INTEGRATED ENERGY EFFICIENCY

GREEN COOLING
AND HEATING SOLUTIONS
FROM AN INDUSTRY LEADER
OUR STORY
Ozone depletion and global climate change have made going green non-negotiable. A leader in environmentally-friendly energy solutions, Commercial Refrigeration Services (CRS) specialises in cooling and heating systems designed to help you reduce your business’ carbon footprint, while increasing efficiencies and saving costs.
Our Story

Founded in 1976 in Johannesburg, CRS initially focused on customised refrigeration installations using the latest technology. With a commitment to continuous development and providing clients with future-proof solutions, we have become a leader in green cooling and heating.

In 2015, Clean Energy Africa (CEA) joined us as a majority shareholder. CEA develops and invests in alternative energy solutions in Sub-Saharan Africa. Together, we continue to push the boundaries in green, energy-efficient cooling and heating.
OUR SOLUTIONS
THE GREEN ANSWER

With green credentials, carbon dioxide ($\text{CO}_2$) is the world’s number one choice of refrigerant. Global legislation, as well as the Kyoto and Montreal Protocols, which reviewed substances linked to ozone depletion and climate change, encourage its use.
We have built up solid experience and a proven track-record in using this environmentally-friendly alternative. Following various industry-changing breakthroughs, we launched a CO$_2$-only refrigeration system in 2010. The drive to create the best CO$_2$ solution in Africa for Africa led to even more improvements and the first Booster System in 2012. Our units are now operating in 62 businesses in Africa.

Keeping our clients a green step ahead, we have also developed a single integrated unit to deliver both cooling and heating in an energy-efficient way.

CLIENT-FOCUSED

Each one of our solutions features technology-driven design and implementation, top-quality components and industry best practices. Excellent client service is a given as our long-standing relationships with Woolworths and Makro prove.
WHY USE CO₂?

- No global warming impact
- No ozone depletion potential (ODP)
- Non-toxic and non-flammable
- Less expensive than Freons (the gases commonly used in refrigeration systems)
- No phase-out regulation (Freons are being replaced in line with global regulations. South Africa has committed to the Montreal Protocol and will phase out the Freon, R22 in 2015.)
- A future-proof solution
- Stable performance with high heat rejection and no temperature glide
- Good thermodynamic properties, making it up to 10% more efficient
- High volumetric efficiency, so smaller components are required
WHERE DO WE GET OUR CO₂?

Food waste is collected at supermarkets.

Instead of ending up in a landfill, it is used in an anaerobic digester to create methane and CO₂.

The captured CO₂ is used in a supermarket’s refrigeration system.

CO₂ is captured and packaged.

OUR SOLUTIONS
OUR PRODUCTS
Our portfolio covers the full range of heating, ventilation, air conditioning and refrigeration (HVAC&R) requirements.

Inside our refrigeration units

Our CO₂ systems are designed from first principle engineering methods with energy-efficiency as the main aim. That is why all of our solutions include a frequency inverter fitted on the compressor, adiabatic condensing, electronic expansion valves and speed-controlled condenser fans, among other high-quality components. They are essential to ensuring that every unit delivers green benefits efficiently and cost-effectively. Each system also includes detailed and user-friendly controls for optimised performance.
SINGLE COMPRESSOR
CONDENSING UNITS

THE EMERALD RANGE

<table>
<thead>
<tr>
<th></th>
<th>ECU-200</th>
<th>ECU-300</th>
<th>ECU-450</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cooling capacity (kW)</td>
<td>20</td>
<td>30</td>
<td>45</td>
</tr>
<tr>
<td>Evaporating temperature (°C)</td>
<td>-5</td>
<td>-5</td>
<td>-5</td>
</tr>
<tr>
<td>Frequency range (Hz)</td>
<td>30 – 80</td>
<td>30 – 80</td>
<td>30 – 80</td>
</tr>
</tbody>
</table>

* Data shown for the following parameters: $T_g\text{co} = 26^\circ C$
The increasing popularity of CO₂ as a refrigerant has highlighted a need for small, affordable refrigeration solutions. The Emerald range of compact single compressor condensing units is ideal for small stores, petrol stations and single-room applications.

