

*Highly Group: The evolution of natural refrigerant
compressors & thermal management systems for Evs*

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CTO

Shanghai Highly (Group) Co., Ltd.
Brussels Belgium 2026.9

OVERVIEW



Shanghai Highly (Group) Co., Ltd.

Stockholder: Shanghai Electric Corp. (28.96%)

Established in 1954

A-share issuance in 1992 (600619)

B-share issuance in 1993 (900910)



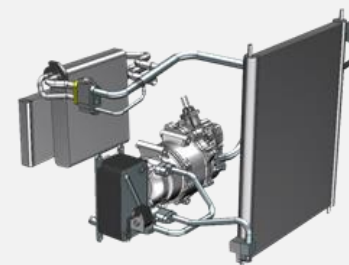
Pudong
Shanghai



Heat Pump System



Rotary Compressor



Thermal Management



Automotive Ac System



Castings & Forgings



Refrigeration Motor



Automobile Castings & Forgings



Electric Scroll Compressor

Heating & Cooling Solutions and The Core Components

Automotive Parts

GLOBAL PRESENCE



12

Countries and regions



16,000

Employees



20+

R&D and Technical Service Centers



35+

Manufacturing
Base



165

Serving countries and regions



200million+

Service user

New Energy Vehicles in China



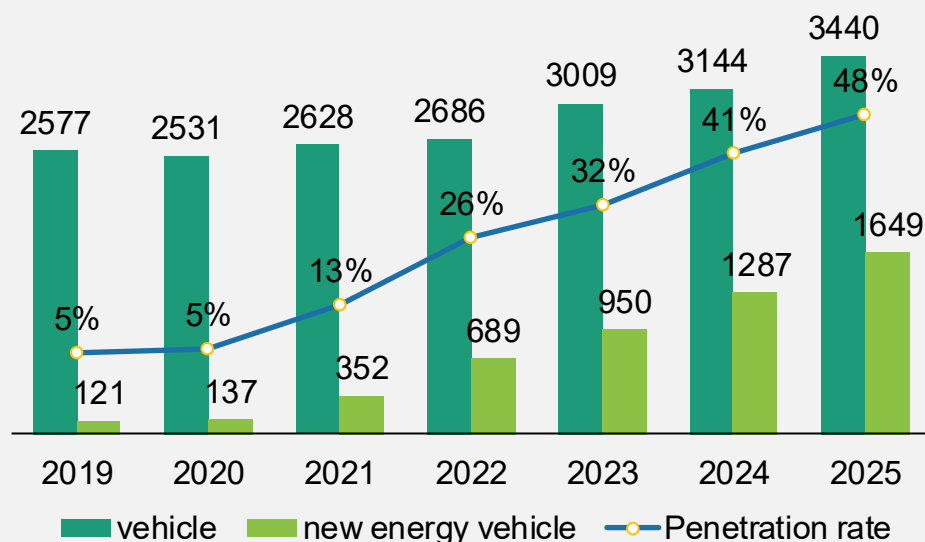
34,400,000 | 2025 China's vehicle sales

30,100,000 | 2025 China's passenger vehicle sales

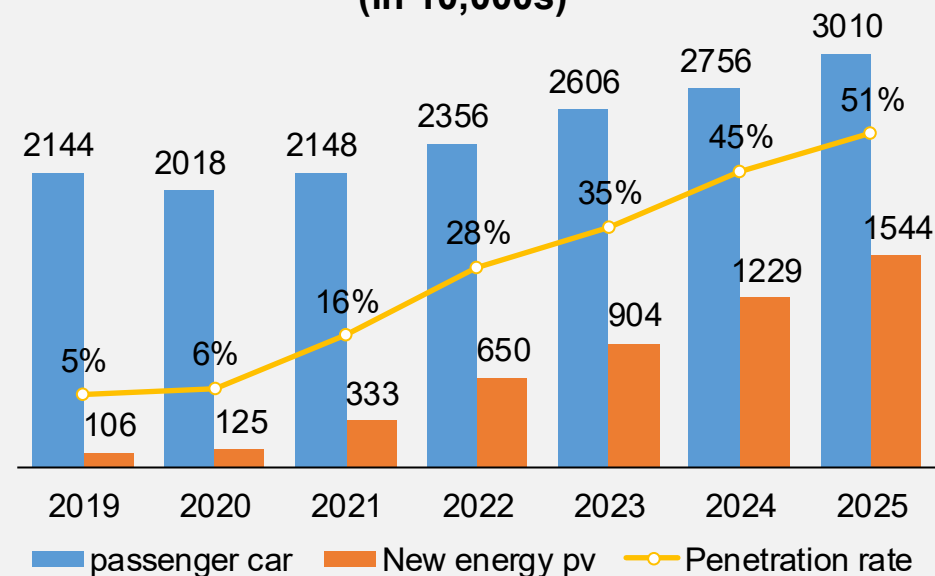
48% | 2025 Penetration rate of new energy vehicles

