RETSCH Product Navigator

- Milling
- Sieving
- **Assisting**
  - Sample Dividers
    - PT 100
    - PK 1000
    - RT 6.5 - RT 75
  - Vibratory Feeder
    - DR 100
  - Fluid Bed Dryer
    - TG 200
  - Ultrasonic Baths
    - UR 1, UR 2, UR 3
  - Pellet Presses
    - PP 40, PP 25

Assisting for more efficient sample preparation and analysis

Dividing, feeding, drying, cleaning, pelletizing

From representative, reproducible sampling and sample division to uniform continuous material feed, from the efficient preparation of pellets for XRF analysis to the rapid cleaning of milling tools and test sieves to gentle sample drying – for all these tasks RETSCH offers a comprehensive range of useful and cost-effective assistants.
The products are intended for universal use and make working with RETSCH mills and sieve shakers even more comfortable and efficient.

Retsch®

Solutions in Milling & Sieving

We assist you in your daily work

The "Assistants" form the perfect complement to the range of mills and sieve shakers from RETSCH. They optimize your results and increase your working efficiency – benefits that you should take advantage of.

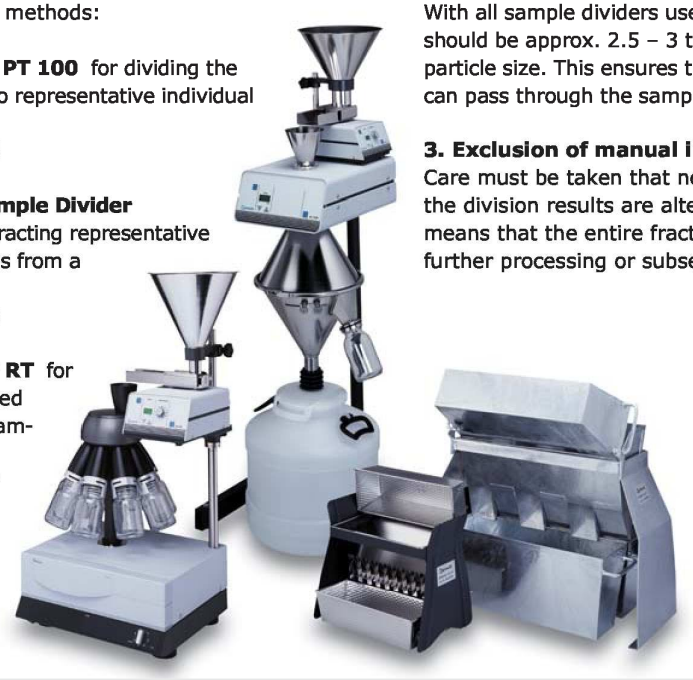
Dividing – as important as the analysis itself!

Errors in sample preparation, above all in dividing the laboratory sample, accumulate in the course of the process and cannot be compensated, even by the most up-to-date analytical instruments.

Only the exact division of the entire sample into representative fractions will guarantee exact and unbiased analytical results!

For quality-conscious manufacturers, processors and supervisors, this means that an exact sample division must be as important as an error-free analysis. Just how large the error can be with different sampling and sample division methods is shown in the diagram below.
RETSCH offers sample dividers which operate with the most exact division methods:

- **Sample Divider PT 100** for dividing the whole sample into representative individual fractions
  More on page 4
- **Rotary Tube Sample Divider PK 1000** for extracting representative individual samples from a material flow
  More on page 6
- **Sample Splitter RT** for economically priced manual on-site sample dividing
  More on page 7



Important rules for sample division:

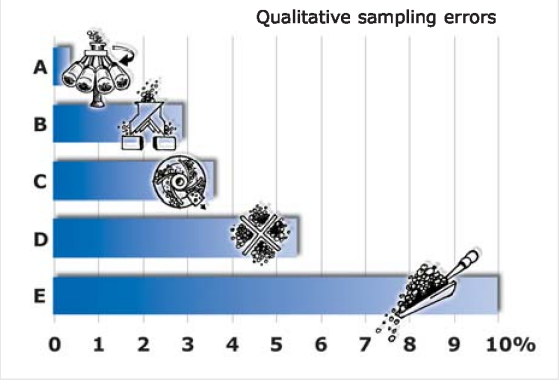
1. Significance of the minimum divided quantity
For the sub-sample to be representative of the entire bulk, its qualitative properties must correspond to that of the original quantity. In order to comply with this requirement, some basic guidelines should be respected. In particular, this concerns the minimum partial quantity as well as the maximum permissable deviation. There are several application-related guidelines and specifications as to the calculation of the minimum quantity and sampling accuracy. Please refer to DIN 51 701, part 2, or the "Guidelines of Preparing Laboratory Samples" from AAFCO (Association of American Feed Control Officials Inc.).

2. Observance of the sample size opening
With all sample dividers used, the sample size opening should be approx. 2.5 – 3 times larger than the maximum particle size. This ensures that even the larger particles can pass through the sample openings uniformly.

3. Exclusion of manual influences
Care must be taken that neither the division process nor the division results are altered by manual influences. This means that the entire fraction obtained must be used for further processing or subsequent analyses!

Comparison of different sampling and sample division methods

The diagram shows how large the error can be for different sampling and sample division methods. It can clearly be seen that rotary tube sample dividers produce the smallest qualitative variation (A). They achieve the highest degree of fractionating accuracy and are therefore clearly superior to all other methods. Sample splitters provide the best results of all the manual fractionating methods.
A: Rotary tube sample dividers
B: Sample splitters
C: Disc dividers
D: Heaping and dividing
E: Random sampling (e.g. with a scoop)



Example: Bulk material, feed size < 5 mm

Feeding – reproducible and efficient

The controlled continuous material feed with the Vibratory Feeder DR 100 offers many advantages. Errors resulting from discontinuous manual feeding are avoided and the results are always reproducible. The DR 100 can be used for material feeding in combination with sample dividers, mills and many other instruments.

