Instruction Manual

HBGS – Gas Leakage Sensor for NH3 and CO2

Table of Contents

Safety Instructions

CAUTION! Always read the instruction manual before commencing work! Read 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, must always be read and adhered to.

	CAUTION! Refers to a possible limitation of functionality or risk in usage.
	NOTE! Contains important information about the product and provides further tips.
	The person responsible for operation must commit to adhering to all the legislative requirements, prevent accidents, and do everything to avoid damage to people and materials.

Intended use, terms of use. The leakage sensor is designed for leakage measurement in and around industrial 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 faults 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

HBGS fulfils the requirements for gas leakage measurement in accordance with F-GAS regulation EU/517/2014. HBGS detects NH3 (R717) in a range of 0-1000 ppm or 0-5000 ppm and CO2 (R744) in a range of 0-10000 ppm. It is an independent unit that must be supplied with 24 V DC. It has 3 built-in digital alarm outputs and one analog 4-20 mA output. You can adjust the alarm using a PC with the HB Configuration Tool and a special USB cable and an adapter

Design and Function

The NH3 sensor version uses a sensor head which has a lifetime of two years in severe conditions and longer if no NH3 is present during normal operation. The CO2 sensor version has a lifetime of more than 5 years. Both sensor elements can easily be replaced and does not require a new calibration.

On the front, you can find 4 integrated LEDs for display of the supply (green) as well as 3 alarm levels (red, orange, and yellow). There is a R button used for resetting after an alarm and putting the sensor in service mode used when doing maintenance with a controlled gas leakage. The sensor is factory calibrated and does only require additional calibration in special applications. The sensor is optimized for use in machine rooms and similar environments. Built-in heating element ensures operation in ambient temperatures down to -30 ° C.

The sensor comes with a calibration certificate as well as with pre-configured alarm limits.

Technical Data

Supply voltage: 24 V DC – Power consumption max 3watt
Connection: Screw terminals
Cable glands: 2 x PG7

Alarm: Can be configured with HB-tool and an USB cable and an adapter
Measurement accuracy NH3   Repeatability +/-10%
Measurement accuracy CO2   Repeatability +/-2%

Standard alarm configuration:
Factory settings - alarms according to EN378

Gas	Measuring range	Alarm A (main alarm)	Alarm B (pre-alarm)	Alarm C (pre-alarm)
NH3	0-1000 ppm	800 ppm	500 ppm	200 ppm
NH3	0-5000 ppm	4000 ppm	2500 ppm	1000 ppm
CO2	0-10000 ppm	8000 ppm	5000 ppm	2000 ppm

Output:

Analog output:	4-20 mA	Installation conditions:	
Max load:	500 ohm	Ambient temperature:	-30…+50°C
Alarm output:	3 x SPDT, 0,5A	Waterproof rating:	IP20, box IP65

Certifications:		Mechanical specifications:	
EMC Emission:	EN61000-6-4	Dimension:	82 x 59 x 126 mm
EMC Immunity:	EN61000-6-2	Material:	Plastic
		Mounting:	On walls with screws

Application Examples

The sensor is designed for leakage measurement of refrigerant in industrial refrigeration systems. It can be installed where the gas potentially can leak, typically in the machine room or where you have the evaporators or condensers inside.

General Installation Instructions

The following applies to system design:

1)	The sensor may be installed and supplied with a standard unshielded cable. If the EMC is higher than described in EN 61326, a shielded cable must be used.
2)	If the sensor is mounted in dusty conditions or where water is used for cleaning the sensor head should be pointing downwards as the sensor might be block or damaged by the water. A protection of the head is recommended during cleaning using water. Remember to remove the protection after cleaning
3)	It is recommended to install the sensor in stairways and other places where gas pockets can form.
4)	If a ventilation system is installed, it would make sense to place a sensor at the inlet.

Special Instructions for NH3

Ammonia is lighter than air so the sensor should be installed above the potentially leaking components or at least 1.5 m from the ground.

1)	The sensor must be mounted at a distance of at least 150 cm from the floor.
2)	By safety valves, the sensor must be placed 1-2 m above the outlet to secure fast reaction.

