

## Application Report | Leak Testing Optical Devices

innomatec innovates simple, modular leak testing workstation for night vision devices, rifle scopes, binoculars, and more

Optical devices used in military and civilian applications must function reliably under extreme conditions. Even the smallest amounts of moisture or dust can severely impair their performance. With the new modular test chamber solution, used in combination with the LTC-503 leak test computer, innomatec offers a simple, flexible, and robust way to test even very small leak rates reliably and repeatably in an industrial production environment.

### Meeting high demands for leak tightness, IPXX standards

Optical devices such as night vision devices, rifle scopes and binoculars are often used in harsh environments. They must not only be protected against dust and moisture, but also withstand stresses such as submersion, temperature fluctuations, and pressure differences. Often, even the smallest amounts of moisture or dust can severely impair or destroy their functionality. Therefore, the requirements for leak testing in this industry are particularly demanding.

### IP Rating Guide

First digit = solids  
Second digit = liquids

*IP63 = 6 Dust tight and 3 protection from splashing water at any direction*

#### EXAMPLE

IP	6	3
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- Ingress Protection
- Solids
- Liquids

#### Protection Against **Solid** Ingress

0	Non-protected (not rated)
1	> 50mm gap for entry
2	> 12mm gap for entry
3	> 2.5mm gap for entry
4	1.0mm gap for entry
5	Dust protected
6	Dust tight

#### Protection Against **Liquid** Ingress

0	Non-protected or rated
1	Vertically dripping water
2	Dripping water tilted at 15 deg
3	Splashing water at any direction
4	Jets of water from any direction
5	Heavy seas or powerful jets of water
6	Powerful water jets with increased pressure
7	Harmful ingress of water when immersed between a depth of 150 to 1000mm (5.9 - 40 in)
8	Continuous immersion in water
9K	Powerful high temperature water jets

In many cases, these products need to meet IPXX (Ingress Protection) standards. The IPXX standards identify to what extent a product is protected against the ingress of dust, water, and more. For example, IP6X specifies complete protection against dust, while higher classes such as IP68 or IP69 additionally require water resistance under high pressure.

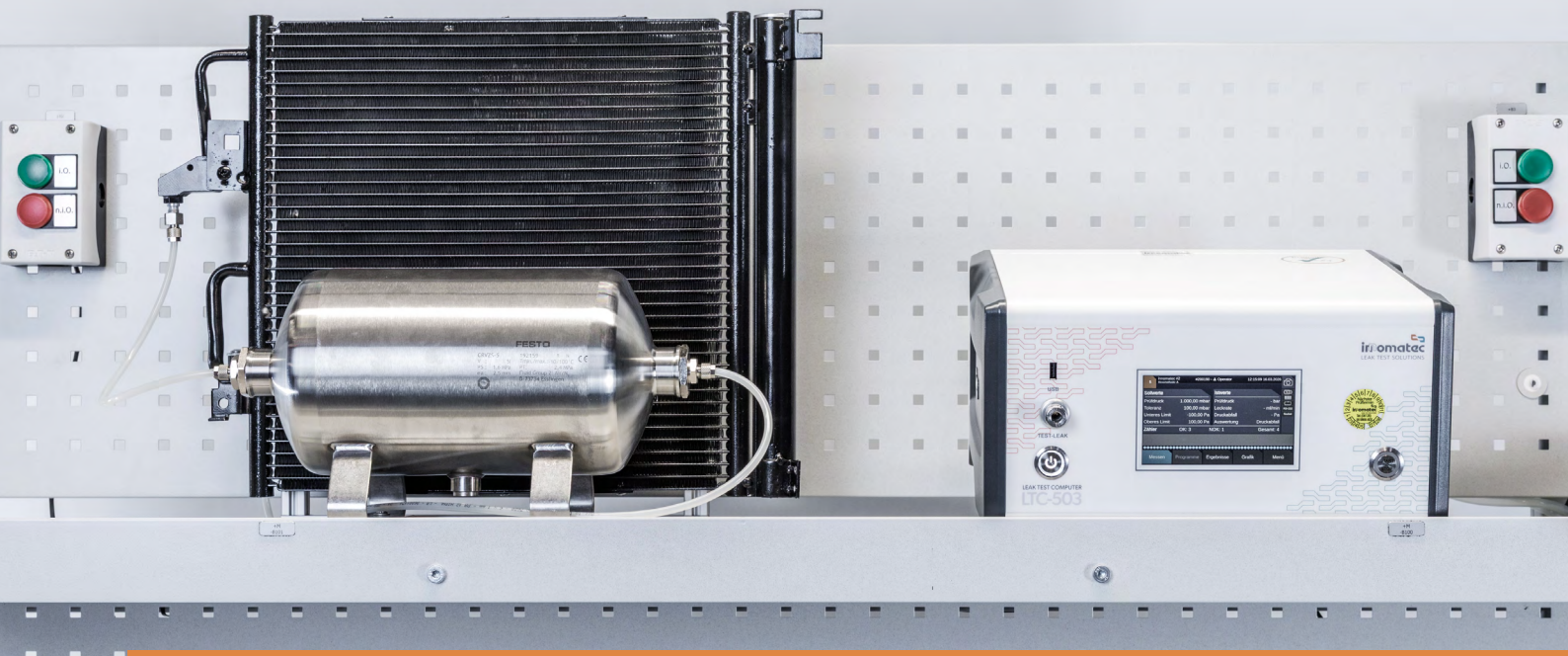
One of the challenges of this type of testing is that IPXX standards provide only rough guidance, without specifying test pressures or acceptable leak rates. innomatec works with the customer to develop test specifications and ensure compliance with any required IPXX standards. This is often done empirically during product development until the correct limit values for the product have been determined.

