THERMO KING

Precedent® Rail

The rail-ready platform that delivers double-digit fuel savings and offers compliance choices that don't compromise performance.



TRANE TECHNOLOGIES



WE KNOW RAIL.

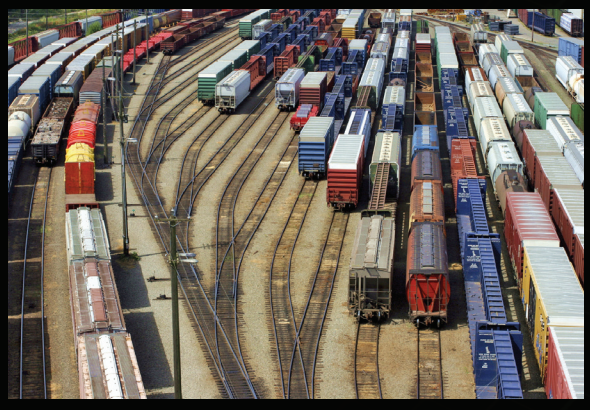
THERMO KING HAS BEEN DESIGNING CUSTOM RAIL SOLUTIONS FOR OUR CUSTOMERS SINCE 1948.

Thermo King introduced the first refrigerated boxcar over 70 years ago and continues to develop and expand on the latest industry-leading rail technologies. Thermo King provides rail solutions to customers by listening to their needs and developing the most reliable, cost-effective products in the industry.

Unsurpassed Reliability and the Lowest Cost of Ownership

Thermo King understands your business and provides rail products designed to offer you unsurpassed reliability and the opportunity to lower your fuel, maintenance and overall operational costs. Thermo King also has you covered from coast to coast, with expert service when and where you need it. Thermo King rail products truly Deliver What Matters:

- Unsurpassed Reliability in Unattended Rail Service
- Backed by the Longest Warranty in the Rail Industry (see your dealer for details)
- Less Maintenance - Extended Maintenance Intervals mean Less Downtime and Less Expense
- Expert Mobile Service and Support Nationwide from the Thermo King Dealer Network.
- Lower Operating Costs and the Lowest Cost of Ownership





Thermo King Advantage: Premium Engine Protection

Thermo King's Rail-Ready units come equipped with a Severe Duty Filtration Package to protect the engine in the harsh environments the unit is exposed to.

The system is built to function in unattended situations because Thermo King understands fuel system performance is the last thing rail and intermodal transporters want to worry about during long, cross country trips.

This system delivers:

- 30% longer maintenance intervals with more capacity than our standard filtration package
- Stable fuel flow with a robust 80 micron strainer
- Longer engine life with the exclusive automatic drainage system found in the 5 micron fuel filter
- Reduced waste with environmentally-friendly replacement elements

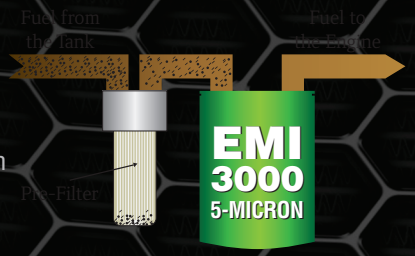
Best Warranty in the North American Rail Industry

Not only do Thermo King Rail-Ready Units provide best-in-class quality and reliability, they are backed by the best warranty in the industry. See the table below to compare the standard warranty on all major parts from Thermo King and its nearest competitor.

	Thermo King	Nearest Competitor
Run Time	8,000 hours	6,000 hours
Years	4 years	3 years

Pre-Filter

Protect the unit from damage caused by particulates suspended in your fuel system.



EMI-3000 Primary Filter

5-micron filter traps more harmful particles.

Ultra Sonic Fuel Sensor

Utilizing ultra sonic technology for more accurate fuel readings, this optional new sensor comes installed in the fuel tank and delivers the following benefits:

Electric Fuel Pump

Allows for easier starts and virtually eliminates bleed starts.

