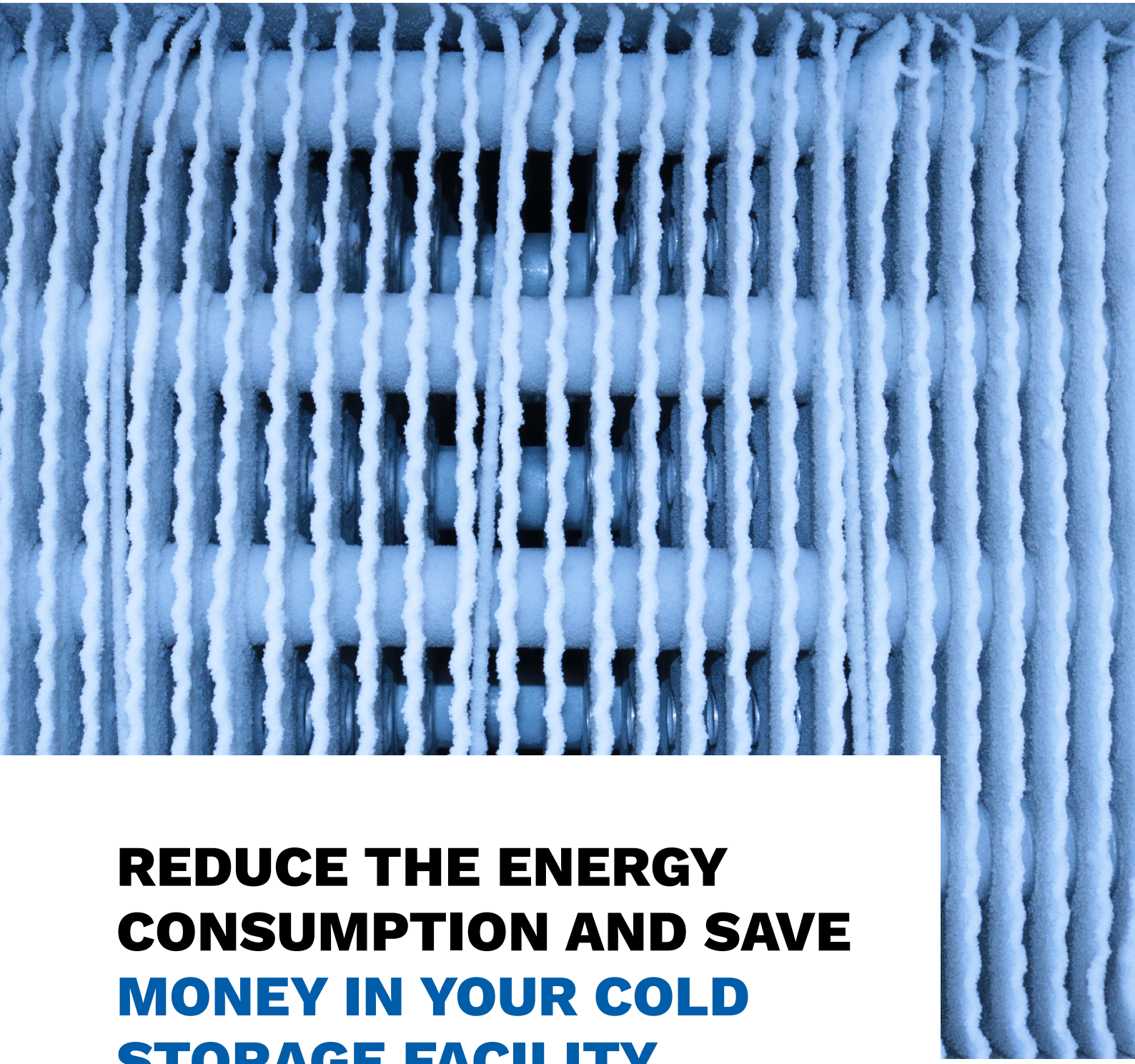
HB Products



REDUCE THE ENERGY CONSUMPTION AND SAVE MONEY IN YOUR COLD STORAGE FACILITY

How to avoid excessive defrost cycles

DEFROST

REDUCE ENERGY CONSUMPTION AND SAVE MONEY

Cold storage facilities have high energy demands, but in many cases, they are much higher than they need to be due to inefficient defrost management of the refrigeration systems.

