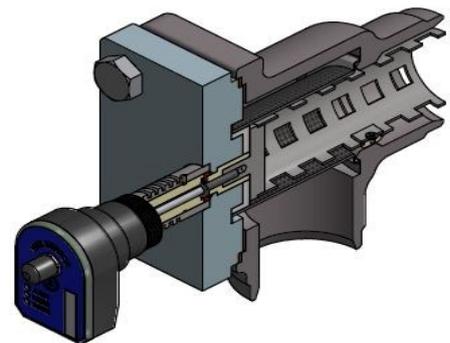
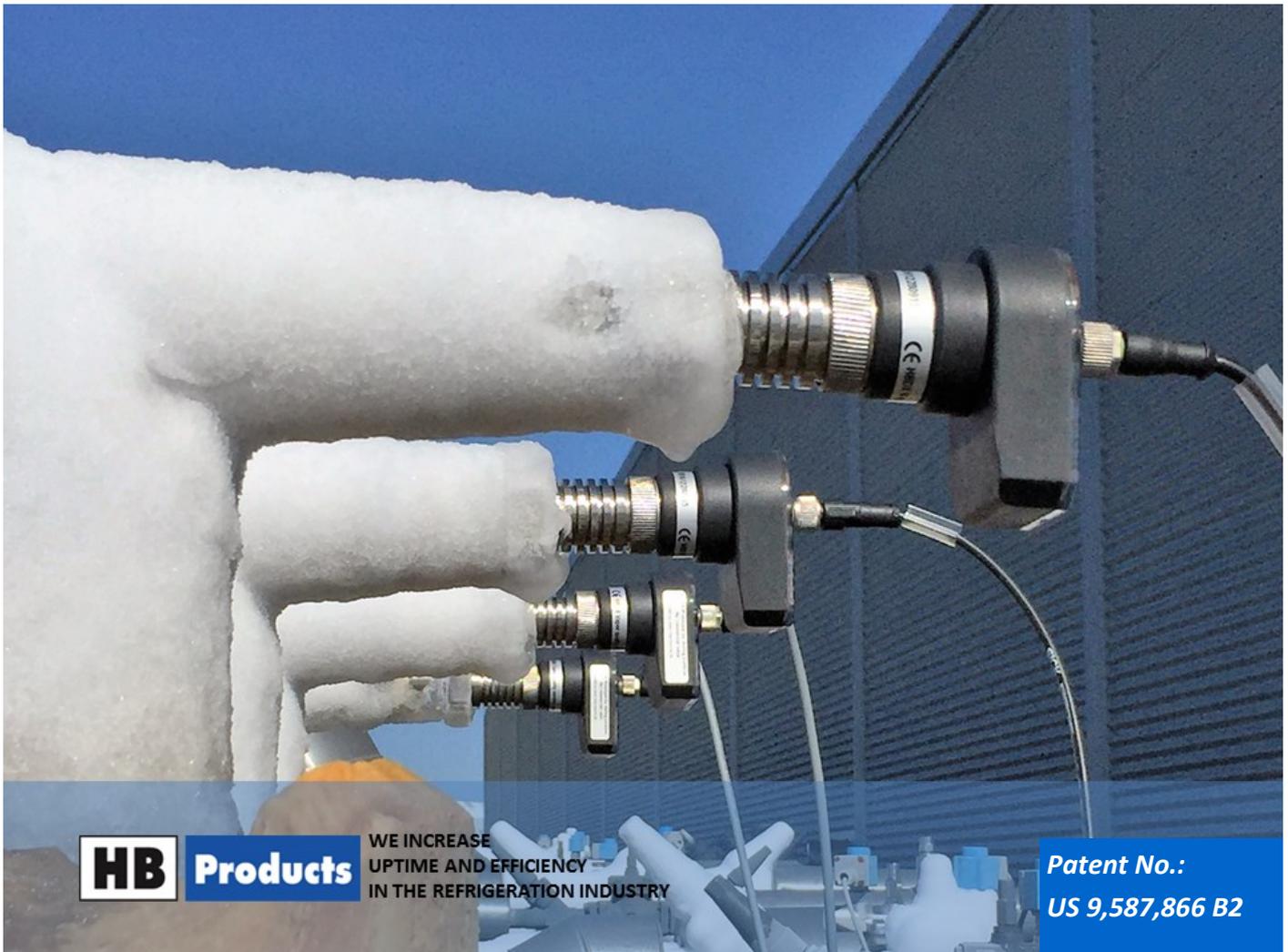


