
The New Cool

Copeland CO₂ scroll technology for booster systems:
Our solution to your challenges.



COPELAND



Revolutionizing Commercial Refrigeration.

The Copeland CO₂ scroll solution for booster systems.

Innovation is the key to meeting the regulatory challenges and consumer trends of commercial refrigeration. Copeland engineers have developed an innovative solution based on several patented technologies, to help solve these economic and ecological challenges, resulting in the industry's most anticipated innovation.

Copeland CO₂ scroll technology is a game-changer for commercial refrigeration. The entirely new CO₂ transcritical scroll compressors are taking sustainable refrigeration a big step forward. These compressors feature Dynamic Vapor Injection (DVI), which enables a smoother and more efficient operation of CO₂ booster systems in all climates, while keeping costs low.

Can Technology Give You Peace of Mind?

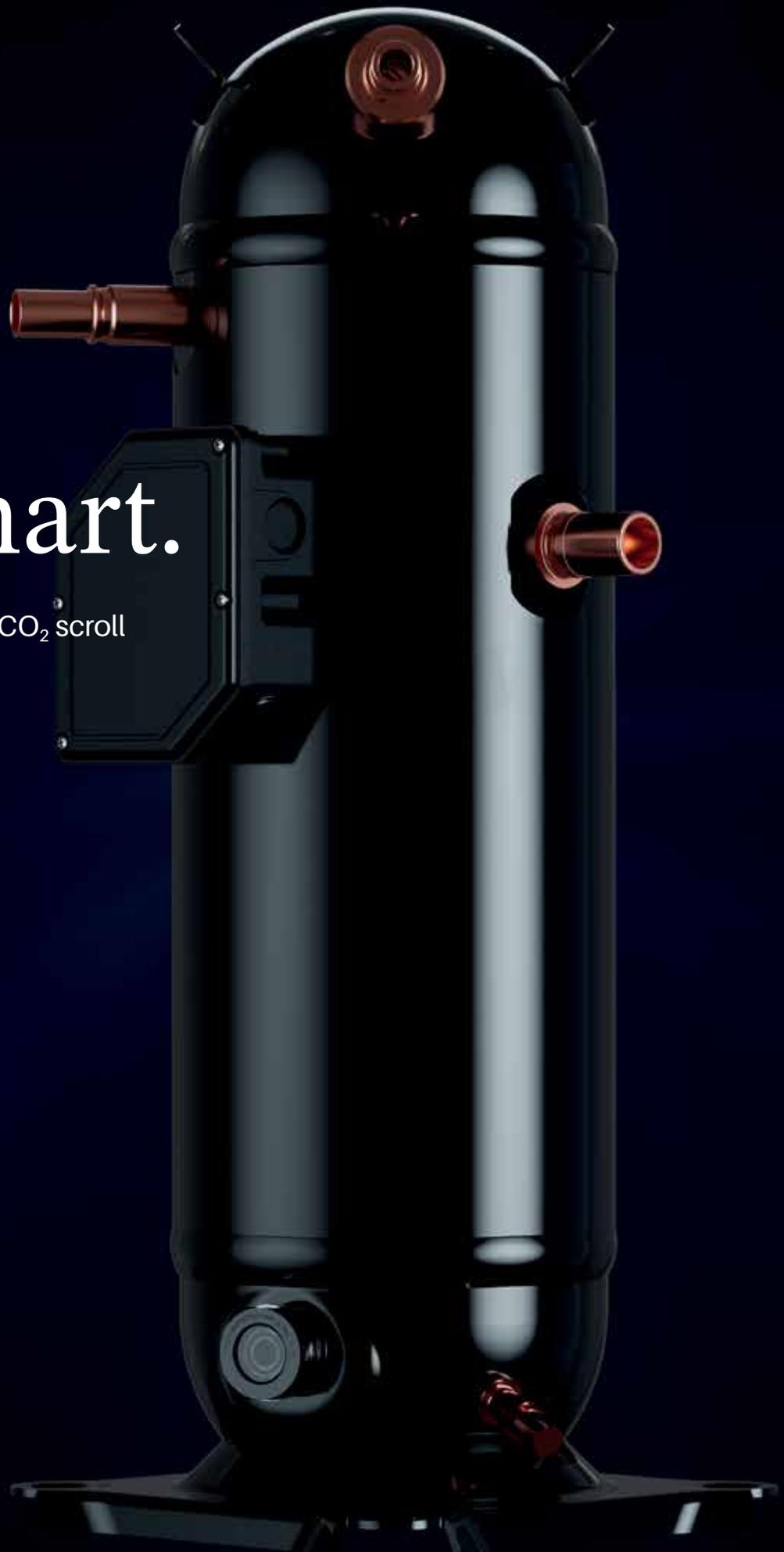
Five success factors making the Copeland CO₂ scroll technology unique.

