



HVAC units for tramways, trains and metros

Proven performance, high reliability and low life cycle cost

Air Conditioning for Passengers



- *Complete capacity range*
- *Self contained, hermetically sealed units*
- *Standard off the shelf units*
- *Customized to fit the application*
- *Easy maintenance*
- *Controlled via Microprocessor*

IR **Ingersoll Rand**
Climate Control Technologies



Travelling in air-conditioned, perfectly temperature controlled trains, tramways and metros is key to the travel comfort of today's passengers and drivers.

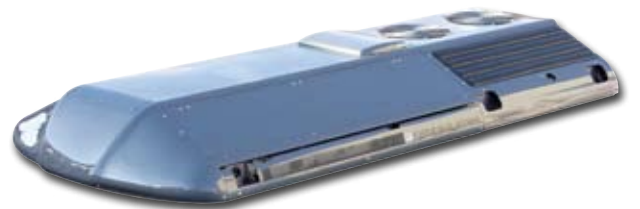
The heating, ventilation and air-conditioning solutions for rail vehicles from Thermo King are highly reliable and deliver top performance while reducing operating costs.

Excellent quality service and maintenance support in every corner of the world is ensured by Thermo King's second-to-none, global dealership network.

Since 1938 Thermo King has been a leader in climate control solutions. Through a culture of constant improvement and innovation we strive to provide total customer satisfaction in everything we do.



Tramway type of unit



LRV type of unit



Low profile saloon unit for metro applications



Tramway type of unit

Specifications

Specifications	Roof mounted units Tramways, commuter trains, coaches, metros
PERFORMANCE	
Cooling capacity	20 -35 kW
Heating capacity	Up to 32 kW
Total air flow rate	3000 - 5300 m ³ /h
Fresh air flow rate	up to 1250 m ³ /h
Operating temperature	-30 to + 70 °C
Weight	up to 800kg
POWER SUPPLY	
Unit power supply	3x208V, 60Hz • 3x230V, 50/60Hz • 3x380/400V, 50Hz • 3x460/480V, 60Hz • 750V DC
Heater power supply	AC ; see Unit power supply • DC up to 750V nominal
CONTROL	
Control voltage	24 to 110V
Communication	CAN Open, MVB or Ethernet
Control of external heaters	Yes
Temperature and humidity control	Yes, by microprocessor
Air distribution control by dampers	Yes, by fresh, return and supply air dampers
REFRIGERANT	
Refrigerant circuit	Hermetic
Refrigerant	R134a or R407C
NORMS & REGULATIONS	
Shock and vibration	IEC 61373
Fire and smoke per	NF F 16-101, 102 and 103 • DIN 5510 • NFPA 130
EMC	EN 50121-3-2
Electronic components	EN 50155
Reliability	EN 50126
Air filters	G2 to G4 per EN 779
Comfort inside passenger compartment (together with car builder)	EN 14750 • EN 13129 • UIC 553
Environment	EN 50125-1
Unit frame	Stainless steel • Aluminum
Inverter duty	

Specifications are subject to change without notice.



Research and Development

Ingersoll Rand's R&D centre near Prague, Czech Republic, is a state-of-the-art facility using the latest technology to perform a wide range of tests on Thermo King equipment.

These extensive tests ensure optimal performance, high quality and reliability of the Thermo King HVAC products. The facility includes:

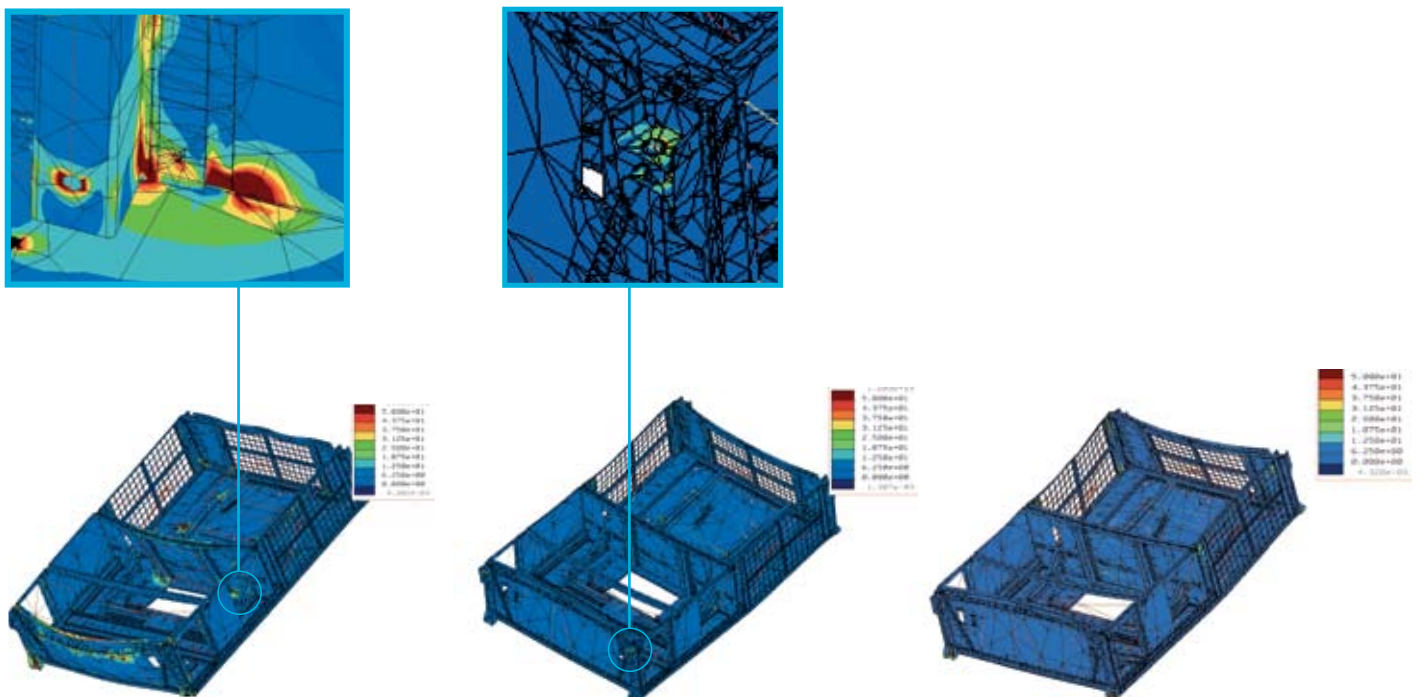
- Multi-axial shaker table laboratory
- Endurance test rooms
- Climate chamber
- Two comparative test chambers
- Two single temperature calorimeters
- Vibration laboratory with climate chamber

Our R&D centre is also a place where new and disruptive technologies are being studied and is Ingersoll Rand's Centre of Excellence in Central Europe.



Modal Analysis

The figure demonstrates results of unit frame design optimization using Finite Element Analysis (FEA). The presented results are modal analyses, which allow evaluation of the frequency and shape of frame natural frequencies. The optimization consists of “tuning” the natural frequencies away from excitations caused by rail operation.



Ingersoll Rand Climate Control Technologies provides equipment and services for:

HEATING, VENTILATION & AIR CONDITIONING



Rail



Bus

TRANSPORT REFRIGERATION



Road Cargo



Air Cargo



Sea Cargo

STATIONARY REFRIGERATION



Commercial Applications



Industrial Applications



Ingersoll Rand

Climate Control Technologies

Providing equipment and services to manage controlled-temperature environments for public and private transport, food and other perishables, 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®-Koxka®, manufacturers of refrigeration and food merchandising equipment.

www.thermoking.com

www.koxka.com

www.hussmann.com

www.ingersollrand.com

For further information please contact: