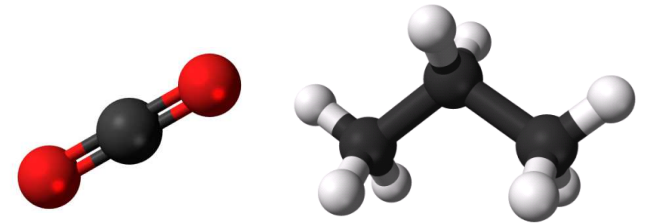


Estrategia de desarrollo de productos a partir del escenario actual y futuro de los refrigerantes

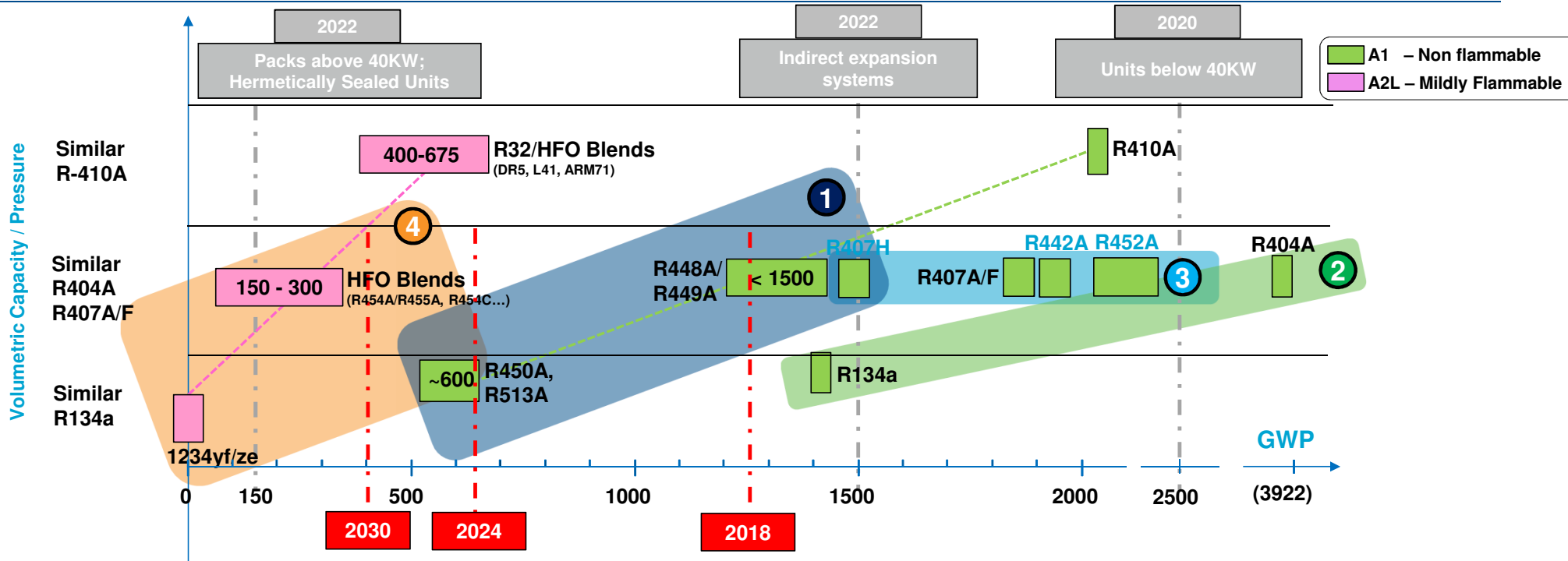
Emerson Commercial & Residential Solutions


EMERSON

Situación Refrigerantes



Tendencias de Mercado actuales y Refrigerantes HFO



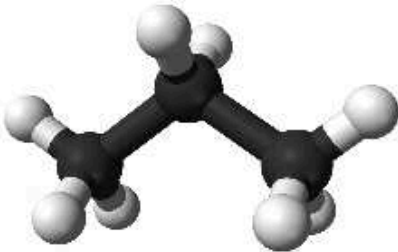
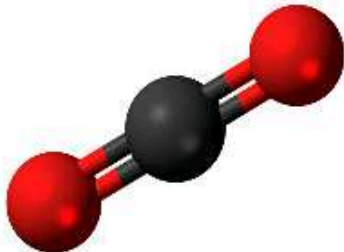
- ① New HFO A1 Blends Broadly Adopted But Late – New Installation ✓ But Not “Perfect” For Retrofit
- ② HFC prices have jumped by 250% (R134a) and 500% (R404A) since 2014 – Now not Available
- ③ Better R404A Retrofit Option are Being Requested Reflecting Industry “Panic”
- ④ A2L Are Still Not Understood (Market/Regulation/Performance/Safety) But OEMs Currently In Active Testing Mode

