

HB Products A/S

Worldwide Coverage by Local Distributors



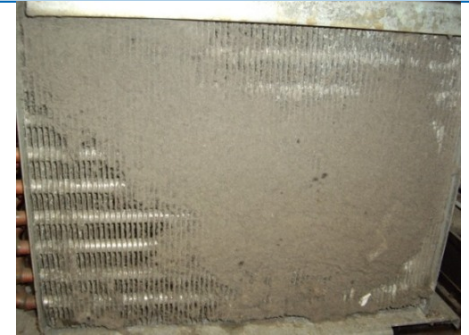
For further information, please visit www.hbproducts.dk



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:

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



Products Portfolio

1

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

Optimizing & Efficiency

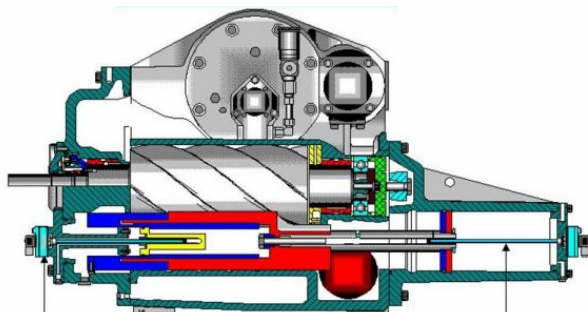
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2

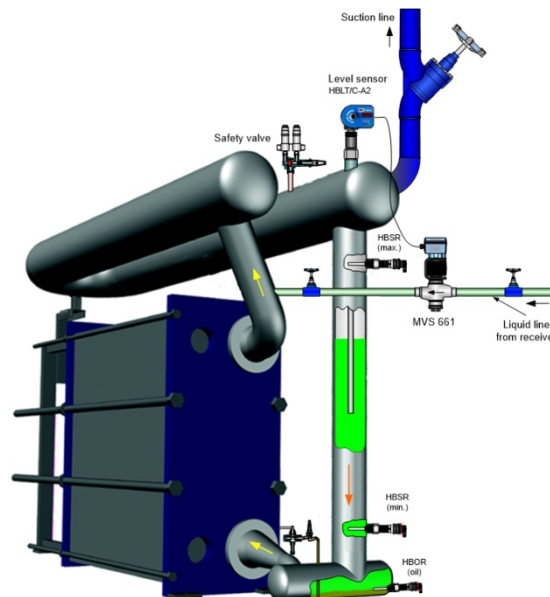
Sensors & Switches for CO₂, NH₃ and HFC/O systems

Compressor Capacity & Position Sensors



Longstroke
Position Sensor
Volumen Control

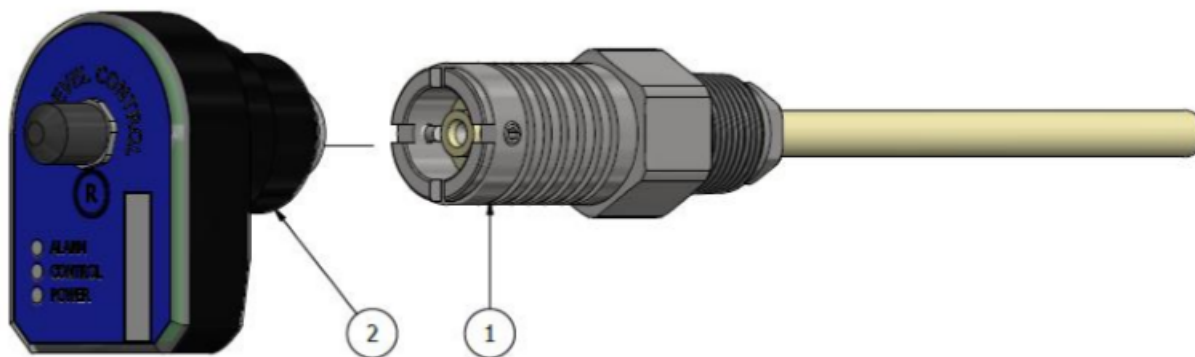
Longstroke
Position Sensor
Capacity Control



Advantages of HBP Sensor Solutions

HB Products Split-Design: No evacuation needed – electronically part can easily be disconnected from the mechanical part

HB Products Capacitive measurement principle means it can detect refrigerant only and differentiate between phases

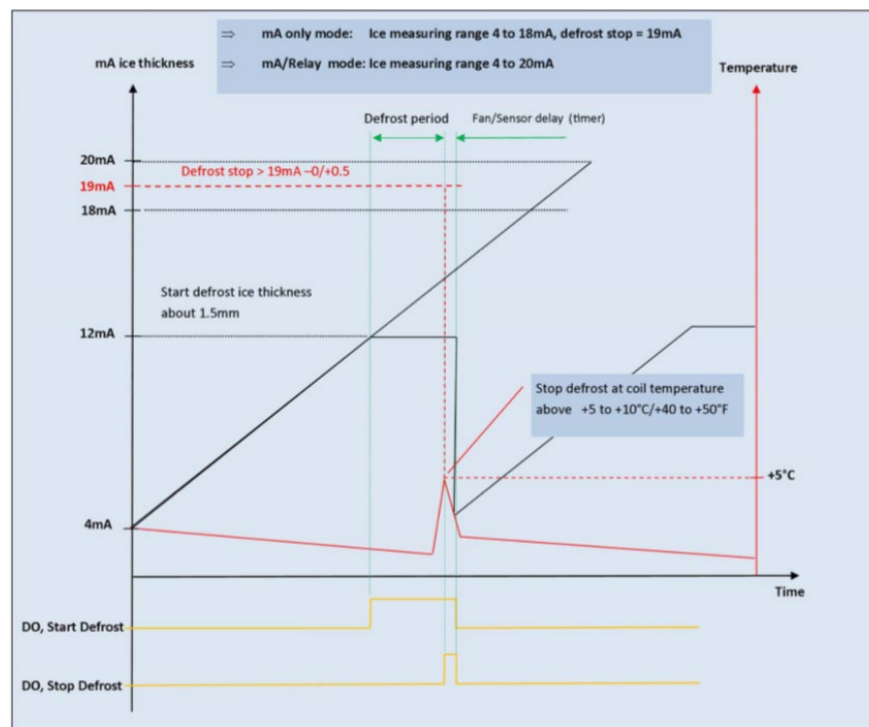
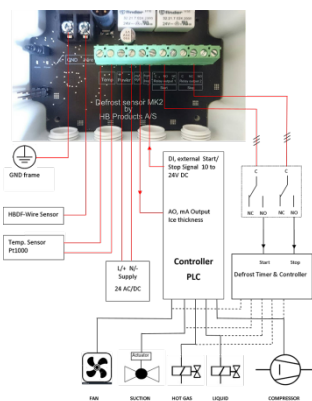


