



Improving dairy farm efficiencies for milk cooling and hot water heating

**PRO Refrigeration, Inc., Auburn,
Washington, United States**

Transitioning from synthetic R-448 to R-744 or natural carbon dioxide refrigerants reduces the impact of global warming on refrigeration while maintaining operational efficiency. Following the successful collaboration on the first PROGreen Packaged CO₂ Chiller System, PRO Refrigeration, Inc. joined forces again with Alfa Laval to pioneer an innovative packaged hybrid chiller system, which integrates energy-efficient Alfa Laval equipment. The new PROGreen R-744 Hybrid Series combines the CO₂ chiller with the PROChiller synthetic refrigerant-based system.



The PROGreen R-744 Hybrid Series offers dairy farms the advantages of a CO₂-based system, including heat recovery and reduced power consumption, while providing a reliable synthetic-based system as a backup. It heralds a new era for dairy farms, delivering unprecedented performance in milk cooling and water heating efficiency, cost-effectiveness, and sustainability gains.

Partnering to introduce safer, more climate-friendly refrigerants

Transitioning to a safer, more climate-friendly CO₂ refrigerant is a business imperative for the dairy, food, beverage, brewery and many other industries. Manufacturers can reduce carbon footprints and energy costs, meeting environmental regulations while optimizing cooling performance. Dairy farms typically oversize their chiller systems, requesting 100% redundancy to provide backup in the event of a system fault or alarm.

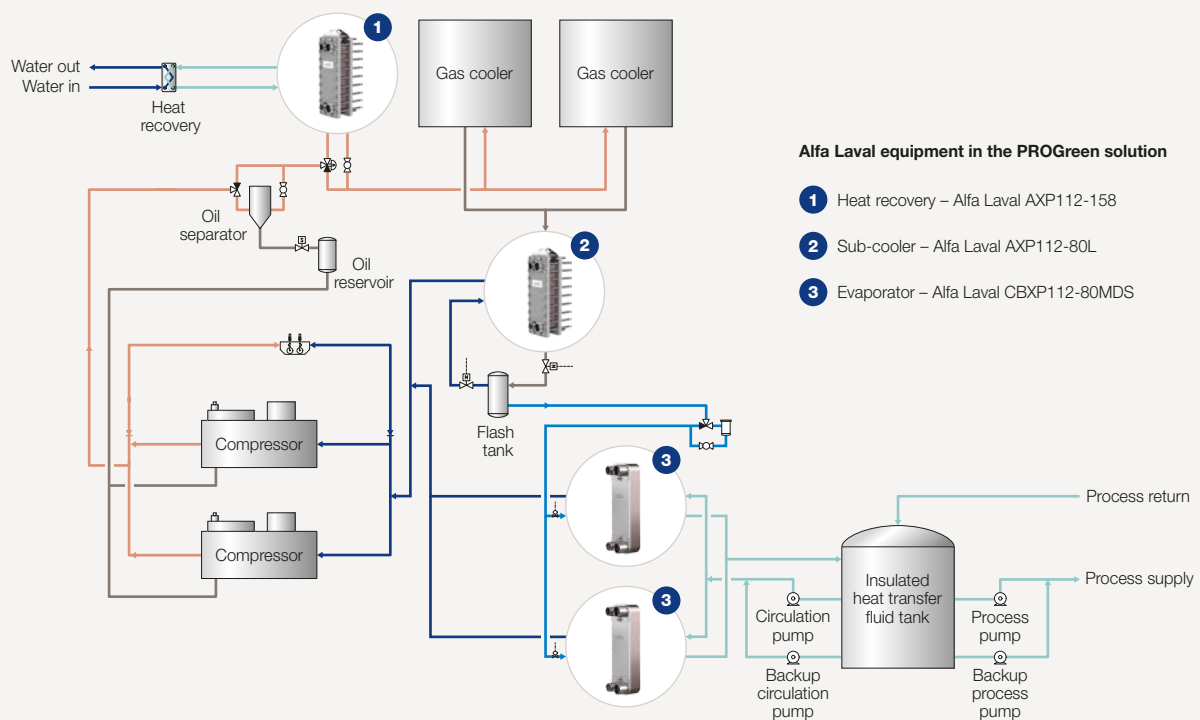
With nearly 80% of its systems catering to dairy and brewery needs, PRO Refrigeration prioritizes efficient cooling solutions for milk and beer. Challenged by their sales team and a key customer, PRO Refrigeration set out to develop a CO₂-based chiller system. PRO assembled a team of partners, customers, and engineers who collaborated on designing, building,

and commissioning the first PROGreen packaged hybrid chiller system.

“We were fortunate to have Alfa Laval as a key supply partner on our PROGreen team when transitioning to natural refrigerant-based solutions,” says Jim VanderGiessen, Chief Executive Officer, PRO Refrigeration, explains. “We are not only redefining the future of milk cooling for the dairy industry in the U.S. but also setting a new standard for refrigeration across other industries.”

