



CAMAG

Fluidic solution for fully automated HPTLC analysis system

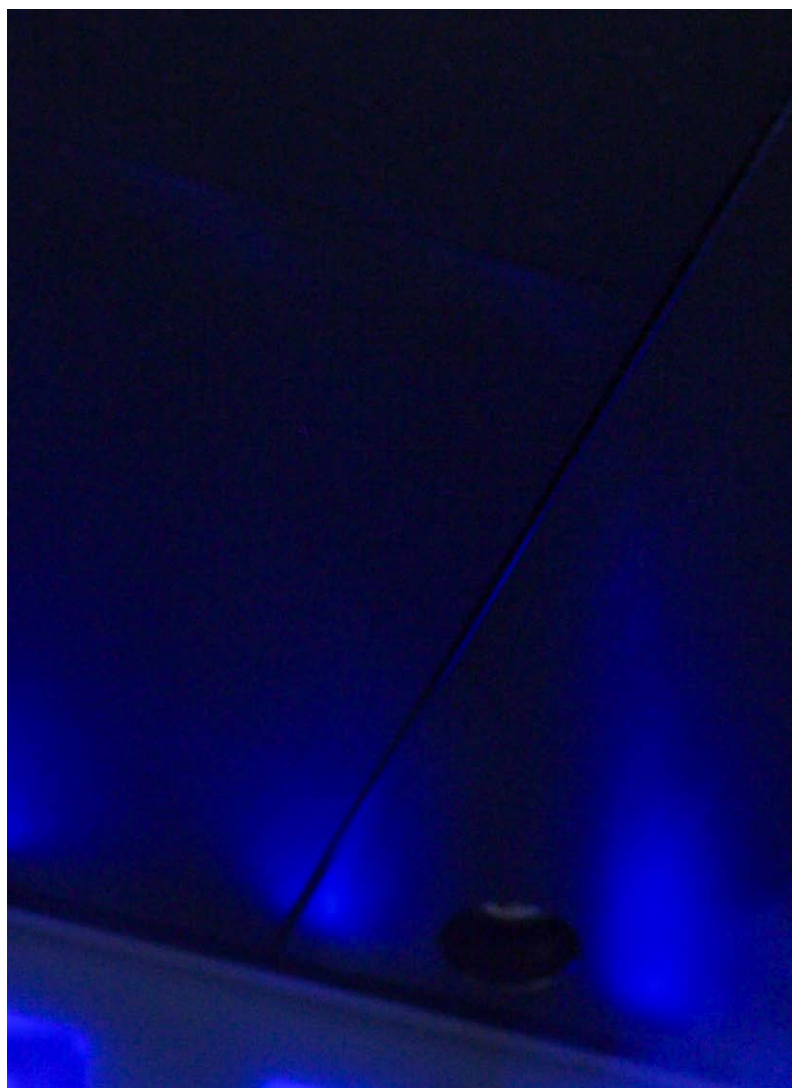
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bürkert
FLUID CONTROL SYSTEMS

Brought to the surface

COLLABORATION WITH CAMAG

CAMAG is a world-leading manufacturer of high-end equipment for high-performance thin-layer chromatography (HPTLC), designed for analysing substances and substance mixtures. In the process of developing a series of modules that does not require manual intervention and delivers reliable results, the focus was on viscosity-independent and chemically resistant components. With the support of Bürkert, CAMAG succeeded in bringing the world's first fully automated HPTLC system to market.



High degree of automation for demanding analytics

High-performance thin-layer chromatography is the method of choice for analysing complex sample mixtures. It makes it possible to separate and quantify individual substances. HPTLC analysis is used in the life science industry, in the quality control of food and herbal medicines, in the analysis of environmental pollutants and in forensic toxicology.

The higher the requirements placed on the results of the analysis, the greater the degree of automation required to avoid application errors and achieve reproducible results. CAMAG therefore set itself the goal of developing a fully

automated HPTLC system. With its new CAMAG® HPTLC PRO system, the Swiss manufacturer covers all process steps, from application using special spray technology for different sample volumes and types to the separation of the analytes in a chamber and the high-precision spraying of reagents for derivatisation, followed by heating of the plate to make individual substances visible. This eliminates sources of error that can arise from manual applications, such as viscosity-dependent dosing settings, the use of solvents and reagents, or the cleaning steps.



Using CAMAG's patented micro droplet spray technology, the spray nozzles produce an extremely fine reagent mist that is evenly distributed throughout the derivatisation chamber and deposited on the plate.

Source: CAMAG

Through thick and thin – precision over a wide viscosity range

The diverse applications of high-performance thin-layer chromatography require the use of solvents and reagents with a wide range of viscosity levels. In collaboration with Bürkert, CAMAG has therefore integrated a micro dosing unit into its modules, which – unlike another manufacturer's pump that was tested – enables a precise pumping process. From viscous reagents containing sulphuric acid to low-viscosity methanol, solvents with a wide range of viscosity levels can be used. The secret behind the Bürkert dosing unit is that the volume is pumped on the basis of pump cycles rather than time. This allows substances to be dosed very precisely, regardless of their viscosity, and in a wide volume range from 300 µl to 3 ml.

