

ENGINEERING
TOMORROW

Danfoss

Refrigeration solutions for the Fishery Industry

Precise Temperature Control And **Zero Corrosion**

Danfoss offers a wide range of valves and controls that can help improve energy efficiency, productivity, & sustainability.

All

the valves and
controls you need
for your refrigeration
system in the Fishery
Industry.



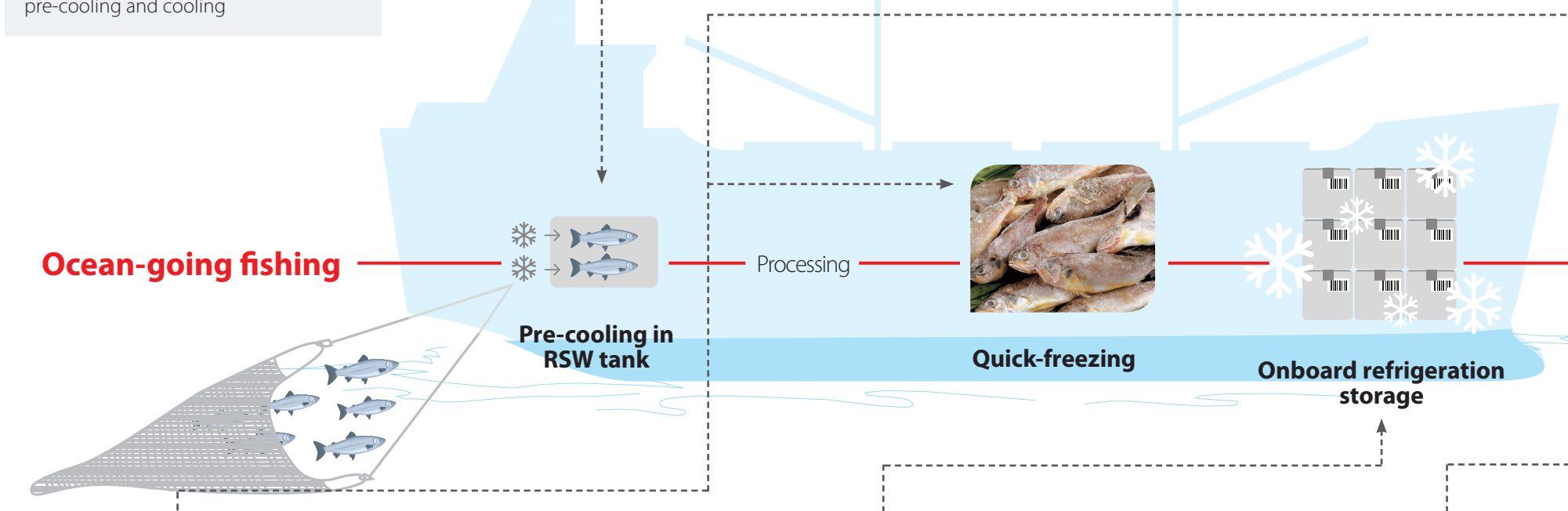
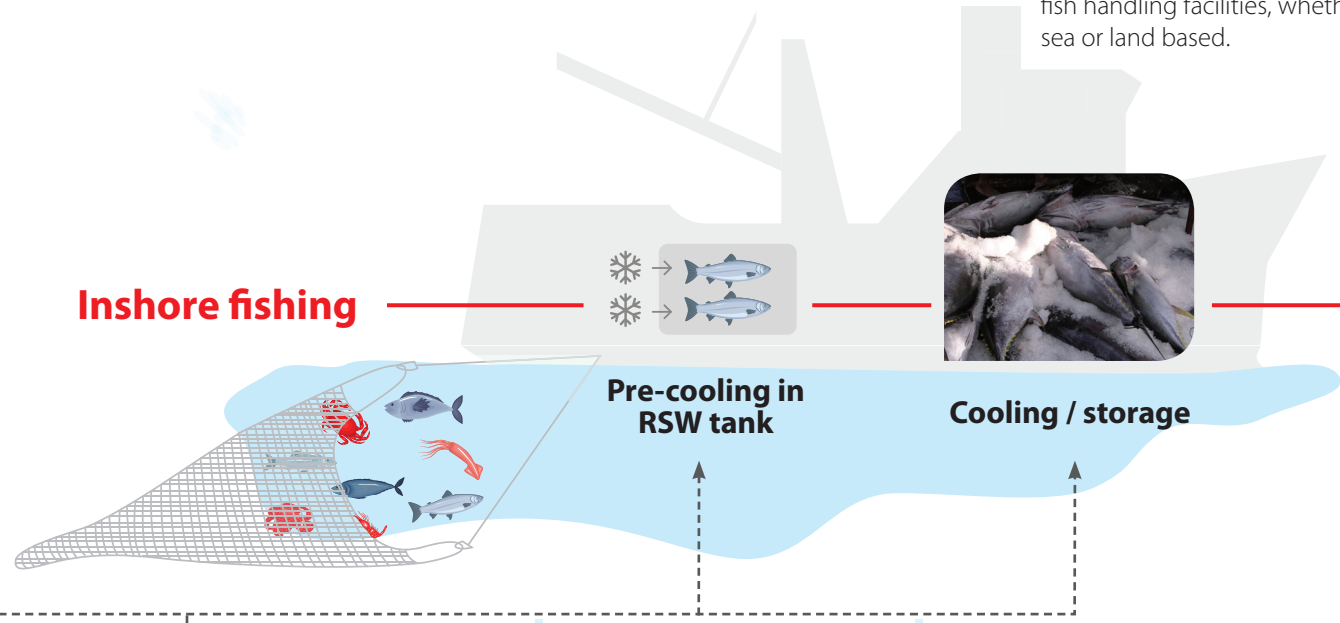
From cold sea to cold storage: Products for **fast, efficient and durable cooling** in the **fishery industry**

