



New inspirations for your lab

Particle sizing

State-of-the-art technology
made in Germany > 02–09

Sample preparation

International Standard for Laboratory
and Quality Control > 12–17





FRITSCH particle sizing

Attractive state-of-the-art technology – **at a price worth to compare**

FRITSCH Particle Sizers make state-of-the-art particle sizing as easy as possible. With fewer parts for less wear and maintenance. And a measuring process that can hardly be surpassed in regards to simplicity and precision: Fill in the sample, start measurement, and that's it. Evaluation is carried out using intuitively designed, browser-based software with automatic updates, that can be operated flexibly from any end device. Cleaning also takes just a few simple steps.

A safe decision

FRITSCH Particle Sizers provide the reliable measurement accuracy, reproducibility and repeatability that you need for demanding analysis tasks in research and development or in quality control. Their performance in all areas easily exceeds the requirements of ISO 13320 or 13322-2. This means that they are already designed with the future in mind. You can also rely 100% on their long-term results.



NEW FRITSCH Laser Particle Sizer A-22 NeXT

Automatic particle size analysis down to the nano-range

The extremely wide measuring range of the A-22 NeXT from 0.01 to 3800 µm means you are perfectly equipped for all measuring tasks. Benefit from ultra-fast measuring times of less than a minute and highly accurate, reproducible measuring results that exceed ISO 13320. Rinsing is four times faster than usual. Our philosophy of low-wear construction means that one professional maintenance per year is sufficient.

➤ **NEW** Now also available with a dry dispersion unit as a module

➤ **NEW** Innovative swirl effect
for particularly homogeneous wet dispersion

➤ **NEW** Browser-based software NeXT control
State-of-the-art programming technology meets maximum usability: As intuitive to use as your smartphone with SOPs, clear listing of all measurements and many more features. Licence-free, can be operated quickly and flexibly on any end device.



Read more about the FRITSCH A-22 NeXT in the particle sizing section at www.fritsch-international.com.



NEW Dry dispersion unit for the A-22 NeXT –
Ultra-compact for rapid measurement of powdery samples
in an accelerated airflow.



Room for the future: The FRITSCH Particle Sizing Technology Centre is part of the new BioTech Valley emerging between Mainz and Birkenfeld, which is fast becoming a biotechnology location of global influence.



New **FRITSCH** Technology Centre Particle Sizing

As a pioneer in the industry, we have poured 35 years of experience in particle sizing technology into the new FRITSCH Technology Centre for Particle Sizing, combining it with the latest high-end technology. Covering an area of 240 m² on three floors, the new building at the FRITSCH headquarters in Idar-Oberstein/Germany offers plenty of room for the entire FRITSCH particle sizing team, bringing together development and application technology.

Here, in the Robert Fritsch Tower, all new technical developments in the field of particle sizing with and without lasers will be created in future; application tests are carried out and the optimal parameters for your specific measurement tasks are determined in individual test measurements. Ideas for new, innovative instruments and modules are developed on the top floor of the tower, constantly improving and expanding the range of FRITSCH Particle Sizers. One floor below, theory is put to the practical test in the application technology department.

When setting up our new technology centre for particle sizing, we also modernized and extended our fully equipped training laboratory. Here we bring particle measurement technology and all its subtleties to life in practical on-site hands-on training courses, where we train our international sales staff. A specially equipped video area means that in the future we will be able to provide even better worldwide online video demonstrations of the instruments, either by individual appointment or in public webinars. These are just two of the benefits you can enjoy as part of the FRITSCH Particle Sizing Community.



Book your free hands-on video demonstration now in the new FRITSCH Technology Centre Particle Sizing. We can explain you our particle sizing instruments, their operation and their software in detail, answer your questions and give you valuable tips for specific applications.

Email us at:
consultation@fritsch.de

Modular concept for particle sizing

Also part of the FRITSCH philosophy: All FRITSCH Particle Sizers are developed according to a smart, modular concept. You only buy what you really need. Therefore you can flexibly grow with your sizing tasks. Modules can be added to at any time, and we are constantly developing our portfolio.

The measuring units

FRITSCH Laser Particle Sizer A-22 NeXT Nano and Micro

Your instrument when it comes to the highest accuracy and sensitivity even with the smallest particles – with an extra wide measuring range from 0.01 to 3800 μm . And a Micro version as an economy alternative for a smaller measuring range from 0.5 to 1500 μm .



FRITSCH Particle Sizer A-28 ImageSizer

State-of-the-art particle sizing at an unrivalled price for the analysis of particle shape and size in a wide measuring range from 5 μm to 20 mm – the perfect alternative to sieving.



The modules



Module Dry dispersion unit **A-22 NeXT**

It's height-adjustable funnel and a stirrer made of stainless steel ensure optimum sample feeding adapted to the respective sample material.



Module Wet dispersion unit

Fast, uniform distribution of the sample material thanks to the powerful centrifugal pump with adjustable speed.



Module Ultrasonic box

For even finer adjustment of the wet dispersion to the respective sample – ideal if you frequently measure sample materials that tend to agglomerate.



Module pH measurement

Simple, continuous monitoring of the pH value of the dispersion liquid – covers fluctuations much more effectively than the zeta potential.



Module Extreme chemical resistance

The special conversion kit for problem-free measurement when using aggressive organic solvents such as benzene or hexane.



Module Dry measurement **A-28 ImageSizer**

Variable funnel height and adjustable feed rate for optimal particle concentration and ideal sample feeding.

The FRITSCH promise:

Anyone who chooses FRITSCH Particle Sizers is well prepared for the next 10 years or more. Their construction makes them extremely durable and resistant – even in harsh industrial applications. Constant advances in software and module development keep FRITSCH Particle Sizers up to date with the latest technology. What's more, you can rely on FRITSCH experts to provide service and support over the entire life cycle of the instrument.

Inspirations from the **FRITSCH** laboratory

NEW Extreme chemical resistance for laser particle measurement

We have developed the special conversion kit Extended for extreme chemical resistance, so that you can also use the FRITSCH Laser Particle Sizer A-22 NeXT when handling aggressive organic solvents, such as benzene or hexane. Its hoses are lined with FEP on the inside, while its seals and the flow plate are made of FFKM. The hoses can be easily switched to avoid contamination.

NEW Innovative pH measurement with the FRITSCH A-22 NeXT

As the first supplier ever, FRITSCH has now developed a way to measure the pH value of the dispersion liquid almost directly in the measuring unit. The new pH sensor is installed as a module in the dispersion bath and connected to the Laser Particle Sizer. It continuously measures the pH value during the measurement and automatically transfers the determined values to the software for documentation. This method covers fluctuations much more effectively than the zeta potential and offers many advantages, especially in the area of research and development. The pH value is much broader, especially with measurements in the field of nano-suspensions. Its monitoring provides valuable information about how and when a chemically inert material, for example, reacts to alkalis, depending on the environment. If the curve is unstable and varies during measurement, the pH value helps with stabilization and interpretation. The pH measurement process now introduced by FRITSCH means these values can be observed precisely. The detection of agglomeration or aggregation is also much easier.



A man with a beard and short brown hair, wearing a dark blue button-down shirt and blue jeans, is sitting in a blue office chair. He is smiling and looking towards the camera. His hands are clasped in his lap. In the background, there is a red shelf with five brown glass bottles, each with a white label. To the right, a black flexible hose is visible, and a person's head is partially visible in the foreground on the right side.

“Each particle measurement is only as good as its dispersion. Due to the swirl effect, the suspension is constantly kept in motion and thus increases the dispersibility of your sample.”



Why choose **FRITSCH**?

- 1. Quality made in Germany:** All FRITSCH-products are produced according to strict quality criteria, and everything is made in-house.
- 2. Innovative ideas for laboratory and quality control –** Always inspired by close interaction with our customers and their practical work.
- 3. Comprehensive expert service:** We support you with application technology knowledge from our own laboratory.
- 4. Direct contacts in 116 countries around the world** are available to you with application-related advice and technical service.
- 5. Satisfied customers around the world** count on our quality, our experience and our service.
- 6. A strong medium-sized family company** now in its fourth generation. Firmly anchored in the region since 1920. Active on the worldwide stage for decades.

FRITSCH – ONE STEP AHEAD.

Become part of the FRITSCH Community

Follow us on our social media channels and reap the benefits from news and expert knowledge on current topics in sample preparation and particle sizing:

 FRITSCH Milling and Sizing Germany

 fritsch.germany

 @FRITSCH_Germany

 FRITSCH Milling and Sizing



FRITSCH sample preparation

Worldwide standard in industry and research – **made in Idar-Oberstein**

The broad FRITSCH product range of laboratory mills is sure to include the right instrument for every material, any type of sample preparation and every sample quantity. From the planetary micro mill to the jaw crusher. For superior ultra-fine grinding down to the nano-range, for mixing and homogenizing emulsions and pastes, or for mechanical alloying and activation in materials research. Everything is optimized for efficient operations, fast cleaning, reliably reproducible results and maximum work safety. Our instruments are among the most technologically advanced that the market has to offer.

Tell us what material you want to grind – we tell you which is the right mill for you.

NEW

FRITSCH Mini Cutting Mill P-29

The inexpensive cutting mill for small sample quantities – especially suitable for sample preparation of grains, other seeds or plastics. With variable rotational speed from 500–6000 rpm, a maximum particle feed size of 13 mm and sieve inserts from 1–6 mm. Easy to clean and grinding chamber completely made of 316L stainless steel. Ask us about it!



FRITSCH showcasing **Laboratory Mills**



Planetary Ball Mill P-5 premium line

Premium power for grinding results down to the nano-range.



Variable Speed Rotor Mill P-14 premium line

Fast pre- and fine-grinding in one instrument – and full flexibility with cutting, impact or pin insert.



Knife Mill P-11

The FRITSCH laboratory mill for foodstuffs with five inserts for different sample quantities.



Universal Cutting Mill P-19 and P-19 large

Easy cleaning and variable rotational speed, also in a stainless steel version for food and pharma – and as P-19 large for throughputs of up to 85 l/h.



Disk Mill P-13 premium line with high-performance Cyclone separator

This power combination ensures simple feeding and cleaning, higher final fineness and faster throughput with minimized thermal load of the samples.



You can find the entire range of FRITSCH laboratory mills in the sample preparation section at www.fritsch-international.com

FRITSCH worldwide – Satisfied customers and strong team

FRITSCH Particle Sizer A-22 NeXT in demand in Africa

With locations and agents in 116 countries, FRITSCH is represented on every continent as a partner for high-tech particle sizing and sample preparation. An increasing number of laboratories and research institutions in Uganda and Kenya are now interested in our state-of-the-art A-22 NeXT Laser Particle Sizer. There is a wide range of sectors and areas of application: In future, companies in the cement and pharmaceutical industries in both countries, the Ugandan Ministry of Mining, the International Institute for Standards Uganda or the forensic laboratory of the Ugandan Federal Police will rely on the FRITSCH A-22 for their particle analysis. In the latter case, the technology will be primarily used to analyse soil samples.

“Although you can’t prove anything using this technology, you can rule out a lot of things, adding another piece to the puzzle”, explains the head of the forensic lab. Highly sensitive in terms of analysis, the A-22 NeXT nonetheless proved itself to be both robust and tough in the harsh environments encountered during our presentation trip to Africa. Together with David Odour, technical director for Vision Africa, and Paul Kawunde, FRITSCH product manager Uganda, our specialist for particle sizing instruments Maik Paluga demonstrated the A-22 NeXT on site in Uganda and Kenya. The instrument’s highly sensitive laser performed perfectly even after transport over dusty, bumpy roads and at laboratory temperatures of over 30°C.



David Odour and
Paul Kawunde
Product Manager



Ugandan
Federal Police



Bamburi
Cement
Plants



Dawa
Pharmaceuticals
in Nairobi

QMineral relies on the **FRITSCH A-22 NeXT**

The independent material testing laboratory QMineral in Heverlee, Belgium has been using the FRITSCH Laser Particle Sizer A-22 NeXT since 2021, having purchased it through FRITSCH agent Benelux Scientific. “As a specialist in characterising materials, we like working with partners who share our values“, says Rieko Adriaens. “Benelux Scientific attaches great importance to high product quality, reliable service and professional employees. These are also the reasons why we at QMineral are so happy about our longstanding partnership with Benelux Scientific as an installer of high-quality laboratory instruments.”



NEW colleague joins the **FRITSCH team** in the US

Reggie Piard has been responsible for service and repairs at the FRITSCH branch in North Carolina/USA since May 2022. After almost 10 years at AT&T, where he started his career having completed a Bachelor of Science degree at North Carolina Central University, he has joined our American team and works closely with FRITSCH Service Germany. **Welcome to the team!**



Compound bow release from FRITSCH prototype construction

Very few suppliers in the industry still afford their own prototype construction. FRITSCH is one of them. That's because it is important to us to develop every idea for practicality from the start. We also like to have every instrument under our control, from the first draft to series production. This philosophy pays off – as our service technician Stefan Bizer will tell you: Together with colleagues Karl Sauerbeck and Lukas Arend, he worked on the trigger release for his compound bow in the FRITSCH prototype construction until it was a perfect fit for his hand. The result: Fourth place in the Masters League at the German Shooting Association Championships. **Great teamwork!**

Personalized grip powder from the **FRITSCH-Lab**



The applications laboratory from FRITSCH is designed to implement concrete applications in laboratory practice with our laboratory instruments for the best possible results. Tell us what you need to achieve and we'll find the perfect solution. Our colleague Fabian Mayer, Head of FRITSCH Accounting in Idar-Oberstein and a

passionate discus thrower, also followed this approach: In preparation for the 2021 German Senior Winter Throw Athletics Championships in Erfurt, he had his very own grip powder made by laboratory manager Leos Benes in the FRITSCH laboratory. The initial materials: natural tree resin and powdered magnesium. The set-up: FRITSCH Knife Mill P-11 with 40 ml single-use grinding vessels. The number of trials: over a dozen until the two men were satisfied with the result. The realization: a short grinding time at maximum speed is much more effective in this case than a long grinding time at low speed. The result: the first championship title for Fabian Mayer in discus throwing. **We are very proud.**

Inspirations from the **FRITSCH** laboratory

In focus: cannabis

The most common method to extract the active ingredients from the cannabis plant is supercritical CO₂ extraction. At a temperature above 31°C and with high pressure, the CO₂ gets into the supercritical state, where it acts as a solvent. Passed through a chamber containing the plant material, it still has the density of a liquid but can fill the entire chamber like a gas. The advantage: The CO₂ extracts the cannabinoids and

terpenes from the plant without causing denaturation or damage to the product.

This produces a safe, high-quality, pure oil that can be processed for a variety of therapeutic uses. The big challenge: the highest possible yield of the ingredients in the shortest possible time. This requires optimum, homogeneous grinding of the cannabis plant. No problem with FRITSCH technology.

Homogenization and characterization of CBD isolates

Solid isolates of CBD can be produced as a non-homogeneous “cake” of materials or as a mixture of loosely associated granules comprising a wide particle size distribution. Creating material suitable for consumption or subsequent formulation in other products typically requires particle size reduction and/or homogenization. Confirmation of particle size distribution of a given sample may be achieved via traditional sieving methods or by using a particle size analyser. Primary considerations when selecting

a milling system for CBD homogenization include:

- > **batch size – throughput requirement per kg/batch or day**
- > **minimising losses – physical and/or chemical**
- > **the desired final particle size range**
- > **easy cleaning to prevent batch cross-contamination**
- > **the (residual) moisture content**

CBD homogenization in small- and medium-scale

Small-scale homogenization of CBD isolate may be achieved by low energy ball milling or by automated mortar grinding with pestle. Larger batches of CBD material can be quickly and continuously homogenized in the FRITSCH P-14 Variable Speed Rotor Mill with Cyclone separator down to the lower micron range to the fineness of talcum powder. The combination of extremely fast homogenization with active removal of material from the rotor area in a fraction

of seconds means there is no time for a temperature increase due to friction, which could cause chemical degradation. Another advantage: Product contact surfaces are made of stainless steel or food-grade plastic vacuum hoses for the Cyclone separator and can all be cleaned between batches to reduce the likelihood of cross-contamination. A variable speed motor and a wide range of sieve rings provides precise control of particle size output.



Perfect for CBD medium-scale homogenization: the FRITSCH Variable Speed Rotor Mill P-14 classic line with high-performance stainless steel Cyclone separator.

CBD homogenization in large-scale

We recommend the FRITSCH Universal Cutting Mill P-19 for homogenising CBD isolate to produce a uniform powder on a production-level scale. Already considered worldwide as the leading precision milling solution for preparing cannabis biomass for extractions or pre-rolls, it can be configured just as effectively as a homogenizer. We recommend the following system settings for this purpose:

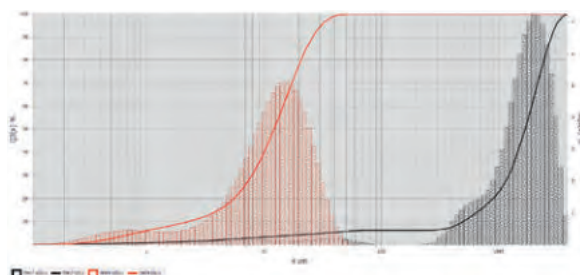
- > **Speed between 2000–3000 rpm**
- > **Rotor with notched edges and fixed knives**
- > **Gap setting 1–2 mm between the cutting rotor and fixed knives**
- > **Sieve cassette: 1, 2 or 4 mm – depending on the nature of sample material and the desired final fineness**
- > **High-performance stainless steel Cyclone separator**
- > **Powerful vacuum cleaner**



FRITSCH Cutting Mill System P-19 with high-performance Cyclone separator and 60-litre collecting vessel for CBD homogenization on a production scale.

Quality control through analysis of CBD particle size

Characterizing the particle size distribution of a CBD sample confirms that the milling system used has achieved particles within an acceptable range, has met important criteria for release into the manufacturing process or for product sale, or the efficacy of a compound is based on its particle size. Laser particle size analysers with Reverse-Fourier design, which were developed and patented by FRITSCH more than 35 years ago, offer enormous advantages and greater flexibility compared to conventional sieving. Above all, the FRITSCH Laser Particle Sizer A-22 NeXT has proven its capability in characterizing CBD isolates in wet or dry dispersion. Ask our particle sizing experts – we will be happy to advise you.



Result of particle sizing of CBD isolate using the FRITSCH A-22 NeXT before and after homogenization: The initial sample (black) contained a mixture of loose granules with a wide particle size distribution. The material homogenized using the FRITSCH Variable Speed Rotor Mill P-14 classic line (red) resulted in a particle size consistency similar to talcum powder.



Watch our application video for sample preparation of cannabis plants with the FRITSCH Universal Cutting Mill P-19.



Also read our online article titled **“The Science Behind the Perfect Joint”** at www.fritsch-international.com in the section Sample Preparation/Applications and Solutions, Cannabis Industry.



Become part of the **FRITSCH Community**

Even if you do not yet use FRITSCH laboratory instruments: Most of our services are open to everyone. No matter where in the world you work. We share our application knowledge in a variety of ways:

- > **Webinars**
- > **Workshops**
- > **Personal application consultation**
- > **Instrument demonstrations online or on site**
- > **Online training**
- > **Installation service including personal instruction**
- > **Exclusive user workshops**
- > **Global problem solving via video call**
- > **Worldwide remote control directly on the instrument**

As a customer, you also benefit from many other services, including a replacement instrument service:

We recommend the right instrument for you: FRITSCH test grinding and test particle analysis

Test the performance of the FRITSCH Laboratory Mills and Particle Sizers on the original: Simply send us a sample of your choice. Our experts in the FRITSCH laboratory will carry out an individual grinding and/or particle analysis, document the results, optimize the milling or sizing parameters in close consultation with you and recommend the appropriate equipment configuration.

Simply complete our online form for test milling or sizing. Both can be found in the section services at www.fritsch-international.com. Alternatively, just contact us with your needs.



NEW FRITSCH app with augmented reality

The free FRITSCH app offers you more than direct, fast access to the entire FRITSCH range for particle sizing and sample preparation, including technical data, product brochures, product and application videos: Thanks to the integrated augmented reality function, you can also position each instrument true to scale within your laboratory environment, so that you can identify the best location in advance, ensuring that there is enough space. You can then put together the right accessories and send us all the details in an offer request with a single click. It couldn't be simpler.

Download the FRITSCH app to your smartphone now for free.





Do you need advice?
We are at your service.

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