



Products

WE INCREASE
UPTIME AND EFFICIENCY
IN THE REFRIGERATION INDUSTRY

Instruction Manual

HBDF – Defrost Sensor

For automatic defrosting of evaporators





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Safety Instructions

CAUTION! Always read the operational guidelines before commencing work! Heed all warnings to the letter! Installation of HBDF requires technical knowledge of both refrigeration and electronics. Only qualified personnel should work with the product. The technician must be aware of the consequences of an improperly installed sensor and must be committed to adhering to the applicable local legislation.

If changes are made to type-approved equipment, this type approval becomes void. The product's input and output, as well as its accessories, may only be connected as shown in this guide. HB Products assumes no responsibility for damages resulting from not adhering to the above.

Explanation of the symbol for safety instructions. In this guide, the symbol below is used to point out important safety instructions for the user. It will always be found in places in the chapters where the information is relevant. The safety instructions and the warnings in particular, must always be read and adhered to.

	CAUTION! Refers to a possible limitation of functionality or risk in usage.
	NOTE! Contains important additional information about the product and provides further tips.
	The person responsible for operation must commit to adhering to all the legislative requirements, preventing accidents, and doing everything so as to avoid damage to people and materials.

Intended use, terms of use. The HBDF defrosting sensor is designed for measuring ice formation in evaporators. If the HBDF is to be used in a different way and if the operation of the product in this function is determined to be problematic, prior approval must be obtained from HB Products.

Preventing collateral damage: Make sure that qualified personnel assess any faults and take necessary precautions before attempting to make replacements or repairs, so as to avoid collateral damage.

Disposal instructions: HBDF is constructed so that the modules can easily be removed and sorted for disposal.

Introduction

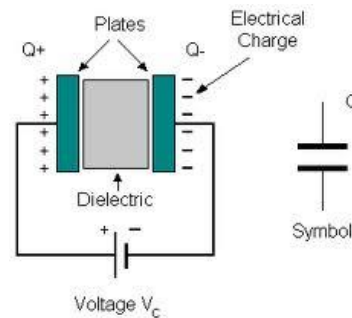
HBDF is an intelligent sensor with an in-built microprocessor. It is designed to measure ice formation in evaporators. It emits a 4-20 mA signal. Apart from the 4-20 mA signal, the sensor also has one in-built alarm output.

The controller can be set up with all the parameters necessary to regulate a

Measurement Principle

The sensor is a capacitive sensor. The capacitive measurement principle is based on the electrical properties in the proximity of a capacitor. A capacitor is an electrical component that is capable of building and retaining an electrical charge.

A capacitor basically consists of two plates. When a charge is applied to one plate, the other plate will be charged with the opposite polarity and retain the charge until it has been grounded. The magnitude of the charge that can be generated (the capacitance) depends, among other things, on what is found between the plates. The substance between the plates is referred to as a dielectric.



The conductivity of a material can vary depending on temperature, chemical composition, and the homogeneity of the material, and therefore it can require a different factory calibration in some cases.

Rather than two plates, sensors for level measurement are usually shaped as cylindrical rods. When liquid covers the sensor, the measured capacity is changed.

Sensors from HB Products are calibrated so that they differentiate between conductive and non-conductive liquids.

In refrigeration systems, oil and liquid CO₂ and HFC are not regarded as conductive fluids, whereas refrigerants such as ammonia and brine are regarded as conductive fluids.

Design

The sensor consists of a mechanical part and an electronic part. These can easily be separated by loosening the union on the electronic part. The electronic part is designed in accordance with IP65 waterproof rating and to resist vibrations. The mechanical part is produced in AISI304 and is installed by drilling into the evaporator frame.

Software

The sensor is delivered with the latest firmware.

The sensor is set up with a configuration tool, "HB Tool", using a PC. It is able to determine the current delivered version on its own.

The newest version of the tools is backwards compatible.

It is not possible to update the software on a sensor that has already been delivered.

