HB Products A/S

Worldwide Coverage by Local Distributors

For further information, please visit www.hbproducts.dk
Defrost - Challenges

Typically seen topics related to defrost

- Uneven ice build-up on evaporator surface
- Timer based defrosting even when there is no demand
- Defrost cycles longer than needed
HB Products vision within the refrigeration industry:

- Become a global leader in development of innovative sensors, when it comes to quality, energy efficiency, functionality and user-friendliness.
- Development of new sensor solutions that supports reduction of GWP as environmentally friendly systems.
- Be represented by distributors and OEM partners Worldwide.
Products Portfolio

1. Linear Displacement Sensors for capacity control. Customized design, mainly OEM business.

Compressor Capacity & Position Sensors

2. Sensors & Switches for CO₂, NH₃ and HFC/O systems

Optimizing & Efficiency

3. Linear Displacement Sensors for capacity control. Customized design, mainly OEM business.
Advantages of HBP Sensor Solutions

- **Split-Design**: No evacuation needed – electronically part can easily be disconnected from the mechanical part.
- **Capacitive measurement principle**: Means it can detect refrigerant only and differentiate between phases.

<table>
<thead>
<tr>
<th>Position</th>
<th>Type</th>
<th>Specification</th>
<th>Part number</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Mechanical parts</td>
<td>¾” NPT / 314 mm/NH3</td>
<td>HBLC-NH3-3.1-2-MEK</td>
</tr>
<tr>
<td></td>
<td></td>
<td>¾” BSPP / 314 mm/NH3</td>
<td>HBLC-NH3-3.1-6-MEK</td>
</tr>
<tr>
<td></td>
<td></td>
<td>¾” NPT / 314 mm/ CO2/HFC</td>
<td>HBLC-CO2/HFC-3.1-2-MEK</td>
</tr>
<tr>
<td></td>
<td></td>
<td>¾” BSPP / 314 mm/ CO2/HFC</td>
<td>HBLC-CO2/HFC-3.1-6-MEK</td>
</tr>
<tr>
<td>2</td>
<td>Electronic parts</td>
<td>Direct output (no cable)</td>
<td>HBLC-EL</td>
</tr>
<tr>
<td></td>
<td></td>
<td>For modulating valve</td>
<td>HBLC/C-EL</td>
</tr>
<tr>
<td></td>
<td></td>
<td>For stepper motor</td>
<td>HBLC/5-EL</td>
</tr>
</tbody>
</table>
HBDF MK2 – Defrost On Demand

Defrost starts only when needed (On Demand)
Stop the defrost when Ice is Melted (Temp. input)
Saves Energy compared with Timer Based Defrosting
Gain more Capacity – Fewer and Shorter Defrost Cycles
Easy Installation – also on Existing Sites
Also available for Heat Pump- and -60°C applications
Installation of wire for defrost sensor

Snap-On-Clips makes installation easy
Vapor Quality Sensors – HBX-series

GWP

CO₂ READY

measuring weather condition inside the pipe

Low Carbon Technologies

Patent No.: US 9,587,866 B2
Vapor quality sensors – CO$_2$, NH$_3$, HFC/O

Measures vapor quality in refrigeration systems – the relationship between gas and liquid (Refrigerant h Log P-diagram).

The sensor measures the degree of dryness, “X”, of the gas in the gas pipes, and the value is converted into a 4-20 mA analogue signal corresponding to “X”. The HBX measures the dryness of the gas in the range X = 0.85...1.05.

The sensor is available in more variants, “Rod Style” for installation in a pipe elbow and “In-line” for welding into the suction pipe. New version for in-line in smaller copper pipes and special strainer housing solution.
Vapor Quality Sensors – CO₂, NH₃, HFC/O

Optimizes at any given load
- Big savings on full load
- Even bigger savings at partial load

>20% SAVING
Installation of X-Sensor

**Flooded / Pump circulated systems:** Installation either directly at exit of evaporator or at the very top of the riser pipe

**DX systems:** Direct at exit of evaporator (Important with proper liquid distribution)
Save Installation Cost – Closed Loop Control

Make installation more simple and obtain a more reliable operation

The X-sensor is also available with integrated cable for:

- /C with direct 4-20 mA control of Siemens or Danfoss ICM modulating valves
- /S with direct control of stepper motor valves – works with all stepper motors on the market
- /PWM with relay box that converts 4-20 mA to Pulse Width Modulation signal for PWM-valves

Direct control of valves gives savings on installation cost and reduce number of potential failure points.
**Compressor Protection**

**HBCP** is used for detecting gas quality at the inlet pipe on refrigeration compressors. The sensor ensures that liquid refrigerant does not enter the compressor, causing damage to the moving parts.

The sensor protects the compressor against damage in the event of liquid hammering from the system.

