

Emerson Copeland Scroll Compressor Technologies Introduction

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Agenda

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Introduction

- Emerson
 - Emerson Commercial and Residential Solutions
 - Emerson Suzhou Engineering Facility
-

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Emerson Scroll Compressor

- Emerson Scroll Design and Advantages
 - Global Warming Potential (GWP) Reduction Efforts
 - Air Conditioning Applications
 - Transport Applications
 - Cold Chain Applications
-

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Emerson Solutions

- Low Ambient Heat Pump
 - Convenient Store Condensing Unit
 - Sensi Hydro Unit
-

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Emerson Industry Stewardship

2018 Emerson At-A-Glance

FOUNDED

1890

HEADQUARTERS IN
ST. LOUIS, MO
USA

RECOGNITION

#**178**

2018
FORTUNE 500
AMERICA'S
LARGEST
CORPORATIONS
BY REVENUE

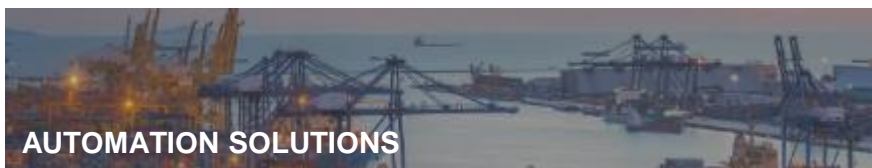
Top 50 Employers

WOMEN ENGINEERS
MAGAZINE

**America's Best
Employers**

FORBES MAGAZINE

TWO BUSINESS PLATFORMS



AUTOMATION SOLUTIONS



COMMERCIAL & RESIDENTIAL SOLUTIONS

WORLDWIDE

87,500
EMPLOYEES

215
MANUFACTURING
LOCATIONS

INNOVATION

EMERSON EMPLOYEES HELD

18,000 ACTIVE PATENTS
WORLDWIDE IN 2018

\$17.4
BILLION

IN GLOBAL SALES
FISCAL YEAR 2018

62
YEARS

CONSECUTIVE
YEARS OF
INCREASED
DIVIDENDS

NYSE:

EMR


EMERSON

Commercial & Residential Solutions



Improving the Quality of People's Lives Around the World

Industries Served include

Construction
Commercial Buildings
Food Retail
Food Service
Transportation
Contractor
Homeowners

Core Expertise

Heating and Air Conditioning
Refrigeration and Cold Chain
Monitoring Systems and
Facility Controls
Food Waste Solutions
Home Repair and Maintenance
Professional Tools for
Mechanical, Electrical, Plumbing
and Industrial Infrastructure

Our Brands include

Copeland
Greenlee
InSinkErator
Klauke
ProAct
RIDGID
Sensi

Emerson Research And Solutions Center



Founded in
成立于

2002



Moved to
new campus
迁入新办公室

2019



35,000 m²

Land area 占地面积



400+

Employees with
员工



4

Doctoral
Degrees 博士

Enhanced Customer Experience 增强客户体验



Commercial &
Residential
Solutions Gallery
商住解决方案展厅



Customer
Experience
Center
客户体验中心



Solutions
Laboratory
整体方案
实验室



13

State-of-the-art
Laboratories
先进的实验室

290+

Test stands for performance,
reliability, and sound & vibration
性能、可靠性测试台及噪音实验室

80 45+

More in Emerson compressors
Plant in field test
更多 压缩机现场试验



10+

Cross-functional teams for diverse products
Covering 3 – 40HP product range
跨职能团队支持和开发整个3-40匹产品线



