



aprotec GmbH

Switching test gases safely

Compact valve cluster for leak testing

We make ideas flow.

Compact distribution station for automatic leak testing system

Where fluids are involved, valves for controlling gases or liquids are a must. They are relied upon in numerous processes – from water and wastewater treatment to the food and pharmaceutical industries, cosmetics production, petrochemicals, and hydrogen applications. Valves are also essential in many testing applications. For example, in testing systems for air conditioning units, the piping must be checked for tightness to ensure that the refrigerating agent does not escape. Such leak testing systems require valves that guarantee a high degree of tightness, are robust and durable and offer substantial throughput with a compact design.

About aprotéc GmbH

Based in Karlstadt in Bavaria, aprotéc GmbH specialises in innovative solutions for automation in process systems technology and leak-tightness testing. The systems are used in a wide range of applications, including facilities for growing ultra-pure crystals for chips used in e-mobility. The Karlstadt company also has extensive experience with leak-tightness testing systems and works closely with its customers to develop solutions that are tailored to their specific requirements. The custom-designed test system for air conditioning units was no exception.



Summer, sun, holiday – what more could you want! However, when the sun blazes down on a motorhome or campervan in midsummer with no shade in sight, an air conditioning unit is essential. There is a wide selection of cooling devices for mobile use, and a common feature among the various models is that prior to being used, they must be tested to ensure long-term reliable operation. This is often performed manually: a special sniffing sensor is held against each connection point to check the piping for leaks.

However, manual measurements are not reproducible and can be unreliable due to variations in measurement distance and speed. Sometimes, the employee carrying out the check simply passes over the test area too quickly. Now, however, aprotec GmbH has developed a test system for Truma, a company that manufactures motorhome air conditioners. The system automatically checks the piping of the devices for leak-tightness, thus avoiding potential human error by the person operating the sniffing sensor.

Sniffing clips replace manual testing

An important element in this are the so-called sniffing clips, which are manually attached to all the connection points of the pipes to be tested. Firstly, an additional sniffing clip that is not involved in the actual testing process measures the background present in the air conditioning unit. If this is within the desired range, the air conditioning unit is initially evacuated to a vacuum of about 1 mbar absolute, and then the test gas (either forming gas or helium) is introduced into the air conditioning unit at a pressure of 40 bar. In the subsequent coarse leak test, all sniffing clips are attached to the detection device, and each clip is then tested individually, with the background measurement checked each time to determine the leak rate at each clip.



Source: aprotect

Sniffing clips replace manual testing. This enables precise tightness testing at the connection points.



Source: aprotect

Compact valve cluster serves as distribution station for the test gas.

Valve cluster with 12 pivoted armature valves

If any forming gas or helium escapes at a leak point, the gas is conducted through integrated transfer capillaries in the sniffing clip to the detection system, where it is flagged up. The task of safely switching between the individual clips is handled by a valve cluster. “At this point, there are 12 Pivoted armature valves from Bürkert Fluid Control Systems”, explains Michael Landgraf, Managing Director at aprotect. All the sniffing clips are connected to these valves via transfer capillaries. The valves switch in such a way that the transfer capillaries are sequentially connected to the detection system, thereby ensuring that the sniffing clip at a leak point can be clearly identified. The rapid switching behaviour of the Bürkert valves also enables a stable measurement process. The operator who places the sniffing clip on the air conditioning unit receives a visual status notification of the test at the clip. A calibration standard can be attached to the clips, and system calibration is then performed automatically.

The Type 0331 valves are robust and have already demonstrated their durability and reliability in many other applications.

“We have been working with the fluidics specialists at Bürkert for many years and are impressed with the quality and reliability of their valves.”

Michael Landgraf, Managing Director at aprotect

Compact with high throughput

The valves deployed are direct-acting, media-separated pivoted armature valves and are available in 3/2 and 2/2-way configurations.

- The 3/2-way version can be used as a distribution valve or a mixing valve.
- Robust Pivoted armature anchor with excellent durability
- Various diaphragm materials and circuit functions
- Housings available in brass, stainless steel, PEEK and polypropylene variants
- Solenoid coils moulded with a chemically resistant epoxy
- Also suitable for critical media such as aggressive acids and bases
- Type 0331 with manual override for commissioning and testing
- Switching status indicated via position feedback as a binary or NAMUR signal
- Optional extra with electronic power reduction or energy-saving impulse variant



With all three valve outlets on the same level, only the valve needs to be replaced during service – no need to modify the piping.