The benefits of automatic feeding:

- Uniform feed of larger amounts
- No temporary overloads
- Less time- and labor-intensive
- Reproducible results

The Vibratory Feeder DR 100 can be used in many applications. The wide range of accessories makes the instrument adaptable to your own particular requirements.

More on page 9

Drying – rapid and gentle

The drying of materials in the RETSCH Fluid Bed Dryer TG 200 takes place in a constant flow of warm air. The result is a rapid, gentle and uniform drying process. **The savings in time** compared with drying in a drying oven are considerable and **may be up to several hours**. After drying in the fluidized bed the bulk goods are both pourable and thoroughly mixed.

Many substances have already been successfully dried in the TG 200, e.g.:

- Chalk, coal, coke, compost, fertilizers, grain, hops, ion exchangers, metal powders, peat, plant parts, pharmaceutical products, plastics, polymers, rubber, salts, sand, sawdust, soil, tea, tobacco, washing powder, waste.
- Apart from bulk goods it is also possible to rapidly dry test sieves which can be installed directly on the instrument.

More on page 10

Cleaning – care is required

RETSCH's product range includes three sizes of ultrasonic baths for cleaning test sieves and grinding tools quickly and easily. UR 1 is for test sieves up to 203 mm dia., UR 2 for test sieves up to 400 mm dia., and the UR 3 for the simultaneous cleaning of up to 5 test sieves 200/203 mm dia. The gentle yet thorough cleaning of test sieves in an ultrasonic bath **increases their working lives** as damage which could occur during manual cleaning is avoided.

More on page 12

Pelletizing – Sample preparation for XRF

For the preparation of solid samples for XRF analysis RETSCH offers pellet presses in 2 sizes. The automatic floor model PP 40 features individual pressure force regulation up to 40 t. The pellets are pressed into steel rings with external diameters of 40 or 51.5 mm. A version with aluminum cups is also available. The manual hydraulic Pellet Press PP 25 is a compact benchtop unit with pressing tools for 32 mm and 40 mm pellets.

More on page 14

Do you need any further "Assistants"?

Please let us have your proposals about how we can make working with RETSCH mills and sieve shakers even more convenient for you. We will be grateful for your suggestions!

Sample Divider PT 100

Simply representative division results

RETSCH sample dividers are rotating dividers. They divide all pourable solids up to 10 mm so accurately that the characteristic composition of each fraction of the sample corresponds exactly to that of the original bulk sample. This very high degree of dividing accuracy and reproducibility is achieved with both fine and coarse materials. The material feed and dividing processes take place automatically, without interruption and without loss of material. The feed amount can range from a few grams up to 5000 ml depending on the sample vessels used. It is possible to produce an individual number of identical fractions for various applications by the repeated division or combination of fractions.

The easy way of sample division

Working with the RETSCH Sample Divider PT 100 is easy and uncomplicated. For example, material feed with the Feeder DR 100 is automatic and synchronized: this means representative sample division right from the start, as the DR 100 only starts feeding the material when the sample divider has reached its proper running speed.
For cleaning and exchanging, the dividing head, feed chute and hopper can be easily removed without any tools.

The sample vessels are also extremely easy to attach and release with the quick-release clamps. This new type of clamping system no longer involves tiresome mounting of the vessels.

Benefits at a glance

- Extremely high division accuracy
- Representative and reproducible division for accurate analysis results
- Modular design
- Automatic material feed via synchronized feeder
- Simple and rapid handling due to a convenient quick-release clamping system for sample vessels
- Speed is monitored and kept constant
- Timer
- Compact, maintenance-free and easy to clean
- Low-noise drive
- CE-conforming
- 2-year warranty

Performance data	PT 100
Applications	sample division, sample reduction
Feed material	bulk materials
Number of divisions	6, 8 or 10
Timer	1 - 60 min or continuous
Technical data	
Feed size	≤10 mm
Feed capacity	max. 5000 ml
Vessel volume	30, 100, 250 or 500 ml
W x H x D	580 x 910 x 420 mm (incl. DR 100)
Net weight	approx. 33.5 kg (incl. DR 100)
Noise values (Noise measurement according to DIN 45635-31-01-KL3)	
Measuring conditions: Dividing material: silica sand; particle size <3 mm	
Emission value with regard to workplace	L_{pAeq} 41 dB(A)

Versatile, variable, individual – sample dividing with the RETSCH PT 100

The Sample Divider PT 100 has a modular design and can be put together to suit individual requirements. It offers an extremely flexible range of possible applications. A feeder, various dividing heads, sample receptacle vessels and further useful accessories are available in addition to the drive unit.

The number of part samples is determined by the choice of the dividing head which is available with 6, 8 or 10 outlets. The dividing heads are made from coated aluminum or plastic. The former are particularly wear-resistant and, in addition, the sticking of dust particles is avoided to a large extend.

Sample vessels are available in different sizes for various applications. Wide-mouth glass bottles fit the dividing heads as standard. Special dividing heads are available for use with Duran laboratory bottles (100, 250 and 500 ml). These dividing heads can also be equipped with inserts for 30 ml plastic bottles.

For fractions with a low density or with a high fineness we recommend the use of a protective cap for the dividing head hopper. The dust cap minimizes both material losses and dust formation.

For uniform material feed the Vibratory Feeder DR 100 should be used. PT 100 and DR 100 are connected via an interface and therefore perfectly matched. In addition, the special swivel back stand assures a fixed position of the feeder over the center of the dividing head inlet thus ensuring increased accuracy. Further information about the Feeder DR 100 can be found in this brochure on page 9.

RETSCH offers a complete unit which includes an 8-outlet aluminum dividing head with the practical quick-release system. The set is supplied with 10 wide-mouth 250 ml sample bottles.

Order data on page 8

1. *Dividing head with quick-release system for wide-mouth bottles*
2. *Dividing head with quick-release system for particle sizes <5 mm, for use with Duran bottles and for*
3. *Insert for 30 ml plastic beakers*

Technology of PT 100

The material to be divided first flows through a decentrally located feed hopper directly into the openings in the dividing head. Even with coarse material, this achieves a very low level of deviations between the materials in the sample vessels. The dividing process itself runs automatically and without manipulation. The dividing head rotates – with speed monitoring – at a constant 110 revolutions per minute, independently of the load and the mains frequency. That means that with a dividing head with ten outlets, the feed flow is divided into 1100 individual samples each minute. The highest degree of dividing accuracy is thus guaranteed. The dividing heads divide the material evenly among the sample vessels. Depending on the quantity and further application, amongst others wide-mouth bottles and Duran laboratory bottles can be used.

Rotating Tube Divider PK 1000

Benefits at a glance

- Exact dividing, also of larger quantities
- Representative and reproducible division for accurate analysis results
- Modular design
- Adjustable dividing ratio
- Extraction of 1-3 samples
- Dividing process according to DIN 51 701/Pt 4
- Batch and continuous operation possible
- Easy cleaning
- 2-year warranty

Easily divides large quantities

The RETSCH rotating tube divider is the prerequisite for representative dust-free division and volume reduction of larger bulk samples. It is suitable for powdered or granular bulk materials with particle sizes up to 10 mm. The rotating tube divider can be provided with bottom cones for 1, 2 or 3 samples. The slot width adjusts the ratio of the fractions and therefore the amount of sample. The minimum feed amount should not be less than 100 ml in order to ensure maximum accuracy.

The sample fractions can be collected in laboratory bottles with a capacity of up to 0.5 liters. The reject collector has a capacity of 30 liters.

All parts coming into contact with the sample material are made from stainless steel or glass. In order to ensure uniform material feed and therefore an increased sample division accuracy, we recommend that the rotating tube divider be used in conjunction with a DR 100 feeder.
The dividers are also suitable for inclusion in continuously working laboratory and pilot-plant scale units.

The PK 1000 is available as a complete unit including 10 x 500 ml sample bottles, a 30 l reject collector, bottom cone and vibratory feeder. It is also possible to select the components individually according to your particular requirements.

Performance data	PK 1000		
Applications	sampling and sample dividing		
Feed material	bulk materials		
Number of divided samples	1 - 3		
Timer	digital, 1 - 99 min or continuous		
Technical data			
Available bottom cones	with 1 sample outlet	with 2 sample outlets	with 3 sample outlets
Slot width, continuously adjustable	0 - 159 mm	0 - 110 mm	0 - 53 mm
Max. dividing ratio	1 x 1:5	2 x 1:7.2	3 x 1:15
Min. dividing ratio*	1 x 1:26	2 x 1:26	3 x 1:26
Feed size	≤10 mm	≤10 mm	≤10 mm
Volume of reject collector	30 liters		
W x H x D	560 x 1150 x 700 mm		
Net weight	approx. 37 kg (without DR 100)		

* for a maximum particle size of 10 mm.
for smaller maximum particle sizes the division ratio increases accordingly

Noise values (Noise measurement according to DIN 45635-31-01-KL3)	
Measuring conditions: Dividing material: silica sand; particle size <3 mm	
Emission value with regard to workplace	L_{pAeq} 63 dB(A)

Technology of PK 1000

The material to be divided passes through the feed hopper into the rotating tube divider. The total material stream is distributed evenly at a constant speed (50 min^{-1}) over the pitch circumference of the lower cone by the tube rotating within the upper cone. The interchangeable lower cones have one, two or three continuously adjustable sample slots. In the course of each rotation a separated quantity corresponding to the width of the slot is deposited in the sample bottle. The rest passes into the reject collector.

Calculating the slot width for the PK 1000

The maximum dividing ratio depends on the maximum slot width which can be set on the bottom cone. This differs between the three bottom cones which are available (see table). The smallest dividing ratio depends upon the maximum particle size of the sample since the slot width should be at least 3 times wider than the maximum particle size.
This means that smaller fractions can be taken from smaller particle sizes. The slot width "X" to be set can be calculated from the ratio of the required fractional amount "QT" to the initial sample amount "QA" multiplied by the fixed pitch circumference "U" of the bottom cone (U = 795 mm for all bottom cones).

$$X = \frac{QT}{QA} * U$$

Example: A representative sample of 250 ml is to be taken from an initial sample amount of 5000 ml. This means that the slot width must be set to 40 mm.

Order data on page 8

Sample Splitters RT 6.5 - RT 75

Accurate manual dividing

RETSCH sample splitters are used for the simple dividing and reduction of bulk materials of all kinds. Sample splitters are ideal for the on-site reduction of sample material. They are easy to use, easy to clean and do not need an electrical power supply. Depending on the particle size, material and particle size distribution, the opening width of the passage should be 2.5 - 3 times greater than the diameter of the largest particle (particle size factor). Each sample splitter consists of one dividing head, one stand and three receptacles.

Order data on page 8

Benefits at a glance

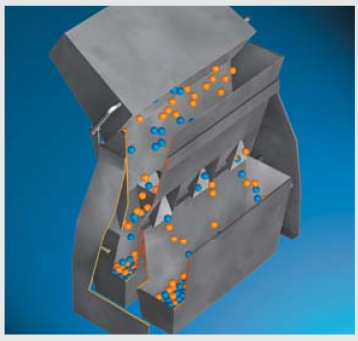
- For use in the laboratory and on-site
- High-precision manual dividing process
- Easy and quick to clean
- Dividing process according to DIN 51701, Part 4
- Inexpensive
- Available in 6 sizes

Technical data	RT 6.5	RT 12.5	RT 25	RT 37.5	RT 50	RT 75
Slot size	6.3 mm	12.5 mm	25.0 mm	37.5 mm	50 mm	75 mm
Number of slots	12	18	16	12	8	6
Max. feed size*	approx. 4 mm	approx. 8 mm	approx. 16 mm	approx. 25 mm	approx. 33 mm	approx. 50 mm
Max. feed charge	5 liters		16 liters			
Material of dividing head	stainless steel		sheet steel, hot-dip galvanized			
Material of stand	sheet steel, painted		sheet steel, hot-dip galvanized			
Material of receptacles	tin plate		sheet steel, hot-dip galvanized			
W x H x D	300 x 270 x 250 mm		620 x 420 x 260 mm			
Net weight	approx. 3.5 kg		approx. 21.5 kg			

* with a 5-10% fraction of the maximum particle size

Technology of sample splitters

With sample splitters, the sample material is evenly distributed in one of the receptacles and then emptied over the dividing head. The material runs through the alternately arranged passages in opposite directions into the two collecting receptacles under the dividing head outlets. With every operation the feed sample is split in halves. This can be repeated as many times as necessary until the required dividing quantity has been obtained.



Order data sample dividers

Sample divider PT 100						Item No.
PT 100 complete unit, incl. dividing head with 8 quick-release outlets, DR 100/40* and 10 wide-mouth bottles 250 ml						
PT 100 complete unit for 220-240 V, 50 Hz						40.534.0005
PT 100 complete unit for 110-120 V, 60 Hz						40.534.0006
PT 100 drive unit (without dividing head, vibratory feeder/stand, sample receptacles)						
PT 100 drive unit for 100-120/200-240 V, 50-60 Hz						40.534.0002
Dividing heads for PT 100						
	material	sample outlets	feed size	sample bottle	bottle fixation	
	aluminum hard-anodized	6	up to 10 mm	wide-mouth bottles	quick-release	42.793.0003
	aluminum hard-anodized	8	up to 10 mm	wide-mouth bottles	quick-release	42.793.0001
	aluminum hard-anodized	10	up to 10 mm	wide-mouth bottles	quick-release	42.793.0002
	POM	8	up to 10 mm	wide-mouth bottles	quick-release	42.793.0007
	aluminum hard-anodized	8	up to 5 mm	Duran laboratory bottles	quick-release	42.793.0009
	Support with 30 ml plastic beakers and lids, 8 pieces (for dividing head 42.793.0009)					42.018.0001
Sample vessels for PT 100				30 ml	100 ml	250 ml / 500 ml
Wide-mouth bottles, 10 pieces				–	–	22.523.0001 / 22.523.0002
Duran laboratory bottles, 10 pieces				–	22.523.0003	22.523.0004 / 22.523.0005
Plastic beaker with cover 30 ml, 10 pieces (for support 42.018.0001)				42.156.0001	–	– / –
Accessories for PT 100						
Hopper, stainless steel, volume 2.8 l (for PT 100 used without DR 100)						03.785.0146
Protective dust cap for hopper, of POM						03.742.0013
Stand for Vibratory feeder DR 100 on PT 100						42.742.0011

Rotating Tube Divider PK 1000				Item No.
PK 1000 complete unit, incl. bottom cone with one sample outlet (max. dividing ratio 1:5), vibratory feeder DR 100/75*, 10 wide-mouth bottles 500 ml and reject collector 30 liters				
PK 1000 complete unit for 220-240 V, 50 Hz				40.411.0010
PK 1000 complete unit for 100-120 V, 60 Hz				40.411.0011
PK 1000 drive unit (without bottom cone and vibratory feeder, with 10 wide-mouth bottles 500 ml and with reject collector 30 liters)				
PK 1000 drive unit for 220-240 V, 50/60 Hz				40.411.0001
PK 1000 drive unit for 100-120 V, 50/60 Hz				40.411.0006
Bottom cone for PK 1000	sample outlets	slot width	max. dividing ratio	
	1, adjustable	159 mm	1: 5	42.787.0001
	2, adjustable	110 mm	2 x 1: 7.2	42.787.0003
	3, adjustable	53 mm	3 x 1:15	42.787.0004
Sample vessels for PK 1000				
Wide-mouth bottles 250 ml, 10 pieces				22.523.0001
Wide-mouth bottles 500 ml, 10 pieces				22.523.0002
Accessories for PK 1000				
Spare reject collector, 30 l				05.010.0004

Sample splitters RT 6.5 - RT 75		Item No.
Sample splitters RT 6.5 and RT 12.5 (incl. 3 receptacles 2.5 liters each, stand and dividing head)		
Sample splitter RT 6.5	with 12 slots 6.3 mm	40.610.0001
Sample splitter RT 12.5	with 18 slots 12.5 mm	40.610.0002
Sample splitters RT 25, RT 37.5, RT 50 and RT 75 (incl. 3 receptacles 8 liters each, stand and dividing head)		
Sample splitter RT 25	with 16 slots 25.0 mm	40.610.0003
Sample splitter RT 37.5	with 12 slots 37.5 mm	40.610.0004
Sample splitter RT 50	with 8 slots 50.0 mm	40.610.0005
Sample splitter RT 75	with 6 slots 75.0 mm	40.610.0006
Spare parts for sample splitters		
Spare receptacle 2.5 liters	(for RT 6.5 and RT 12.5)	42.147.0001
Spare receptacle 8.0 liters	(for RT 25, RT 37.5, RT 50 and RT 75)	42.147.0002

*Accessories for DR 100 see on page 13

Vibratory Feeder DR 100

Uniform, continuous feeding

The RETSCH vibratory feeder is used for the uniform, continuous feeding and conveyance of pourable bulk materials and fine powders. The DR 100 feeds RETSCH mills and sample dividers, as well as balances and particle measuring devices, and it is also suitable for filling and dosing. Their performance, adaptability and compact design make these devices suitable for a great variety of applications. The DR 100 can also be driven and controlled externally via the built-in interface.
RETSCH vibratory feeders guarantee reproducibly exact results and the economic use of downstream laboratory and testing devices. The DR 100 is easy to set up and operate.

The RETSCH vibratory feeders are available in various designs. For the feed of pourable powders and fine grained bulk materials, we recommend feeding kits with 15 mm chute width, and for granulates and coarser materials feeding kits with 40 mm or 75 mm chute width. The conveying rate is continuously adjustable. Depending on the feed material, device and setting, it can amount to approx. 5 l/min.
For special applications coated chutes, a vibrating tube and a V-shaped chute are available. Aluminum chutes are particularly suitable for samples containing fat or oil.

Order data on page 13

Examples of use
1. DR 100 with Sample Divider PT 100
2. DR 100 with Sample Divider PK 1000
3. DR 100 with Ultra Centrifugal Mill ZM 200
4. DR 100 with CAMSIZER from RETSCH Technology

1. 
2. 
3. 
4. 

Benefits at a glance

- Uniform material feed for reproducibly exact results
- Infinitely adjustable volume flow
- Material bed level can be variably adjusted
- Optional control via external interface
- Digital time setting
- Compact control and feed unit
- Easy cleaning of push-fit feed chute
- Maintenance-free design to CE standard
- 2-year warranty

Performance data	DR 100		
Applications	feeding, conveying		
Feed material	pourable bulk materials		
Time display	digital, 1 - 99 min or continuous		
Volume flow	0 - 5 l/min, infinitely adjustable		
Technical data			
Available chute widths	15 mm	40 mm	75 mm
Chute length	210 mm	210 mm	210 mm
Hopper volume	2.8 liters	2.8 liters	3.5 liters
Feed size	<2 mm	<6 mm	<12 mm
W x H x D	260 x 420 x 280 mm		
Net weight	approx. 10 kg		
Noise values (Noise measurement according to DIN 45635-31-01-KL3)			
Measuring conditions: Conveying material: silica sand; particle size <1 mm			
Emission value with regard to workplace	L_{pAeq} 36 dB(A)		

Technology of DR 100

The feed material passes through the hopper onto the vibrating chute. This is made to vibrate at 50 (or 60) Hz by two electromagnets. The volume flow can be continuously adjusted. Via the hopper adjustment, the layer height can be set as required. The DR 100 can be driven externally via an interface for example, when it is used in combination with the Ultra Centrifugal Mill ZM 200. Then the volume flow is automatically adapted to the grinding capacity of the mill.
Due to their compact, maintenance-free design the vibratory feeders can be integrated simply into many devices or laboratory installations.

Fluid Bed Dryer TG 200

Benefits at a glance

- Gentle drying, dispersing and mixing also of temperature-sensitive materials
- Very short drying times
- Digital parameter setting
- 9 parameter combinations can be stored
- Interval operation
- Versatile with a choice of drying containers and exhaust air filters
- Easy handling with clamping device "comfort"
- Motor without brushes allows for long service life
- Conforming to CE requirements
- 2-year warranty

Rapid and gentle fluidized bed drying in the laboratory

The dryer TG 200 is used in quality control, sample preparation and R&D departments. It permits the gentle drying of organic, inorganic, chemical or pharmaceutical bulk materials **without localized overheating**. Suitable materials can be coarse, fine, crystalline, fibrous or leafy. The powerful fan ensures optimal air throughput so that the products to be dried are loosened up and thoroughly mixed. With the interval operation the fluidized bed is mixed even better. Temperature, drying time and air volume can be set digitally and adjusted continuously.

In comparison to conventional drying ovens or microwaves, the fluidized bed drying of the TG 200 results in a considerably better performance. The fan produces an air volume of 185 m^3/h in idle speed. **The average drying time lies between 5 and 20 minutes**, depending on the type, amount and moisture content of the material. This represents a substantial saving in time and is also favorable for the product which is exposed to less thermal stress.

The TG 200 is suitable for the following applications:

- Drying of sample materials such as coal, fertilizer, plant parts, plastics, recycling wood, sawdust, secondary fuels, soils and waste. As the motor is located outside the filtered air flow, the TG 200 can also be used for drying more sensitive materials, like e.g. **pharmaceutical products, without the risk of sample contamination**
- Drying of test sieves

The delivery scope of the fluid bed dryer includes a clamping device "comfort" with filter bag. It is used for attaching the 6 l drying container. Test sieves with 200 mm diameter are mounted directly on the TG 200 without using the drying container. (Adapter for 8" /203 mm sieves available on request).

Drying test sieves with the TG 200

Performance data	TG 200
Applications	drying
Feed material	bulk materials and solids, >63 µm
Temperature control	continuously adj., 40 - 150 °C (dependent on air throughput rate)
Time setting	continuously adjustable, 0 - 99 min, continuous operation
Drying time	5 - 20 min, depending on product, quantity, moisture content
Container volume	1 x 6 liters or 3 x 0.3 liters

Technical data	TG 200
W x H x D	400 x up to 1000 x 480 mm
Net weight	approx. 21 kg

Noise values (Noise measurement according to DIN 45635-31-01-KL3)	
Measuring conditions: Dried product: clay; max. heating power; max. air volume	
Emission value with regard to workplace	L_{pAeq} 75 dB(A)

Accessories for the TG 200

6 l drying container, glass or stainless steel, with base made from Conidur stainless steel perforated plate with 63 µm holes.
The glass container makes the degree of dispersion of the material during the drying process visible. Thus, the operator can directly adjust the air flow if necessary.

Clamping device "comfort" with replaceable filter fleece insert
The filter fleece is mainly used for samples with a particle size below 100 µm. It allows for sample recovery with minimal loss. The filter can be quickly and easily replaced after each application.