360+

Patents
专利

165

Inventions
发明专利

73

Implemented
已应用

New Products

新产品



50+

Products for
the last 10 years
近十年内开发的新
产品



35%

of 2018 sales
2018年的销售额



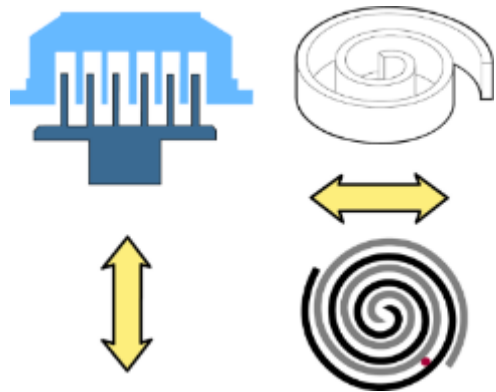
85%

Current China
selling products
developed in center
中国区所销售的产品
有本中心开发的

Emerson Scroll Design and Advantages

Compliance Design

- Dual Compliance Design
 - Enhanced Liquid and Debris Handling
 - Improve Performance Through Tightened Dynamic Sealing



Axial Compliance

Radial Compliance

Variable Speed

- Variable Speed Solution
 - Best in Class Efficiency, Reliability
 - Integrated Solution with Compressor, Drive & Controller



VRF Solution

Heating Solution

Two Stage Scrolls

- Mechanical Modulation Two Stage Scrolls
 - Mechanical Modulated Partial Load Capability
 - Superb Reliability and Simple Control



Two-Stage Scroll

Modulation Mechanism

Global Warming Potential (GWP) Reduction Efforts

Build A2L Capabilities



- A2L Lab Investments In Suzhou
 - Invested A2L Lab and Equipment Covering 3HP-70HP Capacity Range
 - Further Investment Planned For R32 Capability Expansion

R32 New Products



- Key R32 New Products Under Development
 - 5-15HP With Vapor /Liquid Injection Solution Available
 - Optimizing Design Without Injection

Broad Low GWP Refrigerant Offering

Refrigerant	GWP	Solutions	
CO ₂	1	 Trans-critical 	 Sub-critical 
R290	3.3	 Refrigeration Scroll, ATEX 11	 FHP Compressor
R444B, DR7	~300	 Semi-Hermetic	 Scroll
R32	675	 Scroll Compressor	
R448A, R449A, DR33	~1500	 Semi-Hermetic	 Scroll

Emerson Scroll in Air Conditioning

Application

PAC/Duct



VRF



Chiller



Precision Cooling



Product



VS 53Fr



48Fr



VS HS 63Fr



QST

SMT

LCS



VS 53Fr



53Fr



QTM



QST



VS 53Fr



Tandem



CVS



QTM



QST

- ✓ Complete Line-up from 1.5HP-60HP Single Compressor
- ✓ Comprehensive Modulation Products - Variable Speed, 2-Step, Digital, Tandem
- ✓ Highly Recognized Efficiency Performance including Low Ambient Capability

Emerson Scroll in Transportation

Application

Railway



High Speed Railway



Metro



Electric Bus



Product



QTM/QST SMT



QST SMT



SMT Horizontal



QTM Tandem



QST Horizontal



SMT Horizontal



Next Gen QST Horizontal

Fixed Speed

Variable Speed

- ✓ Superior Reliability across All Transport Applications
- ✓ Well Recognized by Market with 50%-90% Share

