TRANE

SINTESIS™

PRIME

Air-cooled Screw Chillers
Model RTAF G Process

Near 0 GWP (<1) refrigerant R1234ze

Designed for Process Cooling Applications

INGERSOLL RAND: OUR COMPANY

A rich legacy serves as the foundation for the next 100 years.

Innovating for 147 years

- Founded when Simon Ingersoll patented the steam-powered rock drill in 1871.
- The Ingersoll-Rand Company was first incorporated on June 1, 1905.
- Acquired Trane (established 1885) in June 2008.

Company headquarters

- Incorporated in Swords, Ireland.
- North American Headquarters and Corporate Center in Davidson, North Carolina.

A global company

- More than 44,000 employees globally.
- A total of 894 facilities around the world, including 53 manufacturing facilities worldwide.

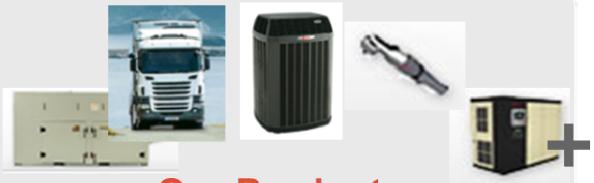
Traded on NYSE

- Listed (NYSE: IR) since 1906.

Reducing Greenhouse Gas Emissions

Ingersoll-Rand Climate Commitment

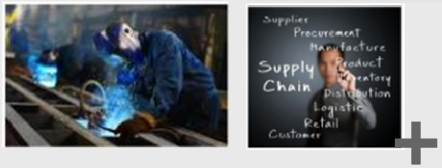
Our company is helping to solve some of the world's most pressing challenges – including the unsustainable demand for energy resources and impact on greenhouse gas emissions.



Our Products

50% reduction in GHG via: 1) increased energy-efficient products; 2) use of next generation refrigerants with lower GWP in refrigerant-based products by 2020

50%



Our Operations

35% GHG reductions in our office buildings, manufacturing facilities and fleet by 2020

35%

Market Leadership and Convening

$500M in research to promote energy efficiency & solve refrigerant gaps via innovation, research, testing, policy over the next 5 years

$500M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Designed for Process Cooling
Applications

Trane Sintesis stands for the broadest variety of State-of-the-Art technologies, creating the best answer for any application..

… for a **superior customer experience**

- Top class efficiencies
- Lowest sound levels
- Smart and versatile
- Lowest Total Cost of Ownership
- Legendary Trane reliability
- Three compressor technologies
- **Environmentally responsible refrigerant choice**

Your expectations delivered by Trane

- Sustainability
- Capacity
- Efficiency
- Versatility
- Reliability

Environmental responsibility

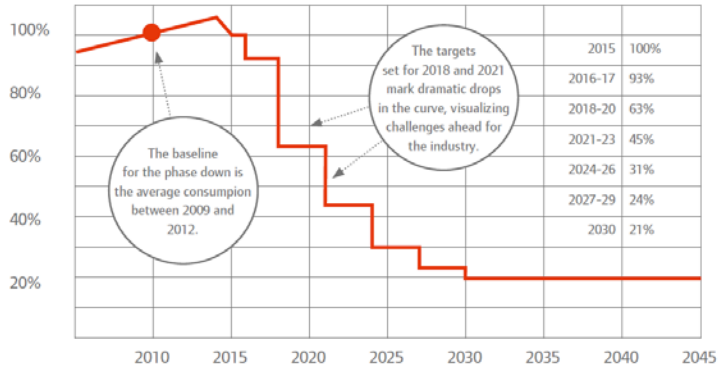
RTAF G Process
Special design
Process cooling
GWP<1 (is <CO2)

R1234ze

Refrigerant cost impact

F-Gas Regulation

- Objective: reduce by **79%**, the production of all HFC's by **2030**
- Entry into force: **January 2015**



Ingersoll-Rand & Trane committed: a complete new HFO chiller range is available, today

Green and Safe go together

Today, chillers for negative temperature applications provides sustainable refrigerant such as Ammonia.