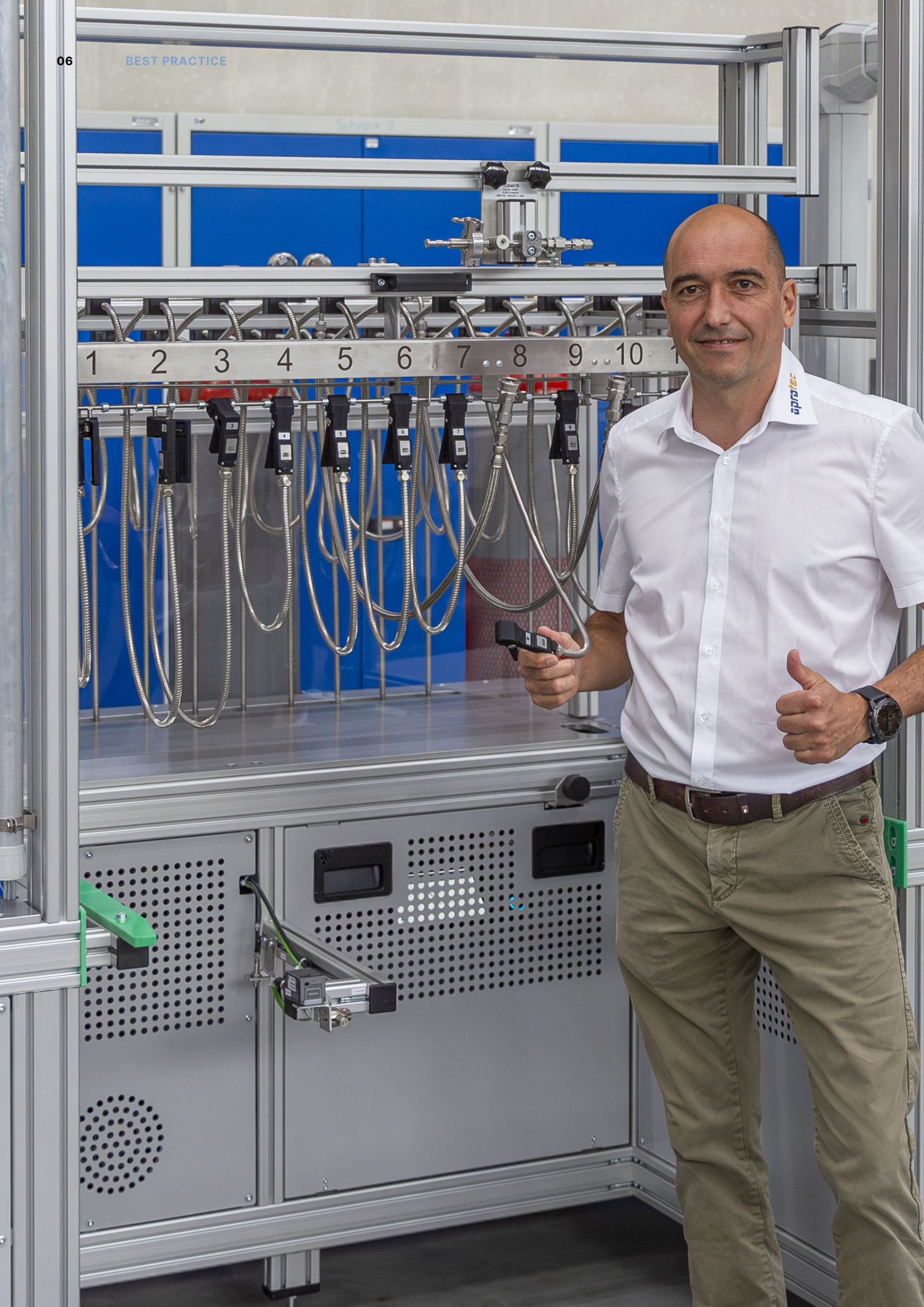
“What’s more, the valves themselves are also vacuum-tight up to 1×10^{-7} mbar·l/s. With a nominal diameter of 4 mm, they allow for a high throughput despite their compact dimensions.”

Michael Landgraf, Managing Director at aprotec

Another practical feature proved to be beneficial: all three valve outlets are located at the bottom of the housing. This is an advantage over other valve designs where the third outlet is usually at the top. With all three outlets on the same level, the valve can be easily replaced during a service without needing to modify the piping. The developers of the leak testing system and the manufacturer of the air conditioning units are both very satisfied, given that all measurement results are reproducible and well-documented, thanks in no small part to the valves. Campervan and motorhome owners can rely on their air conditioning systems functioning in summer and can rest assured that nothing will stand in the way of a stress-free summer holiday.

Kick and Drop coil:

Solenoid valves equipped with the energy-efficient kick and drop coil provide up to 80% energy savings, significantly lower self-heating, and up to 200% higher switching pressure. With the Kick and Drop coil, there is typically a lot of power generated when opening the valve (kick) and the power is drastically reduced during the valve’s holding operation (drop). The open-loop control is managed by integrated electronics within the coil. [Kick-and-drop electronics assembly for energy-saving solenoid valves.](#)





“For us, quality and reliability are paramount concerns for all components used, as we also maintain high quality standards for our systems.”

Michael Landgraf, Managing Director at aprotéc

Source: aprotéc

Automatic test system for air conditioning units. Measurement results are always reproducible and can be cleanly documented.

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