The Copeland CO₂ scroll solution offers unrivalled advantages:

- Low operating costs in all climates due to Dynamic Vapor Injection (DVI)
- One booster design fits all climates without the need for parallel compression
- Enables the most compact and lightest system for applications with limited space availability
- Ensures the highest system reliability in all ambient temperatures

Strong and Smart.

The innovative Copeland CO₂ scroll compressor design.





Deal with Flash Gas in a New Way!

The game-changing Dynamic Vapor Injection technology.

The new Copeland CO₂ transcritical compressors feature Dynamic Vapor Injection (DVI). DVI allows for flash gas to be directly injected from the economizer or the flash gas tank into the compressor through a check valve. This innovative concept enables a more efficient and smoother operation of CO₂ booster systems in any climate, making CO₂ more attractive than ever as the refrigerant of choice. Indeed, DVI technology reduces the system's complexity, eliminating the need for parallel compression.

Copeland CO₂ scroll technology reduces the overall system complexity significantly, which also leads to reduced applied costs through:

- [Easier installation and maintenance](#)
- [Fewer components \(no additional parallel compressor and drive needed\)](#)
- [Simplified piping system](#)
- [Smaller rack in size and weight](#)

Stay Cool. And Calm.

Smart, safe, and silent.

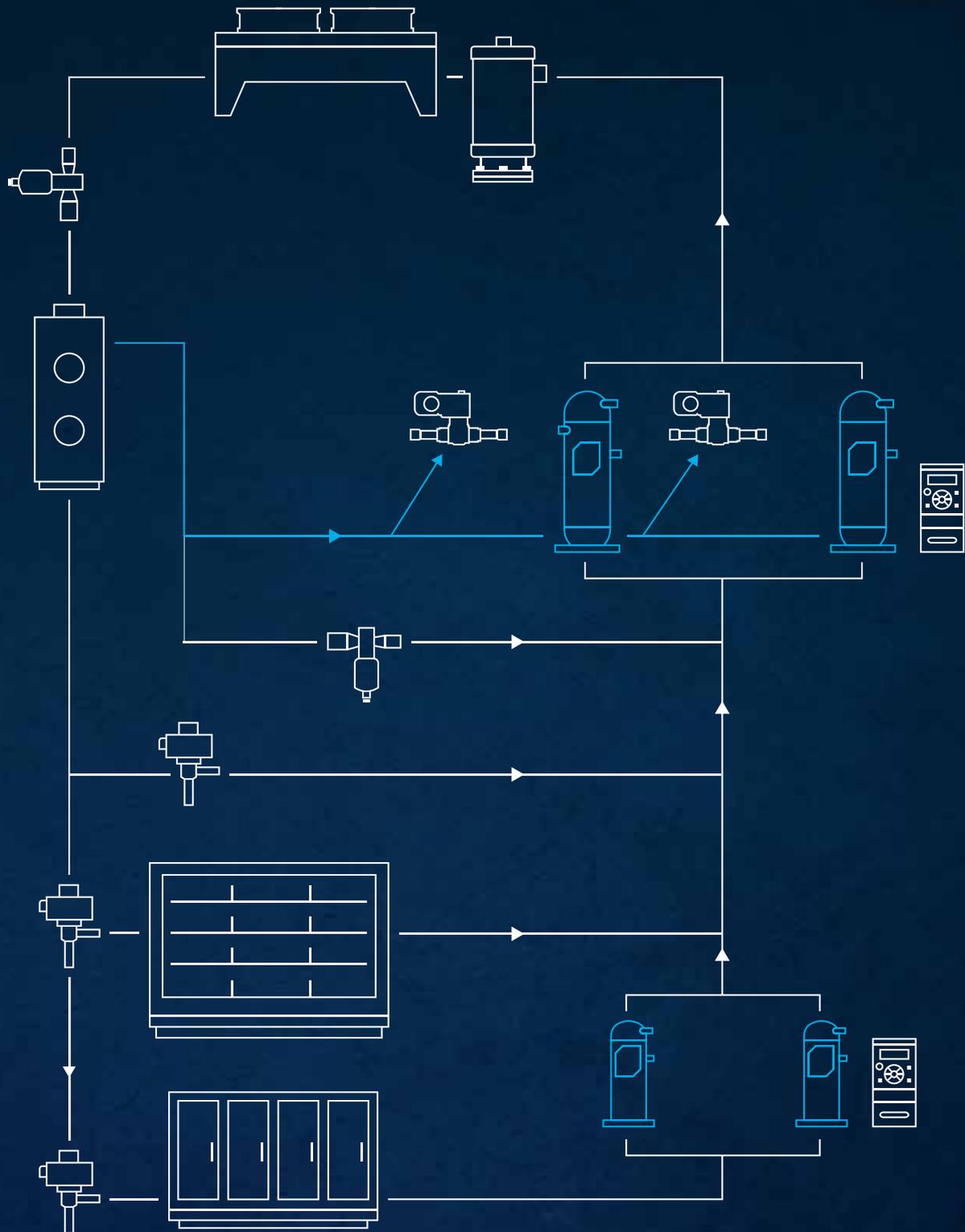
Copeland combined this new generation of CO₂ scroll compressors, equipped with DVI, with a suite of intelligent electronics to create a unique solution for CO₂ boosters with optimized system performance.