Technical Data

Supply:		Mechanical specifications:	
Voltage:	24 V AC/DC	Materials – mechanical parts:	AISI304
Electricity consumption:	600 mA	Materials – electronic parts:	Nylon 6 (PA)
Plug:	M12, 5p/DIN 0627	Configuration & indication:	
Analogue output:	4-20 mA	Configuration	With PC
Max. load:	500 ohm	LED Indication	Green, yellow, and red
Alarm output:	PNP, NC/NO	Cable:	
Installation conditions:		M12 cable – 5 m:	HBxC-M12/5
Ambient temperature:	-40...+50°C	Cable diameter:	5 x 0.34 mm ²
Waterproof rating:	IP65	Screwed cable entry:	PG7 / M8
Vibrations:	IEC 68-2-6 (4g)	Connector type:	90°
Certifications:		Cable:	PUR-OB grey
EMC Emission:	EN61000-3-2	Approval cable:	CSA
EMC Immunity:	EN61000-4-2		



Note! All terminals are protected against improper termination for a supply voltage up to 40 V. If the supply voltage is greater than 40 V, the electronics will be damaged.

Function

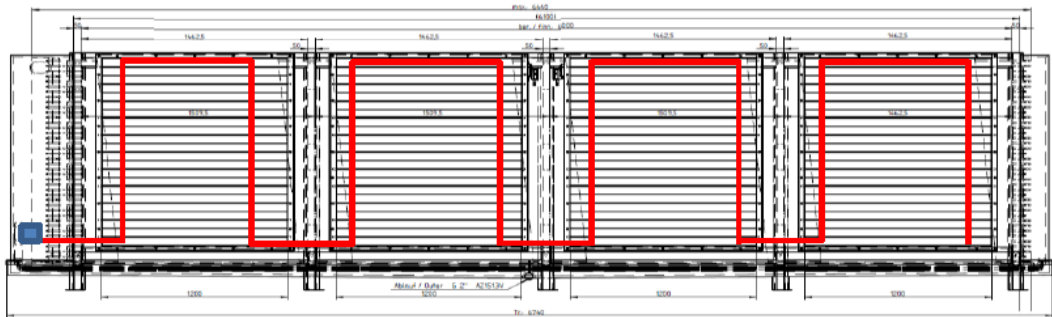
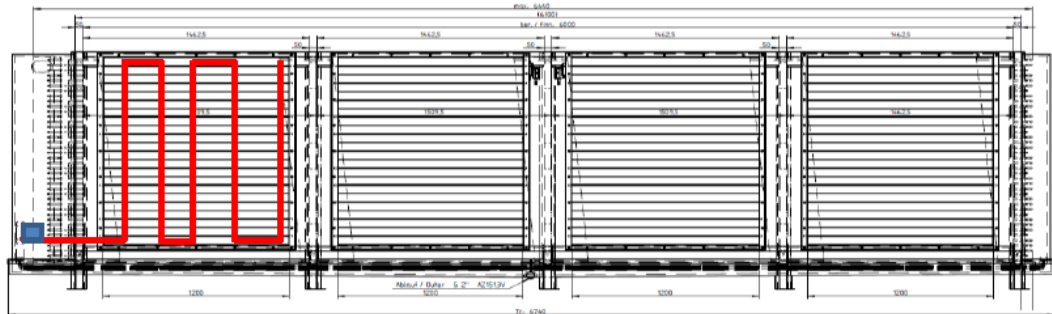
HBDF measures the build-up of ice between the fins of the evaporator. The sensor is installed and calibrated for the currently installed evaporator. The calibration should be carried out before ice begins to build up. When the evaporator is free of ice, the sensor emits 4mA. Depending on the ice build-up, the sensor emits up to 20 mA. A visual inspection must be carried out to determine when defrost should be performed, and the system's PLC should be set to perform defrost at that given signal level (for example 12 mA). Defrost must be stopped when the signal is 4 mA once again.

