

Application Report | Leak Test Computer

LTC-802 M-Performance Leak test of large volumes

Assemblies with large test volumes often contain sensitive components or materials that should not leak.

In electromobility applications, these are mostly housings for energy storage systems, such as battery packs, battery modules, and inverters or converters.

Even fully assembled manual transmissions, differential gears and drivelines require a final leak test to ensure tightness and function.

The test methods for these types of components are complex and vary depending on the test requirement, function and environmental conditions.

One of the most common methods of leak testing is the mass flow method with air. In addition to the classic mass flow method, innomatec has developed the optimized M-Performance method.

innomatec has extensive experience in implementing this type of measurement method for leak testing. This application report describes an example of such a test.

Your solution for leak testing of large volumes



LTC-802 M-Performance
Single channel device
Hybrid processor technology
High degree of customization
through software & hardware



The most common products which are a challenge to test due to large volumes:

- Battery housing (tray & cover)
- Battery modules
- Battery packs
- Fuel tanks
- Liquid container
- Gearbox
- Differential gear
- Drive train
- Inverter / converter
- Truck wheels
- Intake modules

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M-Performance test method

The M-Performance method enables direct leak rate measurement in a wide range of applications with reduced operator effort.

The test pressure is kept constant in the test specimen via a high-precision pressure regulator. The air required for this purpose is measured via a mass flow cell and thus corresponds directly to the leakage rate of the system. Due to the optimized design - using high-precision measurement technology - companies can very flexibly test not only small test specimens from 10 milliliters, but also components with very large volumes of up to 200 liters for leaks - with leak rates from two milliliters/minute.



Highlights of the key advantage of the LTC-802 M-Performance

The LTC-802 M-Performance enables companies to focus more intensively on the essential measurement tasks and to realize feasibility studies more quickly and easily.

- Users can quickly and directly measure the desired measurand (leak rate). The LTC-802 M-Performance eliminates the need for time-consuming determination of volume or volume factor. A conversion from pressure drop to leakage rate, as well as a conversion by means of volume factor is no longer necessary, since no reference volume is required.
- Since the DUT volume is no longer relevant and volume determination is no longer necessary, the process of initial setup and calibration can be much faster. The solution is available "plug and play".
- Minor volume changes - for example, in the case of a component change in the concept or design phase - can be implemented without major changes to the test program parameters.
- Since no reference volume needs to be filled, companies can save compressed air and thus contribute to sustainable production.



Direct leak rate determination



Simple operation

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Application report for BEV battery tray

Battery trays are part of the structural battery housing and are used to house and protect the internal energy storage modules and power electronics.

These components must be protected against moisture, particles and other external influences. A leak test is essential for this purpose.



BEV battery tray in aluminum extrusion construction

Test parameters

Test pressure: 26 mbar

Leakage rate: 40 ml/min

Test volume: 118 l

Component dimensions: 2,326 x 1,634 x 162 mm

TEST RUN

LOADING THE TEST PART

1. The battery tray is loaded either in a specially-developed test facility or sealing tool. Important product data, such as component and batch numbers, are either scanned in or transferred from the automation system.

START OF THE TEST

2. As soon as the start of the test is triggered, the test system or the connec® quick connectors seal the test piece openings close to the process. This can be done automatically or manually. The leak test is started.



innomatec connec® quick connector

PRESSURIZATION OF THE TEST PART

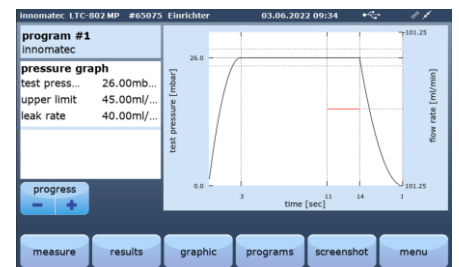
3. The leak test computer fills the battery tray with the predefined test pressure for the set filling time. The pressure is monitored by the pressure transducer of the test instrument and compared with min/max limits. In this way, a gross leak is detected immediately.

STABILIZATION: REDUCTION OF THE NATURAL PRESSURE DROP

4. After the preset filling time has elapsed, a stabilization time set by the operator follows. This time serves to minimize the natural pressure drop of even dense parts due to expansion or contraction, adiabatic heat effect and possibly absorption. Once the compressed air has settled, the actual measurement can take place.

TEST: DETECTION OF FINE LEAKS

5. After the stabilization time, the flow is recorded by the mass flow cell in the set test time and compared with the specified min/max leakage limits to determine whether fine leaks are present.



Graphic shown on LTC

VENTILATION

6. At the end of the test, the pressure trapped in the battery tray is vented to the atmosphere.

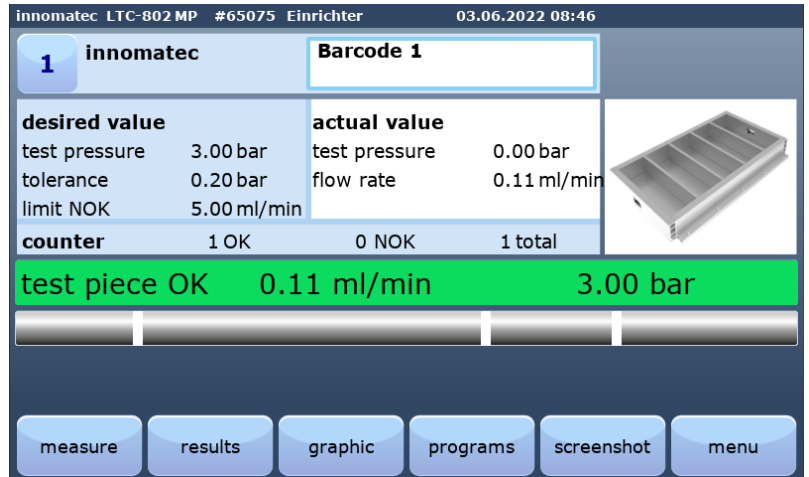
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TEST RESULT DATA

7. After the venting has finished, the test result data is displayed on the LTC.

Highly visible indicators on the display and front panel make it clear to the operator which battery trays have passed or failed the test.