Special Instructions for CO2

CO2 is heavier than air so the sensor should be installed below the potentially leaking components and maximum 0.5 m from the ground.
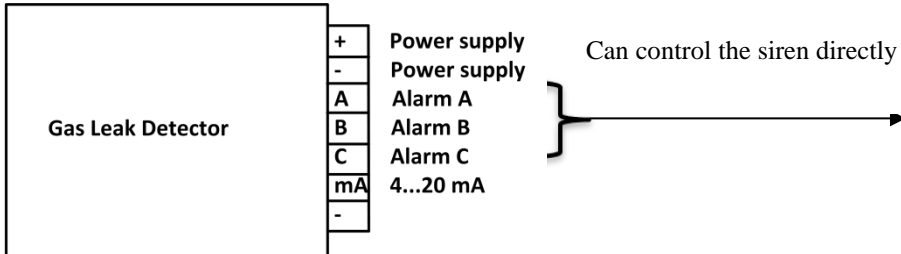
1)	The sensor must be mounted maximum 50 cm above the lowest point in the room.
2)	If there is a basement in open connection which the machine room, it should be placed there
3)	By safety valves, the sensor must be placed below the outlet to secure fast reaction.

For refrigeration systems, HB Products recommends sensor installation at the following locations:

A.	At the safety valve and valve stations
B.	In the machine room
C.	At the pump separator
D.	At the evaporators
E.	At condensers when mounted indoor

Electrical Connection

The sensor is supplied with 24 VDC.

+	Power supply	
-	Power supply	
A	Alarm A	Can control the siren directly
B	Alarm B	
C	Alarm C	
mA	4...20 mA	
-		

Gas Leak Detector

Nexus 105 Siren w. orange flash
Power consumption max 1.6watt

The sensor can be connected directly to a siren using the Alarm A, Alarm B, Alarm C and ground. At the same time the mA signal can be send to a PLC

Analog output signal is linear with the gas content.

NH3 0-1000 ppm	NH3 0-5000 ppm	CO2 0-10000 ppm	Output mA
0 ppm	0 ppm	0 ppm	4 mA
200 ppm	1000 ppm	2000 ppm	7,2 mA
500 ppm	2500 ppm	5000 ppm	12 mA
800 ppm	4000 ppm	8000 ppm	16,8 mA
1000 ppm	5000 ppm	10000 ppm	20 mA

The cables used for connecting to the PLC and for the siren must be mounted with the ferrite clamps included in the package. They make the sensor less sensitive to EMC.

Ferrite clamp

Functionality

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) is activated in case of a leak

Power LED is activated when the sensor is being connected to power.

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 reset, there is still an gas leak in the room.
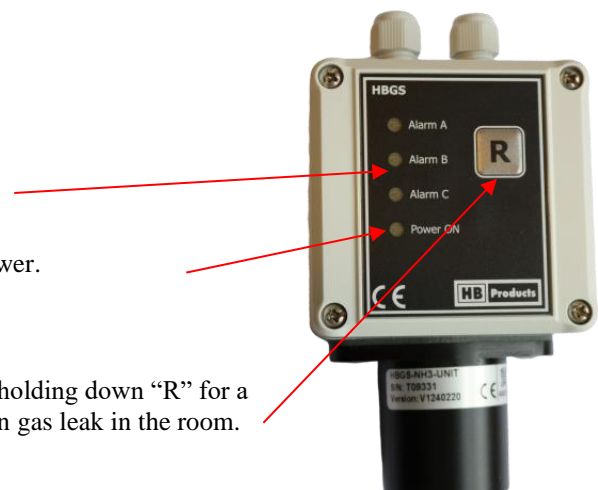
Service mode

The sensor can be put in service mode, which means it is not reacting on gas for 60 minutes or until switched off again. Service mode is activated by pressing the "R" button for minimum 15 seconds until the "Power ON" LED starts to flash fast. Going back to normal mode is done by pressing the "R" button for minimum 15 seconds until the "Power ON" LED show constant light for more than 5 seconds.