With HFO there is no need for safety consessions when going Green

Benefitting from Serial Production, delivery time is 4 – 5 weeks

Factory Test

Special Design, Serial Production: Proven and guaranteed performance

Maintenance

Safe refrigerant and standard design: minimal maintenance requirements, no special waivers needed

€

Special Design, serial Production:

Best Value for Money

	NH_3	R1234ze
GWP	+	+
Toxic	-	+
Delivery time	-	+
Proven Performances	-	+
Easy Maintenance	-	+
First Cost	-	+
Overall	-	+

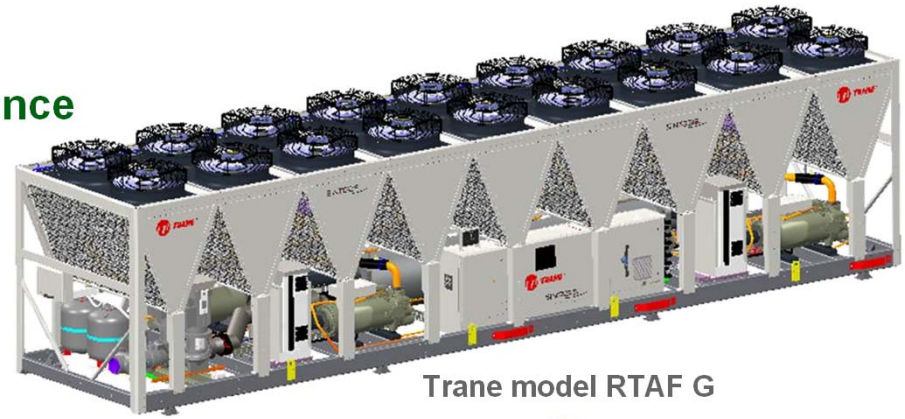
Your expectations in one product

SINTESIS™ PRIME

The sinthesis of **all you ever wanted to have** for your process application **without compromise**…

… for a **superior customer experience**

- Top class **efficiencies**
- **Lowest sound** levels
- **Smart** and versatile
- Lowest **T**otal **C**ost of **O**wnership
- **Legendary Trane reliability**
- **Environmentally responsible refrigerant choice**



Trane model RTAF G

R1234ze

Capacity range – process applications

SINTESIS™ PRIME

3 different sizes with 2, 3 and 4 compressors running with 2 AFDs (Adaptive Frequency™ Drive)

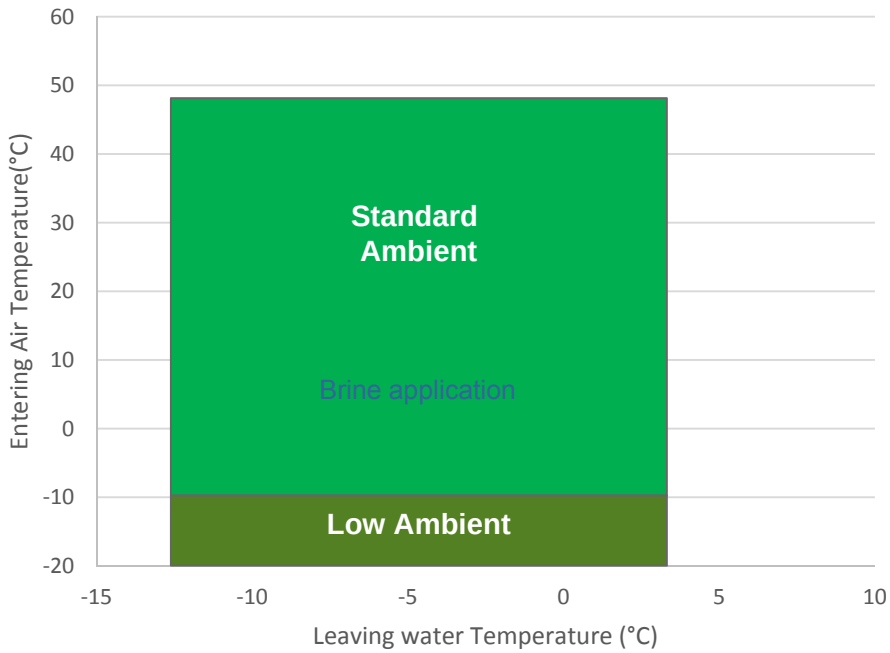
Designed to supply negative temperature leaving brine