At the heart of this solution: the new Copeland XC Pro CO₂ scroll controller, specially designed for the booster application. Its smart control logic manages the suite of intelligent electronics; it monitors, analyzes, and optimizes the different system components to deliver high system efficiency and safe compressor operation; and enables lower pressure design.

Copeland CO₂ scroll compressors run very smoothly and quietly because of their continuous compression process, resulting in less vibration (safer for high-pressure systems). They are available in fixed and variable speeds, which allows for more flexibility and high efficiency thanks to the brushless permanent magnet (BPM) motor technology, in combination with efficient drives. This results in the compressor always operating at optimal speed, rendering inefficient on-off operations obsolete.



CO₂ Scroll Booster Circuit with Dynamic Vapor Injection from Flash Tank.



CO₂ Scroll Solution



CO₂ SCROLL COMPRESSOR
Variable and fixed speed
Medium and low temperature
High and low standstill pressure design



FREQUENCY DRIVE (EVM)
Compressor matched



EXPANSION VALVE (CV)
Gas cooler & flash tank
Pressure control
Desuperheating valve



OIL LEVEL MANAGEMENT (OMS)
Compressor
Oil separator
Flash tank



SOLENOID VALVES
Dynamic Vapor Injection (DVI)



CO₂ SCROLL BOOSTER CONTROLLER (XC PRO)
Refrigerant circuit management
Smart control
Protection
Diagnostics
Communication

COPELAND

Success Comes in Circles – The Perfect Booster System.

Designing a booster system with the Copeland CO₂ scroll solution.

It's the beginning of The New Cool. Our new CO₂ solution integrates high-quality components with a smart electronic concept that makes commercial refrigeration with CO₂ less complex and easier to maintain. It reduces both investment and operational costs, lowering total cost of ownership.

The basis of all these improvements is Dynamic Vapor Injection (DVI) technology. It allows the elimination

of system components such as the parallel compressor or the inverter drive and also reduces the amount of piping required. As a result, the booster circuit is not only less complex compared to standard boosters, but also less prone to faults. Thanks to pre-configured electronics, it is also easier to set up and operate. Combined, these features lead to smoother and more efficient operation of CO₂ booster systems in all climates while keeping costs down.

Efficient Cooling at +44°C? Challenge Accepted.

Your solution for efficient and reliable refrigeration.

The warmer the climate, the greater the challenges of CO₂ refrigeration, as the complexity of the system increases to achieve acceptable efficiency. Copeland CO₂ scroll DVI technology eliminates the need for specific designs for most European climates, but still delivers system efficiency at the highest level. The integrated advanced electronic concept with preconfigured and perfectly matched compressor, sensor, and valve parameters further enhances the system's simplicity and therefore delivers an efficient and reliable operation. The CO₂ scroll compressors' low vibration levels and a simple oil management circuit further contribute to this effect.