Setting up the sensor using a PC allows for adjustments to match the system and the compressor.
HBTS-TR – Temperature Transmitter Series

- Temperature range easily adjusted by PC with use of HB-TOOL (Free)
- Sensor output: 4-20mA
- Sensor type: PT1000
HBPH sensor MK2

HBPH is a pH sensor designed for the extreme requirements of industrial refrigeration.

It is used to measure the pH value of brine in case of an ammonia leak in a heat exchanger.

Liquid temperature range from -10 - +95°C
Measurement area 0 – 14PH
Independent unit that must be supplied with 20 -28 VDC.
Analogue 4... 20 mA output.

Differential measurement technology that ensures a minimum lifetime of 2 years for the sensor element.
How do we measure

The measuring principle is capacitive and measures the dielectric properties of various media in pF (pico Farad).

Two electrodes inside the system perform the measurement.

Real time measurement.

No moving parts.

Material | Dielectric constant of 1 to 100
---|---
Water / brine | 80
Ammonia | 17
CO2 | 1.5 to 2.0
Oil type PAO, POE | 2.2
Oil type PAG | 3.5
Oil type PAO, POE | 2.2
Oil type PAG | 3.5
R134a | 9.24
R22 | 6.35
R410A | 7.78
R507 | 6.97
Ice | 3.2
Air | 1.0 (Dry air)

Dielectric Constant at temperature 20°C/68°F
Refrigerant Level Monitoring - Switches vs. Transmitters

**Single point switches**
- HBSR
- HBLC-R-IP
- HBOR

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**Analogue level transmitters**
- HBLT-A1
- HBLC-HFC & HBLC-CO2
- HBLT-wire

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Digital ON/OFF signal
Switches at the presence of liquid refrigerant

Connects to controller or PLC
Supply 24V DC

HBOR distinguishes between liquid ammonia and refrigerant oil

Analogue 4-20mA signal corresponding to liquid level in vessel or stand pipe

Connects to level controller or PLC
Supply 24V AC/DC
Single Point Switches, Digital on/off

HBSR (DIN plug)
24V AC/DC supply
(AC supply new)

Electronics available as
- PNP (Source)
- NPN (Sink, mainly US)

Switching function
- Normally Open (NO)
- Normally Closed (NC)

Normally Open switches,
switches at the presence of refrigerant

Available only in ¾” Thread – BSPP / NPT
Distinctive LED indication at the presence of liquid
irrespective of switching function

* with “Normally Open” electronics
Oil Sensors/Switches

HBSO, HBOC, HBOR, HBLC-Oil

Level indication, on/off switches for min/max indication of oil in such devices as:
Compressor houses – ensuring adequate lubricating oil during operation and/or before start-up.
Oil separators – level indication for draining from the separator
Oil reservoir – level indication for draining and filling respectively
Oil system – ensuring that oil is present
Refrigerant Level Sensors

**HBLC**

Reacts on the refrigerant and transmits the detected level as an analogue signal of 4-20 mA

Stand alone solution together with modulating valve. Flexible and cost effective alternative to float switches

**HBLC-CO2 / HBLC-HFC**

**HBLC/C-NH3**
Electronic level regulation (HBLC, Siemens MVS)

Electronic alternative to mechanical float valves
Simple, easy and cost attractive alternative
Reliable and flexible mounting.

One product for high and low pressure control
100 bar (CO₂ 150bar)
HBLT-Wire used for NH₃, HFC and HFO

- Flexible sensor wire, which is adjustable to a length of 600 to 4000 mm
- Robust and reliable design with a standard 4-20 mA output signal.
- Designed for the refrigeration industry – max. pressure up to 100 bar.
- Split design which makes the sensor easy to install and service.

https://www.youtube.com/watch?v=1w9Mgu2-nzQ
HBLT-A1

- HBLT measures liquid levels in refrigerant vessels.
- Transmits an active 4-20 mA signal which is proportional to the liquid level 4 mA when the transmitter does not register liquid and 20 mA when the entire transmitter is surrounded by liquid.

Proven and reliable design with process signal output of 4-20 mA
Simple calibration function and the possibility to reduce the effect of liquid peaks.
Designed for the industrial refrigeration industry - max pressure up to 100 bar & high protection degree
Recommended use of HBLT-Wire & HBLT-A1

Use of HBLT-Wire sensor
When using a level sensor for measuring Ammonia in an Alfa Laval U-turn evaporator and other systems with unstable conditions, we have new recommendation based on recent experience:

For Stand-pipes with stable conditions (smooth changes in the level):
Use an HBLT-Wire or an HBLT-A1 rod-style sensor.

For Stand-pipes with unstable conditions (a lot of turbulence, cooking, foaming, liquid from the top):
Use an HBLT-A1 rod-style sensor, or
Use only an HBLT-Wire sensor when you have it mounted in an inner guide-tube of e.g. DN25 as illustrated. The guide-tube will dampen the level and the foaming and you will have a good measurement.
If the HBLT-Wire sensor is already mounted under these conditions WITHOUT a guide-tube, do eventually set the filter time function between 60-120 seconds to level the signal from the turbulent conditions.