Soluciones de Emerson para las Solicitudes de Mercado

CO₂

Propane

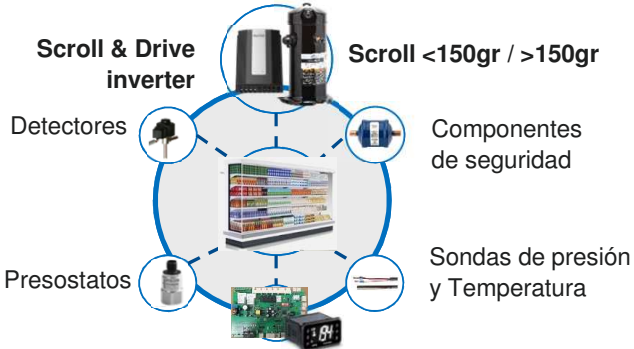
HFO / HFO Blends



3

2

1



A2L - Capacidades, COP y Temperaturas de descarga Candidatos para BT y MT → Resultados de Laboratorio

1

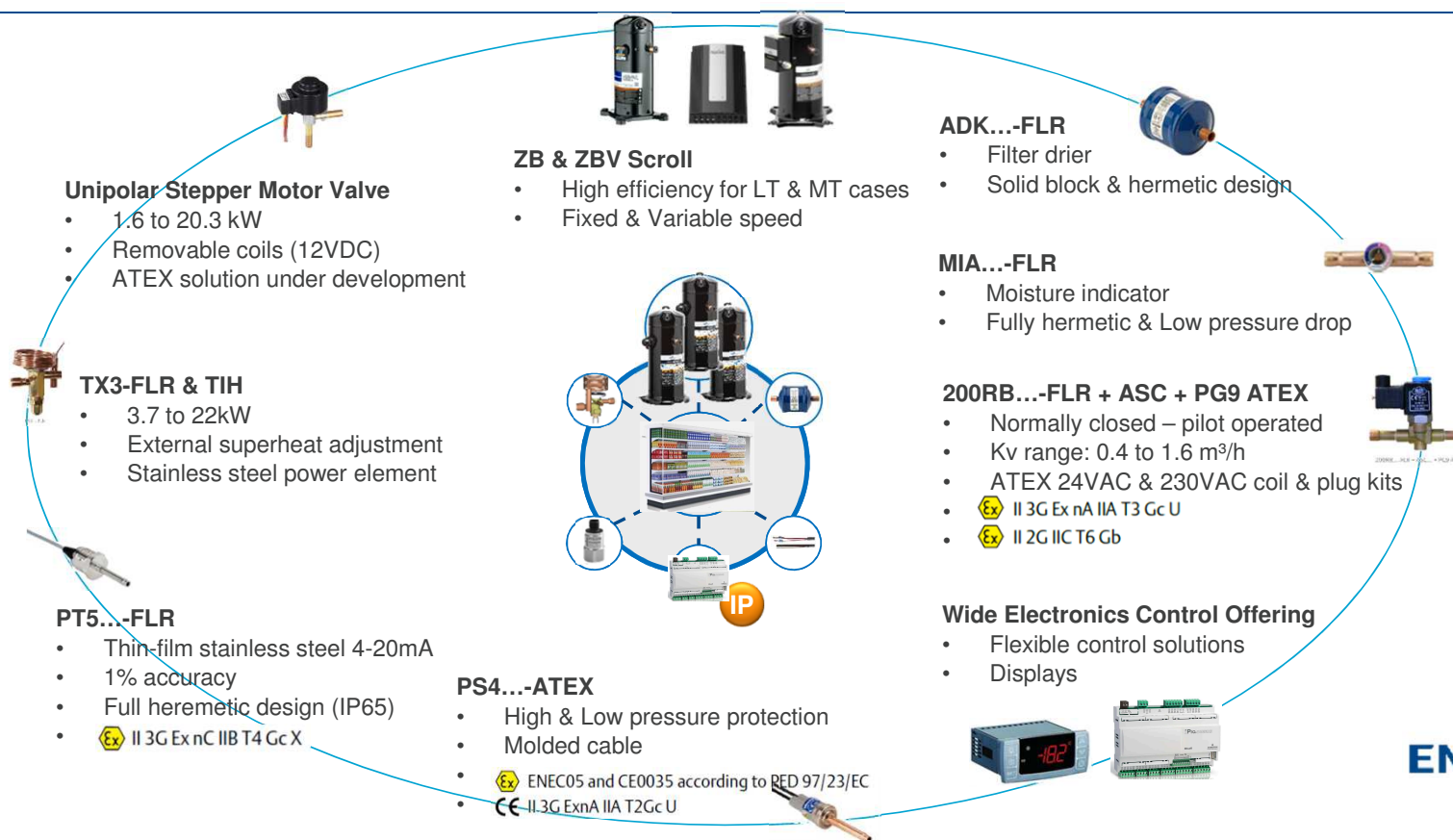
| Refrigerant | GWP | Glide 45°C | Med Temp (-10/45/20) | | | Low Temp (-35/40/20) | | |
|-------------------|-----|------------|----------------------|--------------------|-----------------------|----------------------|--------------------|-----------------------|
| | | | Cap'y (% vs 404A) | COP (% vs 404A) | Discharge Temp (K) | Cap'y (% vs 404A) | COP (% vs 404A) | Discharge Temp (K) |
| R455A (HDR110) | 145 | 10 | -8% | 8% | 11 | -9% | 12% | 20 |
| R454C (DR3) | 148 | 7 | -16% | 6% | 7 | -18% | 9% | 14 |
| R444B (L20) | 295 | 8 | -14% | 7% | 31 | -17% | 13% | 58 |
| R454A (DR7) | 239 | 5 | 0% | 4% | 17 | 3% | 9% | 31 |
| 1234yf | 4 | 0 | -41% | 8% | -9 | | | |
| 1234ze | 6 | 0 | -55% | 13% | -4 | | | |