Flexibility Runs in the Family – Compressor Line Up.

A tailored solution for every application.



ZTI



ZTW



ZL



ZLV



ZO



ZOV

Copeland's brand-new compressors with CO₂ scroll technology provide higher efficiency and reliability in commercial refrigeration. The new portfolio comprises CO₂ compressors for a range of applications from convenience store to small supermarket. The three line ups form the broadest portfolio of CO₂ compressors available on the market:

- Copeland ZT/W CO₂ transcritical scroll compressors for medium temperature (standstill pressure of 110 bar)
- Copeland ZL/V CO₂ subcritical scroll compressors for low temperature (standstill pressure of 110 bar)
- Copeland ZO/V CO₂ subcritical scroll compressors for low temperature (standstill pressure of 45 bar)

A Giant Step for a Smaller CO₂ Footprint.

Copeland CO₂ scroll solution provides answers to the industry's biggest challenges – and makes the natural refrigerant widely available.

The F-Gas regulation is one of the dominant challenges of the refrigeration industry today, posing new limitations on the choice of refrigerants and impacting system architecture. As the phase down of HFCs continues globally, the challenge is to identify truly sustainable alternatives that maximize the environmental, economic, and operational benefits. This is where

our CO₂ solution comes into play. It is a climate-neutral solution that can be used highly efficiently – today and in the future.

CO₂ is the refrigerant of choice due to many benefits and its continued success as a leading refrigerant is now being driven further by a technological leap. As the market leader in scroll technology, we at Copeland have succeeded in perfectly combining scroll technology with CO₂ for medium- and low-temperature applications, thus making the best of both worlds widely available.

CO₂ as a refrigerant offers many advantages:

- It's future-proof
- It's non-flammable
- It's non-toxic (when industry standards and best practice rules are followed)
- It's climate friendly (global warming potential is 1 GWP=1; its ozone depletion potential is 0 ODP=0)



At a Glance: Copeland CO₂ Scroll Compressor Lineup.

Copeland CO₂ Transcritical Fixed Speed Scroll Compressor Models with Dynamic Vapor Injection

Model	Cooling Capacity @ 50 Hz [kW]*	Displacement [m ³ /h]	Suction Diameter [inch]	Discharge Diameter [inch]	Injection Diameter [inch]	Width, Depth, Height [mm]	Net Weight [kg]	Oil Charge [L]	Power Supply	Maximum Operating Current [A]	Sound Power Level [dB(A)]
ZTI16AG	7.7	2.78	3/4	1/2	5/8	240 x 240 x 620	57	1.2	400V - 3Ph (50 Hz)	16.6	69
ZTI21AG	10.1	3.67	3/4	1/2	5/8	240 x 240 x 620	57	1.2	400V - 3Ph (50 Hz)	20.7	70
ZTI28AG	13.9	4.82	3/4	1/2	5/8	240 x 240 x 620	60	1.2	400V - 3Ph (50 Hz)	26.4	73
ZTI36AG	18.5	6.33	3/4	1/2	5/8	240 x 240 x 620	60	1.2	400V - 3Ph (50 Hz)	33.0	73

*Condition: Tevap = -10°C, Gas Cooler Outlet = 35°C, 90 bar Discharge, 10K Super Heat
Preliminary data

Copeland CO₂ Transcritical Variable Speed Scroll Compressor Models with Dynamic Vapor Injection

Model (without Injection)	Cooling Capacity [kW]*	Speed Range [rpm]	Suction Diameter [inch]	Discharge Diameter [inch]	Injection Diameter [inch]	Width, Depth, Height [mm]	Net Weight [kg]	Oil Charge [L]	Drive Power Supply	Maximum Operating Current [A]	Sound Power Level [dB(A)] **
ZTW16AG	4.1-14.9	1,500-5,400	3/4	1/2	5/8	240 x 240 x 620	58	1.2	400V - 3Ph (50 Hz)	27	70
ZTW21AG	5.5-19.8	1,500-5,400	3/4	1/2	5/8	240 x 240 x 620	58	1.2	400V - 3Ph (50 Hz)	34	70
ZTW28AG	7.6-27.4	1,500-5,400	3/4	1/2	5/8	240 x 240 x 620	58	1.2	400V - 3Ph (50 Hz)	45	70
ZTW36AG	10.0-36.0	1,500-5,400	3/4	1/2	5/8	240 x 240 x 620	58	1.2	400V - 3Ph (50 Hz)	56	70