Installation Methods for HBX Sensors

New Sensor Technologies Control Phase of Refrigerant, which make Ammonia more Safe and Optimize all Types of Refrigeration Systems

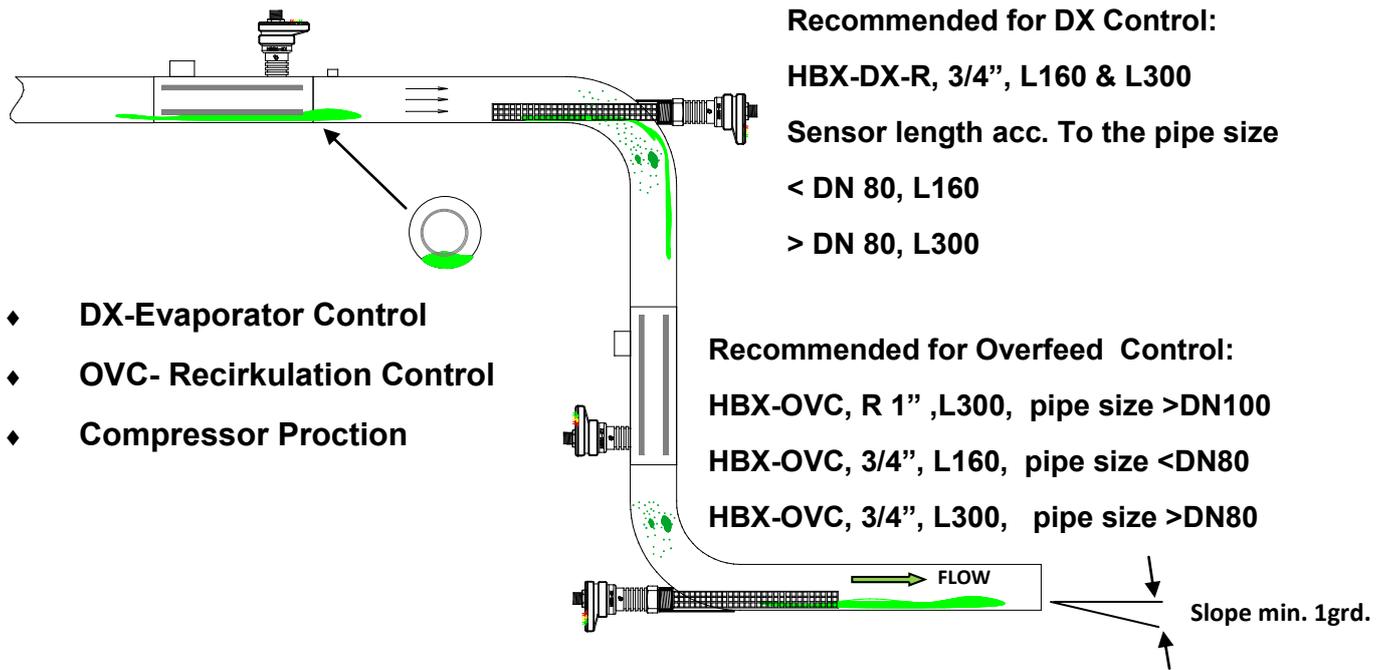
Works with NH₃, CO₂, Propan & HFC/HFO Refrigerant

Next Generation of HBX Vapor Quality Sensors with both Integrated Sensor-, Evaporator- and Remote Control Feature are now ready to Optimize all Types of Evaporators



Optimization of key processes in a refrigeration system

Recommended installation methods



- ◆ DX-Evaporator Control
- ◆ OVC- Recirkulation Control
- ◆ Compressor Protection

**NOTE: Slope the piping to ensure the liquid can flow freely.
This reduces the risk of submerging (drowning) the sensor in liquid.**