TG 200 with attachment with 3 glass containers à 0.3 liters

Drying container of stainless steel

Clamping cover with replaceable filter fleece insert

Attachment with 3 removable glass containers (each 0.3 l)
It permits the simultaneous drying of three samples, also of different materials, under the same conditions. This helps to avoid cross contamination. The glass containers can be easily locked and released with a single turn. The perforated plate is made from stainless steel. Container lids with filter fleece inserts are available as optional accessories.

Order data on page 13

Technology of TG 200

Drying in the fluid bed dryer makes use of the fluidized bed process, a technique similar to the one used in large industrial dryers. Ambient air is drawn in through a filter. A blower moves the air across the heating elements, and ultimately forces it through the perforated plate and into the detachable drying container. The solid particles are blown upward and agitated and thus kept separate one from another. This helps to avoid a caking and sticking of the particles as it often occurs when other drying methods are used.

The air stream extracts moisture from the particles and then exits through the filter bag in the cover. Using the quick-clamp cover with the filter fleece insert is advisable when dealing with products finer than 100 µm in diameter.
The 1000 watt blower provides an air volume of 185 m^3/h at idle speed; heater output is 2000 watts. The air volume, heating power and temperature are infinitely adjustable. Temperature control is effected using the display gauge.

Ultrasonic Baths
UR 1 / UR 2 / UR 3

UR 1

Cleaning

The RETSCH ultrasonic baths clean test sieves, microprecision sieves, glass and metal components as well as metallurgical and geological samples, spectacles, jewellery or coins gently and intensively. In addition to cleaning, the ultrasonic baths can also be used for other working processes.

Dispersion

The RETSCH ultrasonic baths are used to prepare suspension samples for wet sieving, sedimentation analysis or laser diffraction analysis. Agglomerates are desagglomerated and dispersed in the solution.

The RETSCH ultrasonic baths are also used in chromatography to disperse packing material in the slurry and thus obtain reproducible separation materials.

UR 3

Degassing

The RETSCH ultrasonic baths are also suitable for degassing solutions or emulsifying oil and aqueous phases.
Order data on page 13

Benefits at a glance

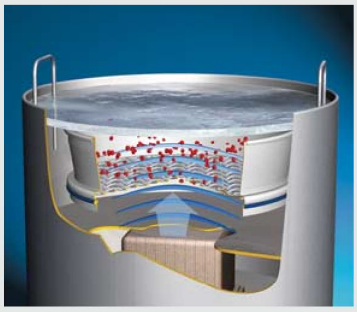
- Fast, gentle, and highly efficient cleaning
- Universal and compact
- Easy to use, saves time and cost
- Intensive dispersion and degassing
- Low-maintenance, long life and environmentally sound
- 2-year warranty

Performance data	UR 1	UR 2	UR 3
Applications	cleaning, dispersion, degassing		
Feed material	sieves, glass and metal components, suspensions		
Oscillating tank			
Ø x H / W x H x D	245 x 130 mm	520 x 200 mm	500 x 300 x 300 mm
Volumes	5.7 liters	42.0 liters	45.0 liters
Suitable for the cleaning of	1 sieve 200 x 50 mm/8" x 2"	1 sieve 400 x 65 mm	max. 5 sieves 200 x 50 mm/8" x 2"
Time setting	1 - 15 min or continuous		
HF continuous maximum output	2 x 240 W	2 x 600 W	2 x 1000 W

Technical data	UR 1	UR 2	UR 3
Ø x H / W x H x D	260 x 260 mm	570 x 460 mm	540 x 500 x 340 mm
Net weight	approx. 5 kg	approx. 21 kg	approx. 27.5 kg
Noise values (DIN EN 61012)			
Noise values	61.5 dB(AU)	76.5 dB(AU)	70.0 dB(AU)

Technology of UR 1/2/3

A high-frequency generator produces about 35,000 oscillations per second, which are transferred into the cleaning solution and cause it to resonate. The energy density of the sound field is so high that a cavitation effect sets in. Innumerable extremely small vacuum bubbles develop, which collapse in microseconds due to pressure and suction, in other words they implode. The pulses triggered by this remove dirt particles even at the deepest, least accessible places or they result in homogenization, dispersion and degassing.
The compact housings and the oscillating tanks are made of stainless steel. Through the ball valve drain located on the casing the cleaning solution can be conveniently and safely drained off. In combination with the splash-proof housing, a high degree of operational safety is provided. Below the oscillating tank is fitted a powerful high frequency generator. The broad-beam oscillation system with PZT oscillators vibrates



the solvent bath at optimum frequency so as to produce an outstanding cleaning effect.

Order data DR 100, TG 200, UR 1/2/3

Vibratory Feeder DR 100					Item-No.
DR 100/40 complete unit, incl. feeding kit (push-fit feed chute 40 mm, holder, hopper 2.8 liters and fixture)					
DR 100/40 complete unit for 220-240 V, 50 Hz					70.937.0054
DR 100/40 complete unit for 110-120 V, 60 Hz					70.937.0055
DR 100 drive unit (please order feeding kit separately)					
DR 100 drive unit for 220-240 V, 50 Hz					70.937.0003
DR 100 drive unit for 110-120 V, 60 Hz					70.937.0012
Feeding kits					
Feeding kit with	holder 15/40,	push-fit feed chute 15 mm,	hopper 2.8 liters	and fixture	72.020.0001
Feeding kit with	holder 15/40,	push-fit feed chute 40 mm,	hopper 2.8 liters	and fixture	72.020.0002
Feeding kit with	holder 75,	push-fit feed chute 75 mm,	hopper 3.5 liters	and fixture	72.020.0003
Push-fit chutes DR 100, lenght 210 mm					
Push-fit feed chute	of stainless steel,	width 15 mm	for holder 15/40		03.729.0035
Push-fit feed chute	of stainless steel,	width 40 mm	for holder 15/40		03.729.0036
Push-fit feed chute	of stainless steel,	width 75 mm	for holder 75		03.729.0037
Push-fit feed chute	of stainless steel,	width 75/40 mm	for holder 75		03.729.0040
Push-fit feed chute	of aluminum,	width 40 mm	for holder 15/40		03.729.0051
Push-fit feed chute	of aluminum,	width 75 mm	for holder 75		03.729.0043
Push-fit feed chute	of stainless steel,	V-shape,	for holder 15/40		03.729.0039
Holders for push-fit chutes DR 100					
Holder 15/40	for push-fit feed chute 15 mm, 40 mm and V-shape				03.018.0007
Holder 75	for push-fit feed chute 75 mm				03.018.0008
Hoppers for DR 100					
Hopper 2.8 liters,	of stainless steel,	for chutes 15 and 40 mm			03.785.0146
Hopper 3.5 liters,	of stainless steel,	for chutes 75/40 and 75 mm			02.785.0019
Hopper 0.6 liters,	of stainless steel,	for chutes 15 and 40 mm			03.785.0151
Hopper 0.6 liters,	of aluminum,	for chutes 15 and 40 mm			03.785.0152
Hopper 2.8 liters,	of stainless steel,	for V-chute			03.785.0159
Fixtures for hoppers DR 100					
Fixture for hopper 0.6 liters and 2.8 liters					02.266.0167
Fixture for hopper 3.5 liters					02.266.0168

Fluid Bed Dryer TG 200			Item-No.
Fluid Bed Dryer TG 200, incl. clamping lid "comfort" with filter bag (Please order drying container separately)			
TG 200 for 200-240 V, 50/60 Hz			70.760.0001
Drying container TG 200			
Drying container of glass,	6 liters		72.783.0001
Drying container of stainless steel,	6 liters		72.783.0002
Drying container of glass,	3 x 0.3 liters (incl. holder)		72.002.0005
Accessories TG 200			
Clamping lid "comfort" with filter insert (exchangeable), incl. 10 replacement filters			72.643.0001
Filter insert for clamping lid "comfort", 10 pieces			72.143.0001
Clamping lid "comfort" with filter bag			72.107.0002
Filter bag for clamping lid "comfort"			02.186.0015
Cover with filter insert for 0.3 liters drying containers, 3 pieces			72.107.0001
Filter insert for 0.3 liters drying container, 1 piece			03.186.0024
Spare drying container of glass, 0.3 liters, 1 piece			02.045.0020
Filter bag for drying container 0.3 liters, 1 piece			02.186.0004
Adapter for drying sieves 203 mm Ø			72.001.0005
Dust filter for blower, 10 pieces			72.143.0003
Quick-clamping elements for TG 200, 1 pair			72.737.0003
Rods, smooth, 1 pair			72.742.0001

Ultrasonic Baths UR 1 / UR 2 / UR 3						Item-No.
Ultrasonic baths (please order cover and basket separately)						
UR 1 for 230 V, 50/60 Hz,	oscillation tank: 24.5 cm Ø x 13.0 cm,	5.7 liters				70.791.0001
UR 1 for 110 V, 60 Hz,	oscillation tank: 24.5 cm Ø x 13.0 cm,	5.7 liters				70.791.0002
UR 2 for 230 V, 50 Hz,	oscillation tank: 52.0 cm Ø x 20.0 cm,	42.0 liters				70.791.0003
UR 2 for 110 V, 60 Hz,	oscillation tank: 52.0 cm Ø x 20.0 cm,	42.0 liters				70.791.0004
UR 3 for 220-240 V, 50/60 Hz,	oscillation tank: 50.0 x 30.0 x 30.0 cm,	45.0 liters				70.791.0005
UR 3 for 110-130 V, 50/60 Hz,	oscillation tank: 50.0 x 30.0 x 30.0 cm,	45.0 liters				70.791.0006
Accessories for ultrasonic baths						
Cover of stainless steel		for UR 1:	09.107.0249	UR 2:	09.107.0250	UR 3: 09.107.0395
Basket of stainless steel		for UR 1:	09.145.0001	UR 2:	09.145.0002	UR 3: 09.145.0003
Detergent TICKOPUR RW 77, 1 liter						05.620.0001

Pellet Press PP 40

Automatic pelletizing for efficient sample preparation

Solid, high-quality pellets are an important precondition for reliable and meaningful XRF analysis. With the PP 40, RETSCH offers a pellet press which presses a wide range of materials such as slag, ores, minerals and cement to strong pellets with a smooth surface. The PP 40 features an **individual pressure force regulation in the range of 1 to 40 t**. Besides controlling the pressure force, it also determines build-up, holding and release of force during pressing. This reduces the inner tensions of the sample and ensures that **even difficult materials are pressed perfectly**.

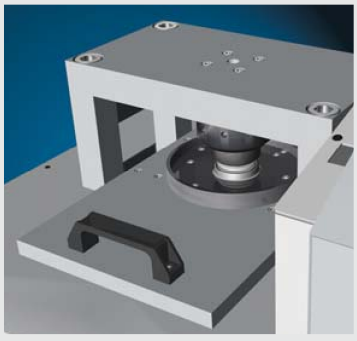
Benefits at a glance

- Individual pressure force regulation, 1 - 40 t
- 32 parameter combinations can be stored
- Pressing tools for various diameters and aluminum cups
- Suitable for very hard materials
- Pressure plate made from tungsten carbide
- Easy and safe operation
- Conforming to CE requirements
- 2-year warranty

Performance data	PP 40
Applications	production of pellets for spectral analyses
Feed material	minerals, slag, ores, cement, raw material etc.
Steel rings (external Ø/internal Ø)	51.5 mm/35 mm 40 mm/35 mm (max. pressure force 20 t) 40 mm/32 mm
Aluminum cup (external Ø)	40 mm
Parameter combinations	32
Pressure force	1 - 40 t (10 - 400 kN)
Pressure force build-up/holding/release time	respectively 5 – 600 Sek.
Technical data	
W x H x D	836 x 1220 x 780 mm
Net weight	approx. 345 kg
Noise values (Noise measurement according to DIN 45635-31-01-KL3)	
Emission value with regard to workplace	L_{pAeq} 50 dB(A)