51% | 2025 Penetration rate of new energy passenger vehicles

China's vehicle sales
(in 10,000s)



China's passenger vehicle sales
(in 10,000s)



Evolutionary Direction → High Energy Efficiency



Power Consumption

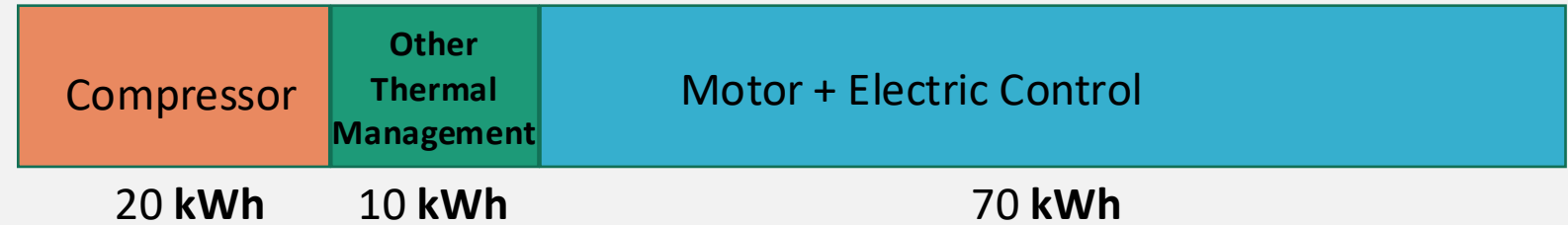
*Annual average energy consumption distribution