Increase In COP Is Attractive
High Discharge Temperatures & Lower Capacity Are Challenges
DR3 Seems to be the best compromise

Soluciones de R290a

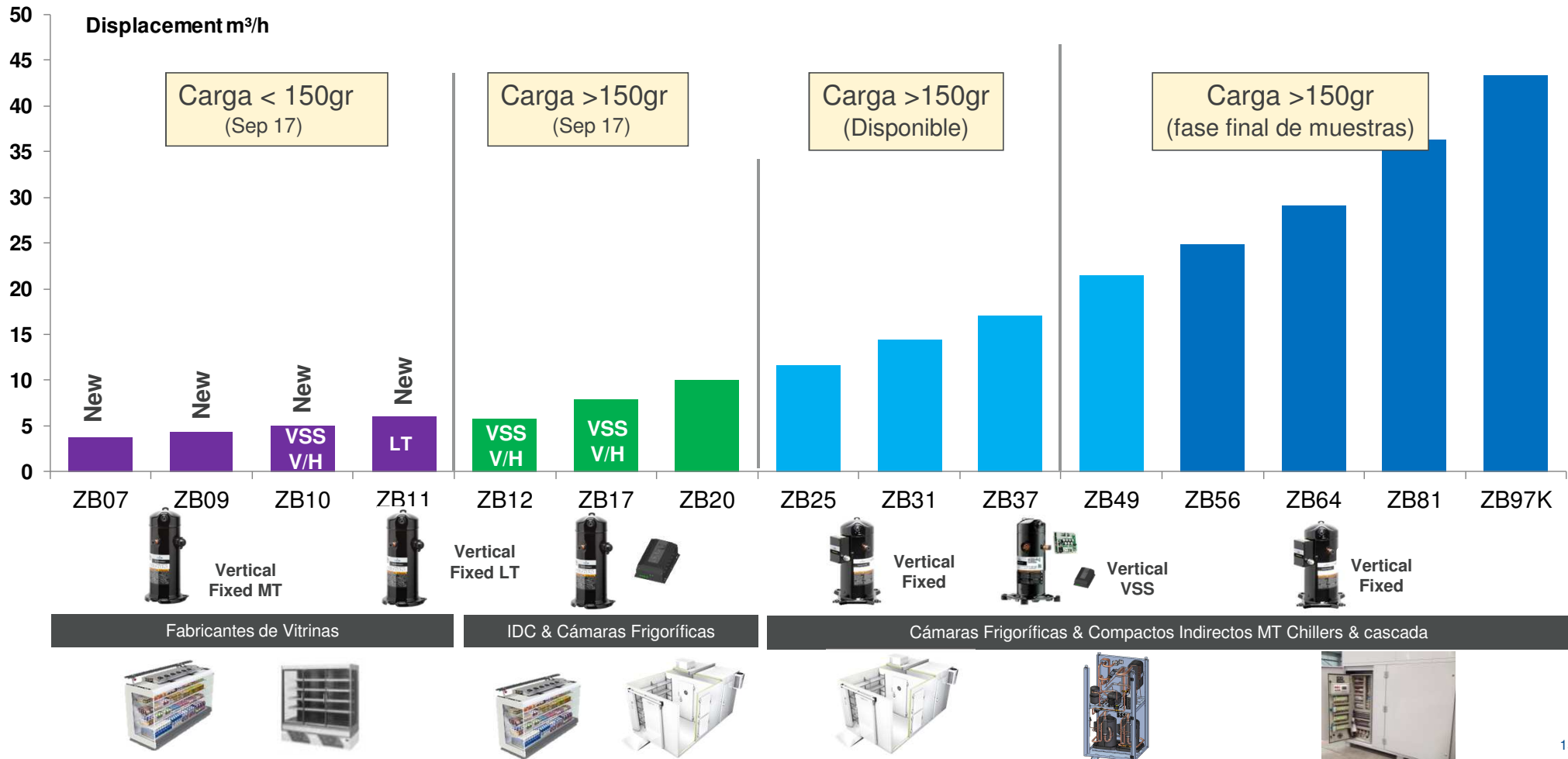


Conocimiento y Solución Completa para Desarrollos con R290a

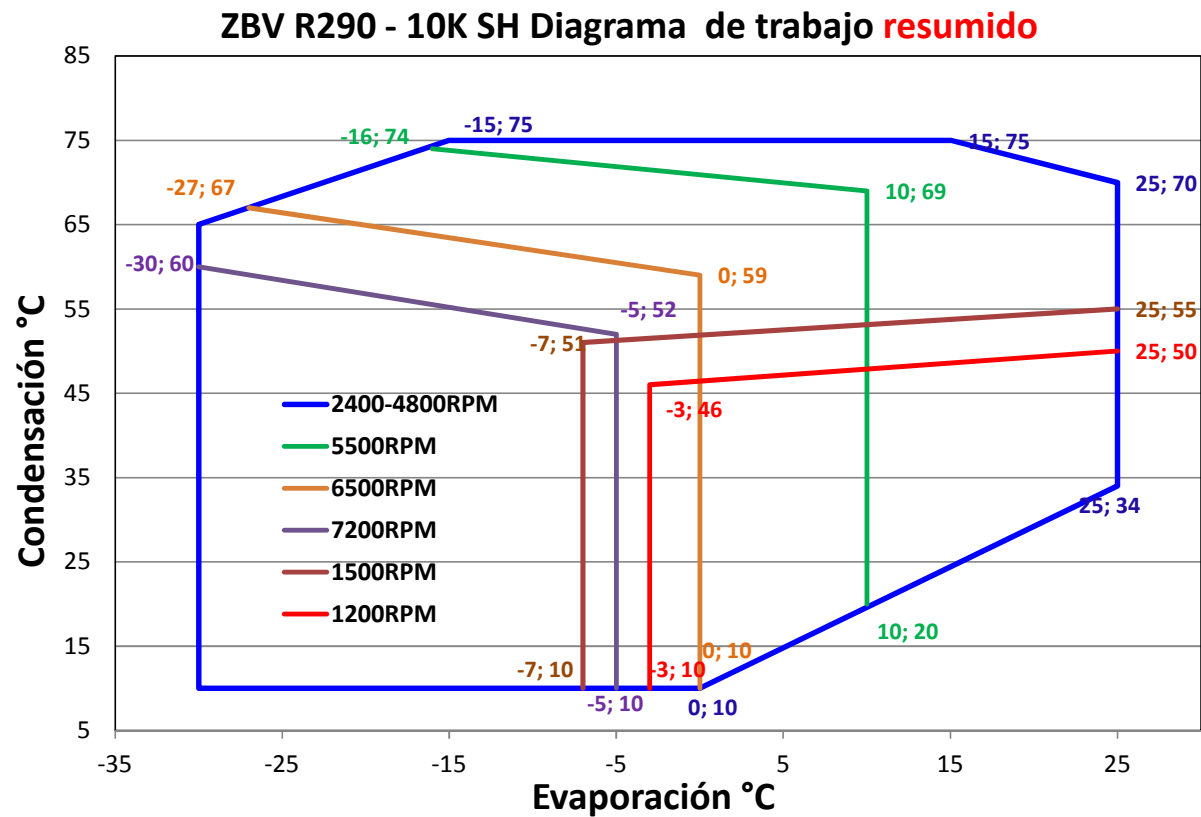


Rango Completo de Soluciones - Eficiencia, Fiabilidad & Seguridad

RANGO DE COMPRESORES DE PROPANO – MEDIA TEMPERATURA



ZBV R290 - Diagramas de trabajo Customizados – Velocidad Variable

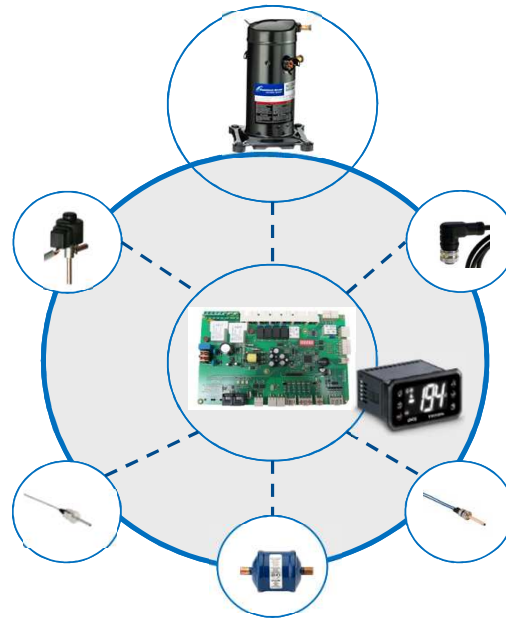


Soluciones customizadas de Emerson con R290 para Aplicaciones Comerciales de Refrigeración

**Multi-Circuitos < 150g
Integrales**



**Único Circuito > 150g
Integrales**