Indication	Result - meaning
Alarm A constant light	Main Alarm gas level has exceeded Alarm A threshold
Alarm B constant light	Gas level has exceeded Alarm B threshold
Alarm C constant light	Gas level has exceeded Alarm C threshold
Power ON constant light	Normal operation
Power ON flashing slowly	Heating up – it takes 3 minutes
Power ON flashing fast	Sensor in service mode – does not react on Gas for 60 minutes
All LED flashing	Error - sensor head missing or other error

Lifetime and verification

The NH3 sensor head has an expected lifetime of two years and then the entire head is replaced. The sensor output can slide up to 2% per month and it is affected by the gas level content in the area – it is these two factors which set the lifetime to two years.
The CO2 sensor head has a lifetime of at least 5 years.
The sensor verification must follow the local requirements and it can be verified using a suited test gas and a test kit.
Test gases must be purchased locally as they are subject to shipment restrictions.

Accessory for test and HB tool:

The service kit can be used for both NH3 and CO2

Part no. Service kit: HBGS -ServiceKit

HBGS- ServiceKit includes:
- Cup and tube
- HBxC-USB (Cable)
- HBGS Adaptor

Kit for gas testing and connection cable for HB-tool used for modifying the alarm limits

Configuring the sensor

The HB Products PC-Tool can be found at: https://www.hbproducts.dk/en/software1/hb-tool.html

Unscrew the two Philips screws on the top and connect the HBxC-USB to the HBGS-USB-ADAPTOR. Connect the HBGS-USB-ADAPTOR to the M12 circular connector of the main unit. Supply the sensor with 24VDC.

The alarm settings can be typed in and saved to the sensor. All alarms can be configured both as NO (normally open) and NC (normally closed) which refers to the contactor, so NO means the contactor will be closed when an alarm occur, and the siren will start if connected. NC can be used to make the installation safer and detect a broken wire, but it requires siren with a similar function, which means it makes alarm when the signal is removed.
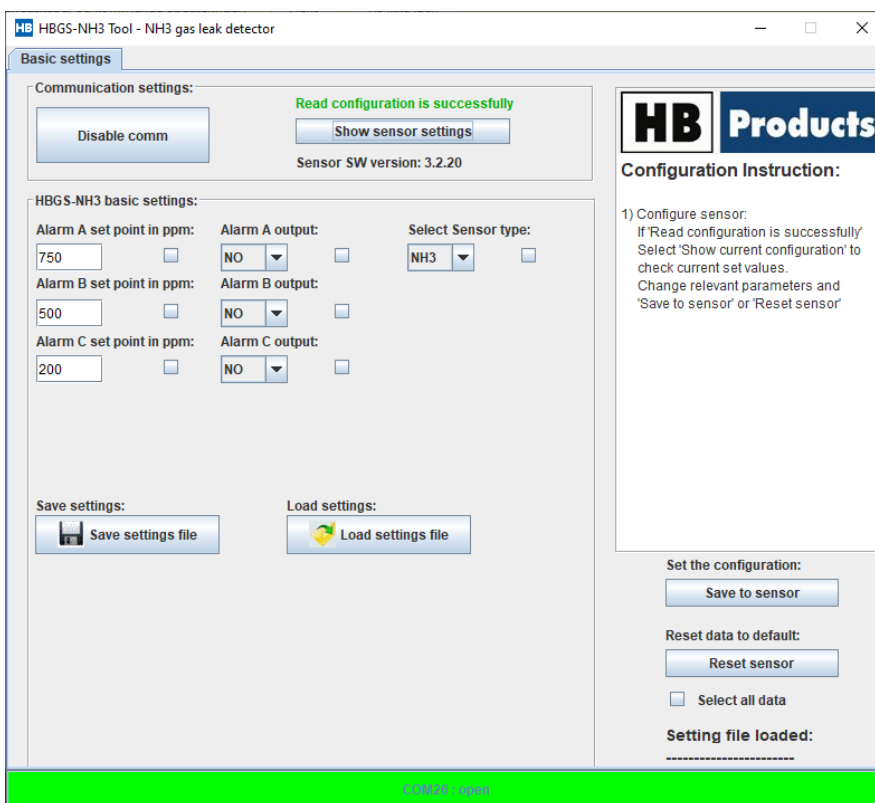
Sensor Repair

A new sensor head can be ordered with product no. HBGS-NH3-UNIT or HBGS-CO2-UNIT
The sensor head can be replaced directly and requires no calibration.

If you have questions to the product, please contact HB Products' dealers/distributors. Please consider their complaint procedures before returning the sensor.

Further Information

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