



**Products**

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UPTIME AND EFFICIENCY  
IN THE REFRIGERATION INDUSTRY

## Instruction manual

# HBLT-Wire – LEVEL SENSOR

For analogue measurements of NH3 and HFC in refrigeration systems



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## Safety Instructions

**CAUTION!** Always read the instruction manual before commencing work! Heed all warnings to the letter! Installation of the sensor 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.

	<p><b>CAUTION!</b> Refers to a possible limitation of functionality or risk in usage.</p> <p><b>NOTE!</b> Contains important information about the product and provides further tips.</p> <p>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.</p>
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**Intended use, conditions of use.** The level sensor is designed for continuous measurement of liquid NH<sub>3</sub> or HFC in refrigeration systems. If the sensor 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.

**Prevention of collateral damage** Make sure that qualified personnel assess any errors and take necessary precautions before attempting to make replacements or repairs, so as to avoid collateral damage.

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

## Introduction

HBLT-Wire is an intelligent sensor with an in-built microprocessor. It is designed for continuous level measurement of liquid NH<sub>3</sub> refrigerant in refrigeration systems.

The sensor emits a 4-20mA analogue signal, which is proportional to the liquid level.

The construction of the sensor makes it suitable for systems with pressure of up to 100 bar.

## Measurement Principle

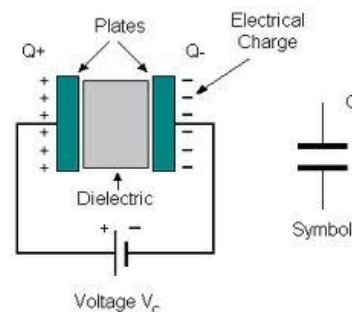
The sensor is a capacitive sensor. The capacitive measurement principle is based on the electrical properties in the proximity of a capacitor. A capacitor is an electrical component that is capable of building and sustaining an electrical charge.

A capacitor basically consists of two plates. When a charge is applied to a 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 (the capacitance) that can be generated depends, among other things, on what is found between the plates. The substance between the plates is referred to as a dielectric.

Rather than the two plates, the sensor for level measurement is shaped as a cylindrical rod. When liquid covers the sensor, the measured capacity is changed.

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

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



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

## Design and Function

The sensor consists of a mechanical part and an electronic part. These are easily separated by a finger nut. The electronic part is designed in accordance with IP65 waterproof rating and so as to resist vibrations.

The mechanical part is produced in AISI304/PTFE and tested to withstand high pressure.

The sensor is a very accurate analogue level transmitter for continuous measurement of liquid NH<sub>3</sub> or HFC on refrigerant plants. Additionally it may serve as high level switch, since the build-in switch function gives alarm signal at 100% level.

## Technical data

### Supply:

Supply:	24 V AC/DC $\pm 10\%$ *
Current draw:	Max 50 mA
Plug:	M12, 5 pins - DIN 0627

### Output:

Analogue output:	4-20 mA
Permitted load on potential free contactless set	1A (24V DC)

### Installation conditions:

Ambient temperature:	-30...50°C
Refrigerant temperature:	-60...+60°C
Max. operational pressure:	100 bar
Waterproof rating:	IP65

### Authorisations:

EMC Emission:	EN61000-3-2
EMC Immunity:	EN61000-4-2

### Mechanical specifications:

Thread connection:	$\frac{3}{4}$ "
Materials - mechanical parts:	AISI304/PTFE
Materials - electronic parts:	Nylon 6 (PA)
Housing design:	Angle

### Calibration & indication:

Calibration	Press-button
LED indication:	Green, yellow, and red

### Cable specification:

Supply cable, 5 meters:	HBxC-M12/5
Cable size:	5 x 0,34 mm <sup>2</sup>
Cable glands:	PG7 / M8
Plug type:	Angle - 90°
Cable type:	PVC-OB grey

