is near full capacity at idle, which means smaller systems and less energy used for every BTU of cooling."

One of the most frequently asked questions about electric HVAC on a bus is "where does the power come from?"

A very good question, considering that most of us know that electricity comes from the power line into our homes and businesses. We also have some understanding about trolley buses, where the power comes from the overhead wires by way of the two catenary

Additionally, users enjoy all of the other advantages that come with a hermetically sealed and factory tested HVAC system. The compressors are electric and integrated into the unit, making it possible to charge and test the unit at the factory, much like a home refrigerator. All of the tubing and hoses normally used to connect the unit and compressor after it is mounted on the bus are eliminated. Reliability is also improved dramatically and the number of maintenance items is reduced.

"Because of the complexity of this system, we have to be satisfied that it is ready for serial production," says Steve Johnson, Thermo King director, bus product management. "We ran this system in City Bus revenue service for the past two cooling seasons in Prague, Czech Republic. Our plan is to have systems running in the US for next year's cooling season."

To see the electric HVAC in action, contact your Thermo King factory representative to arrange a visit to the Minneapolis R&D center.



**Bus Karosa LC 954 Thermo King Athenia Electric  
powered by engine mounted alternator**



**New Global Unit Begins Trek:**

# ATHENIA

## is Coming Your Way Soon

**I**t began as an idea in 2001, became a product marketing specification in 2002, turned into a field test in 2003, got launched in 2004 and is now ready for the world.

It's Athenia, Thermo King's newest global rooftop HVAC system. Before being designed in Thermo King Europe's HVAC design center, a cross-functional team meticulously compared and analyzed air conditioning requirements in regions such as Brazil, China, the United States, Australia, Europe and the Middle East.

The Athenia product range features an excellent capacity/weight ratio. As one of the lowest-weight units in the market, users benefit with reduced fuel costs. Additionally, installation time has been reduced by as much as 33 percent in some applications. The monoblock design can adapt to roof radii ranging from 5 to 18 meters. Radius can now be set by the bus manufacturer at the time of installation, so it is no longer necessary to specify a radius when placing an order. This is a major advantage for bus manufacturers and OEMs, because inventory levels can be reduced and the ordering process is simplified.

### Excellent Results in Spain

Spain is a critical market for Thermo King. The weather extremes experienced in this country – from the blistering heat of summer to frigid winter temperatures – demand maximum performance from climate control units year-round. Frigicoll, the distributor of Thermo King products in Spain, is well aware of this. According to José Manuel Sanjuan, Frigicoll's product director, Athenia units installed in Spain are working perfectly and have successfully overcome the difficulties posed by the Spanish summer and winter.

Forty-one Athenia units are currently in service with nine major fleets in Spain. Also is one company that has had the chance to experience the advantages of the Athenia units firsthand over a number of months. Manuel Ron, general director of Alsa's Maintenance Division, says that in 2004, eight of his company's vehicles with Noge bodies on Mercedes OC 500 chassis were equipped with Thermo King Athenia 1100 HVAC units. So far, results have been satisfactory and drivers have experienced no difficulties in using the Athenia equipment.

Athenia units can currently be equipped with ClimaAIRE II or IntelligAIRE II controllers, which are suitable for use with the full range of compressors (TM31, X430 and S391 and S616 screw compressors) and capable of communicating via CanBus systems. With the excellent results achieved in Spain and other countries, Athenia is sure to catch on wherever it lands. Next stop, the Americas in 2006.

### Versatility has a New Name

In addition to its aerodynamic design, the ATHENIA Series has the flexibility to conform to bus roofs with radii of 5 to 18 meters. This unique feature simplifies planning for users and installation for installers.



Radius = 5 – 18 meters

**Multiple Radii Flexibility**

**FOR MORE INFORMATION,** contact your local Thermo King representative or call 952-887-2313.

# Back to School

## Thermo King's New D5 A/C Unit Fills Void in School Bus Business

**T**hough Thermo King is not new to the school bus business, having supplied thousands of AM2 and AMD air conditioning (A/C) units in the 1970s and 80s, the new D5 A/C unit is part of a renewed focus on school buses.

Mike Yestrumsky, Thermo King shuttle sales manager, identified a segment of the school bus business that required a product configuration not available in the current product line. "Many school buses have to operate in extremely high ambient conditions," says Yestrumsky. "You need an HVAC system with more capacity than you can get from the typical shuttle or small bus A/C unit."

Approximately 800 to 1,000 of such school buses are delivered each year, and with more school districts moving to year-round classes, the demand for air-conditioned school buses will increase.

Thermo King has answered this need with the D5 unit, which has a modular design consisting of a rear-mount evaporator, roof- or skirt-mounted condenser and compressor options for front- or rear-drive buses. The unit is capable of using either R-134a or R-407C refrigerants for standard and high performance cooling demands.

The first prototypes are now being tested in the Thermo King research and design center, with field test installation scheduled for late 2005. Serial production is expected to begin in the fourth quarter of 2005.

"With three dealers dedicated to small bus and school bus demand and with our extensive national dealer network, Thermo King will be able to provide the pre-sale and after-sale services our customers are accustomed to," notes Paul Smith, Thermo King director, bus solutions.

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**Paul Smith**  
Thermo King director  
bus solutions

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# Preventive Maintenance as easy as A, B, C



**Thermo King recommends  
A inspection be performed  
monthly, B inspection  
at preseason and  
C inspection annually.**

**P**reventive maintenance (PM) is the key to a long and healthy bus climate control system life.

It will help prevent component wear and tear, as well as system breakdowns. Just like anything you own, the better you take care of it, the better it will perform and the longer it will last.

Thermo King strongly encourages a complete PM program for all its bus climate control systems, as it helps ensure system quality, reliability and longevity. To make it easier for customers to implement such a program, Thermo King provides each customer with a complete bus maintenance packet with recommended PM procedures. Each packet includes an A, B and C inspection sheet itemizing the procedures to be done before and during the inspection. The technicians need only record the system

information (i.e., bus number, A/C unit serial number, etc.) and go down the checklist to complete a proper PM inspection. In addition, there is a section

on each form to record any parts used as well as observations or comments about the system and the check.

Thermo King recommends the A inspection be performed monthly, the B inspection at preseason and the C inspection annually. If you have questions about Thermo King's PM program, call your local dealer. To find your local dealer, go to [www.thermoking.com](http://www.thermoking.com).



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