Defrosting has traditionally been scheduled on a timer, often resulting in unnecessary defrost cycles. This is costly on the energy budget, leading to significant reductions of profit. Superfluous defrost cycles can also result in reduced operational stability and poorer equipment performance.

Why is Defrost Necessary?

Over time, frost builds up on the evaporator fins, blocking the airflow and reducing the system's efficiency. Defrosting eliminates the buildup of ice, ensuring efficient heat transfer while maintaining the capacity of the system, and ensuring operational stability.

Uncontrolled defrosting can cause water drips, creating slippery and hazardous floors with an increased risk of workplace accidents.

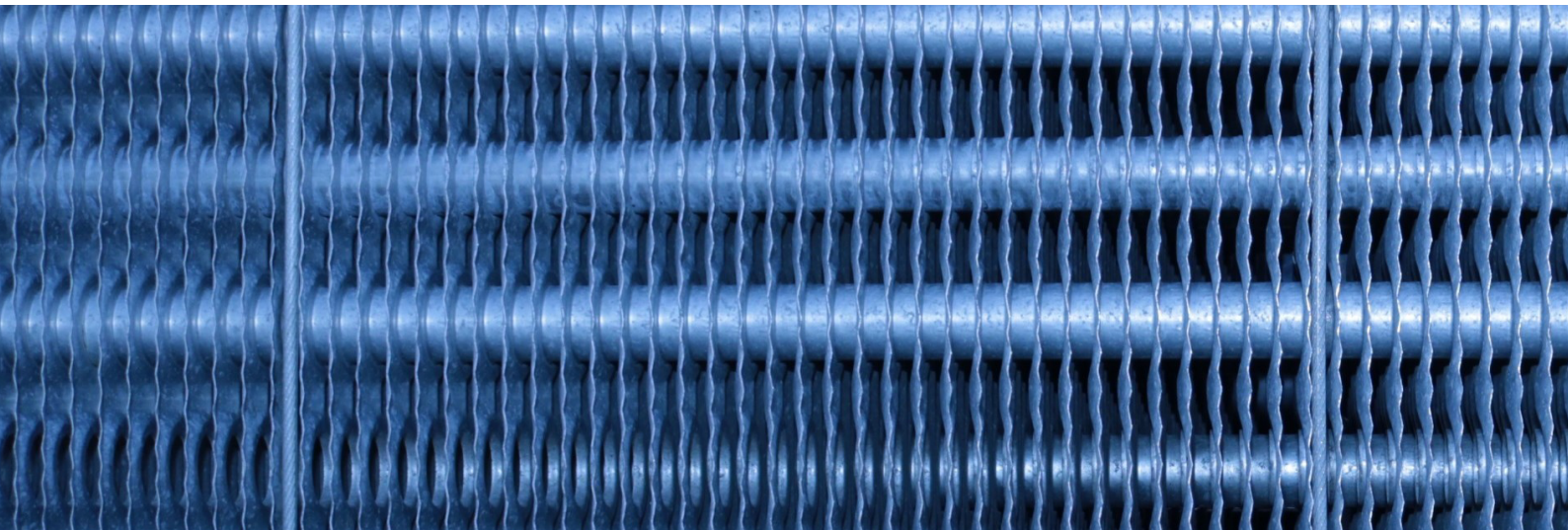
The Solution

The solution is to defrost when necessary, and only when necessary. This can be done by installing the DEFROST HBDF; a sensor using advanced technology to accurately measure the thickness of the ice buildup in the evaporators.

This sensor enables precise control over defrost cycles, allowing owners to freeze or cool larger quantities of products, maximizing facility utilization and productivity. Installing the DEFROST HBDF also eliminates the need for unnecessary service calls.

Facility owners can therefore save time and reduce expenses by avoiding excessive defrost cycles, resulting in improved equipment performance and minimized maintenance.

In cold stores, the HBDF can reduce the number of defrost cycles by 50-70% on a yearly basis, when compared to a traditional timer-based approach. Such a significant reduction can lead to energy savings of up to 40%. This means that owners and operators can see a return of investment for the HBDF in as little as 30 days.