Installation Instructions

The following applies to system design:

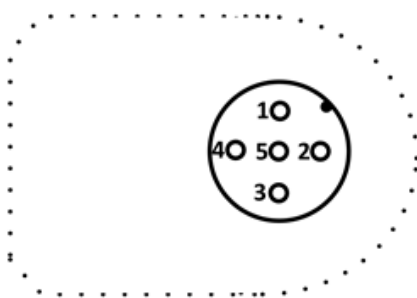
- 1) The sensor mechanism is installed on the evaporator's steel frame.
- 2) The wire is installed between the fins. The wire must only be placed where ice build-up occurs.
- 3) The sensor must be installed with a standard unshielded cable. If the EMC is higher than described in EN 61326, a shielded cable must be used.

It is supplied with a 5-wire cable with an M12 connector, as described in the section "Electrical Connection".

A**B**

CAUTION! In case of welding on the system, make sure that a correct offset nulling has been performed, so that the electronics are not damaged during welding.

Electrical Connection



Supply 24V AC/DC

- 1 = Brown +
- 2 = White -
- 3 = Blue, DO, Alarm, PNP, 1A
- 4 = Black, AO, Control output, 4-20mA
- 5 = Gray, DI, Run in signal (5 to 24 VDC)

LED Indication and Calibration

LED indication:



- 1) Green LED indicates supply operation. flashes during
- 2) Red LED indicates a high or low alarm level, depending on the set-up.

LED signal	ON/OFF/Frequency	Functionality
Green (front)	On	Supply voltage connected
	Flash	Run-in start signal / operation.
	OFF	No supply voltage
Red (front)	ON	Alarm, low or high depending on setup
	Flash	Cannot detect any sensor rod
	OFF	No alarm
Yellow and Red (front)	Flash	Inadequate power supply

Installing the HB Tool

See separate manual.

PC Configuration

See separate manual.

Fault Detection

General:



NOTE! Fault detection on the electronic function and/or for replacement thereof can be carried out without releasing pressure from the system or disassembling the mechanical part of the sensor

Fault Detection

Fault	Reason	Correction of fault
No LED is on / no function	No supply to the sensor or defective cable/plug.	Check for fault in the power supply or replace the supply cable.
Yellow and red LED are flashing	Power supply is too small.	Install a power supply with a capacity of at least 30 W.
No contact activation	There may be dirt between the electronic housing and the mechanical housing	Separate the two parts and clean the spring tip.

Practical measurement of output signals: **4-20 mA signal:** Function and stability of the 4-20 mA signal can be checked by connecting a hand-held multimeter. If the supply is connected and the power LED flashes and there is no output signal, the electronics may be defective.

Sensor Repair

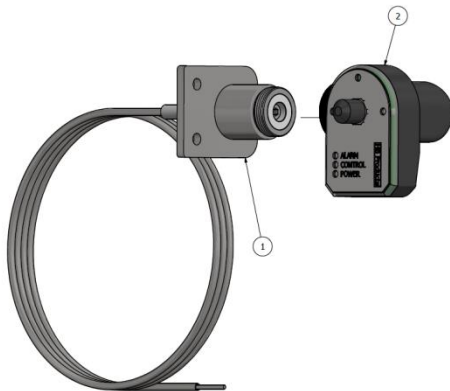
The sensor electronics are completely encased and can therefore not be repaired.

In case of defects with the sensor, it will typically only be necessary to replace the electronics.

Complaints are processed by HB Products' dealers/distributors.

Please consider their complaint procedures before returning the sensor.

Spare Parts



Position	Designation	Specification	Product number
1	Mechanical part	10 m wire	HBDF-MEK-10M
	Mechanical part	20 m wire	HBDF-MEK-20M
	Mechanical part	30 m wire	HBDF-MEK-30M
2	Electronic part		HBDF-EL

Further Information

For further information, please visit our website, www.hbproducts.dk, or send an email to: support@hbproducts.dk.

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