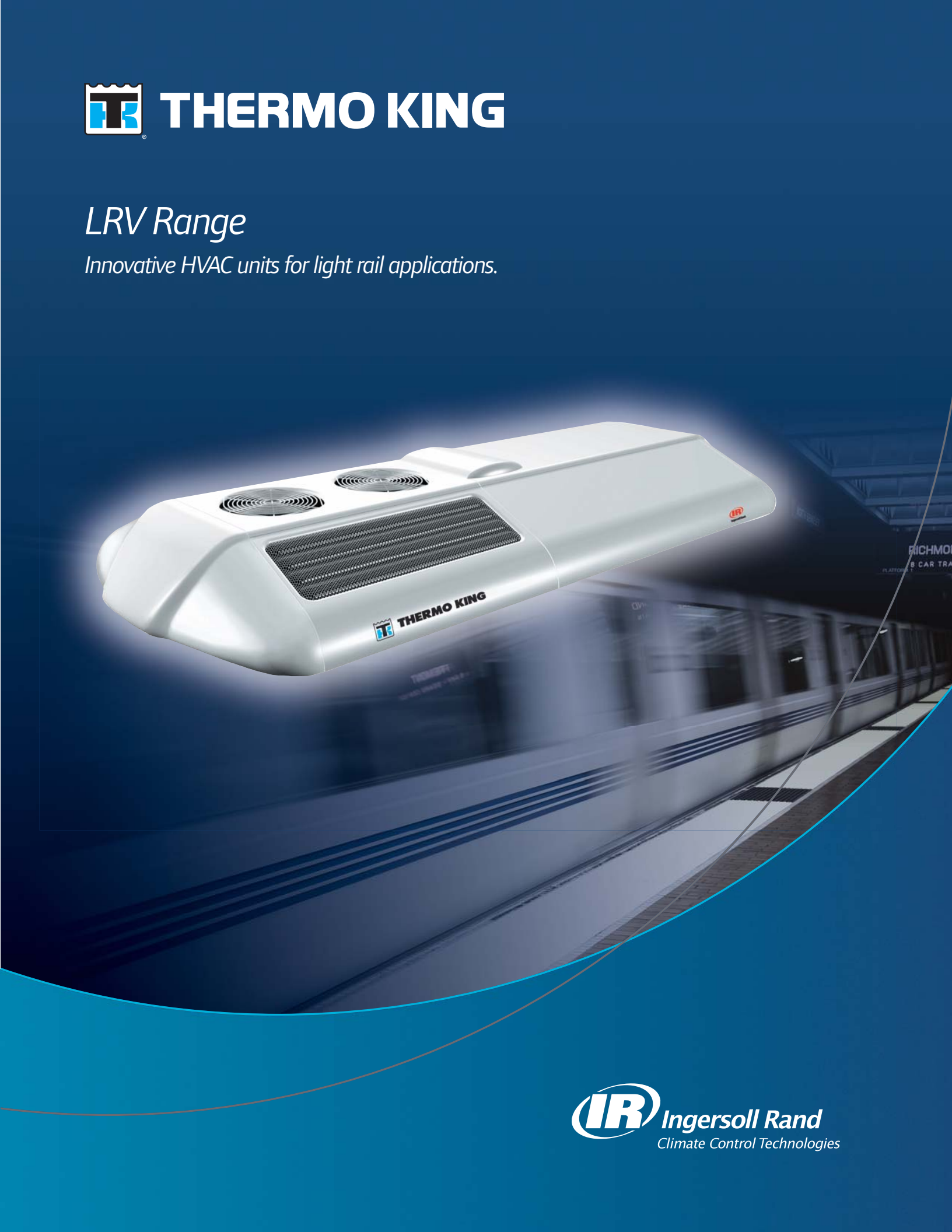
THERMO KING

LRV Range

Innovative HVAC units for light rail applications.



Ingersoll Rand
Climate Control Technologies

Engineered for **performance, reliability and safety**

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

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. 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.

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.

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.