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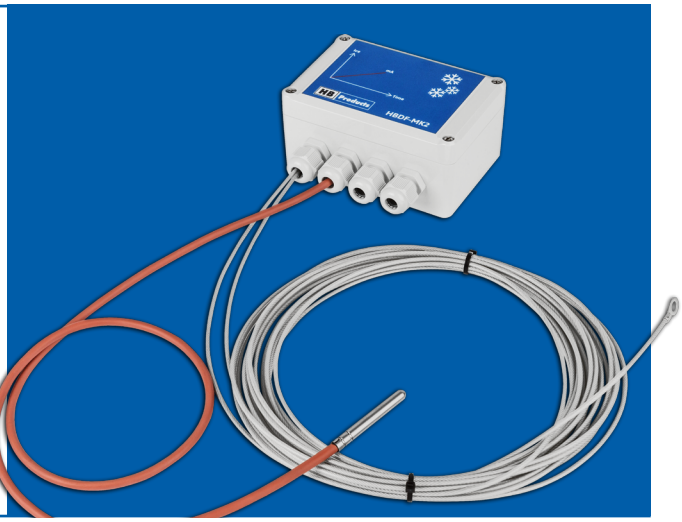
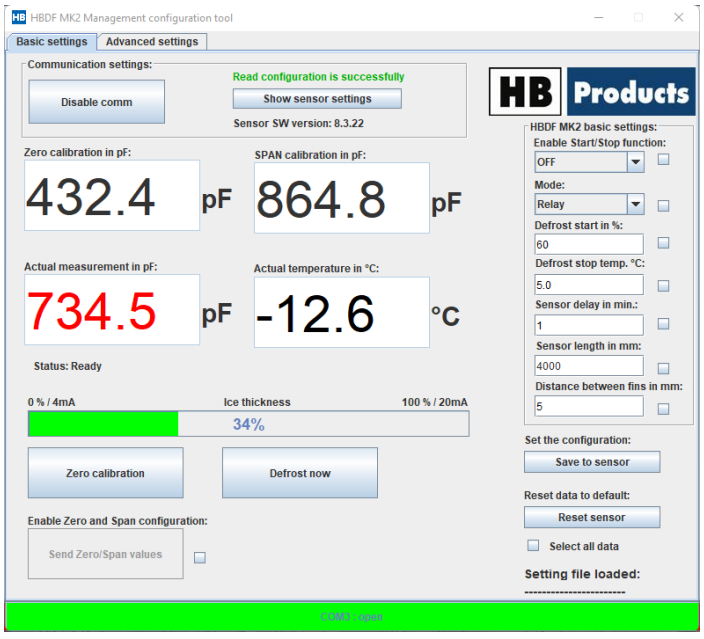
DEFROST SENSOR - HBDF

HBDF is a unique, but easily adaptable solution for automatic defrosting of evaporators.

The sensor can be used on evaporators with a minimum 5 mm fin spacing in cold rooms. The sensor also works on heat pumps, but it requires special conditions and larger fin spacing.





How Does It Work

The Defrost Sensor is based on the capacitive measuring principle, in which an insulated steel wire acts as one conductor, and the evaporator fins act as the second conductor. The sensor measures the ice thickness when the air is displaced by ice between the fins.

During defrosting, the pF value is measured, which can be used to start and stop defrosting. When the defrosting has started, the ice becomes wet whereby the pF value rises to a high level.

When the ice has melted, the pF measurement drops again and stops the defrost. The output is either a 4-20mA analog output and/or a digital output sent to a master control system.

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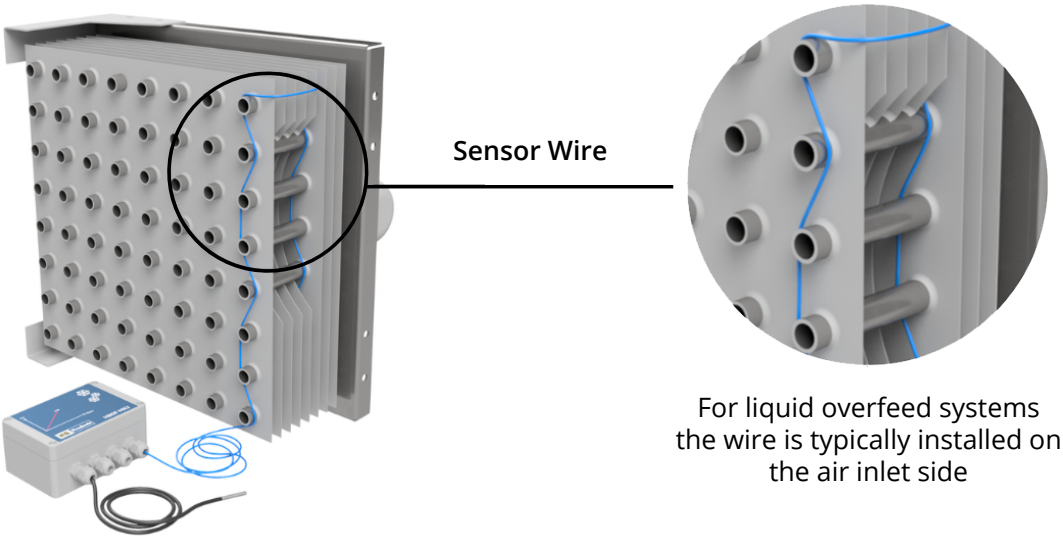
HOW TO INSTALL