### Accessories:

Configuration tool:	HB-Tool
Adapter:	HBS/ADAP/8/2
Plug converter:	HBxC-M12/DIN

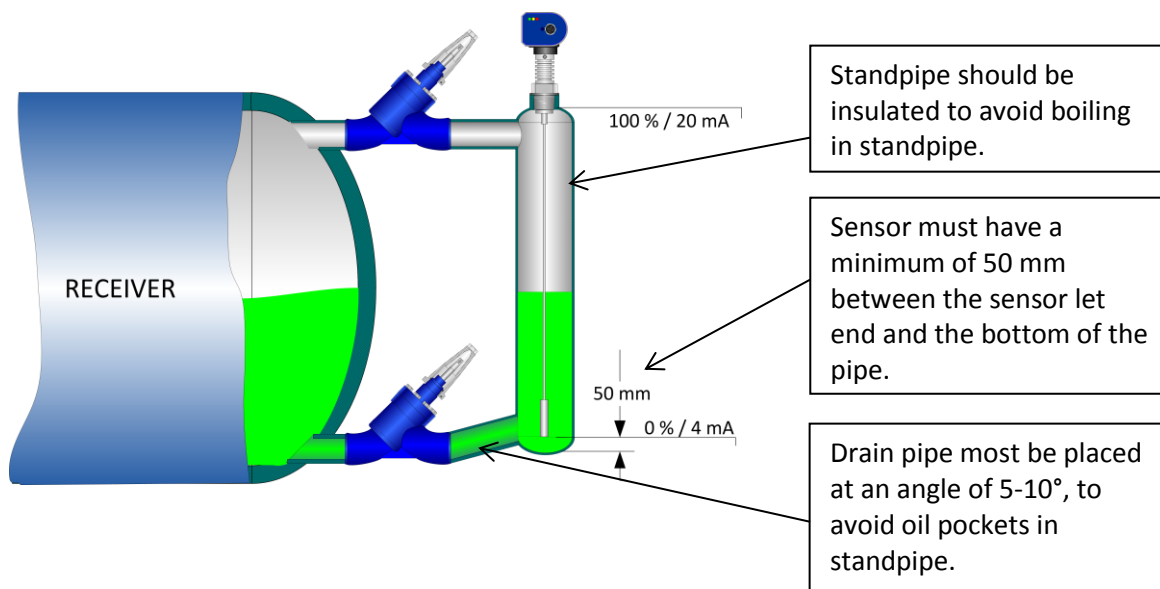


**NOTE!** All terminals are protected against improper termination with a supply voltage up to 40 V. If the supply voltage is greater than 40 V the electronics will be damaged.

**Please note!** Supply Voltage may differ from the data given in the manuals. Applicable will always be the sensor label.

## Application Examples

HBLT-wire is designed for level measurement of liquid NH<sub>3</sub> in chillers, pump separators, coolers and condensers. eg:



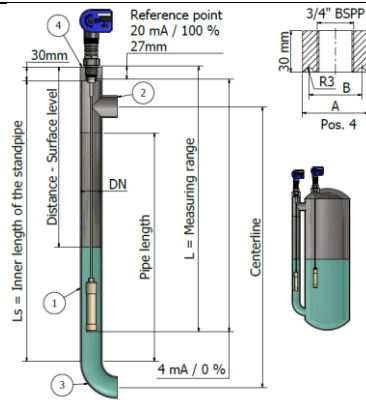
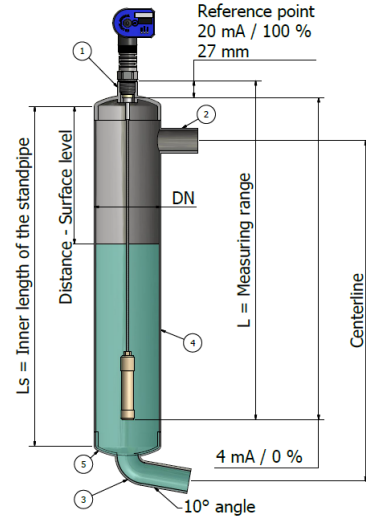
## Installation Instructions

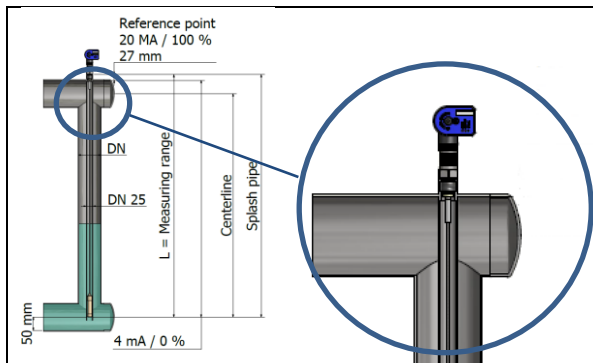
The following applies to the design of the system:

- 1) It must be installed in a vertical position
- 2) Sensor must have a minimum of 50 mm between the sensor let end and the bottom of the pipe.
- 3) The sensor shall be installed in an overflow or stand pipe where the flow stream and turbulence are minimised.
- 4) The stand-pipe shall be mounted in a stand pipe bigger than DN32. Standpipe must be insulated to avoid boiling of refrigerant.
- 5) The outlet pipe from stand-pipe shall be mounted in an angle of 5-10 degree from horizontal. This in order to drain the stand pipe from oil.
- 6) The sensor is installed and is supplied with a standard non-shielded cable.  
 If EMC is greater than described in EN 61326, a shielded cable must be used.



**CAUTION!** In case of welding work on the unit, please make sure that proper earthing is carried out to avoid damaging the electronics.

	<p>Stand pipe: DN32.....DN65.          Recommended pipe standard: DIN 10220          Recommended bending: DIN 2615-1/Type 3          Recommended TEE: DIN 2615-1</p>
	<p>Standpipe: DN65...DN100.          Recommended pipe standard: DIN 10220          Recommended bending: DIN 2615-1/Type 3          Sitepipe can be designed in smaller pipe e.g. 0.5 x DN.</p>



If the sensor is installed in standpipe on front of plate heat exchanger with return liquid flow the wire must be protected against splashing with a protection tube size DN25..DN32.

If a splashing pipe is not installed, the filter time can be changed to 120 sec. See separate manual for sensor configuration.

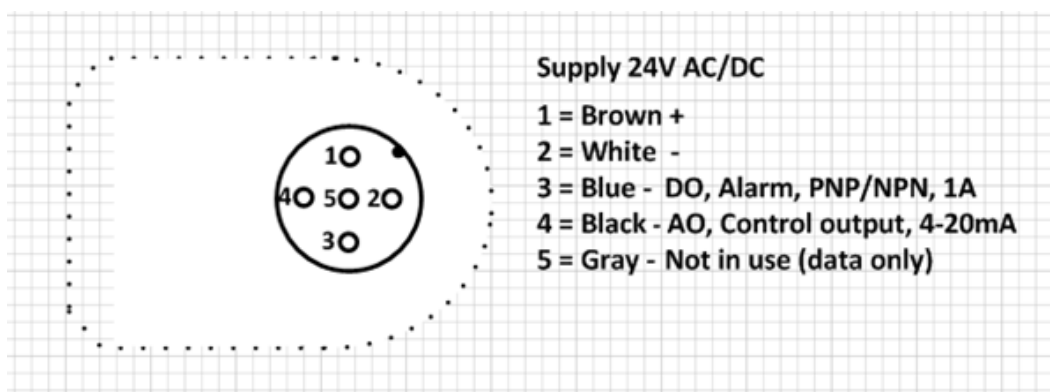
## Power connection

The sensor must be wired with a 4 cord cable with a M12 connection plug

Colour codes in below diagram are related to the cables offered by HB.

The supply voltage is limited to 24V AC/DC

Pin 1 & 2: Power supply. Pin 2 & 4: Analogue output. Pin 2 & 3: Alarm output



## Accessories

If a HBLT-A1 sensor is replaced with a HBLT-Wire sensor below accessories are available. The adapter shall be used to convert thread from 3/4" NPT to 1" G (for European types HBLT-A1-xx). The cable converter fit the old plug from a HBLT-A1 in one end and the HBLT-Wire in the other end.



Threaded sleeve: 1" G / 3/4"NPT

Ordering code: HBS/ADAP/8/2



Converting cable: DIN43650-4pin (male) til M12 – DIN 0627. Calelength: 1 m.