Position	Type	Specification	Part number
1	Mechanical parts	3/4" NPT / 314 mm/NH3	HBLC-NH3-3.1-2-MEK
		3/4" BSPP / 314 mm/NH3	HBLC-NH3-3.1-6-MEK
		3/4" NPT / 314 mm/ CO2/HFC	HBLC-CO2/HFC-3.1-2-MEK
		3/4" BSPP / 314 mm/ CO2/HFC	HBLC-CO2/HFC-3.1-6-MEK
2	Electronic parts	Direct output (no cable)	HBLC-EL
		For modulating valve	HBLC/C-EL
		For stepper motor	HBLC/S-EL

HBDF MK2 – Defrost On Demand



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





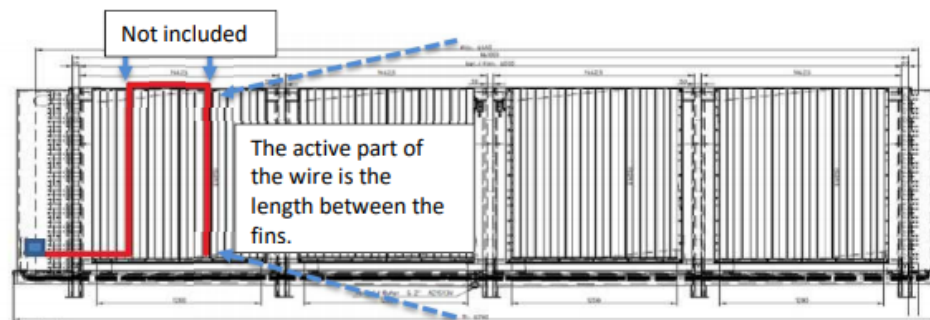
Installation of wire for defrost sensor



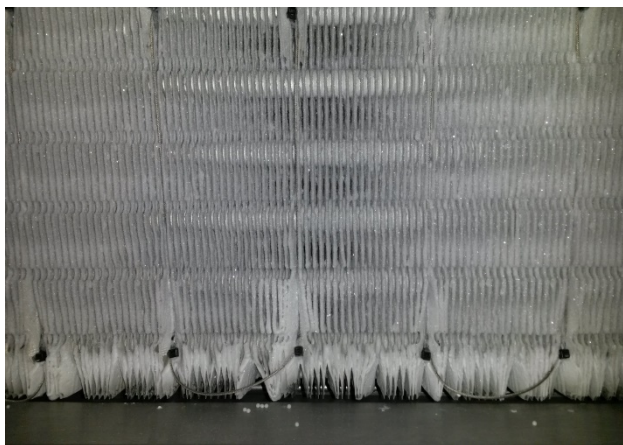
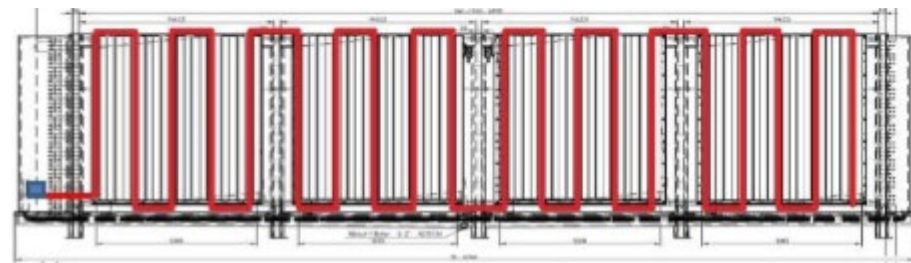
Snap-On-Clips makes installation easy

For installation on air-coolers/evaporators:

A



B



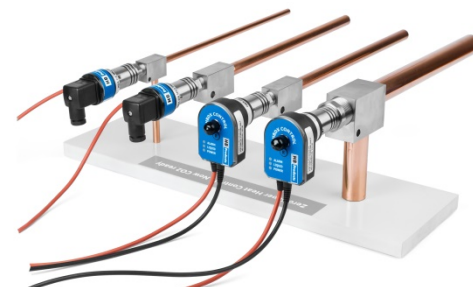
Vapor Quality Sensors – HBX-series

GWP
↓



CO₂ READY

measuring weather condition inside the pipe



Low Carbon Technologies



Patent No.: US 9,587,866 B2

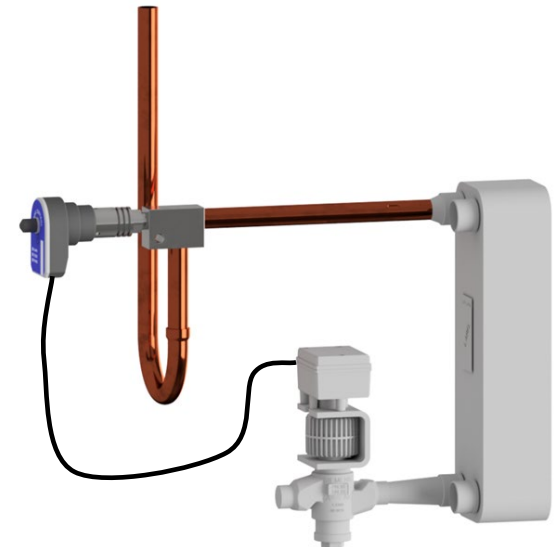
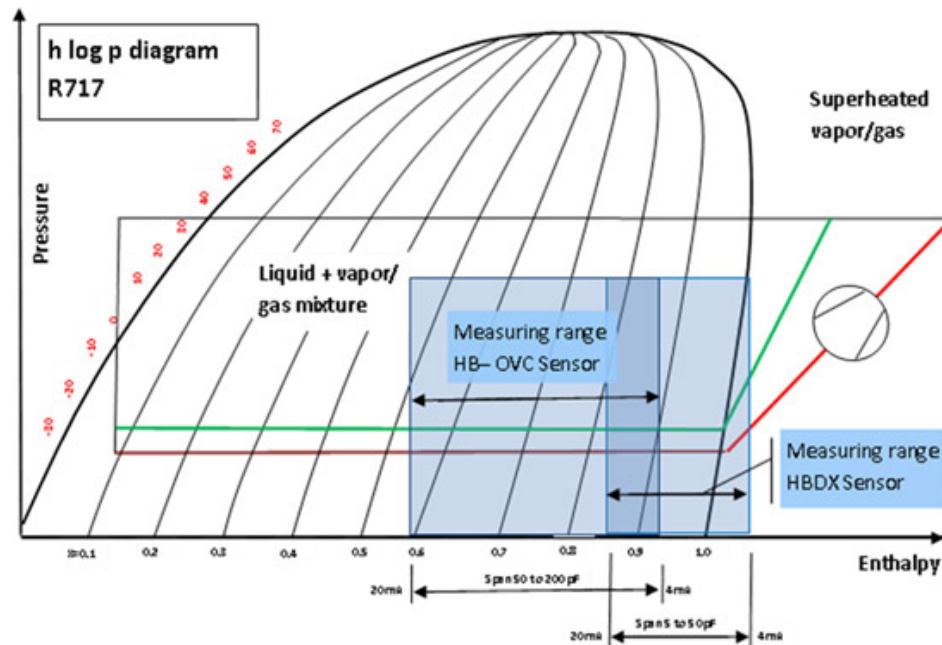


Vapor quality sensors – CO₂, NH₃, HFC/O

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

HB Products 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 $X = 0.85 \dots 1.05$.

HB Products 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.





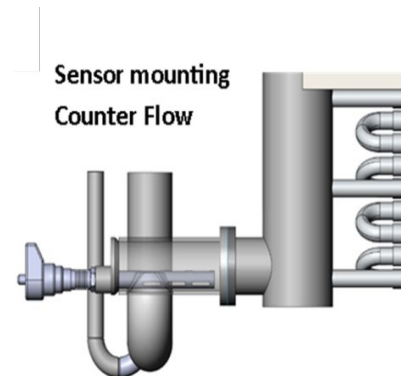
Vapor Quality Sensors – CO₂, NH₃, HFC/O



Optimizes at any given load

HB Products Big savings on full load

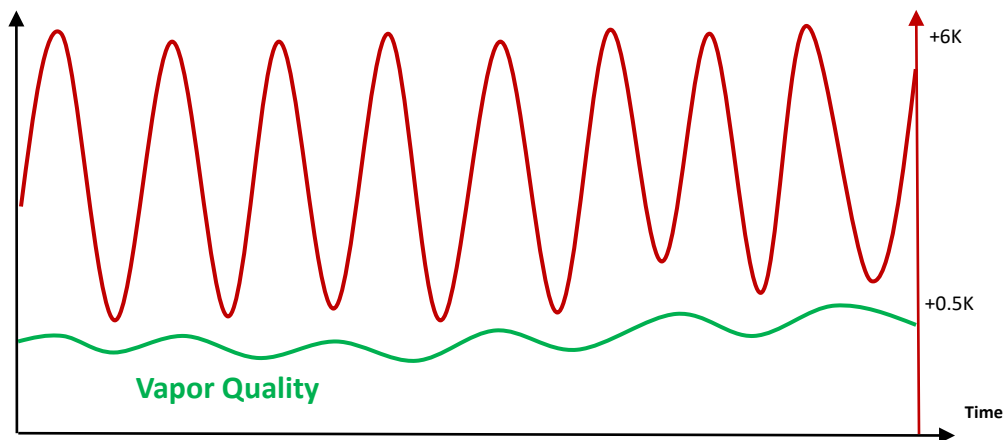
HB Products Even bigger savings at partial load



Vapor Quality

Super-Heat

Super-Heat

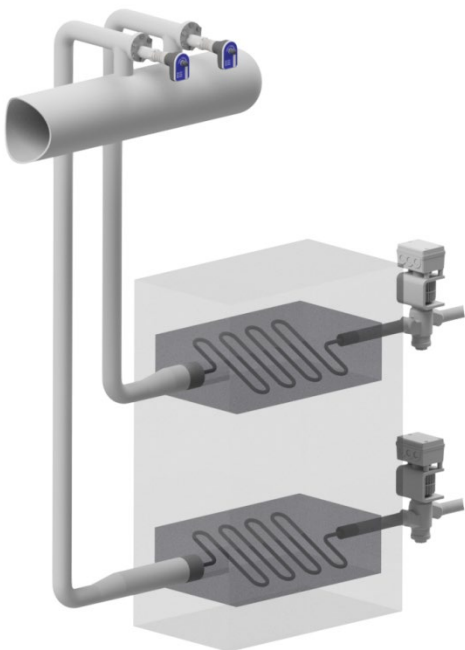
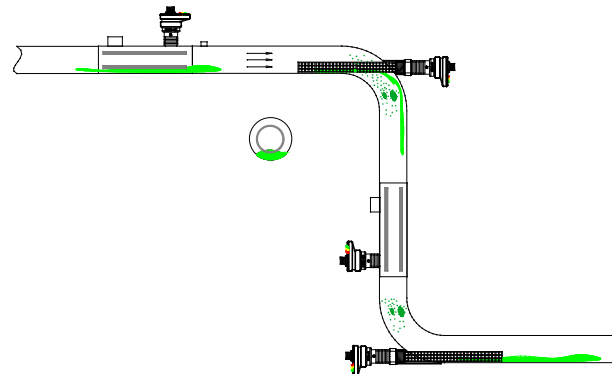
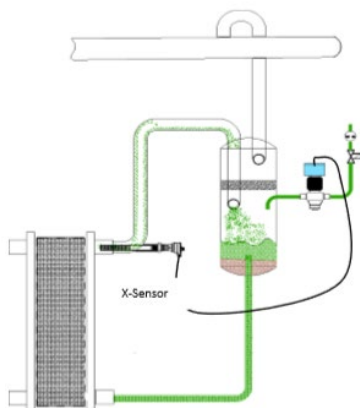




Installation of X-Sensor

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)



Sensor mounted in the outlet of a DX Air-Cooler in Australia

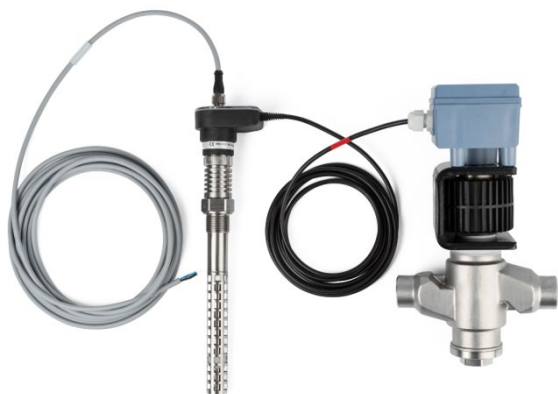
Save Installation Cost– Closed Loop Control

Make installation more simple and obtain a more reliable operation

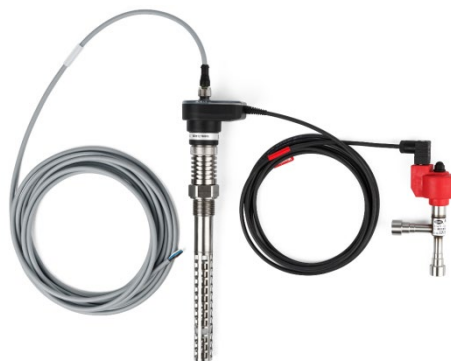
HB Products The X-sensor is also available with integrated cable for:

- /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

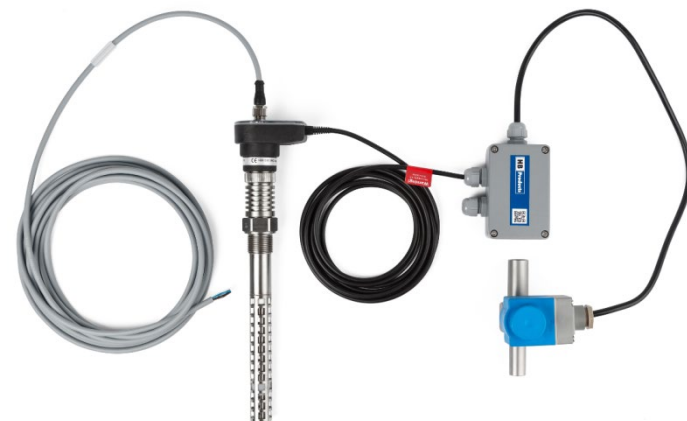
HB Products Direct control of valves gives savings on installation cost and reduce number of potential failure points.



/C 4-20 mA



/S Stepper Motor



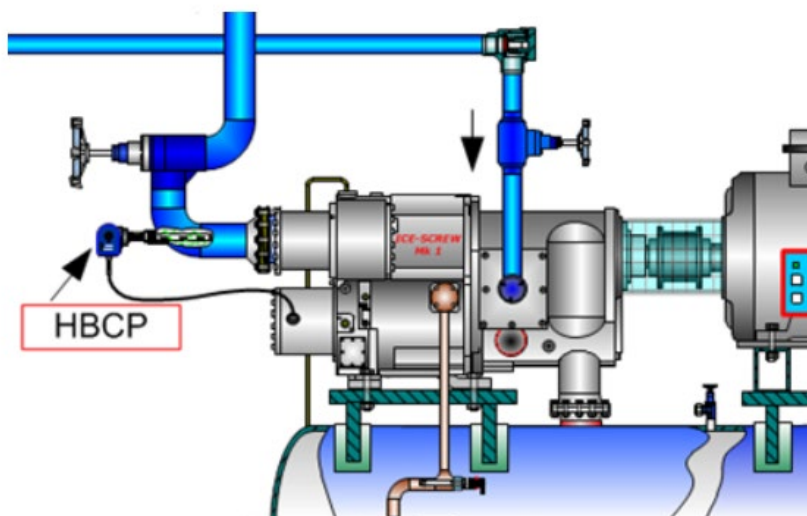
/PWM Pulse Width
Modulation

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.

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

HB Products Setting up the sensor using a PC allows for adjustments to match the system and the compressor.

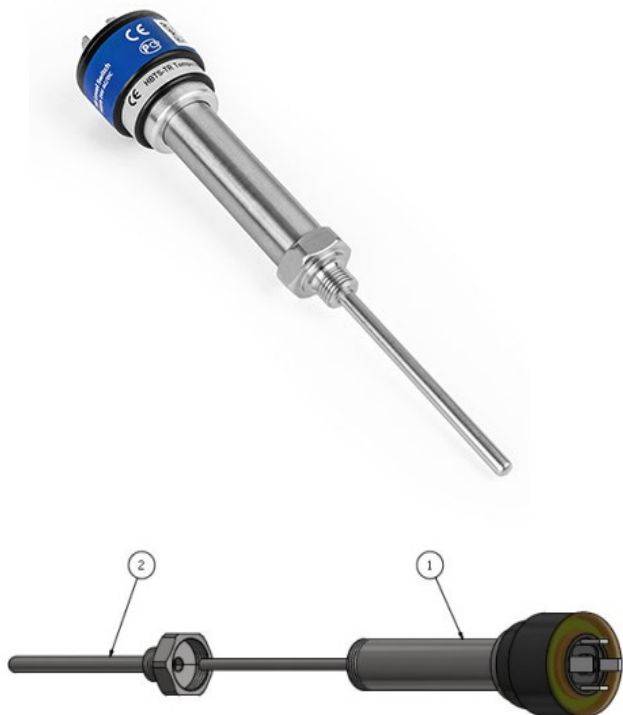


HBTS-TR – Temperature Transmitter Series

HB Products Temperature range easily adjusted by PC with use of HB-TOOL (Free)

HB Products Sensor output: 4-20mA

HB Products 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.

HB Products Liquid temperature range
from -10 - +95°C

HB Products Measurement area 0 – 14PH

HB Products Independent unit that must
be supplied with 20 -28 VDC.

HB Products Analogue 4... 20 mA output.



HB Products Differential measurement
technology that ensures a
minimum lifetime of 2 years for
the sensor element

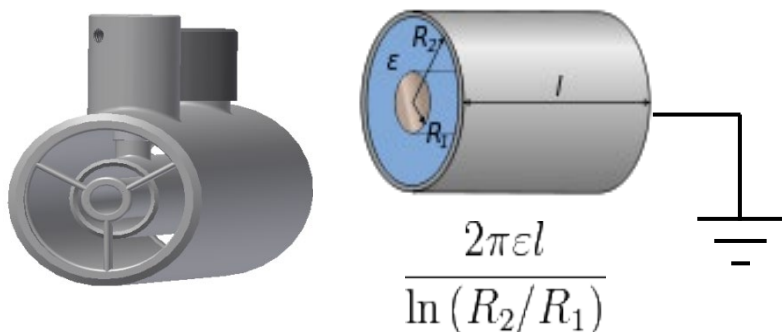
How do we measure

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

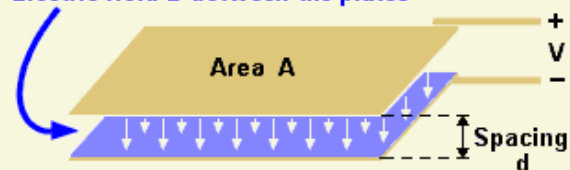
HB Products Two electrodes inside the system perform the measurement.

HB Products Real time measurement.

HB Products No moving parts.



Electric field E between the plates



Charge on the inside of each plate:
+Q on the top, -Q on the bottom

Material	Dielectric constant of 1 to 100
Water / brine	80
Ammonia	17
CO2	1.5 to 2.0
Oil type PAO, POE	2.2 Mineral and synthetic types
Oil type PAG	3.5 Synthetic types
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

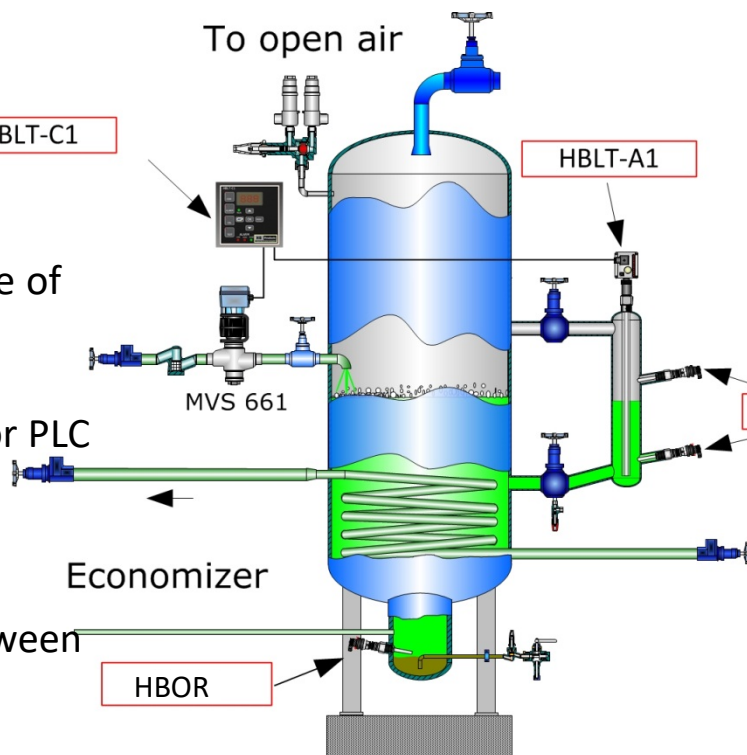
HBSR
HBLC-R-IP
HBOR

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

HLBT-C1

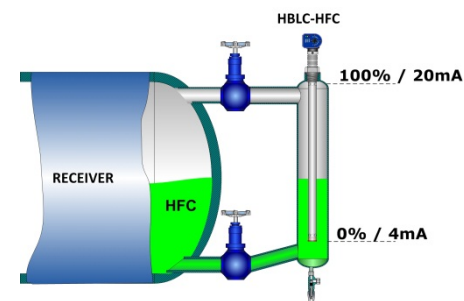


Analogue level transmitters

HLBT-A1/A2
HBLC-HFC & HBLC-CO2
HLBT-wire

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

HB Products PNP (Source)

HB Products NPN (Sink, mainly US)

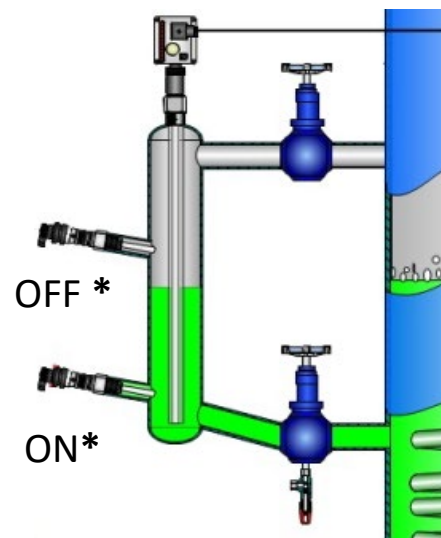
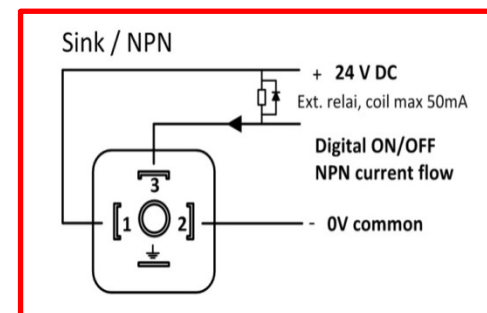
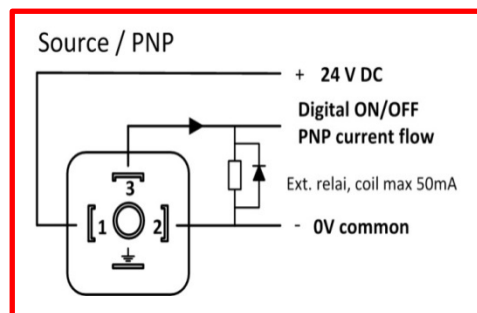
Switching function