Emerson Scroll in Cold Chain



Scroll Compressor w/ the Proven Reliability, Widely Used Across Cold Chain

Emerson Solutions

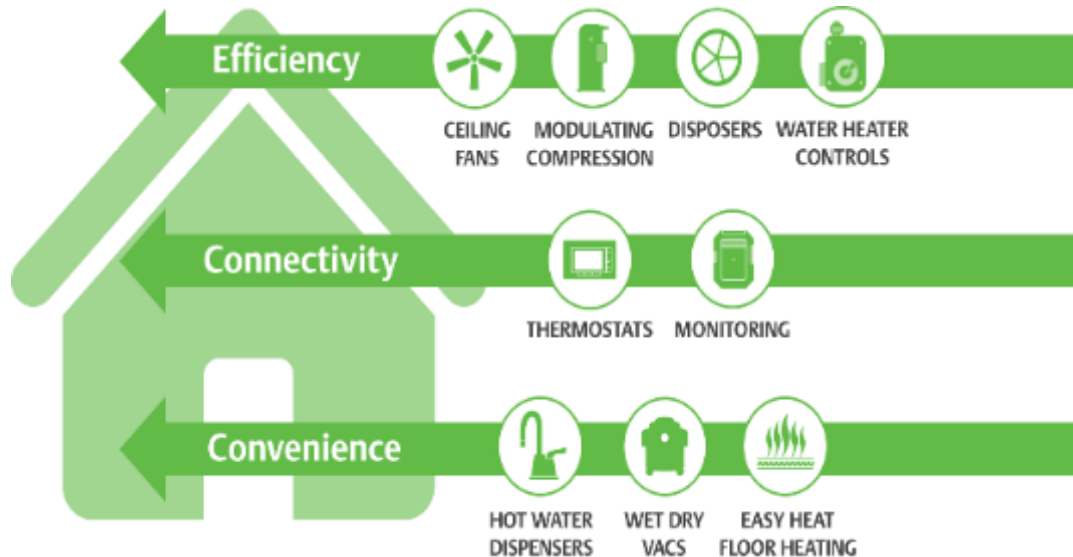


给家庭带来舒适与便利

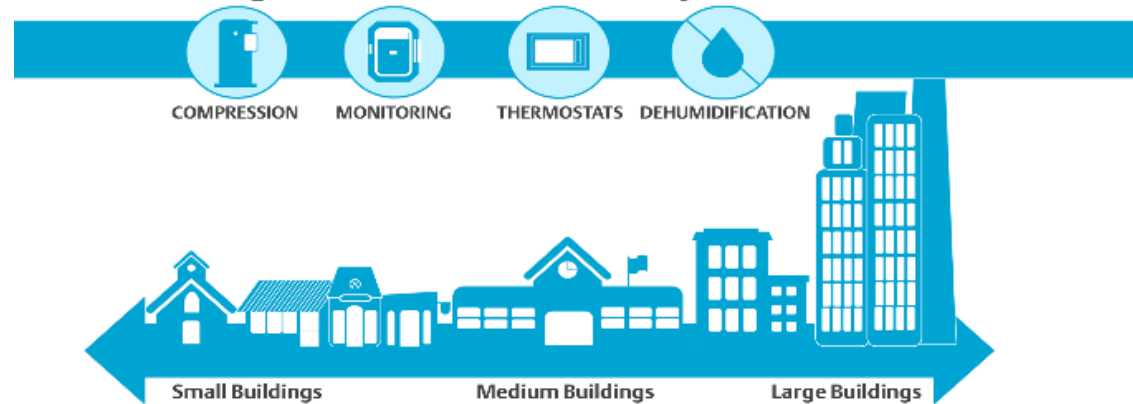
使建筑高效节能

通过冷链解决方案
保持食物新鲜

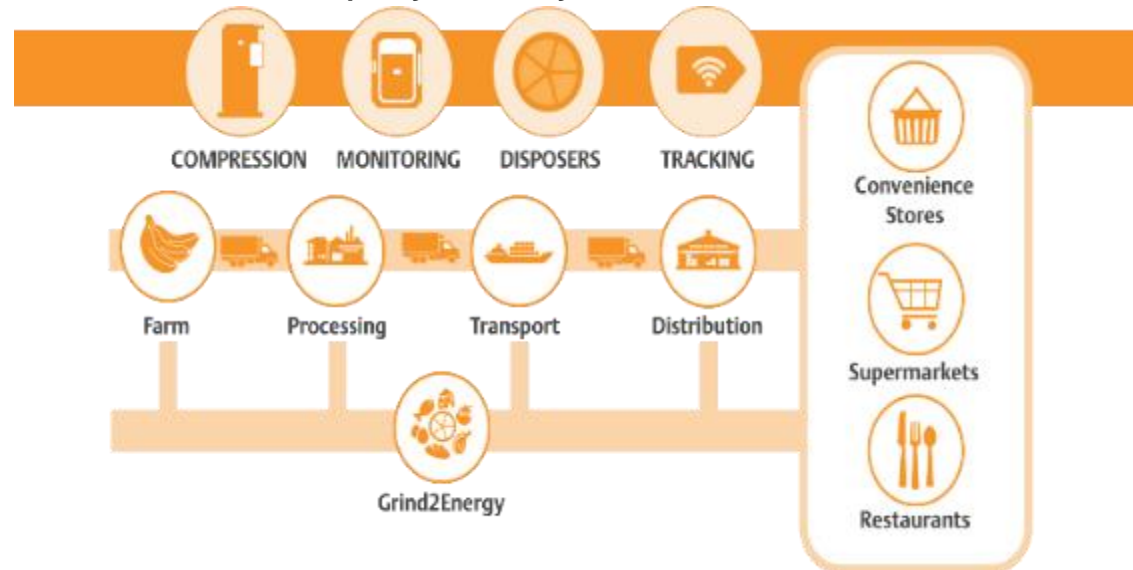
Bringing comfort and convenience to homes