*Condition: Tevap = -10°C, Gas Cooler Outlet = 35°C, 90 bar Discharge, 10K Super Heat
**3,000 rpm
Preliminary data

Copeland CO₂ Subcritical Fixed Speed Scroll Compressor Models (High Standstill Pressure PS)

Model (without Injection)	PS (Lo/Hi) [bar]	Cooling Capacity @ 50 Hz [kW]*	Displacement [m ³ /h]	Suction Diameter [inch]	Discharge Diameter [inch]	Width, Depth, Height [mm]	Net Weight [kg]	Oil Charge [L]	Power Supply	Maximum Operating Current [A]	Sound Power Level [dB(A)]
ZL16AG	110/140	4.3	2.78	3/4	1/2	240 x 240 x 620	57	1.2	400V - 3Ph (50 Hz)	7.8	69
ZL21AG	110/140	5.9	3.67	3/4	1/2	240 x 240 x 620	57	1.2	400V - 3Ph (50 Hz)	8.6	69
ZL28AG	110/140	7.9	4.82	3/4	1/2	240 x 240 x 620	57	1.2	400V - 3Ph (50 Hz)	9.7	69
ZL36AG	110/140	10.8	6.33	3/4	1/2	240 x 240 x 620	57	1.2	400V - 3Ph (50 Hz)	11.0	69

*Condition: Tevap = -35°C, Tcond = -5°C, Super Heat 10K, Sub Cooling OK
Preliminary data

Copeland CO₂ Subcritical Variable Speed Scroll Compressor Models (High Standstill Pressure PS)

Model (without Injection)	PS (Lo/Hi) [bar]	Cooling Capacity Range [kW]*	Speed Range [rpm]*	Suction Diameter [inch]	Discharge Diameter [inch]	Width, Depth, Height [mm]	Net Weight [kg]	Oil Charge [L]	Drive Power Supply	Maximum Operating Current [A]	Sound Power Level [dB(A)]**
ZLV16AG	110/140	1.3-9.7	900-5400	3/4	1/2	240 x 240 x 620	53	1.2	400V - 3Ph (50Hz)	10	67
ZLV21AG	110/140	1.8-11.0	900-5400	3/4	1/2	240 x 240 x 620	53	1.2	400V - 3Ph (50Hz)	13	67
ZLV28AG	110/140	2.4-14.4	900-5400	3/4	1/2	240 x 240 x 620	53	1.2	400V - 3Ph (50Hz)	16	67
ZLV36AG	110/140	3.3-20.0	900-5400	3/4	1/2	240 x 240 x 620	53	1.2	400V - 3Ph (50Hz)	20	67

*Condition: T_{evap} = -35 °C, T_{cond} = -5°C, Super Heat 10K, Sub Cooling 0K
 **3,000 rpm
 Preliminary data

Copeland CO₂ Subcritical Fixed Speed Scroll Compressor Models (Standard Standstill Pressure)

Model (without Injection)	PS (Lo/Hi) [bar]	Cooling Capacity @50 Hz [kW]*	Displacement [m ³ /h]	Rotalock Suction Diameter [inch]	Rotalock Discharge Diameter [inch]	Width, Depth, Height [mm]	Net Weight [kg]	Oil Charge [L]	Power Supply	Maximum Operating Current [A]	Sound Power Level [dB(A)]
ZO18AG	45/60	5.9	3.18	1"1/4	1	228 x 228 x 435	24	0.9	400V - 3Ph (50 Hz) & 460V - 3Ph (60 Hz)	4.4	64
ZO25AG	45/60	8.2	4.36	1"1/4	1	228 x 228 x 435	24	0.9	400V - 3Ph (50 Hz) & 460V - 3Ph (60 Hz)	6.0	64
ZO38AG	45/60	12.2	6.61	1"1/4	1	228 x 228 x 435	26	0.9	400V - 3Ph (50Hz) & 460V - 3Ph (60 Hz)	9.1	65
ZO46AG	45/60	15.0	8.12	1"1/4	1	228 x 228 x 435	26	0.9	400V - 3Ph (50 Hz) & 460V - 3Ph (60 Hz)	11.0	69