Driving Range: 500KM



battery : 100 kWh



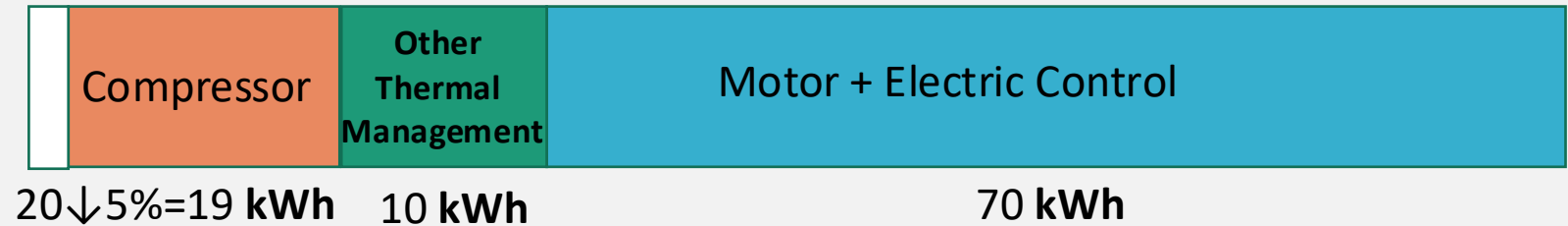
Eff ↑ 5%



Driving Range: 500KM

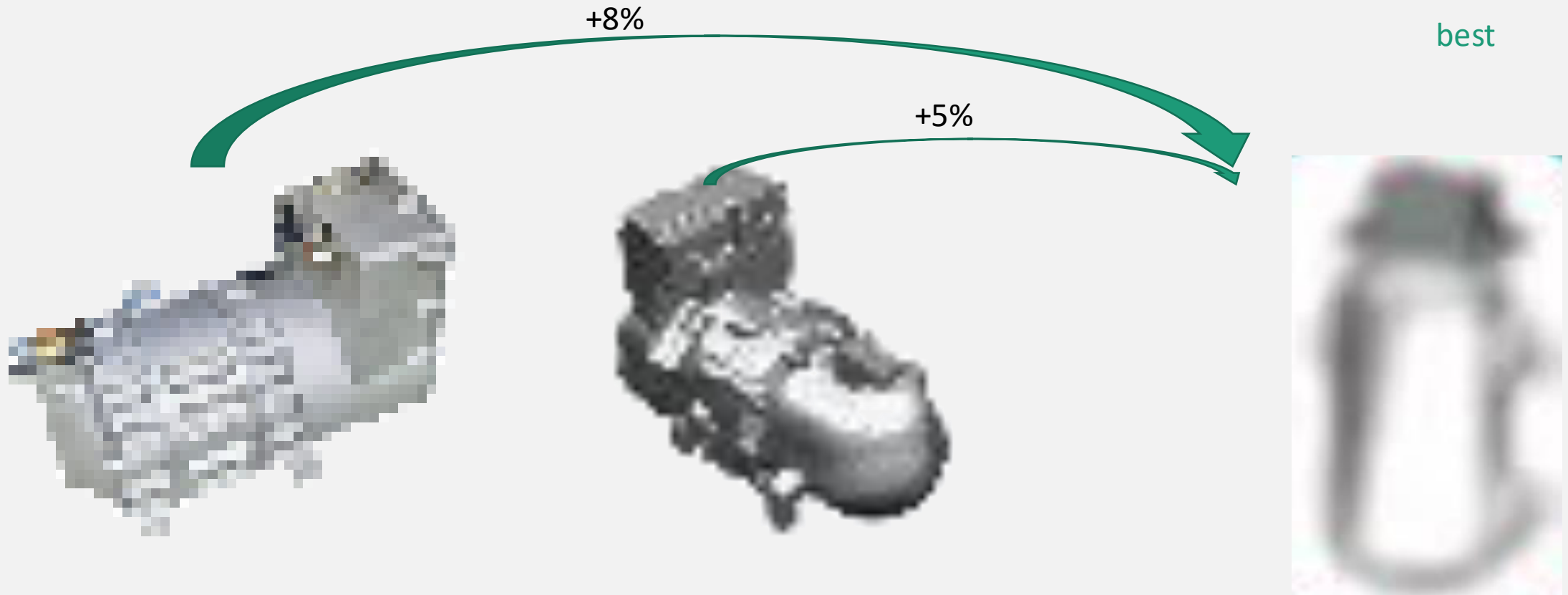


battery : 99 kWh



- For the same driving range, the OEM saves 1 kWh of battery.
- LFP battery costs about €50~80 per kWh.
- LFP battery weighs about 6~8kg per kWh.

CO₂ Passenger Vehicle

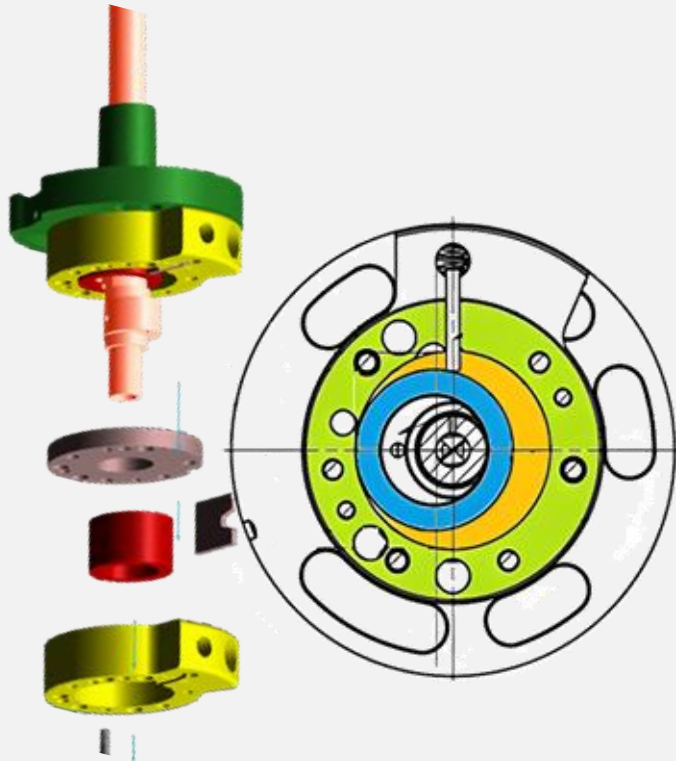


- Scroll
- Horizontal
- Semi-hermetic (bolted)

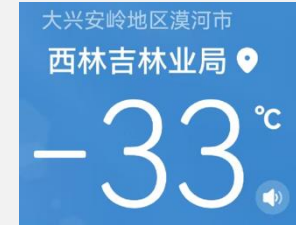
- Rotary
- Horizontal
- Semi-hermetic (bolted)

