



Emerson Climate Technologies at a Glance

Emerson Climate Technologies is the world's leading provider of heating, ventilation, air conditioning, and refrigeration solutions for residential, industrial, and commercial applications. We combine technically superior products and services from our industry-leading

divisions and brands with our global engineering, design and distribution capabilities to create reliable, energy efficient climate systems that improve human comfort, safeguard food, and protect the environment.

Copeland Scroll™

Copeland Scroll™ Compressor for R744 Designed for High Efficiency in CO₂-subcritical Application



For more details, see www.emersonclimate.eu

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Copeland Scroll™ Compressors for R744 (CO₂) Low Temperature Refrigeration

Emerson Climate Technologies is the world's leading compressor manufacturer, delivering comprehensive solutions for numerous refrigeration applications. The ZO compressor range transfers the advantages of Copeland Scroll™ technology to low temperature cascade systems using the refrigerant R744.

Increasing environmental concerns about potential direct emissions from HFC-based refrigeration systems into the atmosphere have led to the revival of R744 in parts of the European refrigeration market. Regionally, this trend is reinforced by legislation and taxation schemes which favor the usage of refrigerant R744.

In comparison with HFC refrigerants, the specific properties of R744 require changes in the design of the refrigeration system. The ZO range of Copeland Scroll compressors has been particularly designed to exploit the characteristics of the R744 refrigeration system. Efficiency, reliability and liquid handling advantages of the Copeland Scroll technology equally apply.

The optimized design of ZO compressors effectively address the challenges of R744 systems i.e., high pressure levels, higher mass flow for a given displacement while securing proper lubrication.

Ideal Choice For Low Temperature Cascade And Booster system

With the combination of scroll ZB and scroll Digital ZBD range for R134a in medium temperature and scroll ZO compressors for CO₂ subcritical in low temperature Emerson is able to offer a complete range of compressor for cascade systems.

The use of scroll and Digital modulation technologies in these hybrid systems helps customers and end users to offset the additional capital costs related to R134a and R744 compared to standard HFCs. Cost savings can be as high as 40% compared to cascade systems based on semi-hermetic solutions with inverters. The scroll compact design minimises the required machine room space and therefore is the ideal choice for small retail applications. In addition, together with Stream CO₂ for transcritical medium temperature equipment, scroll ZO(D) offers many possibilities to reduce the size of the booster systems and to contain equipment manufacturing cost. Digital technology (10-100% stepless capacity modulation) can be used to avoid the high cost associated with variable speed technology, resulting in important cost savings while ensuring the highest equipment efficiency level.

Features and Benefits

- Optimized for high efficiency in CO₂-subcritical cascade and booster systems
- High condensing temperature limit allowing for optimized overall system design
- Compact design minimizing required machine room space
- Half the weight of equivalent semi-hermetic compressors
- Optional Sound Shell allowing 10 dBA sound attenuation
- High bearing reliability and lubrication of all critical parts under all conditions including liquid slugging
- Availability of a digital model offering simple, stepless 10 to 100% capacity modulation

Model	Nominal Horsepower hp	Displacement m ³ /h	Cooling Capacity kW	COP	Net Weight kg	Standstill Pressures LP/HP bar(g)
ZO21K5E	1.5	2.6	4.8	3.6	22	30/52
ZO34K3E	2.0	4.1	7.2	3.5	30	30/52
ZO45K3E	2.5	5.4	10.3	3.9	31	30/52
ZO58 K3E	3.5	6.9	13.0	3.9	33	30/52
ZO88KCE	5.5	10.1	19.6	3.9	40	30/52
ZO104KCE	6.0	11.7	22.7	4.0	40	30/52
Digital Models 10-100%						
ZOD34KCE	2.0	4.1	7.4	3.7	30	30/45
ZOD104KCE	6.0	11.7	22.1	3.8	40	30/45

EN12900: Evaporating -35°C, Condensing -5°C, Suction Superheat 10 K, Subcooling 0K

Optimized Design for R744 Applications

The challenges for R744 compressors compared to HFC compressors lie in the high pressure levels, the higher mass flow for a given displacement, and in securing proper lubrication.

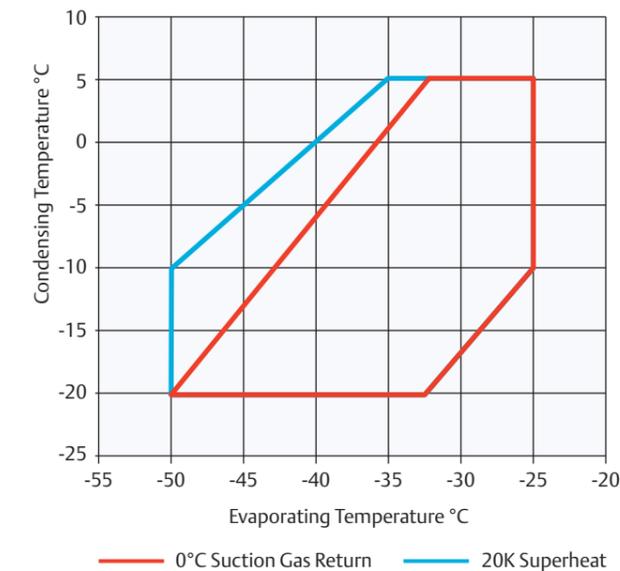
In terms of mechanical strength, ZO scroll compressors benefit from several years of experience with R410A air-conditioning compressors, which are operating at similar pressure levels as R744 compressors. For piston compressors, particular attention has to be paid to redesigning the suction and discharge valves for the higher mass flow. Copeland Scroll™ compressors eliminate this



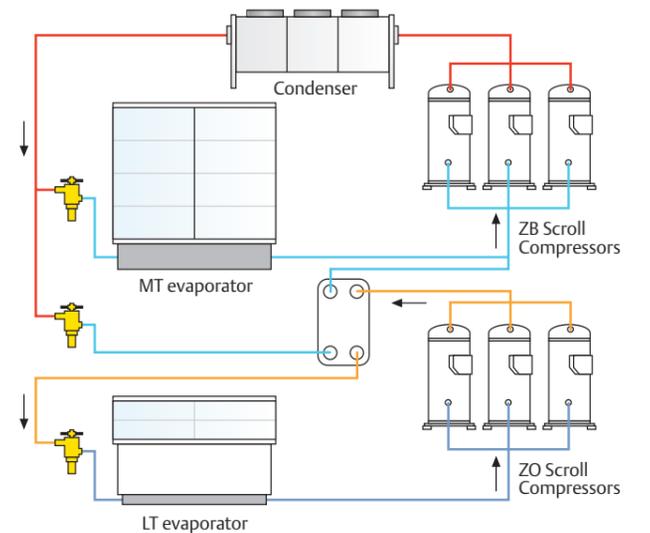
problem up-front by not utilizing suction and discharge valves to control the compression process.

Lubrication is always of particular concern during the design stage of new compressors and has to be proven during reliability and field testing. The effort has resulted in the development of a dedicated polyol ester oil (POE). Moreover, ZO compressors feature internal design details which ensure higher bearing durability and lubrication to all critical parts at any time during run-time and system start-up. This includes the use of Teflon bearings.

Operating Envelope R744



Cascade System



Scroll Compressors for R744 (CO₂) Low Temperature Refrigeration. Safeguarding your product and our environment