

Instruction manual

HBSC2 – CO₂ switch

For detecting liquid CO₂ in refrigeration systems



Introduction

HBSC2 is a level switch for detecting liquid CO₂ in refrigeration systems

Typically, it is installed in/on the receiver, but it is also suited for installation in other locations where one wants to obtain a level indication.

The sensor's measurement principle makes it unique for these purposes, since the properties

of the measurement principle as well as the construction allows it to withstand high pressure and low refrigerant temperatures.

The sensor is suited for use on transcritical CO₂ refrigeration systems.

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.

Principally, a capacitor 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.

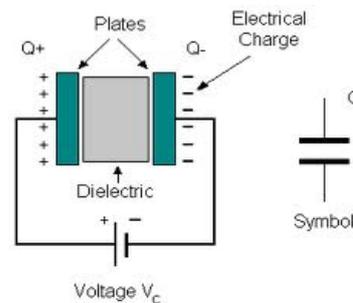
Rather than of the two plates, the sensor for level measurement is shaped as a cylindrical rod. When liquid covers the sensor, the measured capacity changes.

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

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

Design

The sensor consists of a mechanical part and an electronic part. These are easily separated by loosening 2 grub screws, or for mechanisms with mounting tabs, by pressing the electronic part in towards the mechanical part and turning the housing counter-clockwise until a wave washer pushes it from the mounted position. The electronic part is designed in accordance with IP65 waterproof rating and so as to withstand vibrations. The mechanical part is produced in AISI304/PTFE and tested to withstand high pressure.



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.

Technical data

Connection:

Supply:	24 V AC/DC $\pm 10\%$ *
Current draw:	Max 50 mA
Current consumption:	< 10 mA
Plug:	DIN 43 650
Required cable size:	3 x 0,34 mm ²
Required cable glands:	PG7 / M8

Output:

Transistor output:	PNP or NPN
Output function:	NC or NO

Installation conditions:

Ambient temperature:	-20...+50°C
Refrigerant temperature:	-50*...+100°C
Max. operational pressure:	150 bar
Waterproof rating:	IP65
Vibrations:	IEC 68-2-6 (4g)

Authorisations:

EMC Emission:	EN61000-3-2
EMC Immunity:	EN61000-4-2
GOST R:	No 0903044

* For installation of heating element. Otherwise, the minimum temperature is – 30°C.

Mechanical specifications:

Thread connection:	$\frac{3}{4}$ "
Materials, mechanical:	AISI304/PTFE
Materials, electronics:	Nylon 6 (PA)

Indication:

LED indication :	4 x LED (red)
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Accessories:

Heating element:	HBHE
Plug with power supply:	HBPA (110/240 VAC for 24 VDC)



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.

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

Function

HBSC2 is a level switch for detecting liquid CO₂ in refrigeration systems.

Typically, it is installed in/on the refrigerant container, but it is also suited for installation in other locations where one wants to obtain a level indication.

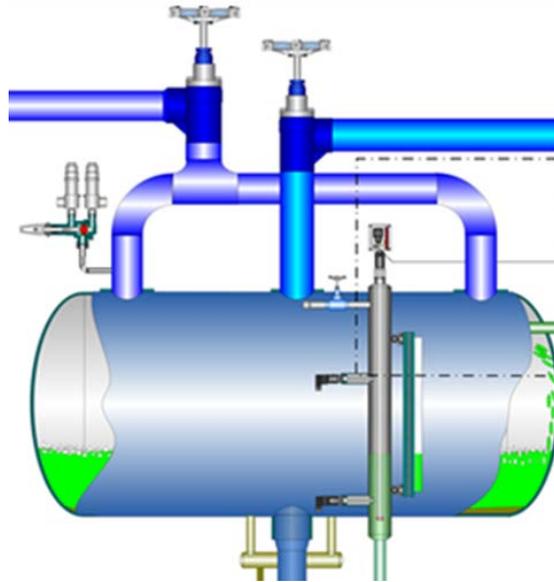
The sensor differentiates between liquid CO₂ and gas, so that the electrical signal from the sensor changes when the liquid level drops below/rises above the level it was installed at.

The sensor is calibrated to switch in the centre of the sensor's cylindrical part, with a hysteresis of about 1 mm. When the CO₂ liquid is on the same level or above this point, 4 LEDs light up (irrespective of the output function NO/NC).

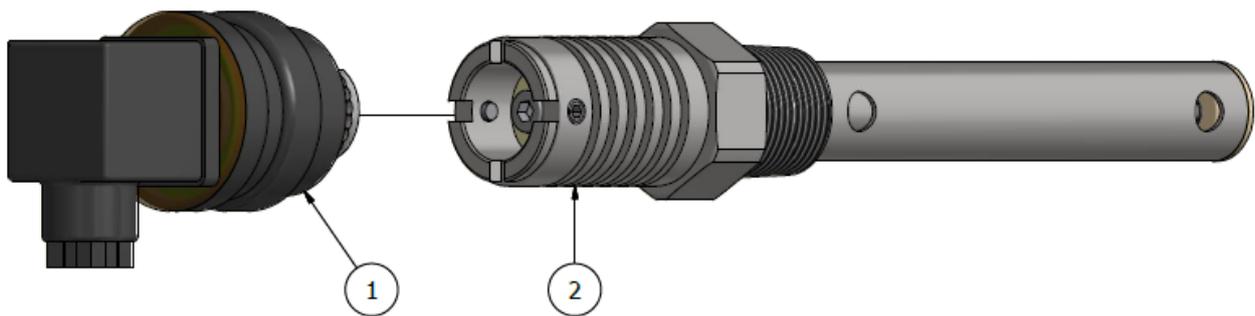
Examples of usage

The HBSC2 switch is well suited for:

- Indication of high and low refrigerant levels in liquid separators, pump separators, economisers, and inter mediate coolers
- on/off control of liquid injection in liquid separators, pump separators, economisers, and inter mediate coolers



Spare parts:



Position	Specification	Type	Part number
1	Electronic part	PNP/NO	HBSC2-EL/PNP/NO
		PNP/NC	HBSC2-EL/PNP/NC
		NPN/NO	HBSC2-EL/NPN/NO
		NPN/NC	HBSC2-EL/NPN/NC
2	Mechanical part	3/4" NPT	HBSC2-MEK-2
		3/4" BSPT	HBSC2-MEK-4
		3/4" BSPP	HBSC2-MEK-6