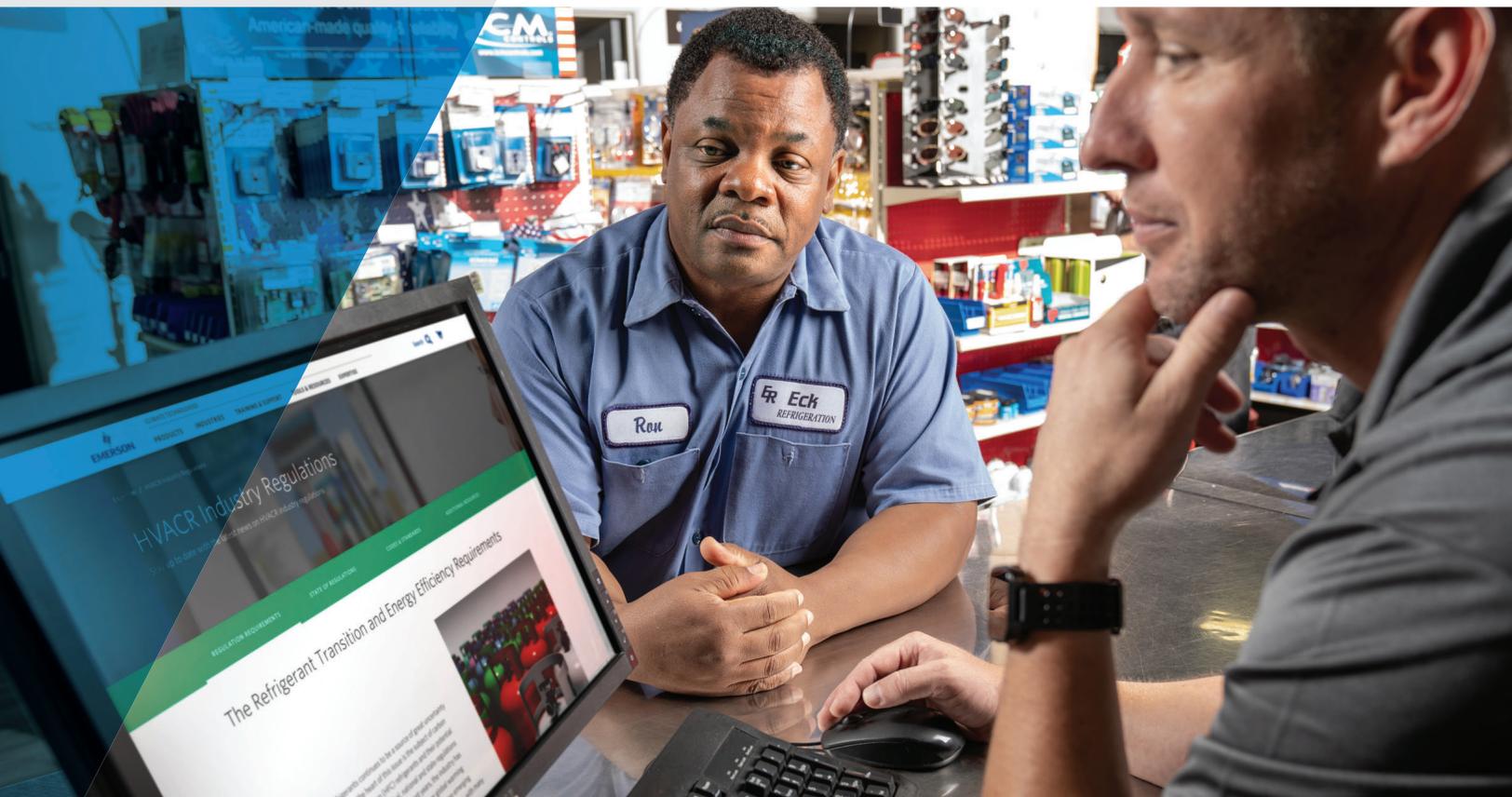


# Copeland™ Authorized Wholesalers Addressing Today's Refrigeration Challenges



# Giving Contractors a Comprehensive Support Network

The unprecedented changes happening in today's commercial refrigeration industry have put contractors in an unenviable position. Not only do they have to keep up to date with new equipment, technologies and applications, they're still the first line of defense when a refrigeration problem needs to be fixed — 24 hours a day, seven days a week. Emerson understands these challenges. That's why we've created a vast Copeland authorized wholesaler network and aftermarket support programs. These resources give contractors the tools they need to address today's refrigeration challenges and keep their customers happy:

- More than 850 Copeland authorized wholesaler locations
- 160,000 compressors
- 651 Copeland technical specialists
- State-of-the-art distribution center delivering 32,000 same-day shipments per year
- 12 customer service representatives answering 60,000 annual calls
- 24/7/365 emergency product locator for Copeland compressors

## The Copeland Advantage

Emerson has long served the commercial refrigeration industry's supermarket, restaurant and convenience store markets. Its Copeland compressor lines have continuously set the standard in performance and reliability. With the industry now in the midst of sweeping regulations — including the Department of Energy's (DOE) energy efficiency minimums and the Environmental Protection Agency's (EPA) refrigerant rulings — Emerson is leading the development of the next generation of refrigeration technology.