### Using innomatec's modular test chamber for reliable leak testing of optical devices

innomatec has developed a compact, user-friendly, and highly precise solution for optical device leak testing applications. The fulsome solution includes a tabletop device designed as a standard workstation. It consists of the LTC-503 leak test computer, a universal test chamber, interchangeable product-specific inserts, and an ergonomic work table. Depending on requirements, the test device can also be used independently of the table and integrated into existing systems.

### innomatec's modular test solution includes:

- LTC-503 leak test computer
- Universal test chamber
- Interchangeable product-specific inserts
- Ergonomic work table





## The leak test process

This test process uses the dose method with pressure difference procedure, also known as a closed component test. In this test process, the device is placed and secured in the test chamber, then exposed to a defined pressure or vacuum in the test chamber. The built-in volume measurement ensures that components with significant leaks are detected and are not simply filled along with the chamber and deemed acceptable. The system then measures whether and how quickly pressure losses occur. This allows for the detection of leaks of all sizes, including extremely small leak rates, or missing components—all required for optical device leak testing, and ensures reliable, repeatable measurements and test results. Additionally, the dosing test ensures that larger leaks and missing components can also be detected.



The interchangeable product-specific test chamber inserts make it possible to optimize test volumes for various device models in your product line, without the need for multiple specialized machines. This approach also allows for reliable detection of even the smallest leaks, shorter measurement times, and very stable, repeatable results.

## Key benefits of innomatec's modular test chamber solution

- **Multi-product testing capability:** With interchangeable inserts, this one system can manage different product models, allowing flexibility without the need for multiple specialized machines.
- **Controlled test chamber design:** The chamber design is key to reliable, repeatable leak test results on the production floor. This design prevents against any environmental factors skewing results, such as temperature fluctuations, draughts or differences in the compressed air used.
- **Adaptable hardware and software:** The LTC 503 system and modular test chambers can be customized to accommodate different components, test volumes, and environmental conditions.
- **Flexible integration:** The test solution can be used as a stand-alone workstation or integrated into existing production lines.
- **Expert support:** innomatec's leak test experts help you identify optimal, product-specific test parameters and functional safety needs for the most reliable and effective leak testing results.

## Discover innomatec's precision leak testing solutions for advanced optical applications

innomatec is at the forefront of leak testing technology for high-performance optical devices used in military and civilian applications. For over 40 years, innomatec has partnered with leading manufacturers worldwide, helping them solve complex leak testing challenges directly on their production lines to ensure maximum reliability and product protection. We continue to advance our technology, combining decades of expertise with application-specific engineering to deliver solutions that meet and exceed the stringent demands of modern optical systems.



**Need help with your optical device leak testing applications?**

**Contact the experts at innomatec!**