

# Sample Application

Sample application determines  
quality and reproducibility of the analysis

## Sample Application – Variations

Sample application is the first step in the workflow of planar chromatography and it affects significantly the quality of the result at the end of the process. The choice of the application technique and the device depend on the requirements of precision, sample volumes, number of analyses and the desired grade of automation.

Spot wise sample application using a fixed volume capillary is the simplest way. Sample volumes of 0.5 to 5  $\mu\text{L}$  can be applied as spots onto conventional layers without intermediate drying, on HPTLC layers it is up to 1  $\mu\text{L}$  per spot. It is recommended to guide the capillary by means of a Nanomat.

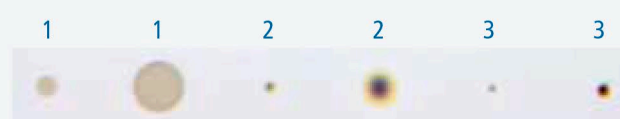
Spraying-on samples as narrow bands allows the application of significantly larger volumes. Starting zones in the form of narrow bands ensure the best resolution that can be achieved with the chromatographic system selected.

Very large sample volumes or samples with a high matrix content can be sprayed-on in the form of rectangles which, prior to chromatography, are focused into narrow bands by a short development step with a solvent of high elution strength.

### Effect of the solvent and the technique of sample application on the chromatogram

Mobile phase: toluene; detection: white light

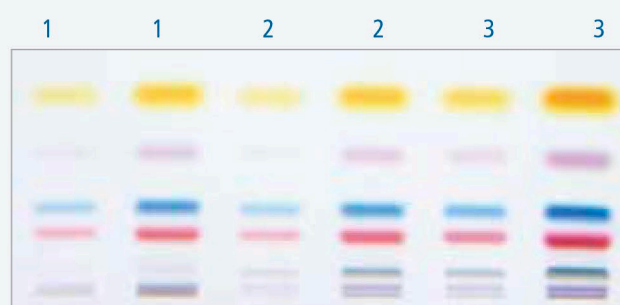
Test dye mixture (0.5 and 5  $\mu\text{L}$ ) dissolved in  
1: methanol      2: toluene      3: hexane



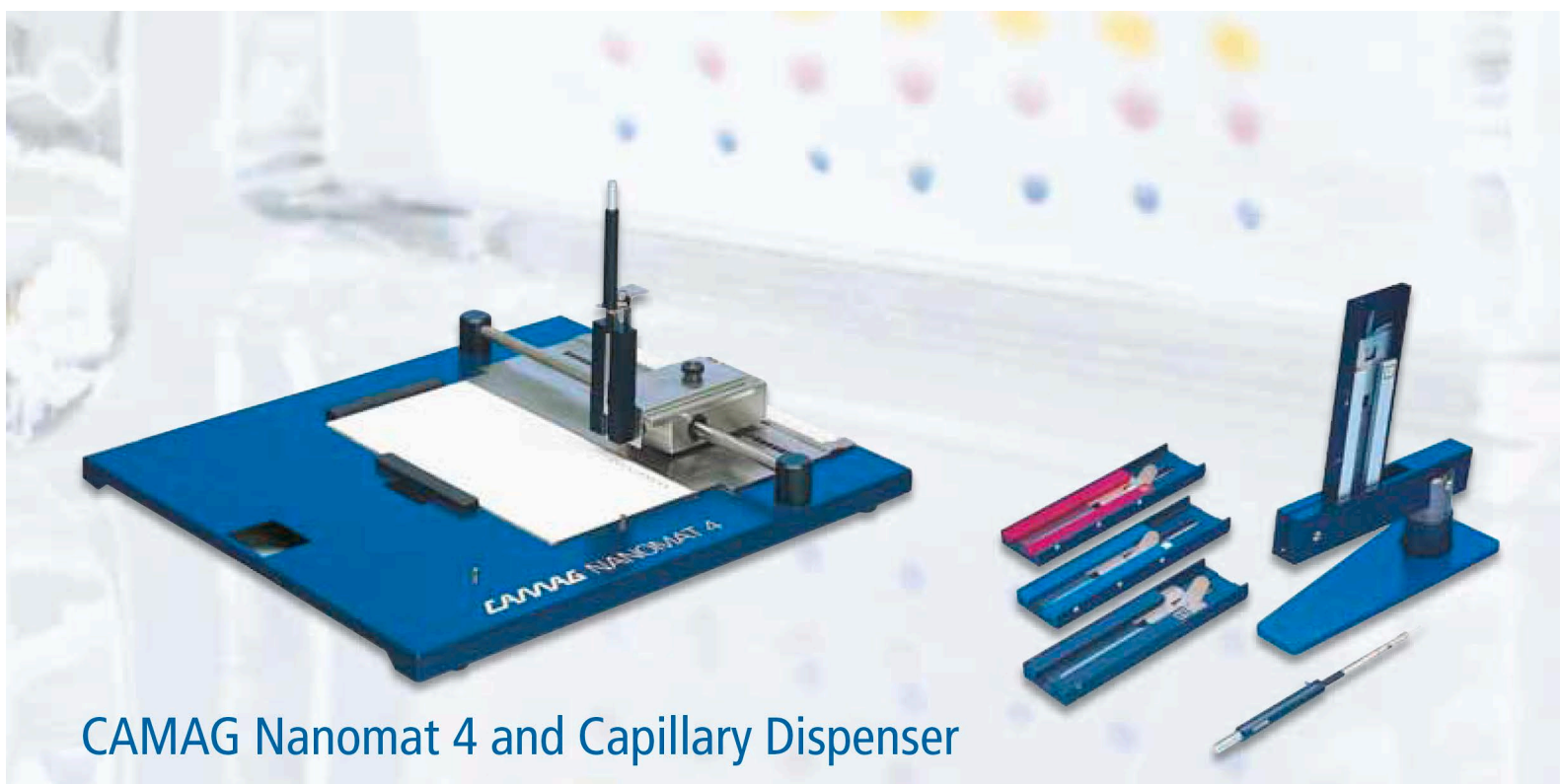
Contact application, prior to development



Developed plate after contact application of spots



Developed plate after spray-on application of bands



## CAMAG Nanomat 4 and Capillary Dispenser

The Nanomat 4 serves for easy application of samples in the form of spots onto TLC and HPTLC layers, precisely positioned and without damage to the layer. The actual sample dosage is performed with a disposable capillary pipette, which is precisely guided, thus ensuring that the chromatogram can be scanned automatically according to a programmed pattern.

### The Nanomat 4 is suitable for

- Conventional TLC plates including self-coated plates up to 20×20 cm
- HPTLC plates 10×10 cm and 20×10 cm
- TLC and HPTLC sheets up to 20×20 cm

### Capillary pipettes

The capillary pipettes are loaded into the dispenser in magazines. Capillaries of 0.5, 1, 2, and 5 µL volume are available. Each capillary size requires an appropriate dispenser magazine. With the Universal Capillary Holder capillary pipettes are taken from the dispenser, then filled with sample solution and placed against the applicator head of the Nanomat 4.

### Ordering information

#### CAMAG Nanomat 4 and Capillary Dispenser

**022.4735 Nanomat 4 complete,** including  
 022.7655 Capillary Dispenser,  
 022.7786 Universal Capillary Holder,  
 022.7661 Dispenser Magazine for 1 µL Capillary Pipettes,  
 022.7771 Capillary Pipettes 1 µL, pack of 5 × 100

022.7660 Dispenser Magazine for 0.5 µL Capillary Pipettes  
 022.7661 Dispenser Magazine for 1.0 µL Capillary Pipettes  
 022.7662 Dispenser Magazine for 2.0 µL Capillary Pipettes  
 022.7665 Dispenser Magazine for 5.0 µL Capillary Pipettes

022.7770 Capillary Pipettes 0.5 µL pack of 5 × 100  
 022.7771 Capillary Pipettes 1.0 µL pack of 5 × 100  
 022.7772 Capillary Pipettes 2.0 µL pack of 5 × 100  
 022.7775 Capillary Pipettes 5.0 µL pack of 5 × 100

Further information under [www.camag.com/nanomat](http://www.camag.com/nanomat)

## CAMAG Automatic TLC Sampler 4 (ATS 4)



Automatic sample application is a key factor for productivity of the HPTLC laboratory. The requirements for an instrument serving this purpose, i.e. precision, robustness during routine use and convenient handling are fully met by the Automatic TLC Sampler 4. The ATS 4 offers fully automatic sample application for qualitative and quantitative analyses as well as for preparative separations. It is suited for routine use and high sample throughput in mass analysis.