*Condition: T_{evap} = -35°C, T_{cond} = -5°C, Super Heat 10K, Sub Cooling 0K
 Preliminary data

Copeland CO₂ Subcritical Variable Speed Scroll Compressor Models (Standard Standstill Pressure PS)

Model (without Injection)	PS (Lo/Hi) [bar]	Cooling Capacity Range [kW]*	Speed Range [rpm]*	Rotalock Suction Diameter [inch]	Rotalock Discharge Diameter [inch]	Width, Depth, Height [mm]	Net Weight [kg]	Oil Charge [L]	Power Supply	Maximum Operating Current [A]**	Sound Power Level [dB(A)]***
ZOV18AG	45/60	3.2-12.6	1,500-6,000	1"1/4	1	228 x 228 x 405	18	0.8	400V - 3Ph (50 Hz) & 460V - 3Ph (60 Hz)	10.5	74
ZOV25AG	45/60	4.3-17.5	1,500-6,000	1"1/4	1	228 x 228 x 405	19	0.8	400V - 3Ph (50 Hz) & 460V - 3Ph (60 Hz)	14.1	77
ZOV38AG	45/60	6.7-26.7	1,500-6,000	1"1/4	1	228 x 228 x 405	20	0.8	400V - 3Ph (50 Hz) & 460V - 3Ph (60 Hz)	18.9	74

*Condition: T_{evap} = -35 °C, T_{cond} = -5°C, Super Heat 10K, Sub Cooling 0K
 ** AtDrive Input
 ***4,500 rpm
 Preliminary data

Technology and Inventiveness Face Reality.

We put our ideas to the test under real-world conditions.



Based in Aachen, Germany, the Europe solution center develops integrated solutions to address market challenges. Our engineering team offers deep expertise in key disciplines: from analytical engineering through system design optimization to advanced electronics. Close collaboration with our customers and a world class design and testing infrastructure are the key success factors for our inventiveness and the development of game-changing technologies such as the Copeland CO₂ scroll technology.

Our test and development infrastructure includes:

- [Psychometric chambers for controlled environment testing](#)
- [Anechoic chambers for acoustics engineering](#)
- [Reverberation chamber for electromagnetic compatibility testing](#)
- [Electronics flex space](#)
- [Design flex space](#)

Let's Sum It Up.

Key Benefits of Our Copeland CO₂ Scroll Solution.

Copeland solutions for booster systems featuring the new CO₂ scroll technology deliver high added value for commercial refrigeration.

Low investment and system cost

- Copeland CO₂ scroll technology allows for reduction of the system cost through a drastically simplified system design.
- The compact scroll compressors are on average 50% lighter than comparable piston compressors, which reduces shipping costs and allows for easier handling.

Low operating and maintenance cost

- Copeland CO₂ solutions with DVI technology and smart electronics provide high efficiency in all climates.
- Our one-design-fits-all-climates approach provides an opportunity to standardize the equipment for the installed base.
- The extremely low vibration level of Copeland CO₂ compressors provides system reliability and limits the risk of pipe rupture.
- The high stand-still pressure ensures system resilience in the event of longer stand still periods without the need for venting or maintenance.

Simple and compact solution for silent operation

- By reducing the booster frame sizes, the industry now has the opportunity to design the most compact and lightest equipment. CO₂ scroll compressors require up to 20% less footprint than semihermetic compressors making them the perfect fit for applications in limited space environments, especially in city locations.
- Flash gas tank injection allows for one design that is suitable for all climates at optimum performance.
- New CO₂ scroll compressors run very quietly thanks to the enclosure design and continuous compression process, making them very suitable for use in urban environments.

Maximum reliability and less food spoilage

- High design pressures increase system resilience and avoid shut-down or venting during summertime.
- The scroll compressor's ability to handle liquid in the event of low superheat or standstill periods provides maximum durability of the system.
- System protection from the risk of piping rupture is no longer a challenge thanks to the low vibration level of the scroll compressors.
- Dedicated Copeland XC Pro controller for CO₂ booster systems ensures safe and reliable operations.

Copeland.com/TheNewCool

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