R1234ze

Unit size HSE	Number of Compressors	Unit Length	Cooling Capacity	SEPR MT
		(m)	at -4 / -8 / 35 with 30% EG	
101	2	5.7	411 kW	3.42
141	3	8.3	599 kW	3.25
191	4	10.1	755 kW	3.27

Cooling capacities: -4/-8° C 30% EG Entering/Leaving evaporator - 35° C Entering Air Condenser

Operating map



Ambient air – all year round cooling

- ✓ From -10° C to 46° C standard
- ✓ Down to -20° C with low ambient option

Leaving water temperature – comfort & process

- ✓ Down to -12° C with ME Glycol
- ✓ Down to -8° C with MP Glycol
- ✓ Up to +4.4° C
- ✓ Full Ecodesign 2018 compliant for Process Medium Temperature

Features

Electronically Commutated (EC) fans

Optimized fan diffusers

Trane Tracer™ UC800 Control and TD7 color touchscreen interface

Micro-channel condenser coils

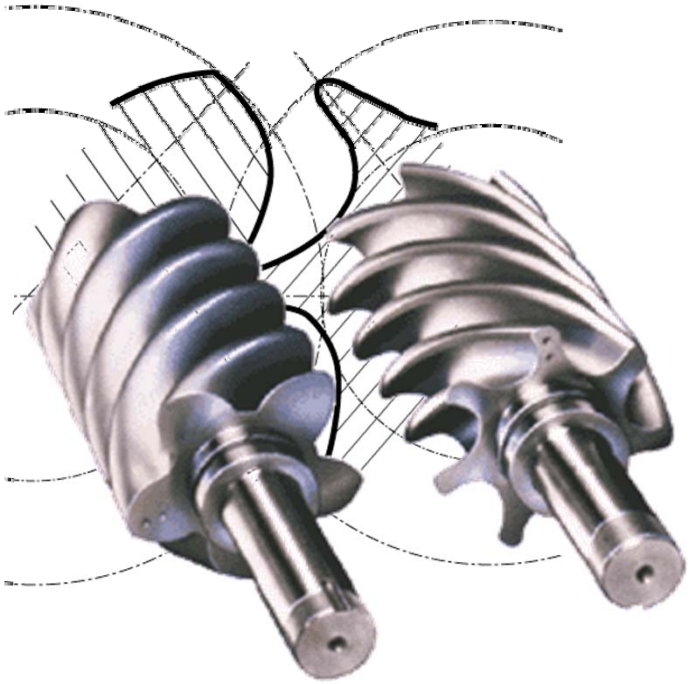
CHIL flooded evaporator

Adaptive Frequency™ Drive

Trane screw compressor

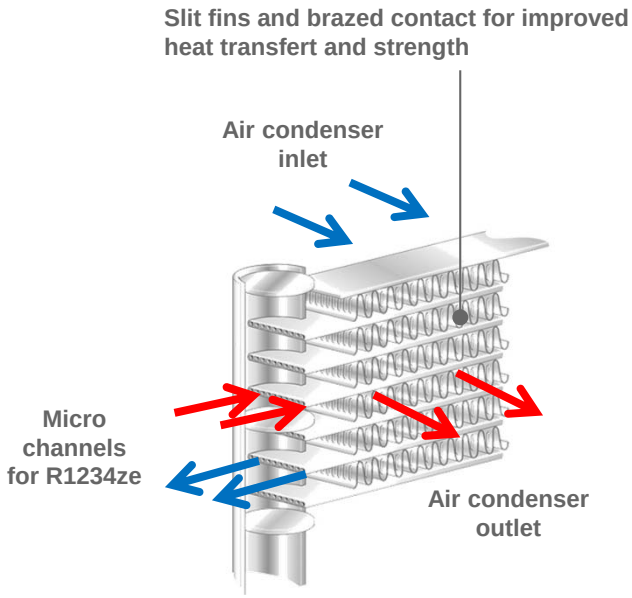
More than 30 years of experience

- Designed, built and tested according to the most demanding and rugged standards
- Proven track record
  - ➔ More than 400 000 compressors worldwide
  - ➔ Industry leading reliability: > 99.5%
- Fewer moving parts
- Direct drive low speed
- Suction gas cooled
- No oil pump needed
- Resistance to liquid slugging
- Field serviceable
- Widest operating map in the industry