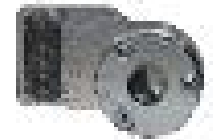
Monoblocks & Chillers









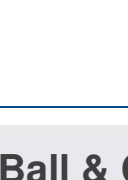

**Equipos servicio de alimentos,
Walk-Ins, Discounters**



Soluciones de CO2



Productos Aprobados Emerson CO₂

| | | |
|-------------------------------------|----------------------------------|---|
| Compressors Transcritical | 5, 7, 9HP |  |
| Compressors Transcritical | 12,15, 30HP |  |
| Compressors Transcritical | 35,40 & 50 HP |  |
| Subcritical Scroll | ZO 21 to ZO104K |  |
| Subcritical Digital Scroll | ZOD34 ZOD104 |  |
| Subcritical Semi-Hermetic | 4MSL High Standstill Pressure |  |
| Subcritical Open Drive Recip | |  |
| Subcritical Open Drive Screw | |  |

| | |
|------------------------------|--|
| Oil Controls |  |
| Oil Watch |  |
| Liquid/oil level |  |
| High Pressure Switch |  |
| Pressure Transducers |  |
| Filter Drier Hermetic |  |
| Filter Drier Shell |  |
| Moisture Indicator |  |

| | |
|---------------------------------|---|
| Ball & Check Valves |  |
| Electronic Valves |  |
| High Pressure Valves |  |
| High Pressure Controller |  |
| EMS, Rack Controllers |  |
| Case & SH Controls |  |
| Leak Detection |  |
| Drives |  |

SELECT DE CO2 DISPONIBLE

Parallel Compressor(s)

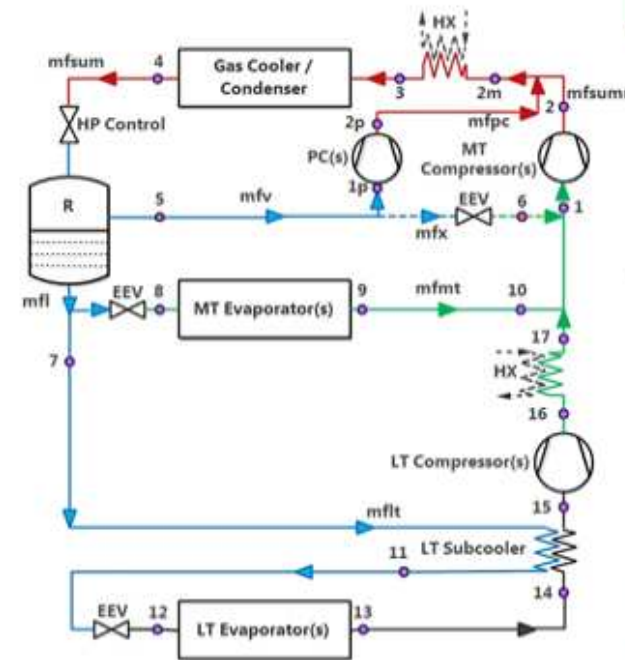
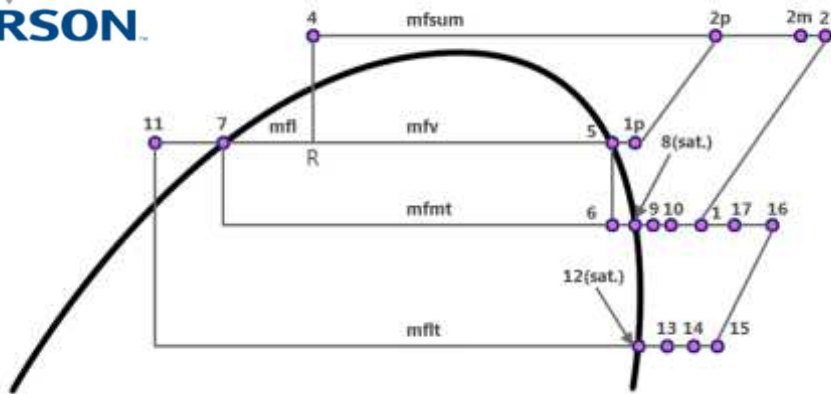
PC suction superheat, t1p-t5 (K)