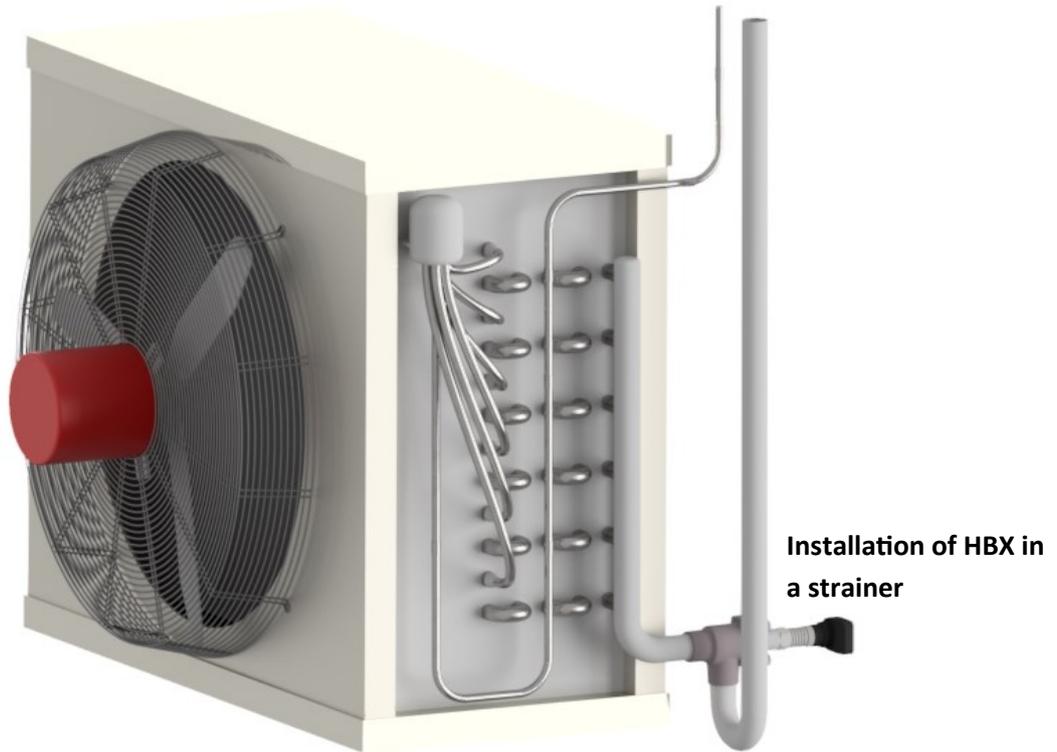
Flow pattern in two-phase flow varies depending on the evaporator load, type of refrigerant, tube diameter, Vapor Quality, mass flux and flow orientation.

All refrigerant types will usually have a stratified two phase flow pattern in horizontal pipes and in part load often slug or plug flow in rising pipes.

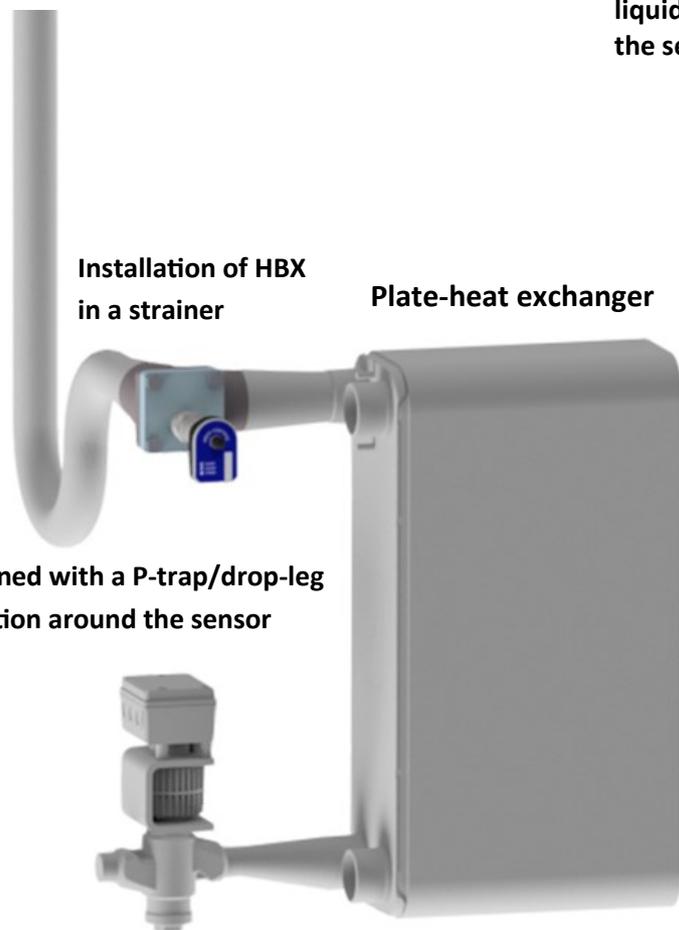
Installation:

1. The sensitivity of the sensor depends on several parameters. Most important is that the sensor is installed in a position where it can catch the liquid and drops at any two-phase flow regime and gas velocity. Especially at DX regulation we recommend that the HBDX-rod style sensor is installed in countercurrent flow direction, with gas velocity range from 10 to 30m/s.
2. Inline type, we recommend that the sensor is installed in horizontal pipes, alternative downwards. (Sensor in the same size as the suction line).
3. Rod style, we recommend that the sensor is installed in horizontal pipes with the position at the bottom of the inside walls to ensure that the liquid is flowing into the sensor in the bottom of the pipe.
 - Counter Flow direction is recommended for DX evaporator Control
 - Flow direction is recommended for Recirkulation/Overfeed Control
4. **Compressor Protection** sensors can be installed in any directions, with optimum location in accordance to the liquid and gas flow.
5. **The sensor must be installed so that the active sensor part is inside the suction pipe/line, the threaded bush/socket must not be longer than the blind part of the sensor. For longer welded sockets, the sensor part should be installed with additional PTFE bushing.**

DX-evaporator/aircooler



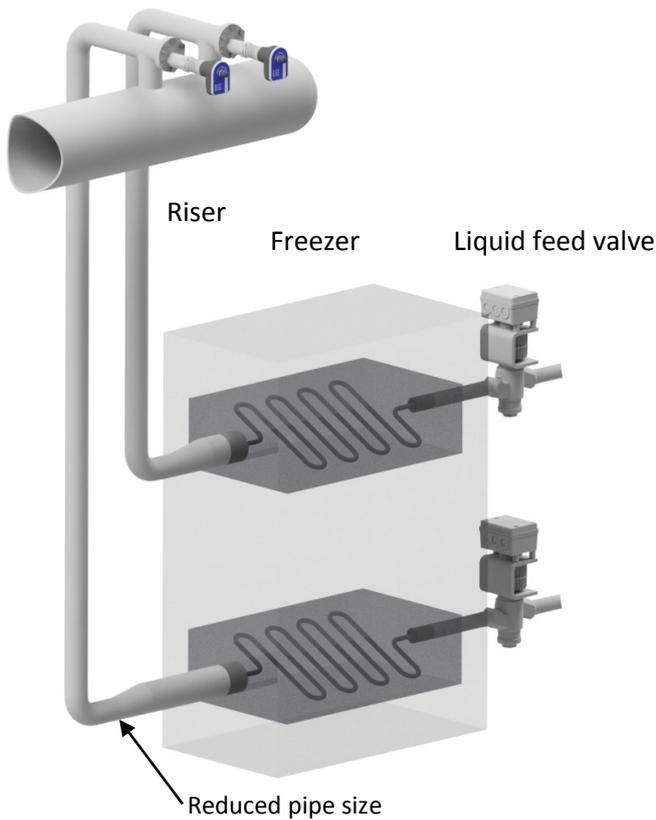
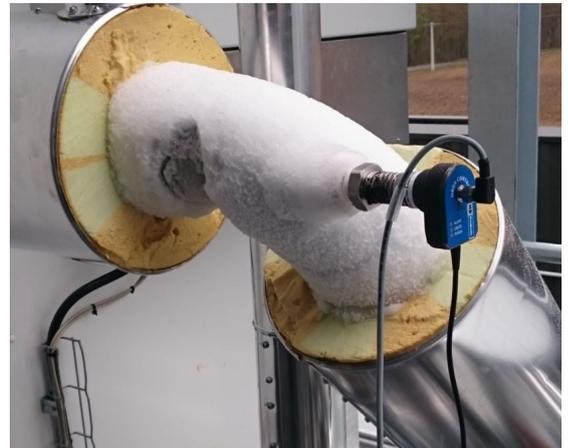
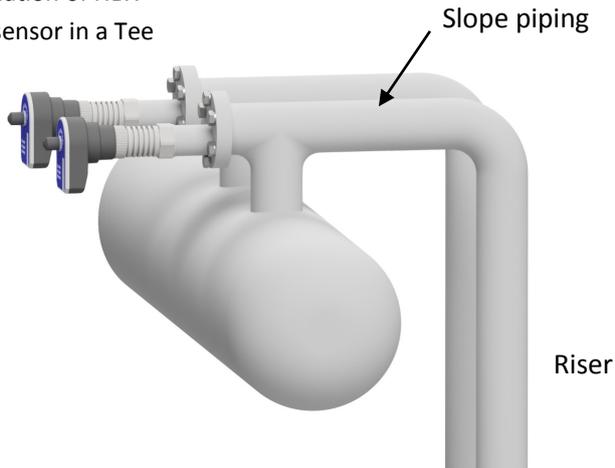
Pipe should be designed with a P-trap/drop-leg to avoid liquid accumulation around the sensor



