Carbon dioxide (CO₂) is one of the most sustainable and safe natural refrigerants. But the cost of CO₂ refrigeration systems has traditionally made it hard for retailers to make the switch — CO₂ systems are often costlier to operate than hydrofluorocarbon (HFC) systems, especially in warmer climates.

Energy Recovery’s new PX G1300 (PX G) energy recovery device is designed to make the transition to CO₂ refrigeration an easy choice — a huge benefit as many retailers work to green their operations and comply with regulation phasing out climate-damaging HFCs.

A Big Leap in System Efficiency = More Savings

The PX G can reduce the energy consumption and operating costs of CO₂ refrigeration systems in a broad range of operating conditions. In fact, the warmer it gets, the better the PX G performs. The PX G is expected to increase CO₂ refrigeration system efficiency, particularly in higher ambient temperatures — driving savings.

Compared to a standard booster CO₂ system with no energy recovery device, a system with the PX G can reduce energy consumption, potentially saving thousands of dollars in annual energy costs.

Benefits

- Increased system efficiency and lower energy consumption
- Reduced operating costs
- Designed for easy operation and maintenance
- Reduces workload on compressors

Operating Range

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pressure</td>
<td>350 – 1,450 PSI</td>
</tr>
<tr>
<td></td>
<td>(24 bar - 100 bar)</td>
</tr>
<tr>
<td>Ambient Temperature</td>
<td>50 – 110°F</td>
</tr>
<tr>
<td></td>
<td>(10 - 43°C)</td>
</tr>
<tr>
<td>System Size</td>
<td>40 KW and higher</td>
</tr>
</tbody>
</table>
How Does the PX G Work in a CO\textsubscript{2} Refrigeration System?

The PX G operates alongside the high pressure valve of the refrigeration system and is designed to “bolt-on” to a CO\textsubscript{2} system for straightforward and risk-free installation. Instead of simply throttling the pressure energy at a high-pressure valve, the PX G harvests the energy to reduce compressor work and reduce power requirements. Diminished compressor work saves energy and reduces compressor duty cycles, leading to lower maintenance needs for the compressors and savings for the system operator.

The PX G is expected to outperform alternate energy recovery technologies such as ejector technology, especially as temperatures rise. This is because the pressure differentials needed to create the refrigeration cycle increase at higher temperatures. While ejector technology typically manages less than 200 PSI/14 bar of pressure differential boost, and therefore provides a limited efficiency improvement, the PX G is able to manage full differential boost as required by the system, and therefore continues to save energy as temperatures rise.
Proven, Reliable, Trusted Technology

Energy Recovery’s pressure exchanger (PX) technology is a globally trusted technology, providing significant savings and operational reliability for its users. PX technology recycles otherwise wasted pressure energy within industrial systems, saving energy, reducing waste and minimizing emissions. It can also handle a range of pressures, including pressure above and beyond what is needed for CO₂ refrigeration systems.

How does it work? A PX acts like a fluid piston, efficiently transferring energy between high-pressure and low-pressure liquid and/or gas through continuously rotating ducts. The PX has only one moving part, the rotor, which boosts reliability — the more moving parts in a mechanical system, the greater chance something could break.

PX Technology Case Study: Water Desalination

The original PX technology product application — the PX® Pressure Exchanger® — was a major contributor to the advancement of reverse osmosis desalination, significantly lowering the energy intensity and cost of water production globally.

The PX Pressure Exchanger is up to 98% efficient, operates with minimal, if any, maintenance, and outlasts most other components of the system it is incorporated into. The ceramic components of the PX Pressure Exchanger are highly durable, and after 25 years, early models are still running strong.

Desalination and CO₂ refrigeration might sound very different, but the role of the PX is the same. In both cases, the PX is pushing fluid and is integrated with pumps and valves. In addition, the PX G rotor is made from the same durable ceramic as the PX Pressure Exchanger and uses an almost identical design — a design which has made the PX Pressure Exchanger a game changing solution for desalination.

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