Ordering code: HBxC-M12/DIN

## Installation guide

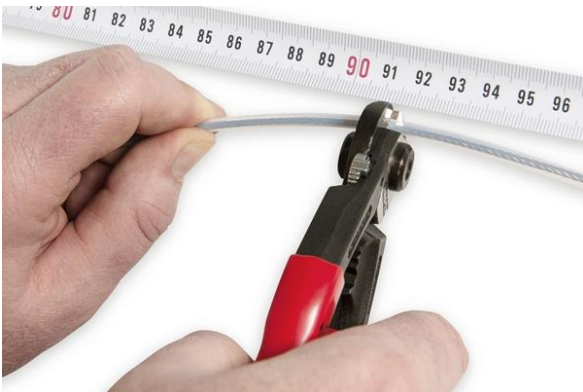
The sensor is installed in the standpipe or directly in the tank. The sensor length is determined by standpipe length or tank height. Steel wire and Teflon hose cut to desired length with a wire cutters or bolt cutter in the end where the let shall be installed. Teflon hose must be mounted outside on the wire. The let shall be fixed by the 2 screws.

HBLT-Wire is installed in an overflow pipe or directly in the container. Liquid gasket is applied to the thread.



To install HBLT-wire, you must use a 2.5 mm Allen key, shifting spanner, and gasket, depending on the type of thread.

Separate the electronic part from the mechanical part



Define the required length of sensor from standpipe. Shorten the wire with wire cutter.

Teflon hose must be 20 mm shorter than wire.

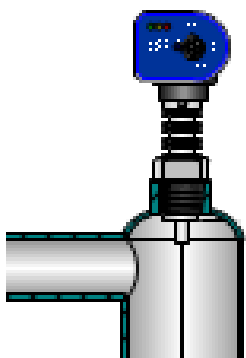


Make sure that wire is in bottom of the hole.



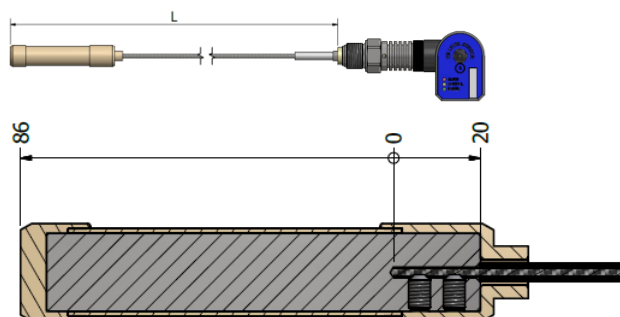
Tighten the 2 set screws to fix the wire.





When sealing the conical thread, you must use liquid conductive sealant, which creates a ground connection between the standpipe/tank and the sensor, since the sensor uses the standpipe/tank as reference. If Teflon is used, it must only be used on part of the thread so that the ground connection is established. If you are in doubt regarding the ground connection, measuring the resistance between the tank and sensor is recommended. This should be approx. 0 ohms.

An aluminium sealing has been included for the sensor with cylindrical thread.



L = Programmable sensor length  
 L = Wire length + 86 mm

Teflon hose must be 20 mm shorter than wire length.

Insert wire in left part and tighten the 2 set screws.  
 Turn the top cover plastic part on the metal part (right-hand thread)

## LED indication

LED indication:

- 1) Green LED indicates 24 V DC supply (blinks during operation)
- 2) Red LED indicates ALARM at 100%



3-digit display:

- 1) Showing 0...100 % corresponding to 4...20 mA.
- 2)

LED Signal	ON/OFF/Frequency	Functionality
Green	ON	Supply
	OFF	No supply
Red	ON	Alarm is activated after 10 seconds with 100% level. Will deactivate when liquid level drops below hysteresis.
	OFF	No alarm

## Installation of HB Configurations Tool

See separate manual.

## PC Configuration

See separate manual.

## Fault detection

General: In case of fault, it is enough to only replace the electronic part.



**NOTE!** Fault detection and/or changing the electronic function can be carried out without releasing pressure from the system or disassembling the mechanical part of the sensor.