The pipe should be designed with a P-trap/drop-leg to avoid liquid accumulation around the sensor

HBX Installation Methods

Installation of HBX-OVC sensor in a Tee



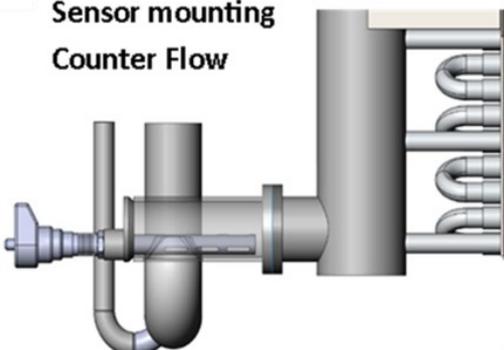
Vapor Quality Sensor installed in the outlet of an evaporator optimizes the entire system and makes it possible to control and limit the amount of refrigerant in the system under all conditions. **In particular**, it is important to control the refrigerant feed during **part load operation** to obtain an optimal flow pattern with **homogeneous Vapor Quality during evaporation**.

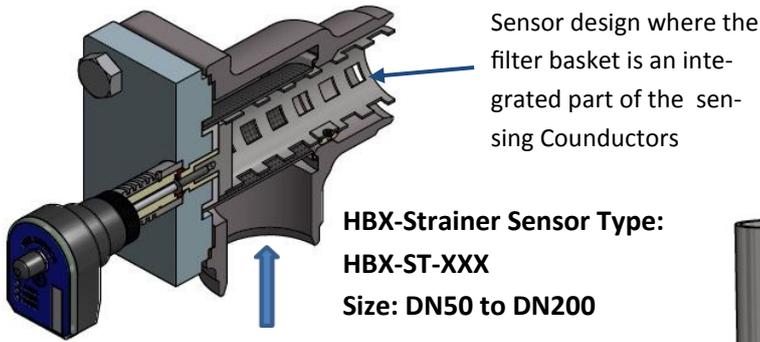
Riser, to ensure liquid transport upwards, the velocity must be high enough as the liquid is transported through shear forces on the gas/liquid surface. When the velocity is sufficient, the liquid will flow on the inside surfaces of the pipe and the gas will flow in the center of the pipe as “annular flow”.

DX evaporator

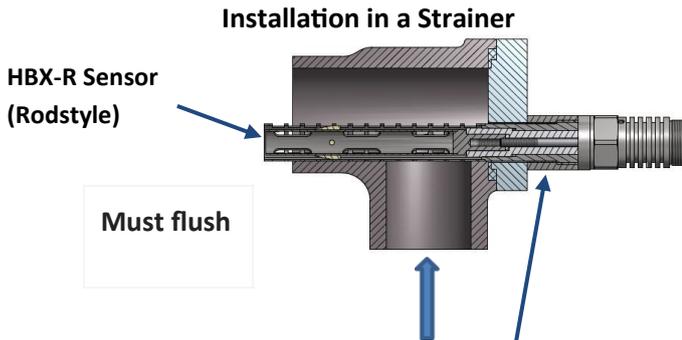


**Sensor mounting
Counter Flow**





Filter cartridge protects the sensor against impurities



The riser pipe should be designed with a P-trap to avoid liquid accumulation around

HBX Installation methods

Recommended sensor type "R" (Rodstyle):

DX Control:

HBX-DX-R, 3/4", L160 pipe size <DN80

HBX-DX-R, 3/4", L300 pipe size > DN80

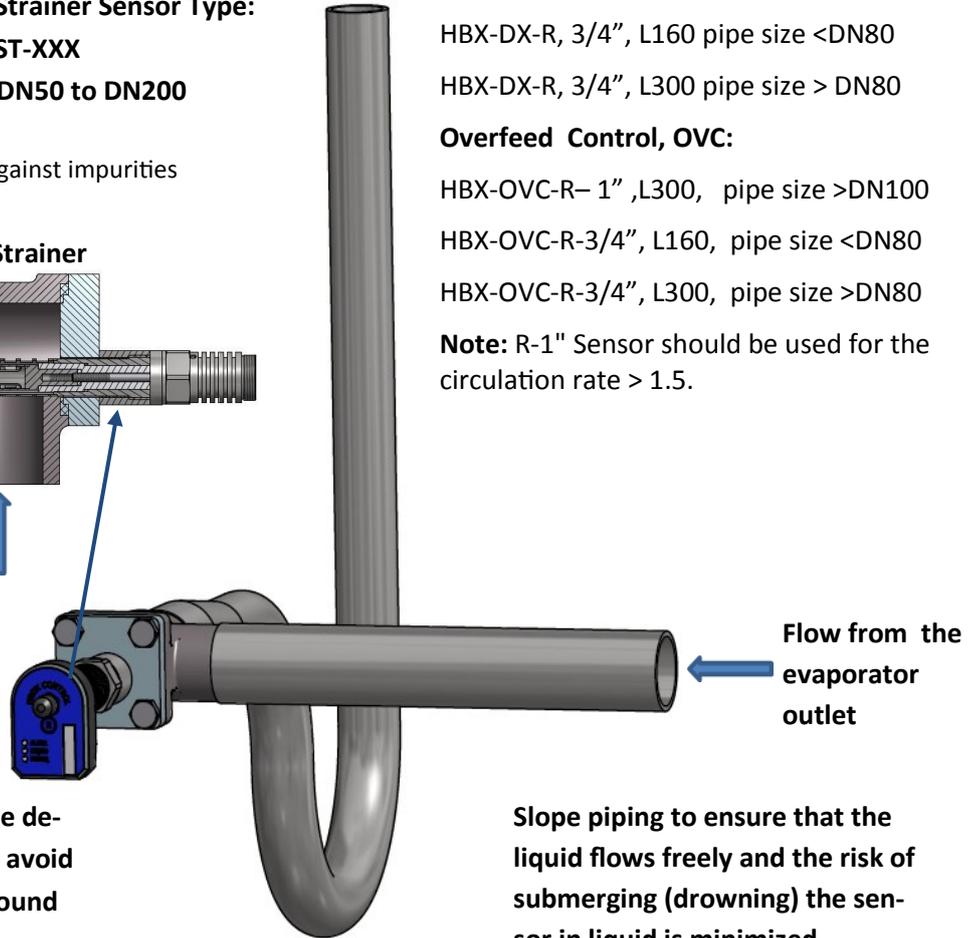
Overfeed Control, OVC:

HBX-OVC-R- 1" ,L300, pipe size >DN100

HBX-OVC-R-3/4", L160, pipe size <DN80

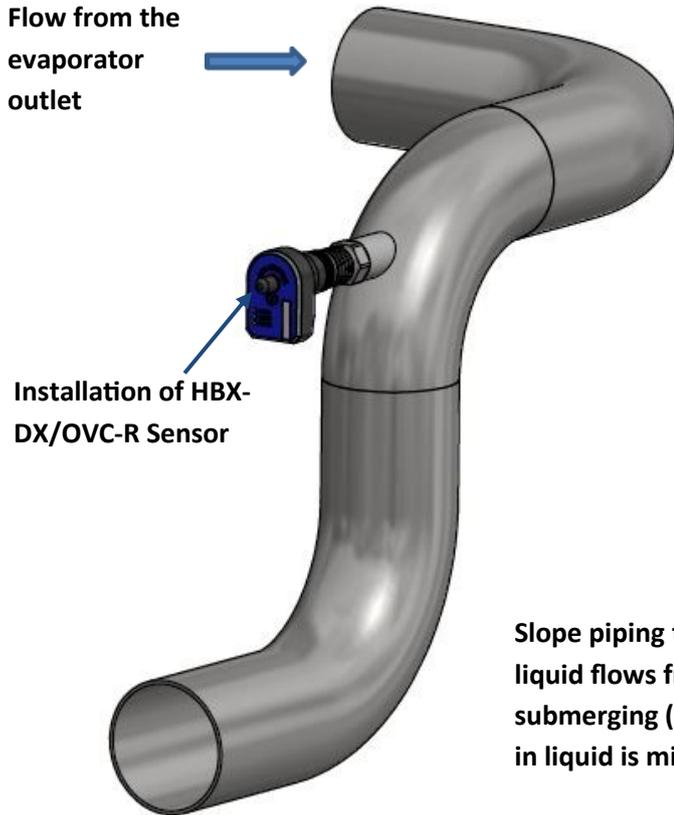
HBX-OVC-R-3/4", L300, pipe size >DN80

Note: R-1" Sensor should be used for the circulation rate > 1.5.



Vapor Quality Sensor installed in the outlet of an evaporator optimizes the entire system and makes it possible to control and limit the amount of refrigerant in the system under all conditions. **In particular**, it is important to control the refrigerant feed during **part load operation** to obtain an optimal flow pattern with **homogeneous vapor Quality during evaporation**.

HBX Installation methods



Recommended sensor type:

DX Control:

HBX-DX-R, 3/4", L160 pipe size <DN80

HBX-DX-R, 3/4", L300 pipe size > DN80

Overfeed Control, OVC:

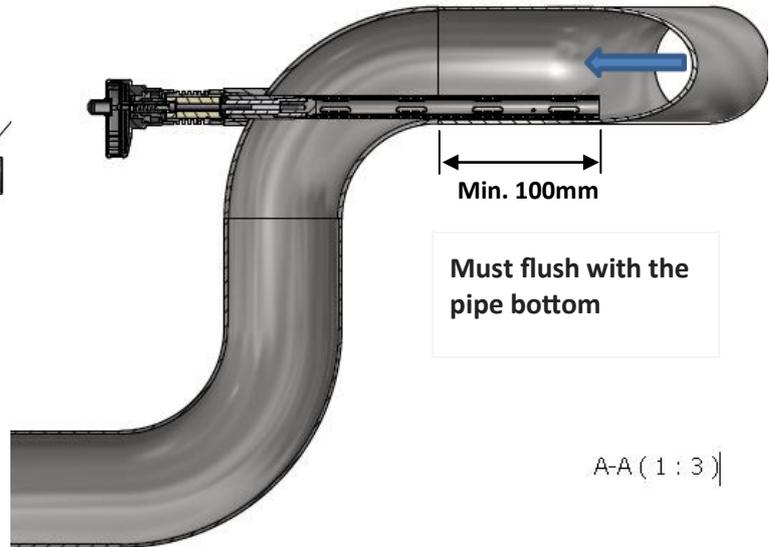
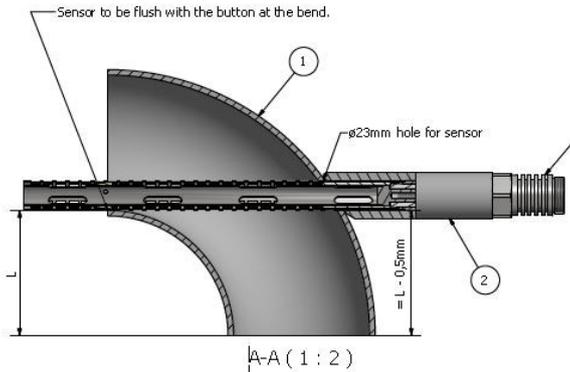
HBX-OVC-R- 1" ,L300, pipe size >DN100

HBX-OVC-R-3/4", L160, pipe size <DN80

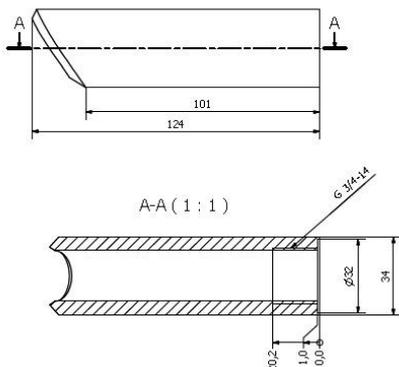
HBX-OVC-R-3/4", L300, pipe size >DN80

Note: R-1" sensor should be used for the circulation rate > 1.5.