Auto Fresh Air Exchange

- Auto fresh air exchange helps keep loads safe from the detrimental effects of gaseous build-up inside the refrigerated space
- Can be controlled and monitored via the unit controller or remotely via telematics

Electric Fuel Heater

Makes starts in cold conditions easier by adding a thermostatically-controlled fuel heater.

Diesel-Direct Electric (DDE) Architecture:

ENGINEERED FOR MAXIMUM RAIL UNATTENDED PERFORMANCE

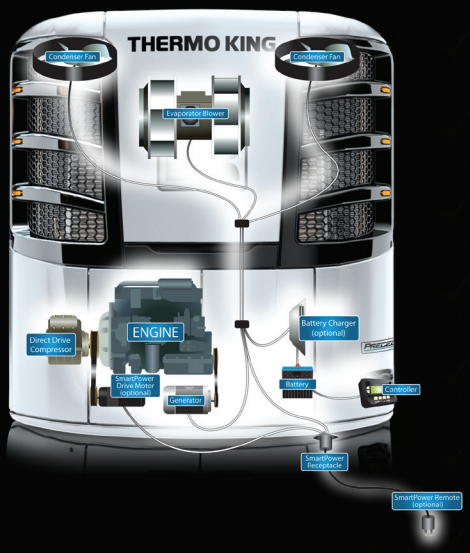
The Precedent platform utilizes an all-new DDE (Diesel Direct Electric) architecture to drive optimum efficiencies and double-digit fuel savings across real-world applications. It's a smarter approach, with the expressed goal of making a lasting difference on your budget.

In addition to brand-new technologies, there are also some familiar components residing within the Precedent architecture. The well-proven X-430 reciprocating compressor provides the performance and reliability Thermo King is famous for and, when combined with the new architecture, delivers better operating efficiencies than ever before.

Why DDE?

Diesel-electrical vs. diesel-mechanical. It was the central debate when deciding Precedent's architectural framework. Instead of choosing one, we chose the best of both.

- Our new platform utilizes DDE architecture to drive optimum efficiencies and double-digit fuel savings.
- DDE ensures minimal energy loss and maximized fuel efficiency and reliability when compared to an all-electrical solution.



Evaporator Blower Assembly

Precedent's evaporator assembly moves air more efficiently than ever. Leveraging the Smooth Air blower system, the airfoil blade profile and contoured air inlets deliver maximum airflow with minimal power draw. We used compression molding to produce both the evaporator and condenser side sections using SMC material and insulation with a 6.7/inch R-value to isolate the condenser and evaporator airflow sections. The bulkhead is structural, allowing for the direct mounting of hardware to cut system weight. All together, it delivers:

- High speed airflow during low speed engine operation for optimal protection of fresh loads and improved fuel efficiency
- An easily removable access panel enables service from front of unit
- 30% larger coil area for improved efficiency and faster pulldown

TracKing™

TELEMATICS FOR YOUR FLEET

Every Precedent refrigeration unit comes connected from the factory powered by TracKing®, making it easier for fleets to monitor and analyze their refrigerated fleet operations.

Putting this data to work gives you the ability to track and trace individual deliveries across your fleet. You'll be able to demonstrate temperature levels, meet regulatory requirements, and respond instantly to new challenges.

OPTIMIZE ASSETS

- Upload and change optimal reefer mode settings using remote OptiSet® Plus for efficient reefer performance
- Reduce manual interventions to manage exceptions and remotely download reefer for diagnostics
- Update software for multiple refrigeration units remotely over the road or in the yard
- Monitor non-reporting unit locations to manage asset utilization

SECURE ASSETS

- Change OptiSet Plus cargo and unit profiles remotely
- Receive notifications on sudden drops in fuel level
- Geo-fence locations to monitor asset entry, exit and stationary durations
- Manage door lock status and audit trails to ensure cargo and asset security

