

Instruction manual

HB switches with circular electronic unit

Covers: HBSC, HBSR, HBSR-HFC, HBSO-LT, HBSO1, HBSO2, HBOR, HBSO1-MT & HBSO2-MT



Functionality











The switches are used for detecting liquid in gas or air (HBOR detect oil in liquid ammonia). The mechanical elements have different design because they are optimized to different liquids. The switches use the capacitive measuring principle and react to the difference in dielectric constant between liquid and gas.

The switches have different calibration and parameter settings in the electronic unit, but unit is the same. The settings cannot be changed by the user, and it must match the mechanical part. Switches delivered after September 2020 has a build in heater which will be in operation below 5°C to keep the sensor dry













Standard switches available from HB-products

Switches from HB-products are suited for different fluids, different temperature ranges and supply voltages. There is a special program for oil switches. The two tables show the recommended products.

Oil switches

Supply voltage and recommended oil temperature Allowed temperature is typically higher	PAO Mineral	POE PAG	Application	Design	Settings NO/NC NPN/PNP Available in special EX version (different electronic unit)
24 V AC/DC low temp -30-40 °C (-22-104 °F)	HBSO-LT		Refrigeration		Preset 
90-240 V AC - low temp -30-40 °C (-22-104 °F)	HBSO-SSR-2-LT		Refrigeration		Preset Relay output
24 V AC/DC - normal temp 0-60 °C (32-140 °F)	HBSO1	HBSO2	Refrigeration		Preset 
90-240 V AC - normal temp 0-60 °C (32-140 °F)	HBSO1-SSR-2	HBSO2-SSR-2	Refrigeration		Preset Relay output
24 V AC/DC - medium temp 40-100 °C (104-212 °F)	HBSO1-MT	HBSO2-MT	Heat pump		Preset 
24 V AC/DC high or all temp 90-145 °C (194-293 °F) 0-145 °C (32-293 °F) changed settings	HBSO-SSR-1-HT		Oil separator or universal		Can be changed Relay output 
24 V AC/DC- Oil return switch -30-80 °C (-22-176 °F)	HBOR		Oil return system NH3		Preset

Liquid switches

Supply voltage, recommended liquid temperature and IP class Specified temperature range is typically wider	Liquid			Electronic part design	Settings NO/NC NPN/PNP EX version (different electronic unit)
	R744 CO2 R600 Butane R600a Isobutane R290 Propane	R507, R410a, R407c R404a, R22, R32, R134a, R1234yf, R1234ze Other HFC/HFO	R717 NH3, R718 Water, Alcohols		
24 V AC/DC – dry conditions -40-50 °C (-40-122 °F) IP54	HBSC2	HBSR-HFC HBSR	HBSR	 V-track connection	Preset 
24 V AC/DC – elevated temp. 50-80 °C 122-176 °F) IP54	HBSC2	HBSR-HFC	HBSR-HP	 V-track connection	Preset 
24 V AC/DC – for wet and condensing applications IP66	HBSC2-U	HBSR-HFC-U HBSR-U	HBSR-U	 Treaded union	Preset 
90-240 V AC - normal temp -55-80 °C (-67-86 °F) IP54	HBSC2-SSR-2	HBSC-HFC-SSR-2 HBSC-HFC-SSR-2	HBSR-SSR-2		Preset Relay output
24 V AC/DC low ambient temp -55-30 °C (-67-86 °F) IP66	HBSC2-SSR-1/IP	HBSR-HFC-SSR-1/IP HBSR-SSR-1/IP	HBSR-SSR-1/IP		Can be changed 
Mechanical part design					

What can happen if the switch is installed outside the recommended temperature range

The HB-products web page has temperature specifications for the switches, and these will be different from the recommended temperature specifications. The switches will operate outside the recommended range but will not be optimal. For oil switches the switch point will change with temperature and this means there is a risk that the switch will not detect oil or detect without oil. For sensors installed in low temperatures condensation might occur and water run into the connection between the mechanical and electrical unit. This might disturb the measurement. Sensors designed for low temperatures has treaded union which is waterproof.

Labelling:

The switches are delivered as NO/NC and NPN/PNP connection. The switches setting is printed on the small silver label on the switch together with the type code. On the same label you find a combined version number and manufacturing date and in second row a unique production number.



TYPE: HBSO1 CONFIGURATION:
PNP/NO



VERSION: VU10 DATE: 080319 DDMMYY
Production no. 400000

Safety Instructions

CAUTION! Read the instruction manual before commencing work! Heed all warnings. Installation of HBSR 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 products, 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.

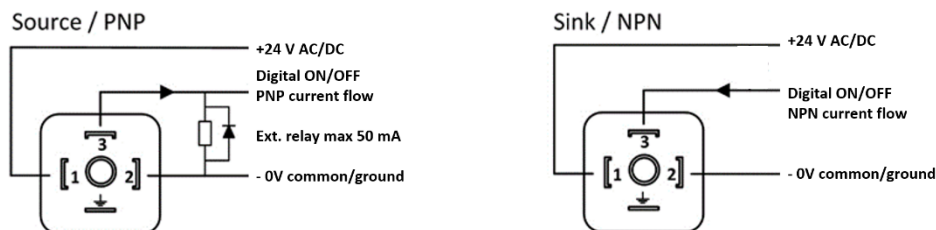
Intended use, conditions of use. The switch is manufactured to detect liquid. If the switch is to be used in a different way or for another purpose, and if the operation of the product in this function is determined to be problematic, prior approval must be obtained from HB Products.

Prevention of collateral damage. Make sure that qualified personnel assess any faults and take necessary precautions before attempting to make replacements or reparations, to avoid collateral damage.

Disposal instructions: The switch is built so the modules can easily be removed and sorted for disposal.

