

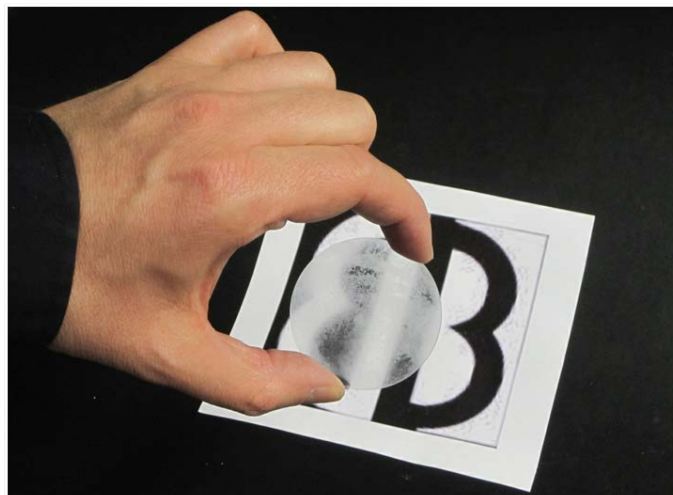
## Protect your optical equipment with nitrogen purging and molecular sieves

Primary sighting instruments, such as **periscopes**, are essential for target acquisition and tracking. However, all these optical and electro-optical equipments have to be protected from the admission of moisture. Permitting access of moisture into a periscope might have potentially catastrophic consequences which can reduce its operational life expectancy, among them condensation, frost, mould and corrosion.

Periscopes are moisture-sensitive equipments due to the presence of lenses, glasses and, alike all the other military equipments, are exposed to harsh operating conditions. Variations in ambient temperature cause **moisture** to **migrate** to the cooler components of the equipment, such as lenses and mirrors, which are usually thermally isolated. This phenomenon occurs to establish relative humidity equilibrium.

As a consequence, condensation or frost can deposit on the lenses of the optics, depending on the ambient temperature. This could obscure the periscope, fogging lenses and mirrors inside and obscuring the target.

The image below shows the **effects of condensation** on a lens.



Distortion-free optical performance and the target detection at considerable distances must be guaranteed in every environmental condition.

If applicable, the installation of **desiccators** on a periscope is advisable for the protection of optical equipment. Depending on the design of the optical system, Brownell offers a wide range of desiccators that can be easily installed and can withstand operating temperature from - 40°C to +90°C.

The use of **molecular sieves** is always recommended to maintain a very dry environment and low dewpoint temperature. The equipment may be subjected to immediate failure as a result of water vapour condensation.

Desiccators usually incorporate a **relative humidity indicator** in order to allow visual indication of the saturation level of the desiccator. The humidity indicator is blue when the desiccant is dry and turns pink when saturated. This shows that the cartridge should be replaced.

For example, the **panel mounting desiccators BLD7916** ( $\frac{1}{2}$ " x 28 UNEF thread) is particularly suitable for such an application. The desiccator is combined with a 15/30% Relative Humidity indicator to monitor the condition of the desiccant.



Stick desiccators are also available with smaller threads such as M8, in accordance with the customer requirements.

However, the desiccation process cannot rely entirely on the desiccator. Periodical purging operations performed during base maintenance are highly recommended to remove the hygroscopic moisture.

Brownell developed **NEPS1000**, a **single-point nitrogen purge system**, where the nitrogen enters and exits the component through the same port. The cavity is flooded with pressurised ultra-dry nitrogen with dewpoint lower than  $-30^{\circ}\text{C}$  in order to create a benign environment for the optics. This will prevent a change of state of the water vapour and create a perfectly dry environment inside the periscope.

Nitrogen is widely used for moisture protection because of its limited reactive capability with other gases. Unlike oxygen, nitrogen is a stable and safe gas.



NEPS1000 can be also used for routine leak testing to maximise purging.

The product is currently available in three portable versions, of which NEPS1000 ADVANTAGE is the original version and benefits of nitrogen purging.

NEPS1000 PUMPED and NEPS1000 DUAL VOLTAGE instead, have been designed for those situations in which bottled dry gas is not available. These versions are equipped with a self-contained pump and moisture adsorbing molecular sieves. The difference between these two versions lies in the double power socket installed in the NEPS1000 DUAL VOLTAGE suited for both field and workshop environment.