MINIMIZE DOWNTIME

- Improve response times with real-time notifications of reefer shutdowns and alarms
- Proactively manage and set accurate temperature setpoints and reefer modes using a smart device
- Monitor and manage reefer fuel levels, low fuel alarms and reefer battery voltage
- Track asset location, movement and stationary times for quick asset turnaround

MAXIMIZE FUEL EFFICIENCY

- Lower fuel costs by unit and trip using remote OptiSet Plus
- Monitor reefer refueling events with fuel increase notifications
- Monitor unauthorized reefer fuel usage when assets are stationary
- Set fuel efficient cycle-sentry modes remotely for deep frozen setpoints
- Improve fuel consumption and increase fuel efficiency
- Reduce unauthorized fuel usage and monitor unplanned stops

IMPROVE CARGO TRACEABILITY

- Monitor and receive temperature out-of-range alerts
- Customize reefer settings to cargo-specific temperature profiles using remote OptiSet Plus for load integrity
- Pre-cool assets remotely to prove temperature traceability for FSMA compliance

UTILIZE DATA FOR EFFICIENCY

- Access remote reefer datalogger download and temperature audit trails for proof-of-delivery
- Run Preventative Maintenance (PM) schedule compliance reports
- Track unit performance and prevent breakdowns with unit operations and fuel history reports
- Customize and schedule performance reports
- Run stationary asset and unit event history reports to manage asset performance and uptime

PRECEDENT RAIL-READY ORDERING GUIDE

Trailer on Flat Car (TOFC) and Intermodal





TOFC Package - includes:

- Severe Duty Air/Oil/Fuel Filtration Package
- 65 Amp Alternator

Factory Options:

- TracKing® Telematics
- Battery Charger
- SmartPower™ Electric Standby
- Auto Fresh Air Exchange
- Fuel Heater

Domestic Refrigerated Container (DRC)





DRC Package - includes:

- Severe Duty Air/Oil/Fuel Filtration Package
- Battery Charger

Factory Options:

- TracKing Telematics
- Auto Fresh Air Exchange
- Fuel Heater

Steel Wheeled Refrigerated Box Car (RBC)





RBC Package - includes:

- Severe Duty Air/Oil/Fuel Filtration Package
- Maximum Flow Evaporator Panel
- 65 Amp Alternator

Factory Options:

- TracKing Telematics
- Battery Charger
- Auto Fresh Air Exchange
- Electric Fuel Heater

Thermo King's Performance Advantage™ Service Offerings

Looking to cut costs and maximize your fleet uptime? Our range of service plans help you choose the right maintenance investment to keep you on the road and running strong. Tap in to the nation's leading experts in transport refrigeration maintenance and experience the Performance Advantage.

PERFORMANCE ADVANTAGE™

THERMO KING RAIL-READY BENEFITS

Lower Operating Costs

Reducing the everyday costs of operating the reefer was essential in the development of these new units. The following features will help you realize reduced operating costs, every day you run:

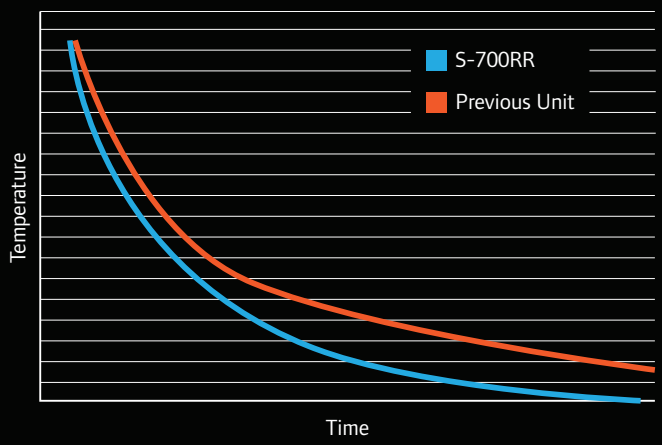
- SR-4 Controller with OptiSet Plus helps ensure correct parameters are set for every load, quickly and easily
- EMI extended maintenance interval means longer intervals between service
- Low Fuel Warning helps prevent costly out-of-fuel shutdowns
- Scheduled Maintenance Reminder to keep unit running at peak efficiency