3.00

Parallel compression ratio (%)

100,00

| Model | Speed Hz | MFR kg/s |
|---------------|----------|----------|
| 4MTL-05_[INV] | 62 | 0,143 |
| 4MTL-07_[INV] | 62 | 0,187 |
| 4MTL-09_[INV] | 62 | 0,226 |
| 4MTL-12_[INV] | 65 | 0,315 |

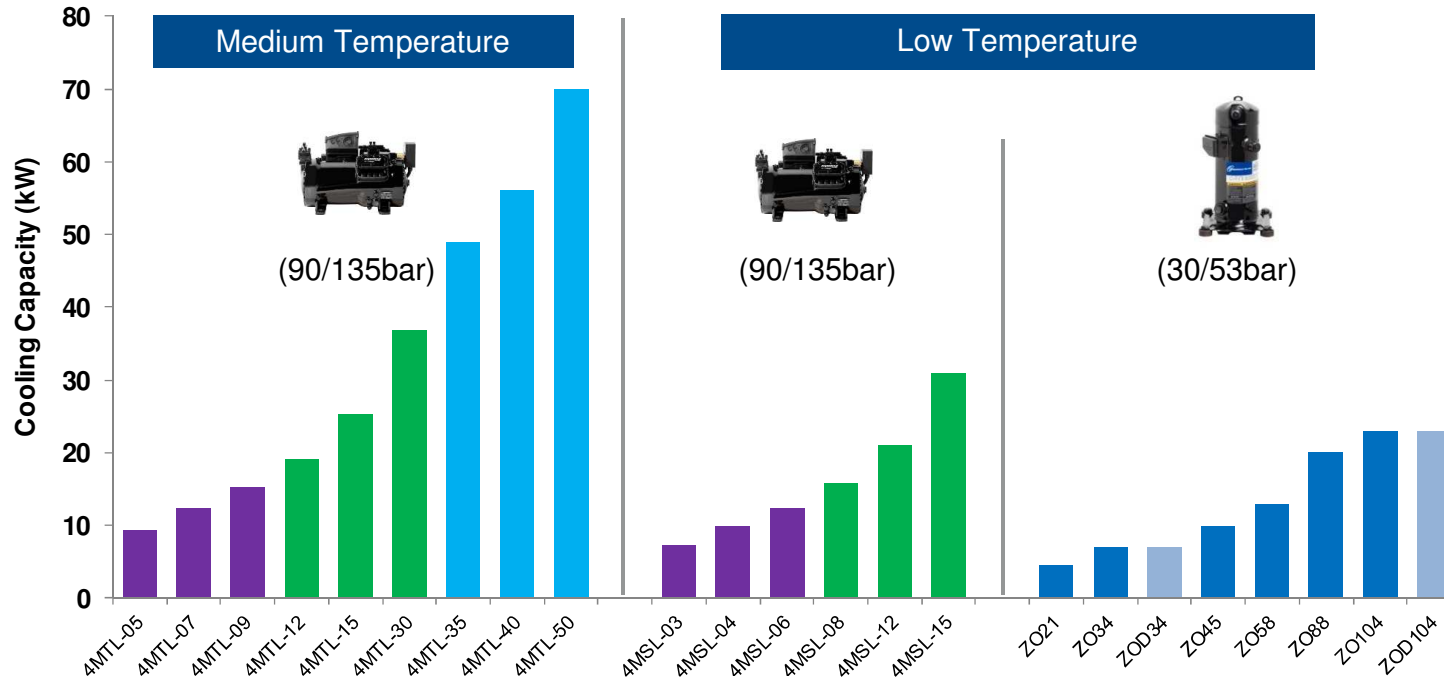


Hide Temperatures

Temp. °C

- 1 : 11,88 °C
- 1p : 8,30 °C
- 2 : 117,46 °C
- 2p : 56,26 °C
- 2m : 89,93 °C
- 3 : 89,93 °C
- 4 : 35,00 °C
- 5 : 5,30 °C
- 6 : -5,00 °C
- 7 : 5,30 °C
- 8 : -5,00 °C
- 9 : 0,00 °C
- 10 : 0,00 °C
- 11 : 5,30 °C
- 12 : -35,00 °C
- 13 : -32,00 °C
- 14 : -32,00 °C
- 15 : -32,00 °C
- 16 : 52,34 °C
- 17 : 32,34 °C
- 1P : 12,02 bar
- MP : 30,46 bar
- RP : 40,00 bar
- HP : 90,00 bar