Only Emerson has the extensive research and development facilities, expert engineering teams, quality control programs and certified testing labs to deliver the reliable performance that the industry has come to expect

from our comprehensive Copeland compressor portfolio. We understand the real challenges you face, and

we're developing the strategies, expertise and breadth of products to help you successfully make this transition.



To find the nearest authorized, full-line wholesaler, download our Copeland Mobile app.

## Copeland Technical Specialist Program

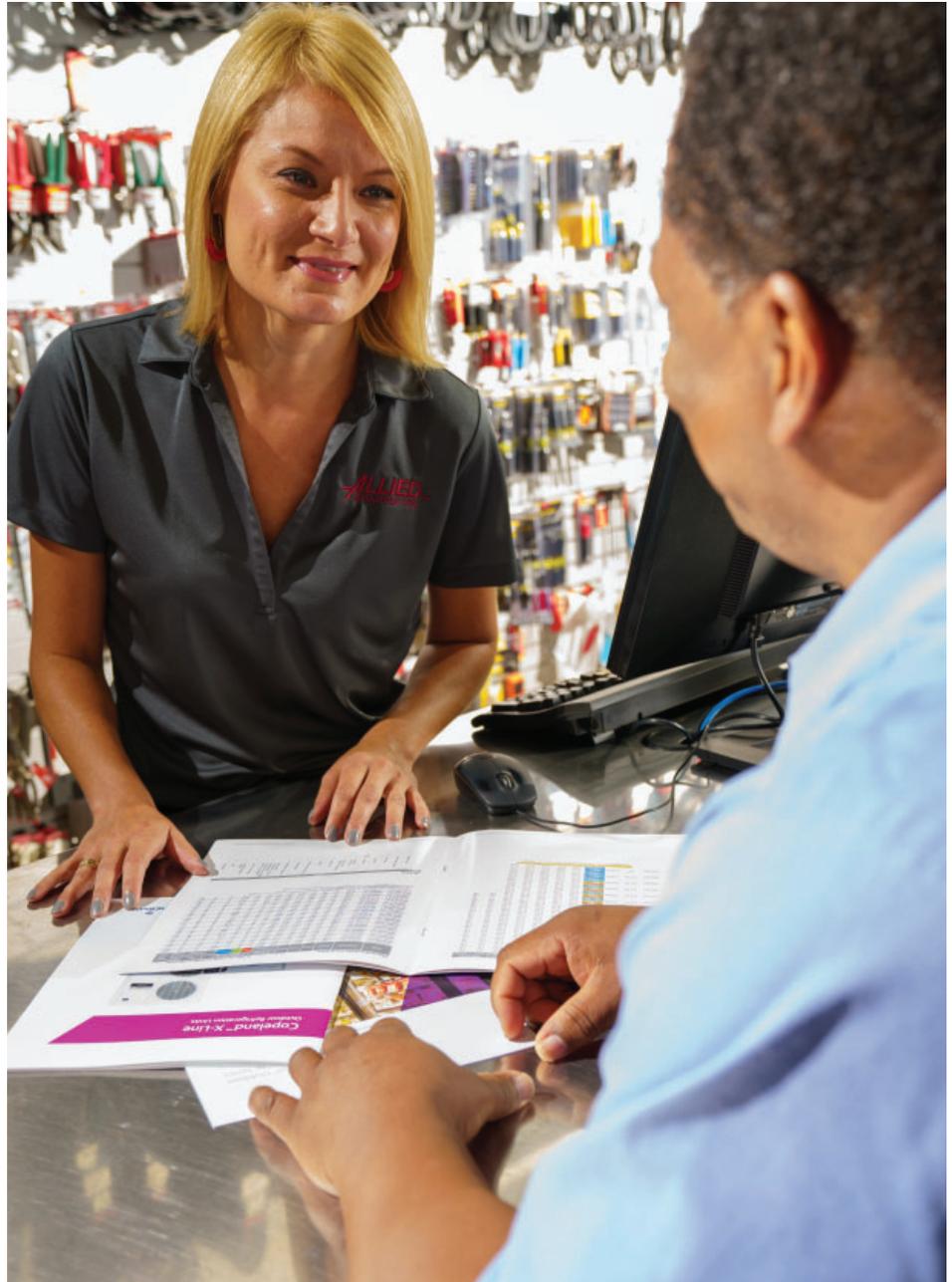
To ensure the highest level of customer service and application expertise with Copeland compressors and condensing units, many of our Copeland authorized wholesalers employ a certified Copeland technical specialist (CTS) at their branches. Each CTS must complete an in-depth Copeland training and certification program that includes the following requirements:

- Attendance of the Compressor Operation and Service seminar
- Passing the Fundamentals of Refrigeration/AC online course with a 75 percent or higher grade
- Completion of a week-long CTS course at Copeland headquarters
- Passing the final CTS exam with a 75 percent or higher grade

## Copeland Compressor Experts at Your Service

The certification process ensures that each CTS has the tools and hands-on expertise to address a variety of refrigeration system application questions. Among the many benefits of the CTS program include:

- A dedicated Copeland product expert at major wholesale branches



- Ability to help technicians quickly diagnose system issues and solve problems
- Timely and accurate responses to technical inquiries from customers
- Promote sales growth, customer trust and rapport

Each specialist is required to continue their education and stay informed of any

changes in regulations or technologies that may impact refrigeration applications. From selecting the right compressor for your application to providing consultation on refrigerant retrofits, your local CTS can help you make the most informed decisions for your business and customers.

► For contractor training opportunities, visit [Education.Emerson.com](http://Education.Emerson.com)

# Achieving New Efficiencies From Traditional Rack Systems



It's estimated that at least 70 percent of grocery stores in the U.S. use a centralized, direct expansion refrigeration architecture based on parallel racks of compressors. These compressor banks share low- and medium-temperature suction groups and discharge lines that circulate refrigerant to designated cases throughout the store.

Today's supermarket operators are seeking new technologies to enable their rack systems to comply with EPA regulations and improve energy efficiencies. Even though some HFC refrigerants are still permitted in rack systems, many operators are faced with the prospect of moving to an acceptable refrigerant option. We can help you assess the possibility for retrofit or recommend a replacement system.

Regardless of your refrigeration system architecture, Copeland ZF and ZB scroll compressors deliver high efficiencies and reliable performance for years to come.



↓ For the most up-to-date information on Copeland products, download our Copeland Mobile app.



Copeland ZB\*KCE scroll compressor

## IMPROVED PERFORMANCE IN LOW TEMPERATURES

The Copeland ZF\*KVE scroll compressor has been specifically designed with vapor injection technology to provide a 50 percent increase in capacity and 20 percent increase in efficiency in low-temperature applications. The ZF\*KVE compression cycle is similar to a two-stage cycle with inter-stage cooling, except that it takes place within a single compressor. This sub-cooling in the middle of the compression process enables it to provide significant performance gains.

## HIGH EFFICIENCY FOR MEDIUM TEMPERATURES

The Copeland ZB\*KCE scroll compressor is optimized for medium-temperature applications and offers on average a 23 percent improvement in annual efficiency. With more than 5.5 million compressors installed worldwide in single-compressor systems, parallel racks and distributed architecture systems, the Copeland ZB\*KCE scroll compressor is the industry standard in reliability.

## ADVANCED DIAGNOSTICS AND PROTECTION



Copeland compressor electronics technology allows contractors to accurately diagnose and troubleshoot system issues — either at the customer’s site or remotely via mobile device or computer. One of the most obvious benefits is its ability to protect the compressor from damage, primarily through its system trip or reset functions. This enabling technology gives

contractors a wealth of historical system data that they can use, both for troubleshooting current issues or preventing system failures before they happen, including but not limited to:

- Over current protection
- Over/under voltage protection
- Unbalanced load detection
- Liquid injection

## Digital Compressors Enable Precise Capacity Modulation

A digital upgrade refers to the process of retrofitting a digital compressor to serve as the lead compressor in a fixed capacity refrigeration rack. The upgrade allows the rack to modulate capacity from 10 to 100 percent and offer precise matching of capacity to changing refrigeration loads. It’s an ideal solution for supermarkets seeking to achieve tight control over suction pressures, improve case temperature precision and reduce compressor cycling.

### Retrofit Kit Components

To retrofit a fixed capacity rack to a system with capacity modulation, Emerson offers a Copeland digital upgrade (retrofit) kit comprised of either a Copeland Discus™ digital compressor or Copeland scroll compressor and the following components: digital master controller; an open loop or stand-alone digital controller; tubing and valve kit; coil; and thermistor.

## CAPACITY CONTROL IN NEW SUPERMARKETS

Digital compressors have proved so effective in providing capacity modulation that this strategy is being written into new design specifications of many big-box retailers. Copeland Discus digital compressors with compressor electronics technology have become the industry workhorse, offering digital modulation to enable precise capacity control while eliminating the traditional compressor cycling problems of uneven cooling and reduced compressor life. By minimizing temperature fluctuations, operators can extend the shelf life of perishable items and reduce food shrink. Through continued investments in this semi-hermetic technology, Emerson has made these units compatible with the latest acceptable HFO refrigerant blends.



► Contact a Copeland technical specialist for more details about our digital retrofit kits.



For the most up-to-date information on Copeland products, download our Copeland Mobile app.