HB Products Normally Open (NO)

HB Products Normally Closed (NC)

Normally Open switches,
switches at the presence of refrigerant

Available only in 3/4" Thread – BSPP / NPT
Distinctive LED indication at the presence of liquid
irrespective of switching function



* with "Normally Open"
electronics

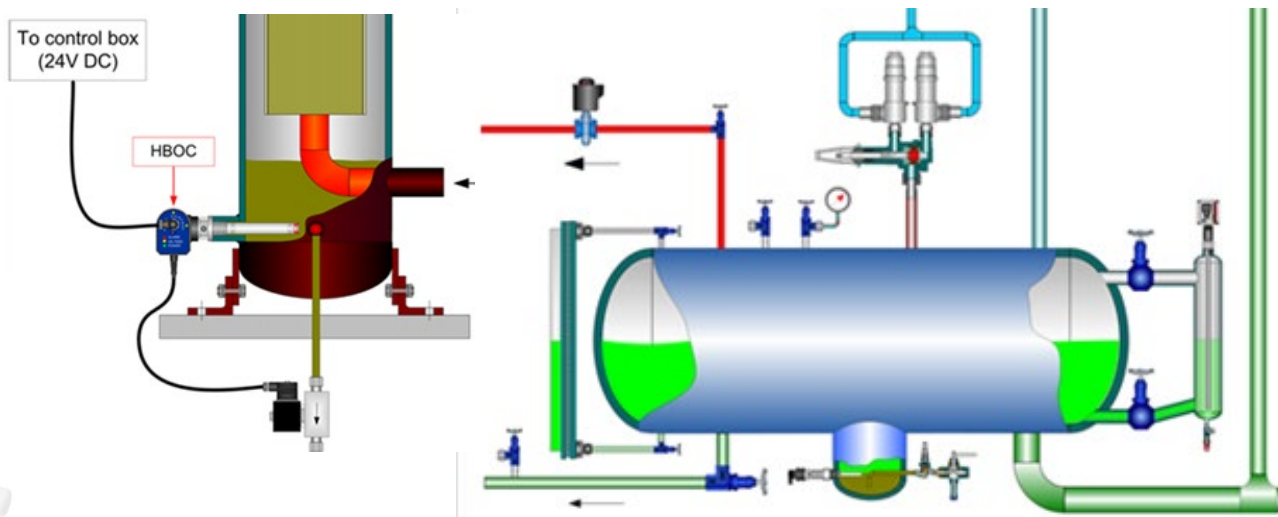


Oil Sensors/Switches

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.

- HB Products** Oil separators – level indication for draining from the separator
- HB Products** Oil reservoir – level indication for draining and filling respectively
- HB Products** Oil system – ensuring that oil is present



Refrigerant Level Sensors

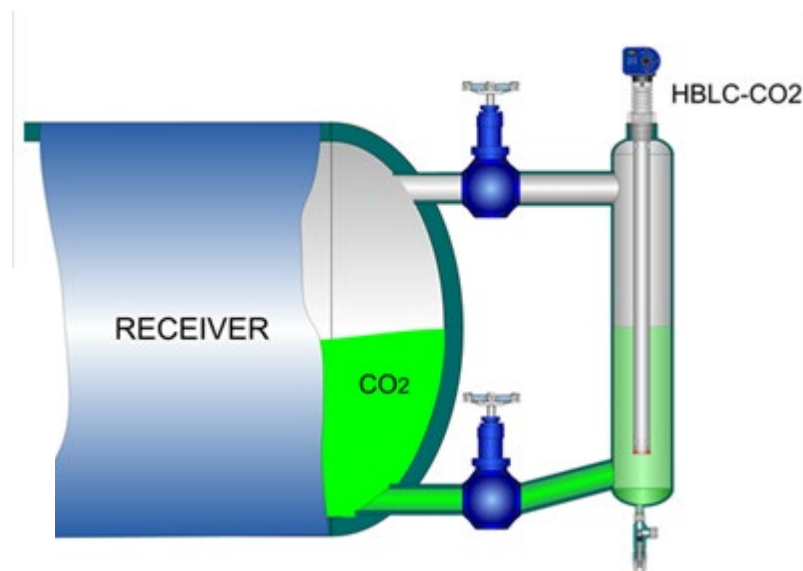
HBLC

- HB Products** Reacts on the refrigerant and transmits the detected level as an analogue signal of 4-20 mA
- HB Products** Stand alone solution together with modulating valve. Flexible and cost effective alternative to float switches