Micro-channel condenser coils

- ✓ Leading-edge coil design for increased corrosion resistance
- ✓ Longer life expectancy
- ✓ Increased efficiency with less refrigerant
- ✓ Reduced carbon footprint
- ✓ 10% overall unit weight reduction
- ✓ Optional E-Coating

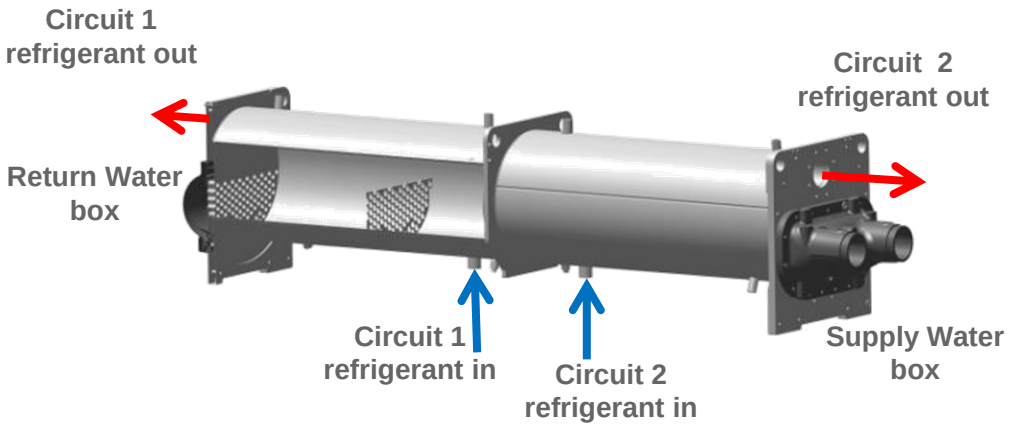


Trane Adaptive Frequency™ Drive

- ✓ Improved efficiency under part load conditions
- ✓ Improved capacity modulation
- ✓ Reduced inrush current
- ✓ Improve capacity regulation

Trane CHIL* flooded evaporator

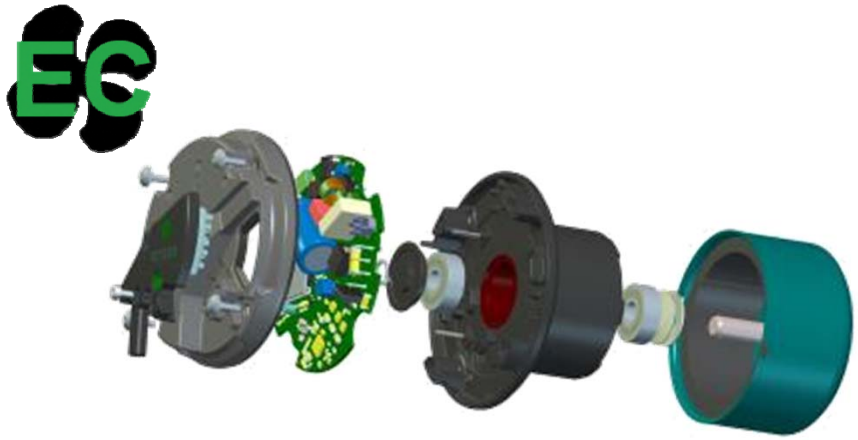
- ✓ Reduced refrigerant volume
- ✓ Increased efficiency
- ✓ Reduced carbon footprint



**** Compact - High performance - Integrated design - Low charge***

Electronically commutated (EC) fans

- ✓ Improved capacity modulation
- ✓ Reduced power consumption
- ✓ Reduced energy costs



Redesigned fan diffusers

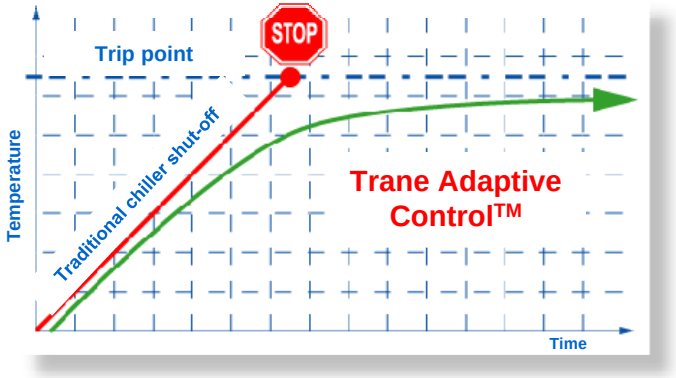
- ✓ Remodelled to optimize airflow
- ✓ Fans consume less power
- ✓ Operating noise reduced

