

PRESSURE BALANCE ELEMENTS

In order to choose the right ventilation plug unit (pressure balance elements) for a specific application, the working principles of the unit must be known first.

Ventilation plugs are permeable to "gases and vapours, e.g. air" but impermeable to "liquids and dust, e.g. water". The permeability resistance to liquids depends on the pore size and structure of the membrane inside these devices.

If the working conditions of water (the most common liquid) are studied, it is possible to say that the water intrusion pressure goes down as air permeability increases. The relevant specifications are collected in tabulated data.

Of the relevant parameters, the "Pressure Balance" function depends on the differential pressure between the inner and the outer environments of the enclosure. As a reference pressure, 70 mBar (70mBar = 1 Psi) value is chosen to present data. Under normal conditions, air circulation exists for all differential pressure levels. But the volume flow rate is very low for smaller values and obviously increases with increasing pressure values. Of course the air flow rate also depends on the properties of the membrane (classified as standard, medium, high and ultra high permeability types).

If there is no water pressure danger (if the device is not immersed in the water), it is always better to choose highly permeable elements for good circulation even for low differential pressure levels.

In essence, there is air circulation in the enclosure from the inside to the outside when the device is heating up due to its operation. Similarly, a circulation in reverse direction occurs during the cooling period. It should also be noted that there is always a level of humidity in air, hence some water in the form of vapour is also circulated with air. However condensed water is blocked by the water repellent membrane unless the differential pressure exceeds the intrusion pressure threshold.

After this technical overview, the utility of the "Ventilation Plugs" can be listed as follows;

- Prevention of pressure increase inside the enclosure. The pressure sensitive elements are not threatened.
- Limiting of temperature increase by the air circulation. The temperature sensitive elements are not threatened.
- Added flexibility for maintenance. In traditional units, when the enclosures are heated, generally the dilated air goes out from the seals but can not return back when the device is colder. Because of the vacuum formed inside the enclosure, the gaskets are exposed to large pressure levels. In result, it is very difficult to open the covers for maintenance. Especially in "luminaires" it is obligatory to change the bulbs when the device is cold. The ventilation plugs in our system prevent these kind of limitations.
- Prevention of accidental water suction into the system. During the cooling period, we know that there is air circulation from the outside to the inside. Hence, if the enclosure is wet from rain or due to other reasons, some water may be sucked inside the enclosure if there is no ventilation plug.
- Prevention of exposure to hot, humid, compressed gases. There is always a level of humidity in the enclosure due to atmospheric conditions. Hence when the device is hot, all the components will be exposed to a hot, humid and compressed environment without the ventilation plug.

To conclude, the ventilation plug can reduce and even fully eliminate the adverse effects of humidity in the environment. Water drops on the bottom of the enclosure are normal, but the inherent damage becomes insignificant due to the existence of a ventilation plug.

Ventilation Plug HBVPX-11UL

C **RA**® US



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Ventilation Plug

HBVPX-11UL

Technical Details	
Material	
Housing Material	PA66 - V0 - UL94
Membrane Material	Acrylic co-polymer on nylon support
Membrane Feature	Hydrophobic - Oleophobic
O-rings	NBR
Protection Degree	With "UH" membrane IP67** With "S, M and H" membranes is IP68*
Air Flow Rates	Refer to the chart
Working Temperatures	-40°C to +105°C
Available Membrane Perm.	S (standard) M (medium) H (high) UH (ultra high)

Remarks
*IP68 is valid where the water intrusion pressure is higher than 0.1 Bars. Please refer to the chart.
**IP67 is valid where the water intrusion pressure is within 0,1 Bars.

Code	Thread	Tightening Torque Value Nm	Enclosure Hole Diameter mm	Enclosure Max. Wall Thickness mm
HBVPX-11UL	M12x1,5	0,5 - 1,0	12,0 - 12,2	5

Item	Part
1	Cap
2	Press ring
3	Membran
4	Body
5	O-ring
6	Lock nut