The measurement results are also transmitted to the higher-level controller via Profinet and matched with product data.

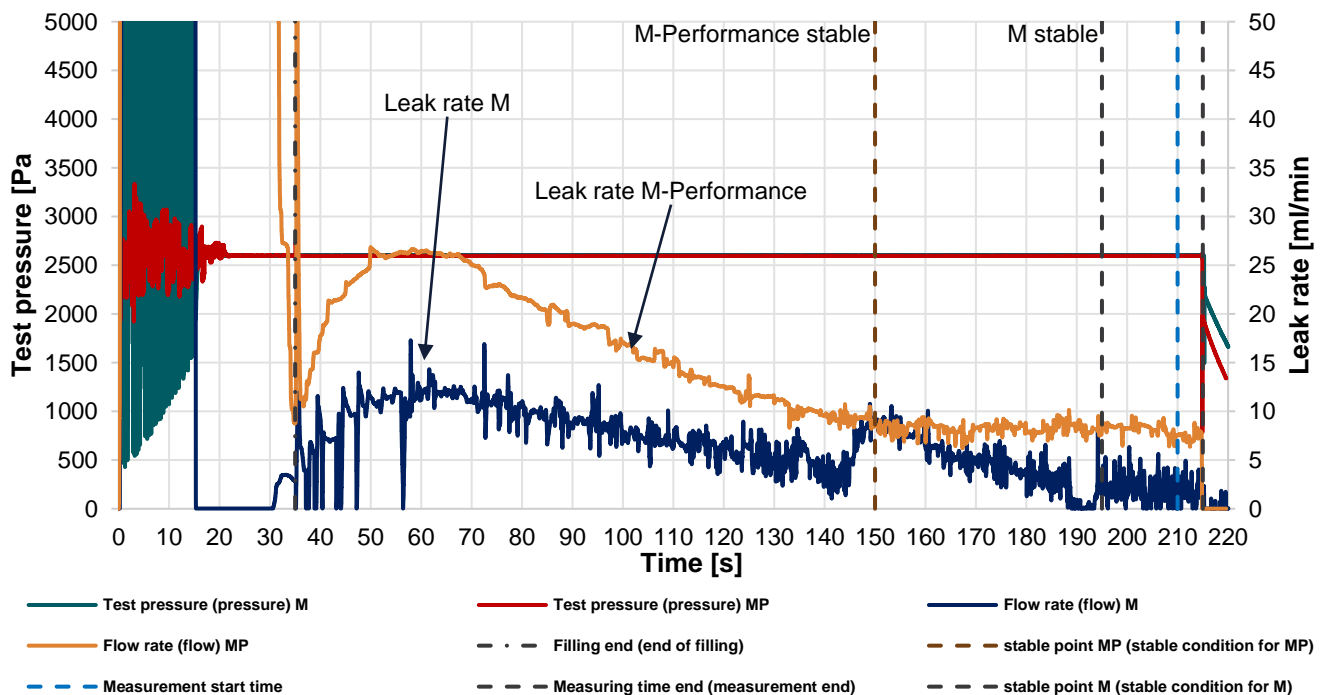


Operator Interface of the LTC-802 M-Performance

Experience with the M-Performance measurement method

With its focus on battery tray testing, the LTC-802 M-Performance has already proven itself. Here, the combination of large volume, medium leak rate and unstable test part, in a classic mass flow measurement with reference volume, leads to the challenge of measuring not only any leaks from the test part, but also environmental influences such as temperature and atmospheric pressure changes. The LTC-802 M-Performance eliminates the need for a reference volume, allowing the leak rate to be determined directly when the total volume is smaller. Therefore, the system with the M-Performance is faster stable and less sensitive to environmental influences.

The graph below shows the comparison between the classical mass flow measurement (M) and the measurement with the LTC-802 M-Performance (MP). It can be clearly seen that a stable measurement point is reached already after 150 s with the M-Performance (no significant change in flow rate). The same point is reached for the mass flow measurement only after approx. 195 s.



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Extensively tested, outstanding performance

A company that has already extensively tested the LTC-802 M-Performance over a long period of time previously required 220 seconds for a test cycle. Thanks to innomatec's new solution, they were able to reduce test cycle times by 20 percent to 176 seconds. In a three-shift operation (24/7), output per year could be increased by more than 30,000 components without negatively affecting measurement capability.

Built on the same software and hardware platform as the LTC-802, users can rely on proven innomatec quality and innovation that provides enhanced capabilities for large volume leak testing.



Test bench with volume reduction, clamping system, automatic recalibration and LTC-802 M-Performance

Proven quality

Simple operation

Low susceptibility to errors

"Customers benefit from innomatec's proven quality standards. The user interface of our new LTC-802 M-Performance solution is intuitive, not error-prone and is similar to existing leak testing products. This means that no training is required for quality assurance staff already using our products. For all other companies, familiarization is minimal due to the high level of user-friendliness," explains Pascal Schröder, Managing Director of innomatec GmbH.

Contact us, to discuss your application

For more information on our industry-leading leak testing solutions for high-volume applications such as EV vehicle battery systems, fuel tanks, transmissions, and other Leak Test Computer requirements, contact us anytime or request a quote today.



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