Fish-handling production facilities require fast, efficient cooling systems to ensure that the products remain fresh, healthy and appetizing all the way to the end customer. Marine environments are harsh on most materials. That's why stainless steel equipment and products are often preferred or required by most fish handling facilities, whether they're sea or land based.

Danfoss refrigeration valves, including our stainless steel series and sub-system solutions, help you maintain a high level of hygiene and enable reliable, efficient and safe refrigeration. They can be used across various cooling applications and needs, regardless of production scale and geographical location.

Our products and solutions play an active role in several of the critical production phases. They help producers of fresh and frozen fish products to consistently obtain high product quality through meticulous temperature control and energy efficiency.

Pre-cooling and cooling
Pre-cooling temperature: Below +39.2 °F
On almost all ships, fish are placed in a refrigerated sea water tank (RSW) right after being caught. The temperature of the sea water is as low as possible, 32 °F to 30.2 °F.
Cooling: Low-temperature sea water (RSW tank) or flake ice can be used for pre-cooling and cooling



Quick-freezing
Quick-freezing temperature: -22 °F to -58 °F
Preliminary processed fishery products are frozen rapidly at a very low temperature to guarantee that they stay fresh while they're stored and transported.
Cooling: A plate freezer can be used for quick-freezing

Onboard refrigeration storage
Refrigeration storage temperature: Below -22 °F

- ▶ The refrigeration storage temperature necessary to guarantee freshness, color and taste will vary depending on the seafood type.
- ▶ Refrigeration storage temperature for fatty fish should be below -22 °F
- ▶ Refrigeration storage temperature for tuna should be below -58 °F or -76 °F

Post-processing
Air can be isolated with plating water glaze or packaging to avoid oxidation and to protect food quality during the refrigeration process.

Refrigeration storage in cold-storage
Refrigeration storage temperature: Below -22 °F
The refrigeration storage temperature necessary to guarantee freshness, color and taste will vary depending on the seafood type.

- ▶ Refrigeration storage temperature for fatty fish should be below -22 °F
- ▶ Refrigeration storage temperature for tuna and so on should be below -58 °F or -76 °F

Cooling: Ammonia and CO₂ can be used for direct refrigeration.
Regular defrosting is required when the refrigeration temperature is maintained with an air cooler.

Note; the illustration shows only one of the many possible process setups.



Enabling more **sustainable** and **energy-efficient cooling systems** across the food & beverage cold chain



High-performing products and solutions for industrial refrigeration systems

Energy efficiency aims at reducing the amount of energy required to provide products and services. It's all about doing more with less. It is the quickest and most affordable way to decarbonize our economy and ensure reliable and sustainable energy for everyone on the planet. The solutions are already there, and they can be implemented right away. And most have short payback time.