Samples are either applied as spots through contact transfer (0.1–5  $\mu\text{L}$ ) or as bands or rectangles (0.5 to > 50  $\mu\text{L}$ ) using the spray-on technique. Starting zones in the form of narrow bands offer the best separation attainable with a given chromatographic system. Application in the form of rectangles allows precise application of large volumes without damaging the layer. Prior to chromatography, these rectangles are focused into narrow bands with a solvent of high elution strength.

The ATS 4 allows "overspotting", i.e. a sequential application from different vials onto the same position. This technique can be used e.g. in pre-chromatographic derivatization, spiking, etc.

### Key features

- Fully automatic sample application, suitable for routine
- Application in the form of spots, bands, or rectangles
- Application of sample volumes between 0.1 and 5  $\mu\text{L}$  by contact transfer
- Spray-on application of sample volumes between 0.5 and > 50  $\mu\text{L}$
- Data input and monitoring through software
- Application of solutions onto any planar medium (FreeMode)



### Heated Spray Nozzle for ATS4 (option)

Heating at 60 °C cuts the time required for the application of aqueous solutions about in half. This is useful e.g. for trace analysis where comparatively large sample volumes have to be applied in order to reach a low detection limit



## ATS 4 FreeMode Software

Free choice of application patterns on planar media of any format

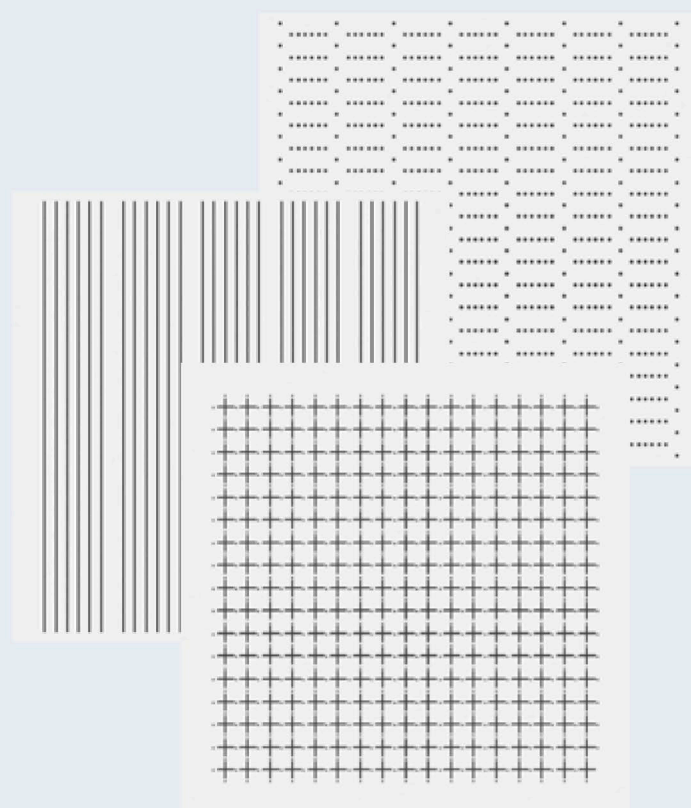
### Examples

Sample application on the opposite edges of three HPTLC plates 20 x 10 cm from a 66-well plate in one application run allows high throughput, e.g. in screening analysis or in combinatorial chemistry.

Application of certain patterns for two-dimensional chromatography according to the "4 x 4" method

The free choice of application patterns can be used in the preparation of test kits for serological investigations using nitrocellulose membranes.

Depending on the characteristic of the test, bioactive substances are sprayed-on as bands rectangular one to another, series of spots, or long-drawn bands. The very good reproducibility with respect to application geometry, spot and band quality, as well as dosage precision ensures reliable evaluation of the test results.