The Defrost Sensor can be installed both on existing as well as new evaporators, but it needs to be installed where the frost layer builds up.

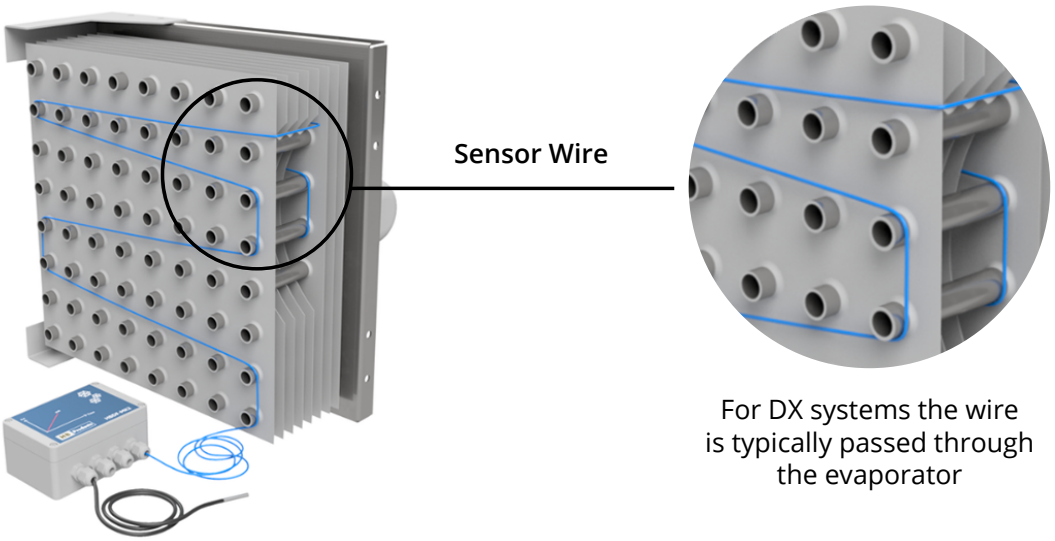
This will typically be on the air inlet side, except on superheated evaporators where the frost builds in the middle of the evaporator – because the first pipes are superheated.

For existing systems, you simply watch where the frost layer is built up first and install the wire in that area. For new evaporators, the wire must be installed where you expect frost to build up.

The installation is made by fitting 5-10 m wire between the fins kept in place by the cooling pipes. The installation should be where you like to measure the frost build-up.



For liquid overfeed systems the wire is typically installed on the air inlet side



For DX systems the wire is typically passed through the evaporator

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HEAT PUMPS

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TOUGH CONDITIONS FOR HEAT PUMPS

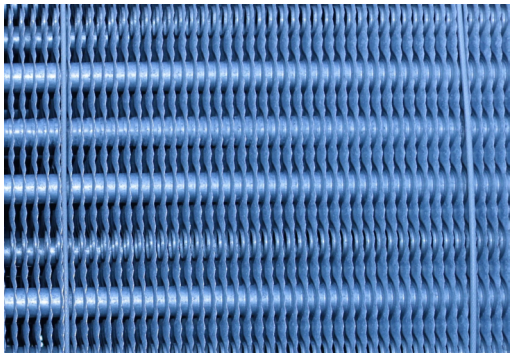
The use of Heat Pumps as an environmentally friendly alternative to fossil-fueled-based heating has grown immensely. Conditions are very different to traditional refrigeration systems as the evaporators are installed outdoors in all weather conditions.

Defrosting is essential for optimal operation of an air-to-water heat pump. As the humidity in the ambient air varies with the season and day-to-day weather, the interval between defrosting must vary as well.