Trane Adaptive Control ™

Intuitive Display in Local Language

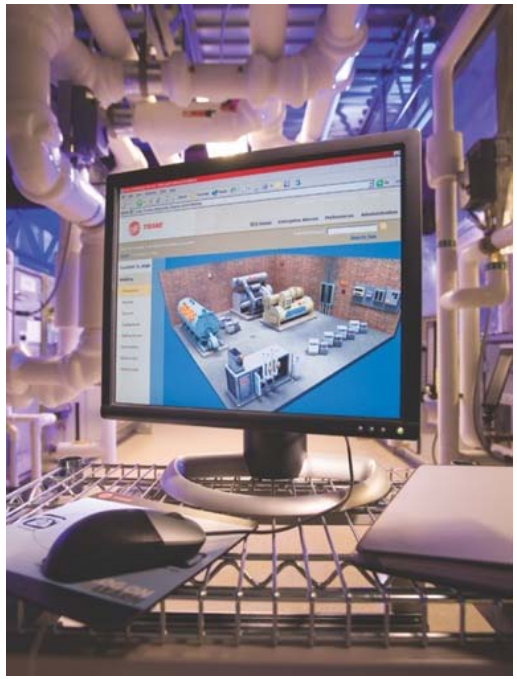
Trend Charts

Diagnostics



- Patented Industry leading algorithms
- Takes actions to prevent shutdown due to abnormal operating conditions:
  - Flow failure
  - Cooling tower or Dry cooler malfunction
  - Extreme operating conditions
- Clear visibility of operation through graphics:
  - Trend monitoring
  - Performance follow-up
  - Preventive maintenance anticipation
- More than 100 diagnostics made when a fault is detected
- Display indicates fault, time and date of diagnostic
  - Quick localization of problem
  - Faster action
- Allows problem fixing without shutting off
  - Downtime minimized

Communication



- Compatible with all Trane Building Management Systems and chiller plant controls
- Communication interfaces
  - BACnet™ MSTP
  - ModBus™ RTU
  - LonTalk™ (LCI-C)

Heat Recovery

To use the energy which produced as a natural outcome of cooling cycle…

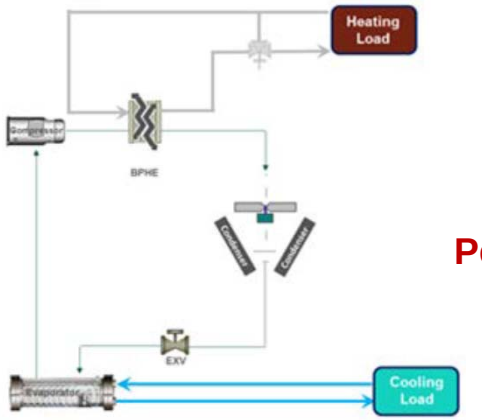
Delivering Hot water up to 63˚ C

Partial Heat Recovery (PHR)

✓ Generate heating up to 25% of cooling capacity

Partial Heat Recovery Plus (PHR+)

✓ Generate heating up to 50% of cooling capacity with an on site fan management installation



Total Heat Recovery (THR)

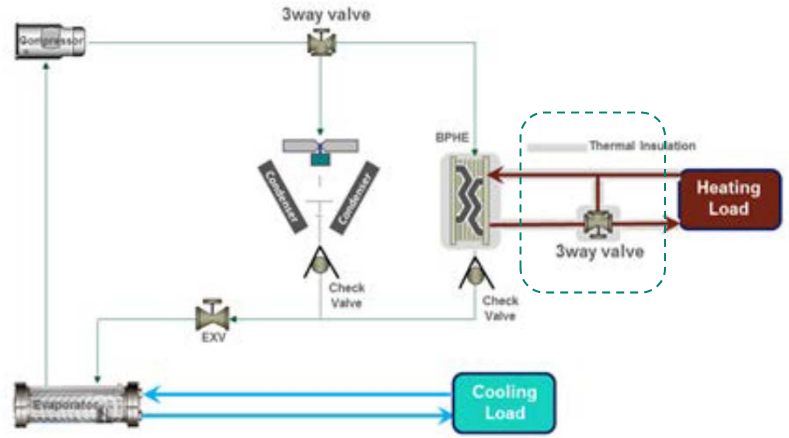
✓ Generate heating up to 130% of cooling capacity