### Note

The Automatic TLC Sampler ATS 4 with winCATS meets all the requirements of GMP/GLP and can be IQ/OQ qualified. If the instrument shall be used in a 21 CFR Part 11 environment, the option 21 CFR Part 11 "compliance ready" is required for each winCATS workstation.

Further information can be found in the special brochure "Automatic TLC Sampler" and under [www.camag.com/ats](http://www.camag.com/ats)

### Ordering information

- 022.7400 CAMAG Automatic TLC Sampler 4, complete with standard accessories and Equilink, without software → *visionCATS*
- 022.7410 CAMAG Automatic TLC Sampler 4, with heated spray nozzle, complete with standard accessories and Equilink, without software → *visionCATS*
- 022.7450 Dosing Syringe Starter Kit for ATS 4 comprised of  
695.0053 Dosing Syringe 25 µL for ATS 4, without needle  
695.0046 Needle for spray-on application  
695.0047 Needle for contact application



## CAMAG Linomat 5

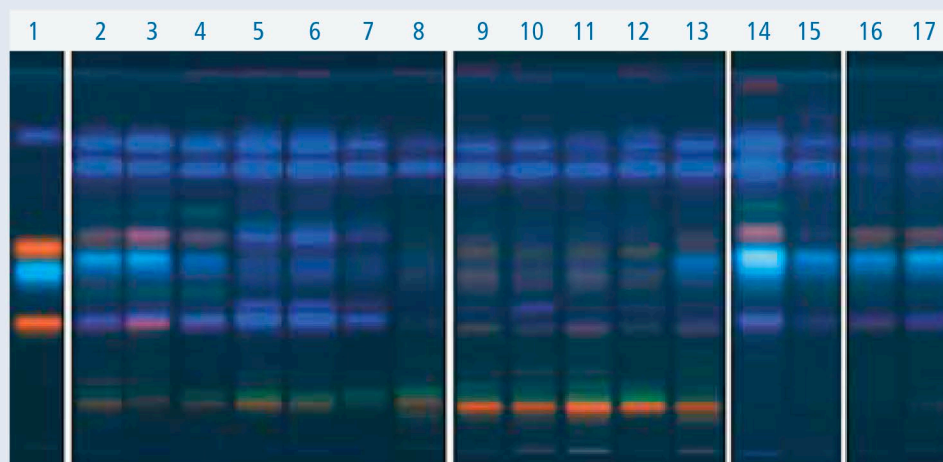
With the Linomat 5 samples are sprayed onto TLC/HPTLC plates in the form of bands with nitrogen or compressed air. Sample application is automatic, only changing the syringe (filling, inserting and rinsing) is manual. The Linomat is suitable for routine use.

### Operation under software

When the Linomat is operated under software, plate dimensions, number and distance of tracks, designation, sample volumes and sequence are software controlled. All operating data are automatically transferred to the densitometric or image processing evaluation step.

### Operation in stand-alone mode

In order to meet the requirements of users employing the Linomat only occasionally it can also be operated in stand-alone mode. Up to 10 application programs can be entered either manually via the keypad or transferred from a computer.



### Sample application as bands

HPTLC fingerprint (flavonoids) of green tea samples representing different geographic origins.

#### Track assignment

- 1 Reference substances with increasing  $R_f$ : rutin, chlorogenic acid, hyperoside, gallic acid
- 2– 8 Samples from China
- 9–13 Samples from Japan
- 14–15 Samples from India

For comparison:

- 16–17 Black tea from Sri-Lanka

Tracks taken from different plates

#### Note

The Linomat 5 with winCATS meets all the requirements of GMP/GLP and can be IQ/OQ qualified. If the instrument shall be used in a 21 CFR Part 11 environment, the option 21 CFR Part 11 "compliance ready" is required for each winCATS workstation.

Further information can be found in the special brochure "Linomat 5" and under [www.camag.com/linomat5](http://www.camag.com/linomat5)

#### Ordering information

**022.7808 CAMAG Linomat 5**, complete with one dosing syringe 100  $\mu$ L, standard accessories and Equilink, without software  
→ *visionCATS*

695.0014 Dosing Syringe 100  $\mu$ L for Linomat

695.0015 Dosing Syringe 500  $\mu$ L for Linomat