Stable spray technology with high durability

To make substances such as sugar or proteins visible, the plates are sprayed with reagents after chromatographic separation. Since these reagents are highly aggressive, CAMAG was looking for a robust dosing system. Here, Thomas van Oordt, Head of Research & Development at CAMAG, lists the key advantages of working with Bürkert: "We have been relying on the excellent technical project support provided by Bürkert's fluid experts for over 30 years. For this project, they presented us with the Type 7615 micro dosing unit as a possible pumping solution that not only works independently of viscosity, but is also extremely resistant to aggressive chemicals." During the development of its HPTLC PRO DERIVATIZATION module, Bürkert therefore worked with CAMAG to

"We can run Bürkert's Type 7615 self-priming micro dosing unit dry and flood it again – that is a truly unique selling point."

**Ph.D. Dr.-Ing. Thomas van Oordt,
Head of Research & Development, CAMAG**

The HPTLC PRO DERIVATIZATION module has three spray nozzles that produce different droplet sizes depending on the reagent and spray parameters.





Did you know?

Bürkert's Type 7615 micro dosing unit doses liquids in the μl range and combines maximum accuracy with exceptional resistance to chemicals. The three valves included with it can be flushed simultaneously. Due to the active inlet and outlet valves, the unit can pump in both directions. An integrated heater allows the valves and the medium to be heated if required. In addition, the unit is self-priming and safe to run dry.

design the micro dosing pump with precision. "Another big advantage is that the unit pumps bidirectionally," explains Thomas van Oordt. "This saves us a lot of switching operations, valves and pumping processes when cleaning the fluid area after each dosing process." Even if there is a potential defect in the sensitive nozzles, the ability to pump in both directions is extremely advantageous, as the aggressive reagent can be immediately extracted and a cleaning process can be started. This is automatically initiated by a message in the system, which significantly increases efficiency compared to manual work steps.

The Head of Research & Development mentions another important aspect: "No matter whether we use aqueous or alcoholic solutions, Bürkert's self-priming pump can run dry and be flooded again – that is a truly unique selling point." This is because the various reactive chemicals that are used require direct cleaning of the fluidic path multiple times. Quick flushing and repeated dry runs with solvents are essential.

Extensive range and tailored solutions

Other Bürkert components besides the micro dosing unit are used in CAMAG solutions, both in stand-alone devices and in the new HPTLC PRO system. These include both Type 6628 TwinPower rocker solenoid valves with separating diaphragms and Type 6027 plunger valves with special seal technology, whose functions include ensuring that the slight negative pressure required for atomising the reagents onto the plate is present. The sensitive dosing and liquid handling processes required for HPTLC are ensured by Bürkert's

media-separating Type 6724 Whisper Valves, which also feature easy flushability and an integrated diagnostic function. "What makes Bürkert stand out is its wide range of high-quality, resistant microfluidic components," explains Thomas van Oordt. "The development phase of our systems in particular involves many changes to parameters, such as volume flow. Through our collaboration with Bürkert, we can swap out valve blocks quickly and easily and find individual solutions."



"Bürkert offers a wide range of resistant, innovative microfluidic components. The durability of the products is essential for meeting CAMAG's needs."

Ph.D. Dr.-Ing. Thomas van Oordt

All in one, fully automated and focused on the future – with demanding analytics in mind

The CAMAG® HPTLC PRO system sets new standards by combining modules connected in series, thus creating a fully automated process. This is thanks in no small part to Bürkert's innovative solutions, which also keep processes reliable. "The control electronics ensure that the entire process is under control. Another advantage of the collaboration is that our electronics assembly experts know Bürkert products in detail," states Thomas van Oordt.

At CAMAG, the sky is the limit as far as further developments are concerned – for both stand-alone devices and the HPTLC PRO system. "We are currently developing the detection module for the HPTLC PRO

system, which is designed to automatically analyse each substance, including its spectrum. This gives customers an all-in-one system from applying samples to analysing them, so all they have to do is place the plates in the plate storage carrier at the start." However, until the system is on the market, this detection step can still be carried out manually. There is even more on the horizon, as Thomas van Oordt explains: "In the future, we will be able to test the substances present directly on the plate – with a view to their toxicity or resistance to antibiotics, for example – using living cells or active enzymes, which opens up new perspectives for efficient screening in analytical laboratories."

About CAMAG

The Swiss company CAMAG is a world leader in the manufacture of high-end instruments for high-performance thin-layer chromatography (HPTLC), used for analysing complex substance mixtures. Founded in 1958, the Muttenz-based company develops, tests and produces all its instruments, including its software, exclusively in Switzerland and distributes them globally through its subsidiaries and representatives. In addition, the 50-strong team supports its customers with training, technical services and analytical consulting. CAMAG stands for quality that's made in Switzerland, reliable results, expertise and constant innovation. CAMAG products enjoy an excellent reputation worldwide.

Bürkert Fluid Control Systems

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