Total Heat Recovery Full (THR)

✓ Generate heating up to 130% of cooling capacity

→With hot water side 3-way valve, pipes and heaters

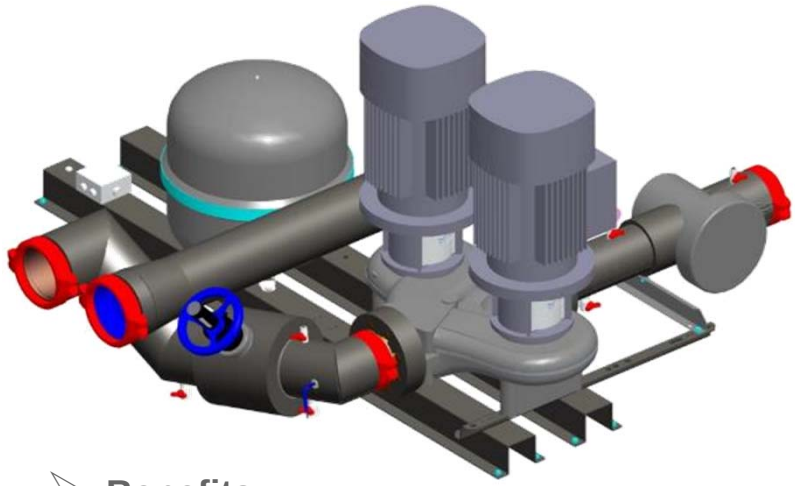
Perfect for a defrosting system



Hydraulic Module

Optimize your on site installation

- Dual Pump – Standard Pressure
- Dual Pump – High Head Pressure



➢ **Variable Speed Pump**

VPF

- Constant Speed
- Constant ΔP

With differential pressure sensor supplied

- Constant ΔT

➢ **Benefits**

- Avoid decoupling system
- 40 to 59% savings

on pump electrical power consumption

Suited to multiple applications

Food and Beverage Industry

Milk Factory

Industrial

Ice Rink

Cold Room

Pharmaceutical Industry

- GREEN
- Designed for Brine
- SAFE
- STANDARD product
- Efficient
- AFFORDABLE

Extensive testing

- Operation in extreme operating conditions leading to World Class reliability
- Pressure vessels resistance
- Electro-Magnetic compatibility (CE compliance)
- Finite element analysis for structure and components design resistance and robustness
- Acoustics and vibrations testing