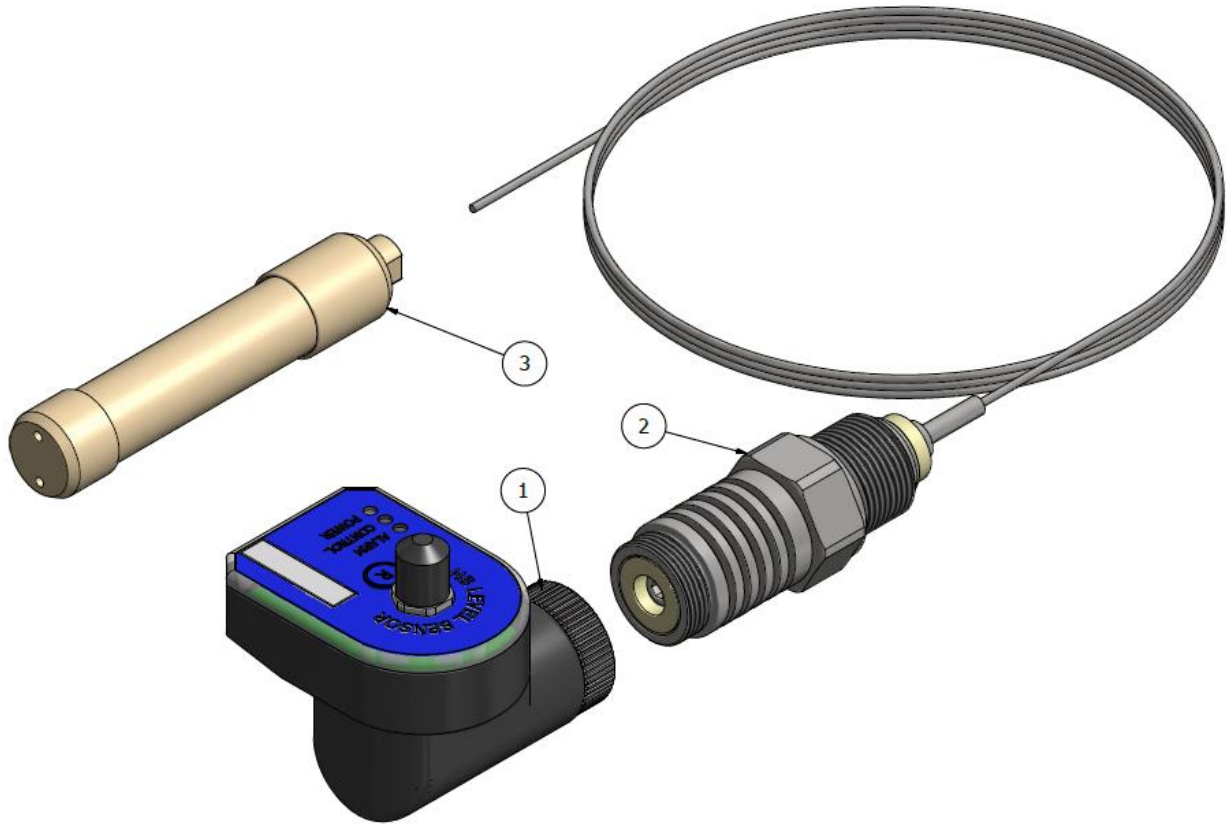
### Fault detection

Fault	Reason	Correction of fault
No LED is on / no function	No supply to the sensor or defective cable/plug.	Check the power supply and the supply cable.
No contact activation	There may be dirt between the electronic housing and the mechanical housing.	Separate the two parts and clean the spring tip.
Delay in sensor activation	1) Can be caused by gas and formation of foam in the system. 2) Can be caused off to high filter time programmed in sensor tool.	1) Check that the sensor is placed optimally, so that gas and air are avoided. 2) Change the filter time value in the sensor configuration tool. See separate manual.
There is no correlation between the output signal and the measuring distance.	The sensor is not calibrated correctly.	Perform 0 % calibration at empty standpipe.

## Sensor Repair

In case of faults with the sensor, it will typically only be necessary to replace the electronics. Reach an agreement with the distributor about how to handle complaints.

## Spare Parts



Position	Description	Specification	Part number
1	Electronic part	PC-programmable	HBLT-Wire-EL
2	Mechanical parts	$\frac{3}{4}$ " NPT	HBLT-Wire-2-MEK
		$\frac{3}{4}$ " BSPP	HBLT-Wire-6-MEK
3	Wire plum	22,5x115	HBLT-Wire-PLUM

## Further Information

For further information, please visit our website, [www.hbproducts.dk](http://www.hbproducts.dk), or send an email to: [support@hbproducts.dk](mailto:support@hbproducts.dk).

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