Rango de compresores para Aplicaciones de CO2 Sistemas Booster & Cascada



Main Characteristics

- Pressures: Operating 120bar Design 90/135bar
- Low Sound Level, Vibration & Pulsation
- Inverter Release 25-70hz (400/3/50Hz)
- Advanced Protection & Communication
- Troubleshooting Capabilities / Fault History
- Individual Compressor Power Monitoring

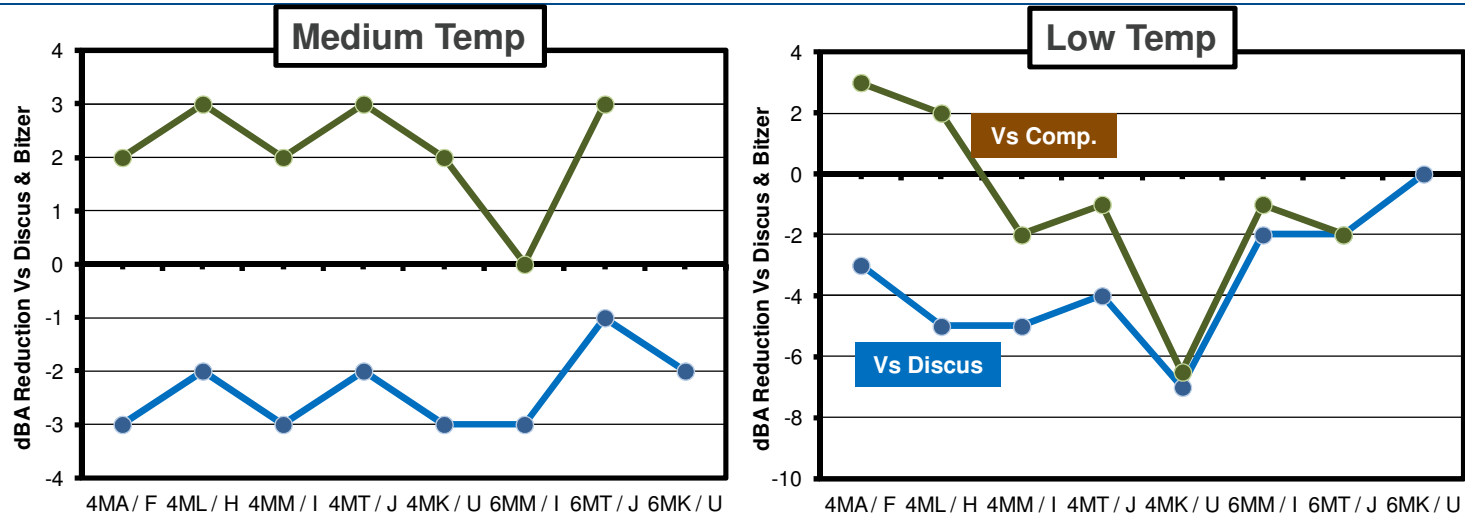


Main Characteristics

- Compact, Half The Weight Of Equivalent Semi-hermetic
- Fit Booster & Cascade Systems
- Digital Modulation From 10...100%
- Optional Sound Shell (-12dBA)
- Opportunity To Contain Cost Impact Of Hybrid Systems Using R134a in MT & CO2 in LT

Nivel Sonoro Stream

Mejora acústica y vibracional



Diseño del compresor:

- Su rediseño permite desde 1...7dBA de reducción Sonora (donde puede restarse la reducción que otorga la funda acústica (opcional))
- Comparativamente con la competencia
 - 3dBA de media por encima en MT
 - 3dba a 6dBA de media por encima en BT



R448/9 y R513A

Compresores Scroll para R-448A/R-449A, R450A y R513A

| Copeland Scroll Models Available with R448A/R449A | | | | | |
|---|-----------------------------------|--------------------|-----------|----------|------------|
| Low Temp models | | Medium Temp Models | | | |
| ZF Models | ZF Vapour Inj. And Digital Models | ZS*KA | ZB Models | Summit | ZB Digital |
| ZF06K4E | ZF13KVE | ZS09KAE | ZB15KCE | ZB66K5E | ZBD21KCE |
| ZF08K4E | ZFD13KVE | ZS11KAE | ZB19KCE | ZB76K5E | ZBD29KCE |
| ZF09K4E | ZF18KVE | ZS13KAE | ZB21KCE | ZB95K5E | ZBD38KCE |
| ZF11K4E | ZFD18KVE | | ZB26KCE | ZB114K5E | ZBD45KCE |
| ZF13K4E | ZFD25KVE | | ZB29KCE | ZB66KCE | ZBD57KCE |
| ZF15K4E | ZF25K5E | | ZB38KCE | ZB76KCE | ZBD76KCE |
| ZF18K4E | ZF34K5E | | ZB42KCE | ZB95KCE | |
| ZF25K5E | ZF41K5E | | ZB45KCE | ZB114KCE | |
| ZF34K5E | ZF49K5E | | ZB48KCE | ZB220KCE | |
| ZF41K5E | | | ZB57KCE | | |
| ZF49K5E | | | | | |