As your technology partner in the green transition, we empower you to meet increasing energy challenges with innovative, reliable solutions. Danfoss offers a wide portfolio of industrial refrigeration valves, controls, and sub-system solutions to enable improved and more efficient cooling in the food & beverage processing industries. Our cold storage solutions help you meet increasing energy challenges and reduce food loss by improving cooling and efficiency across the cold chain.

Intelligent Air Purging System

Danfoss IPS8



About Air Purger:

The **Danfoss Intelligent Purging System (IPS)** is an automatic, self-contained operating unit that helps remove non-condensable gases in a safe and energy efficient way. This helps maintain an optimum refrigeration capacity and system efficiency, allowing professionals to achieve maximum system performance.

✓ Maximize system performance

- ▶ Automatic purging response to non-condensable gases in the refrigeration system
- ▶ Continuous monitoring of differential pressure between system refrigerant and purger refrigerant
- ▶ Reduction of plant power consumption
- ▶ 8-point purging functionality
- ▶ Built-in Modbus communication enables easy sharing of essential data

✓ Easy installation and maintenance

- ▶ Cost-effective design with few mechanical and electrical connection interfaces
- ▶ Minimizes the risk of leakage thanks to the hermetic internal cooling system
- ▶ Plug and play; stand-alone unit eases installation and commissioning – low risk of potential error
- ▶ No need for any advanced settings
- ▶ Easy to handle with its compact design
- ▶ Fast and easy pump down before service

✓ Improve operational safety

- ▶ Electronic smart purging helps reduce the risk of refrigerant release to the environment
- ▶ No need for oil management from the ammonia system
- ▶ Self-contained operating unit functions independently from the main plant
- ▶ Easy monitoring of past purging cycles data with operation log
- ▶ Self-diagnostics for unit and system operation to shut down in case of malfunction of Air Purger components
- ▶ Advance Bubbler support functions included
- ▶ LLS 4000 support increase system protection level

The **Air purger** removes Non Condensable Gasses (Air) from the cooling system



Example:

- ▶ Two stage NH3 system in a Cold room application
- ▶ Capacity 300kW on LT and 900kW on MT Annual
- ▶ Power consumption: 2500MWh
- ▶ Electricity cost \$/kWh: 0.11\$

Danfoss IPS8 reduces the content of non condensables to decrease Tc with 1K:

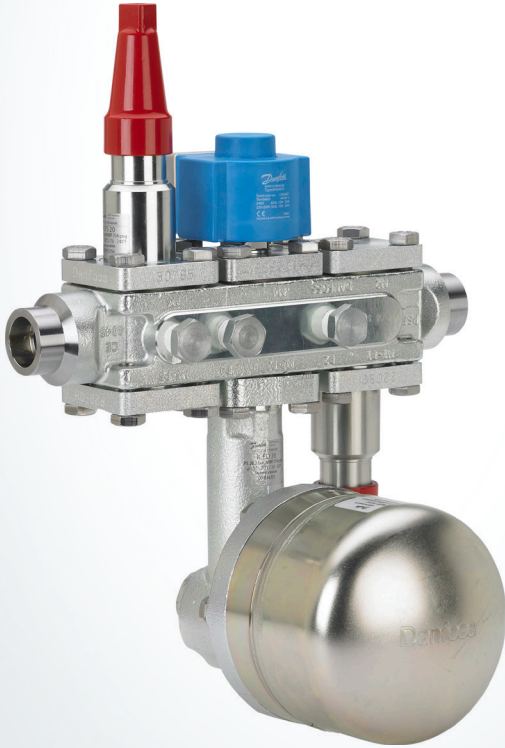
Savings per year **8,078\$**

Savings over 20 Years **161,565\$**

(LT=Low Temperature, MT=Middle Temperature, Tc=Condensor Temperature)

ICFD

Defrost module



Energy Efficient Hot Gas Defrost

The **ICFD defrost module** for CO₂ and Ammonia is a compact liquid-based drain module packaged into our ICF valve station. It unites the well-known benefits of the Danfoss ICF technology with the most efficient defrost method known into one state-of-the-art defrost solution for industrial refrigeration applications.