EPA and CARB Compliance

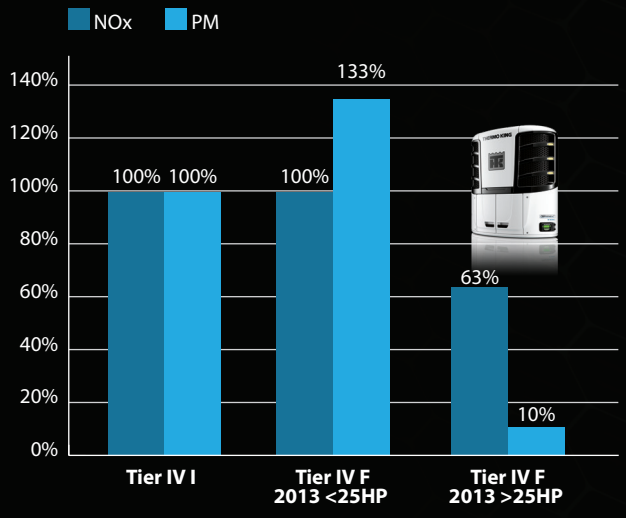
The S-600RR and S-700RR are CARB evergreen* solutions that deliver double-digit fuel efficiency gains without the uncertainty of future compliance. The C-600RR delivers 7-year CARB compliance.

Faster Pulldown, Lower Temperatures

Precedent S-700RR pulls down faster and reaches lower deep-frozen temperatures than the SB-330RR, while using considerbly less fuel.



Reduced Emissions
(Regulatory Levels)



* S-Series models, which include the S-600RR and S-700RR, already meet Tier 4 final emissions certification by the Environmental Protection Agency (EPA) and California Air Resources Board (CARB). Further, they comply with CARB's Ultra-Low-Emission Transport Refrigeration Unit In-Use Performance Standards (ULETRU).

RAIL OPTIONS

Fuel Tanks

Lightweight and durable aluminum fuel tanks.

- Anti-siphon device prevents fuel theft (optional)
- Ultra-Sonic Fuel Sensor (USFS) prevents costly out-of-fuel shutdowns on the road (optional)
- Twin site wired fuel gauge (optional)

DOMESTIC REFRIGERATED CONTAINER	*TRAILER ON FLAT CAR*
85 gal	75 gal
120 gal	110 gal
156 gal	120 gal

CargoLink® Wireless Sensors

Wireless sensor system saves money, reduces maintenance and offers increased load protection.

DOOR SENSORS

- Configurable to shut down unit or switch to low speed operation when door is open
- Decreases fuel consumption and emissions
- Connects with TracKing to monitor when door is open

FUEL SENSOR

- Monitors fuel levels to prevent unnecessary shut downs
- Advanced fuel sensing algorithm detects fuel loss events, eliminates fuel slosh readings and improves accuracy
- Connects with TracKing to monitor fuel level - even when unit is off
- Rapid fuel loss detection alerts you to fuel theft

Rail Remote Status Lights

Prevent costly shutdowns and monitor the conditions of the asset during routine inspection.

- Displays any warning indicators and unit status

PrimAir™ Air Management Solutions

Proper air management is the key to keeping your cargo at the correct temperature.

RETURN AIR BULKHEADS

- Ensure proper airflow by pulling return air off trailer floor
- Provide protection to evaporator during pallet loading

CHUTES

- Ensure proper airflow by pulling return air off trailer floor
- Patent-pending ramped mesh ends protect chute from teardown during loading

PLENUMS

- Formed plastic panels efficiently distribute air throughout container

Solar Panels

Eliminate costly call-outs to start your unit.

