



ATMO
Summit

BRUSSELS
29 Sept. 2026
Business Case for
Natural Refrigerants



TECHNISCHE
UNIVERSITÄT
BERLIN



Bergstrom

48-Volt Electric Compressor for R290 Mobile Systems

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29 September 2026



Founded in **1949**, Rockford, IL
Global Leader of Thermal Management System



Bergstrom Confidential Proprietary



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Bergstrom Inc., a wholly-owned company, is a global leader in the design and supply of climate control systems to the commercial vehicle industry.

- GHG emissions assessments and reduction activities
- Engine-off Parking Cooler Systems
- Battery Energy Storage Systems
- Industry Involvement for R290 Development
 - SAE CRP for BEV
 - SAE CRP for ICE/Hybrid

ecovadis

CDP

SAE
INTERNATIONAL®



R290 Refrigerant Interest

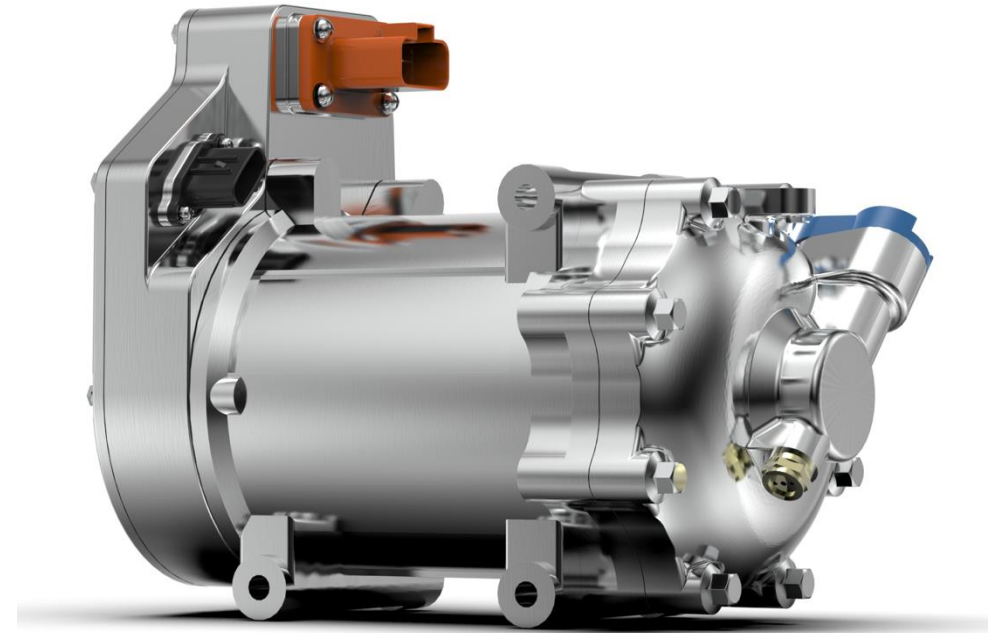
- Reduced Environmental Impact (lower Scope 3 emissions)
- Improved Heat Pump performance at lower temperatures
- Compliance with international regulations
- Reduced cost
- Similar system components to R1234yf
- Higher volumetric refrigerant capacity



www.friolor.com

Overview

- Low-voltage is a safer application vs high-voltage
- Up to 6kW capacity (sufficient for most vehicles)
- Robust construction for heavy duty applications
- R290 compatible with improved discharge section construction



Production Launched Q2 2026

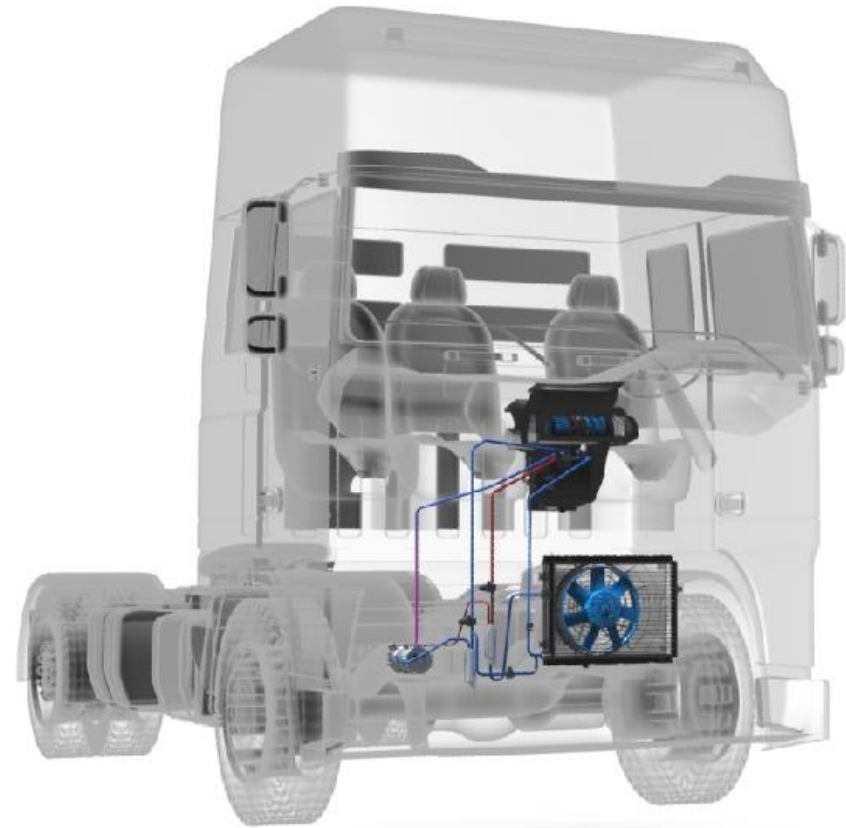


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Applications

- Full vehicle thermal management
- Engine-off operation (for ICE vehicles)
- Pre-conditioning
- Battery/Electronics Thermal Management
- Secondary loop systems
- Mild Hybrids



Design Features

1. Dual-compliance scroll design

- Not standard in the vehicle industry

2. Strong tolerance to slugging and debris

- Robust and reliable over the full-service life

3. Lubrication via oil droplets carried by gas flow

- Wider range of permissible operating angles
- Less sensitive to OCR (oil) amounts

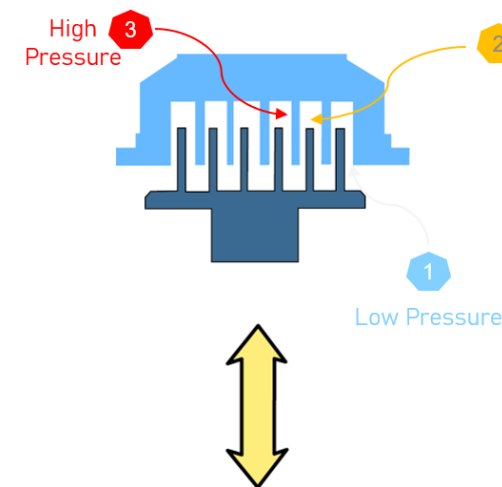
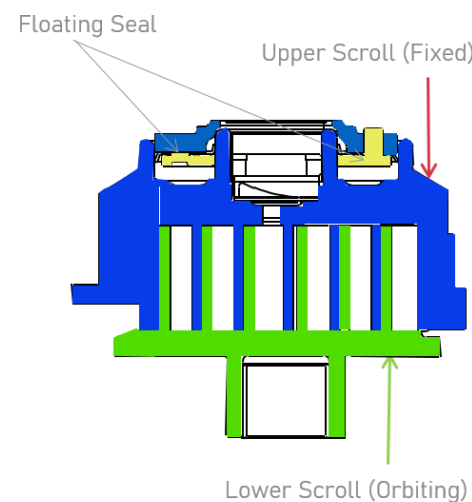
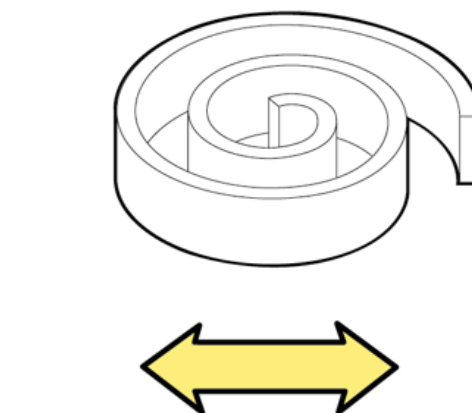
4. Scrolls that wear in over their service life

- Sustained high efficiency even as wear occurs



Dual-Compliance Scroll

- No Lip-seal
- Wearing-in provides improved sealing
- Axial and radial compliance
 - Scroll allowed to float
- More resistant to liquid slugging & debris



48V ELECTRIC SCROLL COMPRESSOR

GENERAL & POWER SPECIFICATIONS

32 cc/rev | 48 VDC nominal | Integrated controller

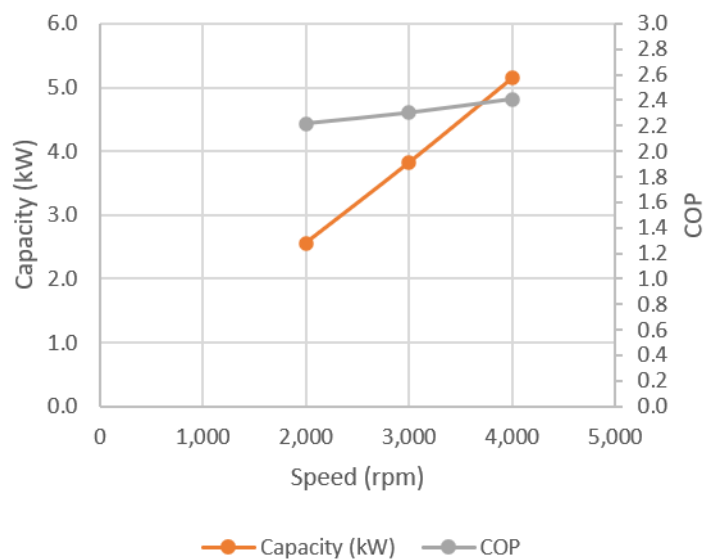
COMPRESSOR GENERAL	
Compressor type	Electrical horizontal scroll
Driver type	Integrated controller
Compressor models	DC60J-A01 (LIN/PWM) DC60J-A03 (CAN) DC60J-A04 (CAN)
Displacement	32 cc/rev
Refrigerants	R134a • R1234yf • R290
Oil	PAG46
Weight	10.5 kg with controller and oil
Sound	65 dB(A) at ARI condition Te/Tc = 7.2°C/54.4°C; 5,000 rpm
IP level	IP67; IP6K9K

COMPRESSOR POWER	
Nominal input	48 VDC
Speed range	1,500–6,000 rpm
Capacity range	1,800–6,700 W
Voltage range	36–60 VDC
Maximum input current	60 A
Minimum input voltage	36 VDC

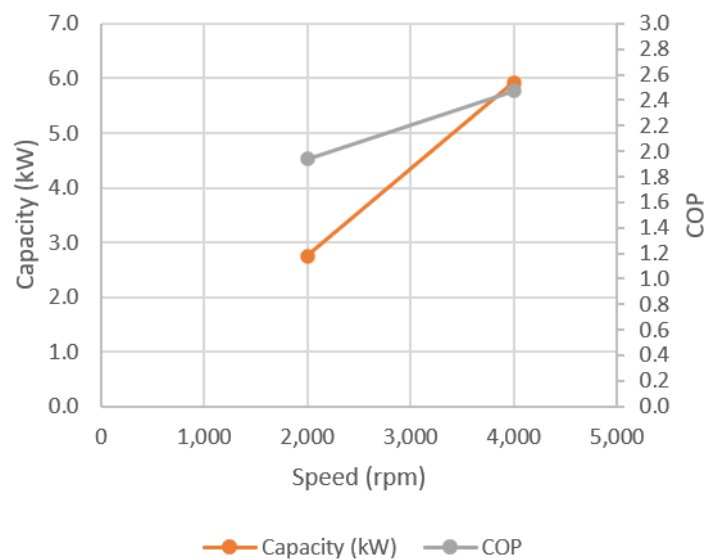


R290 Performance - Cooling

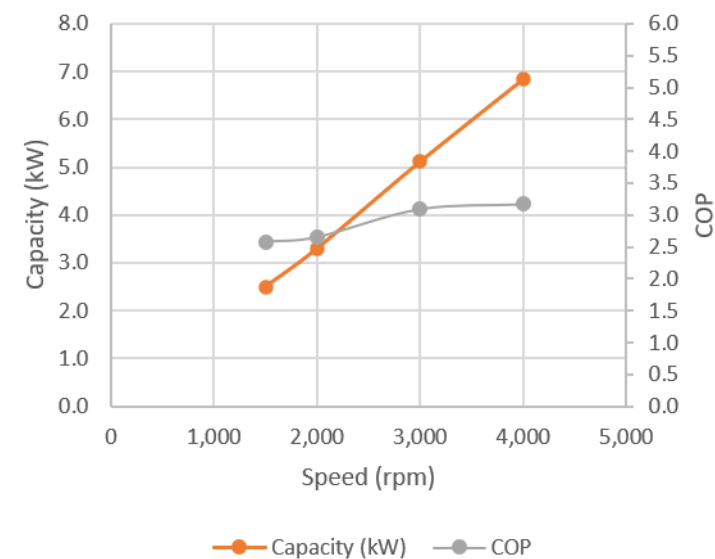
R02: Te 0.67°C, Tc 55.23°C



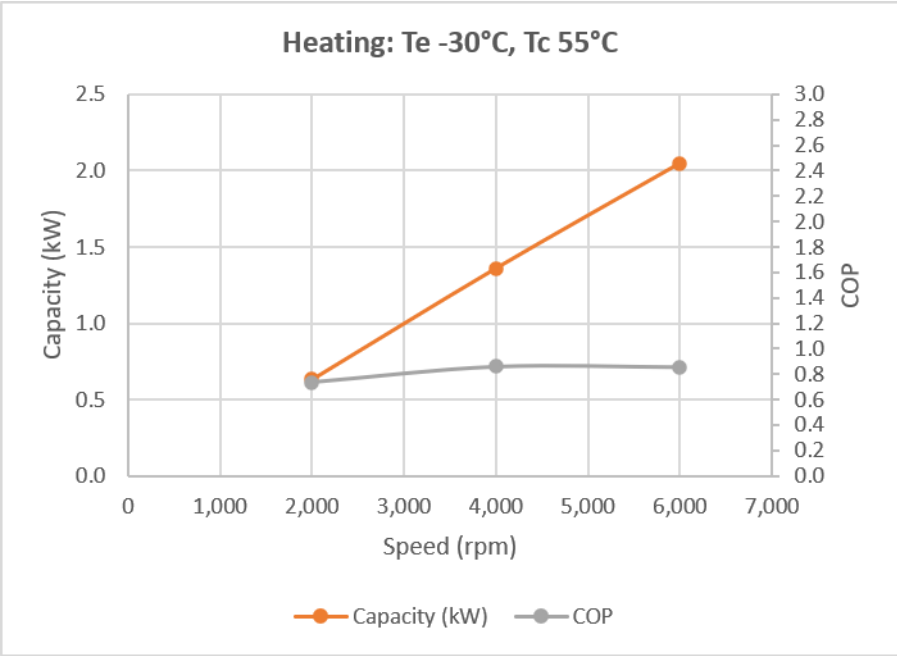
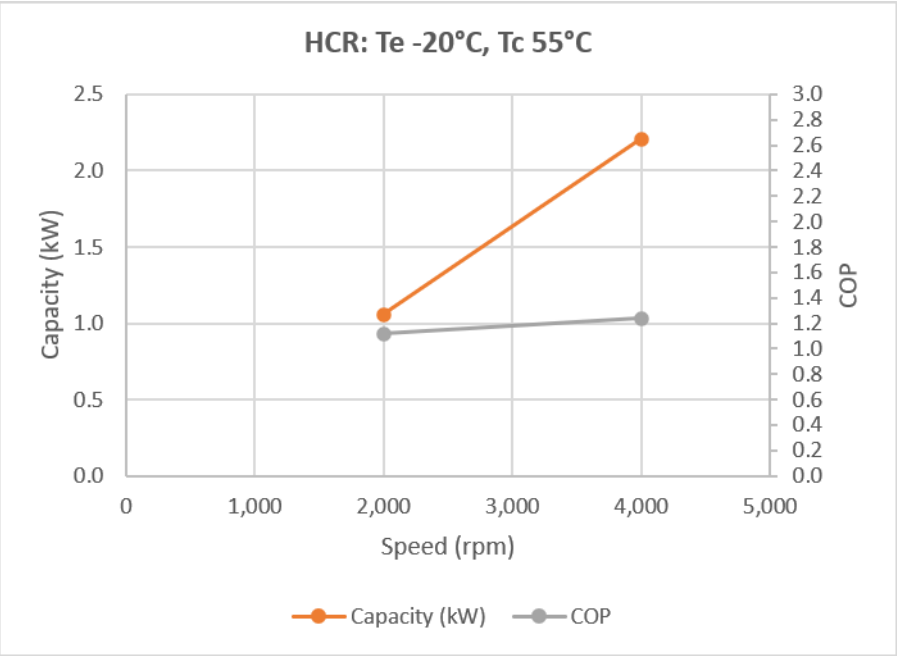
P: Te 5°C, Tc 60°C



R: Te 7.2°C, Tc 54.4°C



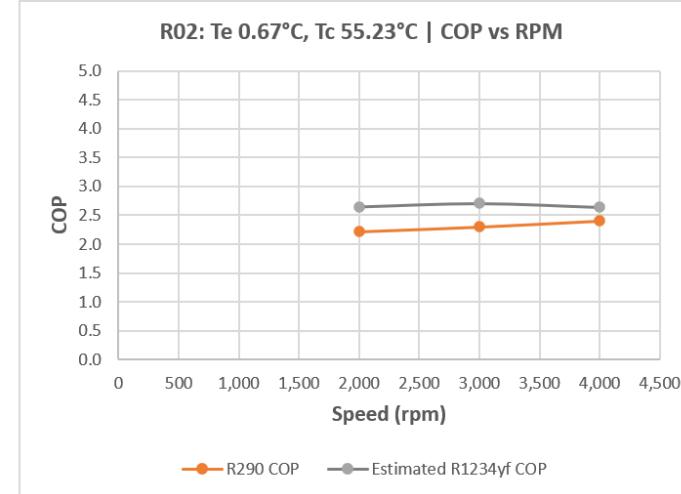
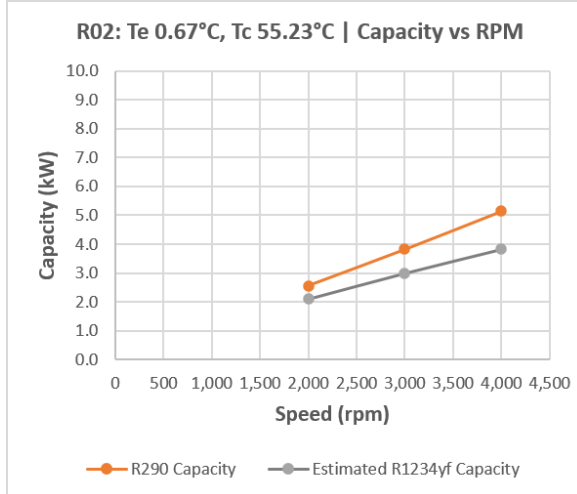
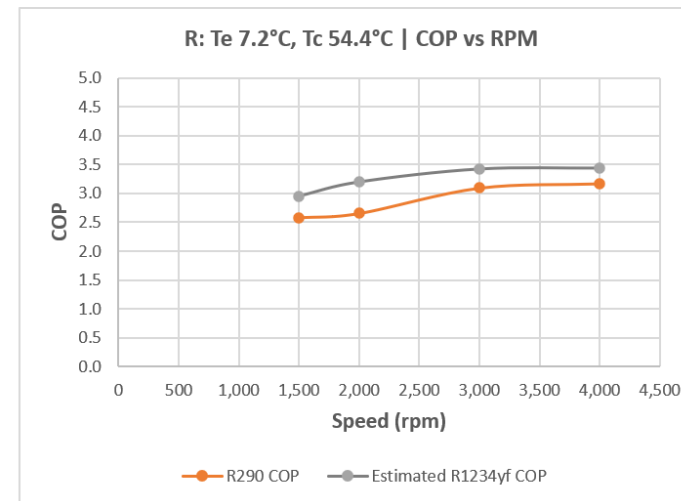
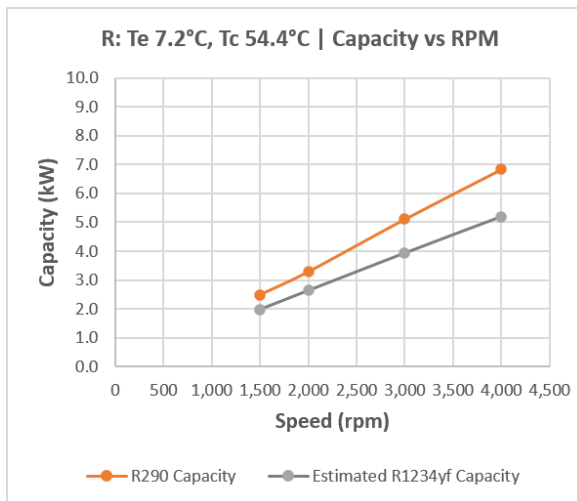
R290 Performance - Heating