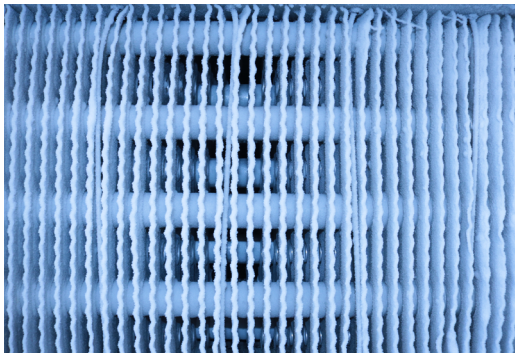
The best way to obtain an optimal defrosting is by use of the Defrost on Demand Sensor solution from HB Products.

The pictures to the left show 3 typical stages of ice formation on an evaporator.

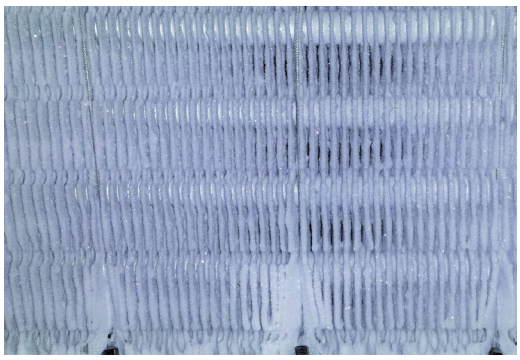
1. Clean evaporator right after the end of a defrosting cycle
2. Recommended ice formation before start of defrosting cycle
3. Too much ice formation – significant reduction of performance



1. Clean evaporator



2. Recommonded ice formation



3. Too much ice formation

Using the Defrost on Demand solution from HB Products, will make it possible for you to maintain stage 2 no matter the time of the year or actual weather condition.

It reduces the number of defrost cycles to what is needed, and it ensures optimal operation of the heat pump system. Timer-based defrosting will initiate defrost cycles when there isn't a need, or it will allow the evaporator to clog with too much ice, causing poor performance or no performance of the heat pump system.

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SAVE MONEY WITH ONDEMAND DEFROST

With a HBDF Defrost Sensor, you can save up to 6.4% on your energy bills by eliminating unnecessary defrost cycles.

Cold storage facilities have high energy demands, but in many cases, the demand is much higher than it needs to be due to inefficient defrost management.

Traditional defrosting is scheduled regularly on a timer. By installing an HBDF Defrost Sensor, which measures the thickness of the frost buildup in the evaporators, you can instead defrost when necessary, and only when necessary.

With the HBDF Defrost Sensor, it is possible to reduce the energy consumption in a cold storage facility by more than 6%, assuming the conditions are as described in the example below.

Such a significant reduction in energy consumption can lead to financial savings of many thousand Euros per year, even when the cost of the sensor and installation is considered.

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EXAMPLE:

A 50,000 m3 cold store with a pumped ammonia refrigeration system, three evaporators, and energy consumption of 30 kWh/m3/year. With an electricity price of €0.15 per kWh, this installation has an electricity expenditure of €225,000 per year.

When you defrost, you add energy to the system, which must be removed again afterwards. Using the Danfoss Liquid Drain method, you can calculate the cost of one defrost cycle.

(41 kWh energy added during defrost + 13 kWh energy removal by refrigeration) x €0.15 = €8.1

Using traditional timer-based defrost, with four defrost cycles per day, the cost of defrosting this facility then amounts to €8.1 × 3 evaporators x 4 cycles/day × 365 days = €34,478 per year.

If you install the HBDF Sensor on each evaporator, you will typically be able to reduce the number of defrost cycles by at least 50% a day, reducing the yearly cost of defrosting to €17,739.

The HBDF Sensor costs €891 plus installation costs of €231. For three evaporators, this results in a total installation price of €3,366. Total savings are therefore €17,739 - €3,366 = €14,373 per year.

In other words, you can **reduce operating costs** by 6.4% (€14,373/€225,000 × 100%) by equipping all three evaporators with an HBDF Sensor.

This means that owners and operators can see a return on investment for the HBDF in as little as 3 months.

HB Products

WE INCREASE
UPTIME, SAFETY
AND EFFICIENCY

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We are dedicated to supplying switches and sensors for industrial applications. We focus on refrigeration, but our sensors can be used in other industrial applications where robust and reliable sensors are called for.

Our sensors are developed and manufactured in Denmark. We mainly use local sourced parts to increase flexibility and reduce lead times. All sensors and switches comply with EU directives and have earned the CE marking.