KEY FEATURES

- **Environmental benefits**
  Each Emerald unit is designed to realise the green advantages of CO₂, helping you to minimise your business’ carbon footprint.

- **All-round efficiency**
  The design, choice of components and operation follow a holistic approach to energy-efficiency.

- **Easy installation**
  With a ‘plug and play’ design, the units are easy to install, commission and maintain. The benefits: affordable installation and reduced time on site.
## TRANSCRITICAL BOOSTER SYSTEMS

**BOOSTING EFFICIENCY**
This range enables you to reclaim waste heat for domestic hot water use or space heating.

### THE ONYX RANGE

<table>
<thead>
<tr>
<th>Number of compressors MT/LT</th>
<th>TCB-2/1</th>
<th>TCB-3/2</th>
<th>TCB-4/2</th>
<th>TCB-5/2</th>
</tr>
</thead>
<tbody>
<tr>
<td>MT capacity (kW)</td>
<td>75 – 115</td>
<td>126 – 155</td>
<td>150 – 192</td>
<td>187 – 250</td>
</tr>
<tr>
<td>LT capacity (kW)</td>
<td>7 – 11</td>
<td>14 – 22</td>
<td>14 – 33</td>
<td>14 – 33</td>
</tr>
</tbody>
</table>

* Data shown for the following parameters: $T_e = -5^\circ C; T_{gco} = 26^\circ C$
* Capacity of each unit can be adapted to suit your requirements.

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**OUR PRODUCTS**
The Onyx range consists of simple integrated systems for supermarket applications.

**KEY FEATURES**

**Green integration** Each Onyx unit delivers the benefits of CO$_2$ through an integrated multi-temperature solution for greener refrigeration.

**Built for efficiency** Units in this range feature a two-stage compression cycle with a common condenser and liquid line for medium temperature (MT) and low temperature (LT) applications. This two-stage design prevents significant losses as big heat exchangers aren’t necessary to condense the LT side. It is just one way in which the range ensures efficiency.

**Longevity** Meticulously-designed suction temperature controls and oil reticulation add to each system’s durability.

**Stability even when the power is out** A UPS system manages important valves and keeps pressure stable during a power failure.
Combining the four HVAC&R needs of a supermarket into one green solution!

**THE DIAMOND RANGE**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cooling capacity MT (kW)</td>
<td>70 – 300</td>
</tr>
<tr>
<td>Cooling capacity LT (kW)</td>
<td>7 – 35</td>
</tr>
<tr>
<td>Cooling capacity AC (kW)</td>
<td>10 – 60</td>
</tr>
<tr>
<td>Evaporation temperature LT/MT/AC (°C)</td>
<td>-30/-5/10</td>
</tr>
<tr>
<td>Frequency range (Hz)</td>
<td>30/80</td>
</tr>
</tbody>
</table>

*Capacity of each unit can be adapted to suit your requirements.
Inspired by the Onyx range’s success, our Integrated Hybrid Systems are complete solutions that provide cooling, air conditioning and heating.

**KEY FEATURES**

- **An environmentally-friendly answer**  Aimed at supermarkets, Diamond units use CO₂ to meet requirements in a low-impact way.

- **Increased efficiency**  Parallel compression increases system efficiency by up to 20%! Splitting the MT compressors and dedicating a set of compressors to the CO₂ system’s flash gas cycle also eliminate unnecessary high pressure ratios.

- **One system, one solution**  The Diamond range’s parallel compression introduces a third temperature stage which enables units to also meet your air conditioning requirements. PLUS heat can be reclaimed for domestic hot water or space heating. The result: A system equipped to address all of the HVAC&R needs within a supermarket. Such a system’s combined coefficient of performance (COP) is significant.
HEAT PUMPS

MORE ENERGY SAVINGS
Flooded evaporation provides higher evaporation temperatures for increased efficiency and enables a heat source, such as waste heat, to be used.