| Copeland Scroll Models Available with R450A/R513A | | |
|---|----------|------------|
| Medium Temp Models | | |
| ZB Models | Summit | ZB Digital |
| ZB15KCE | ZB66K5E | ZBD21KCE |
| ZB19KCE | ZB76K5E | ZBD29KCE |
| ZB21KCE | ZB95K5E | ZBD38KCE |
| ZB26KCE | ZB114K5E | ZBD45KCE |
| ZB29KCE | ZB66KCE | ZBD57KCE |
| ZB38KCE | ZB76KCE | ZBD76KCE |
| ZB42KCE | ZB95KCE | |
| ZB45KCE | ZB114KCE | |
| ZB48KCE | ZB220KCE | |
| ZB57KCE | | |

Compresores Semi-Herméticos para R-448A/R-449A, R450A y R513A

| Copeland Semi Hermetic models available with R448A/R449A/R450A/R513A* | | | | | | | | | | |
|---|------------|------------|---------------|---------|---------|----------------|----------|----------|----------|------------------|
| 2 Cylinder | 3 Cylinder | 8 Cylinder | Stream Models | | | Digital models | | | | Demand Cooling** |
| 2DC-50X | 3DA-50X | 8DH-500X | 4MA-22X | 4MJ-33X | 6MI-40X | 3DAD-50X | 4MAD-22X | 4MJD-33X | 6MID-40X | 4MF-13X DC |
| 2DD-50X | 3DA-75X | 8DL-370X | 4MF-13X | 4MT-22X | 6MM-30X | 3DAD-75X | 4MFD-13X | 4MTD-22X | 6MMD-30X | 4ML-15X DC |
| 2DL-40X | 3DC-100X | 8DJ-600X | 4MH-25X | 4MK-35X | 6MJ-45X | 3DCD-100X | 4MHD-25X | 4MKD-35X | 6MJD-45X | 4MM-20X DC |
| 2DL-75X | 3DC-75X | 8DT-450X | 4ML-15X | 4MU-25X | 6MT-35X | 3DCD-75X | 4MLD-15X | 4MUD-25X | 6MTD-35X | 4MT-22X DC |
| 2DB-50X | 3DS-100X | | 4MI-30X | | 6MK-50X | 3DSD-100X | 4MID-30X | | 6MKD-50X | 4MU-25X DC |
| 2DB-75X | 3DS-150X | | 4MM-20X | | 6MU-40X | 3DSD-150X | 4MMD-20X | | 6MUD-40X | 6MM-30X DC |
| | | | | | | | | | | 6MT-35X DC |
| | | | | | | | | | | 6MU-40X DC |

| Copeland Semi Hermetic models available with R450A | | | | | | | | | | |
|--|------------|------------|---------------|---------|---------|----------------|----------|----------|----------|--|
| 2 Cylinder | 3 Cylinder | 8 Cylinder | Stream Models | | | Digital models | | | | |
| 2DC-50X | 3DA-50X | 8DH-500X | 4MA-22X | 4MJ-33X | 6MI-40X | 3DAD-50X | 4MAD-22X | 4MJD-33X | 6MID-40X | |
| 2DD-50X | 3DA-75X | 8DL-370X | 4MF-13X | 4MT-22X | 6MM-30X | 3DAD-75X | 4MFD-13X | 4MTD-22X | 6MMD-30X | |
| 2DL-40X | 3DC-100X | 8DJ-600X | 4MH-25X | 4MK-35X | 6MJ-45X | 3DCD-100X | 4MHD-25X | 4MKD-35X | 6MJD-45X | |
| 2DL-75X | 3DC-75X | 8DT-450X | 4ML-15X | 4MU-25X | 6MT-35X | 3DCD-75X | 4MLD-15X | 4MUD-25X | 6MTD-35X | |
| 2DB-50X | 3DS-100X | | 4MI-30X | | 6MK-50X | 3DSD-100X | 4MID-30X | | 6MKD-50X | |
| 2DB-75X | 3DS-150X | | 4MM-20X | | 6MU-40X | 3DSD-150X | 4MMD-20X | | 6MUD-40X | |

VARIAS TECNOLOGÍAS

VARIAS SOLUCIONES



GRACIAS

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