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

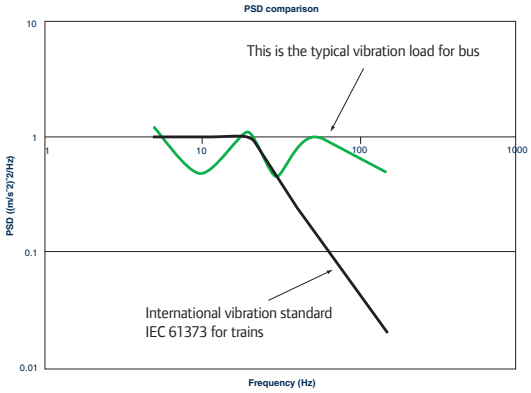
The LRV Range microprocessor controller controls the unit to maintain optimum relative humidity.

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.

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.



Standard features and options **to create the system you need**

Standard Features

Fully Integrated Ultra Slim-Line Design

Advanced Microprocessor Controller

- Communication (CAN, RS232)
- Data logging capability
- Self-diagnostic function
- Downloading capabilities
- Complete system monitoring and fault storing
- Flash load updates
- Interactive troubleshooting
- Independent setpoint control

Refrigerant

- Environmentally friendly R-407C

Life Cost/Load Management

- Start-up alternation
- Two-year warranty

Standard Fresh Air Configuration

- Fresh air opening - front - max. 1600 m3/h
- Supply air opening - bottom

Optional Features

Advanced Microprocessor Controller

- Communicates with other on-board computers (MVB, LonWorks, Wireless, GSM)
- Remote Setpoint Controller enables operator to easily control temperature setpoint from a remote location

Power Source

- Independent power supply inverter for roof mounting with connector for emergency/ventilation

End Caps

- For a streamlined look

Heaters (0-24kW)

- Electric resistance wire heater
- Electric resistance tube heater
- Hot water heat exchanger

Optional Fresh Air Configuration

- Fresh air opening - side - max. 1100 m^3/h
- Supply air opening - front

Specifications

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) m^3/h	1000	1200	1500
Supply air @ 60Hz (max. at 150 Pa external pressure related frequency rate) m^3/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

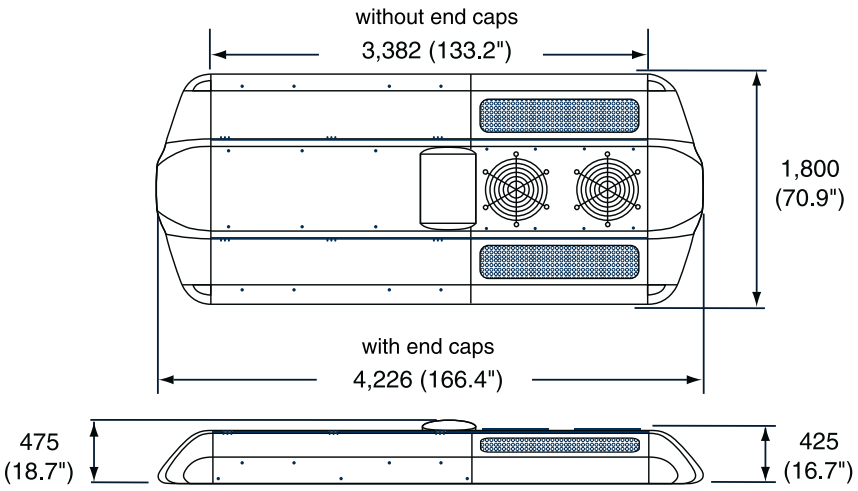
Worldwide Service Organization

Thermo King backs its equipment and customers with a highly-trained, worldwide service organization. This assures you the support of factory authorized service facilities and a stock of factory parts and factory trained mechanics.

Warranty Summary

Terms of the Thermo King Warranty are available on request from your local Thermo King dealer. Please reference document TK50049 for the Thermo King Bus Unit Warranty.

Dimensions millimeters (inches)



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Climate Control Technologies

Providing equipment and services to manage controlled-temperature environments for food and other temperature-sensitive products, our Climate Control Technologies sector encompasses both transport and stationary refrigeration solutions. Our product brands include Thermo King®, a world leader in transport temperature control systems, and Hussmann®, a manufacturer of refrigeration and food merchandising equipment.

TK 51713-5-PL (9-08)