



LRV Range: Light Rail Vehicle HVAC Units

Innovative HVAC units for light rail –
from the leader in transport temperature control.



*Designed to meet
your urban needs*

- Totally self-contained and hermetically sealed
- Microprocessor-based controller
- Lightweight, low profile design
- Ideal for new and retrofit applications
- Complete capacity range—22kW-40kW (8-12 ton)
- Low life-cycle costs
- Proven high reliability with low maintenance
- Environmentally friendly with quiet operation

An  **Ingersoll Rand** business

Designed and manufactured to rail standards

A leader in mobile temperature controls, Thermo King has been supplying environmental control units for over 50 years. Now, the reliable comfort found in cross-country railway cars is available for light rail mass transit cars. Introducing the Thermo King LRV Range. Specifically designed for light rail vehicles, the Thermo King LRV Range effectively

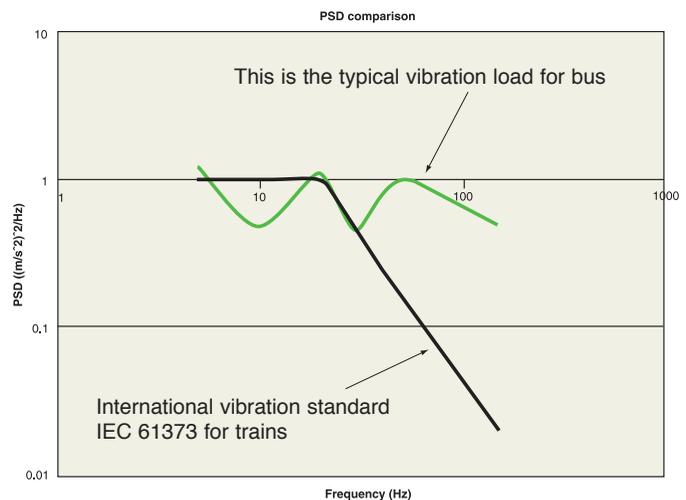
maintains passenger comfort. Streamlined, roof-mounted and microprocessor-controlled, the unit controls temperature and humidity by balancing interior air levels with the outside air.

The Thermo King LRV Range also adapts to meet customers' specific requirements.



Vibration Standard for Trains

The chart shows that the typical vibration environment experienced by bus units is dramatically different from the one experienced by rail units (as defined by International Standard IEC 61373). Using HVAC systems designed for bus applications on rail cars is not recommended. Thermo King's LRV Range units are designed and tested to withstand the rigorous duty cycle of a rail car, where the shock and vibration characteristics are much more demanding on the structural integrity of the HVAC unit.



Thermo King LRV Range units can be used on both new and retrofitted light rail cars.

New Cars

The Thermo King LRV Range units for new rail cars can be designed into the car and installed during manufacture. Thermo King uses digital models of the cars to provide the manufacturer with efficient, suitable and quick installation procedures.



Retrofit

Older light rail cars are refurbished to extend their service life. In many older cars the temperature control was inadequate or non-existent. When

refurbishing cars, the entire air circulation system may be used again with the addition of a Thermo King range unit. The result: a like-new car with the latest technology available in air comfort systems.

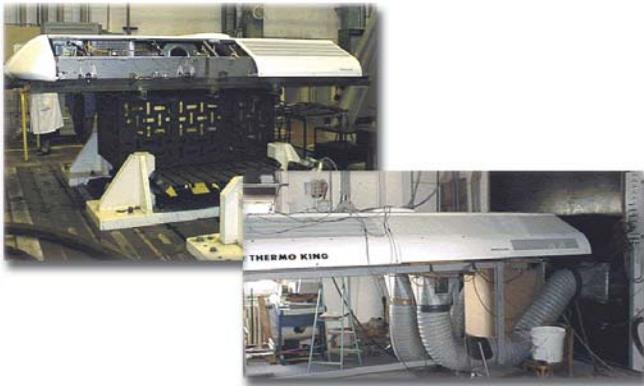


Worldwide protection, care and training



Safety Assurance and Testing

Research, testing and development are key elements in maintaining Thermo King as a world leader in mobile temperature control. This process is applied to our LRV units to ensure safe operation, superior performance, reliability and system longevity.