- Rotary
- Vertical
- Hermetic (Welded)

Vertical Compressor

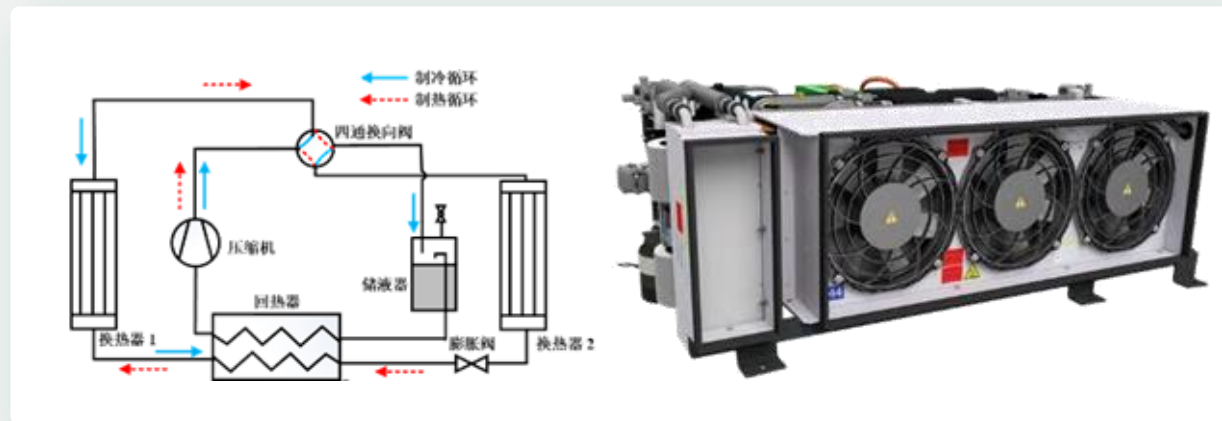


Vertical Layout: time-tested



Tested in real vehicle
under low temperature conditions

CO₂ Commercial Vehicle

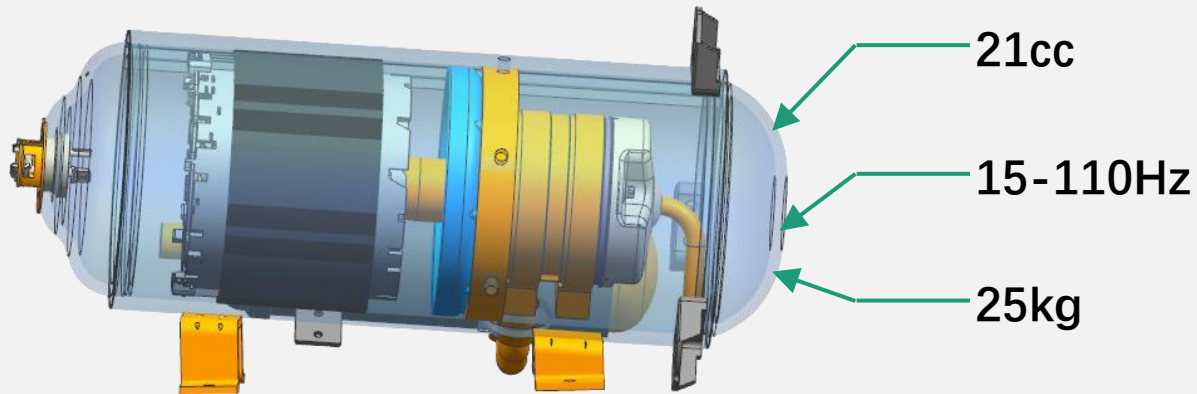


“D” Reciprocating Compressor
40cc/120kg
565×339×442mm



“B” Reciprocating Compressor
40cc/80kg
645×250×219mm

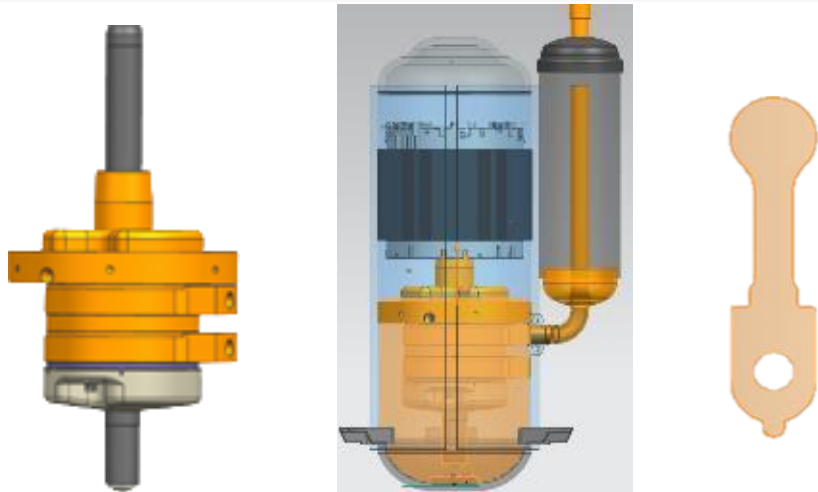
Horizontal Compressor



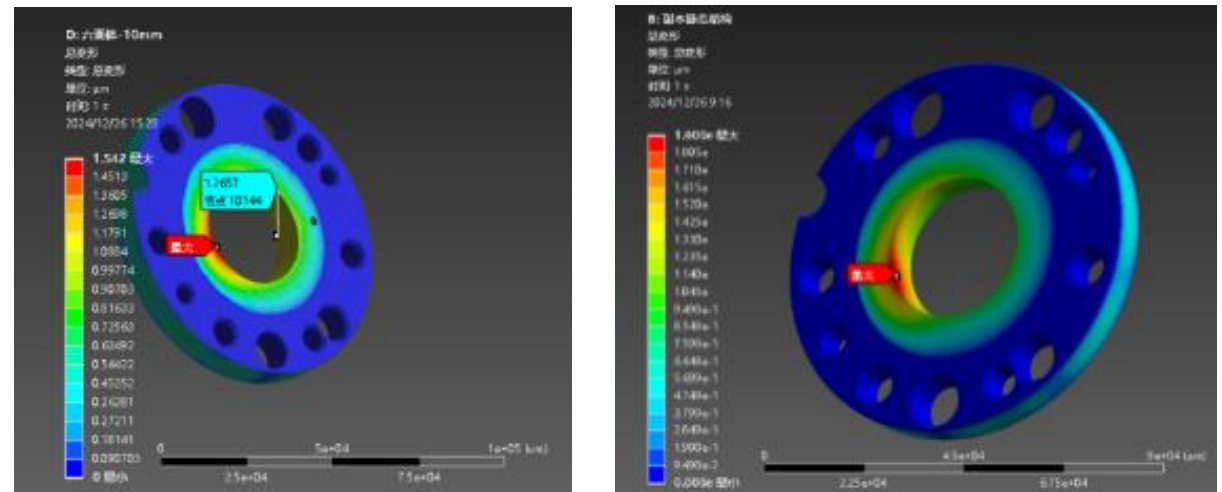
Conventional mainstream compressors suffer from poor variable frequency performance, high cost, and excessive weight.

Highly's commercial CO₂ compressor reduces weight by over two-thirds.

High-density single-suction structure with thickened valve plate design.



Incorporating a vapor injection compressor design



R290 Compressor

Introduction

- **Miniaturization & Efficiency**
- Modular design, compact structure for easy arrangement, high efficiency, reliability, and strong applicability
- **High security**
- 30 years of experience in R290 product development, our unique sealing design ensures safety over an extended period