Providing solutions to drive efficiency and control



Food quality and safety solutions across the cold chain



Emerson Solutions -Low Ambient Heat Pump



Variable Speed Compressor



Drive



System



Electronics Expansion Valve



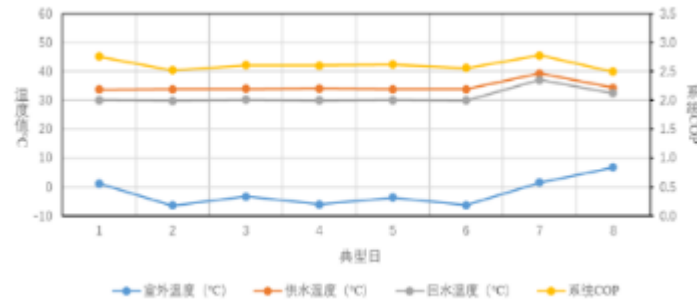
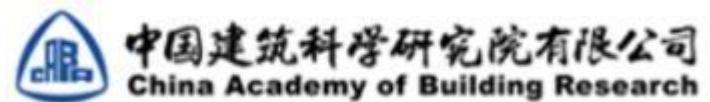
Temperature & Pressure Sensors



System Controller

Proven Reliability & Best-in-Class Comfort At Extreme Low Ambient

- **One of Top 3** Ranked Performance in Beijing MiYun by CABR
 - Season Average Outdoor Temperature -2°C , Minimum Outdoor Temperature -19.9°C
 - Stable Indoor Temperature 21.2°C
 - Heating Season System COP 2.86 (33.6% Better than Average)



Emerson Solutions

-Convenient Store Condensing Unit



Variable Speed
Compressor



Drive



Condensing
Unit



BPHE



EVI Electronic
Expansion
Valve



System Controller

**Proven Reliability & Best-in-Class
Efficiency**

- **Food Quality** with Sophisticated Control Logic and Protection
- **20% Energy Saving** with Variable Speed Scroll and EVI Technologies