# Natural Alternatives — Emerging System Trends

To achieve compliance and meet corporate sustainability objectives, more businesses are evaluating refrigeration systems based on natural refrigerants. These naturally occurring substances — including CO<sub>2</sub> (R-744) and propane (R-290) — pose virtually no threat to the environment and are considered “future proof” options. CO<sub>2</sub> has proved extremely effective in low ambient temperatures, while R-290 provides high energy efficiencies and excellent thermodynamic properties. However, it’s important to understand their unique design and application considerations.

Natural Refrigerant	GWP	ODP	Operating Considerations
Carbon dioxide (R-744)	1	0	<ul style="list-style-type: none"> <li>• High pressure and low critical point</li> <li>• Very little danger to occupants in the event of leaks</li> <li>• Used in medium- and low-temp applications</li> </ul>
Propane (R-290)	3	0	<ul style="list-style-type: none"> <li>• A3, flammable</li> <li>• Very low charge requirements (currently 150 grams is the max)</li> </ul>

## The Propane Refrigeration Proliferation

Propane is a very low-GWP hydrocarbon that offers high-capacity, energy-efficient performance, often outperforming its HFC counterparts. As an A3 refrigerant, R-290 use has been historically limited by safety concerns and low charge limits. Modern compression technology and safe handling procedures have largely mitigated these concerns. Today, global foodservice and food retail operators are adopting R-290 as an effective alternative to R-404A and HFC-134a — especially in a wide range of low-charge, reach-in display cases.

### STAND-ALONE EFFICIENCIES FOR REACH-IN CASES

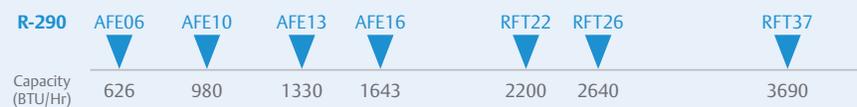
While the EPA has listed R-290 as an acceptable refrigerant alternative in commercial refrigeration applications, its current low charge limit (150g) has largely limited its adoption to stand-alone, reach-in cases. Copeland A\*E and R\*T compressor lines are optimized for use with R-290 and serve as the engine driving our propane-based condensing units. Independent Emerson testing has demonstrated these units are capable of delivering up to 20 percent energy efficiency ratio (EER) improvements over R-404A, helping OEMs achieve needed energy consumption reductions for DOE compliance.

## EMERSON PROPANE COMPRESSOR LINEUP

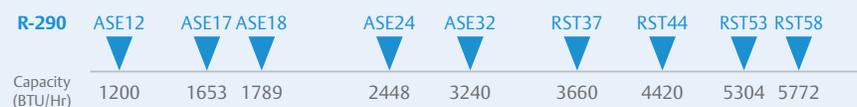


Model ASE — R-290 compressor

### Low-Temperature



### Medium-Temperature

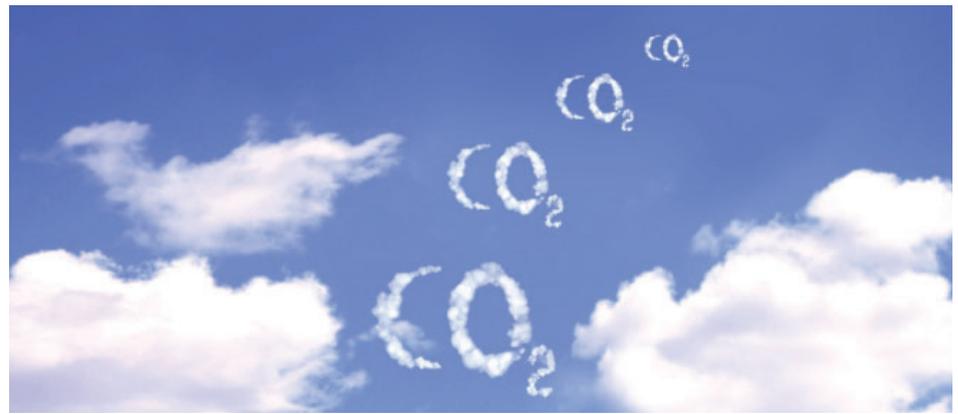


## Leave a Smaller Carbon Footprint With CO<sub>2</sub>

CO<sub>2</sub> has proved to be a very effective alternative to HFCs in both low- and medium-temperature applications. CO<sub>2</sub>-based refrigeration systems have been successfully deployed in commercial and industrial applications in Europe for nearly two decades, and have gained in popularity in the U.S. in recent years.

### CO<sub>2</sub> Transcritical Booster Systems

The Copeland line of four-cylinder CO<sub>2</sub> compressors is the ideal solution for medium-temperature R-744 transcritical booster systems. All compressors are



equipped with compressor electronics technology, offering faster system troubleshooting and protection from problems before they occur.

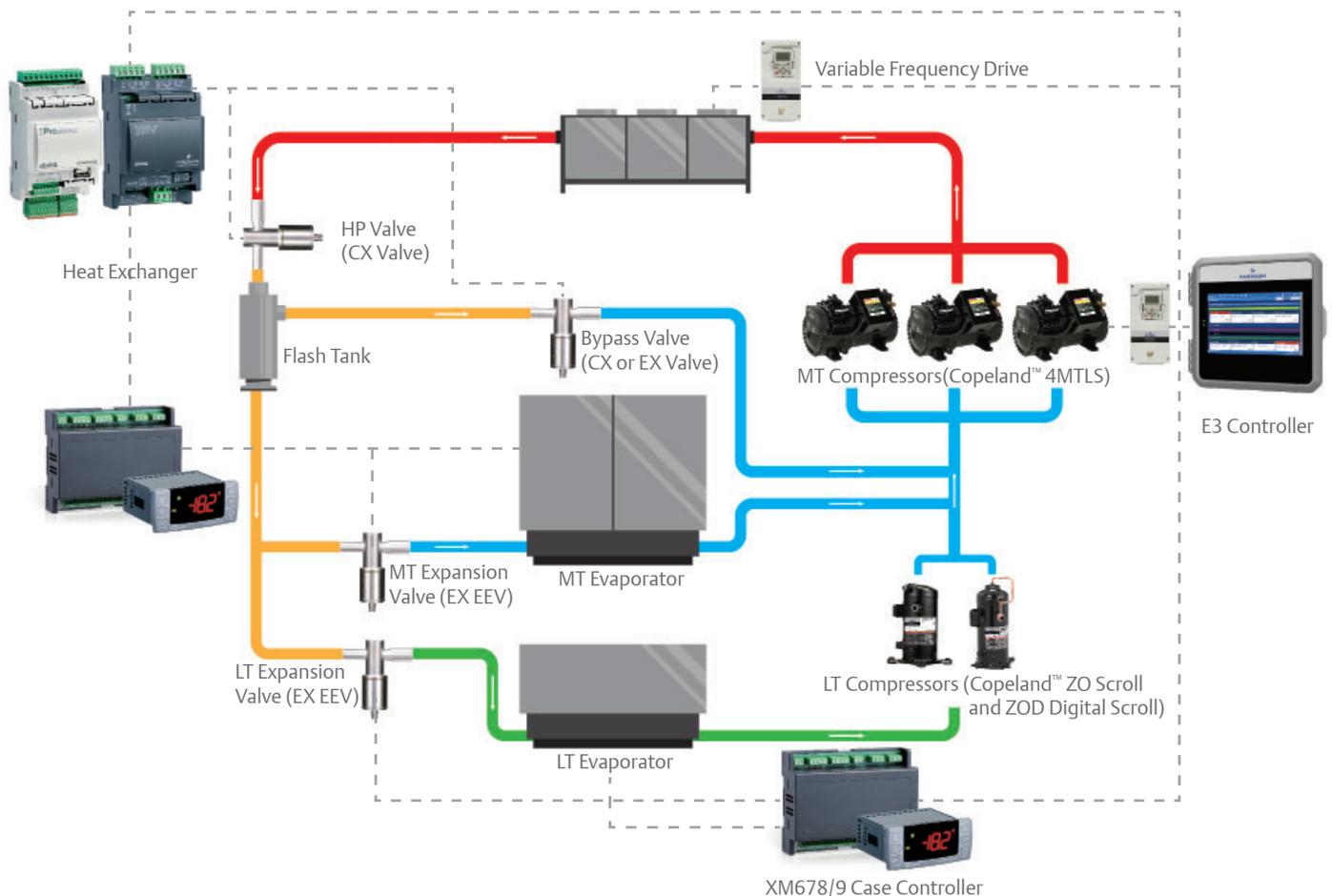
### CO<sub>2</sub> Subcritical Applications

Designed for low-temperature, subcritical CO<sub>2</sub> applications, the Copeland ZO

scroll compressor is well-suited for use in CO<sub>2</sub> cascade and booster systems. Copeland scroll technology delivers the efficiency, reliability and liquid handling advantages needed for these applications.

► For more information on CO<sub>2</sub>, visit [Emerson.com/CO2](http://Emerson.com/CO2).

## CO<sub>2</sub> TRANSCRITICAL BOOSTER SYSTEM



# Reach-ins

## Meeting New Efficiency and Environmental Targets

Stand-alone, reach-in cases were among the first class of commercial refrigeration equipment to be impacted by DOE mandates. In 2017, DOE imposed a 30–50 percent reduction in energy consumption on reach-in, stand-alone commercial refrigeration equipment, as measured in kWh per day. DOE is prepared to initiate another rulemaking to further reduce energy consumption. At the same time, the EPA is phasing out the commonly used HFC refrigerants in this same class of equipment.

Reach-in manufacturers are evaluating lower-GWP refrigerant alternatives, both natural and synthetic blends, to meet current and future energy efficiency standards. These new refrigerants have unique thermodynamic properties that impact system design and service requirements. Emerson has been testing these alternatives for years and has prepared DOE- and EPA-compliant compression technology to make this transition.





## M-Line Condensing Units

Based on fractional horsepower compressors, Copeland M-Line condensing units offer all the requirements equipment manufacturers and end users need to achieve optimal performance in low- and medium-temperature applications:

- Smaller footprint economies
- Minimal sound output for quiet operation
- Higher energy efficiencies to achieve DOE minimums
- Compatibility with alternative A1 and A3 refrigerants

This next generation compressor line comprises the basis of condensing units designed to improve energy efficiencies up to 30 percent through:

- Utilization of new refrigerant performance characteristics
- Electronically commutated fan motors
- Improved condenser coils



## ENHANCE SERVICEABILITY VIA ELECTRONIC UNIT CONTROLS

The optional electronic unit controller allows contractors to improve the serviceability of reach-in units using M-Line compression technology. Benefits include:

Benefits include:

- Quick and easy setup
- Improved set-point accuracy
- Multi-refrigerant capability
- Troubleshooting and diagnostics
- Additional system safeguards



Dixell™ universal replacement controller

► For more information about achieving regulatory compliance, visit [Emerson.com/E360](http://Emerson.com/E360).

# Walk-in Coolers and Freezers

## Efficiency Mandates Drive Innovation

Walk-in coolers and freezers (WICF) will be subject to 20–40 percent reductions as of Jan. 1, 2020, per the DOE’s final rule on energy conservation standards. Efficiency of these units is measured according to the AHRI-1250 testing standard of annual walk-in efficiency factor (AWEF), and includes the equipment’s entire operating envelope.

Both dedicated and multiplex architectures are covered under these AWEF requirements, and each class of equipment is assigned a specific equation to measure efficiencies.

Manufacturers have multiple design options to meet these targets, including improved compression technology, low

condensing operation (floating head) and larger condenser coils. To achieve these substantial improvements to energy efficiencies, the Copeland line of scroll compressors has been expanded to cover a wider range of capacity and horsepower requirements for both low- and medium-temperature applications.





## Copeland ZB\*KA Scroll Compressors

The all-new, smaller-capacity Copeland ZB\*KA line of scroll compressors was designed for medium-temperature, walk-in applications in fractional horsepower displacements. These have been rated for use with new refrigerant alternatives — such as R-448A and R-449A — as well as R-407A, which is still acceptable for use in remote condensing units. Look for wide availability of these units by the summer of 2017.

## Copeland ZF\*KA Scroll Compressors

Specifically designed for low-temperature, walk-in applications, Copeland ZF\*KA scroll compressors were designed for low-temperature, walk-in applications that also require smaller, fractional horsepower displacements. Not only are these units rated to meet EPA refrigerant requirements, they provide the needed efficiency improvements to help meet the DOE energy targets in the near future.

## Copeland ZS\*KA Scroll Compressors

The latest generation of Copeland ZS\*KA scroll compressors is optimized for medium-temperature applications and offers on average a 15 percent improvement in annual efficiency. Scroll technology delivers significant reliability gains due to 70 percent fewer moving parts and less operating fatigue than reciprocating hermetic compressors. A wide operating range and compatibility with acceptable refrigerants make the ZS\*KA a flexible solution for many walk-in refrigeration needs.



Copeland ZF\*KA scroll compressor



For the most up-to-date information on Copeland products, download our Copeland Mobile app.

# Moving the Condensing Unit Outdoors



The Copeland outdoor refrigeration unit, X-Line Series is designed for medium- and low-temperature, walk-in coolers, freezers and display cases commonly found in c-stores and restaurants. With its best-in-class energy efficiencies, slim profile, ultra-low sound levels, superior diagnostics and built-in protection,

the X-Line Series delivers reliable commercial refrigeration while solving many of today's small-format retailer challenges, including:

- Offsetting rising energy costs with new energy efficiency targets
- Reducing energy consumption to meet minimum efficiency levels

- Creating optimal in- and outside-store environments for customers and neighbors
- Identifying the potential for equipment failure in advance to prevent costly product loss
- Evaluating the critical role of refrigeration system architecture in total store energy usage

With its slim profile, lightweight design and wall-mount option, X-Line units give operators the flexibility to install them in the most space-constrained locations. This lowers installation costs and helps avoid expensive system design workarounds or relocation issues. Compared to legacy equipment and technology, the X-Line Series improves annual energy efficiencies by 20 percent.

## WHAT'S INSIDE

### Larger condenser coils

- Increase energy efficiency
- Corrosion-resistant copper tube and coated aluminum fins

### Variable-speed fan motor control

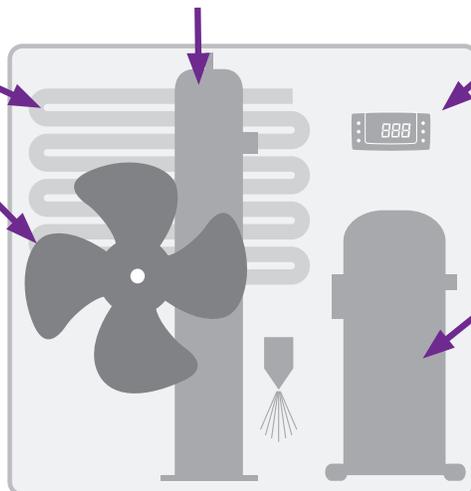
- Contributes to quiet operation
- Provides efficient head pressure control

### Digital technologies

- Variable-capacity modulation for precise temperature control
- Highly flexible load matching
- Linear power reduction relative to modulated capacity

### Heated and insulated receiver

- Allows operation in low ambient temperature situations



### Electronic controls

- Offer greater reliability than traditional mechanical controls
- Avoid nuisance service calls
- Allow technicians to diagnose issues quickly and accurately

### Copeland digital scroll compressor technology

- Based upon field-proven Copeland Scroll design
- Provides the most reliable, highest-efficiency compression available
- Available in 3 to 6 HP

► To learn more about outdoor condensing units, read our white paper at [Emerson.com/CopelandOutdoorUnit](http://Emerson.com/CopelandOutdoorUnit).

# Copeland **Digital** Outdoor Refrigeration Unit X-Line Series

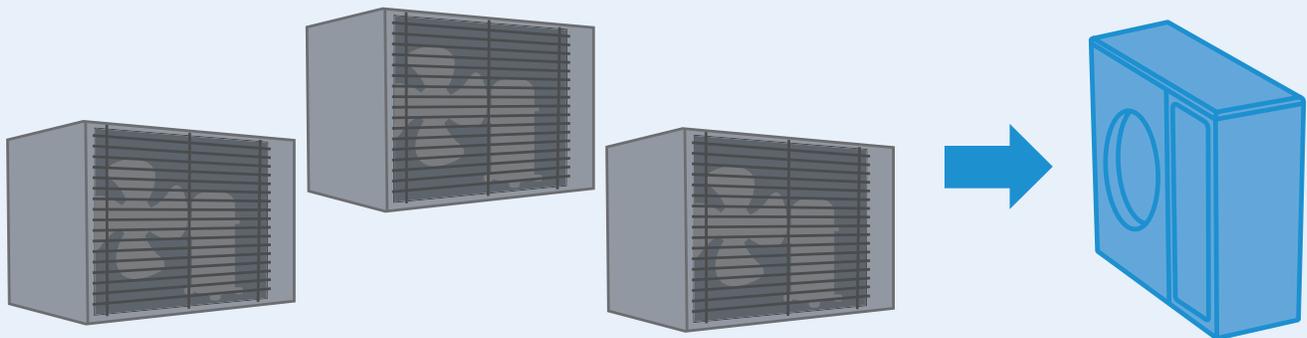
The compact solution for continuous capacity modulation

The Copeland digital outdoor refrigeration unit sets a new standard for energy efficiency, reliability, and installation flexibility. With 20-100% modulation now available and expanded refrigerant approvals, its industry leading on-board diagnostics and system protection can help optimize operational efficiency and deliver peace of mind to any end user. Digital X-Line units are available for applications commonly found in today's food service and food retail establishments.

The perfect solution for refrigeration applications with wide load variation:

- Walk-In Coolers
- Food Preparation Rooms
- Display Cases
- Industrial Process Chillers

Digital compression technology means fewer condensing units are needed to install and maintain for numerous refrigeration loads, which results in fewer line runs, lower refrigerant charges, and faster installation.

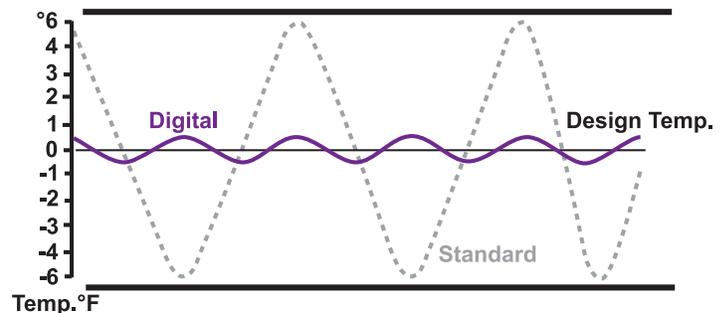


## A Superior Solution for Food Safety

Digital modulation enables tighter control of case temperatures. This provides supermarkets and foodservice establishments with the security of knowing that their food is safe from harmful bacteria growth and other harmful micro-organisms.

## A Superior Solution for Energy Savings

Traditional modulation technologies consume close to full load energy no matter what the required capacity. Copeland digital scroll compressor technology reduces power consumption linearly as it modulates capacity resulting in optimum system performance and control, as shown in Chart A.



**Chart A**

Temperature control comparison digital vs. standard technology

# Copeland Certified Compressors: The Preferred Choice in the Service Aftermarket

## Maintaining a Legacy of Reliability

When you need a replacement compressor, it's important to know exactly what you're getting. With the Copeland Certified compressor program, reliability is assured. To achieve the Copeland Certified compressor status, every compressor is put through a rigid process in which it is completely disassembled to the bare core, i.e., remanufactured from the ground up.

We test every essential component for operational integrity and replace all outdated and discontinued parts to meet Emerson's latest engineering and manufacturing guidelines. All in all, more than 500 parts are either replaced or upgraded. The end result is the most reliable remanufactured compressors in the world, from the most reliable

remanufacturing process on the planet.

If you're letting an uncertified rebuilder perform this process, you're placing the reliability of the compressor at risk.

► [Contact your Copeland authorized wholesaler to learn more about the benefits of a Copeland certified compressor.](#)

Procedure	Copeland Certified compressors	Independent rebuilders' compressors
Ongoing design improvements	Yes 1. Super K/Discus™ compressors get new suction-reed valving, stainless steel reeds and positive-displacement oil pumps 2. Certain Discus models receive Delta Reed modifications to ensure extended life for demanding applications	No
Disassembly	100% disassembly, with the complete removal of all main bearings and internal valving	Partial disassembly, sometimes up to 100%, but normally only as needed to make visible repairs
Crankcase	All cylinder walls are air gauged to match Copeland specifications, and the crankcase is upgraded to current Emerson standards	Limited air gauging results in cylinder walls and crankcase being reworked to varying non-Emerson standards
Valve plates	Cleaned and/or reground to perfectly match Emerson specifications	Reused as received, with limited regrinding capabilities
Pistons	New aluminum pistons and rods	Salvaged discontinued cast-iron pistons with limited air gauging
Crankshaft	Completely cleaned, gauged, upgraded and polished to current Emerson specifications	Limited power-flushing and polishing equipment availability, with no upgrade to current Emerson specifications
Oil pump	Oil pumps are 100% disassembled, cleaned, gauged and retested to Emerson specifications; otherwise, they are replaced	Salvaged discontinued low-volume oil pumps with limited gauging and testing to ensure proper operation and efficiency
Stator and rotor	Stators are requalified to meet Emerson specifications	Stators are rewound to varying specs; reused stators may be discontinued models that have not been properly tested
Sourced components	All parts meet Emerson's latest engineering standards	None of the replacement parts are from Emerson; all are from independent dealers
Randomly conducted audit program	Yes — ensures compressor performance and reliability	No
Oil	Always charged through a metered system to meet Emerson specifications	Most often charged by sight
Electrical	Solid-state module is retested to Emerson specifications; the terminal box, wiring harness and terminal connectors are included	Limited retesting equipment availability with varying types of electrical parts, depending on the rebuilder
Final processing	Complete dehydration and final torquing of all external bolts; helium leak tested and performance tested to assure published performance	Variable dehydration tests and selective retorquing of bolts; limited performance testing to varying standards
UL recognized	Yes — all semi-hermetic models	No

# Copeland™ Mobile

Over 30 Years of Product Information  
at Your Fingertips



**EMERSON**

Our newly updated Copeland Mobile app connects users to the Emerson online product information (OPI) database for easy, on-the-go access.

## Any Device, Wherever You Are

Regardless of whether you're on top of a roof with your phone, in your office on your computer, or in a basement using a tablet, you're able to access Copeland Mobile wherever you are.

## Troubleshoot and Diagnose

Simply scan the barcode on any product to pull up its specifications to quickly troubleshoot and diagnose.



## Quickly Access Product and Job Information

Whether you're scanning a compressor or searching a model number, you can quickly access 30 years of product information, including resources such as catalogs and guides, at your fingertips, in addition to tracking your open jobs via job site commissioning.

## Find Local Inventory

Check the availability of local product replacements at the Copeland authorized wholesaler location nearest to you.

## Help Us Build Better Products

Every time you use the Copeland Mobile app, you're contributing to the research and development of future Copeland compressors.

## Access Support

If you have questions about product support or availability, representatives from our base of operations and our Copeland technical specialists can quickly answer your questions or deliver the product and technical assistance you need.



Scan with your smartphone or visit  
[Climate.Emerson.com/MobileApps](https://Climate.Emerson.com/MobileApps)

## About Emerson

Emerson (NYSE: EMR), headquartered in St. Louis, Missouri (USA), is a global technology and engineering company providing innovative solutions for customers in industrial, commercial, and residential markets. Our Emerson Automation Solutions business helps process, hybrid, and discrete manufacturers maximize production, protect personnel and the environment while optimizing their energy and operating costs. Our Emerson Commercial and Residential Solutions business helps ensure human comfort and health, protect food quality and safety, advance energy efficiency, and create sustainable infrastructure. For more information visit **Emerson.com**.

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