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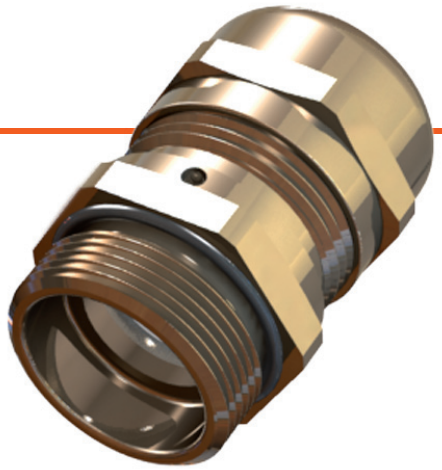
REPORT 2013

Ventilation Systems



About the breathability of industrial enclosures

Give over-pressure its freedom

Sometimes we all need to blow off some steam. This applies not only to us humans but also to machines. Those who have the capability of releasing pressure definitely have an advantage. The following case demonstrates how an innovative cable gland will resolve pressure related challenges in the automation industry.

Dr. Klaus Kempf

Imagine an >IP 65 rated enclosure of 2 liters (~ 1/2 gallon) volume which is used outdoors and is exposed to the elements. On a sunny morning with an ambient temperature of 18°C or 64°F the system is started and within 30 minutes we are at the operating temperature of 48°C (118°F). A contributing factor to the rise of the operating temperature is the increase of the outside temperature to 25°C (77°F).

Based on thermo-dynamic rules a temperature increase of 30°C (54°F) will either result in an air expansion or pressure increase. As a result of the above parameters we will have an air expansion of about 10%. In other words the volume will grow from 2 to 2.2 liters, or the pressure will rise from a standard pressure level (atmospheric pressure) of 1,000 hPa to 1,100 hPa. This for instance is comparable to the drop of pressure that occurs in a tornado, and we all know how powerful a tornado is.

The increased pressure in our case is now trying to escape and will find "emergency exits" such as enclosure gaskets or seals of installed instruments.

Once the system has been shut off the inside temperature will drop to where it was in the morning, and let's assume the ambient temperature is dropping as well, the standard pressure will be re-established quickly. As a result of this cool-down process and the loss of air, 0.2 liters which escaped the enclosure need to be replaced. The same way the air escaped in the first place through gaskets and seals, the air will also be replaced. However, gaskets and seals become weak points and humidity which will be drawn in to the enclosure will cause corrosion inside it. It is a matter of time until the electrical system will cease its function.

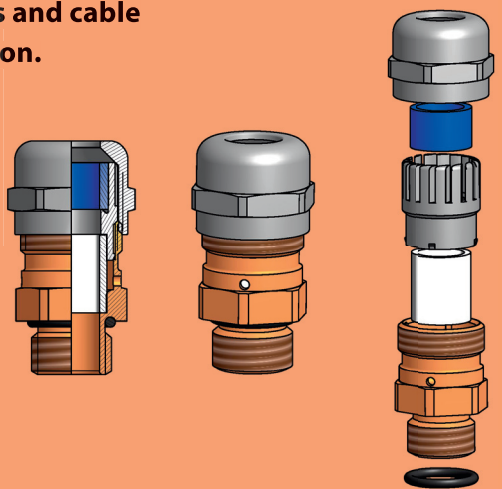
The harsher the environment and the higher the heat loss the sooner the system will fail.

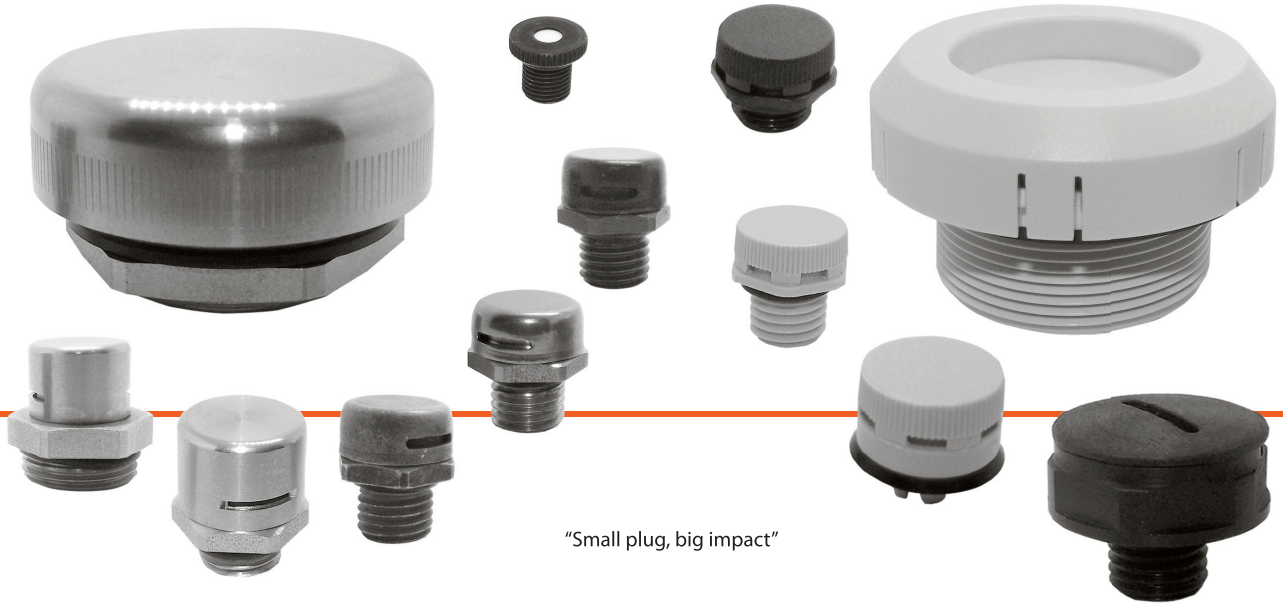
Ingress of humidity

Here is the solution: Pressure balance elements or ventilation components will provide standard pressure, ease stress on gaskets and instrumentation seals and the system in general. How do pressure elements or ventilation components work?

Applications for ventilation plugs and cable glands with pressure compensation.

- Solar photovoltaic
- Outdoor lighting
- LED outdoor lighting
- Telecom outdoor enclosures
- Industrial test instruments
- Sensors for industrial applications
- Industrial PC
- Electricawl enclosures with IP 65 and higher
- Automotive industry: ECU and front/rear lights





"Small plug, big impact"

Inside these products are air permeable, hydrophobic and oleophobic membranes which provide an air exchange as soon as we have a difference between inside and outside pressure.

As a result inside and outside pressure will always be equal. Compared to a valve where pressure compensation can be pretty abrupt, pressure balance elements or ventilation components are easy on gaskets and systems. The membranes also prevent water or dirt from entering the enclosures and maintain the IP rating.

Increased life expectancy

Two different types of pressure balance elements or ventilation components are available. Ventilation plugs and cable glands with integrated pressure compensation. They all meet IP 67 and IP 69K. Common applications are outdoors such as in the solar, telecommunication, lighting industries and for control and sensor systems. A focal point are LED lightings where ventilation components provide a passive heat exchange which contributes to a longer operating life. Increasing requirements exist in manufacturing where these pressure elements ensure failure-free operation.