Large Air-Cooled Testing Facility
Epinal, France

Complying with the highest standards

CE compliance

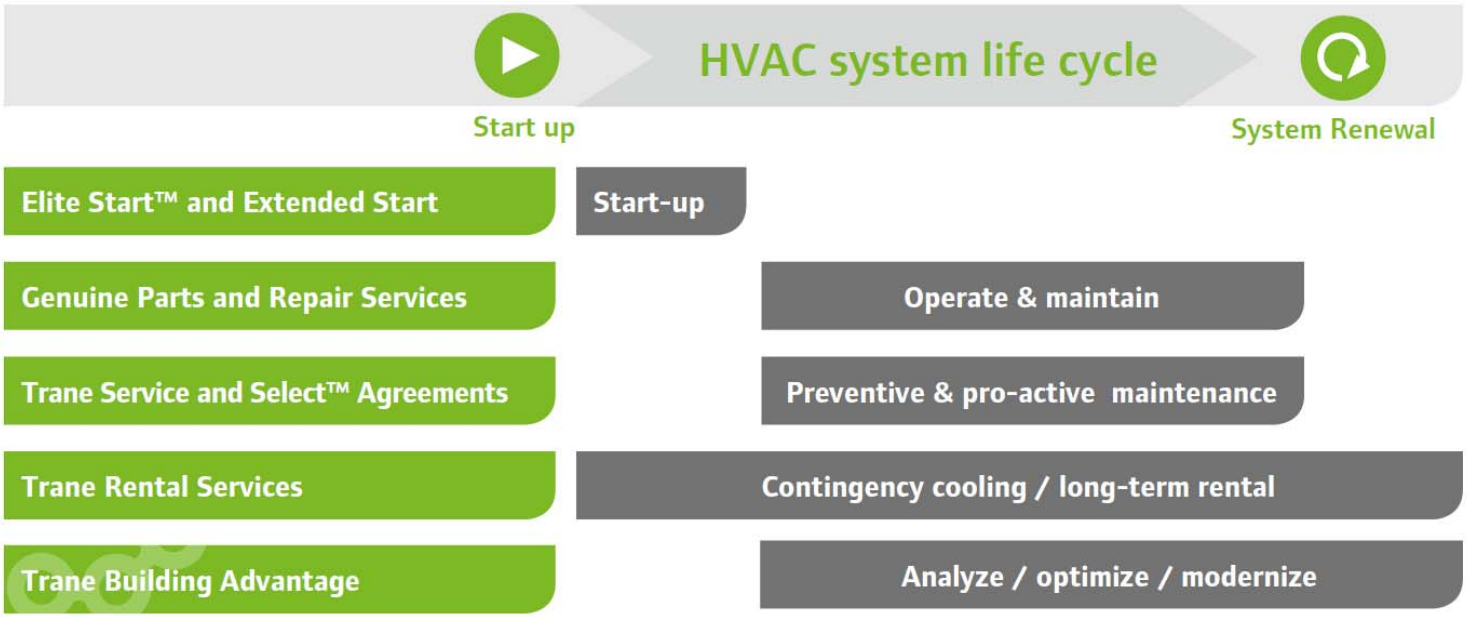
- EU Ecodesign compliant ENTR Lot 1 (2015/1095/EU)
- Pressure Equipment Directive (PED) 97/23/CE
- Machinery Directive (MD) 2006/42/CE
- Low Voltage Directive (LV) 2006/95/CE
- Electromagnetic Compatibility Directive (EMC) 2004/108/CE
- Electrical Machinery Safety Standard EN 60204-1
- Electromagnetic Emission and Immunity Standard EN 61800-3 category C3

Quality Insurance processes

- ISO9001
- ISO14001

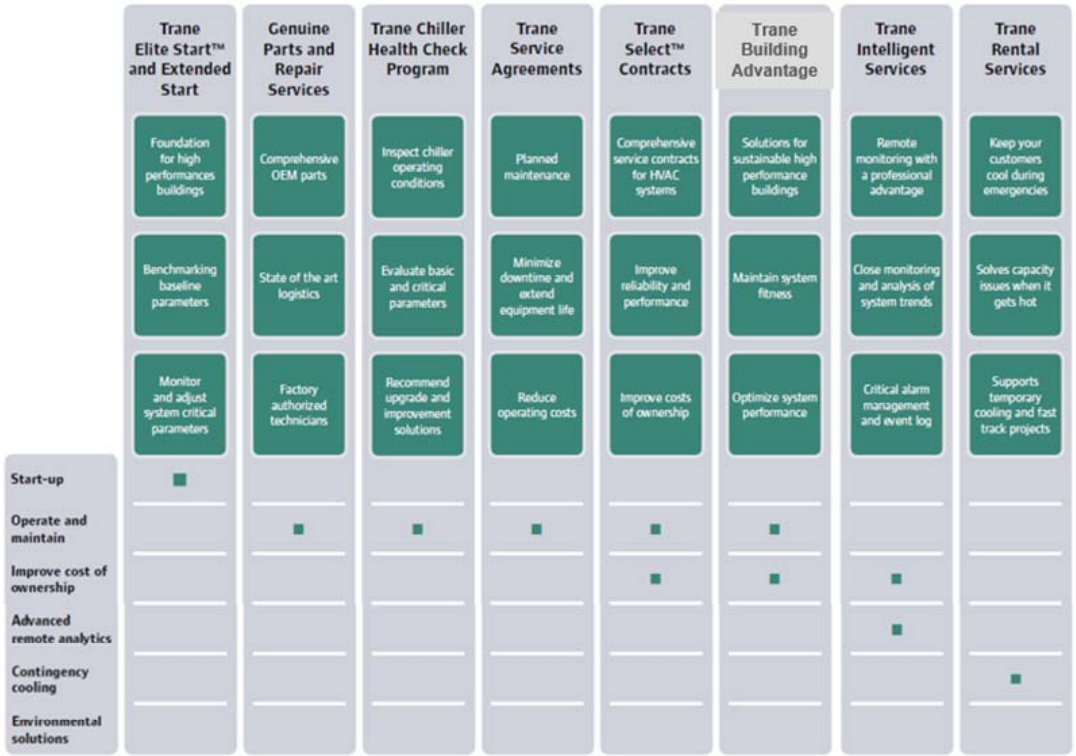
Guaranteed performance of the investment