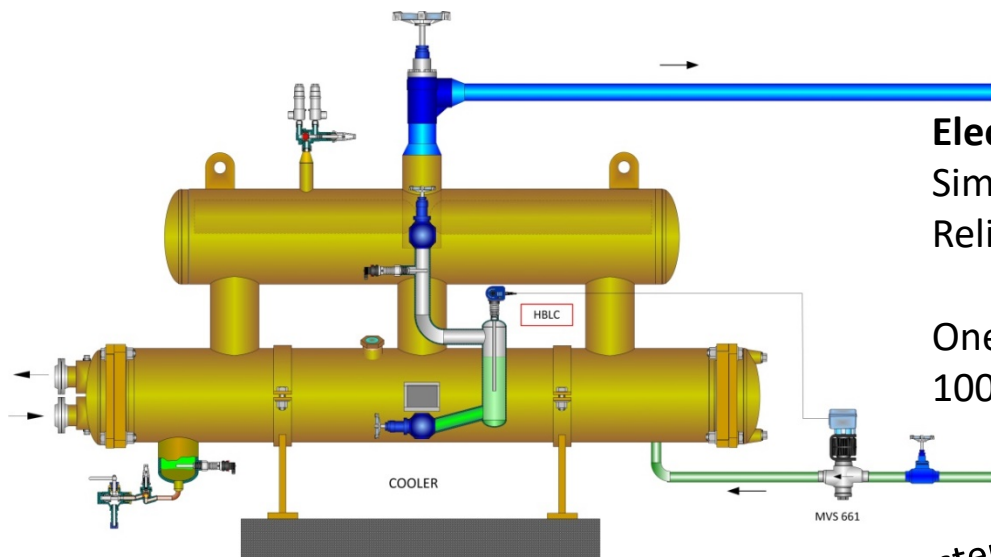
HBLC-CO₂ / HBLC-HFC



HBLC/C-NH₃



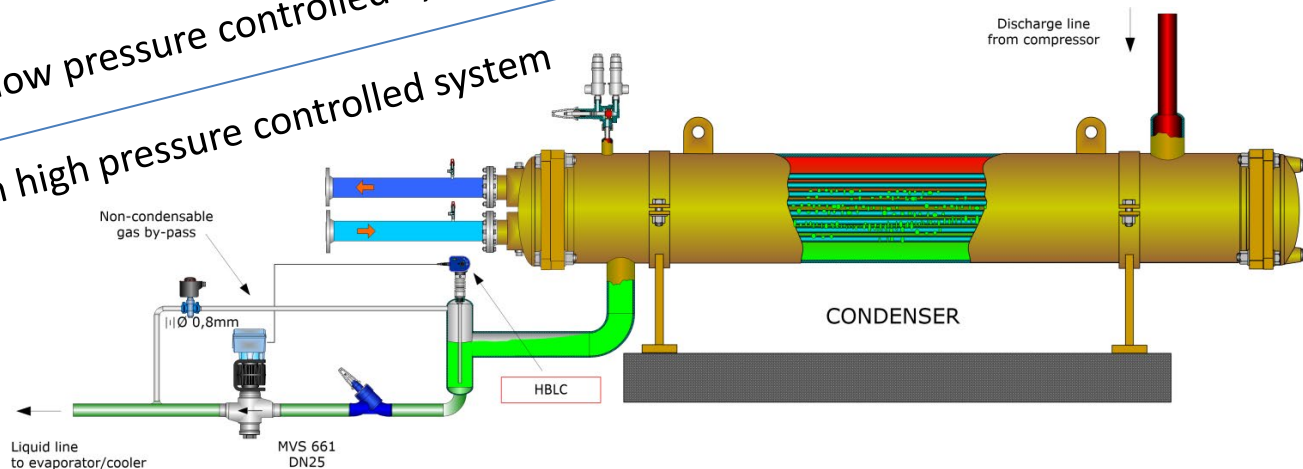
Electronic level regulation (HBLC, Siemens MVS)



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)

HBLC on low pressure controlled system
HBLC on high pressure controlled system

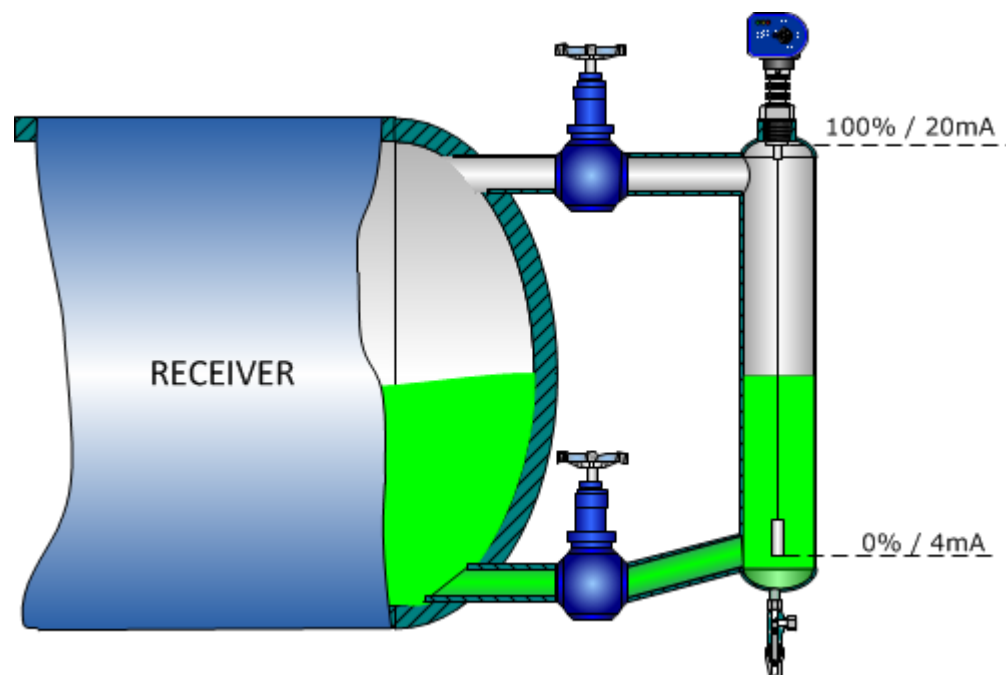




<https://www.youtube.com/watch?v=1w9Mgu2-nzQ>

HBLT-Wire used for NH₃, HFC and HFO

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



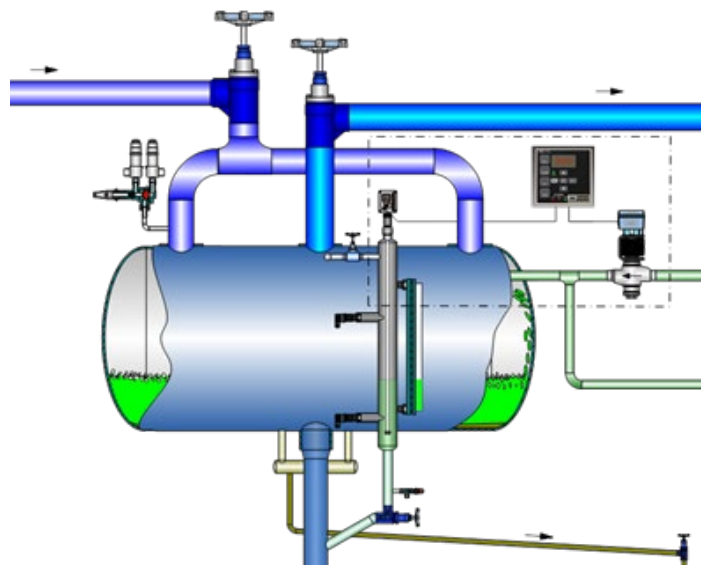
HBLT-A1

- ✓ 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.

