Instruction manual
HB switches with large electronic unit

Covers: HBSC2-SSR, HBSR-SSR, HBSO-SSR



Functionality

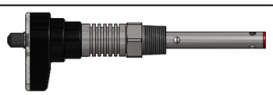
The switches are used for detecting liquid in gas or air (HBOR detect oil in liquid ammonia). The mechanical elements have different design because they are optimized to different liquids. The switches use the capacitive measuring principle and react to the difference in dielectric constant between liquid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

The switches have different calibration and parameter settings in the electronic unit. The basic electronic unit exist in two versions 24 V and 90-240 V, and it must match the mechanical part.

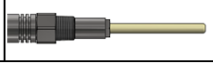
Standard switches available from HB-products

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

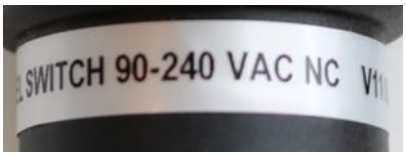
Supply voltage, recommended liquid temperature and IP class Specified temperature range is typically wider	Liquid				
	R744 CO_2 **R600** Butane **R600a** Isobutane **R290** Propane	**R507, R410a, R407c R404a, R22, R32, R134a, R1234yf, R1234ze Other HFC/HFO**	**R717 NH3, R718 Water, Alcohols**	**Electronic part design**	**Settings NO/NC NPN/PNP EX version** (different electronic unit)
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. 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.



Switch with NC configuration

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.

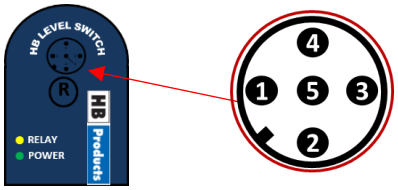
Prevention of collateral damage. Make sure that qualified personnel assess any faults and take necessary precautions before attempting to make replacements or reparations, to avoid collateral damage.

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

Electrical connection

The switch exists in two versions one supplied with 24V AC/DC and one with 90-240V AC. The switch is delivered as NO (normally open) or NC (normally closed) and this refers to the contact in the switch in dry conditions. The 24 V version switch can be changed between NO and NC – this is described in a later section. The switch is connected to the power source on pin1 and pin 2. The contact is potential free relay and it is connected to pin 3 and pin 4

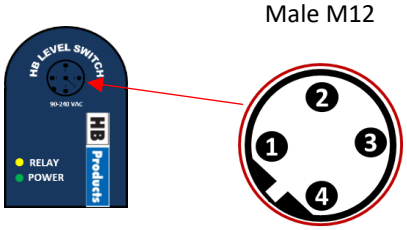
24 V



1 Brown	+24 VDC or 24 V AC
2 White	- common or 24 V AC
3 Blue	Output potential free
4 Black	Output potential free
5 Grey	Communication

Male M12

90-240 V



1 Brown	90-240 V AC
2 White	90-240 V AC
3 Blue	Output potential free
4 Black	Output potential free

LED indication

3 x green LED´s indicate liquid detection
Yellow LED “RELAY” or “ON” indicates closed contact between pin 3 and pin4
Green LED “POWER” indicate power is connected and switch is active when flashing

Irrespective of the output function NO/NC, the three LEDs are activated when liquid is detected.
Some switches have a LED labeled “ALARM” which is not in use.

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. These two should be removed before installation.

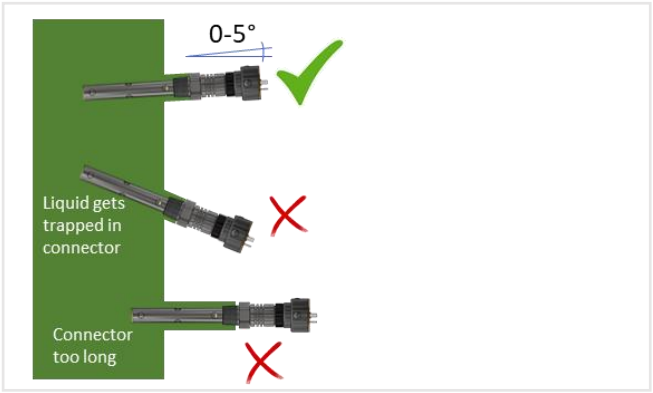
Switches installation in ammonia, water and alcohol has a mechanical element covered with PTFE. This is a part of the switch and should remain on when installed.