Some of the critical tests conducted on the Thermo King LRV Range units include:

- **ANSI Wind Tunnel**
Measures airflow, pressure characteristics and cooling capacity
- **Water Test**
Detects water penetration into evaporator area
- **Salt Spray**
Determines the units' level of anti-corrosion protection
- **Vibration Test**
Determines vibration characteristics
- **Noise Emission**
Measures noise level critical to urban standards
- **ARI Certification**
Tested and certified to ARI rated conditions

Training

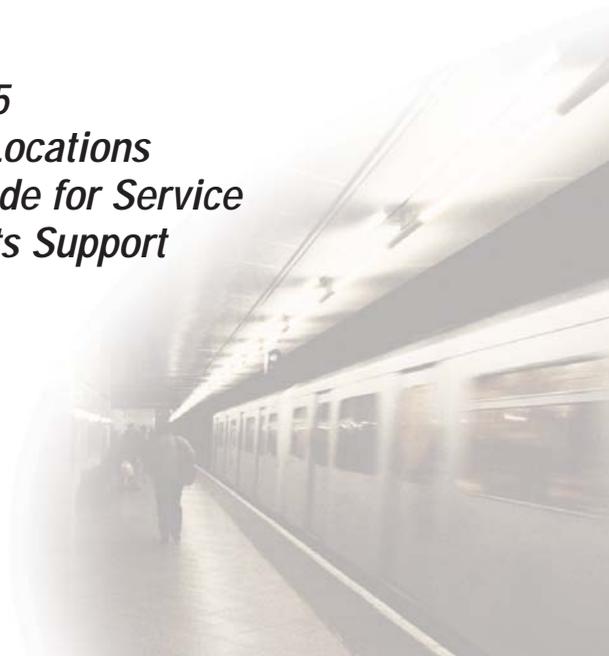
Thermo King operates five of the industry's most advanced training centers in a worldwide network for customers, service staff and dealer technicians. Over the years, more than 130,000 technicians have been instructed in electrical controls, diagnostic equipment, refrigeration and safety. In addition, Thermo King provides on-site training for customer technicians. This consistent quality training is key to maintaining Thermo King's global leadership in mobile HVAC.



**Over 865
Dealer Locations
Worldwide for Service
and Parts Support**

Worldwide Parts and Service

We understand that customers cannot afford downtime. Thermo King has distribution warehouses in eight locations around the world. Our fully automated service parts distribution center can provide same-day shipment to any of our warehouses, dealers and affiliates.



Standard features and options to

More

The Thermo King LRV Range incorporates four standard items in its design: software, refrigerant, load management and fresh air capability. By offering the most extensive range of options available, Thermo King can provide designs and options to meet specific customer requirements. In addition, the Thermo King LRV Range adapts to either new or retrofit applications.

Standard Features

Fully Integrated Ultra Slim-Line Design

Advanced Microprocessor Controller

Communication (CAN, RS232)

- Data logging capability

Software

- Self-diagnostic function
- Downloading capabilities
- Complete system monitoring and fault storing

Service Software (for IBM compatible PC)

- Flash load updates
- Interactive troubleshooting
- Independent setpoint control

Refrigerant

R-407C

- Environmentally friendly refrigerant

Life Cost Management

Load Management

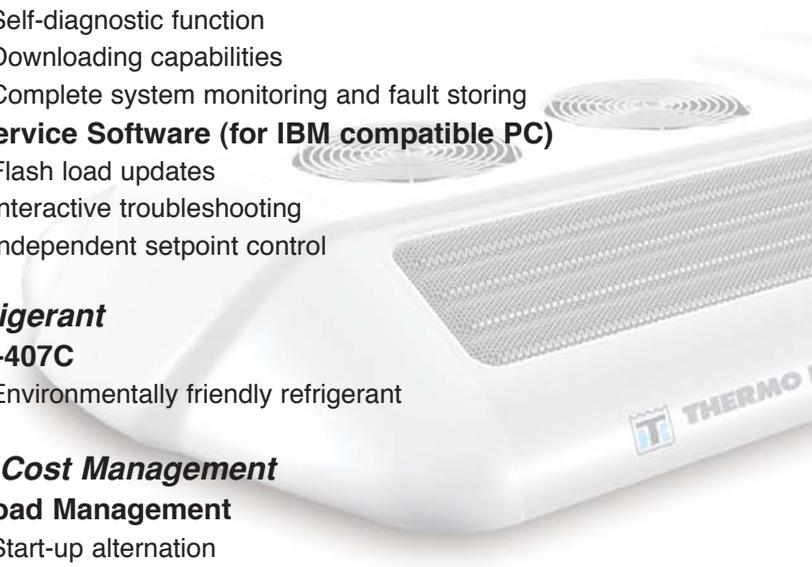
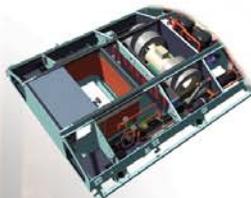
- Start-up alternation
- Two-year warranty

