A quick reference guide for everything you need to know about your Copeland Scroll® compressor.

#KNOWYOURSCROLL
Copeland™ Mobile App (July 31, 2014)
The Copeland Mobile smartphone app provides on-the-go access to Emerson Climate Technologies Online Product Information (OPI) database for Copeland compressor specifications. This database includes both air conditioning and refrigeration products used in a variety of HVACR applications.
Refrigerants & Oils
Refrigerant overview
The following is a quick overview of the most common refrigerants used in the HVACR industry. Access to more detailed information can be obtained by visiting: emersonclimate.com/en-us/resources/Refrigerants/Pages/Refrigerants.aspx

A common sense approach to servicing your system
Along with prohibiting the production of ozone-depleting refrigerants, the Clean Air Act also mandates the use of common sense in handling refrigerants. This includes recovering, recycling, and reclaiming, and by reducing leaks. The Clean Air Act outlines specific refrigerant containment and management practices for HVAC manufacturers, distributors, dealers and technicians.

Source: www.epa.gov/ozone/title6/phaseout/22phaseout.html
- Often referred to by a brand name, such as Freon®

- As of 2010, R-22 was discontinued for use in new air conditioning systems

- By 2015, the use of R-22 must be reduced by 90% in the U.S.

- R-22 is a hydro-chlorofluorocarbon (HCFC) that contributes to ozone depletion
R-410a

- Often referred to by a brand name such as Puron®, Suva® 9100, or Genetron® AZ-20®
- Has been approved for use in new systems
- It is a hydro-fluorocarbon (HFC) that does not contribute to ozone depletion
- **R-410A** operating pressures are more than 50% higher than **R-22** and **R-410A** systems require components capable of working at these higher pressures
- **R-410A** has become the new standard for U.S. residential air conditioning systems and is the most common refrigerant for new light commercial unitary air conditioning systems

Refrigerants & Oils
Often referred to by a brand name such as Suva® 407C or Genetron® 407C

407C is a hydro-fluorocarbon (HFC) that does not contribute to ozone depletion

Of the higher temperature HFC options, 407C most closely matches the operating characteristics of R-22

It is a high-glide refrigerant with lower efficiency, but provides the simplest conversion from R-22 due to its similar pressures
- Widely used in many commercial air conditioning and refrigeration systems globally

- It is a hydro-fluorocarbon (HFC) that does not contribute to ozone depletion; also the first non-ozone-depleting fluorocarbon refrigerant to be commercialized

- It is a single-component refrigerant with no glide, featured in many large commercial screw chillers
Important Dates

January 1, 2010: The Montreal Protocol does not allow manufacturers to produce new HVAC systems containing R-22.

January 1, 2015: The U.S. must reduce its consumption of R-22 by 90%.

January 1, 2020: Chemical companies will no longer be allowed to manufacture R-22 to service existing systems.

With the introduction of HFC refrigerants as alternatives to CFC and HCFC refrigerants, the question of the proper oil to use still comes up. The generally preferred oil for use with HFCs is a polyol ester (POE) that has an additive package for refrigeration applications. Mineral Oil (MO) is not recommended, because oil return is considered to be compromised.
Scan the QR codes and easily source the information you need or find answers to questions.

**Contractor Connection**
Gateway to the latest products, tools and support you need to stay connected on the job.

**Distributor Locator**
Locate an authorized Emerson wholesaler in your area.

**Climate Conversations**
HVARC insights from Emerson industry experts

**AC & Heating Connect**
A website developed as an easy to understand resource for homeowners, commercial end-users and contractors that provides useful tools for improving business and communicating with customers.
Products
Emerson Climate Technologies provides a full-line of Copeland Scroll™ residential compressors that are:
- R-410A ready
- Optimized for 13+ SEER applications
- Built around a unique technology that wears in and not out

They include the latest advances in Copeland Scroll technology featuring:
- 20 major design improvements
- Breakthroughs in protection
- Proven reliability
- Improved efficiency
- Low sound levels
Residential and Light Commercial Compressors

Modulation
Copeland Scroll™
Variable Speed

Modulation Range

20% → 120%

Size (HP)
2 - 5

Applications
16+ SEER high efficiency air conditioners and heat pumps
Residential and Light Commercial Compressors

Modulation
Copeland Scroll™
Two-stage

Modulation Range

Size (HP)
1 - 5

Applications
15-16 SEER systems and heat pumps
Residential and Light Commercial Compressors

Fixed Capacity
Copeland Scroll™ (ZPK6)

Size (HP)
1 - 5

Applications
14+ SEER air conditioning and heat pump
Residential and Light Commercial Compressors

Fixed Capacity
Copeland Scroll™ (ZPK5)

Size (HP)
1.5 - 5

Applications
13-14 SEER air conditioning and heat pump
Residential and Light Commercial Compressors

Fixed Capacity
Copeland Scroll™ (ZPKA)

Size (HP)
1.5 - 2

Applications
13-14 SEER
air conditioning
# Scroll vs. Rotary

<table>
<thead>
<tr>
<th>Min Ambient (heat pumps)</th>
<th>Scroll</th>
<th>Rotary</th>
</tr>
</thead>
<tbody>
<tr>
<td>-30 to -10°F</td>
<td>0 to 12°F</td>
<td></td>
</tr>
</tbody>
</table>

**Recommendation:** Use scroll for more reliable and efficient heat pump operation.

<table>
<thead>
<tr>
<th>Max Ambient (heat pumps)</th>
<th>Scroll</th>
<th>Rotary</th>
</tr>
</thead>
<tbody>
<tr>
<td>120 to 125°F</td>
<td>115 to 120°F</td>
<td></td>
</tr>
</tbody>
</table>

**Recommendation:** Use scroll for areas that reach 100°F + degrees to avoid loss of AC service.

<table>
<thead>
<tr>
<th>Reliability Testing Under High Load (Drives can mitigate some of this concern)</th>
<th>Scroll</th>
<th>Rotary</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ran for 2,000+ hrs of extreme testing</td>
<td>Failed at 1,000 hrs of extreme testing</td>
<td></td>
</tr>
</tbody>
</table>

**Recommendation:** Use scroll to ensure reliable operation, especially in hot climates.

<table>
<thead>
<tr>
<th>Line Set &amp; Vertical Rise Limits</th>
<th>150/50 ft</th>
<th>100/50 ft</th>
</tr>
</thead>
</table>

**Recommendation:** Use scroll for applications requiring long line sets and/or vertical rises.
Residential and Light Commercial Compressors

Fixed Capacity
Copeland™ CR Series

Size (HP)
1.5 - 5

Applications
Air conditioning service, refrigeration and export
Large Commercial Compressors

Our Copeland Scroll™ commercial compressors offer the most advanced scroll technology available to support your commercial air-conditioning needs, including:

- Widest R-410A selection available
- Model ranges from 2 - 60 HP in singles
- Tandems up to 80 HP
Large Commercial Compressors

Modulation
Copeland Scroll Digital™

Size (HP)
3 - 30

Applications
Commercial rooftop applications for schools, hospitals, theaters and restaurants with widely varying loads

Industrial air driers, chillers and precision cooling equipment

Available in tandem configurations

Modulation Range

<table>
<thead>
<tr>
<th>Modulation Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>10%</td>
</tr>
<tr>
<td>100%</td>
</tr>
</tbody>
</table>
Large Commercial Compressors

Modulation
Copeland Scroll™
Variable Speed

Modulation Range

<table>
<thead>
<tr>
<th>Modulation Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>20%</td>
</tr>
<tr>
<td>130%</td>
</tr>
</tbody>
</table>

Size (HP)
7.5 - 15

Applications
Light commercial and commercial air conditioning, heat pump, rooftop and chiller applications

Available in tandem configurations
Large Commercial Compressors

**Fixed capacity**
Copeland Scroll™
30-60 HP

**Applications**
Large commercial rooftop air conditioning and chiller applications

Available in tandem/trio configurations
Large Commercial Compressors

Fixed capacity
Copeland Scroll™
20-25 HP

Applications
Commercial rooftop air conditioning and chiller applications

Available in tandem configurations
Large Commercial Compressors

Fixed capacity
Copeland Scroll™
7-15 HP

Applications
Commercial rooftop air conditioning and chiller applications

Available in tandem/trio configurations
Large Commercial Compressors

Fixed capacity
Copeland Scroll™
9-10 HP

Applications
Commercial rooftop air conditioning and chiller applications

Available in tandem configurations
Large Commercial Compressors

Fixed capacity
Copeland Scroll™
5-8 HP

Applications
Light commercial rooftop air conditioning and chiller applications

Available in tandem configurations
CoreSense™ Technology for Air Conditioning

Residential and light commercial
CoreSense™ Diagnostics

Applications
Residential and light commercial air conditioning and heat pumps

Benefits
Actively protects Copeland Scroll compressors from critical failure
Uses the compressor as a sensor for system health
Five system alert codes
Data port for fault history download
Reduces field failures and warranty claims
CoreSense™ Technology for Air Conditioning

Residential and light commercial
CoreSense™ Communications

Applications
Residential and light commercial air conditioning and heat pumps
Superior replacement for single or two pole contactors

Benefits
Actively shuts down the compressor when critical system faults are detected

Six diagnostic codes enable greater speed and accuracy of troubleshooting

Stores system and fault history for download

Reduces callbacks and provides homeowner peace-of-mind

Same wiring as traditional contactor
CoreSense™ Technology for Air Conditioning

**Commercial**
CoreSense™ Communications

**Applications**
Commercial rooftop air conditioning and chillers

Available in tandem/trio configurations

**Benefits**
A first of its kind communicating scroll compressor

Onboard Modbus® communication

Integrated protection and phase monitoring

Diagnostic fault history over life of compressor

Featured on 13-60 HP Copeland Scroll compressors
Compressor Cutaway Images & Information
Residential Copeland Scroll™ Variable Speed

- Intermediate discharge valves to boost efficiency across a range of conditions
- Improved gas management method enables smooth gas flow into scroll set
- Optimized scroll elements for variable speed performance
- Positive displacement oil pump enhances reliability
Cutaway Images & Information
Commercial Copeland Scroll™ Variable Speed

- Sound reduction technology for reversible chiller transition and defrost
- Capability to ‘tandemize’ for maximum flexibility in system design
- Optimized scroll elements for variable speed performance
- Scroll oil injection and positive displacement oil pump for low speed performance and reliability
Cutaway Images & Information
Copeland Scroll™ Two-stage

Modulation assembly opens and closes by passports for capacity modulation

Pilot valve activates the modulation assembly for part-load and full-load operation

Two-stage solenoid plug triggers pilot valve and modulation assembly based on demand signal
Radial and axial compliance allows for scroll separation enabling variable capacity.

Robust bearing system for increased flexibility during continuous modulation.
Cutaway Images & Information
Copeland Scroll™ ZPK6

- New seal interface
- Modified fixed scroll with enhanced sealing
- Directed suction
Cutaway Images & Information
Copeland Scroll™ ZPKA

- Redesigned muffler plate and valve
- Single plate floating seal
- Optimized scrolls
- Redesigned running gear
- Optimized motor
Nomenclature
Copeland Scroll™ Label

Model number breakdown
Details modulation, range, capacity, electric codes and more.

Serial & Customer number
Unique to each compressor for registration and tracking purposes

Compressor specs
Lists multiple specs such as oil, volts, phase, hertz, operating pressure, etc.
**Nomenclature**

**Copeland Scroll™**

**Family Series**
- Z - Scroll
- V - Asia scroll
- J - High side scroll

**Modulation**
Alpha character preceding capacity when applied:
- D - Digital
- H - Horizontal
- I - Fixed speed EVI
- J - Digital EVI
- S - Two-stage
- T - Even Tandem
- DD - Digital/digital even tandem
- DT - Digital/fixed even tandem
- DU - Digital/fixed uneven tandem
- Y - Trio (Internal reference only)

**Nominal capacity at rating condition**
2-3 numeric characters

**Range/Envelope Code Application Refgtn/substance compressed**

<table>
<thead>
<tr>
<th>Code</th>
<th>Application</th>
<th>Refgtn/substance compressed</th>
</tr>
</thead>
<tbody>
<tr>
<td>P</td>
<td>AC</td>
<td>R-410A/B</td>
</tr>
<tr>
<td>R</td>
<td>AC</td>
<td>R-22/407C/134a</td>
</tr>
<tr>
<td>F</td>
<td>Ref LT / MT</td>
<td>R-404A/134a/22/407A/407C/407F</td>
</tr>
<tr>
<td>S</td>
<td>Ref EM</td>
<td>R-404A/134a/410A</td>
</tr>
<tr>
<td>C</td>
<td>Cryogenic</td>
<td>Helium</td>
</tr>
<tr>
<td>M</td>
<td>Marine</td>
<td>R404A</td>
</tr>
<tr>
<td>N</td>
<td>Gas boost</td>
<td>Natural Gas</td>
</tr>
<tr>
<td>X</td>
<td>Asia cond. unit</td>
<td>R-22</td>
</tr>
<tr>
<td>T</td>
<td>Mobile scroll</td>
<td>R-134A</td>
</tr>
<tr>
<td>H</td>
<td>Heat pump</td>
<td>R-407C/134a/R410A</td>
</tr>
<tr>
<td>O</td>
<td>Ref subcritical LT</td>
<td>R744</td>
</tr>
<tr>
<td>W</td>
<td>Water-heater</td>
<td>R-22/405C/410A</td>
</tr>
<tr>
<td>I</td>
<td>Ice market</td>
<td>R404A</td>
</tr>
</tbody>
</table>

**Model Variation**

<table>
<thead>
<tr>
<th>Variation</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>E</td>
</tr>
<tr>
<td>2</td>
<td>H</td>
</tr>
<tr>
<td>3</td>
<td>L</td>
</tr>
<tr>
<td>4</td>
<td>M</td>
</tr>
<tr>
<td>5</td>
<td>Q</td>
</tr>
<tr>
<td>6</td>
<td>S</td>
</tr>
<tr>
<td>A</td>
<td>W</td>
</tr>
<tr>
<td>B</td>
<td>V</td>
</tr>
<tr>
<td>C</td>
<td>T</td>
</tr>
<tr>
<td>D</td>
<td></td>
</tr>
</tbody>
</table>

**Capacity Multiplier**

<table>
<thead>
<tr>
<th>Multiplier</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>K - 1,000</td>
<td>A</td>
</tr>
<tr>
<td>M - 10,000</td>
<td>B</td>
</tr>
<tr>
<td>C - SCFM</td>
<td>C</td>
</tr>
</tbody>
</table>

CONTINUED >
Optional

- A - PAO Oil
- B - POE R134A Ref Products
- E - POE Oil - AK/DA or 3MA
- G - PAG Oil
- P - POE R410A Ref Products

Motor Protection

<table>
<thead>
<tr>
<th>Type</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internal inherent protection</td>
<td>- F</td>
</tr>
<tr>
<td>External electronic protection</td>
<td>- W</td>
</tr>
<tr>
<td>External enhanced</td>
<td>- E</td>
</tr>
<tr>
<td>No internal protection or TW*+TF*</td>
<td>- X</td>
</tr>
<tr>
<td>Tandem/Trio TE*+TW*</td>
<td>- Y</td>
</tr>
<tr>
<td>Tandem/Trio TE*+TF*</td>
<td>- Z</td>
</tr>
</tbody>
</table>

Motor Descriptions

<table>
<thead>
<tr>
<th>Phase</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>P</td>
</tr>
<tr>
<td>3</td>
<td>T</td>
</tr>
<tr>
<td>BPM</td>
<td>B</td>
</tr>
<tr>
<td>3 PWS 50/50</td>
<td>F</td>
</tr>
<tr>
<td>3 Encapsulated Stator</td>
<td>K</td>
</tr>
<tr>
<td>Multiple Speed</td>
<td>M</td>
</tr>
</tbody>
</table>

Typical Electrical Codes

<table>
<thead>
<tr>
<th>Code</th>
<th>60 Hz</th>
<th>50 Hz</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>208-230-3</td>
<td>200-3</td>
</tr>
<tr>
<td>D</td>
<td>460-3</td>
<td>380-420-3</td>
</tr>
<tr>
<td>E</td>
<td>575-3</td>
<td>380-240-1</td>
</tr>
<tr>
<td>J</td>
<td>220-240-1</td>
<td>380-240-3</td>
</tr>
<tr>
<td>M</td>
<td>265-1</td>
<td>380-3</td>
</tr>
<tr>
<td>P</td>
<td>265-1</td>
<td>220-240-3</td>
</tr>
<tr>
<td>Q</td>
<td>208-230-1</td>
<td>220-1</td>
</tr>
<tr>
<td>R</td>
<td>200-1*</td>
<td>220-1</td>
</tr>
<tr>
<td>S</td>
<td>200-220-3</td>
<td>200-220-3</td>
</tr>
<tr>
<td>V</td>
<td>220-240-1</td>
<td>220-240-1</td>
</tr>
<tr>
<td>W</td>
<td>200-220-3</td>
<td>220-240-3</td>
</tr>
</tbody>
</table>

Misc AC Voltages

<table>
<thead>
<tr>
<th>Code</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>380-3</td>
</tr>
<tr>
<td>7</td>
<td>415-3</td>
</tr>
<tr>
<td>3</td>
<td>220-1</td>
</tr>
</tbody>
</table>

*Model specific

Nomenclature/Nameplates

Nomenclature

Z RDU 12 MCE - TFD - 250

Bill of material product variation
Nomenclature
Copeland Scroll™ Variable Speed

**Family Series**
- Z - Scroll
- V - China scroll, CCC Only
- X - China scroll for export W/UL
- J - High side scroll

**Modulation**
- V - Variable speed
- W - Variable speed EVI

Optional 2nd position
- T - Even tandem
- U - Uneven tandem

**Optional**
- E – POE Oil
- P – POE R410A

**Misc. protection**
- Enhanced external protection: E
- Protection not specified: X

**Model variation**
- 1
- 2
- S
- Reserved future use: 9

**Application range**

<table>
<thead>
<tr>
<th>Code</th>
<th>Application</th>
<th>Refgtn/substance compressed</th>
</tr>
</thead>
<tbody>
<tr>
<td>P</td>
<td>AC/HP</td>
<td>R-410A/B</td>
</tr>
<tr>
<td>H</td>
<td>Heat pump optimized</td>
<td>R410A</td>
</tr>
</tbody>
</table>

**Bill of material product variation**

- 1st generation VS only (K1)
  - Nominal capacity at rating condition
  - Capacity multiplier
  - 2-3 numeric characters
  - K-1,000
  - M-10,000
  - C-SCFM

**Motor types**

1, 2, 3, 4, 5, 6, 7, 8, L, N, Q
Global Scroll Manufacturing
Overview

North America
Sidney, Ohio
Lebanon, Missouri
Ava, Missouri
Natchitoches, Louisiana
Reynosa, Mexico

International
Cookstown, N. Ireland
Welkenreadt, Belgium
Suzhou, China
Rayong, Thailand

- High volume scroll manufacturing on three continents
- Over $1 billion invested in global scroll manufacturing capacity
- Integrated supply chain for global cost savings and risk reduction
- In depth audit process to share best practices and ensure quality
# Global Scroll Manufacturing

## North America

<table>
<thead>
<tr>
<th>Location</th>
<th>Scroll Assembly</th>
<th>Reciprocating Assembly</th>
<th>Scroll Machining</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sidney, OH</td>
<td>●</td>
<td></td>
<td>●</td>
</tr>
<tr>
<td>Lebanon, MO</td>
<td>●</td>
<td></td>
<td>●</td>
</tr>
<tr>
<td>Natchitoches, LA</td>
<td>●</td>
<td></td>
<td>●</td>
</tr>
<tr>
<td>Ava, MO</td>
<td></td>
<td></td>
<td>●</td>
</tr>
<tr>
<td>Reynosa, Mexico</td>
<td>●</td>
<td>●</td>
<td></td>
</tr>
</tbody>
</table>