THE RUBY RANGE

<table>
<thead>
<tr>
<th></th>
<th>RHP-200</th>
<th>RHP-300</th>
<th>RHP-500</th>
<th>RHP-800</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heating capacity (kW)</td>
<td>20</td>
<td>30</td>
<td>50</td>
<td>80</td>
</tr>
<tr>
<td>COP</td>
<td>3.7</td>
<td>3.7</td>
<td>3.7</td>
<td>3.7</td>
</tr>
<tr>
<td>Water inlet temperature (°C)</td>
<td>20</td>
<td>20</td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td>Water outlet temperature (°C)</td>
<td>55</td>
<td>55</td>
<td>55</td>
<td>55</td>
</tr>
</tbody>
</table>

* Data shown for the following parameters: $T_e = 5$ °C

THE GARNET RANGE

| Heating capacity (kW) | 300 – 1000 |
| Frequency range (Hz)  | 30 – 80    |
| COP                   | 4          |

OUR PRODUCTS
We are the only producers of heat pumps using CO₂ in Africa. Ruby and Garnet Heat Pumps boast thermal properties that make water temperature of more than 80°C possible without affecting a system’s COP.

**KEY FEATURES**

- **A variety of applications** This new-generation of heat pumps is designed for domestic and commercial use (the Ruby range), as well as larger industrial applications (the Garnet range).  
- **The green advantage** CO₂ is applied to deliver heating in an environmentally-friendly manner.  
- **Focused on efficiency** The Ruby and Garnet ranges effectively apply the high thermal properties of CO₂ backed by Africa’s high ambient conditions. Each unit has a COP of up to 4.  
- **Easy installation** A ‘plug and play’ design makes installation and commissioning easy. These systems are ready to go with single compressors and direct expansion at evaporators.
CHILLERS

SAPPHIRE

THE SAPPHIRE RANGE

<table>
<thead>
<tr>
<th>Model</th>
<th>Cooling capacity (kW)</th>
<th>COP</th>
<th>Evaporating temperature (°C)</th>
<th>Gas cooler outlet temperature (°C)</th>
</tr>
</thead>
<tbody>
<tr>
<td>SCH-150</td>
<td>15</td>
<td>4</td>
<td>5</td>
<td>25</td>
</tr>
<tr>
<td>SCH-250</td>
<td>25</td>
<td>4</td>
<td>5</td>
<td>25</td>
</tr>
<tr>
<td>SCH-450</td>
<td>45</td>
<td>4</td>
<td>5</td>
<td>25</td>
</tr>
<tr>
<td>SCH-700</td>
<td>70</td>
<td>4</td>
<td>5</td>
<td>25</td>
</tr>
</tbody>
</table>

BOOSTING EFFICIENCY
Heat can be reclaimed to transform Cobalt Chillers into fully integrated heating and cooling solutions for even more efficiency and cost benefits in the long-run.

COBALT

THE COBALT RANGE

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<table>
<thead>
<tr>
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<tbody>
<tr>
<td>Cooling capacity (kW)</td>
<td>300 – 1000</td>
</tr>
<tr>
<td>Frequency range (Hz)</td>
<td>30 – 80</td>
</tr>
<tr>
<td>COP</td>
<td>4.5</td>
</tr>
</tbody>
</table>
We are the only producers of CO₂ chillers in Africa. The Sapphire and Cobalt ranges are energy-efficient, low carbon footprint alternatives to existing cooling options.

**KEY FEATURES**

- **Developed for a range of applications** Sapphire Chillers are aimed at domestic and commercial use, while the Cobalt range takes care of industrial applications.

- **Green advantages** The Chillers provide cooling with low environmental impact by applying the advantages of CO₂.

- **Energy wise** CO₂ has high thermal properties which contributes to better heat transfer between mediums. Cobalt chillers also prevent energy losses through flooded evaporation. They have a COP of 5.

- **Ready to go** The ‘plug and play’ design of the off-the-shelf Sapphire range simplifies installation and commissioning.

- **Cost-effective** High evaporating temperatures eliminate the need for adiabatic cooling, making Sapphire and Cobalt Chillers cost-effective options.
OUR KEY DEVELOPMENT CLIENTS

WOOLWORTHS

makro

CRS COMMERCIAL REFRIGERATION SERVICES
EST. 1976
Our well-established network ensures that we can offer you the best product solutions for your application with expert technical advice and support.

To find out how CRS’ solutions can assist in increasing your business’ energy-efficiency, contact:

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