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 1- 5 degrees downwards

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

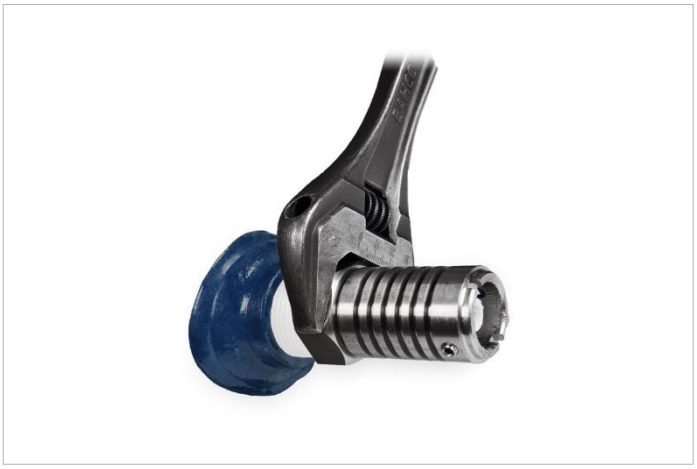
Switches pointing upwards can collect liquid which disturb the measurement.

Disconnect the electronic unit by loosening the treaded union or the two set screws



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

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



Fasten the mechanical part with a suitable 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.

Electrical specifications

Supply AC/DC 24V ± 10 % or 90-240V AC

Connector: M12 IEC 61076-2-101

- 5 pin A type for 24 V
- 4 pin B type for 90-240 V

Relay output

- 24 V current max 1A
- 90-240 V max 40 W

Changing from NO to NC and NC to NO

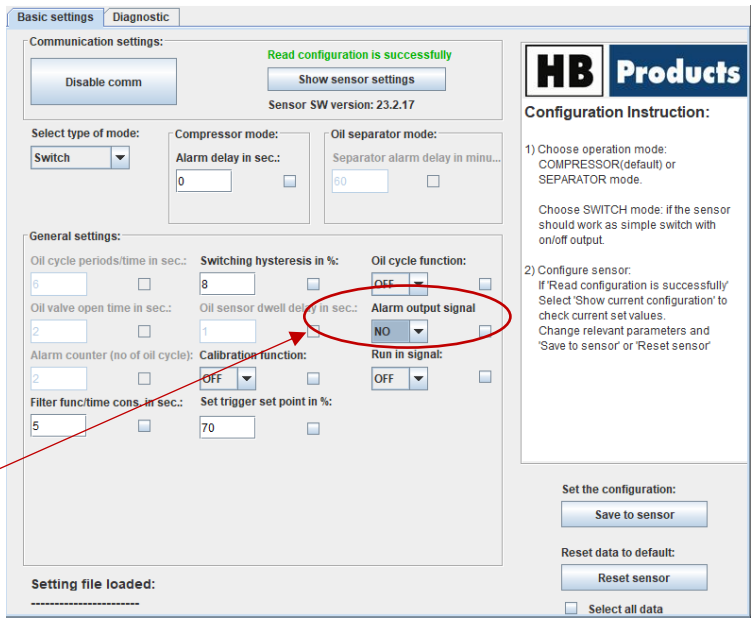
Setting up the switch

The HB tool has two pages of settings. Most fields will be shown in grey when they are not relevant/active with the setting chosen. Detailed explanations of the individual fields will show up when the mouse is moved over the field. Only the latest version of the tool has this feature.

To change the sensor from NO to NC or opposite you connect the switch to a pc using the USB cable Under basic settings you can change the “alarm output signal” in the dropdown menu. After changing the value, you store the data by clicking “save to sensor”. The data is then saved and stored in the sensor and remains there even when the power supply is disconnected.

Connecting the sensor

All sensors are connected to a PC using an USB/M12 cable



Here you select NO or NC

Other parameters can be changed if needed

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 3xLEDs 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.