Standard Fresh Air Configuration

Fresh Air Opening - Front

- Front fresh air - max. 1600 m³/h

Supply Air Opening - Bottom



create the system you need



- Reliability
- Capacity
- Temperature management
- Environmentally friendly

Less



- Maintenance
- Power consumption
- Noise



Optional Features

Advanced Microprocessor Controller

Communication (MVB, LonWorks, Wireless, GSM)

- Communicate with other on-board computers

Remote Setpoint Controller

- Enables operator to easily control temperature setpoint from a remote location



Power Source

Power Supply Inverter

- Independent inverter for roof mounting

Connector for Emergency/Ventilation



End Caps

- For a streamlined look



Heaters (0-24kW)

Electric

- Electric resistance wire heater
- Electric resistance tube heater

Hot Water

- Hot water heat exchanger

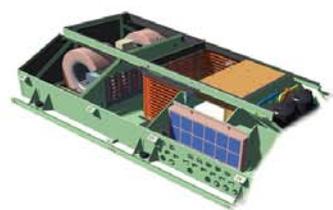


Optional Fresh Air Configuration

Fresh Air Opening - Side

- Side fresh air - max. 1100 m³/h

Supply Air Opening - Front



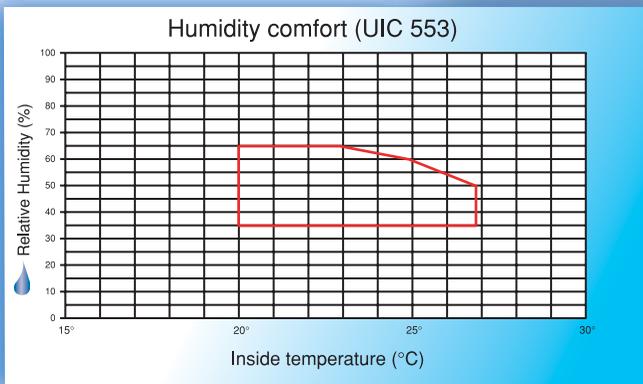
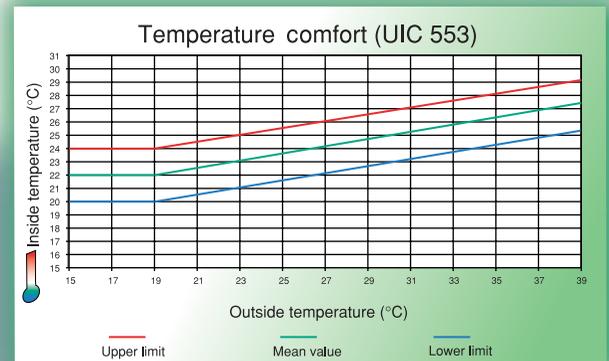
Passenger comfort, guaranteed!

Customer Requirements

At Thermo King, customers' requirements are paramount. We analyze and apply all of the requirements in our units, thus delivering a quality product that keeps passengers comfortable.

Temperature Management

Light rail cars are subject to frequent door openings, which can cause a rapid rise in cabin temperature. The LRV Range, with its microprocessor controller, reduces the temperature swiftly to maintain passenger comfort.



Humidity Reduction

The LRV Range microprocessor controller controls the unit to maintain optimum relative humidity.

Environmentally Balanced Controls

The LRV Range is designed and programmed to function in relationship to the outside environment. The ambient environment is calculated for the worst case conditions of temperature, relative humidity, latitude and elevation, ensuring that the unit will maintain optimum passenger comfort anywhere in the world.