First standardized packaged CO₂ hybrid chiller system in the U.S.

About every 10 years, equipment manufacturers must redesign to accommodate the next-best synthetic refrigerant with a lower global warming potential (GWP). To keep pace, the PRO team focused on finding alternatives to replace synthetic refrigerants.



The innovative PROGreen packaged hybrid chiller process system.

“Working with Alfa Laval helped us achieve great results, including a threefold increase in the heat recovery, enabling the reuse of nearly all the waste heat.”

Damon Reed, PRO's Chief Operating Officer

“Our engineers tested and compared several different components while developing the CO₂ chiller with Alfa Laval,” continues Reed, who served as Project Lead on PROGreen Solutions.

PROGreen Solutions is the first standardized packaged CO₂ hybrid chiller system available in the U.S. Collaborating with Alfa Laval helped overcome some of the challenges PRO faced in dealing with the higher CO₂ pressures, which called for adjustments in infrastructure and technician training.

Reduce energy costs reusing waste heat

Waste heat recovery has proven to be one of the most significant benefits of the PROGreen R-744 Hybrid Series.

- One facility slashed its annual propane usage by 75%, saving over 45 gallons (170 liters) a day, or about \$4,500 a month based on an average price of \$3 per gallon.
- A California farm saved over \$1,400 a month using PROGreen to generate hot water above 150°F (65.5°C) from waste heat, eliminating the need for their natural gas water heater.
- Waste heat recovery raises water temperatures from 70°F (21°C) to over 180°F (82°C), exceeding the limitations of synthetic-based systems, which typically heat water only to 125°F (52°C).



PROGreen integrates high-efficiency Alfa Laval AXP and CBXP brazed heat exchangers into the packaged CO₂ hybrid chiller system, significantly reducing its global warming potential compared to using synthetic refrigerants alone.

Reducing the environmental impact of cooling beverages

The design objective of the new PROGreen hybrid system was to use the same amount of electricity or less to cool the same quantity of milk compared to the synthetic refrigerant system. PRO developed and installed the hybrid chiller system, combining the CO₂ and R-448 refrigeration systems, on a large dairy farm in California. The two systems operate independently yet share a 2,000-gallon capacity chilled glycol tank.

Encouraging results from PRO's monitoring of the hybrid chiller system's power consumption prompted the company to pursue funding from CalNEXT, a statewide initiative to support California's decarbonized future, for an independent third-party comparison between the CO₂-based and synthetic-based systems. The report will be published in January 2025 and focus on two dairy sites in California, including the site equipped with the PROGreen hybrid chiller system.

VanderGiessen underscores the significant cost-effectiveness of integrating Alfa Laval equipment to the R-744 Hybrid Series compared to replacing PRO Refrigeration equipment at customer sites. He attributes the cost savings to the use of 25% fewer materials, which in turn reduces transportation and installation expenses.

The PROGreen R-744 Hybrid Series

The system incorporates an Alfa Laval heat exchanger for heat recovery, a sub-cooler and an evaporator, which optimize process efficiency and reduce material usage. The hybrid chiller uses the CO₂ chiller as the primary system and the lower-cost, synthetic refrigerant-based system as the backup system.

Pioneering a transition to a greener future in the U.S.

As demand for climate-friendly refrigeration systems continues to rise, PRO is poised to expand its market presence with the PROGreen R-744 Hybrid Series, supported by Alfa Laval technology. This hybrid chiller showcases what can be achieved when two companies work together with a shared commitment to innovation, environmental stewardship and a sustainable future.

“Our business strategy hinges on shifting focus from synthetic-based refrigerants towards natural alternatives such as CO₂ and propane. Both are needed to replace synthetics,” VanderGiessen notes. “This paradigm shift is already underway in Europe, where diverse solutions are the norm. There is no one-refrigerant-fits-all solution.”

“Today, CO₂ is emerging as the frontrunner for PRO customers who want to replace synthetic-based systems, especially those with high demand for hot water at drastically reduced or no cost. The emergence of propane-based systems in the U.S. also signals a promising future,” says VanderGiessen, who anticipates propane will play a significant role in PRO’s product line in the future.

PRO is committed to collaborating with Alfa Laval to pioneer tomorrow’s resource-efficient industrial cooling solutions.

Enhanced space utilization

Up to 85% less expensive

Threefold increase in heat recovery

Futureproof with no impact on global warming



Compact Alfa Laval AXP and CBXP brazed heat exchangers withstand extreme pressures and deliver high efficiency, respectively. Designed for sub- and transcritical refrigeration applications, they ensure dependable performance under rigorous conditions while optimizing the use of space.

How to contact Alfa Laval

Up-to-date Alfa Laval contact details for all countries are always available on our website at www.alfalaval.com

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