Technology of PP 40

The steel ring or aluminum cup is inserted in the pressing tool of the PP 40 and filled with the sample material via a hopper. The steel ring is then pushed beneath the pressure plate and the pressing is started. During pressure build-up the density of the powder increases. The pressure build-up in the PP 40 can be adjusted in such a way that the air inside the hollows of the original powder is pressed out which increases the stability of the pellet. The maximum pressure force must be held over a certain period of time to allow full development of the interparticulate adhesive forces thus guaranteeing maximum stability. The PP 40 provides pre-selection of the pressure holding time over a period of 600 seconds. During the pressing process the axial movement of the particles at the steel ring produces friction which in turn leads to the formation of a multi-axial stress condition. Therefore, it is important to decrease the pressure evenly and steadily as an abrupt release could lead to the destruction of the pellet.



The pressure release time of the PP 40 can be set in such a way that a uniform release of tension is ensured.

Easy and safe operation

Operation of the PP 40 is very convenient. The pressing tool is mounted on a sliding tray which is pulled out for filling in the sample. The **steel ring** or aluminum cup is placed into the pressing tool and the material is filled in via a hopper. An advantage of steel rings is lending additional stability to the sample, which is favorable when transporting the sample to the XRF analyzer or in automated systems. Then the pressing tool is pushed beneath the pressure plate made of tungsten carbide, the cover is closed and the pelletizing process is started after selection of the program. The parameters are set easily and safely with one single button, the settings are shown in a graphic display. Up to **32 parameter combinations** can be stored with the PP 40 which guarantees **reproducible pelletizing**. When the pressing process is finished, the cover unlocks automatically. The operator can now lift it and pull the pressing tool out to remove the pellet.

The soundproof and completely enclosed Pellet Press PP 40 meets the highest safety standards.

The Pellet Press PP 40 is delivered with mounted pressing tool, of which there are 4 versions:

- for steel rings 51,5 x 8,5 mm, internal diamter 35 mm
- for steel rings 40 x 14 mm, internal diameter 32 mm
- for steel rings 40 x 14 mm, internal diameter 35 mm (max. pressure force 20 t)
- for aluminum cups 40 mm

Pellet Press PP 25

PP 25 – the "small" solution for XRF analysis

The manual hydraulic Pellet Press PP 25 is a compact benchtop unit with particularly simple and safe operation. With a pressure force of 25 t it is ideally suited for the preparation of solid samples for XRF analysis. The pellets produced are of extremely good quality and are characterized by their high degree of stability. The piston pressure can be read off from the clearly visible manometer scale.

The dies for the Pellet Press PP 25 are available in diameters of 32 mm and 40 mm and can be evacuated completely. This is favorable when pressing porous materials such as e.g. secondary fuels.

Benefits at a glance

- Produces high quality, stable pellets
- Easy and safe operation
- Pressing tools in 2 sizes; can be evacuated
- Compact benchtop unit
- Conforming to CE requirements
- 2-year warranty

Performance data	PP 25
Applications	production of pellets for spectral analyses
Feed material	minerals, slag, ores, cement, raw material etc.
Dies	32 mm ; 40 mm
Max. pressure force	25 t (250 kN)
Technical Data	
W x H x D	290 x 560 x 310 mm
Net weight	50.5 kg

Order data PP 40, PP 25

Pellet Press PP 40	Item-No.
Pellet Press PP 40*, complete with die, incl. 5 steel rings or 20 aluminum cups	
Pellet Press PP 40 for 220-230 V, 50/60 Hz, for steel rings Ø 40 /32 mm	20.750.0002
Pellet Press PP 40 for 220-230 V, 50/60 Hz, for steel rings Ø 40 /35 mm	20.750.0003
Pellet Press PP 40 for 220-230 V, 50/60 Hz, for steel rings Ø 51.5/35 mm	20.750.0004
Pellet Press PP 40 for 220-230 V, 50/60 Hz, for aluminum cups Ø 40 mm	20.750.0005
Accessories PP 40	
Steel ring 40 mm outer Ø, 32 mm inner Ø, 1 piece	22.458.0003
Steel ring 40 mm outer Ø, 35 mm inner Ø, 1 piece	22.458.0004
Steel ring 51.5 mm outer Ø, 35 mm inner Ø, 1 piece	22.458.0005
Aluminum cups, straight walls, for tablets with 40 mm diameter, 1000 pieces	22.458.0006
Licowax® C micropowder binder (formerly known as Hoechst Wax), 250 g	22.440.0001
Multimix binder, 500 x 0.25 g tablets	22.440.0002
*Other voltages upon request	

Pellet Press PP 25	Item-No.
Pellet Press PP 25, hydraulic, manual (Please order die separately)	20.750.0001
Evacuable dies for Pellet Press PP 25	
Die for 32 mm dia. pellets	22.458.0001
Die for 40 mm dia. pellets	22.458.0002
Accessories PP 25	
Aluminum beaker, sloping walls, for 32 mm dia. pellets, 1000 pcs	22.005.0001
Aluminum beaker, sloping walls, for 40 mm dia. pellets, 600 pcs	22.005.0002
Licowax® C micropowder binder (formerly known as Hoechst Wax), 250 g	22.440.0001
Multimix binder, 500 x 0.25 g tablets	22.440.0002

Retsch®

Retsch GmbH
Rheinische Straße 36
42781 Haan, Germany

Telephone +49 21 29 / 55 61 - 0
Telefax +49 21 29 / 87 02

E-mail info@retsch.com
Internet www.retsch.com

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