The ICFD Defrost Module comes in one size and two versions, ICFD 20 – Ammonia and ICFD 20 – CO₂ and is fully compatible with ICF 15-4, ICF 20-4, and ICF 20-6.

✓ Improve defrost performance and reduce energy consumption.

- ▶ The solution makes it possible to equip an evaporator with ICF Valve Stations across the wet suction, liquid, hot gas, and defrost drain lines. It provides an impressive range of benefits in respect of improved operational efficiency, easy installation, and energy savings.

✓ Features and benefits

- ▶ Reduced energy consumption
- ▶ Improved defrost performance
- ▶ Improved job site efficiency
- ▶ Broad application range
- ▶ Easy system design



Fact:
Defrosting is a necessity

Example:

- ▶ Two stage NH₃ system in a Cold room application
- ▶ Numbers of evaporator 12
- ▶ Evaporator capacity 80kW
- ▶ Defrost duration 45 min
- ▶ Number of defrost cycles per day 1
- ▶ Number of days in a year with defrost 365
- ▶ Electricity cost \$/kWh: 0,11\$

Measured savings on **Float controlled Hot Gas Defrost** vs. **Pressure controlled:**

Savings per year **15,079\$**

Savings over 20 Years **306,974\$**

Reduction of Total Cost of Ownership of a Cold room with 12 evaporators

Flexline™ valve portfolio

Consists of three major valve groups offering solutions ranging from basic to advanced, high-level industrial refrigeration systems concepts.



Flexibility

- › Smart solutions based upon a complete common modular platform.
- › Reduce system complexity and increase reliability.



Innovation

- › Innovative design ensures increased system safety and efficiency.
- › Improve food safety and quality.

Automatic, regulated valves

ICV Flexline™

- › ICM Motor valve, ICS pressure controlled valve, and ICLX 2-step solenoid valve in steel



Semi-welded plate heat exchangers

- › Excellent heat transfer capabilities, reliable design, operational safety



Manual valves

SVL Flexline™

- › Stop valves, filters, regulating valves, check valves, and stop valves in stainless steel and steel



Danfoss AIM System control*

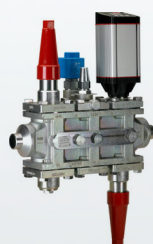
- › Embedded Microprocessor Controls (EMC)
- › PLC Supervisory control systems
- › Power products: Motor Starters and VFDs
- › Combination products utilizing power products and PLC or EMC controls



Advanced system solutions

ICF Multi-functional valve station

- › ICF multi-functional valve
- › Motor valves ICM, stepper motor
- › ICAD, Liquid level control AKS4100
- › Advanced evaporator controller
- › Digital gas detection
- › Intelligent Air purging system



*Only offered in USA and China

Latest in **refrigeration technology**

With more than 90 years of experience in the global refrigeration industry, Danfoss is your reliable partner in innovative refrigeration technology. We offer you support in finding

sustainable refrigerant solutions. With our wide range of components for industrial refrigeration, Danfoss reduces complexity and optimizes project deliveries. Our global know-how is

always available to you – just contact your local Danfoss representative for more information.

Support Tools for Professionals



Coolselector®2:

Easy selection and calculation software
<https://www.danfoss.com/en/service-and-support/downloads/dcs/coolselector-2/>



3D CAD symbols:

Download symbols and illustrations



Ref-Tools:

Complete overview of spare parts, Product-finder and more relevant HVACR tools.
<https://www.danfoss.com/en/service-and-support/downloads/dcs/ref-tools/>



IR Application Tool:

How a two-stage ammonia plant works.
<https://www.danfoss.com/en/service-and-support/downloads/dcs/industrial-refrigeration-application-tool/>



Application Handbook:

How to select control methods for different refrigeration systems.
<https://www.danfoss.com/en/markets/refrigeration-and-air-conditioning/dcs/industrial-refrigeration/industrial-refrigeration-application-handbook/>

Training for Professionals



Danfoss Learning:

Your personal learning portal is fast, easy and always accessible.
<https://www.danfoss.com/en/service-and-support/learning/>



LinkedIn:

<https://www.linkedin.com/company/danfoss-north-america>



YouTube:

<https://www.youtube.com/c/danfossnorthamerica>



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