- Help assure units start
- Increase battery life
- Decrease maintenance costs

NATIONWIDE RAIL COVERAGE FROM THE THERMO KING DEALER NETWORK

EXPERT MOBILE SERVICE. 24 HOURS A DAY. ALL ACROSS NORTH AMERICA.



e-Rail Safe Certified Dealers

e-Rail Safe certification is required to enter rail yards and facilities across the United States. Without this certification, access to rail yards can be denied, causing major problems for your business. If technicians cannot enter the yard, loads can be lost to unit shutdowns, costing you money and customer loyalty.

Thermo King Dealers are e-Rail Safe certified, allowing them to access all rail yards nationwide. UpTime mobile service trucks bring the dealership to the customer and are on call 24 hours a day, 7 days a week. Whenever a unit requires repair, upload or flashloading, or regular maintenance, Thermo King Dealers can deliver Genuine Thermo King Parts and expert service right to you.



Look for this symbol to identify Rail-Ready dealers in your area!



THERMO KING QUALITY AND RELIABILITY

TESTED FOR RELIABILITY IN DEMANDING RAIL APPLICATIONS



Rail-Specific Testing

To ensure years of performance in demanding rail applications, Thermo King applied rail shock loading to the Precedent unit – the railcar shock data was acquired from measurements taken on several units on a fleet of refrigerated boxcars. The unit was bolted to a special fixture and the assembly was then bolted securely to a 50 kip Electro Dynamic shaker table at Thermo King's Vibration Test Lab in Minneapolis (photo below). Half-Sine Wave Shock pulses were applied in the vertical and horizontal directions (direction of railcar travel). Shock loads in the direction of travel varied from 3 impacts at 7 Gs up to several hundred impacts at 2 G loads. Similar impacts were applied in the vertical direction. These rail shock tests are equivalent to a service life of 7 years.

Over-the Road Durability

Because our Rail-Ready units also must perform over the road, accelerated tests were also applied to the Precedent unit on a multi-axis hydraulic shaker table (MAST table) at Thermo King's Research & Development Centre in Prague, Czech Republic. The vibration test profile was generated from data collected from an instrumented reefer unit on a tractor-trailer driven on road surfaces varying from typical paved highways to harsh resonant test tracks. This test is equivalent to driving a tractor-trailer a distance of 1.9 million miles.





PRECEDENT

OPTIONS CHECKLIST

SmartPower Electric Standby:

- ❑ Standard
- ❑ High-Output

- ❑ **SmartPower Prep Package**
- ❑ **SmartPower Remote Receptacle**
- ❑ **Fresh Air Exchange**
- ❑ **Supplemental Power Kit**
- ❑ **Arctic Package**
- ❑ **Battery Charger**
- ❑ **65 Amp Alternator**

Fuel Tanks - Trailer on Flat Car:

- ❑ 50 Gallon
- ❑ 75 Gallon
- ❑ 110 Gallon
- ❑ 120 Gallon

Fuel Tanks - Domestic Refrigerated Container:

- ❑ 85 Gallon
- ❑ 120 Gallon
- ❑ 156 Gallon

- ❑ **Anti-Siphon Device**
- ❑ **Ultra Sonic Fuel Level Sensor**
- ❑ **Wired Twin Site Gauge**
- ❑ **CargoLink Fuel Level Sensor**

Batteries:

- ❑ EON
- ❑ MAXPLUS
- ❑ ReliaMax

TracKing® Telematics:

- ❑ TracKing – Satellite
- ❑ TracKing – Cellular
- ❑ I-box Interface

Remote Status Lights:

- ❑ Status Only

Door Sensors and Switches:

- ❑ CargoLink Wireless Door Sensors
- ❑ Wired Door Switches

- ❑ **Sensor Kits**

Air Management:

- ❑ PrimAir Return Air Bulkheads
- ❑ PrimAir Chutes
- ❑ PrimAir Plenums

- ❑ **Solar Panels**

RailReady

DIMENSIONS

TOFC
86.2″
(includes air deflector and bottom pan)