Below -20C, COP drops below 1.

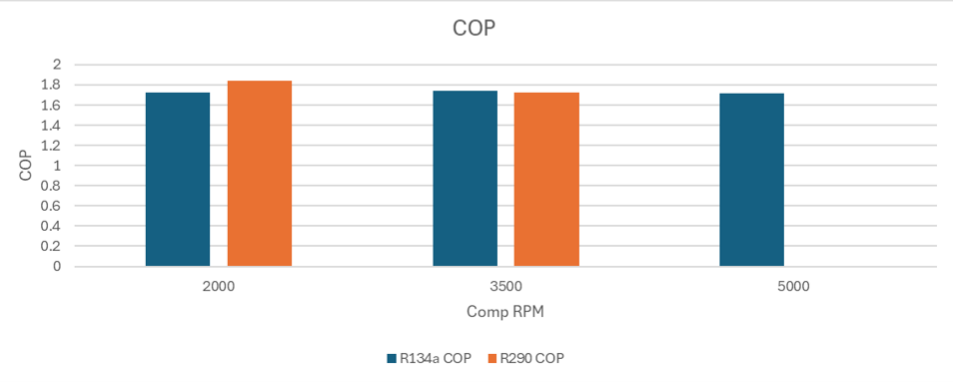
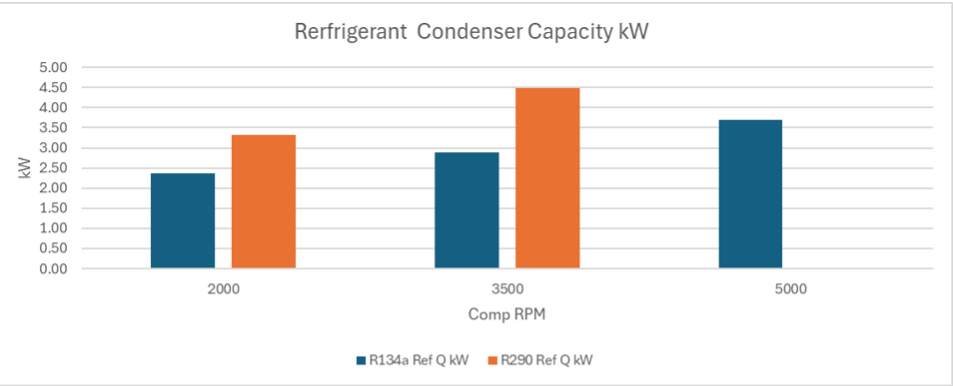
R290 vs 1234yf

- Improved performance vs 1234yf
- System and compressor sizing adjustment required for improved efficiency