HB Products Proven and reliable design with process signal output of 4-20 mA

HB Products Simple calibration function and the possibility to reduce the effect of liquid peaks.

HB Products Designed for the industrial refrigeration industry - max pressure up to 100 bar & high protection degree



New recommended using HBLT-Wire & HBLT-A1/A2 level sensors

Limit 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 /turbulent conditions, we have new recommendation based on recent experience:

For Stand-pipes with stable conditions,(Typically pump separators):

Use an HBLT-Wire or an HBLT-A1/A2 rod-style sensor.

For Stand-pipes with unstable conditions (a lot of turbulence, boiling or foaming):

Use an HBLT-A1/A2 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.

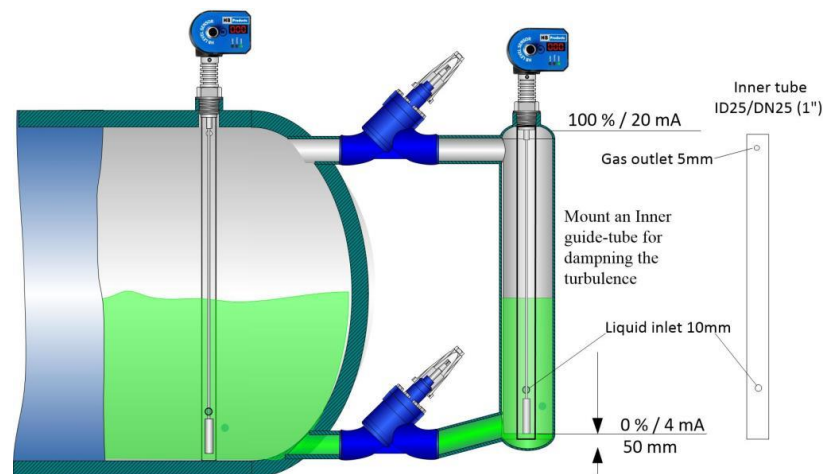
If the HBLT-Wire sensor is already mounted under these conditions WITHOUT a guide-tube, do eventually set the filter time function between **60-120 seconds** to level the signal from the turbulent conditions.

For tank/drum installation:

Use an HBLT-A1/A2 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 dampening the signal from the turbulent conditions.

Note: turbulence can be dampen/attenuated by pinching / closing the upper shut-off valve to a minimum degree of opening.



Refrigerant Control

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

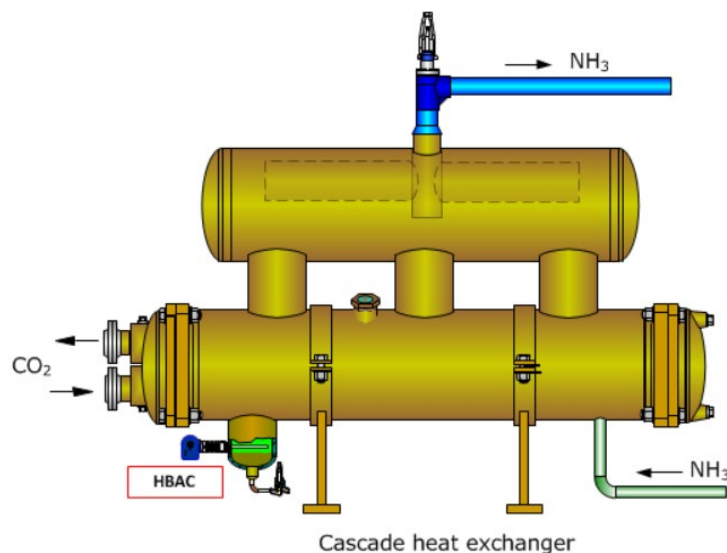


Leakage Sensors

HBAC

- HB Products** *CO₂ leakage detection in NH₃ cascade heat exchanger*
- HB Products** *Simple to install with a sleeve. A cost-optimized solution*
- HB Products** *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.



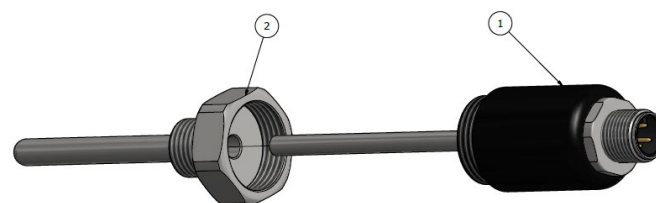
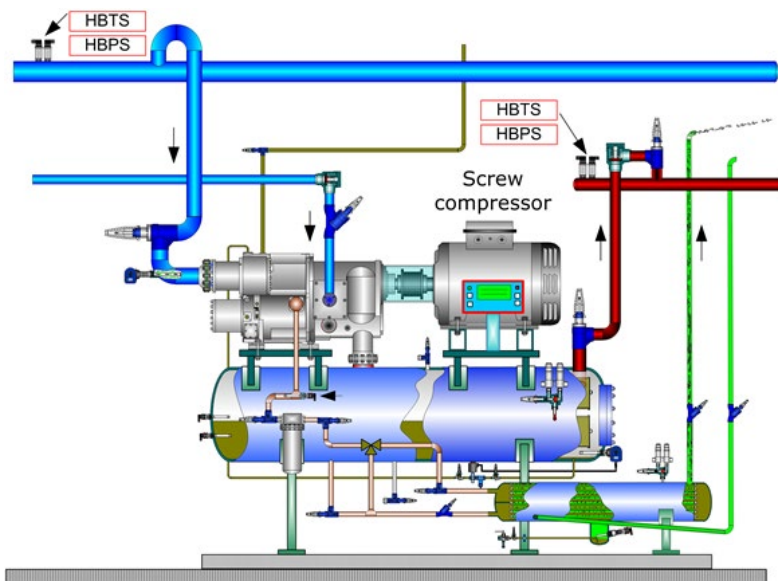
Pressure & Temperature Sensors



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



- Refrigerant temp. $-50 + 130^{\circ}\text{C}$
- Ambient temp. $-30 + 85^{\circ}\text{C}$



Alarm Sensors

HBGS (Gas Sensor)

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