Trane Services



Trane Services

Total chiller life cycle management



Trane Services

Trane Building Advantage

40 to 60% of your total energy budget goes into running your chiller plant. Our mission with Trane Building Advantage is clear: to bring you the services, tools, equipment and expertise to transform your building. Our customers measure HVAC systems by their reliability, efficiency and environmental impact. The suite of enhancement solutions we call Trane Building Advantage has been developed to deliver results at two levels:

Components: By targeting individual components of the system we can ensure they meet design requirements and so optimize life cycle costs.

Plant: We leverage our expertise and use proprietary analysis software to produce a holistic system design to suit specific needs within clear cost parameters.

Analyze	Optimize	Modernize
Oil Analysis	Compressor R'newal	Adaptive Frequency Drive
Thermography	Exchanger Enhancement	Chiller Control Retrofit
Tube Testing	Adiabatic Cooling	Chiller Plant Manager
Vibration Analysis	Automatic Tube Cleaning	Chiller Upgrade
Chiller Plant Analysis	Exchanger Cleaning	FreeCool
Metering	Power Factor Correction	OptiPlant
Refrigerant Leak Testing	Noise Reduction	Partial Heat Recovery
Refrigerant Monitor	Refrigerant Management	Refrigerant Retrofit

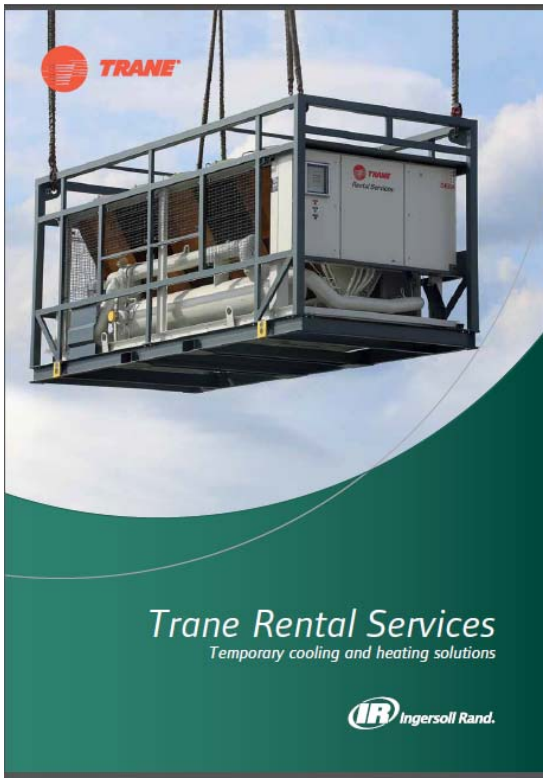
Trane Services

Trane Rental

- 24/7 service
- Latest equipment technology
- Wide rental fleet from 25 to 1600 kW
- Short and long-term rental solutions
- All building purposes
- Wide service network
- Experienced factory-authorized technicians

- Additional Capacity
- Seasonal Cooling
- Emergencies
- Planned Equipment Intervention
- Events and Occasions
- Contingency Planning

Air Cooled Chillers:	13 kW to 1600 kW
Water Cooled Chillers:	200 kW to 1600 kW
Heat Pump Chillers:	50 kW to 330 kW
Air Handling and Blower Units:	up to 7.0 m³ per second
Rooftop Units:	25 kW to 160 kW
Installation and Accessories:	safe lock electrical cables, flexible hoses with kamelock or Bauer connections, couplings, skid pumps, booster pumps and flexible ducting, heat exchangers, water tanks, flanges along with a complete installation service.



TRANE®

It's Hard To Stop A Trane.®