Performance, reliability and safety



Thermo King Quality Components

The Thermo King LRV Range is an efficient, self-contained environmental control unit consisting of compressors, evaporator coil, condenser coils, condenser fan, heavy-duty blowers and a control box. The components are fitted into a low-profile frame for roof mounting.



Scroll Compressors

Fully hermetic scroll compressors operate in tandem, offering high efficiency, low maintenance and quiet operation.



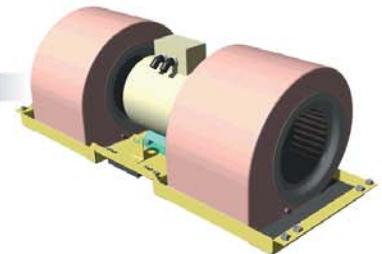
Evaporator Coil

Two TXV valves allow better performance through a wide range of cooling capacity requirements.



Control Box

The control box contains the microprocessor-based controller, circuit breakers, overload relays, contactors and more. All necessary sensors are pre-installed in the unit.



Heavy-duty Blowers

High pressure, heavy-duty blowers are designed to deliver maximum airflow throughout the car.



Condenser Fan/Motor

The condenser fan/motor has specially designed propeller blades for maximum airflow capacity.

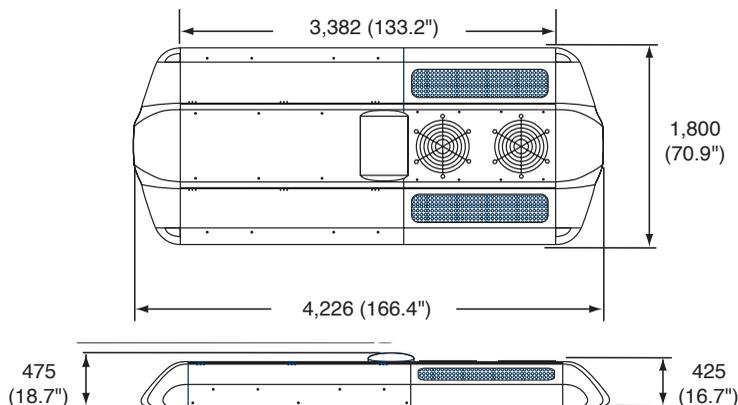


Condenser Coils

Lacquer-coated condenser coils offer high anti-corrosion protection.

LRV Range Specification Performance Table		LRV 8T	LRV 10T	LRV 12T
Capacity Data – System net cooling capacity at 35°C (95°F) / 26.6°C (80°F) / 50% (ambient air dry bulb temperature / inside air dry bulb temperature / inside air inlet relative humidity)				
Cooling capacity (related to the frequency rate)	kW	22/28	28/34	32/40
Heating capacity (electrical or hot water)	kW	0-24	0-24	0-24
Refrigerant type		R-407C	R-407C	R-407C
Compressor type		Scroll	Scroll	Scroll
Electrical Data				
Power voltage range @ 60Hz (AC)	V	208-480	208-480	208-480
Control voltage range (DC)	V	24-110	24-110	24-110
Frequency rate	Hz	50/60	50/60	50/60
Power consumption, full cool (nominal @ 60Hz)	kW	12-17	17-20	20-23
Airflow Data				
Fresh air @ 60Hz (max. flow related to the unit inlet location)	m³/h	1000	1200	1500
Supply air @ 60Hz (max. at 150 Pa external pressure related to the frequency rate)	m³/h	3700	5100	6000
Unit Inlet Locations				
Fresh air (outside air)		Front/Side	Front/Side	Front/Side
Return air (inside air)		Bottom	Bottom	Bottom
Supply air		Bottom/Front	Bottom/Front	Bottom/Front
Weight	kg	560	580	600

Dimensions: Millimeters (Inches)



Warranty

Terms of the Thermo King Limited Express Warranty are available on request.

Basic unit is warranted to be free from defects in material and workmanship. Warranty covers parts and labor only.

Manufacturer is not responsible and will not be held liable in contract or tort (including negligence) for any special, indirect or consequential damages including, but not limited to, injury or damage caused to vehicles, contents or persons, by reason of the installation or use of any Thermo King product or its mechanical failure.

For the specific terms of your warranty coverage contact your local Thermo King dealer or corporate Thermo King representative.

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