Electrical connections

The switch can be supplied with 24V±10% AC or DC. A standard ISO 4400 connector is used. The power consumption will depend on the temperature due to a built-in heater. Wiring is done according to the drawings below depending on the version PNP or NPN. For the PNP versions a relay can be applied between pin 2 and pin 3.



The switch is predefined as NO (normally open) or NC (normally closed) and this refers to the contact in the switch, in dry condition.

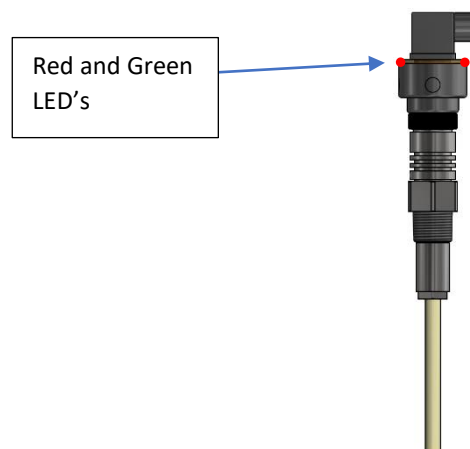
LED indication

4 x red LED's indicate liquid/oil detection.

4 x green LED's flashing indicate no detection, but sensor is active.

4 x red flashing LED's indicate no connection to mechanical unit.

Irrespective of the output function (NO/NC) LED's are activated when liquid is detected.



Mechanical installation

The switch is installed in a vessel or compressor, using Teflon tape or liquid sealant, for those with NPT thread. Switches with a straight tread is delivered with a washer kept in place by an O-ring or a plastic spring. The O-ring or a plastic spring should be removed before installation.

Switches installed in ammonia, water and alcohol has a mechanical element covered with PTFE. This is a part of the switch and should remain on when installed.

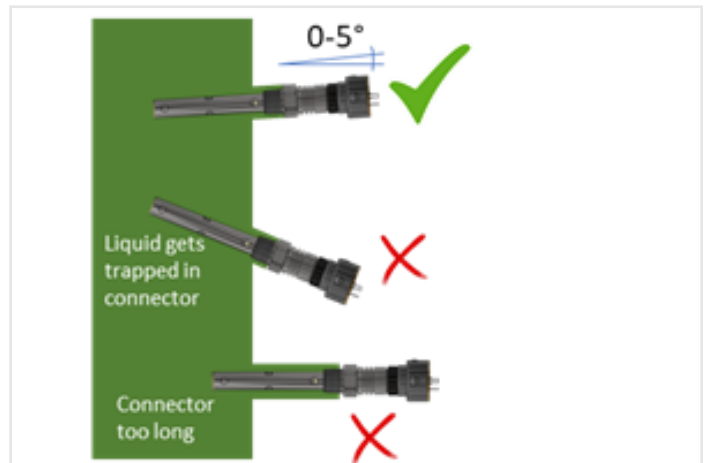
All switches can be installed horizontally except for switches in cold conditions, where the liquid has high viscosity. For these switches, make sure liquid can drain from the switch. This can be done by sloping the switch 0-5 degrees downwards.

Long weld adapters should be avoided because gas pockets can build up and disturb the measurement.

Switches pointing upwards can collect liquid which disturb the measurement.



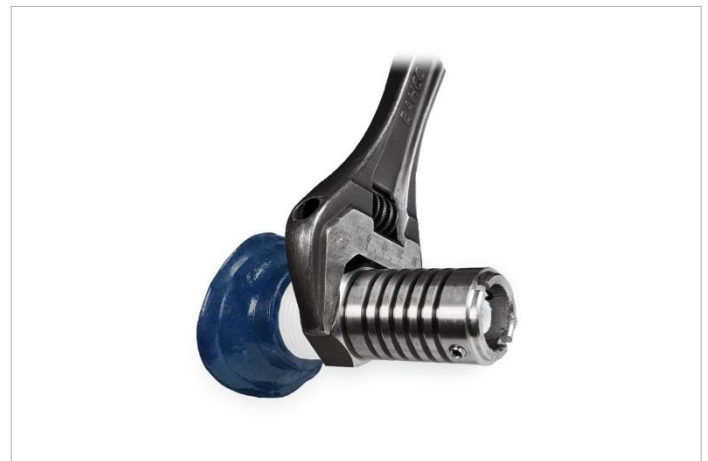
Disconnect the electronic unit by loosening the threaded union or the two set screws.



In cold conditions the switches can be installed with a downward slope.



Apply Teflon tape or liquid gasket on sensors with a conical thread. For other thread types, a washer is used.



Fasten the mechanical part with the shifting spanner (tightening torque 80-150 Nm, depending on thread type).

Mounting the electronic unit

The electronic unit is mounted with either a threaded union or with two set of screws in a V-track. The threaded union is mainly used for switches operating in cold conditions. The set screws are tightened with a torque of 5 Nm and the threaded union is tightened firmly by hand or by using pliers to secure a good electrical connection. For cold installations where condensation occur the treaded union should be used to avoid poor contact between electrical contact between mechanical and electrical unit.

Fault detection

In case of fault, it is normally enough to replace the electronic part.

Fault	Possible Reason	Correction of fault
No LED is on when the sensor is in the medium.	No supply to the sensor or defective cable/plug.	Check the power supply or replace the power supply cable.
Output and 4xLEDs are constantly activated, even though liquid is not in contact with the sensor.	Water or moisture shortcut the sensor between the mechanical and electrical part	Use a sensor with treaded union or dry the parts and make a suitable cover against water

Sensor repair:

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

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

If you have a faulty product, please contact the HB Products dealers/distributors.

Their complaints procedures must be followed before returning the sensor.

Further information

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