For tank/drum installation:
Use an HBLT-A1 rod-style sensor, or use only an HBLT-Wire sensor when you have it mounted in an inner guide-tube of e.g. DN25 as illustrated. The guide-tube will dampen the level and the foaming and you will have a good measurement.
If the HBLT-Wire sensor is already mounted under these conditions WITHOUT a guide-tube, do eventually set the filter time function between 60-120 seconds to level the signal from the turbulent conditions.
# Refrigerant Control

<table>
<thead>
<tr>
<th></th>
<th>HBLT-C1</th>
<th>HBLT-C1-ENC</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Supply:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Voltage</td>
<td>24 V AC/DC ± 10 %</td>
<td>100..270 V AC</td>
</tr>
<tr>
<td>Frequency</td>
<td>50/60 Hz</td>
<td>50/60 Hz</td>
</tr>
<tr>
<td>Current draw</td>
<td>Max 40 mA</td>
<td>Max 1.5 A</td>
</tr>
<tr>
<td><strong>Mechanical specifications:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mounting</td>
<td>In front of panel</td>
<td>On wall</td>
</tr>
<tr>
<td>External measurement</td>
<td>96x96x94 mm (WxHxD)</td>
<td>205x220x140 mm (WxHxD)</td>
</tr>
<tr>
<td>Cut-out measurement</td>
<td>92,8x92,8 mm</td>
<td>N.A.</td>
</tr>
<tr>
<td>Material</td>
<td>Plastic</td>
<td>Plastic</td>
</tr>
<tr>
<td>Weight</td>
<td>0.2 kg</td>
<td>1.4 kg</td>
</tr>
<tr>
<td><strong>Display:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Digit’s on display</td>
<td>3 digits, red</td>
<td></td>
</tr>
<tr>
<td>Alarm indication</td>
<td>LED (green og red)</td>
<td></td>
</tr>
<tr>
<td>Programming</td>
<td>From front</td>
<td></td>
</tr>
<tr>
<td>Updating</td>
<td>1 time each second</td>
<td></td>
</tr>
<tr>
<td>Valve position indication</td>
<td>5 x LED (green, yellow and red)</td>
<td></td>
</tr>
<tr>
<td><strong>Input:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Analogue input – sensor</td>
<td>4-20 mA</td>
<td></td>
</tr>
<tr>
<td>Analogue input - valve feedback</td>
<td>4-20 mA</td>
<td></td>
</tr>
<tr>
<td>Alarm – max level</td>
<td>Relay - 5...25 V DC</td>
<td></td>
</tr>
<tr>
<td><strong>Output:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Analogue output</td>
<td>4-20 mA</td>
<td></td>
</tr>
<tr>
<td>Load</td>
<td>3A/24 VDC</td>
<td></td>
</tr>
<tr>
<td>Relay output</td>
<td>@24VAC/VDC: 3 x 3A</td>
<td></td>
</tr>
<tr>
<td></td>
<td>@110 VAC: 3 x 5A</td>
<td></td>
</tr>
<tr>
<td></td>
<td>@220 VAC: 3 x 5A</td>
<td></td>
</tr>
<tr>
<td>Solid state output</td>
<td>NC/NO-1A-24VAC/VDC</td>
<td></td>
</tr>
</tbody>
</table>
HBAC

- CO₂ leakage detection in NH₃ cascade heat exchanger
- Simple to install with a sleeve. A cost-optimized solution
- LED indication for power and alarm status

Single Shared design that makes it easy to install and make diagnostics. The electronic part can easily be removed from the mechanical part by two small screws.
Pressure & Temperature Sensors

- 0 - 6 bar
- -1 – 25 bar
- -1 – 200 bar

- Refrigerant temp. -50 + 130°C
- Ambient temp. -30 + 85°C
HBGS (Gas Sensor)

- Fulfils the requirements for gas leakage measurement in accordance with F-GAS regulation EU/517/2014.
- Detects NH3 (R717) in a range of 0... 500 ppm.
- Independent unit that must be supplied with 24 V AC/DC.
- Built-in digital alarm output and 1 analogue 4... 20 mA output.
- The sensor can be configured using a PC with the HB Configuration Tool.

**LED Indication**

On the front of the sensor, LED indication is integrated for power supply ON and alarm indication A, B, & C.

Alarm LED (3 alarm levels) are activated in case of a leak.

Power LED is activated when the sensor is being supplied.

**Alarm Reset**

In case of a leak, an alarm is triggered. The alarm can be reset by holding down “R” for a few seconds. If the alarm activates again after pressing “R”, there is still an ammonia leak in the room.