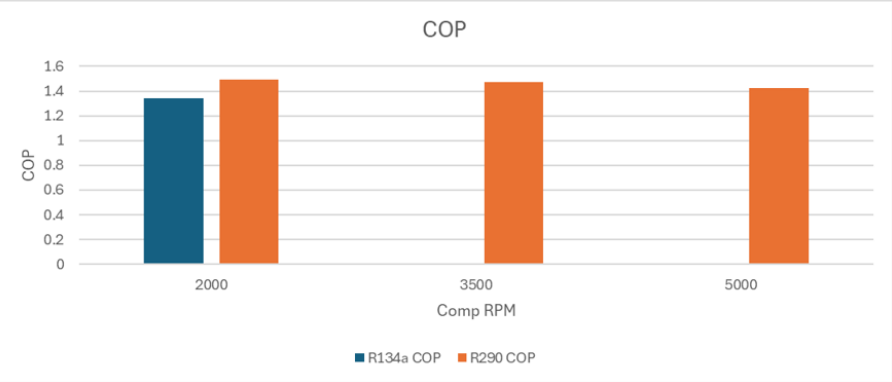
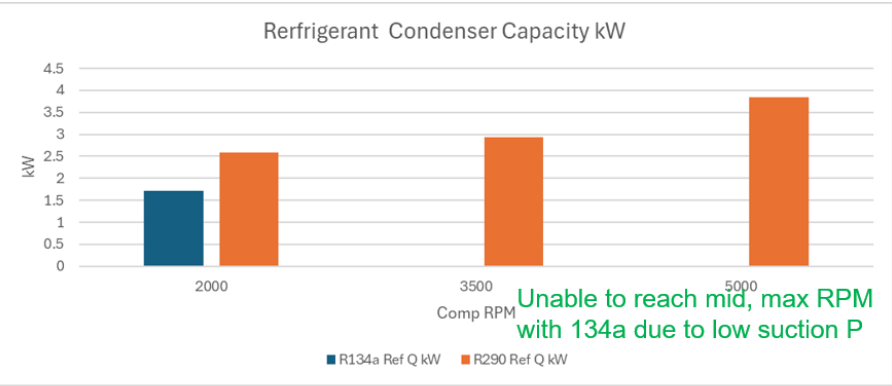


Secondary Loop System Development

0C outdoor, 21C indoor

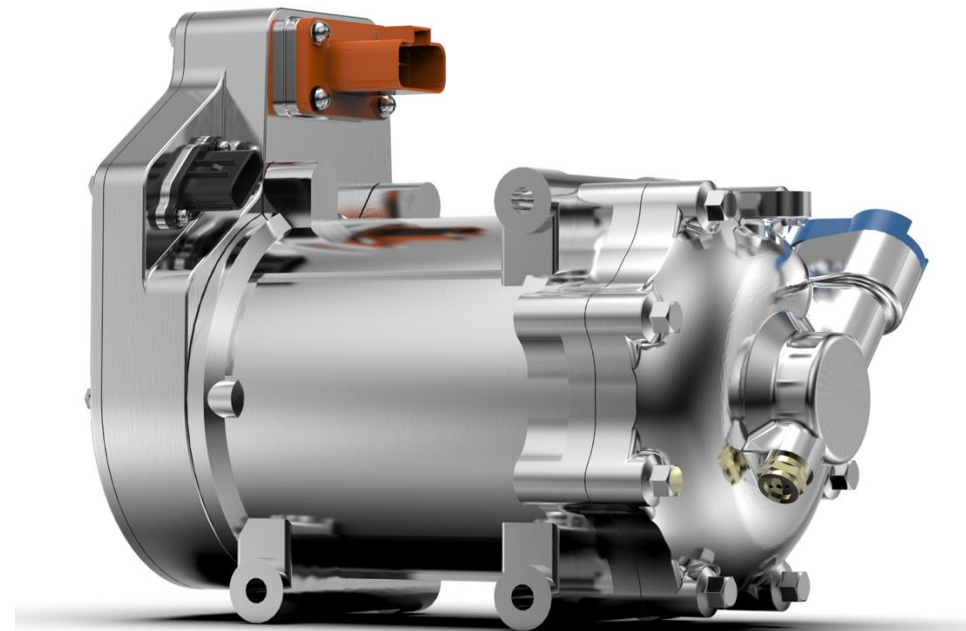


-10C outdoor, 21C indoor



Summary

- 48VDC 32cc compressor is compatible with R290 refrigerant
- Performance can exceed R1234yf
 - Compressor sizing must match system requirements for improved efficiency
 - Heating performance possible at -20C or below ambient
- 24cc displacement version is possible for R290 to match 32cc's performance with 1234yf
- Designed for heavy duty applications



THANK YOU



TECHNOLOGY LEADER
RECOGNIZED FOR
UNPARALLELED
SOLUTIONS IN
THERMAL MANAGEMENT

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