Product features

Innovative Design



R290 refrigerant
compressor

Cover
-35°C~125 °C

10s
rapid heating
and cooling



refrigerant
Zero leakage

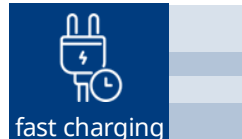
Support 6C
battery cooling



thermal comfort



efficiency



fast charging



environmental sustainability

Mass production 2024

concept development Mass production

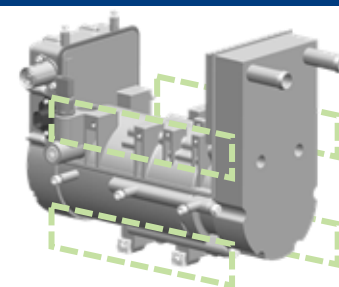
Technical solution

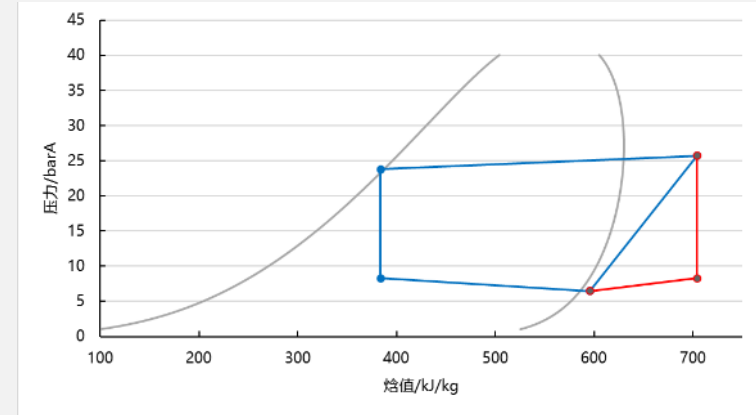
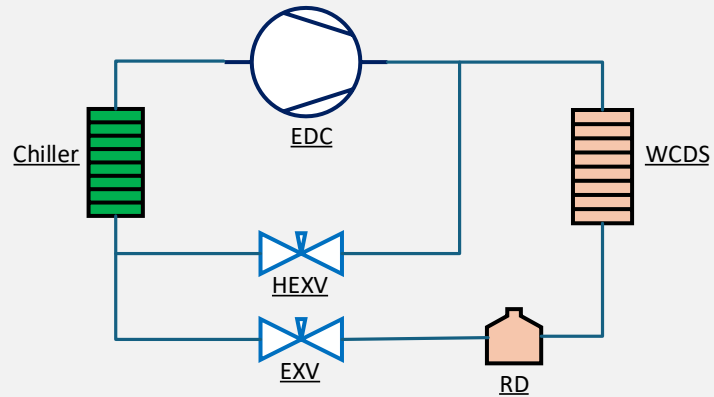
feature	technical point	Target
low noise	Shell excitation and shafting optimization	Noise reduction by 6db
Zero Leakage	Optimize and reduce bolt connections, and enhance sealing	Less than 2g/year
high-intensity	Enhanced overall structural strength	Meet the explosion-proof pressure of R290

Technical point

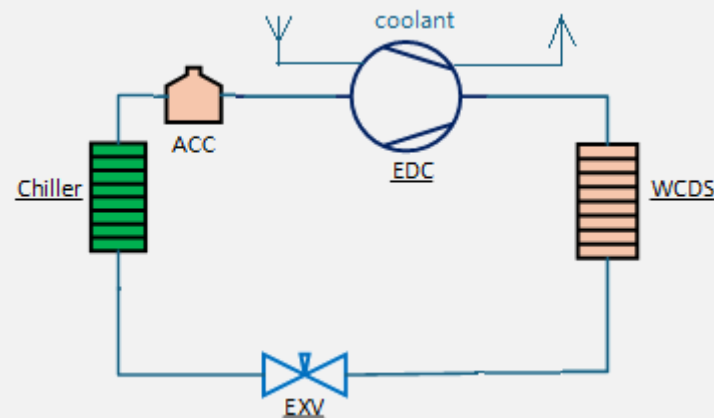
feature	parameter
displacement (cc)	45
voltage range(V)	200~935
speed range(RPM)	600-12000
Maximum cooling capacity (KW)	16
Maximum heating capacity (KW)	10

Composite installation
structure matched with
various pipeline interfaces

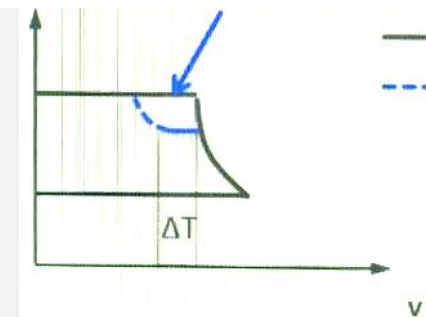




Hot Gas Bypass Control Strategy



The reduced area is the compression work per unit mass reduced



— adiabatic compression process
- - - Exothermic compression process

Heat Rejection Compression

- **High energy efficiency is the future evolutionary direction**
 1. CO₂: Replacing scroll and piston compressors with rotary compressors
 2. R290: Electric Compressor and PTC Integrated
 3. Integrated Module: Hot Gas Bypass Control Strategy & Heat Rejection Compression
- **Thermal management systems with low-efficiency compressors will be eliminated.**

감사합니다

ありがとう

感謝

Thanks

ขอบคุณ

Terima kasih

Gracias

Danke

谢谢



HIGHLY

España France United Kingdom United States of

한국

日本

इंडिया

ประเทศไทย

Malaysia

Indonesia