Emerson Solutions -Sensi Hydro Unit



Emerson Sensi Hydro Unit



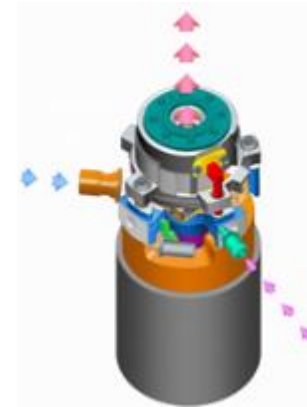
Fan Coil



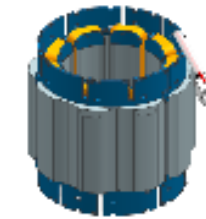
Radiator



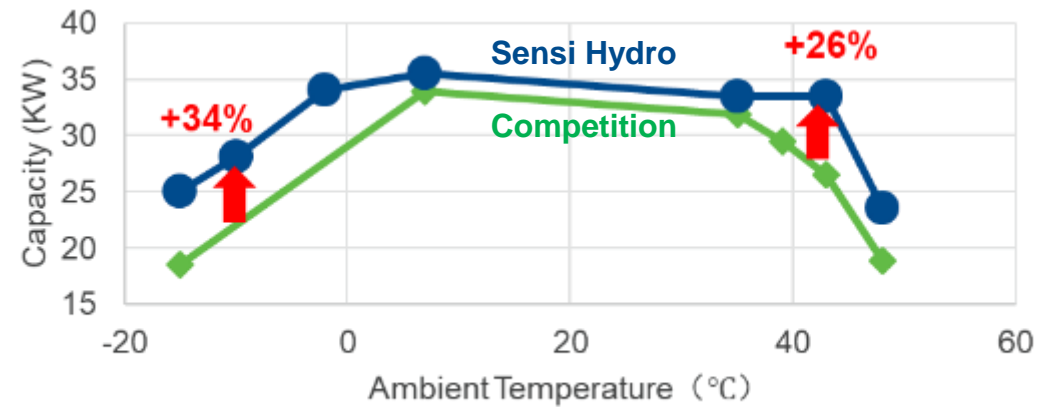
Floor Heating



Vapor Injection



Variable Speed Motor and Drive



Vapor Injection, Variable Speed, Smart Control
Home Comfort in All Weathers

Emerson Industry Stewardship



Environment

- Reduce Global Warming Potential (GWP) with Environment Friendly Refrigerants



Energy

- Reduce Energy Consumption with High Efficiency Products



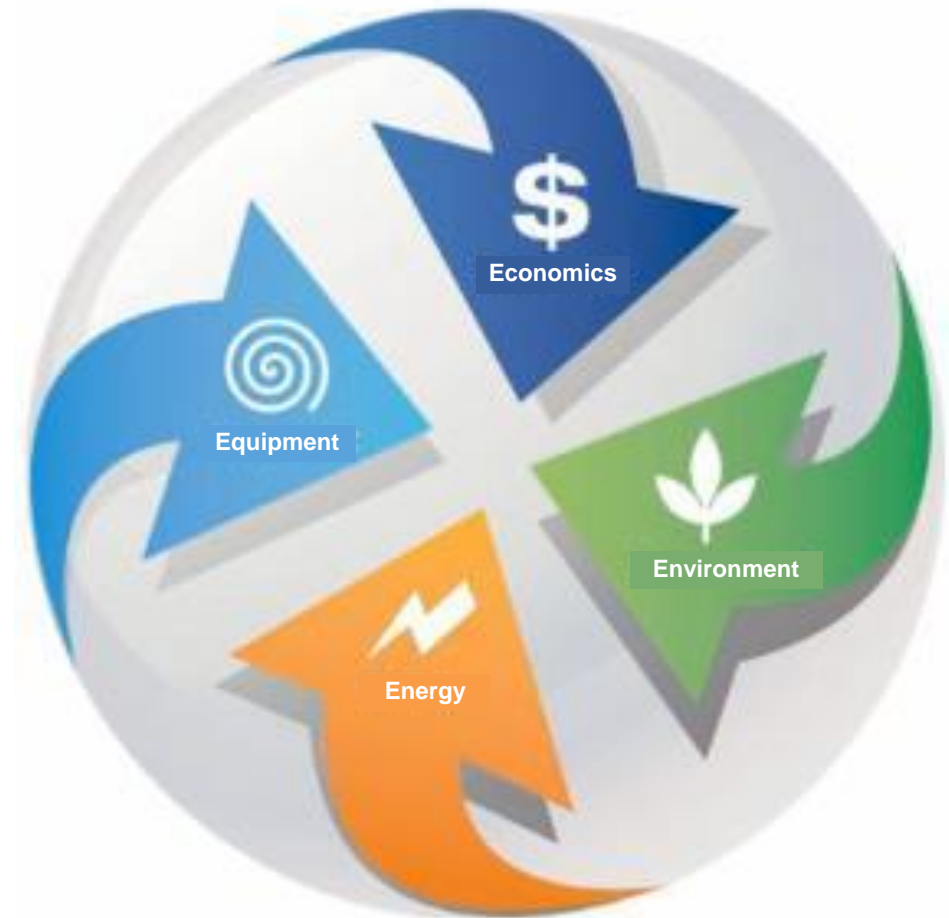
Equipment

- Proven Reliability and Technical Leadership



Economics

- Life Cycle Cost Optimization Ensure Total Ownership Economics





Thanks 谢谢