Slope piping to ensure that the liquid flows freely and the risk of submerging (drowning) the sensor in liquid is minimized.

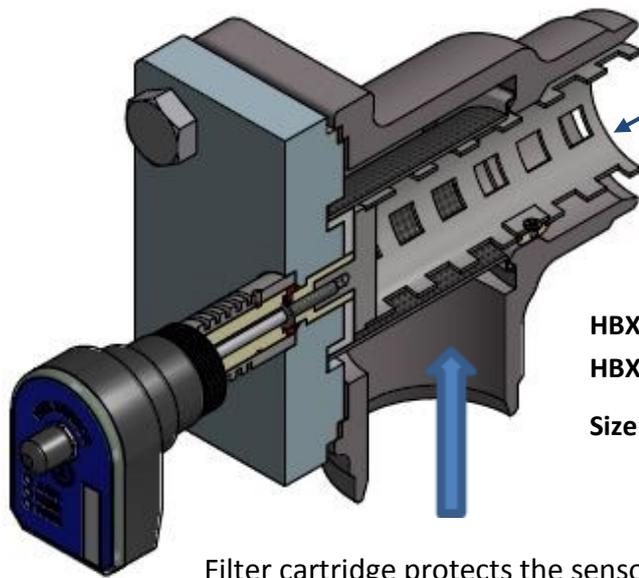


Threaded Elbolet socket and welding instructions can be delivered to all pipe sizes.



Note:
With longer welded socket, the sensor part should be installed with additional PTFE bushing.

Strainer Sensor Type: HBX-ST-XXX



Sensor design where the filter basket is an integrated part of the sensing Conductors

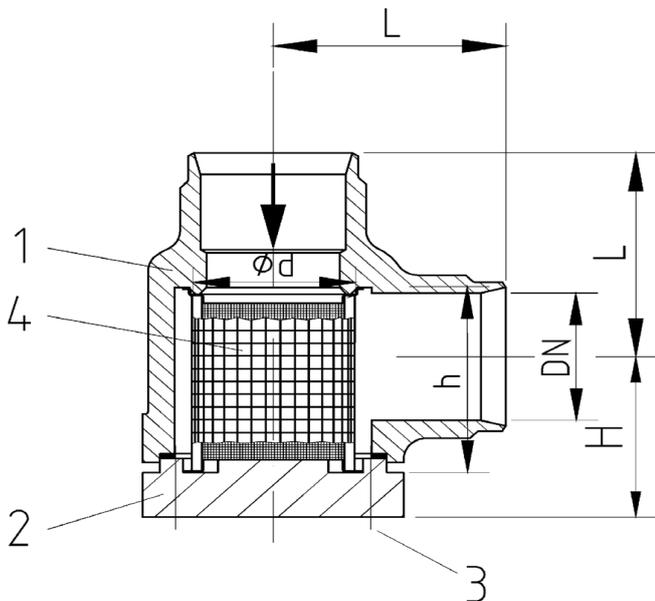
HBX-Strainer sensor type
HBX-ST-XXX

Size: DN50 to DN200

Filter cartridge protects the sensor against impurities



Technical Data:



DN15-200

TS/°C	-60	-40	-10	+50	+100	+160	PS
PS/bar	28	28	28	28	28	26,3	28*
PS/bar	31,5	42	42	42	30,3	26,3	42

PS = MWB = max. allowable working pressure in bar g

TS = MWT = max. allowable working temperature in °C associated with PS

Dimensions [mm]

Part	Material	
1 Body	Dn15-80	DN100-200
	1.0488/1.0546	1.6220
2 Bonnet	1.0488/1.0571	
3 Bolts	A2.70	
4 Strainer Basket	1.4401/1.4305	
Seat	DN15-80	DN100-200
	1.0488/1.0546	1.6220

DN	L	H	H4	D	h
50	80	62	127	57	73
65	95	68	164	69	89
80	100	78	214	89	104
100	105	112	237	101	127
125	146	132	320	138	149
150	163	151	364	163	180
200	193	180	415	195	218

Strainer T6F-SS, carbon steel (Parker Herl)

Available in stainless steel up to DN100

HBX installation methods_04 06.07.2018

*H4= minimum distance for insert-removal