DRC
82.3″

RBC
83.5″
(includes air deflector)



SPECIFICATIONS

S-600RR

Refrigeration Capacity (System net cooling capacity at 100°F ambient and high speed engine operation)

	Engine Power w/ETV	
	BTU/hr	Watts
35°F	60,000	17,584
0°F	32,000	9,378
-20°F	20,000	5,861
Heating Capacity (System net heating capacity at 35/0°F ambient)	Engine Power	
BTU/hr	51,000	
Airflow Capacity		
Volume at 0 Pa static pressure	3,300 ft^3/min	
Engine: four cylinder, direct injection, liquid cooled (Compliant with Final Tier 4 EPA Emissions Regulations Standards)		
Model	TK488CR	
Hp Rating at 2,050 RPM	33.0	
Oil Capacity	12 qt	
Maintenance Interval	3,000 hrs/4,000 HRS	
Compressor: lightweight aluminum alloy body, heads and sump		
Model	X430P	
Displacement	30.0 in^3	
Refrigerant: (Zero Ozone Depletion Potential (ODP), internationally approved)	R404A	
Charge	14.5 lbs	
System Weight	1857 lbs	
50 gallon fuel tank w/bracket	76 lbs	

S-700RR

Refrigeration Capacity (System net cooling capacity at 100°F ambient and high speed engine operation)

	Engine Power w/ETV	
	BTU/hr	Watts
35°F	68,000	19,929
0°F	37,000	10,844
20°F	25,000	7,327
Heating Capacity (System net heating capacity at 35/0°F ambient)	Engine Power	
BTU/hr	72,000	
Airflow Capacity		
Volume at 0 Pa static pressure	3,300 ft^3/min	
Engine: four cylinder, direct injection, liquid cooled (Compliant with Final Tier 4 EPA Emissions Regulations Standards)		
Model	TK488CRH	
Hp Rating at 2,050 RPM	35.0	
Oil Capacity	12 qt	
Maintenance Interval	3,000 hrs/4,000 hrs	
Compressor: lightweight aluminum alloy body, heads and sump		
Model	X430P	
Displacement	30.0 in^3	
Refrigerant: (Zero Ozone Depletion Potential (ODP), internationally approved)	R404A	
Charge	14.5 lbs	
System Weight	1872 lbs	
50 gallon fuel tank w/bracket	76 lbs	

C-600RR

Refrigeration Capacity (System net cooling capacity at 100°F ambient and high speed engine operation)

	Engine Power w/ETV	
	BTU/hr	Watts
35°F	59,000	16,998
0°F	34,000	9,964
20°F	21,000	6,154
Heating Capacity (System net heating capacity at 35/0°F ambient)	Engine Power	
BTU/hr	50,000	
Airflow Capacity		
Volume at 0 Pa static pressure	3,350 ft^3/min	
Engine: four cylinder, direct injection, liquid cooled (Compliant with Final Tier 4 EPA Emissions Regulations Standards)		
Model	TK486V25	
Hp Rating at 2200 RPM	24.0	
Oil Capacity	12 qt	
Maintenance Interval	3,000 hrs	
Compressor: lightweight aluminum alloy body, heads and sump		
Model	X430L	
Displacement	30.0 in^3	
Refrigerant: (Zero Ozone Depletion Potential (ODP), internationally approved)	R404A	
Charge	14.5 lbs	
System Weight	1863 lbs	
50 gallon fuel tank w/bracket	76 lbs	

THERMO KING

Thermo King – by Trane Technologies (NYSE: TT), a global climate innovator – is a worldwide leader in sustainable transport temperature control solutions. Thermo King has been providing transport temperature control solutions for a variety of applications, including trailers, truck bodies, buses, air, shipboard containers and railway cars since 1938. For more information, visit *thermoking.com* or *tranetechnologies.com*.

TK 55835-5-PL (4-20)
© 2020 Trane Technologies. All rights reserved.